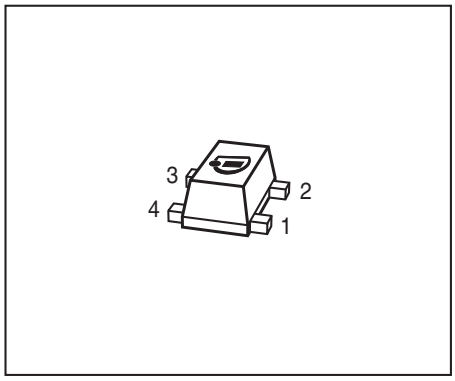
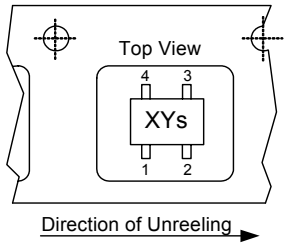
Low Noise SiGe:C Bipolar RF Transistor



- High gain low noise RF transistor
- Based on Infineon's reliable high volume Silicon Germanium technology
- Outstanding noise figure NF_{min} = 0.7 dB at 1.8 GHz
  Outstanding noise figure NF_{min} = 1.3 dB at 6 GHz
- Maximum stable gain
  G_{ms} = 21 dB at 1.8 GHz
  G_{ma} = 10 dB at 6 GHz
- Pb-free (RoHS compliant) and halogen-free thin small flat package (1.4 x 0.8 x 0.59 mm) with visible leads
- Qualification report according to AEC-Q101 available



RoHS HAL

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

Type	Marking	Pin Configuration						Package
BFP620F	R2s	1=B	2=E	3=C	4=E	-	-	TSFP-4

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

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}		V
T_A = 25 °C		2.3	
T_A = -55 °C		2.1	
Collector-emitter voltage	V_{CES}	7.5	
Collector-base voltage	V_{CBO}	7.5	
Emitter-base voltage	V_{EBO}	1.2	
Collector current	I_C	80	mA
Base current	I_B	3	
Total power dissipation[1)] $T_S \leq 96°C$	P_{tot}	185	mW
Junction temperature	T_J	150	°C
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}	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	$V_{(BR)CEO}$	2.3	2.8	-	V
Collector-emitter cutoff current V_{CE} = 7.5 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}	-	-	3	µA
DC current gain I_C = 50 mA, V_{CE} = 1.5 V, pulse measured	h_{FE}	110	180	270	-

[1]For the definition of R_{thJS} please refer to Application Note AN077 (Thermal Resistance Calculation)

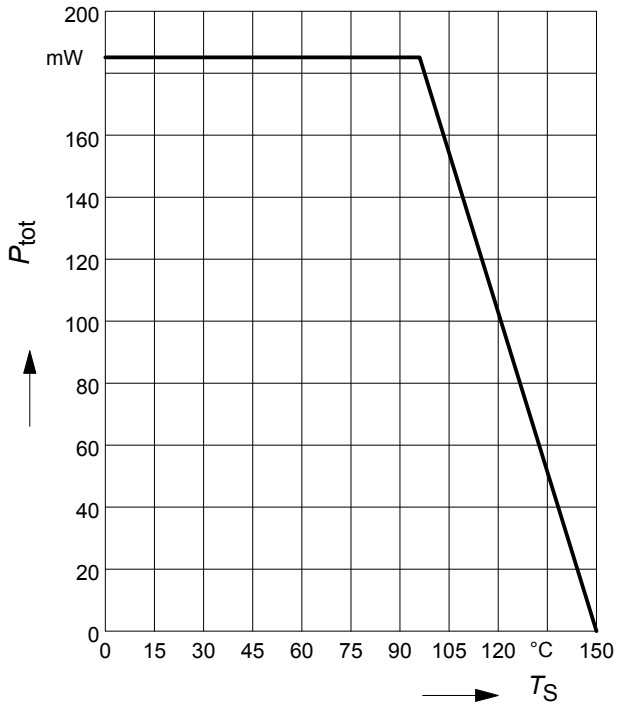
Electrical Characteristics at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (verified by random sampling)					
Transition frequency I_C = 50 mA, V_{CE} = 1.5 V, f = 1 GHz	f_T	-	65	-	GHz
Collector-base capacitance V_{CB} = 2 V, f = 1 MHz, V_{BE} = 0 , emitter grounded	C_{cb}	-	0.12	0.2	pF
Collector emitter capacitance V_{CE} = 2 V, f = 1 MHz, V_{BE} = 0 , base grounded	C_{ce}	-	0.2	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz, V_{CB} = 0 , collector grounded	C_{eb}	-	0.45	-	
Minimum noise figure I_C = 5 mA, V_{CE} = 1.5 V, f = 1.8 GHz, Z_S = Z_{Sopt} I_C = 5 mA, V_{CE} = 1.5 V, f = 6 GHz, Z_S = Z_{Sopt}	NF_{min}	 - -	 0.7 1.3	 - -	dB
Power gain, maximum stable[1)] I_C = 50 mA, V_{CE} = 1.5 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt} , f = 1.8 GHz	G_{ms}	-	21	-	dB
Power gain, maximum available[1)] I_C = 50 mA, V_{CE} = 1.5 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}, f = 6 GHz	G_{ma}	-	10	-	dB
Transducer gain I_C = 50 mA, V_{CE} = 1.5 V, Z_S = Z_L = 50 Ω, f = 1.8 GHz f = 6 GHz	$\lvert S_{21e}\rvert^2$	 - -	 19.5 9.5	 - -	dB
Third order intercept point at output[2)] V_{CE} = 2 V, I_C = 50 mA, Z_S=Z_L=50 Ω, f = 1.8 GHz	$IP3$	-	25	-	dBm
1dB compression point at output I_C = 50 mA, V_{CE} = 2 V, Z_S=Z_L=50 Ω, f = 1.8 GHz	P_{-1dB}	-	14	-	

