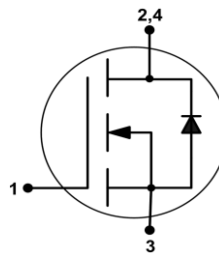
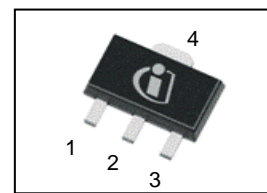


**OptiMOS™ -3 Small-Signal-Transistor**
**Features**

- 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	
		Pulsed drain current	$I_{D,pulse}$	
Avalanche energy, single pulse	$E_{AS}$	$I_D=3.2\text{ A}$ , $R_{GS}=25\ \Omega$	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/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 20$	V
Power dissipation <sup>1)</sup>	$P_{tot}$	$T_A=25\text{ °C}$	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	

<sup>1)</sup> 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 <sup>2</sup> cooling area <sup>2)</sup>	-	-	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	$\mu\text{A}$
		$V_{DS}=60\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ °C}$	-	-	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	$\text{m}\Omega$
		$V_{GS}=10\text{ V}, I_D=3.2\text{ A}$	-	47	60	
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=2.6\text{ A}$	-	6	-	S

<sup>2)</sup> Performed on 40mmx40mmx1.5mm epoxy FR4 PCB with 6cm<sup>2</sup> (one layer, 70 $\mu\text{m}$  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	$t_{d(on)}$	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V},$ $I_D=3.2\text{ A}, R_{G,ext}=6\ \Omega$	-	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**

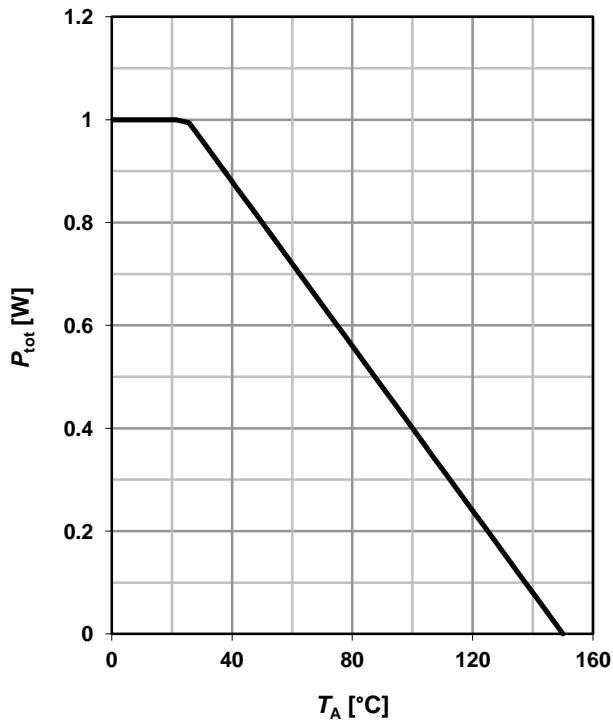
Gate to source charge	$Q_{gs}$	$V_{DD}=48\text{ V}, I_D=3.2\text{ A},$ $V_{GS}=0\text{ to }5\text{ V}$	-	1.6	2.1	nC
Gate to drain charge	$Q_{gd}$		-	1.0	1.4	
Gate charge total	$Q_g$		-	3.7	5.6	
Gate plateau voltage	$V_{plateau}$		-	3.2	-	V

**Reverse Diode**

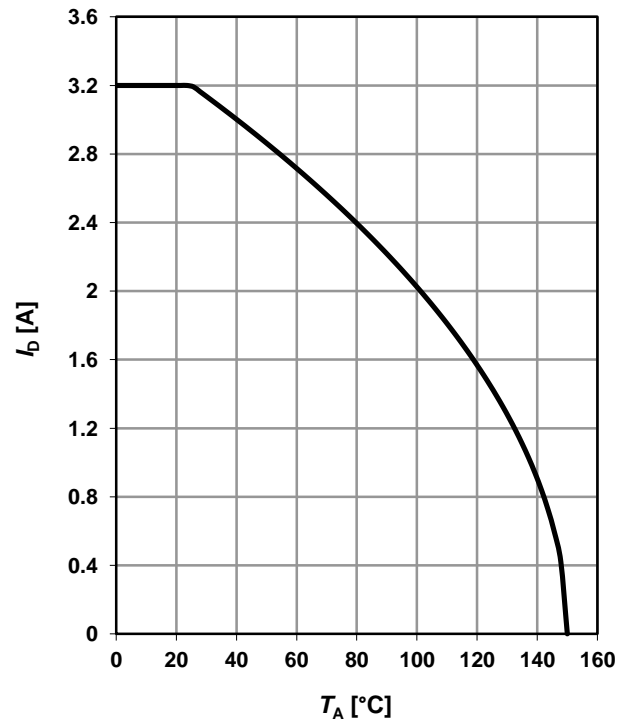
Diode continuous forward current	$I_S$	$T_A=25\text{ }^\circ\text{C}$	-	-	0.9	A
Diode pulse current	$I_{S,pulse}$		-	-	12.8	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=3.2\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	0.8	1.1	V
Reverse recovery time	$t_{rr}$	$V_R=30\text{ V}, I_F=3.2\text{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

