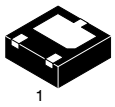
Bias Resistor Transistors (BRT)
NPN, 50 V, 100 mA

NSBCMXW Series



XDFNW3
CASE 521AC

The series of digital transistors is designed to replace a single device and its external resistor bias network. The Bias Resistor Transistor 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. They are housed in the DFN1010−3 package offering superior thermal performance. The transistor is ideal for surface mount applications where board space and reliability are at a premium.

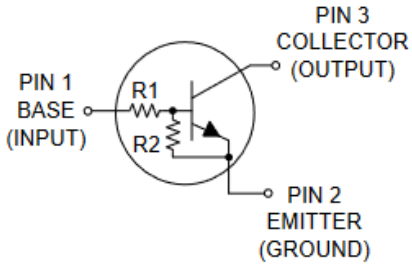
Features

- Built in Bias Resistors
- Complimentary PNP Types Available
- XDFNW3 Package Offers Low Seated Height – 0.44 mm Max
- Wettable Flank Package for Optimal Automated Optical Inspection (AOI)
- 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

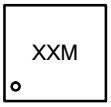
Applications

- Digital Switching
- Controlling IC Input

PIN CONNECTIONS



MARKING DIAGRAM



XX = Specific Device Code
M = Date Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

MAXIMUM RATINGS (T_A = 25°C)

Rating	Symbol	Min	Max	Unit
Collector – Emitter Voltage	V_{CEO}		50	V
Collector – Base Voltage	V_{CBO}		50	V
Input Voltage NSBC114EMXWTBG NSBC124EMXWTBG NSBC144EMXWTBG NSBC143ZMXWTBG NSBC143XMXWTBG NSBC124XMXWTBG	V_I	 −10 −10 −10 −5 −7 −7	 +40 +40 +40 +30 +20 +40	V
Collector Current	I_C		100	mA
Electrostatic discharge (HBM)	ESD	Class 1B		

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.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Power Dissipation @ T_A = 25°C (Note 1)	P_D	450	mW
Thermal Resistance, Junction−to−Ambient (Note 1)	$R_{\theta JA}$	145	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−65 to +150	°C

1. Per JESD51−7 with standard PCB footprint and 2 oz. Cu.

ORDERING INFORMATION

Device	Device−Automotive*	R1	R2	Part Marking	Package†	Shipping
NSBC114EMXWTBG	NSVBC114EMXWTBG	10	10	3W	XDFNW3 (Pb−Free)	3000 / Tape & Reel
NSBC124EMXWTBG	NSVBC124EMXWTBG	22	22	3X		
NSBC144EMXWTBG	NSVBC144EMXWTBG	47	47	3Z		
NSBC143ZMXWTBG	NSVBC143ZMXWTBG	4.7	47	3Y		
NSBC143XMXWTBG	NSVBC143XMXWTBG	4.7	10	3V		
NSBC124XMXWTBG	NSVBC124XMXWTBG	22	47	3T		

†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.

*S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Collector−Base Cutoff Current (V_{CB} = 50 V, I_E = 0)		I_{CBO}	–	–	100	nA
Collector−Emitter Cutoff Current (V_{CE} = 50 V, I_B = 0)		I_{CEO}	–	–	500	nA
Emitter−Base Cutoff Current (V_{EB} = 6 V, I_C = 0)	NSBC114E	I_{EBO}	–	–	0.5	mA
	NSBC124E		–	–	0.2	
	NSBC144E		–	–	0.1	
	NSBC143Z		–	–	0.2	
	NSBC124X		–	–	0.13	
	NSBC143X		–	–	0.5	
DC Current Gain (V_{CE} = 10.0 V, I_C = 5 mA)	NSBC114E	h_{FE}	35	–	–	
	NSBC124E		60	–	–	
	NSBC144E		80	–	–	
	NSBC143Z		80	–	–	
	NSBC143X		35	–	–	
	NSBC124X		80	–	–	
Collector−Emitter Saturation Voltage (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) Input Voltage (off) (V_{CE} = 5.0 V, I_C = 100 μA)	NSBC114E	$V_{I(off)}$	–	1.2	0.8	V
	NSBC124E		–	1.2	0.8	
	NSBC144E		–	1.2	0.8	
	NSBC143Z		–	0.6	0.5	
	NSBC124X		–	0.9	0.5	
	NSBC143X		–	0.9	0.3	
Input Voltage (on)	NSBC114E (V_{CE} = 0.3 V, I_C = 10 mA)	$V_{I(on)}$	2.5	1.8	–	V
	NSBC124E (V_{CE} = 0.3 V, I_C = 5 mA)		2.5	1.6	–	
	NSBC144E (V_{CE} = 0.3 V, I_C = 2 mA)		3	1.6	–	
	NSBC143Z (V_{CE} = 0.3 V, I_C = 5 mA)		1.3	0.9	–	
	NSBC143X (V_{CE} = 0.3 V, I_C = 20 mA)		2.5	2	–	
	NSBC124X (VCE = 0.3 V, IC = 2 mA)		2	12	–	
Output Voltage (on) (V_{CC} = 5.0 V, V_B = 2.5 V, R_L = 1.0 kΩ)		V_{OL}	–	–	0.2	V
Output Voltage (off) (V_{CC} = 5.0 V, V_B = 0.5 V, R_L = 1.0 kΩ)		V_{OH}	4.9	–	–	V
Bias Resistor (R1)	NSBC114E	R1	7	10	13	kΩ
	NSBC124E		15.4	22	28.6	
	NSBC144E		32.9	47	61.1	
	NSBC143Z		3.3	4.7	6.1	
	NSBC143X		3.3	4.7	6.1	
	NSBC124X		15.4	22	28.6	

