

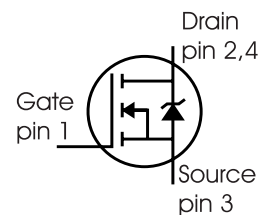
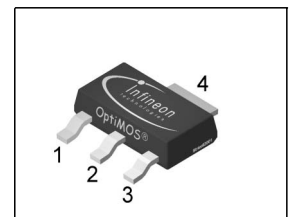
**OptiMOS® Power-Transistor**
**Feature**

- N-Channel
- Enhancement mode
- Logic Level
- Green Product (RoHS Compliant)
- AEC Qualified

**Product Summary**

|              |     |    |
|--------------|-----|----|
| $V_{DS}$     | 55  | V  |
| $R_{DS(on)}$ | 33  | mΩ |
| $I_D$        | 5.2 | A  |

SOT 223



| Type      | Package | Ordering Code | Marking |
|-----------|---------|---------------|---------|
| BSP603S2L | SOT 223 | On Request    | 2N603L  |

**Maximum Ratings**, at  $T_j = 25\text{ °C}$ , unless otherwise specified

| Parameter                           | Symbol              | Value       | Unit |
|-------------------------------------|---------------------|-------------|------|
| Continuous drain current            | $I_D$               |             | A    |
| $T_A=25\text{ °C}$                  |                     | 5.2         |      |
| $T_A=70\text{ °C}$                  |                     | 4.1         |      |
| Pulsed drain current                | $I_{D\text{ puls}}$ | 21          |      |
| $T_A=25\text{ °C}$                  |                     |             |      |
| Gate source voltage                 | $V_{GS}$            | $\pm 20$    | V    |
| Power dissipation                   | $P_{tot}$           | 1.8         | W    |
| $T_A=25\text{ °C}$                  |                     |             |      |
| Operating and storage temperature   | $T_j, T_{stg}$      | -55... +150 | °C   |
| IEC climatic category; DIN IEC 68-1 |                     | 55/150/00   |      |

**Thermal Characteristics**

| Parameter  | Symbol     | Values |      |           | Unit |
|--|------------|--------|------|-----------|------|
|  |            | min.   | typ. | max.      |      |
| <b>Characteristics</b>   |            |        |      |           |      |
| Thermal resistance, junction - soldering point<br>(Pin 4)          | $R_{thJS}$ | -      | 15   | 20        | K/W  |
| Thermal resistance, chip to ambient air:                           | $R_{thJA}$ |        |      |           |      |
| @ min. footprint<br>@ 6 cm <sup>2</sup> cooling area <sup>1)</sup> |            | -      | -    | 120<br>70 |      |

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

| Parameter  | Symbol        | Values |           |          | Unit       |
|--|---------------|--------|-----------|----------|------------|
|  |               | min.   | typ.      | max.     |            |
| <b>Static Characteristics</b>  |               |        |           |          |            |
| Drain-source breakdown voltage<br>$V_{GS}=0V, I_D=1mA$   | $V_{(BR)DSS}$ | 55     | -         | -        | V          |
| Gate threshold voltage, $V_{GS} = V_{DS}$<br>$I_D=50\mu A$   | $V_{GS(th)}$  | 1.2    | 1.6       | 2        |            |
| Zero gate voltage drain current<br>$V_{DS}=55V, V_{GS}=0V, T_j=25^\circ C$<br>$V_{DS}=55V, V_{GS}=0V, T_j=150^\circ C$ | $I_{DSS}$     | -      | 0.1<br>10 | 1<br>100 | $\mu A$    |
| Gate-source leakage current<br>$V_{GS}=20V, V_{DS}=0V$   | $I_{GSS}$     | -      | 10        | 100      | nA         |
| Drain-source on-state resistance<br>$V_{GS}=4.5V, I_D=2.6A$  | $R_{DS(on)}$  | -      | 27        | 40       | m $\Omega$ |
| Drain-source on-state resistance<br>$V_{GS}=10V, I_D=2.6A$   | $R_{DS(on)}$  | -      | 23        | 33       |            |

<sup>1)</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu m$  thick) copper area for drain connection. PCB is vertical without blown air.

