

# **NSBC143TDXV6T1G Datasheet**



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DiGi Electronics Part Number NSBC143TDXV6T1G-DG

Manufacturer onsemi

Manufacturer Product Number NSBC143TDXV6T1G

Description TRANS PREBIAS 2NPN 50V SOT563

**Detailed Description** Pre-Biased Bipolar Transistor (BJT) 2 NPN - Pre-Bia

sed (Dual) 50V 100mA 500mW Surface Mount SOT-

563



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.



# **Purchase and inquiry**

Manufacturer Product Number:	Manufacturer:
NSBC143TDXV6T1G	onsemi
Series:	Product Status:
	Active
Transistor Type:	Current - Collector (Ic) (Max):
2 NPN - Pre-Biased (Dual)	100mA
Voltage - Collector Emitter Breakdown (Max):	Resistor - Base (R1):
50V	4.7kOhms
Resistor - Emitter Base (R2):	DC Current Gain (hFE) (Min) @ lc, Vce:
	160 @ 5mA, 10V
Vce Saturation (Max) @ lb, lc:	Current - Collector Cutoff (Max):
250mV @ 1mA, 10mA	500nA
Frequency - Transition:	Power - Max:
	500mW
Mounting Type:	Package / Case:
Surface Mount	SOT-563, SOT-666
Supplier Device Package:	Base Product Number:
SOT-563	NSBC143

# **Environmental & Export classification**

8541.21.0095

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	



# **Dual NPN Bias Resistor Transistors** $R1 = 4.7 k\Omega$ , $R2 = \infty k\Omega$

## **NPN Transistors with Monolithic Bias Resistor Network**

# MUN5216DW1, **NSBC143TDXV6**

This series of digital transistors is designed to replace a single device and its external resistor bias 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. The BRT eliminates these individual components by integrating them into a single device. The use of a BRT can reduce both system cost and board space.

#### **Features**

- S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- 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<sub>A</sub> = 25°C, common for Q1 and Q2, unless otherwise noted)

Symbol	Rating	Max	Unit
$V_{CBO}$	Collector-Base Voltage	50	Vdc
V <sub>CEO</sub>	Collector-Emitter Voltage	50	Vdc
Ic	Collector Current - Continuous	100	mAdc
V <sub>IN(fwd)</sub>	Input Forward Voltage	30	Vdc
V <sub>IN(rev)</sub>	Input Reverse Voltage	6	Vdc

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

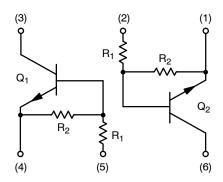


SOT-363 **CASE 419B** 



SOT-563 CASE 463A

#### **PIN CONNECTIONS**



#### **MARKING DIAGRAMS**





SOT-563 CASE 463A

7F = Specific Device Code M = Date Code\*

(Note: Microdot may be in either location)

= Pb-Free Package

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

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

NOTE: Some of the devices on this data sheet have been DISCONTINUED. Please refer to the table on page 5.

