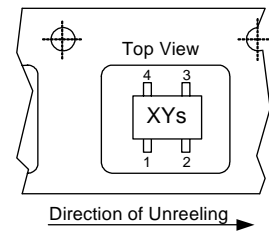
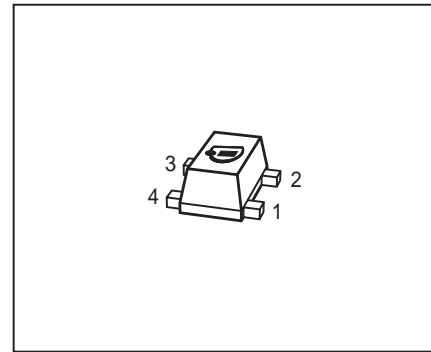


**NPN Silicon Germanium RF Transistor**

- 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  $F = 0.75$  dB at 6 GHz
- High maximum stable gain  
 $G_{ms} = 27.5$  dB at 1.8 GHz
- Gold metallization for extra high reliability
- 150 GHz  $f_T$ -Silicon Germanium technology
- Pb-free (RoHS compliant) package<sup>1)</sup>
- Qualified according AEC Q101



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

Type	Marking	Pin Configuration						Package
BFP740F	R7s	1=B	2=E	3=C	4=E	-	-	TSFP-4

<sup>1</sup>Pb-containing package may be available upon special request

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-emitter voltage $T_A > 0^\circ\text{C}$ $T_A \leq 0^\circ\text{C}$	$V_{\text{CEO}}$	4 3.5	V
Collector-emitter voltage	$V_{\text{CES}}$	13	
Collector-base voltage	$V_{\text{CBO}}$	13	
Emitter-base voltage	$V_{\text{EBO}}$	1.2	
Collector current	$I_{\text{C}}$	30	mA
Base current	$I_{\text{B}}$	3	
Total power dissipation <sup>1)</sup> $T_S \leq 90^\circ\text{C}$	$P_{\text{tot}}$	160	mW
Junction temperature	$T_{\text{j}}$	150	$^\circ\text{C}$
Ambient temperature	$T_{\text{A}}$	-65 ... 150	
Storage temperature	$T_{\text{stg}}$	-65 ... 150	

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>2)</sup>	$R_{\text{thJS}}$	$\leq 370$	K/W

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>DC Characteristics</b>					
Collector-emitter breakdown voltage $I_{\text{C}} = 1 \text{ mA}, I_{\text{B}} = 0$	$V_{(\text{BR})\text{CEO}}$	4	4.7	-	V
Collector-emitter cutoff current $V_{\text{CE}} = 13 \text{ V}, V_{\text{BE}} = 0$	$I_{\text{CES}}$	-	-	30	$\mu\text{A}$
Collector-base cutoff current $V_{\text{CB}} = 5 \text{ V}, I_{\text{E}} = 0$	$I_{\text{CBO}}$	-	-	100	nA
Emitter-base cutoff current $V_{\text{EB}} = 0.5 \text{ V}, I_{\text{C}} = 0$	$I_{\text{EBO}}$	-	-	3	$\mu\text{A}$
DC current gain $I_{\text{C}} = 25 \text{ mA}, V_{\text{CE}} = 3 \text{ V}$ , pulse measured	$h_{\text{FE}}$	160	250	400	-

<sup>1</sup>  $T_S$  is measured on the collector lead at the soldering point to the pcb

<sup>2</sup> For calculation of  $R_{\text{thJA}}$  please refer to Application Note Thermal Resistance

