

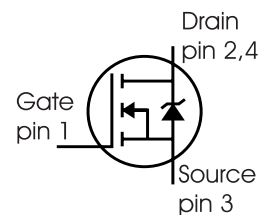
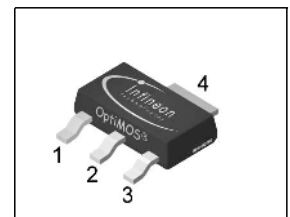
**OptiMOS® Power-Transistor**
**Feature**

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

**Product Summary**

$V_{DS}$	55	V
$R_{DS(on)}$	33	m $\Omega$
$I_D$	5.2	A

SOT 223



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

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

Parameter	Symbol	Value	Unit
Continuous drain current	$I_D$	5.2	A
$T_A=25\text{ }^\circ\text{C}$		5.2	
$T_A=70\text{ }^\circ\text{C}$		4.1	
Pulsed drain current	$I_{D\text{ puls}}$	21	
$T_A=25\text{ }^\circ\text{C}$			
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation	$P_{tot}$	1.8	W
$T_A=25\text{ }^\circ\text{C}$			
Operating and storage temperature	$T_j, T_{stg}$	-55... +150	$^\circ\text{C}$
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 (Pin 4)	$R_{thJS}$	-	15	20	K/W
Thermal resistance, chip to ambient air:	$R_{thJA}$				
@ min. footprint		-	-	120	
@ 6 cm <sup>2</sup> cooling area <sup>1)</sup>		-	-	70	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Static Characteristics</b>					
Drain-source breakdown voltage $V_{GS}=0V, I_D=1mA$	$V_{(BR)DSS}$	55	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=50\mu A$	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current $V_{DS}=55V, V_{GS}=0V, T_j=25\text{ °C}$ $V_{DS}=55V, V_{GS}=0V, T_j=150\text{ °C}$	$I_{DSS}$	-	0.1	1	$\mu A$
		-	10	100	
Gate-source leakage current $V_{GS}=20V, V_{DS}=0V$	$I_{GSS}$	-	10	100	nA
Drain-source on-state resistance $V_{GS}=4.5V, I_D=2.6A$	$R_{DS(on)}$	-	27	40	m $\Omega$
Drain-source on-state resistance $V_{GS}=10V, I_D=2.6A$	$R_{DS(on)}$	-	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	$g_{fs}$	$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 5.2$	8.9	17.8	-	S
Input capacitance	$C_{iss}$	$V_{GS} = 0V$ , $V_{DS} = 25V$ , $f = 1MHz$	-	1034	1390	pF
Output capacitance	$C_{oss}$		-	244	325	
Reverse transfer capacitance	$C_{rss}$		-	75	110	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 30V$ , $V_{GS} = 4.5V$ , $I_D = 5.2A$ , $R_G = 5.6\Omega$	-	10.8	16	ns
Rise time	$t_r$	$V_{DD} = 30V$ , $V_{GS} = 4.5V$ , $I_D = 5.2mA$ , $R_G = 5.6\Omega$	-	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	$Q_g$	$V_{DD} = 44V$ , $I_D = 5.2A$ , $V_{GS} = 0$ to $10V$	-	31	42	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 44V$ , $I_D = 5.2A$	-	3	-	V

