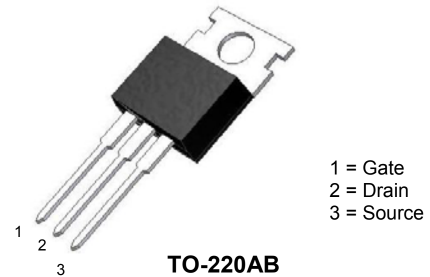
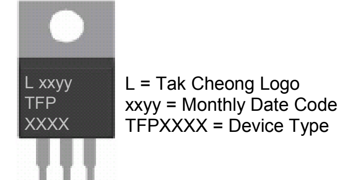
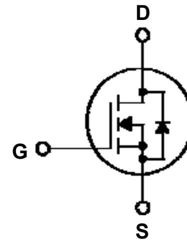
N-Channel Power MOSFET

7A, 600V, 1.2Ω







GENERAL DESCRIPTION

The N-Channel MOSFET is used an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance. This device is well suited for high efficiency switched mode power suppliers, active power factor correction, electronic lamp ballasts based half bridge topology.

FEATURES

- Robust high voltage termination
- Avalanche energy specified
- Diode is characterized for use in bridge circuits
- Source to Drain diode recovery time comparable to a discrete fast recovery diode.

ABSOLUTE MAXIMUM RATINGS (T_C =25°C, unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DSS}	Drain- Source Voltage	600	V
V_{GSS}	Gate-Source Voltage	±30	V
I_D	Drain Current	7.0	A
I_{DM}	Drain Current Pulsed	28	A
P_D	Power Dissipation (Note 2)	147	W
	Derating factor above 25℃	1.18	W/℃
E_{AS}	Single Pulsed Avalanche Energy (Note 1)	530	mJ
E_{AR}	Repetitive Avalanche Energy (Note 2)	14.2	mJ
T_J	Operating Junction Temperature	150	℃
T_{stg}	Storage Temperature Range	- 55 to +150	℃

Notes:

1. L=19.5mH, I_{AS}=7.0A, V_{DD}=50V, R_G=25Ω, Starting T_J=25℃
2. Repetitive Rating: Pulse width limited by maximum junction temperature.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.85	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	℃/W

ELECTRICAL CHARACTERISTICS

Off Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Sounce Breakdown Voltage	V_{GS} = 0V, I_D = 250uA	600	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600V, V_{GS} = 0V	--	--	10	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30V, V_{DS} = 0V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30V, V_{DS} = 0V	--	--	-100	nA

On Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS\ (th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} , I_D = 250uA	2.0	--	4.0	V
$R_{DS(ON)}$	On-Resistance	V_{GS} = 10V, I_D = 3.5A	--	0.96	1.2	Ω

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Ciss	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	--	1095	1430	pF
Coss	Output Capacitance		--	93	75	pF
Crss	Reverse Transfer Capacitance		--	2	21	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 300V, I_D = 7.0A, R_G = 25 Ω (Note 3 & 4)	--	39	60	nS
tr	Turn-On Rise Time		--	29	70	nS
$t_{d(off)}$	Turn-Off Delay Time		--	248	300	nS
tr	Turn-Off Fall Time		--	36	90	nS
Qg	Total Gate Charge	V_{DS} = 480V, I_D = 7.0A, V_{GS} = 10V (Note 3 & 4)	--	26.8	37	nC
Qgs	Gate-Source Charge		--	5.1	--	nC
Qgd	Gate-Drain Charge		--	8.5	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min.	Typ,	Max.	Unit
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	7.0	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	28	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S = 7.0A	--	--	1.4	V
Trr	Reverse Recovery Time	V_{GS} = 0V, I_S = 7.0A, dI_F / dt = 100A/uS (Note 3)	--	365	--	nS
Qrr	Reverse Recovery Charge		--	3.4	--	uC

Notes:
3. Pulse Test: Pulse width < 300us, Duty cycle ≤ 2%.
4. Basically not affected by working temperature.

