

# BC847BPDXV6, SBC847BPDXV6

## NPN/PNP Dual General Purpose Transistor

This transistor is designed for general purpose amplifier applications. It is housed in the SOT-563 which is designed for low power surface mount applications.

### Features

- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

### 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   | mA <sub>dc</sub> |

### 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  | mA <sub>dc</sub> |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### THERMAL CHARACTERISTICS

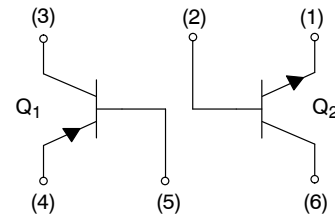
| Characteristic<br>(One Junction Heated)  | Symbol          | Max            | Unit                       |
|--|-----------------|----------------|----------------------------|
| Total Device Dissipation (Note 1)<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 357<br>2.9     | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance –<br>Junction-to-Ambient (Note 1)   | $R_{\theta JA}$ | 350            | $^\circ\text{C}/\text{W}$  |
| Characteristic<br>(Both Junctions Heated)  | Symbol          | Max            | Unit                       |
| Total Device Dissipation (Note 1)<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 500<br>4.0     | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance –<br>Junction-to-Ambient (Note 1)   | $R_{\theta JA}$ | 250            | $^\circ\text{C}/\text{W}$  |
| Junction and Storage Temperature Range   | $T_J, T_{stg}$  | -55 to<br>+150 | $^\circ\text{C}$           |

1. FR-4 @ Minimum Pad

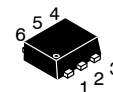


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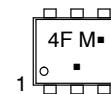


BC847BPDX6T1



SOT-563  
CASE 463A

### MARKING DIAGRAM



4F = Specific Device Code

M = Month Code

■ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device          | Package              | Shipping†                      |
|-----------------|----------------------|--------------------------------|
| BC847BPDXV6T1G  | SOT-563<br>(Pb-Free) | 4 mm pitch<br>4000/Tape & Reel |
| SBC847BPDXV6T1G | SOT-563<br>(Pb-Free) | 2 mm pitch<br>4000/Tape & Reel |
| BC847BPDXV6T5G  | SOT-563<br>(Pb-Free) | 2 mm pitch<br>8000/Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

## BC847BPDV6, SBC847BPDV6

### 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<br>( $I_C = 10\text{ mA}$ )  | $V_{(BR)CEO}$ | 45       | –          | –           | V                   |
| Collector – Emitter Breakdown Voltage<br>( $I_C = 10\ \mu\text{A}$ , $V_{EB} = 0$ )  | $V_{(BR)CES}$ | 50       | –          | –           | V                   |
| Collector – Base Breakdown Voltage<br>( $I_C = 10\ \mu\text{A}$ )  | $V_{(BR)CBO}$ | 50       | –          | –           | V                   |
| Emitter – Base Breakdown Voltage<br>( $I_E = 1.0\ \mu\text{A}$ )   | $V_{(BR)EBO}$ | 6.0      | –          | –           | V                   |
| Collector Cutoff Current ( $V_{CB} = 30\text{ V}$ )<br>( $V_{CB} = 30\text{ V}$ , $T_A = 150^\circ\text{C}$ )                                    | $I_{CBO}$     | –        | –          | 15<br>5.0   | nA<br>$\mu\text{A}$ |
| <b>ON CHARACTERISTICS</b>  |               |          |            |             |                     |
| DC Current Gain<br>( $I_C = 10\ \mu\text{A}$ , $V_{CE} = 5.0\text{ V}$ )<br>( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )                  | $h_{FE}$      | –<br>200 | 150<br>290 | –<br>475    | –                   |
| Collector – Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ )<br>( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )     | $V_{CE(sat)}$ | –<br>–   | –<br>–     | 0.25<br>0.6 | V                   |
| Base – Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ )<br>( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )          | $V_{BE(sat)}$ | –<br>–   | 0.7<br>0.9 | –<br>–      | V                   |
| Base – Emitter Voltage ( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )<br>( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )                 | $V_{BE(on)}$  | 580<br>– | 660<br>–   | 700<br>770  | mV                  |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>  |               |          |            |             |                     |
| Current – Gain – Bandwidth Product<br>( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )                                | $f_T$         | 100      | –          | –           | MHz                 |
| Output Capacitance ( $V_{CB} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ )   | $C_{obo}$     | –        | –          | 4.5         | pF                  |
| Noise Figure<br>( $I_C = 0.2\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $R_S = 2.0\text{ k}\Omega$ , $f = 1.0\text{ kHz}$ , $BW = 200\text{ Hz}$ ) | NF            | –        | –          | 10          | dB                  |

