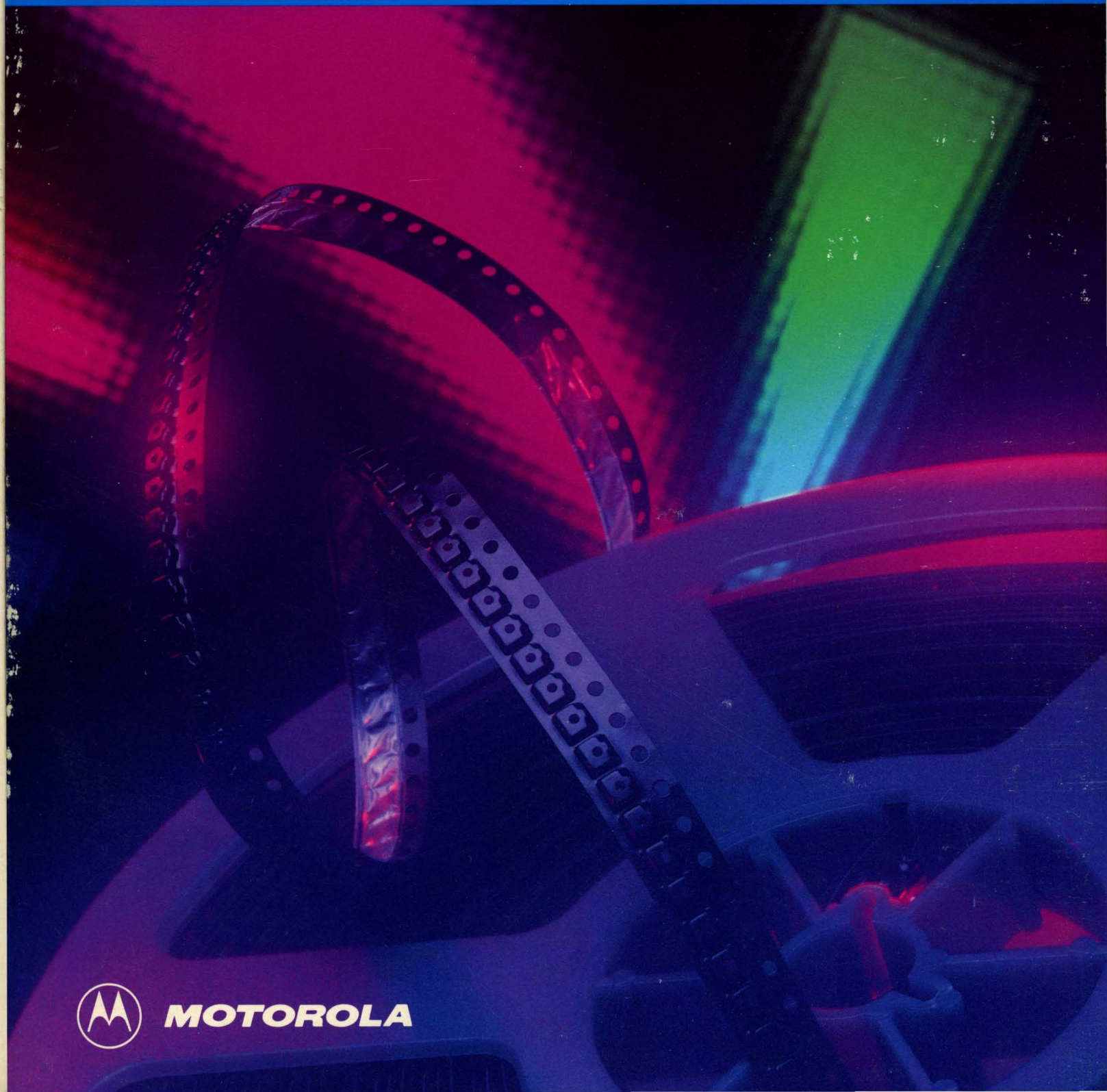
SG127/D
REV 6

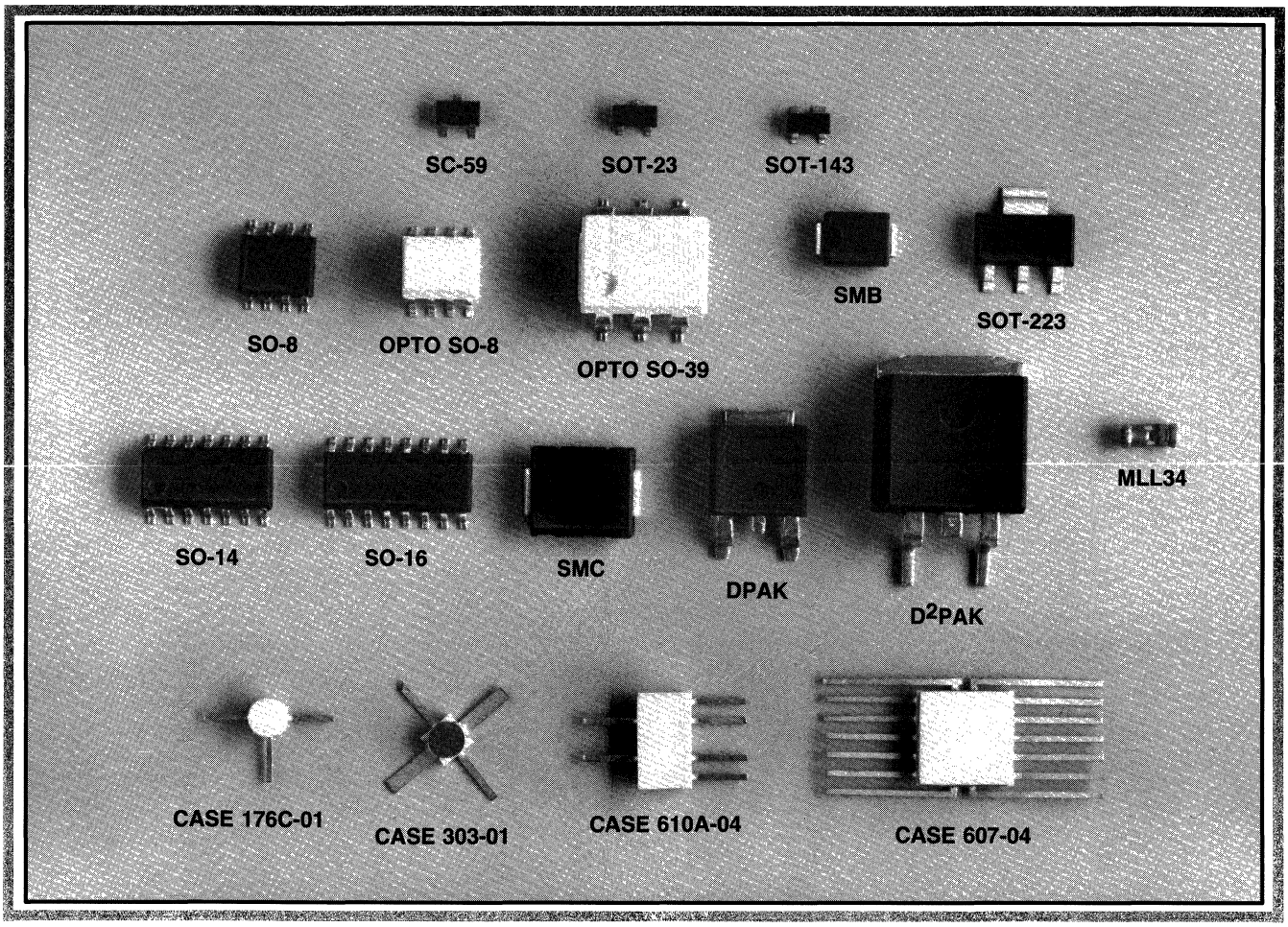
Surface Mount
Selector Guide



MOTOROLA

SURFACE MOUNT PRODUCTS

Discrete Surface Mount Packages



Why Surface Mount?

Surface Mount Technology is now being utilized to offer answers to many problems that have been created in the use of insertion technology.

Limitations have been reached with insertion packages and PC board technology. Surface Mount Technology offers the opportunity to continue to advance the State-of-the-Art designs that cannot be accomplished with Insertion Technology.

Surface Mount Packages allow more optimum device performance with the smaller Surface Mount configuration. Internal lead lengths, parasitic capacitance and inductance that placed limitations on chip performance have been reduced.

The lower profile of Surface Mount Packages allows more boards to be utilized in a given amount of space. They are stacked closer together and utilize less total volume than insertion populated PC boards.

Printed circuit costs are lowered with the reduction of the number of board layers required. The elimination or reduction of the number of plated through holes in the board, contribute significantly to lower PC board prices.

Surface Mount assembly does not require the preparation of components that is common on insertion technology lines. Surface Mount components are sent directly to the assembly line, eliminating an intermediate step.

Automatic placement equipment is available that can place Surface Mount components at the rate of a few thousand per hour to hundreds of thousands of components per hour.

Surface Mount Technology is cost effective, allowing the manufacturer the opportunity to produce smaller units and offer increased functions with the same size product.

Table of Contents

Alphanumeric Index and Cross-Reference

The following table represents a cross-reference guide for surface mount packages which are either manufactured directly by Motorola or for which Motorola manufactures a suitable equivalent. Where the Motorola part number differs from the Industry part number, the Motorola device is a "form, fit and function" replacement for the industry type number — however, subtle differences in characteristics and/or specifications may exist.

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1SMB6.0AT3	1SMB6.0AT3		33
1SMB6.5AT3	1SMB6.5AT3		33
1SMB7.0AT3	1SMB7.0AT3		33
1SMB7.5AT3	1SMB7.5AT3		33
1SMB8.0AT3	1SMB8.0AT3		33
1SMB8.5AT3	1SMB8.5AT3		33
1SMB9.0AT3	1SMB9.0AT3		33
1SMB10AT3 thru 18AT3	1SMB10AT3 thru 18AT3		33
1SMB20AT3	1SMB20AT3		33
1SMB22AT3	1SMB22AT3		33
1SMB24AT3	1SMB24AT3		33
1SMB26AT3	1SMB26AT3		33
1SMB28AT3	1SMB28AT3		33
1SMB30AT3	1SMB30AT3		33
1SMB33AT3	1SMB33AT3		33
1SMB36AT3	1SMB36AT3		33
1SMB40AT3	1SMB40AT3		33
1SMB43AT3	1SMB43AT3		33
1SMB45AT3	1SMB45AT3		33
1SMB48AT3	1SMB48AT3		33
1SMB51AT3	1SMB51AT3		33
1SMB54AT3	1SMB54AT3		33
1SMB58AT3	1SMB58AT3		33
1SMB60AT3	1SMB60AT3		33
1SMB64AT3	1SMB64AT3		33
1SMB70AT3	1SMB70AT3		33
1SMB75AT3	1SMB75AT3		33
1SMB78AT3	1SMB78AT3		33
1SMB85AT3	1SMB85AT3		33
1SMB90AT3	1SMB90AT3		33
1SMB100AT3	1SMB100AT3		33
1SMB110AT3	1SMB110AT3		33
1SMB120AT3	1SMB120AT3		33
1SMB130AT3	1SMB130AT3		33
1SMB150AT3	1SMB150AT3		33
1SMB160AT3	1SMB160AT3		33
1SMB170AT3	1SMB170AT3		33
1SMB5913BT3 thru 28BT3	1SMB5913BT3 thru 28BT3		35
1SMB5929BT3 thru 56BT3	1SMB5929BT3 thru 56BT3		36
1SMC5.0AT3	1SMC5.0AT3		40
1SMC6.0AT3	1SMC6.0AT3		40
1SMC6.5AT3	1SMC6.5AT3		40
1SMC7.0AT3	1SMC7.0AT3		40
1SMC7.5AT3	1SMC7.5AT3		40
1SMC8.0AT3	1SMC8.0AT3		40
1SMC8.5AT3	1SMC8.5AT3		40
1SMC9.0AT3	1SMC9.0AT3		40
1SMC10AT3 thru 18AT3	1SMC10AT3 thru 18AT3		40
1SMC20AT3	1SMC20AT3		40
1SMC22AT3	1SMC22AT3		40
1SMC24AT3	1SMC24AT3		40
1SMC26AT3	1SMC26AT3		40
1SMC28AT3	1SMC28AT3		40
1SMC30AT3	1SMC30AT3		40
1SMC33AT3	1SMC33AT3		40
1SMC36AT3	1SMC36AT3		40
1SMC40AT3	1SMC40AT3		40
1SMC43AT3	1SMC43AT3		40
1SMC45AT3	1SMC45AT3		40

INDUSTRY PART NUMBER	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT	PAGE NO.
1SMC48AT3	1SMC48AT3		40
1SMC51AT3	1SMC51AT3		40
1SMC54AT3	1SMC54AT3		40
1SMC58AT3	1SMC58AT3		40
1SMC60AT3	1SMC60AT3		40
1SMC64AT3	1SMC64AT3		40
1SMC70AT3	1SMC70AT3		40
1SMC75AT3	1SMC75AT3		40
1SMC78AT3	1SMC78AT3		40
1.5SMC6.8AT3	1.5SMC6.8AT3		41
1.5SMC7.5AT3	1.5SMC7.5AT3		41
1.5SMC8.2AT3	1.5SMC8.2AT3		41
1.5SMC9.1AT3	1.5SMC9.1AT3		41
1.5SMC10AT3 thru 18AT3	1.5SMC10AT3 thru 18AT3		41
1.5SMC20AT3	1.5SMC20AT3		41
1.5SMC22AT3	1.5SMC22AT3		41
1.5SMC24AT3	1.5SMC24AT3		41
1.5SMC27AT3	1.5SMC27AT3		41
1.5SMC30AT3	1.5SMC30AT3		41
1.5SMC33AT3	1.5SMC33AT3		41
1.5SMC36AT3	1.5SMC36AT3		41
1.5SMC39AT3	1.5SMC39AT3		41
1.5SMC43AT3	1.5SMC43AT3		41
1.5SMC47AT3	1.5SMC47AT3		41
1.5SMC51AT3	1.5SMC51AT3		41
1.5SMC56AT3	1.5SMC56AT3		41
1.5SMC62AT3	1.5SMC62AT3		41
1.5SMC68AT3	1.5SMC68AT3		41
1.5SMC75AT3	1.5SMC75AT3		41
1.5SMC91AT3	1.5SMC91AT3		41
2N7002	2N7002LT1		24
2SA1022–B	MSA1022–BT1		18
2SA1022–C	MSA1022–CT1		18
2SB709–R	MSB709–RT1		18
2SB709–S	MSB709–ST1		18
2SB710–Q	MSB710–QT1		18
2SC1621	MSC1621T1		18
2SC2295–B	MSC2295–BT1		18
2SC2404	MSC2404–CT1		18
2SC3130	MSC3130T1		18
2SD601–R	MSD601–RT1		18
BAL99L	BAL99LT1		25
BAS16	BAS16T		25
BAS21	BAS21L		25
BAT17	MMBD101LT1		25
BAV70	BAV70LT1		25
BAV74	BAV74LT1		25
BAV99	BAV99LT1		25
BAW56	BAW56LT1		25
BC807–16	BC807–16LT1		20
BC807–25	BC807–25LT1		20
BC807–40	BC807–40LT1		20
BC817–16	BC817–16LT1		20
BC817–25	BC817–25LT1		20
BC817–40	BC817–40LT1		20
BC846A	BC846ALT1		20
BC846B	BC846BLT1		20
BC847A	BC847ALT1		20
BC847B	BC847BLT1		20
BC847C	BC847CLT1		20

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BC848A	BC848ALT1		20
BC848B	BC848BLT1		20
BC848CT	BC848CLT1		20
BC856AT	BC856ALT1		20
BC856BT	BC856BLT1		20
BC857ALT1	BC857ALT1		20
BC857BLT1	BC857BLT1		20
BC858AT	BC858ALT1		20
BC858BT	BC858BLT1		20
BC858CT	BC858CLT1		20
BF550		MMBTH81LT1	21
BF599	MMBTH10LT1		21
BF720	BF720T3		37
BF721	BF721T3		37
BFN25		MMBTA92LT1	22
BFN26		MMBTA42LT1	22
BFN27		MMBTA92LT1	22
BFR92L	BFR92LT1		23
BFR93L	BFR93LT1		23
BFR93L	BFR93LT1		23
BFS17L	BFS17LT1		23
BFT93		MMBR4957LT1	23
BSP16	BSP16T3		37
BSP19T3	BSP19T3		37
BSR14		MMBT2222ALT1	20
BSR17		MMBT3904LT1	20
BSS63	BSS63LT1		23
BSS64	BSS64LT1		23
BSS123	BSS123LT1		24
BSV52	BSV52LT1		21
BZV55C2V4	BZV55C2V4		45
BZV55C2V7	BZV55C2V7		45
BZV55C3V0	BZV55C3V0		45
BZV55C3V3	BZV55C3V3		45
BZV55C3V6	BZV55C3V6		45
BZV55C3V9	BZV55C3V9		45
BZV55C4V3	BZV55C4V3		45
BZV55C4V7	BZV55C4V7		45
BZV55C5V1	BZV55C5V1		45
BZV55C5V6	BZV55C5V6		45
BZV55C6V2	BZV55C6V2		45
BZV55C6V8	BZV55C6V8		45
BZV55C7V5	BZV55C7V5		45
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BZV55C18	BZV55C18		45
BZV55C20	BZV55C20		45
BZV55C22	BZV55C22		45
BZV55C24	BZV55C24		45
BZV55C27	BZV55C27		45
BZV55C30	BZV55C30		45
BZV55C33	BZV55C33		45
BZV55C36	BZV55C36		45
BZV55C39	BZV55C39		45
BZV55C43	BZV55C43		45
BZV55C47	BZV55C47		45
BZV55C51	BZV55C51		45
BZV55C56	BZV55C56		45
BZX84C2V4LT1	BZX84C2V4LT1		26
BZX84C2V7LT1	BZX84C2V7LT1		26
BZX84C3V3LT1	BZX84C3V3LT1		26
BZX84C3V6LT1	BZX84C3V6LT1		26
BZX84C3V9LT1	BZX84C3V9LT1		26
BZX84C3VOLT1	BZX84C3V0LT1		26
BZX84C4V3LT1	BZX84C4V3LT1		26
BZX84C4V7LT1	BZX84C4V7LT1		26
BZX84C5V1LT1	BZX84C5V1LT1		26

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BZX84C5V6LT1	BZX84C5V6LT1		26
BZX84C6V2LT1	BZX84C6V2LT1		26
BZX84C6V8LT1	BZX84C6V8LT1		26
BZX84C7V5LT1	BZX84C7V5LT1		26
BZX84C8V2LT1	BZX84C8V2LT1		26
BZX84C9V1LT1	BZX84C9V1LT1		26
BZX84C10LT1	BZX84C10LT1		26
BZX84C11LT1	BZX84C11LT1		26
BZX84C12LT1	BZX84C12LT1		26
BZX84C13LT1	BZX84C13LT1		26
BZX84C13LT1	BZX84C13LT1		26
BZX84C15LT1	BZX84C15LT1		26
BZX84C16LT1	BZX84C16LT1		26
BZX84C18LT1	BZX84C18LT1		26
BZX84C20LT1	BZX84C20LT1		26
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BZX84C24LT1	BZX84C24LT1		26
BZX84C27LT1	BZX84C27LT1		26
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BZX84C33LT1	BZX84C33LT1		26
BZX84C36LT1	BZX84C36LT1		26
BZX84C39LT1	BZX84C39LT1		26
BZX84C43LT1	BZX84C43LT1		26
BZX84C47LT1	BZX84C47LT1		26
BZX84C51LT1	BZX84C51LT1		26
BZX84C56LT1	BZX84C56LT1		26
BZX84C62LT1	BZX84C62LT1		26
BZX84C68LT1	BZX84C68LT1		26
BZX84C75LT1	BZX84C75LT1		26
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DSP56000FE20	DSP56000FE20		58
DSP56001FE20	DSP56001FE20		58
DSP56001FE27	DSP56000FE27		58
FMBD914		MMBD914LT1	25
FMBT2222A	MMBT2222ALT1		20
FMMT914		MMBD914LT1	25
FMMT2369	MMBT2369ALT1		21
FMMT3904	MMBT3904LT1		20
FMMTA06	MMBTA06LT1		23
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H11L1S	H11L1S		31
H11L2S	H11L2S		31
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IL215 thru 217	MOC215 thru 217		30
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LF351M	LF351D		80
LF353M	LF353D		80
LF411CM	LF411CD		80
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LF442CM	LF442CD		80
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LM78L05ACM	MC78L05ACD		81
LM78L12ACM	MC78L12ACD		81
LM78L15ACM	MC78L15ACD		81
LM79L05ACM	MC79L05ACD		81
LM79L12ACM	MC79L12ACD		82
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LM311M	LM311D		80
LM317LD	LM317LD		80
LM317MDT	LM317MDT		80
LM324D,AD	LM324D,AD		80
LM339M,AM	LM339D,AD		80
LM348M	LM348D		80
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LM2931ACM.CM	LM2931CD		80
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LM2931M–5.0	LM2931AD–5.0		80
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M145567DW	MC145567DW		66
MA15AK	M1MA151AT1		19
MA151A	M1MA151AT1		19
MA151WA	M1MA151WAT1		19
MA151WK	M1MA151WKT1		19
MBRB1535CT	MBRB1535CT		44
MBRB1545CT	MBRB1545CT		44
MBRB2060T	MBRB2060CT		44
MBRB2070CT	MBRB2070CT		44
MBRB2080CT	MBRB2080CT		44
MBRB2090CT	MBRB2090CT		44
MBRB2535CTL	MBRB2535CTL		44
MBRB2545CT	MBRB2545CT		44
MBRB20100CT	MBRB20100CT		44
MBRB20200CT	MBRB20200CT		44
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MBRD330	MBRD330		42
MBRD340	MBRD340		42
MBRD350	MBRD350		42
MBRD360	MBRD360		42
MBRD620CT	MBRD620CT		42
MBRD630CT	MBRD630CT		42
MBRD640CT	MBRD640CT		42
MBRD650CT	MBRD650CT		42
MBRD660CT	MBRD660CT		42
MBRS120LT3	MBRS120LT3		32
MBRS120T3	MBRS120T3		32
MBRS130LT3	MBRS130LT3		32
MBRS130T3	MBRS130T3		32
MBRS140T3	MBRS140T3		32
MBRS170T3	MBRS170T3		32
MBRS180T3	MBRS180T3		32
MBRS190T3	MBRS190T3		32
MBRS340T3	MBRS340T3		40
MBRS1100T3	MBRS1100T3		32
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MC10138	MC10138		76
MC10141	MC10141		76
MC10153	MC10153		76
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MC10168	MC10168		76
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MC10197	MC10197		76
MC10198	MC10198		76
MC10210	MC10210		76
MC10211	MC10211		76
MC10212	MC10212		76
MC10216	MC10216		76
MC10231	MC10231		76
MC10319DW	MC10319DW		82
MC10321DW	MC10321DW		82
MC10322DW	MC10322DW		82
MC10322DW	MC10323DW		82
MC10324DW	MC10324DW		82
MC10H016	MC10H016		77
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MC10H109	MC10H109		77
MC10H113	MC10H113		77
MC10H115 thru 119	MC10H115 thru 119		77
MC10H121	MC10H121		77
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MC10H131	MC10H131		77
MC10H135	MC10H135		77
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MC13055D	MC13055D		82
MC13060D	MC13060D		82
MC1350D	MC1350D		80
MC1357D	MV1357D		80
MC1377DW	MC1377DW		81
MC1378FN	MC1378FN		81
MC1382DW	MC1382DW		81
MC14000	MC14000		67
MC14001	MC14001		67
MC14002	MC14002		67
MC14006	MC14006		67
MC14008	MC14008		67
MC14011 thru 18	MC14011 thru 18		67
MC14020 thru 25	MC14020 thru 25		67
MC14027	MC14027		67
MC14029	MC14029		67
MC14032	MC14032		67
MC14035	MC14035		67
MC14038	MC14038		67
MC1403D	MC1403D		81
MC14040	MC14040		67
MC14042	MC14042		67
MC14043	MC14043		67
MC14044	MC14044		67
MC14046	MC14046		67
MC14049 thru 53	MC14049 thru 53		67
MC14060	MC14060		67
MC14066	MC14066		67
MC14068	MC14068		67
MC14069 thru 73	MC14069 thru 73		67
MC14075 thru 78	MC14075 thru 78		67
MC1413D	MC1413D		81
MC141620FU	MC141620FU		66
MC142100DW	MC142100DW		66
MC142103	MC142103		66
MC1436D,CD	MC1436D,CD		81
MC144110DW	MC144110DW		64
MC144111DW	MC144111DW		64
MC14411DW	MC14411DW		66
MC14433DW	MC14433DW		64
MC14442FN	MC14442FN		64
MC14443DW	MC14443DW		64
MC14447DW	MC14447DW		64
MC14467	MC14467		66
MC14468	MC14468		66
MC14469FN	MC14469FN		65
MC14489DW	MC14489DW		64
MC14495W1	MC14495W1		64
MC14497	MC14497		65
MC14499DW	MC14499DW		64
MC145000FN	MC145000FN		64
MC145001FN	MC145001FN		64
MC145010DW	MC145010DW		66
MC145026D	MC145026D		65
MC145027DW	MC145027DW		65
MC145028DW	MC145028DW		65
MC145030DW	MC145030DW		65
MC145033DW	MC145033DW		66
MC145034DW	MC145034DW		66
MC145035DW	MC145035DW		66

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MC145040FN1	MC145040FN1		64
MC145040FN2	MC145040FN2		64
MC145041FN1	MC145041FN1		64
MC145041FN2	MC145041FN2		64
MC145050DW	MC145050DW		64
MC145051DW	MC145051DW		64
MC145053D	MC145053D		64
MC145106FN	MC145106FN		65
MC145145DW2	MC145145DW2		65
MC145146DW2	MC145146DW2		65
MC145151FN2	MC145151FN2		65
MC145152FN2	MC145152FN2		65
MC145155DW2	MC145155DW2		65
MC145156DW2	MC145156DW2		65
MC145156FN2	MC145156FN2		65
MC145157DW2	MC145157DW2		65
MC145157FN2	MC145157FN2		65
MC145158DW	MC145158DW2		65
MC145158FN2	MC145158FN2		65
MC145159FN	MC145159FN		65
MC145160DW	MC145160DW		65
MC145166DW	MC145166DW		65
MC145167DW	MC145167DW		65
MC145168	MC145168		65
MC145169DW	MC145169DW		65
MC145170D	MC145170D		65
MC145406DW	MC145406DW		66
MC145407DW	MC145407DW		66
MC14541	MC14541		68
MC145412	MC145412		66
MC145421DW	MC145421DW		66
MC145425DW	MC145425DW		66
MC145436	MC145436		66
MC145443DW	MC145443DW		66
MC145453FN	MC145453FN		64
MC145475DW	MC145475DW		66
MC145488	MC145488		66
MC145502	MC145502		66
MC145503DW	MC145503DW		66
MC145505DW	MC145505DW		66
MC14551	MC14551		68
MC14553	MC14553		68
MC14554	MC14554		68
MC14555	MC14555		68
MC145554DW	MC145554DW		66
MC145557DW	MC145557DW		66
MC14556	MC14556		68
MC145564DW	MC145564DW		66
MC14557	MC14557		68
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MC14560	MC14560		68
MC14561	MC14561		68
MC14566	MC14566		68
MC14568	MC14568		68
MC14569	MC14568		68
MC14572	MC14572		68
MC14582	MC14582		68
MC14583	MC14583		68
MC14584	MC14584		68
MC14585	MC14585		68
MC14597	MC14597		68
MC14573D	MC14573D		65
MC14574D	MC14574D		65
MC14575D	MC14575D		65
MC14578D	MC14578D		65
MC1458D,CD	MC1458D,CD		81
MC146818AFN	MC146818AFN		58
MC146823FN	MC146823FN		58
MC1488D	MC1488D		81
MC1489D	MC1489D		81

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MC1496D	MC1496D		81
MC1741CD	MC1741CD		81
MC1747CD	MC1747CD		81
MC1776CD	MC1776CD		81
MC2681	MC2681		57
MC26LS31D	MC26LS31D		81
MC26LS32D	MC26LS32D		81
MC26S10D	MC26S10D		81
MC2831AD	MC2831AD		81
MC3031S	MC3031S		31
MC33033DW	MC33033DW		82
MC33034DW120	MC33034DW120		82
MC33035DW	MC33035DW		82
MC33039D	MC33039D		82
MC3303D	MC3303D		81
MC33064D–5	MC33064D–5		82
MC33065DW	MC33065DW		82
MC33071D,AD	MC33071D,AD		82
MC33072D,AD	MC33072D,AD		82
MC33074D,AD	MC33074D,AD		82
MC33077D	MC33077D		82
MC33078D	MC33078D		82
MC33079D	MC33079D		82
MC33120	MC33120DW		82
MC33164D–3	MC33164D–3		82
MC33164D–5	MC33164D–5		82
MC33171D	MC33171D		82
MC331721D	MC33172D		82
MC33174D	MC33174D		82
MC33272D	MC33272D		82
MC33274D	MC33274D		82
MC33282D	MC33282D		82
MC33284D	MC33284D		82
MC3335DW	MC3335DW		81
MC3345D	MC3345D		81
MC3356FN	MC3356DW		81
MC3361D	MC3361AD		81
MC3362DW	MC3362DW		81
MC3367DW	MC3367DW		81
MC3371D	MC3371D		81
MC34001D,BD	MC34001D,BD		82
MC34002D,BD	MC34002D,BD		82
MC34011AFN	MC34011AFN		82
MC34012–1D	MC34012–1D		82
MC34012–2D	MC34012–2D		82
MC34012–3D	MC34012–3D		82
MC34013AFN	MC34013AFN		82
MC34014FN,DW	MC34014FN,DW		82
MC34017–1D	MC34017–1D		82
MC34017–2D	MC34017–2D		82
MC34017–3D	MC34017–3D		82
MC34018DW	MC34018DW		82
MC3401D	MC33401D		81
MC3403D	MC3403D		81
MC34050D	MC34050D		82
MC34051D	MC34051D		82
MC34063AD	MC34063AD		82
MC34064D–5	MC34064D–5		82
MC34065DW	MC34065DW		82
MC34071D,AD	MC34071D,AD		82
MC340721D,AD	MC34072D,AD		82
MC34074D,AD	MC34074D,AD		82
MC34080D	MC34080D		82
MC34081D	MC34081D		82
MC34084DW,ADW	MC34084DW,ADW		83
MC34085DW,ADW	MC34085DW,ADW		83
MC34114DW	MC34114DW		83
MC34118DW	MC34118DW		83
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MC3423	MC3423		81
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MC3456D	MC3456D		81
MC3458D	MC3458D		81
MC3486D	MC3486D		81
MC3487D	MC3487D		81
MC4558CD	MC4558CD		81
MC4741CD	MC4741CD		81
MC68000	MC68000		57
MC68008	MC68008		57
MC68010	MC68010		57
MC68020	MC68020		57
MC68030	MC68030		57
MC6805P2	MC6805P2		58
MC6805R2	MC6805R2		58
MC6805R3	MC6805R3		58
MC6805R6	MC6805R6		58
MC6805U2	MC6805U2		58
MC6805U3	MC6805U3		58
MC68185	MC68185		57
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MC68230	MC68230		57
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MC68HC05L6	MC68HC05L6		58
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MC68HC05P7	MC68HC05P7		58
MC68HC05P8	MC68HC05P8		58
MC68HC24FN	MC68HC24FN		58
MC68HC68T1DW	MC68HC68T1DW		66
MC68HC68T1DW	MC68HC68T1DW		66
MC68HC705B5	MC68HC705B5		58
MC68HC705C8	MC68HC705C8		58
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MC68HC705P9	MC68HC705P9		58
MC68HC711D3	MC68HC711D3		58
MC68HC711E9	MC68HC711E9		58
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MC74AC/ACT138	MC74AC/ACT138		72
MC74AC/ACT139	MC74AC/ACT139		72
MC74AC/ACT151	MC74AC/ACT151		72
MC74AC/ACT153	MC74AC/ACT153		72
MC74AC/ACT157	MC74AC/ACT157		72
MC74AC163	MC74AC163		72
MC74AC174	MC74AC174		72
MC74AC190	MC74AC190		72
MC74AC/ACT240	MC74AC/ACT240		72
MC74AC/ACT241	MC74AC/ACT241		72
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MC74AC/ACT373	MC74AC/ACT373		72
MC74AC/ACT374	MC74AC/ACT374		72
MC74AC/ACT521	MC74AC/ACT521		72
MC74AC/ACT540	MC74AC/ACT540		72
MC74AC/ACT541	MC74AC/ACT541		72
MC74AC/ACT563	MC74AC/ACT563		72
MC74AC/ACT564	MC74AC/ACT564		72
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MC74AC/ACT574	MC74AC/ACT574		72
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MC74AC/ACT810	MC74AC/ACT810		72
MC74AC4020	MC74AC4020		72
MC74AC4040	MC74AC4040		72
MC74ACT160	MC74ACT160		72
MC74ACT162	MC74ACT162		72
MC74ACT251	MC74ACT251		72
MC74ACT640	MC74ACT640		72
MC74ACT810	MC74ACT810		72
MC74BC00	MC74BC00		78
MC74BC08	MC74BC08		79
MC74BC32	MC74BC32		79
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MC74BC534	MC74BC534		79
MC74BC540	MC74BC540		79
MC74BC541	MC74BC541		79
MC74BC563	MCBC563		79
MC74BC564	MCBC564		79
MC74BC573	MC74BC573		79
MC74BC574	MC74BC574		79
MC74BC575	MC74BC575		79
MC74BC620	MC74BC620		79
MC74BC623	MC74BC623		79
MC74BC640	MC74BC640		79
MC74BC643	MC74BC643		79
MC74BC645	MC74BC645		79
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MC74F04	MC74F04D		75
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MC74F37	MC74F37D		75
MC74F38	MC74F38D		75
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MC74F148	MC74F148D		75
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MC74F153	MC74F153D		75
MC74F157	MC74F157AD,D		75
MC74F158	MC74F158AD,D		75
MC74F160A	MC74F160AD		75
MC74F161A	MC74F161AD		75
MC74F162A	MC74F162AD		75
MC74F163A	MC74F163AD		75
MC74F164	MC74F164D		75
MC74F168	MC74F168D		75
MC74F169	MC74F169D		75
MC74F174	MC74F174D		75
MC74F175	MC74F175D		75
MC74F182	MC74F182D		75
MC74F194	MC74F194D		75
MC74F195	MC74F195		75
MC74F240	MC74F240DW		75
MC74F241	MC74F241DW		75
MC74F242	MC74F242D		75
MC74F243	MC74F243D		75
MC74F244	MC74F244DW		75
MC74F245	MC74F245DW		75
MC74F251	MC74F251D		75
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MC74F256	MC74F256D		75
MC74F257	MC74F257AD,D		75
MC74F258	MC74F258AD,D		75
MC74F259	MC74F259		75
MC74F269	MC74F269DW		75
MC74F273		MC74F273DW	75
MC74F280	MCF4F280D		75
MC74F283	MCF4F283D		75
MC74F299		MC74F299DW	75
MC74F323		MC74F323DW	75
MC74F350	MC74F350D		75
MC74F352	MCF4F352D		75
MC74F353	MCF4F353D		75
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MC74F398	MCF4F398DW		75
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MC74F533	MCF4F533DW		75
MC74F534	MCF4F534DW		75
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MC74F657		MC74F657BDW	75
MC74F803	MC74F803D		75
MC74HC00	MC74HC00A		69
MC74HC02	MC74HC02A		69
MC74HC03	MC74HC03A		69
MC74HC04	MC74HC04A		69
MC74HC08	MC74HC08A		69
MC74HC10	MC74HC10		69
MC74HC11	MC74HC11		69
MC74HC14	MC74HC14A		69
MC74HC20	MC74HC20		69
MC74HC27	MC74HC27		69
MC74HC32	MC74HC32A		69
MC74HC42	MC74HC42		69
MC74HC51	MC74HC51		69
MC74HC58	MC74HC58		69
MC74HC73	MC74HC73		69
MC74HC74	MC74HC74A		69
MC74HC75	MC74HC75		69
MC74HC76	MC74HC76		69
MC74HC86	MC74HC86		69
MC74HC107	MC74HC107		69
MC74HC109	MC74HC109		69
MC74HC112	MC74HC112		69
MC74HC113	MC74HC113		69
MC74HC125	MC74HC125A		69
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MC74HC132	MC74HC132A		69
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MC74HC138	MC74HC138A		69
MC74HC139	MC74HC139A		69
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MC74HC153	MC74HC153		69
MC74HC157	MC74HC157A		69
MC74HC158A	MC74HC158A		69
MC74HC160	MC74HC160		69
MC74HC161	MC74HC161A		69
MC74HC162	MC74HC162		69
MC74HC163	MC74HC163A		69
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MC74HC373A	MC74HC373A		70
MC74HC374A	MC74HC374A		70
MC74HC386	MC74HC386		70
MC74HC390	MC74HC390		70
MC74HC393	MC74HC393		70
MC74HC533A	MC74HC533A		70
MC74HC534	MC74HC534A		70
MC74HC540	MC74HC540		70
MC74HC541	MC74HC541		70
MC74HC563	MC74HC563		70
MC74HC564	MC74HC564		70

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MC74HC574A	MC74HC574A		70
MC74HC589	MC74HC589		70
MC74HC597	MC74HC597		70
MC74HC640	MC74HC640A		70
MC74HC646	MC74HC646		70
MC74HC648	MC74HC648		70
MC74HC4002	MC74HC4002		69
MC74HC4016	MC74HC4016		69
MC74HC4017	MC74HC4017		70
MC74HC4020	MC74HC4020A		70
MC74HC4024	MC74HC4024		70
MC74HC4040	MC74HC4040A		70
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MC74HC4053	MC74HC4053		70
MC74HC4060	MC74HC4060A		70
MC74HC4066	MC74HC4066		70
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MC74HC4078	MC74HC4078		70
MC74HC4351	MC74HC4351		70
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MC74HCT00		MC74HCT00A	69
MC74HCT02		MC74HCT02A	69
MC74HCT04		MC74HCT04A	69
MC74HCT08		MC74HCT08A	69
MC74HCT14		MC74HCT14A	69
MC74HCT32		MC74HCT32A	69
MC74HCT74	MC74HCT74A		69
MC74HCT138	MC74HCT138A		69
MC74HCT157	MC74HCT157A		69
MC74HCT158	MC74HCT158A		69
MC74HCT161	MC74HCT161A		69
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MCM51L1000AJ70	MCM51L1000AJ70		59
MCM51L1000AJ80	MCM51L1000AJ80		59
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MCM51L4100AJ60	MCM51L4100AJ60		59
MCM51L4100AJ80	MCM51L4100AJ80		60
MCM51L4100ANJ10	MCM51L4100ANJ10		60
MCM51L4100ANJ60	MCM51L4100ANJ60		60
MCM51L4100ANJ70	MCM51L4100ANJ70		60
MCM51L4100ANJ80	MCM51L4100ANJ80		60
MCM51L4100J10	MCM51L4100J10		59
MCM51L4100J80	MCM51L4100J80		59
MCM51L4256AJ10	MCM51L4256AJ10		59
MCM51L4256AJ70	MCM51L4256AJ70		59
MCM51L4256AJ80	MCM51L4256AJ80		59
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MCM51L4400ANJ10	MCM51L4400ANJ10		60
MCM51L4400ANJ60	MCM51L4400ANJ60		60
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MCM514402ANJ60	MCM514402ANJ60		60
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MURS130T3	MURS130T3		32
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SM4T33,A		P6SMB33AT3	34
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SM4T150,A		P6SMB150AT3	35
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SM6T7V5,A		P6SMB7.5AT3	34
SM6T10,A		P6SMB10AT3	34
SM6T12,A		P6SMB12AT3	34
SM6T15,A		P6SMB15AT3	34
SM6T18,A		P6SMB18AT3	34
SM6T22,A		P6SMB22AT3	34
SM6T24,A		P6SMB24AT3	34
SM6T27,A		P6SMB27AT3	34
SM6T30,A		P6SMB30AT3	34
SM6T33,A		P6SMB33AT3	34
SM6T36,A		P6SMB36AT3	34
SM6T39,A		P6SMB39AT3	34
SM6T68,A		P6SMB68AT3	35
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SM15T27,A		1.5SMC27AT3	41
SM15T30,A		1.5SMC30AT3	41
SM15T33,A		1.5SMC33AT3	41
SM15T36,A		1.5SMC36AT3	41
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SMBJ30,A	1SMB30AT3		33
SMBJ33,A	1SMB33AT3		33
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SMBJ54,A	1SMB54AT3		33
SMBJ58,A	1SMB58AT3		33
SMBJ60,A	1SMB60AT3		33
SMBJ64,A	1SMB64AT3		33
SMBJ70,A	1SMB70AT3		33
SMBJ75,A	1SMB75AT3		33
SMBJ78,A	1SMB78AT3		33
SMBJ85,A	1SMB85AT3		33
SMBJ90,A	1SMB90AT3		33
SMBJ100,A	1SMB100AT3		33
SMBJ110,A	1SMB110AT3		33
SMBJ120,A	1SMB120AT3		33
SMBJ130,A	1SMB130AT3		33
SMBJ150,A	1SMB150AT3		33
SMBJ160,A	1SMB160AT3		33
SMBJ170,A	1SMB170AT3		33
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SMCJ6.0,A	1SMC6.0AT3		40
SMCJ6.5,A	1SMC6.5AT3		40
SMCJ7.0,A	1SMC7.0AT3		40
SMCJ7.5,A	1SMC7.5AT3		40
SMCJ8.0,A	1SMC8.0AT3		40
SMCJ8.5,A	1SMC8.5AT3		40
SMCJ9.0,A	1SMC9.0AT3		40
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SMCJ20,A	1SMC20AT3		40
SMCJ22,A	1SMC22AT3		40
SMCJ24,A	1SMC24AT3		40
SMCJ26,A	1SMC26AT3		40
SMCJ28,A	1SMC28AT3		40
SMCJ30,A	1SMC30AT3		40
SMCJ33,A	1SMC33AT3		40
SMCJ36,A	1SMC36AT3		40
SMCJ40,A	1SMC40AT3		40
SMCJ43,A	1SMC43AT3		40
SMCJ45,A	1SMC45AT3		40
SMCJ48,A	1SMC48AT3		40
SMCJ51,A	1SMC51AT3		40
SMCJ54,A	1SMC54AT3		40
SMCJ58,A	1SMC58AT3		40
SMCJ60,A	1SMC60AT3		40
SMCJ64,A	1SMC64AT3		40
SMCJ70,A	1SMC70AT3		40
SMCJ75,A	1SMC75AT3		40
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SMMJ5.0,A		1SMC5.0AT3	40
SMMJ6.0,A		1SMC6.0AT3	40
SMMJ6.5,A		1SMC6.5AT3	40
SMMJ7.0,A		1SMC7.0AT3	40
SMMJ7.5,A		1SMC7.5AT3	40
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SMMJ8.5,A		1SMC8.5AT3	40
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SMMJ26,A		1SMC26AT3	40
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SMMJ70,A		1SMC70AT3	40
SMMJ75,A		1SMC75AT3	40
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SMSJ6.0,A		1SMB6.0AT3	33
SMSJ6.5,A		1SMB6.5AT3	33
SMSJ7.0,A		1SMB7.0AT3	33
SMSJ7.5,A		1SMB7.5AT3	33
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SMSJ22,A		1SMB22AT3	33
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SMSJ26,A		1SMB26AT3	33
SMSJ28,A		1SMB28AT3	33
SMSJ30,A		1SMB30AT3	33
SMSJ33,A		1SMB33AT3	33
SMSJ36,A		1SMB36AT3	33
SMSJ40,A		1SMB40AT3	33
SMSJ43,A		1SMB43AT3	33
SMSJ45,A		1SMB45AT3	33
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SMSJ54,A		1SMB54AT3	33
SMSJ58,A		1SMB58AT3	33
SMSJ60,A		1SMB60AT3	33
SMSJ64,A		1SMB64AT3	33
SMSJ70,A		1SMB70AT3	33
SMSJ75,A		1SMB75AT3	33
SMSJ78,A		1SMB78AT3	33
SMSJ85,A		1SMB85AT3	33
SMSJ90,A		1SMB90AT3	33
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TMPD2837		BAV70LT1	25
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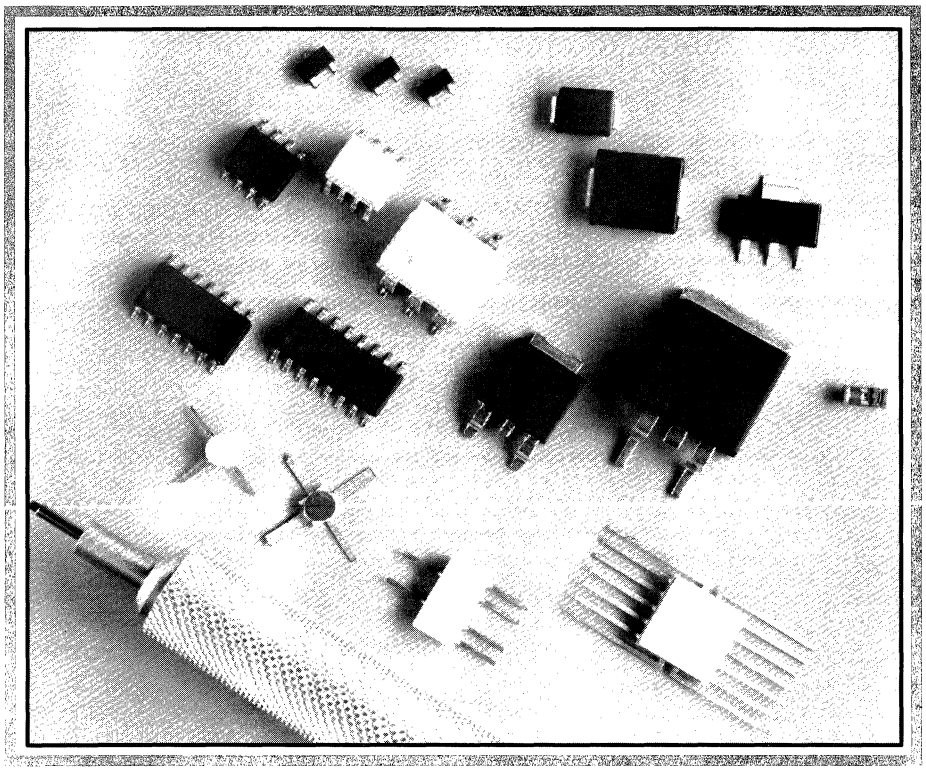


Discrete Product Lines

Understanding Device Prefixes

Off-the-shelf surface mount products include most popular small-signal U. S., European and Asian types.

All U. S. standard Motorola SOT-23 devices will have a common alpha prefix, "MMB," a fourth alpha character which relates to the type of device: T = Transistor, F = FET, V = Varactor, Z = Zener, R = RF, etc.; a numeric designation which corresponds to the device type already in existence. For example: a 2N2222 is an NPN Transistor. That die in SOT-23 would be MMBT2222. European types use prefixes BCX, BCW, BAV, BAW, BZV, and BZX (Pro-Electron series).

The prefix for SOT-143 and SO-8 RF devices is "MRF" (the same as standard RF devices). The designator for the SOT-143 is a "1" in the last digit of the device title. A "2" is used to identify the SO-8 device, i. e. a standard RF device title is MRF872. The SOT-143 packaged device is MRF8721 and the SO-8 device is MRF8722.

The prefix for Opto SO-8 devices is "MOC." The Opto SO-8 has the same footprint as the standard SO-8, but is taller to provide for input-to-output voltage isolation. See package dimensions (page 23) for details. In addition, all 6-pin dual-in-line optoisolators are available in surface mount gull-wing. Add "S" suffix for gull-wing lead form.

The prefix for Multiple Transistors is "MMPQ." For example: the MMPQ2222A is four 2N2222A transistors in the SO-16 package.

Diode Arrays have a prefix of MMAD and can be equated to the popular MAD series of DIP packaged devices. MMAD Diode Arrays can be obtained in SO-14 and SO-16 packages.

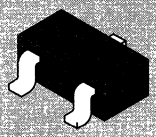
Additional types will be added to the surface mount line according to need. Motorola will encapsulate almost any discrete die in an SOT package, depending on die compatibility and volume requirements. Inquiries regarding custom production runs are invited.

The SC-59 package is slightly larger than the SOT-23 and is a standard package used in Japan. Motorola's MSA, MSB, MSC and MSD series are direct replacements for the Japanese 2SA, 2SB, 2SC, and 2SD devices.

Package Advantages

A wide variety of discrete components from Motorola's repertoire of reliability-proven semiconductor processes and geometries are available in surface mount packages.

- **Small Size** — The amount of space required for a circuit is reduced by 25%–50% over conventional diode and transistor components.
- **Complete Pretest Capability** — Unlike unencapsulated die, which can only be partially tested in wafer form by probing, surface mount products are 100% electrically tested after die separation, wire bonding and encapsulation, giving performance comparable to their larger discrete counterparts.
- **Handling and Assembly Ease** — Surface mount standard package outlines permit both transistors and diodes to be placed on substrates using automated handling equipment.
- **Pre-Formed Leads** — Surface mount packages are ready for placement onto the substrate, with no intermediate lead forming steps required.
- **Reliability** — All aluminum metallized chips used in surface mount packages are nitride passivated or glassivated, and are epoxy encapsulated for superior mechanical strength and moisture resistance.



CASE 318D-03

SC-59 Devices

Maximum die size 25 mil x 25 mil

General-Purpose Transistors

Pinout: 1-Emitter, 2-Base, 3-Collector

Devices are listed in order of descending breakdown voltage.

Device	Marking	$V_{(BR)CEO}$	h_{FE}		
			Min	Max	@ I_C (mA)
NPN					
MSD601-RT1	YR	25	210	340	2
MSD601-ST1	YS	25	290	460	2
MSD602-RT1	WR	25	120	240	150
MSD1328-RT1	1DR	20	200	350	500
PNP					
MSB709-RT1	AR	25	210	340	2
MSB709-ST1	AS	25	290	460	2
MSB710-QT1	CQ	25	85	170	150
MSB710-RT1	CR	25	120	240	150

Switching Transistors

Pinout: 1-Emitter, 2-Base, 3-Collector

Devices are listed in order of descending f_T

Device	Marking	Switching Time (ns)		$V_{(BR)CEO}$	h_{FE}			f_T
		t_{on}	t_{off}		Min	Max	@ I_C (mA)	Min (MHz)
NPN								
MSC1621T1	RB	20	40	20	40	180	1	200

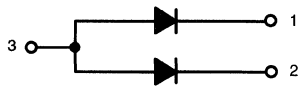
VHF/UHF Amplifiers, Mixers, Oscillators

Pinout: 1-Emitter, 2-Base, 3-Collector

Device	Marking	$V_{(BR)CEO}$	C_{re}	f_T		h_{FE}		
				Min (GHz)	@ I_C (mA)	Min	Max	@ I_C (mA)
NPN								
MSC2295-BT1	VB	20	1.5	0.15	1	70	140	1
MSC2295-CT1	VC	20	1.5	0.15	1	110	220	1
MSC2404-CT1	UC	20	1	0.45	1	65	160	1
MSC3130T1	1S	10	—	1.4	5	75	400	5
PNP								
MSA1022-BT1	EB	20	2	0.15	1	70	140	1
MSA1022-CT1	EC	20	2	0.15	1	110	220	1

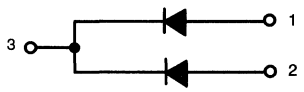
Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

STYLE 5



COMMON ANODE

STYLE 3



COMMON CATHODE

STYLE 4

SINGLE
STYLE 4

STYLE 2

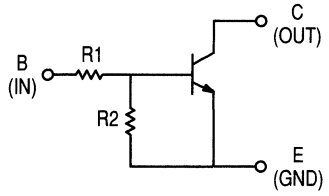
SINGLE
STYLE 2

Switching Diodes

Device	Marking	$V_{(BR)R}$		I_R		V_F			C_J	t_{rr}	Case
		Min (V)	@ I_{BR} (μA)	Max (μA)	@ V_R (V)	Min (V)	Max (V)	@ I_R (mA)	Max pF	Max (μs)	Style
SINGLE											
M1MA151AT1	MA	40	100	0.1	35	—	1.2	100	2	3	4
M1MA151KT1	MH	40	100	0.1	35	—	1.2	100	2	3	2
DUAL											
M1MA151WAT1	MN	40	100	0.1	35	—	1.2	100	15	10	5
M1MA151WKT1	MT	40	100	0.1	35	—	1.2	100	2	3	3

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

Plastic-Encapsulated Surface Mount Bias Resistor Transistors for General Purpose Applications



These devices include bias resistors on the semiconductor chip with the transistor.

See the BRT diagram for orientation of resistors.

Device		Marking		$V_{(BR)CEO}$ Volts	h_{FE} @ I_C		I_C mA	R_1	R_2
NPN	PNP	NPN	PNP	(Min)	Min	mA	Max	Ohm	Ohm
Case 318D-03 – SC-59									
MUN2211T1	MUN2111T1	8A	6A	50	35	5.0	100	10K	10K
MUN2212T1	MUN2112T1	8B	6B	50	60	5.0	100	22K	22K
MUN2213T1	MUN2113T1	8C	6C	50	80	5.0	100	47K	47K

CASE 318-07

SOT-23 Devices

Maximum die size 25 mil x 25 mil

Bipolar Transistors

General-Purpose Transistors

Pinout: 1-Base, 2-Emitter, 3-Collector

Devices are listed in order of descending breakdown voltage.

Device	Marking	$V_{(BR)CEO}$	h_{FE}			f_T
			Min	Max	@ I_C (mA)	Min (MHz)
NPN						
BC846ALT1	1A	65	110	220	2	100
BC846BLT1	1B	65	200	450	2	100
BC817-16LT1	6A	45	100	250	100	200
BC817-25LT1	6B	45	160	400	100	200
BC817-40LT1	6C	45	250	600	100	200
BC847ALT1	1E	45	110	220	2	100
BC847BLT1	1F	45	200	450	2	100
BC847CLT1	1G	45	420	800	2	100
MMBT2222ALT1	1P	40	100	300	150	20
MMBT3904LT1	1AM	40	100	300	1	200
BC848ALT1	1J	30	110	220	2	100
BC848BLT1	1K	30	200	450	2	100
BC848CLT1	1L	30	420	800	2	100
MMBT4401LT1	2X	40	100	300	150	250
MMBT8099LT1	KB	80	100	300	1	150
PNP						
MMBT8599LT1	2W	80	75	—	100	150
BC856ALT1	3A	65	125	250	2	100
BC856BLT1	3B	65	220	475	2	100
MMBT2907ALT1	2F	60	50	—	500	200
BC807-16LT1	5A	45	100	250	100	200
BC807-25LT1	5B	45	160	400	100	200
BC807-40LT1	5C	45	250	600	100	200
BC857ALT1	3E	45	125	250	2	100
BC857BLT1	3F	45	220	475	100	100
MMBT3906LT1	2A	40	100	300	10	250
MMBT4403LT1	2T	40	100	300	150	200
BC858ALT1	3J	30	125	250	2	100
BC858BLT1	3K	30	220	475	2	100
BC858CLT1	3L	30	420	800	2	100

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

Switching Transistors

Pinout: 1-Base, 2-Emitter, 3-Collector

Devices are listed in order of descending f_T

Device	Marking	Switching Time (ns)		$V_{(BR)CEO}$	h_{FE}			f_T
		t_{on}	t_{off}		Min	Max	@ I_C (mA)	Min (MHz)
NPN								
MMBT2369ALT1	M1J	12	18	15	20	—	100	—
BSV52LT1	B2	12	18	12	40	120	10	400
PNP								
MMBT3640LT1	2J	25	35	12	20	—	50	500

VHF/UHF Amplifiers, Mixers, Oscillators

Pinout: 1-Base, 2-Emitter, 3-Collector

Device	Marking	$V_{(BR)CEO}$	C_{cb}	f_T	
			Max (pF)	Min (GHz)	@ I_C (mA)
NPN					
MMBTH10LT1	3E	25	0.7	0.65	4
MMBT918LT1	3B	15	1.7**	0.6	4
MMBTH24LT1	3A	30	0.45	0.4	8
PNP					
MMBTH81LT1	3D	20	0.85	0.6	5
MMBTH69LT1	3J	15	0.35*	2.0	10

*C_{rb} **C_{cb}

Choppers

Pinout: 1-Base, 2-Emitter, 3-Collector

Device	Marking	$V_{(BR)EBO}$	$V_{(BR)CEO}$	h_{FE}		
				Min	Max	@ I_C (mA)
PNP						
MMBT404ALT1	2N	25	35	100	400	12

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

Darlingtons

Pinout: 1-Base, 2-Emitter, 3-Collector

Devices are listed in order of descending h_{FE}.

Device	Marking	$V_{(BR)CEO}$	$V_{CE(sat)}$ Max (V)	h_{FE} Min	h_{FE} Max	h_{FE} @ I_C (mA)
NPN						
MMBTA14LT1	1N	40	1.5	20K	—	100
MMBTA13LT1	1M	30	1.5	10K	—	100
PNP						
MMBTA64LT1	2V	30	1.5	20K	—	100

Low-Noise Transistors

Pinout: 1-Base, 2-Emitter, 3-Collector

Devices are listed in order of ascending NF.

Device	Marking	NF Typ (dB)	$V_{(BR)CEO}$	f_{FE} Min	f_{FE} Max	f_{FE} @ I_C (mA)	f_T Min (MHz)
NPN							
MMBT5089LT1	1R	1	30	400	—	10	50
MMBT2484LT1	1U	3	60	—	800	10	50
MMBT6428LT1	1K	3	50	250	—	10	100
MMBT6429LT1	1L	3	45	500	—	10	100
PNP							
MMBT5087LT1	2Q	1	50	250	—	10	40

High-Voltage Transistors

Pinout: 1-Base, 2-Emitter, 3-Collector

Devices are listed in order of descending breakdown voltage.

Device	Marking	$V_{(BR)CEO}$	h_{FE} Min	h_{FE} Max	h_{FE} @ I_C (mA)	f_T Min (MHz)
NPN						
MMBT6517LT1	1Z	350	15	—	100	40
MMBTA42LT1	1D	300	40	—	30	50
MMBT5551LT1	G1	160	30	—	50	100
PNP						
MMBT6520LT1	2Z	350	15	—	100	40
MMBTA92LT1	2D	300	25	—	30	50
MMBT5401LT1	2L	150	50	—	50	100

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

Drivers

Pinout: 1-Base, 2-Emitter, 3-Collector

Device	Marking	$V_{(BR)CEO}$	h_{FE}			f_T
			Min	Max	@ I_C (mA)	Min (MHz)
NPN						
MMBTA06LT1	1G	80	50	—	100	100
BSS64LT1	AM	80	20	80	4	50
PNP						
BSS63LT1	BM	100	30	—	25	50
MMBTA56LT1	2G	80	50	—	100	50

RF Transistors

Pinout: 1-Base, 2-Emitter, 3-Collector

Devices are listed in order of descending f_T

Device	Marking	f_T			NF			Gain			f
		Typ (GHz)	I_C (mA)	V_{CE} (V)	Typ (dB)	@ I_C (mA)	V_{CE} (V)	Typ (dB)	@ I_C (mA)	V_{CE} (V)	(MHz)
NPN											
MMBR571LT1	7X	8	50	5	2	10	6	16.5	5	6	500
MMBR941LT1	7Y	8	15	6	2.1	5	6	8.5	5	6	2000
MMBR951LT1	7Z	8	30	8	2.1	5	6	7.5	5	6	2000
MMBR911LT1	7P	6	30	10	2	10	10	17	10	10	500
MMBR930LT1	7C	5.5	30	5	1.9	2	5	11	30	5	500
MMBR920LT1	7B	4.5	14	10	2.4	2	10	15	2	10	500
MMBR901LT1	7A	4	15	10	1.9	5	6	12	5	6	1000
BFR92LT1	P1	3.4	14	10	3	3	1.5	—	—	—	500
BFR93LT1	R1	3.4	30	5	2.5	2	5	—	—	—	30
MMBR931LT1	7D	3	1	1	4.3	0.25	1	10	0.25	1	1000
MMBR5179LT1	7H	1.4	5	6	4.5	1.5	6	15	5	6	200
MMBR2060LT1	7E	1	20	1	3.5	1.5	10	13	1.5	10	450
MMBR5031LT1	7G	1	5	6	2.5	1	6	17	1	6	450
MMBR2857LT1	7K	1	4	10	4.5	1.5	6	12.5	1.5	6	450
BFS17LT1	E1	1	2	5	5	2	5	—	—	—	30
PNP											
MMBR536LT1	7R	5.5	20	5	4.5	10	5	14	10	5	500
MMBR4957LT1	7F	1.2	2	10	3	2	10	17	2	10	450

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

Unipolar (Field Effect) Transistors (JFETs)

RF JFETs

Pinout: 1-Drain, 2-Source, 3-Gate

Device	Marking	NF		Y_{fs}			$V_{(BR)GSS}$
		Typ (dB)	f (MHz)	Min (mmhos)	Max (mmhos)	V_{DS} (V)	
N–CHANNEL							
MMBFJ309LT1	6U	1.5	450	10	20	10	25
MMBFJ310LT1	6T	1.5	450	8	18	10	25
MMBFU310LT1	M6C	1.5	450	10	18	10	25
MMBF4416LT1	M6A	2 **	100	4.5	7.5	15	30
MMBF5484LT1	M6B	2	100	3	6	15	25
MMBF5486LT1	6H	2	100	4	8	15	25

** Max

General-Purpose FETs

Pinout: 1-Drain, 2-Source, 3-Gate

Device	Marking	$V_{(*BR)GSS}$	Y_{fs}			I_{DSS}	
			Min (mmhos)	Max (mmhos)	V_{DS} (V)	Min (mA)	Max (mA)
N-CHANNEL							
MMBF5457LT1	6D	25	1	5	15	1	5
MMBF5459LT1	6L	25	2	6	15	4	16
P-CHANNEL							
MMBF5460LT1	M6E	40	1	4	15	1	5

Chopper/Switches, JFETs

Pinout: 1-Drain, 2-Source, 3-Gate

Device	Marking	$r_{DS(on)}$	t_{off}	$V_{(BR)GSS}$	$V_{GS(off)}$		I_{DSS}	
		Max (Ohms)	Max (ns)		Min (V)	Max (V)	Min (mA)	Max (mA)
N-CHANNEL								
MMBF4391LT1	6J	30	20	30	–4	–10	50	150
MMBF4860LT1	6F	40	50	30	–2	–6	20	100
MMBF4392LT1	6K	60	35	30	–2	–5	25	75
MMBF4393LT1	6G	100	50	30	–0.5	–3	5	30
P-CHANNEL								
MMBFJ175LT1	6W	125	30(t)	–30	3	6	–7	–60
MMBFJ177LT1	6Y	300	45(t)	–30	0.8	2.5	–1.5	–20

TMOS FETs

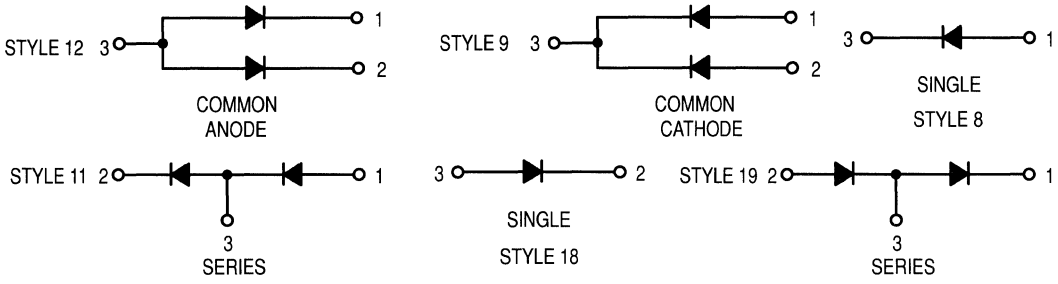
Pinout: 1-Gate, 2-Source, 3-Drain

Device	Marking	$r_{DS(on)}$		V_{DSS}	$V_{GS(th)}$		Switching Time (ns) Max	
		Max (Ohms)	mA		Min (V)	Max (V)	t_{on} (ns)	t_{off} (ns)
N-CHANNEL								
MMBF170LT1	6Z	5	200	60	0.8	3	10	10
BSS123LT1	SA	6	100	100	0.8	2.8	20	40
2N7002LT1	702	7.5	500	60	1	2.5	20	20

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

SOT-23 DIODES

Switching Diodes



General Purpose Diodes

Device	Marking	$V_{(BR)R}$		I_R		V_F			C_T	t_{rr}	Pin Out
		Min (V)	@ I (μA)	Max (μA)	@ V_R (V)	Min (V)	Max (V)	@ I_F (mA)	Max (pF)	Max (ns)	Case Style
SINGLE											
BAL99LT1	JF	70	100	2.5	70		1	50	1.5	6	18
MMBD914LT1	5D	100	100	5	75		1	10	4	4	8
MMBD6050LT1	5A	70	100	0.1	50	0.85	1.1	100	2.5	4	8
DUAL											
BAV70LT1	A4	70	100	5	70		1	50	1.5	6	9
BAW56LT1	A1	70	100	2.5	70		1	50	2	6	12
BAV99LT1	A7	70	100	2.5	70		1	50	1.5	4	11
BAV74LT1	JA	50	5	0.1	50		1	100	2	4	9
MMBD2837LT1	A5	35	100	0.1	30		1	10	4	4	9
MMBD2838LT1	A6	75	100	0.1	50		1	10	4	4	9
MMBD6100LT1	5BM	70	100	0.1	50	0.85	1.1	100	2.5	4	9
MMBD7000LT1	M5C	100	100	0.3	50	0.75	1.1	100	1.5	4	11

Mixer and Detector Diodes

Pin Diodes are designed for VHF Band and General Purpose Switching. Hot Carrier Diodes are ideal for VHF, UHF applications.

Device	Marking	$V_{(BR)R}$		C_T		R_S	V_F		I_R		Pin Out
		Min (V)	@ I_R (μA)	Max (pF)	@ V_R (V)	Max (ohms)	Max (V)	@ I_F (mA)	Max (μA)	@ V_R (V)	Case Style
PIN DIODES (SINGLE)											
MMBV3700LT1	4R	200	10	1	20	1			0.1	150	8
MMBV3401LT1	4D	35	10	1	20	0.7			0.1	25	8
HOT CARRIER SCHOTTKY DIODES (SINGLE)											
MMBD101LT1	4M	4	10	1	0		0.6	10	0.25	3	8
MMBD301LT1	4T	30	10	1.5	15		0.6	10	0.2	25	8
MMBD701LT1	5H	70	10	1	20		1.2	10	0.2	35	8
HOT CARRIER SCHOTTKY DIODES (DUAL)											
MMBD352LT1	M5G	4	10	1	0		0.6	10	0.25	3	11
MMBD353LT1	M4F	4	10	1	0		0.6	10	0.25	3	19

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

SOT-23 Bipolar (for ESD protection) Peak Power Dissipation – 40 Watts @ 1 ms Surge – MMBZ15VDLT1

Breakdown Voltage V_{BR} (Volts)			@ I_T mA	Working Peak Reverse Voltage V_{RWM} (Volts)	Maximum Reverse Leakage Current I_{RWM} I_R (nA)	Maximum Reverse Surge Current I_{RSM} (Amps)	Maximum Reverse Voltage @ I_{RSM} (Clamping Voltage) V_{RSM} (Volts)	Maximum Temperature Coefficient of V_{BR} (mV/°C)
Min	Nom	Max						
14.3	15	15.8	1.0	12.8	100	1.9	21.2	12

Zener Voltage Regulator Diodes

Pinout: 1-Anode, 2-NC, 3-Cathode (V_F = 0.9 V Max @ I_F = 10 mA for all types)

Type Number	Marking	Zener Voltage V_{Z1} (Volts) @ I_{ZT1} = 5 mA (Note 1)	Max Zener Impedance Z_{ZT1} (Ohms) @ I_{ZT1} = 5 mA	Max Reverse Leakage Current		Zener Voltage V_{Z2} (Volts) @ I_{ZT2} = 1 mA (Note 1)		Max Zener Impedance Z_{ZT2} (Ohms) @ I_{ZT2} = 1 mA	Zener Voltage V_{Z3} (Volts) @ I_{ZT3} = 20 mA (Note 1)		Max Zener Impedance Z_{ZT3} (Ohms) @ I_{ZT3} = 20 mA	d_{VZ}/dt (mV/k) @ I_{ZT1} = 5 mA		C pF Max @ V_R = 0 f = 1 MHz
		Nom		I_R µA	@ V_R Volts	Min	Max		Min	Max		Min	Max	
BZX84C2V4LT1	Z11	2.4	100	50	1	1.7	2.1	600	2.6	3.2	50	–3.5	0	450
BZX84C2V7LT1	Z12	2.7	100	20	1	1.9	2.4	600	3	3.6	50	–3.5	0	450
BZX84C3V0LT1	Z13	3	95	10	1	2.1	2.7	600	3.3	3.9	50	–3.5	0	450
BZX84C3V3LT1	Z14	3.3	95	5	1	2.3	2.9	600	3.6	4.2	40	–3.5	0	450
BZX84C3V6LT1	Z15	3.6	90	5	1	2.7	3.3	600	3.9	4.5	40	–3.5	0	450
BZX84C3V9LT1	Z16	3.9	90	3	1	2.9	3.5	600	4.1	4.7	30	–3.5	–2.5	450
BZX84C4V3LT1	W9	4.3	90	3	1	3.3	4	600	4.4	5.1	30	–3.5	0	450
BZX84C4V7LT1	**Z1**	**4.7**	**80**	**3**	**2**	**3.7**	**4.7**	**500**	**4.5**	**5.4**	**15**	**–3.5**	**0.2**	**260**
BZX84C5V11LT1	**Z2**	**5.1**	**60**	**2**	**2**	**4.2**	**5.3**	**480**	**5**	**5.9**	**15**	**–2.7**	**1.2**	**225**
BZX84C5V6LT1	**Z3**	**5.6**	**40**	**1**	**2**	**4.8**	**6**	**400**	**5.2**	**6.3**	**10**	**–2.0**	**2.5**	**200**
BZX84C6V2LT1	**Z4**	**6.2**	**10**	**3**	**4**	**5.6**	**6.6**	**150**	**5.8**	**6.8**	**6**	**0.4**	**3.7**	**185**
BZX84C6V8LT1	**Z5**	**6.8**	**15**	**2**	**4**	**6.3**	**7.2**	**80**	**6.4**	**7.4**	**6**	**1.2**	**4.5**	**155**
BZX84C7V5LT1	Z6	7.5	15	1	5	6.9	7.9	80	7	8	6	2.5	5.3	140
BZX84C8V2LT1	**Z7**	**8.2**	**15**	**0.7**	**5**	**7.6**	**8.7**	**80**	**7.7**	**8.8**	**6**	**3.2**	**6.2**	**135**
BZX84C9V1LT1	**Z8**	**9.1**	**15**	**0.5**	**6**	**8.4**	**9.6**	**100**	**8.5**	**9.7**	**8**	**3.8**	**7.0**	**130**
BZX84C10LT1	**Z9**	**10**	**20**	**0.2**	**7**	**9.3**	**10.6**	**150**	**9.4**	**10.7**	**10**	**4.5**	**8.0**	**130**
BZX84C11LT1	Y1	11	20	0.1	8	10.2	11.6	150	10.4	11.8	10	5.4	9.0	130
BZX84C12LT1	**Y2**	**12**	**25**	**0.1**	**8**	**11.2**	**12.7**	**150**	**11.4**	**12.9**	**10**	**6.0**	**10.0**	**130**
BZX84C13LT1	Y3	13	30	0.1	8	12.3	14	170	12.5	14.2	15	7.0	11.0	120
BZX84C15LT1	**Y4**	**15**	**30**	**0.05**	**10.5**	**13.7**	**15.5**	**200**	**13.9**	**15.7**	**20**	**9.2**	13.0	**110**
BZX84C16LT1	Y5	16	40	0.05	11.2	15.2	17	200	15.4	17.2	20	10.4	14.0	105
BZX84C18LT1	Y6	18	45	0.05	12.6	16.7	19	225	16.9	19.2	20	12.4	16.0	100
BZX84C20LT1	Y7	20	55	0.05	14	18.7	21.1	225	18.9	21.4	20	14.4	18.0	85
BZX84C22LT1	Y8	22	55	0.05	15.4	20.7	23.2	250	20.9	23.4	25	16.4	20.0	85
BZX84C24LT1	Y9	24	70	0.05	16.8	22.7	25.5	250	22.9	25.7	25	18.4	22.0	80
		V_{Z1} Below @ I_{ZT1} = 2 mA	Z_{ZT1} Below @ I_{ZT1} = 2 mA			V_{Z2} Below @ I_{ZT2} = 0.1 mA		Z_{ZT2} Below @ I_{ZT4} = 0.5 mA (Note 2)	V_{Z3} Below @ I_{ZT3} = 10 mA		Z_{ZT3} Below @ I_{ZT3} = 10 mA	d_{VZ}/dt (mV/k) Below @ I_{ZT1} = 2 mA		
BZX84C27LT1	Y10	27	80	0.05	18.9	25	28.9	300	25.2	29.3	45	21.4	25.3	70
BZX84C30LT1	**Y11**	**30**	**80**	**0.05**	**21**	**27.8**	**32**	**300**	**28.1**	**32.4**	**50**	**24.4**	**29.4**	**70**
BZX84C33LT1	Y12	33	80	0.05	23.1	30.8	35	325	31.1	35.4	55	27.4	33.4	70
BZX84C36LT1	Y13	36	90	0.05	25.2	33.8	38	350	34.1	38.4	60	30.4	37.4	70
BZX84C39LT1	Y14	39	130	0.05	27.3	36.7	41	350	37.1	41.5	70	33.4	41.2	45
BZX84C43LT1	Y15	43	150	0.05	30.1	39.7	46	375	40.1	46.5	80	37.6	46.6	40
BZX84C47LT1	Y16	47	170	0.05	32.9	43.7	50	375	44.1	50.5	90	42.0	51.8	40
BZX84C51LT1	Y17	51	180	0.05	35.7	47.6	54	400	48.1	54.6	100	46.6	57.2	40
BZX84C56LT1	Y18	56	200	0.05	39.2	51.5	60	425	52.1	60.8	110	52.2	63.8	40
BZX84C62LT1	Y19	62	215	0.05	43.4	57.4	66	450	58.2	67	120	58.8	71.6	35
BZX84C68LT1	Y20	68	240	0.05	47.6	63.4	72	475	64.2	73.2	130	65.6	79.8	35
BZX84C75LT1	Y21	75	255	0.05	52.5	69.4	79	500	70.3	80.2	140	73.4	88.6	35

NOTES: 1. Zener voltage is measured with a pulse test current (I_Z) applied at an ambient temperature of 25°C.

2. The zener impedance, Z_{ZT2}, for the 27 through 75 volt types is tested at 0.5 mA rather than the test current of 0.1 mA used for V_{Z2}.

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

Zener Voltage Regulator Diodes

Pinout: 1-Anode, 2-NC, 3-Cathode (V_F = 0.9 V Max @ I_F = 10 mA for all types.)

Device	Marking	Test Current I_{ZT} mA	Zener Voltage V_Z (±5%) Nominal (Note 1)	Z_{ZK} I_Z = 0.25 mA Ω Max	Z_{ZT} $I_Z = I_{ZT}$ @ 10% Mod Ω Max	Max I_R μA	@ V_R V
MMBZ5221BLT1	18A	20	2.4	1200	30	100	1
MMBZ5222BLT1	18B	20	2.5	1250	30	100	1
MMBZ5223BLT1	18C	20	2.7	1300	30	75	1
MMBZ5224BLT1	18D	20	2.8	1400	30	75	1
MMBZ5225BLT1	18E	20	3	1600	29	50	1
MMBZ5226BLT1	**8A**	**20**	**3.3**	**1600**	**28**	**25**	**1**
MMBZ5227BLT1	8B	20	3.6	1700	24	15	1
MMBZ5228BLT1	8C	20	3.9	1900	23	10	1
MMBZ5229BLT1	**8D**	**20**	**4.3**	**2000**	**22**	**5**	**1**
MMBZ5230BLT1	**8E**	**20**	**4.7**	**1900**	**19**	**5**	**2**
MMBZ5231BLT1	**8F**	**20**	**5.1**	**1600**	**17**	**5**	**2**
MMBZ5232BLT1	**8G**	**20**	**5.6**	**1600**	**11**	**5**	**3**
MMBZ5233BLT1	8H	20	6	1600	7	5	3.5
MMBZ5234BLT1	**8J**	**20**	**6.2**	**1000**	**7**	**5**	**4**
MMBZ5235BLT1	**8K**	**20**	**6.8**	**750**	**5**	**3**	**5**
MMBZ5236BLT1	**8L**	**20**	**7.5**	**500**	**6**	**3**	**6**
MMBZ5237BLT1	**8M**	**20**	**8.2**	**500**	**8**	**3**	**6.5**
MMBZ5238BLT1	8N	20	8.7	600	8	3	6.5
MMBZ5239BLT1	**8P**	**20**	**9.1**	**600**	**10**	**3**	**7**
MMBZ5240BLT1	**8Q**	**20**	**10**	**600**	**17**	**3**	**8**
MMBZ5241BLT1	8R	20	11	600	22	2	8.4
MMBZ5242BLT1	**8S**	**20**	**12**	**600**	**30**	**1**	**9.1**
MMBZ5243BLT1	8T	9.5	13	600	13	0.5	9.9
MMBZ5244BLT1	8U	9	14	600	15	0.1	10
MMBZ5245BLT1	**8V**	**8.5**	**15**	**600**	**16**	**0.1**	**11**
MMBZ5246BLT1	8W	7.8	16	600	17	0.1	12
MMBZ5247BLT1	8X	7.4	17	600	19	0.1	13
MMBZ5248BLT1	8Y	7	18	600	21	0.1	14
MMBZ5249BLT1	8Z	6.6	19	600	23	0.1	14
MMBZ5250BLT1	81A	6.2	20	600	25	0.1	15
MMBZ5251BLT1	81B	5.6	22	600	29	0.1	17
MMBZ5252BLT1	81C	5.2	24	600	33	0.1	18
MMBZ5253BLT1	81D	5	25	600	35	0.1	19
MMBZ5254BLT1	**81E**	**4.6**	**27**	**600**	**41**	**0.1**	**21**
MMBZ5255BLT1	**81F**	**4.5**	**28**	**600**	**44**	**0.1**	**21**
MMBZ5256BLT1	81G	4.2	30	600	49	0.1	23
MMBZ5257BLT1	81H	3.8	33	700	58	0.1	25
MMBZ5258BLT1	81J	3.4	36	700	70	0.1	27
MMBZ5259BLT1	81K	3.2	39	800	80	0.1	30
MMBZ5260BLT1	18F	3	43	900	93	0.1	33
MMBZ5261BLT1	18G	2.7	47	1000	105	0.1	36
MMBZ5262BLT1	81L	2.5	51	1100	125	0.1	39
MMBZ5263BLT1	81M	2.2	56	1300	150	0.1	43
MMBZ5264BLT1	81N	2.1	60	1400	170	0.1	46
MMBZ5265BLT1	18H	2	62	1400	185	0.1	47
MMBZ5266BLT1	81P	1.8	68	1600	230	0.1	52
MMBZ5267BLT1	18J	1.7	75	1700	270	0.1	56
MMBZ5268BLT1	18K	1.5	82	2000	330	0.1	62
MMBZ5269BLT1	18L	1.4	87	2200	370	0.1	68
MMBZ5270BLT1	81Q	1.4	91	2300	400	0.1	69

NOTE 1. Zener voltage is measured with a pulse test current (I_{ZT}) applied at an ambient temperature of 25°C.

