

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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### NPN SILICON GERMANIUM RF TRANSISTOR

# NESG2046M33

**Phase-out/Discontinued**

### NPN SiGe RF TRANSISTOR FOR LOW NOISE, HIGH-GAIN AMPLIFICATION 3-PIN SUPER LEAD-LESS MINIMOLD (M33, 0804 PKG)

#### FEATURES

- The device is an ideal choice for low noise, high-gain amplification  
NF = 0.8 dB TYP.,  $G_a = 11.5$  dB TYP. @  $V_{CE} = 1$  V,  $I_c = 3$  mA,  $f = 2$  GHz
- High breakdown voltage technology for SiGe Tr. adopted:  $V_{CEO}$  (absolute maximum ratings) = 5.0 V
- 3-pin super lead-less minimold (M33, 0804 PKG) package

#### <R> ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
NESG2046M33	NESG2046M33-A	3-pin super lead-less minimold (M33, 0804 PKG) (Pb-Free)	50 pcs (Non reel)	<ul style="list-style-type: none"> <li>8 mm wide embossed taping</li> <li>Pin 2 (Base) face the perforation side of the tape</li> </ul>
NESG2046M33-T3	NESG2046M33-T3-A		10 kpcs/reel	

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

#### ABSOLUTE MAXIMUM RATINGS ( $T_A = +25^\circ\text{C}$ )

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	$V_{CBO}$	13	V
Collector to Emitter Voltage	$V_{CEO}$	5	V
Emitter to Base Voltage	$V_{EBO}$	1.5	V
Collector Current	$I_c$	40	mA
Total Power Dissipation	$P_{tot}^{Note}$	130	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

