

## MOSFET

### 英飞凌高耐热60V OptiMOS™5 功率晶体管

#### 特性

- 针对高性能 SMPS (例如同步整流) 进行优化
- 100% 雪崩测试
- 卓越的耐热性
- N沟道
- 符合 JEDEC <sup>1)</sup> 工业应用标准
- 无铅镀层; 符合RoHS标准
- 符合 IEC61249-2-21 标准的无卤素

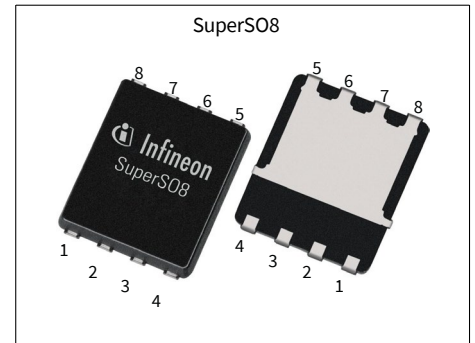
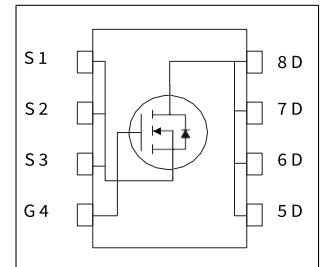


表 1 主要性能参数

Parameter	Value	Unit
$V_{DS}$	80	V
$R_{DS(on),max}$	11.7	m $\Omega$
$I_D$	49	A
$Q_{oss}$	19	nC
$Q_G(0V..10V)$	15	nC



Type / Ordering Code	Package	Marking	Related Links
BSC117N08NS5	PG-TDSON-8	117N08NS	-

<sup>1)</sup> J-STD20 和 JESD22

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# OptiMOS™5 功率晶体管, 80 V

## 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	$I_D$	-	-	49 31 19	A	$V_{GS}=10\text{ V}, T_C=25\text{ °C}$ $V_{GS}=10\text{ V}, T_C=100\text{ °C}$ $V_{GS}=10\text{ V}, T_C=25\text{ °C}, R_{thJA}=50\text{K/W}^1$
Pulsed drain current <sup>2)</sup>	$I_{D,pulse}$	-	-	196	A	$T_C=25\text{ °C}$
Avalanche energy, single pulse <sup>3)</sup>	$E_{AS}$	-	-	14	mJ	$I_D=50\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	$V_{GS}$	-20	-	20	V	-
Power dissipation	$P_{tot}$	-	-	50 2.5	W	$T_C=25\text{ °C}$ $T_A=25\text{ °C}, R_{thJA}=50\text{ K/W}^1$
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, bottom	$R_{thJC}$	-	1.5	2.5	K/W	-
Thermal resistance, junction - case, top	$R_{thJC}$	-	-	20	K/W	-
Device on PCB, 6 cm <sup>2</sup> cooling area <sup>1)</sup>	$R_{thJA}$	-	-	50	K/W	-

<sup>1)</sup>器件位于 40 mm x 40 mm x 1.5 mm 环氧树脂 PCB FR4 上, 具有 6 cm<sup>2</sup> (一层, 70 μm 厚) 的铜面积用于漏极连接。PCB 在静止空气中垂直放置。

<sup>2)</sup>详细信息请参见图 3

<sup>3)</sup>详细信息请参见图 13

### 3 电气特性

**表4 静态特性**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	80	-	-	V	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	2.2	3	3.8	V	$V_{DS}=V_{GS}, I_D=22\text{ }\mu\text{A}$
Zero gate voltage drain current	$I_{DSS}$	-	0.1 10	1 100	$\mu\text{A}$	$V_{DS}=80\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^\circ\text{C}$ $V_{DS}=80\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ }^\circ\text{C}$
Gate-source leakage current	$I_{GSS}$	-	10	100	nA	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	9.6 13.7	11.7 16.3	$\text{m}\Omega$	$V_{GS}=10\text{ V}, I_D=25\text{ A}$ $V_{GS}=6\text{ V}, I_D=12.5\text{ A}$
Gate resistance <sup>1)</sup>	$R_G$	-	1.1	1.7	$\Omega$	-
Transconductance	$g_{fs}$	19	38	-	S	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=25\text{ A}$

**表5 动态特性**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance <sup>1)</sup>	$C_{iss}$	-	1000	1300	pF	$V_{GS}=0\text{ V}, V_{DS}=40\text{ V}, f=1\text{ MHz}$
Output capacitance <sup>1)</sup>	$C_{oss}$	-	180	230	pF	$V_{GS}=0\text{ V}, V_{DS}=40\text{ V}, f=1\text{ MHz}$
Reverse transfer capacitance <sup>1)</sup>	$C_{rss}$	-	11	19	pF	$V_{GS}=0\text{ V}, V_{DS}=40\text{ V}, f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	10	-	ns	$V_{DD}=40\text{ V}, V_{GS}=10\text{ V}, I_D=25\text{ A}, R_{G,ext}=3\text{ }\Omega$
Rise time	$t_r$	-	4	-	ns	$V_{DD}=40\text{ V}, V_{GS}=10\text{ V}, I_D=25\text{ A}, R_{G,ext}=3\text{ }\Omega$
Turn-off delay time	$t_{d(off)}$	-	16	-	ns	$V_{DD}=40\text{ V}, V_{GS}=10\text{ V}, I_D=25\text{ A}, R_{G,ext}=3\text{ }\Omega$
Fall time	$t_f$	-	3	-	ns	$V_{DD}=40\text{ V}, V_{GS}=10\text{ V}, I_D=25\text{ A}, R_{G,ext}=3\text{ }\Omega$

