英飞凌MOSFET

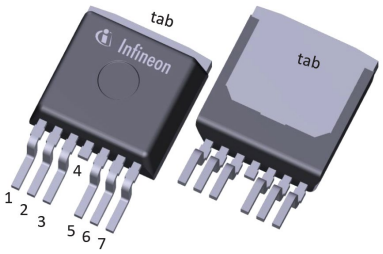
英飞凌OptiMOS™ 8 功率晶体管， 100 V

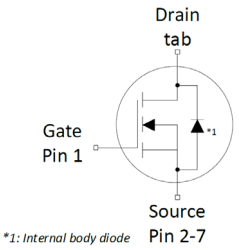
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特性

- N沟道，标准电平
- 极低的导通电阻$R_{DS(on)}$
- 高额定电流
- 紧密$_{VGS\ (th)}$传播
- 软体二极管的恢复特性与低Q_{rr}
- 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
- 基于 J-STD-020 的 MSL 1 分类

D²-PAK 7pin





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}	100	V
$R_{DS(on),max}$	0.94	mΩ
I_D	408	A
Q_{oss}	499	nC
Q_G (0 V...10 V)	255	nC
Q_{rr} (100 A/µs)	89	nC

Part number	Package	Marking	Related links
IPF009N10NM8	PG-TO263-7	009N10N8	-

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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	-	-	408	A	V_{GS}=10 V, T_C=25 °C
				312		V_{GS}=10 V, T_C=100 °C
				312		V_{GS}=15 V, T_C=100 °C
				42		V_{GS}=10 V, T_A=25 °C, R_{THJA}=40 °C/W [2]
Pulsed drain current [3]	$I_{D,pulse}$	-	-	1632	A	T_A=25 °C
Avalanche energy, single pulse [4]	E_{AS}	-	-	1170	mJ	I_D=100 A, R_{GS}=25 Ω
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	500	W	T_C=25 °C
				3.8		T_A=25 °C, R_{THJA}=40 °C/W [2]
Operating and storage temperature	T_j, T_{stg}	-55	-	175	°C	IEC climatic category; DIN IEC 68-1: 55/175/56

1) 额定值的适用条件：产品在数据手册中规定的绝对最大值条件下运行、确保外壳温度为25°C更高的外壳温度请参见图 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 14

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}	-	0.2	0.3	°C/W	-
Thermal resistance, junction - ambient, 6 cm^2 cooling area [5)]	R_{thJA}		-	40		
Thermal resistance, junction - ambient, minimal footprint	R_{thJA}		-	62		

5) 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	$V_{(BR)DSS}$	100	-	-	V	V_{GS}=0 V, I_D=1 mA
Gate threshold voltage	$V_{GS(th)}$	2.4	2.8	3.2	V	V_{DS}=V_{GS}, I_D=279 µA
Zero gate voltage drain current	I_{DSS}	-	0.1	1	µA	V_{DS}=80 V, V_{GS}=0 V, T_j=25 °C
Zero gate voltage drain current [6]	I_{DSS}	-	10	100	µA	V_{DS}=80 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	$R_{DS(on)}$	-	0.83	0.94	mΩ	V_{GS}=15 V, I_D=100 A
			0.87	0.99		V_{GS}=10 V, I_D=100 A
			0.93	1.03		V_{GS}=8 V, I_D=50 A
Gate resistance [6]	R_G	-	1.1	2.3	Ω	-
Transconductance [6]	g_{fs}	160	320	-	S	$\|V_{DS}\|\geq 2\|I_D\|R_{DS(on)max}$, I_D=100 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}	-	16000	21000	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Output capacitance [7]	C_{oss}		2400	3100		
Reverse transfer capacitance [7]	C_{rss}		450	790		
Turn-on delay time	$t_{d(on)}$	-	29	-	ns	V_{DD}=50 V, V_{GS}=10 V, I_D=50 A, $R_{G,ext}$=1.6 Ω
Rise time	t_r		15			
Turn-off delay time	$t_{d(off)}$		86			
Fall time	t_f		30			

[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}	-	69	-	nC	V_{DD}=50 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge at threshold	$Q_{g(th)}$		46	-	nC	
Gate to drain charge [9)]	Q_{gd}		62	93	nC	
Switching charge	Q_{sw}		85	-	nC	
Gate charge total [9)]	Q_g		255	319	nC	
Gate plateau voltage	$V_{plateau}$		4.2	-	V	
Gate charge total, sync. FET	$Q_{g(sync)}$	-	213	-	nC	V_{DS}=0.1 V, V_{GS}=0 to 10 V
Output charge [9)]	Q_{oss}	-	499	664	nC	V_{DS}=50 V, V_{GS}=0 V

