



## DUAL SURFACE MOUNT NPN/PNP TRANSISTORS (COMPLIMENTARY)

This device contains two electrically-isolated complimentary pair (NPN and PNP) general-purpose transistors. This device is ideal for portable applications where board space is at a premium.

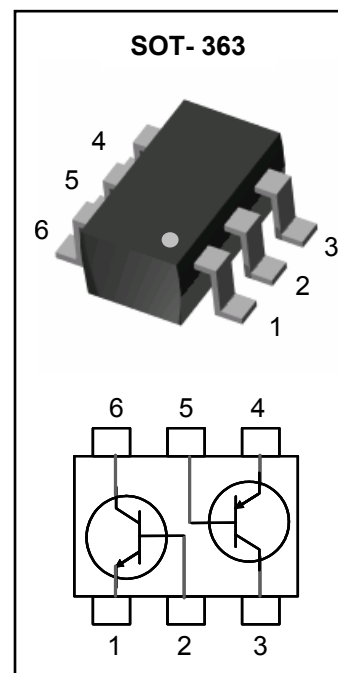
### FEATURES

- Electrically-Isolated Complimentary Transistor Pairs
- Acquire quality system certificate : TS16949
- AEC-Q101 qualified
- Lead free in comply with EU RoHS 2002/95/EC directives.
- Green molding compound as per IEC61249 Std. . (Halogen Free)

### APPLICATIONS

- General Purpose Amplifier Applications
- Hand-Held Computers, PDAs

Device Marking Code: 47P



### MAXIMUM RATINGS - NPN

$T_J = 25^{\circ}\text{C}$  Unless otherwise noted

| Rating                       | Symbol    | Value | Units |
|------------------------------|-----------|-------|-------|
| Collector-Base Voltage       | $V_{CBO}$ | 50    | V     |
| Collector-Emitter Voltage    | $V_{CEO}$ | 45    | V     |
| Emitter-Base Voltage Voltage | $V_{EBO}$ | 6.0   | V     |
| Collector Current            | $I_C$     | 100   | mA    |

### MAXIMUM RATINGS - PNP

$T_J = 25^{\circ}\text{C}$  Unless otherwise noted

| Rating                       | Symbol    | Value | Units |
|------------------------------|-----------|-------|-------|
| Collector-Base Voltage       | $V_{CBO}$ | -50   | V     |
| Collector-Emitter Voltage    | $V_{CEO}$ | -45   | V     |
| Emitter-Base Voltage Voltage | $V_{EBO}$ | -5.0  | V     |
| Collector Current            | $I_C$     | -100  | mA    |

### THERMAL CHARACTERISTICS

| Characteristic                                   | Symbol     | Value       | Units                |
|--------------------------------------------------|------------|-------------|----------------------|
| Total Power Dissipation (Note 1)                 | $P_D$      | 200         | mW                   |
| Operating Junction Temperature Range             | $T_J$      | -55 to +150 | $^{\circ}\text{C}$   |
| Storage Temperature Range                        | $T_{stg}$  | -55 to +150 | $^{\circ}\text{C}$   |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{thja}$ | 556         | $^{\circ}\text{C/W}$ |