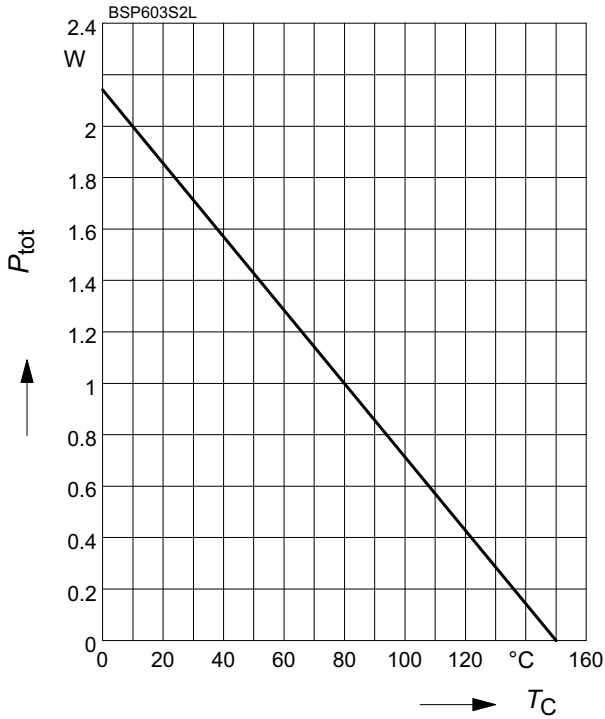
**Reverse Diode**

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	$t_{rr}$	$V_R = 30V$ , $I_F = I_S$ , $di_F/dt = 100A/\mu s$	-	46	58	ns
Reverse recovery charge	$Q_{rr}$		-	44	55	nC

