



# BC847CPN-AU

## DUAL GENERAL PURPOSE TRANSISTORS

NPN/PNP Duals (Complementary)

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

### FEATURES

- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard
- Acquire quality system certificate : TS16949
- AEC-Q101 qualified

### MECHANICAL DATA

- Case : SOT-363
- Terminals : Solderable per MIL-STD-750,Method 2026
- Approx weight : 0.006 grams

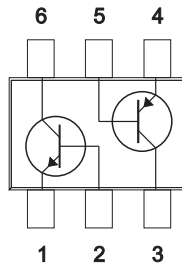
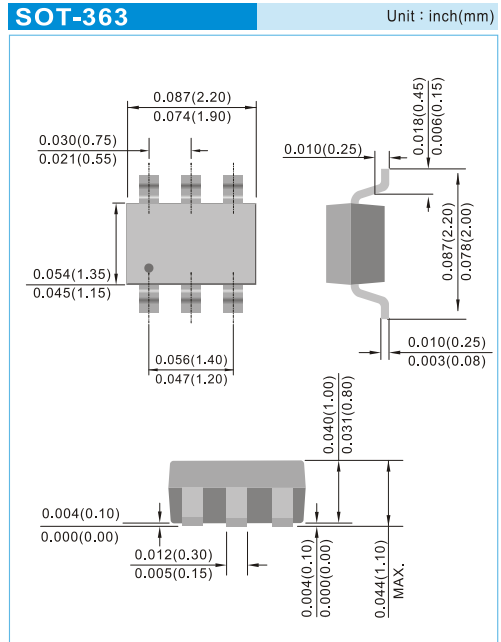


Fig.55



### MAXIMUM RATINGS-NPN

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CE0}$	45	V
Collector-Base Voltage	$V_{CBO}$	50	V
Emitter-Base Voltage	$V_{EBO}$	6.0	V
Collector Current-Continuous	$I_c$	100	mAdc

### MAXIMUM RATINGS-PNP

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CE0}$	-45	V
Collector-Base Voltage	$V_{CBO}$	-50	V
Emitter-Base Voltage	$V_{EBO}$	-5.0	V
Collector Current-Continuous	$I_c$	-100	mAdc

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.



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## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation Per Device FR-4 Board (Note 1) $T_A=25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	380 250 3	mW  mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	328	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	550	$^\circ\text{C}/\text{W}$
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- FR-4 = 70 x 60 x 1mm.
- Mounted on an FR4 PCB, single-sided copper, mini pad.

## ELECTRICAL CHARACTERISTICS (NPN) ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Breakdown Voltage $I_C=10\text{mA}$	$V_{(BR)CEO}$	45	-	-	V
Collector-Emitter Breakdown Voltage $I_C=10\mu\text{A}, V_{EB}=0$	$V_{(BR)CES}$	50	-	-	V
Collector-Base Breakdown Voltage $I_C=10\mu\text{A}$	$V_{(BR)CBO}$	50	-	-	V
Emitter-Base Breakdown Voltage $I_E=1.0\mu\text{A}$	$V_{(BR)EBO}$	6.0	-	-	V
Collector Cutoff Current $V_{CB}=30\text{V}$ $V_{CB}=30\text{V}, T_A=150^\circ\text{C}$	$I_{CBO}$	-	-	15 5.0	nA $\mu\text{A}$
<b>ON CHARACTERISTICS</b>					
DC Current Gain $I_C=10\mu\text{A}, V_{CE}=5.0\text{V}$ $I_C=2.0\text{mA}, V_{CE}=5.0\text{V}$	$h_{FE}$	- 420	270 520	- 800	-
Collector-Emitter Saturation Voltage $I_C=10\text{mA}, I_B=0.5\text{mA}$ $I_C=100\text{mA}, I_B=5.0\text{mA}$	$V_{CE(sat)}$	- -	- -	0.25 0.6	V
Base-Emitter Saturation Voltage $I_C=10\text{mA}, I_B=0.5\text{mA}$ $I_C=100\text{mA}, I_B=5.0\text{mA}$	$V_{BE(sat)}$	- -	0.7 0.9	- -	V
Base-Emitter Voltage $I_C=2.0\text{mA}, V_{CE}=5.0\text{V}$ $I_C=10\text{mA}, V_{CE}=5.0\text{V}$	$V_{BE(on)}$	580 -	660 -	700 770	mV
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
Current-Gain-Bandwidth Product $I_C=10\text{mA}, V_{CE}=5.0\text{Vdc}, f=100\text{MHz}$	$f_T$	100	-	-	MHz
Output Capacitance ( $V_{CB}=10\text{V}, f=1\text{MHz}$ )	$C_{ob}$	-	-	4.5	pF
Noise Figure $I_C=0.2\text{mA}, V_{CE}=5.0\text{Vdc}, R_s=2.0\text{k}\Omega, f=1.0\text{kHz}, BW=200\text{Hz}$	NF	-	-	10	dB