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

Tuning Diodes

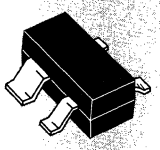
General Purpose, Abrupt and Hyper-Abrupt Junction, Voltage Variable Capacitance diodes are used for tuning and control of RF circuits through UHF frequencies.

Pinout: 1-Anode, 2-NC, 3-Cathode

Device	Marking	$V_{(BR)R}$		C_T			Capacitance Ratio		Q			I_R	
		Min (V)	@ I_R (μA)	Min (pF)	Max (pF)	@ V_R (V)	Min	Max	Typ	@ V_R (V)	& f (MHz)	Max (μA)	@ V_R (V)
MMBV105GLT1	M4E	30	10	1.8	2.8	25	4	6	350	3	50	0.05	28
MMBV109LT1	M4A	30	10	26	32	3	5	6.5	250	3	50	0.05	28
MMBV2101LT1	M4G	30	10	6.1	7.5	4	2.5	3.2	400	4	50	0.02	25
MMBV2103LT1	4H	30	10	9	11	4	2.5	3.2	350	4	50	0.02	25
MMBV2105LT1	4U	30	10	13.5	16.5	4	2.5	3.2	300	4	50	0.02	25
MMBV2107LT1	4W	30	10	19.8	24.2	4	2.5	3.2	250	4	50	0.02	25
MMBV2109LT1	4J	30	10	29.7	36.3	4	2.5	3.2	200	4	50	0.02	25
MMBV3102LT1	M4C	30	10	20	25	3	4.5	6	300	3	50	0.1	25
MMBV409LT1	X5	20	10	26	32	3	1.5	1.9	300	3	50	0.1	15
MMBV432LT1(1)	M4B	14	10	43*	48.1*	2	1.5	2	200	2	50	0.1	9
MMBV609LT1(1)	5L	20	10	26*	32*	3	1.8	2.4	300	3	50	0.01	15
MMBV809LT1	5K	20	10	4.5	6.1	2	1.8	2.6	350	3	50	0.05	15

(1) Monolithic Dual, Style 9 *Each Diode

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.



CASE 318A-05

SOT-143 Devices

Maximum die size 25 mil x 25 mil

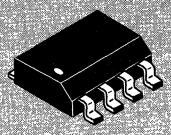
RF Transistors

Device	Marking	f_T			N_F			Gain			f (MHz)
		Typ (GHz)	I_C (mA)	V_{CE} (V)	Typ (dB)	I_C (mA)	V_{CE} (V)	Typ (dB)	I_C (mA)	V_{CE} (V)	
NPN											
MRF9411L	10	8	15	6	2.1	5	6	9.5	5	6	2000
MRF5711L	02	8	50	8	1.6	10	6	13.5	10	6	1000
MRF9511L	11	8	30	8	2.1	5	6	9	5	6	2000
MRF0211L	15	5.5	40	10	1.8	5	10	9.5	5	10	1000
MRF9331L	05	5	1	1	2.5	0.5	1	12.5	0.5	1	1000
MRF9011L	01	3.8	15	10	2.3	5	10	10.2	5	10	1000
PNP											
MRF5211	04	4.2	50	8	2.8	5	6	11	5	6	1000

Monolithic Microwave Integrated Circuits

Device	Marking	f Range MHz	Gain dB Typ @ 1 GHz	Supply Current Idc (mA)	Output Level 1 dB Compression dBm Typ	NF @ 1500 MHz dB
MWA0211L	06	30-3000	11.5	25	7	6
MWA0311L	14	30-3000	11.5	35	12	6

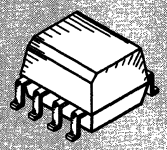
Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.



CASE 751-03

SO-8 Devices

Maximum die size 40 mil x 60 mil



CASE 846-01

RF Transistors

Device	Marking	f_T			NF			Gain			NF and Gain
		Typ (GHz) @ I_C (mA)	V_{CE} (V)		Typ (dB) @ I_C (mA)	V_{CE} (V)		Typ (dB) @ I_C (mA)	V_{CE} (V)		f (MHz)
NPN											
MRF5812	5812	5.5	75	10	2	50	10	15.5	50	10	500
MRFQ19	Q19	5.3	50	10	3.5	50	10	14.6	50	10	500
MRF8372	8372	5	75	10	—	—	—	10	—	12.5	870
MRFQ17	Q17	2.25	50	12.5	—	—	—	12	50	12.5	500
MRF4427	4427	1.6	50	12	—	—	—	18	—	12	175
MRF5943	5943	1.5	35	15	3.4	30	15	12	10	15	200
MRF3866	3866	0.8	50	15	—	—	—	10.5	50	15	400
PNP											
MRF5583	5583	2.1	35	15	—	—	—	15	35	15	250
MRF5160	5160	0.8	50	15	—	—	—	10	50	15	400

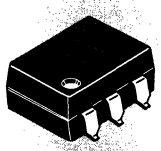
Optoisolators*

Device	Marking	Current Transfer Ratio			$V_{CE(sat)}$			t_r/t_f Typ				$V_{(BR)CEO}$	V_F	
		% Min	@ I_F mA	V_{CE} Volts	Volts Max	@ I_F mA	I_C mA	µs	@ I_C mA	V_{CC} Volts	R_L Ω	Volts Min	Volts Max	@ I_F mA
TRANSISTOR OUTPUT														
MOC205	M205	40	10	10	0.4	10	2	1.6	2	10	100	70	1.5	10
MOC206	M206	63	10	10	0.4	10	2	1.6	2	10	100	70	1.5	10
MOC207	M207	100	10	10	0.4	10	2	1.6	2	10	100	70	1.5	10
MOC211	M211	20	10	10	0.4	10	2	3.2	2	10	100	30	1.5	10
MOC212	M212	50	10	10	0.4	10	2	3.2	2	10	100	30	1.5	10
MOC213	M213	100	10	10	0.4	10	2	3.2	2	10	100	30	1.5	10
MOC215	M215	20	10	5	0.4	1	0.1	3.2	2	10	100	30	1.3	1
MOC216	M216	50	10	5	0.4	1	0.1	3.2	2	10	100	30	1.3	1
MOC217	M217	100	10	5	0.4	1	0.1	3.2	2	10	100	30	1.3	1
DARLINGTON OUTPUT														
MOC221	M221	100	1	5	1	1	0.5	2	5	10	100	30	1.3	1
MOC222	M222	200	1	5	1	1	0.5	2	5	10	100	30	1.3	1
MOC223	M223	500	1	5	1	1	0.5	2	5	10	100	30	1.3	1

*Available in Tape and Reel. Add suffix R1.

All Motorola 6-pin DIP optoisolators are also available with Surface Mount table lead forms options, and are now available in Tape and Reel; just add an "S" suffix to standard optoisolators part numbers for Surface Mount option and R2 for Tape and Reel option. Examples: MOC3063 standard optoisolators, MOC3063S, Surface Mount optoisolator, MOC30635R2 surface mount with tape and reel.

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.



CASE 730C-03

SO-39 Devices

Maximum die size 60 mil x 60 mil

Optoisolators

Traic Driver Output (Style 5)

Device	Peak Blocking Voltage Min	LED Trigger Current-I_{FT} (V_{TM} = 3 V) mA Max	Zero Crossing Inhibit Voltage (at rated I_{FT}) Volts Max	V_{ISO} Vac Pk	dv/dt V/μs Typ
MOC3009S	250	30	—	7500	10
MOC3010S	250	15	—	7500	10
MOC3011S	250	10	—	7500	10
MOC3012S	250	5	—	7500	10
MOC3020S	400	30	—	7500	10
MOC3021S	400	15	—	7500	10
MOC3022S	400	10	—	7500	10
MOC3023S	400	5	—	7500	10
MOC3031S	250	15	20	7500	2000
MOC3032S	250	10	20	7500	2000
MOC3033S	250	5	20	7500	2000
MOC3041S	400	15	20	7500	2000
MOC3042S	400	10	20	7500	2000
MOC3043S	400	5	20	7500	2000
MOC3061S	600	15	20	7500	2000
MOC3062S	600	10	20	7500	1500
MOC3063S	600	5	20	7500	1500
MOC3081S	800	15	20	7500	1500
MOC3082S	800	10	20	7500	1500
MOC3083S	800	5	20	7500	1500

AC Input — Transistor Output (Style 1)

Device	Current Transfer Ratio (CTR)			$V_{CE(sat)}$			$V_{(BR)CEO}$ Volts Min	V_F		V_{ISO} Vac Pk
	% Min	@ I_F mA	V_{CE} Volts	Volts Max	@ I_F mA	I_C mA		Volts Max	@ I_F mA	
H11AA1S	20	±10	10	0.4	±10	0.5	30	1.5	±10	7500
H11AA2S	10	±10	10	0.4	±10	0.5	30	1.8	±10	7500
H11AA3S	50	±10	10	0.4	±10	0.5	30	1.5	±10	7500
H11AA4S	100	±10	10	0.4	±10	0.5	30	1.5	±10	7500

Schmitt Trigger Output (Style 3)

Device	Threshold Current On mA Max	Threshold Current Off mA Max	$I_{F(off)}/I_{F(on)}$ Min	$I_{F(off)}/I_{F(on)}$ Max	V_{CC} Min	V_{CC} Max	t_r, t_f μs Typ	V_{ISO} Vac Pk
H11L1S	1.6	0.3	0.5	0.9	3	15	0.1	7500
H11L2S	10	0.3	0.5	0.9	3	15	0.1	7500
MOC5007S	1.6	0.3	0.5	0.9	3	15	0.1	7500
MOC5008S	4	0.3	0.5	0.9	3	15	0.1	7500
MOC5009S	10	0.3	0.5	0.9	3	15	0.1	7500

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

CASE 403A-03

SMB Devices

Maximum die size 60 mil x 60 mil

Rectifiers

Device	V_{RRM} Volts	I_O Amps	I_{FSM} Amps	V_F @ 25°C Volts	I_R @ 25°C mA
MBRS120T3	20	1	40	0.550	1.000
MBRS120LT3	20	1	40	0.395	1.000
MBRS130T3	30	1	40	0.550	1.000
MBRS130LT3	30	1	40	0.395	1.000
MBRS140T3	40	1	40	0.600	1.000
MBRS170T3	70	1	40	0.790	0.500
MBRS180T3	80	1	40	0.790	0.500
MBRS190T3	90	1	40	0.790	0.500
MBRS1100T3	100	1	40	0.790	0.500
MURS105T3	50	1	40	0.875	0.002
MURS110T3	100	1	40	0.875	0.002
MURS115T3	150	1	40	0.875	0.002
MURS120T3	200	1	40	0.875	0.002
MURS130T3	300	1	35	1.250	0.005
MURS140T3	400	1	35	1.250	0.005
MURS150T3	500	1	35	1.250	0.005
MURS160T3	600	1	35	1.250	0.005

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

Transient Voltage Suppressors (T_A = 25°C unless otherwise noted)

Device	Reverse Stand-Off Voltage V_R Volts (1)	Breakdown Voltage* V_{BR} @ I_T Volts Min	mA	Maximum Clamping Voltage V_C @ I_{pp} Volts	Peak Pulse Current (See Figure 2) I_{pp} Amps	Maximum Reverse Leakage @ V_R I_R µA	Device Marking
1SMB5.0AT3	5.0	6.40	10	9.2	65.2	800	KE
1SMB6.0AT3	6.0	6.67	10	10.3	58.3	800	KG
1SMB6.5AT3	6.5	7.22	10	11.2	53.6	500	KK
1SMB7.0AT3	7.0	7.78	10	12.0	50.0	200	KM
1SMB7.5AT3	7.5	8.33	1.0	12.9	46.5	100	KP
1SMB8.0AT3	8.0	8.89	1.0	13.6	44.1	50	KR
1SMB8.5AT3	8.5	9.44	1.0	14.4	41.7	10	KT
1SMB9.0AT3	9.0	10.0	1.0	15.4	39.0	5.0	KV
1SMB10AT3	10	11.1	1.0	17.0	35.3	5.0	KX
1SMB11AT3	11	12.2	1.0	18.2	33.0	5.0	KZ
1SMB12AT3	12	13.3	1.0	19.9	30.2	5.0	LE
1SMB13AT3	13	14.4	1.0	21.5	27.9	5.0	LG
1SMB14AT3	14	15.6	1.0	23.2	25.8	5.0	LK
1SMB15AT3	15	16.7	1.0	24.4	24.0	5.0	LM
1SMB16AT3	16	17.8	1.0	26.0	23.1	5.0	LP
1SMB17AT3	17	18.9	1.0	27.6	21.7	5.0	LR
1SMB18AT3	18	20.0	1.0	29.2	20.5	5.0	LT
1SMB20AT3	20	22.2	1.0	32.4	18.5	5.0	LV
1SMB22AT3	22	24.4	1.0	35.5	16.9	5.0	LX
1SMB24AT3	24	26.7	1.0	38.9	15.4	5.0	LZ
1SMB26AT3	26	28.9	1.0	42.1	14.2	5.0	ME
1SMB28AT3	28	31.1	1.0	45.4	13.2	5.0	MG
1SMB30AT3	30	33.3	1.0	48.4	12.4	5.0	MK
1SMB33AT3	33	36.7	1.0	53.3	11.3	5.0	MM
1SMB36AT3	36	40.0	1.0	58.1	10.3	5.0	MP
1SMB40AT3	40	44.4	1.0	64.5	9.3	5.0	MR
1SMB43AT3	43	47.8	1.0	69.4	8.6	5.0	MT
1SMB45AT3	45	50.0	1.0	72.7	8.3	5.0	MV
1SMB48AT3	48	53.3	1.0	77.4	7.7	5.0	MX
1SMB51AT3	51	56.7	1.0	82.4	7.3	5.0	MZ
1SMB54AT3	54	60.0	1.0	87.1	6.9	5.0	NE
1SMB58AT3	58	64.4	1.0	93.6	6.4	5.0	NG
1SMB60AT3	60	66.7	1.0	96.8	6.2	5.0	NK
1SMB64AT3	64	71.1	1.0	103	5.8	5.0	NM
1SMB70AT3	70	77.8	1.0	113	5.3	5.0	NP
1SMB75AT3	75	83.3	1.0	121	4.9	5.0	NR
1SMB78AT3	78	86.7	1.0	126	4.7	5.0	NT
1SMB85AT3	85	94.4	1.0	137	4.4	5.0	NV
1SMB90AT3	90	100	1.0	146	4.1	5.0	NX
1SMB100AT3	100	111	1.0	162	3.7	5.0	NZ
1SMB110AT3	110	122	1.0	177	3.4	5.0	PE
1SMB120AT3	120	133	1.0	193	3.1	5.0	PG
1SMB130AT3	130	144	1.0	209	2.9	5.0	PK
1SMB150AT3	150	167	1.0	243	2.5	5.0	PM
1SMB160AT3	160	178	1.0	259	2.3	5.0	PP
1SMB170AT3	170	189	1.0	275	2.2	5.0	PR

Note 1: A transient suppressor is normally selected according to the reverse "Stand Off Voltage" (V_R) which should be equal to or greater than the DC or continuous peak operating voltage level.

* V_{BR} measured at pulse test current I_T at an ambient temperaure of 25°C.

Transient Voltage Suppressors

(T_A = 25°C unless otherwise noted) (V_F = 3.5 V Max, I_F** = 50 A for all types.)

Device	Breakdown Voltage* V_{BR} @ I_T Volts Min	Nom	Max	mA	Working Peak Reverse Voltage V_{RWM} Volts	Maximum Reverse Leakage @ V_{RWM} I_R μA	Maximum Reverse Surge Current I_{RSM} Amps	Maximum Reverse Voltage @ I_{RSM} (Clamping Voltage) V_{RSM} Volts	Maximum Temperature Coefficient of V_{BR} %/°C	Device Marking
P6SMB6.8AT3	6.45	6.8	7.14	10	5.8	1000	57	10.5	0.057	6V8A
P6SMB7.5AT3	7.13	7.5	7.88	10	6.4	500	53	11.3	0.061	7V5A
P6SMB8.2AT3	7.79	8.2	8.61	10	7.02	200	50	12.1	0.065	8V2A
P6SMB9.1AT3	8.65	9.1	9.55	1	7.78	50	45	13.4	0.068	9V1A
P6SMB10AT3	9.5	10	10.5	1	8.55	10	41	14.5	0.073	10A
P6SMB11AT3	10.5	11	11.6	1	9.4	5	38	15.6	0.075	11A
P6SMB12AT3	11.4	12	12.6	1	10.2	5	36	16.7	0.078	12A
P6SMB13AT3	**12.4**	**13**	**13.7**	**1**	**11.1**	**5**	**33**	**18.2**	**0.081**	**13A**
P6SMB15AT3	**14.3**	**15**	**15.8**	**1**	**12.8**	**5**	**28**	**21.2**	**0.084**	**15A**
P6SMB16AT3	15.2	16	16.8	1	13.6	5	27	22.5	0.086	16A
P6SMB18AT3	17.1	18	18.9	1	15.3	5	24	25.2	0.088	18A
P6SMB20AT3	19	20	21	1	17.1	5	22	27.7	0.09	20A
P6SMB22AT3	20.9	22	23.1	1	18.8	5	20	30.6	0.092	22A
P6SMB24AT3	22.8	24	25.2	1	20.5	5	18	33.2	0.094	24A
P6SMB27AT3	**25.7**	**27**	**28.4**	**1**	**23.1**	**5**	**16**	**37.5**	**0.096**	**27A**
P6SMB30AT3	**28.5**	**30**	**31.5**	**1**	**25.6**	**5**	**14.4**	**41.4**	**0.097**	**30A**
P6SMB33AT3	**31.4**	**33**	**34.7**	**1**	**28.2**	**5**	**13.2**	**45.7**	**0.098**	**33A**
P6SMB36AT3	**34.2**	**36**	**37.8**	**1**	**30.8**	**5**	**12**	**49.9**	**0.099**	**36A**
P6SMB39AT3	37.1	39	41	1	33.3	5	11.2	53.9	0.1	39A
P6SMB43AT3	40.9	43	45.2	1	36.8	5	10.1	59.3	0.101	43A

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

* V_{BR} measured at pulse test current I_T at an ambient temperaure of 25°C.
** 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

Transient Voltage Suppressors

(T_A = 25°C unless otherwise noted) (V_F = 3.5 V Max, I_F** = 50 A for all types.)

Device	Breakdown Voltage* V_{BR} @ I_T Volts Min	Nom	Max	mA	Working Peak Reverse Voltage V_{RWM} Volts	Maximum Reverse Leakage @ V_{RWM} I_R µA	Maximum Reverse Surge Current I_{RSM} Amps	Maximum Reverse Voltage @ I_{RSM} (Clamping Voltage) V_{RSM} Volts	Maximum Temperature Coefficient of V_{BR} %/°C	Device Marking
P6SMB47AT3	44.7	47	49.4	1	40.2	5	9.3	64.8	0.101	47A
P6SMB51AT3	**48.5**	**51**	**53.6**	**1**	**43.6**	**5**	**8.6**	**70.1**	**0.102**	**51A**
P6SMB56AT3	53.2	56	58.8	1	47.8	5	7.8	77	0.103	56A
P6SMB62AT3	**58.9**	**62**	**65.1**	**1**	**53**	**5**	**7.1**	**85**	**0.104**	**62A**
P6SMB68AT3	64.6	68	71.4	1	58.1	5	6.5	92	0.104	68A
P6SMB75AT3	71.3	75	78.8	1	64.1	5	5.8	103	0.105	75A
P6SMB82AT3	77.9	82	86.1	1	70.1	5	5.3	113	0.105	82A
P6SMB91AT3	86.5	91	95.5	1	77.8	5	4.8	125	0.106	91A
P6SMB100AT3	95	100	105	1	85.5	5	4.4	137	0.106	100A
P6SMB110AT3	105	110	116	1	94	5	4	152	0.107	110A
P6SMB120AT3	114	120	126	1	102	5	3.6	165	0.107	120A
P6SMB130AT3	124	130	137	1	111	5	3.3	179	0.107	130A
P6SMB150AT3	143	150	158	1	128	5	2.9	207	0.108	150A
P6SMB160AT3	152	160	168	1	136	5	2.7	219	0.108	160A
P6SMB170AT3	162	170	179	1	145	5	2.6	234	0.108	170A
P6SMB180AT3	171	180	189	1	154	5	2.4	246	0.108	180A
P6SMB200AT3	190	200	210	1	171	5	2.2	274	0.108	200A

* V_{BR} measured at pulse test current I_T at an ambient temperaure of 25°C.
** 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

Transient Voltage Suppressors

(T_L = 30°C unless otherwise noted) (V_F = 1.5 Volts Max @ I_F = 200 mAdc for all types.)

Device*	Nominal Zener Voltage V_Z @ I_{ZT} Volts (Note 1)	Test Current I_{ZT} mA	Max Zener Impedance (Note 2) Z_{ZT} @ I_{ZT} Ohms	Z_{ZK} Ohms @	I_{ZK} mA	Max Reverse Leakage Current I_R µA @	V_R Volts	Maximum DC Zener Current I_{ZM} mAdc	Device Marking
1SMB5913BT3	3.3	113.6	10	500	1	100	1	454	913B
1SMB5914BT3	3.6	104.2	9	500	1	75	1	416	914B
1SMB5915BT3	3.9	96.1	7.5	500	1	25	1	384	915B
1SMB5916BT3	4.3	87.2	6	500	1	5	1	348	916B
1SMB5917BT3	4.7	79.8	5	500	1	5	1.5	319	917B
1SMB5918BT3	**5.1**	**73.5**	**4**	**350**	**1**	**5**	**2**	**294**	**918B**
1SMB5919BT3	5.6	66.9	2	250	1	5	3	267	919B
1SMB5920BT3	**6.2**	**60.5**	**2**	**200**	**1**	**5**	**4**	**241**	**920B**
1SMB5921BT3	6.8	55.1	2.5	200	1	5	5.2	220	921B
1SMB5922BT3	7.5	50	3	400	0.5	5	6.8	200	922B
1SMB5923BT3	8.2	45.7	3.5	400	0.5	5	6.5	182	923B
1SMB5924BT3	9.1	41.2	4	500	0.5	5	7	164	924B
1SMB5925BT3	**10**	**37.5**	**4.5**	**500**	**0.25**	**5**	**8**	**150**	**925B**
1SMB5926BT3	11	34.1	5.5	550	0.25	1	8.4	136	926B
1SMB5927BT3	**12**	**31.2**	**6.5**	**550**	**0.25**	**1**	**9.1**	**125**	**927B**
1SMB5928BT3	13	28.8	7	550	0.25	1	9.9	115	928B

(continued)

*TOLERANCE AND VOLTAGE DESIGNATION Tolerance designation — The type numbers listed indicate a tolerance of ±5%.

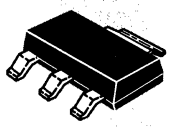
Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

Transient Voltage Suppressors

(T_L = 30°C unless otherwise noted) (V_F = 1.5 V Max @ I_F = 200 mAdc for all types.)

Device*	Nominal Zener Voltage V_Z @ I_{ZT} Volts (Note 1)	Test Current I_{ZT} mA	Max Zener Impedance (Note 2)			Max Reverse Leakage Current		Maximum DC Zener Current I_{ZM} mAdc	Device Marking
			Z_{ZT} @ I_{ZT} Ohms	Z_{ZK} Ohms	@ I_{ZK} mA	I_R µA	@ V_R Volts		
1SMB5929BT3	**15**	**25**	**9**	**600**	**0.25**	**1**	**11.4**	**100**	**929B**
1SMB5930BT3	16	23.4	10	600	0.25	1	12.2	93	930B
1SMB5931BT3	**18**	**20.8**	**12**	**650**	**0.25**	**1**	**13.7**	**83**	**931B**
1SMB5932BT3	20	18.7	14	650	0.25	1	15.2	75	932B
1SMB5933BT3	22	17	17.5	650	0.25	1	16.7	68	933B
1SMB5934BT3	**24**	**15.6**	**19**	**700**	**0.25**	**1**	**18.2**	**62**	**934B**
1SMB5935BT3	27	13.9	23	700	0.25	1	20.6	55	935B
1SMB5936BT3	**30**	**12.5**	**26**	**750**	**0.25**	**1**	**22.8**	**50**	**936B**
1SMB5937BT3	33	11.4	33	800	0.25	1	25.1	45	937B
1SMB5938BT3	36	10.4	38	850	0.25	1	27.4	41	938B
1SMB5939BT3	39	9.6	45	900	0.25	1	29.7	38	939B
1SMB5940BT3	43	8.7	53	950	0.25	1	32.7	34	940B
1SMB5941BT3	47	8	67	1000	0.25	1	35.8	31	941B
1SMB5942BT3	51	7.3	70	1100	0.25	1	38.8	29	942B
1SMB5943BT3	56	6.7	86	1300	0.25	1	42.6	26	943B
1SMB5944BT3	62	6	100	1500	0.25	1	47.1	24	944B
1SMB5945BT3	68	5.5	120	1700	0.25	1	51.7	22	945B
1SMB5946BT3	75	5	140	2000	0.25	1	56	20	946B
1SMB5947BT3	82	4.6	160	2500	0.25	1	62.2	18	947B
1SMB5948BT3	91	4.1	200	3000	0.25	1	69.2	16	948B
1SMB5949BT3	100	3.7	250	3100	0.25	1	76	15	949B
1SMB5950BT3	110	3.4	300	4000	0.25	1	83.6	13	950B
1SMB5951BT3	120	3.1	380	4500	0.25	1	91.2	12	951B
1SMB5952BT3	130	2.9	450	5000	0.25	1	98.8	11	952B
1SMB5953BT3	150	2.5	600	6000	0.25	1	114	10	953B
1SMB5954BT3	160	2.3	700	6500	0.25	1	121.6	9	954B
1SMB5955BT3	180	2.1	900	7000	0.25	1	136.8	8	955B
1SMB5956BT3	200	1.9	1200	8000	0.25	1	152	7	956B

*TOLERANCE AND VOLTAGE DESIGNATION Tolerance designation — The type numbers listed indicate a tolerance of ±5%.



CASE 318E-04

SOT-223 Devices

Maximum die size 90 mil x 90 mil

General Purpose Transistors

Pinout: 1-Base, 2-Collector, 3-Emitter, 4-Collector

Device	Marking	t_{on}	t_{off}	$V_{(BR)CEO}$	h_{FE}		f_T	
					Min	Max	@ I_C (mA)	Min (MHz)
NPN								
PZT2222AT3	2222A	35	285	40	100	300	20	300
PNP								
PZT2907AT3	2907A	45	100	60	100	300	50	200

Darlingtons

Pinout: 1-Base, 2-Collector, 3-Emitter, 4-Collector

Device	Marking	$V_{(BR)CEO}$		h_{FE}		
				Min	Max	@ I_C (mA)
PNP						
PZTA64T3	ZTA64	30	1.5	20k	—	100

High-Voltage Transistors

Pinout: 1-Base, 2-Collector, 3-Emitter, 4-Collector

Device	Marking	$V_{(BR)CEO}$	h_{FE}		f_T	
			Min	Max	@ I_C (mA)	Min (MHz)
NPN						
PTZA42T3	TZA42	300	40	—	10	50
BSP19T3	BSP19	350	40	—	10	70
BF720T3	BF720	250	50	—	10	60
PNP						
PTZA92T3	TZA92	300	40	—	10	50
BF721T3	BF721	250	50	—	10	60
PZTA96T3	ZTA96	450	50	150	10	50
BSP16T3	BSP16	300	30	150	10	15

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

TMOS FETs

Pinout: 1-Gate, 2-Drain, 3-Source, 4-Drain

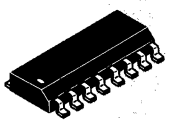
Device	Marking	$r_{DS(on)}$		BV_{DSS}	$V_{GS(th)}$		Switching Time (ns) Max	
		Max (Ohm)	@ mA		Min (V)	Max (V)	t_{on}	t_{off}
N-CHANNEL								
MMFT107T3	FT107	14	200	200	1	3	15	15
MMFT960T3	FT960	1.7	1000	60	1	3.5	15	15
MMFT6661T3	T6661	4	1000	90	0.8	2	5	5

Tuning Diode

Pinout: 1-Anode, 2-Cathode, 3-NC, 4-Cathode

Device	Marking	$V_{(BR)R}$		C_T			Capacitance Ratio		Q			I_R	
		Min (V)	@ I_R (μA)	Min (pF)	Max (pF)	@ V_R (V)	Min	Max	Typ	@ V_R (V)	&f (MHz)	Max (μA)	@ V_R (V)
MV7005T3	V7005	15	10	400	520	1	12	—	300	1	1	0.1	9

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.



CASE 751B-03

SO-14, SO-16 Devices

Maximum die size 75 mil x 115 mil

Quad Transistors

Device	$V_{(BR)CEO}$	$V_{(BR)CBO}$	h_{FE} Min	h_{FE} @ I_C	f_T Min @ mA		Package
MMPQ2222A	40	75	40	500	350*	20	SO-16
MMPQ2369	15	40	20	100	450	10	SO-16
MMPQ2907A	50	60	50	500	350*	50	SO-16
MMPQ3467	40	40	20	500	125	50	SO-16
MMPQ3725	40	60	25	500	250	50	SO-16
MMPQ3904	40	60	75	10	250	10	SO-16
MMPQ3906	40	40	75	10	200	10	SO-16
MMPQ3799	60	60	300	0.5	60	1	SO-16
MMPQ6700*	40	40	70	10	200	10	SO-16

*NPN/PNP

Diode Arrays

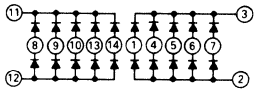
Device	Description	V_{RM}	V_R	V_F @ 100 mA	V_F @ 500 mA	Package
MMAD130	Dual 10 Diode	50	40	1.1	1.5	SO-14
MMAD1103	16 Diode	50	40	1.1	1.5	SO-14
MMAD1105	8 Diode, Common Cathode	50	40	1.1	1.5	SO-14
MMAD1106	8 Diode, Common Cathode	50	40	1.1	1.5	SO-14
MMAD1107	Dual 8 Diode	50	40	1.1	1.5	SO-14
MMAD1108	8 Diode	50	40	1.1	1.5	SO-16
MMAD1109	7 Diode	50	40	1.1	1.5	SO-14

Diode Array Configurations

SO-14

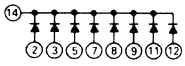
MMAD130

Dual 10 Diode Array



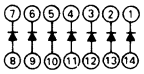
MMAD1105

8 Diode Array (Common Cathode)



NC Pin 1,4,6,10,13

MMAD1109

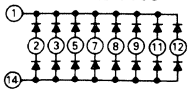


(Independant)

7 Diode Array

MMAD1103

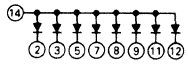
16 Diode Array



NC Pin 4,6,10,13

MMAD1106

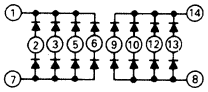
8 Diode Array (Common Anode)



NC Pin 1,4,6,10,13

MMAD1104

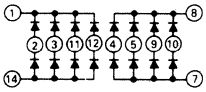
Dual 8 Diode Array



NC Pin 4,11

MMAD1107

Dual 8 Diode Array



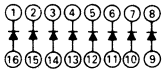
NC Pin 6,13

SO-16

MMPQ Series and MMAD1108

MMAD1108

8 Diode Array



Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

CASE 403-03

SMC Devices

Maximum die size 104 mil x 104 mil

Rectifiers

Device	V_{RRM} Volts	I_O Amps	I_{FSM} Amps	V_F @ 25°C Volts	I_R @ 25°C mA
MBRS340T3	40	3	80	0.525	2
MURS340T3	400	3	75	1.25	0.01
MURS360T3	600	3	75	1.25	0.01

Transient Voltage Suppressors (T_A = 25°C unless otherwise noted)

Device	Reverse Stand-Off Voltage V_R Volts (1)	Breakdown Voltage* V_{BR} @ I_T Volts Min	mA	Maximum Clamping Voltage V_C @ I_{pp} Volts	Peak Pulse Current (See Figure 2) I_{pp} Amps	Maximum Reverse Leakage @ V_R I_R µA	Device Marking
1SMC5.0AT3	5.0	6.40	10	9.2	163.0	1000	GDE
1SMC6.0AT3	6.0	6.67	10	10.3	145.6	1000	GDG
1SMC6.5AT3	6.5	7.22	10	11.2	133.9	500	GDK
1SMC7.0AT3	7.0	7.78	10	12.0	125.0	200	GDM
1SMC7.5AT3	7.5	8.33	1.0	12.9	116.3	100	GDP
1SMC8.0AT3	8.0	8.89	1.0	13.6	110.3	50	GDR
1SMC8.5AT3	8.5	9.44	1.0	14.4	104.2	20	GDT
1SMC9.0AT3	9.0	10.0	1.0	15.4	97.4	10	GDV
1SMC10AT3	10	11.1	1.0	17.0	88.2	5.0	GDX
1SMC11AT3	11	12.2	1.0	18.2	82.4	5.0	GDZ
1SMC12AT3	12	13.3	1.0	19.9	75.3	5.0	GEE
1SMC13AT3	13	14.4	1.0	21.5	69.7	5.0	GEG
1SMC14AT3	14	15.6	1.0	23.2	64.7	5.0	GEK
1SMC15AT3	15	16.7	1.0	24.4	61.5	5.0	GEM
1SMC16AT3	16	17.8	1.0	26.0	57.7	5.0	GEP
1SMC17AT3	17	18.9	1.0	27.6	53.3	5.0	GER
1SMC18AT3	18	20.0	1.0	29.2	51.4	5.0	GET
1SMC20AT3	20	22.2	1.0	32.4	46.3	5.0	GEV
1SMC22AT3	22	24.4	1.0	35.5	42.2	5.0	GEX
1SMC24AT3	24	26.7	1.0	38.9	38.6	5.0	GEZ
1SMC26AT3	26	28.9	1.0	42.1	35.6	5.0	GFE
1SMC28AT3	28	31.1	1.0	45.4	33.0	5.0	GFG
1SMC30AT3	30	33.3	1.0	48.4	31.0	5.0	GFK
1SMC33AT3	33	36.7	1.0	53.3	28.1	5.0	GFM
1SMC36AT3	36	40.0	1.0	58.1	25.8	5.0	GFP
1SMC40AT3	40	44.4	1.0	64.5	23.2	5.0	GFR
1SMC43AT3	43	47.8	1.0	69.4	21.6	5.0	GFT
1SMC45AT3	45	50.0	1.0	72.7	20.6	5.0	GFV
1SMC48AT3	48	53.3	1.0	77.4	19.4	5.0	GFX
1SMC51AT3	51	56.7	1.0	82.4	18.2	5.0	GFZ
1SMC54AT3	54	60.0	1.0	87.1	17.2	5.0	GGE
1SMC58AT3	58	64.4	1.0	93.6	16.0	5.0	GGG
1SMC60AT3	60	66.7	1.0	96.8	15.5	5.0	GGK
1SMC64AT3	64	71.1	1.0	103	14.6	5.0	GGM
1SMC70AT3	70	77.8	1.0	113	13.3	5.0	GGP
1SMC75AT3	75	83.3	1.0	121	12.4	5.0	GGR
1SMC78AT3	78	86.7	1.0	126	11.4	5.0	GGT

Note 1: A transient suppressor is normally selected according to the reverse "Stand Off Voltage" (V_R) which should be equal to or greater than the DC or continuous peak operating voltage level.

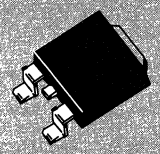
* V_{BR} measured at pulse test current I_T at an ambient temperaure of 25°C.

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

Transient Voltage Suppressors (Continued)

Device	Breakdown Voltage* V_{BR} @ I_T Volts				Working Peak Reverse Voltage V_{RWM} Volts	Maximum Reverse Leakage @ V_{RWM} I_R μA	Maximum Reverse Surge Current I_{RSM} Amps	Maximum Reverse Voltage @ I_{RSM} (Clamping Voltage) V_{RSM} Volts	Maximum Temperature Coefficient of V_{BR} %/°C	Device Marking
	Min	Nom	Max	mA						
1.5SMC6.8AT3	6.45	6.8	7.14	10	5.8	1000	143	10.5	0.057	6V8A
1.5SMC7.5AT3	7.13	7.5	7.88	10	6.4	500	132	11.3	0.061	7V5A
1.5SMC8.2AT3	7.79	8.2	8.61	10	7.02	200	124	12.1	0.065	8V2A
1.5SMC9.1AT3	8.65	9.1	9.55	1	7.78	50	112	13.4	0.068	9V1A
1.5SMC10AT3	9.5	10	10.5	1	8.55	10	103	14.5	0.073	10A
1.5SMC11AT3	10.5	11	11.6	1	9.4	5	96	15.6	0.075	11A
1.5SMC12AT3	11.4	12	12.6	1	10.2	5	90	16.7	0.078	12A
1.5SMC13AT3	12.4	13	13.7	1	11.1	5	82	18.2	0.081	13A
1.5SMC15AT3	14.3	15	15.8	1	12.8	5	71	21.2	0.084	15A
1.5SMC16AT3	15.2	16	16.8	1	13.6	5	67	22.5	0.086	16A
1.5SMC18AT3	17.1	18	18.9	1	15.3	5	59.5	25.2	0.088	18A
1.5SMC20AT3	19	20	21	1	17.1	5	54	27.7	0.09	20A
1.5SMC22AT3	20.9	22	23.1	1	18.8	5	49	30.6	0.092	22A
1.5SMC24AT3	22.8	24	25.2	1	20.5	5	45	33.2	0.094	24A
1.5SMC27AT3	25.7	27	28.4	1	23.1	5	40	37.5	0.096	27A
1.5SMC30AT3	28.5	30	31.5	1	25.6	5	36	41.4	0.097	30A
1.5SMC33AT3	31.4	33	34.7	1	28.2	5	33	45.7	0.098	33A
1.5SMC36AT3	34.2	36	37.8	1	30.8	5	30	49.9	0.099	36A
1.5SMC39AT3	37.1	39	41	1	33.3	5	28	53.9	0.1	39A
1.5SMC43AT3	40.9	43	45.2	1	36.8	5	25.3	59.3	0.101	43A
1.5SMC47AT3	44.7	47	49.4	1	40.2	5	23.2	64.8	0.101	47A
1.5SMC51AT3	48.5	51	53.6	1	43.6	5	21.4	70.1	0.102	51A
1.5SMC56AT3	53.2	56	58.8	1	47.8	5	19.5	77	0.103	56A
1.5SMC62AT3	58.9	62	65.1	1	53	5	17.7	85	0.104	62A
1.5SMC68AT3	64.6	68	71.4	1	58.1	5	16.3	92	0.104	68A
1.5SMC75AT3	71.3	75	78.8	1	64.1	5	14.6	103	0.105	75A
1.5SMC82AT3	77.9	82	86.1	1	70.1	5	13.3	113	0.105	82A
1.5SMC91AT3	86.5	91	95.5	1	77.8	5	12	125	0.106	91A

* V_{BR} measured at pulse test current I_T at an ambient temperaure of 25°C.
** 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.



CASE 369A-07

DPAK Devices

Schottky Rectifiers

Device	V_{RRM}	$I_{F(AV)}$
SINGLE		
MBRD320	20 V	3 A
MBRD330	30 V	3 A
MBRD340	40 V	3 A
MBRD350	50 V	3 A
MBRD360	60 V	3 A
DUAL		
MBRD620CT	20 V	6 A
MBRD630CT	30 V	6 A
MBRD640CT	40 V	6 A
MBRD650CT	50 V	6 A
MBRD660CT	60 V	6 A

Ultrafast Rectifiers

Device	V_{RRM}	$I_{F(AV)}$	t_{rr} (Max)
SINGLE			
MURD305	50 V	3 A	35 ns
MURD310	100 V	3 A	35 ns
MURD315	150 V	3 A	35 ns
MURD320	200 V	3 A	35 ns
DUAL			
MURD605CT	50 V	6 A	35 ns
MURD610CT	100 V	6 A	35 ns
MURD615CT	150 V	6 A	35 ns
MURD620CT	200 V	6 A	35 ns

SCRs

Device	V_{RRM}	(RMS) Current	I_{GT} (mA)	V_{GT} (V)
MCR703A	100 V	4 A	0.075	1
MCR704A	200 V	4 A	0.075	1
MCR706A	400 V	4 A	0.075	1
MCR708A	600 V	4 A	0.075	1

Bipolar Power Transistors

Device		I_C Cont Amps Max	$V_{CEO(sus)}$ Volts Min	h_{FE} @ I_C		Resistive Switching			f_T MHz Min	P_D(1) 1.75 Watts
NPN	PNP			Min/Max	Amps	t_s µs Typ	t_f µs Typ	I_C Amps		
MJD340	MJD350	0.5	300	30/240	0.05	—	—	—	—	15
MJD47		1	250	30/150	0.3	2	0.2	0.3	10	15
	MJD5731	1	350	30/175	0.3	1.5	0.2	0.3	10	15
MJD50		1	400	30/150	0.3	2	0.2	0.3	10	20
MJD13003		1.5	400	5/25	1	4 max	0.7 max	1	4	15
MJD112##	MJD117##	2	100	1000 min	2	1.7	1.3	2	25#	20
MJD31	MJD32	3	40	10 min	1	0.6	0.3	1	3	15
MJD31C	MJD32C	3	100	10 min	1	0.6	0.3	1	3	15
MJD148		4	45	30 min	4	—	—	—	3	20
MJD6039##	MJD6036##	4	80	1k/12k	2	1.7	1.2	2	25	20
MJD243	MJD253	4	100	40/180	0.2	0.16	0.04	1	40	12.5
MJD200	MJD210	5	25	45/180	2	0.15	0.04	2	65	12.5
MJD41C	MJD42C	6	100	15/75	3	0.4	0.15	3	3	20
MJD44H11	MJD45H11	8	80	40 min	4	0.5	0.14	5	50 typ	20
MJD122##	MJD127##	8	100	1k/12k	4	1.5	2	4	4#	20
MJD3055	MJD2955	10	60	20/100	4	1.5	1.5	3	2	20
MJD44E3##		10	80	1k min	5	2	0.5	10		20

Darlington, #$|h_{FE}|$@1 MHz

Note: See Tape and Reel under Technical Data Section for reel size,quantity and ordering information.

Note: 1 Power rating @ T_A = 25° C on FR-4 glass body epoxy printed circuit board using recommended footprint as shown on the data sheet.

TMOS Power MOSFETs

Device	$V_{(BR)DSS}$ Volts (Min)	$R_{DS(on)}$ @ I_D Ohms Max	Amps	P_D (Watts)(1) Max
N-CHANNEL				
MTD2N50	500	4	1	1.75
MTD1N50	500	6	0.5	1.75
MTD1N45	450	6	0.5	1.75
MTD1N40	400	5	0.5	1.75
MTD2N20	200	0.7	4	1.75
MTD4N20	200	0.7	2	1.75
MTD6N15	150	0.3	3	1.75
MTD9N10E	100	0.25	4.5	1.75
MTD6N10	100	0.25	6	1.75
MTD5N10	100	0.5	2.5	1.75
MTD4P06(2)	60	0.6	2	1.75
MTD3055E	60	0.15	4	1.75
MTD3055EL(3)	60	0.18	6	1.75
MTD5N06	60	0.4	5	1.75
MTD2955(2)	60	0.3	6	1.75
MTD10N05E	50	0.1	5	1.75

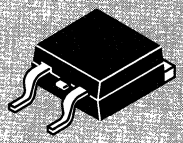
Note 1: Power rating when mounted on a board with the minimum pad size recommended.

Note 2: P-channel

Note: See Tape and Reel under Technical Data section for reel size, quantity and ordering information.

Note 3: Logic Level

Note: Power rating @ T_A = 25 C on FR-4 glass body epoxy printed circuit board using recommended footprint as shown on the data sheet.



CASE 418B-01

D²PAK Devices

Schottky Rectifiers

Device	V_{RRM}	$I_{F(AV)}$	V_F @ 25°C Volts	I_F @ 25°C (mA)	t_{rr} nsec
MBRB1535CT	35	15	0.84	0.1	<10
MBRB1545CT	45	15	0.84	0.1	<10
MBRB2060CT	60	20	0.95	0.15	<10
MBRB2070CT	70	20	0.95	0.15	<10
MBRB2080CT	80	20	0.95	0.15	<10
MBRB2090CT	90	20	0.95	0.15	<10
MBRB20100CT	100	20	0.95	0.15	<10
MBRB20200CT	200	20	1.0	1.0	<10
MBRB2535CTL	35	25	0.55	5.0	<10
MBRB2535CT	35	30	0.82	0.2	<10
MBRB2545CT	45	30	0.82	0.2	<10

Ultrafast Rectifiers

Device	V_{RRM}	$I_{F(AV)}$	V_F @ 25°C Volts	I_F @ 25°C (mA)	t_{rr} nsec
MURHB840CT	400	8	2.00	0.01	28
MURB1605CT	50	16	0.975	0.005	35
MURB1610CT	100	16	0.975	0.005	35
MURB1615CT	150	16	0.975	0.005	35
MURB1620CT	200	16	0.975	0.005	35
MURB1630CT	300	16	1.30	0.01	60
MURB1640CT	400	16	1.30	0.01	60

TMOS Power MOSFETs

Device	$V_{(BR)DSS}$ Volts Min	$R_{DS(on)}$ @ I_D		$PD(watts)^{(1)}$ Max
		Ohms Max	Amps	
N-CHANNEL				
MTB8N50E	500	0.8	4	2.5
MTB10N40E	400	0.55	5	2.5
MTB20N20E	200	0.18	10	2.5
MTB33N10	100	0.058	16.5	2.5
MTB50N06EL(2)	60	0.025	25	2.5
MTB50N06E	60	0.028	25	2.5
MTB36N06E	60	0.040	18	2.5
MTB30N06EL(2)	60	0.05	15	2.5
MTB23P06(3)	60	0.12	11.5	2.5
MTB15N06E	60	0.12	7.5	2.5

Note: See Tape and Reel under Technical Data Section for reel size,quantity and ordering information.

Note 1: Power rating @ T_A = 25 C on FR-4 glass body epoxy printed circuit board using recommended footprint as shown on the data sheet.

Note 2: Indicates Logic Level

Note 3: Indicates P-Channel

CASE 362-02

Leadless Zeners

Polarity band indicates cathode.

500 mW Leadless Zeners (DO-34) (V_F = 0.9 V Max @ I_F = 10 mA for all types)

	Zener Voltage V_{Z1} (Volts) @ I_{ZT1} = 5 mA (Note 1)			Max Zener Impedance Z_{ZT1} (Ohms) @ I_{ZT1} = 5 mA	Max Reverse Leakage Current		Zener Voltage V_{Z2} (Volts) @ I_{ZT2} = 1 mA (Note 1)		Max Zener Impedance Z_{ZT2} (Ohms) @ I_{ZT2} = 1 mA	Zener Voltage V_{Z3} (Volts) @ I_{ZT3} = 20 mA (Note 1)		Max Zener Impedance Z_{ZT3} (Ohms) @ I_{ZT3} = 20 mA
	Nom	Min	Max		I_R μA @	V_R Volts	Min	Max		Min	Max	
BZV55C2V4	2.4	2.2	2.6	100	50	1	1.7	2.1	600	2.6	3.2	50
BZV55C2V7	2.7	2.5	2.9	100	20	1	1.9	2.4	600	3	3.6	50
BZV55C3V0	3	2.8	3.2	95	10	1	2.1	2.7	600	3.3	3.9	50
BZV55C3V3	3.3	3.1	3.5	95	5	1	2.3	2.9	600	3.6	4.2	40
BZV55C3V6	3.6	3.4	3.8	90	5	1	2.7	3.3	600	3.9	4.5	40
BZV55C3V9	3.9	3.7	4.1	90	3	1	2.9	3.5	600	4.1	4.7	30
BZV55C4V3	4.3	4	4.6	90	3	1	3.3	4	600	4.4	5.1	30
BZV55C4V7	4.7	4.4	5	80	3	2	3.7	4.7	500	4.5	5.4	15
BZV55C5V1	5.1	4.8	5.4	60	2	2	4.2	5.3	480	5	5.9	15
BZV55C5V6	5.6	5.2	6	40	1	2	4.8	6	400	5.2	6.3	10
BZV55C6V2	6.2	5.8	6.6	10	3	4	5.6	6.6	150	5.8	6.8	6
BZV55C6V8	6.8	6.4	7.2	15	2	4	6.3	7.2	80	6.4	7.4	6
BZV55C7V5	7.5	7	7.9	15	1	5	6.9	7.9	80	7	8	6
BZV55C8V2	8.2	7.7	8.7	15	0.7	5	7.6	8.7	80	7.7	8.8	6
BZV55C9V1	9.1	8.5	9.6	15	0.5	6	8.4	9.6	100	8.5	9.7	8
BZV55C10	10	9.4	10.6	20	0.2	7	9.3	10.6	150	9.4	10.7	10
BZV55C11	11	10.4	11.6	20	0.1	8	10.2	11.6	150	10.4	11.8	10
BZV55C12	12	11.4	12.7	25	0.1	8	11.2	12.7	150	11.4	12.9	10
BZV55C13	13	12.4	14.1	30	0.1	8	12.3	14	170	12.5	14.2	15
BZV55C15	15	13.8	15.6	30	0.05	10.5	13.7	15.5	200	13.9	15.7	20
BZV55C16	16	15.3	17.1	40	0.05	11.2	15.2	17	200	15.4	17.2	20
BZV55C18	18	16.8	19.1	45	0.05	12.6	16.7	19	225	16.9	19.2	20
BZV55C20	20	18.8	21.2	55	0.05	14	18.7	21.1	225	18.9	21.4	20
BZV55C22	22	20.8	23.3	55	0.05	15.4	20.7	23.2	250	20.9	23.4	25
BZV55C24	24	22.8	25.6	70	0.05	16.8	22.7	25.5	250	22.9	25.7	25
	V_{Z1} Below @ I_{ZT1} = 2 mA			Z_{ZT1} Below @ I_{ZT1} = 2 mA			V_{Z2} Below @ I_{ZT2} = 0.1 mA		Z_{ZT2} Below @ I_{ZT4} = 0.5 mA (Note 2)	V_{Z3} Below @ I_{ZT3} = 10 mA		Z_{ZT3} Below @ I_{ZT3} = 10 mA
BZV55C27	27	25.1	28.9	80	0.05	18.9	25	28.9	300	25.2	29.3	45
BZV55C30	30	28	32	80	0.05	21	27.8	32	300	28.1	32.4	50
BZV55C33	33	31	35	80	0.05	23.1	30.8	35	325	31.1	35.4	55
BZV55C36	36	34	38	90	0.05	25.2	33.8	38	350	34.1	38.4	60
BZV55C39	39	37	41	130	0.05	27.3	36.7	41	350	37.1	41.5	70
BZV55C43	43	40	46	150	0.05	30.1	39.7	46	375	40.1	46.5	80
BZV55C47	47	44	50	170	0.05	32.9	43.7	50	375	44.1	50.5	90
BZV55C51	51	48	54	180	0.05	35.7	47.6	54	400	48.1	54.6	100
BZV55C56	56	52	60	200	0.05	39.2	51.5	60	425	52.1	60.8	110

NOTES: 1. Zener voltage is measured with a pulse test current (I_Z) applied at an ambient temperature of 25°C.

2. The zener impedance, Z_{ZT2}, for the 27 through 56 volt types is tested at 0.5 mA rather than the test current of 0.1 mA used for V_{Z2}.

Note: See Tape and Reel under Technical Data Section for reel size,quantity and ordering information.

Leadless Zeners (T_A = 25°C, V_F = 0.9 V Max at I_F = 10 mA for all types)

Type Number (Note 1)	Zener Voltage V_Z @ I_{ZT} = 50 μA Volts			Maximum Reverse Current I_R μA (Note 3)	Test Voltage V_R Volts	Maximum Zener Current I_{ZM} mA (Note 2)	Maximum Voltage Change ΔV_Z Volts (Note 4)
	Nom (Note 5)	Min	Max				
MLL4678	1.8	1.71	1.89	7.5	1	120	0.7
MLL4679	2	1.9	2.1	5	1	110	0.7
MLL4680	2.2	2.09	2.31	4	1	100	0.75
MLL4681	2.4	2.28	2.52	2	1	95	0.8
MLL4682	2.7	2.565	2.835	1	1	90	0.85
MLL4683	3	2.85	3.15	0.8	1	85	0.9
MLL4684	3.3	3.135	3.465	7.5	1.5	80	0.95
MLL4685	3.6	3.42	3.78	7.5	2	75	0.95
MLL4686	3.9	3.705	4.095	5	2	70	0.97
MLL4687	4.3	4.085	4.515	4	2	65	0.99
MLL4688	4.7	4.465	4.935	10	3	60	0.99
MLL4689	5.1	4.845	5.355	10	3	55	0.97
MLL4690	5.6	5.32	5.88	10	4	50	0.96
MLL4691	6.2	5.89	6.51	10	5	45	0.95
MLL4692	6.8	6.46	7.14	10	5.1	35	0.9
MLL4693	7.5	7.125	7.875	10	5.7	31.8	0.75
MLL4694	8.2	7.79	8.61	1	6.2	29	0.5
MLL4695	8.7	8.265	9.135	1	6.6	27.4	0.1
MLL4696	9.1	8.645	9.555	1	6.9	26.2	0.08
MLL4697	10	9.5	10.5	1	7.6	24.8	0.1
MLL4698	11	10.45	11.55	0.05	8.4	21.6	0.11
MLL4699	12	11.4	12.6	0.05	9.1	20.4	0.12
MLL4700	13	12.35	13.65	0.05	9.8	19	0.13
MLL4701	14	13.3	14.7	0.05	10.6	17.5	0.14
MLL4702	15	14.25	15.75	0.05	11.4	16.3	0.15
MLL4703	16	15.2	16.8	0.05	12.1	15.4	0.16
MLL4704	17	16.15	17.85	0.05	12.9	14.5	0.17
MLL4705	18	17.1	18.9	0.05	13.6	13.2	0.18
MLL4706	19	18.05	19.95	0.05	14.4	12.5	0.19
MLL4707	20	19	21	0.01	15.2	11.9	0.2
MLL4708	22	20.9	23.1	0.01	16.7	10.8	0.22
MLL4709	24	22.8	25.2	0.01	18.2	9.9	0.24
MLL4710	25	23.75	26.25	0.01	19	9.5	0.25
MLL4711	27	25.65	28.35	0.01	20.4	8.8	0.27
MLL4712	28	26.6	29.4	0.01	21.2	8.5	0.28
MLL4713	30	28.5	31.5	0.01	22.8	7.9	0.3
MLL4714	33	31.35	34.65	0.01	25	7.2	0.33
MLL4715	36	34.2	37.8	0.01	27.3	6.6	0.36
MLL4716	39	37.05	40.95	0.01	29.6	6.1	0.39
MLL4717	43	40.85	45.15	0.01	32.6	5.5	0.43

NOTE 1. TOLERANCE AND VOLTAGE DESIGNATION (V_Z)

The type numbers shown have a standard tolerance of ±5% on the nominal zener voltage.

NOTE 2. MAXIMUM ZENER CURRENT RATINGS (I_{ZM})

Maximum zener current ratings are based on maximum zener voltage of the individual units.

NOTE 3. REVERSE LEAKAGE CURRENT (I_R)

Reverse leakage currents are guaranteed and are measured at V_R as shown on the table.

NOTE 4. MAXIMUM VOLTAGE CHANGE (ΔV_Z)

Voltage change is equal to the difference between V_Z at 100 μA and V_Z at 10 μA.

NOTE 5. ZENER VOLTAGE (V_Z) MEASUREMENT

Nominal zener voltage is measured with the device junction in thermal equilibrium at the case temperature of 30°C ±1°C.

Leadless Zeners (T_A = 25°C, V_F = 0.9 V Max at I_F = 10 mA for all types)

Type No. (Note 1)	Nominal Zener Voltage V_Z @ I_{ZT} Volts (Note 2)	Test Current I_{ZT} mA	Max Zener Impedance		Max Reverse Leakage Current		Max Zener Voltage Temperature Coeff.
			Z_{ZT} @ I_{ZT} Ohms	Z_{ZK} @ I_{ZK} = 0.25 mA Ohms	I_R μA	@ V_R Volts	θ_{VZ} (%/°C) (Note 3)
MLL5221B	2.4	20	30	1200	100	1	−0.085
MLL5222B	2.5	20	30	1250	100	1	−0.085
MLL5223B	2.7	20	30	1300	75	1	−0.08
MLL5224B	2.8	20	30	1400	75	1	−0.08
MLL5225B	3	20	29	1600	50	1	−0.075
MLL5226B	3.3	20	28	1600	25	1	−0.07
MLL5227B	3.6	20	24	1700	15	1	−0.065
MLL5228B	3.9	20	23	1900	10	1	−0.06
MLL5229B	4.3	20	22	2000	5	1	±0.055
MLL5230B	4.7	20	19	1900	5	2	± 0.03
MLL5231B	**5.1**	**20**	**17**	**1600**	**5**	**2**	**± 0.03**
MLL5232B	5.6	20	11	1600	5	3	+0.038
MLL5233B	**6**	**20**	**7**	**1600**	**5**	**3.5**	**+0.038**
MLL5234B	6.2	20	7	1000	5	4	+0.045
MLL5235B	6.8	20	5	750	3	5	+0.05
MLL5236B	7.5	20	6	500	3	6	+0.058
MLL5237B	8.2	20	8	500	3	6.5	+0.062
MLL5238B	8.7	20	8	600	3	6.5	+0.065
MLL5239B	9.1	20	10	600	3	7	+0.068
MLL5240B	10	20	17	600	3	8	+0.075
MLL5241B	11	20	22	600	2	8.4	+0.076
MLL5242B	12	20	30	600	1	9.1	+0.077
MLL5243B	13	9.5	13	600	0.5	9.9	+0.079
MLL5244B	**14**	**9**	**15**	**600**	**0.1**	**10**	**+0.082**
MLL5245B	15	8.5	16	600	0.1	11	+0.082
MLL5246B	16	7.8	17	600	0.1	12	+0.083
MLL5247B	17	7.4	19	600	0.1	13	+0.084
MLL5248B	18	7	21	600	0.1	14	+0.085
MLL5249B	19	6.6	23	600	0.1	14	+0.086
MLL5250B	20	6.2	25	600	0.1	15	+0.086
MLL5251B	22	5.6	29	600	0.1	17	+0.087
MLL5252B	**24**	**5.2**	**33**	**600**	**0.1**	**18**	**+0.088**
MLL5253B	25	5	35	600	0.1	19	+0.089
MLL5254B	27	4.6	41	600	0.1	21	+0.09
MLL5255B	28	4.5	44	600	0.1	21	+0.091
MLL5256B	30	4.2	49	600	0.1	23	+0.091
MLL5257B	33	3.8	58	700	0.1	25	+0.092
MLL5258B	36	3.4	70	700	0.1	27	+0.093
MLL5259B	39	3.2	80	800	0.1	30	+0.094
MLL5260B	43	3	93	900	0.1	33	+0.095
MLL5261B	47	2.7	105	1000	0.1	36	+0.095
MLL5262B	51	2.5	125	1100	0.1	39	+0.096
MLL5263B	56	2.2	150	1300	0.1	43	+0.096

(continued)

Note: See Tape and Reel under Technical Data Section for reel size, quantity and ordering information.

NOTE 1. TOLERANCE

Units shown indicate a tolerance of ±5%.

NOTE 2. SPECIAL SELECTIONS AVAILABLE:

For information on special selections contact your nearest Motorola representative.

NOTE 3. TEMPERATURE COEFFICIENT (θ_{VZ})

Test conditions for temperature coefficient are as follows:

a. I_{ZT} = 7.5 mA, T_1 = 25°C,
T_2 = 125°C (MLL5221B through MLL5242B).

b. I_{ZT} = Rated I_{ZT}, T_1 = 25°C,
T_2 = 125°C (MLL5243B through MLL5263B).

Units shown indicate a tolerance of ±5%.

Device to be temperature stabilized with current applied prior to reading breakdown voltage at the specified ambient temperature.

NOTE 4. ZENER VOLTAGE (V_Z) MEASUREMENT

Nominal zener voltage is measured with the device junction in thermal equilibrium at the case temperature of 30°C ±1°C.

NOTE 5. ZENER IMPEDANCE (Z_Z) DERIVATION

Z_{ZT} and Z_{ZK} are measured by dividing the ac voltage drop across the device by the ac current applied. The specified limits are for I_Z(ac) = 0.1 x I_Z(dc) with the ac frequency = 1 kHz.

Discrete Military Devices

Small-Signal Transistors CASE 176C-01, MICRO-C

Device	Marking	$V_{(BR)CEO}$	h_{FE}		
			Min	Max	@ I_C (mA)
NPN					
MMCM2484HXV	484	60	250	800	1
MMCM2222AHXV	222	50	75	325	1
MMCM2369AHXV	369	15	40	120	10
MMCM918HXV	918	15	20	200	3
PNP					
MMCM3251AHXV	251	60	100	300	10
MMCM2907AHXV	907	60	100	450	1
MMCM2605HXV	605	60	150	450	0.5

RF Transistors CASE 303-01

Device	Marking	$V_{(BR)CEO}$	h_{FE}		
			Min	Max	@ I_C (mA)
NPN					
MRF6604HXV	JV6604	15	30	200	30
MRF66043HXV	JV6603	15	30	200	15
PNP					
MRF522HXV	522	10	25	125	30

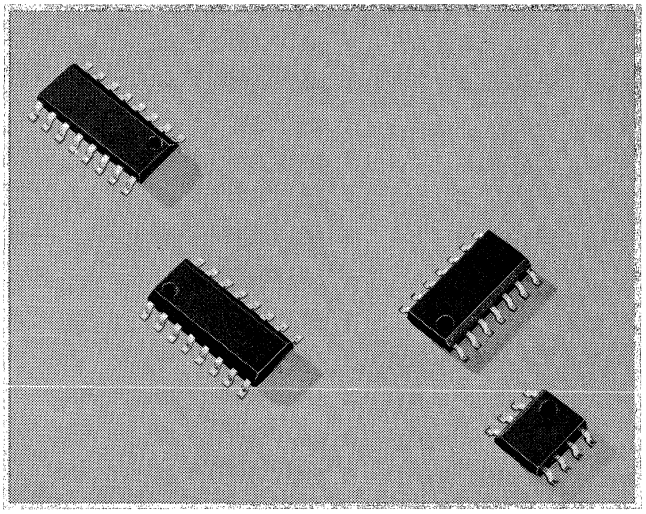
Small-Signal Dual Transistors CASE 610A-04, 6 LEAD FLAT PACK

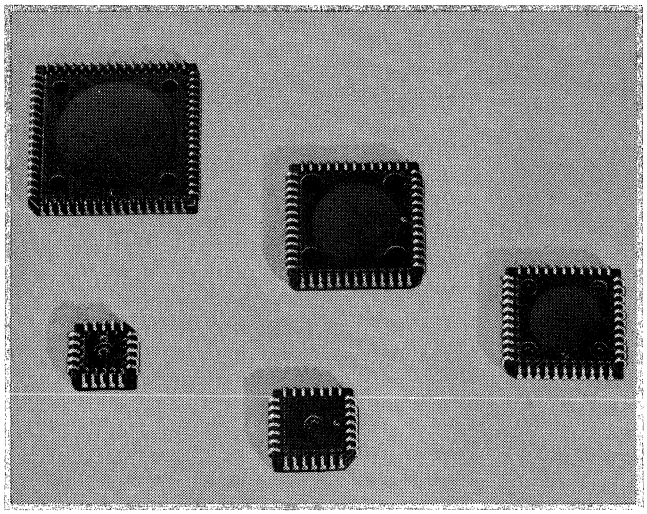
Device	Polarity	$V_{(BR)CEO}$	h_{FE}		
			Min	Max	@ I_C (mA)
MD2484FHXV	NPN	60	250	800	1
MD2219AFHXV	NPN	50	75	325	1
MD2369AFHXV	NPN	15	40	120	10
MD918FHXV	NPN	15	20	200	3
MD918AFHXV	MATCHED	15	20	200	3
MD3251AFHXV	PNP	60	100	300	10
MD2905AFHXV	PNP	60	100	450	1
MD2605HXV	PNP	60	150	450	0.5
MD3468FHXV	PNP	50	25	75	500
MD6002FHXV	NPN/PNP	30	100	300	100

Small-Signal Quad Transistors CASE 607-04 14 LEAD FLAT PACK

Device	Marking	$V_{(BR)CEO}$	h_{FE}		
			Min	Max	@ I_C (mA)
MQ2484HXV	NPN	60	250	800	1
2N6990JTXV	NPN	50	75	325	1
MQ2369AHXV	NPN	15	40	120	10
MQ918HXV	NPN	15	20	200	3
MQ3251AHXV	PNP	60	100	300	10
2N6988JTXV	PNP	60	100	450	1
MQ2605HXV	PNP	60	150	450	0.5
MQ3468HXV	PNP	50	25	75	500
MQ6002HXV	NPN/PNP	30	100	300	100

Integrated Circuits Product Lines





Standard JEDEC and EIAJ Packaging Used Throughout

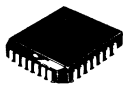
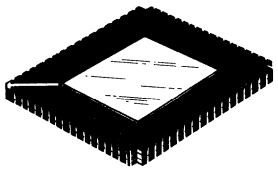
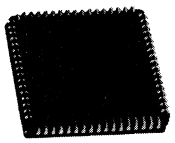
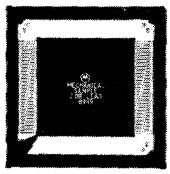
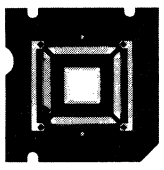
Small-outline packages are assembled in either narrow body (0.15") or wide body (0.300") widths. The package, narrow or wide, is used depending on the IC die size and/or number of pins. All SOIC packages are the common gull-wing design complying with EIA JEDEC packaging standards utilized world-wide.

Plastic leaded chip carrier (PLCC) packages are available for larger pin-count LSI functions. All packages are symmetrical, having equal lead-count on all four sides. The packages are square for the 3 logic familes and the special functions. Standard marking for Pin 1 orientation is noted on the package. Each of the PLCC packages complies with EIA JEDEC packaging standards for dimensions. All PLCC's have rolled-under "J" lead designs.

ASIC Products

General Packaging Information

The following is a list of package offerings for commercial arrays. The diversity of package style and pin count lets the designer best match system size, cost, and performance requirements.

PLCC	Plastic (non-hermetic) Leaded Chip Carrier (for production parts).	
LCC	Commercial Prototype parts come in ceramic (hermetic) Leadless Chip Carrier (LCC).	
JLDQ	Commercial Prototype parts come in ceramic (hermetic) J-Leaded Chip Carrier. A compatible footprint to the PLCC.	
QFP (EIAJ)	Plastic (non-hermetic) Quad Flat Pack for production parts.	
CQFP (EIAJ)	Commercial Prototype parts come in ceramic (non-hermetic) Quad Flat Pack.	
QFP (MCR)	Plastic (non-hermetic) Quad Flat Pack for production parts in a Molded Carrier Ring.	
TAB	Tape Automated Bond Tape, Die on tape is supplied in a specially designed carrier.	

This packaging information is intended to be used as a supplement to formally published design manuals and data sheets for Motorola Semicustom Circuits. If a conflict occurs in the packaging information between documents, consult a local Motorola sales office to obtain the latest information.

Package Information

PLASTIC LEADED CHIP CARRIER

The Plastic (non-hermetic) Leaded Chip Carriers (PLCCs) are square, low profile packages, whose chip cavity is the largest portion of the package size. The body of the PLCC is very similar to a Flat Pack, however the leads of the PLCC are bent under the package rather than parallel to the seating plane as in a Flat Pack. The PLCC's are offered in lead counts ranging from 28 to 84 leads, with 40 or 50 mil pitch. Because the leads are short and bent under the package it may be easier to assemble than a Flat Pack. However, the choice of using a PLCC or a PQFP would be based on the final assembly technique utilized.

LEADLESS CHIP CARRIER

The Leadless Chip Carrier (LCC), is a low profile, light weight, surface mount, solder-seal, ceramic (hermetic) package with a gold plated kovar lid and gold plated leads. Like the PLCC, the LCC is also square, with leads which line all four sides of the package. There are three types of LCCs; A, B and C. Type A LCCs are typically used for high power devices. Products, which do not typically require special heatsinks or cooling techniques because of low power dissipation are offered in Type B or C LCCs. All lead counts 52 and below are available in Type C (surface mount) chip carriers. The 68 and 84 LCCs are Type B (socketable). Leadless Chip Carriers (LCCs) are not offered as Commercial production packages, but are used for commercial prototypes.

CERAMIC LEADED CHIP CARRIER

The Ceramic (hermetic) Leaded Chip Carrier (JLDQ), like the PLCC is a square, low profile package with the same footprint as the PLCC. Ceramic Leaded Chip Carriers (JLDQs) are not offered as production packages, but are used for commercial prototypes.

PLASTIC QUAD FLAT PACK (EIAJ)

The Plastic (non-hermetic) Quad Flat Packs (QFP) are either square or rectangular, low profile packages, with leads which originate from all four sides and project out parallel to the seating plane. The leads can be bent such that they surface mount to a PC board. This allows for the elimination of through holes in the PC board, thus increasing its routability over through-board type packaging. The leads range in pitch from 0.040 to 0.020 of an inch and have lead counts from 64 to 208. The leads can be left flat or formed with an upward or downward bend as desired. To ensure straight leads, all devices are shipped in robotic compatible trays.

CERAMIC QUAD FLAT PACK (EIAJ)

The Ceramic (non-hermetic) Quad Flat Pack (CQFP), like the QFP is also a square or rectangular low profile package with the same footprint as the plastic QFP. Ceramic Quad Flat Pack Packages are not offered for commercial production, but are used for prototypes.

NOTE: The QFP and CQFP packages are not JEDEC (Joint Electron Device Engineering Council) type packages but are instead, EIAJ (Electronic Industry Association of Japan).

Package Construction Cross Reference

Construction Features	Package Type					
	PLCC	LCC	JLDQ	QFP	CQFP	TAB
Hermetic		X	X			
Non-Hermetic	X			X	X	X
Silver Glass Die Attach		X	X		X	
Epoxy Die Attach	X			X		
Gold Ball Wire Bond	X			X		
Aluminum Wire Bond		X	X		X	
TAB (Tape Automated Bond)						X
Ceramic/Al_2O_3 Base		X	X		X	
PCB Base						
Ceramic Lid			X		X	
Kovar Lid		X				
Black Anodized Al Lid						
Molding Compound (Novalac Epoxy — Alumina Filled)	X			X		
By Pass Capacitors						
Alloy 42/Kovar Leads/Pins	X		X	X	X	
Copper Leads/Pins	X			X**		X
Phosphor Bronze Pins						
Sn/Pb Lead Finish	X			X		
Gold Lead Finish		X	X		X	
Tin Lead Finish						X
Single Layer Metal Tape						X
Double Layer Metal Tape						X
Heat Sink Attached						
Thermal Slug						
Alignment/Polarity Pin						

Detailed information for ASIC Arrays is available separately in Motorola's document BR916/D — "Packaging Manual for ASIC Arrays." Contact your local sales office for details.
**When in a Molded Carrier Ring

Package Outline Cross Reference

Basic Case Description	Pin-Out	Special Features	Case Outline No.	Case Code
Plastic Leaded Chip Carrier **(PLCC)**	28		776-02	PR
	44		777-02	PK
	52		778-02	PM
	68		779-02	PG
	84		780-01	PI
Leadless Chip Carrier (LCC)	28	Cavity Up	786-01	ZM
	44	Cavity Up	788-01	ZG
	68	Cavity Down (Bipolar)	745-01	ZC
	68	Cavity Up	760A	ZJ
	84	Cavity Down (Bipolar)	799-01	ZB
	84	Cavity Up	794-01	ZK
Ceramic Leaded Chip Carrier **(JLDQ)**	28	J-Leads	N/A	JA
	44	J-Leads	N/A	JB
	52	J-Leads	N/A	JC
	68	J-Leads	N/A	JD
	84	J-Leads	N/A	JE
Plastic Quad Flat Pack **(QFP)** - EIAJ	64		N/A	FB
	80		N/A	FC
	100		N/A	FD
	120		N/A	FG
See Note* on Molded	128		N/A	CA
Carrier Ring (MCR)	160		N/A	FH
	208			FY
Ceramic Quad Flat Pack **(CQFP)** - EIAJ	64		N/A	FI
	80		N/A	FJ
	100		N/A	FK
	120		N/A	FL
	128		N/A	FV
	160		N/A	FM
	208		N/A	FZ
M-Quad Metal Quad Flat Pak	160		N/A	EA
	208		N/A	EB
Tape Automated Bond Tape **(TAB)**	188	Single Layer Metal	N/A	TF
	360	Double Layer Metal	N/A	TA
	360	Single Layer Metal	N/A	TE

NA = Not Available

*Note: When the Molded Carrier Ring is made available, the first letter of the case code will change to an 'M' e. g., 64 QFP is FB, with an MCR the case code would be MB.

ASIC PRODUCTS (continued)

HCA62A00 Series...2-Micron CMOS Arrays

	Array							
	62A06	**62A10**	**62A17**	**62A25**	**62A36**	**62A50**	**62A67**	**62A85**
# of Programmable Signal or Power & Ground Pads	44	54	68	86	102	124	146	168
28 PLCC	X	X	X					
44 PLCC	X	X	X	X	X	X		
52 PLCC		X	X	X	X	X		
68 PLCC			X	X	X	X	X	X
84 PLCC				X	X	X	X	X
64 QFP			X	X	X			
80 QFP			X	X	X	X		
100 QFP					X	X		
120 QFP						X	X	X
160 QFP							X	X
X = Available								

PLCC: Plastic Leaded Chip Carrier
JLDQ: J-Lead Ceramic Chip Carrier
QFP: Plastic Quad Flat Pack
CQFP: Ceramic Quad Flat Pack

HDC Series...1-Micron CMOS Arrays

	Array									
	HDC003	**HDC006**	**HDC008**	**HDC011**	**HDC016**	**HDC027**	**HDC031**	**HDC049**	**HDC064**	**HDC105**
# of I/O Cells	88	120	144	168	204	264	280	352	300	512
# of Programmable Signal or Power & Ground Pads	68	88	100	112	128	160	164	208	224	268
# of Dedicated Power & Ground Pads	8	8	8	8	8	8	16	8	16	32
COMMERCIAL										
28 PLCC	X	X	X							
44 PLCC	X	X	X							
68 PLCC	X	X	X	X	X		X			
84 PLCC		X	X	X	X		X			
64 QFP (MCR)	X	X	X	X	X					
80 QFP (MCR)		X	X	X	X		X			
100 QFP (MCR)			X	X	X		X			
120 QFP (MCR)					X		X			
128 QFP (MCR)						X	X	X		
144 QEP (MCR)					X		X		X	
160 QEP (MCR)						X	X			
208 QFP (MCR)								X	X	
160 M-Quad									D	D
180 M-Quad									D	D

X = Available D = In Development P = Planned
PLCC: Plastic Leaded Chip Carrier
LCC: Ceramic Leaded Chip Carrier
JLDQ: J-Lead Ceramic Chip Carrier
MCR: Molded Carrier Ring
QFP: Plastic Quad Flat Pack
CQFP: Ceramic Quad Flat Pack
M-Quad: Metal Quad Flat Pak (consult factory for mechanical drawings)

MCA2 Series

Array	MCA 800ECL
MAX # of I/O Ports	54
Package Type	
68 LCC	X

X = Available

MCA3 ECL Series

Array	MCA 800ECL
MAX # of I/O Ports	256
360 TAB	X

CASE 403A-03

Microcomputer Components

Motorola offers many of its popular microprocessors, peripherals, and communication devices in surface-mount packages. The "J"-leaded plastic leaded chip carrier (PLCC) is available in 44-, 52-, 68-, and 84-lead packages.

Several of Motorola's microprocessors are now available in the gull-winged plastic quad flat pack (PQFP) and ceramic quad flat pack (CQFP) in 68- and 132-lead packages. The following table lists the Motorola products available for the PLCC, PQFP, and CQFP packaging.

