

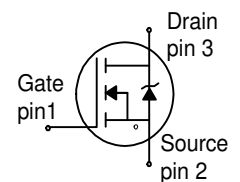
**OptiMOS® Buck converter series**
**Feature**

- N-Channel
- Enhancement mode
- Logic Level
- Avalanche rated <sup>1)</sup>
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21


**Product Summary**

$V_{DS}$	55	V
$R_{DS(on)}$	650	m $\Omega$
$I_D$	0.54	A

PG-SOT 23



Type	Package	Tape and Reel	Marking
BSS670S2L	PG-SOT 23	H6327: 3000 pcs/reel	BSs

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

Parameter	Symbol	Value	Unit
Continuous drain current $T_A=25\text{ }^\circ\text{C}$ $T_A=70\text{ }^\circ\text{C}$	$I_D$	0.54 0.43	A
Pulsed drain current $T_A=25\text{ }^\circ\text{C}$	$I_{D\text{ puls}}$	2.2	
Avalanche energy, single pulse $I_D = 0.54\text{ A}$ , $R_G = 25\text{ }\Omega$ <sup>1)</sup>	$E_{AS}$	8.1	mJ
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation $T_A=25\text{ }^\circ\text{C}$	$P_{tot}$	0.36	W
Operating and storage temperature	$T_j, T_{stg}$	-55... +150	$^\circ\text{C}$
IEC climatic category; DIN IEC 68-1		55/150/56	
ESD Class JESD22-A114-HBM		Class 0	

<sup>1)</sup> Valid from devices with date code 0604 onwards

**Thermal Characteristics**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Characteristics</b>					
Thermal resistance, junction - soldering point (Pin 3)	$R_{thJS}$	-	-	290	K/W
SMD version, device on PCB: @ min. footprint @ 6 cm <sup>2</sup> cooling area <sup>2)</sup>	$R_{thJA}$	-	-	350 300	

**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 $V_{GS}=0, I_D=1\text{mA}$	$V_{(BR)DSS}$	55	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=2.7\mu\text{A}$	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current $V_{DS}=55\text{V}, V_{GS}=0, T_j=25^\circ\text{C}$ $V_{DS}=55\text{V}, V_{GS}=0, T_j=150^\circ\text{C}$	$I_{DSS}$	-	0.01 1	0.1 10	$\mu\text{A}$
Gate-source leakage current $V_{GS}=20\text{V}, V_{DS}=0\text{V}$	$I_{GSS}$	-	1	100	
Drain-source on-state resistance $V_{GS}=4.5\text{V}, I_D=270\text{mA}$	$R_{DS(on)}$	-	430	825	m $\Omega$
Drain-source on-state resistance $V_{GS}=10\text{V}, I_D=270\text{mA}$	$R_{DS(on)}$	-	346	650	

<sup>2)</sup> Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  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	$g_{fs}$	$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 0.54A$	0.6	1.2	-	S
Input capacitance	$C_{iss}$	$V_{GS} = 0$ , $V_{DS} = 25V$ , $f = 1MHz$	-	56	75	pF
Output capacitance	$C_{oss}$		-	13	18	
Reverse transfer capacitance	$C_{rss}$		-	7	10	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 30V$ , $V_{GS} = 4.5V$ , $I_D = 0.54A$ , $R_G = 130\Omega$	-	9	14	ns
Rise time	$t_r$		-	25	37	
Turn-off delay time	$t_{d(off)}$		-	21	31	
Fall time	$t_f$		-	24	32	

