Complementary Bias Resistor Transistors R1 = 2.2/47 kΩ, R2 = 47 kΩ

NPN and PNP Transistors with Monolithic Bias Resistor Network

NSVBC143JPDXV6

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

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable*
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS

(T_A = 25°C both polarities Q_1 (PNP) & Q_2 (NPN), unless otherwise noted)

Rating	Symbol	Max	Unit
Collector-Base Voltage	V_{CBO}	50	Vdc
Collector-Emitter Voltage	V_{CEO}	50	Vdc
Collector Current – Continuous	I_C	100	mAdc
Input Forward Voltage	$V_{IN(fwd)}$	12	Vdc
Input Reverse Voltage	$V_{IN(rev)}$	5	Vdc

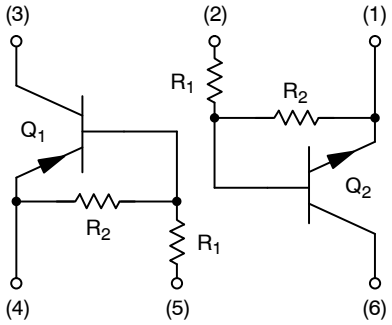
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

ORDERING INFORMATION

Device	Package	Shipping†
NSVBC143JPDXV6T5G	SOT−563	8,000/Tape & Reel
NSVBC143JPDXV6T1G	SOT−563	4,000/Tape & Reel

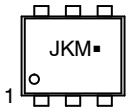
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PIN CONNECTIONS



MARKING DIAGRAM

SOT−563
CASE 463A



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

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
NSVBC143JPDXV6 (SOT−563) ONE JUNCTION HEATED			
Total Device Dissipation T_A = 25°C (Note 1) Derate above 25°C (Note 1)	P_D	 357 2.9	 mW mW/°C
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	 350	°C/W
NSVBC143JPDXV6 (SOT−563) BOTH JUNCTION HEATED (Note 2)			
Total Device Dissipation T_A = 25°C (Note 1) Derate above 25°C (Note 1)	P_D	 500 4.0	 mW mW/°C
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	 250	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

1. FR−4 @ Minimum Pad.
2. Both junction heated values assume total power is sum of two equally powered channels.

ELECTRICAL CHARACTERISTICS (T_A = 25°C both polarities Q_1 (PNP) & Q_2 (NPN), unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Base Cutoff Current (V_{CB} = 50 V, I_E = 0)	I_{CBO}	–	–	100	nAdc
Collector-Emitter Cutoff Current (V_{CE} = 50 V, I_B = 0)	I_{CEO}	–	–	500	nAdc
Emitter-Base Cutoff Current (V_{EB} = 6.0 V, I_C = 0)	I_{EBO}	–	–	0.2	mAdc
Collector-Base Breakdown Voltage (I_C = 10 μA, I_E = 0)	$V_{(BR)CBO}$	50	–	–	Vdc
Collector-Emitter Breakdown Voltage (Note 3) (I_C = 2.0 mA, I_B = 0)	$V_{(BR)CEO}$	50	–	–	Vdc
ON CHARACTERISTICS					
DC Current Gain (Note 3) (I_C = 5.0 mA, V_{CE} = 10 V)	h_{FE}	80	140	–	
Collector-Emitter Saturation Voltage (Note 3) (I_C = 10 mA, I_B = 0.3 mA)	$V_{CE(sat)}$	–	–	0.25	V
Input Voltage (Off) (V_{CE} = 5.0 V, I_C = 100 μA) (NPN) (V_{CE} = 5.0 V, I_C = 100 μA) (PNP)	$V_{i(off)}$	– –	1.2 0.6	0.8 0.5	Vdc
Input Voltage (On) (V_{CE} = 0.3 V, I_C = 2.0 mA) (NPN) (V_{CE} = 0.3 V, I_C = 5.0 mA) (PNP)	$V_{i(on)}$	3.0 1.1	1.6 0.8	– –	Vdc
Output Voltage (On) (V_{CC} = 5.0 V, V_B = 3.5 V, R_L = 1.0 kΩ) (NPN) (V_{CC} = 5.0 V, V_B = 2.5 V, R_L = 1.0 kΩ) (PNP)	V_{OL}	– –	– –	0.2 0.2	Vdc
Output Voltage (Off) (V_{CC} = 5.0 V, V_B = 0.5 V, R_L = 1.0 kΩ)	V_{OH}	4.9	–	–	Vdc
Input Resistor (NPN) Input Resistor (PNP)	R1	32.9 1.5	47 2.2	61.1 2.9	kΩ
Resistor Ratio (NPN) Resistor Ratio (PNP)	R_1/R_2	0.8 0.038	1.0 0.047	1.2 0.056	

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.

