

# DATA SHEET



## NPN SILICON RF TRANSISTOR

# NE68018 / 2SC5013 JEITA Part No.

### NPN EPITAXIAL SILICON RF TRANSISTOR FOR HIGH-FREQUENCY LOW-NOISE AMPLIFICATION 4-PIN SUPER MINIMOLD

#### FEATURES

- High Gain Bandwidth Product (fr = 10 GHz TYP.)
- Low Noise, High Gain
- Low Voltage Operation
- 4-pin super minimold Package

#### ★ ORDERING INFORMATION

Part Number	Quantity	Supplying Form
NE68018-A 2SC5013-A	50 pcs (Non reel)	<ul style="list-style-type: none"> <li>• 8 mm wide embossed taping</li> <li>• Pin 3 (Base), Pin 4 (Emitter) face to perforation side of the tape</li> </ul>
NE68018-A 2SC5013-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<sub>A</sub> = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V <sub>CBO</sub>	20	V
Collector to Emitter Voltage	V <sub>CEO</sub>	10	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** 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> = 6 V, I <sub>C</sub> = 10 mA	50	100	250	-
RF Characteristics						
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 10 mA	-	10	-	GHz
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 10 mA, f = 2.0 GHz	7.5	9.5	-	dB
Noise Figure	NF	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 5 mA, f = 2.0 GHz	-	1.8	3.0	dB
Reverse Transfer Capacitance	C <sub>re</sub> <sup>Note 2</sup>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 mA, f = 1.0 MHz	-	0.25	0.8	pF

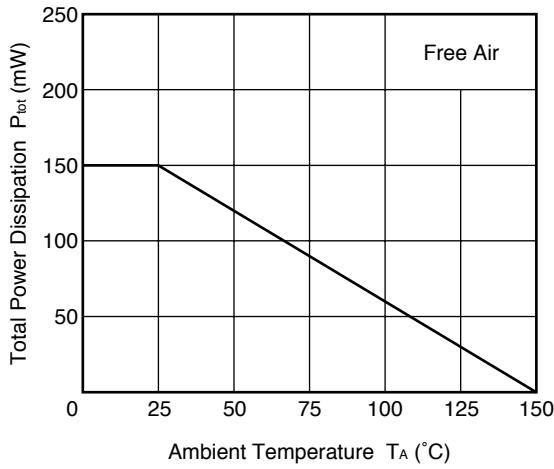
- Notes 1.** Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%  
**2.** Collector to base capacitance when the emitter grounded

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

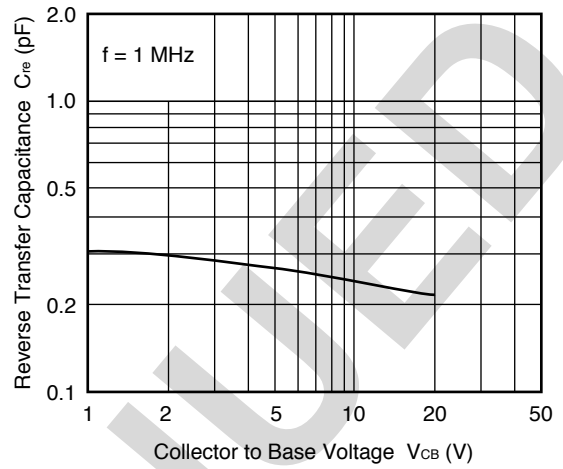
Rank	EB	FB	GB
Marking	R46	R47	R48
h <sub>FE</sub> Value	50 to 100	80 to 160	125 to 250

