

MOSFET

英飞凌高耐热60V OptiMOS™3 功率晶体管

特性

- 非常适合高频切换和同步整流
- 优化的DC/DC转换器技术
- 出色的栅极电荷 $\times R_{DS(on)}$ 产品 (FOM)
- 极低的导通电阻 $R_{DS(on)}$
- 卓越的耐热性
- N沟道, 逻辑电平
- 100% 雪崩测试
- 无铅镀层; 符合RoHS标准
- 符合 JEDEC ¹⁾ 工业应用标准
- 符合 IEC61249-2-21 标准的无卤素

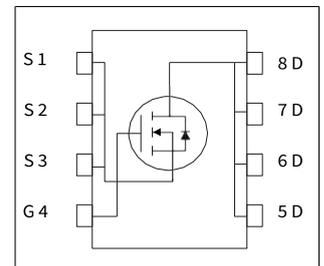


表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(on),max}$	2.8	m Ω
I_b	174	A



Type / Ordering Code	Package	Marking	Related Links
BSC028N06LS3 G	PG-TDSON-8	028N06LS	-

¹⁾ J-STD20 和 JESD22

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™3 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	-	-	174	A	$V_{GS}=10\text{ V}, T_C=25\text{ °C } V_{GS}=10\text{ V},$ $T_C=100\text{ °C } V_{GS}=4.5\text{ V},$ $T_C=25\text{ °C } V_{GS}=4.5\text{ V},$ $T_C=100\text{ °C}$ $V_{GS}=10\text{ V}, T_A=25\text{ °C}, R_{thJA}=50\text{ K/W}^2)$
		-	-	110		
		-	-	133		
		-	-	84		
		-	-	23		
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	696	A	$T_C=25\text{ °C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	298	mJ	$I_D=50\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	139	W	$T_C=25\text{ °C}$ $T_A=25\text{ °C}, R_{thJA}=50\text{ K/W}^2)$
		-	-	2.5		
Operating and storage temperature	T_j, T_{stg}	-55	-	150	°C	IEC climatic category; DIN IEC 68-1: 55/150/56

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}	-	-	0.9	K/W	-
Device on PCB, minimal footprint	R_{thJA}	-	-	62	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⁾器件位于 40 mm x 40 mm x 1.5 mm 环氧 PCB FR4 上, 具有 6 cm² (一层, 70 μm 厚) 铜面积用于漏极连接。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

OptiMOS™3 功率晶体管, 60 V

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	$V_{GS(th)}$	1.2	1.7	2.2	V	$V_{DS}=V_{GS}, I_D=93\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1 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	$R_{DS(on)}$	-	3.2 2.3	4.8 2.8	$\text{m}\Omega$	$V_{GS}=4.5\text{ V}, I_D=25\text{ A}$ $V_{GS}=10\text{ V}, I_D=50\text{ A}$
Gate resistance	R_G	-	1.3	-	Ω	-
Transconductance	g_{fs}	60	120	-	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}	-	10000	13000	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Output capacitance ¹⁾	C_{oss}	-	1700	2300	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	70	-	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	19	-	ns	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V}, I_D=30\text{ A}, R_G=3.3\text{ }\Omega$
Rise time	t_r	-	17	-	ns	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V}, I_D=30\text{ A}, R_G=3.3\text{ }\Omega$
Turn-off delay time	$t_{d(off)}$	-	77	-	ns	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V}, I_D=30\text{ A}, R_G=3.3\text{ }\Omega$
Fall time	t_f	-	19	-	ns	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V}, I_D=30\text{ A}, R_G=3.3\text{ }\Omega$

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}	-	31	-	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }4.5\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	17	-	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }4.5\text{ V}$
Gate to drain charge	Q_{gd}	-	10	-	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }4.5\text{ V}$
Switching charge	Q_{sw}	-	24	-	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }4.5\text{ V}$
Gate charge total ¹⁾	Q_g	-	59	79	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }4.5\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	3.1	-	V	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }4.5\text{ V}$
Gate charge total ¹⁾	Q_g	-	132	175	nC	$V_{DD}=30\text{ V}, I_D=50\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Output charge ¹⁾	Q_{oss}	-	83	110	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”

表 7 反向二极管

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	106	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	696	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	t_{rr}	-	47	-	ns	$V_R=30\text{ V}, I_F=30\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}	-	58	-	nC	$V_R=30\text{ V}, I_F=30\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$