**Gate Charge Characteristics**

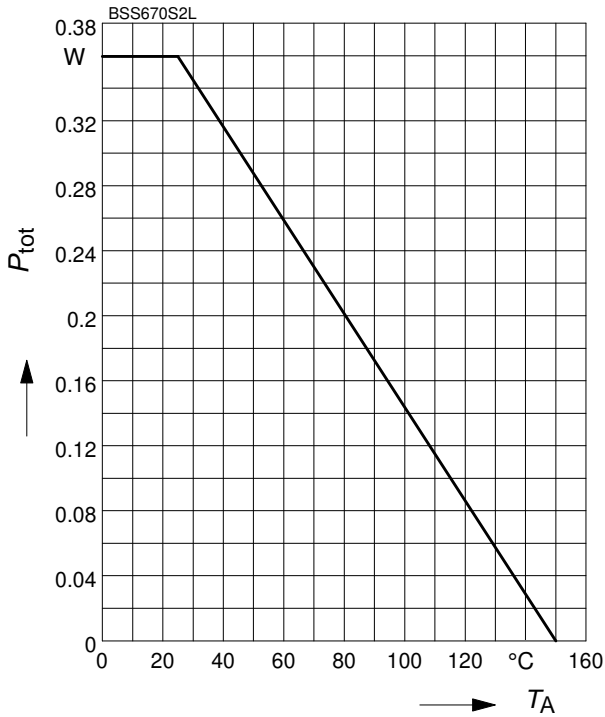
Gate to source charge	$Q_{gs}$	$V_{DD} = 40V$ , $I_D = 0.54A$	-	0.19	0.25	nC
Gate to drain charge	$Q_{gd}$		-	0.57	0.86	
Gate charge total	$Q_g$	$V_{DD} = 40V$ , $I_D = 0.54A$ , $V_{GS} = 0$ to $10V$	-	1.7	2.26	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 40V$ , $I_D = 0.54A$	-	3.1	-	V

**Reverse Diode**

Inverse diode continuous forward current	$I_S$	$T_A = 25^\circ C$	-	-	0.38	A
Inv. diode direct current, pulsed	$I_{SM}$		-	-	2.2	
Inverse diode forward voltage	$V_{SD}$	$V_{GS} = 0$ , $I_F = 0.54A$	-	0.8	1.1	V
Reverse recovery time	$t_{rr}$	$V_R = 30V$ , $I_F = I_S$ , $dI_F/dt = 100A/\mu s$	-	51	64	ns
Reverse recovery charge	$Q_{rr}$		-	22	28	

