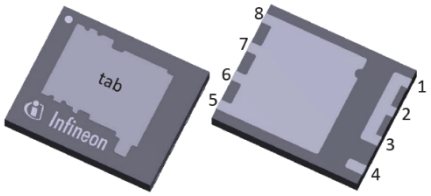
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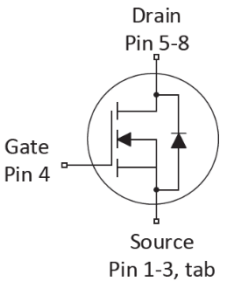
OptiMOS™ 7 功率晶体管, 40 V

PG-WSON-8



特性

- 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

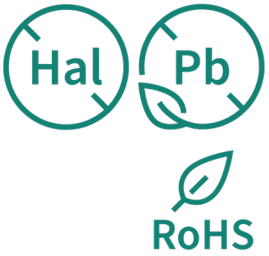


产品验证

已通过 JEDEC 相关测试。

表 1　　主要性能参数

Parameter	Value	Unit
V_{DS}	40	V
$R_{DS(on),max}$	0.57	mΩ
I_D	443	A
Q_{OSS}	144	nC
Q_G(0 V..10 V)	112	nC
Q_{rr}(100 A/µs)	64	nC



Part number	Package	Marking	Related links
ISCH57N04NM7VSC	PG-WSON-8	57NM7VSC	-

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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	-	-	443	A	V_{GS}=10 V, T_C=25 °C
				313		V_{GS}=10 V, T_C=100 °C
				328		V_{GS}=15 V, T_C=100 °C
				52		V_{GS}=10 V, T_A=25 °C, R_{THJA}=50 °C/W [2]
Pulsed drain current [3]	$I_{D,pulse}$	-	-	1772	A	T_C=25 °C
Avalanche energy, single pulse [4]	E_{AS}	-	-	718	mJ	I_D=50 A, R_{GS}=25 Ω
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	214	W	T_C=25 °C
				3.0		T_A=25 °C, R_{thJA}=50 °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}	-	0.47	0.7	°C/W	-
Thermal resistance, junction - case, top	R_{thJC}		0.48	0.72		
Thermal resistance, junction - ambient, 6 cm² cooling area [5)]	R_{thJA}		-	50		

5) 器件置于40 mm × 40 mm × 1.5 mm 环氧树脂印刷电路板 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 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	$V_{(BR)DSS}$	40	-	-	V	V_{GS}=0 V, I_D=1 mA
Gate threshold voltage	$V_{GS(th)}$	2.4	2.75	3.2	V	V_{DS}=V_{GS}, I_D=113 µA
Zero gate voltage drain current	I_{DSS}	-	0.1	1	µA	V_{DS}=40 V, V_{GS}=0 V, T_j=25 °C
Zero gate voltage drain current [6]	I_{DSS}	-	10	100	µA	V_{DS}=40 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	$R_{DS(on)}$	-	0.44	0.52	mΩ	V_{GS}=15 V, I_D=50 A
			0.49	0.57		V_{GS}=10 V, I_D=50 A
Gate resistance	R_G	-	0.85	-	Ω	-
Transconductance [6]	g_{fs}	60	120	-	S	$\|V_{DS}\|\geq 2\|I_D\|R_{DS(on)max}$, I_D=50 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}	-	7800	10000	pF	V_{GS}=0 V, V_{DS}=20 V, f=1 MHz
Output capacitance [7]	C_{oss}		3900	5100		
Reverse transfer capacitance [7]	C_{rss}		49	86		
Turn-on delay time	$t_{d(on)}$	-	18	-	ns	V_{DD}=20 V, V_{GS}=10 V, I_D=50 A, $R_{G,ext}$=1.6 Ω
Rise time	t_r		7.5			
Turn-off delay time	$t_{d(off)}$		41			
Fall time	t_f		14			

[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}	-	36	-	nC	V_{DD}=20 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge at threshold	$Q_{g(th)}$		22	-	nC	
Gate to drain charge [9)]	Q_{gd}		20	30	nC	
Switching charge	Q_{sw}		35	-	nC	
Gate charge total [9)]	Q_g		112	140	nC	
Gate plateau voltage	$V_{plateau}$		4.6	-	V	
Gate charge total, sync. FET	$Q_{g(sync)}$	-	102	-	nC	V_{DS}=0.1 V, V_{GS}=0 to 10 V
Output charge [9)]	Q_{oss}	-	144	192	nC	V_{DS}=20 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。