4 电气特性图

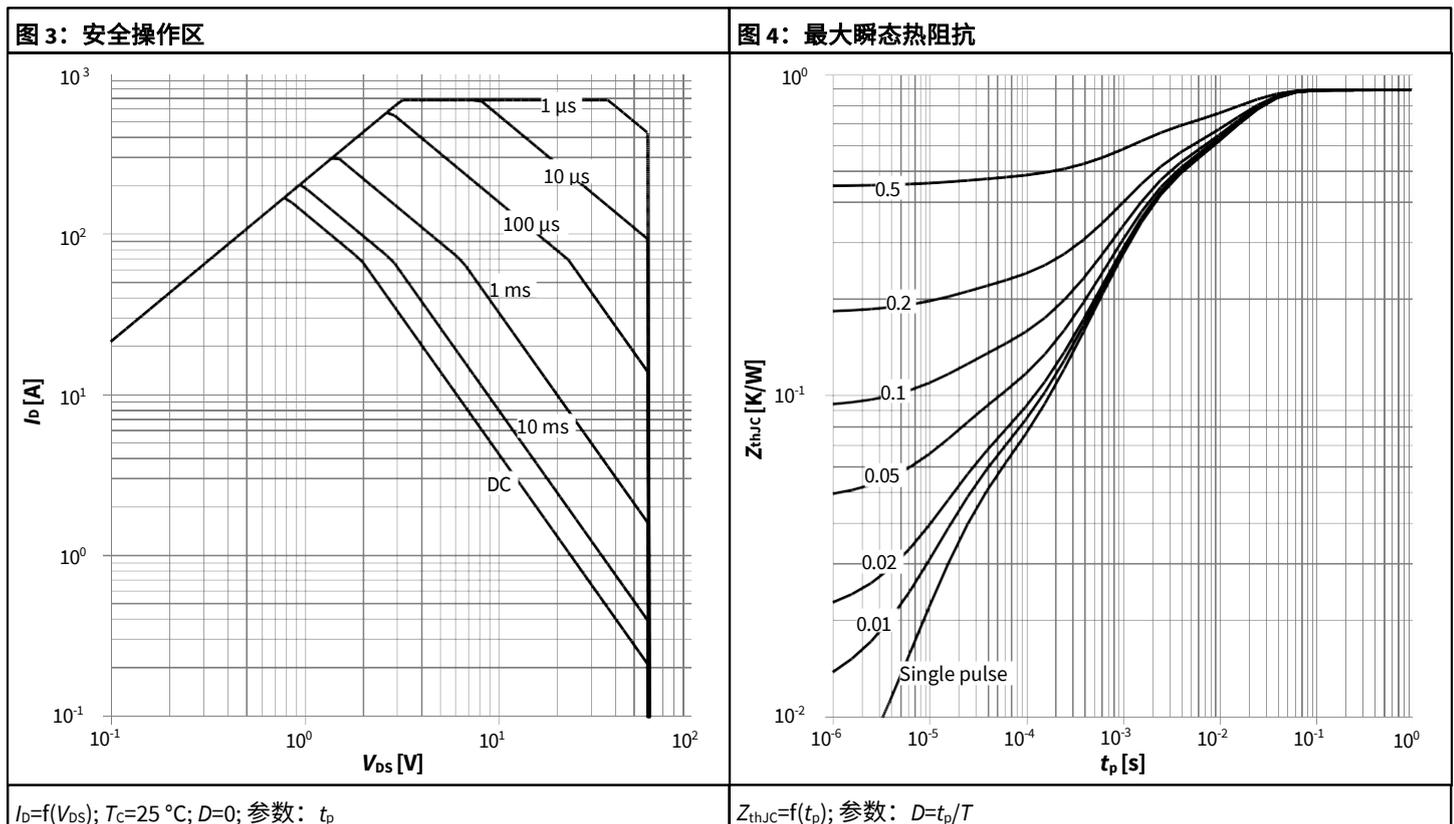
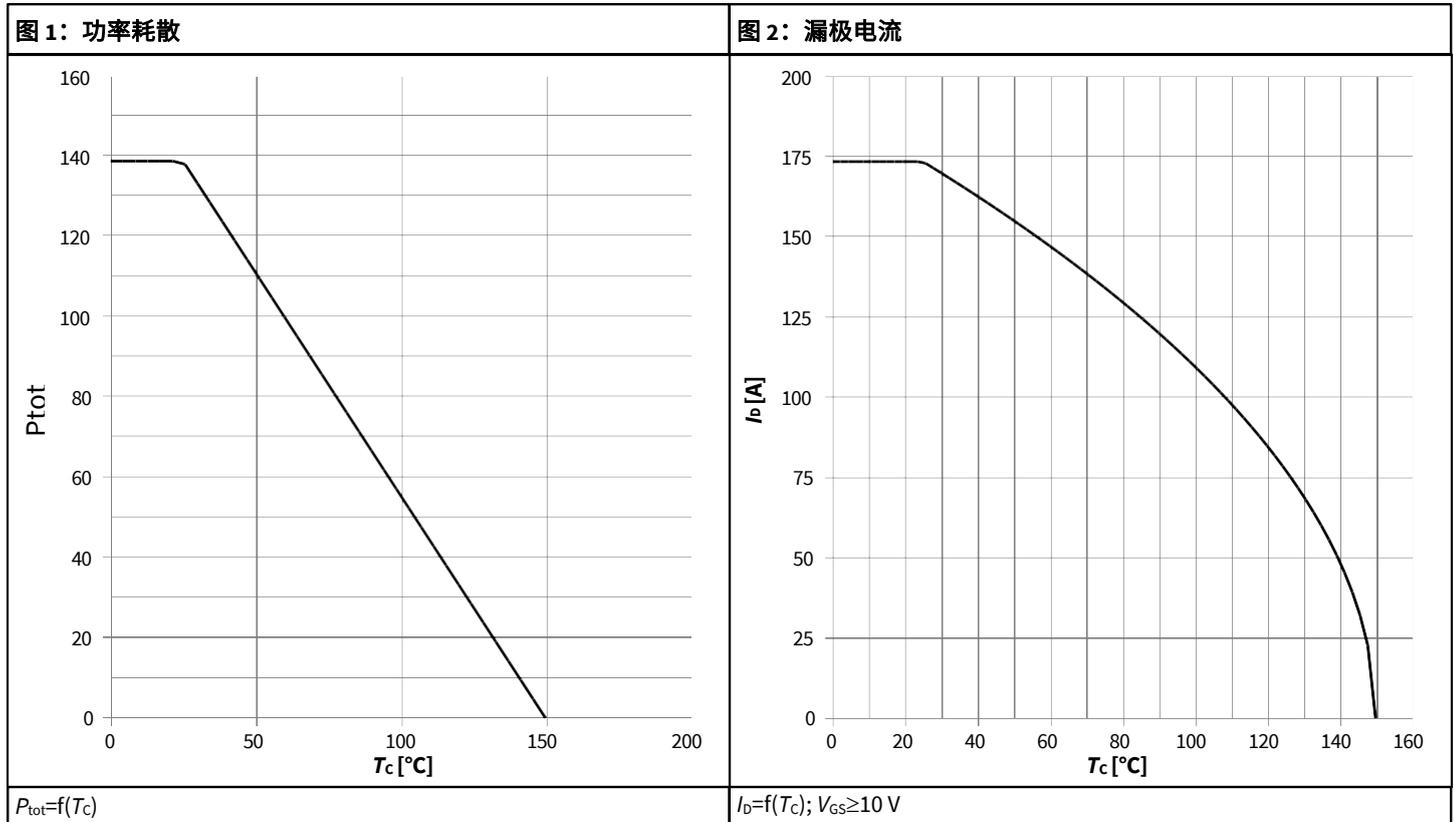
