

OptiMOS™2 Power-Transistor

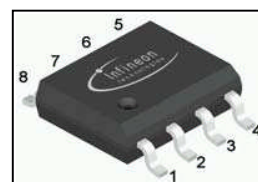
Features

- Fast switching MOSFET for SMPS
- Optimized technology for notebook DC/DC converters
- Qualified according to JEDEC¹⁾ for target applications
- N-Channel
- Logic level
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- Superior thermal resistance
- Avalanche rated
- Pb-free plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

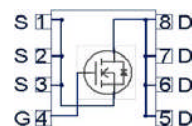
Product Summary

V_{DS}	30	V
$R_{DS(on),max}$	6.8	mΩ
I_D	15	A

PG-DSO-8



Type	Package	Marking
BSO072N03S	PG-DSO-8	072N3S



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	$T_A=25\text{ °C}^{(2)}$	15	12	A
		$T_A=70\text{ °C}^{(2)}$	12	9.6	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}^{(3)}$	60		
Avalanche energy, single pulse	E_{AS}	$I_D=15\text{ A}$, $R_{GS}=25\text{ Ω}$	145		mJ
Reverse diode dv/dt	dv/dt	$I_D=15\text{ A}$, $V_{DS}=20\text{ V}$, $di/dt=200\text{ A/μs}$, $T_{j,max}=150\text{ °C}$	6		kV/μs
Gate source voltage	V_{GS}		±20		V
Power dissipation	P_{tot}	$T_A=25\text{ °C}^{(2)}$	2.5	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 ² cooling area ²⁾ , $t_p \leq 10$ s	-	-	50	
		6 cm ² cooling area ²⁾ , 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, $I_D=1$ mA	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=45$ μ A	1.2	1.6	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, $T_j=125$ °C	-	10	100	
Gate-source leakage current	I_{GSS}	$V_{GS}=20$ V, $V_{DS}=0$ V	-	10	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5$ V, $I_D=13$ A	-	7.4	9.3	m Ω
		$V_{GS}=10$ V, $I_D=15$ A	-	5.7	6.8	
Gate resistance	R_G		-	1	-	Ω
Transconductance	g_{fs}	$ V_{DS} > 2 I_D R_{DS(on)max}$, $I_D=15$ A	24	47	-	S

¹⁾ J-STD20 and JESD22

²⁾ 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.

³⁾ See figure 3

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics

Thermal resistance,	θ_{JA}	C_{iss}	-	2430	3230	pF
Thermal resistance,	θ_{JC}	C_{oss}	-	865	1150	
Reverse transfer capacitance		C_{rss}	-	110	160	
Turn-on delay time		$t_{d(on)}$	-	6.5	10	ns
Rise time		t_r	-	5.4	8.1	
Turn-off delay time		$t_{d(off)}$	-	27	40	
Fall time		t_f	-	4.0	6.0	

Gate Charge Characteristics⁴⁾

Gate to source charge	Q_{gs}	$V_{DD}=15\text{ V}, I_D=7.5\text{ A},$ $V_{GS}=0\text{ to }5\text{ V}$	-	6.6	8.8	nC
Gate charge at threshold	$Q_{g(th)}$		-	3.9	5.2	
Gate to drain charge	Q_{gd}		-	4.5	6.7	
Switching charge	Q_{sw}		-	7.2	10	
Gate charge total	Q_g		-	19	25	
Gate plateau voltage	$V_{plateau}$		-	2.7	-	V
Gate charge total, sync. FET	$Q_{g(sync)}$	$V_{DS}=0.1\text{ V},$ $V_{GS}=0\text{ to }5\text{ V}$	-	16	22	nC
Output charge	Q_{oss}	$V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$	-	21	27	