## BC847BPDV6, SBC847BPDV6

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

| Characteristic  | Symbol        | Min       | Typ          | Max            | Unit                |
|---|---------------|-----------|--------------|----------------|---------------------|
| <b>OFF CHARACTERISTICS</b>  |               |           |              |                |                     |
| Collector – Emitter Breakdown Voltage<br>( $I_C = -10\text{ mA}$ )  | $V_{(BR)CEO}$ | -45       | -            | -              | V                   |
| Collector – Emitter Breakdown Voltage<br>( $I_C = -10\ \mu\text{A}$ , $V_{EB} = 0$ )  | $V_{(BR)CES}$ | -50       | -            | -              | V                   |
| Collector – Base Breakdown Voltage<br>( $I_C = -10\ \mu\text{A}$ )  | $V_{(BR)CBO}$ | -50       | -            | -              | V                   |
| Emitter – Base Breakdown Voltage<br>( $I_E = -1.0\ \mu\text{A}$ )   | $V_{(BR)EBO}$ | -5.0      | -            | -              | V                   |
| Collector Cutoff Current ( $V_{CB} = -30\text{ V}$ )<br>( $V_{CB} = -30\text{ V}$ , $T_A = 150^\circ\text{C}$ )                                       | $I_{CBO}$     | -         | -            | -15<br>-4.0    | nA<br>$\mu\text{A}$ |
| <b>ON CHARACTERISTICS</b>   |               |           |              |                |                     |
| DC Current Gain<br>( $I_C = -10\ \mu\text{A}$ , $V_{CE} = -5.0\text{ V}$ )<br>( $I_C = -2.0\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ )                   | $h_{FE}$      | -<br>200  | 150<br>290   | -<br>475       | -                   |
| Collector – Emitter Saturation Voltage<br>( $I_C = -10\text{ mA}$ , $I_B = -0.5\text{ mA}$ )<br>( $I_C = -100\text{ mA}$ , $I_B = -5.0\text{ mA}$ )   | $V_{CE(sat)}$ | -<br>-    | -<br>-       | -0.3<br>-0.65  | V                   |
| Base – Emitter Saturation Voltage<br>( $I_C = -10\text{ mA}$ , $I_B = -0.5\text{ mA}$ )<br>( $I_C = -100\text{ mA}$ , $I_B = -5.0\text{ mA}$ )        | $V_{BE(sat)}$ | -<br>-    | -0.7<br>-0.9 | -<br>-         | V                   |
| Base – Emitter On Voltage<br>( $I_C = -2.0\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ )<br>( $I_C = -10\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ )            | $V_{BE(on)}$  | -0.6<br>- | -<br>-       | -0.75<br>-0.82 | V                   |
| <b>SMALL – SIGNAL CHARACTERISTICS</b>   |               |           |              |                |                     |
| Current – Gain – Bandwidth Product<br>( $I_C = -10\text{ mA}$ , $V_{CE} = -5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )                                   | $f_T$         | 100       | -            | -              | MHz                 |
| Output Capacitance<br>( $V_{CB} = -10\text{ V}$ , $f = 1.0\text{ MHz}$ )  | $C_{ob}$      | -         | -            | 4.5            | pF                  |
| Noise Figure<br>( $I_C = -0.2\text{ mA}$ , $V_{CE} = -5.0\text{ Vdc}$ , $R_S = 2.0\text{ k}\Omega$ ,<br>$f = 1.0\text{ kHz}$ , $BW = 200\text{ Hz}$ ) | NF            | -         | -            | 10             | dB                  |

