

**Surface Mount
Plastic PIN Diodes**

**SMPP Series
V6**

Features

- Industry Standard Surface Mount Packages
- Lead-Free (RoHS Compliant) Equivalents Available with 260 °C Reflow Compatibility
- Low Loss, High Isolation Switching Diodes
- Low Distortion Attenuator Diodes
- Single and Dual Diode Configurations
- Tape and Reel Packaging

Description and Applications

M/A-COM offers silicon PIN diodes in five standard, low cost, surface mount plastic packages for use as switches and attenuators. These diodes are offered with standard Sn/Pb plating, as well as with 100% matte Sn plating on our RoHS compliant devices. M/A-COM's PIN diodes feature a variety of low resistance, low capacitance devices for various microwave control circuit applications.

The MA4P275/MA4P7436 series offer the lowest series resistance for best performance as low loss series switches and high isolation shunt switches.

The MA4P789/MA4P7433 series have the lowest capacitance and offers the highest isolation in series and series-shunt switches through 3GHz.

The MA4P282/MA4P7447 series and the MA4P274/MA4P7455 series are general purpose PIN diodes useful as either switches or attenuators.

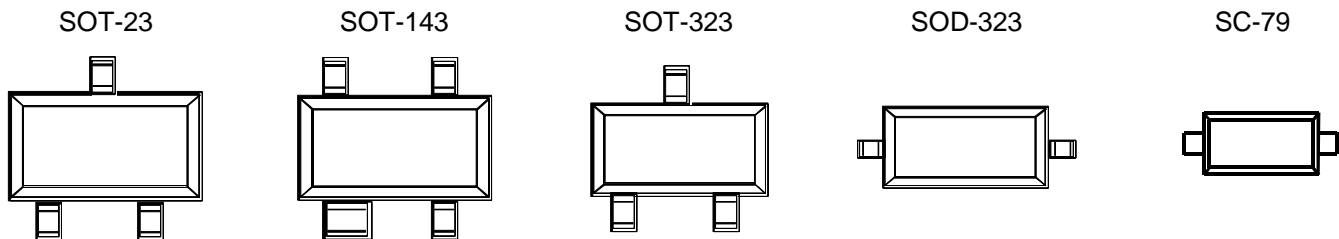
The MA4P277/MA4P7437 series and MA4P278/MA4P7438 devices have thicker intrinsic regions to provide lower distortion in attenuator circuits.

The MA4P290/MA4P7439 devices have the thickest I-Region, offering the lowest distortion and highest IP3 for current controlled attenuator circuits. These devices are ideal for AGC functions for infrastructure and CATV applications.

These parts are available as single diodes, series tees (ST), series tee reverse (STR), common cathode pairs (CK), common anode pairs (CA), and unconnected pairs in the respective featured packages.

M/A-COM's PIN diodes are available in the SOT-23 (case style 287), the SOT-143 (case style 1068), the SOT-323/SC-70 (3L) (case style 1146), the SOD-323 (case style 1141), and the SC-79 (case style 1279) packages. These packages are supplied on tape and reel for automatic pick and place assembly. The tape and reel suffix designation is a "T" at the end of the part number.

Package Outlines



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Absolute Maximum Ratings @ 25 °C¹ (Unless Otherwise Noted)

