

英飞凌MOSFET

OptiMOS™ 5 功率晶体管, 30 V

特性

- N沟道，逻辑
- 极低的导通电阻 $R_{DS(on)}$
- 卓越的热阻抗
- 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

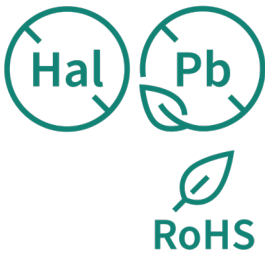
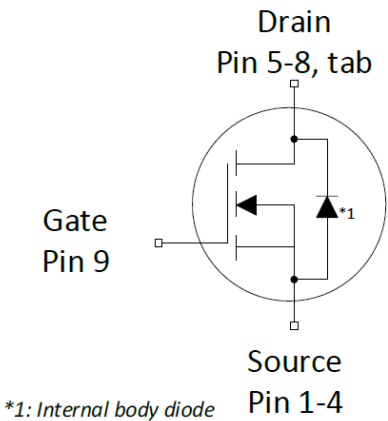
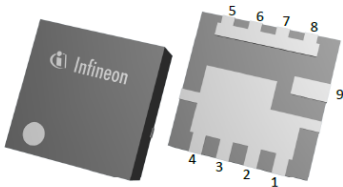
产品验证

已通过 JEDEC 相关测试。

表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	30	V
$R_{DS(on),max}$	1.15	mΩ
I_D	224	A
Q_{oss}	22	nC
Q_G	40	nC

PG-TTFN-9 (3x3)



Part number	Package	Marking	Related links
IQE012N03LM5CG	PG-TTFN-9	01203C5	-

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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	-	-	224	A	$V_{GS}=10\text{ V}, T_C=25\text{ }^{\circ}\text{C}$
				159		$V_{GS}=10\text{ V}, T_C=100\text{ }^{\circ}\text{C}$
				137		$V_{GS}=4.5\text{ V}, T_C=100\text{ }^{\circ}\text{C}$
				34		$V_{GS}=10\text{ V}, T_A=25\text{ }^{\circ}\text{C}, R_{thJA}=60\text{ }^{\circ}\text{C/W}$ ²⁾
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	896	A	$T_A=25\text{ }^{\circ}\text{C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	108	mJ	$I_D=20\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-16	-	16	V	-
Power dissipation	P_{tot}	-	-	107	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}	-	-	1.4	$^{\circ}\text{C/W}$	-
Thermal resistance, junction - ambient, 6 cm^2 cooling area ⁵⁾	R_{thJA}			60		

5) 器件置于 $40\text{ mm} \times 40\text{ mm} \times 1.5\text{ mm}$ 环氧树脂印刷电路板 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。印刷电路板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	$V_{(BR)DSS}$	30	-	-	V	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	1.2	1.6	2.0	V	$V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1	1	μA	$V_{DS}=24\text{ V}, V_{GS}=0\text{ V}, T_j=25^\circ\text{C}$
			10	100		$V_{DS}=24\text{ V}, V_{GS}=0\text{ V}, T_j=125^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=16\text{ V}, V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	1.0	1.15	m Ω	$V_{GS}=10\text{ V}, I_D=20\text{ A}$
			1.3	1.55		$V_{GS}=4.5\text{ V}, I_D=20\text{ A}$
Gate resistance ⁶⁾	R_G	-	0.9	-	Ω	-
Transconductance ⁶⁾	g_{fs}	75	150	-	S	$ V_{DS} \geq 2 I_D R_{DS(on)max}, I_D=20\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}	-	2700	3500	pF	$V_{GS}=0\text{ V}, V_{DS}=15\text{ V}, f=1\text{ MHz}$
Output capacitance ⁷⁾	C_{oss}		710	920		
Reverse transfer capacitance ⁷⁾	C_{rss}		65	110		
Turn-on delay time	$t_{d(on)}$	-	4.6	-	ns	$V_{DD}=15\text{ V}, V_{GS}=10\text{ V}, I_D=20\text{ A},$ $R_{G,ext}=1.6\text{ }\Omega$
Rise time	t_r		1.7			
Turn-off delay time	$t_{d(off)}$		19.4			
Fall time	t_f		3.2			

