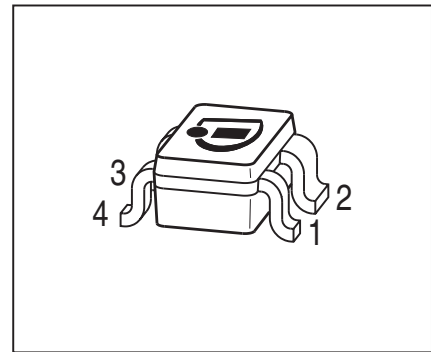


NPN Silicon RF Transistor

- Low current device suitable e.g. for handhelds
- For high frequency oscillators e.g. DRO for LNB
- For ISM band applications like Automatic Meter Reading, Sensors etc.
- Transit frequency $f_T = 25$ GHz
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



ESD (Electrostatic discharge) sensitive device, observe handling precaution!

Type	Marking	Pin Configuration						Package
BFP410	AKs	1=B	2=E	3=C	4=E	-	-	SOT343

Maximum Ratings at $T_A = 25$ °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Collector-emitter voltage $T_A = 25$ °C $T_A = -55$ °C	V_{CEO}	4.5 4.1	V
Collector-emitter voltage	V_{CES}	13	
Collector-base voltage	V_{CBO}	13	
Emitter-base voltage	V_{EBO}	1.5	
Collector current	I_C	40	mA
Base current	I_B	6	
Total power dissipation ¹⁾ $T_S \leq 100$ °C	P_{tot}	150	mW
Junction temperature	T_J	150	°C
Ambient temperature	T_A	-55 ... 150	
Storage temperature	T_{Stg}	-55 ... 150	

¹⁾ T_S is measured on the emitter lead at the soldering point to the pcb

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point ¹⁾	R_{thJS}	335	K/W

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage $I_C = 1 \text{ mA}, I_B = 0$	$V_{(BR)CEO}$	4.5	5	-	V
Collector-emitter cutoff current $V_{CE} = 2 \text{ V}, V_{BE} = 0$ $V_{CE} = 5 \text{ V}, V_{BE} = 0, T_A = 85^\circ\text{C}$ (verified by random sampling)	I_{CES}	-	1	30	nA
		-	2	50	
Collector-base cutoff current $V_{CB} = 2 \text{ V}, I_E = 0$	I_{CBO}	-	1	30	
Emitter-base cutoff current $V_{EB} = 0.5 \text{ V}, I_C = 0$	I_{EBO}	-	0.001	0.6	μA
DC current gain $I_C = 13 \text{ mA}, V_{CE} = 2 \text{ V}$, pulse measured	h_{FE}	60	95	130	-