3. Pulsed Condition: Pulse Width = 300 ms, Duty Cycle ≤ 2%.

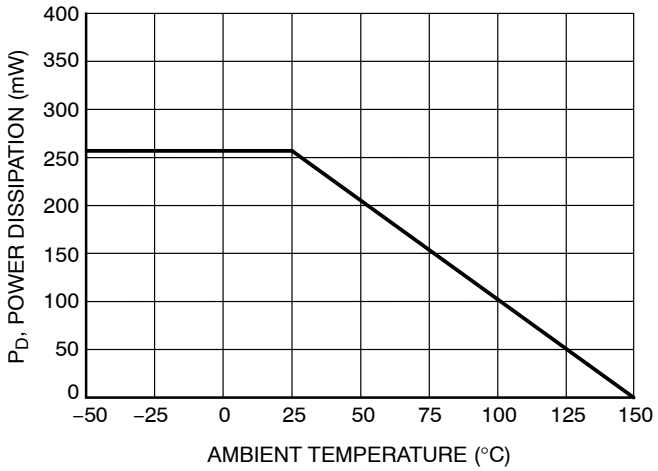


Figure 1. Derating Curve

TYPICAL CHARACTERISTICS – NPN TRANSISTOR

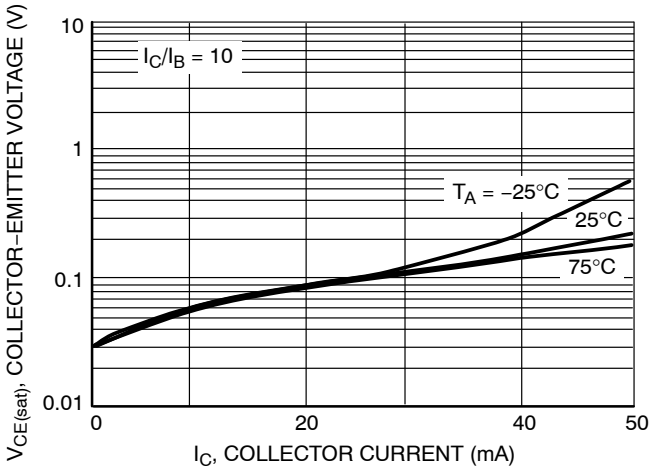


Figure 2. $V_{CE(sat)}$ vs. I_C

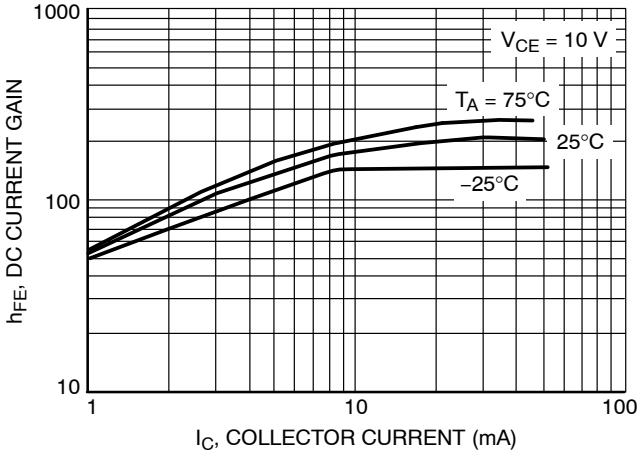


Figure 3. DC Current Gain

