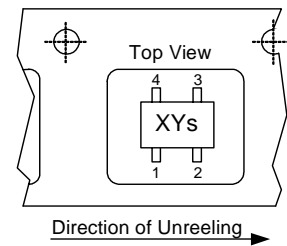
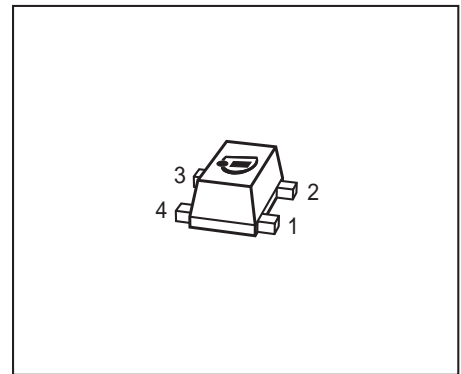


NPN Silicon Germanium RF Transistor

- 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



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

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	4	V
$T_A > 0^\circ\text{C}$		4	
$T_A \leq 0^\circ\text{C}$		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⁾	P_{tot}	160	mW
$T_S \leq 90^\circ\text{C}$			
Junction temperature	T_j	150	$^\circ\text{C}$
Ambient temperature	T_A	-65 ... 150	
Storage temperature	T_{stg}	-65 ... 150	

¹⁾ 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}	≤ 370	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	4.7	-	V
Collector-emitter cutoff current $V_{CE} = 13 \text{ V}, V_{BE} = 0$	I_{CES}	-	-	30	μA
Collector-base cutoff current $V_{CB} = 5 \text{ V}, I_E = 0$	I_{CBO}	-	-	100	nA
Emitter-base cutoff current $V_{EB} = 0.5 \text{ V}, I_C = 0$	I_{EBO}	-	-	3	μA
DC current gain $I_C = 25 \text{ mA}, V_{CE} = 3 \text{ V}$, pulse measured	h_{FE}	160	250	400	-

¹⁾For 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 $I_C = 25\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 1\text{ GHz}$	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 ¹⁾ $I_C = 25\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 1.8\text{ GHz}$	G_{ms}	-	27.5	-	dB
Power gain, maximum available ¹⁾ $I_C = 25\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 6\text{ GHz}$	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 ²⁾ $V_{CE} = 3\text{ V}$, $I_C = 25\text{ mA}$, $Z_S = Z_L = 50\ \Omega$, $f = 1.8\text{ GHz}$	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	-	

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

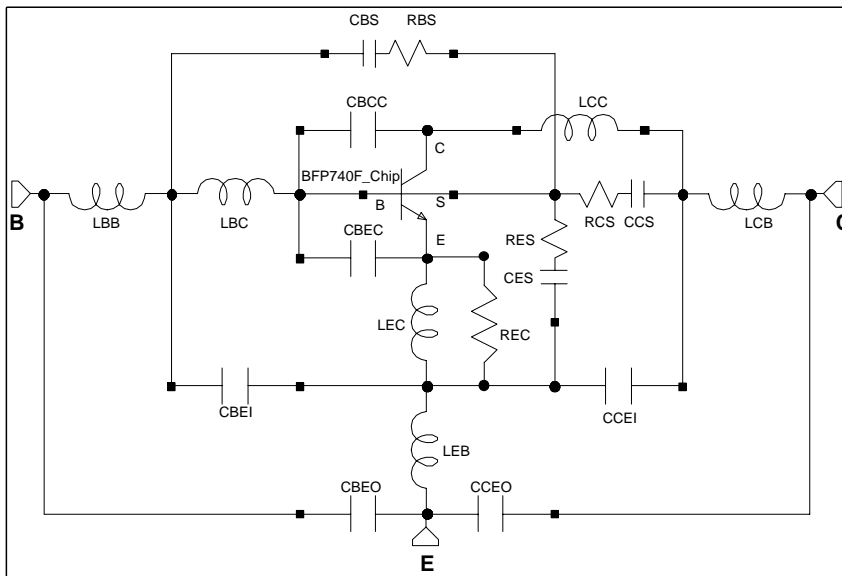
SPICE Parameter (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax):

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	Ω	IRB =	10	A
RBM =	1.69	Ω	RE =	90	mΩ	RC =	6.88	Ω
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. Extracted on behalf of Infineon Technologies AG by: Institut für Mobil- und Satellitentechnik (IMST)

