Truesemi®

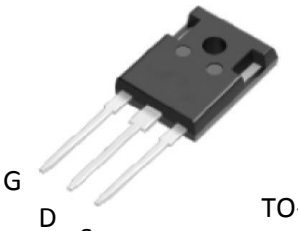
TSK50N50M

500V N-Channel MOSFET

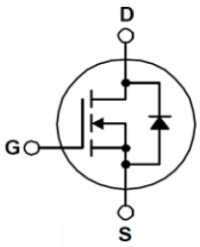
Features

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.

- 50A,500V,Max.RDS(on)=0.11Ω @ VGS =10V
- Low gate charge
- High ruggedness
- 100% avalanche tested
- RoHS compliant device



TO-247



Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter		Value	Units
V_{DSS}	Drain-Source Voltage		500	V
V_{GS}	Gate-Source Voltage		± 30	V
I_D	Drain Current	T_C = 25℃	50	A
		T_C = 100℃	30	A
I_{DM}	Pulsed Drain Current	(Note 1)	184	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	2116	mJ
I_{AS}	Single avalanche current	(Note 1)	50	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	29	mJ
P_D	Power Dissipation (T_C = 25℃)		290	W
T_J	Junction temperature		150	℃
T_{stg}	Storage temperature range		-55~150	℃

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance,Junction-to-Case	--	0.43	℃/W
$R_{\theta JA}$	Thermal Resistance,Junction-to-Ambient	--	50	℃/W

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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	2.0	--	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 25A	--	0.09	0.11	Ω
g_{fs}	Forward transfer conductance	V_{DS} = 10V, I_D = 25A (Note 4)	--	5.1	--	S
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	500	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 500 V, V_{GS} = 0 V	--	--	10	uA
I_{GSS}	Gate leakage current	V_{DS}=0V, V_{GS}=±20V	--	--	±100	nA
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	8349	--	pF
C_{oss}	Output Capacitance		--	658	--	pF
C_{rss}	Reverse Transfer Capacitance		--	67	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	V_{DD} = 250 V, I_D = 23 A, R_G = 25 Ω (Note 4)	--	62	--	ns
t_r	Turn-On Rise Time		--	24	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	188	--	ns
t_f	Turn-Off Fall Time		--	23	--	ns
Q_g	Total Gate Charge	V_{DS} =400 V, I_D = 25A, V_{GS} = 10 V (Note 4)	--	180	--	nC
Q_{gs}	Gate-Source Charge		--	39	--	nC
Q_{gd}	Gate-Drain Charge		--	57	--	nC
Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		--	--	46	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	184	
V_{SD}	Source-Drain Diode Forward Voltage	I_S = 50A, V_{GS} = 0 V	--	--	1.5	V
t_{rr}	Reverse Recovery Time	I_S = 50A, V_{GS} = 0 V, di_F/dt = 100 A/μs (Note 4)	--	487	--	ns
Q_{rr}	Reverse Recovery Charge		--	6.9	--	uC

NOTES:

