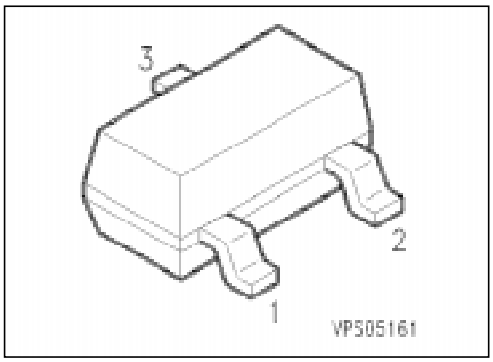
SIEMENS

## PNP Silicon Transistors

**SMBT 5086**
**SMBT 5087**

- For AF input stages and driver applications
- High current gain
- Low collector-emitter saturation voltage
- Low noise between 30 Hz and 15 kHz




| Type | Marking | Ordering Code (tape and reel) | Pin Configuration 1 | 2 | 3 | Package[1)] |
|---|---|---|---|---|---|---|
| SMBT 5086<br>SMBT 5087 | s2P<br>s2Q | Q62702-M0002<br>Q68000-A8319 | B | E | C | SOT-23 |

### Maximum Ratings

| Parameter | Symbol | Values | Unit |
|---|---|---|---|
| Collector-emitter voltage | $V_{CE0}$ | 50 | V |
| Collector-base voltage | $V_{CB0}$ | 50 | |
| Emitter-base voltage | $V_{EB0}$ | 3 | |
| Collector current | $I_C$ | 50 | mA |
| Total power dissipation, $T_S$ = 71 °C | $P_{tot}$ | 330 | mW |
| Junction temperature | $T_j$ | 150 | °C |
| Storage temperature range | $T_{stg}$ | – 65 … + 150 | |

### Thermal Resistance

| | | | |
|---|---|---|---|
| Junction - ambient[2)] | $R_{th\ JA}$ | ≤ 310 | K/W |
| Junction - soldering point | $R_{th\ JS}$ | ≤ 240 | |

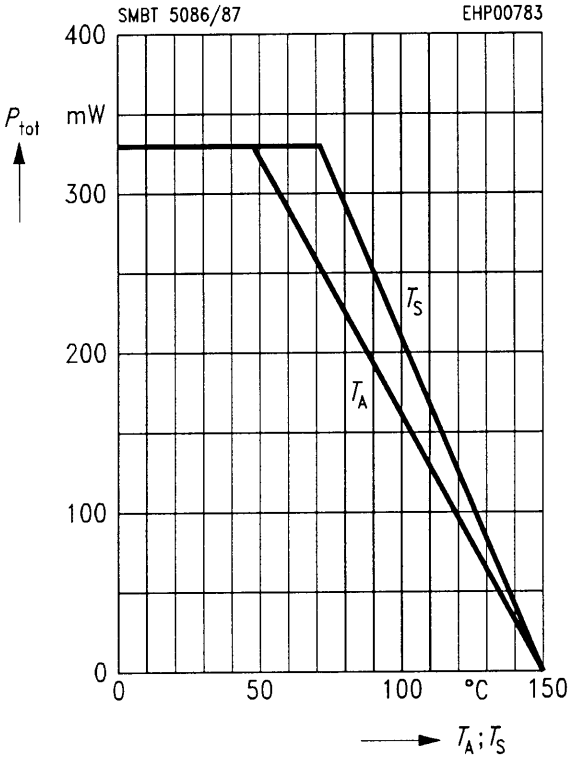
1) For detailed information see chapter Package Outlines.
2) Package mounted on epoxy pcb 40 mm × 40 mm × 1.5 mm/6 cm² Cu.