Package Equivalent Circuit:

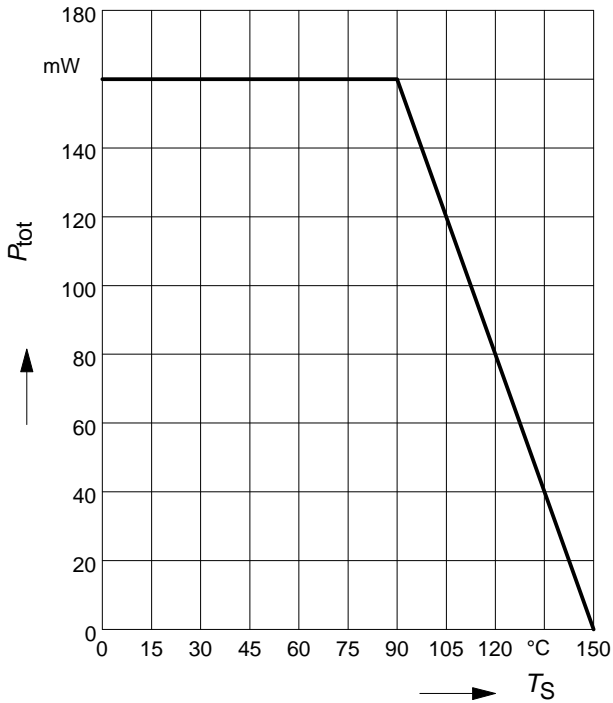


LBC =	0.1	nH
LCC =	0.2	nH
LEC =	20	pH
LBB =	0.411	nH
LCB =	0.696	nH
LEB =	21	pH
CBEC =	0.1	pF
CBCC =	1	fF
CES =	0.34	pF
CBS =	39	fF
CCS =	75	fF
CCEO =	0.177	pF
CBE0 =	92	fF
CCEI =	0.217	pF
CBEI =	52	fF
REC =	2	Ω
RBS =	3.5	mΩ
RCS =	1.65	mΩ
RES =	90	Ω

