

MOSFET

英飞凌高耐热60V OptiMOS™功率 MOSFET

特性

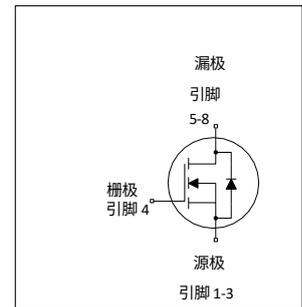
- 双面冷却封装——具有最低的结顶热阻
- 额定温度为 175°C
- 针对同步整流进行了优化
- 100% 雪崩测试
- 卓越的耐热性
- N沟道
- 无铅镀层；符合RoHS标准
- 符合 IEC61249-2-21 标准的无卤素
- 源极互连尺寸增大，焊点可靠性更高

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
$R_{DS(on),max}$	1.6	mΩ
I_b	234	A
Q_{oss}	81	nC
$Q_G(0V..10V)$	71	nC



Type / Ordering Code	Package	Marking	Related Links
BSC016N06NSSC	PG-WSON-8-2	016N06SC	-

本数据手册的原文使用英文撰写。为方便起见，英飞凌提供了译文；由于翻译过程中可能使用了自动化工具，英飞凌不保证译文的准确性。为确认准确性，请务必访问 infineon.com 参考最新的英文版本（控制文档）。

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OptiMOS™功率 MOSFET, 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	I_D	-	-	234 165 31	A	$V_{GS}=10\text{ V}, T_C=25\text{ °C}^1$ $V_{GS}=10\text{ V}, T_C=100\text{ °C}$ $V_{GS}=10\text{ V}, T_A=25\text{ °C}, R_{thJA}=50\text{ K/W}^2$
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	936	A	$T_C=25\text{ °C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	380	mJ	$I_D=50\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	167 3.0	W	$T_C=25\text{ °C}$ $T_A=25\text{ °C}, R_{thJA}=50\text{ K/W}$
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

表 3 热特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, bottom	R_{thJC}	-	0.5	0.9	K/W	-
Thermal resistance, junction - case, top	R_{thJC}	-	0.4	0.86	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	$V_{DS}=V_{GS}, I_D=95\text{ }\mu\text{A}$
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	$R_{DS(on)}$	-	1.4 1.8	1.6 2.4	$\text{m}\Omega$	$V_{GS}=10\text{ V}, I_D=50\text{ A}$ $V_{GS}=6\text{ V}, I_D=12.5\text{ A}$
Gate resistance	R_G	-	1.9	2.9	Ω	-
Transconductance	g_{fs}	70	140	-	S	$ V_{DS} > 2 I_D R_{DS(on)max}, I_D=50\text{ A}$

表5 动态特性¹⁾

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	3900	5200	6500	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Output capacitance	C_{oss}	900	1200	1500	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	14	48	96	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	19	38	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	-	9	18	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	$t_{d(off)}$	-	34	70	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	-	9	18	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}	16	22	30	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	10	14	19	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge	Q_{gd}	8.8	13	20	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	14	21	30	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge total	Q_g	58	71	95	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	3.7	4.3	4.9	V	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge total, sync. FET	$Q_{g(sync)}$	49	62	86	nC	$V_{DS}=0.1\text{ V}, V_{GS}=0\text{ to }10\text{ V}$
Output charge	Q_{oss}	60	81	102	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⁾栅极电荷参数定义见图 16。由设计定义, 不受制于生产测试。