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}	-	6.3	-	nC	$V_{DD}=15\text{ V}$, $I_D=20\text{ A}$, $V_{GS}=0\text{ to }4.5\text{ V}$
Gate charge at threshold	$Q_{g(th)}$		4.3	-	nC	
Gate to drain charge ⁹⁾	Q_{gd}		4.3	6.5	nC	
Switching charge	Q_{sw}		6.4	-	nC	
Gate charge total ⁹⁾	Q_g		18.9	24	nC	
Gate plateau voltage	$V_{plateau}$		2.4	-	V	
Gate charge total ⁹⁾	Q_g	-	40	53	nC	$V_{DD}=15\text{ V}$, $I_D=20\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Output charge ⁹⁾	Q_{oss}	-	22	29	nC	$V_{DS}=15\text{ V}$, $V_{GS}=0\text{ V}$

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	-	-	89	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$			896		
Diode forward voltage	V_{SD}	-	0.74	1.0	V	$V_{GS}=0\text{ V}$, $I_F=20\text{ A}$, $T_J=25\text{ °C}$
Reverse recovery time ¹⁰⁾	t_{rr}	-	23	47	ns	$V_R=15\text{ V}$, $I_F=20\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁰⁾	Q_{rr}		14	27	nC	
Reverse recovery time ¹⁰⁾	t_{rr}	-	16	32	ns	$V_R=15\text{ V}$, $I_F=20\text{ A}$, $di_F/dt=500\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁰⁾	Q_{rr}		38	75	nC	

