

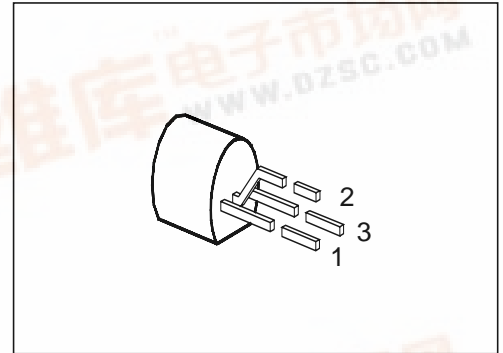
SIEMENS

NPN Silicon AF Transistors

BCX 58

BCX 59

- High current gain
- Low collector-emitter saturation voltage
- Complementary types: BCX 78, BCX 79 (PNP)



| Type | Marking | Ordering Code | Pin Configuration | | | Package ¹⁾ |
|-------------|---------|---------------|-------------------|---|---|-----------------------|
| | | | 1 | 2 | 3 | |
| BCX 58 VIII | — | Q62702-C619 | C | B | E | TO-92 |
| BCX 58 IX | | Q62702-C620 | | | | |
| BCX 58 X | | Q62702-C621 | | | | |
| BCX 59 VIII | | Q62702-C623 | | | | |
| BCX 59 IX | | Q62702-C624 | | | | |
| BCX 59 X | | Q62702-C625 | | | | |

Maximum Ratings

| Parameter | Symbol | Values | | Unit |
|---|-----------|----------------|--------|--------------------|
| | | BCX 58 | BCX 59 | |
| Collector-emitter voltage | V_{CE0} | 32 | 45 | V |
| Collector-base voltage | V_{CB0} | 32 | 45 | |
| Emitter-base voltage | V_{EB0} | 7 | | |
| Collector current | I_C | 100 | | mA |
| Peak collector current | I_{CM} | 200 | | |
| Peak base current | I_{BM} | 200 | | |
| Total power dissipation, $T_C = 70\text{ }^{\circ}\text{C}$ | P_{tot} | 500 | | mW |
| Junction temperature | T_j | 150 | | $^{\circ}\text{C}$ |
| Storage temperature range | T_{stg} | − 65 ... + 150 | | |

Thermal Resistance

| | | | |
|-------------------------------|-------------|-------|-----|
| Junction - ambient | $R_{th JA}$ | ≤ 250 | K/W |
| Junction - case ²⁾ | $R_{th JC}$ | ≤ 160 | |

¹⁾ For detailed information see chapter Package Outlines.

²⁾ Mounted on Al heat sink 15 mm × 25 mm × 0.5 mm.



Electrical Characteristicsat $T_A = 25\text{ °C}$, unless otherwise specified.

| Parameter | Symbol | Values | | | Unit |
|-----------|--------|--------|------|------|------|
| | | min. | typ. | max. | |

