

MOSFET

英飞凌高耐热 60V OptiMOS™ 功率晶体管

特性

- 针对高性能 SMPS（例如同步整流）进行优化
- 额定温度为 175°C
- 100% 雪崩测试
- 卓越的耐热性
- N通道
- 无铅镀层；符合RoHS标准
- 符合 IEC61249-2-21 标准的无卤素

产品验证

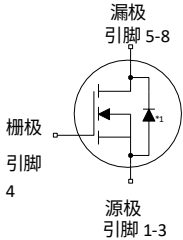
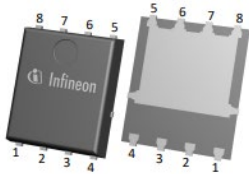
完全符合 JEDEC 工业应用标准

表 1 主要性能参数

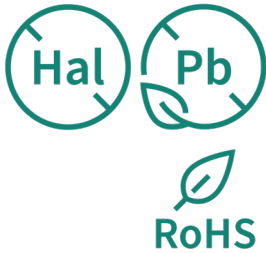
Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(on),max}$	9.7	mΩ
I_D	48	A
Q_{OSS}	14	A
$Q_{G(0V..10V)}$	12	A

Type/Ordering Code	Package	Marking	Related Links
BSC097N06NS	PG-TDSON-8	097N06NS	-

PG-TDSON-8



*1: 内部体二极管



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1 最大额定值

除非另有规定， $T_j = 25\text{ °C}$

表 2 最大额定值

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D	-	-	48 34 13	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⁾	$I_{D,pulse}$	-	-	192	A	$T_C=25\text{ °C}$
Avalanche energy, single pulse ⁴⁾	E_{AS}	-	-	13	mJ	$I_D=30\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	43 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	-

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基板上，配有6 cm²（单层，70微米厚）铜层，用于漏极连接。PCB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



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}	-	2.1	3.5	K/W	-
Thermal resistance, junction - case, top	R_{thJC}	-	-	20	K/W	-
Device on PCB, 6 cm ² cooling area ⁵⁾	R_{thJA}	-	-	50	K/W	-

⁵⁾ 器件置于40 mm × 40 mm × 1.5 mm 环氧树脂 PCB FR4基板上，配有6 cm²（单层，70微米厚）铜层，用于漏极连接。PCB垂直放置在静止空气中。

BSC097N06NS

3 电气特性

除非另有规定, $T_j = 25\text{ }^{\circ}\text{C}$

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	$V_{DS}=V_{GS}, I_D=14\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1 10	1 100	μA	$V_{DS}=60\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^{\circ}\text{C}$ $V_{DS}=60\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ }^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	8.0 12.0	9.7 14.6	m Ω	$V_{GS}=10\text{ V}, I_D=40\text{ A}$ $V_{GS}=6\text{ V}, I_D=10\text{ A}$
Gate resistance ⁶⁾	R_G	-	1.1	1.7	Ω	-
Transconductance	g_{fs}	24	48	-	S	$ V_{DS} > 2 I_D R_{DS(on)max}, I_D=40\text{ A}$

⁶⁾ 由设计定义。未经过生产测试。表5 动态特性 ⁷⁾

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	860	1075	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Output capacitance	C_{oss}	-	210	263	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	16	32	pF	$V_{GS}=0\text{ V}, V_{DS}=30\text{ V}, f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	6	-	ns	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V}, I_D=40\text{ A},$ $R_{G,ext}, ext=1.6\text{ }\Omega$
Rise time	t_r	-	2	-	ns	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V}, I_D=40\text{ A},$ $R_{G,ext}, ext=1.6\text{ }\Omega$
Turn-off delay time	$t_{d(off)}$	-	10	-	ns	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V}, I_D=40\text{ A},$ $R_{G,ext}, ext=1.6\text{ }\Omega$
Fall time	t_f	-	2	-	ns	$V_{DD}=30\text{ V}, V_{GS}=10\text{ V}, I_D=40\text{ A},$ $R_{G,ext}, ext=1.6\text{ }\Omega$

⁷⁾ 由设计定义。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}	-	4.5	-	nC	$V_{DD}=30\text{ V}, I_D=40\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	2.4	-	nC	$V_{DD}=30\text{ V}, I_D=40\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge	Q_{gd}	-	2.6	3.7	nC	$V_{DD}=30\text{ V}, I_D=40\text{ A}, V_{GS}=0\text{ to }10\text{ V}$

表 6 栅极电荷特性⁸⁾

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Switching charge	Q_{sw}	-	4.7	-	nC	$V_{DD}=30\text{ V}$, $I_D=40\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total	Q_g	-	12	15	nC	$V_{DD}=30\text{ V}$, $I_D=40\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	5.2	-	V	$V_{DD}=30\text{ V}$, $I_D=40\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total, sync. FET	$Q_{g(sync)}$	-	10	-	nC	$V_{DS}=0.1\text{ V}$, $V_{GS}=0\text{ to }10\text{ V}$
Output charge	Q_{oss}	-	14	19	nC	$V_{DD}=30\text{ V}$, $V_{GS}=0\text{ V}$

