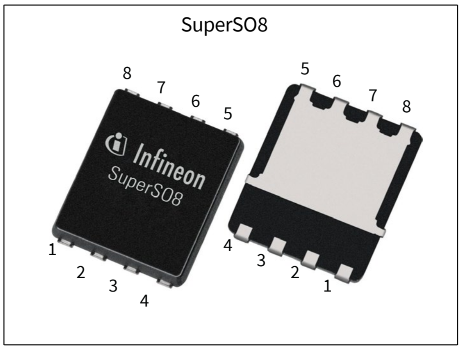
MOSFET

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
- 100% 雪崩测试
- 卓越的耐热性
- N沟道，逻辑电平
- 符合 JEDEC [1)]工业应用要求
- 无铅镀层；符合RoHS标准
- 符合 IEC61249-2-21 标准的无卤素



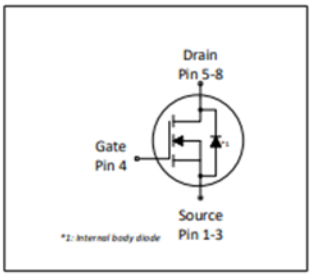


表 1　　主要性能参数

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(on),max}$	9.4	mΩ
I_D	47	A
Q_{OSS}	13	nC
Q_G(0V..4.5V)	7	nC

RoHS

Type / Ordering Code	Package	Marking	Related Links
BSC094N06LS5	PG-TDSON-8	094N06LS	-

1) J-STD20 和 JESD22

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1 最大额定值

除非另有规定，$T_j = 25\ °C$

表 2 最大额定值

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current	I_D	- - -	- - -	47 30 11	A	V_{GS}=10 V, T_C=25 °C V_{GS}=10 V, T_C=100 °C V_{GS}=10 V, T_A=25 °C, R_{thJA} =50K/W[1)
Pulsed drain current[2)]	$I_{D,pulse}$	-	-	188	A	T_C=25 °C
Avalanche energy, single pulse[3)]	E_{AS}	-	-	13	mJ	I_D=30 A, R_{GS}=25 Ω
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	- -	- -	36 2.1	W	T_C=25 °C T_A=25 °C, R_{thJA}=50 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}	-	2.1	3.5	K/W	-
Device on PCB, 6 cm² 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	$V_{(BR)DSS}$	60	-	-	V	V_{GS}=0 V, I_D=1 mA
Gate threshold voltage	$V_{GS(th)}$	1.1	1.7	2.3	V	V_{DS}=V_{GS}, I_D=14 µA
Zero gate voltage drain current	I_{DSS}	- -	0.1 10	1 100	µA	V_{DS}=60 V, V_{GS}=0 V, T_j=25 °C V_{DS}=60 V, V_{GS}=0 V, T_j=125 °C
Gate-source leakage current	I_{GSS}	-	10	100	nA	V_{GS}=20 V, V_{DS}=0 V
Drain-source on-state resistance	$R_{DS(on)}$	- -	7.7 11	9.4 13.4	mΩ	V_{GS}=10 V, I_D=24 A V_{GS}=4.5 V, I_D=12 A
Gate resistance[1]	R_G	-	1.1	1.65	Ω	-
Transconductance	g_{fs}	22	45	-	S	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=24 A

表5 动态特性[1]

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	970	1300	pF	V_{GS}=0 V, V_{DS}=30 V, f=1 MHz
Output capacitance	C_{oss}	-	210	280	pF	V_{GS}=0 V, V_{DS}=30 V, f=1 MHz
Reverse transfer capacitance	C_{rss}	-	12	21	pF	V_{GS}=0 V, V_{DS}=30 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	4	-	ns	V_{DD}=30 V, V_{GS}=10 V, I_D=24 A, $R_{G,ext}$=1.6 Ω
Rise time	t_r	-	3	-	ns	V_{DD}=30 V, V_{GS}=10 V, I_D=24 A, $R_{G,ext}$=1.6 Ω
Turn-off delay time	$t_{d(off)}$	-	14	-	ns	V_{DD}=30 V, V_{GS}=10 V, I_D=24 A, $R_{G,ext}$=1.6 Ω
Fall time	t_f	-	3	-	ns	V_{DD}=30 V, V_{GS}=10 V, I_D=24 A, $R_{G,ext}$=1.6 Ω

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}	-	3	-	nC	V_{DD}=30 V, I_D=24 A, V_{GS}=0 to 4.5 V
Gate charge at threshold	$Q_{g(th)}$	-	2	-	nC	V_{DD}=30 V, I_D=24 A, V_{GS}=0 to 4.5 V
Gate to drain charge[1]	Q_{gd}	-	2	3.5	nC	V_{DD}=30 V, I_D=24 A, V_{GS}=0 to 4.5 V
Switching charge	Q_{sw}	-	4	-	nC	V_{DD}=30 V, I_D=24 A, V_{GS}=0 to 4.5 V
Gate charge total[1]	Q_g	-	7	9.4	nC	V_{DD}=30 V, I_D=24 A, V_{GS}=0 to 4.5 V
Gate plateau voltage	$V_{plateau}$	-	3.1	-	V	V_{DD}=30 V, I_D=24 A, V_{GS}=0 to 4.5 V
Gate charge total, sync. FET	$Q_{g(sync)}$	-	12	-	nC	V_{DS}=0.1 V, V_{GS}=0 to 10 V
Output charge[1]	Q_{oss}	-	13	18	nC	V_{DD}=30 V, V_{GS}=0 V

