

MOSFET

英飞凌高耐热80V 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 ¹⁾ 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

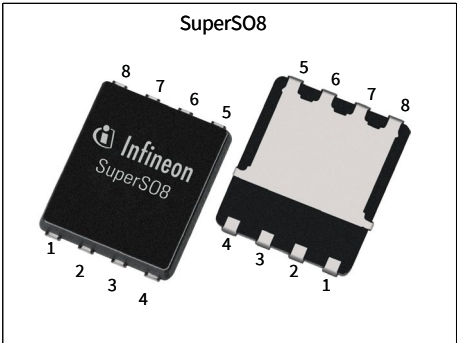
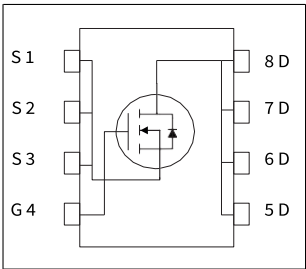


表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	80	V
$R_{DS(on),max}$	5.2	mΩ
I_D	95	A
Q_{oss}	39	nC
$Q_G(0V..10V)$	32	nC



Type / Ordering Code	Package	Marking	Related Links
BSC052N08NS5	PG-TDSON-8	052N08NS	-

¹⁾ J-STD20 和 JESD22

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目录

描述1

最大额定值3

热特性3

电气特性4

电气特性图6

封装外形10

修订历史13

商标13

免责声明13

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	-	-	95 60 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 ⁽²⁾	$I_{D,pulse}$	-	-	380	A	$T_C=25\text{ °C}$
Avalanche energy, single pulse ⁽³⁾	E_{AS}	-	-	70	mJ	$I_D=50\text{ A}$, $R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	83 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}	-	0.9	1.5	K/W	-
Thermal resistance, junction - case, top	R_{thJC}	-	-	20	K/W	-
Device on PCB, 6 cm ² cooling area ⁽¹⁾	R_{thJA}	-	-	50	K/W	-

⁽¹⁾器件位于 40 mm x 40 mm x 1.5 mm 环氧树脂 PCB FR4 上, 具有 6 cm² (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。

⁽²⁾详细信息请参见图 3

⁽³⁾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	3.0	3.8	V	$V_{DS}=V_{GS}$, $I_D=49\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1 10	1 100	μA	$V_{DS}=80\text{ V}$, $V_{GS}=0\text{ V}$, $T_J=25\text{ }^\circ\text{C}$ $V_{DS}=80\text{ V}$, $V_{GS}=0\text{ V}$, $T_J=125\text{ }^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	10	100	nA	$V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	4.4 6.3	5.2 7.6	m Ω	$V_{GS}=10\text{ V}$, $I_D=47.5\text{ A}$ $V_{GS}=6\text{ V}$, $I_D=23.8\text{ A}$
Gate resistance ¹⁾	R_G	-	1.1	1.7	Ω	-
Transconductance	g_{fs}	38	76	-	S	$ V_{DS} >2 I_D R_{DS(on)max}$, $I_D=47.5\text{ A}$

表5 动态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance ¹⁾	C_{iss}	-	2200	2900	pF	$V_{GS}=0\text{ V}$, $V_{DS}=40\text{ V}$, $f=1\text{ MHz}$
Output capacitance ¹⁾	C_{oss}	-	370	480	pF	$V_{GS}=0\text{ V}$, $V_{DS}=40\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance ¹⁾	C_{rss}	-	18	32	pF	$V_{GS}=0\text{ V}$, $V_{DS}=40\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	12	-	ns	$V_{DD}=40\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=47.5\text{ A}$, $R_{G,ext}=3\text{ }\Omega$
Rise time	t_r	-	7	-	ns	$V_{DD}=40\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=47.5\text{ A}$, $R_{G,ext}=3\text{ }\Omega$
Turn-off delay time	$t_{d(off)}$	-	19	-	ns	$V_{DD}=40\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=47.5\text{ A}$, $R_{G,ext}=3\text{ }\Omega$
Fall time	t_f	-	5	-	ns	$V_{DD}=40\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=47.5\text{ A}$, $R_{G,ext}=3\text{ }\Omega$

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}	-	11	-	nC	$V_{DD}=40\text{ V}$, $I_D=47.5\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	6.2	-	nC	$V_{DD}=40\text{ V}$, $I_D=47.5\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge ¹⁾	Q_{gd}	-	7.1	11	nC	$V_{DD}=40\text{ V}$, $I_D=47.5\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	12	-	nC	$V_{DD}=40\text{ V}$, $I_D=47.5\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total ¹⁾	Q_g	-	32	40	nC	$V_{DD}=40\text{ V}$, $I_D=47.5\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	4.9	-	V	$V_{DD}=40\text{ V}$, $I_D=47.5\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total, sync. FET	$Q_{g(sync)}$	-	27	-	nC	$V_{DS}=0.1\text{ V}$, $V_{GS}=0\text{ to }10\text{ V}$
Output charge ¹⁾	Q_{oss}	-	39	52	nC	$V_{DD}=40\text{ V}$, $V_{GS}=0\text{ V}$

