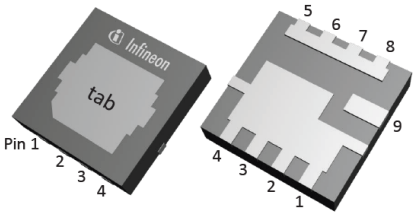
英飞凌MOSFET

PG-WHTFN-9 (3x3)

OptiMOS™ 6 功率晶体管，60 V

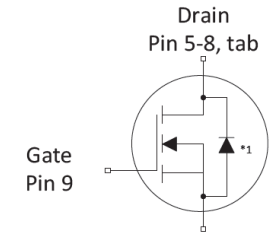
特性



- 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



*1: Internal body diode

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/µs)	26	nC

Part number	Package	Marking	Related links
IQE018N06NM6CGSC	PG-WHTFN-9	T	-

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1 最大额定值

除非另有规定，T_A =25 °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 V, T_C=25 °C
				126		V_{GS}=10 V, T_C=100 °C
				93		V_{GS}=6 V, T_C=100 °C
				25		V_{GS}=10 V, T_A=25°C,R_{thJA}=60°C/W [2]
Pulsed drain current [3]	$I_{D,pulse}$	-	-	712	A	T_C=25 °C
Avalanche energy, single pulse [4]	E_{AS}	-	-	280	mJ	I_D=20 A, R_{GS}=25 Ω
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	125	W	T_C=25 °C
				2.5		T_A=25 °C, R_{thJA}=60 °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 mm × 40 mm × 1.5 mm 环氧树脂 PCB FR4 上，配有6 cm^2（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) 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, bottom	R_{thJC}	-	0.57	1.2	°C/W	-
Thermal resistance, junction - case, top	R_{thJC}		0.7	1.4		
Thermal resistance, junction - ambient, 6 cm^2 cooling area [5)]	R_{thJA}		-	60		

5) 器件置于40 mm × 40 mm × 1.5 mm 环氧树脂 PCB FR4基板上，配有6 cm^2（单层，70微米厚）铜层，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°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 V, I_D=1 mA
Gate threshold voltage	$V_{GS(th)}$	2.1	2.7	3.3	V	V_{DS}=V_{GS}, I_D=51 µA
Zero gate voltage drain current	I_{DSS}	-	0.1	1	µA	V_{DS}=48 V, V_{GS}=0 V, T_j=25 °C
			10	100		V_{DS}=48 V, V_{GS}=0 V, T_j=125 °C
Gate-source leakage current	I_{GSS}	-	10	100	nA	V_{GS}=20 V, V_{DS}=0 V
Drain-source on-state resistance	$R_{DS(on)}$	-	1.5	1.8	mΩ	V_{GS}=10 V, I_D=30 A
Drain-source on-state resistance [6]	$R_{DS(on)}$	-	1.68	2.2	mΩ	V_{GS}=8 V, I_D=15 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 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 V, V_{DS}=30 V, f=1 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 V, V_{GS}=10 V, I_D=30 A, $R_{G,ext}$=1.6 Ω
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_{DD}=30 V, I_D=30 A, V_{GS}=0 to 10 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 V, V_{GS}=0 to 10 V
Output charge [9)]	Q_{oss}	-	64	85	nC	V_{DS}=30 V, V_{GS}=0 V

8) 参数定义请参数见“栅极电荷波形”

