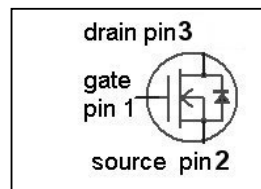
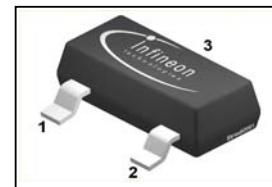


**SIPMOS® Small-Signal-Transistor**
**Features**

- N-channel
- Depletion mode
- $dv/dt$  rated
- Available with  $V_{GS(th)}$  indicator on reel
- Pb-free lead-plating; RoHS compliant

**Product Summary**

$V_{DS}$	60	V
$R_{DS(on),max}$	8	$\Omega$
$I_{DSS,min}$	0.13	A


**SOT-23**


Type	Package	Pb-free	Tape and Reel Information	Marking
BSS159	PG-SOT-23	Yes	L6327: 3000 pcs/reel	SGs
BSS159	PG-SOT-23	Yes	L6906: 3000 pcs/reel sorted in $V_{GS(th)}$ bands <sup>1)</sup>	SGs

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$T_A=25\text{ °C}$	0.23	A
		$T_A=70\text{ °C}$	0.18	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	0.92	
Reverse diode $dv/dt$	$dv/dt$	$I_D=0.23\text{ A}$ , $V_{DS}=60\text{ V}$ , $di/dt=200\text{ A}/\mu\text{s}$ , $T_{j,max}=150\text{ °C}$	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 20$	V
ESD sensitivity (HBM) as per MIL-STD 883			Class 0	
Power dissipation	$P_{tot}$	$T_A=25\text{ °C}$	0.36	W
Operating and storage temperature	$T_j, T_{stg}$		-55 ... 150	°C
IEC climatic category; DIN IEC 68-1			55/150/56	

<sup>1)</sup> see table on next page and diagram 11

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Thermal characteristics**

Thermal characteristics	$R_{thJA}$	minimal footprint	-	-	350	K/W
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**Electrical characteristics**, at  $T_j=25\text{ °C}$ , unless otherwise specified

**Static characteristics**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=-10\text{ V}$ , $I_D=250\text{ }\mu\text{A}$	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=3\text{ V}$ , $I_D=26\text{ }\mu\text{A}$	-3.5	-2.8	-2.4	
Drain-source cutoff current	$I_{D(off)}$	$V_{DS}=60\text{ V}$ , $V_{GS}=-10\text{ V}$ , $T_j=25\text{ °C}$	-	-	0.1	$\mu\text{A}$
		$V_{DS}=60\text{ V}$ , $V_{GS}=-10\text{ V}$ , $T_j=125\text{ °C}$	-	-	10	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20\text{ V}$ , $V_{DS}=0\text{ V}$	-	-	10	nA
On-state drain current	$I_{DSS}$	$V_{GS}=0\text{ V}$ , $V_{DS}=10\text{ V}$	130	-	-	mA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=0\text{ V}$ , $I_D=0.07\text{ A}$	-	3.9	8	$\Omega$
		$V_{GS}=10\text{ V}$ , $I_D=0.16\text{ A}$	-	1.7	3.5	
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}$ , $I_D=0.16\text{ A}$	0.1	0.19	-	S

**Threshold voltage  $V_{GS(th)}$  sorted in bands<sup>2)</sup>**

J	$V_{GS(th)}$	$V_{DS}=3\text{ V}$ , $I_D=26\text{ }\mu\text{A}$	-2.6	-	-2.4	V
K			-2.75	-	-2.55	
L			-2.9	-	-2.7	
M			-3.05	-	-2.85	
N			-3.2	-	-3	

<sup>2)</sup> Each reel contains transistors out of one band whose identifying letter is printed on the reel label. A specific band cannot be ordered separately.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics**

