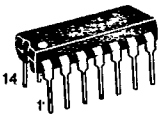
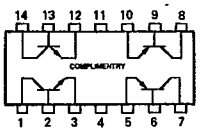
T-43-25

MPQ6100, A
STYLE 1
MPQ6600, A
STYLE 2
CASE 646-06
TO-116





QUAD COMPLEMENTARY PAIR TRANSISTORS
NPN/PNP SILICON

Refer to MHQ2483 for NPN Curves.

Refer to MHQ3798 for PNP Curves.

MAXIMUM RATINGS

Rating	Symbol	MPQ6100 MPQ6600	MPQ6100A MPQ6600A	Unit
Collector-Emitter Voltage	V_{CEO}	40	45	Vdc
Collector-Base Voltage	V_{CBO}	60		Vdc
Emitter-Base Voltage	V_{EBO}	5.0		Vdc
Collector Current — Continuous	I_C	50		mAdc
		Each Transistor	Four Transistors Equal Power	
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	500 4.0	900 7.2	mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	0.825 6.7	2.4 19.2	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150		°C

THERMAL CHARACTERISTICS

Characteristic		Junction to Case	Junction to Ambient	Unit
Thermal Resistance(1)	Each Die	151	250	°C/W
	Effective, 4 Die	52	139	°C/W
Coupling Factors	Q1-Q4 or Q2-Q3	34	70	%
	Q1-Q2 or Q3-Q4	2.0	26	%

(1) $R_{\theta JA}$ is measured with the device soldered into a typical printed circuit board.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

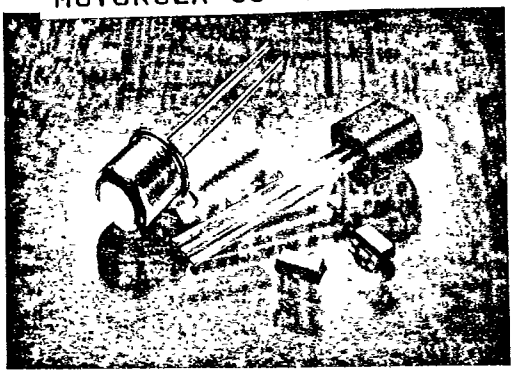
Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage(2) (I_C = 10 mAdc, I_B = 0)	MPQ6100,6600	$V_{(BR)CEO}$	40	—	—	Vdc
	MPQ6100A,6600A		45	—	—	
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)		$V_{(BR)CBO}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		$V_{(BR)EBO}$	5.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 50 Vdc, I_E = 0)		I_{CBO}	—	—	10	nAdc
ON CHARACTERISTICS(2)						
DC Current Gain (I_C = 100 μAdc, V_{CE} = 5.0 Vdc)	MPQ6100,6600	h_{FE}	50	—	—	—
	MPQ6100A,6600A		100	—	—	
(I_C = 500 μAdc, V_{CE} = 5.0 Vdc)	MPQ6100,6600		75	—	—	
	MPQ6100A,6600A		150	—	—	
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc)	MPQ6100,6600		75	—	—	
	MPQ6100A,6600A		150	—	—	
(I_C = 10 mAdc, V_{CE} = 5.0 Vdc)	MPQ6100,6600		60	—	—	
	MPQ6100A,6600A		125	—	—	
Collector-Emitter Saturation Voltage (I_C = 1.0 mAdc, I_B = 100 μAdc)		$V_{CE(sat)}$	—	—	0.25	Vdc
Base-Emitter Saturation Voltage (I_C = 1.0 mAdc, I_B = 100 μAdc)		$V_{BE(sat)}$	—	—	0.8	Vdc
SMALL-SIGNAL CHARACTERISTICS						
Current-Gain — Bandwidth Product (I_C = 500 μAdc, V_{CE} = 5.0 Vdc, f = 20 MHz)		f_T	50	—	—	MHz
Output Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 100 kHz)	PNP	C_{obo}	—	1.2	4.0	pF
	NPN		—	1.8	4.0	

ELECTRICAL CHARACTERISTICS (continued) (T_A = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Typ	Max	Unit
Input Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 100 kHz)	PNP	C_{ibo}	—	—	8.0	pF
	NPN		—	—	8.0	
Noise Figure (I_C = 100 μAdc, V_{CE} = 5.0 Vdc, R_S = 10 kohms, f = 10 Hz to 15.7 kHz, BW = 10 kHz)		NF	—	4.0	—	dB

(2) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

T-91-20



The following pages contain information on the various packages referenced on the individual data sheets. Information includes: a picture of the package, dimensions in both millimeters and inches, the various pinout configurations (styles), a cross reference for case numbers, old JEDEC "TO" numbers, and the new JEDEC "TO" designation.

Additionally, abstracts of available application notes are provided. Please contact your local sales representative for those desired.

