

# NST489AMT1, NSVT489AMT1G

## High Current Surface Mount NPN Silicon Low $V_{CE(sat)}$ Switching Transistor for Load Management in Portable Applications

### Features

- AEC-Q101 Qualified and PPAP Capable
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- Pb-Free Packages are Available\*

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

| Rating                         | Symbol    | Max | Unit |
|--------------------------------|-----------|-----|------|
| Collector-Emitter Voltage      | $V_{CEO}$ | 30  | V    |
| Collector-Base Voltage         | $V_{CBO}$ | 50  | V    |
| Emitter-Base Voltage           | $V_{EBO}$ | 5.0 | V    |
| Collector Current – Continuous | $I_C$     | 2.0 | A    |
| Collector Current – Peak       | $I_{CM}$  | 3.0 | A    |

### THERMAL CHARACTERISTICS

| Characteristic                                                                          | Symbol                                               | Max          | Unit                                                   |
|-----------------------------------------------------------------------------------------|------------------------------------------------------|--------------|--------------------------------------------------------|
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$ (Note 1)                                       | 535<br>4.3   | mW<br>mW/ $^\circ\text{C}$                             |
| Thermal Resistance,<br>Junction-to-Ambient                                              | $R_{\theta JA}$ (Note 1)                             | 234          | $^\circ\text{C}/\text{W}$                              |
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$ (Note 2)                                       | 1.180<br>9.4 | W<br>mW/ $^\circ\text{C}$                              |
| Thermal Resistance,<br>Junction-to-Ambient                                              | $R_{\theta JA}$ (Note 2)                             | 106          | $^\circ\text{C}/\text{W}$                              |
| Thermal Resistance,<br>Junction-to-Lead #1                                              | $R_{\theta JL}$ (Note 1)<br>$R_{\theta JL}$ (Note 2) | 110<br>50    | $^\circ\text{C}/\text{W}$<br>$^\circ\text{C}/\text{W}$ |
| Total Device Dissipation<br>(Single Pulse < 10 s)                                       | $P_{D\text{single}}$<br>(Notes 2 and 3)              | 1.75         | W                                                      |
| Junction and Storage<br>Temperature Range                                               | $T_J, T_{stg}$                                       | -55 to +150  | $^\circ\text{C}$                                       |

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.

1. FR-4 with 1 oz and  $3.9\text{ mm}^2$  of copper area.
2. FR-4 with 1 oz and  $645\text{ mm}^2$  of copper area.
3. Refer to Figure 8.

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



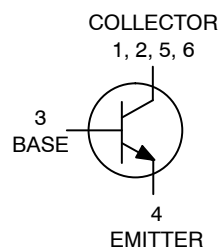
ON Semiconductor®

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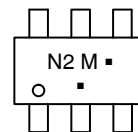
30 VOLTS, 3.0 AMPS  
NPN TRANSISTOR



TSOP-6  
CASE 318G  
STYLE 6



### DEVICE MARKING



N2 = Specific Device Code  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation may vary depending upon manufacturing location.

### ORDERING INFORMATION

| Device       | Package              | Shipping†              |
|--------------|----------------------|------------------------|
| NST489AMT1   | TSSOP-6              | 3,000 /<br>Tape & Reel |
| NST489AMT1G  | TSSOP-6<br>(Pb-Free) | 3,000 /<br>Tape & Reel |
| NSVT489AMT1G | TSSOP-6<br>(Pb-Free) | 3,000 /<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.

