

OptiMOS® 2 Small-Signal-Transistor

Features

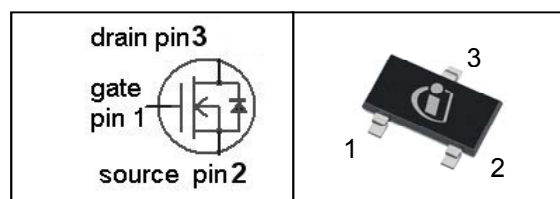
- N-channel
- Enhancement mode
- Super Logic level (2.5V rated)
- Avalanche rated
- Footprint compatible to SOT23
- dv/dt rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101



Product Summary

V_{DS}		20	V
$R_{DS(on),max}$	$V_{GS}=4.5\text{ V}$	21	$m\Omega$
	$V_{GS}=2.5\text{ V}$	33	
I_D		3.8	A

PG-SC-59



Type	Package	Tape and Reel Information	Marking	Lead Free	Packing
BSR202N	PG-SC-59	L6327 = 3000 pcs. / reel	LA's	Yes	Non dry

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_A=25\text{ °C}$	3.8	A
		$T_A=70\text{ °C}$	3.1	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	15.2	
Avalanche energy, single pulse	E_{AS}	$I_D=3.8\text{ A}$, $R_{GS}=25\text{ }\Omega$	30	mJ
Reverse diode dv/dt	dv/dt	$I_D=3.8\text{ A}$, $V_{DS}=16\text{ V}$, $di/dt=200\text{ A}/\mu\text{s}$, $T_{j,max}=150\text{ °C}$	6	kV/ μs
Gate source voltage	V_{GS}		± 12	V
Power dissipation	P_{tot}	$T_A=25\text{ °C}$	0.5	W
Operating and storage temperature	T_j , T_{stg}		-55 ... 150	$^{\circ}\text{C}$
ESD Class		JESD22-A114-HBM	0 (0V to 250V)	
Soldering Temperature			260 $^{\circ}\text{C}$	
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	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$	20	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=30\text{ }\mu\text{A}$	0.7	0.95	1.2	
Drain-source leakage current	I_{DSS}	$V_{DS}=20\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^{\circ}\text{C}$	-	-	1	μA
		$V_{DS}=20\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ }^{\circ}\text{C}$	-	-	100	
Gate-source leakage current	I_{GSS}	$V_{GS}=12\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=2.5\text{ V}, I_D=3\text{ A}$	-	25	33	$\text{m}\Omega$
		$V_{GS}=4.5\text{ V}, I_D=3.8\text{ A}$	-	17	21	
Transconductance	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=3.8\text{ A}$		17	-	S

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=10\text{ V},$ $f=1\text{ MHz}$	-	863	1147	pF
Output capacitance	C_{oss}		-	278	370	
Reverse transfer capacitance	C_{rss}		-	40	60	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=10\text{ V}, V_{GS}=4.5\text{ V},$ $I_D=3.8\text{ A}, R_G=6\ \Omega$	-	8.8	-	ns
Rise time	t_r		-	16.7	-	
Turn-off delay time	$t_{d(off)}$		-	19	-	
Fall time	t_f		-	3.7	-	

Gate Charge Characteristics

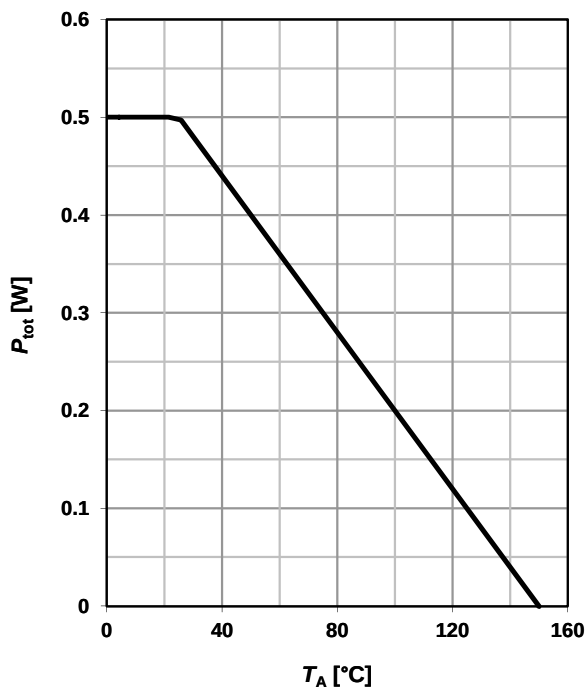
Gate to source charge	Q_{gs}	$V_{DD}=10\text{ V}, I_D=3.8\text{ A},$ $V_{GS}=0\text{ to }4.5\text{ V}$	-	1.66	2.21	nC
Gate to drain charge	Q_{gd}		-	1.1	1.6	
Gate charge total	Q_g		-	5.8	8.8	
Gate plateau voltage	$V_{plateau}$		-	1.9	-	V