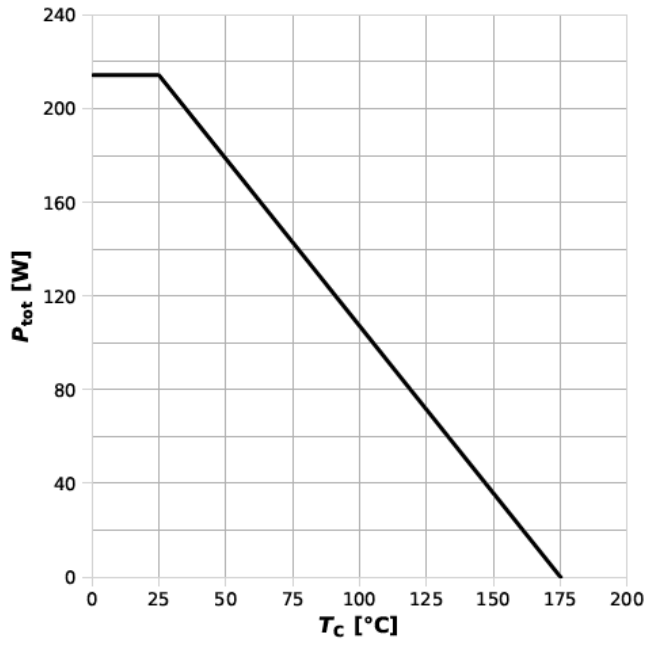
表 7 反向二极管

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	201	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$			1772		
Diode forward voltage	V_{SD}	-	0.78	1.0	V	V_{GS}=0 V, I_F=50 A, T_j=25 °C
Reverse recovery time [10)]	t_{rr}	-	52	-	ns	V_R=20 V, I_F=50 A, di_F/dt=100 A/µs
Reverse recovery charge [10)]	Q_{rr}		64		nC	

