

英飞凌MOSFET

OptiMOS™ 6 功率晶体管, 60 V

特性

- 针对低压驱动和电池供电应用进行了优化
- 针对高性能 SMPS 进行了优化
- N沟道, 标准电平
- 极低的导通电阻 $R_{DS(on)}$
- 卓越的热阻
- 100% 雪崩测试
- 无铅镀层; 符合 RoHS 标准
- 符合 IEC61249-2-21 标准的无卤素

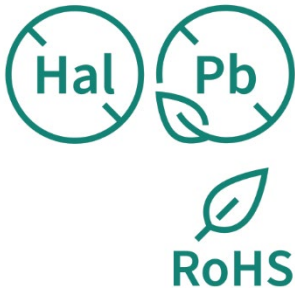
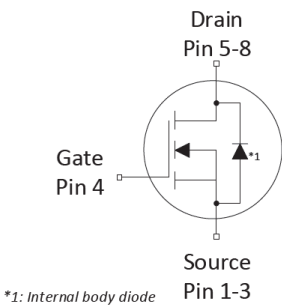
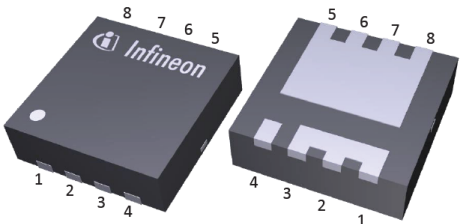
产品验证

符合 JEDEC JESD47, JESD22 和 J-STD-020 相关测试的工业应用要求。

表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(on),max}$	7.2	mΩ
I_D	57	A
Q_{oss}	20	nC
Q_G	12.3	nC
$Q_{rr}(1000A/\mu s)$	45	nC

PG-TSDSON-8 FL



Part number	Package	Marking	Related links
ISZ072N06NM6	PG-TSDSON-8	072N6N6	-

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1 最大额定值

除非另有规定, $T_A=25\text{ }^{\circ}\text{C}$

表 2 最大额定值

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D	-	-	57	A	$V_{GS}=10\text{ V}, T_C=25\text{ }^{\circ}\text{C}$
				40		$V_{GS}=10\text{ V}, T_C=100\text{ }^{\circ}\text{C}$
				37		$V_{GS}=8\text{ V}, T_C=100\text{ }^{\circ}\text{C}$
				12.7		$V_{GS}=10\text{ V}, T_A=25\text{ }^{\circ}\text{C}, R_{thJA}=60\text{ }^{\circ}\text{C/W}$ ²⁾
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	228	A	$T_C=25\text{ }^{\circ}\text{C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	41	mJ	$I_D=10\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	50	W	$T_C=25\text{ }^{\circ}\text{C}$
				2.5		$T_A=25\text{ }^{\circ}\text{C}, R_{thJA}=60\text{ }^{\circ}\text{C/W}$ ²⁾
Operating and storage temperature	T_j, T_{stg}	-55	-	175	$^{\circ}\text{C}$	-

¹⁾ 额定值指产品仅具有数据手册指定的绝对最大值, 保持外壳温度符合规定要求。其他外壳温度请参见图 2。需要根据实际环境条件降低额定值。

²⁾ 器件置于 $40\text{ mm} \times 40\text{ mm} \times 1.5\text{ mm}$ 环氧树脂 PCB FR4 上, 配有 6 cm^2 (单层, $70\text{ }\mu\text{m}$ 厚) 铜层面积用于漏极连接。PCB 在静止空气中垂直放置。

³⁾ 详细信息请参见图 3

⁴⁾ 详细信息请参见图 13

2 热特性

表 3 热特性

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}		1.5	3.0		
Thermal resistance, junction - ambient, 6 cm ² cooling area ⁵⁾	R_{thJA}	-	-	60	°C/W	-

⁵⁾ 器件置于40 mm × 40 mm × 1.5 mm 环氧树脂印刷电路板 FR4 上，配有 6 cm²（单层，70 μm 厚）铜层面积用于漏极连接。PCB 垂直放置在静止空气中。

