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# DATA SHEET



## NPN SILICON RF TRANSISTOR NE46134 / 2SC4536 JEITA Part No.

### NPN EPITAXIAL SILICON RF TRANSISTOR FOR HIGH-FREQUENCY LOW-NOISE AMPLIFICATION 3-PIN POWER MINIMOLD

#### DESCRIPTION

The NE46134 / 2SC4536 is designed for use in middle power, low distortion low noise figure RF amplifier. It features excellent linearity and large dynamic range, which make it suitable for CATV, telecommunication, and other use, it employs plastic surface mount type package (SOT-89).

#### FEATURES

- ★ • Low distortion:  $IM_2 = 59.0$  dBc TYP.,  $IM_3 = 82.0$  dBc TYP. @  $V_{CE} = 10$  V,  $I_C = 50$  mA
- ★ • Low noise:  $NF = 2.0$  dB TYP. @  $V_{CE} = 10$  V,  $I_C = 50$  mA,  $f = 1$  GHz
- Large  $P_{tot}$  :  $P_{tot} = 2.0$  W (Mounted on double-sided copper-clad  $16\text{ cm}^2 \times 0.7$  mm (t) ceramic substrate)
- Small package : 3-pin power minimold package

#### ★ ORDERING INFORMATION

Part Number	Quantity	Supplying Form
NE46134-AZ 2SC4536-AZ	25 pcs (Non reel)	• 12 mm wide embossed taping • Collector face the perforation side of the tape
NE46134-T1-AZ 2SC4536-T1-AZ	1 kpcs/reel	

**Remark** To order evaluation samples, contact your nearby sales office.  
The unit sample quantity is 25 pcs.

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

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	$V_{CBO}$	30	V
Collector to Emitter Voltage	$V_{CEO}$	15	V
Emitter to Base Voltage	$V_{EBO}$	3.0	V
Collector Current	$I_C$	250	mA
Total Power Dissipation	$P_{tot}^{\text{Note}}$	2.0	W
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

**Note** Mounted on double-sided copper-clad  $16\text{ cm}^2 \times 0.7$  mm (t) ceramic substrate

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

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

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
<b>DC Characteristics</b>						
Collector Cut-off Current	I <sub>CB0</sub>	V <sub>CB</sub> = 20 V, I <sub>E</sub> = 0 mA	–	–	5.0	μA
Emitter Cut-off Current	I <sub>EB0</sub>	V <sub>EB</sub> = 2 V, I <sub>C</sub> = 0 mA	–	–	5.0	μA
★ DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA	60	–	200	–
<b>RF Characteristics</b>						
★ Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA, f = 1 GHz	5.5	7.2	–	dB
Noise Figure (1)	NF <sup>Note 2</sup>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA, f = 500 MHz	–	1.5	–	dB
Noise Figure (2)	NF <sup>Note 2</sup>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA, f = 1 GHz	–	2.0	–	dB
★ 2nd Order Intermodulation Distortion	IM <sub>2</sub>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA, R <sub>S</sub> = R <sub>L</sub> = 75 Ω, V <sub>O</sub> = 105 dBμV/75 Ω, f <sub>1</sub> = 190 MHz, f <sub>2</sub> = 90 MHz, f = f <sub>1</sub> – f <sub>2</sub>	–	59.0	–	dBc
★ 3rd Order Intermodulation Distortion	IM <sub>3</sub>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 50 mA, R <sub>S</sub> = R <sub>L</sub> = 75 Ω, V <sub>O</sub> = 105 dBμV/75 Ω, f <sub>1</sub> = 190 MHz, f <sub>2</sub> = 200 MHz, f = 2 × f <sub>1</sub> – f <sub>2</sub>	–	82.0	–	dBc

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

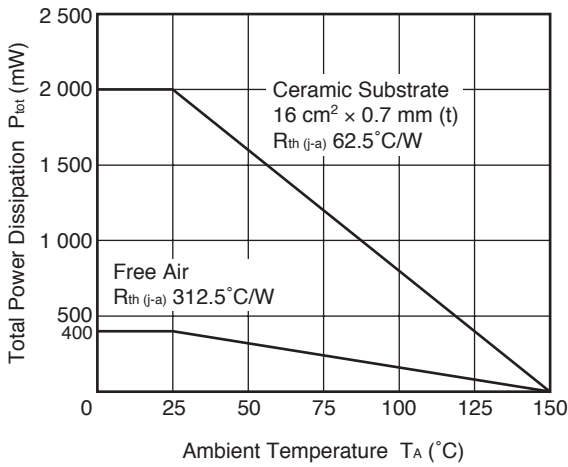
**2.** R<sub>S</sub> = R<sub>L</sub> = 50 Ω, tuned