MC68000 Family Surface-Mount Packaging

Device	Description	Packing			Leads					MHz
		FN	FC	FE	44	52	68	84	132	
Microprocessors										
MC68030	32-Bit MPU (MMU On-Chip)			X					X	16, 20, 25, 33
MC68020	32-Bit Virtual Memory MPU		X	X					X	16, 20, 25
MC68010	16-/32-Bit Virtual Memory MPU	X					X			8, 10, 12
MC68000	16-/32-Bit MPU	X					X			8, 10, 12, 16
MC68HC000	HCMOS 16-/32-Bit MPU	X	X				X			8, 10, 12, 16
MC68HC001	HCMOS 8-/16-/32-Bit MPU	X	X				X			8, 10, 12, 16
MC68008	Reduced-Bus 8-Bit M68000	X				X				8, 10
Integrated Processors										
MC68302	Integrated Multiprotocol Processor			X					X	16
MC68332	Integrated Microcontroller			X					X	16
General-Purpose Peripherals										
MC68881	Floating-Point Coprocessor	X					X			12, 16, 20
MC68882	Enhanced Floating-Point Coprocessor	X					X			16, 20, 25, 33, 40
MC68440	Expanded Dual DMA for 16-/32-Bit Applications	X					X			8, 10
MC68230	Parallel Interface Timer	X				X				8, 10
MC68901	Multifunction Peripheral	X				X				4
Communications										
MC68605	X.25 Protocol Controller	X						X		10, 12, 16
MC68606	Multilink LAPD Protocol Controller	X						X		12, 16
MC68681	DUART, M68000 I/F	X			X					—
MC2681	DUART, General-Purpose I/F	X			X					—
MC68824	Token Bus Controller, MAP	X						X		10, 12
MC68185	Twisted-Pair Modem	X			X					—
MC68194	Carrierband Modem	X				X				—

FN - Plastic Leaded Chip Carrier (PLCC)
FC - Plastic Quad Flat Pack (PQFP)
FE - Ceramic Quad Flat Pack (CQFP)

MCUs

Device	ROM	RAM	EEPROM	Timer	SPI	SCI	Input Capture	Output Compares	A/D Converter	Real-Time Interrupt	Watchdog	I/O	Bus Speed MHz	Package†
M6805 (HMOS)														
MC6805R2	2048	64	0	8-Bit	No	No	—	—	Yes	No	No	32	0.1-1.0	44-FN
MC6805R3	4k	112	0	8-Bit	No	No	—	—	Yes	No	No	32	0.1-1.0	44-FN
MC6805R6	4k	112	0	8-Bit	No	No	—	—	Yes	No	No	32	0.1-1.0	44-FN
MC6805U2	2048	64	0	8-Bit	No	No	—	—	No	No	No	32	0.1-1.0	44-FN
MC6805U3	3776	112	0	8-Bit	No	No	—	—	No	No	No	32	0.1-1.0	44-FN
MC6805P2	1110	64	0	8-Bit	No	No	—	—	No	No	No	N/A	0.1-1.0	28-FN
M68HC05 (HCMOS)														
MC68HC05A6	4K	176	2096	16-Bit	Yes	Yes	1	1	No	No	No	24	0-2.1	44-FN
MC68HC05B4	4K	176	0	16-Bit	No	Yes	2	2	Yes	No	No	32	0-2.1	52-FN
MC68HC05B6	6K	176	256	16-Bit	No	Yes	2	2	Yes	No	No	32	0-2.1	52-FN
MC68HC05C4	4K	176	0	16-Bit	Yes	Yes	1	1	No	No	No	31	0-4.0	44-FN 44-FB
MC68HC05C8	8K	176	0	16-Bit	Yes	Yes	1	1	No	No	No	31	0-4.0	44-FN 44-FB
MC68HC05C9	16K	352	0	16-Bit	Yes	Yes	1	1	No	No	Yes	31	0-2.1	44-FN
MC68HC05J1	1K	64	0	15-Bit	No	No	—	—	No	No	Yes	14	0-2.0	20-DW
MC68HC05L6	6K	176	0	**	Yes	No	1	1	No	No	No	24	0-2.1	68-FN
MC68HC05M4	4K	128	0	16-Bit 8-Bit	No	No	1	1	Yes	No	No	32	0-2.1	52-FN
MC68HC05P1	2K	128	0	16-Bit	No	No	1	1	No	No	No	21	0-2.1	28-DW
MC68HC05P7	2K	128	0	16-Bit	No	No	1	1	No	No	Yes	21	0-2.1	28-DW
MC68HC05P8	2K	112	32	16-Bit 15-Bit	—	—	—	—	Yes	Yes	Yes	20	0-2.0	28-DW

One Time Programmable MCUs

Device	Available	RAM	EPROM	Serial	A/D	Timer	I/O	Package†
MC68HC705B5	2Q90	176	6.3K	SCI	Yes	16-Bit	32	52-FN
MC68HC705C8	Now	304	8K	SCI, SPI	No	16-Bit	24	44-FN
MC68HC705J2	3Q90	64	2K	No	No	15-Bit	14	20-DW
MC68HC705P9	2Q90	128	2K	SIOP	Yes	16-Bit	21	28-DW
MC68705R3	Now	112	4K	No	Ys	8-Bit	32	44-FN
MC68HC711D3	Now	192	4K	SCI, SPI	No	16-Bit	32	44-FN
MC68HC711E9	3Q90	512	12K	SCI, SPI	Yes	16-Bit	29	52-FN

† FN — Plastic Quad (PLCC)
FB — Quad Flatpack (QFP)
DW — Small Outline (Wide Body SOIC)

Peripherals

Device	Function	Leads
MC146823FN	CMOS PIA (Peripheral Interface Adapter)	44 28
MC146818AFN	CMOS Real Time Clock plus RAM	44
MC68HC24FN	HCMOS I/O Port Expander	

Digital Signal Processing

Device	Function	Leads
DSP56000FE20	24-Bit Digital Signal Processor (ROM) 20.5 MHz	132
DSP56001FE20	24-Bit Digital Signal Processor (RAM) 20.5 MHz	132
DSP56001FE27	24-Bit Digital Signal Processor (RAM) 20.5 MHz	132

MOS Memories

MOS Memories

Device	Device Description	Package Description	Case Outline
MCM511000AJ70	1Mx1 DRAM 70 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM511000AJ80	1Mx1 DRAM 80 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM511001AJ10	1Mx1 DRAM 100 ns Nibble Mode	20 Lead 300 Mil SOJ	822–03
MCM511001AJ70	1Mx1 DRAM 70 ns Nibble Mode	20 Lead 300 Mil SOJ	822–03
MCM511001AJ80	1Mx1 DRAM 80 ns Nibble Mode	20 Lead 300 Mil SOJ	822–03
MCM511002AJ10	1Mx1 DRAM 100 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM511002AJ70	1Mx1 DRAM 70 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM511002AJ80	1Mx1 DRAM 80 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM51L1000AJ10	1Mx1 DRAM 100 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L1000AJ70	1Mx1 DRAM 70 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L1000AJ80	1Mx1 DRAM 80 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM514256AJ10	256Kx4 DRAM 100 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514256AJ70	256Kx4 DRAM 70 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514256AJ80	256Kx4 DRAM 80 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514258AJ10	256Kx4 DRAM 100 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM514258AJ70	256Kx4 DRAM 70 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM514258AJ80	256Kx4 DRAM 80 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM51L4256AJ10	256Kx4 DRAM 100 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L4256AJ70	256Kx4 DRAM 70 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L4256AJ80	256Kx4 DRAM 80 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L4100J10	4Mx1 DRAM 100 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01
MCM51L4100J80	4Mx1 DRAM 80 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01
MCM51L4400J10	1Mx4 DRAM 100 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01
MCM51L4400J80	1Mx4 DRAM 80 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01
MCM514100AJ10	4Mx1 DRAM 100 ns Page Mode	20 Lead 350 Mil SOJ	822A–01
MCM514100AJ60	4Mx1 DRAM 60 ns Page Mode	20 Lead 350 Mil SOJ	822A–01
MCM514100AJ70	4Mx1 DRAM 70 ns Page Mode	20 Lead 350 Mil SOJ	822A–01
MCM514100AJ80	4Mx1 DRAM 80 ns Page Mode	20 Lead 350 Mil SOJ	822A–01
MCM514101AJ10	4Mx1 DRAM 100 ns Nibble Mode	20 Lead 350 Mil SOJ	822A–01
MCM514101AJ60	4Mx1 DRAM 60 ns Nibble Mode	20 Lead 350 Mil SOJ	822A–01
MCM514101AJ70	4Mx1 DRAM 70 ns Nibble Mode	20 Lead 350 Mil SOJ	822A–01
MCM514101AJ80	4Mx1 DRAM 80 ns Nibble Mode	20 Lead 350 Mil SOJ	822A–01
MCM514102AJ10	4Mx1 DRAM 100 ns Static Column	20 Lead 350 Mil SOJ	822A–01
MCM514102AJ60	4Mx1 DRAM 60 ns Static Column	20 Lead 350 Mil SOJ	822A–01
MCM514102AJ70	4Mx1 DRAM 70 ns Static Column	20 Lead 350 Mil SOJ	822A–01
MCM514102AJ80	4Mx1 DRAM 80 ns Static Column	20 Lead 350 Mil SOJ	822A–01
MCM514400AJ10	1Mx4 DRAM 100 ns Page Mode	20 Lead 350 Mil SOJ	822A–01
MCM514400AJ60	1Mx4 DRAM 60 ns Page Mode	20 Lead 350 Mil SOJ	822A–01
MCM514400AJ70	1Mx4 DRAM 70 ns Page Mode	20 Lead 350 Mil SOJ	822A–01
MCM514400AJ80	1Mx4 DRAM 80 ns Page Mode	20 Lead 350 Mil SOJ	822A–01
MCM514402AJ10	1Mx4 DRAM 100 ns Static Column	20 Lead 350 Mil SOJ	822A–01
MCM514402AJ60	1Mx4 DRAM 60 ns Static Column	20 Lead 350 Mil SOJ	822A–01
MCM514402AJ70	1Mx4 DRAM 70 ns Static Column	20 Lead 350 Mil SOJ	822A–01
MCM514402AJ80	1Mx4 DRAM 80 ns Static Column	20 Lead 350 Mil SOJ	822A–01
MCM514410AJ10	1Mx4 DRAM 100 ns Write Per Bit Mode	20 Lead 350 Mil SOJ	822A–01
MCM514410AJ60	1Mx4 DRAM 60 ns Write Per Bit Mode	20 Lead 350 Mil SOJ	822A–01
MCM514410AJ70	1Mx4 DRAM 70 ns Write Per Bit Mode	20 Lead 350 Mil SOJ	822A–01
MCM514410AJ80	1Mx4 DRAM 80 ns Write Per Bit Mode	20 Lead 350 Mil SOJ	822A–01
MCM51L4100AJ10	4Mx1 DRAM 100 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01
MCM51L4100AJ60	4Mx1 DRAM 60 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01

MOS Memories

Device	Device Description	Package Description	Case Outline
DRAMs			
MCM51L4100AJ80	4Mx1 DRAM 80 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01
MCM51L4400AJ10	1Mx4 DRAM 100 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01
MCM51L4400AJ60	1Mx4 DRAM 60 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01
MCM51L4400AJ70	1Mx4 DRAM 70 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01
MCM51L4400AJ80	1Mx4 DRAM 80 ns Page Mode (Low Power)	20 Lead 350 Mil SOJ	822A–01
MCM514100ANJ10	4Mx1 DRAM 100 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514100ANJ60	4Mx1 DRAM 60 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514100ANJ70	4Mx1 DRAM 70 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514100ANJ80	4Mx1 DRAM 80 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514101ANJ10	4Mx1 DRAM 100 ns Nibble Mode	20 Lead 300 Mil SOJ	822–03
MCM514101ANJ60	4Mx1 DRAM 60 ns Nibble Mode	20 Lead 300 Mil SOJ	822–03
MCM514101ANJ70	4Mx1 DRAM 70 ns Nibble Mode	20 Lead 300 Mil SOJ	822–03
MCM514101ANJ80	4Mx1 DRAM 80 ns Nibble Mode	20 Lead 300 Mil SOJ	822–03
MCM514102ANJ10	4Mx1 DRAM 100 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM514102ANJ60	4Mx1 DRAM 60 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM514102ANJ70	4Mx1 DRAM 70 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM514102ANJ80	4Mx1 DRAM 80 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM514400ANJ10	1Mx4 DRAM 100 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514400ANJ60	1Mx4 DRAM 60 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514400ANJ70	1Mx4 DRAM 70 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514400ANJ80	1Mx4 DRAM 80 ns Page Mode	20 Lead 300 Mil SOJ	822–03
MCM514402ANJ10	1Mx4 DRAM 100 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM514402ANJ60	1Mx4 DRAM 60 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM514402ANJ70	1Mx4 DRAM 70 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM514402ANJ80	1Mx4 DRAM 80 ns Static Column	20 Lead 300 Mil SOJ	822–03
MCM514410ANJ10	1Mx4 DRAM 100 ns Write Per Bit Mode	20 Lead 300 Mil SOJ	822–03
MCM514410ANJ60	1Mx4 DRAM 60 ns Write Per Bit Mode	20 Lead 300 Mil SOJ	822–03
MCM514410ANJ70	1Mx4 DRAM 70 ns Write Per Bit Mode	20 Lead 300 Mil SOJ	822–03
MCM514410ANJ80	1Mx4 DRAM 80 ns Write Per Bit Mode	20 Lead 300 Mil SOJ	822–03
MCM51L4100ANJ10	4Mx1 DRAM 100 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L4100ANJ60	4Mx1 DRAM 60 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L4100ANJ70	4Mx1 DRAM 70 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L4100ANJ80	4Mx1 DRAM 80 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L4400ANJ10	1Mx4 DRAM 100 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L4400ANJ60	1Mx4 DRAM 60 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L4400ANJ70	1Mx4 DRAM 70 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03
MCM51L4400ANJ80	1Mx4 DRAM 80 ns Page Mode (Low Power)	20 Lead 300 Mil SOJ	822–03

NOTE: The "R2" suffix on some device numbers denotes units packaged in Tape and Reel form.

General SRAMs

Device	Device Description	Package Description	Case Outline
MCM60L256AFC10	32Kx8 CMOS SRAM 100 ns Industrial Temp.	28 Lead 330 Mil SOG	751H–02
MCM60L256AFV10	32Kx8 CMOS SRAM 100 ns Extended Temp.	28 Lead 330 Mil SOG	751H–02

NOTE: The "R2" suffix on some device numbers denotes units packaged in Tape and Reel form.

FAST Static RAMs

Device	Device Description	Package Description	Case Outline
MCM6205NJ17	32K x 9 FSRAM 17 ns	32 Lead 300 Mil SOJ	857
MCM6205NJ20	32K x 9 FSRAM 20 ns	32 Lead 300 Mil SOJ	857
MCM6205NJ25	32K x 9 FSRAM 25 ns	32 Lead 300 Mil SOJ	857
MCM6205NJ35	32K x 9 FSRAM 35 ns	32 Lead 300 Mil SOJ	857
MCM6206NJ17	32K x 8 FSRAM 17 ns	28 Lead 300 Mil SOJ	810B
MCM6206NJ20	32K x 8 FSRAM 20 ns	28 Lead 300 Mil SOJ	810B
MCM6206NJ25	32K x 8 FSRAM 25 ns	28 Lead 300 Mil SOJ	810B
MCM6206J30	32K x 8 FSRAM 30 ns	28 Lead 400 Mil SOJ	810
MCM6206J35	32K x 8 FSRAM 35 ns	28 Lead 400 Mil SOJ	810
MCM6206J45	32K x 8 FSRAM 45 ns	28 Lead 400 Mil SOJ	810
MCM6706J10	32K x 8 FSRAM 10 ns	28 Lead 300 Mil SOJ	810B
MCM6706J12	32K x 8 FSRAM 12 ns	28 Lead 300 Mil SOJ	810B
MCM6706J15	32K x 8 FSRAM 15 ns	28 Lead 300 Mil SOJ	810B
MCM6207J15	256K x 1 FSRAM 15 ns	24 Lead 300 Mil SOJ	810A
MCM6207J20	256K x 1 FSRAM 20 ns	24 Lead 300 Mil SOJ	810A
MCM6207J25	256K x 1 FSRAM 25 ns	24 Lead 300 Mil SOJ	810A
MCM6207J35	256K x 81 FSRAM 35 ns	24 Lead 300 Mil SOJ	810A
MCM6208J35	64K x 4 FSRAM 35 ns	24 Lead 300 Mil SOJ	810A
MCM6208J15	64K x 4 FSRAM 15 ns	24 Lead 300 Mil SOJ	810A
MCM6208J20	64K x 4 FSRAM 20 ns	24 Lead 300 Mil SOJ	810A
MCM6208J25	64K x 4 FSRAM 25 ns	24 Lead 300 Mil SOJ	810A
MCM6708J10	64K x 4 FSRAM 10 ns	24 Lead 300 Mil SOJ	810A
MCM6708J12	64K x 4 FSRAM 12 ns	24 Lead 300 Mil SOJ	810A
MCM6708J15	64K x 4 FSRAM 15 ns	24 Lead 300 Mil SOJ	810A
MCM6209J35	64K x 4 FSRAM w/OE 35 ns	28 Lead 300 Mil SOJ	810B
MCM6209J15	64K x 4 FSRAM w/OE 15 ns	28 Lead 300 Mil SOJ	810B
MCM6209J20	64K x 4 FSRAM w/OE 20 ns	28 Lead 300 Mil SOJ	810B
MCM6209J25	64K x 4 FSRAM w/OE 25 ns	28 Lead 300 Mil SOJ	810B
MCM6709J10	64K x 4 FSRAM 10 ns	28 Lead 300 Mil SOJ	810B
MCM6709J12	64K x 4 FSRAM 12 ns	28 Lead 300 Mil SOJ	810B
MCM6709J15	64K x 4 FSRAM 15 ns	28 Lead 300 Mil SOJ	810B
MCM6226J25	128K x 8 FSRAM 25 ns	32 Lead 400 Mil SOJ	
MCM6226J30	128K x 8 FSRAM 30 ns	32 Lead 400 Mil SOJ	
MCM6228J25	256K x 4 FSRAM 25 ns	28 Lead 400 Mil SOJ	810
MCM6228J30	256K x 4 FSRAM 30 ns	28 Lead 400 Mil SOJ	810
MCM6264NJ15	8K x 8 FSRAM 15 ns	28 Lead 300 Mil SOJ	810B
MCM6264DNJ20	8K x 8 FSRAM 20 ns	28 Lead 300 Mil SOJ	810B
MCM6264DJ20	8K x 8 FSRAM 20ns	28 Lead 400 Mil SOJ	810
MCM6264DNJ25	8K x 8 FSRAM 25ns	28 Lead 300 Mil SOJ	810B
MCM6264DJ25	8K x 8 FSRAM 25ns	28 Lead 400 Mil SOJ	810
MCM6264NJ35	8K x 8 FSRAM 35ns	28 Lead 300 Mil SOJ	810B
MCM6264J35	8K x 8 FSRAM 35ns	28 Lead 400 Mil SOJ	810
MCM6264NJ45	8K x 8 FSRAM 45ns	28 Lead 300 Mil SOJ	810B
MCM6264J45	8K x 8 FSRAM 45ns	28 Lead 400 Mil SOJ	810
MCM6264NJ55	8K x 8 FSRAM 55ns	28 Lead 300 Mil SOJ	810B
MCM6264J55	8K x 8 FSRAM 55ns	28 Lead 400 Mil SOJ	810
MCM6264DNJC20	8K x 8 FSRAM 20 ns, Ind. Temp.	28 Lead 300 Mil SOJ	810B
MCM6264DJC20	8K x 8 FSRAM 20 ns, Ind. Temp.	28 Lead 400 Mil SOJ	810
MCM6264DNJC25	8K x 8 FSRAM 25 ns, Ind. Temp.	28 Lead 300 Mil SOJ	810B
MCM6264DJC25	8K x 8 FSRAM 25 ns, Ind. Temp.	28 Lead 400 Mil SOJ	810
MCM6264NJC35	8K x 8 FSRAM 35 ns, Ind. Temp.	28 Lead 300 Mil SOJ	810B
MCM6264JC35	8K x 8 FSRAM 35 ns, Ind. Temp.	28 Lead 400 Mil SOJ	810
MCM6264NJC45	8K x 8 FSRAM 45 ns, Ind. Temp.	28 Lead 300 Mil SOJ	810B
MCM6264JC45	8K x 8 FSRAM 45 ns, Ind. Temp.	28 Lead 400 Mil SOJ	810
MCM6264NJC55	8K x 8 FSRAM 55 ns, Ind. Temp.	28 Lead 300 Mil SOJ	810B
MCM6264JC55	8K x 8 FSRAM 55 ns, Ind. Temp.	28 Lead 400 Mil SOJ	810
MCM62L64NJ35	8K x 8 FSRAM 35 ns, Low Power	28 Lead 300 Mil SOJ	810B
MCM62L64J35	8K x 8 FSRAM 35 ns, Low Power	28 Lead 400 Mil SOJ	810
MCM62L64NJ45	8K x 8 FSRAM 45 ns, Low Power	28 Lead 300 Mil SOJ	810B
MCM62L64J45	8K x 8 FSRAM 45 ns, Low Power	28 Lead 400 Mil SOJ	810
MCM62L64NJ55	8K x 8 FSRAM 55 ns, Low Power	28 Lead 300 Mil SOJ	810B
MCM62L64J55	8K x 8 FSRAM 55 ns, Low Power	28 Lead 400 Mil SOJ	810

FAST Static RAMs

Device	Device Description	Package Description	Case Outline
MCM6265J15	8K x 9 FSRAM 15 ns	28 Lead 300 Mil SOJ	810B
MCM6265J20	8K x 9 FSRAM 20 ns	28 Lead 300 Mil SOJ	810B
MCM6265J25	8K x 9 FSRAM 25 ns	28 Lead 300 Mil SOJ	810B
MCM6270J20	4K x 4 FSRAM 20 ns	24 Lead 300 Mil SOJ	810A
MCM6270J35	4K x 4 FSRAM 25 ns	24 Lead 300 Mil SOJ	810A
MCM6270J25	4K x 4 FSRAM 35 ns	24 Lead 300 Mil SOJ	810A
MCM6287J12	64K x 1 FSRAM 12 ns	24 Lead 300 Mil SOJ	810A
MCM6287J15	64K x 1 FSRAM 15 ns	24 Lead 300 Mil SOJ	810A
MCM6287J20	64K x 1 FSRAM 20 ns	24 Lead 300 Mil SOJ	810A
MCM6287J25	64K x 1 FSRAM 25 ns	24 Lead 300 Mil SOJ	810A
MCM6287J35	64K x 1 FSRAM 35 ns	24 Lead 300 Mil SOJ	810A
MCM6290J12	16K x 4 FSRAM w/OE 12 ns	24 Lead 300 Mil SOJ	810A
MCM6290J15	16K x 4 FSRAM w/OE 15 ns	24 Lead 300 Mil SOJ	810A
MCM6290J20	16K x 4 FSRAM w/OE 20 ns	24 Lead 300 Mil SOJ	810A
MCM6290J25	16K x 4 FSRAM w/OE 25 ns	24 Lead 300 Mil SOJ	810A
MCM6290J30	16K x 4 FSRAM w/OE 30 ns	24 Lead 300 Mil SOJ	810A
MCM6290J35	16K x 4 FSRAM w/OE 35 ns	24 Lead 300 Mil SOJ	810A
MCM6290J45	16K x 4 FSRAM w/OE 45 ns	24 Lead 300 Mil SOJ	810A

Application Specific Memories

Device	Device Description	Package Description	Case Outline
MCM4180J18	4K x 4 Cache Tag RAM 18 ns	24 Lead 300 Mil SOJ	810A
MCM4180J20	4K x 4 Cache Tag RAM 20 ns	24 Lead 300 Mil SOJ	810A
MCM4180J25	4K x 4 Cache Tag RAM 25 ns	24 Lead 300 Mil SOJ	810A
MCM56824FN25	8K x 24 DSPRAM T .25 ns	52 Lead PLCC	778
MCM56824FN35	8K x 24 DSPRAM 35 ns	52 Lead PLCC	778
MCM62110FN15	32K x 9 Sync. Dual 1/0 15 ns	52 Lead PLCC	778
MCM62110FN20	32K x 9 Sync. Dual 1/0 20 ns	52 Lead PLCC	778
MCM62350J18	4K x 4 Cache Tag RAM 18 ns	24 Lead 300 Mil SOJ	810A
MCM62350J20	4K x 4 Cache Tag RAM 20 ns	24 Lead 300 Mil SOJ	810A
MCM62350J25	4K x 4 Cache Tag RAM 25 ns	24 Lead 300 Mil SOJ	810A
MCM62351J18	4K x 4 Cache Tag RAM 18 ns	24 Lead 300 Mil SOJ	810A
MCM62351J20	4K x 4 Cache Tag RAM 20 ns	24 Lead 300 Mil SOJ	810A
MCM62351J25	4K x 4 Cache Tag RAM 25 ns	24 Lead 300 Mil SOJ	810A
MCM62486FN14	32K x 9 BurstRAM TM 14 ns	44 Lead PLCC	777
MCM62486FN20	32K x 9 BurstRAM 20 ns	44 Lead PLCC	777
MCM62820FN23	8K x 20 Latched FSRAM 23 ns	52 Lead PLCC	778
MCM62820FN30	8K x 20 Latched FSRAM 30 ns	52 Lead PLCC	778
MCM6293NJ20	16K x 4 Pipeline Sync. 20 ns	28 Lead 300 Mil SOJ	810B
MCM6293NJ25	16K x 4 Pipeline Sync. 25 ns	28 Lead 300 Mil SOJ	810B
MCM6294NJ20	16K x 4 Pipeline Sync. 20 ns	28 Lead 300 Mil SOJ	810B
MCM6294NJ25	16K x 4 Pipeline Sync. 25 ns	28 Lead 300 Mil SOJ	810B
MCM6295NJ25	16K x 4 Sync. FSRAM 25 ns	28 Lead 300 Mil SOJ	810B
MCM6295NJ30	16K x 4 Sync. FSRAM 30 ns	28 Lead 300 Mil SOJ	810B
MCM62940FN20	32K x 9 BurstRAM 20 ns	44 Lead PLCC	777
MCM62940FN25	32K x 9 BurstRAM 25 ns	44 Lead PLCC	777
MCM62950FN15	32K x 9 Sync. FSRAM 15 ns	44 Lead PLCC	777
MCM62950FN20	32K x 9 Sync. FSRAM 20 ns	44 Lead PLCC	777
MCM62963FN18	4K x 10 Pipeline Sync. 18 ns	44 Lead PLCC	777
MCM62963FN20	4K x 10 Pipeline Sync. 20 ns	44 Lead PLCC	777
MCM62963FN25	4K x 10 Pipeline Sync. 25 ns	44 Lead PLCC	777
MCM62973FN18	4K x 12 Pipeline Sync. 18 ns	44 Lead PLCC	777
MCM62973FN20	4K x 12 Pipeline Sync. 20 ns	44 Lead PLCC	777
MCM62973FN25	4K x 12 Pipeline Sync. 25 ns	44 Lead PLCC	777

Application Specific Memories

Device	Device Description	Package Description	Case Outline
MCM62974FN18	4K x 12 Pipeline Sync. 18 ns	44 Lead PLCC	777
MCM62974FN20	4K x 12 Pipeline Sync. 20 ns	44 Lead PLCC	777
MCM62974FN25	4K x 12 Pipeline Sync. 25 ns	44 Lead PLCC	777
MCM62975FN25	4K x 12 Sync. FSRAM 25 ns	44 Lead PLCC	777
MCM62975FN30	4K x 12 Sync. FSRAM 30 ns	44 Lead PLCC	777
MCM62980J15	64K x 4 Sync. FSRAM 15 ns	28 Lead 300 Mil SOJ	810B
MCM62980J20	64K x 4 Sync. FSRAM 20 ns	28 Lead 300 Mil SOJ	810B
MCM62981J20	64K x 4 Sync. ParityRAM TM 15 ns	32 Lead 300 Mil SOJ	857
MCM62981J15	64K x 4 ParityRAM 20 ns	32 Lead 300 Mil SOJ	857
MCM62982J12	64K x 4 Sync. FSRAM 12 ns	28 Lead 300 Mil SOJ	810B
MCM62982J15	64K x 4 Sync. FSRAM 15 ns	28 Lead 300 Mil SOJ	810B
MCM62983J12	64K x 4 Sync. ParityRAM 12 ns	32 Lead 300 Mil SOJ	857
MCM62983J15	64K x 4 Sync. ParityRAM 15 ns	32 Lead 300 Mil SOJ	857
MCM62990FN15	16K x 16 Sync. FSRAM 15 ns	52 Lead PLCC	778
MCM62990FN20	16K x 16 Sync. FSRAM 20 ns	52 Lead PLCC	778
MCM62995FN18	16K x 16 Latched FSRAM 18 ns	52 Lead PLCC	778
MCM62995FN20	16K x 16 Latched FSRAM 20 ns	52 Lead PLCC	778
MCM62995FN25	16K x 16 Latched FSRAM 25 ns	52 Lead PLCC	778

Note: All Surface mount products are available in Tape & Reel.

Standard Logic and Integrated Circuits Products

Surface-mount capabilities are becoming essential as systems designers and board-layout engineers deal with size reductionand component densities. Motorola hs made the investment in assembly equipment so customers can apply the latest packaging techniques.

Motorola offers over 400 individual CMOS products in three different families for logic and interface applications. These devices utilize various MOS processes and offer the designer varying speeds, power trade-offs and operating voltages. Design flexibility is a big user feature with product complexities ranging from the simplest gates to the more complex LSi analog-to-digital converters and microprocessor peripherals.

Metal-gate and Silicon-gate technologies are employed in the fabrication process with gate geometries as low as 1.5 microns used int he designs.

Both the SOIC and PLCC packages are offered by Motorola for these CMOS products. The SOIC packages are denoted by a common suffix of "D" or "DWS." This package identifier is added to the end of each standard part number. In the case of PLCC packages, the "FN" suffix is utilized — again after the standard device part number. Examples of the SOIC part numbering are:

MC14011BD
MC74HC00D

In the case of the PLCC packages, they would be identified as follows:

MC145040FN1
MC14442FN

MOS Digital-Analog

A/D and D/A Converters

Device Number	Function	Package
MC14433DW	3-1/2 Digit A/D Converter	SO-24L
MC14442FN	11-Channel 8-Bit A/D Converter with Parallel Interface	PLCC-28
MC14443DW	6-Channel A/D Converter Subsystem	SO-16L
MC4447DW	6-Channel A/D Converter Subsystem	SO-16L
MC144110DW	Hex D/A Converter with Serial Interface	SO-20L
MC144111DW	Quad D/A Converter with Serial Interface	SO-16L
MC145040FN1**	11-Channel, 8-Bit A/D Converter with Serial Interface	PLCC-20
MC145040FN2**	11-Channel, 8-Bit A/D Converter with Serial Interface	PLCC-20
MC145041FN1**	11-Channel, 8-Bit A/D Converter with Serial Interface	PLCC-20
MC145041FN2**	11-Channel, 8-Bit A/D Converter with Serial Interface	PLCC-20
MC145050DW	11-channel 10-bit A/D Converter with Serial Interface	SO-20L
MC145051DW	11-channel 10-bit A/D Converter with Serial Interface	SO-20L
MC145053D	5-Channel 10-Bit A/D Converter with Serial Interface	SO-14L

Decoders/Display Drivers

Device	Function	Package
MC14489DW	Multi-Character LED Display/Lamp Driver	SO-20L
MC14495W1	Hex-to-7 Segment Latch/Decoder ROM/Driver	SO-16L
MC14499DW	7-Segment LED Display Decoder/Driver with Serial Interface	SO-20L
MC145000FN	48-Segment Multiplexed LCD Driver (Master)	PLCC-28
MC145001FN	44-Segment Multiplexed LCD Driver (Slave)	PLCC-28
MC145453FN	33-Segment LCD Driver with Serial Interface	PLCC-244

Operational Amplifiers/Comparators

Device Number	Function	Package
MC14573D	Quad Programmable Operational Amplifier	SO-16
MC14574D	Quad Programmable Comparator	SO-16
MC14575D	Dual Programmable Operational Amplifier and Dual Comparator	SO-16
MC14578D	Micro-Power Comparator Plus Voltage Follower	SO-16

Phase-Locked Loop Frequency Synthesizers

Device	Function	Package
MC145106FN	PLL Frequency Synthesizer	PLCC-20
MC145145DW2	4-Bit Data Bus Input PLL Frequency Synthesizer	SO-20L
MC145146DW2	4-Bit Data Bus Input PLL Frequency Synthesizer	SO-20L
MC145151FN2	Parallel Input PLL Frequency Synthesizer	PLCC-28
MC145152FN2	Parallel Input PLL Frequency Synthesizer	PLCC-28
MC145155FN2	Serial Input PLL Frequency Synthesizer	PLCC-20
MC145155DW2	Serial Input PLL Frequency Synthesizer	SO-20L
MC145156FN2	Serial Input PLL Frequency Synthesizer	PLCC-20
MC145156DW2	Serial Input PLL Frequency Synthesizer	SO-20L
MC145157FN2	Serial Input PLL Frequency Synthesizer	PLCC-20
MC145157DW2	Serial Input PLL Frequency Synthesizer	SO-16L
MC145158FN2	Serial Input PLL Frequency Synthesizer	PLCC-20
MC145158DW2	Serial Input PLL Frequency Synthesizer	SO-16L
MC145159FN#	Serial Input PLL Frequency Synthesizer with Analog Phase Detector	PLCC-20
MC145160DW	Dual PLL for Cordless Telephones	SO-20L
MC145166DW	Dual PLL for Cordless Telephones	SO-16L
MC145167DW	Dual PLL for Cordless Telephones	SO-16L
MC145168	Dual PLL for Cordless Telephones	SO-16L
MC145169DW	Dual PLL for Cordless Telephones	+
MC145170D	PLL Frequency Synthesizer with Serial Interface	SO-16L

+ Consult Factory

** The digit 1 or 2 after the package designator is not a part of the package definition, but describes electrical capability of the device.
# Electrical variations may require a numerical suffix after the package suffix. Contact your Motorola representative for details.

Remote Control Functions

Device	Function	Package
MC14469FN	Addressable Asynchronous Receiver/Transmitter	PLCC-44
MC14497	PCM Remote Control Transmitter	*
MC145026D	Remote Control Encoder	SO-16
MC145027DW	Remote Control Decoder	SO-16L
MC145028DW	Remote Control Decoder	SO-16L
MC145030DW	Remote Control Encoder/Decoder	SO-20L

Smoke Detectors

Device	Function	Package
MC14467	Low-Cost Smoke Detector	*
MC14468	Interconnectable Smoke Detector	*
MC145010DW	Photoelectric Smoke Detector with I/O	SO-16L

Telecommunications Devices

Device	Function	Package
MC14410DW	2-of-8 Tone Encoder	SO-16L
MC14411DW	Bit Rate Generator	SO-24L
MC142100DW	Crosspoint Switch with Control Memory (4 x 4 x 1)	SO-16L
MC142103	Transcoder HDB31 AM1 to NR2	*
MC143403D	Quad Line Driver (Op Amp)	SO-14
MC145406DW	EIA-232/V.28 CMOS Driver/Receiver	SO-16L
MC145407DW	EIA-232/V.28 CMOS Driver/Receiver, 5 Volts Only	SO-20L
MC145412	Pulse/Tone Repertory Dialer (Nine 18-Digit Memory)	*
MC145421DW	UDLT II Master	SO-24L
MC145425DW	UDLT II Slave	SO-24L
MC145436	DTMF Decoder	*
MC145443DW	300-Baud Bell 103 Single-Chip Modem	SO-20L
MC145475DW	ISDN S/T Interface Transceiver	SO-28L
MC145488	Dual Data Link Controller	68-PLCC
MC145502	PCM Codec/Filter	*
MC145503DW	PCM Codec/Filter	SO-16L
MC145505DW	PCM Codec/Filter	SO-16L
MC145554DW	PCM Codec/Filter (TP3054 Compatible)	SO-16L
MC145557DW	PCM Codec/Filter (TP3057 Compatible)	SO-16L
MC145564DW	PCM Codec/Filter (TP3064 Compatible)	SO-20L
MC145567DW	PCM Codec/Filter (TP3067 Compatible)	SO-20L

Miscellaneous Functions

Device Number	Function	Package
MC141620FU	Enhanced Comb Filter	**
MC145033DW	Remote Control Encoder/Decoder	SO-28L
MC145034DW	Remote Control Encoder	SO-28L
MC145035DW	Remote Control Decoder	SO-28L
MC68HC68T1DW	Real-Time Clock plus RAM with Serial Interface	SO-16L

*Introduction of this device in surface mount packages is dependent on market demand.

PC Chipset

Device Number	Function	Package
MSC3201FN	XT/AT Floppy Disk Controller 4-drive	PLCC 68L
MCCS16L451FN	Single Serial Single Parallel I/O Port XT/AT	PLCC 68L
MCCS16C452FN	Dual Serial Single Parallel I/O Port XT/AT	PLCC 68L
MCC16C462FN	Dual Serial Single Parallel I/O Port XT/AT Clock Input	PLCC 68L
MCCS146818BFN	Real Time Clock Parallel Interface	PLCC 28L
MCCS1850DW	Real Time Clock Serial Interface	SOIC-16L
MCCS53C90AFU	SCSI Protocol Controller	PLCC 68L
MCC33205FU	XT/AT Floppy Disk Controller 3-drive	QPFP 64L
MCCS2036FU	Single Chip AT 286/386 SX	QFP 208L

Real-Time Clock

Device Number	Function	Package
MC68HC68T1DW	Real-Time Clock Plus RAM with Serial Interface	SO-16L

CMOS Standard Logic

MC14XXX Series (–55°C to +125°C)
Suffix: D = Narrow Body SOIC
DW = Wide Body SOIC

Device	Function	Pins	Suffix
MC14000	Dual 3-Input NOR Gate plus Inverter	14	D
MC14001	Quad 2-Input NOR Gate	14	D
MC14002	Dual 4-Input NOR Gate	14	D
MC14006	18-Bit Static Shift Register	14	D
MC14007	Dual Complementary Pair plus Inverter	14	D
MC14008	4-Bit Full Adder	16	D
MC14011	Quad 2-Input NAND Gate	14	D
MC14012	Dual 4-Input NAND Gate	14	D
MC14013	Dual D Flip-Flop	14	D
MC14014	8-Bit Static Shift Register	16	D
MC14015	Dual 5-Bit Static Shift Register	16	D
MC14016	Quad Analog Switch/Quad Multiplexer	14	D
MC14017	Decade Counter/Divider	16	D
MC14018	Presettable Divide-by-N Counter	16	D
MC14020	14-Bit Binary Counter	16	D
MC14021	8-Bit Static Shift Register	16	D
MC14022	Octal Counter/Divider	16	D
MC14023	Triple 3-Input NAND Gate	14	D
MC14024	7-Stage Ripple Counter	14	D
MC14025	Triple 3-Input NOR Gate	14	D
MC14027	Dual J-K Flip-Flop	16	D
MC14028	BCD-to-Decimal Decoder	16	D
MC14029	4-Bit Presettable Up/Down Counter	16	D
MC14032	Triple Serial Adder (Positive Logic)	16	D
MC14035	4-Bit Shift Register	16	D
MC14038	Triple Serial Adder (Negative Logic)	16	D
MC14040	12-Bit Binary Counter	16	D
MC14042	Quad Latch	16	D
MC14043	Quad NOR R-S Latch	16	D
MC14044	Quad NAND R-S Latch	16	D
MC14046	Phase-Locked Loop	16	DW
MC14049	Hex Inverter/Buffer	16	D
MC14050	Hex Buffer	16	D
MC14051	8-Channel Analog Multiplexer	16	D
MC14052	Dual 4-Channel Analog Multiplexer	16	D
MC14053	Triple 2-Channel Analog Multiplexer	16	D
MC14060	14-Bit Binary Counter and Osc.	16	D
MC14066	Quad Analog Switch	14	D
MC14068	8-Input NAND Gate	14	D
MC14069	Hex Inverter	14	D
MC14070	Quad Exclusive OR Gate	14	D
MC14071	Quad 2-Input OR Gate	14	D
MC14072	Dual 4-Input OR Gate	14	D
MC14073	Triple 3-Input AND Gate	14	D
MC14075	Triple 3-Input OR Gate	14	D
MC14076	Quad D-Type Register	16	D
MC14077	Quad Exclusive NOR Gate	14	D
MC14078	8-Input NOR Gate	14	D

Device	Function	Pins	Suffix
MC14081	Quad 2-Input AND Gate	14	D
MC14082	Dual 4-Input AND Gate	14	D
MC14093	Quad 2-Input NAND Schmitt Trigger	14	D
MC14094	8-Bit Bus-Compatible Shift Store Latch	16	D
MC14099	8-Bit Addressable Latch	16	DW
MC14106	Hex Schmitt Trigger	14	D
MC14160	Decade Counter (Asynchronous Clear)	16	D
MC14161	Binary Counter (Asynchronous Clear)	16	D
MC14162	Decade Counter (Synchronous Clear)	16	D
MC14163	Binary Counter (Synchronous Clear)	16	D
MC14174	Hex D Flip-Flop	16	D
MC14175	Quad D Flip-Flop	16	D
MC14194	4-Bit Universal Shift Register	16	D
MC14415	Quad Precision Timer/Driver	16	DW
MC14490	Hex Contact Bounce Eliminator	16	DW
MC14500	Industrial Control Unit	16	DW
MC14501	Triple Gate	16	D
MC14502	Strobed Hex Inverter/Buffer	16	DW
MC14503	Hex 3-State Buffer	16	D
MC14504	Hex TTL or CMOS to CMOS Level Shifter	16	D
MC14506	Dual Expandable AOI Gate	16	D
MC14510	BCD Up/Down Counter	16	D
MC14512	8-Channel Data Selector	16	D
MC14516	Binary Up/Down Counter	16	D
MC14517	Dual 64-Bit Static Shift Register	16	DW
MC14518	Dual BCD Up Counter	16	DW
MC14519	4-Bit AND/OR Selector	16	D
MC14520	Dual Binary Up Counter	16	DW
MC14521	24-Stage Frequency Divider	16	D
MC14522	Programmable BCD Divide-by-N Counter	16	DW
MC14526	Programmable Binary Divide-by-N Counter	16	DW
MC14527	BCD Rate Multiplier	16	DW
MC14528	Dual Monostable Multivibrator	16	D
MC14529	Dual 4-Channel Analog Data Selector	16	D
MC14530	Dual 5-Input Majority Logic Gate	16	D
MC14531	12-Bit Parity Tree	16	D
MC14532	8-Bit Priority Encoder	16	D
MC14536	Programmable Timer	16	DW
MC14538	Dual Precision Monostable Multivibrator	16	DW
MC14539	Dual 4-Channel Data Selector/Multiplexer	16	D

List includes "B" or "UB" series parts. Packages are the same.

MC14XXX Series — continued

Device	Function	Pins	Suffix
MC14541	Programmable Oscillator-Timer	14	D
MC14551	Quad 2-Channel Analog MUX	16	D
MC14553	3-Digit BCD Counter	16	DW
MC14554	2 x 2-Bit Parallel Binary Multiplier	16	D
MC14555	Dual Binary to 1-of-4 Decoder	16	D
MC14556	Dual Binary to 1-of-4 Decoder (Inverting)	16	D
MC14557	1-to-64-Bit Variable Length Shift Register	16	DW
MC14560	NBCD Adder	16	D
MC14561	9's Complementer	14	D

Device	Function	Pins	Suffix
MC14566	Industrial Time Base Generator	16	D
MC14568	Phase Comparator Programmable Counter	16	D
MC14569	Dual Programmable BCD Binary Counter	16	DW
MC14572	Hex Gate	16	D
MC14582	Look-Ahead Carry Block	16	N
MC14583	Dual Schmitt Trigger	16	D
MC14584	Hex Schmitt Trigger	14	D
MC14585	4-Bit Magnitude Comparator	16	D
MC14597	8-Bit Bus Compatible Counter/Latch	16	DW

List includes "B" or "UB" series parts. Packages are the same.

High-Speed CMOS Logic

MC74HC/HCT00 Series (–55 to +125°C) D = Narrow Body SOIC DW = Wide Body SOIC

Device	Function	Pins	Suffix
HC00A	Quad 2-Input NAND Gate	14	D
HCT00A	Quad 2-Input NAND Gate	14	D
HC02A	Quad 2-Input NOR Gate	14	D
HCT02A	Quad 2-Input NOR Gate	14	D
HC03A	Quad 2-Input NAND, Open Drain Outputs	14	D
HC04A	Hex Inverter	14	D
HCT04A	Hex Inverter	14	D
HCU04	Hex Unbuffered Inverter	14	D
HC08A	Quad 2-Input AND Gate	14	D
HCT08A	Quad 2-Input AND Gate	14	D
HC10	Triple 3-Input NAND Gate	14	D
HC11	Triple 3-Input AND Gate	14	D
HC14A	Hex Schmitt-Trigger Inverter	14	D
HCT14A	Hex Schmitt-Trigger Inverter	14	D
HC20	Dual 4-Input NAND Gate	14	D
HC27	Triple 3-Input NOR Gate	14	D
HC30	8-Input NAND Gate	14	D
HC32A	Quad 2-Input OR Gate	14	D
HCT32A	Quad 2-Input OR Gate	14	D
HC42	BCD to 1-of-10 Decoder	16	D
HC51	2-Wide, 2-Input/2-Wide, 3-Input AND-OR-INVERT Gates	14	D
HC58	2-Wide, 2-Input/2-Wide, 3-Input AND-OR Gates	14	D
HC73	Dual J-K Flip-Flop with Reset	14	D
HC74A	Dual D-Type Flip-Flop w/Set/Reset, Pos-Edge Triggered	14	D
HCT74A	Dual D-Type Flip-Flop w/Set/Reset, Pos-Edge Triggered	14	D
HC75	4-Bit D-Type Latch	16	D
HC76	Dual J-K Flip-Flop with Set and Reset	16	D
HC86	Quad 2-Input Exclusive OR Gate	14	D
HC107	Dual J-K Flip-Flop with Reset	14	D
HC109	Dual J-K Flip-Flop w/Set/Reset, Pos-Edge Triggered	16	D
HC112	Dual J-K Flip-Flop with Set and Reset	16	D
HC113	Dual J-K Flip-Flop with Set	14	D
HC125A	Quad 3-State Buffer	14	D
HC126A	Quad 3-State Buffer	14	D
HC132A	Quad 2-Input Schmitt-Trigger NAND Gate	14	D
HC133	13-Input NAND Gate	16	D
HC137	1-of-8 Decoder/Demux w/Latched Inputs, Inverting Output	16	D
HC138A	1-of-8 Decoder/Demultiplexer	16	D
HCT138A	1-of-8 Decoder/Demultiplexer	16	D
HC139A	Dual 1-of-4 Decoder (Active-Low Outputs)	16	D

Device	Function	Pins	Suffix
HC151	8-Channel Digital Multiplexer	16	D
HC153	Dual 4-Channel Digital Multiplexer	16	D
HC157A	Quad 2-Input Data Selector/Multiplexer	16	D
HCT157A	Quad 2-Input Data Selector/Multiplexer	16	D
HC158A	Quad 2-Input Data Sel/Mux, Inv Output	16	D
HCT158A	Quad 2-Input Data Sel/Mux, Inv Output	16	D
HC160	Programmable Decade Counter, Asynchronous Reset	16	D
HC161A	Programmable 4-Bit Binary Counter, Asynchronous Reset	16	D
HCT161A	Programmable 4-Bit Binary Counter, Asynchronous Reset	16	D
HC162	Programmable Decade Counter, Synchronous Reset	16	D
HC163A	Programmable 4-Bit Binary Counter, Synchronous Reset	16	D
HCT163A	Programmable 4-Bit Binary Counter, Synchronous Reset	16	D
HC165	8-Bit Serial or Parallel Input/Serial Output Shift Reg	16	D
HC173	4-Bit D-Type Flip-Flop with Common Clock and Reset, 3-State	16	D
HC174A	Hex D-Type Flip-Flop with Common Clock and Reset	16	D
HCT174A	Hex D-Type Flip-Flop with Common Clock and Reset	16	D
HC175	Quad D-Type Flip-Flop	16	D
HC237	1-of-8 Decoder/Demultiplexer with Latched Inputs	16	D
HC240A	Octal Buffer/Line Driver/Line Receiver, 3-State, Inv Output	20	DW
HCT240A	Octal Buffer/Line Driver/Line Receiver, 3-State, Inverting Output, TTL Logic Level	20	DW
HC241A	Octal Buffer/Line Driver/Line Receiver, 3-State	20	DW
HCT241A	Octal Buffer/Line Driver/Line Receiver, 3-State, TTL Logic Level	20	DW
HC244A	Octal Buffer/Line Driver/Line Receiver, 3-State	20	DW
HCT244A	Octal Buffer/Line Driver/Line Receiver, 3-State, TTL Logic Level	20	DW
HC245A	Octal Bus Transceiver, 3-State	20	DW
HCT245A	Octal Bus Transceiver, 3-State, TTL Logic Level	20	DW

MC74HC/HCT00 Series — continued

Device	Function	Pins	Suffix
HC251	8-Input Multiplexer, 3-State	16	D
HC253	Dual 4-Input Multiplexer, 3-State	16	D
HC257	Quad 2-Input Data Sel/Mux, 3-State	16	D
HC259	8-Bit Addressable Latch	16	D
HC266	Quad 2-Input Exclusive NOR Gate, Open Drain Output	14	D
HC273A	Octal D-Type Flip-Flop with Common Clock/Reset	20	DW
HCT273A	Octal D-Type Flip-Flop with Common Clock/Reset	20	DW
HC280	9-Bit Odd/Even Parity Generator/Checker	14	D
HC299	8-Bit Universal Shift/Store Register, 3-State	20	DW
HC354	8-Input Multiplexer, 3-State	20	DW
HC356	8-Input Multiplexer, 3-State	20	DW
HC373A	Octal D-Type Transparent Latch, 3-State	20	DW
HCT373A	Octal D-Type Transparent Latch, 3-State, TTL Logic Level	20	DW
HC374A	Octal D-Type Flip-Flop, 3-State	20	DW
HCT374A	Octal D-Type Flip-Flop, 3-State, TTL Logic Level	20	DW
HC386	Quad 2-Input Exclusive OR Gate	14	D
HC390	Dual 4-Stage Binary Ripple Counter with ±2 and ±5 Sections	16	D
HC393	Dual 4-Stage Binary Ripple Counter	14	D
HC533A	Octal D-Type Transparent Latch, 3-State, Inverting Output	20	DW
HCT533A	Octal D-Type Transparent Latch, 3-State, Inverting Output	20	DW
HC534A	Octal D-Type Flip-Flop, 3-State, Inverting Output	20	DW
HCT534A	Octal D-Type Flip-Flop, 3-State, Inv Output, TTL Logic Level	20	DW
HC540	Octal Buffer/Line Driver/Line Rec, 3-State, Inv Output	20	DW
HCT540	Octal 3-State Buffer/Line Driver/Line Receiver, Inverting Output, TTL Logic Level	20	DW
HC541	Octal Buffer/Line Driver/Line Receiver, 3-State	20	DW
HCT541	Octal 3-State Buffer/Line Driver/Line Receiver, TTL Logic Level	20	DW
HC563	Octal Transparent Latch, 3-State, Inverting Output	20	DW
HC564	Octal D-Type Flip-Flop, 3-State, Inverting Output	20	DW

Device	Function	Pins	Suffix
HC573A	Octal Transparent Latch, 3-State	20	DW
HCT573A	Octal Transparent Latch, 3-State	20	DW
HC574A	Octal D-Type Flip-Flop, 3-State	20	DW
HCT574A	Octal D-Type Flip-Flop, 3-State	20	DW
HC589	8-Bit Parallel-to-Serial Shift Register with Input Latches, 3-State	16	D
	8-Bit Serial-to-Parallel Shift Register	16	D
HC597	8-Bit Parallel-to-Serial Shift Register with Input Latches	16	D
HC640A	Octal Bus Transceiver, 3-State	20	DW
HCT640A	Octal Bus Transceiver, 3-State, Inverting Output, TTL Logic Level	20	DW
HC646	Octal Bus Transceiver, 3-State	24	DW
HC648	Octal Bus Transceiver, 3-State	24	DW
HCT646	Octal Bus Transceiver, 3-State, TTL Logic Level	20	DW
HC4002	Dual 4-Input NOR Gate	14	D
HC4016	Quad Analog Switch	14	D
HC4017	Decade Counter/Divider	16	D
HC4020A	14-Stage Binary Ripple Counter	16	D
HC4040	12-Stage Binary Ripple Counter	16	D
HC4024	7-Stage Binary Ripple Counter	14	D
HC4049	Hex Inverting Buffer/Logic Level Down Converter	16	D
HC4050	Hex Buffer/Logic Level Down Converter	16	D
HC4051	8-Channel Analog Multiplexer/Demultiplexer	16	DW
HC4052	8-Channel Analog Multiplexer/Demultiplexer	16	DW
HC4053	8-Channel Analog Multiplexer/Demultiplexer	16	DW
HC4060A	14-Stage Binary Ripple Counter	16	D
HC4066	Quad Analog Switch	14	D
HC4075	Triple 3-Input OR Gate	14	D
HC4078	8-Input NOR Gate	14	D
HC4351	Quad Analog Mux/Demux w/Latched Select Inputs	20	DW
HC4352	Dual 4-Channel Analog Multiplexer/Demultiplexer with Latched Select Inputs	20	DW
HC4353	Triple 2-Channel Analog Multiplexer/Demultiplexer with Latched Select Inputs	20	DW
HC4511	BCD-to-7 Segment Latch/Decoder/Driver	16	D
HC4543	BCD-to-7 Segment Latch/Decoder/Driver for CDs	14	D
HC7266	Quad 2-Input Exlcusive NOR Totem Pole Outputs	16	D

Logic Package Offering*

Both SOIC and PLCC packages utilize 50 mil lead spacing between adjacent pins.

Package-Type	Lead Count and/or Body Size
SOIC	Narrow 8LD, 14LD, 16LD Wide 16LD, 18LD, 20LD, 24LD, 28LD
PLCC	20LD, 28LD, 44LD, 52LD, 68LD

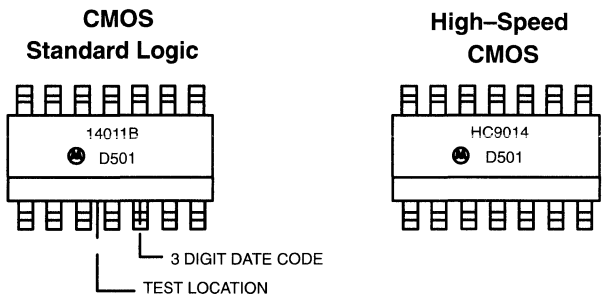
* See the Selector Guide portion for function to package compatibility.

Not all packages are available for every function.

LD = Lead

SOIC Marking

SOIC marking is done per the examples shown below.



PLCC packages (except 20-lead) are able to accommodate full part number and logo/assy location information.

Popular logic and dedicated LSI functions will be inventoried for immediate delivery. Others will be built on request. Inquiries regarding custom production runs are invited.

FACT CMOS

MC74AC(T)00 Series (-40 to +85°C)
Suffix: N . . . . Plastic Dual In-line (all devices)

Device	Description	Pins
AC00	Quad 2-Input NAND Gate	14
AC02	Quad 2-Input NOR Gate	14
AC04	Hex Inverter	14
AC05	Hex Inverter w/Open Drain Output	14
AC08	Quad 2-Input AND Gate	14
AC10	Triple 3-Input NAND Gate	14
AC11	Triple 3-Input AND Gate	14
AC14	Hex Schmitt Trigger Inverter	14
AC32	Quad 2-Input OR Gate	14
AC74	Dual D Flip-Flop	
AC86	Quad 2-Input XOR	14
AC109	Dual J-K F/F	16
AC132	Quad 2-Input NAND	14
AC138	1-of-8 Decoder/Demultiplexer	16
AC139	Dual 1-of-4 Decoder/Demultiplexer	16
AC151	8-Input Data Selector/Multiplexer	16
AC153	Dual 4-Input Multiplexer	16
AC157	Quad 2-Input Multiplexer	16
AC163	4-Bit Binary Counter, Sync. Reset	16
AC174	Hex D Flip-Flop w/Master Reset	16
AC190	4-Bit Up/Down Dec. Cntr.	16
AC240	Octal Buffer/Line Driver	20
AC241	Octal Buffer/Line	20
AC244	Octal Buffer/Line Driver	20
AC245	Octal Transceiver	20
AC253	Dual 4-Input MUX	16
AC256	Dual 4-Bit Addressable Latch	16
AC258	Quad 2-Input Inverting 3-State MUX	16
AC273	Octal D Flip-Flop	20
AC299	Univ. Ship/Storage	20
AC352	Dual 4-Input Multiplexer	16
AC353	Dual 4-input MUX	16
AC373	Octal D Latch	20
AC374	Octal D Latch	20
AC377	Octal D-F/F	20
AC378	6-Bit D-Input Register	16
AC521	8-Bit Identity Comparator	20
AC540	Octal Inverter Buffer	20
AC541	Octal Buffer/Line Driver	20
AC563	Octal Transparator Latch	20
AC564	Octal D-F/F 3-State	20
AC573	Octal D Latch	20
AC574	Octal D-F/F Broadside	20
AC640	Octal Transceiver	20
AC646	Octal Transceiver Register	24
AC810	Quad 2-Input XNOR	14
AC4020	14-State Binary Ripple Counter	16
AC4040	12-State Binary Ripple Counter	16

TTL Compatible Devices

Device	Description	Pins
ACT00	Quad 2-Input NAND Gate	14
ACT02	Quad 2-Input NOR Gate	14
ACT04	Hex Inverter	14
ACT05	Hex Inverter w/Open Drain Output	14
ACT08	Quad 2-Input AND Gate	14
ACT10	Triple 3-Input NAND	14
ACT11	Triple 3-Input AND Gate	14
ACT14	Hex Schmitt Trigger Inverting	14
ACT32	Quad 2-Input NOR Gate	14
ACT74	Dual D Flip-Flop	14
ACT86	Quad 2-Input XOR	14
ACT109	Dual J-K F/F	16
ACT132	Quad 2-Input NAND	14
ACT138	1-of-8 Decoder/Demultiplexer	16
ACT139	Dual 1-of-4 Decoder/Demultiplexer	16
ACT151	8-input Data Selector/Multiplexer	16
ACT153	Dual 4-input Multiplexer	16
ACT157	Quad 2-input Multiplexer	16
ACT160	BCD Decade Counter	16
ACT162	BCD Decade Counter	16
ACT240	Octal Buffer/Line Driver	20
ACT241	Octal Buffer/Line	20
ACT244	Octal Buffer/Line Driver	20
ACT245	Octal Transceiver	20
ACT251	8-Input Multiplexer	16
ACT253	Dual 4-Input MUX	16
ACT256	Dual 4-Bit Addressable Latch	16
ACT258	Quad 2-Input Inverting 3-State MUX	16
ACT273	Octal D Flip-Flop	20
ACT352	Dual 4-Input Multiplexer	20
ACT353	Dual 4-input MUX	16
ACT373	Octal D Latch	20
ACT374	Octal D Latch	20
ACT377	Octal D-F/F	20
ACT378	6-Bit D-Input Register	16
ACT521	8-Bit Identity Comparator	20
ACT540	Octal Inverter Buffer	20
ACT541	Octal Buffer	20
ACT563	Octal Transparator Latch	20
ACT564	Octal D-F/F 3-State	20
ACT573	Octal D Latch	20
ACT574	Octal D-F/F Broadside	20
ACT640	Octal Transceiver	20
ACT810	Quad 2-input XNOR	14

Bipolar Logic Products

Bipolar Logic is currently offering, in surface mounted packages, five of the most popular bipolar logic lines being used today.

The following tables for LS-TTL, FAST-TTL, MECL 10K, MECL 10KH and ECLinPS indicate package type for these four families and may be ordered in rails or Tape and Reel.

LS TTL Devices Available in SOIC

SN74LS00 Series (0 to + 70°C)
SN54LS00 Series (0 to –55 to +125°C)
Suffix: N . . . Plastic (only 74-Series)
J . . . Ceramic (54/74 Series)

Device	Function	Pins
LS00D	Quad 2-Input NAND Gate	14
LS01D	Quad 2-Input NAND Gate, Open-Collector	14
LS02D	Quad 2-Input NOR Gate	14
LS03D	Quad 2-Input NAND Gate, Open-Collector	14
LS04D	Hex Inverter	14
LS05D	Hex Inverter, Open-Collector	14
LS08D	Quad 2-Input AND Gate	14
LS09D	Quad 2-Input AND Gate, Open-Collector	14
LS10D	Triple 3-Input NAND Gate	14
LS11D	Triple 3-Input AND Gate	14
LS12D	Triple 3-Input NAND Gate, Open-Collector	14
LS13D	Dual 4-Input Schmitt Trigger	14
LS14D	Hex Schmitt Trigger	14
LS15D	Triple 3-Input AND Gate, Open-Collector	14
LS20D	Dual 4-Input NAND Gate	14
LS21D	Dual 4-Input AND Gate	14
LS22D	Dual 4-Input NAND Gate, Open-Collector	14
LS26D	Quad 2-Input NAND, High Voltage	14
LS27D	Triple 3-Input NOR Gate	14
LS28D	Quad 2-Input NOR Buffer	14
LS30D	8-Input NAND Gate	14
LS32D	Quad 2-Input OR Gate	14
LS33D	Quad 2-Input NOR Buffer, Open-Collector	14
LS37D	Quad 2-Input NAND Buffer	14
LS38D	Quad 2-Input NAND Buffer, Open-Collector	14
LS40D	Dual 4-Input NAND Buffer	14
LS42D	1-of-10 Decoder	16
LS47D	BCD to 7-Segment Decoder/Driver, Open-Collector	16
LS48D	BCD to 7-Segment Decoder/Drier, with pull-ups	16
LS51D	Dual AND-OR-INVERT Gate	14
LS54D	3-2-2-3 Input AND-OR-INVERT Gate	14
LS55D	2-Wide 4-Input AND-OR-INVERT Gate	14
LS73AD	Dual JK Flip-Flop	14
LS74AD	Dual D Flip-Flop	14
LS75D	4-Bit Bi-Stable Latch with Q and Q	16
LS76AD	Dual JK Flip-Flop	16
LS77D	4-Bit Bi-Stable Latch	14
LS78AD	Dual JK Flip-Flop with Preset	14
LS83AD	4-Bit Full Adder	16
LS85D	4-Bit Magnitude Comparator	16
LS86D	Quad Exclusive OR Gate	14
LS90D	Decade Counter	14
LS92D	Divide-By-12 Counter	14
LS93D	4-Bit Binary Counter	14

Device	Function	Pins
LS95BD	4-Bit Shift Register	14
LS107AD	Dual JK Flip-Flop with Clear	14
LS109AD	Dual JK Flip-Flop with Preset	16
LS112AD	Dual JK Edge-Triggered Flip-Flop	16
LS113AD	Dual JK Edge-Triggered Flip-Flop	14
LS114AD	Dual JK Edge-Triggered Flip-Flop	14
LS122D	Retriggerable Monostable Multivibrator	14
LS123D	Dual Retriggerable Monostable Multivibrator	16
LS125AD	Quad Buffer, Low Enable, 3-State	14
LS126AD	Quad Buffer, High Enable, 3-State	14
LS132D	Quad 2-Input Schmitt Trigger	14
LS133D	13-Input NAND Gate	16
LS136D	Quad Exclusive OR Gate, Open-Collector	14
LS137D	3-Line to 8-Line Decoder/Demultiplexer	16
LS138D	1-of-8 Decoder/Demultiplexer	16
LS139D	Dual 1-of-4 Decoder/Demultiplexer	16
LS145D	1-of-10 Decoder/Driver, Open-Collector	16
LS147D	10-Line Decimal to 4-Line Priority Encoder	16
LS148D	8-Input to 3-Line Priority Encoder	16
LS151D	8-Input Multiplexer	16
LS153D	Dual 4-Input Multiplexer	16
LS155D	Dual 1-of-4 Decoder	16
LS156D	Dual 1-of-4 Decoder, Open-Collector	16
LS157D	Quad 2-Input Multiplexer, Non-Inverting	16
LS158D	Quad 2-Input Multiplexer, Inverting	16
LS160AD	BCD Decade Counter, Asynchronous Reset (9310 Type)	16
LS161AD	4-Bit Binary Counter, Asynchronous Reset (9316 Type)	16
LS162AD	BCD Decade Counter, Synchronous Reset	16
LS163AD	4-Bit Binary Counter, Synchronous Reset	16
LS164D	8-Bit Serial-In/Parallel-Out Shift Register	14
LS165D	8-Bit Parallel-In/Serial-Out Shift Register	16
LS166D	8-Bit Parallel-In/Serial-Out Shift Register	16
LS168D	Up/Down Decade Counter	16
LS169D	Up/Down Binary Counter	16
LS170D	4 x 4 Register File, Open-Collector	16
LS173AD	4-Bit D Register, 3-State	16
LS174D	Hex D Flip-Flop with Clear	16
LS175D	Quad D Flip-Flop with Clear	16
LS190D	Up/Down Decade Counter	16
LS191D	Up/Down Binary Counter	16
LS192D	Up/Down Decade Counter with Clear	16
LS193D	Up/Down Binary Counter with Clear	16
LS194AD	4-Bit Right/Left Shift Register	16

LS TTL Devices Available in SOIC (continued)

Device	Function	Pins
LS195AD	4-Bit Shift Register (9300 Type)	16
LS196D	Decade Counter, Asynchronously Presettable	14
LS197D	4-Bit Binary Counter, Asynchronously Presettable	14
LS221D	Dual One-Shot (Very Stable)	16
LS241DW	Octal Bus/Line Driver, 3-State	20
LS244DW	Octal Driver, Non-Inverting, 3-State	20
LS245DW	Octal Bus Transceiver, Non-Inverting, 3-State	20
LS247D	BCD to 7-Segment Decoder/Driver, Open-Collector	16
LS251D	8-Input Multiplexer, 3-State	16
LS253D	Dual 4-Input Multiplexer, 3-State	16
LS256D	Dual 4-Bit Addressable Latch	16
LS257AD	Quad 2-Input Multiplexer, Non-Inverting, 3-State	16
LS258AD	Quad 2-Input Multiplexer, Inverting 3-State	16
LS259D	8-Bit Addressable Latch (9334)	16
LS260D	Dual 5-Input NOR Gate	14
LS266D	Quad Exclusive NOR Gate, Open-Collector	14
LS273DW	Octal D Flip-Flop with Clear	20
LS279D	Quad Set/Reset Latch	16
LS280D	8-Bit Odd/Even Parity Generator/Checker	14
LS283D	4-Bit Full Adder (Rotated LS83A)	16
LS290D	Decade Counter (Divide By 2 and 5)	14
LS293D	4-Bit Binary Counter	16
LS298D	Quad 2-Multiplexer, with Output Register	16
LS299DW	8-Bit Shift/Storage Register, 3-State	20
LS322ADW	8-Bit Shift Register with Sign Extend, 3-State	20
LS323DW	8-Bit Shift/Storage Register, 3-State	20
LS348D	8-Input to 3-Line Priority Encoder, 3-State	16
LS352D	Dual 4-Multiplexer (Inverting LS153)	16
LS353D	Dual 4-Multiplexer (3-State LS352)	16
LS365AD	Hex Buffer, Common Enable, 3-State	16

Device	Function	Pins
LS366AD	Hex Inverter, Common Enable, 3-State	16
LS367AD	Hex Buffer, 4-Bit and 2-Bit, 3-State	16
LS368AD	Hex Inverter, 4-Bit and 2-Bit, 3-State	16
LS373DW	Octal Transparent Latch, 3-State	20
LS374DW	Octal D Flip-Flop, 3-State	20
LS375D	Quad Latch	16
LS377DW	Octal D Flip-Flop with Enable	20
LS378D	Hex D Flip-Flop with Enable	16
LS379D	4-Bit D Flip-Flop with Enable	16
LS386D	2-Input Quad/Exclusive OR Gate	14
LS390D	Dual Decade Counter	16
LS393D	Dual 4-Bit Binary Counter	14
LS395D	4-Bit Shift Register, 3-State	16
LS398DW	Quad 2-Input Multiplexer with Output Register	20
LS399D	Quad 2-Input Multiplexer with Output Register	16
LS540DW	Octal Buffer/Line Driver, 3-State	20
LS541DW	Octal Buffer/Line Driver, 3-State	20
LS569DW	Binary Up/Down Counter, 3-State	20
LS623DW	Octal Bus Transceiver, Inverting, Open-Collector	20
LS640DW	4 x 4 Register File, 3-State	20
LS641DW	Octal Bus Transceiver, Non-Inverting, Open-Collector	20
LS642DW	Octal Bus Transceiver, Inverting, Open-Collector	20
LS670D	4 x 4 Register File, 3-State	20
LS682DW	8-Bit Magnitude Comparator	20
LS684DW	8-Bit Magnitude Comparator	20
LS688DW	8-Bit Magnitude Comparator	20
LS795DW	Octal Buffer (81LS95), 3-State	20
LS796DW	Octal Buffer (81LS96), 3-State	20
LS797DW	Octal Buffer (81LS97), 3-State	20
LS798DW	Octal Buffer (81LS98), 3-State	20

FAST TTL Devices Available in SOIC

MC74F00 Series (0 to + 70°C)

Suffix: D . . . Narrow Body Width SOIC
DW . . . Wide Body Width SOIC

Device	Function	Pins
F00D	Quad 2-Input NAND Gate	14
F02D	Quad 2-Input NOR Gate	14
F04D	Hex Inverter	14
F08D	Quad 2-Input AND Gale	14
F10D	Triple 3-Input NAND Gate	14
F11D	Triple 3-Input AND Gate	14
F13D	Dual 4-Input NAND Schmitt Trigger	14
F14D	Hex Inverter Schmitt Trigger	14
F20D	Dual 4-Input NAND Gate	14
F21D	Dual 4-Input AND Gate	14
F32D	Quad 2-Input OR Gate	14
F37D	Quad 2-Input NAND Buffer	14
F38D	Quad 2-Input NAND Buffer OC	14
F40D	Dual 4-Input NAND Buffer	14
F51D	2 Wide 2-3 Input AND-OR INVERT Gate	14
F64D	4-2-2-3 Input AND-OR-INVERT Gate	14
F74D	Dual D Flip-Flop	14
F85D	4-Bit Magnitude Comparator	16
F86D	Quad Ex/OR Gate	14
F109D	Dual J-K Flip-Flop w/Preset	16
F125D	Quad Buffer, 3-State	14
F126D	Quad Buffer, 3-State	14
F132D	Quad 2-Input NAND Schmitt Trigger	14
F138D	1-of-8 Decoder/Demultiplexer	16
F139D	Dual 1-of-4 Decoder/Demultiplexer	16
F148D	8-Line to 3-Line Priority Encoder	16
F151D	8-Input Multiplexer	16
F153D	Dual 4-Input Multiplexer	16
F157AD,D	Quad 2-Input Multiplexer	16
F158AD,D	Quad 2-Input Multiplexer	16
F160AD	BCD Decade Counter, Asynchronous Reset	16
F161AD	4-Bit Binary Counter, Asynchronous Reset	16
F162AD	BCD Decade Counter, Synchronous Reset	16
F163AD	4-Bit Binary Counter, Synchronous Reset	16
F164D	8-Bit Ser. In-Ser. Out Shift Register	14
F168D	Up/Down Decade Counter	16
F169D	Up/Down Binary Counter	16
F174D	Hex D Flip-Flop	16
F175D	Quad D Flip-Flop	16
F182D	Look Ahead Carry Generator	16
F194D	Universal Shift Register	16
F195D	Universal Shift Register	16
F240DW	Octal Bus/Line Driver/Inverting/3-State	20
F241DW	Octal Bus/Line Driver/3-State	20

Device	Function	Pins
F242D	Quad Bus Transceiver/Inverting/3-State	14
F243D	Quad Bus Transceiver/Non-Inverting/ 3-State	14
F244DW	Octal Bus Driver/Non-Inverting/3-State	20
F245DW	Octal Bus Transceiver	20
F251D	8-Input Multiplexer/3-State	16
F253D	Dual 4-Input Multiplexer/3-State	16
F256D	Dual 4-Bit Addressable Latch	16
F257AD,D	Quad 2-Input Multiplexer/3-State	16
F258AD,D	Quad 2-Input Multiplexer, Inverting/3-State	16
F259DW	8-Bit Addressable Latch	16
F269DW	8-Bit Bi-Directional Binary Counter	24
F273DW	Octal D-F/F	20
F280D	9-Bit Odd/Even Parity Gen/Checker	14
F283D	4-Bit Full Adder	16
F299DW	8-Bit Shift/Store Register	20
F323DW	8-Bit Universal Shift Register	20
F350D	4-Bit Shifter/3-State	16
F352D	Dual 4-Input Multiplexer	16
F353D	Dual 4-Input Multiplexer/3-State	20
F365D	Hex Buffer Driver Gated Enable Non-Inverting/3-State	16
F366D	Hex Buffer Driver Gated Enable Inverting/3-State	16
F367D	Hex Buffer Driver/4-2-Bit/Non-Inverting/3-State	16
F368D	Hex Buffer Driver/4-2-Bit/Inverting/3-State	16
F373DW	Octal Transparent Latch/3-State	20
F374DW	Octal D Flip-Flop/3-State	20
F377DW	Octal D-F/F	20
F378D	Hex Parallel D Register w/Enable	16
F379D	Quad Parallel Register w/Enable	16
F381DW	4-Bit ALU	20
F398DW	Quad 2-Port Register	20
F399D	Quad 2-Port Register	16
F521DW	Octal Comparator	20
F533DW	Octal Transparent Latch/3-State	20
F534DW	Octal D Flip-Flop/3-State	20
F543ADW	Octal Register Transceiver	24
F568DW	Decade Up/Down Counter/3-State	20
F569DW	Binary Up/Down Counter/3-State	20
F657ADW	Octal Bus Transceiver	24
F657BDW	Octal Bus Transceiver	24
F803D	Quad D-F/F w/Mtchd. Prop. Delays	14

MECL 10K Devices Available in PLCC

MC10100/10200 — (– 30°C to + 85°C)

Suffix: P . . . Plastic DIP
L . . . Ceramic DIP

Device	Function	Pins
MC10100	Quad NOR Gate W/Strobe	20
MC10101	Quad OR/NOR Gate	20
MC10102	Quad NOR Gate	20
MC10103	Quad 2-Input OR Gate	20
MC10104	Quad AND Gate	20
MC10105	Triple 2-3-2 OR/NOR Gate	20
MC10106	Triple 4-3-3 NOR Gate	20
MC10107	Triple Exclusive OR/NOR Gate	20
MC10109	Dual 4-5 Input OR/NOR Gate	20
MC10110	Dual 3-Input/3-Output OR Gate	20
MC10111	Dual 3-Input/3-Output NOR Gate	20
MC10113	Quad Exclusive OR Gate	20
MC10114	Triple Line Receiver	20
MC10115	Quad Line Receiver	20
MC10116	Triple Line Receiver	20
MC10117	Dual 2-Wide OR-AND/OR-AND-INVERT Gate	20
MC10118	Dual 2-Wide 3-Input OR-AND Gate	20
MC10119	4-Wide 4-3-3-3-Input OR-AND Gate	20
MC10121	4-Wide OR-AND/OR-AND-INVERT Gate	20
MC10123	Triple 4-3-3-Input Bus Driver	20
MC10124	Quad TTL-To-MECL Translator	20
MC10125	Quad MECL-To-TTL Translator	20
MC10130	Dual D Latch	20
MC10131	Dual D Flip-Flop	20
MC10133	Quad Latch	20
MC10134	Dual MUX W/Latch (Separate Select)	20
MC10135	Dual J-K Master-Slave Flip-Flop	20
MC10136	Universal Hexadecimal Counter	20
MC10138	Bi-Quinary Counter	20
MC10141	4-Bit Universal Shift Register	20
MC10153	Quad Latch (Negative Clock)	20

Device	Function	Pins
MC10158	Quad 2-Input Multiplexer (Noninverting Output)	20
MC10159	Quad 2-Input Multiplexer (Inverting Output)	20
MC10160	12-Bit Parity Generator/Checker	20
MC10161	Binary to 1-8 Line Decoder (Low)	20
MC10162	Binary to 1-8 Line Decoder (High)	20
MC10164	8-Line Multiplexer	20
MC10165	Priority Encoder	20
MC10166	5-Bit Comparator	20
MC10168	Quad Latch (Common Clock)	20
MC10170	9 + 2-Bit Parity Checker	20
MC10171	Dual 4-Line Decoder (Low)	20
MC10172	Dual 4-Line Decoder (High)	20
MC10173	Quad 2-Input Multiplexer with Latch	20
MC10174	Dual 4-to-1 Multiplexer	20
MC10175	Quint Latch	20
MC10176	Hex D Flip-Flop	20
MC10178	Binary Counter	20
MC10186	Hex D Flip-Flop W/Common Reset	20
MC10188	Hex Buffer W/Enable	20
MC10189	Hex Inverter W/Enable	20
MC10192	Quad Bus Driver	20
MC10195	Hex Inverter/Buffer	20
MC10197	Hex AND Gate	20
MC10198	Retriggerable 1-Shot Multivibrator	20
MC10210	High-Speed Dual 3-Input/3-Output OR Gate	20
MC10211	High-Speed Dual 3-Input/3-Output NOR Gate	20
MC10212	High-Speed Dual 2-NOR/1-OR Gate	20
MC10216	High-Speed Triple Line Receiver	20
MC10231	High-Speed Dual D Flip-Flop	20

MECL 10KH Devices Available in PLCC

MC10H100 Series — (0 to + 75°C)

Suffix: P . . . Plastic Leaded Chip Carrier
L . . . Ceramic DIP

Device	Function	Pins
H016	Binary Counter	20
H100	Quad 2-Input OR/NOR Gate	20
H101	Quad 2-Input NOR Gate with Strobe	20
H102	Quad NOR Gate	20
H103	Quad 2-Input OR Gate	20
H104	Quad AND Gate	20
H105	Triple 2-3-2 Input OR/NOR Gate	20
H106	Triple 4-3-3 Input NOR Gate	20
H107	Triple Exclusive OR/NOR Gate	20
H109	Dual 4-5 Input OR/NOR Gate	20
H113	Quad Exclusive OR Gate	20
H115	Quad Line Receiver	20
H116	Triple Line Receiver	20
H117	Dual 2-Wide OR-AND/OR-AND INVERT Gate	20
H118	Dual 2-Wide 3-Input OR/AND Gate	20
H119	4-Wide 4-3-3-3 Input OR-AND Gate	20
H121	4-Wide OR-AND/OR-AND INVERT Gate	20
H123	Triple 4-3-3 Input Bus Driver (250 Ohm)	20
H124	Quad TTL-to-MECL Translator	20
H125	Quad MECL-to-TTL Translator	20
H130	Dual D Latch	20
H131	Dual D Master Slave Flip-Flop	16
H135	Dual J-K Master Slave Flip-Flop	20
H136	Universal Hexadecimal Counter	20
H141	4-Bit Universal Shift Register	20
H145	16 x 4 Bit Register File	20
H155	Content Addressable Memory	18
H158	Quad 2-Input Multiplexer (Noninverting)	20
H159	Quad 2-rInput Multiplexer (Inverting)	20
H160	12-Bit Parity Generator-Checker	20
H161	Binary to 1-8 Line Decoder (Low)	20
H162	Binary to 1-8 Line Decoder (High)	20
H164	8-Line Multiplexer	20
H165	8-Input Priority Encoder	20
H166	5-Bit Magnitude Comparator	20
H171	Dual Binary to 1-4 Decoder (Low)	20
H172	Dual Binary to 1-4 Decoder (High)	20
H173	Quad 2-Input Multiplexer/Latch	20

Device	Function	Pins
H174	Dual 4-1 Multiplexer	20
H175	Quint Latch	20
H176	Hex D Flip-Flop	20
H179	Look Ahead Carry Block	20
H180	Dual High Speed Adder/Subtractor	20
H181	4-Bit ALU	28
H186	Hex D Flip-Flop w/Common Reset	20
H188	Hex Buffer w/Enable	20
H189	Hex Inverter w/Enable	20
H209	Dual 4-5-Input OR/NOR Gate	20
H210	Dual 3-Input 3-Output OR Gate	20
H211	Dual 3-Input 3-Output NOR Gate	20
H330	Quad Bus Driver/Receiver with 2-to-1 Output Multiplexers (25 Ohm)	28
H332	Dual Bus Driver/Receiver with 4-to-1 Output Multiplexers (25 Ohm)	20
H334	Quad Bus Driver/Receiver with Transmit and Receiver Latches (25 Ohm)	20
H350	Quad MECL-to-TTL Translator Single Power Supply (-5.2 V or +5.0 V)	20
H423	Triple 3-Input Bus Driver w/Enable (25 Ohm)	20
H424	Quad TTL-to-MECL Translator (ECL Strobe)	20
H600	9-Bit TTL-ECL Translator	28
H601	9-Bit ECL-TTL Translator	28
H602	9-Bit TTL-ECL Translator, Latch	28
H603	9-Bit ECL-TTL Translator, Latch	28
H640	ECL-TTL 68030/040 Clock Driver	28
H641	ECL-TTL Clock Driver	28
H642	ECL-TTL 68030/040 Clock Driver	28
H643	ECL-TTL Clock Driver	28
H645	1:9 TTL-TTL Clock Distribution Chip	28
H660	4-Bit ECL-TTL DRAM Driver	28
H680	4-Bit ECL-TTL Bus Transceiver	28
H681	6-Bit 50 Ohm ECL-TTL Transceiver	28

ECLinPS Devices Available in PLCC

MC10/100 Series — (0 to + 85°C)

Device	Function	Pins
E016	8-Bit Synchronous Binary Counter	28
E101	4-Bit 4-Input OR/NOR Gate	28
E104	5-Bit 2-Input AND/NAND Gate	28
E107	5-Bit 2-Input XOR/XNOR Gate	28
E111	1:9 Differential Clock Driver	28
E112	4-Bit Driver, Common Enable	28
E116	5-Bit Differential Line Receiver	28
E122	9-Bit Buffer	28
E131	4-Bit D Flip-Flop	28
E141	8-Bit Shift Register	28
E142	9-Bit Shift Register	28
E143	9-Bit Hold Register	28
E150	6-Bit D Latch	28
E151	6-Bit D Register	28
E154	5-Bit 2:1 MUX-Latch	28
E155	6-Bit 2:1 MUX-Latch	28
E156	3-Bit 4:1 Multiplexer	28
E157	4-Bit Individual-Select 2:1 Mux	28
E158	5-Bit 2:1 Multiplexer	28
E160	12-Bit Parity Generator/Checker	28
E163	2-Bit 8:1 Multiplexer	28
E166	9-Bit Magnitude Comparator	28
E167	6-Bit 2:1 MUX-Register	28
E171	6-Bit 4:1 Multiplexer	28
E175	9-Bit Latch	28
E193	8-Bit EDAC/Parity	28
E195	Programmable Delay Chip (Dig. 20PS Res.)	28
E196	Programmable Delay Chip (Dig. 80PS Anal. 1.6 PS/MV)	28
E212	3-Bit Scannable ECl Address Driver	28
E241	8-Bit Scannable Register	28
E256	3-Bit 4:1 MUX Latch	28
E336	3-Bit Registered Bus Transceiver	28
E337	3-Bit Scannable Register Bus Transceiver	28
E451	6-Bit Register Differential Data & CLK Inputs	28
E452	5-Bit Differential Register	28
E457	Differential 2:1 Multiplexer	28

BiCMOS Logic Products

Motorola BiCMOS logic offers a combination of high speed, low power dissipation, high noise immunity, wide fanout capability, and high reliability.