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

| Characteristic                                                                              | Symbol        | Min               | Typ                  | Max                     | Unit          |
|---------------------------------------------------------------------------------------------|---------------|-------------------|----------------------|-------------------------|---------------|
| <b>OFF CHARACTERISTICS</b>                                                                  |               |                   |                      |                         |               |
| Collector – Emitter Breakdown Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0$ )                  | $V_{(BR)CEO}$ | 30                | –                    | –                       | V             |
| Collector – Base Breakdown Voltage ( $I_C = 0.1\text{ mA}$ , $I_E = 0$ )                    | $V_{(BR)CBO}$ | 50                | –                    | –                       | V             |
| Emitter – Base Breakdown Voltage ( $I_E = 0.1\text{ mA}$ , $I_C = 0$ )                      | $V_{(BR)EBO}$ | 5.0               | –                    | –                       | V             |
| Collector Cutoff Current ( $V_{CB} = 30\text{ V}$ , $I_E = 0$ )                             | $I_{CBO}$     | –                 | –                    | 0.1                     | $\mu\text{A}$ |
| Collector – Emitter Cutoff Current ( $V_{CES} = 30\text{ V}$ )                              | $I_{CES}$     | –                 | –                    | 0.1                     | $\mu\text{A}$ |
| Emitter Cutoff Current ( $V_{EB} = 4.0\text{ V}$ )                                          | $I_{EBO}$     | –                 | –                    | 0.1                     | $\mu\text{A}$ |
| <b>ON CHARACTERISTICS</b>                                                                   |               |                   |                      |                         |               |
| DC Current Gain (Note 4)                                                                    | $h_{FE}$      | 300<br>300<br>200 | –<br>500<br>–        | –<br>900<br>–           |               |
| Collector – Emitter Saturation Voltage (Note 4)                                             | $V_{CE(sat)}$ | –<br>–<br>–       | 0.10<br>0.06<br>0.05 | 0.200<br>0.125<br>0.075 | V             |
| Base – Emitter Saturation Voltage (Note 4) ( $I_C = 1.0\text{ A}$ , $I_B = 0.1\text{ A}$ )  | $V_{BE(sat)}$ | –                 | –                    | 1.1                     | V             |
| Base – Emitter Turn-on Voltage (Note 4) ( $I_C = 1.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ )  | $V_{BE(on)}$  | –                 | –                    | 1.1                     | V             |
| Cutoff Frequency ( $I_C = 100\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ , $f = 100\text{ MHz}$ ) | $f_T$         | 200               | 300                  | –                       | MHz           |
| Output Capacitance ( $f = 1.0\text{ MHz}$ )                                                 | $C_{obo}$     | –                 | –                    | 15                      | pF            |