3 电气特性

除非另有规定, $T_j = 25^\circ\text{C}$

表 4 静态特性

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	60	-	-	V	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	2.1	2.7	3.3	V	$V_{DS}=V_{GS}, I_D=14\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1	1.0	μA	$V_{DS}=48\text{ V}, V_{GS}=0\text{ V}, T_j=25^\circ\text{C}$
			10	100		$V_{DS}=48\text{ V}, V_{GS}=0\text{ V}, T_j=125^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	5.4	7.2	m Ω	$V_{GS}=10\text{ V}, I_D=10\text{ A}$
Drain-source on-state resistance ⁶⁾	$R_{DS(on)}$	-	6.1	8.5	m Ω	$V_{GS}=8\text{ V}, I_D=5\text{ A}$
Gate resistance	R_G	-	0.7	-	Ω	-
Transconductance ⁶⁾	g_{fs}	18	36	-	S	$ V_{DS} \geq 2 I_D R_{DS(on)max}, I_D=10\text{ A}$

⁶⁾ 由设计指定, 未经过生产测试。

表 5 动态特性

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance ⁷⁾	C_{iss}	-	790	1000	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Output capacitance ⁷⁾	C_{oss}		330	430		
Reverse transfer capacitance ⁷⁾	C_{rss}		18	32		
Turn-on delay time	$t_{d(on)}$	-	5.6	-	ns	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V}, I_D=10\text{ A},$ $R_{G,ext}=1.6\text{ }\Omega$
Rise time	t_r		5.8			
Turn-off delay time	$t_{d(off)}$		7.5			
Fall time	t_f		2.3			

⁷⁾ 由设计指定, 未经过生产测试。

表 6 栅极电荷特性⁸⁾

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	3.5	-	nC	$V_{DD}=30\text{ V}, I_D=10\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$		2.1	-	nC	
Gate to drain charge ⁹⁾	Q_{gd}		2.9	4.4	nC	
Switching charge	Q_{sw}		4.3	-	nC	
Gate charge total ⁹⁾	Q_g		12.3	15.4	nC	
Gate plateau voltage	$V_{plateau}$		4.5	-	V	
Output charge ⁹⁾	Q_{oss}	-	20	27	nC	$V_{DS}=30\text{ V}, V_{GS}=0\text{ V}$

⁸⁾ 参数定义请参见“栅极电荷波形”

⁹⁾ 由设计指定, 未经过生产测试。

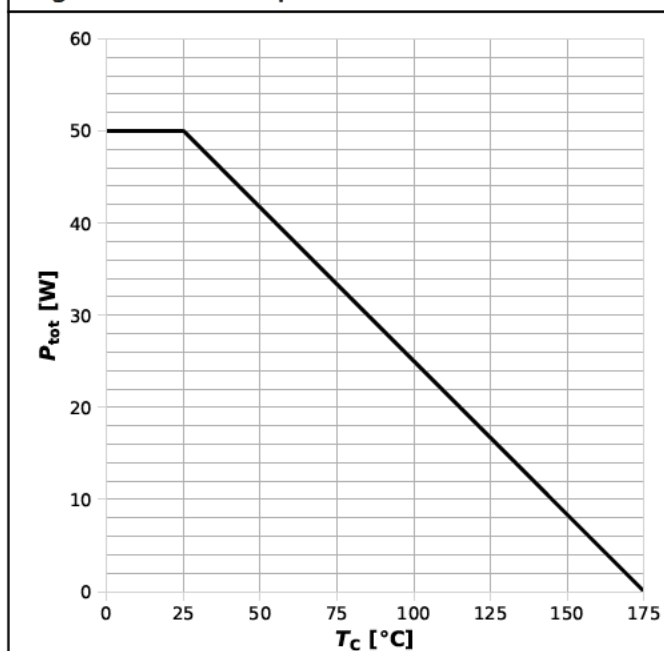
表 7 反向二极管

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	45	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$			228		
Diode forward voltage	V_{SD}	-	0.81	1.0	V	$V_{GS}=0\text{ V}, I_F=10\text{ A}, T_J=25\text{ °C}$
Reverse recovery time ¹⁰⁾	t_{rr}	-	20	40	ns	$V_R=30\text{ V}, I_F=10\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁰⁾	Q_{rr}		10	20	nC	
Reverse recovery time ¹⁰⁾	t_{rr}	-	13	26	ns	$V_R=30\text{ V}, I_F=10\text{ A}, di_F/dt=1000\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁰⁾	Q_{rr}		45	90	nC	