Input capacitance	$C_{iss}$	$V_{GS}=-10\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	33	44	pF
<b>Dynamic characteristics</b>	$C_{oss}$		-	8.3	11	
Reverse transfer capacitance	$C_{rss}$		-	3.9	5.9	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=25\text{ V},$ $V_{GS}=-3\ldots 7\text{ V},$ $I_D=0.16\text{ A}, R_G=6\ \Omega$	-	3.1	4.7	ns
Rise time	$t_r$		-	2.9	4.4	
Turn-off delay time	$t_{d(off)}$		-	9	13	
Fall time	$t_f$		-	9	13	

**Gate Charge Characteristics**

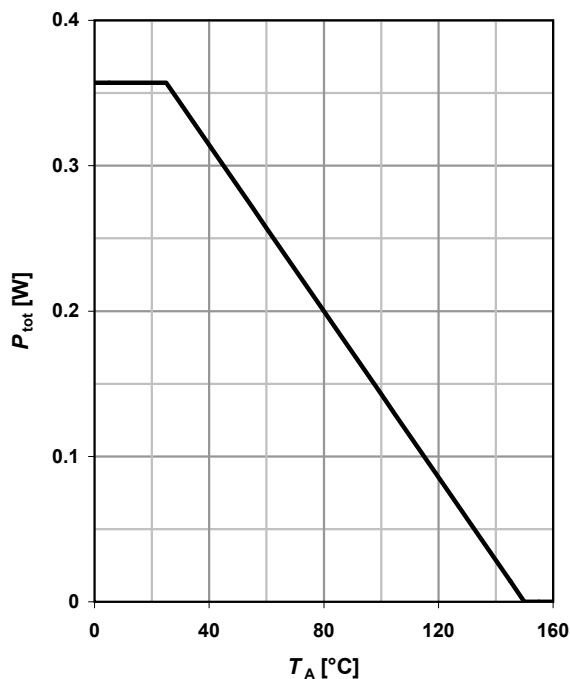
Gate to source charge	$Q_{gs}$	$V_{DD}=40\text{ V}, I_D=0.16\text{ A},$ $V_{GS}=-3\text{ to }5\text{ V}$	-	0.14	0.21	nC
Gate to drain charge	$Q_{gd}$		-	0.7	1.1	
Gate charge total	$Q_g$		-	2.2	2.9	
Gate plateau voltage	$V_{plateau}$		-	-0.14	-	V

**Reverse Diode**

Diode continuous forward current	$I_S$	$T_A=25\text{ °C}$	-	-	0.20	A
Diode pulse current	$I_{S,pulse}$		-	-	0.81	
Diode forward voltage	$V_{SD}$	$V_{GS}=-3\text{ V}, I_F=0.16\text{ A},$ $T_j=25\text{ °C}$	-	0.79	1.2	V
Reverse recovery time	$t_{rr}$	$V_R=30\text{ V}, I_F=0.16\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	10.4	13	ns
Reverse recovery charge	$Q_{rr}$		-	3.3	4.1	

