



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

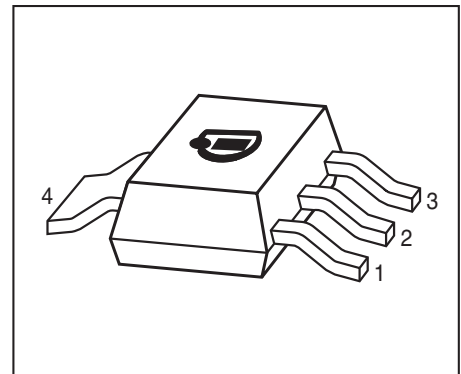
Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



**NPN Silicon Darlington Transistors**

- High collector current
- Low collector-emitter saturation voltage
- Complementary types: BSP60 - BSP62 (PNP)
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



| Type  | Marking | Pin Configuration |     |     |     |   |   | Package |
|-------|---------|-------------------|-----|-----|-----|---|---|---------|
|       |         | 1=B               | 2=C | 3=E | 4=C | - | - |         |
| BSP50 | BSP50   | 1=B               | 2=C | 3=E | 4=C | - | - | SOT223  |
| BSP51 | BSP51   | 1=B               | 2=C | 3=E | 4=C | - | - | SOT223  |
| BSP52 | BSP52   | 1=B               | 2=C | 3=E | 4=C | - | - | SOT223  |

**Maximum Ratings**

| Parameter                                     | Symbol    | Value       | Unit |
|---|-----------|-------------|------|
| Collector-emitter voltage                     | $V_{CEO}$ |             | V    |
| BSP50   |           | 45          |      |
| BSP51   |           | 60          |      |
| BSP52   |           | 80          |      |
| Collector-base voltage                        | $V_{CBO}$ |             |      |
| BSP50   |           | 60          |      |
| BSP51   |           | 80          |      |
| BSP52   |           | 90          |      |
| Emitter-base voltage                          | $V_{EBO}$ | 5           |      |
| Collector current                             | $I_C$     | 1           | A    |
| Peak collector current, $t_p \leq 10$ ms      | $I_{CM}$  | 2           |      |
| Base current                                  | $I_B$     | 100         | mA   |
| Total power dissipation-<br>$T_S \leq 124$ °C | $P_{tot}$ | 1.5         | W    |
| Junction temperature                          | $T_j$     | 150         | °C   |
| Storage temperature                           | $T_{stg}$ | -65 ... 150 |      |

**Thermal Resistance**

| Parameter                                | Symbol     | Value     | Unit |
|--|------------|-----------|------|
| Junction - soldering point <sup>1)</sup> | $R_{thJS}$ | $\leq 17$ | 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<br>$I_C = 10\text{ mA}$ , $I_B = 0$ , BSP50<br>$I_C = 10\text{ mA}$ , $I_B = 0$ , BSP51<br>$I_C = 10\text{ mA}$ , $I_B = 0$ , BSP52                            | $V_{(BR)CEO}$ | 45<br>60<br>80 | -<br>-<br>- | -<br>-<br>- | V             |
| Collector-base breakdown voltage<br>$I_C = 100\text{ }\mu\text{A}$ , $I_E = 0$ , BSP50<br>$I_C = 100\text{ }\mu\text{A}$ , $I_E = 0$ , BSP51<br>$I_C = 100\text{ }\mu\text{A}$ , $I_E = 0$ , BSP52 | $V_{(BR)CBO}$ | 60<br>80<br>90 | -<br>-<br>- | -<br>-<br>- |               |
| Emitter-base breakdown voltage<br>$I_E = 100\text{ }\mu\text{A}$ , $I_C = 0$   | $V_{(BR)EBO}$ | 5              | -           | -           |               |
| Collector-emitter cutoff current<br>$V_{CE} = V_{CE0max}$ , $V_{BE} = 0$   | $I_{CES}$     | -              | -           | 10          | $\mu\text{A}$ |
| Emitter-base cutoff current<br>$V_{EB} = 4\text{ V}$ , $I_C = 0$   | $I_{EBO}$     | -              | -           | 10          | $\mu\text{A}$ |
| DC current gain <sup>2)</sup><br>$I_C = 150\text{ mA}$ , $V_{CE} = 10\text{ V}$<br>$I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ V}$  | $h_{FE}$      | 1000<br>2000   | -<br>-      | -<br>-      | -             |
| Collector-emitter saturation voltage <sup>2)</sup><br>$I_C = 500\text{ mA}$ , $I_B = 0.5\text{ mA}$<br>$I_C = 1\text{ A}$ , $I_B = 1\text{ mA}$  | $V_{CEsat}$   | -<br>-         | -<br>-      | 1.3<br>1.8  | V             |
| Base emitter saturation voltage <sup>2)</sup><br>$I_C = 500\text{ mA}$ , $I_B = 0.5\text{ mA}$<br>$I_C = 1\text{ mA}$ , $I_B = 1\text{ A}$   | $V_{BEsat}$   | -<br>-         | -<br>-      | 1.9<br>2.2  |               |

