# Samwin®

SW6N70DA

N-channel Enhanced mode TO-251N/S/U/TO-252/TO-220F /TO-251/TO-251NX/TO-220/TO-251Q /TO-251MQ MOSFET

Features

- High ruggedness
- Low $R_{DS(ON)}$ (Typ 1.7Ω) @V_{GS}=10V
- Low Gate Charge (Typ 26nC)
- Improved dv/dt Capability
- 100% Avalanche Tested
- Application: TV-Power , LED , Charger

TO251N TO251S TO251U TO252 TO220F

TO251 TO251NX TO220 TO251Q TO251MQ

1. Gate 2. Drain 3. Source
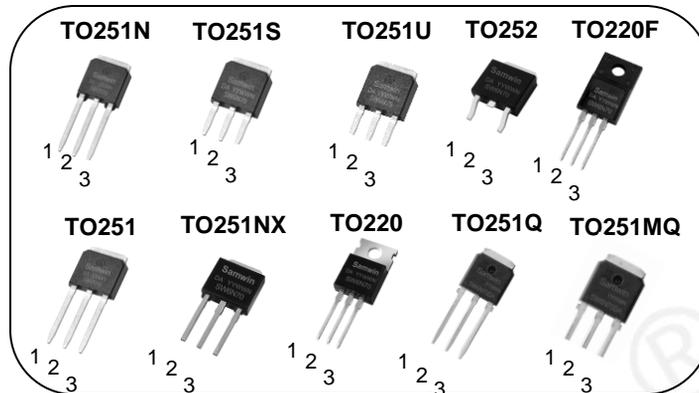
BV_{DSS} : 700V
I_D : 6A
$R_{DS(ON)}$: 1.7Ω
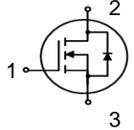
General Description

This power MOSFET is produced with advanced technology of SAMWIN.
This technology enable the power MOSFET to have better characteristics, including fast switching time, low on resistance, low gate charge and especially excellent avalanche characteristics.

Order Codes

Item	Sales Type	Marking	Package	Packaging
1	SW N 6N70DA	SW6N70DA	TO-251N	TUBE
2	SW SI 6N70DA	SW6N70DA	TO-251S	TUBE
3	SW UI 6N70DA	SW6N70DA	TO-251U	TUBE
4	SW D 6N70DA	SW6N70DA	TO-252	REEL
5	SW F 6N70DA	SW6N70DA	TO-220F	TUBE
6	SW I 6N70DA	SW6N70DA	TO-251	TUBE
7	SWNX 6N70DA	SW6N70DA	TO-251NX	TUBE
8	SW P 6N70DA	SW6N70DA	TO-220	TUBE
9	SW QI 6N70DA	SW6N70DA	TO-251Q	TUBE
10	SW MQI 6N70DA	SW6N70DA	TO-251MQ	TUBE

Absolute maximum ratings

Symbol	Parameter	TO251S/ TO251U	TO252	TO220F	TO251/T O251N	TO251 NX	TO220	TO-251Q/TO- 251MQ	Unit
		Value							
V_{DSS}	Drain to source voltage	700							V
I_D	Continuous drain current (@T_C=25°C)	6*							A
	Continuous drain current (@T_C=100°C)	3.8*							A
I_{DM}	Drain current pulsed (note 1)	24							A
V_{GS}	Gate to source voltage	±30							V
E_{AS}	Single pulsed avalanche energy (note 2)	216							mJ
E_{AR}	Repetitive avalanche energy (note 1)	20							mJ
dv/dt	Peak diode recovery dv/dt (note 3)	5							V/ns
P_D	Total power dissipation (@T_C=25°C)	138.8	130.2	21.9	138.8	147	186.6	138.8	W
	Derating factor above 25°C	1.11	1.04	0.18	1.11	1.18	1.49	1.11	W/°C
T_{STG}, T_J	Operating junction temperature & storage temperature	-55 ~ + 150							°C
T_L	Maximum lead temperature for soldering purpose, 1/8 from case for 5 seconds.	300							°C

*. Drain current is limited by junction temperature.

Thermal characteristics

Symbol	Parameter	Value							Unit
		TO251S/TO251U	TO252	TO220F	TO251/TO251N	TO251NX	TO220	TO-251Q/TO-251MQ	
R_{thjc}	Thermal resistance, Junction to case	0.9	0.96	5.7	0.9	0.85	0.67	0.9	ºC/W
R_{thja}	Thermal resistance, Junction to ambient	80		46.9	80	100	59.2	80	ºC/W