⁸⁾ 由设计标定，不受制于生产测试。栅极电荷参数定义见图16

表 7 反向二极管

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	36	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	192	A	$T_C=25\text{ °C}$
Diode forward voltage	V_{SD}	-	1.0	1.2	V	$V_{GS}=0\text{ V}$, $I_F=30\text{ A}$, $T_J=25\text{ °C}$
Reverse recovery time ⁹⁾	t_{rr}	-	33	53	ns	$V_R=30\text{ V}$, $I_F=30\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge ⁹⁾	Q_{rr}	-	30	-	nC	$V_R=30\text{ V}$, $I_F=30\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$

⁹⁾ 由设计定义。未经过生产测试。

4 电气特性图

图 1：功率耗散

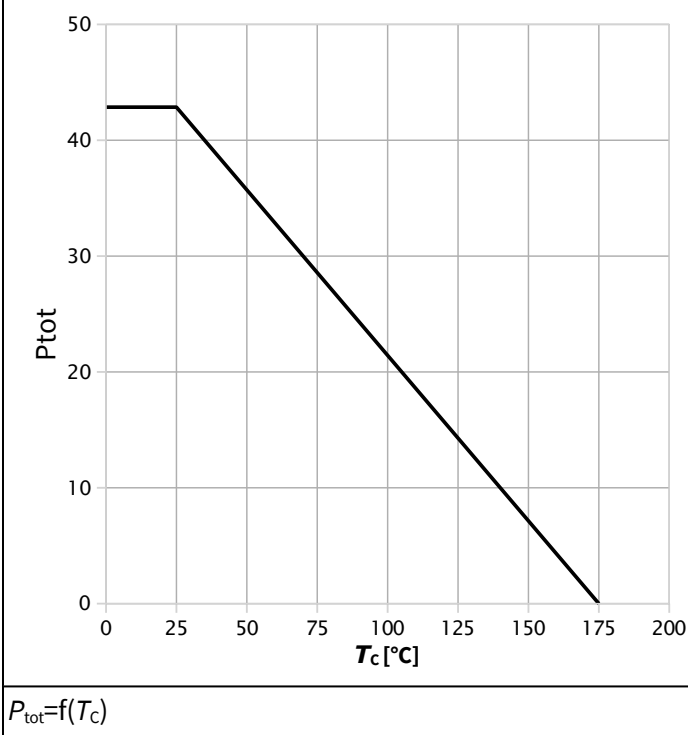


图 2：漏极电流

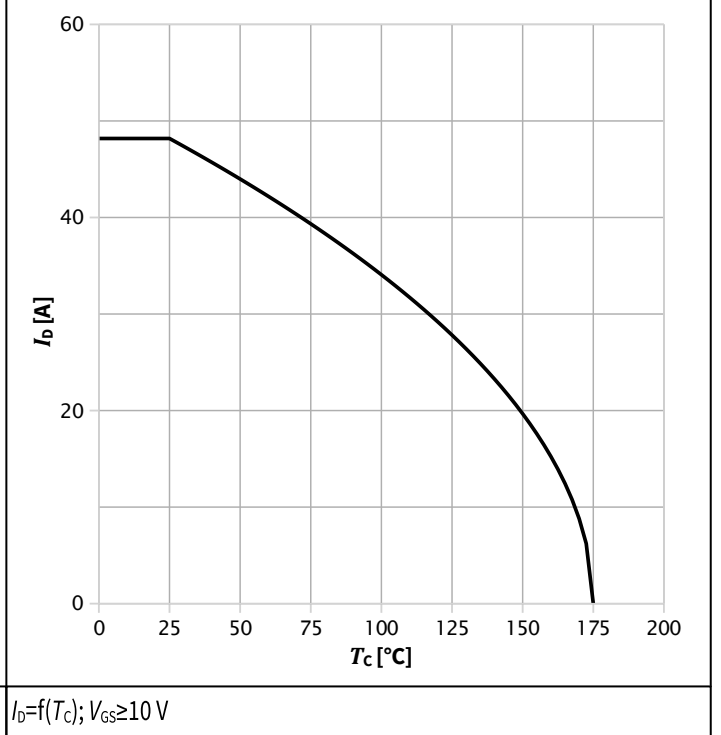


图 3：安全操作区

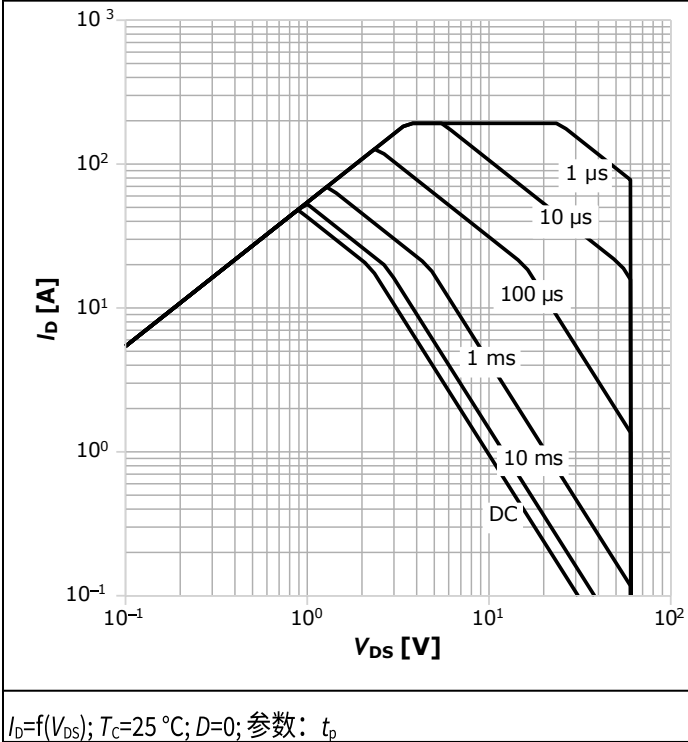


图 4：最大瞬态热阻抗

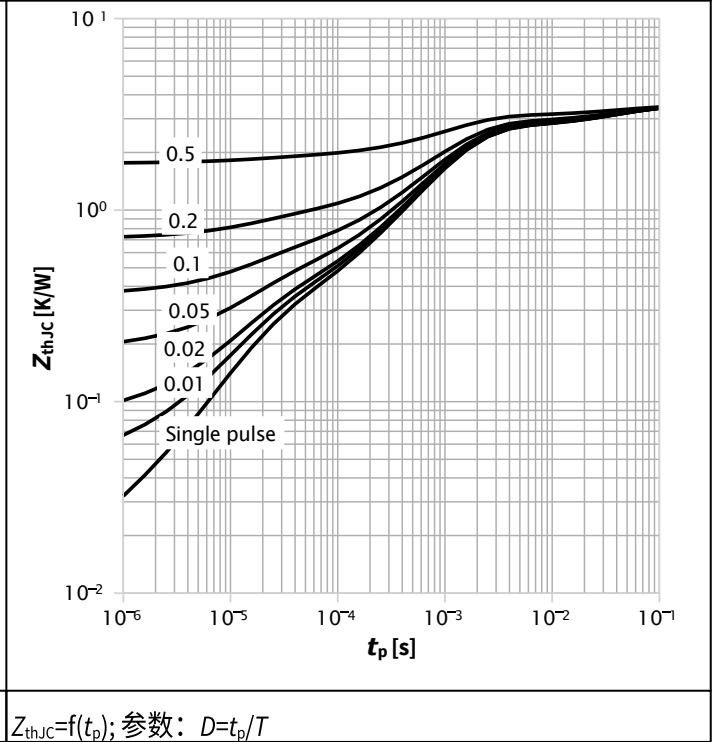


图 5：典型输出特性

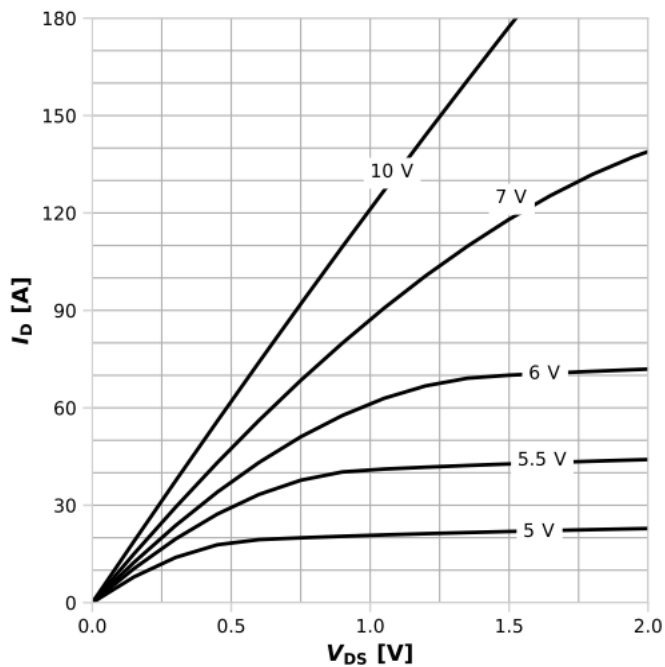

 $I_D = f(V_{DS}); T_j = 25^\circ\text{C}; \text{参数: } V_{GS}$

