NSBA114EF3T5G Series

Preferred Devices

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−1123 package which is designed for low power surface mount applications.

Features

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The SOT−1123 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°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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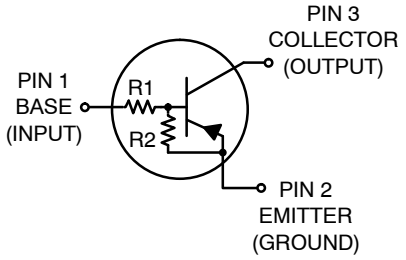
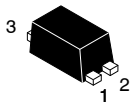
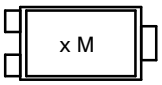
PNP SILICON DIGITAL TRANSISTORS





SOT−1123
CASE 524AA
STYLE 1

MARKING DIAGRAM



x = Device Code
M = Date Code
G or ▪ = Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping†
NSBA114EFT5G	SOT−1123 (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.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation T_A = 25°C (Note 1) Derate above 25°C	P_D	 254 2.0	 mW mW/°C
Thermal Resistance (Note 1) Junction-to-Ambient	$R_{\theta JA}$	493	°C/W
Total Device Dissipation T_A = 25°C (Note 2) Derate above 25°C	P_D	 297 2.4	 mW mW/°C
Thermal Resistance (Note 2) Junction-to-Ambient	$R_{\theta JA}$	421	°C/W
Thermal Resistance (Note 1) Junction-to-Lead 3	$R_{\theta JL}$	193	°C/W
Junction and Storage Temperature	T_J, T_{stg}	−55 to +150	°C

1. FR−4 @ 100 mm^2, 1 oz. copper traces, still air.
2. FR−4 @ 500 mm^2, 1 oz. copper traces, still air.

ORDERING INFORMATION, DEVICE MARKING AND RESISTOR VALUES

Device	Marking*	R1 (k)	R2 (k)	Package	Shipping†
NSBA114EF3T5G	F (0°)	10	10	SOT−1123 (Pb−Free)	8000 / Tape & Reel
NSBA124EF3T5G	Y (0°)	22	22		
NSBA144EF3T5G	E (0°)	47	47		
NSBA114YF3T5TG	K (0°)	10	47		
NSBA123TF3T5G	F (90°)	2.2	∞		
NSBA143EF3T5G	A (90°)	4.7	4.7		
NSBA143ZF3T5G	E (90°)	4.7	47		
NSBA123JF3T5G	J (90°)	2.2	47		
NSBA144WF3T5G	D (90°)	47	22		
NSBA114TF3T5G	L (90°)	10	∞		
NSBA115TF3T5G	Q (90°)	100	∞		

†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.

ELECTRICAL CHARACTERISTICS (T_A = 25°C 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	NSBA114EF3T5G	I_{EBO}	–	–	0.5	mAdc
(V_{EB} = 6.0 V, I_C = 0)	NSBA124EF3T5G		–	–	0.2	
	NSBA144EF3T5G		–	–	0.1	
	NSBA114YF3T5TG		–	–	0.2	
	NSBA123TF3T5G		–	–	4.0	
	NSBA114TF3T5G		–	–	0.9	
	NSBA143EF3T5G		–	–	1.5	
	NSBA115T53T5G		–	–	0.1	
	NSBA143ZF3T5G		–	–	0.18	
	NSBA123JF3T5G		–	–	0.2	
	NSBA144WF3T5G		–	–	0.13	
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 (Note 3)						
DC Current Gain	NSBA114EF3T5G	h_{FE}	35	60	–	
(V_{CE} = 10 V, I_C = 5.0 mA)	NSBA124EF3T5G		60	100	–	
	NSBA144EF3T5G		80	140	–	
	NSBA114YF3T5TG		80	140	–	
	NSBA115TF3T5G/NSBA123TF3T5G		160	350	–	
	NSBA143EF3T5G		15	27	–	
	NSBA143ZF3T5G		80	140	–	
	NSBA123JF3T5G		80	140	–	
	NSBA144WF3T5G		80	140	–	
	NSBA114TF3T5G		160	250	–	
Collector−Emitter Saturation Voltage (I_C = 10 mA, I_E = 0.3 mA) NSBA114EF3T5G/NSBA124EF3T5G/NSBA144EF3T5G NSBA114YF3T5G/NSBA123TF3T5G/NSBA123JF3T5G NSBA144WF3T5G (I_C = 10 mA, I_B = 1 mA) NSBA143ZF3T5G/NSBA143EF3T5G/NSBA114TF3T5G (I_C = 10 mA, I_B = 5 mA) NSBA115TF3T5G		$V_{CE(sat)}$	–	–	0.25	Vdc
Output Voltage (on)		V_{OL}				Vdc
(V_{CC} = 5.0 V, V_B = 2.5 V, R_L = 1.0 kΩ)	NSBA114TF3T5G		–	–	0.2	
	NSBA114EF3T5G		–	–	0.2	
	NSBA124EF3T5G		–	–	0.2	
	NSBA114YF3T5G		–	–	0.2	
	NSBA123TF3T5G		–	–	0.2	
	NSBA143EF3T5G		–	–	0.2	
	NSBA143ZF3T5G		–	–	0.2	
	NSBA123JF3T5G		–	–	0.2	
(V_{CC} = 5.0 V, V_B = 3.5 V, R_L = 1.0 kΩ)	NSBA144EF3T5G		–	–	0.2	
(V_{CC} = 5.0 V, V_B = 4.0 V, R_L = 1.0 kΩ)	NSBA144WF3T5G		–	–	0.2	
(V_{CC} = 5.0 V, V_B = 5.0 V, R_L = 1.0 kΩ)	NSBA115TF3T5G		–	–	0.2	
Output Voltage (off) (V_{CC} = 5.0 V, V_B = 0.5 V, R_L = 1.0 kΩ) NSBA114EF3T5G/NSBA124EF3T5G/NSBA144EF3T5G NSBA114YEF3T5G/NSBA143ZF3T5G/NSBA123JF3TG NSBA144WF3T5G (V_{CC} = 5.0 V, V_B = 0.25 V, R_L = 1.0 kΩ) NSBA123TF3T5G/NSBA143EF3T5G/NSBA114TF3T5G/ NSBA115TF3T5G		V_{OH}	4.9	–	–	Vdc

3. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%

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

Characteristic		Symbol	Min	Typ	Max	Unit
Input Resistor	NSBA114TF3T5C	R1	7.0	10	13	kΩ
	NSBA114EF3T5G		7.0	10	13	
	NSBA124EF3T5G		15.4	22	28.6	
	NSBA144EF3T5G		32.9	47	61.1	
	NSBA114YF3T5TG		7.0	10	13	
	NSBA123TF3T5G		1.5	2.2	2.9	
	NSBA143EF3T5G		3.3	4.7	6.1	
	NSBA143ZF3T5G		3.3	4.7	6.1	
	NSBA123JF3T5G		1.54	2.2	2.86	
	NSBA144WF3T5G		32.9	47	61.1	
	NSBA115TF3T5G		70	100	130	
Resistor Ratio		R_1/R_2				
	NSBA114EF3T5G/NSBA124EF3T5G/ NSBA144EF3T5G/NSBA143EF3T5G		0.8	1.0	1.2	
	NSBA114YF3T5TG		0.17	0.21	0.25	
	NSBA123TF3T5G/NSBA114TF3T5G/ NSBA115TF3T5G		–	–	–	
	NSBA143ZF3T5G		0.055	0.1	0.185	
	NSBA123JF3T5G		0.038	0.047	0.056	
	NSBA144WF3T5G		1.7	2.1	2.6	

