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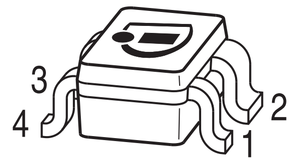
NPN Silicon Germanium RF Transistor



- High gain ultra low noise RF transistor
- Provides outstanding performance for a wide range of wireless applications up to 10 GHz and more
- Ideal for CDMA and WLAN applications
- Outstanding noise figure F = 0.5 dB at 1.8 GHz
  Outstanding noise figure F = 0.85 dB at 6 GHz
- High maximum stable gain
  G_{ms} = 27 dB at 1.8 GHz
- Gold metallization for extra high reliability
- 150 GHz f_T-Silicon Germanium technology
- Pb-free (RoHS compliant) package [1)]
- Qualified according AEC Q101

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

Type	Marking	Pin Configuration						Package
BFP740	R7s	1=B	2=E	3=C	4=E	-	-	SOT343

[1]Pb-containing package may be available upon special request

2009-12-04

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}		V
T_A > 0°C		4	
$T_A \leq$ 0°C		3.5	
Collector-emitter voltage	V_{CES}	13	
Collector-base voltage	V_{CBO}	13	
Emitter-base voltage	V_{EBO}	1.2	
Collector current	I_C	30	mA
Base current	I_B	3	
Total power dissipation[1] $T_S \leq$ 89°C	P_{tot}	160	mW
Junction temperature	T_j	150	°C
Ambient temperature	T_A	-65 ... 150	
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point[2]	R_{thJS}	$\leq$ 380	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 I_C = 1 mA, I_B = 0	$V_{(BR)CEO}$	4	4.7	-	V
Collector-emitter cutoff current V_{CE} = 13 V, V_{BE} = 0	I_{CES}	-	-	30	µA
Collector-base cutoff current V_{CB} = 5 V, I_E = 0	I_{CBO}	-	-	100	nA
Emitter-base cutoff current V_{EB} = 0.5 V, I_C = 0	I_{EBO}	-	-	3	µA
DC current gain I_C = 25 mA, V_{CE} = 3 V, pulse measured	h_{FE}	160	250	400	-

[1] T_S is measured on the collector lead at the soldering point to the pcb

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

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

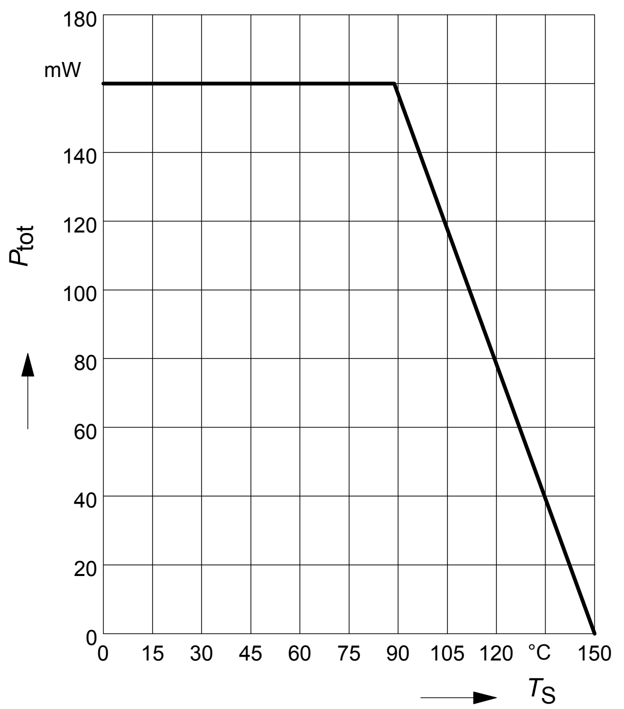
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (verified by random sampling)					
Transition frequency I_C = 25 mA, V_{CE} = 3 V, f = 2 GHz	f_T	-	42	-	GHz
Collector-base capacitance V_{CB} = 3 V, f = 1 MHz, V_{BE} = 0 , emitter grounded	C_{cb}	-	0.08	0.14	pF
Collector emitter capacitance V_{CE} = 3 V, f = 1 MHz, V_{BE} = 0 , base grounded	C_{ce}	-	0.24	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz, V_{CB} = 0 , collector grounded	C_{eb}	-	0.44	-	
Noise figure I_C = 8 mA, V_{CE} = 3 V, f = 1.8 GHz, $Z_S = Z_{Sopt}$ I_C = 8 mA, V_{CE} = 3 V, f = 6 GHz, $Z_S = Z_{Sopt}$	F	 - -	 0.5 0.85	 - -	dB
Power gain, maximum stable[1)] I_C = 25 mA, V_{CE} = 3 V, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, f = 1.8 GHz	G_{ms}	-	27	-	dB
Power gain, maximum available[1)] I_C = 25 mA, V_{CE} = 3 V, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, f = 6 GHz	G_{ma}	-	17	-	dB
Transducer gain I_C = 25 mA, V_{CE} = 3 V, $Z_S = Z_L$ = 50 Ω, f = 1.8 GHz f = 6 GHz	$\|S_{21e}\|^2$	 - -	 24.5 13.5	 - -	dB
Third order intercept point at output[2)] V_{CE} = 3 V, I_C = 25 mA, $Z_S=Z_L$=50 Ω, f = 1.8 GHz	IP_3	-	25	-	dBm
1dB Compression point at output I_C = 25 mA, V_{CE} = 3 V, $Z_S=Z_L$=50 Ω, f = 1.8 GHz	P_{-1dB}	-	11	-	

