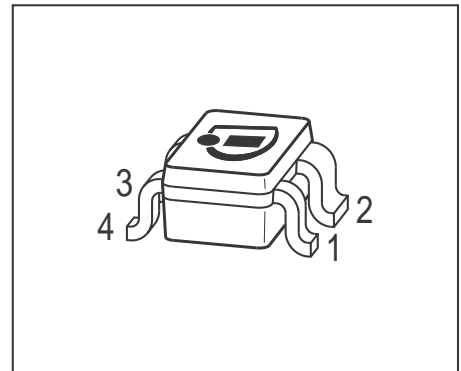


**NPN Silicon RF Transistor**

- Low noise amplifier designed for low voltage applications, ideal for 1.2 V or 1.8 V supply voltage. Supports 2.9 V  $V_{CC}$  with enough external collector resistance.
- High gain and low noise at high frequencies due to high transit frequency  $f_T = 45$  GHz
- Finds usage e.g. in cordless phones and satellite receivers
- Pb-free (RoHS compliant) standard package with visible leads
- Qualified according AEC Q101



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

Type	Marking	Pin Configuration						Package
BFP520	APs	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	$V_{CEO}$	2.5	V
$T_A = -55$ °C		2.4	
Collector-emitter voltage	$V_{CES}$	10	
Collector-base voltage	$V_{CBO}$	10	
Emitter-base voltage	$V_{EBO}$	1	
Collector current	$I_C$	40	mA
Base current	$I_B$	4	
Total power dissipation <sup>1)</sup>	$P_{tot}$	100	mW
$T_S \leq 105$ °C			
Junction temperature	$T_J$	150	°C
Storage temperature	$T_{Stg}$	-55 ... 150	

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

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>1)</sup>	$R_{thJS}$	≤ 450	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 $I_C = 1 \text{ mA}, I_B = 0$	$V_{(BR)CEO}$	2.5	3	3.5	V
Collector-emitter cutoff current $V_{CE} = 2 \text{ V}, V_{BE} = 0$ $V_{CE} = 10 \text{ V}, V_{BE} = 0$	$I_{CES}$	-	1	30	nA
Collector-base cutoff current $V_{CB} = 2 \text{ V}, I_E = 0$	$I_{CBO}$	-	-	30	
Emitter-base cutoff current $V_{EB} = 0.5 \text{ V}, I_C = 0$	$I_{EBO}$	-	100	3000	
DC current gain $I_C = 20 \text{ mA}, V_{CE} = 2 \text{ V}$ , pulse measured	$h_{FE}$	70	110	170	-

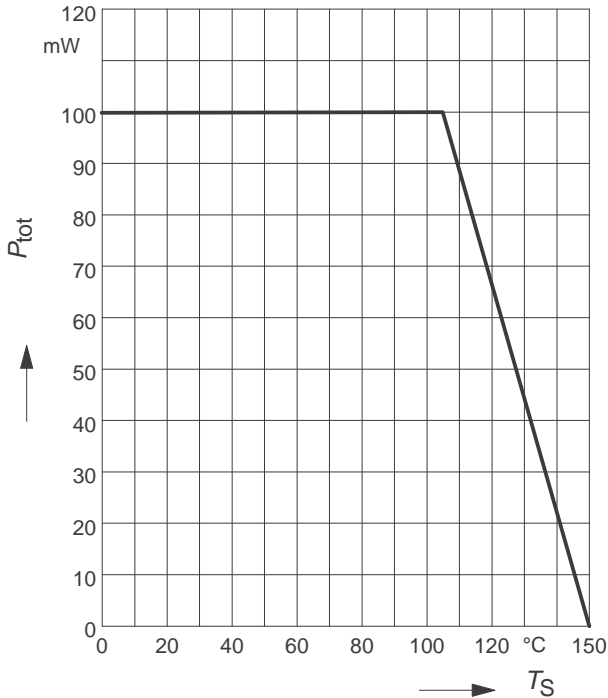
<sup>1)</sup>For calculation of  $R_{thJA}$  please refer to Application Note AN077 Thermal Resistance

