



BSS138W

**SIPMOS<sup>®</sup> Small-Signal-Transistor**

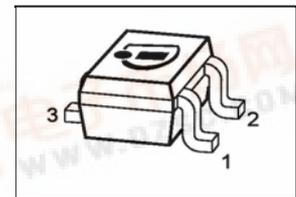
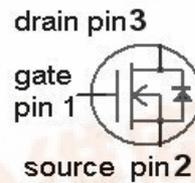
**Features**

- N-channel
- Enhancement mode
- Logic level
- dv/dt rated

**Product Summary**

$V_{DS}$	60	V
$R_{DS(on),max}$	3.5	$\Omega$
$I_D$	0.28	A

SOT-323



Type	Package	Ordering Code	Tape and Reel Information	Marking
BSS138W	SOT-323	Q67042-S4187	E6327: 3000 pcs/reel	SWs
BSS138W	SOT-323	Q67042-S4191	E6433: 10000 pcs/reel	SWs

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$T_A=25\text{ }^\circ\text{C}$	0.28	A
		$T_A=70\text{ }^\circ\text{C}$	0.22	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ }^\circ\text{C}$	1.12	
Reverse diode dv/dt	dv/dt	$I_D=0.28\text{ A}$ , $V_{DS}=48\text{ V}$ , $di/dt=200\text{ A}/\mu\text{s}$ , $T_{j,max}=150\text{ }^\circ\text{C}$	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 20$	V
ESD sensitivity (HBM) as per MIL-STD 883			Class 1	
Power dissipation	$P_{tot}$	$T_A=25\text{ }^\circ\text{C}$	0.50	W
Operating and storage temperature	$T_j, T_{stg}$		-55 ... 150	$^\circ\text{C}$
IEC climatic category; DIN IEC 68-1			55/150/56	



Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Thermal characteristics**

Thermal resistance, junction - minimal footprint	$R_{thJA}$		-	-	250	K/W
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**Electrical characteristics, at  $T_j=25\text{ }^\circ\text{C}$ , unless otherwise specified**
**Static characteristics**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=26\text{ }\mu\text{A}$	0.6	1.0	1.4	
Drain-source leakage current	$I_{D(off)}$	$V_{DS}=60\text{ V},$ $V_{GS}=0\text{ V}, T_j=25\text{ }^\circ\text{C}$	-	-	0.1	$\mu\text{A}$
		$V_{DS}=60\text{ V},$ $V_{GS}=0\text{ V}, T_j=150\text{ }^\circ\text{C}$	-	-	5	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	1	10	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5\text{ V}, I_D=0.03\text{ A}$	-	3	4.0	$\Omega$
		$V_{GS}=4.5\text{ V}, I_D=0.16\text{ A}$	-	3.2	6	
		$V_{GS}=10\text{ V}, I_D=0.2\text{ A}$	-	2.1	3.5	
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max},$ $I_D=0.22\text{ A}$	0.12	0.23	-	S

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics**

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	32	43	pF
Output capacitance	$C_{oss}$		-	7.2	10	
Reverse transfer capacitance	$C_{rss}$		-	2.8	4.2	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V},$ $I_D=0.2\text{ A}, R_G=6\ \Omega$	-	2.2	3.3	ns
Rise time	$t_r$		-	3.0	4.5	
Turn-off delay time	$t_{d(off)}$		-	6.7	10	
Fall time	$t_f$		-	8.2	12	