**1 Power dissipation**

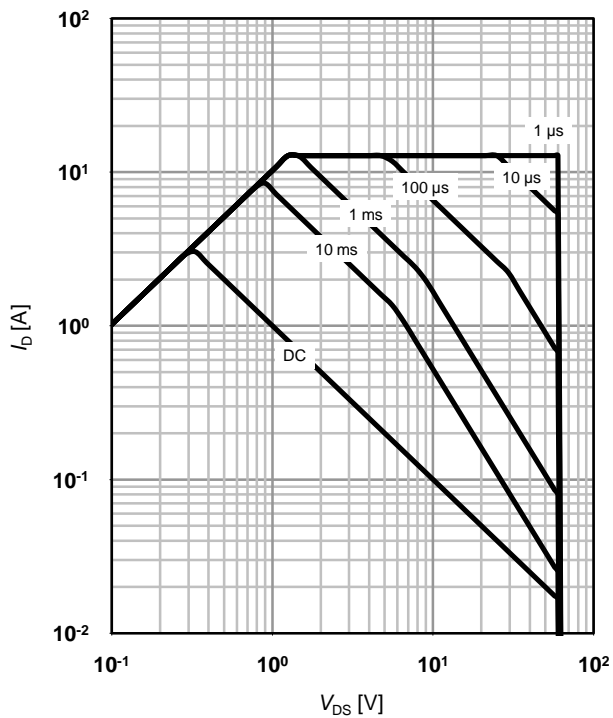
$$P_{\text{tot}} = f(T_A)$$


**2 Drain current**

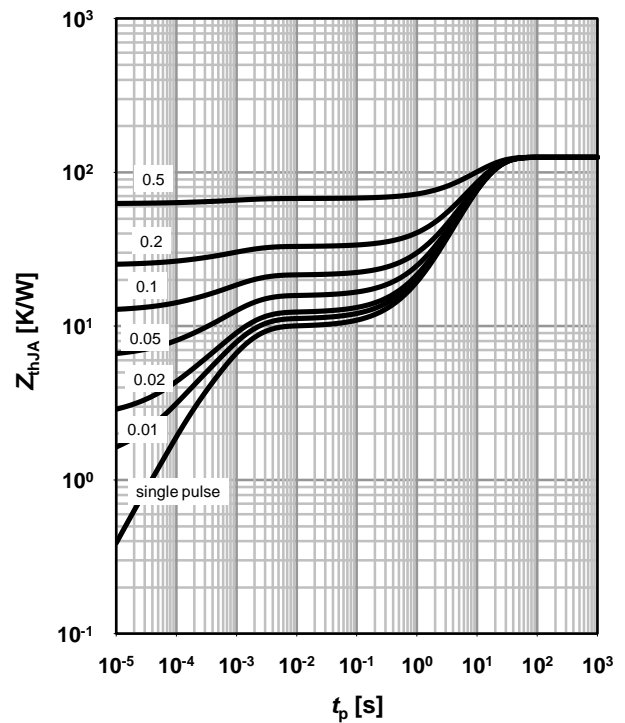
$$I_D = f(T_A); V_{GS} \geq 10 \text{ V}$$


