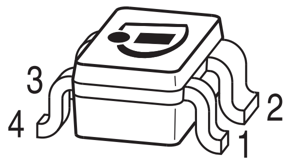
BFP540

NPN Silicon RF Transistor



- For highest gain low noise amplifier
  at 1.8 GHz
- Outstanding G_{ms} = 21.5 dB
  Noise Figure F = 0.9 dB
- Gold metallization for high reliability
- SIEGET ® 45 - Line
- Pb-free (RoHS compliant) package [1)]
- Qualified according AEC Q101

AEC Qualified RoHS

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

Type	**Marking**	**Pin Configuration**						**Package**
BFP540	ATs	1=B	2=E	3=C	4=E	-	-	SOT343

Maximum Ratings

Parameter	**Symbol**	**Value**	**Unit**
Collector-emitter voltage	V_{CEO}		V
T_A > 0°C		4.5	
$T_A \leq$ 0°C		4	
Collector-emitter voltage	V_{CES}	14	
Collector-base voltage	V_{CBO}	14	
Emitter-base voltage	V_{EBO}	1	
Collector current	I_C	80	mA
Base current	I_B	8	
Total power dissipation[2)]	P_{tot}	250	mW
$T_S \leq$ 77°C			
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

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point[1)]	R_{thJS}	≤ 290	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	$V_{(BR)CEO}$	4.5	5	-	V
Collector-emitter cutoff current V_{CE} = 14 V, V_{BE} = 0	I_{CES}	-	-	10	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}	-	-	10	µA
DC current gain I_C = 20 mA, V_{CE} = 3.5 V, pulse measured	h_{FE}	50	110	185	-

[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 I_C = 50 mA, V_{CE} = 4 V, f = 1 GHz	f_T	21	30	-	GHz
Collector-base capacitance V_{CB} = 2 V, f = 1 MHz, V_{BE} = 0 , emitter grounded	C_{cb}	-	0.14	0.24	pF
Collector emitter capacitance V_{CE} = 2 V, f = 1 MHz, V_{BE} = 0 , base grounded	C_{ce}	-	0.33	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz, V_{CB} = 0 , collector grounded	C_{eb}	-	0.65	-	
Noise figure I_C = 5 mA, V_{CE} = 2 V, f = 1.8 GHz, $Z_S = Z_{Sopt}$ I_C = 5 mA, V_{CE} = 2 V, f = 3 GHz, $Z_S = Z_{Sopt}$	F	 - -	 0.9 1.3	 1.4 -	dB
Power gain, maximum stable1) I_C = 20 mA, V_{CE} = 2 V, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, f = 1.8 GHz	G_{ms}	-	21.5	-	dB
Power gain, maximum available1) I_C = 20 mA, V_{CE} = 2 V, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, f = 3 GHz	G_{ma}	-	16	-	dB
Transducer gain I_C = 20 mA, V_{CE} = 2 V, $Z_S = Z_L$ = 50 Ω, f = 1.8 GHz f = 3 GHz	$\|S_{21e}\|^2$	 16 -	 18.5 14.5	 - -	dB
Third order intercept point at output2) V_{CE} = 2 V, I_C = 20 mA, $Z_S=Z_L$=50 Ω, f = 1.8 GHz	IP_3	-	24.5	-	dBm
1dB Compression point at output I_C = 20 mA, V_{CE} = 2 V, $Z_S=Z_L$=50 Ω, f = 1.8 GHz	P_{-1dB}	-	11	-	

