

OptiMOS™ -3 Small-Signal-Transistor

Features

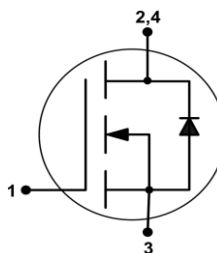
- N-channel
- Enhancement mode
- Logic level (4.5V rated)
- Avalanche rated
- Qualified according to AEC Q101
- 100%lead-free; Halogen-free; RoHS compliant



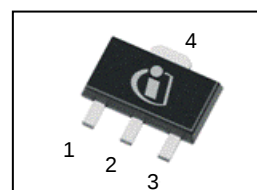
Halogen-Free

Product Summary

V_{DS}	60	V
$R_{DS(on),max}$	$V_{GS}=10\text{ V}$	60
	$V_{GS}=4.5\text{ V}$	90
I_D	3.2	A



PG-SOT-89



Type	Package	Tape and Reel Information	Marking	Halogen-free	Package
BSS606N	PG-SOT-89	H6327: 3000 pcs/ reel	KE	Yes	Non-dry

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_A=25\text{ °C}$	3.2	A
		$T_A=70\text{ °C}$	2.6	
		$T_A=25\text{ °C}$	12.8	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	12.8	
Avalanche energy, single pulse	E_{AS}	$I_D=3.2\text{ A}$, $R_{GS}=25\text{ }\Omega$	14	mJ
Reverse diode dv/dt	dv/dt	$I_D=3.2\text{ A}$, $V_{DS}=48\text{ V}$, $di/dt=100\text{ A}/\mu\text{s}$, $T_{j,max}=150\text{ °C}$	6	kV/ μs
Gate source voltage	V_{GS}		± 20	V
Power dissipation ¹⁾	P_{tot}	$T_A=25\text{ °C}$	1.0	W
Operating and storage temperature	T_j , T_{stg}		-55 ... 150	°C
ESD Class		JESD22-A114 -HBM	class 0 (< 250V)	
Soldering Temperature			260 °C	
IEC climatic category; DIN IEC 68-1			55/150/56	

¹⁾ Value refers to minimum footprint

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

Thermal resistance, junction - case	R_{thJC}		-	-	10	K/W
SMD version, device on PCB	R_{thJA}	minimal footprint	-	-	125	
		6 cm ² cooling area ²⁾	-	-	70	

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	$V_{GS(th)}$	$V_{DS}=0\text{ V}, I_D=15\text{ }\mu\text{A}$	1.3	1.8	2.3	
Drain-source leakage current	I_{DSS}	$V_{DS}=60\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-	1	μA
		$V_{DS}=60\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ °C}$	-	-	100	
Gate-source leakage current	I_{GSS}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5\text{ V}, I_D=2.6\text{ A}$	-	66	90	m Ω
		$V_{GS}=10\text{ V}, I_D=3.2\text{ A}$	-	47	60	
Transconductance	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=2.6\text{ A}$	-	6	-	S

²⁾ Performed on 40mmx40mmx1.5mm epoxy FR4 PCB with 6cm² (one layer, 70 μm thick) copper area for drain connectio. PCB is vertical without blown air.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	494	657	pF
Output capacitance	C_{oss}		-	131	174	
Reverse transfer capacitance	C_{rss}		-	10.2	15.3	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V},$ $I_D=3.2\text{ A}, R_{G,ext}=6\text{ }\Omega$	-	5.6	-	ns
Rise time	t_r		-	2.6	-	
Turn-off delay time	$t_{d(off)}$		-	13	-	
Fall time	t_f		-	2.1	-	