### 1 Power dissipation

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

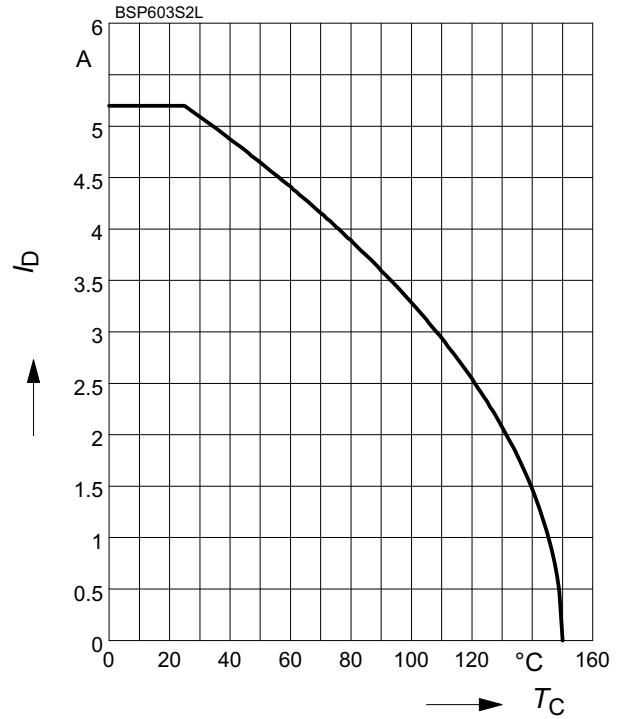
parameter:  $V_{GS} \geq 4 \text{ V}$



### 2 Drain current

$$I_D = f(T_C)$$

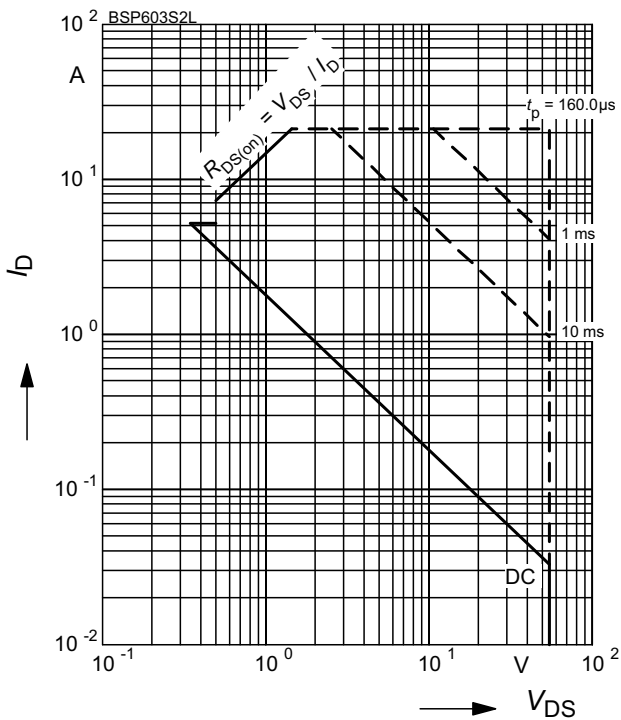
parameter:  $V_{GS} \geq 10 \text{ V}$



### 3 Safe operating area

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

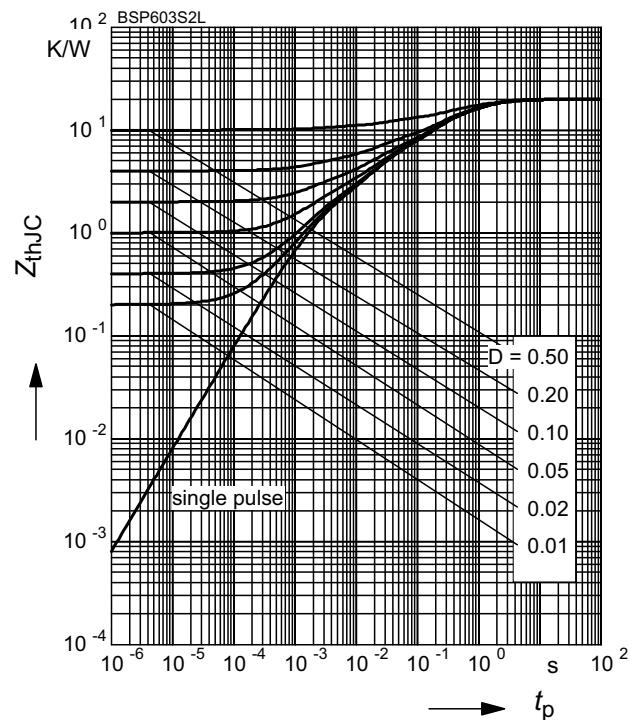
parameter:  $D = 0, T_C = \text{--}$



