

英飞凌MOSFET

OptiMOS™ 7 功率晶体管, 25 V

特性

- N沟道，逻辑电平
- 针对硬开关拓扑进行了优化
- 针对最佳FOM_{oss}进行了优化
- dv/dt耐受性方面具有出色的米勒比
- 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

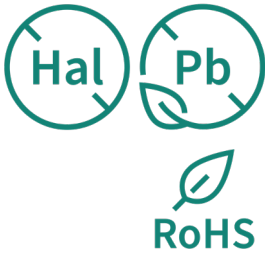
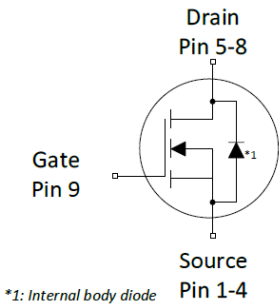
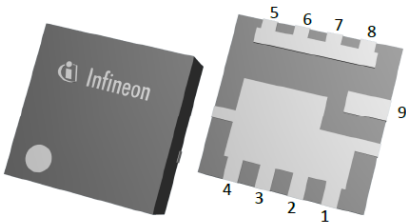
符合 JEDEC JESD47, JESD22 和 J-STD-020 相关测试的工业应用要求。

表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	25	V
$R_{DS(on),max}$	0.54	mΩ
I_D	406	A
Q_{oss}	38	nC
$Q_G(0V...10V)$	57	nC

Part number	Package	Marking	Related links
IQEH54NE2LM7UCG	PG-TTFN-9	H54E2UC	-

PG-TTFN-9 (3x3)



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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	-	-	406	A	$V_{GS}=10\text{ V}, T_C=25\text{ °C}$
				287		$V_{GS}=10\text{ V}, T_C=100\text{ °C}$
				230		$V_{GS}=4.5\text{ V}, T_C=100\text{ °C}$
				52		$V_{GS}=10\text{ V}, T_A=25\text{ °C}, R_{thJA}=60\text{ °C/W}^{2)}$
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	1624	A	$T_C=25\text{ °C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	340	mJ	$I_D=20\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-16	-	16	V	-
Power dissipation	P_{tot}	-	-	150	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}	-	-	1	°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	$V_{(BR)DSS}$	25	-	-	V	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	1.4	1.7	2.0	V	$V_{DS}=V_{GS}, I_D=432\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1	1	μA	$V_{DS}=22\text{ V}, V_{GS}=0\text{ V}, T_j=25^\circ\text{C}$
			10	100		$V_{DS}=22\text{ V}, V_{GS}=0\text{ V}, T_j=125^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=16\text{ V}, V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.47	0.54	m Ω	$V_{GS}=10\text{ V}, I_D=20\text{ A}$
			0.68	0.84		$V_{GS}=4.5\text{ V}, I_D=20\text{ A}$
Gate resistance	R_G	-	0.75	-	Ω	-
Transconductance	g_{fs}	55	110	-	S	$ V_{DS} \geq 2 I_D /R_{DS(on)max}, I_D=20\text{ A}$

表 5 动态特性

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	4700	6100	pF	$V_{GS}=0\text{ V}, V_{DS}=12\text{ V}, f=1\text{ MHz}$
Output capacitance	C_{oss}		1800	-		
Reverse transfer capacitance	C_{rss}		81	-		
Turn-on delay time	$t_{d(on)}$	-	7.0	-	ns	$V_{DD}=12\text{ V}, V_{GS}=10\text{ V}, I_D=20\text{ A},$ $R_{G,ext}=3\text{ }\Omega$
Rise time	t_r		2.0			
Turn-off delay time	$t_{d(off)}$		29			
Fall time	t_f		4.4			

表 6 栅极电荷特性⁶⁾

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	13.3	-	nC	$V_{DD}=12\text{ V}$, $I_D=20\text{ A}$, $V_{GS}=0\text{ to }4.5\text{ V}$
Gate charge at threshold	$Q_{g(th)}$		8.1		nC	
Gate to drain charge	Q_{gd}		4.2		nC	
Switching charge	Q_{sw}		9.4		nC	
Gate charge total	Q_g		27		nC	
Gate plateau voltage	$V_{plateau}$		2.8		V	
Gate charge total	Q_g	-	57	-	nC	$V_{DD}=12\text{ V}$, $I_D=20\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Output charge	Q_{oss}	-	38	-	nC	$V_{DS}=12\text{ V}$, $V_{GS}=0\text{ V}$