DC characteristics

| | | | | | | |
|--|--|---------------|--------------------------|--------------------------|--------------------------|---------------|
| Collector-emitter breakdown voltage $I_C = 2\text{ mA}$ | BCX 58 BCX 59 | $V_{(BR)CE0}$ | 32 45 | — — | — — | V |
| Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}$ | BCX 58 BCX 59 | $V_{(BR)CB0}$ | 32 45 | — — | — — | |
| Emitter-base breakdown voltage $I_E = 1\text{ }\mu\text{A}$ | | $V_{(BR)EB0}$ | 7 | — | — | |
| Collector cutoff current $V_{CB} = 32\text{ V}$ | BCX 58 | I_{CB0} | — | — | 20 | nA |
| $V_{CB} = 45\text{ V}$ | BCX 59 | | — | — | 20 | nA |
| $V_{CB} = 32\text{ V}, T_A = 150\text{ °C}$ | BCX 58 | | — | — | 10 | μA |
| $V_{CB} = 45\text{ V}, T_A = 150\text{ °C}$ | BCX 59 | | — | — | 10 | μA |
| Collector cutoff current $V_{CE} = 32\text{ V}, V_{BE} = 0.2\text{ V}, T_A = 100\text{ °C}$ | | I_{CEX} | — | — | 20 | μA |
| $V_{CE} = 45\text{ V}, V_{BE} = 0.2\text{ V}, T_A = 100\text{ °C}$ | | | — | — | 20 | |
| Emitter cutoff current $V_{EB} = 4\text{ V}$ | | I_{EB0} | — | — | 20 | nA |
| DC current gain $I_C = 10\text{ }\mu\text{A}, V_{CE} = 5\text{ V}$ | BCX 58 VII, BCX 59 VII BCX 58 VIII, BCX 59 VIII BCX 58 IX, BCX 59 IX BCX 58 X, BCX 59 X | h_{FE} | 20 20 40 100 | 78 145 220 300 | — — — — | |
| $I_C = 2\text{ mA}, V_{CE} = 5\text{ V}$ | BCX 58 VII, BCX 59 VII BCX 58 VIII, BCX 59 VIII BCX 58 IX, BCX 59 IX BCX 58 X, BCX 59 X | | 120 180 250 380 | 170 250 350 500 | 220 310 460 630 | |
| $I_C = 100\text{ mA}, V_{CE} = 1\text{ V}^{1)}$ | BCX 58 VII, BCX 59 VII BCX 58 VIII, BCX 59 VIII BCX 58 IX, BCX 59 IX BCX 58 X, BCX 59 X | | 40 45 60 60 | — — — — | — — — — | |

1) Pulse test: $t \leq 300\text{ }\mu\text{s}$, $D \leq 2\text{ %}$.

Electrical Characteristicsat $T_A = 25\text{ °C}$, unless otherwise specified.

| Parameter | Symbol | Values | | | Unit |
|-----------|--------|--------|------|------|------|
| | | min. | typ. | max. | |

DC characteristics

| | | | | | |
|---|--------------|----------------|----------------------|----------------|---|
| Collector-emitter saturation voltage ¹⁾ $I_C = 100\text{ mA}$, $I_B = 2.5\text{ mA}$ | V_{CEsat} | — | — | 0.5 | V |
| Base-emitter saturation voltage ¹⁾ $I_C = 100\text{ mA}$, $I_B = 2.5\text{ mA}$ | V_{BEsat} | — | — | 1.0 | |
| Base-emitter voltage $I_C = 10\text{ }\mu\text{A}$, $V_{CE} = 5\text{ V}$ $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$ $I_C = 100\text{ mA}$, $V_{CE} = 1\text{ V}$ ¹⁾ | $V_{BE(on)}$ | — 0.55 — | 0.52 0.65 0.83 | — 0.75 — | |

¹⁾ Pulse test: $t \leq 300\text{ }\mu\text{s}$, $D \leq 2\text{ }\%$.

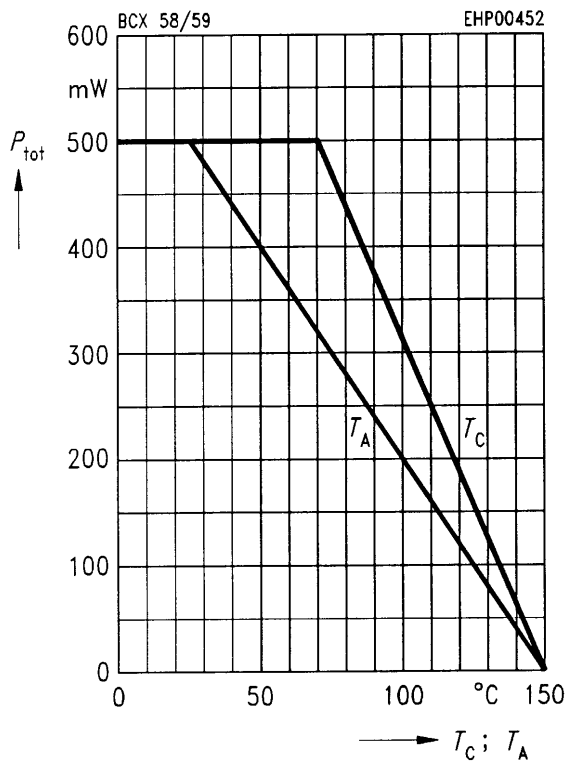
Electrical Characteristicsat $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified.

