

# NST30010MXV6T1G, NSVT30010MXV6T1G

## Dual Matched General Purpose Transistor

### PNP Matched Pair

These transistors are housed in an ultra-small SOT563 package ideally suited for portable products. They are assembled to create a pair of devices highly matched in all parameters, eliminating the need for costly trimming. Applications are Current Mirrors; Differential, Sense and Balanced Amplifiers; Mixers; Detectors and Limiters.

#### Features

- Current Gain Matching to 10%
- Base-Emitter Voltage Matched to 2 mV
- Drop-In Replacement for Standard Device
- AEC-Q101 Qualified and PPAP Capable
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These are Pb-Free Devices\*

#### MAXIMUM RATINGS

| Rating                         | Symbol    | Value | Unit             |
|--------------------------------|-----------|-------|------------------|
| Collector-Emitter Voltage      | $V_{CEO}$ | -30   | V                |
| Collector-Base Voltage         | $V_{CBO}$ | -30   | 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.

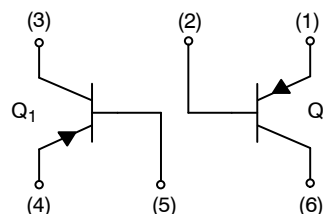


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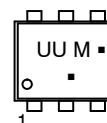
<http://onsemi.com>



SOT-563  
CASE 463A  
PLASTIC



#### MARKING DIAGRAMS



UU = Device Code  
M = Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

| Device           | Package              | Shipping†              |
|------------------|----------------------|------------------------|
| NST30010MXV6T1G  | SOT-563<br>(Pb-Free) | 4,000 /<br>Tape & Reel |
| NSVT30010MXV6T1G | SOT-563<br>(Pb-Free) | 4,000 /<br>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.

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

# NST30010MXV6T1G, NSVT30010MXV6T1G

## THERMAL CHARACTERISTICS

| Characteristic                                                                                                                                            | Parameter                                              | Symbol                            | One Device Heated        | Both Devices Heated                        | Unit                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------|--------------------------|--------------------------------------------|----------------------------|
| Total Device Dissipation,<br>T <sub>A</sub> = 25°C (Note 1)<br>Derate above 25°C (Note 1)<br>T <sub>A</sub> = 25°C (Note 2)<br>Derate above 25°C (Note 2) | Two Devices Heated Total Package                       | P <sub>D</sub>                    | 357<br>2.9<br>429<br>3.4 | 500 (250 ea)<br>4.0<br>661 (331 ea)<br>5.3 | mW<br>mW/°C<br>mW<br>mW/°C |
| Thermal Resistance<br>Junction-to-Ambient (Note 1)<br>Junction-to-Ambient (Note 2)                                                                        | One Heated Device                                      | R <sub>θJA</sub>                  | 350<br>291               | 250<br>189                                 | °C/W                       |
| Thermal Resistance<br>Junction-to-Ambient (Note 1)<br>Junction-to-Ambient (Note 2)                                                                        | Unheated Device Heated by Heated Device                | Ψ <sub>JA</sub>                   | 149<br>88                | –<br>–                                     | °C/W                       |
| Thermal Resistance<br>Junction-to-Lead (Note 1)<br>Junction-to-Lead (Note 2)                                                                              | Lead Attached to Heated Device                         | Ψ <sub>JL</sub>                   | 128<br>152               | 76<br>85                                   | °C/W                       |
| Thermal Resistance<br>Junction-to-Lead (Note 1)<br>Junction-to-Lead (Note 2)                                                                              | Heated Device Heating Lead Attached to Unheated Device | Ψ <sub>JL</sub>                   | 224<br>222               | –<br>–                                     | °C/W                       |
| Junction and Storage Temperature Range                                                                                                                    |                                                        | T <sub>J</sub> , T <sub>stg</sub> | –55 to +150              |                                            | °C                         |

1. PCB with 51 square millimeter of 2 oz (0.070mm thick) copper heat spreading connected to package leads. Mounted on a FR4 PCB 76x76x1.5mm Single layer traces. Natural convection test according to JEDEC 51.
2. PCB with 250 square millimeter of 2 oz (0.070mm thick) copper heat spreading connected to package leads. Mounted on a FR4 PCB 76x76x1.5mm Single layer traces. Natural convection test according to JEDEC 51.

