# NST847BPDP6T5G

# Dual Complementary General Purpose Transistor

The NST847BPDP6T5G device is a spin−off of our popular SOT−23/SOT−323/SOT−563 three−leaded device. It is designed for general purpose amplifier applications and is housed in the SOT−963 six−leaded surface mount package. By putting two discrete devices in one package, this device is ideal for low−power surface mount applications where board space is at a premium.

### Features

- $h_{FE}$, 200−450
- Low $V_{CE(sat)}$, ≤ 0.3 V
- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- This is a Pb−Free Device

### MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector − Emitter Voltage | $V_{CEO}$ | 45 | Vdc |
| Collector − Base Voltage | $V_{CBO}$ | 50 | Vdc |
| Emitter − Base Voltage | $V_{EBO}$ | 6.0 | Vdc |
| Collector Current − Continuous | $I_C$ | 100 | mAdc |
| Electrostatic Discharge HBM<br>MM | ESD Class | 2<br>B | |

### THERMAL CHARACTERISTICS

| Characteristic (Single Heated) | Symbol | Max | Unit |
|---|---|---|---|
| Total Device Dissipation $T_A$ = 25°C<br>Derate above 25°C (Note 1) | $P_D$ | 240<br>1.9 | mW<br>mW/°C |
| Thermal Resistance, Junction-to-Ambient (Note 1) | $R_{\theta JA}$ | 520 | °C/W |
| Total Device Dissipation $T_A$ = 25°C<br>Derate above 25°C (Note 2) | $P_D$ | 280<br>2.2 | mW<br>mW/°C |
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 446 | °C/W |
| **Characteristic (Dual Heated)** (Note 3) | **Symbol** | **Max** | **Unit** |
| Total Device Dissipation $T_A$ = 25°C<br>Derate above 25°C (Note 1) | $P_D$ | 350<br>2.8 | mW<br>mW/°C |
| Thermal Resistance, Junction-to-Ambient (Note 1) | $R_{\theta JA}$ | 357 | °C/W |
| Total Device Dissipation $T_A$ = 25°C<br>Derate above 25°C (Note 2) | $P_D$ | 420<br>3.4 | mW<br>mW/°C |
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 297 | °C/W |
| Junction and Storage Temperature Range | $T_J$, $T_{stg}$ | −55 to +150 | °C |

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.

1. FR−4 @ 100 mm$^2$, 1 oz. copper traces, still air.
2. FR−4 @ 500 mm$^2$, 1 oz. copper traces, still air.
3. Dual heated values assume total power is sum of two equally powered channels

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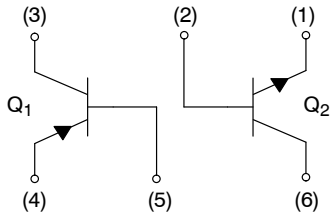
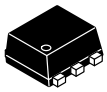


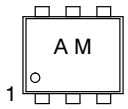

**NST847BPDP6T5G***

*Q1 PNP
Q2 NPN



**SOT−963**
**CASE 527AD**

### MARKING DIAGRAM




A = Device Code
M = Date Code

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NST847BPDP6T5G | SOT−963 (Pb−Free) | 8000/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.