10) 由设计指定，未经过生产测试。

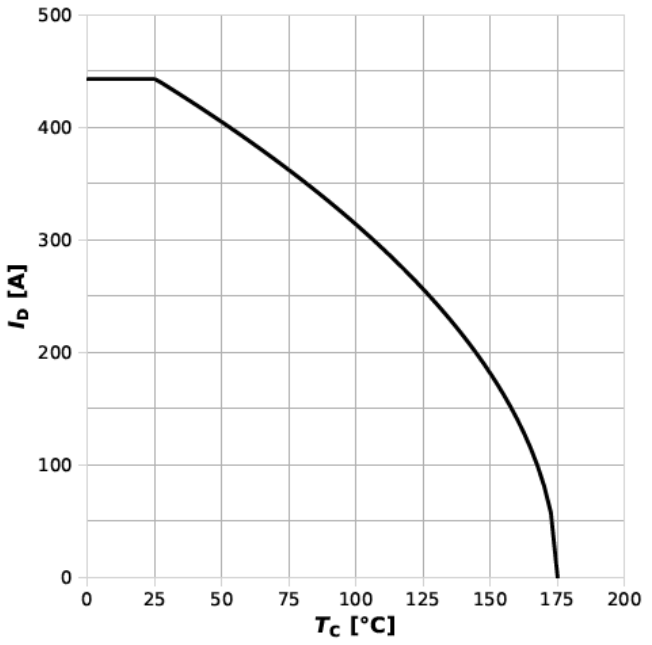
4 电气特性图

Diagram 1: Power dissipation



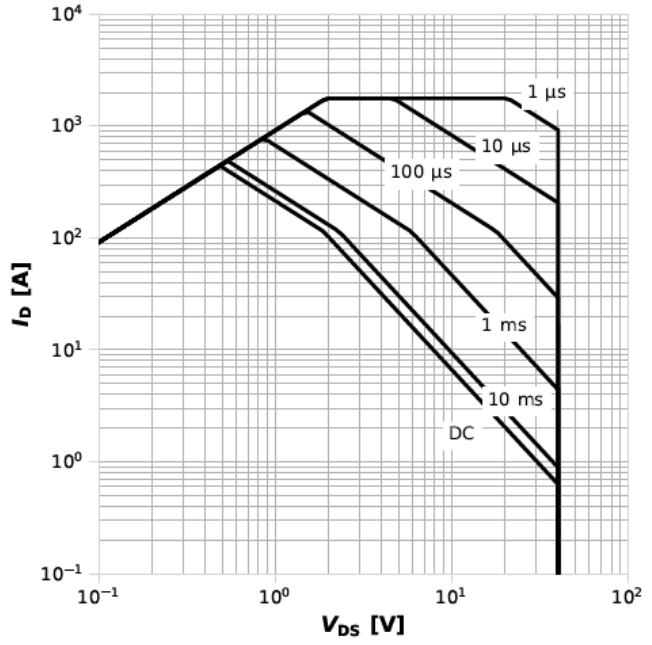
$P_{tot}=f(T_C)$

Diagram 2: Drain current



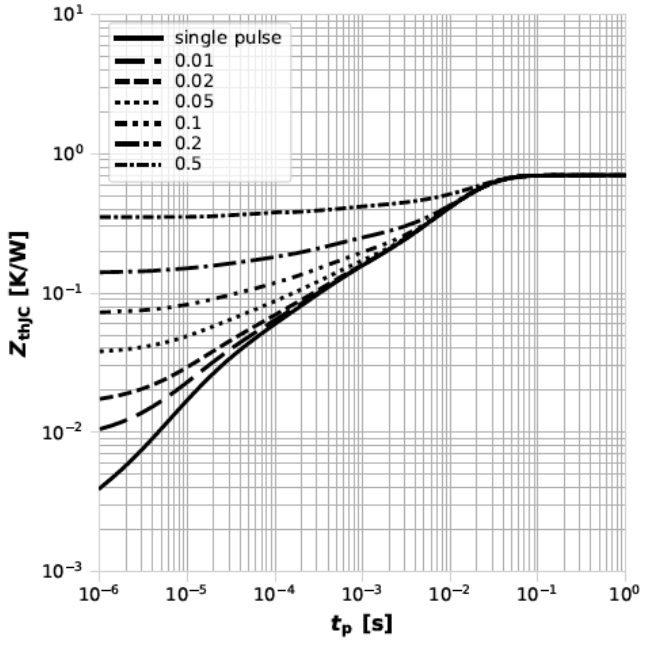
$I_D=f(T_C)$; $V_{GS}\geq 10$ V

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: $D=t_p/T$

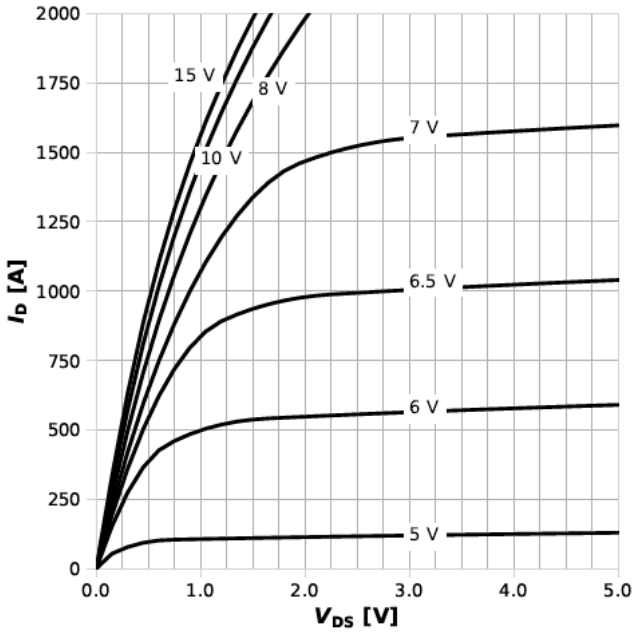
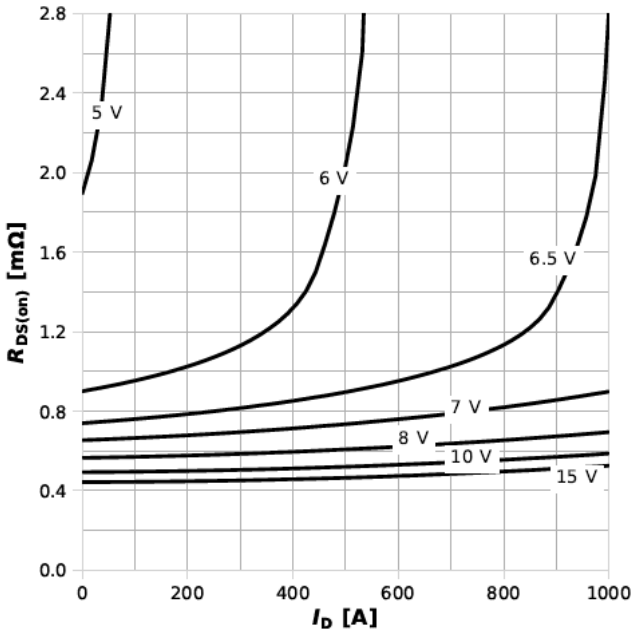
Diagram 5: Typ. output characteristics	Diagram 6: Typ. drain-source on resistance
	
$I_D=f(V_{DS})$, $T_j=25$ °C; parameter: V_{GS}	$R_{DS(on)}=f(I_D)$, $T_j=25$ °C; parameter: V_{GS}

