Low Noise Silicon Bipolar RF Transistor

- For highest gain and low noise amplifier
- Outstanding G_{ms} = 21.5 dB at 1.8 GHz

  Minimum noise figure NF_{min} = 0.9 dB at 1.8 GHz
- Pb-free (RoHS compliant) and halogen-free package

  with visible leads
- Qualification report according to AEC-Q101 available

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 at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}		V
T_A = 25 °C		4.5	
T_A = -55 °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[1]	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] 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	$V_{(BR)CEO}$	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 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} = 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	-	
Minimum 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}	NF_{min}	- -	0.9 1.3	1.4 -	dB
Power gain, maximum stable[1] 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 available[1] 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 output[2] V_{CE} = 2 V, I_C = 20 mA, Z_S=Z_L =50 Ω, f = 1.8 GHz	$IP3$	-	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-(k²-1)$^{1/2}$), 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
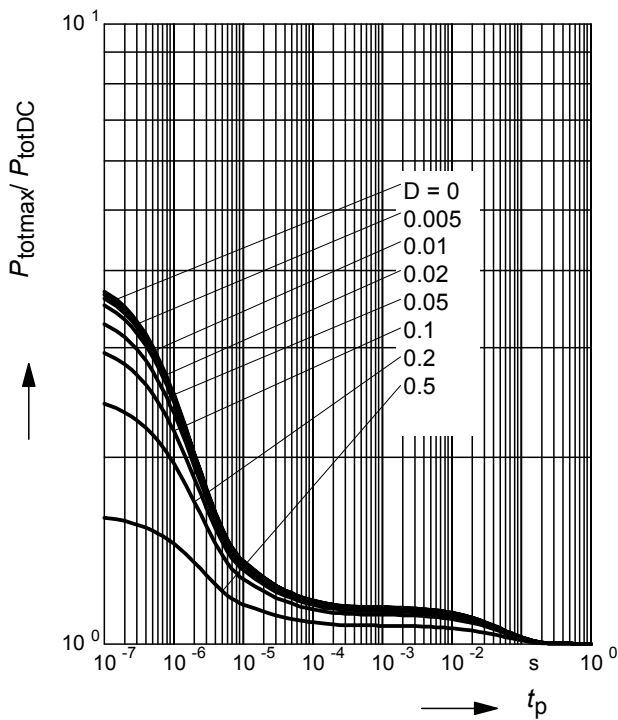
Total power dissipation $P_{tot} = f(T_S)$
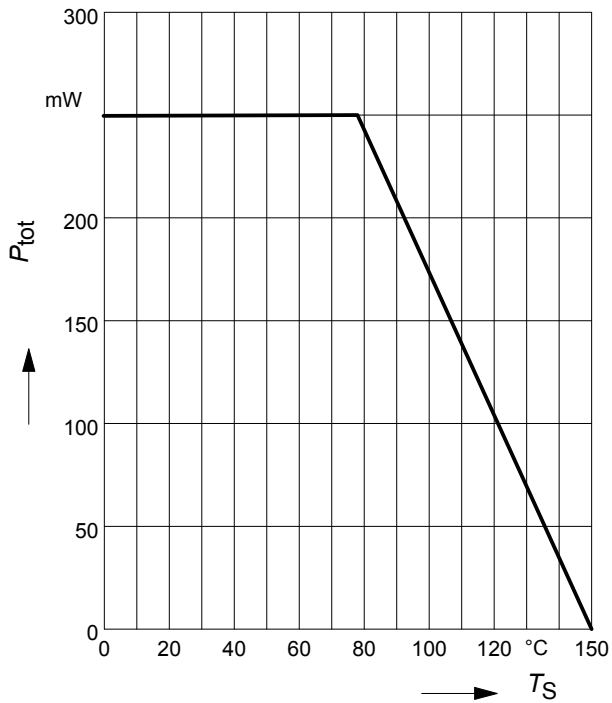
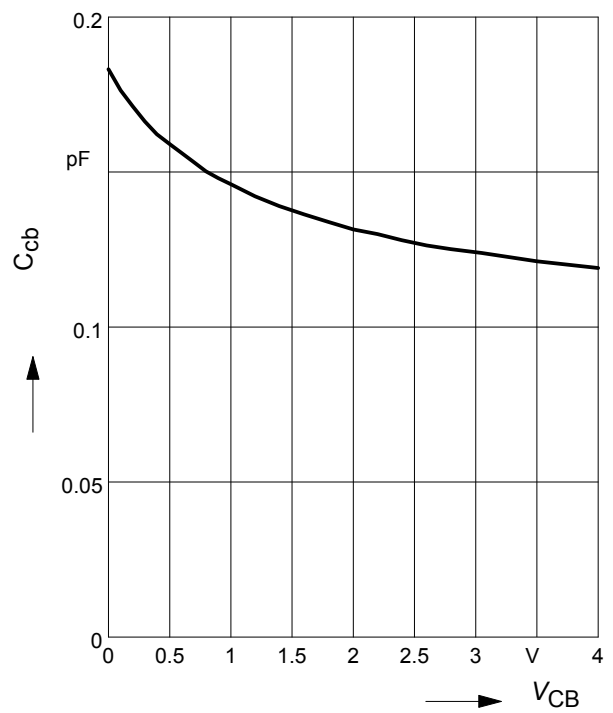**Permissible Pulse Load** $R_{thJS} = f(t_p)$
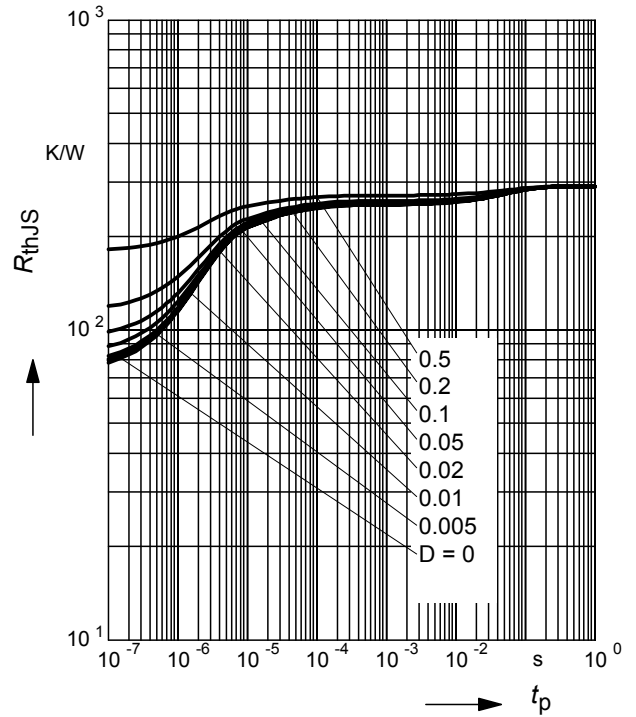
Permissible Pulse Load