BiCMOS Devices Available in SOIC

MC74BC00 Series (-40 to +855C)

Suffix: D . . . Narrow Body Width SOIC
DW . . . Wide Body Width SOIC

Device	Description	Pins	SOIC
MC74BC00	Quad 2-Input NAND Gate	14	D
MC74BC08	Quad 2-Input AND Gate	14	D
MC74BC32	Quad 2-Input OR Gate	14	D
MC74BC230	Octal Bus Buffer, 3-State, Inverting/Non-Inverting	20	DW
MC74BC231	Octal Bus Buffer, 3-State, Inverting	20	DW
MC74BC240	Octal Bus Buffer, 3-State, Inverting	20	DW
MC74BC241	Octal Bus Buffer, 3-State, Non-Inverting	20	DW
MC74BC242	Octal Bus Transceiver, 3-State, Inverting	20	DW
MC74BC243	Octal Bus Transceiver, 3-State, Inverting	20	DW
MC74BC244	Octal Bus Buffer, 3-State, Non-Inverting	20	DW
MC74BC365	Hex Bus Buffer, 3-State, Non-Inverting	20	DW
MC74BC366	Hex Bus Buffer, 3-State, Inverting	20	DW
MC74BC367	Hex Bus Buffer, 3-State, Non-Inverting	20	DW
MC74BC368	Hex Bus Buffer, 3-State, Inverting	20	DW
MC74BC373	Octal D-Type Latch, 3-State, Non-Inverting	20	DW
MC74BC374	Octal D-Type Flip-Flop, 3-State, Non-Inverting	20	DW
MC74BC533	Octal D-Type Latch, 3-State, Inverting	20	DW
MC74BC534	Octal D-Type Flip-Flop, 3-State, Inverting	20	DW
MC74BC540	Octal Bus Buffer, 3-State, Inverting	20	DW
MC74BC541	Octal Bus Buffer, 3-State, Non-Inverting	20	DW
MC74BC563	Octal D-Type Latch, 3-State, Inverting	20	DW
MC74BC564	Octal D-Type Flip-Flop, 3-State, Inverting	20	DW
MC74BC573	Octal D-Type Flip-Flop, 3-State, Non-Inverting	20	DW
MC74BC574	Octal D-Type Flip-Flop, 3-State, Non-Inverting	20	DW
MC74BC575	Octal D-Type Flip-Flop, Non-Inverting	20	DW
MC74BC620	Octal Bus Transceiver, 3-State, Inverting	20	DW
MC74BC623	Octal Bus Transceiver, 3-State, Non-Inverting	20	DW
MC74BC640	Octal Bus Transceiver, 3-State, Inverting	20	DW
MC74BC643	Octal Bus Transceiver, 3-State, Inverting/Non-Inverting	20	DW
MC74BC645	Octal Bus Transceiver, 3-State, Non-Inverting	20	DW

Linear and Interface

All the major bipolar analog families are now represented in surface mount packaging. Standard SO and PLCC packages are augmented by SOP-8 and DPAK for linear regulators. In addition, tape and reel shipping to the updated RS481A is now on line for the industry's largest array of op-amps, regulators, interface, data conversion, consumer, telecom and automotive linear ICs.

Bipolar

Device	Function	Package
CA3146D	Transistor Array	SO-14
DAC-08CD, ED	High-Speed 8-Bit Multiplying D-to-A Converter	SO-16
LF351D	Single JFET Operational Amplifier	SO-8
LF353D	Dual JFET Operational Amplifiers	SO-8
LF411CD	Single JFET Operational Amplifier	SO-8
LF412CD	Dual JFET Operational Amplifiers	SO-8
LF441CD	Single JFET Low Power Operational Amplifier	SO-8
LF442CD	Dual JFET Low Power Operational Amplifiers	SO-8
LF444CD	Quad JFET Low Power Operational Amplifiers	SO-14
LM201AD	General Purpose Adjustable Operational Amplifier	SO-8
LM211D	High Performance Voltage Comparator	SO-8
LM224D	Quad Low Power Operational Amplifiers	SO-14
LM239D, AD	Quad Single Supply Comparators	SO-14
LM258D	Dual Low Power Operational Amplifier	SO-8
LM285D-1.2	Micropower Voltage Reference Diodes	SO-8
LM285D-2.5	Micropower Voltage Reference Diodes	SO-8
LM293D	Dual Comparators	SO-8
LM301AD	General Purpose Adjustable Operational Amplifier	SO-8
LM308D	Precision Operational Amplifier	SO-8
LM311D	High Performance Voltage Comparator	SO-8
LM317LD	Positive Adjustable 100 mA Voltage Regulator	SOP-8
LM317MDT	Positive Adjustable 500 mA Voltage Regulator	DPAK
LM324D, AD	Quad Low Power Operational Amplifiers	SO-14
LM339D, AD	Quad Single Supply Comparators	SO-14
LM348D	Quad MC1741 Operational Amplifiers	SO-14
LM358D	Dual Low Power Operational Amplifiers	SO-8
LM385D-1.2	Micropower Voltage Reference Diodes	SO-8
LM385D-2.5	Micropower Voltage Reference Diodes	SO-8
LM393D	Dual Comparators	SO-8
LM833D	Dual Audio Amplifiers	SO-8
LM2901D	Quad Single Supply Comparators	SO-14
LM2902D	Quad Low Power Operational Amplifiers	SO-14
LM2903D	Dual Comparators	SO-8
LM2904D	Dual Low Power Operational Amplifiers	SO-8
LM2931AD-5.0, D-5.0	Low Dropout Voltage Regulator	SOP-8
LM2931CD	Adjustable Low Dropout Voltage Regulator	SOP-8
LM3900D	Quad Single Supply Operational Amplifiers	SO-14
MC1350D	IF Amplifier	SO-8
MC1357D	FM IC with Quadrature Detector	SO-14

(continued)

LINEAR AND INTERFACE (continued)

Device	Function	Package
MC1377DW	Color Television RGB to PAL/NTSC Encoder	SO-20L
MC1378FN	Video Overlay Synchronizer	PLCC-44
MC1382DW	Multimode Monitor TTL To Analog Video	SO-24L
MC1403D	Precision Low Voltage Reference	SO-8
MC1413D	Peripheral Driver Array	SO-16
MC1436D, CD	High Voltage Operational Amplifier	SO-8
MC1455D	Timing Circuit	SO-8
MC1458D, CD	Dual Operational Amplifiers	SO-8
MC1488D	Quad RS-232C Driver	SO-14
MC1489D	Quad RS-232C Receiver	SO-14
MC1495D	Four-Quadrant Multiplier	SO-14
MC1496D	Balanced Modulator-Demodulator	SO-14
MC1723CD	Adjustable Positive Or Negative Voltage Regulator	SO-14
MC1741CD	General Purpose Operational Amplifier	SO-8
MC1747CD	Dual MC1741 Operational Amplifiers	SO-14
MC1776CD	Programmable Operational Amplifier	SO-8
MC26LS31D	Quad EIA-422/3 Drivers	SO-16
MC26LS32D	Quad EIA-422 Receivers	SO-16
MC26S10D	Quad Bus Transceiver	SO-16
MC2831AD	FM Transmitter	SO-16
MC3303D	Quad Differential-Input Operational Amplifier	SO-14
MC3335DW	Basic Dual Conversion Receiver	SO-20L
MC3346D	General Purpose Transistor Array	SO-14
MC3356DW	FSK Receiver	SO-20L
MC3359DW	Low Power Narrowband FM IF Amplifier	SO-20L
MC3361AD	Low Voltage Narrowband FM IF Amplifier	SO-16
MC3362DW	Dual Conversion Receivers	SO-28L
MC3363DW	Dual Conversion Receivers	SO-28L
MC3367DW	Low Voltage VHF Receiver	SO-28L
MC3371D	Low Voltage FM Receiver with RSSI	SO-16
MC3372D	Low Voltage FM Receiver with RSSI, Ceramic Quadrature Detector	SO-16
MC3401D	Quad Operational Amplifiers	SO-14
MC3403D	Quad Differential-Input Operational Amplifiers	SO-14
MC3423D	Overvoltage Sensing Circuit	SO-8
MC3448AD	Quad GPIB Transceiver	SO-16
MC3450D	Quad Line Receivers	SO-16
MC3452D	Quad Line Receivers	SO-16
MC3456D	Dual Timing Circuit	SO-14
MC3458D	Dual Low Power Operational Amplifiers	SO-8
MC3486D	Quad EIA-422/3 Receivers	SO-16
MC3487D	Quad EIA-422 Drivers	SO-16
MC4558CD	Dual High Frequency Operational Amplifiers	SO-8
MC4741CD	Quad MC1741 Operational Amplifiers	SO-14
MC78L05ACD	Positive Voltage Regulator, 5 V, 100 mA	SO-8
MC78L08ACD	Positive Voltage Regulator, 8 V, 100 mA	SO-8
MC78L12ACD	Positive Voltage Regulator, 12 V, 100 mA	SO-8
MC78L15ACD	Positive Voltage Regulator, 15 V, 100 mA	SO-8
MC78M05CDT	Positive Voltage Regulator, 5 V, 500 mA	DPAK
MC78M08CDT	Positive Voltage Regulator, 8 V, 500 mA	DPAK
MC78M12CDT	Positive Voltage Regulator, 12 V, 500 mA	DPAK
MC78M15CDT	Positive Voltage Regulator, 15 V, 500 mA	DPAK
MC79L05ACD	3-Terminal Negative Fixed Voltage Regulator, –5 V, 100 mA	SO-8
MC79L12ACD	3-Terminal Negative Fixed Voltage Regulator, – 12 V, 100 mA	SOP-8
MC79L15ACD	3-Terminal Negative Fixed Voltage Regulator, – 15 V, 100 mA	SOP-8

*To Be Introduced

(continued)

LINEAR AND INTERFACE (continued)

Device	Function	Package
MC79M05CDT	3-Terminal Negative Fixed Voltage Regulator, – 5 V, 500 mA	DPAK
MC79M12CDT	3-Terminal Negative Fixed Voltage Regulator, – 12 V, 500 mA	DPAK
MC79M15CDT	3-Terminal Negative Fixed Voltage Regulator, – 15 V, 500 mA	DPAK
MC10319DW	8-Bit A/D Flash Converter	SO-24L
MC10321DW	7-Bit A/D Flash Converter	SO-20L
MC13022DW*	Medium Voltage AM Stereo C-QUAM® Decoder	SO-28L
MC13023D*	AM Front End/Tuning Stabilizer	SO-16
MC13024DW	Low Voltage C-QUAM® Receiver	SO-24L
MC13055D	VHF LAN Receiver — FSK	SO-16
MC13060D	1 Watt Audio Amp	SOP-8
MC33033DW	Brushless DC Motor Controller	SO-20L
MC33034DW120, DW60	Brushless DC Motor Controller	SO-24L
MC33035DW	Brushless DC Motor Controller	SO-24L
MC33039D	Closed Loop Brushless Motor Adaptor	SO-8
MC33064D-5	Undervoltage Sensing Circuit (5 V ± 5% Supply)	SO-8
MC33065DW	Dual Current Mode PWM Controller	SO-16L
MC33071D, AD	Single, High Speed Single Supply Operational Amplifiers	SO-8
MC33072D, AD	Dual, High Speed Single Supply Operational Amplifiers	SO-8
MC33074D, AD	Quad, High Speed Single Supply Operational Amplifiers	SO-14
MC33077D	Dual, Low Noise High Frequency Operational Amplifiers	SO-8
MC33078D	Dual Audio, Low Noise Operational Amplifiers	SO-8
MC33079D	Low Power, Single Supply Operational Amplifier	SO-14
MC33120DW*	SLIC II	SO-20L
MC33164D-3	Micropower Undervoltage Sensing Circuit (3 V ±5% Supply)	SO-8
MC33164D-5	Micropower Undervoltage Sensing Circuit (5 V ±10% Supply)	SO-8
MC33171D	Single, Low Power, Single Supply Operational Amplifier	SO-8
MC33172D	Dual, Low Power, Single Supply Operational Amplifiers	SO-8
MC33174D	Quad, Low Power, Single Supply Operational Amplifiers	SO-14
MC33178D	Dual Precision Operational Amplifiers	SO-8
MC33179D	Quad Precision Operational Amplifiers	SO-14
MC33272D	Dual Precision Bipolar Operational Amplifier	SO-8
MC33274D	Quad Precision Bipolar Operational Amplifiers	SO-14
MC33282D	Dual Precision Low Input JFET Operational Amplifiers (Trim-in-the-Package)	SO-8
MC33284D	Quad Precision JFET Operational Amplifiers (Trim-in-the-Package)	SO-14
MC34001D, BD	Single JFET Input Operational Amplifiers	SO-8
MC34002D, BD	Dual JFET Input Operational Amplifiers	SO-8
MC34011AFN	Electronic Telephone Circuit	PLCC-44
MC34012-1D	Telephone Tone Ringer	SO-8
MC34012-2D	Telephone Tone Ringer	SO-8
MC34012-3D	Telephone Tone Ringer	SO-8
MC34013AFN	Speech Network and Tone Dialer	PLCC-28
MC34014FN,DW	Telephone Speech Network with Dialer Interface	PLCC-20, SO-20L
MC34017-1D	Telephone Tone Dialer	SO-8
MC34017-2D	Telephone Tone Dialer	SO-8
MC34017-3D	Telephone Tone Dialer	SO-8
MC34018DW	Voice Switched Speakerphone Circuit	SO-28L
MC34050D	EIA-422/23 Transceiver	SO-16
MC34051D	EIA-422/23 Transceiver	SO-16
MC34060AD	Switchmode Pulse Width Modulation Control Circuit	SO-14
MC34063AD	Precision DC-to-DC Converter Control Circuit	SO-8
MC34064D-5	Undervoltage Sensing Circuit (5 V ± 5% Supply)	SO-8
MC34065DW	Dual Current Mode PWM Controller	SO-16L
MC34071D, AD	Single, High Speed, Single Supply Operational Amplifiers	SO-8
MC34072D, AD	Dual, High Speed, Single Supply Operational Amplifiers	SO-8
MC34074D, AD	Quad, High Performance, Single Supply Operational Amplifiers	SO-14
MC34081D	High Speed Decompensated (AVCL ≥ 2) JFET Input Operational Amplifier	SO-8
MC34080D	High-Speed JFET Input Operational Amplifier	SO-8

*To Be Introduced

(continued)

LINEAR AND INTERFACE (continued)

Device	Function	Package
MC34084DW, ADW	Quad High Speed, JFET Operational Amplifiers	SO-16L
MC34085DW, ADW	Quad High Speed, JFET Operational Amplifiers	SO-16L
MC34114DW	Speech Network II	SO-18L
MC34118DW	Speakerphone II	SO-18L
MC34119D	Telephone Speaker Amplifier	SO-8
MC34129D	Power Supply Controller	SO-14
MC34164D-3	Micropower Undervoltage Sensing Circuit (3 V ± 5% Supply)	SO-8
MC34164D-5	Micropower Undervoltage Sensing Circuit (5 V ± 10% Supply)	SO-8
MC34181D	Single, Low Power, High Speed JFET Operational Amplifier	SO-8
MC34182D	Dual, Low Power, High Speed JFET Operational Amplifiers	SO-8
MC34184D	Quad, Low Power, High Speed JFET Operational Amplifiers	SO-14
MC44301DW*	High Performance Video IF	SO-24L
MC44802DW	PLL Tuning Circuit w/1.3 GHz Prescaler	SO-20L
NE556D	Dual Timing Circuit	SO-14
NE592D	Video Amplifier	SO-14
TL064CD	Quad JFET Low Power Operational Amplifier	SO-14
TL071CD, ACD	Single, Low Noise JFET Input Operational Amplifiers	SO-8
TL072CD, ACD	Dual, Low Noise JFET Input Operational Amplifiers	SO-8
TL081CD, ACD	Single, JFET Input Operational Amplifiers	SO-8
TL082CD, ACD	Dual, JFET Input Operational Amplifiers	SO-8
TL431ACD, AID, CD, ID	Programmable Precision Reference	SOP-8
UAA1041D	Automotive Direction Indicator	SO-8
UC2842AD	Off-Line Current Mode PWM Controller	SO-14
UC2843AD	Current Mode PWM Controller	SO-14
UC2844D	Off-Line Current Mode PWM Controller (DC ≤ 50%)	SO-14
UC2845D	Current Mode PWM Controller (DC ≤ 50%)	SO-14
UC3842AD	Off-Line Current Mode PWM Controller	SO-14
UC3843AD	Current Mode PWM Controller	SO-14
UC3844D	Off-Line Current Mode PWM Controller (DC ≤ 50%)	SO-14
UC3845D	Current Mode PWM Controller (DC ≤ 50%)	SO-14

*To Be Introduced.
DT = DPAK, D = SOIC & SOP, Narrow body SOIC & SOP, DW = Wide body SOICs, FN = PLLL

Military IC Products

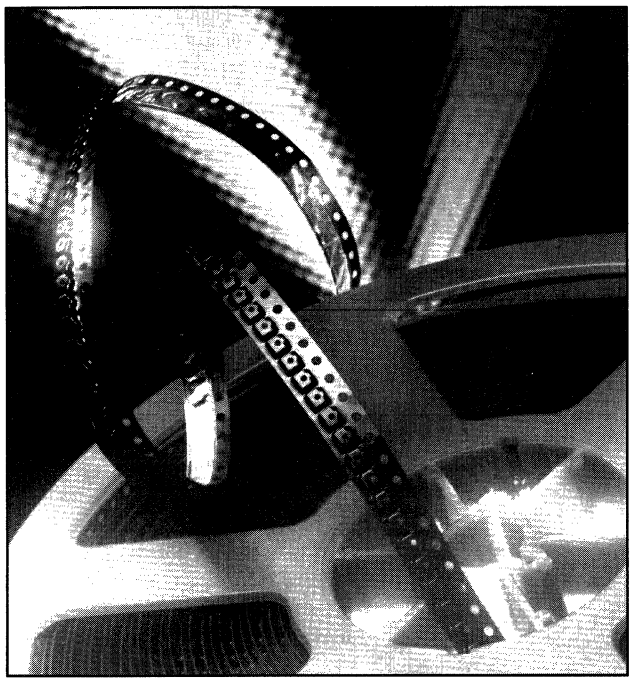
Product Group	Ceramic Leaded Chip Carrier CLCC Packages				
	52	58	100	132	
68020				X	
68030				X	
68881		X			
68882		X			
68HC000		X			
68HC11A0	X				
68HC11A1	X				
68HC811E2	X				
56001			X		

Product Group	Leadless Ceramic Chip Carrier LCCC Packages				
	20	22	24	32	68
ALS	X				
LS	X				
MECL 10K	X				
MECL 10KH	X				
HCMOS	X				
Bipolar RAMs			X		
Static RAMs	X	X		X	
Linear*	X				
68000					X

Product Group	Ceramic Flat Pack FP Packages				
	14	16	20	24	
FAST	X	X	X	X	
ALS	X	X	X		
LS	X	X	X	X	
MECL III		X			
MECL 10K	X	X			
MECL 10KH	X	X			
Bipolar RAMs		X			

*Only select linear devices offered, Motorola complies with C2a designator in Appendix C Mil-M-38510 20 terminal package. Motorola uses the letter U for packages not otherwise designated in Appendix C Mil-M-38510.

Technical Data



The Motorola Semiconductor Sector is committed to Surface Mount Package Technology. Devices are offered in a wide variety of JEDEC packages and the list of part numbers will be expanded as the demand for them increases.

Thermal Data for specific packaging is available and thermal characterization is a continuing process. The following section contains thermal data on surface mount packages that will be very useful in circuit designs.

Total system reliability is directly affected by the thermal characteristics of initial board design. Care must be taken to eliminate "Hot Spots" on the PC board. The surface mount technology allows both sides of the PC board to be utilized for component placement. This attribute can contribute to excess heat being generated due to the PC board being sandwiched between two heat sources. This type of problem must be recognized and dealt with in the initial PC board design to insure long term reliability.

The PC board layout must have package pad geometries of the correct size to ensure the correct wetting of the component leads to the PC board. Recommended pad geometries are given in the following section. These recommendations are not all inclusive. Small variations may be required depending on the solder paste, solder mask, or the solder process equipment being used.

The Solder Reflow Process has the unique capability to self align components. This alignment is dependent on the proper pad geometry and component size.

Quality and Reliability

The cost of failure is high . . . high in terms of incoming inspection to verify product integrity and conformance to specifications; higher still in terms of subsystem repair, should a defective part inadvertently reach the assembly stage, highest by far when a marginal part causes field failure of operating equipment.

With semiconductors, the often critical nature of their end application leaves no room for failure. Nor should there be. By their very nature, properly designed and carefully manufactured semiconductor devices will far outlast the equipment in which they are employed. But the terms "proper design" and "careful manufacture" are highly interpretive. Proper design implies, and demands, a wide base of experience in the marriage of circuit development and utilization of processes that will optimize performance, yield and long-term dependability. Careful manufacture suggests not only the dedication of all personnel to proven production procedures, but also a high-volume production level over time, sufficient to evolve test and inspection procedures that eliminate all chance for error.

Finally, it requires ongoing investment in equipment and research to investigate potential failure mechanisms, to evaluate the results, and to apply these to present and future products for the continual advancement of the technology frontier.

In all these aspects, Motorola continues to be an industry leader. The result — a clear, unambiguous warranty which, for bipolar digital products, assures defect-free shipments and, in many instances, permits on-line ordering with ship-to-stock deliveries.

It has been truly said and often repeated that Quality must be built into a product, and cannot be assured solely through electrical and environmental screens. At Motorola, a Statistical Process Control System is implemented not only to insure the manufacture of products to precisely defined and proven specifications, but to provide and verify the continual improvements needed to achieve and maintain a zero-defects accomplishment.

Statistical process control involves three steps: process evaluation, process monitoring and reaction.

Evaluation includes capability studies, process modeling and optimization.

Monitoring includes process charting, verification and feedback.

Reaction includes both the planned action to adjust for anticipated process variation, and methods for responding to unexpected change.

At Motorola SPC permeates all phases of product development, manufacture and improvements. In plastic materials, for example, residual trace elements such as chlorine, sodium, etc., are specified to the lowest achievable levels and continually verified and assured by in-house chemical analysis during incoming inspection.

Process controls for wafer fabrication include metallization thickness and step coverage by means of routine scanning electron microscopy, and grain size is carefully measured and controlled. Oxide and metal cleanliness and dopant levels of deposited glassivation are periodically measured and controlled. Special stress tests have been added to detect oxide defects, diffusion faults, parameter shifts and other phenomena that cannot be detected through standard visual inspection and electrical testing. And all processing procedures, controls, and tests are implemented throughout Motorola's worldwide facilities to insure product uniformity.

To verify product consistency, weekly tests are conducted for compliance to Motorola standards of marking, solderability, hermeticity, wire bonds and a wide variety of other parameters — parameters guaranteed by the stringent controls and inspections associated with the manufacturing process.

Reliability Testing

New packages undergo numerous tests per MIL-STD-883C by the Reliability Engineering Department. Following is a table outlining the tests which are typically performed. Not all tests may be required depending upon the package. Also, additional tests may be run based on specific applications. Sample sizes and number of lots evaluated may vary. Specific questions should be directed to the nearest Motorola sales office.

Type of Test	MIL-STD-883C Test Method	Test Condition and Stress Levels	Hermetic Package	Plastic Package
1. PHYSICAL CHARACTERISTICS				
A. Physical Dimensions	2016	Per Case Outline	X	X
B. Solderability	2003	Examine 15 LDS/Unit	X	X
C. Resistance to Solvents	2015		X	X
D. Lid Torque	2024	Glass Seal Only	X	
E. Internal Visual and Mechanical	2014	Per 12M54564J	X	
F. Bond Strength	1011D	15 Wire/Unit	X	
G. Die Shear	2019		X	
2. EXTENDED TEMPERATURE CYCLING (With Seal Test	1010C	100, 500 cycles – 65°C/ + 150°C Air-to-Air	X	X
3. EXTENDED THERMAL SHOCK (With Seal Test	1011C	100, 500, 1000 cycles – 65°C/ + 150°C LIQ-LIQ	X	X
— Hermetic only)	1014B&C	No Bubbles	X	
4. THERMAL SEQUENCE	5005 SBGP D3		X	X
A. Thermal Shock	1011B	15 cycles –55°C/ + 125°C	X	X
B. Temperature Cycling	1010C	100 cycles –65°C/ + 150°C	X	X
C. Moisture Resistance	1004	10 day (omit insulation resistance test for Cer. Lids)	X	X
D. Seal Test (Hermetic)	1014B&C	No Bubbles	X	
5. MECHANICAL SEQUENCE	5005 SBGP D4			
A. Mechanical Shock	2002B	1500G, 0.5 sec. all axes	X	X
B. Vibration (Var. Freq.)	2007A	20G, 20–2000 Hz; X, Y, Z axes	X	X
C. Constant Acceleration	2001E 2001D 2001B	30Kg Y1 axis (up to 40 ld.) 20Kg. Y1 axis (up to 149 ld.) 10Kg. Y1 axis (> 149 ld.)*	X	X
D. Seal Test (Hermetic)	1014B&C	No Bubbles	X	
6. HIGH TEMPERATURE (STATIC) OPERATING LIFE	1005 A or C	40, 250, 504 & 1008 hrs. power on/5 min. off/5 min. (normal bias)	X	X
		T_A = 145°C and/or T_J > 175°C but < 250°C Max.	X	
		T_A = 145°C and/or T_J = 175°C		X
7. PRESSURE TEMPERATURE HUMIDITY BIAS PTHB (Biased Autoclave)	—	15PSIG, 121°C, 100% RH Normal Bias 16, 48 Hrs. (non-hermetic only, 96-hrs. for information only)**		X

Notes:

*Initial step 10Kg. with 10kg. step increases.

**See alternate test #15 for high power packages.

***For higher power devices with ΔT_{JA} > 10°C, (still air, no heatsink).

RELIABILITY TESTING (continued)

Type of Test	MIL-STD-883C Test Method	Test Condition and Stress Levels	Hermetic Package	Plastic Package
8. HIGH TEMPERATURE POWER CYCLING (Intermittent) OPERATING LIFE	1006 A or C	40, 250, 504 & 1008 hrs. power on/5 min. off/5 min. (normal bias)	X	X
		T_A = 145°C and/or T_J > 175°C but < 250°C Max.	X	
		T_A = 145°C and/or T_J = 175°C		X
9. HIGH TEMPERATURE STORAGE LIFE (Optional)	1008C	T_A = 150°C, no bias 500, 1000 hrs.	X	X
10. THERMAL CHARACTERISTICS				
A. Die Attach	1012C	1 SEC-SAGE DAE400A	X	X
B. θJA	1012C	2000 SEC-SAGE TRT400B	X	X
C. θJA	1012C	Thermal Diode Method	X	X
11. SALT ATMOSPHERE (w/Seal Test-Hermetic only)	1009A&B	24 & 48 Hrs — No Bias	X	X
	1014B&C	No Bubbles	X	
12. INTERNAL WATER VAPOR (w/Seal Test-Hermetic only)	1018	Procedure 1, Mass Spec Method; 5000 PPM MAX	X	
	1014B&C	No Bubbles	X	
13. Lead Integrity (w/Seal Test-Hermetic only)	2004A	Lead Tension (Cerdip, 8 oz., 30 sec, 15 ld/pkg.; PGA, 2 lbs., 30 sec.)	X	
	2004B1	Bending Stress — 3 cycles 3 leads/package	X	X
	1014B&C	No Bubbles	X	
14. PLATING THICKNESS	—	X-Ray Fluorescence Method Internal Bonding posts—5/pkg external leads/terminals—5/pkg external metal lid—1/pkg	X	X

ALTERNATE TESTS:

15. PRESSURE TEMPERATURE HUMIDITY (PTH AUTOCLAVE)	—	121°C, 100% RH No Bias — 96, 192, 288 Hrs (non-hermetic only)		X
PTH WITH HI-TEMP STATIC OP LIFE	1005 A or C	T_A = 145°C and/or T_J = 175°C 40 & 96 hrs***		X
16. TEMPERATURE HUMIDITY BIAS (THB)	—	85°C/85% RH, Nominal Bias 168, 504, 1008, 2016 Hrs (non-hermetic only)		X

Notes:

*Initial step 10Kg. with 10kg. step increases.

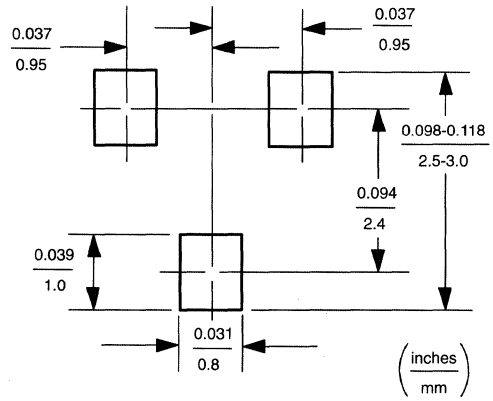
**See alternate test #15 for high power packages.

***For higher power devices with ΔTJA>105C, (still air, no heatsink).

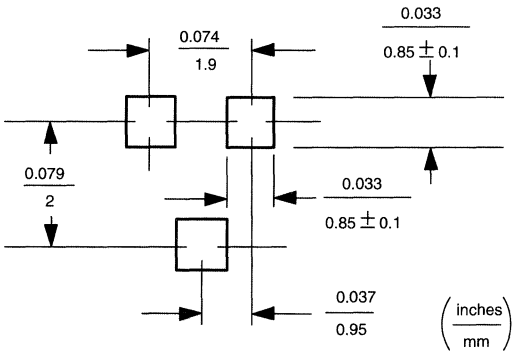
Geometries

Solder Pad Geometries

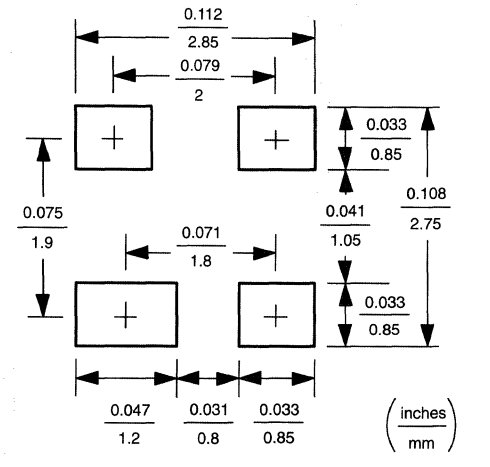
Surface mount board layout is a critical portion of the total design. The "footprint" for the semiconductor packages must be the correct size to insure proper solder connection interface between the board and the package. With the correct pad geometry the packages will self align when subjected to a solder reflow process.



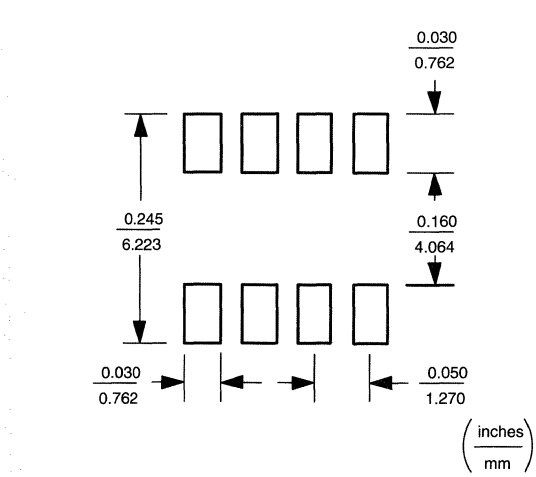
SC-59



SOT-23

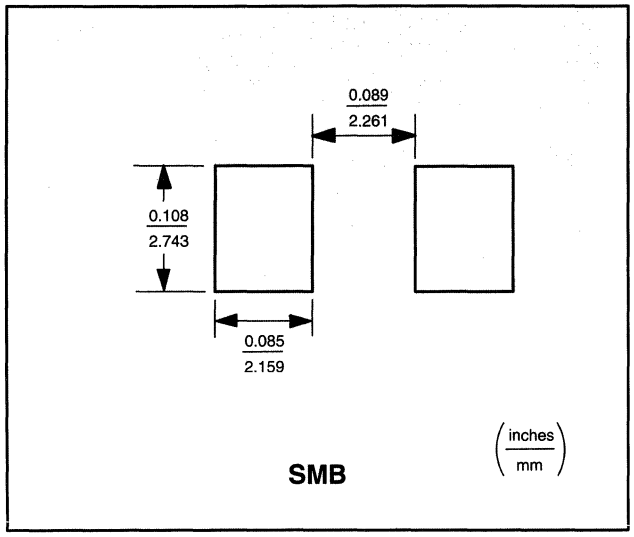


SOT-143

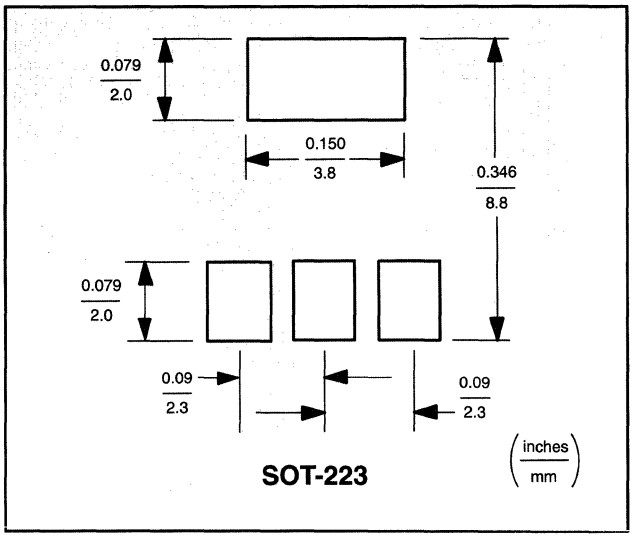


SO-8, OPTO SO-8, SO-14, SO-16

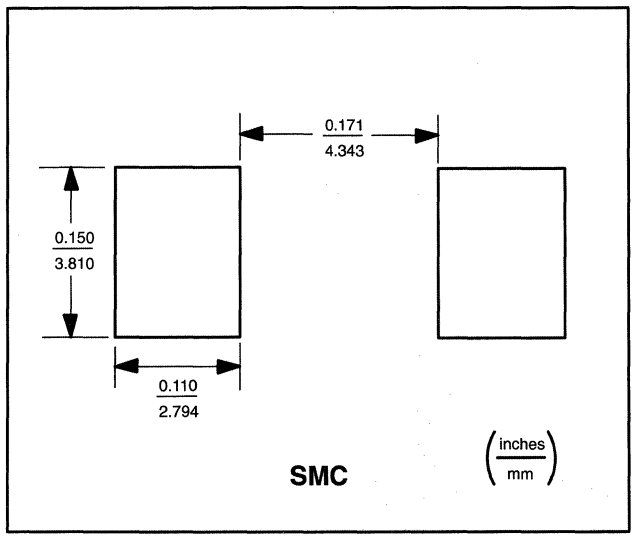
GEOMETRIES (continued)



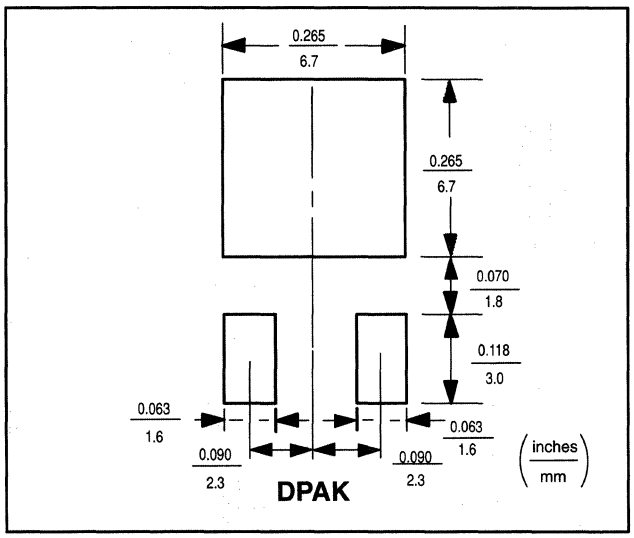
SMB



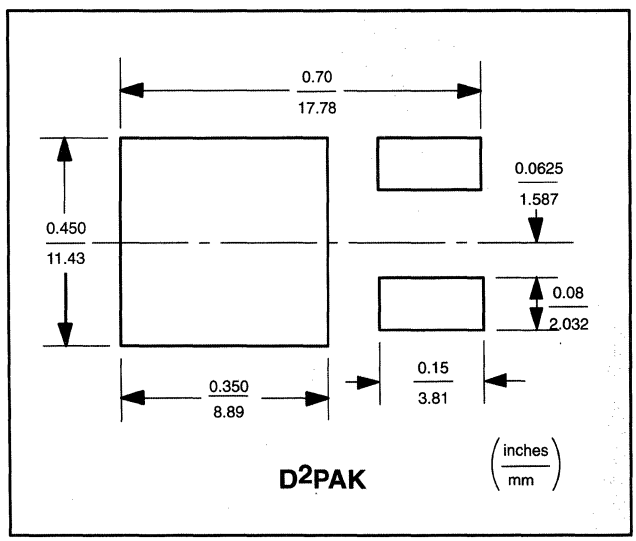
SOT-223



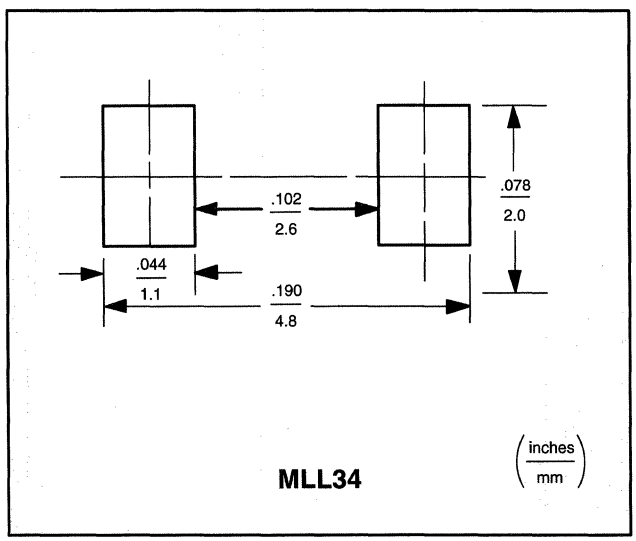
SMC



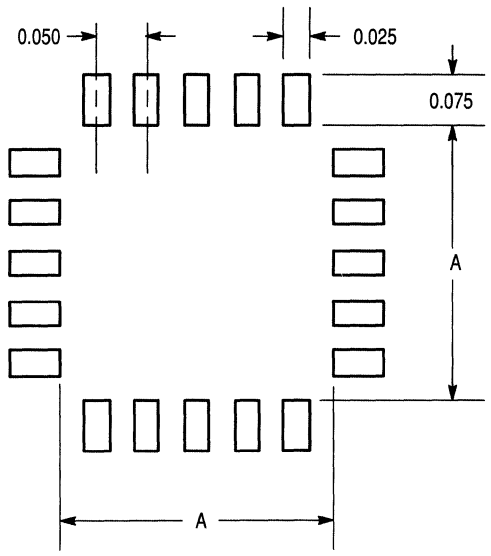
DPAK



D²PAK



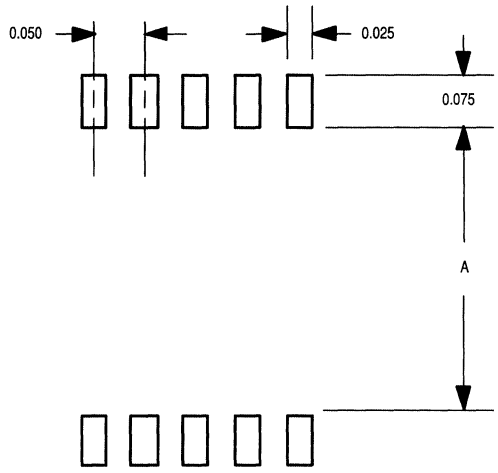
MLL34



Dimensions in inches

Leads	Dimension A, Inches
20	0.255
28	0.355
44	0.555
52	0.655
68	0.855
84	1.055

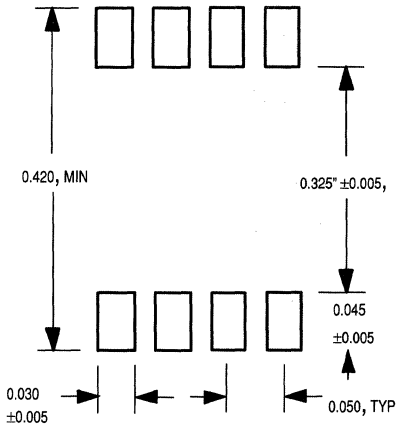
PLCC



Dimensions in inches

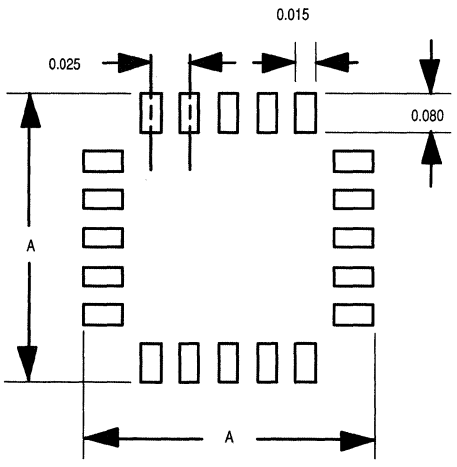
Leads	Width, Inches	Dimension A, Inches
20	0.300	0.195
20	0.350	0.243
24	0.300	0.195
28	0.300	0.195
28	0.400	0.295
32	0.300	0.195
32	0.400	0.295

SOJ



Dimensions in inches

SO-16L, SO-20L, SO-18L



Dimensions in inches

Leads	Dimension A. Inches
68	0.710
132	1.110

Thermal Data

POWER DISSIPATION FOR DISCRETE SURFACE MOUNT PACKAGES — GENERAL RULES

The power dissipation of discrete surface mount packages is a function of the size of the collector/drain pad in the footprint. The footprint shown on the data sheet is the minimum recommended footprint necessary to achieve the P_D rating shown on the data sheet. This can vary from the minimum pad size for soldering to the pad size given for maximum power dissipation. Power dissipation for a surface mount device is determined by $T_{J(max)}$, the maximum rated junction temperature of the die, $R_{\theta JA}$, the thermal resistance from the device junction to ambient; and the operating temperature, T_A. For example, using the values provided on the data sheet for the SOT-223 package, P_D can be calculated as follows.

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature T_A of 25°C, one can calculate the power dissipation of the device which in this case is 550 milliwatts.

$$P_D = \frac{150°C - 25°C}{156°C/W} = 0.8 \text{ watts}$$

The 156°C/W for the SOT-223 package assumes the recommended collector pad area of 118 mil^2 on a glass epoxy printed circuit board to achieve a power dissipation of 800 milliwatts using the footprint shown. Enlarging the area of the collector/drain pad will increase the power dissipation of the device. Another alternative is to use a ceramic substrate or an aluminum core board such as Thermalclad™. Using a board material such as Thermalclad, a power dissipation of 1.6 watts can be achieved using the same footprint. The same assumptions can be applied to other discrete surface mount packages.

Thermalclad is a trademark of the Bergquist Co.

GENERAL MOUNTING PRECAUTIONS — SO TYPE PACKAGES, MLL34, SMB, SMC, DPAK, D^2PAK*

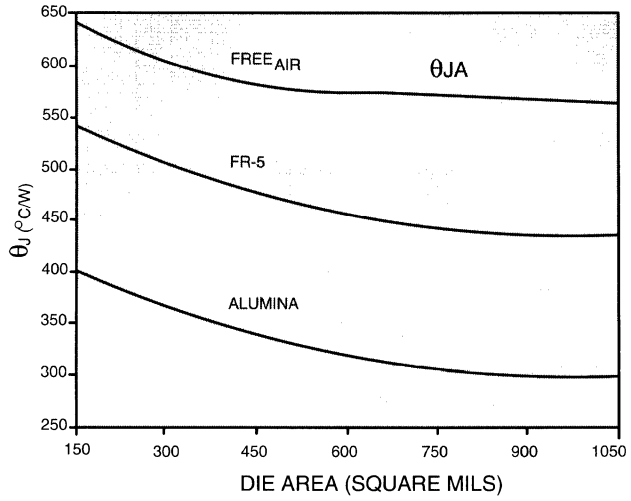
The melting temperature of solder is higher than the rated temperature of the device and the entire device is heated to a high temperature; therefore failure to complete soldering within a short time could result in device failure. Therefore the following items should always be observed in order to minimize the thermal stress to which the devices are subjected.

- Always preheat the device
- The delta temperature between the preheat and soldering should be 100°C or less**
- When preheating and soldering, the temperature of the leads and the case must not exceed the maximum temperature ratings as shown on the data sheet. When using infrared heating with the reflow soldering method, the difference in temperatures of the case and the leads shall be Δ10°C or less.
- The soldering temperature and time shall not exceed 260°C for more than 10 seconds
- When shifting from preheating to soldering, the maximum temperature gradient shall be 5°C or less
- After soldering has been completed, the device should be allowed to cool naturally for three minutes or more. Gradual cooling should be used as the use of forced cooling will increase the temperature gradient and result in latent mechanical stress.
- One should not apply mechanical stress or shock during cooling

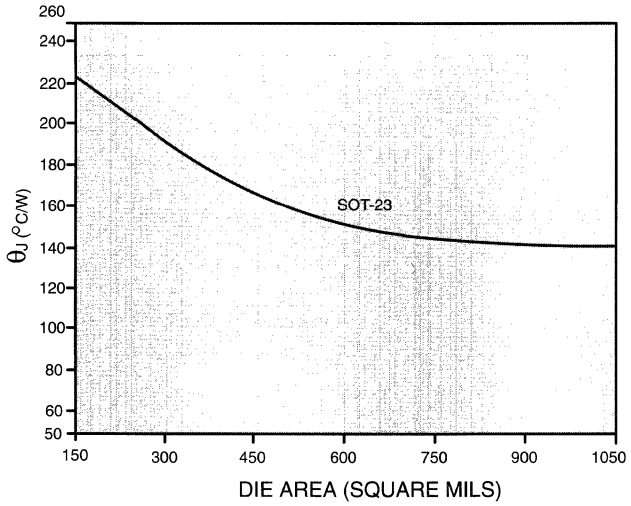
*Not recommended for wave solder
**Soldering a device without preheating can cause excessive thermal shock and stress which can result in damage to the device

THERMAL DATA (continued)

SC-59/SOT-23 Thermal Resistance θJA Comparison



SC-59/SOT-23 Thermal Resistance θJC



Thermal Rating and Power Dissipation

	SC-59/SOT-23		
	Free Air	FR-5	Alumina
θJA(°C/W)	570	450	310
θJC(°C/W)	140	140	140
θCA(°C/W)	430	310	170
P_D (mW)	219	225	300

Die Size = 32.5 x 32.5 Mil
FR-5 = 1″ x .75″ x 0.062″
lumina = 0.4″ x 0.3″ x 0.024″ (99.5% Aluminal)
$P_D = (T_{J(max)} - T_A)/R_{\theta JA}$

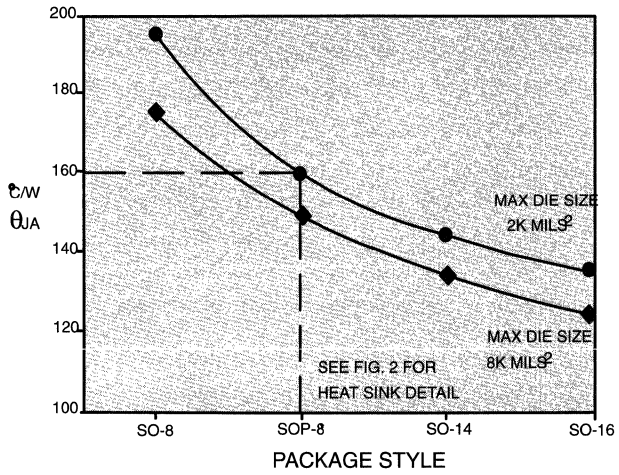
Device Junction Temperature versus Time to 0.1% Bond Failures

Junction Temperature °C	Time Hours	Time Years
80	1,032,200	117.8
90	419,300	47.9
100	178,700	20.4
110	79,600	9.4
120	37,000	4.2
130	17,800	2.0
140	8,900	1.0

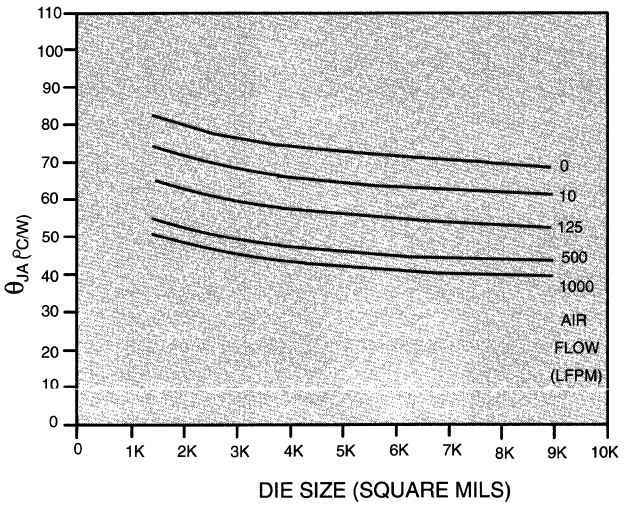
DPAK Thermal
Free Air Dissipation Rating (T_A = 25°C)
Total Power Dissipation: P_D = 1.75 W
$R_{\theta JA}$ Free Air: 100°C/W
$R_{\theta JA}$ FR5 Board: 71°C/W
$R_{\theta JC}$ FR5 Board: 6.25°C/W
*Theta determined with 112 mil x 112 mil die

MLL34 Leadless
Free Air Dissipation Ratings (T_A = 50°C)
Total Power Dissipation: P_D = 500 mW
Maximum Junction Temperature: T_J = 200°C
Thermal Resistance: $R_{\theta JA}$ = 303°C/W

SOIC Package Thermal Resistance Junction-to-Ambient (°C/W)



PLCC-20 Thermal Resistance

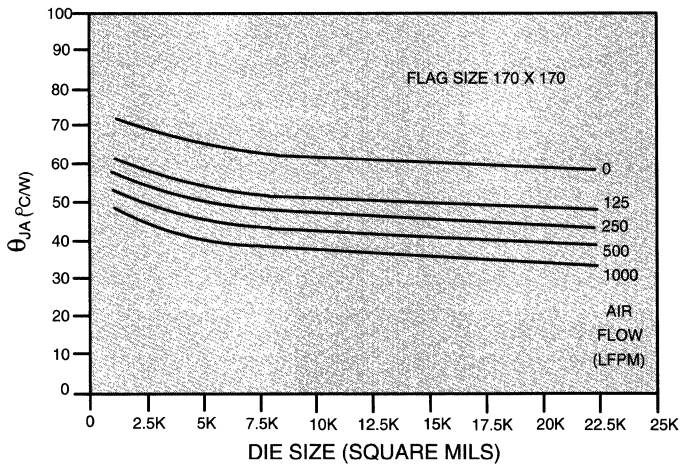


DATA TAKEN USING PHILIPS SO TEST BOARD #7322-078, 80873
*SOP-8 USING STANDARD SO-8 FOOTPRINT — MIN PAD SIZE

Measurement specimens are solder mounted on printed circuit card 20 mm x 32 mm x 1.7 mm in still air. No auxiliary thermal condition aids are used.

This data was collected using thermal test die in 20-pin PLCC packages on PLCC test boards (2.24" x 2.24" x .062" glass epoxy, type FR-4, with solder coated 1 oz./sq. ft. copper).

PLCC-28 Thermal Resistance



ASIC PRODUCTS HDC SERIES ARRAYS THERMAL PERFORMANCE

Estimated RθJA

	HDC Array	Die Size	Cavity/ Flag Size	Thermal Resistance—Junction to Ambient ($R_{\theta JA}$)				
				Free Air	250 LFM	500 LFM	750 LFM	1000 LFM
28 PLCC ø	HDC003	136 x 136	150 x 150	80.7	60	46.2	43	40
	HDC006	168 x 168	180 x 180	—	—	—	—	—
	HDC008	182 x 182	200 x 200	—	—	—	—	—
44 PLCC ø	HDC003	136 x 136	200 x 200	67	51	43	39	35
	HDC006	168 x 168	200 x 200	—	—	—	—	—
	HDC008	182 x 182	200 x 200	—	—	—	—	—
68 PLCC ø	HDC003	136 x 136	260 x 260	51	40	35	29	25
	HDC006	168 x 168	260 x 260	—	—	—	—	—
	HDC008	182 x 182	260 x 260	—	—	—	—	—
	HDC011	201 x 201	260 x 260	—	—	—	—	—
	HDC016	232 x 232	260 x 260	—	—	—	—	—
	HDC031	294 x 294	325 x 325	—	—	—	—	—
84 PLCC α	HDC006	168 x 168	275 x 275	49	—	—	—	—
	HDC008	182 x 182	275 x 275	—	—	—	—	—
	HDC011	201 x 201	275 x 275	—	—	—	—	—
	HDC016	232 x 232	275 x 275	—	—	—	—	—
	HDC031	294 x 294	330 x 330	—	—	—	—	—
64 QFP ♦	HDC003	136 x 136	240 x 240	93.2	78.3	67.6	—	60.0
	HDC006	168 x 168	240 x 240	92.2	—	—	—	—
	HDC008	182 x 182	240 x 240	91.1	—	—	—	—
	HDC011	201 x 201	240 x 240	90.0	—	—	—	—
	HDC016	232 x 232	300 x 300	89.3	—	—	—	—
80 QFP ♦	HDC006	168 x 168	255 x 255	88.9	72.7	62.7	—	55.8
	HDC008	182 x 182	255 x 255	87.4	—	—	—	—
	HDC011	201 x 201	255 x 255	85.7	—	—	—	—
	HDC016	232 x 232	315 x 315	84.0	—	—	—	—
	HDC031	294 x 294	315 x 315	70.0	58.7	49.4	—	41.7
100 QFP ♦	HDC008	182 x 182	255 x 255	85.8	—	—	—	—
	HDC011	201 x 201	255 x 255	85.0	—	—	—	—
	HDC016	232 x 232	255 x 255	84.3	—	—	—	—
	HDC031	294 x 294	315 x 315	77.5	—	—	—	—
120 QFP ♦	HDC016	232 x 232	330 x 330	62.5	57.8	43.0	—	38.6
	HDC031	294 x 294	330 x 330	61.5	56.9	42.0	—	37.5
	HDC064	402 x 402	430 x 430	—	—	—	—	—
128 QFP ♦	HDC016	232 x 232	340 x 340	60.6	56.2	41.7	—	36.9
	HDC031	294 x 294	400 x 400	54.6	43.4	36.4	—	32.1
144 QFP ♦	HDC027	282 x 282	380 x 380	—	—	—	—	—
	HDC031	294 x 294	380 x 380	55.7	44.5	37.9	—	33.9
160 QFP ♦	HDC027	282 x 282	—	—	—	—	—	—
	HDC031	294 x 294	400 x 400	55.3	41.2	35.1	—	30.8
	HDC049	354 x 354	—	—	—	—	—	—
	HDC064	402 x 402	430 x 430	53.1	39.1	32.2	—	28.3
208 QFP ♦ (MCR)	HDC049	354 x 354	—	—	—	—	—	—
	HDC064	402 x 402	—	—	—	—	—	—

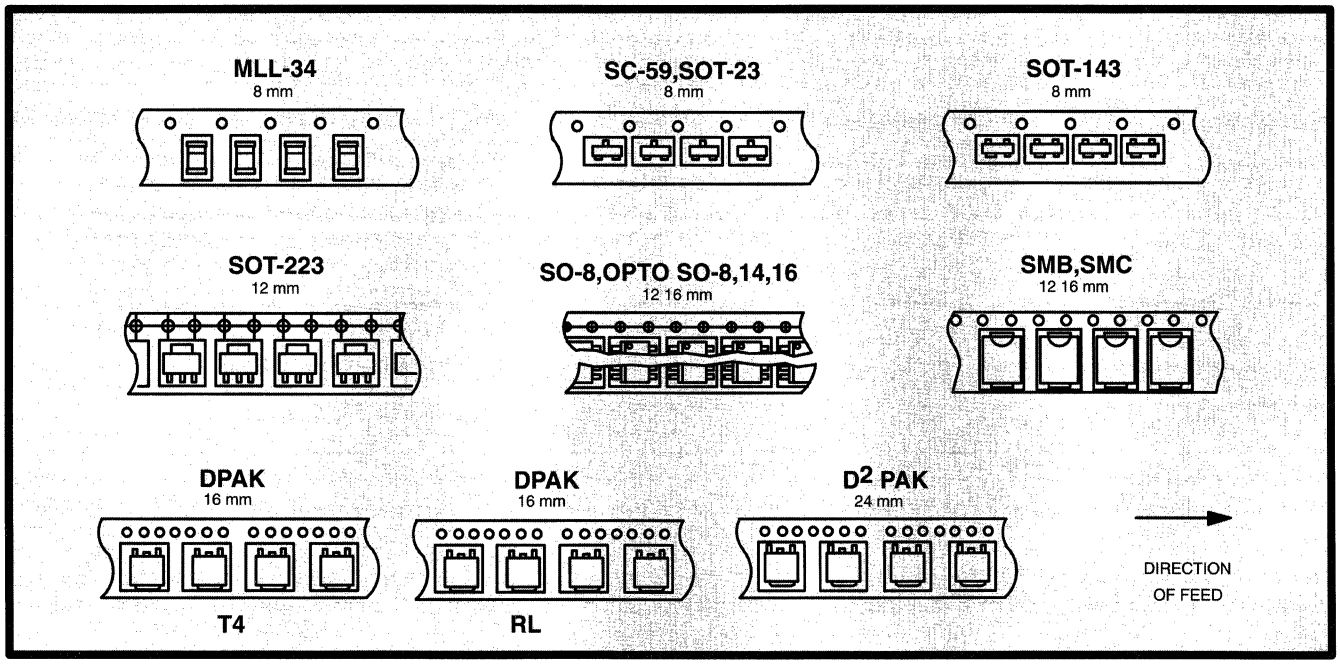
Packaging Information

Discrete Products

Embossed Tape and Reel is used to facilitate automatic pick and place equipment feed requirements. The tape is used as the shipping container for various products and requires a minimum of handling. The antistatic/conductive tape provides a secure cavity for the product when sealed with the "peel-back" cover tape.

- Two Reel Sizes Available (7" and 13")
- Used for Automatic Pick and Place Feed Systems
- Minimizes Product Handling
- EIA 481A
- MLL-34, SC-59, SOT-23, SOT-143 in 8 mm Tape
- SO-8, OPTO SO-8, SOT-223, SMB in 12 mm Tape
- DPAK, SO-14, SO-16, SMC in 16 mm Tape
- D^2PAK in 24 mm Tape

Used the standard device title and add the required suffix as listed in the option table below. Note that the individual reels have a finite number of devices depending on the type of product contained in the tape. Also note the minimum lot size is one full reel for each line item, and orders are required to be in increments of the single reel quantity.



TAPE AND REEL ORDERING INFORMATION

Package	Tape Width (mm)	Reel Size (inch)	Devices Per Reel and Minimum Order Quantity	Device Suffix
SOT-23	8	7	3,000	T1
	8	13	10,000	T3
SOT-143	8	7	3,000	T1
	8	13	10,000	T3
MLL-34	8	7	2,000	T1
	8	13	5,000	T3
SOT-223	12	7	1,000	T1
	12	13	4,000	T3
SMB	12	13	2,500	T3
SO-8, OPTO SO-8	12	7	500	R1
	12	13	2,500	R2
SO-14	16	7	500	R1
	16	13	2,500	R2
SO-16	16	7	500	R1
	16	13	2,500	R2
DPAK	16	13	2,500	T4
SMC	16	13	2,500	T3
SC-59	8	7	3,000	T1
D2PAK	24	13	800	T4

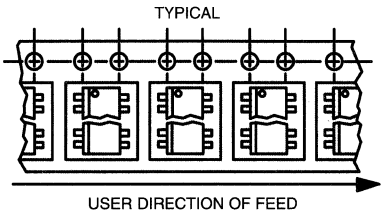
Packaging Information

Standard Bipolar Logic, Bipolar Analog, BiCMOS, and MOS Integrated Circuits

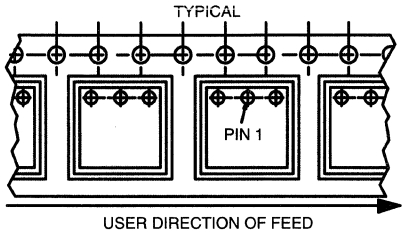
Motorola has now added the convenience of Tape and Reel packaging for our growing family of standard Integrated Circuit products. Two reel sizes are available, for all but the largest types, to support the requirements of both first and second generation pick-and-place equipment. The packaging fully conforms to the latest EIA-481A specification. The antistatic embossed tape provides a secure cavity, sealed with a peel-back cover tape.

MECHANICAL POLARIZATION

SOIC DEVICES



PLCC DEVICES



Package	Tape Width (mm)	Device[1] per Reel	Reel Size (inch)	Device Suffix
SO-8, SOP-8	12	2,500	13	R2
SO-14	16	2,500	13	R2
SO-16	16	2,500	13	R2
SO-16L WIDE	16	1,000	13	R2
SO-20L WIDE	24	1,000	13	R2
SO-24L WIDE	24	1,000	13	R2
SO-28L WIDE	24	1,000	13	R2
PLCC-20	16	1,000	13	R2
PLCC-28	24	500	13	R2
PLCC-44	32	500	13	R2
PLCC-52	32	500	13	R2
PLCC-68	44	250	13	R2
PLCC-84	44	250	13	R2
TO-226AA (TO-92)[2]	18	2,000	13	RA, RB, RE, RM, or RP (Ammo Pack) only

Notes: 1. Minimum order quantity is 1 reel. Distributors/OEM customers may break lots or reels at their option, however broken reels may not be returned.

2. Integrated Circuits in TO-226AA packages are available in Styles A, B and E only, with optional "Ammo Pack" (Suffix RM or RP). For ordering information please contact your local Motorola Semiconductor Sales Office.

SURFACE MOUNT CASE OUTLINE INDEX

DESCRIPTION	CASE	JEDEC
6-PIN DIP/BUTT .3	730B	
6-PIN DIP/BUTT .4	730D	
6-PIN DIP/GULL	730C	
CLCC-100	842A	MO-082
CLCC-132	831B	MO-082
CLCC-132	831C	MO-082
CLCC-52	848A	MO-084
CLCC-68	847A	MO-084
CQFP-100	842	
CQFP-120	843	
CQFP-132	831	MO-082
CQFP-144	863A	
CQFP-148	834	
CQFP-44, J	777B	MO-087
CQFP-52, J	778B	MO-087
CQFP-64	840	
CQFP-68, J	779A	MO-087
CQFP-80	841	
CQFP-84, J	780A	
D2PAK	418B	TO-263
DPAK	369A	TO-252AA
FP-14	717	
FP-14	607-04	
FP-16	650	
FP-20	737	
FP-24	652	
FP-28	865	
FP-6	610A-04	
FP-68	849	
LCCC-20	756A	
LCCC-20	756C	
LCCC-20	756D	
LCCC-20	800	
LCCC-24	753	
LCCC-28	763A	
LCCC-32	766A	
LCCC-32	766B	
LCCC-68	760	
MICRO-C	176C	
MLL34	362-01	DO-213
PLCC-20	775	MS-016
PLCC-28	776	MS-016
PLCC-44	777	MS-016
PLCC-52	778	MS–016

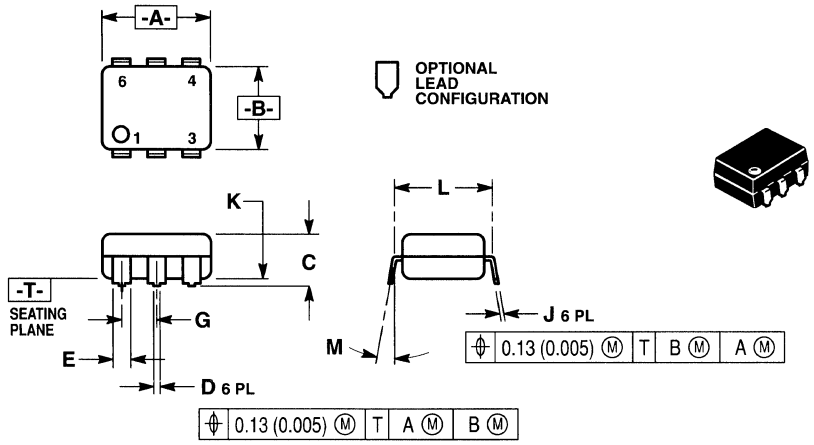
DESCRIPTION	CASE	JEDEC
PLCC-68	779	MS-016
PLCC-84	780	MS-016
PQFP-132	831A	MO-069
PQFP-132LP-MCR	878	
PQFP-68LP	847	MO-069
PQFP-68LP-MCR	877	
QFP-100 14X20	842B	MO-108CC-1
QFP-120 28X28	843A	MO-108DA-1
QFP-128 28X28	862A	MO-108DB-1
QFP-144 28X28	863B	MO-108DC-1
QFP-160 28X28	864A	MO-108DD-1
QFP-208 28X28	872	
QFP-32 7X7	873	
QFP-44 10X10	824	
QFP-44 10X10	824A	
QFP-44 10X10	824B	
QFP-44 10X10	824C	
QFP-52 10X10	837	
QFP-52 10X10	848B	
QFP-52 10X10	848C	
QFP-64 14X14	840B	
QFP-64 14X14	840C	
QFP-64 14X20	840A	MO-108CA-2
QFP-80 14X14	841B	
QFP-80 14X14	841C	
QFP-80 14X14	841D	
QFP-80 14X14	841	
QFP-80 14X20	841A	MO-108CB-1
RF	303	
SC-59	318D	
SMB	403A	
SMC	403	
SO-14	751A	MS-013AB
SO-16	751B	MS-013AC
SO-16L	751G	MS-013AA
SO-18L	751C	MS-018AB
SO-20L	751D	MS-018AC
SO-24L	751E	MS-018AD
SO-28L	751F	MS-013AE
SO-28L, 0.330	751H	MO-059AC
SO-32, 0.350	854	
SO-32, 0.440	855	
SO-8	751	MS-012AA
SO-8 OPTO COUPLER	846	

SURFACE MOUNT CASE OUTLINE INDEX

DESCRIPTION	CASE	JEDEC
SOJ-26/20, 0.350	822A	MO-063
SOJ-26/24, 0.300	880	
SOJ-28	810	MO-061
SOJ-28, 0.300	810B	
SOJ-32, 0.300	857	MO-077
SOJ-32, 0.400	857A	
SOJ-24	810A	MO-065
SOJ-26/20	822	MO-063
SOJ-26/20, 0.350	822A	MO-063

DESCRIPTION	CASE	JEDEC
SOJ-26/24, 0.300	880	
SOJ-28	810	MO-061
SOJ-28, 0.300	810B	
SOT-143	318A	TO253
SOT-223	318E	TO-261AA
SOT-23	318-07	TO-236AB
SOJ-24	810A	MO-065
SOJ-26/20	822	MO-063
SOJ-26/20, 0.350	822A	MO-063

6-PIN DIP/BUTT .3

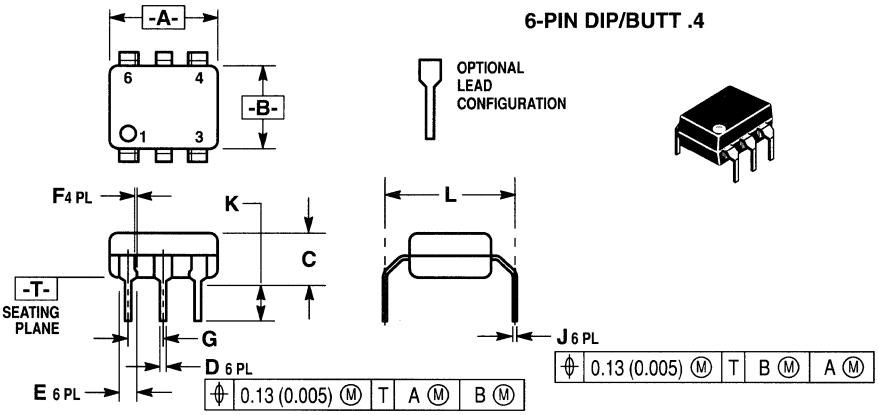


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. 730B-01 OBSOLETE, NEW STANDARD 730B-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.13	8.89	0.320	0.350
B	6.10	6.60	0.240	0.260
C	2.93	5.08	0.115	0.200
D	0.41	0.50	0.016	0.020
E	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
J	0.20	0.30	0.008	0.012
K	0.51	0.63	0.020	0.025
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°

CASE 730B-02

6-PIN DIP/BUTT .4

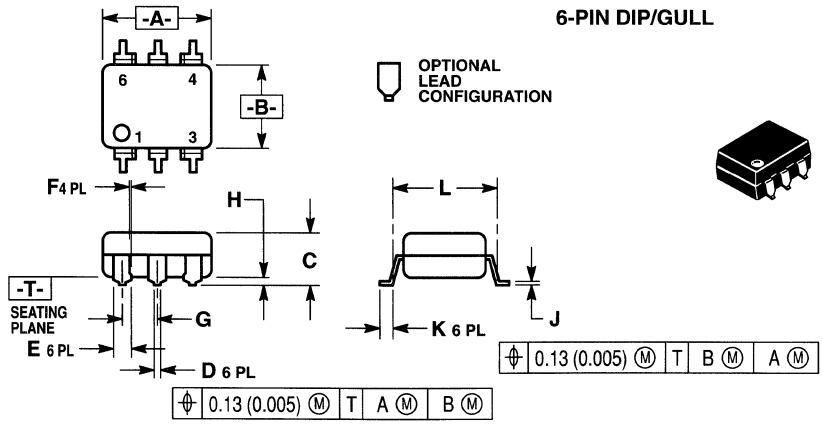


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. 730D-01 AND -02 OBSOLETE, NEW STANDARD 730D-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.13	8.89	0.320	0.350
B	6.10	6.60	0.240	0.260
C	2.42	4.44	0.095	0.175
D	0.41	0.50	0.016	0.020
E	1.02	1.77	0.040	0.070
F	0.25	0.36	0.010	0.014
G	2.54 BSC		0.100 BSC	
J	0.20	0.30	0.008	0.012
K	3.38	—	0.133	—
L	10.16 BSC		0.400 BSC	

CASE 730D-03

6-PIN DIP/GULL



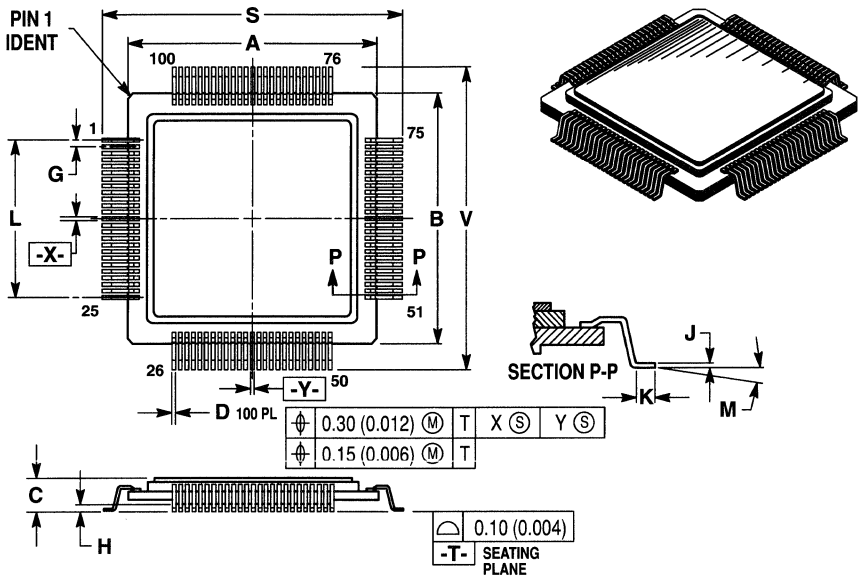
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 730C-01 OBSOLETE, NEW STANDARD 730C-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.13	8.89	0.320	0.350
B	6.10	6.60	0.240	0.260
C	2.93	5.08	0.115	0.200
D	0.41	0.50	0.016	0.020
E	1.02	1.77	0.040	0.070
F	0.25	0.36	0.010	0.014
G	2.54 BSC		0.100 BSC	
H	0.51	0.63	0.020	0.025
J	0.20	0.30	0.008	0.012
K	0.16	0.88	0.006	0.035
L	8.13 BSC		0.320 BSC	

CASE 730C-03

SURFACE MOUNT PACKAGE OUTLINES (continued)

CLCC-100



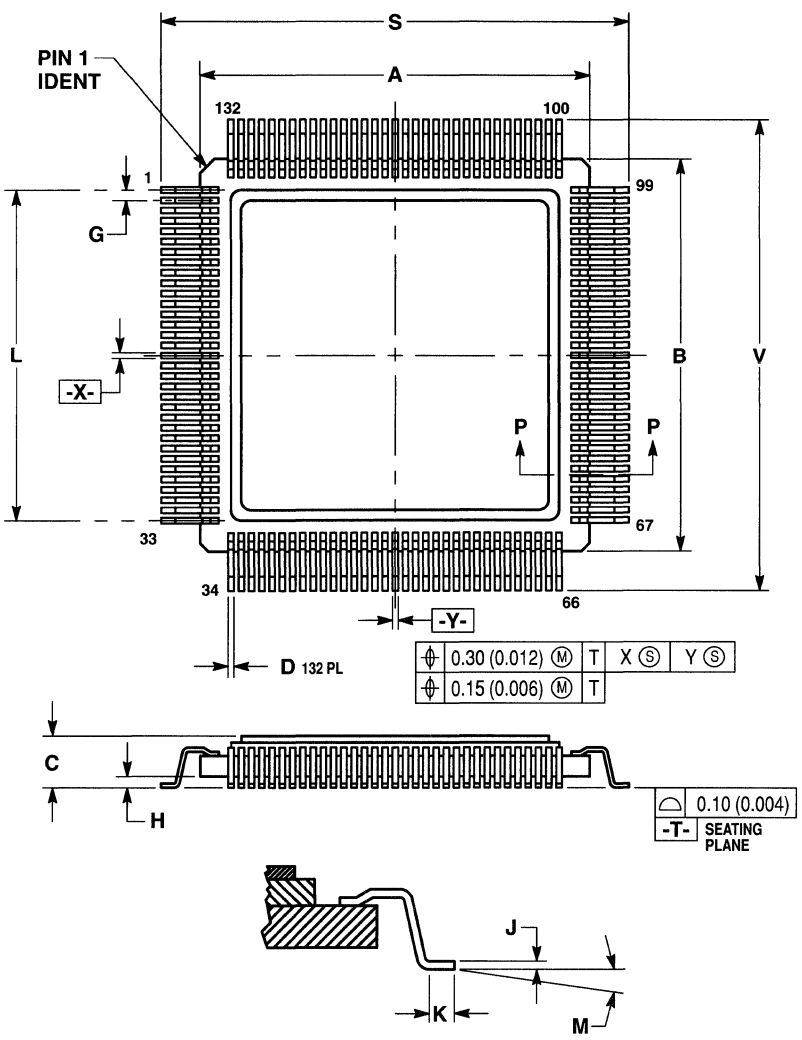
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DATUMS X AND Y TO BE DETERMINED WHERE CENTER LEADS EXIT THE BODY.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	23.88	24.38	0.940	0.960
B	23.88	24.38	0.940	0.960
C	—	3.17	—	0.125
D	0.21	0.35	0.008	0.014
G	0.64 BSC		0.025 BSC	
H	0.46	0.88	0.018	0.035
J	0.13	0.25	0.005	0.010
K	0.61	1.01	0.024	0.040
L	15.24 BSC		0.600 BSC	
M	0°	8°	0°	8°
S	28.78	29.13	1.133	1.147
V	28.78	29.13	1.133	1.147

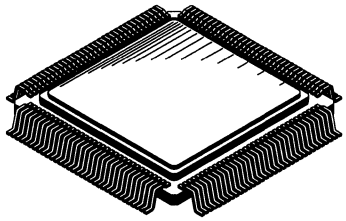
CASE 842A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

CLCC-132



SECTION P–P



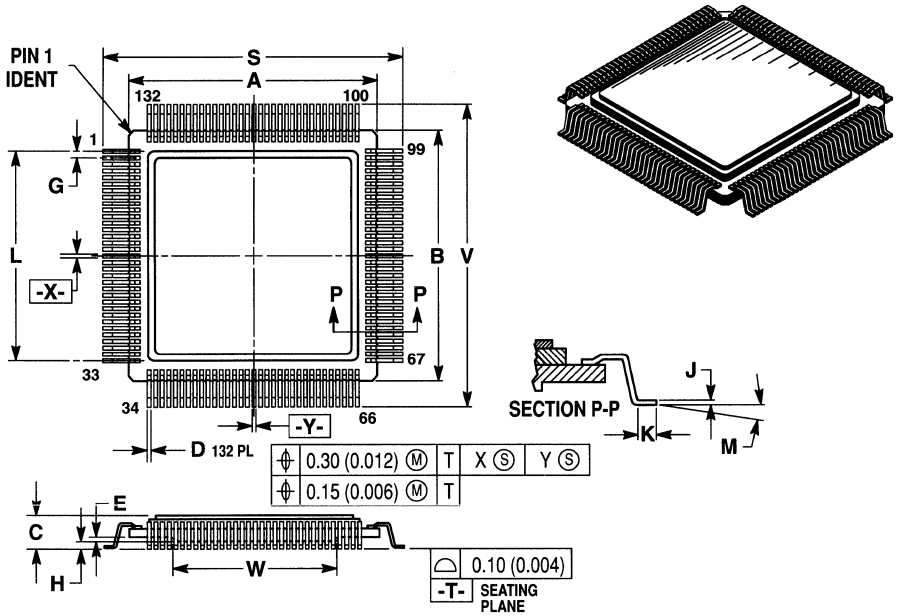
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DATUMS X AND Y TO BE DETERMINED WHERE CENTER LEADS EXIT THE BODY.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	23.88	24.38	0.940	0.960
B	23.88	24.38	0.940	0.960
C	—	3.17	—	0.125
D	0.21	0.35	0.008	0.014
G	0.64 BSC		0.025 BSC	
H	0.46	0.88	0.018	0.035
J	0.13	0.25	0.005	0.010
K	0.61	1.01	0.024	0.040
L	20.32 BSC		0.800 BSC	
M	0°	8°	0°	8°
S	28.78	29.13	1.133	1.147
V	28.78	29.13	1.133	1.147

CASE 831B-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

CLCC-132

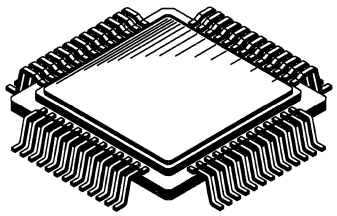


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DATUMS X AND Y TO BE DETERMINED WHERE CENTER LEADS EXIT THE BODY.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	23.88	24.38	0.940	0.960
B	23.88	24.38	0.940	0.960
C	—	3.17	—	0.125
D	0.21	0.35	0.008	0.014
E	0.33	0.45	0.013	0.018
G	0.64 BSC		0.025 BSC	
H	0.46	0.88	0.018	0.035
J	0.13	0.25	0.005	0.010
K	0.61	1.01	0.024	0.040
L	20.32 BSC		0.800 BSC	
M	0°	8°	0°	8°
S	28.78	29.13	1.133	1.147
V	28.78	29.13	1.133	1.147
W	15.75	16.25	0.620	0.640

CASE 831C-01

CLCC-52



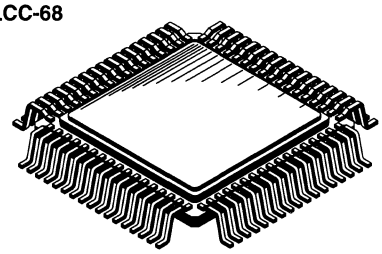
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DATUMS X AND Y TO BE DETERMINED WHERE CENTER LEADS EXIT THE BODY.

