

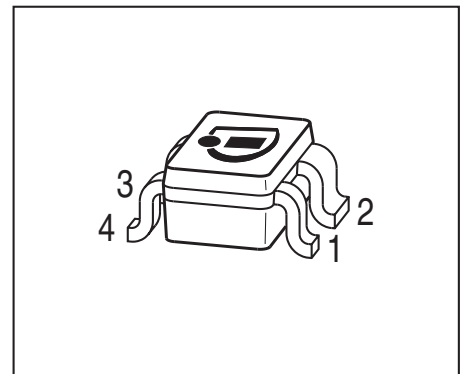


**THE DATASHEET OF  
BFP460H6433XTMA1**



**NPN Silicon RF Transistor**

- General purpose low noise amplifier for low voltage, low current applications
- High ESD robustness, typical 1500V (HBM)
- Low minimum noise figure 1.1 dB at 1.8 GHz
- High linearity: output compression point  
OP1dB = 13 dBm @ 3V, 35mA, 1.8GHz
- Easy to use standard package with visible leads
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



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

Type	Marking	Pin Configuration						Package
BFP460	ABs	1 = E	2 = C	3 = E	4=B	-	-	SOT343

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-emitter voltage $T_A > 0\text{ }^\circ\text{C}$ $T_A \leq 0\text{ }^\circ\text{C}$	$V_{CEO}$	4.5 4.2	V
Collector-emitter voltage	$V_{CES}$	15	
Collector-base voltage	$V_{CBO}$	15	
Emitter-base voltage	$V_{EBO}$	1.5	
Collector current	$I_C$	70	mA
Base current	$I_B$	7	
Total power dissipation <sup>1)</sup> $T_S \leq 92\text{ }^\circ\text{C}$	$P_{tot}$	230	mW
Junction temperature	$T_J$	150	$^\circ\text{C}$
Ambient temperature	$T_A$	-65 ... 150	
Storage temperature	$T_{Stg}$	-65 ... 150	

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

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>1)</sup>	$R_{thJS}$	≤ 250	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 $I_C = 1 \text{ mA}, I_B = 0$	$V_{(BR)CEO}$	4.5	5.8	-	V
Collector-emitter cutoff current $V_{CE} = 15 \text{ V}, V_{BE} = 0$ $V_{CE} = 2 \text{ V}, V_{BE} = 0$ $V_{CE} = 5 \text{ V}, V_{BE} = 0, T_A = 85^\circ\text{C}$ Verified by random sampling	$I_{CES}$	-	-	1000	nA
		-	1	30	
		-	2	40	
Collector-base cutoff current $V_{CB} = 2 \text{ V}, I_E = 0$ $V_{CB} = 5 \text{ V}, I_E = 0$	$I_{CBO}$	-	1	30	nA
		-	-	30	
Emitter-base cutoff current $V_{EB} = 0,5 \text{ V}, I_C = 0$	$I_{EBO}$	-	1	500	nA
DC current gain $V_{CE} = 3 \text{ V}, I_C = 20 \text{ mA}$ , pulse measured	$h_{FE}$	90	120	160	-

<sup>1)</sup>For calculation of  $R_{thJA}$  please refer to Application Note AN077 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 $I_C = 30\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 1\text{ GHz}$	$f_T$	16	22	-	GHz
Collector-base capacitance $V_{CB} = 3\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , emitter grounded	$C_{cb}$	-	0.32	0.45	pF
Collector emitter capacitance $V_{CE} = 3\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , base grounded	$C_{ce}$	-	0.28	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ , collector grounded	$C_{eb}$	-	0.55	-	
Minimum noise figure $V_{CE} = 2\text{ V}$ , $I_C = 3\text{ mA}$ , $Z_S = Z_{Sopt}$ , $f = 100\text{ MHz}$ $V_{CE} = 3\text{ V}$ , $I_C = 5\text{ mA}$ , $Z_S = Z_{Sopt}$ , $f = 1.8\text{ GHz}$ $V_{CE} = 3\text{ V}$ , $I_C = 5\text{ mA}$ , $Z_S = Z_{Sopt}$ , $f = 3\text{ GHz}$	$NF_{min}$	-	0.7 1.1 1.2	-	dB