⁶⁾ 参数定义请参数见“栅极电荷波形”。

表 7 反向二极管

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	137	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$			1624		
Diode forward voltage	V_{SD}	-	0.76	1.0	V	$V_{GS}=0\text{ V}$, $I_F=20\text{ A}$, $T_J=25\text{ °C}$
Reverse recovery time	t_{rr}	-	25	-	ns	$V_R=12\text{ V}$, $I_F=20\text{ A}$, $di_F/dt=400\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		88		nC	

4 电气特性图

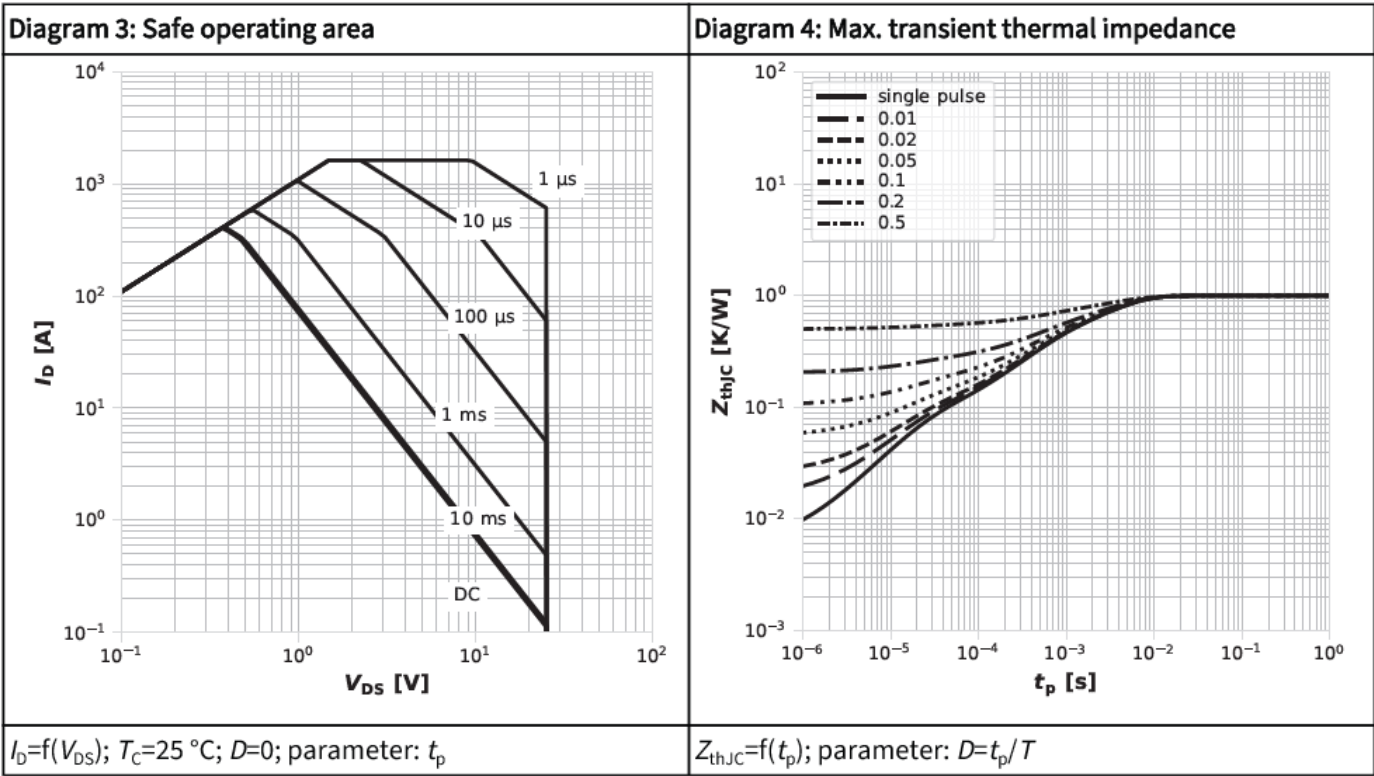
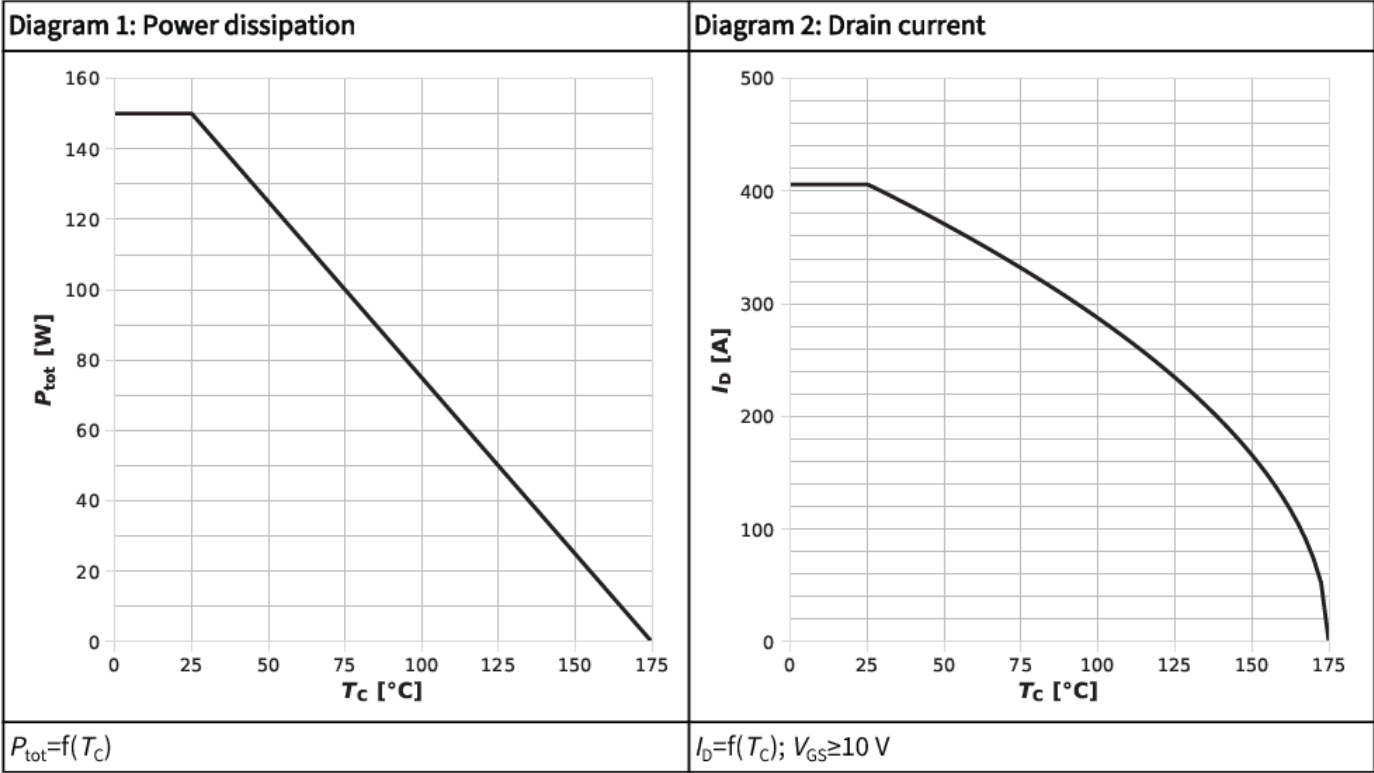
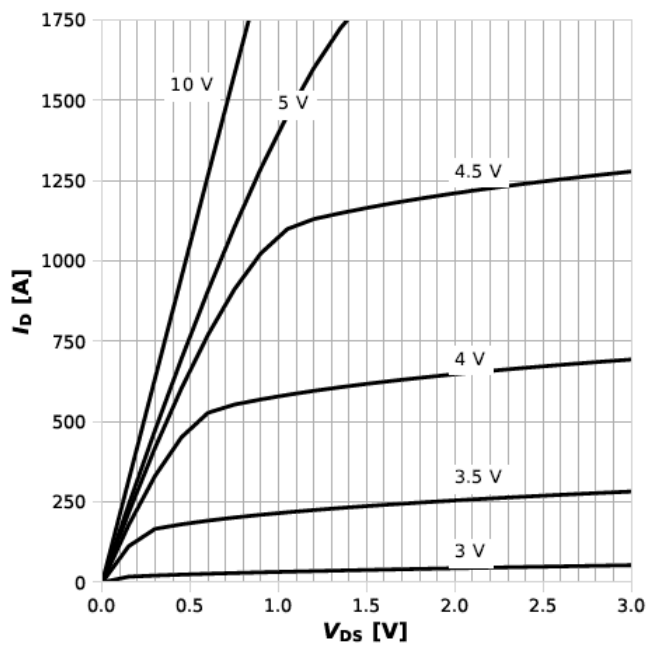
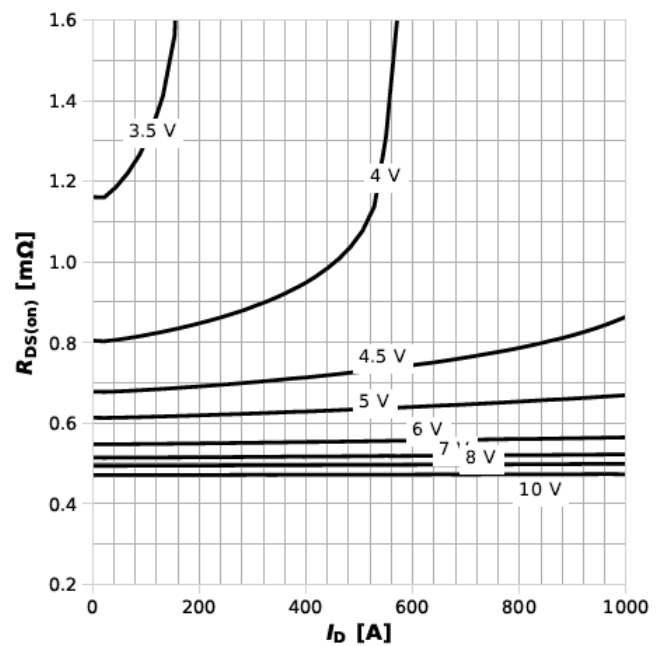