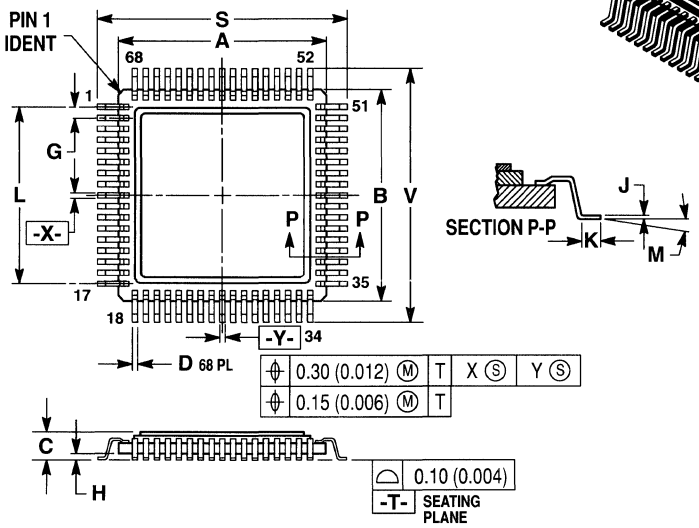
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	23.88	24.38	0.940	0.960
B	23.88	24.38	0.940	0.960
C	—	3.17	—	0.125
D	0. 46	0.76	0.018	0.030
G	1.27 BSC		0.050 BSC	
H	0.46	0.88	0.018	0.035
J	0.13	0.25	0.005	0.010
K	0.61	1.01	0.024	0.040
L	15.24 BSC		0.600 BSC	
M	0°	8°	0°	8°
S	28.78	29.13	1.133	1.147
V	28.78	29.13	1.133	1.147

CASE 848A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

CLCC-68



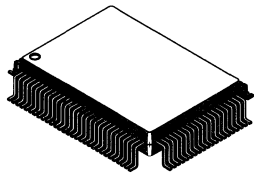


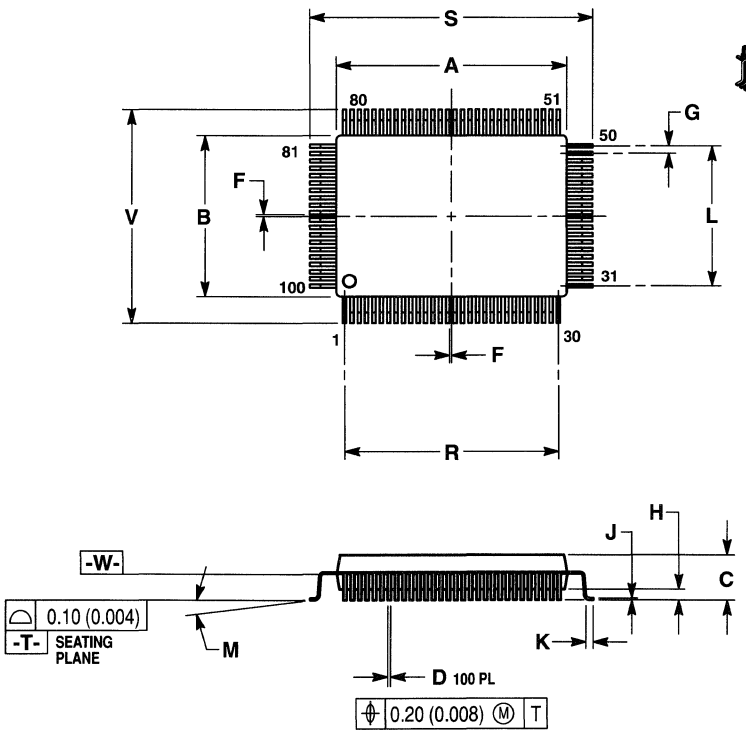
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DATUMS X AND Y TO BE DETERMINED WHERE CENTER LEADS EXIT THE BODY.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	23.88	24.38	0.940	0.960
B	23.88	24.38	0.940	0.960
C	—	3.17	—	0.125
D	0. 46	0.76	0.018	0.030
G	1.27 BSC		0.050 BSC	
H	0.46	0.88	0.018	0.035
J	0.13	0.25	0.005	0.010
K	0.61	1.01	0.024	0.040
L	20.32 BSC		0.800 BSC	
M	0°	8°	0°	8°
S	28.78	29.13	1.133	1.147
V	28.78	29.13	1.133	1.147

CASE 847A-01

CQFP-100





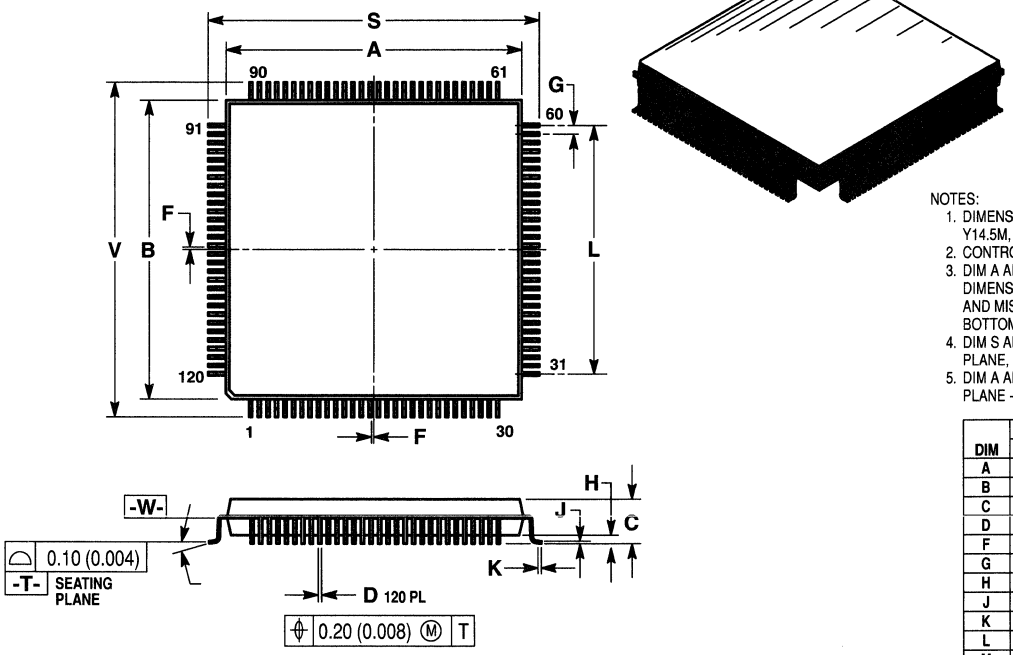
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM A AND B DEFINE MAXIMUM CERAMIC BODY DIMENSIONS INCLUDING GLASS PROTRUSION AND MISMATCH OF CERAMIC BODY TOP AND BOTTOM.
4. DIM S AND V TO BE DETERMINED AT SEATING PLANE, DATUM -T-.
5. DIM A AND B TO BE DETERMINED AT DATUM PLANE -W-.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	19.82	19.91	0.780	0.784
B	13.82	13.91	0.544	0.548
C	2.82	3.07	0.111	0.121
D	0.28	0.32	0.011	0.013
F	0.325 BSC		0.0128 BSC	
G	0.65 BSC		0.0256 BSC	
H	0.15	0.30	0.006	0.012
J	0.13	0.20	0.005	0.008
K	0.61	1.01	0.024	0.040
L	12.35 REF		0.486 REF	
M	0°	10°	0°	10°
R	18.85 REF		0.742 REF	
S	24.00	24.40	0.945	0.961
V	18.00	18.40	0.709	0.725

CASE 842-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

CQFP-120

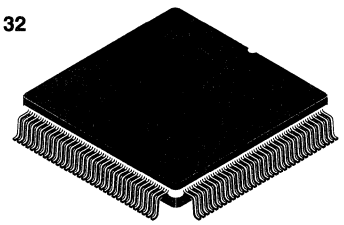


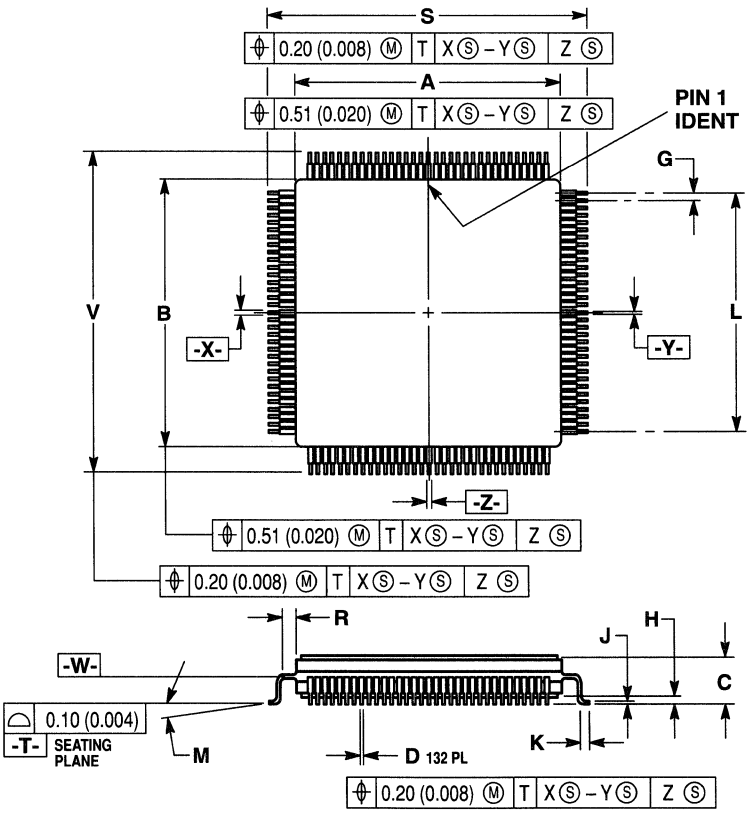
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM A AND B DEFINE MAXIMUM CERAMIC BODY DIMENSIONS INCLUDING GLASS PROTRUSION AND MISMATCH OF CERAMIC BODY TOP AND BOTTOM.
4. DIM S AND V TO BE DETERMINED AT SEATING PLANE, DATUM -T-.
5. DIM A AND B TO BE DETERMINED AT DATUM PLANE -W-.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.82	27.91	1.095	1.099
B	27.82	27.91	1.095	1.099
C	3.64	3.93	0.143	0.155
D	0.31	0.40	0.012	0.016
F	0.40 BSC		0.01575 BSC	
G	0.80 BSC		0.0315 BSC	
H	0.15	0.30	0.006	0.012
J	0.13	0.20	0.005	0.008
K	0.61	1.01	0.024	0.040
L	23.20 REF		0.914 REF	
M	0°	8°	0°	8°
S	32.00	32.40	1.260	1.276
V	32.00	32.40	1.260	1.276

CASE 843-01

CQFP-132



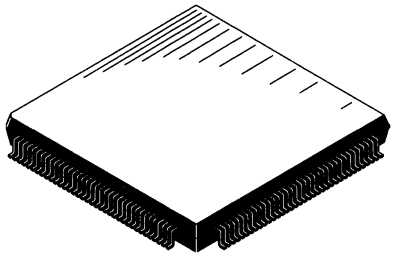


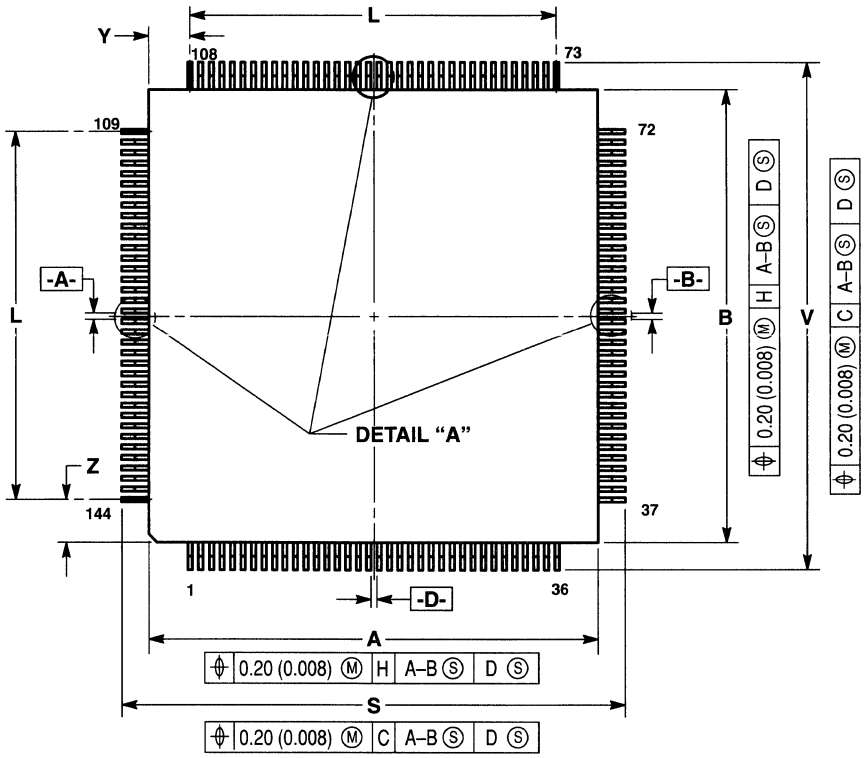
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM A AND B DEFINE MAXIMUM CERAMIC BODY DIMENSIONS INCLUDING GLASS PROTRUSION AND MISMATCH OF CERAMIC BODY TOP AND BOTTOM.
4. DATUM PLANE -W- IS LOCATED AT THE UNDERSIDE OF LEADS WHERE LEADS EXIT PACKAGE BODY.
5. DATUMS X–Y AND Z TO BE DETERMINED WHERE CENTER LEADS EXIT PACKAGE BODY AT DATUM -W-.
6. DIM S AND V TO BE DETERMINED AT SEATING PLANE, DATUM -T-.
7. DIM A AND B TO BE DETERMINED AT DATUM PLANE -W-.

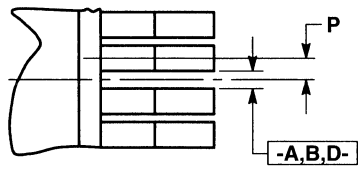
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	21.85	22.86	0.860	0.900
B	21.85	22.86	0.860	0.900
C	3.94	4.31	0.155	0.170
D	0.204	0.292	0.0080	0.0115
G	0.64 BSC		0.025 BSC	
H	0.64	0.88	0.025	0.035
J	0.13	0.20	0.005	0.008
K	0.51	0.76	0.020	0.030
L	20.32 REF		0.800 REF	
M	0°	8°	0°	8°
R	0.64	—	0.025	—
S	27.31	27.55	1.075	1.085
V	27.31	27.55	1.075	1.085

CASE 831-01

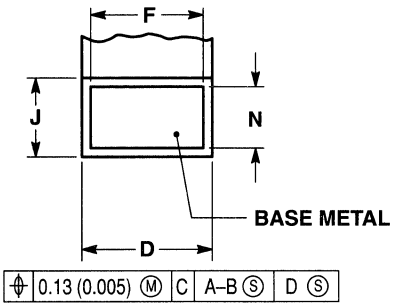
CQFP-144



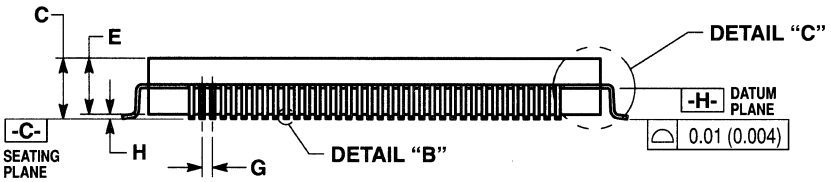


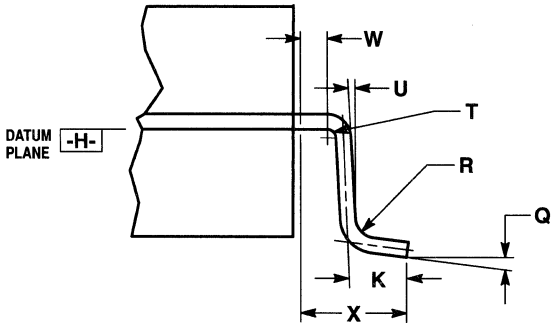


DETAIL "A"



DETAIL "B"





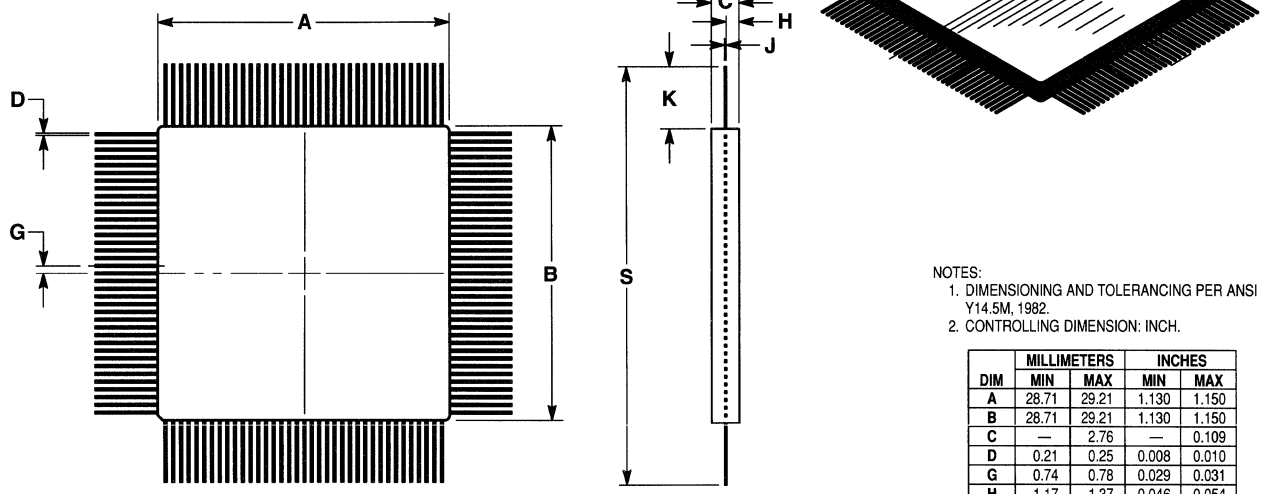
DETAIL "C"

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE CERAMIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DEFINE MAXIMUM CERAMIC BODY DIMENSIONS INCLUDING GLASS PROTRUSION AND MISMATCH CERAMIC BODY TOP AND BOTTOM.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	25.84	27.70	1.017	1.091
B	25.84	27.70	1.017	1.091
C	3.55	4.31	0.140	0.170
D	0.22	0.41	0.009	0.016
E	2.95	3.70	0.116	0.146
F	0.20	0.36	0.008	0.014
G	0.65 BSC		0.026 BSC	
H	0.25	0.88	0.010	0.035
J	0.13	0.25	0.005	0.010
K	0.65	0.95	0.026	0.037
L	22.75 REF		0.896 REF	
N	0.10	0.16	0.004	0.006
P	0.33 BSC		0.013 BSC	
Q	0°	8°	0°	8°
R	0.20 REF		0.008 REF	
S	30.95	31.45	1.219	1.238
T	0.20 REF		0.008 REF	
U	0°	8°	0°	8°
V	30.95	31.45	1.219	1.238
W	1.50 REF		0.059 REF	
X	2.50 REF		0.098 REF	
Y	1.60 REF		0.063 REF	
Z	1.60 REF		0.063 REF	

CASE 863A-01

CQFP-148

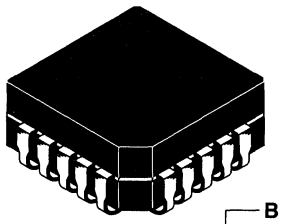


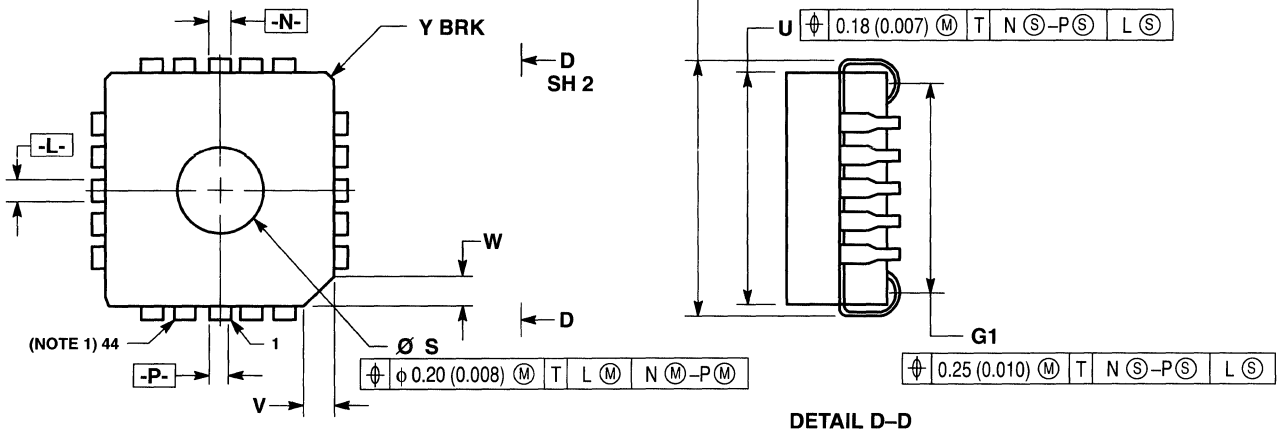
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	28.71	29.21	1.130	1.150
B	28.71	29.21	1.130	1.150
C	—	2.76	—	0.109
D	0.21	0.25	0.008	0.010
G	0.74	0.78	0.029	0.031
H	1.17	1.37	0.046	0.054
J	0.11	0.15	0.004	0.006
K	5.80	6.55	0.228	0.258
S	41.15	41.27	1.620	1.625

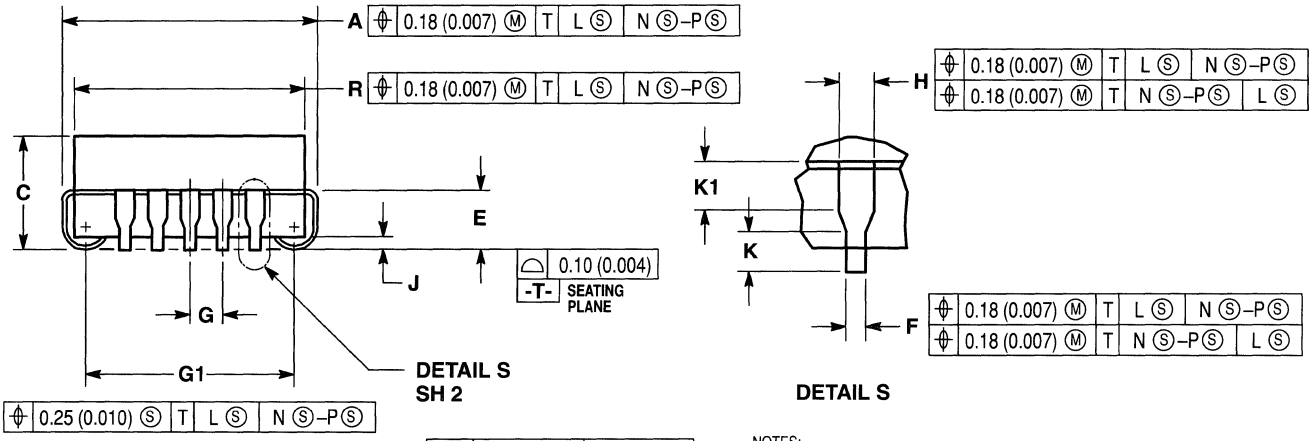
CASE 834-01

CQFP-44, J





DETAIL D–D



DETAIL S

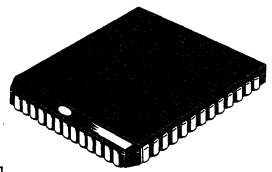
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	17.40	17.65	0.685	0.695
B	17.40	17.65	0.685	0.695
C	4.20	4.57	0.165	0.180
E	2.29	2.79	0.090	0.110
F	0.33	0.48	0.013	0.019
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	0.64	—	0.025	—
R	16.51	16.66	0.650	0.656
S	6.94	7.26	0.273	0.286
U	16.51	16.66	0.650	0.656
V	1.07	1.21	0.042	0.048
W	1.07	1.21	0.042	0.048
Y	—	0.50	—	0.020
G1	14.99	16.00	0.590	0.630
K1	1.02	—	0.040	—

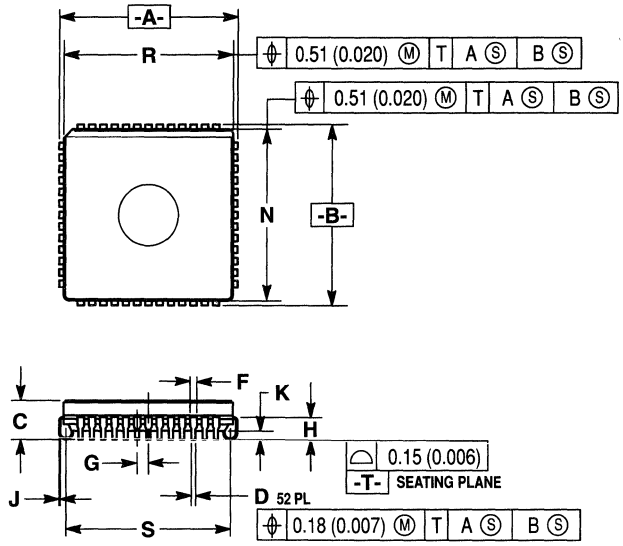
NOTES:
1. **DUE TO SPACE LIMITATION, CASE 777B-02 SHALL BE REPRESENTED BY A GENERAL (SMALLER) CASE OUTLINE DRAWING RATHER THAN SHOWING ALL 44 LEADS.**
2. DATUMS -L-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXIT BODY.
3. DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
4. DIM R AND U DO NOT INCLUDE GLASS MINISCUS. ALLOWABLE GLASS RUNOUT IS 0.25 (0.010) PER SIDE.
5. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
6. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
7. 778B-01 OBSOLETE, NEW STANDARD 777B-02.

CASE 777B-02

SURFACE MOUNT PACKAGE OUTLINES (continued)

CQFP-52, J



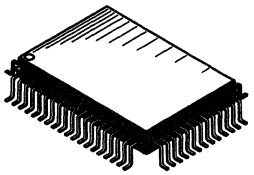


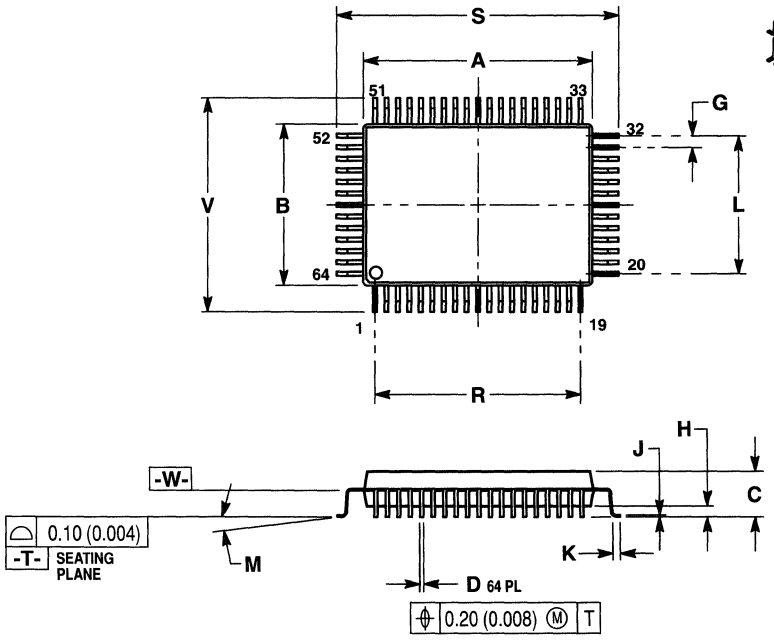
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM R AND N DO NOT INCLUDE GLASS PROTRUSION. GLASS PROTRUSION TO BE 0.25 (0.010) MAXIMUM.
4. ALL DIMENSIONS AND TOLERANCES INCLUDE LEAD TRIM OFFSET AND LEAD FINISH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	19.94	20.19	0.785	0.795
B	19.94	20.19	0.785	0.795
C	4.20	5.08	0.165	0.200
D	0.44	0.53	0.017	0.021
F	0.67	0.81	0.026	0.032
G	1.27 BSC		0.050 BSC	
H	2.29	3.30	0.090	0.130
J	0.16	0.25	0.006	0.010
K	0.89	1.14	0.035	0.045
N	18.67	19.20	0.735	0.756
R	18.67	19.20	0.735	0.756
S	17.53	18.54	0.690	0.730

CASE 778B-01

CQFP-64





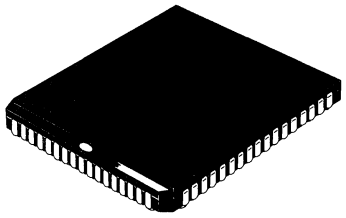
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM A AND B DEFINE MAXIMUM CERAMIC BODY DIMENSIONS INCLUDING GLASS PROTRUSION AND MISMATCH OF CERAMIC BODY TOP AND BOTTOM.
4. DIM S AND V TO BE DETERMINED AT SEATING PLANE, DATUM -T-.
5. DIM A AND B TO BE DETERMINED AT DATUM PLANE -W-.

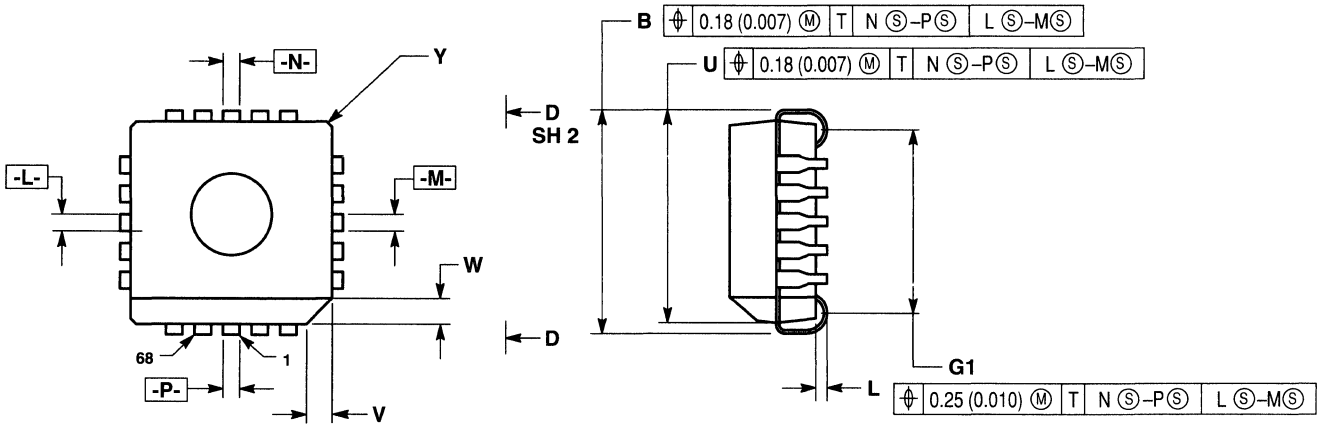
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	19.90	20.10	0.783	0.791
B	13.90	14.10	0.547	0.555
C	2.85	3.15	0.112	0.124
D	0.35	0.45	0.014	0.018
G	1.00 BSC		0.039 BSC	
H	0.15	0.45	0.006	0.018
J	0.13	0.20	0.005	0.008
K	0.65	0.95	0.026	0.037
L	12.00 REF		0.472 REF	
M	0°	10°	0°	10°
R	18.00 REF		0.709 REF	
S	23.65	24.15	0.931	0.951
V	17.65	18.15	0.695	0.715

CASE 840-01

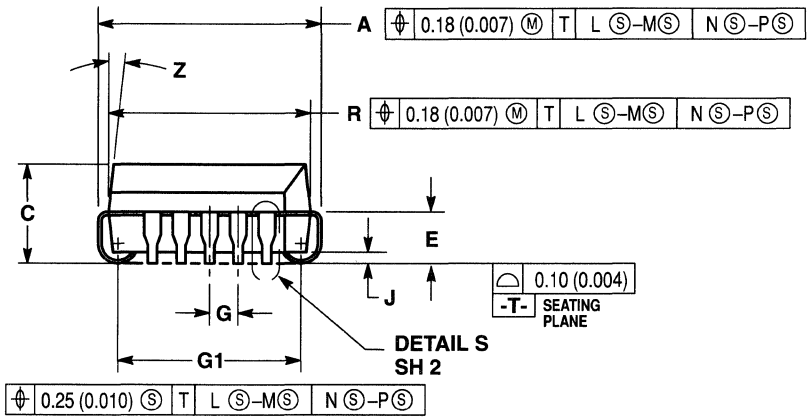
SURFACE MOUNT PACKAGE OUTLINES (continued)

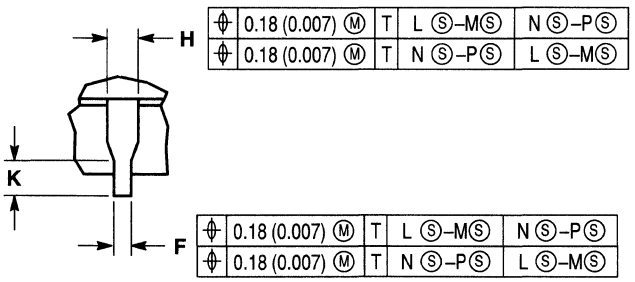
CQFP-68, J





DETAIL





DETAIL S

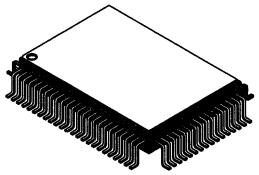
NOTES:
1. **DUE TO SPACE LIMITATION, CASE 779A-01 SHALL BE REPRESENTED BY A GENERAL (SMALLER) CASE OUTLINE DRAWING RATHER THAN SHOWING ALL 68 LEADS.**
2. DATUMS -L-, -M-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PACKAGE BODY AT GLASS PARTING LINE.
3. DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
4. DIM R AND U DO NOT INCLUDE GLASS PROTRUSION. ALLOWABLE GLASS PROTRUSION IS 0.25 (0.010) PER SIDE.
5. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
6. CONTROLLING DIMENSION: INCH.

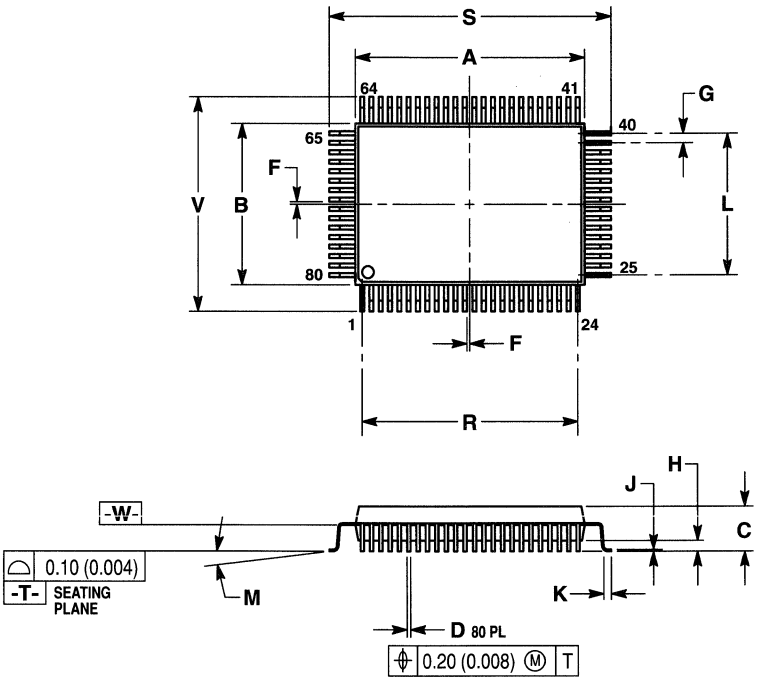
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	25.02	25.27	0.985	0.995
B	25.02	25.27	0.985	0.995
C	3.94	5.08	0.155	0.200
E	2.29	3.05	0.090	0.120
F	0.43	0.48	0.017	0.021
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	1.27 BSC		0.050 BSC	
L	0.08	—	0.003	—
R	23.62	24.33	0.930	0.958
U	23.62	24.33	0.930	0.958
V	0.91	1.12	0.036	0.044
W	0.91	1.12	0.036	0.044
G1	22.61	23.62	0.890	0.930

CASE 779A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

CQFP-80





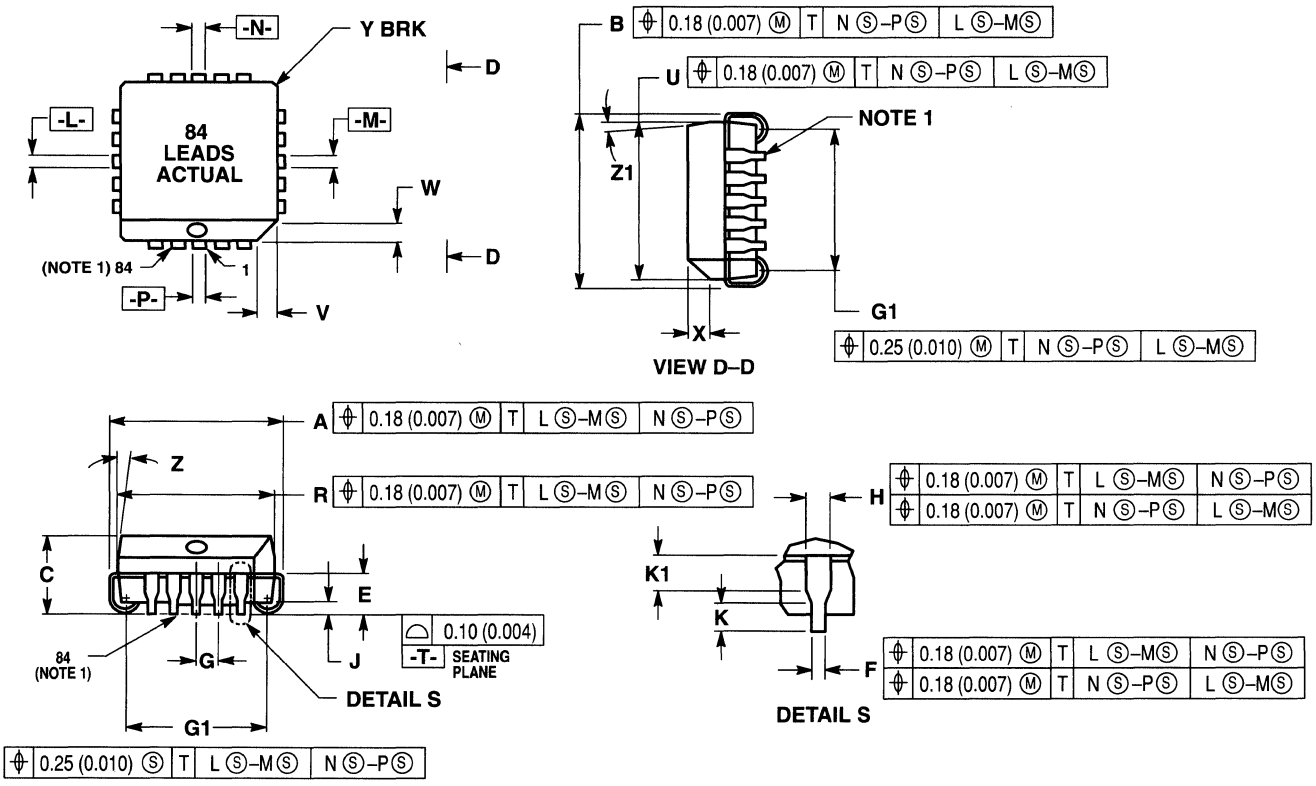
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982
2. CONTROLLING DIMENSION: INCH.
3. DIM A AND B DEFINE MAXIMUM CERAMIC BODY DIMENSIONS INCLUDING GLASS PROTRUSION AND MISMATCH OF CERAMIC BODY TOP AND BOTTOM.
4. DIM S AND V TO BE DETERMINED AT SEATING PLANE, DATUM -T-.
5. DIM A AND B TO BE DETERMINED AT DATUM PLANE -W-.

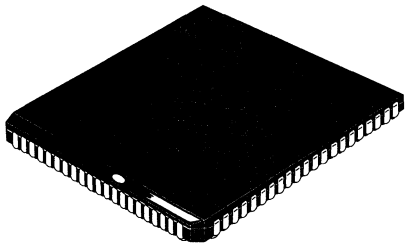
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	19.82	19.91	0.780	0.784
B	13.82	13.91	0.544	0.548
C	2.82	3.07	0.111	0.121
D	0.31	0.40	0.012	0.016
F	0.40 BSC		0.016 BSC	
G	0.80 BSC		0.032 BSC	
H	0..15	0.30	0.006	0.012
J	0.13	0.20	0.005	0.008
K	0.61	1.01	0.024	0.040
L	12.00 REF		0.472 REF	
M	0°	10°	0°	10°
R	18.40 REF		0.724 REF	
S	24.00	24.40	0.945	0.961
V	18.00	18.40	0.709	0.725

CASE 841-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

CQFP-84, J





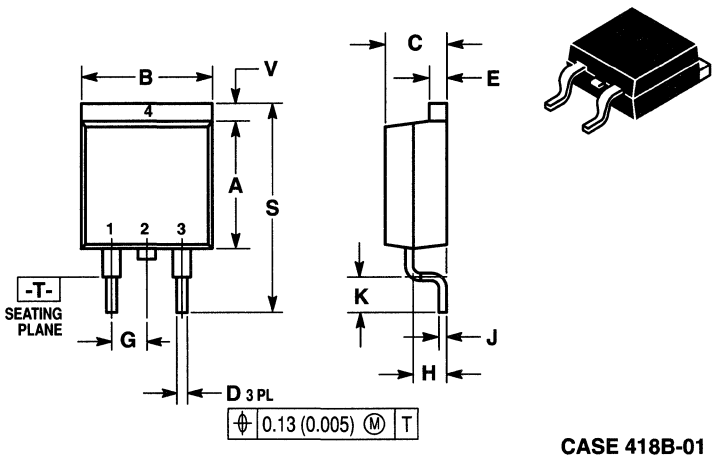
DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	30.10	30.35	1.185	1.195
B	30.10	30.35	1.185	1.195
C	4.20	4.57	0.165	0.180
E	2.29	2.79	0.090	0.110
F	0.33	0.53	0.013	0.021
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	0.64	—	0.025	—
R	29.21	29.36	1.150	1.156
U	29.21	29.36	1.150	1.156
V	1.07	1.21	0.042	0.048
W	1.07	1.21	0.042	0.048
X	1.07	1.42	0.042	0.056
Y	—	0.50	—	0.020
Z	2°	10°	2°	10°
G1	28.20	28.70	1.110	1.130
K1	1.02	—	0.040	—
Z1	2°	10°	2°	10°

NOTES:
1. **DUE TO SPACE LIMITATION, CASE 780-01 SHALL BE REPRESENTED BY A GENERAL (SMALLER) CASE OUTLINE DRAWING RATHER THAN SHOWING ALL 84 LEADS.**
2. DATUMS -L-, -M-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PACKAGE BODY AT GLASS PARTING LINE.
3. DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
4. DIM R AND U DO NOT INCLUDE GLASS PROTRUSION. ALLOWABLE GLASS PROTRUSION IS 0.25 (0.010) PER SIDE.
5. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
6. CONTROLLING DIMENSION: INCH.

CASE 780A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

D²PAK

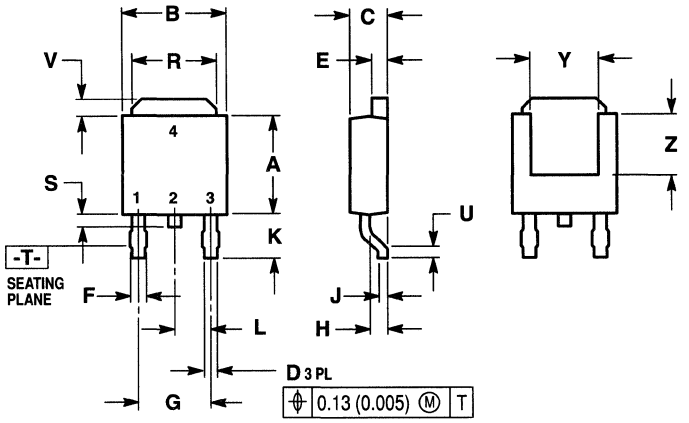


CASE 418B-01

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.64	9.65	0.340	0.380
B	9.65	10.29	0.380	0.405
C	4.06	4.83	0.160	0.190
D	0.51	0.89	0.020	0.035
E	1.14	1.40	0.045	0.055
G	2.54 BSC		0.100 BSC	
H	2.03	2.79	0.080	0.110
J	0.46	0.64	0.018	0.025
K	2.29	2.79	0.090	0.110
S	14.60	15.88	0.575	0.625
V	1.14	1.40	0.045	0.055

DPAK

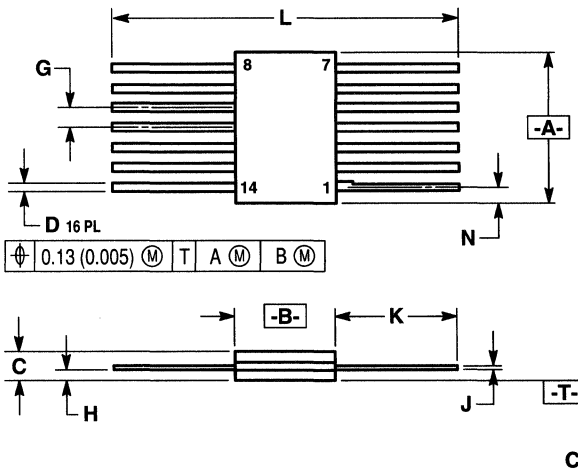


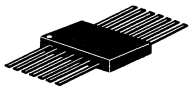
CASE 369A-07

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 369A-01 THRU -03 OBSOLETE.
4. 369A-04 THRU -06 OBSOLETE, NEW STANDARD 369A-07.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	5.97	6.22	0.235	0.245
B	6.35	6.73	0.250	0.265
C	2.19	2.38	0.086	0.094
D	0.69	0.88	0.027	0.035
E	0.84	1.01	0.033	0.040
F	0.77	1.14	0.030	0.045
G	4.58 BSC		0.180 BSC	
H	0.87	1.01	0.034	0.040
J	0.46	0.58	0.018	0.023
K	2.60	2.89	0.102	0.114
L	2.29 BSC		0.090 BSC	
R	4.45	5.46	0.175	0.215
S	0.51	1.27	0.020	0.050
U	0.51	—	0.020	—
V	0.77	1.27	0.030	0.050
Y	4.32	—	0.170	—
Z	3.69	—	0.145	—

FP-14





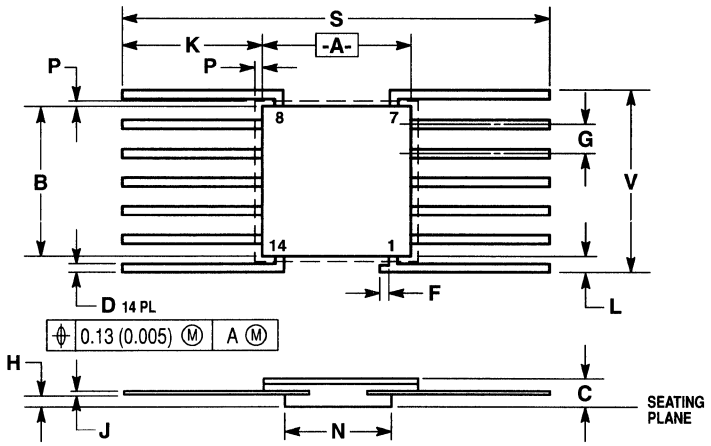
CASE 717-04

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION "A" AND "B" ALLOW FOR LID MISALIGNMENT, AND GLASS MINISCUS.
4. DIMENSION "H" SHALL BE MEASURED AT THE POINT OF EXIT OF THE LEAD FROM THE BODY.
5. LEAD NUMBER 1 IDENTIFIED BY TAB ON LEAD OR DOT ON COVER.
6. DIMENSION "J" INCLUDES SOLDER LEAD FINISH.
7. LEAD NUMBERS SHOWN FOR REFERENCE ONLY.
8. 717-01 THRU -03 OBSOLETE, NEW STANDARD 717-04.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.40	9.90	0.370	0.390
B	6.23	6.60	0.245	0.260
C	1.53	2.15	0.060	0.085
D	0.36	0.48	0.014	0.019
G	1.27 BSC		0.050 BSC	
H	0.64	1.01	0.025	0.040
J	0.11	0.17	0.004	0.007
K	6.35	9.39	0.250	0.370
L	18.93	—	0.745	—
N	—	1.14	—	0.045

SURFACE MOUNT PACKAGE OUTLINES (continued)

FP-14

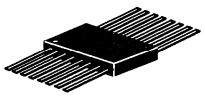


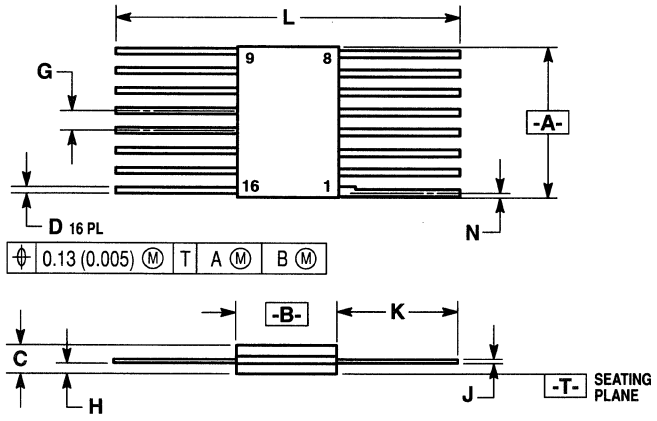
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS P DETERMINE ZONE WITHIN WHICH ALL BODY AND LEAD IRREGULARITIES LIE.
4. 607-01 THRU -03 OBSOLETE, NEW STANDARD 607-04.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	6.10	6.98	0.240	0.275
B	6.10	6.98	0.240	0.275
C	0.77	1.77	0.030	0.070
D	0.26	0.48	0.010	0.019
F	—	0.38	—	0.015
G	1.27 BSC		0.050 BSC	
H	0.13	0.88	0.005	0.035
J	0.08	0.015	0.003	0.006
K	6.35	—	0.250	—
L	0.26	—	0.010	—
N	4.45	4.95	0.175	0.195
P	—	0.38	—	0.015
S	18.80	—	0.740	—
V	7.62	8.38	0.300	0.330

CASE 607-04

FP-16





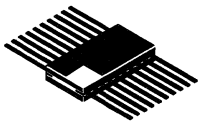
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION "A" AND "B" ALLOW FOR LID MISALIGNMENT, AND GLASS MINISCUS.
4. DIMENSION "H" SHALL BE MEASURED AT THE POINT OF EXIT OF THE LEAD FROM THE BODY.
5. LEAD NUMBER 1 IDENTIFIED BY TAB ON LEAD OR DOT ON COVER.
6. DIMENSION "J" INCLUDES SOLDER LEAD FINISH.
7. LEAD NUMBERS SHOWN FOR REFERENCE ONLY.
8. 650-01 THRU -04 OBSOLETE, NEW STANDARD 650-05.

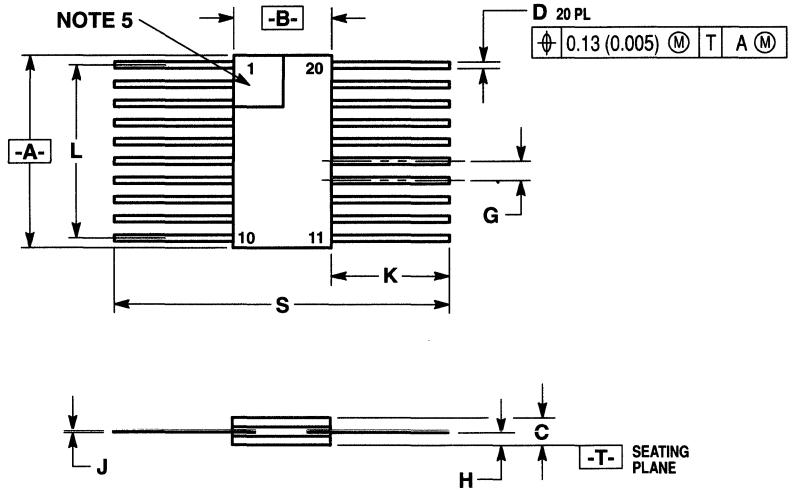
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.40	9.90	0.370	0.390
B	6.23	6.60	0.245	0.260
C	1.53	2.15	0.060	0.085
D	0.36	0.48	0.014	0.019
G	1.27 BSC		0.050 BSC	
H	0.64	1.01	0.025	0.040
J	0.11	0.17	0.004	0.007
K	6.35	9.39	0.250	0.370
L	18.93	—	0.745	—
N	—	0.50	—	0.020

CASE 650-05

SURFACE MOUNT PACKAGE OUTLINES (continued)

FP-20



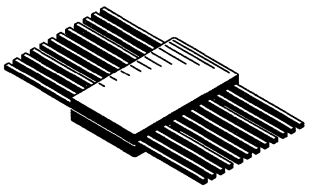


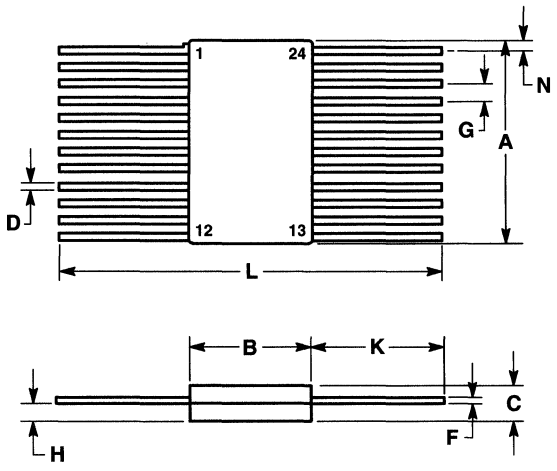
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM A AND B ALLOW FOR LID MISALIGNMENT, AND GLASS MINISCUS.
4. DIM H SHALL BE MEASURED AT THE POINT OF EXIT OF THE LEAD FROM THE BODY.
5. LEAD NUMBER 1 IDENTIFIED BY TAB ON LEAD OR DOT ON COVER.
6. DIM J INCLUDES SOLDER LEAD FINISH.
7. LEAD NUMBERS SHOWN FOR REFERENCE ONLY.
8. 737-01 AND -02 OBSOLETE, NEW STANDARD 737-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	12.32	13.08	0.485	0.515
B	5.84	7.11	0.230	0.280
C	1.52	2.16	0.060	0.085
D	0.38	0.48	0.015	0.019
G	1.27 BSC		0.050 BSC	
H	0.64	1.02	0.025	0.040
J	0.10	0.18	0.004	0.007
K	6.35	9.39	0.250	0.370
L	11.43 BSC		0.450 BSC	
S	18.54	—	0.730	—

CASE 737-03

FP-24





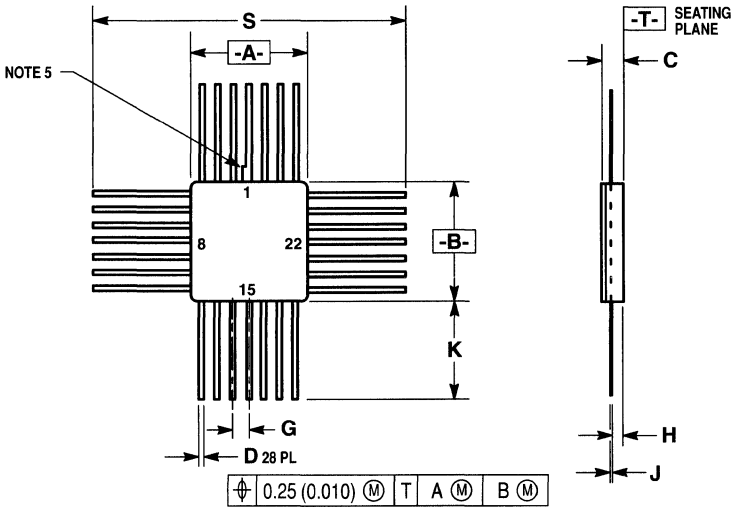
NOTE:
1. LEADS WITHIN 0.25 mm (0.010) TOTAL OF TRUE POSITION AT MAXIMUM MATERIAL CONDITION.
2. 652-01 OBSOLETE, NEW STANDARD 652-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	14.99	15.49	0.590	0.610
B	9.27	9.91	0.365	0.390
C	1.27	2.03	0.050	0.080
D	0.38	0.48	0.015	0.019
F	0.08	0.15	0.003	0.006
G	1.27 BSC		0.050 BSC	
H	0.69	1.02	0.027	0.040
K	6.35	9.40	0.250	0.370
L	21.97	—	0.865	—
N	0.25	0.63	0.010	0.025

CASE 652-02

SURFACE MOUNT PACKAGE OUTLINES (continued)

FP-28

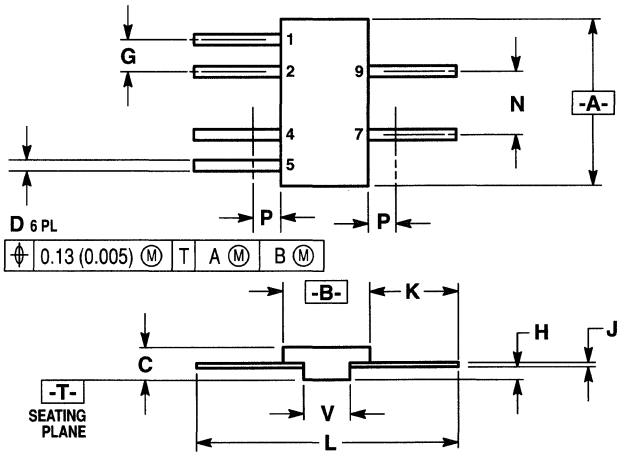


NOTES:
1. DIMENSIONS AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS A AND B ALLOW FOR LID MISALIGNMENT, AND GLASS MINISCUS.
4. DIMENSION H SHALL BE MEASURED AT THE POINT OF EXIT OF THE LEAD FROM THE BODY.
5. LEAD NUMBER 1 IDENTIFIED BY TAB ON LEAD.
6. DIMENSION J INCLUDES SOLDER LEAD FINISH.
7. LEAD NUMBERS SHOWN FOR REFERENCE ONLY.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.89	10.16	0.350	0.400
B	8.89	10.16	0.350	0.400
C	1.52	2.03	0.060	0.080
D	0.36	0.48	0.014	0.019
G	1.27 BSC		0.050 BSC	
H	0.89	1.09	0.035	0.043
J	0.10	0.18	0.004	0.007
K	7.49	8.38	0.295	0.330
S	23.88	25.65	0.940	1.010

CASE 865-01

FP-6



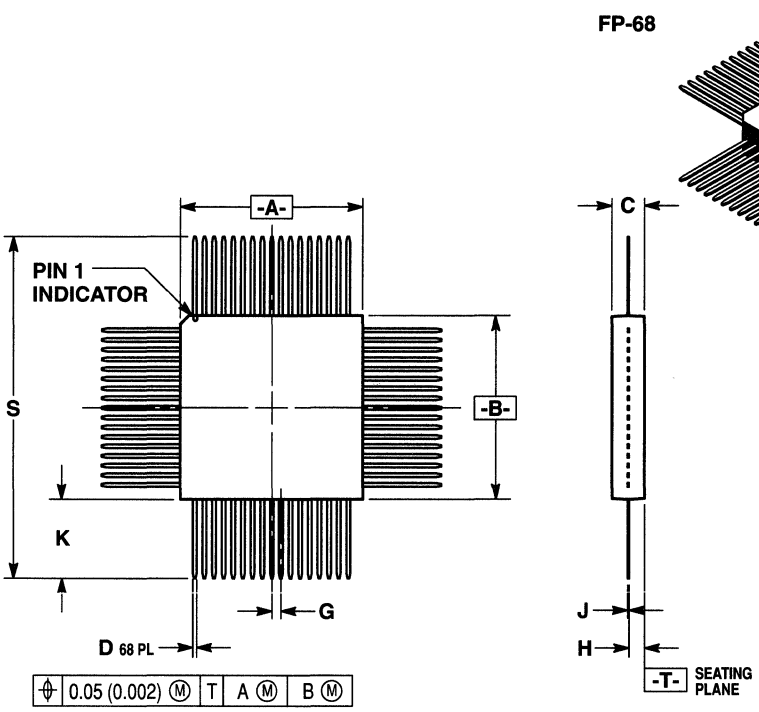
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM D, G AND N TO BE MEASURED WITHIN DIM P.
4. 610A-01 THRU -03 AND -05 OBSOLETE, NEW STANDARD 610A-04.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	6.10	7.37	0.240	0.290
B	2.92	4.06	0.115	0.160
C	0.76	2.03	0.030	0.070
D	0.36	0.48	0.014	0.019
G	1.27 BSC		0.050 BSC	
H	0.13	0.89	0.005	0.035
J	0.08	0.15	0.003	0.006
K	3.81	—	0.150	—
L	10.54	—	0.415	—
N	2.54 BSC		0.100 BSC	
P	—	1.27	—	0.050
V	1.65	2.03	0.065	0.080

CASE 610A-04

SURFACE MOUNT PACKAGE OUTLINES (continued)

FP-68

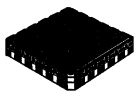


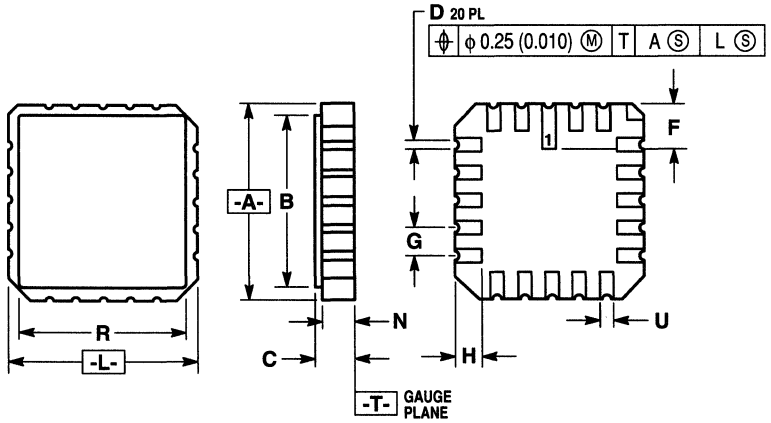
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS B AND C DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.010 (0.25 PER SIDE.
4. 849-01 OBSOLETE, NEW STANDARD 849-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	24.08	24.18	0.948	0.952
B	24.08	24.18	0.948	0.952
C	4.22	4.32	0.166	0.170
D	0.43	0.58	0.017	0.023
G	1.27 BSC		0.050 BSC	
H	1.98	2.08	0.078	0.082
J	0.196	0.211	0.0077	0.0083
K	10.41	10.54	0.410	0.415
S	44.70	44.96	1.760	1.770

CASE 849-02

LCCC-20





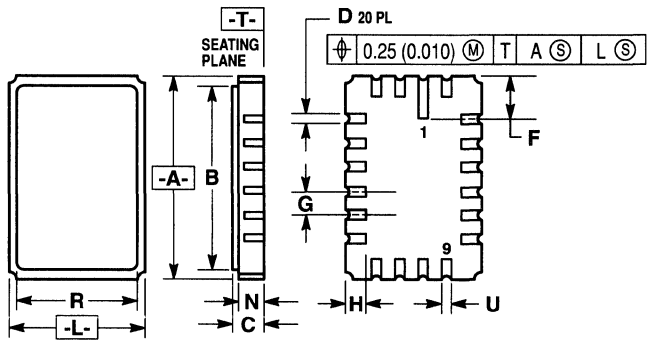
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.68	9.09	0.342	0.358
B	7.49	7.75	0.295	0.305
C	—	1.90	—	0.075
D	0.30	0.50	0.012	0.020
F	1.91	2.41	0.075	0.095
G	1.27 BSC		0.050 BSC	
H	1.07	1.47	0.042	0.058
L	8.68	9.09	0.342	0.358
N	1.27	1.52	0.050	0.060
R	7.49	7.74	0.295	0.305
U	0.55	0.71	0.022	0.028

CASE 756A-02

SURFACE MOUNT PACKAGE OUTLINES (continued)

LCCC-20

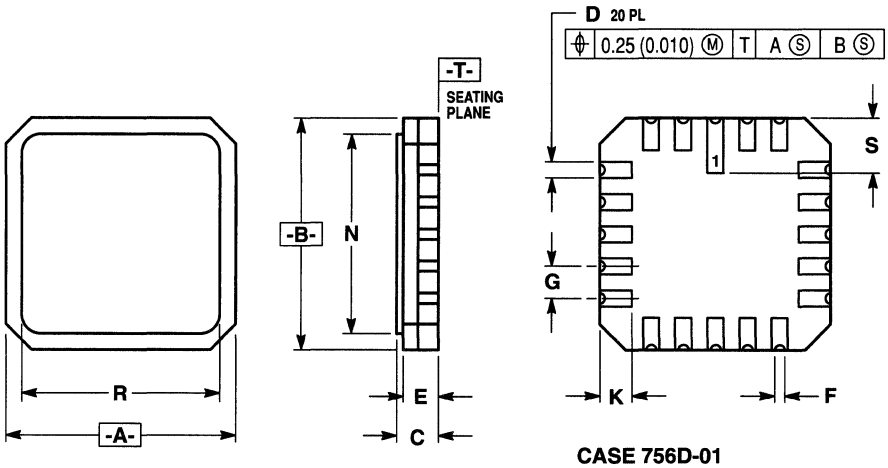


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	10.67	10.92	0.420	0.430
B	10.09	10.41	0.400	0.410
C	1.68	1.98	0.066	0.078
D	0.56	0.71	0.022	0.028
F	2.11	2.46	0.083	0.097
G	1.27 BSC		0.050 BSC	
H	1.07	1.21	0.042	0.048
L	7.24	7.49	0.285	0.295
N	1.40	1.65	0.055	0.065
R	6.61	6.85	0.260	0.270
U	0.28	0.53	0.011	0.021

CASE 756C-01

LCCC-20

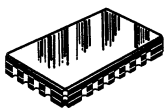


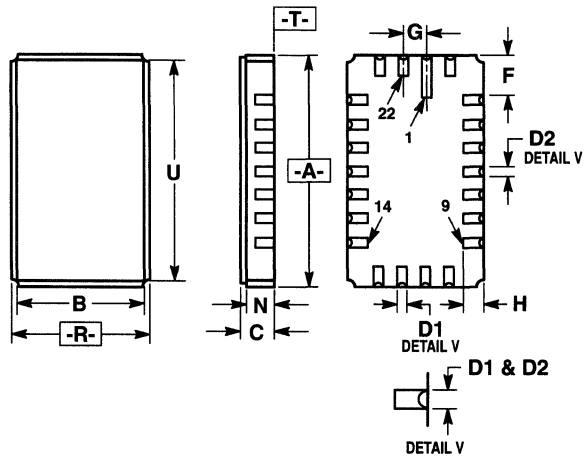
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.69	9.65	0.342	0.380
B	8.69	9.65	0.342	0.380
C	1.27	2.03	0.050	0.080
D	0.51	0.76	0.020	0.030
E	1.27	1.78	0.050	0.070
F	0.30	0.51	0.012	0.020
G	1.27 BSC		0.050 BSC	
K	1.14	1.40	0.045	0.055
N	7.87	9.65	0.310	0.380
R	7.87	9.65	0.310	0.380
S	1.90	2.41	0.075	0.095

CASE 756D-01

LCCC-20





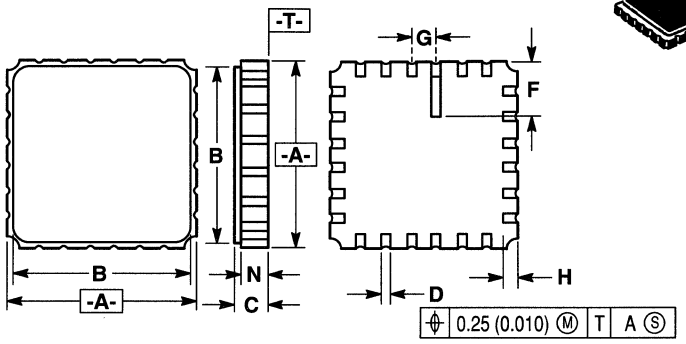
NOTES:
1. POSITIONAL TOLERANCE FOR TERMINALS D_2, 14 PLACES:
   0.25 (0.010) M T R S U S
   TERMINALS D_1, 8 PLACES:
   0.25 (0.010) M T U S R S
2. DIMENSIONING AND TOLERANCING PER Y14.5M, 1982.
3. CONTROLLING DIM: INCH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	12.27	12.62	0.483	0.497
B	6.68	7.03	0.263	0.277
C	1.63	1.98	0.064	0.078
D	0.51	0.76	0.020	0.030
F	1.98	2.33	0.078	0.092
G	1.27 BSC		0.050 BSC	
H	0.97	1.32	0.038	0.052
N	1.27	1.62	0.050	0.064
R	7.19	7.54	0.283	0.297
U	11.76	12.11	0.463	0.477

CASE 800-02

SURFACE MOUNT PACKAGE OUTLINES (continued)

LCCC-24

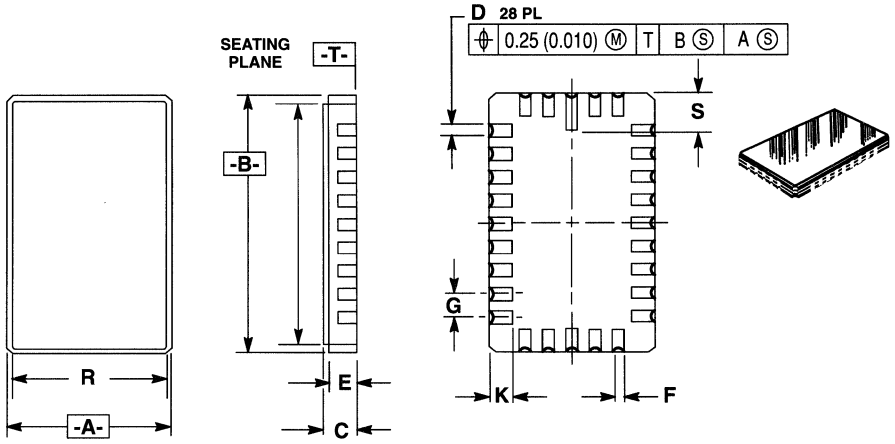


NOTES:
1. -T- IS GAUGE PLANE.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1982.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	10.01	10.41	0.394	0.410
B	8.74	9.06	0.344	0.356
C	—	1.90	—	0.075
D	0.51	0.76	0.020	0.030
F	1.91	2.41	0.075	0.095
G	1.27 BSC		0.050 BSC	
H	1.14	1.39	0.045	0.055
N	1.35	1.70	0.053	0.067