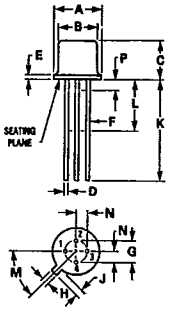
Package Outline Dimensions and Application Literature

7

Package Outline Dimensions

Dimensions are in inches unless otherwise noted.

CASE 20-03 TO-72 (TO-206AF) METAL



NOTE: ALL RULES AND NOTES ASSOCIATED WITH TO-72 OUTLINE SHALL APPLY.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.41	0.53	0.016	0.021
E	—	0.76	—	0.030
F	0.41	0.48	0.016	0.019
G	2.54 BSC		0.100 BSC	
H	0.91	1.17	0.036	0.046
J	0.71	1.22	0.028	0.048
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	—	1.27	—	0.050

All JEDEC dimensions and notes apply.

CASE 20 STYLES

STYLE 1:
PIN 1. SOURCE
2. DRAIN
3. GATE
4. CASE LEAD

STYLE 2:
PIN 1. SOURCE
2. GATE
3. DRAIN
4. SUBSTRATE AND CASE LEAD

STYLE 3:
PIN 1. DRAIN
2. SOURCE
3. GATE
4. CASE LEAD

STYLE 4:
PIN 1. SOURCE
2. GATE
3. DRAIN
4. GATE 2 — SUBSTRATE AND CASE

STYLE 5:
PIN 1. SOURCE
2. GATE 1
3. DRAIN
4. CASE

STYLE 6:
PIN 1. DRAIN
2. SOURCE AND SUBSTRATE
3. GATE
4. SOURCE AND SUBSTRATE

STYLE 7:
PIN 1. DRAIN
2. SOURCE
3. GATE
4. CASE AND SUBSTRATE

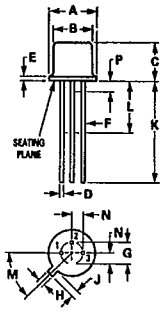
STYLE 8:
PIN 1. EMITTER 2
2. BASE 1
3. COLLECTOR
4. EMITTER 1
BASE 2

STYLE 9:
PIN 1. DRAIN
2. GATE 2
3. GATE 1
4. SOURCE, SUBSTRATE AND CASE

STYLE 10:
PIN 1. EMITTER
2. BASE
3. COLLECTOR
4. CASE

STYLE 11:
PIN 1. EMITTER
2. CATHODE
3. COLLECTOR
4. ANODE

CASE 22-03 TO-18 (TO-206AA) METAL



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.406	0.533	0.016	0.021
E	—	0.762	—	0.030
F	0.406	0.483	0.016	0.019
G	2.54 BSC		0.100 BSC	
H	0.914	1.17	0.036	0.046
J	0.711	1.22	0.028	0.048
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	—	1.27	—	0.050

All JEDEC notes and dimensions apply

CASE 22 STYLES

STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 2:
PIN 1. SOURCE, SUBSTRATE AND CASE
2. GATE
3. DRAIN

STYLE 3:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 4.
PIN 1 SOURCE
2. DRAIN
3. GATE AND CASE

STYLE 5
PIN 1. EMITTER
2. BASE 1
3. BASE 2

STYLE 6.
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 7:
PIN 1. ANODE
2. BASE
3. CATHODE

STYLE 8:
PIN 1. GATE
2. ANODE 1
3. ANODE 2

STYLE 9:
PIN 1. ANODE 2
2. ANODE 1
3. GATE (CONNECTED TO CASE)

STYLE 10:
PIN 1. BASE
2. EMITTER
3. BASE

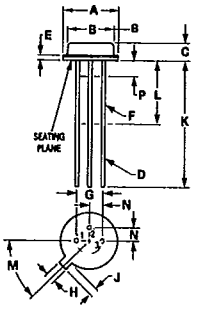
STYLE 11:
PIN 1 DRAIN
2. GATE
3. SOURCE, SUBSTRATE

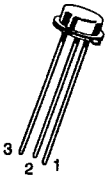
STYLE 12:
PIN 1. SOURCE
2. GATE
3. DRAIN (CASE)

STYLE 13:
PIN 1. ANODE
2. GATE
3. CATHODE

CASE 26-03 TO-46 (TO-206AB) METAL

STYLE 1:
PIN 1 EMITTER
2. BASE
3. COLLECTOR

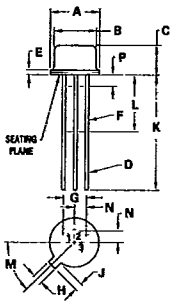




DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	1.65	2.16	0.065	0.085
D	0.406	0.533	0.016	0.021
E	—	1.02	—	0.040
F	0.305	0.483	0.012	0.019
G	2.54 BSC		0.100 BSC	
H	0.914	1.17	0.036	0.046
J	0.711	1.22	0.028	0.048
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	—	1.27	—	0.050

