

Dual Bias Resistor Transistor

NPN Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

NSB1706DMW5T1G, NSVB1706DMW5T1G

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

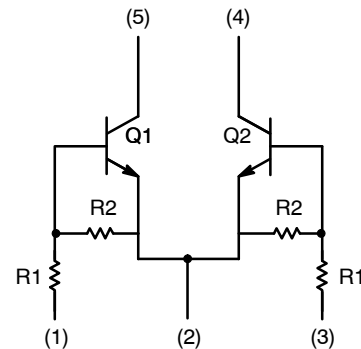
($T_A = 25^\circ\text{C}$ unless otherwise noted, common for Q_1 and Q_2)

Symbol	Rating	Value	Unit
V_{CBO}	Collector-Base Voltage	50	Vdc
V_{CEO}	Collector-Emitter Voltage	50	Vdc
I_C	Collector Current	100	mAdc

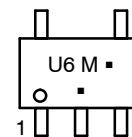
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



1
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](#).

NSB1706DMW5T1G, NSVB1706DMW5T1G

THERMAL CHARACTERISTICS

Symbol	Characteristic (One Junction Heated)	Max	Unit
P_D	Total Device Dissipation $T_A = 25\text{ }^{\circ}\text{C}$ Derate above $25\text{ }^{\circ}\text{C}$	187 (Note 1) 256 (Note 2) 1.5 (Note 1) 2.0 (Note 2)	mW mW/ $^{\circ}\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	670 (Note 1) 490 (Note 2)	$^{\circ}\text{C/W}$
Symbol	Characteristic (Both Junctions Heated)	Max	Unit
P_D	Total Device Dissipation $T_A = 25\text{ }^{\circ}\text{C}$ Derate above $25\text{ }^{\circ}\text{C}$	250 (Note 1) 385 (Note 2) 2.0 (Note 1) 3.0 (Note 2)	mW mW/ $^{\circ}\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	493 (Note 1) 325 (Note 2)	$^{\circ}\text{C/W}$
$R_{\theta JL}$	Thermal Resistance, Junction-to-Lead	188 (Note 1) 208 (Note 2)	$^{\circ}\text{C/W}$
T_J, T_{stg}	Junction and Storage Temperature	-55 to +150	$^{\circ}\text{C}$

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

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

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

OFF CHARACTERISTICS

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

ON CHARACTERISTICS (Note 3)

h_{FE}	DC Current Gain ($V_{CE} = 10\text{ V}$, $I_C = 5.0\text{ mA}$)	80	200	–	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage ($I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$)	–	–	0.25	Vdc
$V_{i(off)}$	Input Voltage (off) ($V_{CE} = 5.0\text{ V}$, $I_C = 100\text{ }\mu\text{A}$)	–	0.6	0.5	Vdc
$V_{i(on)}$	Input Voltage (on) ($V_{CE} = 0.3\text{ V}$, $I_C = 5\text{ mA}$)	1.3	0.9	–	Vdc
V_{OL}	Output Voltage (on) ($V_{CC} = 5.0\text{ V}$, $V_B = 2.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	–	–	0.2	Vdc
V_{OH}	Output Voltage (off) ($V_{CC} = 5.0\text{ V}$, $V_B = 0.25\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	4.9	–	–	Vdc
R_1	Input Resistor	3.3	4.7	6.1	k Ω
R_1/R_2	Resistor Ratio	0.055	0.1	0.185	

