

TSA12N90M

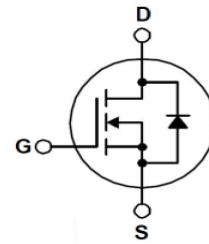
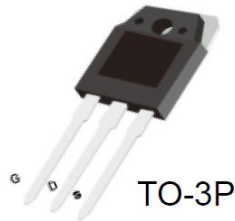
900V N-Channel MOSFET

General Description

This Power MOSFET is produced using Truesemi's advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

Features

- 12A,900V,Max.RDS(on)=1.1Ω @ VGS =10V
- Low gate charge: Qg=83nC (Typ.)
- 100% avalanche tested
- RoHS compliant device



Absolute Maximum Ratings Tc=25°C unless otherwise specified

Symbol	Parameter		Value	Units
V _{DSS}	Drain-Source Voltage		900	V
V _{GS}	Gate-Source Voltage		± 30	V
I _D	Drain Current	T _C = 25°C	12	A
		T _C = 100°C	8.0	A
I _{DM}	Pulsed Drain Current *		48	A
E _{AS}	Single Pulsed Avalanche Energy (Note 2)		640	mJ
I _{AS}	Repetitive avalanche current (Note 2)		15	A
E _{AR}	Repetitive Avalanche Energy (Note 1)		15.6	mJ
P _D	Power Dissipation (T _C = 25°C)		156	W
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +150	°C

* Limited only maximum junction temperature

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
R _{θJC}	Thermal Resistance, Junction-to-Case	--	0.80	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	--	62.5	°C/W

Electrical Characteristics T_c=25 °C unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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On Characteristics

V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 uA	3.0	--	5.0	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D =5.5A	--	0.86	1.10	Ω
R _g	Internal gate resistance	Open drain, f=1MHz	--	1	--	Ω

Off Characteristics

BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 uA	900	--	--	V
I _{DSS}	Drain-source cut-off current	V _{DS} = 900 V, V _{GS} = 0 V	--	--	10	uA
		V _{DS} = 900 V, T _C = 125 °C	--	--	100	uA
I _{GSSF}	Gate-Body Leakage Current,Forward	V _{GS} = 30 V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current,Reverse	V _{GS} =- 30 V, V _{DS} = 0 V	--	--	-100	nA

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	2900	--	pF
C _{oss}	Output Capacitance		--	210	--	pF
C _{rss}	Reverse Transfer Capacitance		--	32	--	pF

Switching Characteristics

t _{d(on)}	Turn-On Time	V _{DD} = 450V, I _D = 12 A, R _G = 25 Ω (Note 3,4)	--	66	--	ns
t _r	Turn-On Rise Time		--	63	--	ns
t _{d(off)}	Turn-Off Delay Time		--	195	--	ns
t _f	Turn-Off Fall Time		--	74	--	ns
Q _g	Total Gate Charge	V _{DS} =720 V, I _D =12A, V _{GS} = 10 V (Note 3,4)	--	83	--	nC
Q _{gs}	Gate-Source Charge		--	15	--	nC
Q _{gd}	Gate-Drain Charge		--	42	--	nC

Source-Drain Diode Maximum Ratings and Characteristics

I _S	Continuous Source-Drain Diode Forward Current		--	--	12	A
I _{SM}	Pulsed Source-Drain Diode Forward Current		--	--	33	
V _{SD}	Source-Drain Diode Forward Voltage	I _S =12A, V _{GS} = 0 V	--	--	1.5	V
t _{rr}	Reverse Recovery Time	I _S =12A, V _{GS} = 0 V di _F /dt = 100 A/μs (Note 3, 4)	--	920	--	ns
Q _{rr}	Reverse Recovery Charge		--	7.2	--	uC

NOTES:

1. Repeated rating: Pulse width limited by safe operating area
2. L=20mH, I_{AS}=8A, V_{DS}=80V, R_G=25Ω, Starting T_J=25 °C
3. Pulse test: Pulse width≤300us, Duty cycle≤2%
4. Essentially Independent of Operating Temperature Typical Characteristics