Gate Charge Characteristics

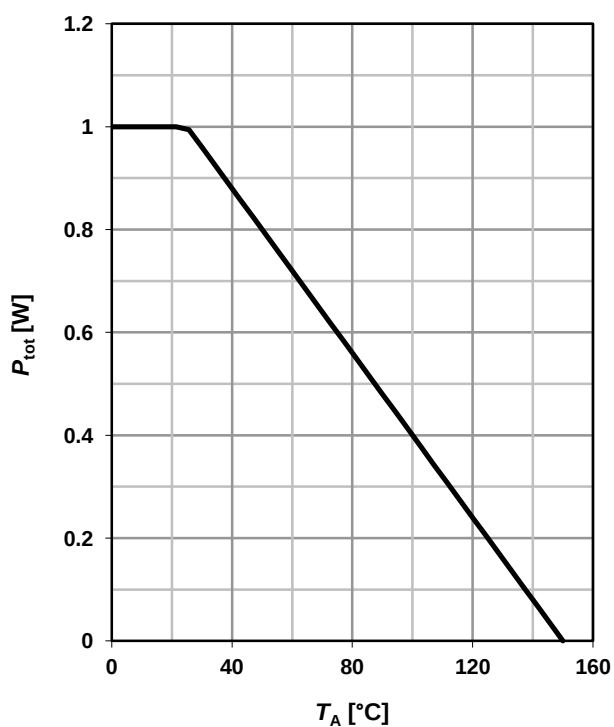
Gate to source charge	Q_{gs}	$V_{DD}=48\text{ V}, I_D=3.2\text{ A},$ $V_{GS}=0\text{ to }5\text{ V}$	-	1.6	2.1	nC
Gate to drain charge	Q_{gd}		-	1.0	1.4	
Gate charge total	Q_g		-	3.7	5.6	
Gate plateau voltage	$V_{plateau}$		-	3.2	-	V

Reverse Diode

Diode continuous forward current	I_S	$T_A=25\text{ }^\circ\text{C}$	-	-	0.9	A
Diode pulse current	$I_{S,pulse}$		-	-	12.8	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=3.2\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	0.8	1.1	V
Reverse recovery time	t_{rr}	$V_R=30\text{ V}, I_F=3.2\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	22	-	ns
Reverse recovery charge	Q_{rr}		-	11	-	nC

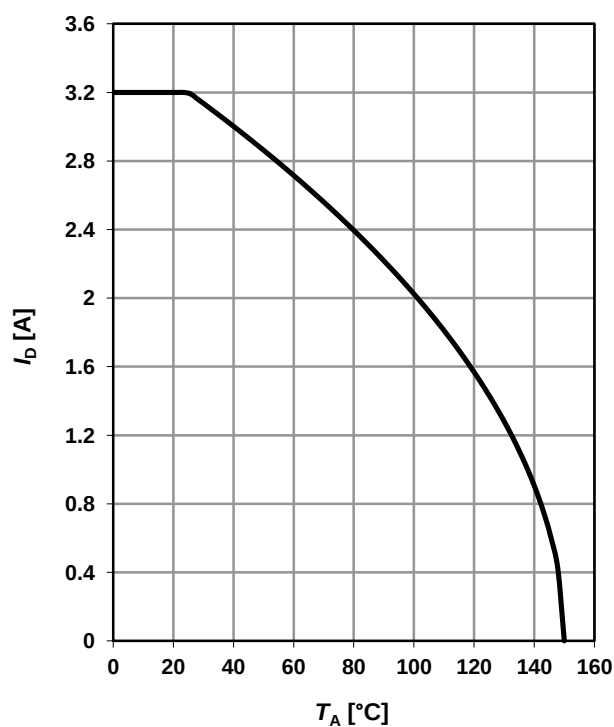
1 Power dissipation

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



2 Drain current

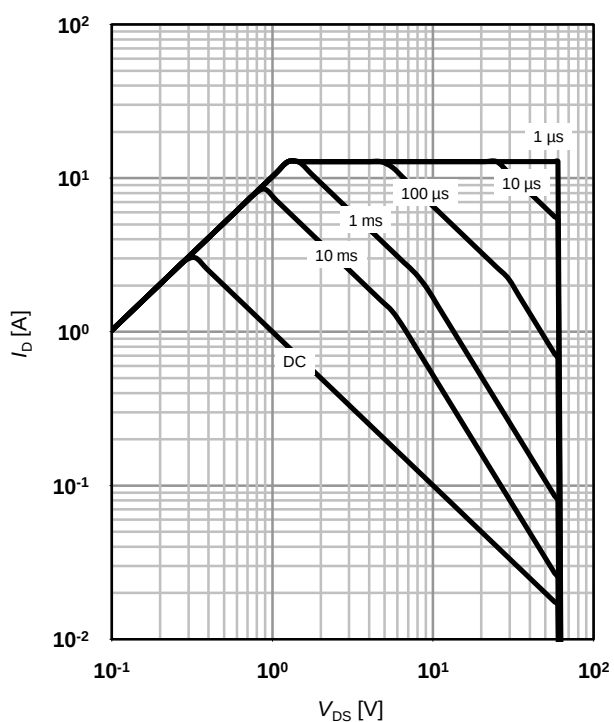
$$I_D = f(T_A); V_{GS} \geq 10 \text{ V}$$