[1]由设计标定，不受制于生产测试。
[2] 参数定义请参见 栅极电荷波形

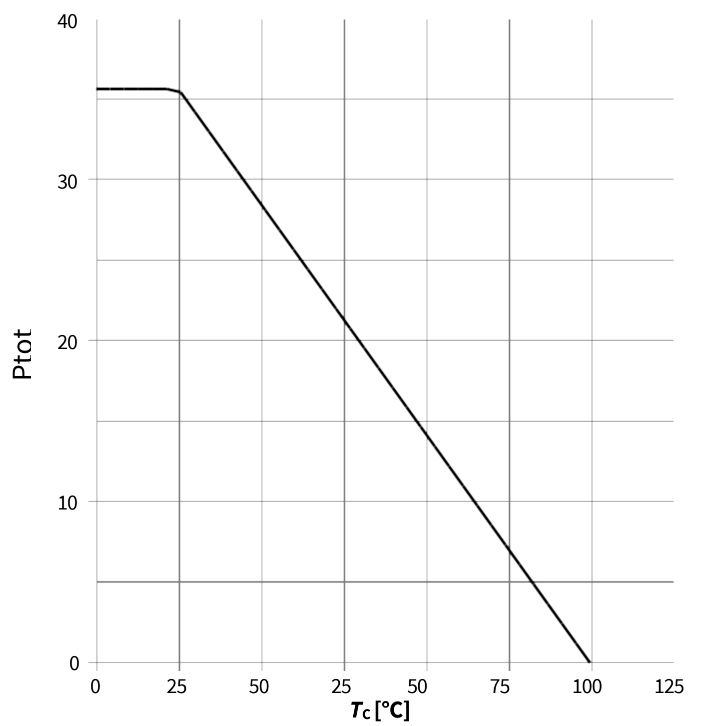
表 7 反向二极管

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	30	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$	-	-	188	A	T_C=25 °C
Diode forward voltage	V_{SD}	-	0.9	1.2	V	V_{GS}=0 V, I_F=24 A, T_j=25 °C
Reverse recovery time[1)]	t_{rr}	-	18	36	ns	V_R=30 V, I_F=24 *A*, di_F/d*t*=100 A/µs
Reverse recovery charge[1)]	Q_{rr}	-	6	12	nC	V_R=30 V, I_F=24 *A*, di_F/d*t*=100 A/µs

[1)]由设计标定，不受制于生产测试。

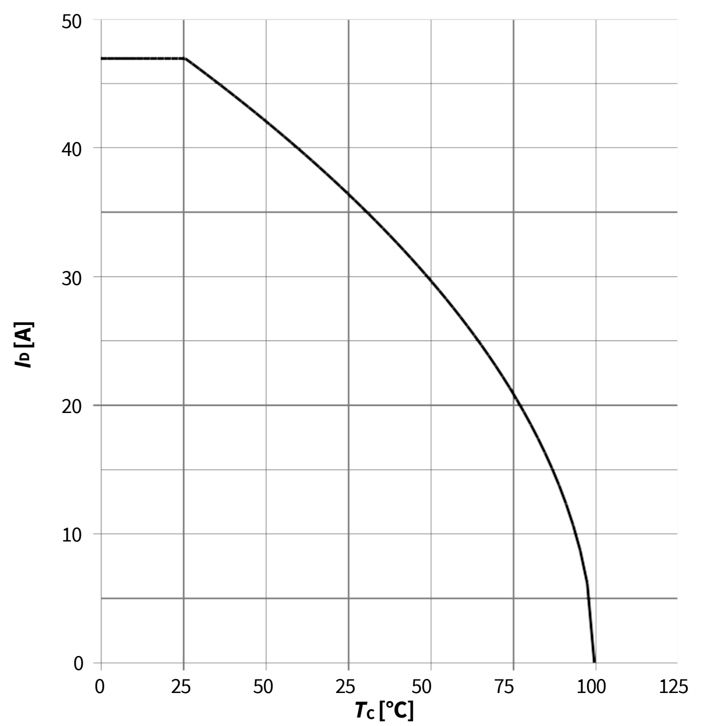
4 电气特性图

图 1：功率耗散



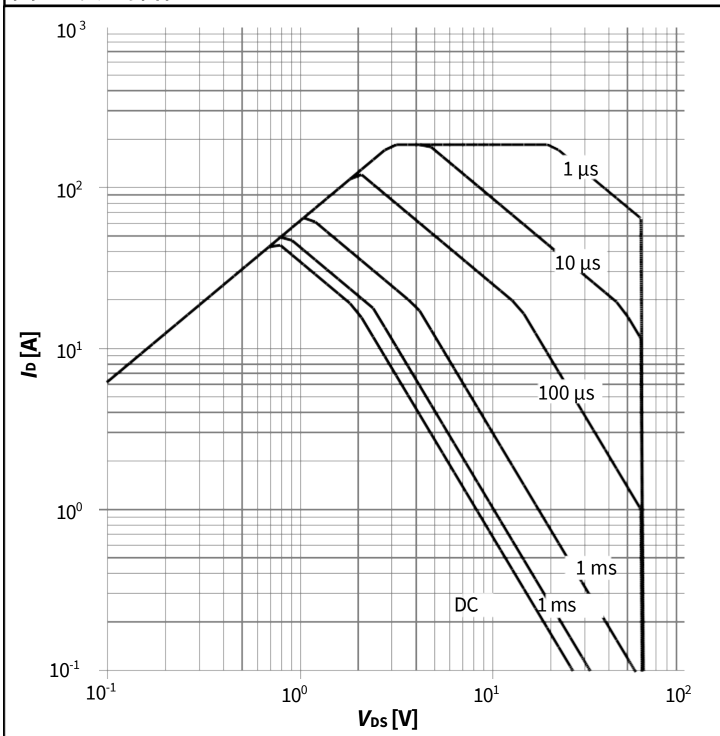
P_{tot}=f(T_C)

