

# NSBA114EDP6T5G Series

Preferred Devices

## Dual Digital Transistors (BRT)

### PNP Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

This new series of digital transistors is designed to replace a single device and its external resistor bias network. The digital transistor contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. The digital transistor eliminates these individual components by integrating them into a single device. The use of a digital transistor can reduce both system cost and board space. The device is housed in the SOT-963 package which is designed for low power surface mount applications.

#### Features

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The SOT-963 Package can be Soldered using Wave or Reflow.
- Available in 4 mm, 8000 Unit Tape & Reel
- These are Pb-Free Devices
- These are Halide-Free Devices

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

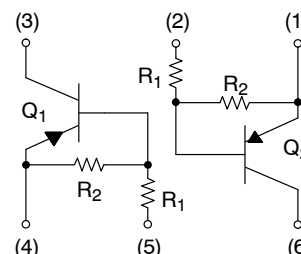
Rating	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	50	Vdc
Collector-Emitter Voltage	$V_{CEO}$	50	Vdc
Collector Current	$I_C$	100	mAdc

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



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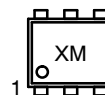
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#### MARKING DIAGRAM



SOT-963  
CASE 527AD



- X = Specific Device Code
- M = Date Code
- = Pb-Free Package

#### ORDERING INFORMATION

Device	Package	Shipping†
NSBA114EDP6T5G	SOT-963 (Pb-Free)	8000 / 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.

#### DEVICE MARKING INFORMATION

See specific marking information in the device marking table on page 2 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

# NSBA114EDP6T5G Series

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
<b>SINGLE HEATED</b>			
Total Device Dissipation $T_A = 25^\circ\text{C}$ (Note 1) Derate above $25^\circ\text{C}$	$P_D$	231 1.9	mW mW/ $^\circ\text{C}$
Thermal Resistance (Note 1) Junction-to-Ambient	$R_{\theta JA}$	540	$^\circ\text{C}/\text{W}$
Total Device Dissipation $T_A = 25^\circ\text{C}$ (Note 2) Derate above $25^\circ\text{C}$	$P_D$	269 2.2	mW mW/ $^\circ\text{C}$
Thermal Resistance (Note 2) Junction-to-Ambient	$R_{\theta JA}$	464	$^\circ\text{C}/\text{W}$
<b>DUAL HEATED</b> (Note 3)			
Total Device Dissipation $T_A = 25^\circ\text{C}$ (Note 1) Derate above $25^\circ\text{C}$	$P_D$	339 2.7	mW mW/ $^\circ\text{C}$
Thermal Resistance (Note 1) Junction-to-Ambient	$R_{\theta JA}$	369	$^\circ\text{C}/\text{W}$
Total Device Dissipation $T_A = 25^\circ\text{C}$ (Note 2) Derate above $25^\circ\text{C}$	$P_D$	408 3.3	mW mW/ $^\circ\text{C}$
Thermal Resistance (Note 2) Junction-to-Ambient	$R_{\theta JA}$	306	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

- FR-4 @ 100 mm<sup>2</sup>, 1 oz. copper traces, still air.
- FR-4 @ 500 mm<sup>2</sup>, 1 oz. copper traces, still air.
- Dual heated values assume total power is sum of two equally powered channels.

## ORDERING INFORMATION, DEVICE MARKING AND RESISTOR VALUES

Device	Marking*	R1 (k)	R2 (k)	Package	Shipping <sup>†</sup>
NSBA114EDP6T5G	F (180°)	10	10	SOT-963 (Pb-Free)	8000/Tape & Reel
NSBA124EDP6T5G	E (90°)	22	22		
NSBA144EDP6T5G	E (270°)	47	47		
NSBA114YDP6T5G	Q (0°)	10	47		
NSBA123TDP6T5G	L (90°)	2.2	∞		
NSBA143EDP6T5G	F (90°)	4.7	4.7		
NSBA143ZDP6T5G	K (90°)	4.7	47		
NSBA123JDP6T5G	P (90°)	2.2	47		
NSBA144WDP6T5G	J (90°)	47	22		
NSBA114TDP6T5G	T (180°)	10	∞		
NSBA115TDP6T5G	V (180°)	100	∞		

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

\*(XX°) = Degree rotation in the clockwise direction.

## NSBA114EDP6T5G Series

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector–Base Cutoff Current ( $V_{CB} = 50\text{ V}, I_E = 0$ )	$I_{CBO}$	–	–	100	nAdc
Collector–Emitter Cutoff Current ( $V_{CE} = 50\text{ V}, I_B = 0$ )	$I_{CEO}$	–	–	500	nAdc
Emitter–Base Cutoff Current ( $V_{EB} = 6.0\text{ V}, I_C = 0$ )	$I_{EBO}$	–	–	0.5	mAdc
NSBA114EDP6T5G		–	–	0.2	
NSBA124EDP6T5G		–	–	0.1	
NSBA144EDP6T5G		–	–	0.2	
NSBA114YDP6T5G		–	–	4.0	
NSBA123TDP6T5G		–	–	0.9	
NSBA114TDP6T5G		–	–	1.5	
NSBA143EDP6T5G		–	–	0.1	
NSBA115TDP6T5G		–	–	0.18	
NSBA143ZDP6T5G		–	–	0.2	
NSBA123JDP6T5G		–	–	0.13	
NSBA144WDP6T5G		–	–		
Collector–Base Breakdown Voltage ( $I_C = 10\ \mu\text{A}, I_E = 0$ )	$V_{(BR)CBO}$	50	–	–	Vdc
Collector–Emitter Breakdown Voltage (Note 4) ( $I_C = 2.0\text{ mA}, I_B = 0$ )	$V_{(BR)CEO}$	50	–	–	Vdc
<b>ON CHARACTERISTICS (Note 4)</b>					
DC Current Gain ( $V_{CE} = 10\text{ V}, I_C = 5.0\text{ mA}$ )	$h_{FE}$	35	60	–	
NSBA114EDP6T5G		60	100	–	
NSBA124EDP6T5G		80	140	–	
NSBA144EDP6T5G		80	140	–	
NSBA114YDP6T5G		160	350	–	
NSBA115TDP6T5G/NSBA123TDP6T5G		15	27	–	
NSBA143EDP6T5G		80	140	–	
NSBA143ZDP6T5G		80	140	–	
NSBA123JDP6T5G		80	140	–	
NSBA144WDP6T5G		80	140	–	
NSBA114TDP6T5G		160	250	–	
Collector–Emitter Saturation Voltage ( $I_C = 10\text{ mA}, I_E = 0.3\text{ mA}$ ) NSBA114EDP6T5G/NSBA124EDP6T5G/NSBA144EDP6T5G NSBA114YDP6T5G/NSBA123TDP6T5G NSBA123JDP6T5G/NSBA144EDP6T5G ( $I_C = 10\text{ mA}, I_B = 1\text{ mA}$ ) NSBA143ZDP6T5G/NSBA143EDP6T5G/NSBA114TDP6T5G ( $I_C = 10\text{ mA}, I_B = 5\text{ mA}$ ) NSBA115TDP6T5G	$V_{CE(sat)}$	–	–	0.25	Vdc
Output Voltage (on) ( $V_{CC} = 5.0\text{ V}, V_B = 2.5\text{ V}, R_L = 1.0\text{ k}\Omega$ )	$V_{OL}$	–	–	0.2	Vdc
NSBA114TDP6T5G		–	–	0.2	
NSBA114EDP6T5G		–	–	0.2	
NSBA124EDP6T5G		–	–	0.2	
NSBA114YDP6T5G		–	–	0.2	
NSBA123TDP6T5G		–	–	0.2	
NSBA143EDP6T5G		–	–	0.2	
NSBA143ZDP6T5G		–	–	0.2	
NSBA123JDP6T5G		–	–	0.2	
( $V_{CC} = 5.0\text{ V}, V_B = 3.5\text{ V}, R_L = 1.0\text{ k}\Omega$ )		–	–	0.2	
( $V_{CC} = 5.0\text{ V}, V_B = 4.0\text{ V}, R_L = 1.0\text{ k}\Omega$ )		–	–	0.2	
( $V_{CC} = 5.0\text{ V}, V_B = 5.0\text{ V}, R_L = 1.0\text{ k}\Omega$ )		–	–	0.2	
Output Voltage (off) ( $V_{CC} = 5.0\text{ V}, V_B = 0.5\text{ V}, R_L = 1.0\text{ k}\Omega$ ) NSBA114EDP6T5G/NSBA124EDP6T5G/NSBA144EDP6T5G NSBA114YDP6T5G/NSBA143ZDP6T5G/NSBA123JDP6T5G NSBA144WDP6T5G ( $V_{CC} = 5.0\text{ V}, V_B = 0.25\text{ V}, R_L = 1.0\text{ k}\Omega$ ) NSBA123TDP6T5G/NSBA143EDP6T5G/ NSBA114TDP6T5G/NSBA115TDP6T5G	$V_{OH}$	4.9	–	–	Vdc

4. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty Cycle < 2.0%

## NSBA114EDP6T5G Series

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted) (Continued)

Characteristic		Symbol	Min	Typ	Max	Unit
Input Resistor	NSBA114TDP6T5G	R1	7.0	10	13	kΩ
	NSBA114EDP6T5G		7.0	10	13	
	NSBA124EDP6T5G		15.4	22	28.6	
	NSBA144EDP6T5G		32.9	47	61.1	
	NSBA114YDP6T5G		7.0	10	13	
	NSBA123TDP6T5G		1.5	2.2	2.9	
	NSBA143EDP6T5G		3.3	4.7	6.1	
	NSBA143ZDP6T5G		3.3	4.7	6.1	
	NSBA123JDP6T5G		1.54	2.2	2.86	
	NSBA144WDP6T5G		32.9	47	61.1	
	NSBA115TDP6T5G		70	100	130	
Resistor Ratio	NSBA114EDP6T5G/NSBA124EDP6T5G	R <sub>1</sub> /R <sub>2</sub>	0.8	1.0	1.2	
	NSBA144EDP6T5G/NSBA143EDP6T5G		0.17	0.21	0.25	
	NSBA114YDP6T5G		-	-	-	
	NSBA123TDP6T5G/NSBA114TDP6T5G/					
	NSBA115TDP6T5G					
	NSBA143ZDP6T5G		0.055	0.1	0.185	
	NSBA123JDP6T5G		0.038	0.047	0.056	
	NSBA144WDP6T5G		1.7	2.1	2.6	