9) 由设计指定，未经过生产测试。

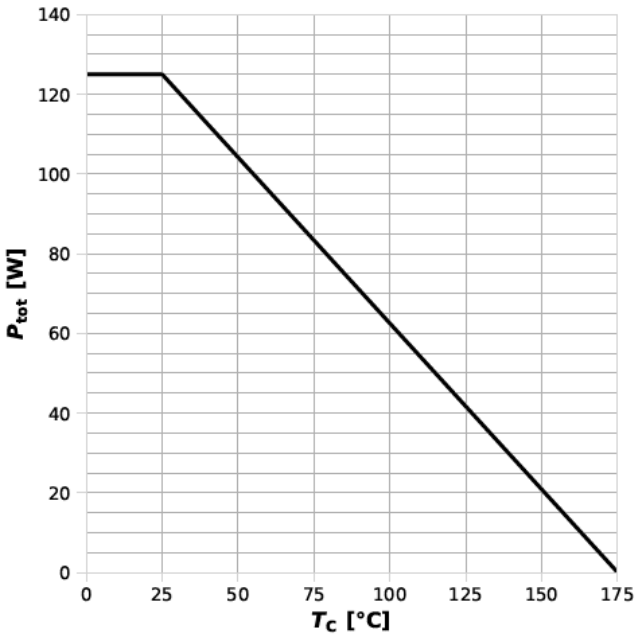
表 7 反向二极管

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

10) 由设计指定，未经过生产测试。

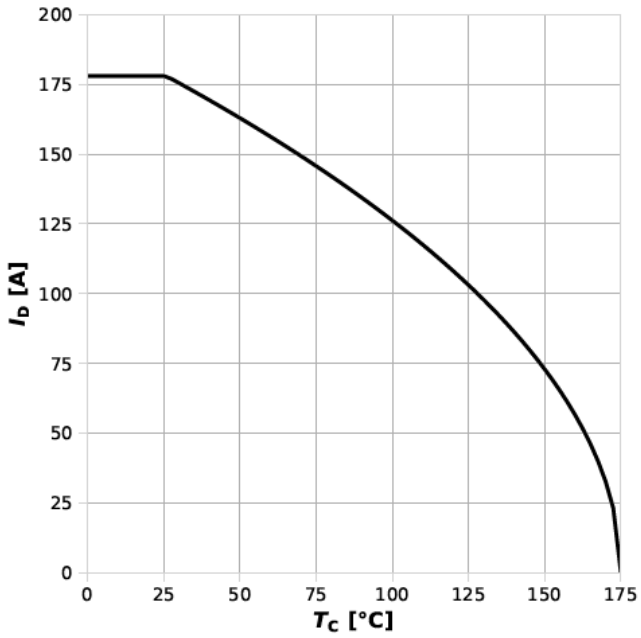
4 电气特性图

Diagram 1: Power dissipation



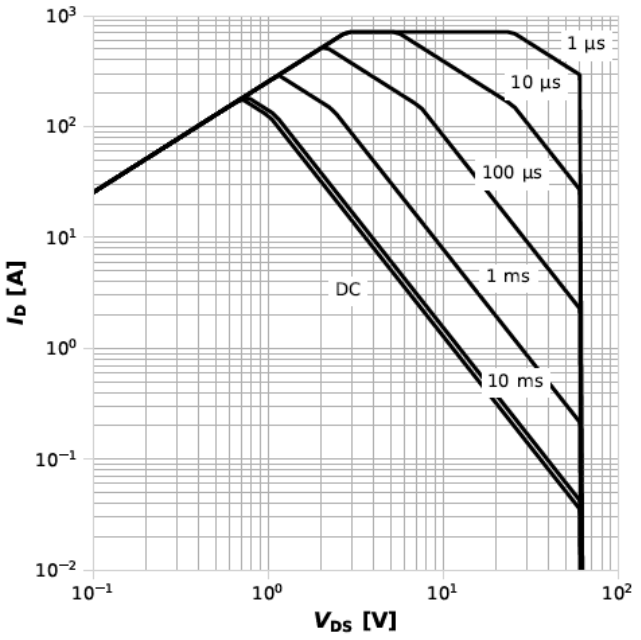
$P_{tot}=f(T_C)$

Diagram 2: Drain current



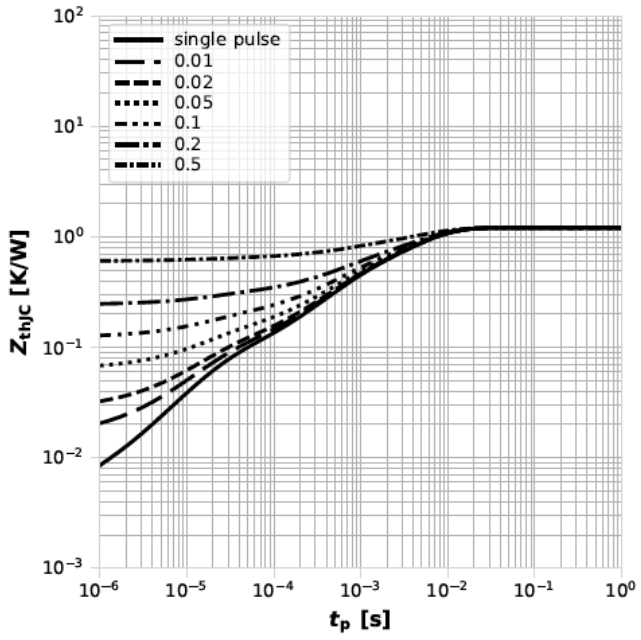
$I_D=f(T_C)$; $V_{GS}\geq 10$ V

Diagram 3: Safe operating area



