Dual General Purpose Transistors

NPN Duals

BC846BDW1, BC847BDW1, BC848CDW1

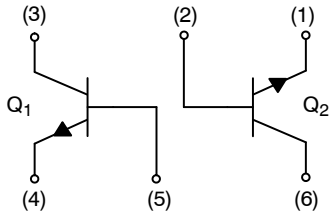
These transistors are designed for general purpose amplifier applications. They are housed in the SOT−363/SC−88 which is designed for low power surface mount applications.

Features

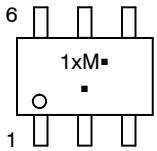
- S and NSV Prefixes for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant*



SOT−363/SC−88
CASE 419B
STYLE 1



MARKING DIAGRAM



1x = Specific Device Code
x = B, F, G, L
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

MAXIMUM RATINGS

Rating	Symbol	BC846	BC847	BC848	Unit
Collector − Emitter Voltage	V_{CEO}	65	45	30	V
Collector − Base Voltage	V_{CBO}	80	50	30	V
Emitter − Base Voltage	V_{EBO}	6.0	6.0	5.0	V
Collector Current − Continuous	I_C	100	100	100	mAdc

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.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation Per Device FR−5 Board (Note 1) T_A = 25°C Derate Above 25 °C	P_D	380 250 3.0	mW mW mW/°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	 328	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

1. FR−5 = 1.0 x 0.75 x 0.062 in

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 10 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 10.

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

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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) BC846 BC847 BC848	$V_{(BR)CEO}$	 65 45 30	 – – –	 – – –	V
Collector – Emitter Breakdown Voltage (I_C = 10 μA, V_{EB} = 0) BC846 BC847 BC848	$V_{(BR)CES}$	 80 50 30	 – – –	 – – –	V
Collector – Base Breakdown Voltage (I_C = 10 μA) BC846 BC847 BC848	$V_{(BR)CBO}$	 80 50 30	 – – –	 – – –	V
Emitter – Base Breakdown Voltage (I_E = 1.0 μA) BC846 BC847 BC848	$V_{(BR)EBO}$	 6.0 6.0 5.0	 – – –	 – – –	V
Collector Cutoff Current (V_{CB} = 30 V) (V_{CB} = 30 V, T_A = 150 °C)	I_{CBO}	– –	– –	15 5.0	nA μA
ON CHARACTERISTICS					
DC Current Gain (I_C = 10 μA, V_{CE} = 5.0 V) BC846B, BC847B BC847C, BC848C (I_C = 2.0 mA, V_{CE} = 5.0 V) BC846B, BC847B BC847C, BC848C	h_{FE}	 – – 200 420	 150 270 290 520	 – – 450 800	–
Collector – Emitter Saturation Voltage (I_C = 10 mA, I_B = 0.5 mA) (I_C = 100 mA, I_B = 5.0 mA)	$V_{CE(sat)}$	– –	– –	0.25 0.6	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 Voltage (I_C = 2.0 mA, V_{CE} = 5.0 V) (I_C = 10 mA, V_{CE} = 5.0 V)	$V_{BE(on)}$	580 –	660 –	700 770	mV
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}	–	–	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)	NF	–	–	10	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.

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TYPICAL CHARACTERISTICS – BC846BDW1