TYPICAL CHARACTERISTICS

图 1、 导通电阻

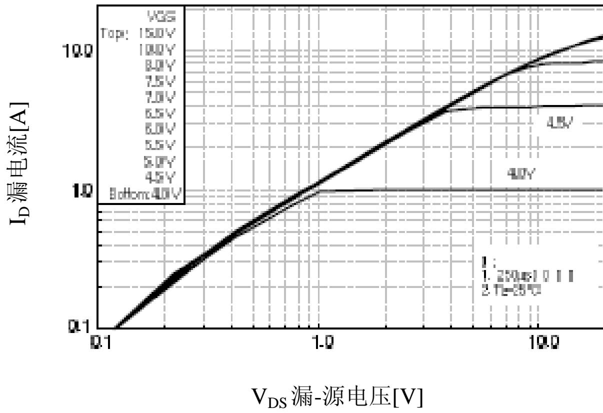


图 2、 传输特性

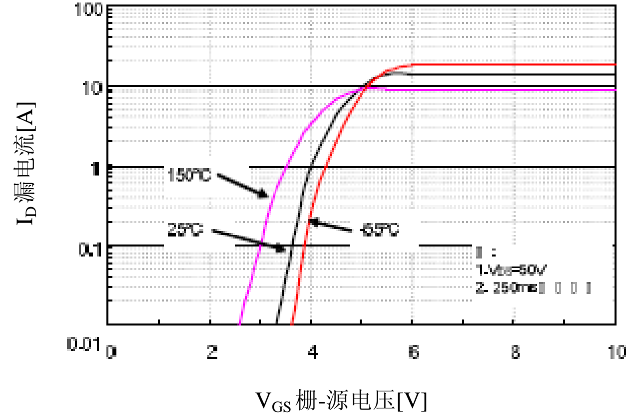


图 3、 导通电阻 vs.漏电流和栅极电压

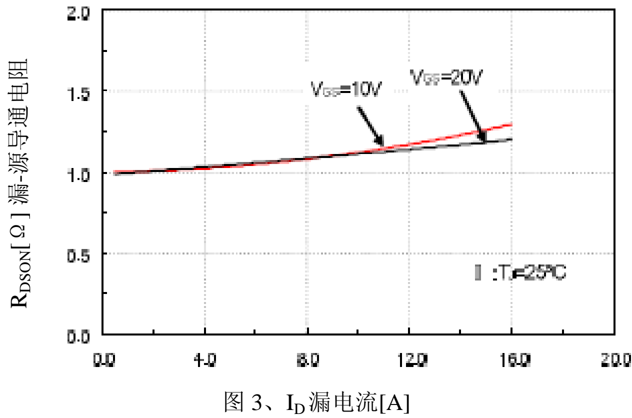


图 4、 体二极管正向电压降 vs.源电流和温度

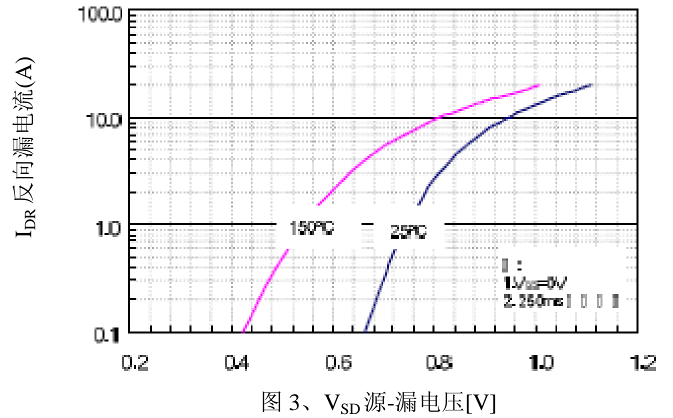