4. Pulsed Condition: Pulse Width  $\leq 300\text{ }\mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .

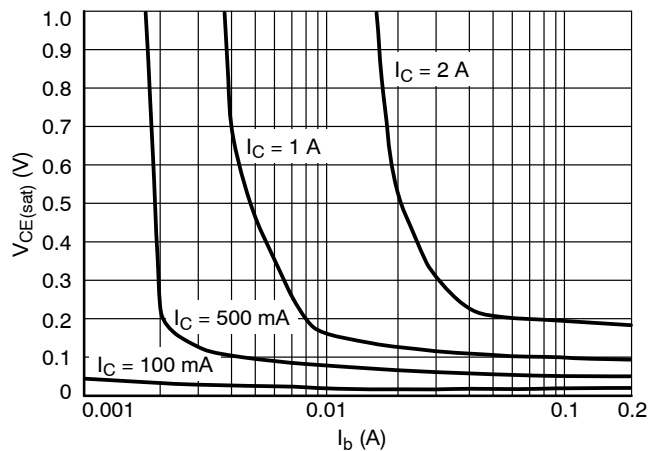


Figure 1.  $V_{CE(sat)}$  versus  $I_B$

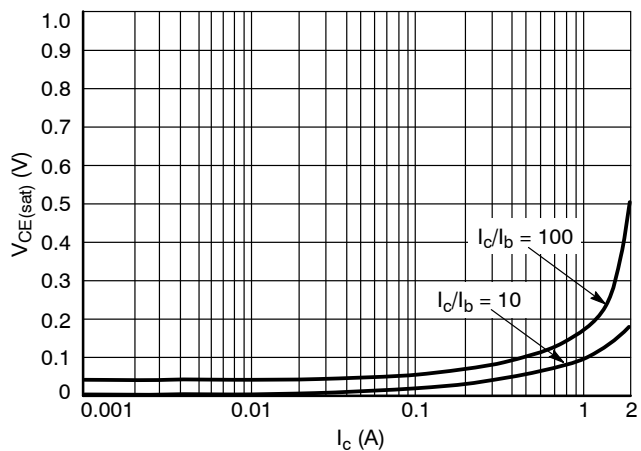


Figure 2.  $V_{CE(sat)}$  versus  $I_C$

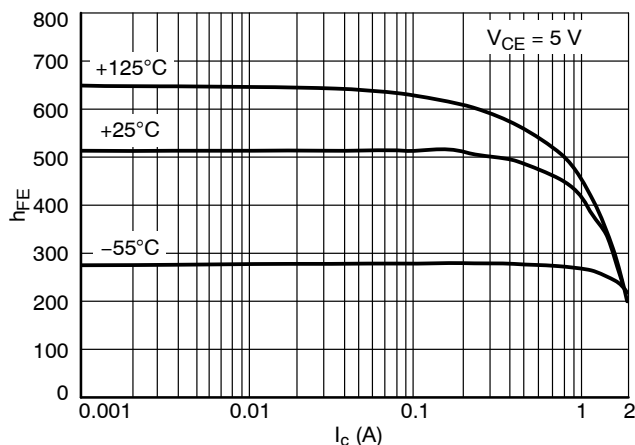


Figure 3.  $h_{FE}$  versus  $I_C$

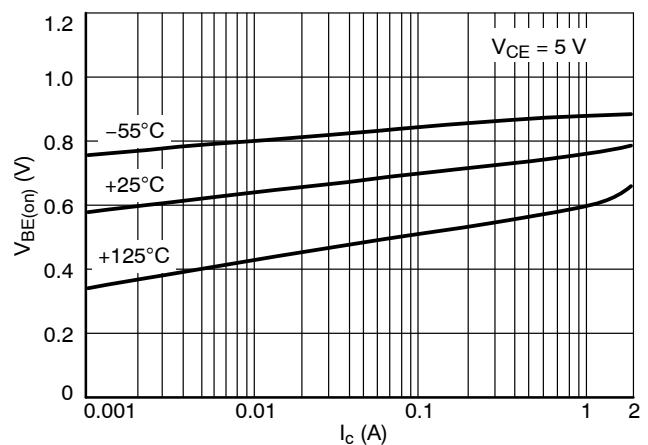


Figure 4.  $V_{BE(on)}$  versus  $I_C$

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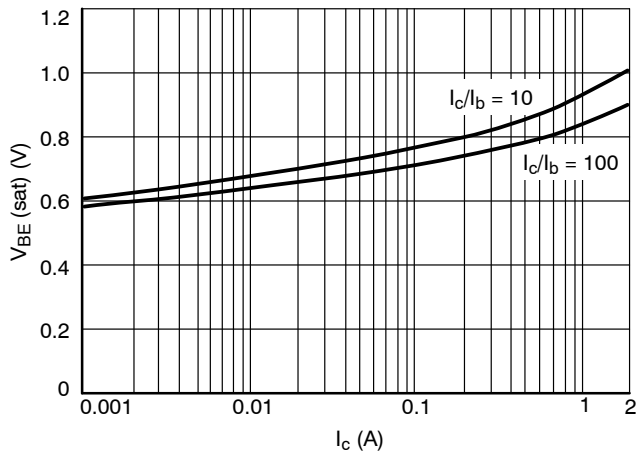


