

# Bias Resistor Transistors (BRT)

PNP, 50 V, 100 mA

## NSBAMXW Series

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 NPN 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

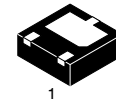
### Applications

- Digital Switching
- Controlling IC Input

### MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

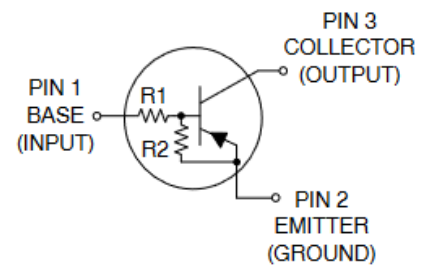
Rating	Symbol	Min	Max	Unit
Collector – Emitter Voltage	V <sub>CEO</sub>		-50	V
Collector – Base Voltage	V <sub>CBO</sub>		-50	V
Input Voltage	V <sub>I</sub>			V
NSBA114EMXWTBG		-40	+10	
NSBA124EMXWTBG		-40	+10	
NSBA143EMXWTBG		-30	+10	
NSBA144EMXWTBG		-40	+10	
NSBA123YMXWTBG		-5	+12	
Collector Current	I <sub>C</sub>		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.

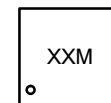


XDFNW3  
CASE 521AC

### PIN CONNECTIONS



### MARKING DIAGRAM



XX = Specific Device Code  
M = Date Code

### ORDERING INFORMATION

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

## NSBAMXW Series

### THERMAL CHARACTERISTICS

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

1. Per JE5D51-7 with standard PCB footprint and 2 oz. Cu.

### ORDERING INFORMATION

Device	Device-Automotive*	R1	R2	Part Marking	Package†	Shipping
NSBA114EMXWTBG	NSVBA114EMXWTBG	10	10	4X	XDFNW3 (Pb-Free)	3000 / Tape & Reel
NSBA124EMXWTBG	NSVBA124EMXWTBG	22	22	4Y		
NSBA143EMXWTBG	NSVBA143EMXWTBG	4.7	4.7	4V		
NSBA144EMXWTBG	NSVBA144EMXWTBG	47	47	4Z		
NSBA123YMXWTBG	NSVBA123YMXWTBG	2.2	10	4W		

†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.

## NSBAMXW Series

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Collector-Base Cutoff Current ( $V_{CB} = -50\text{ V}$ , $I_E = 0$ )		$I_{CBO}$	-	-	-100	nA
Collector-Emitter Cutoff Current ( $V_{CE} = -50\text{ V}$ , $I_B = 0$ )		$I_{CEO}$	-	-	-500	nA
Emitter-Base Cutoff Current ( $V_{EB} = -5\text{ V}$ , $I_C = 0$ )	NSBA114E	$I_{EBO}$	-	-	-0.5	mA
	NSBA124E		-	-	-0.2	
	NSBA143E		-	-	-1.5	
	NSBA144E		-	-	-0.13	
	NSBA123Y		-	-	-0.7	
DC Current Gain ( $V_{CE} = -10.0\text{ V}$ , $I_C = -5\text{ mA}$ )	NSBA114E	$h_{FE}$	35	-	-	
	NSBA124E		60	-	-	
	NSBA143E		15	-	-	
	NSBA144E		80	-	-	
	NSBA123Y		35	-	-	
Collector-Emitter Saturation Voltage ( $I_C = -10\text{ mA}$ , $I_B = -0.3\text{ mA}$ )		$V_{CE(sat)}$	-	-	-0.25	V
Input Voltage (off) ( $V_{CE} = -5.0\text{ V}$ , $I_C = -100\text{ }\mu\text{A}$ )	NSBA114E	$V_{I(off)}$	-	-1.2	-0.8	V
	NSBA124E		-	-1.2	-0.8	
	NSBA143E		-	-1.2	-0.5	
	NSBA144E		-	-1.2	-0.8	
	NSBA123Y		-	-0.75	-0.3	
Input Voltage (on)	NSBA114E ( $V_{CE} = -0.3\text{ V}$ , $I_C = -10\text{ mA}$ )	$V_{I(on)}$	-2.5	-1.8	-	V
	NSBA124E ( $V_{CE} = -0.3\text{ V}$ , $I_C = -5\text{ mA}$ )		-2.5	-1.7	-	
	NSBA143E ( $V_{CE} = -0.3\text{ V}$ , $I_C = -20\text{ mA}$ )		-3	-2.4	-	
	NSBA144E ( $V_{CE} = -0.3\text{ V}$ , $I_C = -5\text{ mA}$ )		-3	-1.6	-	
	NSBA123Y ( $V_{CE} = -0.3\text{ V}$ , $I_C = -20\text{ mA}$ )		-2.5	-1.15	-	
Output Voltage (on) ( $V_{CC} = 5.0\text{ V}$ , $V_B = 3.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )		$V_{OL}$	-	-	0.2	V
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	-	-	V
Bias Resistor (R1)	NSBA114E	R1	7	10	13	k $\Omega$
	NSBA124E		15.4	22	28.6	
	NSBA143E		3.3	4.7	6.1	
	NSBA144E		32.9	47	61.1	
	NSBA123Y		1.54	2.2	2.86	
Resistor Ratio	NSBA114E	R1/R2	0.8	1	1.2	
	NSBA124E		0.8	1	1.2	
	NSBA143E		0.8	1	1.2	
	NSBA144E		0.8	1	1.2	
	NSBA123Y		0.18	0.22	0.27	

