# BC847CPN

## DUAL GENERAL PURPOSE TRANSISTORS

NPN/PNP Duals (Complimentary)

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

### FEATURES

- Lead free in compliance with EU RoHS 2011/65/EU directive
- Green molding compound as per IEC61249 Std. . (Halogen Free)

### MECHANICALDATA

- Case : SOT-363
- Terminals : Solderable per MIL-STD-750,Method 2026
- Approx weight : 0.0002 ounces, 0.006 grams
- Marking : 4C7

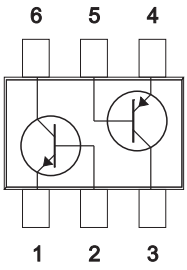
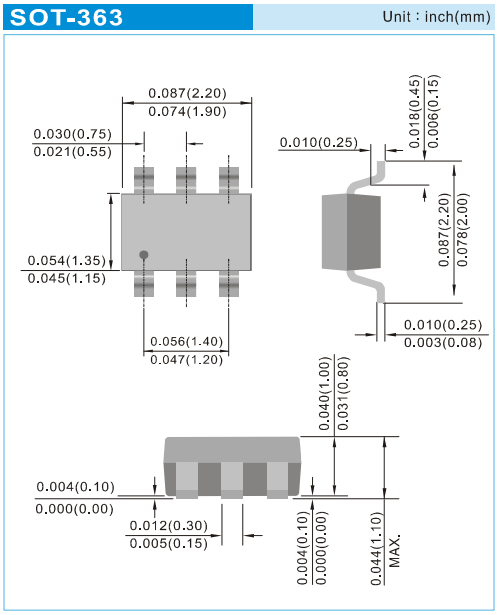



Fig.55




### MAXIMUM RATINGS-NPN

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | 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 | $V_{CEO}$ | -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 noraml operting 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 Disspation<br>Per Device<br>FR-4 Board (Note 1) $T_A$=25°C<br>Derate above 25°C | $P_D$ | 380<br>250<br><br>3 | mW<br><br>mW/°C |
| Thermal Resistance,Junction-to-Ambient (Note 1) | $R_{\Theta JA}$ | 328 | °C/W |
| Thermal Resistance,Junction-to-Ambient (Note 2) | $R_{\Theta JA}$ | 550 | °C/W |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 to +150 | °C |

1.FR-4 = 70 x 60 x 1mm.

2.Mounted on a FR4 PCB, single-sided copper, mini pad.

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

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

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

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| OFF CHARACTERISTICS | | | | | |
| Collector-Emitter Breakdown Voltage<br>$I_C$=-10mA | $V_{(BR)CEO}$ | -45 | - | - | V |
| Collector-Emitter Breakdown Voltage<br>$I_C$=-10μA,$V_{EB}$=0 | $V_{(BR)CES}$ | -50 | - | - | V |
| Collector-Base Breakdown Voltage<br>$I_C$=-10μA | $V_{(BR)CBO}$ | -50 | - | - | V |
| Emitter-Base Breakdown Voltage<br>$I_E$=-1.0μA | $V_{(BR)EBO}$ | -5.0 | - | - | V |
| Collector Cutoff Current $V_{CB}$=-30V<br>$V_{CB}$=-30V,$T_A$=150°C | $I_{CBO}$ | - | - | -15<br>-4.0 | nA<br>μA |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain<br>$I_C$=-10μA,$V_{CE}$=-5.0V<br>$I_C$=-2.0mA,$V_{CE}$=-5.0V | $h_{FE}$ | -<br>420 | 270<br>520 | -<br>800 | - |
| Collector-Emitter Saturation Voltage $I_C$=-10mA,$I_B$=-0.5mA<br>$I_C$=-100mA,$I_B$=-5.0mA | $V_{CE}$(sat) | -<br>- | -<br>- | -0.3<br>-0.65 | V |
| Base-Emitter Saturation Voltage $I_C$=-10mA,$I_B$=-0.5mA<br>$I_C$=-100mA,$I_B$=-5.0mA | $V_{BE}$(sat) | -<br>- | -0.7<br>-0.9 | -<br>- | V |
| Base-Emitter Voltage $I_C$=-2.0mA,$V_{CE}$=-5.0V<br>$I_C$=-10mA,$V_{CE}$=-5.0V | $V_{BE}$(on) | -0.6<br>- | -<br>- | -0.75<br>-0.82 | mV |
| SMALL-SIGNAL CHARACTERISTICS | | | | | |
| Current-Gain-Bandwidth Product<br>$I_C$=-10mA,$V_{CE}$=-5.0Vdc,f=100MHz | $f_T$ | 100 | - | - | MHz |
| Output Capacitance ($V_{CB}$=-10V,f=1MHz) | Cobo | - | - | 4.5 | pF |
| Noise Figure<br>$I_C$=-0.2mA,$V_{CE}$=-5.0Vdc,$R_S$=2.0kΩ,1.0kHz,BW=200Hz | NF | - | - | 10 | dB |

