Truesemi®

TSA50N25M

250V N-Channel MOSFET

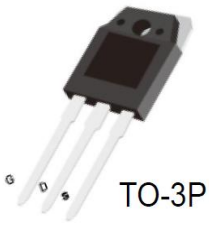
General Description

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.

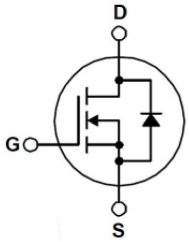
Features

•50A,250V,Max.RDS(on)=0.078Ω @ VGS =10V
♦ Fast switching speed
♦ Low gate charge
♦ RoHS compliant device

Applications
♦ Synchronous Rectification
♦ Power Management in Inverter System



TO-3P



Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter		Value	Units
V_{DSS}	Drain-Source Voltage		250	V
V_{GS}	Gate-Source Voltage		± 30	V
I_D	Drain Current	T_C = 25℃	50	A
		T_C = 100℃	31.6	A
I_{DM}	Pulsed Drain Current		200	A
E_{AS}	Single Pulsed Avalanche Energy (Note 1)		1250	mJ
I_{AS}	Single avalanche current		20	A
P_D	Power Dissipation (T_C = 25℃)		245	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃

*** Limited only maximum junction temperature**

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance,Junction-to-Case	--	0.51	℃/W
$R_{\theta JA}$	Thermal Resistance,Junction-to-Ambient	--	50.0	℃/W

Electrical Characteristics T_C=25 ℃ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 uA	2	--	4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 25A	--	0.065	0.078	Ω
Rg	Internal gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	--	0.8	--	Ω
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	250	--	--	V
I_{DSS}	Drain-source cut-off current	V_{DS} = 250 V, V_{GS} = 0 V	--	--	1	uA
I_{GSS}	Gate leakage current	V_{DS}=0V, V_{GS}=±30V	--	--	±100	nA
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz (Note 3,4)	--	5521	--	pF
C_{oss}	Output Capacitance		--	395	--	pF
C_{rss}	Reverse Transfer Capacitance		--	42	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	V_{DD} = 125V, I_D = 50A, R_G = 25 Ω,V_{GS}=10V (Note 3,4)	--	55	--	ns
t_r	Turn-On Rise Time		--	50	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	212	--	ns
t_f	Turn-Off Fall Time		--	31	--	ns
Q_g	Total Gate Charge	V_{DS} = 200 V, I_D =50A, V_{GS} = 10 V (Note 3,4)	--	76	--	nC
Q_{gs}	Gate-Source Charge		--	20	--	nC
Q_{gd}	Gate-Drain Charge		--	25	--	nC
Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		--	--	50	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	200	
V_{SD}	Source-Drain Diode Forward Voltage	I_{SD} =50A, V_{GS} = 0 V	--	--	1.2	V
t_{rr}	Reverse Recovery Time	I_{SD} = 50A, V_{GS} = 0 V di_F/dt = 100 A/μs (Note 3,4)	--	271	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.4	--	uC

NOTES:

1.L=5mH, IAS=20 VDD=50V, Starting TJ=25◇C

2.Pulse test: Pulse width≤300us, Duty cycle≤2%

3. Essentially independent of operating temperature typical characteristics

4.Guaranteed by design, not subject to production testing.