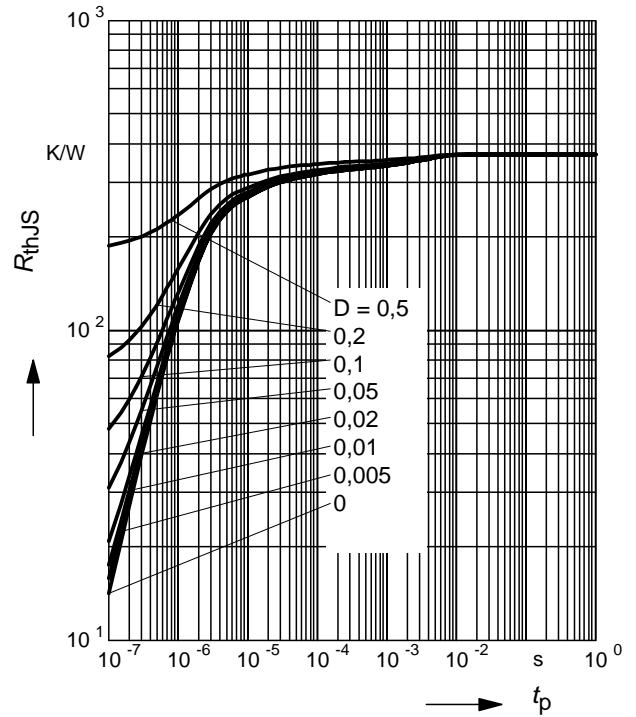
Valid up to 6GHz

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>

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

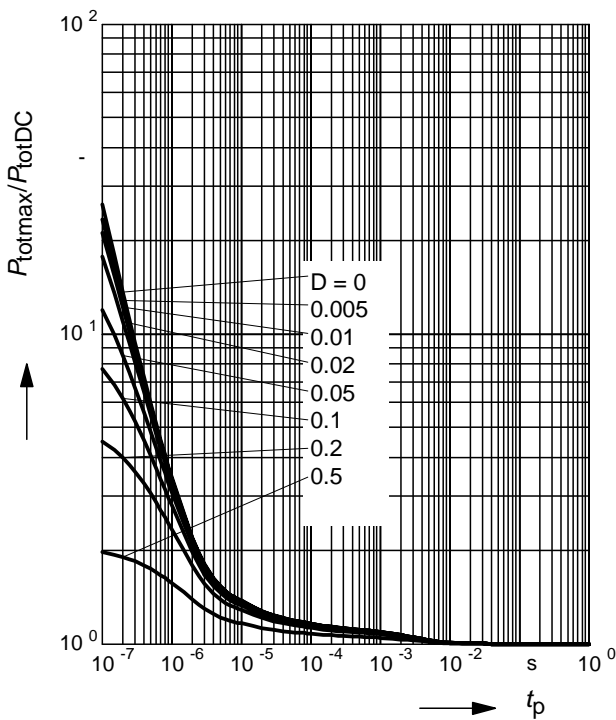


Permissible Pulse Load $R_{thJS} = f(t_p)$



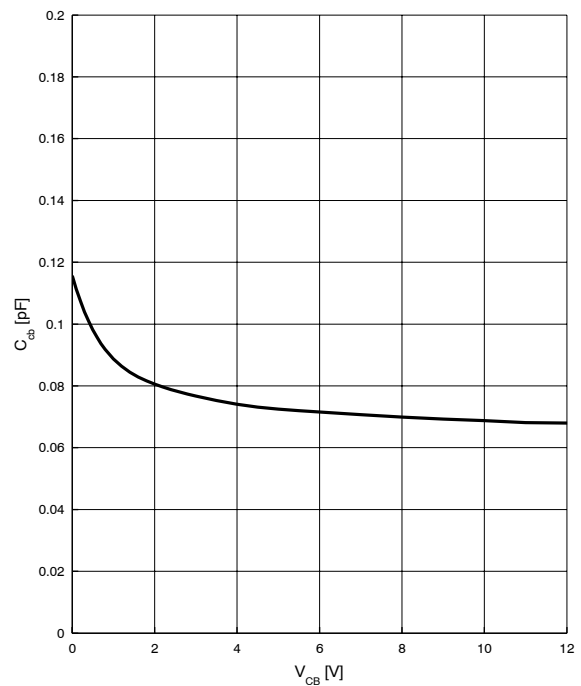
Permissible Pulse Load

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



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

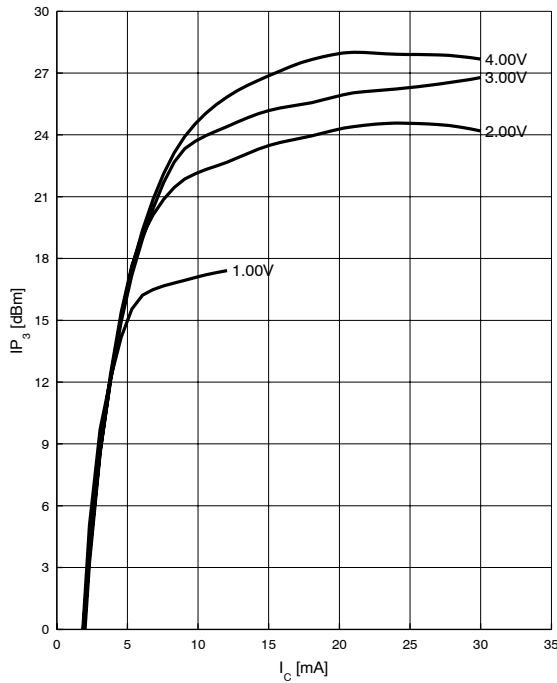