1. Repeated rating: Pulse width limited by safe operating area

2.L=2mH, IAS=50A, VDD=50V, RG=25Ω, Starting TJ=25°C

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

4. Essentially independent of operating temperature typical characteristics

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Typical Characteristics

Fig. 1 I_D - V_{DS}

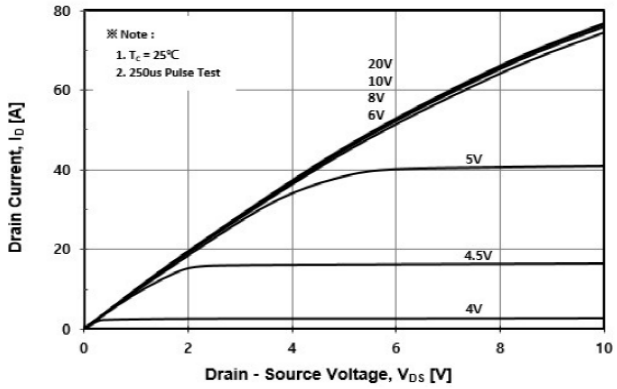


Fig. 2 I_D - V_{GS}

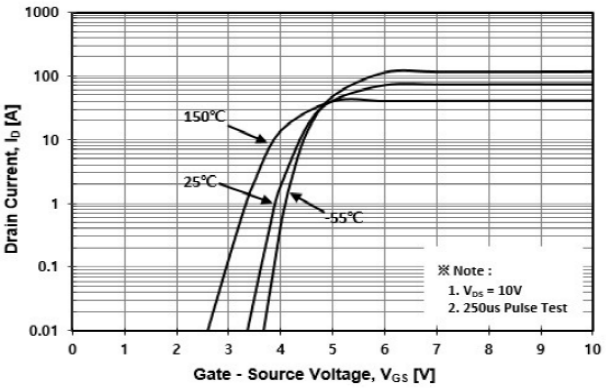


Fig. 3 $R_{DS(ON)}$ - I_D

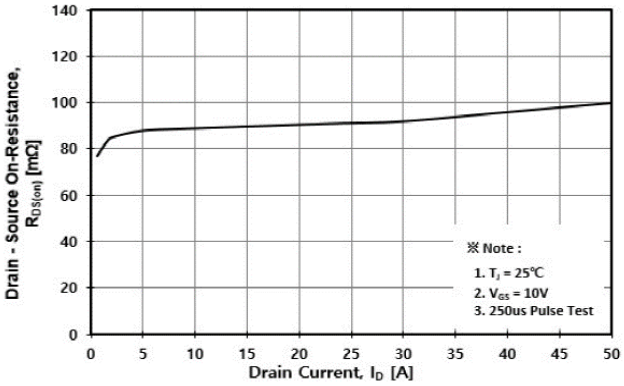


Fig. 4 I_S - V_{SD}

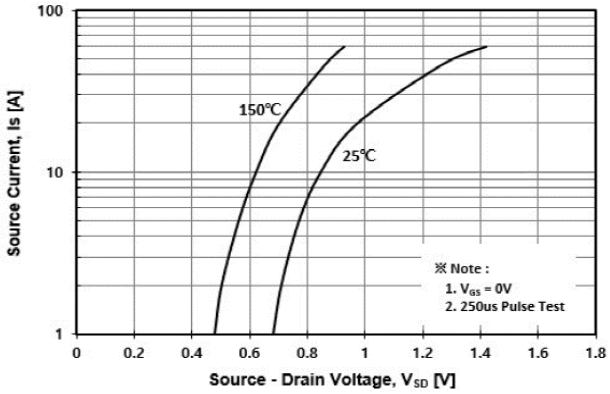


Fig. 5 Capacitance - V_{DS}

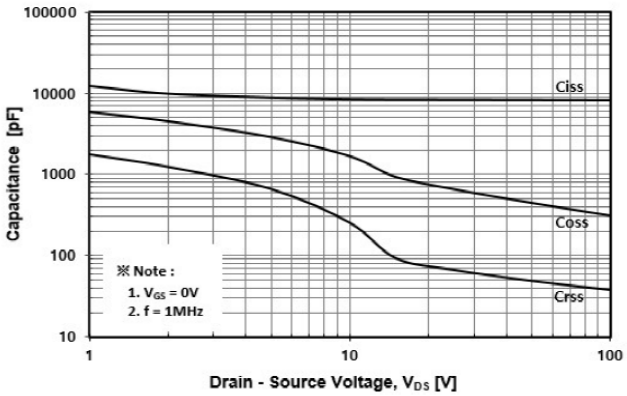
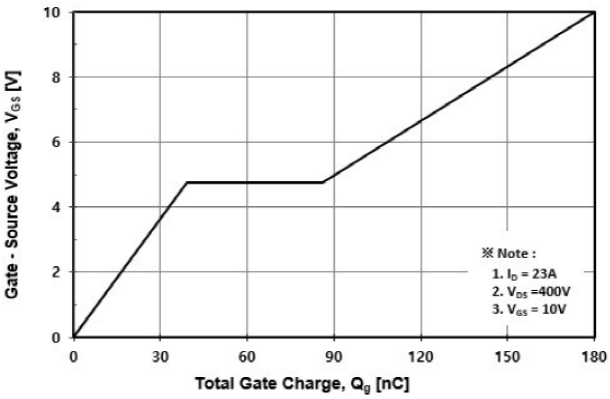


Fig. 6 V_{GS} - Q_G



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Typical Characteristics Curve (Continue)