**表6 栅极电荷特性<sup>2)</sup>**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	$Q_{gs}$	-	5	-	nC	$V_{DD}=40\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	3	-	nC	$V_{DD}=40\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge <sup>1)</sup>	$Q_{gd}$	-	3	5	nC	$V_{DD}=40\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Switching charge	$Q_{sw}$	-	6	-	nC	$V_{DD}=40\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge total <sup>1)</sup>	$Q_g$	-	15	18	nC	$V_{DD}=40\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	5.0	-	V	$V_{DD}=40\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge total, sync. FET	$Q_{g(sync)}$	-	13	-	nC	$V_{DS}=0.1\text{ V}, V_{GS}=0\text{ to }10\text{ V}$
Output charge <sup>1)</sup>	$Q_{oss}$	-	19	25	nC	$V_{DD}=40\text{ V}, V_{GS}=0\text{ V}$

<sup>1)</sup>由设计标定, 不受制于生产测试。

<sup>2)</sup>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	$I_S$	-	-	45	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	196	A	$T_C=25\text{ °C}$
Diode forward voltage	$V_{SD}$	-	0.9	1.1	V	$V_{GS}=0\text{ V}, I_F=25\text{ A}, T_J=25\text{ °C}$
Reverse recovery time <sup>1)</sup>	$t_{rr}$	-	37	73	ns	$V_R=40\text{ V}, I_F=25\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge <sup>1)</sup>	$Q_{rr}$	-	45	90	nC	$V_R=40\text{ V}, I_F=25\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$