Parameter	Absolute Maximum Value
Operating Temperature	-65°C to +150 °C
Storage Temperature	-65°C to +125 °C
Junction Temperature	+ 175 °C
RF C.W. Incident Power @ 25 °C: MA4P282 / MA4P7447 (θ die = 15 °C / W), RF & DC Incident De-rating Coefficient = - 21.3 mW / °C MA4P275 / MA4P7436 (θ die = 25 °C / W), RF & DC Incident De-rating Coefficient = - 16.8 mW / °C MA4P278 / MA4P7438 (θ die = 30 °C / W), RF & DC Incident De-rating Coefficient = - 13.3 mW / °C MA4P274 / MA4P7455 (θ die = 35 °C / W), RF & DC Incident De-rating Coefficient = - 13.3 mW / °C MA4P277 / MA4P7437 (θ die = 45 °C / W), RF & DC Incident De-rating Coefficient = - 13.3 mW / °C MA4P290 / MA4P7439 (θ die = 55 °C / W), RF & DC Incident De-rating Coefficient = - 13.3 mW / °C MA4P789 / MA4P7433 (θ die = 80 °C / W), RF & DC Incident De-rating Coefficient = - 10.7 mW / °C	+ 32 dBm + 31 dBm + 30 dBm + 30 dBm + 30 dBm + 30 dBm + 29 dBm
Total (RF + DC) Power Dissipation @ 25 °C (SOT-23, SOT-143) : RF & DC Dissipated De-rating Coefficient = - 33.3 mW / °C (SOT-323, SOD-323, SC-79) : RF & DC Dissipated De-rating Coefficient = - 26.7 mW / °C	250 mW 200 mW
Reverse Voltage	Voltage Rating
Forward Current	150 mA DC

1. Operation of these devices above any one of these parameters may cause permanent damage.

Electrical Specifications @ 25°C


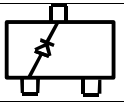
Standard Part Number	RoHS Compliant Part Number	Reverse Voltage ¹ (V)	Total Capacitance ² Max. (pF)	R _s @ 10 mA ³ Max. (Ohms)	Nominal Characteristics	
					Carrier Lifetime ⁴ (ms)	I-Region Thickness (mils)
MA4P275	MA4P7436	75	1.00 @ 20V	0.5	0.2	0.4
MA4P789	MA4P7433	75	0.35 @ 20V	1.5	0.2	0.4
MA4P282	MA4P7447	100	1.20 @ 20V	0.6	1.0	0.8
MA4P274	MA4P7455	100	0.35 @ 50V	3.0	1.0	2.0
MA4P277	MA4P7437	200	0.35 @ 50V	6.0	2.0	4.0
MA4P278	MA4P7438	200	0.35 @ 50V	10.0	3.0	5.0
MA4P290	MA4P7439	200	0.30 @ 50V	16.0	3.0	7.0

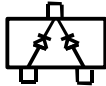
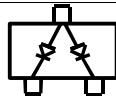
1. The reverse current will not exceed 10 μ A at the reverse voltage rating.
2. Total capacitance is measured at 1 MHz at the indicated voltage.
3. Series resistance is measured at the specified current and a frequency of 100 MHz.
4. Nominal minority carrier lifetime is measured at I_F = 10 mA, I_R = 6 mA, 90% recovery.

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Packaging and Configurations

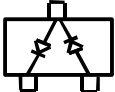

					
Single				Single	
SC-79		SOD-323		SOT-23	
Standard Part Number	RoHS Compliant Part Number	Standard Part Number	RoHS Compliant Part Number	Standard Part Number	RoHS Compliant Part Number
MA4P275-1279T	MA4P7436-1279T	MA4P275-1141T	MA4P7436-1141T	MA4P275-287T	MA4P7436-287T
MA4P789-1279T	MA4P7433-1279T	MA4P789-1141T	MA4P7433-1141T	MA4P789-287T	MA4P7433-287T
MA4P282-1279T	MA4P7447-1279T	MA4P282-1141T	MA4P7447-1141T	MA4P282-287T	MA4P7447-287T
MA4P274-1279T	MA4P7455-1279T	MA4P274-1141T	MA4P7455-1141T	MA4P274-287T	MA4P7455-287T
		MA4P277-1141T	MA4P7437-1141T	MA4P277-287T	MA4P7437-287T
		MA4P278-1141T	MA4P7438-1141T	MA4P278-287T	MA4P7438-287T
		MA4P290-1141T	MA4P7439-1141T	MA4P290-287T	MA4P7439-287T
$L_S = 0.6 \text{ nH}$		$L_S = 0.6 \text{ nH}$		$L_S = 1.4 \text{ nH}$	
$C_P = 0.10 \text{ pF}$		$C_P = 0.11 \text{ pF}$		$C_P = 0.12 \text{ pF}$	

