

SIPMOS® Small-Signal-Transistor

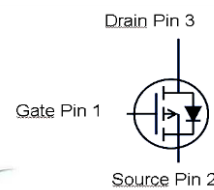
Features

- P-Channel
- Enhancement mode
- Logic level
- Footprint and pinning compatible with SOT-23 / SuperSOT-23 packages
- Avalanche rated
- Pb-free lead finishing; RoHS compliant
- Qualified according to AEC Q101
- Halogen free according to IEC61249-2-21

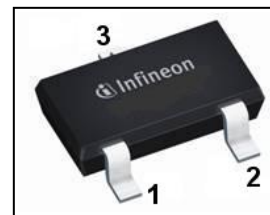


Product Summary

V_{DS}	-60	V
$R_{DS(on),max}$	0.8	Ω
I_D	-0.62	A



SC-59



Type	Package	Tape and reel information	Marking	Halogen-free	Packing
BSR315P	PG-SC59	H6327 = 3000 pcs. / reel	LB	Yes	Non dry

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

Parameter	Symbol	Conditions	Value	Unit
			steady state	
Continuous drain current	I_D	$T_A=25\text{ °C}$	-0.62	A
		$T_A=70\text{ °C}$	-0.49	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	-2.48	
Avalanche energy, single pulse	E_{AS}	$I_D=0.62\text{ A}$, $R_{GS}=25\text{ }\Omega$	24	mJ
Gate source voltage	V_{GS}		± 20	V
Power dissipation	P_{tot}	$T_A=25\text{ °C}$	0.5	W
Operating and storage temperature	T_J , T_{stg}		-55 ... 150	°C
ESD class		JESD22-C101	1A (250V to 500V)	
Soldering temperature			260 °C	
IEC climatic category; DIN IEC 68-1			55/150/56	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

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

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$, $I_D=-250\text{ }\mu\text{A}$	-60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=-160\text{ }\mu\text{A}$	-1	-1.5	-2	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=-60\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$	-	-0.1	-1	μA
		$V_{DS}=-60\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=150\text{ °C}$	-	-10	-100	
Gate-source leakage current	I_{GSS}	$V_{GS}=-20\text{ V}$, $V_{DS}=0\text{ V}$	-	-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-4.5\text{ V}$, $I_D=-0.49\text{ A}$	-	870	1300	m Ω
		$V_{GS}=-10\text{ V}$, $I_D=-0.62\text{ A}$	-	620	800	
Transconductance	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}$, $I_D=-0.49\text{ A}$	0.5	0.9	-	S

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics²⁾

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=-25\text{ V},$ $f=1\text{ MHz}$	-	132	176	pF
Output capacitance	C_{oss}		-	42	56	
Reverse transfer capacitance	C_{rss}		-	20	30	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-30\text{ V},$ $V_{GS}=-10\text{ V},$ $I_D=-0.62\text{ A}, R_{G,ext}=6\text{ }\Omega$	-	8	13	ns
Rise time	t_r		-	28	46	
Turn-off delay time	$t_{d(off)}$		-	21	32	
Fall time	t_f		-	20	30	

Gate Charge Characteristics^{1),2)}

Gate to source charge	Q_{gs}	$V_{DD}=-48\text{ V},$ $I_D=-0.62\text{ A}, V_{GS}=0\text{ to }-10\text{ V}$	-	0.4	0.5	nC
Gate to drain charge	Q_{gd}		-	2	3	
Gate charge total	Q_g		-	4	6	
Gate plateau voltage	$V_{plateau}$		-	-3	-	V