$f = 1 \text{ MHz}$



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

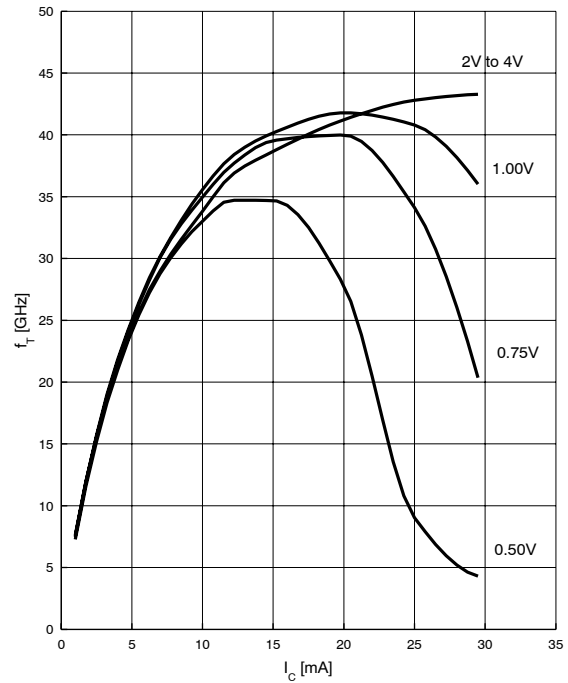
(Output, $Z_S = Z_L = 50 \Omega$)

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



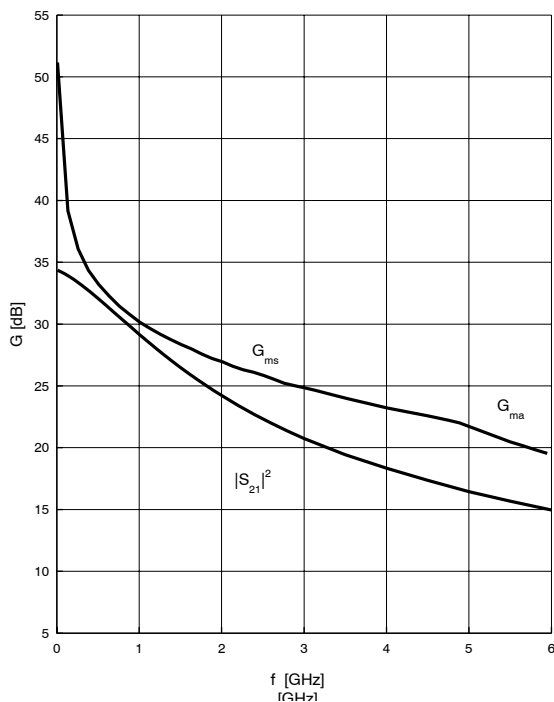
Transition frequency $f_T = f(I_C)$

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



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

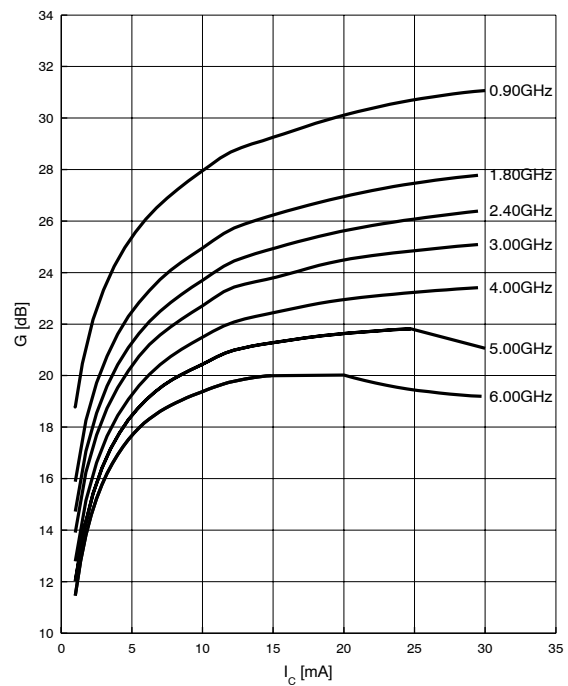
$V_{CE} = 3 \text{ V}, I_C = 25 \text{ mA}$



