

英飞凌MOSFET功率晶体管

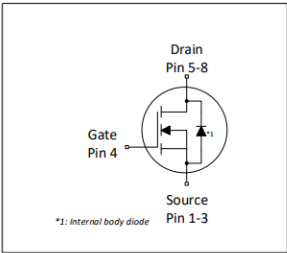
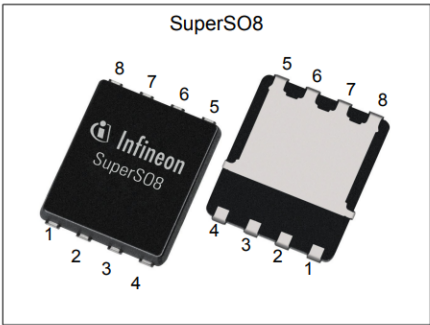
英飞凌BSC520N15NS3 G OptiMOS™ 3 150 V 150°C功率晶体管

特性

- 针对dc-dc转换进行了优化
- N沟道，正常电平
- 出色的栅极电荷 $\times R_{DS(on)}$ 乘积 (FOM)
- 极低的导通电阻 $R_{DS(on)}$
- 工作温度150°C
- 无铅镀层；符合RoHS标准
- 符合 JEDEC ¹⁾ 的目标应用要求
- 符合 IEC61249-2-21 标准的无卤素

表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	150	V
$R_{DS(on),max}$	52	mΩ
I_D	21	A



Type / Ordering Code	Package	Marking	Related Links
BSC520N15NS3 G	PG-TDSON-8	520N15NS	-

¹⁾ J-STD20 和 JESD22

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1 最大额定值

除非另有规定, $T_A = 25\text{ °C}$

表 2 最大额定值

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current	I_D	-	-	21 14	A	$T_C = 25\text{ °C}$ $T_C = 100\text{ °C}$
Pulsed drain current ¹⁾	$I_{D,pulse}$	-	-	84	A	$T_C = 25\text{ °C}$
Avalanche energy, single pulse	E_{AS}	-	-	60	mJ	$I_D = 18\text{ A}$, $R_{GS} = 25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	57	W	$T_C = 25\text{ °C}$
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	R_{thJC}	-	-	2.2	K/W	-
Thermal resistance, junction - ambient, 6 cm ² cooling area ²⁾	R_{thJA}	-	-	50	K/W	-

3 电气特性

除非另有规定, $T_j = 25\text{ °C}$

表4 静态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	150	-	-	V	$V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	$V_{DS} = V_{GS}$, $I_D = 35\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.01 10	1 100	μA	$V_{DS} = 120\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 25\text{ °C}$ $V_{DS} = 120\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	1	100	nA	$V_{GS} = 20\text{ V}$, $V_{DS} = 0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	42 42	52 52	m Ω	$V_{GS} = 10\text{ V}$, $I_D = 18\text{ A}$ $V_{GS} = 8\text{ V}$, $I_D = 9\text{ A}$
Gate resistance	R_G	-	2.1	-	Ω	-
Transconductance	g_{fs}	11	21	-	S	$ V_{DS} > 2 I_D R_{DS(on)max}$, $I_D = 18\text{ A}$

¹⁾ 参见图3

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。

表 5 动态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	670	890	pF	$V_{GS}=0\text{ V}$, $V_{DS}=75\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}	-	80	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=75\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	3.4	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=75\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	7	-	ns	$V_{DD}=75\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=9\text{ A}$, $R_G=1.6\ \Omega$
Rise time	t_r	-	4	-	ns	$V_{DD}=75\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=9\text{ A}$, $R_G=1.6\ \Omega$
Turn-off delay time	$t_{d(off)}$	-	10	-	ns	$V_{DD}=75\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=9\text{ A}$, $R_G=1.6\ \Omega$
Fall time	t_f	-	3	-	ns	$V_{DD}=75\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=9\text{ A}$, $R_G=1.6\ \Omega$