Reverse Diode

Diode continuous forward current	I_S	$T_A=25\text{ °C}$	-	-	0.8	A
Diode pulse current	$I_{S,pulse}$		-	-	15.2	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=3.8\text{ A},$ $T_J=25\text{ °C}$	-	0.8	1.1	V
Reverse recovery time	t_{rr}	$V_R=10\text{ V}, I_F=3.8\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	14.3	-	ns
Reverse recovery charge	Q_{rr}		-	7.6	-	nC

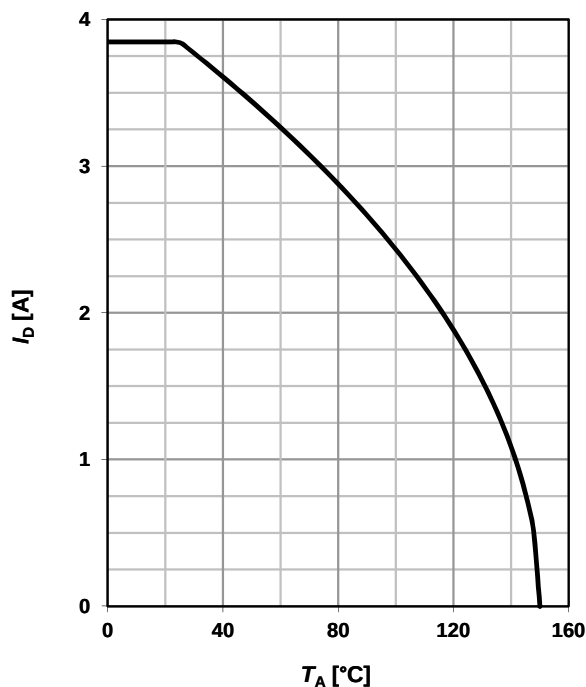
1 Power dissipation

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



2 Drain current

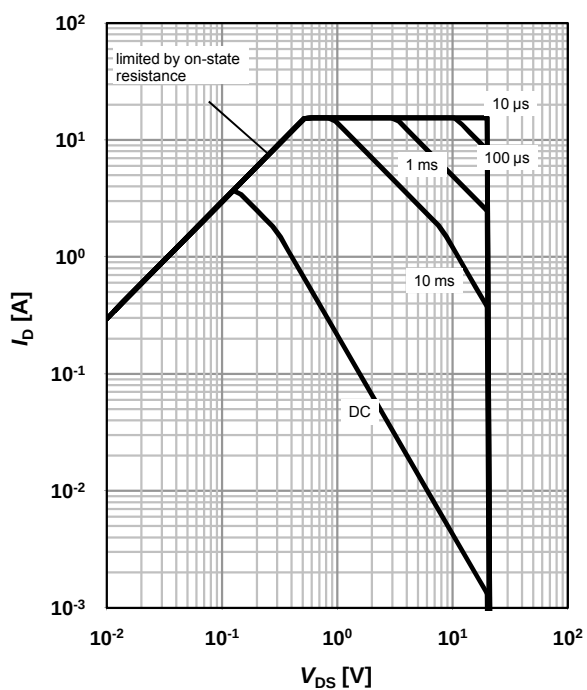
$$I_D = f(T_A); V_{GS} \geq 4.5 \text{ V}$$