TYPICAL NPN CHARACTERISTICS

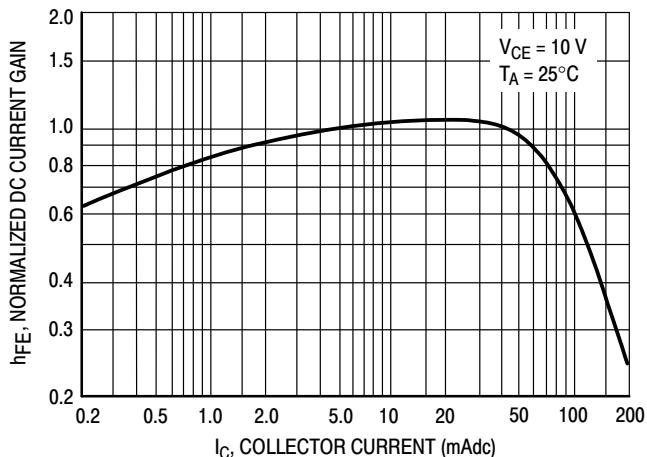


Figure 1. Normalized DC Current Gain

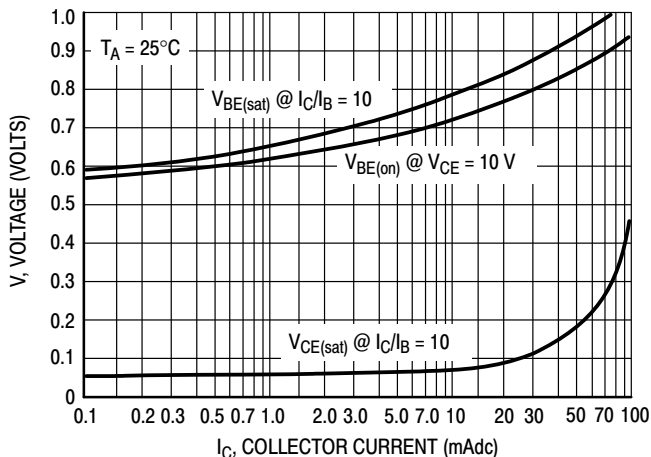


Figure 2. "Saturation" and "On" Voltages

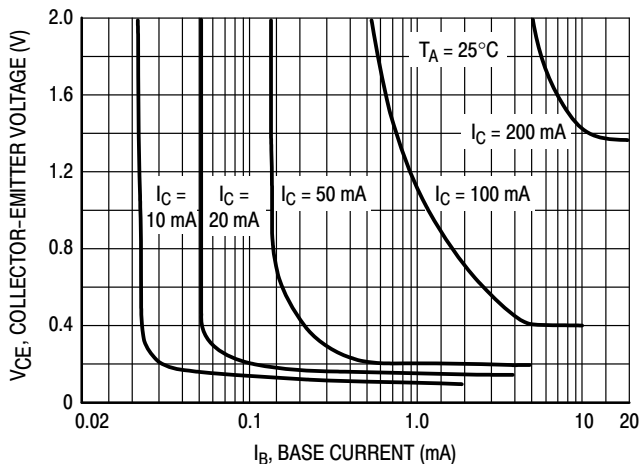


Figure 3. Collector Saturation Region

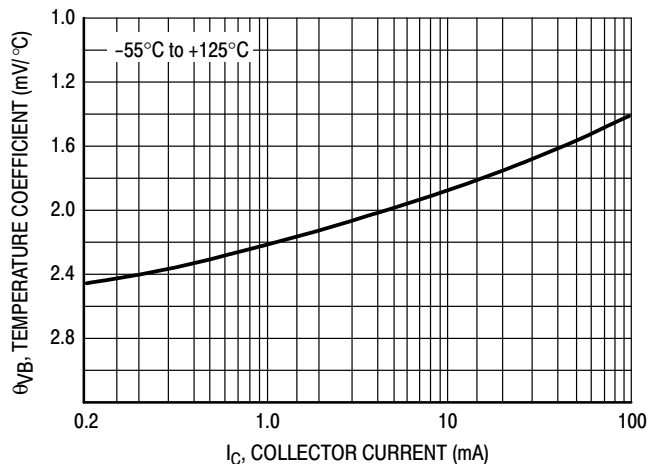


Figure 4. Base-Emitter Temperature Coefficient

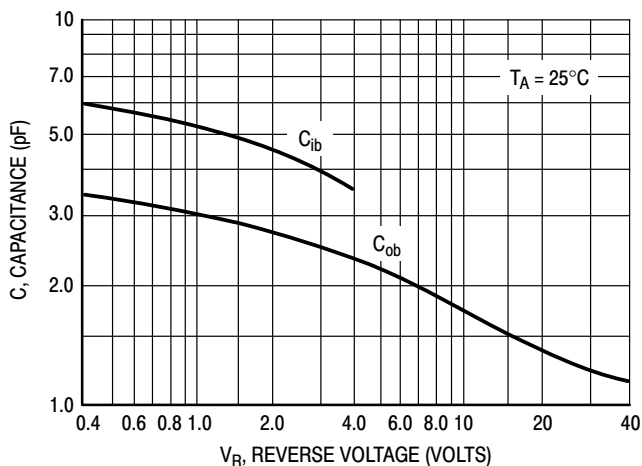


Figure 5. Capacitances

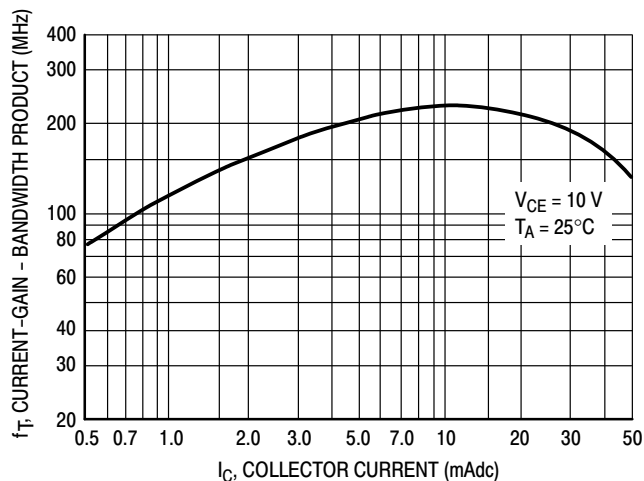


Figure 6. Current-Gain - Bandwidth Product

TYPICAL PNP CHARACTERISTICS

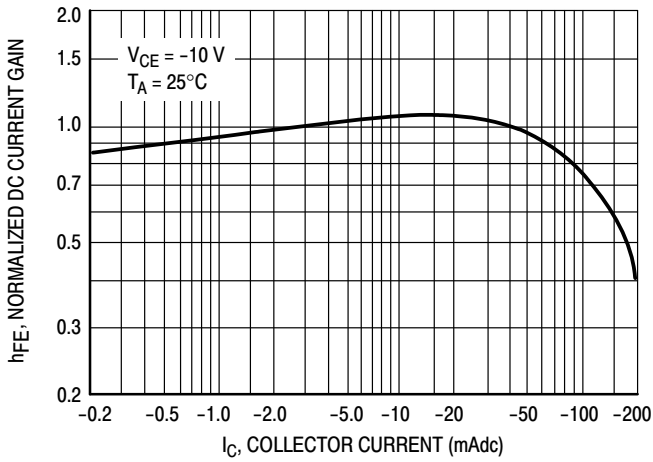


Figure 7. Normalized DC Current Gain