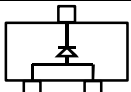
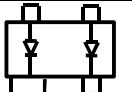
							
Common Cathode				Common Anode			
SOT-23		SC70 (3L)		SOT-23		SC70 (3L)	
Standard Part Number	RoHS Compliant Part Number	Standard Part Number	RoHS Compliant Part Number	Standard Part Number	RoHS Compliant Part Number	Standard Part Number	RoHS Compliant Part Number
MA4P275CK-287T	MA4P7436CK-287T	MA4P275CK-1146T	MA4P7436CK-1146T	MA4P275CA-287T	MA4P7436-287T	MA4P275CA-1146T	MA4P7436CA-1146T
MA4P289CK-287T	MA4P7433CK-287T	MA4P789CK-1146T	MA4P7433CK-1146T	MA4P789CA-287T	MA4P7433-287T	MA4P789CA-1146T	MA4P7433CA-1146T
MA4P282CK-287T	MA4P7447CK-287T			MA4P282CA-287T	MA4P7447-287T		
MA4P274CK-287T	MA4P7455CK-287T	MA4P274CK-1146T	MA4P7455CK-1146T	MA4P274CA-287T	MA4P7455-287T	MA4P274CA-1146T	MA4P7455CA-1146T
MA4P277CK-287T	MA4P7437CK-287T			MA4P277CA-287T	MA4P7437-287T		
MA4P278CK-287T	MA4P7436CK-287T			MA4P278CA-287T	MA4P7438-287T		
MA4P290CK-287T	MA4P7439CK-287T			MA4P290CA-287T	MA4P7439-287T		
$L_S = 1.4 \text{ nH}$		$L_S = 1.3 \text{ nH}$		$L_S = 1.4 \text{ nH}$		$L_S = 0.6 \text{ nH}$	
$C_P = 0.12 \text{ pF}$		$C_P = 0.12 \text{ pF}$		$C_P = 0.12 \text{ pF}$		$C_P = 0.10 \text{ pF}$	

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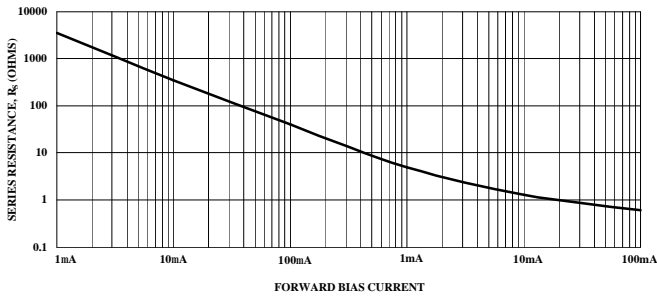
Packaging and Configurations