**Gate Charge Characteristics**

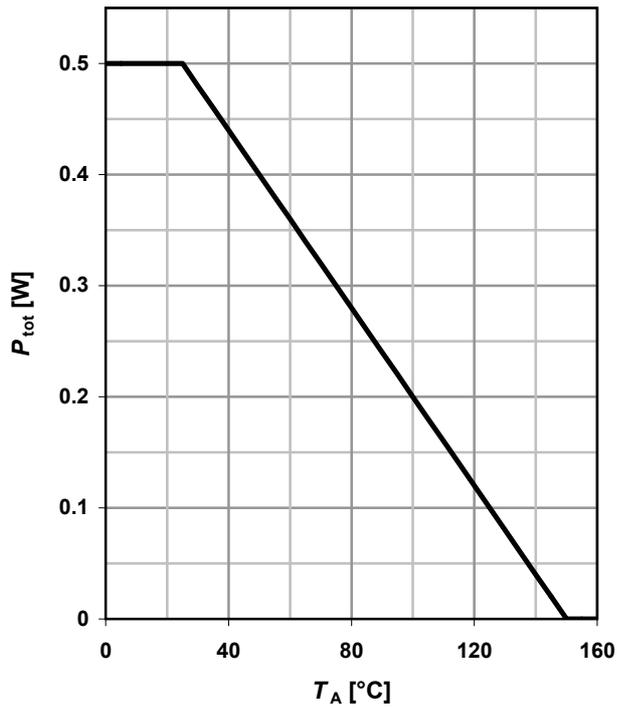
Gate to source charge	$Q_{gs}$	$V_{DD}=48\text{ V}, I_D=0.2\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	0.10	0.13	nC
Gate to drain charge	$Q_{gd}$		-	0.3	0.4	
Gate charge total	$Q_g$		-	1.0	1.5	
Gate plateau voltage	$V_{plateau}$		-	3.2	-	V

**Reverse Diode**

Diode continuous forward current	$I_S$	$T_A=25\text{ }^\circ\text{C}$	-	-	0.28	A
Diode pulse current	$I_{S,pulse}$		-	-	1.12	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=0.28\text{ A},$ $T_J=25\text{ }^\circ\text{C}$	-	0.85	1.2	V
Reverse recovery time	$t_{rr}$	$V_R=30\text{ V}, I_F=0.28\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	8.3	12.4	ns
Reverse recovery charge	$Q_{rr}$		-	3.3	5	nC