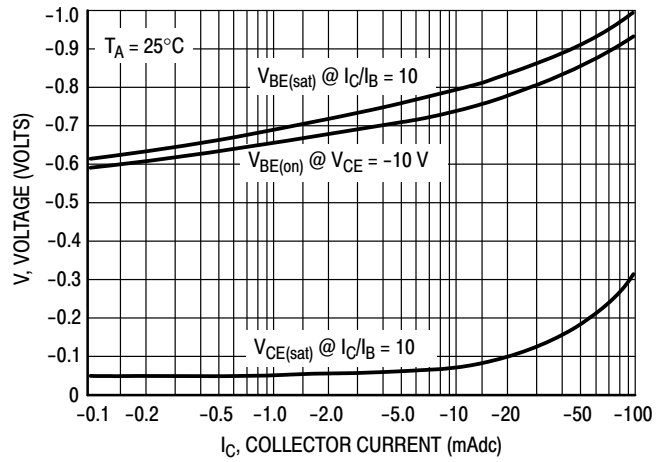


Figure 8. "Saturation" and "On" Voltages

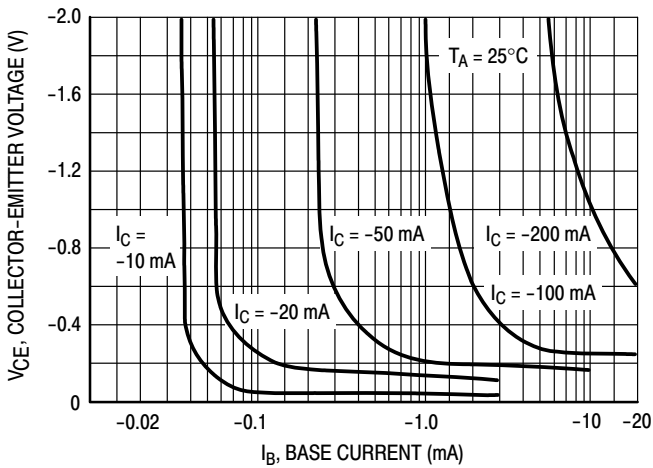


Figure 9. Collector Saturation Region

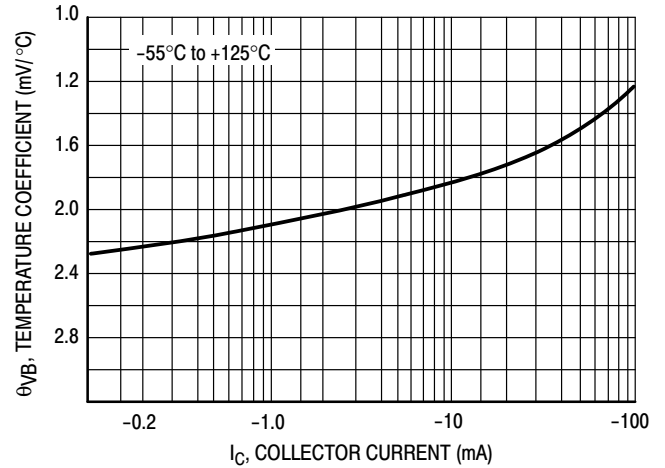


Figure 10. Base-Emitter Temperature Coefficient

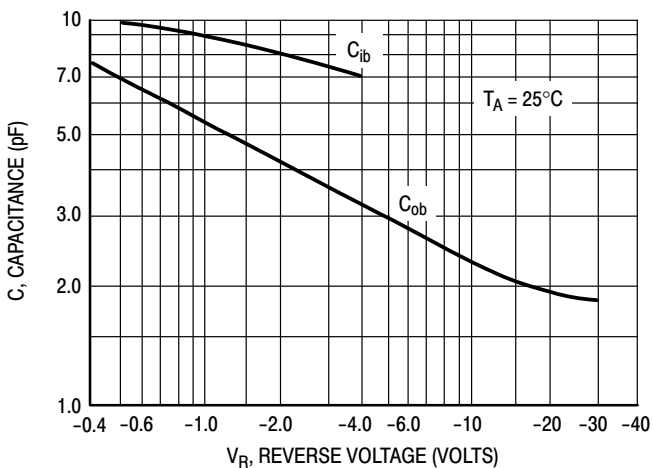


Figure 11. Capacitances