							
Series Tee				Series Tee Reverse			
SOT-23		SC70 (3L)		SOT-23		SC70 (3L)	
Standard Part Number	RoHS Compliant Part Number	Standard Part Number	RoHS Compliant Part Number	Standard Part Number	Standard Part Number	Standard Part Number	RoHS Compliant Part Number
MA4P275ST-287T	MA4P7436ST-287T	MA4P275ST-1146T	MA4P7436ST-1146T	MA4P275STR-287T	MA4P7436STR-287T	MA4P275STR-1146T	MA4P7436STR-1146T
MA4P789ST-287T	MA4P7433ST-287T	MA4P789ST-1146T	MA4P7433ST-1146T	MA4P789STR-287T	MA4P7433STR-287T	MA4P789STR-1146T	MA4P7433STR-1146T
MA4P282ST-287T	MA4P7447ST-287T	MA4P282ST-1146T	MA4P7447ST-1146T	MA4P282STR-287T	MA4P7447STR-287T	MA4P282STR-1146T	MA4P7447STR-1146T
MA4P274ST-287T	MA4P7455ST-287T	MA4P274CK-1146T	MA4P7455ST-1146T	MA4P274STR-287T	MA4P7455STR-287T	MA4P274STR-1146T	MA4P7455STR-1146T
MA4P277ST-287T	MA4P7437ST-287T	MA4P277ST-1146T	MA4P7437ST-1146T	MA4P277STR-287T	MA4P7437STR-287T	MA4P277STR-1146T	MA4P7437STR-1146T
MA4P278ST-287T	MA4P7436ST-287T	MA4P278ST-1146T	MA4P7436ST-1146T	MA4P278STR-287T	MA4P7438STR-287T	MA4P278STR-1146T	MA4P7438STR-1146T
MA4P290ST-287T	MA4P7439ST-287T	MA4P290ST-1146T	MA4P7439ST-1146T	MA4P290STR-287T	MA4P7439STR-287T	MA4P290STR-1146T	MA4P7439STR-1146T
$L_S = 1.4 \text{ nH}$		$L_S = 1.3 \text{ nH}$		$L_S = 1.4 \text{ nH}$		$L_S = 1.3 \text{ nH}$	
$C_P = 0.12 \text{ pF}$		$C_P = 0.12 \text{ pF}$		$C_P = 0.12 \text{ pF}$		$C_P = 0.12 \text{ pF}$	

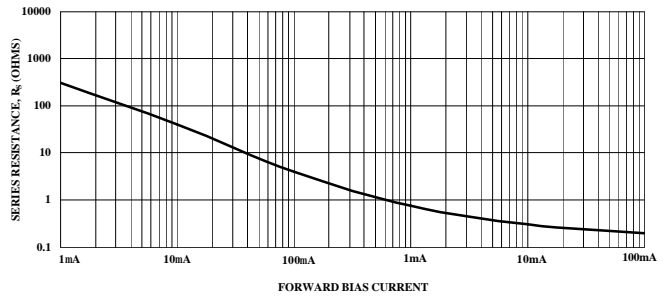
			
Low Inductance		Unconnected Pair	
SOT-23		SOT-143	
Standard Part Number	RoHS Compliant Part Number	Standard Part Number	RoHS Compliant Part Number
MA4P290-LI-287T	MA4P7439LI-287T	MA4P275-1068T	MA4P7436-1068T
		MA4P789-1068T	MA4P7433-1068T
		MA4P274-1068T	MA4P7455-1068T
$L_S = 0.4 \text{ nH}$		$L_S = 1.3 \text{ nH}$	
$C_P = 0.12 \text{ pF}$		$C_P = 0.12 \text{ pF}$	

Typical Forward Resistance vs DC Bias Current Curves @ 100 MHz

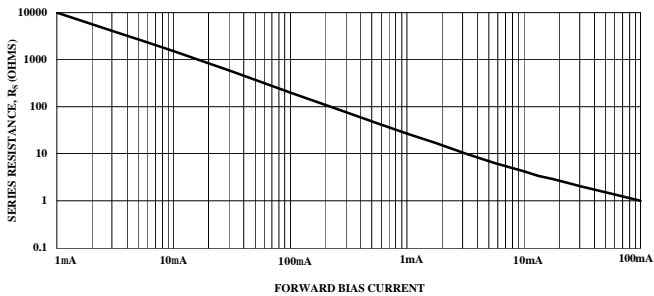
**Resistance vs Forward Current
(MA4P274 / MA4P7455 Series)**



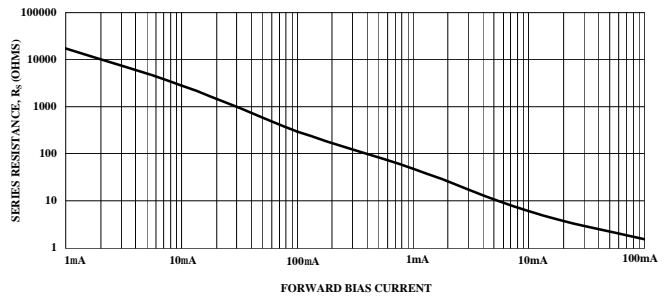
**Resistance vs Forward Current
(MA4P275 / MA4P7436 Series)**