Electrical characteristic (T_C = 25ºC unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Off characteristics						
BV_{DSS}	Drain to source breakdown voltage	V_{GS}=0V, I_D=250uA	700			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown voltage temperature coefficient	I_D=250uA, referenced to 25ºC		0.42		V/ºC
I_{DSS}	Drain to source leakage current	V_{DS}=700V, V_{GS}=0V			1	uA
		V_{DS}=560V, T_C=125ºC			50	uA
I_{GSS}	Gate to source leakage current, forward	V_{GS}=30V, V_{DS}=0V			100	nA
	Gate to source leakage current, reverse	V_{GS}=-30V, V_{DS}=0V			-100	nA
On characteristics						
$V_{GS(TH)}$	Gate threshold voltage	V_{DS}=V_{GS}, I_D=250uA	2.5		4.5	V
$R_{DS(ON)}$	Drain to source on state resistance	V_{GS}=10V, I_D=3A		1.7	1.9	Ω
G_{fs}	Forward transconductance	V_{DS}=30V, I_D=3A		5		S
Dynamic characteristics						
C_{iss}	Input capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz		1040		pF
C_{oss}	Output capacitance			88		
C_{rss}	Reverse transfer capacitance			9		
$t_{d(on)}$	Turn on delay time	V_{DS}=350V, I_D=6A, R_G=25Ω, V_{GS}=10V (note 4,5)		21		ns
t_r	Rising time			34		
$t_{d(off)}$	Turn off delay time			65		
t_f	Fall time			33		
Q_g	Total gate charge	V_{DS}=560V, V_{GS}=10V, I_D=6A (note 4,5)		26		nC
Q_{gs}	Gate-source charge			5.5		
Q_{gd}	Gate-drain charge			11		
R_g	Gate resistance	V_{DS}=0V, Scan F mode		2.5		Ω

Source to drain diode ratings characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_S	Continuous source current	Integral reverse p-n Junction diode in the MOSFET			6	A
I_{SM}	Pulsed source current				24	A
V_{SD}	Diode forward voltage drop.	I_S=6A, V_{GS}=0V			1.4	V
t_{rr}	Reverse recovery time	I_S=6A, V_{GS}=0V,		455		ns
Q_{rr}	Reverse recovery charge	dI_F/dt=100A/us		2.95		uC

※. Notes
1.   Repeatitive rating : pulse width limited by junction temperature.
2.   L = 12mH, I_{AS} = 6A, V_{DD} =100 V, R_G=25Ω, Starting T_J = 25ºC
3. I_{SD} ≤ 6A, di/dt = 100A/us, V_{DD} ≤ BV_{DSS}, Staring T_J =25ºC
4.   Pulse Test : Pulse Width ≤ 300us, duty cycle ≤ 2%
5.   Essentially independent of operating temperature.