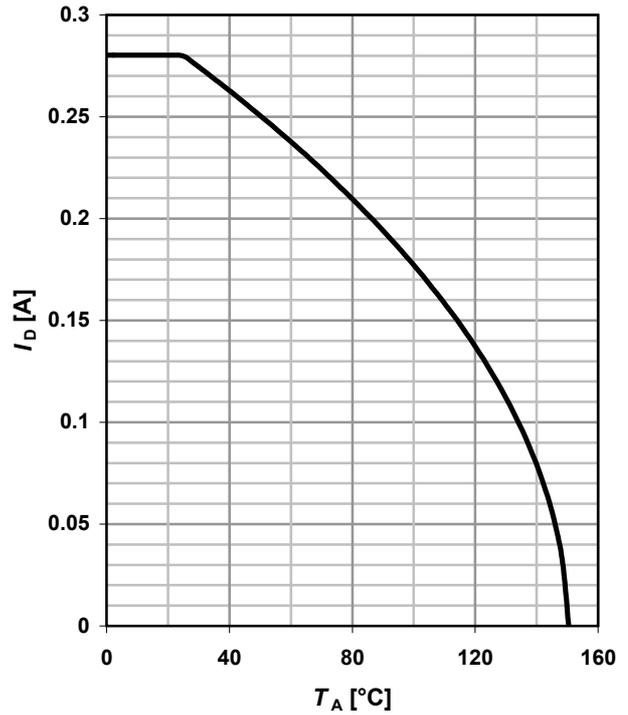
**1 Power dissipation**

$P_{tot}=f(T_A)$



**2 Drain current**

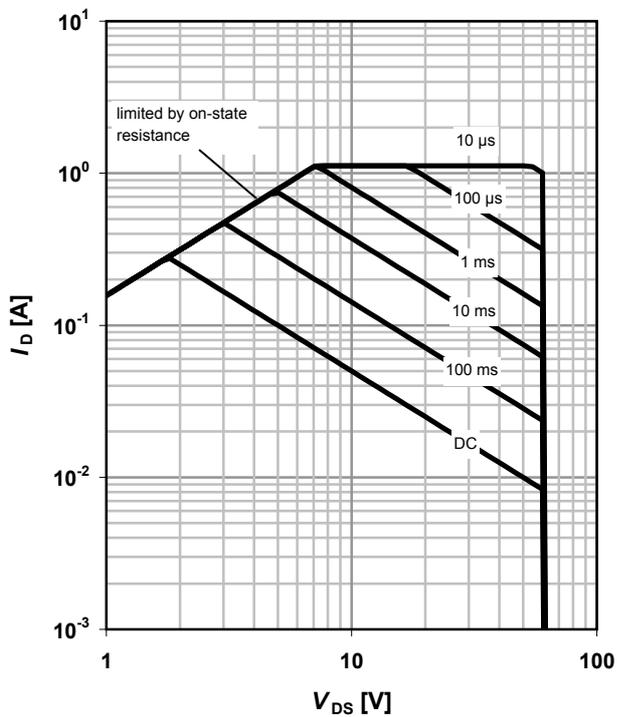
$I_D=f(T_A); V_{GS} \geq 10\text{ V}$



**3 Safe operation area**

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

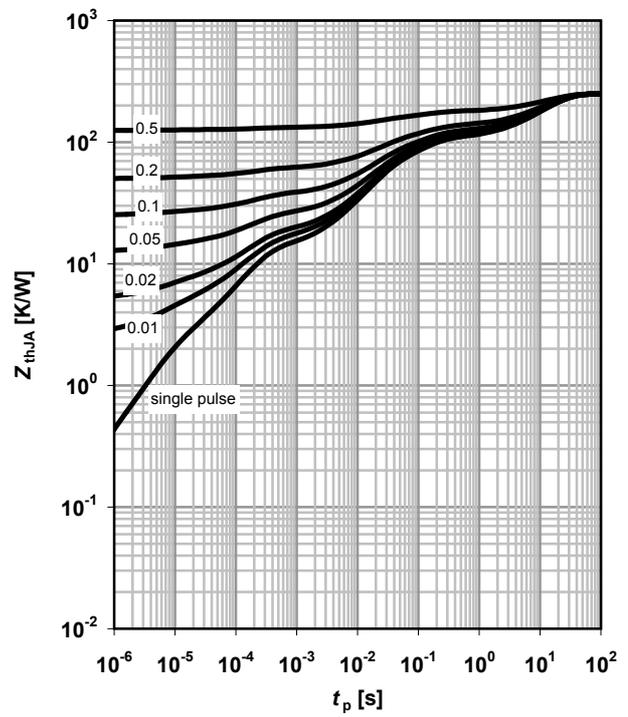
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJA}=f(t_p)$

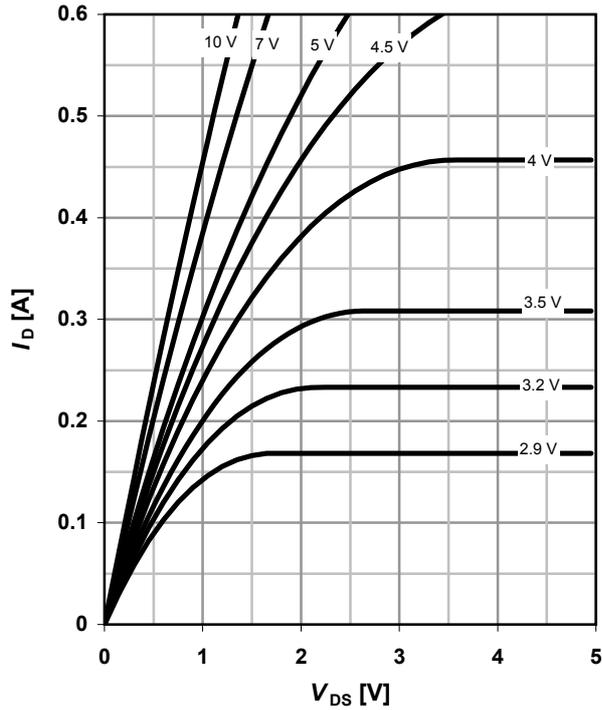
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