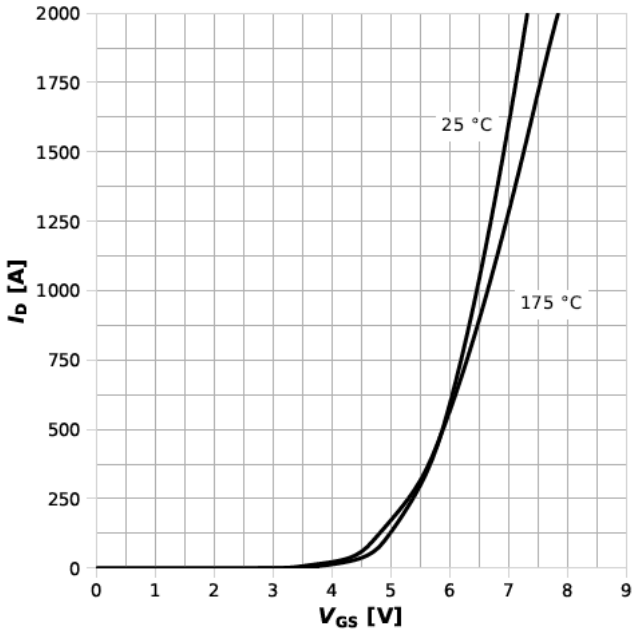
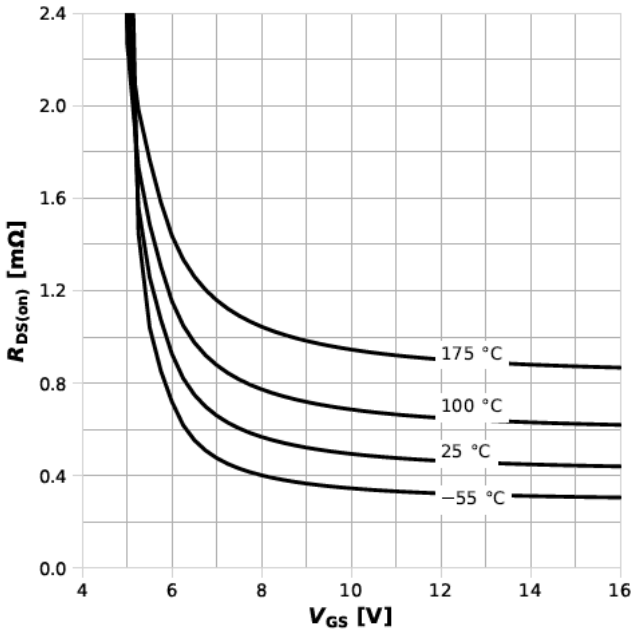
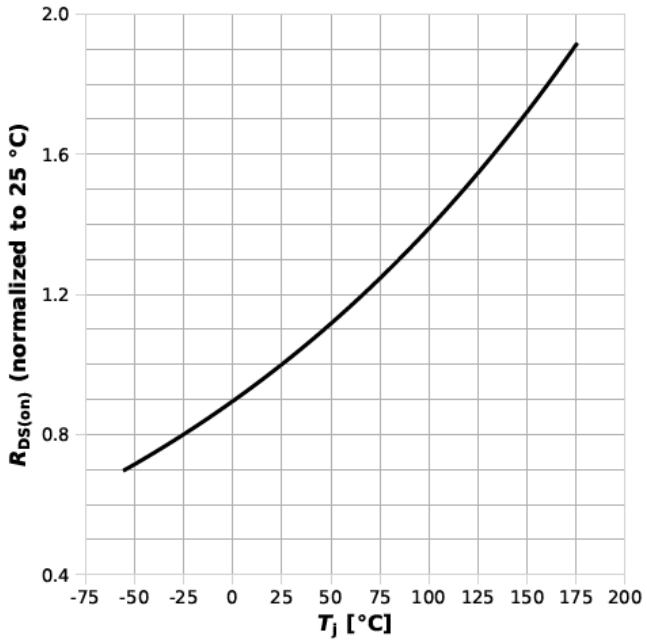
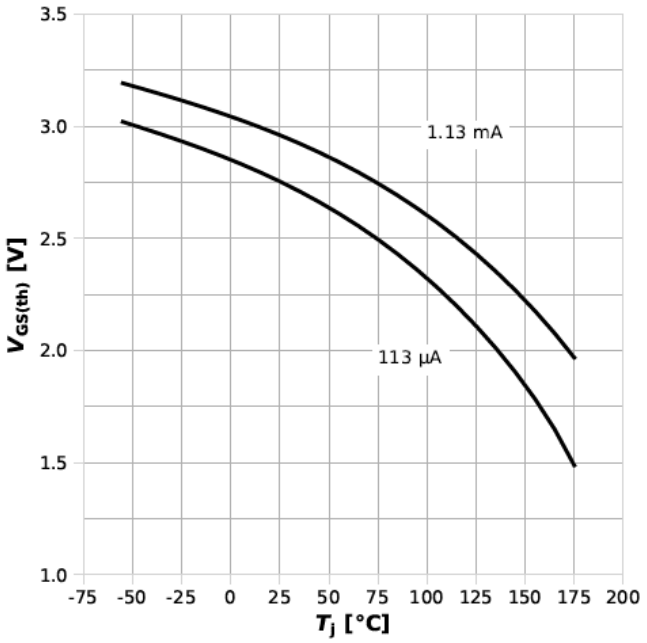
Diagram 7: Typ. transfer characteristics	Diagram 8: Typ. drain-source on resistance
	