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

Diagram 4: Max. transient thermal impedance



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

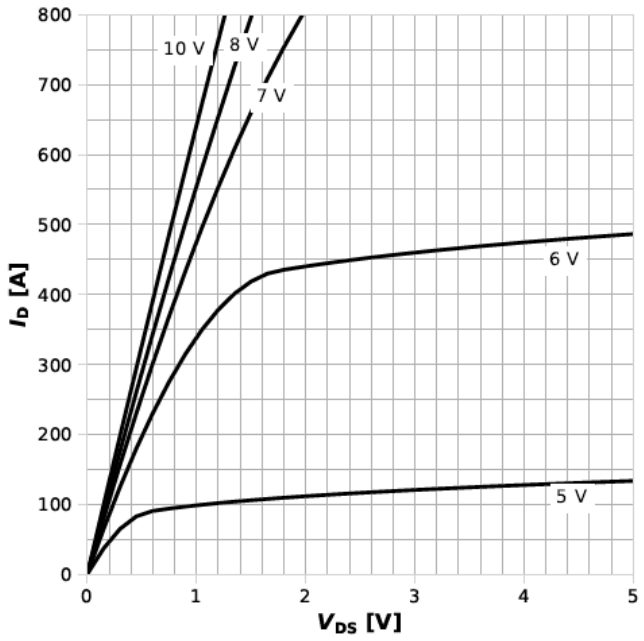
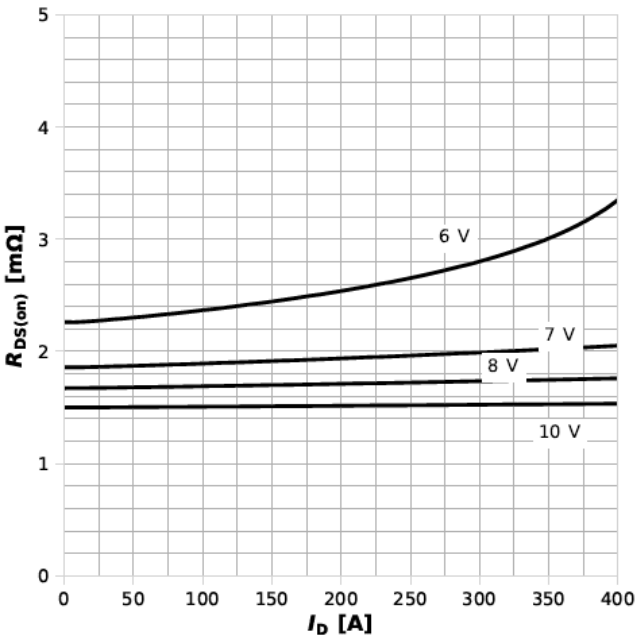
Diagram 5: Typ. output characteristics	Diagram 6: Typ. drain-source on resistance
	
I_D=f(V_{DS}), T_j=25 °C; parameter: V_{GS}	$R_{DS(on)}$=f(I_D), T_j=25 °C; parameter: V_{GS}

