

MOSFET

英飞凌高耐热60V OptiMOS™5 功率晶体管

特性

- 针对同步整流进行了优化
- 100% 雪崩测试
- 卓越的耐热性
- N沟道
- 额定温度为 175°C
- 无铅镀层；符合RoHS标准
- 符合 IEC61249-2-21 标准的无卤素
- 源极互连尺寸增大，焊点可靠性更高

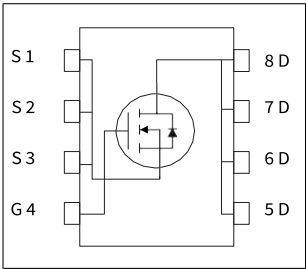


产品验证

完全符合 JEDEC 工业应用标准

表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(on),max}$	1.2	mΩ
I_D	306	A
Q_{oss}	122	nC
$Q_G(0V..10V)$	115	nC



Type / Ordering Code	Package	Marking	Related Links
BSC012N06NS	TS0N-8-3	012N06N	-

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OptiMOS™5 功率晶体管, 60 V

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	-	-	306 217 36	A	$V_{GS}=10\text{ V}$, $T_C=25\text{ °C}$ $V_{GS}=10\text{ V}$, $T_C=100\text{ °C}$ $V_{GS}=10\text{ V}$, $T_A=25\text{ °C}$, $R_{thJA}=50\text{ K/W}^{2)}$
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	1224	A	$T_C=25\text{ °C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	911	mJ	$I_D=50\text{ A}$, $R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	214 3.0	W	$T_C=25\text{ °C}$ $T_A=25\text{ °C}$, $R_{thJA}=50\text{ K/W}^{2)}$
Operating and storage temperature	T_j , T_{stg}	-55	-	175	°C	IEC climatic category; DIN IEC 68-1: 55/175/56

2 热特性

除非另有规定, $T_j = 25\text{ °C}$

表3 热特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, bottom	R_{thJC}	-	0.35	0.7	K/W	-
Thermal resistance, junction - case, top	R_{thJC}	-	-	20	K/W	-
Device on PCB, 6 cm ² cooling area ²⁾	R_{thJA}	-	-	50	K/W	-

¹⁾额定值指产品仅具有数据表指定的绝对最大值, 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⁾器件安装在 40 mm x 40 mm x 1.5 mm 环氧树脂印刷电路板 FR4 上, 漏极连接用铜面积为 6 cm² (一层, 70 μm 厚)。印刷电路板垂直放置在静止空气中。

³⁾详细信息请参见图 3

⁴⁾详细信息请参见图 13

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3 电气特性

除非另有规定, $T_j = 25\text{ °C}$

表4 静态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	60	-	-	V	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	2.1	2.8	3.3	V	$V_{DS}=V_{GS}$, $I_D=147\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.5 10	1 100	μA	$V_{DS}=60\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$ $V_{DS}=60\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.9 1.2	1.2 1.7	$\text{m}\Omega$	$V_{GS}=10\text{ V}$, $I_D=50\text{ A}$ $V_{GS}=6\text{ V}$, $I_D=12.5\text{ A}$
Gate resistance ¹⁾	R_G	-	2.2	3.3	Ω	-
Transconductance	g_{fs}	85	170	-	S	$ V_{DS} > 2 I_D R_{DS(on)max}$, $I_D=50\text{ A}$

表5 动态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance ¹⁾	C_{iss}	-	8300	11000	pF	$V_{GS}=0\text{ V}$, $V_{DS}=30\text{ V}$, $f=1\text{ MHz}$
Output capacitance ¹⁾	C_{oss}	-	1800	2400	pF	$V_{GS}=0\text{ V}$, $V_{DS}=30\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance ¹⁾	C_{rss}	-	71	120	pF	$V_{GS}=0\text{ V}$, $V_{DS}=30\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	11	-	ns	$V_{DD}=30\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Rise time	t_r	-	15	-	ns	$V_{DD}=30\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Turn-off delay time	$t_{d(off)}$	-	54	-	ns	$V_{DD}=30\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$
Fall time	t_f	-	31	-	ns	$V_{DD}=30\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_{G,ext}=1.6\text{ }\Omega$