CASE 753-02

LCCC-28

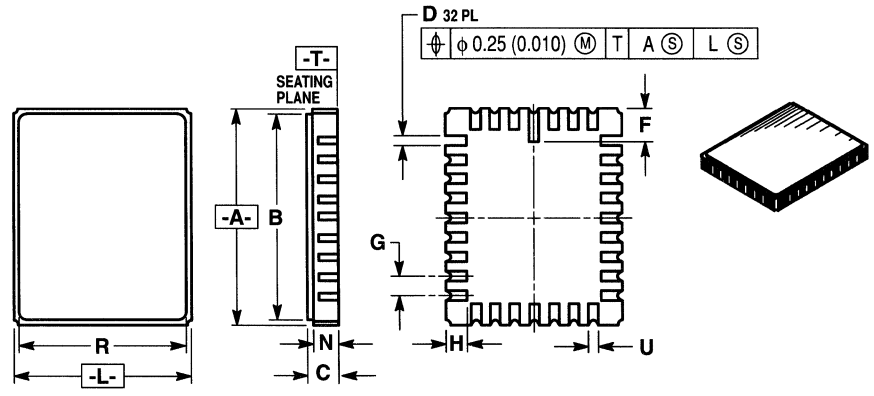


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.69	9.19	0.342	0.362
B	13.74	14.27	0.541	0.562
C	1.62	2.03	0.064	0.080
D	0.51	0.76	0.020	0.030
E	1.32	1.73	0.052	0.068
F	–	0.051	–	0.020
G	1.27 BSC		0.050 BSC	
K	1.07	1.47	0.042	0.058
N	13.23	13.77	0.521	0.542
R	8.15	8.69	0.321	0.342
S	1.78	2.41	0.070	0.095

CASE 763A-01

LCCC-32



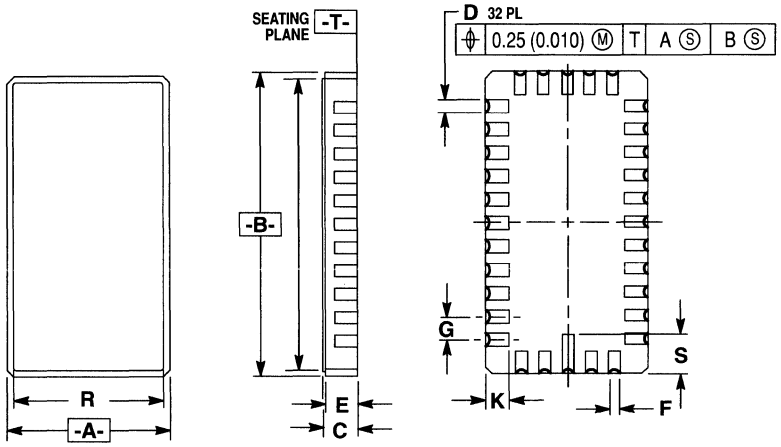
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	13.85	14.22	0.545	0.560
B	13.34	13.58	0.525	0.535
C	1.91	2.26	0.075	0.089
D	0.56	0.71	0.022	0.028
F	1.91	2.41	0.075	0.095
G	1.27 BSC		0.050 BSC	
H	1.07	1.47	0.042	0.058
L	11.31	11.63	0.445	0.458
N	1.63	1.93	0.064	0.076
R	10.80	11.04	0.425	0.435
U	—	0.50	—	0.020

CASE 766A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

LCCC-32

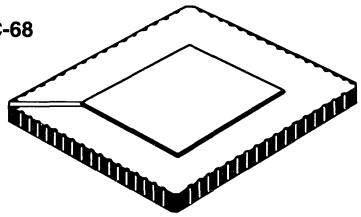


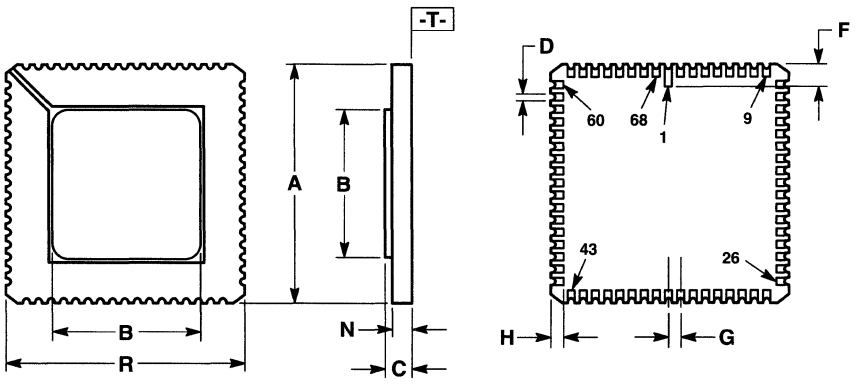
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.70	9.10	0.344	0.360
B	16.30	16.80	0.662	0.080
C	1.52	2.54	0.100	0.060
D	0.60	0.70	0.022	0.028
E	1.50	2.00	0.060	0.080
F	–	0.05	–	0.020
G	1.30 BSC		0.050 BSC	
K	1.10	1.40	0.045	0.055
N	15.60	16.10	0.615	0.635
R	8.00	8.50	0.315	0.335
S	1.90	2.40	0.075	0.095

CASE 766B-01

LCCC-68





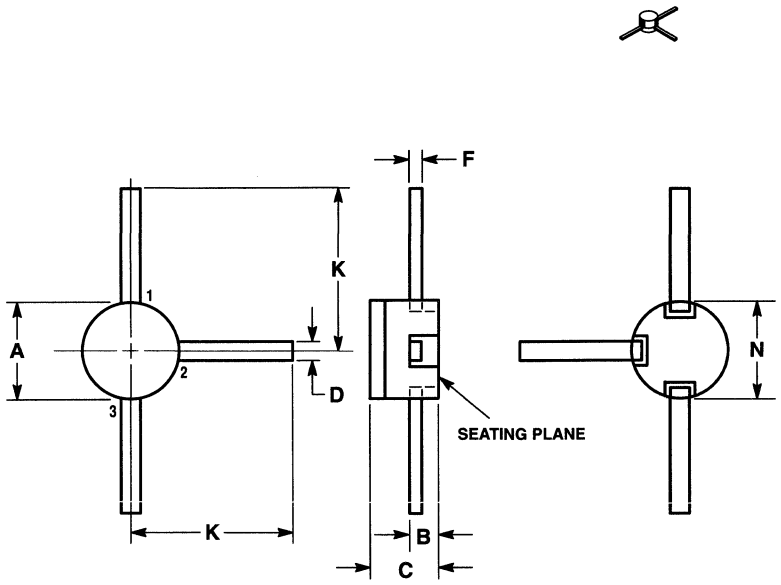
NOTES:
1. DIMENSION A IS DATUM (2 PLACES).
2. -T- IS GAUGE PLANE.
3. POSITIONAL TOLERANCE FOR TERMINALS (D): 68 PLACES
   0.25 (0.010) M T A S R S
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	23.83	24.43	0.938	0.962
B	15.24	15.49	0.600	0.610
C	2.03	3.05	0.080	0.120
D	0.56	0.71	0.022	0.028
F	1.90	2.41	0.075	0.095
G	1.27 BSC		0.050 BSC	
H	1.02	1.52	0.040	0.060
N	1.78	2.29	0.070	0.090
R	23.83	24.43	0.938	0.962

CASE 760-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

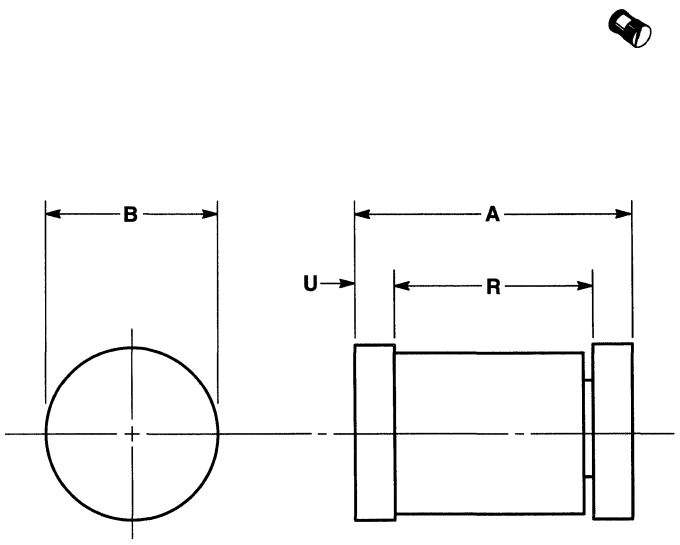
MICRO-G



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.03	2.67	0.080	0.105
B	0.38	0.76	0.015	0.030
C	1.27	2.03	0.050	0.080
D	0.25	0.41	0.010	0.016
F	0.08	0.015	0.003	0.006
K	4.06	4.57	0.160	0.180
N	2.03	2.67	0.080	0.105

CASE 176C-01

MLL34

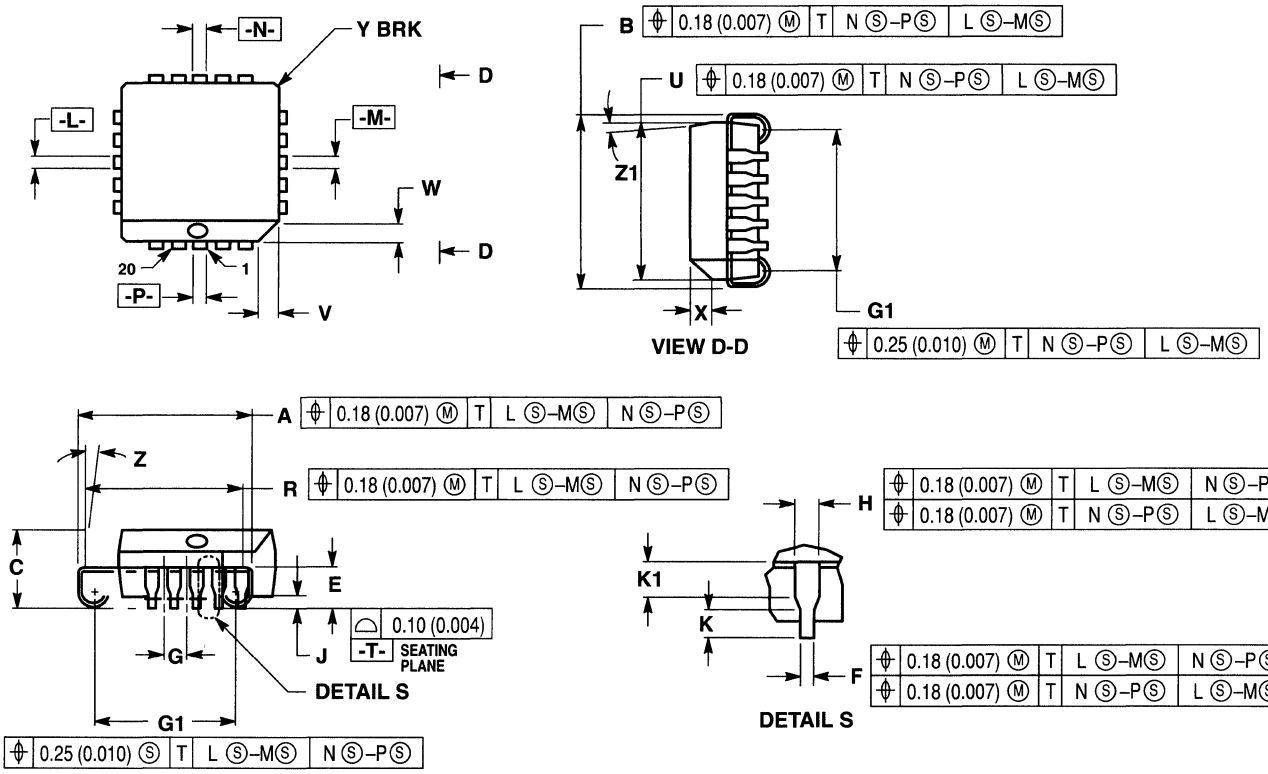


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 362-01 OBSOLETE, NEW STANDARD 362-03.

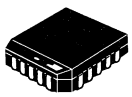
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	3.30	3.70	0.130	0.146
B	1.60	1.73	0.063	0.068
R	2.49	—	0.098	—
U	0.41	0.55	0.016	0.022

CASE 362-03

PLCC-20



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.78	10.03	0.385	0.395
B	9.78	10.03	0.385	0.395
C	4.20	4.57	0.165	0.180
E	2.29	2.79	0.090	0.110
F	0.33	0.48	0.013	0.019
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	0.64	—	0.025	—
R	8.89	9.04	0.350	0.356
U	8.89	9.04	0.350	0.356
V	1.07	1.21	0.042	0.048
W	1.07	1.21	0.042	0.048
X	1.07	1.42	0.042	0.056
Y	—	0.50	—	0.020
Z	2°	10°	2°	10°
G1	7.88	8.38	0.310	0.330
K1	1.02	—	0.040	—
Z1	2°	10°	2°	10°

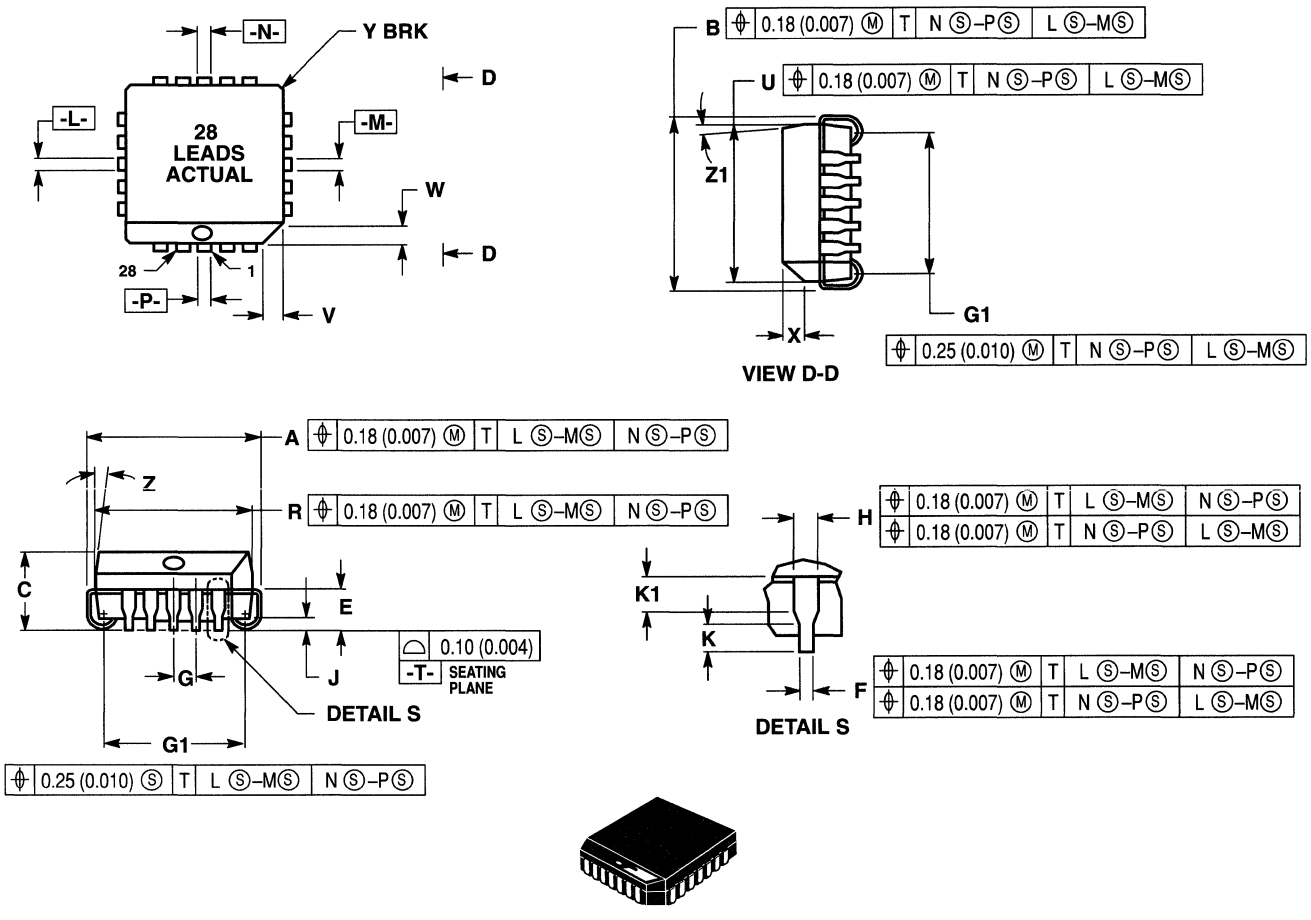


NOTES:
1. DATUMS -L-, -M-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXIT PLASTIC BODY AT MOLD PARTING LINE.
2. DIM GI, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
3. DIM R AND U DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.25 (0.010) PER SIDE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
5. CONTROLLING DIMENSION: INCH.
6. 775-01 IS OBSOLETE, NEW STANDARD 775-02.

CASE 775-02

SURFACE MOUNT PACKAGE OUTLINES (continued)

PLCC-28

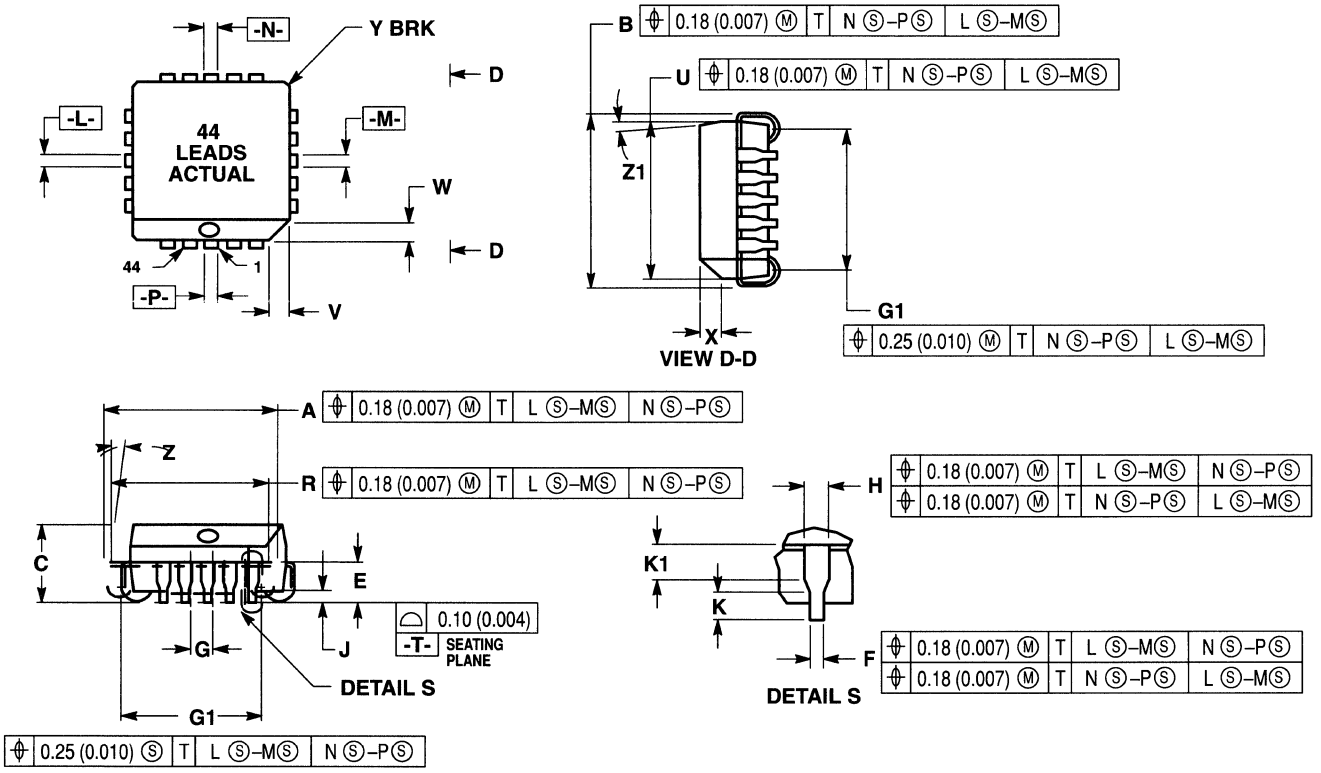


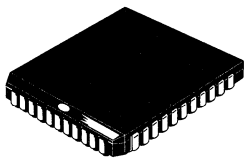
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	12.32	12.57	0.485	0.495
B	12.32	12.57	0.485	0.495
C	4.20	4.57	0.165	0.180
E	2.29	2.79	0.090	0.110
F	0.33	0.48	0.013	0.019
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	0.64	—	0.025	—
R	11.43	11.58	0.450	0.456
U	11.43	11.58	0.450	0.456
V	1.07	1.21	0.042	0.048
W	1.07	1.21	0.042	0.048
X	1.07	1.42	0.042	0.056
Y	—	0.50	—	0.020
Z	2°	10°	2°	10°
G1	10.42	10.92	0.410	0.430
K1	1.02	—	0.040	—
Z1	2°	10°	2°	10°

NOTES:
1. **DUE TO SPACE LIMITATION, CASE 776-02 SHALL BE REPRESENTED BY A GENERAL (SMALLER) CASE OUTLINE DRAWING RATHER THAN SHOWING ALL 28 LEADS.**
2. DATUMS -L-, -M-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXIT PLASTIC BODY AT MOLD PARTING LINE.
3. DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
4. DIM R AND U DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.25 (0.010) PER SIDE.
5. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
6. CONTROLLING DIMENSION: INCH.
7. 776-01 IS OBSOLETE, NEW STANDARD 776-02.

CASE 776-02

PLCC-44





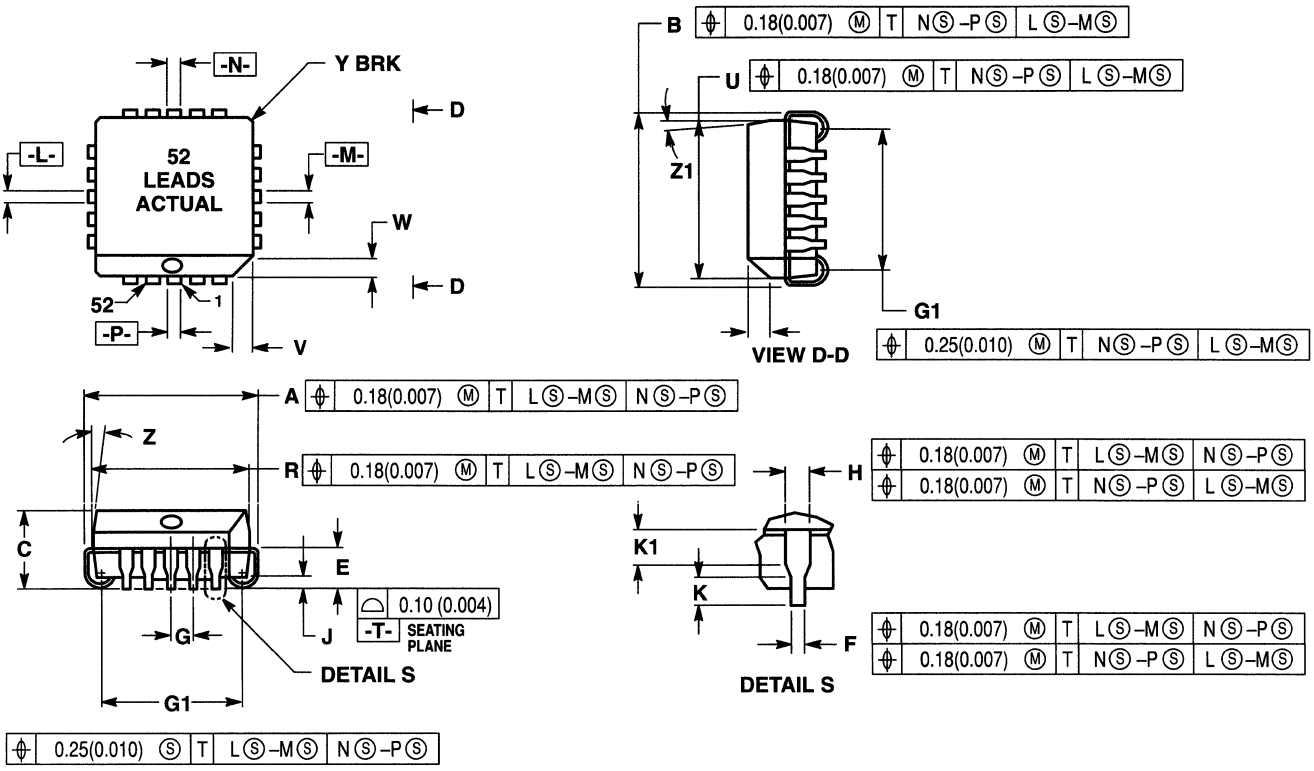
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	17.40	17.65	0.685	0.695
B	17.40	17.65	0.685	0.695
C	4.20	4.57	0.165	0.180
E	2.29	2.79	0.090	0.110
F	0.33	0.48	0.013	0.019
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	0.64	—	0.025	—
R	16.51	16.66	0.650	0.656
U	16.51	16.66	0.650	0.656
V	1.07	1.21	0.042	0.048
W	1.07	1.21	0.042	0.048
X	1.07	1.42	0.042	0.056
Y	—	0.50	—	0.020
Z	2°	10°	2°	10°
G1	15.50	16.00	0.610	0.630
K1	1.02	—	0.040	—
Z1	2°	10°	2°	10°

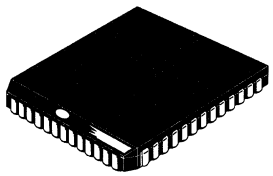
NOTES:
1. **DUE TO SPACE LIMITATION, CASE 777-02 SHALL BE REPRESENTED BY A GENERAL (SMALLER) CASE OUTLINE DRAWING RATHER THAN SHOWING ALL 44 LEADS.**
2. DATUMS -L-, -M-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXIT PLASTIC BODY AT MOLD PARTING LINE.
3. DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
4. DIM R AND U DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.25 (0.010) PER SIDE.
5. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
6. CONTROLLING DIMENSION: INCH.
7. 777-01 IS OBSOLETE, NEW STANDARD 777-02.

CASE 777-02

SURFACE MOUNT PACKAGE OUTLINES (continued)

PLCC-52



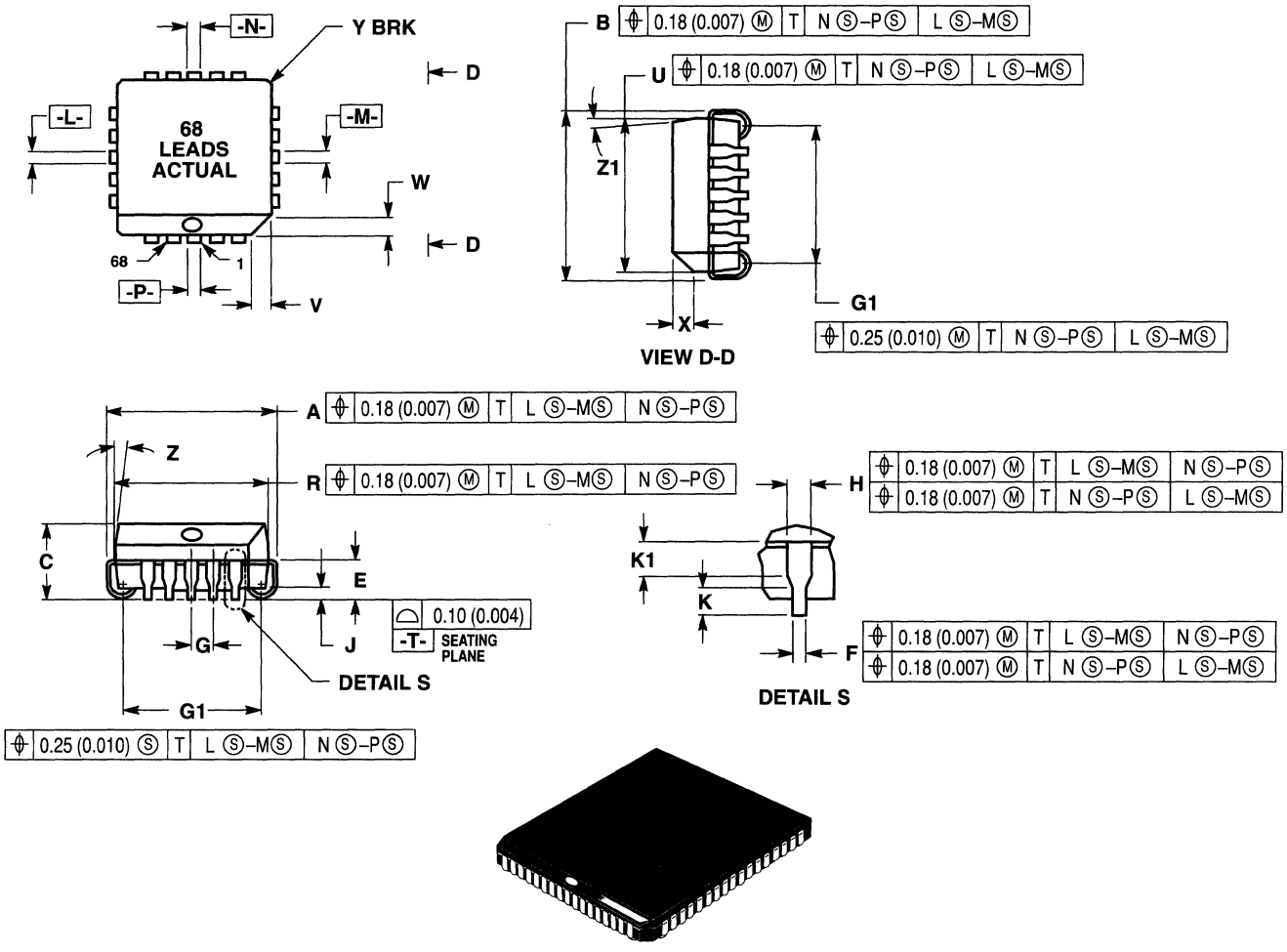


DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	19.94	20.19	0.785	0.795
B	19.94	20.19	0.785	0.795
C	4.20	4.57	0.165	0.180
E	2.29	2.79	0.090	0.110
F	0.33	0.48	0.013	0.019
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	0.64	—	0.025	—
R	19.05	19.20	0.750	0.756
U	19.05	19.20	0.750	0.756
V	1.07	1.21	0.042	0.048
W	1.07	1.21	0.042	0.048
X	1.07	1.42	0.042	0.056
Y	—	0.50	—	0.020
Z	2°	10°	2°	10°
G1	18.04	18.54	0.710	0.730
K1	1.02	—	0.040	—
Z1	2°	10°	2°	10°

NOTES:
1. **DUE TO SPACE LIMITATION, CASE 778-02 SHALL BE REPRESENTED BY A GENERAL (SMALLER) CASE OUTLINE DRAWING RATHER THAN SHOWING ALL 52 LEADS.**
2. DATUMS -L-, -M-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXIT PLASTIC BODY AT MOLD PARTING LINE.
3. DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
4. DIM R AND U DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.25 (0.010) PER SIDE.
5. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
6. CONTROLLING DIMENSION: INCH.
7. 778-01 IS OBSOLETE, NEW STANDARD 778-02.

CASE 778-02

PLCC-68

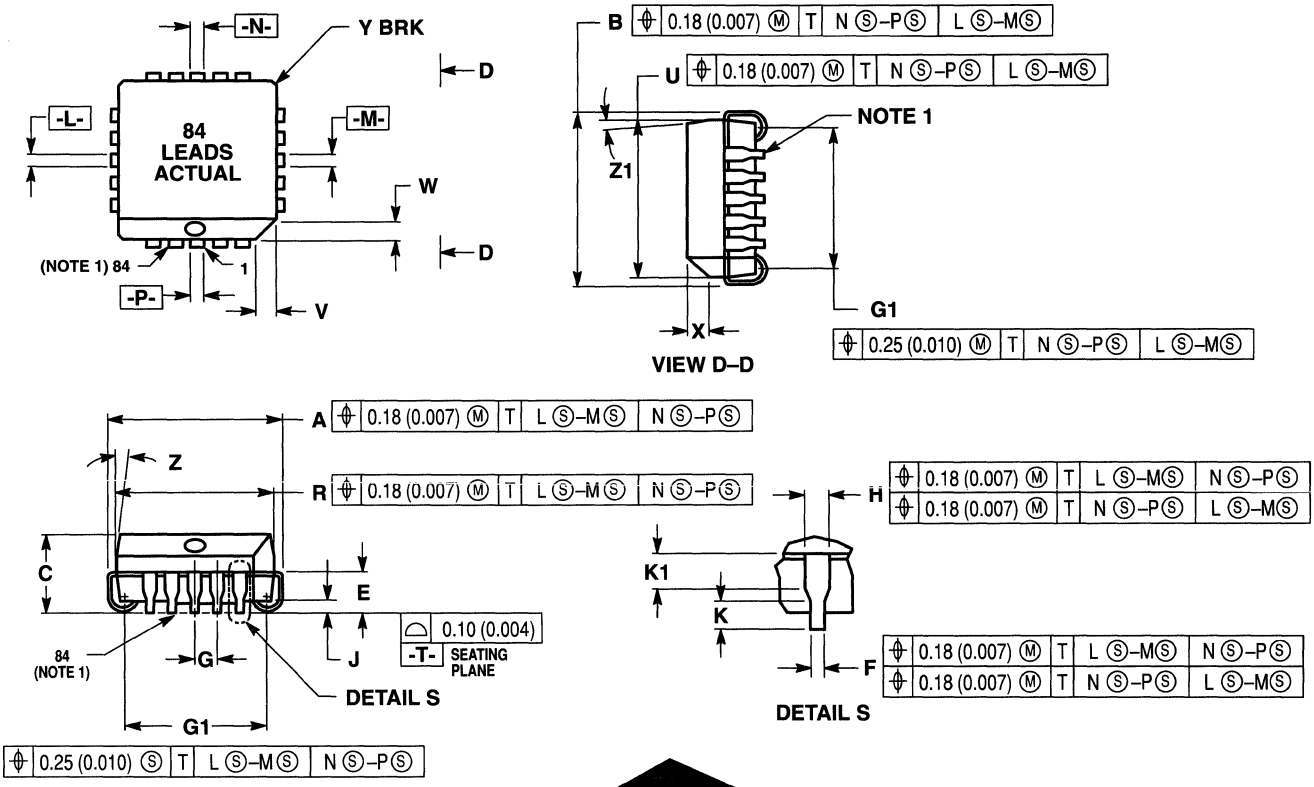


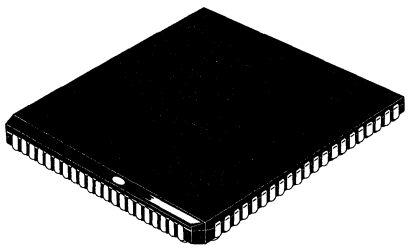
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	25.02	25.27	0.985	0.995
B	25.02	25.27	0.985	0.995
C	4.20	4.57	0.165	0.180
E	2.29	2.79	0.090	0.110
F	0.33	0.48	0.013	0.019
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	0.64	—	0.025	—
R	24.13	24.28	0.950	0.956
U	24.13	24.28	0.950	0.956
V	1.07	1.21	0.042	0.048
W	1.07	1.21	0.042	0.048
X	1.07	1.42	0.042	0.056
Y	—	0.50	—	0.020
Z	2°	10°	2°	10°
G1	23.12	23.62	0.910	0.930
K1	1.02	—	0.040	—
Z1	2°	10°	2°	10°

NOTES:
1. **DUE TO SPACE LIMITATION, CASE 779-02 SHALL BE REPRESENTED BY A GENERAL (SMALLER) CASE OUTLINE DRAWING RATHER THAN SHOWING ALL 68 LEADS.**
2. DATUMS -L-, -M-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXIT PLASTIC BODY AT MOLD PARTING LINE.
3. DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
4. DIM R AND U DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.25 (0.010) PER SIDE.
5. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
6. CONTROLLING DIMENSION: INCH.
7. 779-01 IS OBSOLETE, NEW STANDARD 779-02.

CASE 779-02

PLCC-84



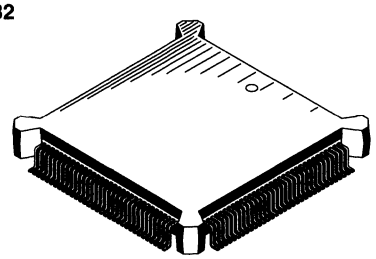


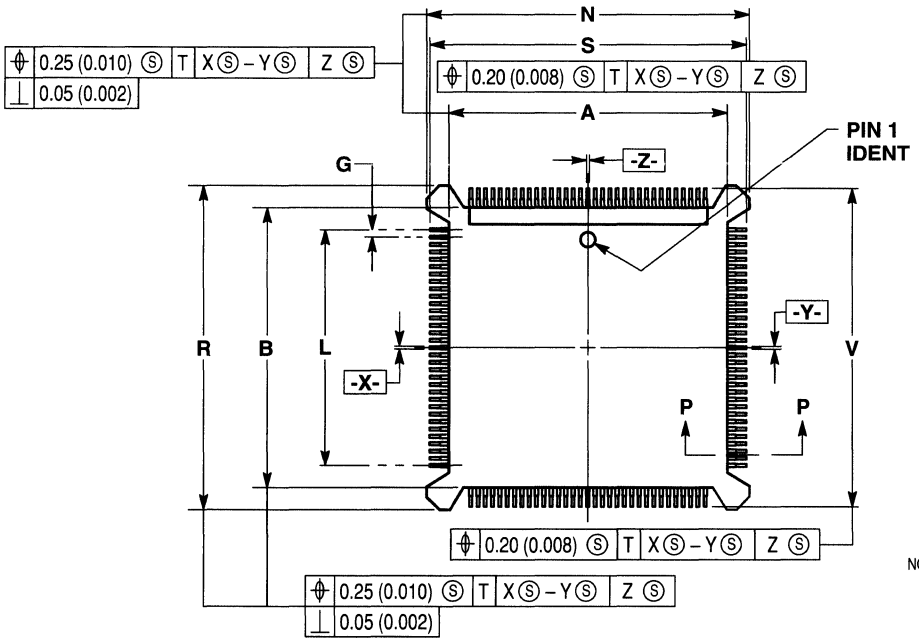
DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	30.10	30.35	1.185	1.195
B	30.10	30.35	1.185	1.195
C	4.20	4.57	0.165	0.180
E	2.29	2.79	0.090	0.110
F	0.33	0.48	0.013	0.019
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	0.64	—	0.025	—
R	29.21	29.36	1.150	1.156
U	29.21	29.36	1.150	1.156
V	1.07	1.21	0.042	0.048
W	1.07	1.21	0.042	0.048
X	1.07	1.42	0.042	0.056
Y	—	0.50	—	0.020
Z	2°	10°	2°	10°
G1	28.20	28.70	1.110	1.130
K1	1.02	—	0.040	—
Z1	2°	10°	2°	10°

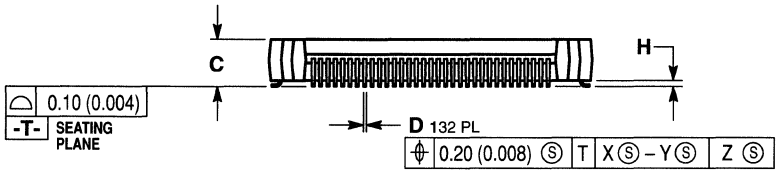
NOTES:
1. **DUE TO SPACE LIMITATION, CASE 780-01 SHALL BE REPRESENTED BY A GENERAL (SMALLER) CASE OUTLINE DRAWING RATHER THAN SHOWING ALL 84 LEADS.**
2. DATUMS -L-, -M-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXIT PLASTIC BODY AT MOLD PARTING LINE.
3. DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
4. DIM R AND U DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.25 (0.010) PER SIDE.
5. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
6. CONTROLLING DIMENSION: INCH.

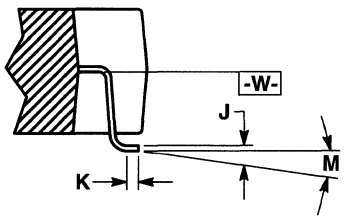
CASE 780-01

PQFP-132









SECTION P–P

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS A, B, N, AND R DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION FOR DIMENSIONS A AND B IS 0.25 (0.010), FOR DIMENSIONS N AND R IS 0.18 (0.007).
4. DATUM PLANE -W- IS LOCATED AT THE UNDERSIDE OF LEADS WHERE LEADS EXIT PACKAGE BODY.
5. DATUMS X–Y AND Z TO BE DETERMINED WHERE CENTER LEADS EXIT PACKAGE BODY AT DATUM -W-.
6. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE, DATUM -T-.
7. DIMENSIONS A, B, N, AND R TO BE DETERMINED AT DATUM PLANE -W-.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	24.06	24.20	0.947	0.953
B	24.06	24.20	0.947	0.953
C	4.07	4.57	0.160	0.180
D	0.21	0.30	0.008	0.012
G	0.64 BSC		0.025 BSC	
H	0.51	1.01	0.020	0.040
J	0.16	0.20	0.006	0.008
K	0.51	0.76	0.020	0.030
L	20.32 REF		0.800 REF	
M	0°	8°	0°	8°
N	27.88	28.01	1.097	1.103
R	27.88	28.01	1.097	1.103
S	27.31	27.55	1.075	1.085
V	27.31	27.55	1.075	1.085

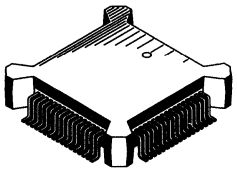
CASE 831A-01

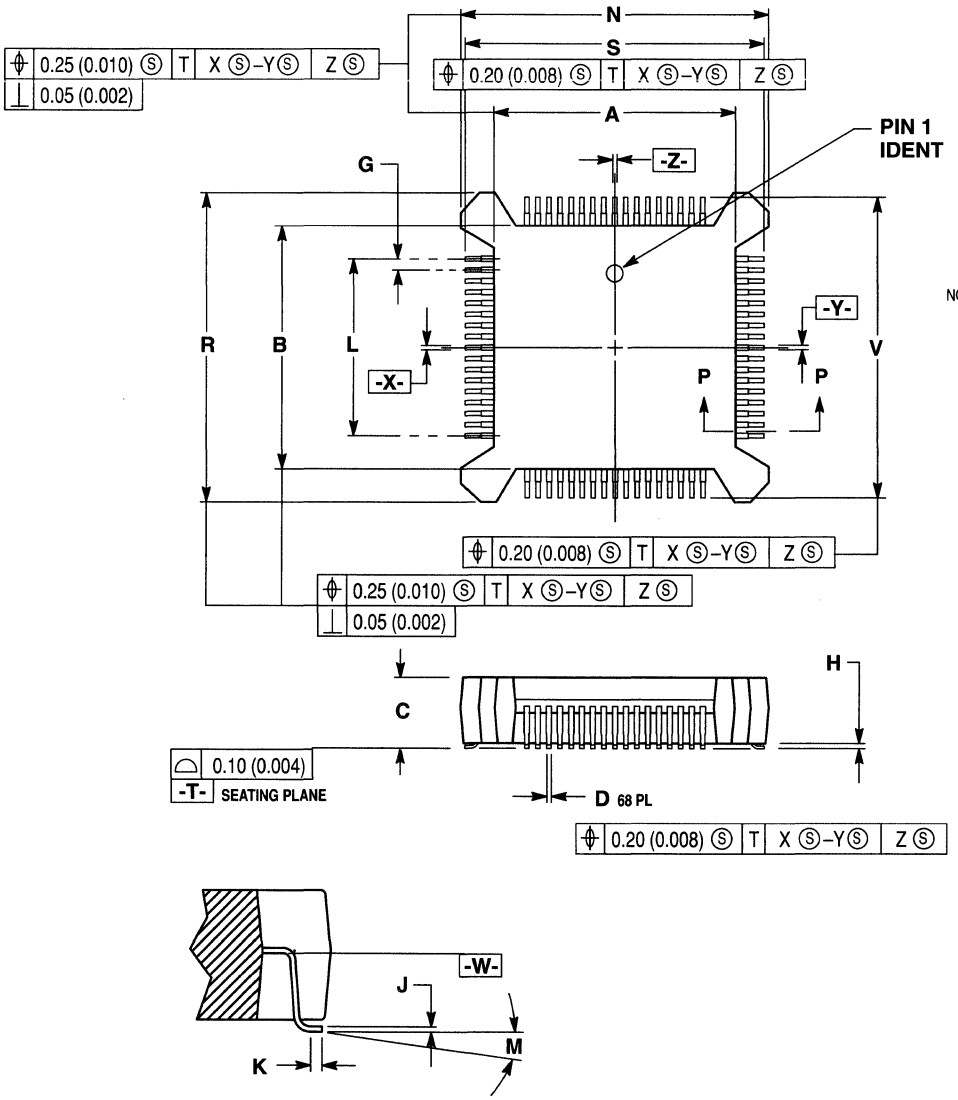
PQFP-132LP-MCR

Drawing not available at time of printing.

CASE 878-01

PQFP-68LP





SECTION P-P

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS A, B, N, AND R DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION FOR DIMENSIONS A AND B IS 0.25 (0.010), FOR DIMENSIONS N AND R IS 0.18 (0.007).
4. DATUM PLANE -W- IS LOCATED AT THE UNDERSIDE OF LEADS WHERE LEADS EXIT PACKAGE BODY.
5. DATUMS X-Y AND Z TO BE DETERMINED WHERE CENTER LEADS EXIT PACKAGE BODY AT DATUM -W-.
6. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE, DATUM -T-.
7. DIMENSIONS A, B, N, AND R TO BE DETERMINED AT DATUM PLANE -W-.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	13.90	14.04	0.547	0.553
B	13.90	14.04	0.547	0.553
C	2.14	3.04	0.084	0.120
D	0.21	0.30	0.008	0.012
G	0.64 BSC		0.025 BSC	
H	0.11	0.40	0.004	0.019
J	0.16	0.20	0.006	0.008
K	0.51	0.76	0.020	0.030
L	10.16 REF		0.400 REF	
M	0°	8°	0°	8°
N	17.71	17.85	0.697	0.703
R	17.71	17.85	0.697	0.703
S	17.15	17.39	0.675	0.685
V	17.15	17.39	0.675	0.685

CASE 847-01

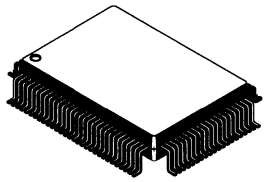
PQFP-68LP-MCR

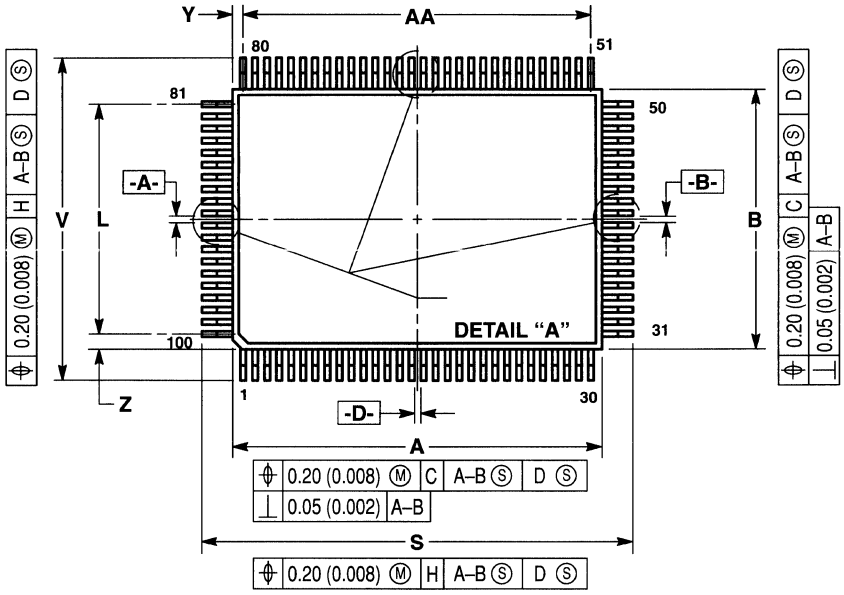
Drawing not available at time of printing.

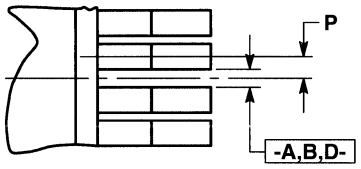
CASE 877-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

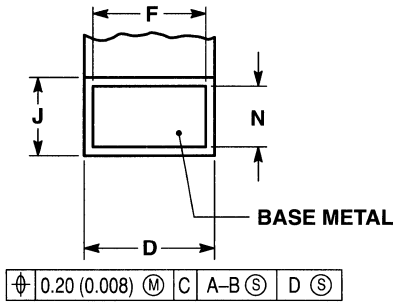
QFP-100 14X20



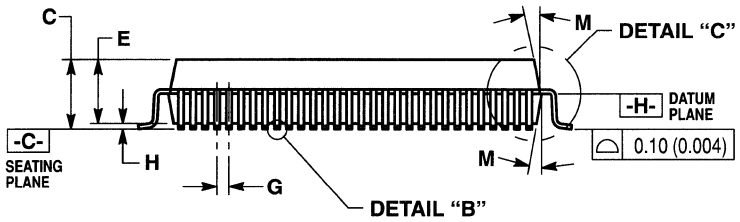


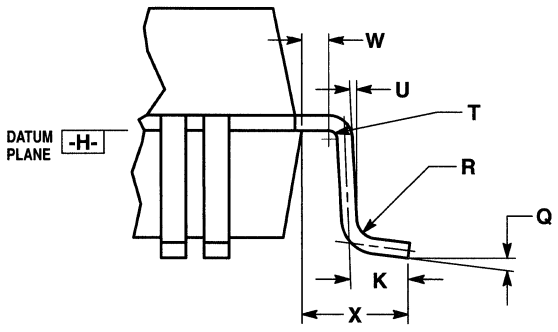


DETAIL "A"



DETAIL "B"





DETAIL "C"

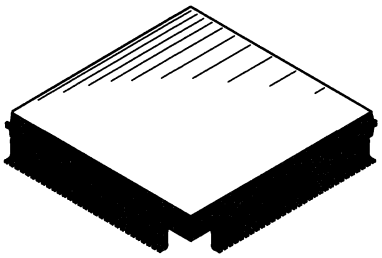
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

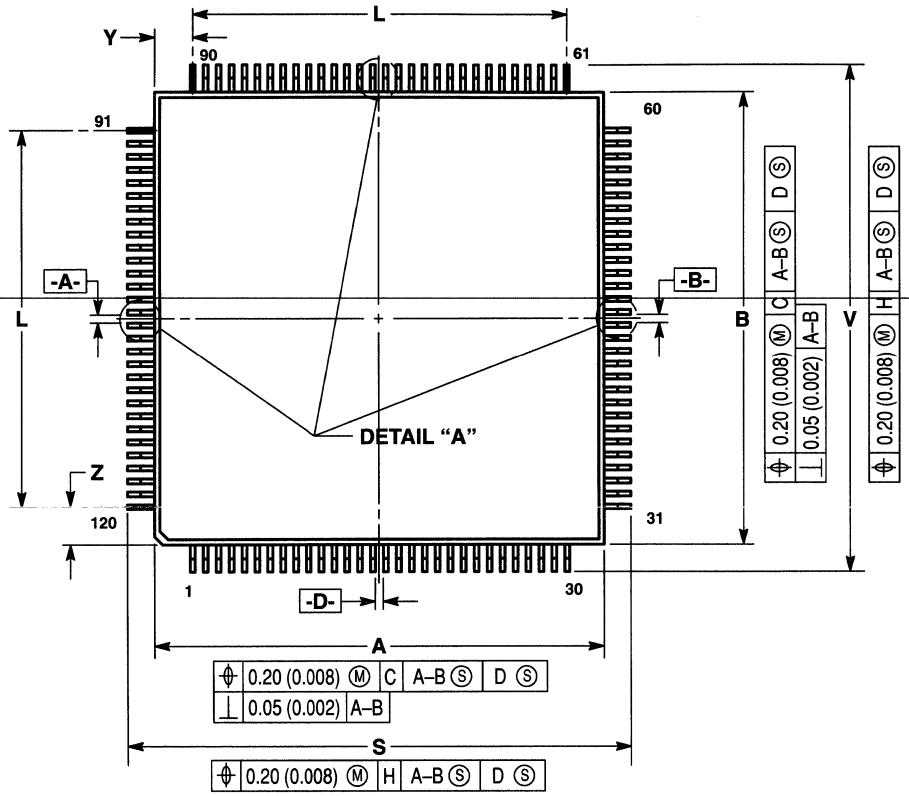
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	19.90	20.10	0.783	0.791
B	13.90	14.10	0.547	0.555
C	2.85	3.15	0.112	0.124
D	0.22	0.38	0.009	0.015
E	2.55	3.05	0.100	0.120
F	0.22	0.33	0.009	0.013
G	0.65 BSC		0.026 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.23	0.005	0.009
K	0.75	0.92	0.030	0.036
L	12.35 REF		0.486 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.325 BSC		0.013 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	23.10	23.37	0.909	0.920
T	0.13	—	0.005	—
U	0°	—	0°	—
V	17.10	17.37	0.673	0.684
W	0.40	—	0.016	
X	1.60 REF		0.063 REF	
Y	0.58 REF		0.023 REF	
Z	0.83 REF		0.033 REF	
AA	18.85 REF		0.742 REF	

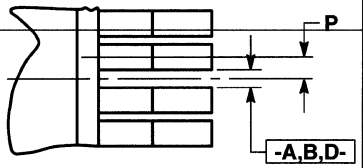
CASE 842B-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

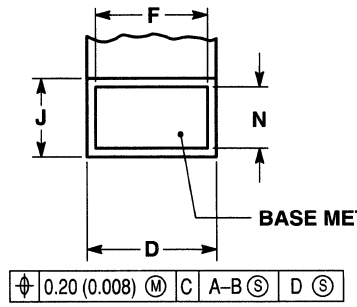
QFP-120 28X28



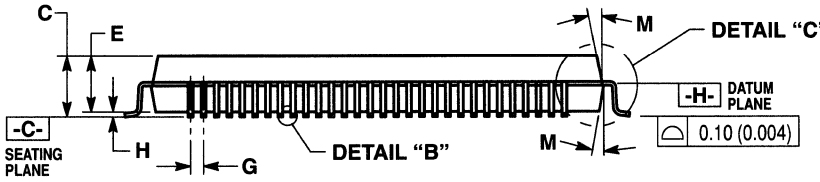


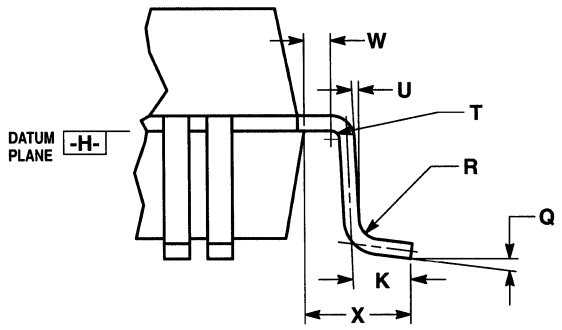


DETAIL "A"



DETAIL "B"





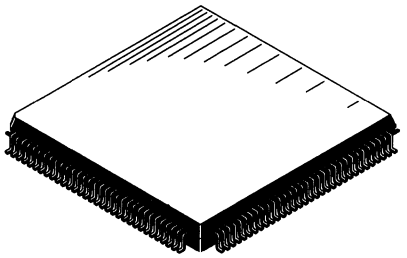
DETAIL "C"

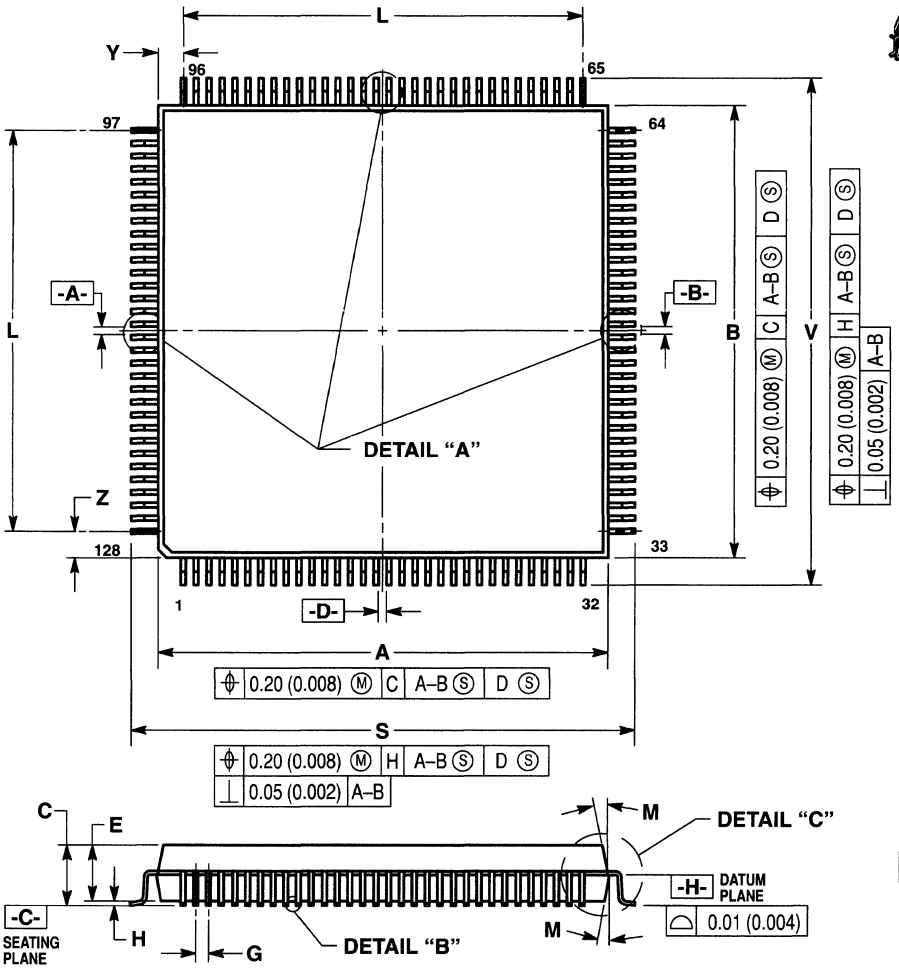
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

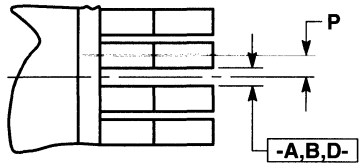
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.90	28.10	1.098	1.106
B	27.90	28.10	1.098	1.106
C	3.45	3.85	0.136	0.152
D	0.30	0.45	0.012	0.018
E	3.17	3.67	0.125	0.144
F	0.30	0.40	0.012	0.016
G	0.80 BSC		0.032 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.23	0.005	0.009
K	0.75	0.92	0.030	0.036
L	23.20 REF		0.913 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.40 BSC		0.016 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	31.10	31.37	1.224	1.235
T	0.13	—	0.005	—
U	0°	—	0°	—
V	31.10	31.37	1.224	1.235
W	0.40	—	0.016	—
X	1.60 REF		0.063 REF	
Y	2.40 REF		0.094 REF	
Z	2.40 REF		0.094 REF	

CASE 843A-01

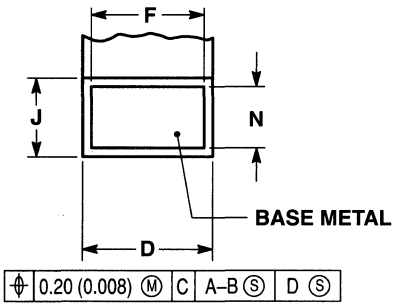
QFP-128 28X28



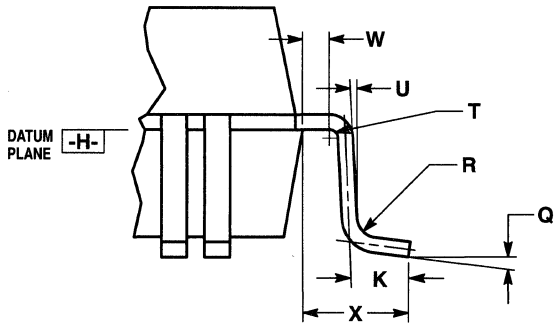




DETAIL "A"



SECTION "B"



DETAIL "C"

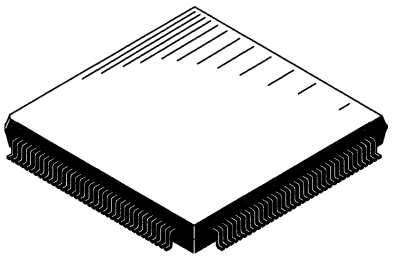
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

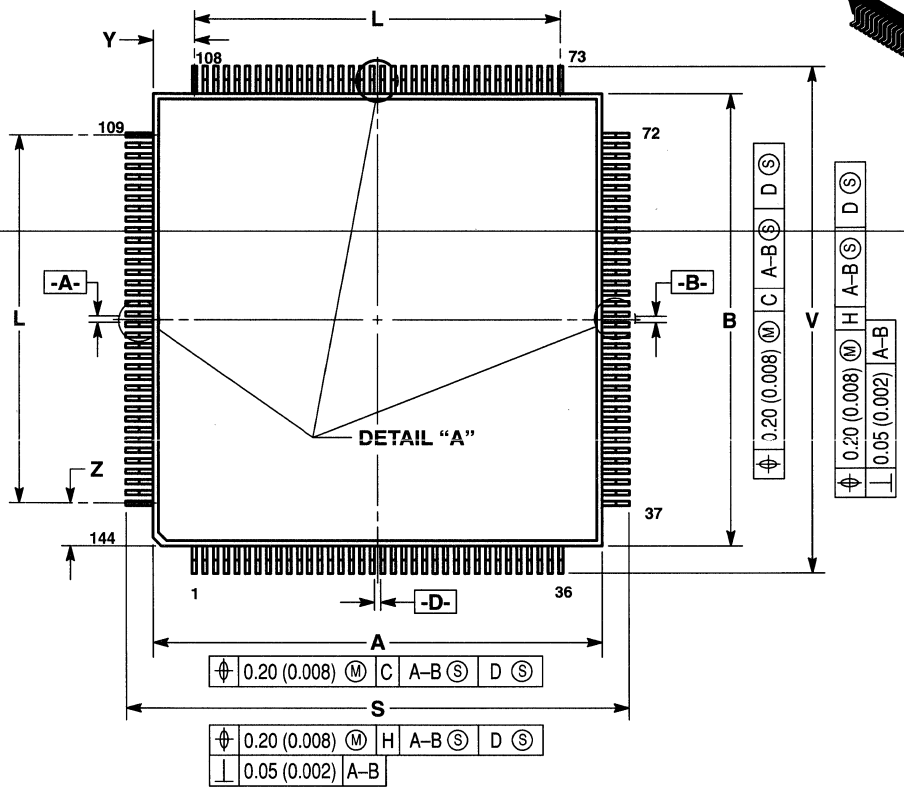
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.90	28.10	1.098	1.106
B	27.90	28.10	1.098	1.106
C	3.45	3.85	0.136	0.152
D	0.30	0.45	0.012	0.018
E	3.17	3.67	0.125	0.144
F	0.30	0.40	0.012	0.016
G	0.80 BSC		0.032 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.23	0.005	0.009
K	0.75	0.92	0.030	0.036
L	24.80 REF		0.976 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.40 BSC		0.016 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	31.10	31.37	1.224	1.235
T	0.13	—	0.005	—
U	0°	—	0°	—
V	31.10	31.37	1.224	1.235
W	0.40	—	0.016	—
X	1.60 REF		0.063 REF	
Y	1.60 REF		0.063 REF	
Z	1.60 REF		0.063 REF	

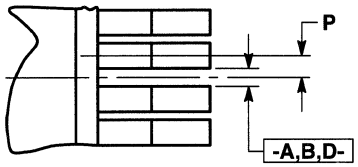
CASE 862A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

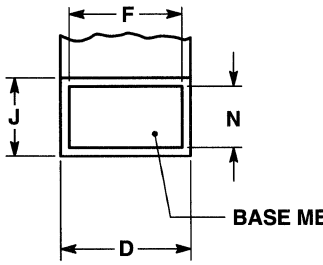
QFP-144 28X28



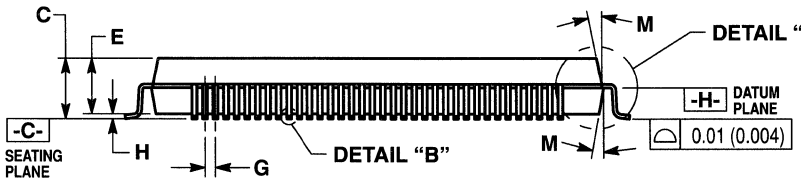


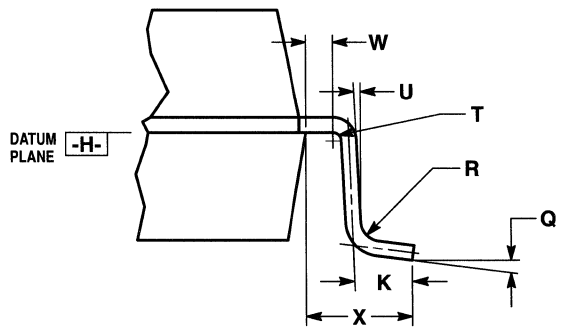


DETAIL "A"



DETAIL "B"





DETAIL "C"

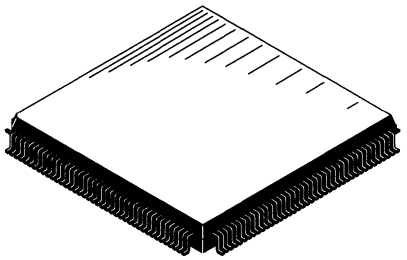
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

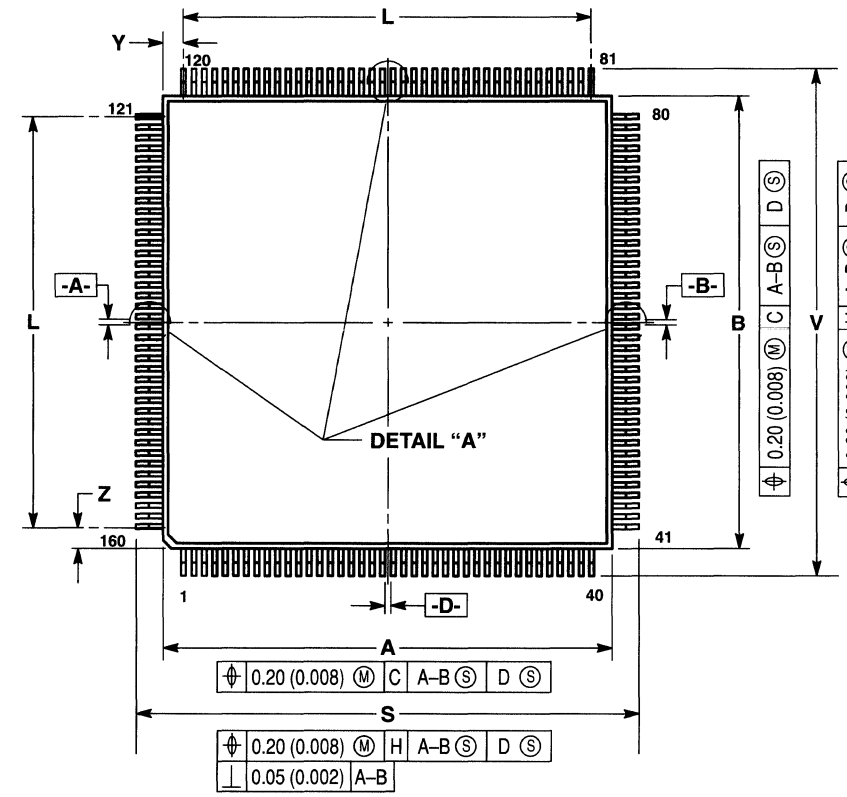
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.90	28.10	1.098	1.106
B	27.90	28.10	1.098	1.106
C	3.45	3.85	0.136	0.152
D	0.22	0.38	0.009	0.015
E	3.17	3.67	0.125	0.144
F	0.22	0.33	0.009	0.013
G	0.65 BSC		0.026 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.23	0.005	0.009
K	0.75	0.92	0.030	0.036
L	22.75 REF		0.896 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.325 BSC		0.0130 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	31.10	31.37	1.224	1.235
T	0.13	—	0.005	—
U	0°	—	0°	—
V	31.10	31.37	1.224	1.235
W	0.40	—	0.016	—
X	1.60 REF		0.063 REF	
Y	2.63 REF		0.104 REF	
Z	2.63 REF		0.104 REF	

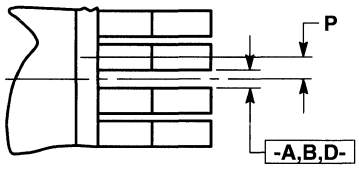
CASE 863B-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

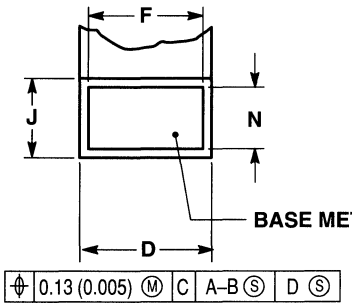
QFP-160 28X28



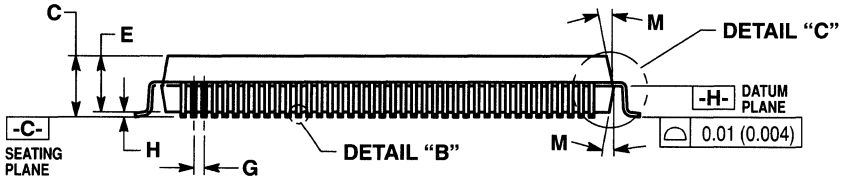


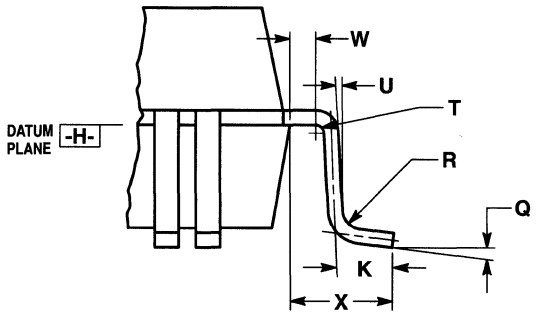


DETAIL "A"



DETAIL "B"





DETAIL "C"

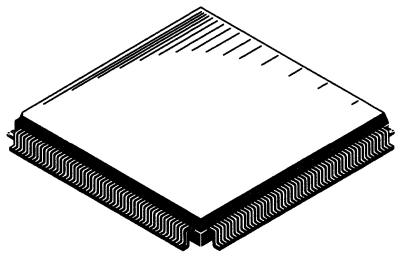
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

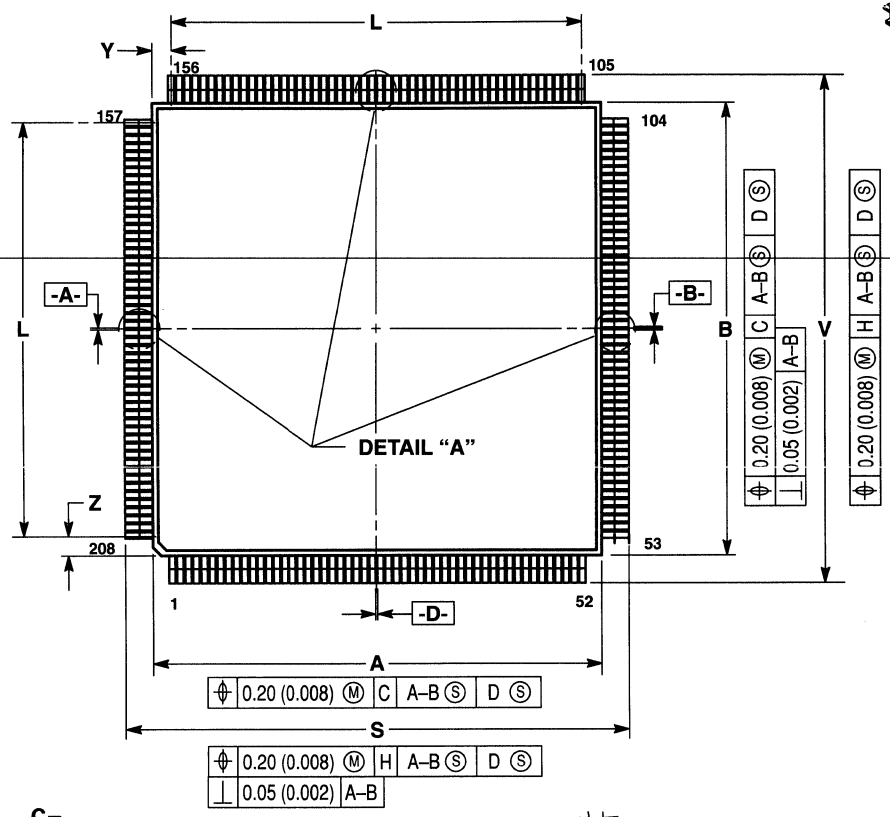
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.90	28.10	1.098	1.106
B	27.90	28.10	1.098	1.106
C	3.45	3.85	0.136	0.152
D	0.22	0.38	0.009	0.015
E	3.20	3.50	0.126	0.138
F	0.22	0.33	0.009	0.013
G	0.650 BSC		0.0256 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.18	0.005	0.007
K	0.75	0.92	0.030	0.036
L	25.35 REF		0.998 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.325 BSC		0.0130 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	31.10	31.37	1.224	1.235
T	0.13	—	0.005	—
U	0°	—	0°	—
V	31.10	31.37	1.224	1.235
W	0.40	—	0.016	—
X	1.60 REF		0.063 REF	
Y	1.33 REF		0.052 REF	
Z	1.33 REF		0.052 REF	

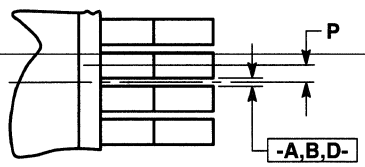
CASE 864A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

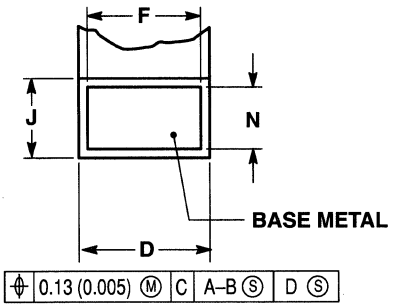
QFP-208 28X28



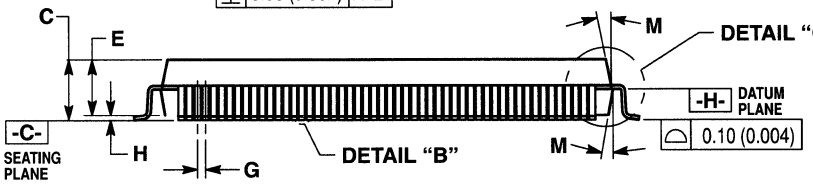


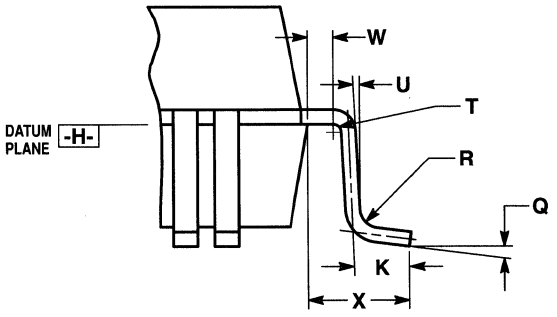


DETAIL "A"



DETAIL "B"





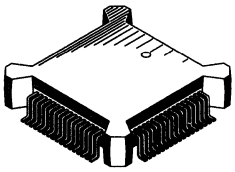
DETAIL "C"

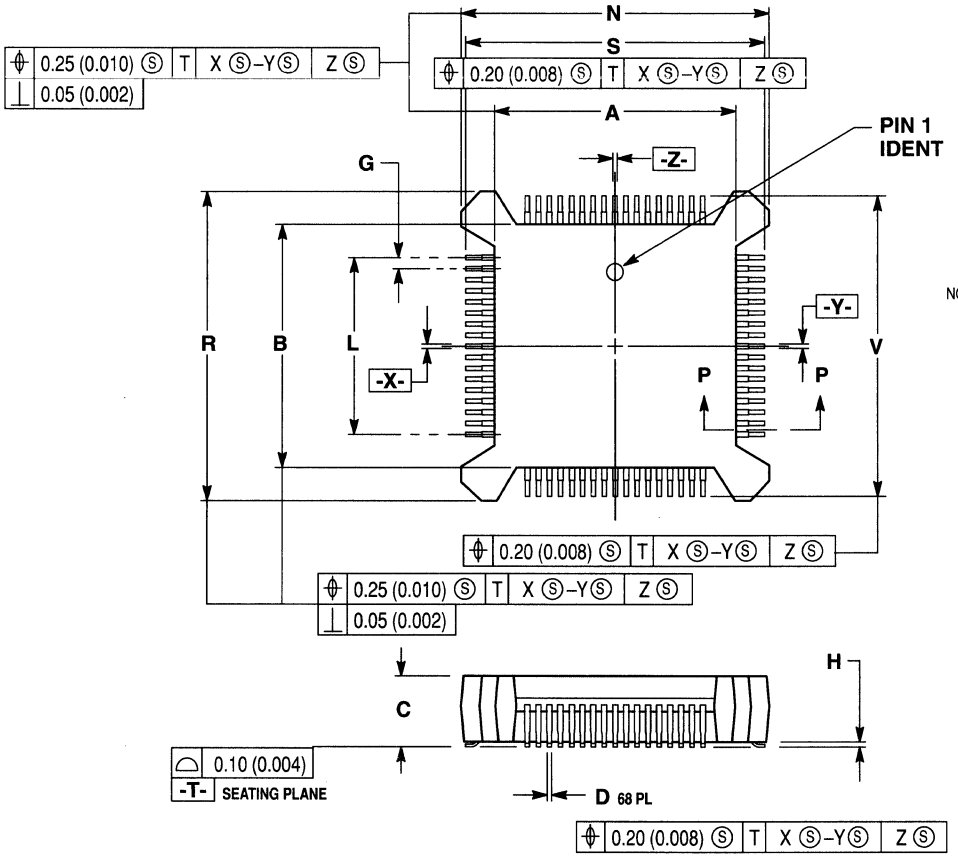
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.
8. 872-01 OBSOLETE, NEW STANDARD 872-02.

