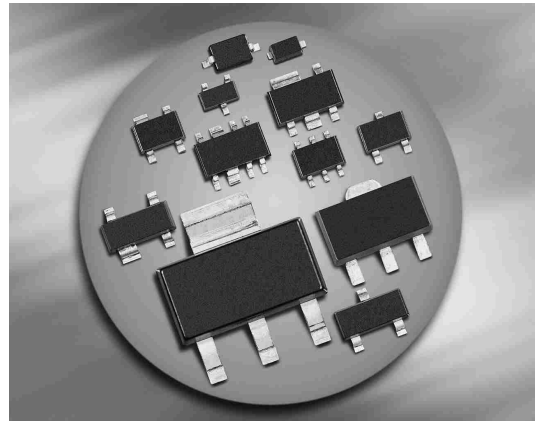
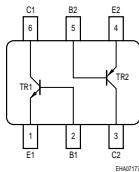


**NPN / PNP Silicon Switching Transistor Array**

- High current gain
- Low collector-emitter saturation voltage
- Two (galvanic) internal isolated NPN / PNP transistor in one package
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101


**SMBT3904PN**  
**SMBT3904UPN**


Type	Marking	Pin Configuration						Package
		1=E	2=B	3=C	4=E	5=B	6=C	
SMBT3904PN	s3P	1=E	2=B	3=C	4=E	5=B	6=C	SOT363
SMBT3904UPN	s3P	1=E	2=B	3=C	4=E	5=B	6=C	SC74

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-emitter voltage	$V_{CEO}$	40	V
Collector-base voltage	$V_{CBO}$	40	
Emitter-base voltage	$V_{EBO}$	6	
Collector current	$I_C$	200	mA
Total power dissipation- $T_S \leq 115 \text{ }^\circ\text{C}$ , SMBT3904PN $T_S \leq 105 \text{ }^\circ\text{C}$ , SMBT3904UPN	$P_{tot}$	250 330	mW
Junction temperature	$T_j$	150	
Storage temperature	$T_{stg}$	-65 ... 150	$^\circ\text{C}$

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>1)</sup>	$R_{thJS}$		K/W
SMBT3904PN		≤ 140	
SMBT3904UPN		≤ 135	

**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 $I_C = 1 \text{ mA}, I_B = 0$	$V_{(BR)CEO}$	40	-	-	V
Collector-base breakdown voltage $I_C = 10 \mu\text{A}, I_E = 0$	$V_{(BR)CBO}$	40	-	-	
Emitter-base breakdown voltage $I_E = 10 \mu\text{A}, I_C = 0$	$V_{(BR)EBO}$	6	-	-	
Collector-base cutoff current $V_{CB} = 30 \text{ V}, I_E = 0$	$I_{CBO}$	-	-	50	nA
DC current gain <sup>2)</sup> $I_C = 100 \mu\text{A}, V_{CE} = 1 \text{ V}$ $I_C = 1 \text{ mA}, V_{CE} = 1 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 1 \text{ V}$ $I_C = 50 \text{ mA}, V_{CE} = 1 \text{ V}$ $I_C = 100 \text{ mA}, V_{CE} = 1 \text{ V}$	$h_{FE}$	40 70 100 60 30	- - - - -	- - 300 - -	-
Collector-emitter saturation voltage <sup>2)</sup> $I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 5 \text{ mA}$	$V_{CEsat}$	- -	- -	0.25 0.4	V
Base emitter saturation voltage <sup>2)</sup> $I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 5 \text{ mA}$	$V_{BEsat}$	0.65 -	- -	0.85 0.95	

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

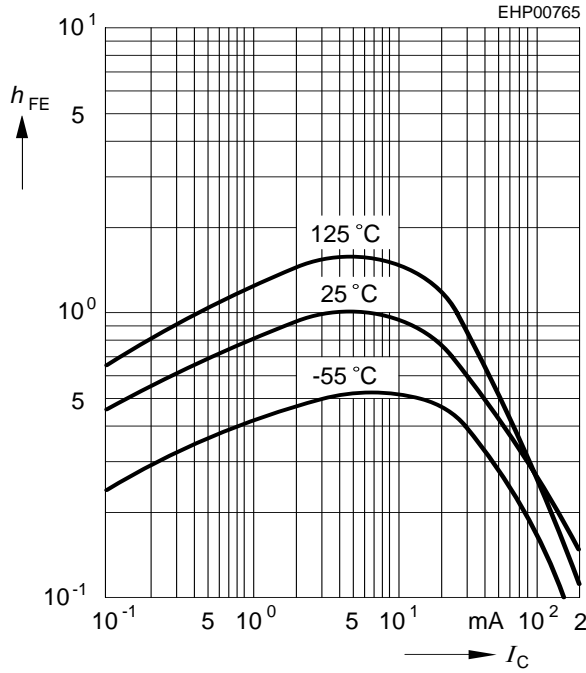
<sup>2)</sup>Pulse test:  $t < 300\mu\text{s}$ ;  $D < 2\%$