### 4 Max. transient thermal impedance

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

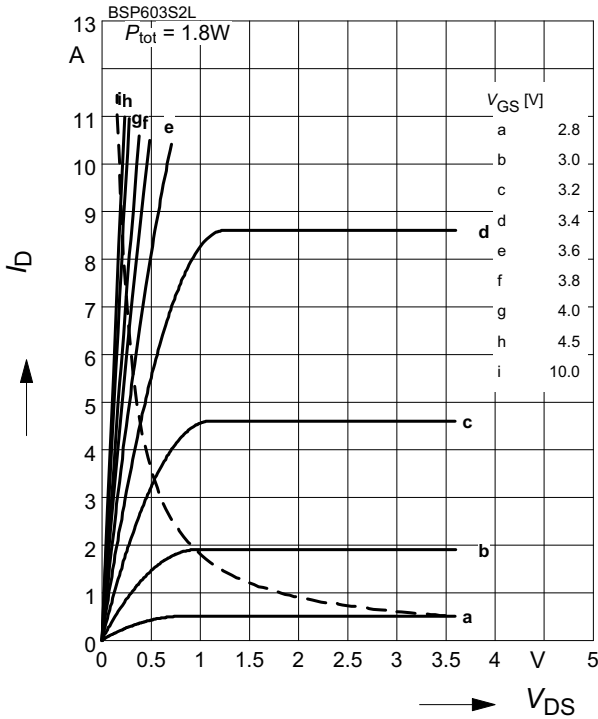
parameter:  $D = t_p/T$



**5 Typ. output characteristic**

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

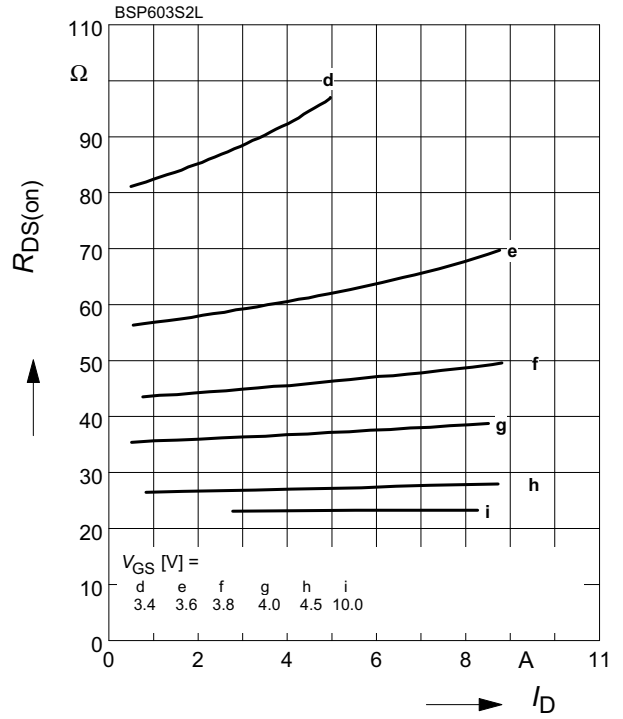
parameter:  $t_p = 80 \mu\text{s}$



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

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

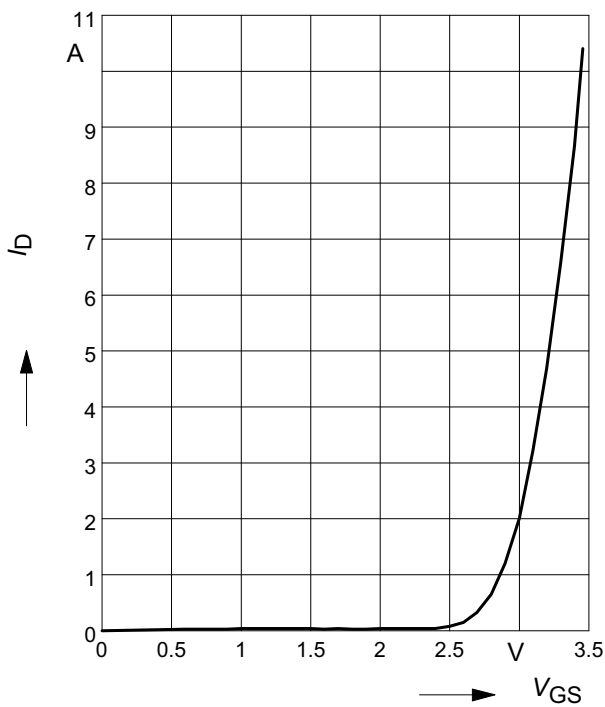
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