图 6：典型漏源导通电阻

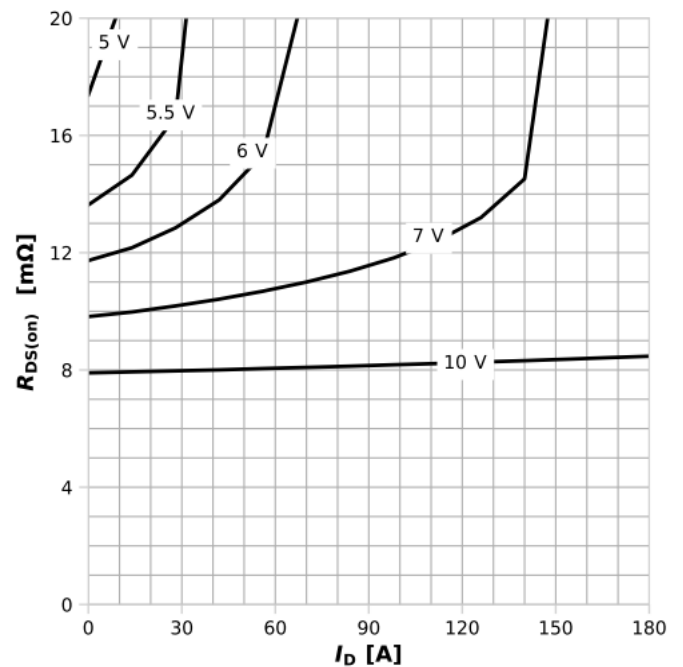

 $R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}; \text{参数: } V_{GS}$

图 7：典型转移特性

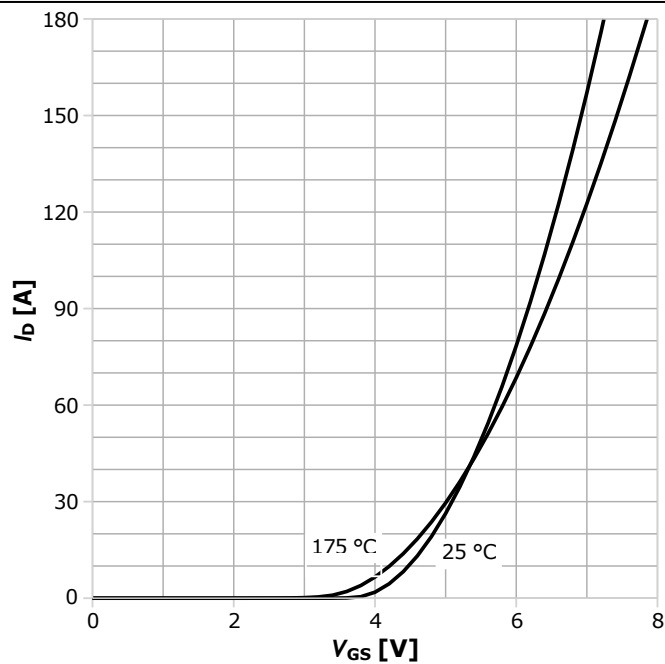

 $I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}; \text{参数: } T_j$

图 8：典型正向跨导

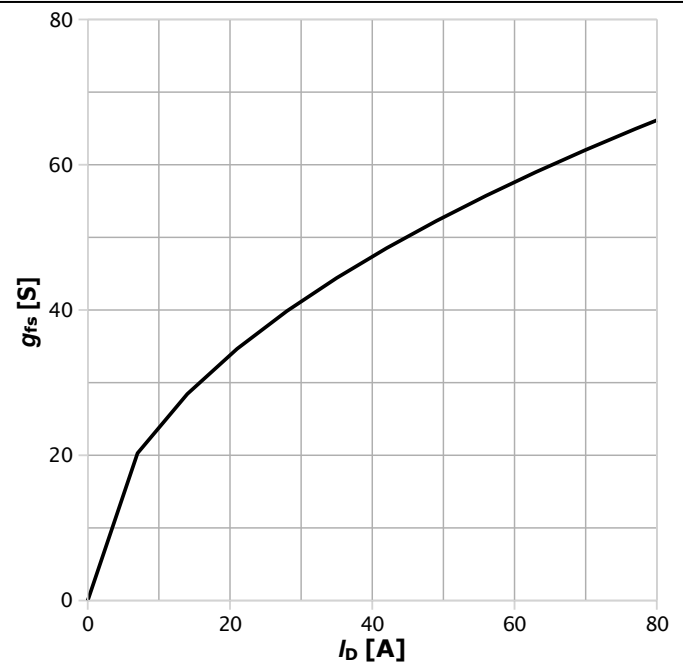
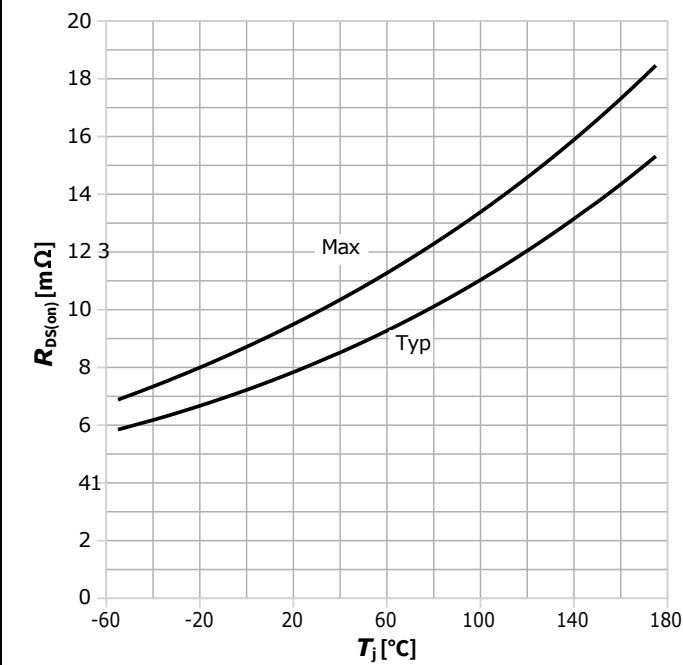
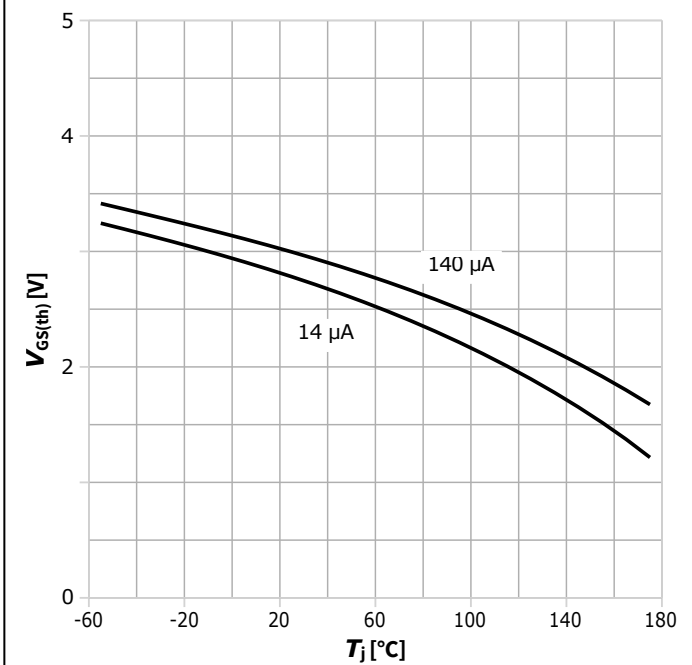