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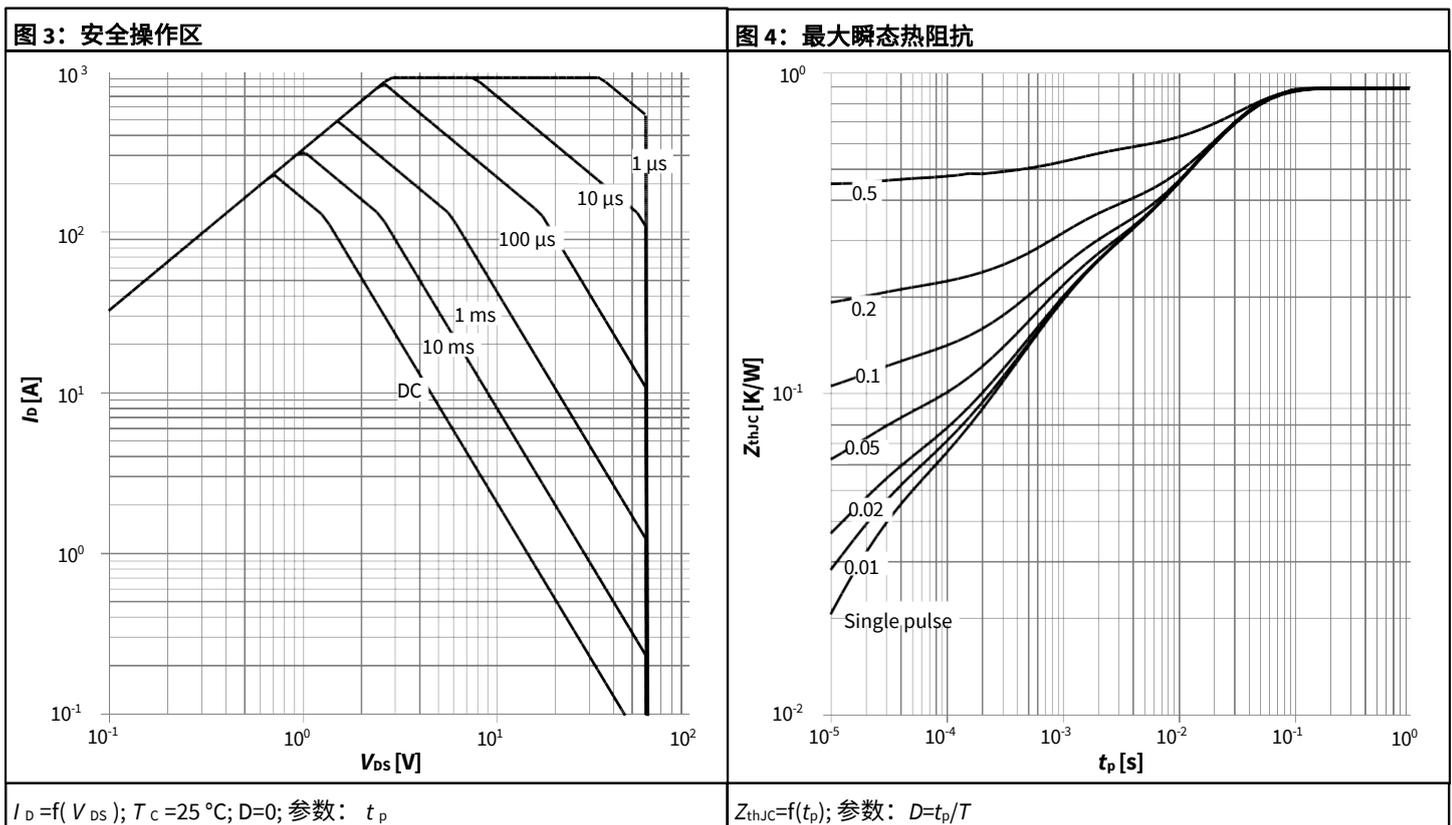
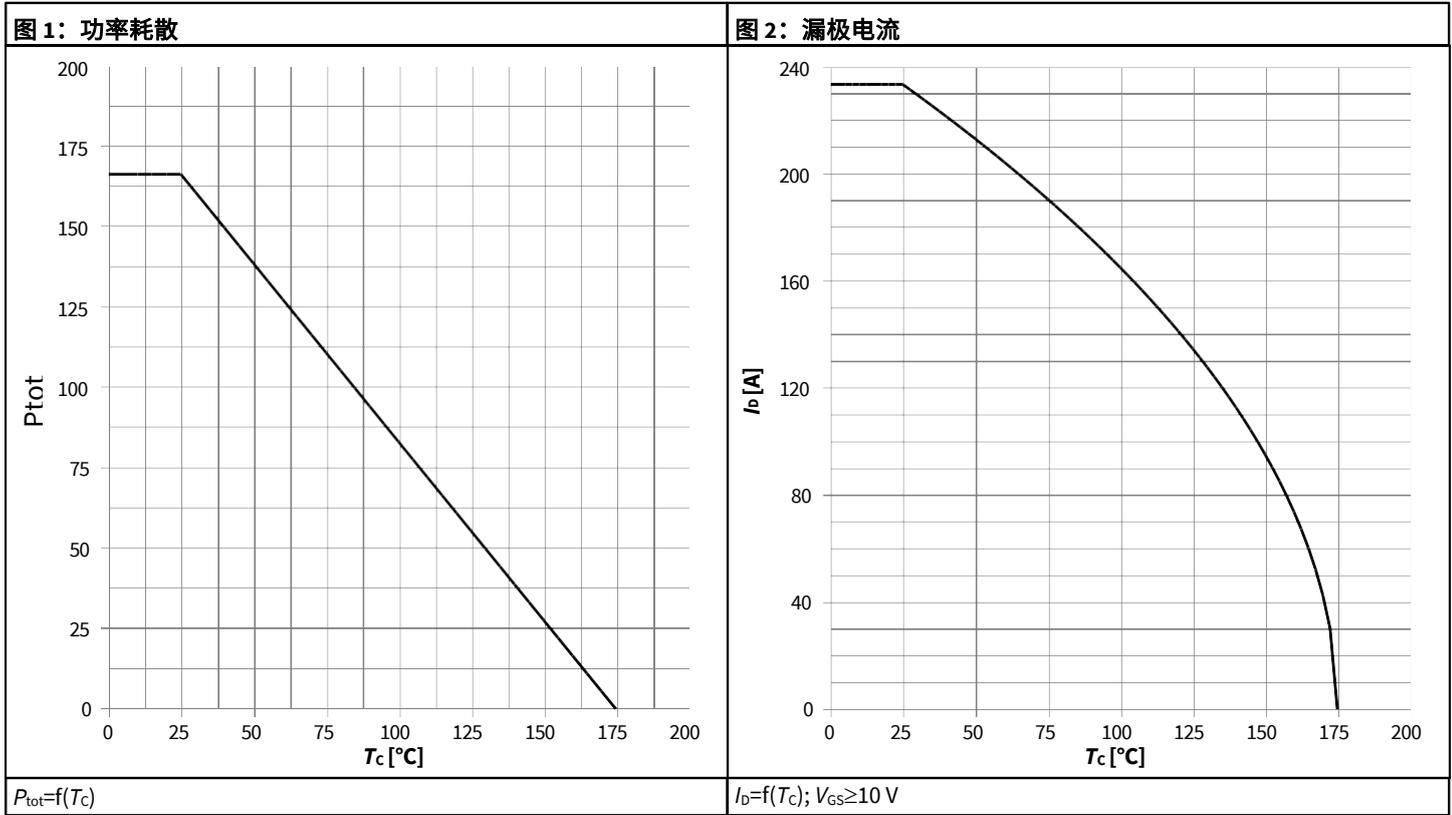
表 7 反向二极管