¹⁰⁾ 由设计指定, 未经过生产测试。

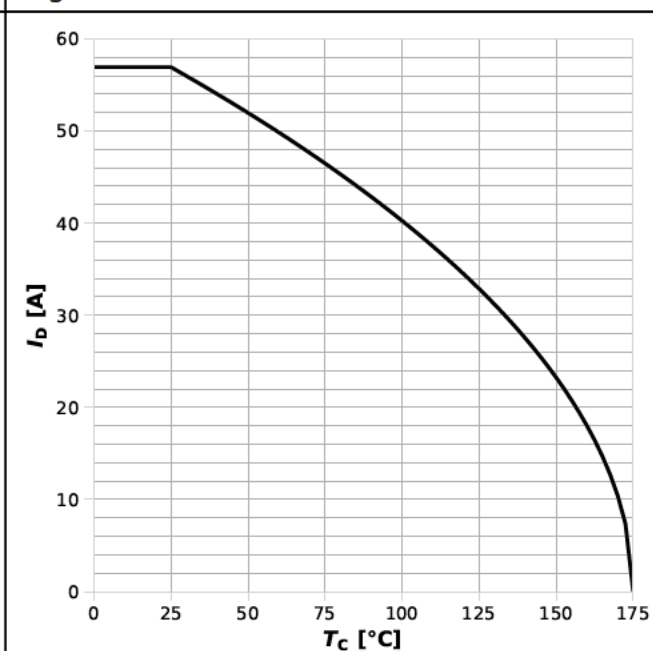
4 电气特性图

Diagram 1: Power dissipation



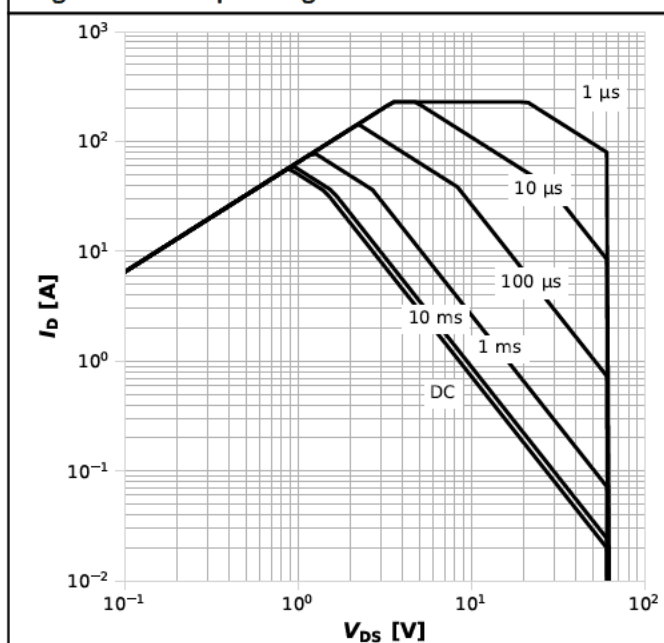
$$P_{tot}=f(T_c)$$

Diagram 2: Drain current



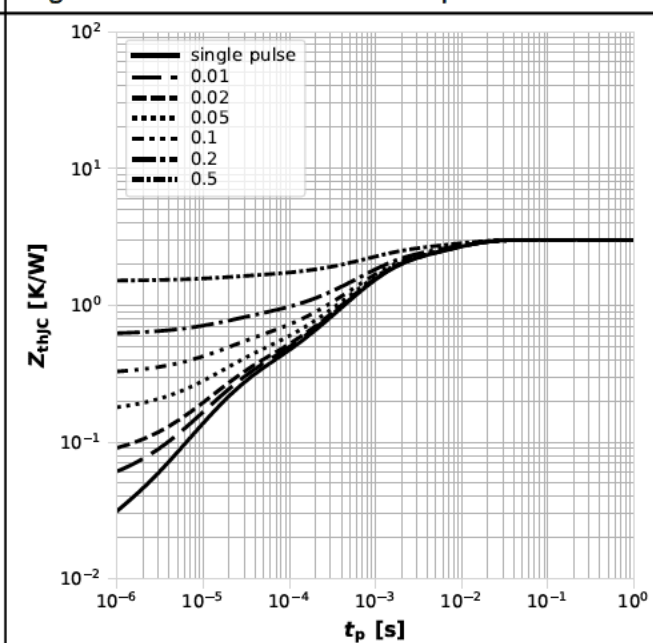
$$I_D=f(T_c); V_{GS} \geq 10 \text{ V}$$