图 5、 电容特性

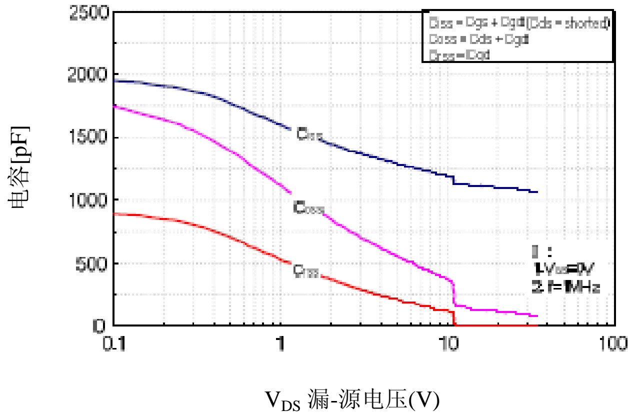


图 6、 栅极电荷特性

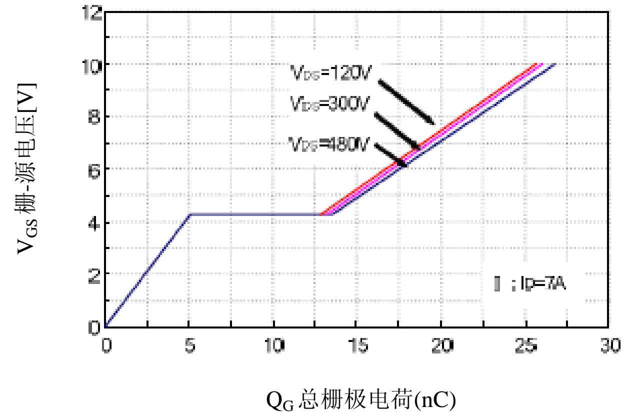


图 7、 击穿电压 vs.温度

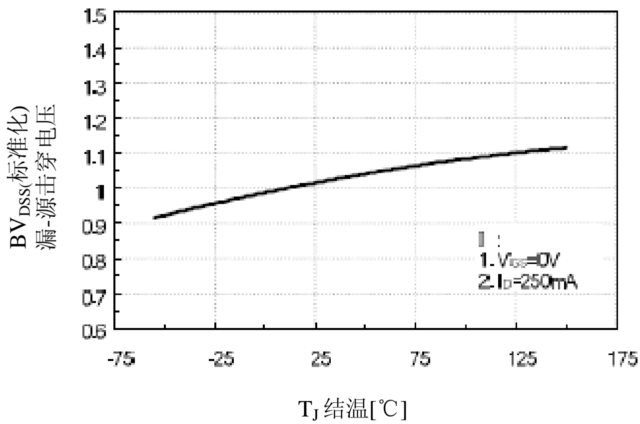
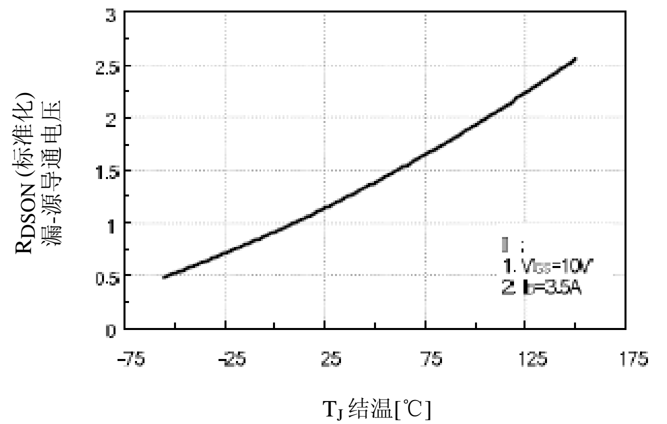
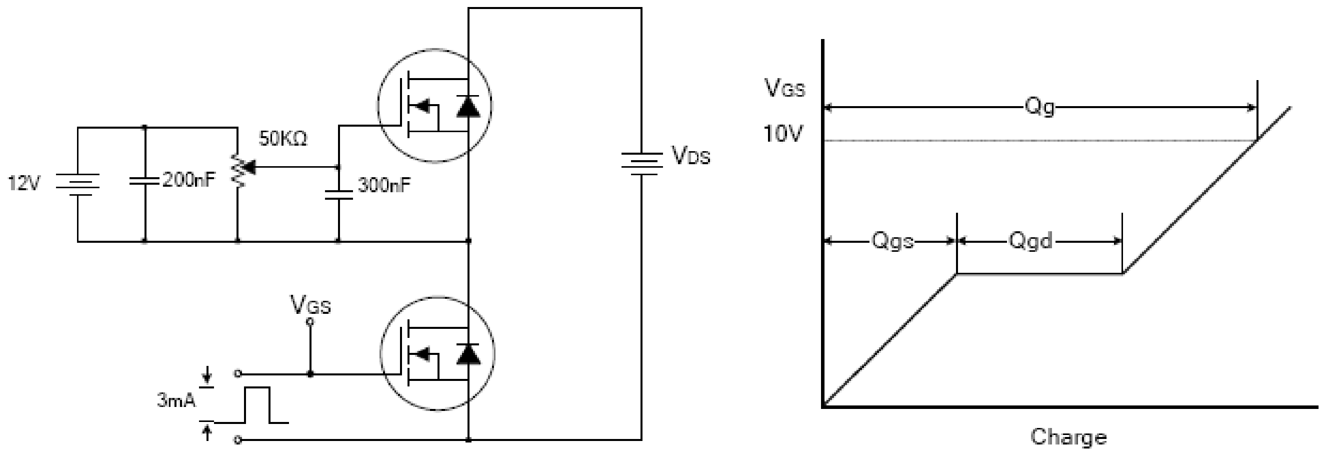


