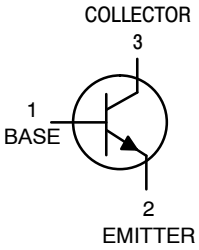
General Purpose Transistors

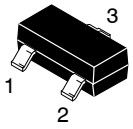
NPN Silicon

BC817-16L, SBC817-16L, BC817-25L, SBC817-25L, BC817-40L, SBC817-40L



Features

- S and NSV Prefixes 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



SOT−23
CASE 318
STYLE 6

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector − Emitter Voltage	V_{CEO}	45	V
Collector − Base Voltage	V_{CBO}	50	V
Emitter − Base Voltage	V_{EBO}	5.0	V
Collector Current − Continuous	I_C	500	mAdc

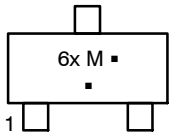
THERMAL CHARACTERISTICS

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}	−65 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.

MARKING DIAGRAM



6x = Device Code
x = A, B, or C
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 2 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)		$V_{(BR)CEO}$	45	−	−	V
Collector − Emitter Breakdown Voltage (V_{EB} = 0, I_C = 10 μA)		$V_{(BR)CES}$	50	−	−	V
Emitter − Base Breakdown Voltage (I_E = 1.0 μA)		$V_{(BR)EBO}$	5.0	−	−	V
Collector Cutoff Current (V_{CB} = 20 V)		I_{CBO}	−	−	100	nA
(V_{CB} = 20 V, T_A = 150°C)			−	−	5.0	μA
ON CHARACTERISTICS						
DC Current Gain (I_C = 100 mA, V_{CE} = 1.0 V)	BC817−16, SBC817−16	h_{FE}	100	−	250	−
	BC817−25, SBC817−25		160	−	400	
	BC817−40, SBC817−40		250	−	600	
(I_C = 500 mA, V_{CE} = 1.0 V)			40	−	−	
Collector − Emitter Saturation Voltage (I_C = 500 mA, I_B = 50 mA)		$V_{CE(sat)}$	−	−	0.7	V
Base − Emitter On Voltage (I_C = 500 mA, V_{CE} = 1.0 V)		$V_{BE(on)}$	−	−	1.2	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_{obo}	−	10	−	pF
SWITCHING CHARACTERISTICS						
Delay Time (V_{CC} = 3.0 Vdc, V_{BE} = 0.5 V, I_C = 10 mA)		t_d	−	85	−	ns
Rise Time (V_{CC} = 3.0 Vdc, V_{BE} = 0.5 V, I_C = 10 mA)		t_r	−	30	−	ns
Storage Time (V_{CC} = 3.0 Vdc, I_C = 10 mA, I_{B1} = 1 mA, I_{B2} = 1 mA)		t_s	−	1000	−	ns
Fall Time (V_{CC} = 3.0 Vdc, I_C = 10 mA, , I_{B1} = 1 mA, I_{B2} = 1 mA)		t_f	−	300	−	ns

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.

ORDERING INFORMATION

Device	Specific Marking	Package	Shipping†
BC817−16LT1G	6A	SOT−23 (Pb−Free)	3000 / Tape & Reel
NSVBC817−16LT1G			
BC817−16LT3G			10,000 / Tape & Reel
SBC817−16LT3G			
BC817−25LT1G	6B	SOT−23 (Pb−Free)	3000 / Tape & Reel
SBC817−25LT1G			
BC817−25LT3G			10,000 / Tape & Reel
SBC817−25LT3G			
BC817−40LT1G	6C	SOT−23 (Pb−Free)	3000 / Tape & Reel
SBC817−40LT1G			
BC817−40LT3G			10,000 / Tape & Reel
SBC817−40LT3G			

†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.