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



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

Diagram 5: Typ. output characteristics

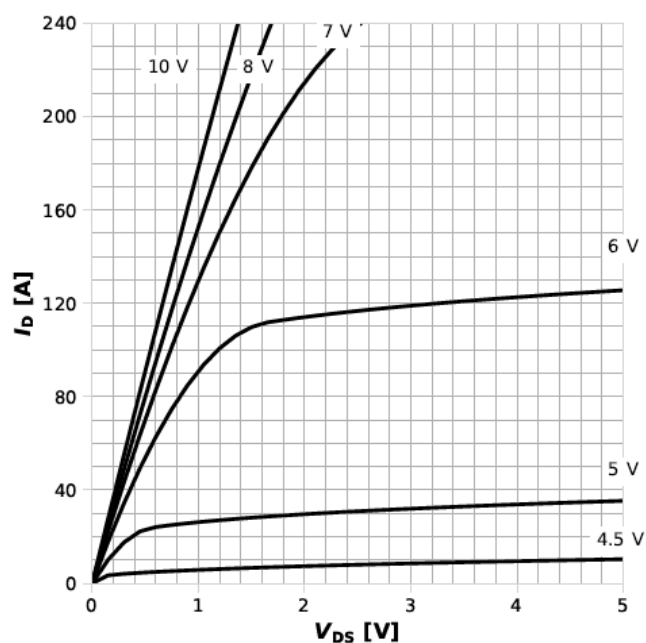

 $I_D = f(V_{DS}), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 6: Typ. drain-source on resistance

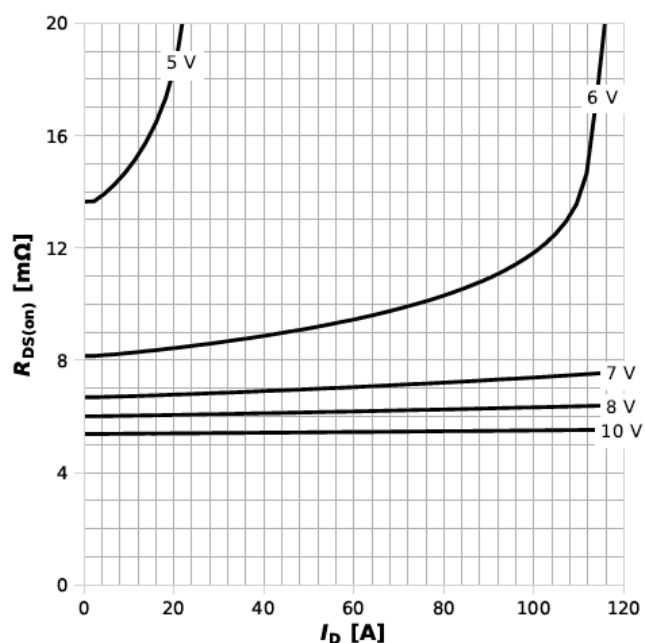

 $R_{DS(on)} = f(I_D), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 7: Typ. transfer characteristics