**Fig. 1. On-state characteristics**
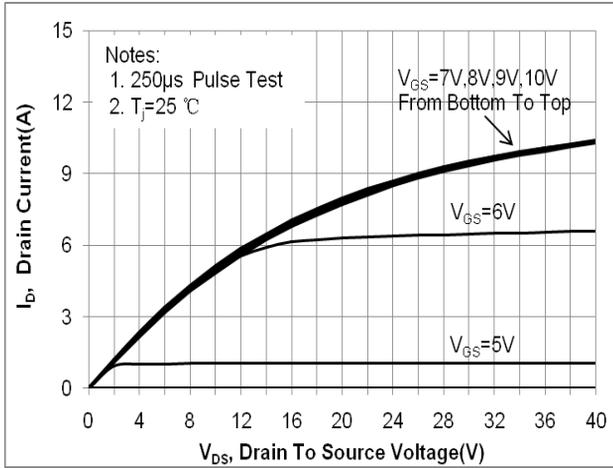
**Fig. 2. Transfer Characteristics**
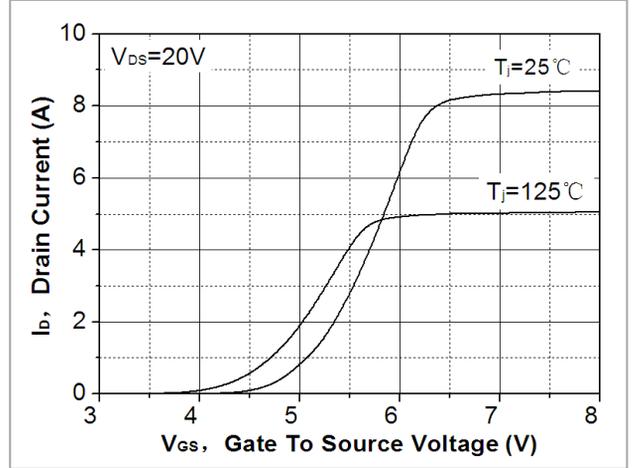
**Fig. 3. On-resistance variation vs. drain current and gate voltage**
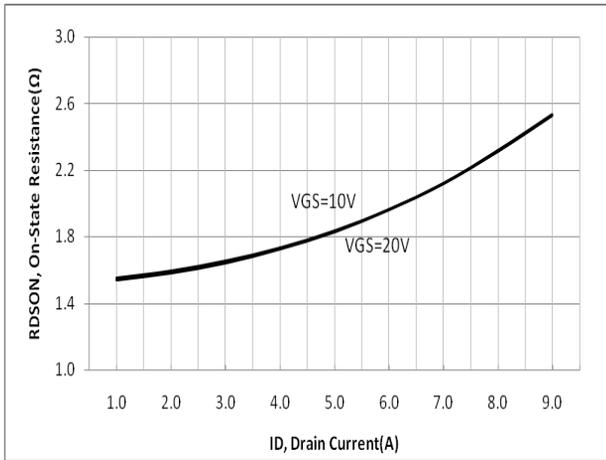
**Fig. 4. On state current vs. diode forward voltage**
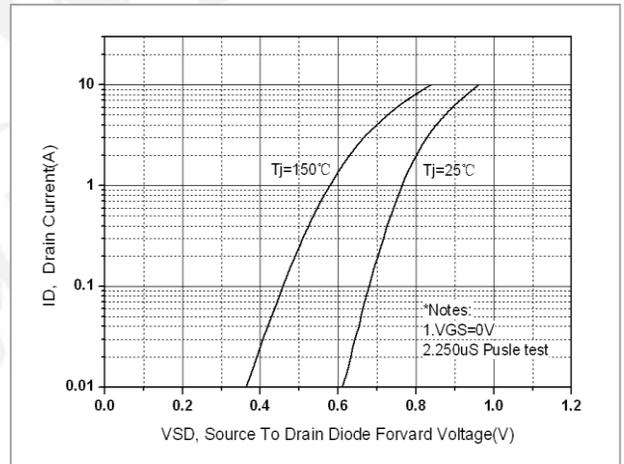
**Fig 5. Breakdown Voltage Variation vs. Junction Temperature**
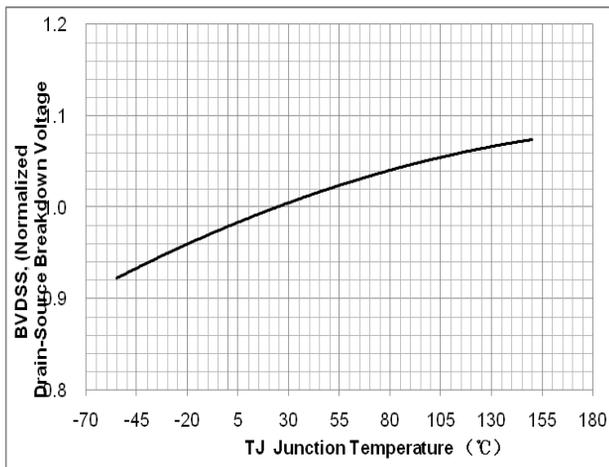
**Fig. 6. On resistance variation vs. junction temperature**
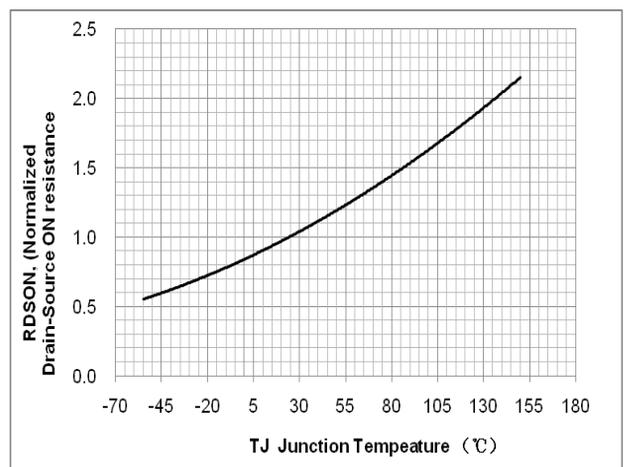
Fig. 7. Gate charge characteristics
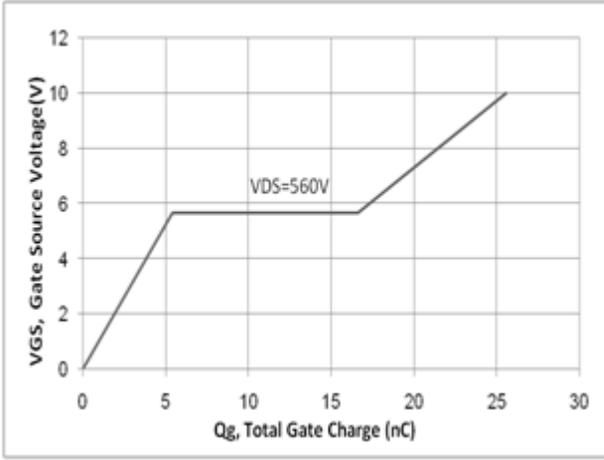