Diagram 5: Typ. output characteristics



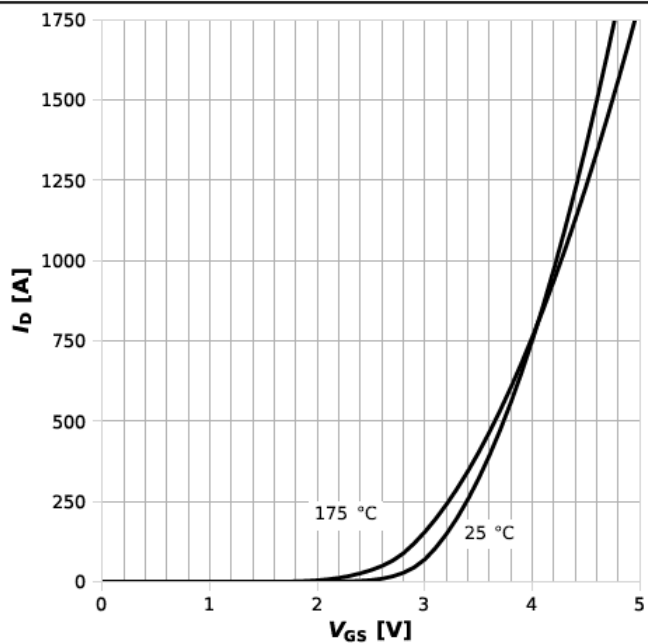
$$I_D = f(V_{DS}), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$$

