

英飞凌MOSFET

OptiMOS™ 6 功率晶体管, 60 V

特性

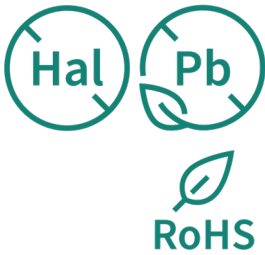
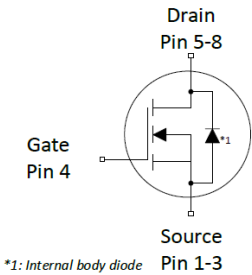
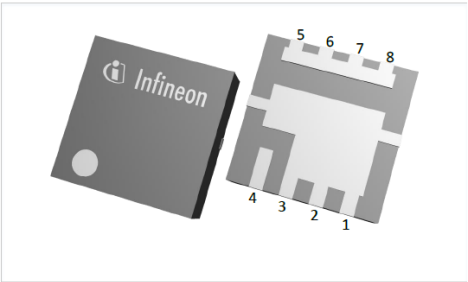
- 非常适合高频开关和同步整流
- N沟道, 标准电平
- 极低的导通电阻 $R_{DS(on)}$
- 卓越的热阻
- 100% 雪崩测试
- 无铅镀层; 符合 RoHS 标准
- 符合 IEC61249-2-21 标准的无卤素

产品验证

完全符合 JEDEC 工业应用标准

表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(on),max}$	1.8	mΩ
I_D	178	A
Q_{oss}	64	nC
$Q_G(0V...10V)$	43	nC
$Q_{rr}(100A/\mu s)$	26	nC



Part number	Package	Marking	Related links
IQE018N06NM6	PG-TSON-8	018N6N6	-

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1 最大额定值

除非另有规定, $T_A=25\text{ °C}$

表 2 最大额定值

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D	-	-	178	A	$V_{GS}=10\text{ V}, T_C=25\text{ °C}$
				126		$V_{GS}=10\text{ V}, T_C=100\text{ °C}$
				93		$V_{GS}=6\text{ V}, T_C=100\text{ °C}$
				25		$V_{GS}=10\text{ V}, T_A=25\text{ °C}, R_{thJA}=60\text{ °C/W}^{2)}$
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	712	A	$T_C=25\text{ °C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	280	mJ	$I_D=20\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	125	W	$T_C=25\text{ °C}$
				2.5		$T_A=25\text{ °C}, R_{thJA}=60\text{ °C/W}^{2)}$
Operating and storage temperature	T_j, T_{stg}	-55	-	175	°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}		0.57	1.2		
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 PCB FR4 上, 配有6 cm² (单层, 70 μm厚) 铜层面积用于漏极连接。PCB在静止空气中垂直放置。

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	$V_{DS}=V_{GS}, I_D=51\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1	1	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	$R_{DS(on)}$	-	1.5	1.8	m Ω	$V_{GS}=10\text{ V}, I_D=30\text{ A}$
Drain-source on-state resistance ⁶⁾	$R_{DS(on)}$	-	1.68	2.2	m Ω	$V_{GS}=8\text{ V}, I_D=15\text{ A}$
Gate resistance	R_G	0.3	0.6	1.0	Ω	-
Transconductance ⁶⁾	g_{fs}	60	120	-	S	$ V_{DS} \geq 2 I_D R_{DS(on)max}, I_D=30\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	C_{iss}	-	2800	3600	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Output capacitance ⁷⁾	C_{oss}		1000	1300		
Reverse transfer capacitance ⁷⁾	C_{rss}		53	93		
Turn-on delay time	$t_{d(on)}$	-	7.2	-	ns	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V}, I_D=30\text{ A},$ $R_{G,ext}=1.6\text{ }\Omega$
Rise time	t_r		1.5			
Turn-off delay time	$t_{d(off)}$		14.5			
Fall time	t_f		4.4			

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}	-	12.4	-	nC	$V_{DS}=30\text{ V}, I_D=30\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$		7.6	-	nC	
Gate to drain charge ⁹⁾	Q_{gd}		9.7	14.6	nC	
Switching charge	Q_{sw}		14.5	-	nC	
Gate charge total ⁹⁾	Q_g		43	56	nC	
Gate plateau voltage	$V_{plateau}$		4.4	-	V	
Gate charge total, sync. FET	$Q_{g(sync)}$	-	38	-	nC	$V_{DS}=0.1\text{ V}, V_{GS}=0\text{ to }10\text{ V}$
Output charge ⁹⁾	Q_{oss}	-	64	85	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。