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	119	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	936	A	$T_C=25\text{ °C}$
Diode forward voltage	V_{SD}	-	0.84	1.2	V	$V_{GS}=0\text{ V}, I_F=50\text{ A}, T_J=25\text{ °C}$
Reverse recovery time ¹⁾	t_{rr}	24	61	98	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}	39	78	156	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。

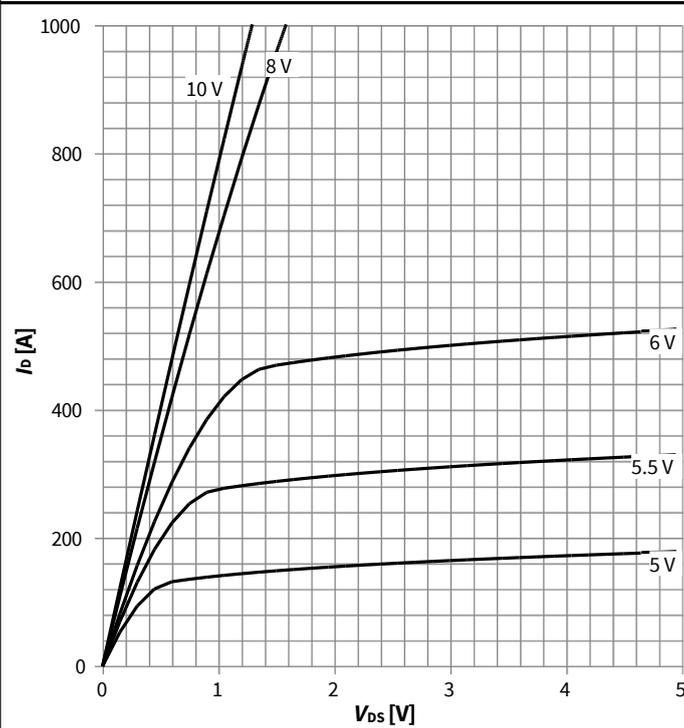
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4 电气特性图