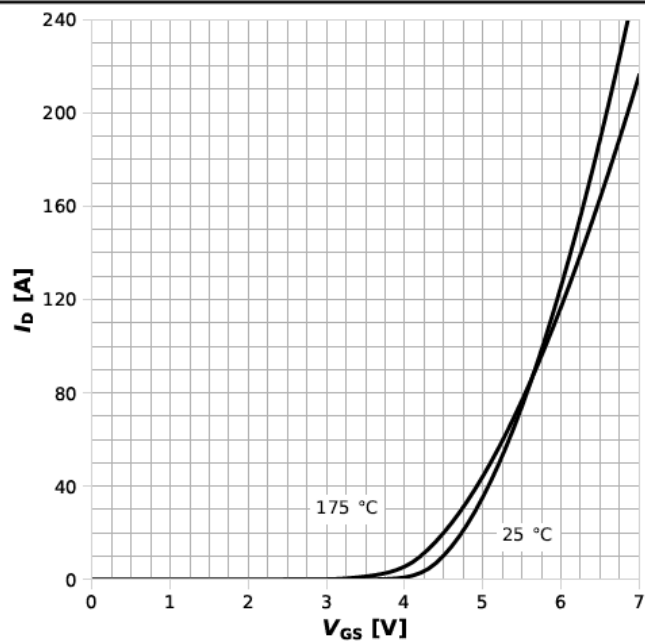

 $I_D = f(V_{GS}), |V_{DS}| > 2|I_D|R_{DS(on)max}; \text{parameter: } T_j$

Diagram 8: Typ. drain-source on resistance

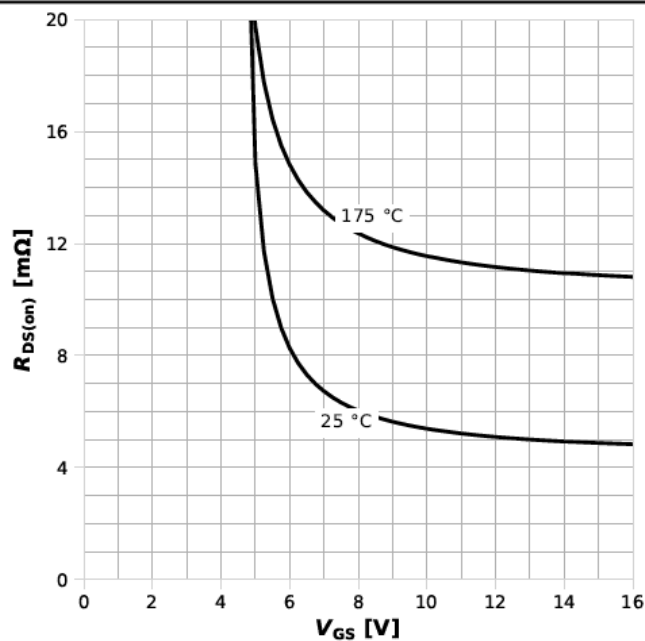
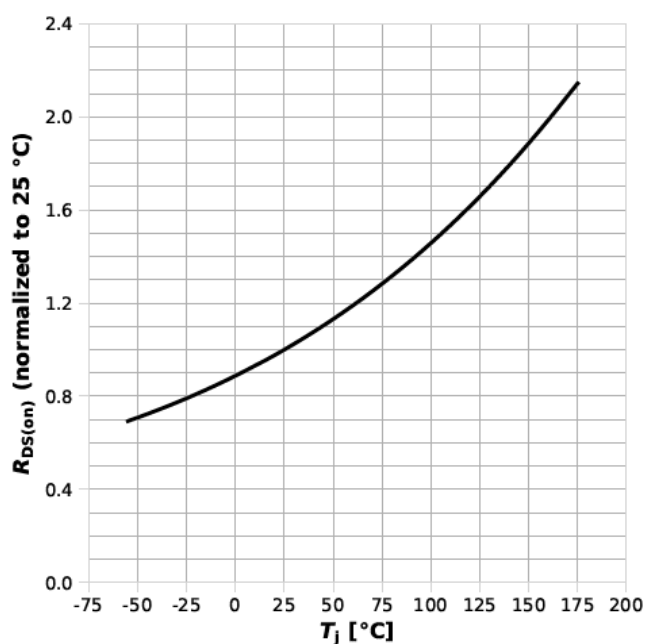
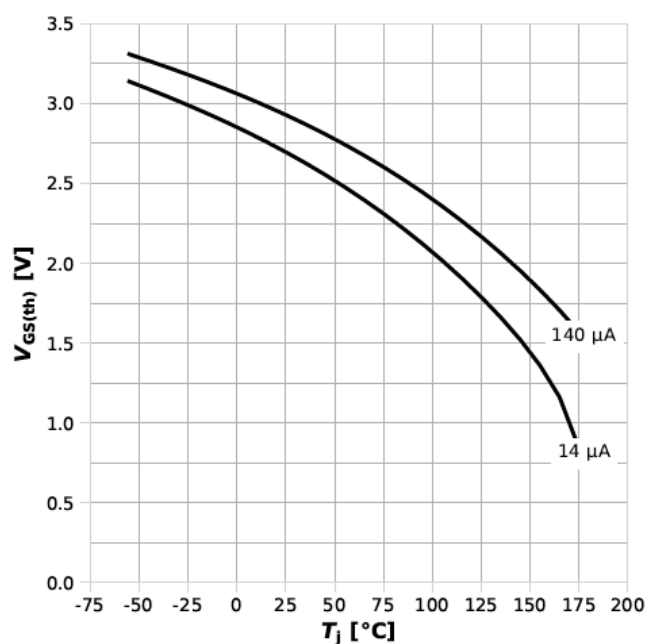