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## ELECTRICAL CHARACTERISTICS (PNP) (T<sub>A</sub>=25°C unless otherwise noted)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Breakdown Voltage I <sub>C</sub> =-10mA	V <sub>(BR)CEO</sub>	-45	-	-	V
Collector-Emitter Breakdown Voltage I <sub>C</sub> =-10μA, V <sub>EB</sub> =0	V <sub>(BR)CES</sub>	-50	-	-	V
Collector-Base Breakdown Voltage I <sub>C</sub> =-10μA	V <sub>(BR)CBO</sub>	-50	-	-	V
Emitter-Base Breakdown Voltage I <sub>E</sub> =-1.0μA	V <sub>(BR)EBO</sub>	-5.0	-	-	V
Collector Cutoff Current V <sub>CB</sub> =-30V V <sub>CB</sub> =-30V, T <sub>A</sub> =150°C	I <sub>CBO</sub>	-	-	-15 -4.0	nA μA
<b>ON CHARACTERISTICS</b>					
DC Current Gain I <sub>C</sub> =-10μA, V <sub>CE</sub> =-5.0V I <sub>C</sub> =-2.0mA, V <sub>CE</sub> =-5.0V	h <sub>FE</sub>	- 420	270 520	- 800	-
Collector-Emitter Saturation Voltage I <sub>C</sub> =-10mA, I <sub>B</sub> =-0.5mA I <sub>C</sub> =-100mA, I <sub>B</sub> =-5.0mA	V <sub>CE(sat)</sub>	- -	- -	-0.3 -0.65	V
Base-Emitter Saturation Voltage I <sub>C</sub> =-10mA, I <sub>B</sub> =-0.5mA I <sub>C</sub> =-100mA, I <sub>B</sub> =-5.0mA	V <sub>BE(sat)</sub>	- -	-0.7 -0.9	- -	V
Base-Emitter Voltage I <sub>C</sub> =-2.0mA, V <sub>CE</sub> =-5.0V I <sub>C</sub> =-10mA, V <sub>CE</sub> =-5.0V	V <sub>BE(on)</sub>	-0.6 -	- -	-0.75 -0.82	mV
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
Current-Gain-Bandwidth Product I <sub>C</sub> =-10mA, V <sub>CE</sub> =-5.0Vdc, f=100MHz	f <sub>T</sub>	100	-	-	MHz
Output Capacitance (V <sub>CB</sub> =-10V, f=1MHz)	C <sub>obo</sub>	-	-	4.5	pF
Noise Figure I <sub>C</sub> =-0.2mA, V <sub>CE</sub> =-5.0Vdc, R <sub>S</sub> =2.0kΩ, 1.0kHz, BW=200Hz	NF	-	-	10	dB



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## TYPICAL NPN CHARACTERISTICS