Fig. 7 BV_{DSS} - T_J

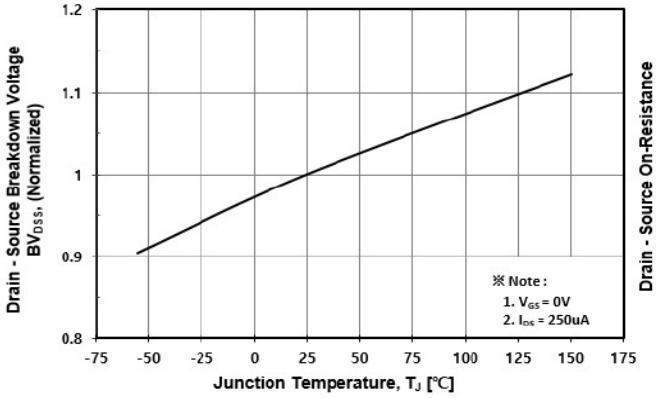


Fig. 8 $R_{DS(ON)}$ - T_J

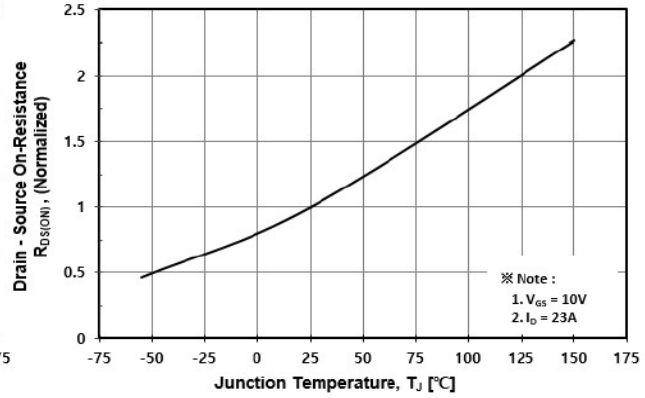


Fig. 9 I_D - T_C

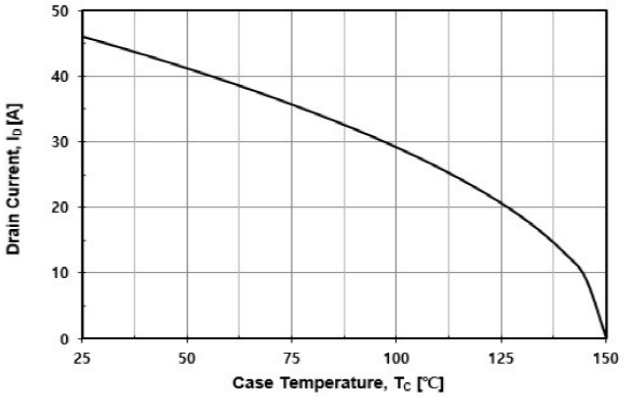


Fig. 10 Safe Operating Area

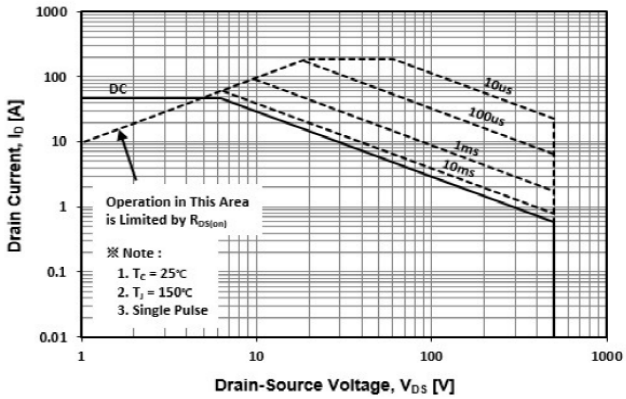


Fig. 11 Transient Thermal Impedance

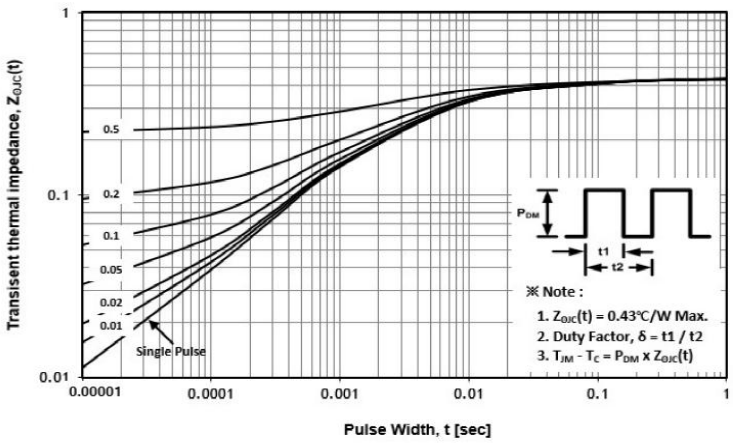
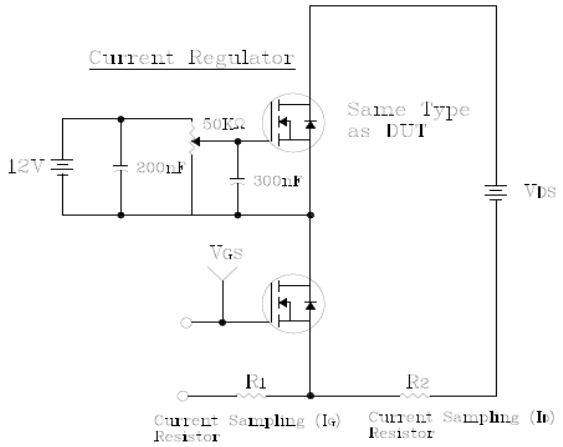


Fig. 12 Gate Charge Test Circuit & Waveform