### THERMAL CHARACTERISTICS

Symbol		Characteristic	Max	Unit
MUN5216DW	1 (SOT-363) One Junction Heat	ed		
P <sub>D</sub>	Total Device Dissipation $T_A = 25^{\circ}C \qquad \text{(Note 1)}$ $\text{(Note 2)}$ Derate above 25°C $\text{(Note 2)}$	(Note 1)	187 256 1.5 2.0	mW mW/°C
$R_{ hetaJA}$	Thermal Resistance, Junction to Ambient	(Note 1) (Note 2)	670 490	°C/W
MUN5216DW	1 (SOT-363) Both Junction Hea	ted (Note 3)		
P <sub>D</sub>	Total Device Dissipation $T_A = 25^{\circ}C \qquad \text{(Note 1)}$ $\text{(Note 2)}$ Derate above 25°C $\text{(Note 2)}$	(Note 1)	250 385 2.0 3.0	mW mW/°C
$R_{ hetaJA}$	Thermal Resistance, Junction to Ambient	(Note 1) (Note 2)	493 325	°C/W
$R_{ hetaJL}$	Thermal Resistance, Junction to Lead (Note 2)	(Note 1)	188 208	°C/W
T <sub>J</sub> , T <sub>stg</sub>	Junction and Storage Temperature Range		-55 to +150	°C
NSBC143TDX	(V6 (SOT-563) One Junction He	eated		
P <sub>D</sub>	Total Device Dissipation  T <sub>A</sub> = 25°C (Note 1)  Derate above 25°C	(Note 1)	357 2.9	mW mW/°C
$R_{ hetaJA}$	Thermal Resistance, Junction to Ambient	(Note 1)	350	°C/W
NSBC143TDX	(V6 (SOT-563) Both Junction H	eated (Note 3)		
P <sub>D</sub>	Total Device Dissipation  T <sub>A</sub> = 25°C (Note 1)  Derate above 25°C	(Note 1)	500 4.0	mW mW/°C
$R_{ hetaJA}$	Thermal Resistance, Junction to Ambient	(Note 1)	250	°C/W
T <sub>J</sub> , T <sub>stg</sub>	Junction and Storage Temper	ature Range	-55 to +150	°C

FR-4 @ Minimum Pad.
 FR-4 @ 1.0 x 1.0 Inch Pad.
 Both junction heated values assume total power is sum of two equally powered channels.

**ELECTRICAL CHARACTERISTICS** (T<sub>A</sub> = 25°C, common for Q<sub>1</sub> and Q<sub>2</sub>, unless otherwise noted)

Symbol	Characteristic	Min	Тур	Max	Unit
OFF CHARA	CTERISTICS		•		
I <sub>CBO</sub>	Collector–Base Cutoff Current $(V_{CB} = 50 \text{ V}, I_E = 0)$	-	-	100	nAdc
I <sub>CEO</sub>	Collector–Emitter Cutoff Current $(V_{CE} = 50 \text{ V}, I_B = 0)$	-	_	500	nAdc
I <sub>EBO</sub>	Emitter-Base Cutoff Current $(V_{EB} = 6.0 \text{ V}, I_C = 0)$	-	_	1.9	mAdc
V <sub>(BR)CBO</sub>	Collector–Base Breakdown Voltage ( $I_C = 10 \mu A, I_E = 0$ )	50	-	_	Vdc
V <sub>(BR)CEO</sub>	Collector–Emitter Breakdown Voltage (Note 4) (I <sub>C</sub> = 2.0 mA, I <sub>B</sub> = 0)	50	-	_	Vdc
ON CHARAC	TERISTICS				
h <sub>FE</sub>	DC Current Gain (Note 4) (I <sub>C</sub> = 5.0 mA, V <sub>CE</sub> = 10 V)	160	350	_	
V <sub>CE(sat)</sub>	Collector–Emitter Saturation Voltage (Note 4) (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1.0 mA)	-	_	0.25	Vdc
$V_{i(off)}$	Input Voltage (off) (V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 100 $\mu$ A)	-	0.6	_	Vdc
V <sub>i(on)</sub>	Input Voltage (on) (V <sub>CE</sub> = 0.2 V, I <sub>C</sub> = 10 mA)	-	0.9	-	Vdc
V <sub>OL</sub>	Output Voltage (on) (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 2.5 V, R <sub>L</sub> = 1.0 k $\Omega$ )	-	-	0.2	Vdc
V <sub>OH</sub>	Output Voltage (off) (V <sub>CC</sub> = 5.0 V, V <sub>B</sub> = 0.25 V, R <sub>L</sub> = 1.0 k $\Omega$ )	4.9	_	_	Vdc
R1	Input Resistor	3.3	4.7	6.1	kΩ
R <sub>1</sub> /R <sub>2</sub>	Resistor Ratio	-	_	_	

<sup>4.</sup> Pulsed Condition: Pulse Width = 300 msec, Duty Cycle  $\leq$  2%.