TYPICAL CHARACTERISTICS − BC817−16L, SBC817−16L

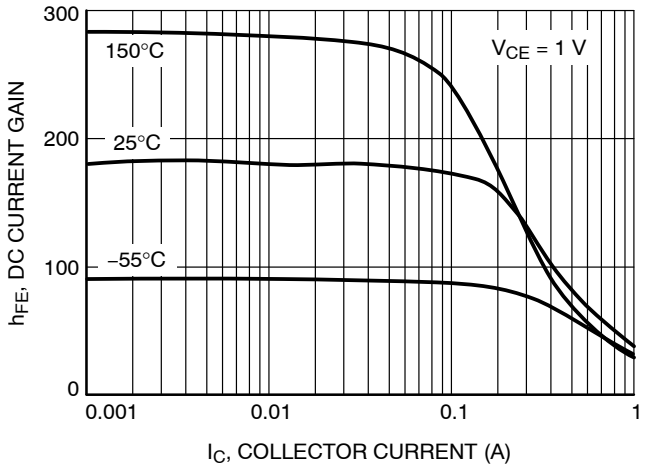


Figure 1. DC Current Gain vs. Collector Current

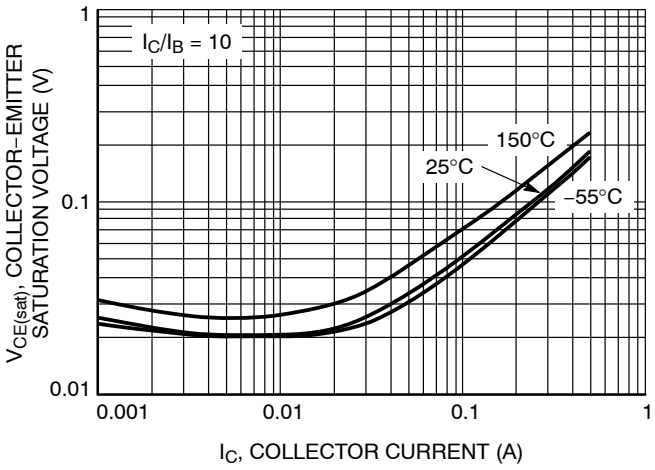


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

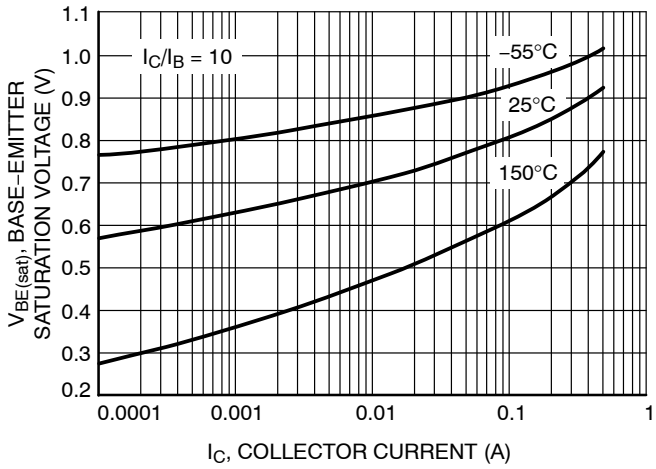


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

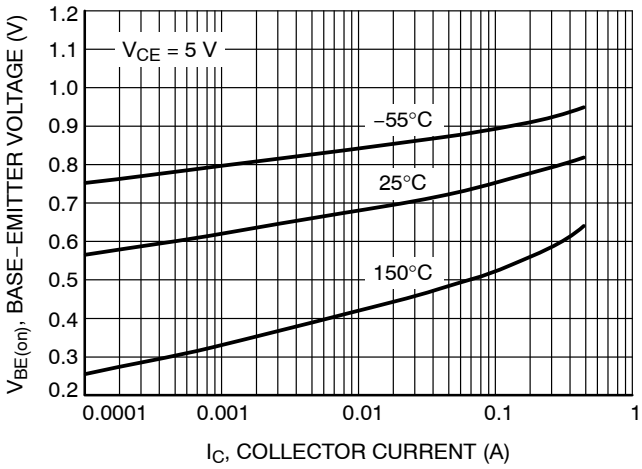


Figure 4. Base Emitter Voltage vs. Collector Current

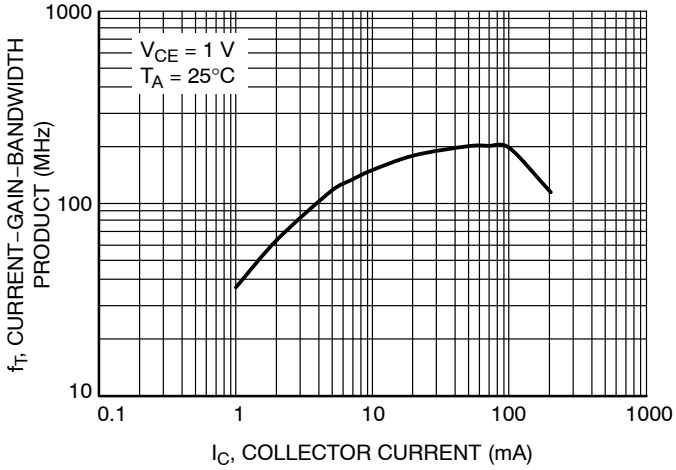


Figure 5. Current Gain Bandwidth Product vs. Collector Current