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

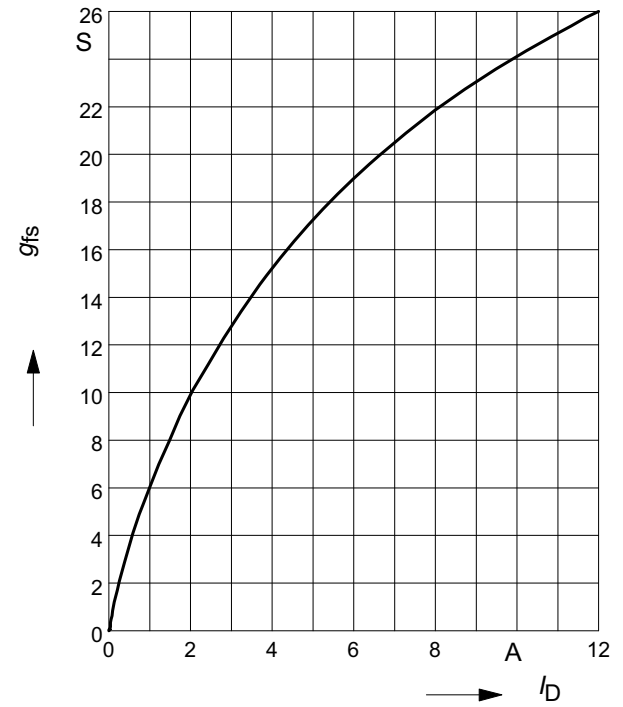
parameter:  $t_p = 80 \mu\text{s}$



**8 Typ. forward transconductance**

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

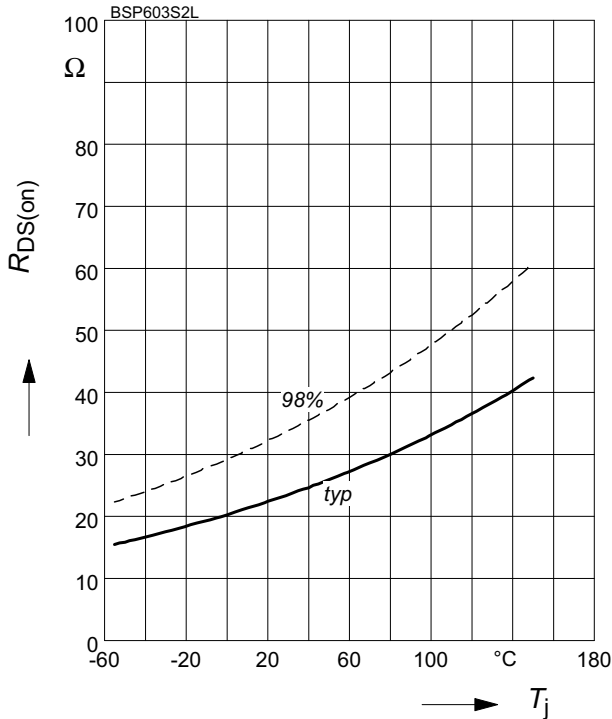
parameter:  $g_{fs}$



### 9 Drain-source on-state resistance

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

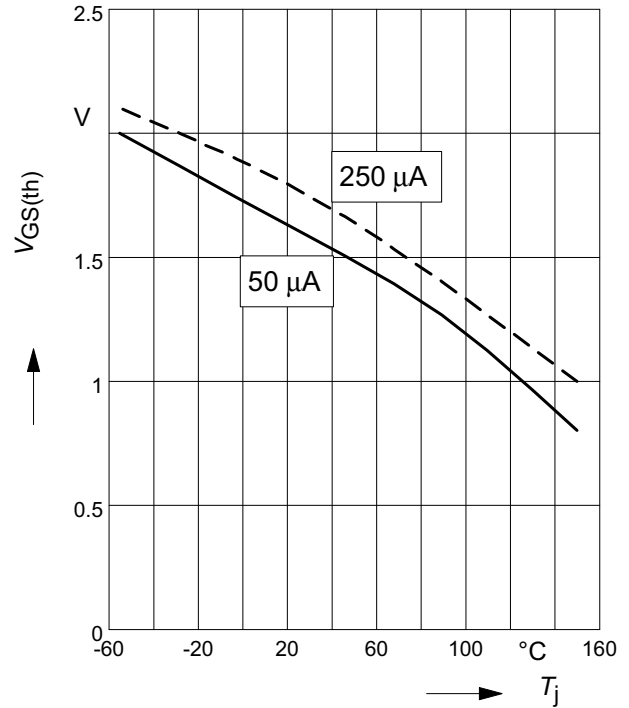
parameter :  $I_D = 2.6 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$