Typical Electrical Characteristics Curves

Fig. 1 I_D - V_{DS}

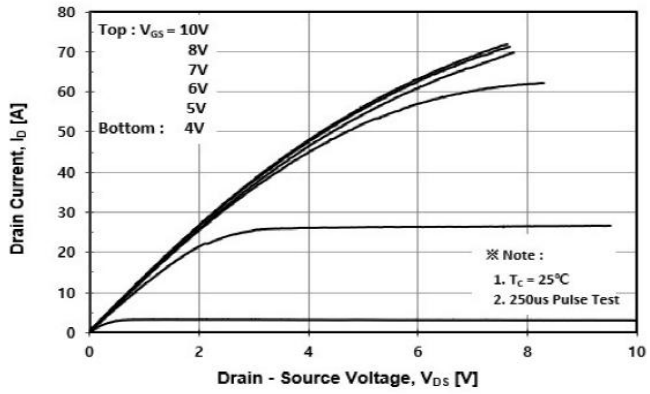


Fig. 2 I_D - V_{GS}

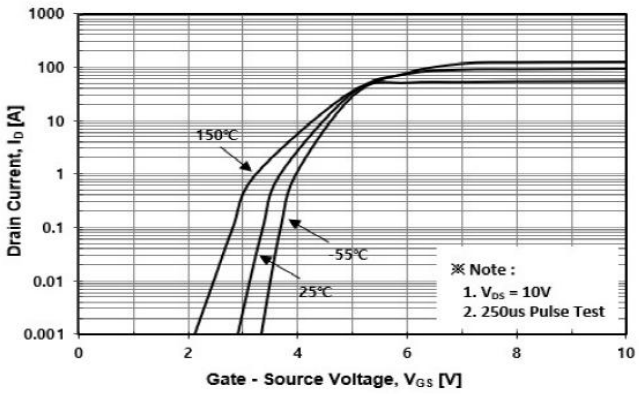


Fig. 3 $R_{DS(ON)}$ - I_D

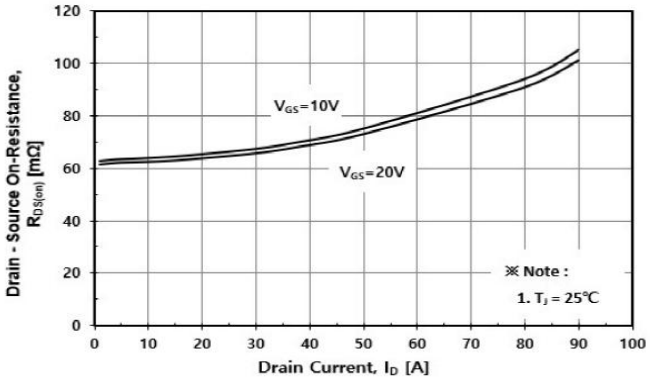


Fig. 4 I_S - V_{SD}

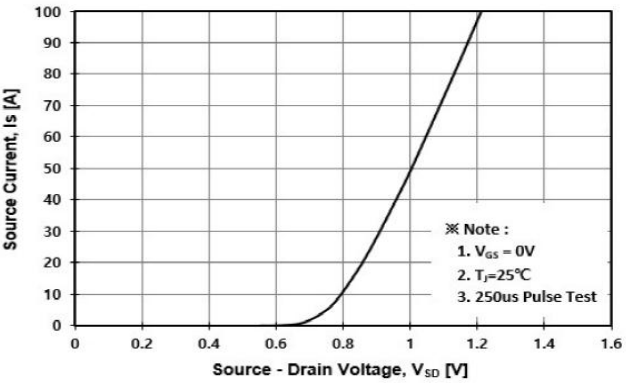


Fig. 5 Capacitance - V_{DS}

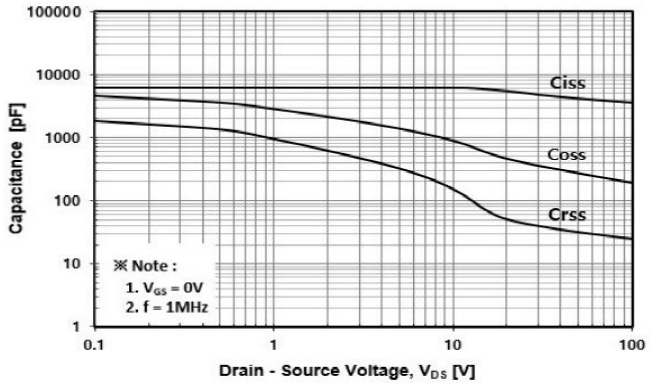
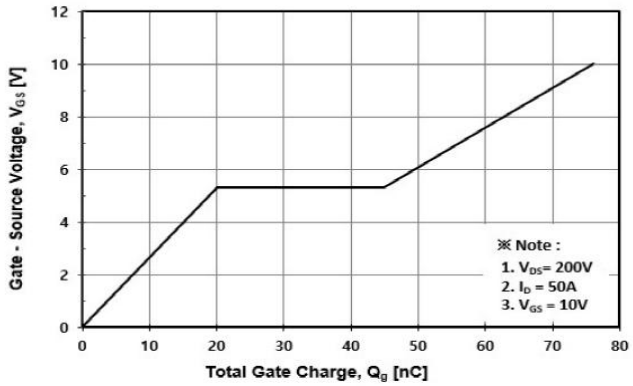