Reverse Diode

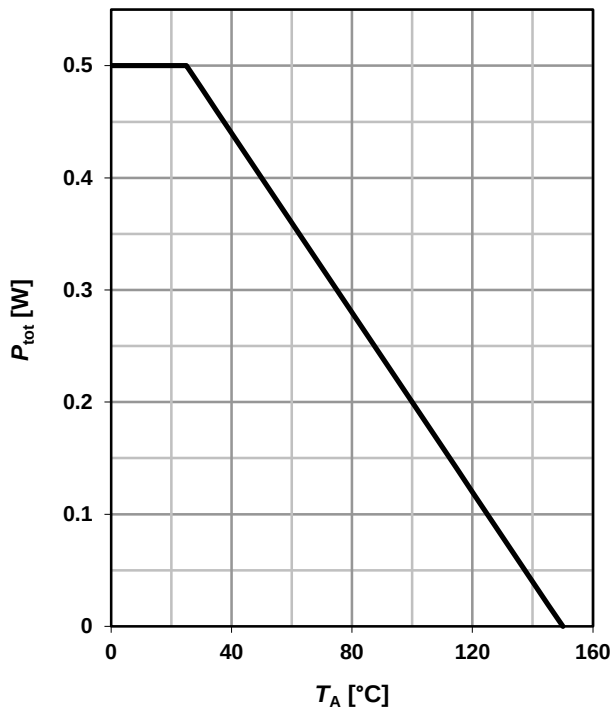
Diode continuous forward current	I_S	$T_A=25\text{ }^\circ\text{C}$	-	-	-0.56	A
Diode pulse current	$I_{S,pulse}$		-	-	-2.5	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=-0.62\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	-0.82	-1.2	V
Reverse recovery time ²⁾	t_{rr}	$V_R=-30\text{ V}, I_F= I_S ,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	32	48	ns
Reverse recovery charge ²⁾	Q_{rr}		-	29	43	nC

²⁾ Defined by design. Not subjected to production test

¹⁾ See figure 16 for gate charge parameter definition

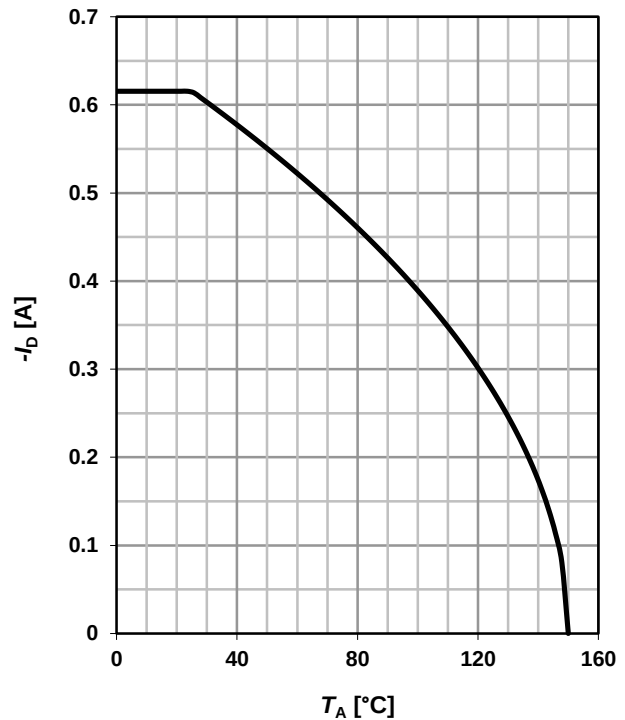
1 Power dissipation

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



2 Drain current

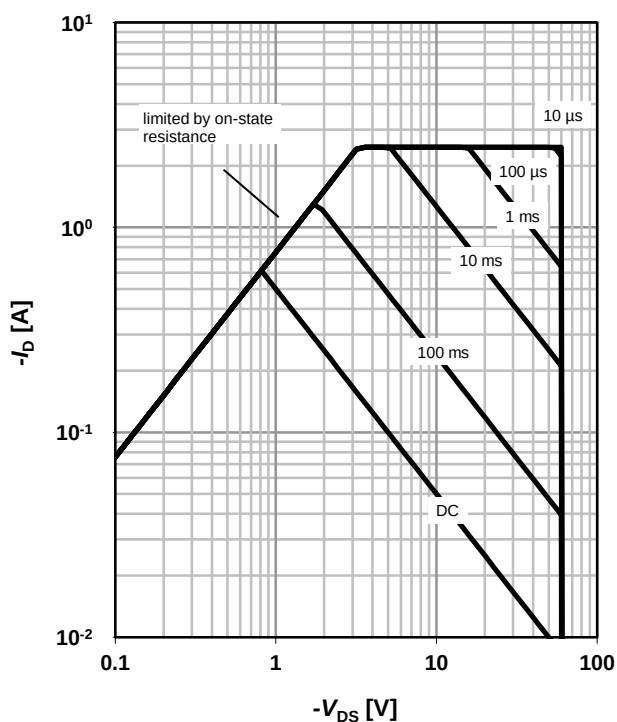
$$I_D = f(T_A); |V_{GS}| \geq 10 \text{ V}$$