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

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Collector – Emitter Breakdown Voltage | | $V_{(BR)CEO}$ | | | | V |
| ($I_C$ = 1.0 mA, $I_B$ = 0) | (NPN) | | 45 | – | – | |
| ($I_C$ = –1.0 mA, $I_B$ = 0) | (PNP) | | –45 | – | – | |
| Collector – Base Breakdown Voltage | | $V_{(BR)CBO}$ | | | | V |
| ($I_C$ = 10 μA, $I_E$ = 0) | (NPN) | | 50 | – | – | |
| ($I_C$ = –10 μA, $I_E$ = 0) | (PNP) | | –50 | – | – | |
| Collector – Emitter Breakdown Voltage | | $V_{(BR)CES}$ | | | | V |
| ($I_C$ = 10 μA) | (NPN) | | 50 | – | – | |
| ($I_C$ = –10 μA) | (PNP) | | –50 | – | – | |
| Emitter – Base Breakdown Voltage | | $V_{(BR)EBO}$ | | | | V |
| ($I_E$ = 1.0 μA, $I_C$ = 0) | (NPN) | | 6.0 | – | – | |
| ($I_E$ = –1.0 μA, $I_C$ = 0) | (PNP) | | –5.0 | – | – | |
| Collector Cutoff Current | | $I_{CBO}$ | | | | |
| ($V_{CB}$ = 30 V) | (NPN) | | – | – | 15 | nA |
| ($V_{CB}$ = 30 V, $T_A$ = 150°C) | (NPN) | | – | – | 5.0 | μA |
| ($V_{CB}$ = –30 V) | (PNP) | | – | – | –15 | nA |
| ($V_{CB}$ = –30 V, $T_A$ = 150°C) | (PNP) | | – | – | –4.0 | μA |
| **ON CHARACTERISTICS** (Note 4) | | | | | | |
| DC Current Gain | | $h_{FE}$ | | | | – |
| ($I_C$ = 2.0 mA, $V_{CE}$ = 5.0 V) | (NPN) | | 200 | 290 | 450 | |
| ($I_C$ = –2.0 mA, $V_{CE}$ = –5.0 V) | (PNP) | | 220 | 290 | 475 | |
| Collector – Emitter Saturation Voltage | | $V_{CE(sat)}$ | | | | V |
| ($I_C$ = 10 mA, $I_B$ = 0.5 mA) | (NPN) | | – | – | 0.25 | |
| ($I_C$ = 100 mA, $I_B$ = 5.0 mA) | | | – | – | 0.60 | |
| ($I_C$ = –10 mA, $I_B$ = –0.5 mA) | (PNP) | | – | – | –0.30 | |
| ($I_C$ = –100 mA, $I_B$ = –5.0 mA) | | | – | – | –0.70 | |
| Base – Emitter Saturation Voltage | | $V_{BE(sat)}$ | | | | V |
| ($I_C$ = 10 mA, $I_B$ = 0.5 mA) | (NPN) | | – | 0.70 | – | |
| ($I_C$ = 100 mA, $I_B$ = 5.0 mA) | | | – | 0.90 | – | |
| ($I_C$ = –10 mA, $I_B$ = –0.5 mA) | (PNP) | | – | –0.70 | – | |
| ($I_C$ = –100 mA, $I_B$ = –5.0 mA) | | | – | –0.90 | – | |
| Base – Emitter On Voltage | | $V_{BE(on)}$ | | | | V |
| ($I_C$ = 2.0 mA, $V_{CE}$ = 5.0 V) | (NPN) | | 0.58 | 0.66 | 0.70 | |
| ($I_C$ = 10 mA, $V_{CE}$ = 5.0 V) | | | – | – | 0.77 | |
| ($I_C$ = –2.0 mA, $V_{CE}$ = –5.0 V) | (PNP) | | –0.60 | – | –0.75 | |
| ($I_C$ = –10 mA, $V_{CE}$ = –5.0 V) | | | – | – | –0.82 | |
| **SMALL–SIGNAL CHARACTERISTICS** | | | | | | |
| Current–Gain – Bandwidth Product | | $f_T$ | | | | MHz |
| ($I_C$ = 10 mA, $V_{CE}$ = 5.0 V, f = 100 MHz) | (NPN) | | 100 | – | – | |
| ($I_C$ = –10 mA, $V_{CE}$ = –5.0 V, f = 100 MHz) | (PNP) | | 100 | – | – | |
| Output Capacitance | | $C_{ob}$ | | | | pF |
| ($V_{CB}$ = 10 V, f = 1.0 MHz) | (NPN) | | – | – | 4.5 | |
| ($V_{CB}$ = –10 V, f = 1.0 MHz) | (PNP) | | – | – | 4.5 | |
| Noise Figure | | NF | | | | dB |
| ($I_C$ = 0.2 mA, $V_{CE}$ = 5.0 V, $R_S$ = 2 kΩ, f = 1 kHz, BW = 200 Hz) | (NPN) | | – | – | 10 | |
| ($I_C$ = –0.2 mA, $V_{CE}$ = –5.0 V, $R_S$ = 2 kΩ, f = 1 kHz, BW = 200 Hz) | (PNP) | | – | – | 10 | |