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

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

### OFF CHARACTERISTICS

|                                                                                                         |                      |        |        |             |          |
|---------------------------------------------------------------------------------------------------------|----------------------|--------|--------|-------------|----------|
| Collector – Emitter Breakdown Voltage, (I <sub>C</sub> = –10 mA)                                        | V <sub>(BR)CEO</sub> | –30    | –      | –           | V        |
| Collector – Emitter Breakdown Voltage, (I <sub>C</sub> = –10 μA, V <sub>EB</sub> = 0)                   | V <sub>(BR)CES</sub> | –30    | –      | –           | V        |
| Collector – Base Breakdown Voltage, (I <sub>C</sub> = –10 μA)                                           | V <sub>(BR)CBO</sub> | –30    | –      | –           | V        |
| Emitter – Base Breakdown Voltage, (I <sub>E</sub> = –1.0 μA)                                            | V <sub>(BR)EBO</sub> | –5.0   | –      | –           | V        |
| Collector Cutoff Current (V <sub>CB</sub> = –30 V)<br>(V <sub>CB</sub> = –30 V, T <sub>A</sub> = 150°C) | I <sub>CBO</sub>     | –<br>– | –<br>– | –15<br>–4.0 | nA<br>μA |

### ON CHARACTERISTICS

|                                                                                                                                                                                                           |                                                                     |                   |                 |                       |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------|-----------------|-----------------------|---------|
| DC Current Gain<br>(I <sub>C</sub> = –10 μA, V <sub>CE</sub> = –5.0 V)<br>(I <sub>C</sub> = –2.0 mA, V <sub>CE</sub> = –5.0 V)<br>(I <sub>C</sub> = –2.0 mA, V <sub>CE</sub> = –5.0 V) (Note 3)           | h <sub>FE</sub><br><br>h <sub>FE(1)}/h<sub>FE(2)}</sub></sub>       | 270<br>420<br>0.9 | –<br>520<br>1.0 | –<br>800<br>–         | –       |
| Collector – Emitter Saturation Voltage<br>(I <sub>C</sub> = –10 mA, I <sub>B</sub> = –0.5 mA)<br>(I <sub>C</sub> = –100 mA, I <sub>B</sub> = –5.0 mA)                                                     | V <sub>CE(sat)</sub>                                                | –<br>–            | –<br>–          | –0.30<br>–0.60        | V       |
| Base – Emitter Saturation Voltage<br>(I <sub>C</sub> = –10 mA, I <sub>B</sub> = –1.0 mA)<br>(I <sub>C</sub> = –100 mA, I <sub>B</sub> = –10 mA)                                                           | V <sub>BE(sat)</sub>                                                | –<br>–            | –0.75<br>–0.90  | –<br>–                | V       |
| Base – Emitter On Voltage<br>(I <sub>C</sub> = –2.0 mA, V <sub>CE</sub> = –5.0 V)<br>(I <sub>C</sub> = –10 mA, V <sub>CE</sub> = –5.0 V)<br>(I <sub>C</sub> = –2.0 mA, V <sub>CE</sub> = –5.0 V) (Note 4) | V <sub>BE(on)</sub><br><br>V <sub>BE(1)} – V<sub>BE(2)}</sub></sub> | –0.60<br>–<br>–   | –<br>–<br>1.0   | –0.75<br>–0.82<br>2.0 | V<br>mV |

### SMALL-SIGNAL CHARACTERISTICS

|                                                                                                                  |                 |     |   |     |     |
|------------------------------------------------------------------------------------------------------------------|-----------------|-----|---|-----|-----|
| Current – Gain – Bandwidth Product, (I <sub>C</sub> = –10 mA, V <sub>CE</sub> = –5 Vdc, f = 100 MHz)             | f <sub>T</sub>  | 100 | – | –   | MHz |
| Output Capacitance, (V <sub>CB</sub> = –10 V, f = 1.0 MHz)                                                       | C <sub>ob</sub> | –   | – | 4.5 | pF  |
| Noise Figure, (I <sub>C</sub> = –0.2 mA, V <sub>CE</sub> = –5 Vdc, R <sub>S</sub> = 2 kΩ, f = 1 kHz, BW = 200Hz) | NF              | –   | – | 10  | dB  |