Typical Characteristics

Fig. 1 $I_D - V_{DS}$

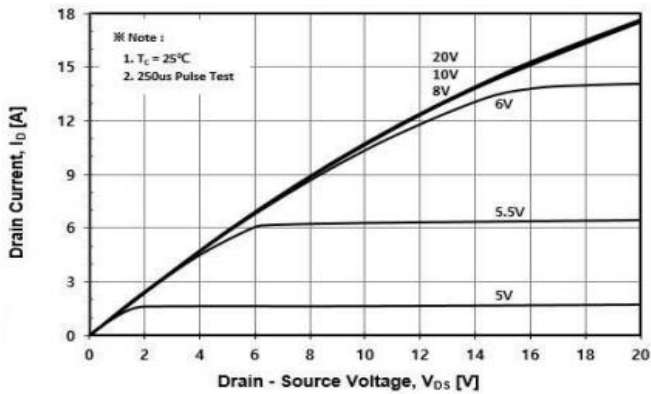


Fig. 2 $I_D - V_{GS}$

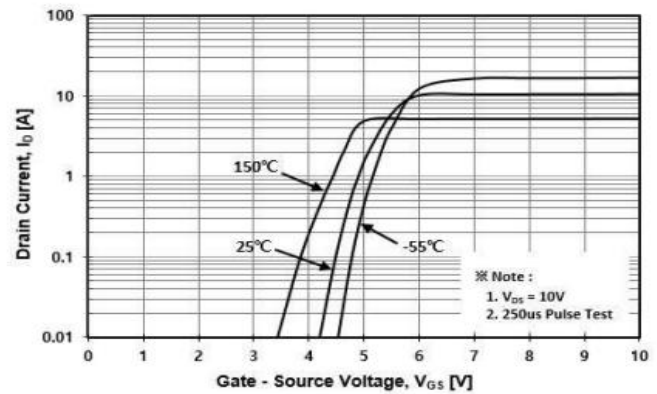


Fig. 3 $R_{DS(ON)} - I_D$

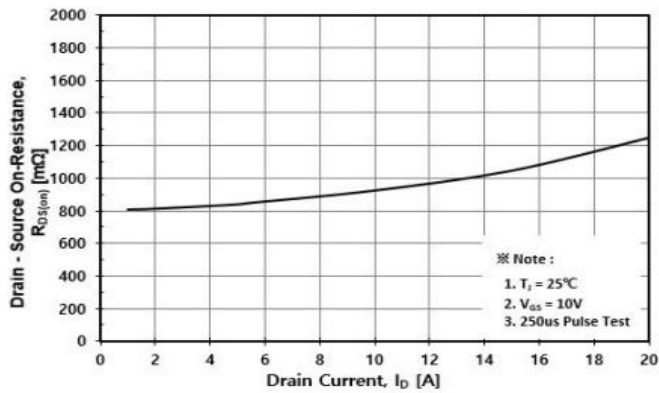


Fig. 4 $I_S - V_{SD}$

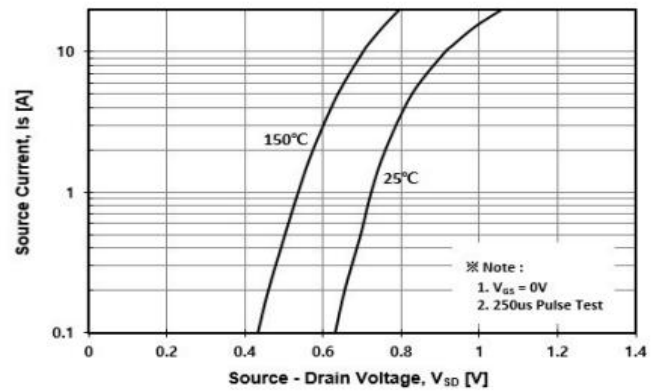


Fig. 5 Capacitance - V_{DS}