图 2：漏极电流



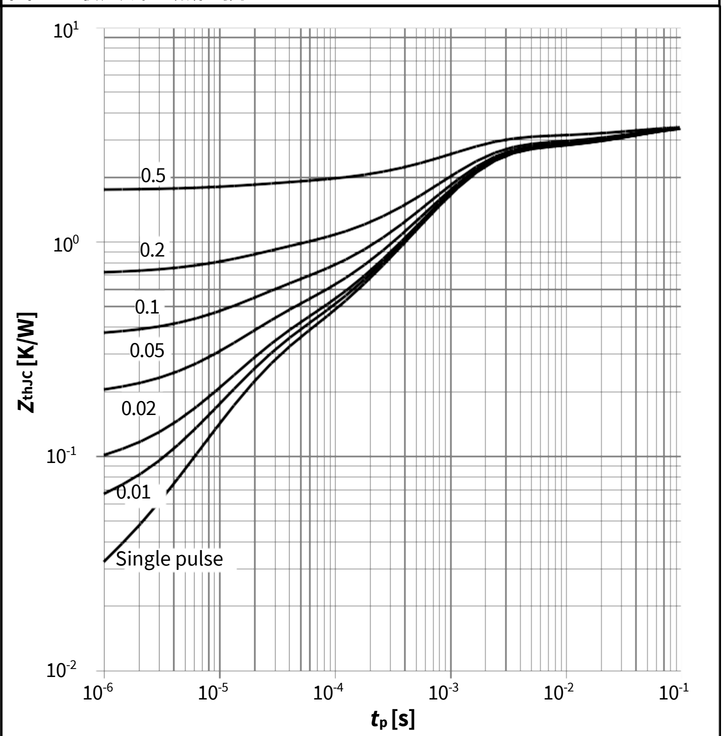
I_D=f(T_C); V_{GS}≥10 V

图 3：安全操作区



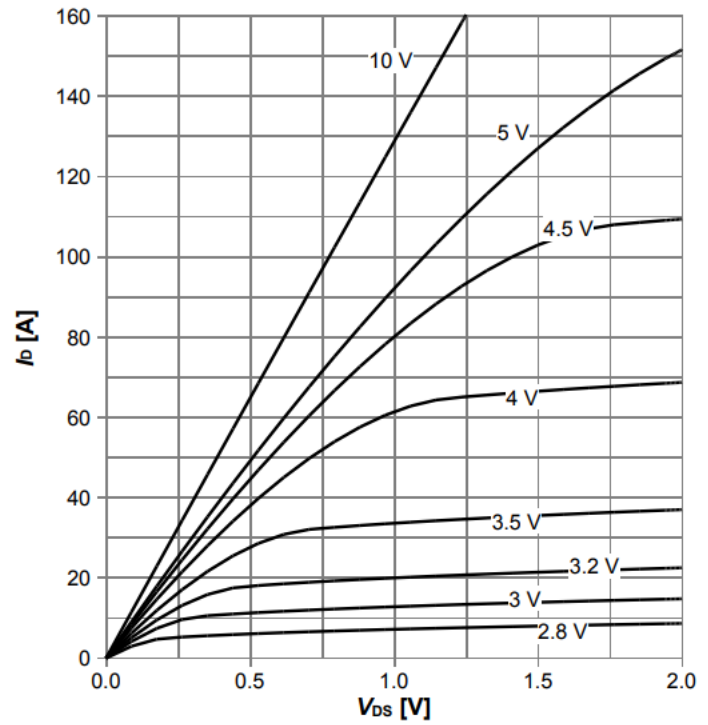
I_D=f(V_{DS}); T_C=25 °C; D=0; 参数：t_p

图 4：最大瞬态热阻抗



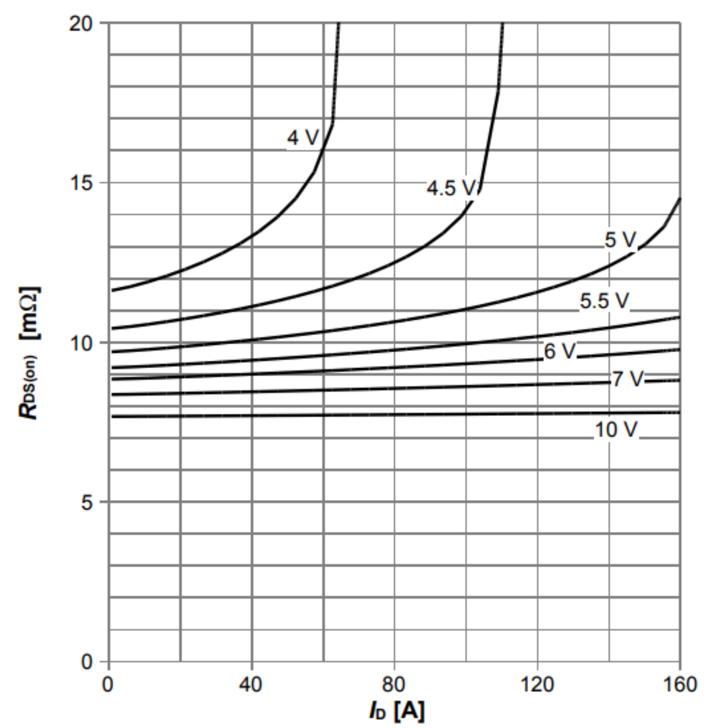
