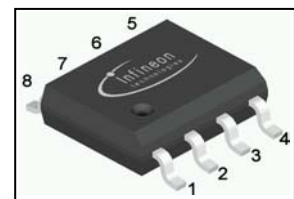


**OptiMOS<sup>®</sup>-P Small-Signal-Transistor**
**Features**

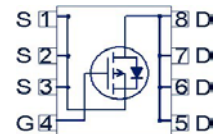
- P-Channel
- Enhancement mode
- Logic level
- 150°C operating temperature
- Avalanche rated
- dv/dt rated
- Ideal for fast switching buck converter

**Product Summary**

$V_{DS}$	-30	V
$R_{DS(on),max}$	13	mΩ
$I_D$	-11.3	A

**P-DSO-8**


Type	Package	Ordering Code	Marking
BSO130P03S	P-DSO-8	Q67042-S4233	130P3S


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

Parameter	Symbol	Conditions	Value		Unit
			≤10 secs	steady state	
Continuous drain current	$I_D$	$T_A=25\text{ °C}^{1)}$	-11.3	-9.2	A
		$T_A=70\text{ °C}^{1)}$	-9.1	-7.4	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}^{2)}$	-45		
Avalanche energy, single pulse	$E_{AS}$	$I_D=11.3\text{ A}, R_{GS}=25\text{ Ω}$	148		mJ
Reverse diode dv/dt	dv/dt	$I_D=11.3\text{ A}, V_{DS}=20\text{ V},$ $di/dt=-200\text{ A/μs},$ $T_{j,max}=150\text{ °C}$	-6		kV/μs
Gate source voltage	$V_{GS}$		±25		V
Power dissipation	$P_{tot}$	$T_A=25\text{ °C}^{1)}$	2.36	1.56	W
Operating and storage temperature	$T_j, T_{stg}$		-55 ... 150		°C
IEC climatic category; DIN IEC 68-1			55/150/56		

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Thermal characteristics**

Thermal resistance, junction - soldering point	$R_{thJS}$		-	-	35	K/W
Thermal resistance, junction - ambient	$R_{thJA}$	minimal footprint, $t_p \leq 10$ s	-	-	110	
		minimal footprint, steady state	-	-	150	
		6 cm <sup>2</sup> cooling area <sup>1)</sup> , $t_p \leq 10$ s	-	-	53	
		6 cm <sup>2</sup> cooling area <sup>1)</sup> , steady state	-	-	80	

**Electrical characteristics, at  $T_j=25$  °C, unless otherwise specified**
**Static characteristics**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0$ V, $I_D=-250\mu$ A	-30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ , $I_D=-140$ $\mu$ A	-1	-1.5	-2.2	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=-30$ V, $V_{GS}=0$ V, $T_j=25$ °C	-	-0.1	-1	$\mu$ A
		$V_{DS}=-30$ V, $V_{GS}=0$ V, $T_j=125$ °C	-	-10	-100	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=-25$ V, $V_{DS}=0$ V	-	-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-10$ V, $I_D=-11.3$ A	-	9.9	13.0	m $\Omega$
Transconductance	$g_{fs}$	$ V_{DS}  > 2 I_D R_{DS(on)max}$ , $I_D=-9.5$ A	14	27	-	S

<sup>1)</sup> Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70  $\mu$ m thick) copper area for drain connection. PCB is vertical in still air.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics**

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}$ , $V_{DS}=-25\text{ V}$ , $f=1\text{ MHz}$	-	2650	3520	pF
Output capacitance	$C_{oss}$		-	708	942	
Reverse transfer capacitance	$C_{rss}$		-	580	870	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-15\text{ V}$ , $V_{GS}=-10\text{ V}$ , $I_D=-1\text{ A}$ , $R_G=6\ \Omega$	-	13	20	ns
Rise time	$t_r$		-	16	24	
Turn-off delay time	$t_{d(off)}$		-	70	105	
Fall time	$t_f$		-	62	93	