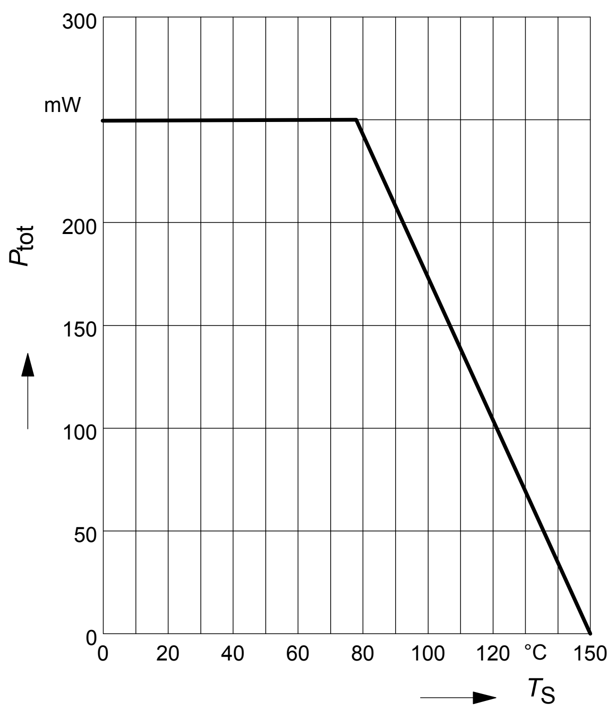
[1] $G_{ma} = |S_{21e} / S_{12e}| (k-(k^2-1)^{1/2})$, $G_{ms} = |S_{21e} / S_{12e}|$

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

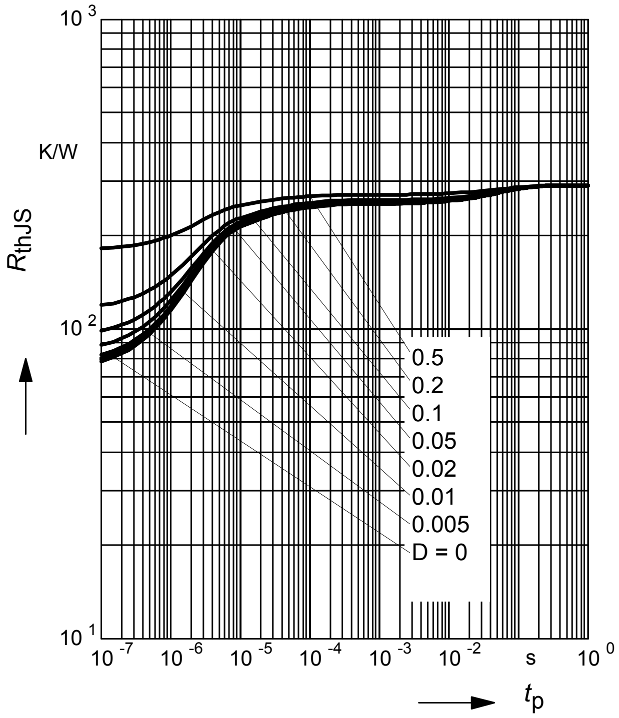
Simulation Data

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 8 GHz using typical devices. The BFP540 nonlinear SPICE-model reflects the typical DC- and RF-device performance with high accuracy.