Fig. 8. Capacitance Characteristics
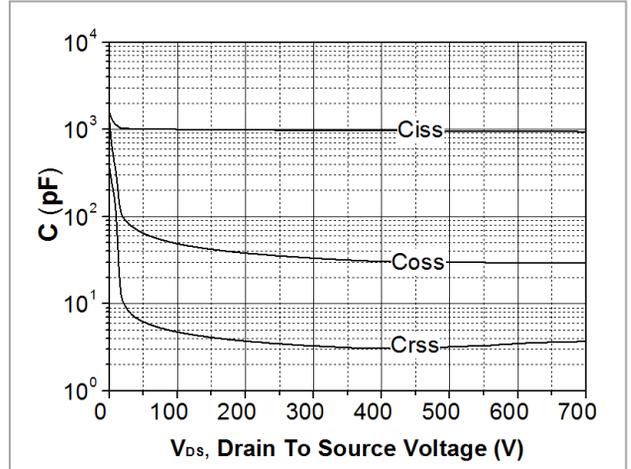
Fig. 9. Maximum safe operating area (TO-251S&TO-251U)
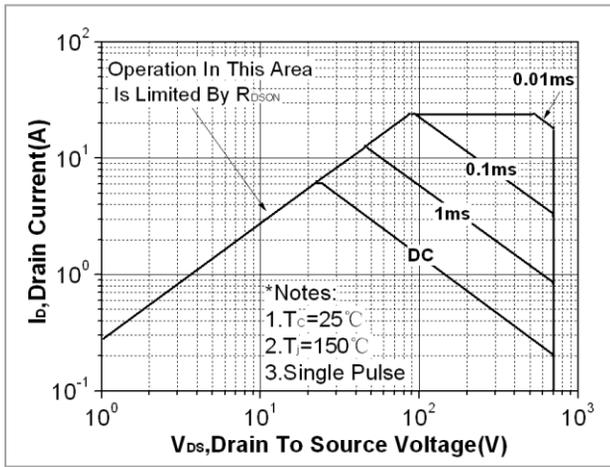
Fig.10. Maximum safe operating area(TO-252)
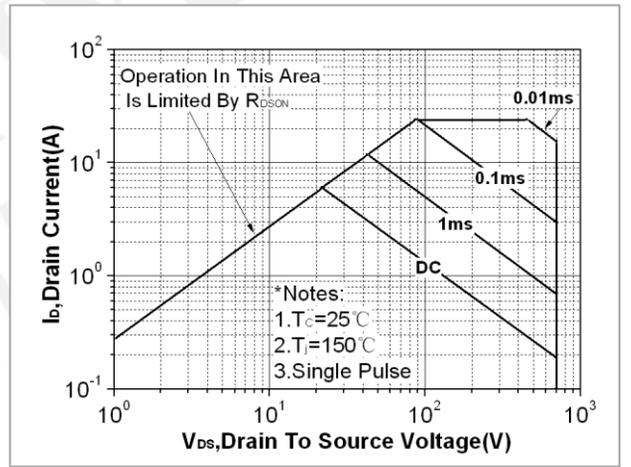
Fig. 11. Maximum safe operating area(TO-220F)
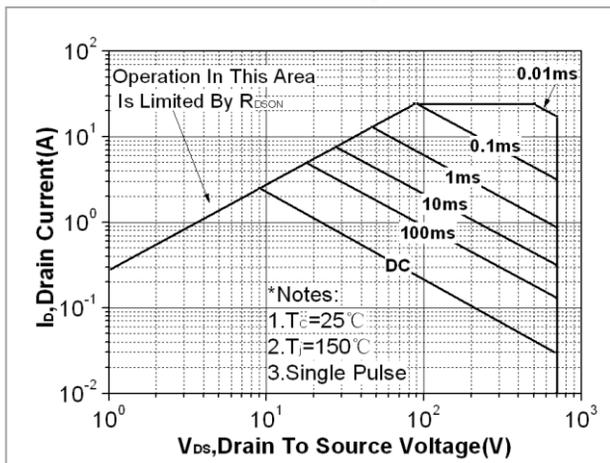
Fig. 12. Maximum safe operating area (TO-251&TO-251N)
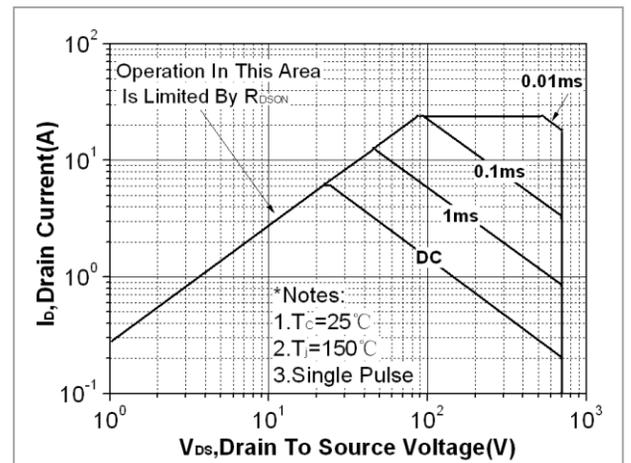
