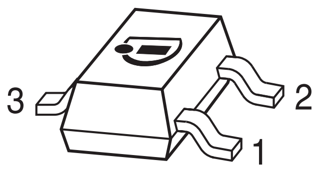
NPN Silicon Switching Transistor



- Low collector-emitter saturation voltage
- Complementary type:
  SMBT2907A / MMBT2907A (PNP)
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101

Type	Marking	Pin Configuration			Package
SMBT2222A/MMBT2222A	s1P	1 = B	2 = E	3 = C	SOT23

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	40	V
Collector-base voltage	V_{CBO}	75	
Emitter-base voltage	V_{EBO}	6	
Collector current	I_C	600	mA
Total power dissipation- $T_S \leq 77$ °C	P_{tot}	330	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point[1)]	R_{thJS}	≤ 220	K/W

[1]For calculation of R_{thJA} 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.	
DC Characteristics					
Collector-emitter breakdown voltage I_C = 10 mA, I_B = 0	$V_{(BR)CEO}$	40	-	-	V
Collector-base breakdown voltage I_C = 10 µA, I_E = 0	$V_{(BR)CBO}$	75	-	-	
Emitter-base breakdown voltage I_E = 10 µA, I_C = 0	$V_{(BR)EBO}$	6	-	-	
Collector-base cutoff current V_{CB} = 60 V, I_E = 0 V_{CB} = 60 V, I_E = 0 , T_A = 150 °C	I_{CBO}	 - -	 - -	 0.01 10	µA
Emitter-base cutoff current V_{EB} = 3 V, I_C = 0	I_{EBO}	-	-	10	nA
DC current gain[1)] I_C = 100 µA, V_{CE} = 10 V I_C = 1 mA, V_{CE} = 10 V I_C = 10 mA, V_{CE} = 10 V I_C = 150 mA, V_{CE} = 1 V I_C = 150 mA, V_{CE} = 10 V I_C = 500 mA, V_{CE} = 10 V	h_{FE}	 35 50 75 50 100 40	 - - - - - -	 - - - - 300 -	-
Collector-emitter saturation voltage[1)] I_C = 150 mA, I_B = 15 mA I_C = 500 mA, I_B = 50 mA	V_{CEsat}	 - -	 - -	 0.3 1	V
Base emitter saturation voltage[1)] I_C = 150 mA, I_B = 15 mA I_C = 500 mA, I_B = 50 mA	V_{BEsat}	 0.6 -	 - -	 1.2 2	