**Gate Charge Characteristics<sup>3)</sup>**

Gate to source charge	$Q_{gs}$	$V_{DD}=-24\text{ V}$ , $I_D=11.3\text{ A}$ , $V_{GS}=0\text{ to }-10\text{ V}$	-	-7	-9	nC
Gate charge at threshold	$Q_{g(th)}$		-	-3.7	-5.0	
Gate to drain charge	$Q_{gd}$		-	-21	-32	
Switching charge	$Q_{sw}$		-	-25	-36	
Gate charge total	$Q_g$		-	-61	-81	
Gate plateau voltage	$V_{plateau}$		-	-2.6	-	V
Output charge	$Q_{oss}$	$V_{DD}=-15\text{ V}$ , $V_{GS}=0\text{ V}$	-	-22	-29	

**Reverse Diode**

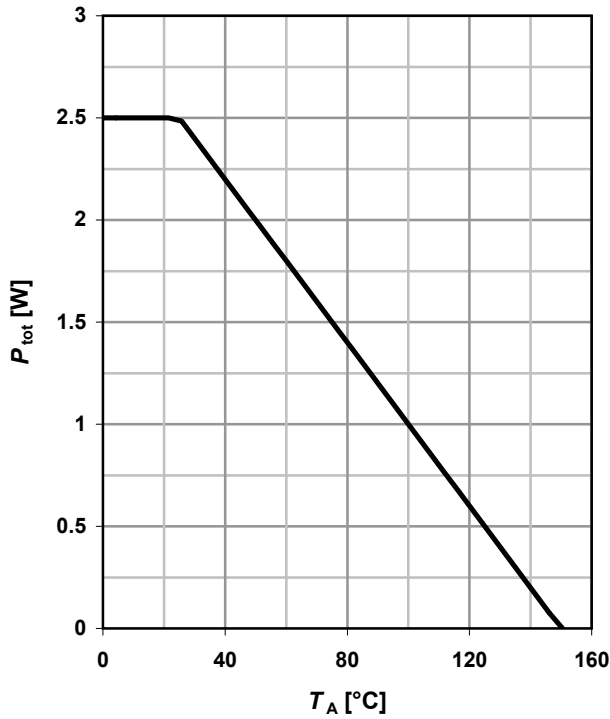
Diode continuous forward current	$I_S$	$T_A=25\text{ }^\circ\text{C}$	-	-	-2.1	A
Diode pulse current	$I_{S,pulse}$		-	-	-45	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}$ , $I_F=-11.3\text{ A}$ , $T_j=25\text{ }^\circ\text{C}$	-	-0.84	-1.2	V
Reverse recovery time	$t_{rr}$	$V_R=15\text{ V}$ , $I_F=-11.3\text{ A}$ , $di_F/dt=100\text{ A}/\mu\text{s}$	-	26	33	ns
Reverse recovery charge	$Q_{rr}$		-	16	20	