Fig. 6 V_{GS} - Q_G



Typical Electrical Characteristics Curves

Fig. 7 BV_{DSS} - T_J

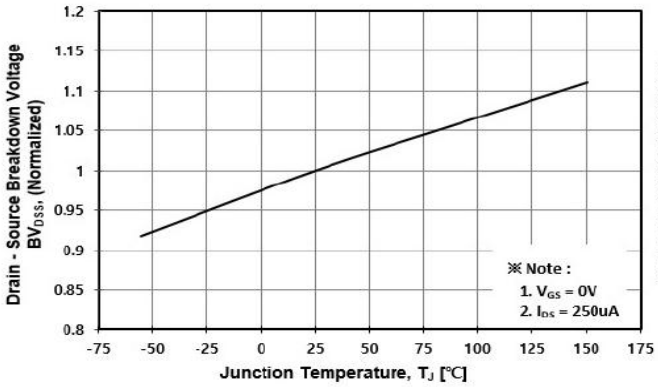


Fig. 8 $R_{DS(ON)}$ - T_J

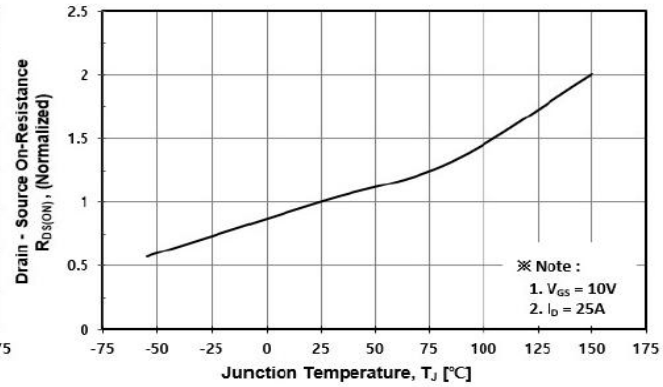


Fig. 9 I_D - T_C

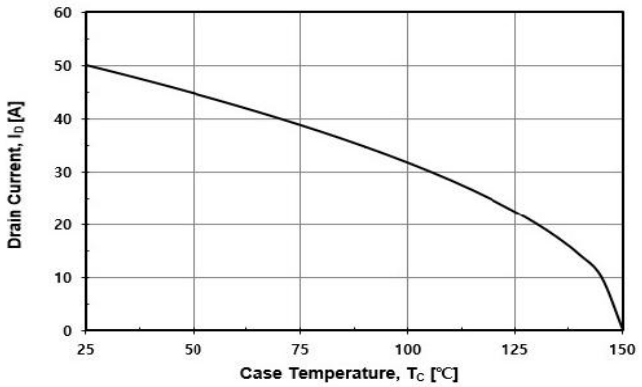


Fig. 10 Safe Operating Area

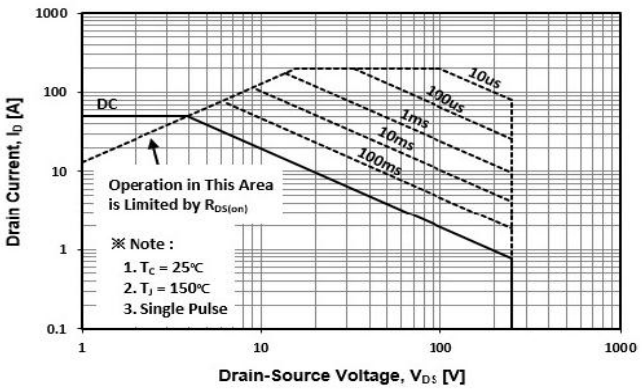


Fig. 11 Transient Thermal Impedance

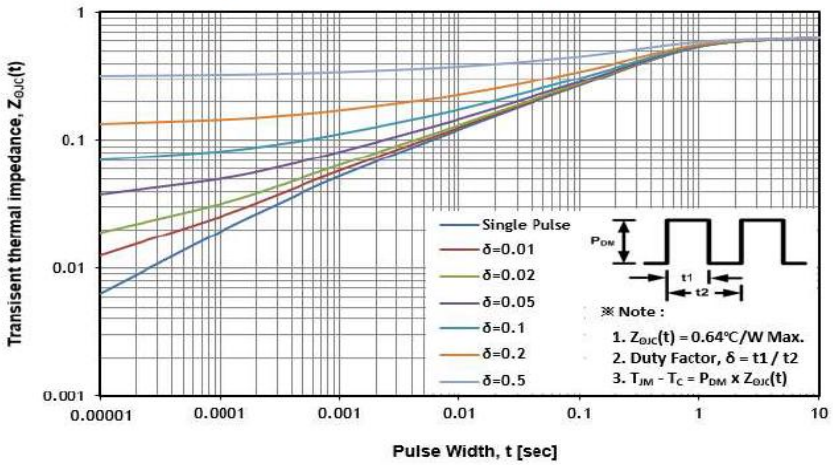