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

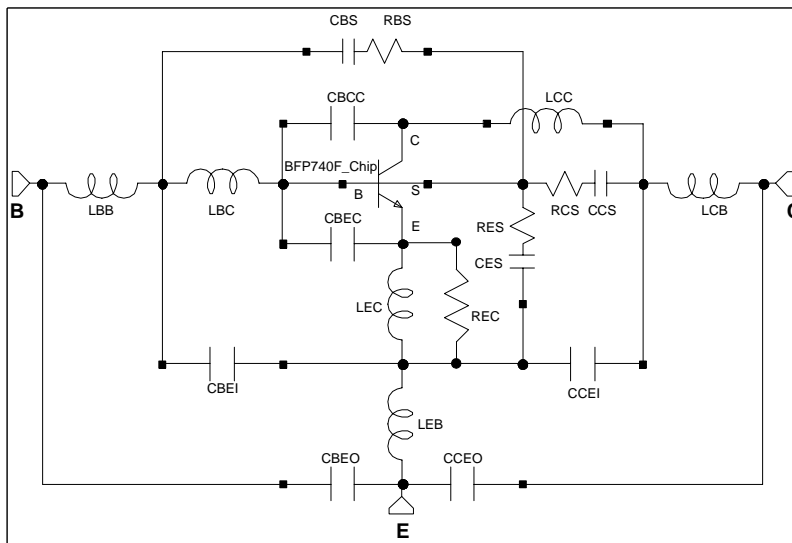
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics (verified by random sampling)</b>					
Transition frequency $I_C = 25\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1\text{ GHz}$	$f_T$	-	42	-	GHz
Collector-base capacitance $V_{CB} = 3\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , emitter grounded	$C_{cb}$	-	0.08	0.14	pF
Collector emitter capacitance $V_{CE} = 3\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , base grounded	$C_{ce}$	-	0.2	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ , collector grounded	$C_{eb}$	-	0.44	-	
Noise figure $I_C = 8\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1.8\text{ GHz}$ , $Z_S = Z_{Sopt}$ $I_C = 8\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 6\text{ GHz}$ , $Z_S = Z_{Sopt}$	$F$	-	0.5 0.75	-	dB
Power gain, maximum stable <sup>1)</sup> $I_C = 25\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 1.8\text{ GHz}$	$G_{ms}$	-	27.5	-	dB
Power gain, maximum available <sup>1)</sup> $I_C = 25\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 6\text{ GHz}$	$G_{ma}$	-	19	-	dB
Transducer gain $I_C = 25\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_L = 50\ \Omega$ , $f = 1.8\text{ GHz}$ $f = 6\text{ GHz}$	$ S_{21e} ^2$	-	25 15	-	dB
Third order intercept point at output <sup>2)</sup> $V_{CE} = 3\text{ V}$ , $I_C = 25\text{ mA}$ , $Z_S = Z_L = 50\ \Omega$ , $f = 1.8\text{ GHz}$	$IP_3$	-	25	-	dBm
1dB Compression point at output $I_C = 25\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $Z_S = Z_L = 50\ \Omega$ , $f = 1.8\text{ GHz}$	$P_{-1dB}$	-	11	-	

<sup>1)</sup>  $G_{ma} = |S_{21e} / S_{12e}| (k - (k^2 - 1)^{1/2})$ ,  $G_{ms} = |S_{21e} / S_{12e}|$ 
<sup>2)</sup>  $IP_3$  value depends on termination of all intermodulation frequency components.  
Termination used for this measurement is  $50\ \Omega$  from 0.1 MHz to 6 GHz

**SPICE Parameter (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax):**
**Transistor Chip Data:**

IS =	384.4	aA	BF =	1.1	k	NF =	1.018	-
VAF =	400	V	IKF =	512.1	mA	ISE =	4.296	fA
NE =	1.586	-	BR =	62	-	NR =	1	-
VAR =	1.28	V	IKR =	5	mA	ISC =	3.85	fA
NC =	1.5	-	RB =	3.23	$\Omega$	IRB =	10	A
RBM =	1.69	$\Omega$	RE =	90	m $\Omega$	RC =	6.88	$\Omega$
CJE =	220	fF	VJE =	590	mV	MJE =	70	m
TF =	2.1	ps	XTF =	3	-	VTF =	1.32	V
ITF =	290	mA	PTF =	100	mdeg	CJC =	99.5	fF
VJC =	550	mV	MJC =	152	m	XCJC =	10	m
TR =	13	ps	CJS =	79.7	fF	VJS =	570	mV
MJS =	180	m	XTB =	-2.2	-	EG =	1.11	eV
XTI =	910	m	FC =	950	m	TNOM =	298	K
AF =	1	-	KF =	0	-			

All parameters are ready to use, no scaling is necessary.