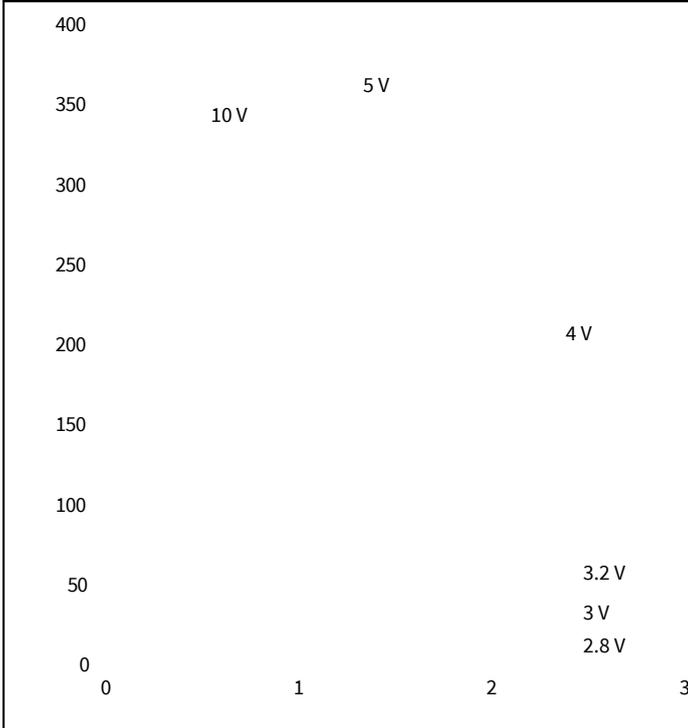
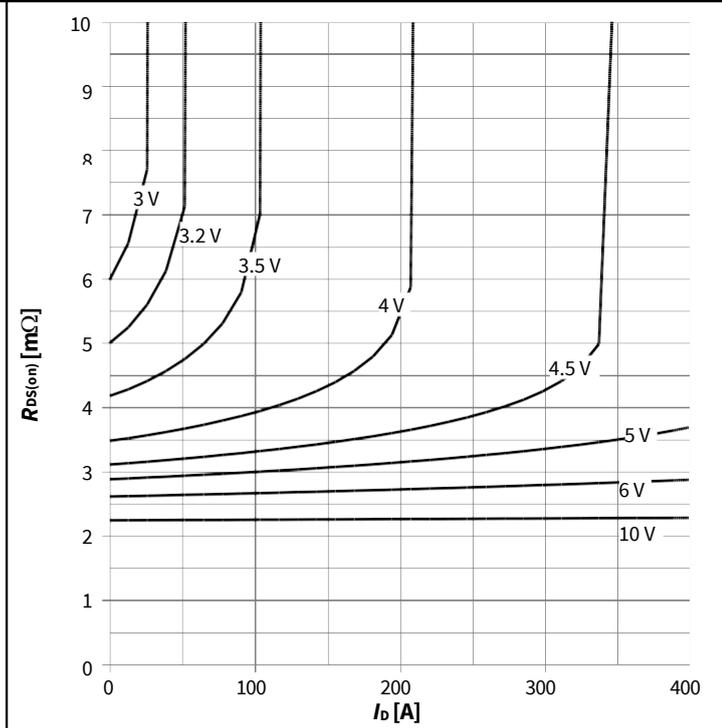