3 Safe operating area

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

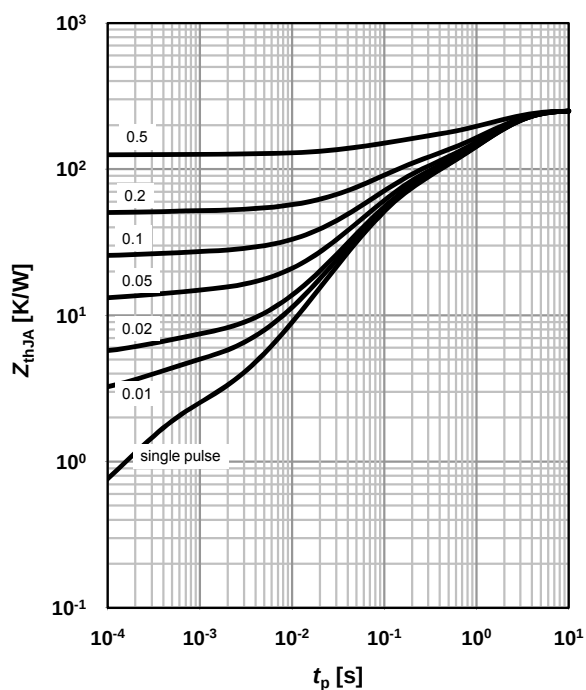
parameter: t_p



4 Max. transient thermal impedance

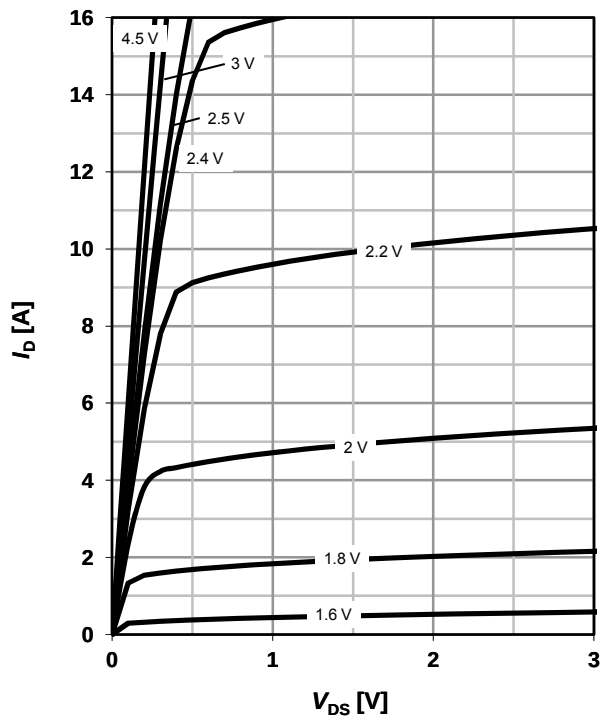
$$Z_{thJA} = f(t_p)$$

parameter: $D = t_p/T$



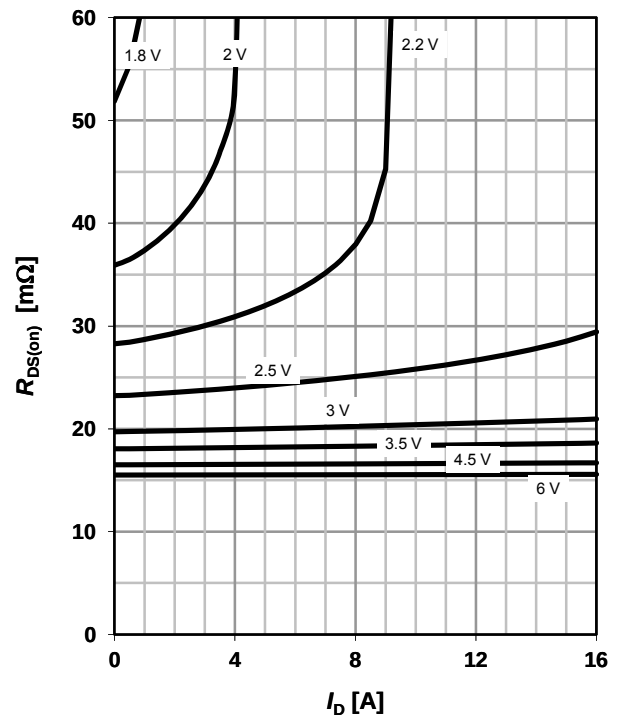
5 Typ. output characteristics

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