<sup>1)</sup>由设计标定，不受制于生产测试。

## 4 电气特性图

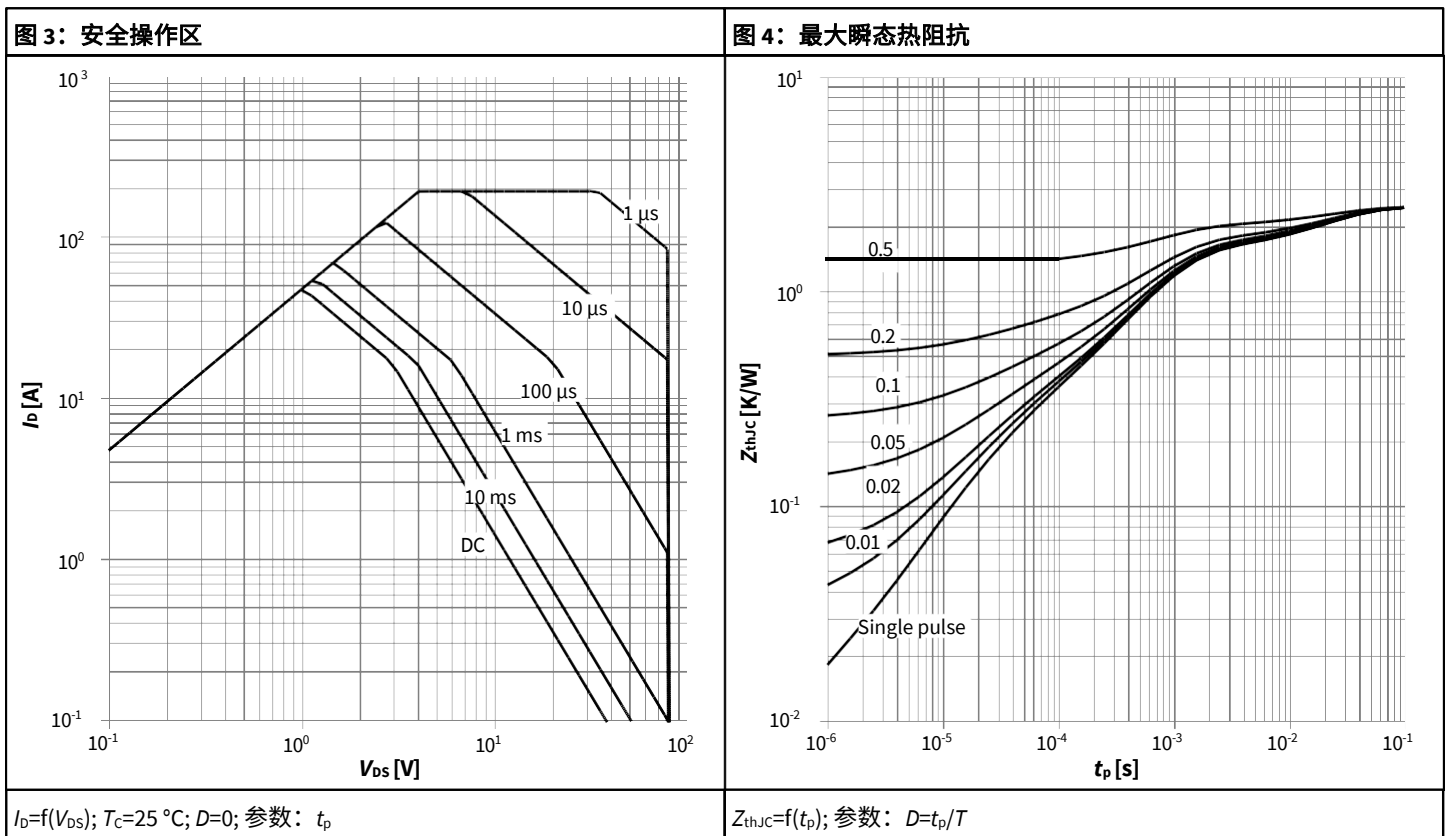
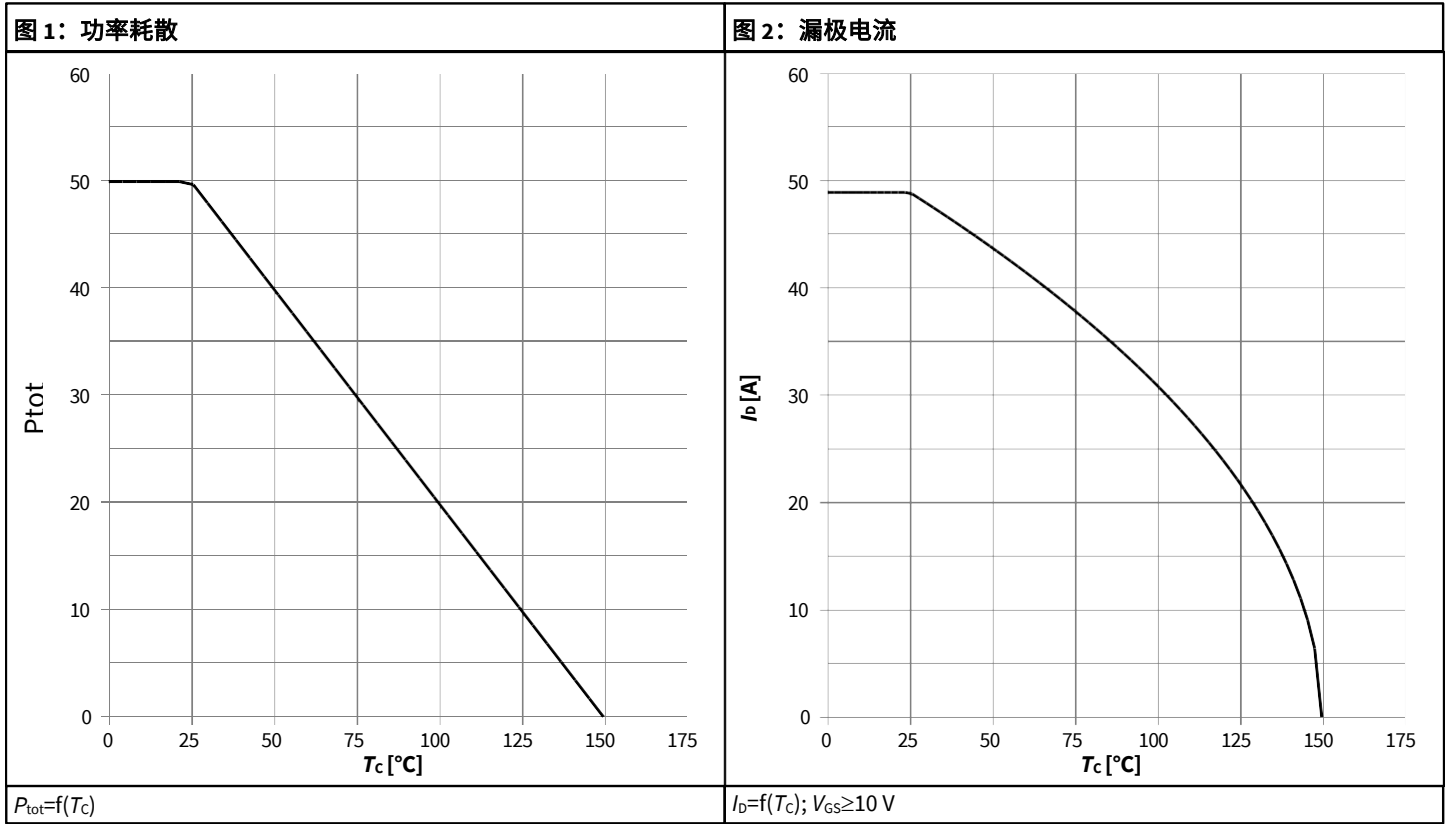
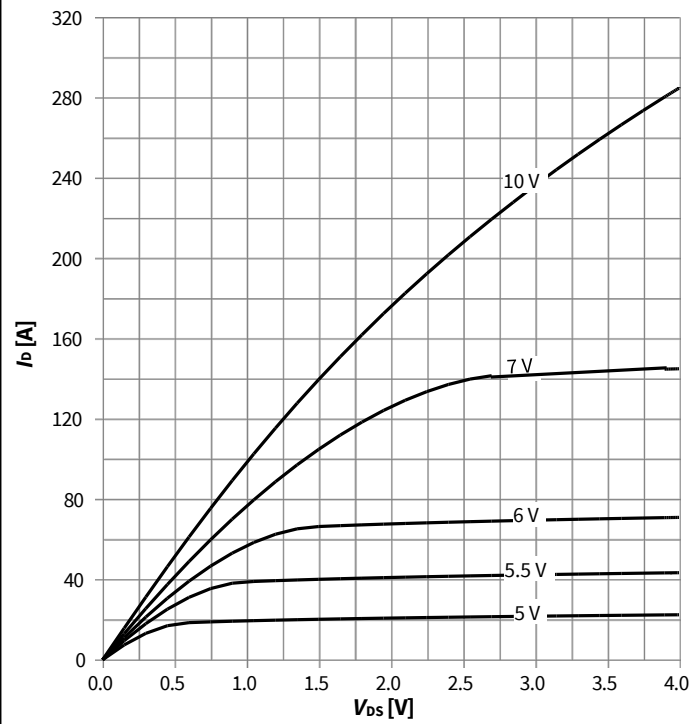
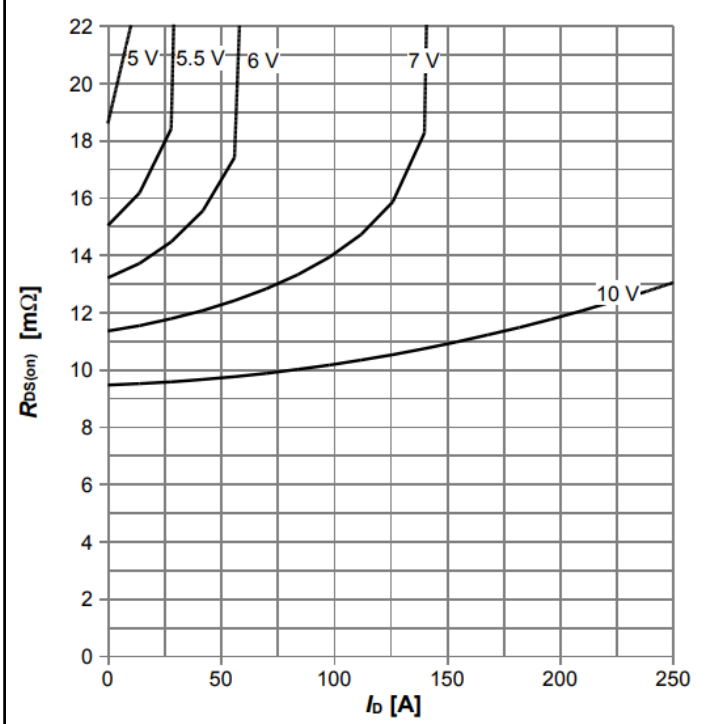


