OptiMOS™ P3 Power-Transistor

Features

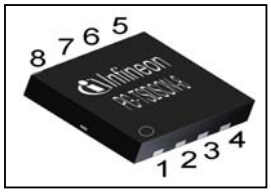
- single P-Channel in S3O8
- Qualified according JEDEC[1] for target applications
- 150 °C operating temperature
- V_{GS}=25 V, specially suited for notebook applications
- Pb-free; RoHS compliant
- ESD protected
- applications: battery management, load switching
- Halogen-free according to IEC61249-2-21

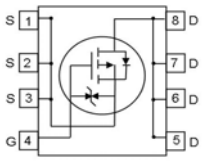
RoHS Halogen-Free

Product Summary

V_{DS}	-30	V
$R_{DS(on),max}$	12	mΩ
I_D	-40	A

PG-TSDSON-8





Type	Package	Marking	Lead free	Halogen free	Packing
BSZ120P03NS3E G	PG-TSDSON-8	120P3NE	Yes	Yes	non-dry

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	T_C=25 °C	-40.0	A
		T_C=70 °C	-40	
		T_A=25 °C[2]	-11.0	
Pulsed drain current	$I_{D,pulse}$	T_C=25 °C[3]	-160	
Avalanche energy, single pulse	E_{AS}	I_D=-20 A, R_{GS}=25 Ω	73	mJ
Gate source voltage	V_{GS}		±25	V
Power dissipation	P_{tot}	T_A=25 °C	52	W
		T_A=25 °C[2]	2.1	
Operating and storage temperature	T_j, T_{stg}		-55 … 150	°C
ESD class		JESD22-A114 HBM	class 2 (> 2 kV)	
Soldering temperature			260	°C
IEC climatic category; DIN IEC 68-1			55/150/56	

[1] J-STD20 and JESD22

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - case	R_{thJC}		-	-	2.4	K/W
Thermal resistance, junction - ambient	R_{thJA}	6 cm^2 cooling area[2)]	-	-	60	
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=-250µA	-30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-73 µA	-3.1	-2.5	-1.9	
Zero gate voltage drain current	I_{DSS}	V_{DS}=-30 V, V_{GS}=0 V, T_j=25 °C	-	-	-1	µA
		V_{DS}=-30 V, V_{GS}=0 V, T_j=125 °C	-	-	-100	
Gate-source leakage current	I_{GSS}	V_{GS}=-25 V, V_{DS}=0 V	-	-	-10	µA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=-6 V, I_D=-20 A	-	12.0	20.0	mΩ
		V_{GS}=-10 V, I_D=-20 A	-	9.0	12.0	
Gate resistance	R_G		-	2.2	-	Ω
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=-20 A	22	36	-	S

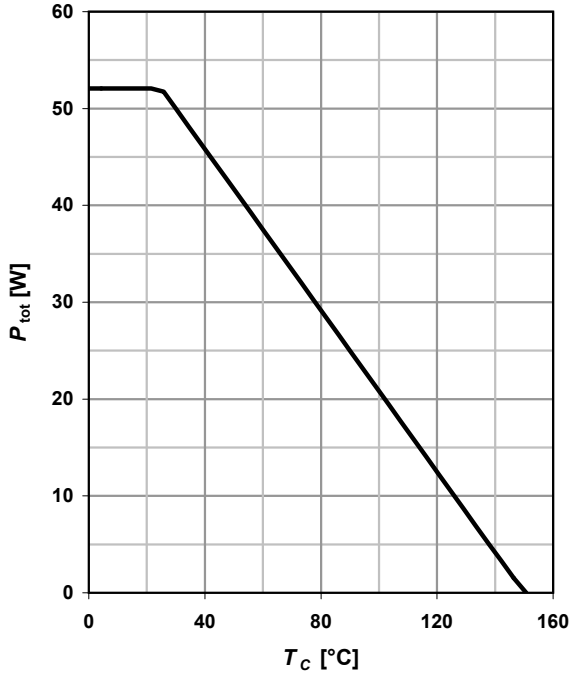
[2)] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm^2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