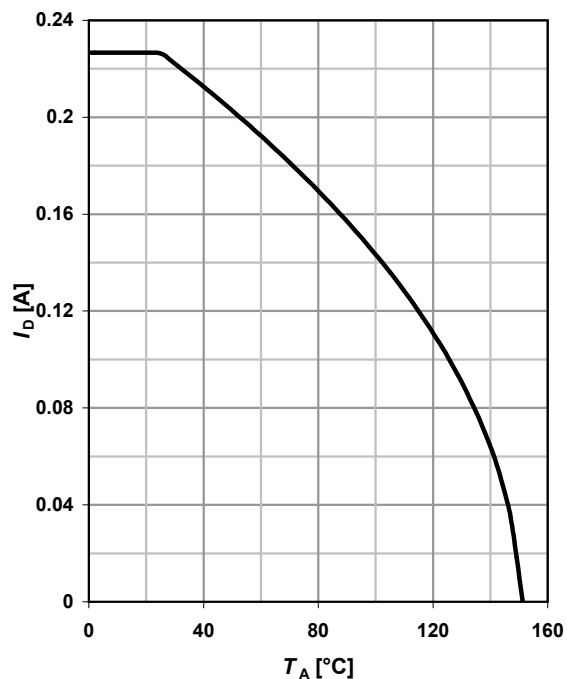
### 1 Power dissipation

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



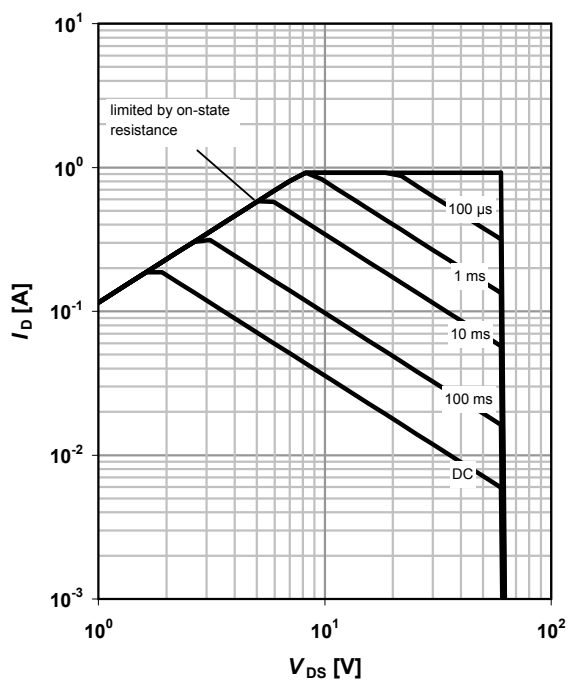
### 2 Drain current

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



### 3 Safe operating area

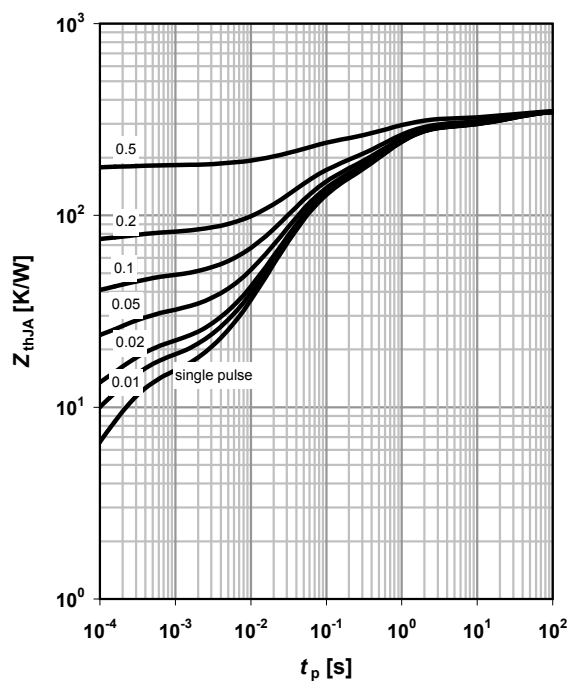
$$I_D = f(V_{\text{DS}}); T_A = 25 \text{ °C}; D = 0$$