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

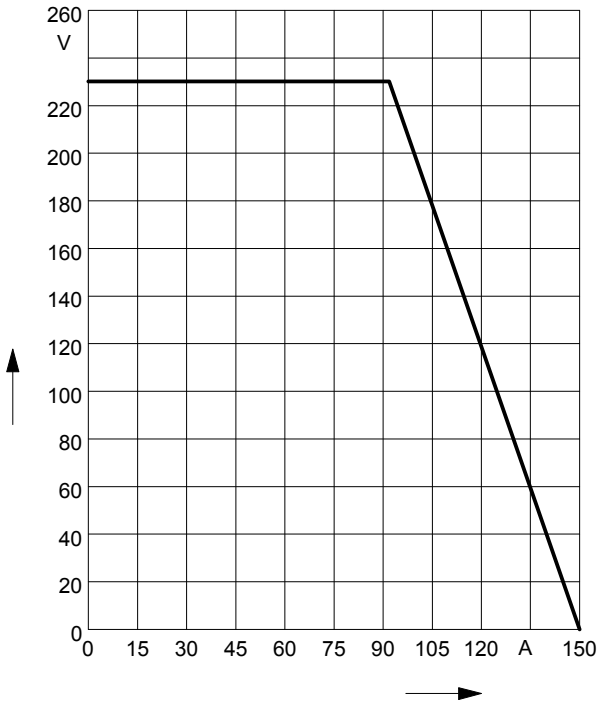
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics (verified by random sampling)</b>					
Maximum power Gain <sup>1)</sup> $I_C = 3 \text{ mA}$ , $V_{CE} = 1.5 \text{ V}$ , $Z_S = Z_{\text{Sopt}}$ , $Z_L = Z_{\text{Lopt}}$ , $f = 100 \text{ MHz}$ $I_C = 20 \text{ mA}$ , $V_{CE} = 3 \text{ V}$ , $Z_S = Z_{\text{Sopt}}$ , $Z_L = Z_{\text{Lopt}}$ , $f = 1,8 \text{ GHz}$ $f = 3 \text{ GHz}$	$G_{\text{max}}$	-	26.5	-	dB
Transducer gain $I_C = 3 \text{ mA}$ , $V_{CE} = 1.5 \text{ V}$ , $Z_S = Z_L = 50\Omega$ , $f = 100 \text{ MHz}$ $I_C = 20 \text{ mA}$ , $V_{CE} = 3 \text{ V}$ , $Z_S = Z_L = 50\Omega$ , $f = 1.8 \text{ GHz}$ $f = 3 \text{ GHz}$	$ S_{21e} ^2$	-	20	-	dB
Third order intercept point at output <sup>2)</sup> $V_{CE} = 3 \text{ V}$ , $I_C = 20 \text{ mA}$ , $f = 100 \text{ MHz}$ $V_{CE} = 3 \text{ V}$ , $I_C = 20 \text{ mA}$ , $f = 1.8 \text{ GHz}$	$IP_3$	-	23.5	-	dBm
1dB compression point at output $V_{CE} = 3\text{V}$ , $I_C = 20\text{mA}$ , $Z_S=Z_L = 50\Omega$ , $f = 100 \text{ MHz}$ $V_{CE} = 3\text{V}$ , $I_C = 20\text{mA}$ , $Z_S=Z_L = 50\Omega$ , $f = 1.8 \text{ GHz}$ $V_{CE} = 3\text{V}$ , $I_C = 35\text{mA}$ , $Z_S=Z_L = 50\Omega$ , $f = 1.8 \text{ GHz}$	$P_{-1\text{dB}}$	-	9.5	-	
		-	11.5	-	
		-	13	-	