**Electrical Characteristics**

| Parameter | Symbol | Conditions | Values |      |      | Unit |
|-----------|--------|------------|--------|------|------|------|
|           |        |            | min.   | typ. | max. |      |

**Dynamic Characteristics**

|                              |              |  |     |      |      |    |
|------------------------------|--------------|--|-----|------|------|----|
| Transconductance             | $g_{fs}$     | $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ ,<br>$I_D = 5.2$             | 8.9 | 17.8 | -    | S  |
| Input capacitance            | $C_{iss}$    | $V_{GS} = 0V$ , $V_{DS} = 25V$ ,<br>$f = 1MHz$                             | -   | 1034 | 1390 | pF |
| Output capacitance           | $C_{oss}$    |  | -   | 244  | 325  |    |
| Reverse transfer capacitance | $C_{rss}$    |  | -   | 75   | 110  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD} = 30V$ , $V_{GS} = 4.5V$ ,<br>$I_D = 5.2A$ ,<br>$R_G = 5.6\Omega$  | -   | 10.8 | 16   | ns |
| Rise time                    | $t_r$        | $V_{DD} = 30V$ , $V_{GS} = 4.5V$ ,<br>$I_D = 5.2mA$ ,<br>$R_G = 5.6\Omega$ | -   | 16   | 24   |    |
| Turn-off delay time          | $t_{d(off)}$ |  | -   | 28   | 40   |    |
| Fall time                    | $t_f$        |  | -   | 15   | 23   |    |

**Gate Charge Characteristics**

|                       |                 |  |   |      |     |    |
|-----------------------|-----------------|--|---|------|-----|----|
| Gate to source charge | $Q_{gs}$        | $V_{DD} = 44V$ , $I_D = 5.2A$                            | - | 3.5  | 4.6 | nC |
| Gate to drain charge  | $Q_{gd}$        |  | - | 10.6 | 16  |    |
| Gate charge total     | $Q_g$           | $V_{DD} = 44V$ , $I_D = 5.2A$ ,<br>$V_{GS} = 0$ to $10V$ | - | 31   | 42  |    |
| Gate plateau voltage  | $V_{(plateau)}$ | $V_{DD} = 44V$ , $I_D = 5.2A$                            | - | 3    | -   | V  |

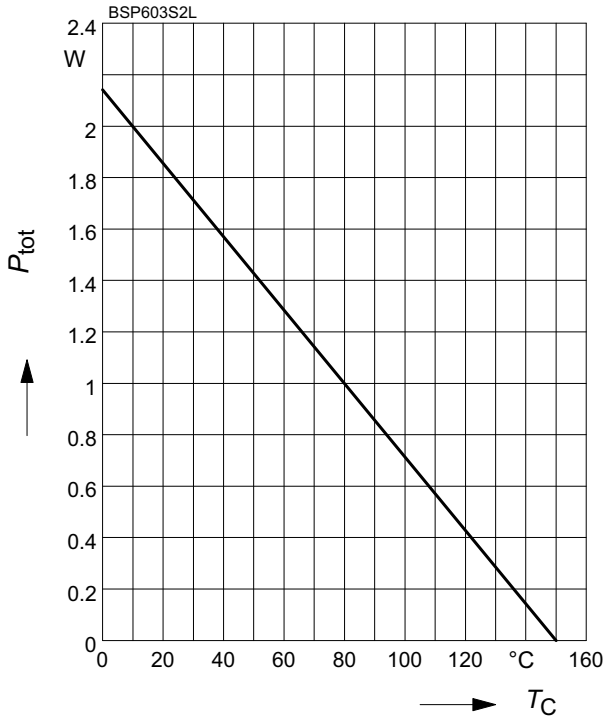
**Reverse Diode**

|  |          |   |   |     |     |    |
|--|----------|---|---|-----|-----|----|
| Inverse diode continuous forward current | $I_S$    | $T_A = 25^\circ C$                                    | - | -   | 5.2 | A  |
| Inv. diode direct current, pulsed        | $I_{SM}$ |   | - | -   | 21  |    |
| Inverse diode forward voltage            | $V_{SD}$ | $V_{GS} = 0V$ , $I_F = 5.2A$                          | - | 0.8 | 1.1 | V  |
| Reverse recovery time                    | $t_{rr}$ | $V_R = 30V$ , $I_F = I_S$ ,<br>$di_F/dt = 100A/\mu s$ | - | 46  | 58  | ns |
| Reverse recovery charge                  | $Q_{rr}$ |   | - | 44  | 55  | nC |

