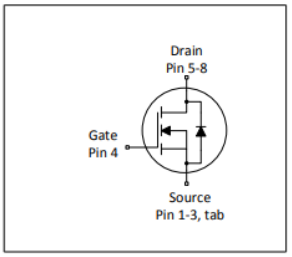
英飞凌MOSFET功率晶体管

英飞凌BSC030N10NS5SC OptiMOS™5 100 V 175°C功率晶体管

特性

- 双面冷却封装，具有最低的结顶热阻抗
- 额定温度为 175°C
- N沟道，正常电平
- 极低的导通电阻 $R_{DS(on)}$
- 卓越的耐热性
- 100% 雪崩测试
- 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}	100	V
$R_{DS(on),max}$	3.0	mΩ
I_D	171	A
Q_{oss}	91	nC
Q_G	70	nC

Type / Ordering Code	Package	Marking	Related Links
BSC030N10NS5SC	PG-WSON-8	030N10SC	-

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目录

1 最大额定值

除非另有规定， T_A = 25 °C

表 2 最大额定值

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current[1]	I_D	- - -	- - -	171 121 22	A	V_{GS}=10 V, T_C=25 °C V_{GS}=10 V, T_C=100 °C V_{GS}=10V,T_A=25°C, R_{thJA}=50°C/W[2]
Pulsed drain current[3]	$I_{D,pulse}$	-	-	684	A	T_A=25 °C
Avalanche energy, single pulse[4]	E_{AS}	-	-	398	mJ	I_D=50 A, R_{GS}=25 Ω
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	- -	- -	188 3.0	W	T_C=25 °C T_A=25 °C, R_{thJA}=50 °C/W[2]
Operating and storage temperature	T_j, T_{stg}	-55	-	175	°C	IEC climatic category; DIN IEC 68-1: 55/175/56

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}	-	0.5	0.8	°C/W	-
Thermal resistance, junction - case, top	R_{thJC}	-	0.36	0.72	°C/W	-
Thermal resistance, junction - ambient, 6 cm² cooling area[2]	R_{thJA}	-	-	50	°C/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] 器件安装在 40 mm x 40 mm x 1.5 mm环氧树脂印刷电路板 FR4 上，漏极连接用铜面积为 6 cm² （一层，70 µm厚）。印刷电路板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

3 电气特性

除非另有规定， T_j = 25 °C

表4 静态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	100	-	-	V	V_{GS}=0 V, I_D=1 mA
Gate threshold voltage	$V_{GS(th)}$	2.2	3.0	3.8	V	V_{DS}=V_{GS}, I_D=115 µA
Zero gate voltage drain current	I_{DSS}	- -	0.1 10	1 100	µA	V_{DS}=100 V, V_{GS}=0 V, T_j=25 °C V_{DS}=100 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	$R_{DS(on)}$	- -	2.6 3.2	3.0 4.3	mΩ	V_{GS}=10 V, I_D=50 A V_{GS}=6 V, I_D=25 A
Gate resistance	R_G	-	1.5	2.3	Ω	-
Transconductance	g_{fs}	65	130	-	S	$\|V_{DS}\|\geq 2\|I_D\|R_{DS(on)max}$, I_D=50 A

表 5 动态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	5000	6500	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Output capacitance[1)]	C_{oss}	-	770	1000	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Reverse transfer capacitance[1)]	C_{rss}	-	34	60	pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Turn-on delay time	$t_{d(on)}$	-	22	-	ns	V_{DD}=50 V, V_{GS}=10 V, I_D=50 A, $R_{G,ext}$=1.6 Ω
Rise time	t_r	-	13	-	ns	V_{DD}=50 V, V_{GS}=10 V, I_D=50 A, $R_{G,ext}$=1.6 Ω
Turn-off delay time	$t_{d(off)}$	-	47	-	ns	V_{DD}=50 V, V_{GS}=10 V, I_D=50 A, $R_{G,ext}$=1.6 Ω
Fall time	t_f	-	15	-	ns	V_{DD}=50 V, V_{GS}=10 V, I_D=50 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}	-	22	-	nC	V_{DD}=50 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge at threshold	$Q_{g(th)}$	-	15	-	nC	V_{DD}=50 V, I_D=50 A, V_{GS}=0 to 10 V
Gate to drain charge[1)]	Q_{gd}	-	14	21	nC	V_{DD}=50 V, I_D=50 A, V_{GS}=0 to 10 V
Switching charge	Q_{sw}	-	22	-	nC	V_{DD}=50 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge total[1)]	Q_g	-	70	88	nC	V_{DD}=50 V, I_D=50 A, V_{GS}=0 to 10 V
Gate plateau voltage	$V_{plateau}$	-	4.5	-	V	V_{DD}=50 V, I_D=50 A, V_{GS}=0 to 10 V
Gate charge total, sync. FET	$Q_{g(sync)}$	-	61	-	nC	V_{DS}=0.1 V, V_{GS}=0 to 10 V
Output charge[1)]	Q_{oss}	-	91	121	nC	V_{DS}=50 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”