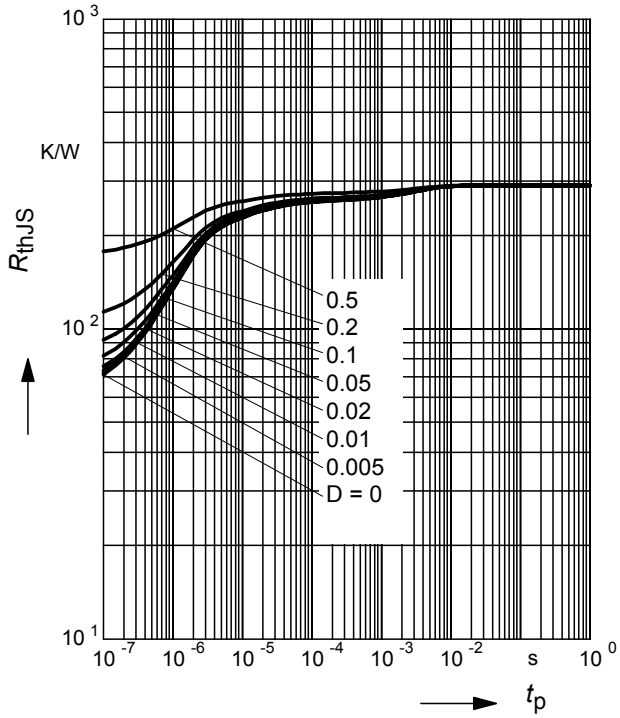
[1] $G_{ma} = \lvert S_{21e} / S_{12e}\rvert (k-(k^2-1)^{1/2})$, $G_{ms} = \lvert S_{21e} / S_{12e}\rvert$