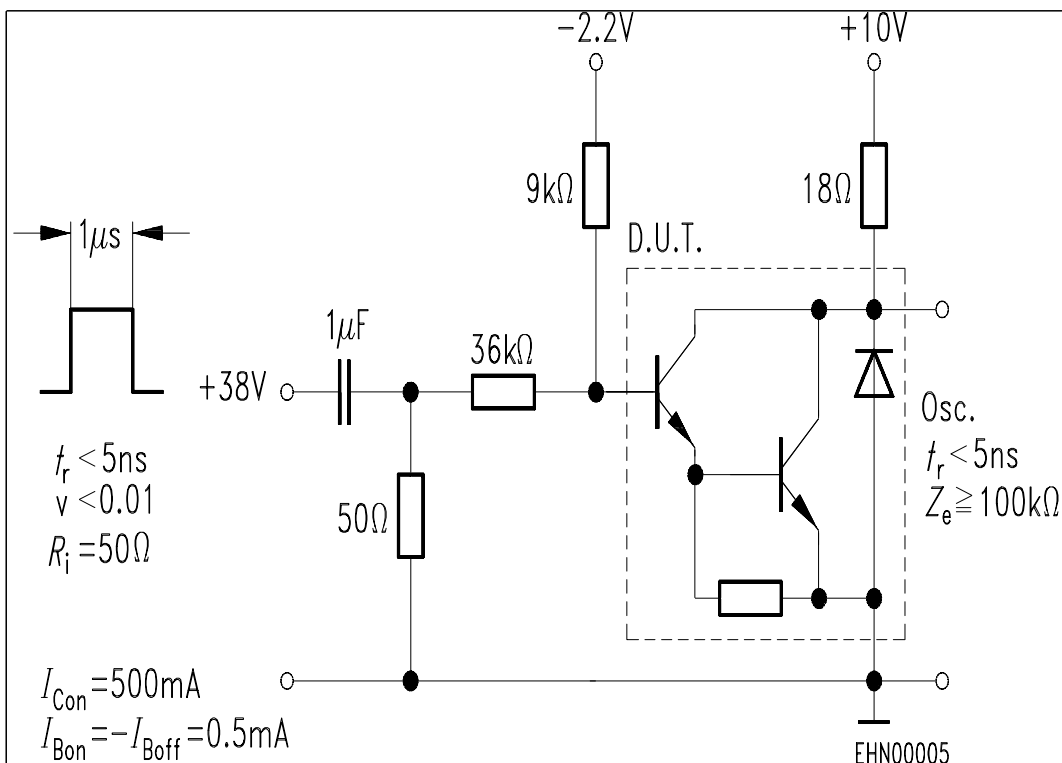
<sup>1)</sup>For calculation of  $R_{thJA}$  please refer to Application Note AN077 (Thermal Resistance Calculation)