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

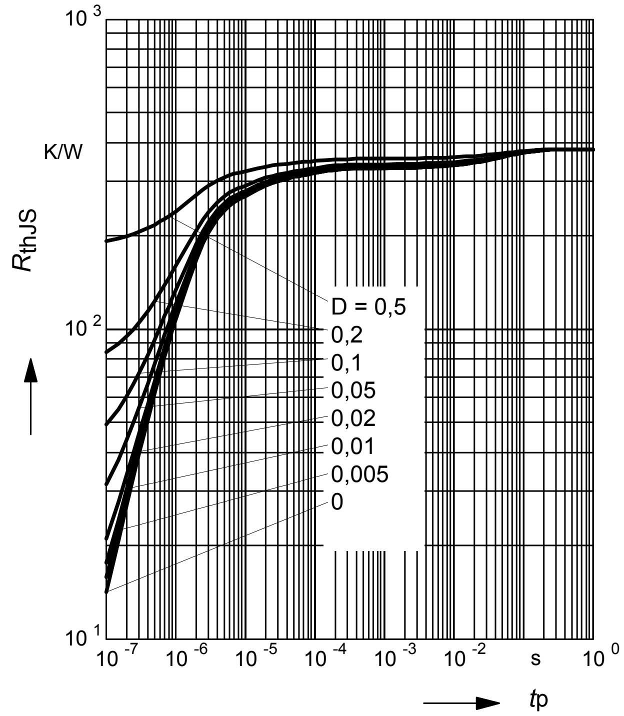
Simulation Data

For SPICE-model as well as for S-parameters including noise parameters refer to our internet website: **www.infineon.com/rf.models.** Please consult our website and download the latest version before actually starting your design.
The simulation data have been generated and verified up to 12 GHz using typical devices. The BFP740 nonlinear SPICE-model reflects the typical DC- and RF-device performance with high accuracy.