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.

# NSBAMXW Series

## TYPICAL CHARACTERISTICS (Ref NSBA124E)

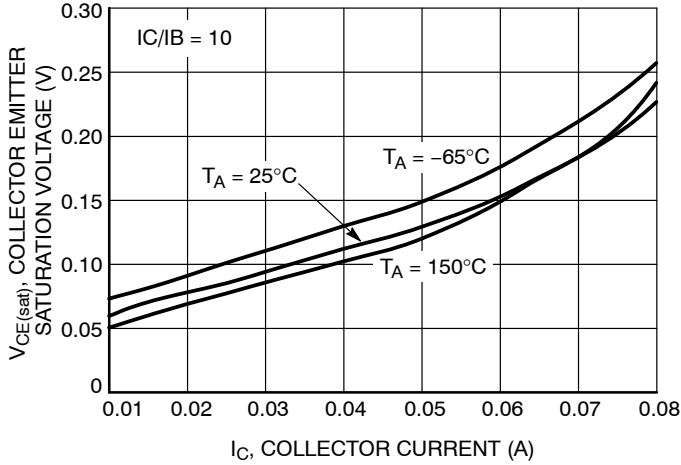


Figure 1.  $V_{CE(sat)}$  vs.  $I_C$

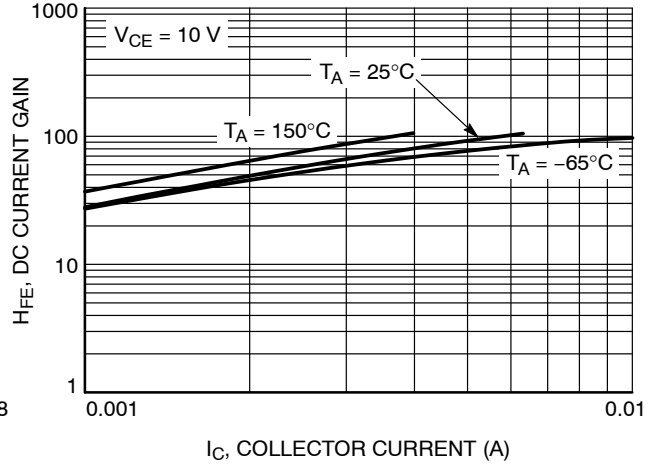


Figure 2. DC Current Gain

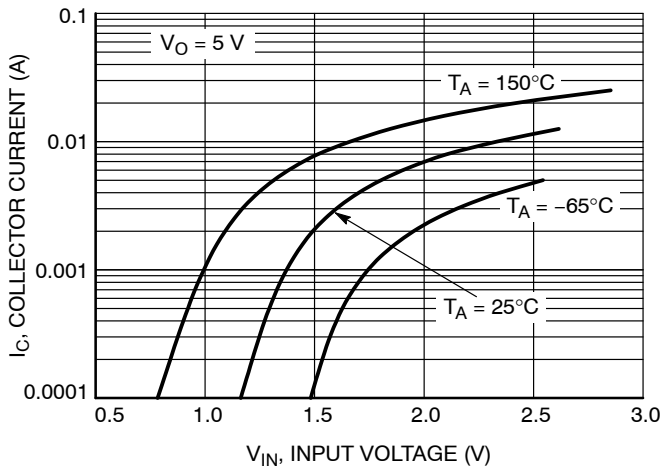


Figure 3. Output Current vs. Input Voltage

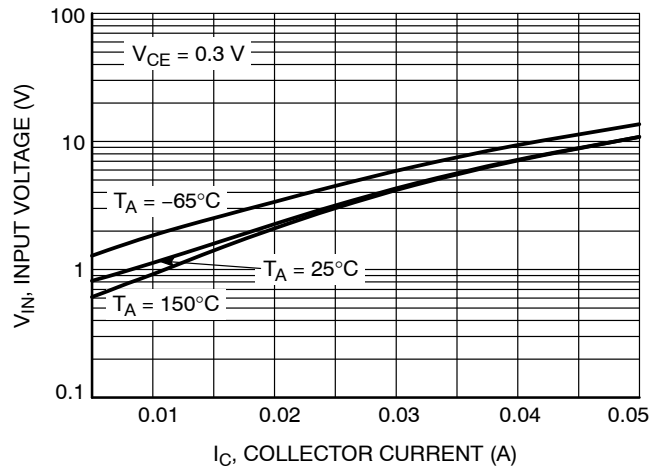


Figure 4. Input Voltage vs. Output Current

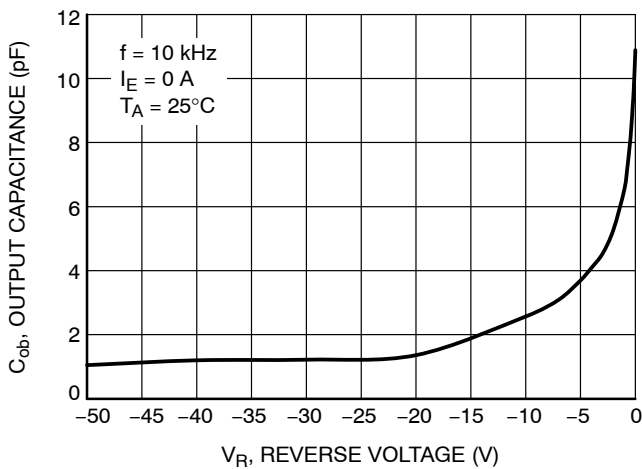


Figure 5. Output Capacitance

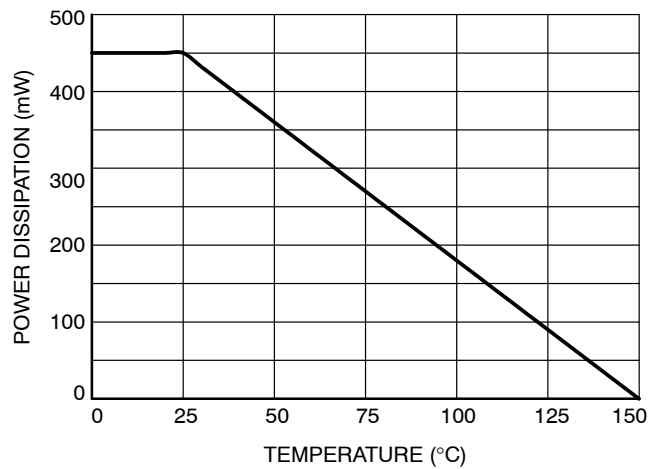