Figure 5.  $V_{BE(sat)}$  versus  $I_C$

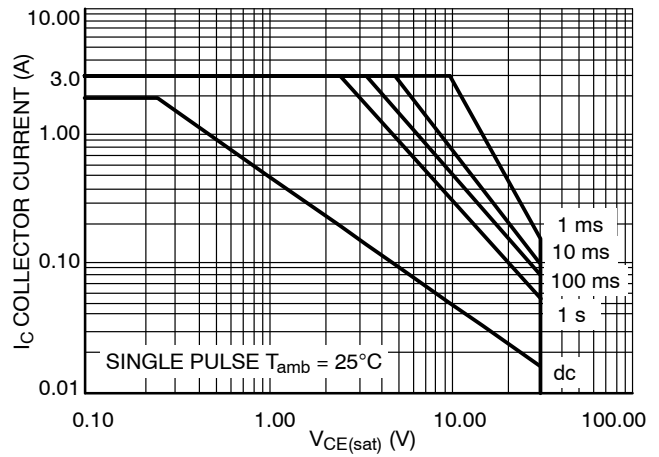


Figure 6. Safe Operating Area

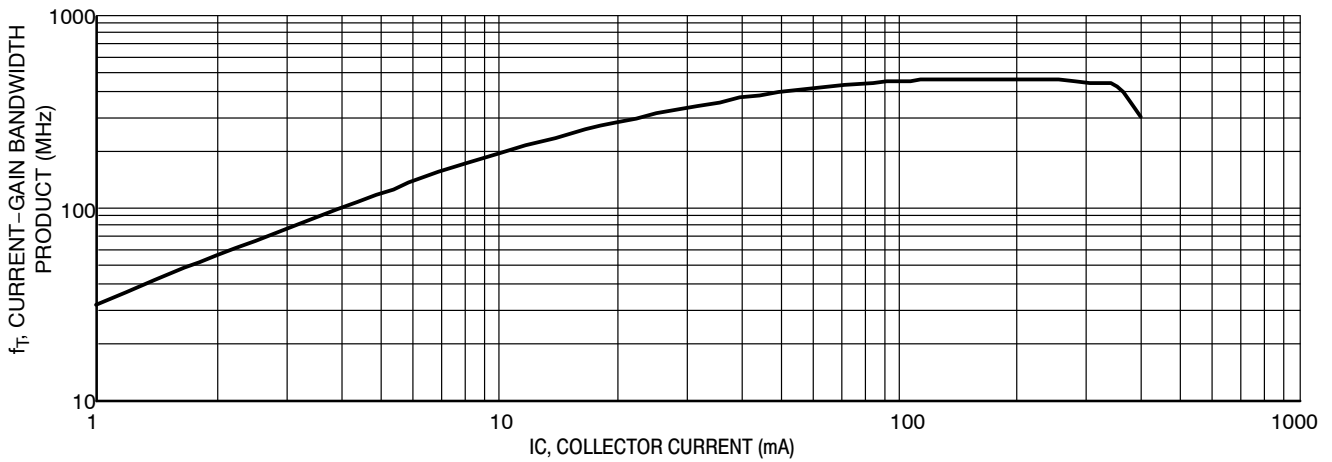


Figure 7.  $f_T$  (MHZ) versus  $I_C$  (mA)  $V_{CE} = 5.0$  V

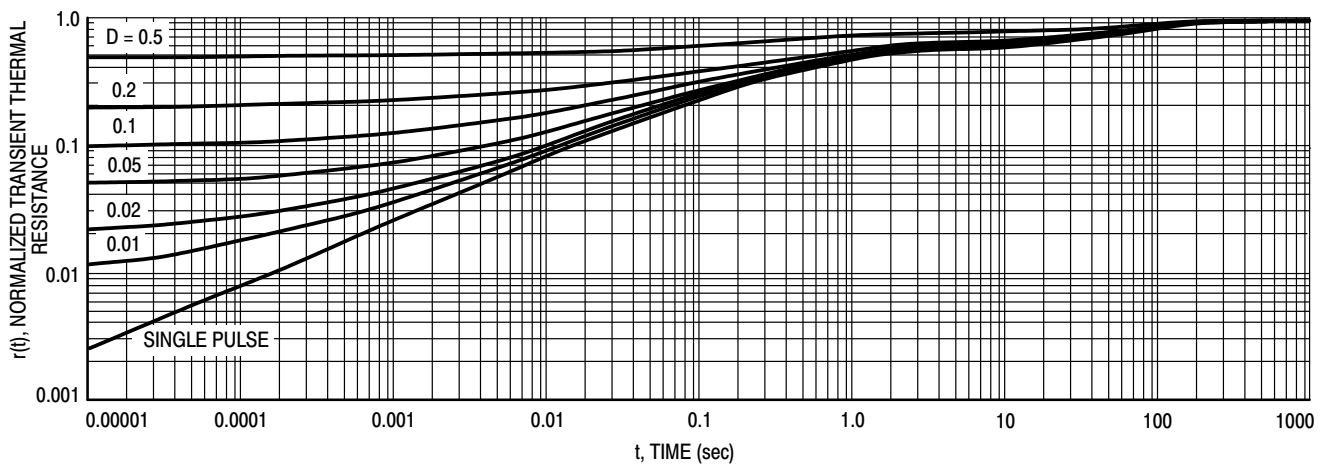
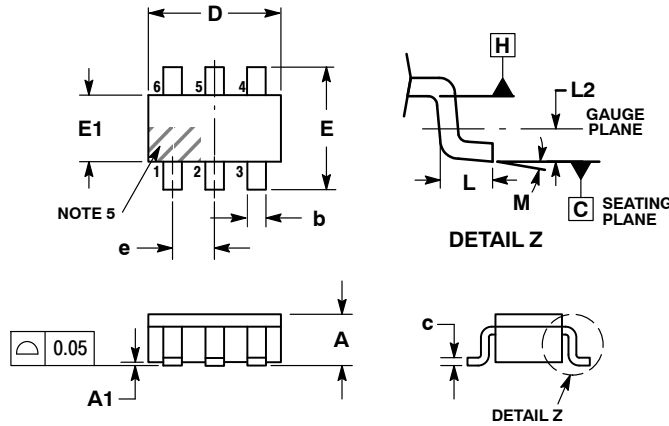


Figure 8. Normalized Thermal Response

# NST489AMT1, NSVT489AMT1G

## PACKAGE DIMENSIONS

### TSOP-6 CASE 318G-02 ISSUE U



#### NOTES:

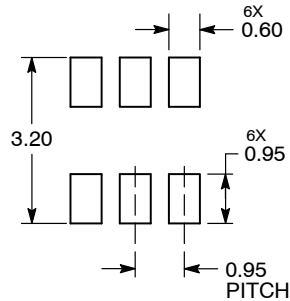
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN         | NOM  | MAX  |
| A   | 0.90        | 1.00 | 1.10 |
| A1  | 0.01        | 0.06 | 0.10 |
| b   | 0.25        | 0.38 | 0.50 |
| c   | 0.10        | 0.18 | 0.26 |
| D   | 2.90        | 3.00 | 3.10 |
| E   | 2.50        | 2.75 | 3.00 |
| E1  | 1.30        | 1.50 | 1.70 |
| e   | 0.85        | 0.95 | 1.05 |
| L   | 0.20        | 0.40 | 0.60 |
| L2  | 0.25 BSC    |      |      |
| M   | 0°          | -    | 10°  |

#### STYLE 6:

1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR

### RECOMMENDED SOLDERING 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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