表6 栅极电荷特性¹⁾

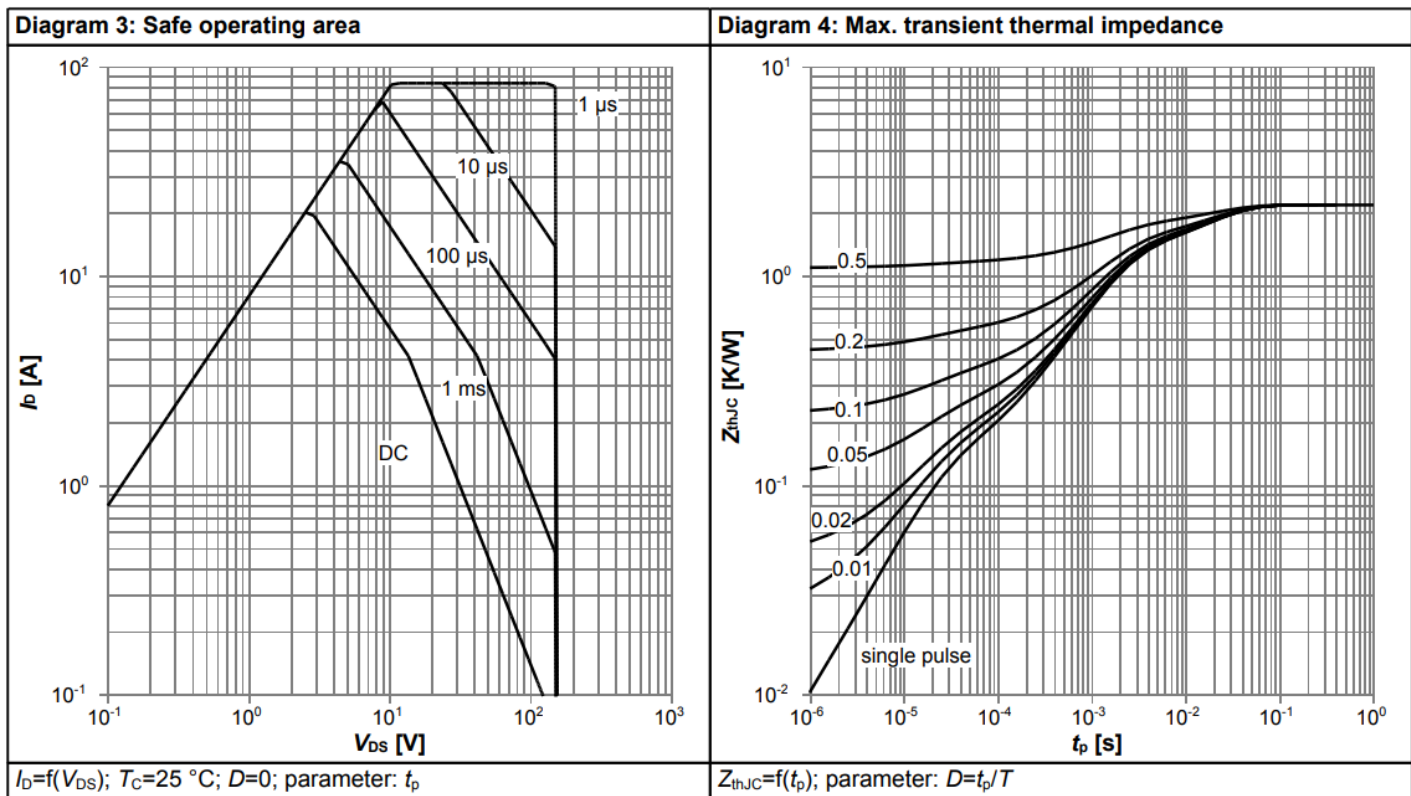
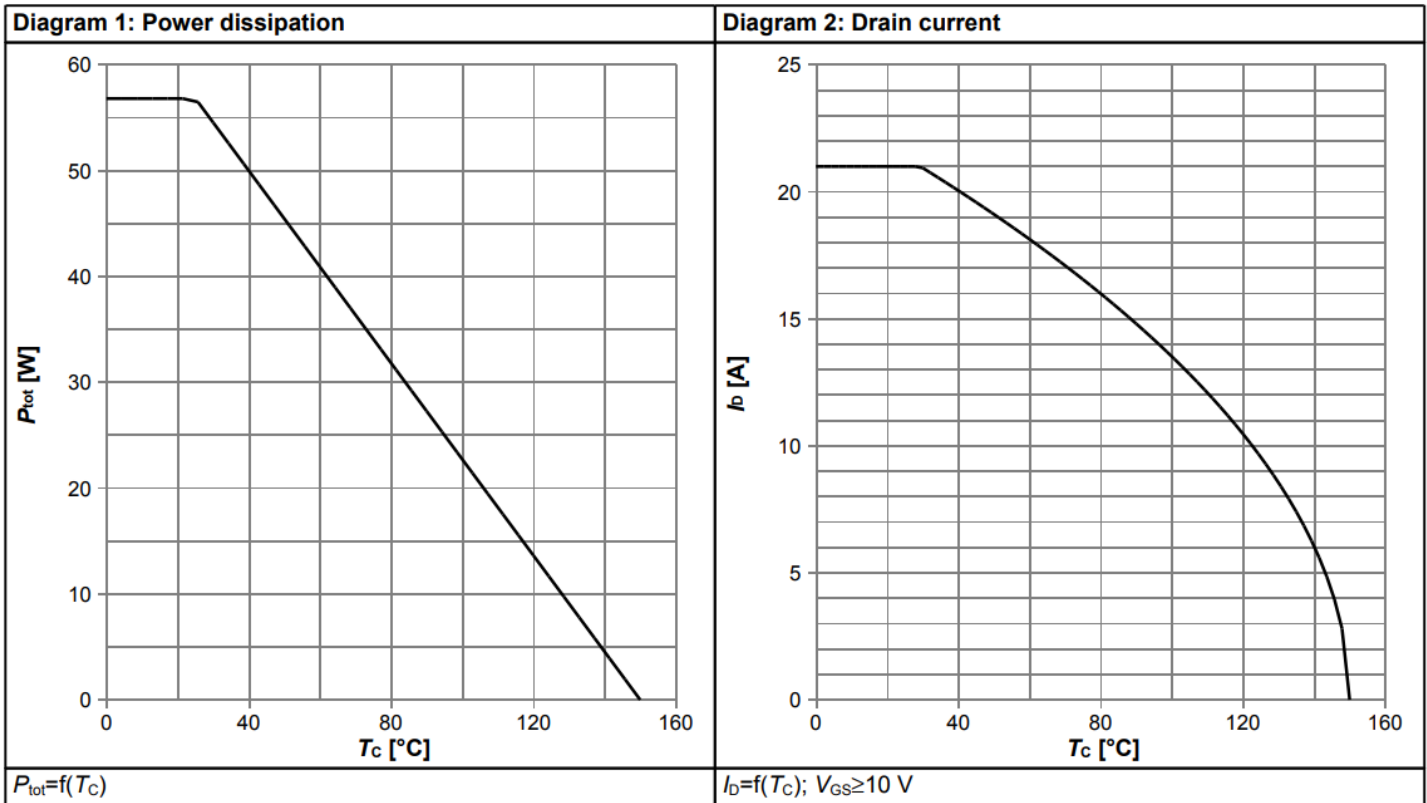
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	3.5	4.6	nC	$V_{DD}=75\text{ V}$, $I_D=9\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge	Q_{gd}	-	1.5	-	nC	$V_{DD}=75\text{ V}$, $I_D=9\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	3	-	nC	$V_{DD}=75\text{ V}$, $I_D=9\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total	Q_g	-	8.7	12	nC	$V_{DD}=75\text{ V}$, $I_D=9\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	5.2	-	V	$V_{DD}=75\text{ V}$, $I_D=9\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Output charge	Q_{oss}	-	22	29	nC	$V_{DD}=75\text{ V}$, $V_{GS}=0\text{ V}$