3. h<sub>FE(1)}/h<sub>FE(2)}</sub> is the ratio of one transistor compared to the other transistor within the same package. The smaller h<sub>FE</sub> is used as numerator.</sub>
4. V<sub>BE(1)} – V<sub>BE(2)}</sub> is the absolute difference of one transistor compared to the other transistor within the same package.</sub>

TYPICAL CHARACTERISTICS

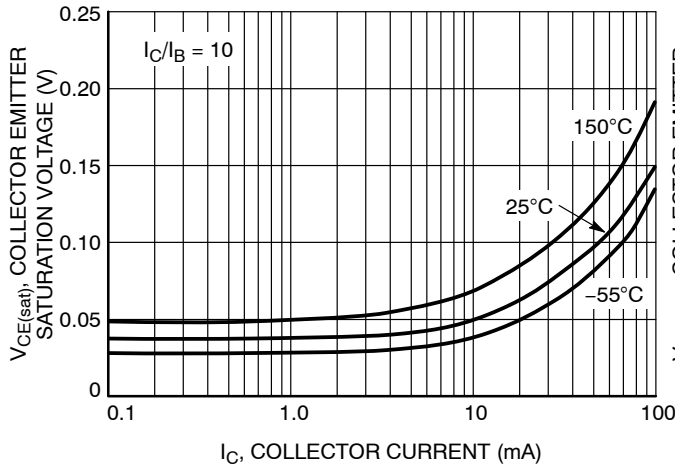


Figure 1. Collector Emitter Saturation Voltage vs. Collector Current

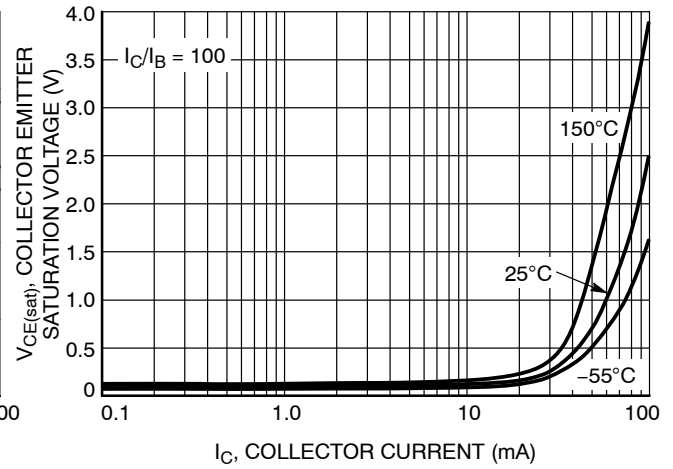


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

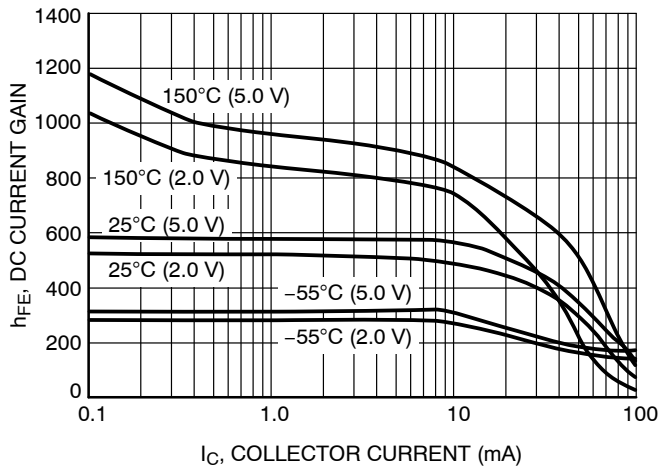


Figure 3. DC Current Gain vs. Collector Current

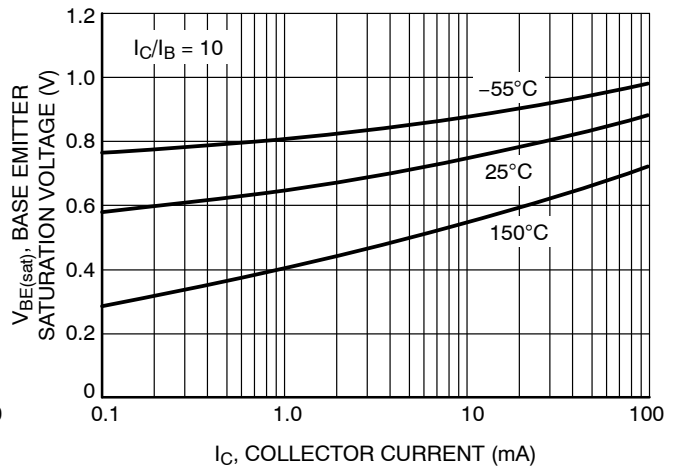


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

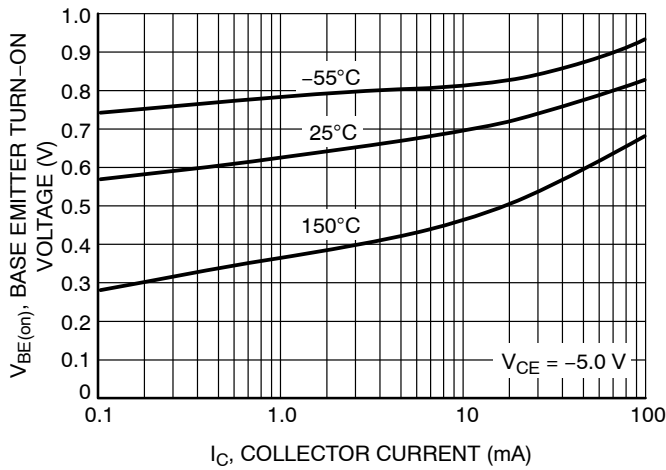


