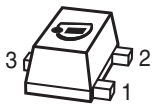
NPN Silicon RF Transistor



- Low noise amplifier for low current applications
- Collector design supports 5V supply voltage
- For oscillators up to 3.5 GHz
- Low noise figure 1.0 dB at 1.8 GHz
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101

AEC Qualified RoHS

ESD (**E**lectro**s**tatic **d**ischarge) sensitive device, observe handling precaution!

Type	Marking	Pin Configuration			Package
BFR360F	FBs	1 = B	2 = E	3 = C	TSFP-3

Maximum Ratings at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	6	V
Collector-emitter voltage	V_{CES}	15	
Collector-base voltage	V_{CBO}	15	
Emitter-base voltage	V_{EBO}	2	
Collector current	I_C	35	mA
Base current	I_B	4	
Total power dissipation[1)] $T_S \leq 98$°C	P_{tot}	210	mW
Junction temperature	T_J	150	°C
Storage temperature	T_{Stg}	-55 ... 150	

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point[2)]	R_{thJS}	≤ 250	K/W

[1] T_S is measured on the collector lead at the soldering point to the pcb

[2] For calculation of R_{thJA} please refer to Application Note AN077 Thermal Resistance

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	$V_{(BR)CEO}$	6	9	-	V
Collector-emitter cutoff current V_{CE} = 4 V, V_{BE} = 0 V_{CE} = 10 V, V_{BE} = 0, T_A = 85°C Verified by random sampling	I_{CES}	 - -	 1 2	 30 50	nA
Collector-base cutoff current V_{CB} = 4 V, I_E = 0	I_{CBO}	-	1	30	
Emitter-base cutoff current V_{EB} = 1 V, I_C = 0	I_{EBO}	-	1	500	
DC current gain I_C = 15 mA, V_{CE} = 3 V, pulse measured	h_{FE}	90	120	160	-

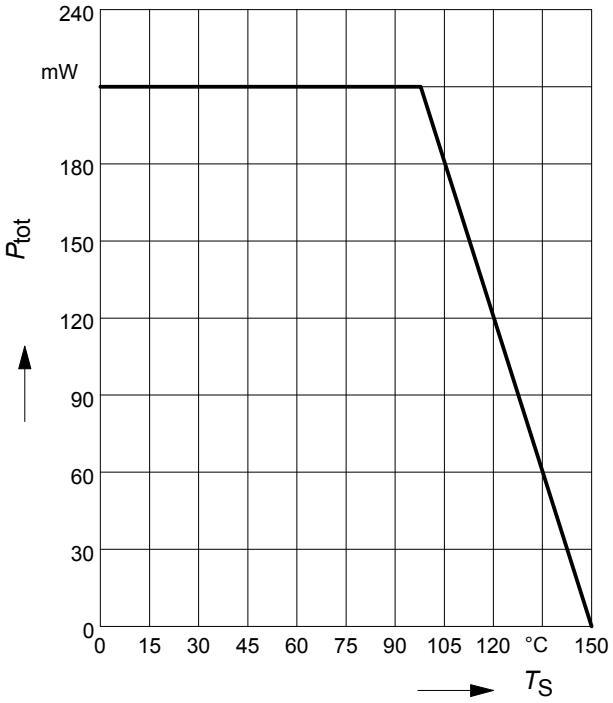
Electrical Characteristics at T_A = 25°C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (verified by random sampling)					
Transition frequency I_C = 15 mA, V_{CE} = 3 V, f = 1 GHz	f_T	11	14	-	GHz
Collector-base capacitance V_{CB} = 5 V, f = 1 MHz, V_{BE} = 0 , emitter grounded	C_{cb}	-	0.32	0.5	pF
Collector emitter capacitance V_{CE} = 5 V, f = 1 MHz, V_{BE} = 0 , base grounded	C_{ce}	-	0.2	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz, V_{CB} = 0 , collector grounded	C_{eb}	-	0.4	-	
Minimum noise figure I_C = 3 mA, V_{CE} = 3 V, Z_S = Z_{Sopt}, f = 1.8 GHz	NF_{min}	-	1	-	dB
Power gain, maximum available[1)] I_C = 15 mA, V_{CE} = 3 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}, f = 1.8 GHz f = 3 GHz	G_{ma}	 - -	 15.5 11	 - -	
Transducer gain I_C = 15 mA, V_{CE} = 3 V, Z_S = Z_L = 50Ω, f = 1.8 GHz f = 3 GHz	$\lvert S_{21e}\rvert^2$	 - -	 13 9	 - -	dB
Third order intercept point at output[2)] V_{CE} = 3 V, I_C = 15 mA, f = 1.8 GHz, Z_S = Z_L = 50Ω	IP_3	-	24	-	dBm
1dB compression point at output I_C = 15 mA, V_{CE} = 3 V, Z_S = Z_L = 50Ω, f = 1.8 GHz	P_{-1dB}	-	9	-	