TYPICAL CHARACTERISTICS − BC817−16L, SBC817−16L

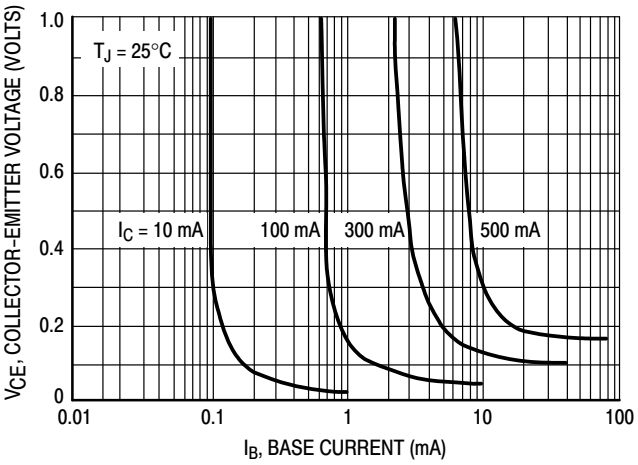


Figure 6. Saturation Region

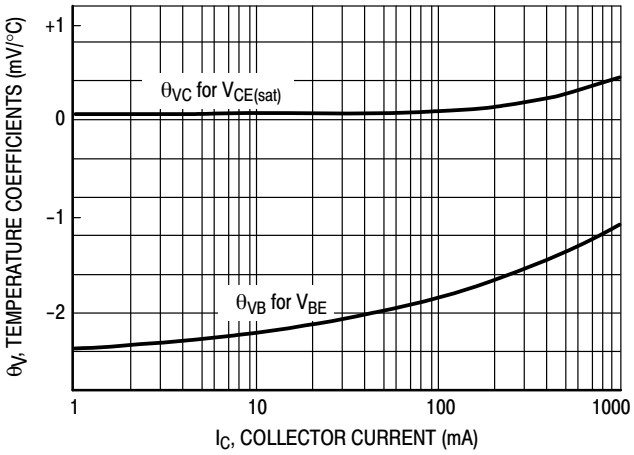


Figure 7. Temperature Coefficients

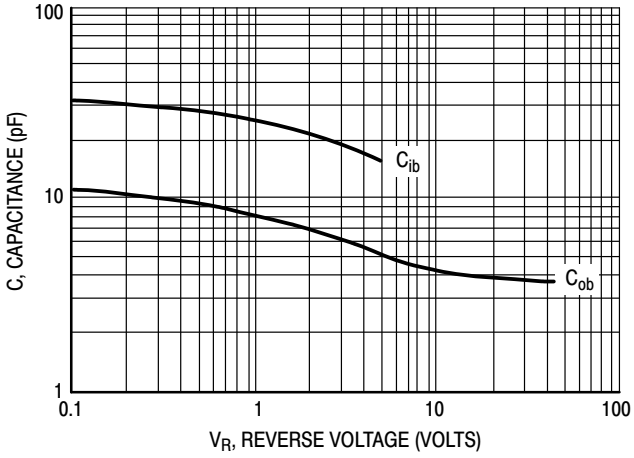


Figure 8. Capacitances

TYPICAL CHARACTERISTICS − BC817−25L, SBC817−25L

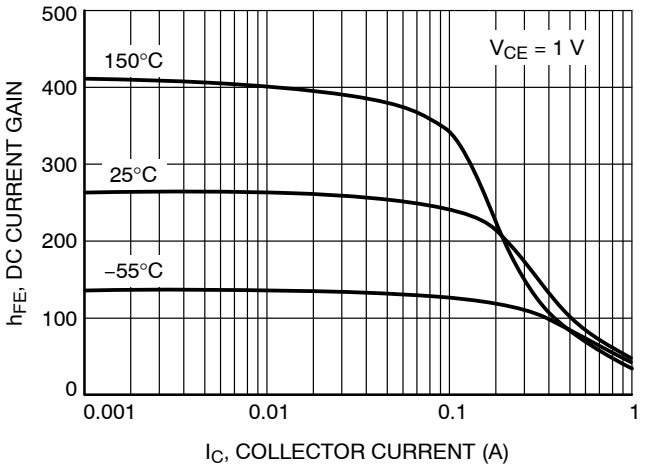


Figure 9. DC Current Gain vs. Collector Current

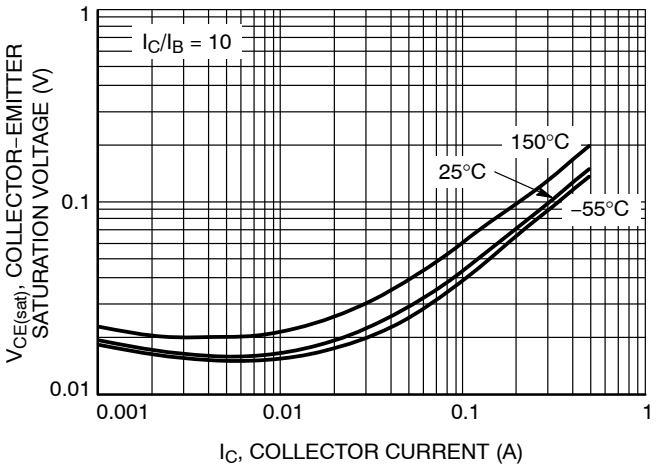


Figure 10. Collector Emitter Saturation Voltage vs. Collector Current