<sup>2)</sup> See figure 3

<sup>3)</sup> See figure 16 for gate charge parameter definition

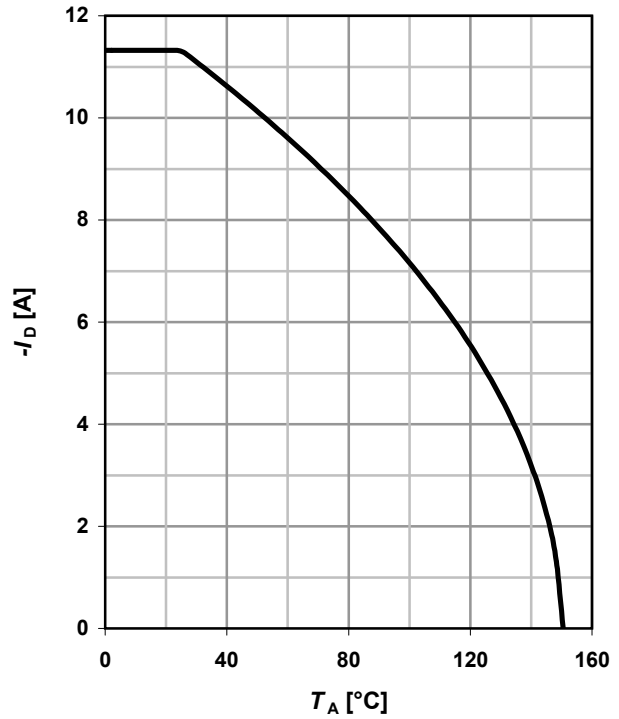
**1 Power dissipation**

$P_{tot}=f(T_A); t_p \leq 10 \text{ s}$



**2 Drain current**

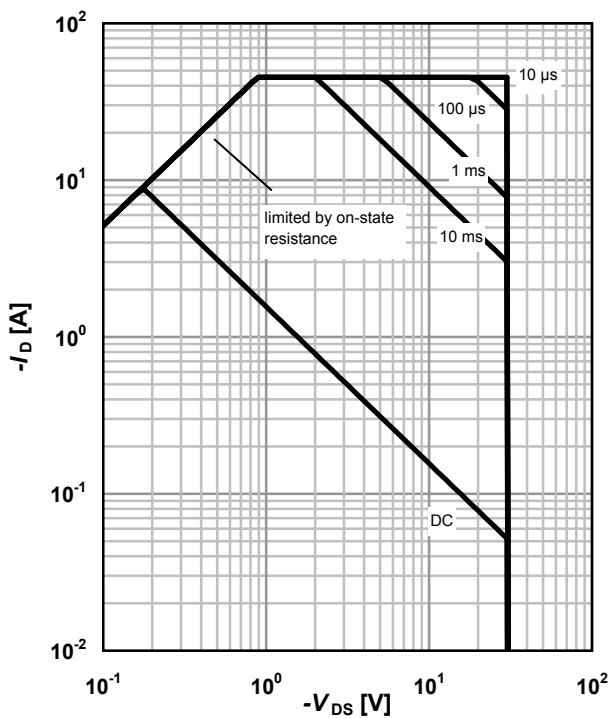
$I_D=f(T_A); |V_{GS}| \geq 10 \text{ V}; t_p \leq 10 \text{ s}$