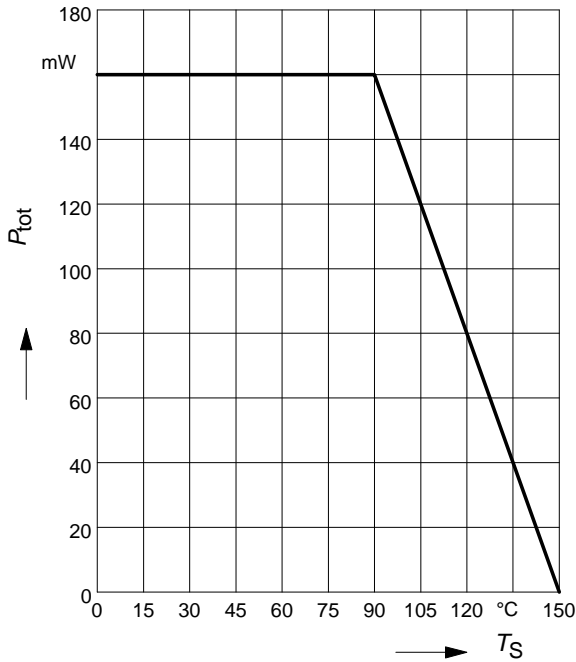
**Package Equivalent Circuit:**


For examples and ready to use parameters please contact your local Infineon Technologies distributor or sales office to obtain a Infineon Technologies CD-ROM or see Internet: <http://www.infineon.com>

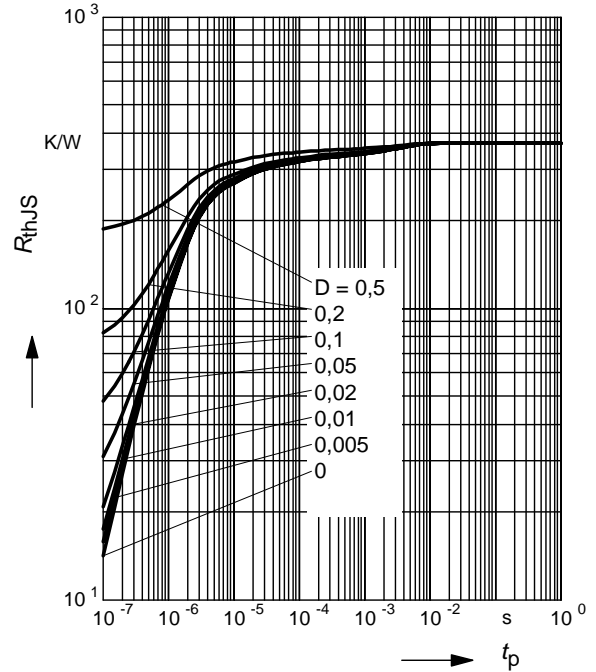
LBC =	0.1	nH
LCC =	0.2	nH
LEC =	20	pH
LBB =	0.411	nH
LCB =	0.696	nH
LEB =	21	pH
CBEC =	0.1	pF
CBCC =	1	fF
CES =	0.34	pF
CBS =	39	fF
CCS =	75	fF
CCEO =	0.177	pF
CBE0 =	92	fF
CCEI =	0.217	pF
CBEI =	52	fF
REC =	2	$\Omega$
RBS =	3.5	k $\Omega$
RCS =	1.65	k $\Omega$
RES =	90	$\Omega$