| Parameter | Symbol | Values | | | Unit |
|-----------|--------|--------|------|------|------|
| | | min. | typ. | max. | |

AC characteristics

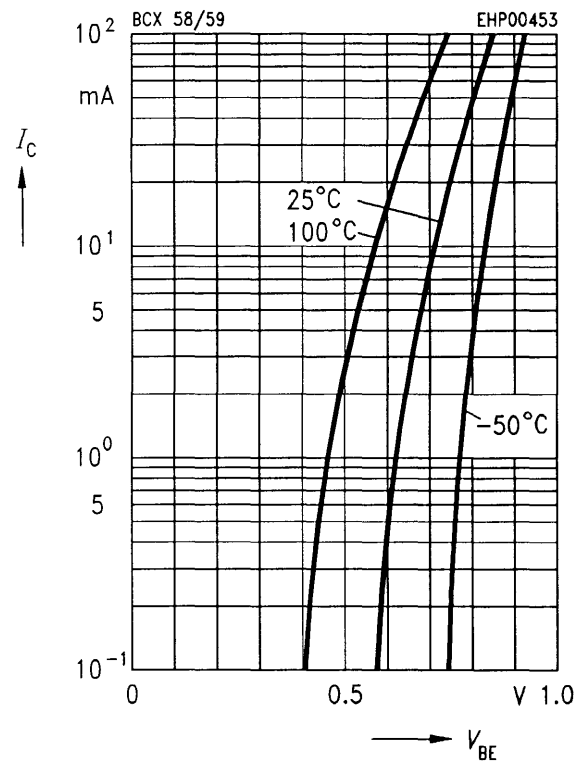
| | | | | | |
|--|-----------|------------------|--------------------------|------------------|---------------|
| Transition frequency $I_C = 20\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 100\text{ MHz}$ | f_T | — | 200 | — | MHz |
| Output capacitance $V_{CB} = 10\text{ V}$, $f = 1\text{ MHz}$ | C_{obo} | — | 3 | — | pF |
| Input capacitance $V_{CB} = 0.5\text{ V}$, $f = 1\text{ MHz}$ | C_{ibo} | — | 8 | — | |
| Short-circuit input impedance $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ BCX 58 VII, BCX 59 VII BCX 58 VIII, BCX 59 VIII BCX 58 IX, BCX 59 IX BCX 58 X, BCX 59 X | h_{11e} | — — — — | 2.7 3.6 4.5 7.5 | — — — — | k Ω |
| Open-circuit reverse voltage transfer ratio $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ BCX 58 VII, BCX 59 VII BCX 58 VIII, BCX 59 VIII BCX 58 IX, BCX 59 IX BCX 58 X, BCX 59 X | h_{12e} | — — — — | 1.5 2.0 2.0 3.0 | — — — — | 10^{-4} |
| Short-circuit forward current transfer ratio $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ BCX 58 VII, BCX 59 VII BCX 58 VIII, BCX 59 VIII BCX 58 IX, BCX 59 IX BCX 58 X, BCX 59 X | h_{21e} | — — — — | 200 260 330 520 | — — — — | — |
| Open-circuit output admittance $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ BCX 58 VII, BCX 59 VII BCX 58 VIII, BCX 59 VIII BCX 58 IX, BCX 59 IX BCX 58 X, BCX 59 X | h_{22e} | — — — — | 18 24 30 50 | — — — — | μS |
| Noise figure $I_C = 0.2\text{ mA}$, $V_{CE} = 5\text{ V}$, $R_S = 2\text{ k}\Omega$ $f = 1\text{ kHz}$, $\Delta f = 200\text{ Hz}$ | F | — | 2 | — | dB |