8)　参数定义请参数见“栅极充电波形”。

9)　由设计指定，未经过生产测试。

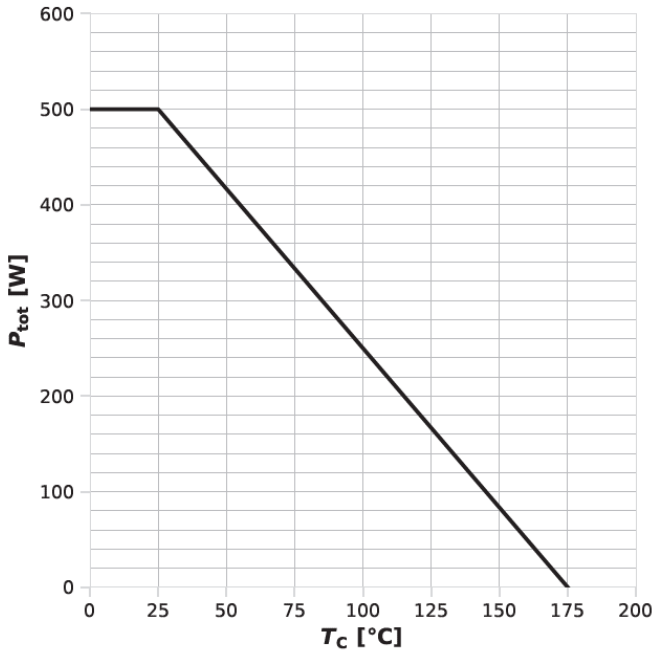
表 7　　反向二极管

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	336	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$			1632		
Diode forward voltage	V_{SD}	-	0.83	1	V	V_{GS}=0 V, I_F=100 A, T_j=25 °C
Reverse recovery time [10)]	t_{rr}	-	48	96	ns	V_R=50 V, I_F=50 A, di_F/dt=100 A/µs
Reverse recovery charge [10)]	Q_{rr}		89	178	nC	
Reverse recovery time [10)]	t_{rr}	-	53	106	ns	V_R=50 V, I_F=50 A, di_F/dt=1000 A/µs
Reverse recovery charge [10)]	Q_{rr}		804	1608	nC	

10)　由设计指定，未经过生产测试。

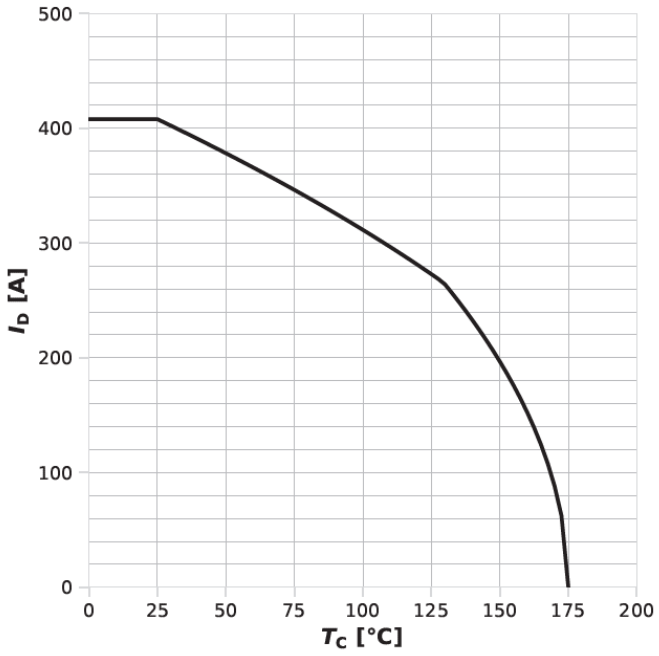
4 电气特性图

Diagram 1: Power dissipation



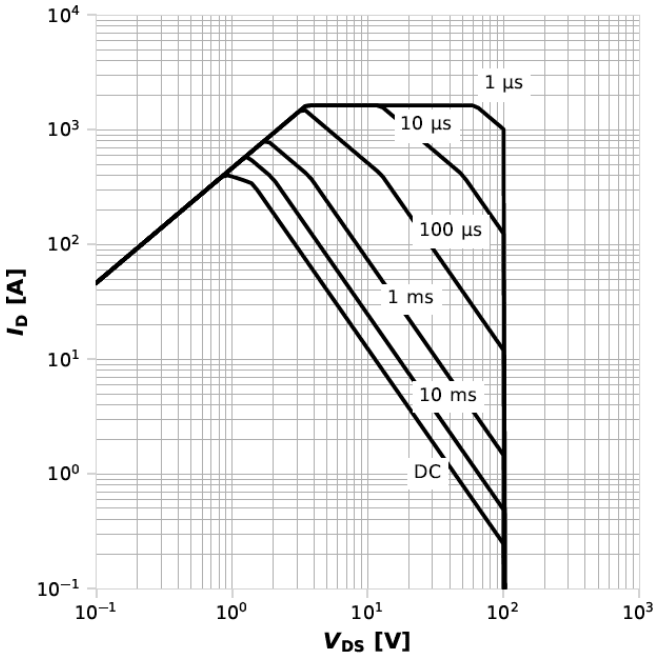
P_{tot}=f(T_C)