4. Pulse Test: Pulse Width ≤ 300 μs; Duty Cycle ≤ 2.0%.

## NPN TRANSISTOR

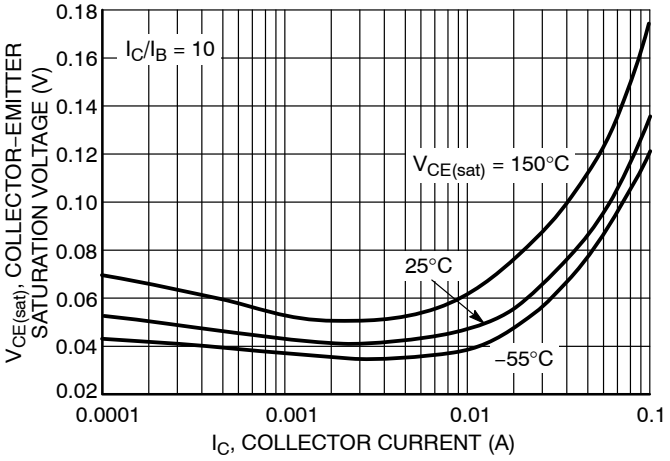



**Figure 1. Collector Emitter Saturation Voltage vs. Collector Current**

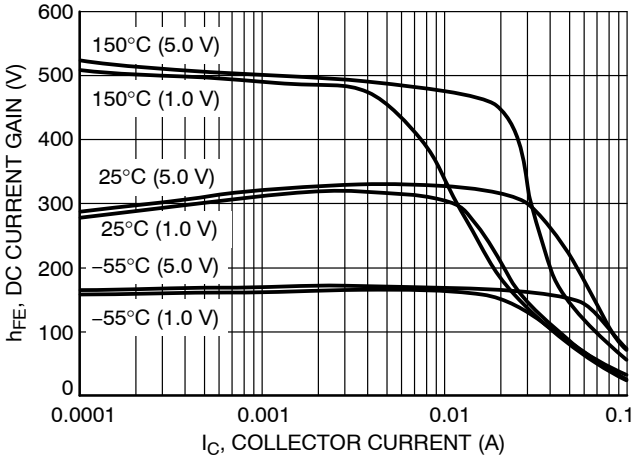



**Figure 2. DC Current Gain vs. Collector Current**

## NPN TRANSISTOR

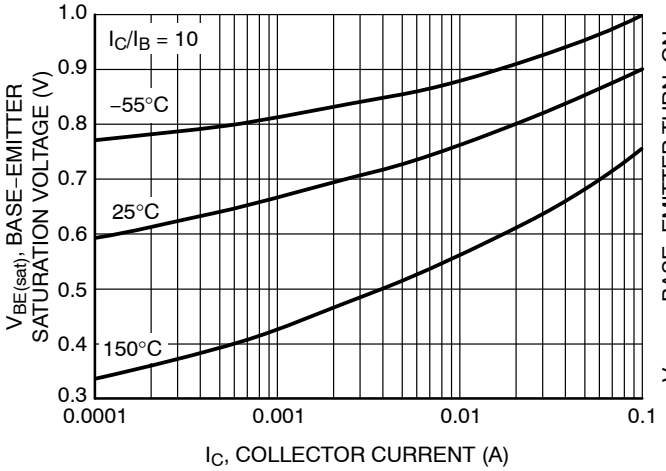



**Figure 3. Base Emitter Saturation Voltage vs. Collector Current**

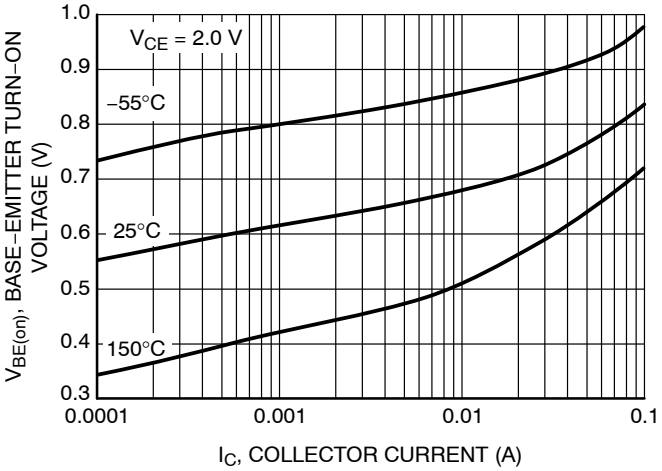



**Figure 4. Base Emitter Turn−On Voltage vs. Collector Current**

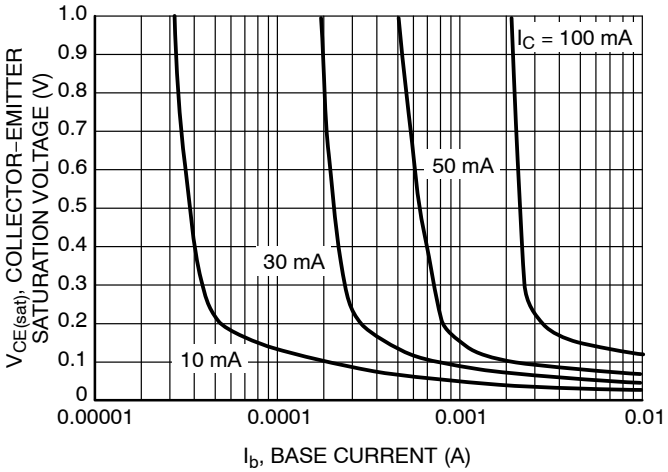



**Figure 5. Saturation Region**

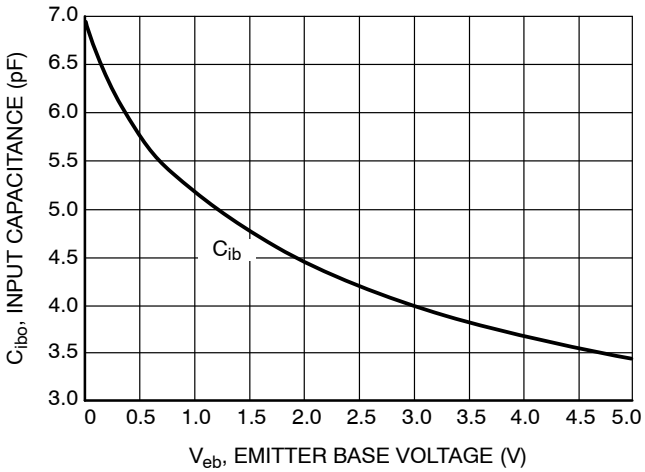



**Figure 6. Input Capacitance**

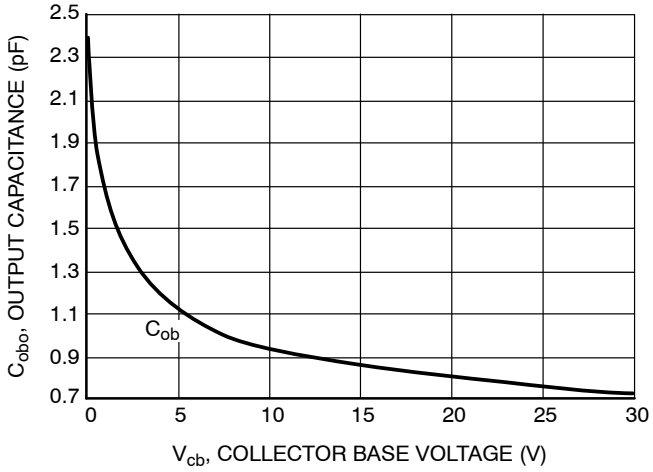



**Figure 7. Output Capacitance**

## PNP TRANSISTOR

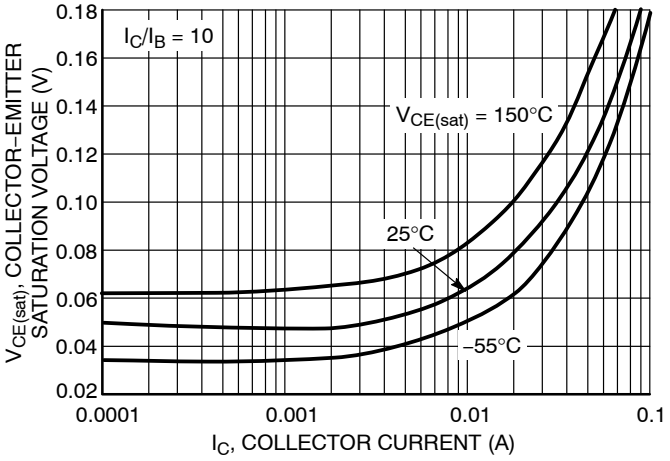