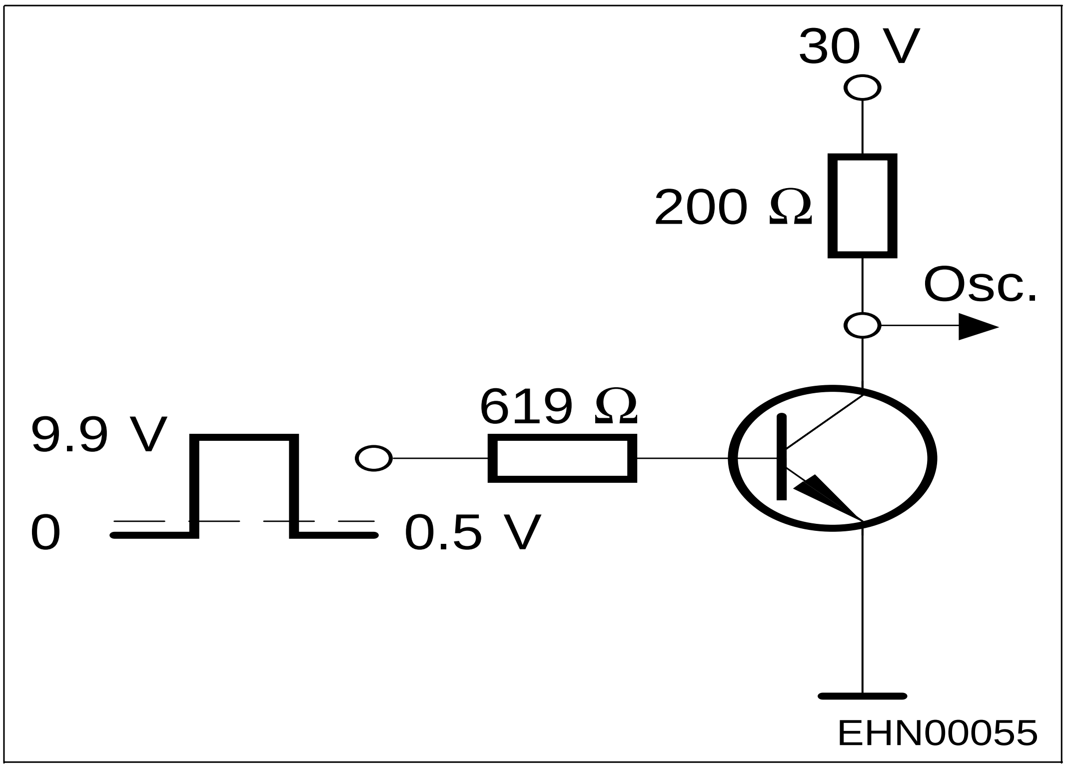
[1]Pulse test: t < 300µs; D < 2%

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

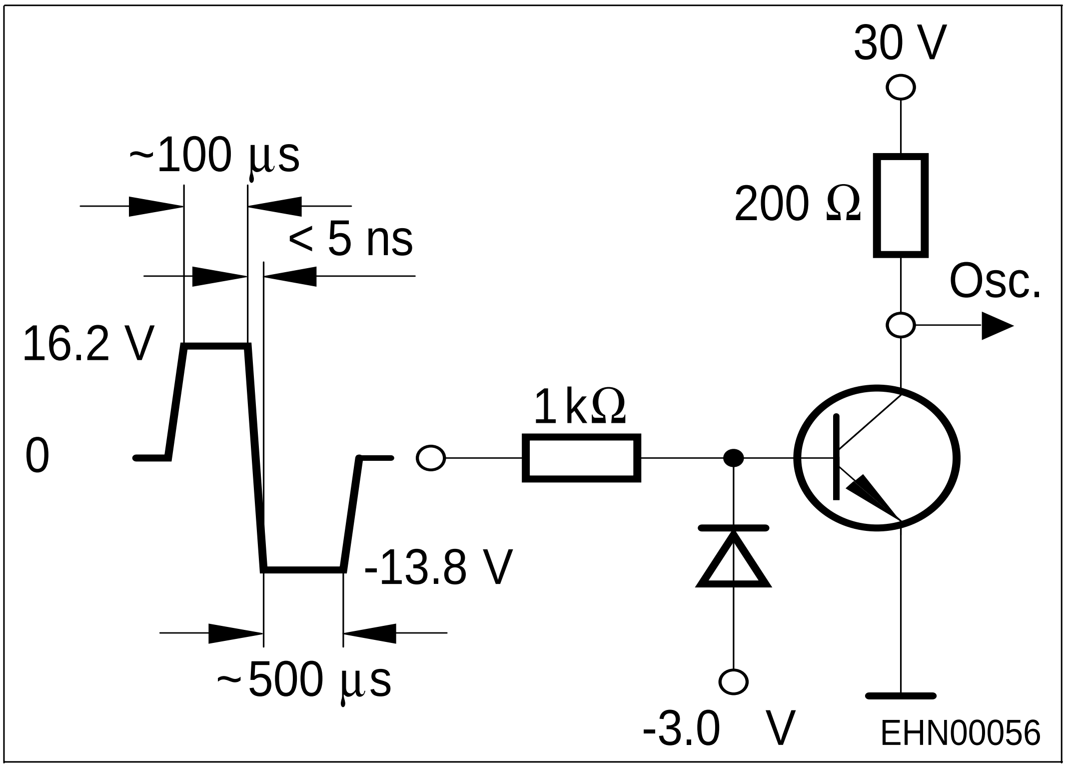
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency I_C = 20 mA, V_{CE} = 20 V, f = 100 MHz	f_T	300	-	-	MHz
Collector-base capacitance V_{CB} = 10 V, f = 1 MHz	C_{cb}	-	2.5	5	pF
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	-	35	
Short-circuit input impedance I_C = 1 mA, V_{CE} = 10 V, f = 1 kHz I_C = 10 mA, V_{CE} = 10 V, f = 1 kHz	h_{11e}	 2 0.25	 - -	 8 1.25	kΩ
Open-circuit reverse voltage transf. ratio I_C = 1 mA, V_{CE} = 10 V, f = 1 kHz I_C = 10 mA, V_{CE} = 10 V, f = 1 kHz	h_{12e}	 - -	 - -	 8 4	10^{-4}