表6 栅极电荷特性²⁾

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	35	-	nC	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	23	-	nC	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge ¹⁾	Q_{gd}	-	21	31	nC	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	32	-	nC	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total ¹⁾	Q_g	-	115	143	nC	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	4.2	-	V	$V_{DD}=30\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total, sync. FET	$Q_{g(sync)}$	-	102	-	nC	$V_{DS}=0.1\text{ V}$, $V_{GS}=0\text{ to }10\text{ V}$
Output charge ¹⁾	Q_{oss}	-	122	163	nC	$V_{DD}=30\text{ V}$, $V_{GS}=0\text{ V}$

¹⁾ 由设计标定, 不受制于生产测试。

²⁾ 参数定义请参见“栅极充电波形”

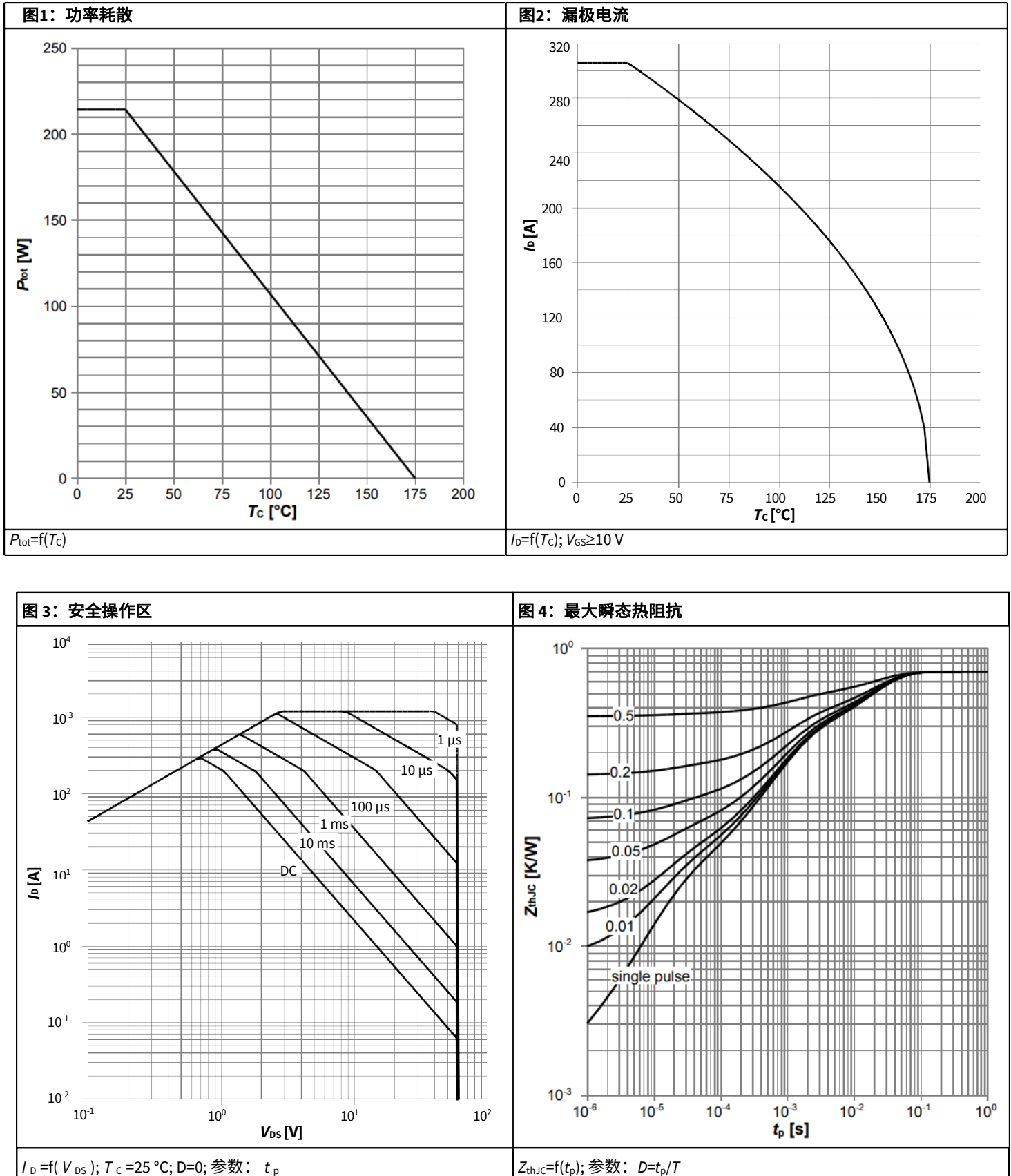
OptiMOS™5 功率晶体管, 60 V

表 7 反向二极管

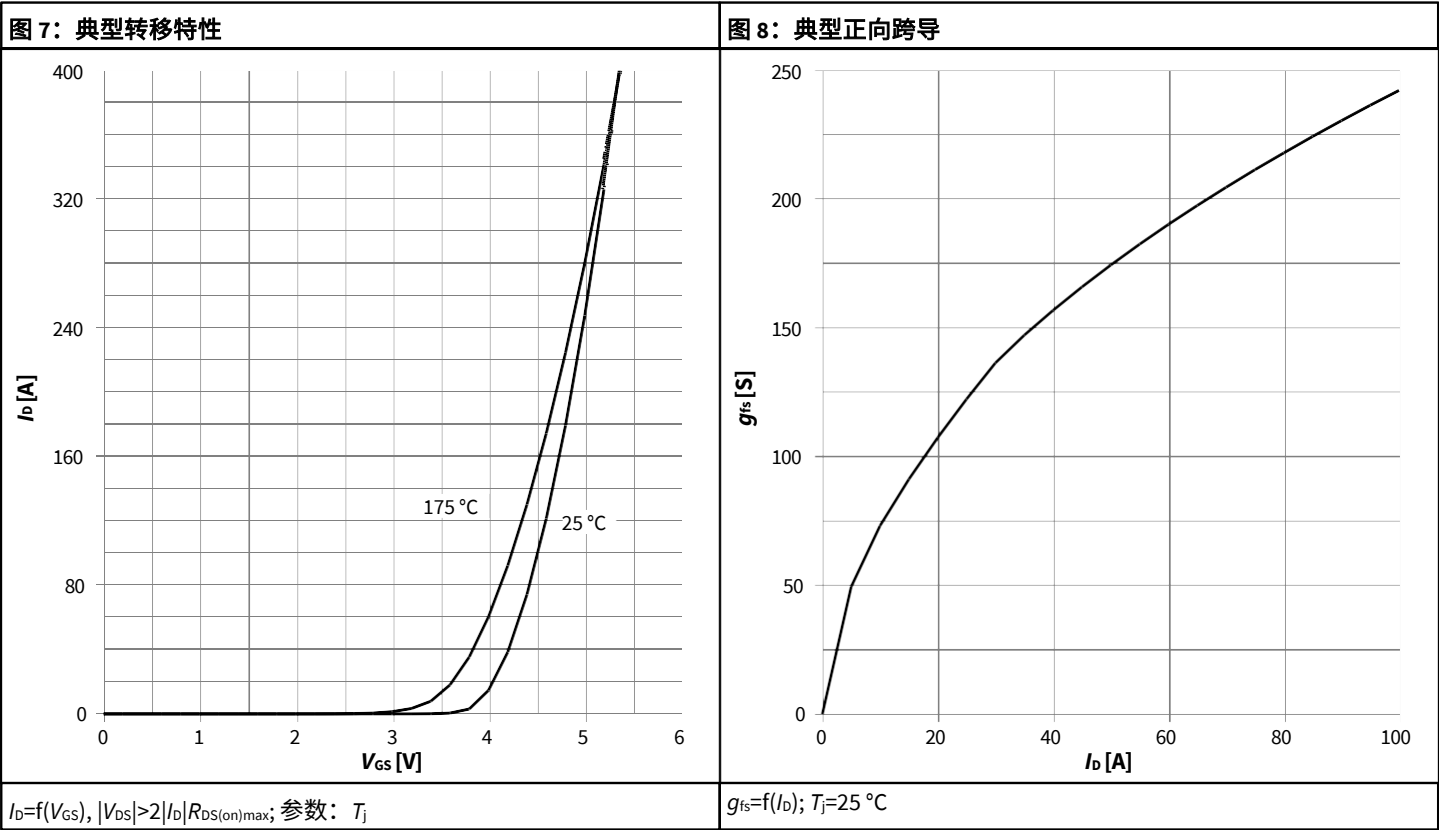
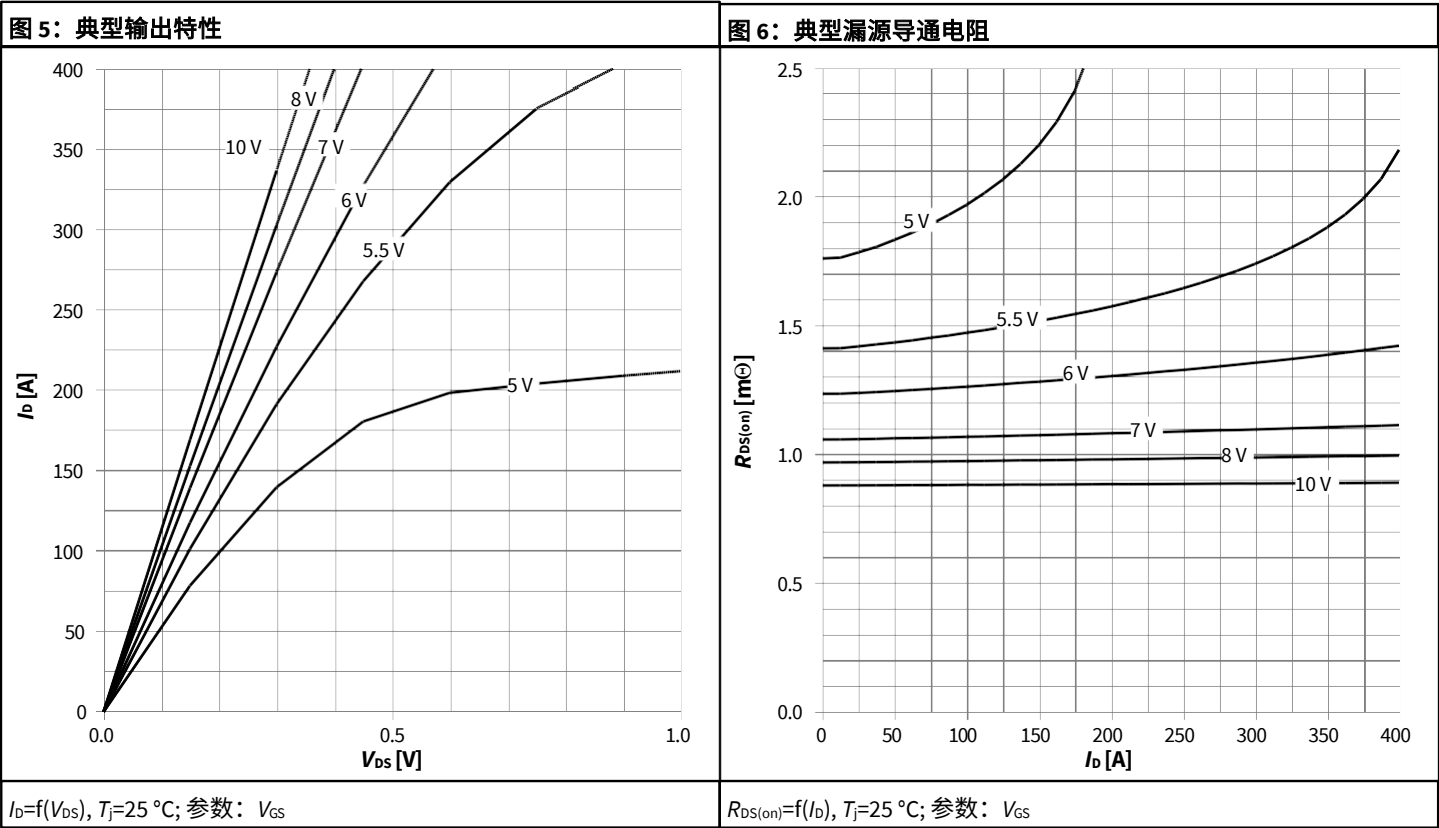
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	179	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	1224	A	$T_C=25\text{ °C}$
Diode forward voltage	V_{SD}	-	0.8	1.2	V	$V_{GS}=0\text{ V}$, $I_F=50\text{ A}$, $T_J=25\text{ °C}$
Reverse recovery time ¹⁾	t_{rr}	-	41	82	ns	$V_R=30\text{ V}$, $I_F=50\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁾	Q_{rr}	-	170	340	nC	$V_R=30\text{ V}$, $I_F=50\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$