★ **h<sub>FE</sub> CLASSIFICATION**

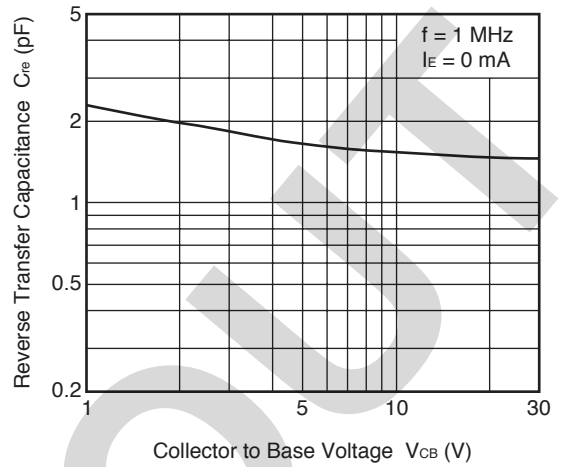
Rank	QR	QS
Marking	QR	QS
h <sub>FE</sub> Value	60 to 120	100 to 200

★ TYPICAL CHARACTERISTICS (T<sub>A</sub> = +25°C)

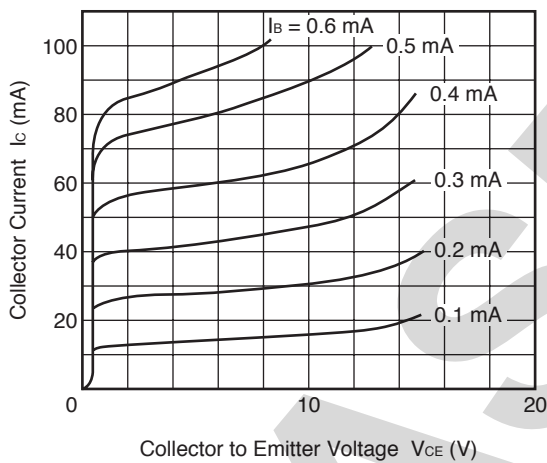
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



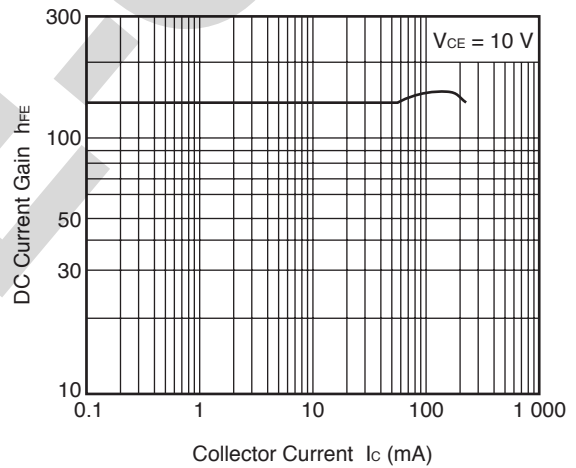
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



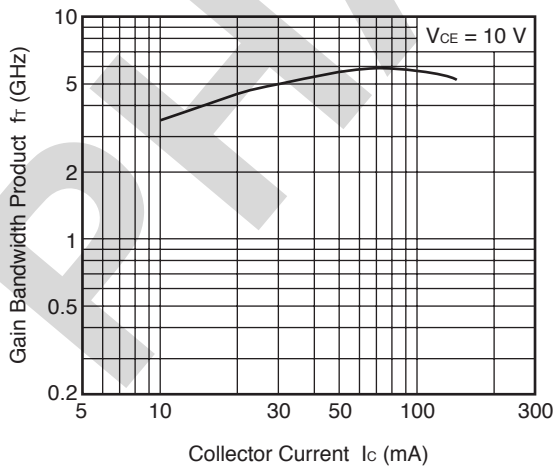
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



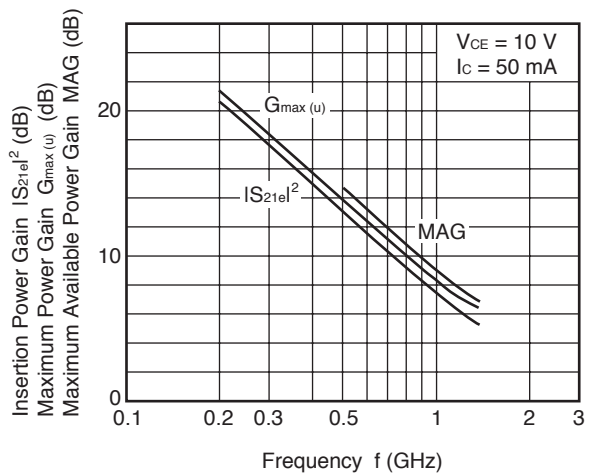
DC CURRENT GAIN vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

