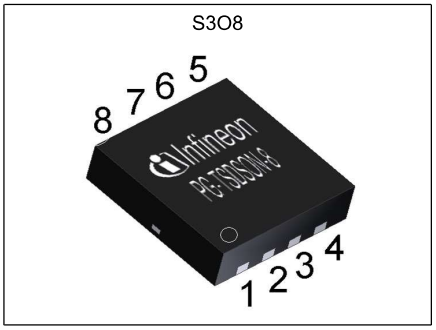
MOSFET

OptiMOS™ P3 Power-Transistor, -30 V



Features

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

Product validation

Qualified according to JEDEC Standard

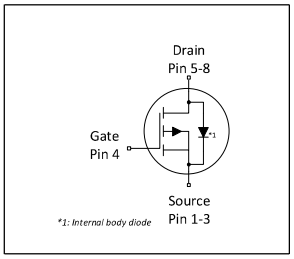


Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	-30	V
$R_{DS(on),max}$	8.6	mΩ
I_D	-40	A

Type / Ordering Code	Package	Marking	Related Links
BSZ0905PNS	PG-TSDSON-8	0905PNS	-

Table of Contents

Description 1
Maximum ratings 3
Thermal characteristics 3
Electrical characteristics 4
Electrical characteristics diagrams 6
Package Outlines 10
Revision History 11
Trademarks 11
Disclaimer 11

1 Maximum ratings

at T_j=25 °C, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current	I_D	- - -	- - -	-40 -40 -13.5	A	T_C=25 °C T_C=70 °C T_A=25 °C[1)]
Pulsed drain current	$I_{D,pulse}$	-	-	-160	A	T_C=25 °C[2)]
Avalanche energy, single pulse	E_{AS}	-	-	105	mJ	I_D=-20 A, R_{GS}=25 Ω
Gate source voltage	V_{GS}	-25	-	25	V	-
Power dissipation	P_{tot}	- -	- -	69 2.1	-	T_A=25 °C T_A=25 °C[1)]
Operating and storage temperature	T_j, T_{stg}	-55	-	150	°C	IEC climatic category; DIN IEC 68-1: 55/150/56
ESD class	-	-	1C	-	-	(1kV-2kV), JESD22-A114 HBM
Soldering temperature	-	-	260	-	°C	-

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	1.8	K/W	-
Thermal resistance, junction - ambient, 6 cm² cooling area[1)]	R_{thJA}	-	-	60	K/W	-

[1)] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.
[2)] See Fig. 3 for more detailed information

3 Electrical characteristics

at T_j=25 °C, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	-30	-	-	V	V_{GS}=0 V, I_D=-250 µA
Gate threshold voltage	$V_{GS(th)}$	-3.1	-2.5	-1.9	V	V_{DS}=V_{GS}, I_D=-105 µA
Zero gate voltage drain current	I_{DSS}	- -	- -	-1 -10	µA	V_{DS}=-30 V, V_{GS}=0 V, T_j=25 °C V_{DS}=-30 V, V_{GS}=0 V, T_j=125 °C
Gate-source leakage current	I_{GSS}	-	-	-100	nA	V_{GS}=-25 V, V_{DS}=0 V
Drain-source on-state resistance	$R_{DS(on)}$	- -	8.7 6.5	13.4 8.6	mΩ	V_{GS}=-6 V, I_D=-20 A V_{GS}=-10 V, I_D=-20 A
Gate resistance	R_G	-	2.2	-	Ω	-
Transconductance	g_{fs}	30	43	-	S	|V_{DS}|>2|I_D|$R_{DS(on)max}$, I_D=-20 A

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	3190	-	pF	V_{GS}=0 V, V_{DS}=-15 V, f=1 MHz
Output capacitance	C_{oss}	-	1520	-	pF	V_{GS}=0 V, V_{DS}=-15 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	-	110	-	pF	V_{GS}=0 V, V_{DS}=-15 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	16	-	ns	V_{DD}=-15 V, V_{GS}=-10 V, I_D=-20 A, $R_{G,ext}$=6 Ω
Rise time	t_r	-	46	-	ns	V_{DD}=-15 V, V_{GS}=-10 V, I_D=-20 A, $R_{G,ext}$=6 Ω
Turn-off delay time	$t_{d(off)}$	-	35	-	ns	V_{DD}=-15 V, V_{GS}=-10 V, I_D=-20 A, $R_{G,ext}$=6 Ω
Fall time	t_f	-	8	-	ns	V_{DD}=-15 V, V_{GS}=-10 V, I_D=-20 A, $R_{G,ext}$=6 Ω