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

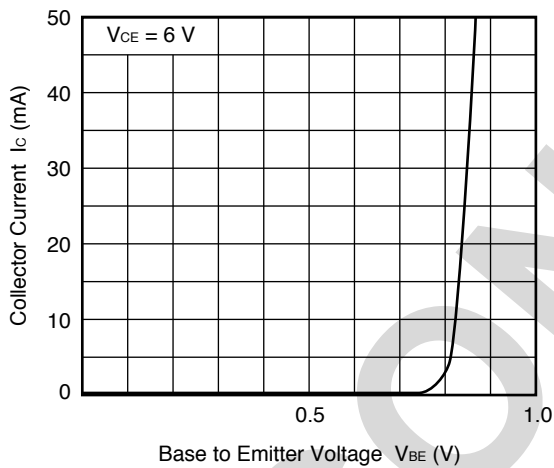
**TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE**



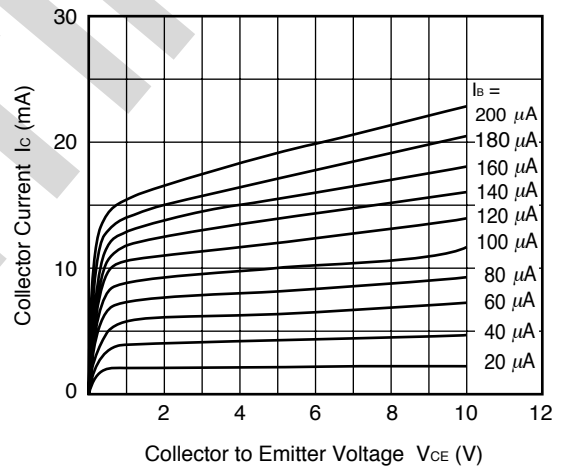
**REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE**



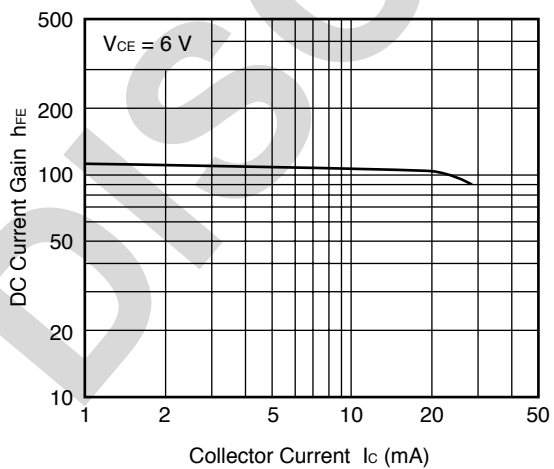
**COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE**



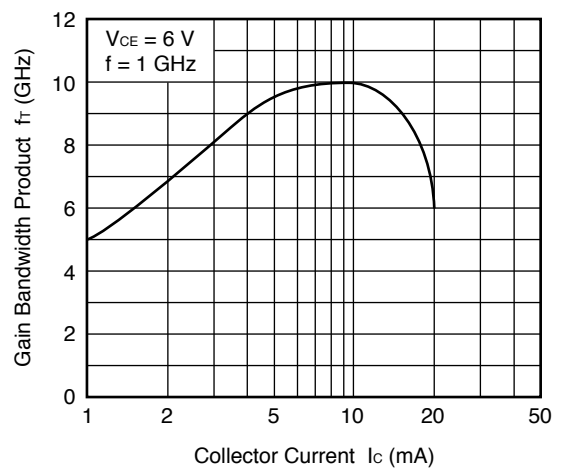
**COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE**