3 Safe operating area

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

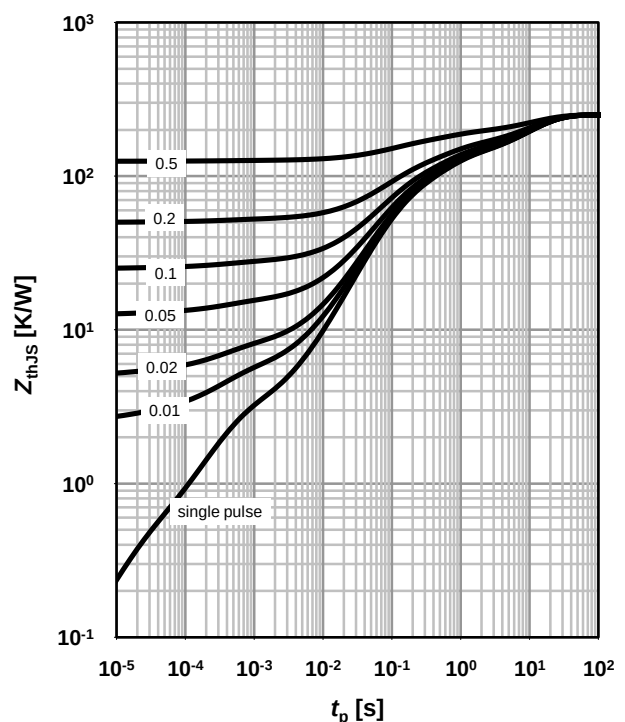
parameter: t_p



4 Max. transient thermal impedance

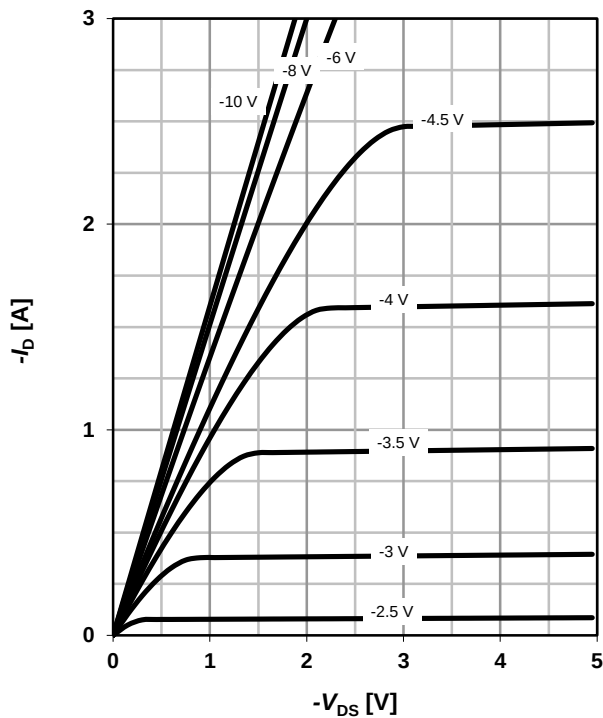
$$Z_{thJA} = f(t_p)$$

parameter: $D = t_p/T$



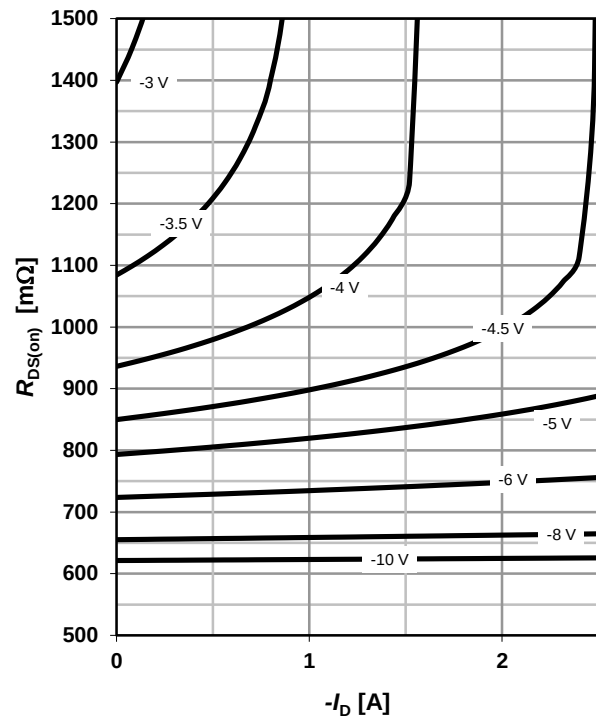
5 Typ. output characteristics

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