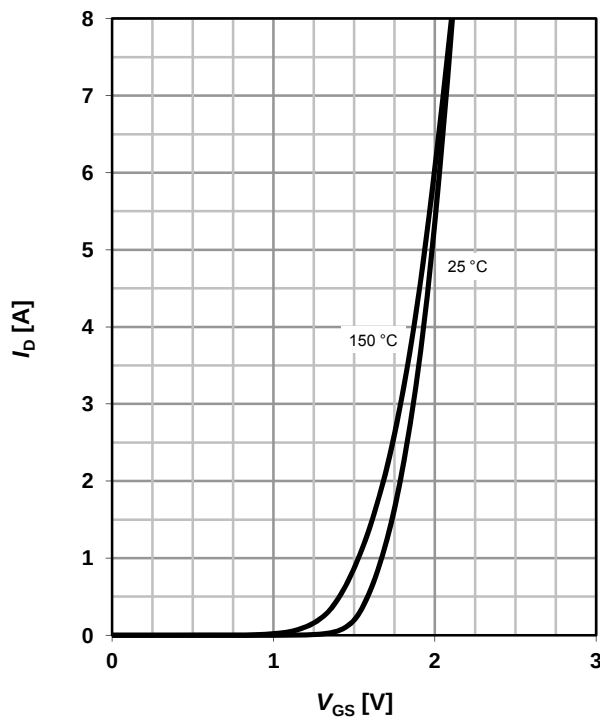
parameter: V_{GS}


6 Typ. drain-source on resistance

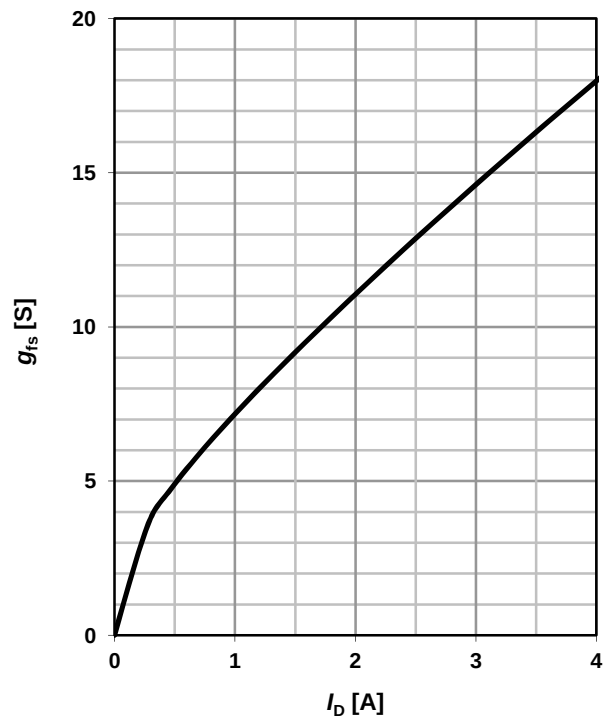
 $R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$

parameter: V_{GS}


7 Typ. transfer characteristics

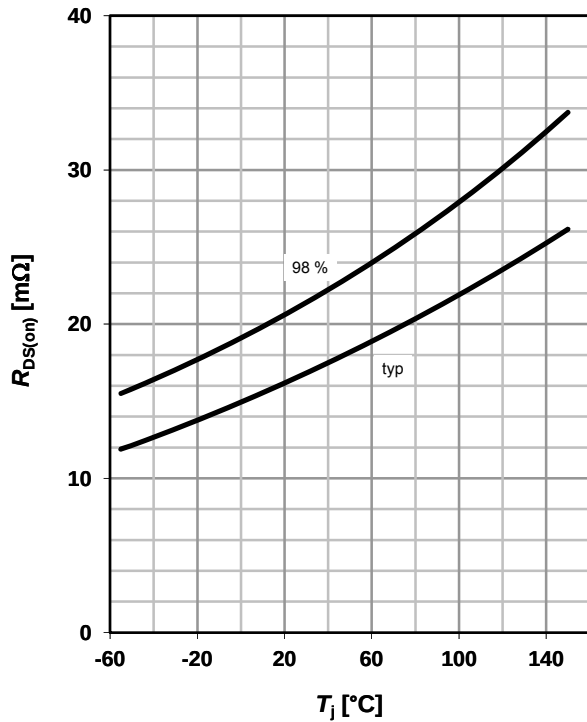
 $I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$