Diagram 2: Drain current



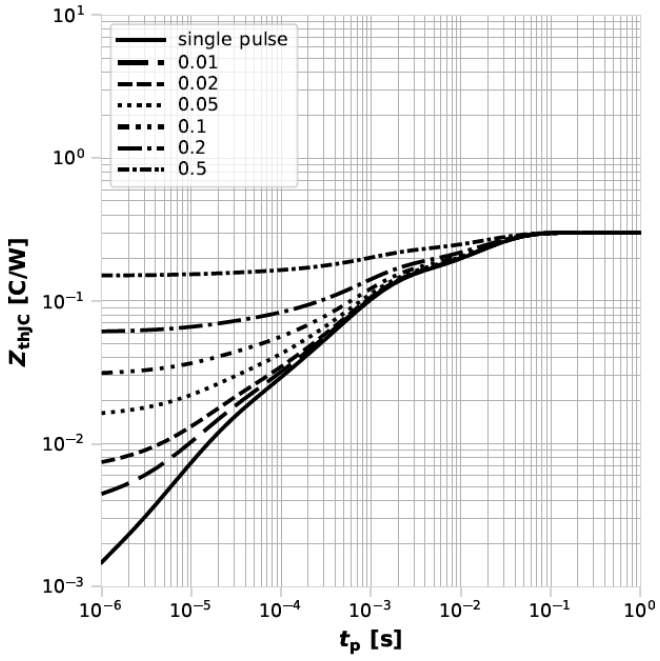
I_D=f(T_C); V_{GS}≥10 V

Diagram 3: Safe operating area



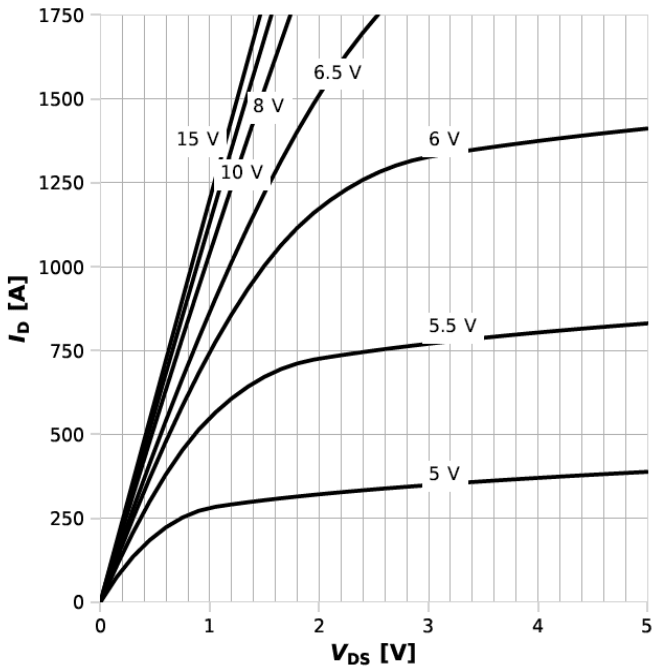
I_D=f(V_{DS}); T_C=25 °C; D=0; parameter: t_p

Diagram 4: Max. transient thermal impedance



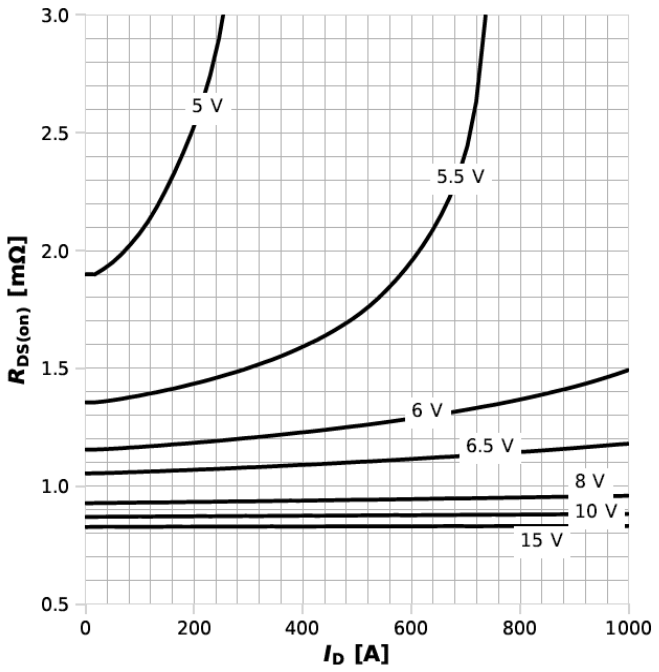
Z_{thJC}=f(t_p); parameter: D=t_p/T

Diagram 5: Typ. output characteristics



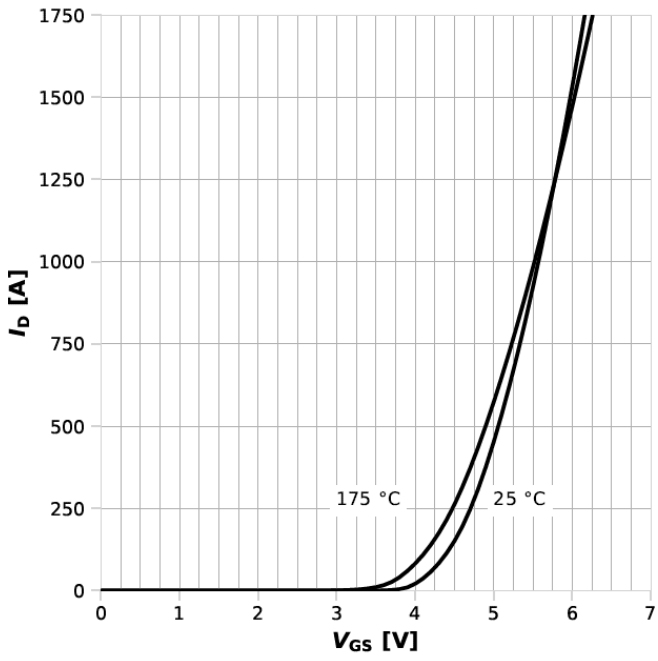
I_D=f(V_{DS}), T_j=25 °C; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