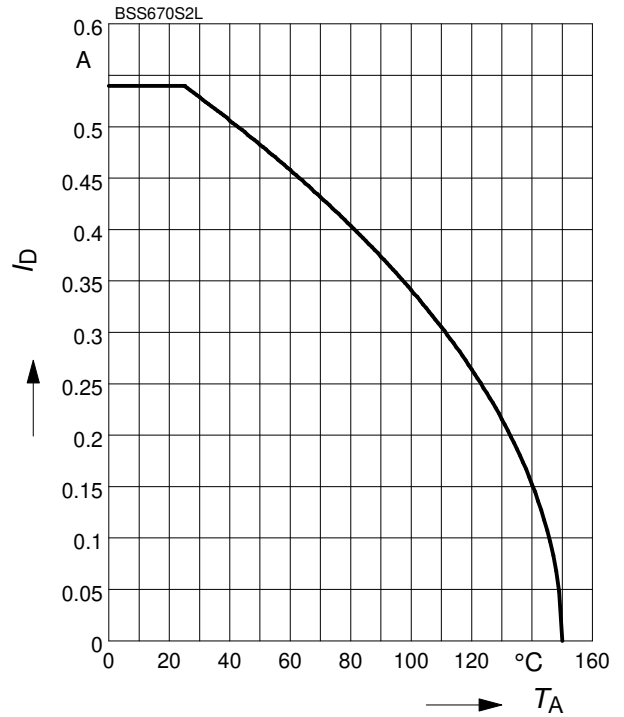
**1 Power dissipation**

$P_{tot} = f(T_A)$



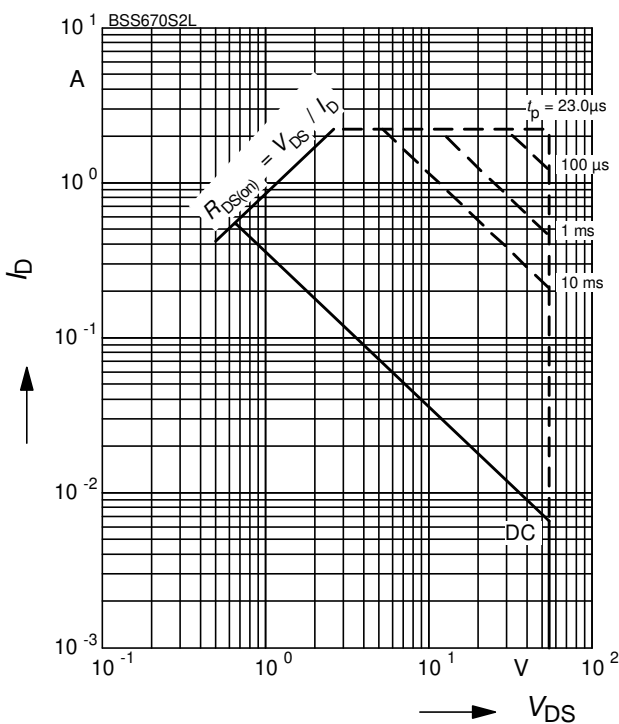
**2 Drain current**

$I_D = f(T_A)$   
parameter:  $V_{GS} \geq 10 \text{ V}$



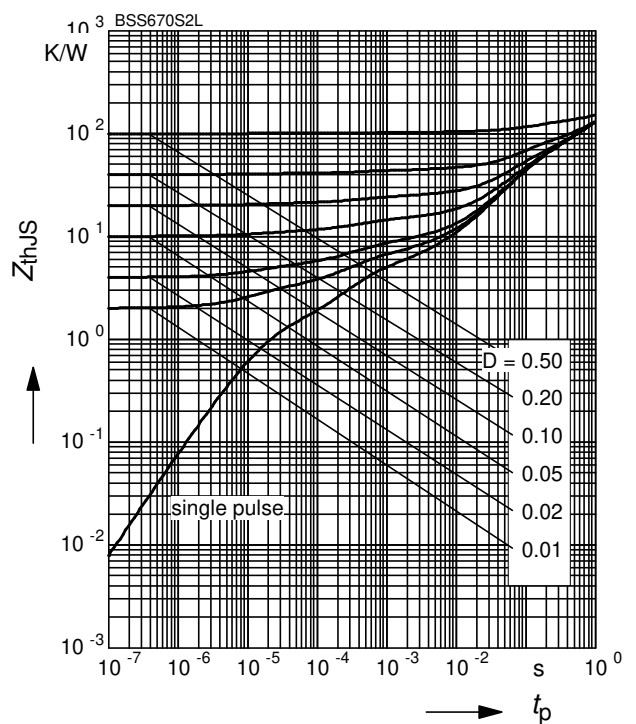
**3 Safe operating area**

$I_D = f(V_{DS})$   
parameter:  $D = 0, T_A = 25 \text{ °C}$



**4 Transient thermal impedance**

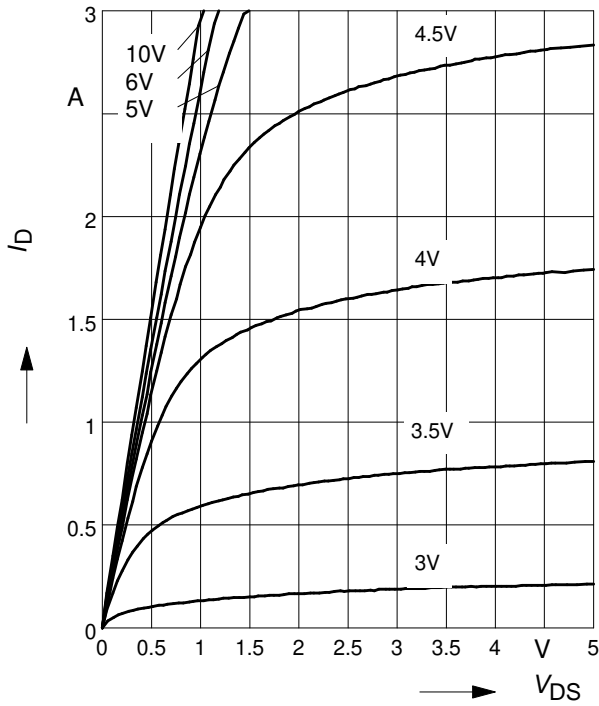
$Z_{thJS} = f(t_p)$   
parameter:  $D = t_p/T$