$I_D=f(V_{GS})$, $\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$; parameter: T_j	$R_{DS(on)}=f(V_{GS})$, $I_D=50$ A; parameter: T_j

Diagram 9: Normalized drain-source on resistance



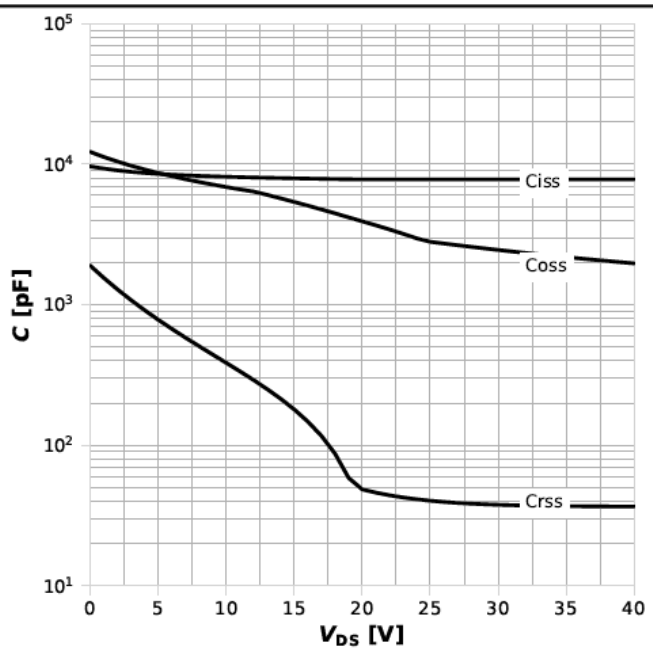
$R_{DS(on)}$=f(T_j), I_D=50 A, V_{GS}=10 V

Diagram 10: Typ. gate threshold voltage



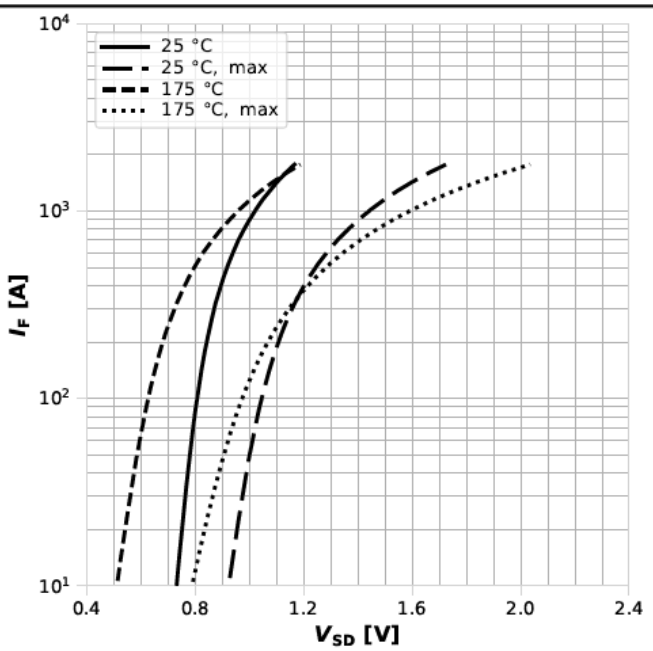
$V_{GS(th}$=f(T_j), V_{GS}=V_{DS}; parameter: I_D