图 5: 典型输出特性



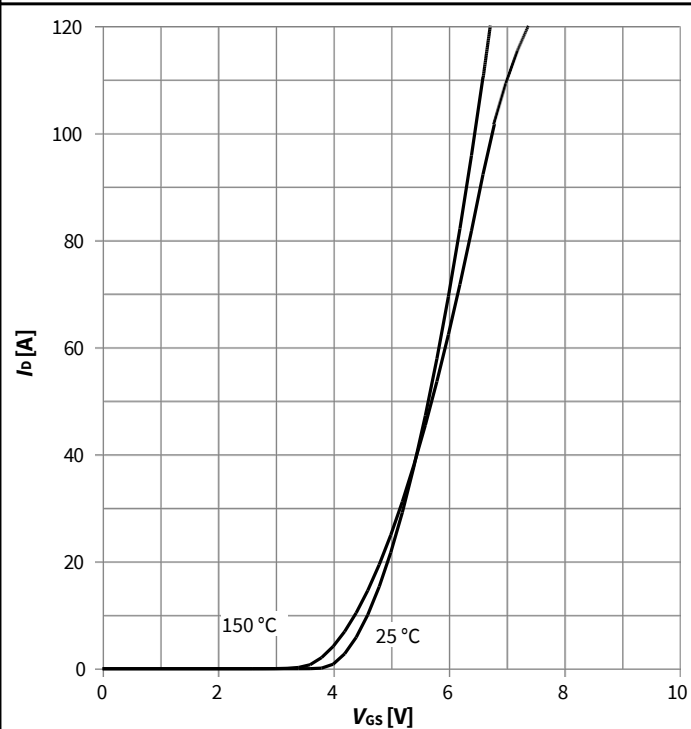
$I_D = f(V_{DS}), T_j = 25\text{ }^\circ\text{C};$  参数:  $V_{GS}$

图 6: 典型漏源导通电阻



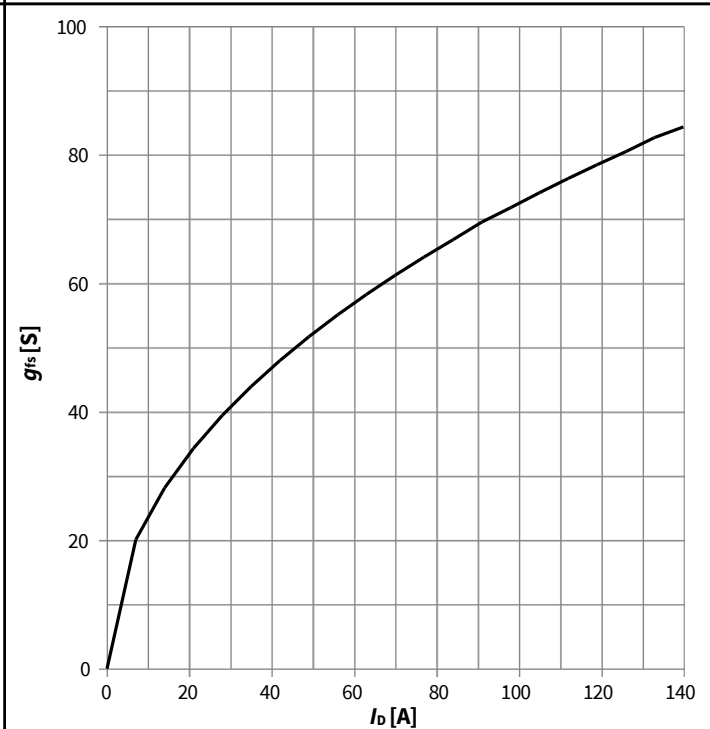
$R_{DS(on)} = f(I_D), T_j = 25\text{ }^\circ\text{C};$  参数:  $V_{GS}$

图 7: 典型转移特性



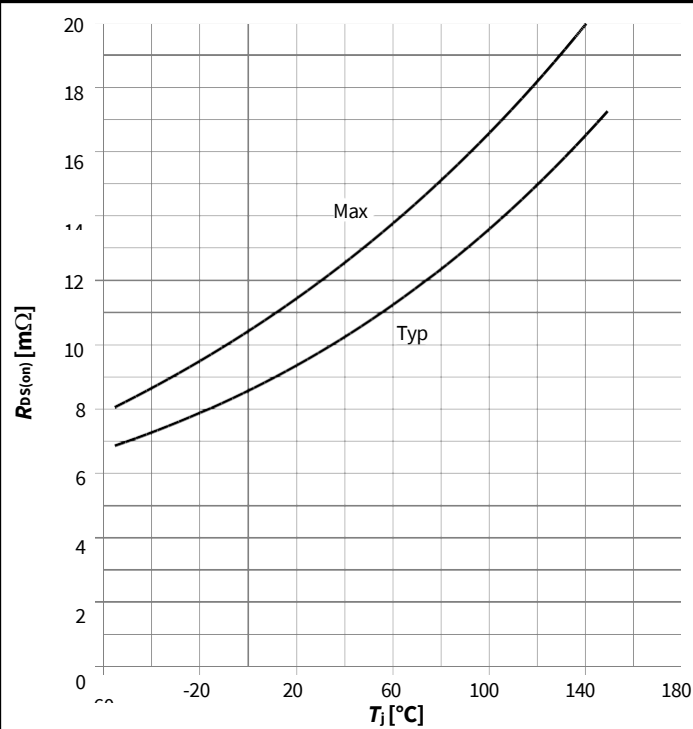
$I_D = f(V_{GS}), |V_{DS}| > 2|I_D|R_{DS(on)max};$  参数:  $T_j$