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

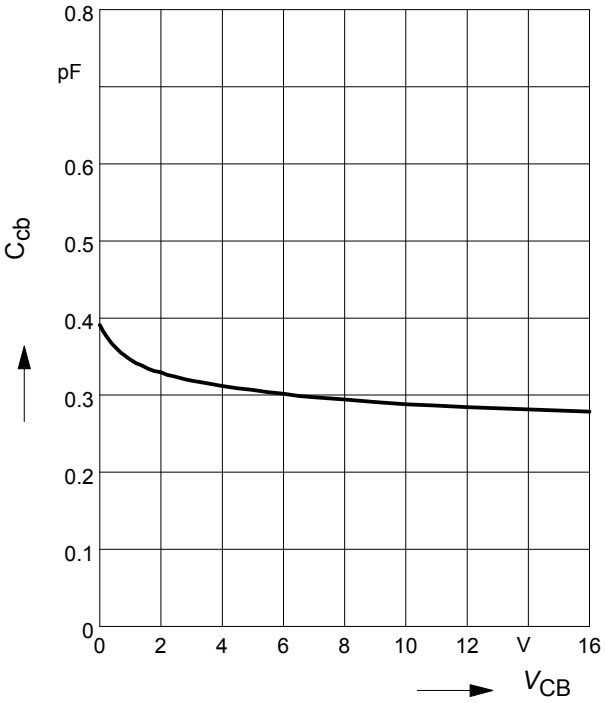
[2] IP3 value depends on termination of all intermodulation frequency components.
Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