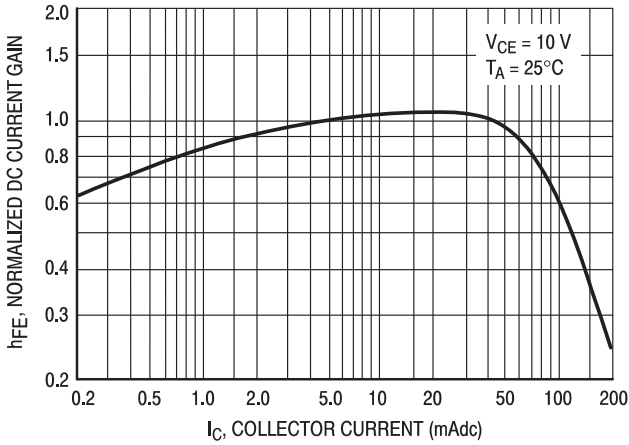


Figure 1 . Normalized DC Current Gain

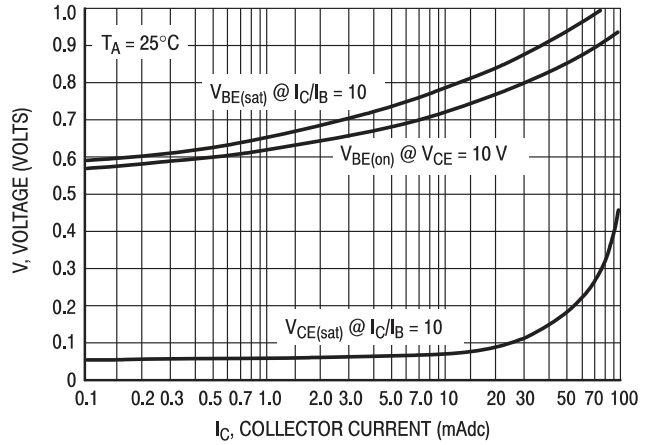


Figure 2 . "Saturation" and "On" Voltages

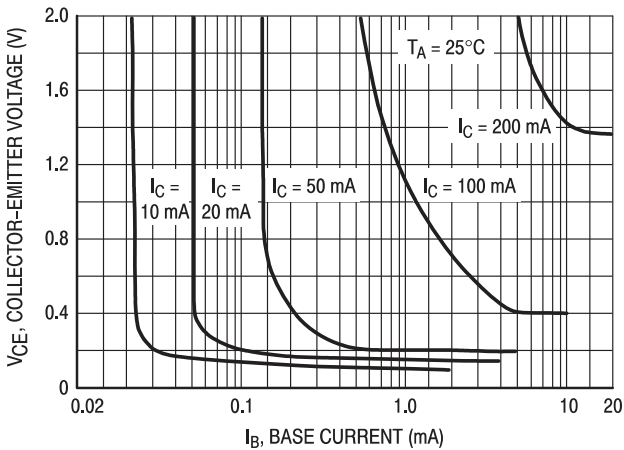


Figure 3 . Collector Saturation Region

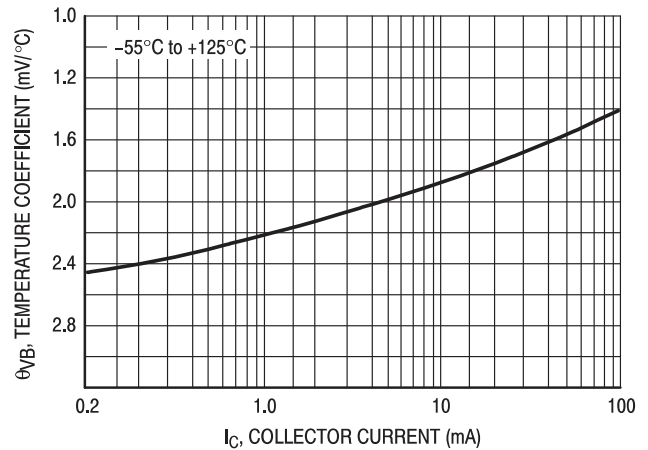


Figure 4 . Base-Emitter Temperature Coefficient

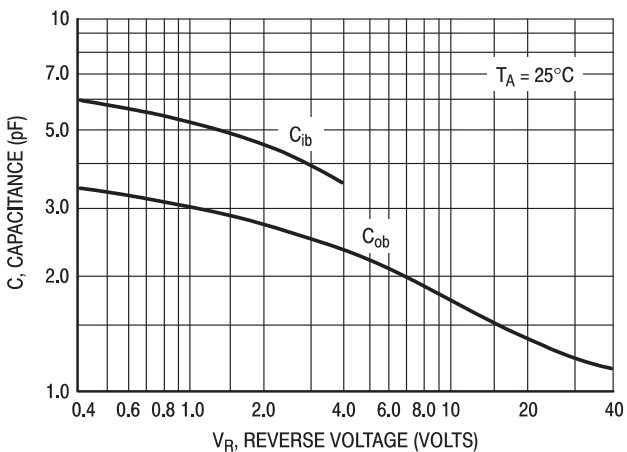


Figure 5 . Capacitances

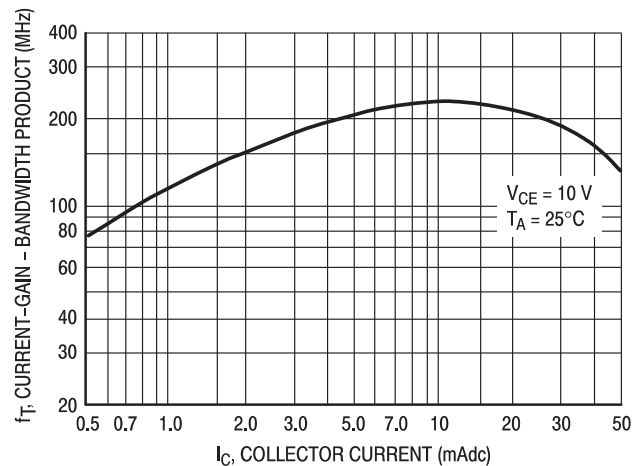


Figure 6 . Current-Gain - Bandwidth Product



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## TYPICAL PNP CHARACTERISTICS