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

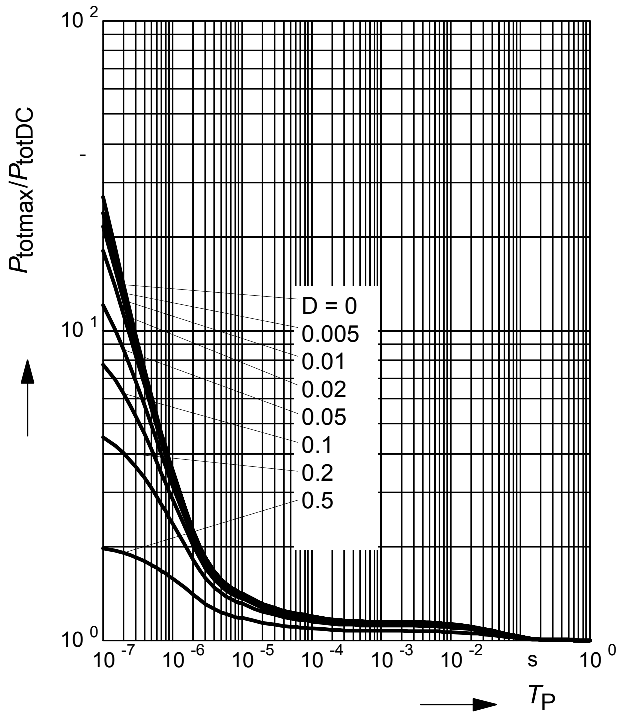


Permissible Pulse Load $R_{thJS} = f(t_p)$



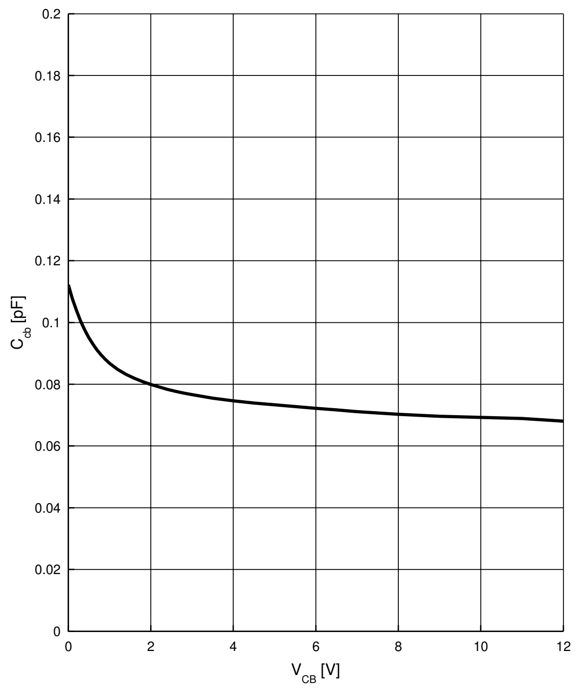
Permissible Pulse Load

$P_{totmax}/P_{totDC} = f(t_p)$

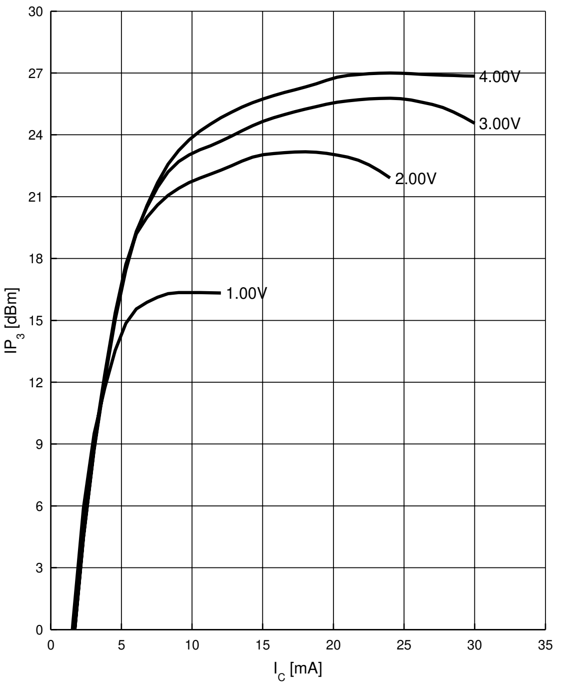


Collector-base capacitance $C_{cb} = f(V_{CB})$

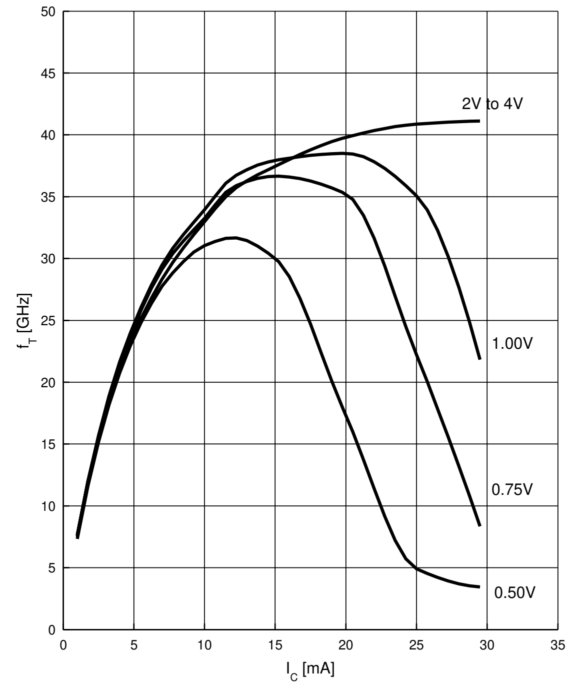