### 4 Max. transient thermal impedance

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

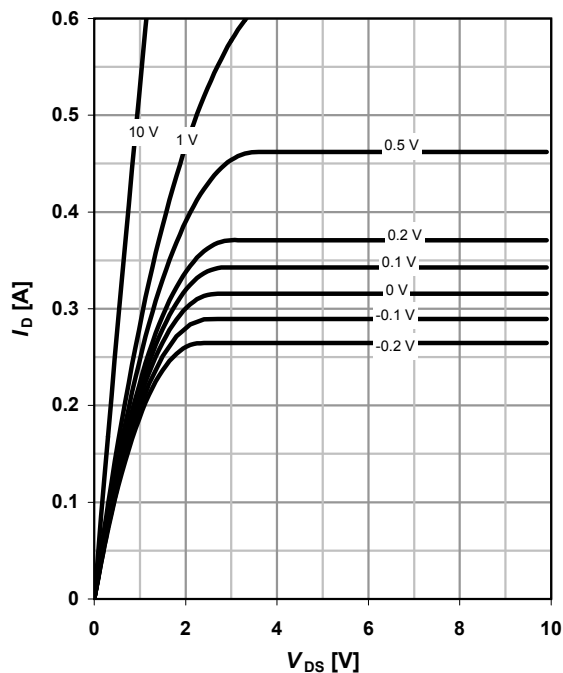
$$\text{parameter: } D = t_p / T$$



### 5 Typ. output characteristics

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

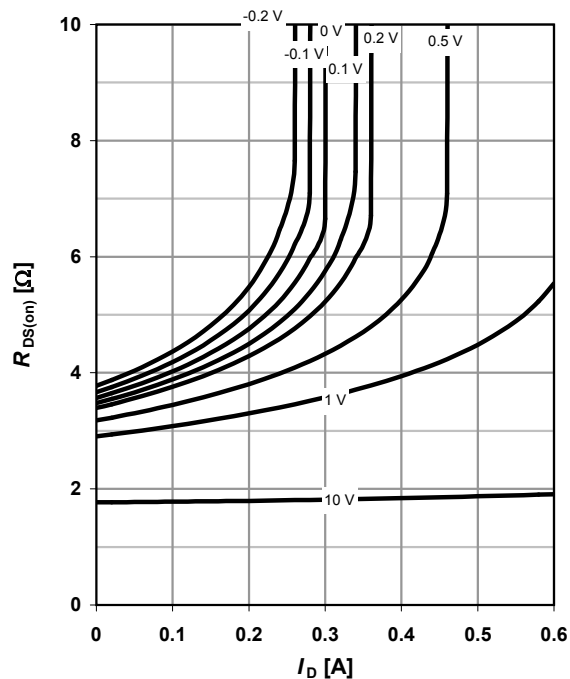
parameter:  $V_{GS}$



### 6 Typ. drain-source on resistance

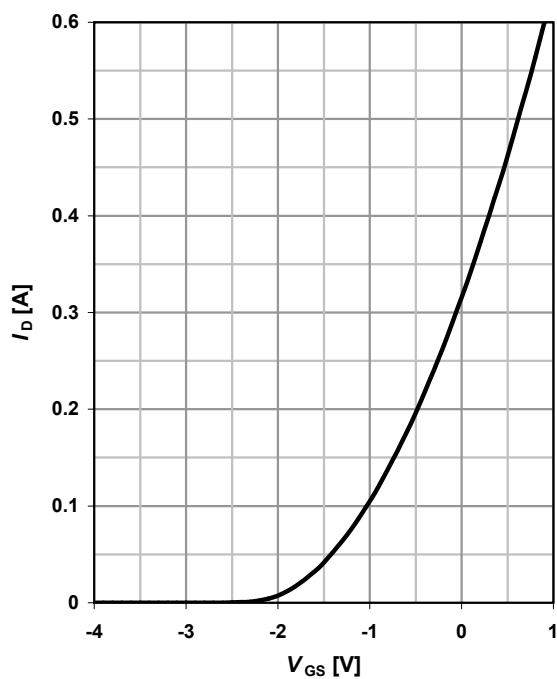
$$R_{DS(on)} = f(I_D); T_J = 25^\circ\text{C}$$

