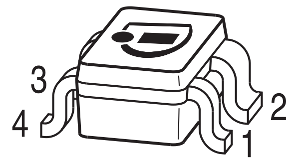
Low Noise Silicon Bipolar RF Transistor



- For ESD protected high gain low noise amplifier
- High ESD robustness
  typical value 1000 V (HBM)
- Outstanding G_{ms} = 21.5 dB @ 1.8 GHz
  Minimum noise figure NF_{min} = 0.9 dB @ 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
BFP540ESD	AUs	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 T_A = 25 °C T_A = -55 °C	V_{CEO}	 4.5 4	V
Collector-emitter voltage	V_{CES}	10	
Collector-base voltage	V_{CBO}	10	
Emitter-base voltage	V_{EBO}	1	
Collector current	I_C	80	mA
Base current	I_B	8	
Total power dissipation[1)] $T_S \leq 77$°C	P_{tot}	250	mW
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} = 10 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	170	-

[1]For the definition of R_{thJS} please refer to Application Note AN077 (Thermal Resistance Calculation)

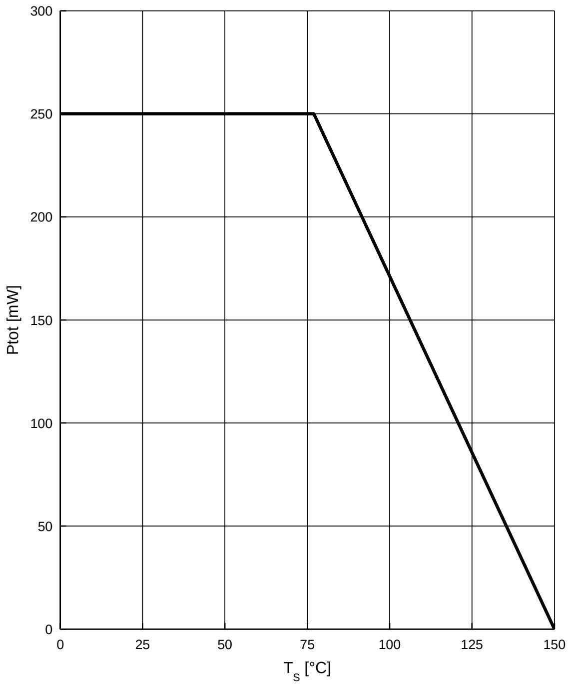
Electrical Characteristics at T_A = 25 °C, unless otherwise specified

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}	-	0.41	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz, V_{CB} = 0 , collector grounded	C_{eb}	-	0.59	-	
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, $Z_S = Z_L$ = 50Ω, f = 1.8GHz I_C = 20 mA, V_{CE} = 2 V, $Z_S = Z_L$ = 50Ω, f = 3GHz	$\|S_{21e}\|^2$	 16 -	 18.5 14	 - -	dB
Third order intercept point at output[2)] V_{CE} = 2 V, I_C = 20 mA, $Z_S = Z_L$ = 50Ω, f = 1.8GHz	$IP3$	-	24.5	-	dBm
1dB compression point at output I_C = 20 mA, V_{CE} = 2 V, $Z_S = Z_L$ = 50Ω, f = 1.8GHz	P_{-1dB}	-	11	-	

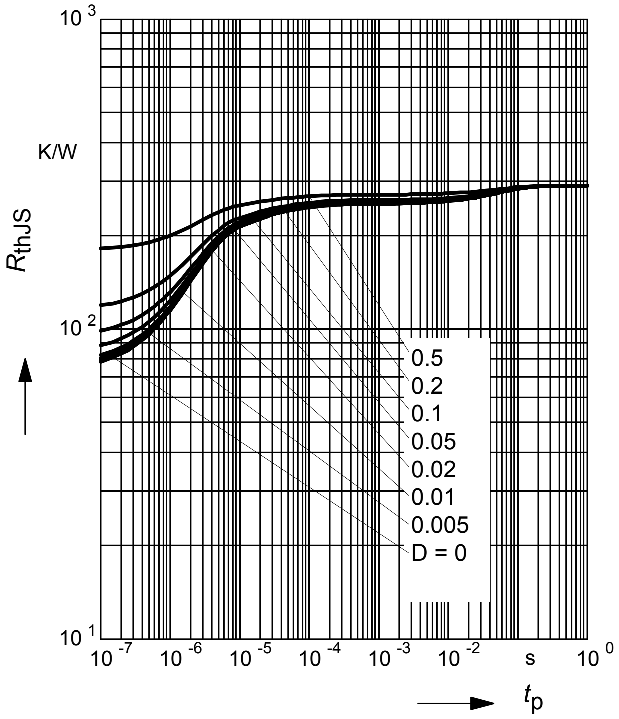
[1] $G_{ma} = |S_{21e} / S_{12e}| (k-(k^2-1)^{1/2})$, $G_{ms} = |S_{21e} / S_{12e}|$