**5 Typ. output characteristic**

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

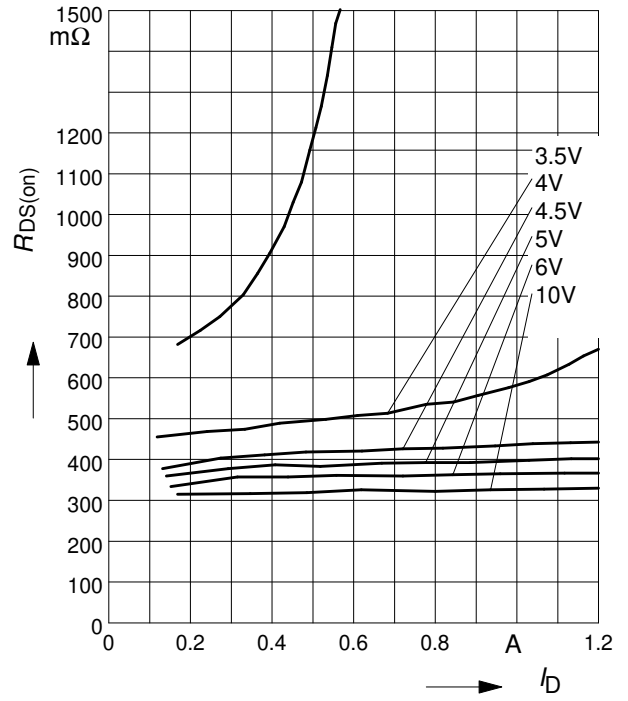
parameter:  $t_p = 80 \mu\text{s}$



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

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

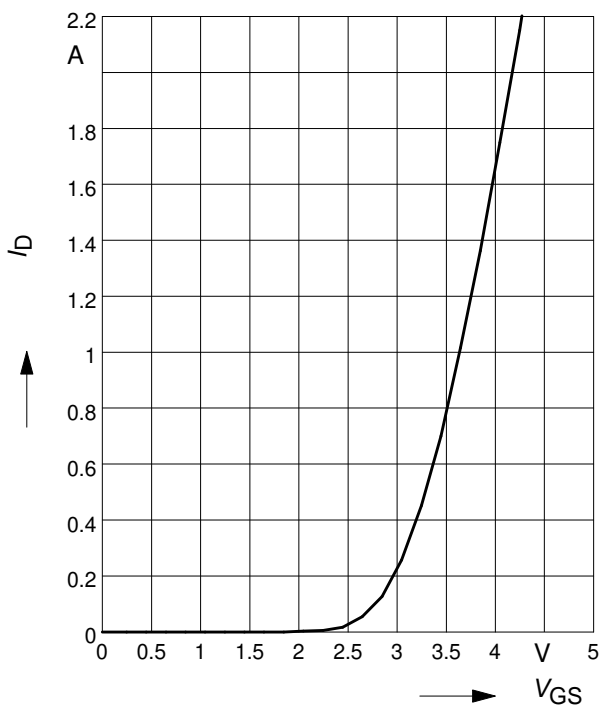
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