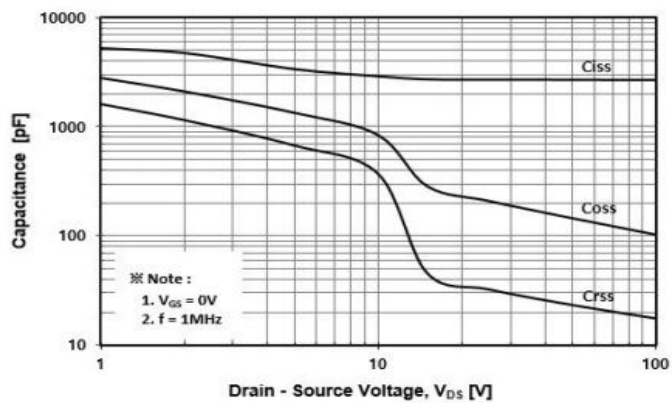
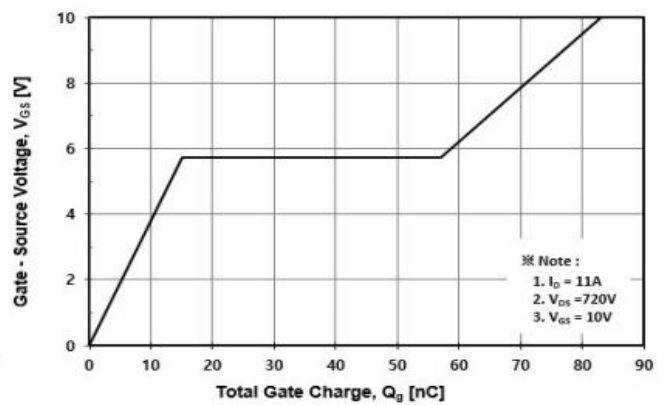


Fig. 6 $V_{GS} - Q_G$



Typical Characteristics Curve (Continue)

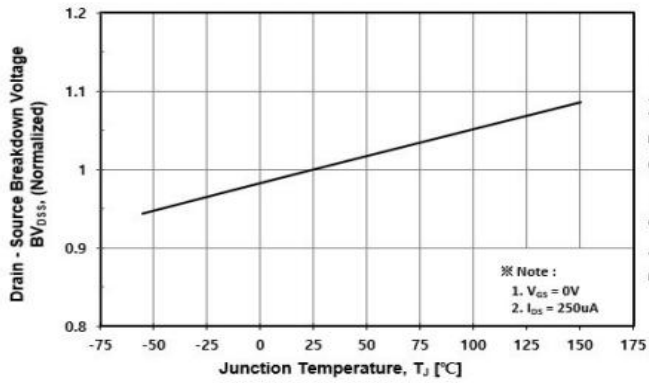
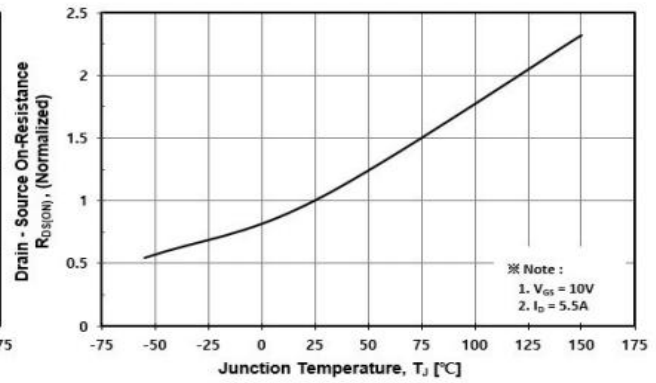
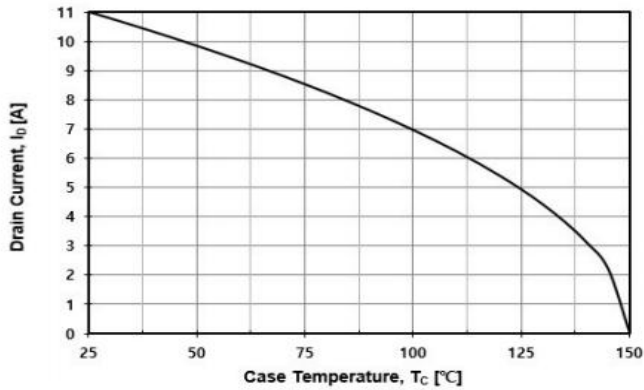
Fig. 7 $BV_{DSS} - T_J$ Fig. 8 $R_{DS(ON)} - T_J$ Fig. 9 $I_D - T_C$ 