[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 $P_{tot} = f(T_S)$

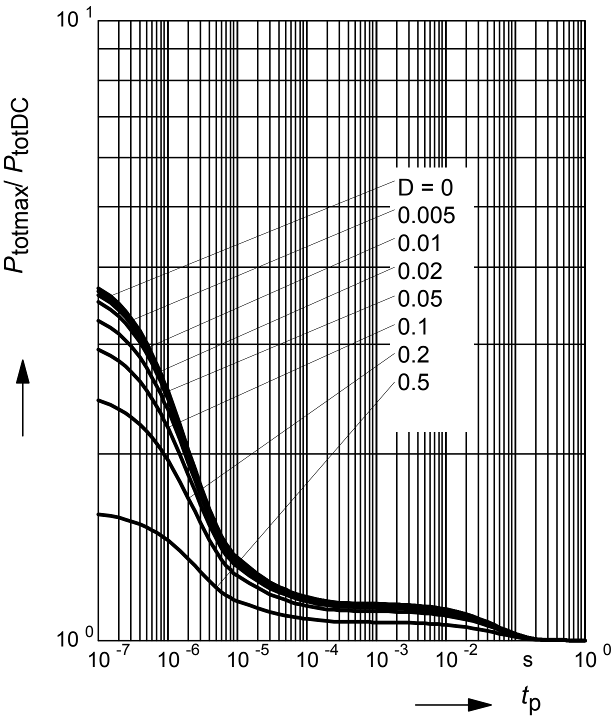


Permissible Pulse Load $R_{thJS} = f(t_p)$



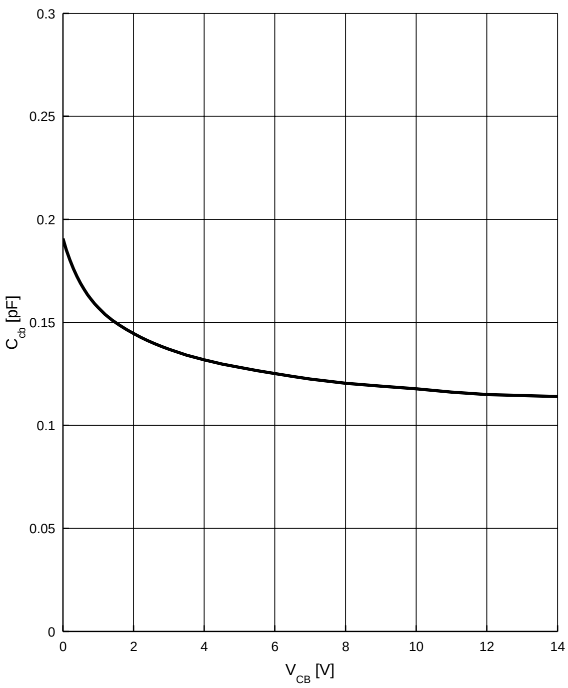
Permissible Pulse Load

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

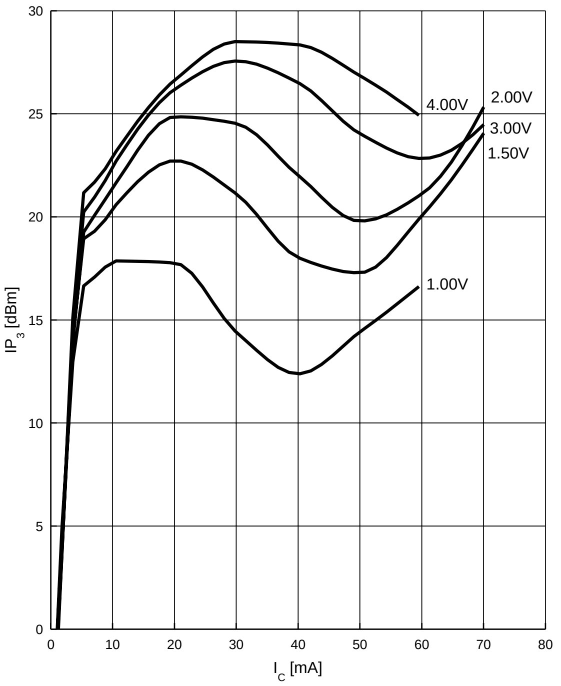


