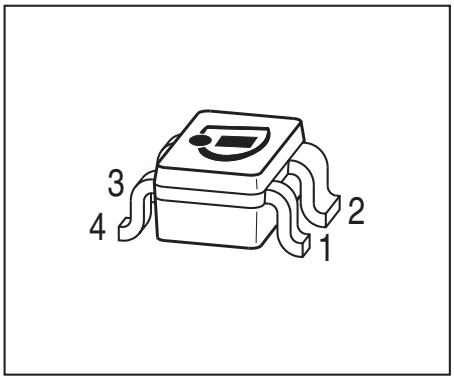
**NPN Silicon RF Transistor***




- For low voltage / low current applications
- Ideal for ESD protected low noise amplification
- Low noise figure: 1.1 dB at 1.8 GHz
- Excellent ESD performance
  typical value 1500V (HBM)
- High $f_T$ of 22 GHz
- Pb-free (RoHS compliant) package [1)]
- Qualified according AEC Q101

* Short term description

**ESD** (**E**lectro**s**tatic **d**ischarge) sensitive device, observe handling precaution!

| Type | Marking | Pin Configuration | | | | | | Package |
|---|---|---|---|---|---|---|---|---|
| BFP460 | ABs | 1 = E | 2 = C | 3 = E | 4=B | - | - | SOT343 |

**Maximum Ratings**

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector-emitter voltage | $V_{CEO}$ | | V |
| $T_A$ > 0 °C | | 4.5 | |
| $T_A$ ≤ 0 °C | | 4.2 | |
| Collector-emitter voltage | $V_{CES}$ | 15 | |
| Collector-base voltage | $V_{CBO}$ | 15 | |
| Emitter-base voltage | $V_{EBO}$ | 1.5 | |
| Collector current | $I_C$ | 50 | mA |
| Base current | $I_B$ | 5 | |
| Total power dissipation[2)] $T_S$ ≤ 100°C | $P_{tot}$ | 200 | mW |
| Junction temperature | $T_j$ | 150 | °C |
| Ambient temperature | $T_A$ | -65 ... 150 | |
| Storage temperature | $T_{stg}$ | -65 ... 150 | |

[1]Pb-containing package may be available upon special request
[2]$T_S$ is measured on the collector lead at the soldering point to the pcb

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## Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Junction - soldering point[1)] | $R_{thJS}$ | ≤ 250 | K/W |

**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, $I_B$ = 0 | $V_{(BR)CEO}$ | 4.5 | 5.8 | - | V |
| Collector-emitter cutoff current<br>$V_{CE}$ = 15 V, $V_{BE}$ = 0 | $I_{CES}$ | - | - | 10 | µA |
| Collector-base cutoff current<br>$V_{CB}$ = 5 V, $I_E$ = 0 | $I_{CBO}$ | - | - | 100 | nA |
| Emitter-base cutoff current<br>$V_{EB}$ = 0,5 V, $I_C$ = 0 | $I_{EBO}$ | - | - | 1 | µA |
| DC current gain<br>$I_C$ = 20 mA, $V_{CE}$ = 3 V, pulse measured | $h_{FE}$ | 90 | 120 | 160 | - |

[1]For calculation of $R_{thJA}$ please refer to Application Note Thermal Resistance

