

英飞凌MOSFET功率晶体管

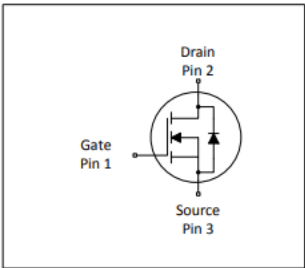
英飞凌IPA083N10N5 OptiMOS™5 100 V 功率晶体管

特性

- 非常适合高频切换和同步整流
- 出色的栅极电荷 $\times R_{DS(on)}$ 乘积 (FOM)
- 极低的导通电阻 $R_{DS(on)}$
- N沟道，正常电平
- 100% 雪崩测试
- 无铅镀层；符合RoHS标准
- 符合 JEDEC ¹⁾ 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}	100	V
$R_{DS(on),max}$	8.3	mΩ
I_D	44	A
Q_{oss}	40	nC
$Q_G(0V..10V)$	30	nC



Type / Ordering Code	Package	Marking	Related Links
IPA083N10N5	PG-TO220-FP	083N10N5	-

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	-	-	44 32	A	$T_C = 25\text{ °C}$ $T_C = 100\text{ °C}$
Pulsed drain current ¹⁾	$I_{D,pulse}$	-	-	176	A	$T_C = 25\text{ °C}$
Avalanche energy, single pulse	E_{AS}	-	-	83	mJ	$I_D = 44\text{ A}$, $R_{GS} = 25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	36	W	$T_C = 25\text{ °C}$
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	R_{thJC}	-	3.1	4.1	K/W	-

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	$V_{(BR)DSS}$	100	-	-	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	$V_{DS} = 100\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 25\text{ °C}$ $V_{DS} = 100\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	1	100	nA	$V_{GS} = 20\text{ V}$, $V_{DS} = 0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	7.2 8.8	8.3 11.0	m Ω	$V_{GS} = 10\text{ V}$, $I_D = 44\text{ A}$ $V_{GS} = 6\text{ V}$, $I_D = 22\text{ A}$
Gate resistance ²⁾	R_G	-	1.2	1.8	Ω	-
Transconductance	g_{fs}	38	76	-	S	$ V_{DS} > 2 I_D /R_{DS(on)max}$, $I_D = 44\text{ A}$

¹⁾ 请参见图 3

²⁾ 由设计标定, 不受制于生产测试。

表5 动态特性¹⁾

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	2100	2730	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}	-	337	438	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	16	28	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	15	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=44\text{ A}$, $R_{G,ext}=1.6\ \Omega$
Rise time	t_r	-	5	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=44\text{ A}$, $R_{G,ext}=1.6\ \Omega$
Turn-off delay time	$t_{d(off)}$	-	24	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=44\text{ A}$, $R_{G,ext}=1.6\ \Omega$
Fall time	t_f	-	5	-	ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=44\text{ A}$, $R_{G,ext}=1.6\ \Omega$

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}	-	10	-	nC	$V_{DD}=50\text{ V}$, $I_D=44\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge ¹⁾	Q_{gd}	-	6	10	nC	$V_{DD}=50\text{ V}$, $I_D=44\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	10	-	nC	$V_{DD}=50\text{ V}$, $I_D=44\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total ¹⁾	Q_g	-	30	37	nC	$V_{DD}=50\text{ V}$, $I_D=44\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	4.8	-	V	$V_{DD}=50\text{ V}$, $I_D=44\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Output charge ¹⁾	Q_{oss}	-	40	53	nC	$V_{DD}=50\text{ V}$, $V_{GS}=0\text{ V}$

表7 反向二极管

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	30	A	$T_C=25\text{ }^\circ\text{C}$
Diode pulse current	$I_{S,pulse}$	-	-	176	A	$T_C=25\text{ }^\circ\text{C}$
Diode forward voltage	V_{SD}	-	0.9	1.2	V	$V_{GS}=0\text{ V}$, $I_F=44\text{ A}$, $T_J=25\text{ }^\circ\text{C}$
Reverse recovery time ¹⁾	t_{rr}	-	55	110	ns	$V_R=50\text{ V}$, $I_F=I_S$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁾	Q_{rr}	-	95	190	nC	$V_R=50\text{ V}$, $I_F=I_S$, $di_F/dt=100\text{ A}/\mu\text{s}$

