BC856ALT1 Series

Preferred Devices

General Purpose Transistors

PNP Silicon

Features

- Pb−Free Packages are Available

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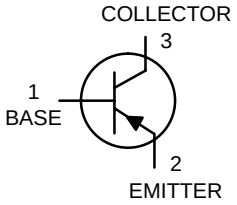
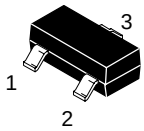




SOT−23
CASE 318
STYLE 6

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

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

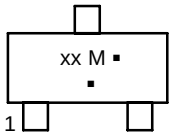
THERMAL CHARACTERISTICS

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

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.

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.

MARKING DIAGRAM



xx = Device Code
xx = (Refer to page 5)
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 5 of this data sheet.

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

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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 Series	$V_{(BR)CEO}$	−65	−	−	V
	BC857 Series		−45	−	−	
	BC858, BC859 Series		−30	−	−	
Collector−Emitter Breakdown Voltage (I_C = −10 μA, V_{EB} = 0)	BC856 Series	$V_{(BR)CES}$	−80	−	−	V
	BC857A, BC857B Only		−50	−	−	
	BC858, BC859 Series		−30	−	−	
Collector−Base Breakdown Voltage (I_C = −10 μA)	BC856 Series	$V_{(BR)CBO}$	−80	−	−	V
	BC857 Series		−50	−	−	
	BC858, BC859 Series		−30	−	−	
Emitter−Base Breakdown Voltage (I_E = −1.0 μA)	BC856 Series	$V_{(BR)EBO}$	−5.0	−	−	V
	BC857 Series		−5.0	−	−	
	BC858, BC859 Series		−5.0	−	−	
Collector Cutoff Current (V_{CB} = −30 V)		I_{CBO}	−	−	−15	nA
(V_{CB} = −30 V, T_A = 150°C)			−	−	−4.0	μA
ON CHARACTERISTICS						
DC Current Gain (I_C = −10 μA, V_{CE} = −5.0 V)	BC856A, BC857A, BC858A	h_{FE}	−	90	−	−
	BC856B, BC857B, BC858B		−	150	−	
	BC857C, BC858C		−	270	−	
(I_C = −2.0 mA, V_{CE} = −5.0 V)	BC856A, BC857A, BC858A		125	180	250	
	BC856B, BC857B, BC858B, BC859B		220	290	475	
	BC857C, BC858C, BC859C		420	520	800	
Collector−Emitter Saturation Voltage		$V_{CE(sat)}$				V
(I_C = −10 mA, I_B = −0.5 mA)			−	−	−0.3	
(I_C = −100 mA, I_B = −5.0 mA)			−	−	−0.65	
Base−Emitter Saturation Voltage		$V_{BE(sat)}$				V
(I_C = −10 mA, I_B = −0.5 mA)			−	−0.7	−	
(I_C = −100 mA, I_B = −5.0 mA)			−	−0.9	−	
Base−Emitter On Voltage		$V_{BE(on)}$				V
(I_C = −2.0 mA, V_{CE} = −5.0 V)			−0.6	−	−0.75	
(I_C = −10 mA, V_{CE} = −5.0 V)			−	−	−0.82	
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		NF				dB
(I_C = −0.2 mA, V_{CE} = −5.0 Vdc, R_S = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz)						
	BC856, BC857, BC858 Series		−	−	10	
	BC859 Series		−	−	4.0	

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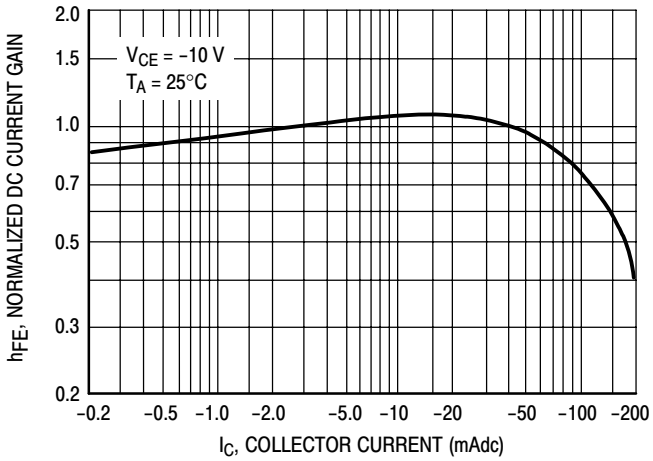