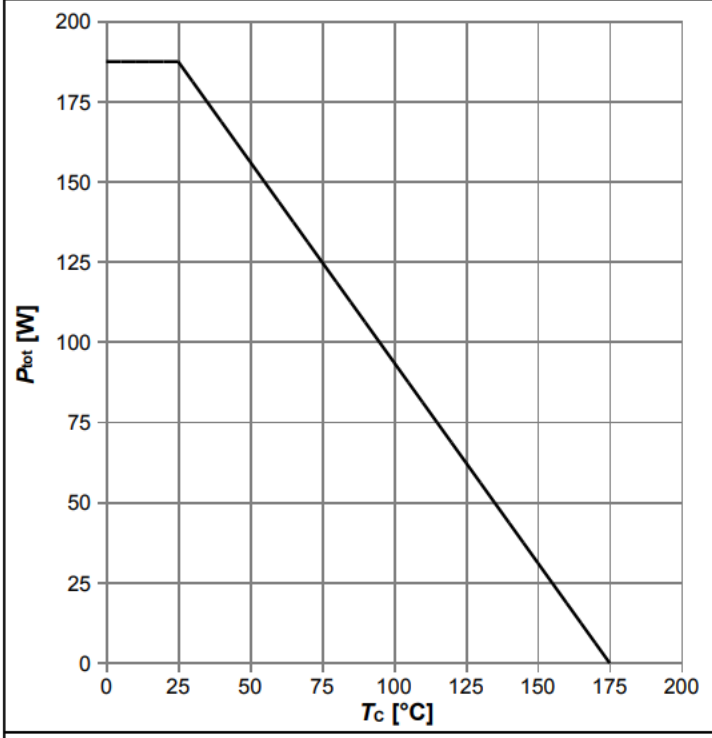
表 7　　反向二极管

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	148	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$	-	-	684	A	T_C=25 °C
Diode forward voltage	V_{SD}	-	0.84	1.1	V	V_{GS}=0 V, I_F=50 A, T_j=25 °C
Reverse recovery time[1)]	t_{rr}	-	62	124	ns	V_R=50 V, I_F=50 A, di_F/dt=100 A/µs
Reverse recovery charge[1)]	Q_{rr}	-	122	244	nC	V_R=50 V, I_F=50 A, di_F/dt=100 A/µs