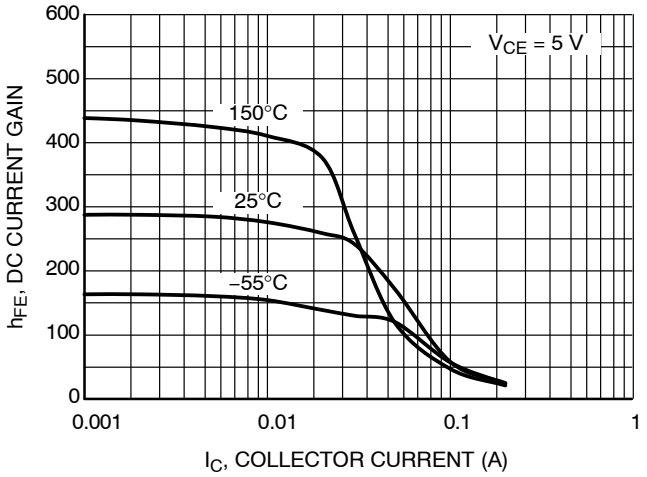


Figure 1. DC Current Gain at V_{CE} = 5 V

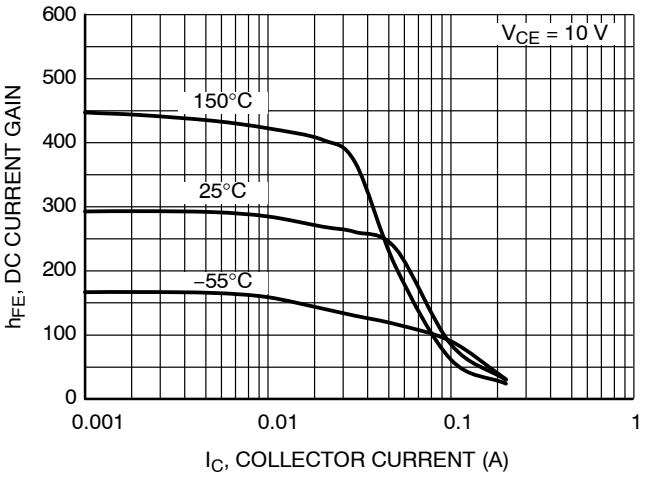


Figure 2. DC Current Gain at V_{CE} = 10 V

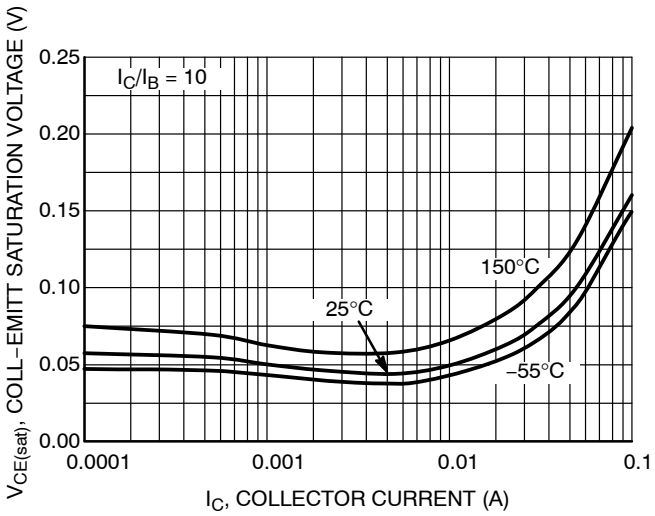


Figure 3. $V_{CE(sat)}$ at I_C/I_B = 10

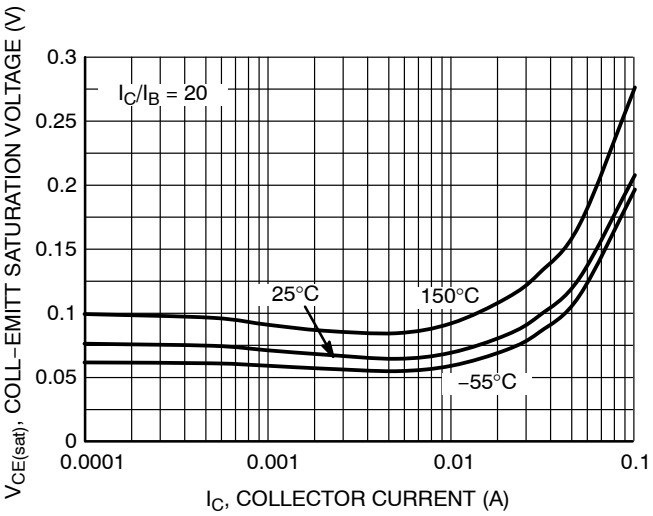


Figure 4. $V_{CE(sat)}$ at I_C/I_B = 20

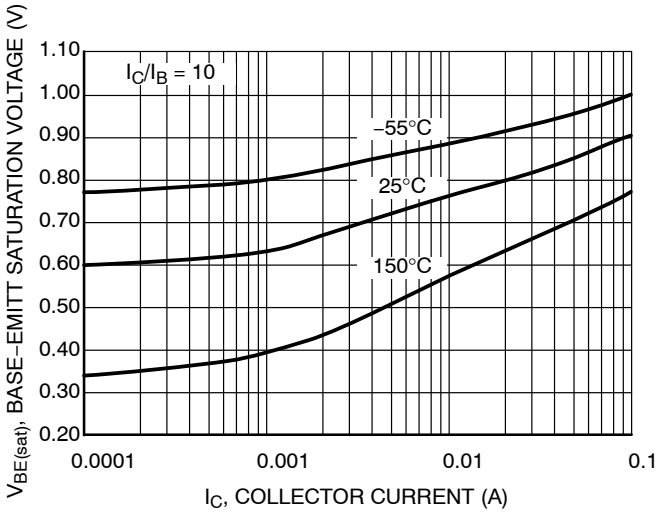


Figure 5. $V_{BE(sat)}$ at I_C/I_B = 10

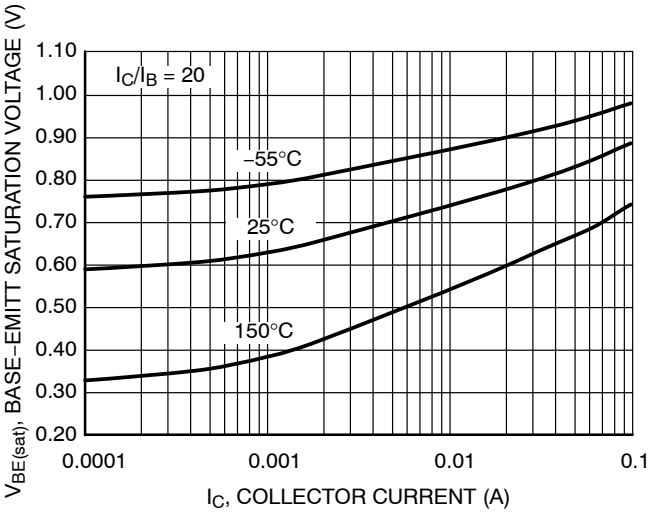


Figure 6. $V_{BE(sat)}$ at I_C/I_B = 20

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TYPICAL CHARACTERISTICS – BC846BDW1