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

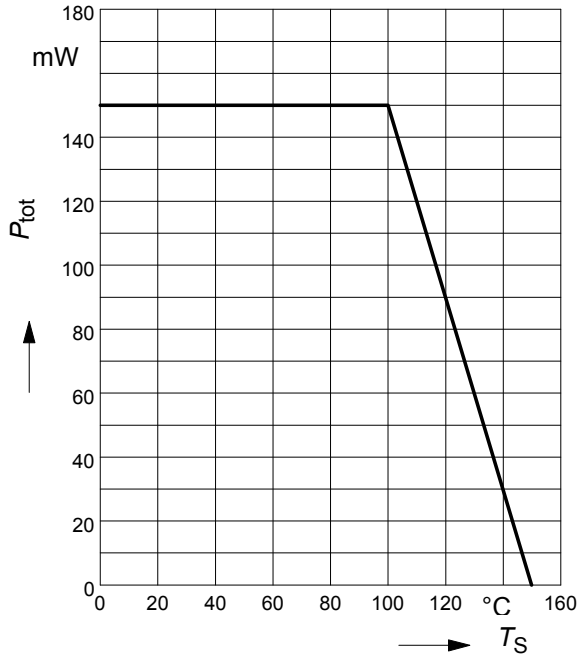
Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (verified by random sampling)					
Transition frequency $I_C = 20 \text{ mA}$, $V_{CE} = 2 \text{ V}$, $f = 2 \text{ GHz}$	f_T	18	25	-	GHz
Collector-base capacitance $V_{CB} = 2 \text{ V}$, $f = 1 \text{ MHz}$, $V_{BE} = 0$, emitter grounded	C_{cb}	-	0.09	0.17	pF
Collector emitter capacitance $V_{CE} = 2 \text{ V}$, $f = 1 \text{ MHz}$, $V_{BE} = 0$, base grounded	C_{ce}	-	0.35	-	
Emitter-base capacitance $V_{EB} = 0.5 \text{ V}$, $f = 1 \text{ MHz}$, $V_{CB} = 0$, collector grounded	C_{eb}	-	0.45	-	
Noise figure $I_C = 2 \text{ mA}$, $V_{CE} = 2 \text{ V}$, $f = 2 \text{ GHz}$, $Z_S = Z_{Sopt}$	F	-	1.2	-	dB
Power gain, maximum stable ¹⁾ $I_C = 20 \text{ mA}$, $V_{CE} = 2 \text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 2 \text{ GHz}$	G_{ms}	-	21.5	-	dB
Insertion power gain $V_{CE} = 2 \text{ V}$, $I_C = 20 \text{ mA}$, $f = 2 \text{ GHz}$, $Z_S = Z_L = 50 \Omega$	$ S_{21} ^2$	-	18.5	-	
Third order intercept point at output ²⁾ $V_{CE} = 2 \text{ V}$, $I_C = 20 \text{ mA}$, $f = 2 \text{ GHz}$, $Z_S = Z_L = 50 \Omega$	IP_3	-	23.5	-	dBm
1dB Compression point at output $I_C = 20 \text{ mA}$, $V_{CE} = 2 \text{ V}$, $Z_S = Z_L = 50 \Omega$, $f = 2 \text{ GHz}$	P_{-1dB}	-	10.5	-	

$$^1G_{ms} = |S_{21} / S_{12}|$$

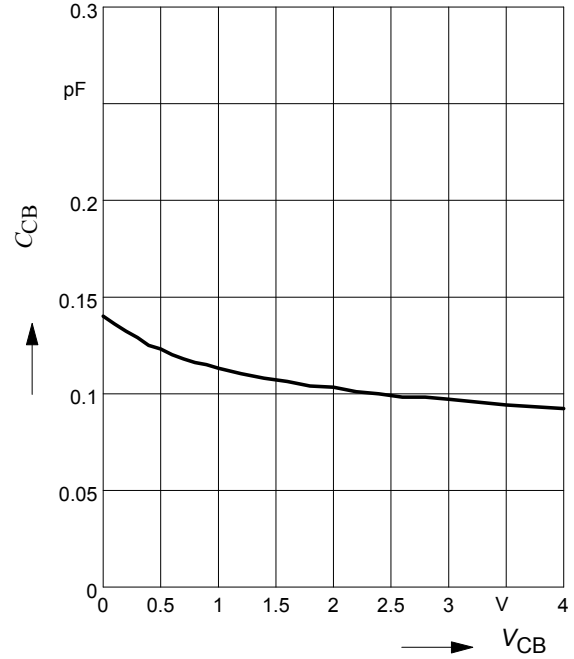
²IP3 value depends on termination of all intermodulation frequency components.
Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