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

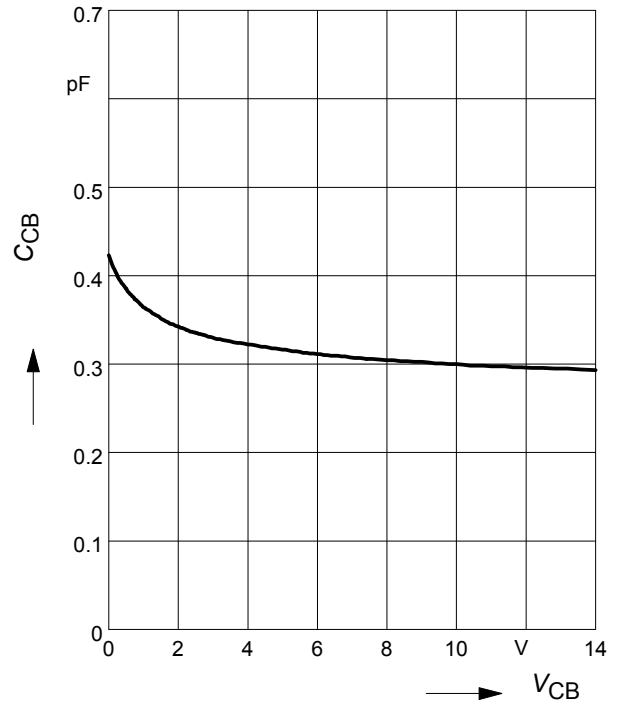
<sup>2</sup>IP3 value depends on termination of all intermodulation frequency components.

Termination used for this measurement is  $50\Omega$  from 0.1 MHz to 6 GHz

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



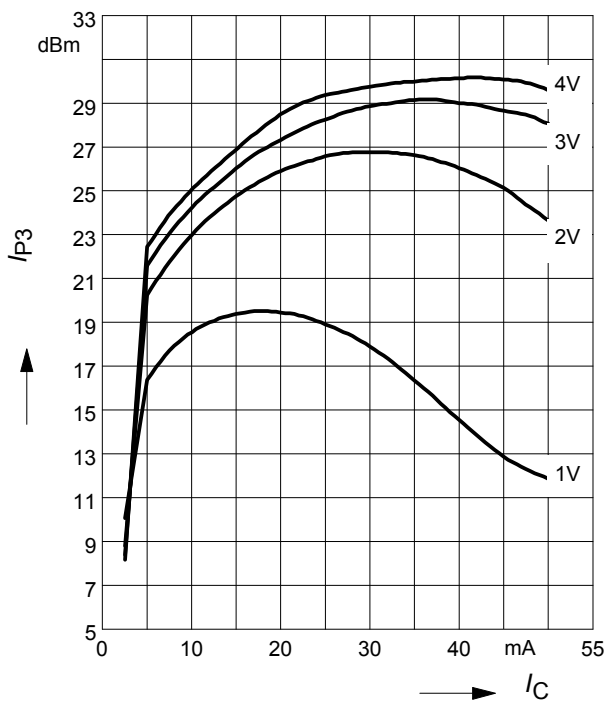
**Collector-base capacitance  $C_{cb} = f(V_{CB})$   
 $f = 1\text{MHz}$**