Figure 1. Normalized DC Current Gain

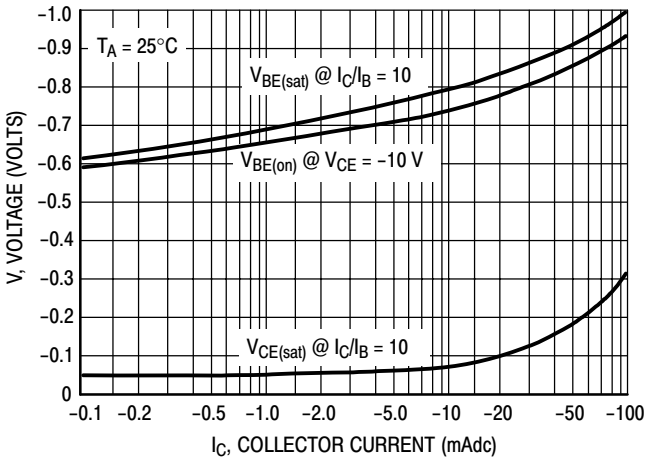

Figure 2. “Saturation” and “On” Voltages

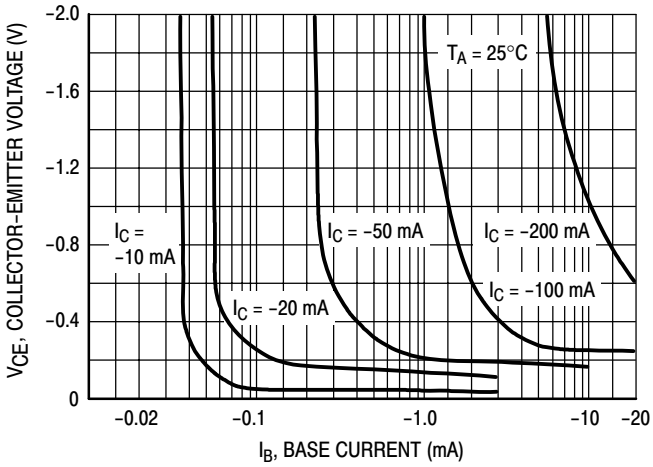

Figure 3. Collector Saturation Region

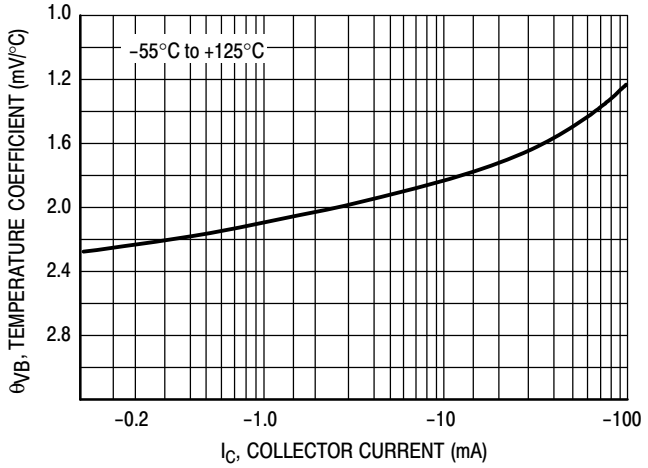

Figure 4. Base−Emitter Temperature Coefficient

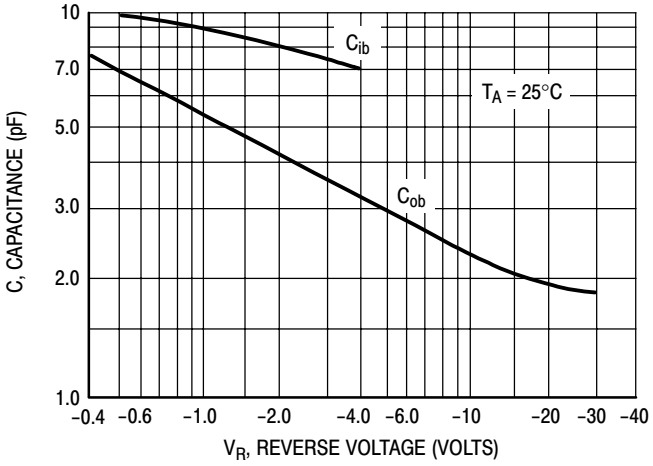

Figure 5. Capacitances

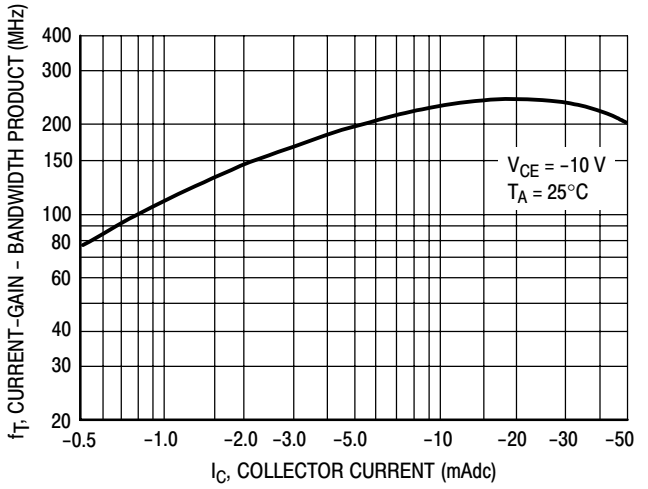