[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

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

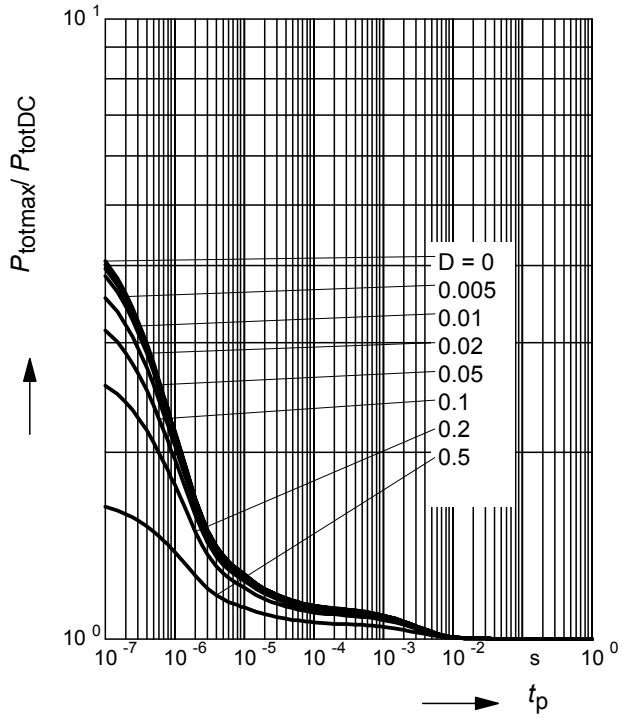


Permissible Pulse Load $R_{thJS} = f(t_p)$



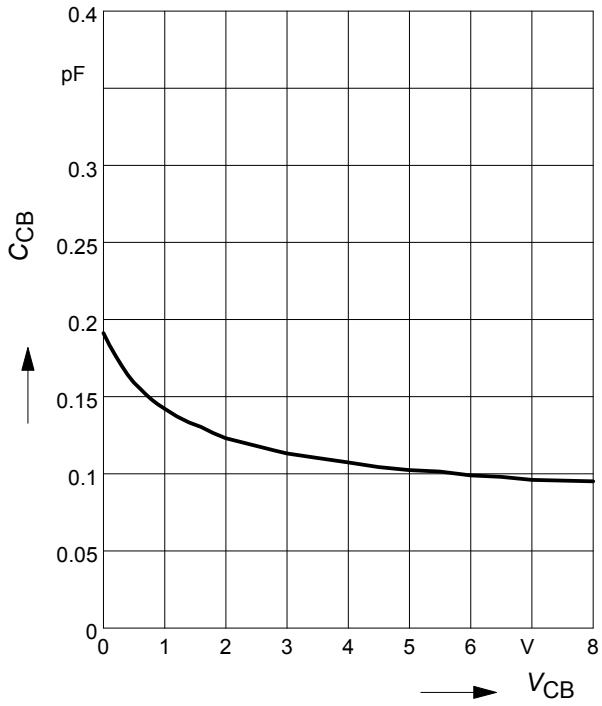
Permissible Pulse Load

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



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

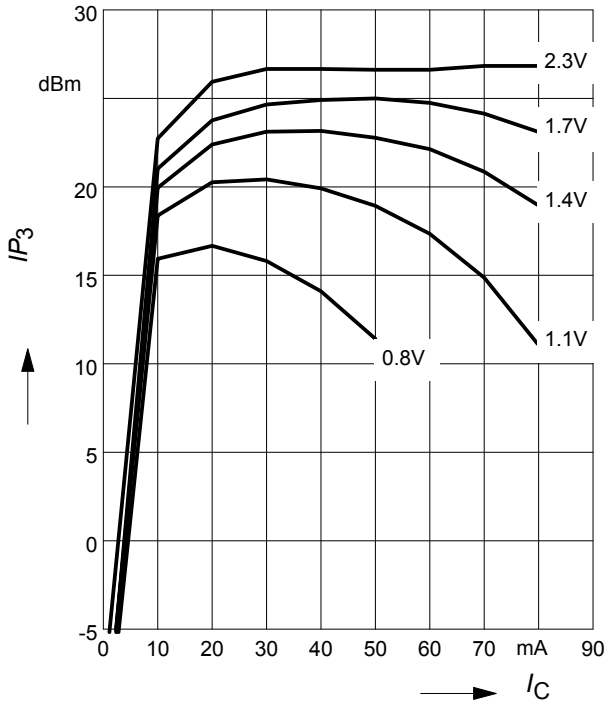
f = 1MHz



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