Collector-base capacitance $C_{cb} = f(V_{CB})$

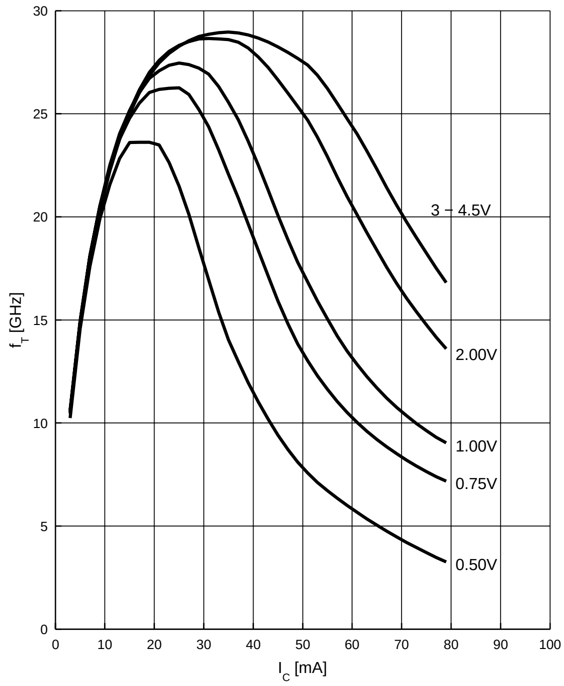
f = 1 MHz



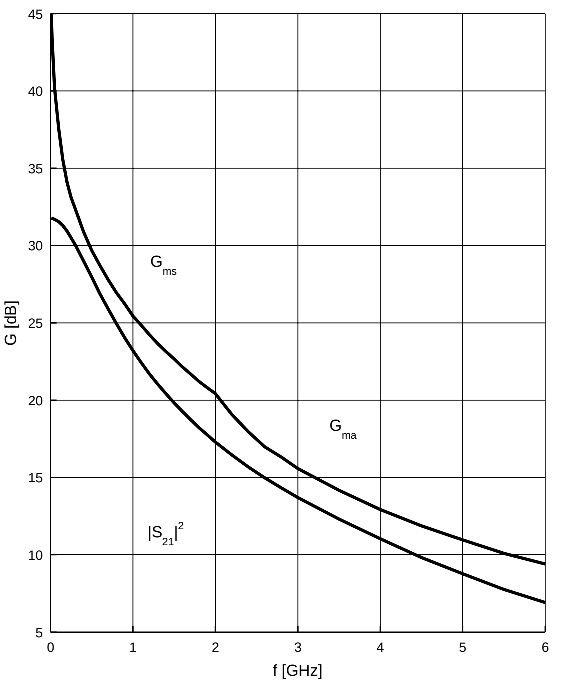
Third order Intercept Point $IP_3 = f\ (I_C)$
(Output, $Z_S = Z_L = 50\ \Omega$)
V_{CE} = parameter, f = 900 MHz



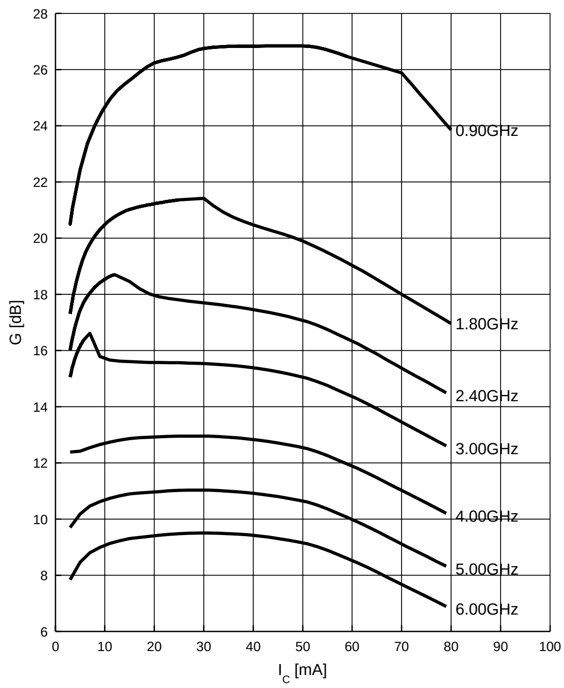
Transition frequency $f_T = f(I_C)$
V_{CE} = parameter in V, f = 2 GHz