表 7 反向二极管

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	21	A	$T_C=25\text{ }^\circ\text{C}$
Diode pulse current	$I_{S,pulse}$	-	-	84	A	$T_C=25\text{ }^\circ\text{C}$
Diode forward voltage	V_{SD}	-	0.9	1.2	V	$V_{GS}=0\text{ V}$, $I_F=21\text{ A}$, $T_J=25\text{ }^\circ\text{C}$
Reverse recovery time	t_{rr}	-	66	-	ns	$V_R=50\text{ V}$, $I_F=9\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}	-	226	-	nC	$V_R=50\text{ V}$, $I_F=9\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$

¹⁾参数定义请参见“栅极充电波形”

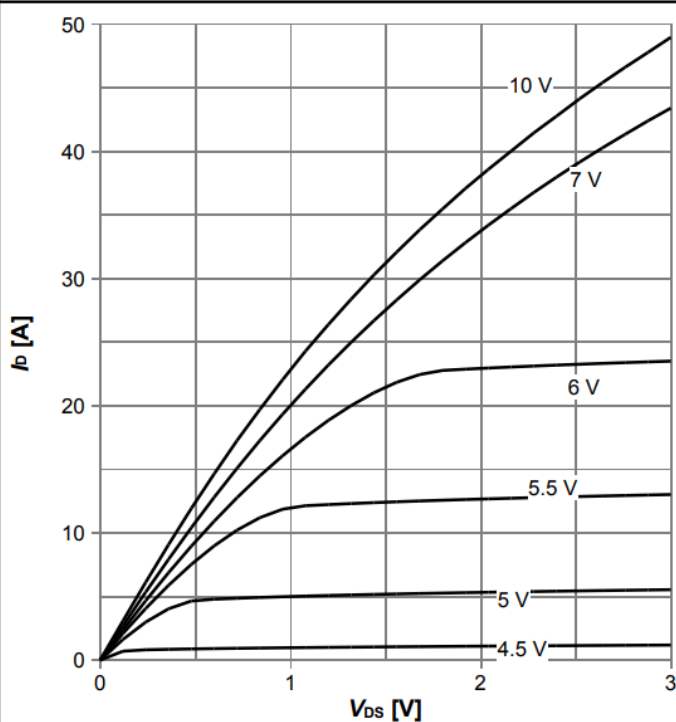
4 电气特性图



OptiMOS™ 3 Power-Transistor, 150 V

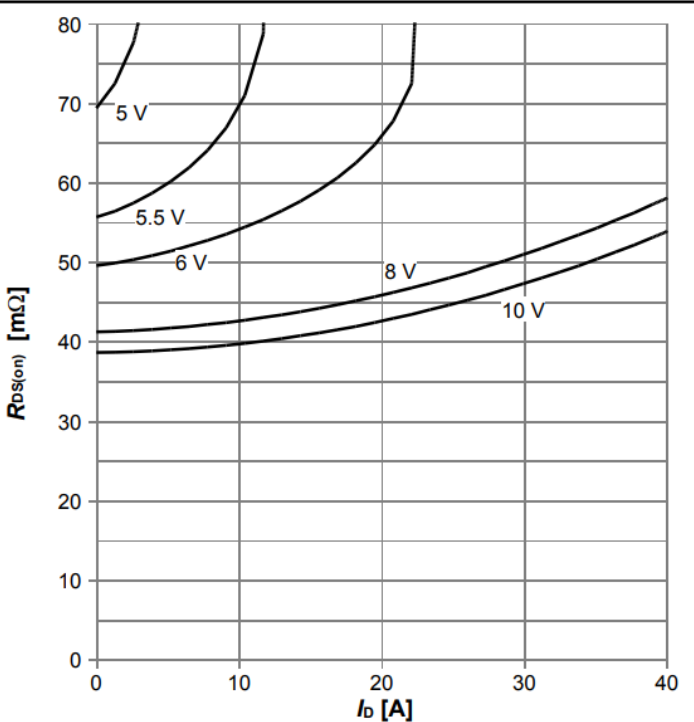
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Diagram 5: Typ. output characteristics



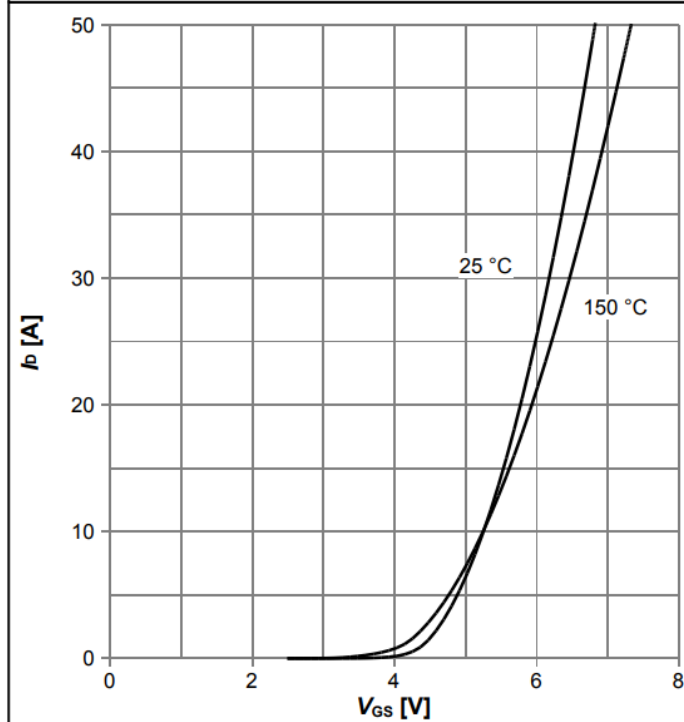
$I_D = f(V_{DS})$; $T_J = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



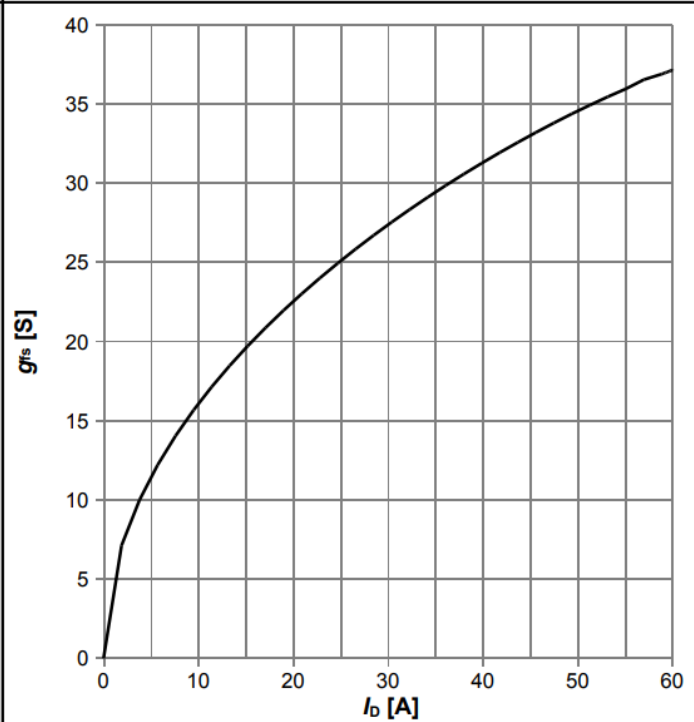
$R_{DS(on)} = f(I_D)$; $T_J = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