Z_{thJC}=f(t_p); 参数：D=t_p/T

图 5：典型输出特性



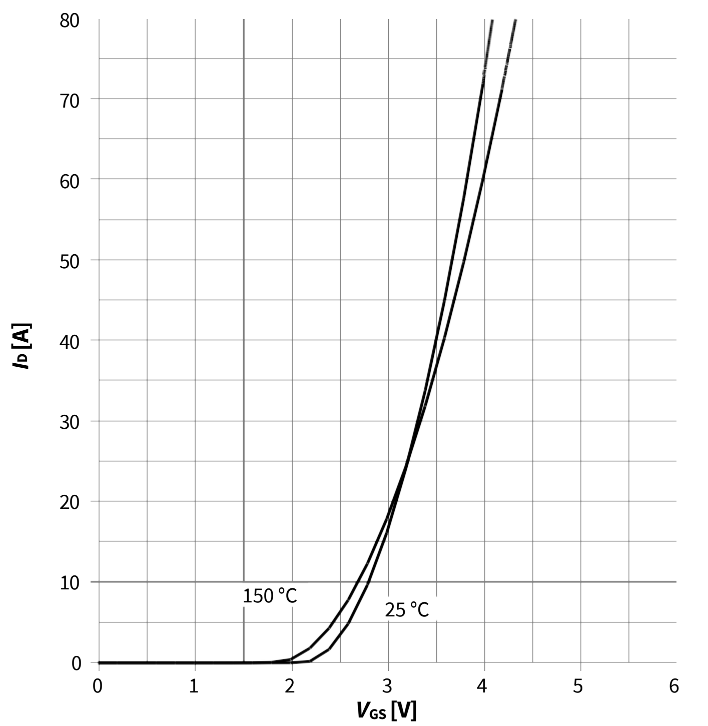
I_D=f(V_{DS}), T_j=25 °C; 参数：V_{GS}

图 6：典型漏源导通电阻



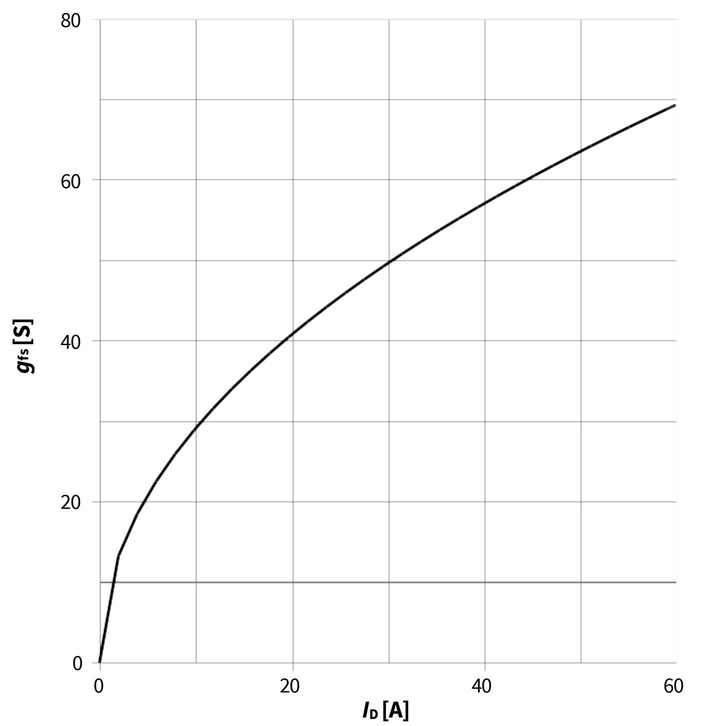
$R_{DS(on)}$=f(I_D), T_j=25 °C; 参数：V_{GS}