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

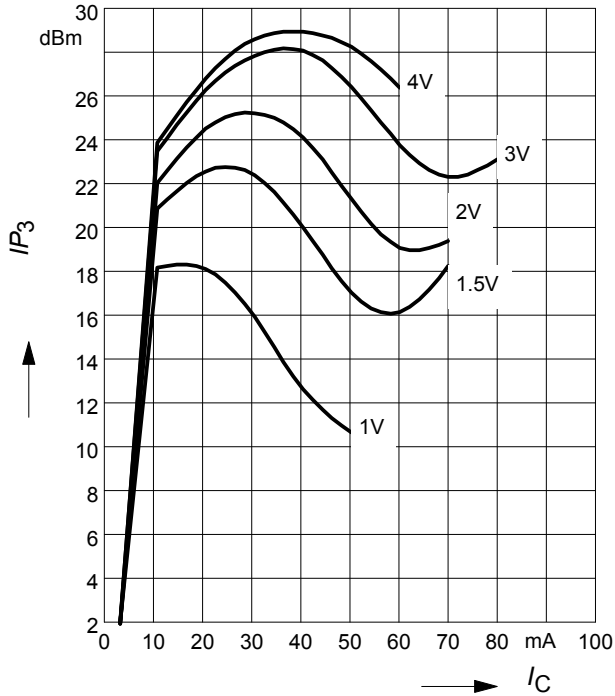**Collector-base capacitance** $C_{cb} = f(V_{CB})$