图 5: 典型输出特性



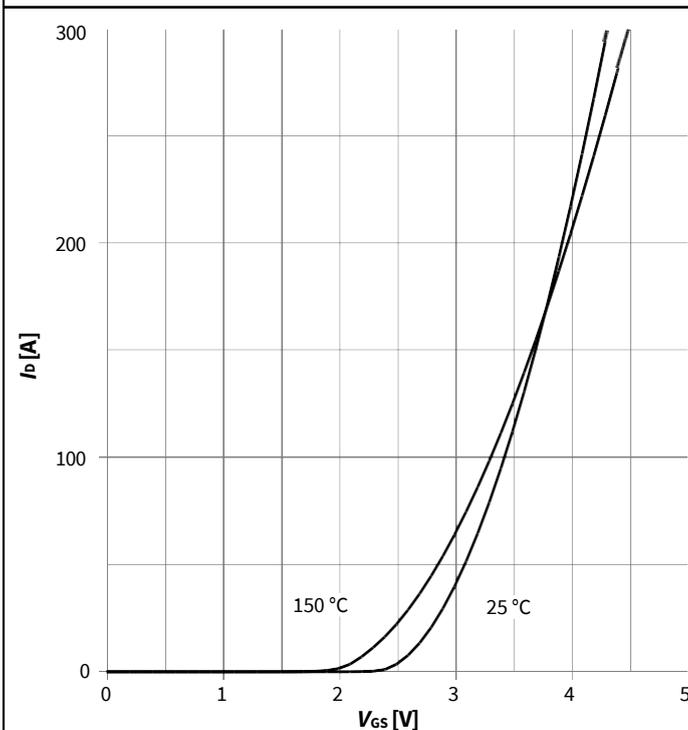
$I_D = f(V_{DS}, T_j = 25^\circ\text{C}; \text{参数: } V_{GS})$

图 6: 典型漏源导通电阻



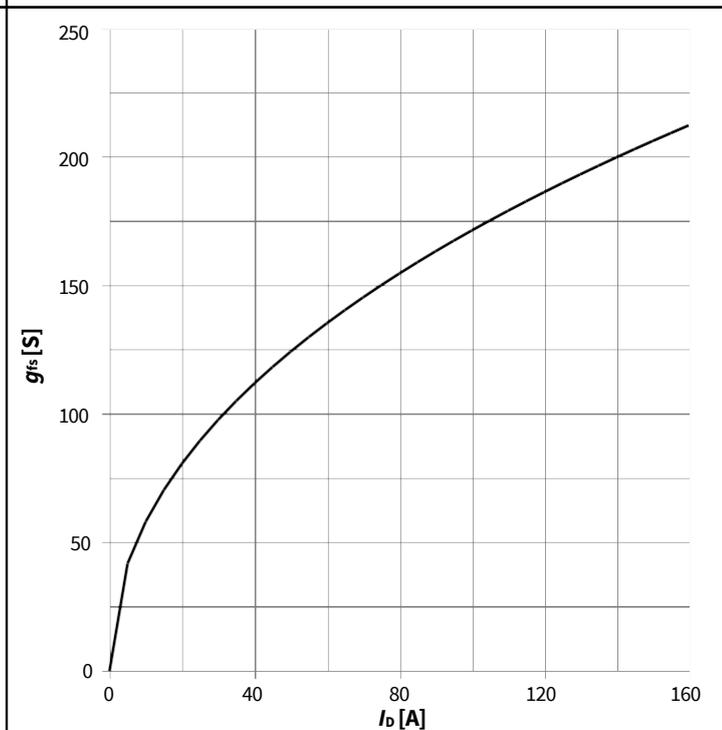
$R_{DS(on)} = f(I_D, T_j = 25^\circ\text{C}; \text{参数: } V_{GS})$