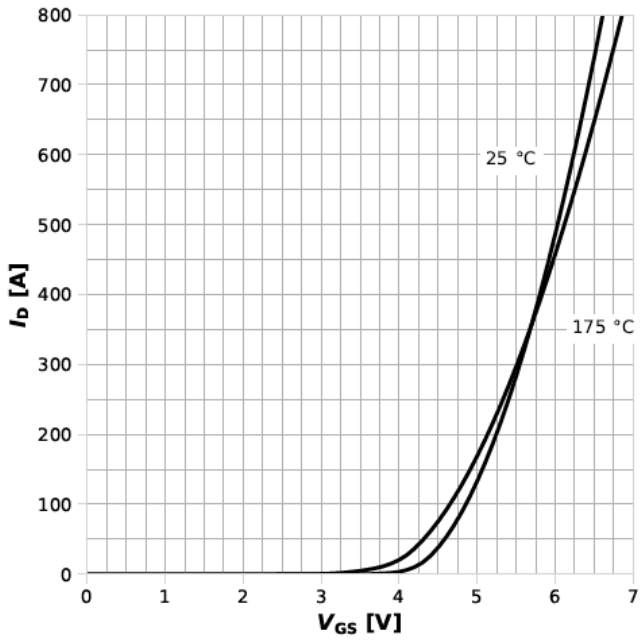
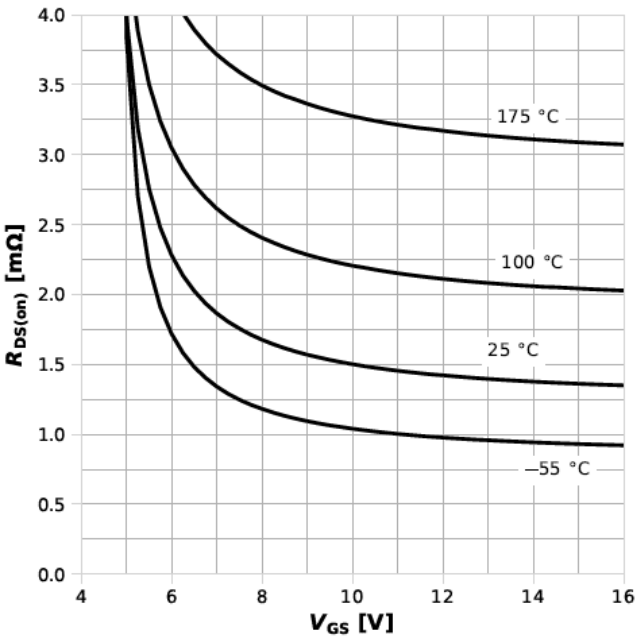
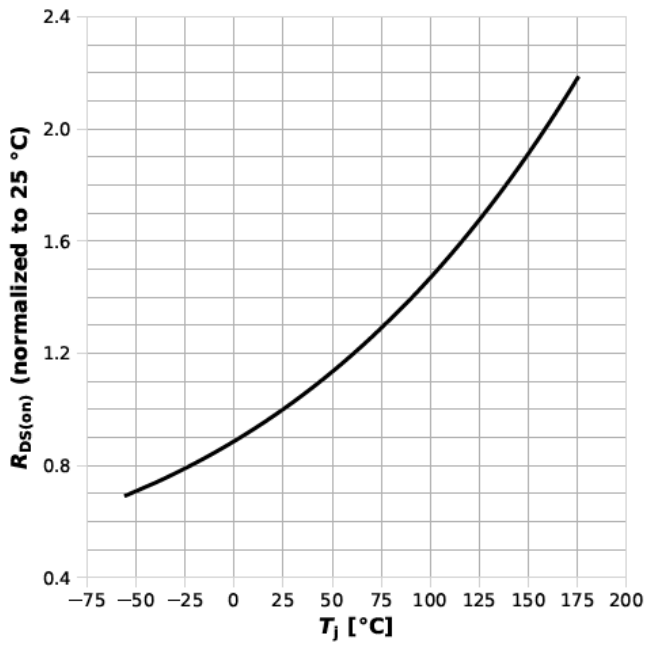
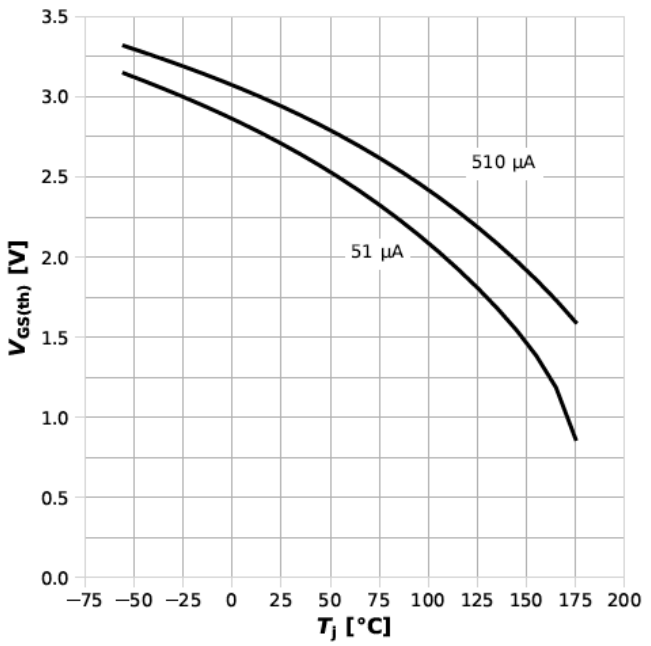
Diagram 7: Typ. transfer characteristics	Diagram 8: Typ. drain-source on resistance
	
I_D=f(V_{GS}), $\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$; parameter: T_j	$R_{DS(on)}$=f(V_{GS}), I_D=30 A; parameter: T_j

Diagram 9: Normalized drain-source on resistance



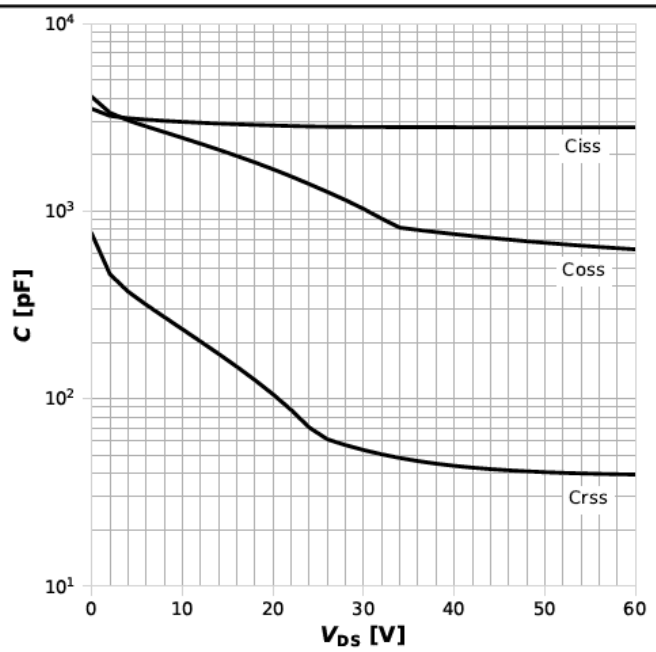
$R_{DS(on)}$=f(T_j), I_D=30 A, V_{GS}=10 V