$f = 1MHz$

2013-09-20

Third order Intercept Point $IP_3 = f(I_C)$
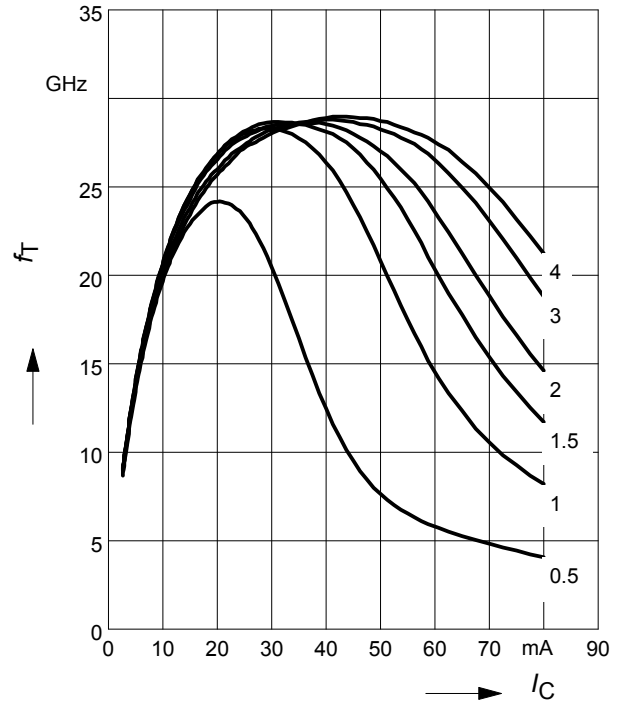
(Output, $Z_S = Z_L = 50\Omega$)