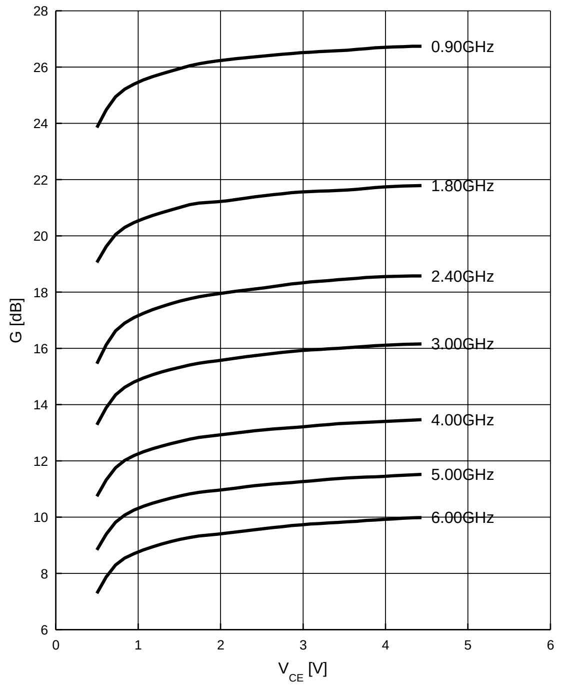
Power gain G_{ma}, $G_{ms} = f\ (f)$
V_{CE} = 3 V, I_C = 25 mA



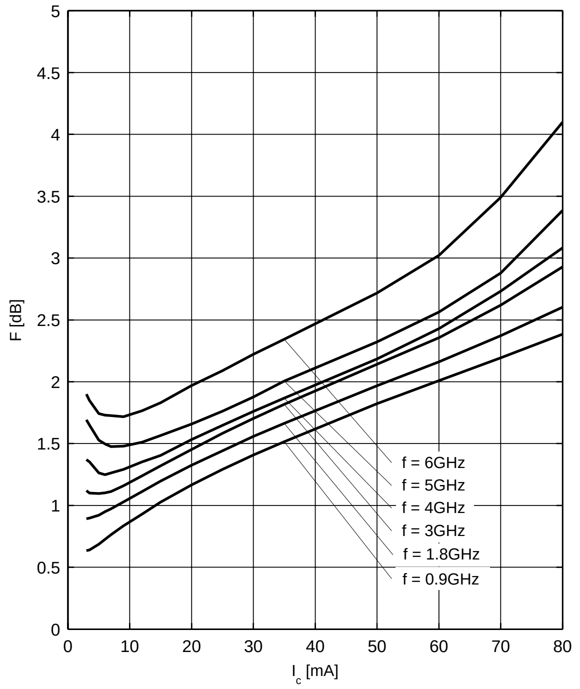
Power gain G_{ma}, $G_{ms} = f\ (I_C)$
V_{CE} = 3 V
f = parameter in GHz



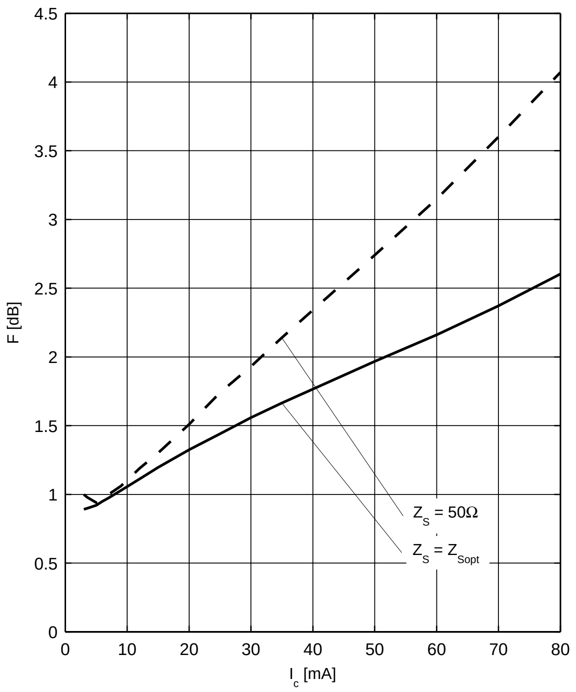
Power gain G_{ma}, G_{ms} = f (V_{CE})
I_C = 20 mA
f = parameter in GHz