8 Typ. forward transconductance

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


9 Drain-source on-state resistance

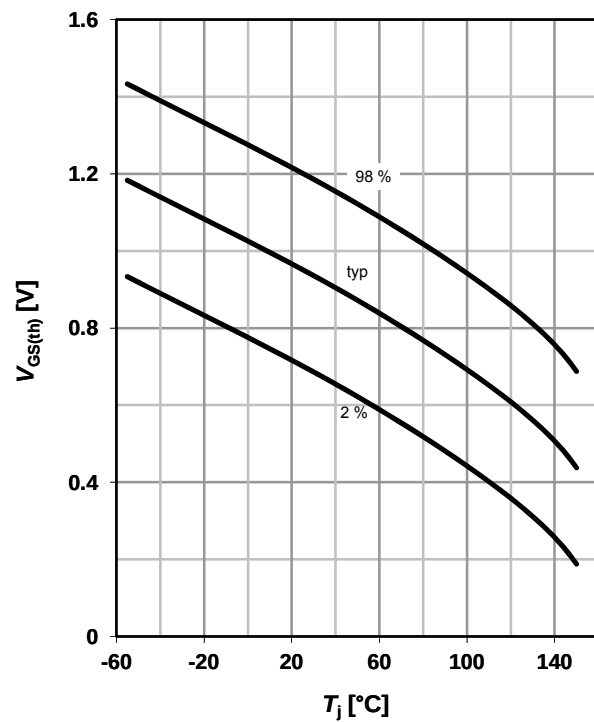
$$R_{DS(on)} = f(T_j); I_D = 3.8 \text{ A}; V_{GS} = 4.5 \text{ V}$$



10 Typ. gate threshold voltage

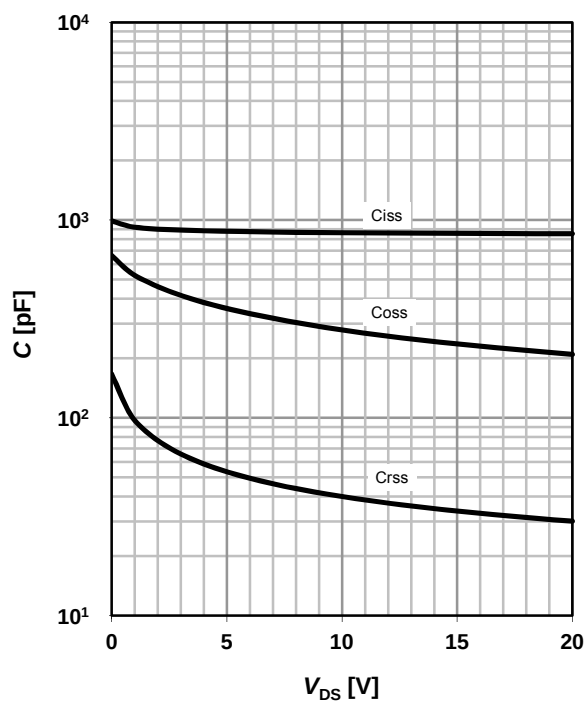
$$V_{GS(th)} = f(T_j); V_{DS} = V_{GS}; I_D = 30 \text{ μA}$$

parameter: I_D



11 Typ. capacitances

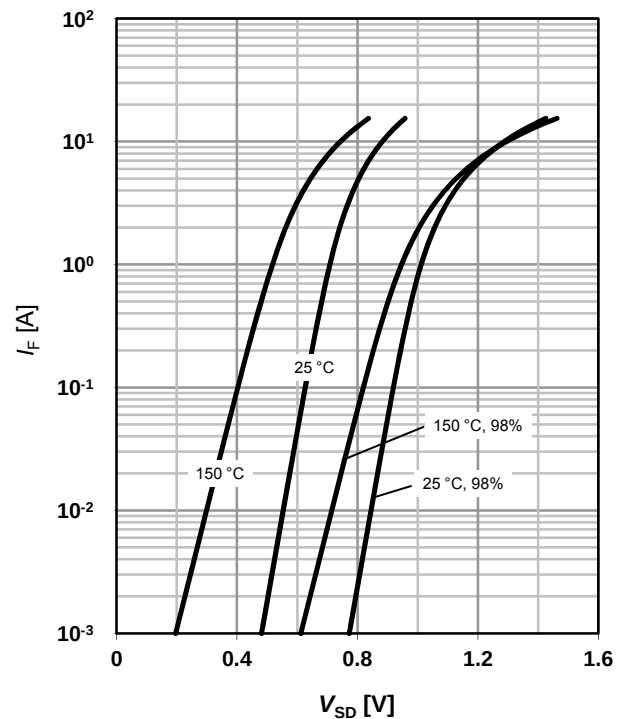
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25^\circ\text{C}$$