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

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

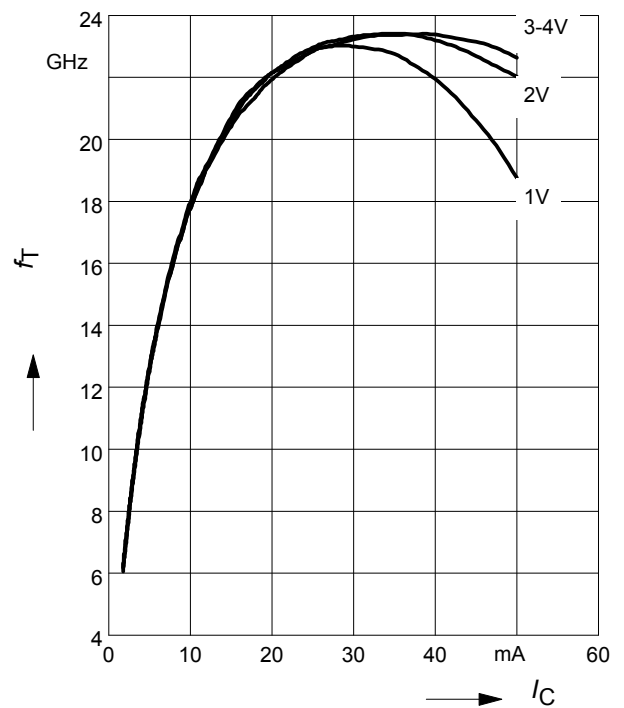
$V_{CE} = \text{parameter}, f = 1800\text{MHz}$



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

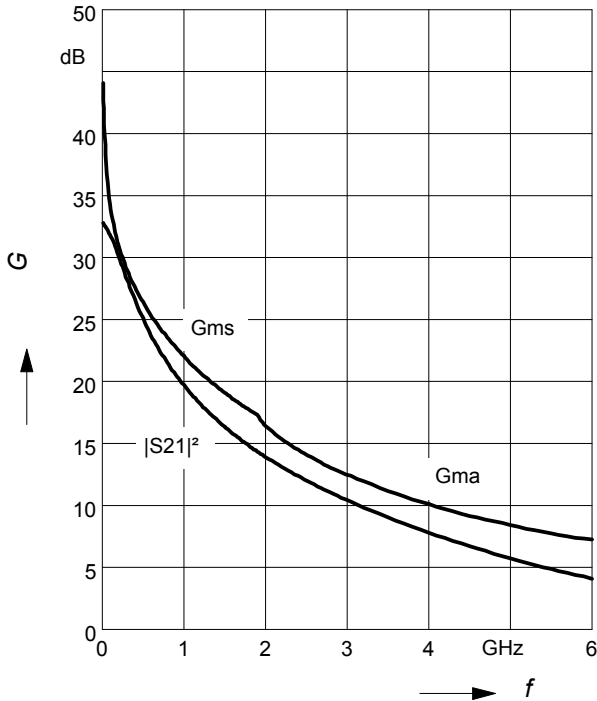
$f = 1\text{GHz}$

$V_{CE} = \text{parameter}$



**Power gain  $G_{ma}$ ,  $G_{ms}$ ,  $|S_{21}|^2 = f(f)$**

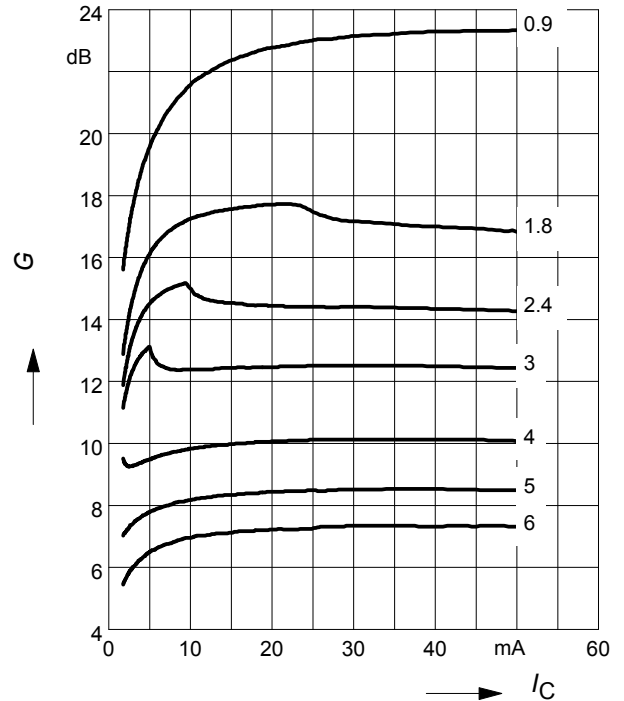
$V_{CE} = 3\text{ V}$ ,  $I_C = 20\text{ mA}$