parameter: V_{GS}


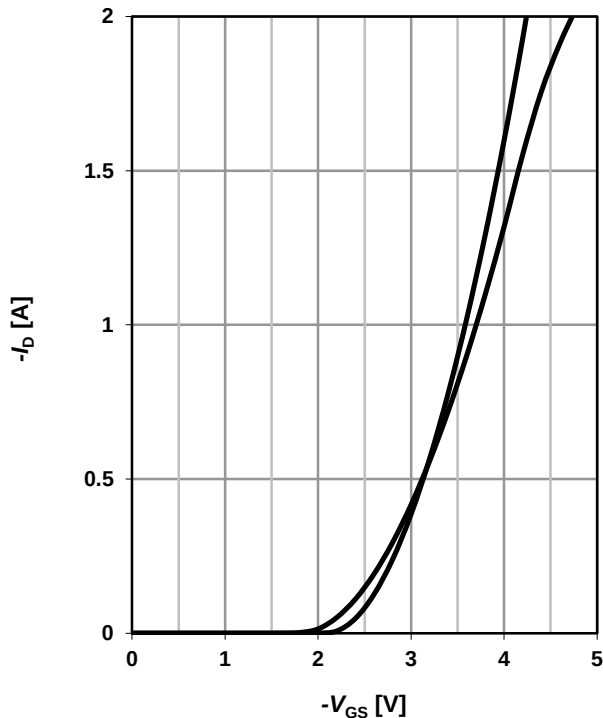
6 Typ. drain-source on resistance

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

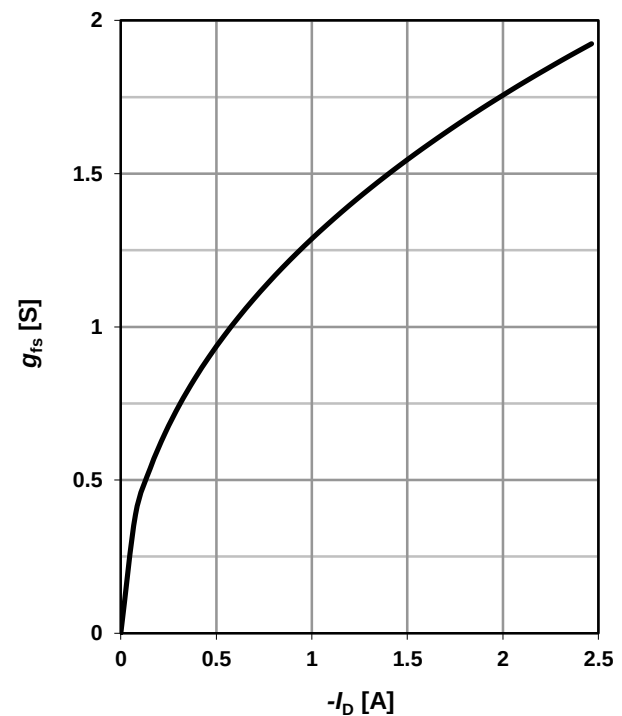
parameter: V_{GS}


7 Typ. transfer characteristics

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

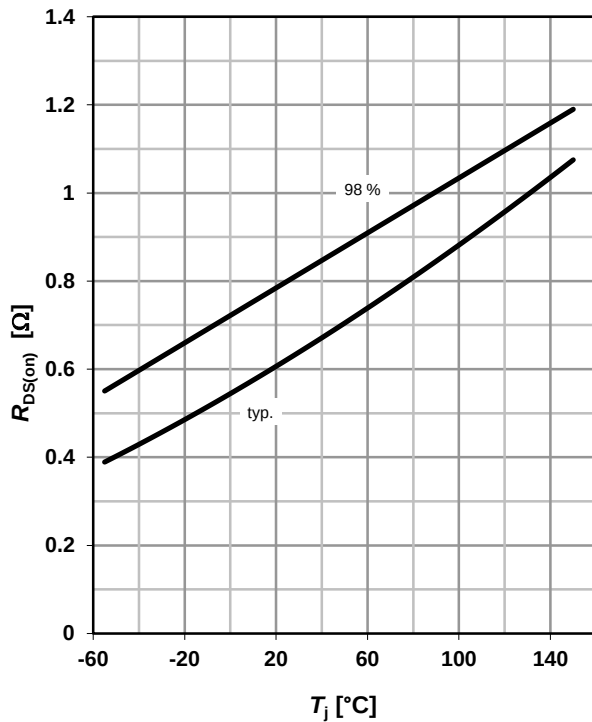
