

OptiMOS®-P Power-Transistor

Features

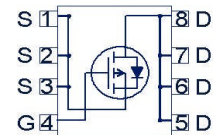
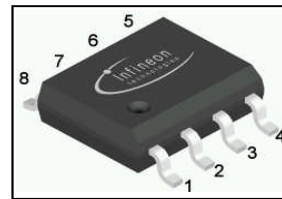
- single P-Channel in SO8
- Enhancement mode
- Logic level
- 150°C operating temperature
- Qualified according JEDEC for trarget applications
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21



Product Summary

V_{DS}		-30	V
$R_{DS(on),max}$	$V_{GS}=-10\text{ V}$	21	mΩ
	$V_{GS}=-4.5\text{ V}$	31	mΩ
I_D		-9.1	A

PG-DSO-8



Type	Package	Marking	Lead free	Halogen free	packing
BSO303SP H	PG-DSO-8	303SP	Yes	Yes	dry

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

Parameter	Symbol	Conditions	Value		Unit
			≤10 secs	steady state	
Continuous drain current ¹⁾	I_D	$T_A=25\text{ °C}$	-9.1	-7.2	A
		$T_A=70\text{ °C}$	-7.1	-5.8	
		$T_A=25\text{ °C}$	-8.9	-7.2	A
		$T_A=70\text{ °C}$	-7.1	-5.8	
Pulsed drain current ²⁾	$I_{D,pulse}$	$T_A=25\text{ °C}^{2)}$	-36		
Avalanche energy, single pulse	E_{AS}	$I_D = -9.1\text{ A}, R_{GS}=25\text{ Ω}$	97		mJ
Gate source voltage	V_{GS}		±20		V
Power dissipation	P_{tot}	$T_A=25\text{ °C}^{1)}$	2.50	1.56	W
Operating and storage temperature	T_J, T_{stg}		-55 ... 150		°C
ESD class		JESD22-A114 HBM	1B (500V - 1 kV)		
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 - 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 ² cooling area ¹⁾ , $t_p \leq 10$ s	-	-	50	
		6 cm ² cooling area ¹⁾ , 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, $I_D = -250$ μ A	-30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -100$ μ A	-1	-1.5	-2	
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -30$ V, $V_{GS} = 0$ V, $T_j = 25$ °C	-	-0.1	-1	μ A
		$V_{DS} = -30$ V, $V_{GS} = 0$ V, $T_j = 150$ °C	-	-10	-100	
Gate-source leakage current	I_{GSS}	$V_{GS} = -20$ V, $V_{DS} = 0$ V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = -4.5$ V, $I_D = -7.8$ A	-	22	31	m Ω
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = -10$ V, $I_D = -9.1$ A	-	15	21	
Transconductance	g_{fs}	$ V_{DS} > 2 I_D R_{DS(on)max}$, $I_D = -7.3$ A	12	19	-	S

¹⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μ 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}	$V_{GS}=0\text{ V},$ $V_{DS}=-25\text{ V}, f=1\text{ MHz}$	-	1750	2330	pF
Output capacitance	C_{oss}		-	470	625	
Reverse transfer capacitance	C_{rss}		-	390	580	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-15\text{ V},$ $V_{GS}=-10\text{ V},$ $I_D=-1\text{ A}, R_G=6\ \Omega$	-	10	15	ns
Rise time	t_r		-	11	17	
Turn-off delay time	$t_{d(off)}$		-	42	63	
Fall time	t_f		-	33	50	

Gate Charge Characteristics³⁾

Gate to source charge	Q_{gs}	$V_{DD}=-24\text{ V}, I_D=9.1\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$	-	-4.8	-6.4	nC
Gate charge at threshold	$Q_{g(th)}$		-	-2.6	-3.5	
Gate to drain charge	Q_{gd}		-	-14	-21	
Switching charge	Q_{sw}		-	-16	-24	
Gate charge total	Q_g		-	-40	-54	
Gate plateau voltage	$V_{plateau}$		-	-2.7	-	V
Output charge	Q_{oss}	$V_{DD}=-15\text{ V}, V_{GS}=0\text{ V}$	-	-14	-19	

Reverse Diode

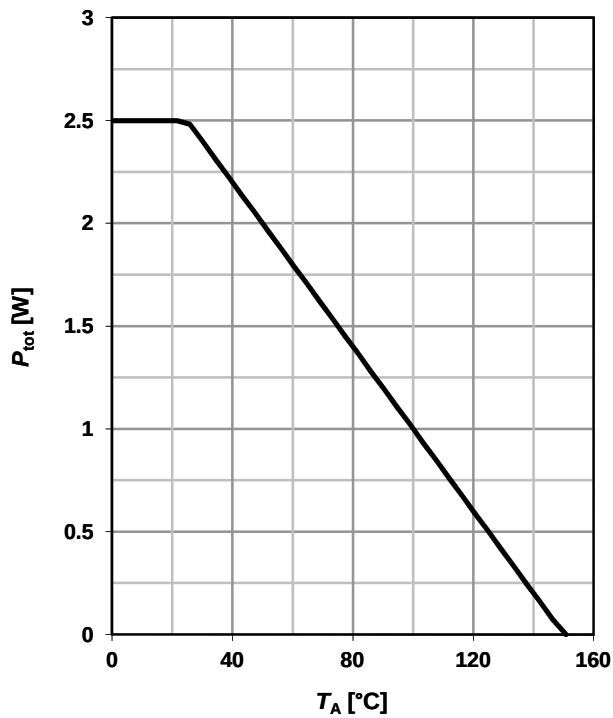
Diode continuous forward current	I_S	$T_A=25\text{ °C}$	-	-	-2.1	A
Diode pulse current	$I_{S,pulse}$		-	-	-36.5	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=-9.1\text{ A},$ $T_J=25\text{ °C}$	-	-0.88	-1.2	V
Reverse recovery time	t_{rr}	$V_R=15\text{ V}, I_F=-9.1\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	19	24	ns
Reverse recovery charge	Q_{rr}		-	9	11	nC

²⁾ See figure 3

³⁾ See figure 16 for gate charge parameter definition

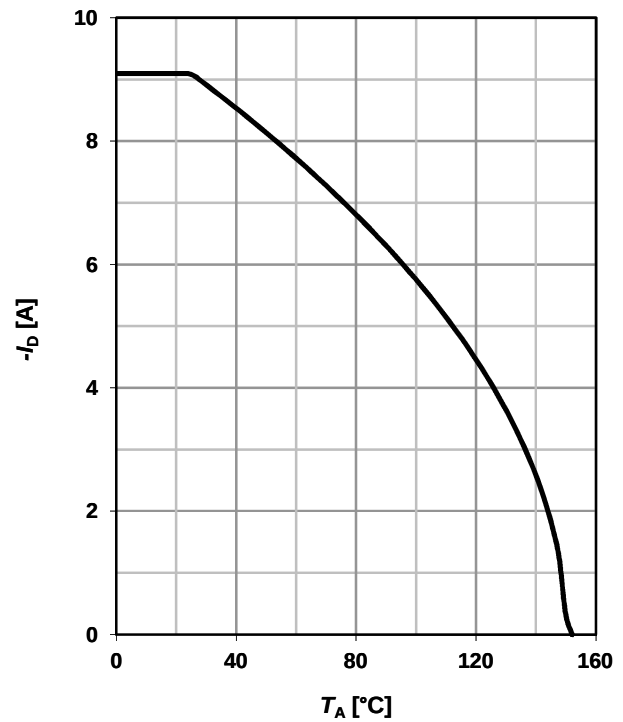
1 Power dissipation

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



2 Drain current

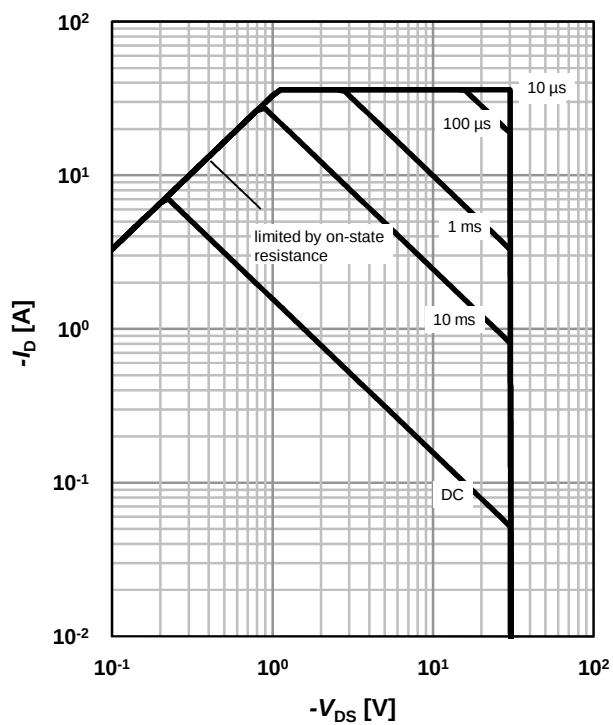
$$I_D = f(T_A); |V_{GS}| \geq 10 \text{ V}; t_p \leq 10 \text{ s}$$



3 Safe operating area

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

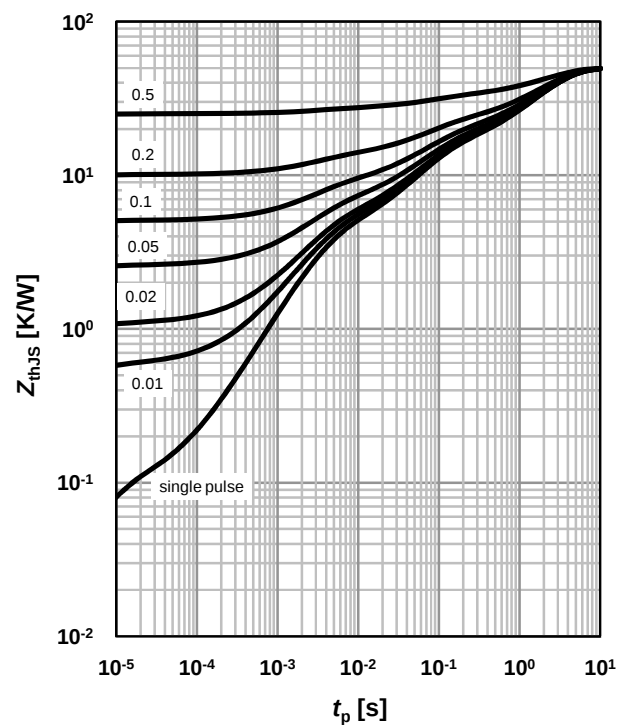
parameter: t_p



4 Max. transient thermal impedance

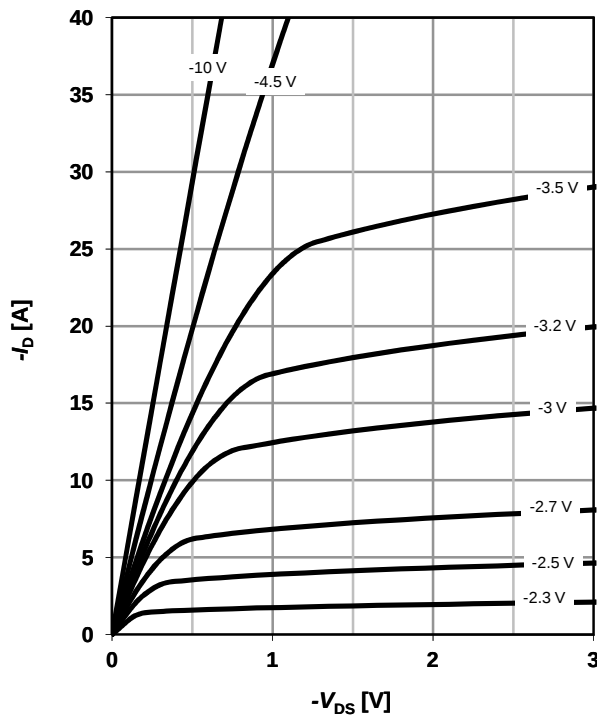
$$Z_{\text{thJS}} = f(t_p)$$

parameter: $D = t_p/T$



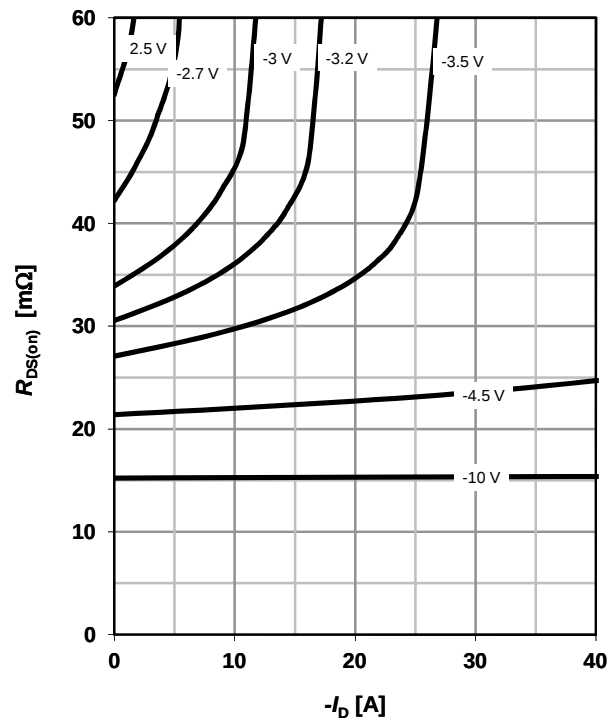
5 Typ. output characteristics

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

parameter: V_{GS}


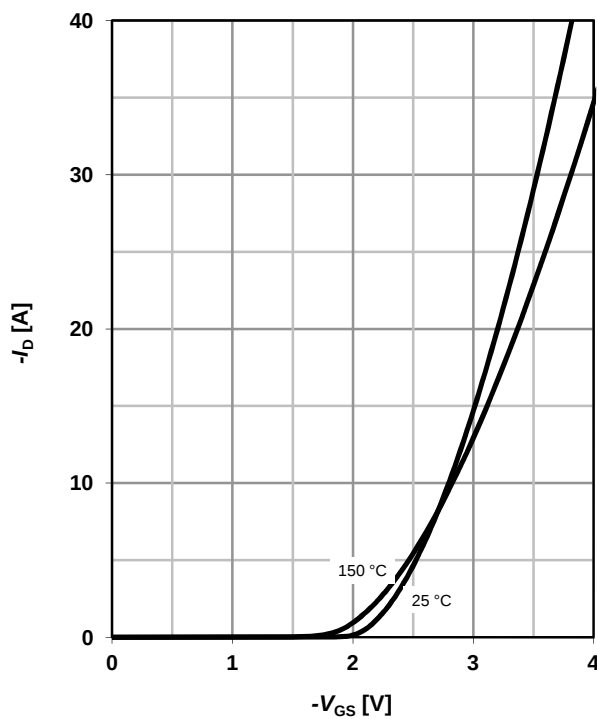
6 Typ. drain-source on resistance

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

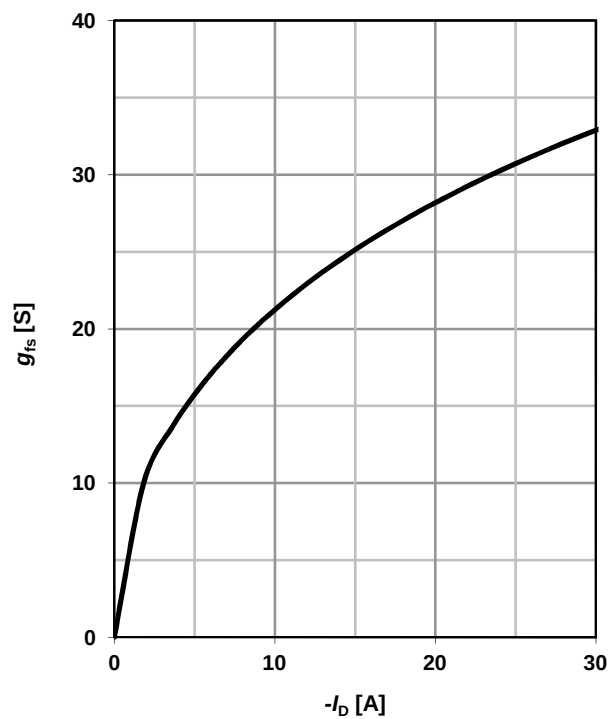
parameter: V_{GS}


7 Typ. transfer characteristics

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

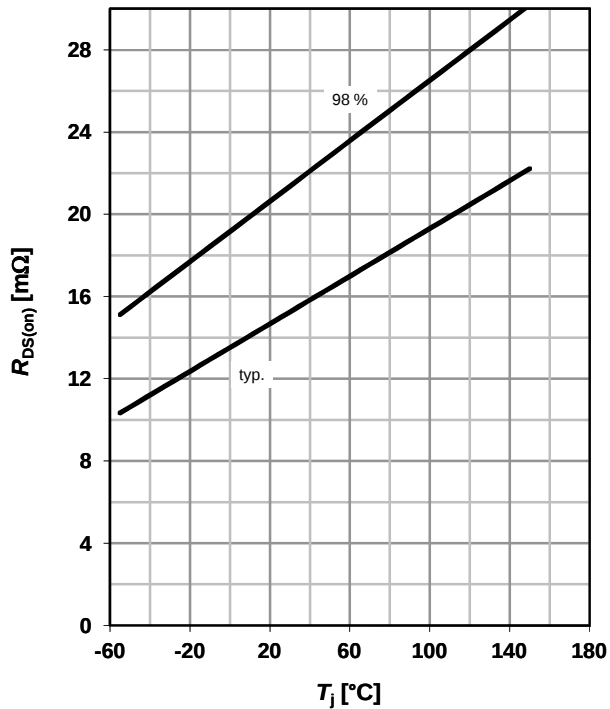
parameter: T_j


8 Typ. forward transconductance

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


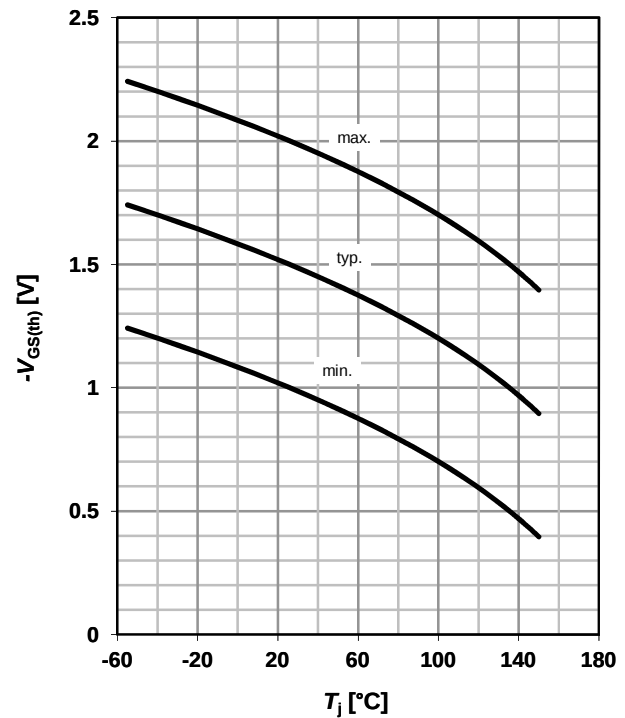
9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j); I_D = -9.1 \text{ A}; V_{GS} = -10 \text{ V}$$



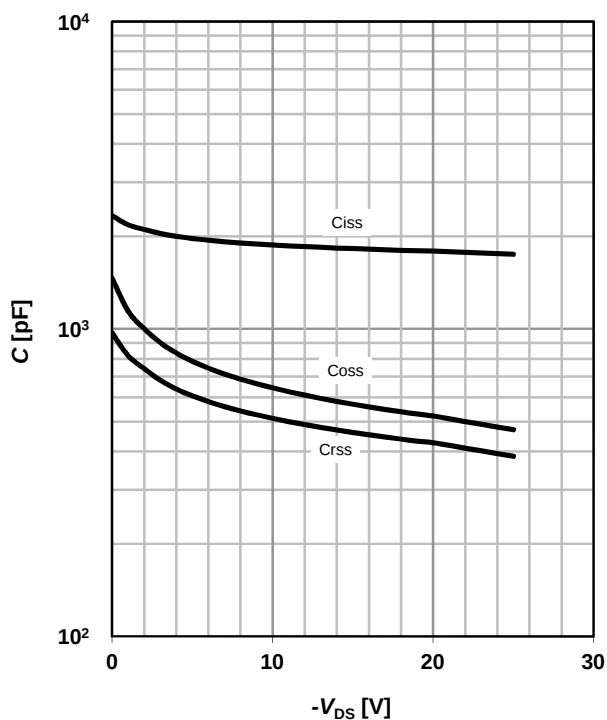
10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -100 \text{ μA}$$



11 Typ. capacitances

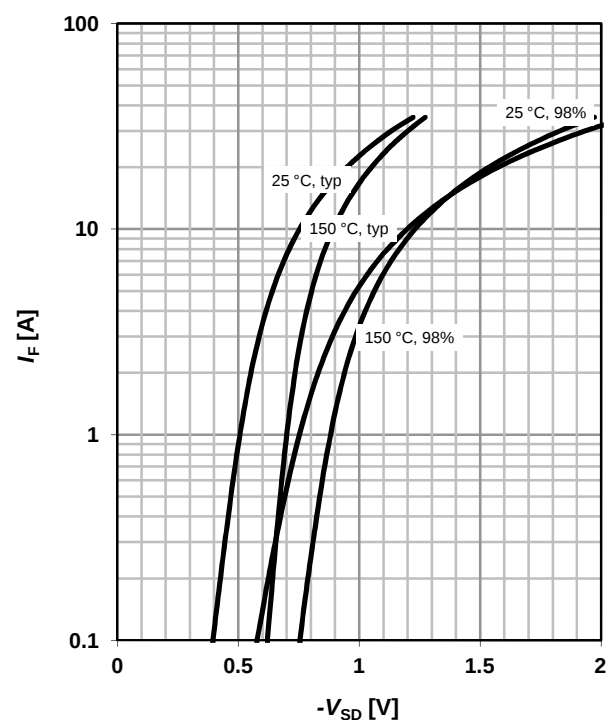
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



12 Forward characteristics of reverse diode

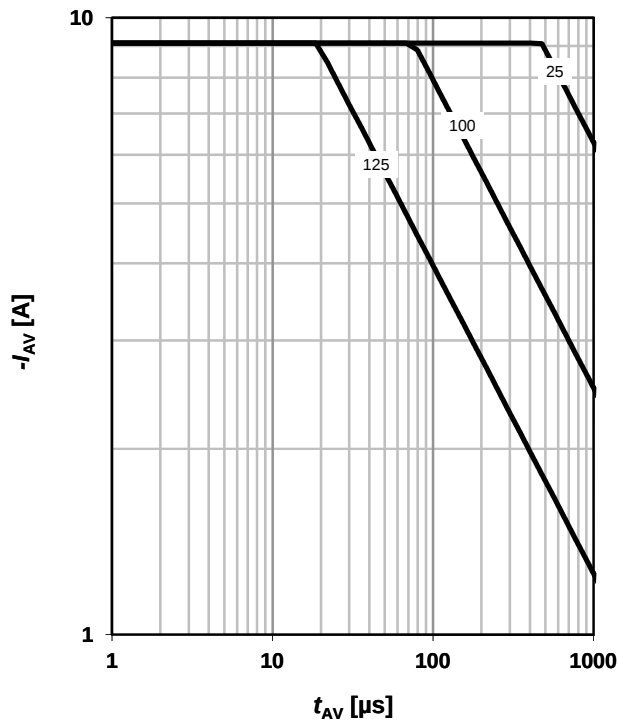
$$I_F = f(V_{SD})$$

parameter: T_j



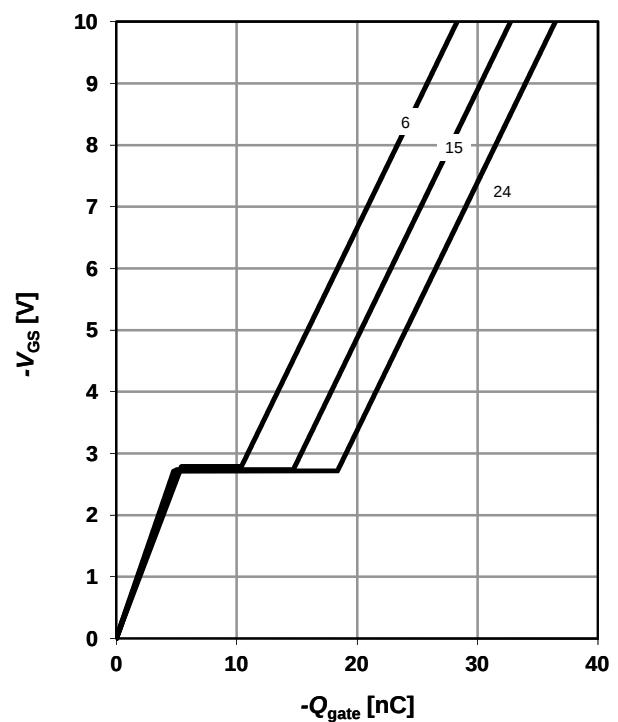
13 Avalanche characteristics

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

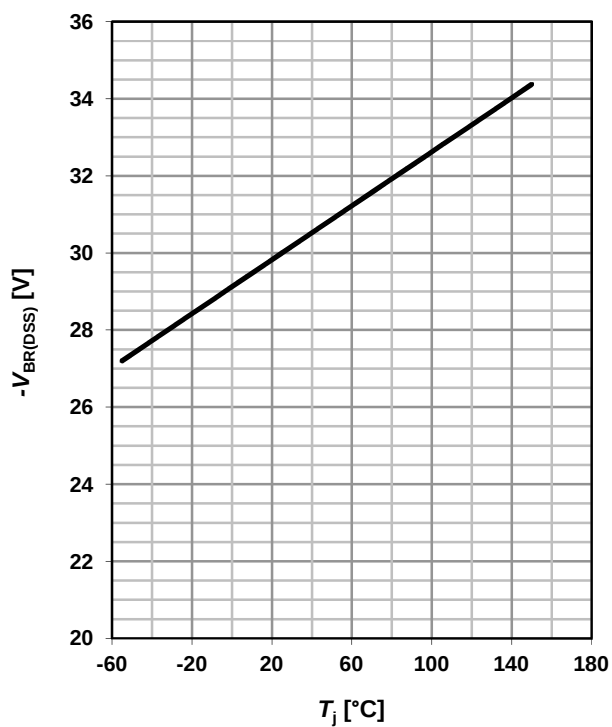
parameter: $T_{j(\text{start})}$


14 Typ. gate charge

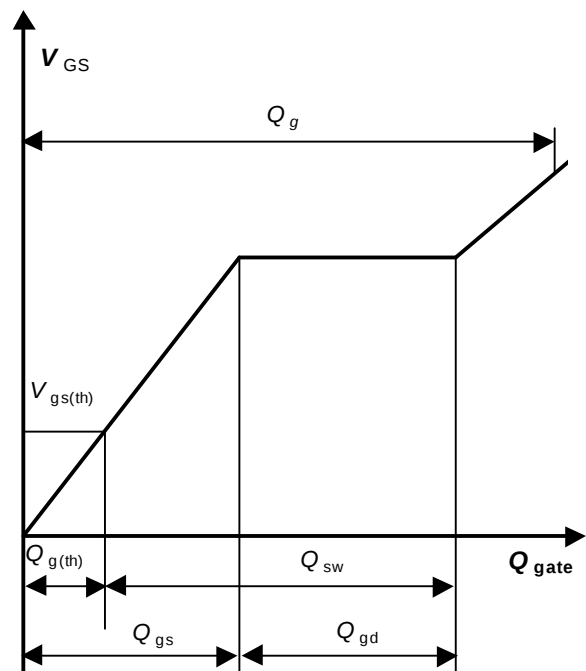
 $V_{GS}=f(Q_{gate}); I_D=-9.1\text{ A pulsed}$

parameter: V_{DD}


15 Drain-source breakdown voltage

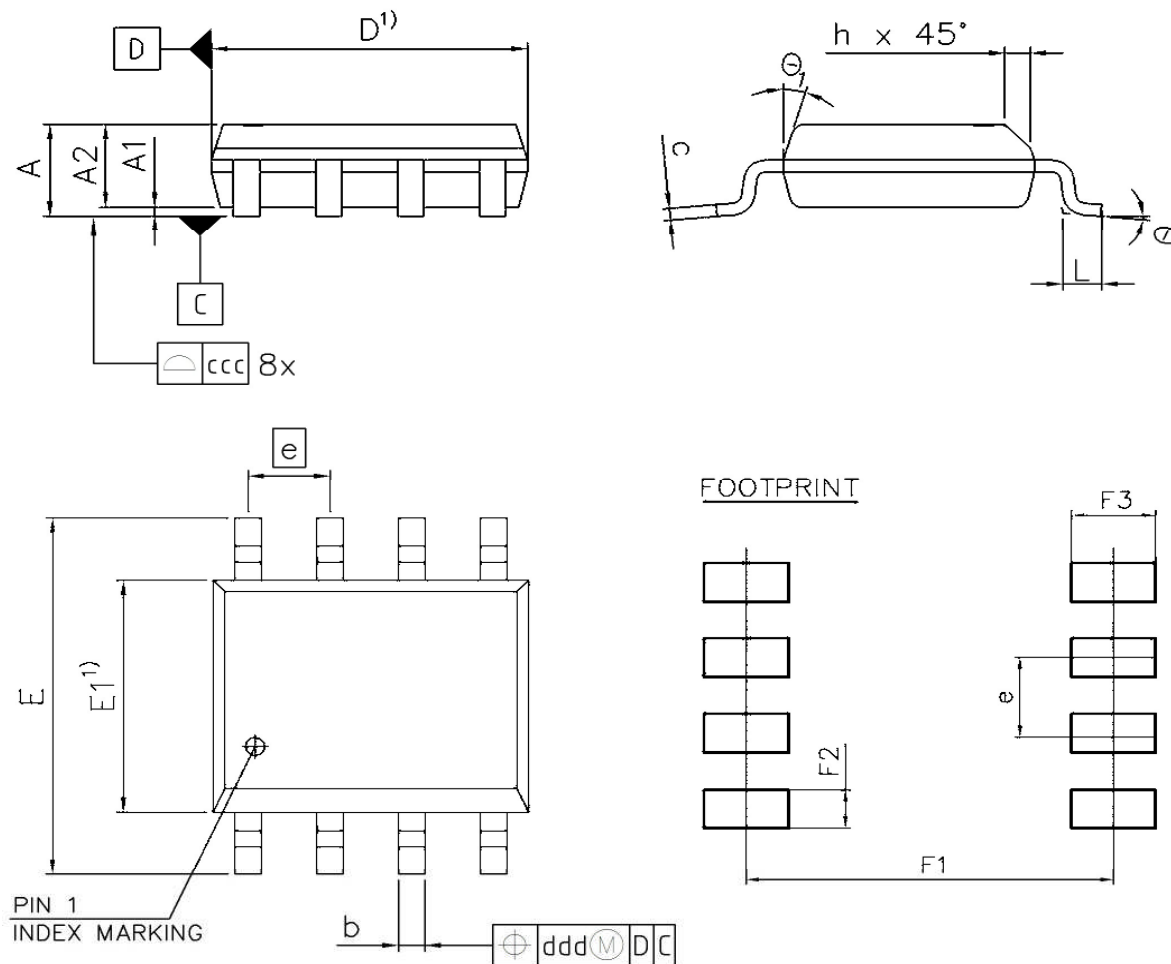
 $V_{BR(DSS)}=f(T_j); I_D=-250\ \mu\text{A}$


16 Gate charge waveforms



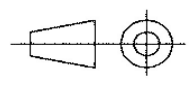
Package Outline

P-DSO-8: Outline



1) DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	1.75	-	0.069
A1	0.10	-	0.004	-
A2	1.25	1.65	0.049	0.065
b	0.35	0.51	0.014	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27		0.050	
N	8		8	
L	0.39	0.89	0.015	0.035
h	0.23	0.50	0.009	0.020
Θ	0°	8°	0°	8°
Θ ₁	-	19°	-	19°
ccc	0.10		0.004	
ddd	0.25		0.010	
F1	5.59	5.79	0.220	0.228
F2	0.55	0.75	0.022	0.030
F3	1.21	1.41	0.048	0.056

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