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



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

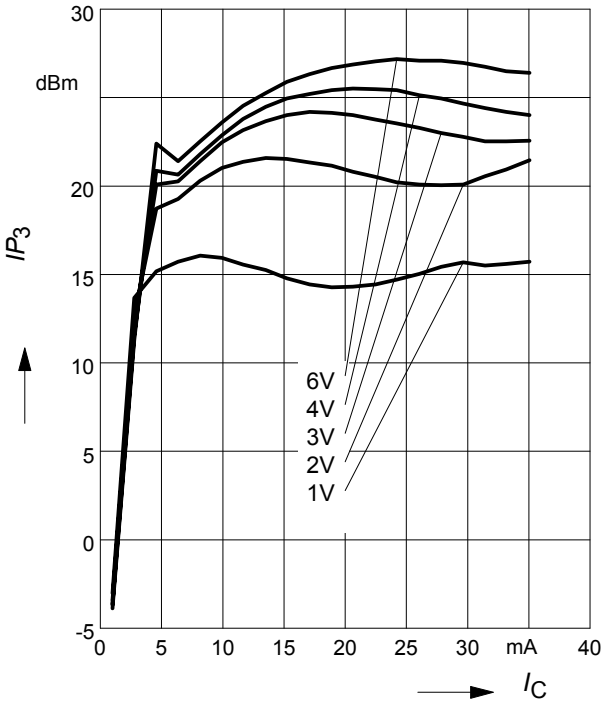
f = 1MHz



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

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

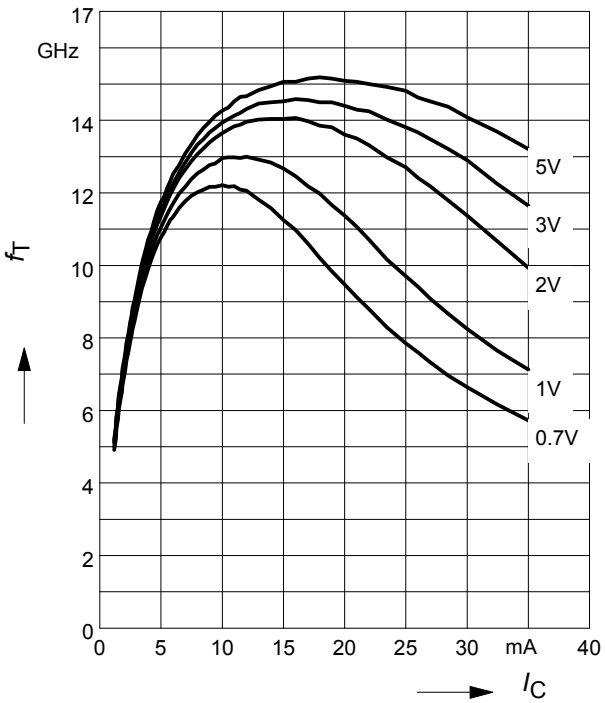
V_{CE} = parameter, f = 1.8GHz



Transition frequency $f_T = f(I_C)$

f = 1GHz