Note 1. FR-4 board 70 x 60 x 1mm with minimum recommended pad layout

**NPN ELECTRICAL CHARACTERISTICS (Note 2)** $T_J = 25^\circ\text{C}$  Unless otherwise noted

| Parameter                            | Symbol        | Conditions                                                     | Min  | Typ  | Max | Units         |
|--------------------------------------|---------------|----------------------------------------------------------------|------|------|-----|---------------|
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C = 10\text{mA}$                                            | 45   | -    | -   | V             |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CES}$ | $I_C = 10\mu\text{A}, V_{EB} = 0$                              | 50   | -    | -   | V             |
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C = 10\mu\text{A}$                                          | 50   | -    | -   | V             |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E = 1.0\mu\text{A}$                                         | 6.0  | -    | -   | V             |
| Collector Cutoff Current             | $I_{CBO}$     | $V_{CB} = 30\text{V}, I_E = 0$<br>$T_J = 150^\circ\text{C}$    | -    | -    | 15  | nA            |
|                                      |               |                                                                | -    | -    | 5   | $\mu\text{A}$ |
| Emitter Cutoff Current               | $I_{EBO}$     | $V_{EB} = 5\text{V}, I_C = 0$                                  | -    | -    | 100 | nA            |
| DC Current Gain                      | $h_{FE}$      | $V_{CE} = 5\text{V}, I_C = 2.0\text{mA}$                       | 200  | -    | 450 | -             |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | $I_C = 10\text{mA}, I_B = 0.5\text{mA}$                        | -    | -    | 0.1 | V             |
|                                      |               | $I_C = 100\text{mA}, I_B = 5\text{mA}$                         | -    | -    | 0.4 | V             |
| Base-Emitter Saturation Voltage      | $V_{BE(SAT)}$ | $I_C = 10\text{mA}, I_B = 0.5\text{mA}$                        | -    | 0.75 | -   | V             |
| Base-Emitter Voltage                 | $V_{BE}$      | $V_{CE} = 5\text{V}, I_C = 2.0\text{mA}$                       | 0.58 | -    | 0.7 | V             |
| Gain-Bandwidth Product               | $f_T$         | $V_{CE} = 5\text{V}, I_C = 10\text{mA}$<br>$f = 100\text{MHz}$ | 100  | -    | -   | MHz           |
| Collector-Base Capacitance           | $C_{CBO}$     | $V_{CB} = 10\text{V}, f = 1.0\text{MHz}$                       | -    | -    | 1.5 | pF            |
| Emitter-Base Capacitance             | $C_{EBO}$     | $V_{EB} = 0.5\text{V}, f = 1.0\text{MHz}$                      | -    | 7    | -   | pF            |

**PNP ELECTRICAL CHARACTERISTICS (Note 2)** $T = 25^\circ\text{C}$  Unless otherwise noted

| Parameter                            | Symbol        | Conditions                                                       | Min  | Typ  | Max   | Units         |
|--------------------------------------|---------------|------------------------------------------------------------------|------|------|-------|---------------|
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C = -10\text{mA}$                                             | -45  | -    | -     | V             |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CES}$ | $I_C = -10\mu\text{A}, V_{EB} = 0$                               | -50  | -    | -     | V             |
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C = -10\mu\text{A}$                                           | -50  | -    | -     | V             |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E = -1.0\mu\text{A}$                                          | -5.0 | -    | -     | V             |
| Collector Cutoff Current             | $I_{CBO}$     | $V_{CB} = -30\text{V}, I_E = 0$<br>$T_J = 150^\circ\text{C}$     | -    | -    | -15   | nA            |
|                                      |               |                                                                  | -    | -    | -4.0  | $\mu\text{A}$ |
| Emitter Cutoff Current               | $I_{EBO}$     | $V_{EB} = -5\text{V}, I_C = 0$                                   | -    | -    | -100  | nA            |
| DC Current Gain                      | $h_{FE}$      | $V_{CE} = -5\text{V}, I_C = -2.0\text{mA}$                       | 200  | -    | 475   | -             |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | $I_C = -10\text{mA}, I_B = -0.5\text{mA}$                        | -    | -    | -0.3  | V             |
|                                      |               | $I_C = -100\text{mA}, I_B = -5\text{mA}$                         | -    | -    | -0.65 | V             |
| Base-Emitter Saturation Voltage      | $V_{BE(SAT)}$ | $I_C = -10\text{mA}, I_B = -0.5\text{mA}$                        | -    | -0.7 | -     | V             |
| Base-Emitter Voltage                 | $V_{BE}$      | $V_{CE} = -5\text{V}, I_C = -2.0\text{mA}$                       | -0.6 | -    | -0.75 | V             |
| Gain-Bandwidth Product               | $f_T$         | $V_{CE} = -5\text{V}, I_C = -10\text{mA}$<br>$f = 100\text{MHz}$ | 100  | -    | -     | MHz           |
| Collector-Base Capacitance           | $C_{CBO}$     | $V_{CB} = -10\text{V}, f = 1.0\text{MHz}$                        | -    | -    | 4.5   | pF            |
| Emitter-Base Capacitance             | $C_{EBO}$     | $V_{EB} = -0.5\text{V}, f = 1.0\text{MHz}$                       | -    | 11   | -     | pF            |