Diagram 6: Typ. drain-source on resistance



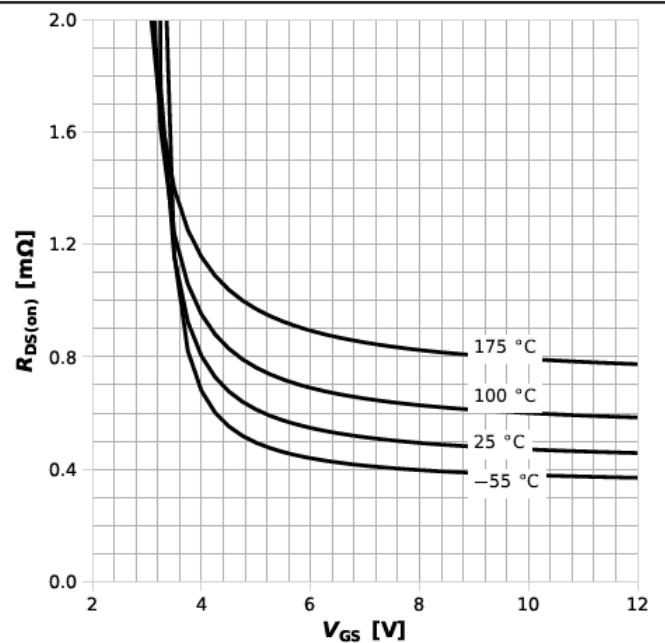
$$R_{DS(on)} = f(I_D), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$$

Diagram 7: Typ. transfer characteristics



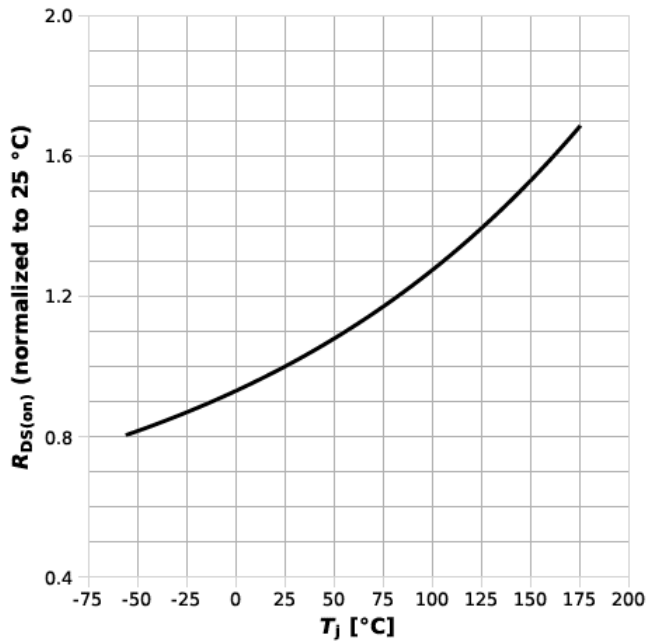
$$I_D = f(V_{GS}), |V_{DS}| > 2|I_D| R_{DS(on)\max}; \text{parameter: } T_j$$

Diagram 8: Typ. drain-source on resistance



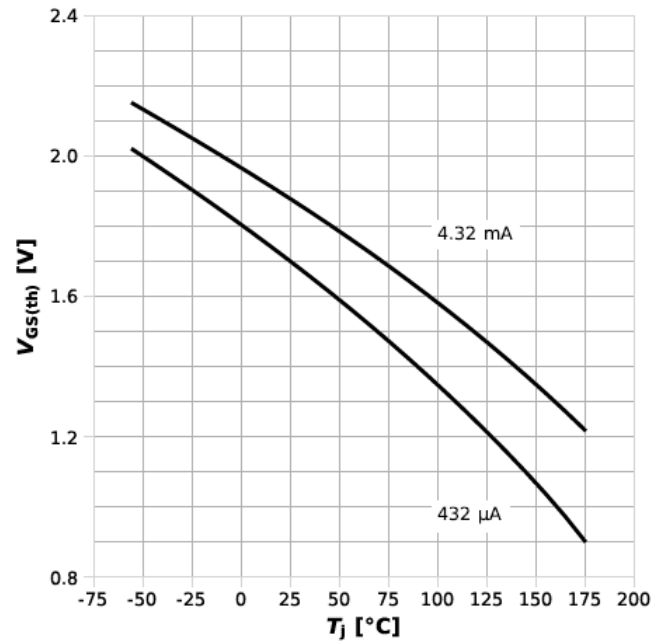
$$R_{DS(on)} = f(V_{GS}), I_D = 20\text{ A}; \text{parameter: } T_j$$