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

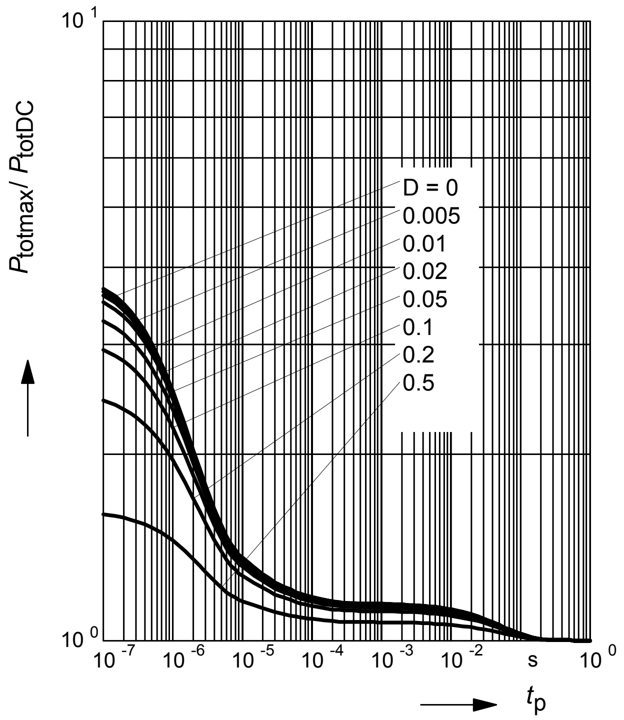


Permissible Pulse Load $R_{thJS} = f(t_p)$



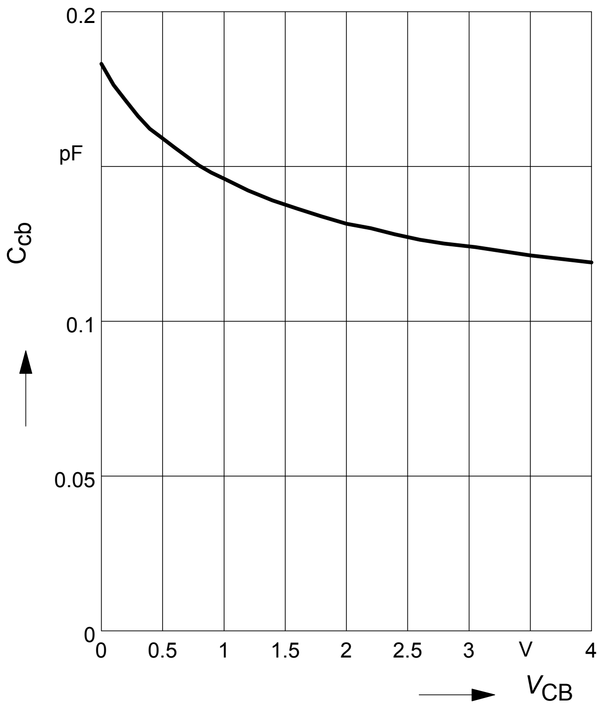
Permissible Pulse Load

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



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

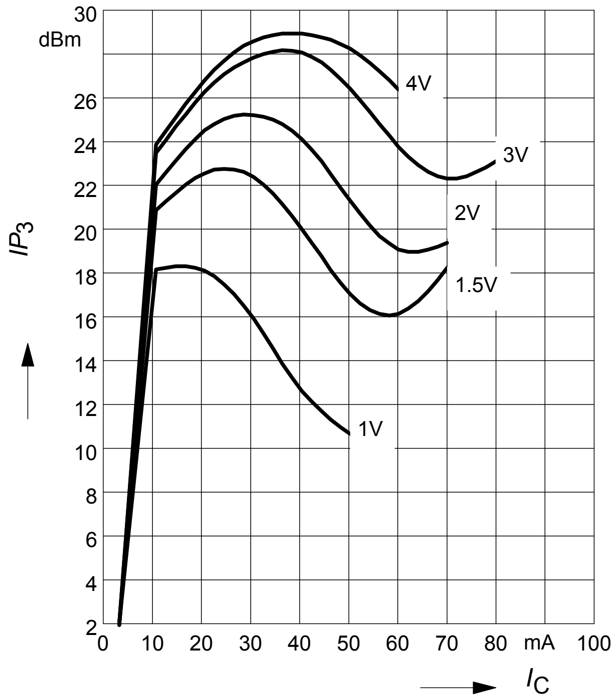
f = 1MHz



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

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

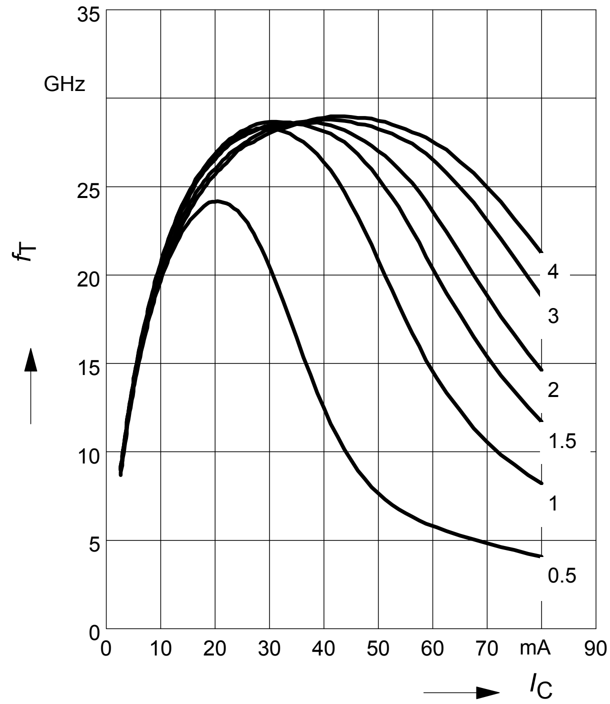