### 10 Typ. gate threshold voltage

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

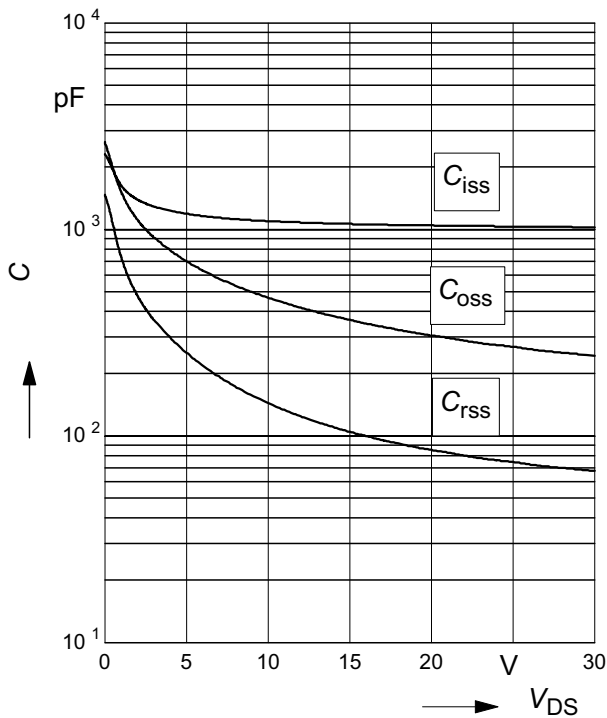
parameter:  $V_{GS} = V_{DS}$



### 11 Typ. capacitances

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

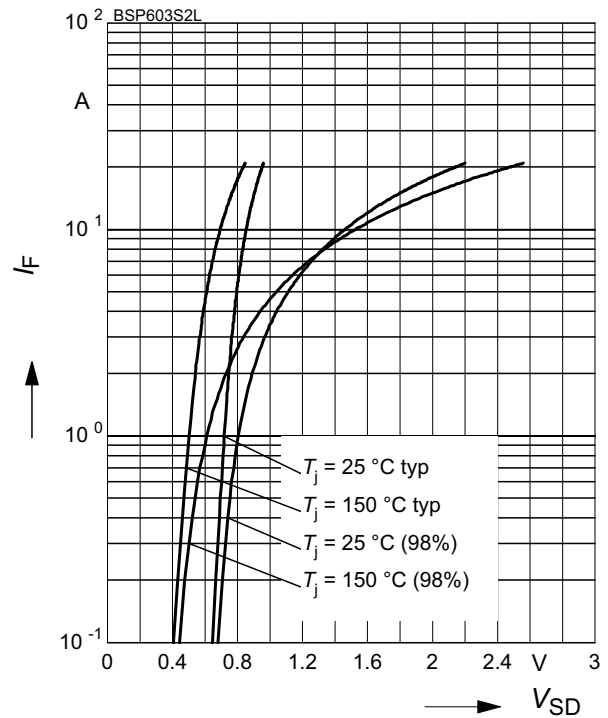
parameter:  $V_{GS}=0\text{V}$ ,  $f=1 \text{ MHz}$



### 12 Forward character. of reverse diode

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

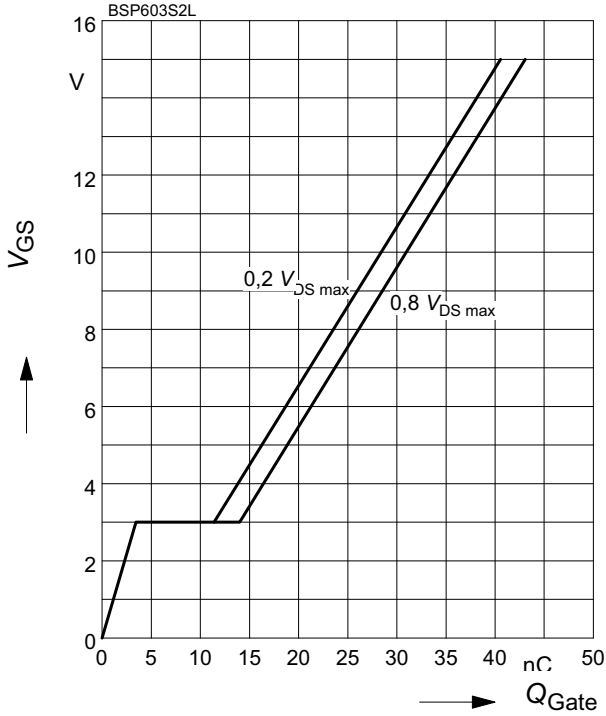
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