Valid up to 6GHz

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

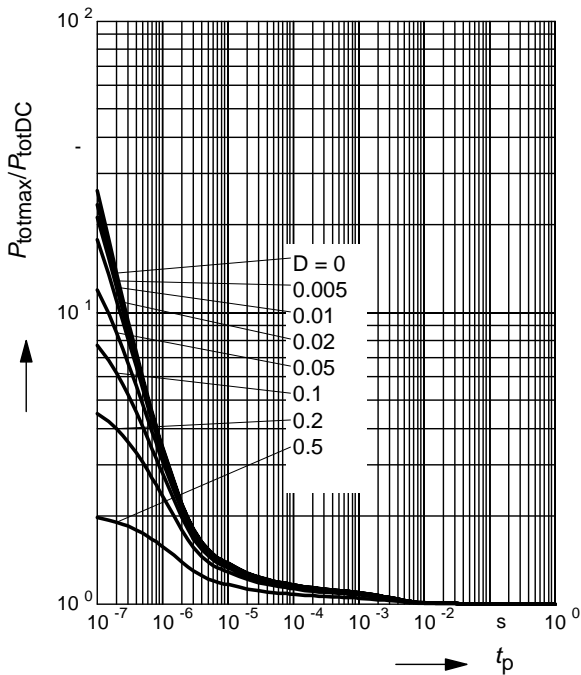


Permissible Pulse Load  $R_{thJS} = f(t_p)$



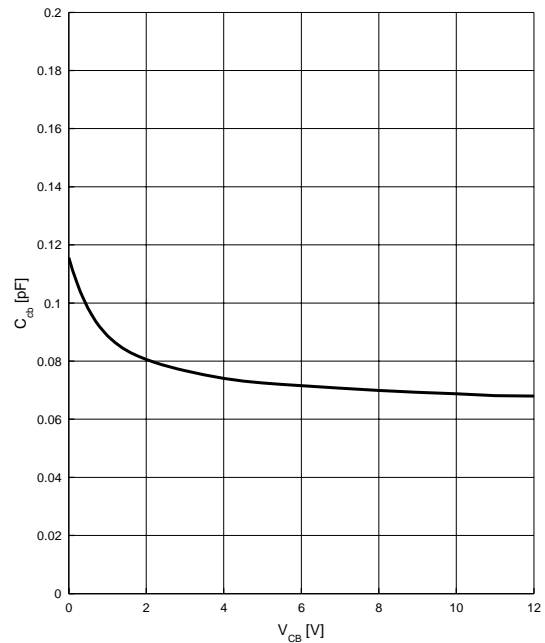
Permissible Pulse Load

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



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