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

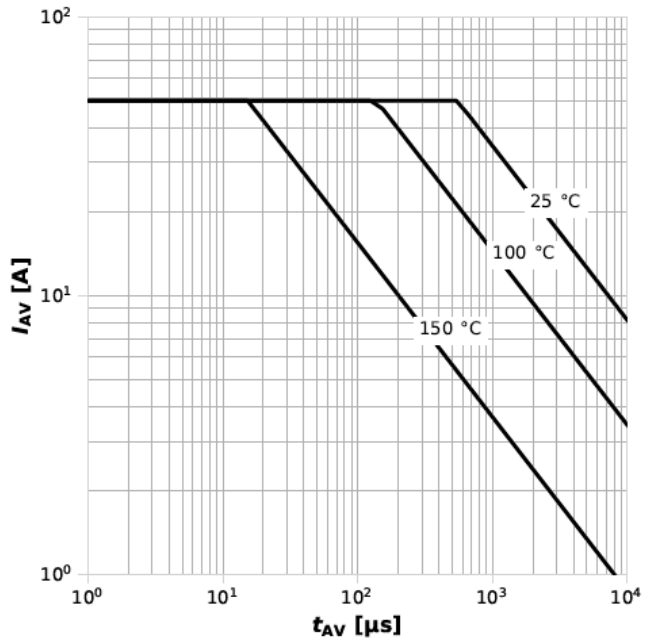
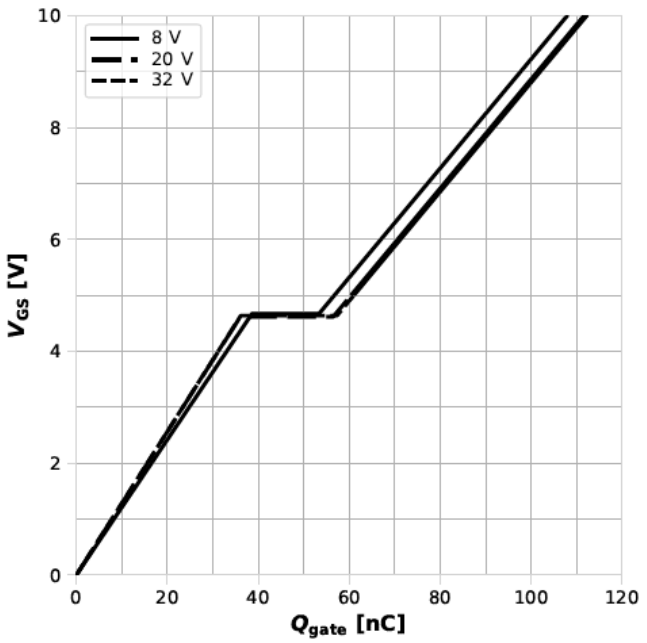
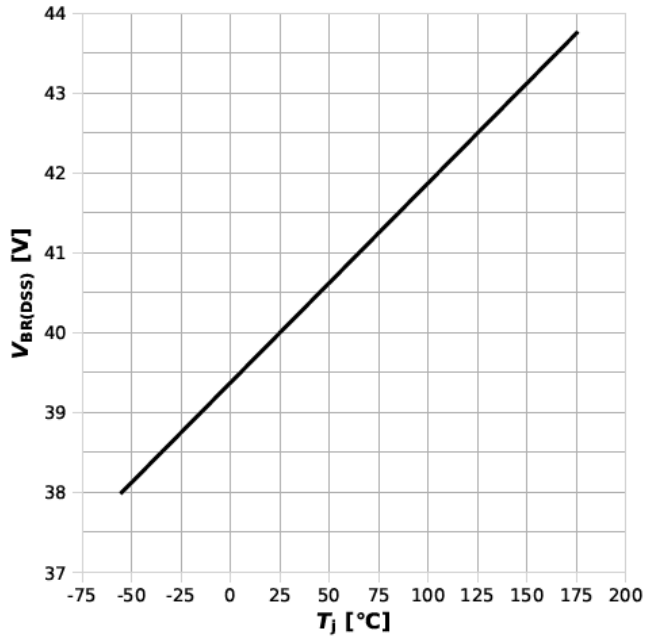
