

# NPN SILICON GERMANIUM RF TRANSISTOR NESG3033M14

# NPN SIGE RF TRANSISTOR FOR LOW NOISE, HIGH-GAIN AMPLIFICATION 4-PIN LEAD-LESS MINIMOLD (M14, 1208 PKG)

#### **FEATURES**

- The device is an ideal choice for low noise, high-gain amplification
   NF = 0.6 dB TYP. @ VcE = 2 V, Ic = 6 mA, f = 2.0 GHz
- Maximum stable power gain: MSG = 20.5 dB TYP. @ VcE = 2 V, Ic = 15 mA, f = 2.0 GHz
- SiGe HBT technology (UHS3) adopted: fmax = 110 GHz
- This product is improvement of ESD of NESG3032M14.
- 4-pin lead-less minimold (M14, 1208 PKG)

#### ORDERING INFORMATION

| Part Number    | Order Number     | Package                                  | Quantity             | Supplying Form   |
|----------------|------------------|--|----------------------|--|
| NESG3033M14    | NESG3033M14-A    | 4-pin lead-less minimold (M14, 1208 PKG) | 50 pcs<br>(Non reel) | 8 mm w ide embossed taping     Pin 1 (Collector), Pin 4 (Emitter) face the |
| NESG3033M14-T3 | NESG3033M14-T3-A | (Pb-Free)                                | 10 kpcs/reel         | perforation side of the tape   |

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

## ABSOLUTE MAXIMUM RATINGS ( $T_A = +25$ °C)

| Parameter                    | Symbol                     | Ratings     | Unit |
|------------------------------|----------------------------|-------------|------|
| Collector to Base Voltage    | V <sub>CBO</sub> Note<br>1 | 5.0         | V    |
| Collector to Emitter Voltage | Vceo                       | 4.3         | V    |
| Base Current                 | l <sub>B</sub> Note 1      | 12          | mA   |
| Collector Current            | lc                         | 35          | mA   |
| Total Pow er Dissipation     | Ptot Note 2                | 150         | mW   |
| Junction Temperature         | Tj                         | 150         | °C   |
| Storage Temperature          | Tstg                       | −65 to +150 | °C   |

Notes 1. VoBo and IB are limited by the permissible current of the protection element.

2. Mounted on 1.08 cm<sup>2</sup> × 1.0 mm (t) glass epoxy PWB

Caution: Observe precautions when handling because these devices are sensitive to electrostatic discharge

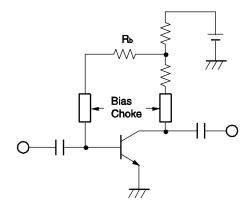
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# RECOMMENDED OPERATING RANGE (TA = +25°C)

| Parameter              | Symbol | MIN. | TYP. | MAX. | Unit |  |
|------------------------|--------|------|------|------|------|--|
| Input Pow er           | Pin    | -    | -    | 0    | dBm  |  |
| Base Feedback Resister | R₀     | _    | _    | 100  | kΩ   |  |

**Remark** When the voltage return bias circuit like the figure below is used, a current increase is seen because the ESD protection element is turned on when recommended range of motion in the above table is exceeded.

However, there is no influence of reliability, including deterioration.



# ELECTRICAL CHARACTERISTICS (TA = +25°C)

| Parameter  | Symbol               | Test Conditions  | MIN. | TYP. | MAX. | Unit |
|--|----------------------|--|------|------|------|------|
| DC Characteristics   |                      |  |      |      |      |      |
| Collector Cut-off Current                                      | Ісво                 | Vсв = 5 V, le = 0 mA   | -    | -    | 100  | nA   |
| Emitter Cut-off Current  | Ево                  | V <sub>EB</sub> = 1 V, lc = 0 mA   | -    | ı    | 100  | nA   |
| DC Current Gain  | hre Note 1           | VcE = 2 V, lc = 6 mA   | 220  | 300  | 380  | -    |
| RF Characteristics   |                      |  |      |      |      |      |
| Insertion Pow er Gain  | S <sub>21e</sub>   2 | VcE = 2 V, lc = 15 mA, f = 2.0 GHz   | 15.0 | 17.5 | _    | dB   |
| Noise Figure   | NF                   | $\begin{split} &\text{Vce} = 2 \text{ V}, \text{ lc} = 6 \text{ mA}, \text{ f} = 2.0 \text{ GHz}, \\ &\text{Zs} = Z_{\text{Sopt}}, \text{ ZL} = Z_{\text{Lopt}} \end{split}$   | _    | 0.60 | 0.85 | dB   |
| Associated Gain  | Ga                   | $\begin{split} &\text{Vce} = 2 \text{ V}, \text{ lc} = 6 \text{ mA}, \text{ f} = 2.0 \text{ GHz}, \\ &\text{Zs} = Z_{\text{Sopt}}, \text{ ZL} = Z_{\text{Lopt}} \end{split}$   | _    | 17.5 | _    | dB   |
| Reverse Transfer Capacitance                                   | Cre Note 2           | VcB = 2 V, le = 0 mA, f = 1 MHz  | -    | 0.15 | 0.25 | pF   |
| Maximum Stable Pow er Gain                                     | MSG Note             | VcE = 2 V, lc = 15 mA, f = 2.0 GHz   | 17.5 | 20.5 | -    | dB   |
| Gain 1 dB Compression Output<br>Pow er                         | Po (1 dB)            | $\begin{split} \text{VcE} &= 3 \text{ V, } \text{ k} \text{ (set)} = 20 \text{ mA}, \\ \text{f} &= 2.0 \text{ GHz}, \text{ Zs} = \text{Z} \text{Sopt, } \text{ZL} = \text{Z} \text{Lopt} \end{split}$                | -    | 12.5 | -    | dBm  |
| 3rd Order Intermodulation Distortion<br>Output Intercept Point | OIP <sub>3</sub>     | $\begin{split} \text{V}_{\text{CE}} &= 3 \text{ V}, \text{ lc }_{\text{(set)}} = 20 \text{ mA}, \\ \text{f} &= 2.0 \text{ GHz}, \text{ Zs} = \text{Z}_{\text{Sopt}}, \text{ZL} = \text{Z}_{\text{Lopt}} \end{split}$ | _    | 24.0 | _    | dBm  |

**Notes 1.** Pulse measurement: PW  $\leq$  350  $\mu$ s, Duty Cycle  $\leq$  2%

2. Collector to base capacitance when the emitter grounded

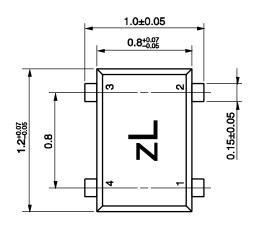
3. MSG = 
$$\frac{S_{21}}{S_{12}}$$

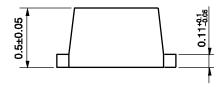
## **hfe CLASSIFICATION**

| Rank                  | FB         |  |  |
|-----------------------|------------|--|--|
| Marking               | zL         |  |  |
| h <sub>FE</sub> Value | 220 to 380 |  |  |

## PACKAGE DIMENSIONS

# 4-PIN LEAD-LESS MINIMOLD (M14, 1208 PKG) (UNIT: mm)





## **PIN CONNECTIONS**

- 1. Collector
- 2. Emitter
- 3. Base
- 4. NC (Connected with Pin 2)