 $R_{DS(on)} = f(V_{GS}), I_D = 10\text{ A}; \text{parameter: } T_j$

Diagram 9: Normalized drain-source on resistance



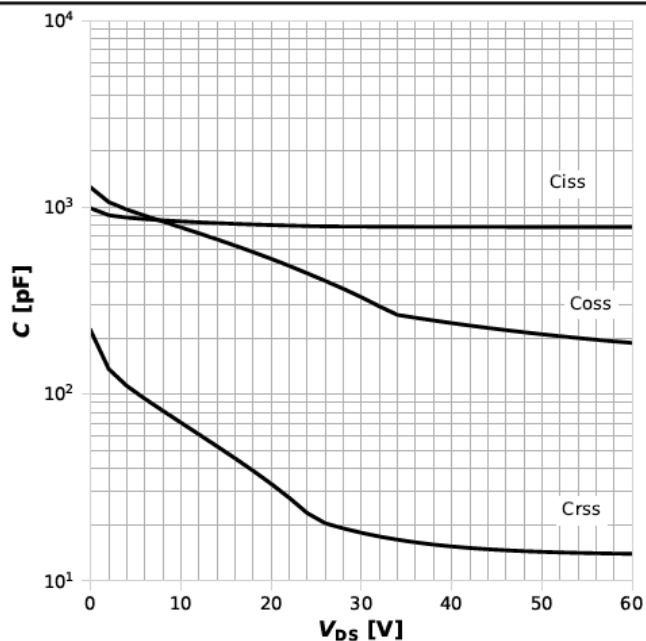
$$R_{DS(on)} = f(T_J), I_D = 10 \text{ A}, V_{GS} = 10 \text{ V}$$

Diagram 10: Typ. gate threshold voltage



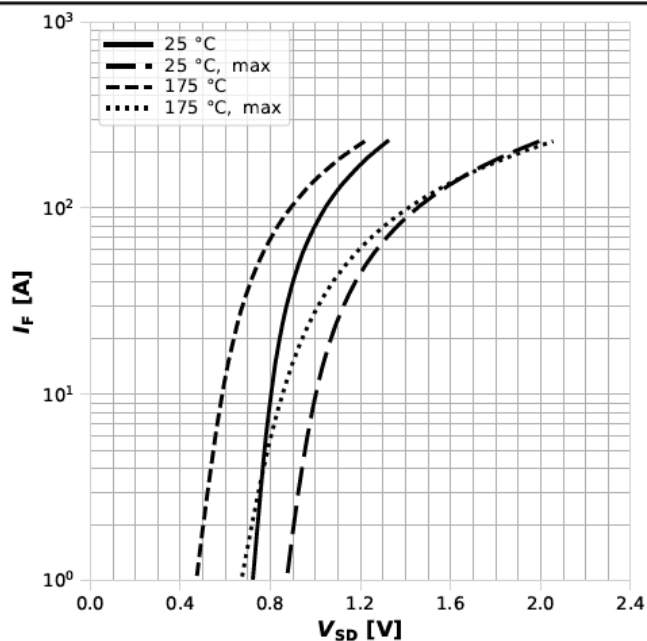
$$V_{GS(th)} = f(T_J), V_{GS} = V_{DS}; \text{ parameter: } I_D$$