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

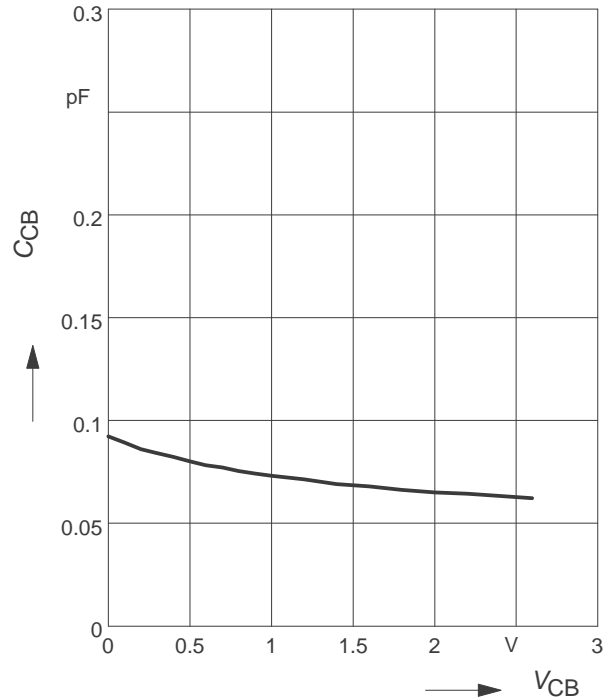
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics</b> (verified by random sampling)					
Transition frequency $I_C = 30\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $f = 2\text{ GHz}$	$f_T$	32	45	-	GHz
Collector-base capacitance $V_{CB} = 2\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , emitter grounded	$C_{cb}$	-	0.07	0.13	pF
Collector emitter capacitance $V_{CE} = 2\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ , base grounded	$C_{ce}$	-	0.3	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ , collector grounded	$C_{eb}$	-	0.33	-	
Minimum noise figure $I_C = 2\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $Z_S = Z_{Sopt}$ , $f = 1.8\text{ GHz}$	$NF_{min}$	-	0.95	-	dB
Power gain, maximum stable <sup>1)</sup> $I_C = 20\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 1.8\text{ GHz}$	$G_{ms}$	-	24	-	dB
Insertion power gain $V_{CE} = 2\text{ V}$ , $I_C = 20\text{ mA}$ , $f = 1.8\text{ GHz}$ , $Z_S = Z_L = 50\ \Omega$	$ S_{21} ^2$	-	21.5	-	
Third order intercept point at output $V_{CE} = 2\text{ V}$ , $I_C = 20\text{ mA}$ , $f = 1.8\text{ GHz}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ $V_{CE} = 2\text{ V}$ , $I_C = 7\text{ mA}$ , $f = 1.8\text{ GHz}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$	$IP_3$	-	25	-	dBm
		-	17	-	
1dB Compression point at output $I_C = 20\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 1.8\text{ GHz}$ $I_C = 7\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ , $f = 1.8\text{ GHz}$	$P_{-1dB}$	-	12	-	
		-	5	-	

<sup>1)</sup> $G_{ms} = |S_{21} / S_{12}|$

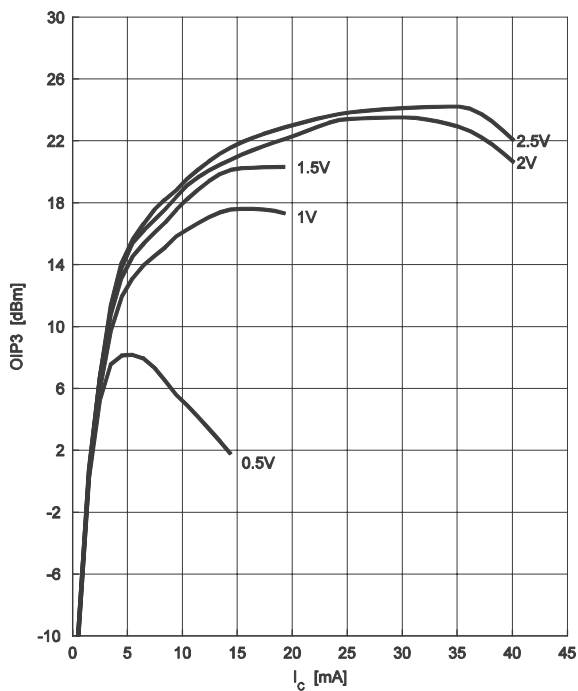
Total power dissipation  $P_{tot} = f(T_S)$