图 7: 典型转移特性



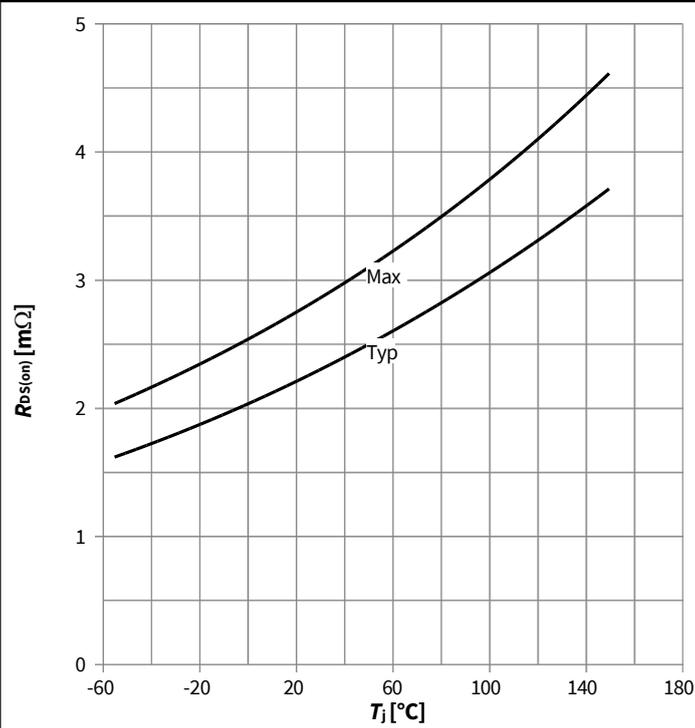
$I_D = f(V_{GS}, |V_{DS}| > 2|I_D|R_{DS(on)max}; \text{参数: } T_j)$

图 8: 典型正向跨导



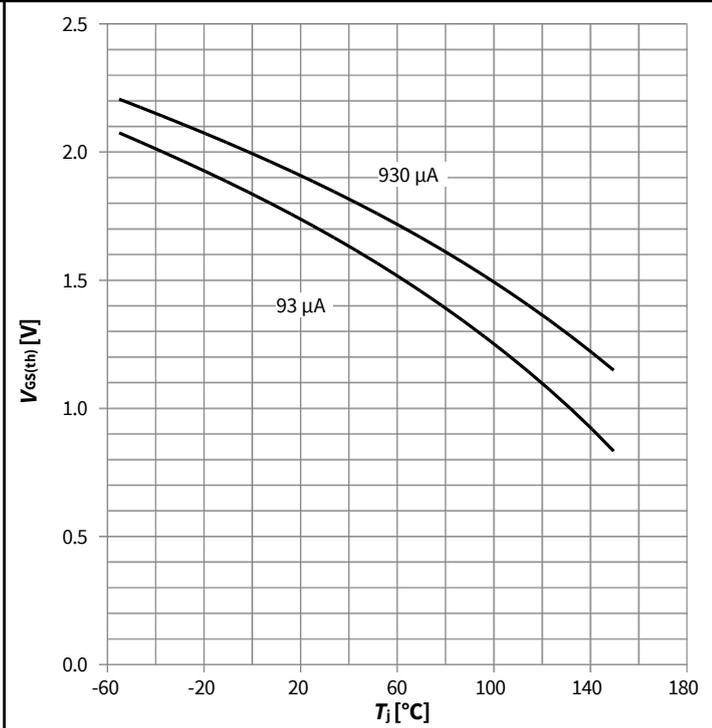
$g_{fs} = f(I_D); T_j = 25^\circ\text{C}$