Figure 5. Base Emitter Turn-On Voltage vs. Collector Current

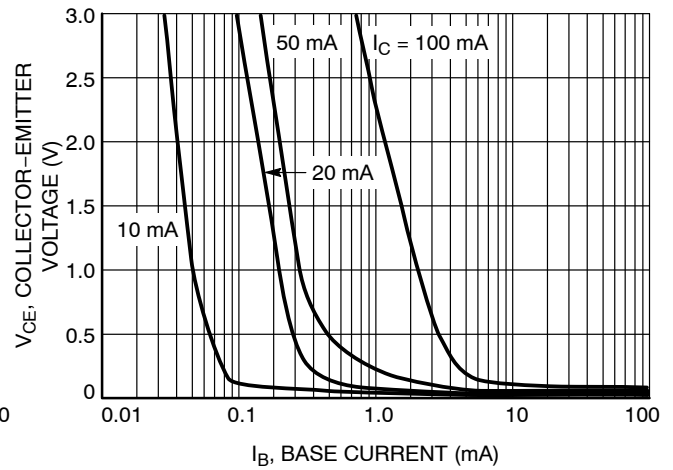


Figure 6. Saturation Region @ 25°C

TYPICAL CHARACTERISTICS

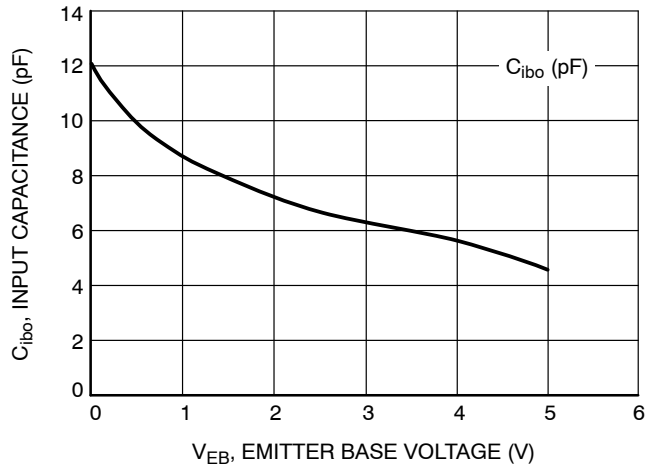


Figure 7. Input Capacitance

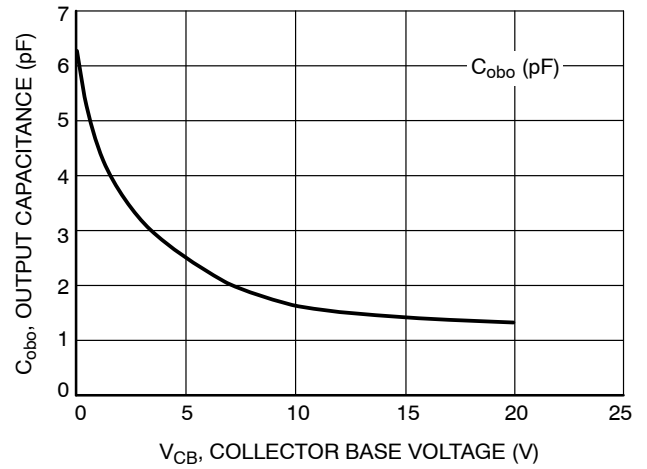
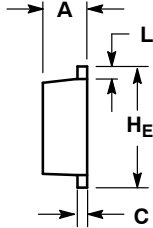
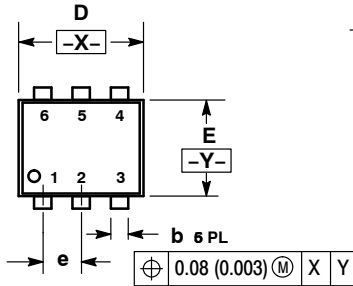


Figure 8. Output Capacitance

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## PACKAGE DIMENSIONS

### SOT-563, 6 LEAD CASE 463A-01 ISSUE F



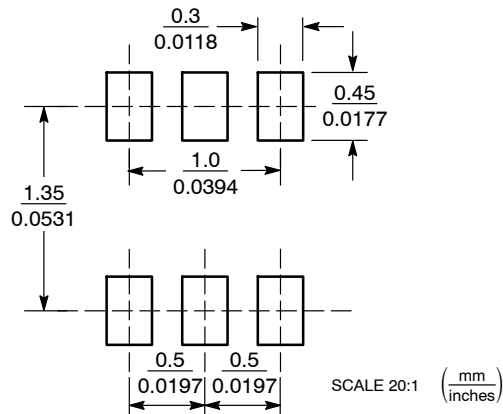
STYLE 1:  
PIN 1. EMITTER 1  
2. BASE 1  
3. COLLECTOR 2  
4. EMITTER 2  
5. BASE 2  
6. COLLECTOR 1

#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

| DIM            | MILLIMETERS |      |      | INCHES   |       |       |
|----------------|-------------|------|------|----------|-------|-------|
|                | MIN         | NOM  | MAX  | MIN      | NOM   | MAX   |
| A              | 0.50        | 0.55 | 0.60 | 0.020    | 0.021 | 0.023 |
| b              | 0.17        | 0.22 | 0.27 | 0.007    | 0.009 | 0.011 |
| C              | 0.08        | 0.12 | 0.18 | 0.003    | 0.005 | 0.007 |
| D              | 1.50        | 1.60 | 1.70 | 0.059    | 0.062 | 0.066 |
| E              | 1.10        | 1.20 | 1.30 | 0.043    | 0.047 | 0.051 |
| e              | 0.5 BSC     |      |      | 0.02 BSC |       |       |
| L              | 0.10        | 0.20 | 0.30 | 0.004    | 0.008 | 0.012 |
| H <sub>E</sub> | 1.50        | 1.60 | 1.70 | 0.059    | 0.062 | 0.066 |

### SOLDERING 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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