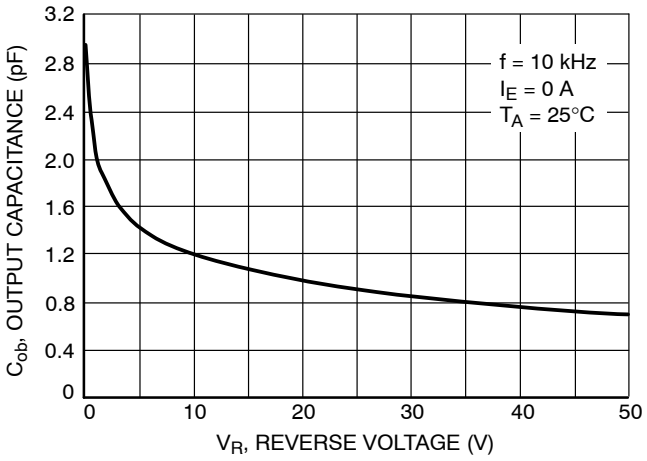


Figure 4. Output Capacitance

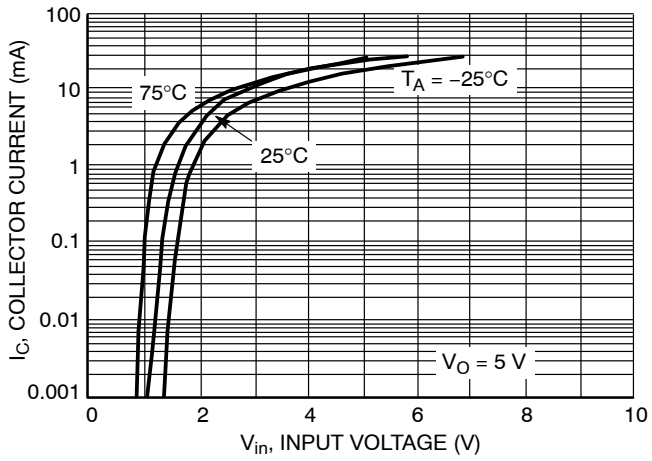


Figure 5. Output Current vs. Input Voltage

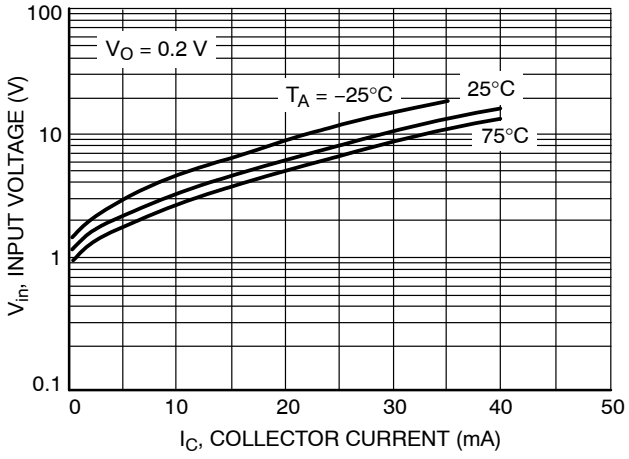


Figure 6. Input Voltage vs. Output Current

TYPICAL CHARACTERISTICS – PNP TRANSISTOR

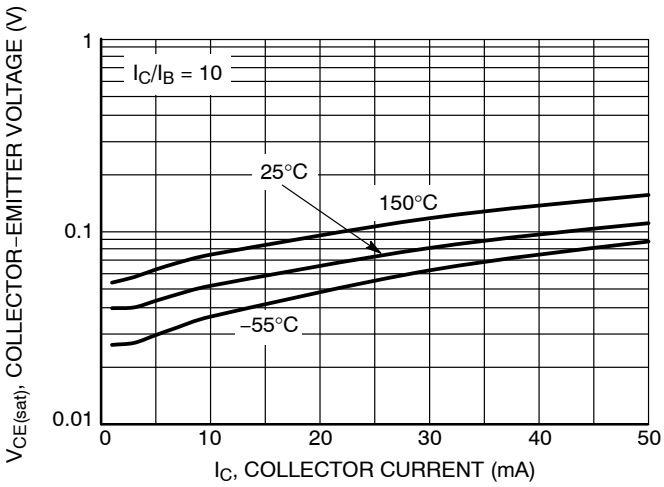


Figure 7. $V_{CE(sat)}$ vs. I_C

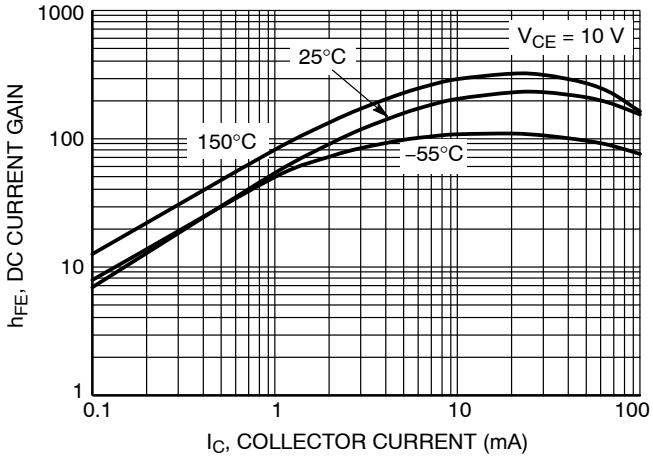


Figure 8. DC Current Gain

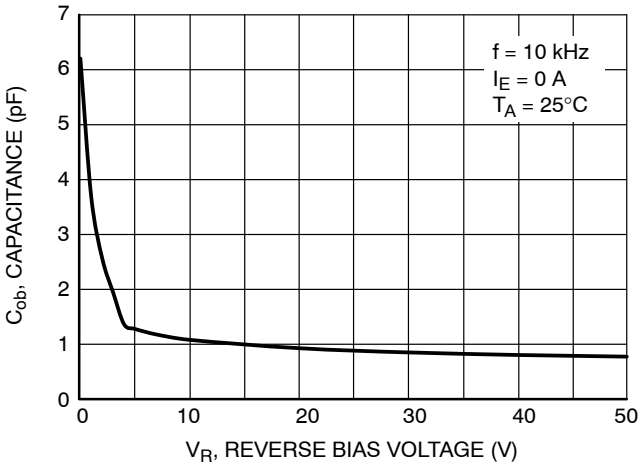


Figure 9. Output Capacitance

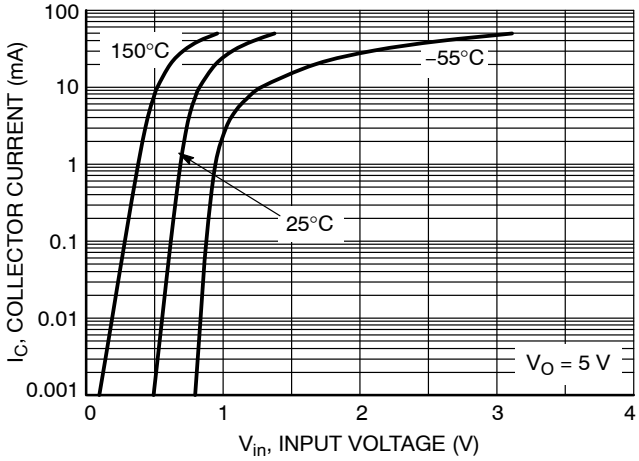


Figure 10. Output Current vs. Input Voltage

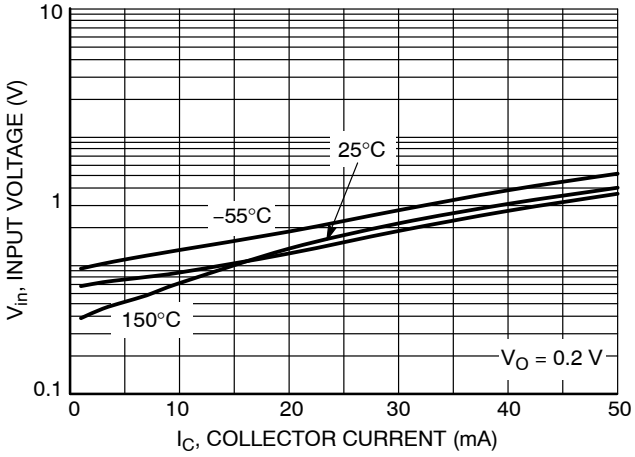
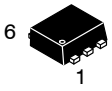