3 Safe operating area

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

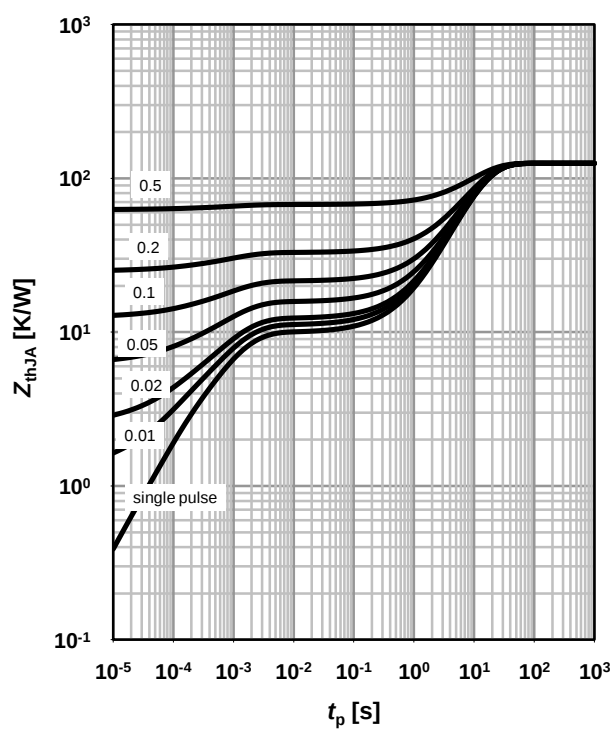
parameter: t_p



4 Max. transient thermal impedance

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

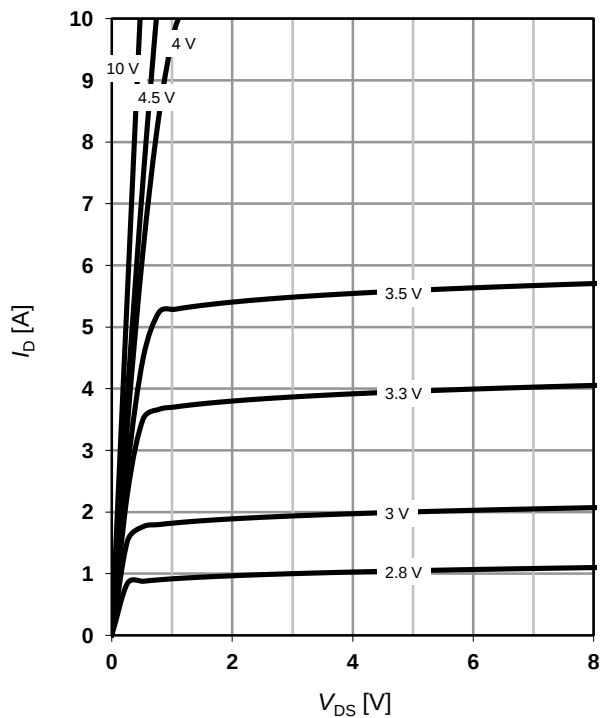
parameter: $D = t_p/T$



5 Typ. output characteristics

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

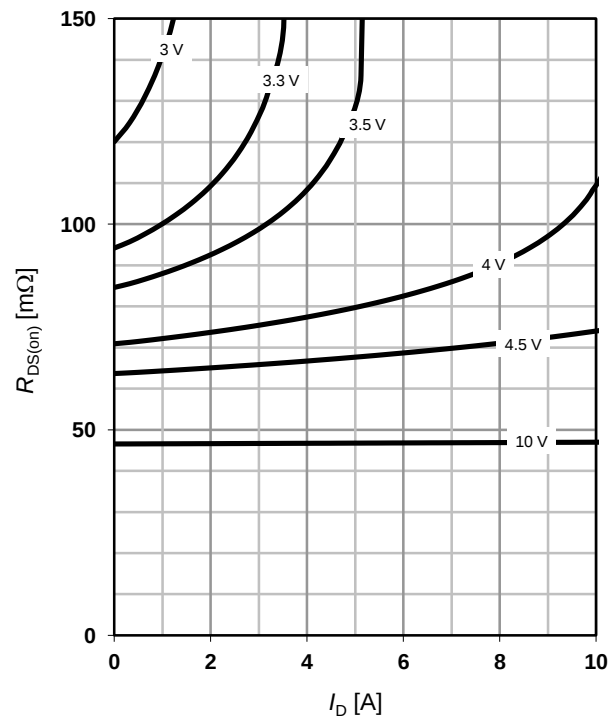
parameter: V_{GS}



6 Typ. drain-source on resistance

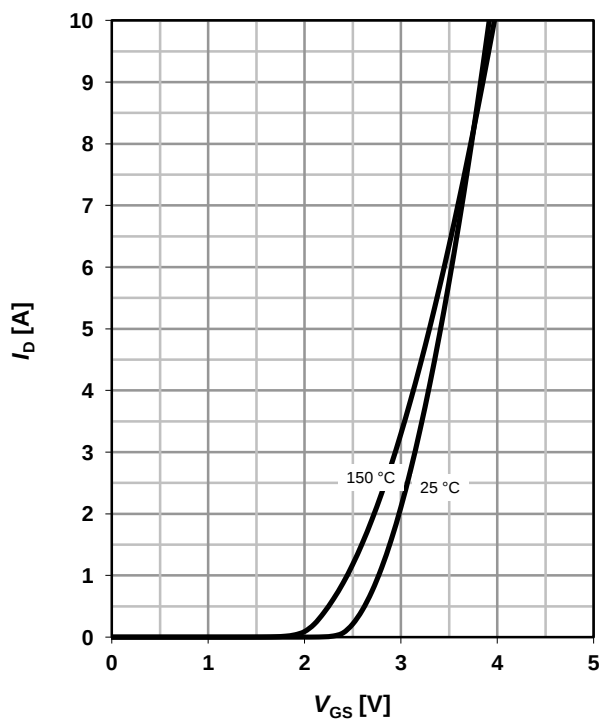
$$R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$$