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

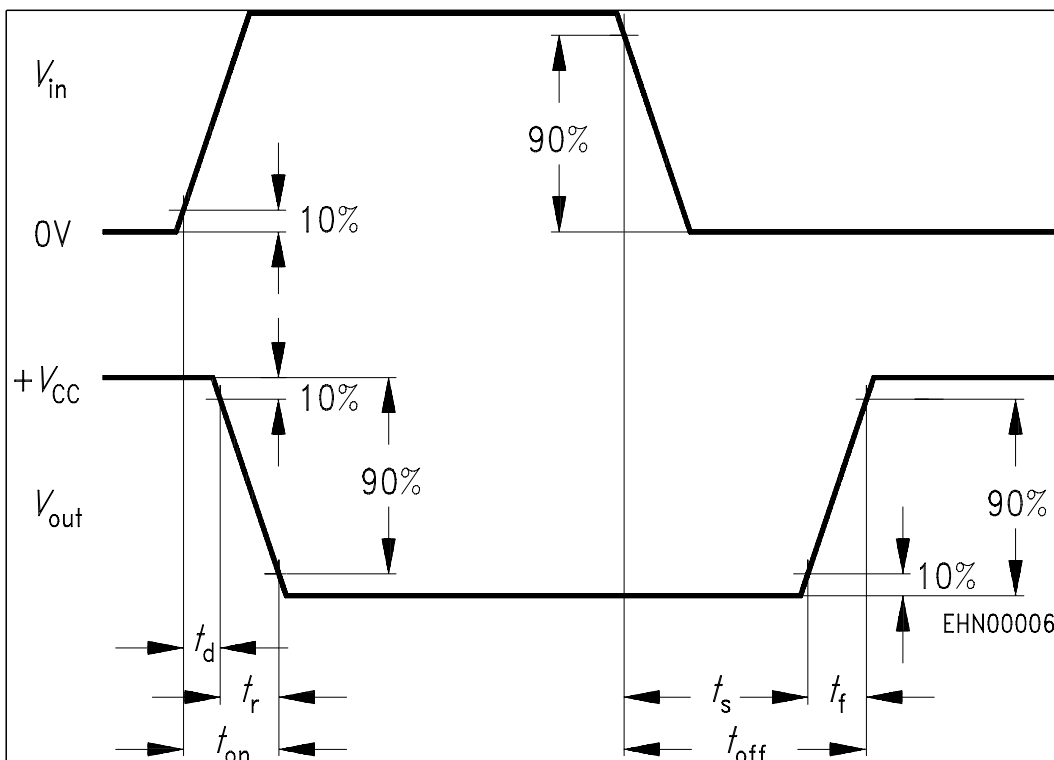
**Electrical Characteristics at  $T_A = 25^\circ\text{C}$ , unless otherwise specified**

| Parameter  | Symbol      | Values |      |      | Unit |
|--|-------------|--------|------|------|------|
|  |             | min.   | typ. | max. |      |
| <b>AC Characteristics</b>  |             |        |      |      |      |
| Transition frequency<br>$I_C = 100\text{ mA}, V_{CE} = 5\text{ V}, f = 100\text{ MHz}$ | $f_T$       | -      | 200  | -    | MHz  |
| Tum-on time<br>$I_C = 500\text{ mA}, I_{B1} = I_{B2} = 0.5\text{ mA}$                  | $t_{(on)}$  | -      | 400  | -    | ns   |
| Tum-off time<br>$I_C = 500\text{ mA}, I_{B1} = I_{B2} = 0.5\text{ mA}$                 | $t_{(off)}$ | -      | 1500 | -    |      |