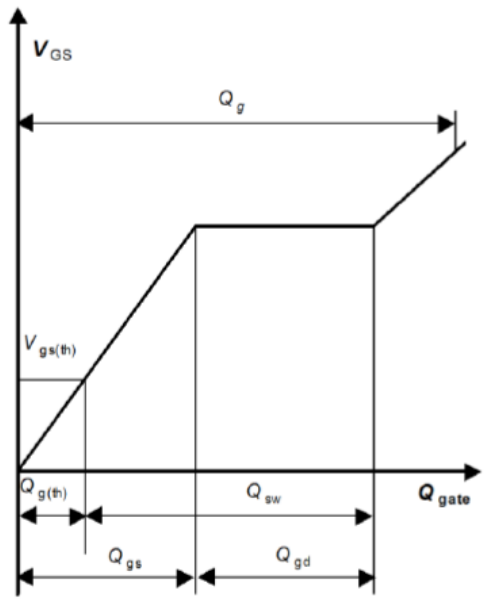
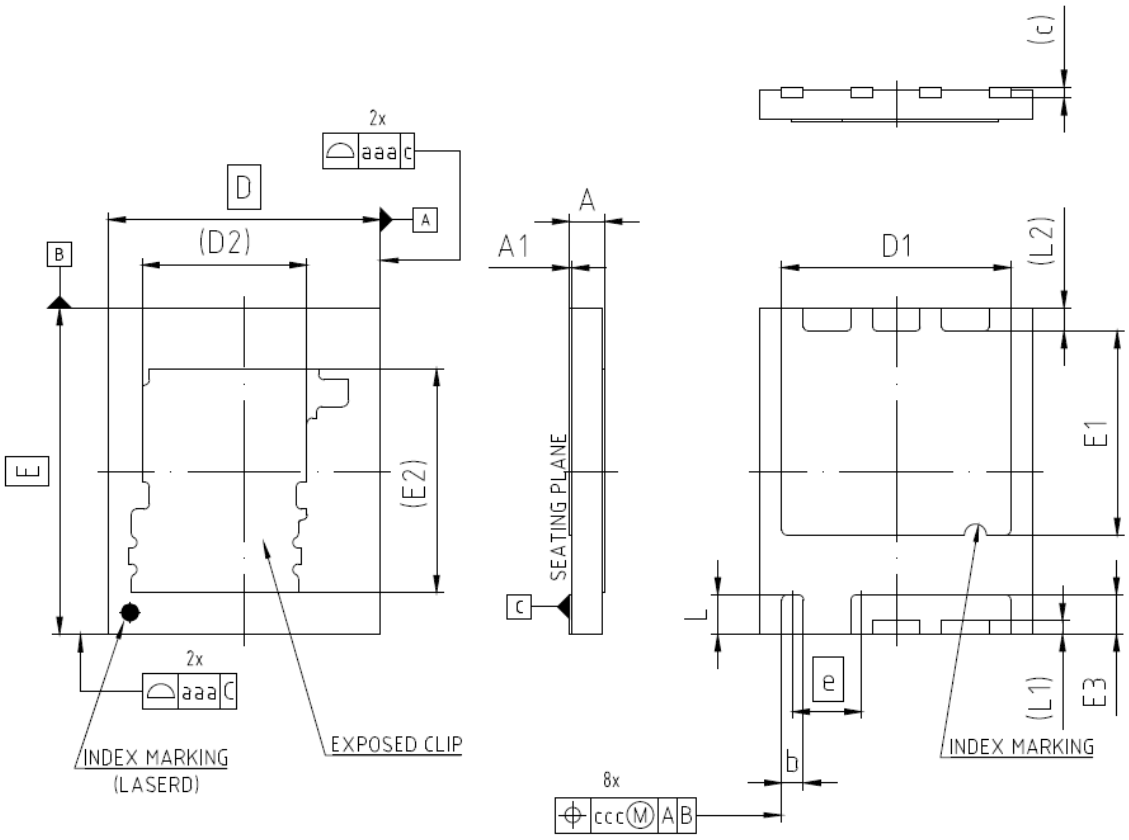
Diagram 13: Avalanche characteristics	Diagram 14: Typ. gate charge
	
