

NST3904DP6T5G

Dual General Purpose Transistor

The NST3904DP6T5G 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} , 100–300
- Low $V_{CE(sat)}$, ≤ 0.4 V
- Reduces Board Space and Component Count
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--------------------------------|-----------|---------------------|------|
| Collector – Emitter Voltage | V_{CEO} | 40 | Vdc |
| Collector – Base Voltage | V_{CBO} | 60 | Vdc |
| Emitter – Base Voltage | V_{EBO} | 6.0 | Vdc |
| Collector Current – Continuous | I_C | 200 | mAdc |
| Electrostatic Discharge | HBM MM | ESD Class 2 B | |

THERMAL CHARACTERISTICS

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

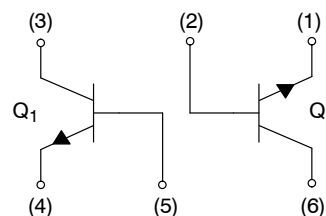
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-4 @ 100 mm², 1 oz. copper traces, still air.
2. FR-4 @ 500 mm², 1 oz. copper traces, still air.
3. Dual heated values assume total power is sum of two equally powered channels.

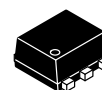


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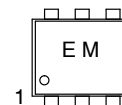


NST3904DP6T5G



SOT-963
CASE 527AD

MARKING DIAGRAM



E = Device Code
M = Date Code

ORDERING INFORMATION

| Device | Package | Shipping† |
|----------------|----------------------|------------------|
| NST3904DP6T5G | SOT-963 (Pb-Free) | 8000/Tape & Reel |
| NSVT3904DP6T5G | 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.

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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

OFF CHARACTERISTICS

| | | | | |
|------------------------------------------------------------------------------------------------|----------------------|-----|----|------|
| Collector – Emitter Breakdown Voltage (Note 4) (I _C = 1.0 mAdc, I _B = 0) | V _{(BR)CEO} | 40 | – | Vdc |
| Collector – Base Breakdown Voltage (I _C = 10 µAdc, I _E = 0) | V _{(BR)CBO} | 60 | – | Vdc |
| Emitter – Base Breakdown Voltage (I _E = 10 µAdc, I _C = 0) | V _{(BR)EBO} | 6.0 | – | Vdc |
| Collector Cutoff Current (V _{CE} = 30 Vdc, V _{EB} = 3.0 Vdc) | I _{CEX} | – | 50 | nAdc |

ON CHARACTERISTICS (Note 4)

| | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------|-------------------------|-----|
| DC Current Gain (I _C = 0.1 mAdc, V _{CE} = 1.0 Vdc) (I _C = 1.0 mAdc, V _{CE} = 1.0 Vdc) (I _C = 10 mAdc, V _{CE} = 1.0 Vdc) (I _C = 50 mAdc, V _{CE} = 1.0 Vdc) (I _C = 100 mAdc, V _{CE} = 1.0 Vdc) | h _{FE} | 40 70 100 60 30 | – – 300 – – | – |
| Collector – Emitter Saturation Voltage (I _C = 10 mAdc, I _B = 1.0 mAdc) (I _C = 50 mAdc, I _B = 5.0 mAdc) | V _{CE(sat)} | – – | 0.2 0.3 | Vdc |
| Base – Emitter Saturation Voltage (I _C = 10 mAdc, I _B = 1.0 mAdc) (I _C = 50 mAdc, I _B = 5.0 mAdc) | V _{BE(sat)} | 0.65 – | 0.85 0.95 | Vdc |

SMALL-SIGNAL CHARACTERISTICS

| | | | | |
|------------------------------------------------------------------------------------------------------------|------------------|-----|-----|-----|
| Current – Gain – Bandwidth Product (I _C = 10 mAdc, V _{CE} = 20 Vdc, f = 100 MHz) | f _T | 200 | – | MHz |
| Output Capacitance (V _{CB} = 5.0 Vdc, I _E = 0, f = 1.0 MHz) | C _{obo} | – | 4.0 | pF |
| Input Capacitance (V _{EB} = 0.5 Vdc, I _C = 0, f = 1.0 MHz) | C _{ibo} | – | 8.0 | pF |
| Noise Figure (V _{CE} = 5.0 Vdc, I _C = 100 µAdc, R _S = 1.0 k Ω, f = 1.0 kHz) | NF | – | 5.0 | dB |