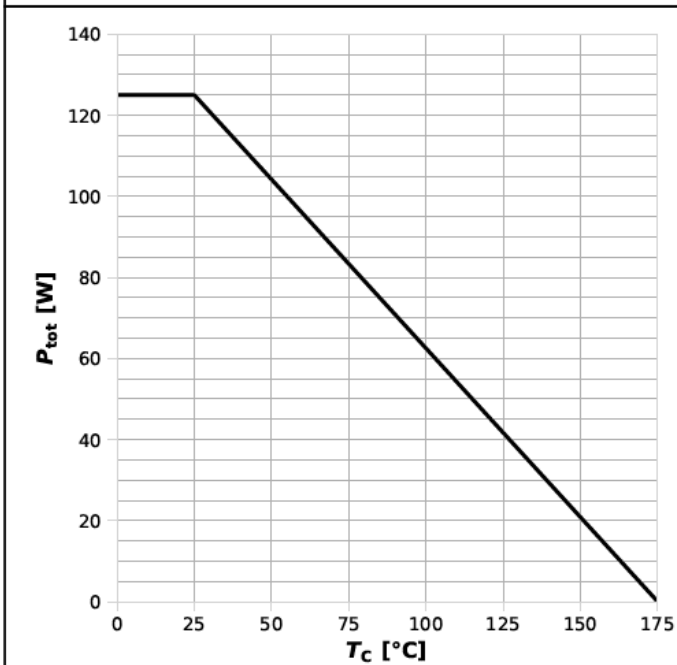
表 7 反向二极管

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	123	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$			712		
Diode forward voltage	V_{SD}	-	0.80	1.0	V	$V_{GS}=0\text{ V}, I_F=30\text{ A}, T_J=25\text{ °C}$
Reverse recovery time ¹⁰⁾	t_{rr}	-	31	62	ns	$V_R=30\text{ V}, I_F=30\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁰⁾	Q_{rr}		26	52	nC	
Reverse recovery time ¹⁰⁾	t_{rr}	-	20	40	ns	$V_R=30\text{ V}, I_F=30\text{ A}, di_F/dt=1000\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁰⁾	Q_{rr}		138	276	nC	