All JEDEC dimensions and notes apply

CASE 27-02 TO-52 (TO-206AC) METAL



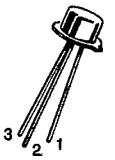
STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 2:
PIN 1 DRAIN
2. SOURCE
3. GATE & CASE

STYLE 3:
PIN 1. EMITTER
2. BASE
3. BASE 2

STYLE 4-
PIN 1. SOURCE
2. DRAIN
3. GATE & CASE

STYLE 5:
PIN 1. SOURCE
2. GATE
3. DRAIN & CASE

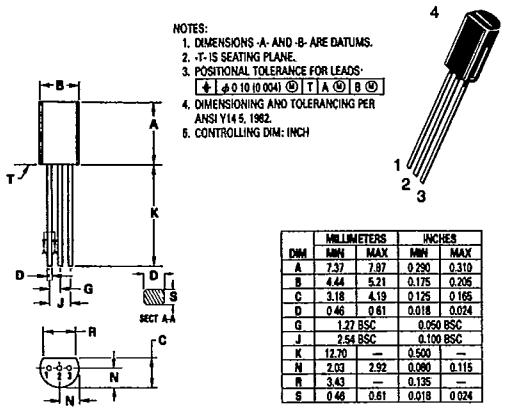


NOTE:
1 ALL RULES & NOTES ASSOCIATED WITH TO-52 OUTLINE SHALL APPLY.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	2.92	3.81	0.115	0.150
D	—	0.533	—	0.021
E	—	0.762	—	0.030
F	0.406	0.483	0.016	0.019
G	2.54 BSC		0.100 BSC	
H	0.914	1.17	0.036	0.046
J	0.711	1.22	0.028	0.048
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	—	1.27	—	0.050

PACKAGE OUTLINE DIMENSIONS (continued)

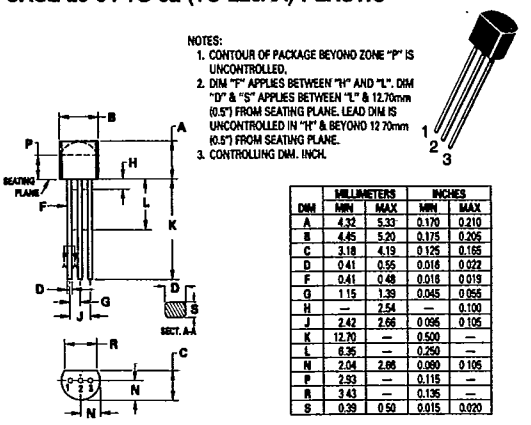
CASE 29-03 TO-92 (TO-226AE) PLASTIC



NOTES:
1. DIMENSIONS -A- AND -B- ARE DATUMS.
2. -T- IS SEATING PLANE.
3. POSITIONAL TOLERANCE FOR LEADS:
   ⌖ ⌀0.10 (0.004) Ⓜ T A Ⓜ B Ⓜ
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1982.
5. CONTROLLING DIM: INCH

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	7.37	7.87	0.290	0.310
B	4.44	5.21	0.175	0.205
C	3.18	4.19	0.125	0.165
D	0.46	0.61	0.018	0.024
G	1.27 BSC		0.050 BSC	
J	2.54 BSC		0.100 BSC	
K	12.70	—	0.500	—
N	2.03	2.92	0.080	0.115
R	3.43	—	0.135	—
S	0.46	0.61	0.018	0.024

CASE 29-04 TO-92 (TO-226AA) PLASTIC



NOTES:
1. CONTOUR OF PACKAGE BEYOND ZONE "P" IS UNCONTROLLED.
2. DIM "F" APPLIES BETWEEN "H" AND "L". DIM "D" & "S" APPLIES BETWEEN "L" & 12.70mm (0.5") FROM SEATING PLANE. LEAD DIM IS UNCONTROLLED IN "H" & BEYOND 12.70mm (0.5") FROM SEATING PLANE.
3. CONTROLLING DIM. INCH.

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	4.32	5.33	0.170	0.210
B	4.45	5.20	0.175	0.205
C	3.18	4.19	0.125	0.165
D	0.41	0.55	0.016	0.022
F	0.41	0.48	0.016	0.019
G	1.15	1.39	0.045	0.055
H	—	2.54	—	0.100
J	2.42	2.66	0.095	0.105
K	12.70	—	0.500	—
L	6.35	—	0.250	—
N	2.04	2.66	0.080	0.105
P	2.93	—	0.115	—
R	3.43	—	0.135	—
S	0.39	0.50	0.015	0.020

CASE 29 STYLES

STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 2:
PIN 1. BASE
2. EMMITTER
3. COLLECTOR

STYLE 3:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 5:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 6:
PIN 1. GATE
2. SOURCE & SUBSTRATE
3. DRAIN