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j,start}$	V_{GS}=f(Q_{gate}), I_D=50 A pulsed, T_j=25 °C; parameter: V_{DD}

Diagram 15: Min. drain-source breakdown voltage	Gate charge waveforms
	
$V_{BR(DSS)}$=f(T_j); I_D=1 mA	-

5 封装外形



PACKAGE - GROUP NUMBER:	PG-WSON-8-U01				
DIMENSIONS	MILLIMETERS		DIMENSIONS	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	0.55	0.75	e	1.27	
A1	0.00	0.05	L	0.68	0.78
b	0.35	0.45	L1	0.25	
c	0.20		L2	0.42	
D	5.00		aaa	0.05	
D1	4.11	4.31	ccc	0.10	
D2	3.03				
E	6.00				
E1	3.66	3.86			
E2	4.11				
E3	0.63	0.83			

NOTE: DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS

图 1　　PG-WSON-8 外形图，尺寸单位为毫米

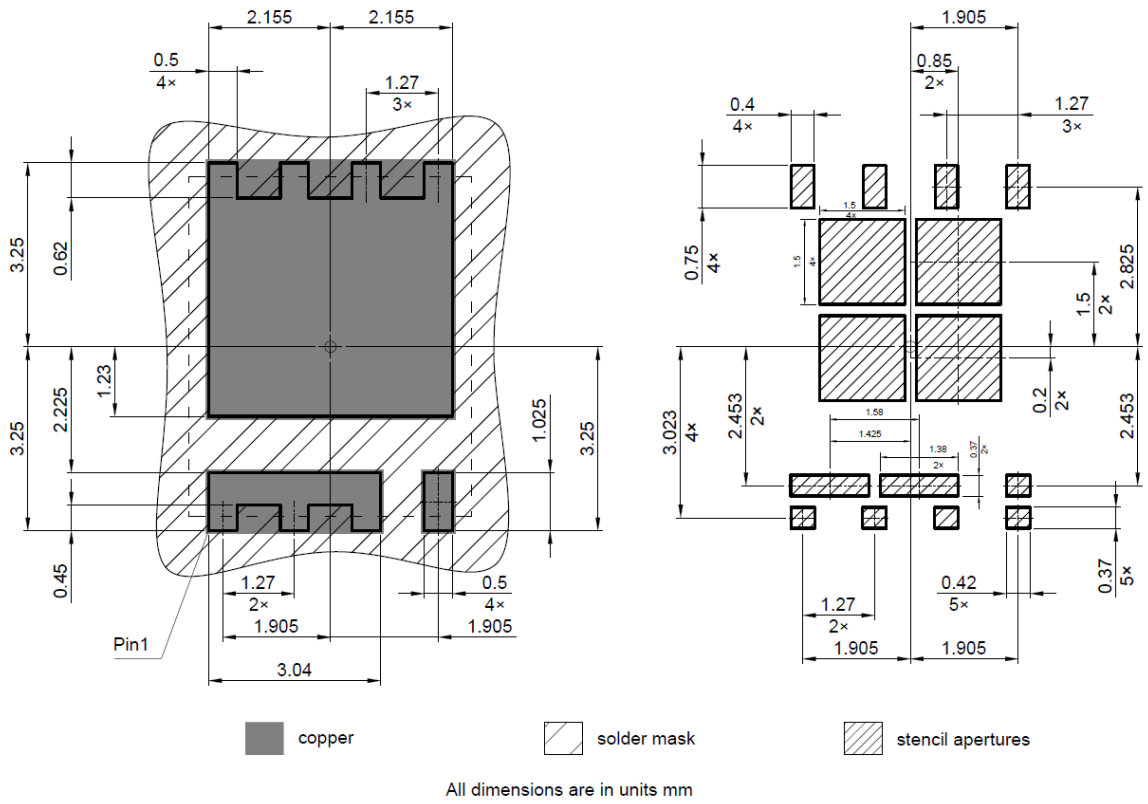


图 2　　PG-WSON-8 封装图，尺寸单位为毫米

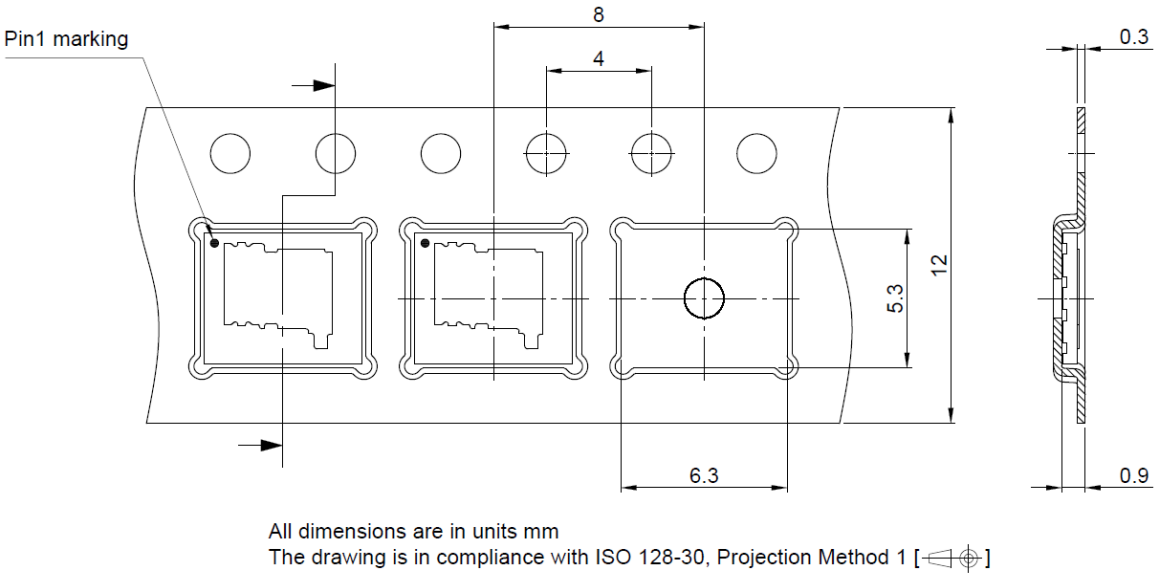


图 3　　PG-WSON-8 包装型号，尺寸单位为毫米

修订记录

ISCH57N04NM7VSC

Revision 2025-11-24, Rev. 1. 0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2025-11-24	Release of final version

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