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

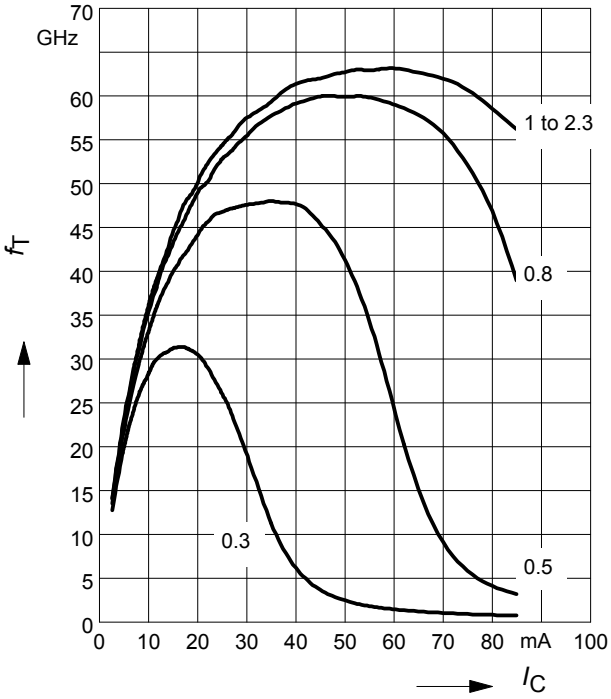
V_{CE} = parameter, f =1.8GHz



Transition frequency $f_T= f(I_C)$

f = 1GHz

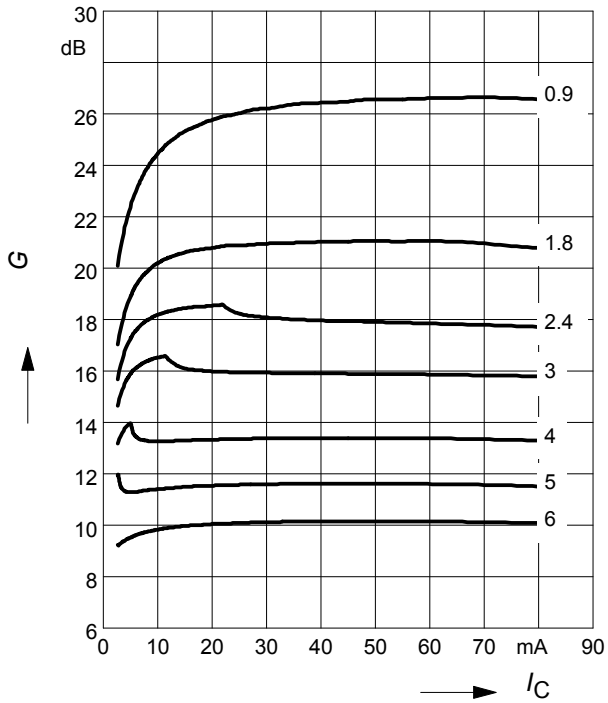
V_{CE} = Parameter in V



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

V_{CE} = 1.5V

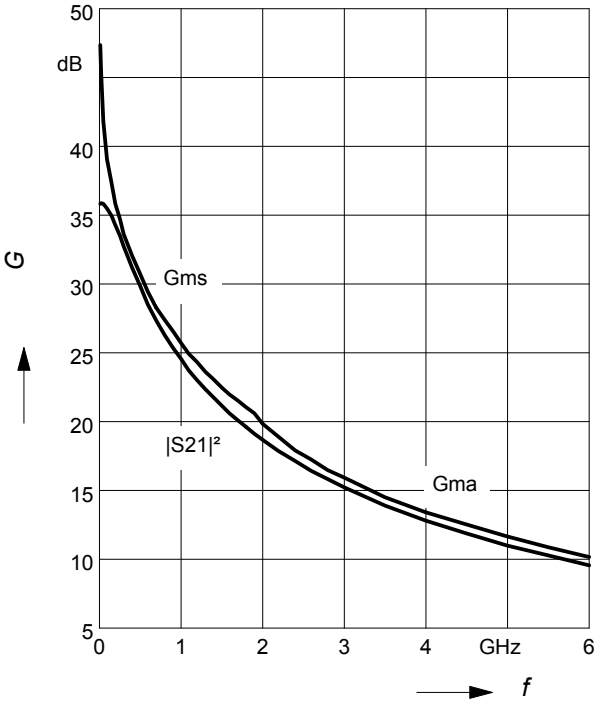
f = Parameter in GHz



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

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