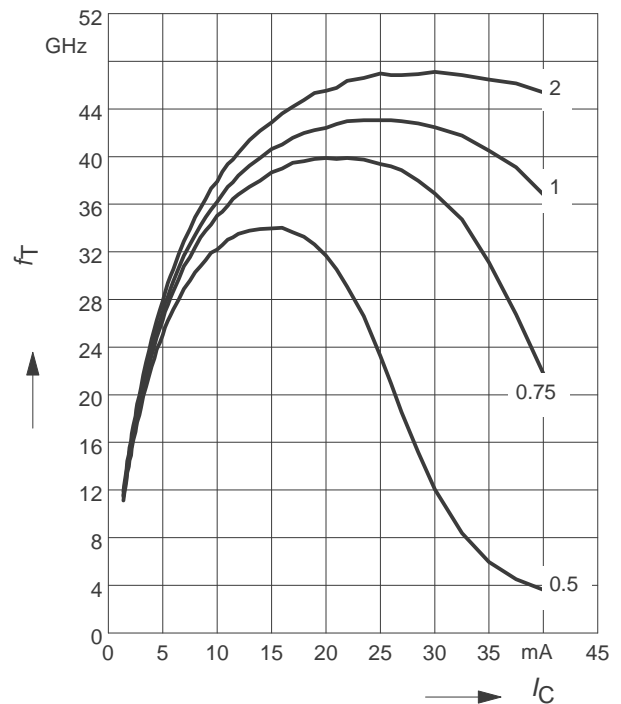
Collector-base capacitance  $C_{cb} = f(V_{CB})$   
 $f = 1\text{MHz}$



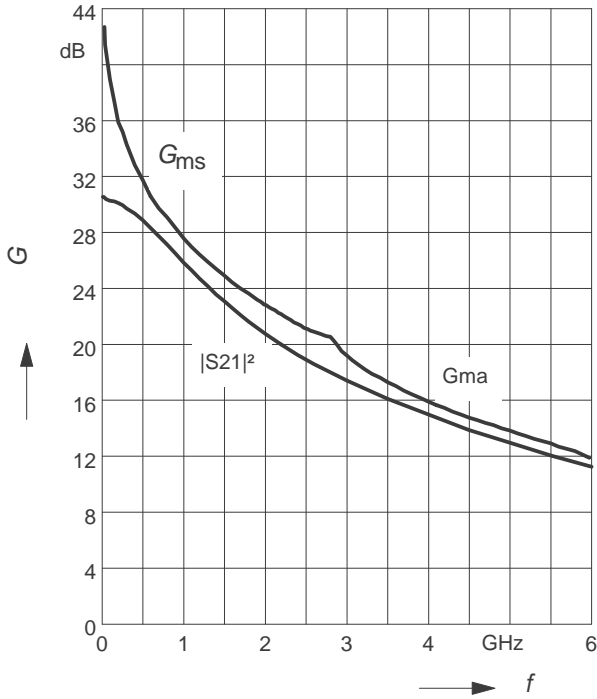
Third order Intercept Point  $IP_3 = f(I_C)$   
(Output,  $Z_S = Z_L = 50 \Omega$ )  
 $V_{CE} = \text{parameter}$ ,  $f = 900\text{MHz}$