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## TYPICAL NPN CHARACTERISTICS

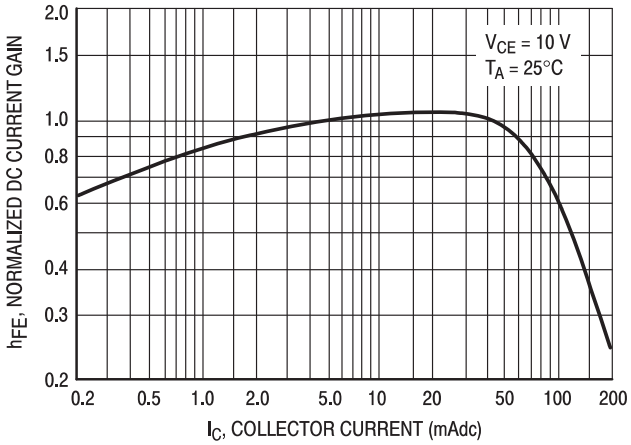


**Figure 1 . Normalized DC Current Gain**

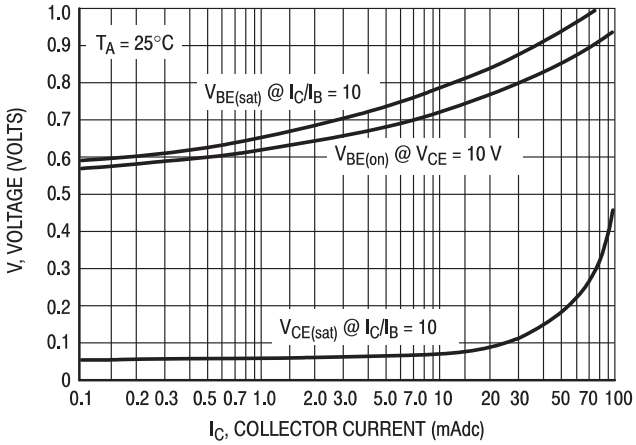


**Figure 2 . "Saturation" and "On" Voltages**

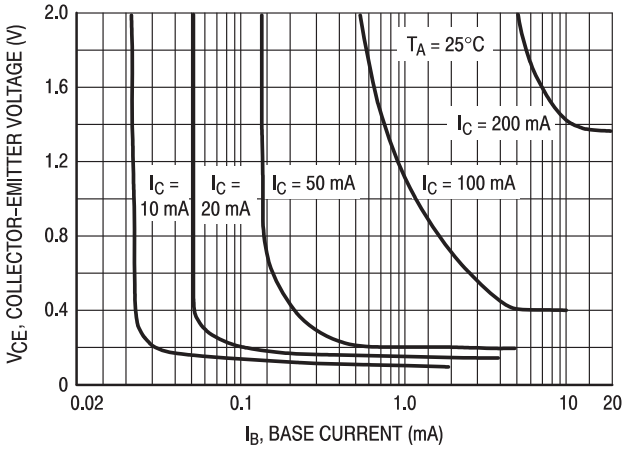