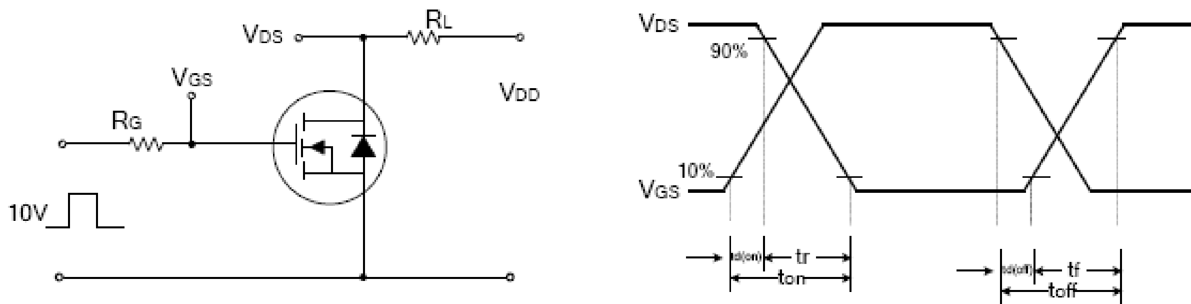
图 8、 导通电压 vs.温度



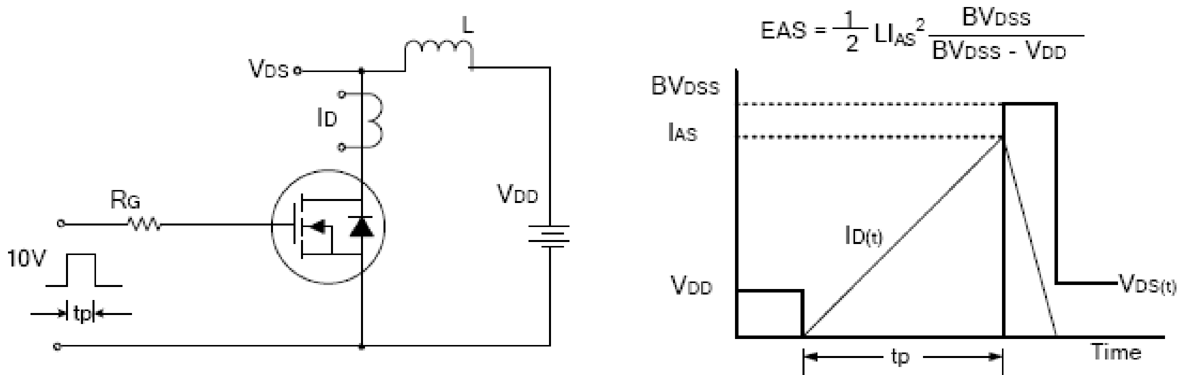
栅极电荷量测试电路及波形图



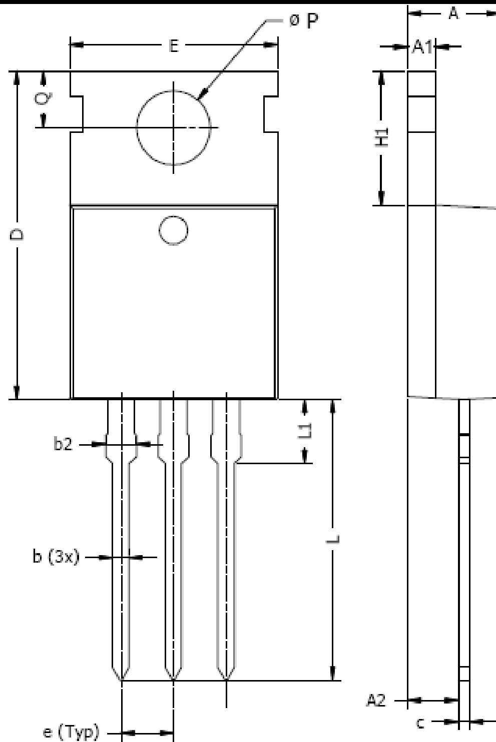
开关时间测试电路及波形图



E_{AS}测试电路及波形图



TO220AB PACKAGE OUTLINE



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	3.60	4.80	0.142	0.189
A1	1.20	1.40	0.047	0.055
A2	2.03	2.90	0.080	0.114
b	0.40	1.00	0.016	0.039
b2	1.20	1.78	0.047	0.070
c	0.36	0.60	0.014	0.024
D	14.22	16.50	0.560	0.650
e	2.34	2.74	0.092	0.108
E	9.70	10.60	0.382	0.417
H1	5.84	6.85	0.230	0.270
L	12.70	14.70	0.500	0.579
L1	2.70	3.30	0.106	0.130
ØP	3.50	4.00	0.138	0.157
Q	2.54	3.40	0.100	0.134

NOTE: Above package outline conforms to JEDEC TO-220AB

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