Diagram 10: Typ. gate threshold voltage



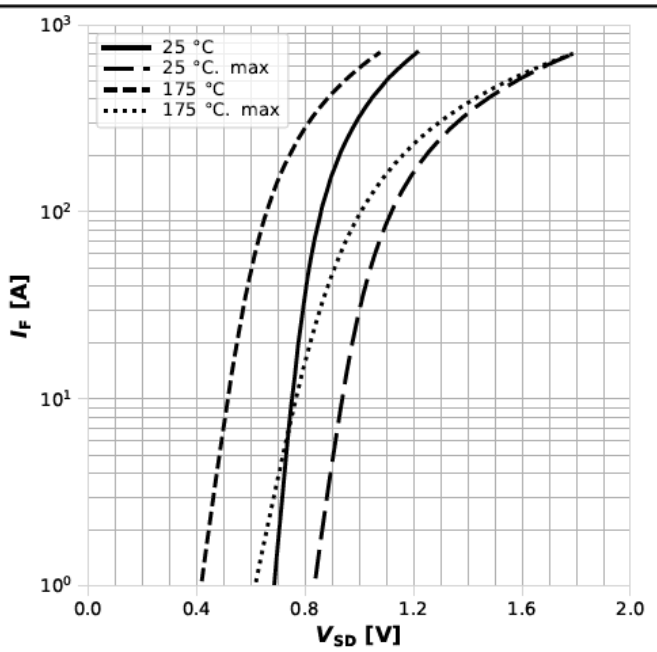
$V_{GS(th}$=f(T_j), V_{GS}=V_{DS}; parameter: I_D

Diagram 11: Typ. capacitances



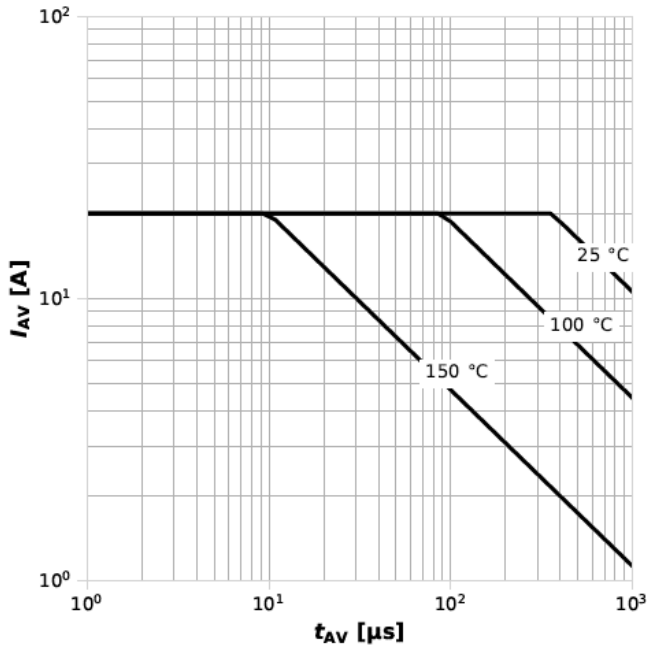
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