**Figure 8. Collector Emitter Saturation Voltage vs. Collector Current**

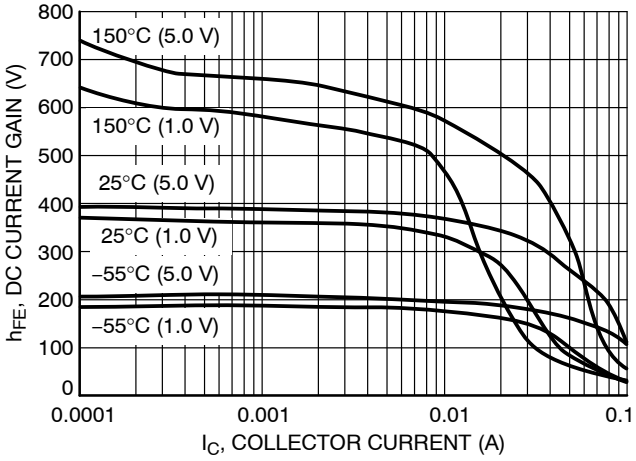



**Figure 9. DC Current Gain vs. Collector Current**

## PNP TRANSISTOR

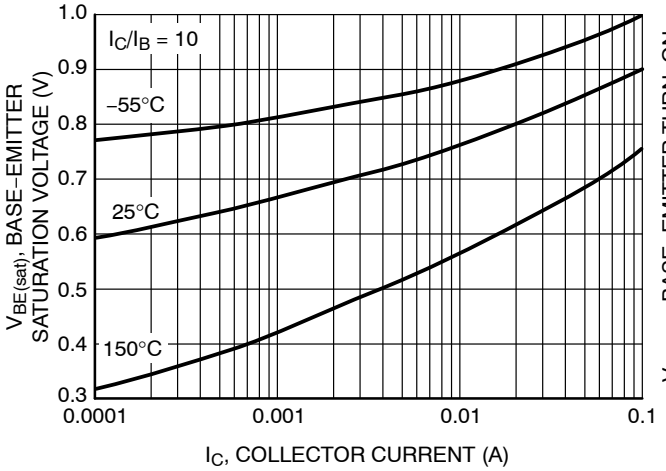



**Figure 10. Base Emitter Saturation Voltage vs. Collector Current**

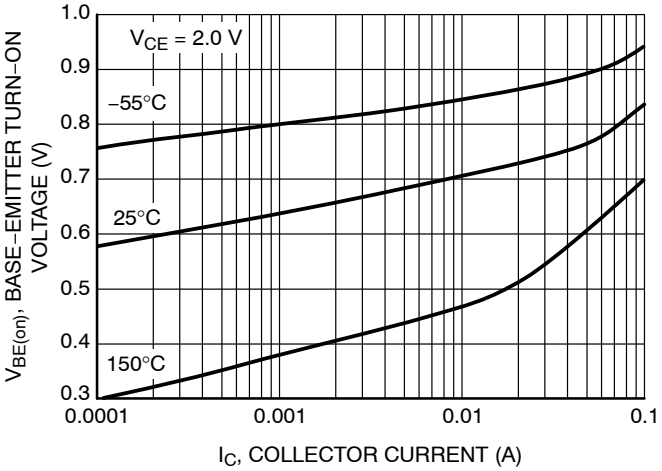



**Figure 11. Base Emitter Turn−On Voltage vs. Collector Current**

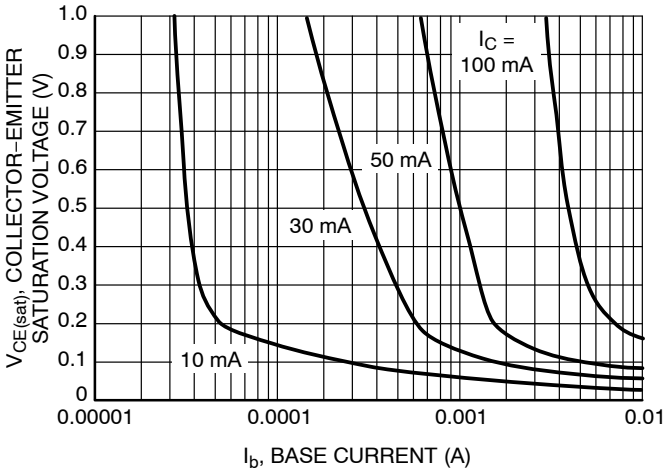



**Figure 12. Saturation Region**

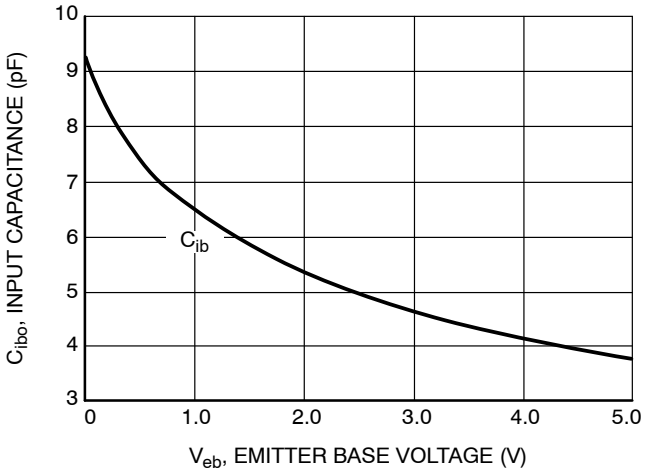



**Figure 13. Input Capacitance**

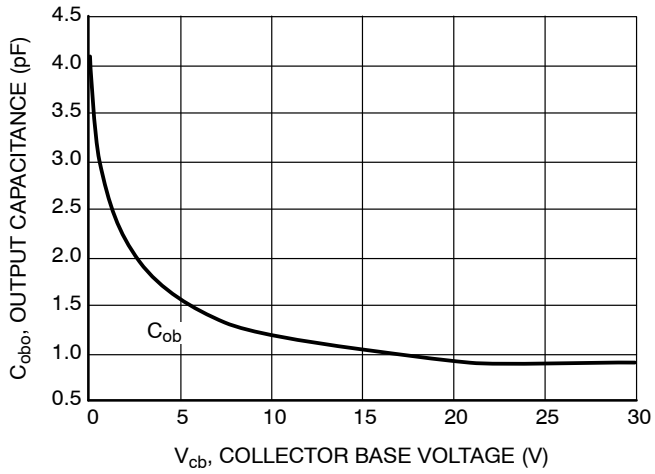


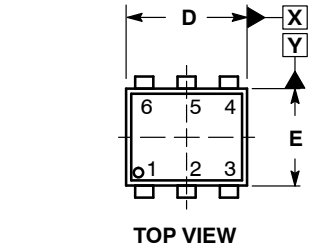

**Figure 14. Output Capacitance**

# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS

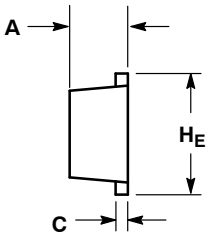
**SOT−963**
CASE 527AD
ISSUE E