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

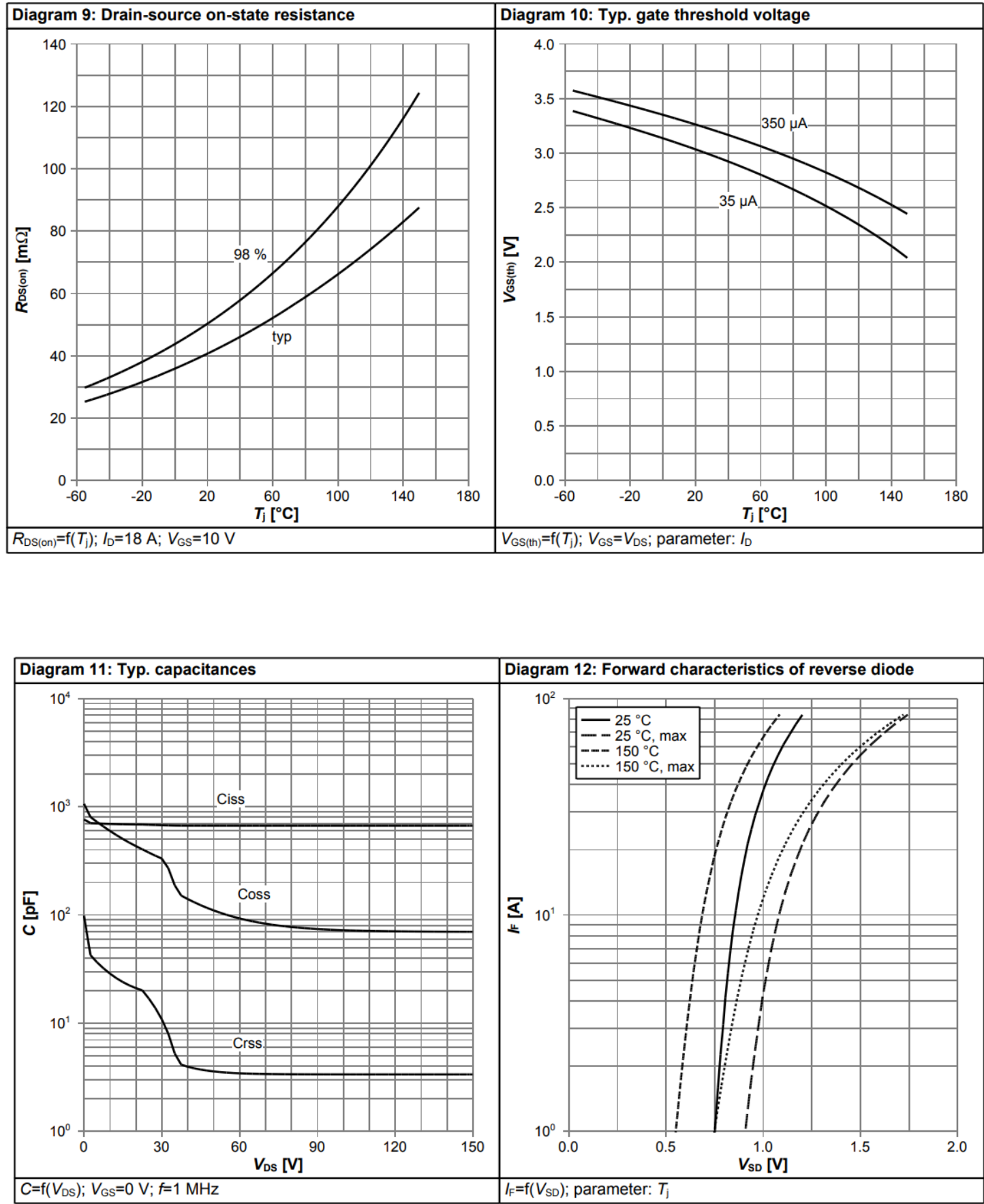
Diagram 8: Typ. forward transconductance