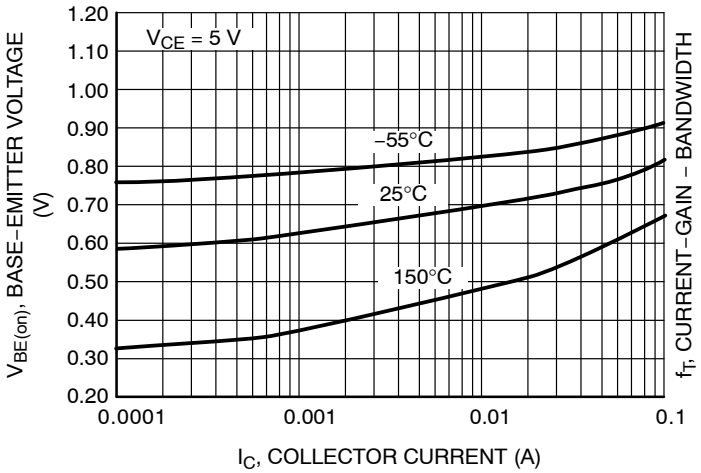


Figure 7. $V_{BE(on)}$ at V_{CE} = 5 V

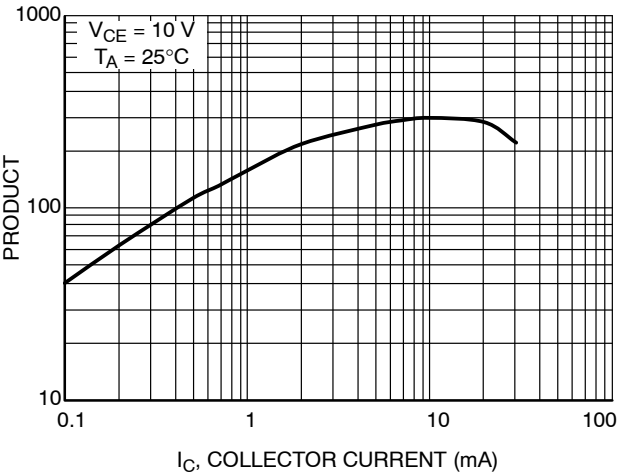


Figure 8. Current − Gain − Bandwidth Product

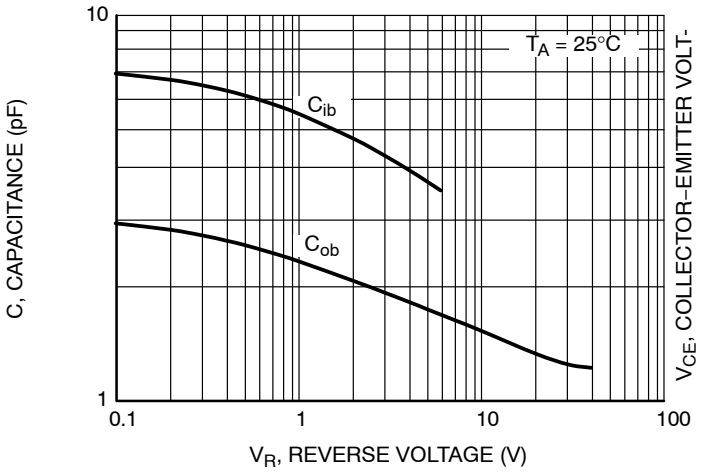


Figure 9. Capacitances

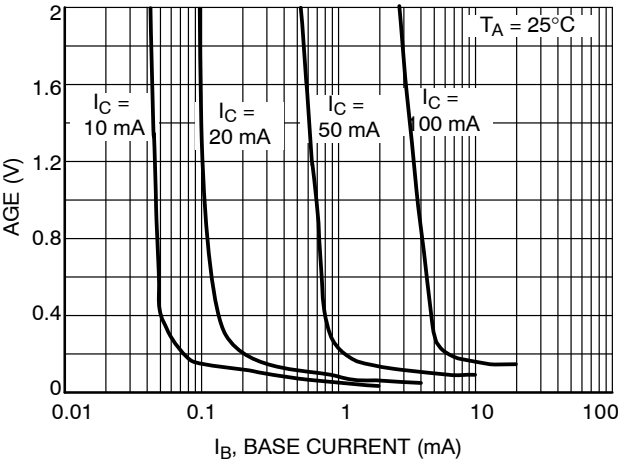


Figure 10. Collector Saturation Region

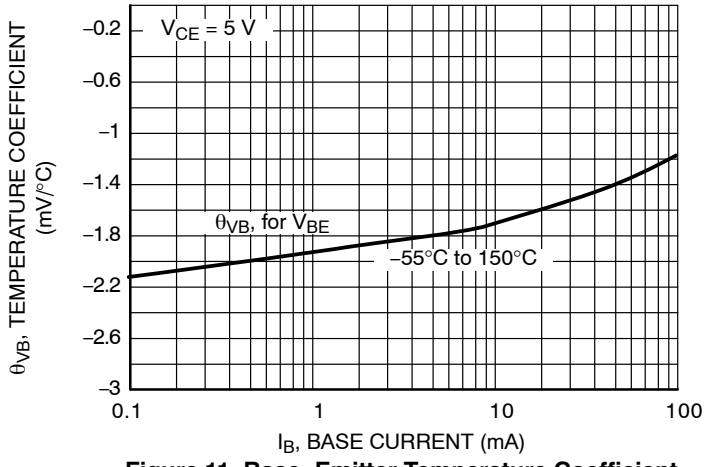


Figure 11. Base−Emitter Temperature Coefficient

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TYPICAL CHARACTERISTICS – BC847BDW1