[1)]由设计标定，不受制于生产测试。

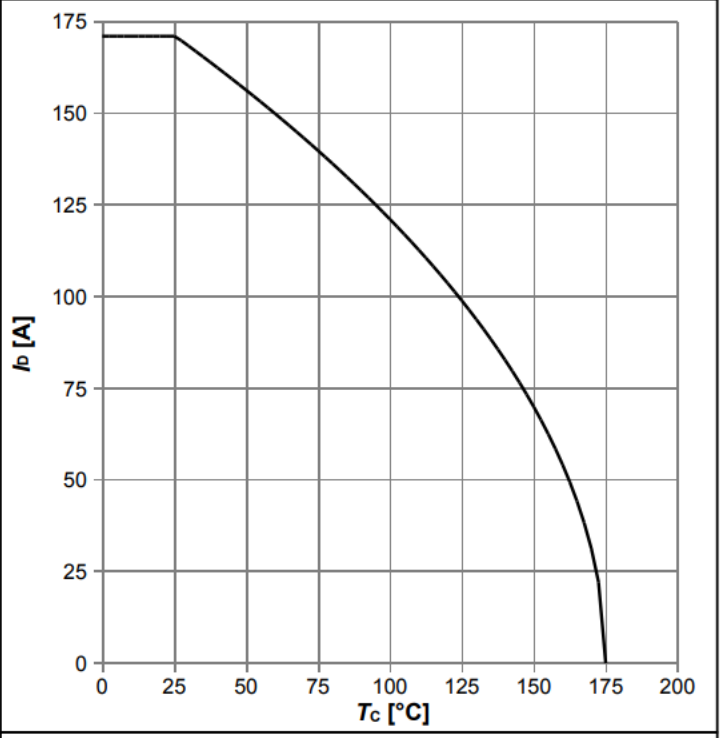
4 电气特性图

Diagram 1: Power dissipation



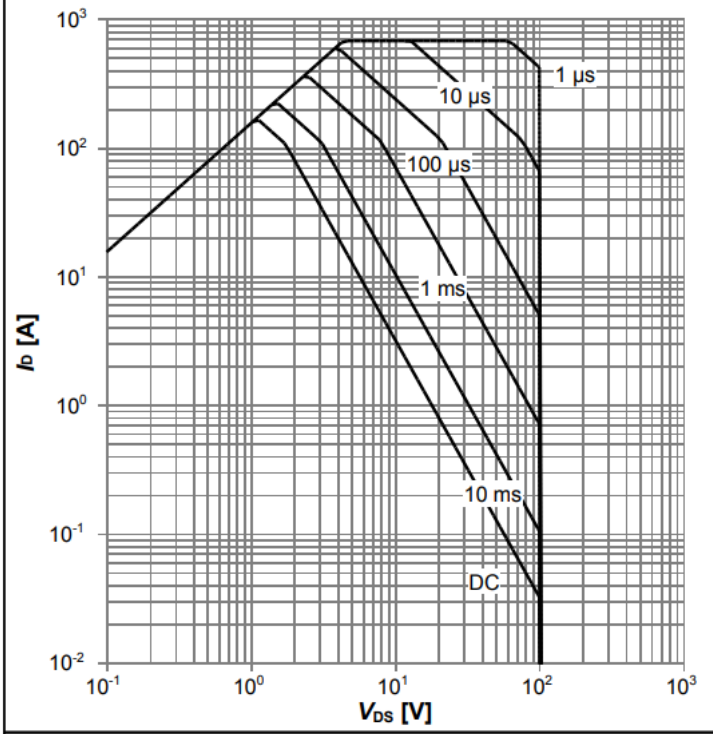
$P_{tot}=f(T_C)$

Diagram 2: Drain current



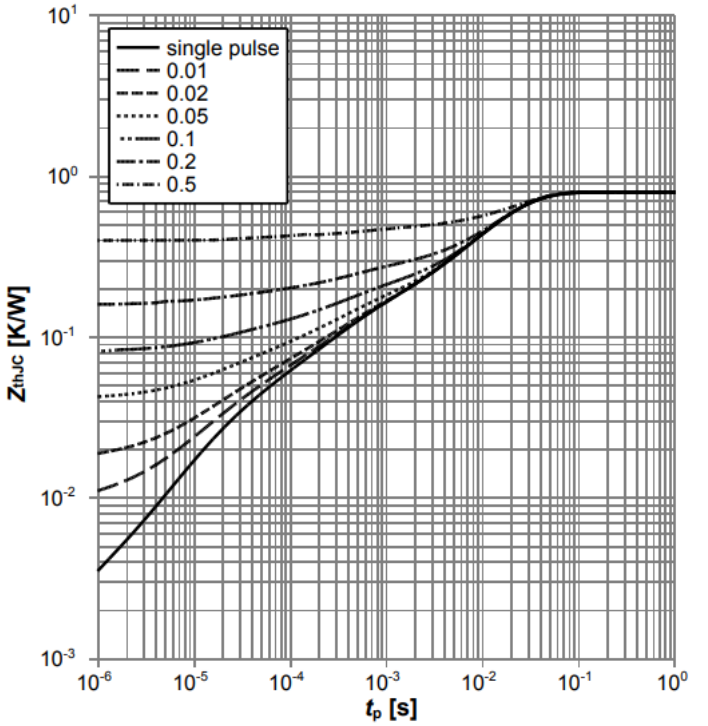
$I_D=f(T_C)$; $V_{GS}\geq 10$ V

Diagram 3: Safe operating area



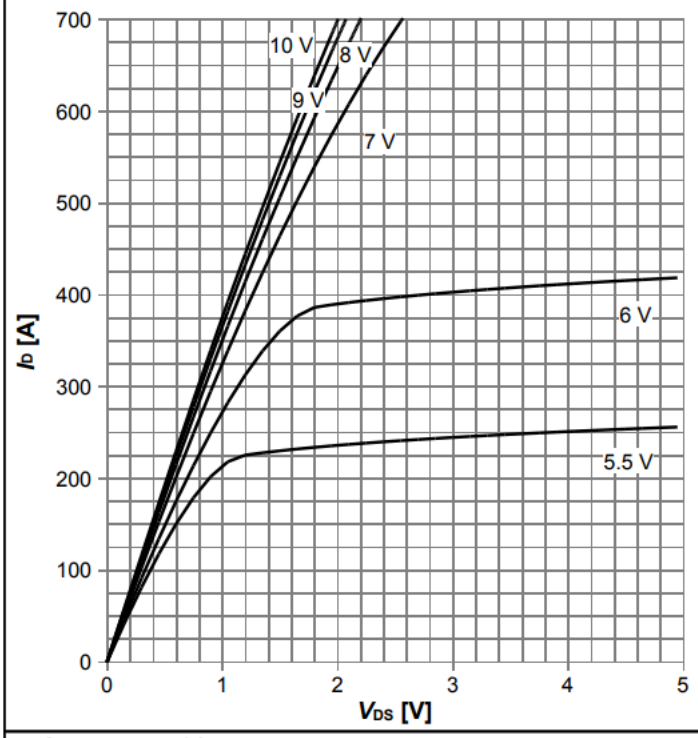
$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$; parameter: t_p