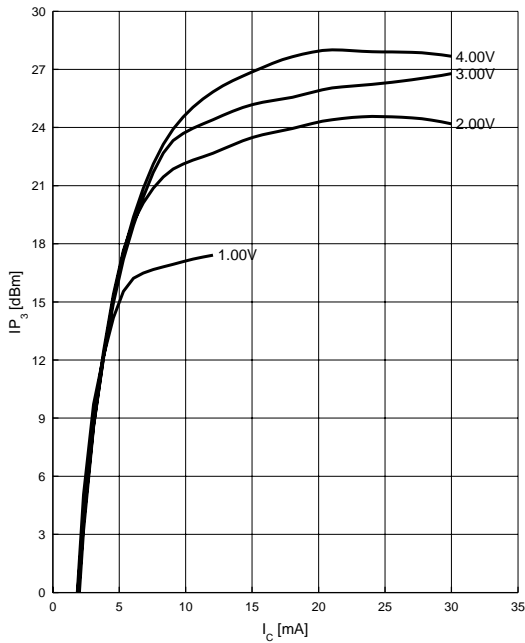
$f = 1 \text{ MHz}$



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

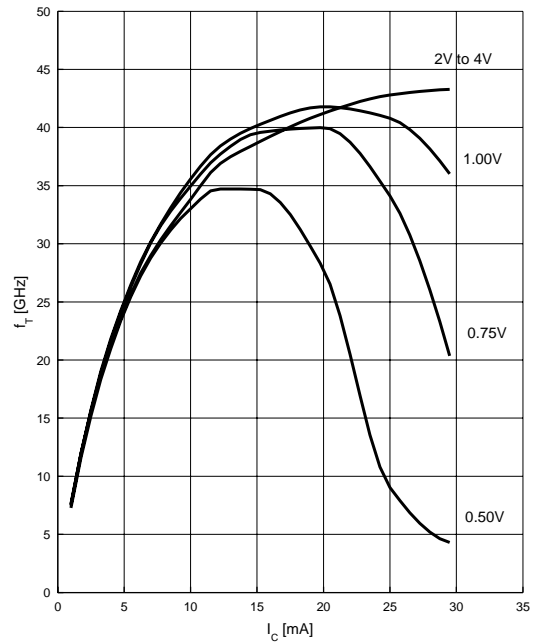
(Output,  $Z_S = Z_L = 50 \Omega$ )

$V_{CE}$  = parameter,  $f = 900$  MHz



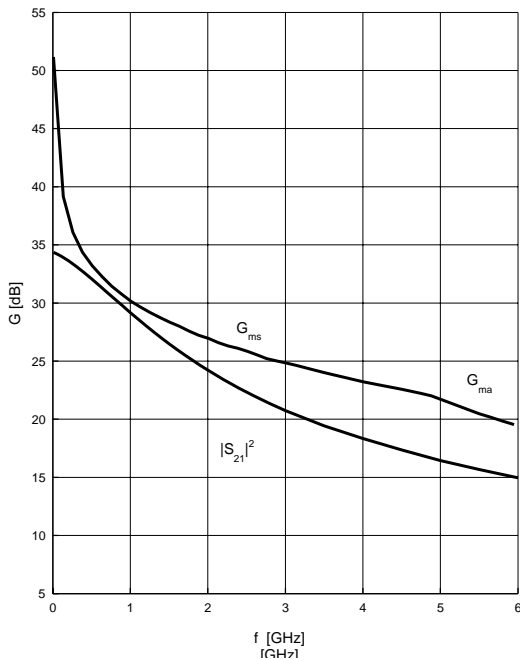
**Transition frequency  $f_T = f(I_C)$**