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics</b>					
Transition frequency $I_C = 10\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $f = 100\text{ MHz}$	$f_T$	250	-	-	MHz
Collector-base capacitance $V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$	$C_{cb}$	-	-	3.5	pF
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$	$C_{eb}$	-	-	10	
Delay time $V_{CC} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = 1\text{ mA}$ , $V_{BE(off)} = 0.5\text{ V}$	$t_d$	-	-	35	ns
Rise time $V_{CC} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = 1\text{ mA}$ , $V_{BE(off)} = 0.5\text{ V}$	$t_r$	-	-	35	
Storage time $V_{CC} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = I_{B2} = 1\text{ mA}$	$t_{stg}$	-	-	225	
Fall time $V_{CC} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = I_{B2} = 1\text{ mA}$	$t_f$	-	-	75	
Noise figure $I_C = 100\text{ }\mu\text{A}$ , $V_{CE} = 5\text{ V}$ , $f = 1\text{ kHz}$ , $\Delta f = 200\text{ Hz}$ , $R_S = 1\text{ k}\Omega$	$F$	-	-	5	

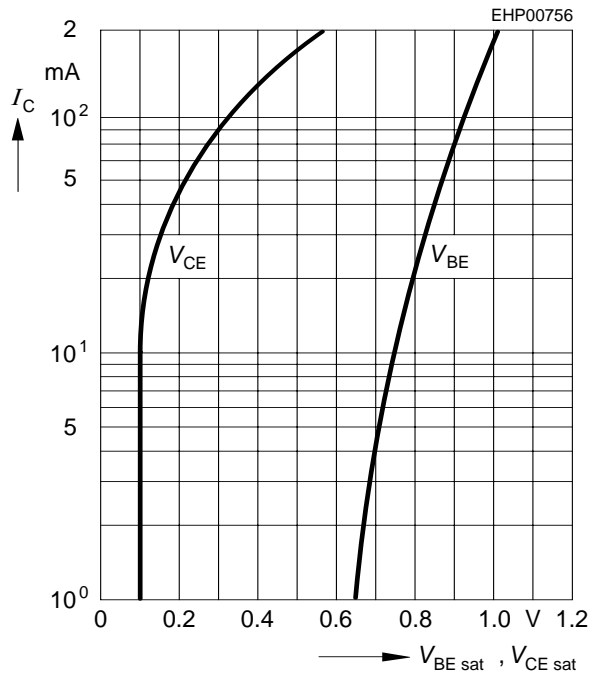
DC current gain  $h_{FE} = f(I_C)$

$V_{CE} = 10\text{ V}$ , normalized



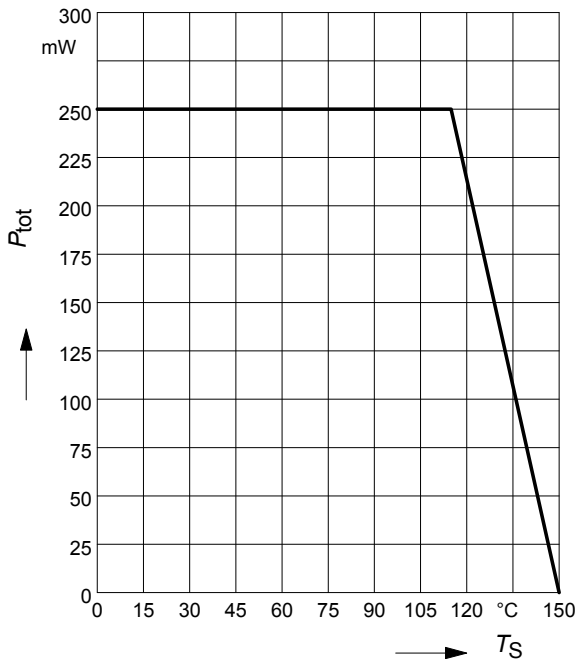
Saturation voltage  $I_C = f(V_{BEsat}; V_{CEsat})$