图 8: 典型正向跨导



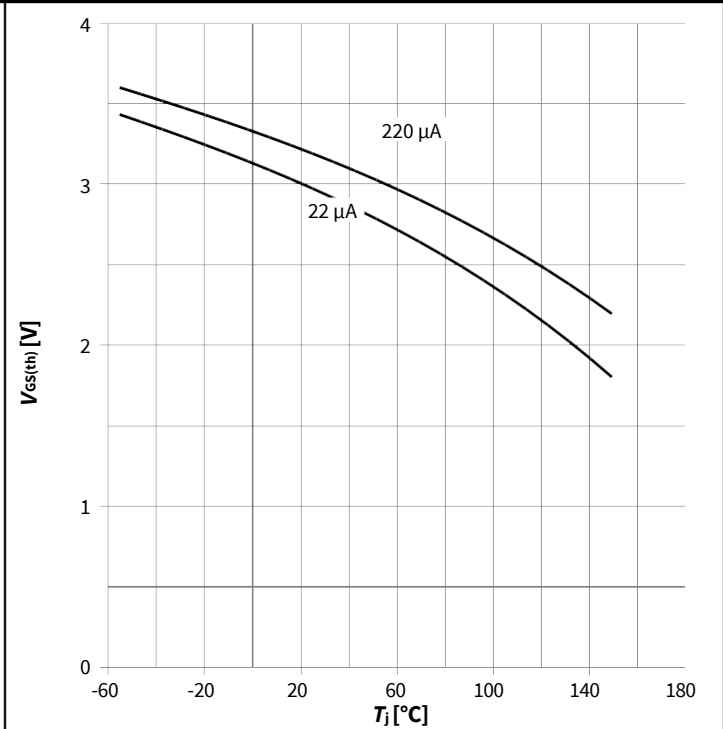
$g_{fs} = f(I_D); T_j = 25\text{ }^\circ\text{C}$

图 9: 漏源导通电阻



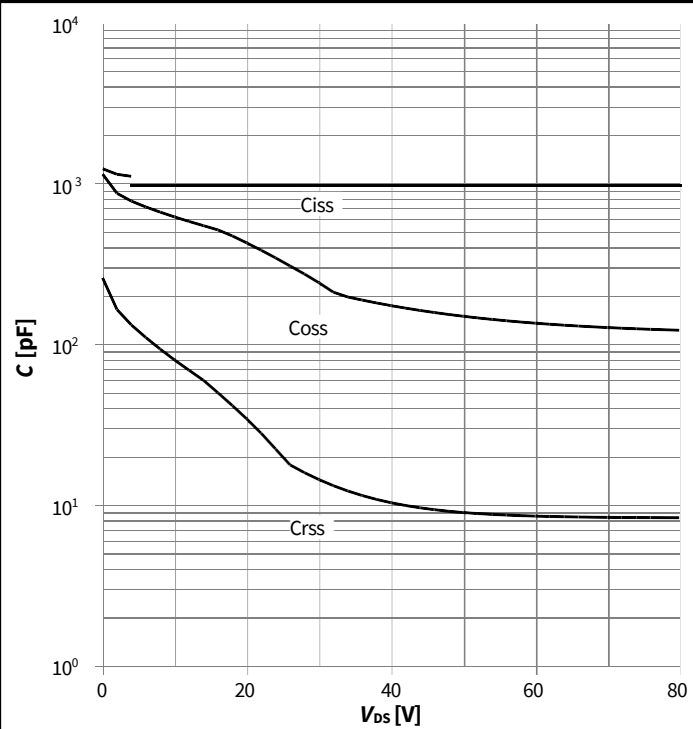
$R_{DS(on)}=f(T_j); I_D=25\text{ A}; V_{GS}=10\text{ V}$