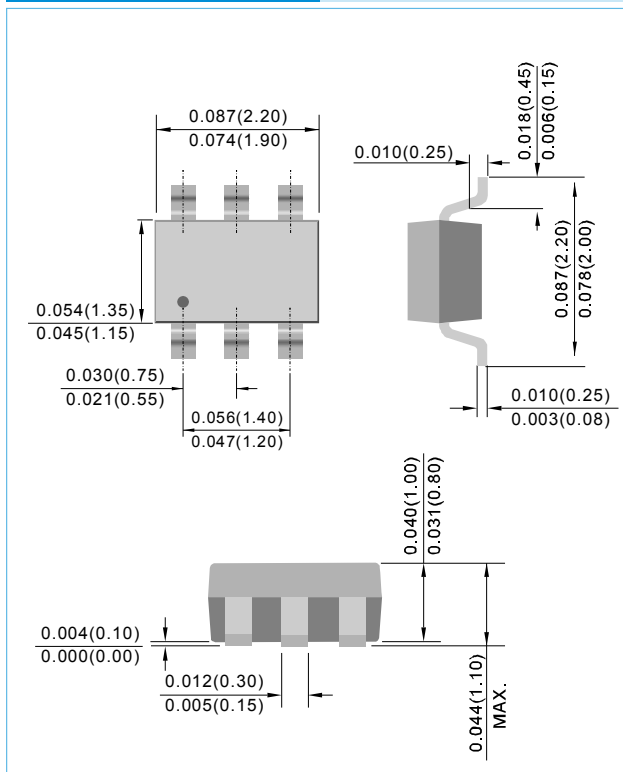
Note 2. Short duration test pulse used to minimize self-heating



## PACKAGE LAYOUT AND SUGGESTED PAD DIMENSIONS

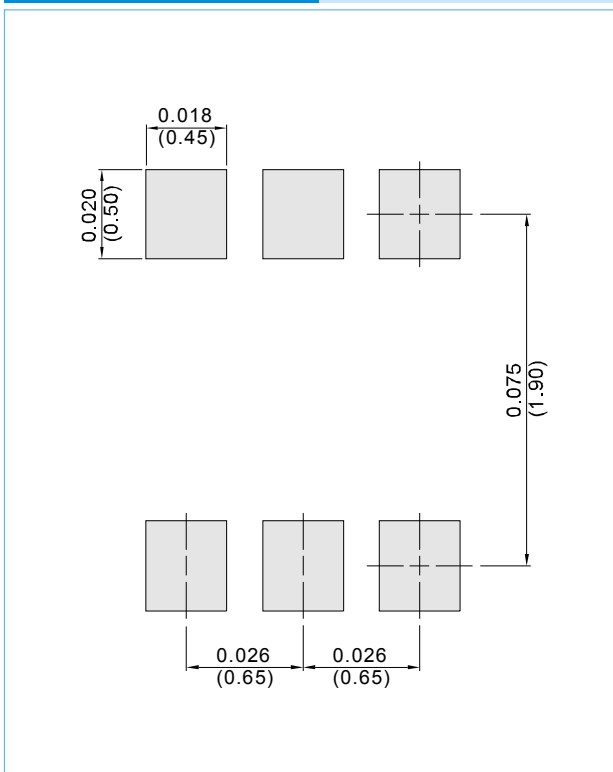
### SOT-363

Unit : inch(mm)



### SOT-363

Unit : inch(mm)



## ORDERING INFORMATION

BC847BPN T/R7 - 3,000 units per 7 inch reel

BC847BPN T/R13 - 10,000 units per 13 inch reel

## BC847BPN-AU

### Part No\_packing code\_Version

BC847BPN-AU\_R1\_000A1

BC847BPN-AU\_R2\_000A1

For example :

**RB500V-40\_R2\_00001**

Part No.

Serial number

Version code means HF

Packing size code means 13"

Packing type means T/R

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



## BC847BPN-AU

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