Diagram 9: Normalized drain-source on resistance



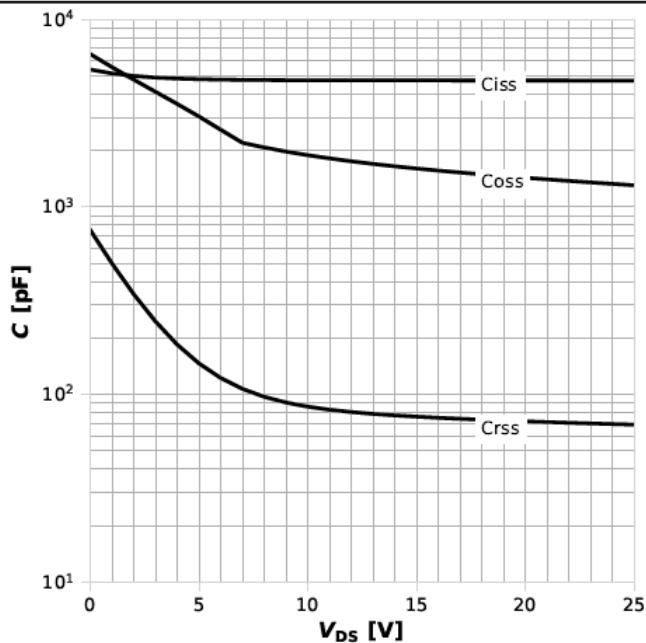
$$R_{DS(on)} = f(T_j), I_D = 20 \text{ A}, V_{GS} = 10 \text{ V}$$

Diagram 10: Typ. gate threshold voltage



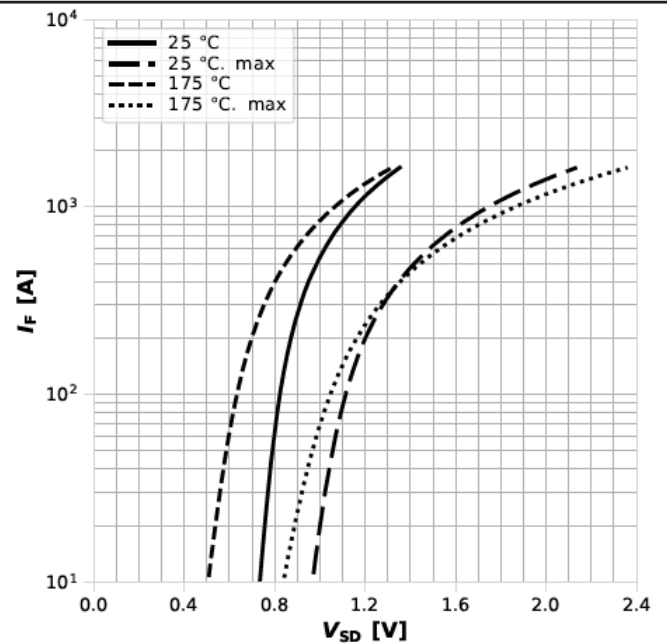
$$V_{GS(th)} = f(T_j), V_{GS} = V_{DS}; \text{ parameter: } I_D$$

Diagram 11: Typ. capacitances



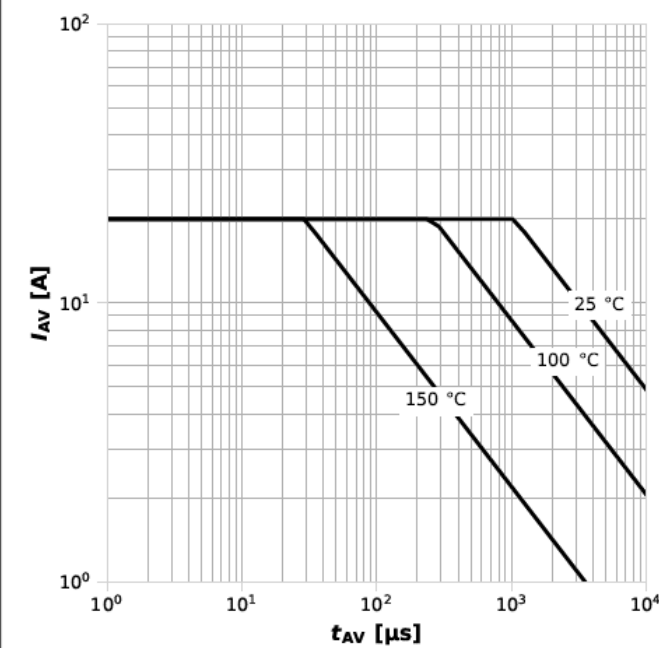
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$