parameter:  $V_{GS}$



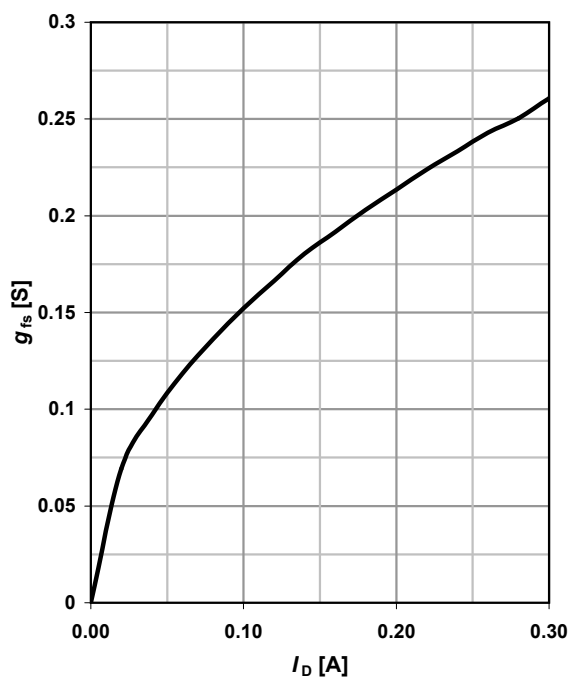
### 7 Typ. transfer characteristics

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



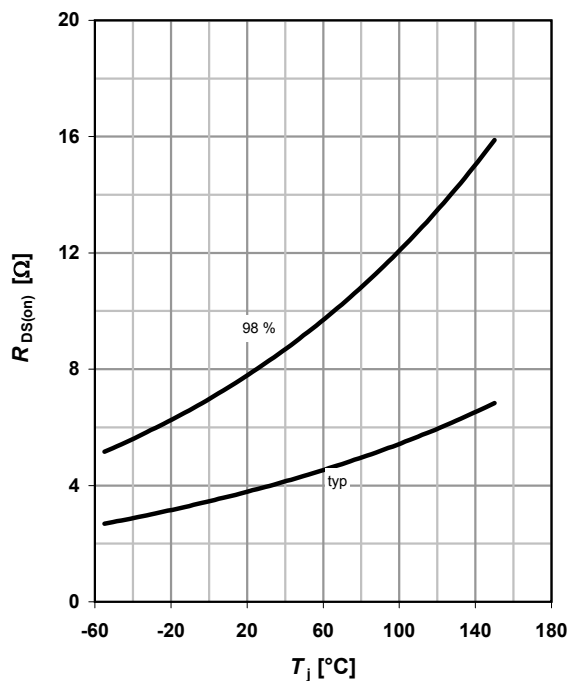
### 8 Typ. forward transconductance

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



### 9 Drain-source on-state resistance

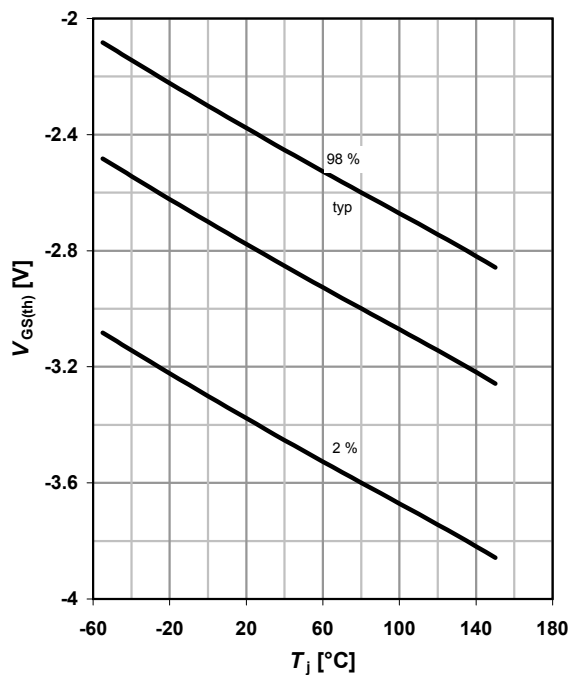
$$R_{DS(on)} = f(T_j); I_D = 0.07 \text{ A}; V_{GS} = 0 \text{ V}$$