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

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

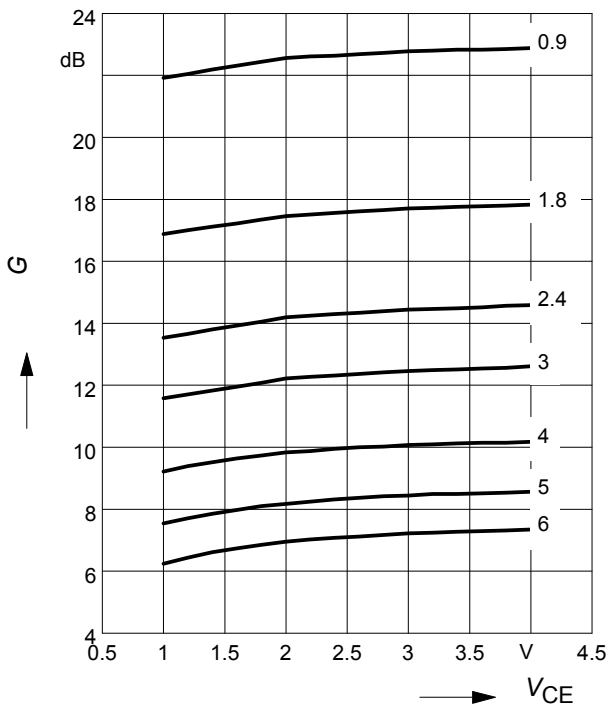
$f = \text{parameter in GHz}$



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

$I_C = 20\text{ mA}$

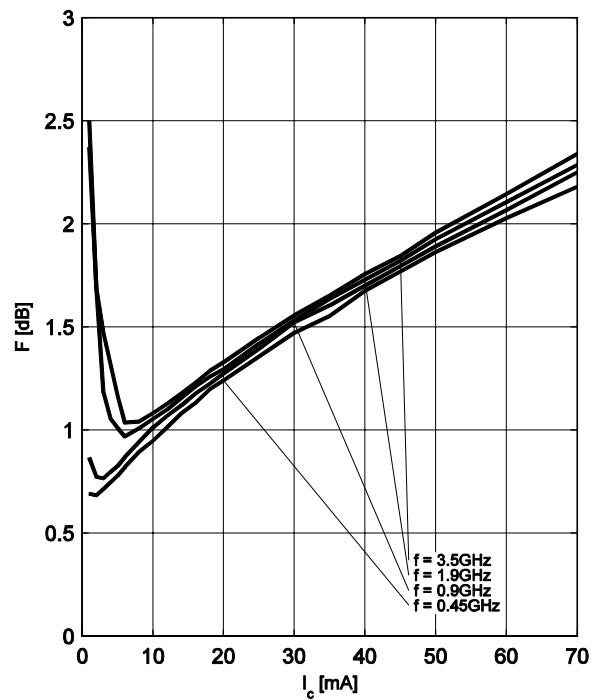
$f = \text{parameter in GHz}$



**Noise figure  $F = f(I_C)$**

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

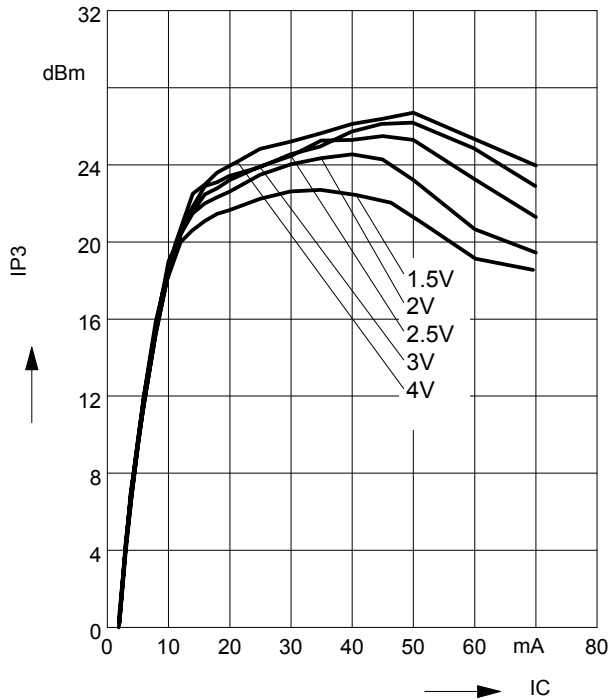
$Z_S = Z_{\text{Sopt}}$



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

