

PRELIMINARY DATA SHEET



NEC's NPN SiGe  
HIGH FREQUENCY TRANSISTOR

NESG3031M14

FEATURES

- **LOW NOISE FIGURE AND HIGH-GAIN**  
 NF = 0.95 dB TYP, Ga = 10 dB TYP @ VCE = 2 V, Ic = 6 mA, f = 5.2 GHz  
 NF = 1.1 dB TYP, Ga = 9.5 dB TYP @ VCE = 2 V, Ic = 6 mA, f = 5.8 GHz
- **MAXIMUM STABLE POWER GAIN:**  
 MSG = 15.0 dB TYP @ VCE = 3 V, Ic = 20 mA, f = 5.8 GHz
- **SiGe HBT TECHNOLOGY:**  
 USH3 process, fmax = 110 GHz
- **M14 PACKAGE:**  
 4-pin lead-less minimold package

ORDERING INFORMATION

PART NUMBER	QUANTITY	SUPPLYING FORM
NESG3031M14	50 pcs (Non reel)	• 8 mm wide embossed taping
NESG3031M14-T3	10 kpcs/reel	• Pin 1 (Collector), Pin 4 (Emitter) face the perforation side of the tape

**Remark** To order evaluation samples, contact your nearby sales office.  
 Unit sample quantity is 50 pcs.

ABSOLUTE MAXIMUM RATINGS (TA = +25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Collector to Base Voltage	V <sub>CBO</sub>	12.0	V
Collector to Emitter Voltage	V <sub>CEO</sub>	4.3	V
Emitter to Base Voltage	V <sub>EBO</sub>	1.5	V
Collector Current	I <sub>c</sub>	35	mA
Total Power Dissipation	P <sub>tot</sub> <sup>Note</sup>	150	mW
Junction Temperature	T <sub>j</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-65 to +150	°C

**Note** Mounted on 1.08 cm<sup>2</sup> × 1.0 mm, (t) glass epoxy PCB



## NESG3031M14

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
DC Characteristics						
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0 mA	–	–	100	nA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0 mA	–	–	100	nA
DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 6 mA	220	300	380	–
RF Characteristics						
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 20 mA, f = 5.8 GHz	6.5	9.0	–	dB
Noise Figure (1)	NF	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 6 mA, f = 5.2 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	0.95	–	dB
Noise Figure (2)	NF	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 6 mA, f = 5.8 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	1.1	1.5	dB
Associated Gain (1)	G <sub>a</sub>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 6 mA, f = 5.2 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	10.0	–	dB
Associated Gain (2)	G <sub>a</sub>	V <sub>CE</sub> = 2 V, I <sub>C</sub> = 6 mA, f = 5.8 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	7.5	9.5	–	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 2 V, I <sub>E</sub> = 0 mA, f = 1 MHz	–	0.15	0.25	pF
Maximum Stable Power Gain	MSG <sup>Note 3</sup>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 20 mA, f = 5.8 GHz	12.0	15.0	–	dB
Gain 1 dB Compression Output Power	P <sub>O</sub> (1 dB)	V <sub>CE</sub> = 3 V, I <sub>C (set)</sub> = 20 mA, f = 5.8 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	13.0	–	dBm
3rd Order Intermodulation Distortion Output Intercept Point	OIP <sub>3</sub>	V <sub>CE</sub> = 3 V, I <sub>C (set)</sub> = 20 mA, f = 5.8 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	18.0	–	dBm

**Notes 1.** Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

**2.** Collector to base capacitance when the emitter grounded

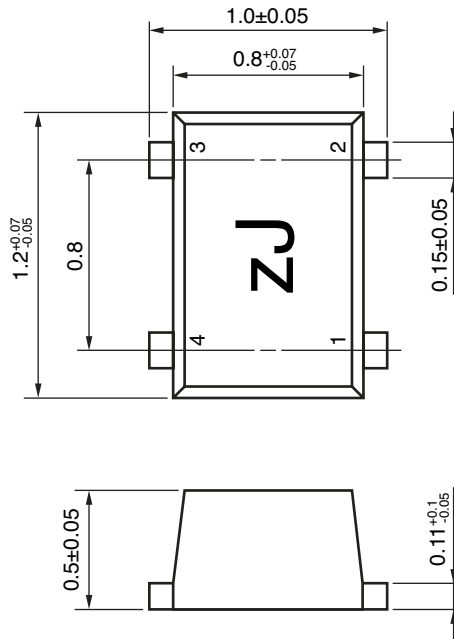
$$3. \text{MSG} = \left| \frac{S_{21}}{S_{12}} \right|$$

### h<sub>FE</sub> CLASSIFICATION

RANK	FB
Marking	zJ
h <sub>FE</sub> Value	220 to 380

**PACKAGE DIMENSIONS** (Units in mm)

**4-PIN LEAD-LESS MINIMOLD (M14, 1208 PACKAGE)**



**PIN CONNECTIONS**

- 1. Collector
- 2. Emitter
- 3. Base
- 4. Emitter

Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.