Diagram 11: Typ. capacitances



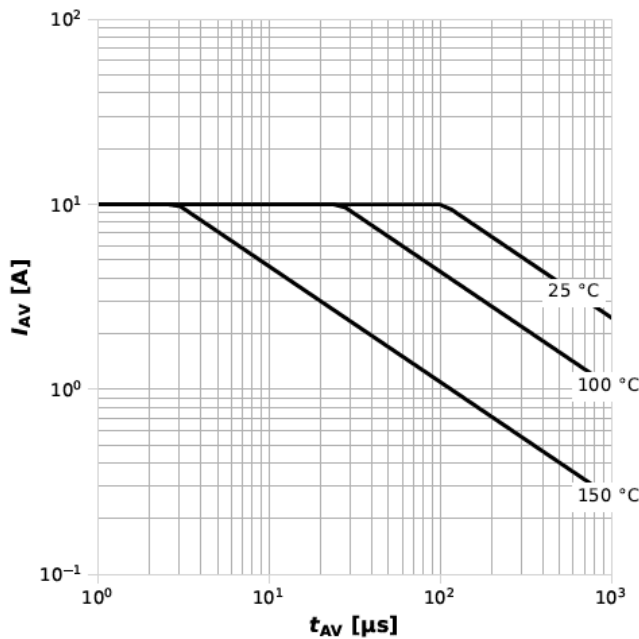
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$

Diagram 12: Forward characteristics of reverse diode



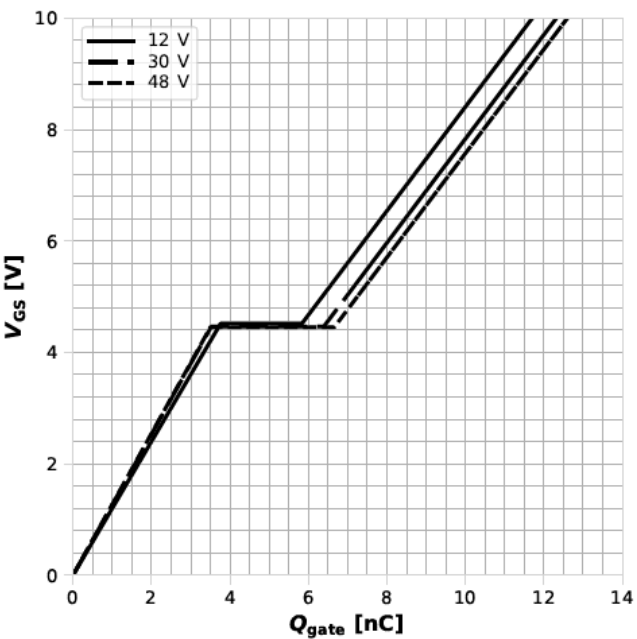
$$I_F = f(V_{SD}); \text{ parameter: } T_J$$

Diagram 13: Avalanche characteristics



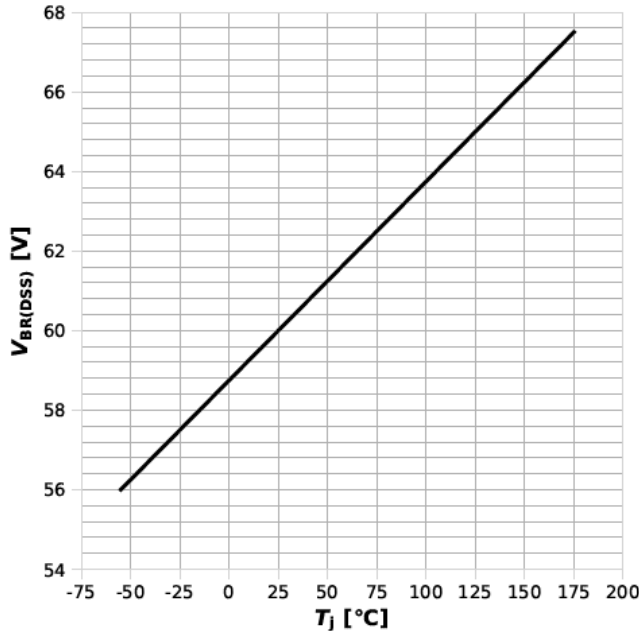
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