TYPICAL ELECTRICAL CHARACTERISTICS – NSBA114EF3T5G

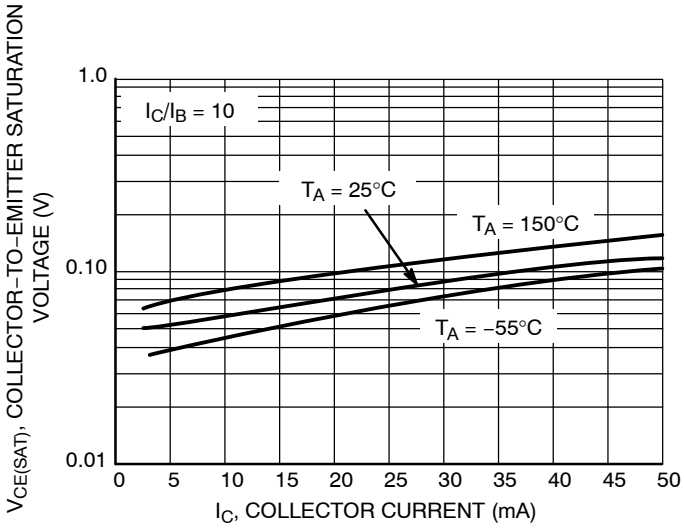


Figure 1. $V_{CE(sat)}$ vs. I_C

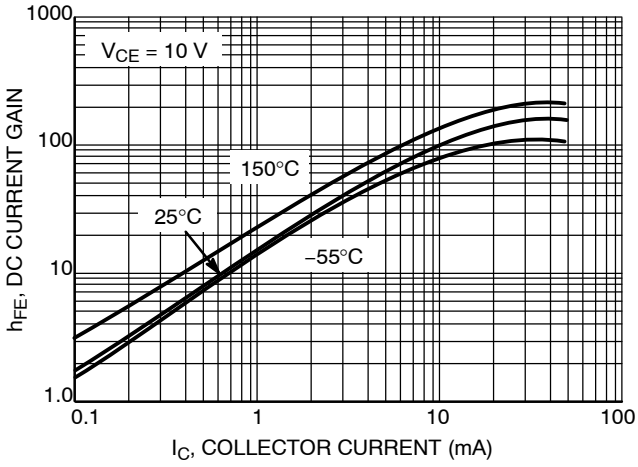


Figure 2. DC Current Gain

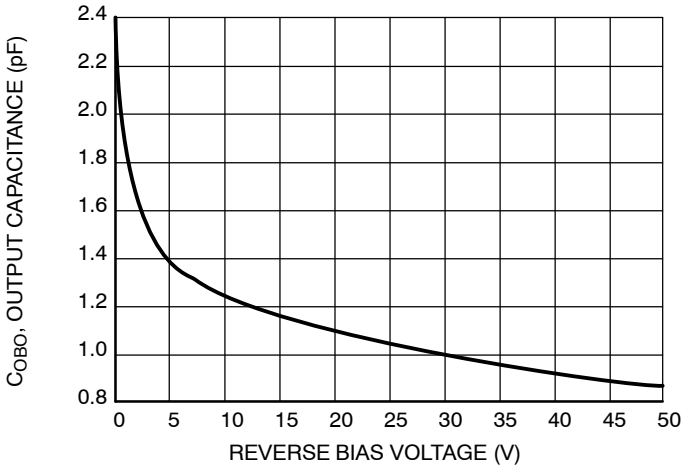


Figure 3. Output Capacitance

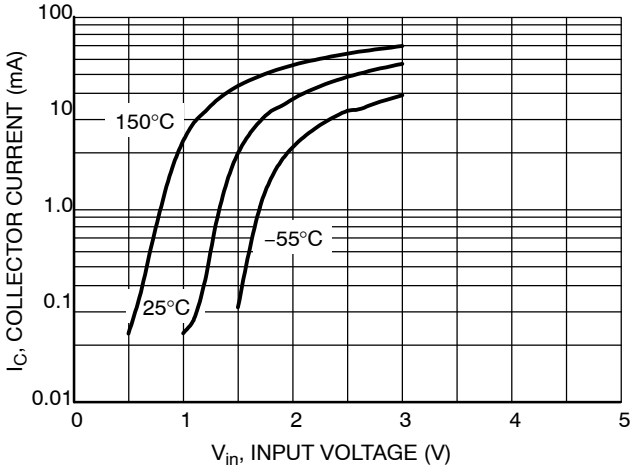


Figure 4. Output Current vs. Input Voltage

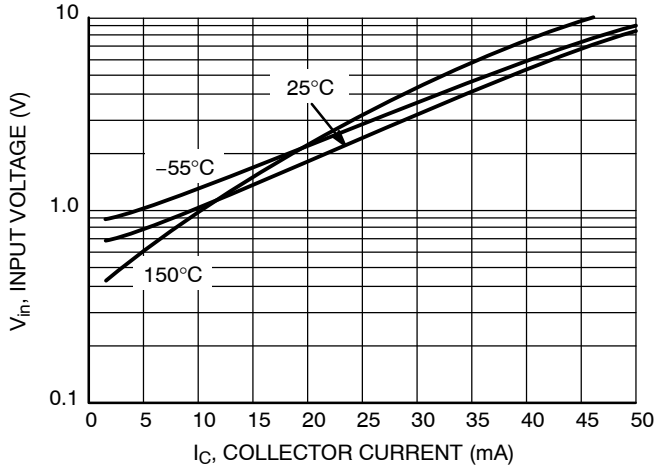
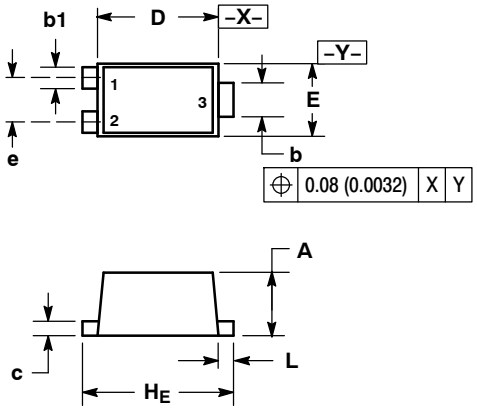


Figure 5. Input Voltage vs. Output Current

PACKAGE DIMENSIONS

SOT−1123
CASE 524AA−01
ISSUE B

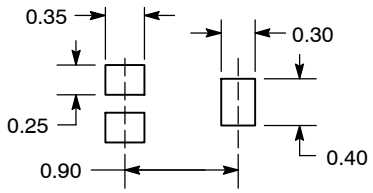


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.34	0.37	0.40	0.013	0.015	0.016
b	0.15	0.22	0.28	0.006	0.009	0.011
b1	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	0.75	0.80	0.85	0.030	0.031	0.033
E	0.55	0.60	0.65	0.022	0.024	0.026
e	0.35	−−−	0.40	0.014	−−−−	0.016
H_E	0.95	1.00	1.05	0.037	0.039	0.041
L	0.05	0.10	0.15	0.002	0.004	0.006

STYLE 1:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
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