图 9: 漏源导通电阻



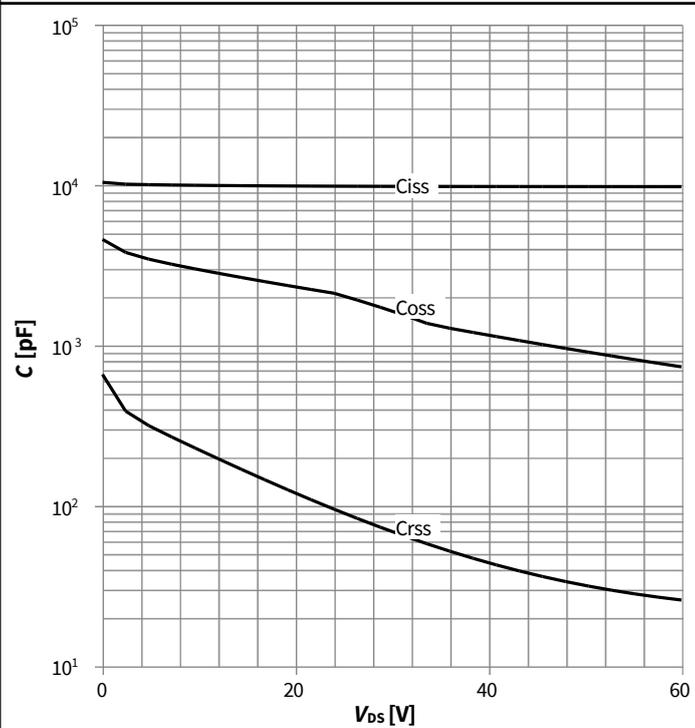
$R_{DS(on)} = f(T_j); I_D = 50 \text{ A}; V_{GS} = 10 \text{ V}$

图 10: 典型栅极阈值电压



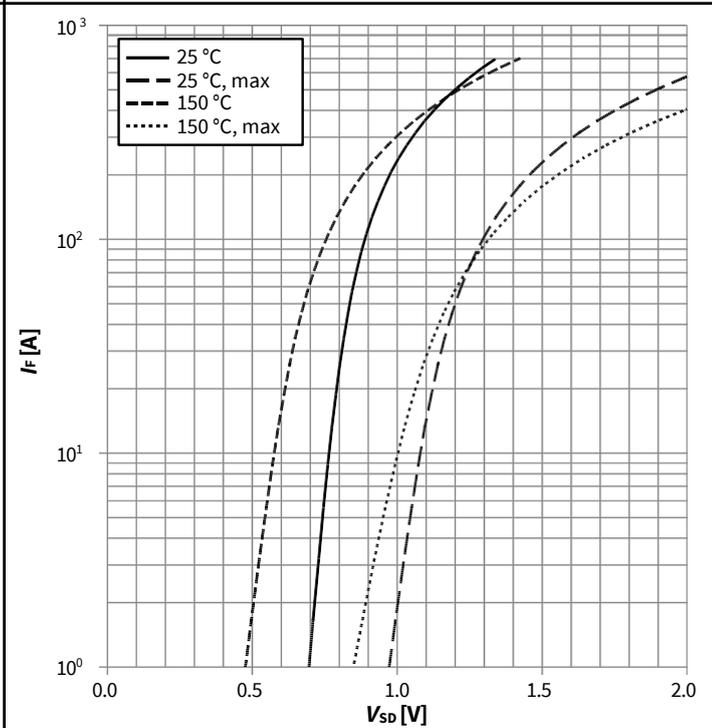
$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$

图 11: 典型电容值



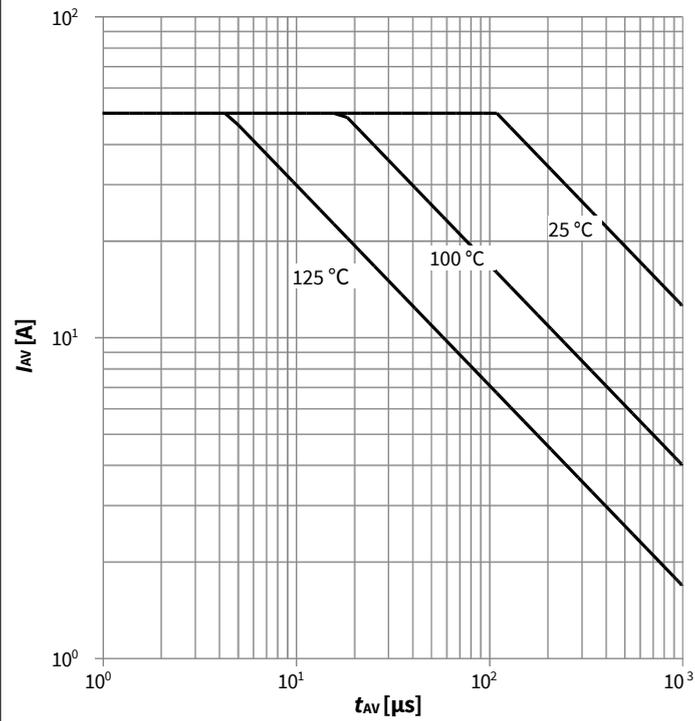
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$