### 1 Power dissipation

$$P_{\text{tot}} = f(T_C)$$

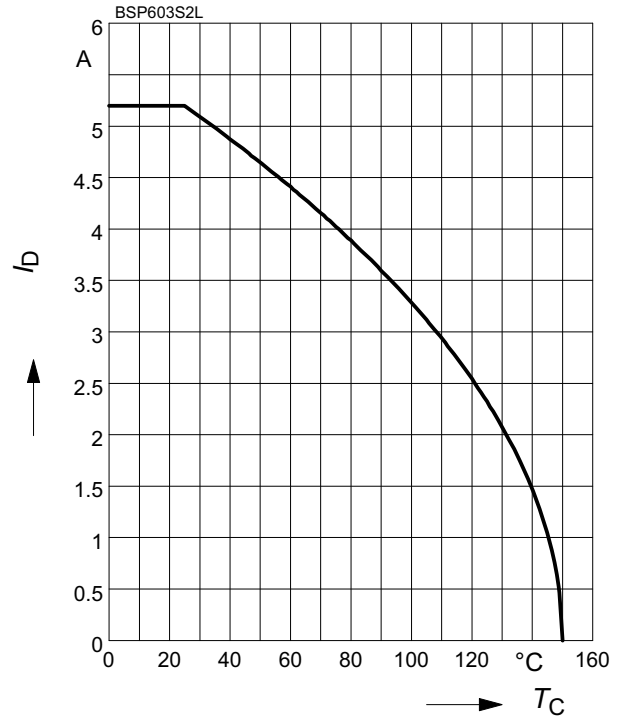
parameter:  $V_{GS} \geq 4 \text{ V}$



### 2 Drain current

$$I_D = f(T_C)$$

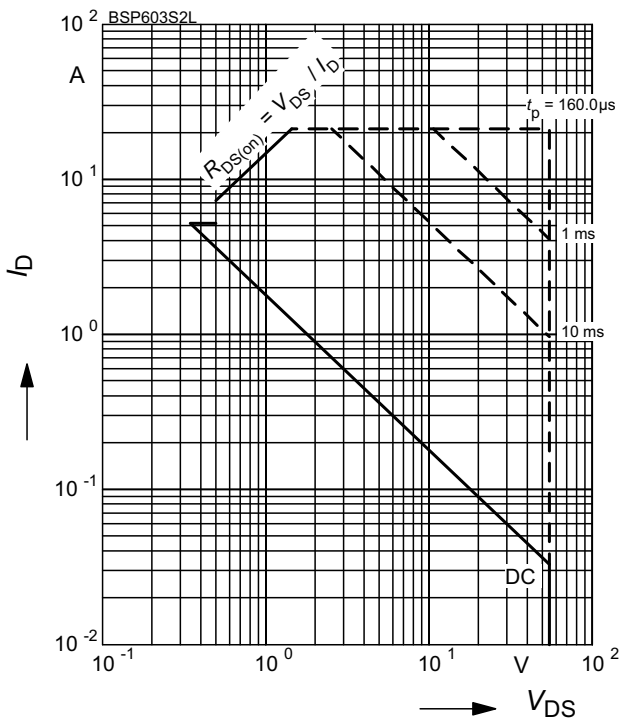
parameter:  $V_{GS} \geq 10 \text{ V}$



### 3 Safe operating area

$$I_D = f(V_{DS})$$

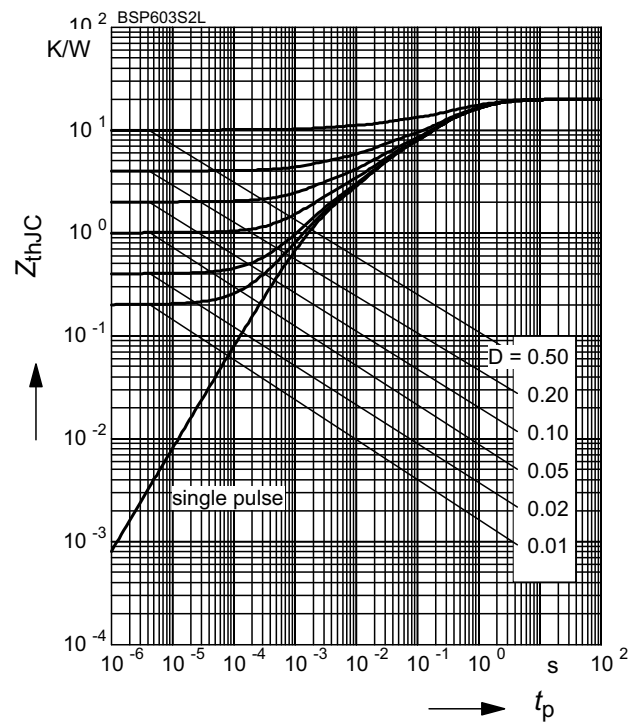
parameter:  $D = 0, T_C = \text{--}$