¹⁾由设计标定，不受限于生产测试。

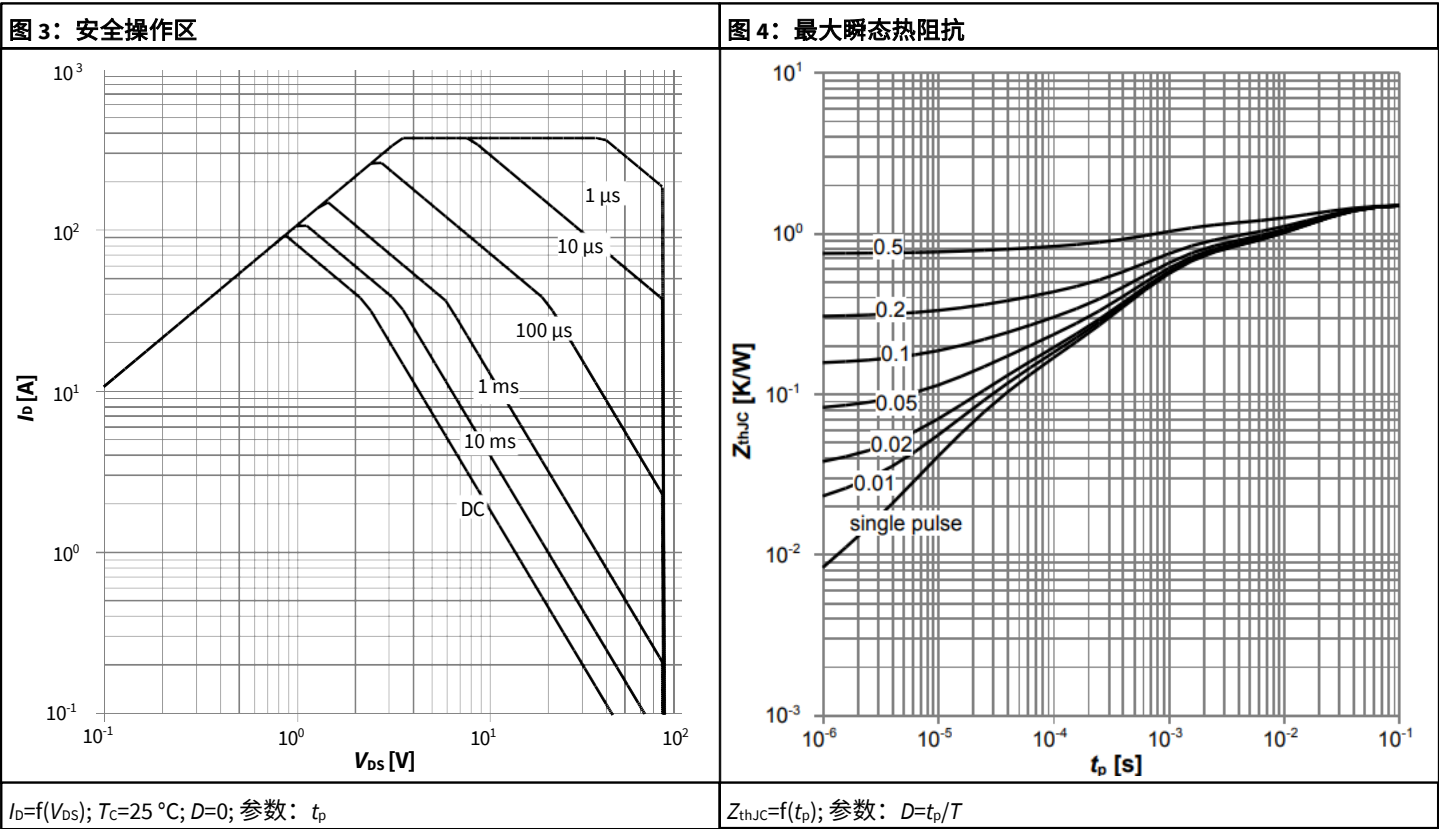
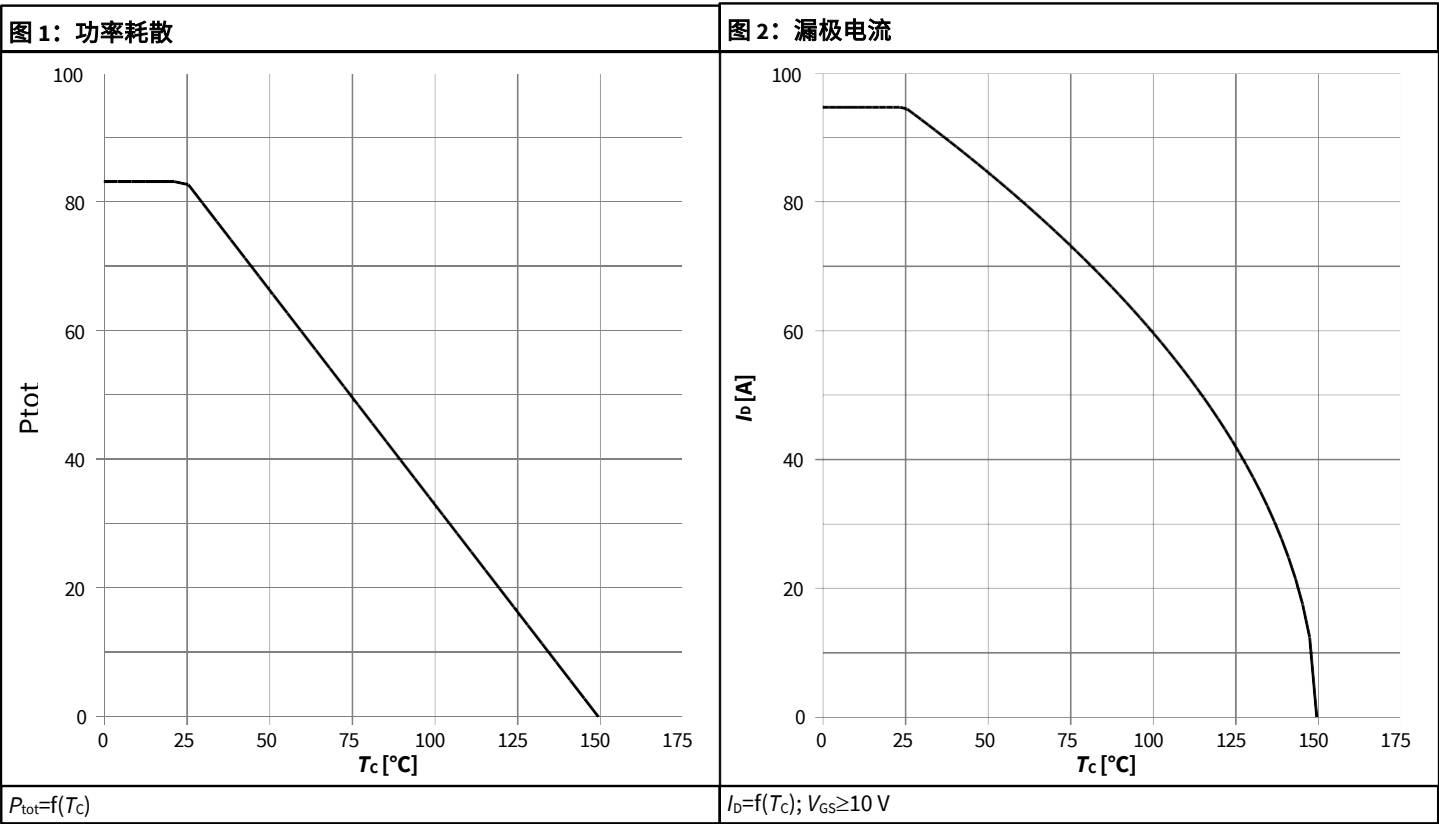
²⁾参数定义请参见“栅极充电波形”