图 12: 反向二极管的正向特性



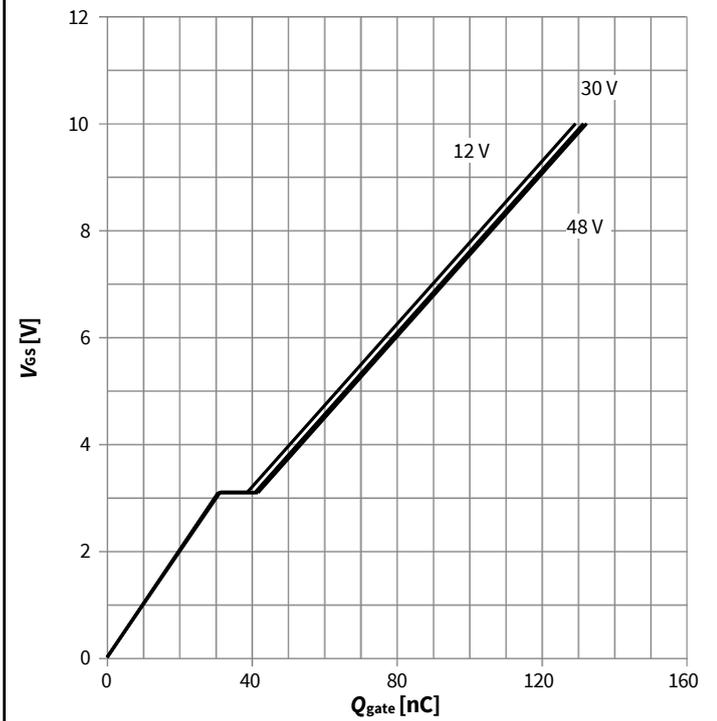
$I_F = f(V_{SD}); \text{参数: } T_j$

图 13: 雪崩特性



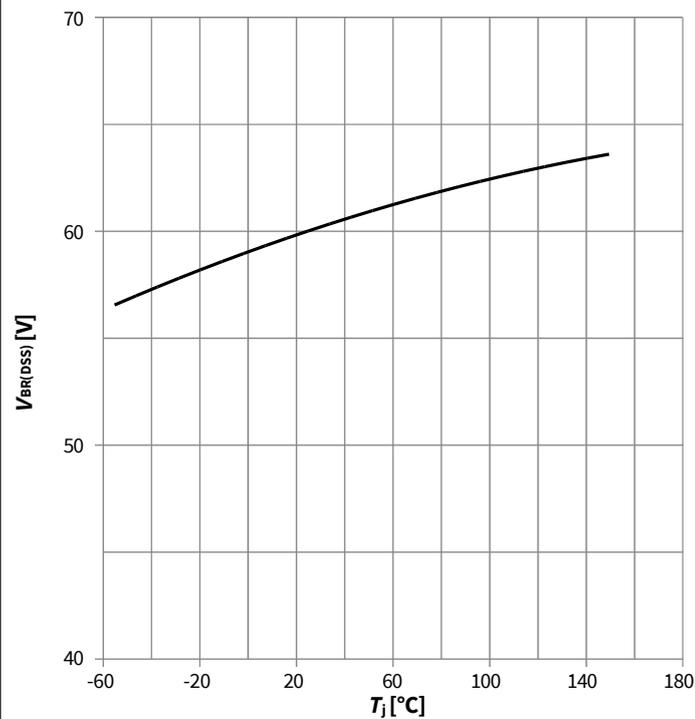
$I_{AS}=f(t_{AV}); R_{GS}=25\ \Omega$; 参数: $T_{j(start)}$

图 14: 典型栅极电荷



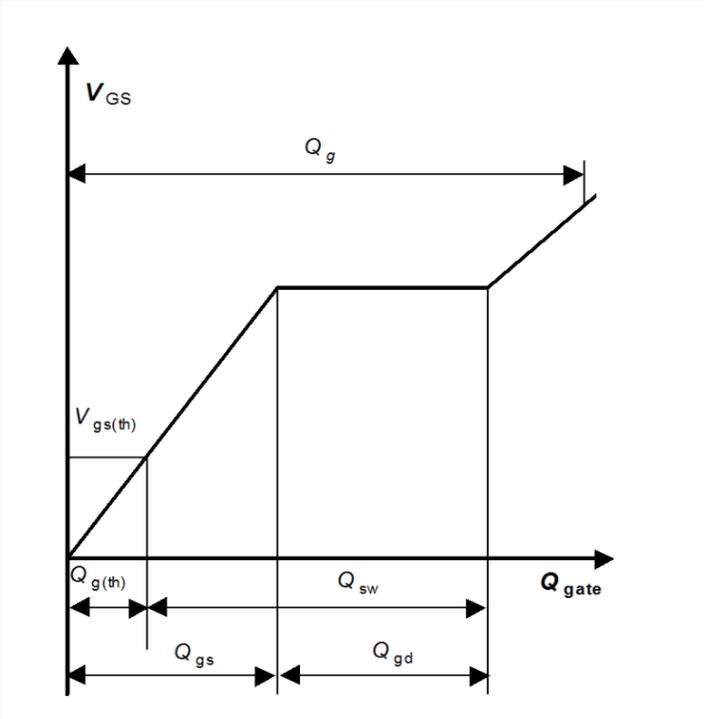
$V_{GS}=f(Q_{gate}); I_D=50\ \text{A}$ 脉冲; 参数: V_{DD}