parameter: T_j


8 Typ. forward transconductance

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


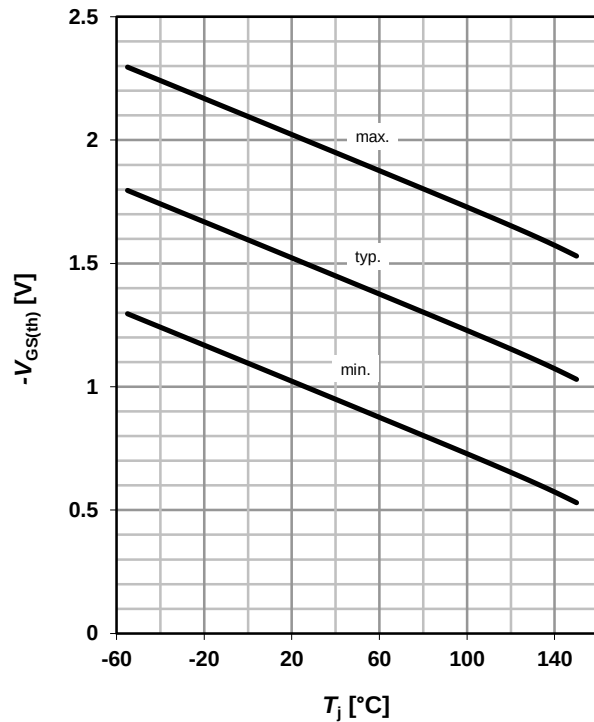
9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j); I_D = -0.62 \text{ A}; V_{GS} = -10 \text{ V}$$



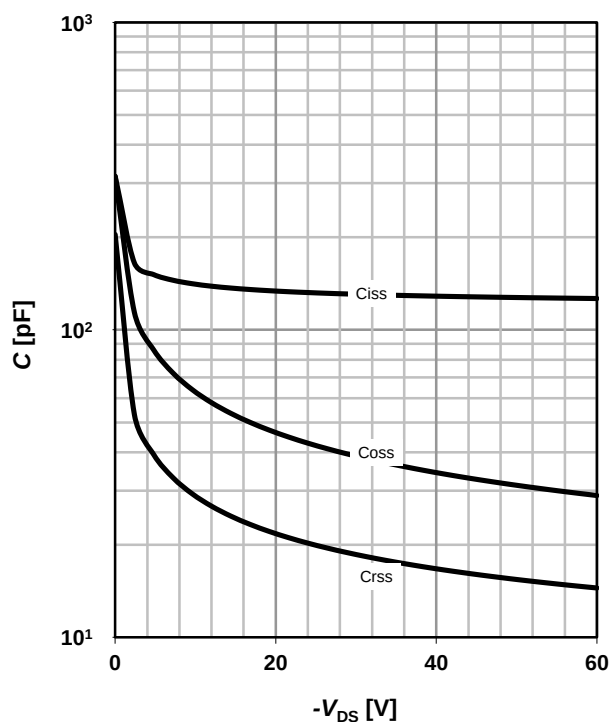
10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -160 \mu\text{A}$$