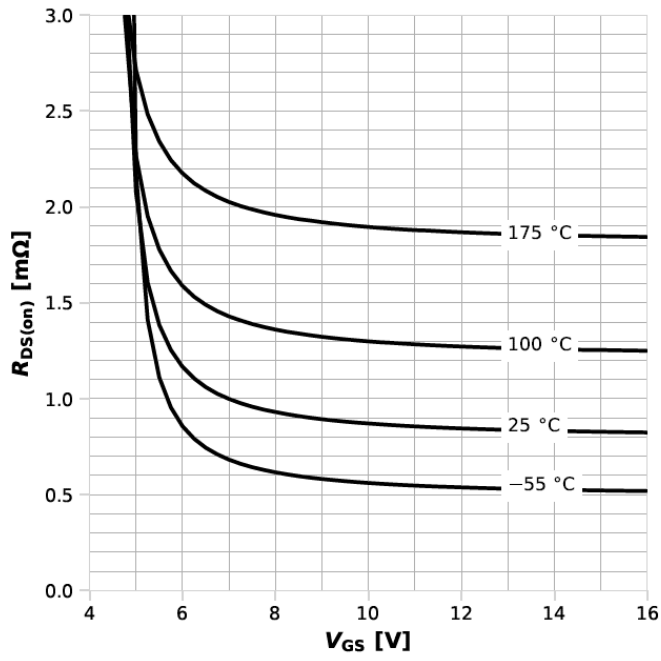
$R_{DS(on)}$=f(I_D), T_j=25 °C; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



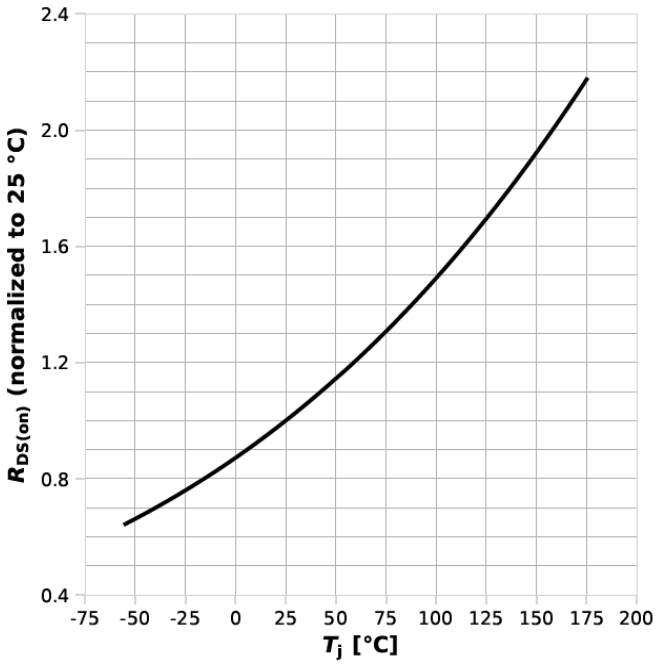
I_D=f(V_{GS}), |V_{DS}|>2|I_D|$R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. drain-source on resistance



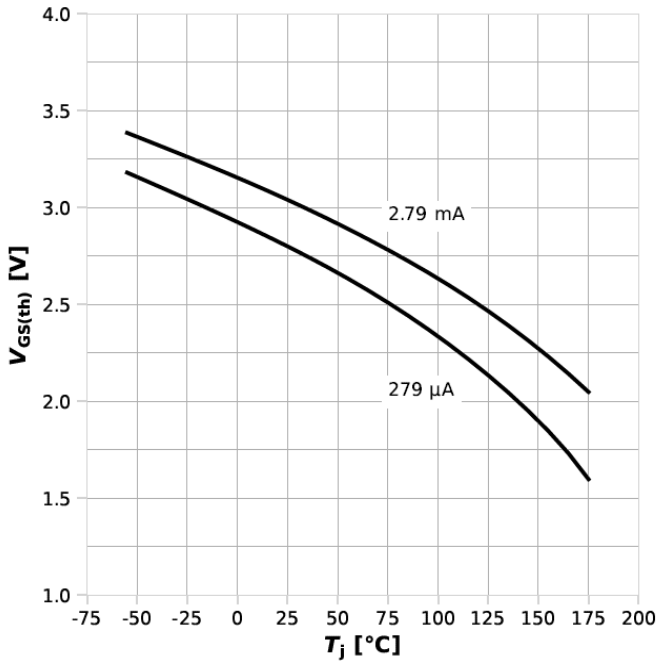
$R_{DS(on)}$=f(V_{GS}), I_D=100 A; parameter: T_j