f = 1 MHz



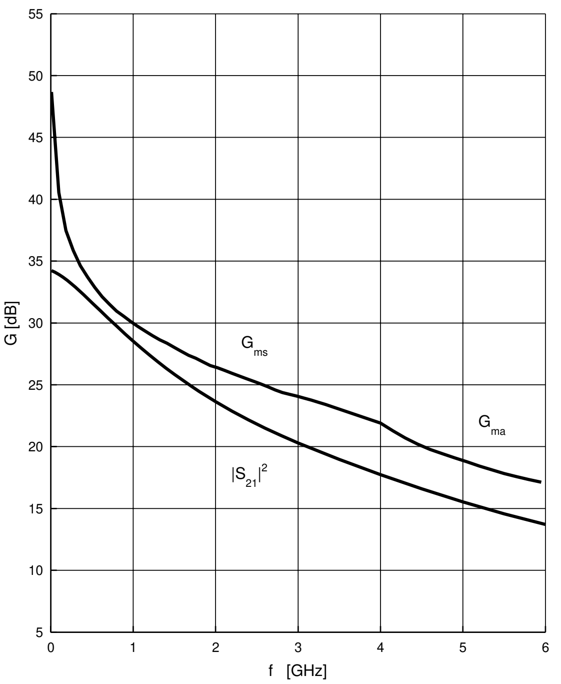
Third order Intercept Point $IP_3 = f\ (I_C)$
(Output, $Z_S = Z_L = 50\ \Omega$)
V_{CE} = parameter, f = 1.8 GHz



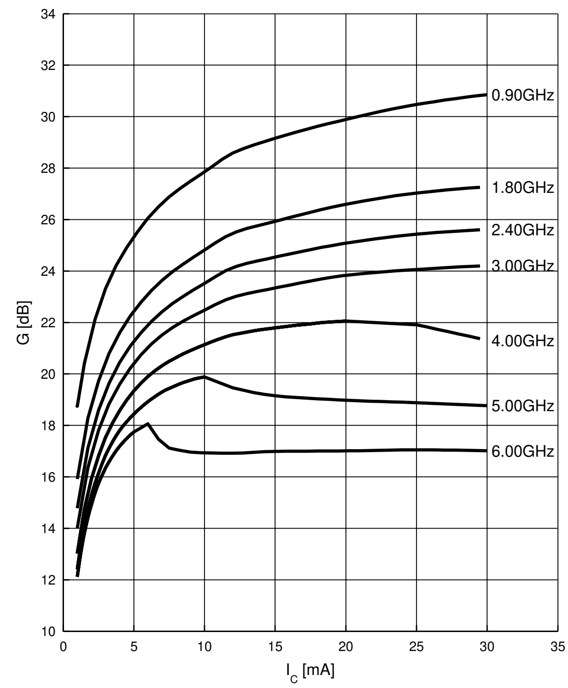
Transition frequency $f_T = f(I_C)$
f = 2 GHz
V_{CE} = parameter



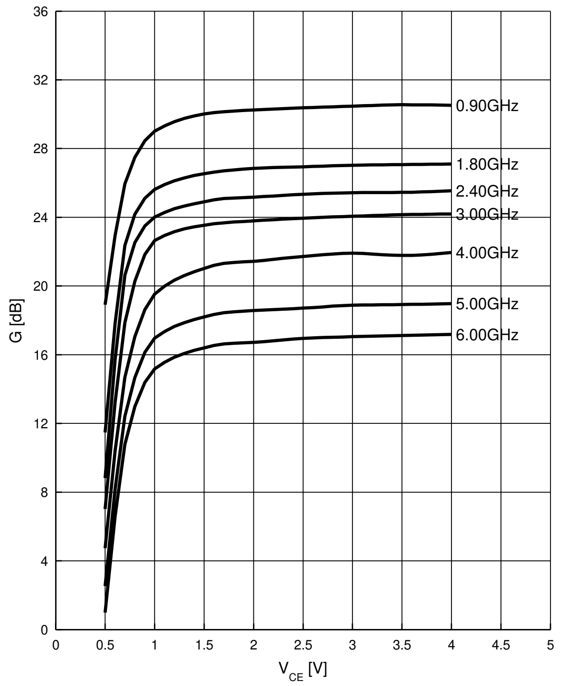
Power gain G_{ma}, $G_{ms} = f\ (f)$
V_{CE} = 3 V, I_C = 25 mA