表 7 反向二极管

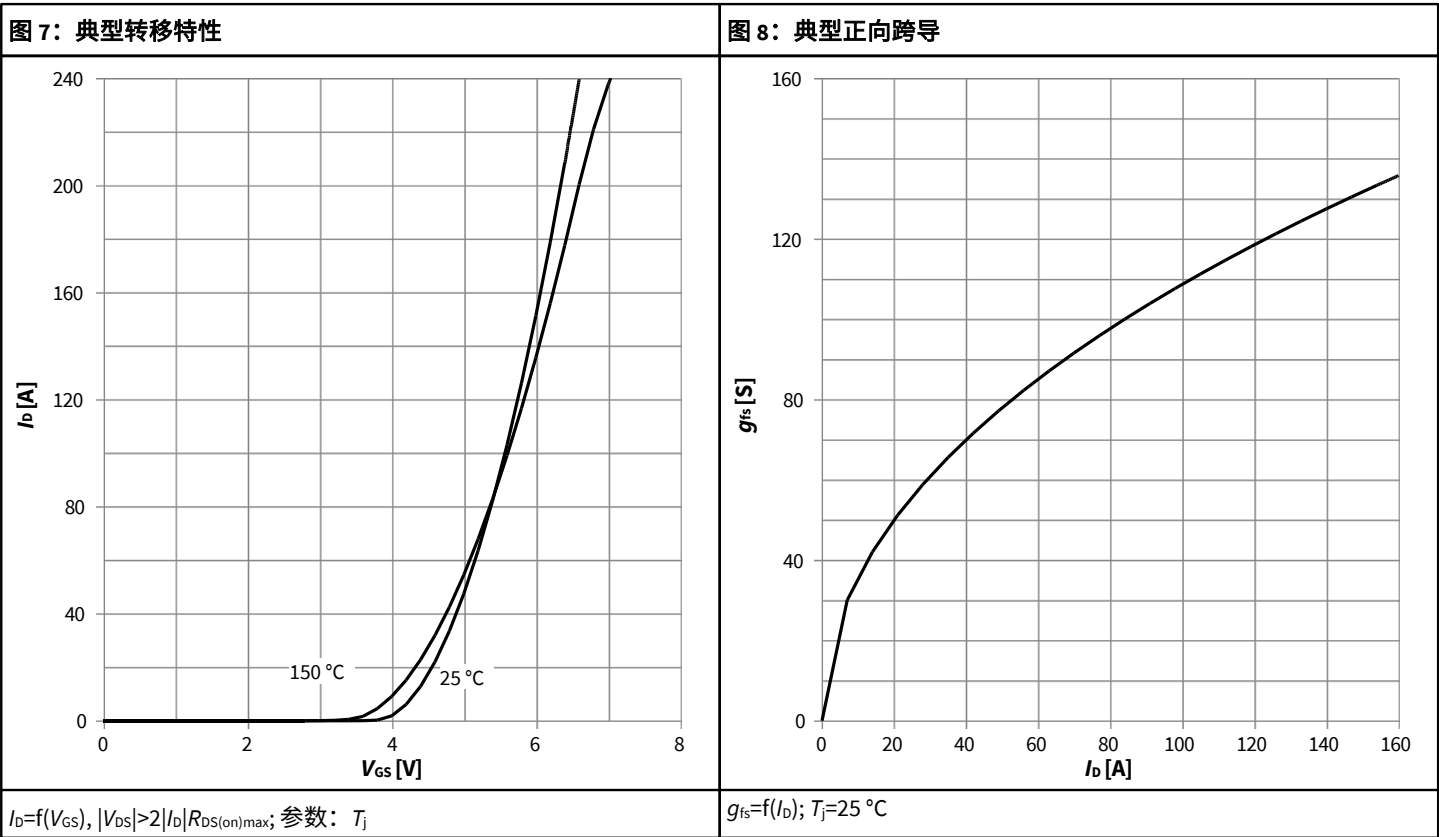
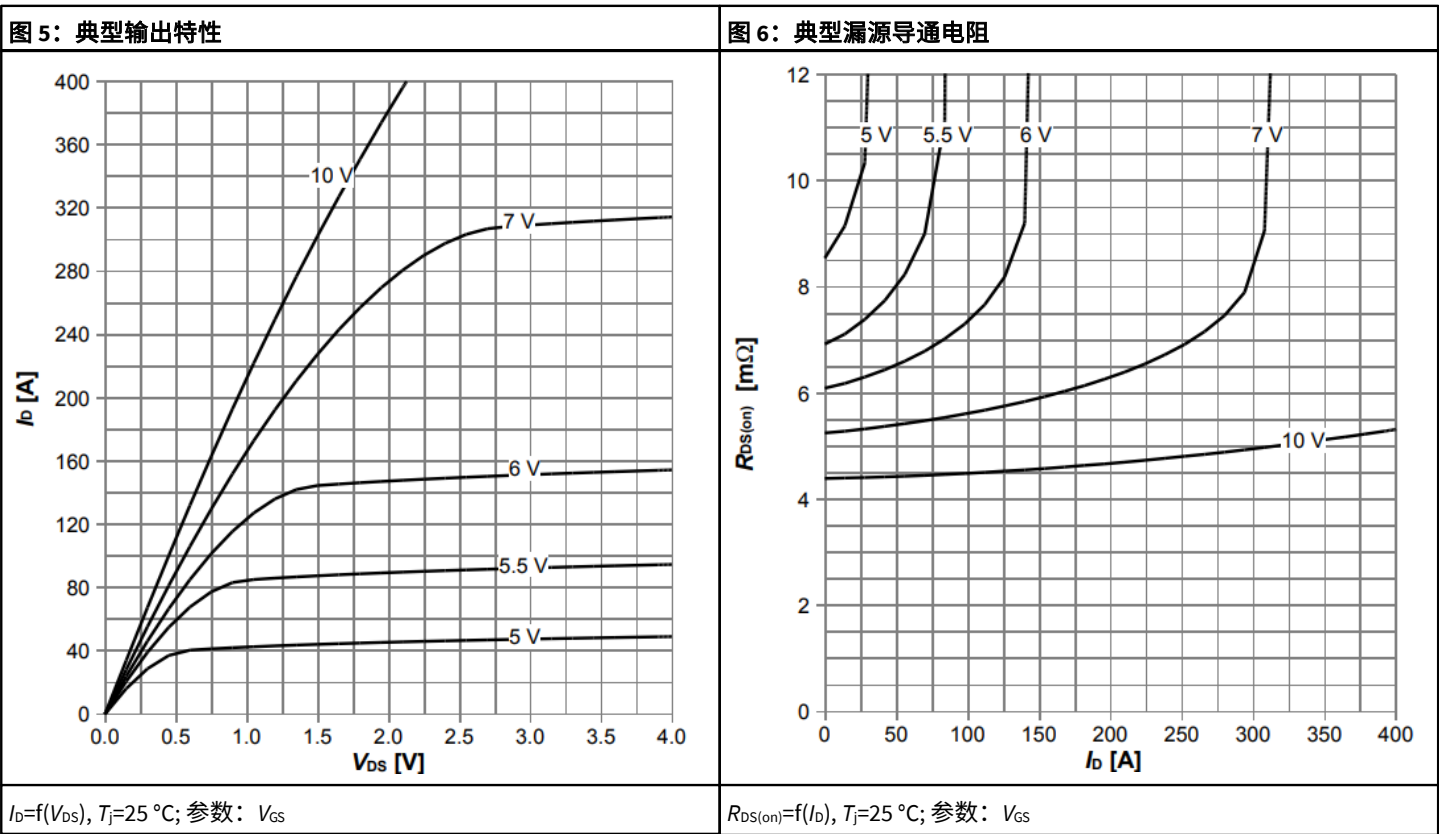
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	76	A	$T_C=25\text{ °C}$
Diode pulse current	$I_{S,pulse}$	-	-	380	A	$T_C=25\text{ °C}$
Diode forward voltage	V_{SD}	-	0.89	1.1	V	$V_{GS}=0\text{ V}$, $I_F=47.5\text{ A}$, $T_J=25\text{ °C}$
Reverse recovery time ¹⁾	t_{rr}	-	37	74	ns	$V_R=40\text{ V}$, $I_F=47.5\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁾	Q_{rr}	-	35	70	nC	$V_R=40\text{ V}$, $I_F=47.5\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$