¹⁰⁾ 由设计指定，未经过生产测试。

4 电气特性图

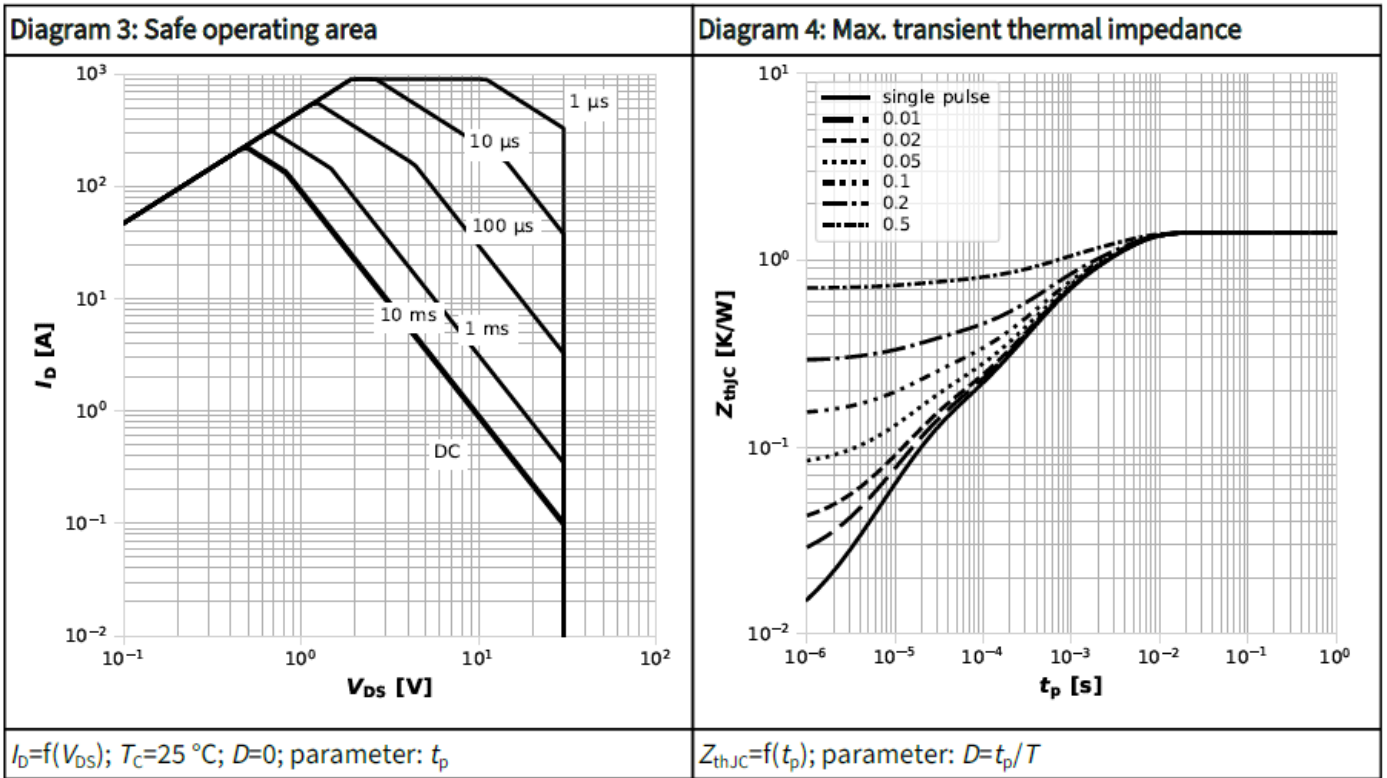
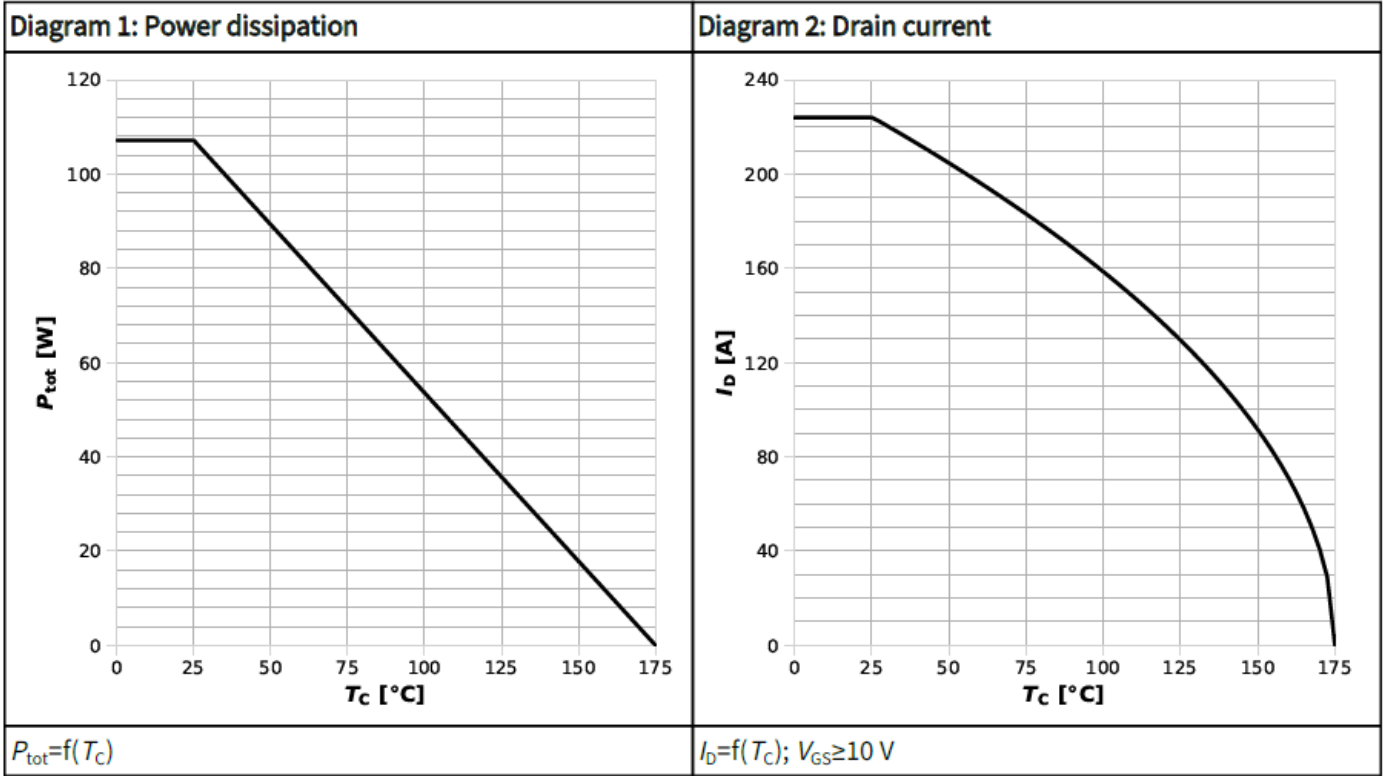
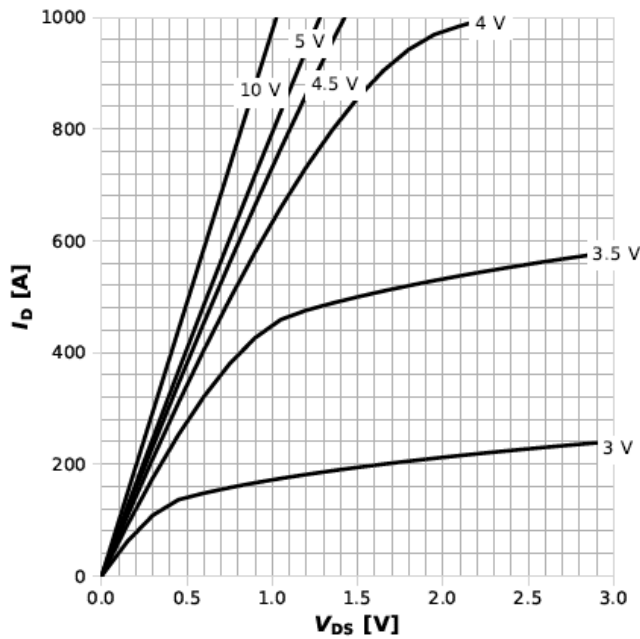
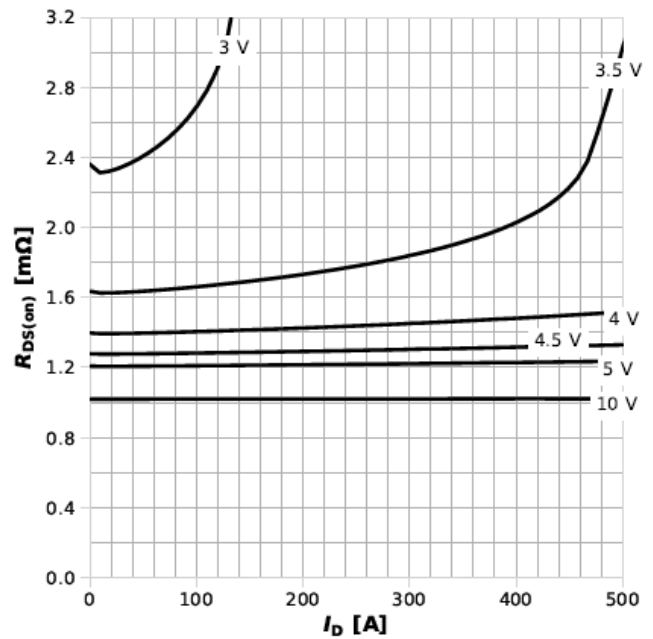