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

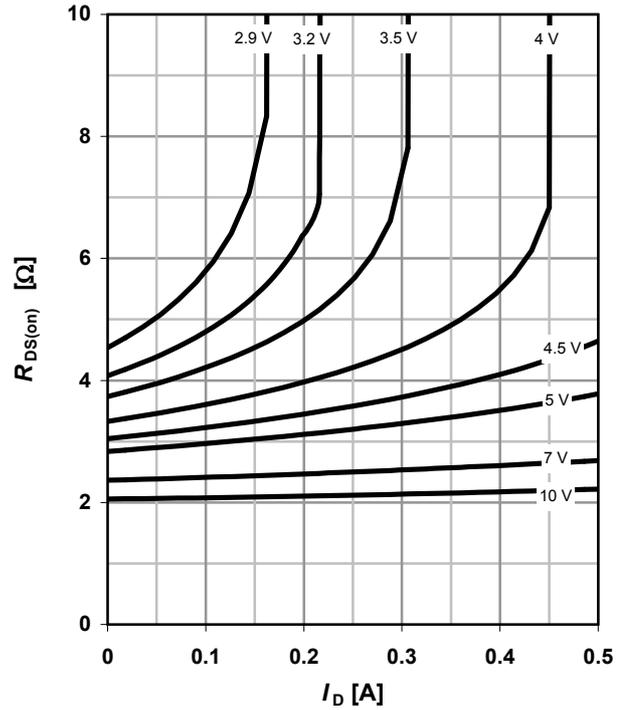
parameter:  $V_{GS}$



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

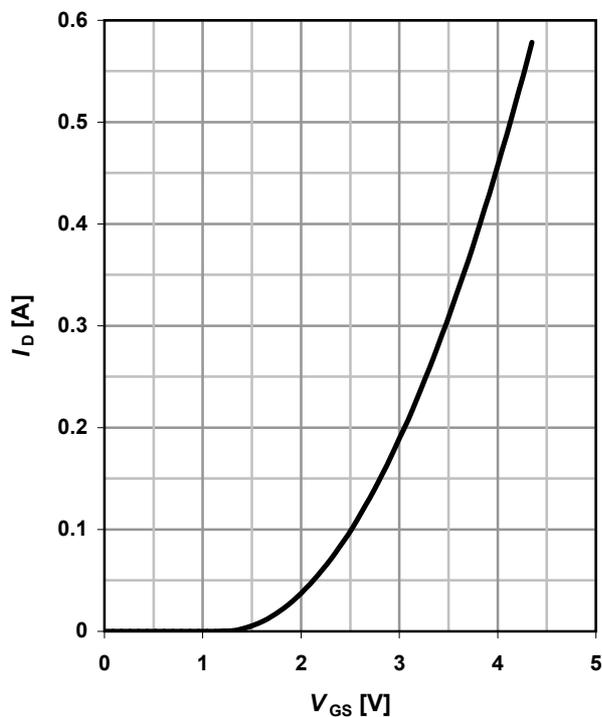
$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$