SWITCHING CHARACTERISTICS

| | | | | | |
|--------------|---------------------------------------------------------|----------------|---|-----|----|
| Delay Time | (V _{CC} = 3.0 Vdc, V _{BE} = –0.5 Vdc) | t _d | – | 35 | ns |
| Rise Time | (I _C = 10 mAdc, I _{B1} = 1.0 mAdc) | t _r | – | 35 | |
| Storage Time | (V _{CC} = 3.0 Vdc, I _C = 10 mAdc) | t _s | – | 275 | ns |
| Fall Time | (I _{B1} = I _{B2} = 1.0 mAdc) | t _f | – | 50 | |

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

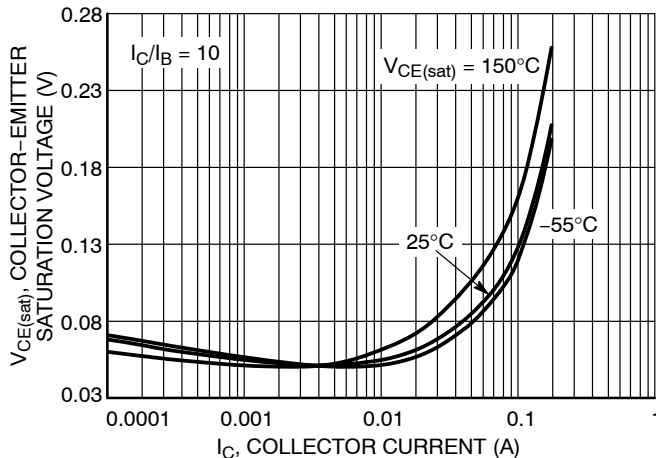


Figure 1. Collector Emitter Saturation Voltage vs. Collector Current

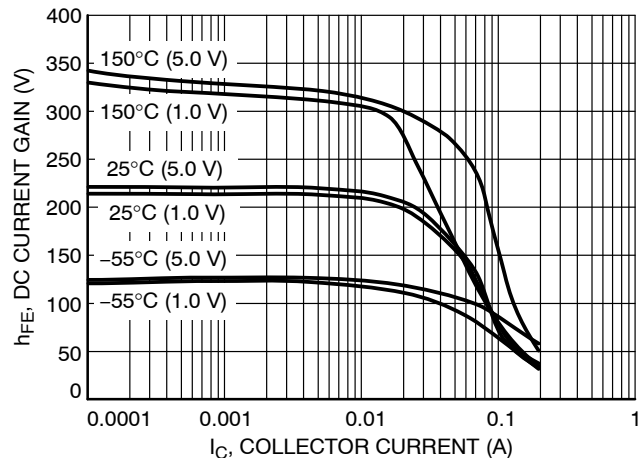


Figure 2. DC Current Gain vs. Collector Current

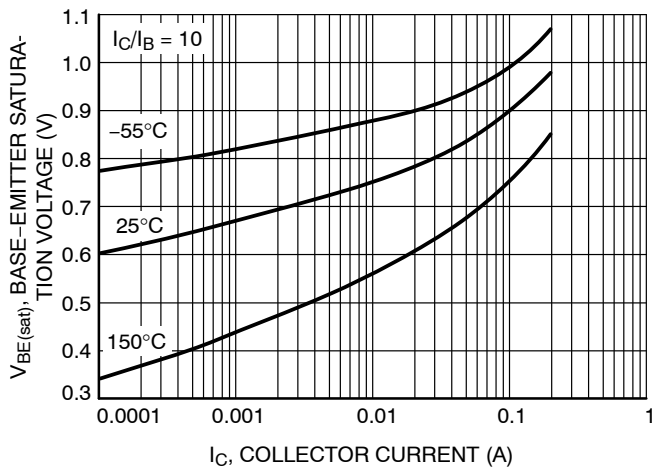


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

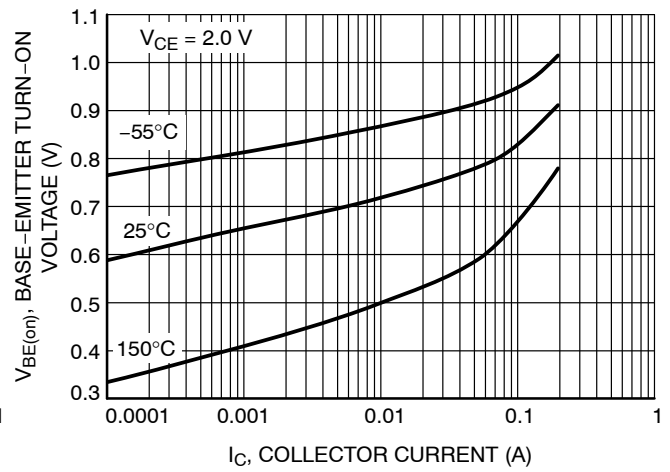