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Resistor Ratio	NSBC114E	R1/R2	0.8	1	1.2	
	NSBC124E		0.8	1	1.2	
	NSBC144E		0.8	1	1.2	
	NSBC143Z		0.08	0.1	0.12	
	NSBC143X		0.38	0.47	0.56	
	NSBC124X		0.38	0.47	0.56	

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.

TYPICAL CHARACTERISTICS (Ref. NSBC144E)

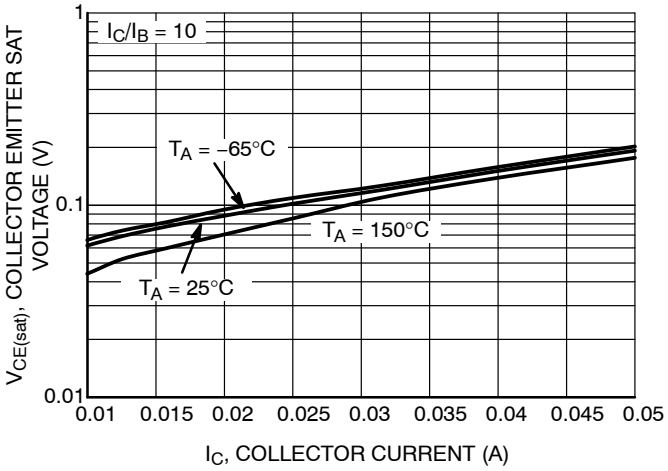


Figure 1. $V_{CE(sat)}$ vs. I_C

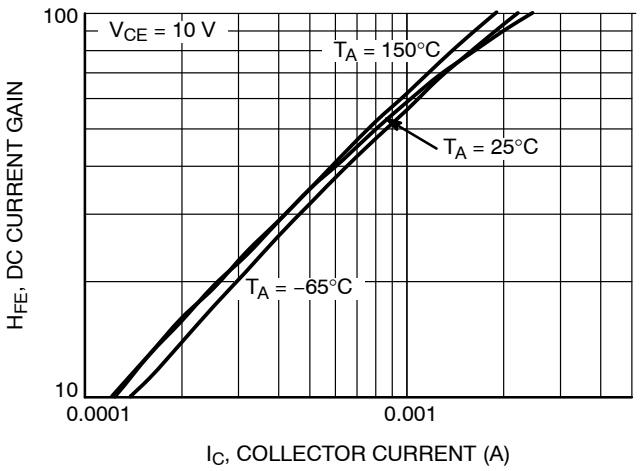


Figure 2. DC Current Gain

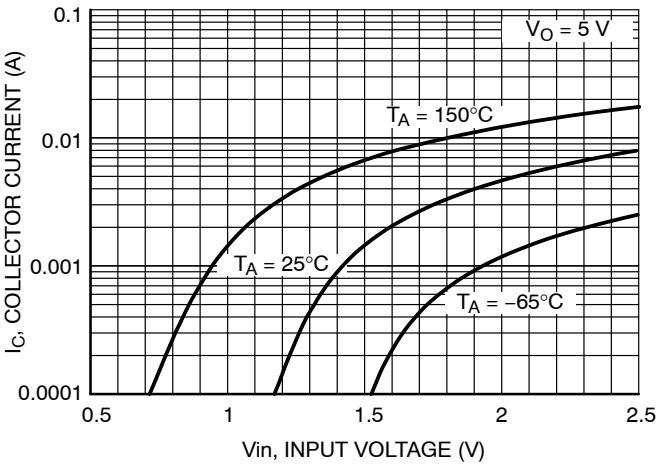


Figure 3. Output Current vs. Input Voltage

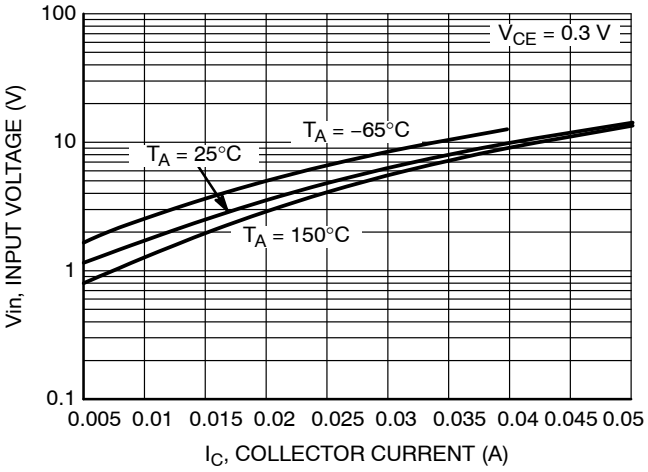


Figure 4. Input Voltage vs. Output Current