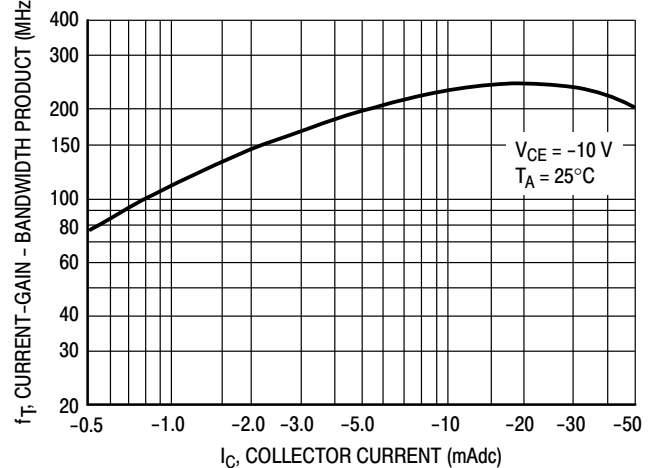
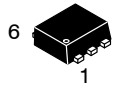


Figure 12. Current-Gain - Bandwidth Product

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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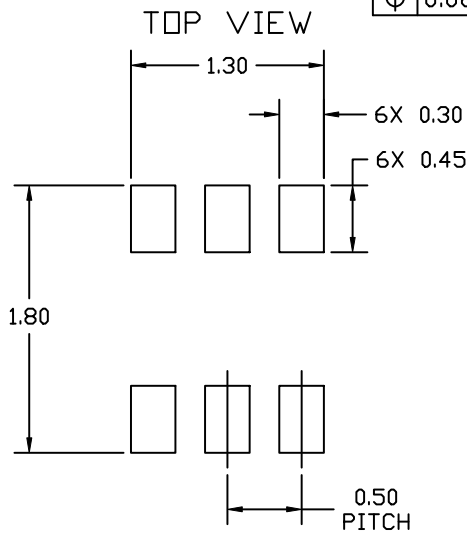
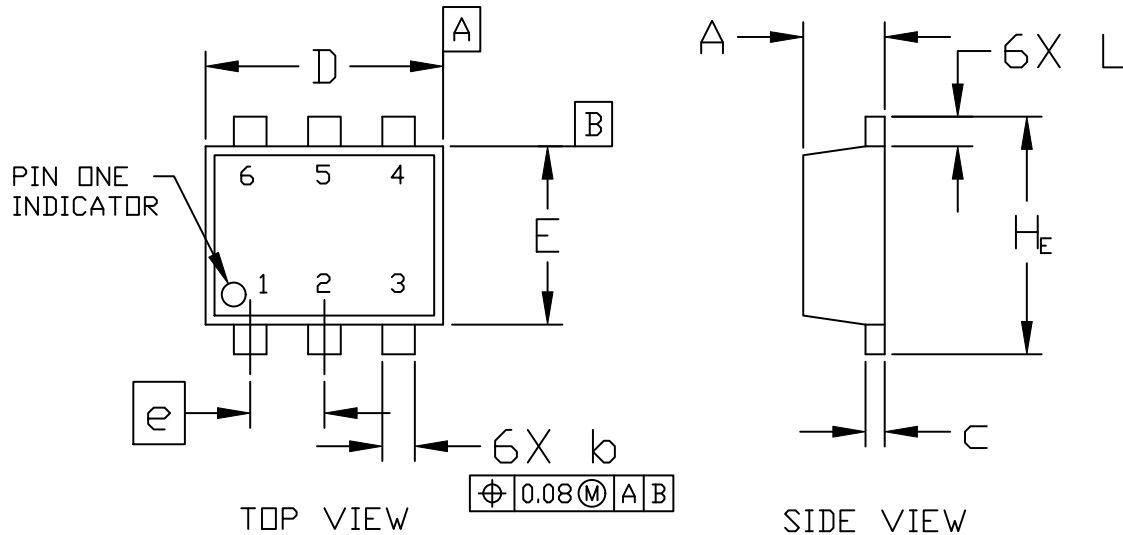
SCALE 4:1