### 10 Typ. gate threshold voltage

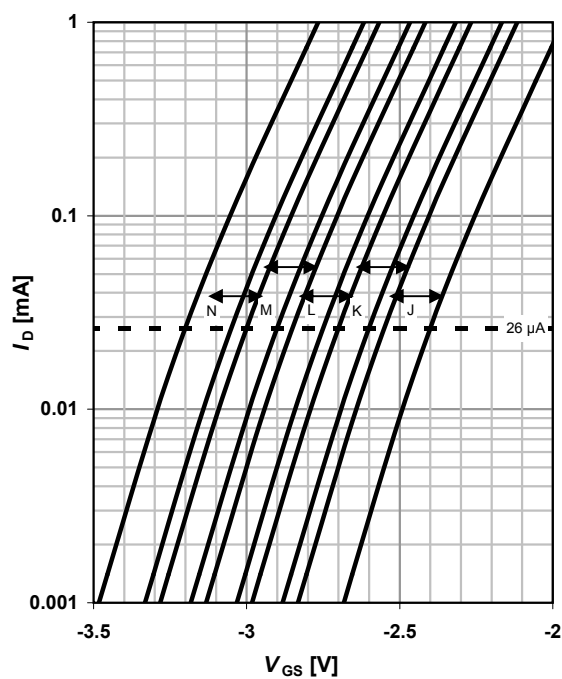
$$V_{GS(th)} = f(T_j); V_{DS} = 3 \text{ V}; I_D = 26 \text{ } \mu\text{A}$$

parameter:  $I_D$



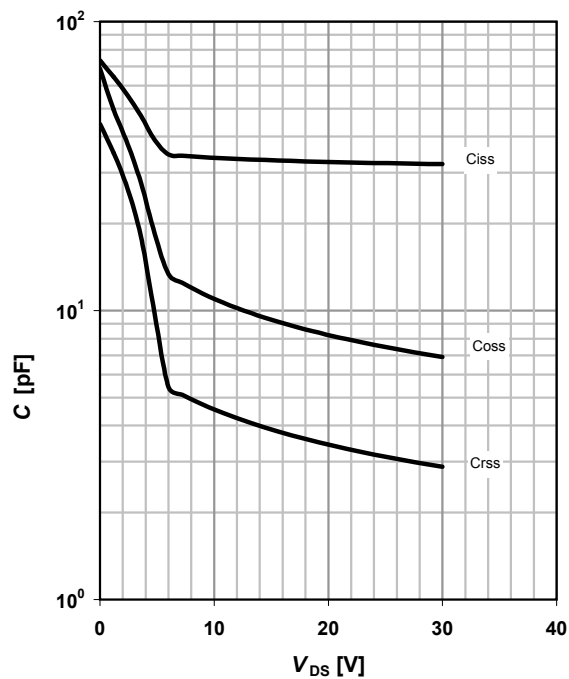
### 11 Threshold voltage bands

$$I_D = f(V_{GS}); V_{DS} = 3 \text{ V}; T_j = 25 \text{ } ^\circ\text{C}$$



### 12 Typ. capacitances

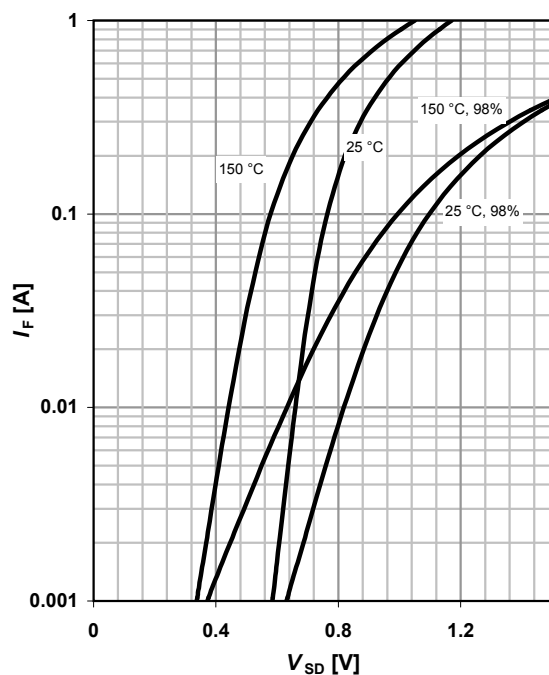
$$C = f(V_{DS}); V_{GS} = -10 \text{ V}; f = 1 \text{ MHz}$$