**3 Safe operation area**

$I_D=f(V_{DS}); T_A=25 \text{ }^\circ\text{C}^1; D=0$

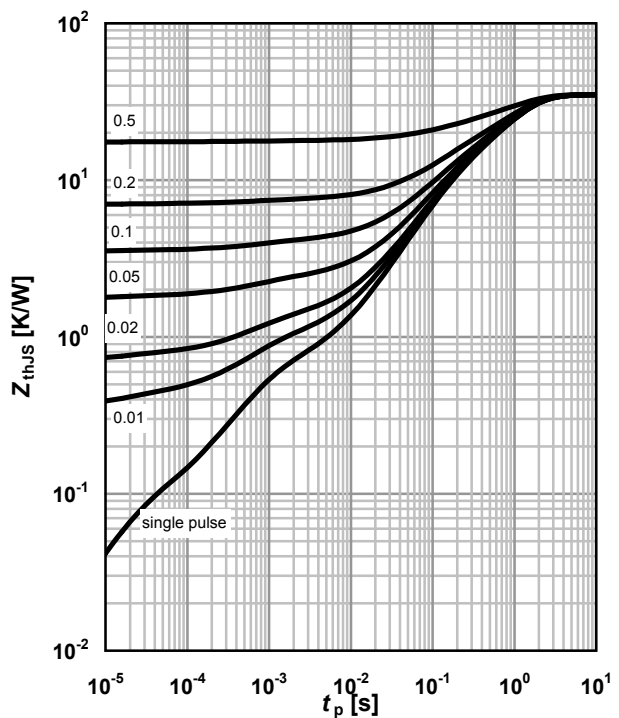
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJS}=f(t_p)$

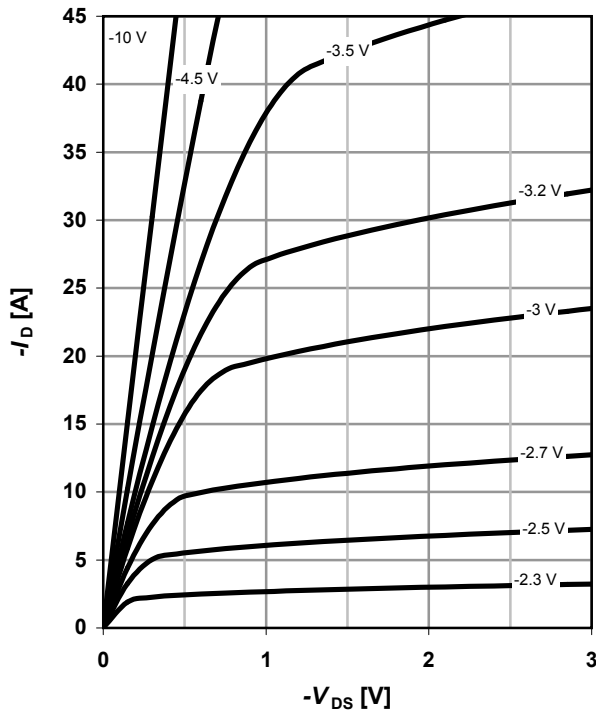
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