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

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **AC Characteristics** (verified by random sampling) | | | | | |
| Transition frequency<br>$I_C$ = 30 mA, $V_{CE}$ = 3 V, $f$ = 1 GHz | $f_T$ | 16 | 22 | - | GHz |
| Collector-base capacitance<br>$V_{CB}$ = 3 V, $f$ = 1 MHz, $V_{BE}$ = 0 ,<br>emitter grounded | $C_{cb}$ | - | 0.32 | 0.45 | pF |
| Collector emitter capacitance<br>$V_{CE}$ = 3 V, $f$ = 1 MHz, $V_{BE}$ = 0 ,<br>base grounded | $C_{ce}$ | - | 0.28 | - | |
| Emitter-base capacitance<br>$V_{EB}$ = 0.5 V, $f$ = 1 MHz, $V_{CB}$ = 0 ,<br>collector grounded | $C_{eb}$ | - | 0.55 | - | |
| Noise figure<br>$I_C$ = 5 mA, $V_{CE}$ = 3 V, $Z_S$ = $Z_{Sopt}$ ,<br>$f$ = 1.8 GHz<br>$f$ = 3 GHz | $F$ | <br><br>-<br>- | <br><br>1.1<br>1.35 | <br><br>-<br>- | dB |
| Power gain, maximum stable[1)]<br>$I_C$ = 20 mA, $V_{CE}$ = 3 V, $Z_S$ = $Z_{Sopt}$,<br>$Z_L$ = $Z_{Lopt}$, $f$ = 1.8 GHz | $G_{ms}$ | - | 17.5 | - | dB |
| Power gain, maximum available[1)]<br>$I_C$ = 20 mA, $V_{CE}$ = 3 V, $Z_S$ = $Z_{Sopt}$,<br>$Z_L$ = $Z_{Lopt}$ , $f$ = 3 GHz | $G_{ma}$ | - | 12.5 | - | dB |
| Transducer gain<br>$I_C$ = 20 mA, $V_{CE}$ = 3 V, $Z_S$ = $Z_L$ = 50Ω,<br>$f$ = 1,8 GHz<br>$f$ = 3 GHz | $\lvert S_{21e}\rvert^2$ | <br><br>-<br>- | <br><br>15<br>10.5 | <br><br>-<br>- | dB |
| Third order intercept point at output[2)]<br>$V_{CE}$ = 3 V, $I_C$ = 20 mA, $f$ = 1.8 GHz | $IP_3$ | - | 27.5 | - | dBm |
| 1dB Compression point at output<br>$I_C$ = 20 mA, $V_{CE}$ = 3 V, $f$ = 1.8 GHz | $P_{-1dB}$ | - | 11.5 | - | |

[1] $G_{ma} = \lvert S_{21} / S_{12} \rvert (k-(k^2-1)^{1/2})$, $G_{ms} = \lvert S_{21} / S_{12} \rvert$

[2] IP3 value depends on termination of all intermodulation frequency components.
Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

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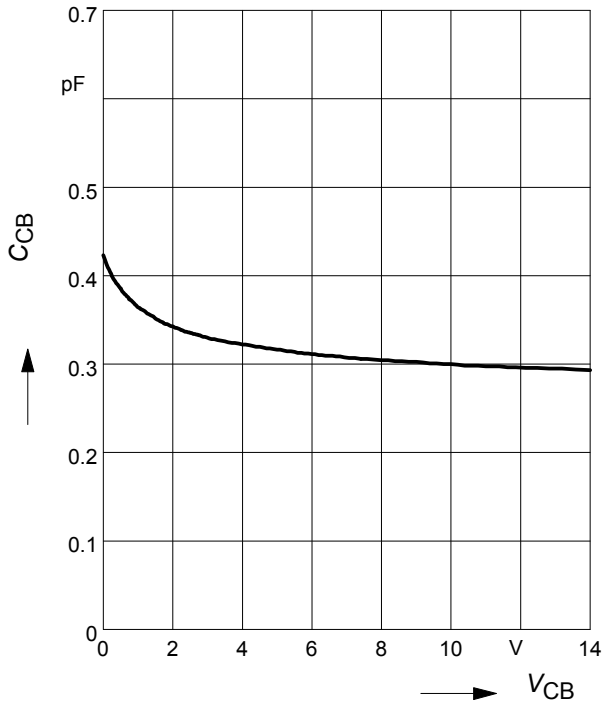
**Collector-base capacitance** $C_{cb}= f(V_{CB})$

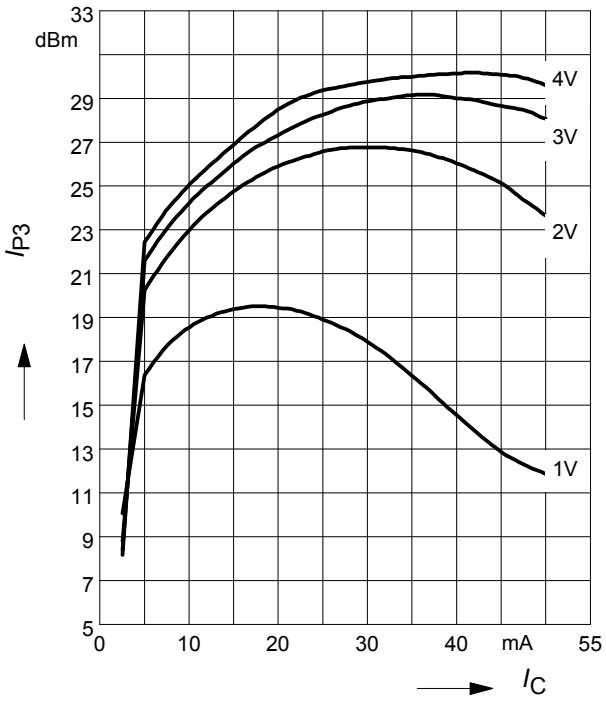
$f$ = 1MHz




**Third order Intercept Point** $IP_3=f(I_C)$

(Output, $Z_S=Z_L=50\Omega$)