### 4 Max. transient thermal impedance

$$Z_{\text{thJC}} = f(t_p)$$

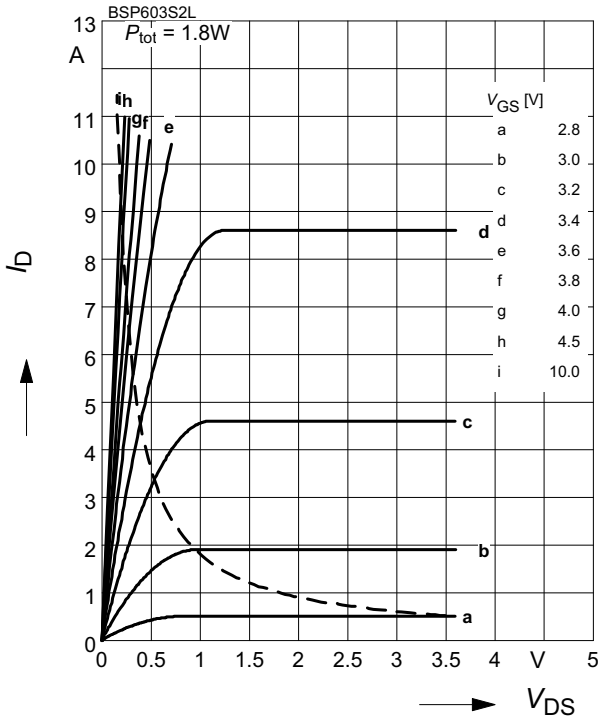
parameter:  $D = t_p/T$



**5 Typ. output characteristic**

$I_D = f(V_{DS}); T_j = 25^\circ\text{C}$

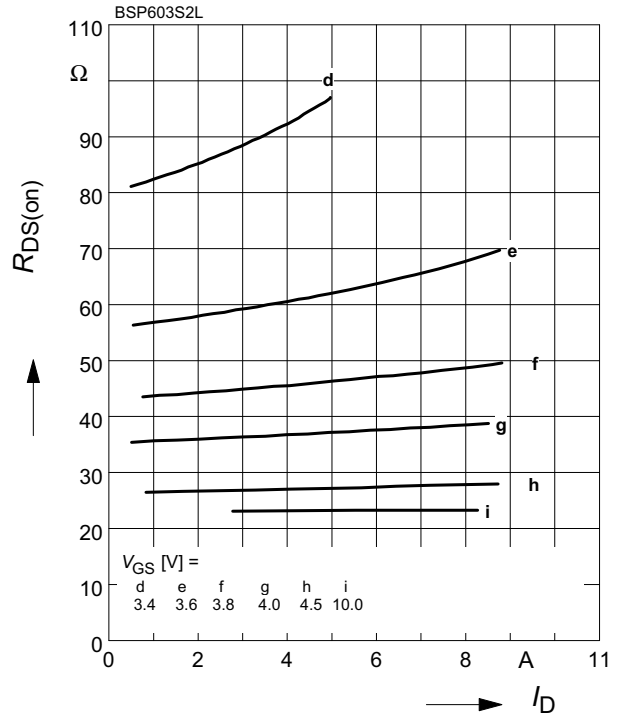
parameter:  $t_p = 80 \mu\text{s}$



**6 Typ. drain-source on resistance**

$R_{DS(on)} = f(I_D)$

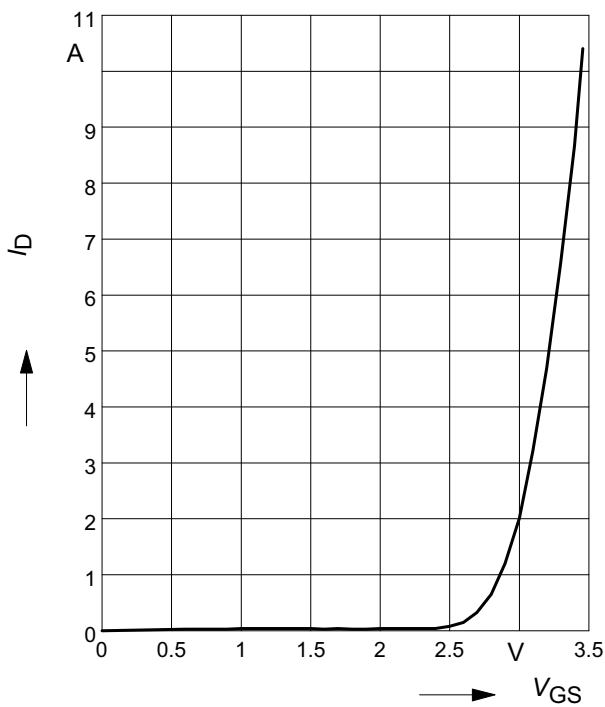
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