**Note** Mounted on  $1.08 \text{ cm}^2 \times 1.0 \text{ mm}$  (t) glass epoxy PCB

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

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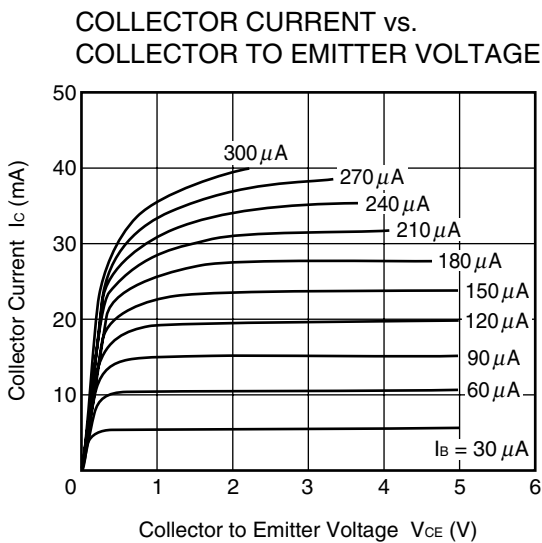
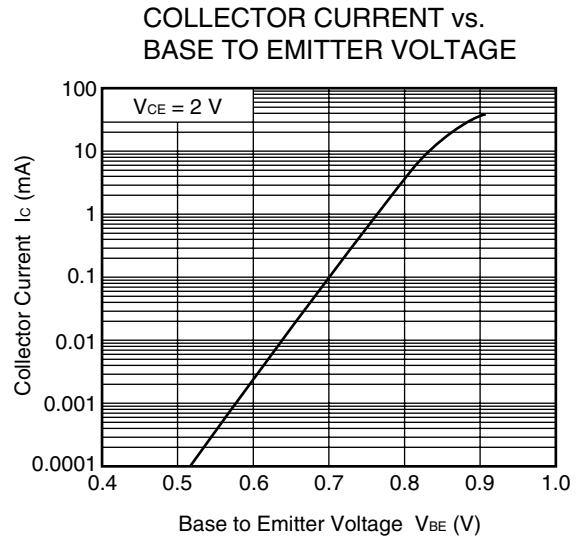
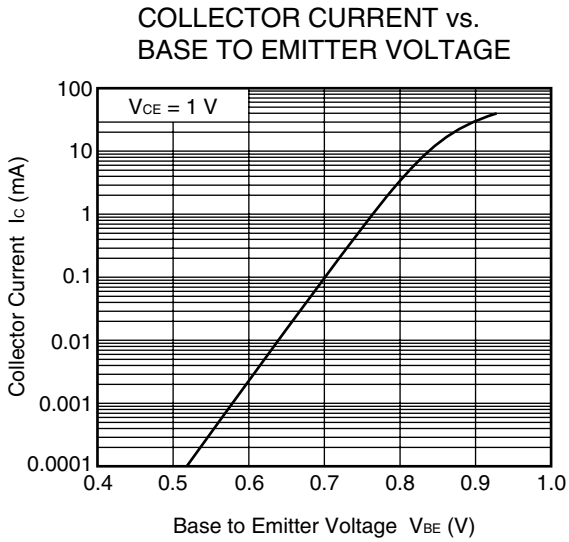
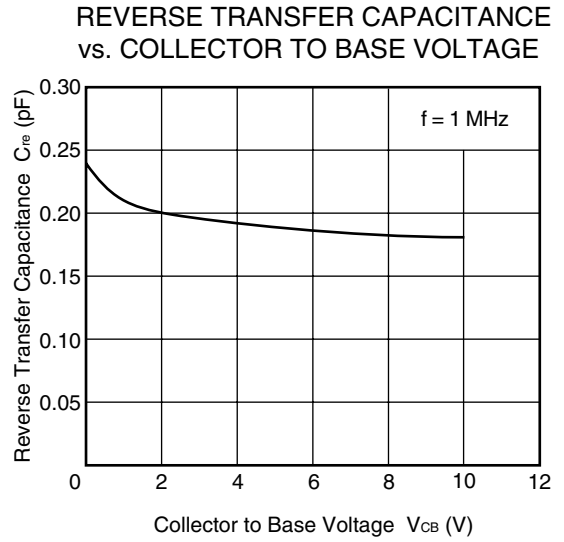
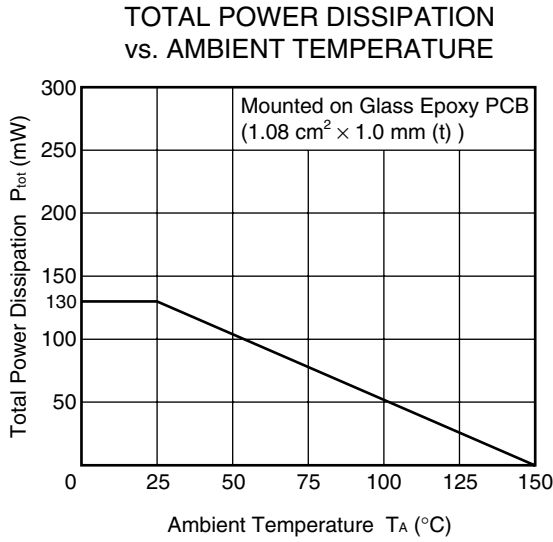
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0 mA	–	–	100	nA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 0.5 V, I <sub>C</sub> = 0 mA	–	–	100	nA
DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 2 mA	140	180	220	–
RF Characteristics						
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 15 mA, f = 2 GHz	15	18	–	GHz
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 15 mA, f = 2 GHz	11	13	–	dB
Noise Figure	NF	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	–	0.8	1.5	dB
Associated Gain	G <sub>a</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2 GHz, Z <sub>S</sub> = Z <sub>Sopt</sub> , Z <sub>L</sub> = Z <sub>Lopt</sub>	9.5	11.5	–	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 1 V, I <sub>E</sub> = 0 mA, f = 1 MHz	–	0.2	0.4	pF

- Notes** 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%  
 2. Collector to base capacitance when the emitter grounded

**h<sub>FE</sub> CLASSIFICATION**

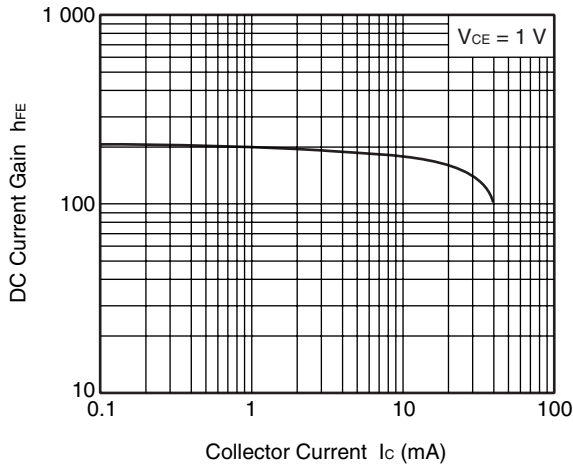
Rank	FB
Marking	T7
h <sub>FE</sub> Value	140 to 220

<R> **TYPICAL CHARACTERISTICS (T<sub>A</sub> = +25°C, unless otherwise specified)**