Table 6 Gate charge characteristics[1)]

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	16.1	-	nC	V_{DD}=-15 V, I_D=-20 A, V_{GS}=0 to -10 V
Gate charge at threshold	$Q_{g(th)}$	-	5.0	-	nC	V_{DD}=-15 V, I_D=-20 A, V_{GS}=0 to -10 V
Gate to drain charge	Q_{gd}	-	7.4	-	nC	V_{DD}=-15 V, I_D=-20 A, V_{GS}=0 to -10 V
Switching charge	Q_{sw}	-	18.4	-	nC	V_{DD}=-15 V, I_D=-20 A, V_{GS}=0 to -10 V
Gate charge total	Q_g	-	43.2	-	nC	V_{DD}=-15 V, I_D=-20 A, V_{GS}=0 to -10 V
Gate plateau voltage	$V_{plateau}$	-	-4.5	-	V	V_{DD}=-15 V, I_D=-20 A, V_{GS}=0 to -10 V
Output charge	Q_{oss}	-	34.9	-	nC	V_{DD}=-15 V, V_{GS}=0 V

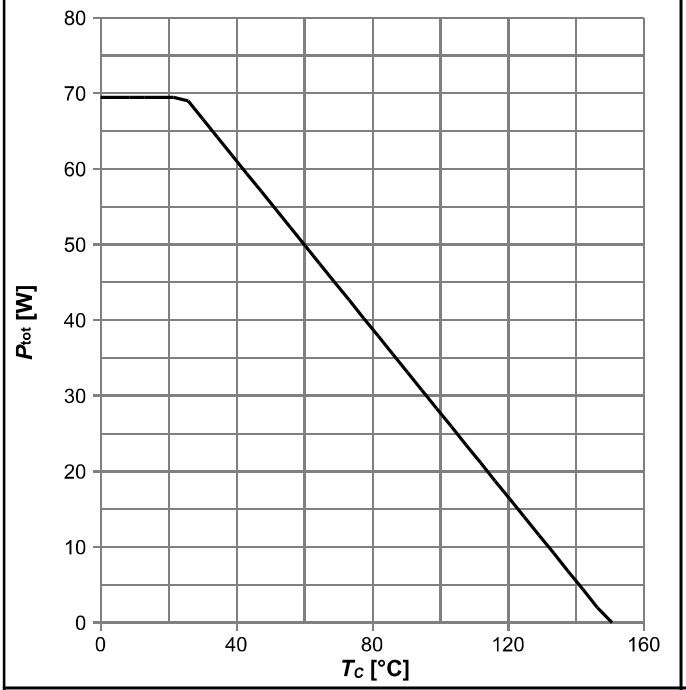
[1)] See Fig. 3 for more detailed information

Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continous forward current	I_S	-	-	-40	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$	-	-	-160	A	T_C=25 °C
Diode forward voltage	V_{SD}	-	-	-1.1	V	V_{GS}=0 V, I_F=-40 A, T_j=25 °C
Reverse recovery time	t_{rr}	-	39	-	ns	V_R=15 V, I_F=|I_S|, di_F/dt=100 A/µs
Reverse recovery charge	Q_{rr}	-	34	-	nC	V_R=15 V, I_F=|I_S|, di_F/dt=100 A/µs

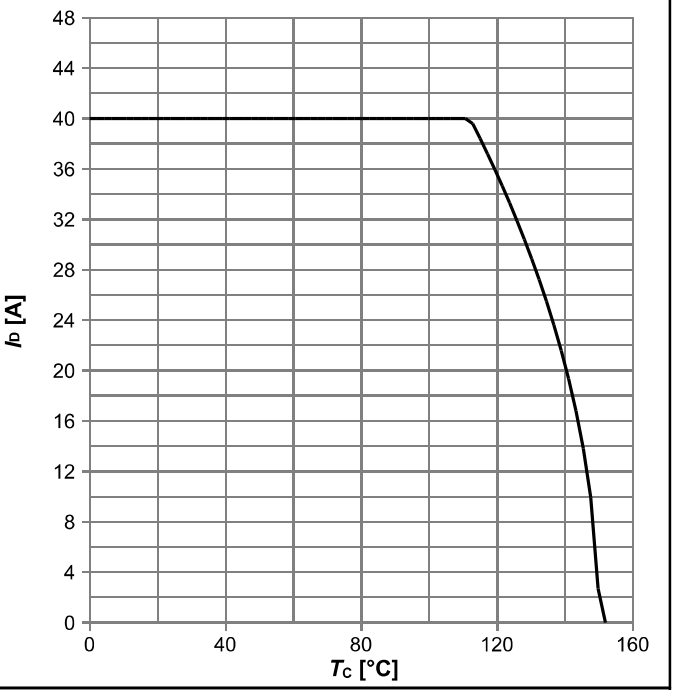
4 Electrical characteristics diagrams

Diagram 1: Power dissipation



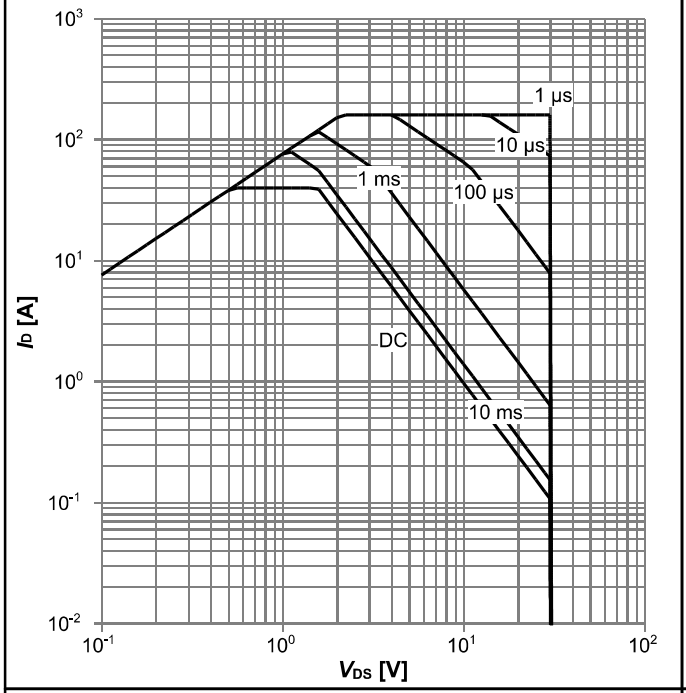
$P_{tot}=f(T_C)$; $t_p \leq 10$ s

Diagram 2: Drain current



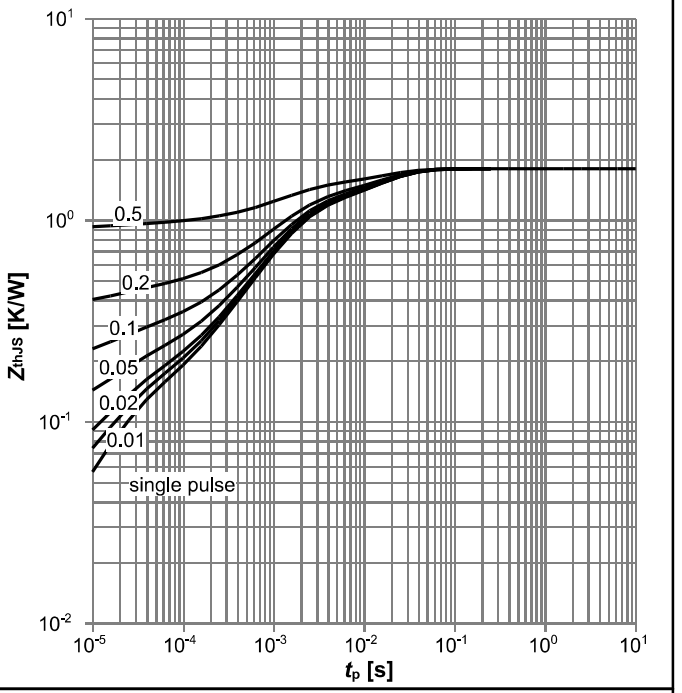
$I_D=f(T_C)$; $|V_{GS}| \geq 10$ V; $t_p \leq 10$ s

Diagram 3: Safe operating area



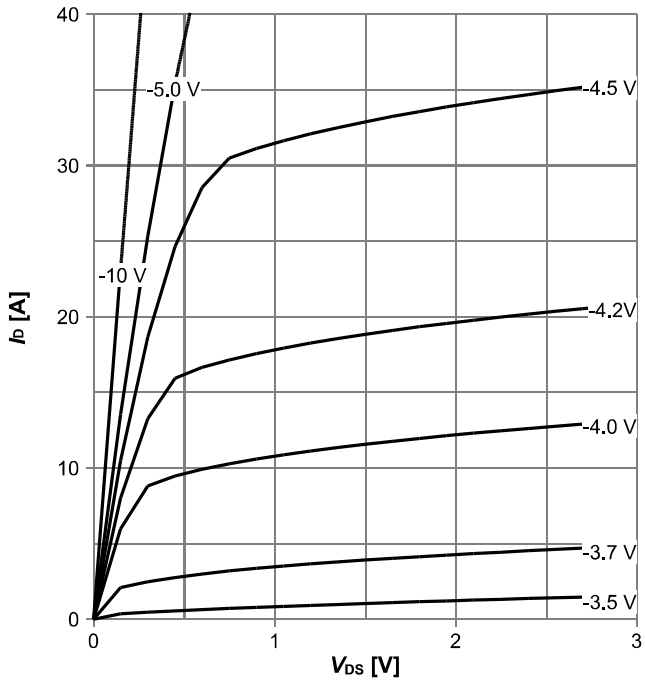
$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$; parameter: t_p

Diagram 4: Max. transient thermal impedance



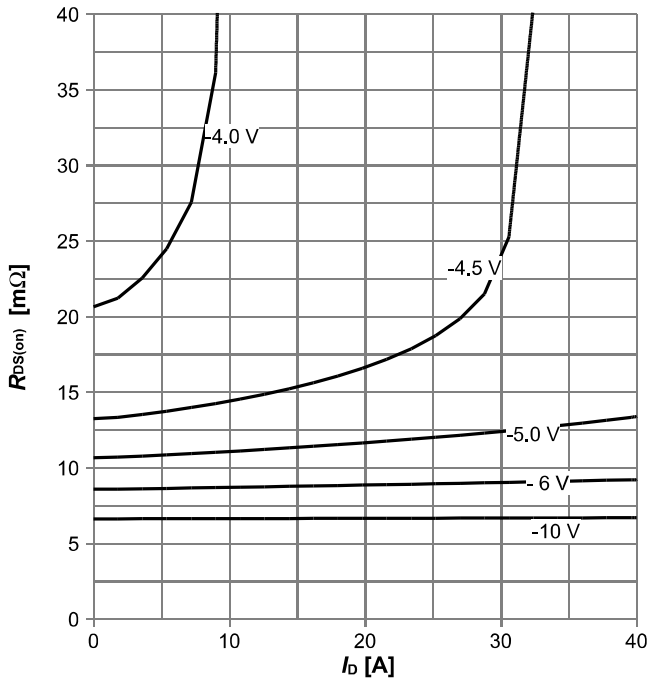
$Z_{thJS}=f(t_p)$; parameter: $D=t_p/T$

Diagram 5: Typ. output characteristics



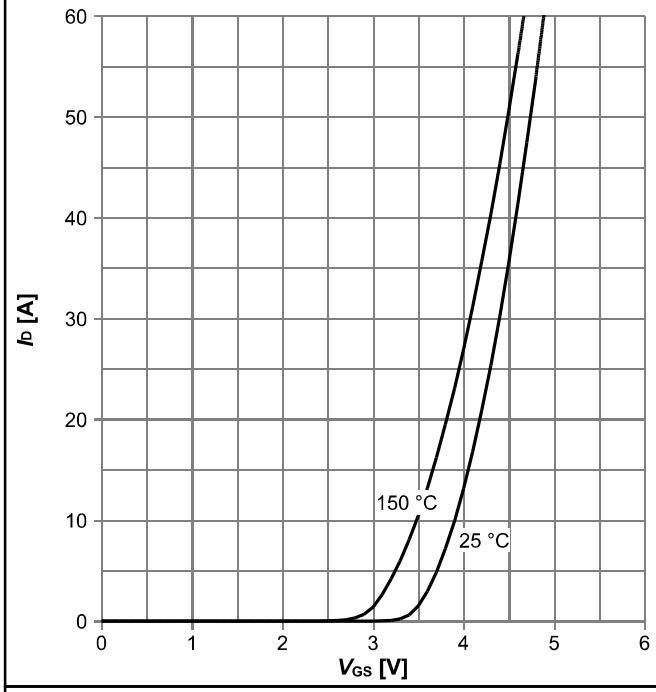
$I_D=f(V_{DS})$; $T_j=25$ °C; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



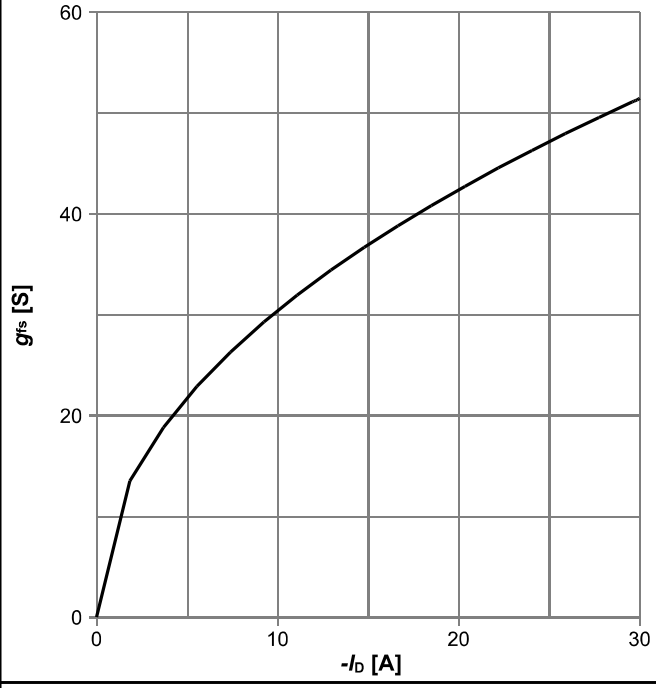
$R_{DS(on)}=f(I_D)$; $T_j=25$ °C; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



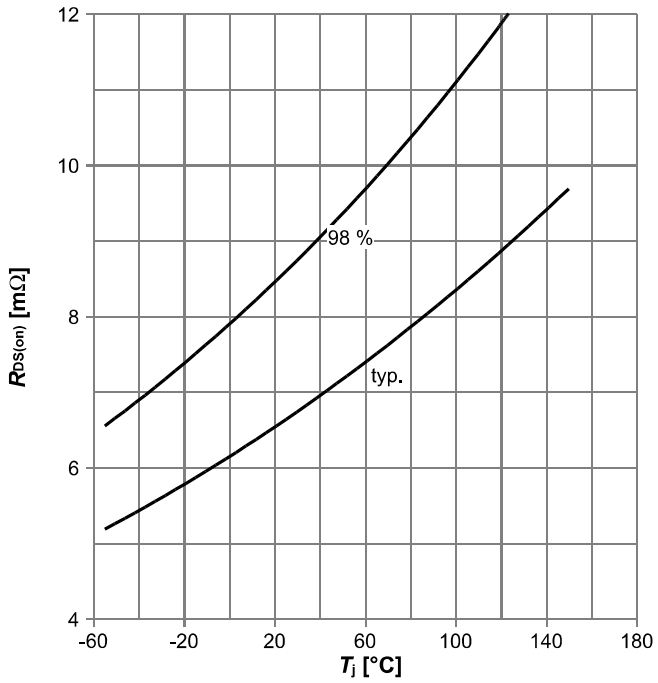
$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. forward transconductance



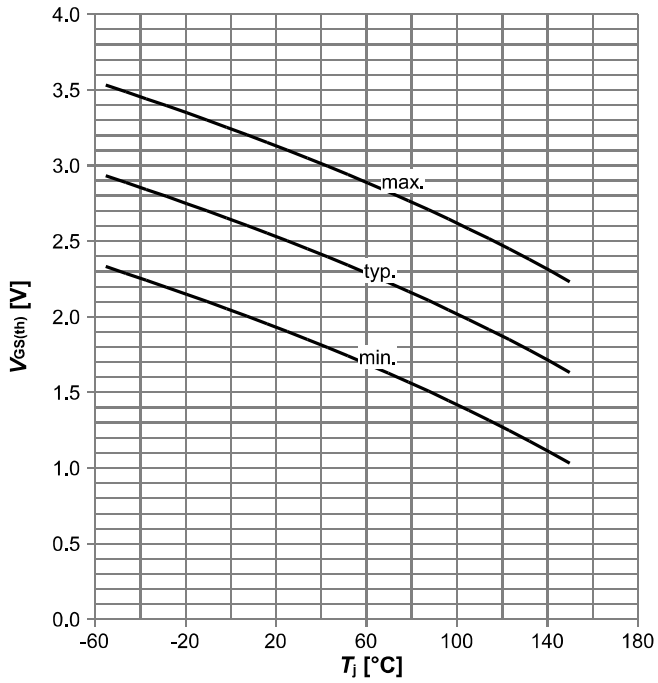
$g_{fs}=f(I_D)$; $T_j=25$ °C

Diagram 9: Drain-source on-state resistance



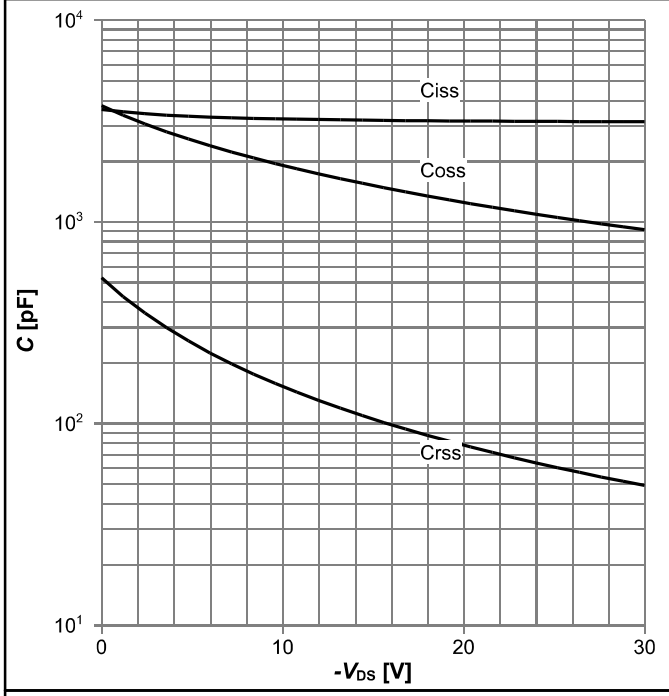
$R_{DS(on)}$=f(T_j); I_D=-20 A; V_{GS}=-10 V

Diagram 10: Typ. gate threshold voltage



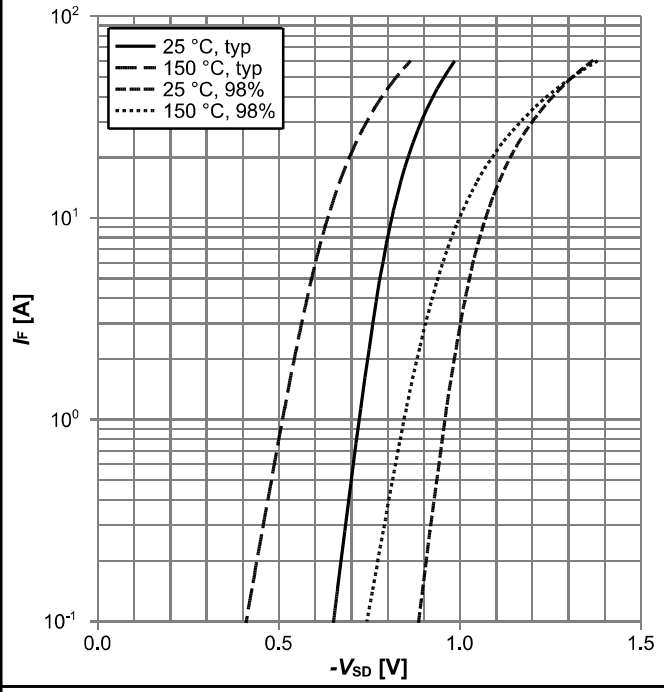
$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=-105 µA

Diagram 11: Typ. capacitances



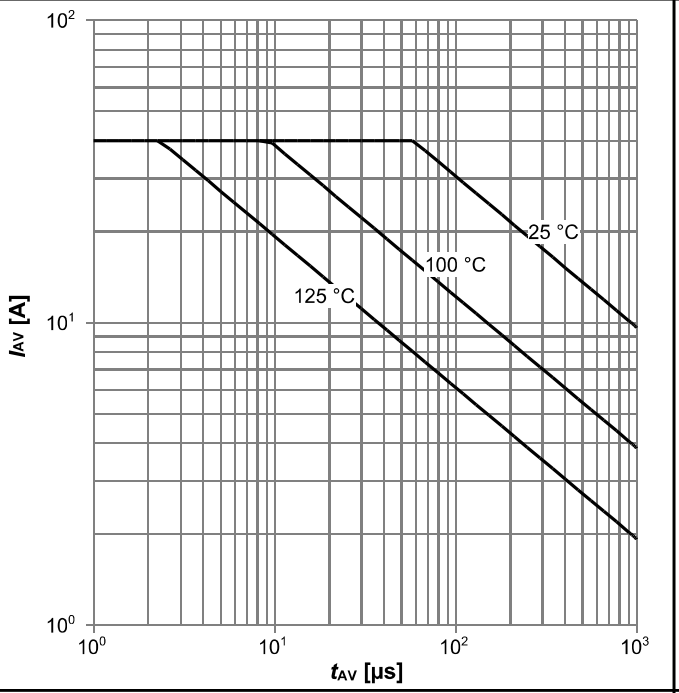
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

Diagram 12: Forward characteristics of reverse diode



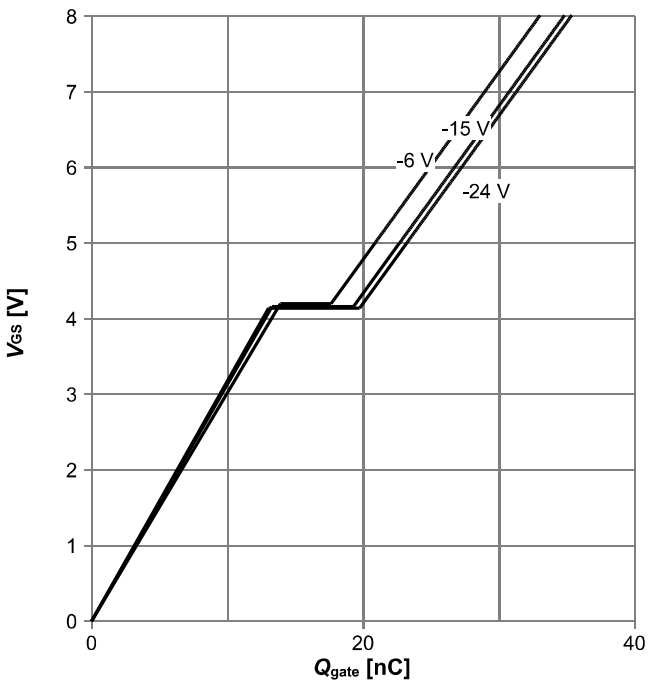
I_F=f(V_{SD}); parameter: T_j

Diagram 13: Avalanche characteristics



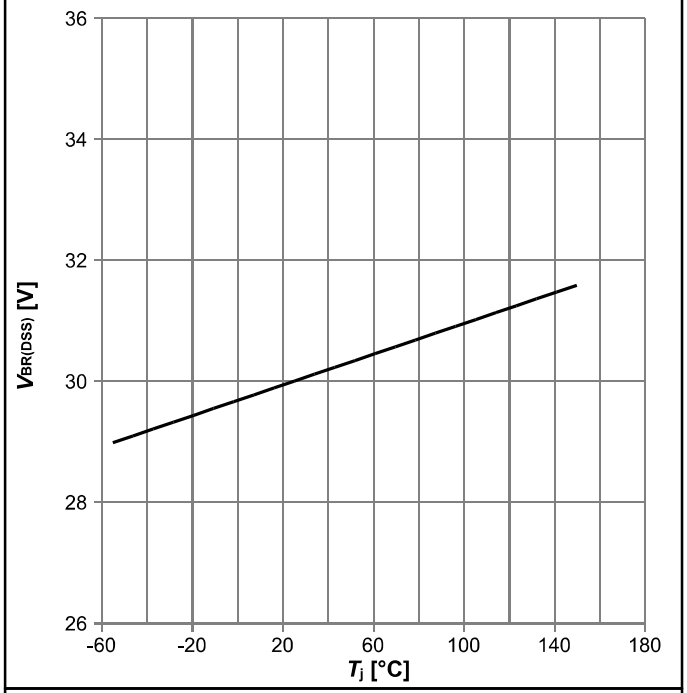
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{j(start)}$

Diagram 14: Typ. gate charge



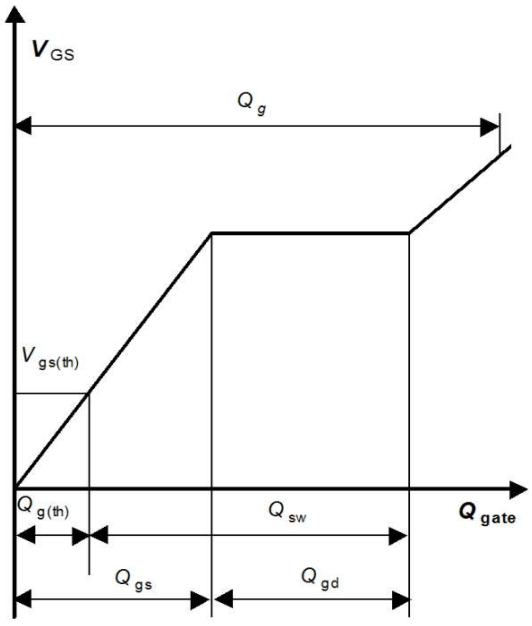
$V_{GS}=f(Q_{gate})$; I_D=-20 A pulsed; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage

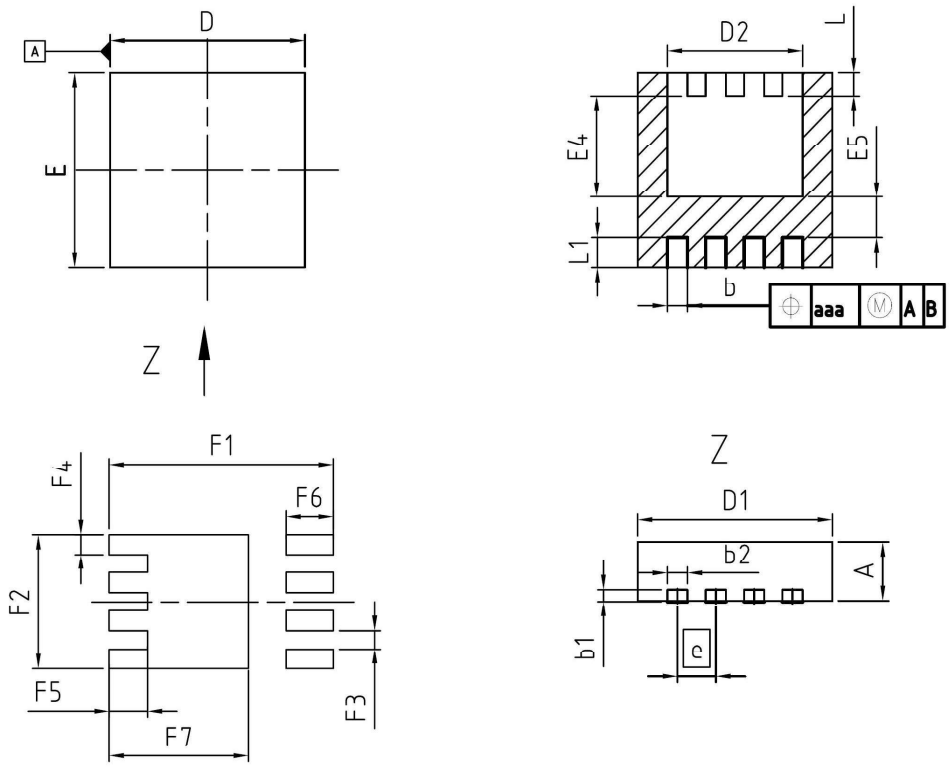


$V_{BR(DSS)}=f(T_j)$; I_D=-250 µA

Diagram Gate charge waveforms



5 Package Outlines



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	

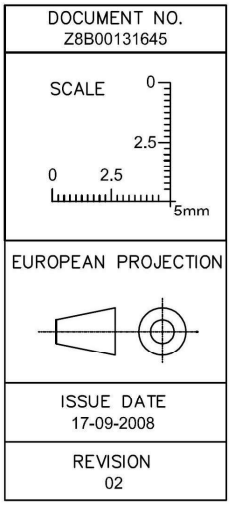


Figure 1 Outline PG-TSDSON-8, dimensions in mm/inches

Revision History

BSZ0905PNS

Revision: 2022-01-26, Rev. 2.1

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2019-12-13	Release of final version
2.1	2022-01-26	Update switching symbol

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