$h_{FE} = 10$



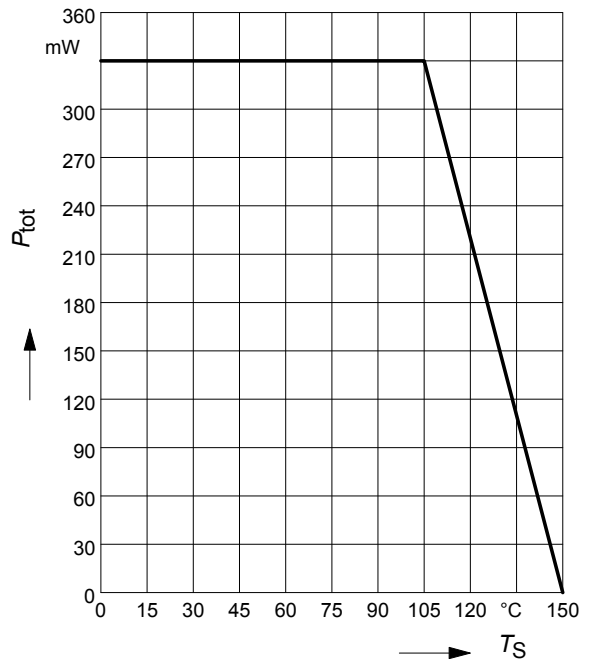
Total power dissipation  $P_{tot} = f(T_S)$

SMBT3904PN



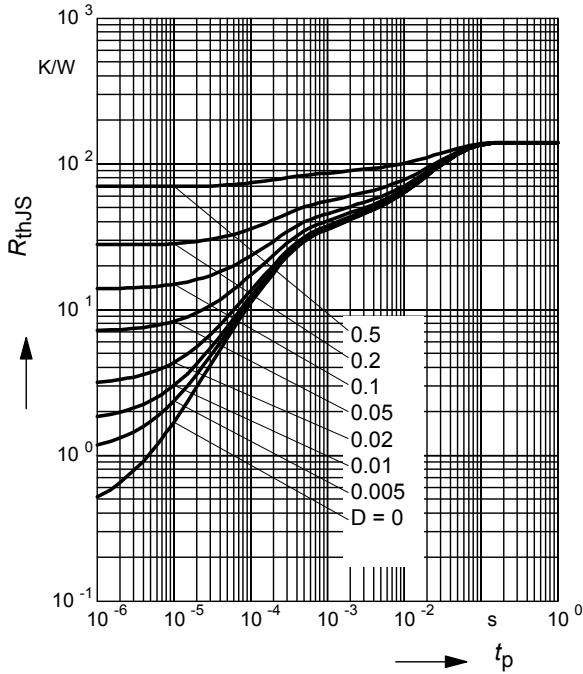
Total power dissipation  $P_{tot} = f(T_S)$