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

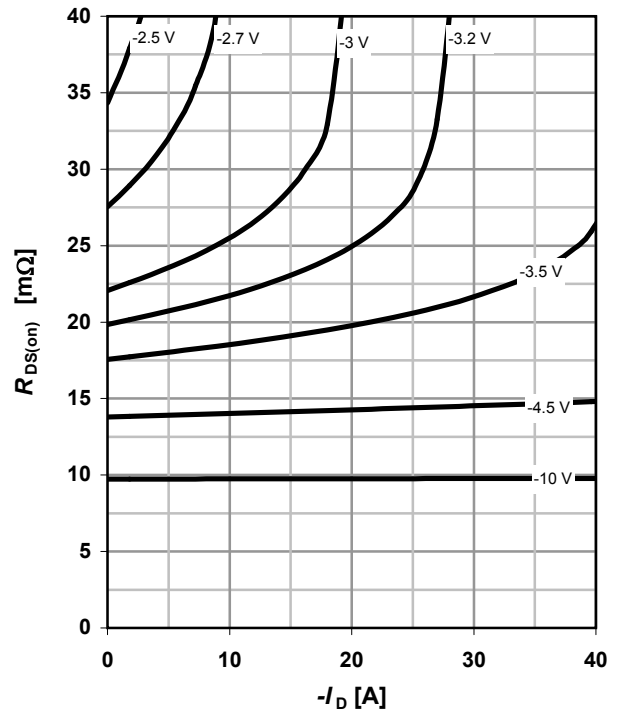
parameter:  $V_{GS}$



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

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

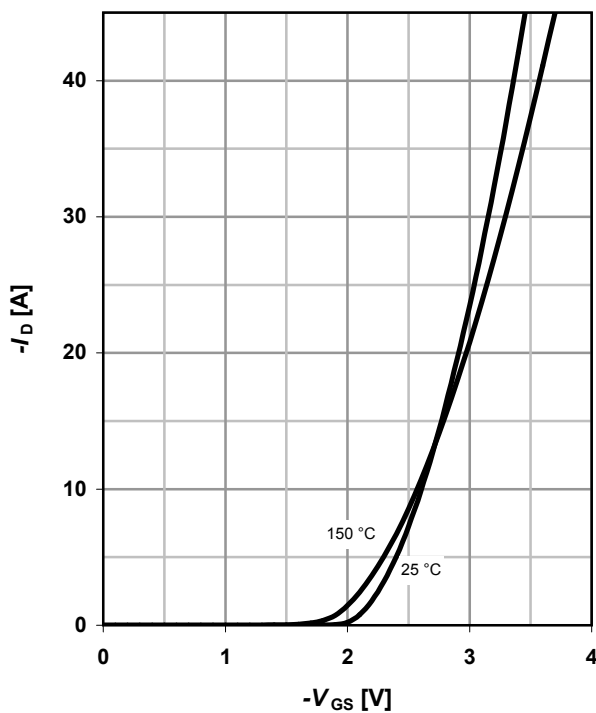
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

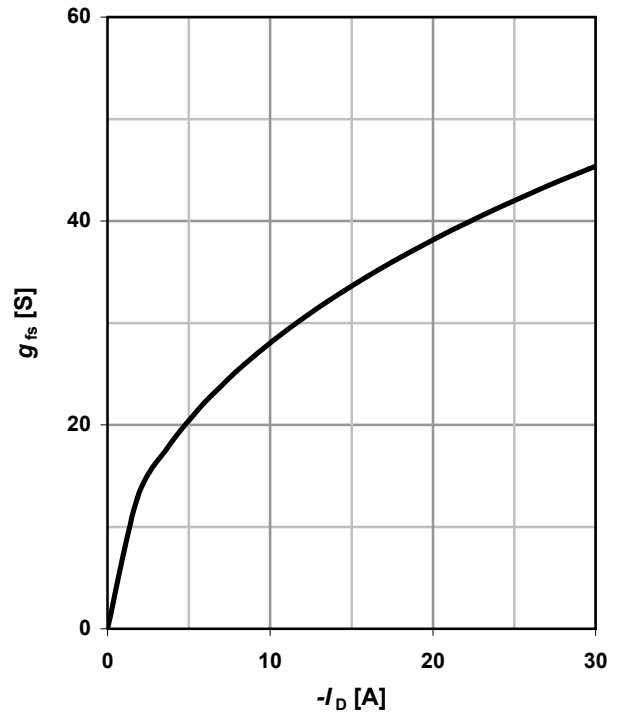
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