parameter: V_{GS}



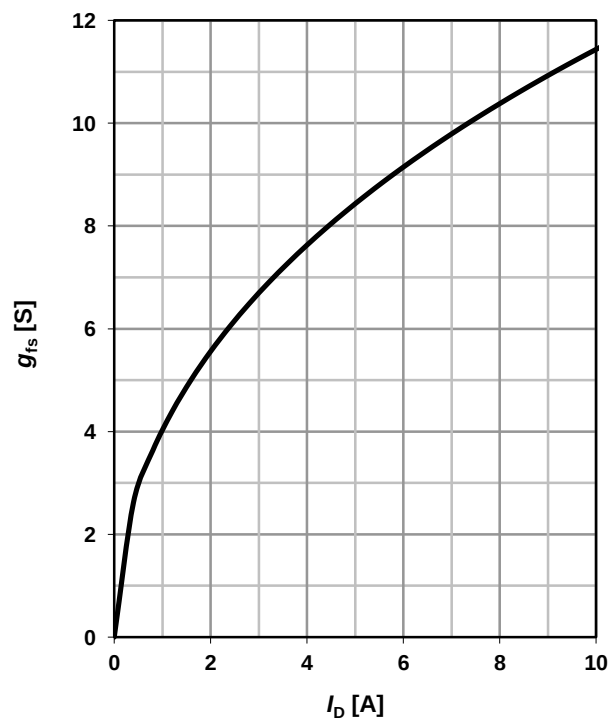
7 Typ. transfer characteristics

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



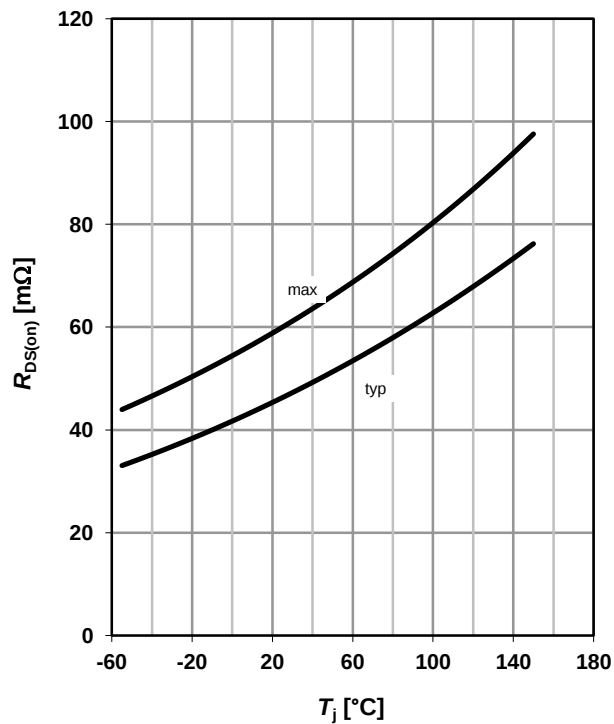
8 Typ. forward transconductance

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



9 Drain-source on-state resistance

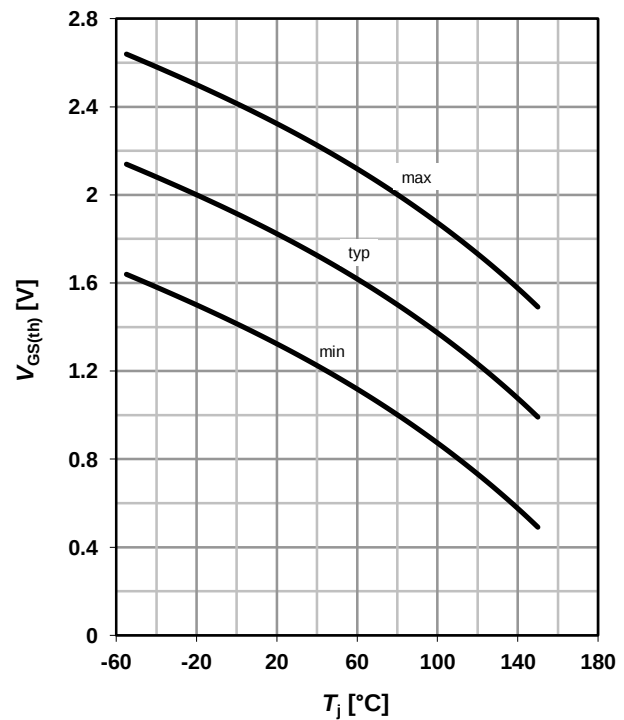
$R_{DS(on)} = f(T_j)$; $I_D = 3.2 \text{ A}$; $V_{GS} = 10 \text{ V}$



10 Typ. gate threshold voltage

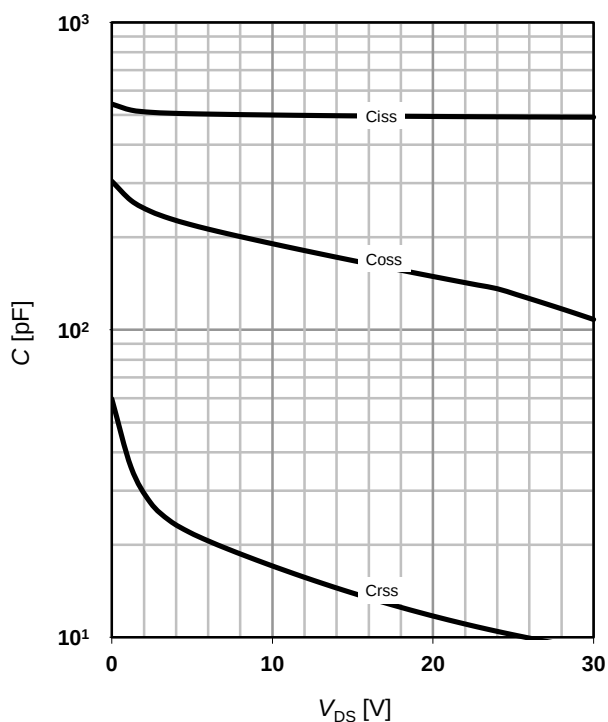
$V_{GS(th)} = f(T_j)$; $V_{DS} = V_{GS}$; $I_D = 15 \mu\text{A}$