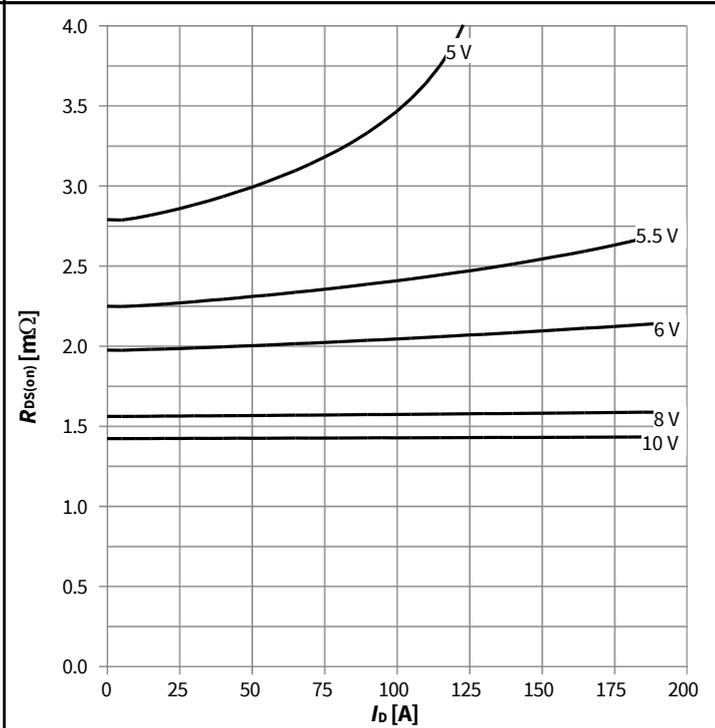
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图 5: 典型输出特性



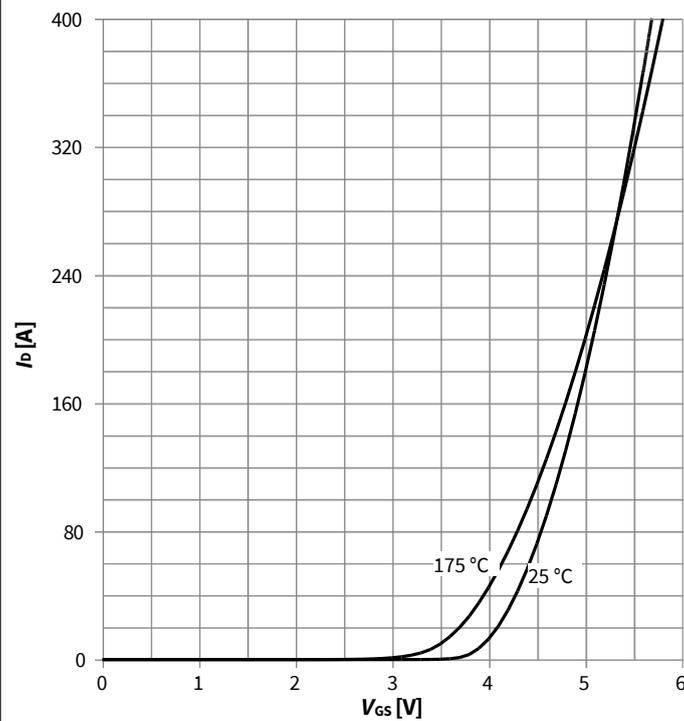
$I_D = f(V_{DS})$, $T_j = 25^\circ\text{C}$; 参数: V_{GS}

图 6: 典型漏源导通电阻



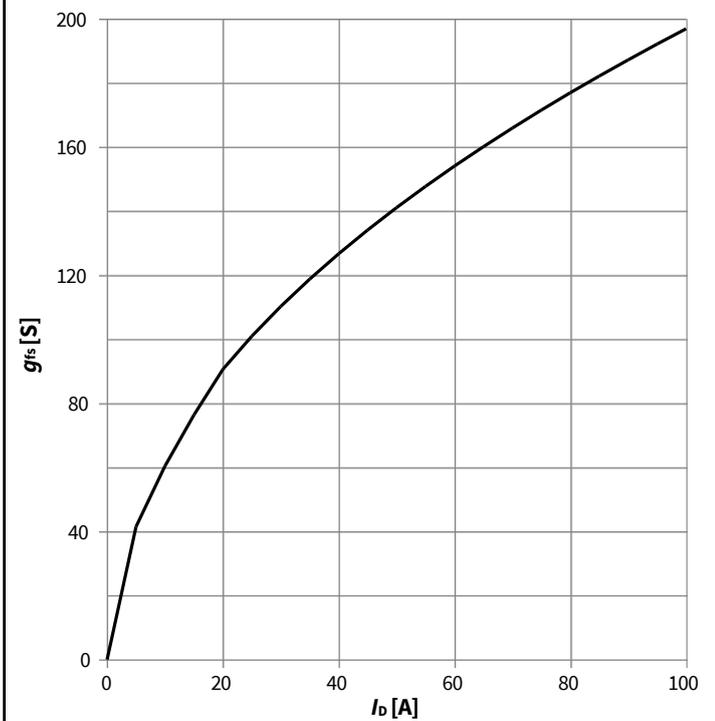
$R_{DS(on)} = f(I_D)$, $T_j = 25^\circ\text{C}$; 参数: V_{GS}