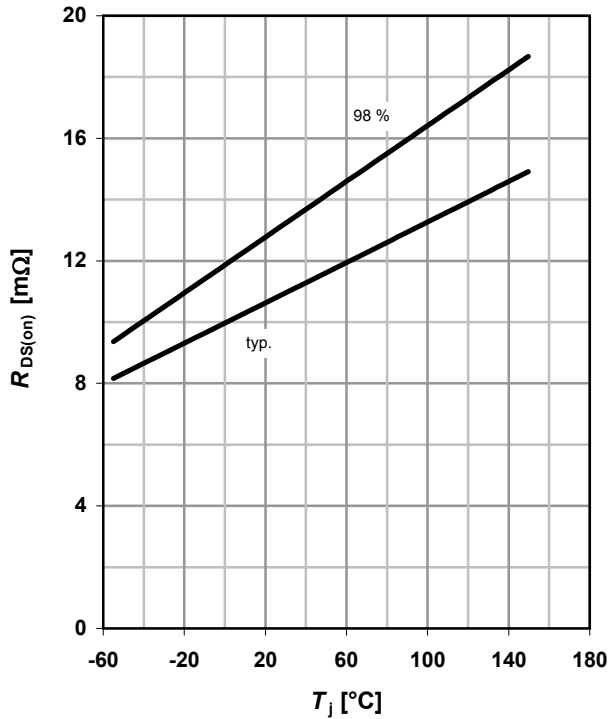
**8 Typ. forward transconductance**

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



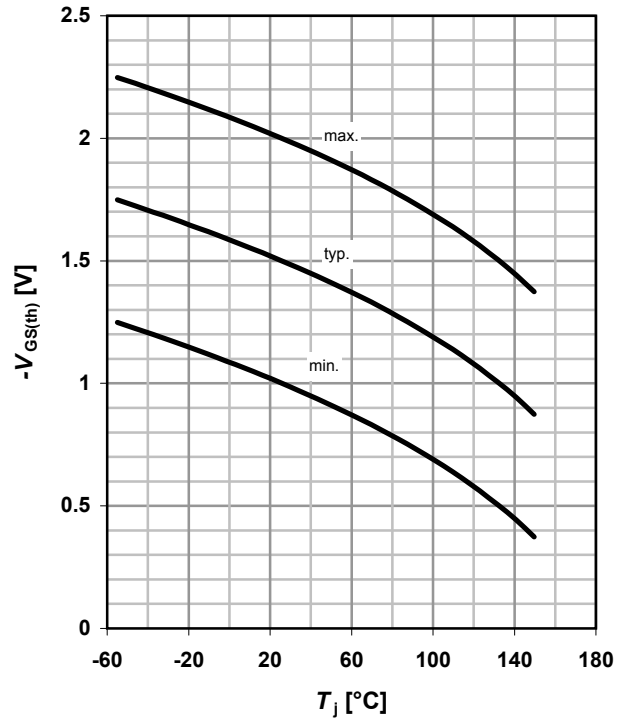
**9 Drain-source on-state resistance**

$R_{DS(on)} = f(T_j); I_D = -11.3 \text{ A}; V_{GS} = -10 \text{ V}$



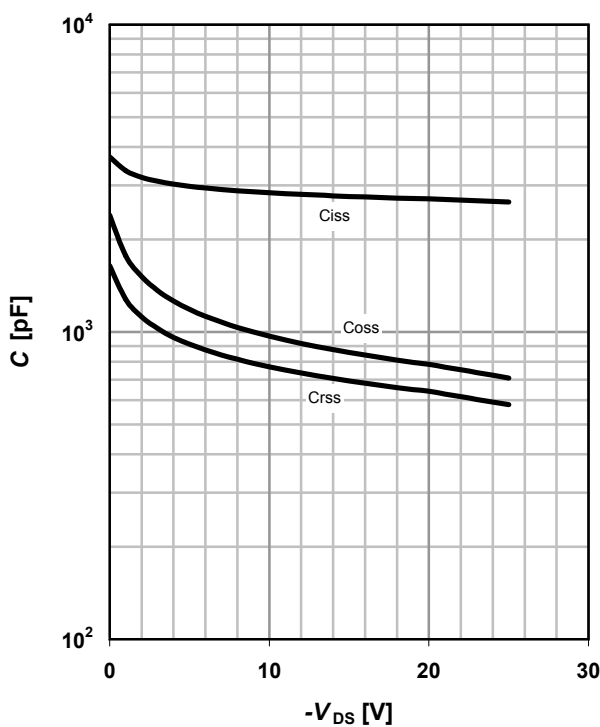
**10 Typ. gate threshold voltage**

$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -140 \mu\text{A}$



**11 Typ. capacitances**

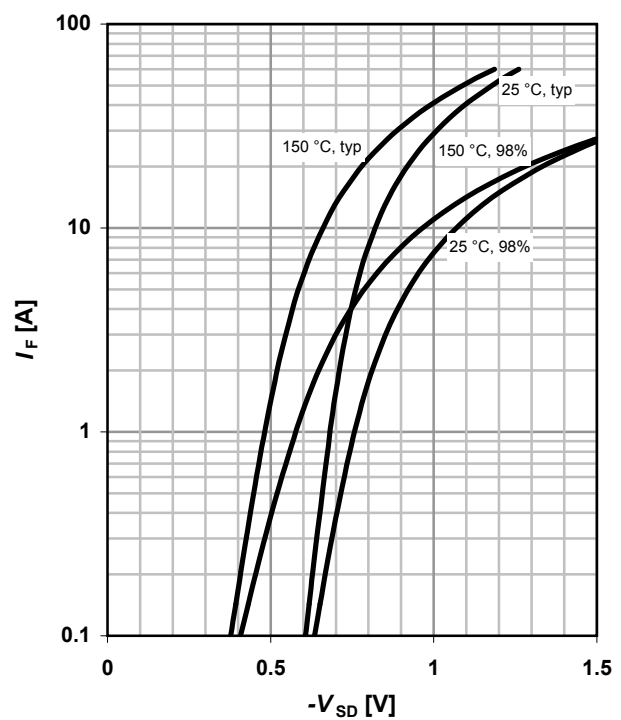
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