STYLE 7:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 8:
PIN 1. DRAIN
2. GATE
3. SOURCE & SUBSTRATE

STYLE 9.
PIN 1. BASE 1
2. EMITTER
3. BASE 2

STYLE 10:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 11:
PIN 1. ANODE
2. CATHODE & ANODE
3. CATHODE

STYLE 12:
PIN 1. MAIN TER 1
2. GATE
3. MAIN TER 2

STYLE 13:
PIN 1. ANODE 1
2. GATE
3. CATHODE 2

STYLE 14:
PIN 1. EMITTER
2. COLLECTOR
3. BASE

STYLE 15:
PIN 1. ANODE 1
2. CATHODE
3. ANODE 2

STYLE 16:
PIN 1. ANODE
2. GATE
3. CATHODE

STYLE 17:
PIN 1. COLLECTOR
2. BASE
3. EMITTER

STYLE 18:
PIN 1. ANODE
2. CATHODE
3. NOT CONN

STYLE 19:
PIN 1. GATE
2. ANODE
3. CATHODE

STYLE 20:
PIN 1. NOT CONN
2. CATHODE
3. ANODE

STYLE 21:
PIN 1. COLLECTOR
2. EMITTER
3. BASE

STYLE 22:
PIN 1. SOURCE
2. GATE
3. DRAIN

STYLE 23:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 24.
PIN 1. EMITTER
2. COLLECTOR/ ANODE
3. CATHODE

STYLE 25:
PIN 1. MT 1
2. GATE
3. MT 2

STYLE 26:
PIN 1. V_{CC}
2. GROUND
3. OUTPUT

STYLE 27:
PIN 1. MT
2. SUBSTRATE
3. MT

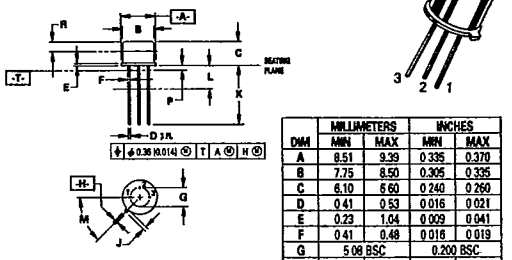
STYLE 28:
PIN 1. CATHODE
2. ANODE
3. GATE

STYLE 29:
PIN 1. NOT CONN
2. ANODE
3. CATHODE

STYLE 30:
PIN 1. DRAIN
2. GATE
3. SOURCE

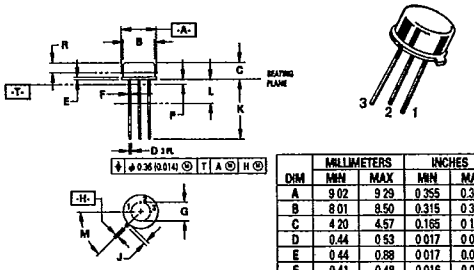
STYLE 31:
PIN 1. GATE
2. DRAIN
3. SOURCE

CASE 79-04 TO-39 (TO-205AD) METAL



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	8.51	9.39	0.335	0.370
B	7.75	8.50	0.305	0.335
C	6.10	6.60	0.240	0.260
D	0.41	0.53	0.016	0.021
E	0.23	1.04	0.009	0.041
F	0.41	0.48	0.016	0.019
G	5.08 BSC		0.200 BSC	
H	0.72	0.86	0.028	0.034
J	0.74	1.14	0.029	0.045
K	12.70	19.05	0.500	0.750
L	6.35	—	0.250	—
M	45° BSC		45° BSC	
P	—	1.27	—	0.050
R	2.54	—	0.100	—

CASE 79-05 TO-39 (TO-205AF) METAL



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	9.02	9.29	0.355	0.366
B	8.01	8.50	0.315	0.335
C	4.20	4.57	0.165	0.180
D	0.44	0.53	0.017	0.021
E	0.44	0.88	0.017	0.035
F	0.41	0.48	0.016	0.019
G	5.08 BSC		0.200 BSC	
H	0.72	0.86	0.028	0.034
J	0.74	1.01	0.029	0.040
K	12.70	19.05	0.500	0.750
L	6.35	—	0.250	—
M	45° BSC		45° BSC	
P	—	1.27	—	0.050
R	2.54	—	0.100	—

CASE 79 STYLES

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION J MEASURED FROM DIMENSION A MAXIMUM.
4. DIMENSION B SHALL NOT VARY MORE THAN 0.25 (0.010) IN ZONE R. THIS ZONE CONTROLLED FOR AUTOMATIC HANDLING.
5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L. DIMENSION D APPLIES BETWEEN DIMENSION L AND K MINIMUM. LEAD DIAMETER IS UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.