¹⁾由设计标定, 不受制于生产测试。²⁾参数定义 请参见“栅极充电波形”

4 电气特性图

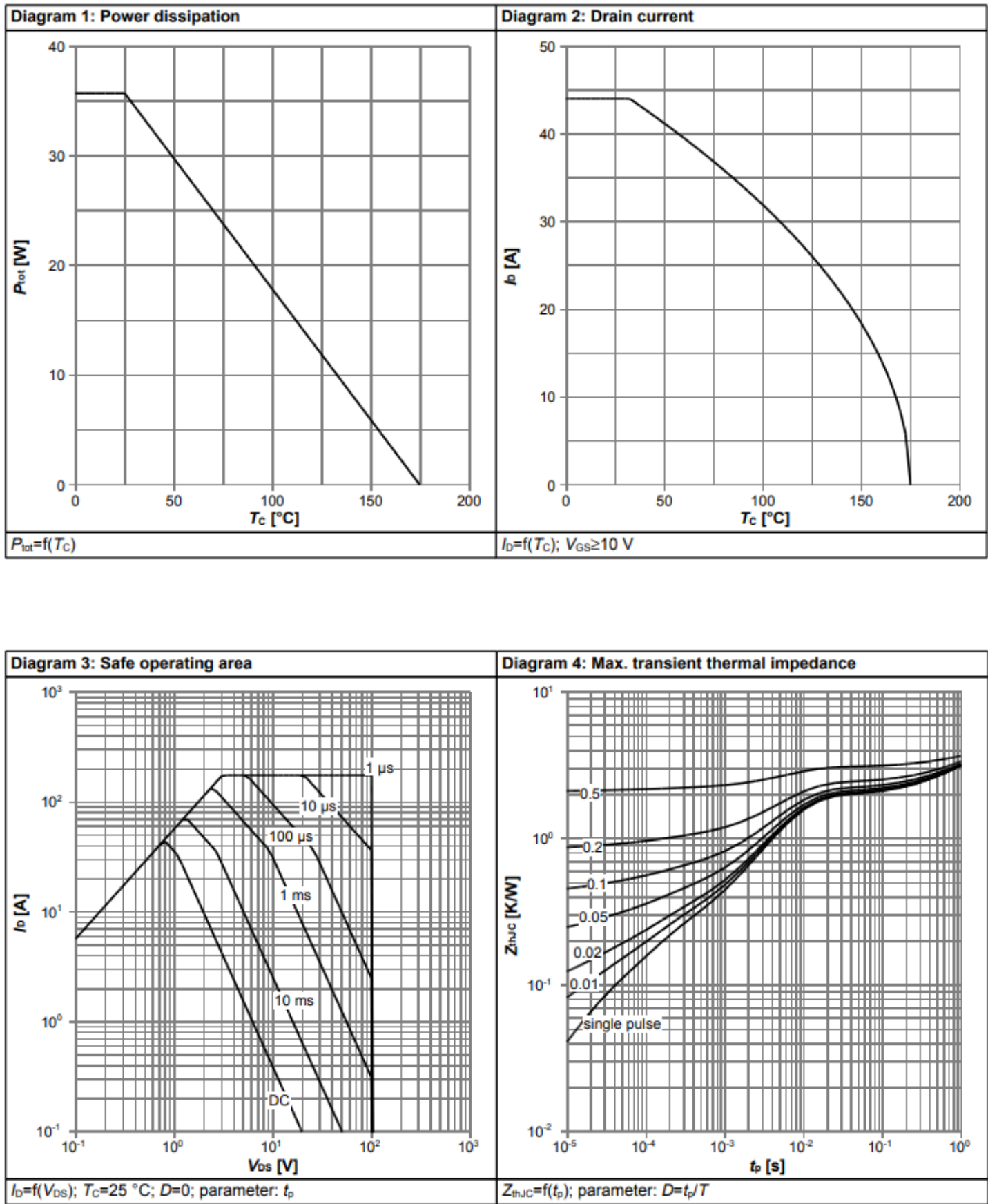
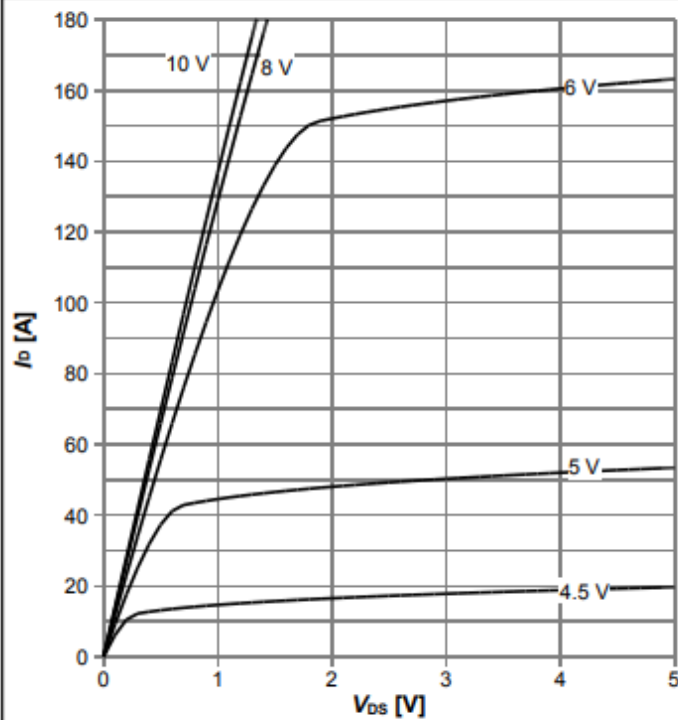
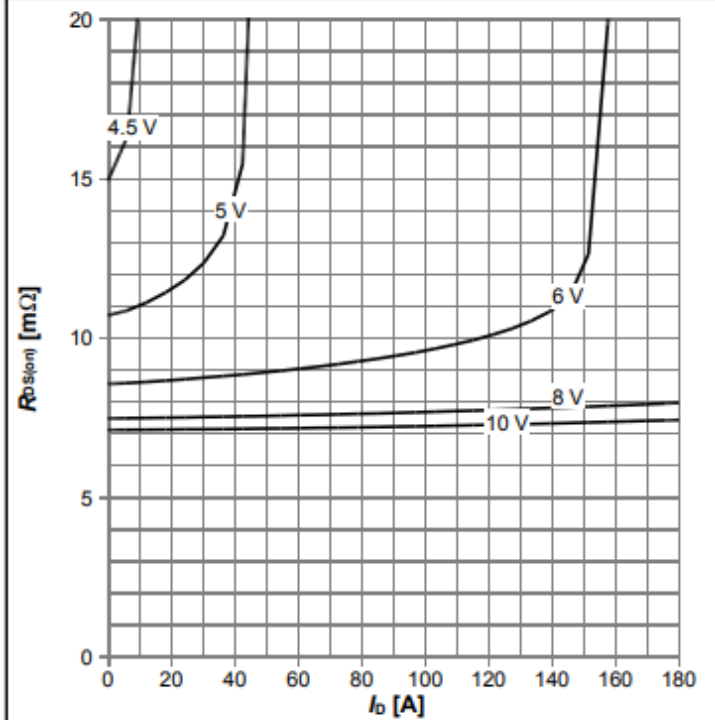