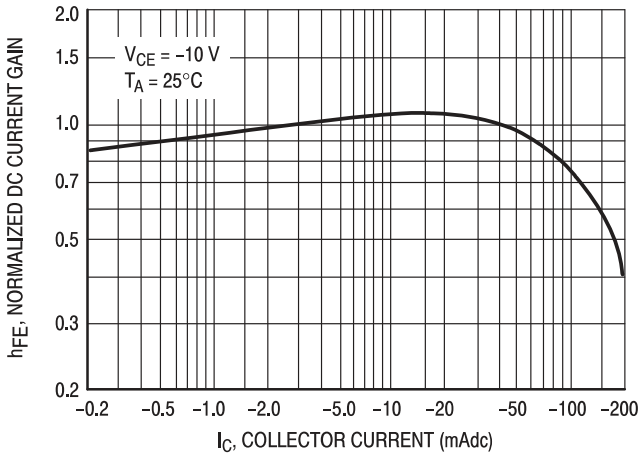


Figure 7 . Normalized DC Current Gain

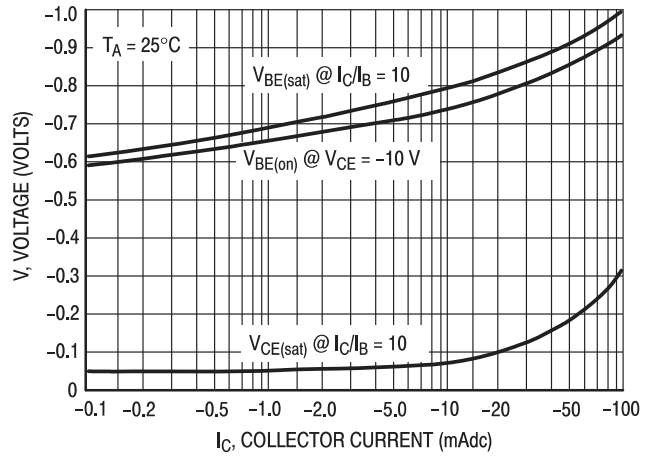


Figure 8 . "Saturation" and "On" Voltages

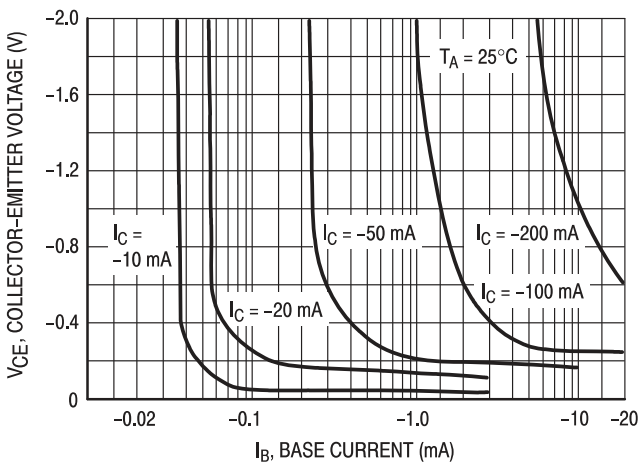


Figure 9 . Collector Saturation Region