**Electrical Characteristics**
at $T_A$ = 25 °C, unless otherwise specified.

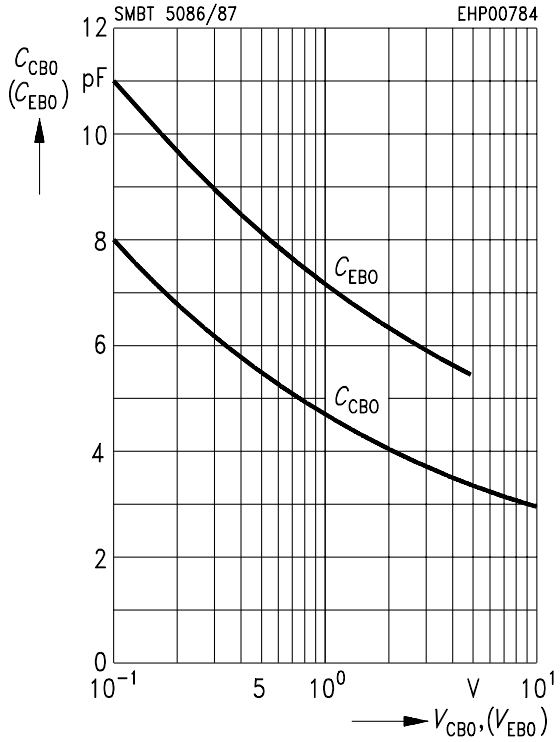
| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **DC characteristics** | | | | | |
| Collector-emitter breakdown voltage<br>$I_C$ = 1 mA | $V_{(BR)CE0}$ | 50 | – | – | V |
| Collector-base breakdown voltage<br>$I_C$ = 100 µA | $V_{(BR)CB0}$ | 50 | – | – | |
| Emitter-base breakdown voltage, $I_E$ = 10 µA | $V_{(BR)EB0}$ | 3 | – | – | |
| Collector-base cutoff current | $I_{CB0}$ | | | | |
| $V_{CB}$ = 10 V, $I_E$ = 0 | | – | – | 10 | nA |
| $V_{CB}$ = 35 V, $I_E$ = 0 | | – | – | 50 | nA |
| $V_{CB}$ = 35 V, $I_E$ = 0, $T_A$ = 150 °C | | – | – | 20 | µA |
| DC current gain | $h_{FE}$ | | | | – |
| $I_C$ = 100 µA, $V_{CE}$ = 5 V SMBT 5086 | | 150 | – | 500 | |
| SMBT 5087 | | 250 | – | 800 | |
| $I_C$ = 1 mA, $V_{CE}$ = 5 V SMBT 5086 | | 150 | – | – | |
| SMBT 5087 | | 250 | – | – | |
| $I_C$ = 10 mA, $V_{CE}$ = 5 V SMBT 5086 | | 150 | – | – | |
| SMBT 5087 | | 250 | – | – | |
| Collector-emitter saturation voltage[1)]<br>$I_C$ = 10 mA, $I_B$ = 1 mA | $V_{CEsat}$ | – | – | 0.3 | V |
| Base-emitter saturation voltage[1)]<br>$I_C$ = 10 mA, $I_B$ = 1 mA | $V_{BEsat}$ | – | – | 0.85 | |
| **AC characteristics** | | | | | |
| Transition frequency<br>$I_C$ = 0.5 mA, $V_{CE}$ = 5 V, $f$ = 100 MHz | $f_T$ | 40 | – | – | MHz |
| Output capacitance, $V_{CB}$ = 5 V, $f$ = 1 MHz | $C_{obo}$ | – | – | 4 | pF |
| Small-signal current gain | $h_{fe}$ | | | | – |
| $I_C$ = 1 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz SMBT 5086 | | 150 | – | 600 | |
| $I_C$ = 1 mA, $V_{CE}$ = 5 V, $f$ = 1 kHz SMBT 5087 | | 250 | – | 900 | |
| Noise figure | $NF$ | | | | |
| $I_C$ = 100 µA, $V_{CE}$ = 5 V, $f$ = 1 kHz, | | | | | |
| $R_S$ = 3 kΩ SMBT 5086 | | – | – | 3 | dB |
| SMBT 5087 | | – | – | 2 | dB |
| $I_C$ = 2 mA, $V_{CE}$ = 5 V, $f$ = 10 Hz to 15 kHz, | | | | | |
| $R_S$ = 10 kΩ SMBT 5086 | | – | – | 3 | dB |
| SMBT 5087 | | – | – | 2 | dB |

[1)] Pulse test conditions: $t \leq$ 300 µs, $D \leq$ 2 %.