parameter:  $V_{GS}$



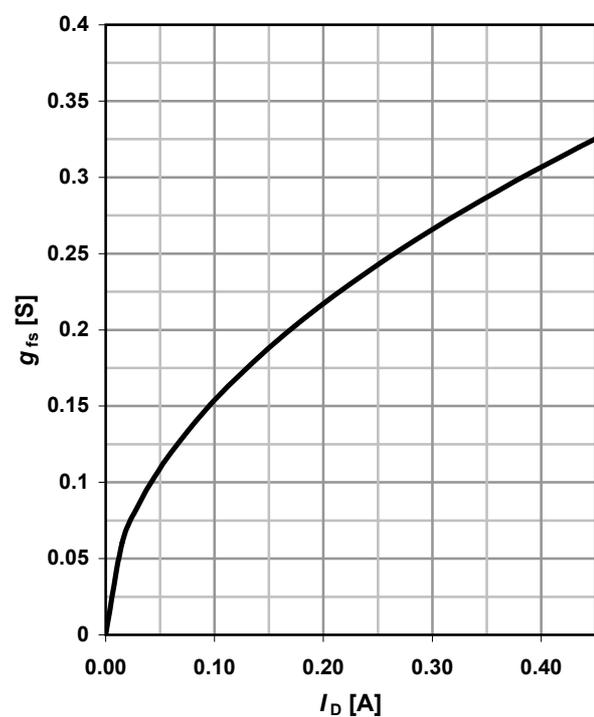
**7 Typ. transfer characteristics**

$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$



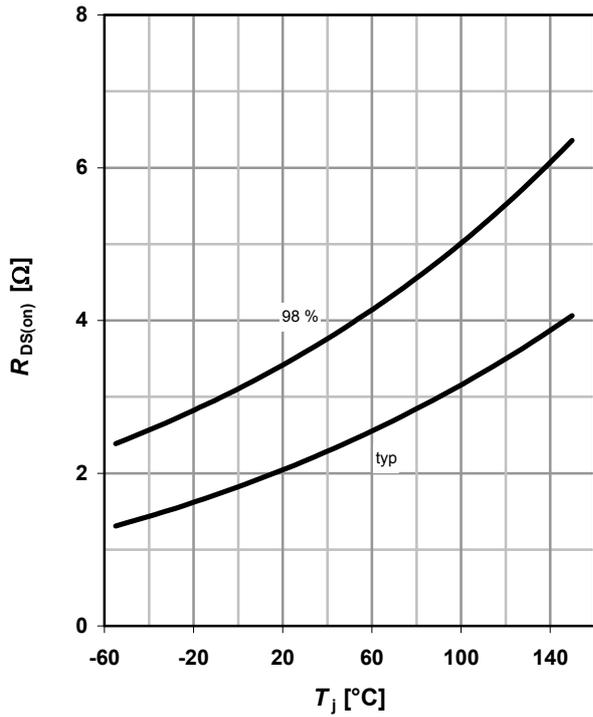
**8 Typ. forward transconductance**

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



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

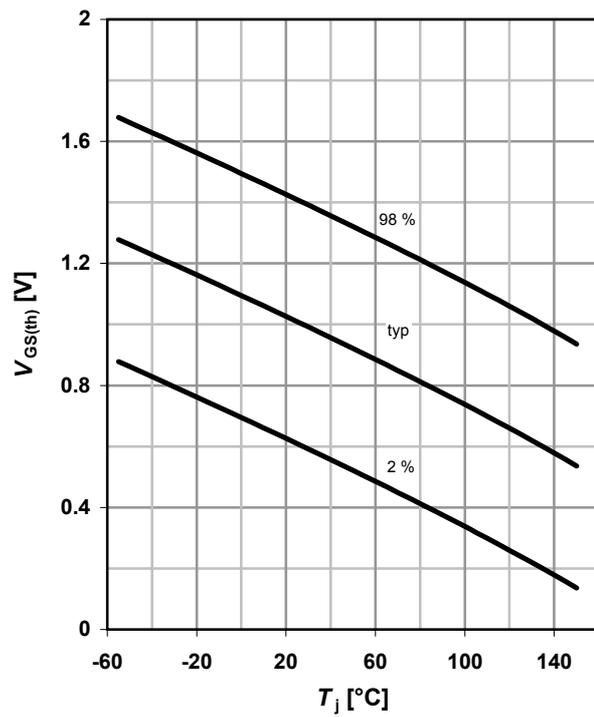
$R_{DS(on)}=f(T_j); I_D=0.2\text{ A}; V_{GS}=10\text{ V}$