Diagram 4: Max. transient thermal impedance



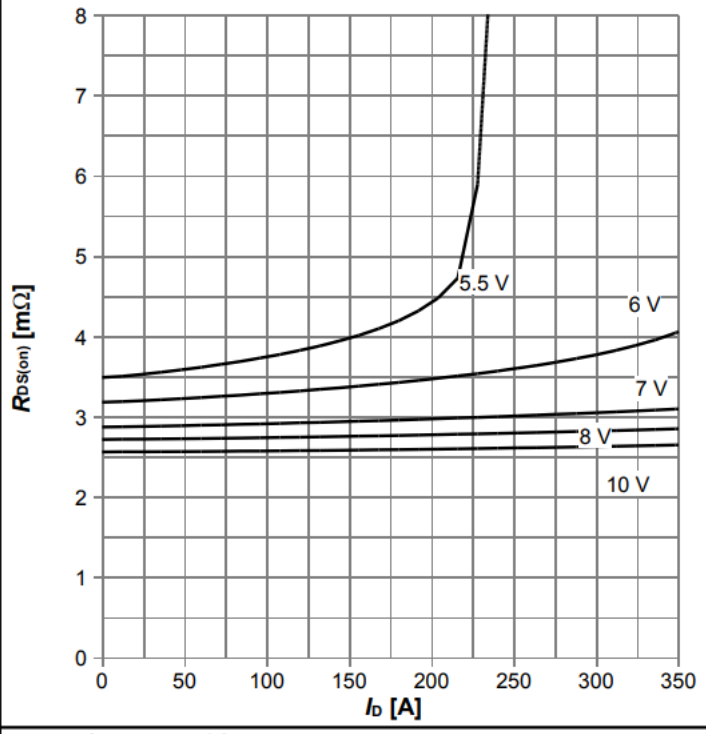
$Z_{thJC}=f(t_p)$; parameter: $D=t_p/T$

Diagram 5: Typ. output characteristics



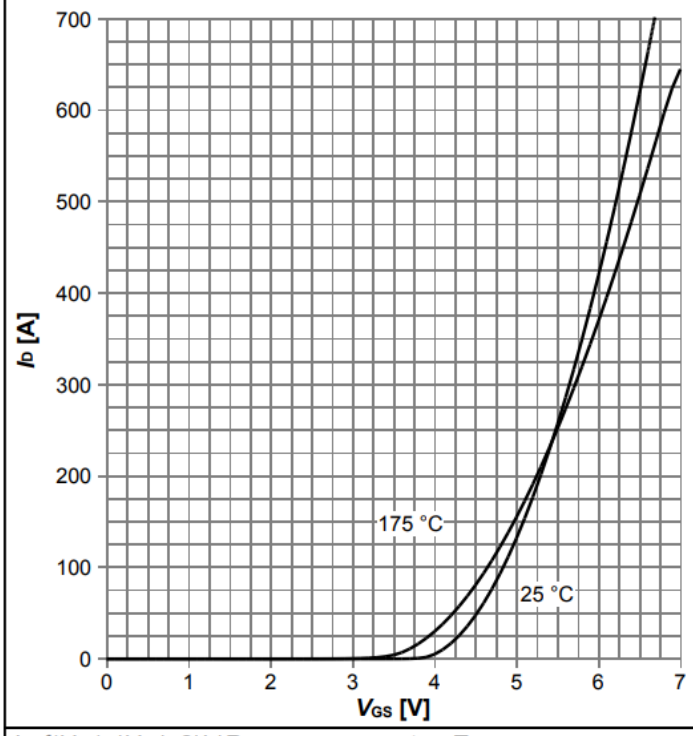
I_D=f(V_{DS}), T_j=25 °C; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



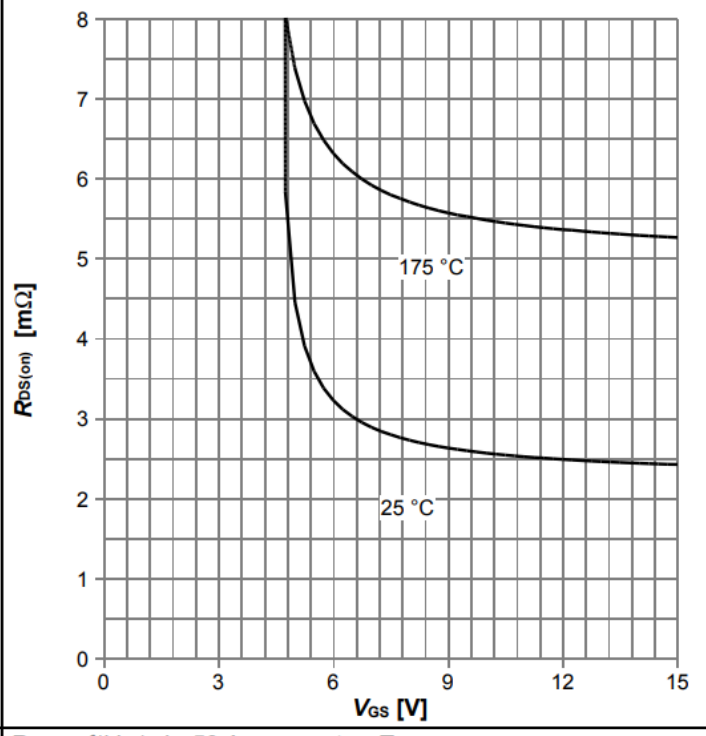
$R_{DS(on)}$=f(I_D), T_j=25 °C; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