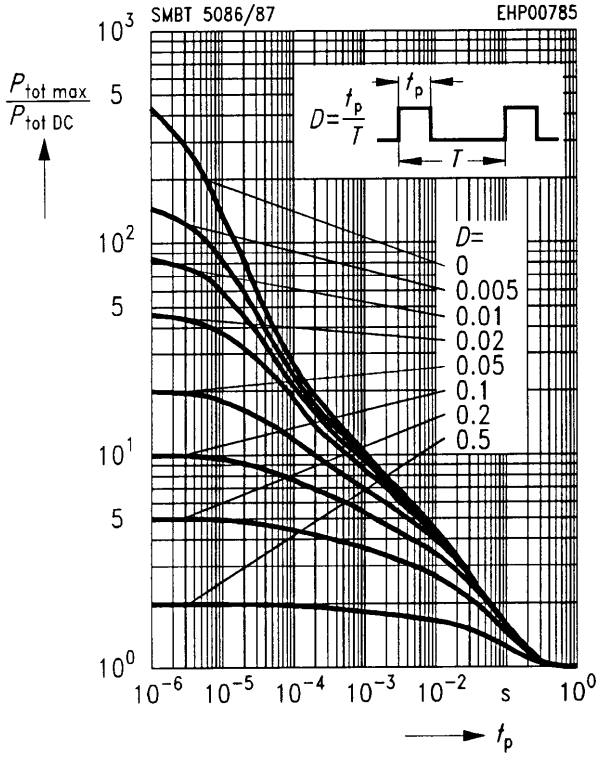
**Total power dissipation** $P_{tot} = f(T_A{}^*; T_S)$
* Package mounted on epoxy