 $g_{fs} = f(I_D); T_j = 25^\circ\text{C}$

图 9：漏源导通电阻



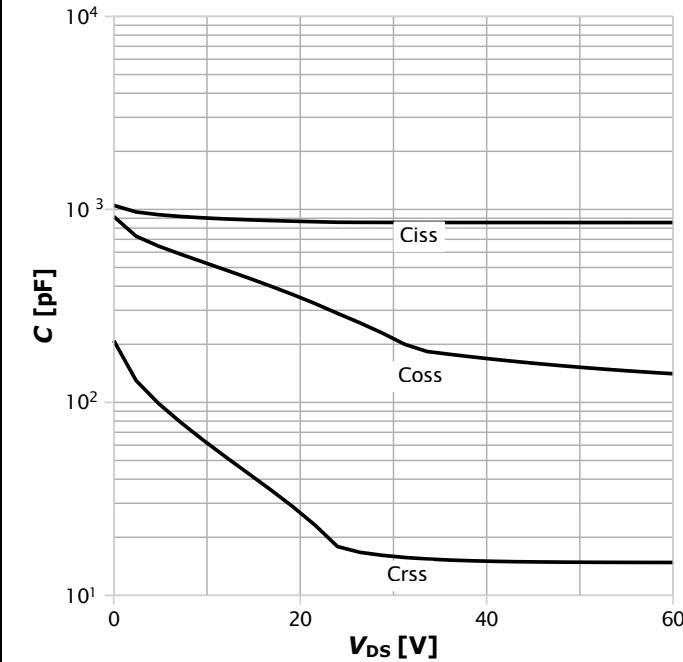
$$R_{DS(on)} = f(T_j); I_D = 40 \text{ A}; V_{GS} = 10 \text{ V}$$

图 10：典型栅极阈值电压



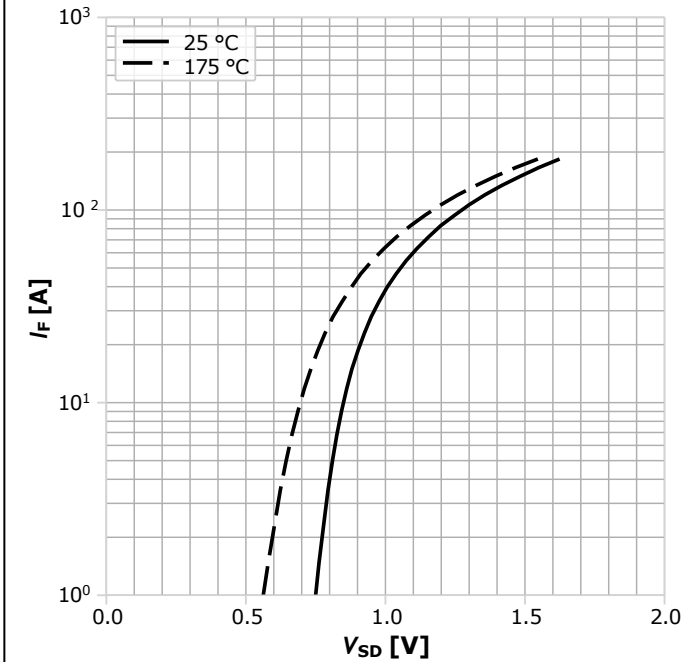
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