Fig. 13. Maximum safe operating area(TO-251NX)
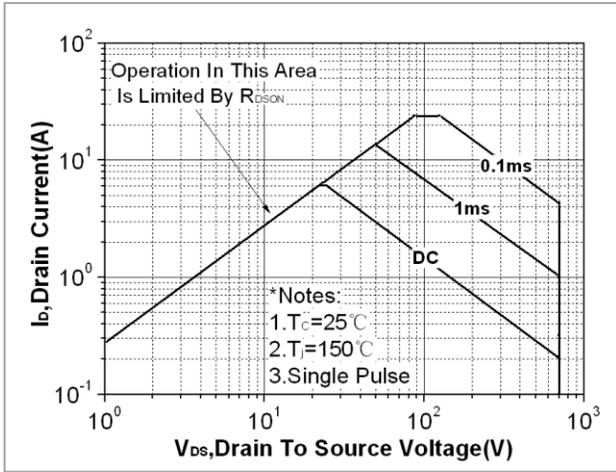
Fig. 14. Maximum safe operating area(TO-220)
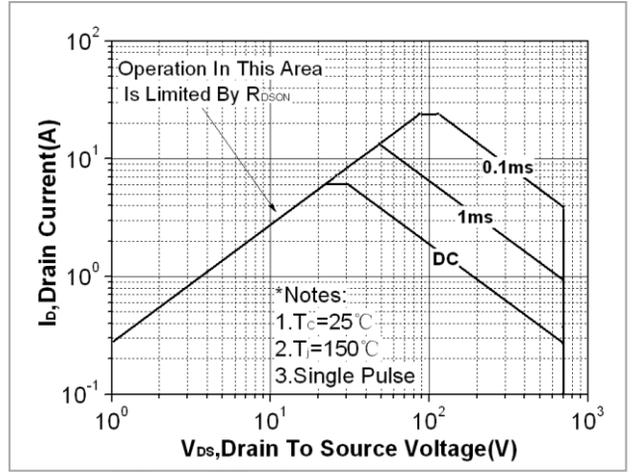
Fig. 15. Maximum safe operating area(TO-251Q&TO-251MQ)
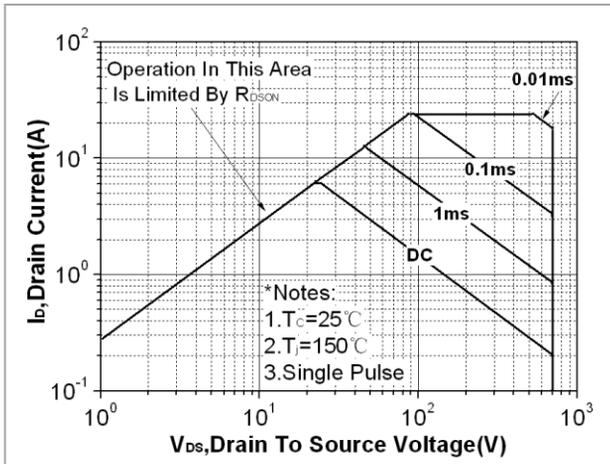
Fig. 16. Transient thermal response curve(TO-251S&TO-251U)
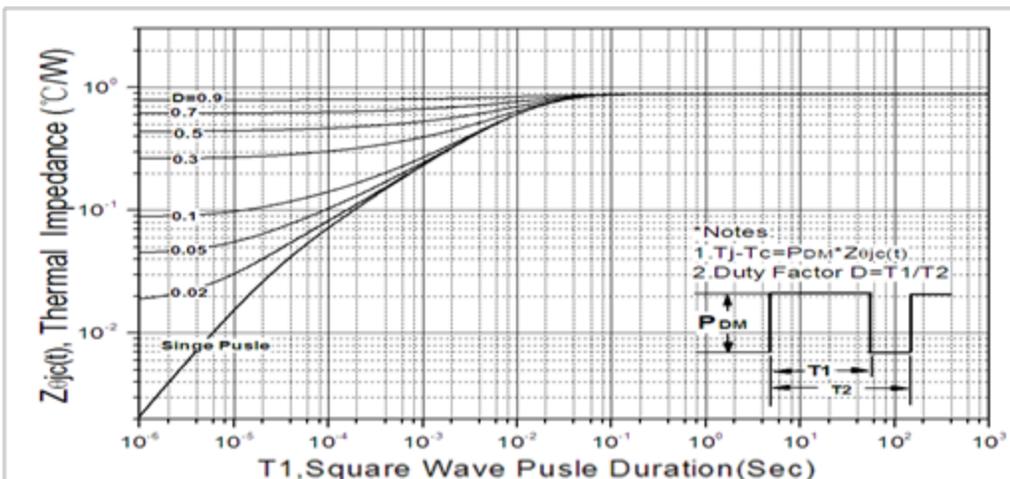
Fig. 17. Transient thermal response curve(TO-252)
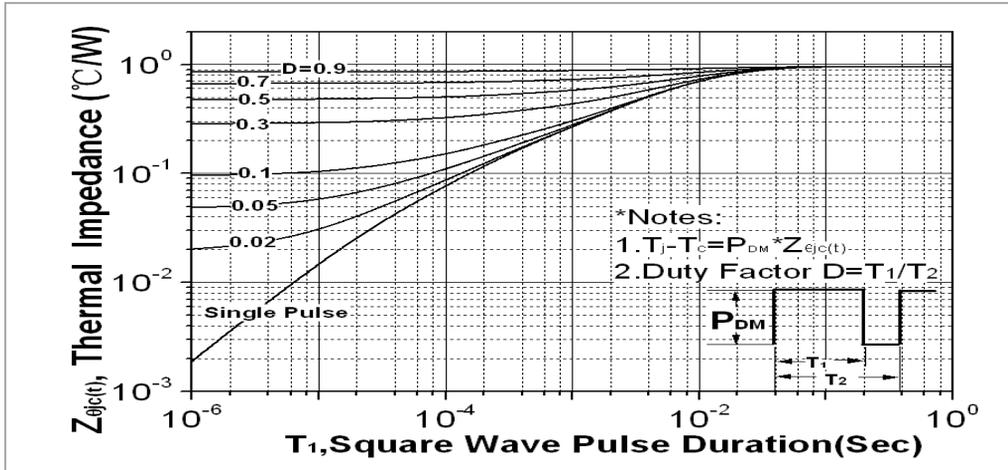