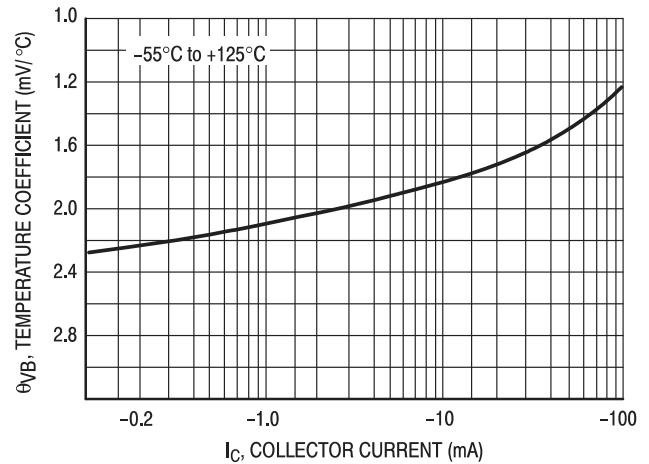


Figure 10 . Base-Emitter Temperature Coefficient

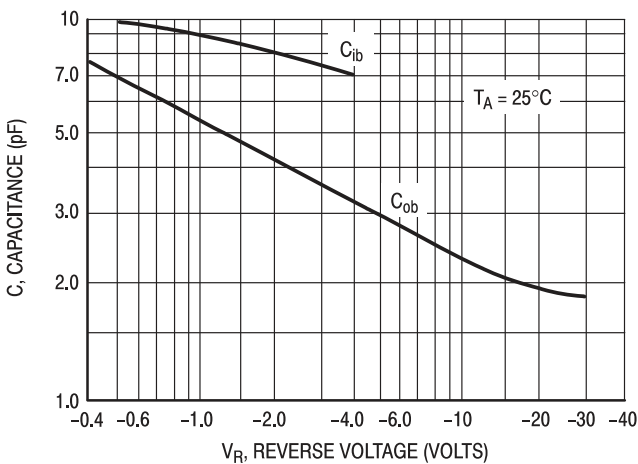


Figure 11 . Capacitances

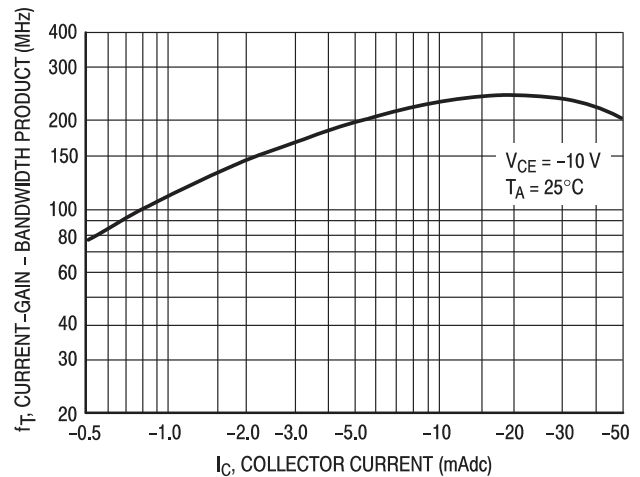
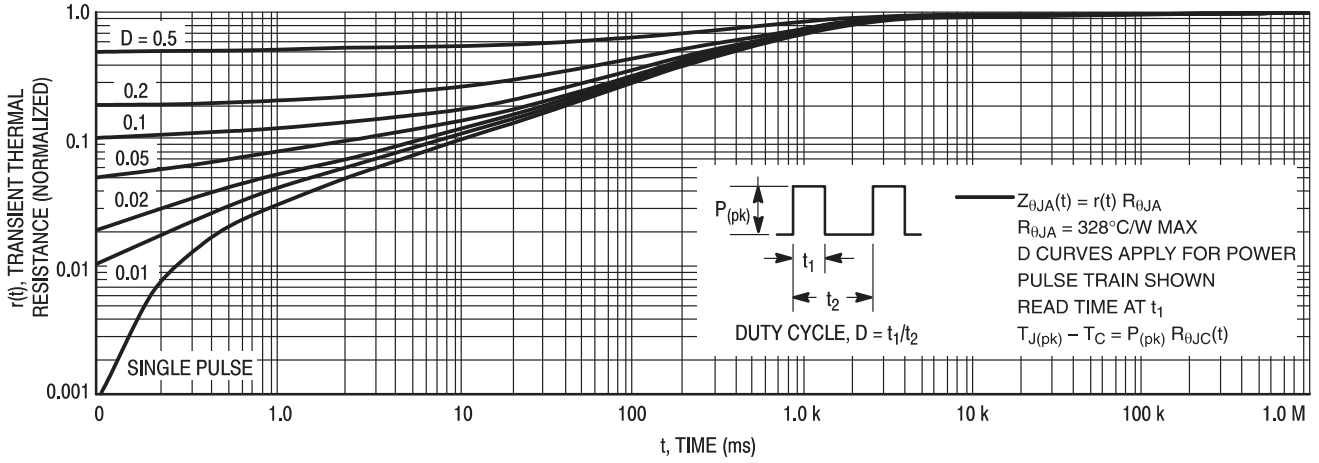


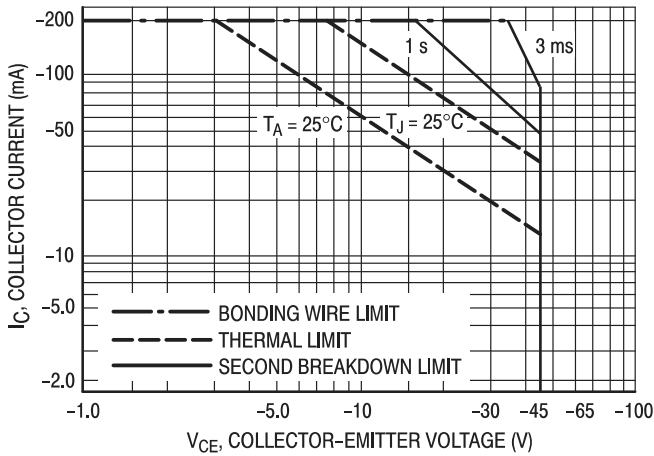
Figure 12 . Current-Gain - Bandwidth Product



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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 26 is based upon  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  or  $T_A$  is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 25. 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.

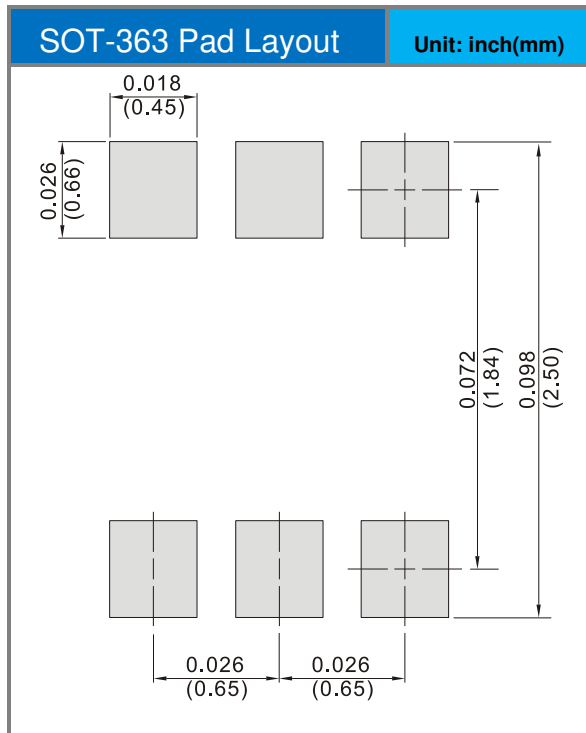


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## Product and Packing Information

Part No.	Package Type	Packing Type	Marking
BC847CPN-AU	SOT-363	3K pcs / 7" reel	4C7
BC847CPN-AU	SOT-363	10K pcs / 13" reel	4C7

## Mounting Pad Layout





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