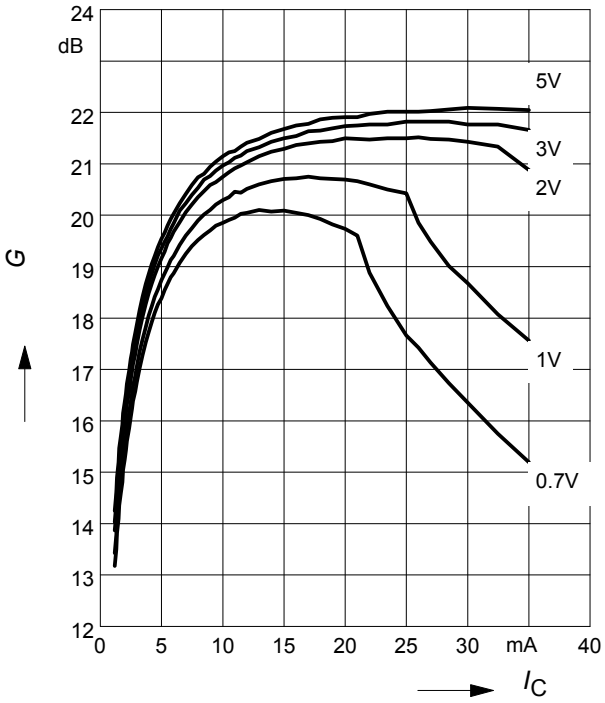
V_{CE} = parameter



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

f = 0.9GHz

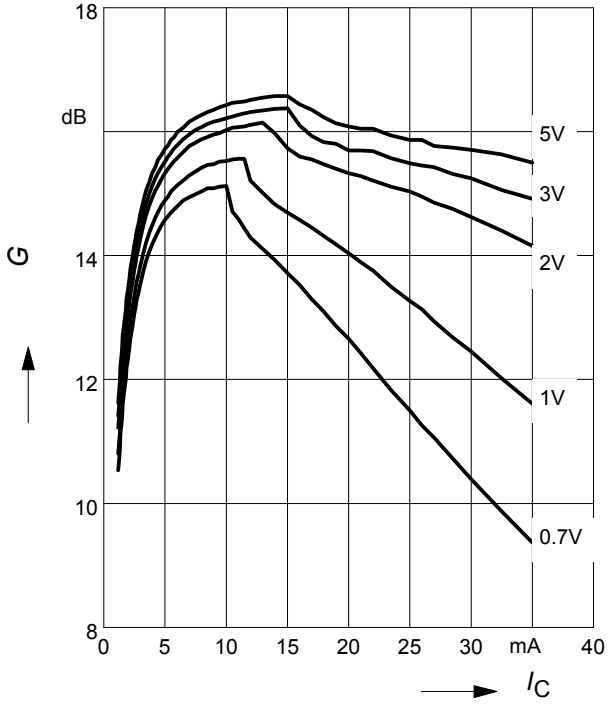
V_{CE} = parameter



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

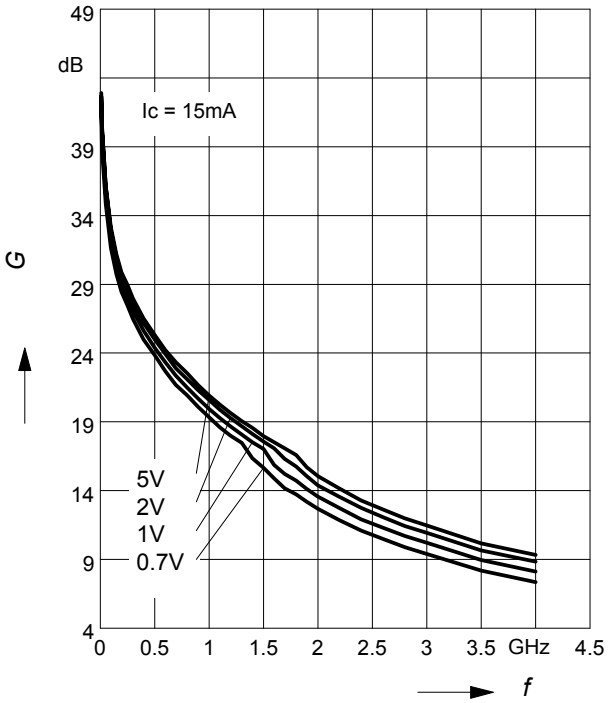
f = 1.8GHz

V_{CE} = parameter



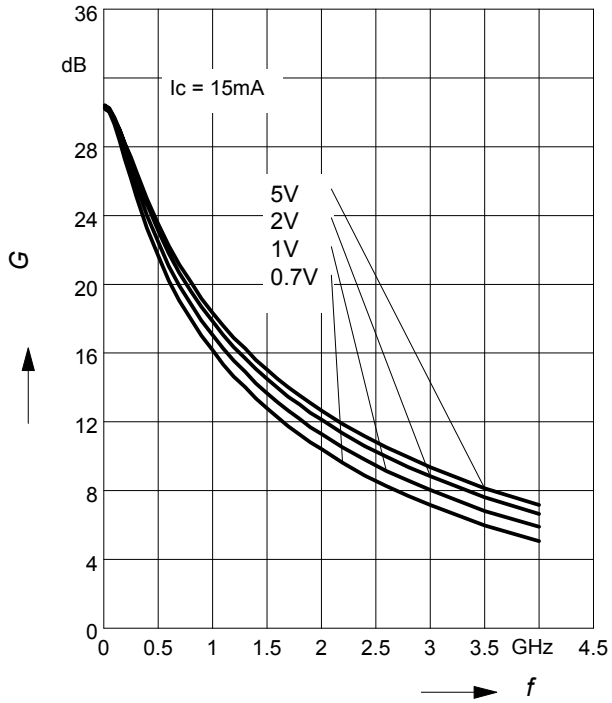
Power Gain G_{ma}, G_{ms} = $f(f)$

V_{CE} = parameter