V_{CE} = parameter, f = 1.8GHz

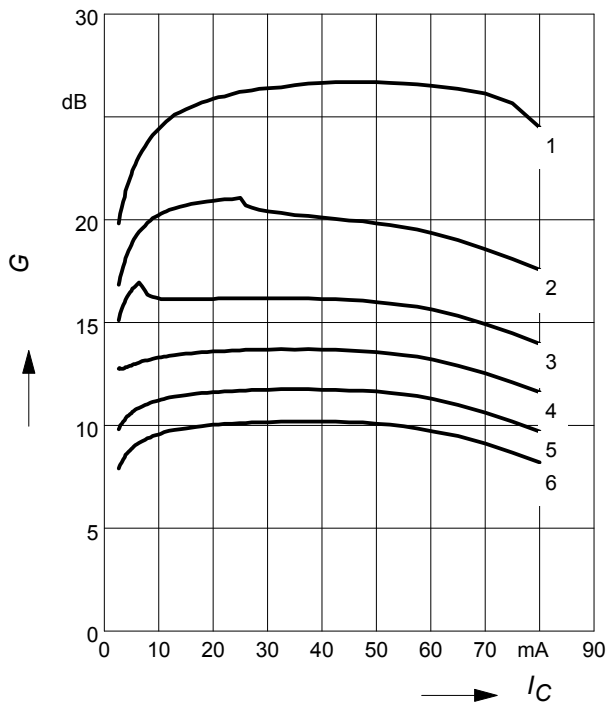**Transition frequency** $f_T = f(I_C)$

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

2013-09-20
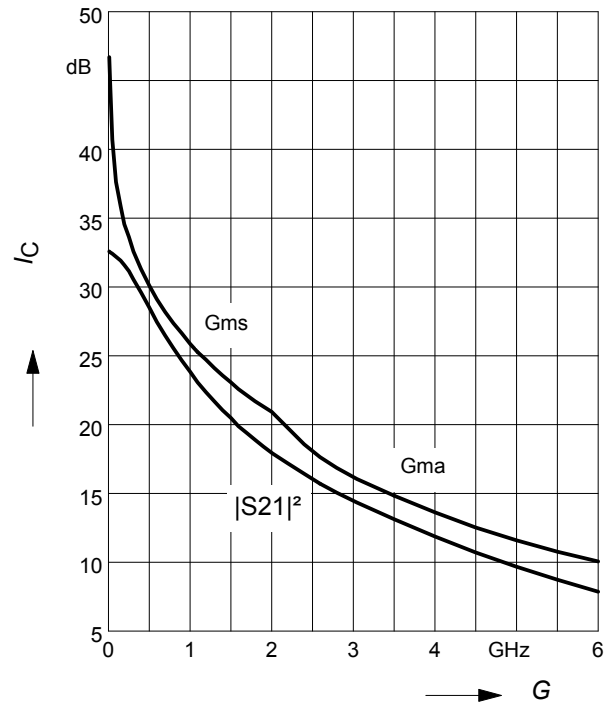
Power gain G_{ma}, G_{ms} = f (V_{CE})

I_C = 20mA

f = Parameter in GHz
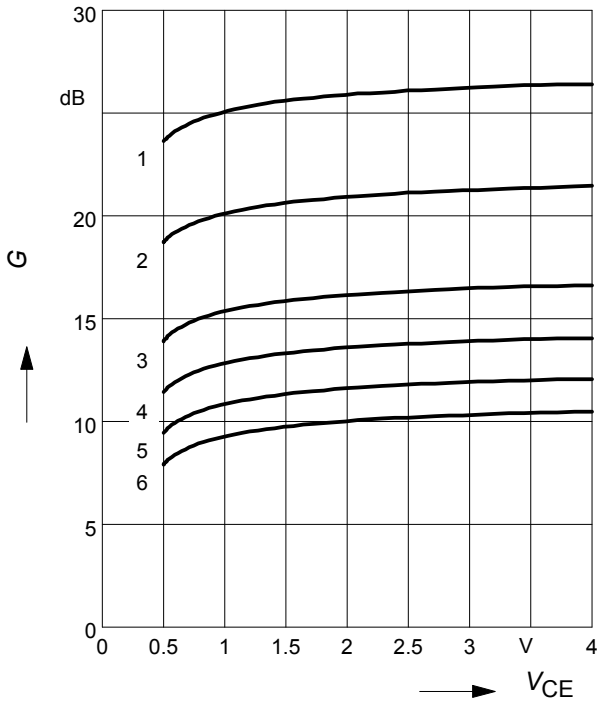
Noise figure F = $f(I_C)$

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

f = 6GHz
f = 5GHz
f = 4GHz
f = 3GHz
f = 2.4GHz
f = 1.8GHz
f = 0.9GHz
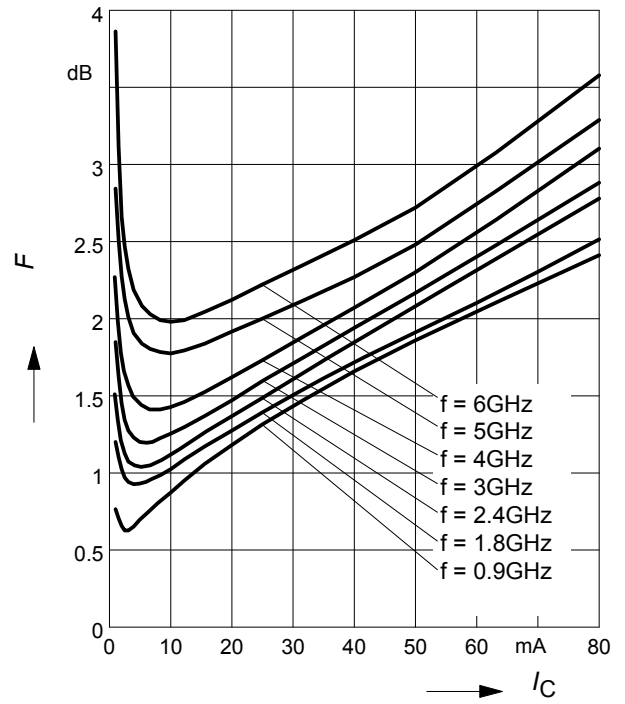
Noise figure F = $f(I_C)$