图 7：典型转移特性



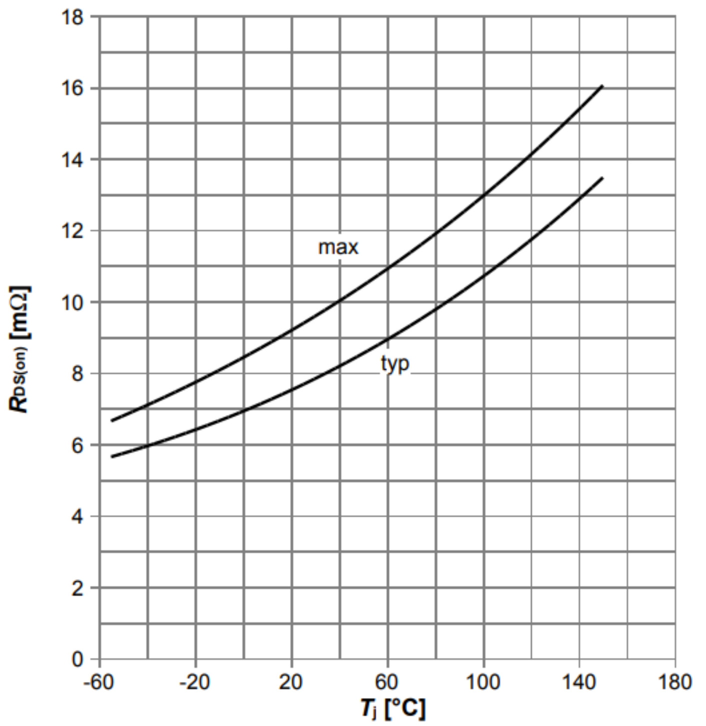
I_D=f(V_{GS}), |V_{DS}|>2|I_D|$R_{DS(on)max}$; 参数：T_j

图 8：典型正向跨导



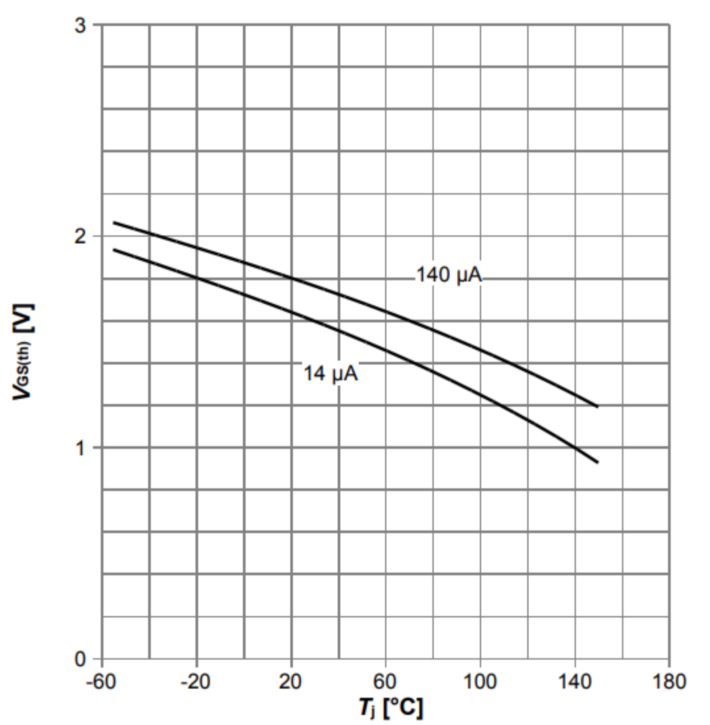
g_{fs}=f(I_D); T_j=25 °C

图 8：漏源导通电阻



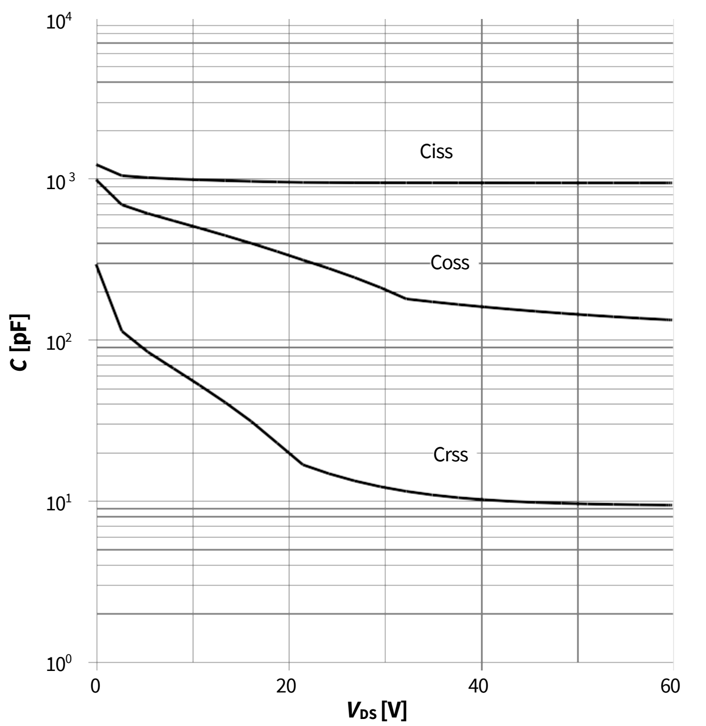
$R_{DS(on)}$=f(T_j), I_D=24 A, V_{GS}=10 V