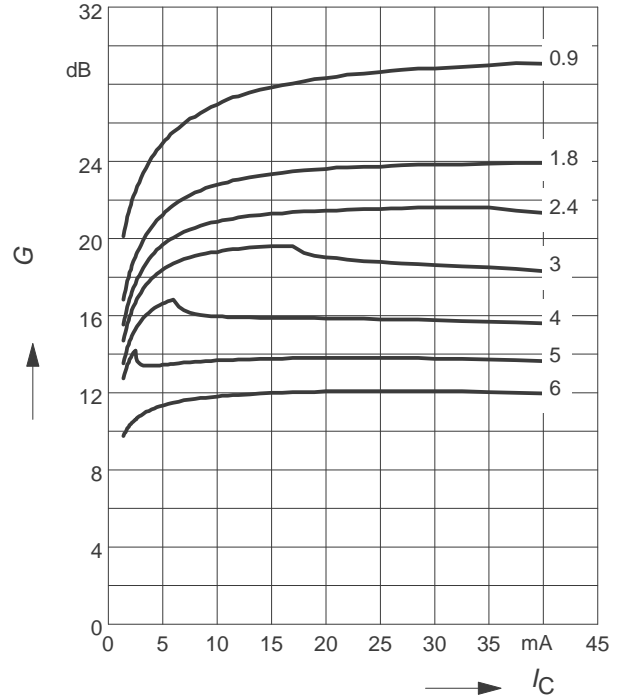
Transition frequency  $f_T = f(I_C)$   
 $f = 2\text{GHz}$   
 $V_{CE} = \text{parameter in V}$



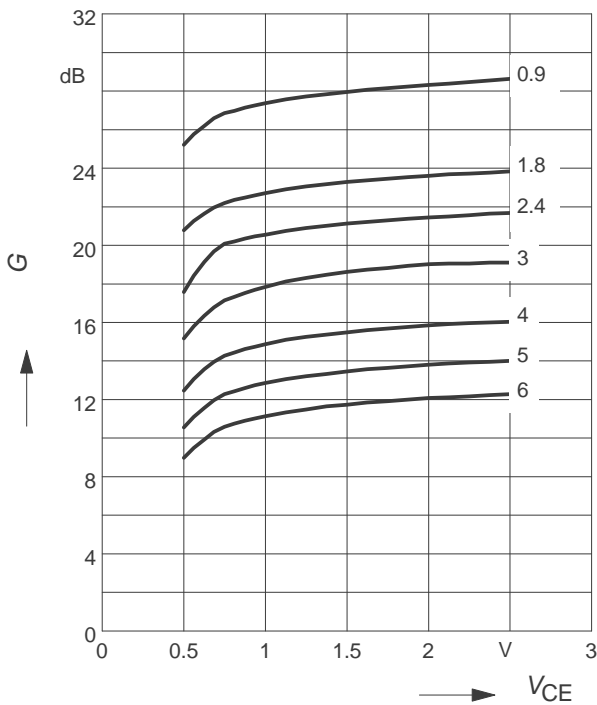
**Power gain  $G_{ma}$ ,  $G_{ms}$ ,  $|S_{21}|^2 = f(f)$**   
 $V_{CE} = 2\text{ V}$ ,  $I_C = 20\text{ mA}$



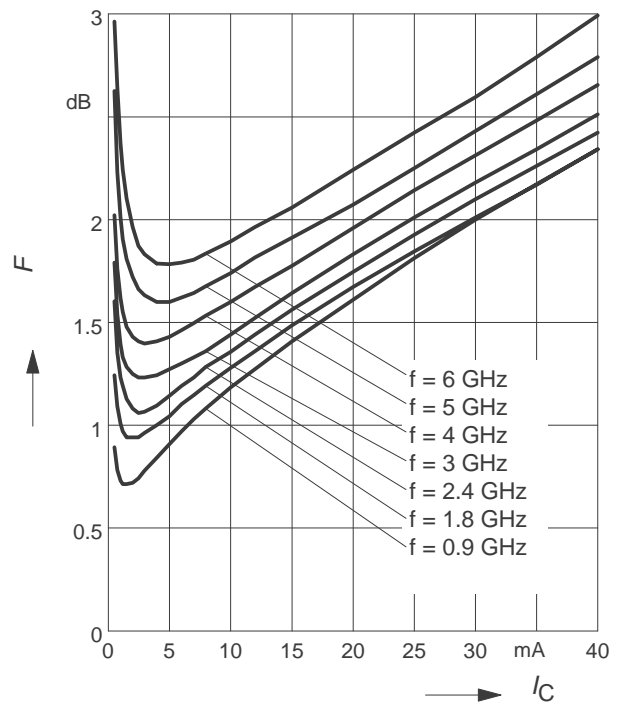
**Power gain  $G_{ma}$ ,  $G_{ms} = f(I_C)$**   
 $V_{CE} = 2\text{ V}$   
 $f = \text{parameter in GHz}$