Diagram 5: Typ. output characteristics



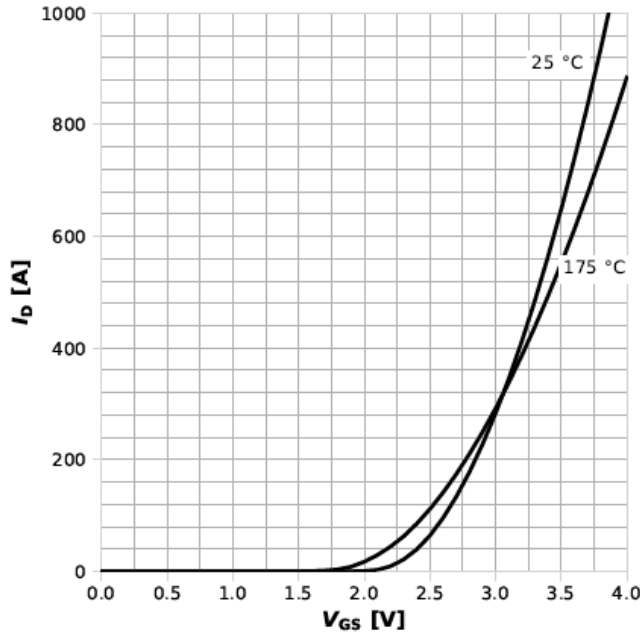
$I_D = f(V_{DS})$, $T_j = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