STYLE 1.
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 2:
PIN 1 DRAIN
2. SOURCE
3. GATE

STYLE 3:
PIN 1. CATHODE
2. CATE
3. ANODE

STYLE 4:
PIN 1. MAIN TERM. 1
2. GATE
3. MAIN TERM. 2

STYLE 5.
PIN 1. COLLECTOR
2. BASE
3. EMITTER

STYLE 6.
PIN 1 SOURCE
2. GATE
3. DRAIN
(CASE)

STYLE 7:
PIN 1. DRAIN
2. GATE
3. SOURCE

STYLE 8:
PIN 1 ANODE
2. ANODE
3. CATHODE

STYLE 9:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 10:
PIN 1. COLLECTOR
2. EMITTER
3. BASE

7

T-90-20
T-91-20

PACKAGE OUTLINE DIMENSIONS (continued)

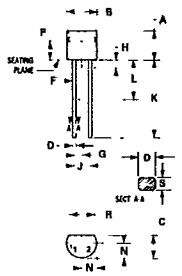
CASE 182-02 TO-92 (TO-226AC) PLASTIC

NOTES
1. CONTOUR OF PACKAGE BEYOND ZONE P IS UNCONTROLLED
2. DIMENSION F APPLIES BETWEEN H AND L. DIMENSION D AND S APPLIES BETWEEN L AND 12.70mm (0.5") FROM SEATING PLANE. LEAD DIMENSION IS UNCONTROLLED IN H AND BEYOND 12.70mm (0.5") FROM SEATING PLANE.

STYLE 1
PIN 1. ANODE
2. CATHODE

STYLE 2:
PIN 1. CATHODE
2. ANODE

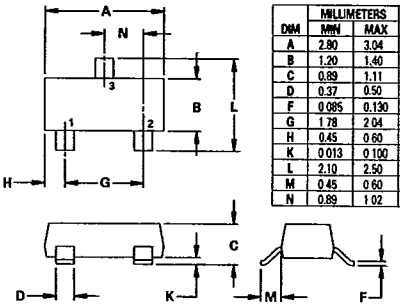
STYLE 3
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	4.32	5.33	0.170	0.210
B	4.45	5.21	0.175	0.205
C	3.18	4.19	0.125	0.165
D	0.41	0.56	0.016	0.022
F	0.407	0.482	0.016	0.019
G	1.27 BSC		0.050 BSC	
H	—	1.27	—	0.050
J	2.54 BSC		0.100 BSC	
K	12.70	—	0.500	—
L	6.35	—	0.250	—
N	2.03	2.66	0.080	0.105
P	2.93	—	0.115	—
R	3.43	—	0.135	—
S	0.36	0.41	0.014	0.016

CASE 318-03 TO-236AB (SOT-23) PLASTIC

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



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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
F	0.085	0.130	0.0034	0.0051
G	1.78	2.04	0.0701	0.0807
H	0.45	0.60	0.0177	0.0236
K	0.013	0.100	0.0005	0.0040
L	2.10	2.50	0.0830	0.0984
M	0.45	0.60	0.0180	0.0236
N	0.89	1.02	0.0350	0.0401

CASE 318 STYLES

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 7.
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9.
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 10.
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE-ANODE

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16
PIN 1. ANODE
2. CATHODE
3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE

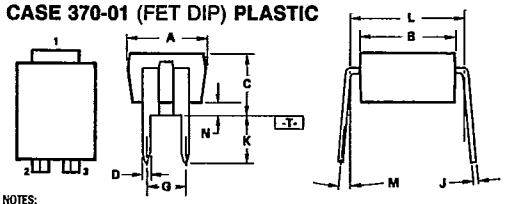
STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE — ANODE

STYLE 20:
PIN 1. CATHODE
2. ANODE
3. GATE

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

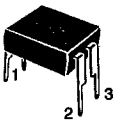
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

CASE 370-01 (FET DIP) PLASTIC



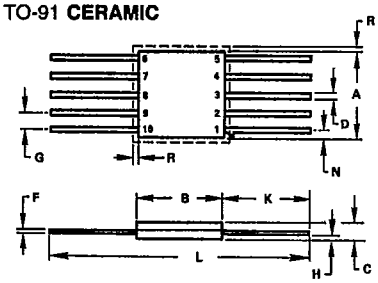
NOTES:
1. SURFACE "T" IS BOTH A DATUM AND SEATING PLANE.
2. POSITIONAL TOLERANCE FOR LEADS: D DIM 4 PL
   ⌖ | 0.27 (0.010) M | -T- | A M
   LEADS: J DIM 4 PL
   ⌖ | 0.27 (0.010) M | -T- | B M
3. DIMENSIONING AND TOLERANCING PER Y14.5M, 1982.
4. CONTROLLING DIMENSION: INCH
5. DIMENSION "J" PRIOR TO SOLDER DIP PLATING