Figure 6. Derating Curve

# NSBAMXW Series

## TYPICAL CHARACTERISTICS

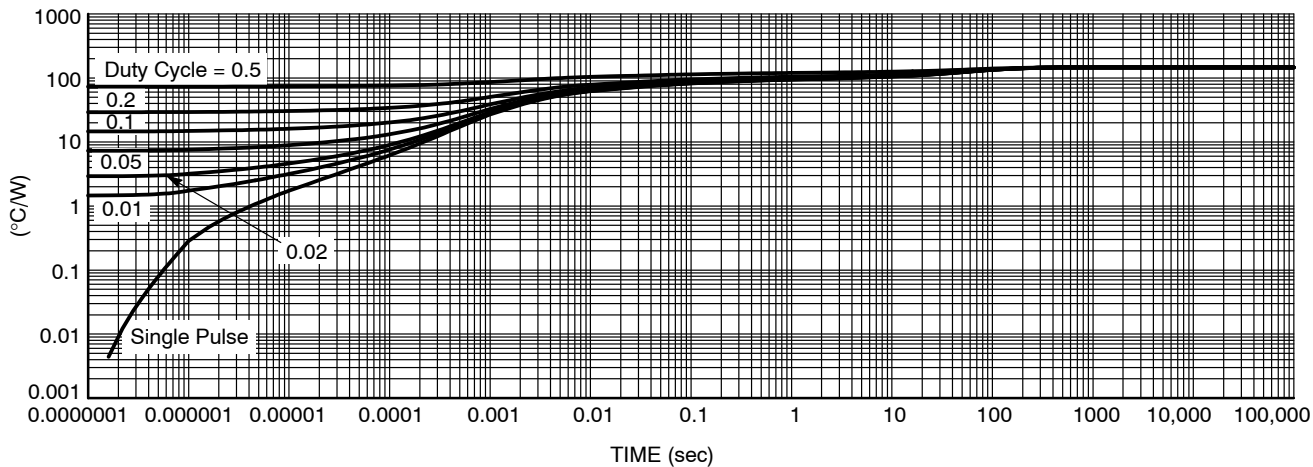
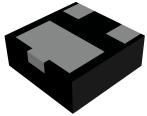
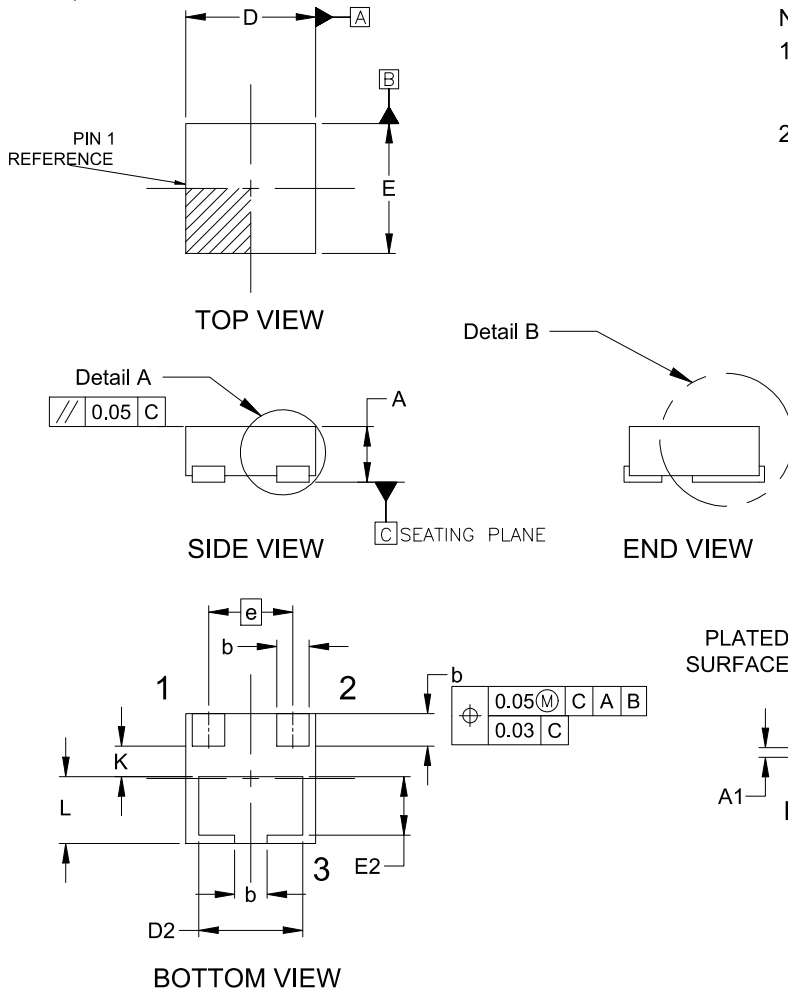


Figure 7. Transient Thermal Impedance from Junction-to-Ambient as a Function of Pulse Duration



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

DATE 07 MAY 2024

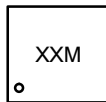


NOTES:

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

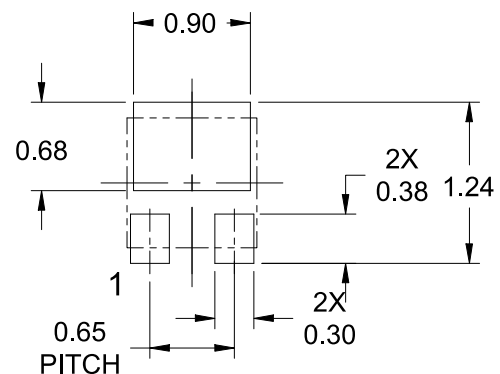
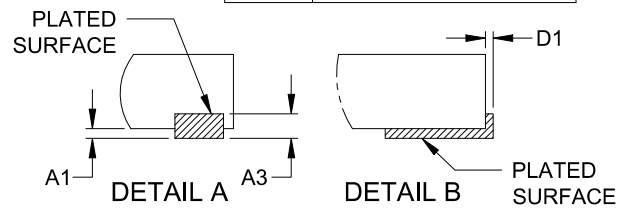
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.32	0.38	0.44
A1	0.00	---	0.04
A3	0.125 REF		
b	0.20	0.25	0.30
D	0.90	1.00	1.10
D1	0.00	---	0.04
D2	0.75	0.80	0.85
E	0.90	1.00	1.10
E2	0.40	0.45	0.50
e	0.65 BSC		
L	0.465	0.515	0.565
K	0.23 REF		

**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.



\* For additional information on our Pb-Free strategy and soldering details, please download the ONSEMI Soldering and Mounting Techniques Reference Manual, S•LDERRM/D.

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