SMBT3904UPN



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

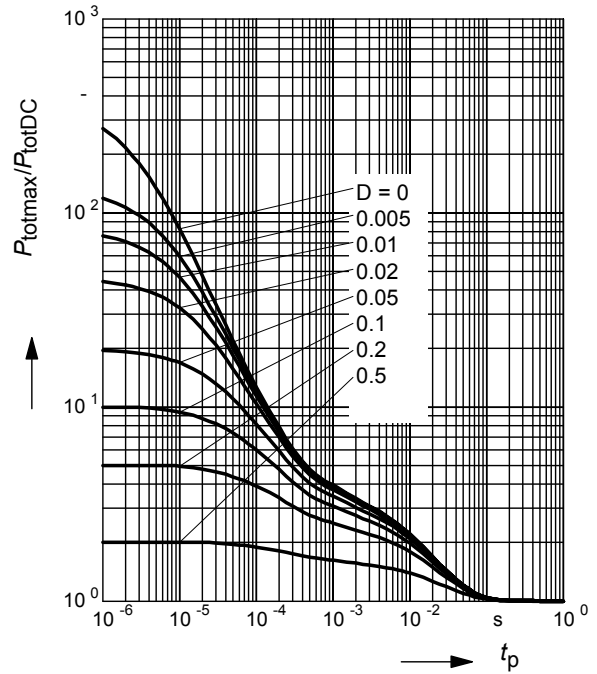
SMBT3904PN



**Permissible Pulse Load**

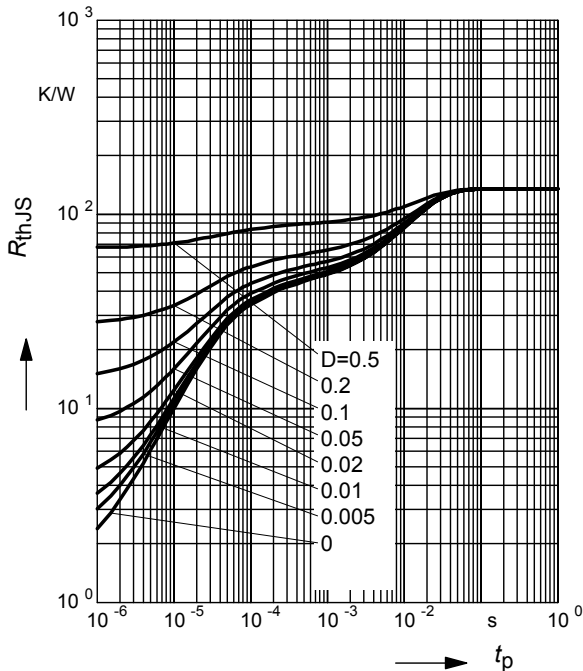
$P_{totmax}/P_{totDC} = f(t_p)$

SMBT3904PN



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

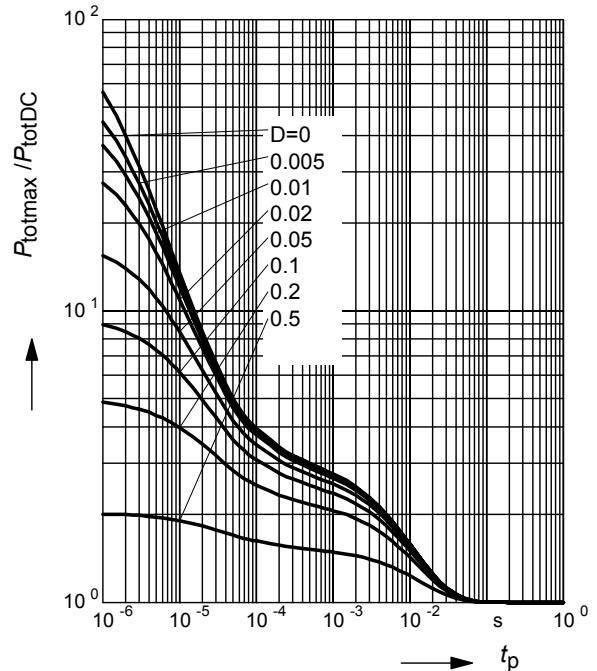