Short-circuit forward current transf. ratio I_C = 1 mA, V_{CE} = 10 V, f = 1 kHz I_C = 10 mA, V_{CE} = 10 V, f = 1 kHz	h_{21e}	 50 75	 - -	 300 375	-
Open-circuit output admittance I_C = 1 mA, V_{CE} = 10 V, f = 1 kHz I_C = 10 mA, V_{CE} = 10 V, f = 1 kHz	h_{22e}	 5 25	 - -	 35 200	µS
Delay time V_{CC} = 30 V, I_C = 150 mA, I_{B1} = 15 mA, $V_{BE(off)}$ = 0.5 V	t_d	-	-	10	ns
Rise time V_{CC} = 30 V, I_C = 150 mA, I_{B1} = 15 mA, $V_{BE(off)}$ = 0.5 V	t_r	-	-	25	
Storage time V_{CC} = 30 V, I_C = 150 mA, I_{B1} = I_{B2} = 15mA	t_{stg}	-	-	225	
Fall time V_{CC} = 30 V, I_C = 150 mA, I_{B1} = I_{B2} = 15mA	t_f	-	-	60	
Noise figure I_C = 100 µA, V_{CE} = 10 V, f = 1 kHz, Δf = 200 Hz, R_S = 1 kΩ	F	-	-	4	dB

