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# DATA SHEET



## NPN SILICON RF TRANSISTOR

# NE68030 / 2SC4228 JEITA Part No.

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

#### DESCRIPTION

The NE68030 / 2SC4228 is a low supply voltage transistor designed for VHF, UHF low noise amplifier. It is suitable for a high density surface mount assembly since the transistor has been applied 3-pin super minimold package.

#### FEATURES

- ★ Low noise :  $NF = 1.9 \text{ dB TYP. @ } V_{CE} = 3 \text{ V, } I_c = 5 \text{ mA, } f = 2 \text{ GHz}$
- High gain :  $|S_{21e}|^2 = 7.5 \text{ dB TYP. @ } V_{CE} = 3 \text{ V, } I_c = 5 \text{ mA, } f = 2 \text{ GHz}$
- 3-pin super minimold package

#### ★ ORDERING INFORMATION

Part Number	Quantity	Supplying Form
NE68030-A 2SC4228-A	50 pcs (Non reel)	<ul style="list-style-type: none"> <li>• 8 mm wide embossed taping</li> <li>• Pin 3 (Collector) face the perforation side of the tape</li> </ul>
NE68030-T1-A 2SC4228-T1-A	3 kpcs/reel	

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

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

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	$V_{CBO}$	20	V
Collector to Emitter Voltage	$V_{CEO}$	10	V
Emitter to Base Voltage	$V_{EBO}$	1.5	V
Collector Current	$I_c$	35	mA
Total Power Dissipation	$P_{tot}^{\text{Note}}$	150	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