图 10：典型栅极阈值电压



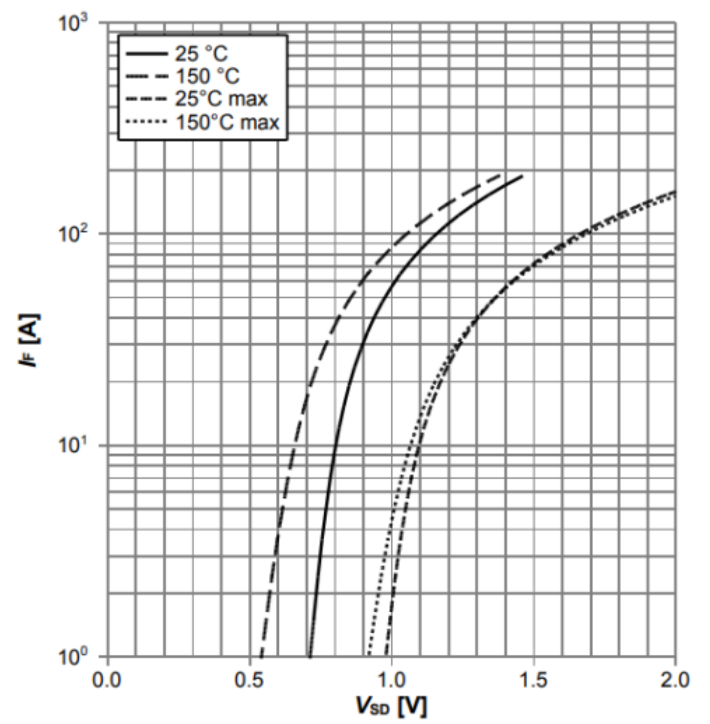
$V_{GS(th)}$ = f (T_j)； V_{GS}

图 11：典型电容值



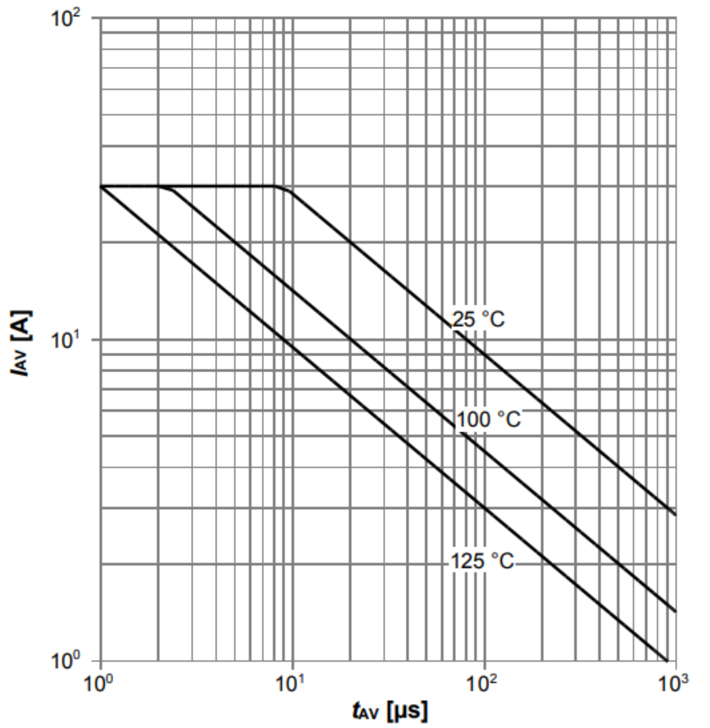
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