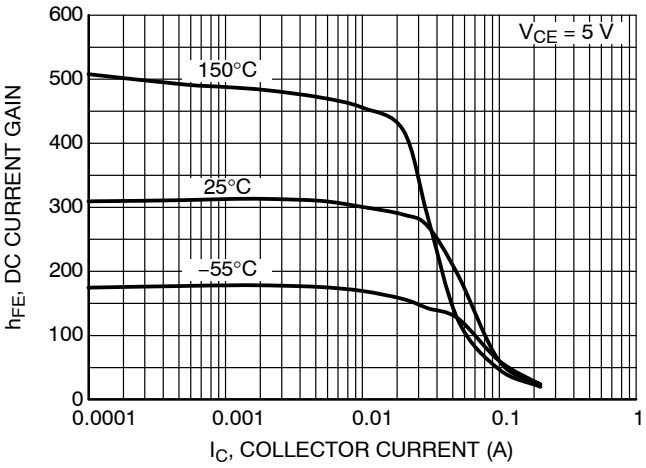


Figure 12. DC Current Gain at V_{CE} = 5 V

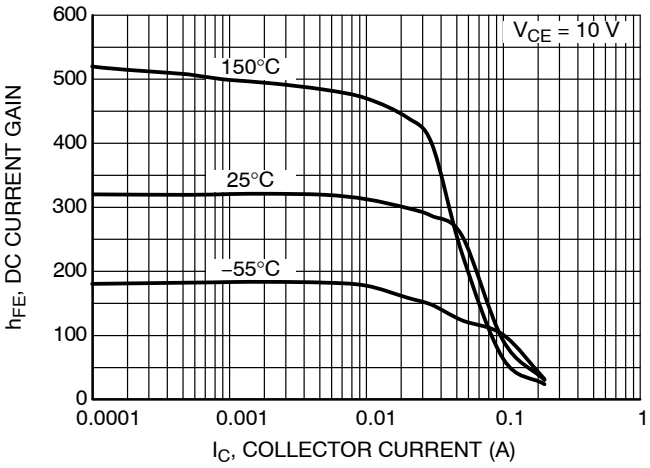


Figure 13. DC Current Gain at V_{CE} = 10 V

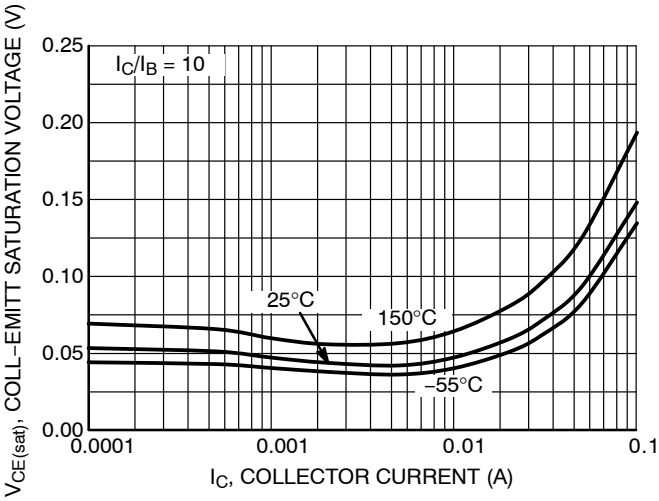


Figure 14. V_{CE} at I_C/I_B = 10

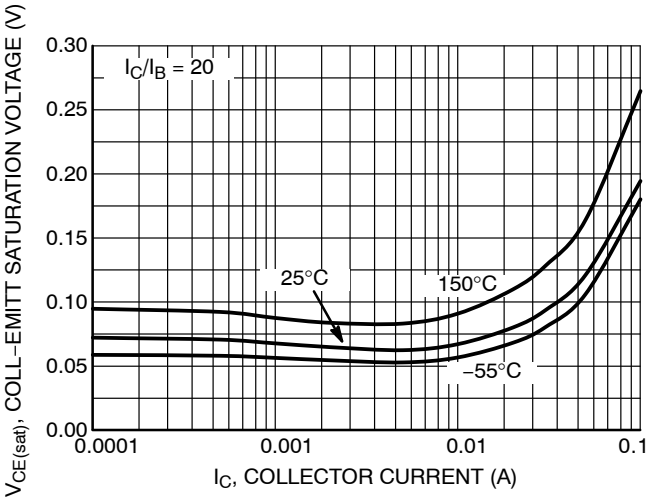


Figure 15. V_{CE} at I_C/I_B = 20

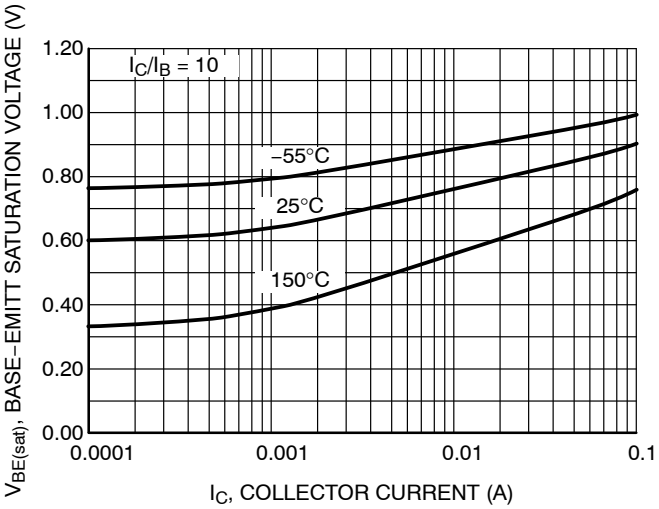


Figure 16. $V_{BE(sat)}$ at I_C/I_B = 10

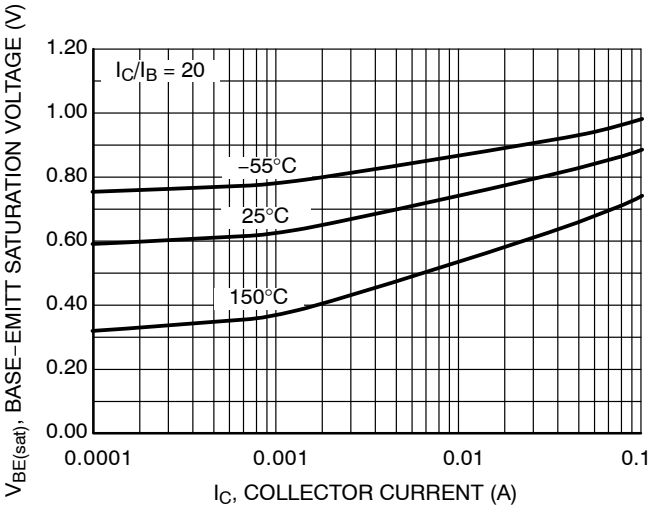


Figure 17. $V_{BE(sat)}$ at I_C/I_B = 20

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TYPICAL CHARACTERISTICS – BC847BDW1