parameter: I_D



11 Typ. capacitances

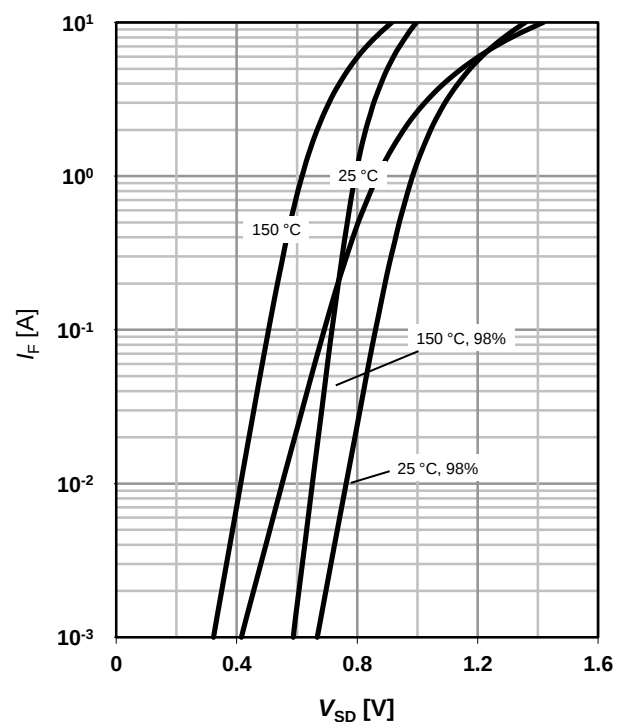
$C = f(V_{DS})$; $V_{GS} = 0 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25^\circ\text{C}$