图 12：反向二极管的正向特性



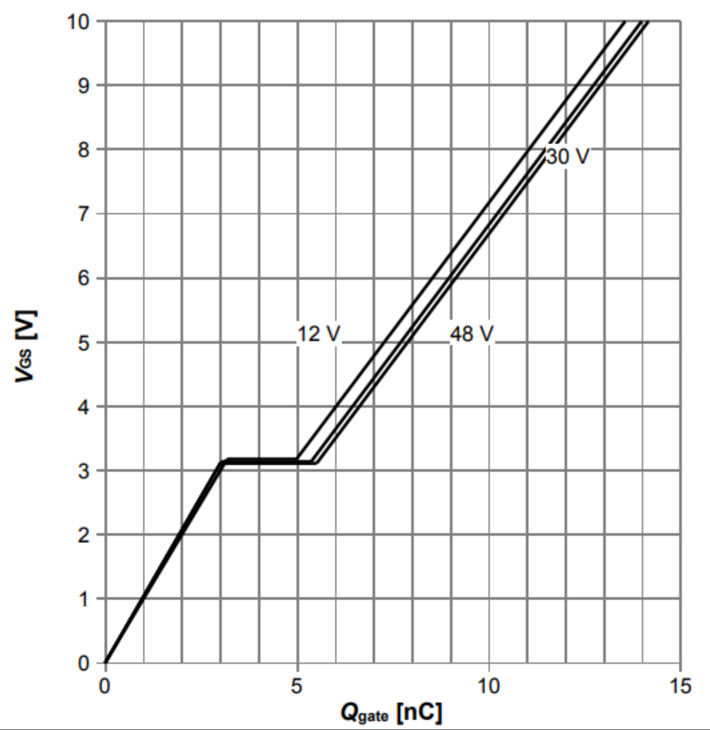
I_F=f(V_{SD}); 参数：T_j

图 13：雪崩特性



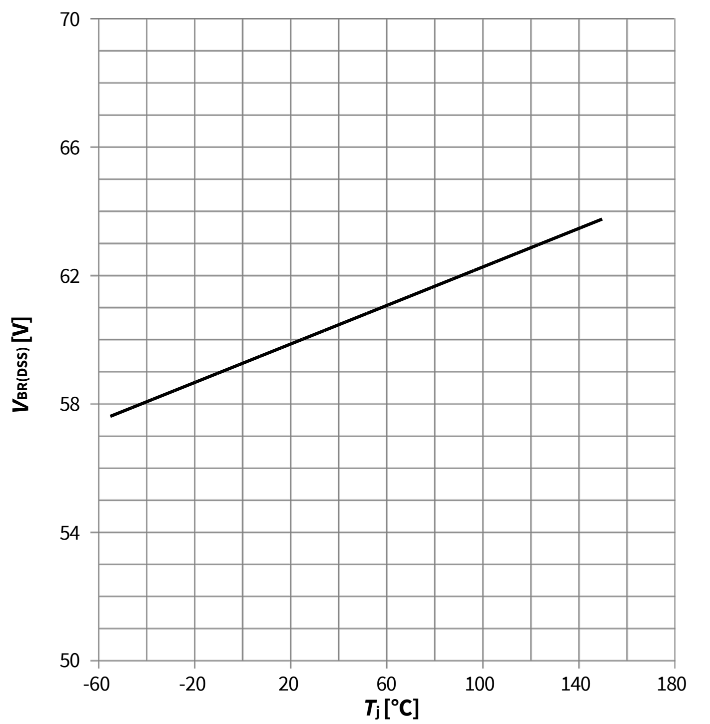
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j(start)}$

图 14：典型栅极电荷



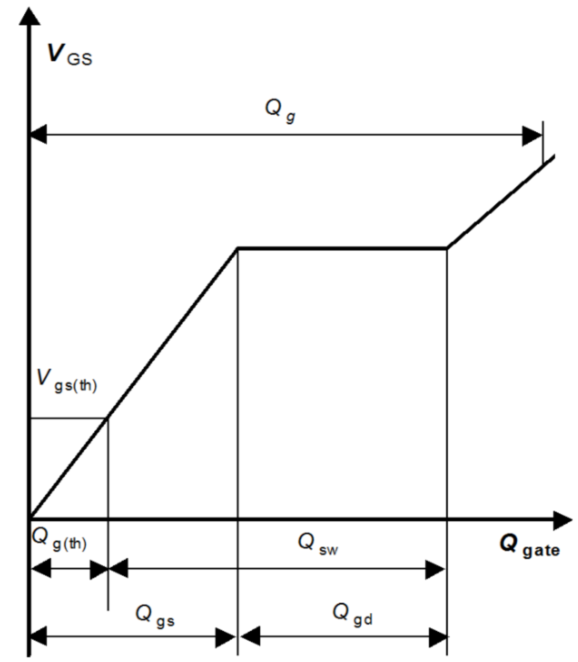
V_{GS}=f(Q_{gate}); I_D=24 A pulsed; parameter: V_{DD}

图 15：漏源击穿电压

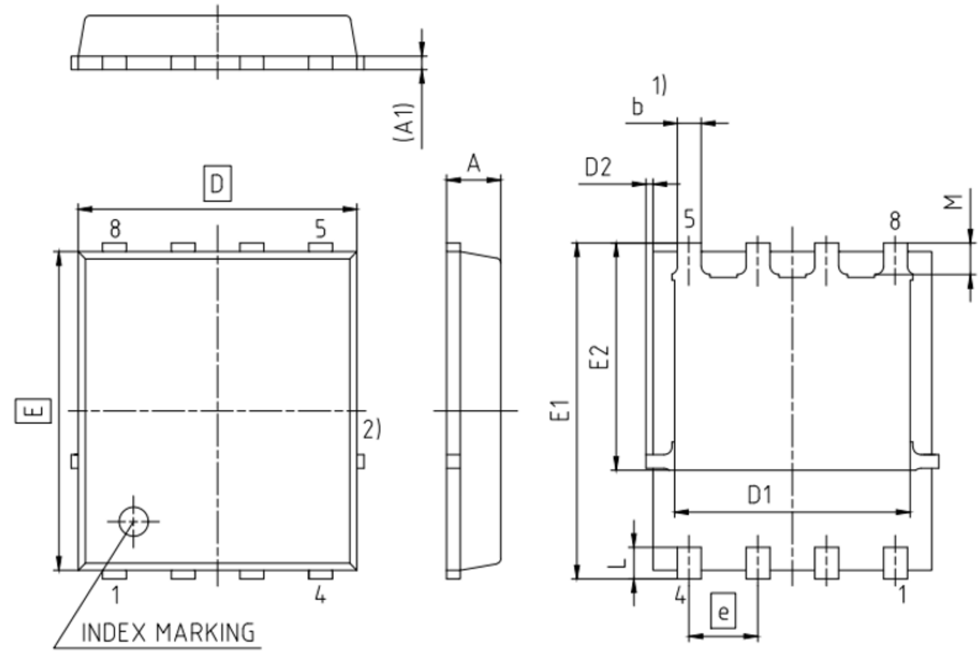


$V_{BR(DSS)}$ = f(T_j); I_D = 1 mA

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	0.00	0.22
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