图 15: 漏源击穿电压

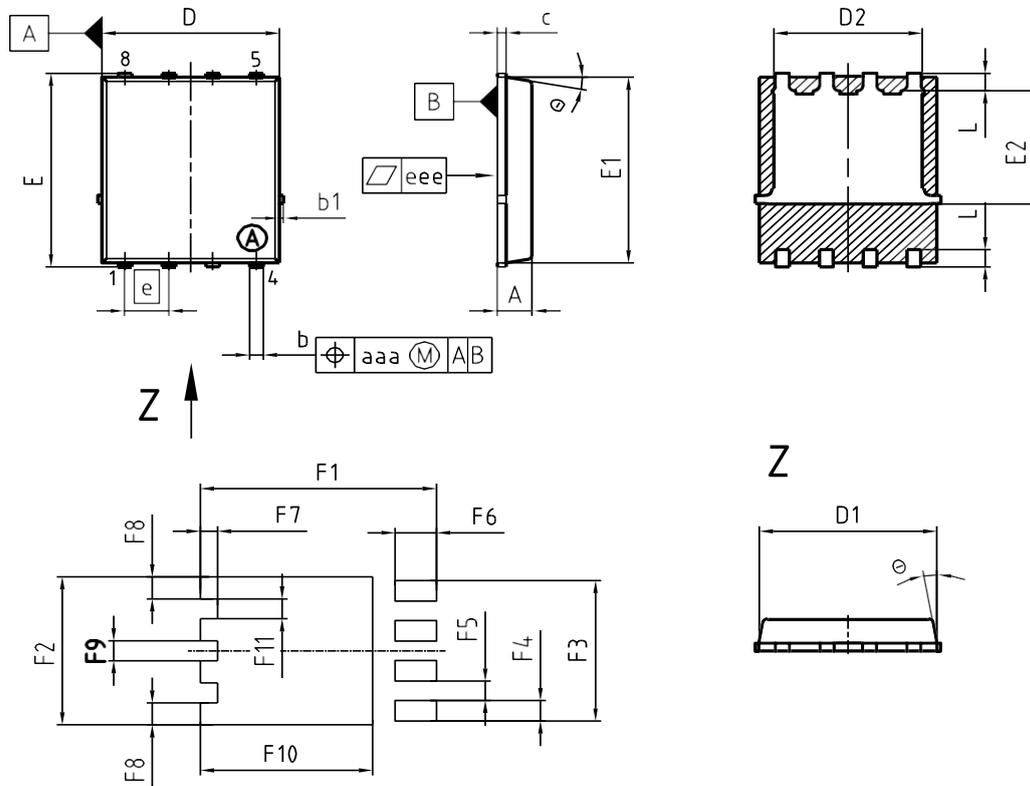


$V_{BR(DSS)}=f(T_j); I_D=1\ \text{mA}$

图 栅极充电波形



5 封装外形



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.10	0.035	0.043
b	0.34	0.54	0.013	0.021
b1	0.02	0.22	0.001	0.008
c	0.15	0.35	0.006	0.014
D=D1	4.95	5.35	0.195	0.211
D2	4.20	4.40	0.165	0.173
E	5.95	6.35	0.234	0.250
E1	5.70	6.10	0.224	0.240
E2	3.40	3.80	0.134	0.150
e	1.27		0.050	
N	8		8	
L	0.45	0.65	0.018	0.026
θ	8.5°	11.5°	8.5°	11.5°
aaa	0.25		0.010	
eee	0.05		0.002	
F1	6.75	6.95	0.266	0.274
F2	4.60	4.80	0.181	0.189
F3	4.36	4.56	0.172	0.180
F4	0.55	0.75	0.022	0.030
F5	0.52	0.72	0.020	0.028
F6	1.10	1.30	0.043	0.051
F7	0.40	0.60	0.016	0.024
F8	0.60	0.80	0.024	0.031
F9	0.53	0.73	0.021	0.029
F10	4.90	5.10	0.193	0.201
F11	0.53	0.73	0.021	0.029

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SCALE

EUROPEAN PROJECTION

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03

图1 PG-TDSON-8 外形图, 尺寸单位为毫米

修订记录

BSC028N06LS3 G

Revision: 2020-09-14, Rev. 2.3

历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.3	2020-09-14	Update current rating and footnotes

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