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

OptiMOS™ 3 Power-Transistor, 150 V

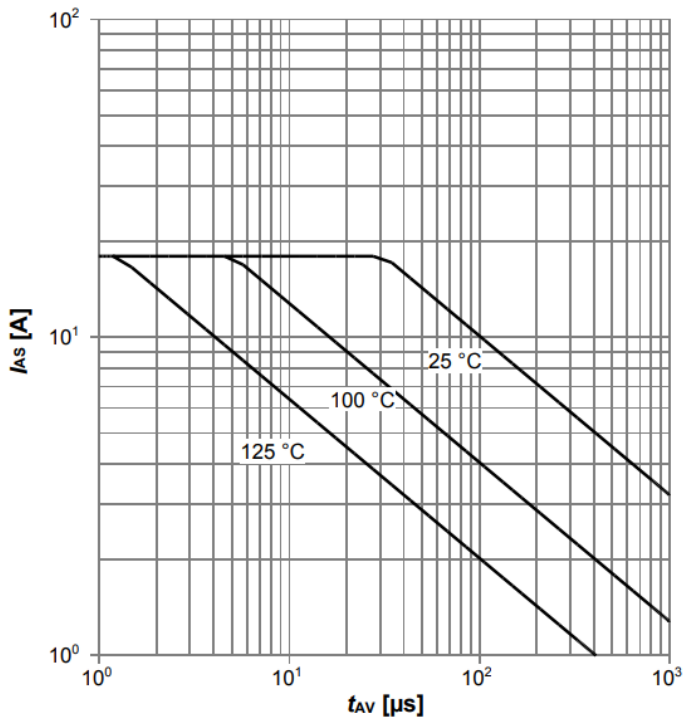
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OptiMOS™ 3 Power-Transistor, 150 V

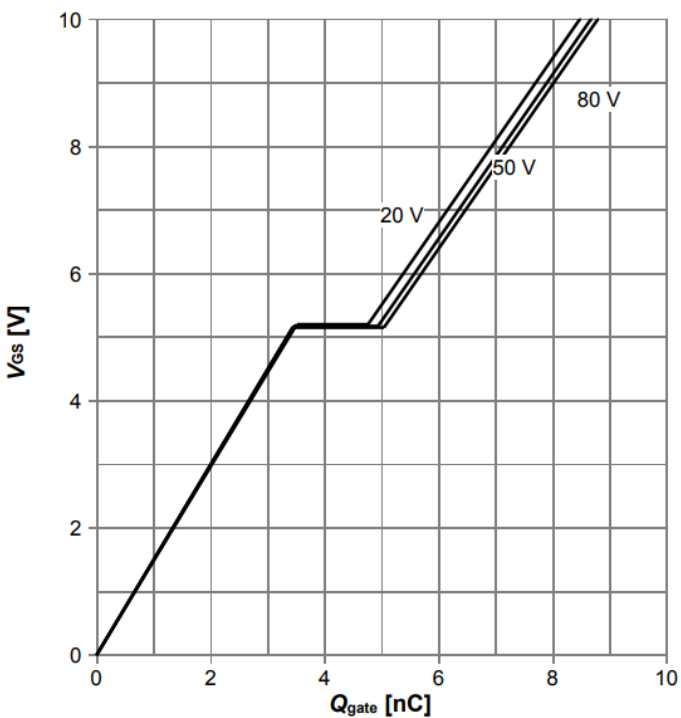
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Diagram 13: Avalanche characteristics



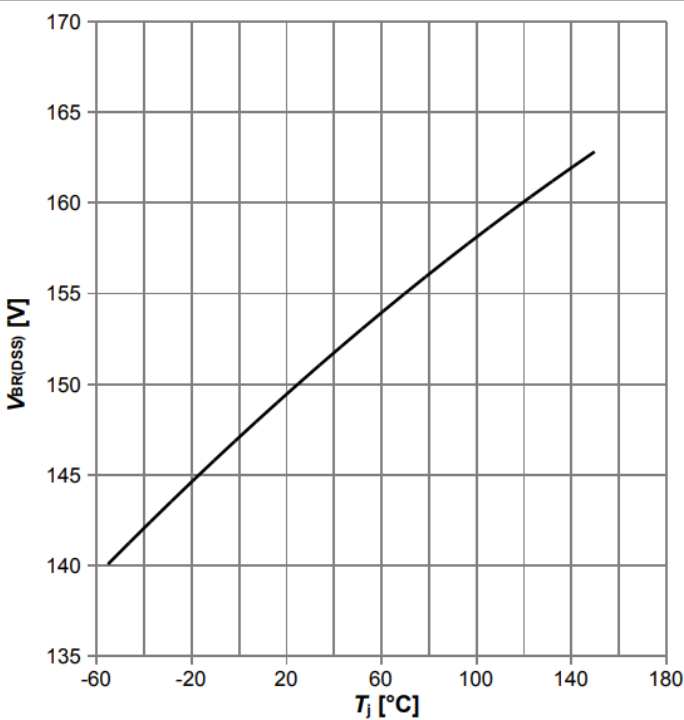
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{j(start)}$