$I_D = f(V_{GS}); V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$

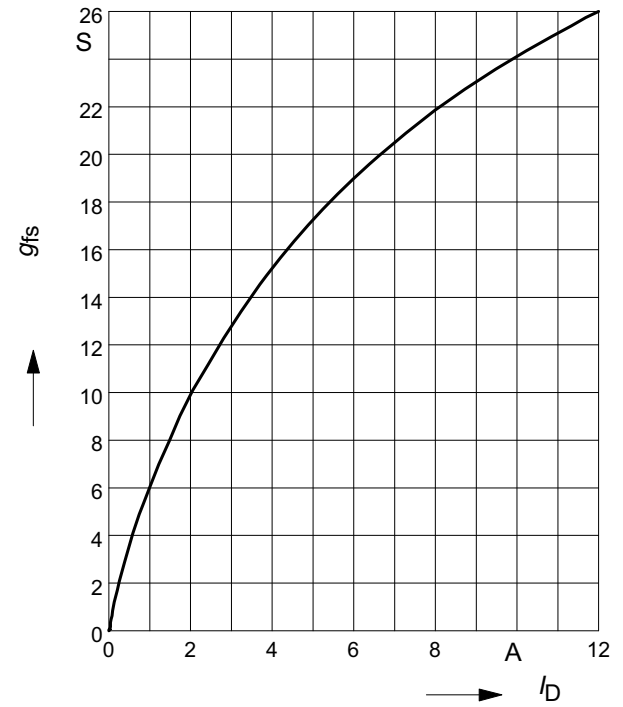
parameter:  $t_p = 80 \mu\text{s}$



**8 Typ. forward transconductance**

$g_{fs} = f(I_D); T_j = 25^\circ\text{C}$

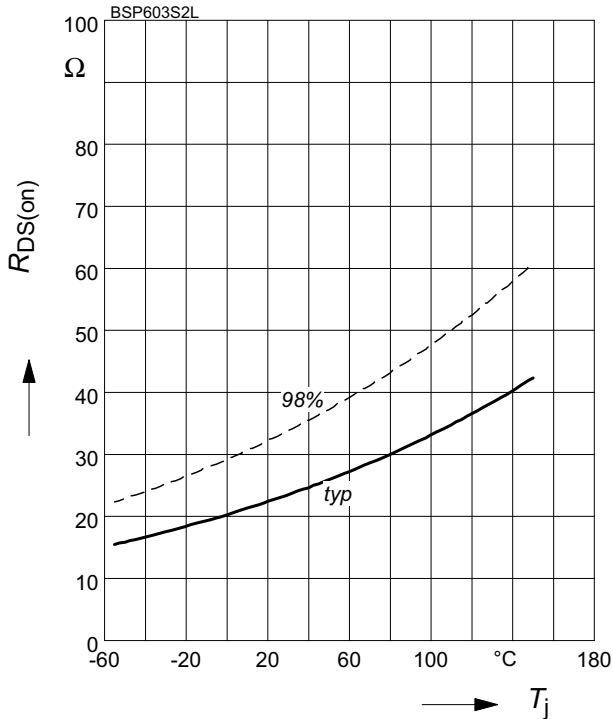
parameter:  $g_{fs}$



### 9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j)$$

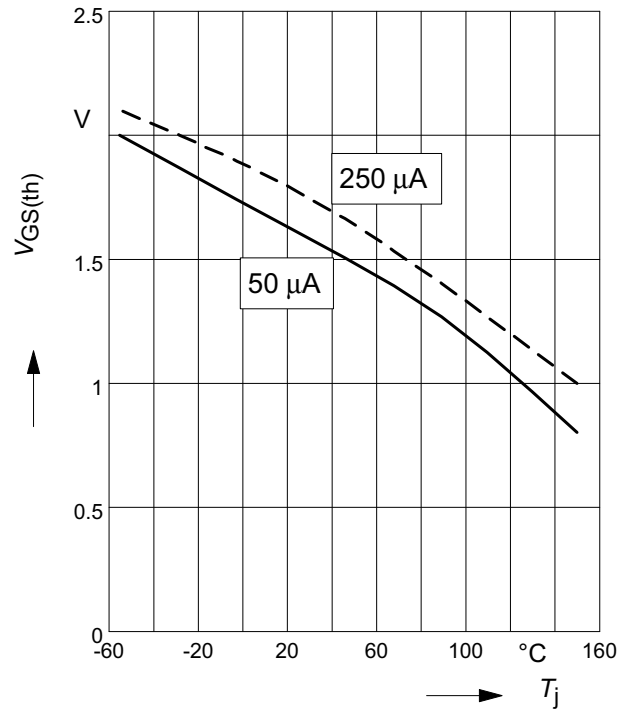
parameter :  $I_D = 2.6 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$