[3)] See Fig. 3 for more detailed information

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=-15 V, f=1 MHz	-	2240	3360	pF
Output capacitance	C_{oss}		-	1090	1635	
Reverse transfer capacitance	C_{rss}		-	74	111	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-15 V, V_{GS}=-10 V, I_D=-20 A, R_G=6 Ω	-	13	20	ns
Rise time	t_r		-	11	17	
Turn-off delay time	$t_{d(off)}$		-	23	35	
Fall time	t_f		-	5	8	
Gate Charge Characteristics[3)]						
Gate to source charge	Q_{gs}	V_{DD}=-15 V, I_D=20 A, V_{GS}=0 to -10 V	-	11	17	nC
Gate charge at threshold	$Q_{g(th)}$		-	4	6	
Gate to drain charge	Q_{gd}		-	5	8	
Switching charge	Q_{sw}		-	13	20	
Gate charge total	Q_g		-	30	45	
Gate plateau voltage	$V_{plateau}$		-	4.6	-	V
Output charge	Q_{oss}	V_{DD}=-15 V, V_{GS}=0 V	-	25	38	nC
Reverse Diode						
Diode continous forward current	I_S	T_C=25 °C	-	-	40	A
Diode pulse current	$I_{S,pulse}$		-	-	160	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=-20 A, T_j=25 °C	-	-	-1.1	V
Reverse recovery time	t_{rr}	V_R=15 V, I_F=$\|I_S\|$, di_F/dt=100 A/µs	-	47	-	ns
Reverse recovery charge	Q_{rr}		-	55	-	nC

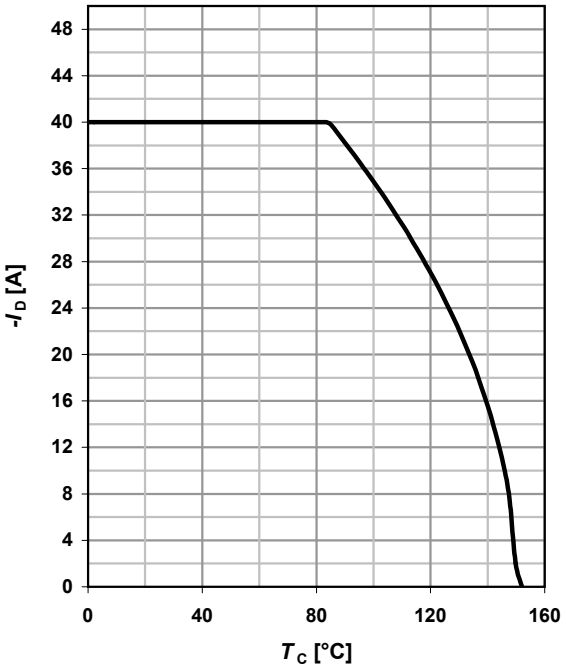
1 Power dissipation

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



2 Drain current

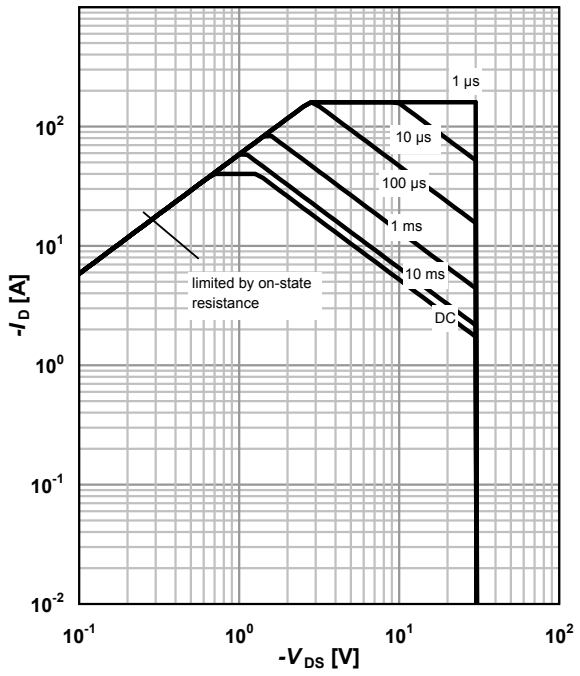
$I_D=f(T_C)$; $|V_{GS}| \geq 10$ V; $t_p \leq 10$ s



3 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C[1)]; $D=0$

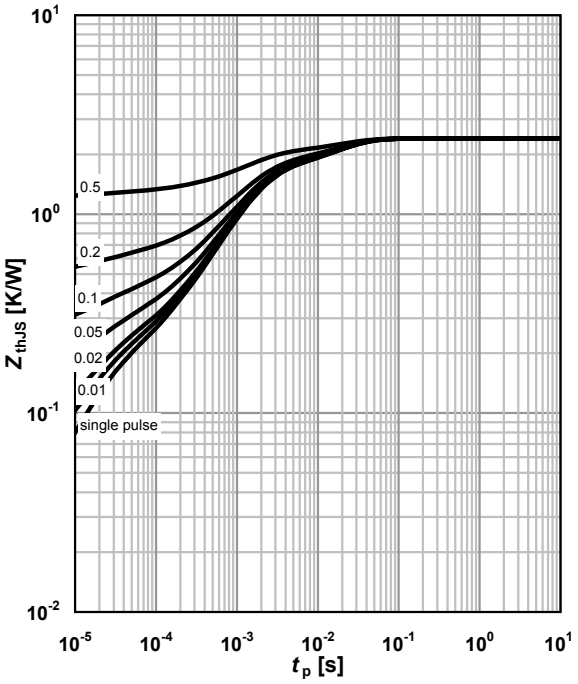
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJS}=f(t_p)$

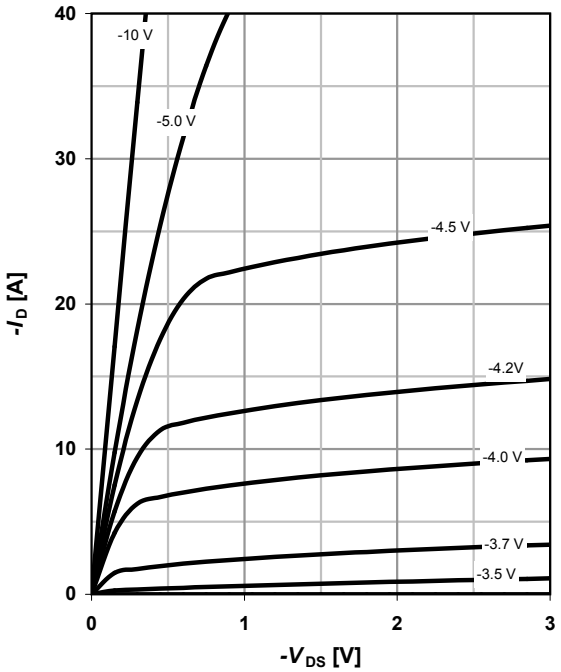
parameter: $D=t_p/T$



5 Typ. output characteristics

I_D=f(V_{DS}); T_j=25 °C

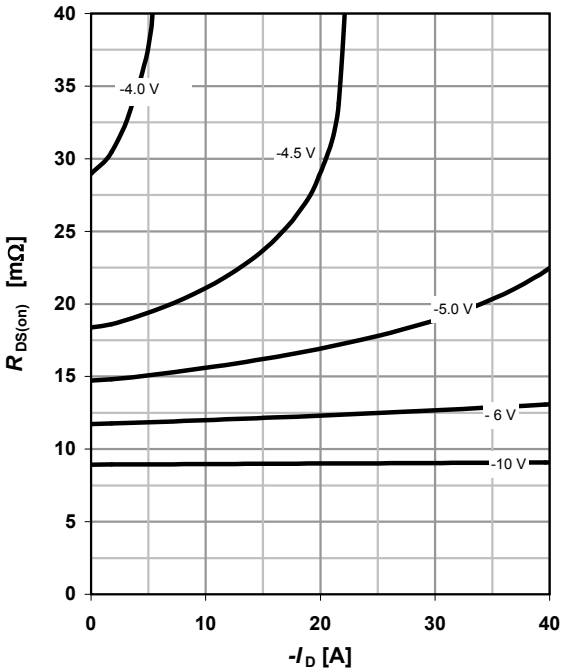
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)}$=f(I_D); T_j=25 °C

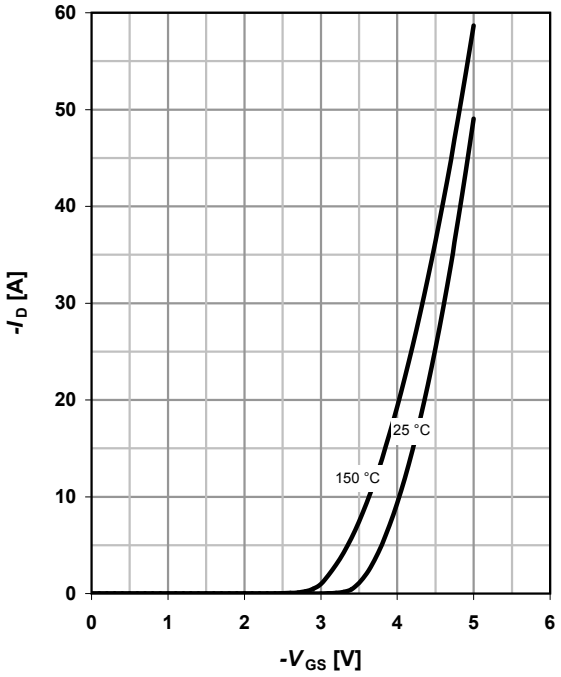
parameter: V_{GS}



7 Typ. transfer characteristics

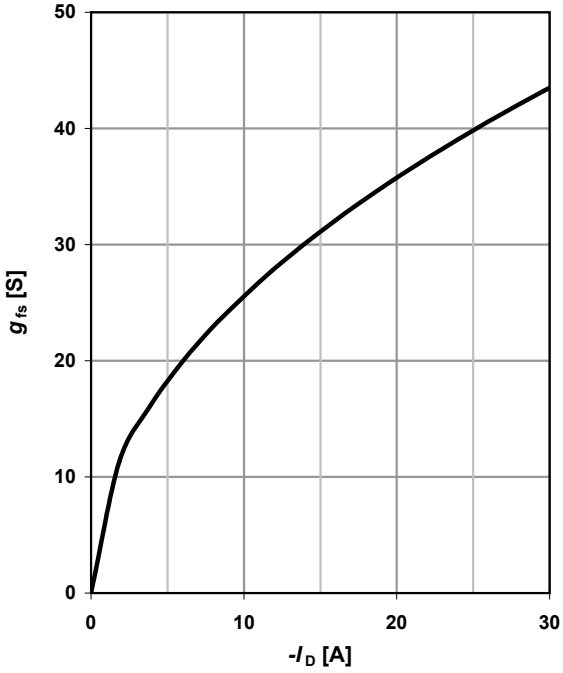
I_D=f(V_{GS}); $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: T_j



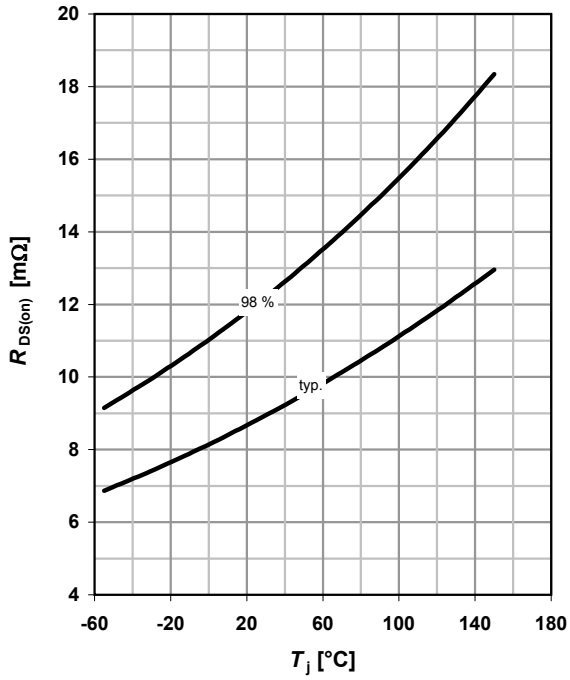
8 Typ. forward transconductance

g_{fs}=f(I_D); T_j=25 °C



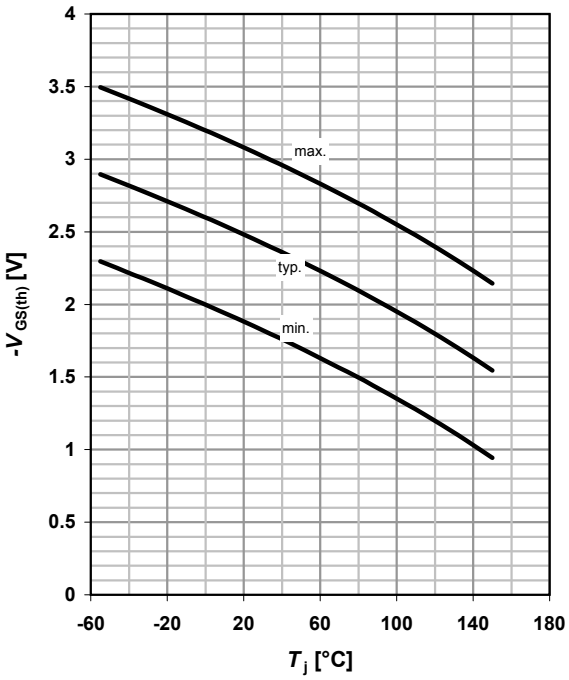
9 Drain-source on-state resistance

$R_{DS(on)}$=f(T_j); I_D=-20 A; V_{GS}=-10 V



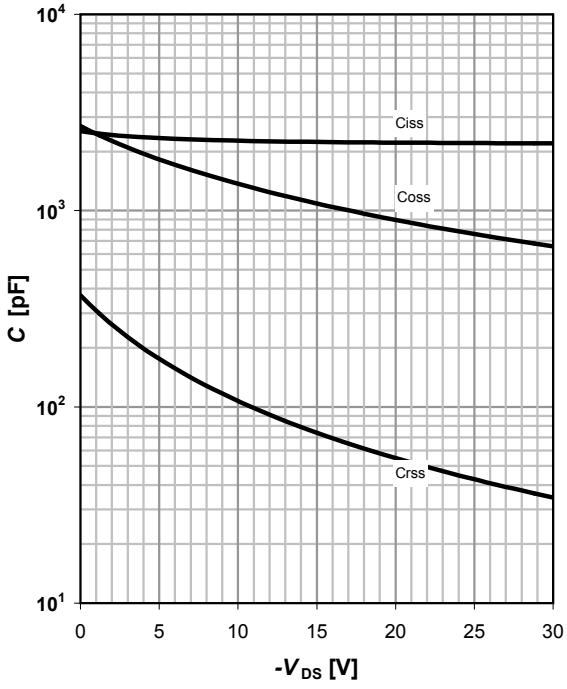
10 Typ. gate threshold voltage

$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=-73 µA



11 Typ. capacitances

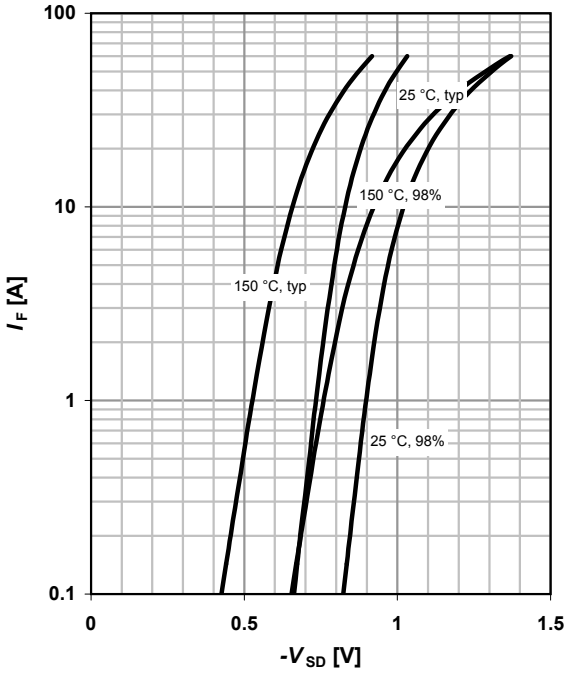
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



12 Forward characteristics of reverse diode

I_F=f(V_{SD})

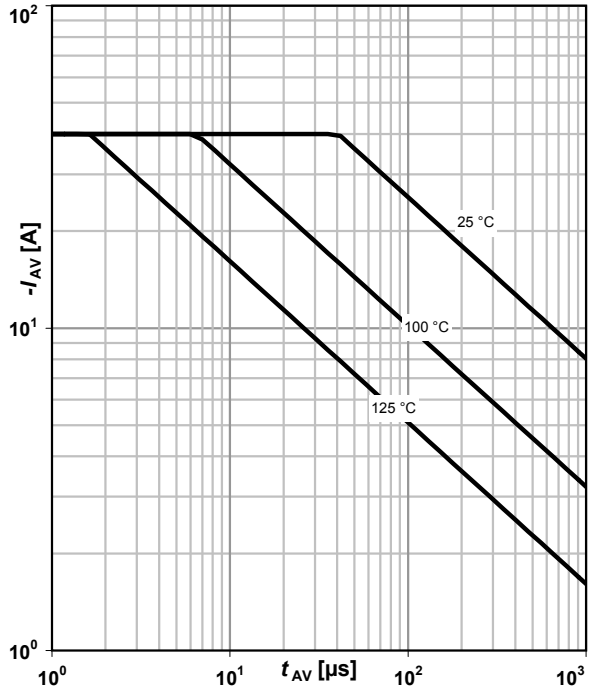
parameter: T_j



13 Avalanche characteristics

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

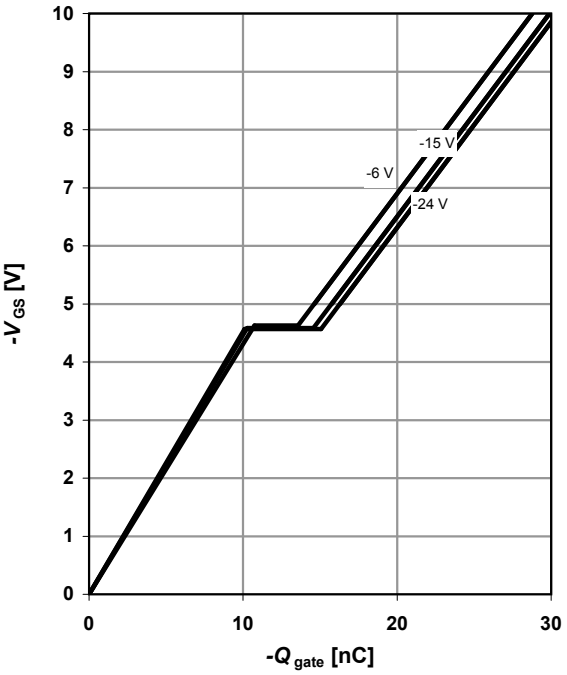
parameter: $T_{j(start)}$



14 Typ. gate charge

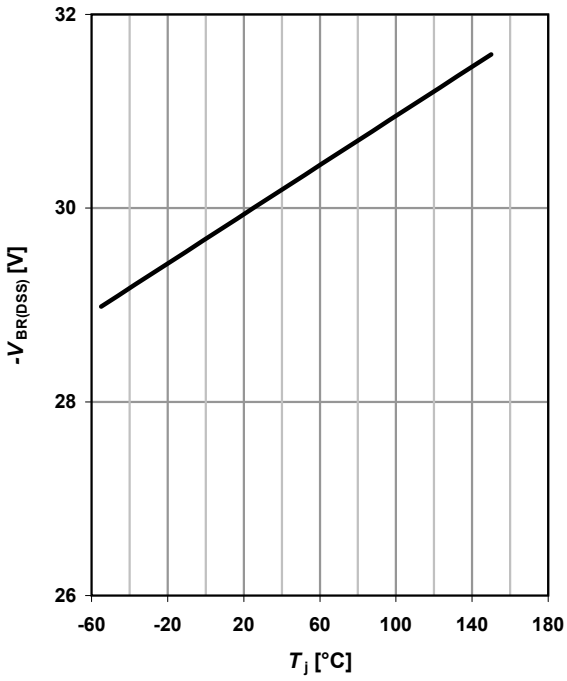
V_{GS}=f(Q_{gate}); I_D=-20 A pulsed

parameter: V_{DD}

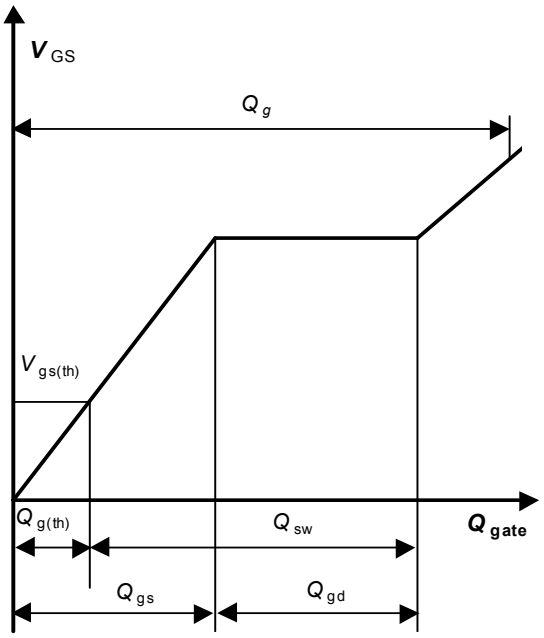


15 Drain-source breakdown voltage

$V_{BR(DSS)}$=f(T_j); I_D=-250 µA

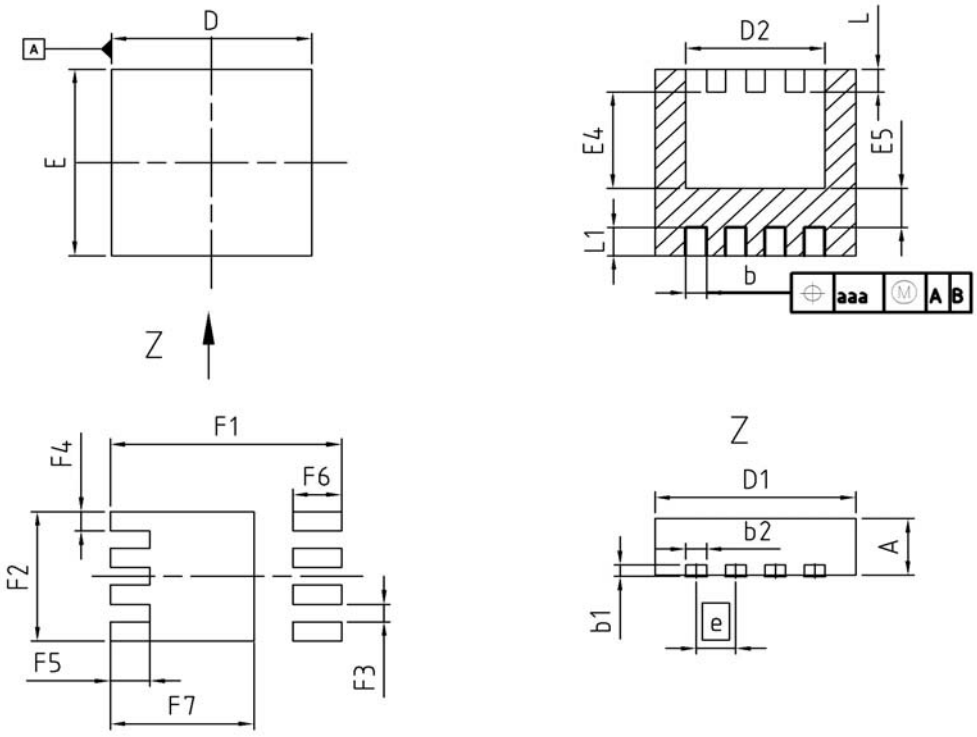


16 Gate charge waveforms

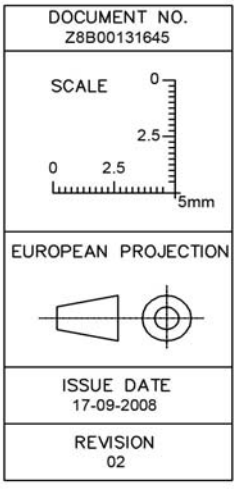


Package Outline

PG-TSDSON-8



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.10	0.035	0.043
b	0.24	0.44	0.009	0.017
b1	0.10	0.30	0.004	0.012
b2	0.20	0.44	0.008	0.017
D=D1	3.20	3.40	0.126	0.134
D2	2.15	2.45	0.085	0.096
E	3.20	3.40	0.126	0.134
E4	1.60	1.81	0.063	0.071
E5	0.59	0.86	0.023	0.034
e	0.65		0.026	
N	8		8	
L	0.30	0.56	0.012	0.022
L1	0.33	0.60	0.013	0.024
aaa	0.25		0.010	
F1	3.80		0.150	
F2	2.29		0.090	
F3	0.31		0.012	
F4	0.34		0.013	
F5	0.65		0.026	
F6	0.80		0.031	
F7	2.36		0.093	



Dimensions in mm

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