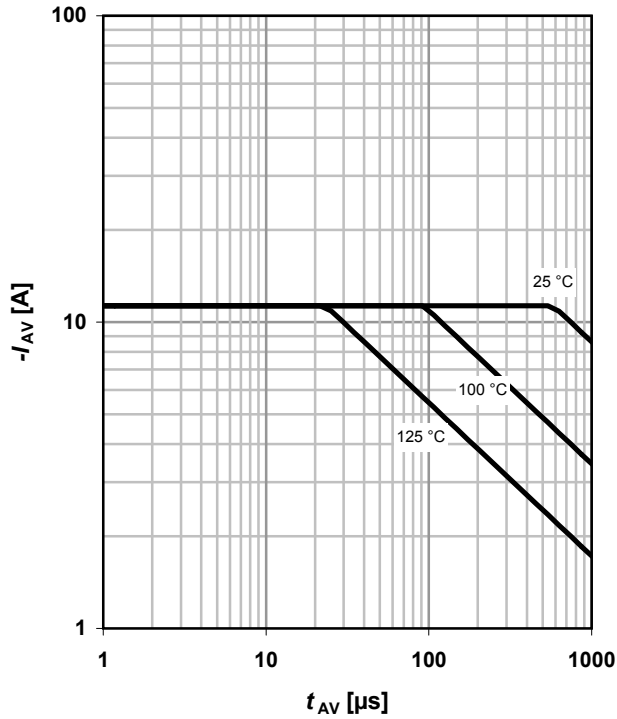
parameter:  $T_j$



**13 Avalanche characteristics**

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

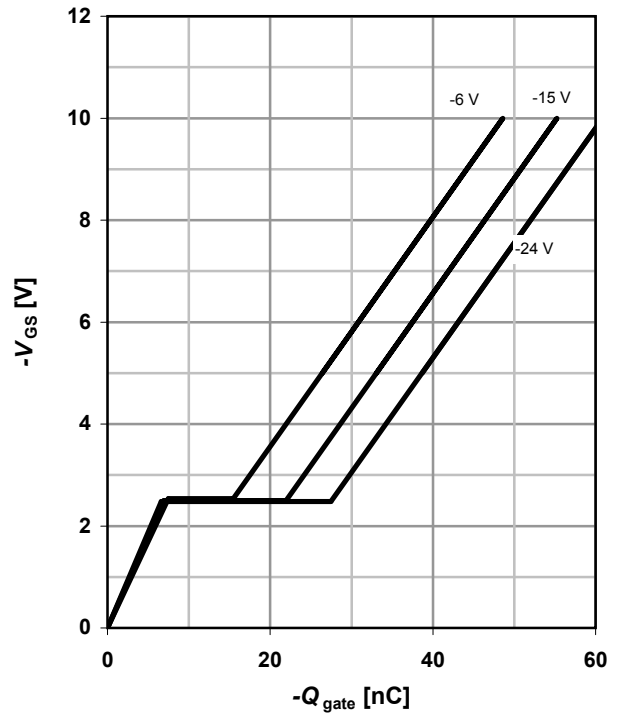
parameter:  $T_{j(\text{start})}$



**14 Typ. gate charge**

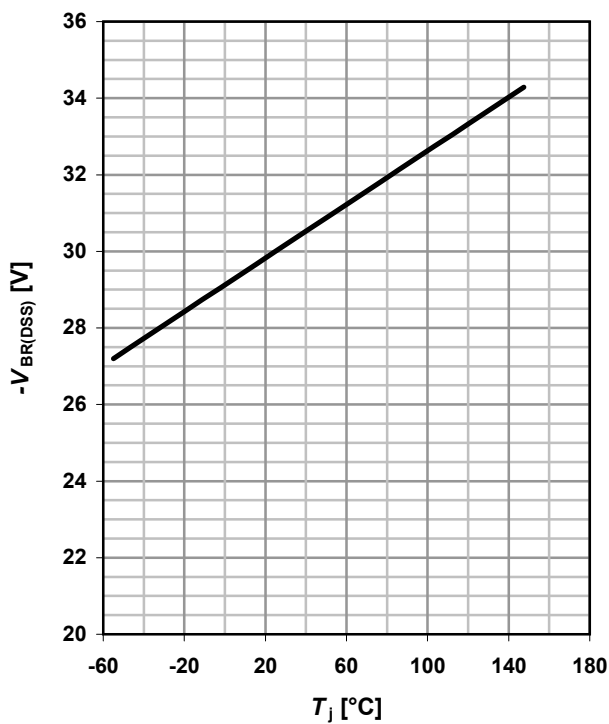
$V_{GS}=f(Q_{\text{gate}}); I_D=-5.5 \text{ A pulsed}$