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

ZS = 50Ohm
ZS = Zsopt
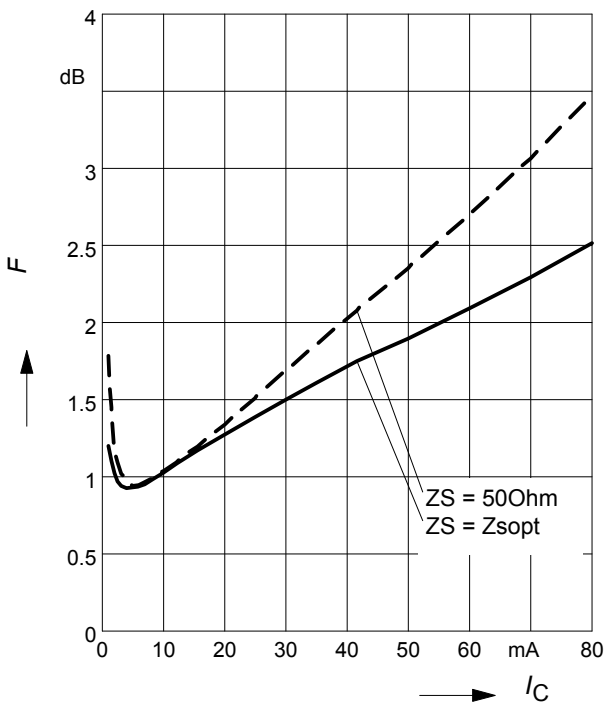
Noise figure F = $f(f)$

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

IC = 20mA
IC = 5mA

2013-09-20
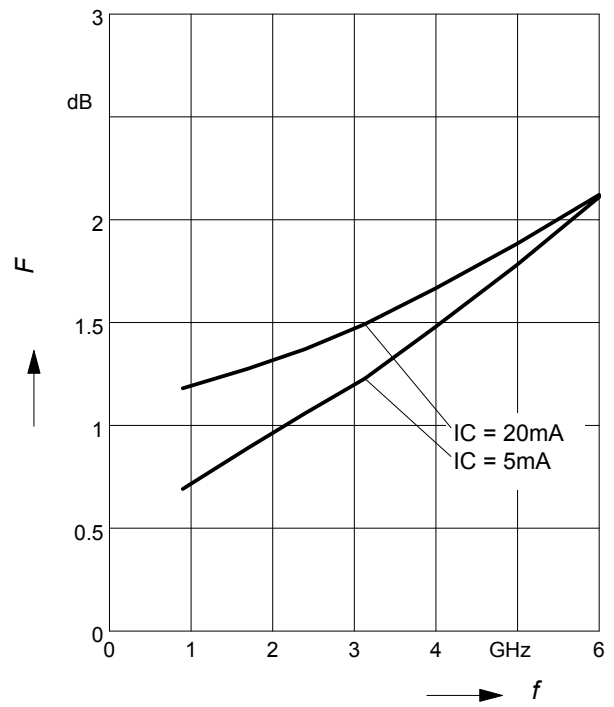
Source impedance for min.