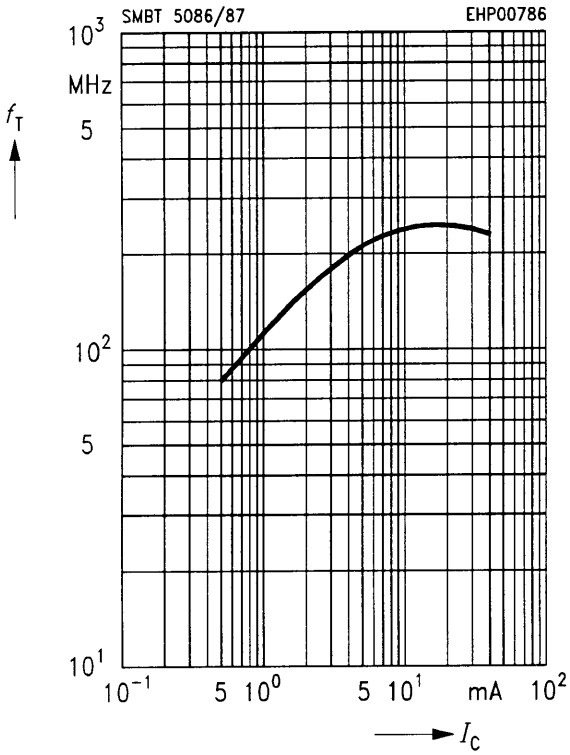

**Collector-base capacitance** $C_{CB0} = f(V_{CB0})$
**Emitter-base capacitance** $C_{EB0} = f(V_{EB0})$



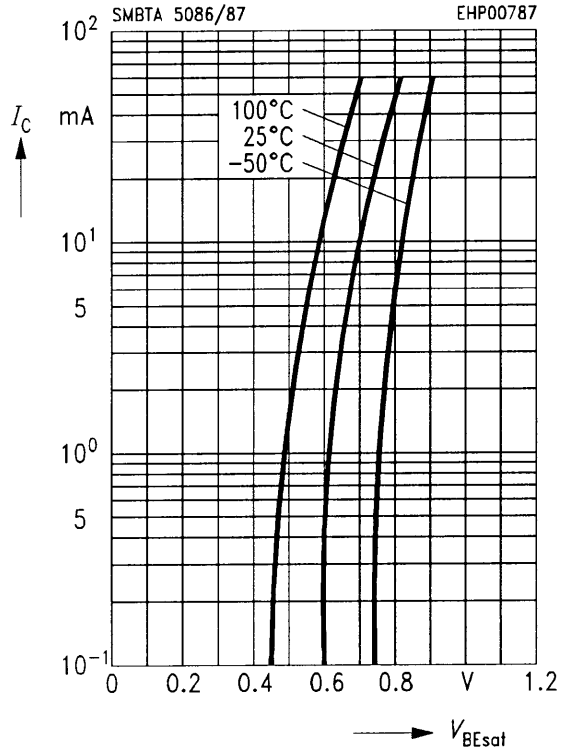

**Permissible pulse load** $P_{tot\,max}/P_{tot\,DC} = f(t_p)$



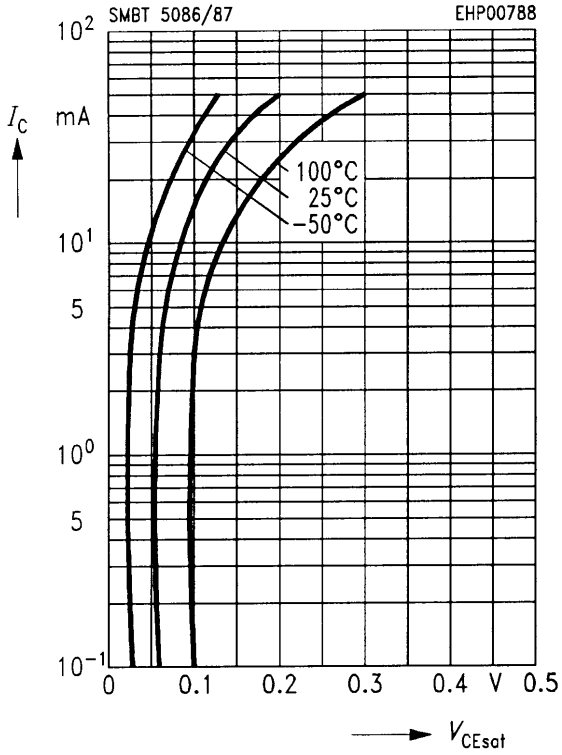

**Transition frequency** $f_T = f(I_C)$
$V_{CE} = 5$ V



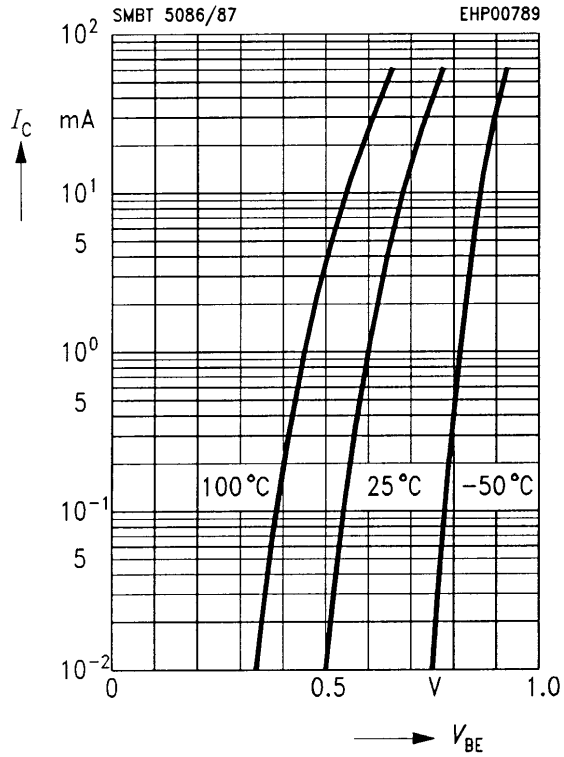
**Base-emitter saturation voltage**
$I_C = f(V_{BE\,sat})$, $h_{FE} = 40$