**Note** Free air

**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)**

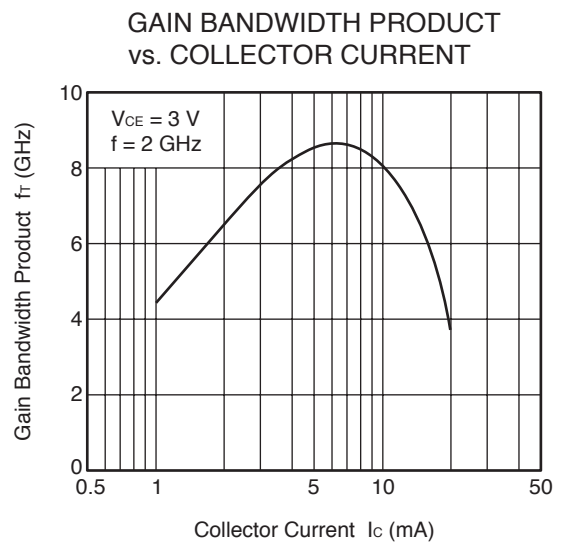
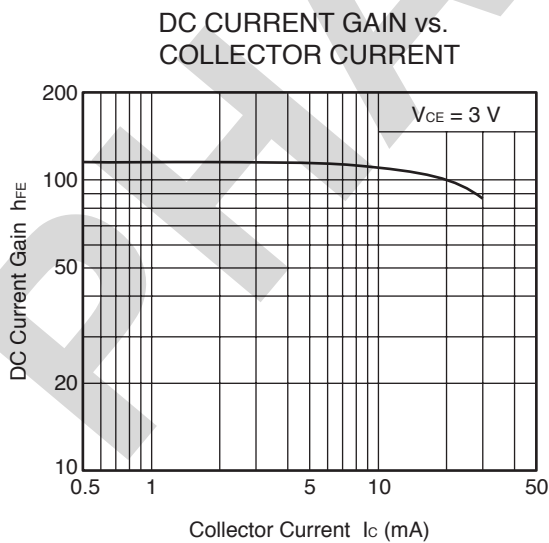
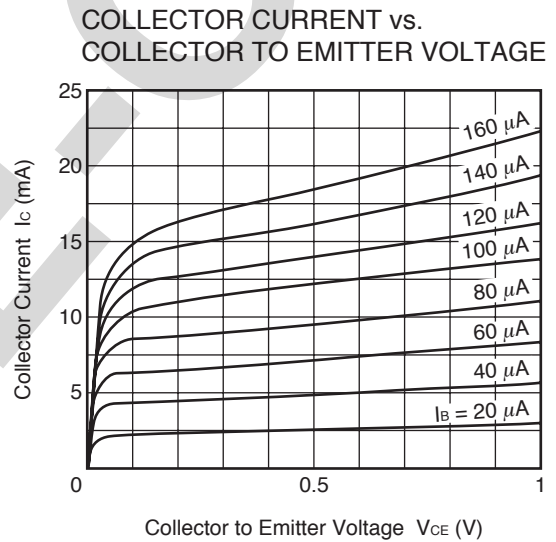
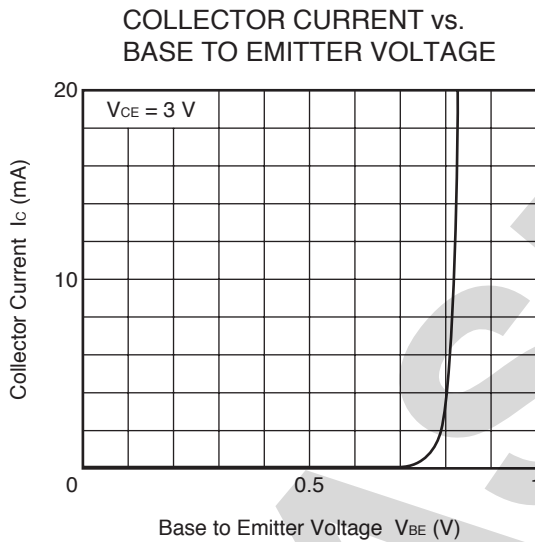
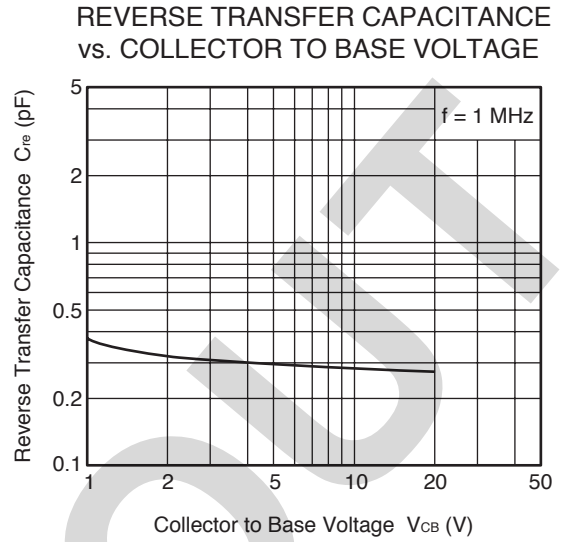
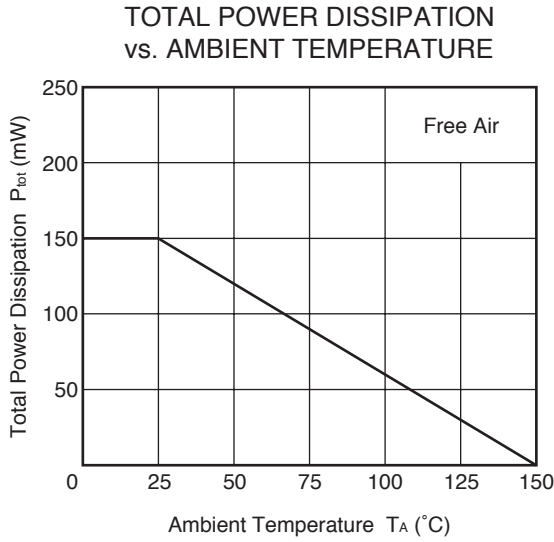
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 mA	-	-	1.0	μA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0 mA	-	-	1.0	μA
DC Current Gain	h <sub>FE</sub> <sup>Note 1</sup>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA	50	100	250	-
RF Characteristics						
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2 GHz	5.5	8.0	-	GHz
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2 GHz	5.5	7.5	-	dB
Noise Figure	NF	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2 GHz	-	1.9	3.2	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 3 V, I <sub>E</sub> = 0 mA, f = 1 MHz	-	0.3	0.7	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	R43	R44	R45
Marking	R43	R44	R45
h <sub>FE</sub> Value	50 to 100	80 to 160	125 to 250