Total power dissipation $P_{\text{tot}} = f(T_A; T_C)$

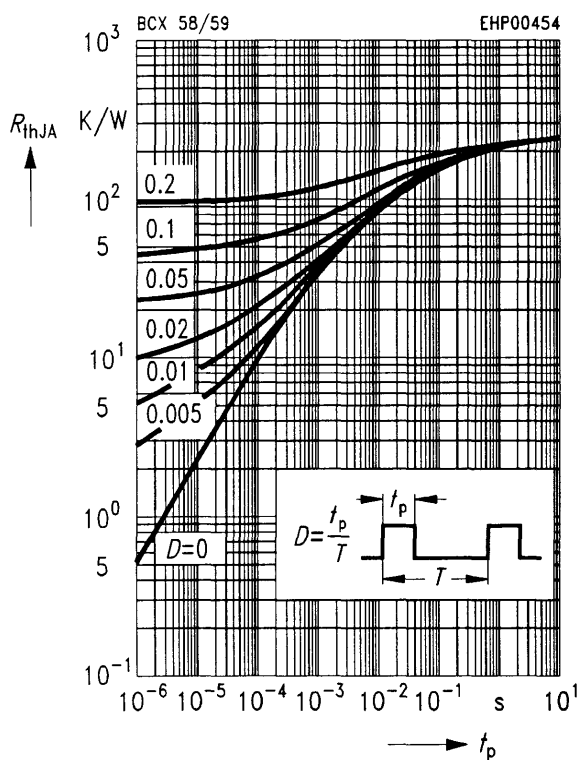


Collector current $I_C = f(V_{\text{BE}})$

$V_{\text{CE}} = 5 \text{ V}$ (common emitter configuration)