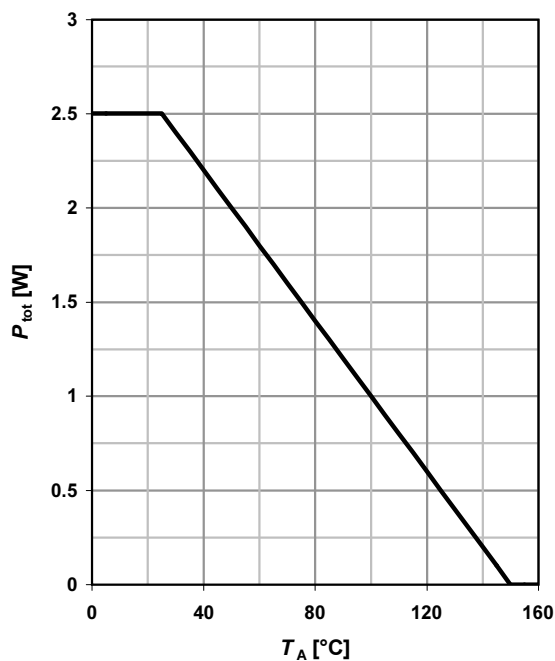
Reverse Diode

Diode continuous forward current	I_S	$T_A=25\text{ °C}$	-	-	2.5	A
Diode pulse current	$I_{S,pulse}$		-	-	60	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=2.5\text{ A},$ $T_j=25\text{ °C}$	-	0.73	1	V
Reverse recovery charge	Q_{rr}	$V_R=15\text{ V}, I_F=I_S,$ $di_F/dt=400\text{ A}/\mu\text{s}$	-	-	10	nC

⁴⁾ See figure 16 for gate charge parameter definition

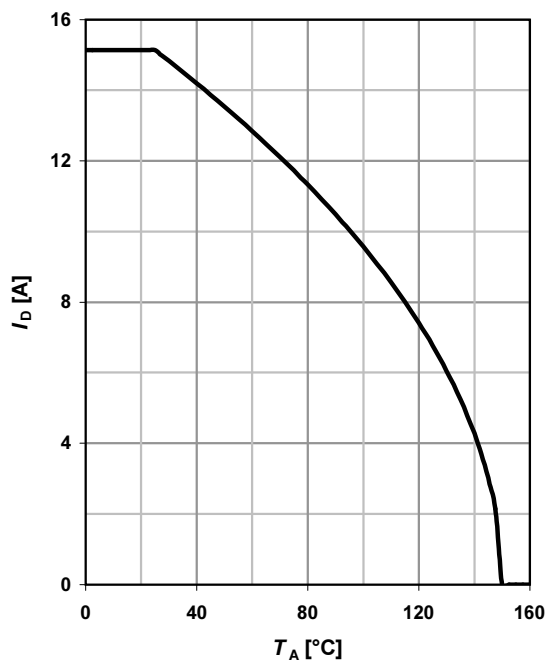
1 Power dissipation

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



2 Drain current

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



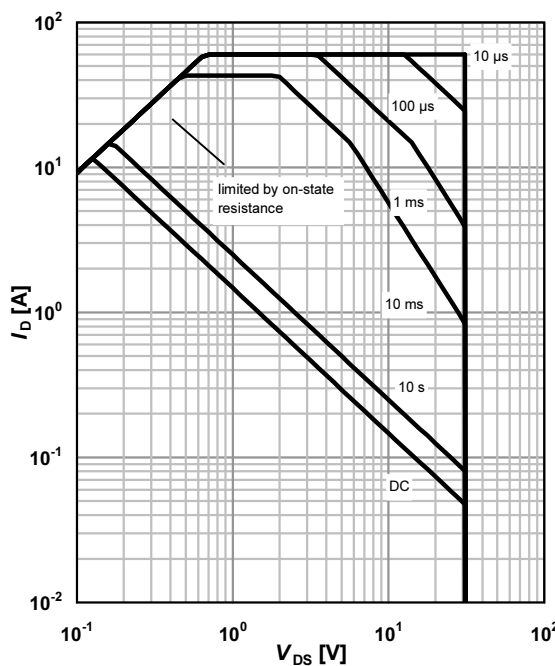
3 Safe operating area

Thermal resistance,

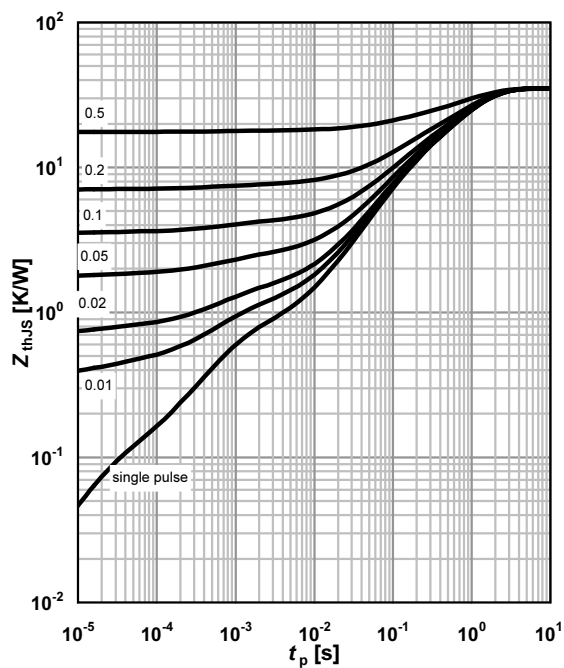
Thermal resistance,

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

junction - ambient parameter: $D = t_p / T$



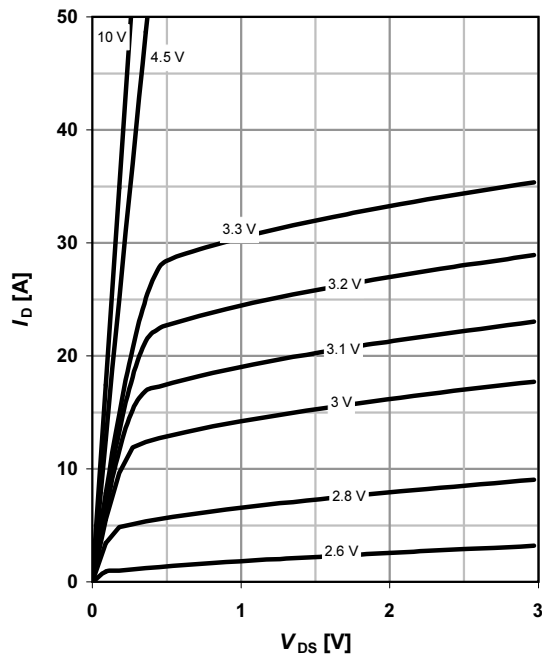
4 Max. transient thermal impedance



5 Typ. output characteristics

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

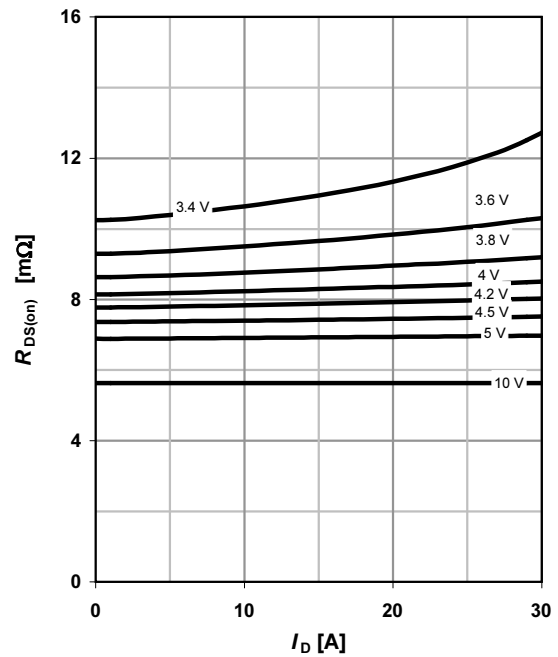
parameter: V_{GS}



6 Typ. drain-source on resistance

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

parameter: V_{GS}



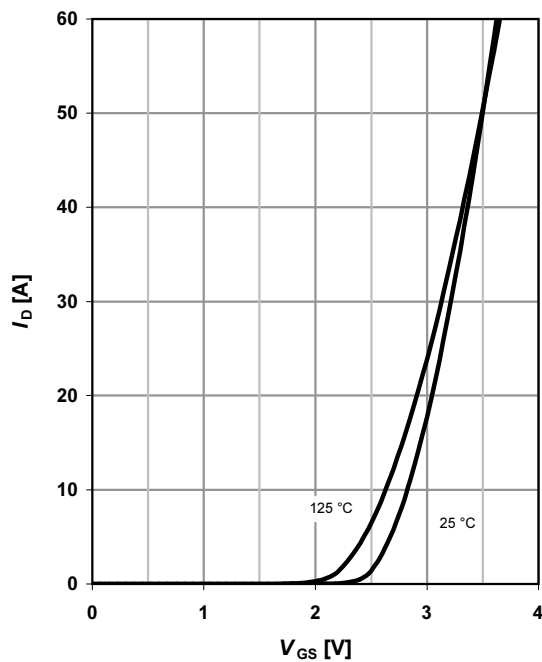
7 Typ. transfer characteristics

Thermal resistance,

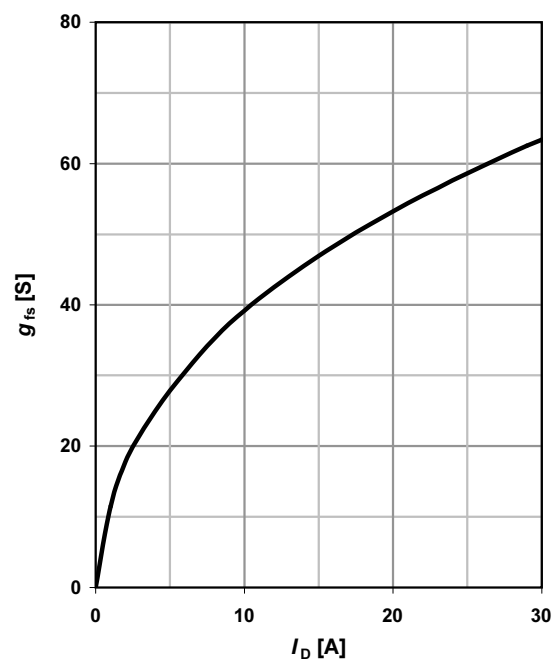
$$g_{fs} = f(I_D); T_J = 25^\circ\text{C}$$

Thermal resistance,

junction - ambient

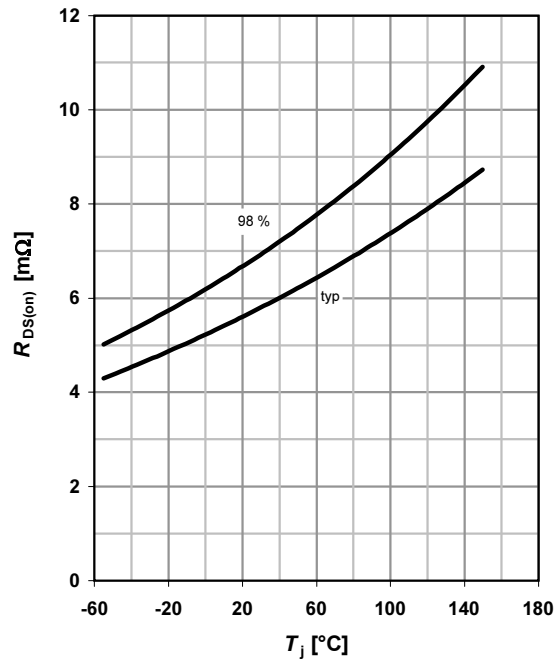


8 Typ. forward transconductance



9 Drain-source on-state resistance

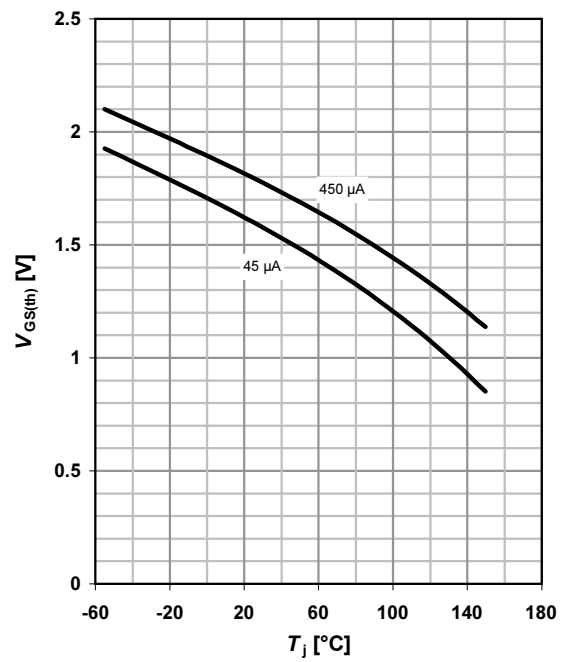
$$R_{DS(on)} = f(T_j); I_D = 15 \text{ A}; V_{GS} = 10 \text{ V}$$



10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

parameter: I_D



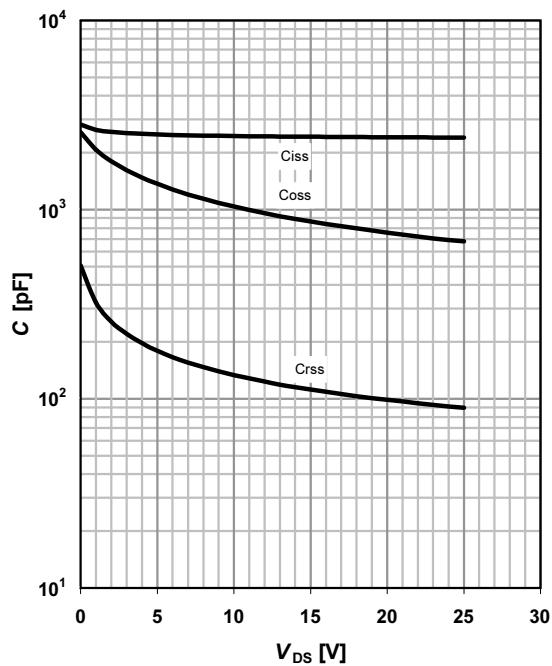
11 Typ. capacitances

Thermal resistance,

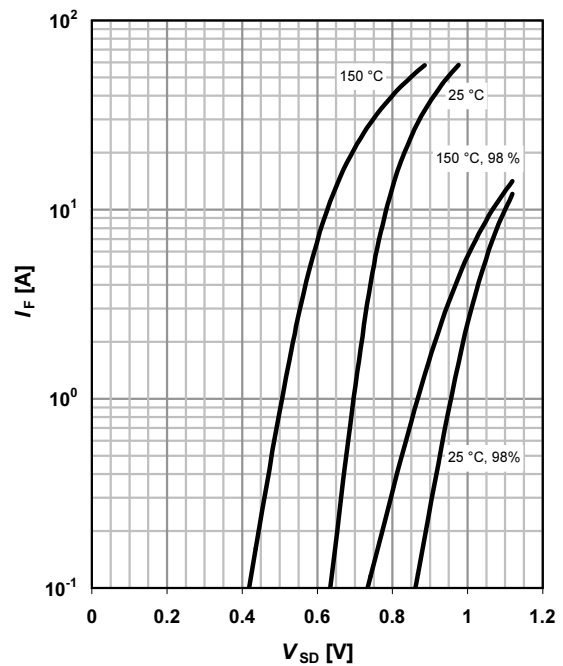
junction - solderir $I_F = f(V_{SD})$

Thermal resistance,

junction - ambient parameter: T_j



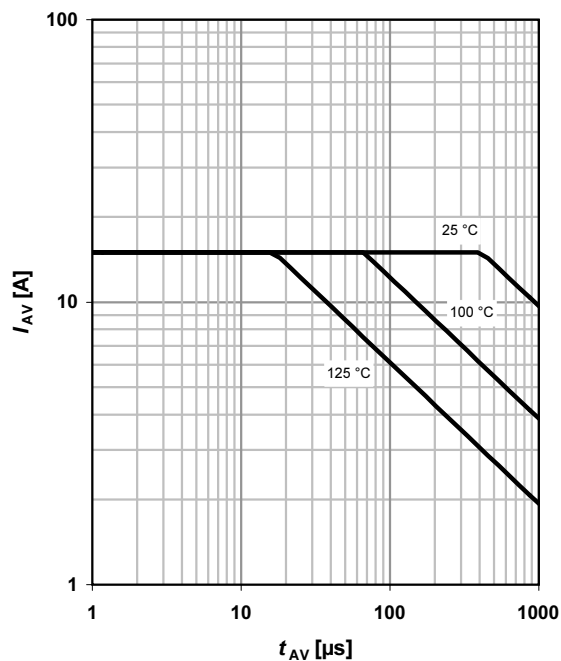
12 Forward characteristics of reverse diode



13 Avalanche characteristics

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

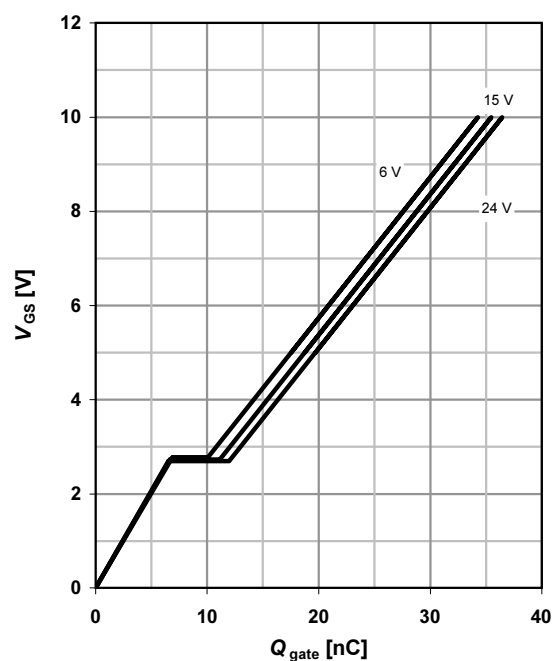
parameter: $T_{j(\text{start})}$



14 Typ. gate charge

$$V_{GS}=f(Q_{gate}); I_D=7.5\ \text{A pulsed}$$

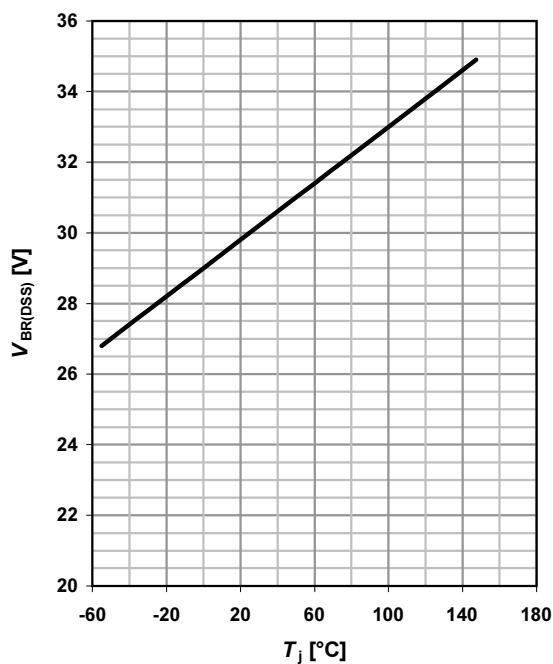
parameter: V_{DD}



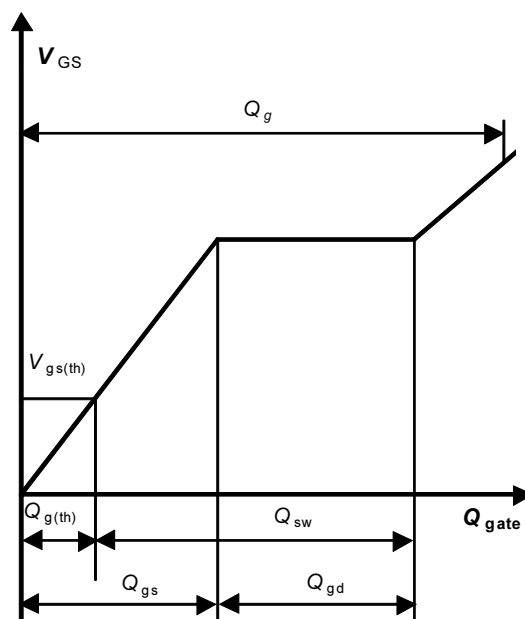
15 Drain-source breakdown voltage

Thermal resistance, junction - soldering point

Thermal resistance, junction - ambient

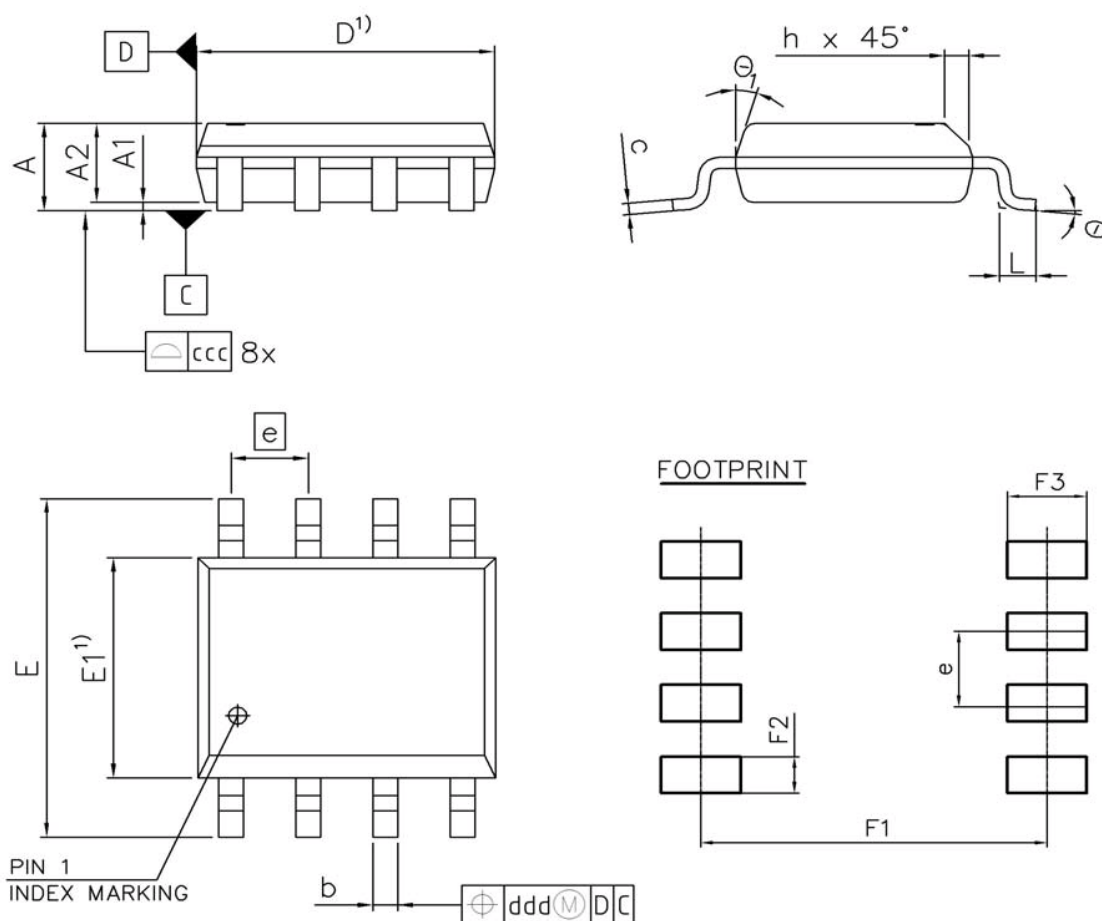


16 Gate charge waveforms



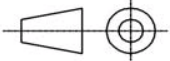
Package Outline

PG-DSO-8



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
theta	0°	8°	0°	8°
theta1	-	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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