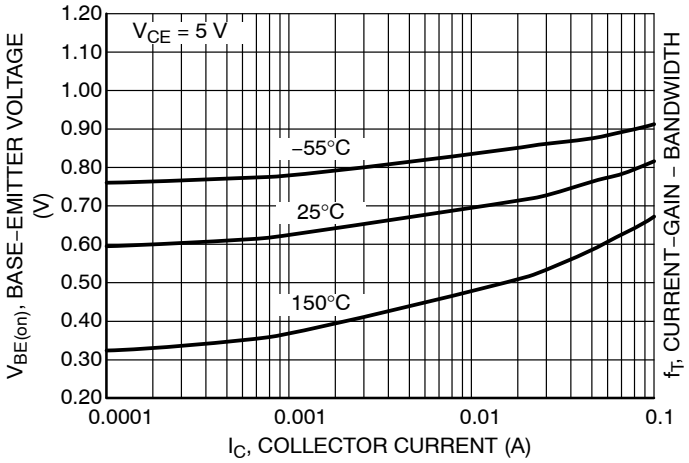


Figure 18. $V_{BE(on)}$ at V_{CE} = 5 V

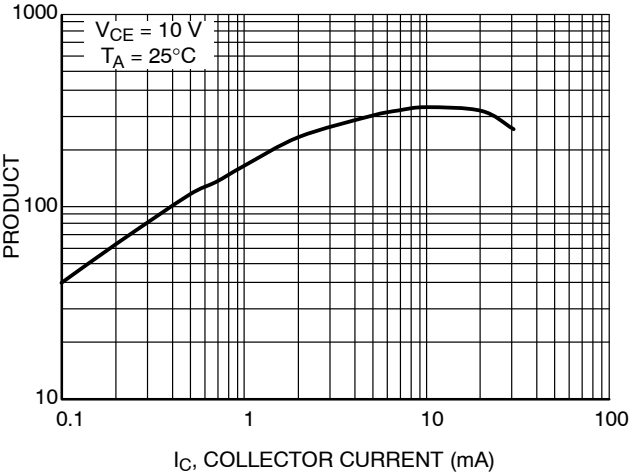


Figure 19. Current – Gain – Bandwidth Product

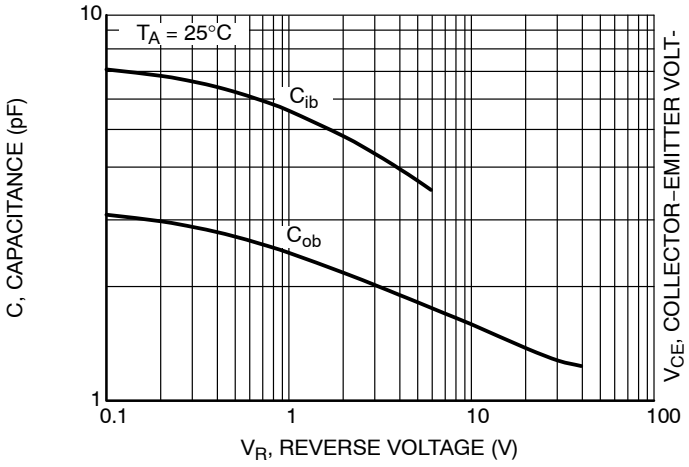


Figure 20. Capacitances

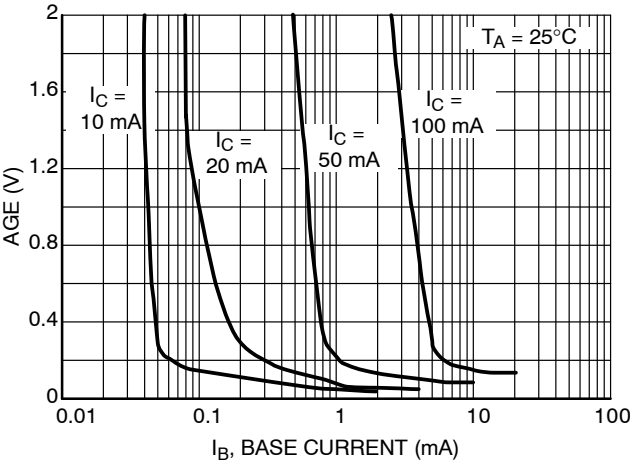


Figure 21. Collector Saturation Region

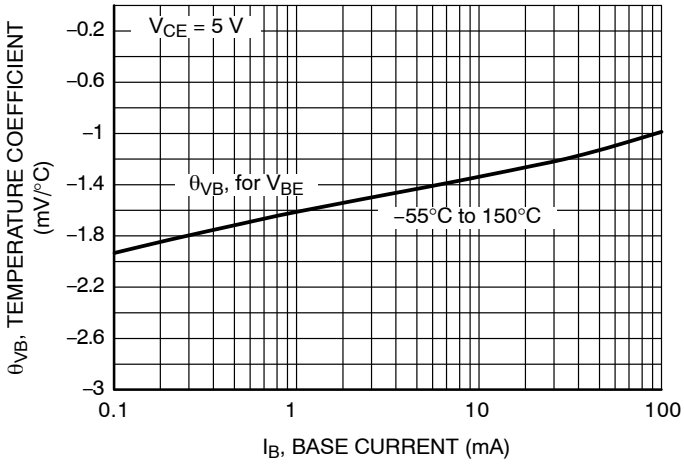


Figure 22. Base–Emitter Temperature Coefficient

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TYPICAL CHARACTERISTICS – BC848CDW1