Diagram 14: Typ. gate charge



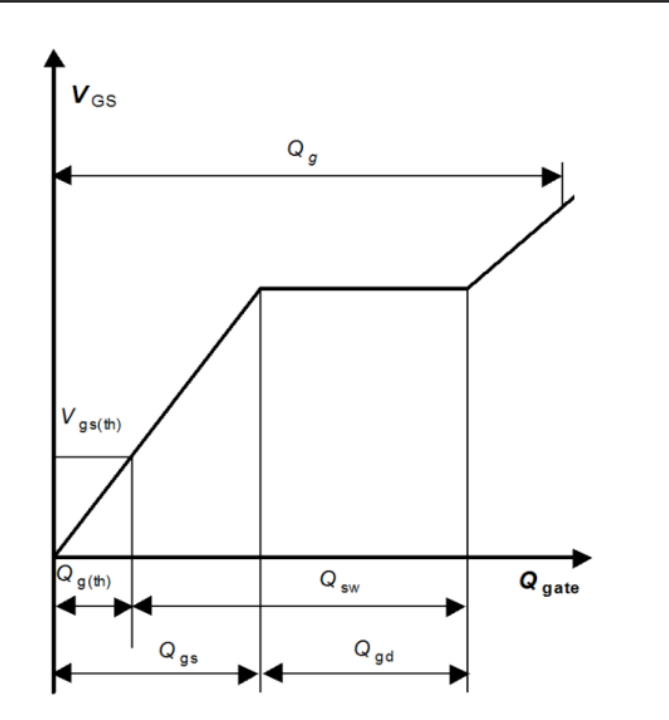
$V_{GS}=f(Q_{gate})$; $I_D=9\text{ A}$ pulsed; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage



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

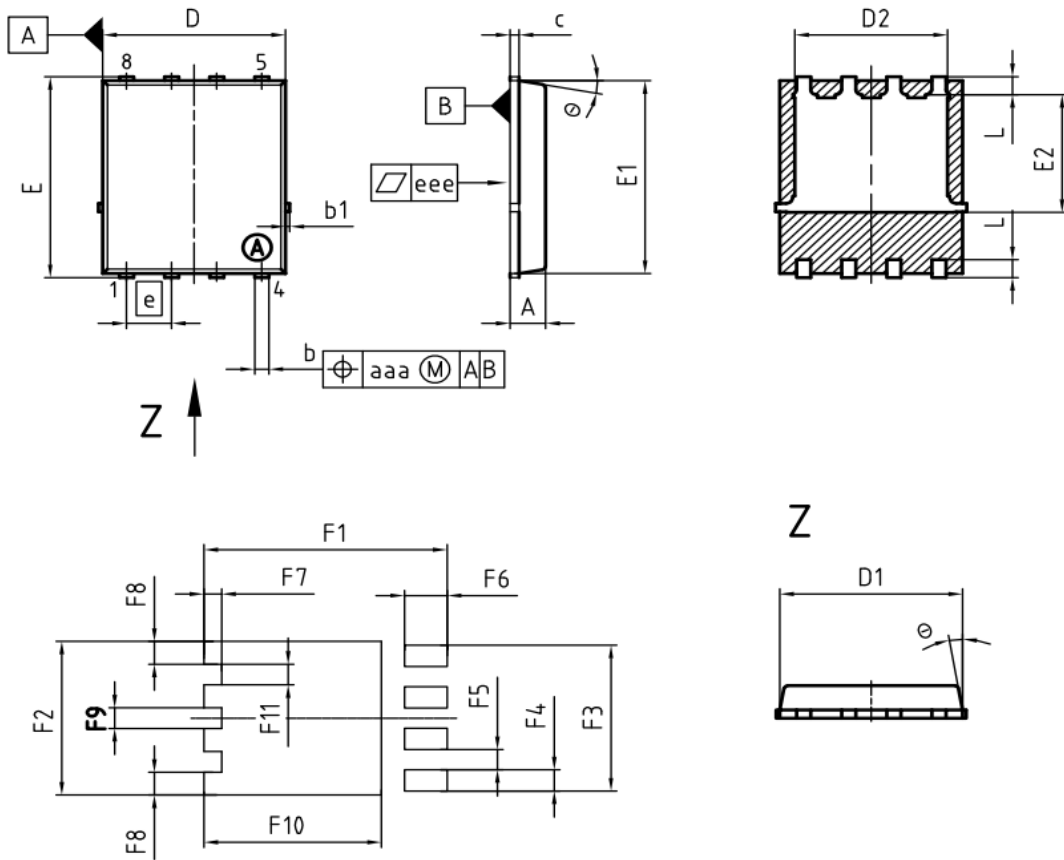
Diagram Gate charge waveforms



OptiMOS™ 3 Power-Transistor, 150 V

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1 封装外形



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.10	0.035	0.043
b	0.34	0.54	0.013	0.021
b1	0.02	0.22	0.001	0.008
c	0.15	0.35	0.006	0.014
D=D1	4.95	5.35	0.195	0.211
D2	4.20	4.40	0.165	0.173
E	5.95	6.35	0.234	0.250
E1	5.70	6.10	0.224	0.240
E2	3.40	3.80	0.134	0.150
e	1.27		0.050	
N	8		8	
L	0.45	0.65	0.018	0.026
θ	8.5°	11.5°	8.5°	11.5°
aaa	0.25		0.010	
eee	0.05		0.002	
F1	6.75	6.95	0.266	0.274
F2	4.60	4.80	0.181	0.189
F3	4.36	4.56	0.172	0.180
F4	0.55	0.75	0.022	0.030
F5	0.52	0.72	0.020	0.028
F6	1.10	1.30	0.043	0.051
F7	0.40	0.60	0.016	0.024
F8	0.60	0.80	0.024	0.031
F9	0.53	0.73	0.021	0.029
F10	4.90	5.10	0.193	0.201
F11	0.53	0.73	0.021	0.029

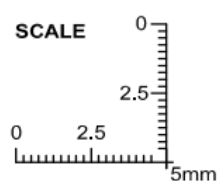
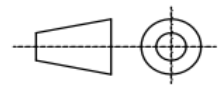
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图 1 PG-TDSON-8 外形图，尺寸单位为毫米

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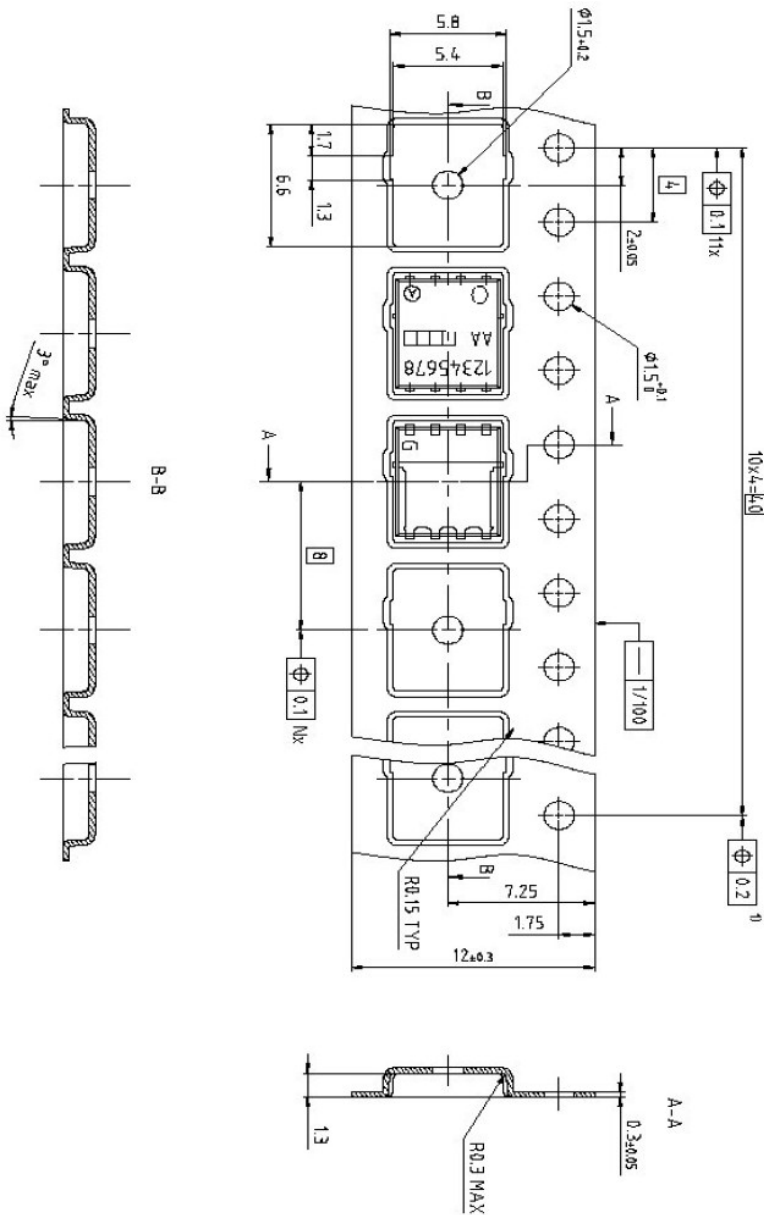


图 2 PG-TDSON-8 外形图，尺寸单位为毫米

修订记录

BSC520N15NS3 G

Revision: 2023-03-24, Rev. 2.3

历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.3	2023-03-24	Fix bug Diagram 4

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