SMBT3904UPN



**Permissible Pulse Load**

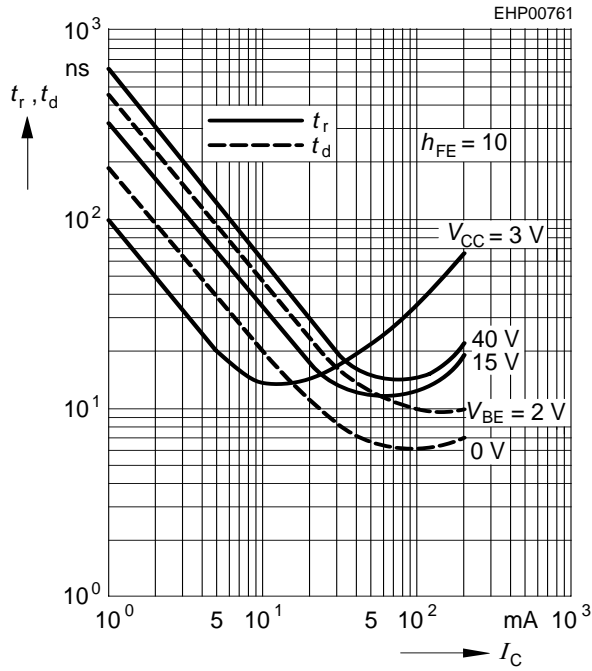
$P_{totmax}/P_{totDC} = f(t_p)$

SMBT3904UPN

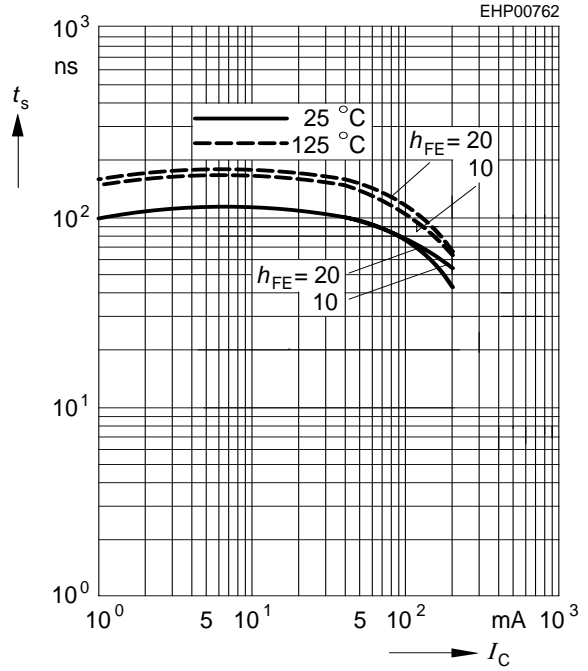


Delay time  $t_d = f(I_C)$

Rise time  $t_r = f(I_C)$

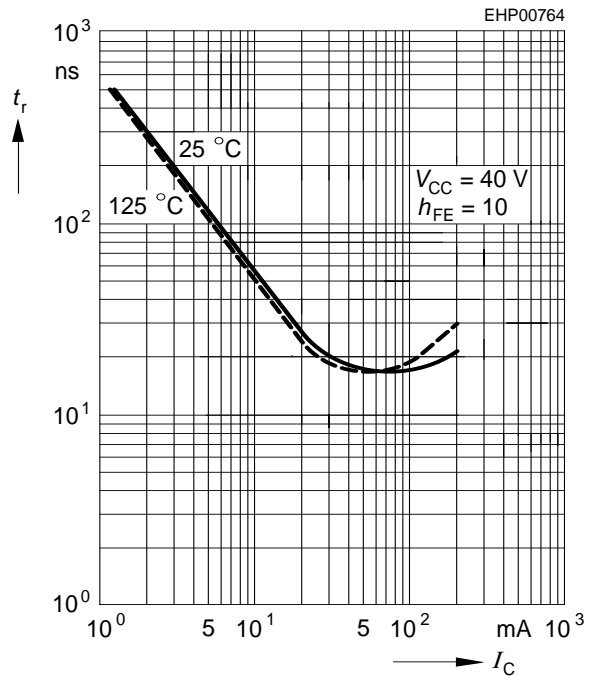
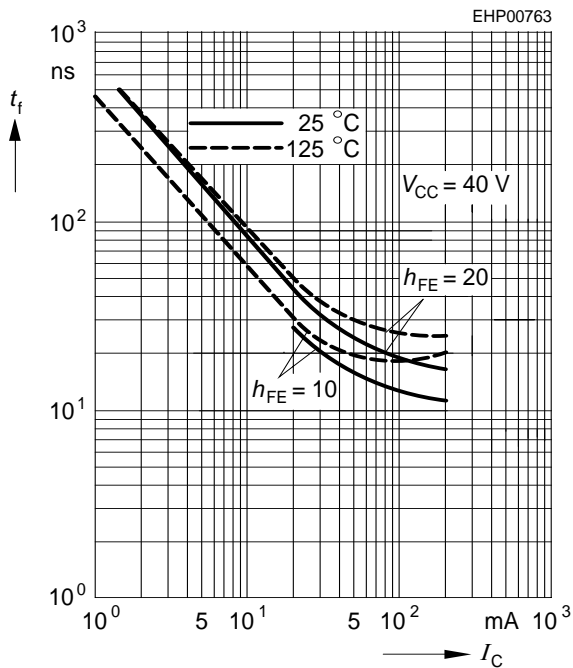