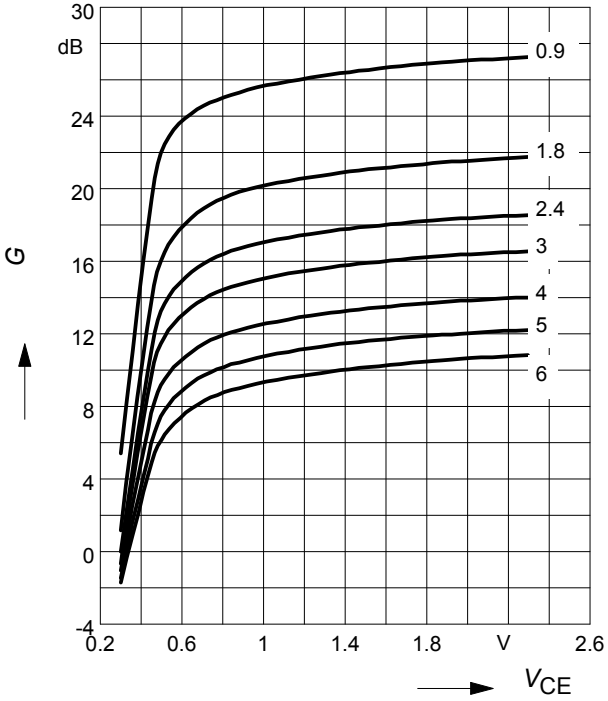
V_{CE} = 1.5V, I_C = 50mA



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

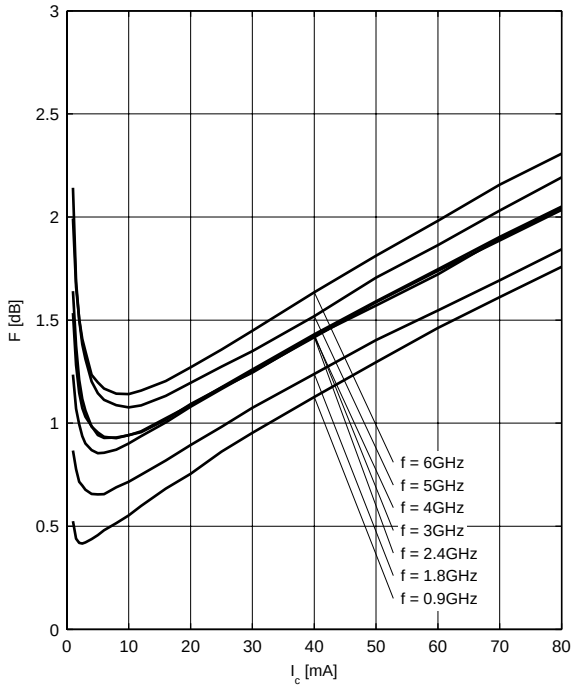
I_C = 50mA

f = Parameter in GHz



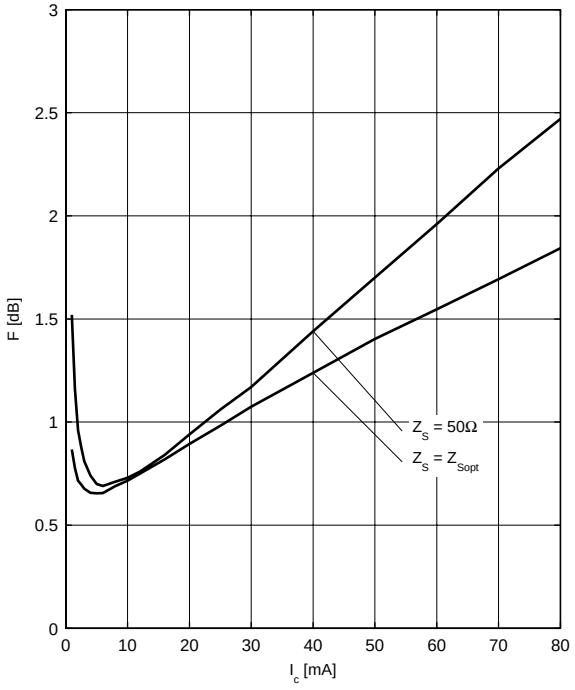
Noise figure $F = f(I_C)$

V_{CE} = 1.5V, $Z_S = Z_{Sopt}$



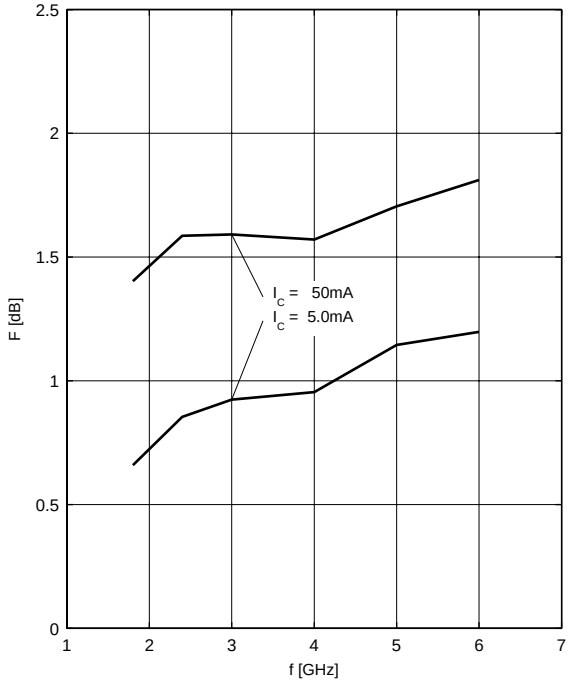
Noise figure $F = f(I_C)$

V_{CE} = 1.5V, f = 1.8 GHz

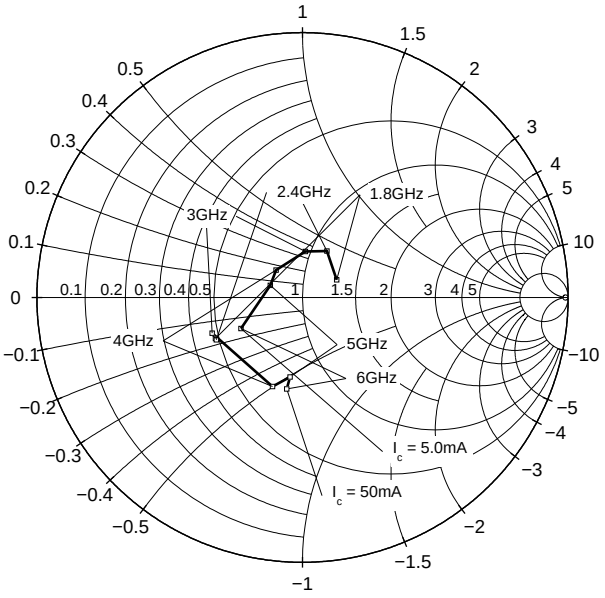


Noise figure $F = f(f)$