### 13 Forward characteristics of reverse diode

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

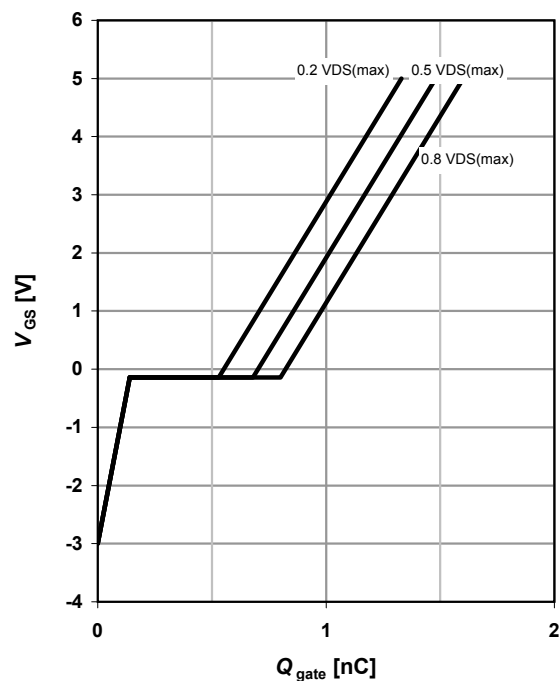
parameter:  $T_j$



### 15 Typ. gate charge

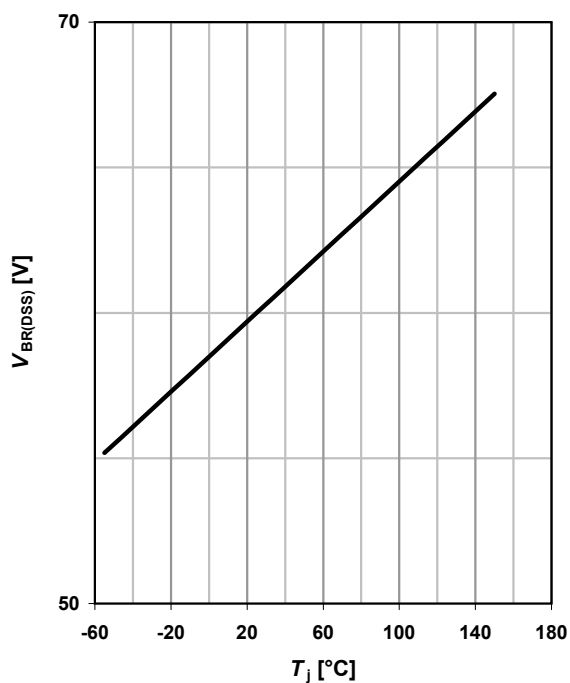
$$V_{GS} = f(Q_{gate}); I_D = 0.16\text{ A pulsed}$$

parameter:  $V_{DD}$

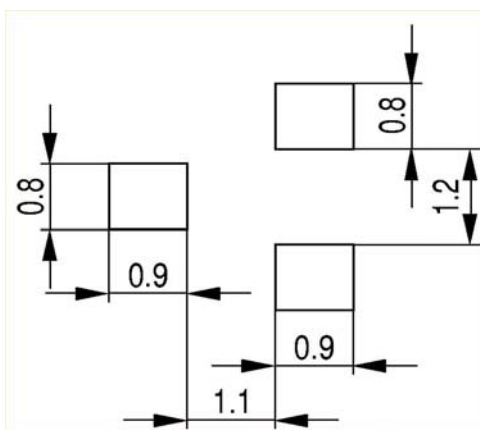


### 16 Drain-source breakdown voltage

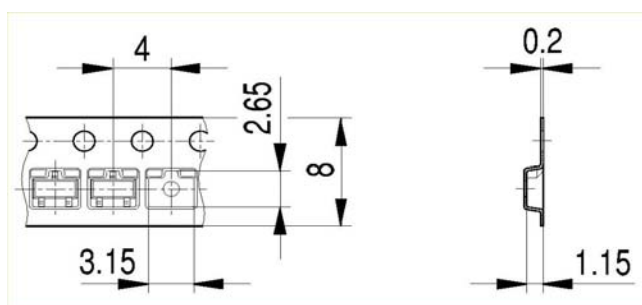
$$V_{BR(DSS)} = f(T_j); I_D = 250\text{ }\mu\text{A}$$



### Package Outline:



**Packaging:**



Dimensions in mm



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