Storage time  $t_{stg} = f(I_C)$

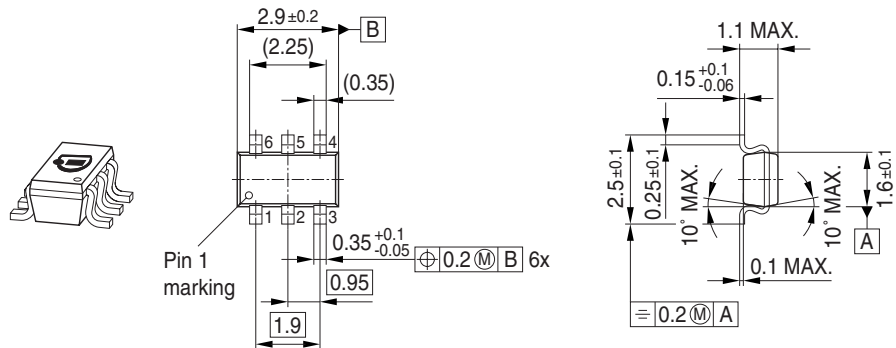


Fall time  $t_f = f(I_C)$

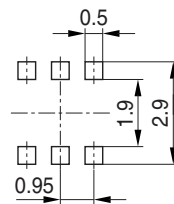
Rise time  $t_r = f(I_C)$



Package Outline

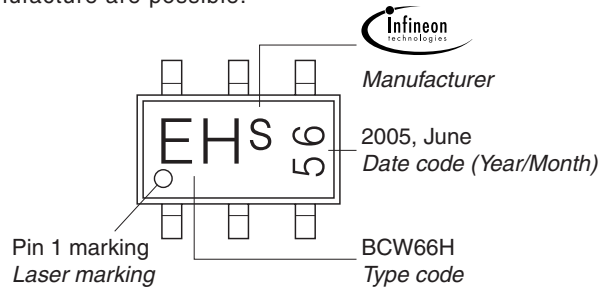


Foot Print



Marking Layout (Example)

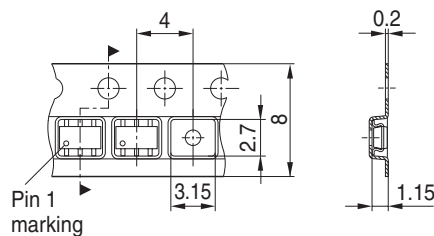
Small variations in positioning of Date code, Type code and Manufacture are possible.



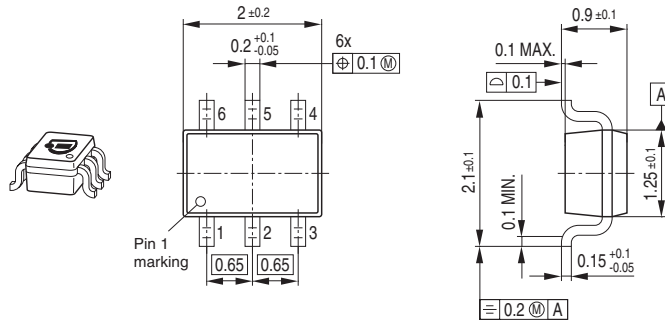
Standard Packing

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

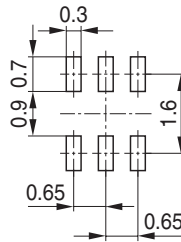
For symmetric types no defined Pin 1 orientation in reel.



Package Outline

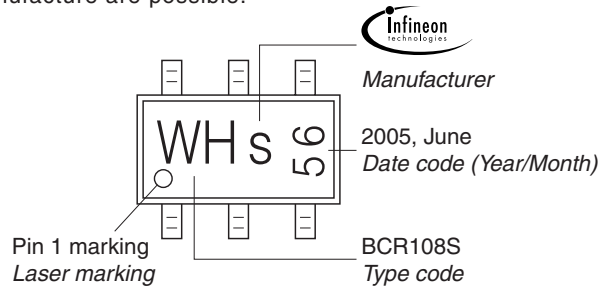


Foot Print



Marking Layout (Example)

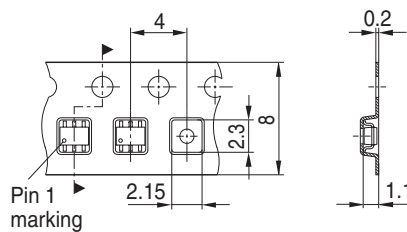
Small variations in positioning of Date code, Type code and Manufacture are possible.



Standard Packing

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

For symmetric types no defined Pin 1 orientation in reel.





**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.