

# MMJT9435

Preferred Device

勝特力材料 886-3-5753170  
勝特力电子(上海) 86-21-54151736  
勝特力电子(深圳) 86-755-83298787  
[Http://www.100y.com.tw](http://www.100y.com.tw)



## Bipolar Power Transistors

### PNP Silicon

#### Features

- Pb-Free Packages are Available
- Collector–Emitter Sustaining Voltage –  
 $V_{CEO(sus)} = 30 \text{ Vdc (Min) @ } I_C = 10 \text{ mAdc}$
- High DC Current Gain –  
 $h_{FE} = 125 \text{ (Min) @ } I_C = 0.8 \text{ Adc}$   
 $= 90 \text{ (Min) @ } I_C = 3.0 \text{ Adc}$
- Low Collector–Emitter Saturation Voltage –  
 $V_{CE(sat)} = 0.275 \text{ Vdc (Max) @ } I_C = 1.2 \text{ Adc}$   
 $= 0.55 \text{ Vdc (Max) @ } I_C = 3.0 \text{ Adc}$
- SOT-223 Surface Mount Packaging
- Epoxy Meets UL 94, V-0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B; > 8000 V  
Machine Model, C; > 400 V

ON Semiconductor®

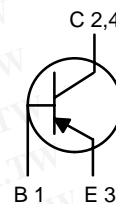
<http://onsemi.com>

#### POWER BJT

$I_C = 3.0 \text{ AMPERES}$

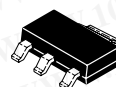
$BV_{CEO} = 30 \text{ VOLTS}$

$V_{CE(sat)} = 0.275 \text{ VOLTS}$

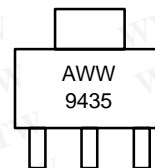


Schematic

#### MARKING DIAGRAM

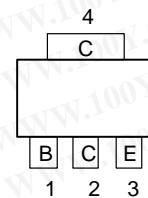


SOT-223  
CASE 318E  
STYLE 1



9435 = Specific Device Code  
A = Assembly Location  
WW = Work Week

#### PIN ASSIGNMENT



Top View Pinout

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

**MAXIMUM RATINGS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	30	Vdc
Collector-Base Voltage	$V_{CB}$	45	Vdc
Emitter-Base Voltage	$V_{EB}$	6.0	Vdc
Base Current – Continuous	$I_B$	1.0	Adc
Collector Current – Continuous – Peak	$I_C$	3.0 5.0	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$ Total $P_D$ @ $T_A = 25^\circ\text{C}$ mounted on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material Total $P_D$ @ $T_A = 25^\circ\text{C}$ mounted on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material	$P_D$	3.0 24 1.56 0.72	W mW/ $^\circ\text{C}$ W
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case – Junction-to-Ambient on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material – Junction-to-Ambient on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material	$R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	42 80 174	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	$T_L$	260	$^\circ\text{C}$

**ORDERING INFORMATION**

Device	Package	Shipping†
MMJT9435T1	SOT-223	1000 / Tape & Reel
MMJT9435T1G	SOT-223 (Pb-Free)	1000 / Tape & Reel
MMJT9435T3	SOT-223	4000 / Tape & Reel
MMJT9435T3G	SOT-223 (Pb-Free)	4000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Sustaining Voltage ( $I_C = 10 \text{ mAdc}$ , $I_B = 0 \text{ Adc}$ )	$V_{CEO(sus)}$	30	—	—	Vdc
Emitter-Base Voltage ( $I_E = 50 \mu\text{Adc}$ , $I_C = 0 \text{ Adc}$ )	$V_{EBO}$	6.0	—	—	Vdc
Collector Cutoff Current ( $V_{CE} = 25 \text{ Vdc}$ , $R_{BE} = 200 \Omega$ ) ( $V_{CE} = 25 \text{ Vdc}$ , $R_{BE} = 200 \Omega$ , $T_J = 125^\circ\text{C}$ )	$I_{CER}$	—	—	20 200	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{BE} = 5.0 \text{ Vdc}$ )	$I_{EBO}$	—	—	10	$\mu\text{Adc}$

**ON CHARACTERISTICS** (Note 1)

Collector-Emitter Saturation Voltage ( $I_C = 0.8 \text{ Adc}$ , $I_B = 20 \text{ mAdc}$ ) ( $I_C = 1.2 \text{ Adc}$ , $I_B = 20 \text{ mAdc}$ ) ( $I_C = 3.0 \text{ Adc}$ , $I_B = 0.3 \text{ Adc}$ )	$V_{CE(sat)}$	—	0.155	0.210	Vdc
		—	—	0.275	
		—	—	0.550	
Base-Emitter Saturation Voltage ( $I_C = 3.0 \text{ Adc}$ , $I_B = 0.3 \text{ Adc}$ )	$V_{BE(sat)}$	—	—	1.25	Vdc
Base-Emitter On Voltage ( $I_C = 1.2 \text{ Adc}$ , $V_{CE} = 4.0 \text{ Vdc}$ )	$V_{BE(on)}$	—	—	1.10	Vdc
DC Current Gain ( $I_C = 0.8 \text{ Adc}$ , $V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 1.2 \text{ Adc}$ , $V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 3.0 \text{ Adc}$ , $V_{CE} = 1.0 \text{ Vdc}$ )	$h_{FE}$	125	220	—	—
		110	—	—	—
		90	—	—	—
		—	—	—	—

**DYNAMIC CHARACTERISTICS**

Output Capacitance ( $V_{CB} = 10 \text{ Vdc}$ , $I_E = 0 \text{ Adc}$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	100	150	pF
Input Capacitance ( $V_{EB} = 8.0 \text{ Vdc}$ )	$C_{ib}$	—	135	—	pF
Current-Gain – Bandwidth Product (Note 2) ( $I_C = 500 \text{ mA}$ , $V_{CE} = 10 \text{ V}$ , $F_{test} = 1.0 \text{ MHz}$ )	$f_T$	—	110	—	MHz

 1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

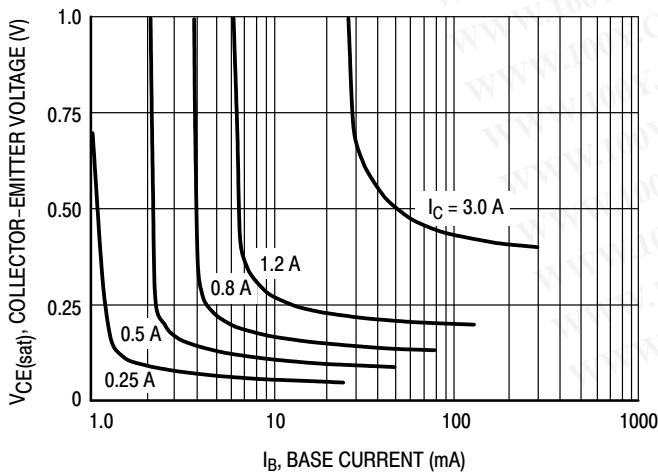
 2.  $f_T = |h_{FE}| \cdot f_{test}$ 


Figure 1. Collector Saturation Region

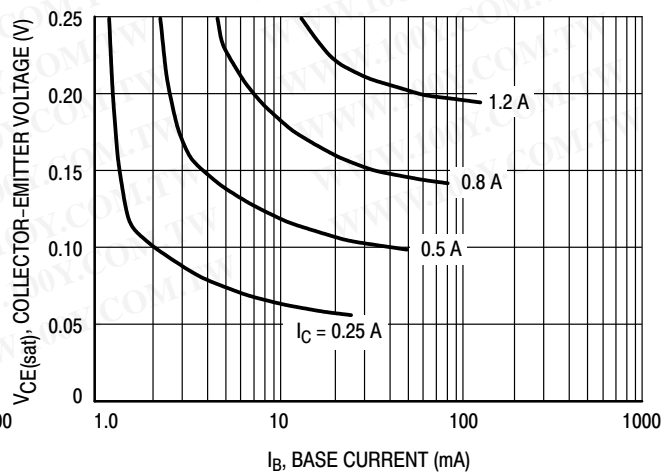


Figure 2. Collector Saturation Region

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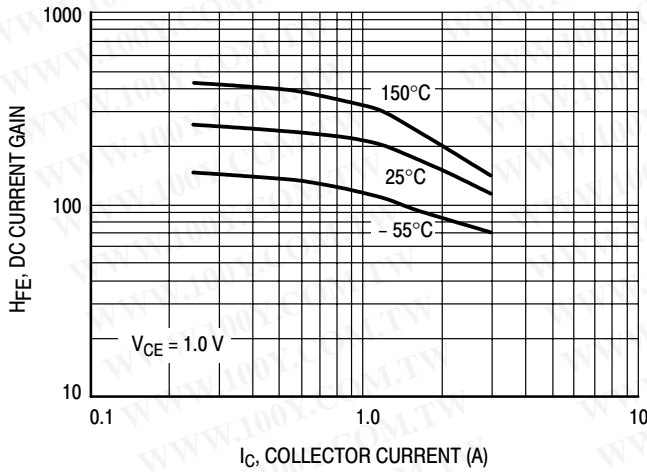


Figure 3. DC Current Gain

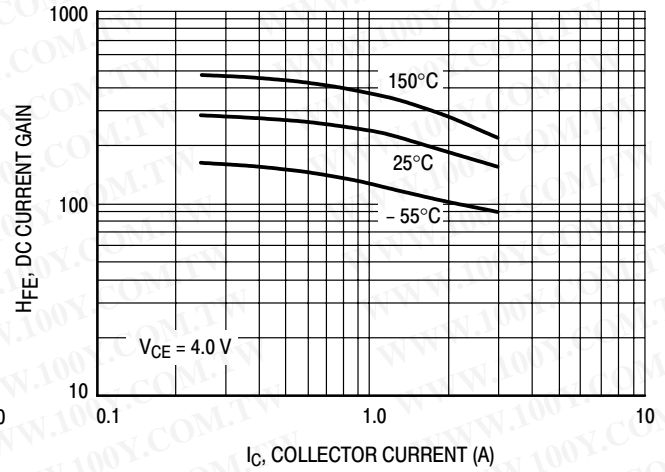


Figure 4. DC Current Gain

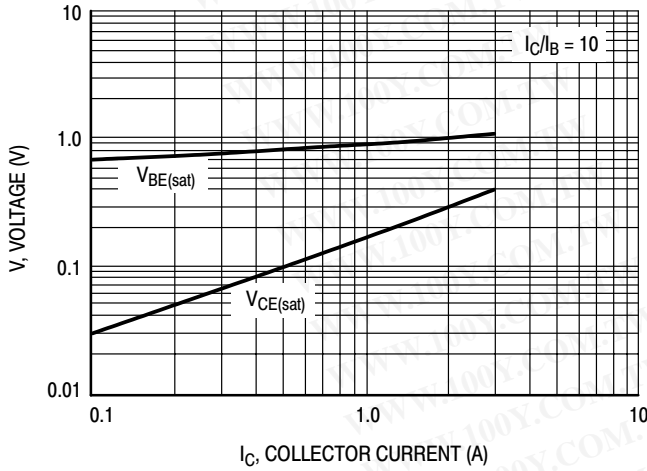


Figure 5. "On" Voltages

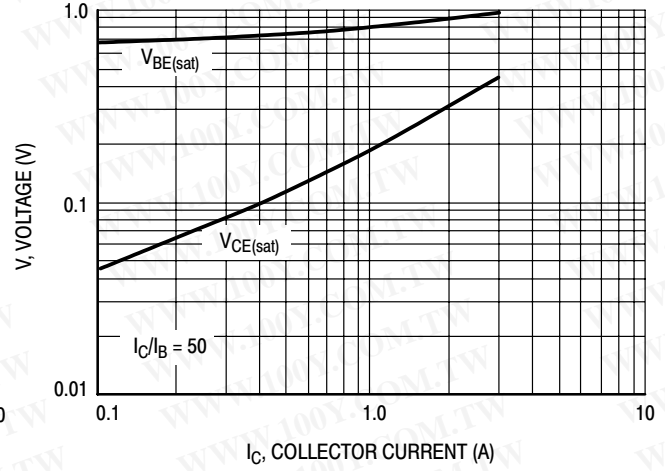


Figure 6. "On" Voltages

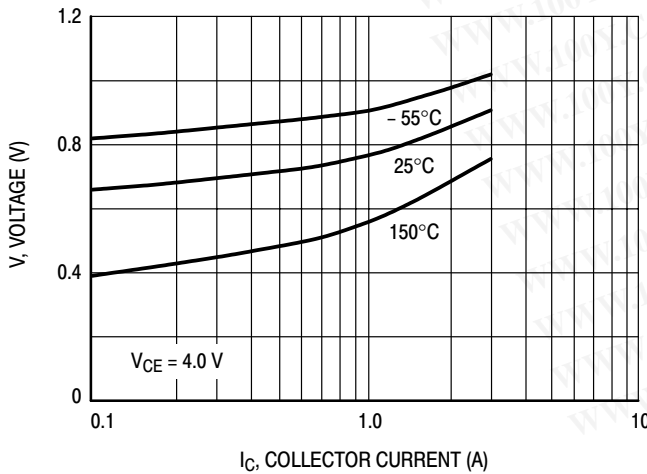


Figure 7.  $V_{BE(on)}$  Voltage

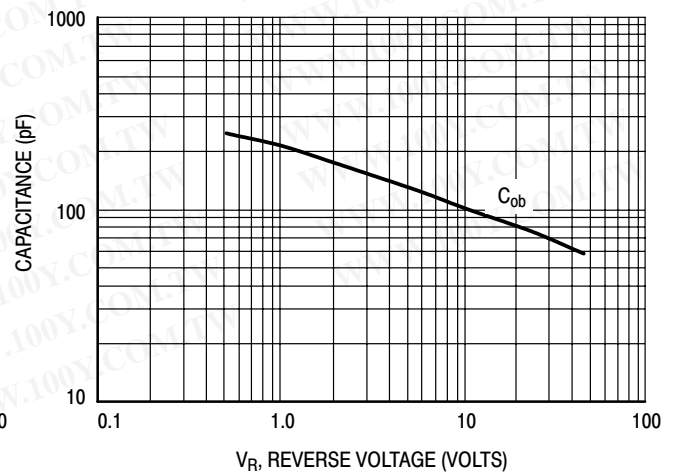


Figure 8. Output Capacitance

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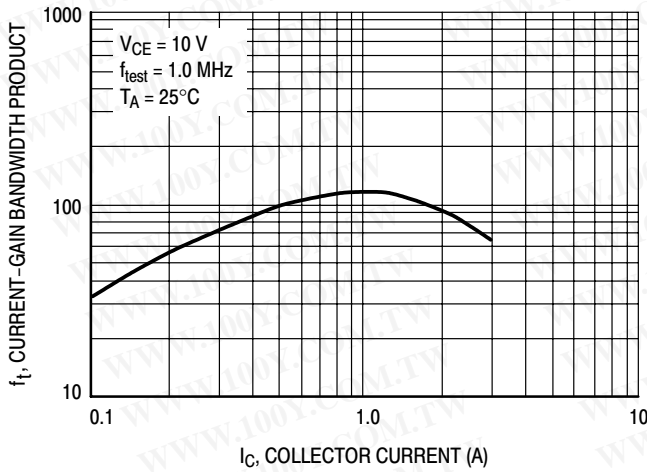


Figure 9. Current-Gain Bandwidth Product

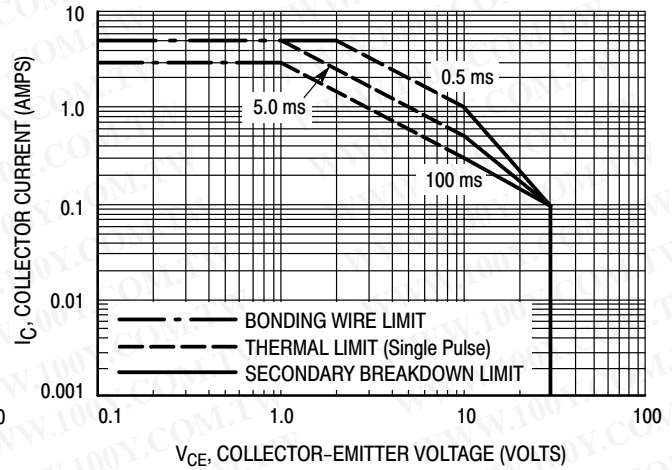


Figure 10. Active Region Safe Operating Area

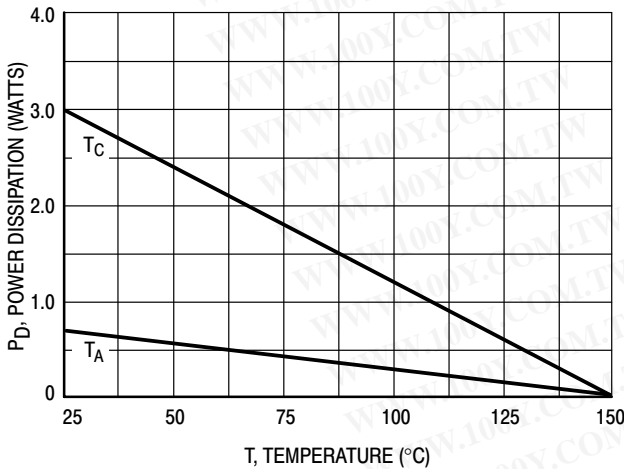


Figure 11. Power Derating

There are two limitations on the power handling ability of a transistor: average junction temperature and secondary breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 10 is based on  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Secondary breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 12. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown.

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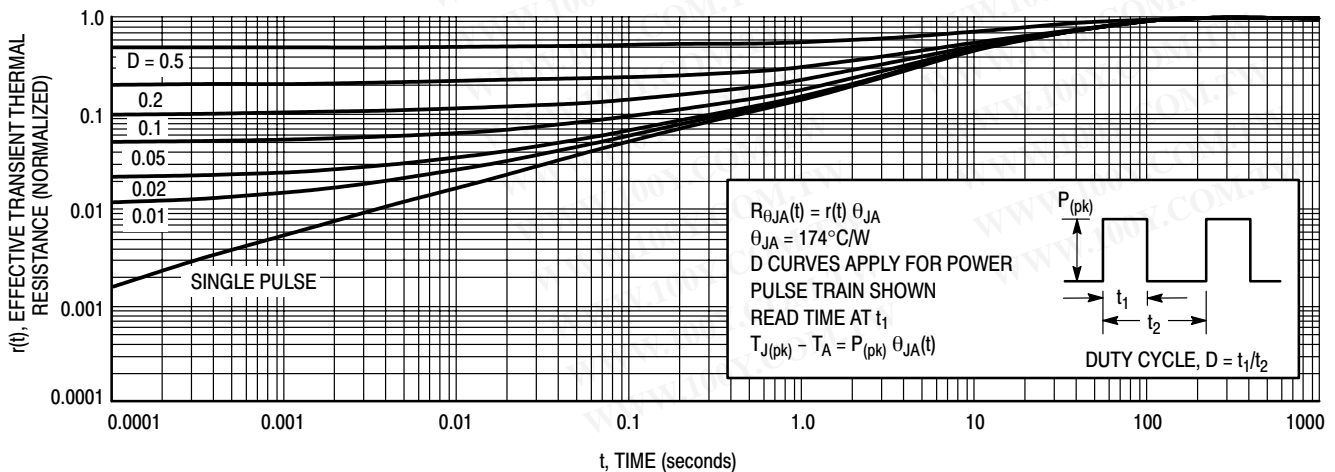


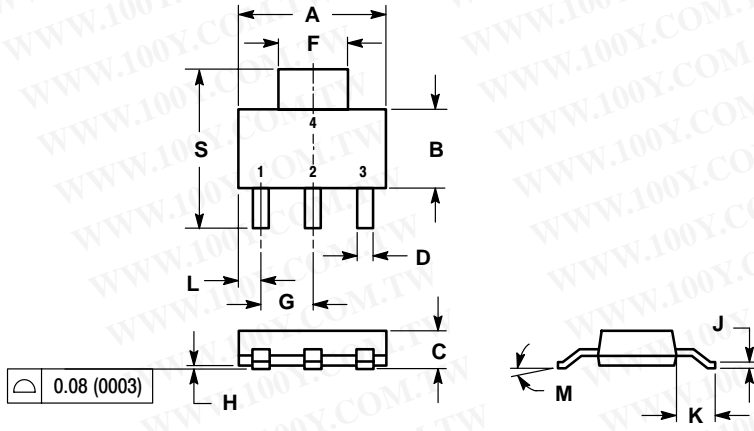
Figure 12. Thermal Response

# MMJT9435

## PACKAGE DIMENSIONS

SOT-223 (TO-261)  
CASE 318E-04  
ISSUE K

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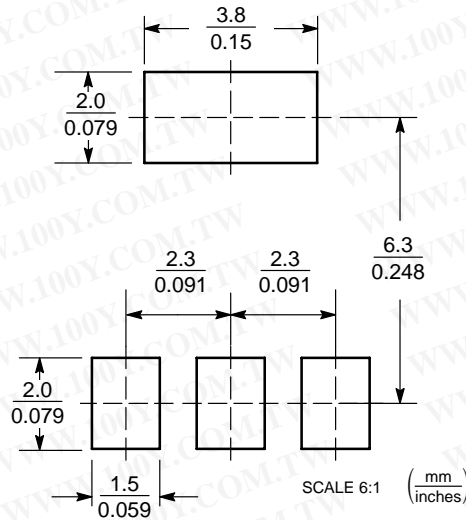


- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.


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

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

## SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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