¹⁰⁾ 由设计指定, 未经过生产测试。

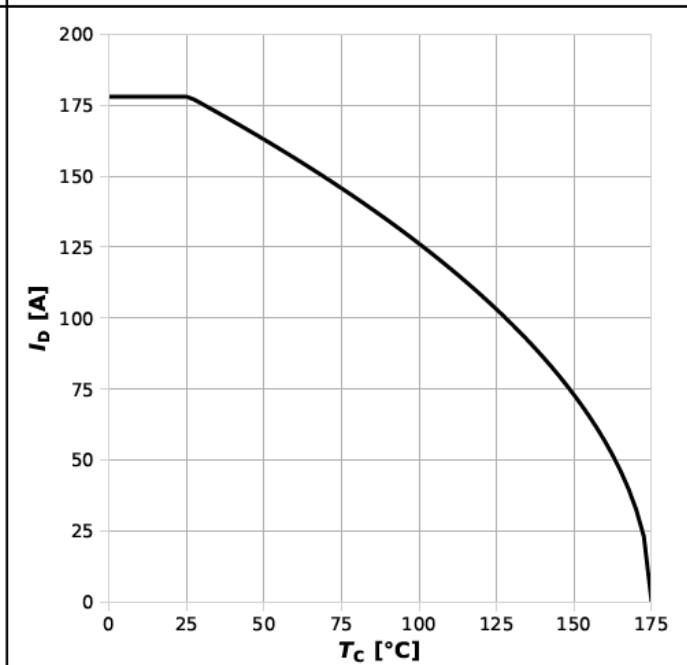
4 电气特性图

Diagram 1: Power dissipation



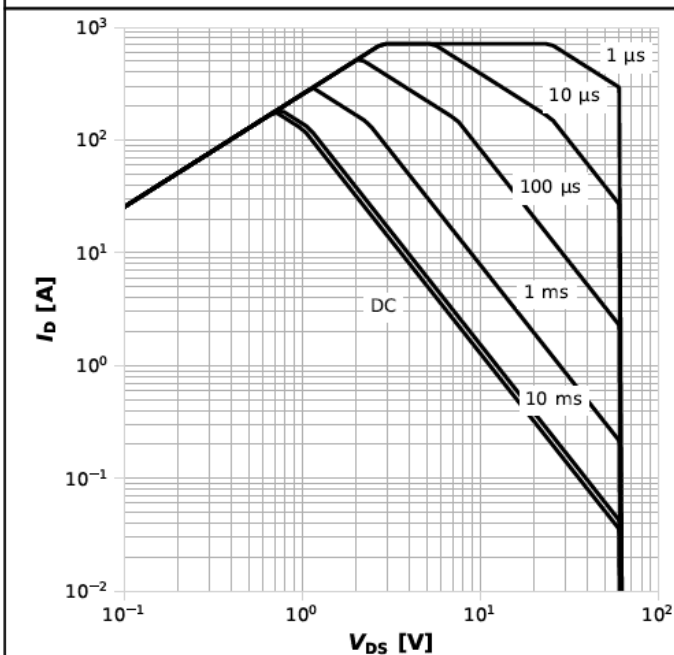
$$P_{tot}=f(T_c)$$

Diagram 2: Drain current



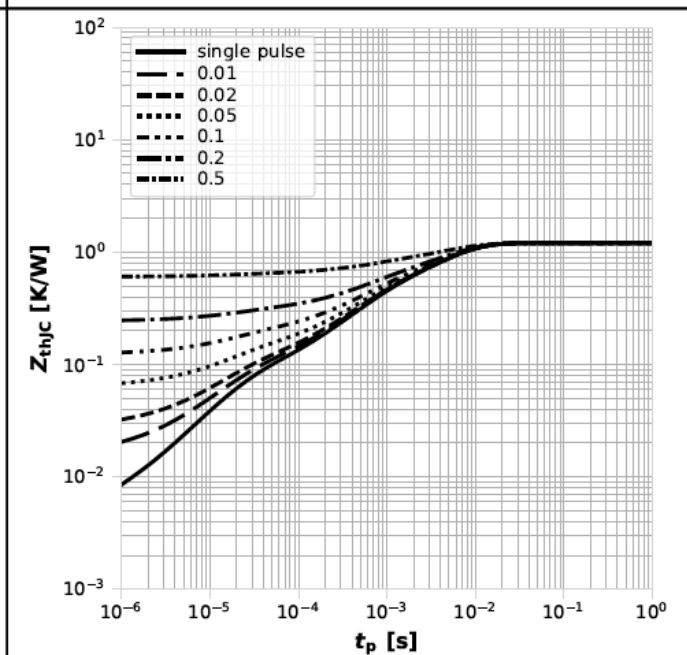
$$I_D=f(T_c); V_{GS}\geq 10\text{ V}$$

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

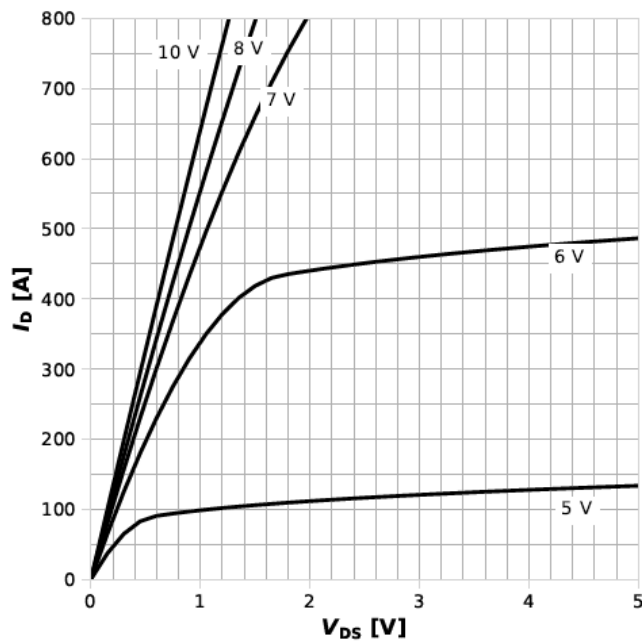

 $I_D = f(V_{DS}), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 6: Typ. drain-source on resistance

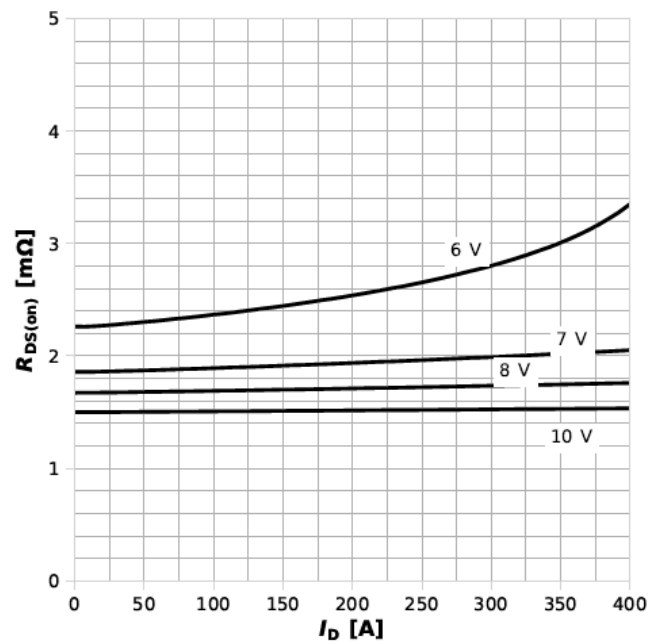

 $R_{DS(on)} = f(I_D), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 7: Typ. transfer characteristics