**Figure 3 . Collector Saturation Region**

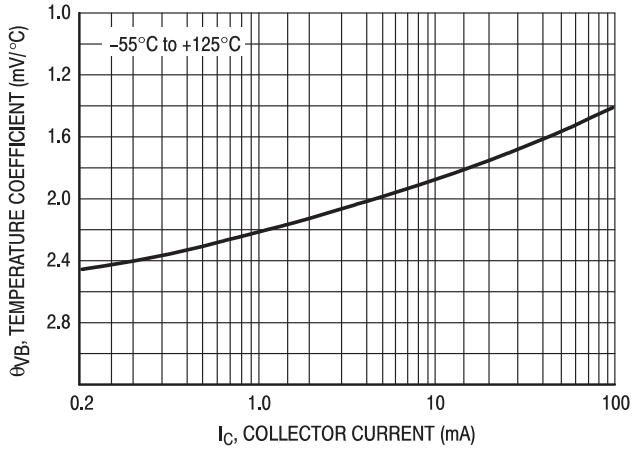


**Figure 4 . Base–Emitter Temperature Coefficient**

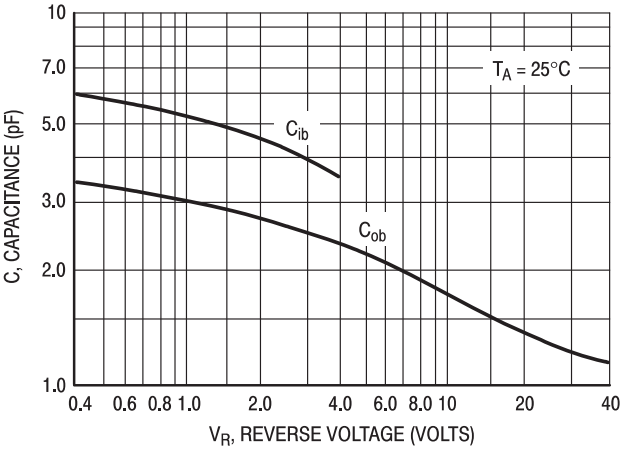


**Figure 5 . Capacitances**

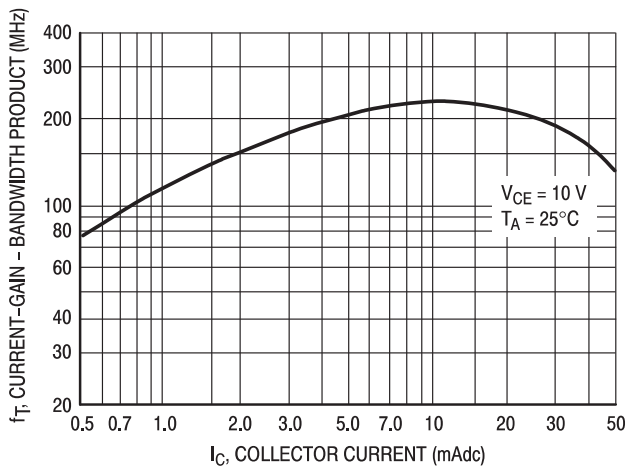


**Figure 6 . Current–Gain – Bandwidth Product**

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## TYPICAL PNP CHARACTERISTICS