$V_{CE}$  = parameter in V,  $f = 2$  GHz



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

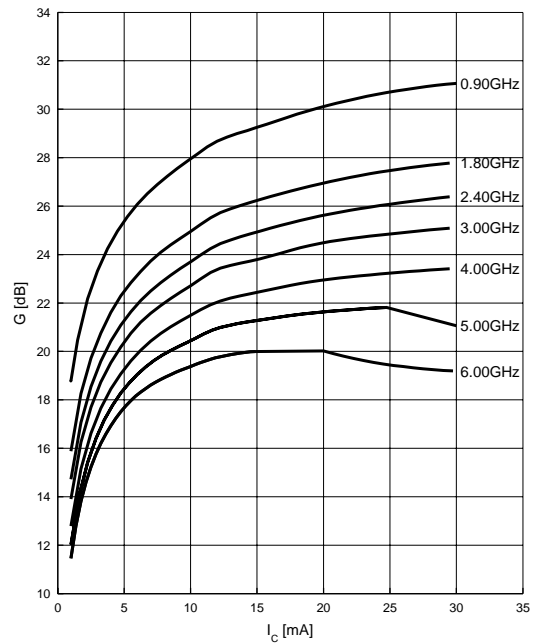
$V_{CE} = 3$  V,  $I_C = 25$  mA



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

$V_{CE} = 3$  V

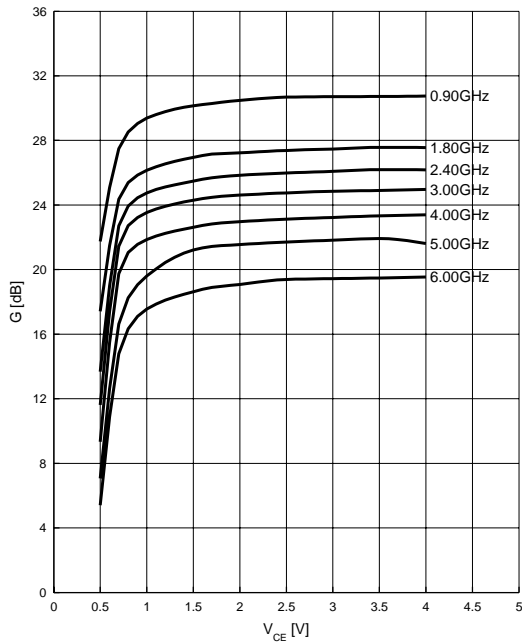
$f$  = parameter in GHz



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

$I_C = 25 \text{ mA}$

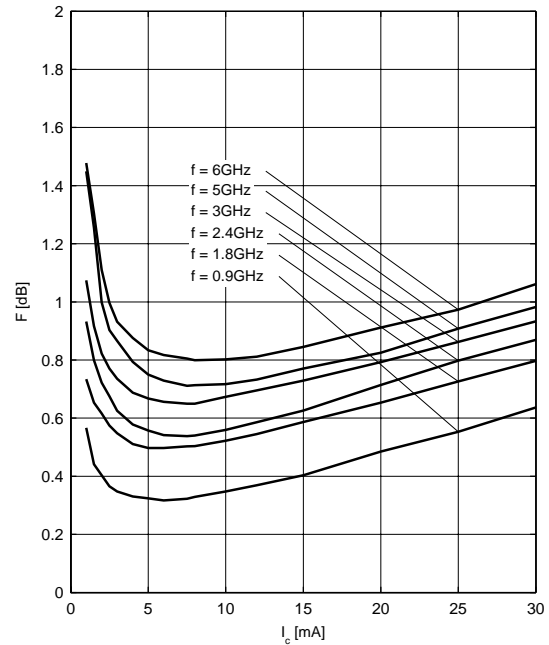
$f = \text{parameter in GHz}$



Noise figure  $F = f(I_C)$

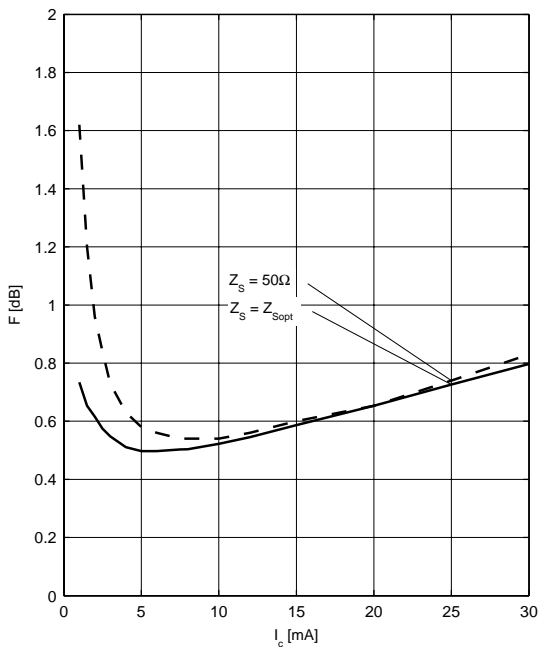
$V_{CE} = 3 \text{ V}$ ,  $f = \text{parameter in GHz}$