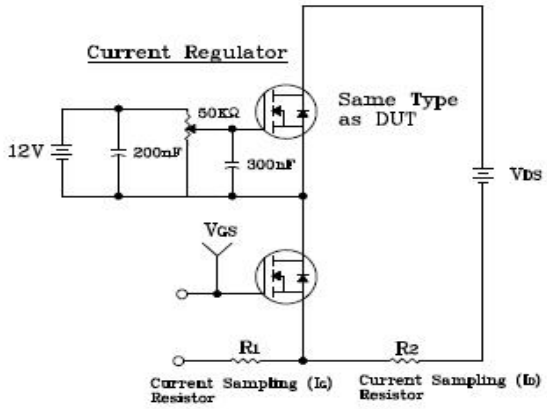


Fig. 12 Gate Charge Test Circuit & Waveform



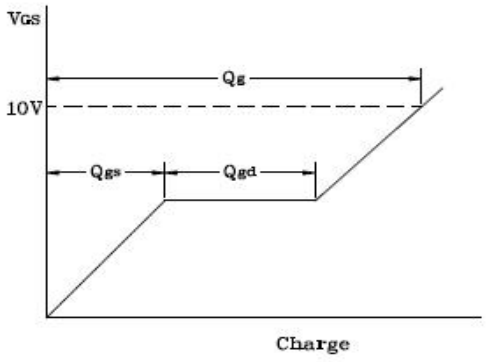
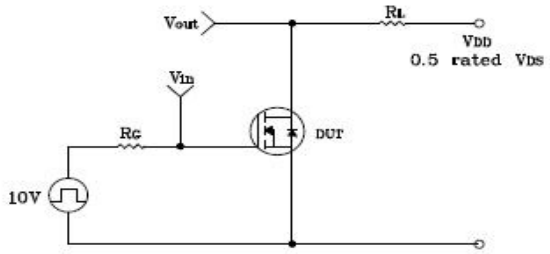


Fig. 13 Resistive Switching Test Circuit & Waveform



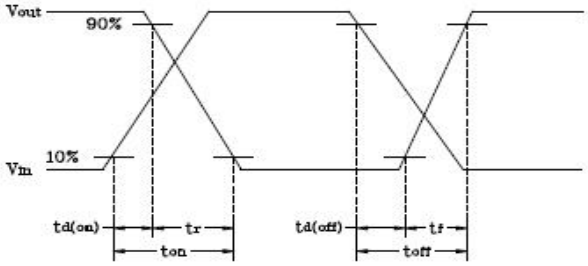
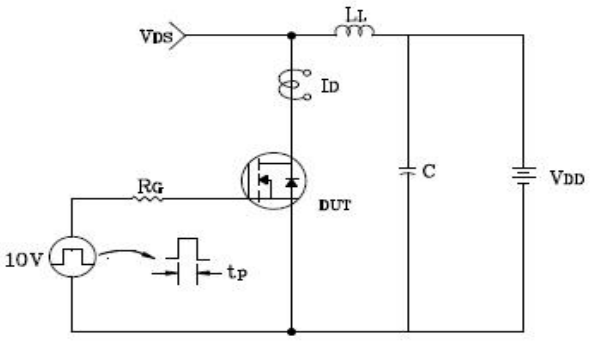


Fig. 14 E_{AS} Test Circuit & Waveform



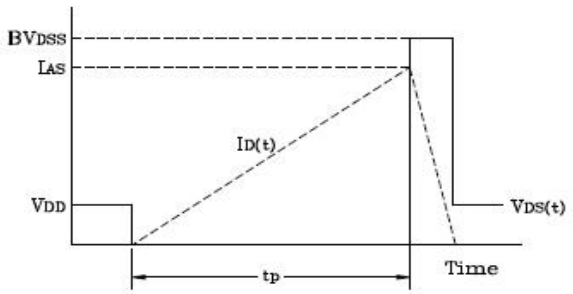


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform