BC856ALT1G Series

General Purpose Transistors

PNP Silicon

Features

- S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage BC856, SBC856 BC857, SBC857 BC858, NSVBC858, BC859	V_{CEO}	 −65 −45 −30	V
Collector-Base Voltage BC856, SBC856 BC857, SBC857 BC858, NSVBC858, BC859	V_{CBO}	 −80 −50 −30	V
Emitter−Base Voltage	V_{EBO}	−5.0	V
Collector Current − Continuous	I_C	−100	mAdc
Collector Current − Peak	I_C	−200	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR−5 Board, (Note 1) T_A = 25°C Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	556	°C/W
Total Device Dissipation Alumina Substrate, (Note 2) T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature	T_J, T_{stg}	−55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR−5 = 1.0 x 0.75 x 0.062 in.
2. Alumina = 0.4 x 0.3 x 0.024 in 99.5% alumina.

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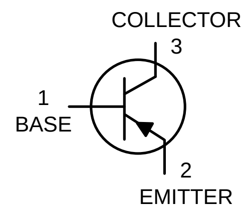
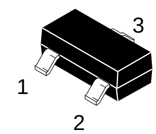
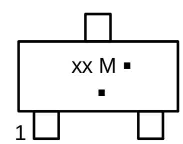




SOT−23 (TO−236)
CASE 318
STYLE 6

MARKING DIAGRAM



xx = Device Code
xx = (Refer to page 6)
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or overbar may vary depending upon manufacturing location.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage (I_C = −10 mA) BC856, SBC856 Series BC857, SBC857 Series BC858, NSBVC858 BC859 Series	$V_{(BR)CEO}$	−65 −45 −30	− − −	− − −	V
Collector−Emitter Breakdown Voltage (I_C = −10 μA, V_{EB} = 0) BC856 S, SBC856eries BC857A, SBC857A, BC857B, SBC857B Only BC858, NSVB858, BC859 Series	$V_{(BR)CES}$	−80 −50 −30	− − −	− − −	V
Collector−Base Breakdown Voltage (I_C = −10 μA) BC856, SBC856 Series BC857, SBC857 Series BC858, NSVBC858, BC859 Series	$V_{(BR)CBO}$	−80 −50 −30	− − −	− − −	V
Emitter−Base Breakdown Voltage (I_E = −1.0 μA) BC856, SBC856 Series BC857, SBC857 Series BC858, NSVBC858, BC859 Series	$V_{(BR)EBO}$	−5.0 −5.0 −5.0	− − −	− − −	V
Collector Cutoff Current (V_{CB} = −30 V) (V_{CB} = −30 V, T_A = 150°C)	I_{CBO}	− −	− −	−15 −4.0	nA μA
ON CHARACTERISTICS					
DC Current Gain (I_C = −10 μA, V_{CE} = −5.0 V) BC856A, SBC856A, BC857A, SBC857A, BC858A BC856B, SBC856B, BC857B, SBC857B, BC858B, NSVBC858B BC857C, SBC857C BC858C	h_{FE}	− − −	90 150 270	− − −	−
(I_C = −2.0 mA, V_{CE} = −5.0 V) BC856A, SBC856A, BC857A, SBC857A, BC858A BC856B, SBC856B, BC857B, SBC857B, BC858B, NSVBC858B, BC859B BC857C, SBC857C, BC858C, BC859C		125 220 420	180 290 520	250 475 800	
Collector−Emitter Saturation Voltage (I_C = −10 mA, I_B = −0.5 mA) (I_C = −100 mA, I_B = −5.0 mA)	$V_{CE(sat)}$	 − −	 − −	 −0.3 −0.65	V
Base−Emitter Saturation Voltage (I_C = −10 mA, I_B = −0.5 mA) (I_C = −100 mA, I_B = −5.0 mA)	$V_{BE(sat)}$	 − −	 −0.7 −0.9	 − −	V
Base−Emitter On Voltage (I_C = −2.0 mA, V_{CE} = −5.0 V) (I_C = −10 mA, V_{CE} = −5.0 V)	$V_{BE(on)}$	 −0.6 −	 − −	 −0.75 −0.82	V
SMALL−SIGNAL CHARACTERISTICS					
Current−Gain − Bandwidth Product (I_C = −10 mA, V_{CE} = −5.0 Vdc, f = 100 MHz)	f_T	100	−	−	MHz
Output Capacitance (V_{CB} = −10 V, f = 1.0 MHz)	C_{ob}	−	−	4.5	pF
Noise Figure (I_C = −0.2 mA, V_{CE} = −5.0 Vdc, R_S = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz) BC856, SBC856, BC857, SBC857, BC858, NSVBC858 Series BC859 Series	NF	 − −	 − −	 10 4.0	dB

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

BC857/BC858/BC859/SBC857/NSVBC858

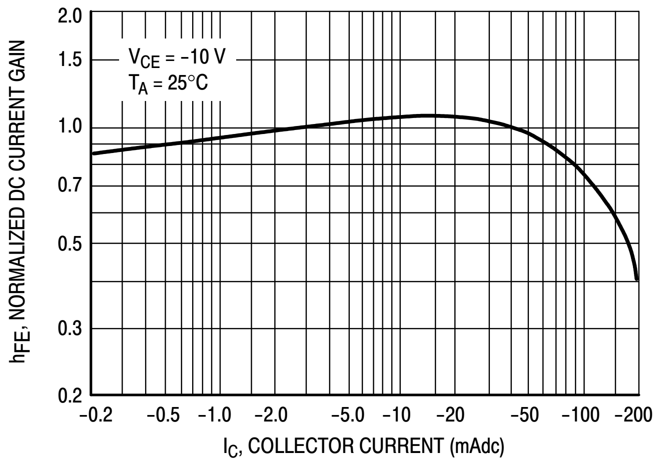


Figure 1. Normalized DC Current Gain

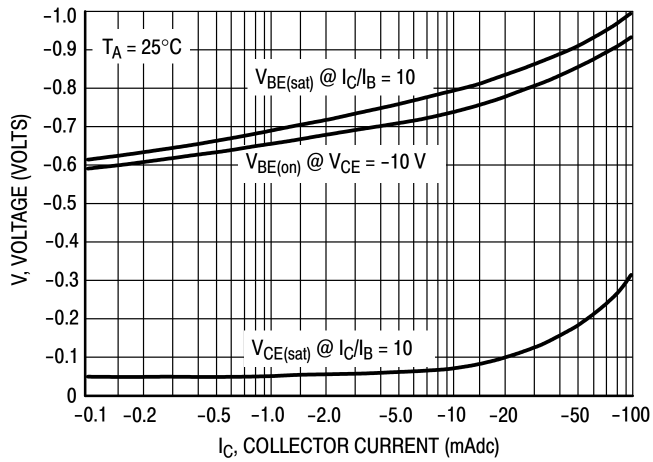


Figure 2. “Saturation” and “On” Voltages

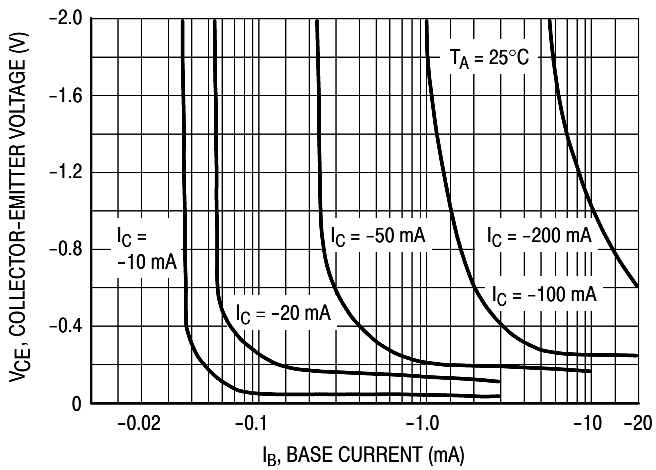


Figure 3. Collector Saturation Region

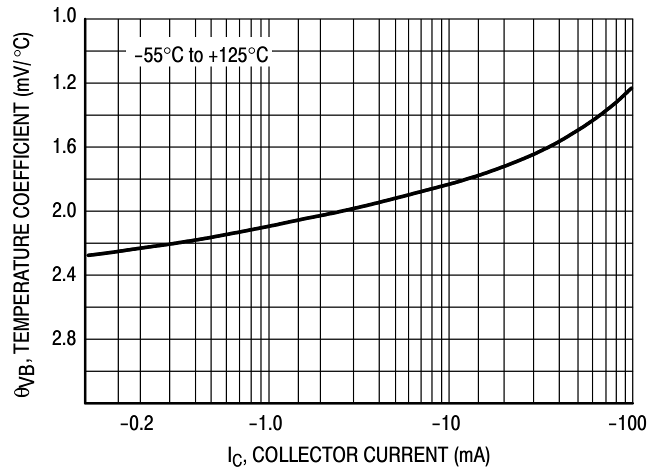


Figure 4. Base−Emitter Temperature Coefficient

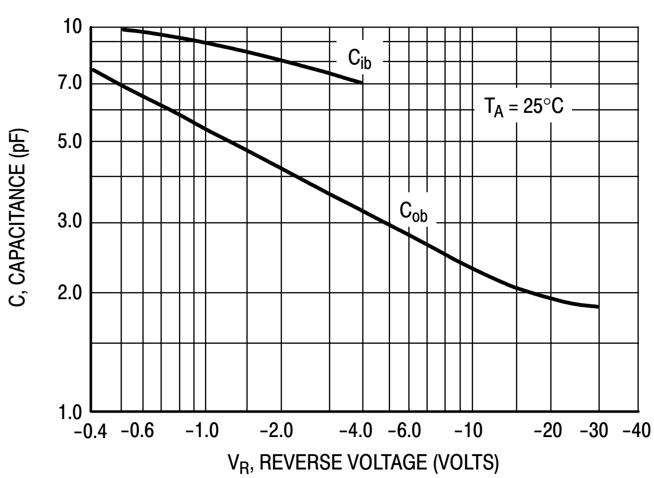


Figure 5. Capacitances

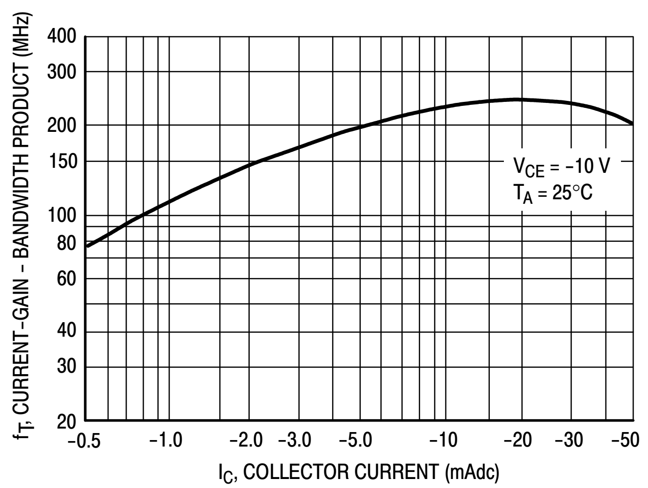


Figure 6. Current−Gain − Bandwidth Product

BC856/SBC856

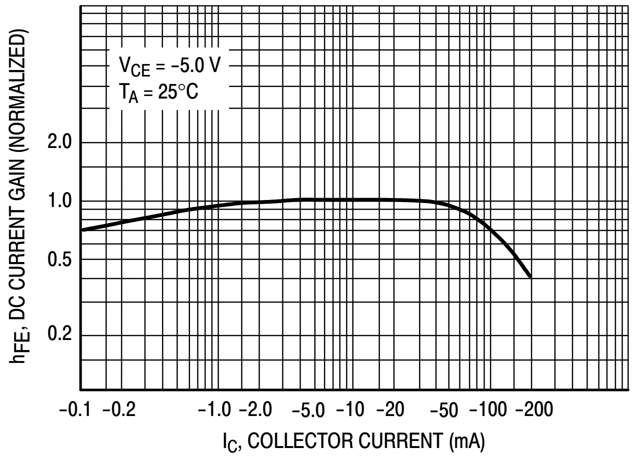


Figure 7. DC Current Gain

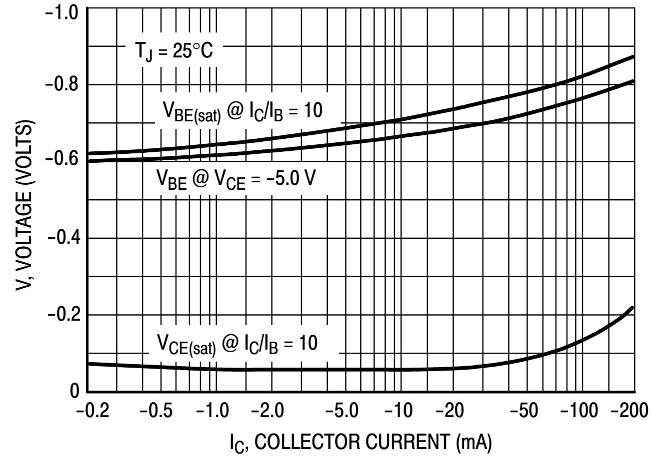


Figure 8. "On" Voltage

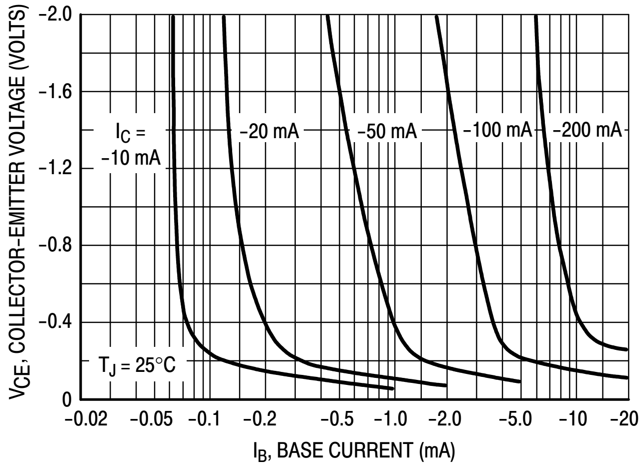


Figure 9. Collector Saturation Region

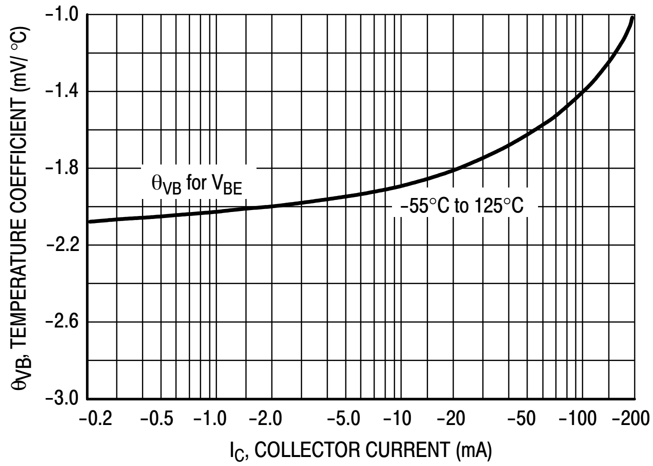


Figure 10. Base−Emitter Temperature Coefficient

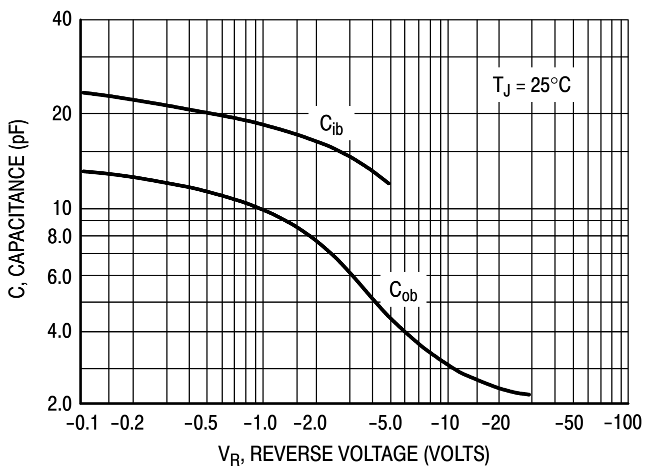


Figure 11. Capacitance

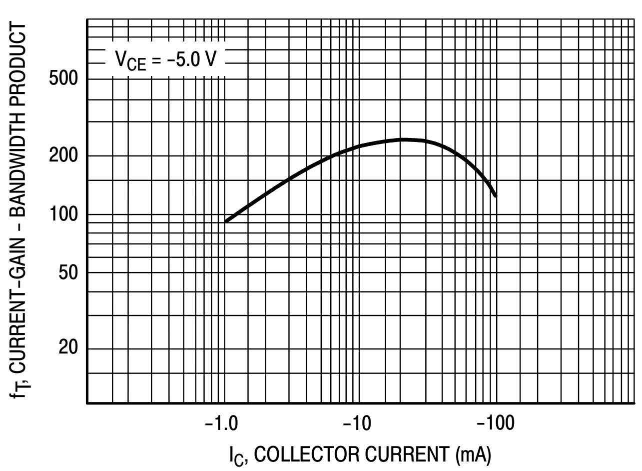


Figure 12. Current−Gain − Bandwidth Product

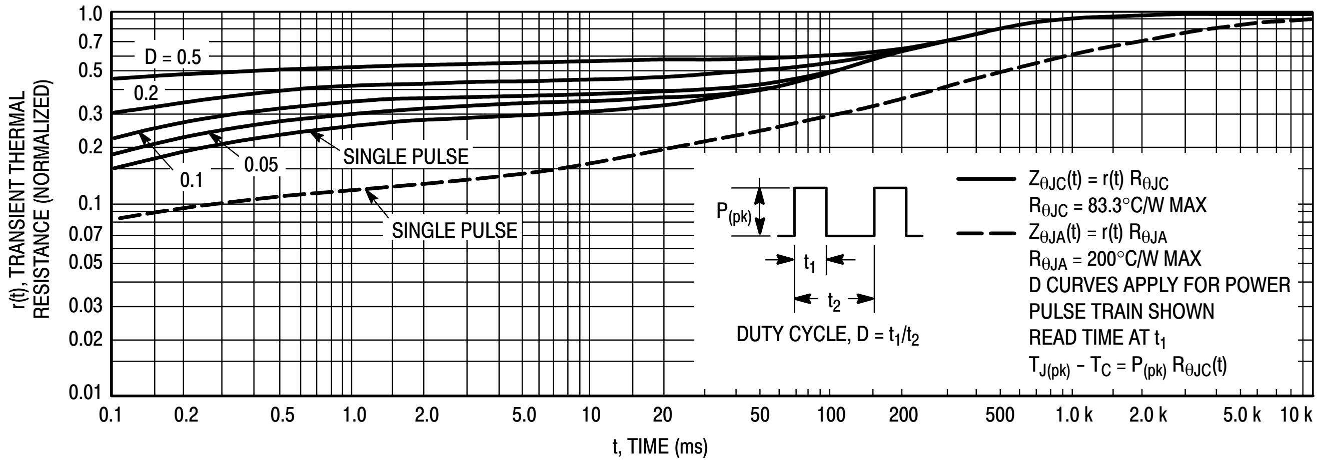


Figure 13. Thermal Response

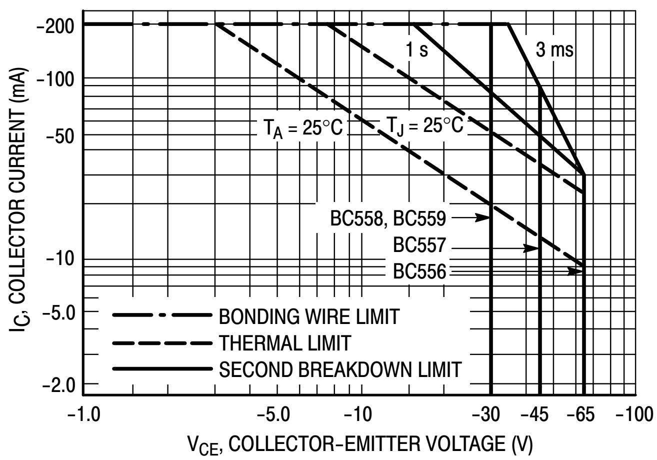


Figure 14. Active Region Safe Operating Area

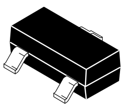
The safe operating area curves indicate I_C-V_{CE} limits of the transistor that must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 14 is based upon $T_{J(pk)} = 150°C$; T_C or T_A is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided $T_{J(pk)} \le 150°C$. $T_{J(pk)}$ may be calculated from the data in Figure 13. At high case or ambient temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by the secondary breakdown.

ORDERING INFORMATION

Device	Marking	Package	Shipping†
BC856ALT1G	3A	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC856ALT1G*			
BC856ALT3G			10,000 / Tape & Reel
BC856BLT1G	3B	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC856BLT1G*			
BC856BLT3G			10,000 / Tape & Reel
SBC856BLT3G*			
BC857ALT1G	3E	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC857ALT1G*			
BC857BLT1G	3F	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC857BLT1G*			
BC857BLT3G			10,000 / Tape & Reel
NSVBC857BLT3G*			
BC857CLT1G	3G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SBC857CLT1G*			
BC857CLT3G			10,000 / Tape & Reel
BC858ALT1G	3J	SOT−23 (Pb−Free)	3,000 / Tape & Reel
BC858BLT1G	3K	SOT−23 (Pb−Free)	
NSVBC858BLT1G*			
BC858BLT3G	3L	SOT−23 (Pb−Free)	10,000 / Tape & Reel
BC858CLT1G		SOT−23 (Pb−Free)	3,000 / Tape & Reel
BC858CLT3G		SOT−23 (Pb−Free)	10,000 / Tape & Reel
BC859BLT1G	4B	SOT−23 (Pb−Free)	3,000 / Tape & Reel
BC859BLT3G		SOT−23 (Pb−Free)	10,000 / Tape & Reel
BC859CLT1G	4C	SOT−23 (Pb−Free)	3,000 / Tape & Reel
BC859CLT3G		SOT−23 (Pb−Free)	10,000 / Tape & Reel

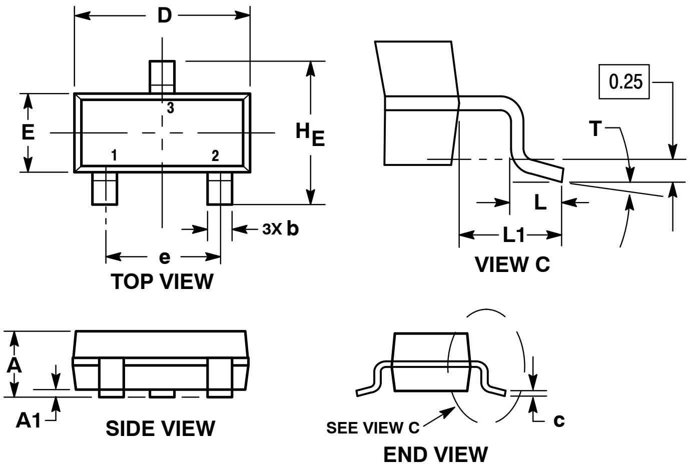
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.
*S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.



SCALE 4:1

SOT−23 (TO−236)
CASE 318−08
ISSUE AS

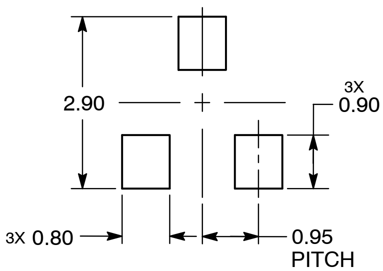
DATE 30 JAN 2018



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

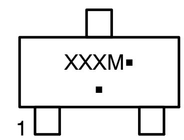
	MILLIMETERS			INCHES		
DIM	**MIN**	**NOM**	**MAX**	**MIN**	**NOM**	**MAX**
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H_E	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	−−−	10°	0°	−−−	10°

RECOMMENDED SOLDERING FOOTPRINT



DIMENSIONS: MILLIMETERS

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.

STYLE 1 THRU 5:
CANCELLED

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

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 24:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE

STYLE 26:
PIN 1. CATHODE
2. ANODE
3. NO CONNECTION

STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

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

DOCUMENT NUMBER:	**98ASB42226B**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**SOT−23 (TO−236)**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

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onsemi Website: www.onsemi.com

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North American Technical Support:
Voice Mail: 1 800−282−9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:
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