Switching time test circuit

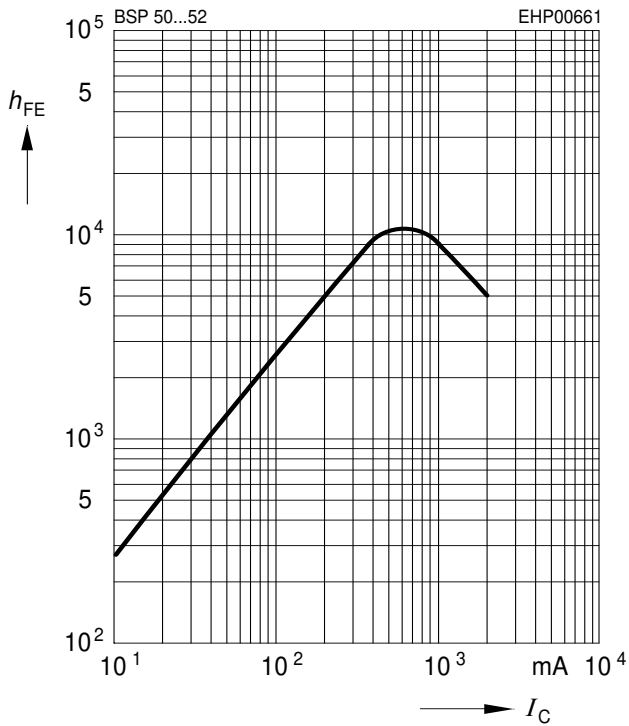


Switching time waveform



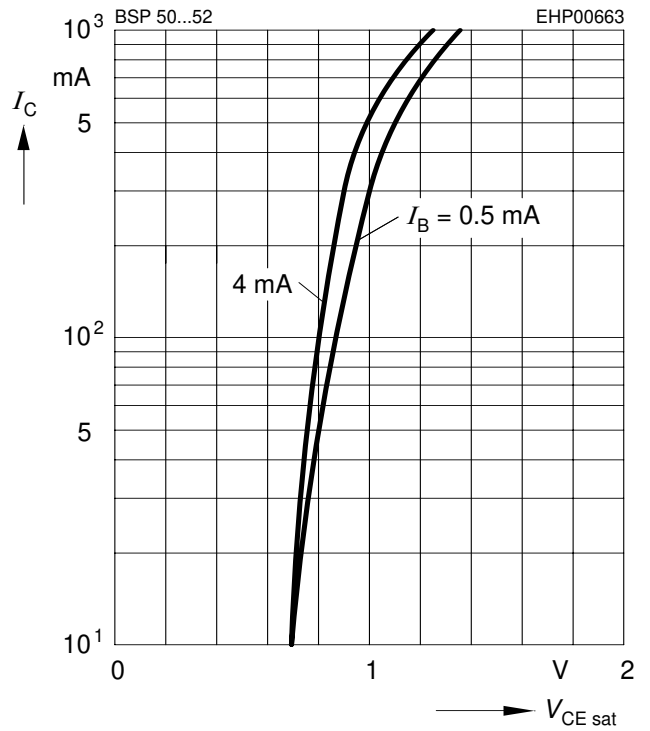
**DC current gain  $h_{FE} = f(I_C)$**

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



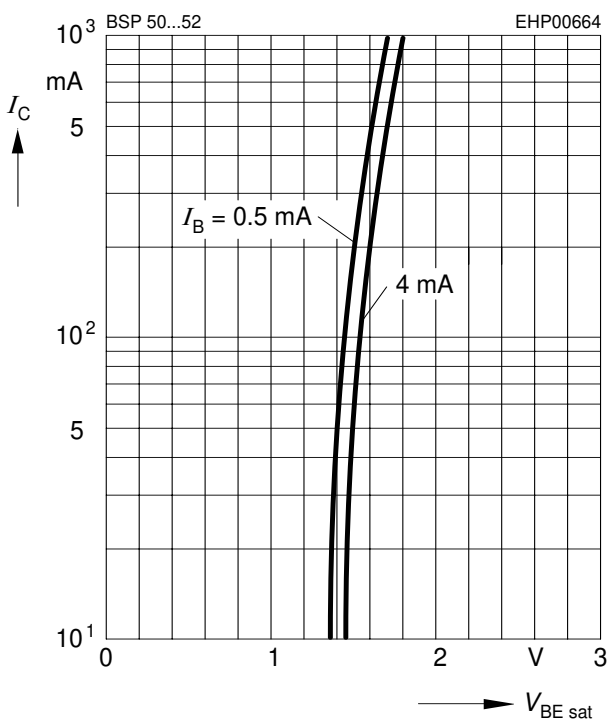
**Collector-emitter saturation voltage**