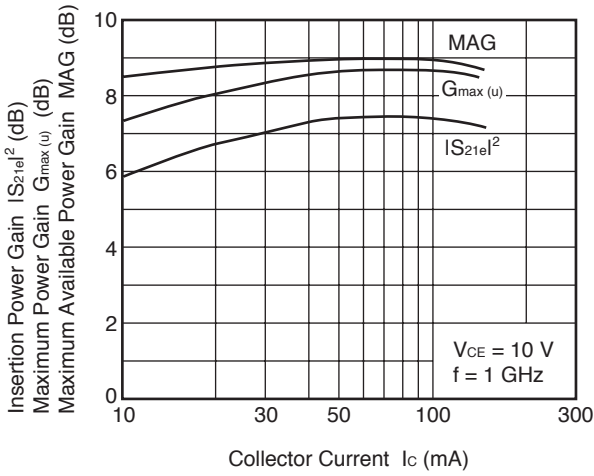


INSERTION POWER GAIN, MAXIMUM POWER GAIN, MAG vs. FREQUENCY

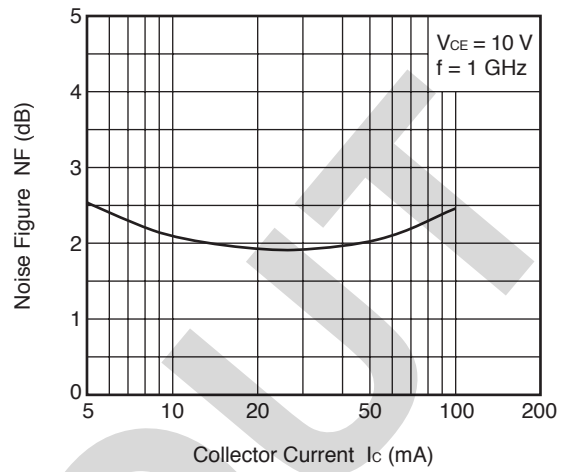




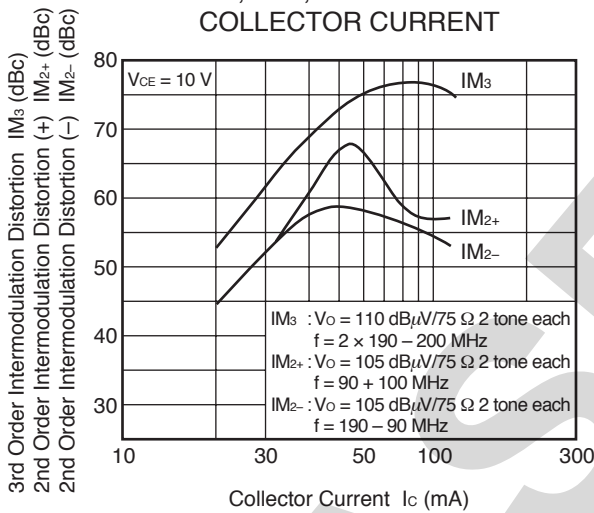
INSERTION POWER GAIN, MAXIMUM POWER GAIN, MAG vs. COLLECTOR CURRENT



NOISE FIGURE vs. COLLECTOR CURRENT



IM3, IM2+, IM2- vs. COLLECTOR CURRENT



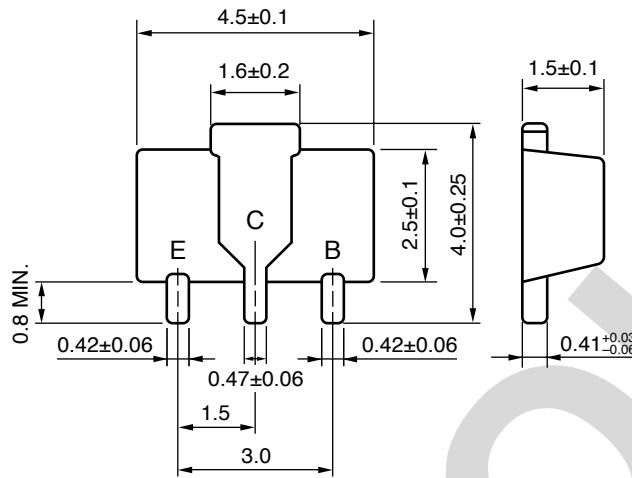
**Remark** The graphs indicate nominal characteristics.

**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 POWER MINIMOLD (UNIT: mm)



**PIN CONNECTIONS**

- E : Emitter
- C : Collector (Fin)
- B : Base

(IEC : SOT-89)

PHASE OUT

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