Diagram 12: Forward characteristics of reverse diode



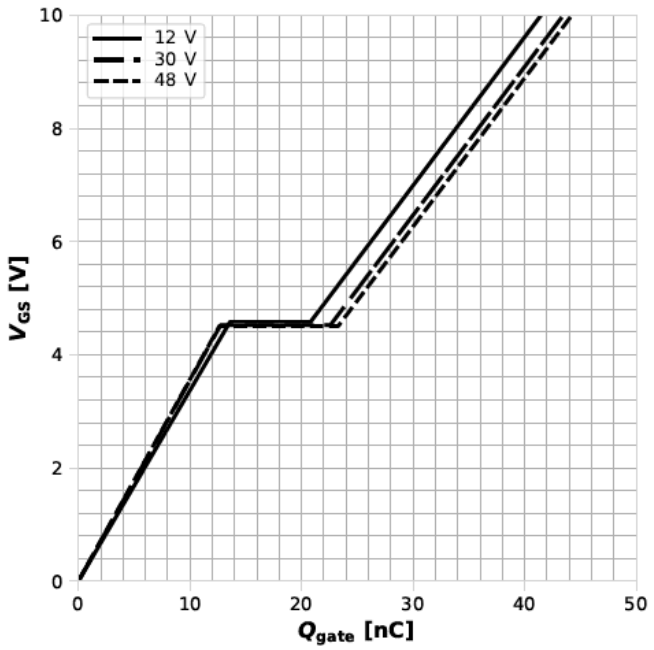
I_F=f(V_{SD}); parameter: T_j

Diagram 13: Avalanche characteristics



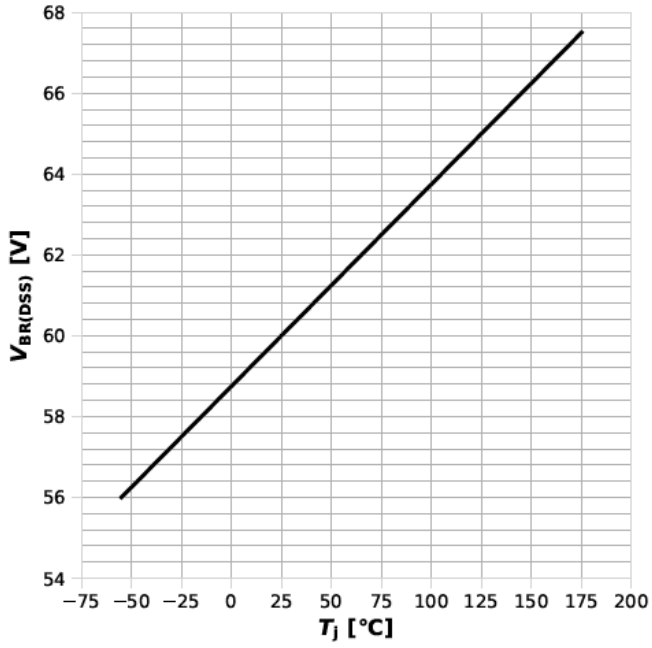
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



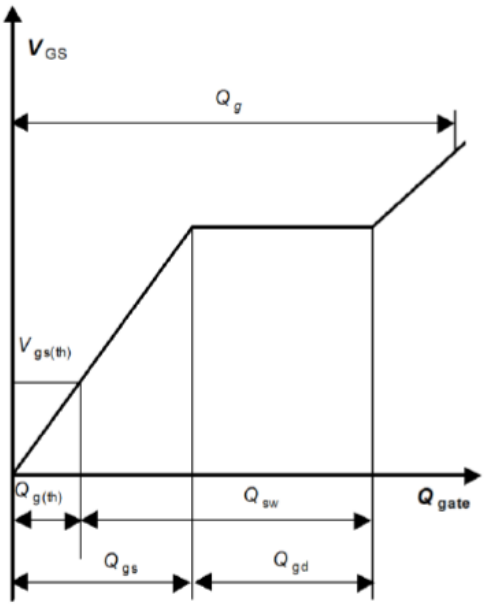
$V_{GS}=f(Q_{gate})$, $I_D=30$ A pulsed, $T_j=25$ °C; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage



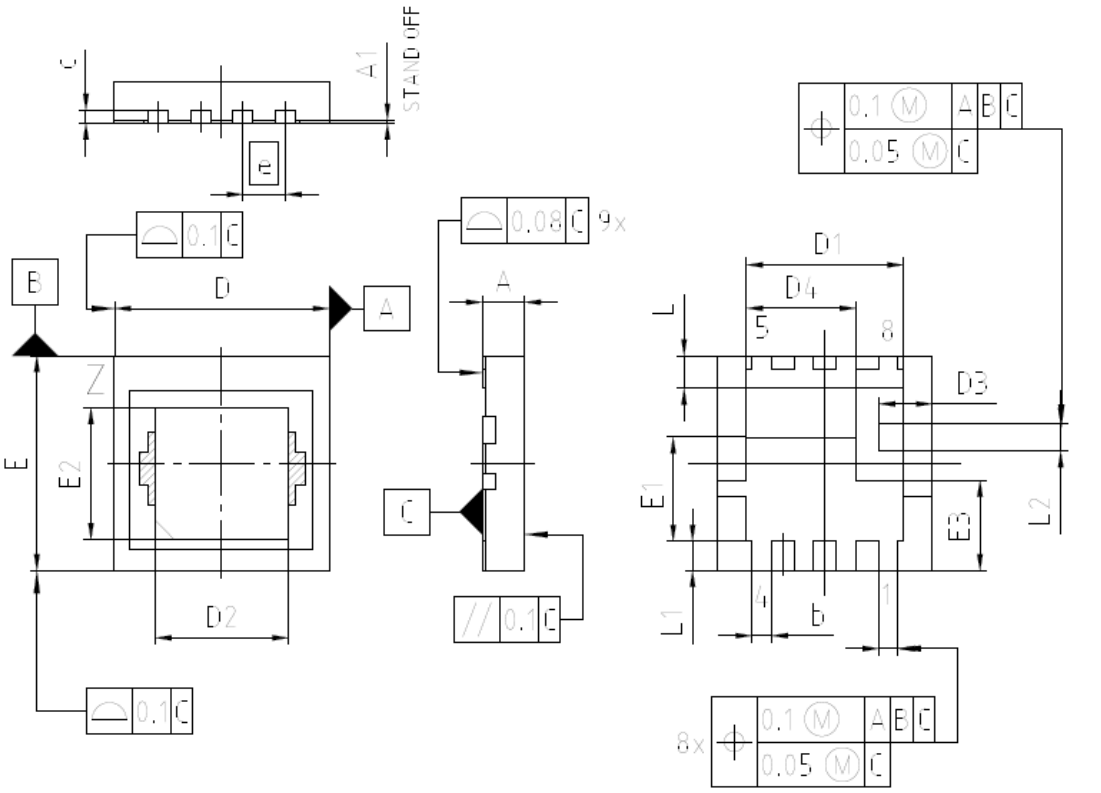
$V_{BR(DSS)}=f(T_j)$; $I_D=10$ mA

Gate charge waveforms



-

5 封装外形



PACKAGE - GROUP NUMBER:	PG-WHTFN-9-U01	
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	0.55	0.75
A1	0	0.05
b	0.20	0.40
c	0.10	0.30
D	3.20	3.40
D1	2.31	2.51
D2	1.95	2.25
D3	0.73	0.93
D4	1.58	1.78
E	3.20	3.40
E1	1.50	1.70
E2	1.93	2.23
E3	1.285	1.485
e	0.65	
L	0.40	0.60
L1	0.35	0.55
L2	0.32	0.52