12 Forward characteristics of reverse diode

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

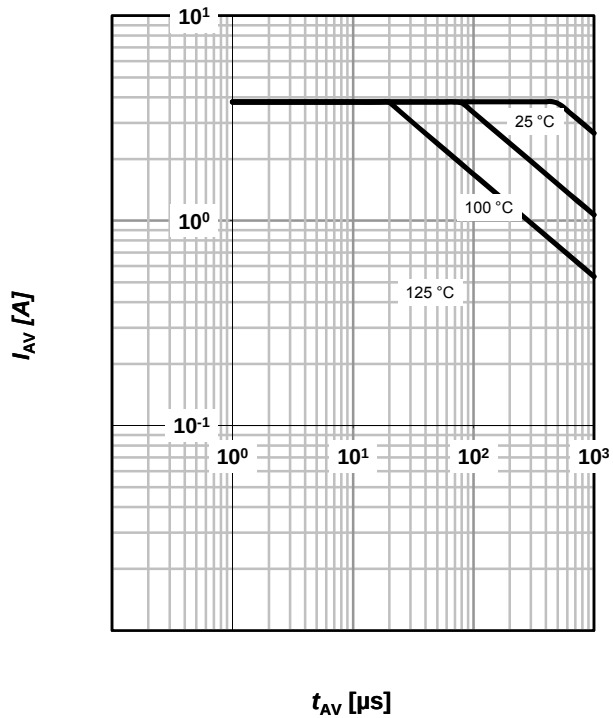
parameter: T_j



13 Avalanche characteristics

$$I_{AS}=f(t_{AV}); R_{GS}=25\ \Omega$$

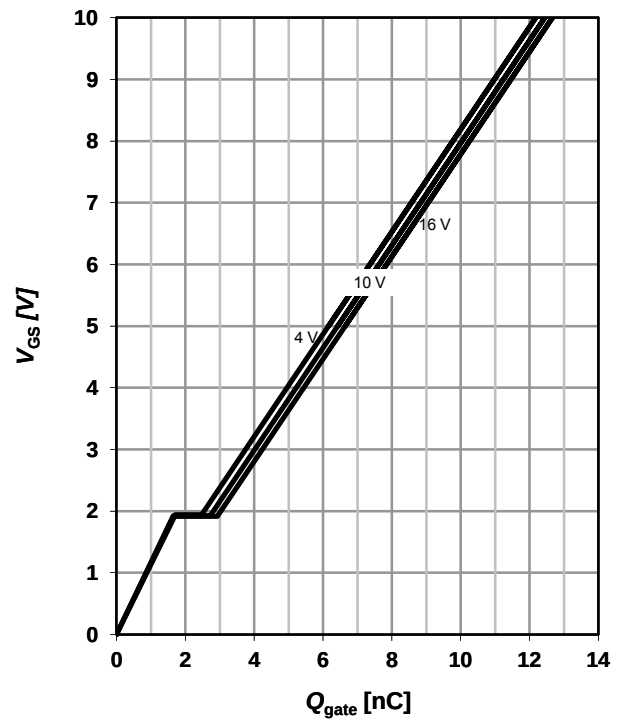
parameter: $T_{j(\text{start})}$



14 Typ. gate charge

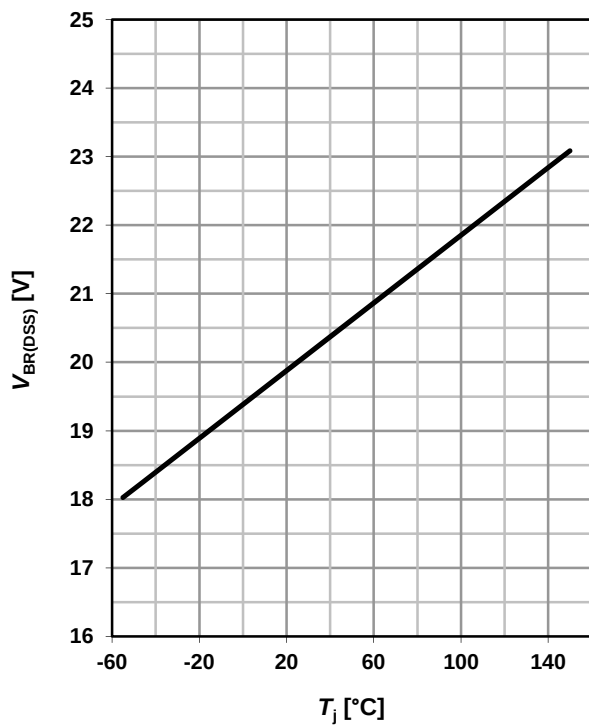
$$V_{GS}=f(Q_{\text{gate}}); I_D=3.8\ \text{A pulsed}$$

parameter: V_{DD}

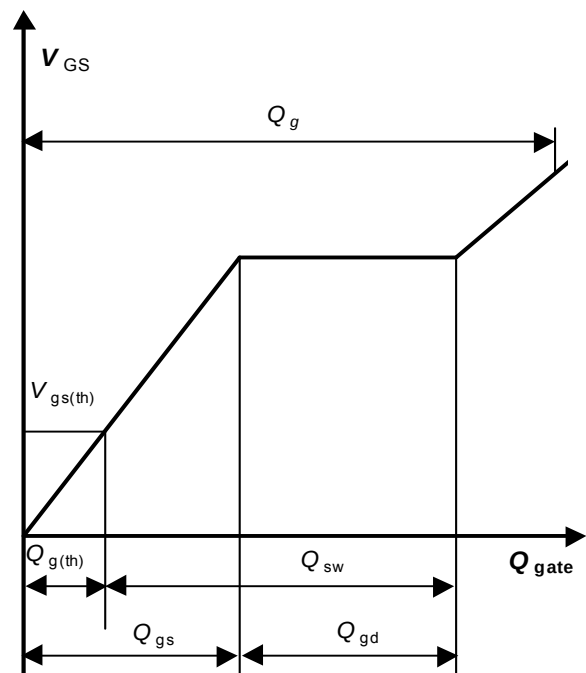


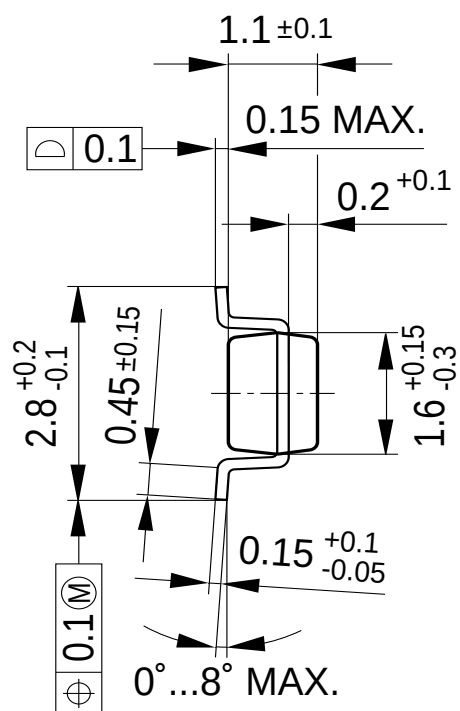
15 Drain-source breakdown voltage

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



16 Gate charge waveforms



PG-SC59

GPS09473

Technical drawing of a stepped shaft with the following dimensions:

- Top diameter: 0.8
- Top step height: 0.9
- Intermediate section height: 1.3
- Bottom step height: 0.9
- Bottom diameter: 1.2

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