**Resistance vs Forward Current
(MA4P277 / MA4P7437 Series)**

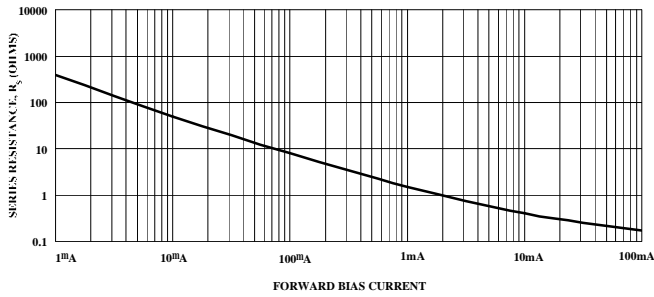


**Resistance vs Forward Current
(MA4P278 / MA4P7438 Series)**

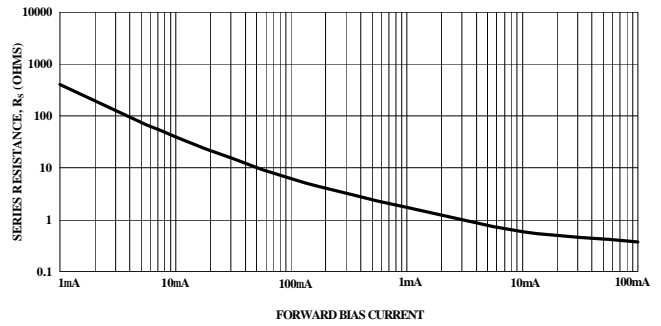


Typical Forward Resistance vs DC Bias Current Curves @ 100 MHz

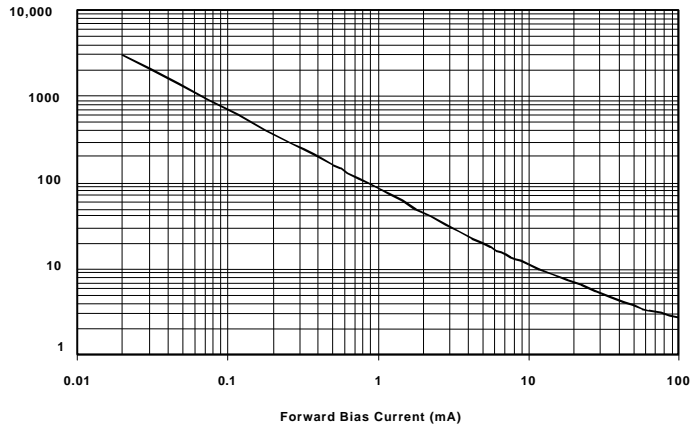
**Resistance vs Forward Current
(MA4P282 / MA4P7447 Series)**



**Resistance vs Forward Current
(MA4P789 / MA4P7433 Series)**



**Resistance vs Forward Current
(MA4P290 / MA4P7439 Series)**



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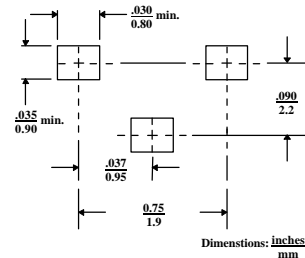
Mounting Information

The illustration indicates the recommended mounting pad configuration for the SOT-23, SOT-323, SOD-323, SOT-143, and SC-79 packages. Solder paste containing flux should be screened onto the pads to a thickness of 0.005-0.007 inches. The plastic package is placed in position, firmly adhering to the solder paste.

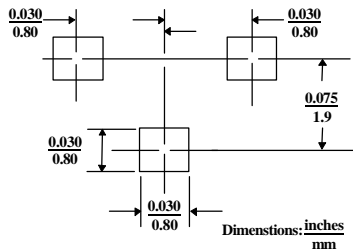
Permanent attachment is performed by a reflow soldering procedure during which the tab temperature does not exceed +275 °C and the body temperature does not exceed +250 °C, for standard models and +260 °C for the RoHS compliant devices.