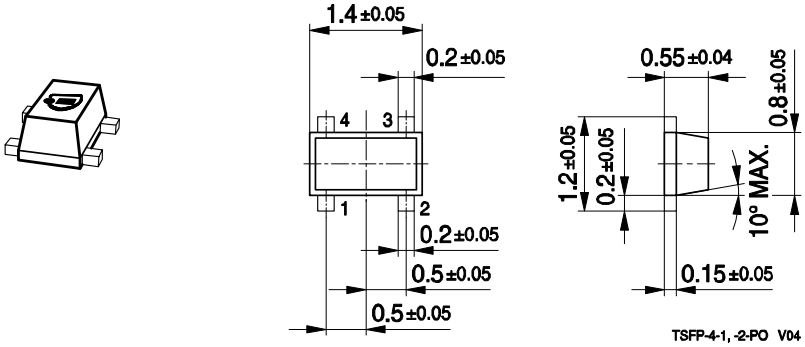
V_{CE} = 1.5V, $Z_S = Z_{Sopt}$



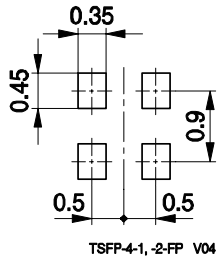
Source impedance for min.
noise figure vs. frequency
V_{CE} = 1.5V, I_C = 5.0mA/50.0mA



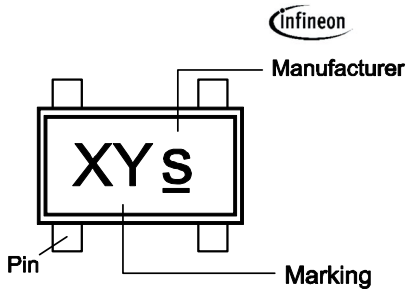
Package Outline



Foot Print

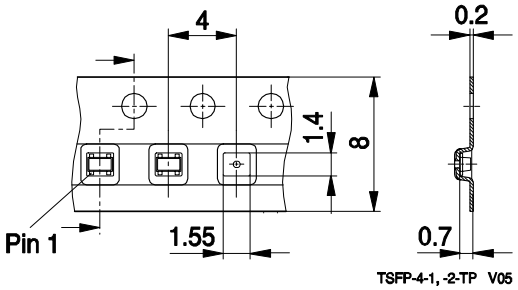


Marking Layout (Example)



Standard Packing

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



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