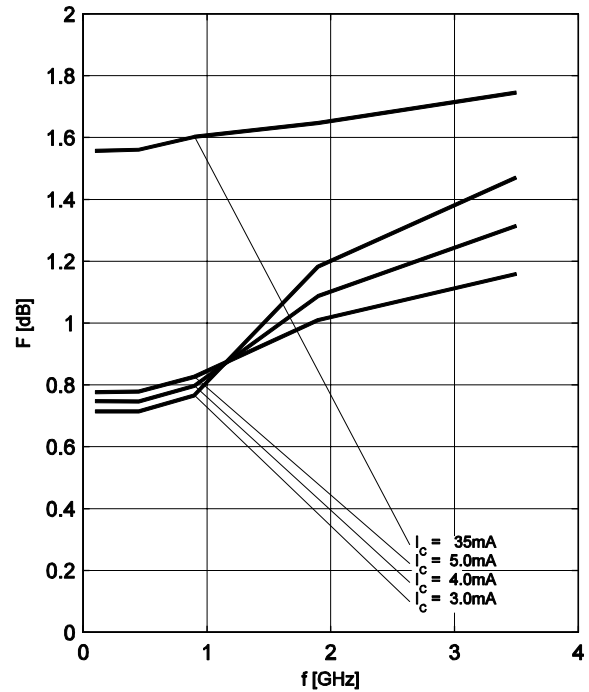
(Output,  $Z_S=Z_L=50\Omega$ )

$V_{CE}$  = parameter,  $f$  = 100MHz



**Noise figure  $F = f(f)$**

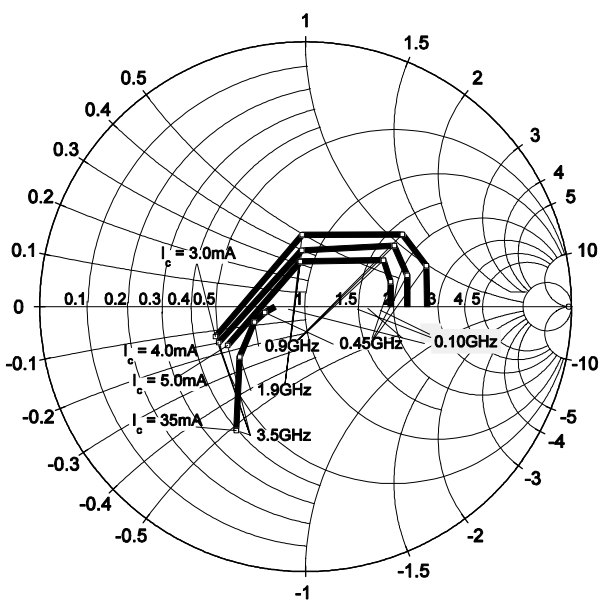
$V_{CE} = 2V$ ,  $Z_S = Z_{Sopt}$ ,  $I_C$  = parameter



**Source impedance for min.**

noise figure vs. frequency

$V_{CE} = 2V$ ,  $I_C$  = parameter



**SPICE Parameter**

For the SPICE model as well as for the S-parameters (including noise parameters) please refer to our internet website [www.infineon.com/rf.models](http://www.infineon.com/rf.models).