$I_C = f(V_{CEsat}), I_B = \text{Parameter}$



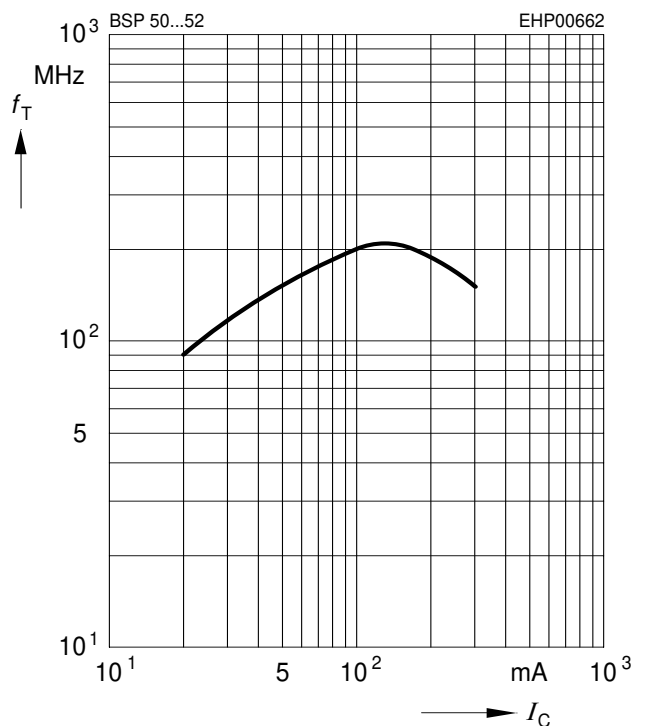
**Base-emitter saturation voltage**

$I_C = f(V_{BEsat}), I_B = \text{Parameter}$



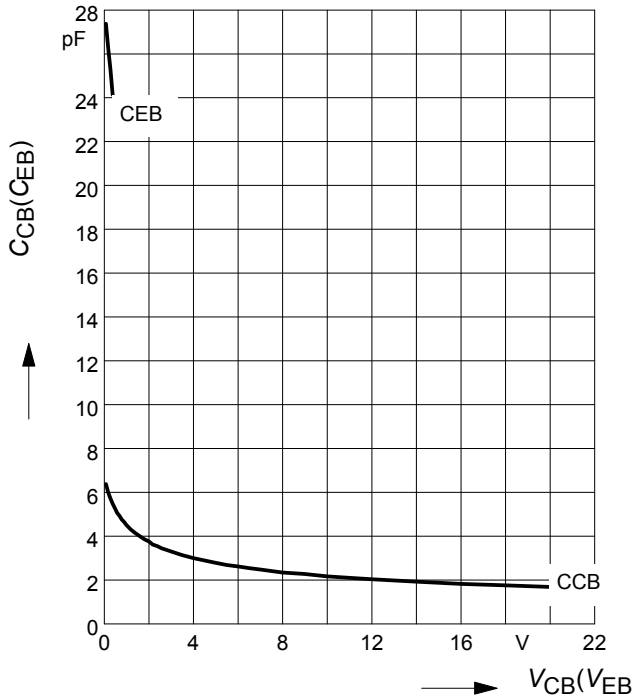
**Transition frequency  $f_T = f(I_C)$**