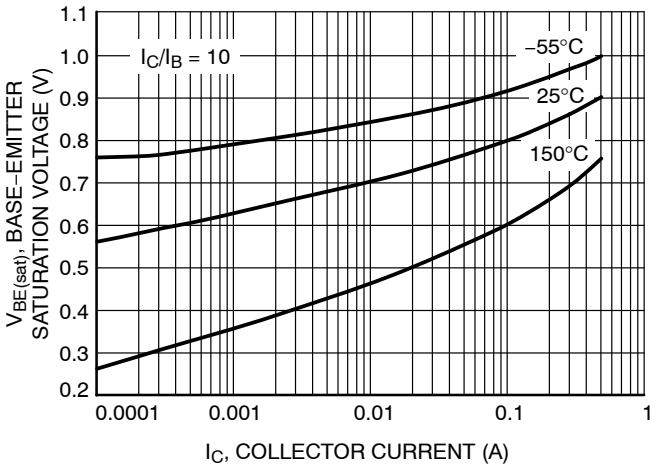


Figure 11. Base Emitter Saturation Voltage vs. Collector Current

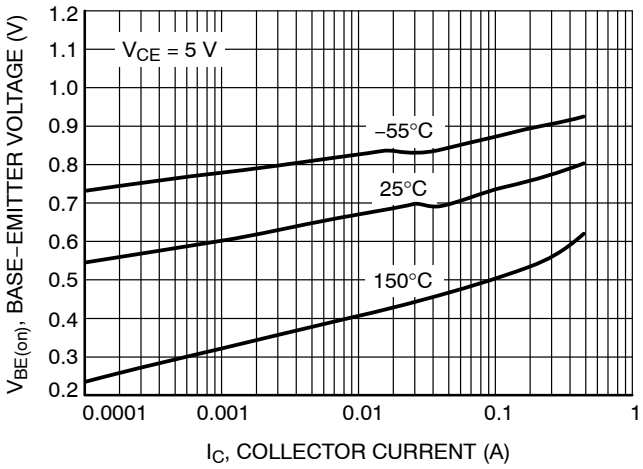


Figure 12. Base Emitter Voltage vs. Collector Current

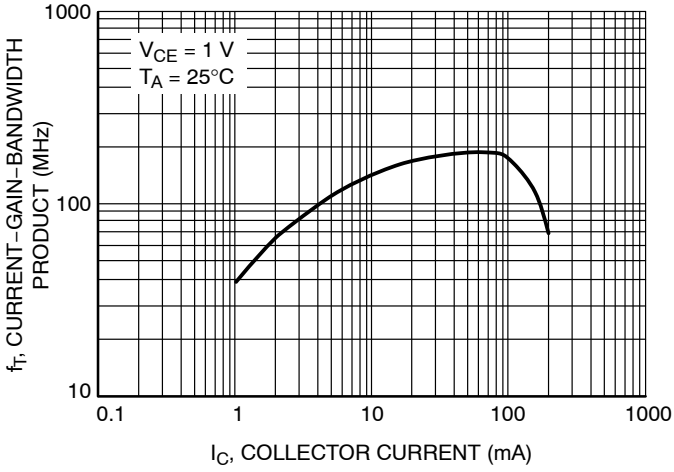


Figure 13. Current Gain Bandwidth Product vs. Collector Current

TYPICAL CHARACTERISTICS − BC817−25L, SBC81725L

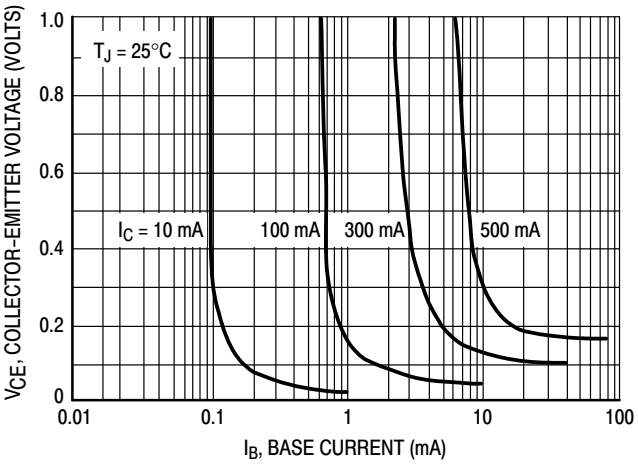


Figure 14. Saturation Region

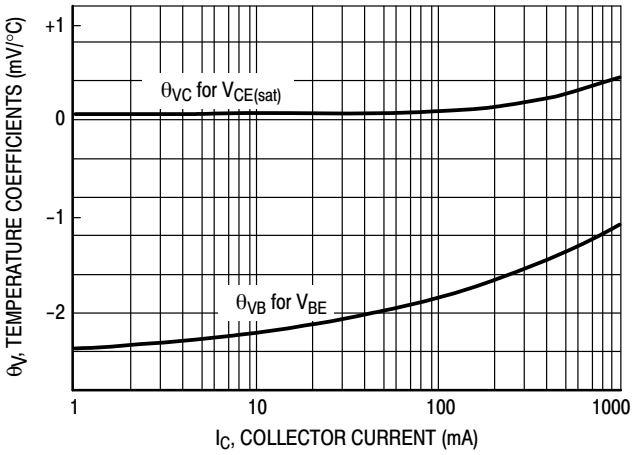


Figure 15. Temperature Coefficients