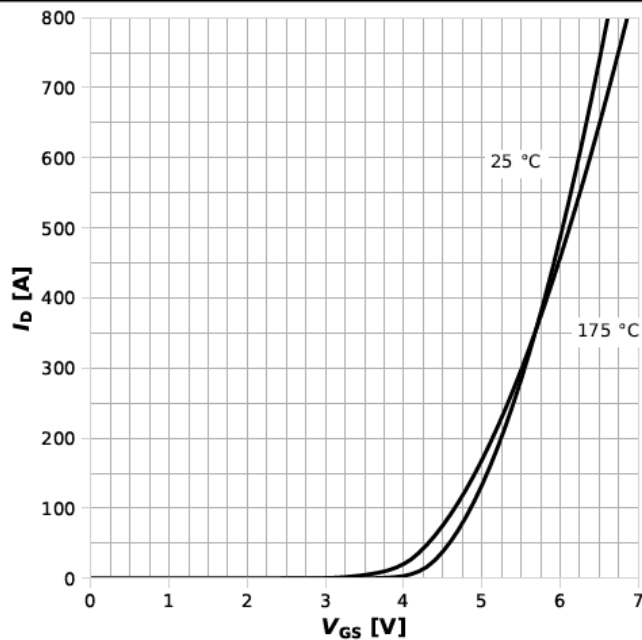

 $I_D = f(V_{GS}), |V_{DS}| > 2|I_D|R_{DS(on)\max}; \text{parameter: } T_j$

Diagram 8: Typ. drain-source on resistance

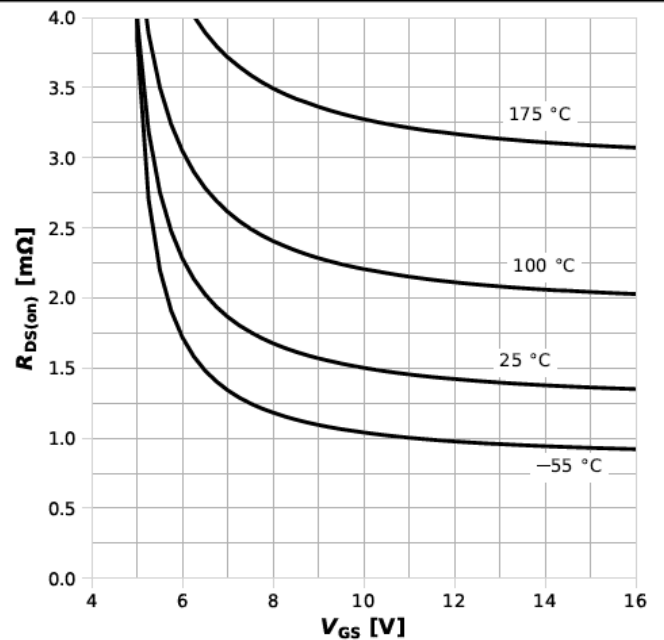
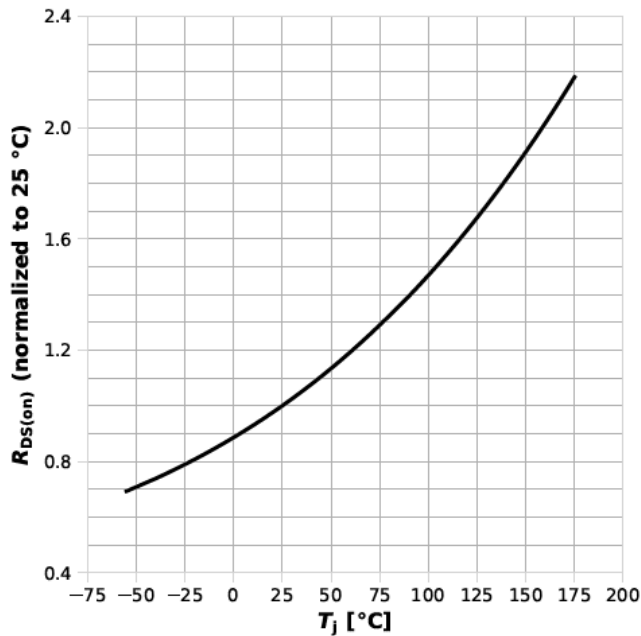
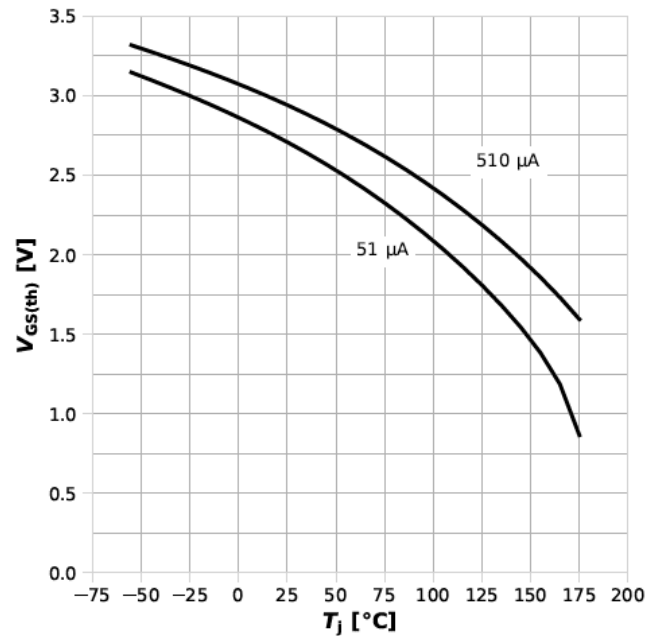