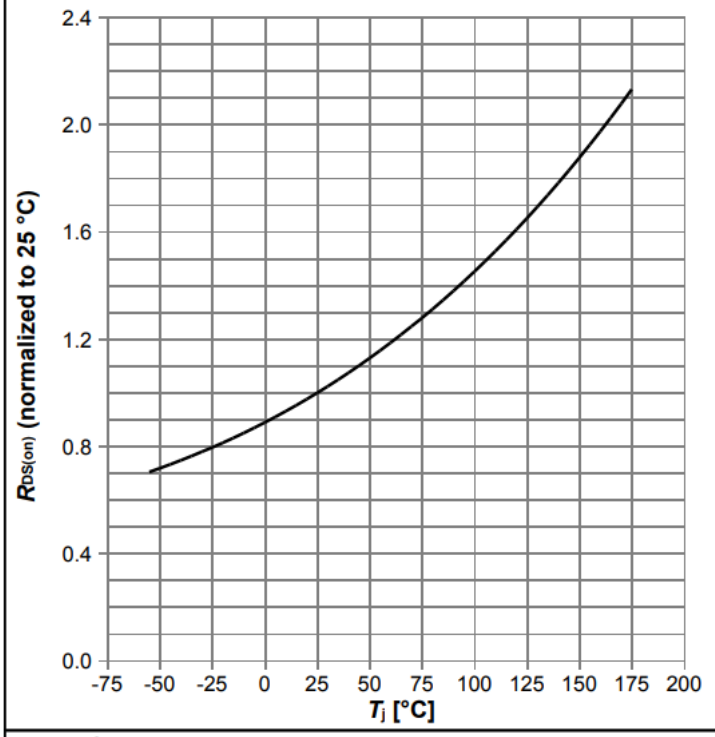
I_D=f(V_{GS}), |V_{DS}|>2|I_D|$R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. drain-source on resistance



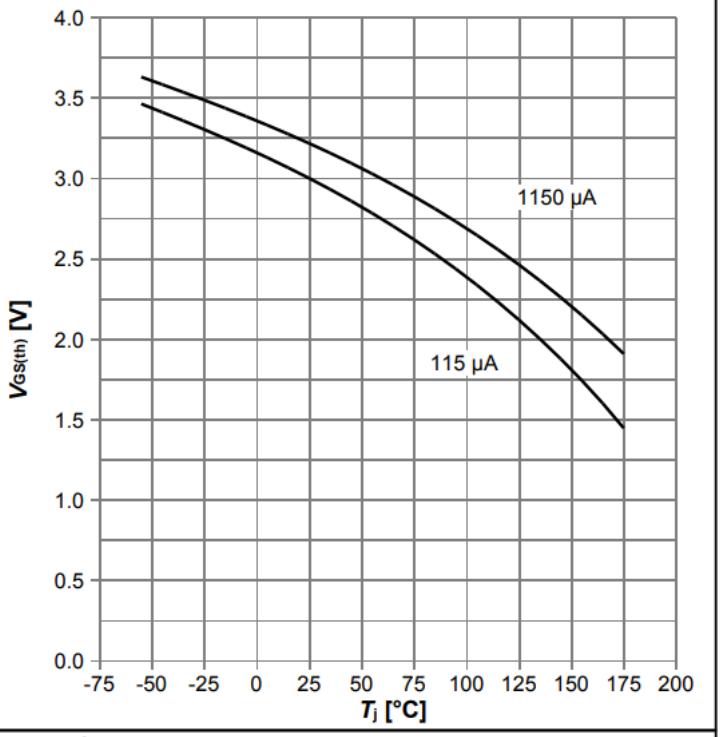
$R_{DS(on)}$=f(V_{GS}), I_D=50 A; parameter: T_j