Figure 6. Current−Gain − Bandwidth Product

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BC856

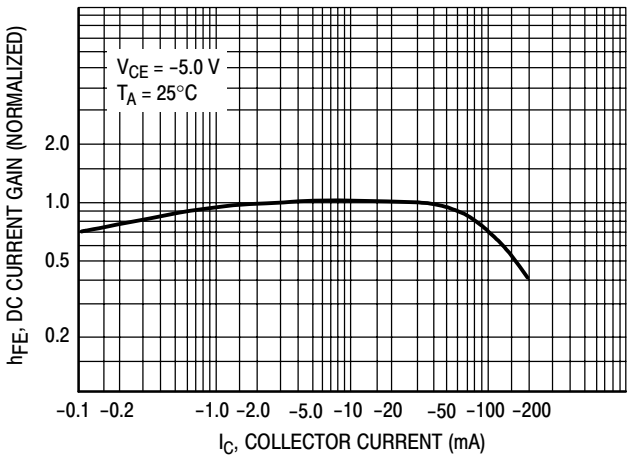

Figure 7. DC Current Gain

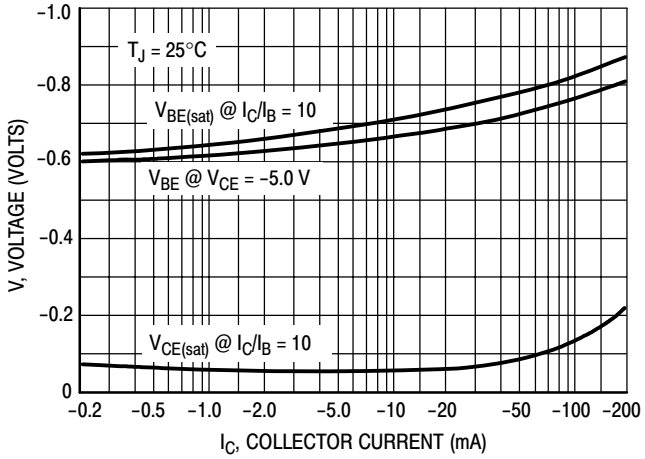

Figure 8. “On” Voltage

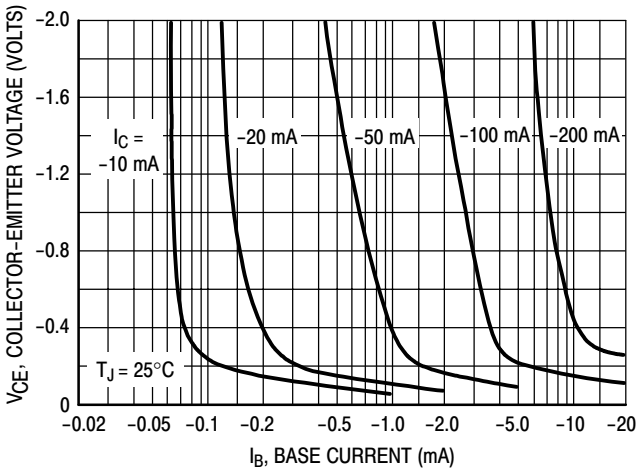

Figure 9. Collector Saturation Region

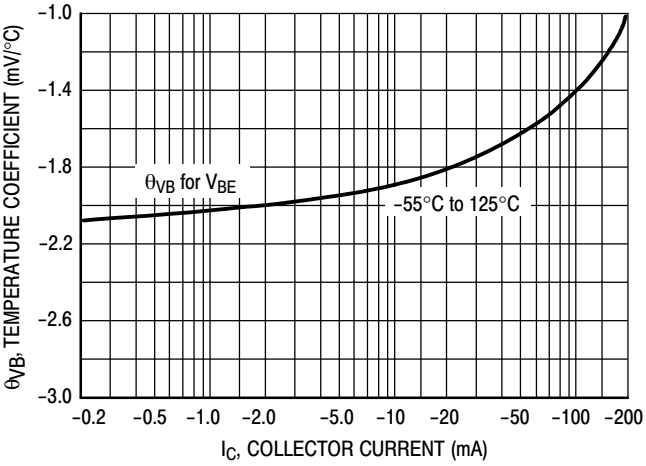