 $R_{DS(on)} = f(V_{GS}), I_D = 30\text{ A}; \text{parameter: } T_j$

Diagram 9: Normalized drain-source on resistance



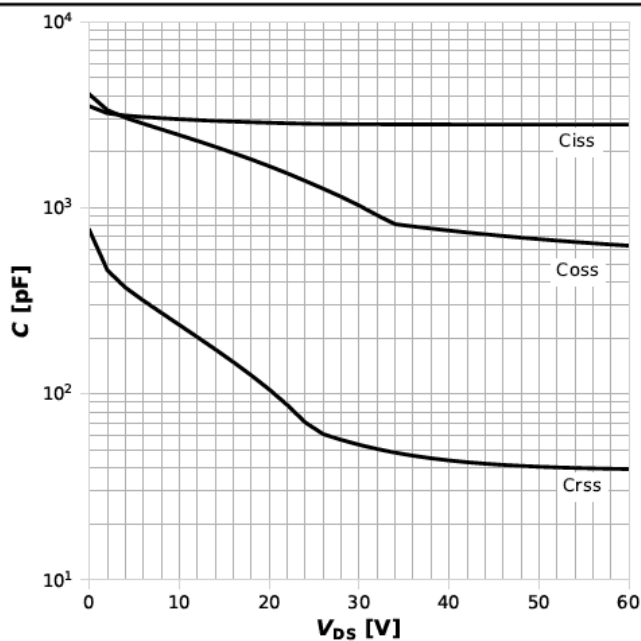
$$R_{DS(on)} = f(T_J), I_D = 30 \text{ A}, V_{GS} = 10 \text{ V}$$

Diagram 10: Typ. gate threshold voltage



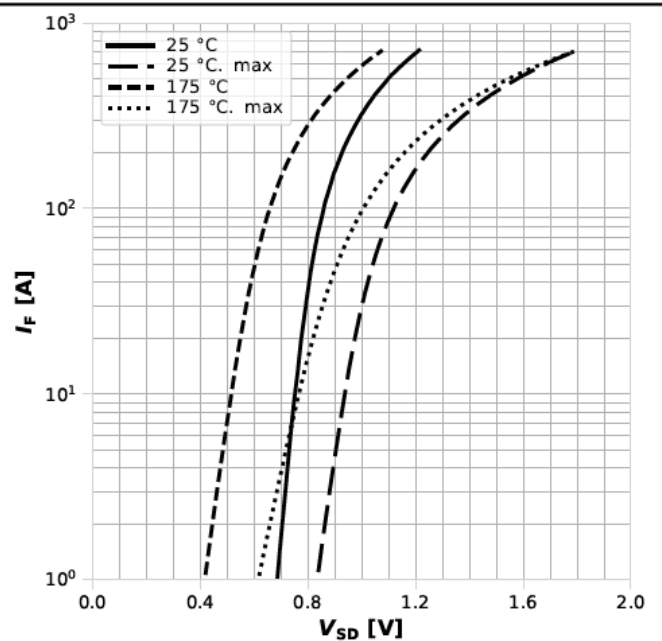
$$V_{GS(th)} = f(T_J), V_{GS} = V_{DS}; \text{ parameter: } I_D$$

Diagram 11: Typ. capacitances



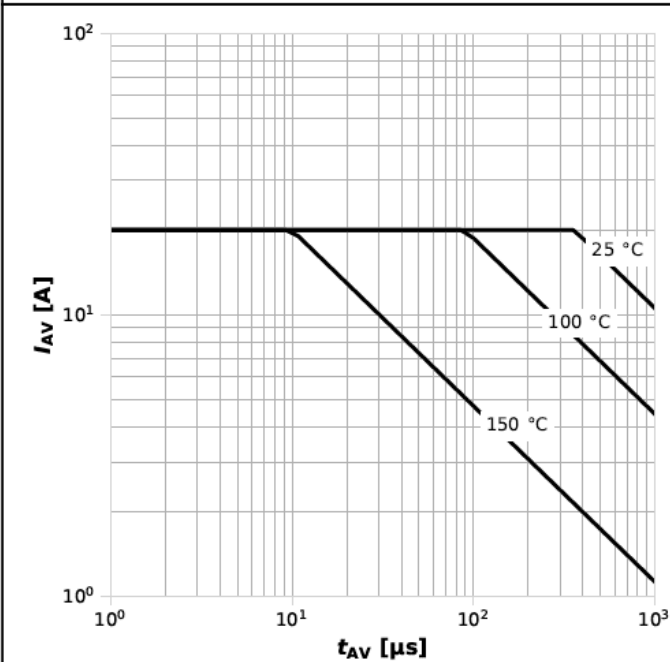
$$C = f(V_{DS}), V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$$