Test circuit

Delay and rise time



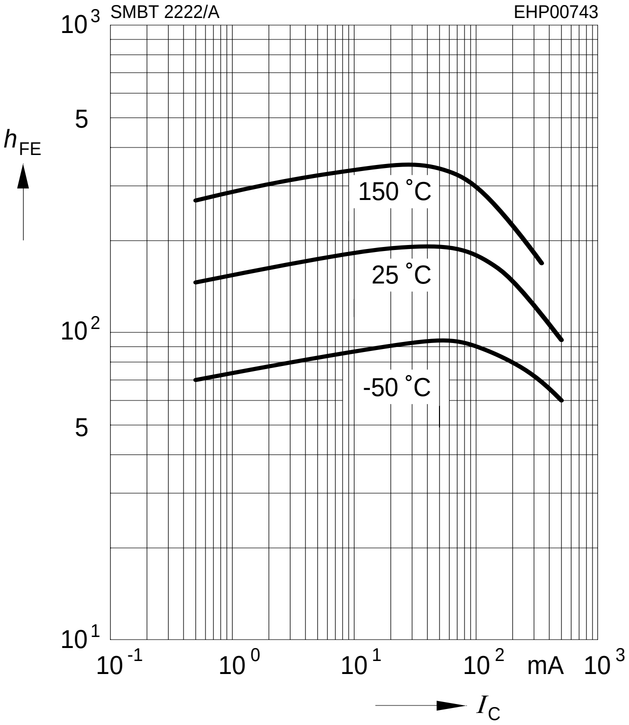
Storage and fall time



Oscillograph: R > 100Ω, C < 12pF, t_r < 5ns

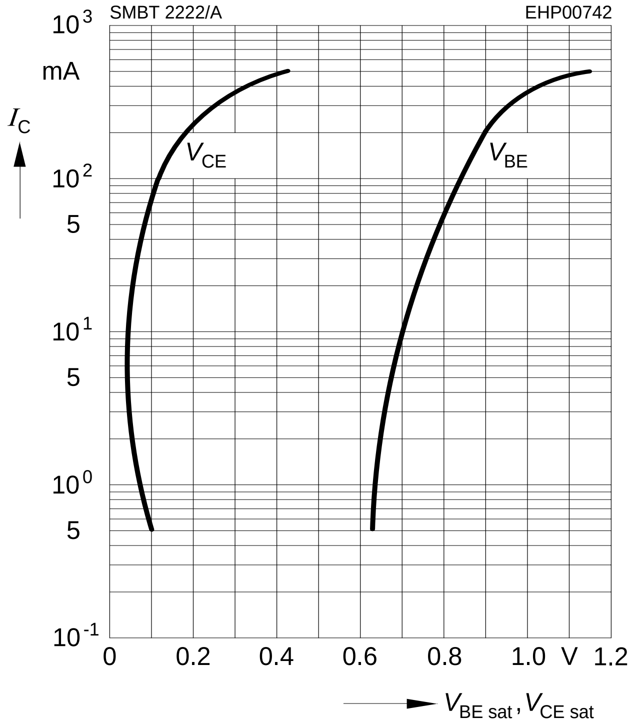
DC current gain $h_{FE} = f(I_C)$

$V_{CE} = 10$ V



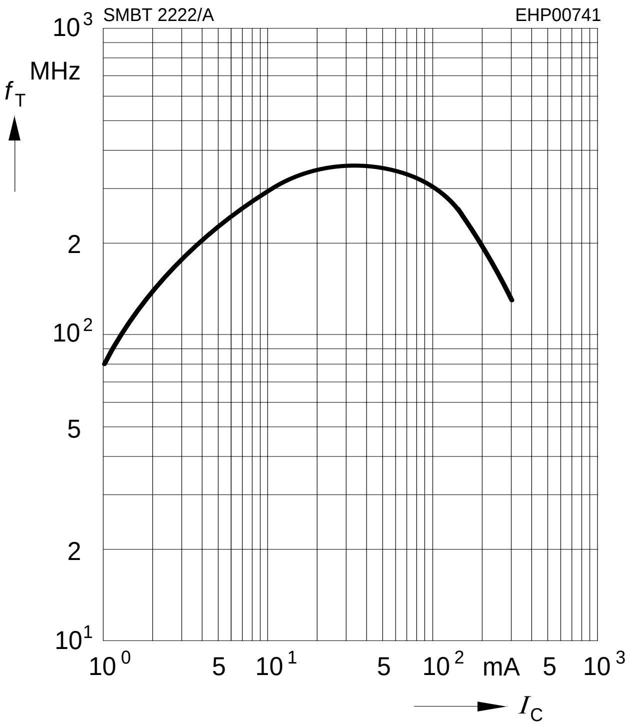
Saturation voltage $I_C = f(V_{BEsat};\ V_{CEsat})$