Fig. 10 Safe Operating Area

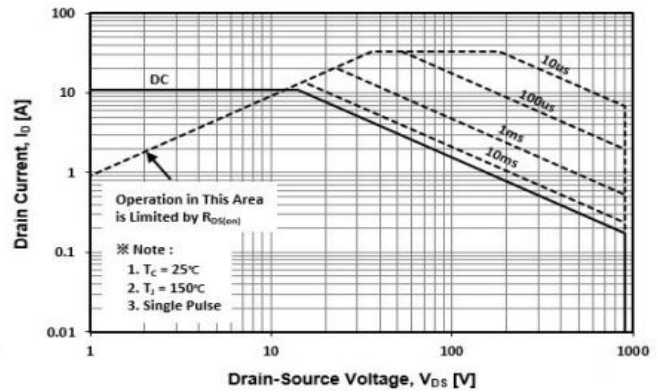


Fig. 11 Transient Thermal Impedance

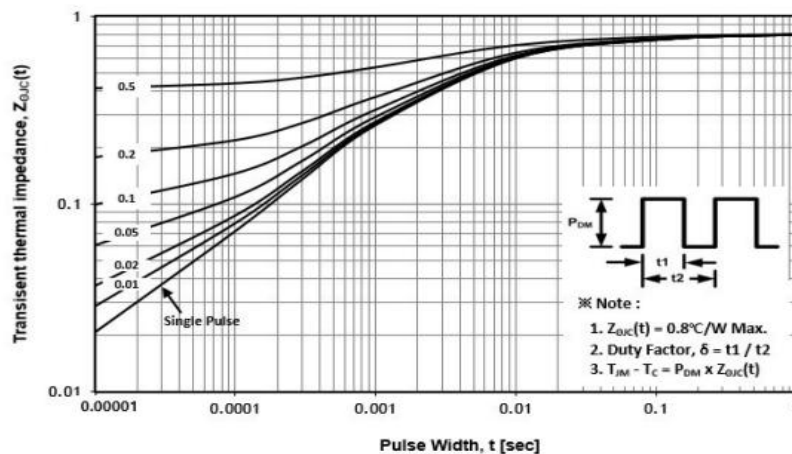


Fig. 12 Gate Charge Test Circuit & Waveform

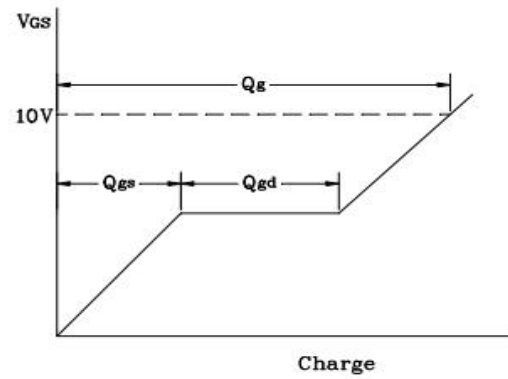
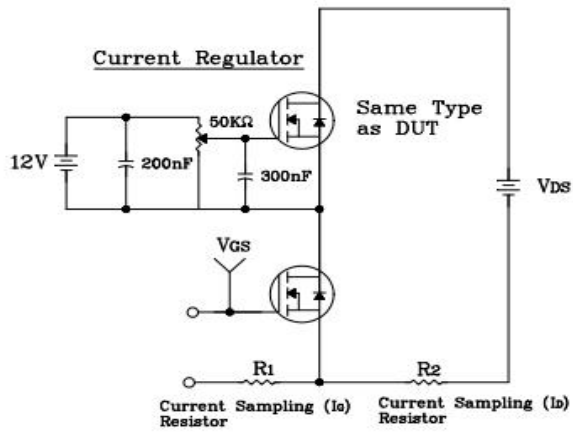
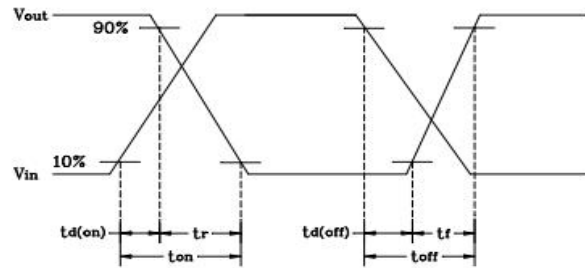
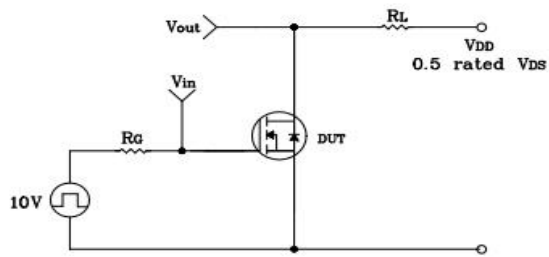


Fig. 13 Resistive Switching Test Circuit & Waveform

Fig. 14 E_{AS} Test Circuit & Waveform