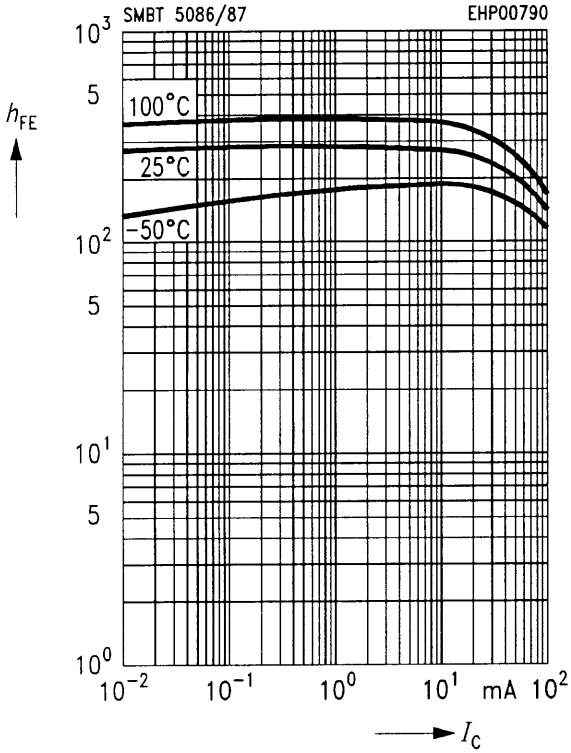

**Collector-emitter saturation voltage**
$I_C = f(V_{CE\,sat})$, $h_{FE} = 40$



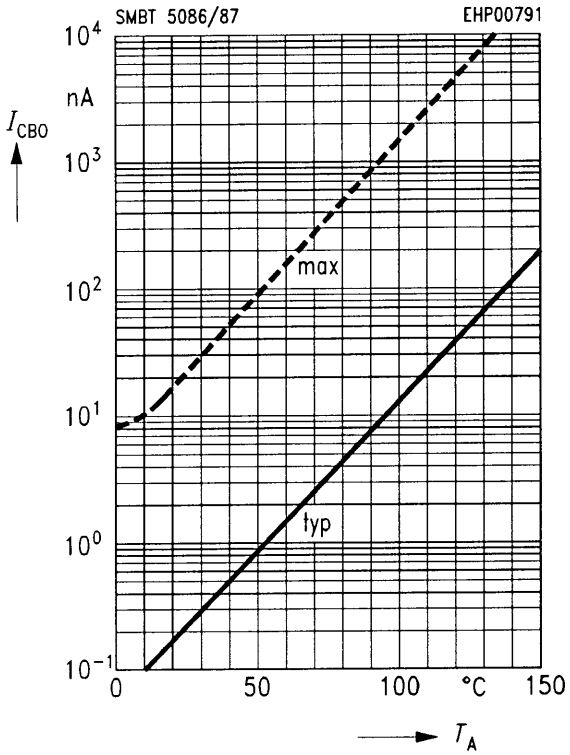

**Collector current** $I_C = f(V_{BE})$
$V_{CE} = 1$ V



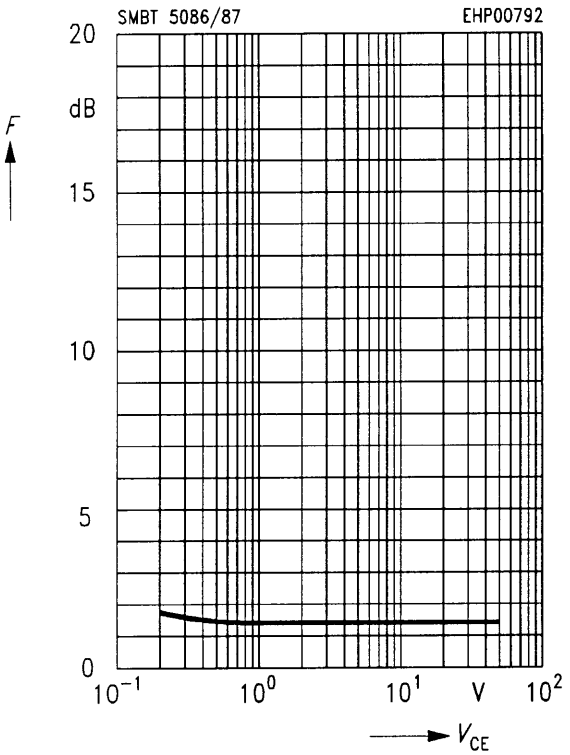

**DC current gain** $h_{FE} = f(I_C)$
$V_{CE} = 1$ V



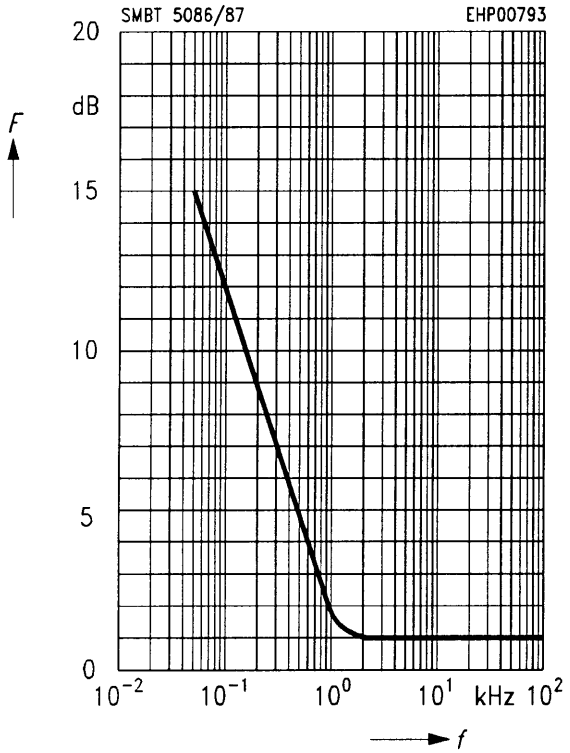
**Collector cutoff current** $I_{CB0} = f(T_A)$



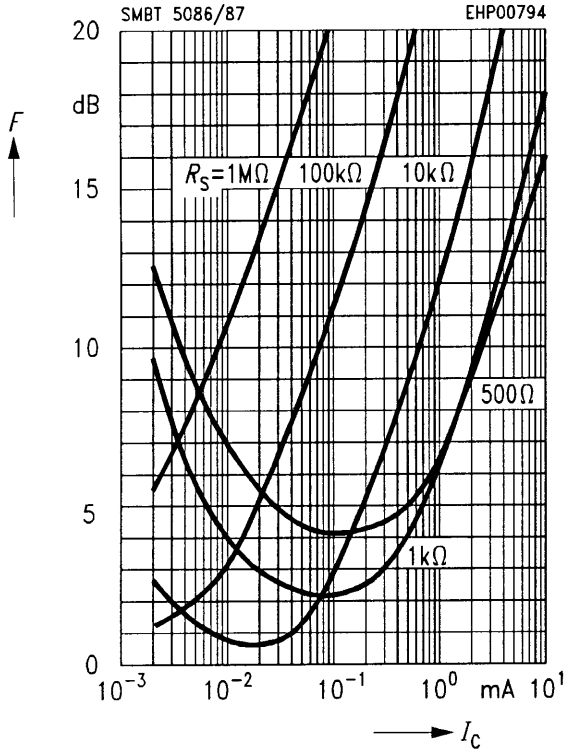