Diagram 5: Typ. output characteristics



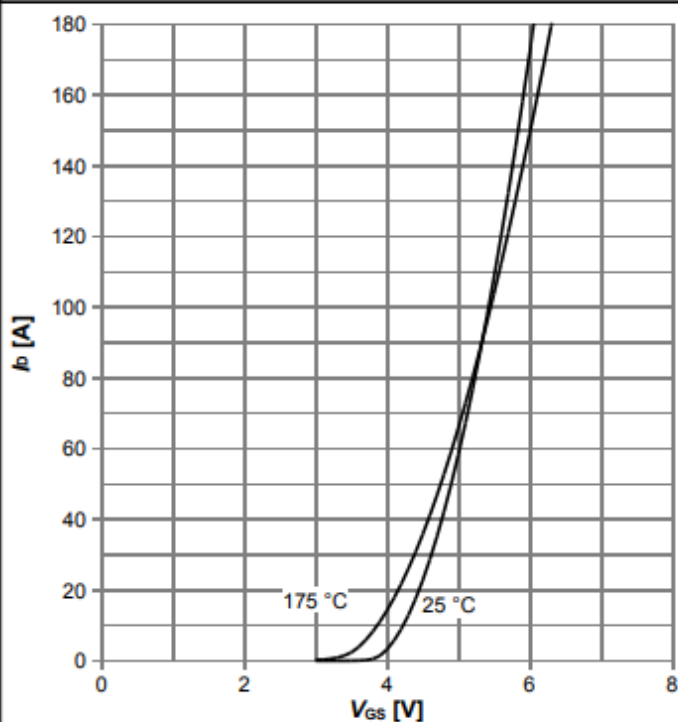
$I_D = f(V_{DS}); T_J = 25^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 6: Typ. drain-source on resistance