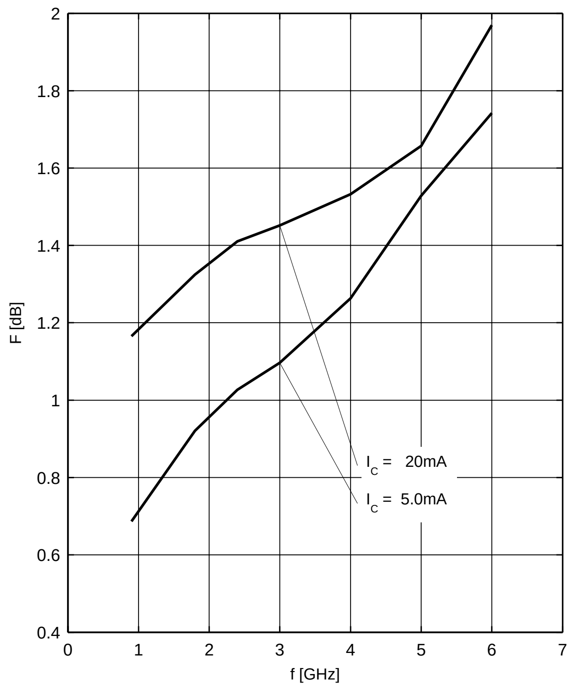
Noise figure F = f(I_C)
V_{CE} = 3 V, f = parameter in GHz
Z_S = Z_{Sopt}



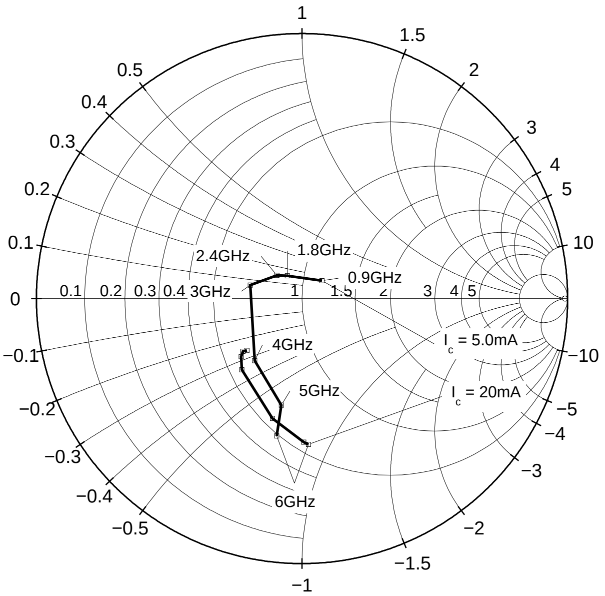
Noise figure F = f(I_C)
V_{CE} = 3V, f = 1.8 GHz



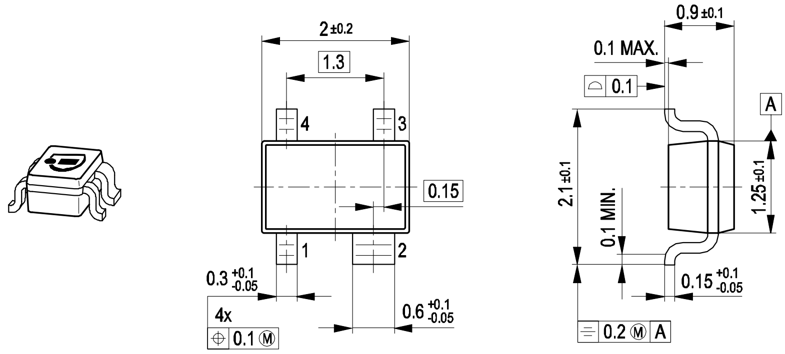
Noise figure F = f(f)
V_{CE} = 3 V, Z_S = Z_{Sopt}



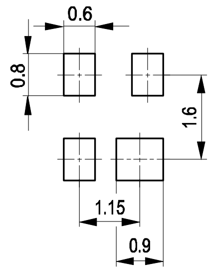
Source impedance for min.
noise figure vs. frequency
V_{CE} = 3 V, I_C = 5 mA / 20 mA



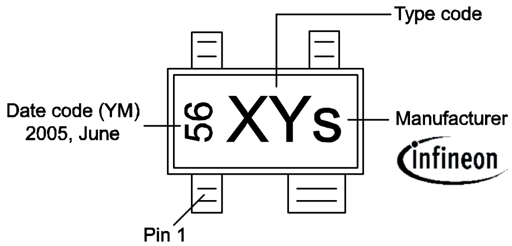
Package Outline



Foot Print

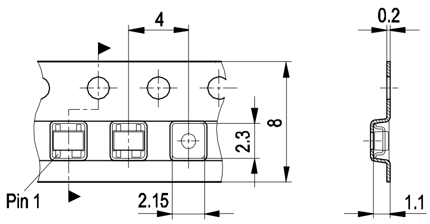


Marking Layout (Example)



Standard Packing

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



Edition 2009-11-16

Published by
Infineon Technologies AG
81726 Munich, Germany

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>).

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.