Complementary Bias Resistor Transistors R1 = 4.7 k Ω , R2 = ∞ k Ω

NPN and PNP Transistors with Monolithic Bias Resistor Network

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_A = 25°C both polarities Q1 (PNP) and Q2 (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	$V_{IN(fwd)}$	30	Vdc
Input Reverse Voltage -NPN -PNP	V _{IN(rev)}	6 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 [†]
MUN5316DW1T1G NSVMUN5316DW1T1G	SOT-363	3,000 / Tape & Reel
NSBC143TPDXV6T1G, NSVB143TPDXV6T1G	SOT-563	4,000 / Tape & Reel

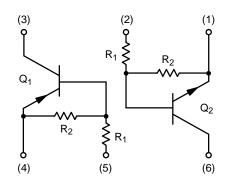
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



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PIN CONNECTIONS



MARKING DIAGRAMS





SOT-363 CASE 419B





SOT-563 CASE 463A

16 = 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.

THERMAL CHARACTERISTICS

Characteristic		Symbol	Max	Unit
MUN5316DW1 (SOT-363) One Junction Heated			•	
Total Device Dissipation $T_A = 25^{\circ}C$ Derate above $25^{\circ}C$	(Note 1) (Note 2) (Note 1) (Note 2)	P _D	187 256 1.5 2.0	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1) (Note 2)	$R_{ hetaJA}$	670 490	°C/W
MUN5316DW1 (SOT-363) Both Junction Heated (Note 3)				
Total Device Dissipation $T_A = 25^{\circ}C$ Derate above 25°C	(Note 1) (Note 2) (Note 1) (Note 2)	P _D	250 385 2.0 3.0	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1) (Note 2)	$R_{ heta JA}$	493 325	°C/W
Thermal Resistance, Junction to Lead	(Note 1) (Note 2)	$R_{ heta JL}$	188 208	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C
NSBC143TPDXV6 (SOT-563) One Junction Heated				
Total Device Dissipation T _A = 25°C Derate above 25°C	(Note 1) (Note 1)	P_{D}	357 2.9	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1)	$R_{ hetaJA}$	350	°C/W
NSBC143TPDXV6 (SOT-563) Both Junction Heated (Note 3)			
Total Device Dissipation T _A = 25°C Derate above 25°C	(Note 1) (Note 1)	P_{D}	500 4.0	mW mW/°C
Thermal Resistance, Junction to Ambient	(Note 1)	$R_{ hetaJA}$	250	°C/W
Junction and Storage Temperature Range		T _J , T _{stg}	-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 ($T_A = 25^{\circ}C$ both polarities Q_1 (PNP) and Q_2 (NPN), unless otherwise noted)

Characteristic	Symbol	Min	Тур	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}	_	_	1.9	mAdc
Collector–Base Breakdown Voltage ($I_C = 10 \mu A, I_E = 0$)	V _(BR) CBO	50	_	-	Vdc
Collector–Emitter Breakdown Voltage (Note 4) (I _C = 2.0 mA, I _B = 0)	V _(BR) CEO	50	_	_	Vdc
ON CHARACTERISTICS	·				
DC Current Gain (Note 4) (I _C = 5.0 mA, V _{CE} = 10 V)	h _{FE}	160	350	-	
Collector–Emitter Saturation Voltage (Note 4) $(I_C = 10 \text{ mA}, I_B = 0.3 \text{ mA})$	V _{CE(sat)}	_	_	0.25	Vdc
Input Voltage (off) ($V_{CE} = 5.0 \text{ V}, I_{C} = 100 \mu\text{A}$) (NPN) ($V_{CE} = 5.0 \text{ V}, I_{C} = 100 \mu\text{A}$) (PNP)	V _{i(off)}	_	0.6 0.58	-	Vdc
Input Voltage (on) (V _{CE} = 0.2 V, I _C = 10 mA) (NPN) (V _{CE} = 0.2 V, I _C = 10 mA) (PNP)	V _{i(on)}	-	0.9 1.0	_	Vdc
Output Voltage (on) (V _{CC} = 5.0 V, V _B = 2.5 V, R _L = 1.0 k Ω)	V _{OL}	_	_	0.2	Vdc
Output Voltage (off) $(V_{CC} = 5.0 \text{ V}, V_B = 0.5 \text{ V}, R_L = 1.0 \text{ k}\Omega)$	V _{OH}	4.9	_	-	Vdc
Input Resistor	R1	3.3	4.7	6.1	kΩ
Resistor Ratio	R ₁ /R ₂	-	_	-	

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.

^{4.} Pulsed Condition: Pulse Width = 300 msec, Duty Cycle ≤ 2%.

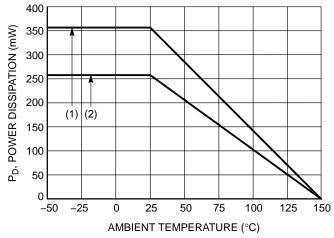
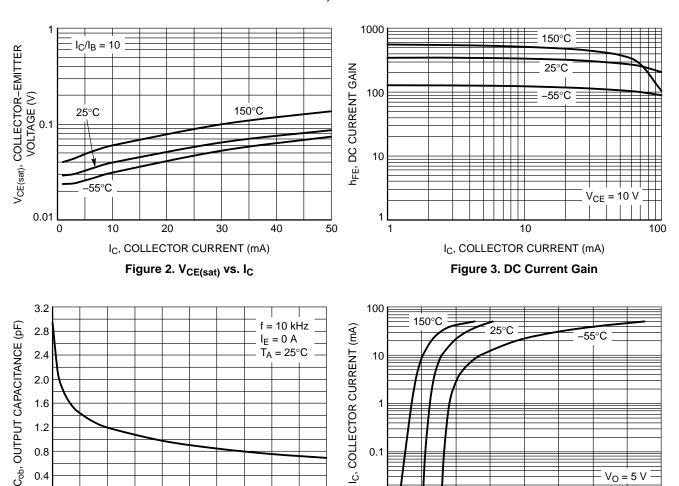