图 10: 典型栅极阈值电压



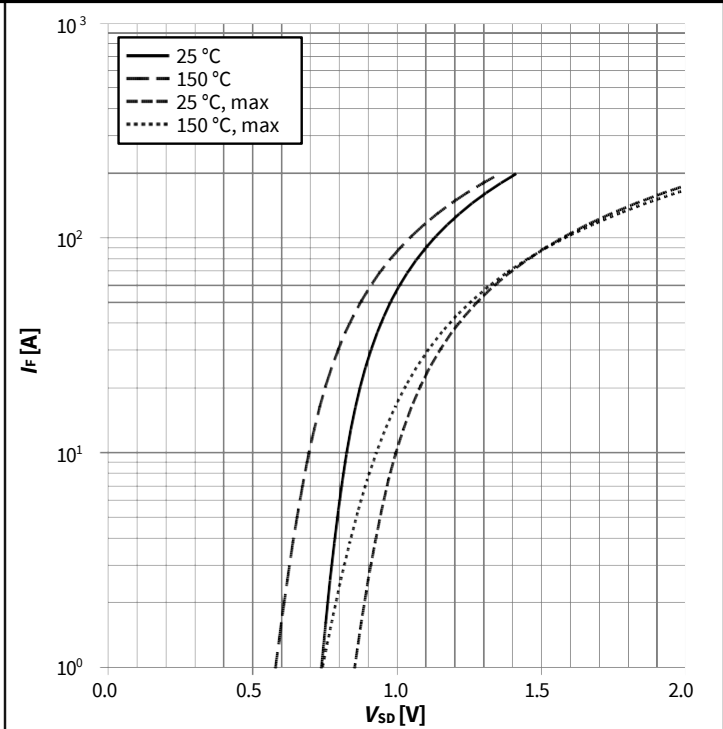
$V_{GS(th)}=f(T_j); V_{GS}=V_{DS}$

图 11: 典型电容值



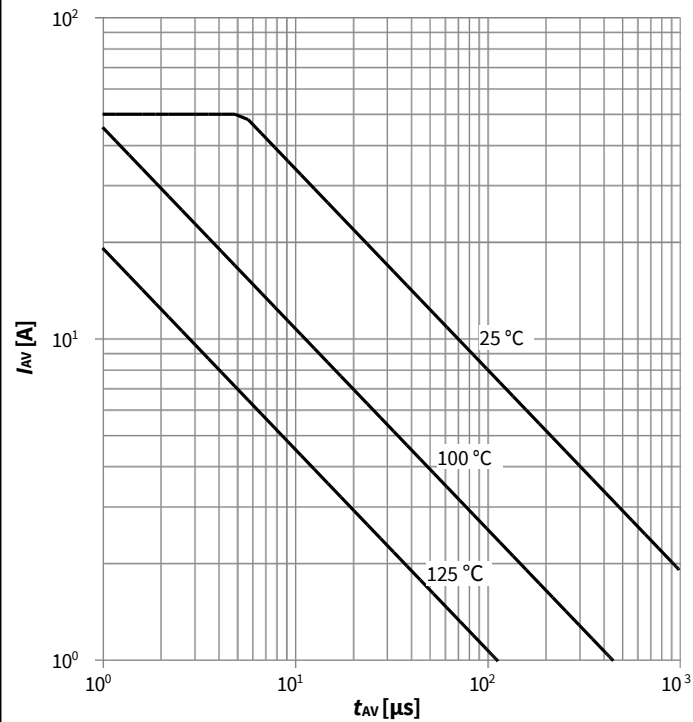
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}$

图 12: 反向二极管的正向特性



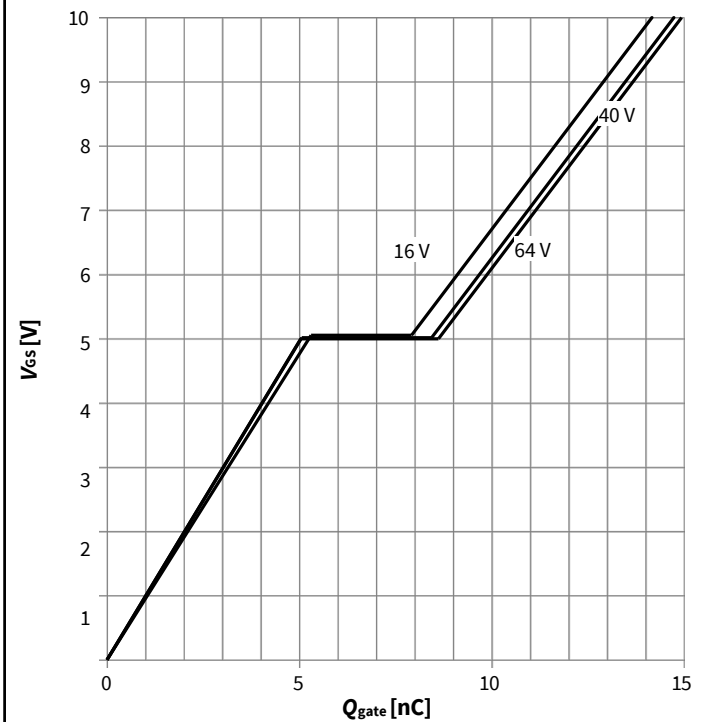
$I_F=f(V_{SD});$  参数:  $T_j$

图 13: 雪崩特性



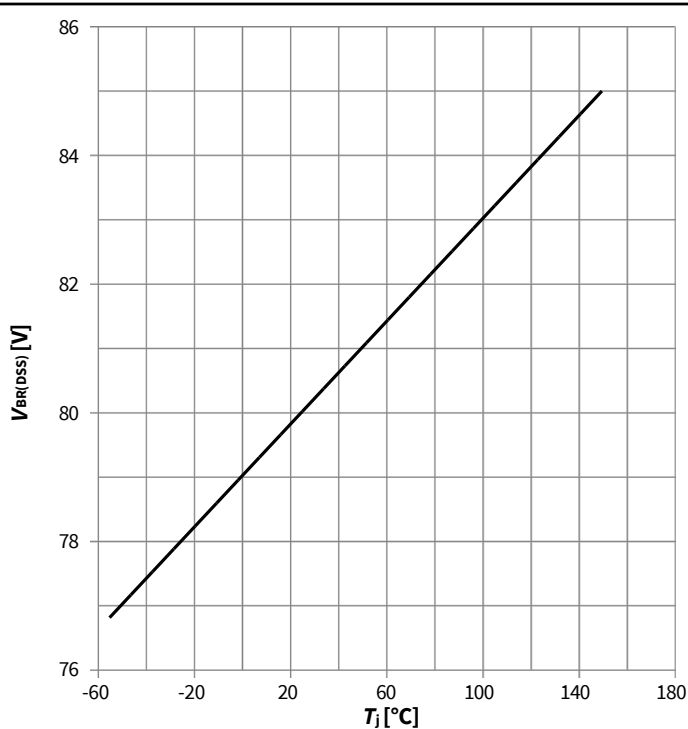
$I_{AS}=f(t_{AV}); R_{GS}=25\ \Omega$ ; 参数:  $T_{j(start)}$