¹⁾由设计标定，不受制于生产测试。

4 电气特性图

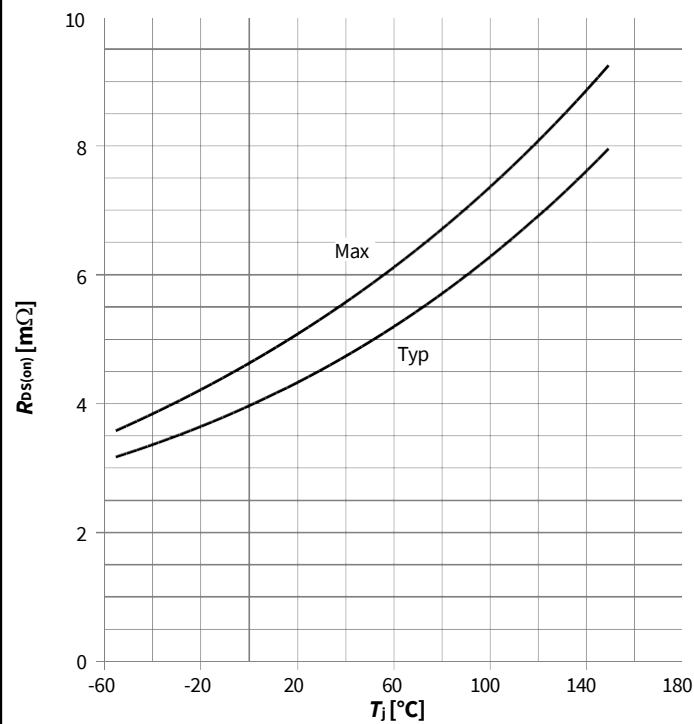


OptiMOS™5 功率晶体管, 80 V



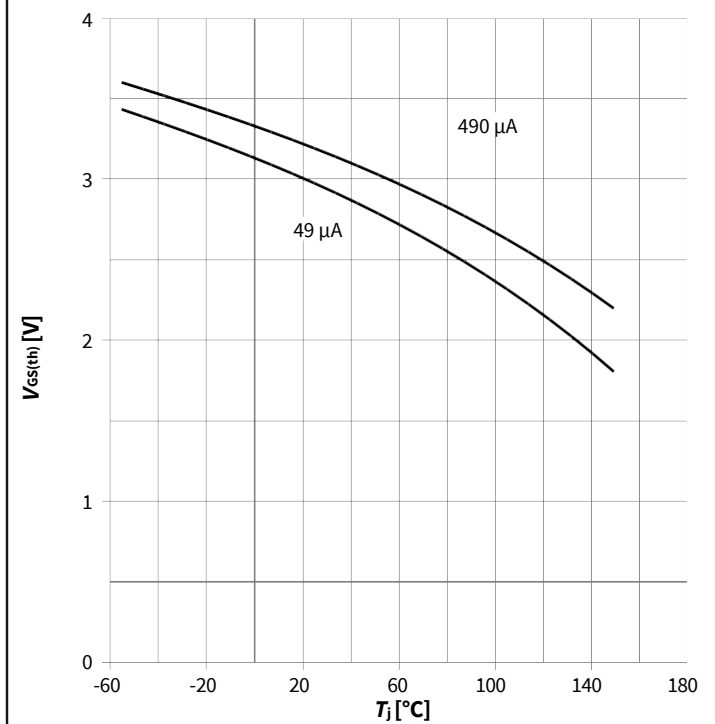
OptiMOS™5 功率晶体管, 80 V

图 9：漏源导通电阻



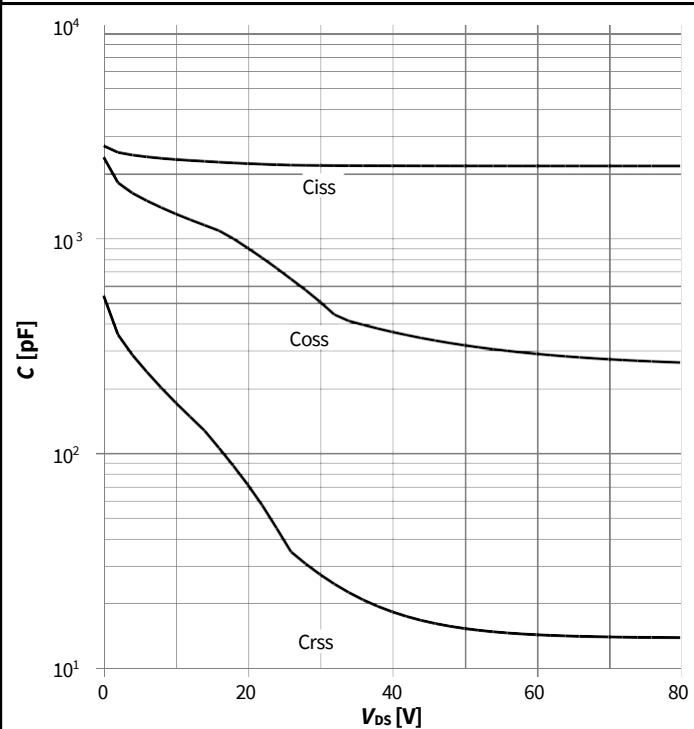
$$R_{DS(on)} = f(T_j); I_D = 47.5 \text{ A}; V_{GS} = 10 \text{ V}$$