**10 Typ. gate threshold voltage**

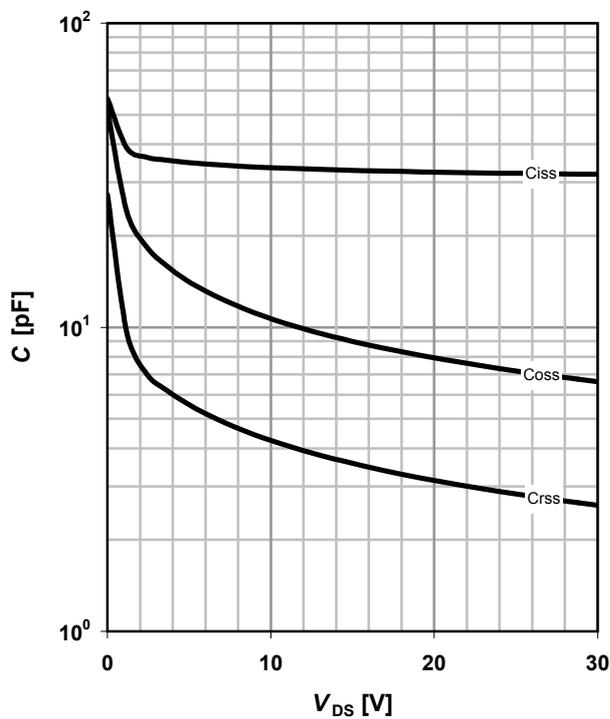
$V_{GS(th)}=f(T_j); V_{DS}=V_{GS}; I_D=26\ \mu\text{A}$

parameter:  $I_D$



**11 Typ. capacitances**

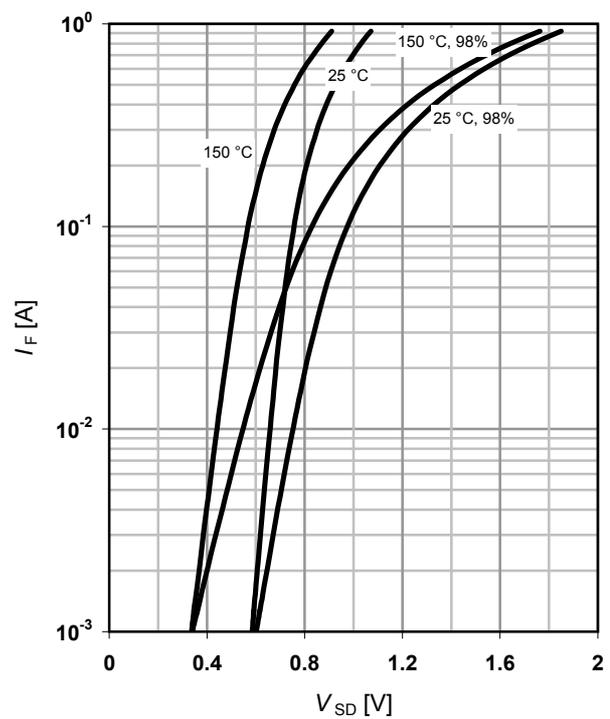
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}; T_j=25^\circ\text{C}$