图 14: 典型栅极电荷



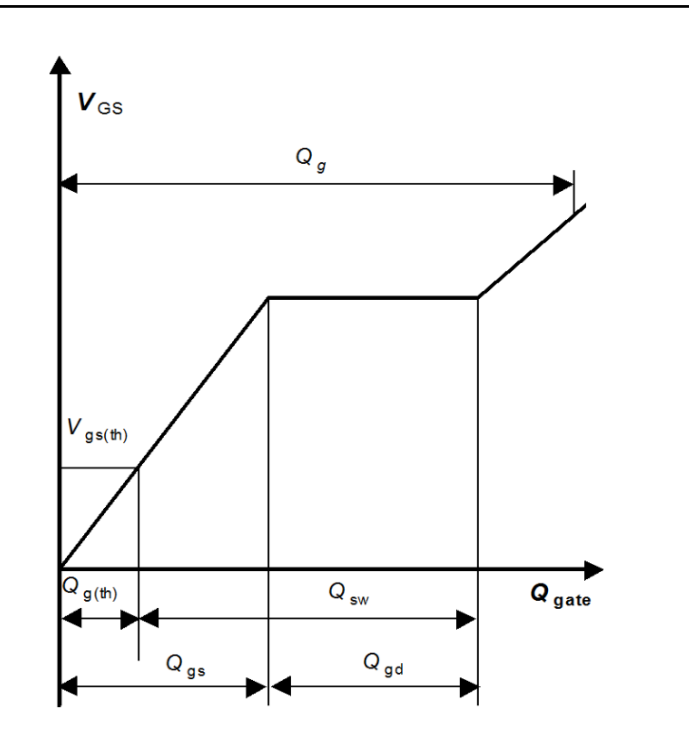
$V_{GS}=f(Q_{gate}); I_D=50\ \text{A pulsed}$ ; 参数:  $V_{DD}$

图 15: 漏源击穿电压

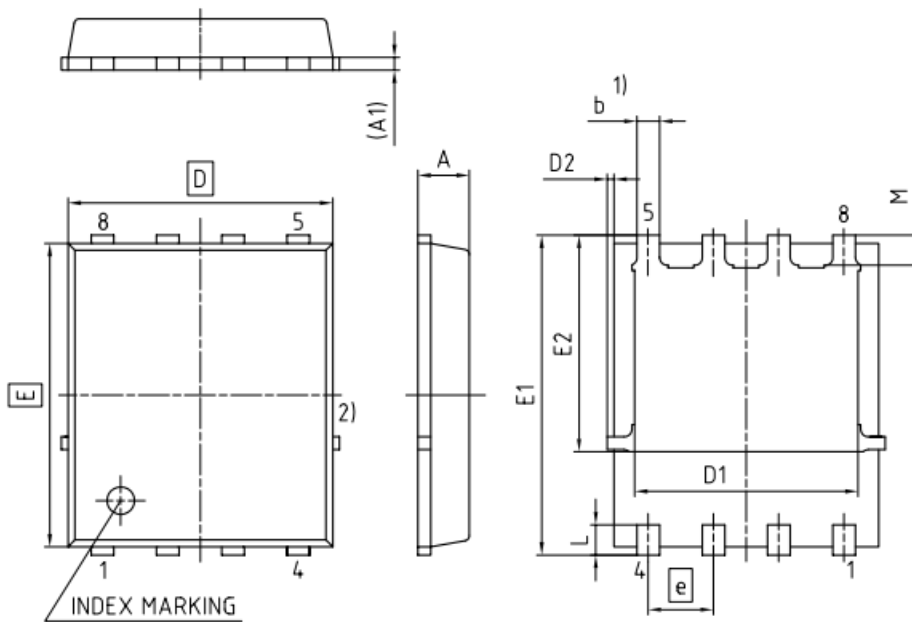


$V_{BR(DSS)}=f(T_j); I_D=1\ \text{mA}$

图 栅极充电波形



## 5 封装外形



- 1) EXCLUDING MOLD FLASH
- 2) REMOVAL ON MOLD GATE
- INTRUSION 0.1 MM
- PROTRUSION 0.1 MM
- LEAD LENGTH UP TO ANTI FLASH LINE
- ALL METAL SURFACES ARE PLATED, EXCEPT AREA OF CUT

DIMENSION	MILLIMETERS	
	MIN.	MAX.
A	0.90	1.20
A1	0.15	0.35
b	0.34	0.54
D	4.80	5.35
D1	3.90	4.40
D2	0.03	0.23
E	5.70	6.10
E1	5.90	6.42
E2	3.88	4.31
e	1.27	
L	0.45	0.71
M	0.45	0.69