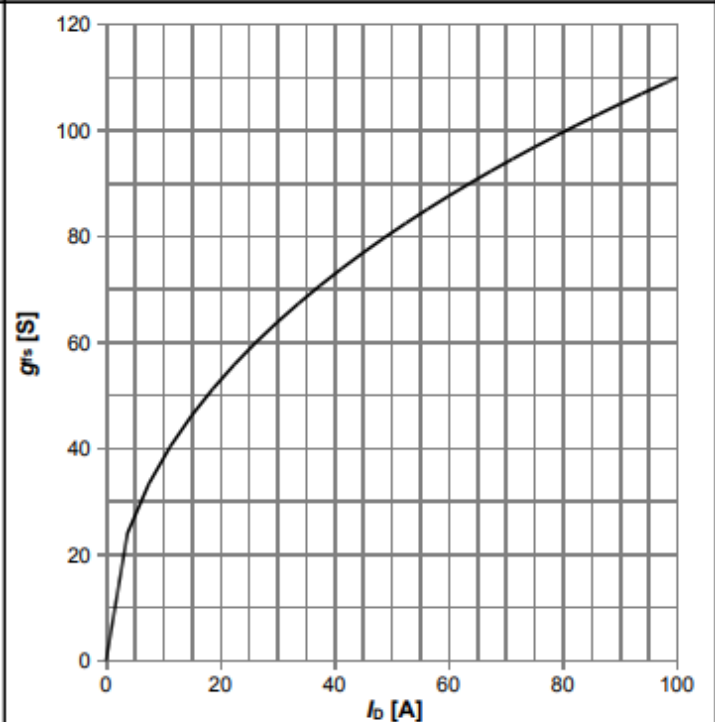
$R_{DS(on)} = f(I_D); T_J = 25^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 7: Typ. transfer characteristics



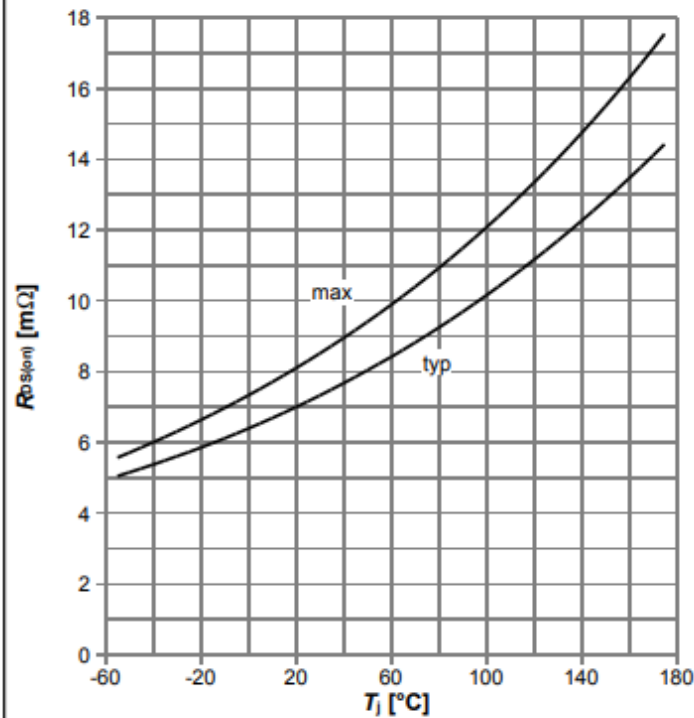
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}; \text{parameter: } T_J$