11 Typ. capacitances

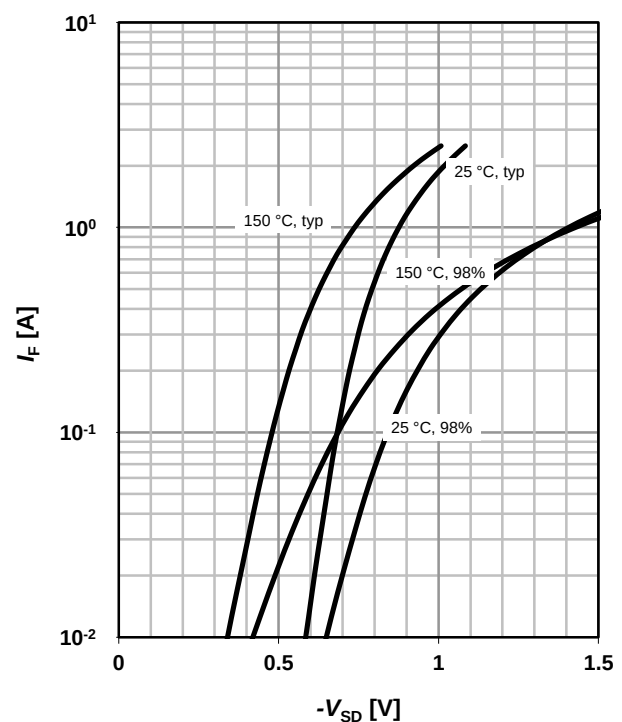
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