**Power gain  $G_{ma}$ ,  $G_{ms} = f(V_{CE})$**   
 $I_C = 20\text{ mA}$   
 $f = \text{parameter in GHz}$

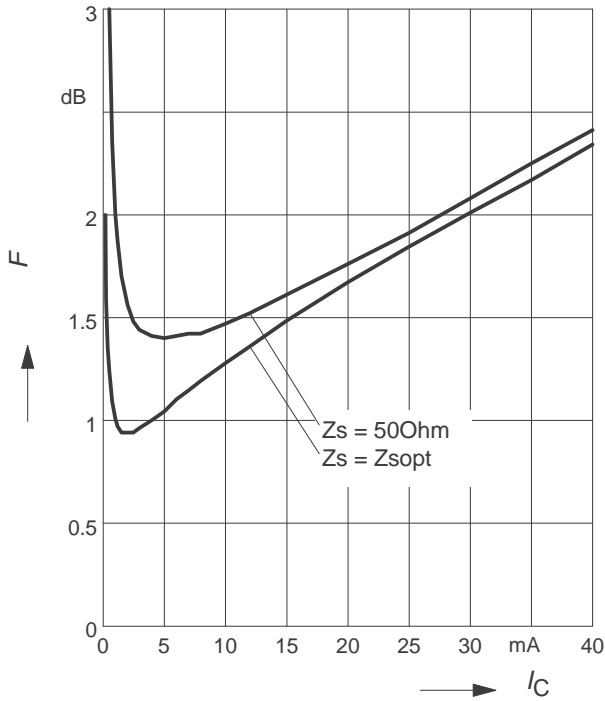


**Minimum noise figure  $NF_{min} = f(I_C)$**   
 $V_{CE} = 2\text{ V}$ ,  $Z_S = Z_{Sopt}$



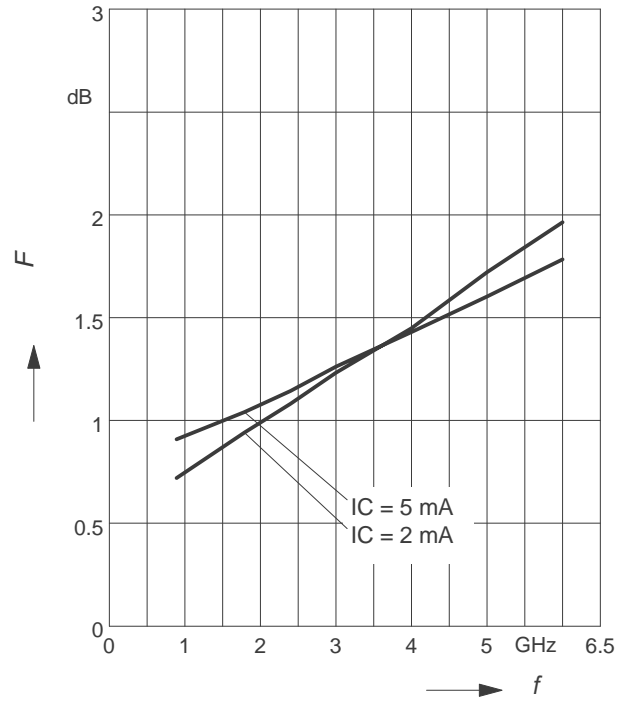
Noise figure  $F = f(I_C)$

$V_{CE} = 2\text{ V}$ ,  $f = 1.8\text{ GHz}$



Minimum noise figure  $NF_{min} = f(f)$

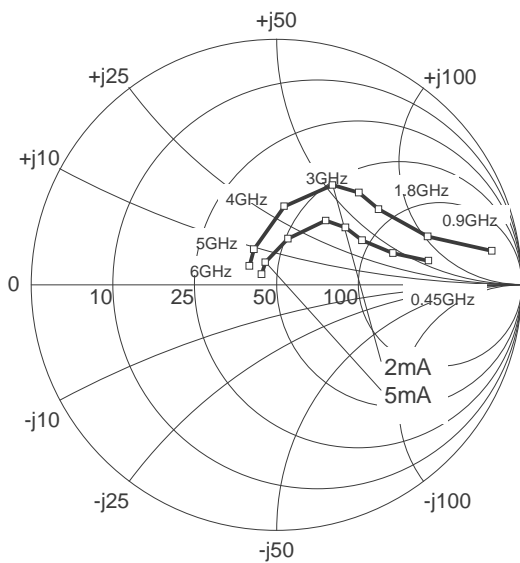
$V_{CE} = 2\text{ V}$ ,  $Z_S = Z_{Sopt}$



**Source impedance** for min.

noise figure vs. frequency

$V_{CE} = 2\text{ V}$ ,  $I_C = 2\text{ mA} / 5\text{ mA}$

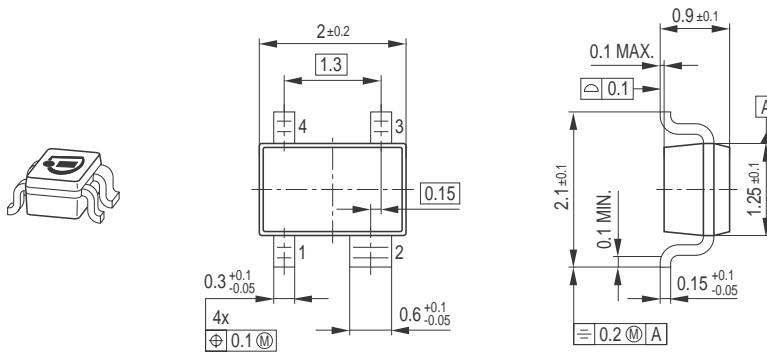


**SPICE GP Model**

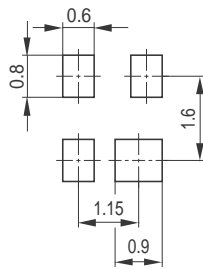
For the SPICE Gummel Poon (GP) model as well as for the S-parameters (including noise parameters) please refer to our internet website [www.infineon.com/rf.models](http://www.infineon.com/rf.models).