STYLE 1:
PIN 1. DRAIN
2. GATE
3. SOURCE



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	4.70	5.02	0.185	0.198
B	6.10	7.11	0.240	0.280
C	4.06	5.08	0.160	0.200
D	0.38	0.63	0.015	0.025
G	2.54 BSC		0.100 BSC	
J	0.30	0.43	0.012	0.017
K	2.79	3.81	0.110	0.150
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.77	0.020	0.070

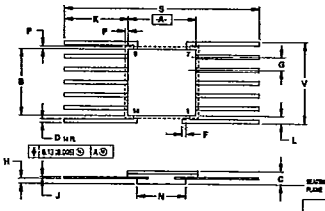
CASE 606-04 TO-91 CERAMIC



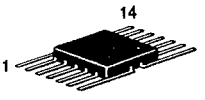
NOTE:
1. ALL RULES & NOTES ASSOCIATED WITH TO-91 OUTLINE SHALL APPLY.
2. LEADS WITHIN 0.25 mm (0.010) TOTAL OF TRUE POSITION AT MAXIMUM MATERIAL CONDITION (AT BODY)

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	6.10	7.36	0.240	0.290
B	6.10	6.60	0.240	0.260
C	0.762	1.77	0.030	0.070
D	0.254	0.482	0.010	0.019
F	0.077	0.152	0.003	0.006
G	1.15	1.39	0.045	0.055
H	0.127	0.889	0.005	0.035
K	1.78	—	0.070	—
R	—	0.381	—	0.015

CASE 607-04 CERAMIC



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.

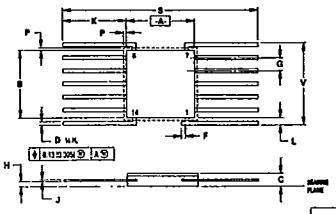


STYLE 1
PIN 1. COLLECTOR
2. BASE
3. EMITTER
4. NOT CONNECTED
5. EMITTER
6. BASE
7. COLLECTOR
8. COLLECTOR
9. BASE
10. EMITTER
11. NOT CONNECTED
12. EMITTER
13. BASE
14. COLLECTOR

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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

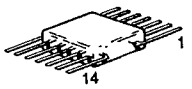
PACKAGE OUTLINE DIMENSIONS (continued) T-90-20

CASE 607-05 CERAMIC



STYLE 1:
PIN 1. COLLECTOR
2. BASE
3. EMITTER
4. NOT CONNECTED
5. EMITTER
6. BASE
7. COLLECTOR
8. COLLECTOR
9. BASE
10. EMITTER
11. NOT CONNECTED
12. EMITTER
13. BASE
14. COLLECTOR

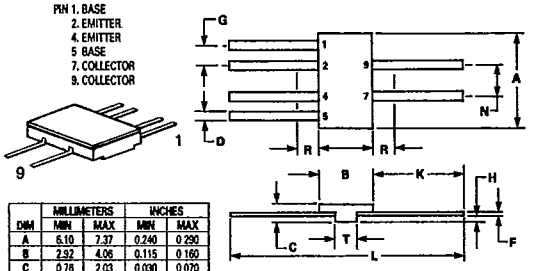
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS P DETERMINE ZONE WITHIN WHICH ALL BODY AND LEAD IRREGULARITIES LIE.



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	6.10	6.60	0.240	0.260
B	6.10	6.60	0.240	0.260
C	0.77	1.77	0.030	0.070
D	0.33	0.48	0.013	0.019
F	—	0.38	—	0.015
G	1.27 BSC		0.050 BSC	
H	0.30	0.88	0.012	0.035
J	0.08	0.15	0.003	0.006
K	6.35	9.39	0.250	0.370
L	0.26	—	0.010	—
P	—	0.38	—	0.015
S	18.80	—	0.740	—
V	7.62	8.38	0.300	0.330

CASE 610A-04 CERAMIC T-91-20

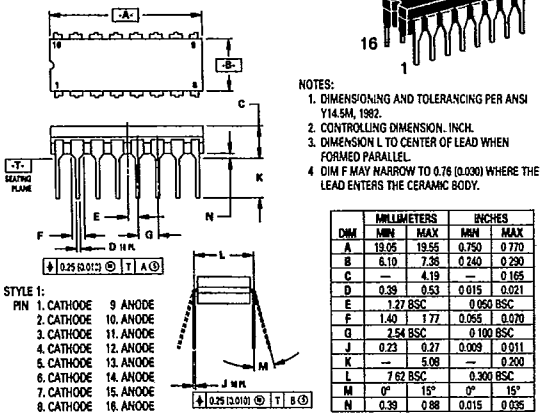
STYLE 1:
PIN 1. BASE
2. EMITTER
4. EMITTER
5. BASE
7. COLLECTOR
9. COLLECTOR



DIM	MILLIMETERS MIN	MAX	INCHES 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
F	0.08	0.15	0.003	0.006
G	1.27 BSC		0.050 BSC	
H	0.13	0.89	0.005	0.035
K	3.81	—	0.150	—
L	10.54	—	0.415	—
N	2.54 BSC		0.100 BSC	
R	—	1.27	—	0.050
T	1.65	2.03	0.065	0.080

NOTES:
1. DIM "D," "G" & "N" TO BE MEASURED IN ZONE "R."
2. LEADS WITHIN 0.13 mm (0.005) TOTAL OF TRUE POSITION WITHIN "R" AT MAXIMUM MATERIAL CONDITION.