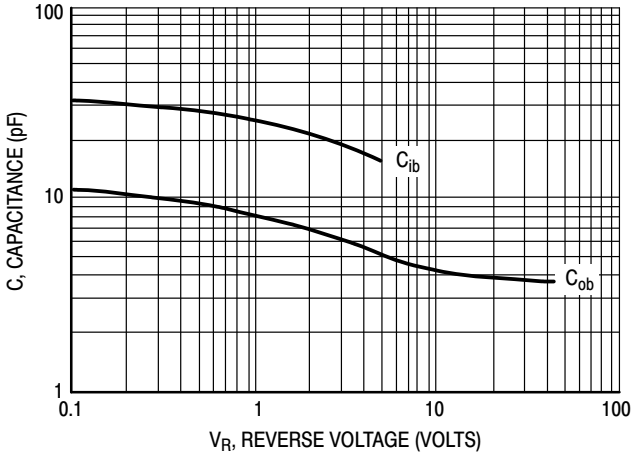


Figure 16. Capacitances

TYPICAL CHARACTERISTICS − BC817−40L, SBC817−40L

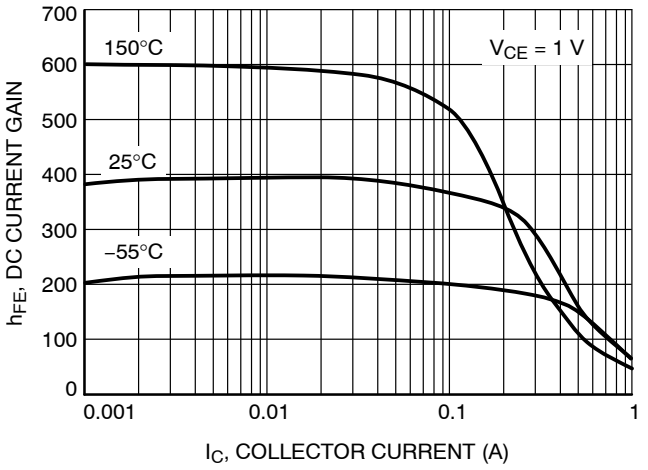


Figure 17. DC Current Gain vs. Collector Current

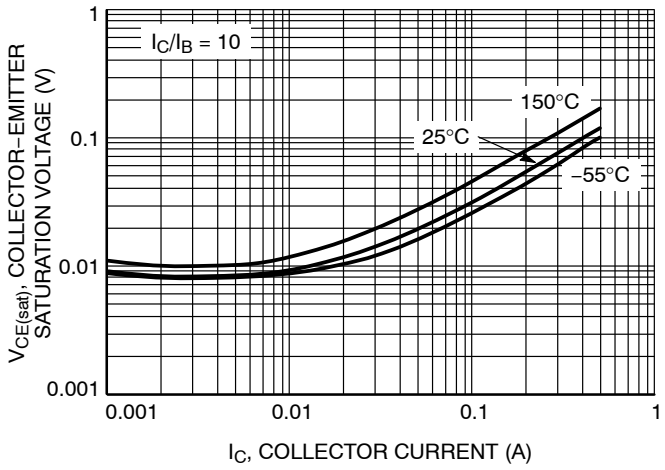


Figure 18. Collector Emitter Saturation Voltage vs. Collector Current

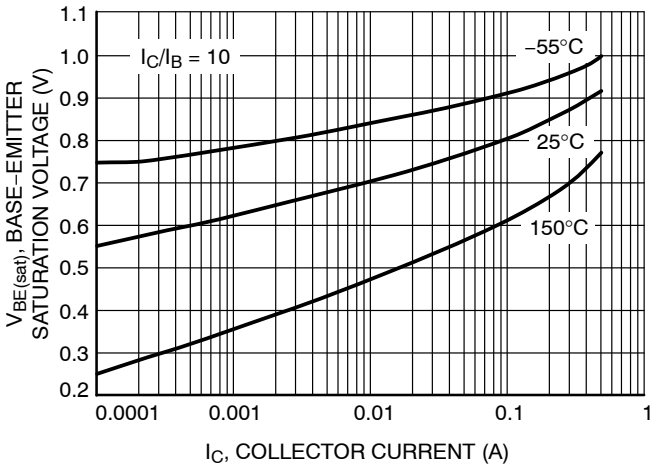


Figure 19. Base Emitter Saturation Voltage vs. Collector Current

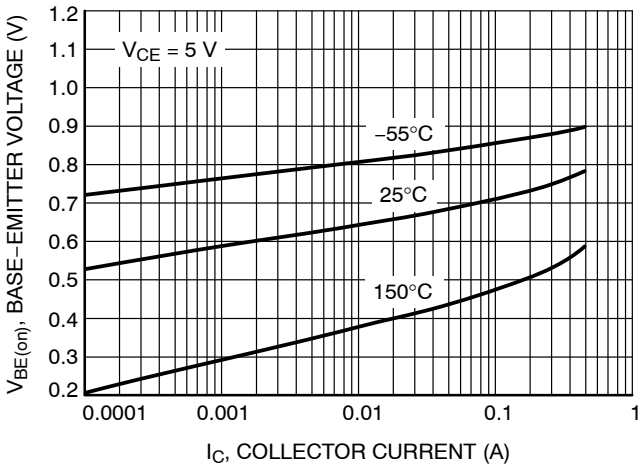


Figure 20. Base Emitter Voltage vs. Collector Current