$h_{FE} = 10$



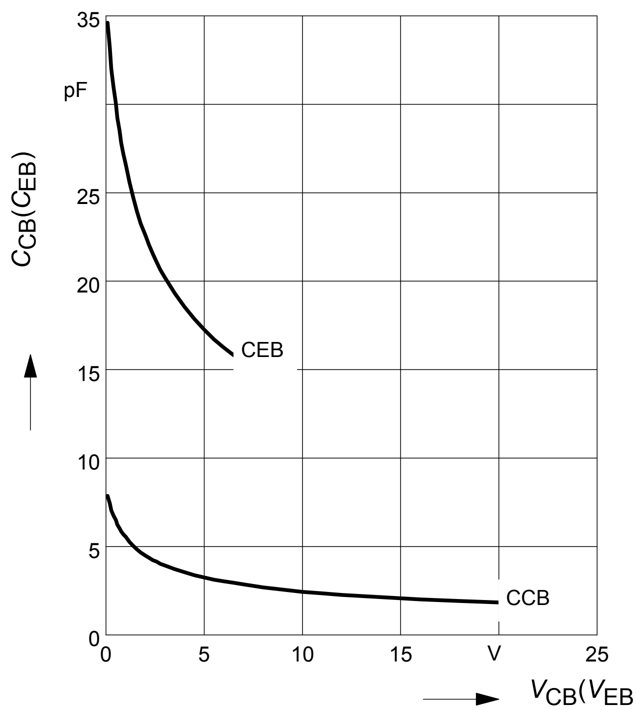
Transition frequency $f_T = f(I_C)$

$V_{CE} = 20$ V

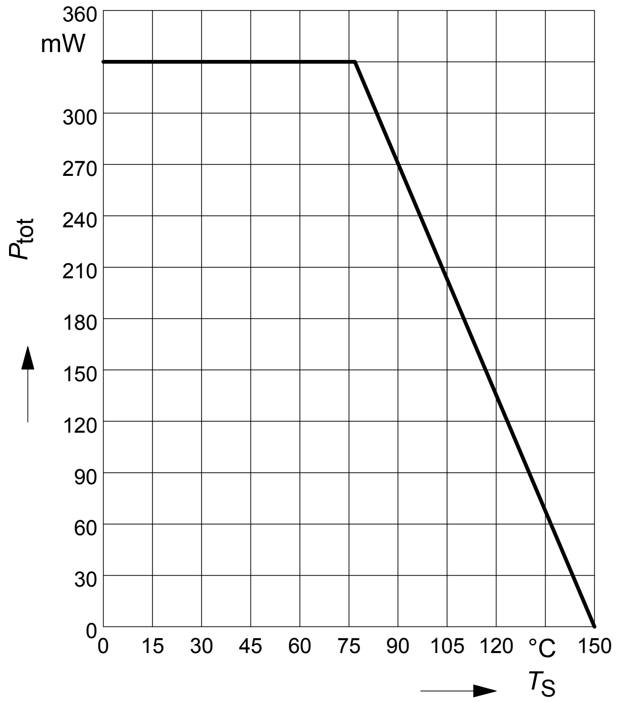


Collector-base capacitance $C_{cb} = f(V_{CB})$

Emitter-base capacitance $C_{eb} = f(V_{EB})$

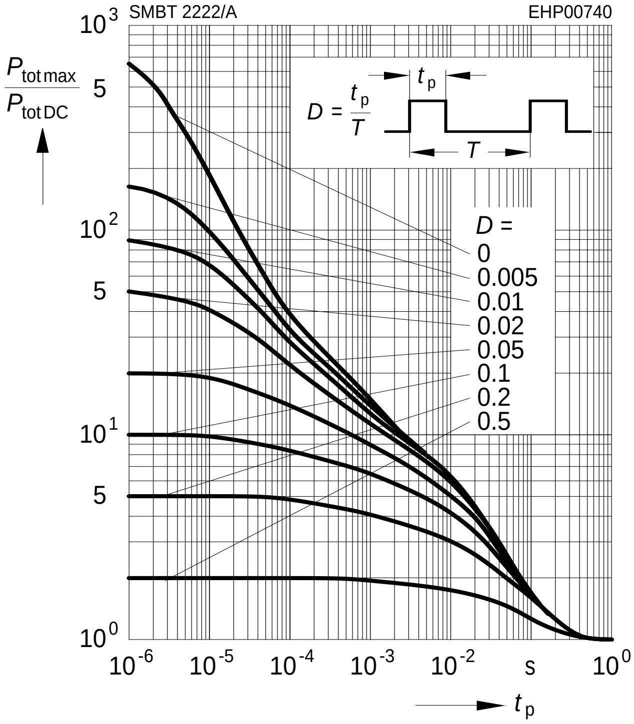


Total power dissipation $P_{tot} = f(T_S)$



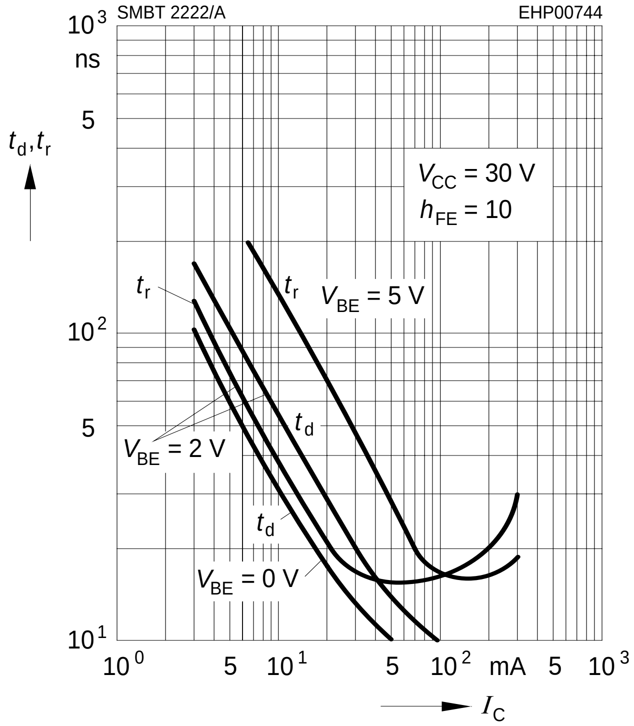
Permissible Pulse Load

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