**DC CURRENT GAIN vs. COLLECTOR CURRENT**

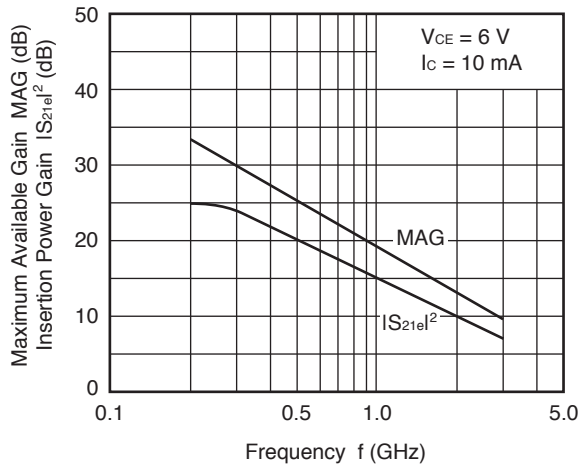


**GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT**

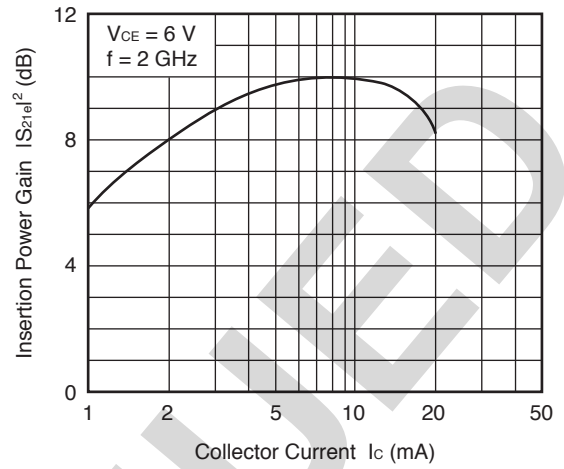


**Remark** The graphs indicate nominal characteristics.

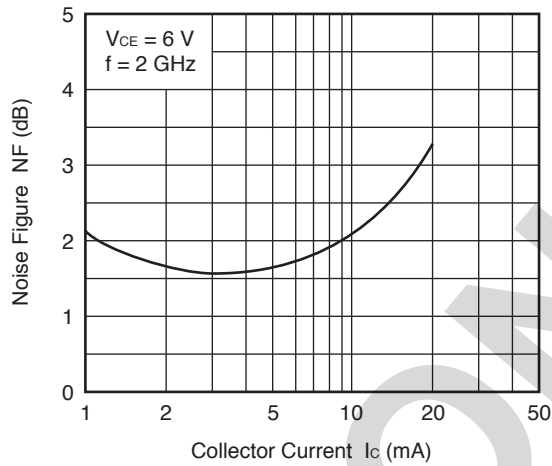
MAXIMUM AVAILABLE GAIN/INSERTION POWER GAIN vs. FREQUENCY



INSERTION POWER GAIN vs. COLLECTOR CURRENT



NOISE FIGURE vs. COLLECTOR CURRENT



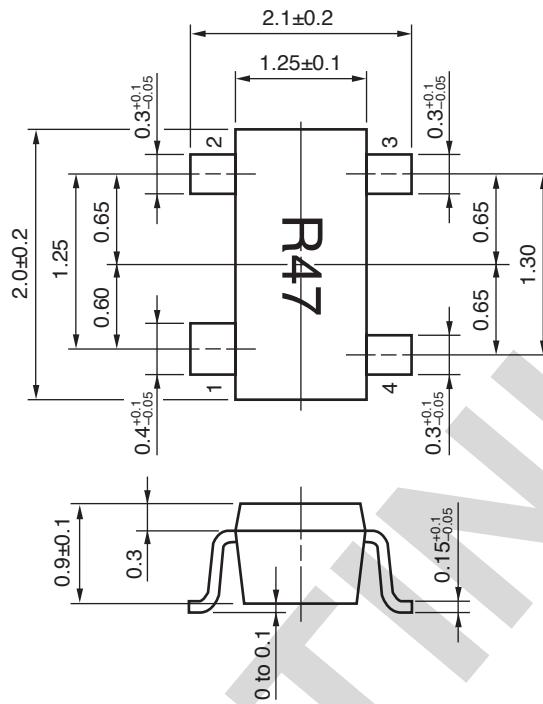
**Remark** The graphs indicate nominal characteristics.

★ **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

4-PIN SUPER MINIMOLD (UNIT: mm)



**PIN CONNECTIONS**

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

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