¹⁾由设计标定，不受制于生产测试。

4 电气特性图

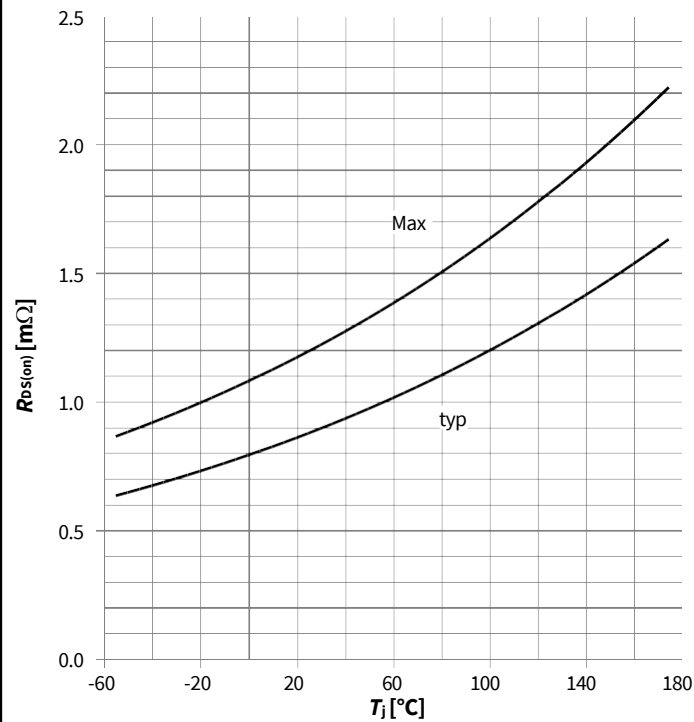


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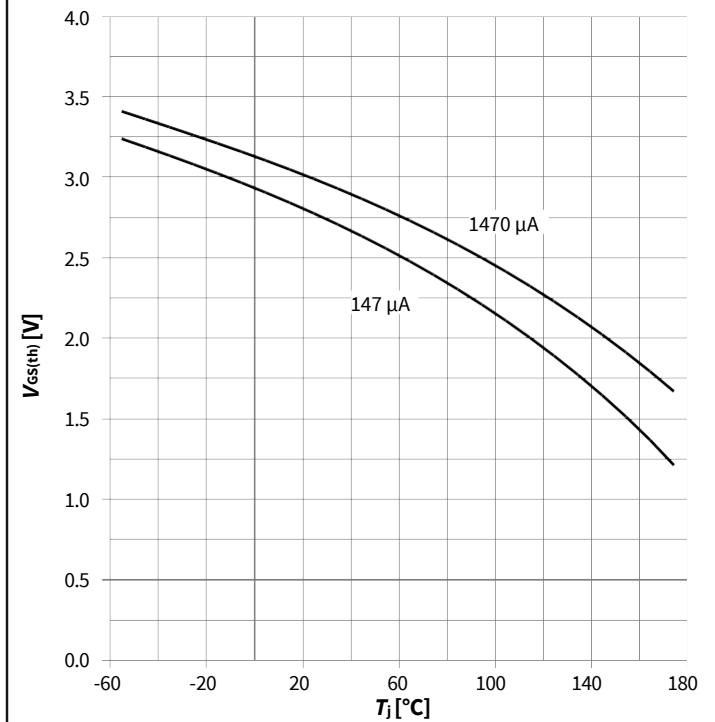
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图 9：漏源导通电阻



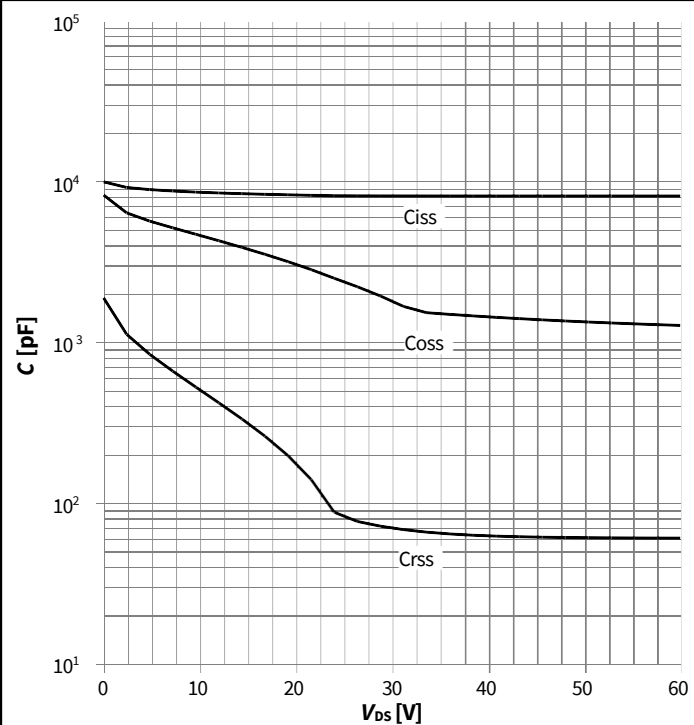
$$R_{DS(on)} = f(T_j); I_D = 50 \text{ A}; V_{GS} = 10 \text{ V}$$

图 10：典型栅极阈值电压



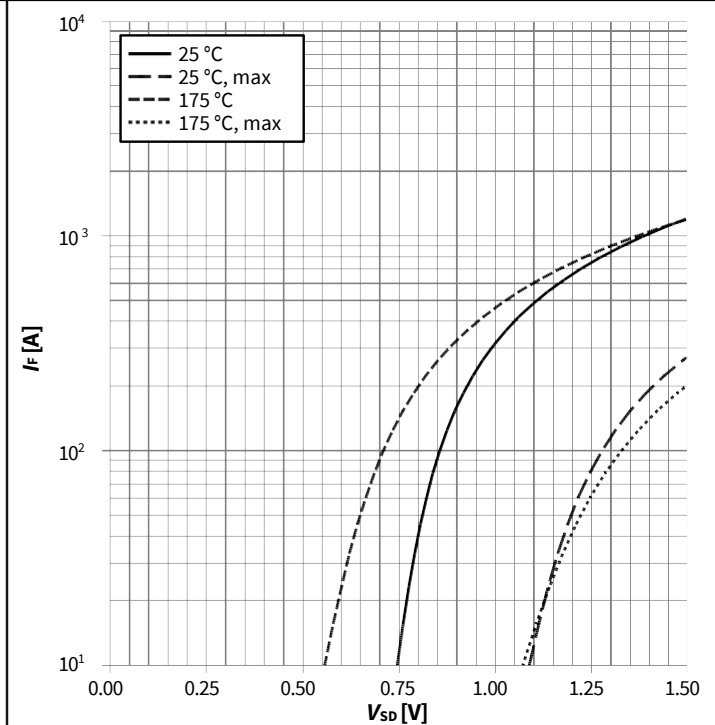
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

图 11：典型电容值



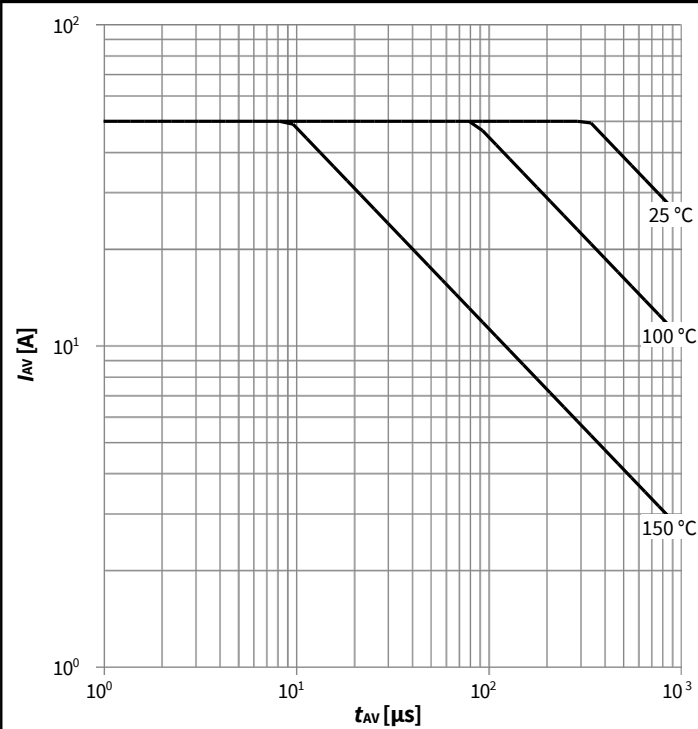
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$

图 12：反向二极管的正向特性



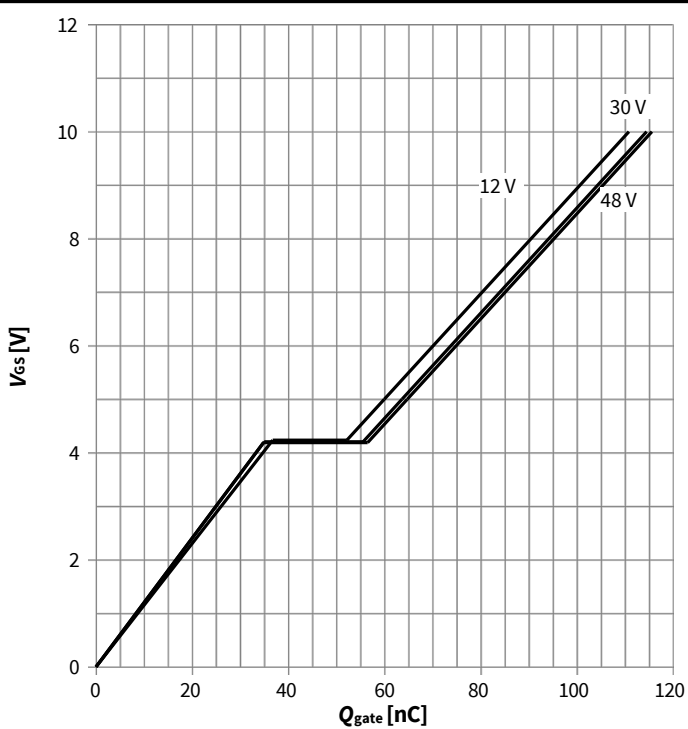
$$I_F = f(V_{SD}); \text{参数: } T_j$$

图 13: 雪崩特性



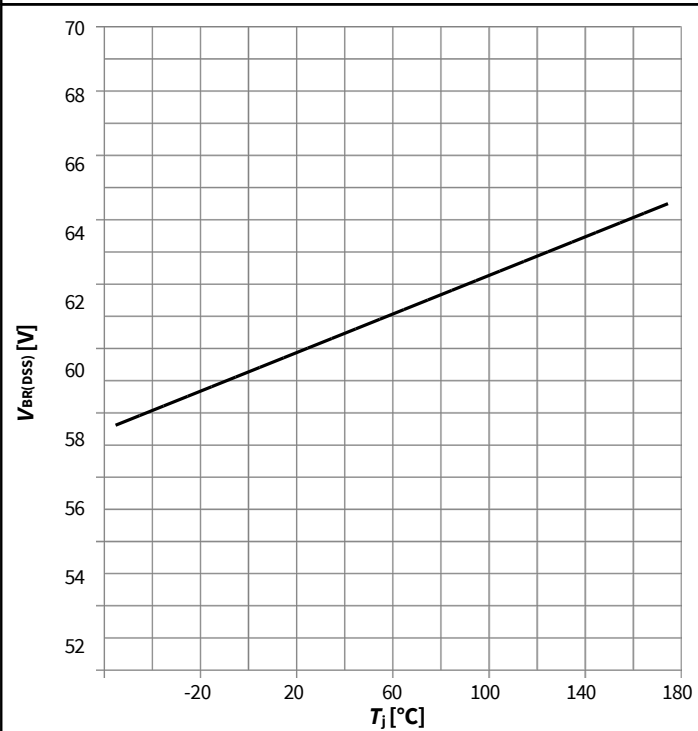
$I_{AS}=f(t_{AV}); R_{GS}=25\ \Omega$; 参数: $T_{j(start)}$