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

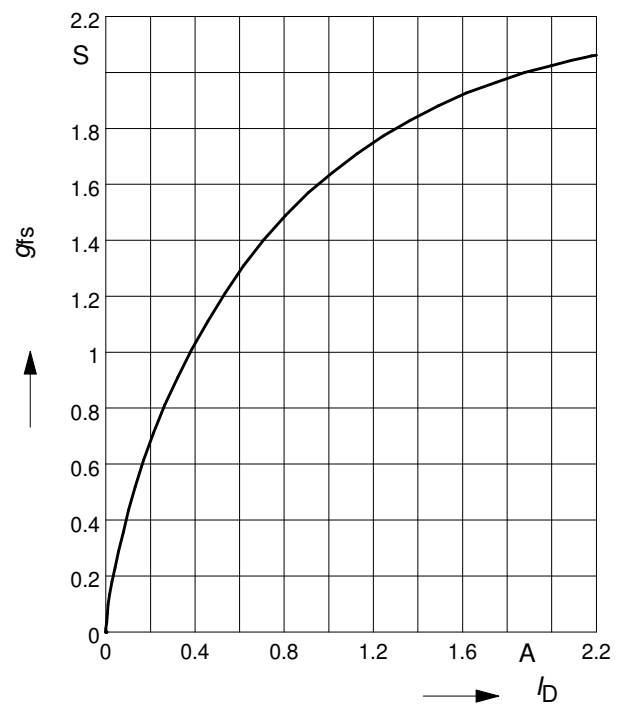
parameter:  $t_p = 80 \mu\text{s}$



**8 Typ. forward transconductance**

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

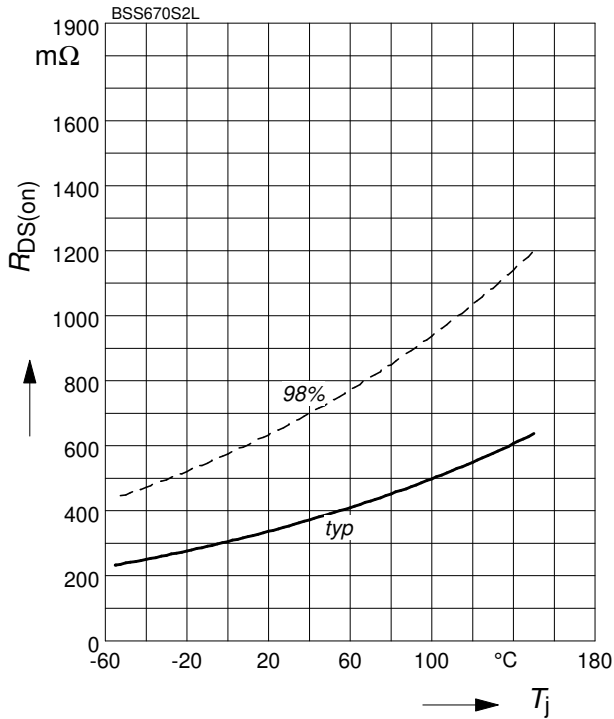
parameter:  $g_{fs}$



**9 Drain-source on-state resistance**

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

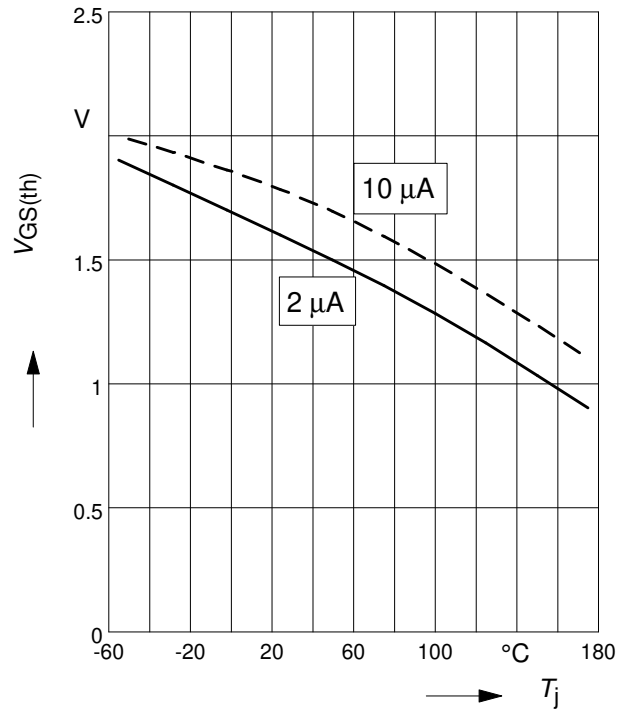
parameter :  $I_D = 270 \text{ mA}$ ,  $V_{GS} = 10 \text{ V}$