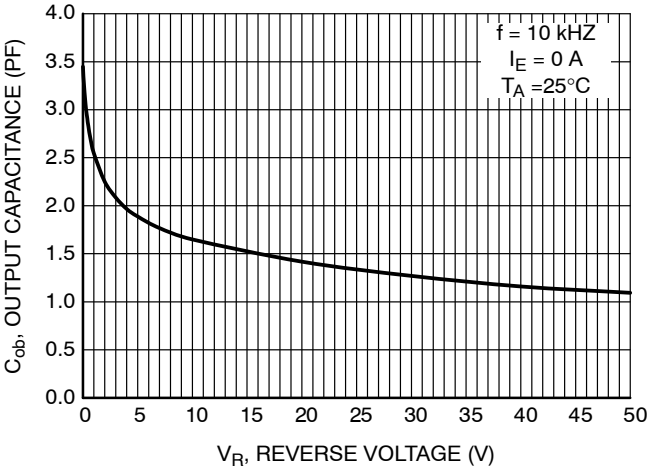


Figure 5. Output Capacitance

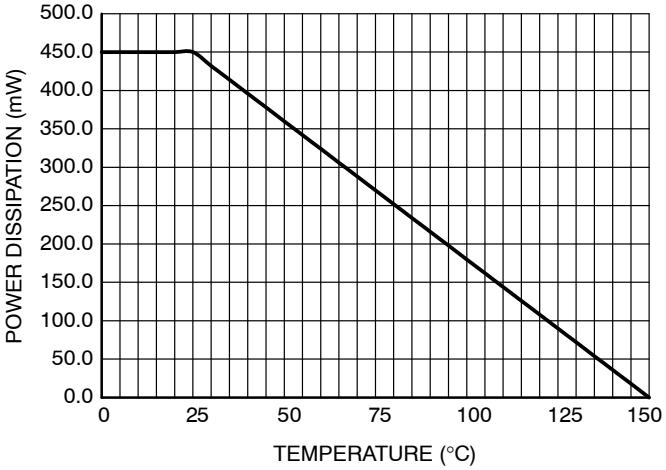


Figure 6. Derating Curve

TYPICAL CHARACTERISTICS

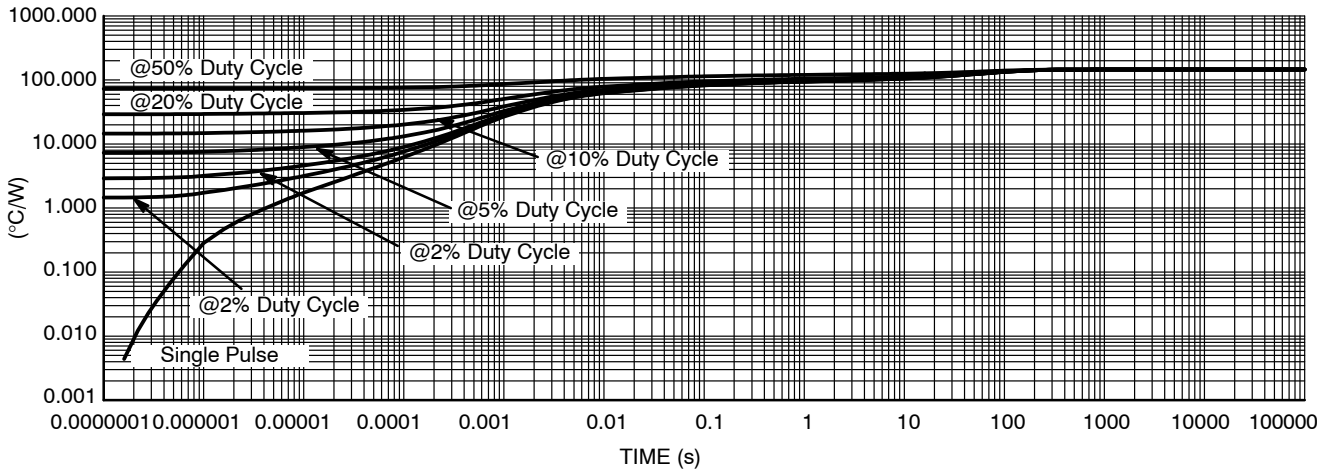
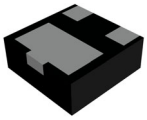
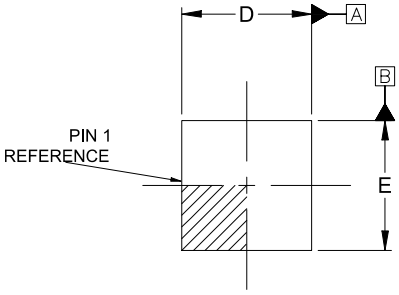


Figure 7. Transient Thermal Impedance from Junction−to−Ambient as a Function of Pulse Duration

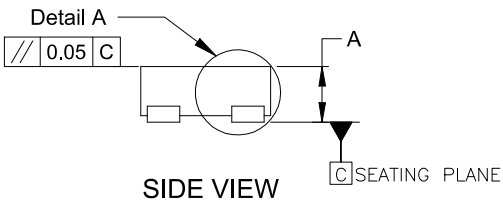
PACKAGE DIMENSIONS



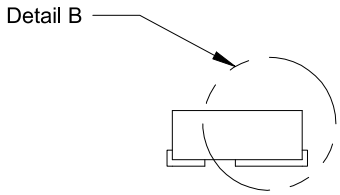
XDFNW3 1.00x1.00x0.38 0.65P
CASE 521AC
ISSUE B



TOP VIEW



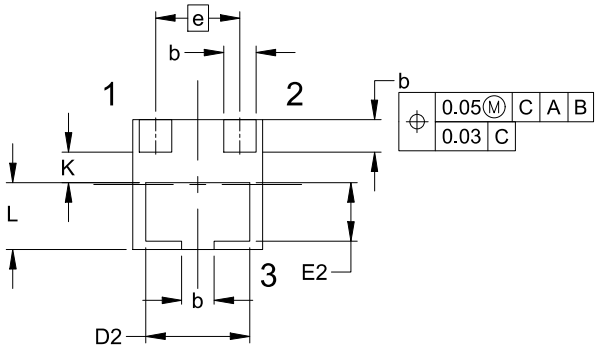
SIDE VIEW



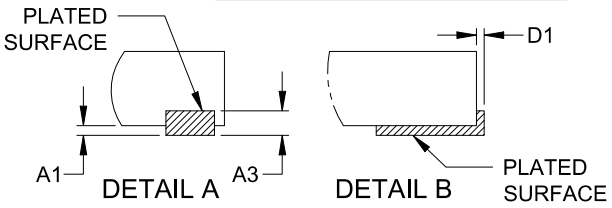
END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS

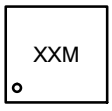
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.32	0.38	0.44
A1	0.00	---	0.04
A3		0.125 REF	
b	0.20	0.25	0.30
D	0.90	1.00	1.10
D1	0.00	---	0.04
D2	0.75	0.80	0.85
E	0.90	1.00	1.10
E2	0.40	0.45	0.50
e		0.65 BSC	
L	0.465	0.515	0.565
K		0.23 REF	



BOTTOM VIEW

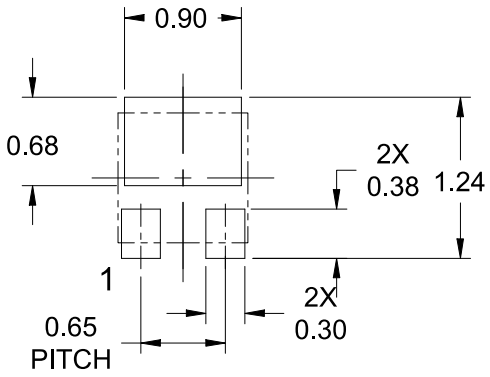


GENERIC MARKING DIAGRAM*



XX = Specific Device Code
M = Month Code

*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.



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.

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