$V_{CE} = 5\text{ V}, f = 100\text{ MHz}$

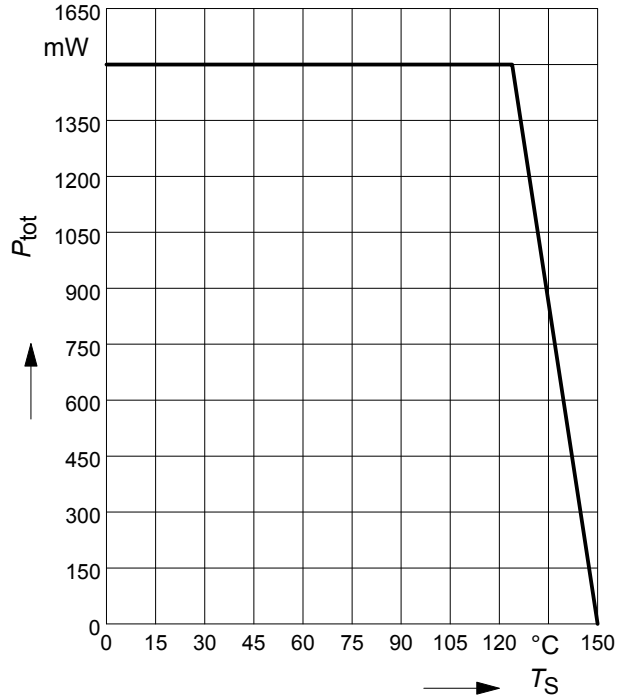


Collector-base capacitance  $C_{cb} = f(V_{CB})$

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

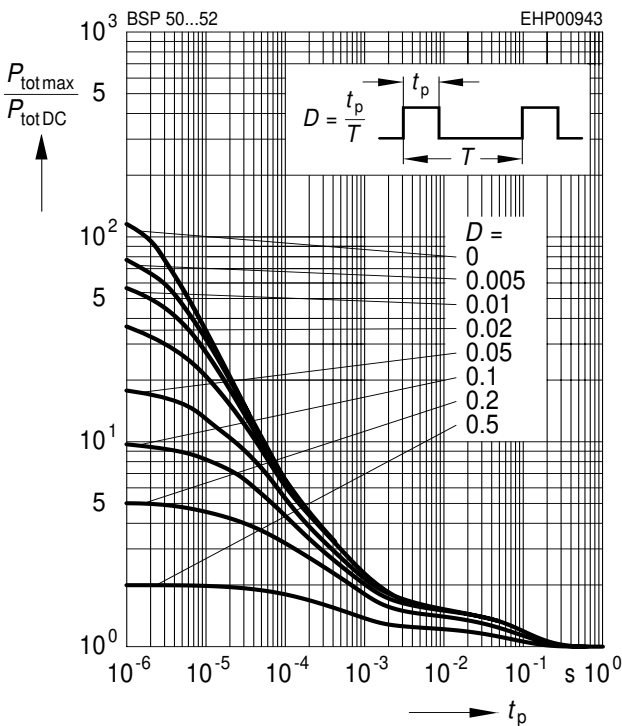


Total power dissipation  $P_{tot} = f(T_S)$



Permissible Pulse Load

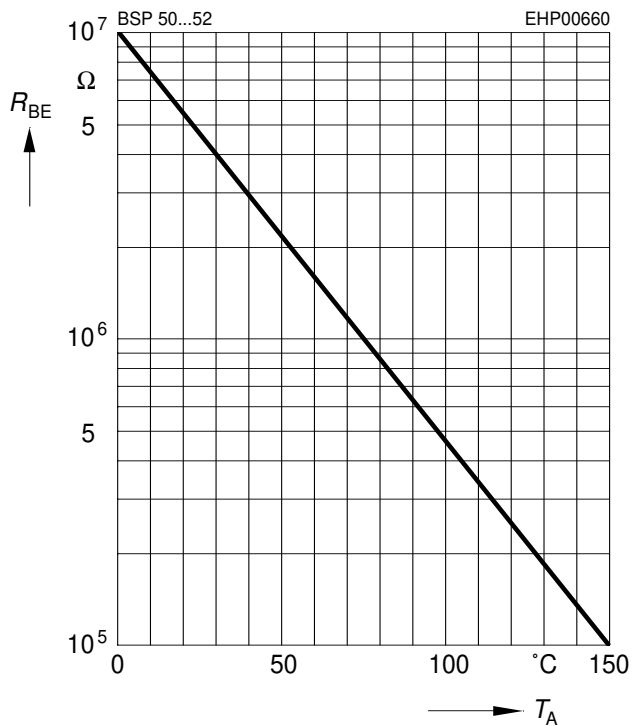
$P_{totmax}/P_{totDC} = f(t_p)$



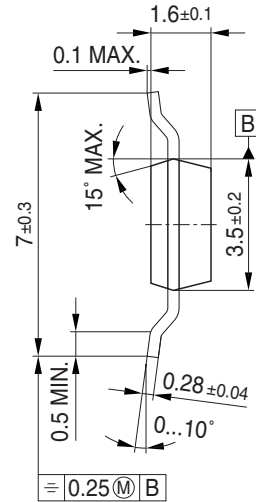
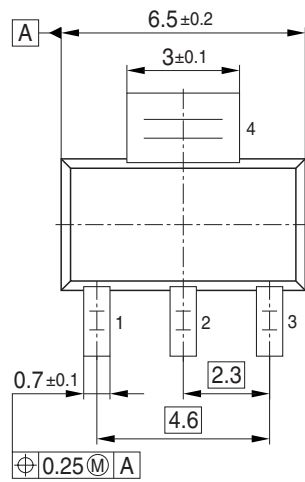