Fig. 18. Transient thermal response curve(TO-220F)
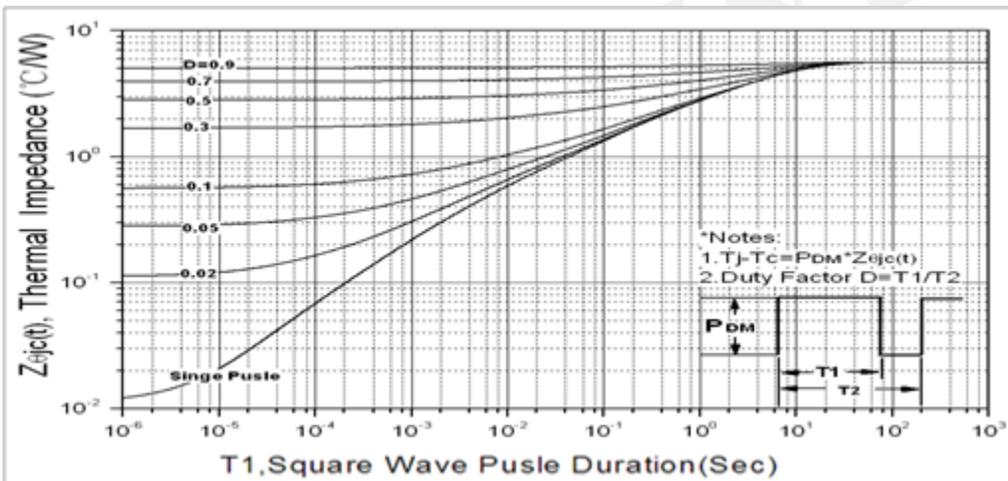
**Fig. 19. Transient thermal response curve(TO-251&TO-251N)**
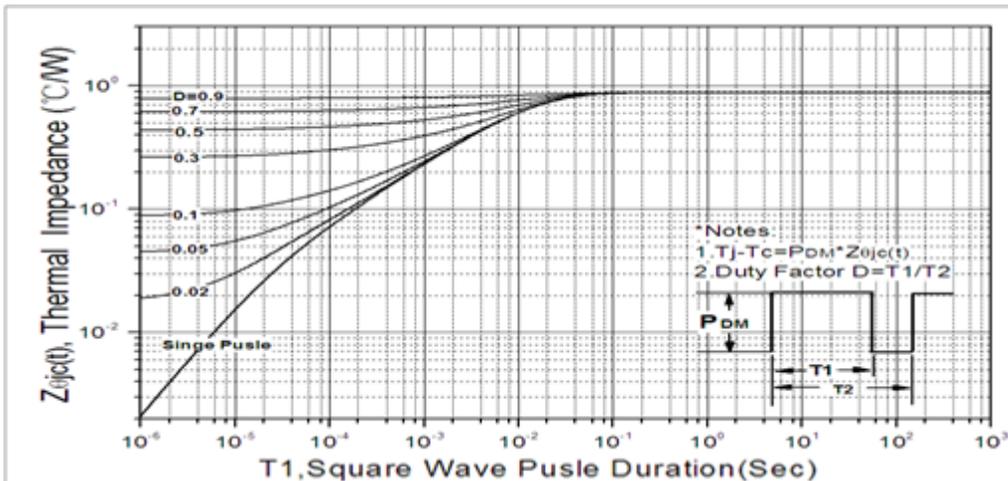
Fig. 20 Transient thermal response curve(TO-251NX)
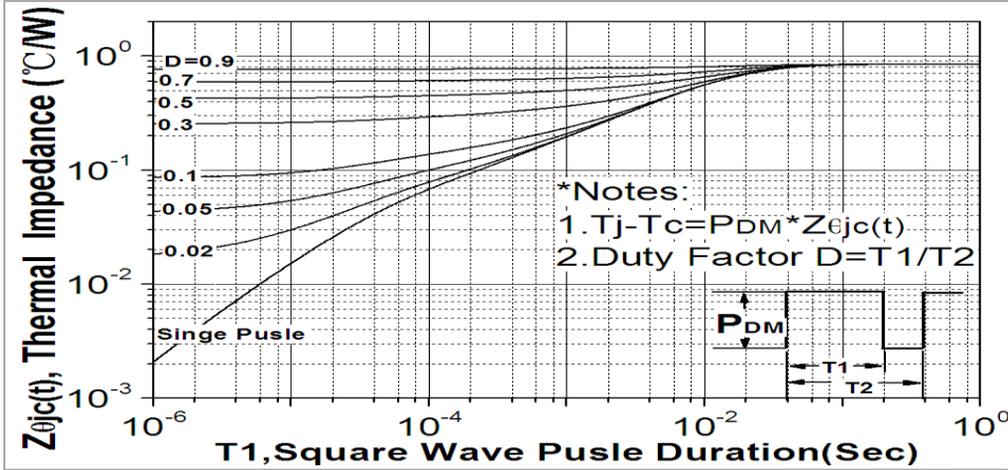