### 10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j)$$

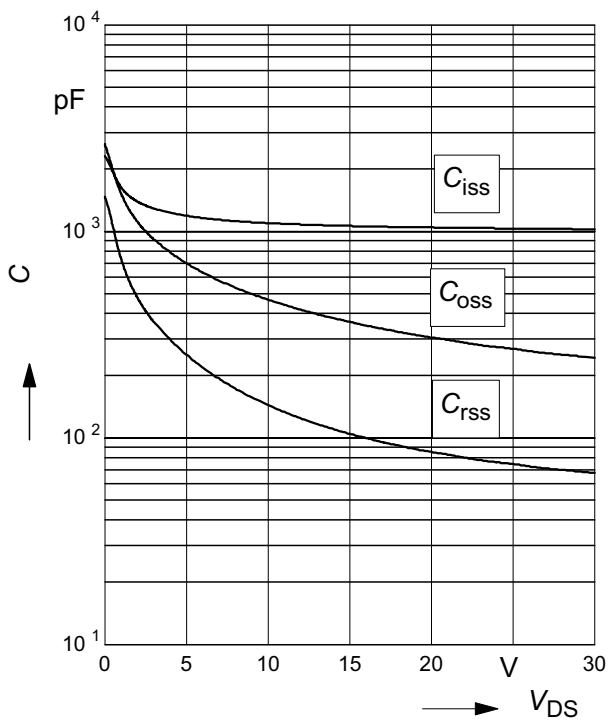
parameter:  $V_{GS} = V_{DS}$



### 11 Typ. capacitances

$$C = f(V_{DS})$$

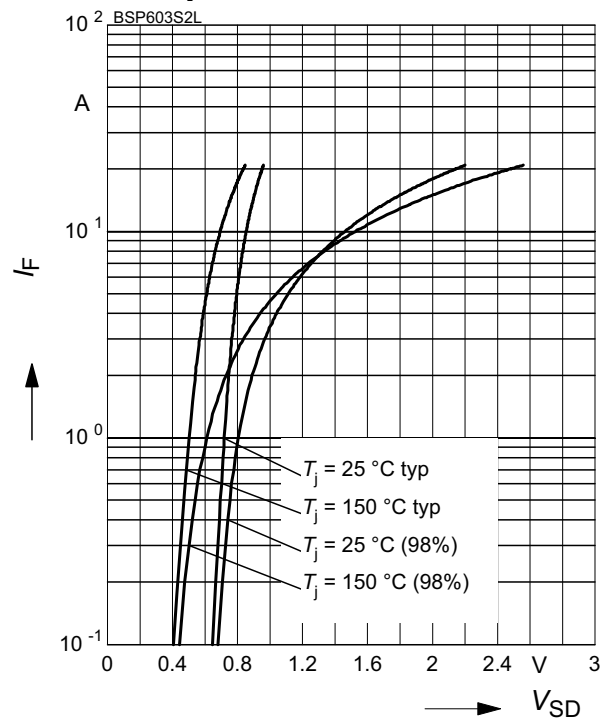
parameter:  $V_{GS}=0\text{V}$ ,  $f=1 \text{ MHz}$