Please consult our website and download the latest versions before actually starting your design. You find the BFP520 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 BFP520 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.

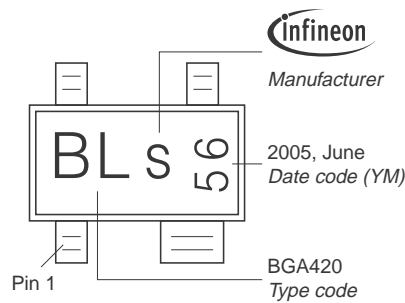
Package Outline



Foot Print

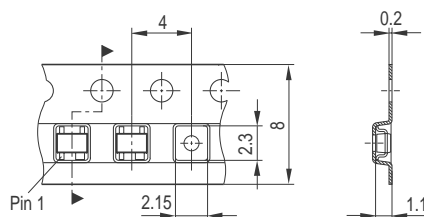


Marking Layout (Example)



Standard Packing

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





**Datasheet Revision History: 16 August 2010**

This datasheet replaces the revision from 30 March 2007 and 28 June 2010. 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 Revisions: 30 March 2007 and 28 June 2010</b>	
<b>Page</b>	<b>Subject (changes since last revision)</b>
1	Feature list updated
2	Typical values for leakage currents included, values for maximum leakage currents reduced
4	OIP3 characteristic added
7	SPICE model parameters removed from the datasheet, link to the respective internet site added

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