Diagram 12: Forward characteristics of reverse diode



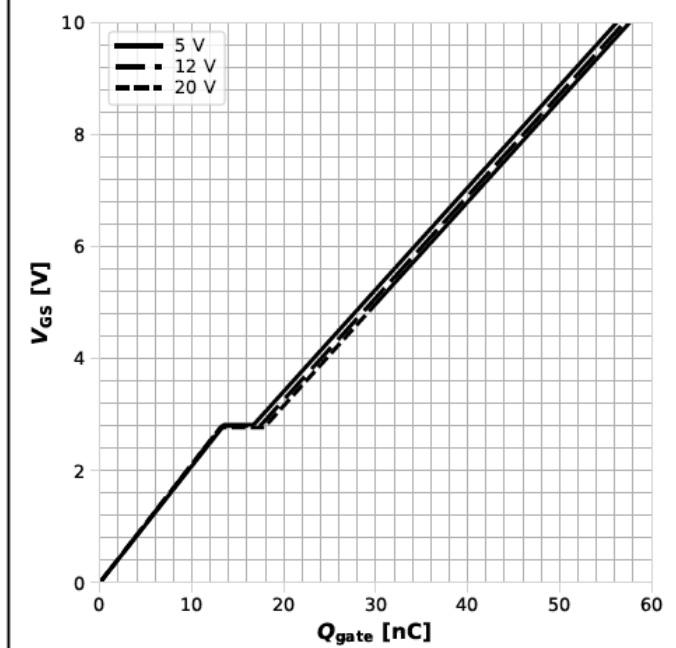
$$I_F = f(V_{SD}); \text{ parameter: } T_j$$

Diagram 13: Avalanche characteristics



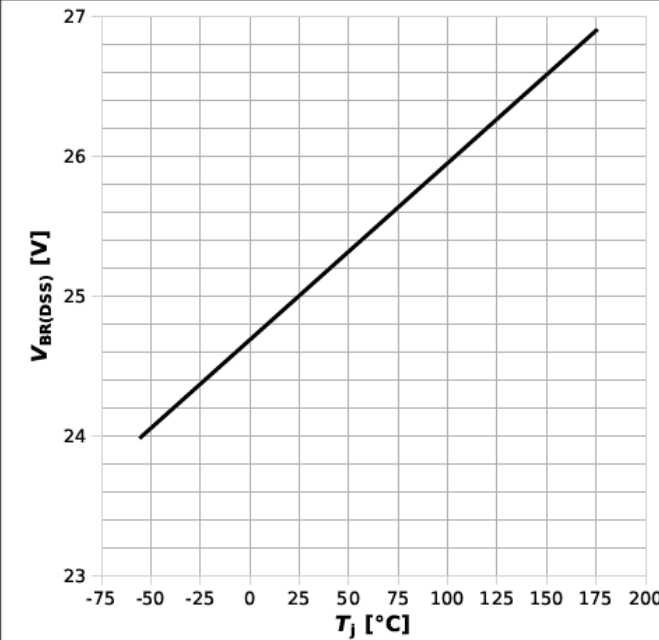
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



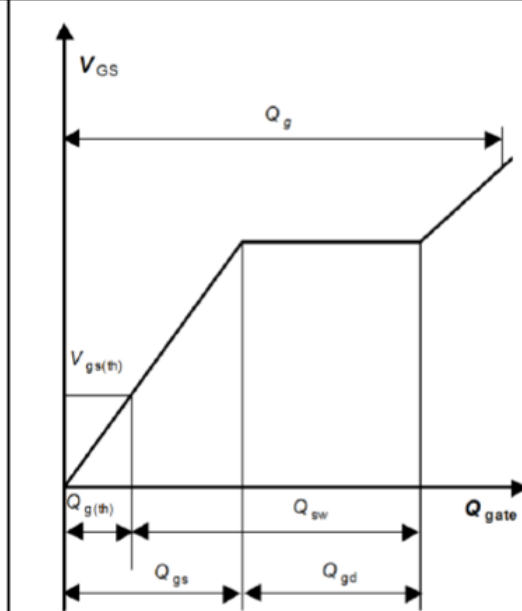
$V_{GS}=f(Q_{gate})$, $I_D=20\text{ A}$ pulsed, $T_j=25\text{ °C}$; parameter: V_{DD}