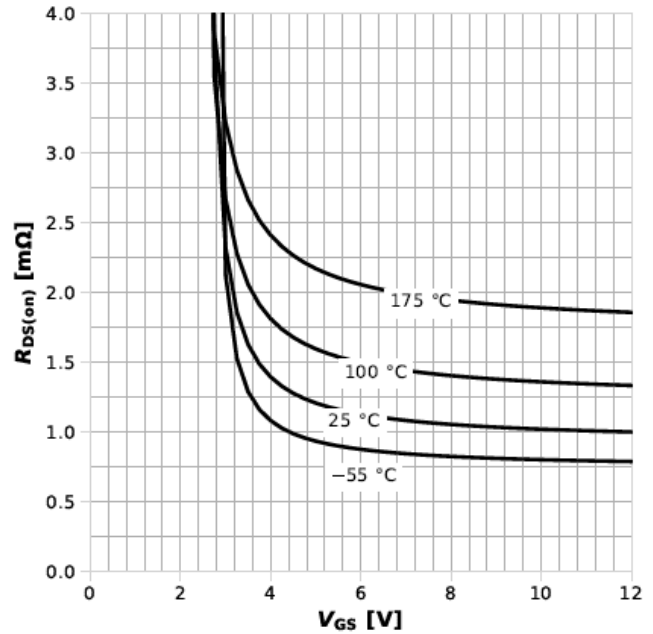
$R_{DS(on)} = f(I_D)$, $T_j = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



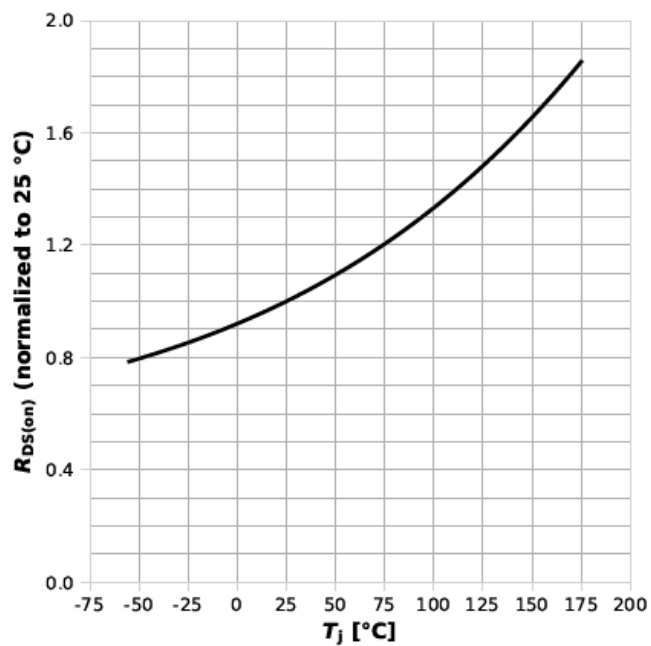
$I_D = f(V_{GS})$, $|V_{DS}| > 2|I_D|R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. drain-source on resistance



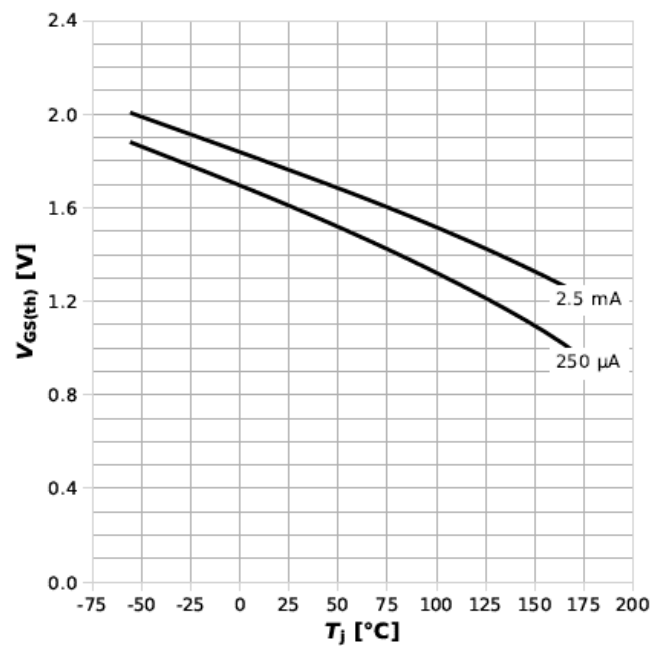
$R_{DS(on)} = f(V_{GS})$, $I_D = 20\text{ A}$; parameter: T_j