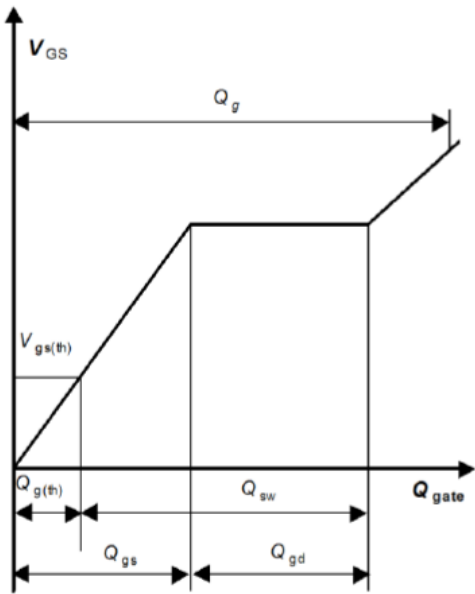
$V_{GS}=f(Q_{gate})$, $I_D=10\text{ A}$ pulsed, $T_j=25\text{ °C}$; parameter: V_{DD}

Diagram 15: Min. drain-source breakdown voltage

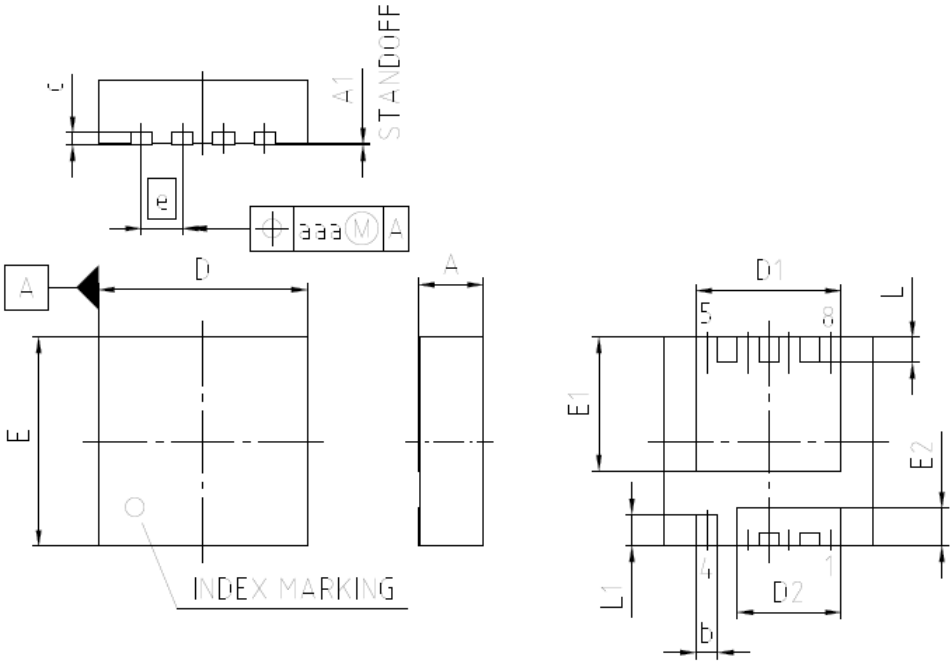


$V_{BR(DSS)}=f(T_j)$; $I_D=10\text{ mA}$

Gate charge waveforms



5 封装外形



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

图 1 PG-TSDSON-8 外形图，尺寸单位为毫米

修订记录

ISZ072N06NM6

Revision 2025-07-07, Rev. 2. 1

Previous revisions

Revision	Date	Subjects (major changes since last revision)
2.0	2024-05-07	Release of final
2.1	2025-07-07	Revised Rdson at Vgs from 6V to 8V

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