Please refer to Application Note M538 for surface mounting instructions.

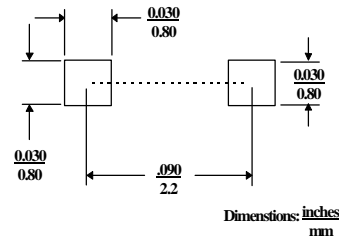
SOT-23



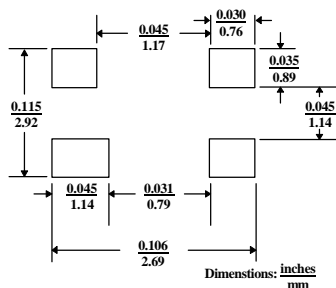
SOT-323



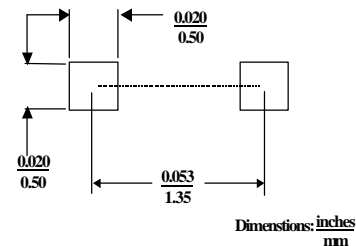
SOD-323



SOT-143



SC-79



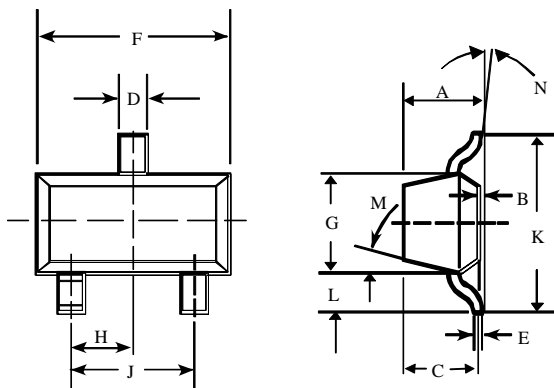
**Surface Mount
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Case Styles

SOT-23

Case Style 287



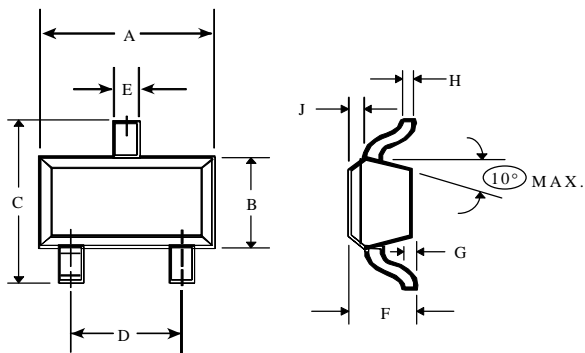
SOT-23 (Case Style 287)

DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	—	0.048	—	1.22
B	—	0.008	—	0.20
C	—	0.040	—	1.00
D	0.013	0.020	0.35	0.50
E	0.003	0.006	0.08	0.15
F	0.110	0.119	2.80	3.00
G	0.047	0.056	1.20	1.40
H	0.037 typical		0.95 typical	
J	0.075 typical		1.90 typical	
K	—	0.103	—	2.60
L	—	0.024	—	0.60
DIM.	GRADIENT			
M	10° max. ¹			
N	2° . . .30°			

Note: 1. Applicable on all sides

SOT-323

Case Style 1146



SOT-323 (Case Style 1146)

DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.063	0.087	1.6	2.2
B	0.045	0.053	1.15	1.35
C	0.079	0.087	2.0	2.2
D	0.047	0.055	1.2	1.4
E	0.008	0.016	0.2	0.4
F	0.031	0.039	0.8	1.0
G	—	0.004	—	0.1
H	0.003	0.006	0.08 typical	0.15
J	0.004	0.010	0.1	0.25