Diagram 9: Normalized drain-source on resistance



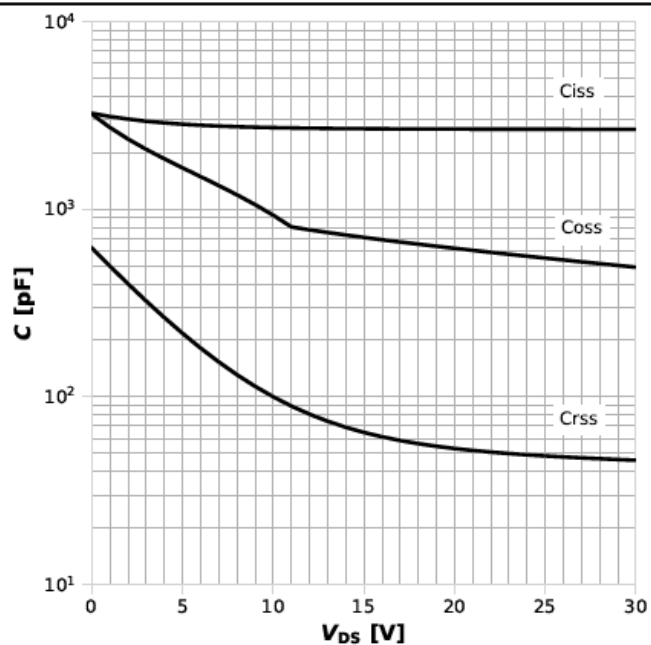
$$R_{DS(on)} = f(T_j), I_D = 20 \text{ A}, V_{GS} = 10 \text{ V}$$

Diagram 10: Typ. gate threshold voltage



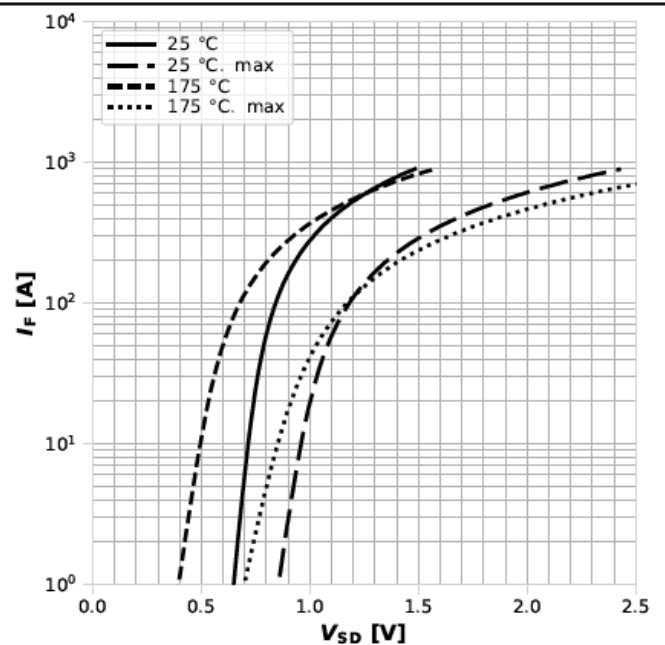
$$V_{GS(th)} = f(T_j), V_{GS} = V_{DS}; \text{ parameter: } I_D$$

Diagram 11: Typ. capacitances



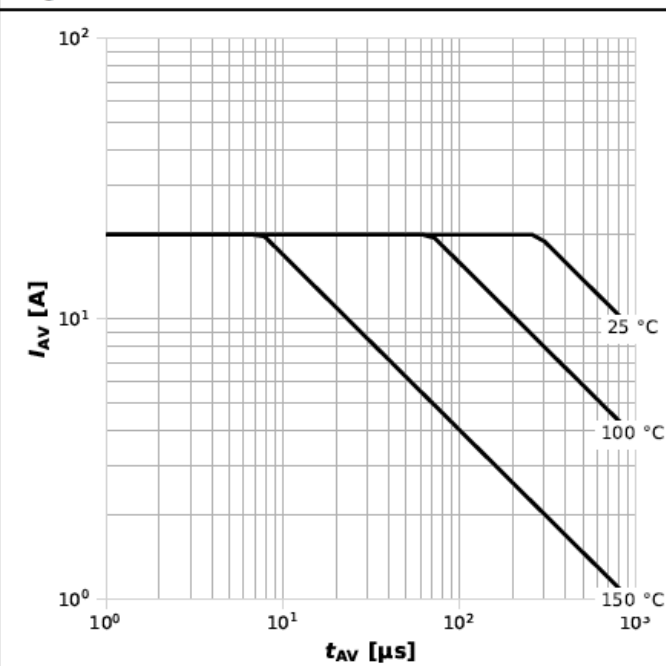
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$