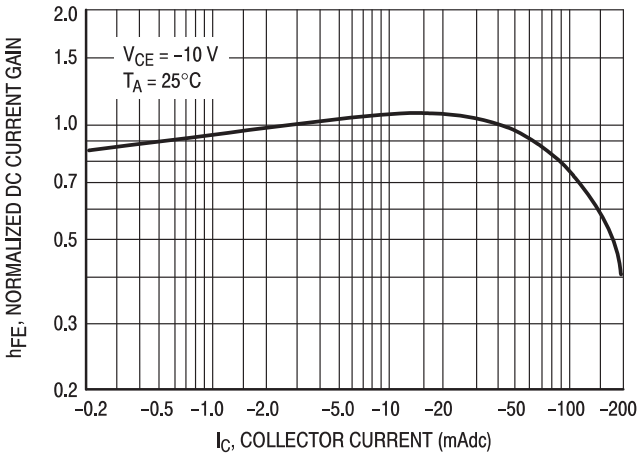


**Figure 7 . Normalized DC Current Gain**

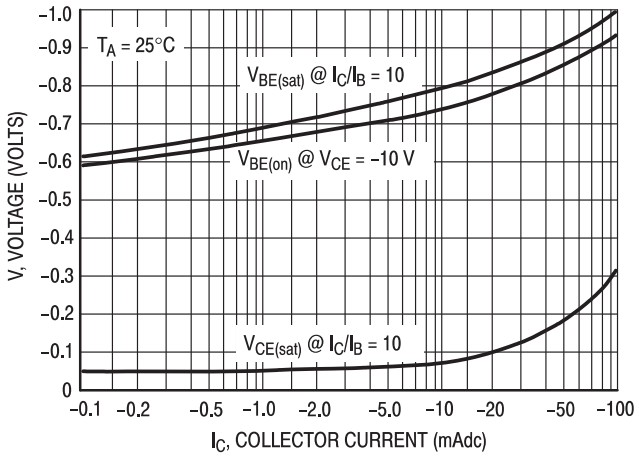


**Figure 8 . "Saturation" and "On" Voltages**

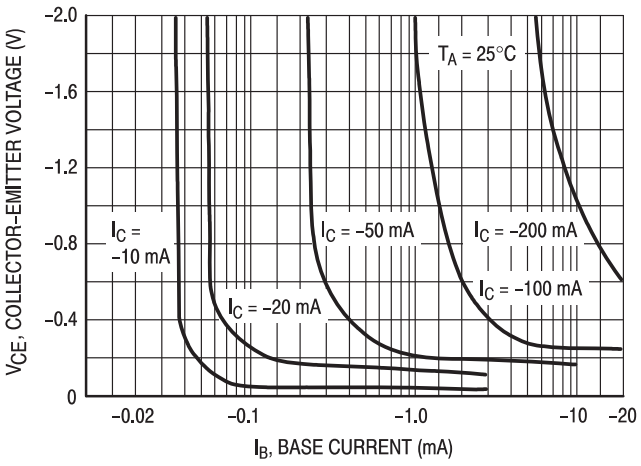


**Figure 9 . Collector Saturation Region**

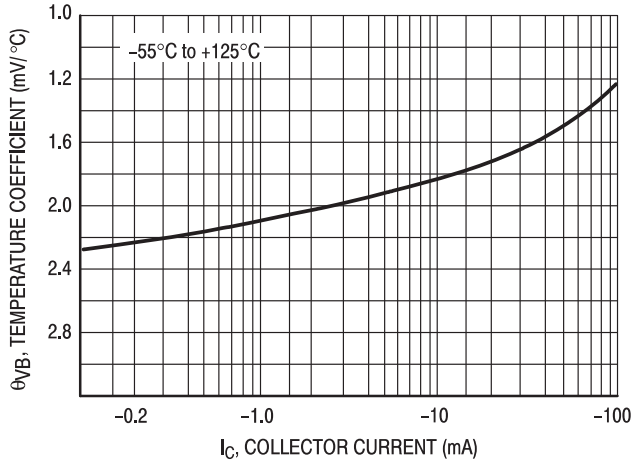