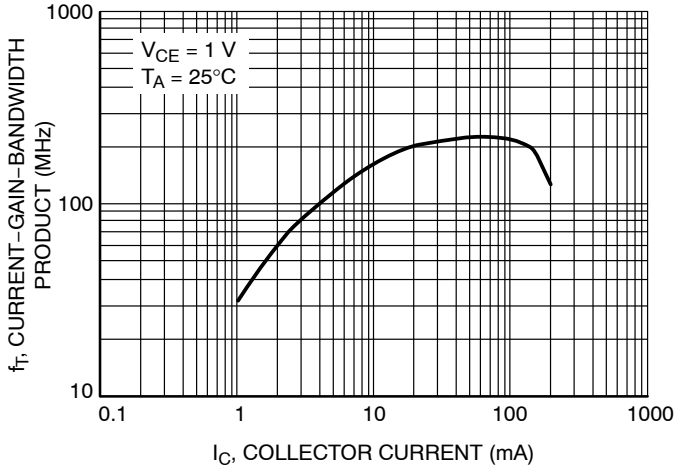


Figure 21. Current Gain Bandwidth Product vs. Collector Current

TYPICAL CHARACTERISTICS − BC817−40L, SBC817−40L

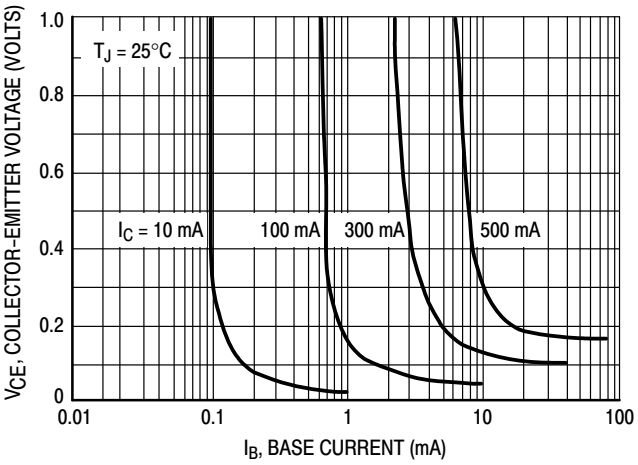


Figure 22. Saturation Region

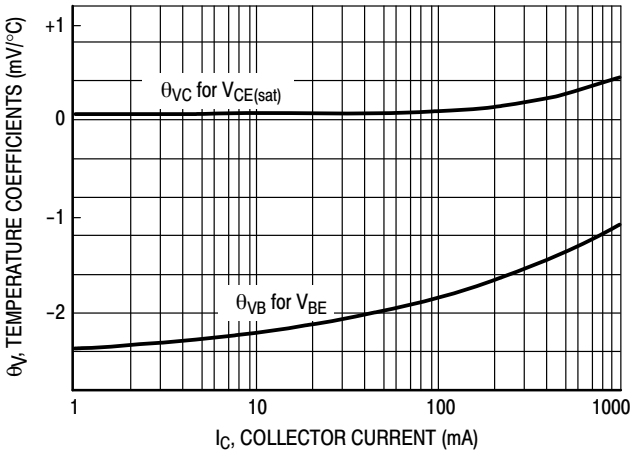


Figure 23. Temperature Coefficients

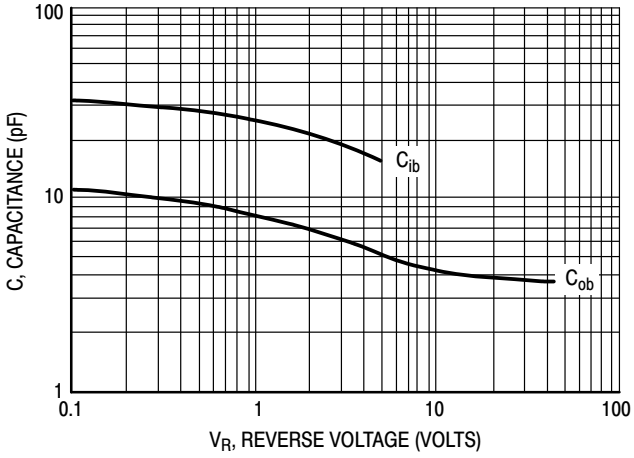


Figure 24. Capacitances

TYPICAL CHARACTERISTICS − BC817−16L, SBC817−16L, BC817−25L, SBC817−25L, BC817−40L, SBC817−40L

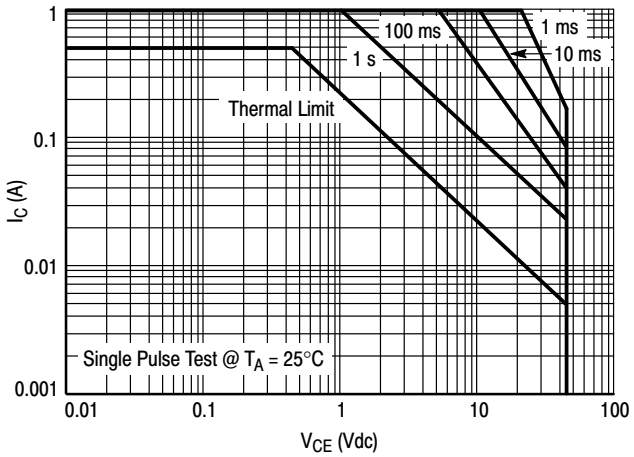