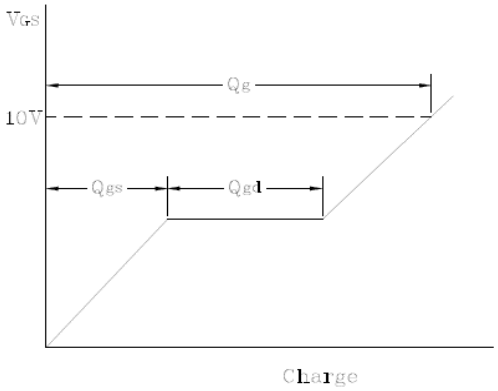
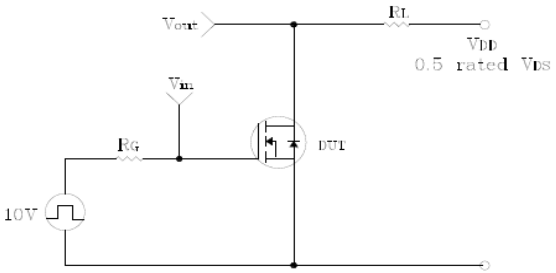


Fig. 13 Resistive Switching Test Circuit & Waveform



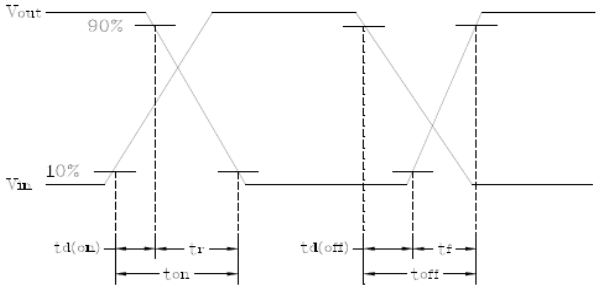
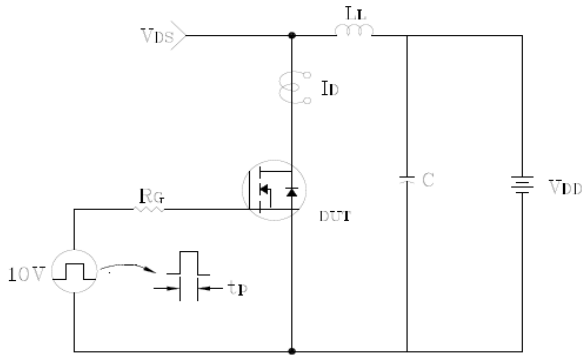
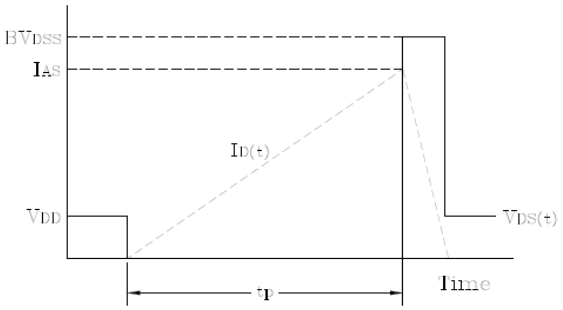


Fig. 14 E_{AS} Test Circuit & Waveform





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Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform

