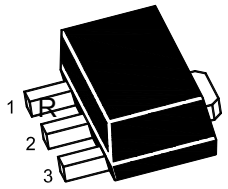
# NPN Silicon Epitaxial Planar Transistor

Low frequency transistor

Marking: R CFR
S CFS




1.Base 2.Collector 3.Emitter
SOT-89 Plastic Package

**Absolute Maximum Ratings ($T_a$ = 25 °C)**

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector Base Voltage | $V_{CBO}$ | 40 | V |
| Collector Emitter Voltage | $V_{CEO}$ | 20 | V |
| Emitter Base Voltage | $V_{EBO}$ | 6 | V |
| Collector Current - DC<br>Collector Current - Pulse [1] | $I_C$<br>$I_{CP}$ | 3<br>5 [1] | A |
| Total Power Dissipation | $P_{tot}$ | 0.5<br>2 [2] | W |
| Junction Temperature | $T_J$ | 150 | °C |
| Storage Temperature Range | $T_{Stg}$ | - 55 to + 150 | °C |

[1] Single pulse Pw = 10 ms.
[2] Mounted on a 40 X 40 X 0.7 mm ceramic substrate.

**Characteristics at $T_a$ = 25 °C**

| Parameter | | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| DC Current Gain<br>at $V_{CE}$ = 2 V, $I_C$ = 100 mA | Current Gain Group R<br>S | $h_{FE}$<br>$h_{FE}$ | 180<br>270 | -<br>- | 390<br>560 | -<br>- |
| Collector Base Breakdown Voltage<br>at $I_C$ = 50 µA | | $V_{(BR)CBO}$ | 40 | - | - | V |
| Collector Emitter Breakdown Voltage<br>at $I_C$ = 1 mA | | $V_{(BR)CEO}$ | 20 | - | - | V |
| Emitter Base Breakdown Voltage<br>at $I_E$ = 50 µA | | $V_{(BR)EBO}$ | 6 | - | - | V |
| Collector Cutoff Current<br>at $V_{CB}$ = 30 V | | $I_{CBO}$ | - | - | 100 | nA |
| Emitter Cutoff Current<br>at $V_{EB}$ = 5 V | | $I_{EBO}$ | - | - | 100 | nA |
| Collector Emitter Saturation Voltage<br>at $I_C$ = 2 A, $I_B$ = 100 mA | | $V_{CE(sat)}$ | - | - | 0.5 | V |
| Transition Frequency<br>at $V_{CE}$ = 2 V, -$I_E$ = 500 mA, f = 100 MHz | | $f_T$ | - | 290 | - | MHz |
| Collector Output Capacitance<br>at $V_{CE}$ = 10 V, $I_E$ = 0 A, f = 1 MHz | | $C_{ob}$ | - | 25 | - | pF |

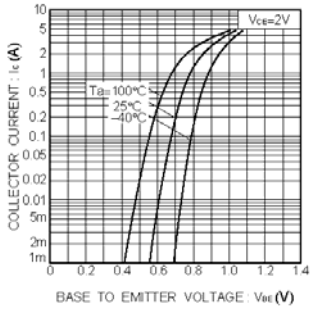



Fig.1 Grounded emitter propagation characteristics

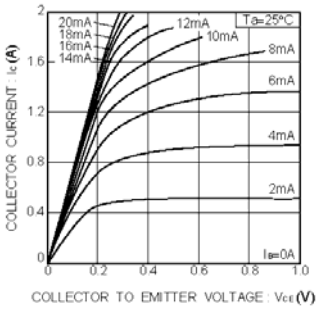



Fig.2 Grounded emitter output characteristics (Ⅰ)

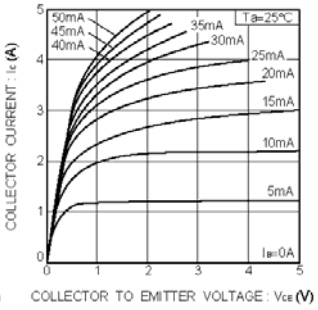



Fig.3 Grounded emitter output characteristics (Ⅱ)

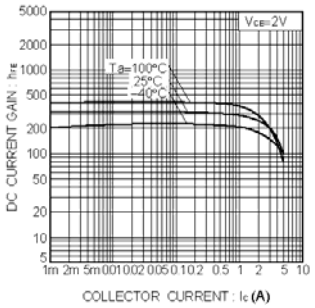



Fig.4 DC current gain vs. collector current

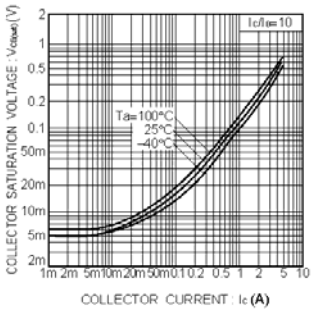



Fig.5 Collector-emitter saturation voltage vs. collector current (Ⅰ)

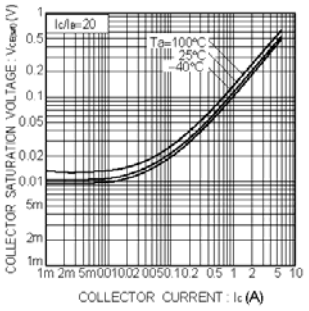



Fig.6 Collector-emitter saturation voltage vs. collector curren (Ⅱ)

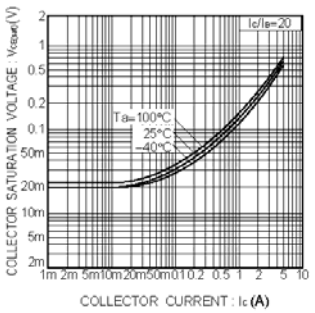



Fig.7 Collector-emitter saturation voltage vs. collector current (Ⅲ)

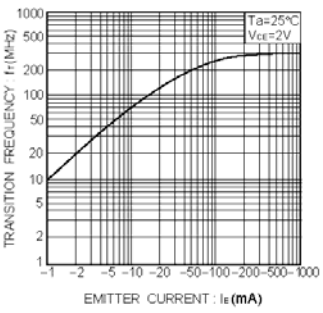



Fig.8 Gain bandwidth product vs. emitter current

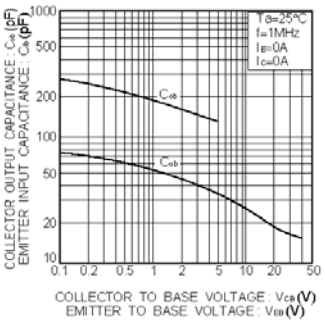



Fig.9 Collector output capacitance vs. collector-base voltage
Emitter input capacitance vs. emitter-base voltage