图 11：典型电容值



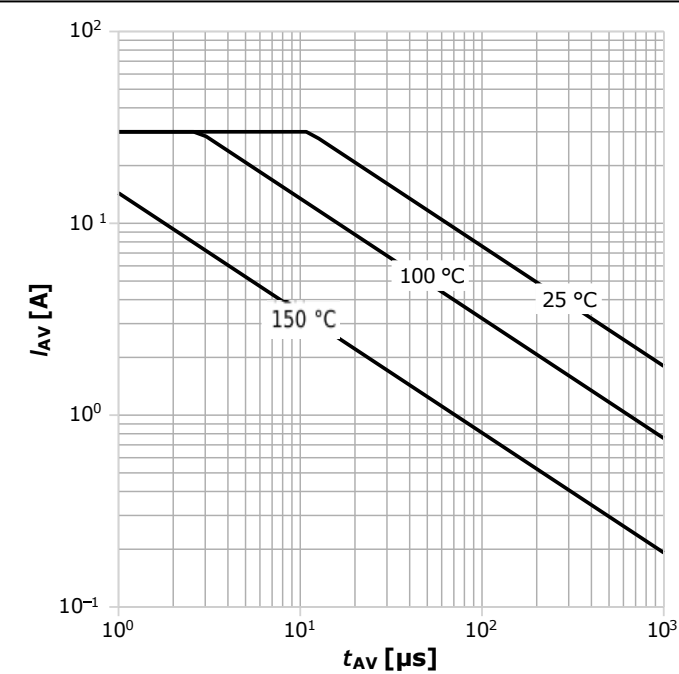
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$

图 12：反向二极管的正向特性



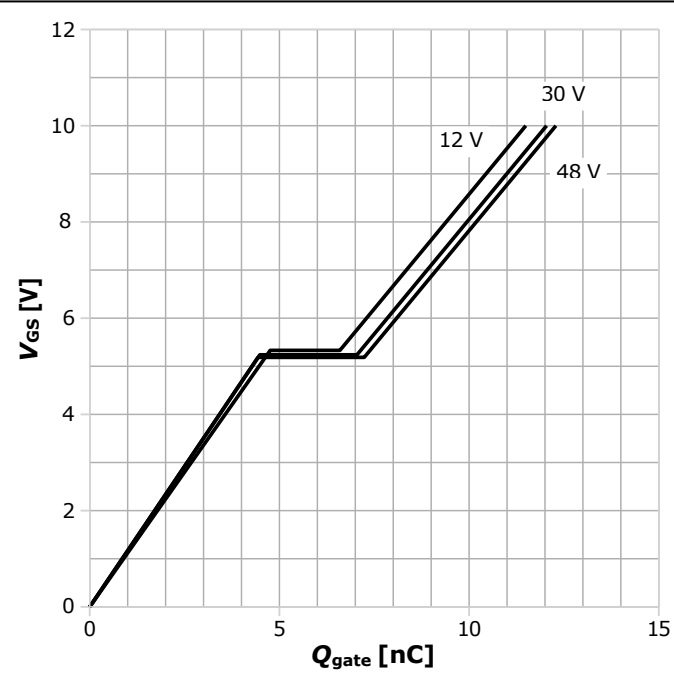
$$I_F = f(V_{DS}); \text{参数: } T_j$$

图 13：雪崩特性



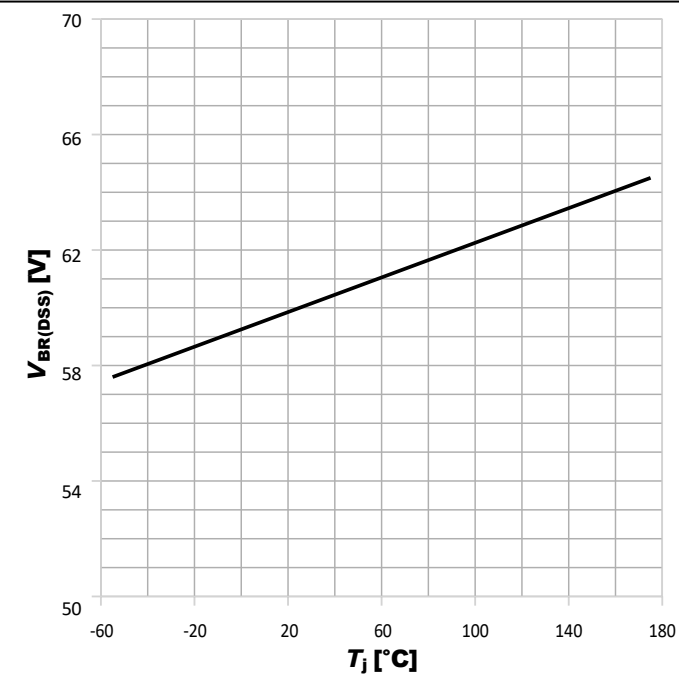
$I_{AS}=f(t_{AV}); R_{GS}=25\ \Omega$; 参数: $T_{j(start)}$

图 14：典型栅极电荷



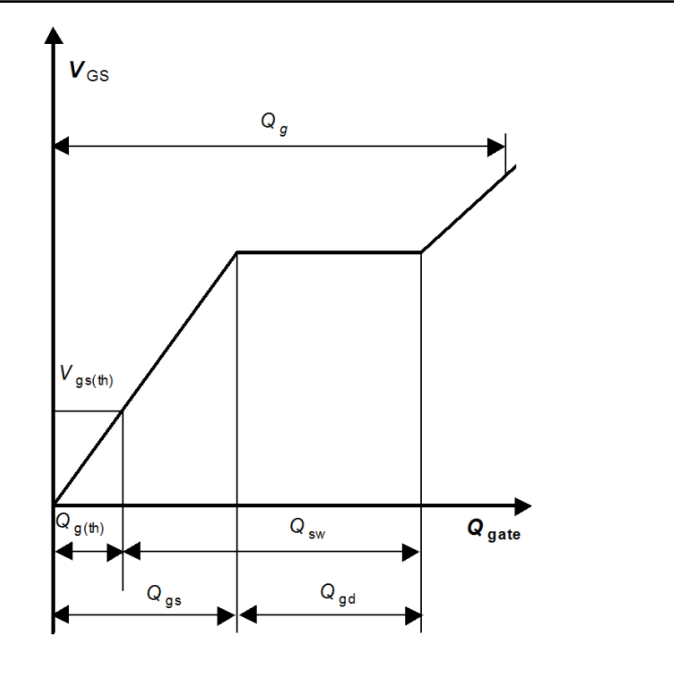
$V_{GS}=f(Q_{gate}); I_D=50\text{ A pulsed}$; 参数: V_{DD}