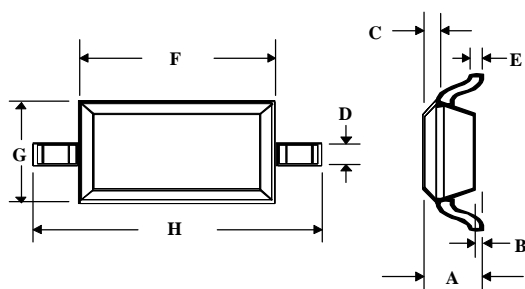
**Surface Mount
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**SMPP Series
V6**

Case Styles (Cont'd)

SOD-323

Case Style 1141

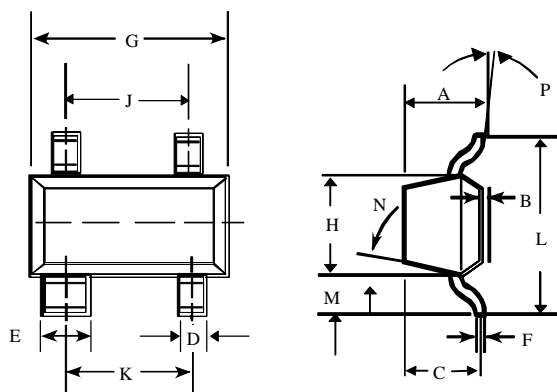


SOD-323 (Case Style 1141)

DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	—	0.043	—	1.1
B	—	0.004	—	0.1
C	—	0.008	—	0.2
D	0.010	0.016	0.25	0.4
E	0.003	0.006	0.08	0.15
F	0.063	0.075	1.6	1.9
G	0.045	0.057	1.15	1.45
H	0.091	0.106	2.3	2.7

SOT-143

Case Style 1068



SOT-143 (Case Style 1068)

DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	—	0.044	—	1.10
B	—	0.004	—	0.10
C	—	0.040	—	1.00
D	0.013	0.020	0.35	0.50
E	0.030	0.035	0.75	0.90
F	0.003	0.006	0.08	0.15
G	0.110	0.119	2.80	3.00
H	0.047	0.056	1.20	1.40
J	0.075 typical		1.90 typical	
K	0.075 typical		1.90 typical	
L	—	0.103	—	2.6
M	—	0.024	—	0.6
DIM.	GRADIENT			
M	10° max. ¹			
N	2° . . . 30°			

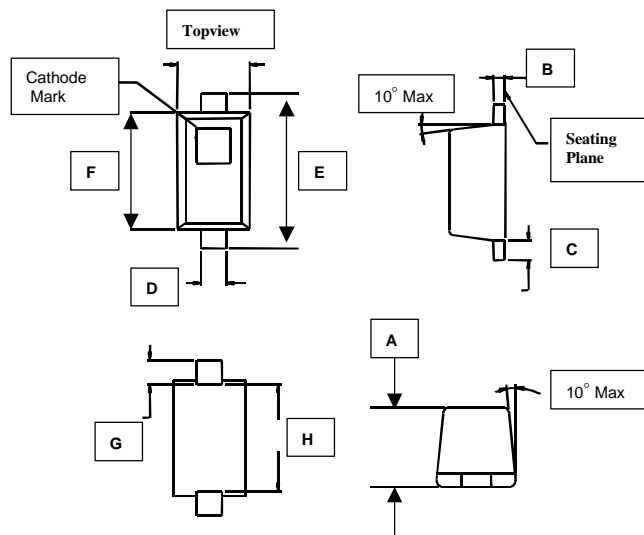
Note: 1. Applicable on all sides

Case Styles (Cont'd)

SC-79 (Case Style 1279)

SC-79

Case Style 1279



DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.020	0.028	0.50	0.71
B	0.003	0.008	0.08	0.20
C	0.006	0.010	0.15	0.25
D	0.010	0.014	0.25	0.36
E	0.059	0.067	0.08	0.15
F	0.043	0.051	1.50	1.30
G	0.011	0.012	0.28	0.30
H	0.037	0.043	0.94	1.09