12 Forward characteristics of reverse diode

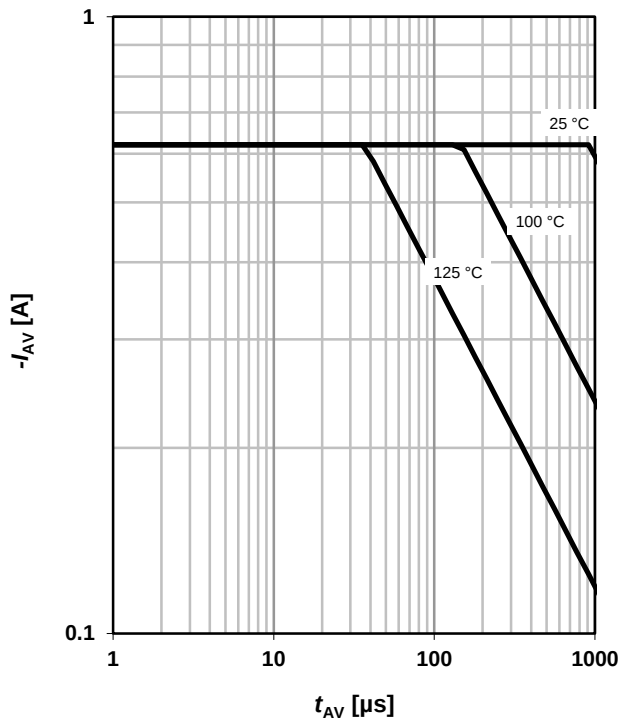
$$I_F = f(V_{SD})$$

parameter: T_j



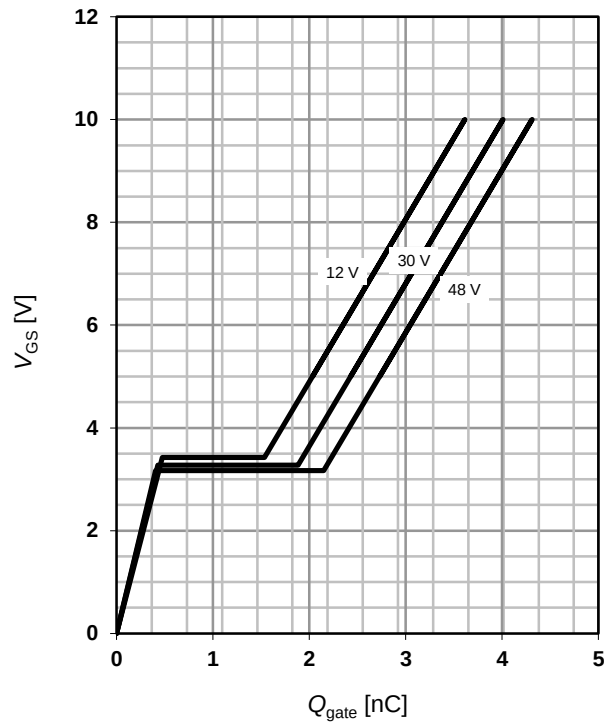
13 Avalanche characteristics

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

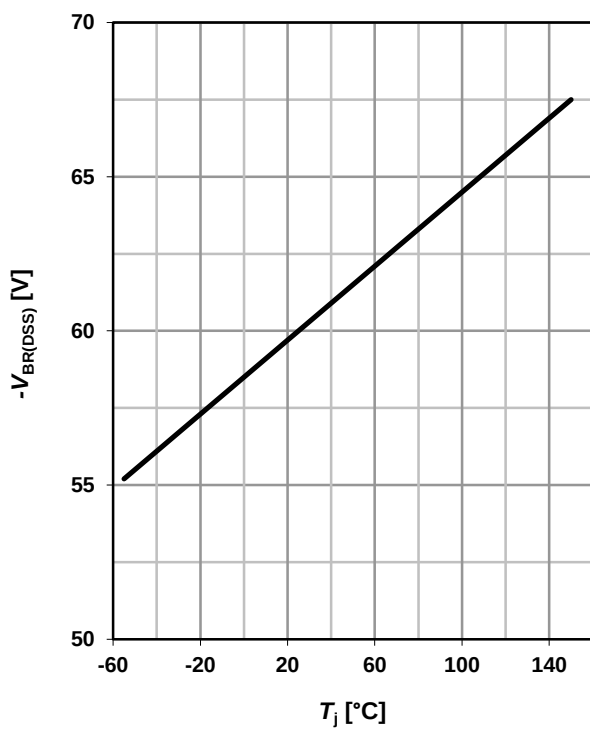
parameter: $T_{j(\text{start})}$


14 Typ. gate charge

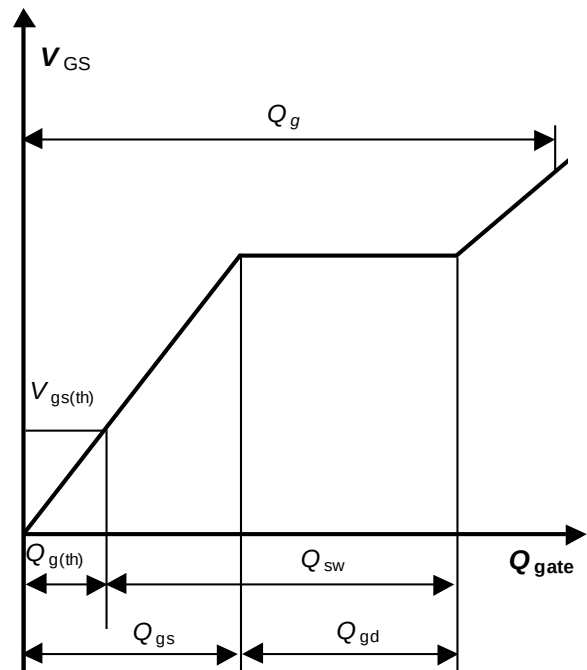
 $V_{GS}=f(Q_{\text{gate}}); I_D=-0.62\ \text{A pulsed}$