Total power dissipation $P_{tot} = f(T_S)$



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

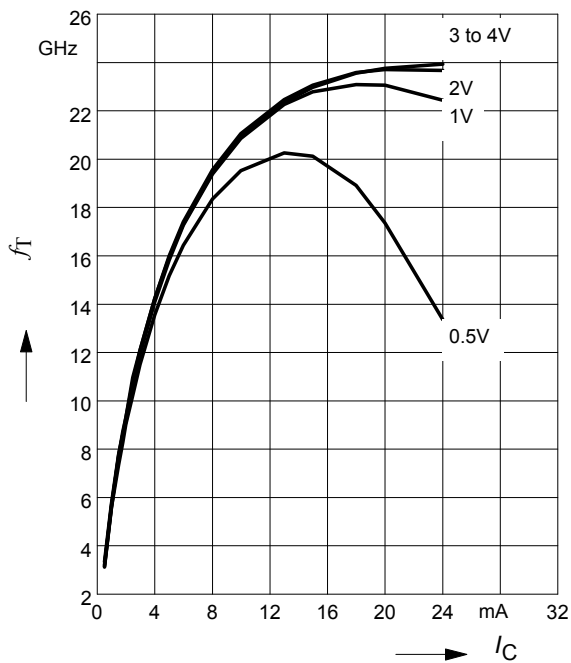
$f = 1\text{MHz}$



Transition frequency $f_T = f(I_C)$

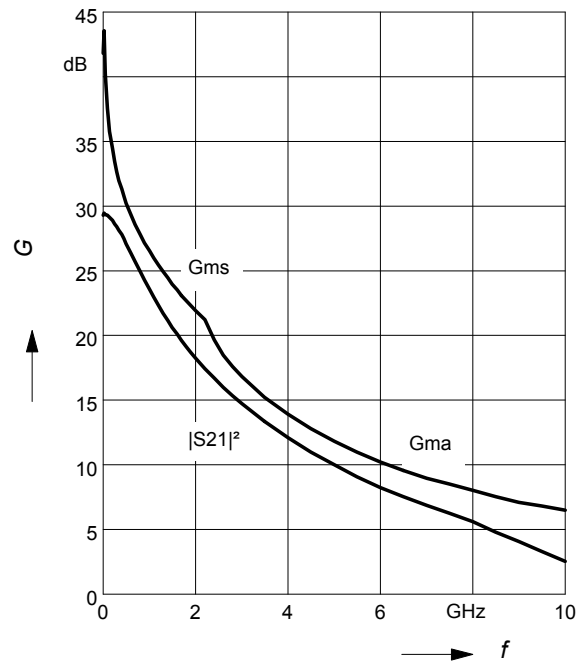