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

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

NSB1706DMW5T1G, NSVB1706DMW5T1G

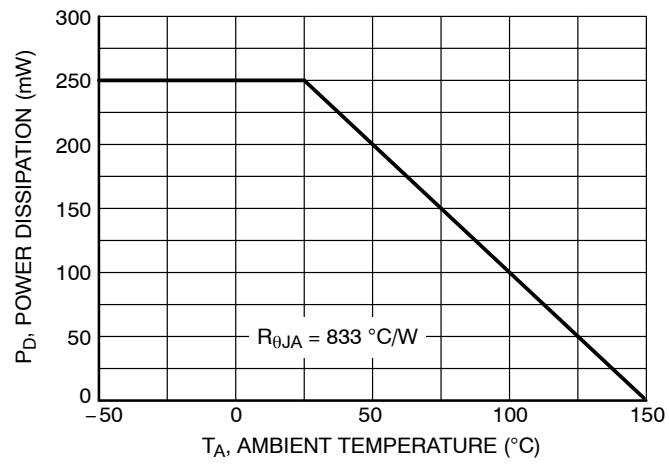


Figure 1. Derating Curve

NSB1706DMW5T1G, NSVB1706DMW5T1G

REVISION HISTORY

Revision	Description of Changes	Date
7	Rebranded the Data Sheet to onsemi format.	7/11/2025

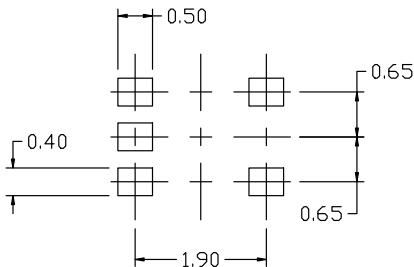
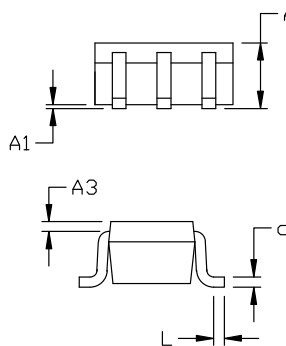
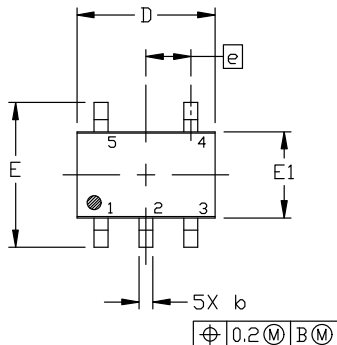
This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.



SCALE 2:1

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

DATE 11 APR 2023

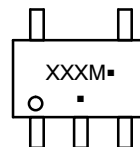

**RECOMMENDED
MOUNTING FOOTPRINT**

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

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.1016MM PER SIDE.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.80	0.95	1.10
A1	---	---	0.10
A3	0.20 REF		
b	0.10	0.20	0.30
c	0.10	---	0.25
D	1.80	2.00	2.20
E	2.00	2.10	2.20
E1	1.15	1.25	1.35
e	0.65 BSC		
L	0.10	0.15	0.30

**GENERIC MARKING
DIAGRAM***


*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.

XXX = Specific Device Code

M = Date Code

▪ = Pb-Free Package

(Note: Microdot may be in either location)

STYLE 1:

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

STYLE 2:

- PIN 1. ANODE
2. EMITTER
3. BASE
4. COLLECTOR
5. CATHODE

STYLE 3:

- PIN 1. ANODE 1
2. N/C
3. ANODE 2
4. CATHODE 2
5. CATHODE 1

STYLE 4:

- PIN 1. SOURCE 1
2. DRAIN 1/2
3. SOURCE 1
4. GATE 1
5. GATE 2

STYLE 5:

- PIN 1. CATHODE
2. COMMON ANODE
3. CATHODE 2
4. CATHODE 3
5. CATHODE 4

STYLE 6:

- PIN 1. EMITTER 2
2. BASE 2
3. EMITTER 1
4. COLLECTOR
5. COLLECTOR 2/BASE 1

STYLE 7:

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

STYLE 8:

- PIN 1. CATHODE
2. COLLECTOR
3. N/C
4. BASE
5. EMITTER

STYLE 9:

- PIN 1. ANODE
2. CATHODE
3. ANODE
4. ANODE
5. ANODE

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

DOCUMENT NUMBER:	98ASB42984B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SC-88A (SC-70-5/SOT-353)	PAGE 1 OF 1

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales