

MOSFET

OptiMOS™ 6 Power-Transistor, 150 V

Features

- N-channel, normal level
- Very low on-resistance $R_{DS(on)}$
- Superior thermal resistance
- 100% avalanche tested
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21
- MSL 1 classified according to J-STD-020

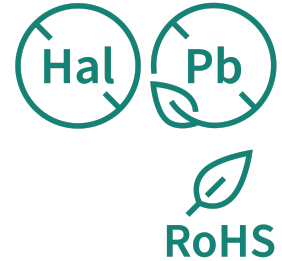
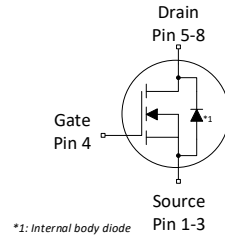
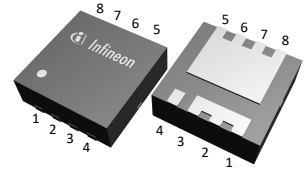
Product validation

Fully qualified according to JEDEC for Industrial Applications

Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	150	V
$R_{DS(on),max}$	17.3	mΩ
I_D	48	A
Q_{oss}	45	nC
Q_G	14.8	nC
Q_{rr} (500 A/μs)	101	nC

PG-TSDSON-8 FL



Type/Ordering Code	Package	Marking	Related Links
ISZ173N15NM6	PG-TSDSON-8	17315N6	-



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1 Maximum ratings

at $T_A=25\text{ °C}$, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D	-	-	48 34 32 7.9	A	$V_{GS}=10\text{ V}$, $T_C=25\text{ °C}$ $V_{GS}=10\text{ V}$, $T_C=100\text{ °C}$ $V_{GS}=8\text{ V}$, $T_C=100\text{ °C}$ $V_{GS}=10\text{ V}$, $T_A=25\text{ °C}$, $R_{thJA}=60\text{ °C/W}$ ²⁾
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	192	A	$T_C=25\text{ °C}$
Avalanche current, single pulse ⁴⁾	I_{AS}	-	-	16	A	$T_C=25\text{ °C}$
Avalanche energy, single pulse	E_{AS}	-	-	140	mJ	$I_D=7\text{ A}$, $R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	94 2.5	W	$T_C=25\text{ °C}$ $T_A=25\text{ °C}$, $R_{thJA}=60\text{ °C/W}$ ²⁾
Operating and storage temperature	T_j , T_{stg}	-55	-	175	°C	-

¹⁾ Rating refers to the product only with datasheet specified absolute maximum values, maintaining case temperature as specified. For other case temperatures please refer to Diagram 2. De-rating will be required based on the actual environmental conditions.

²⁾ 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.

³⁾ See Diagram 3 for more detailed information

⁴⁾ See Diagram 13 for more detailed information

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	1.6	°C/W	-
Thermal resistance, junction - ambient, 6 cm ² cooling area ⁵⁾	R_{thJA}	-	-	60	°C/W	-

⁵⁾ 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.

3 Electrical characteristics

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

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	150	-	-	V	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	3.0	3.5	4.0	V	$V_{DS}=V_{GS}$, $I_D=35\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1 10	1 100	μA	$V_{DS}=120\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$ $V_{DS}=120\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	13.8 15.3 17.2	16.3 17.3 20.2	m Ω	$V_{GS}=15\text{ V}$, $I_D=16\text{ A}$ $V_{GS}=10\text{ V}$, $I_D=16\text{ A}$ $V_{GS}=8\text{ V}$, $I_D=8\text{ A}$
Gate resistance	R_G	-	0.82	1.23	Ω	-
Transconductance	g_{fs}	14	27	-	S	$ V_{DS} \geq 2 I_D $, $R_{DS(on)max}$, $I_D=16\text{ A}$

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Input capacitance ⁶⁾	C_{iss}	-	1000	1300	pF	$V_{GS}=0\text{ V}$, $V_{DS}=75\text{ V}$, $f=1\text{ MHz}$
Output capacitance ⁶⁾	C_{oss}	-	330	430	pF	$V_{GS}=0\text{ V}$, $V_{DS}=75\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance ⁶⁾	C_{rss}	-	9	14	pF	$V_{GS}=0\text{ V}$, $V_{DS}=75\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	7	-	ns	$V_{DD}=75\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=8\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Rise time	t_r	-	2	-	ns	$V_{DD}=75\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=8\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Turn-off delay time	$t_{d(off)}$	-	9	-	ns	$V_{DD}=75\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=8\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Fall time	t_f	-	11	-	ns	$V_{DD}=75\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=8\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$

⁶⁾ Defined by design. Not subject to production test.

Table 6 Gate charge characteristics ⁷⁾

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Gate to source charge ⁸⁾	Q_{gs}	-	5.5	7.2	nC	$V_{DD}=75\text{ V}, I_D=8\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	3.6	-	nC	$V_{DD}=75\text{ V}, I_D=8\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge ⁸⁾	Q_{gd}	-	3.8	5.7	nC	$V_{DD}=75\text{ V}, I_D=8\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	5.7	-	nC	$V_{DD}=75\text{ V}, I_D=8\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge total ⁸⁾	Q_g	-	14.8	19.2	nC	$V_{DD}=75\text{ V}, I_D=8\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	5.4	-	V	$V_{DD}=75\text{ V}, I_D=8\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge total, sync. FET	$Q_{g(sync)}$	-	12	-	nC	$V_{DS}=0.1\text{ V}, V_{GS}=0\text{ to }10\text{ V}$
Output charge ⁸⁾	Q_{oss}	-	45	59	nC	$V_{DS}=75\text{ V}, V_{GS}=0\text{ V}$

⁷⁾ See "Gate charge waveforms" for parameter definition

⁸⁾ Defined by design. Not subject to production test.

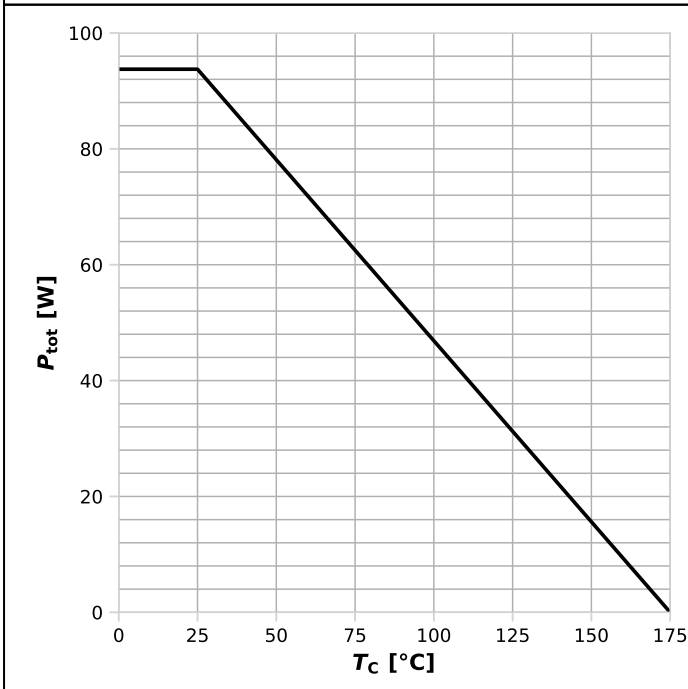
Table 7 Reverse diode

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	48	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	192	A	$T_C=25\text{ °C}$
Diode forward voltage	V_{SD}	-	0.85	1.0	V	$V_{GS}=0\text{ V}, I_F=16\text{ A}, T_j=25\text{ °C}$
Reverse recovery time ⁹⁾	t_{rr}	-	31	62	ns	$V_R=75\text{ V}, I_F=8\text{ A}, di_F/dt=500\text{ A}/\mu\text{s}$
Reverse recovery charge ⁹⁾	Q_{rr}	-	101	202	nC	$V_R=75\text{ V}, I_F=8\text{ A}, di_F/dt=500\text{ A}/\mu\text{s}$
Reverse recovery time ⁹⁾	t_{rr}	-	21	42	ns	$V_R=75\text{ V}, I_F=8\text{ A}, di_F/dt=1000\text{ A}/\mu\text{s}$
Reverse recovery charge ⁹⁾	Q_{rr}	-	128	256	nC	$V_R=75\text{ V}, I_F=8\text{ A}, di_F/dt=1000\text{ A}/\mu\text{s}$

⁹⁾ Defined by design. Not subject to production test.

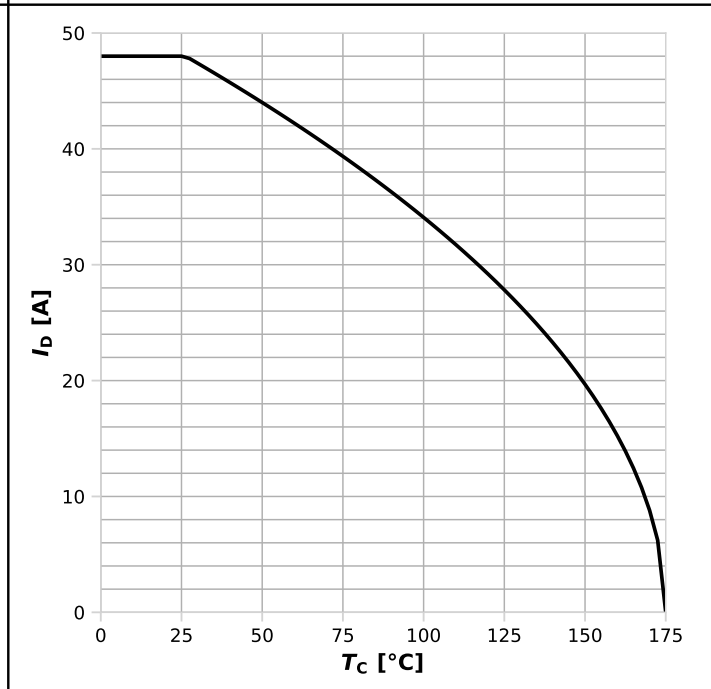
4 Electrical characteristics diagrams

Diagram 1: Power dissipation



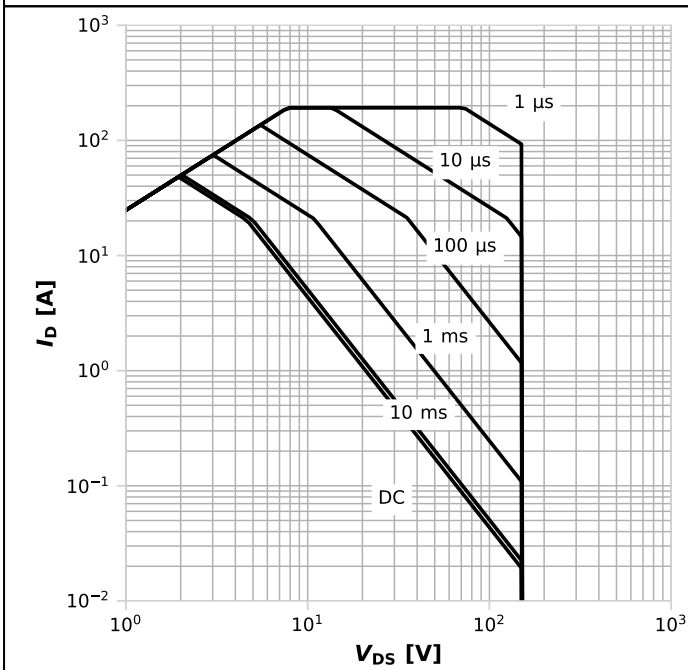
$$P_{\text{tot}}=f(T_c)$$

Diagram 2: Drain current



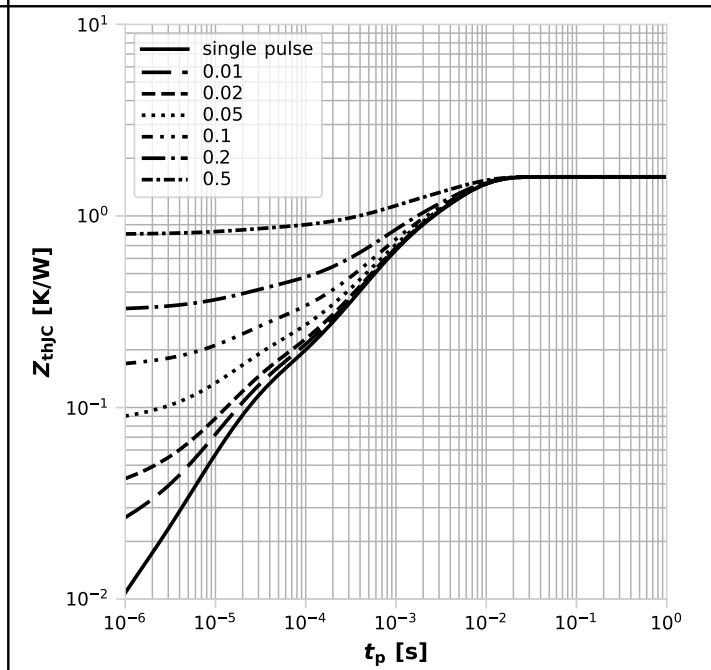
$$I_D=f(T_c); V_{GS} \geq 10 \text{ V}$$

Diagram 3: Safe operating area



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

Diagram 4: Max. transient thermal impedance



$$Z_{\text{thJC}}=f(t_p); \text{parameter: } D=t_p/T$$

Diagram 5: Typ. output characteristics

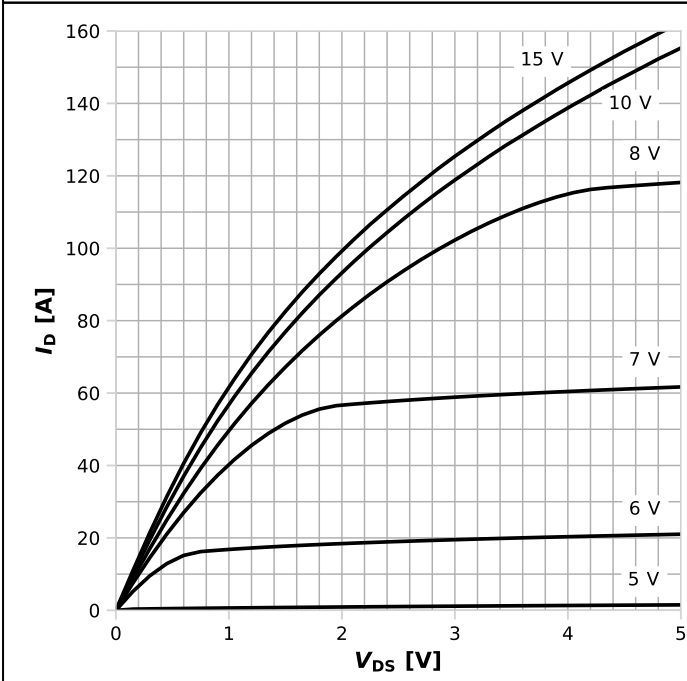

 $I_D = f(V_{DS}), T_j = 25\text{ °C}; \text{parameter: } V_{GS}$

Diagram 6: Typ. drain-source on resistance

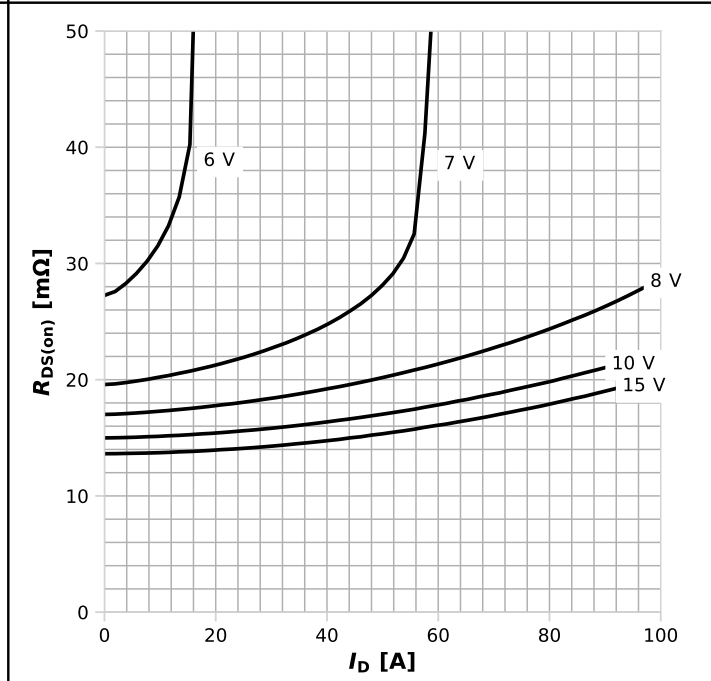

 $R_{DS(on)} = f(I_D), T_j = 25\text{ °C}; \text{parameter: } V_{GS}$

Diagram 7: Typ. transfer characteristics

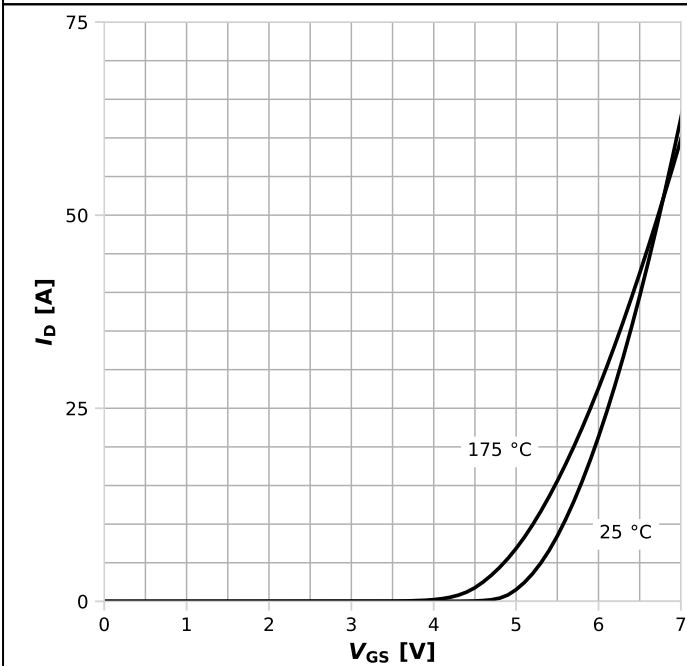

 $I_D = f(V_{GS}), |V_{DS}| > 2|I_D|R_{DS(on)max}; \text{parameter: } T_j$

Diagram 8: Typ. drain-source on resistance

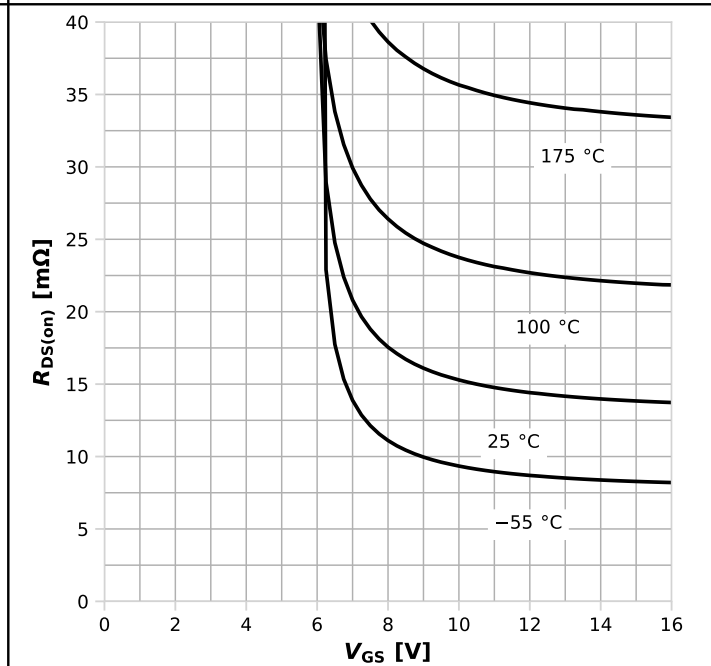
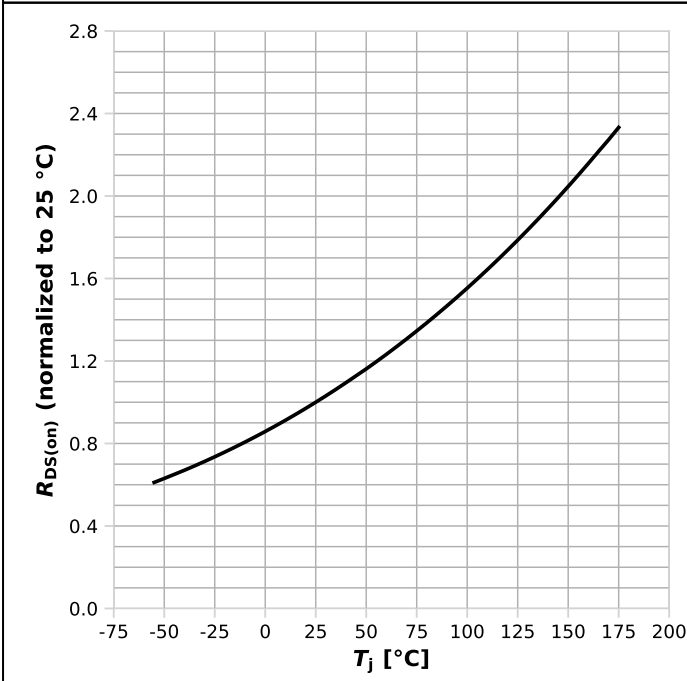
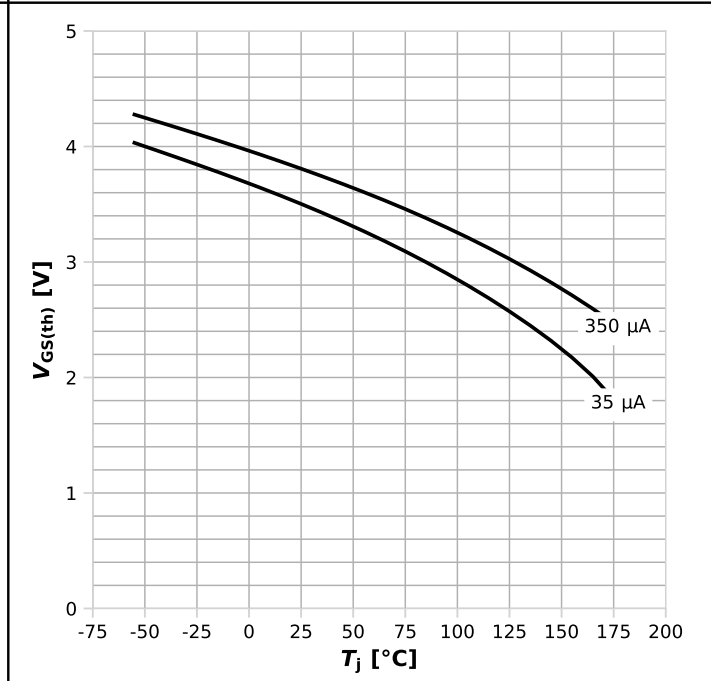

 $R_{DS(on)} = f(V_{GS}), I_D = 16\text{ A}; \text{parameter: } T_j$

Diagram 9: Normalized drain-source on resistance



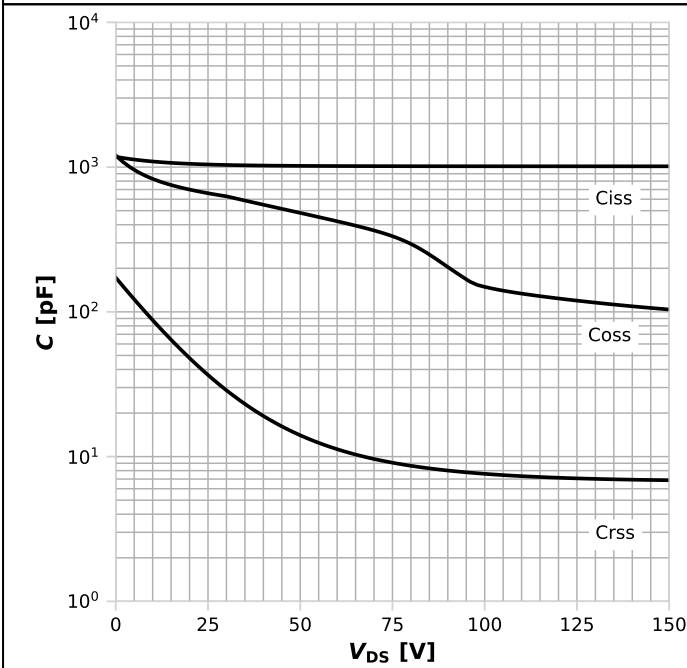
$R_{DS(on)}=f(T_j), I_D=16\text{ A}, V_{GS}=10\text{ V}$

Diagram 10: Typ. gate threshold voltage



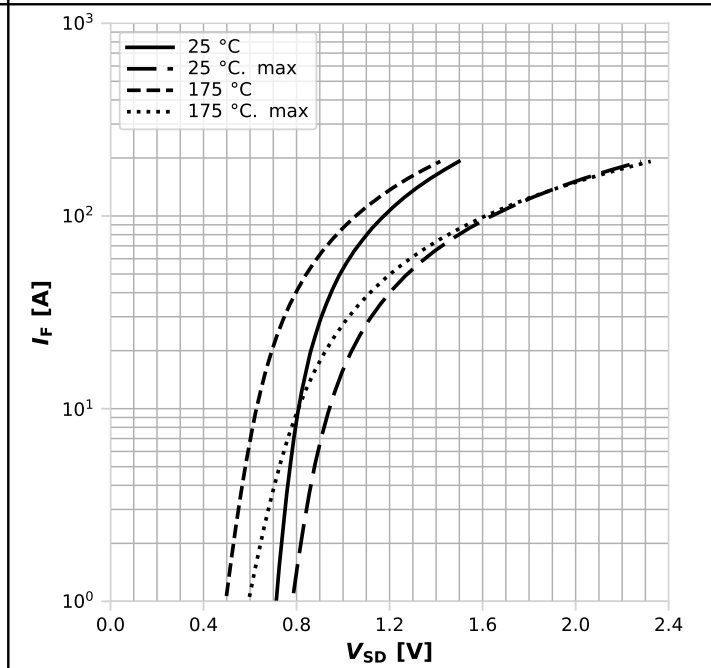
$V_{GS(th)}=f(T_j), V_{GS}=V_{DS}; \text{parameter: } I_D$

Diagram 11: Typ. capacitances



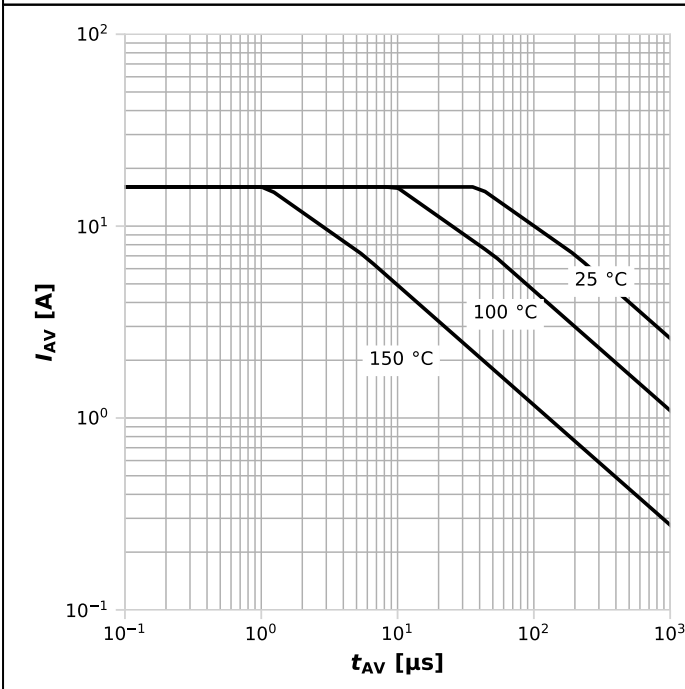
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}$

Diagram 12: Forward characteristics of reverse diode



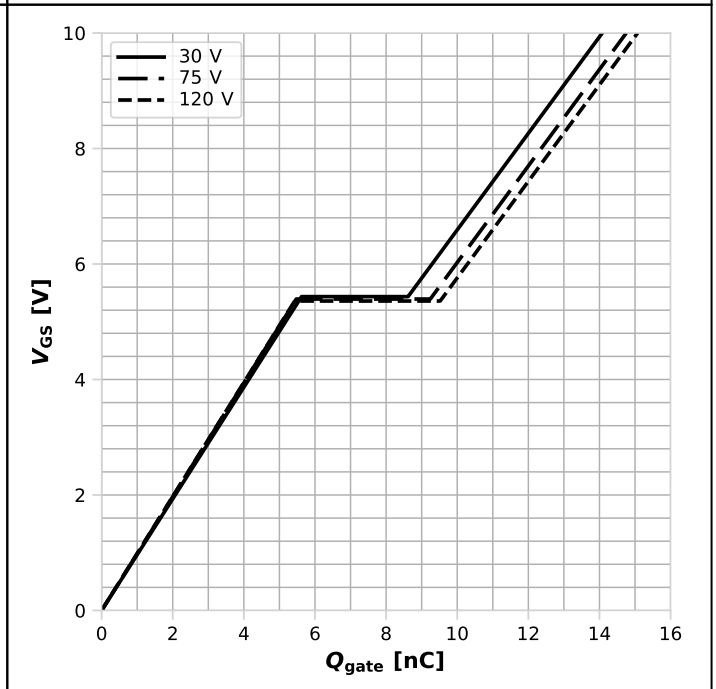
$I_F=f(V_{SD}); \text{parameter: } T_j$

Diagram 13: Avalanche characteristics



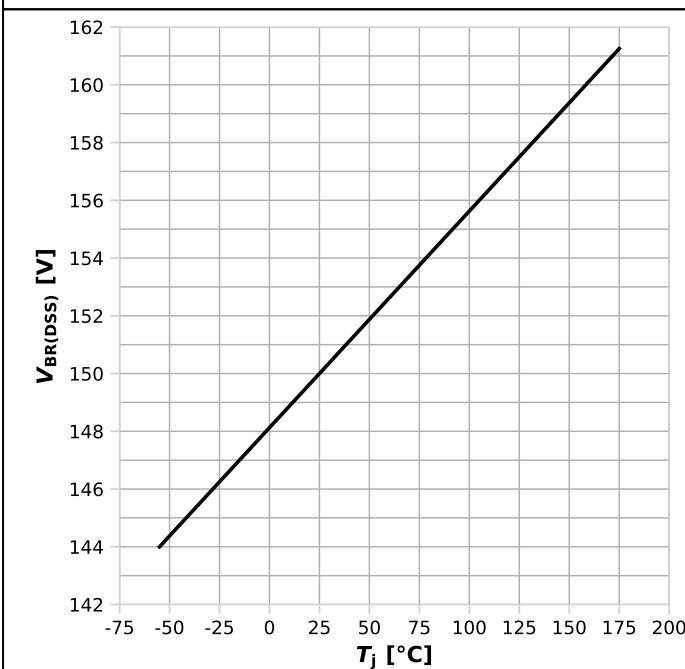
$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



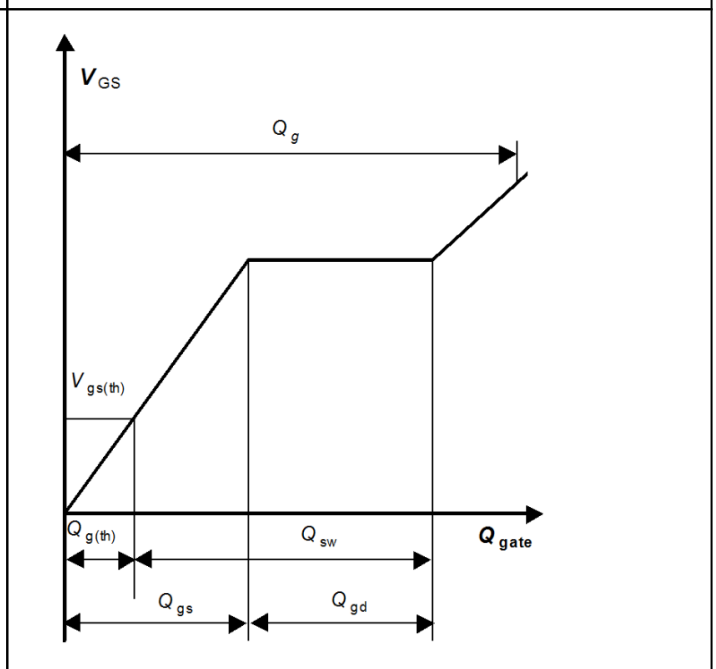
$V_{GS}=f(Q_{gate}), I_D=8 \text{ A pulsed}, T_j=25 \text{ °C}$; parameter: V_{DD}

Diagram 15: Min. drain-source breakdown voltage



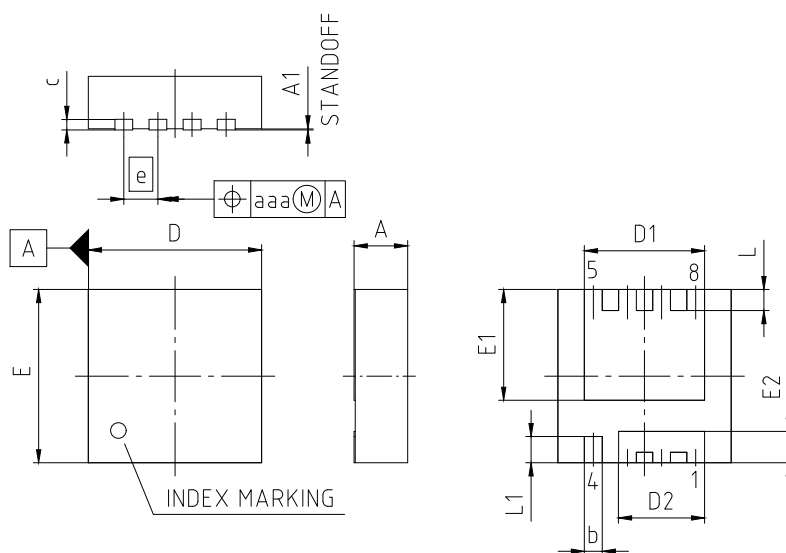
$V_{BR(DSS)}=f(T_j); I_D=1 \text{ mA}$

Gate charge waveforms



-

5 Package Outlines



PACKAGE - GROUP NUMBER: PG-TSDSON-8-U03		
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	0.90	1.10
A1	0	0.05
b	0.24	0.44
c	0.10	0.30
D	3.20	3.40
D1	2.19	2.39
D2	1.54	1.74
E	3.20	3.40
E1	2.01	2.21
E2	0.50	0.70
e	0.65	
L	0.30	0.50
L1	0.40	0.60
aaa	0.06	
N	8	

NOTE:
 DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS

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

Revision History

ISZ173N15NM6

Revision 2024-04-22, Rev. 2.0

Previous Revision

Revision	Date	Subjects (major changes since last revision)
1.0	2024-03-15	Release of preliminary version
2.0	2024-04-22	Release of final

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