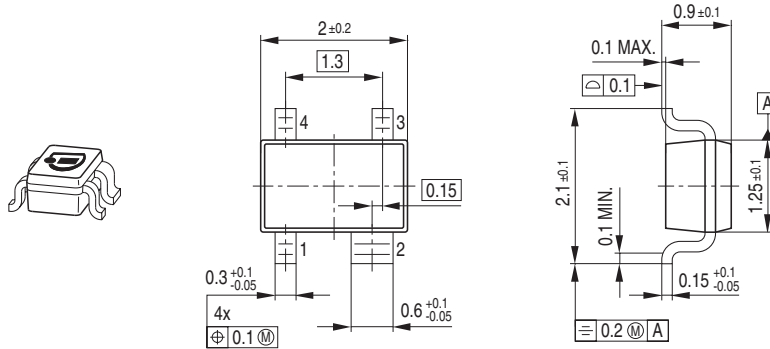
Please consult our website and download the latest versions before actually starting your design.

You find the BFP460 SPICE model in the internet in MWO- and ADS- format which you can import into these circuit simulation tools very quickly and conveniently.

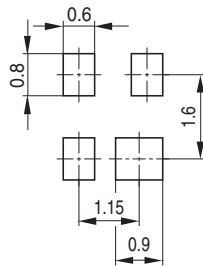
The simulation data have been generated and verified using typical devices.

The BFP460 SPICE model reflects the typical DC- and RF-performance with high accuracy.

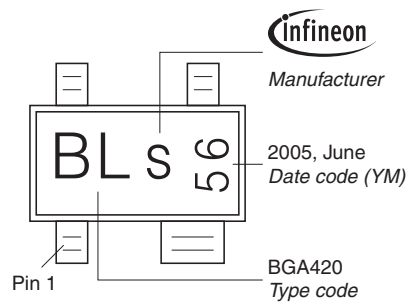
Package Outline



Foot Print

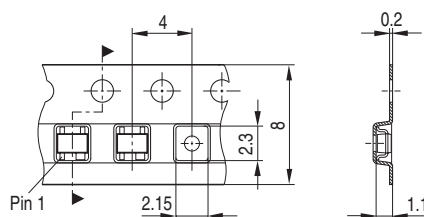


Marking Layout (Example)



Standard Packing

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



**Datasheet Revision History: 17 May 2010**

This datasheet replaces the revision from 14 August 2008.

The product itself has not been changed and the device characteristics remain unchanged. Only the product description and information available in the datasheet has been expanded and updated.

<b>Previous Revision: 14 August 2008</b>	
<b>Page</b>	<b>Subject (changes since last revision)</b>
1	Maximum ratings for collector current $I_{Cmax}$ , base current $I_{Bmax}$ and total power dissipation $P_{tot}$ increased
2	Typical values for leakage currents included, maximum leakage current values reduced
3	Noise description at 100 MHz added
4	Gain and linearity description at 100 MHz added
5 - 7	Curves for $IP_3$ and noise at 100 MHz added

**Edition 2009-11-16**

**Published by  
Infineon Technologies AG  
81726 Munich, Germany**

**© 2009 Infineon Technologies AG  
All Rights Reserved.**

### **Legal Disclaimer**

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

### **Information**

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office ( [www.infineon.com](http://www.infineon.com) ).



### **Warnings**

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View BFP460H6433XTMA1 on WIN SOURCE](#)
-  [Infineon Technologies](#) Information

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management