图 14: 典型栅极电荷



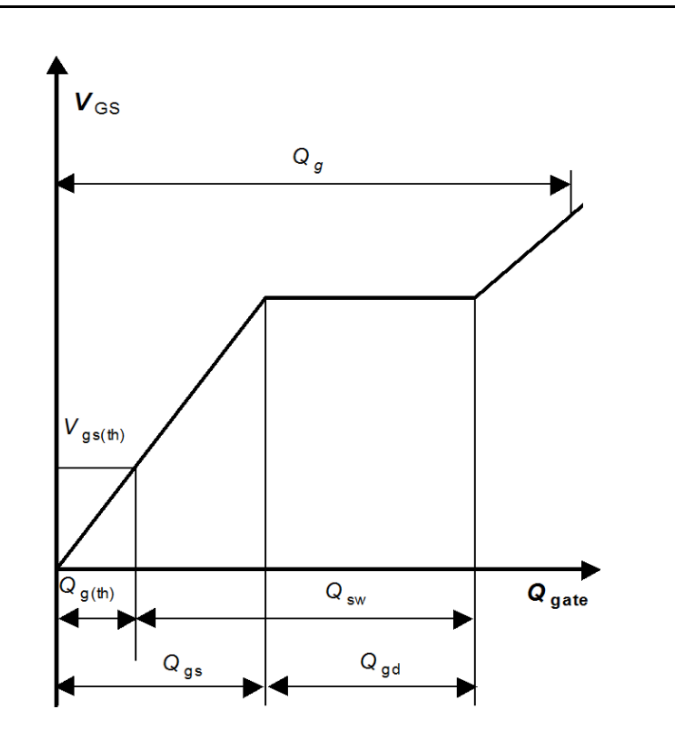
$V_{GS}=f(Q_{gate}); I_D=50\text{ A 脉冲}$; 参数: V_{DD}

图 15: 漏源击穿电压

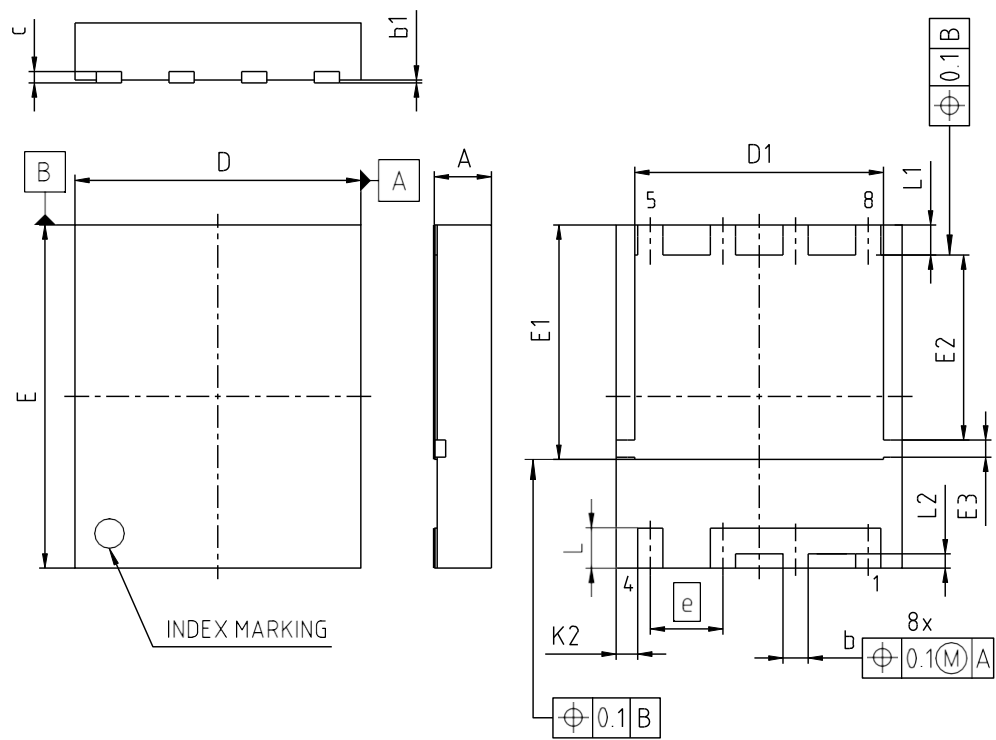


$V_{BR(DSS)}=f(T_j); I_D=1\text{ mA}$

图 栅极充电波形



5 封装外形



DIMENSION	MILLIMETERS	
	MIN.	MAX.
A	-	1.10
b	0.34	0.54
b1	-	0.05
c	0.20	
D	4.90	5.10
D1	4.25	4.45
E	5.90	6.10
E1	4.00	4.20
E2	3.14	3.34
E3	0.20	0.40
e	1.27	
K2	(0.37)	
L	0.60	0.80
L1	0.43	0.63
L2	(0.25)	

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图 1 PG-TSON-8-3 外形图, 尺寸单位为毫米/英寸

修订记录

BSC012N06NS

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历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.0	2018-03-08	Release of final version
2.1	2018-12-11	Rev. 2.0
2.2	2020-02-06	Update current rating
2.3	2020-02-28	Update footnotes

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