noise figure vs. frequency

V_{CE} = 2V, I_C = 5mA / 20mA

2013-09-20
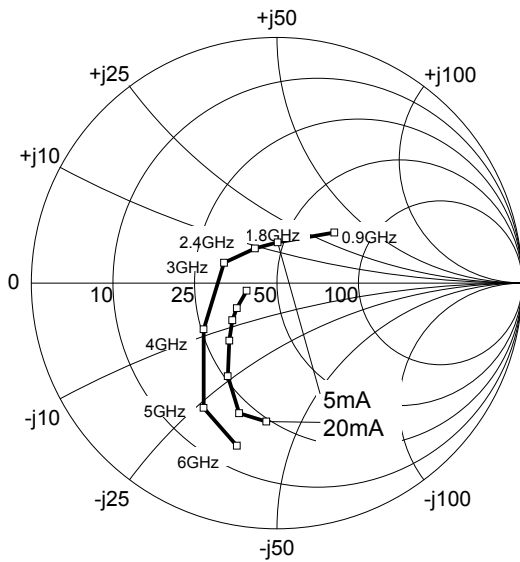
SPICE GP Model

For the SPICE Gummel Poon (GP) model as well as for the S-parameters (including noise parameters) please refer to our internet website www.infineon.com/rf.models.

Please consult our website and download the latest versions before actually starting your design. You find the BFP540 SPICE GP model in the internet in MWO- and ADS-format, which you can import into these circuit simulation tools very quickly and conveniently. The model already contains the package parasitics and is ready to use for DC and high frequency simulations. The terminals of the model circuit correspond to the pin configuration of the device. The model parameters have been extracted and verified up to 10 GHz using typical devices. The BFP540 SPICE GP model reflects the typical DC- and RF-performance within the limitations which are given by the SPICE GP model itself. Besides the DC characteristics all S-parameters in magnitude and phase, as well as noise figure (including optimum source impedance, equivalent noise resistance and flicker noise) and intermodulation have been extracted.
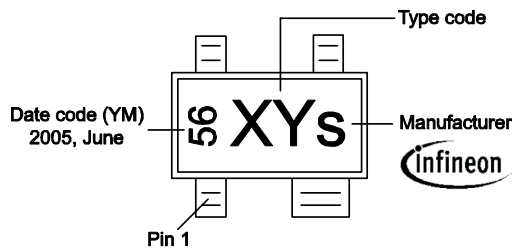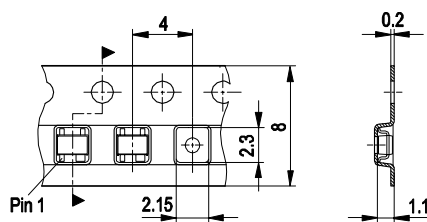
Package Outline
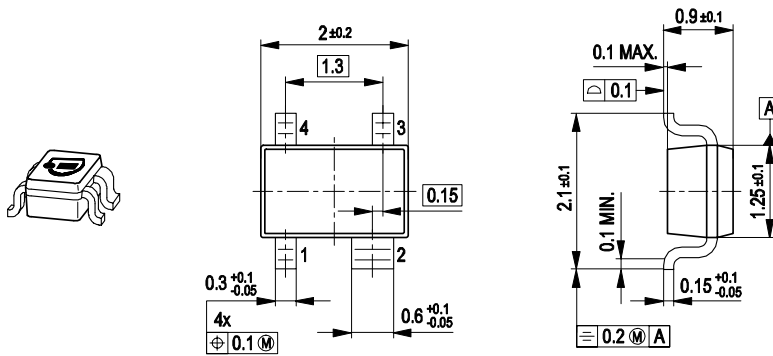
Foot Print
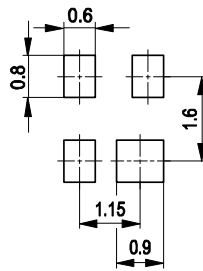
Marking Layout (Example)

Standard Packing

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

2013-09-20

Edition 2009-11-16

Legal Disclaimer

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (<www.infineon.com>).

Warnings

2013-09-20

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Infineon](#):
[BFP540FE6327](#)   [BFP 540 H6327](#)