# NSBA114EDP6T5G Series

## TYPICAL ELECTRICAL CHARACTERISTICS – NSBA114EDP6T5G

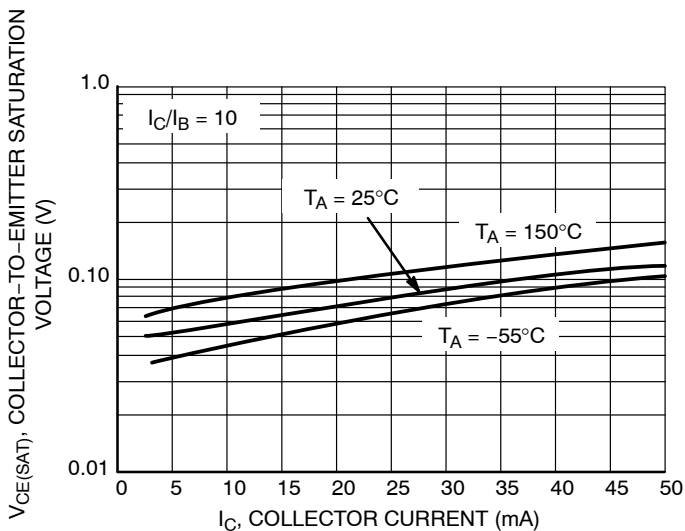


Figure 1.  $V_{CE(sat)}$  vs.  $I_C$

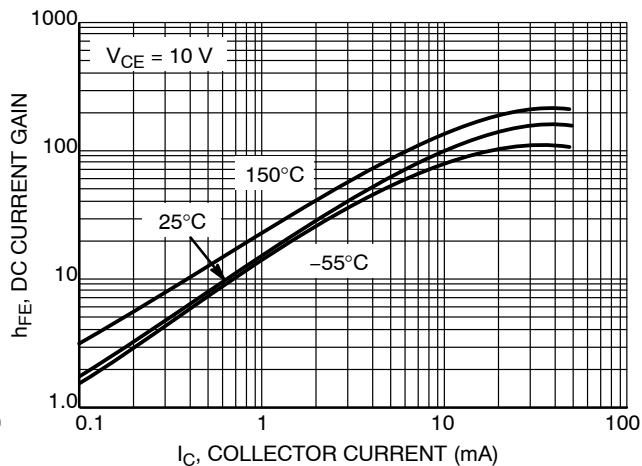


Figure 2. DC Current Gain

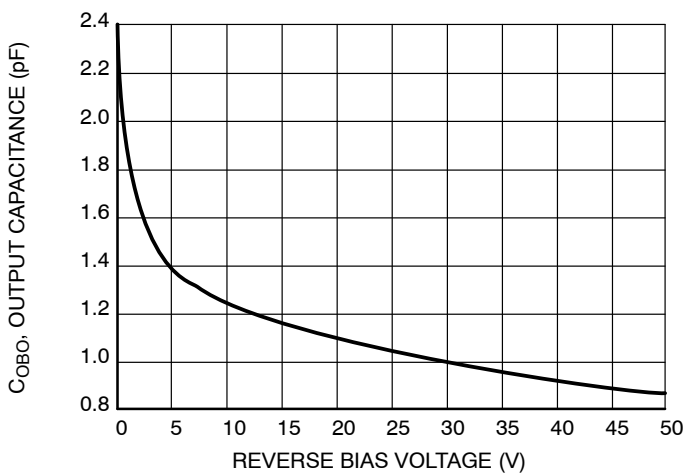


Figure 3. Output Capacitance

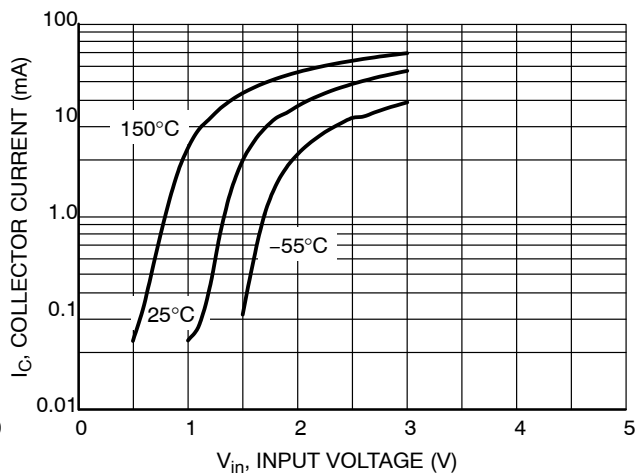


Figure 4. Output Current vs. Input Voltage

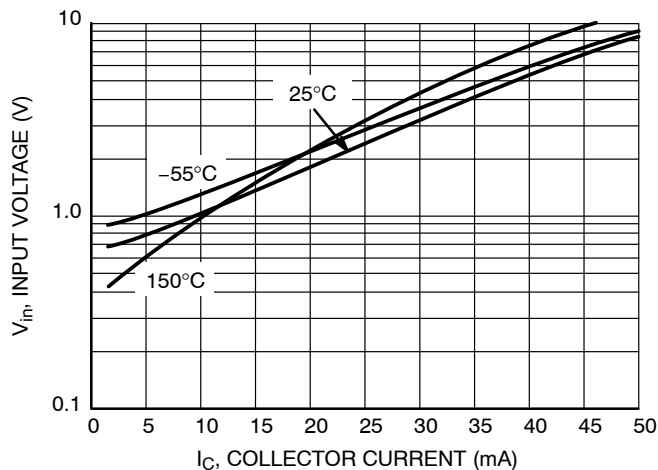
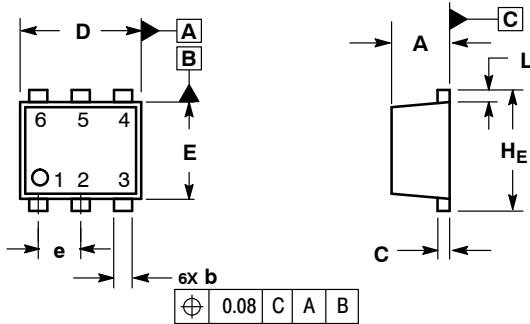


Figure 5. Input Voltage vs. Output Current

# NSBA114EDP6T5G Series

## PACKAGE DIMENSIONS

SOT-963  
CASE 527AD-01  
ISSUE D

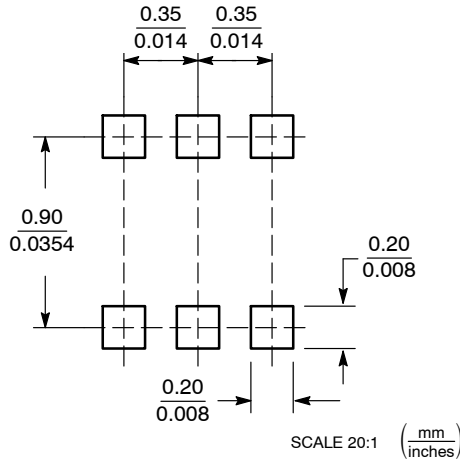


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.34	0.37	0.40			
b	0.10	0.15	0.20	0.004	0.006	0.008
C	0.07	0.12	0.17	0.003	0.005	0.007
D	0.95	1.00	1.05	0.037	0.039	0.041
E	0.75	0.80	0.85	0.03	0.032	0.034
e	0.35 BSC			0.014 BSC		
L	0.05	0.10	0.15	0.002	0.004	0.006
HE	0.95	1.00	1.05	0.037	0.039	0.041

### 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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