CASE 620-09 (16-PIN DIP) CERAMIC

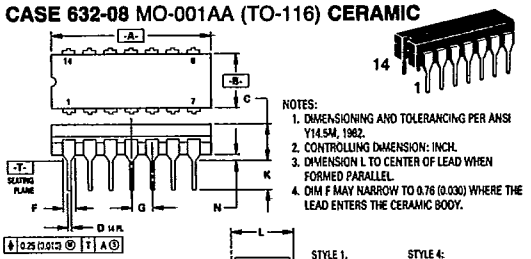


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.

STYLE 1:
PIN 1. CATHODE 9 ANODE
2. CATHODE 10. ANODE
3. CATHODE 11. ANODE
4. CATHODE 12. ANODE
5. CATHODE 13. ANODE
6. CATHODE 14. ANODE
7. CATHODE 15. ANODE
8. CATHODE 16. ANODE

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	19.05	19.55	0.750	0.770
B	6.10	7.36	0.240	0.290
C	—	4.19	—	0.165
D	0.39	0.53	0.015	0.021
E	1.27 BSC		0.050 BSC	
F	1.40	1.77	0.055	0.070
G	2.54 BSC		0.100 BSC	
J	0.23	0.27	0.009	0.011
K	—	5.08	—	0.200
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.39	0.88	0.015	0.035

CASE 632-08 MO-001AA (TO-116) CERAMIC



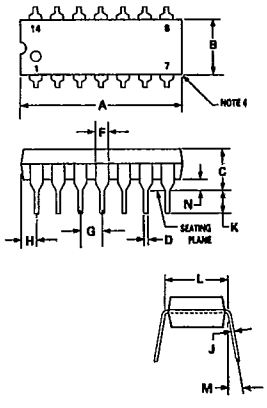
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	19.05	19.94	0.750	0.785
B	6.23	7.11	0.245	0.280
C	3.94	5.08	0.155	0.200
D	0.39	0.50	0.015	0.020
F	1.40	1.65	0.055	0.065
G	2.54 BSC		0.100 BSC	
J	0.21	0.38	0.008	0.015
K	3.18	4.31	0.125	0.170
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.01	0.020	0.040

STYLE 1. PIN 1. COLLECTOR 2. BASE 3. EMITTER 4. NO CONNECTION 5. EMITTER 6. BASE 7. COLLECTOR 8. COLLECTOR 9. BASE 10. EMITTER 11. NO CONNECTION 12. EMITTER 13. BASE 14. COLLECTOR

STYLE 4. PIN 1. DRAIN 2. SOURCE 3. GATE 4. NO CONNECTION 5. GATE 6. SOURCE 7. DRAIN 8. DRAIN 9. SOURCE 10. GATE 11. NO CONNECTION 12. GATE 13. SOURCE 14. DRAIN

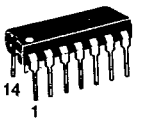
CASE 646-06 (14-PIN DIP) PLASTIC



STYLE 1.
PIN 1. COLLECTOR
2. BASE
3. EMITTER
4. NO CONNECTION
5. EMITTER
6. BASE
7. COLLECTOR
8. COLLECTOR
9. BASE
10. EMITTER
11. NO CONNECTION
12. EMITTER
13. BASE
14. COLLECTOR

STYLE 5.
PIN 1. GATE
2. DRAIN
3. SOURCE
4. NO CONNECTION
5. SOURCE
6. DRAIN
7. GATE
8. GATE
9. DRAIN
10. SOURCE
11. NO CONNECTION
12. SOURCE
13. DRAIN
14. GATE

NOTES:
1. LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
2. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
3. DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
4. ROUNDED CORNERS OPTIONAL.