SOT-563, 6 LEAD  
CASE 463A  
ISSUE H

DATE 26 JAN 2021

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.



| DIM            | MILLIMETERS |      |      |
|----------------|-------------|------|------|
|                | MIN.        | NOM. | MAX. |
| A              | 0.50        | 0.55 | 0.60 |
| b              | 0.17        | 0.22 | 0.27 |
| c              | 0.08        | 0.13 | 0.18 |
| D              | 1.50        | 1.60 | 1.70 |
| E              | 1.10        | 1.20 | 1.30 |
| e              | 0.50 BSC    |      |      |
| L              | 0.10        | 0.20 | 0.30 |
| H <sub>E</sub> | 1.50        | 1.60 | 1.70 |

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.

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CASE 463A  
ISSUE H

DATE 26 JAN 2021

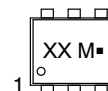
|  |  |  |
|--|--|--|
| STYLE 1:<br>PIN 1. EMITTER 1<br>2. BASE 1<br>3. COLLECTOR 2<br>4. EMITTER 2<br>5. BASE 2<br>6. COLLECTOR 1 | STYLE 2:<br>PIN 1. EMITTER 1<br>2. EMITTER 2<br>3. BASE 2<br>4. COLLECTOR 2<br>5. BASE 1<br>6. COLLECTOR 1 | STYLE 3:<br>PIN 1. CATHODE 1<br>2. CATHODE 1<br>3. ANODE/ANODE 2<br>4. CATHODE 2<br>5. CATHODE 2<br>6. ANODE/ANODE 1 |
|--|--|--|

|   |  |  |
|---|--|--|
| STYLE 4:<br>PIN 1. COLLECTOR<br>2. COLLECTOR<br>3. BASE<br>4. EMITTER<br>5. COLLECTOR<br>6. COLLECTOR | STYLE 5:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE<br>4. ANODE<br>5. CATHODE<br>6. CATHODE | STYLE 6:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE<br>4. CATHODE<br>5. CATHODE<br>6. CATHODE |
|---|--|--|

|  |  |  |
|--|--|--|
| STYLE 7:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE<br>4. CATHODE<br>5. ANODE<br>6. CATHODE | STYLE 8:<br>PIN 1. DRAIN<br>2. DRAIN<br>3. GATE<br>4. SOURCE<br>5. DRAIN<br>6. DRAIN | STYLE 9:<br>PIN 1. SOURCE 1<br>2. GATE 1<br>3. DRAIN 2<br>4. SOURCE 2<br>5. GATE 2<br>6. DRAIN 1 |
|--|--|--|

|   |   |
|---|---|
| STYLE 10:<br>PIN 1. CATHODE 1<br>2. N/C<br>3. CATHODE 2<br>4. ANODE 2<br>5. N/C<br>6. ANODE 1 | STYLE 11:<br>PIN 1. EMITTER 2<br>2. BASE 2<br>3. COLLECTOR 1<br>4. EMITTER 1<br>5. BASE 1<br>6. COLLECTOR 2 |
|---|---|

**GENERIC  
MARKING DIAGRAM\***



XX = Specific Device Code  
M = Month 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.

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[2N2369ADCSM](#) [2SC2412KT146S](#) [2SC5490A-TL-H](#) [2SD1816S-TL-E](#) [2SD1816T-TL-E](#) [CMXT2207 TR](#) [CPH6501-TL-E](#) [MCH4021-TL-E](#)  
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[NJL0302DG](#) [2N3583](#) [2SA1434-TB-E](#) [2SC3143-4-TB-E](#) [2SD1621S-TD-E](#) [NTE103](#) [30A02MH-TL-E](#) [NSV40301MZ4T1G](#) [NTE101](#) [NTE13](#)  
[NTE15](#) [NTE16001](#)