V_{CE} = parameter, f = 1.8GHz



Transition frequency $f_T = f(I_C)$

f = 1GHz

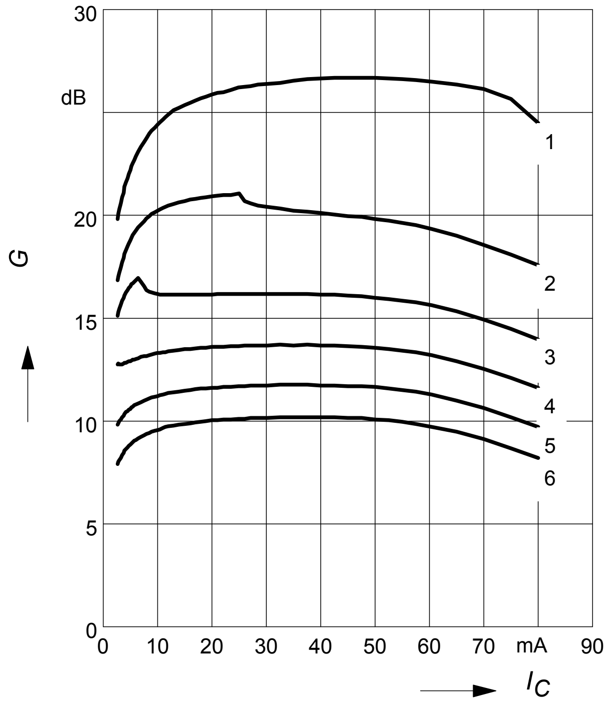
V_{CE} = Parameter in V



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

V_{CE} = 2V

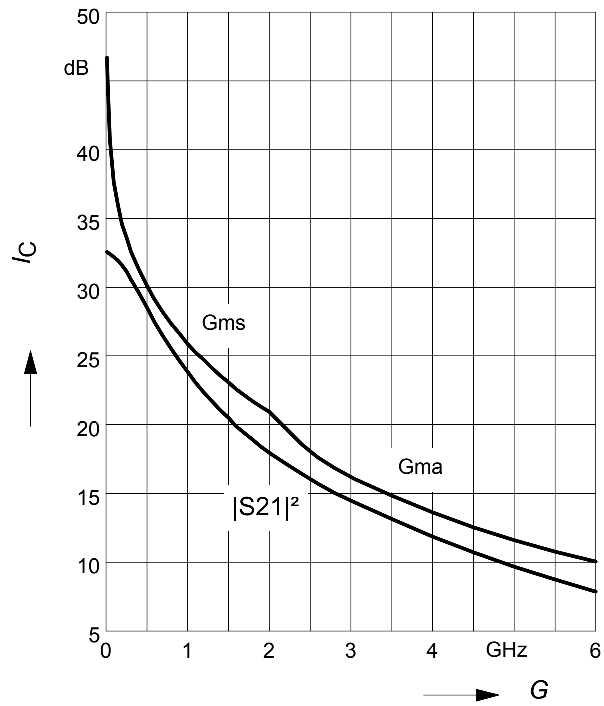
f = Parameter in GHz



Power Gain G_{ma}, $G_{ms} = f(f)$,

$|S_{21}|^2 = f$ (f)

V_{CE} = 2V, I_C = 20mA



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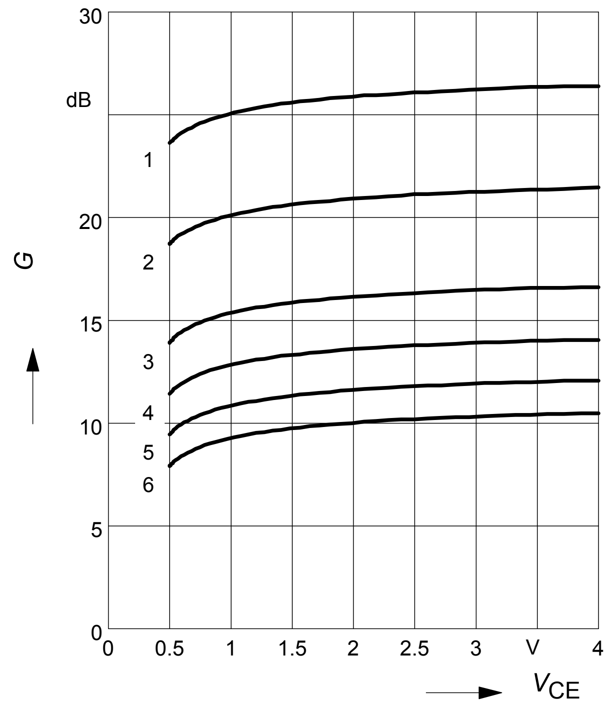
Power gain G_{ma}, $G_{ms} = f(V_{CE})$