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

$V_{CE} = 3 \text{ V}$

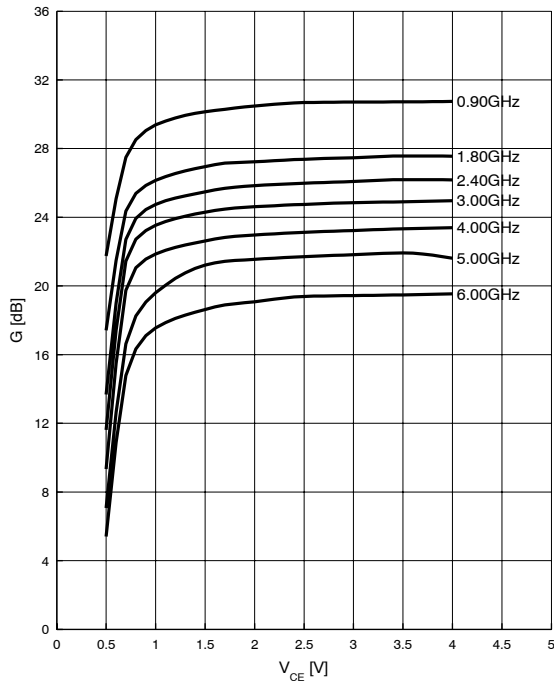
f = parameter in GHz



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

$I_C = 25 \text{ mA}$

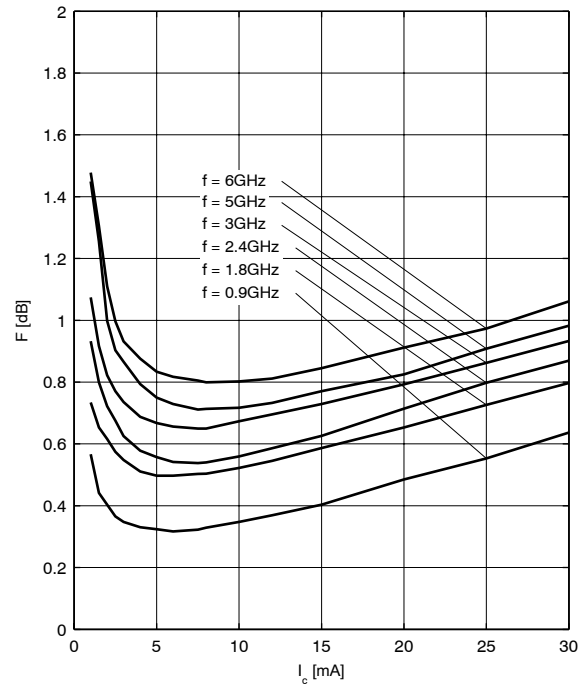
$f = \text{parameter in GHz}$



Noise figure $F = f(I_C)$

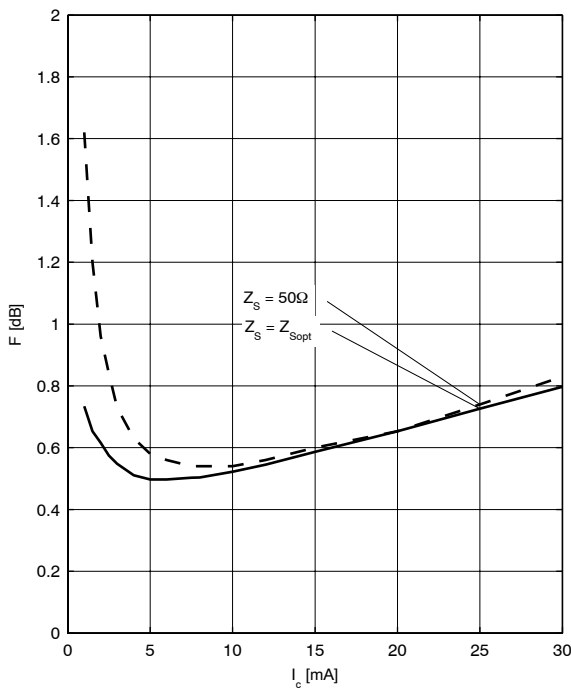
$V_{CE} = 3 \text{ V}$, $f = \text{parameter in GHz}$