Diagram 8: Typ. forward transconductance



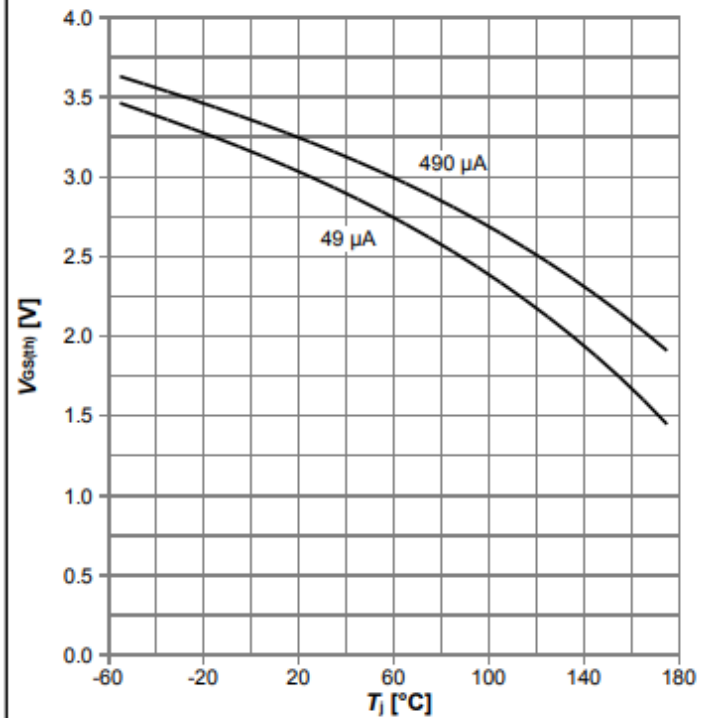
$g_{fs} = f(I_D); T_J = 25^\circ\text{C}$

Diagram 9: Drain-source on-state resistance



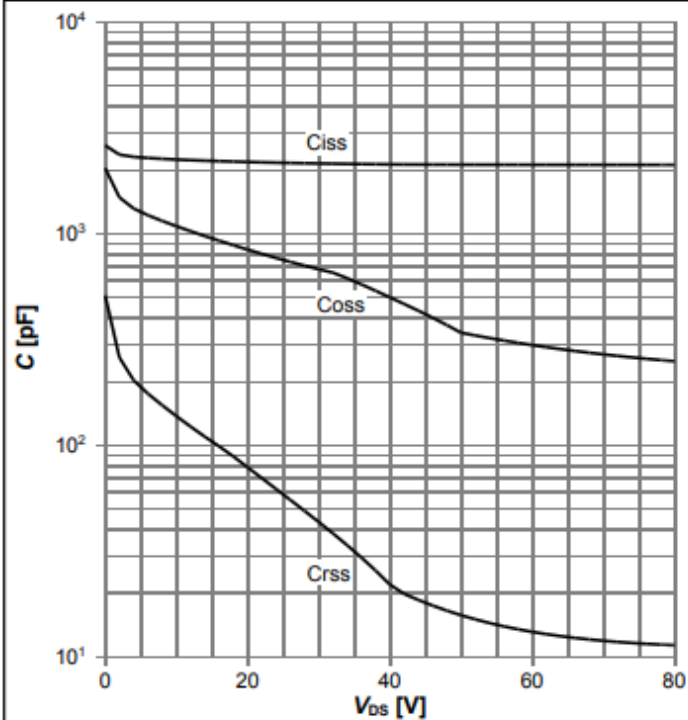
$R_{DS(on)} = f(T_j); I_D = 44 \text{ A}; V_{GS} = 10 \text{ V}$