Diagram 12: Forward characteristics of reverse diode



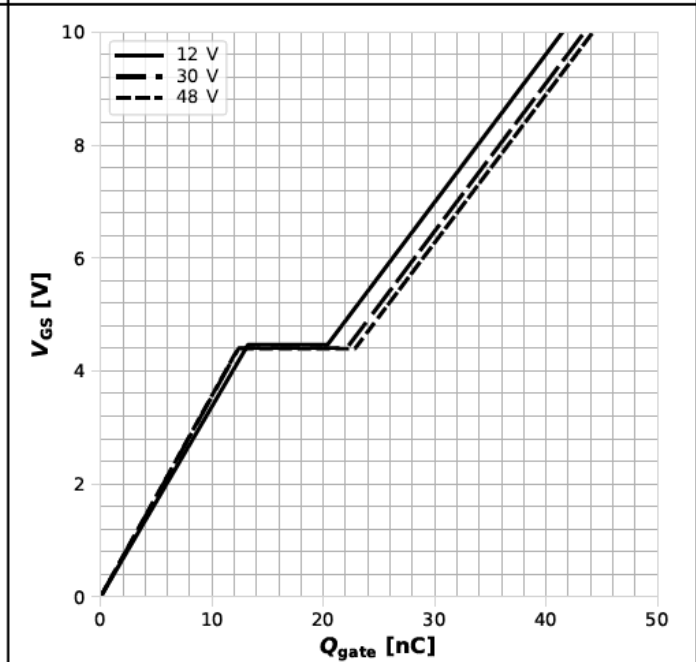
$$I_F = f(V_{SD}), \text{ parameter: } T_J$$

Diagram 13: Avalanche characteristics



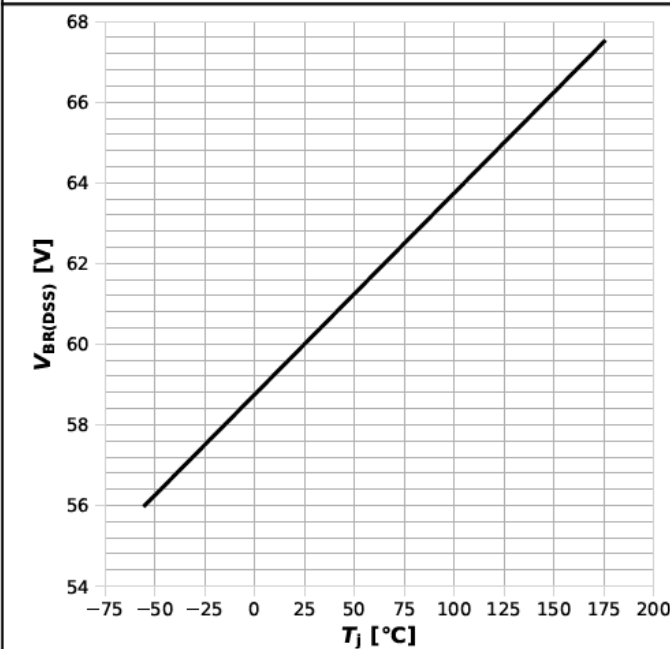
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



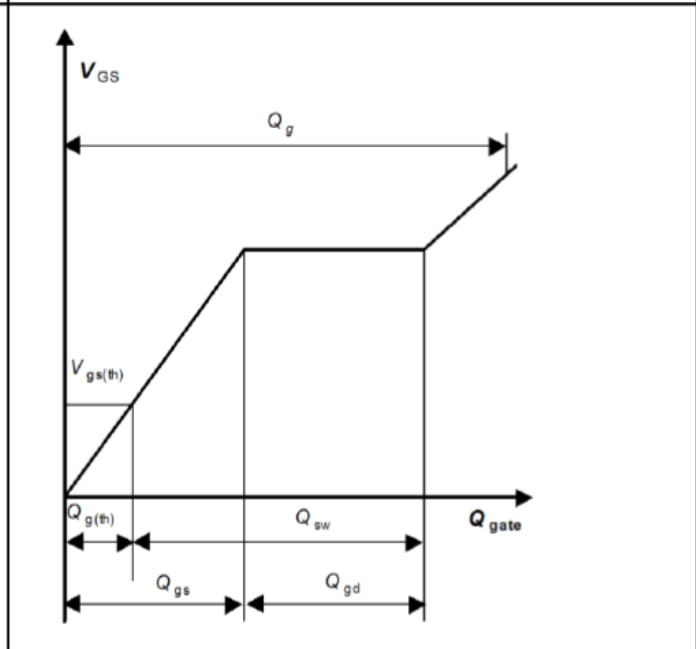
$V_{GS}=f(Q_{gate})$, $I_D=30\text{ A}$ pulsed, $T_j=25\text{ °C}$; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage



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

Gate charge waveforms



5 封装外形

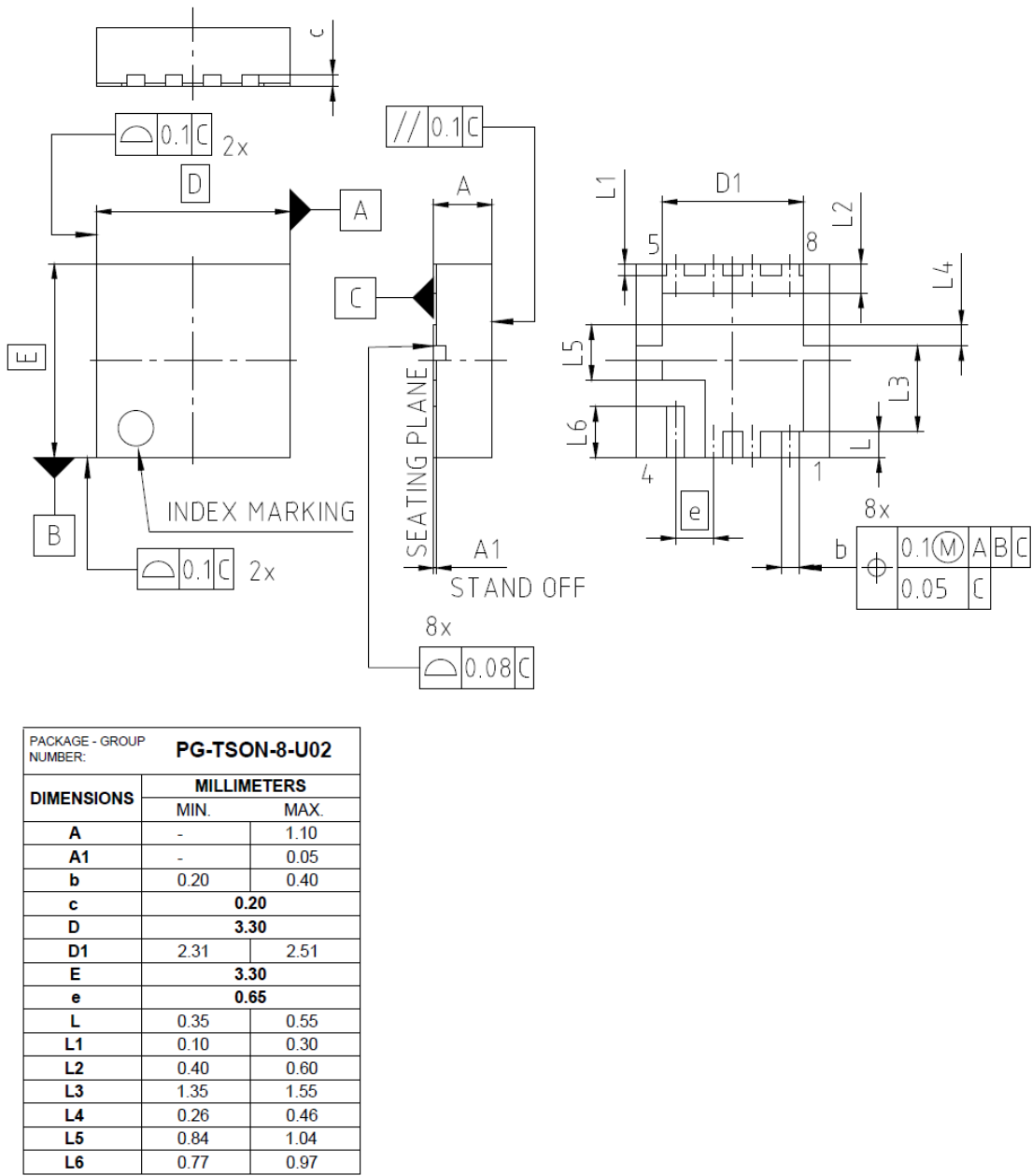


图 1 PG-TSON-8 外形图，尺寸单位为毫米

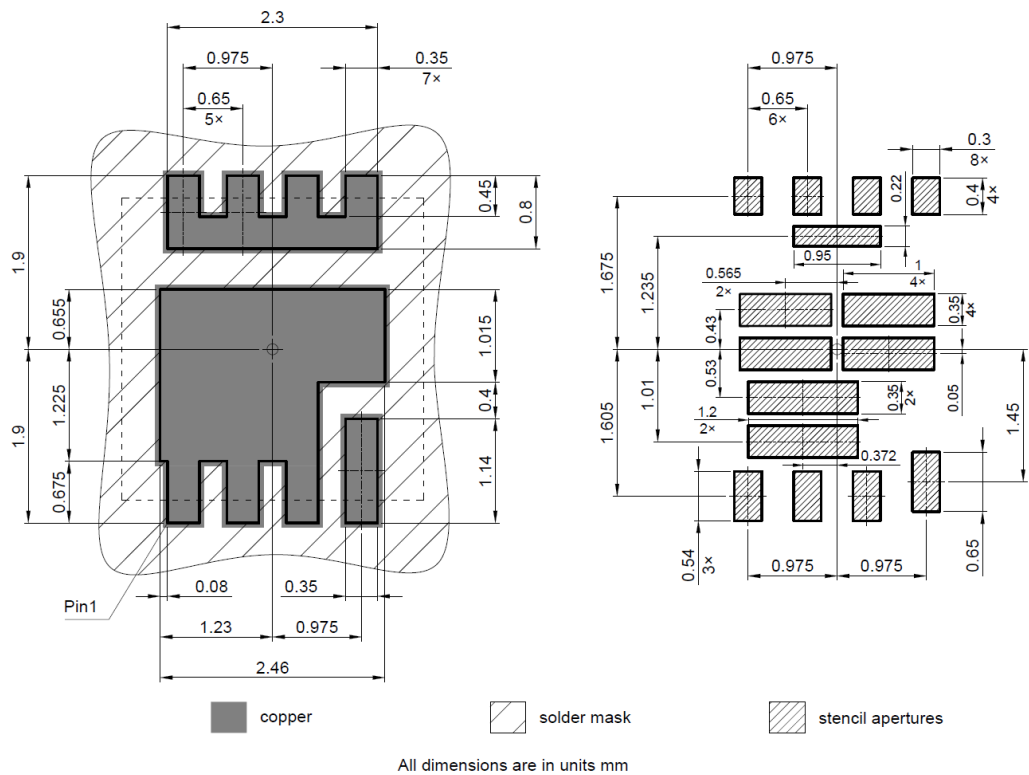
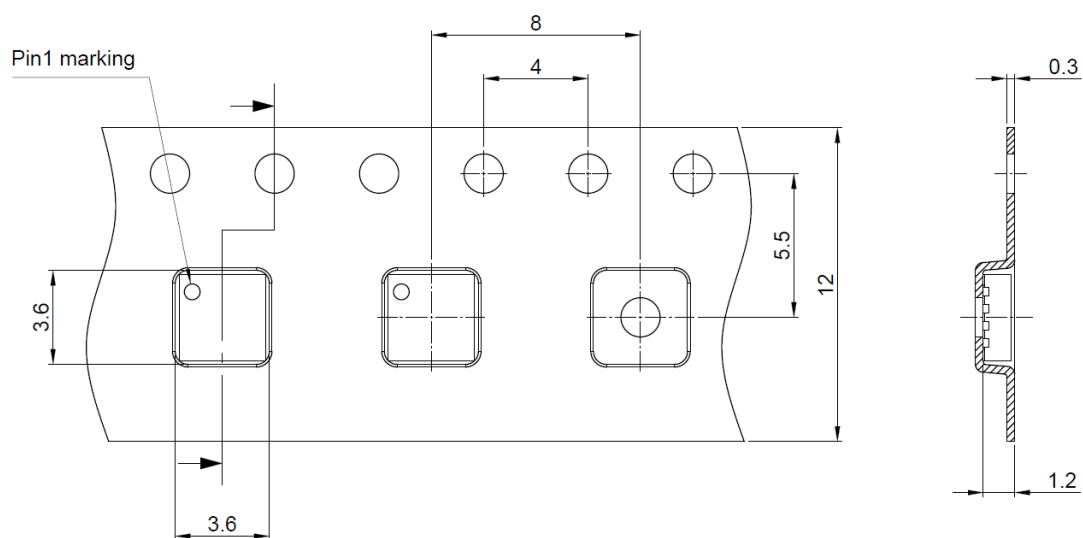


图 2 PG-TSON-8 封装图，尺寸单位为毫米



All dimensions are in units mm

The drawing is in compliance with ISO 128-30, Projection Method 1 [1st angle projection]

图 3 PG-TSON-8 封装变体，尺寸单位为毫米

修订记录

IQE018N06NM6

Revision 2025-02-06, Rev. 2. 1

Previous revisions

Revision	Date	Subjects (major changes since last revision)
2.0	2024-02-14	Release of final version
2.1	2025-02-06	Revised Rdson at Vgs from 6V to 8V

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