DOCUMENT NO.
Z8B00003332

REVISION
08

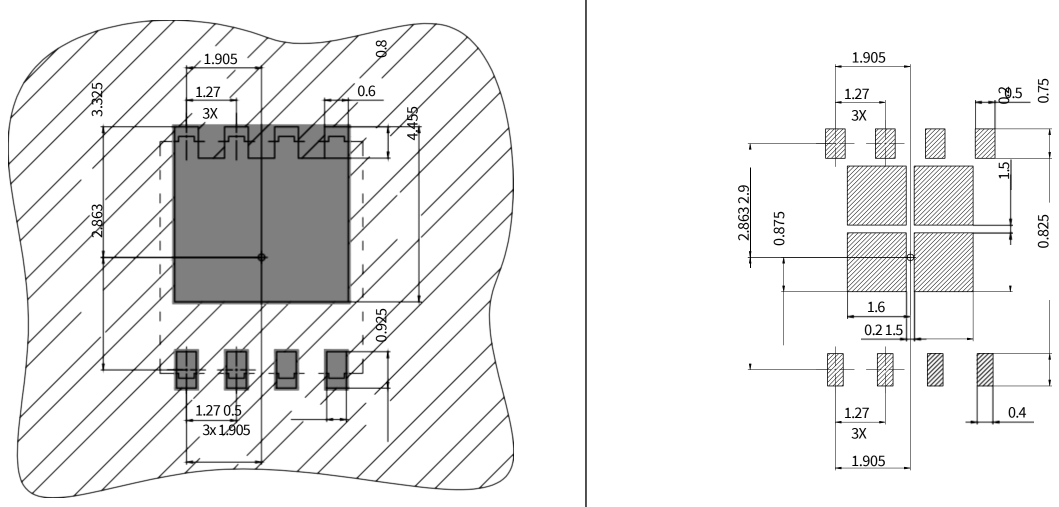
SCALE 10:1
0 1 2 3mm

EUROPEAN PROJECTION

ISSUE DATE
05.11.2019

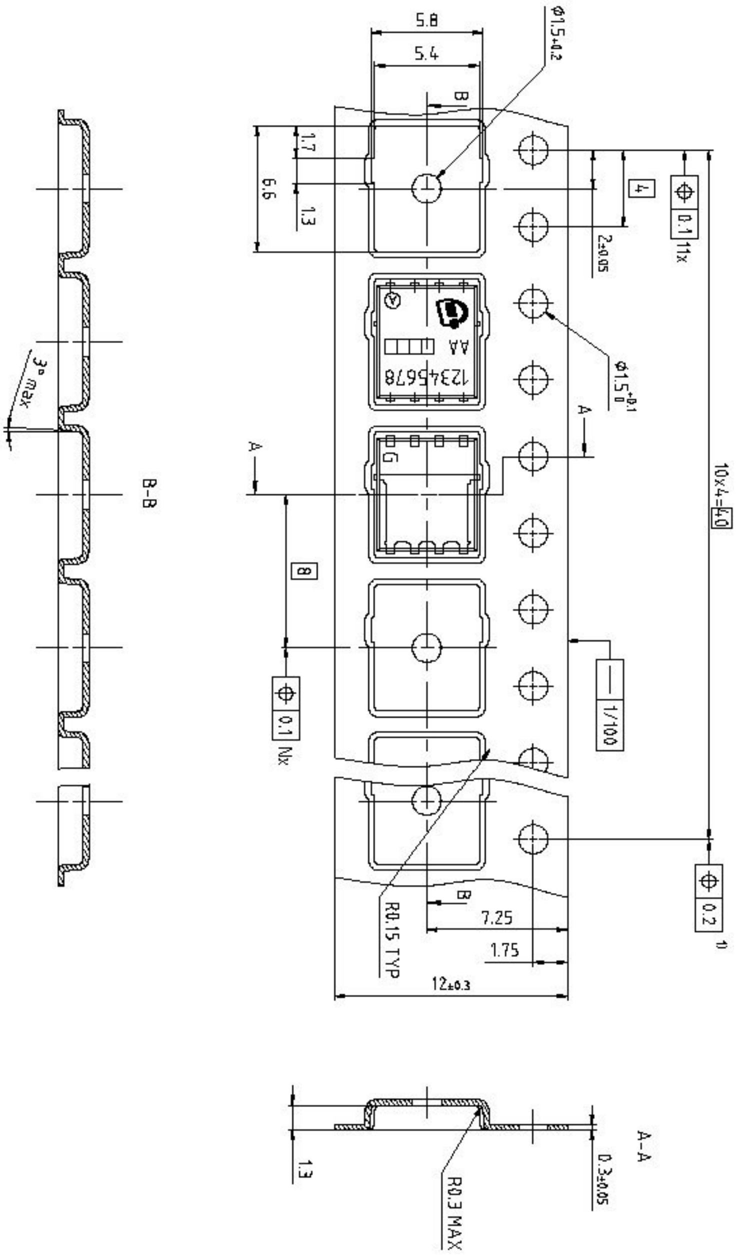
图 1 PG-TDSON-8 外形图，尺寸单位为毫米

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 2 外形板焊盘 (TDSON-8)，尺寸单位为毫米



尺寸（毫米）

图3 封装外形胶带（TDSON-8）

修订记录

BSC094N06LS5

修订：2023-01-13，修订版 2.2

历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.0	2016-09-23	Release of final version
2.1	2020-05-15	Update package drawings
2.2	2023-01-13	Update Marking

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