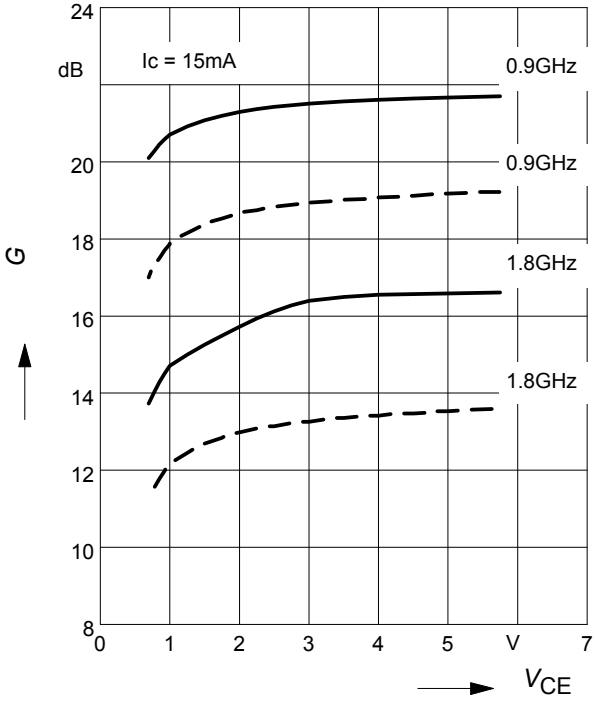


Insertion Power Gain $|S_{21}|^2$ = $f(f)$

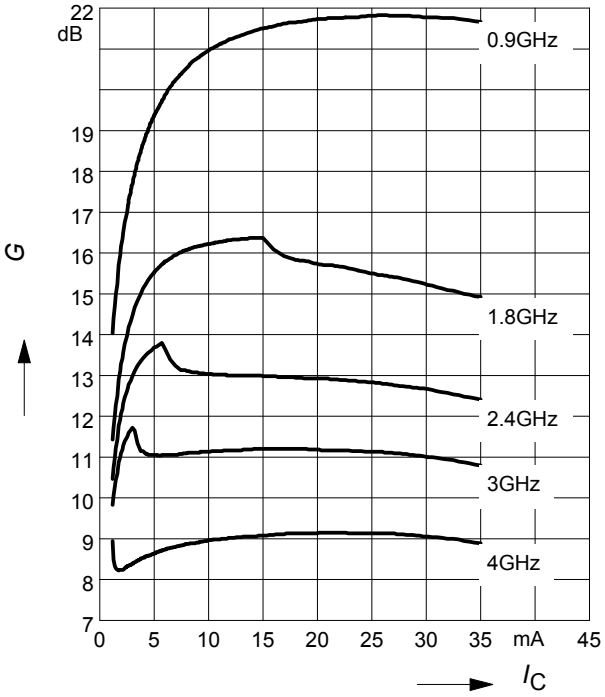
V_{CE} = parameter



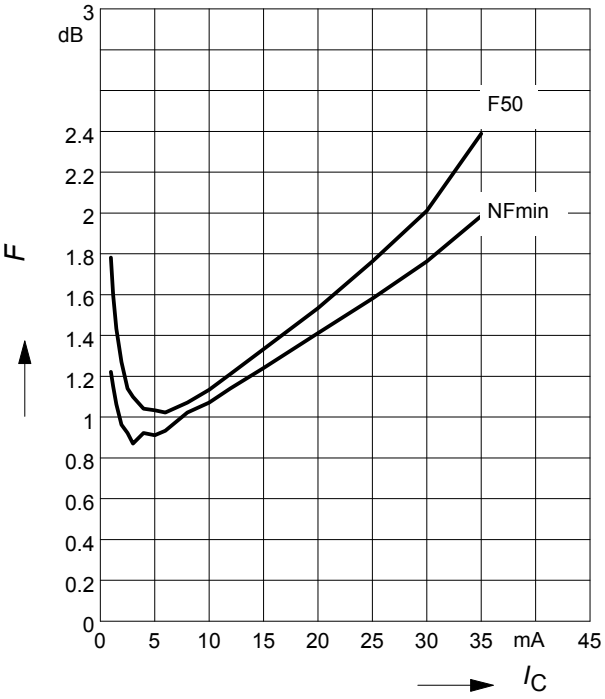
Power Gain G_{ma}, G_{ms} = $f(V_{CE})$: ——
$|S_{21}|^2$ = $f(V_{CE})$: - - - -
f = parameter



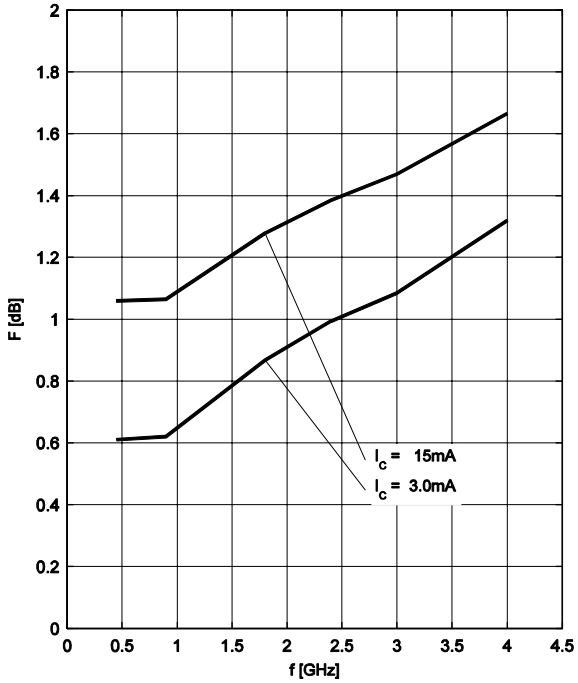
Power gain G_{ma}, G_{ms} = $f(I_C)$
V_{CE} = 3V
f = parameter