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图 1 PG-TDSON-8 外形图, 尺寸单位为毫米

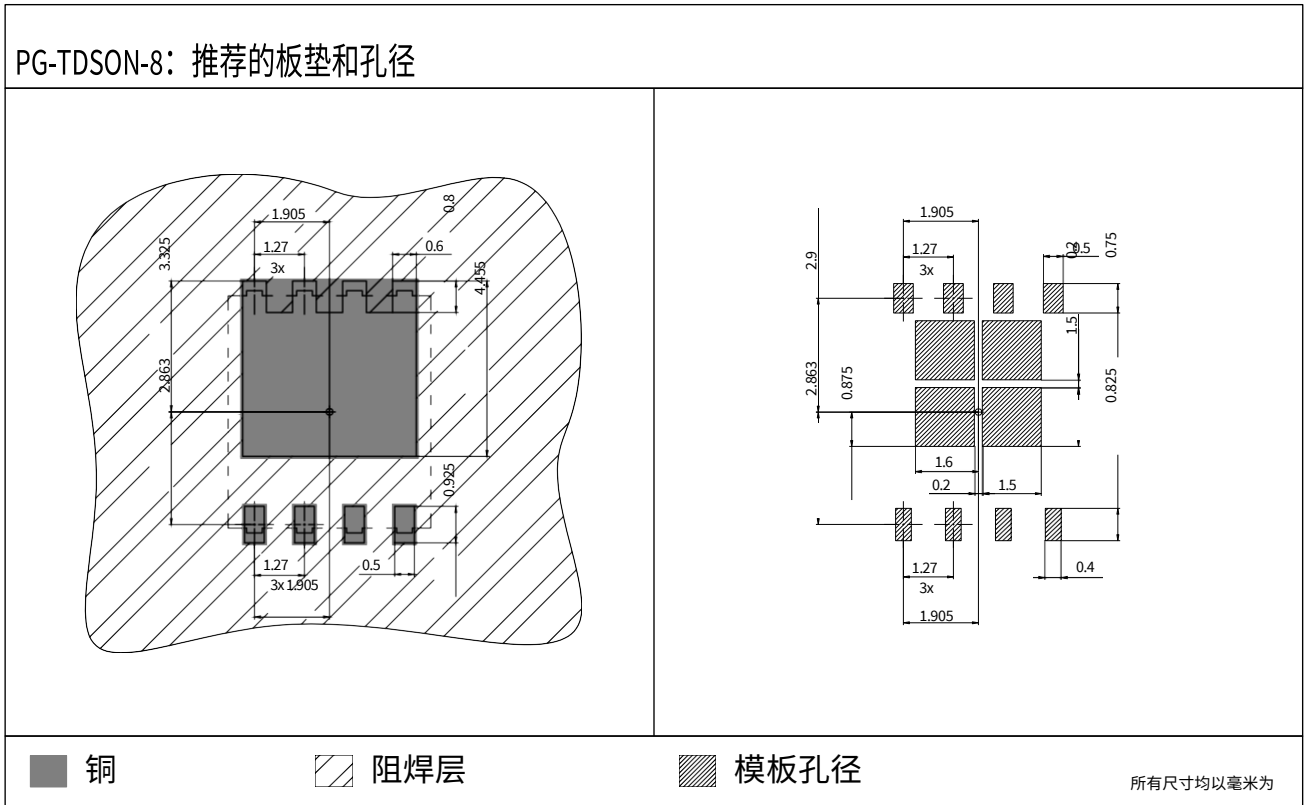
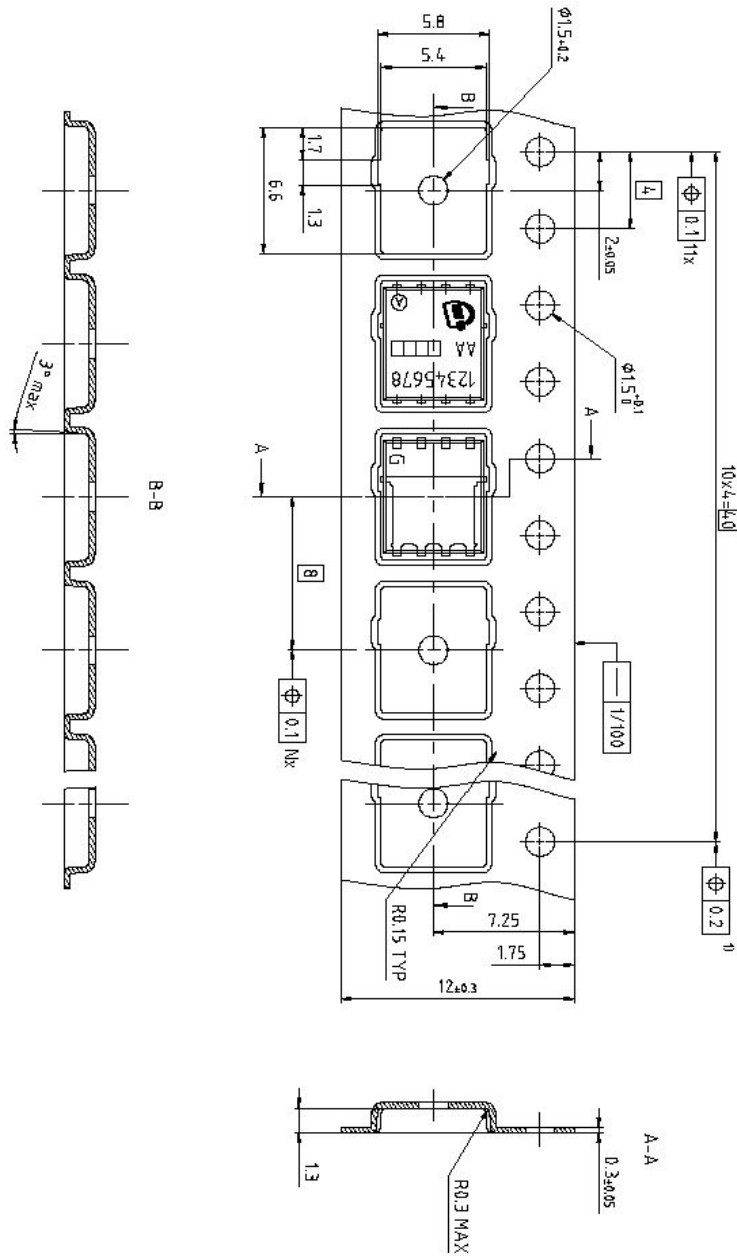


图 2 外形板焊盘 (TDSON-8), 尺寸单位为毫米

# OptiMOS™5 功率晶体管, 80 V



尺寸 (毫米)

图3 封装外形胶带 (TDSON-8)

## 修订记录

BSC117N08NS5

Revision: 2020-02-07, Rev. 2.1

### 历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.0	2014-12-17	Release of final version
2.1	2020-02-07	Update package drawings

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