**Figure 10 . Base–Emitter Temperature Coefficient**

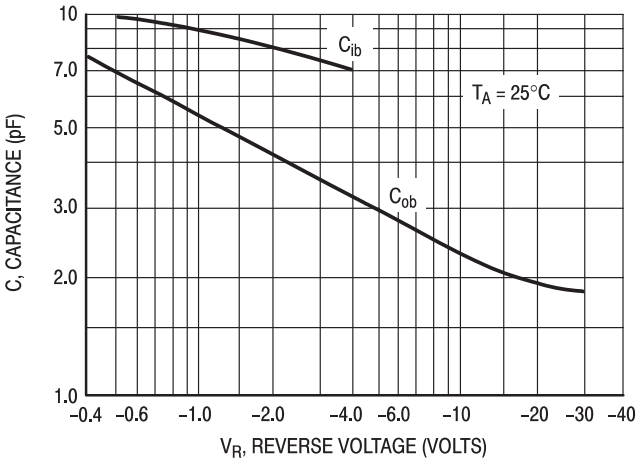


**Figure 11 . Capacitances**

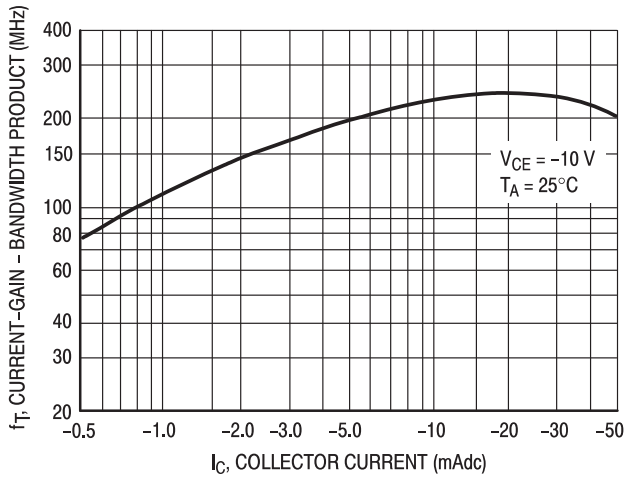


**Figure 12 . Current–Gain – Bandwidth Product**

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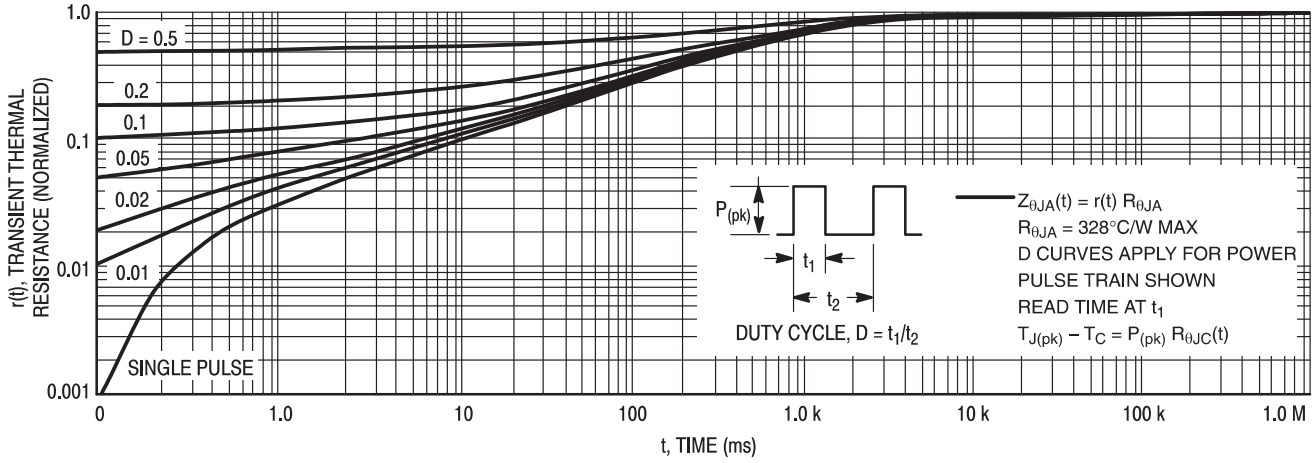