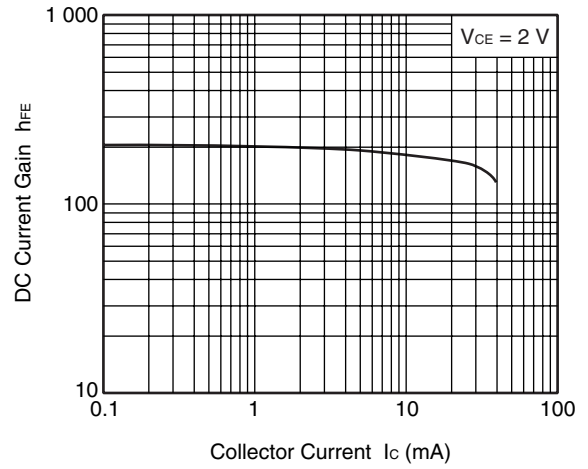


**Remark** The graphs indicate nominal characteristics.

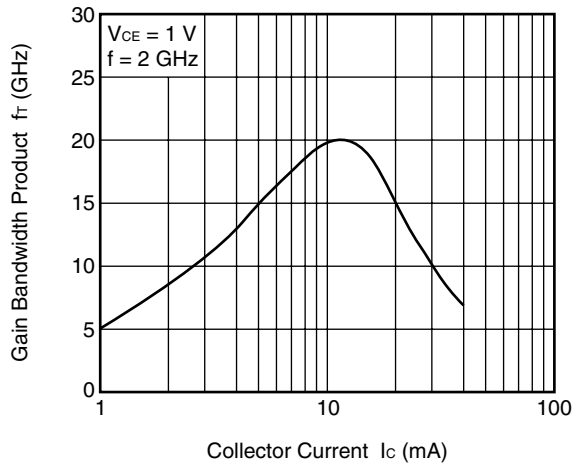
DC CURRENT GAIN vs. COLLECTOR CURRENT



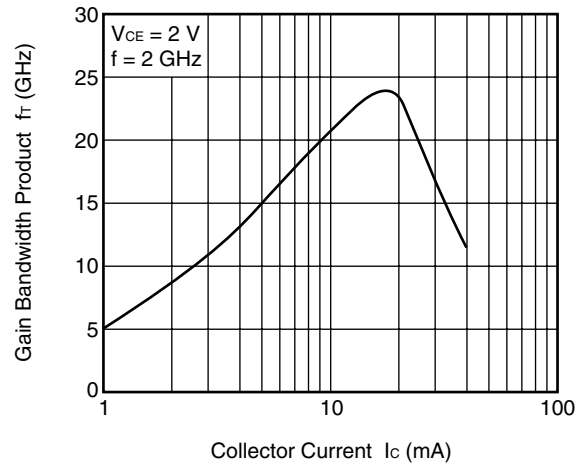
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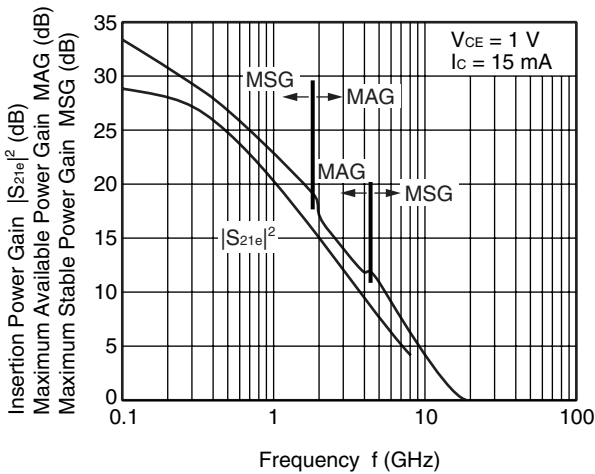
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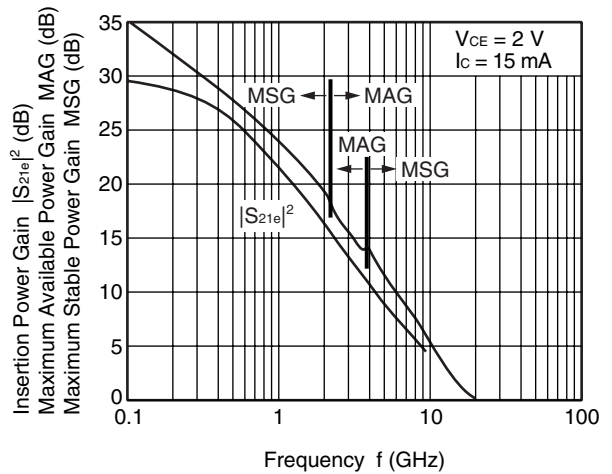
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY

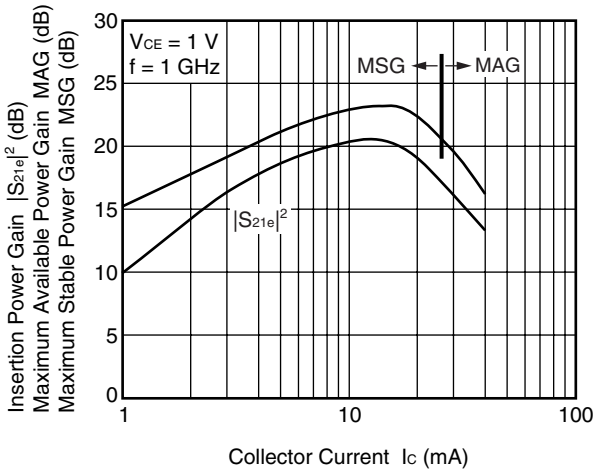


INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY

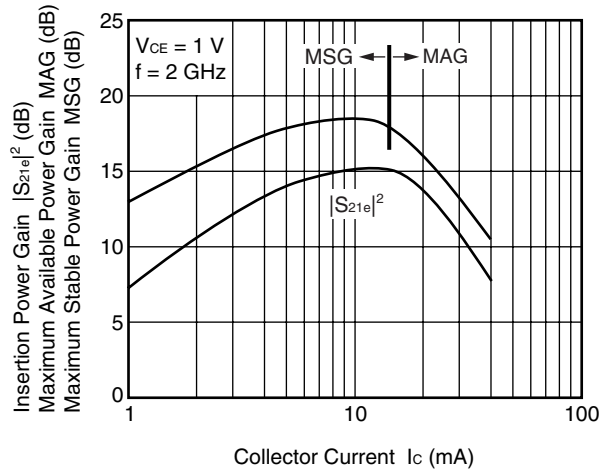


**Remark** The graphs indicate nominal characteristics.

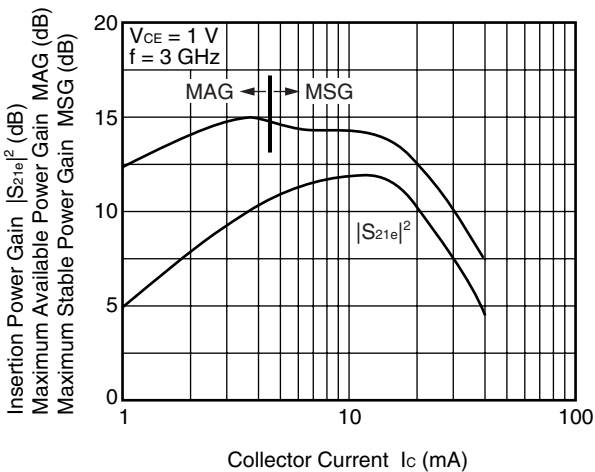
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



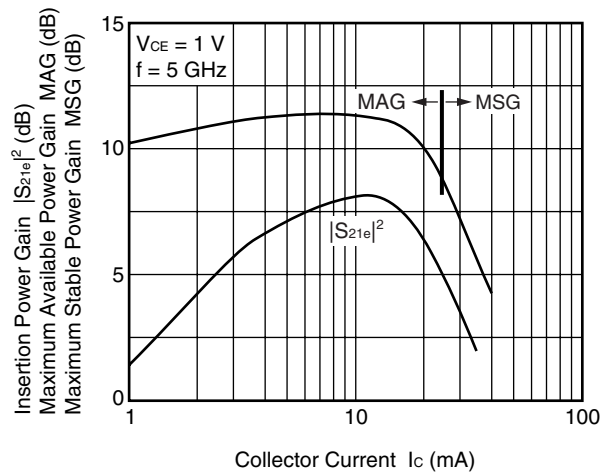
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



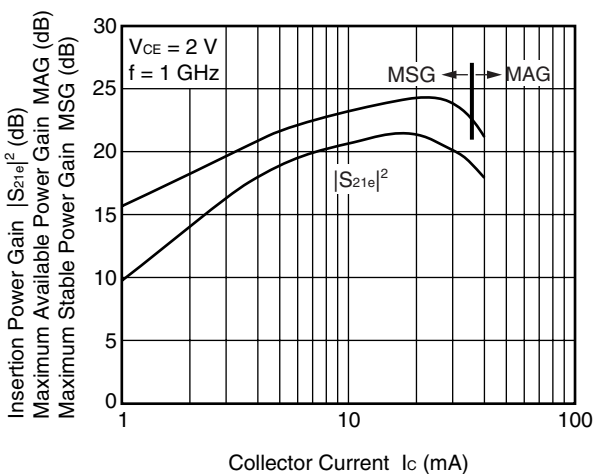
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