Figure 4. Base Emitter Turn-On Voltage vs. Collector Current

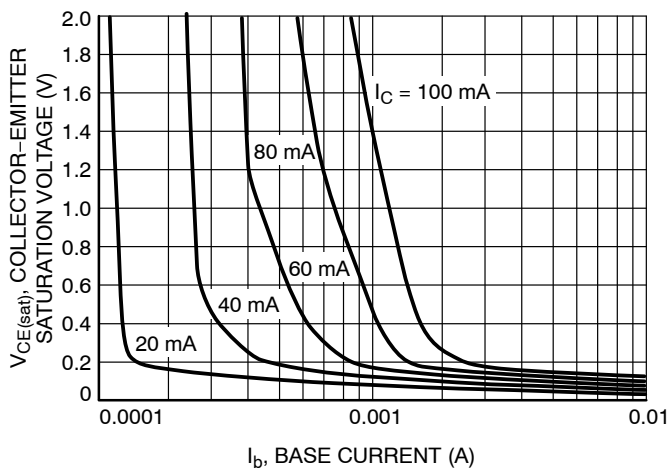


Figure 5. Saturation Region

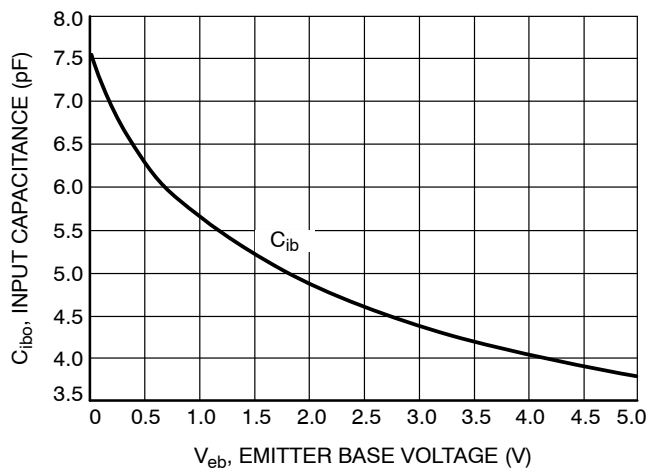


Figure 6. Input Capacitance

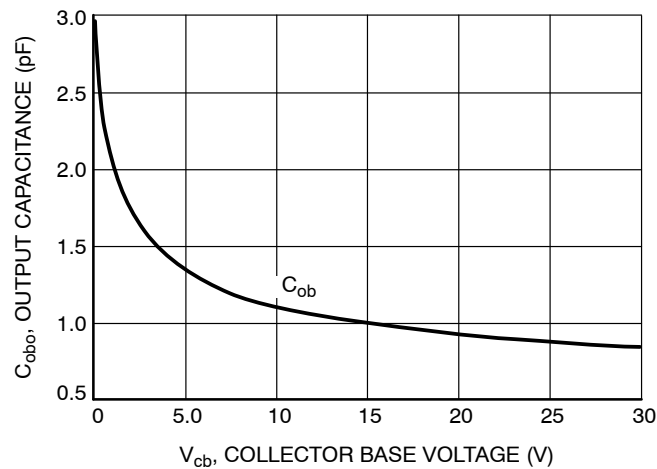
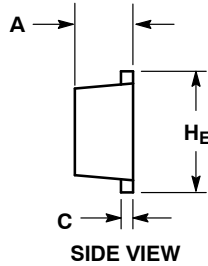
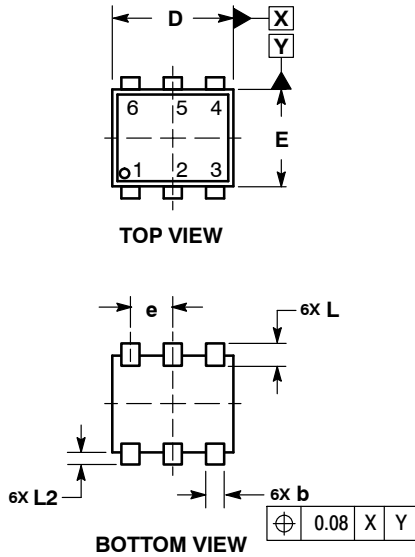


Figure 7. Output Capacitance

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PACKAGE DIMENSIONS

SOT-963 CASE 527AD ISSUE E

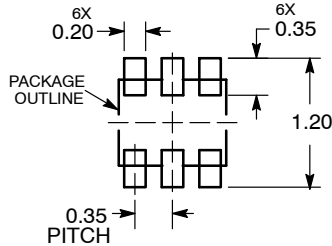


NOTES:

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.

| DIM | MILLIMETERS | | |
|----------------|-------------|------|------|
| | 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 ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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