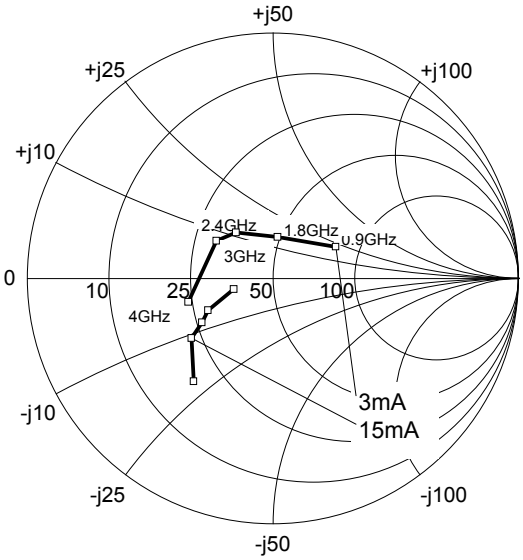
Noise figure NF = $f(I_C)$
V_{CE} = 3V, f = 1,8 GHz



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



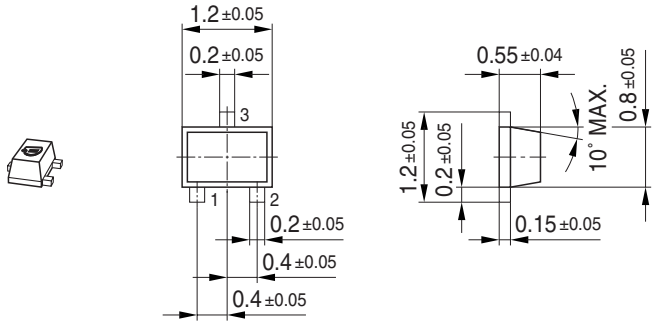
Source impedance for min.
noise figure vs. frequency
V_{CE} = 3 V



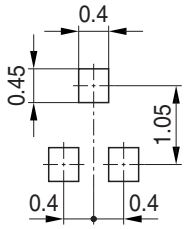
SPICE Parameter

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.

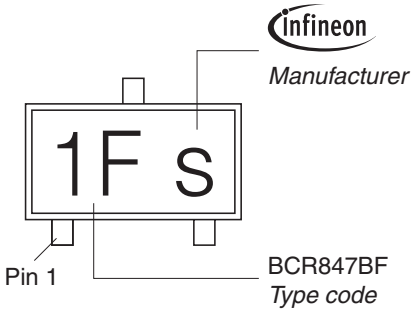
Package Outline



Foot Print

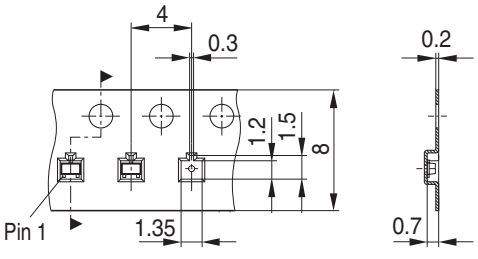


Marking Layout (Example)



Standard Packing

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



Datasheet Revision History: 20 May 2010

This datasheet replaces the revision from 30 March 2007.
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.

Previous Revision: 30 March 2007	
Page	**Subject (changes since last revision)**
1	Datasheet has final status
1	Max. ratings refer to 25°C
1	Max. rating for T_A removed
1	Lower max. rating for storage temperature T_{Stg} changed
2	Typical values for leakage currents included, maximum leakage current values reduced
6	Characteristic curve for NFmin vs. frequency included

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