图 10：典型栅极阈值电压



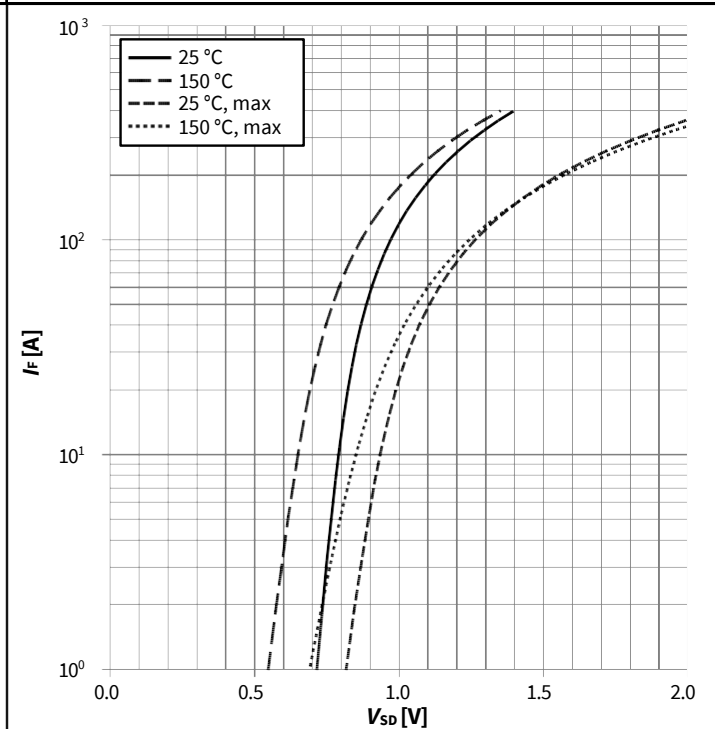
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$$