图 15：漏源击穿电压



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

栅极充电波形



-

5 封装外形尺寸

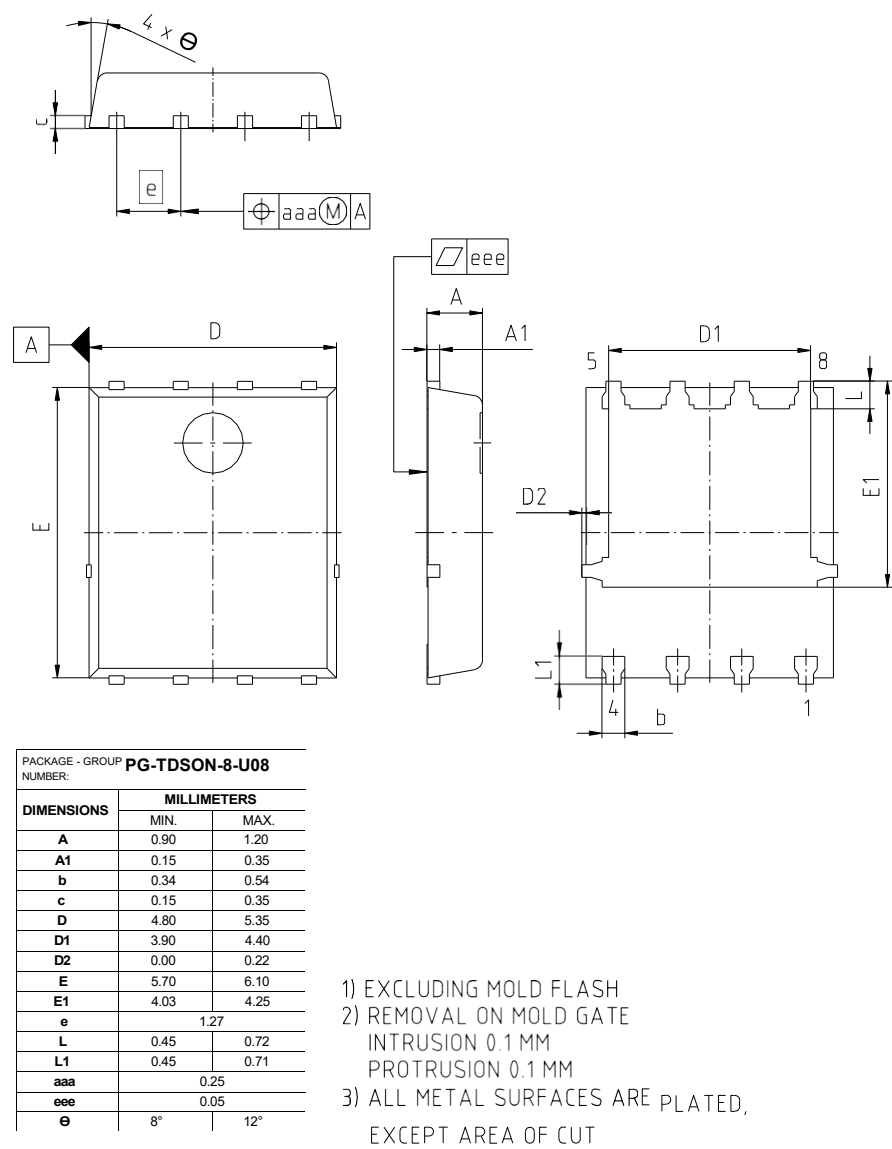


图 1 PG- TDSON- 8 外形图，尺寸单位为毫米

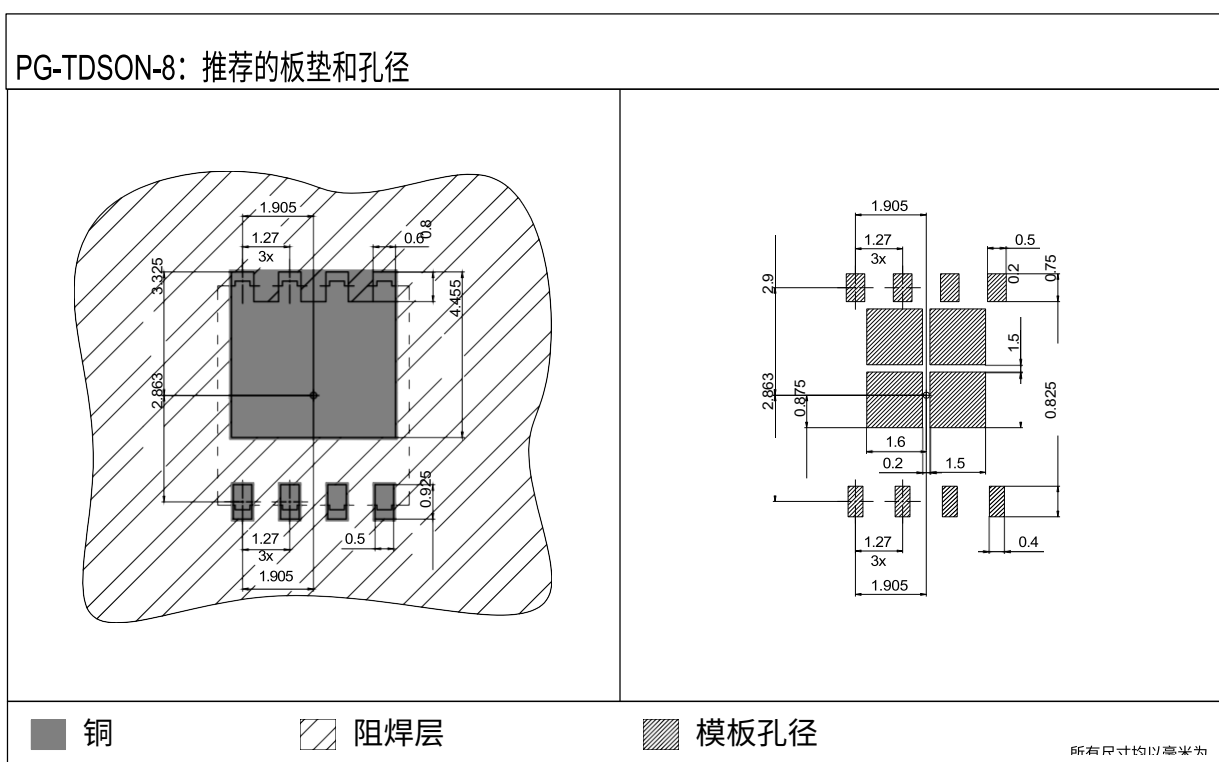
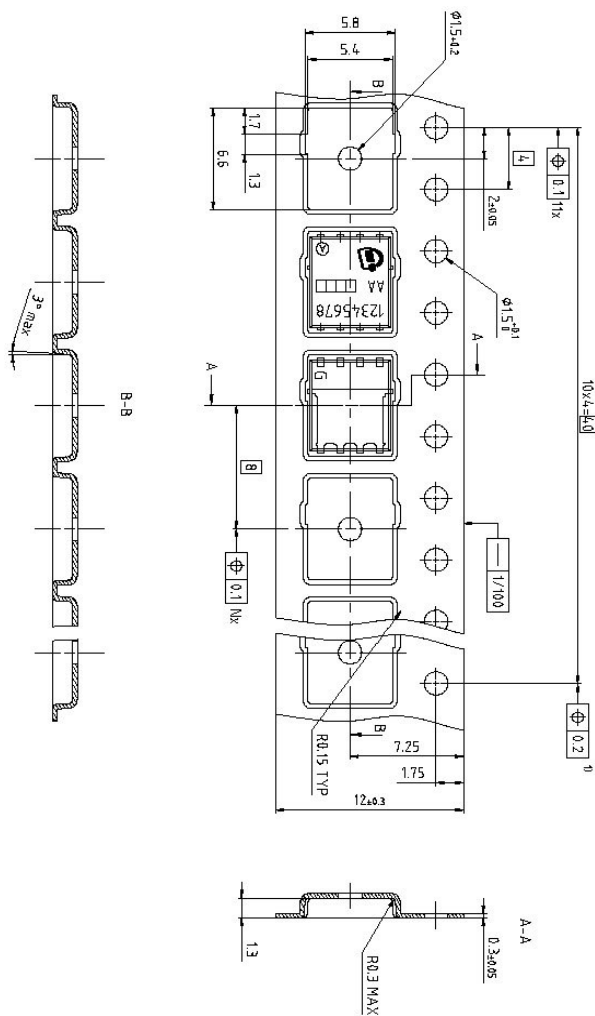


图 2 PG- TDSO N- 8 外形图, 尺寸单位为毫米



尺寸 (毫米)

图 3 PG- TDSON- 8 外形图，尺寸单位为毫米

修订记录

BSC097N06NS

Revision 2024 - 06 - 12 , Rev. 2 . 3

历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.2	2019-11-15	Update package drawings and footnotes, addition RthJC_typ and Qoss_max
2.3	2024-06-12	Upgrade Operating and storage temperature max to 175°C . Update drawings in section 5 Package Outlines. Production validation added on page1. Add footnote to Id on page 1.

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