

NSB1706DMW5T1G, NSVB1706DMW5T1G

Dual Bias Resistor Transistor

NPN Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

The Bias Resistor Transistor (BRT) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. These digital transistors are designed to replace a single device and its external resistor bias network. The BRT eliminates these individual components by integrating them into a single device. In the NSB1706DMW5T1G, two BRT devices are housed in the SC-88A package which is ideal for low power surface mount applications where board space is at a premium.

Features

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS

(T_A = 25°C unless otherwise noted, common for Q₁ and Q₂)

| Rating | Symbol | Value | Unit |
|---------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CBO} | 50 | Vdc |
| Collector-Emitter Voltage | V _{CEO} | 50 | Vdc |
| Collector Current | I _C | 100 | mAdc |

THERMAL CHARACTERISTICS

| Characteristic (One Junction Heated) | Symbol | Max | Unit |
|--|-----------------------------------|--|-------------|
| Total Device Dissipation T _A = 25°C Derate above 25°C | P _D | 187 (Note 1) 256 (Note 2) 1.5 (Note 1) 2.0 (Note 2) | mW mW/°C |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} | 670 (Note 1) 490 (Note 2) | °C/W |
| Characteristic (Both Junctions Heated) | Symbol | Max | Unit |
| Total Device Dissipation T _A = 25°C Derate above 25°C | P _D | 250 (Note 1) 385 (Note 2) 2.0 (Note 1) 3.0 (Note 2) | mW mW/°C |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} | 493 (Note 1) 325 (Note 2) | °C/W |
| Thermal Resistance, Junction-to-Lead | R _{θJL} | 188 (Note 1) 208 (Note 2) | °C/W |
| Junction and Storage Temperature | T _J , T _{stg} | -55 to +150 | °C |

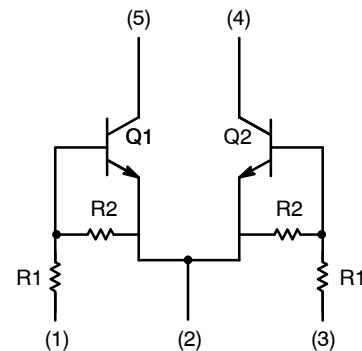
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 @ Minimum Pad.
2. FR-4 @ 1.0 x 1.0 inch Pad.



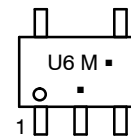
ON Semiconductor®

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SC-88A
CASE 419A
STYLE 1

MARKING DIAGRAM



U6 = Device Marking
M = Date Code
▪ = Pb-Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

| Device | Package | Shipping† |
|-----------------|---------------------|-----------------------|
| NSB1706DMW5T1G | SC-88A (Pb-Free) | 3000 / Tape & Reel |
| NSVB1706DMW5T1G | SC-88A (Pb-Free) | 3000 / 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.

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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted, common for Q_1 and Q_2)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---------------|-----|-----|------|------|
| OFF CHARACTERISTICS | | | | | |
| Collector-Base Cutoff Current ($V_{CB} = 50\text{ V}$, $I_E = 0$) | I_{CBO} | - | - | 100 | nAdc |
| Collector-Emitter Cutoff Current ($V_{CE} = 50\text{ V}$, $I_B = 0$) | I_{CEO} | - | - | 500 | nAdc |
| Emitter-Base Cutoff Current ($V_{EB} = 6.0\text{ V}$, $I_C = 0$) | I_{EBO} | - | - | 0.18 | mAdc |
| Collector-Base Breakdown Voltage ($I_C = 10\ \mu\text{A}$, $I_E = 0$) | $V_{(BR)CBO}$ | 50 | - | - | Vdc |
| Collector-Emitter Breakdown Voltage (Note 3) ($I_C = 2.0\text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | 50 | - | - | Vdc |

ON CHARACTERISTICS (Note 3)

| | | | | | |
|--|---------------|-------|-----|-------|------------------|
| DC Current Gain ($V_{CE} = 10\text{ V}$, $I_C = 5.0\text{ mA}$) | h_{FE} | 80 | 200 | - | |
| Collector-Emitter Saturation Voltage ($I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$) | $V_{CE(sat)}$ | - | - | 0.25 | Vdc |
| Output Voltage (on) ($V_{CC} = 5.0\text{ V}$, $V_B = 2.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) | V_{OL} | - | - | 0.2 | Vdc |
| Output Voltage (off) ($V_{CC} = 5.0\text{ V}$, $V_B = 0.25\text{ V}$, $R_L = 1.0\text{ k}\Omega$) | V_{OH} | 4.9 | - | - | Vdc |
| Input Resistor | R1 | 3.3 | 4.7 | 6.1 | $\text{k}\Omega$ |
| Resistor Ratio | R1/R2 | 0.055 | 0.1 | 0.185 | |

NOTE: New resistor combinations. Updated curves to follow in subsequent data sheets.

3. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%.

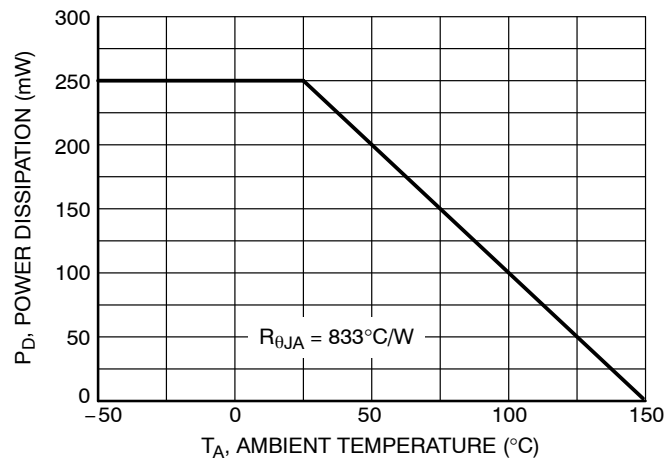
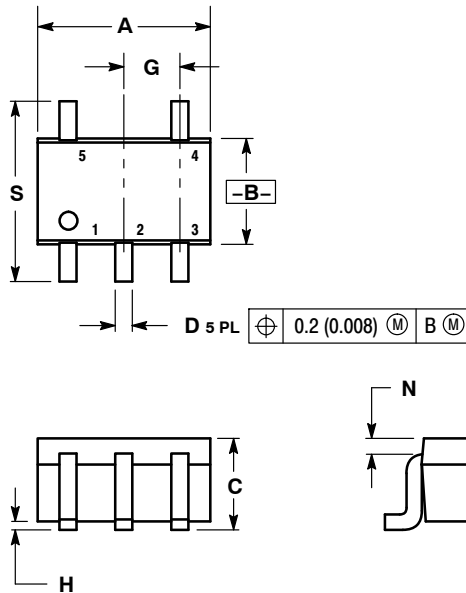


Figure 1. Derating Curve

NSB1706DMW5T1G, NSVB1706DMW5T1G

PACKAGE DIMENSIONS

SC-88A (SC-70-5/SOT-353)
CASE 419A-02
ISSUE K



NOTES:

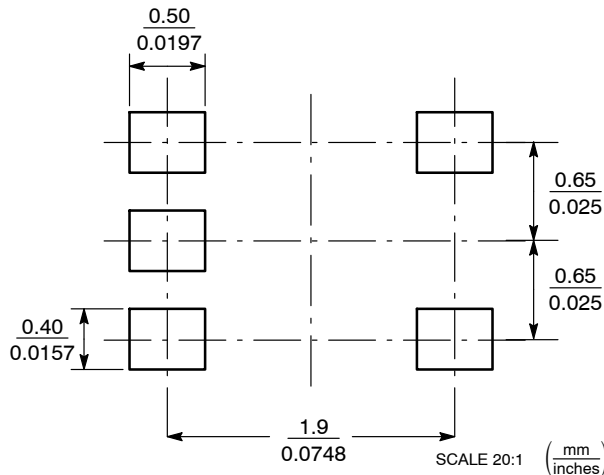
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.071 | 0.087 | 1.80 | 2.20 |
| B | 0.045 | 0.053 | 1.15 | 1.35 |
| C | 0.031 | 0.043 | 0.80 | 1.10 |
| D | 0.004 | 0.012 | 0.10 | 0.30 |
| G | 0.026 BSC | | 0.65 BSC | |
| H | --- | 0.004 | --- | 0.10 |
| J | 0.004 | 0.010 | 0.10 | 0.25 |
| K | 0.004 | 0.012 | 0.10 | 0.30 |
| N | 0.008 REF | | 0.20 REF | |
| S | 0.079 | 0.087 | 2.00 | 2.20 |

STYLE 1:

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

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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