图 11：典型电容值



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

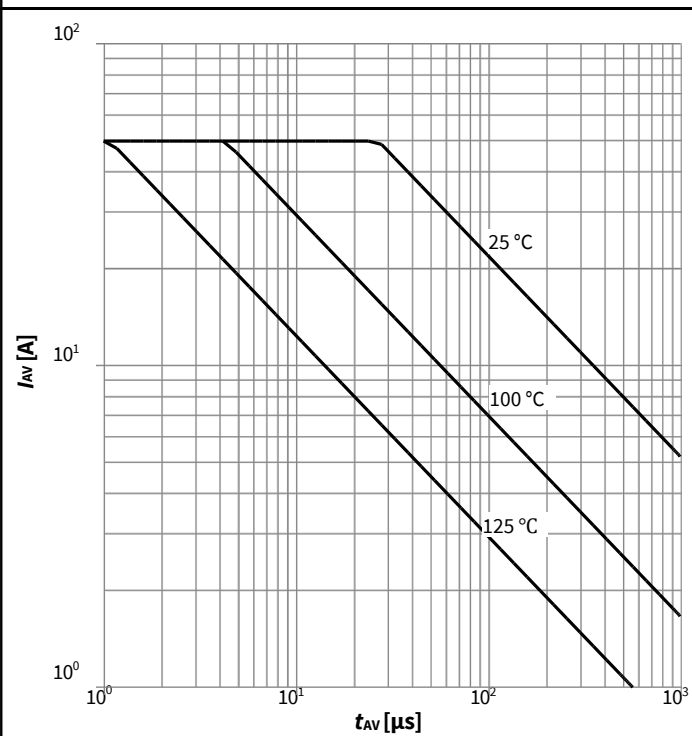
图 12：反向二极管的正向特性



$$I_F = f(V_{SD}); \text{参数: } T_j$$

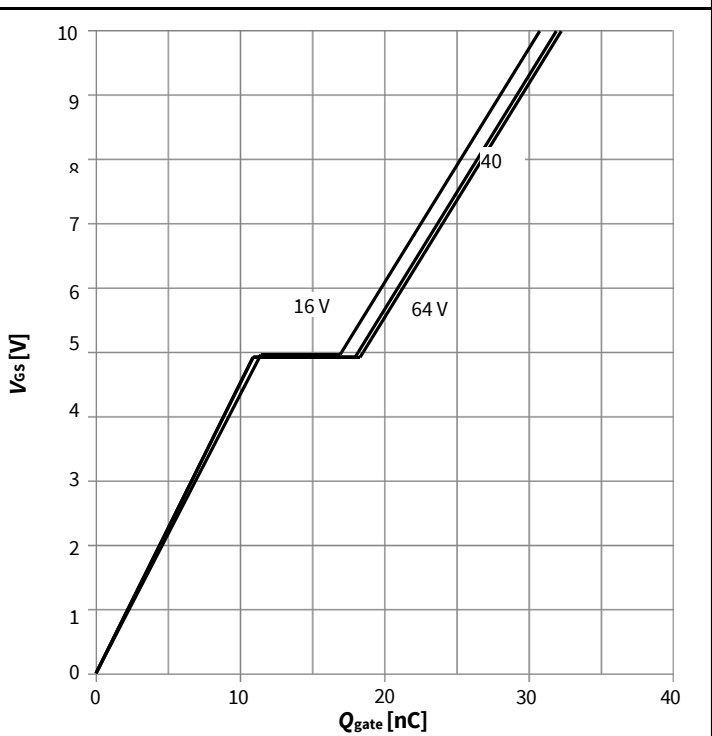
OptiMOS™5 功率晶体管, 80 V

图 13: 雪崩特性



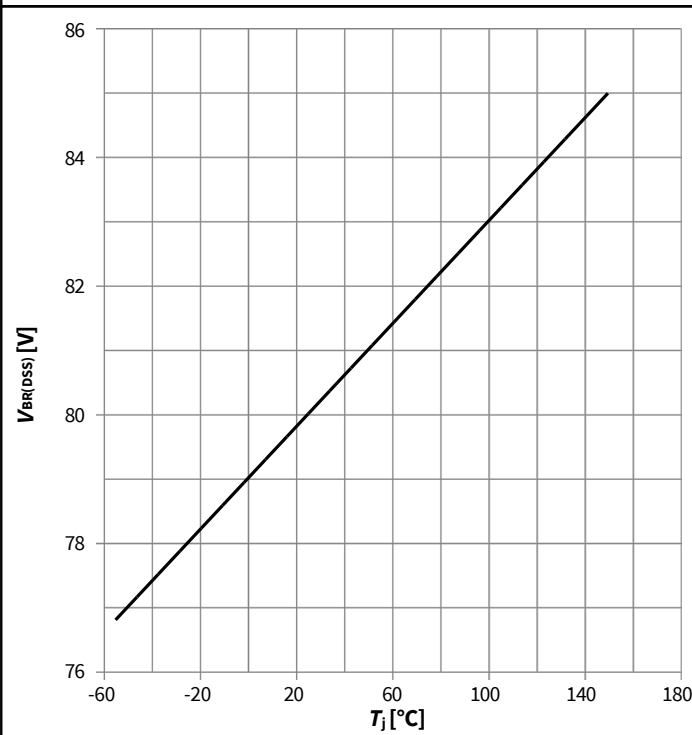
$I_{AS}=f(t_{AV}); R_{GS}=25\ \Omega$; 参数: $T_{j(start)}$

图 14: 典型栅极电荷



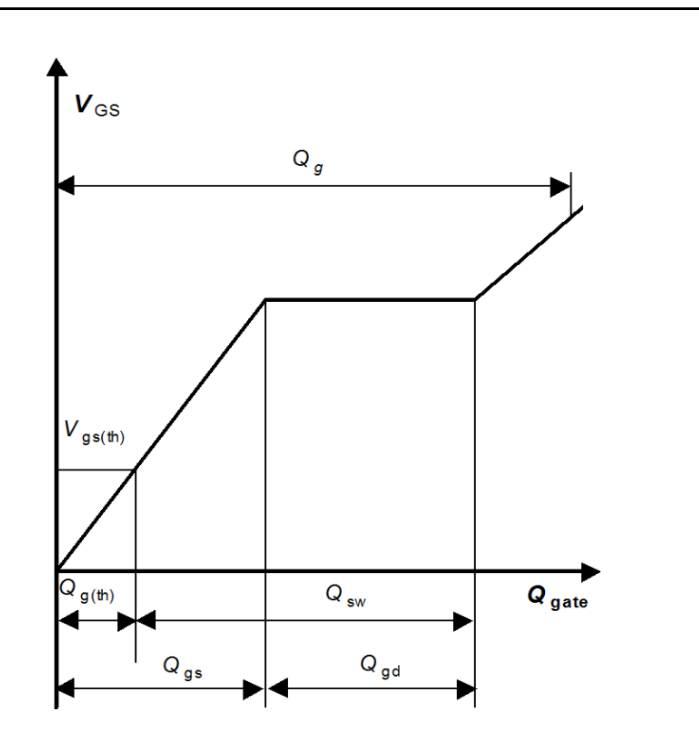
$V_{GS}=f(Q_{gate}); I_D=47.5\ A\ pulsed$; 参数: V_{DD}