12 Forward characteristics of reverse diode

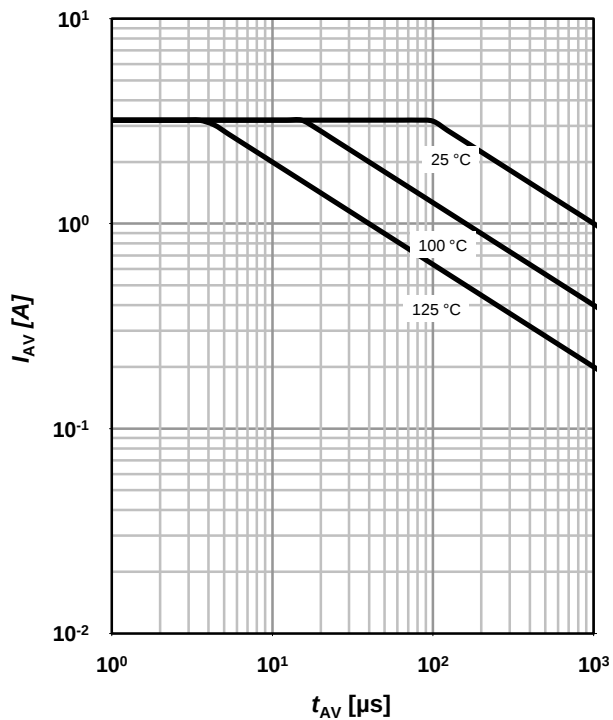
$I_F = f(V_{SD})$

parameter: T_j



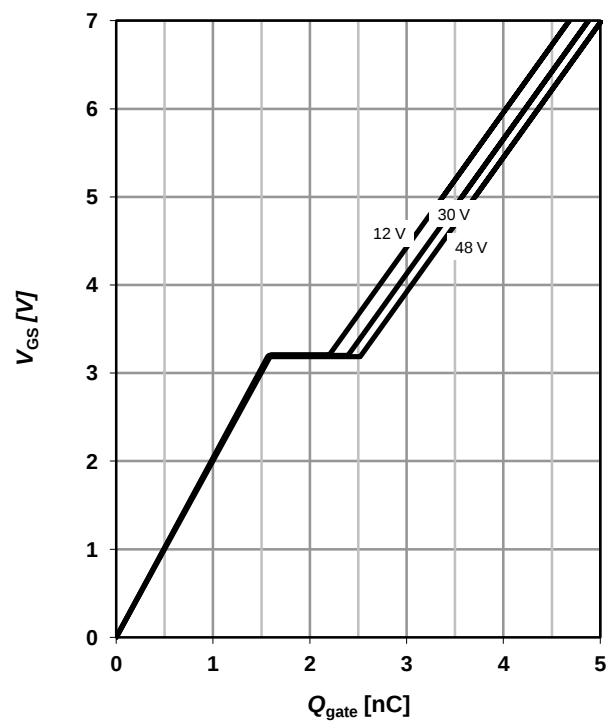
13 Avalanche characteristics

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

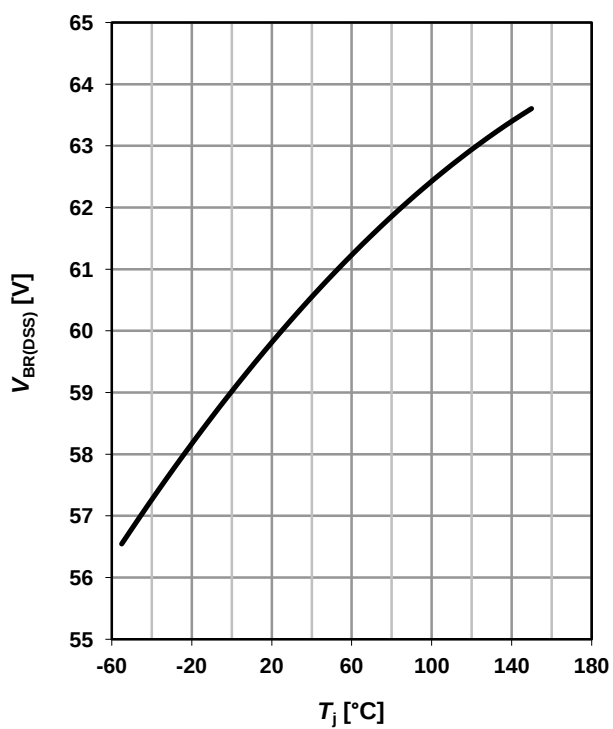
parameter: $T_{j(\text{start})}$


14 Typ. gate charge

 $V_{GS}=f(Q_{gate}); I_D=3.2\ \text{A pulsed}$