parameter:  $V_{DD}$

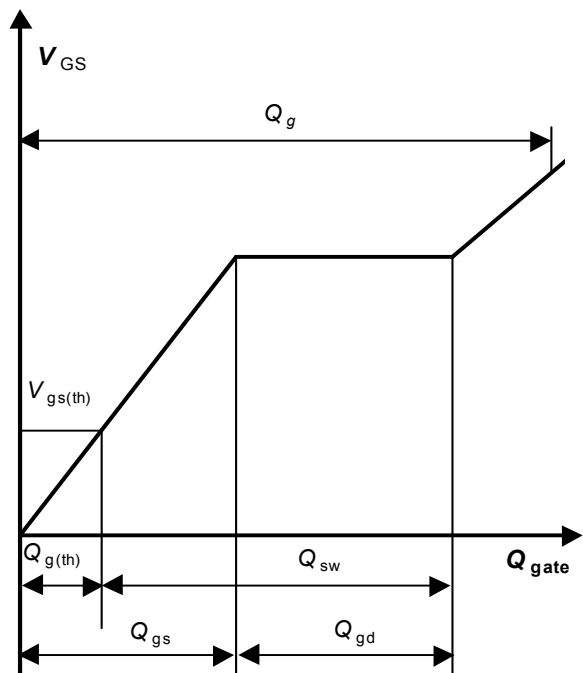


**15 Drain-source breakdown voltage**

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

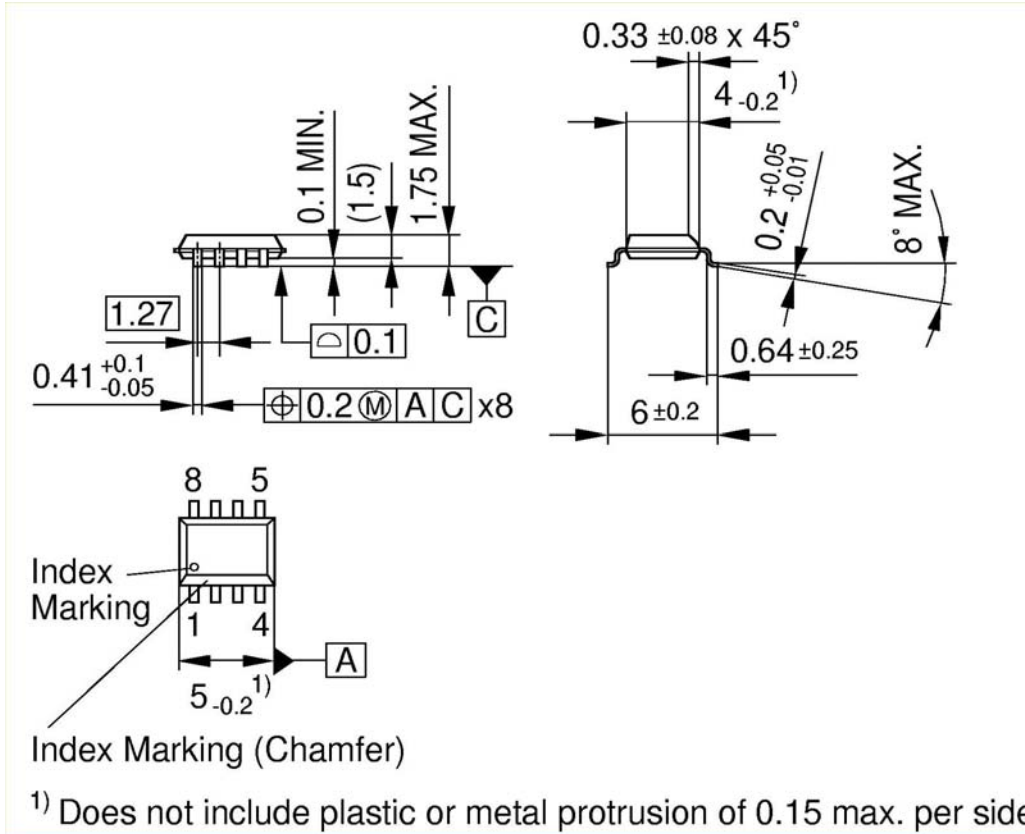


**16 Gate charge waveforms**



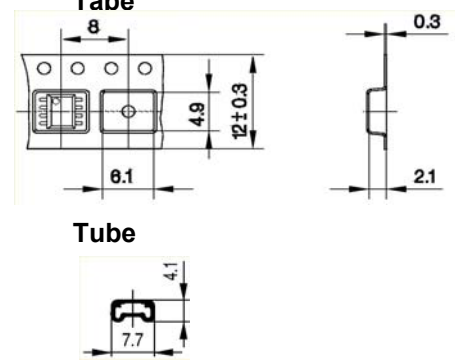
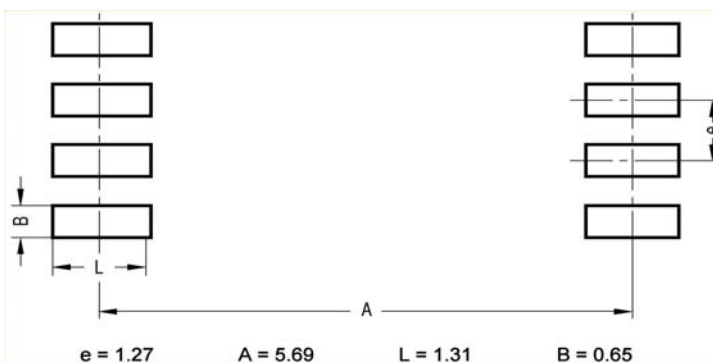
Package Outline

P-DSO-8: Outline



Footprint

Packaging



Dimensions in mm



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