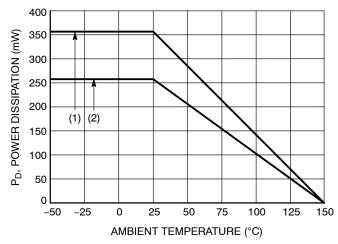


Figure 1. Derating Curve

- (1) SOT-363; 1.0 x 1.0 inch Pad
- (2) SOT-563; Minimum Pad

# TYPICAL CHARACTERISTICS MUN5216DW1, NSBC143TDXV6

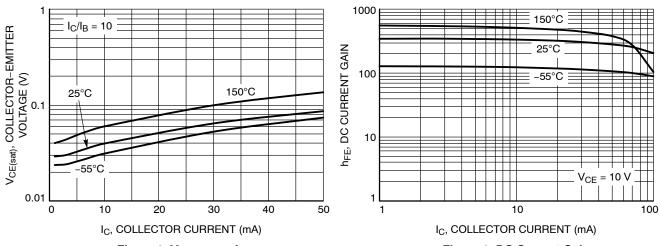


Figure 2. V<sub>CE(sat)</sub> vs. I<sub>C</sub>

Figure 3. DC Current Gain

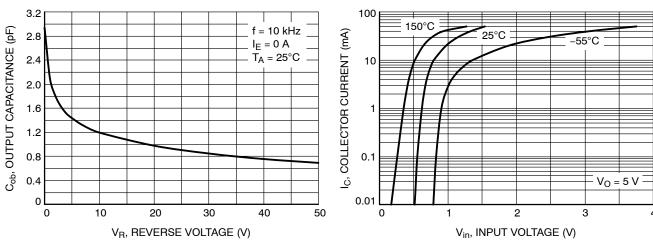


Figure 4. Output Capacitance

Figure 5. Output Current vs. Input Voltage

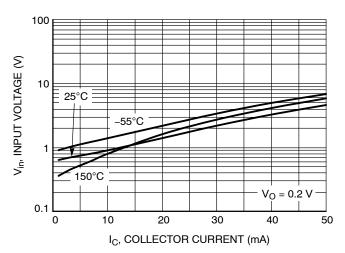


Figure 6. Input Voltage vs. Output Current

#### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
MUN5216DW1T1G, SMUN5216DW1T1G	SOT-363	3,000 / Tape & Reel
NSBC143TDXV6T1G	SOT-563	4,000 / Tape & Reel

#### **DISCONTINUED** (Note 5)

NSBC143TDXV6T5G	SOT-563	8,000 / Tape & Reel

<sup>†</sup>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.

DISCONTINUED: This device is not recommended for new design. Please contact your onsemi representative for information. The most current information on this device may be available on <a href="https://www.onsemi.com">www.onsemi.com</a>.



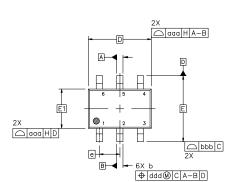
# **MECHANICAL CASE OUTLINE**

PACKAGE DIMENSIONS



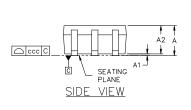
#### SC-88 2.00x1.25x0.90, 0.65P CASE 419B-02 **ISSUE Z**

**DATE 18 APR 2024** 



#### NOTES:

- DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
- ALL DIMENSION ARE IN MILLIMETERS.
- DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
- DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
  DATUMS A AND B ARE DETERMINED AT DATUM H.
- DIMENSIONS 6 AND C APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP. 6.
- DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION 6 AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.