### 12 Forward character. of reverse diode

$$I_F = f(V_{SD})$$

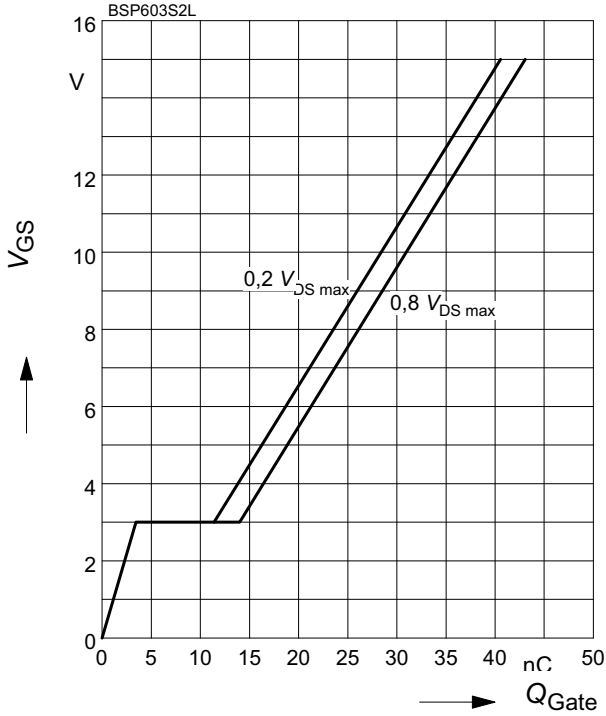
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



**13 Typ. gate charge**

$$V_{GS} = f(Q_{Gate})$$

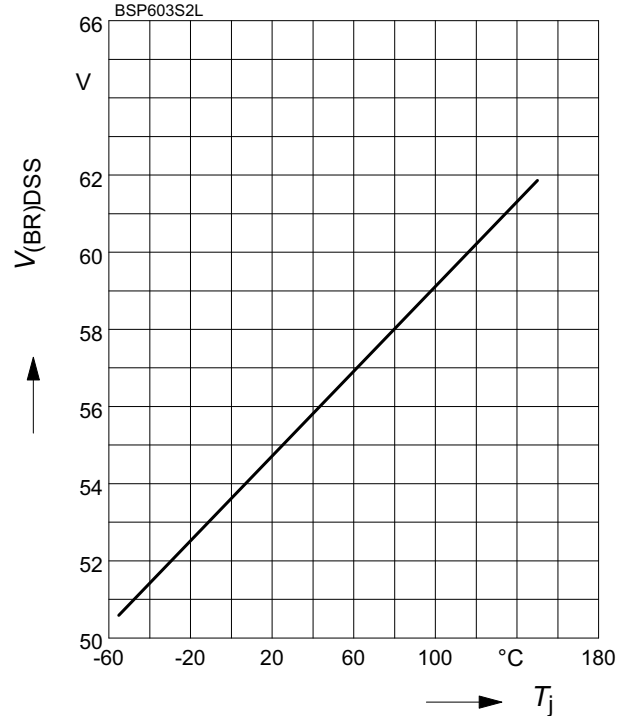
parameter:  $I_D = 5.2 \text{ A pulsed}$