图 7: 典型转移特性



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

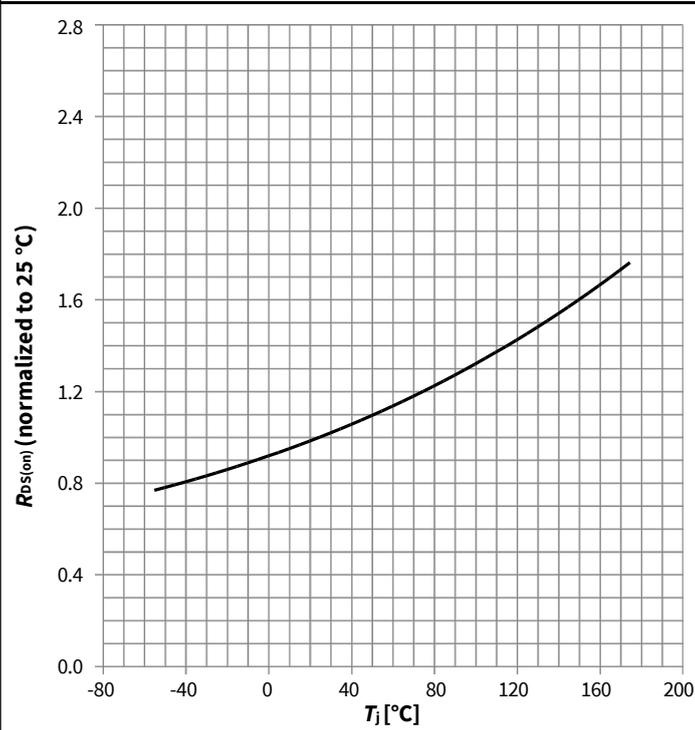
图 8: 典型正向跨导



$g_{fs} = f(I_D)$, $T_j = 25^\circ\text{C}$

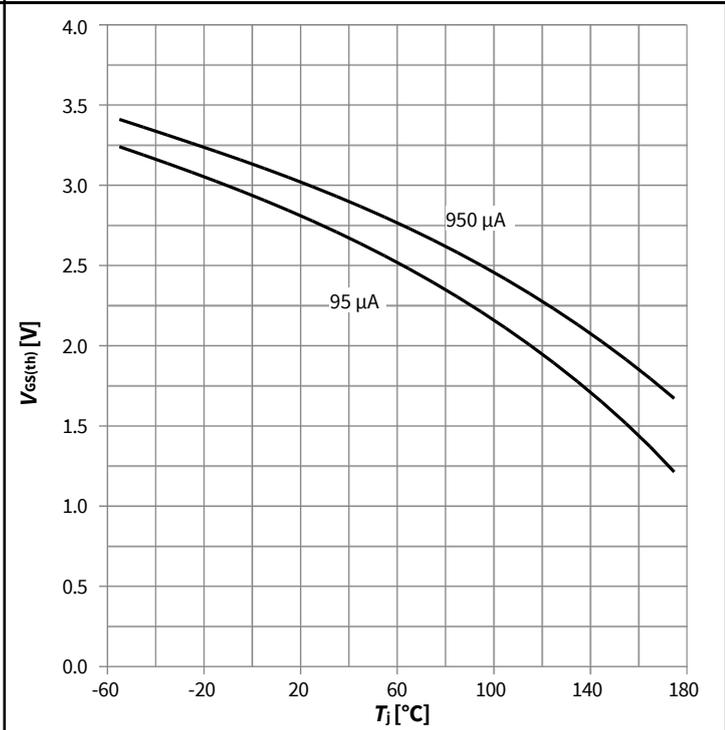
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图 9: 漏源导通电阻



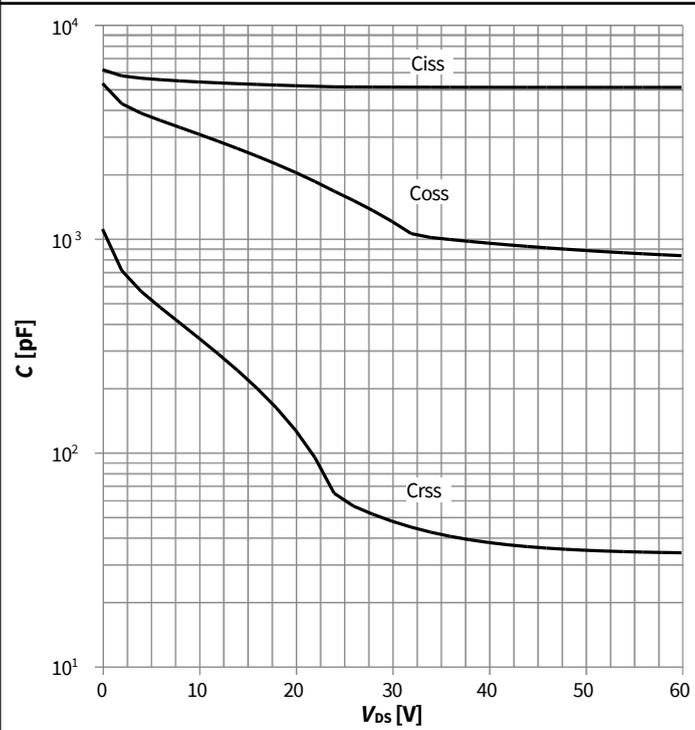
$R_{DS(on)}=f(T_j)$, $I_D=50\text{ A}$, $V_{GS}=10\text{ V}$