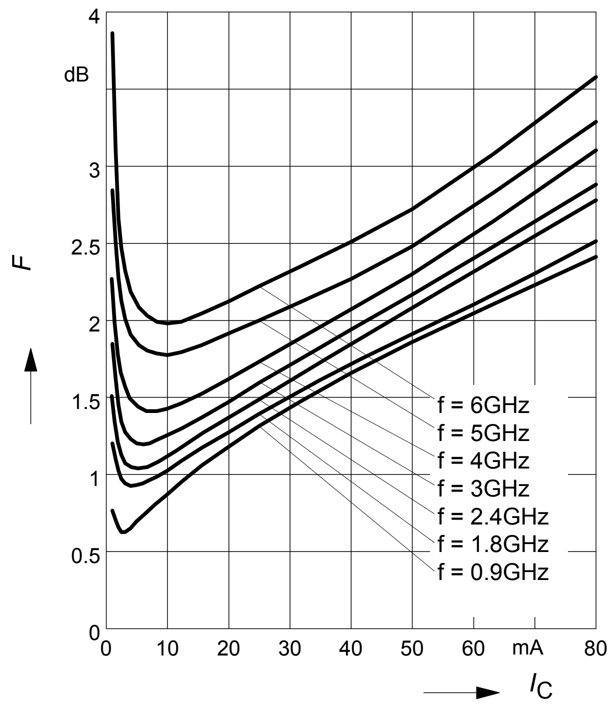
I_C = 20mA

f = Parameter in GHz



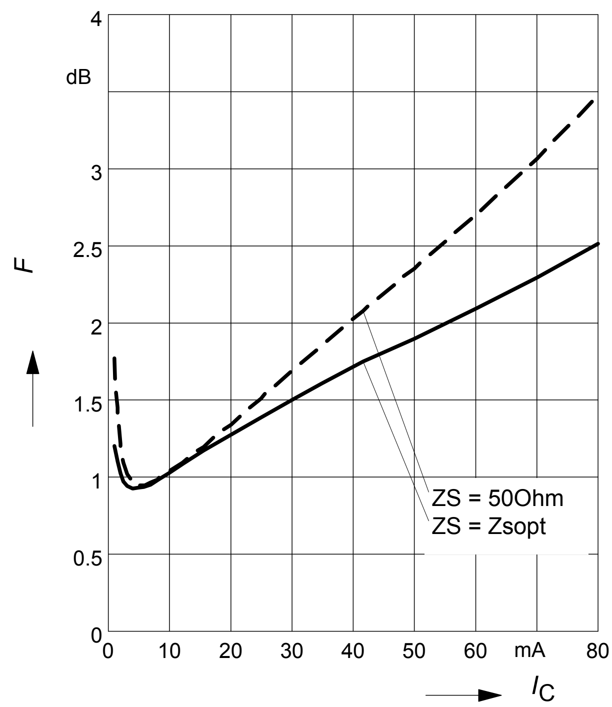
Noise figure $F = f(I_C)$

V_{CE} = 2V, $Z_S = Z_{Sopt}$



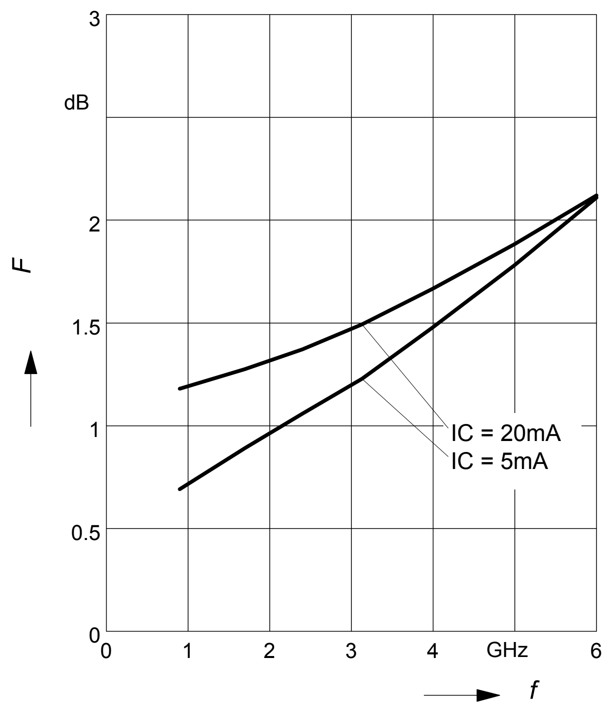
Noise figure $F = f(I_C)$

V_{CE} = 2V, f = 1.8GHz

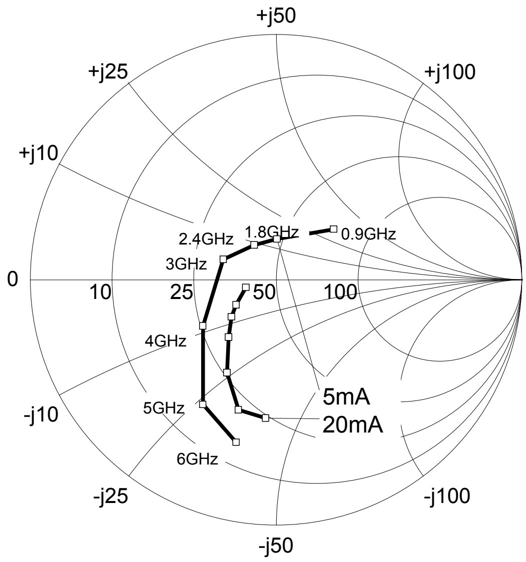


Noise figure $F = f(f)$

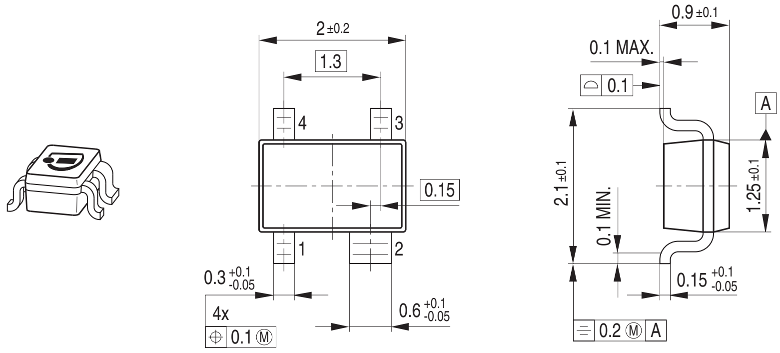
V_{CE} = 2V, $Z_S = Z_{Sopt}$



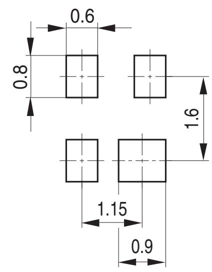
Source impedance for min.
noise figure vs. frequency
V_{CE} = 2V, I_C = 5mA / 20mA



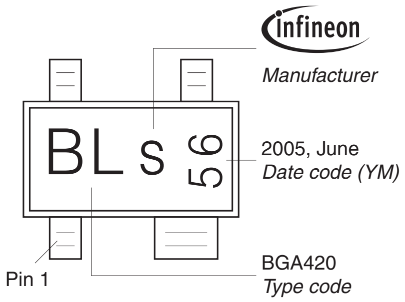
Package Outline



Foot Print

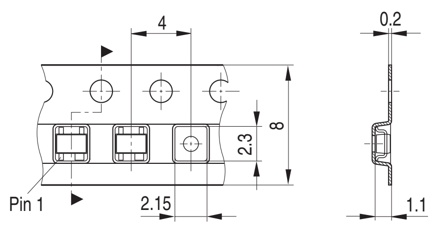


Marking Layout (Example)



Standard Packing

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



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