$f = 2\text{GHz}$

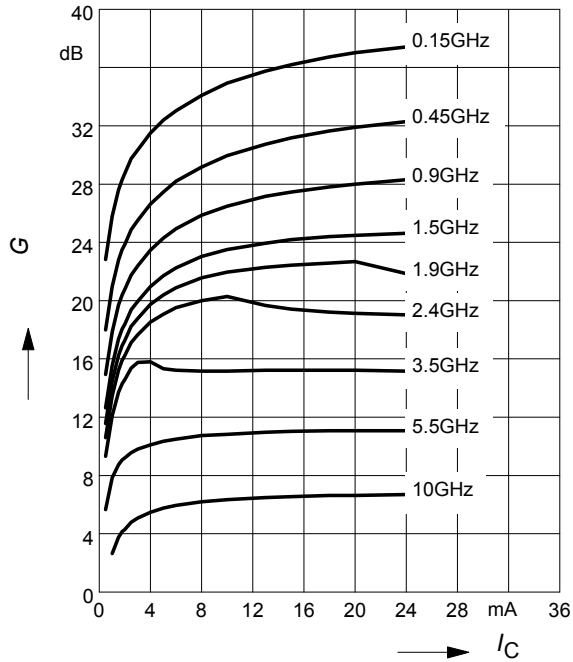
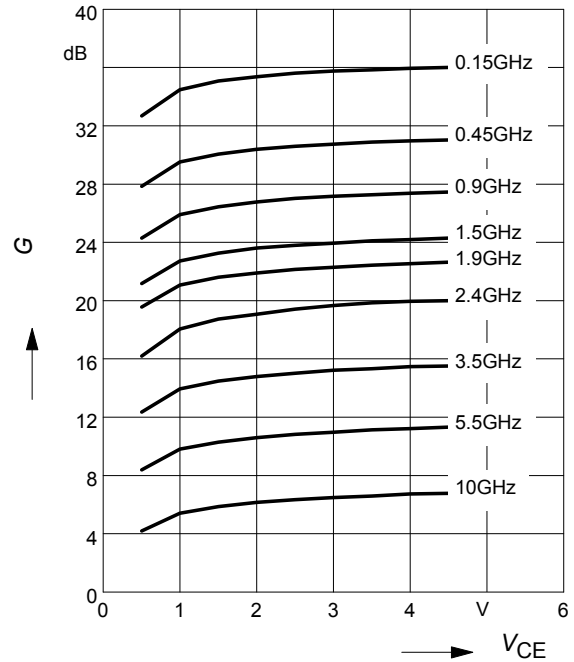
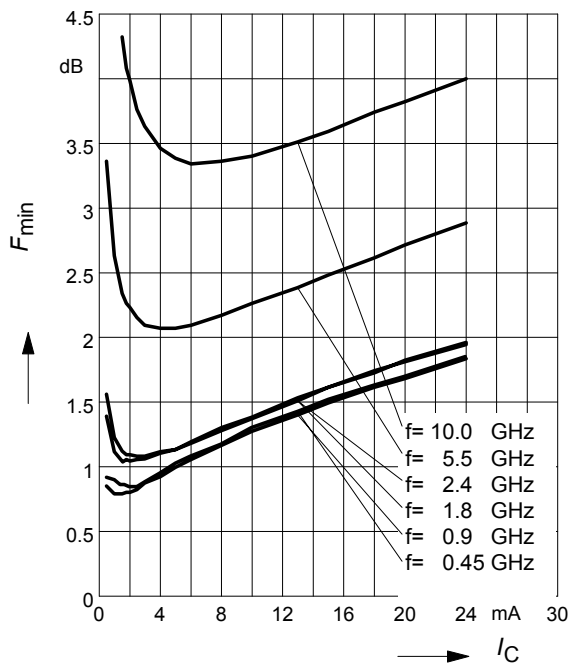
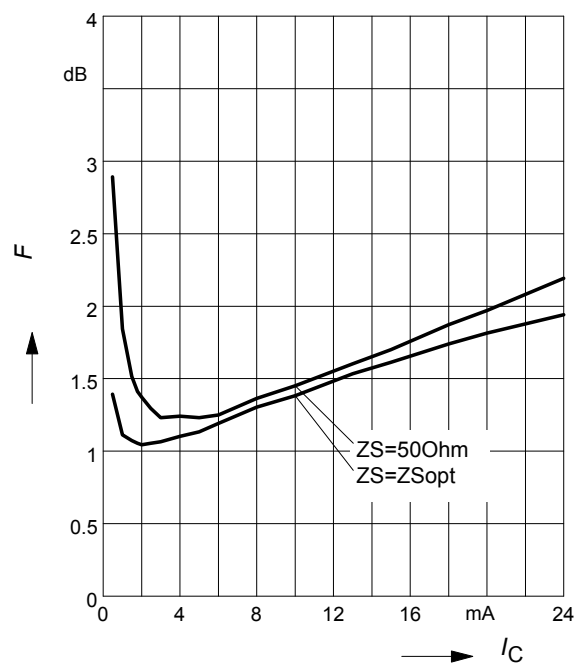
$V_{CE} = \text{parameter in V}$



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

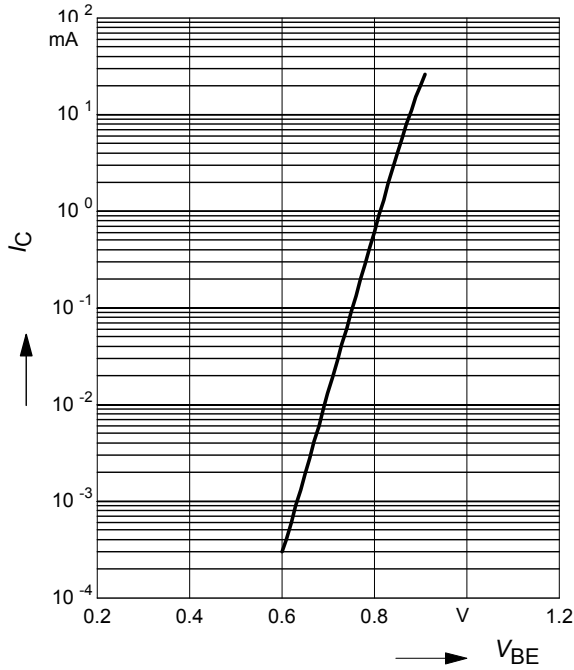
$V_{CE} = 2\text{V}, I_C = 13\text{mA}$



Power gain G_{ma} , $G_{ms} = f(I_C)$
 $V_{CE} = 2V$
 $f = \text{parameter in GHz}$

Power gain G_{ma} , $G_{ms} = f(V_{CE})$
 $I_C = 13 \text{ mA}$
 $f = \text{parameter in GHz}$