parameter: V_{DD}


15 Drain-source breakdown voltage

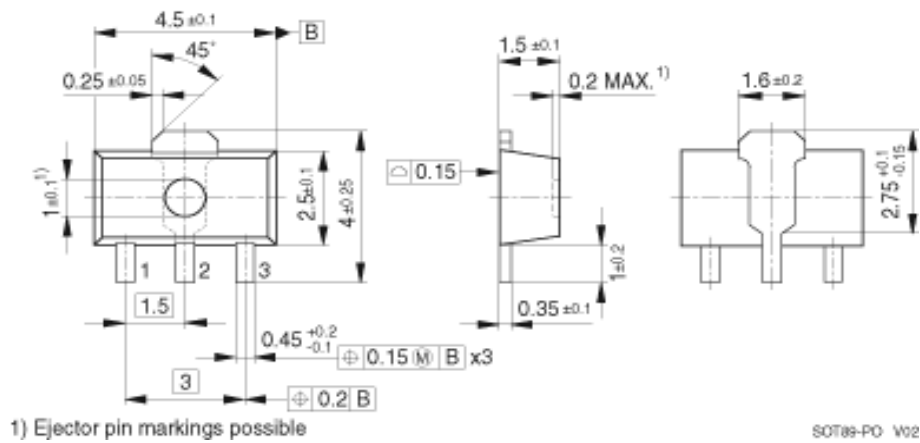
 $V_{BR(DSS)}=f(T_j); I_D=250\ \mu\text{A}$


16 Gate charge waveforms

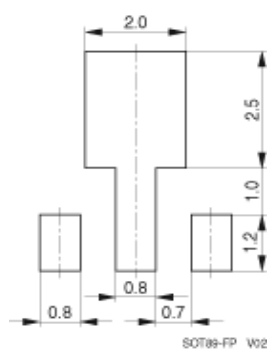


SOT-89

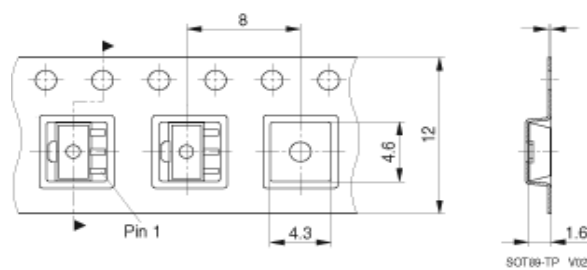
Package Outline:



Footprint:



Packaging:



Dimensions in mm

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