Figure 25. Safe Operating Area

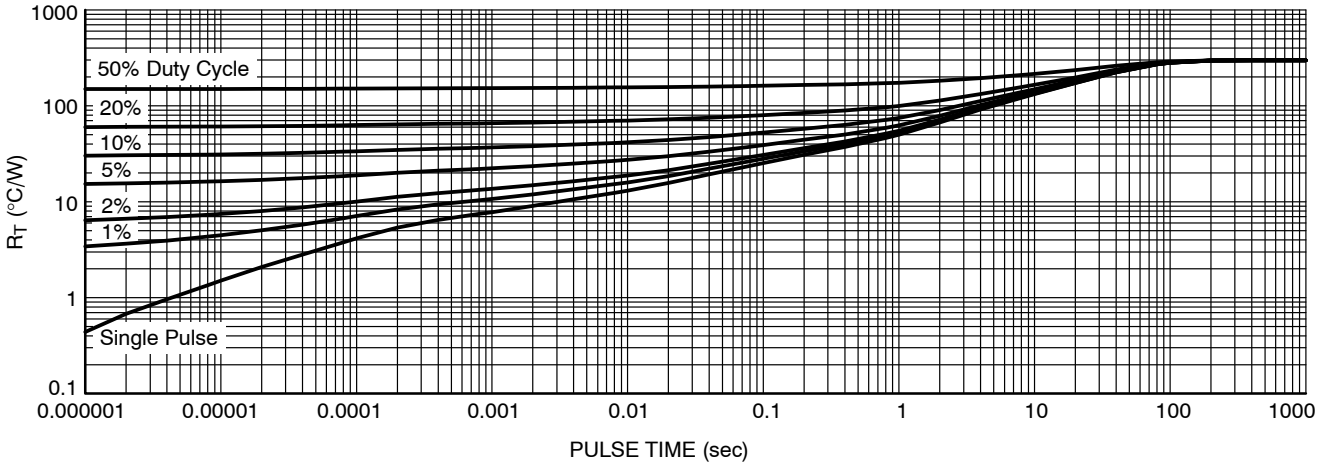
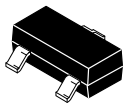


Figure 26. Thermal Response

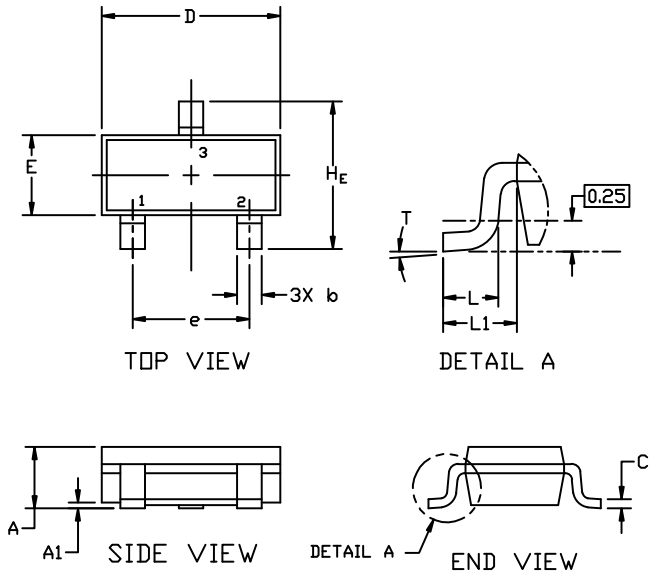
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



SCALE 4:1

SOT−23 (TO−236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

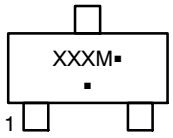


NOTES:

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.

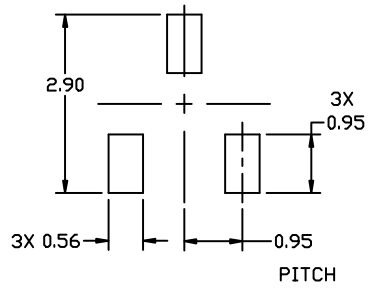
	MILLIMETERS			INCHES		
DIM	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
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°

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. Some products may not follow the Generic Marking.



RECOMMENDED
MOUNTING 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.

STYLES ON PAGE 2

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 2**

SOT−23 (TO−236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

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

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales