

# DATA SHEET

# NEC

## NPN SILICON RF TRANSISTOR **2SC5180**

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

#### FEATURES

- Low current consumption and high gain  
 $|S_{21e}|^2 = 12 \text{ dB TYP. @ } V_{CE} = 2 \text{ V, } I_c = 7 \text{ mA, } f = 2 \text{ GHz}$   
 $|S_{21e}|^2 = 11 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_c = 5 \text{ mA, } f = 2 \text{ GHz}$
- 4-pin super minimold Package

#### ★ ORDERING INFORMATION

| Part Number | Quantity          | Supplying Form  |
|-------------|-------------------|---|
| 2SC5180     | 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> |
| 2SC5180-T1  | 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>                 | 5           | V    |
| Collector to Emitter Voltage | V <sub>CEO</sub>                 | 3           | V    |
| Emitter to Base Voltage      | V <sub>EBO</sub>                 | 2           | V    |
| Collector Current            | I <sub>c</sub>                   | 10          | mA   |
| Total Power Dissipation      | P <sub>tot</sub> <sup>Note</sup> | 30          | 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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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

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

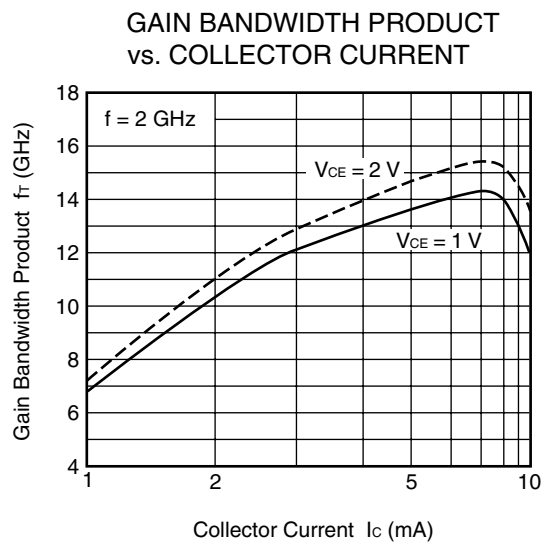
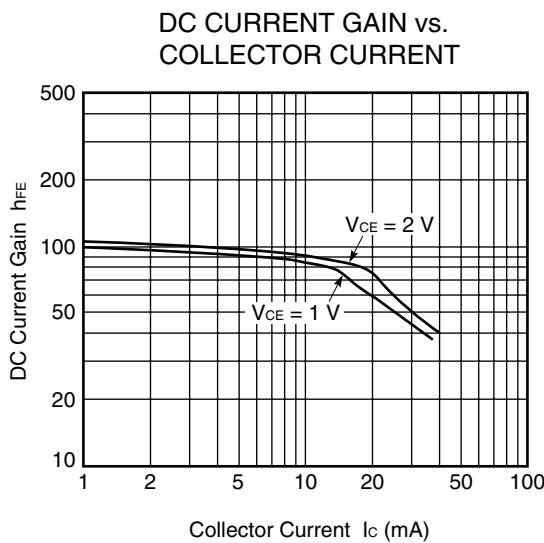
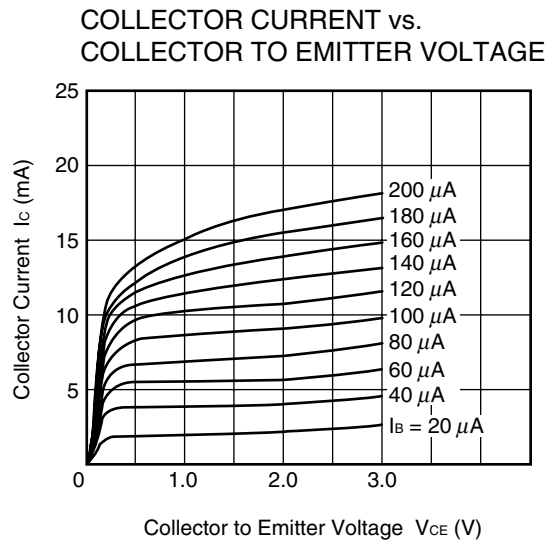
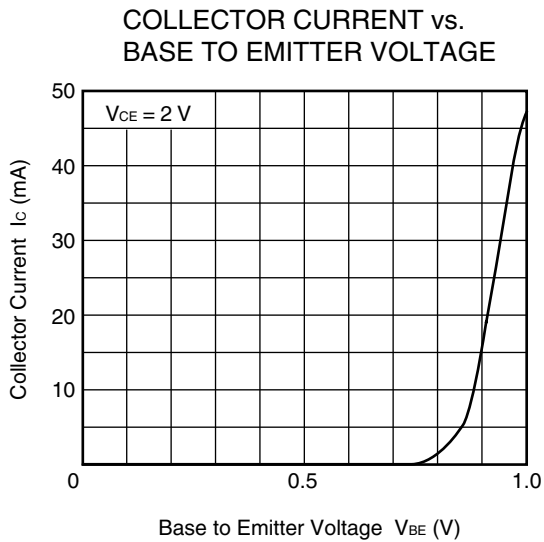
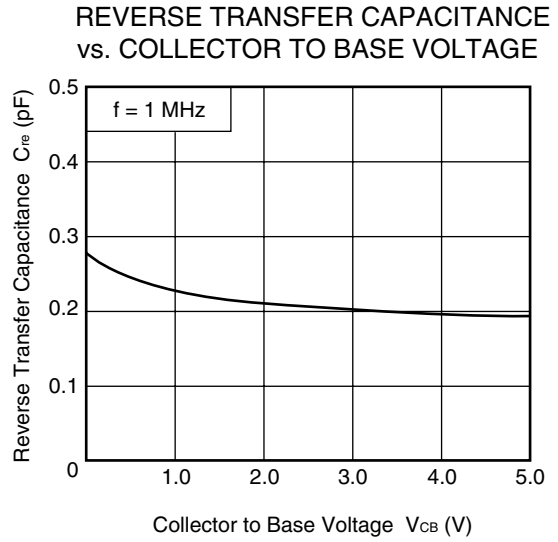
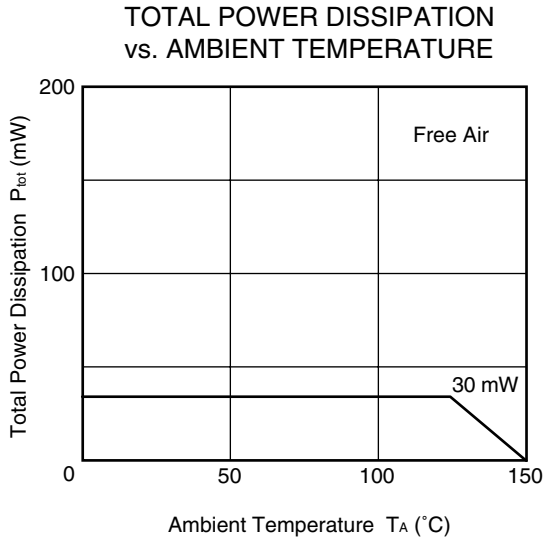
| Parameter                    | Symbol                            | Test Conditions   | MIN. | TYP. | MAX. | Unit |
|------------------------------|-----------------------------------|---|------|------|------|------|
| DC Characteristics           |                                   |   |      |      |      |      |
| Collector Cut-off Current    | I <sub>CBO</sub>                  | V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0 mA              | –    | –    | 100  | nA   |
| Emitter Cut-off Current      | I <sub>EBO</sub>                  | V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0 mA              | –    | –    | 100  | nA   |
| DC Current Gain              | h <sub>FE</sub> <sup>Note 1</sup> | V <sub>CE</sub> = 2 V, I <sub>C</sub> = 7 mA              | 70   | –    | 140  | –    |
| RF Characteristics           |                                   |   |      |      |      |      |
| Gain Bandwidth Product (1)   | f <sub>T</sub>                    | V <sub>CE</sub> = 2 V, I <sub>C</sub> = 7 mA, f = 2.0 GHz | 12   | 15.5 | –    | GHz  |
| Gain Bandwidth Product (2)   | f <sub>T</sub>                    | V <sub>CE</sub> = 1 V, I <sub>C</sub> = 5 mA, f = 2.0 GHz | 10   | 13   | –    | GHz  |
| Insertion Power Gain (1)     | S <sub>21e</sub>   <sup>2</sup>   | V <sub>CE</sub> = 2 V, I <sub>C</sub> = 7 mA, f = 2.0 GHz | 10   | 12   | –    | dB   |
| Insertion Power Gain (2)     | S <sub>21e</sub>   <sup>2</sup>   | V <sub>CE</sub> = 1 V, I <sub>C</sub> = 5 mA, f = 2.0 GHz | 8.5  | 11   | –    | dB   |
| Noise Figure (1)             | NF                                | V <sub>CE</sub> = 2 V, I <sub>C</sub> = 3 mA, f = 2.0 GHz | –    | 1.5  | 2.0  | dB   |
| Noise Figure (2)             | NF                                | V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2.0 GHz | –    | 1.5  | 2.0  | dB   |
| Reverse Transfer Capacitance | C <sub>re</sub> <sup>Note 2</sup> | V <sub>CB</sub> = 2 V, I <sub>E</sub> = 0 mA, f = 1.0 MHz | –    | 0.3  | 0.5  | pF   |

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

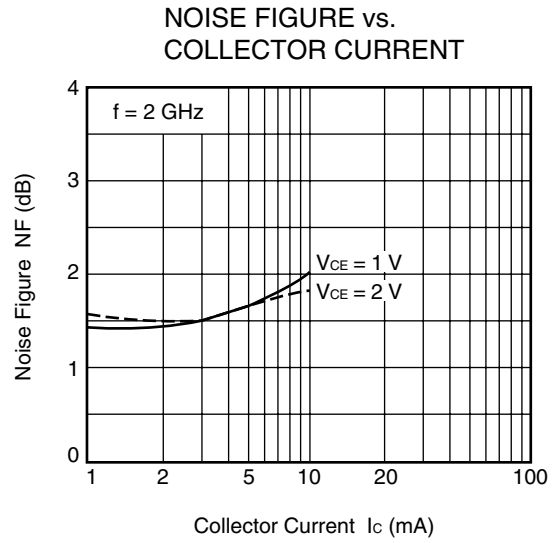
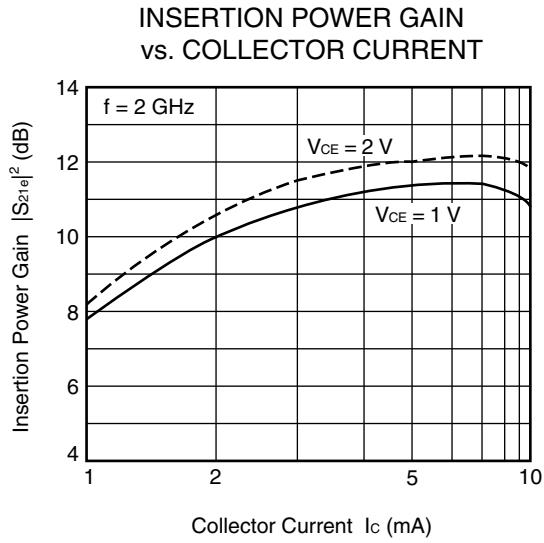
**h<sub>FE</sub> CLASSIFICATION**

|                       |           |
|-----------------------|-----------|
| Rank                  | FB        |
| Marking               | T84       |
| h <sub>FE</sub> Value | 70 to 140 |

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



**Remark** The graphs indicate nominal characteristics.



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★ **S-PARAMETERS**

S-parameters/Noise parameters are provided on the NEC Compound Semiconductor Devices Web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

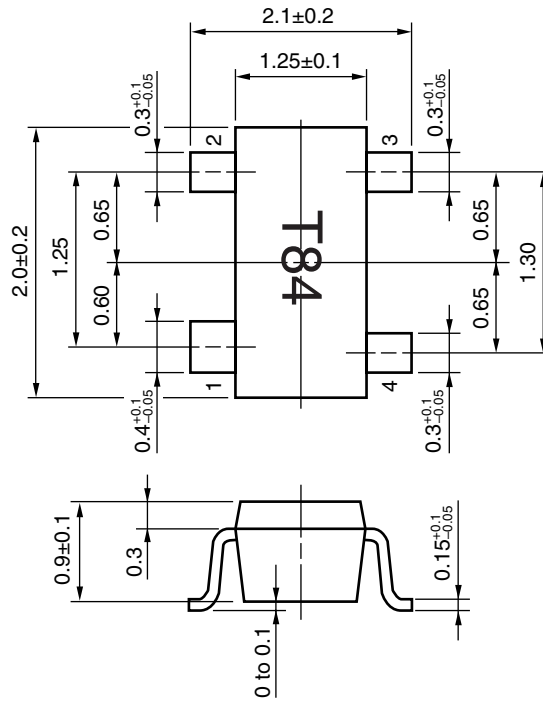
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

URL <http://www.ncsd.necel.com/>

★ PACKAGE DIMENSIONS

4-PIN SUPER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

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

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