**Noise figure** $NF = f(V_{CE})$
$I_C$ = 0.2 mA, $R_S$ = 2 kΩ, $f$ = 1 kHz



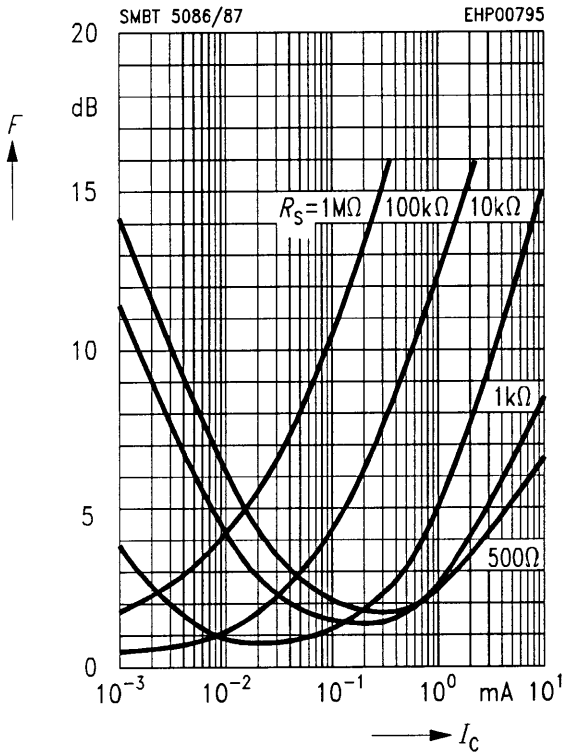

**Noise figure** $NF = f(I_C)$
$I_C$ = 0.2 mA, $R_S$ = 2 kΩ, $V_{CE}$ = 5 V




**Noise figure** $NF = f(I_C)$
$V_{CE}$ = 5 V, $f$ = 120 kHz



**Noise figure** $NF = f(I_C)$
$V_{CE}$ = 5 V, $f$ = 1 kHz




**Noise figure** $NF = f(I_C)$
$V_{CE}$ = 5 V, $f$ = 10 kHz