parameter: V_{DD}


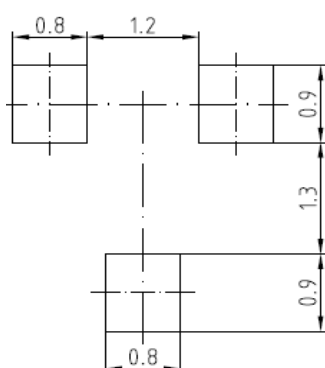
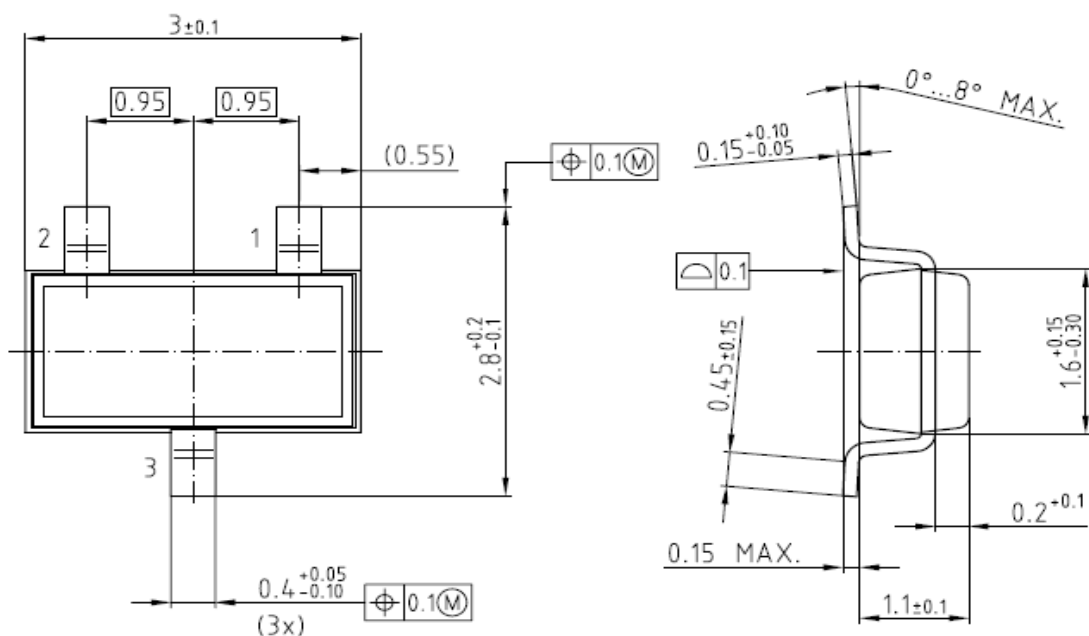
15 Drain-source breakdown voltage

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


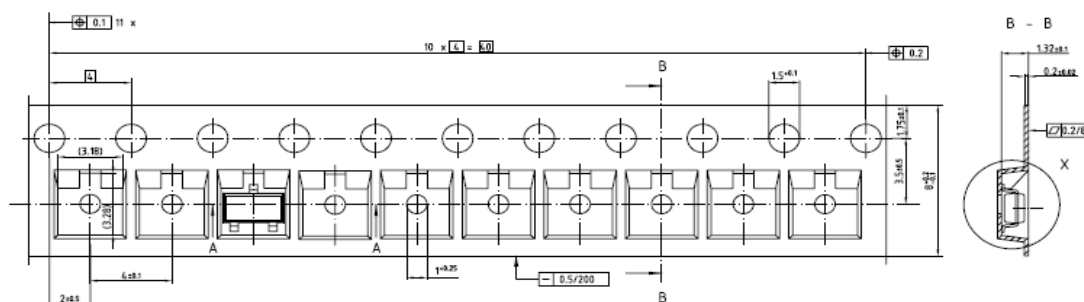
16 Gate charge waveforms



SC-59: Outline



Tape



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