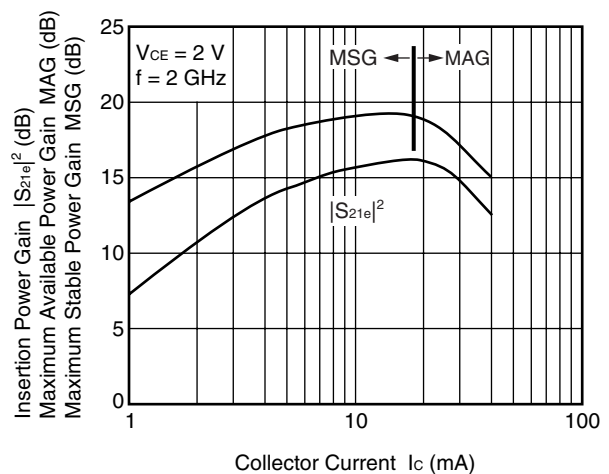
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

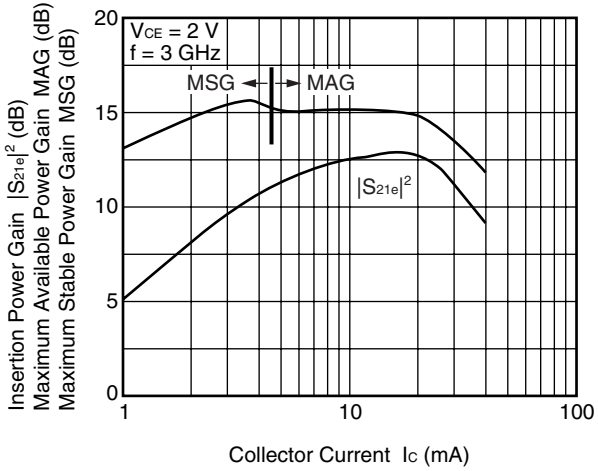


INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT

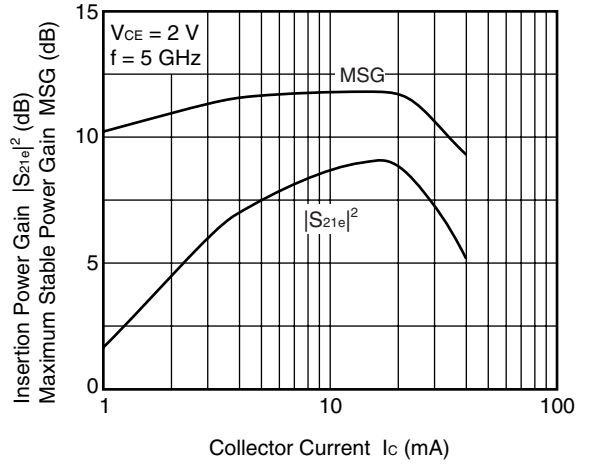


**Remark** The graphs indicate nominal characteristics.

INSERTION POWER GAIN, MAG, MSG  
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MSG  
vs. COLLECTOR CURRENT



**Remark** The graphs indicate nominal characteristics.

<R> **S-PARAMETERS**

S-parameters and noise parameters are provided on our Web site in a format (S2P) that enables the direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.

Click here to download S-parameters.

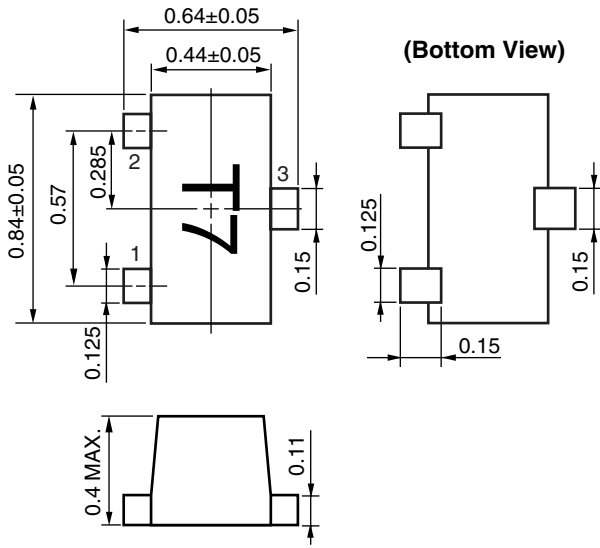
[RF and Microwave] → [Device Parameters]

URL <http://www.necel.com/microwave/en/>



**PACKAGE DIMENSIONS**

**3-PIN SUPER LEAD-LESS MINIMOLD (M33, 0804 PKG) (UNIT: mm)**



**PIN CONNECTIONS**

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

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