Diagram 9: Normalized drain-source on resistance



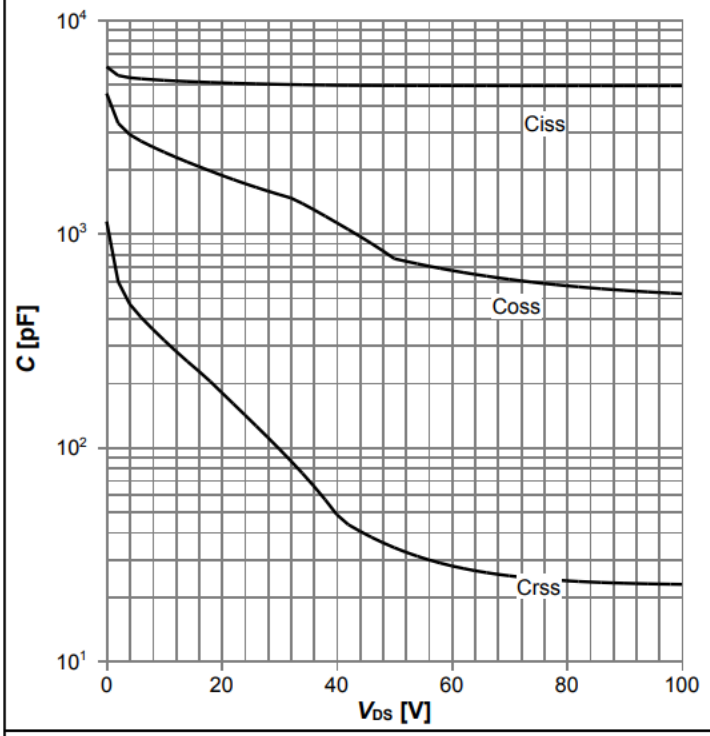
$R_{DS(on)}=f(T_j)$, I_D=50 A, V_{GS}=10 V

Diagram 10: Typ. gate threshold voltage



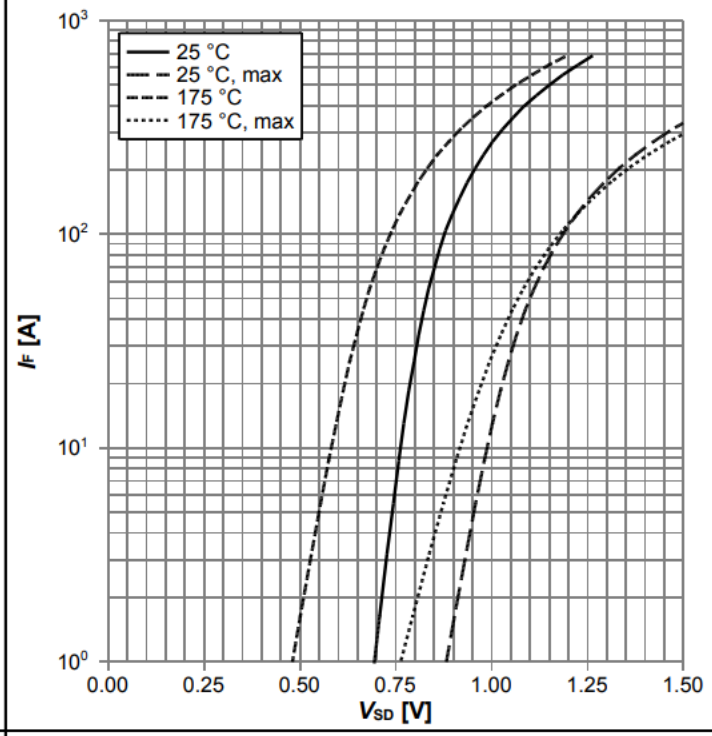
$V_{GS(th)}=f(T_j)$, $V_{GS}=V_{DS}$; parameter: I_D