**3 Safe operating area**

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

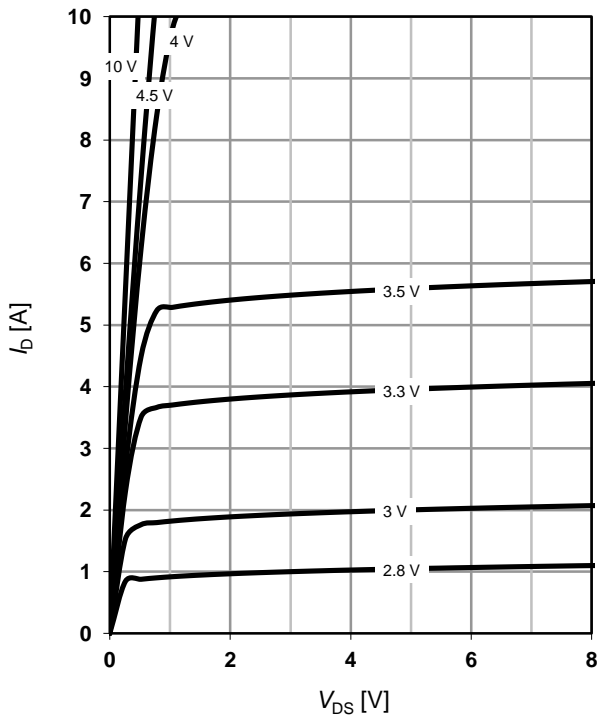
 parameter:  $t_p$ 

**4 Max. transient thermal impedance**

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

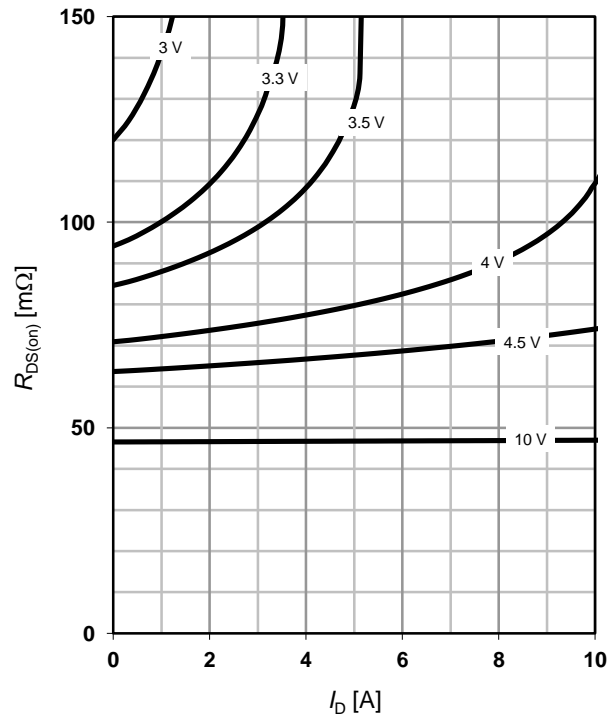
 parameter:  $D = t_p/T$ 


**5 Typ. output characteristics**

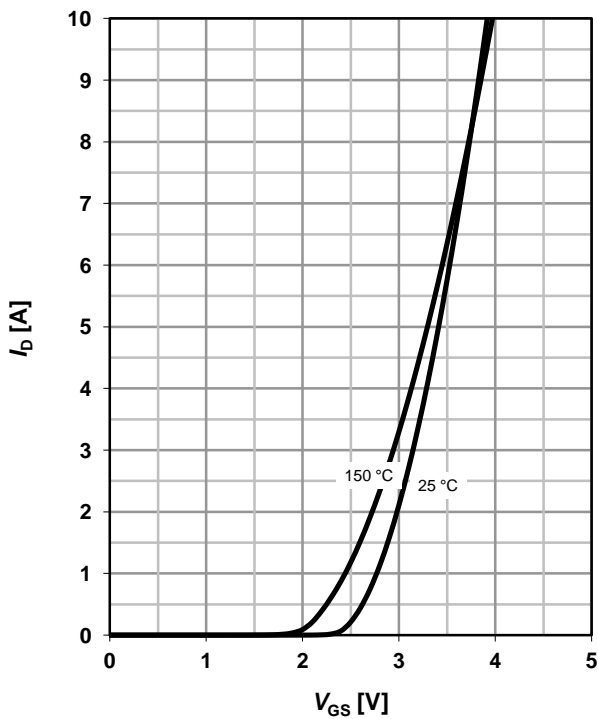
$$I_D = f(V_{DS}); T_j = 25\text{ °C}$$

 parameter:  $V_{GS}$ 

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