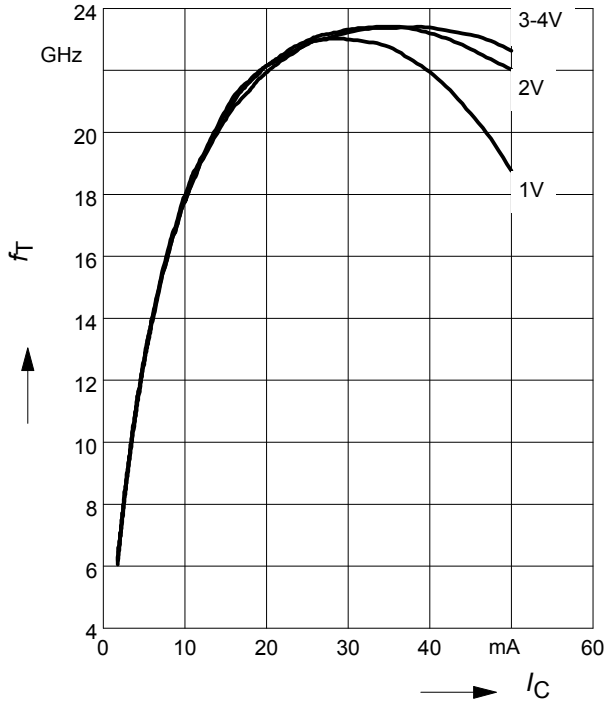
$V_{CE}$ = parameter, $f$ = 1800MHz -




**Transition frequency** $f_T= f(I_C)$

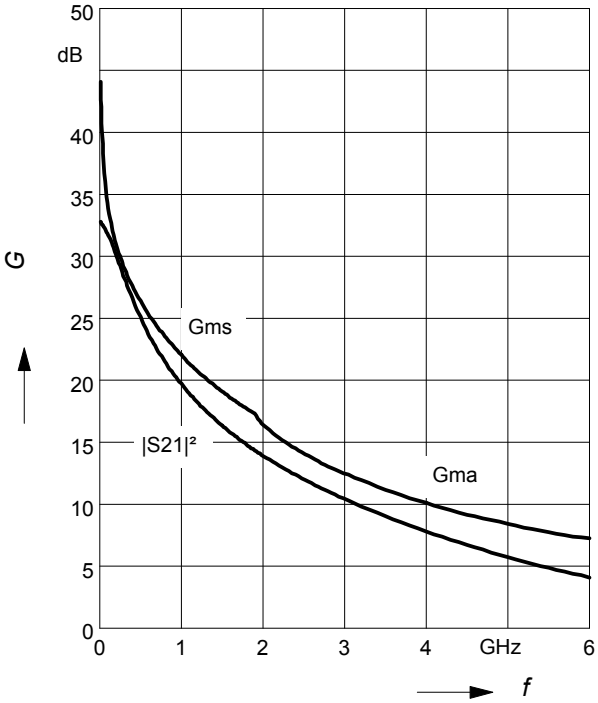
$f$ = 1 GHz

$V_{CE}$ = parameter in V




**Power gain** $G_{ma}$, $G_{ms}$, $|S_{21}|^2 = f(f)$

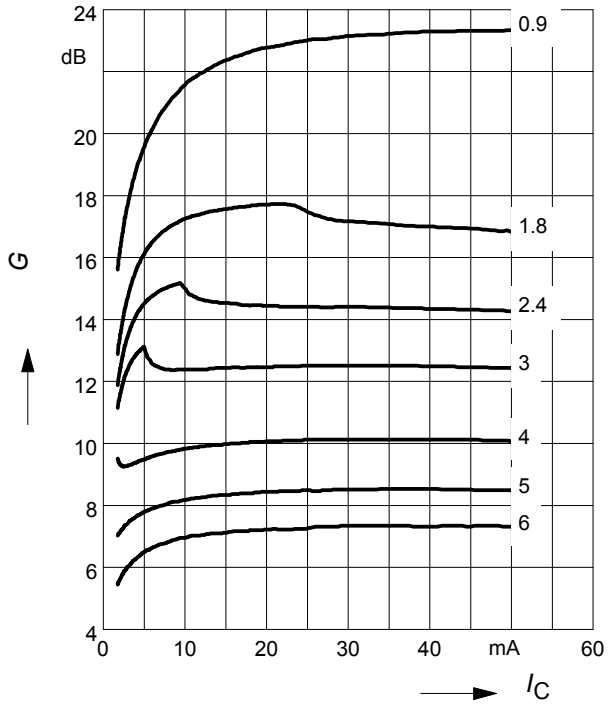
$V_{CE}$ = 3 V, $I_C$ = 20 mA



**Power gain** $G_{ma}$, $G_{ms}$ = $f$ ($I_C$)

$V_{CE}$ = 3V

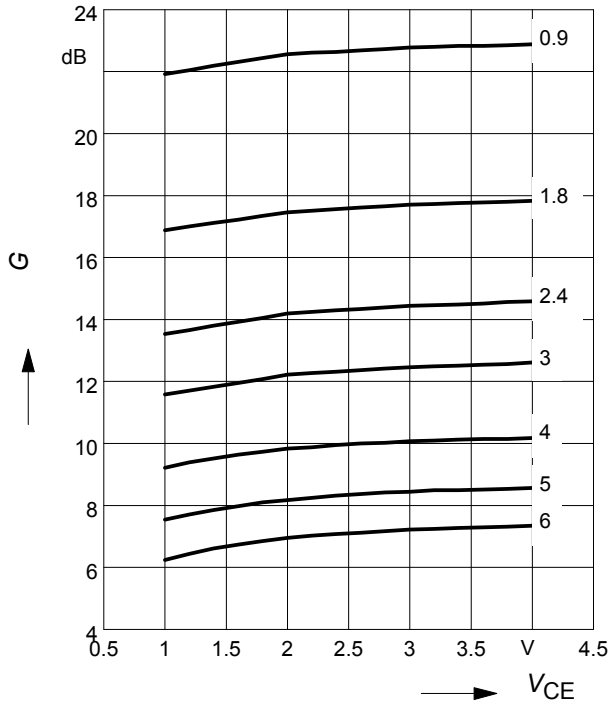
$f$ = parameter in GHz