Diagram 10: Typ. gate threshold voltage



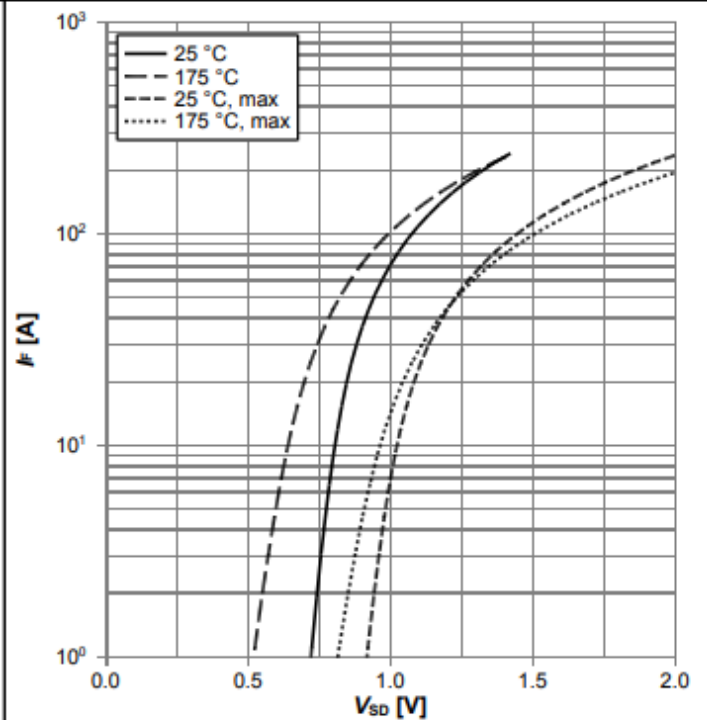
$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; \text{parameter: } I_D$

Diagram 11: Typ. capacitances



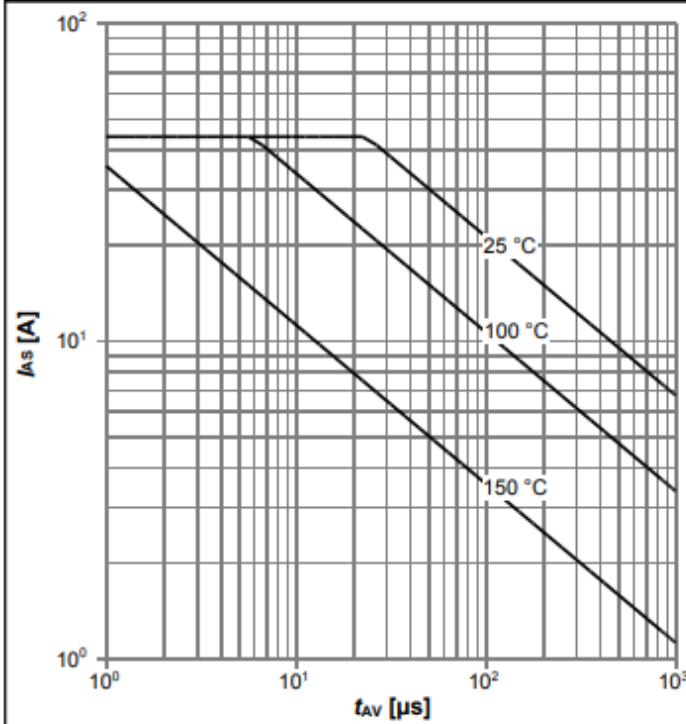
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$

Diagram 12: Forward characteristics of reverse diode



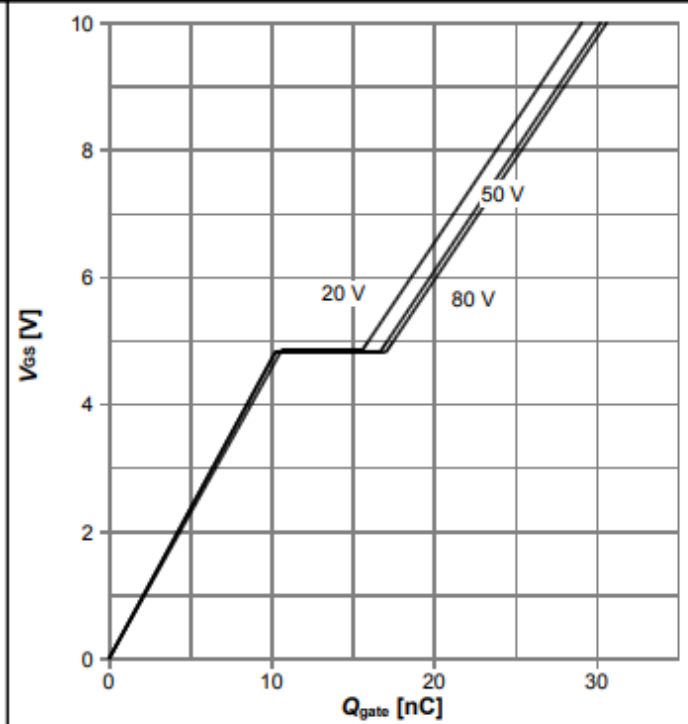
$I_F = f(V_{SD}); \text{parameter: } T_j$