**12 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

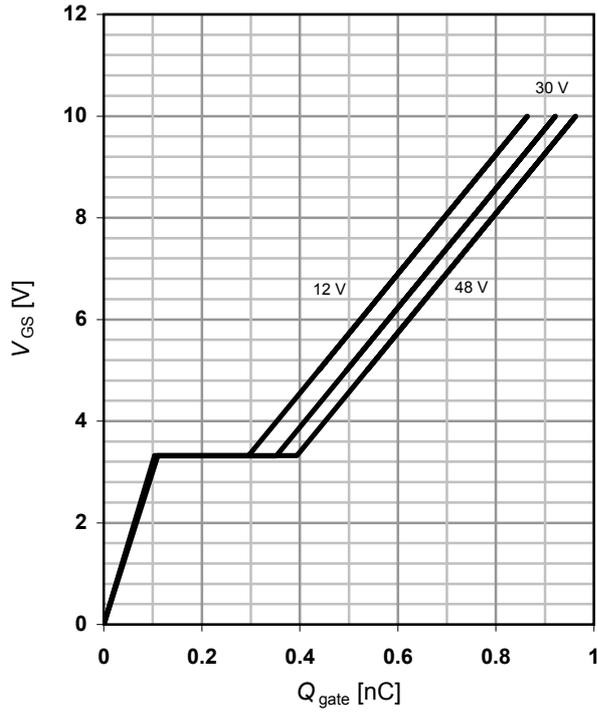
parameter:  $T_j$



**13 Typ. gate charge**

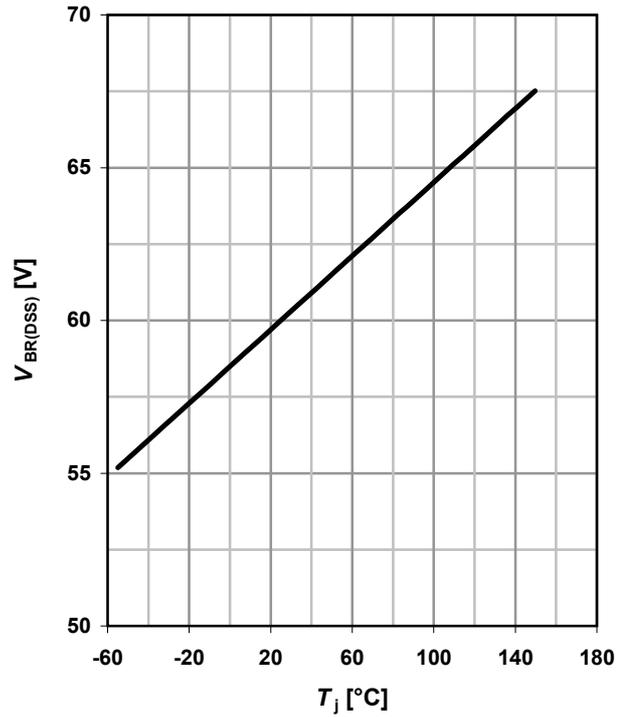
$V_{GS}=f(Q_{gate}); I_D=0.2 \text{ A pulsed}$

parameter:  $V_{DD}$

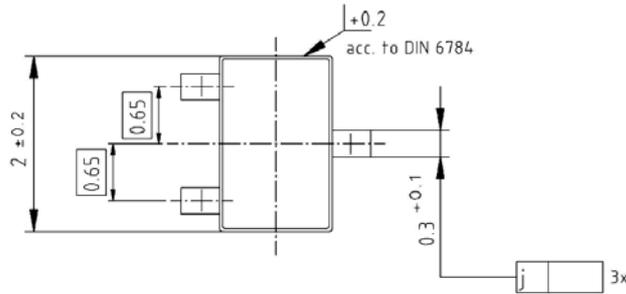
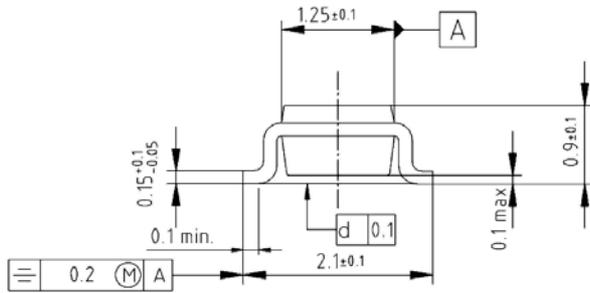


**14 Drain-source breakdown voltage**

$V_{BR(DSS)}=f(T_j); I_D=250 \mu A$

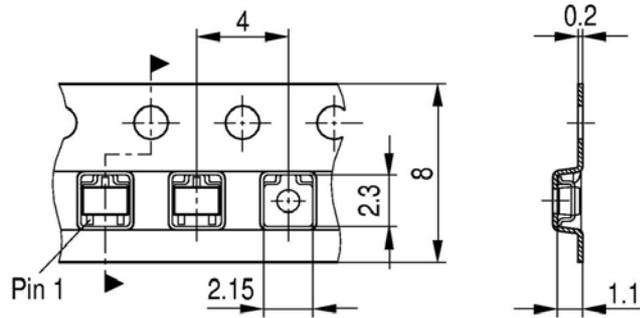
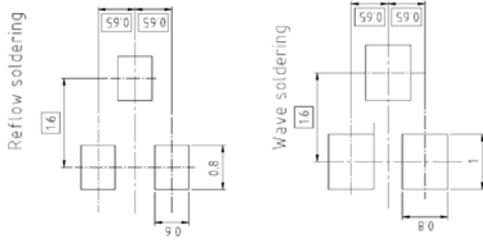


Package Outline:



Footprint:

Packaging:



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