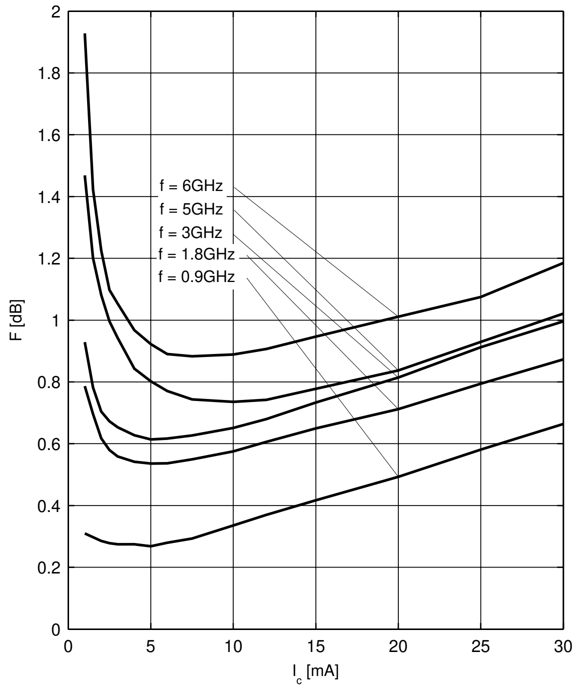
Power gain G_{ma}, $G_{ms} = f\ (I_C)$
V_{CE} = 3 V
f = parameter



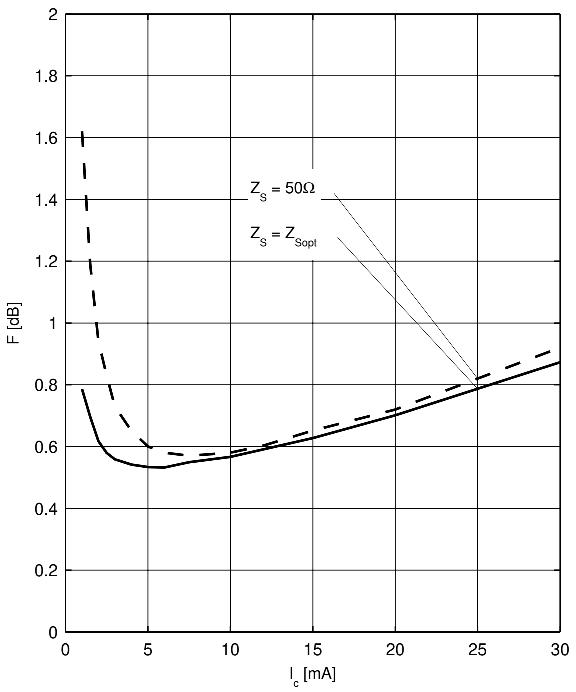
Power gain G_{ma}, $G_{ms} = f\ (V_{CE})$
I_C = 25 mA
f = parameter