Diagram 9: Normalized drain-source on resistance



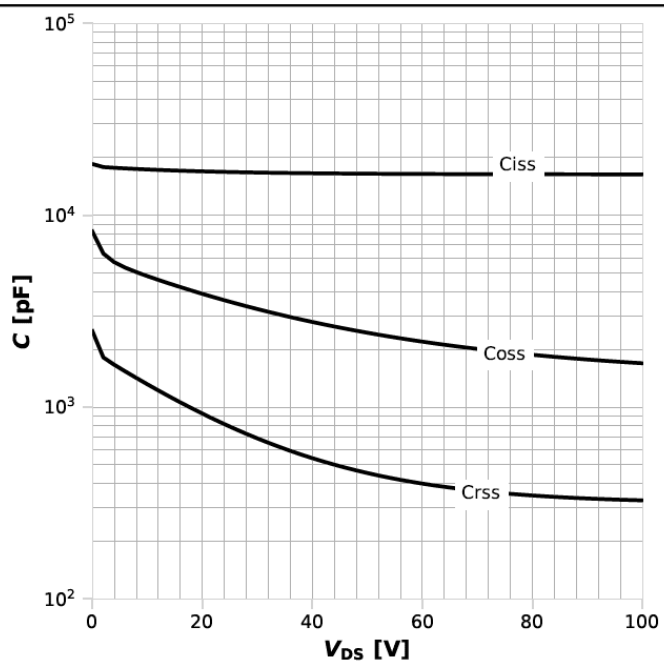
$R_{DS(on)}$=f(T_j), I_D=100 A, V_{GS}=10 V

Diagram 10: Typ. gate threshold voltage



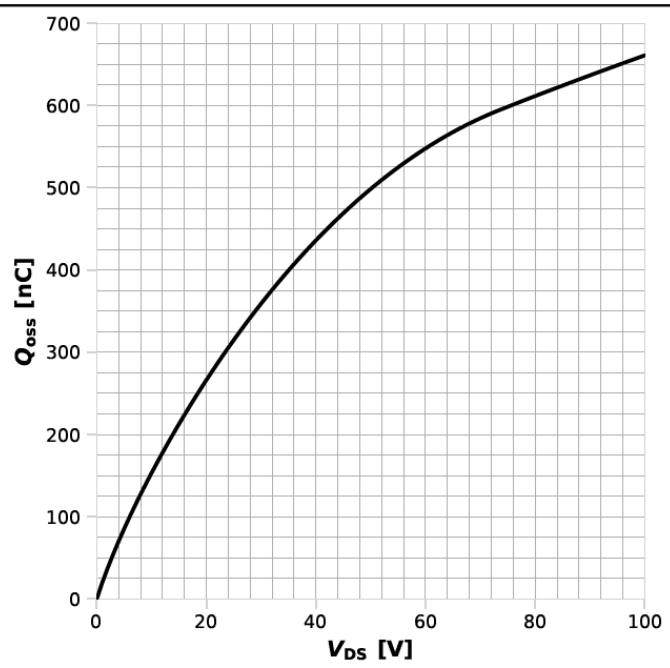
$V_{GS(th}$=f(T_j), V_{GS}=V_{DS}; parameter: I_D

Diagram 11: Typ. capacitances



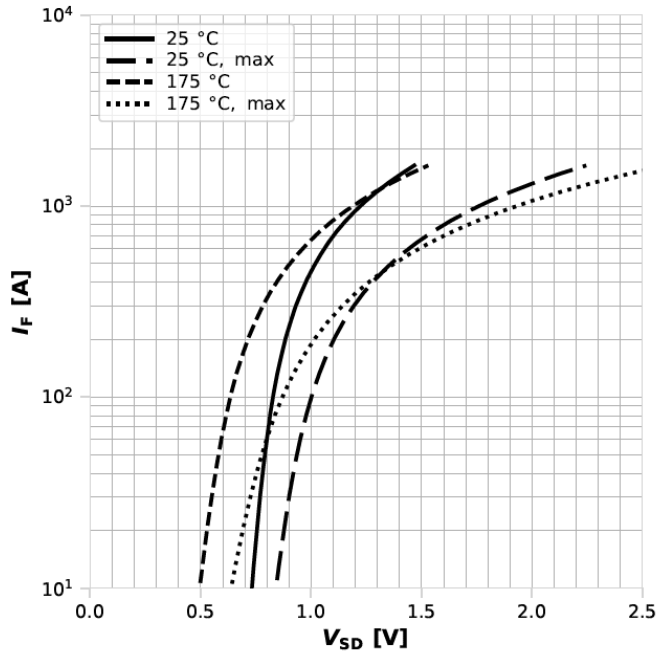
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

Diagram 12: Typ. output charge



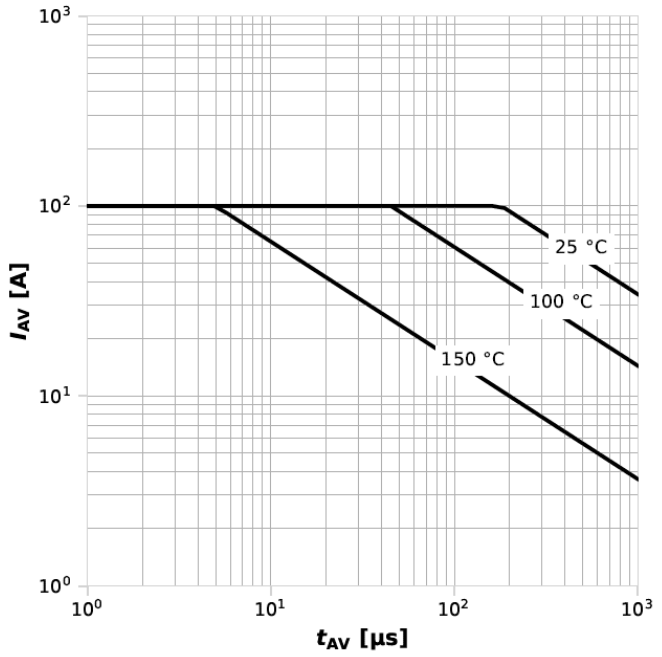
Q_{oss}=f(V_{DS}), V_{GS}=0 V

Diagram 13: Forward characteristics of reverse diode



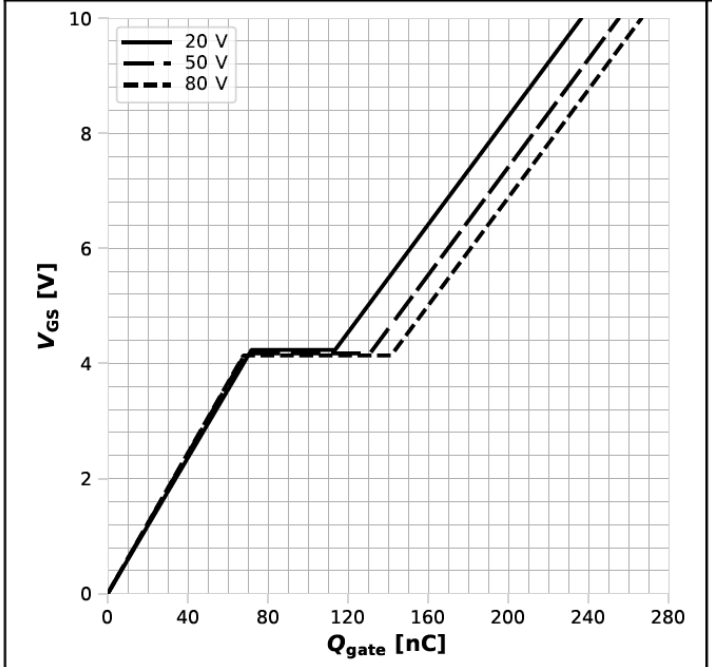
I_F=f(V_{SD}); parameter: T_j

Diagram 14: Avalanche characteristics



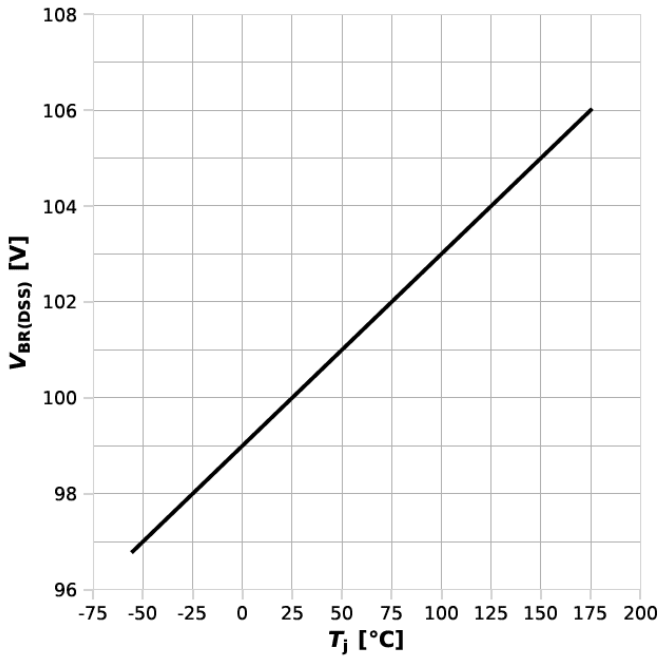
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j,start}$

Diagram 15: Typ. gate charge



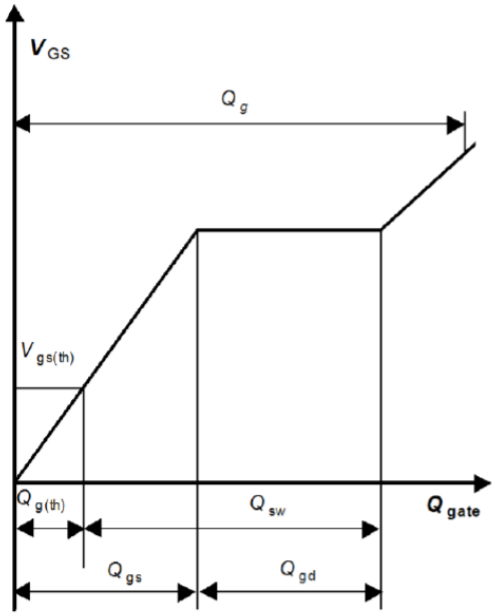
V_{GS}=f(Q_{gate}), I_D=50 A pulsed, T_j=25 °C; parameter: V_{DD}

Diagram 16: Min. drain-source breakdown voltage



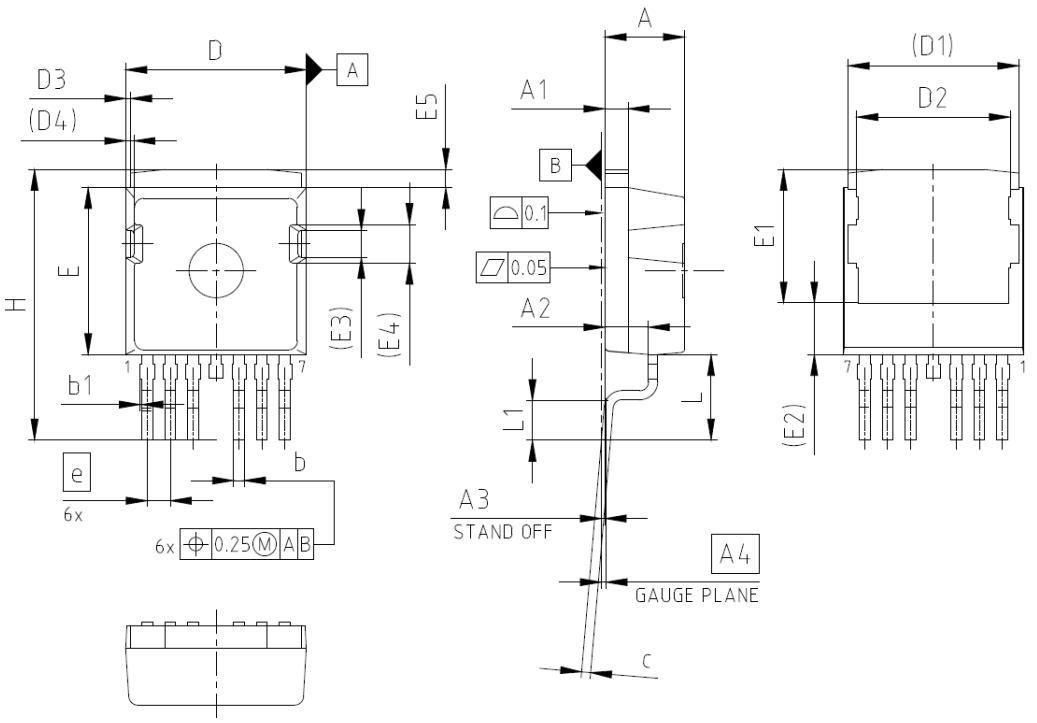
$V_{BR(DSS)}$=f(T_j); I_D=1 mA

Gate charge waveforms



-

5 封装外形



PACKAGE - GROUP NUMBER:	PG-TO263-7-U06				
DIMENSIONS	MILLIMETERS		DIMENSIONS	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	4.30	4.50	**E**	9.05	9.45
A1	1.17	1.37	**E1**	7.30	7.50
A2	2.30	2.50	**E2**	2.85	
A3	0.00	0.20	**E3**	1.50	
A4	0.25		**E4**	2.13	
b	0.50	0.70	**E5**	0.70	1.30
b1	0.00	0.15	**e**	1.27	
c	0.40	0.60	**H**	14.90	15.10
D	9.80	10.20	**L**	4.20	5.20
D1	9.46		**L1**	1.90	2.10
D2	8.40	8.60	**N**	7	
D3	0.00	0.30			
D4	0.45				

NOTES: (1) DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS
(2) N IS THE NUMBER OF LEADS

图 1 PG-TO263-7 外形图，尺寸单位为毫米

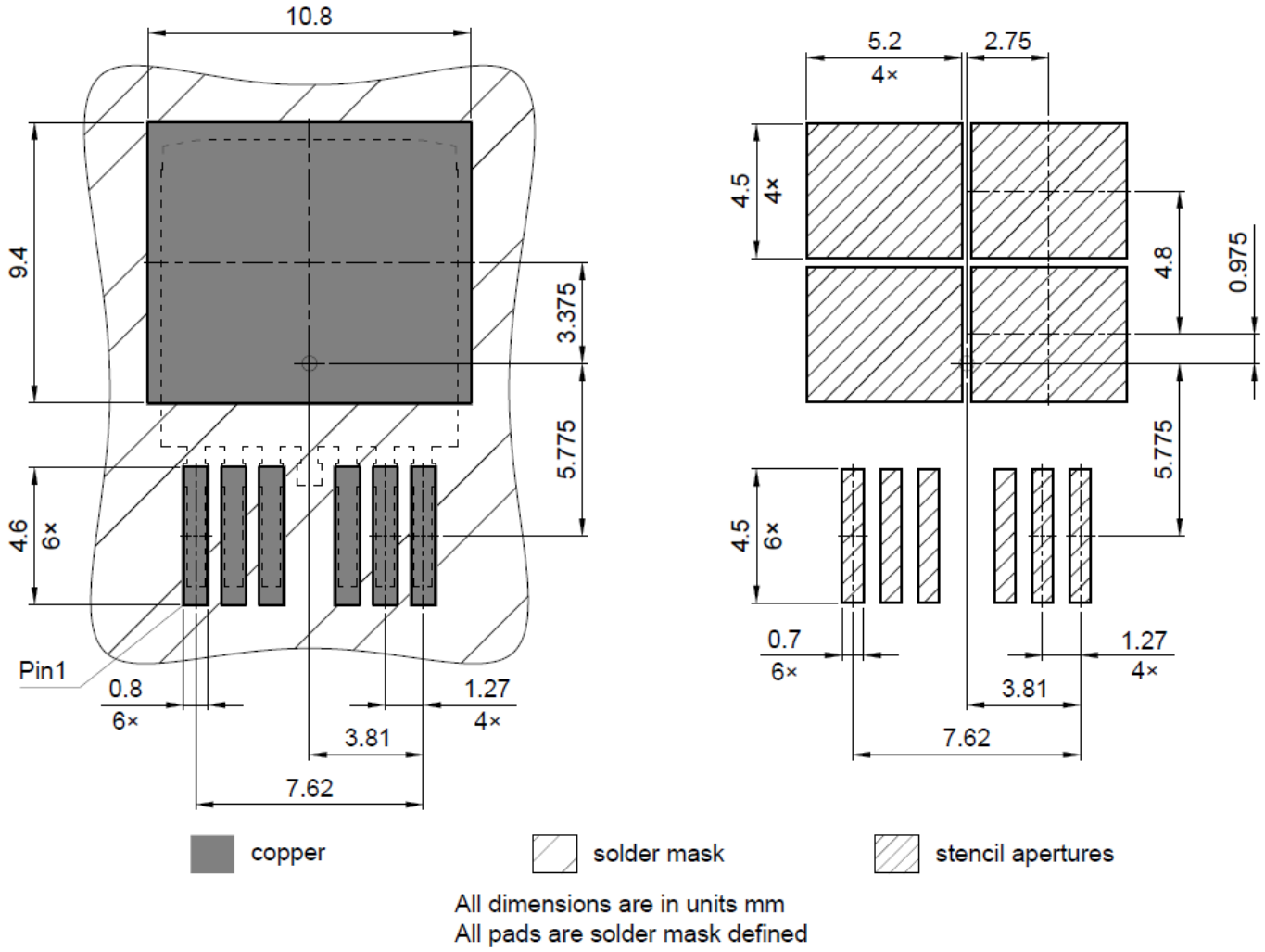


图 2 PG- TO 263 - 7 封装图，尺寸单位为毫米

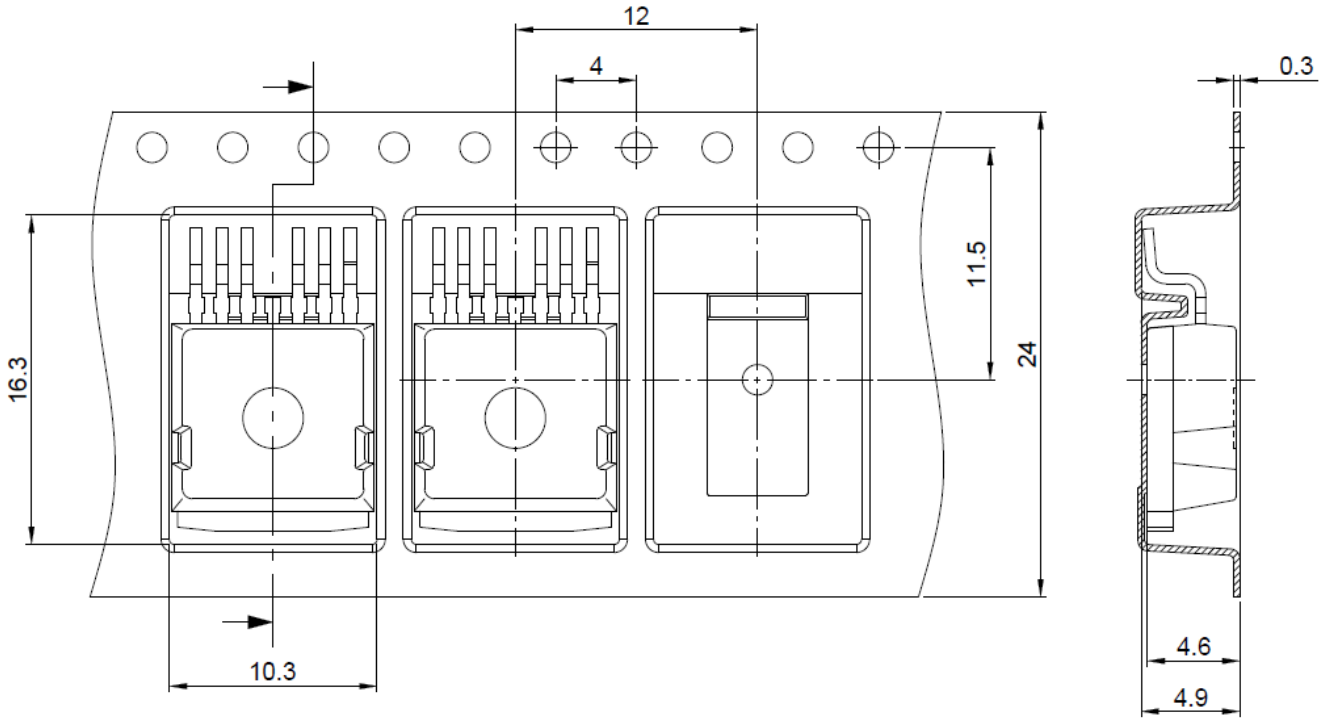


图3 PG-TO 263-7 包装型号，尺寸单位：毫米

修订记录

IPF009N10NM8

Revision 2025 - 12 - 10 , Rev. 1 . 0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2025-12-10	Release of final version

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