$Z_S = Z_{Sopt}$



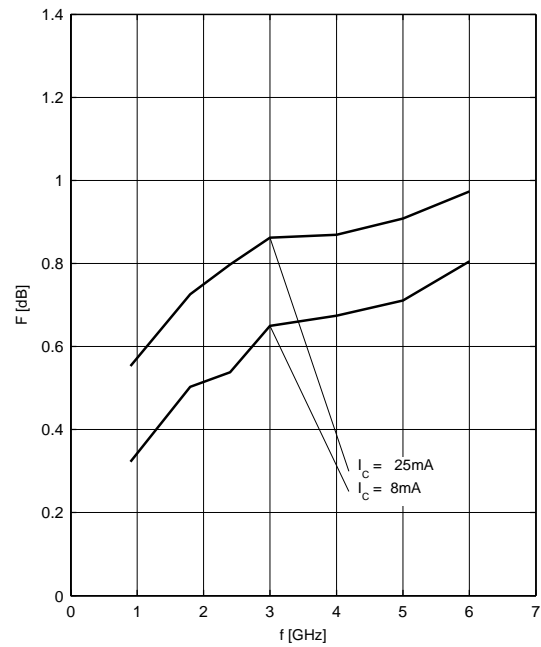
Noise figure  $F = f(I_C)$

$V_{CE} = 3 \text{ V}$ ,  $f = 1.8 \text{ GHz}$



Noise figure  $F = f(f)$

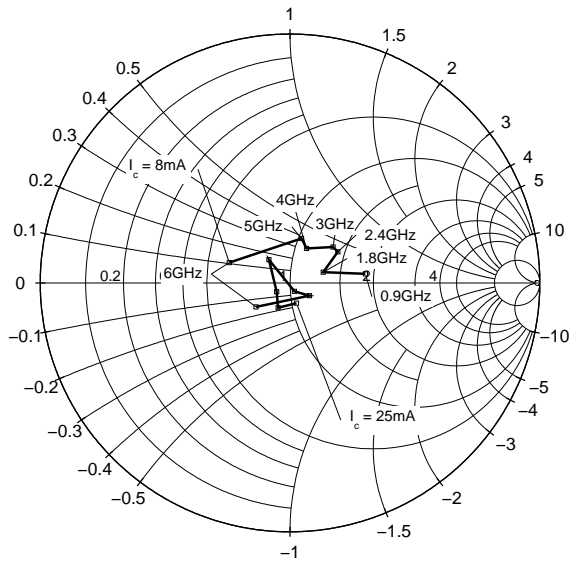
$V_{CE} = 3 \text{ V}$ ,  $Z_S = Z_{Sopt}$



Source impedance for min.

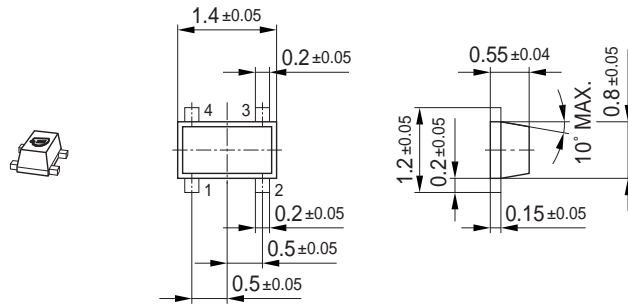
noise figure vs. frequency

$V_{CE} = 3\text{ V}$ ,  $I_C = 8\text{ mA} / 25\text{ mA}$

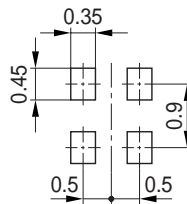




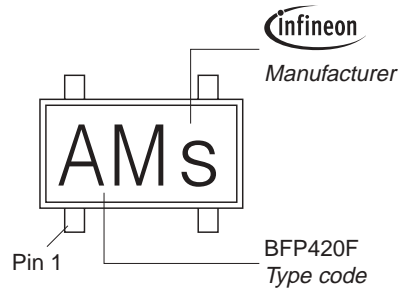
Package Outline



Foot Print

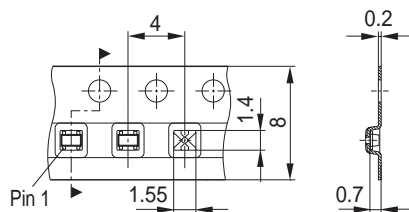


Marking Layout (Example)



Standard Packing

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



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