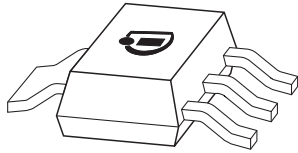
External resistance  $R_{BE} = f(T_A)^{**}$

$V_{CB} = V_{CEmax}$

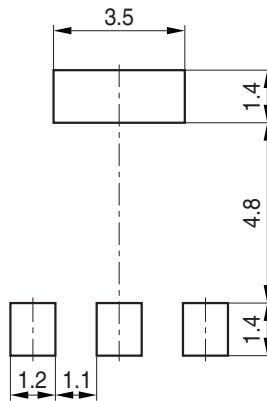
\*\*  $R_{BEmax}$  for thermal stability



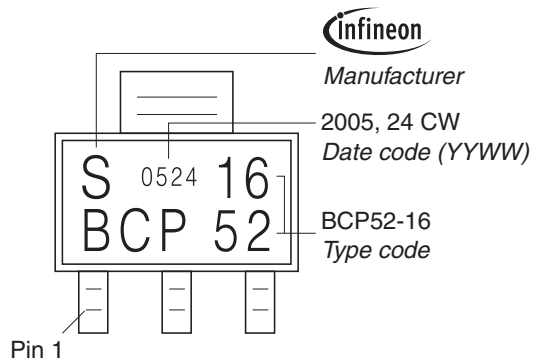
Package Outline



Foot Print

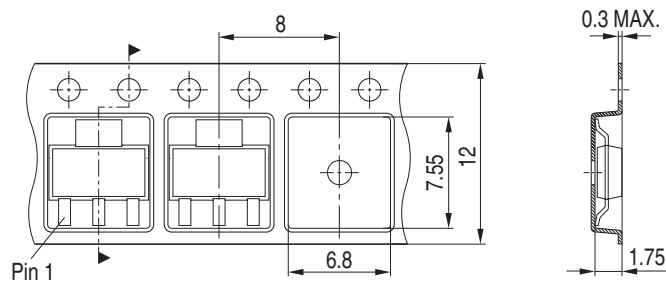


Marking Layout (Example)



Packing

Reel ø180 mm = 1.000 Pieces/Reel  
 Reel ø330 mm = 4.000 Pieces/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.