**14 Drain-source breakdown voltage**

$$V_{(BR)DSS} = f(T_j)$$

parameter:  $I_D = 10 \text{ mA}$



# 1 Package Outlines

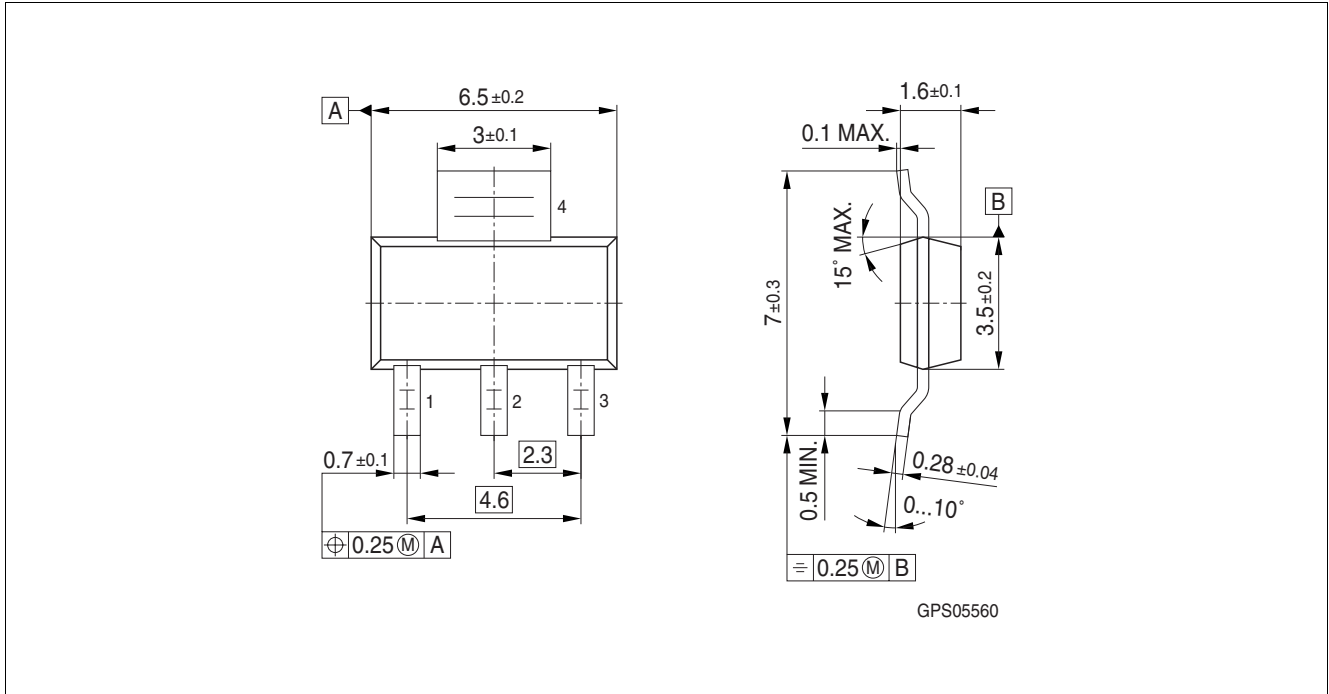


Figure 1 SOT 223

### Green Product (RoHS compliant)

To meet the world-wide customer requirements for environmentally friendly products and to be compliant with government regulations the device is available as a green product. Green products are RoHS-Compliant (i.e. Pb-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

For further information on alternative packages, please visit our website:  
<http://www.infineon.com/packages>.

Dimensions in mm



## 2 Revision History

| Revision | Date       | Changes   |
|----------|------------|---|
| 1.1      | 2008-05-27 | Initial version of RoHS-compliant derivate of BSP603S2L<br>Page 1: AEC certified statement added<br>Page 1 and 8: added RoHS compliance statement and Green product feature<br>Page 1 and 8: Package changed to RoHS compliant version<br>Page 9-10: added Revision History, updated Legal Disclaimer |

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