Diagram 13: Avalanche characteristics



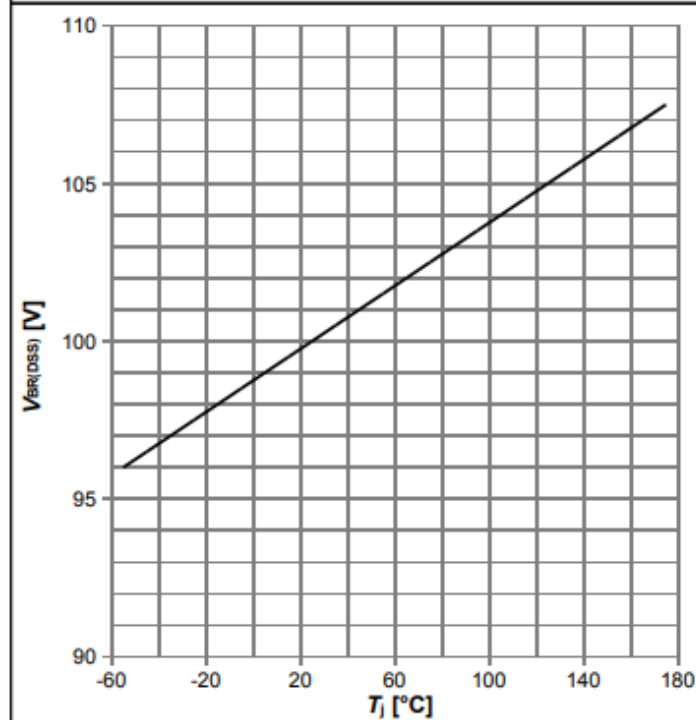
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{J(start)}$

Diagram 14: Typ. gate charge



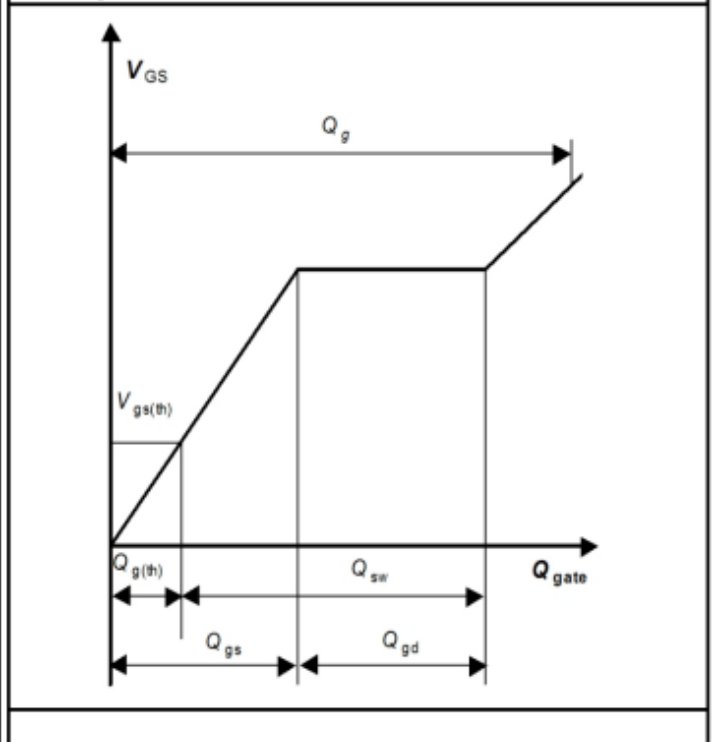
$V_{GS}=f(Q_{gate})$; $I_D=44\text{ A}$ pulsed; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage

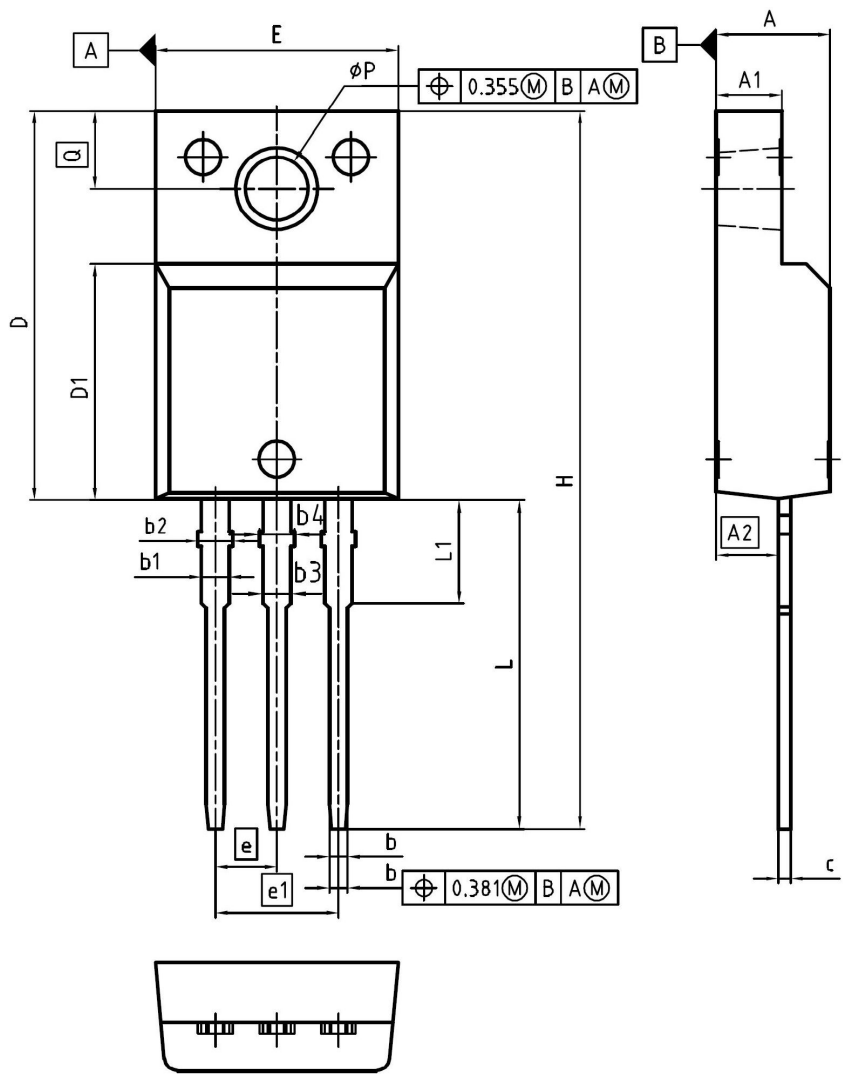


$V_{BR(DSS)}=f(T_J)$; $I_D=1\text{ mA}$

Gate charge waveforms



5 封装外形



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.55	4.85	0.179	0.191
A1	2.55	2.85	0.100	0.112
A2	2.42	2.72	0.095	0.107
b	0.65	0.85	0.026	0.033
b1	0.95	1.33	0.037	0.052
b2	0.95	1.51	0.037	0.059
b3	0.65	1.33	0.026	0.052
b4	0.65	1.51	0.026	0.059
c	0.40	0.63	0.016	0.025
D	15.85	16.15	0.624	0.636
D1	9.53	9.83	0.375	0.387
E	10.35	10.65	0.407	0.419
e	2.54		0.100	
e1	5.08		0.200	
N	3		3	
H	29.45	29.75	1.159	1.171
L	13.45	13.75	0.530	0.541
L1	3.15	3.45	0.124	0.136
øP	2.95	3.20	0.116	0.126
Q	3.15	3.50	0.124	0.138

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Z8B00003319

SCALE
0 2.5 5mm

EUROPEAN PROJECTION

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REVISION
03

图 1 PG-T0220-FP 外形图，尺寸单位为毫米/英寸

修订记录

IPA083N10N5

Revision: 2016-10-03, Rev. 2.1

历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.0	2014-12-18	Release of final version
2.1	2016-10-03	Update Avalanche Energy

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