**SCALE 4:1**

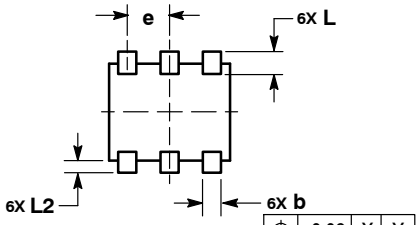
DATE 09 FEB 2010




**TOP VIEW**




**SIDE VIEW**

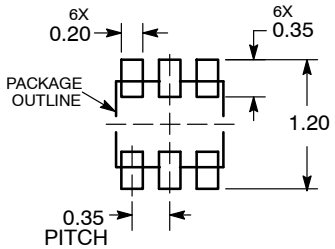



**BOTTOM VIEW**

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| | MILLIMETERS | | |
|---|---|---|---|
| DIM | MIN | NOM | MAX |
| A | 0.34 | 0.37 | 0.40 |
| b | 0.10 | 0.15 | 0.20 |
| C | 0.07 | 0.12 | 0.17 |
| D | 0.95 | 1.00 | 1.05 |
| E | 0.75 | 0.80 | 0.85 |
| e | 0.35 BSC | | |
| $H_E$ | 0.95 | 1.00 | 1.05 |
| L | 0.19 REF | | |
| L2 | 0.05 | 0.10 | 0.15 |

### RECOMMENDED MOUNTING FOOTPRINT*




DIMENSIONS: MILLIMETERS

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

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

STYLE 2:
PIN 1. EMITTER 1
2. EMITTER2
3. BASE 2
4. COLLECTOR 2
5. BASE 1
6. COLLECTOR 1

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

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

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

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

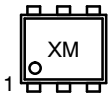
STYLE 7:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

STYLE 8:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

STYLE 9:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

STYLE 10:
PIN 1. CATHODE 1
2. N/C
3. CATHODE 2
4. ANODE 2
5. N/C
6. ANODE 1

### GENERIC MARKING DIAGRAM*




X = Specific Device Code
M = Month Code

*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.

| | | |
|---|---|---|
| **DOCUMENT NUMBER:** | **98AON26456D** | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red. |
| **DESCRIPTION:** | **SOT−963, 1.00x1.00, 0.35P** | **PAGE 1 OF 1** |

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