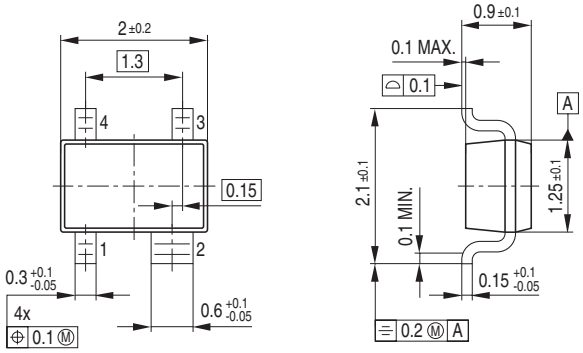

**Power gain** $G_{ma}$, $G_{ms}$ = $f$ ($V_{CE}$)

$I_C$ = 20 mA

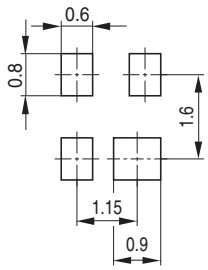
$f$ = parameter in GHz



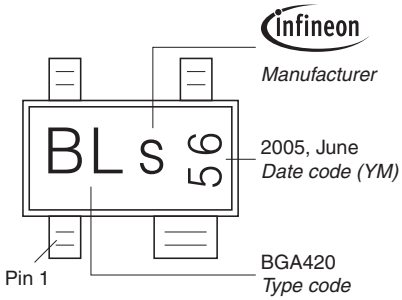
## Package Outline




## Foot Print

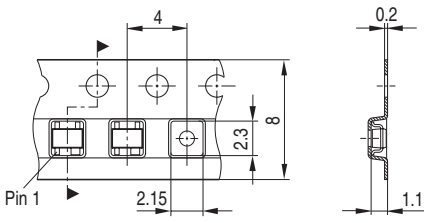



## Marking Layout (Example)




## Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel

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