**10 Typ. gate threshold voltage**

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

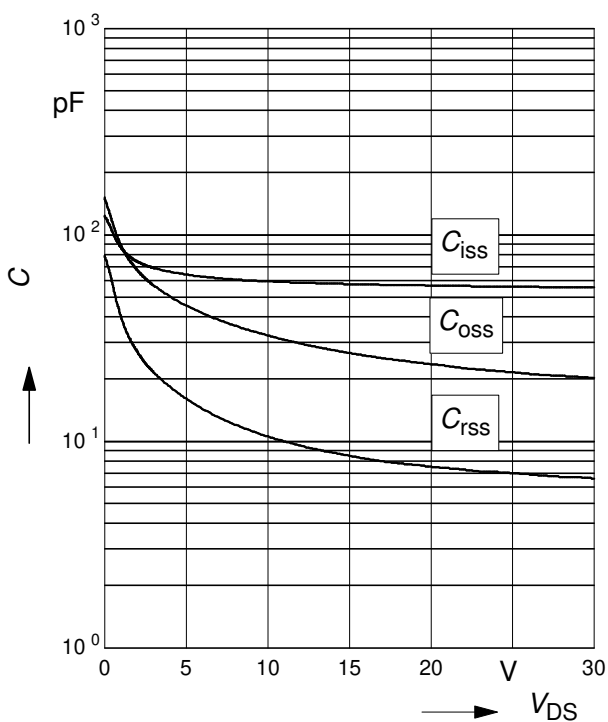
parameter:  $V_{GS} = V_{DS}$



**11 Typ. capacitances**

$C = f(V_{DS})$

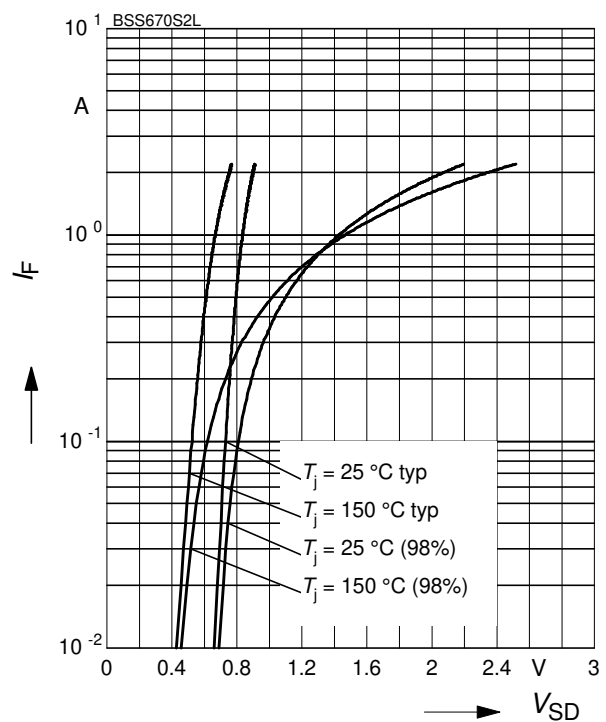
parameter:  $V_{GS}=0$ ,  $f=1 \text{ MHz}$



**12 Forward character. of reverse diode**

$I_F = f(V_{SD})$

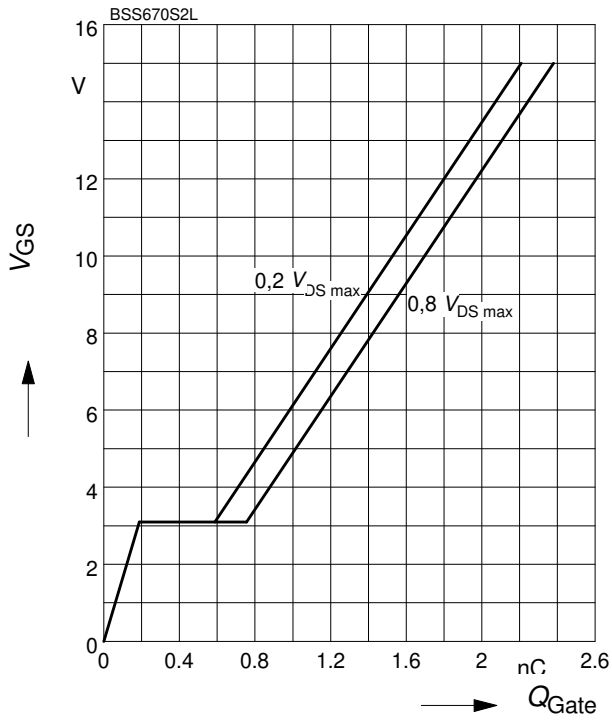
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



**13 Typ. gate charge**

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

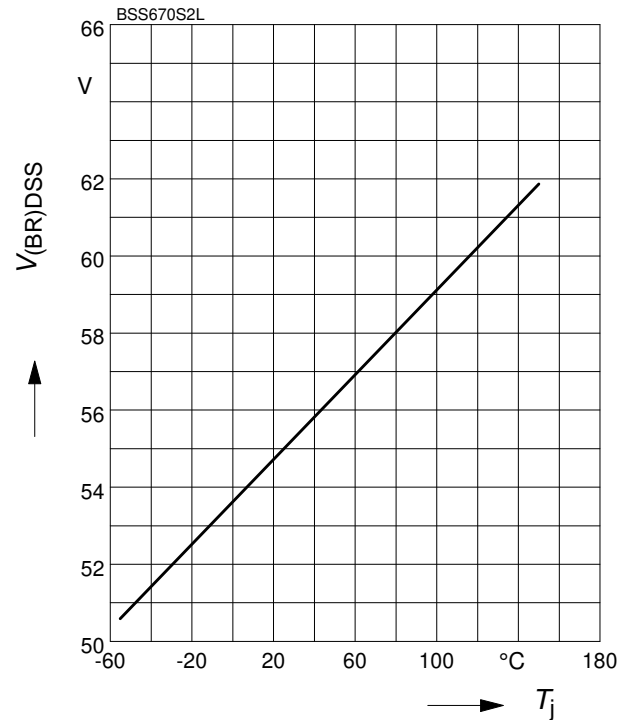
parameter:  $I_D = 0.54$  A pulsed



**14 Drain-source breakdown voltage**

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

parameter:  $I_D = 10$  mA



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81726 Munich, Germany  
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