图 10: 典型栅极阈值电压



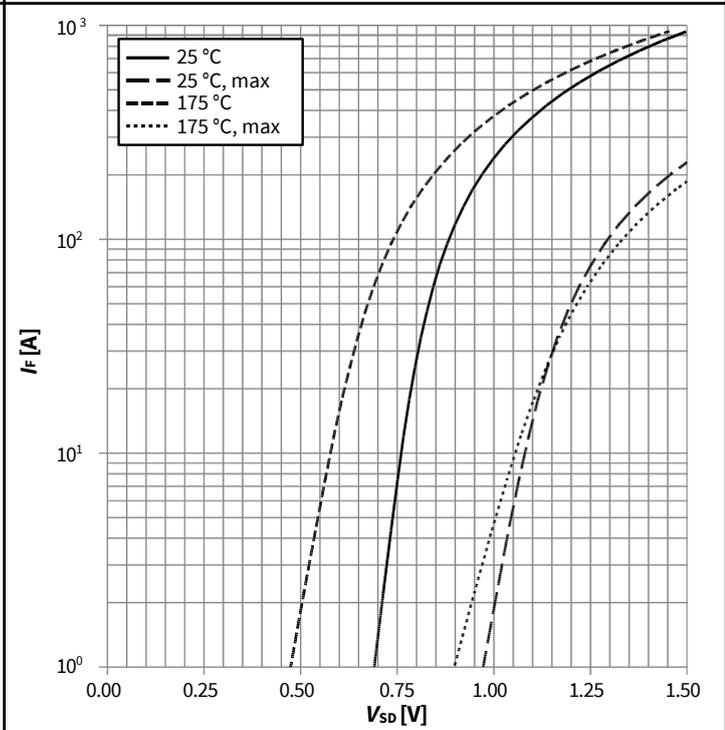
$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$