**Fig. 21. Transient thermal response curve(TO-220)**
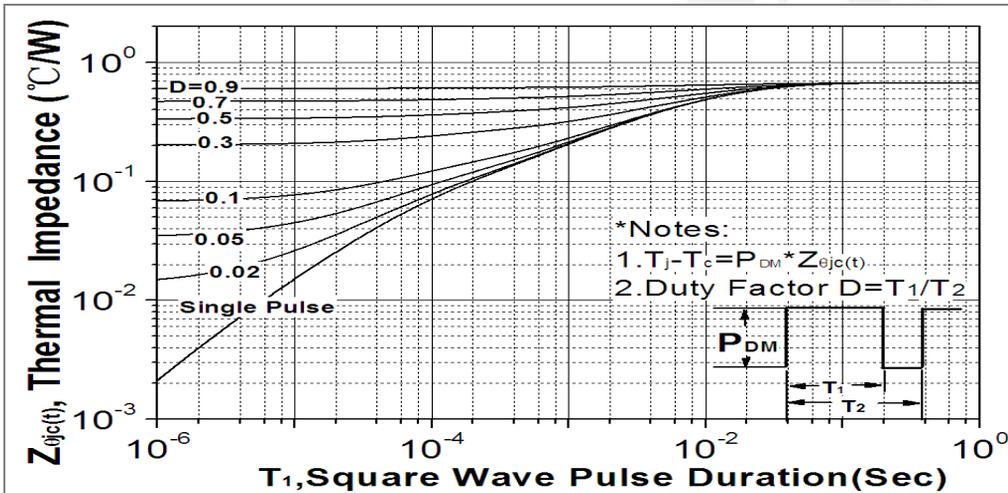


Fig. 22. Transient thermal response curve(TO-251Q&TO-251MQ)
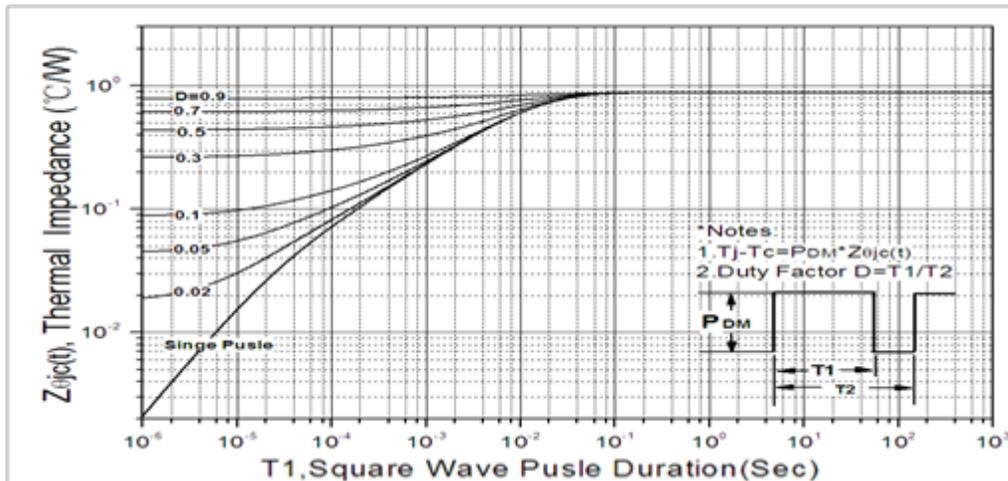
Fig. 23. Gate charge test circuit & waveform
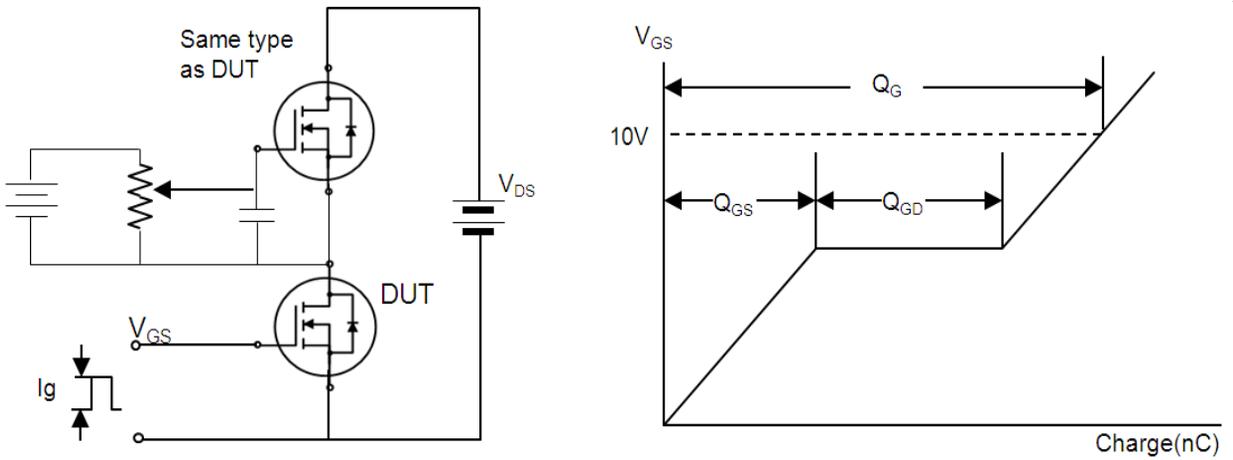
Fig. 24. Switching time test circuit & waveform
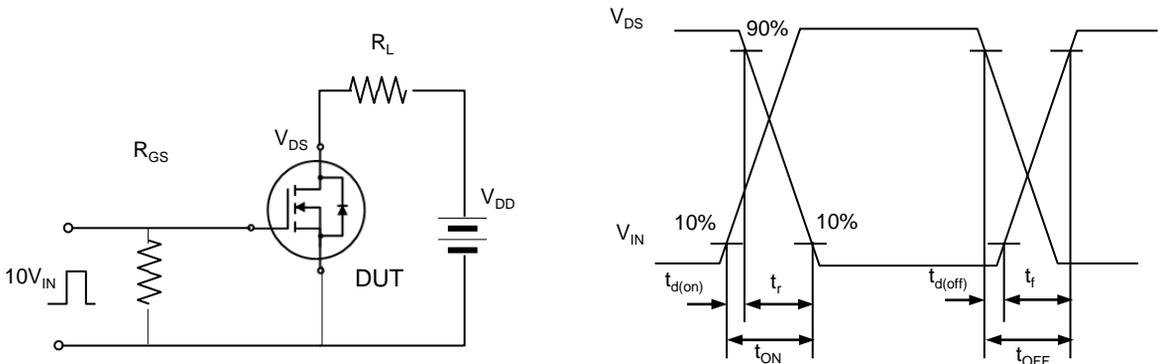
Fig. 25. Unclamped Inductive switching test circuit & waveform