Figure 11. Input Voltage vs. Output Current

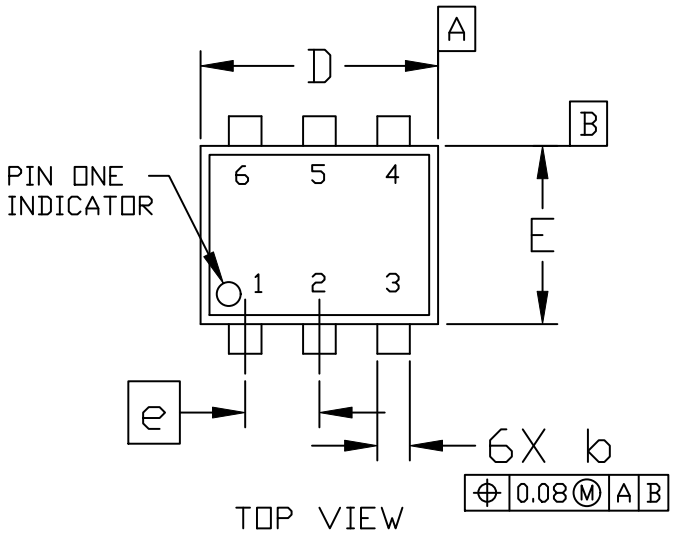


SCALE 4:1

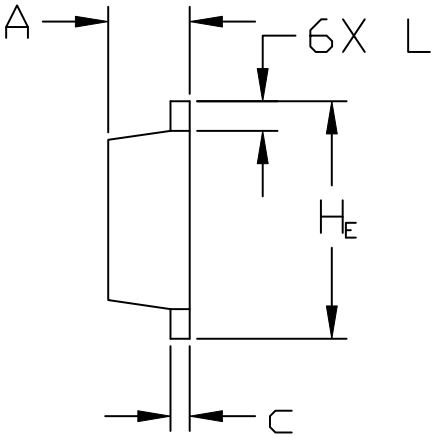
SOT−563, 6 LEAD
CASE 463A
ISSUE H

DATE 26 JAN 2021

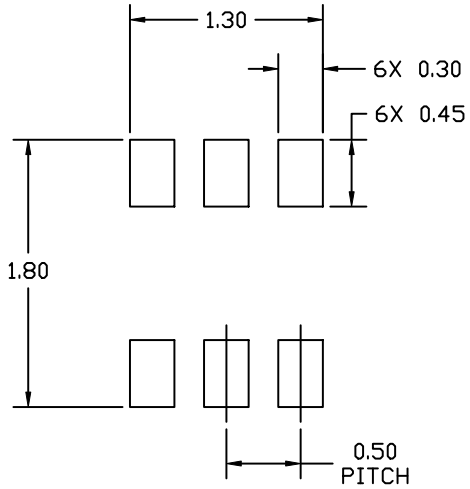
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.



TOP VIEW



SIDE VIEW



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.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.50	0.55	0.60
b	0.17	0.22	0.27
c	0.08	0.13	0.18
D	1.50	1.60	1.70
E	1.10	1.20	1.30
e	0.50 BSC		
L	0.10	0.20	0.30
H_E	1.50	1.60	1.70

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CASE 463A
ISSUE H

DATE 26 JAN 2021

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

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

STYLE 3:
PIN 1. CATHODE 1
2. CATHODE 1
3. ANODE/ANODE 2
4. CATHODE 2
5. CATHODE 2
6. ANODE/ANODE 1

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

STYLE 5:
PIN 1. CATHODE
2. CATHODE
3. ANODE
4. ANODE
5. CATHODE
6. CATHODE

STYLE 6:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE

STYLE 7:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

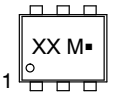
STYLE 8:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

STYLE 9:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

STYLE 10:
PIN 1. CATHODE 1
2. N/C
3. CATHODE 2
4. ANODE 2
5. N/C
6. ANODE 1

STYLE 11:
PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 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.

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