图 11: 典型电容值



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

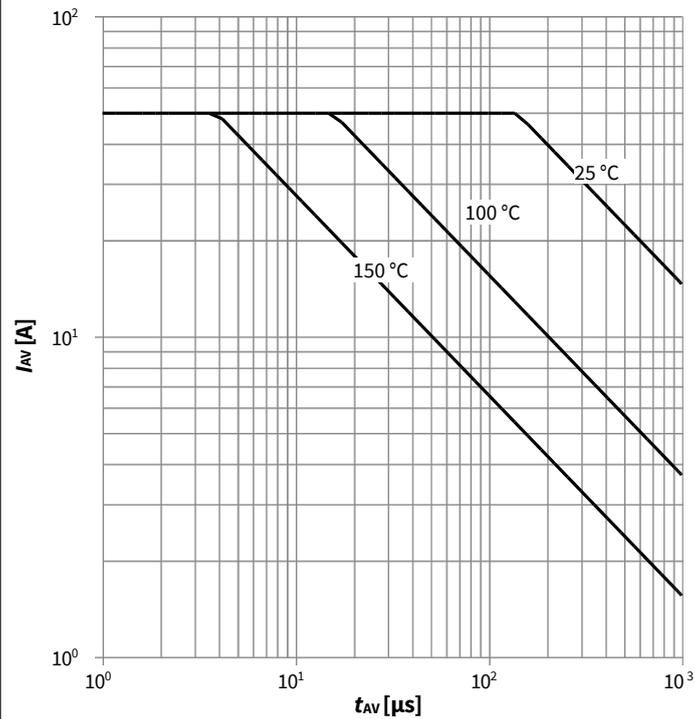
图 12: 反向二极管的正向特性



$I_F=f(V_{SD})$; 参数: T_j

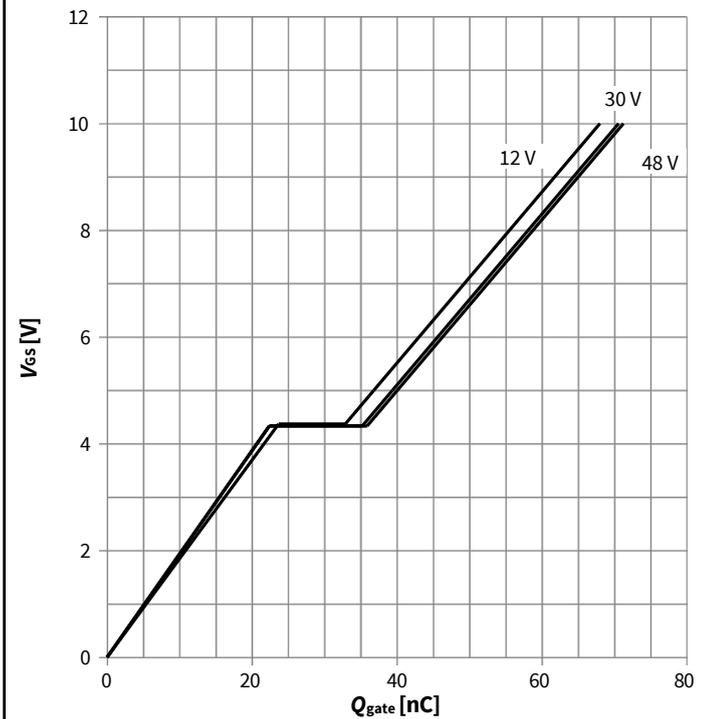
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图 13: 雪崩特性



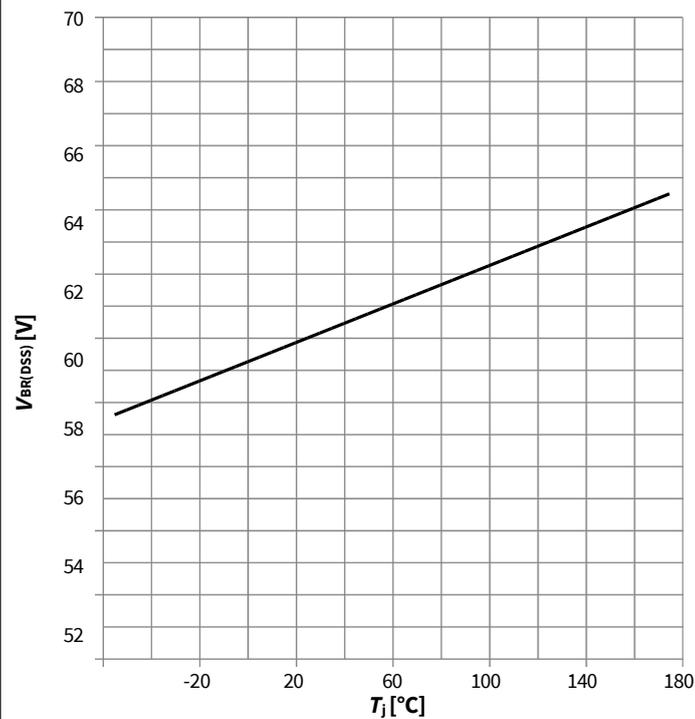
$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$; 参数: $T_{j(start)}$

图 14: 典型栅极电荷



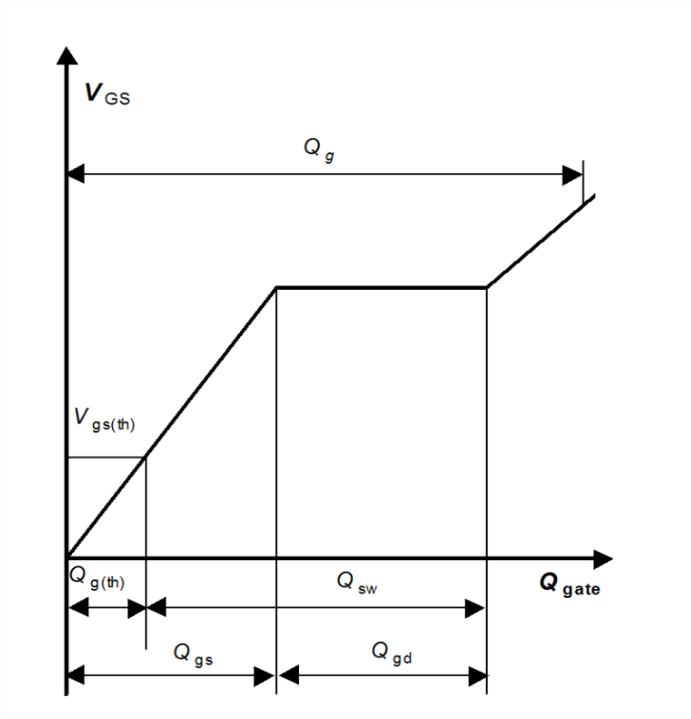
$V_{GS}=f(Q_{gate}); I_D=50$ A 脉冲; 参数: V_{DD}