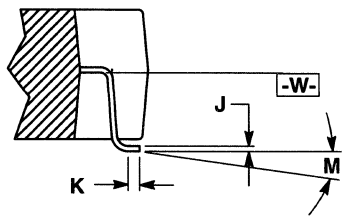
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.90	28.10	1.098	1.106
B	27.90	28.10	1.098	1.106
C	3.45	3.85	0.136	0.152
D	0.17	0.28	0.007	0.011
E	3.20	3.56	0.126	0.140
F	0.16	0.28	0.006	0.011
G	0.500 BSC		0.0197 BSC	
H	0.25	0.35	0.010	0.012
J	0.13	0.23	0.005	0.009
K	0.40	0.57	0.016	0.022
L	25.5 REF		1.004 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.250 BSC		0.009 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	30.50	30.77	1.201	1.211
T	0.13	—	0.005	—
U	0°	—	0°	—
V	30.50	30.77	1.201	1.211
W	0.40	—	0.016	—
X	1.30 REF		0.051 REF	
Y	1.25 REF		0.049 REF	
Z	1.25 REF		0.049 REF	

CASE 872-02

PQFP-68LP







SECTION P-P

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS A, B, N, AND R DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION FOR DIMENSIONS A AND B IS 0.25 (0.010), FOR DIMENSIONS N AND R IS 0.18 (0.007).
4. DATUM PLANE -W- IS LOCATED AT THE UNDERSIDE OF LEADS WHERE LEADS EXIT PACKAGE BODY.
5. DATUMS X-Y AND Z TO BE DETERMINED WHERE CENTER LEADS EXIT PACKAGE BODY AT DATUM -W-.
6. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE, DATUM -T-.
7. DIMENSIONS A, B, N, AND R TO BE DETERMINED AT DATUM PLANE -W-.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	13.90	14.04	0.547	0.553
B	13.90	14.04	0.547	0.553
C	2.14	3.04	0.084	0.120
D	0.21	0.30	0.008	0.012
G	0.64 BSC		0.025 BSC	
H	0.11	0.40	0.004	0.019
J	0.16	0.20	0.006	0.008
K	0.51	0.76	0.020	0.030
L	10.16 REF		0.400 REF	
M	0°	8°	0°	8°
N	17.71	17.85	0.697	0.703
R	17.71	17.85	0.697	0.703
S	17.15	17.39	0.675	0.685
V	17.15	17.39	0.675	0.685

CASE 847-01

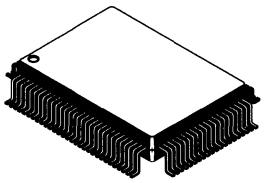
PQFP-68LP-MCR

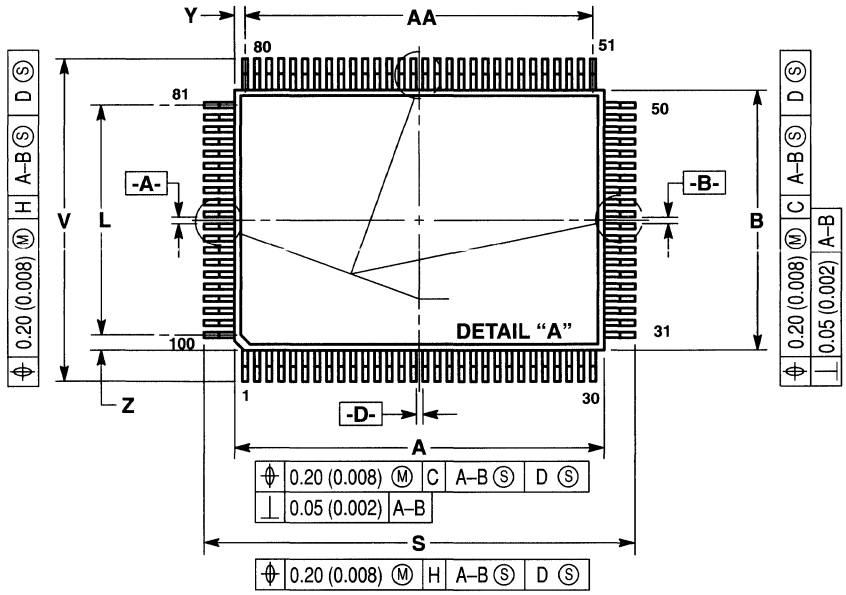
Drawing not available at time of printing.

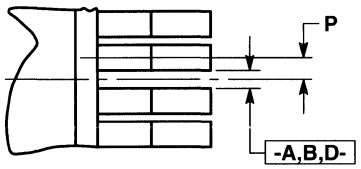
CASE 877-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

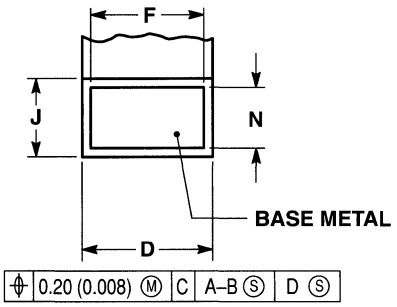
QFP-100 14X20



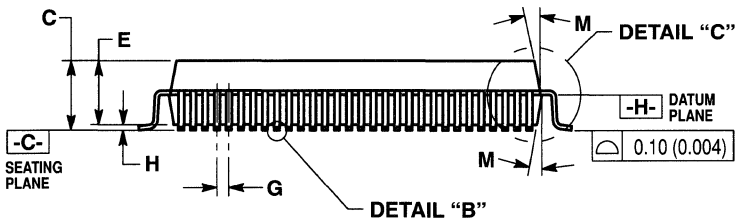


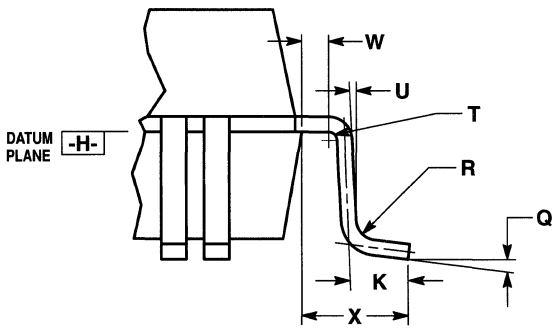


DETAIL "A"



DETAIL "B"





DETAIL "C"

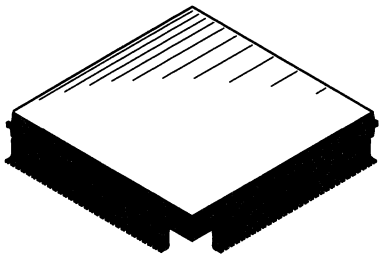
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

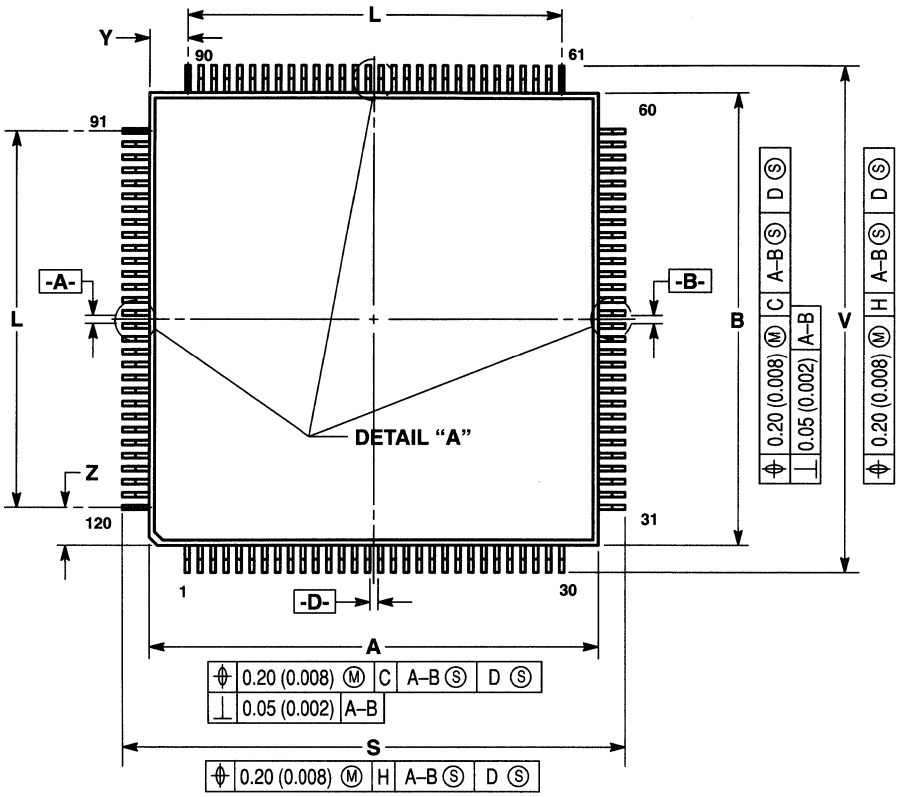
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	19.90	20.10	0.783	0.791
B	13.90	14.10	0.547	0.555
C	2.85	3.15	0.112	0.124
D	0.22	0.38	0.009	0.015
E	2.55	3.05	0.100	0.120
F	0.22	0.33	0.009	0.013
G	0.65 BSC		0.026 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.23	0.005	0.009
K	0.75	0.92	0.030	0.036
L	12.35 REF		0.486 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.325 BSC		0.013 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	23.10	23.37	0.909	0.920
T	0.13	—	0.005	—
U	0°	—	0°	—
V	17.10	17.37	0.673	0.684
W	0.40	—	0.016	
X	1.60 REF		0.063 REF	
Y	0.58 REF		0.023 REF	
Z	0.83 REF		0.033 REF	
AA	18.85 REF		0.742 REF	

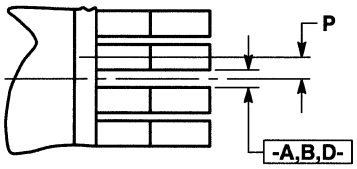
CASE 842B-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

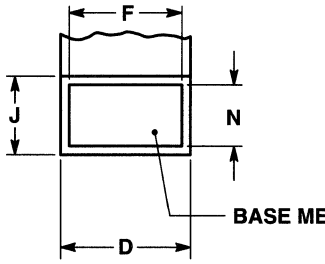
QFP-120 28X28



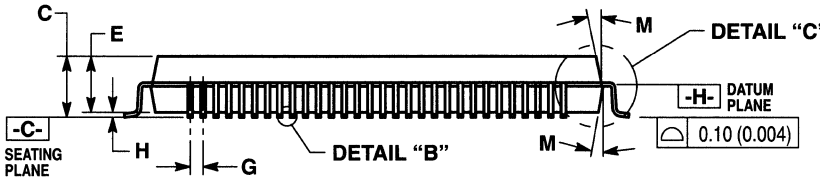


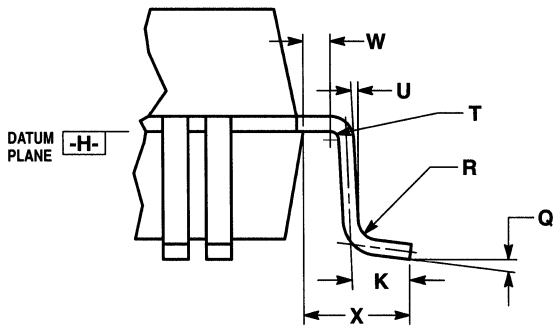


DETAIL "A"



DETAIL "B"





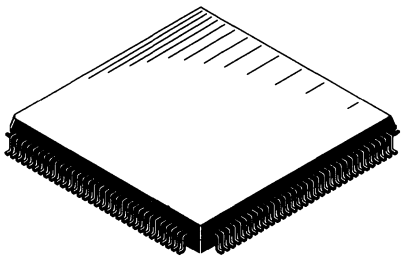
DETAIL "C"

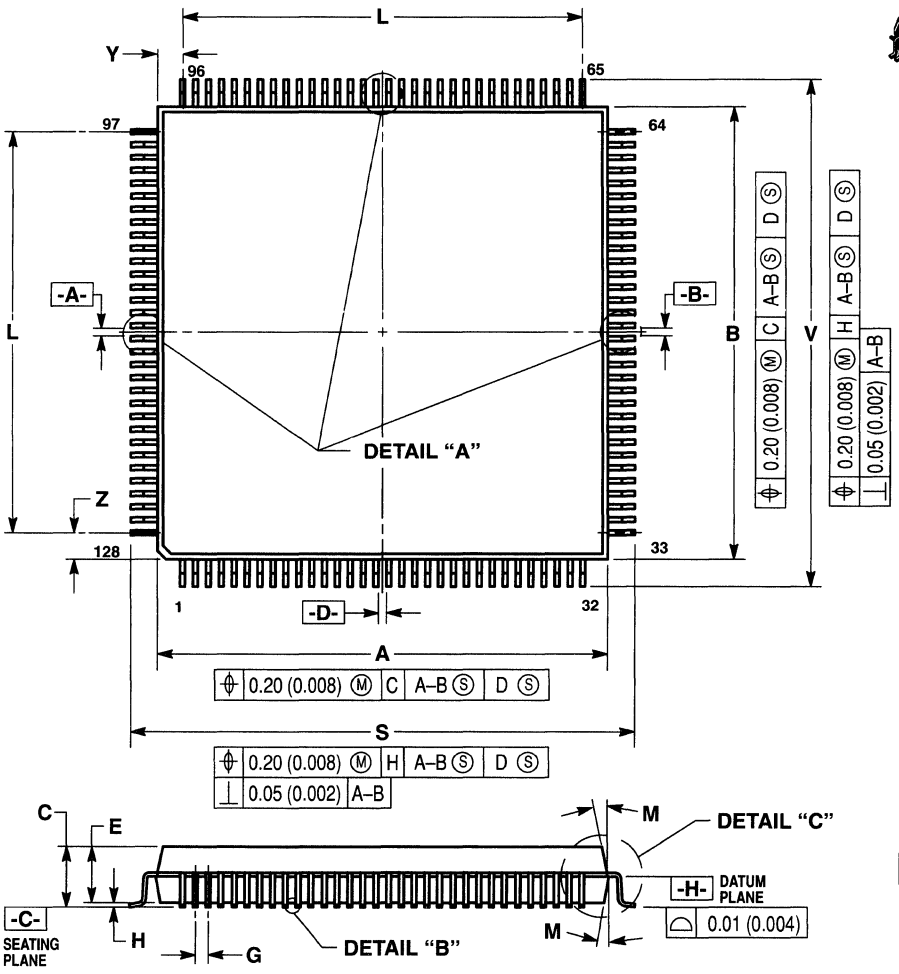
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

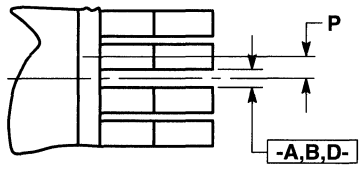
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.90	28.10	1.098	1.106
B	27.90	28.10	1.098	1.106
C	3.45	3.85	0.136	0.152
D	0.30	0.45	0.012	0.018
E	3.17	3.67	0.125	0.144
F	0.30	0.40	0.012	0.016
G	0.80 BSC		0.032 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.23	0.005	0.009
K	0.75	0.92	0.030	0.036
L	23.20 REF		0.913 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.40 BSC		0.016 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	31.10	31.37	1.224	1.235
T	0.13	—	0.005	—
U	0°	—	0°	—
V	31.10	31.37	1.224	1.235
W	0.40	—	0.016	—
X	1.60 REF		0.063 REF	
Y	2.40 REF		0.094 REF	
Z	2.40 REF		0.094 REF	

CASE 843A-01

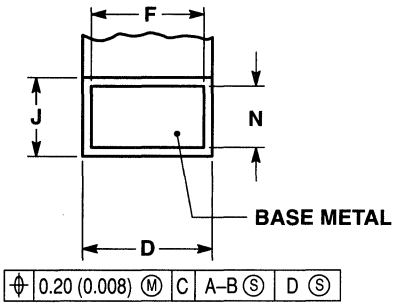
QFP-128 28X28



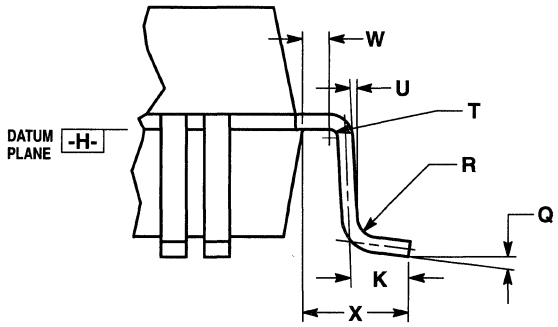




DETAIL "A"



SECTION "B"



DETAIL "C"

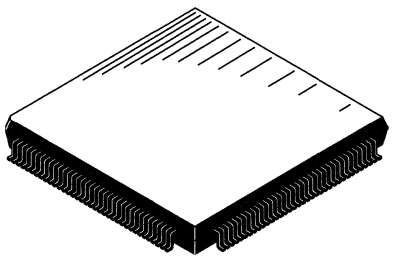
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

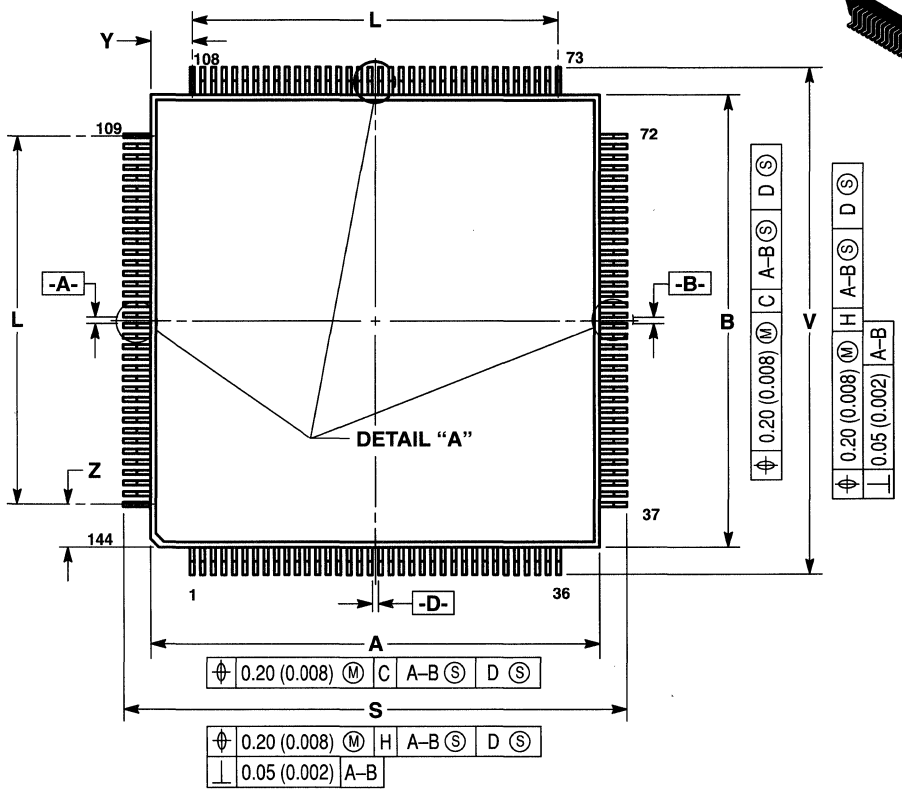
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.90	28.10	1.098	1.106
B	27.90	28.10	1.098	1.106
C	3.45	3.85	0.136	0.152
D	0.30	0.45	0.012	0.018
E	3.17	3.67	0.125	0.144
F	0.30	0.40	0.012	0.016
G	0.80 BSC		0.032 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.23	0.005	0.009
K	0.75	0.92	0.030	0.036
L	24.80 REF		0.976 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.40 BSC		0.016 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	31.10	31.37	1.224	1.235
T	0.13	—	0.005	—
U	0°	—	0°	—
V	31.10	31.37	1.224	1.235
W	0.40	—	0.016	—
X	1.60 REF		0.063 REF	
Y	1.60 REF		0.063 REF	
Z	1.60 REF		0.063 REF	

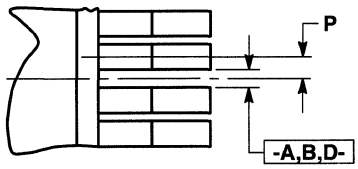
CASE 862A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

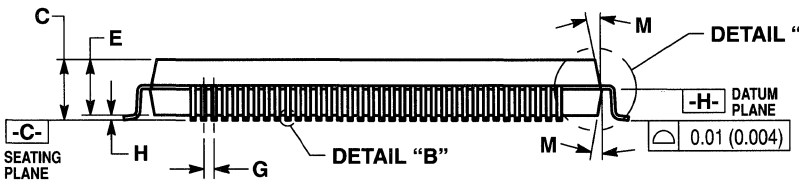
QFP-144 28X28

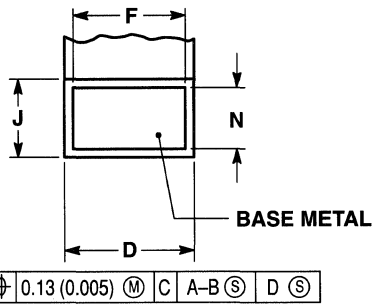




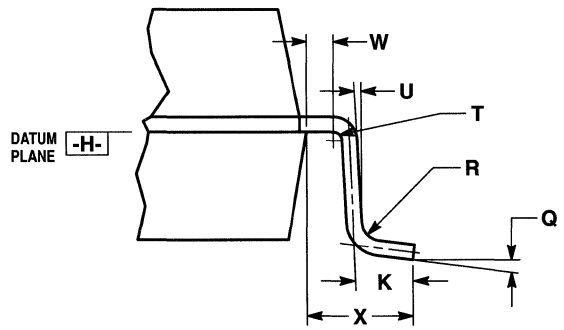


DETAIL "A"





DETAIL "B"



DETAIL "C"

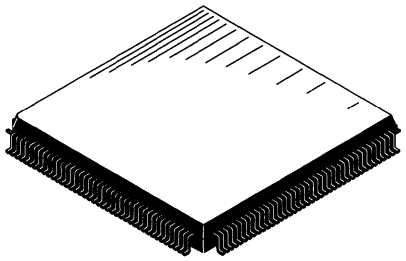
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

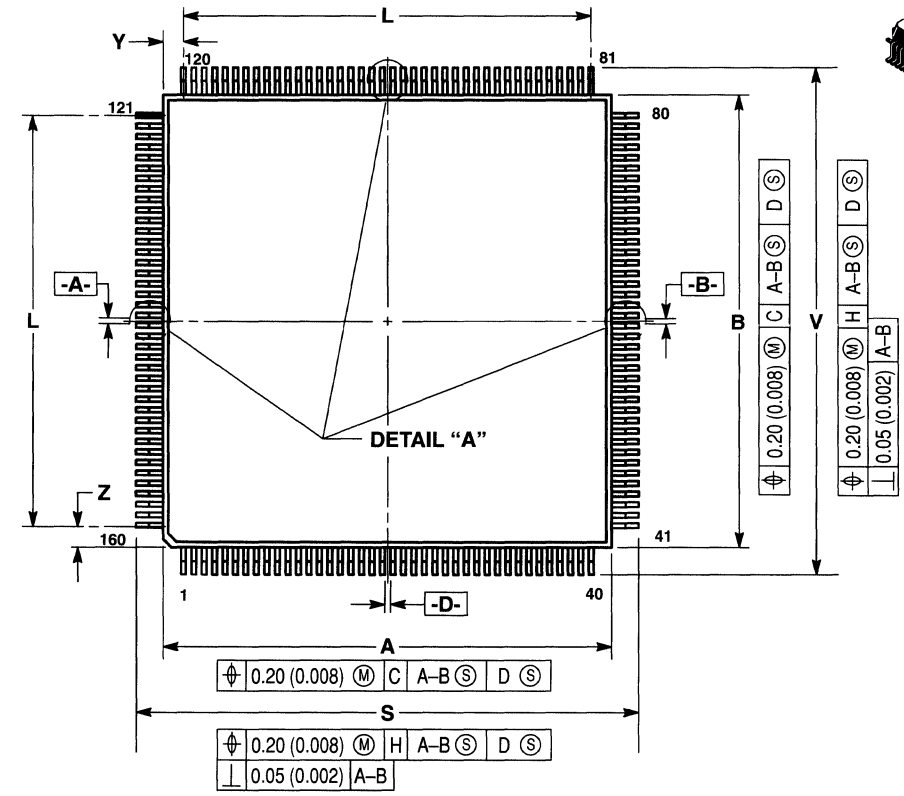
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.90	28.10	1.098	1.106
B	27.90	28.10	1.098	1.106
C	3.45	3.85	0.136	0.152
D	0.22	0.38	0.009	0.015
E	3.17	3.67	0.125	0.144
F	0.22	0.33	0.009	0.013
G	0.65 BSC		0.026 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.23	0.005	0.009
K	0.75	0.92	0.030	0.036
L	22.75 REF		0.896 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.325 BSC		0.0130 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	31.10	31.37	1.224	1.235
T	0.13	—	0.005	—
U	0°	—	0°	—
V	31.10	31.37	1.224	1.235
W	0.40	—	0.016	—
X	1.60 REF		0.063 REF	
Y	2.63 REF		0.104 REF	
Z	2.63 REF		0.104 REF	

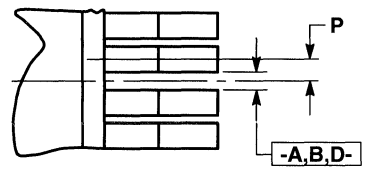
CASE 863B-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

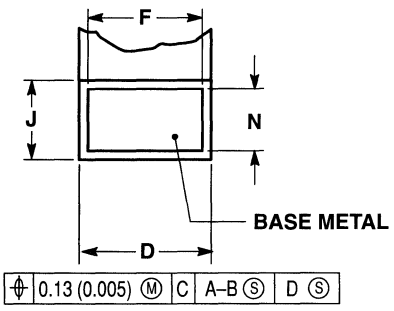
QFP-160 28X28



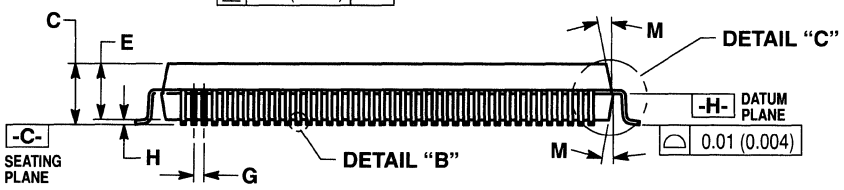


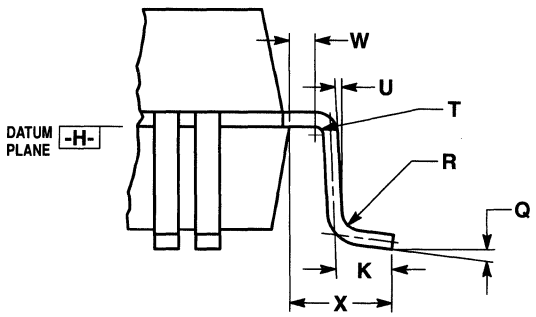


DETAIL "A"



DETAIL "B"





DETAIL "C"

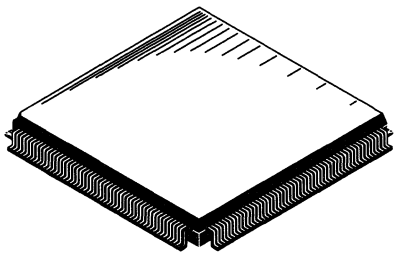
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

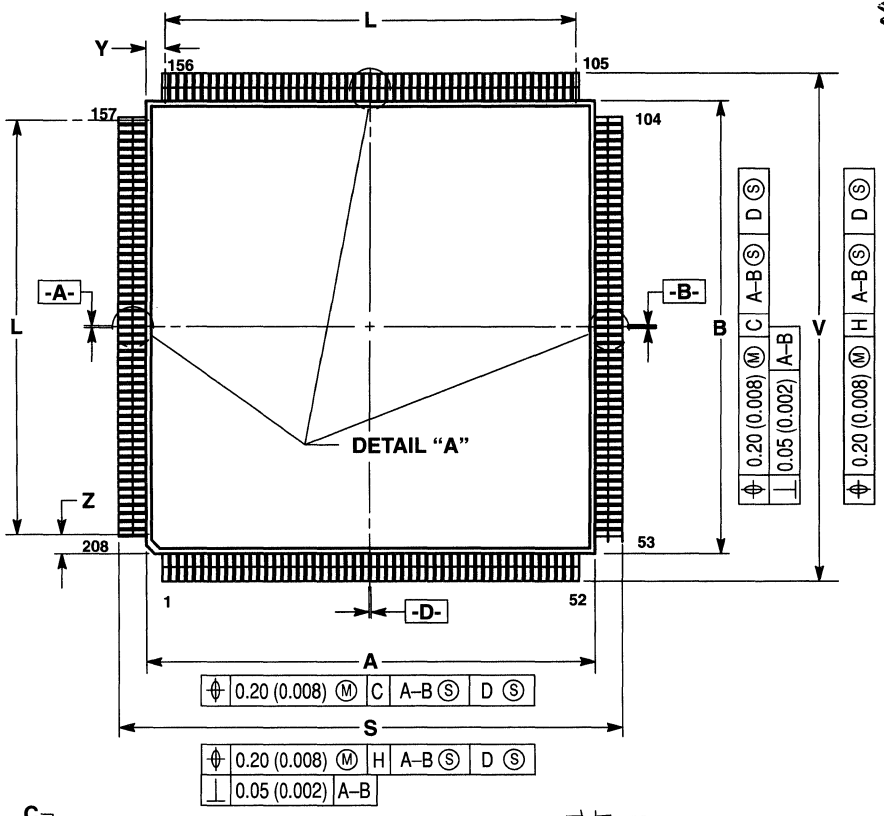
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.90	28.10	1.098	1.106
B	27.90	28.10	1.098	1.106
C	3.45	3.85	0.136	0.152
D	0.22	0.38	0.009	0.015
E	3.20	3.50	0.126	0.138
F	0.22	0.33	0.009	0.013
G	0.650 BSC		0.0256 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.18	0.005	0.007
K	0.75	0.92	0.030	0.036
L	25.35 REF		0.998 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.325 BSC		0.0130 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	31.10	31.37	1.224	1.235
T	0.13	—	0.005	—
U	0°	—	0°	—
V	31.10	31.37	1.224	1.235
W	0.40	—	0.016	—
X	1.60 REF		0.063 REF	
Y	1.33 REF		0.052 REF	
Z	1.33 REF		0.052 REF	

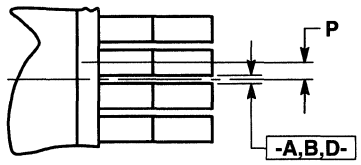
CASE 864A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

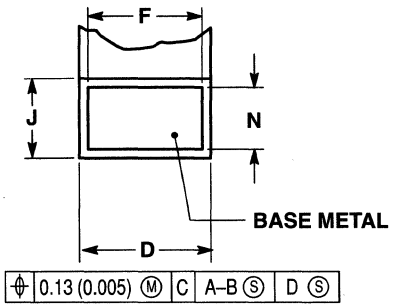
QFP-208 28X28



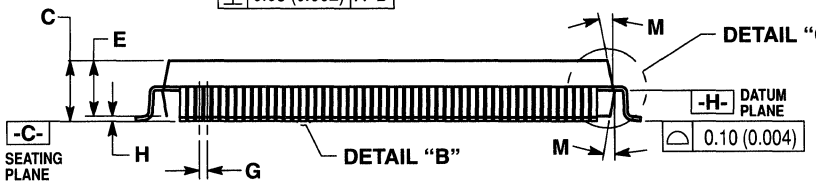


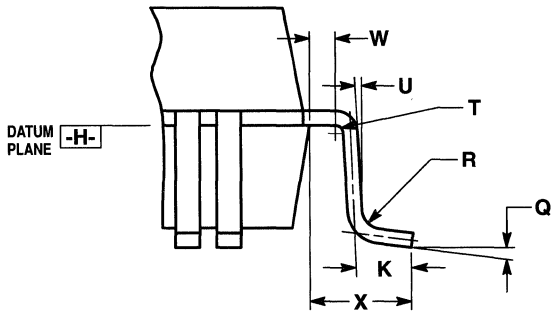


DETAIL "A"



DETAIL "B"





DETAIL "C"

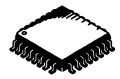
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.
8. 872-01 OBSOLETE, NEW STANDARD 872-02.

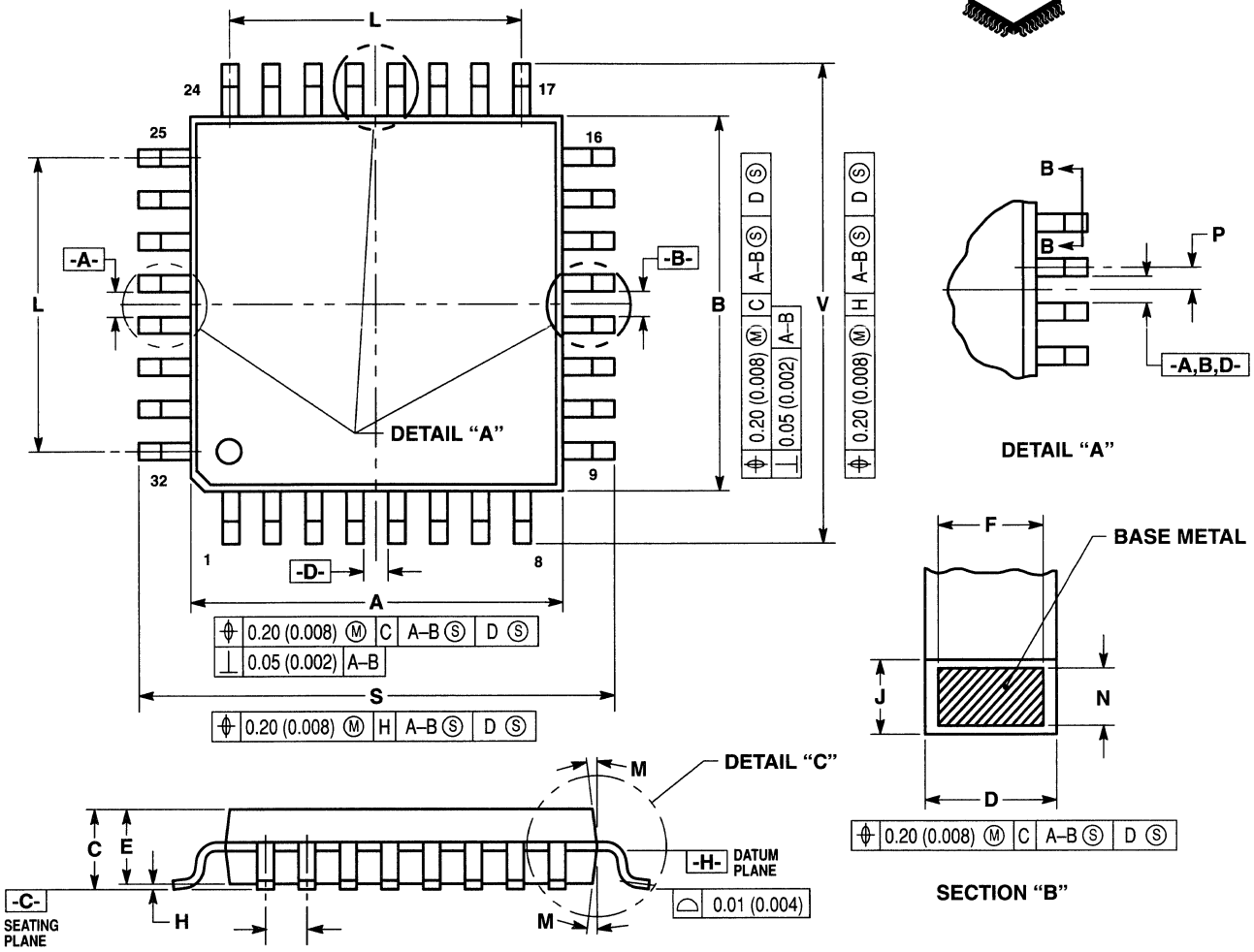
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	27.90	28.10	1.098	1.106
B	27.90	28.10	1.098	1.106
C	3.45	3.85	0.136	0.152
D	0.17	0.28	0.007	0.011
E	3.20	3.56	0.126	0.140
F	0.16	0.28	0.006	0.011
G	0.500 BSC		0.0197 BSC	
H	0.25	0.35	0.010	0.012
J	0.13	0.23	0.005	0.009
K	0.40	0.57	0.016	0.022
L	25.5 REF		1.004 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.250 BSC		0.009 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	30.50	30.77	1.201	1.211
T	0.13	—	0.005	—
U	0°	—	0°	—
V	30.50	30.77	1.201	1.211
W	0.40	—	0.016	—
X	1.30 REF		0.051 REF	
Y	1.25 REF		0.049 REF	
Z	1.25 REF		0.049 REF	

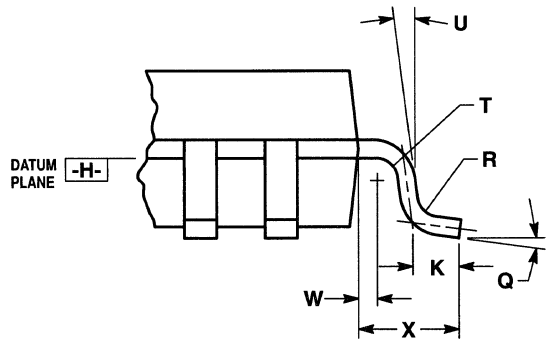
CASE 872-02

SURFACE MOUNT PACKAGE OUTLINES (continued)

QFP-32 7X7







DETAIL "C"

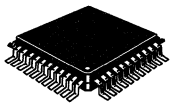
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

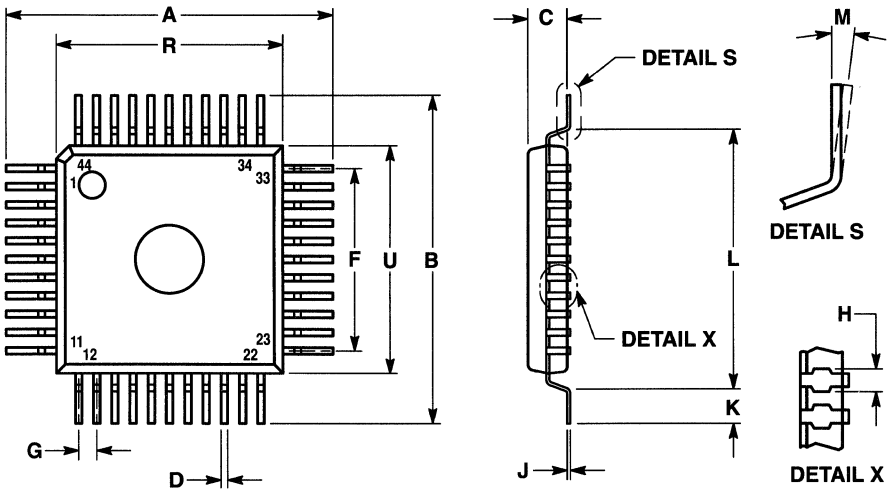
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	6.95	7.10	0.274	0.280
B	6.95	7.10	0.274	0.280
C	1.40	1.60	0.055	0.063
D	0.273	0.373	0.010	0.015
E	1.30	1.50	0.051	0.059
F	0.273	—	0.010	—
G	0.80 BSC		0.031 BSC	
H	—	0.20	—	0.008
J	0.119	0.197	0.005	0.008
K	0.33	0.57	0.013	0.022
L	5.6 REF		0.220 REF	
M	6°	8°	6°	8°
N	0.119	0.135	0.005	0.005
P	0.40 BSC		0.016 BSC	
Q	5°	10°	5°	10°
R	0.15	0.25	0.006	0.010
S	8.85	9.15	0.348	0.360
T	0.15	0.25	0.006	0.010
U	5°	11°	5°	11°
V	8.85	9.15	0.348	0.360
W	0.30	0.40	0.012	0.016
X	1.0 REF		0.039 REF	

CASE 873-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

QFP-44 10X10



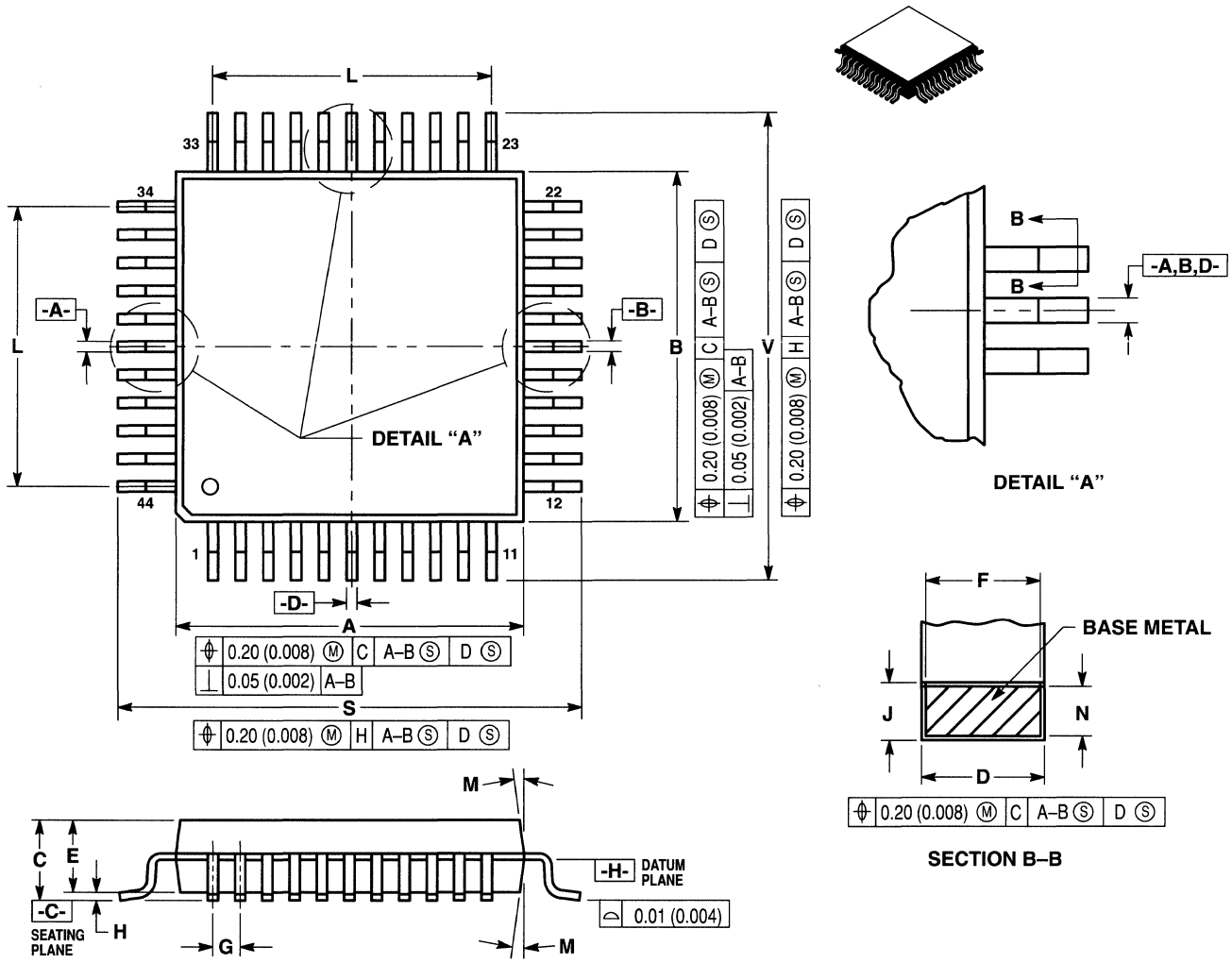


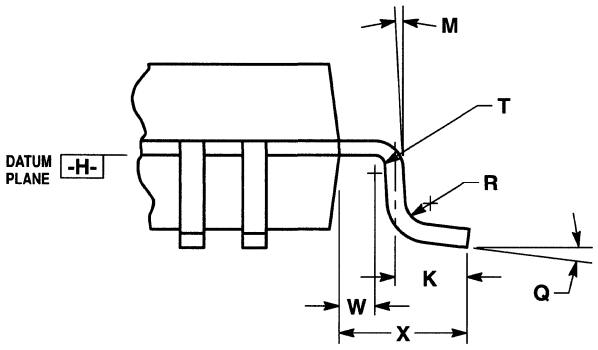
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	13.87	14.8	0.547	0.582
B	13.87	14.8	0.547	0.582
C	1.44	2.25	0.057	0.088
D	0.20	0.435	0.008	0.017
F	7.85	8.15	0.310	0.320
G	0.65	0.95	0.026	0.037
H	—	0.53	—	0.020
J	0.10	0.20	0.004	0.007
K	0.60	1.65	0.024	0.064
L	11.3	12.67	0.445	0.498
M	0°	10°	0°	10°
R	9.9	10.1	0.390	0.397
U	9.9	10.1	0.390	0.397

CASE 824-01

QFP-44 10X10





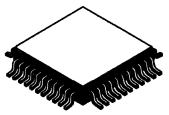
DETAIL "C"

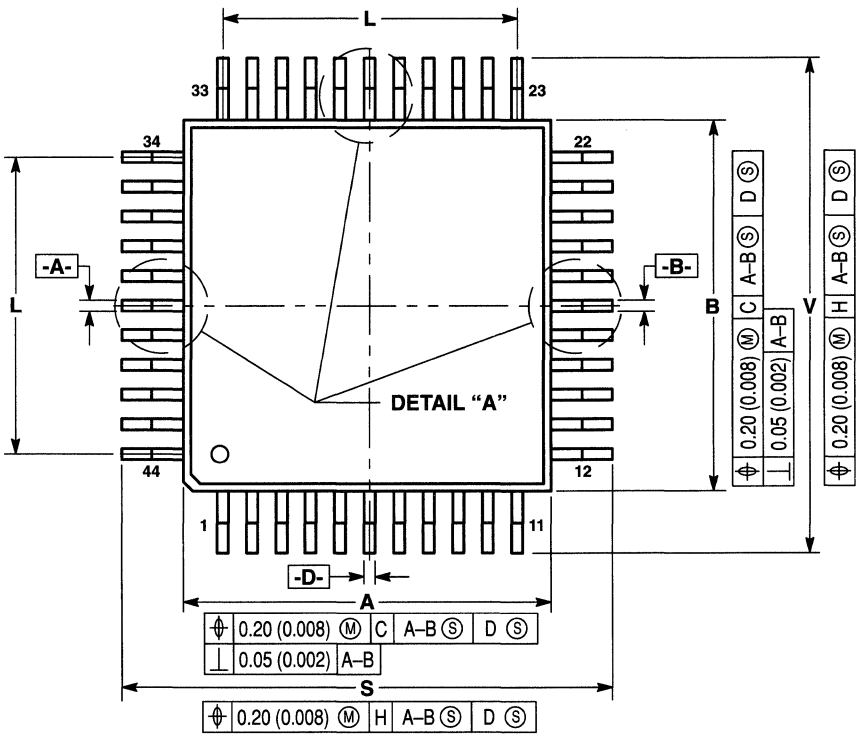
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

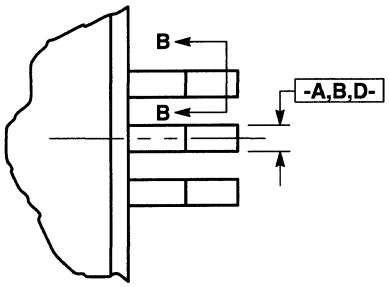
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.90	10.10	0.390	0.398
B	9.90	10.10	0.390	0.398
C	2.10	2.45	0.083	0.096
D	0.30	0.45	0.012	0.018
E	2.00	2.10	0.079	0.083
F	0.30	0.40	0.012	0.016
G	0.80 BSC		0.031 BSC	
H	—	0.25	—	0.010
J	0.13	0.23	0.005	0.009
K	0.65	0.95	0.026	0.037
L	8.00 REF		0.315 REF	
M	5°	10°	5°	10°
N	0.13	0.17	0.005	0.007
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	12.95	13.45	0.510	0.530
T	0.13	—	0.005	—
U	0°	—	0°	—
V	12.95	13.45	0.510	0.530
W	0.40	—	0.016	—
X	1.6 REF		0.063 REF	

CASE 824A-01

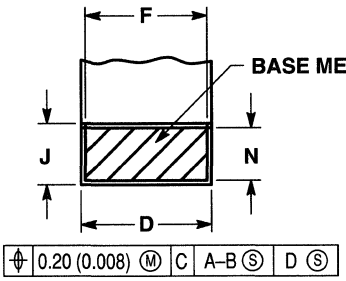
QFP-44 10X10



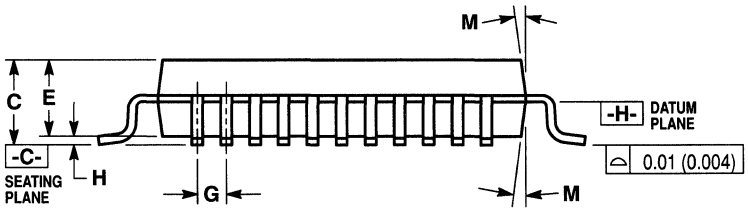


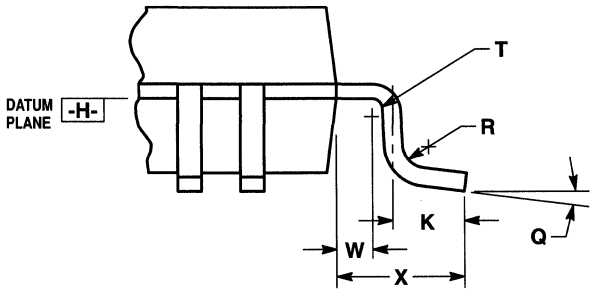


DETAIL "A"



SECTION B–B





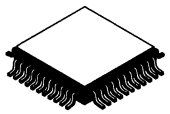
DETAIL "C"

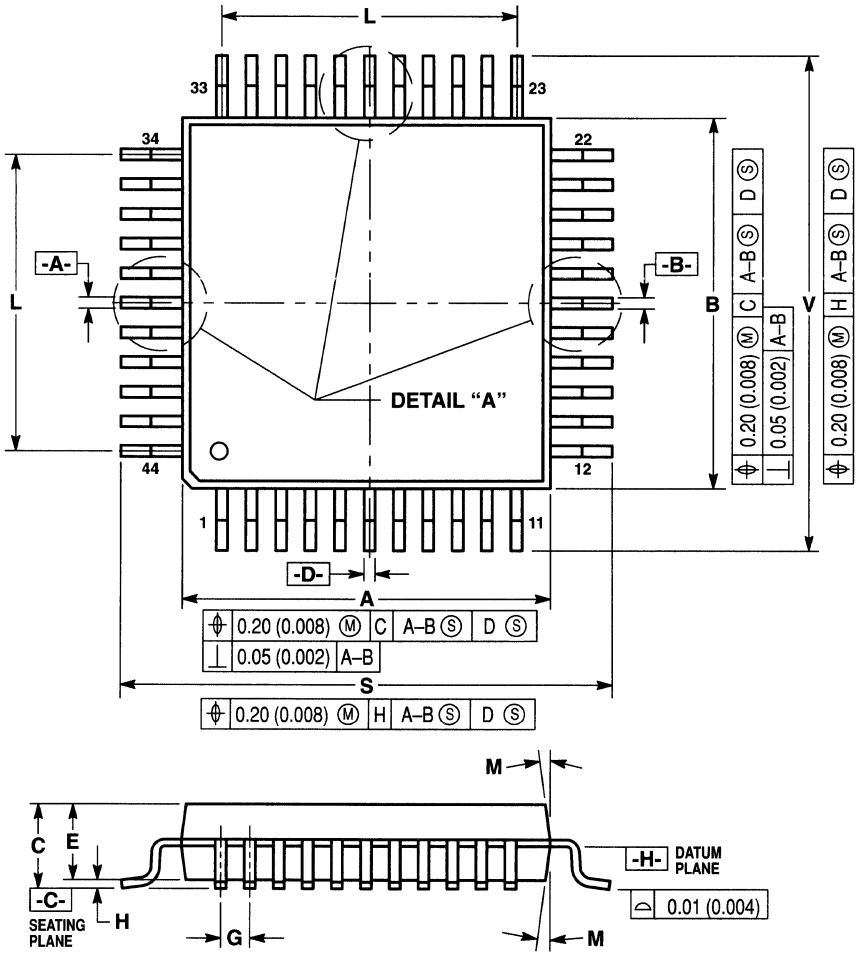
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.
8. 824B-01 OBSOLETE, NEW STANDARD 824B-02.

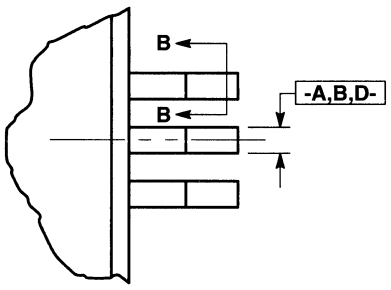
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.70	10.30	0.382	0.406
B	9.70	10.30	0.382	0.406
C	2.05	2.40	0.081	0.094
D	0.30	0.50	0.012	0.020
E	2.05	2.25	0.081	0.089
F	0.30	—	0.012	—
G	0.80 BSC		0.031 BSC	
H	—	0.010	—	0.0039
J	0.13	—	0.005	—
K	1.05	1.35	0.041	0.053
L	8.00 REF		0.315 REF	
M	20°	22°	20°	22°
N	0.12	0.18	0.005	0.007
Q	0°	7°	0°	7°
R	0.463	0.535	0.018	0.021
S	13.70	14.30	0.539	0.563
T	0.283	0.383	0.011	0.015
V	13.70	14.30	0.539	0.563
W	0.40	—	0.016	—
X	2.0 REF		0.079 REF	

CASE 824B-02

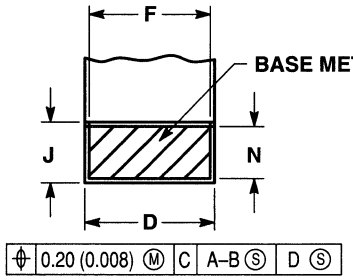
QFP-44 10X10



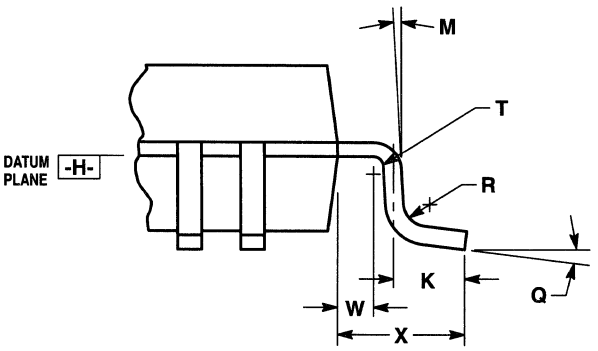




DETAIL "A"



SECTION B–B



DETAIL "C"

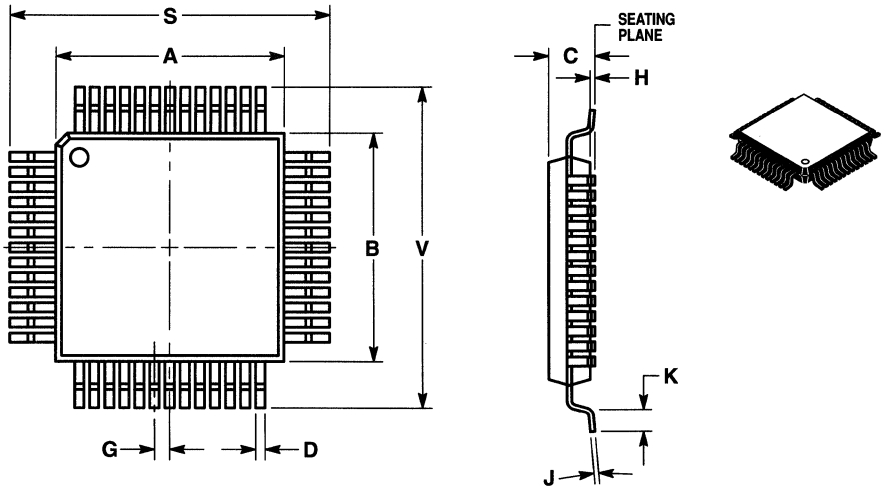
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.90	10.10	0.390	0.398
B	9.90	10.10	0.390	0.398
C	2.12	2.39	0.083	0.094
D	0.30	0.45	0.012	0.018
E	1.97	2.09	0.078	0.082
F	0.30	—	0.012	—
G	0.80 BSC		0.031 BSC	
H	0.15	0.30	0.006	0.012
J	0.15	0.20	0.006	0.008
K	0.65	0.95	0.026	0.037
L	8.00 REF		0.315 REF	
M	8°	12°	8°	12°
N	0.15	—	0.006	—
Q	0°	7°	0°	7°
R	0.20	0.50	0.008	0.020
S	13.90	14.30	0.547	0.563
T	0.10	0.20	0.004	0.008
U	—	10°	—	10°
V	13.90	14.30	0.547	0.563
W	0.60	—	0.024	—
X	2.0 REF		0.077 REF	

CASE 824C-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

QFP-52 10X10



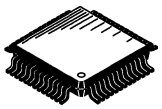
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

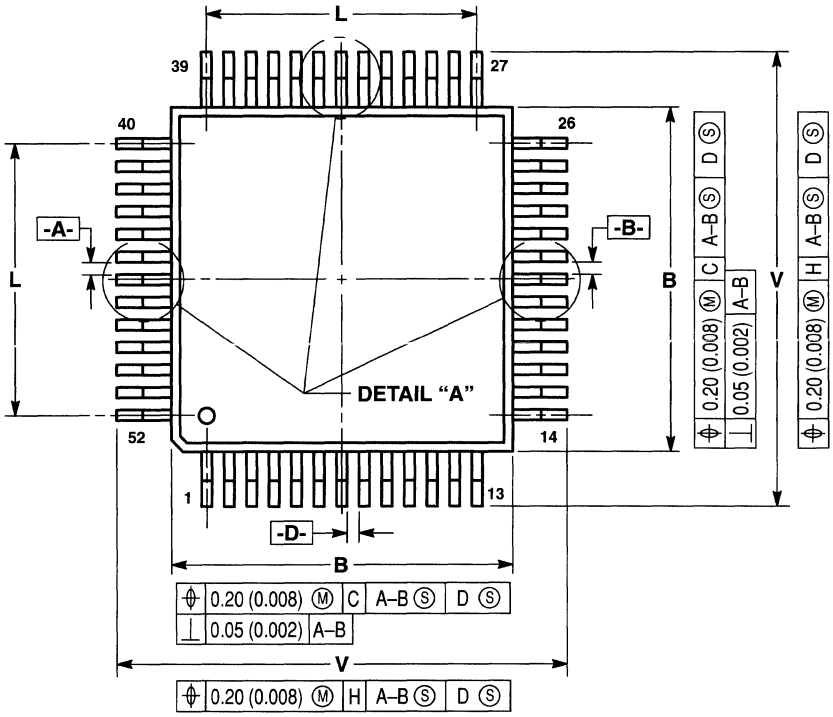
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.81	10.21	0.386	0.402
B	9.81	10.21	0.386	0.402
C	1.78	2.28	0.070	0.090
D	0.26	0.55	0.010	0.022
G	0.54	0.78	0.021	0.031
H	0.06	0.35	0.002	0.014
J	0.11	0.20	0.004	0.008
K	0.61	0.99	0.024	0.039
S	13.92	14.22	0.548	0.560
V	13.92	14.22	0.548	0.560

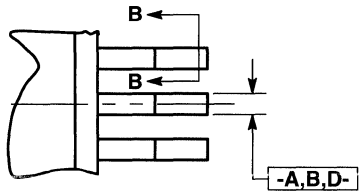
CASE 837-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

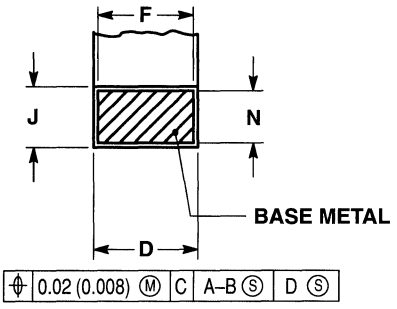
QFP-52 10X10



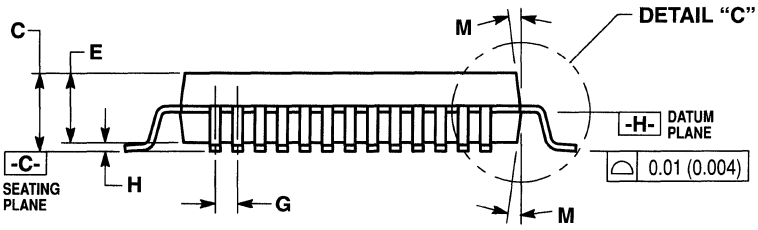


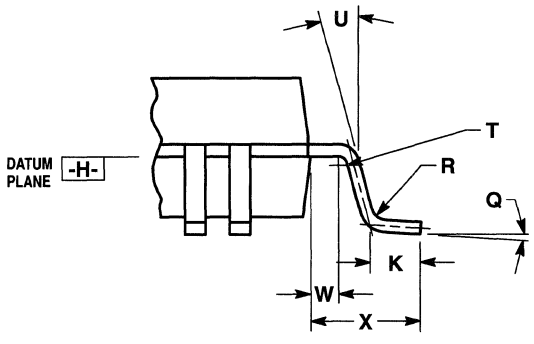


DETAIL "A"



SECTION B–B





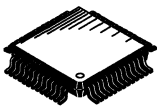
DETAIL "C"

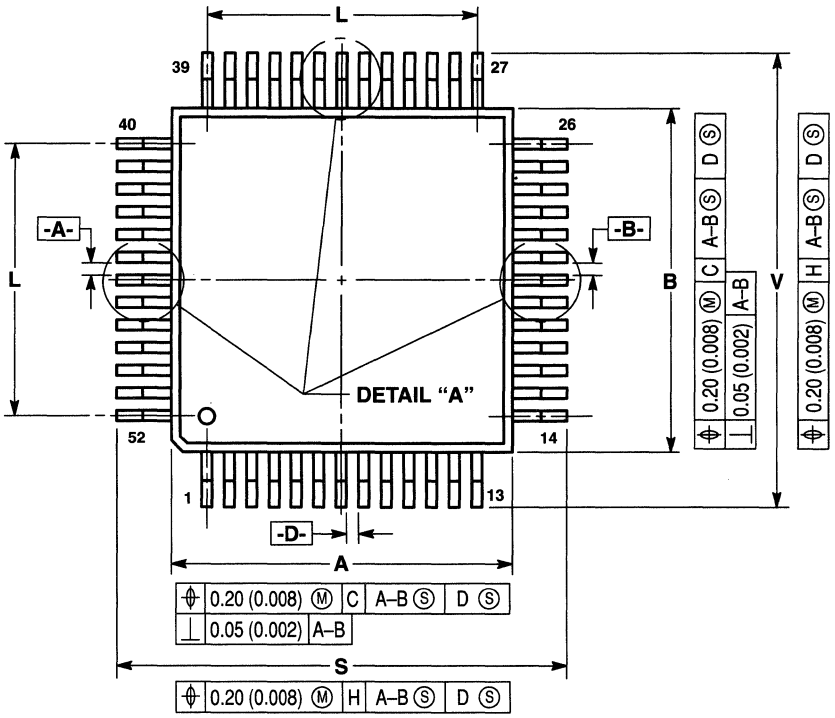
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

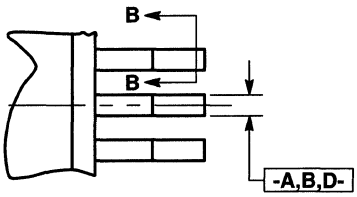
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.90	10.10	0.390	0.398
B	9.90	10.10	0.390	0.398
C	2.10	2.45	0.083	0.096
D	0.22	0. 38	0.009	0.015
E	2.00	2.10	0.079	0.083
F	0.22	0.33	0.009	0.013
G	0.65 BSC		0.026 BSC	
H	—	0.25	—	0.010
J	0.13	0.23	0.005	0.009
K	0.65	0.95	0.026	0.037
L	7.80 REF		0.307 REF	
M	5°	10°	5°	10°
N	0.13	0.17	0.005	0.007
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	12.95	13.45	0.510	0.530
T	0.13	—	0.005	—
U	0°	—	0°	—
V	12.95	13.45	0.510	0.530
W	0.35	0.45	0.014	0.018
X	1.6 REF		0.063 REF	

CASE 848B-01

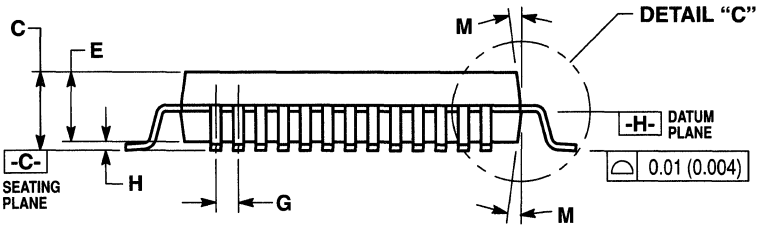
QFP-52 10X10

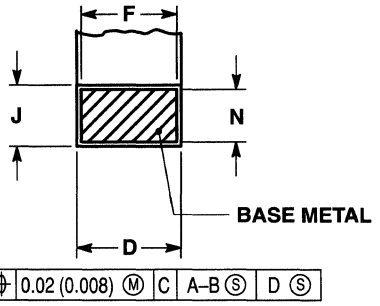




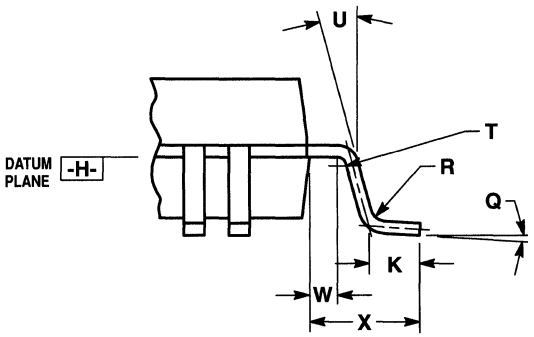


DETAIL "A"





SECTION B–B



DETAIL "C"

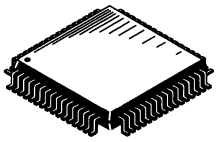
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

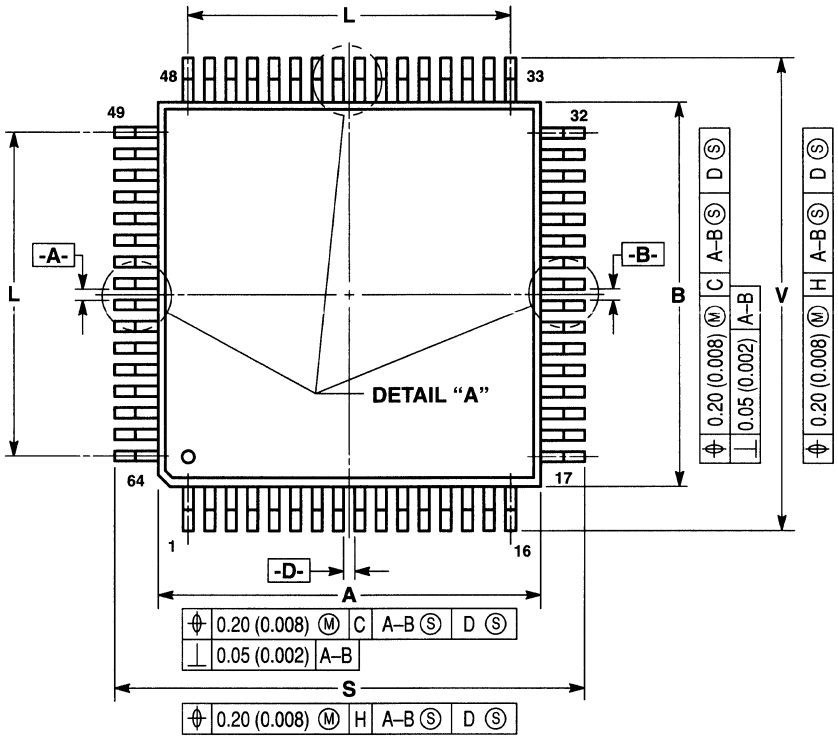
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.90	10.10	0.390	0.398
B	9.90	10.10	0.390	0.398
C	2.12	2.39	0.083	0.094
D	0.22	0.38	0.009	0.015
E	1.97	2.09	0.078	0.082
F	0.22	—	0.009	—
G	0.65 BSC		0.026 BSC	
H	0.15	0.30	0.006	0.012
J	0.15	0.20	0.006	0.008
K	0.65	0.95	0.026	0.037
L	7.80 REF		0.307 REF	
M	8°	12°	8°	12°
N	0.15	—	0.006	—
Q	0°	7°	0°	7°
R	0.20	0.50	0.008	0.020
S	13.90	14.30	0.547	0.563
T	0.15	—	0.006	—
U	0°	10°	0°	10°
V	13.90	14.30	0.547	0.563
W	0.60	—	0.024	—
X	1.95 REF		0.077 REF	

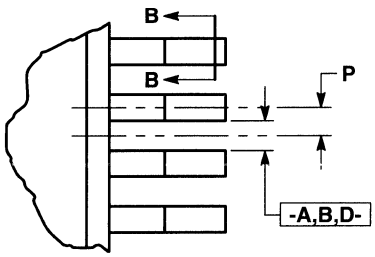
CASE 848C-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

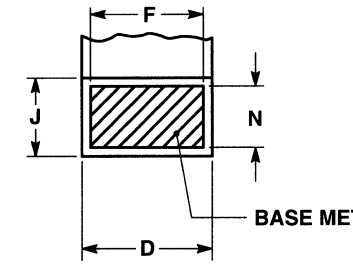
QFP-64 14X14



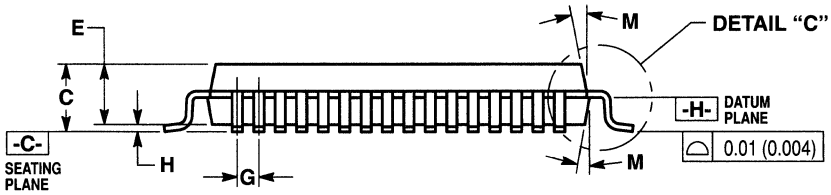


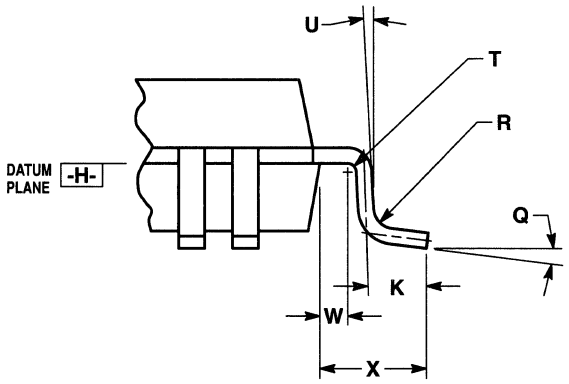


DETAIL "A"



SECTION B–B





DETAIL "C"

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
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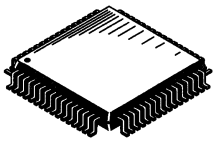
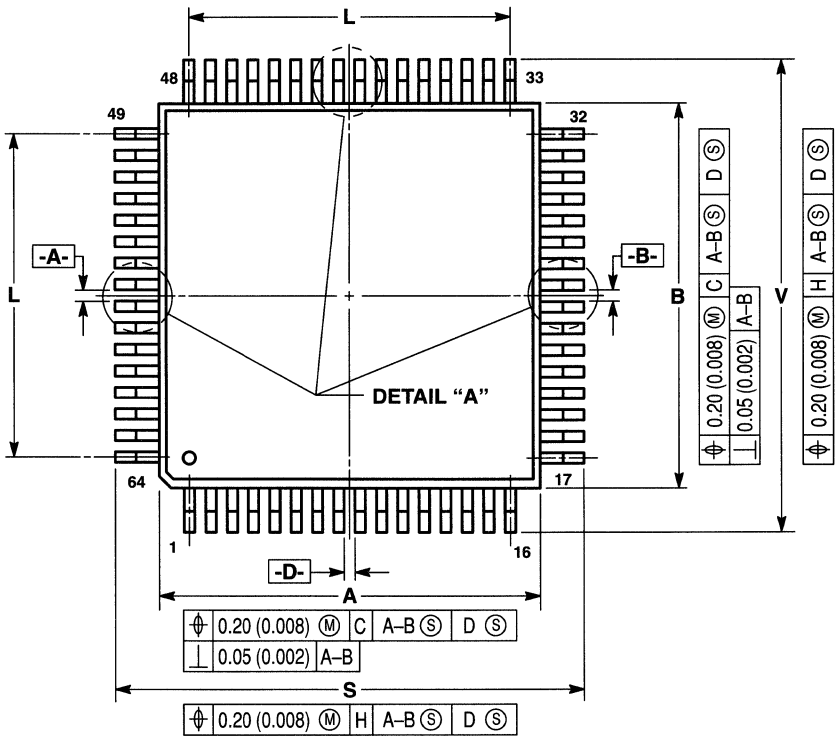
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	13.90	14.10	0.547	0.555
B	13.90	14.10	0.547	0.555
C	2.15	2.45	0.085	0.096
D	0.30	0.45	0.012	0.018
E	2.00	2.40	0.079	0.094
F	0.30	0.40	0.012	0.016
G	0.80 BSC		0.031 BSC	
H	—	0.25	—	0.010
J	0.13	0.23	0.005	0.009
K	0.65	0.95	0.026	0.037
L	12.00 REF		0.472 REF	
M	5°	10°	5°	10°
N	0.13	0.17	0.005	0.007
P	0.40 BSC		0.016 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	16.95	17.45	0.667	0.687
T	0.13	—	0.005	—
U	0°	—	0°	—
V	16.95	17.45	0.667	0.687
W	0.35	0.45	0.014	0.018
X	1.6 REF		0.063 REF	

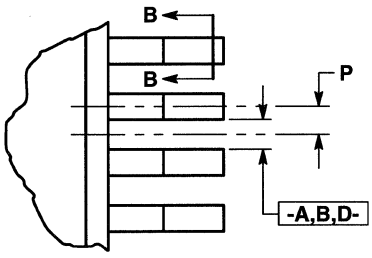
CASE 840B-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

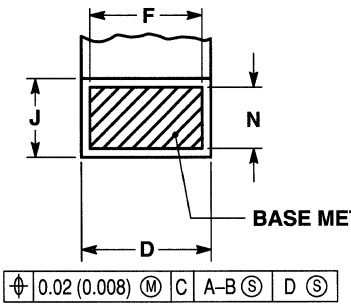
QFP-64 14X14



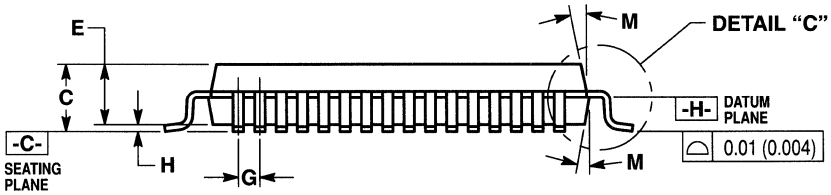


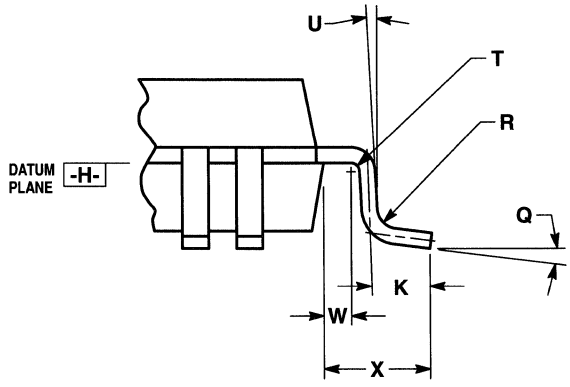


DETAIL "A"



SECTION B–B





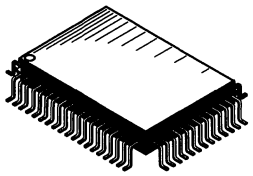
DETAIL "C"

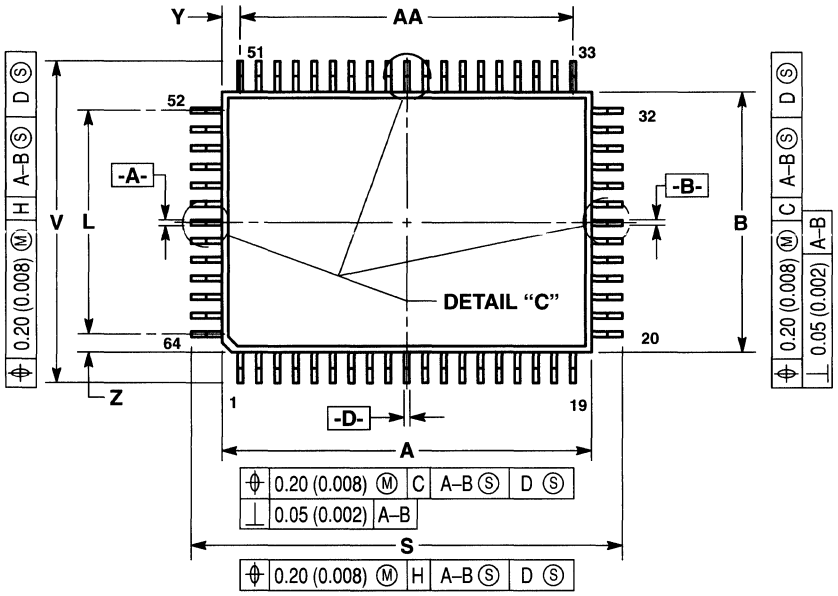
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

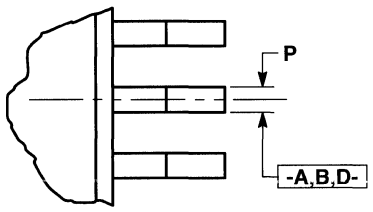
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	13.95	14.10	0.549	0.555
B	13.95	14.10	0.549	0.555
C	2.217	2.457	0.087	0.097
D	0.30	0.40	0.012	0.016
E	2.15	2.25	0.085	0.089
F	0.30	—	0.012	—
G	0.80 BSC		0.031 BSC	
H	0.067	0.207	0.003	0.008
J	0.168	0.173	0.007	0.007
K	0.50	0.66	0.020	0.026
L	12.00 REF		0.472 REF	
M	6°	8°	6°	8°
N	0.143	0.157	0.006	0.006
P	0.40 BSC		0.016 BSC	
Q	2°	8°	2°	8°
R	0.13	0.30	0.005	0.012
S	16.20	16.60	0.638	0.654
T	0.15	0.25	0.006	0.010
U	9°	15°	9°	15°
V	16.20	16.60	0.638	0.654
W	0.37	0.47	0.015	0.019
X	1.2 REF		0.047 REF	

CASE 840C-01

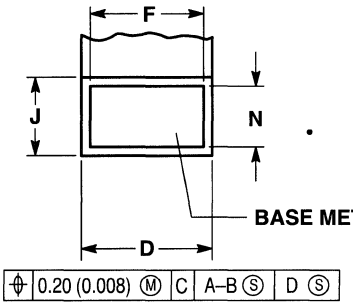
QFP-64 14X20



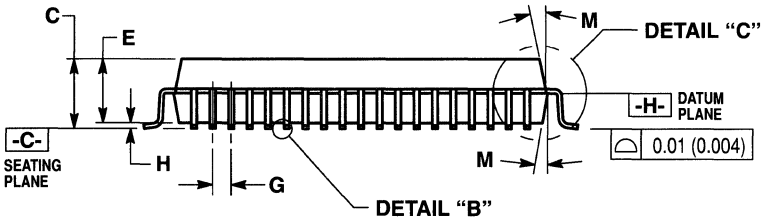


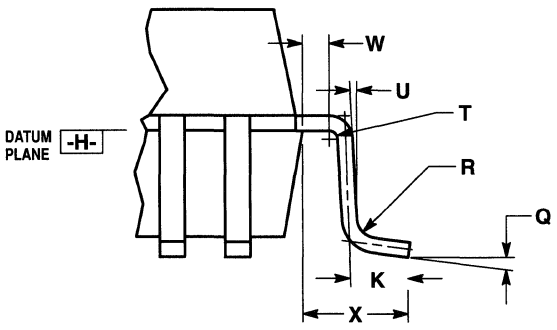


DETAIL "A"



DETAIL "B"





DETAIL "C"

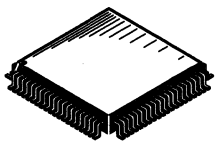
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.
8. 840A-01 OBSOLETE, NEW STANDARD 840A-02.

