



NPN SILICON RF TRANSISTOR

NE85639 / 2SC4093

JEITA
Part No.

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

DESCRIPTION

The NE85639 / 2SC4093 is a NPN silicon epitaxial transistor designed for low noise amplifier at VHF, UHF and CATV band.

It has large dynamic range and good current characteristics, and is contained in a 4-pin minimold package which enables high-isolation gain.

FEATURES

- Low Noise
NF = 1.1 dB TYP. @ $V_{CE} = 10\text{ V}$, $I_C = 7\text{ mA}$, $f = 1\text{ GHz}$
- High Power gain
 $|S_{21e}|^2 = 13\text{ dB TYP. @ } V_{CE} = 10\text{ V}$, $I_C = 20\text{ mA}$, $f = 1\text{ GHz}$
- Maximum available power gain: MAG = 14.2 dB TYP. @ $V_{CE} = 10\text{ V}$, $I_C = 20\text{ mA}$, $f = 1\text{ GHz}$
- 4-pin minimold Package

★ ORDERING INFORMATION

| Part Number | Quantity | Supplying Form |
|------------------------------|-------------------|---|
| NE85639-A 2SC4093-A | 50 pcs (Non reel) | • 8 mm wide embossed taping • Pin 3 (Base), Pin 4 (Emitter) face to perforation side of the tape |
| NE85639-T1-A 2SC4093-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} | 12 | V |
| Emitter to Base Voltage | V_{EBO} | 3.0 | V |
| Collector Current | I_C | 100 | mA |
| Total Power Dissipation | P_{tot} ^{Note} | 200 | 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_A = +25°C)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|------------------------------|-----------------------------------|---|------|------|------|------|
| DC Characteristics | | | | | | |
| Collector Cut-off Current | I _{CBO} | V _{CB} = 10 V, I _E = 0 mA | – | – | 1.0 | μA |
| Emitter Cut-off Current | I _{EBO} | V _{EB} = 1 V, I _C = 0 mA | – | – | 1.0 | μA |
| DC Current Gain | h _{FE} ^{Note 1} | V _{CE} = 10 V, I _C = 20 mA | 50 | 120 | 250 | – |
| RF Characteristics | | | | | | |
| Gain Bandwidth Product | f _T | V _{CE} = 10 V, I _C = 20 mA | – | 7.0 | – | GHz |
| Insertion Power Gain | S _{21e} ² | V _{CE} = 10 V, I _C = 20 mA, f = 1.0 GHz | 11 | 13 | – | dB |
| Noise Figure | NF | V _{CE} = 10 V, I _C = 7 mA, f = 1.0 GHz | – | 1.1 | 2.0 | dB |
| Reverse Transfer Capacitance | C _{re} ^{Note 2} | V _{CB} = 10 V, I _E = 0 mA, f = 1.0 MHz | – | 0.6 | 0.95 | pF |

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

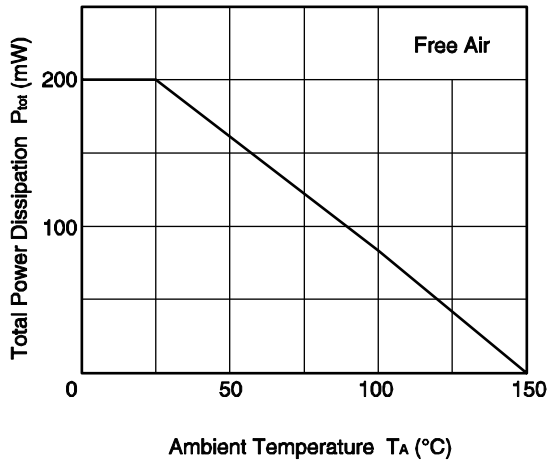
h_{FE} CLASSIFICATION

| Rank | R26/RBF ^{Note} | R27/RBG ^{Note} | R28/RBH ^{Note} |
|---------|-------------------------|-------------------------|-------------------------|
| Marking | R26 | R27 | R28 |
| Range | 50 to 100 | 80 to 160 | 125 to 250 |

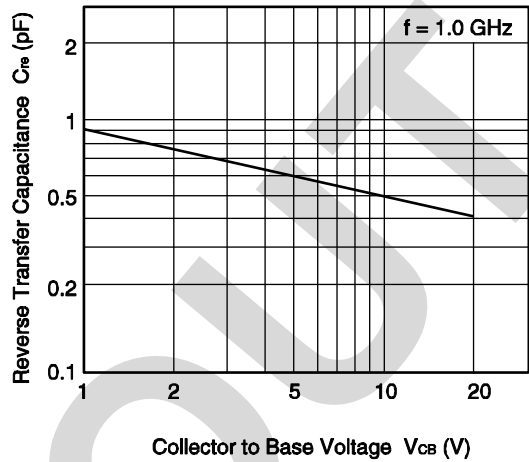
Note Old Specification / New Specification

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

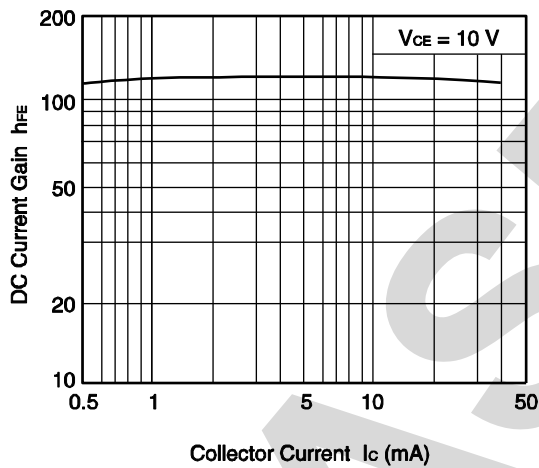
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