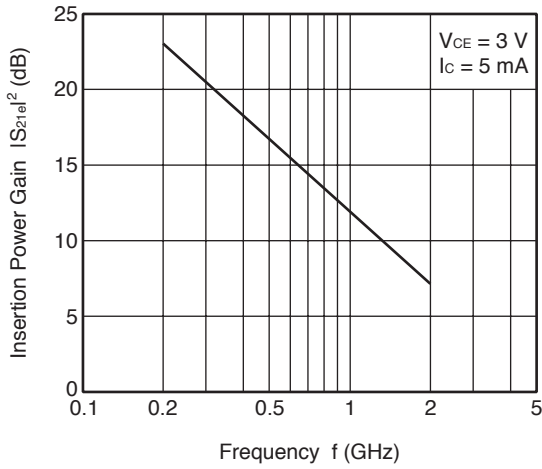
**TYPICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise specified)**



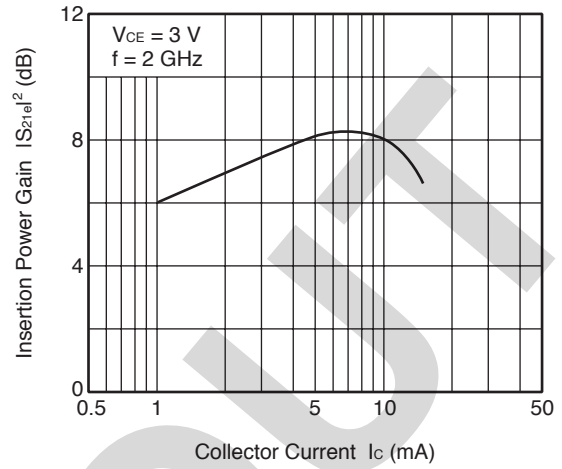
**Remark** The graphs indicate nominal characteristics.



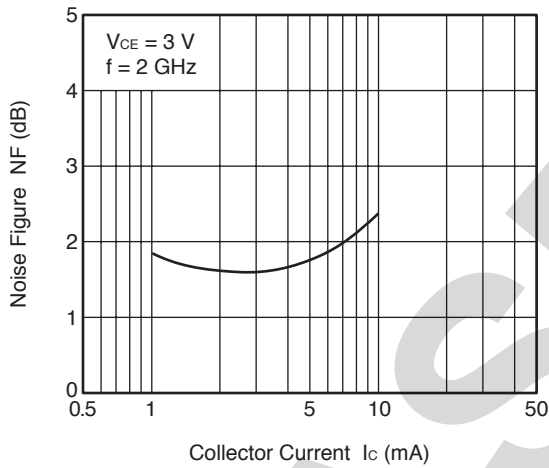
INSERTION POWER GAIN vs. FREQUENCY



INSERTION POWER GAIN vs. COLLECTOR CURRENT



NOISE FIGURE vs. COLLECTOR CURRENT



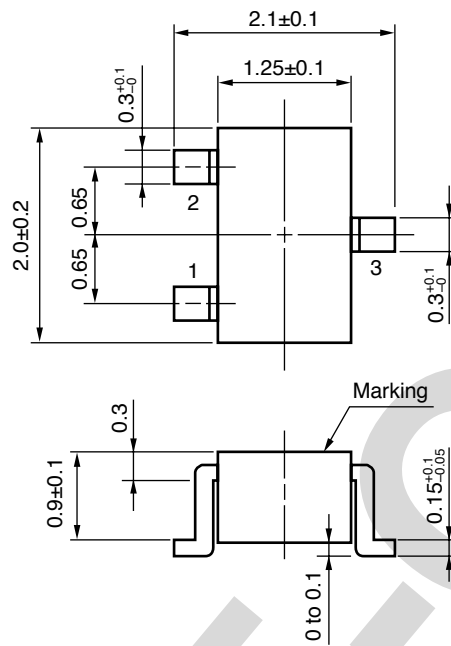
**Remark** The graphs indicate nominal characteristics.

**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 SUPER MINIMOLD (UNIT: mm)**



**PIN CONNECTIONS**

- 1. Emitter
  - 2. Base
  - 3. Collector
- (EIAJ : SC-70)

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