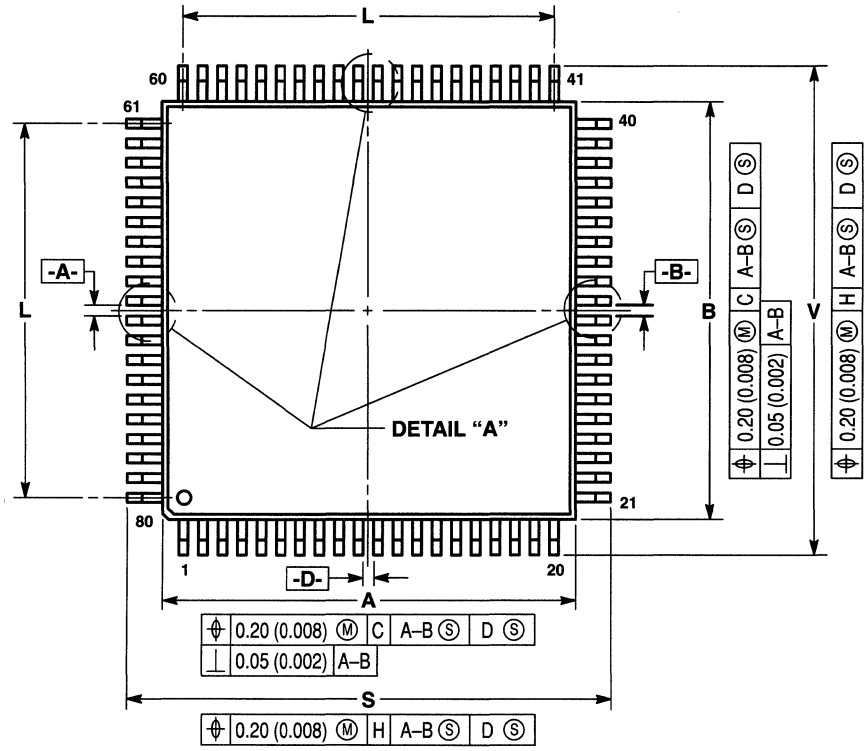
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	19.90	20.10	0.783	0.791
B	13.90	14.10	0.547	0.555
C	2.85	3.15	0.112	0.124
D	0.35	0.50	0.014	0.020
E	2.55	3.05	0.100	0.120
F	0.35	0.45	0.014	0.018
G	1.00 BSC		0.039 BSC	
H	0.15	0.20	0.006	0.008
J	0.13	0.23	0.005	0.009
K	0.65	0.95	0.026	0.037
L	12.00 REF		0.472 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.50 BSC		0.020 BSC	
Q	0°	10°	0°	10°
R	0.13	0.30	0.005	0.012
S	23.10	23.37	0.909	0.920
T	0.13	—	0.005	—
U	0°	—	0°	—
V	17.10	17.37	0.673	0.684
W	0.40	—	0.016	—
X	1.60 REF		0.063 REF	
Y	0.99 REF		0.039 REF	
Z	1.02 REF		0.040 REF	
AA	18.00 REF		0.709 REF	

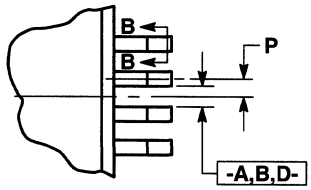
CASE 840A-02

SURFACE MOUNT PACKAGE OUTLINES (continued)

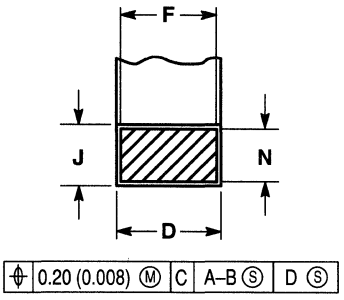
QFP-80 14X14



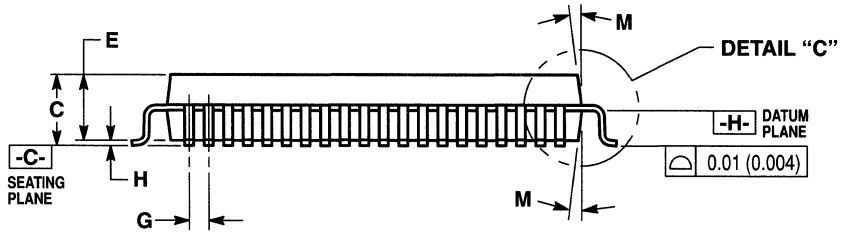


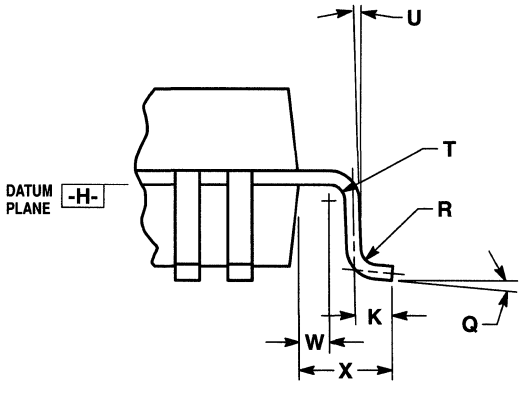


DETAIL "A"



SECTION B–B





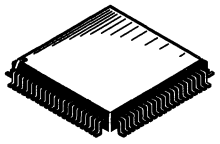
DETAIL "C"

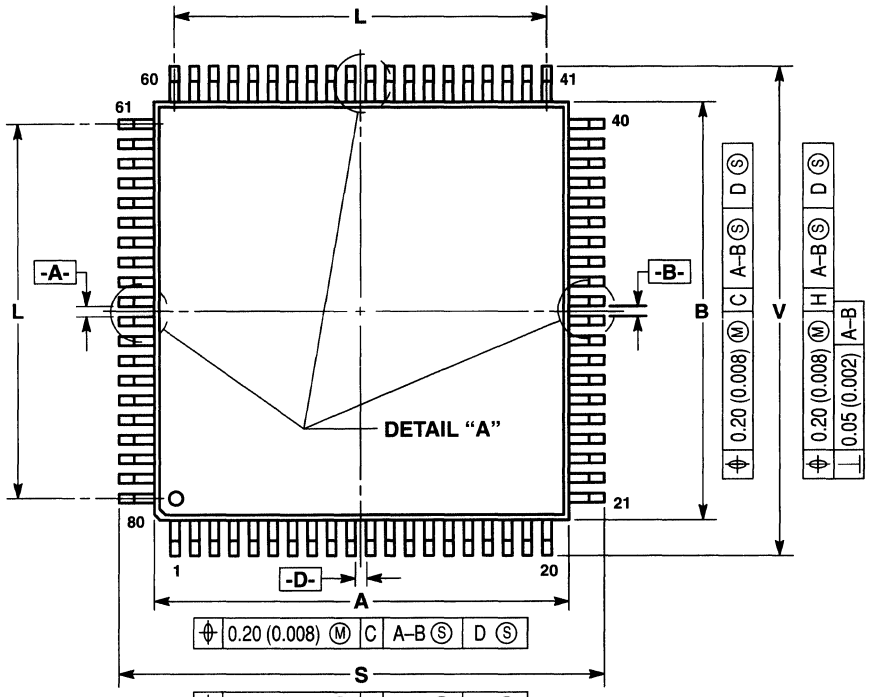
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

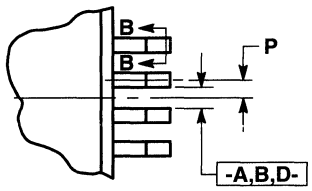
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	13.90	14.10	0.547	0.555
B	13.90	14.10	0.547	0.555
C	2.15	2.45	0.084	0.096
D	0.22	0.38	0.009	0.015
E	2.00	2.40	0.079	0.094
F	0.22	0.33	0.009	0.013
G	0.65 BSC		0.026 BSC	
H	—	0.25	—	0.010
J	0.13	0.23	0.005	0.009
K	0.65	0.95	0.026	0.037
L	12.35 REF		0.486 REF	
M	5°	10°	5°	10°
N	0.13	0.17	0.005	0.007
P	0.325 BSC		0.013 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	16.95	17.45	0.667	0.687
T	0.13	—	0.005	—
U	0°	—	0°	—
V	16.95	17.45	0.667	0.687
W	0.35	0.45	0.014	0.018
X	1.6 REF		0.06 REF	

CASE 841B-01

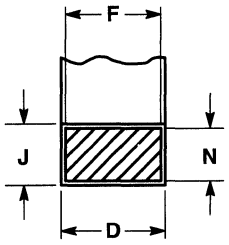
QFP-80 14X14





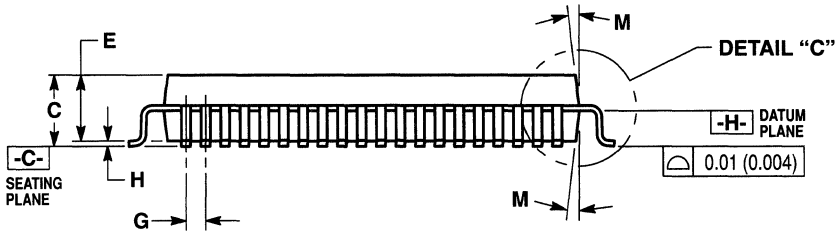


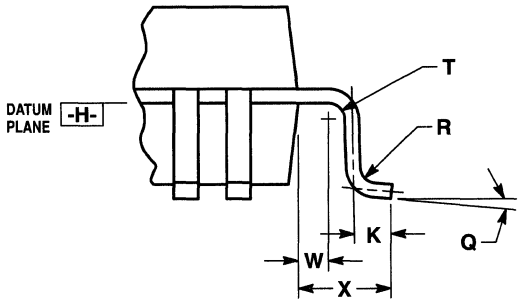
DETAIL "A"



0.20 (0.008) M C A–B S D S

SECTION B–B





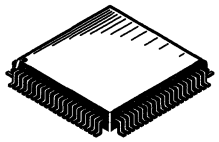
DETAIL "C"

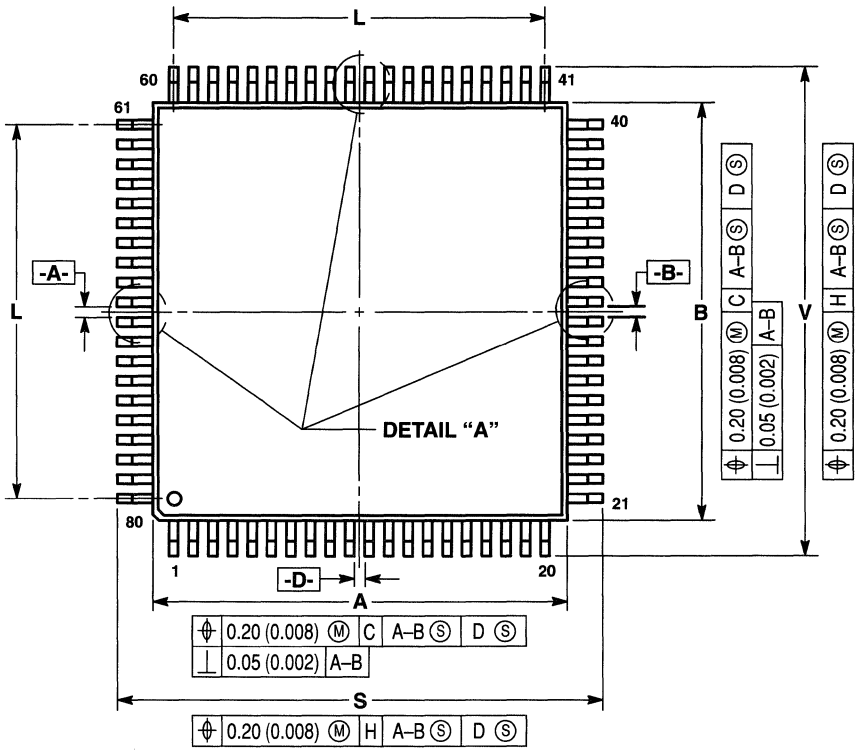
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.
8. 841C-01 OBSOLETE, NEW STANDARD 841C-02.

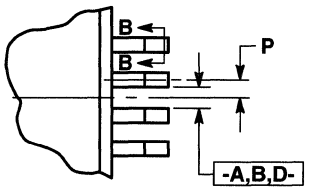
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	13.90	14.10	0.547	0.555
B	13.90	14.10	0.547	0.555
C	2.60	2.90	0.102	0.114
D	0.25	0.45	0.010	0.018
E	2.60	2.80	0.102	0.110
F	0.25	—	0.010	—
G	0.65 BSC		0.026 BSC	
H	—	0.10	—	0.003
J	0.13	—	0.005	—
K	0.70	0.90	0.028	0.035
L	12.35 REF		0.486 REF	
M	20°	22°	20°	22°
N	0.12	0.18	0.005	0.007
P	0.325 BSC		0.013 BSC	
Q	0°	—	0°	—
S	16.90	17.50	0.665	0.689
T	0.13	—	0.005	—
V	16.90	17.50	0.665	0.689
W	0.35	—	0.014	—
X	1.6 REF		0.063 REF	

CASE 841C-02

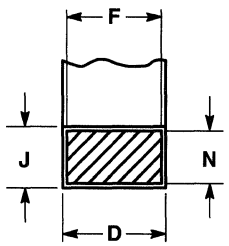
QFP-80 14X14





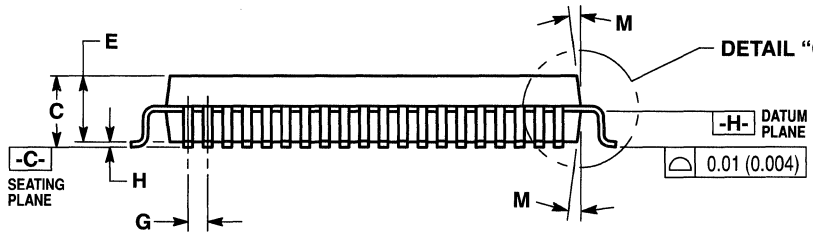


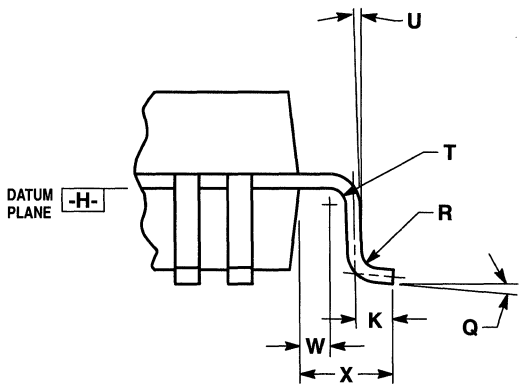
DETAIL "A"



0.20 (0.008) M C A–B S D S

SECTION B–B





DETAIL "C"

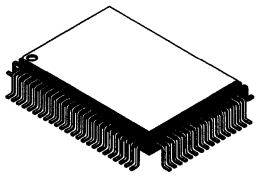
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

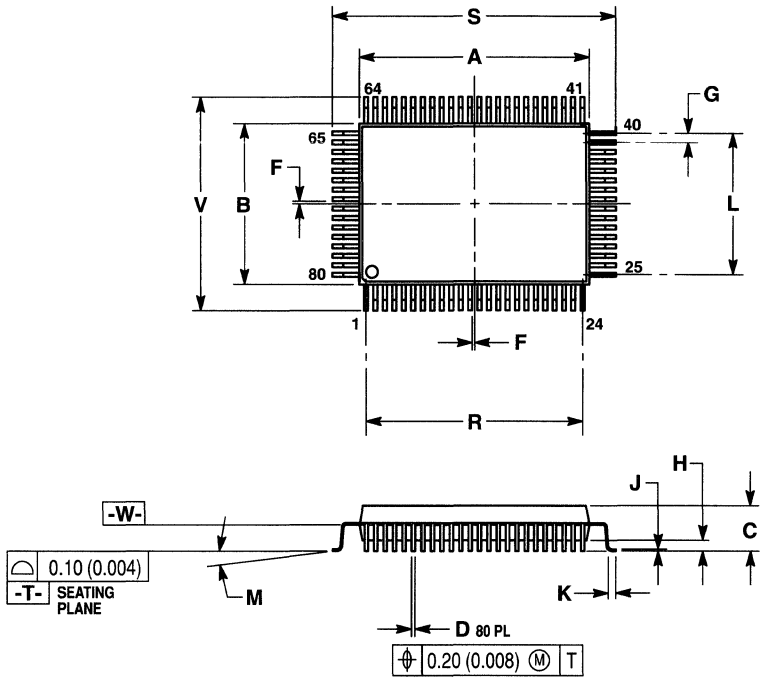
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	13.95	14.05	0.549	0.553
B	13.95	14.05	0.549	0.553
C	2.20	2.55	0.087	0.100
D	0.25	0.35	0.010	0.014
E	2.15	2.25	0.085	0.088
F	0.25	—	0.010	—
G	0.65 BSC		0.026 BSC	
H	0.05	0.20	0.002	0.008
J	0.168	0.173	0.007	0.007
K	0.50	0.66	0.020	0.026
L	12.35 REF		0.486 REF	
M	6°	8°	6°	8°
N	0.143	0.157	0.006	0.006
P	0.325 BSC		0.013 BSC	
Q	2°	8°	2°	8°
R	0.15	0.25	0.006	0.010
S	16.20	16.60	0.638	0.654
T	0.15	0.25	0.006	0.010
U	9°	15°	9°	15°
V	16.20	16.60	0.638	0.654
W	0.37	0.47	0.015	0.019
X	1.2 REF		0.047 REF	

CASE 841D-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

QFP-80 14X14





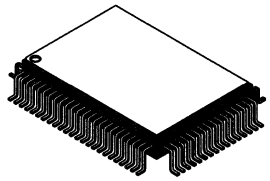
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982
2. CONTROLLING DIMENSION: INCH.
3. DIM A AND B DEFINE MAXIMUM CERAMIC BODY DIMENSIONS INCLUDING GLASS PROTRUSION AND MISMATCH OF CERAMIC BODY TOP AND BOTTOM.
4. DIM S AND V TO BE DETERMINED AT SEATING PLANE, DATUM -T-.
5. DIM A AND B TO BE DETERMINED AT DATUM PLANE -W-.

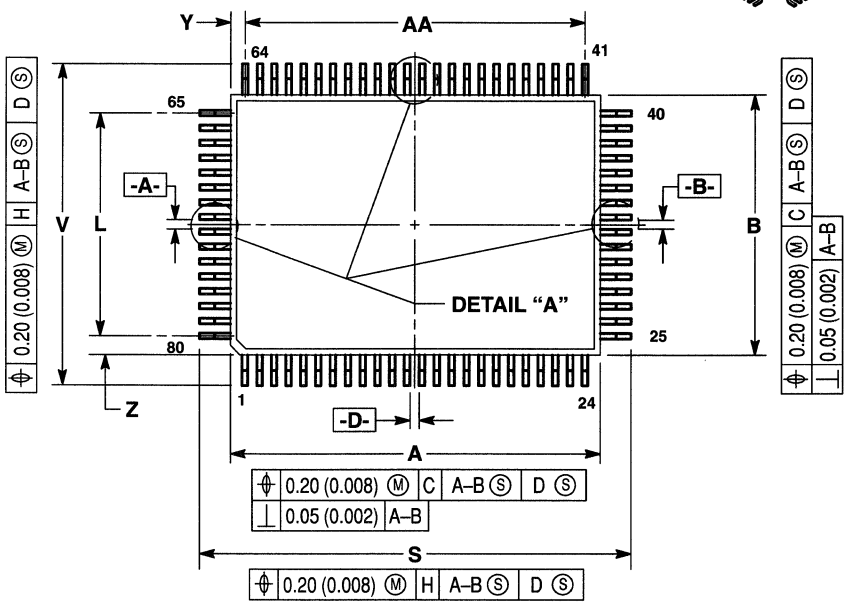
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	19.82	19.91	0.780	0.784
B	13.82	13.91	0.544	0.548
C	2.82	3.07	0.111	0.121
D	0.31	0.40	0.012	0.016
F	0.40 BSC		0.016 BSC	
G	0.80 BSC		0.032 BSC	
H	0.,15	0.30	0.006	0.012
J	0.13	0.20	0.005	0.008
K	0.61	1.01	0.024	0.040
L	12.00 REF		0.472 REF	
M	0°	10°	0°	10°
R	18.40 REF		0.724 REF	
S	24.00	24.40	0.945	0.961
V	18.00	18.40	0.709	0.725

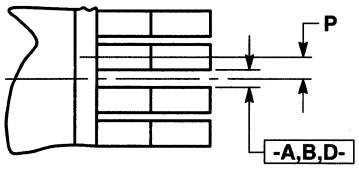
CASE 841-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

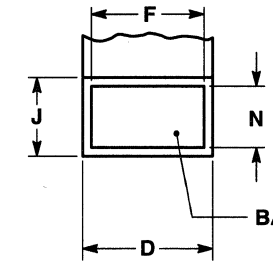
QFP-80 14X20





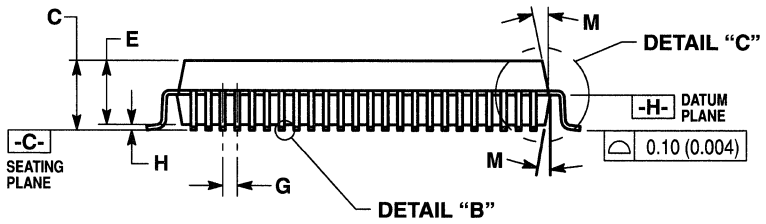


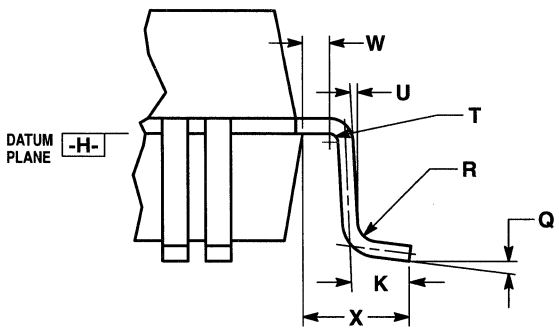
DETAIL "A"



0.12 (0.005) M C A–B S D S

SECTION "B"





DETAIL "C"

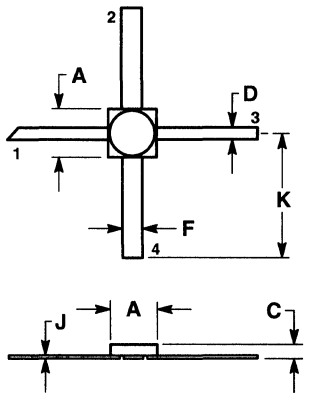
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE -H- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS A–B AND -D- TO BE DETERMINED AT DATUM PLANE -H-.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -C-.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT.

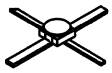
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	19.90	20.10	0.783	0.791
B	13.90	14.10	0.547	0.555
C	2.85	3.15	0.112	0.124
D	0.30	0.45	0.012	0.018
E	2.55	3.05	0.100	0.120
F	0.30	0.40	0.012	0.016
G	0.80 BSC		0.032 BSC	
H	0.25	0.35	0.010	0.014
J	0.13	0.23	0.005	0.009
K	0.75	0.92	0.030	0.036
L	12.00 REF		0.472 REF	
M	5°	16°	5°	16°
N	0.13	0.17	0.005	0.007
P	0.40 BSC		0.016 BSC	
Q	0°	7°	0°	7°
R	0.13	0.30	0.005	0.012
S	23.10	23.37	0.909	0.920
T	0.13	—	0.005	—
U	0°	—	0°	—
V	17.10	17.37	0.673	0.684
W	0.40	—	0.016	
X	1.60 REF		0.063 REF	
Y	0.80 REF		0.031 REF	
Z	1.00 REF		0.039 REF	
AA	18.40 REF		0.724 RFEF	

CASE 841A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

RF



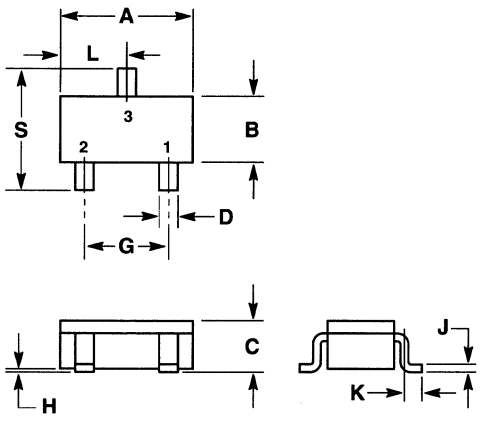


NOTES:
1. DIMENSION "K" APPLIES TO ALL LEADS.
2. DIRECTION OF 45° CUT ON PIN 1 IS VENDOR OPTION.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	2.29	2.67	0.090	0.105
C	0.89	1.40	0.035	0.055
D	0.41	0.61	0.016	0.024
F	0.89	1.09	0.035	0.043
J	0.08	0.15	0.003	0.006
K	4.45	5.84	0.175	0.230

CASE 303-01

SC-59

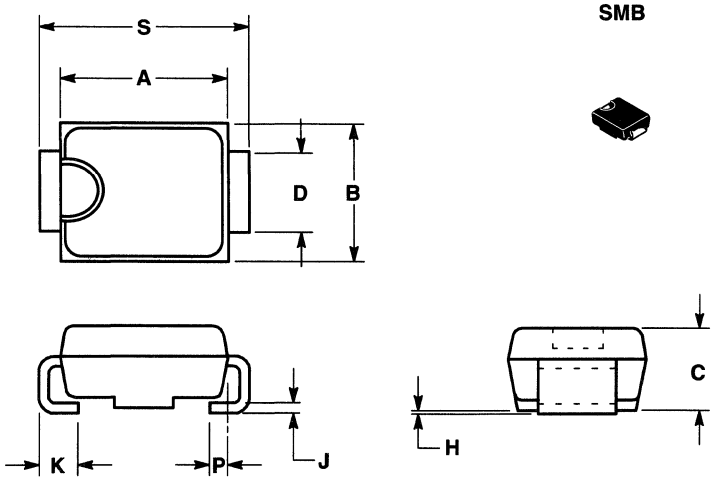


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y15.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. 318D-01 AND -02 OBSOLETE, NEW STANDARD 318D-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	2.70	3.10	0.1063	0.1220
B	1.30	1.70	0.0512	0.0669
C	1.00	1.30	0.0394	0.0511
D	0.35	0.50	0.0138	0.0196
G	1.70	2.10	0.0670	0.0826
H	0.013	0.100	0.0005	0.0040
J	0.10	0.26	0.0040	0.0102
K	0.20	0.60	0.0079	0.0236
L	1.25	1.65	0.0493	0.0649
S	2.50	3.00	0.0985	0.1181

CASE 318D-03

SMB



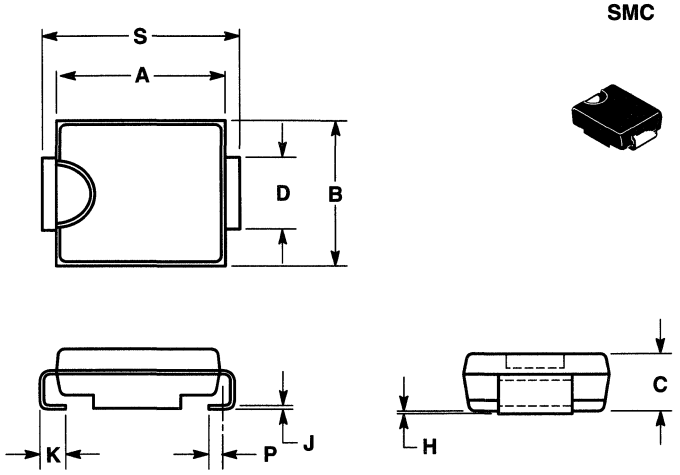
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. D DIMENSION SHALL BE MEASURED WITHIN DIMENSION P.
4. 403A-01 AND -02 OBSOLETE, NEW STANDARD 403A-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.06	4.57	0.160	0.180
B	3.30	3.81	0.130	0.150
C	1.90	2.41	0.075	0.095
D	1.96	2.11	0.077	0.083
H	0.051	0.152	0.0020	0.0060
J	0.15	0.30	0.006	0.012
K	0.76	1.27	0.030	0.050
P	0.51 REF		0.020 REF	
S	5.21	5.59	0.205	0.220

CASE 403A-03

SURFACE MOUNT PACKAGE OUTLINES (continued)

SMC

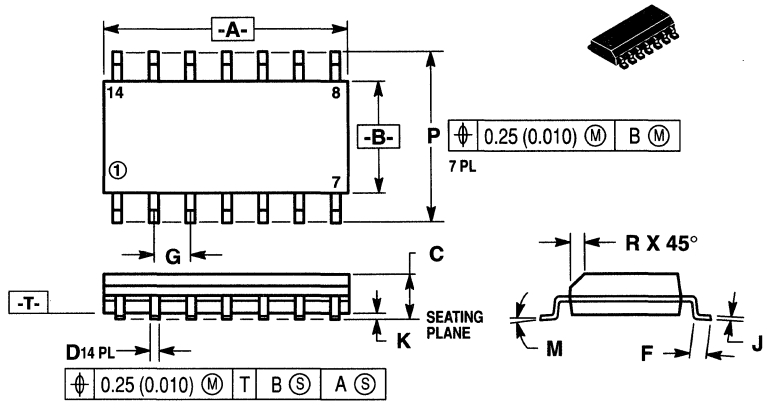


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. D DIMENSION SHALL BE MEASURED WITHIN DIMENSION P.
4. 403-01 AND -02 OBSOLETE, NEW STANDARD 403-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	6.60	7.11	0.260	0.280
B	5.59	6.10	0.220	0.240
C	1.90	2.41	0.075	0.095
D	2.92	3.07	0.115	0.121
H	0.051	0.152	0.0020	0.0060
J	0.15	0.30	0.006	0.012
K	0.76	1.27	0.030	0.050
P	0.51 REF		0.020 REF	
S	7.75	8.13	0.305	0.320

CASE 403-03

SO-14

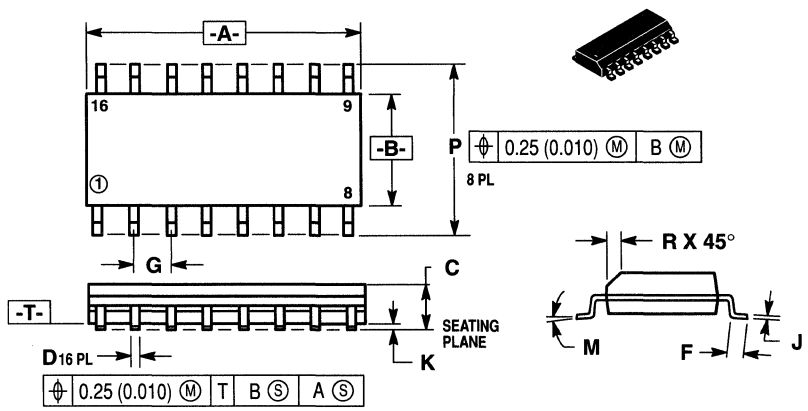


NOTES:
1. DIMENSIONS "A" AND "B" ARE DATUMS AND "T" IS A DATUM SURFACE.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
3. CONTROLLING DIMENSION: MILLIMETER.
4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
5. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
6. 751A-01 IS OBSOLETE, NEW STANDARD 751A-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

CASE 751A-02

SO-16



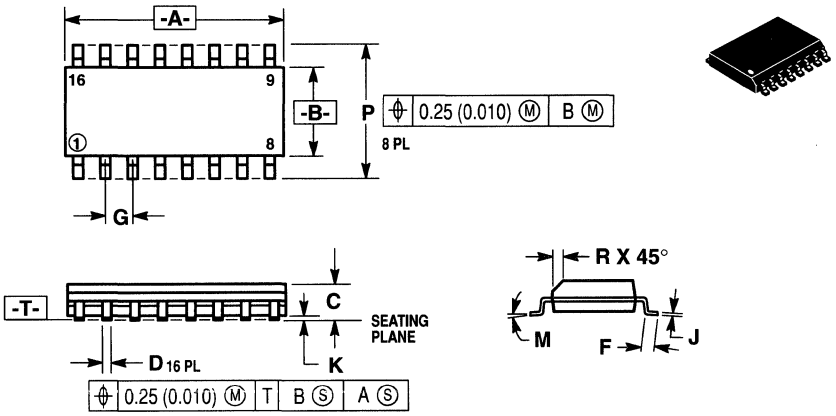
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. 751B-01 IS OBSOLETE, NEW STANDARD 751B-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

CASE 751B-03

SURFACE MOUNT PACKAGE OUTLINES (continued)

SO-16L

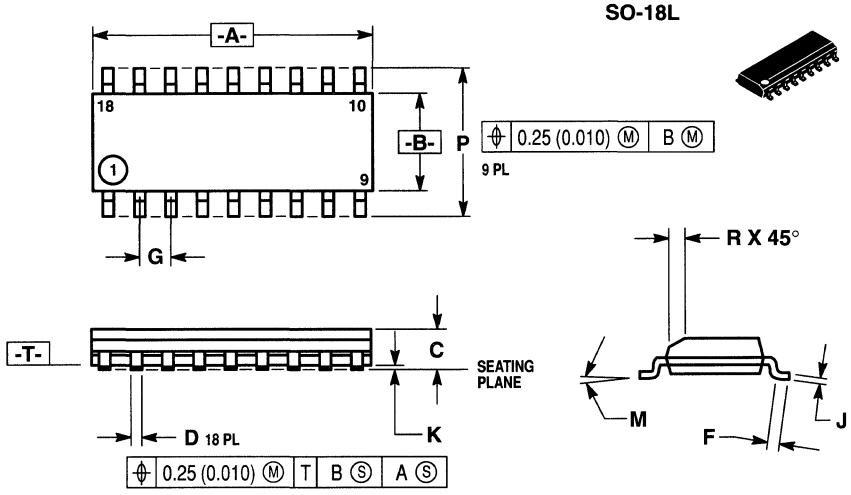


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	10.15	10.45	0.400	0.411
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

CASE 751G-01

SO-18L

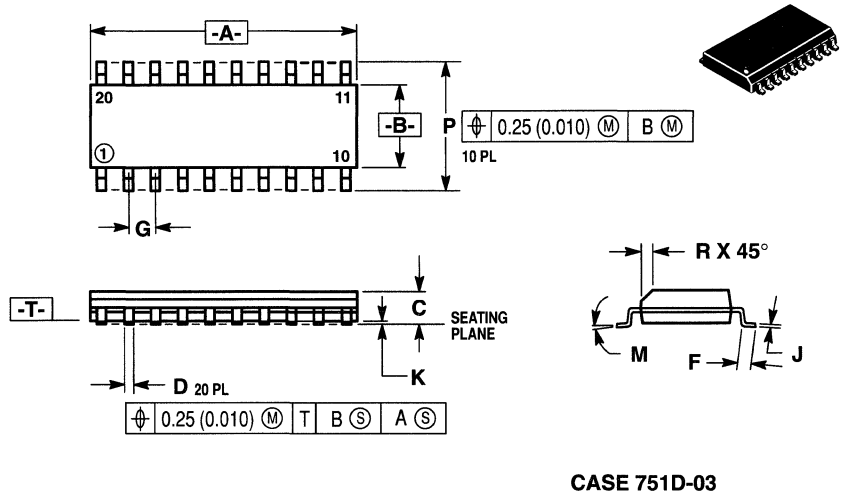


NOTES:
1. DIMENSIONS "A" AND "B" ARE DATUMS AND "T" IS A DATUM SURFACE.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
3. CONTROLLING DIM: MILLIMETER.
4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
5. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
6. 751C-01, AND 02 OBSOLETE, NEW STANDARD 751C-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	11.40	11.70	0.449	0.460
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

CASE 751C-03

SO-20L



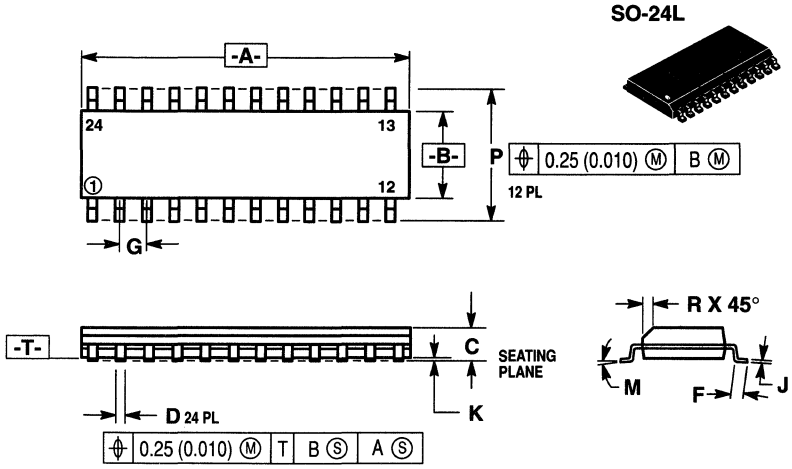
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. 751D-01, AND -02 OBSOLETE, NEW STANDARD 751D-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

CASE 751D-03

SURFACE MOUNT PACKAGE OUTLINES (continued)

SO-24L

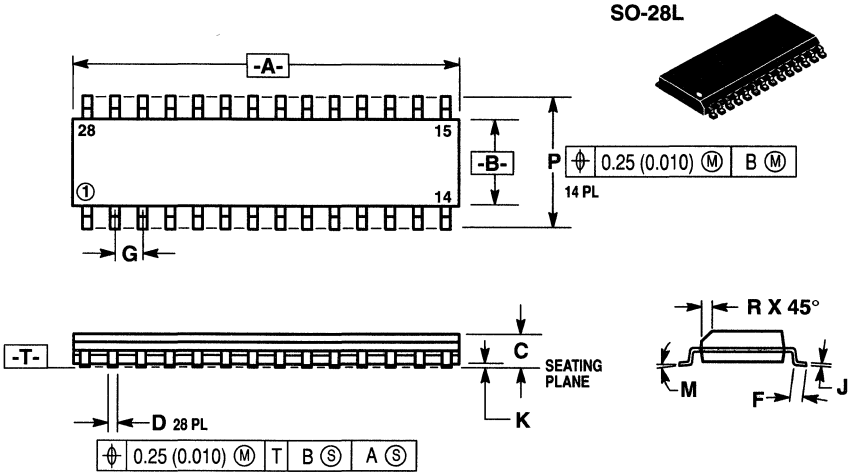


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. 751E-01 AND -02 OBSOLETE, NEW STANDARD 751E-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	15.25	15.54	0.601	0.612
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.41	0.90	0.016	0.035
G	1.27 BSC		0.050 BSC	
J	0.229	0.317	0.0090	0.0125
K	0.127	0.292	0.0050	0.0115
M	0°	8°	0°	8°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

CASE 751E-03

SO-28L

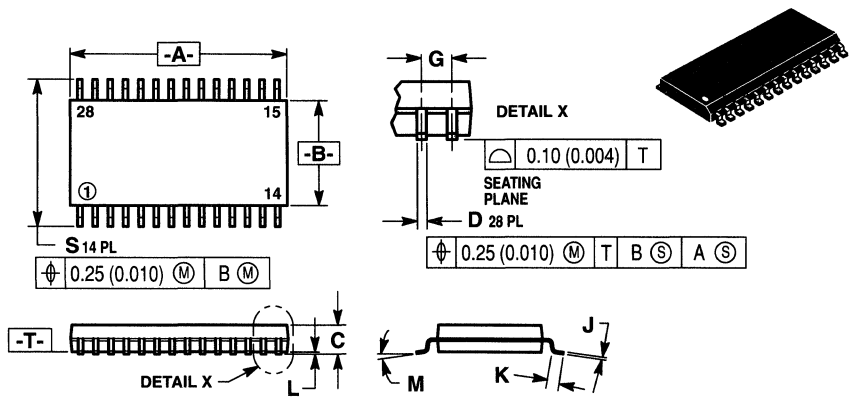


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. 751F-01 AND -02 OBSOLETE, NEW STANDARD 751F-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	17.80	18.05	0.701	0.711
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.41	0.90	0.016	0.035
G	1.27 BSC		0.050 BSC	
J	0.229	0.317	0.0090	0.0125
K	0.127	0.292	0.0050	0.0115
M	0°	8°	0°	8°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

CASE 751F-03

SO-28L, 0.330



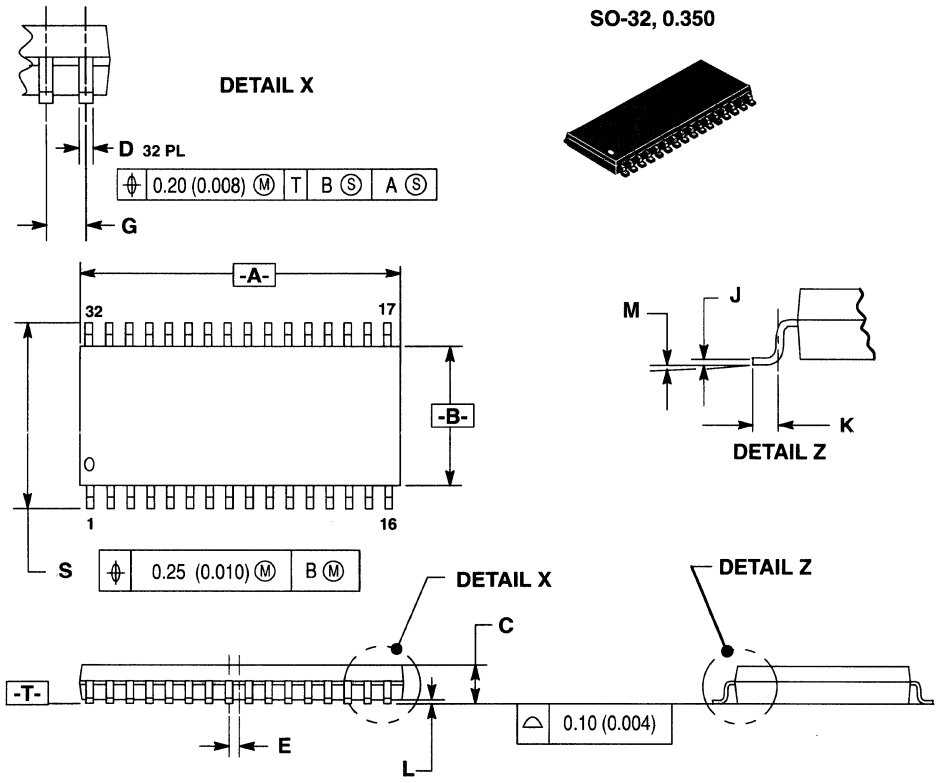
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIM: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. 751H-01 OBSOLETE, NEW STANDARD 751H-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	17.70	18.50	0.697	0.728
B	8.23	8.90	0.324	0.350
C	2.04	2.50	0.080	0.098
D	0.35	0.50	0.014	0.020
G	1.27 BSC		0.050 BSC	
J	0.14	0.25	0.0060	0.0098
K	0.40	1.27	0.016	0.050
L	0.05	0.20	0.002	0.008
M	0°	8°	0°	8°
S	11.50	12.10	0.453	0.476

CASE 751H-02

SURFACE MOUNT PACKAGE OUTLINES (continued)

SO-32, 0.350

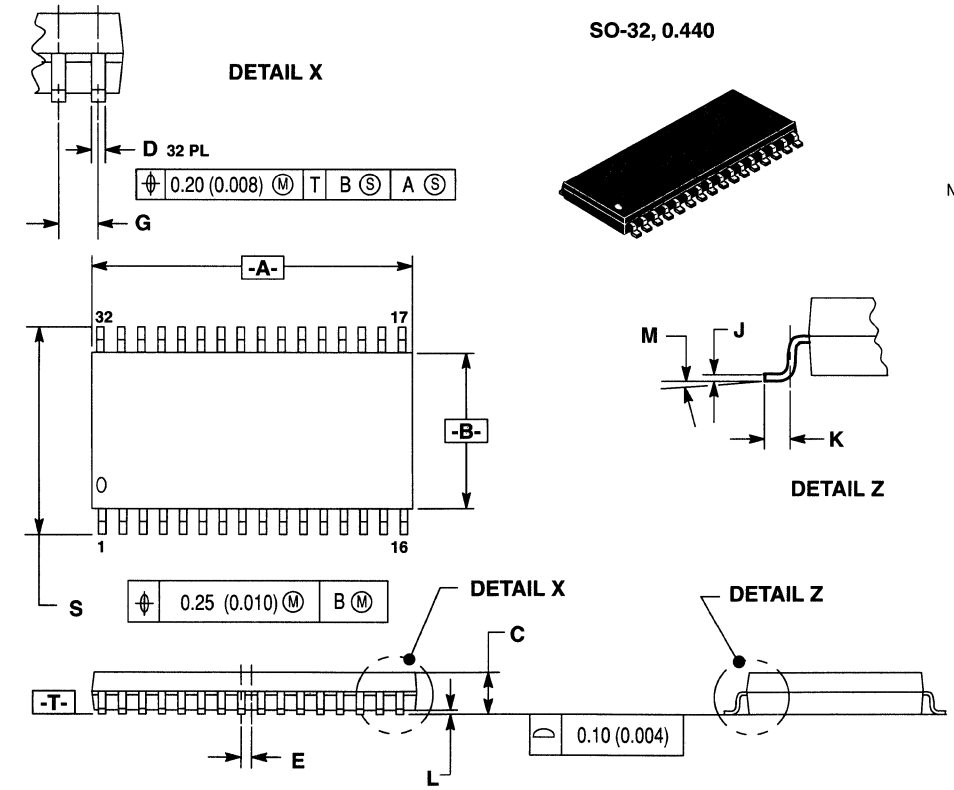


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	20.40	20.70	0.803	0.815
B	8.70	8.90	0.342	0.350
C	2.30	2.60	0.090	0.102
D	0.36	0.51	0.014	0.020
E	0.64 BSC		0.025 BSC	
G	1.27 BSC		0.050 BSC	
J	0.15	0.32	0.006	0.012
K	0.61	1.00	0.024	0.039
L	0.10	0.30	0.004	0.012
M	0°	8°	0°	8°
S	11.91	12.52	0.469	0.493

CASE 854-01

SO-32, 0.440



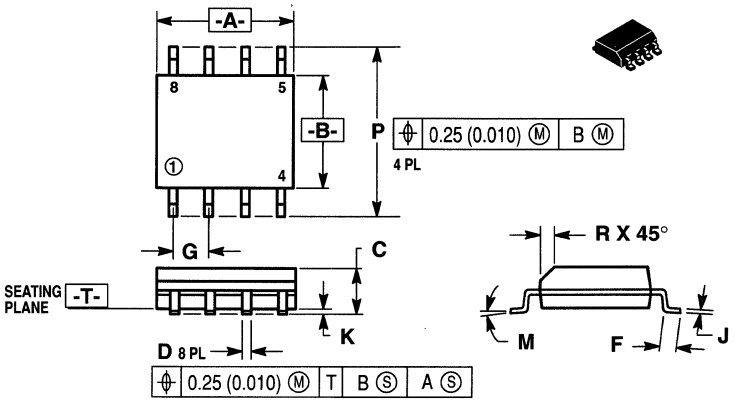
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	20.40	20.70	0.803	0.815
B	11.10	11.30	0.437	0.445
C	2.75	3.04	0.108	0.120
D	0.35	0.50	0.014	0.020
E	0.64 BSC		0.025 BSC	
G	1.27 BSC		0.050 BSC	
J	0.14	0.32	0.006	0.012
K	0.60	1.00	0.024	0.039
L	0.10	0.35	0.004	0.014
M	0°	8°	0°	8°
S	13.80	14.40	0.543	0.567

CASE 855-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

SO-8

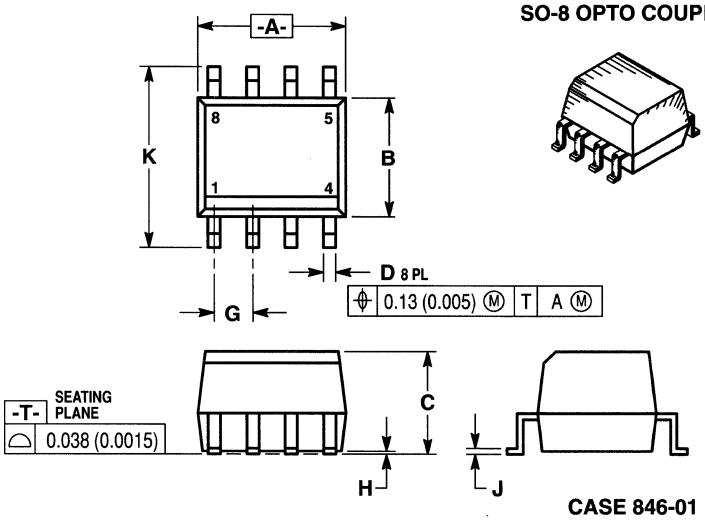


CASE 751-03

NOTES:
1. DIMENSIONS "A" AND "B" ARE DATUMS AND "T" IS A DATUM SURFACE.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
3. CONTROLLING DIM: MILLIMETER.
4. DIMENSION "A" AND "B" DO NOT INCLUDE MOLD PROTRUSION.
5. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
6. 751-01 AND -02 OBSOLETE, NEW STANDARD 751-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.18	0.25	0.007	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

SO-8 OPTO COUPLER

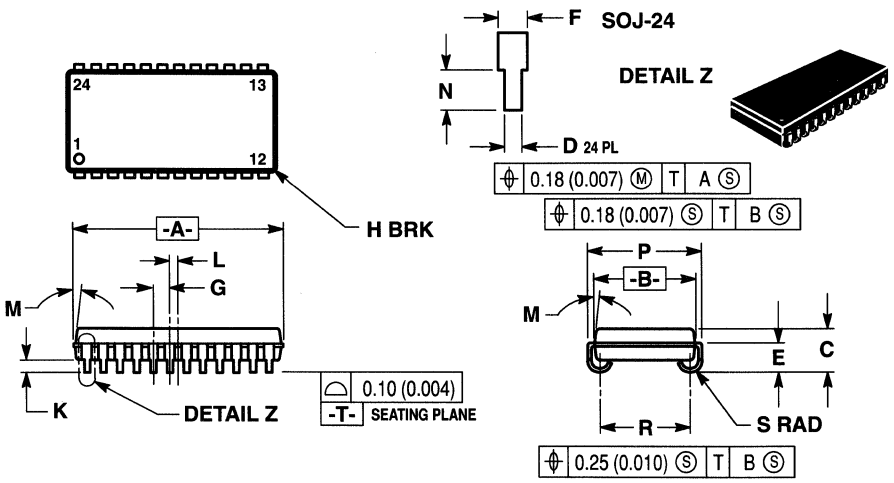


CASE 846-01

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.63	5.13	0.182	0.202
B	3.66	4.16	0.144	0.164
C	3.13	3.63	0.123	0.143
D	0.28	0.53	0.011	0.021
G	1.27 BSC		0.050 BSC	
H	0.08	0.20	0.003	0.008
J	0.16	0.25	0.006	0.010
K	5.69	6.19	0.224	0.244

SOJ-24



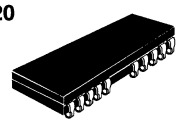
CASE 810A-02

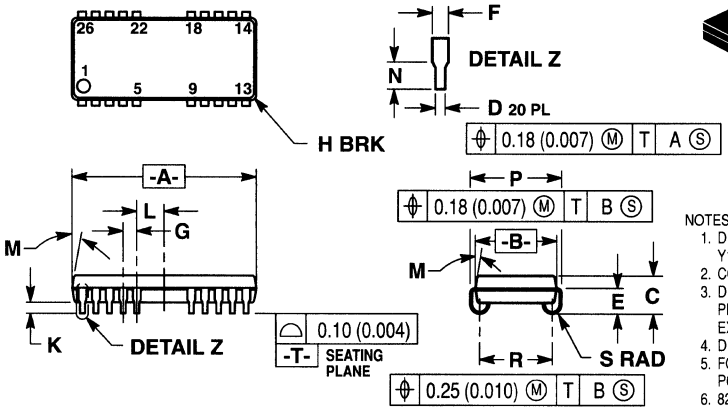
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSION "A" AND "B" DO NOT INCLUDE MOLD PROTRUSION. MOLD PROTRUSION SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
3. CONTROLLING DIMENSION: INCH.
4. DIM "R" TO BE DETERMINED AT DATUM -T-
5. 810A-01 IS OBSOLETE, NEW STANDARD 810A-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	15.75	16.00	0.620	0.630
B	7.50	7.74	0.295	0.305
C	3.26	3.75	0.128	0.148
D	0.39	0.50	0.015	0.020
E	2.24	2.48	0.088	0.098
F	0.67	0.81	0.026	0.032
G	1.27 BSC		0.050 BSC	
H	—	0.50	—	0.020
K	0.89	1.14	0.035	0.045
L	0.64 BSC		0.025 BSC	
M	0°	5°	0°	5°
N	0.76	1.14	0.030	0.045
P	8.51	8.76	0.335	0.345
R	6.61	7.11	0.260	0.280
S	0.77	1.01	0.030	0.040

SURFACE MOUNT PACKAGE OUTLINES (continued)

SOJ-26/20



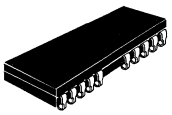


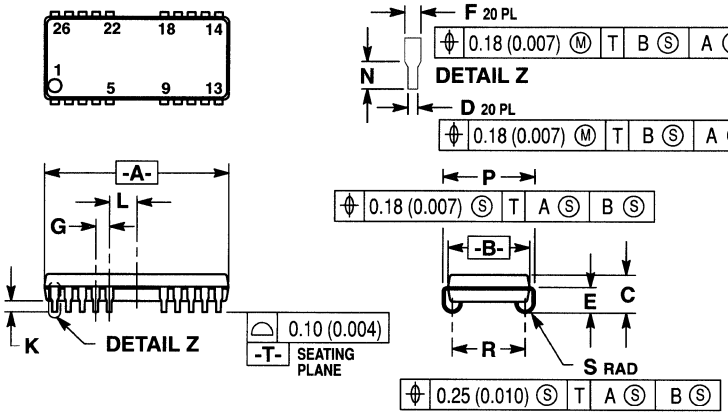
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION A & B DO NOT INCLUDE MOLD PROTRUSION. MOLD PROTRUSION SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIM R TO BE DETERMINED AT DATUM -T-.
5. FOR LEAD IDENTIFICATION PURPOSES, PIN POSITIONS 6, 7, 8, 19, 20, & 21 ARE NOT USED.
6. 822-01 AND -02 OBSOLETE, NEW STANDARD 822-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	17.02	17.27	0.670	0.680
B	7.50	7.74	0.295	0.305
C	3.26	3.75	0.128	0.148
D	0.39	0.50	0.015	0.020
E	2.24	2.48	0.088	0.098
F	0.67	0.81	0.026	0.032
G	1.27 BSC		0.050 BSC	
H	—	0.50	—	0.020
K	0.89	1.14	0.035	0.045
L	2.54 BSC		0.100 BSC	
M	0°	10°	0°	10°
N	0.89	1.14	0.035	0.045
P	8.39	8.63	0.330	0.340
R	6.61	6.98	0.260	0.275
S	0.77	1.01	0.030	0.040

CASE 822-03

SOJ-26/20, 0.350



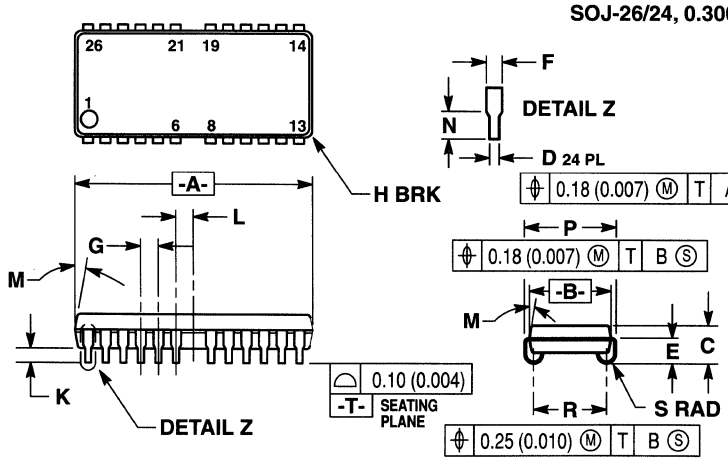


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION A & B DO NOT INCLUDE MOLD PROTRUSION. MOLD PROTRUSION SHALL NOT EXCEED 0.15 (0.006) PER SIDE
4. DIMENSION A & B INCLUDE MOLD MISMATCH AND ARE DETERMINED AT THE PARTING LINE.
5. DIM R TO BE DETERMINED AT DATUM -T-
6. FOR LEAD IDENTIFICATION PURPOSES, PIN POSITIONS 6, 7, 8, 19, 20, & 21 ARE NOT USED.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	17.02	17.27	0.670	0.680
B	8.77	9.01	0.345	0.355
C	3.26	3.75	0.128	0.148
D	0.41	0.50	0.016	0.020
E	2.24	2.48	0.088	0.098
F	0.67	0.81	0.026	0.032
G	1.27 BSC		0.050 BSC	
K	0.64	—	0.025	—
L	2.54 BSC		0.100 BSC	
N	0.89	1.14	0.035	0.045
P	9.66	9.90	0.380	0.390
R	7.88	8.25	0.310	0.325
S	0.77	1.01	0.030	0.040

CASE 822A-01

SOJ-26/24, 0.300



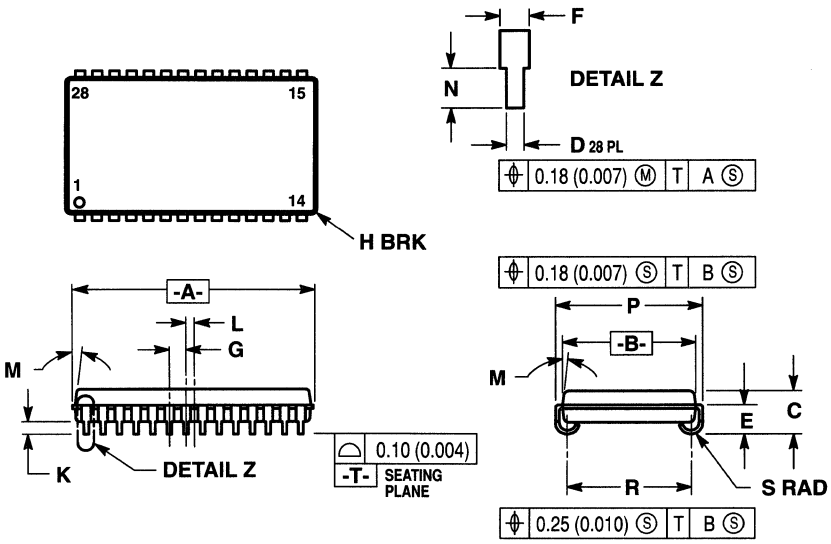
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION A & B DO NOT INCLUDE MOLD PROTRUSION. MOLD PROTRUSION SHALL NOT EXCEED 0.15 (0.006) PER SIDE
4. DIM R TO BE DETERMINED AT DATUM -T-.
5. FOR LEAD IDENTIFICATION PURPOSES, PIN POSITIONS 7, & 20 ARE NOT USED

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	17.02	17.27	0.670	0.680
B	7.50	7.74	0.295	0.305
C	3.26	3.75	0.128	0.148
D	0.39	0.50	0.015	0.020
E	2.24	2.48	0.088	0.098
F	0.67	0.81	0.026	0.032
G	1.27 BSC		0.050 BSC	
H	–	0.50	–	0.020
K	0.89	1.14	0.035	0.045
L	1.27 BSC		0.050 BSC	
M	0°	10°	0°	10°
N	0.89	1.14	0.035	0.045
P	8.39	8.63	0.330	0.340
R	6.61	6.98	0.260	0.275
S	0.77	1.01	0.030	0.040

CASE 880-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

SOJ-28

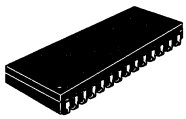


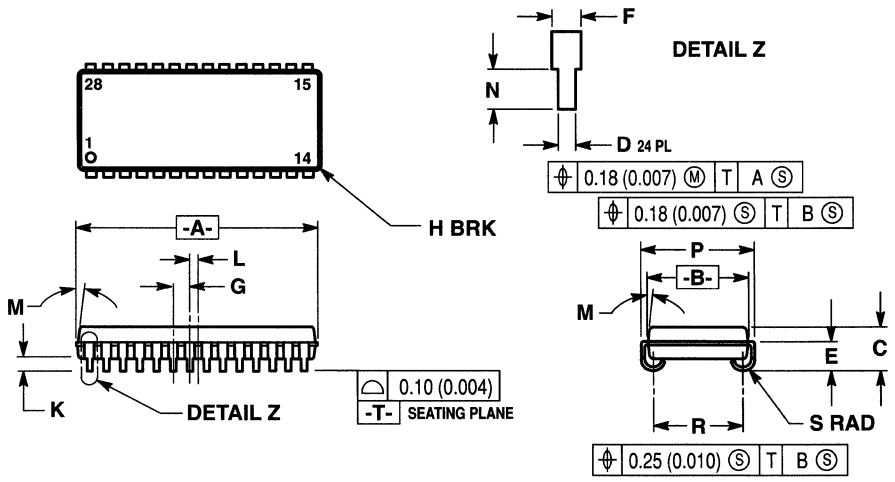
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSION A & B DO NOT INCLUDE MOLD PROTRUSION. MOLD PROTRUSION SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
3. CONTROLLING DIMENSION: INCH.
4. DIM R TO BE DETERMINED AT DATUM -T-.
5. 810-01 AND -02 OBSOLETE, NEW STANDARD 810-03.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	18.29	18.54	0.720	0.730
B	10.04	10.28	0.395	0.405
C	3.26	3.75	0.128	0.148
D	0.39	0.50	0.015	0.020
E	2.24	2.48	0.088	0.098
F	0.67	0.81	0.026	0.032
G	1.27 BSC		0.050 BSC	
H	—	0.50	—	0.020
K	0.89	1.14	0.035	0.045
L	0.64 BSC		0.025 BSC	
M	0°	5°	0°	5°
N	0.76	1.14	0.030	0.045
P	11.05	11.30	0.435	0.445
R	9.15	9.65	0.360	0.380
S	0.77	1.01	0.030	0.040

CASE 810-03

SOJ-28, 0.300





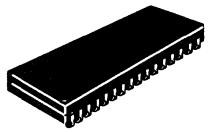
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSION A & B DO NOT INCLUDE MOLD PROTRUSION. MOLD PROTRUSION SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
3. CONTROLLING DIMENSION: INCH.
4. DIM R TO BE DETERMINED AT DATUM -T-.
5. 810B-01 AND -02 OBSOLETE, NEW STANDARD 810B-03.

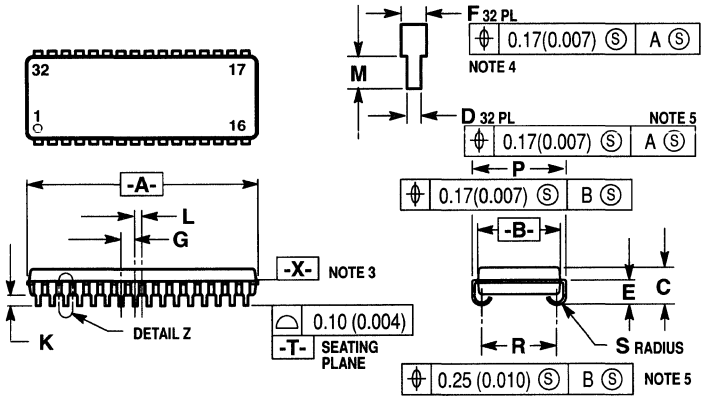
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	18.29	18.54	0.720	0.730
B	7.50	7.74	0.295	0.305
C	3.26	3.75	0.128	0.148
D	0.39	0.50	0.015	0.020
E	2.24	2.48	0.088	0.098
F	0.67	0.81	0.026	0.032
G	1.27 BSC		0.050 BSC	
H	—	0.50	—	0.020
K	0.89	1.14	0.035	0.045
L	0.64 BSC		0.025 BSC	
M	0°	10°	0°	10°
N	0.76	1.14	0.030	0.045
P	8.38	8.64	0.330	0.340
R	6.60	6.86	0.260	0.270
S	0.77	1.01	0.030	0.040

CASE 810B-03

SURFACE MOUNT PACKAGE OUTLINES (continued)

SOJ-32, 0.300



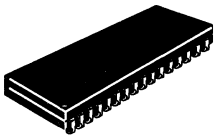


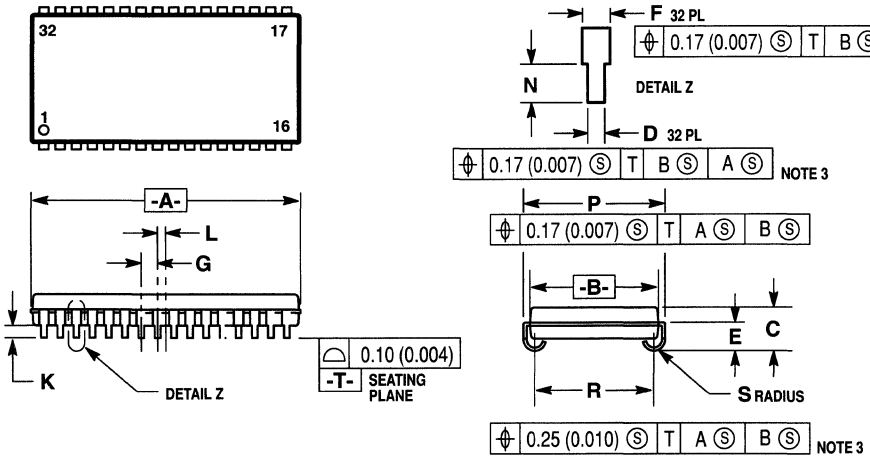
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DATUM PLANE -X- LOCATED AT TOP OF MOLD PARTING LINE AND COINCIDENT WITH TOP OF LEAD, WHERE LEAD EXITS BODY.
4. TO BE DETERMINED AT PLANE -X-.
5. TO BE DETERMINED AT PLANE -T-.
6. DIMENSION A & B DO NOT INCLUDE MOLD PROTRUSION. MOLD PROTRUSION SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
7. 857-01 IS OBSOLETE, NEW STANDARD 857-02.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	20.83	21.08	0.820	0.830
B	7.50	7.74	0.295	0.305
C	3.26	3.75	0.128	0.148
D	0.41	0.50	0.016	0.020
E	2.24	2.48	0.088	0.098
F	0.67	0.81	0.026	0.032
G	1.27 BSC		0.050 BSC	
K	0.89	1.14	0.035	0.045
L	0.64 BSC		0.025 BSC	
N	0.76	1.14	0.030	0.045
P	8.38	8.64	0.330	0.340
R	6.60	6.86	0.260	0.270
S	0.77	1.01	0.030	0.040

CASE 857-02

SOJ-32, 0.400





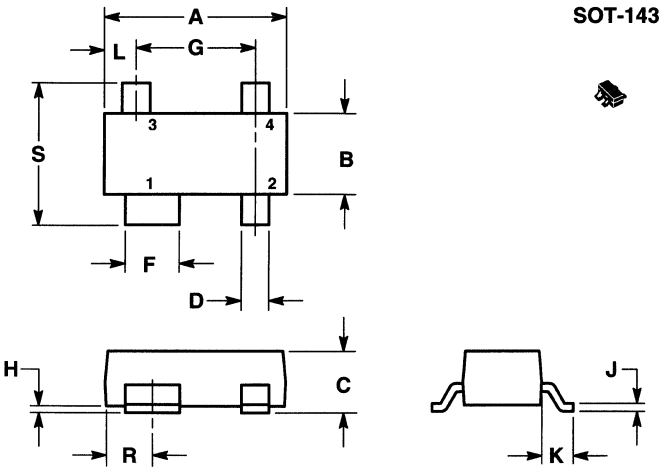
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. TO BE DETERMINED AT PLANE -T-.
4. DIMENSION A & B DO NOT INCLUDE MOLD PROTRUSION. MOLD PROTRUSION SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
5. DIMENSION A & B INCLUDE MOLD MISMATCH AND ARE DETERMINED AT THE PARTING LINE.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	20.83	21.08	0.820	0.830
B	10.03	10.29	0.395	0.405
C	3.26	3.75	0.128	0.148
D	0.41	0.50	0.016	0.020
E	2.24	2.48	0.088	0.098
F	0.67	0.81	0.026	0.032
G	1.27 BSC		0.050 BSC	
K	0.89	1.14	0.035	0.045
L	0.64 BSC		0.025 BSC	
N	0.89	1.14	0.035	0.045
P	11.05	11.30	0.435	0.445
R	9.27	9.52	0.365	0.375
S	0.77	1.01	0.030	0.040

CASE 857A-01

SURFACE MOUNT PACKAGE OUTLINES (continued)

SOT-143



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. 318A-01 THRU -04 OBSOLETE, NEW STANDARD 318A-05.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	2.80	3.04	0.110	0.120
B	1.20	1.39	0.047	0.055
C	0.84	1.14	0.033	0.045
D	0.39	0.50	0.015	0.020
F	0.79	0.93	0.031	0.037
G	1.78	2.03	0.070	0.080
H	0.013	0.10	0.0005	0.004
J	0.08	0.15	0.003	0.006
K	0.46	0.60	0.018	0.024
L	0.445	0.60	0.0175	0.024
R	0.72	0.83	0.028	0.033
S	2.11	2.48	0.083	0.098

CASE 318A-05

SOT-223

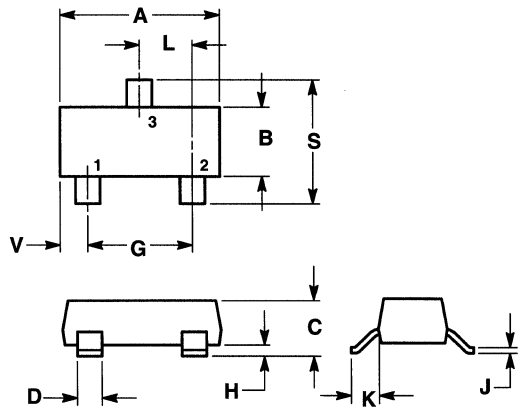
SCALE 1:1

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. 318E-01 THRU -03 OBSOLETE, NEW STANDARD 318E-04.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	6.30	6.70	0.249	0.263
B	3.30	3.70	0.130	0.145
C	1.50	1.75	0.060	0.068
D	0.60	0.89	0.024	0.035
F	2.90	3.20	0.115	0.126
G	2.20	2.40	0.087	0.094
H	0.020	0.100	0.0008	0.0040
J	0.24	0.35	0.009	0.014
K	1.50	2.00	0.060	0.078
L	0.85	1.05	0.033	0.041
M	0 °	10 °	0 °	10 °
S	6.70	7.30	0.264	0.287

CASE 318E-04

SOT-23



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-03 OBSOLETE, NEW STANDARD 318-07.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	2.80	3.04	0.1102	0.1197
B	1.20	1.40	0.0472	0.0551
C	0.89	1.11	0.0350	0.0440
D	0.37	0.50	0.0150	0.0200
G	1.78	2.04	0.0701	0.0807
H	0.013	0.100	0.0005	0.0040
J	0.085	0.177	0.0034	0.0070
K	0.45	0.60	0.0180	0.0236
L	0.89	1.02	0.0350	0.0401
S	2.10	2.50	0.0830	0.0984
V	0.45	0.60	0.0177	0.0236

CASE 318-07

GLOSSARY OF PACKAGING ABBREVIATIONS

CLCC Ceramic Leaded Chip Carrier. Solder sealed, multilayer ceramic.

CQFP Glass sealed Ceramic Quad Flat Pack with gull wing leads. Also called CERQUAD or CQUAD.

CQUAD Same as CQFP.

DPAK Small power transistor package for surface mount.

D^{2}PAK Larger (same size as TO-220) power transistor package for surface mount.

EIA Electronic Industries Association.

EIAJ Electronic Industries Association of Japan.

FPT Fine Pitch Technology. Surface mount technology using packages whose lead pitch is 25 mils or less.

FQFP Fine Pitch Quad Flat Pack – Low profile EIAJ plastic chip carrier with gull wing leads on fine metric pitches of either 0.5 mm, 0.4mm, or 0.3 mm. Was called SQFP and VQFP.

IPC The Institute for Interconnecting and packaging Electronic Circuits. This trade organization develops processes and guidelines for attaching components to printed circuit boards.

JEDEC Joint Electron Devices Engineering Council. The package outline standardizing body in the U.S.

JLDQ Same as CQFP except with J-leads instead of gull wing.

LCC Leadless Ceramic Chip Carrier. Same as LCCC.

LCCC Leadless Ceramic Chip Carrier.

MCR Molded Carrier Ring. Used to protect and hold leads of chip carriers in place during manufacture and shipping.

MELF Metal Electrode Face Bonded – leadless cylindrical, two terminal surface mount package.

M-QUAD™ Metal Quad Flat Pack fabricated from aluminum for better heat dissipation.

PITCH The center-to-center distance between adjacent leads on a package.

PLCC Plastic Leaded Chip Carrier with "J" leads on 0.050 inch pitch.

PQFP Plastic Quad Flat Pack – JEDEC version with corner bumpers and gull wing leads on 0.025 inch pitch. All dimensions are in inches.

QFP Quad Flat Pack - Low profile EIAJ and JEDEC metric plastic chip carrier with gull wing leads on pitches or either 1.0 mm, 0.8 mm, or 0.65 mm.

SC Japanese prefix for very small transistor packages such as the SC59.

SLAM Single Layer Alumina Metallized. One form of LCCC.

SM Surface Mount.

SMB Rectangular Surface Mount molded plastic diode package. Overall dimensions are 0.140 x 0.212 inch.

SMC Same as SMB except larger. 0.230 x 0.312 inch.

SMT Surface Mount Technology

SO JEDEC abbreviation for small outline IC packages commonly referred to as SOICs.

SOG Wide body SOIC used for MOS Memories. Same as SOL.

SOIC Small Outline Integrated Circuit. Has gull wing leads on 0.050 inch pitch.

SOJ SOIC with "J" leads for high density memory.

SOL Wide body SOIC.

SOP Small Outline Power. Eight lead SOIC with pins 2,3,6,7 connected to the flag the chip is mounted on to enhance the power handling capability.

SOP The Japanese use the term SOP to indicate Small Outline Package. Their Mini Flat Pack and our SOIC fall into this category.

SOT Small Outline Transistor.

SSOP Shrink Small Outline Package. Smaller EIAJ SOIC like package with 0.65 mm lead pitch.

SQFP Shrink QFP. Now called FQFP. QFP with 0.5 mm, 0.4 mm, or 0.3 mm lead pitch.

TAB Tape Automated Bonding.

TSOP Thin Small Outline Package. A new version of Japanese MFP for memories. Has very thin profile and very fine, metric lead pitch.

VQFP Japanese QFP with very fine, metric lead pitch. Also called SQFP or FQFP.

VSOP Very Small Outline Package. Japanese SOP with very fine lead pitch. Also called SSOP.

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