**13 Typ. gate charge**

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

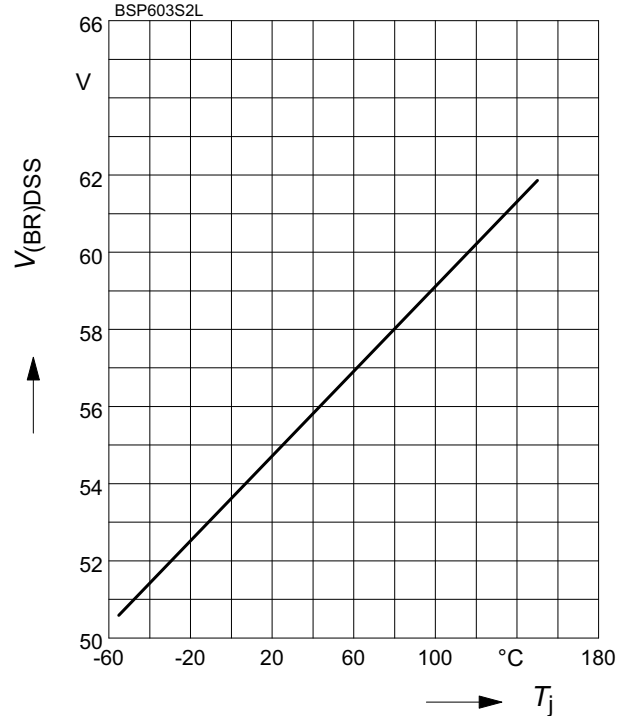
parameter:  $I_D = 5.2 \text{ A pulsed}$



**14 Drain-source breakdown voltage**

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

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



# 1 Package Outlines

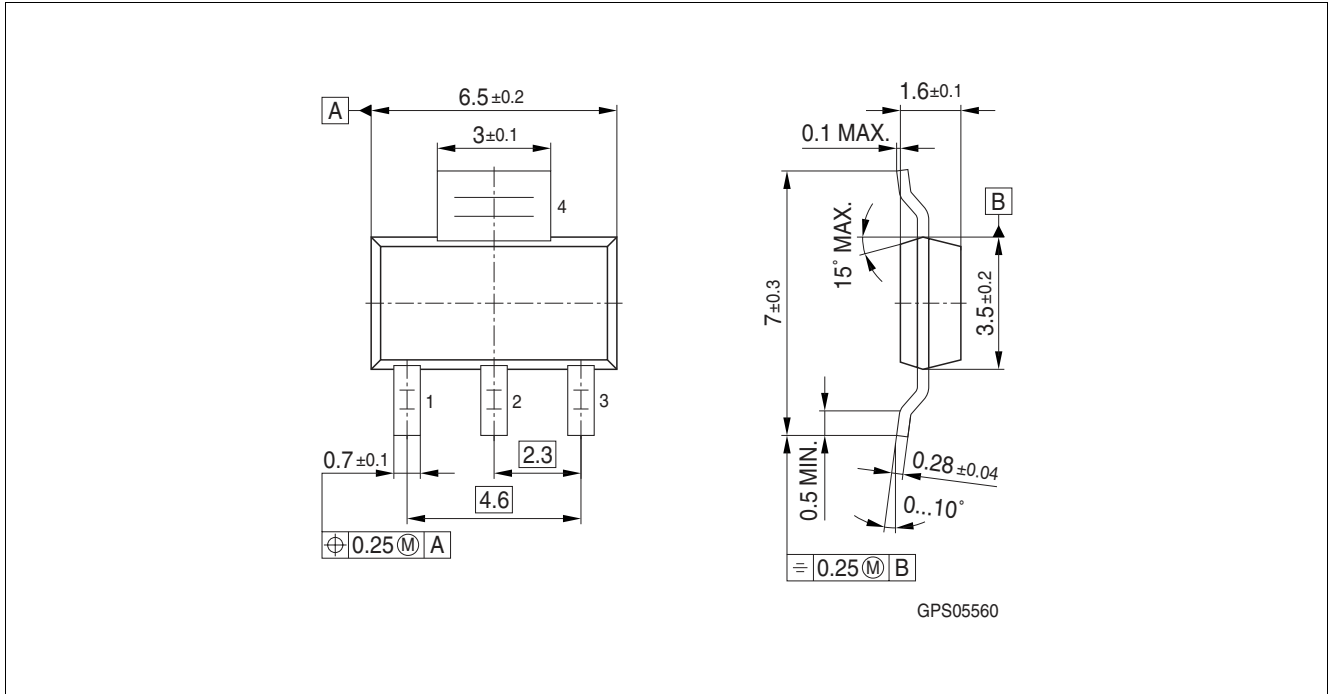


Figure 1 SOT 223

### 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).



## 2 Revision History

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

**Edition 2008-05-27**

**Published by  
Infineon Technologies AG  
81726 Munich, Germany**

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