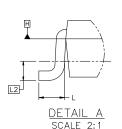
6X 0.30 -

6X 0.66

2.50

TOP VIEW





	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
Α			1.10
A1	0.00		0.10
A2	0.70	0.90	1.00
b	0.15	0.20	0.25
С	0.08	0.15	0.22
D	2.00 BSC		
Е	2.10 BSC		
E1	1.25 BSC		
е		0.65 BSC	;
L	0.26	0.36	0.46
L2	0.15 BSC		
aaa	0.15		
bbb	0.30		
ссс	0.10		
ddd		0.10	
ddd		0.10	

### **GENERIC MARKING DIAGRAM\***



XXX = Specific Device Code = Date Code\*

= Pb-Free Package

RECOMMENDED MOUNTING FOOTPRINT\*

FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

(Note: Microdot may be in either location)

- \*Date Code orientation and/or position may vary depending upon manufacturing location.
- \*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.

#### **STYLES ON PAGE 2**

DOCUMENT NUMBER:	98ASB42985B Electronic versions are uncontrolled except when accessed directly from the Documer Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red		
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#### SC-88 2.00x1.25x0.90, 0.65P CASE 419B-02 ISSUE Z

**DATE 18 APR 2024** 

STYLE 1: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	STYLE 2: CANCELLED	STYLE 3: CANCELLED	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. COLLECTOR 4. EMITTER 5. BASE 6. ANODE	STYLE 5: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 6: PIN 1. ANODE 2 2. N/C 3. CATHODE 1 4. ANODE 1 5. N/C 6. CATHODE 2
STYLE 7: PIN 1. SOURCE 2 2. DRAIN 2 3. GATE 1 4. SOURCE 1 5. DRAIN 1 6. GATE 2	STYLE 8: CANCELLED	STYLE 9: PIN 1. EMITTER 2 2. EMITTER 1 3. COLLECTOR 1 4. BASE 1 5. BASE 2 6. COLLECTOR 2	STYLE 10: PIN 1. SOURCE 2 2. SOURCE 1 3. GATE 1 4. DRAIN 1 5. DRAIN 2 6. GATE 2	STYLE 11: PIN 1. CATHODE 2 2. CATHODE 2 3. ANODE 1 4. CATHODE 1 5. CATHODE 1 6. ANODE 2	STYLE 12: PIN 1. ANODE 2 2. ANODE 2 3. CATHODE 1 4. ANODE 1 5. ANODE 1 6. CATHODE 2
STYLE 13: PIN 1. ANODE 2. N/C 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 14: PIN 1. VREF 2. GND 3. GND 4. IOUT 5. VEN 6. VCC	STYLE 15: PIN 1. ANODE 1 2. ANODE 2 3. ANODE 3 4. CATHODE 3 5. CATHODE 2 6. CATHODE 1	STYLE 16: PIN 1. BASE 1 2. EMITTER 2 3. COLLECTOR 2 4. BASE 2 5. EMITTER 1 6. COLLECTOR 1	STYLE 17: PIN 1. BASE 1 2. EMITTER 1 3. COLLECTOR 2 4. BASE 2 5. EMITTER 2 6. COLLECTOR 1	STYLE 18: PIN 1. VIN1 2. VCC 3. VOUT2 4. VIN2 5. GND 6. VOUT1
STYLE 19: PIN 1. I OUT 2. GND 3. GND 4. V CC 5. V EN 6. V REF	STYLE 20: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. EMITTER 5. COLLECTOR 6. COLLECTOR	STYLE 21: PIN 1. ANODE 1 2. N/C 3. ANODE 2 4. CATHODE 2 5. N/C 6. CATHODE 1	STYLE 22: PIN 1. D1 (i) 2. GND 3. D2 (i) 4. D2 (c) 5. VBUS 6. D1 (c)	STYLE 23: PIN 1. Vn 2. CH1 3. Vp 4. N/C 5. CH2 6. N/C	STYLE 24: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE
STYLE 25: PIN 1. BASE 1 2. CATHODE 3. COLLECTOR 2 4. BASE 2 5. EMITTER 6. COLLECTOR 1	STYLE 26: PIN 1. SOURCE 1 2. GATE 1 3. DRAIN 2 4. SOURCE 2 5. GATE 2 6. DRAIN 1	STYLE 27: PIN 1. BASE 2 2. BASE 1 3. COLLECTOR 1 4. EMITTER 1 5. EMITTER 2 6. COLLECTOR 2	STYLE 28: PIN 1. DRAIN 2. DRAIN 3. GATE 4. SOURCE 5. DRAIN 6. DRAIN	STYLE 29: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE/ANODE 6. CATHODE	STYLE 30: PIN 1. SOURCE 1 2. DRAIN 2 3. DRAIN 2 4. SOURCE 2 5. GATE 1 6. DRAIN 1