$$E_{AS} = \frac{1}{2} L I_{AS}^2$$
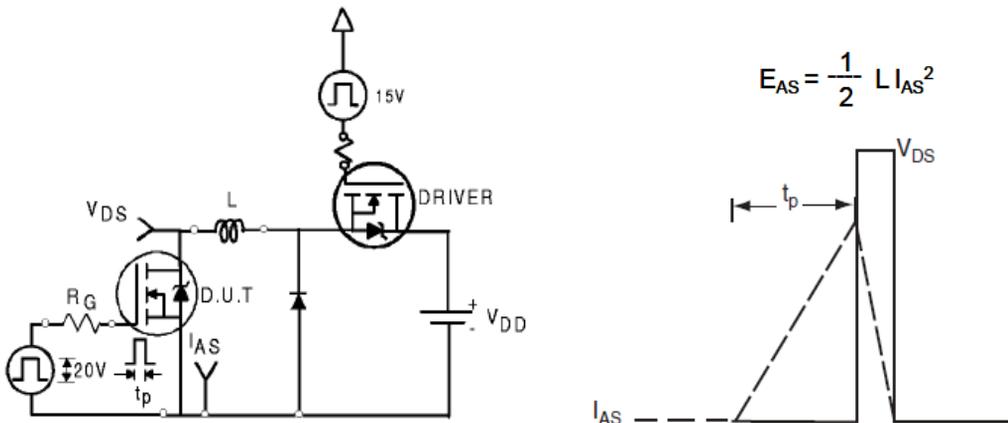
Fig. 26. Peak diode recovery dv/dt test circuit & waveform
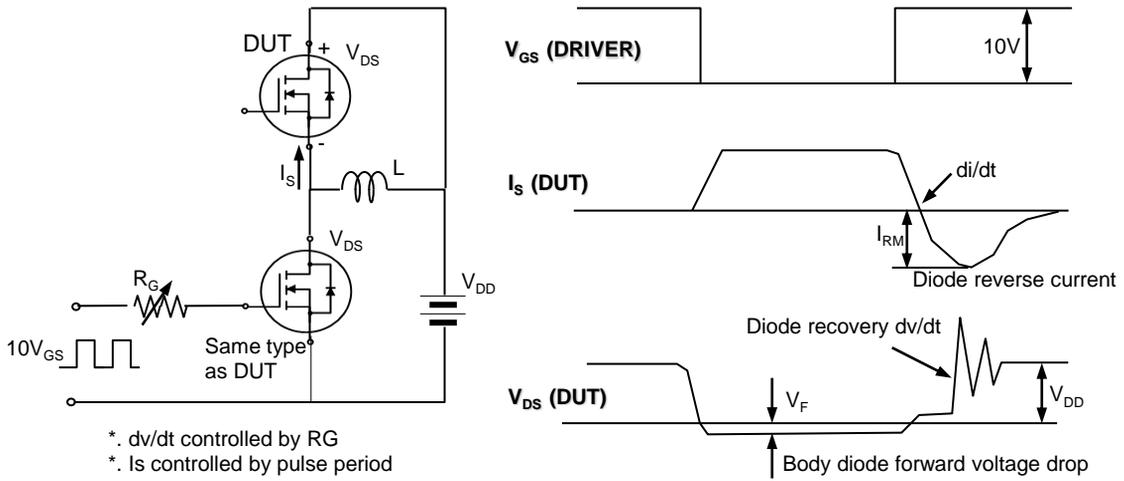
*. dv/dt controlled by RG
*. Is controlled by pulse period

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET *category:*

Click to view products by Sam&wing *manufacturer:*

Other Similar products are found below :

IRFD120 JANTX2N5237 2SK2267(Q) BUK455-60A/B TK100A10N1,S4X(S MIC4420CM-TR VN1206L NDP4060 SI4482DY

IRS2092STRPBF-EL IPS70R2K0CEAKMA1 TK31J60W5,S1VQ(O TK31J60W,S1VQ(O TK16J60W,S1VQ(O 2SK2614(TE16L1,Q)

DMN1017UCP3-7 EFC2J004NUZTDG P85W28HP2F-7071 DMN1053UCP4-7 NTE2384 DMC2700UDMQ-7 DMN2080UCB4-7

DMN61D9UWQ-13 US6M2GTR DMN31D5UDJ-7 DMP22D4UFO-7B IPS60R3K4CEAKMA1 DMN1006UCA6-7 DMN16M9UCA6-7

STF5N65M6 IRF40H233XTMA1 STU5N65M6 DMN6022SSD-13 DMN13M9UCA6-7 DMTH10H4M6SPS-13 IPS60R360PFD7SAKMA1

DMN2990UFB-7B SSM3K35CT,L3F IPLK60R1K0PFD7ATMA1 2N7002W-G MCAC30N06Y-TP IPWS65R035CFD7AXKSA1

MCQ7328-TP SSM3J143TU,LXHF DMN12M3UCA6-7 PJMF280N65E1_T0_00201 PJMF380N65E1_T0_00201

PJMF280N60E1_T0_00201 PJMF600N65E1_T0_00201 PJMF900N65E1_T0_00201