Noise figure $F = f(I_C)$
 $V_{CE} = 2V, Z_S = Z_{Sopt}$

Noise figure $F = f(I_C)$
 $V_{CE} = 2V, f = 2 \text{ GHz}$


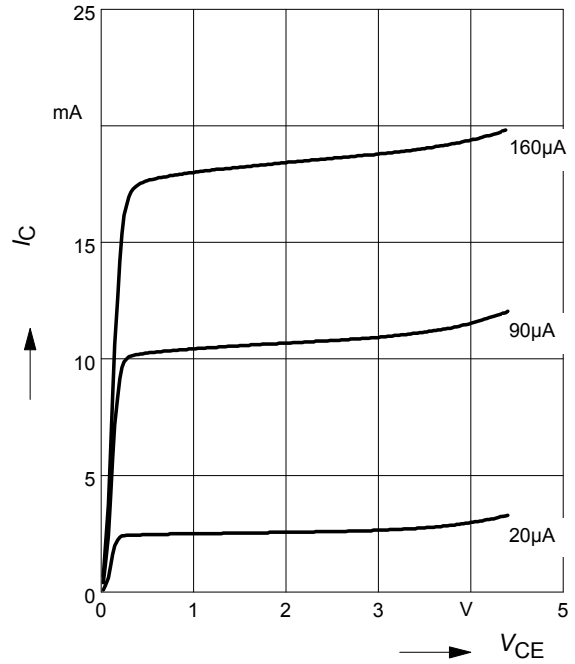
Collector current $I_C = f(V_{BE})$

$V_{CE} = 2\text{ V}$



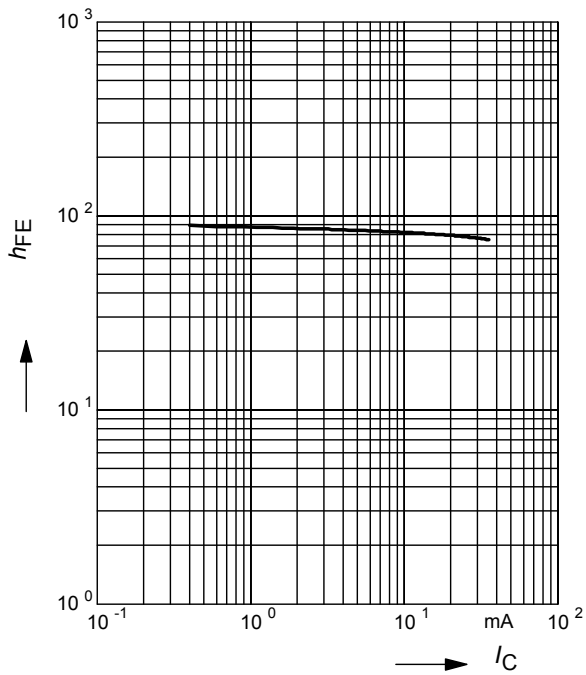
Collector current $I_C = f(V_{CE})$

Parameter I_B

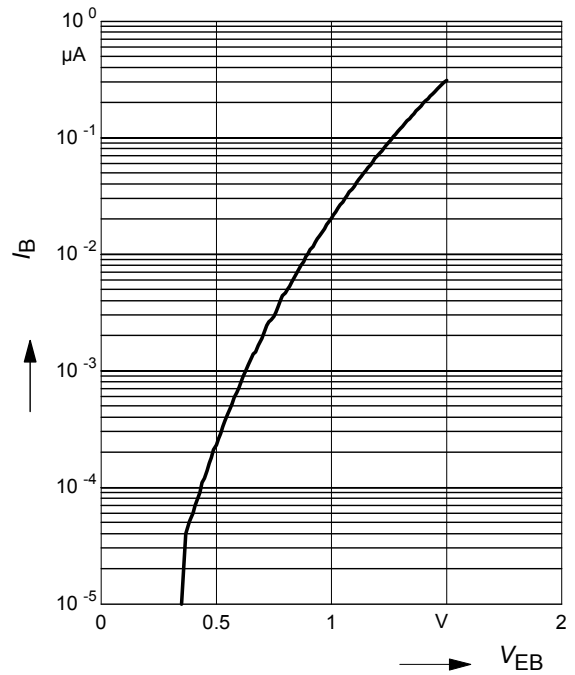


DC current gain $h_{FE} = f(I_C)$

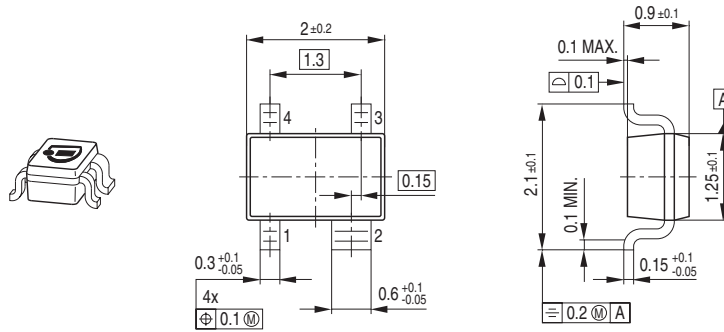
$V_{CE} = 2\text{ V}$



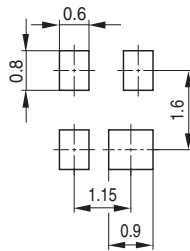
Base current reverse $I_B = f(V_{EB})$



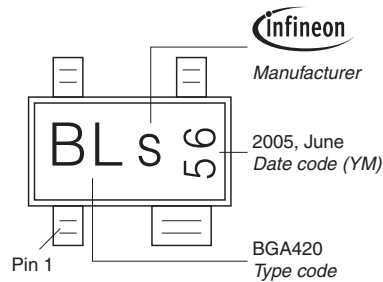
Package Outline



Foot Print

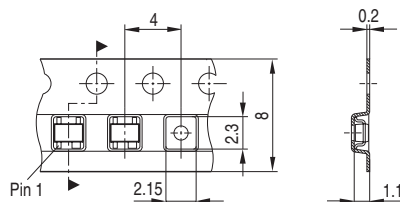


Marking Layout (Example)



Standard Packing

Reel \varnothing 180 mm = 3.000 Pieces/Reel
 Reel \varnothing 330 mm = 10.000 Pieces/Reel



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