Diagram 12: Forward characteristics of reverse diode



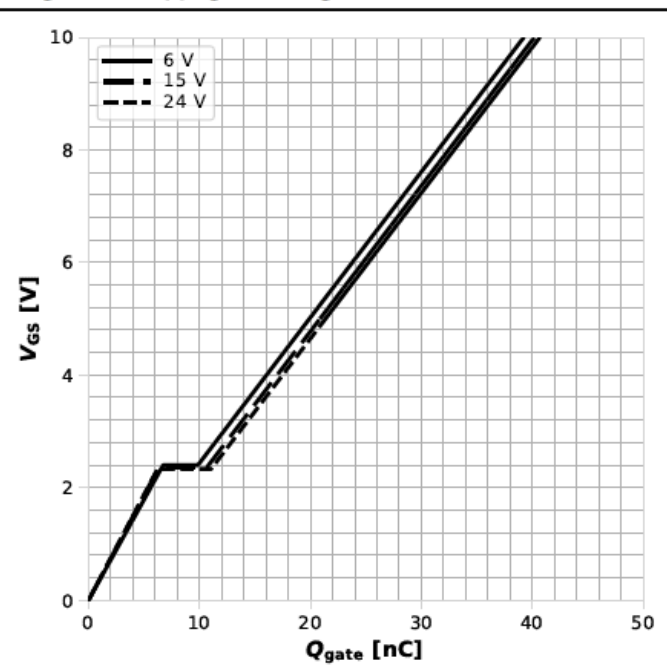
$$I_F = f(V_{SD}); \text{ parameter: } T_j$$

Diagram 13: Avalanche characteristics



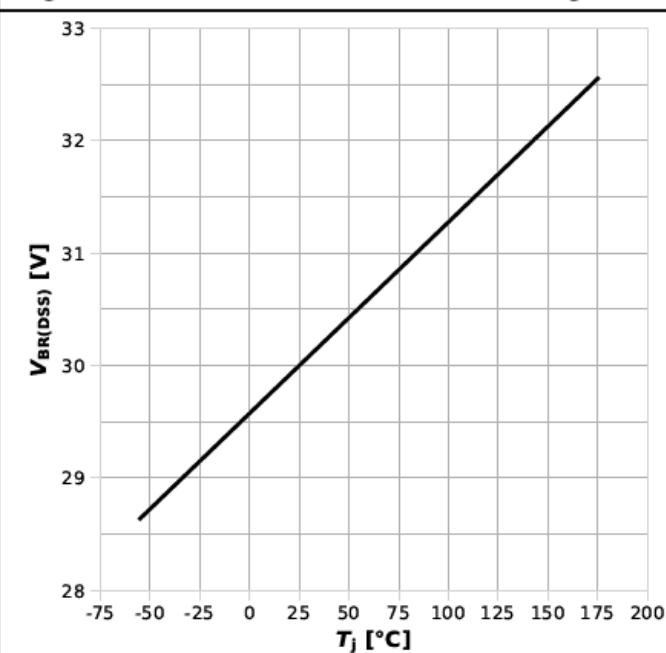
$I_{AS}=f(t_{AV}); R_{GS}=25\ \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



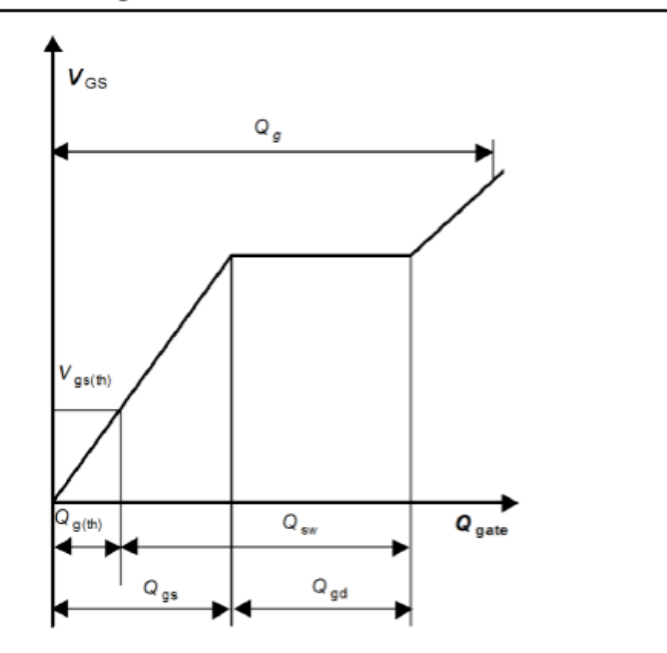
$V_{GS}=f(Q_{gate}), I_D=20\text{ A pulsed}, T_j=25\text{ °C}$; parameter: V_{DD}