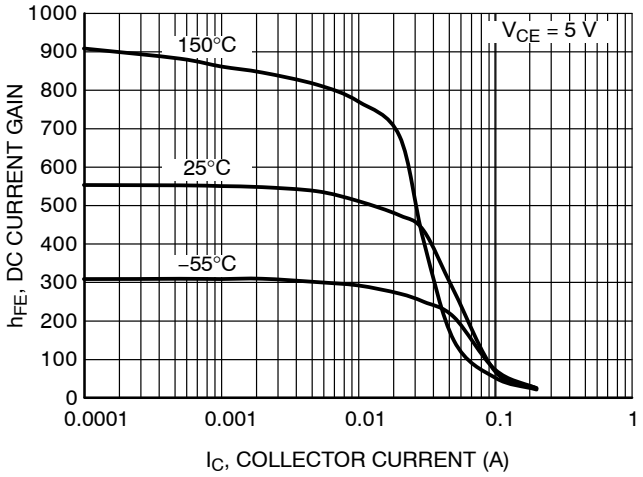


Figure 23. DC Current Gain at V_{CE} = 5 V

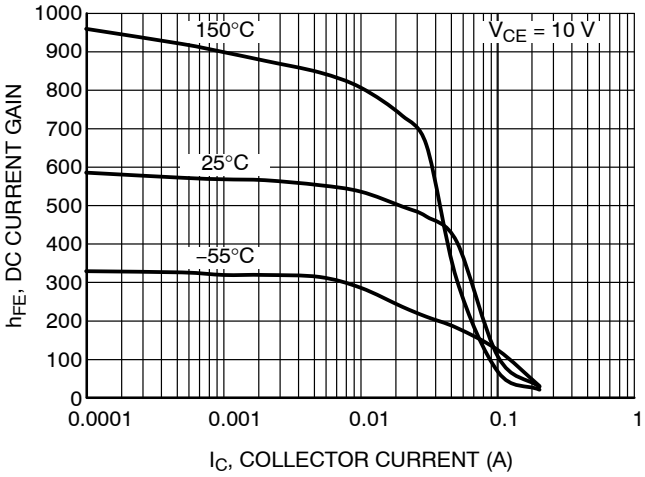


Figure 24. DC Current Gain at V_{CE} = 10 V

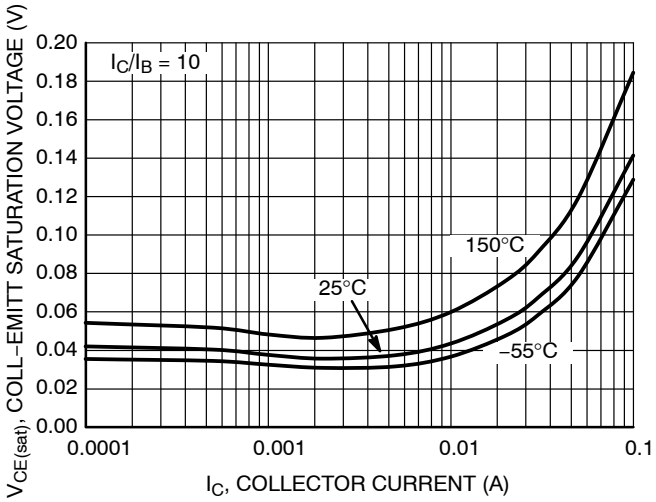


Figure 25. V_{CE} at I_C/I_B = 10

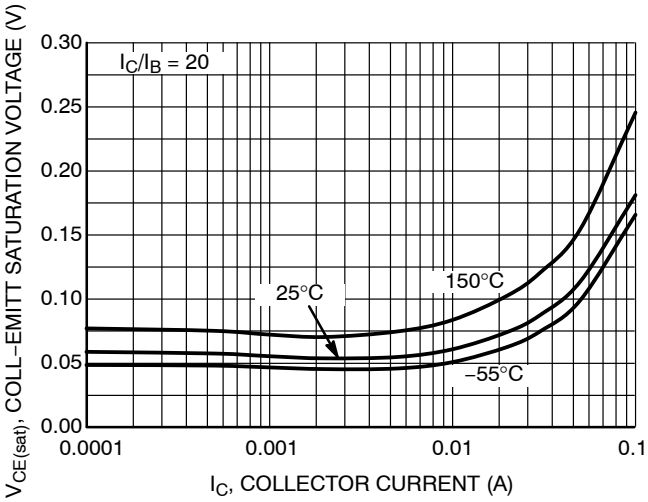


Figure 26. V_{CE} at I_C/I_B = 20

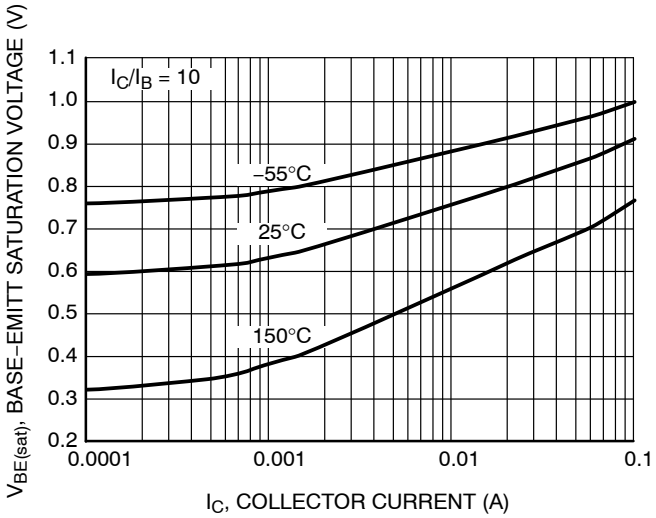


Figure 27. $V_{BE(sat)}$ at I_C/I_B = 10

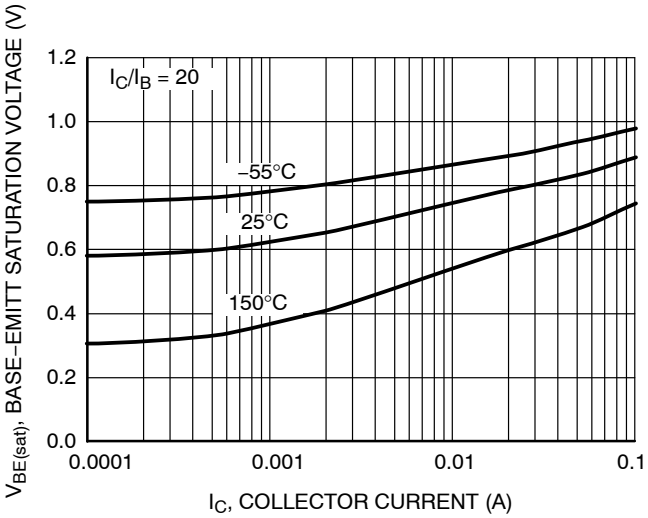


Figure 28. $V_{BE(sat)}$ at I_C/I_B = 20

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TYPICAL CHARACTERISTICS – BC848CDW1