**Figure 13. Thermal Response**

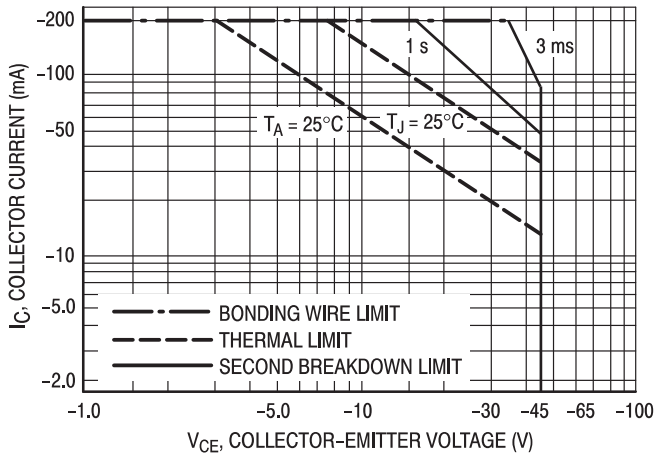


**Figure 14 . Active Region Safe Operating Area**

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°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 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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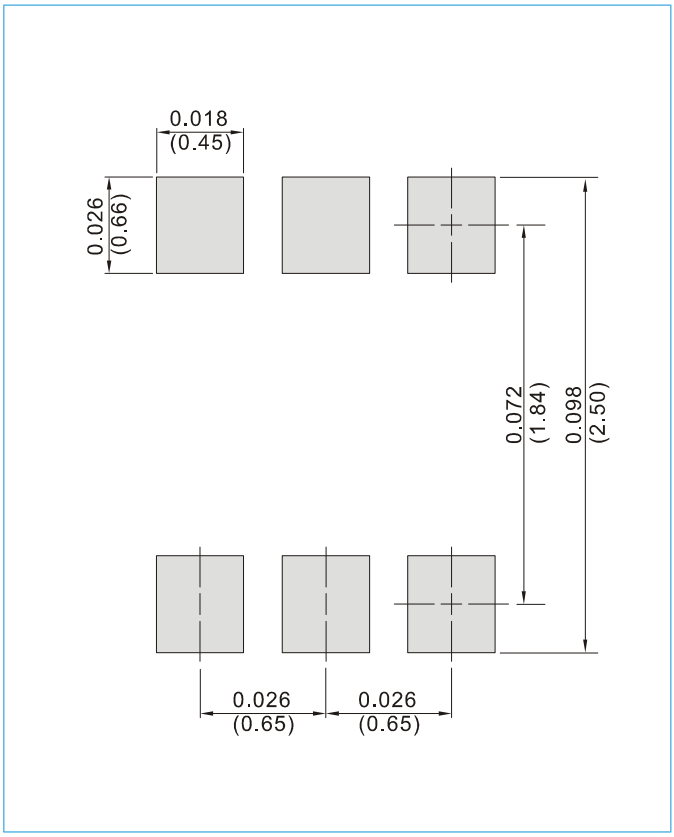
## MOUNTING PAD LAYOUT

SOT-363 Unit : inch(mm)




## ORDER INFORMATION

- Packing information

  T/R - 10K per 13" plastic Reel

  T/R - 3K per 7" plastic Reel

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**Part No_packing code_Version**

BC847CPN_R1_00001

BC847CPN_R2_00001

**For example :**

**RB500V-40_R2_00001**


| Packing Code XX | | | | Version Code XXXXX | | |
|---|---|---|---|---|---|---|
| Packing type | 1st Code | Packing size code | 2nd Code | HF or RoHS | 1st Code | 2nd~5th Code |
| Tape and Ammunition Box (T/B) | A | N/A | 0 | HF | 0 | serial number |
| Tape and Reel (T/R) | R | 7" | 1 | RoHS | 1 | serial number |
| Bulk Packing (B/P) | B | 13" | 2 | | | |
| Tube Packing (T/P) | T | 26mm | X | | | |
| Tape and Reel (Right Oriented) (TRR) | S | 52mm | Y | | | |
| Tape and Reel (Left Oriented) (TRL) | L | PANASERT T/B CATHODE UP (PBCU) | U | | | |
| FORMING | F | PANASERT T/B CATHODE DOWN (PBCD) | D | | | |

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