Diagram 11: Typ. capacitances



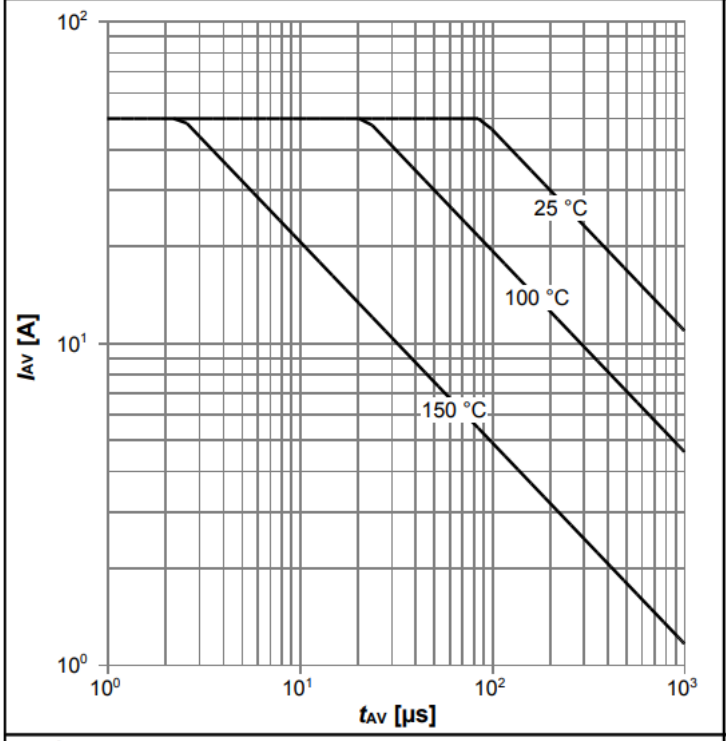
$C=f(V_{DS})$; V_{GS}=0 V; f=1 MHz

Diagram 12: Forward characteristics of reverse diode



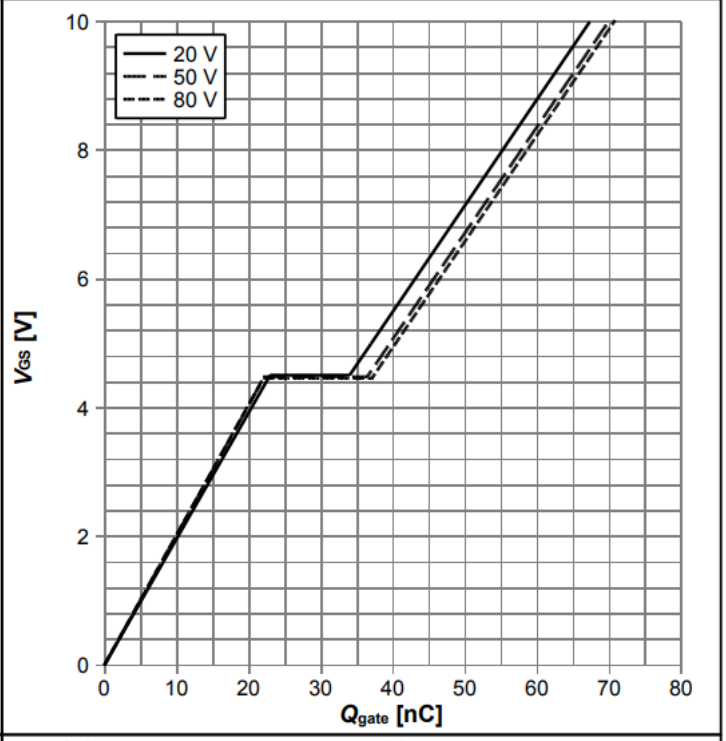
$I_F=f(V_{SD})$; parameter: T_j

Diagram 13: Avalanche characteristics



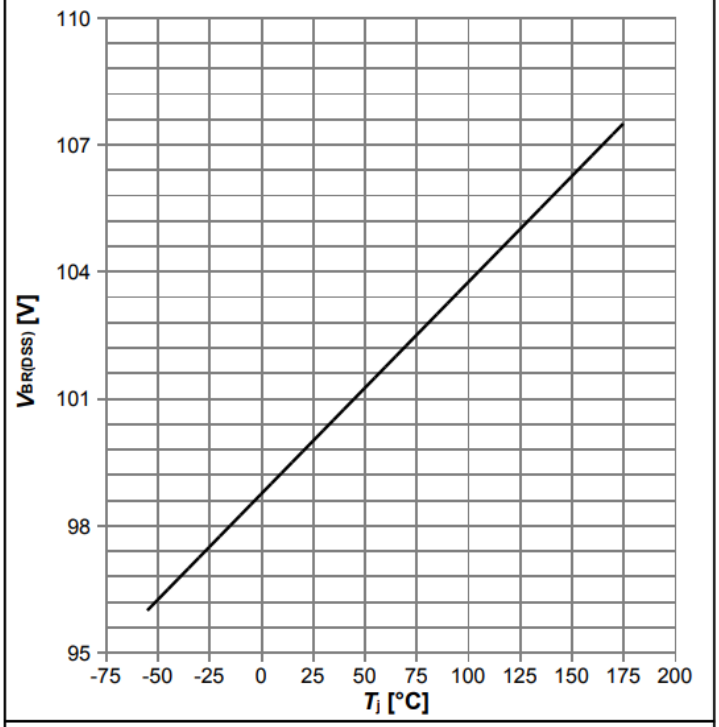
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



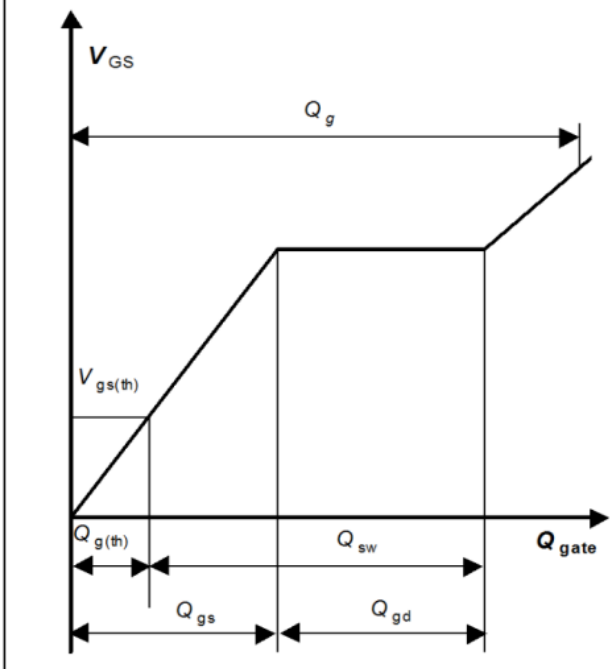
$V_{GS}=f(Q_{gate})$, $I_D=50$ A pulsed, $T_j=25$ °C; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage

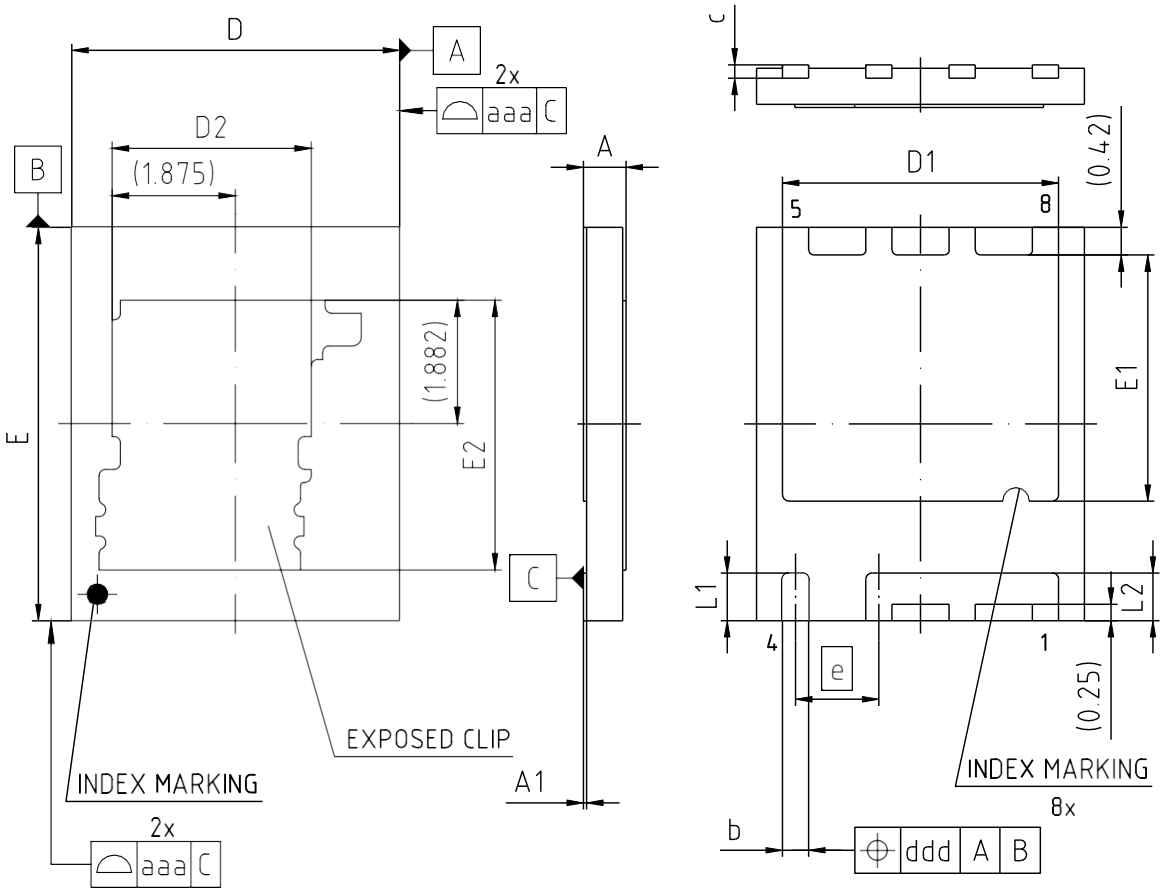


$V_{BR(DSS)}=f(T_j)$; $I_D=1$ mA

Diagram Gate charge waveforms



5 封装外形



DIMENSIONS DOES NOT INCLUDE MOLD FLASH OR MOLD PROTRUSIONS.

DIMENSION	MILLIMETERS	
	MIN.	MAX.
A	-	0.75
A1	-	0.05
b	0.35	0.45
c	0.203	
D	4.95	5.05
D1	4.11	4.31
D2	3.03	
E	5.95	6.05
E1	3.66	3.86
E2	4.11	
e	1.27	
L1	0.675	0.775
L2	0.625	0.825
aaa	0.05	
ddd	0.10	

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图 1 PG-WSON-8 外形图，尺寸单位为毫米

修订记录

BSC030N10NS5SC

Revision: 2022-10-07, Rev. 2.1

历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.0	2022-09-17	Release of final version
2.1	2022-10-07	Update "Features"

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