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

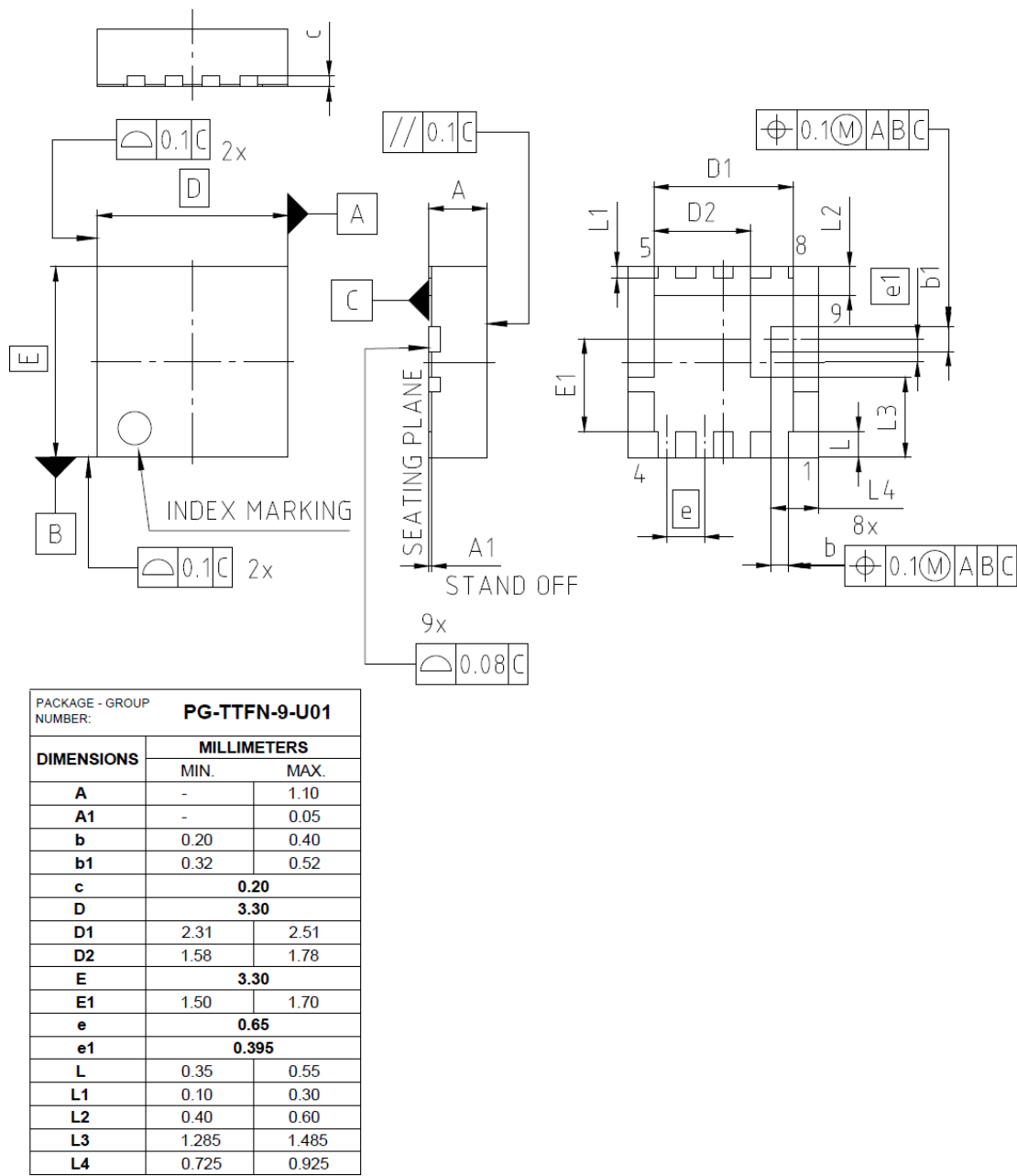


图 1 PG-TTFN-9 外形图，尺寸单位为毫米

修订记录

IQEH54NE2LM7UCG

Revision 2025-08-05, Rev. 1. 0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2025-08-05	Release of final datasheet

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