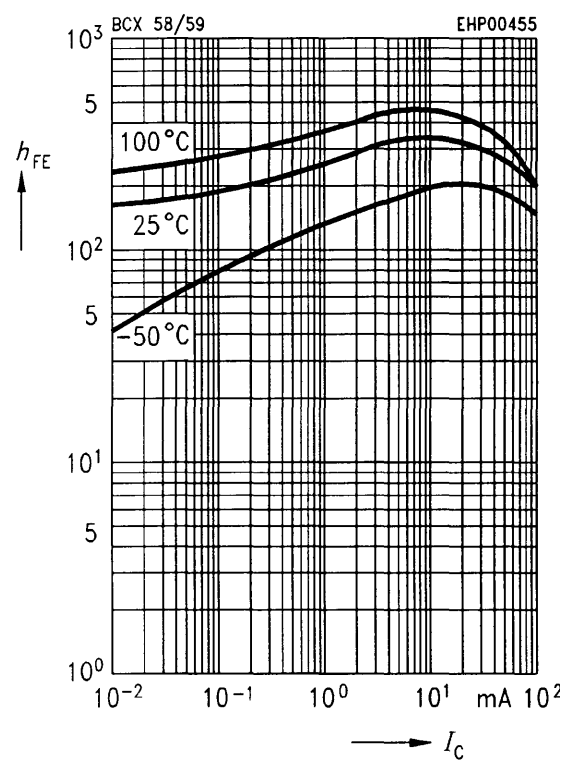


Permissible pulse load $R_{\text{thJA}} = f(t_p)$

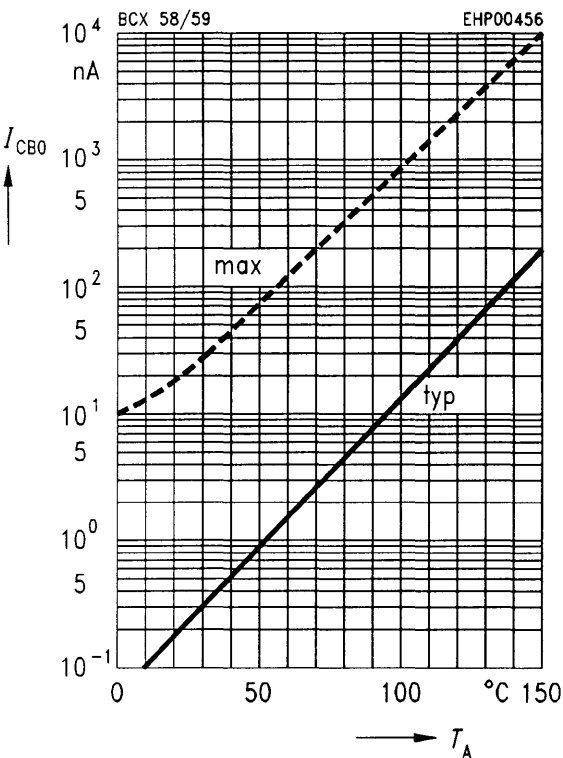


DC current gain $h_{\text{FE}} = f(I_C)$

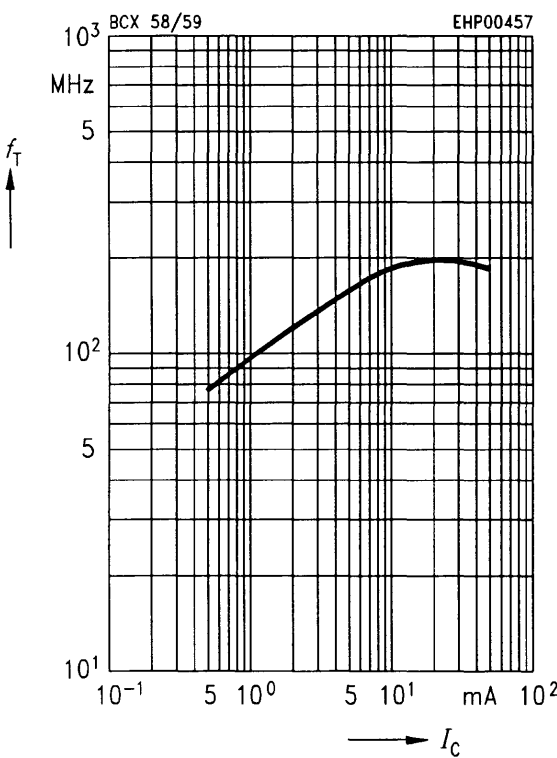
$V_{\text{CE}} = 5 \text{ V}$ (common emitter configuration)



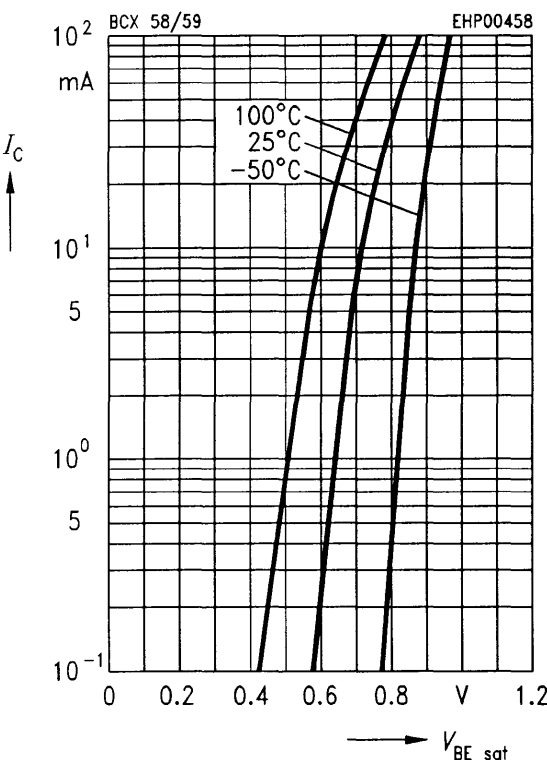
Collector cutoff current $I_{CB0} = f(T_A)$
 $V_{CB} = 45 \text{ V}$



Transition frequency $f_T = f(I_C)$
 $V_{CE} = 5 \text{ V}, f = 100 \text{ MHz}$



Base-emitter saturation voltage
 $I_C = f(V_{BEsat})$
 $h_{FE} = 20$



Collector-emitter saturation voltage
 $I_C = f(V_{CEsat})$
 $h_{FE} = 20$