图 15: 漏源击穿电压



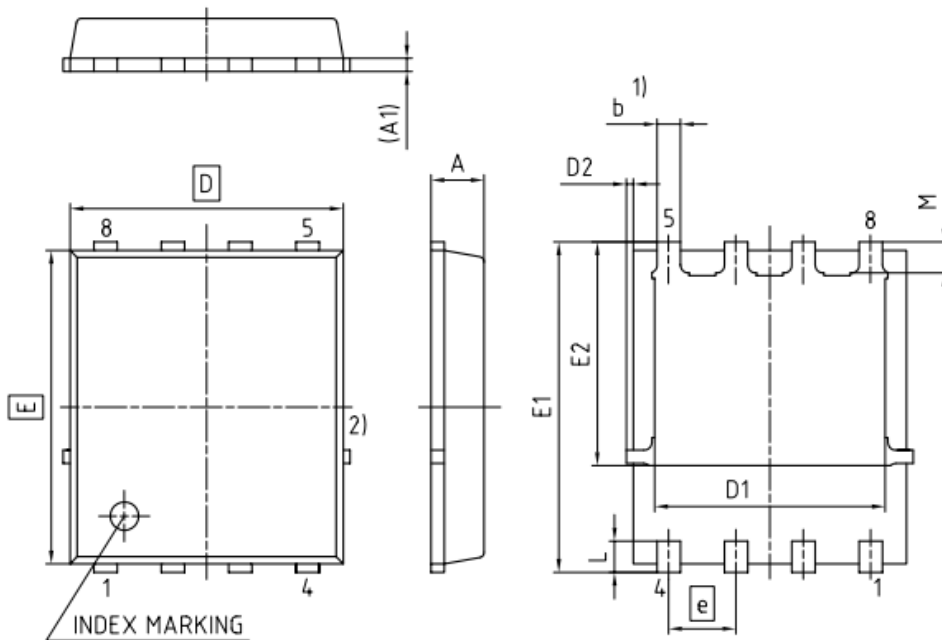
$V_{BR(DSS)}=f(T_j); I_D=1\ mA$

图 栅极充电波形



OptiMOS™5 功率晶体管, 80 V

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

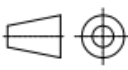
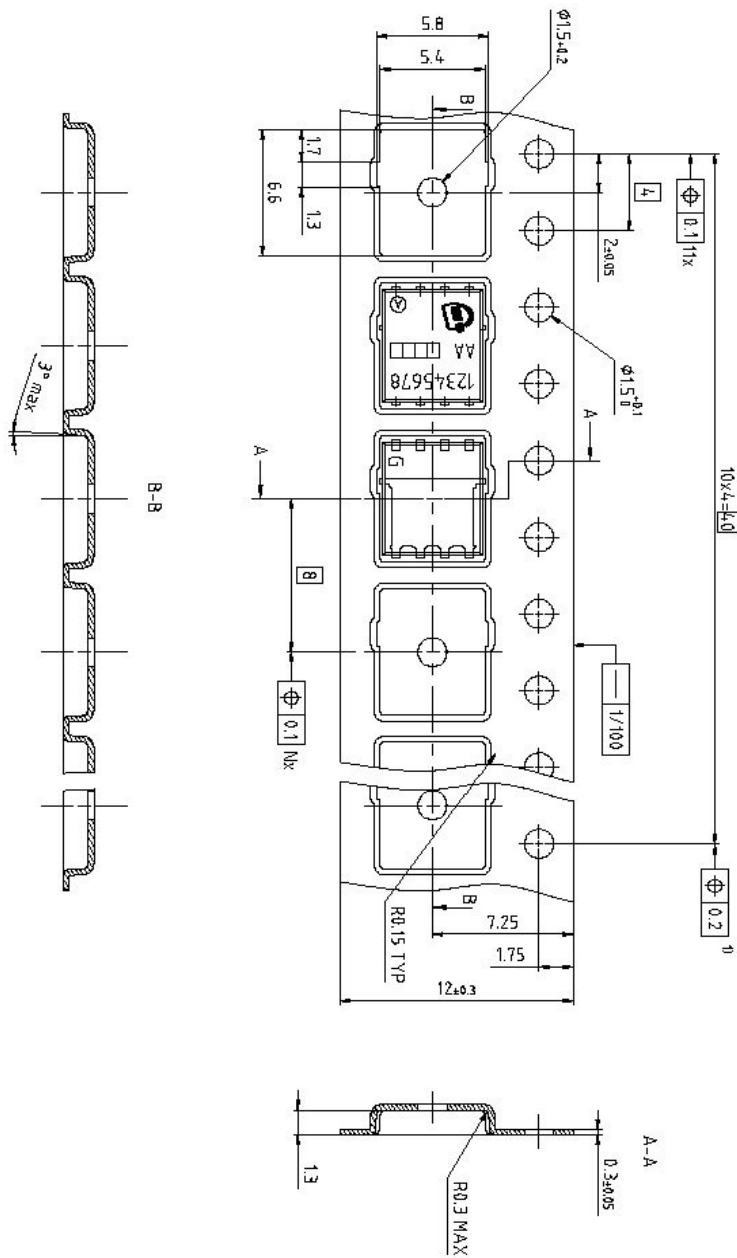
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ISSUE DATE 06.06.2019

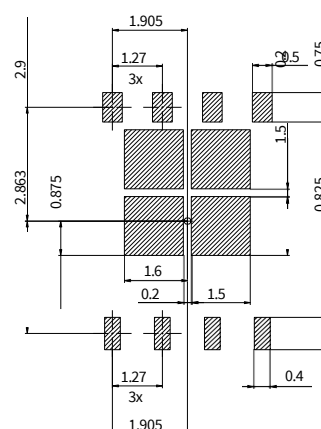
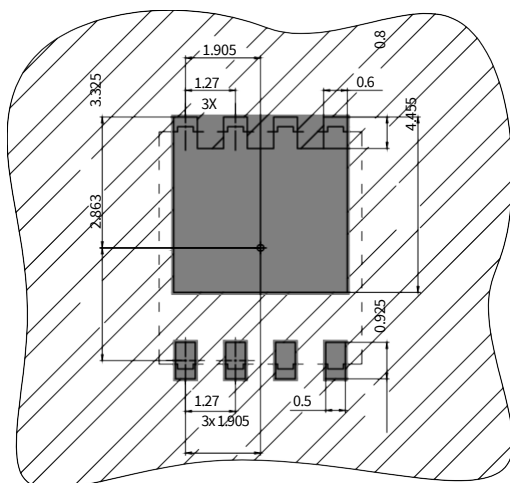
图 1 PG-TDSON-8 外形图, 尺寸单位为毫米



尺寸 (毫米)

图2 封装外形胶带 (TDSON-8)

PG-TDSON-8: 推荐的板垫和孔径



■ 铜

 阻焊层 模板孔径

所有尺寸均以毫米为

图3 外形板焊盘 (TDSO-8), 尺寸单位为毫米

修订记录

BSC052N08NS5

Revision: 2019-10-31, Rev. 2.1

历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.0	2014-12-27	Release of final version
2.1	2019-10-31	Update package drawings

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Published by

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Edition 2025-04-21

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