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:	98ASB42985B Electronic versions are uncontrolled except when accessed directly from the Document R Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.		
DESCRIPTION:	SC-88 2.00x1.25x0.90, 0.65	SC-88 2.00x1.25x0.90, 0.65P	

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# **MECHANICAL CASE OUTLINE**

PACKAGE DIMENSIONS



STYLE 1:

PIN 1. EMITTER 1 2. BASE 1

3. COLLECTOR 2

6. COLLECTOR 1

4. EMITTER 2

5. BASE 2

STYLE 4: PIN 1. COLLECTOR 2. COLLECTOR

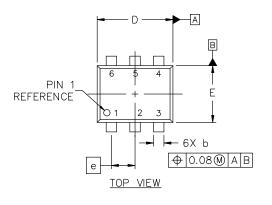
3. BASE

#### SOT-563-6 1.60x1.20x0.55, 0.50P CASE 463A **ISSUE J**

**DATE 15 FEB 2024** 

#### NOTES:

- 1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
- ALL DIMENSION ARE IN MILLIMETERS.
- MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.



STYLE 2:

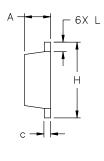
PIN 1. EMITTER 1

3. BASE 2

5. BASE 1 6. COLLECTOR 1

2. EMITTER 2

4. COLLECTOR 2



SIDE VIEW

STYLE 3:

PIN 1. CATHODE 1 2. CATHODE 1

STYLE 6: PIN 1. CATHODE 2. ANODE

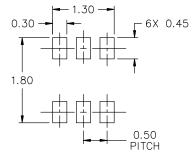
3. CATHODE

4. CATHODE 5. CATHODE

3. ANDDE/ANDDE 2 CATHODE 2

6. ANDDE/ANDDE 1

DIM	MILLIMETERS			
ויונת	MIN.	N□M.	MAX.	
А	0.50	0.55	0.60	
Ø	0.17	0.22	0.27	
	0.08	0.13	0.18	
D	1.50	1.60	1.70	
Е	1.10	1.20	1.30	
е	0.50 BSC			
Η	1.50	1.60	1.70	
L	0.10	0.20	0.30	



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.

#### 4. EMITTER 5. COLLECTOR 6. COLLECTOR 6. CATHODE 6. CATHODE STYLE 7: STYLE 8: STYLE 9 1. CATHODE PIN 1. DRAIN PIN 1. SOURCE 1 2. DRAIN 2. GATE 1

STYLE 5: PIN 1. CATHODE 2. CATHODE

4. ANDDE 5. CATHODE

3. ANDDE

#### 2. ANDDE 3. CATHODE 4. CATHODE 3. GATE 4. SOURCE 5. DRAIN 3. DRAIN 2 4. SOURCE 2 5. GATE 2 5. ANDDE CATHODE 6. DRAIN DRAIN 1

STYLE 10:	STYLE 11:
PIN 1. CATHODE 1	PIN 1. EMITTER 2
2. N/C	2. BASE 2
3. CATHODE 2	3. COLLECTOR 1
4. ANODE 2	4. EMITTER 1
5. N/C	5. BASE 1
6. AN□DE 1	6. COLLECTOR 2

#### **GENERIC MARKING DIAGRAM\***



XX = Specific Device Code M = Month Code

= Pb-Free Package

\*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.

DOCUMENT NUMBER:	00,101111202	Printed versions are uncontrolled except when stamped "CONTROLLED"	
DESCRIPTION:	SOT-563-6 1.60x1.20x0.55, 0.50P PAGE		PAGE 1 OF 1

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