图 1　　PG- WHTFN- 9 封装外形，尺寸单位为毫米

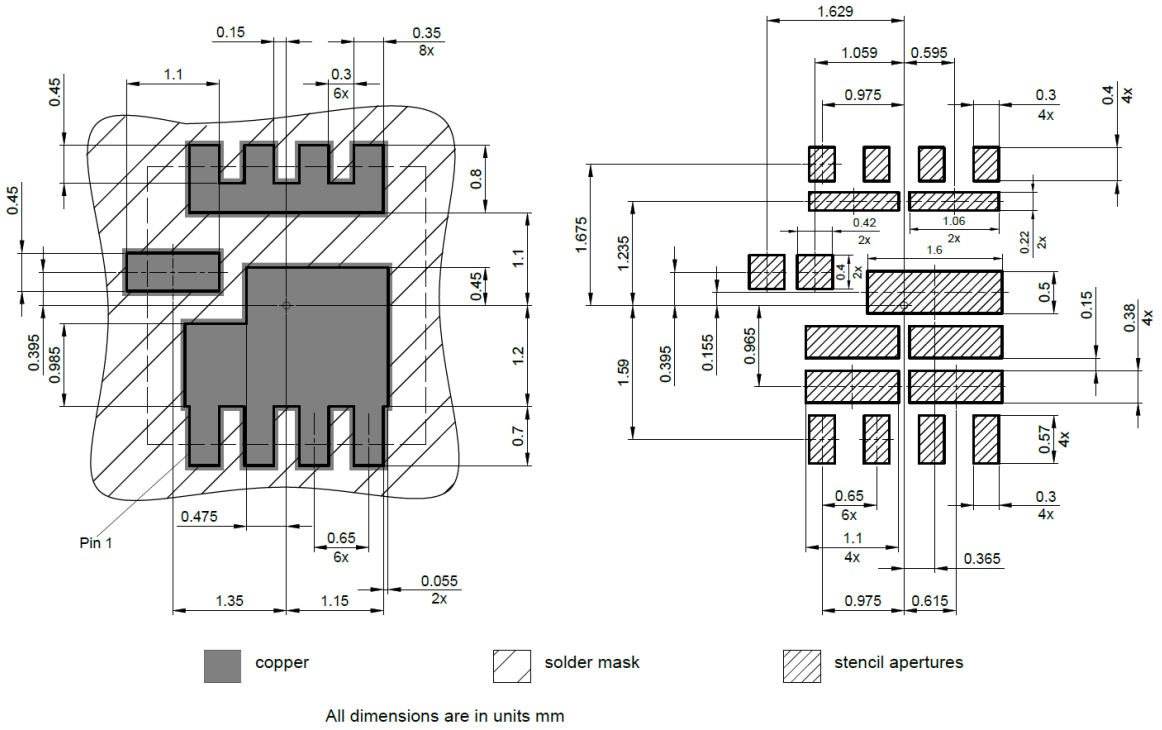


图 2　　PG- WHTFN- 9封装图，尺寸单位为毫米

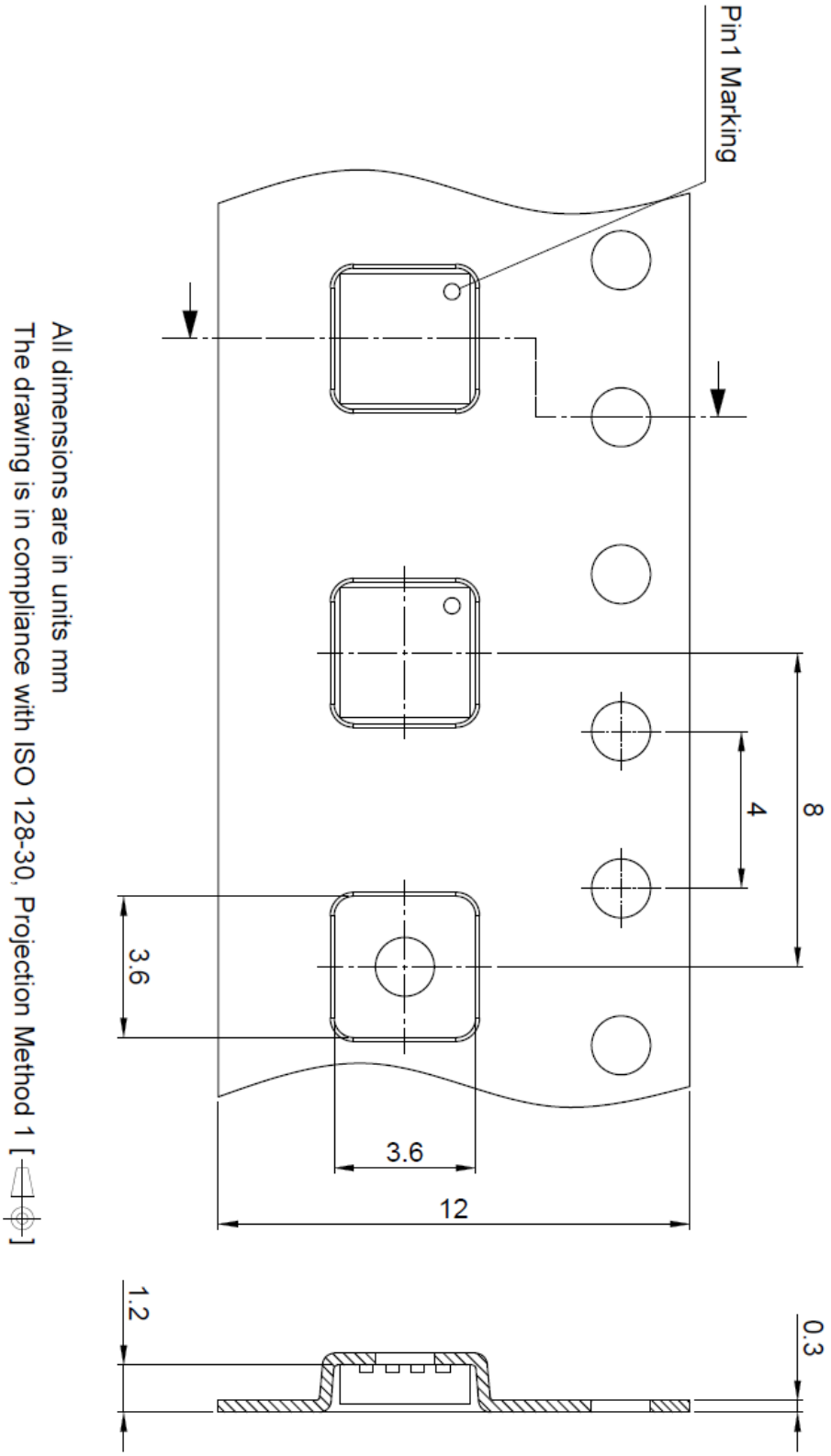


图 3　　PG- WHTFN- 9封装变体，尺寸单位为毫米

修订记录

IQE018N06NM6CGSC

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

Previous revisions

Revision	Date	Subjects (major changes since last revision)
2.0	2023-12-07	Release of final version
2.1	2025-02-06	Update current, Added RthJC, top and Revised Rdson at Vgs from 6V to 8V

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