$Z_S = Z_{Sopt}$



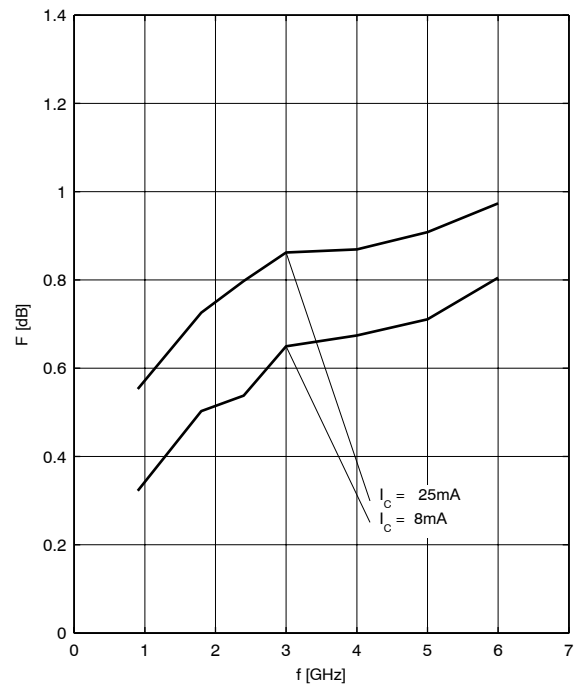
Noise figure $F = f(I_C)$

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



Noise figure $F = f(f)$

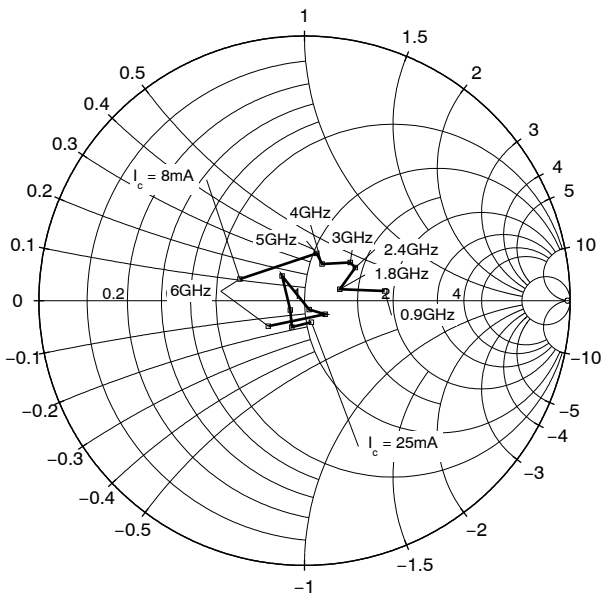
$V_{CE} = 3 \text{ V}$, $Z_S = Z_{Sopt}$



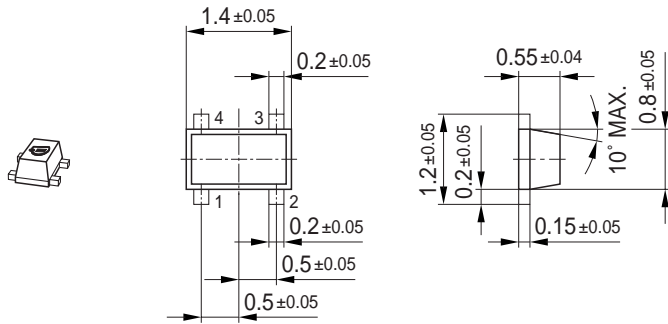
Source impedance for min.

noise figure vs. frequency

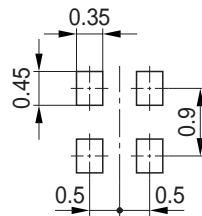
$V_{CE} = 3\text{ V}$, $I_C = 8\text{ mA} / 25\text{ mA}$



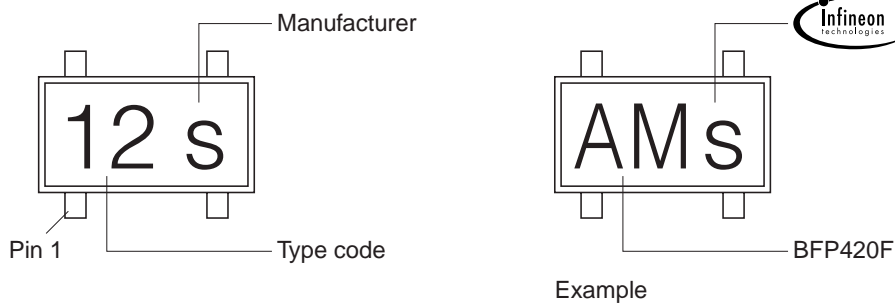
Package Outline



Foot Print

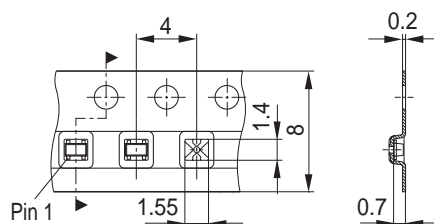


Marking Layout



Standard Packing

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



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