图 15: 漏源击穿电压

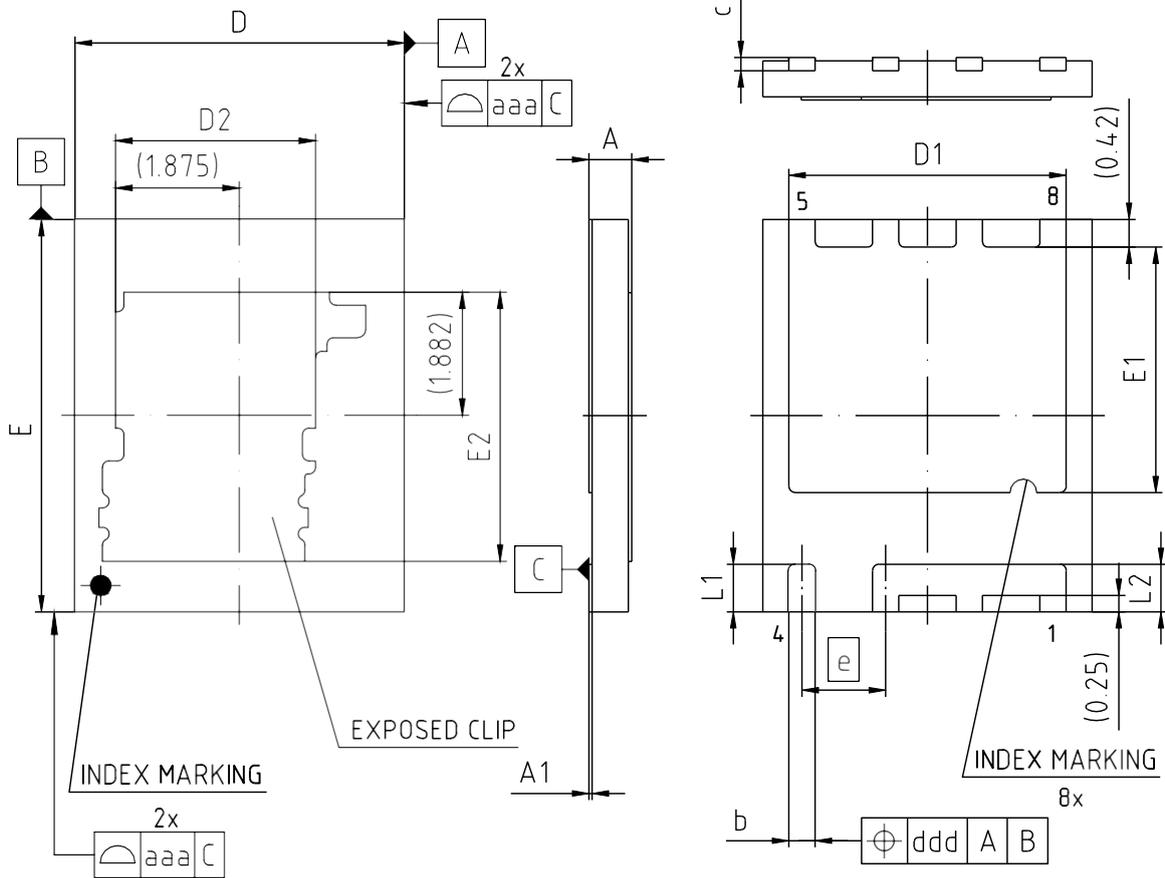


$V_{BR(DSS)}=f(T_j); I_D=1$ mA

图 栅极充电波形



5 封装外形



DIMENSIONS DOES NOT INCLUDE MOLD FLASH OR MOLD PROTRUSIONS.

DIMENSION	MILLIMETERS	
	MIN.	MAX.
A	-	0.75
A1	-	0.05
b	0.35	0.45
c	0.203	
D	4.95	5.05
D1	4.11	4.31
D2	3.03	
E	5.95	6.05
E1	3.66	3.86
E2	4.11	
e	1.27	
L1	0.675	0.775
L2	0.625	0.825
aaa	0.05	
ddd	0.10	

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图 1 PG-WSO8 外形图, 尺寸单位为毫米

修订记录

BSC016N06NSSC

Revision: 2019-10-10, Rev. 2.0

历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.0	2019-10-10	Release of final version

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