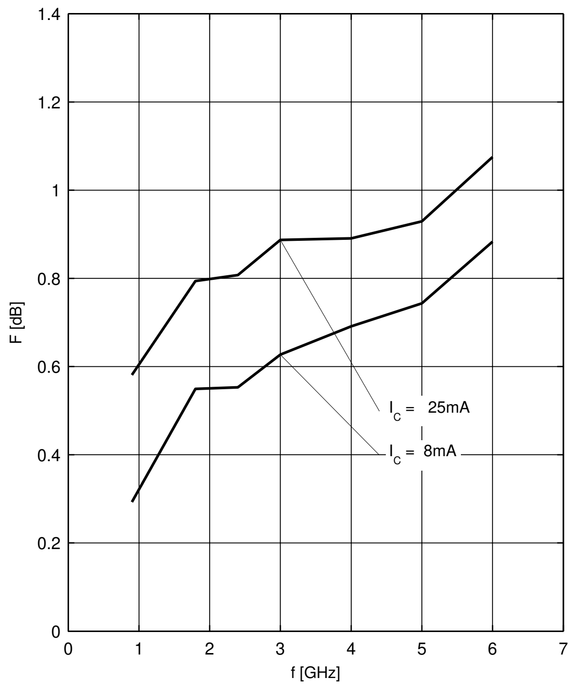
Noise figure $F = f(I_C)$
V_{CE} = 3V, f = parameter
$Z_S = Z_{Sopt}$



Noise figure $F = f(I_C)$
V_{CE} = 3V, f = 1.8 GHz



Noise figure $F = f(f)$
V_{CE} = 3 V, $Z_S = Z_{Sopt}$



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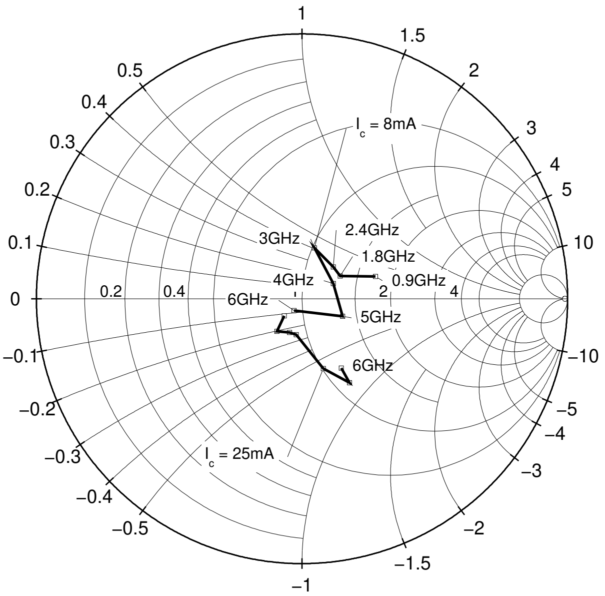
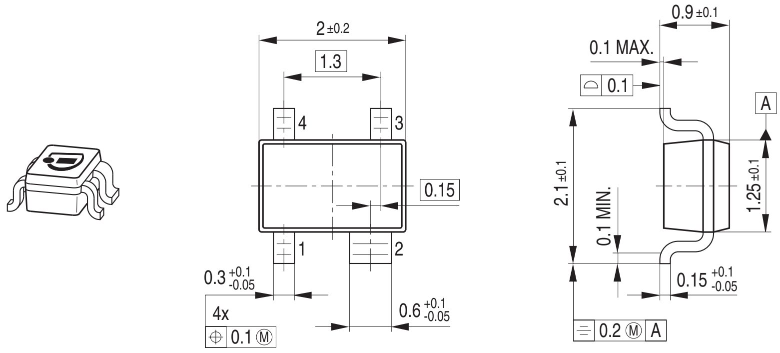
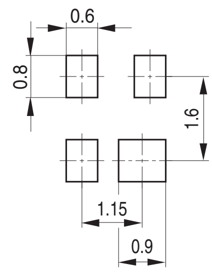
Source impedance for min.
noise figure vs. frequency
V_{CE} = 3 V, I_C = 8 mA / 25 mA



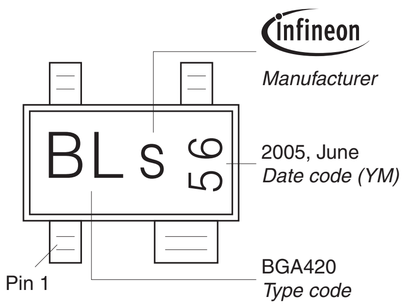
Package Outline



Foot Print

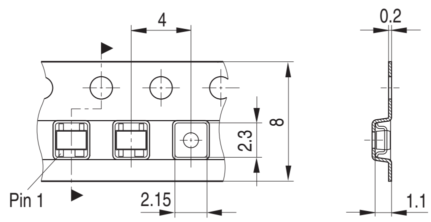


Marking Layout (Example)



Standard Packing

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



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