Diagram 15: Min. drain-source breakdown voltage



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

Gate charge waveforms



-

5 封装外形

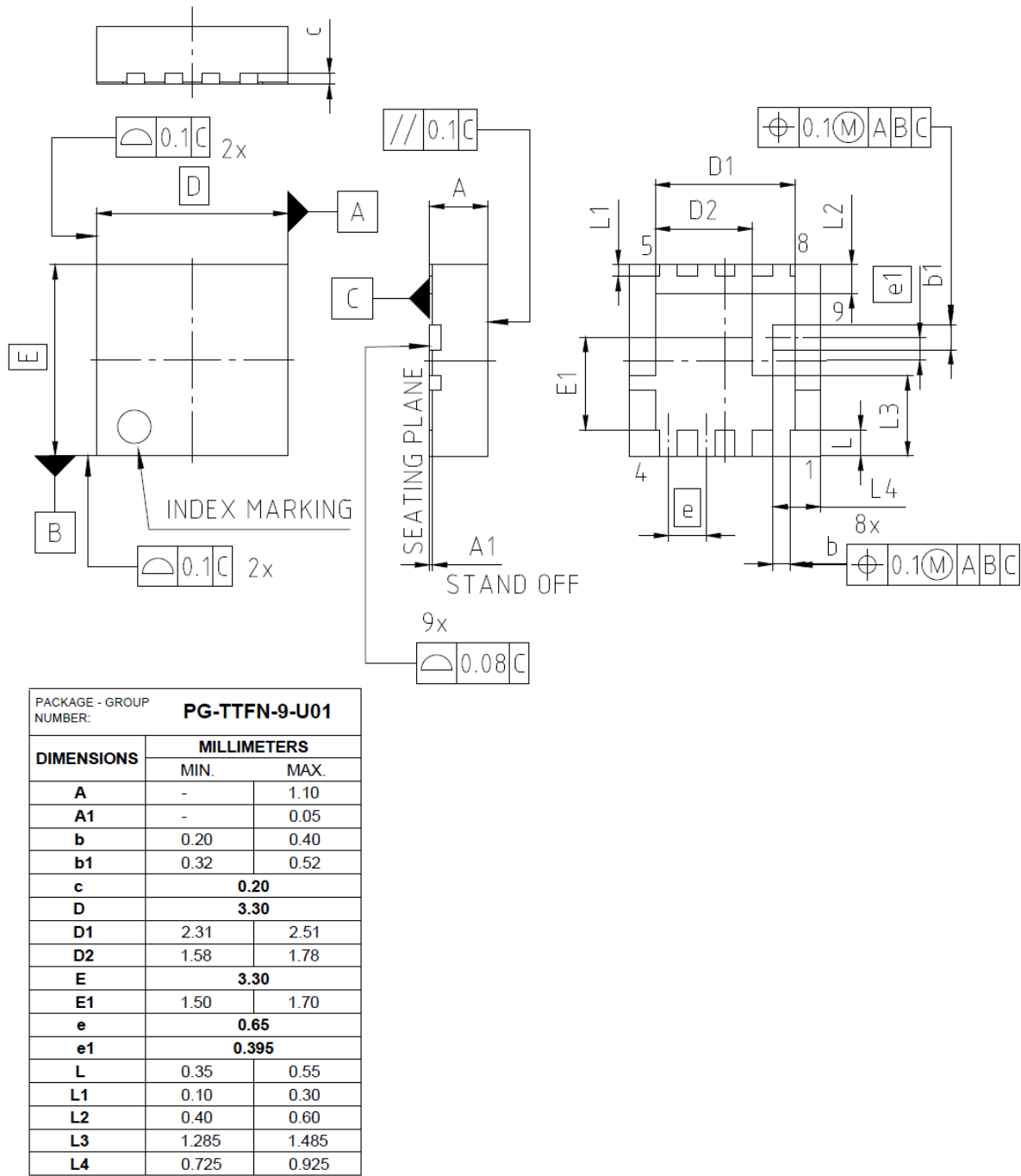


图 1 PG-TTFN-9 外形图，尺寸单位为毫米

修订记录

IQE012N03LM5CG

Revision 2026-02-01, Rev. 1. 1

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2025-12-17	Release of final datasheet
1.1	2026-02-01	Update technology and footnotes

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版本 2026-09-22

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