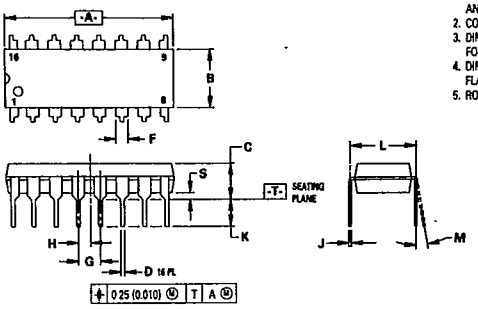


DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	18.16	19.56	0.715	0.770
B	6.10	6.60	0.240	0.260
C	3.69	4.69	0.145	0.185
D	0.38	0.53	0.015	0.021
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.32	2.41	0.052	0.095
J	0.20	0.38	0.008	0.015
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	0°	10°	0°	10°
N	0.39	1.01	0.015	0.039

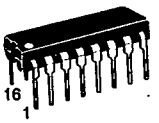
7

PACKAGE OUTLINE DIMENSIONS (continued)

CASE 648-08 (16-PIN DIP) PLASTIC



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION "B" DOES NOT INCLUDE MOLD FLASH
5. ROUNDED CORNERS OPTIONAL.

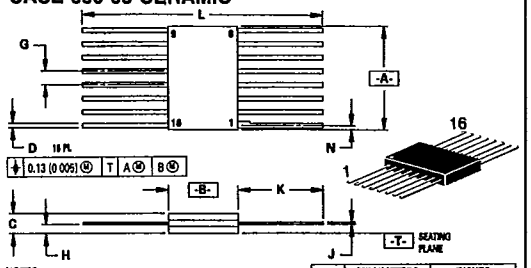


STYLE 1:
PIN 1. CATHODE
2. CATHODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE
7. CATHODE
8. CATHODE
9. ANODE
10. ANODE
11. ANODE
12. ANODE
13. ANODE
14. ANODE
15. ANODE
16. ANODE

STYLE 2
PIN 1. COMMON DRAIN
2. COMMON DRAIN
3. COMMON DRAIN
4. COMMON DRAIN
5. COMMON DRAIN
6. COMMON DRAIN
7. COMMON DRAIN
8. COMMON DRAIN
9. GATE
10. SOURCE
11. GATE
12. SOURCE
13. GATE
14. SOURCE
15. GATE
16. SOURCE

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	18.80	19.55	0.740	0.770
B	6.35	6.85	0.250	0.270
C	3.69	4.44	0.145	0.175
D	0.39	0.53	0.015	0.021
F	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.27 BSC		0.050 BSC	
J	0.21	0.38	0.008	0.015
K	2.80	3.30	0.110	0.130
L	7.50	7.74	0.295	0.305
M	0°	10°	0°	10°
S	0.51	1.01	0.020	0.040

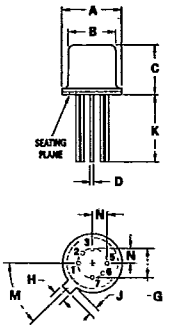
CASE 650-05 CERAMIC



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.

	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	8.35	9.39	0.250	0.370
L	18.93	—	0.745	—
N	—	0.50	—	0.020

CASE 654-07 METAL

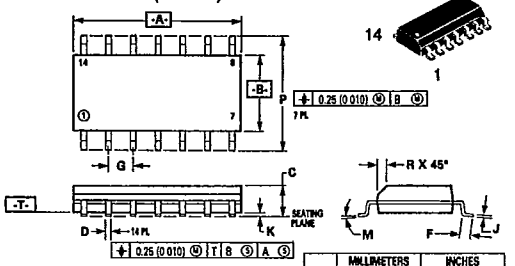


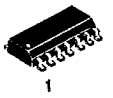
STYLE 1:
PIN 1. COLLECTOR
2. BASE
3. EMITTER
4. OMITTED
5. EMITTER
6. BASE
7. COLLECTOR
8. OMITTED

STYLE 5:
SIDE 1 (NPN)
PIN 1. COLLECTOR
2. BASE
3. EMITTER
4. OMITTED
SIDE 2 (PNP)
5. EMITTER
6. BASE
7. COLLECTOR
8. OMITTED

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.51	9.40	0.335	0.370
B	7.75	8.51	0.305	0.335
C	3.81	4.70	0.150	0.185
D	0.41	0.53	0.016	0.021
G	5.08 BSC		0.200 BSC	
H	0.71	0.86	0.028	0.034
J	0.74	1.14	0.029	0.045
K	12.70	—	0.500	—
M	45° BSC		45° BSC	
N	2.54 BSC		0.100 BSC	

CASE 751A-02 (SO-14) PLASTIC

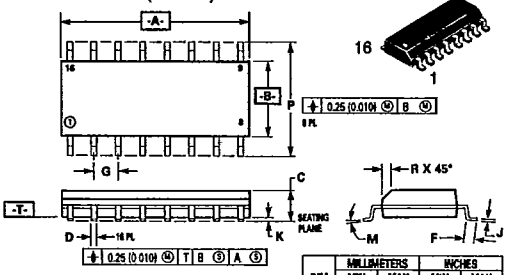


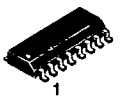


NOTES:
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
3. CONTROLLING DIMENSION: MILLIMETER.
4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
5. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

	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 751B-03 (SO-16) PLASTIC





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.

	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