Figure 1. Derating Curve

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

TYPICAL CHARACTERISTICS – NPN TRANSISTORS MUN5316DW1, NSBC143TPDXV6



0.01

V_R, REVERSE VOLTAGE (V) Figure 4. Output Capacitance

 $\label{eq:Vin} V_{in}, \text{INPUT VOLTAGE (V)}$ Figure 5. Output Current vs. Input Voltage

3

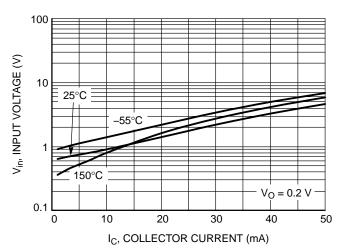


Figure 6. Input Voltage vs. Output Current

TYPICAL CHARACTERISTICS – PNP TRANSISTORS MUN5316DW1, NSBC143TPDXV6

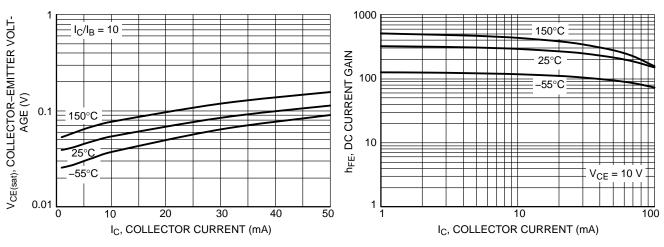


Figure 7. V_{CE(sat)} vs. I_C

Figure 8. DC Current Gain

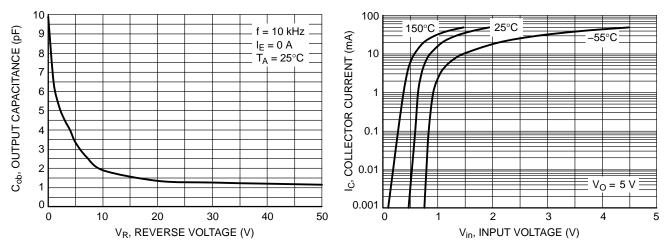


Figure 9. Output Capacitance

Figure 10. Output Current vs. Input Voltage

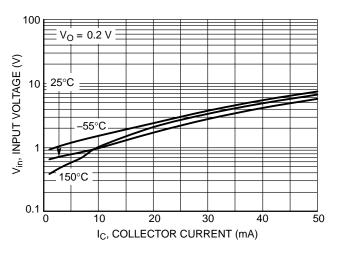
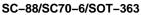
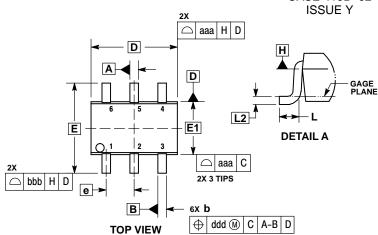


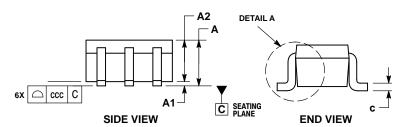
Figure 11. Input Voltage vs. Output Current

PACKAGE DIMENSIONS



CASE 419B-02





- NOTES:

 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.

 2. CONTROLLING DIMENSION: MILLIMETERS.

 3. 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.

- SIONS, 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.

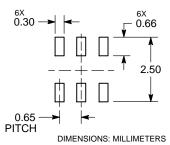
 DATUMS A AND B ARE DETERMINED AT DATUM H.

 DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.

 DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α			1.10			0.043
A1	0.00		0.10	0.000		0.004
A2	0.70	0.90	1.00	0.027	0.035	0.039
b	0.15	0.20	0.25	0.006	0.008	0.010
С	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.070	0.078	0.086
Е	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.049	0.053
е	0.65 BSC			0.026 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2	0.15 BSC 0.006 BSC			SC		
aaa	0.15 0.006					
bbb	0.30				0.012	
CCC	0.10 0.004					
ddd	0.10 0.004					

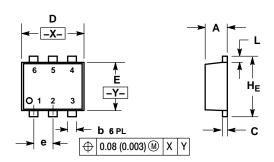
RECOMMENDED SOLDERING FOOTPRINT*



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

PACKAGE DIMENSIONS

SOT-563, 6 LEAD CASE 463A ISSUE F



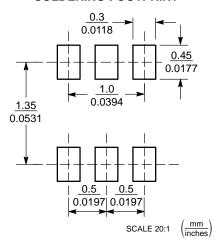
NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI
 V14 5M 1982
- Y14.5M, 1982.

 CONTROLLING DIMENSION: MILLIMETERS
- 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

	MILLIMETERS			INCHES			
DIM	MIN	NOM	MAX	MIN	NOM	MAX	
Α	0.50	0.55	0.60	0.020	0.021	0.023	
b	0.17	0.22	0.27	0.007	0.009	0.011	
C	0.08	0.12	0.18	0.003	0.005	0.007	
D	1.50	1.60	1.70	0.059	0.062	0.066	
Е	1.10	1.20	1.30	0.043	0.047	0.051	
е	0.5 BSC			0.02 BSC			
L	0.10	0.20	0.30	0.004	0.008	0.012	
HE	1.50	1.60	1.70	0.059	0.062	0.066	

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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