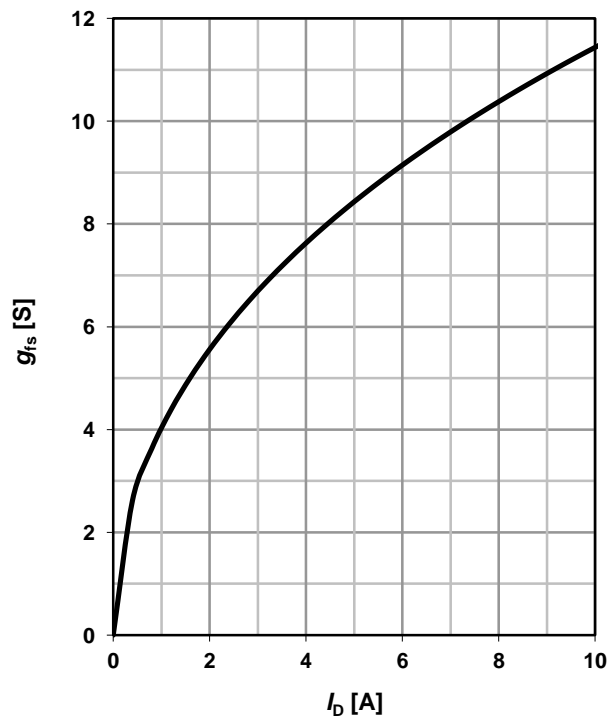
$$R_{DS(on)} = f(I_D); T_j = 25\text{ °C}$$

 parameter:  $V_{GS}$ 

**7 Typ. transfer characteristics**

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

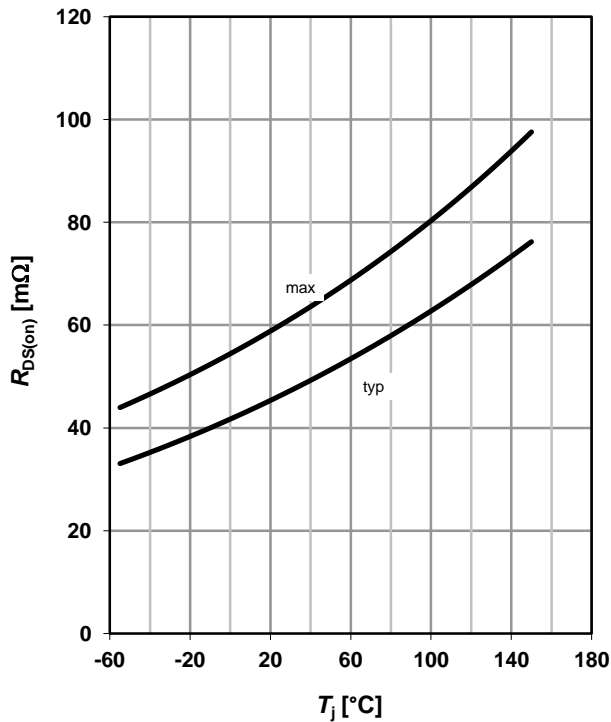

**8 Typ. forward transconductance**

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



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

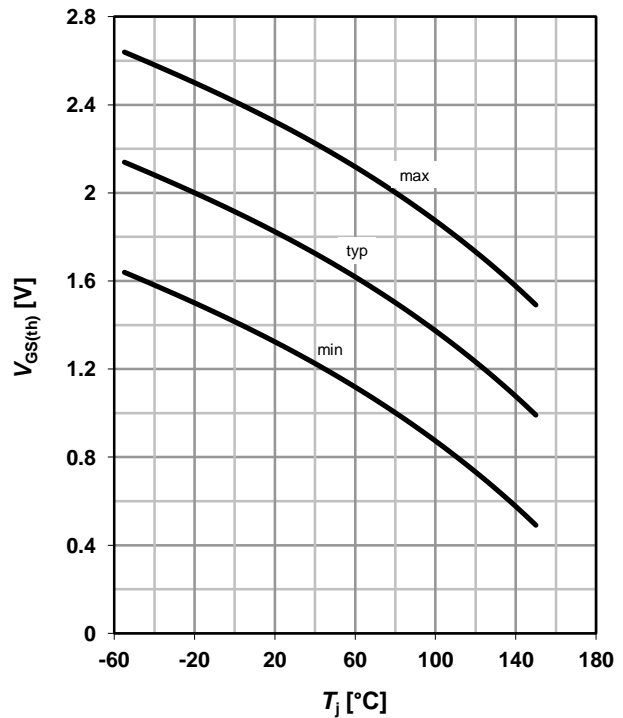
$R_{DS(on)}=f(T_j); I_D=3.2\text{ A}; V_{GS}=10\text{ V}$



**10 Typ. gate threshold voltage**

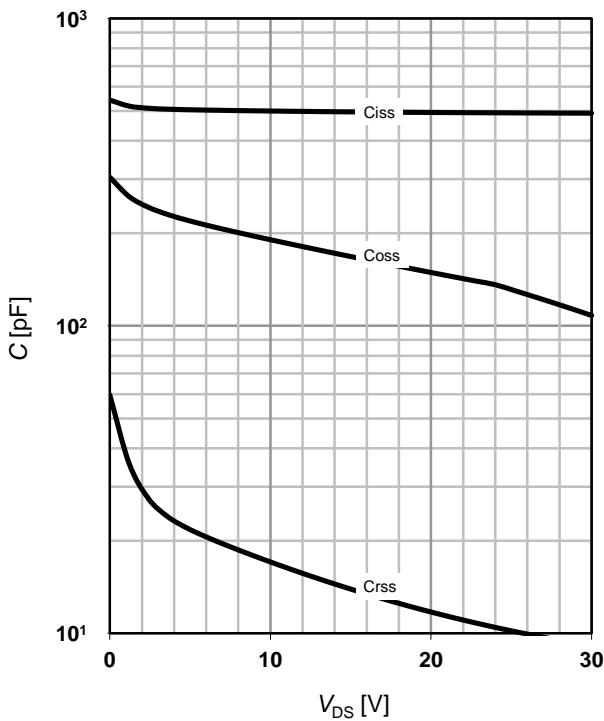
$V_{GS(th)}=f(T_j); V_{DS}=V_{GS}; I_D=15\text{ }\mu\text{A}$

parameter:  $I_D$



**11 Typ. capacitances**

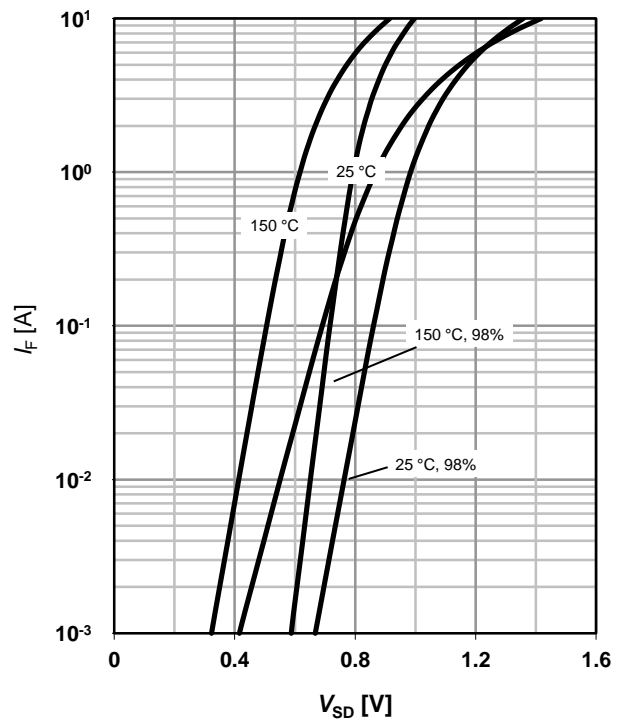
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}; T_j=25^\circ\text{C}$



**12 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

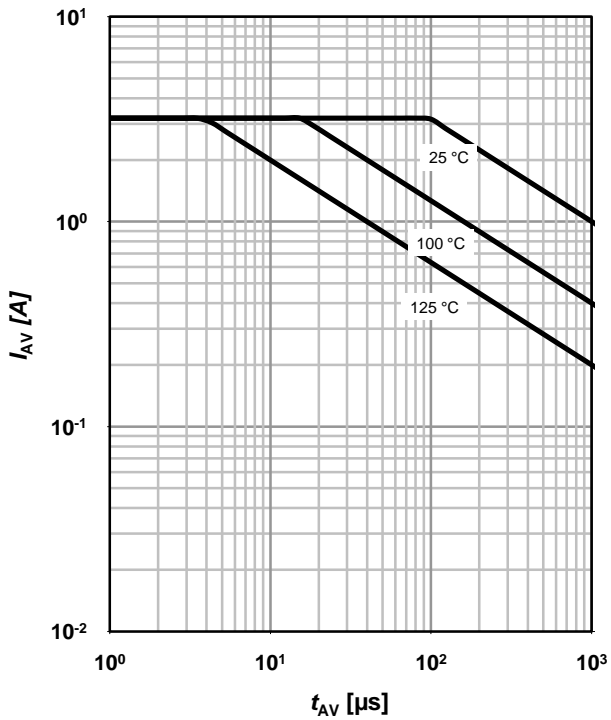
parameter:  $T_j$



**13 Avalanche characteristics**

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

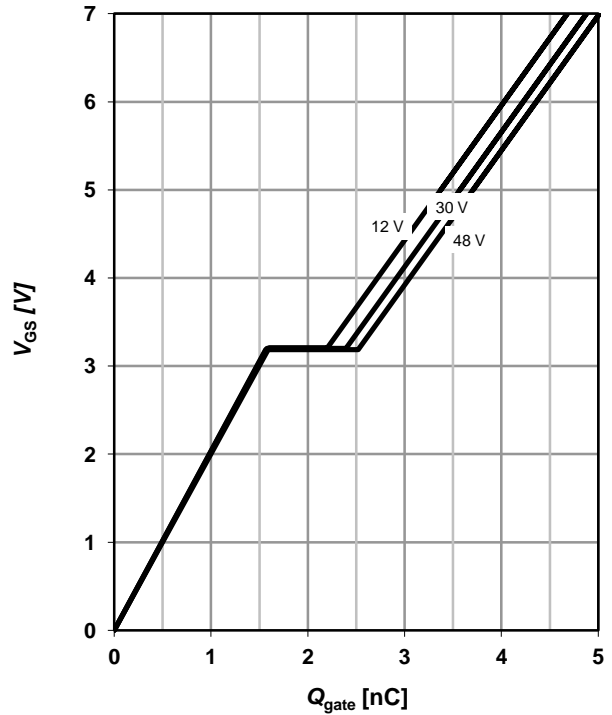
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

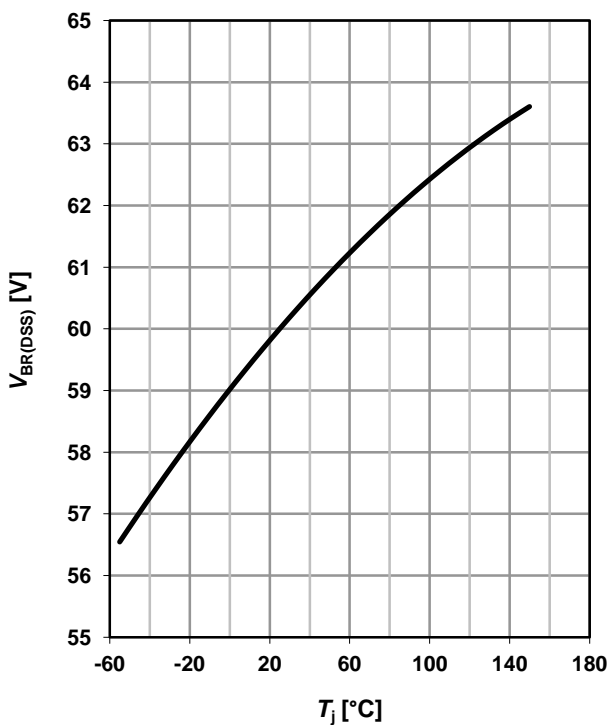
$V_{GS}=f(Q_{gate}); I_D=3.2 \text{ A pulsed}$

parameter:  $V_{DD}$

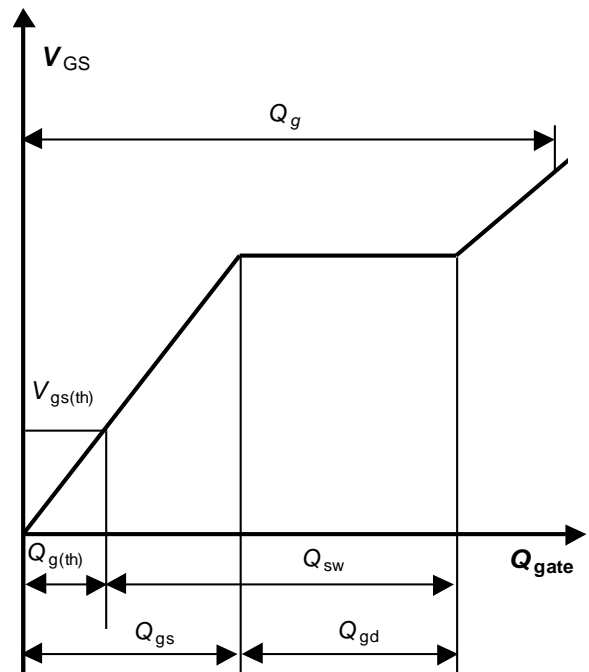


**15 Drain-source breakdown voltage**

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



**16 Gate charge waveforms**







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