Figure 10. Base−Emitter Temperature Coefficient

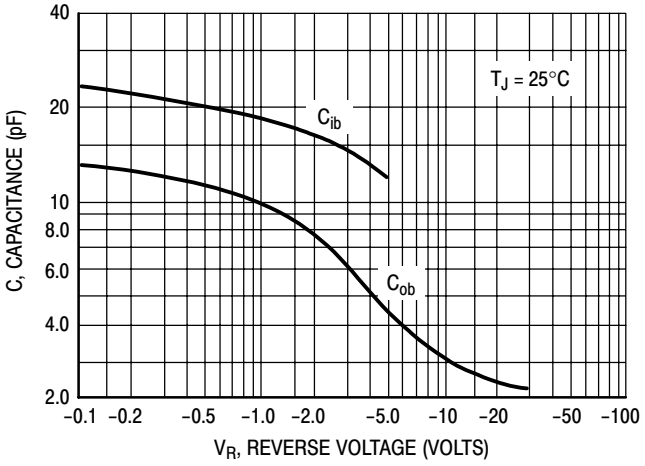

Figure 11. Capacitance

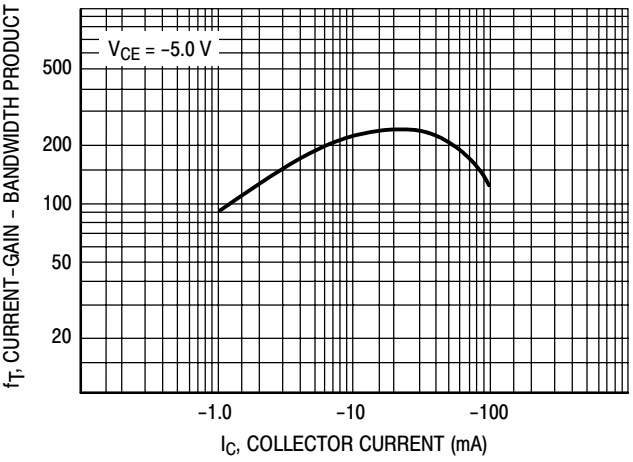

Figure 12. Current−Gain − Bandwidth Product

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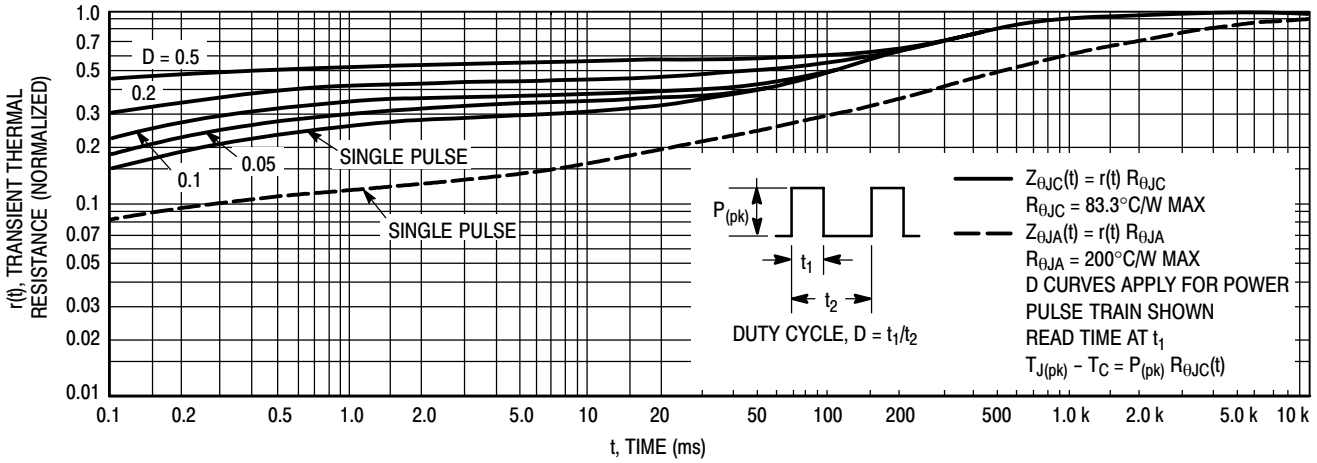

Figure 13. Thermal Response

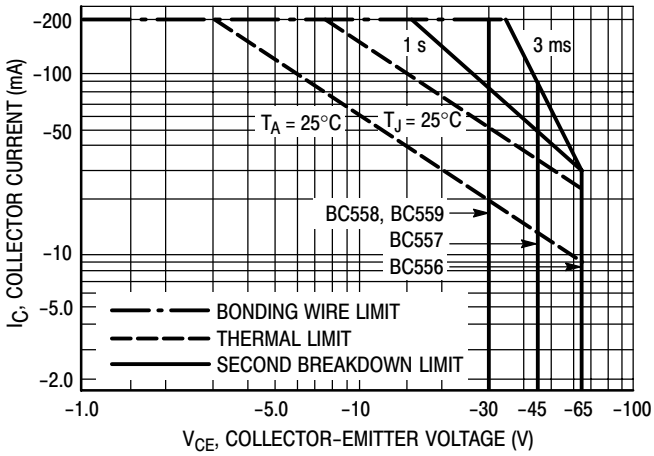

Figure 14. Active Region Safe Operating Area

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†
BC856ALT1	3A	SOT−23	3,000 / Tape & Reel
BC856ALT1G		SOT−23 (Pb−Free)	
BC856ALT3		SOT−23	10,000 / Tape & Reel
BC856ALT3G		SOT−23 (Pb−Free)	
BC856BLT1	3B	SOT−23	3,000 / Tape & Reel
BC856BLT1G		SOT−23 (Pb−Free)	
BC856BLT3		SOT−23	10,000 / Tape & Reel
BC856BLT3G		SOT−23 (Pb−Free)	

†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.