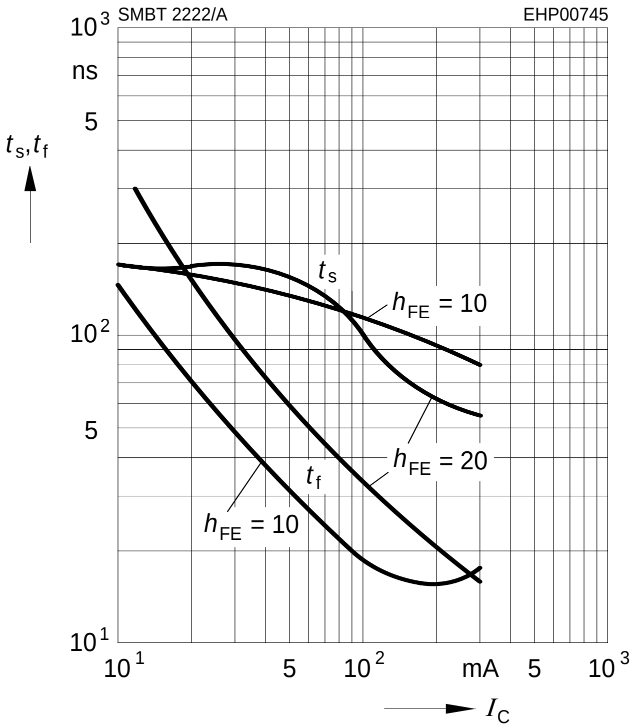
Delay time $t_d = f(I_C)$

Rise time $t_r = f(I_C)$

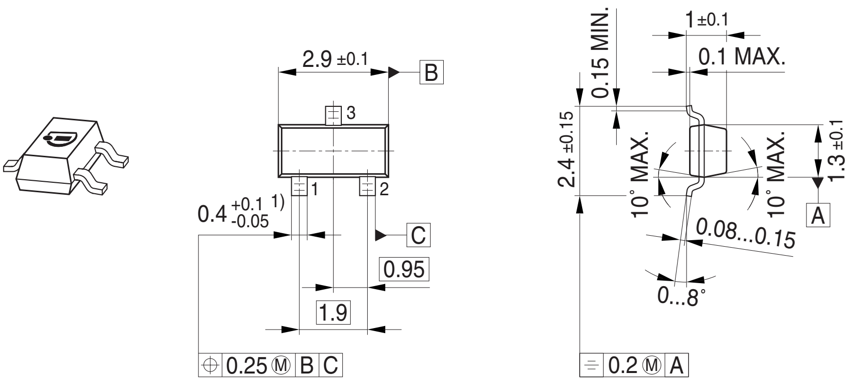


Storage time $t_{stg} = f(I_C)$

Fall time $t_f = f(I_C)$

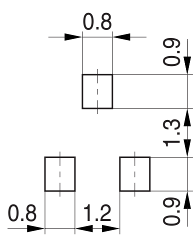


Package Outline

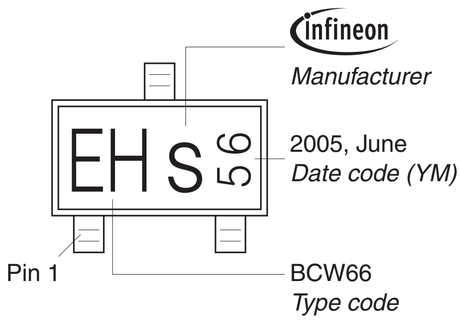


1) Lead width can be 0.6 max. in dambar area

Foot Print

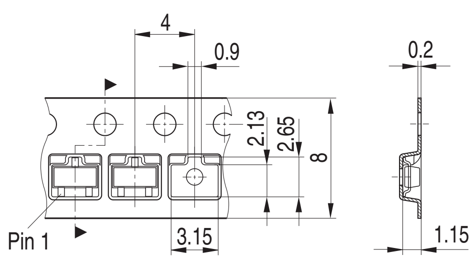


Marking Layout (Example)



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.