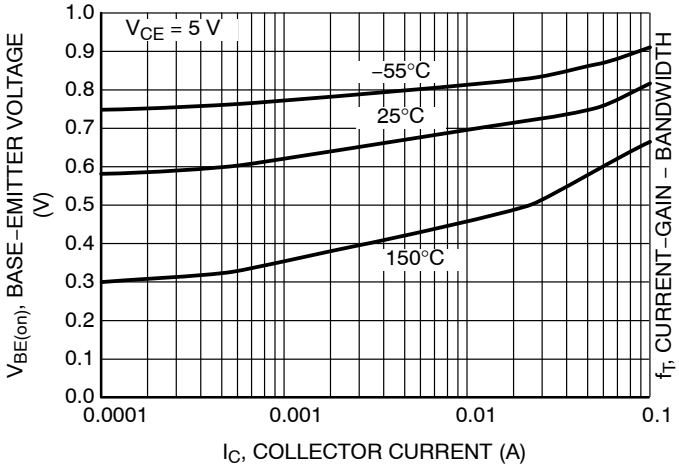


Figure 29. $V_{BE(on)}$ at V_{CE} = 5 V

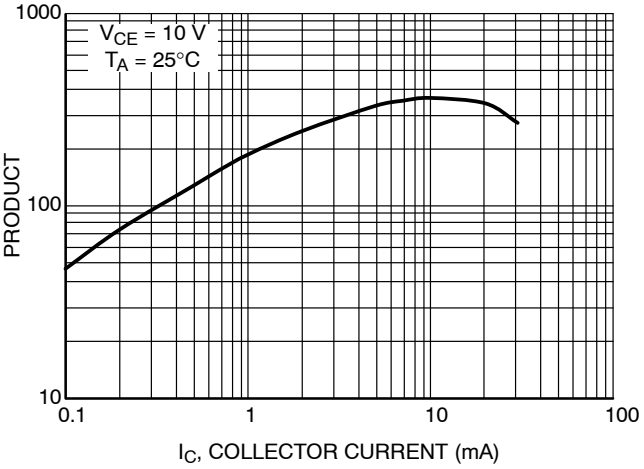


Figure 30. Current − Gain − Bandwidth Product

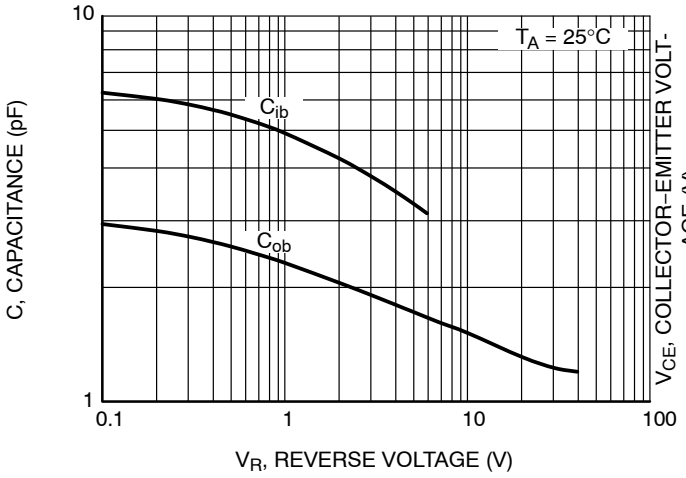


Figure 31. Capacitances

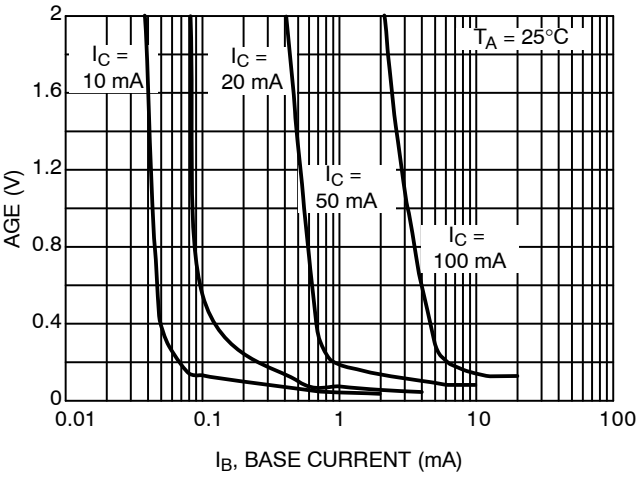


Figure 32. Collector Saturation Region

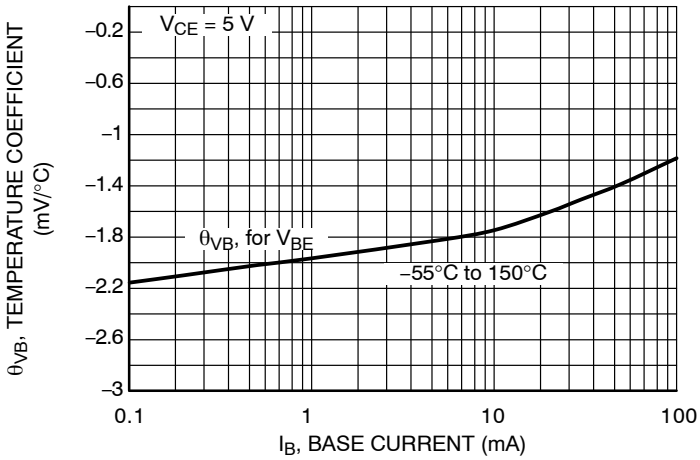


Figure 33. Base−Emitter Temperature Coefficient

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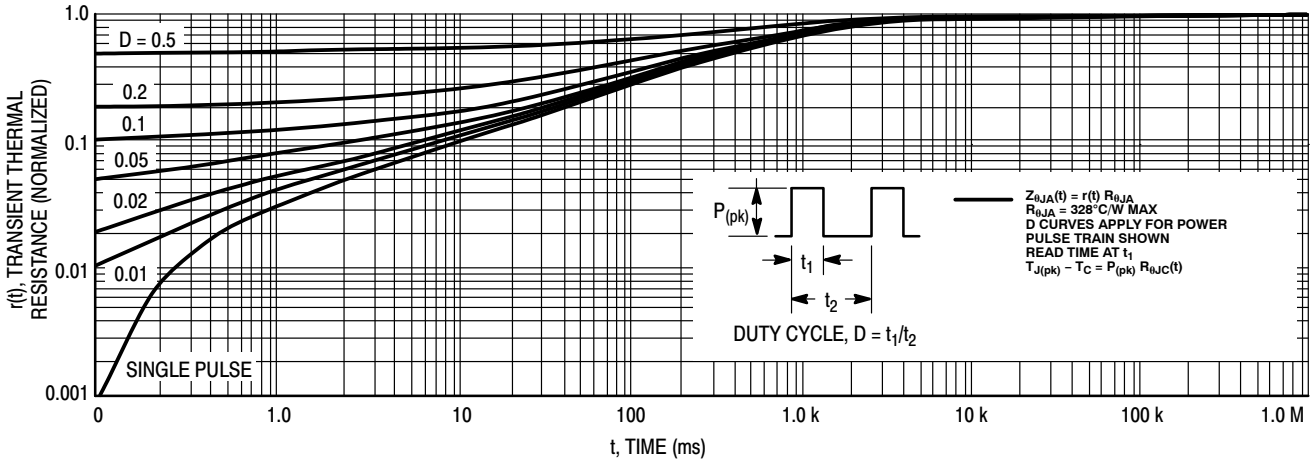


Figure 34. Thermal Response

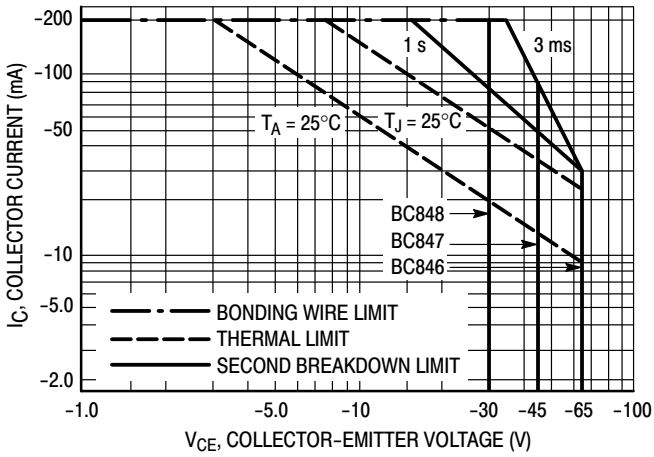


Figure 35. Active Region Safe Operating Area

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 35 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 $T_{J(pk)} \leq$ 150°C. $T_{J(pk)}$ may be calculated from the data in Figure 34. 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.

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ORDERING INFORMATION

Device	Markings	Package	Shipping†
BC846BDW1T1G BC846BDW1T1G−NC SBC846BDW1T1G* SBC846BDW1T1G−NC*	1B	SOT−363 (Pb−Free)	3,000 / Tape & Reel
BC847BDW1T1G BC847BDW1T1G−NC SBC847BDW1T1G* SBC847BDW1T1G−NC* NSVBC847BDW1T2G* NSVBC847BDW1T2G−NC*	1F	SOT−363 (Pb−Free)	3,000 / Tape & Reel
BC847BDW1T3G BC847BDW1T3G−NC SBC847BDW1T3G* SBC847BDW1T3G−NC*			10,000 / Tape & Reel
BC847CDW1T1G BC847CDW1T1G−NC SBC847CDW1T1G* SBC847CDW1T1G−NC*	1G	SOT−363 (Pb−Free)	3,000 / Tape & Reel
BC848CDW1T1G BC848CDW1T1G−NC	1L	SOT−363 (Pb−Free)	3,000 / Tape & Reel

DISCONTINUED (Note 2)

NSVBC848CDW1T1G*	1L	SOT−363 (Pb−Free)	3,000 / 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 Prefixes for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.

2. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.

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REVISION HISTORY

Revision	Description of Changes	Date
14	Marked discontinued OPN.	6/12/2026
15	Added five new automotive OPNs.	7/9/2026
16	Added ”−NC” OPNs.	9/8/2026

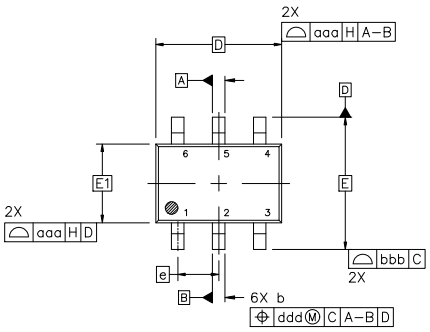
This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

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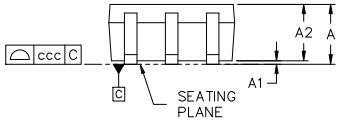


SC−88 2.00x1.25x0.90, 0.65P
CASE 419B−02
ISSUE Z

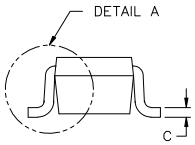
DATE 18 APR 2024



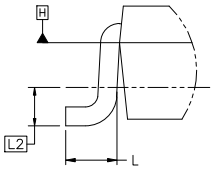
TOP VIEW



SIDE VIEW



END VIEW

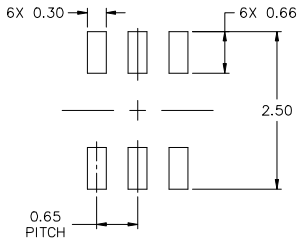


DETAIL A
SCALE 2:1

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5−2018.
2. ALL DIMENSION ARE IN MILLIMETERS.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
5. DATUMS A AND B ARE DETERMINED AT DATUM H.
6. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
7. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

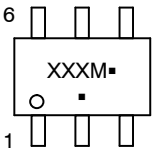
	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
A	−−−	−−−	1.10
A1	0.00	−−−	0.10
A2	0.70	0.90	1.00
b	0.15	0.20	0.25
c	0.08	0.15	0.22
D	2.00 BSC		
E	2.10 BSC		
E1	1.25 BSC		
e	0.65 BSC		
L	0.26	0.36	0.46
L2	0.15 BSC		
aaa	0.15		
bbb	0.30		
ccc	0.10		
ddd	0.10		



RECOMMENDED MOUNTING FOOTPRINT*

* FOR ADDITIONAL INFORMATION ON OUR Pb−FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



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

(Note: Microdot may be in either location)

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

*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.

STYLES ON PAGE 2

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ISSUE Z

DATE 18 APR 2024

STYLE 1:
PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2

STYLE 2:
CANCELLED

STYLE 3:
CANCELLED

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. COLLECTOR
4. EMITTER
5. BASE
6. ANODE

STYLE 5:
PIN 1. ANODE
2. ANODE
3. COLLECTOR
4. EMITTER
5. BASE
6. CATHODE

STYLE 6:
PIN 1. ANODE 2
2. N/C
3. CATHODE 1
4. ANODE 1
5. N/C
6. CATHODE 2

STYLE 7:
PIN 1. SOURCE 2
2. DRAIN 2
3. GATE 1
4. SOURCE 1
5. DRAIN 1
6. GATE 2

STYLE 8:
CANCELLED

STYLE 9:
PIN 1. EMITTER 2
2. EMITTER 1
3. COLLECTOR 1
4. BASE 1
5. BASE 2
6. COLLECTOR 2

STYLE 10:
PIN 1. SOURCE 2
2. SOURCE 1
3. GATE 1
4. DRAIN 1
5. DRAIN 2
6. GATE 2

STYLE 11:
PIN 1. CATHODE 2
2. CATHODE 2
3. ANODE 1
4. CATHODE 1
5. CATHODE 1
6. ANODE 2

STYLE 12:
PIN 1. ANODE 2
2. ANODE 2
3. CATHODE 1
4. ANODE 1
5. ANODE 1
6. CATHODE 2

STYLE 13:
PIN 1. ANODE
2. N/C
3. COLLECTOR
4. EMITTER
5. BASE
6. CATHODE

STYLE 14:
PIN 1. VREF
2. GND
3. GND
4. IOUT
5. VEN
6. VCC

STYLE 15:
PIN 1. ANODE 1
2. ANODE 2
3. ANODE 3
4. CATHODE 3
5. CATHODE 2
6. CATHODE 1

STYLE 16:
PIN 1. BASE 1
2. EMITTER 2
3. COLLECTOR 2
4. BASE 2
5. EMITTER 1
6. COLLECTOR 1

STYLE 17:
PIN 1. BASE 1
2. EMITTER 1
3. COLLECTOR 2
4. BASE 2
5. EMITTER 2
6. COLLECTOR 1

STYLE 18:
PIN 1. VIN1
2. VCC
3. VOUT2
4. VIN2
5. GND
6. VOUT1

STYLE 19:
PIN 1. I OUT
2. GND
3. GND
4. V CC
5. V EN
6. V REF

STYLE 20:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR

STYLE 21:
PIN 1. ANODE 1
2. N/C
3. ANODE 2
4. CATHODE 2
5. N/C
6. CATHODE 1

STYLE 22:
PIN 1. D1 (i)
2. GND
3. D2 (i)
4. D2 (c)
5. VBUS
6. D1 (c)

STYLE 23:
PIN 1. Vn
2. CH1
3. Vp
4. N/C
5. CH2
6. N/C

STYLE 24:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE

STYLE 25:
PIN 1. BASE 1
2. CATHODE
3. COLLECTOR 2
4. BASE 2
5. EMITTER
6. COLLECTOR 1

STYLE 26:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

STYLE 27:
PIN 1. BASE 2
2. BASE 1
3. COLLECTOR 1
4. EMITTER 1
5. EMITTER 2
6. COLLECTOR 2

STYLE 28:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

STYLE 29:
PIN 1. ANODE
2. ANODE
3. COLLECTOR
4. EMITTER
5. BASE/ANODE
6. CATHODE

STYLE 30:
PIN 1. SOURCE 1
2. DRAIN 2
3. DRAIN 2
4. SOURCE 2
5. GATE 1
6. DRAIN 1

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

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