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ORDERING INFORMATION

Device	Marking	Package	Shipping†
BC857ALT1	3E	SOT−23	3,000 / Tape & Reel
BC857ALT1G		SOT−23 (Pb−Free)	
BC857BLT1	3F	SOT−23	
BC857BLT1G		SOT−23 (Pb−Free)	
BC857BLT3		SOT−23	10,000 / Tape & Reel
BC857BLT3G		SOT−23 (Pb−Free)	
BC857CLT1	3G	SOT−23	3,000 / Tape & Reel
BC857CLT1G		SOT−23 (Pb−Free)	
BC858ALT1	3J	SOT−23	
BC858ALT1G		SOT−23 (Pb−Free)	
BC858BLT1	3K	SOT−23	
BC858BLT1G		SOT−23 (Pb−Free)	
BC858BLT3	3L	SOT−23	10,000 / Tape & Reel
BC858BLT3G		SOT−23 (Pb−Free)	
BC858CLT1		SOT−23	3,000 / Tape & Reel
BC858CLT1G		SOT−23 (Pb−Free)	
BC858CLT3		SOT−23	10,000 / Tape & Reel
BC858CLT3G		SOT−23 (Pb−Free)	
BC859BLT1	4B	SOT−23	3,000 / Tape & Reel
BC859BLT1G		SOT−23 (Pb−Free)	
BC859BLT3		SOT−23	10,000 / Tape & Reel
BC859BLT3G		SOT−23 (Pb−Free)	
BC859CLT1	4C	SOT−23	3,000 / Tape & Reel
BC859CLT1G		SOT−23 (Pb−Free)	
BC859CLT3		SOT−23	10,000 / Tape & Reel
BC859CLT3G		SOT−23 (Pb−Free)	

†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.

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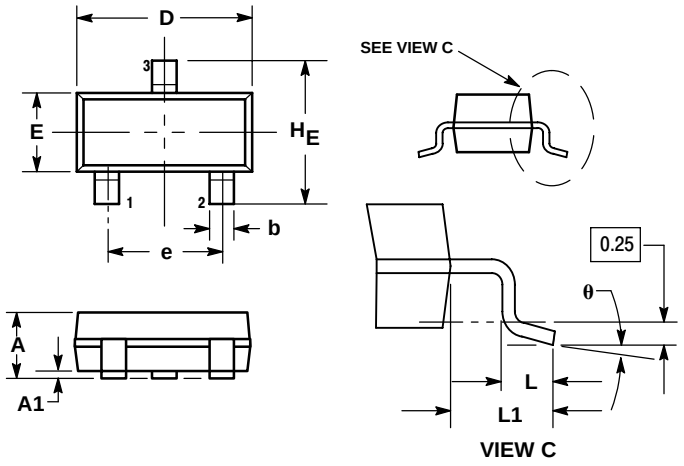
BC856ALT1 Series

PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−08
ISSUE AM

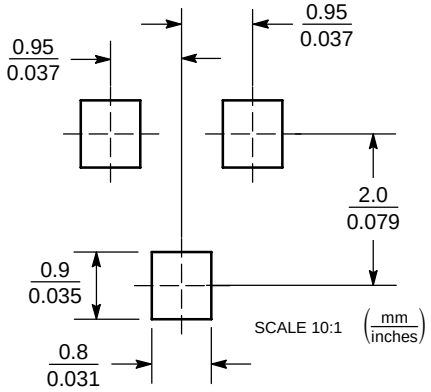


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318−01 THRU −07 AND −09 OBSOLETE, NEW STANDARD 318−08.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
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	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
H_E	2.10	2.40	2.64	0.083	0.094	0.104

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