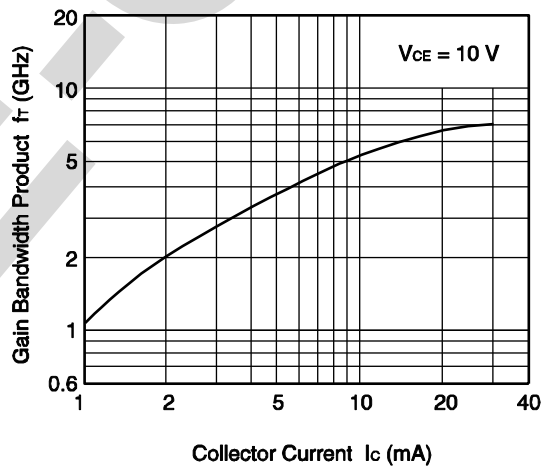
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



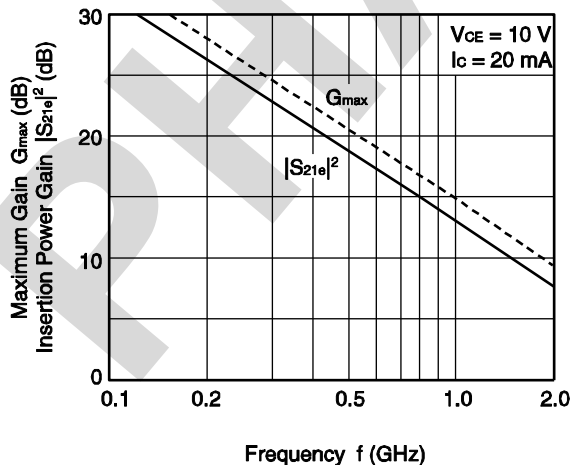
DC CURRENT GAIN vs. COLLECTOR CURRENT



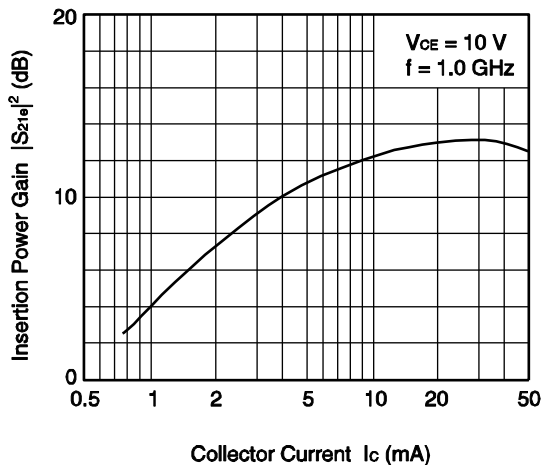
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



MAXIMUM GAIN/INSERTION POWER GAIN vs. FREQUENCY

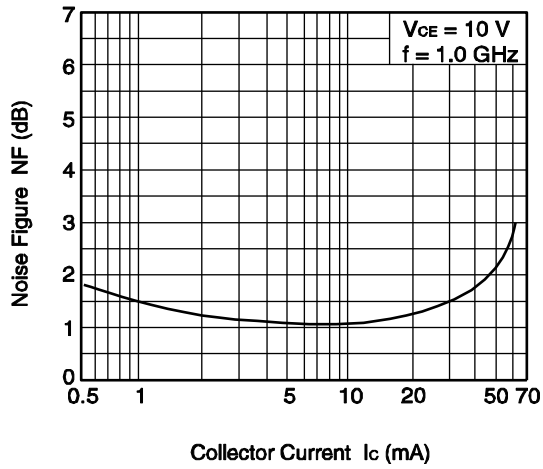


INSERTION POWER GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

**NOISE FIGURE vs.
COLLECTOR CURRENT**



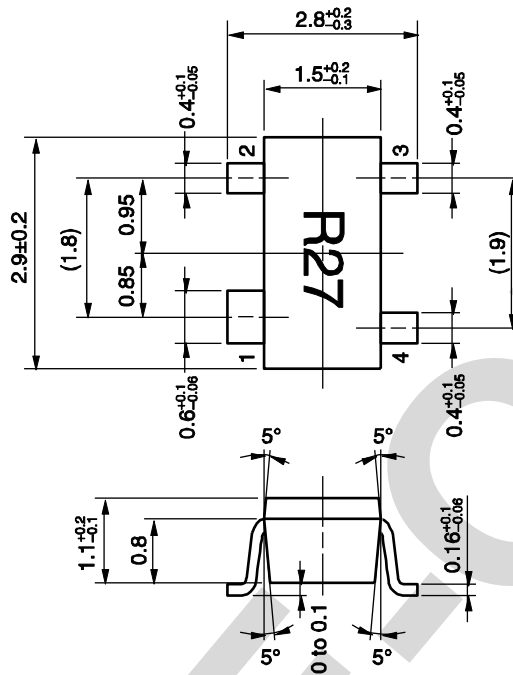
Remark The graph indicates nominal characteristics.

★ **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 MINIMOLD PACKAGE (UNIT: mm)



PIN CONNECTIONS

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

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