

TSK110N25M

250V N-Channel Power MOSFET

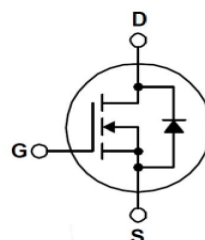
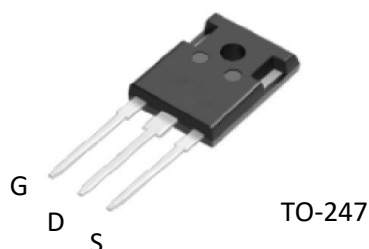
General Description

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

110A, 250V, Max. $R_{DS(on)}$ = 30m Ω
@ V_{GS} = 10V

- ◆ Drain-Source breakdown voltage:
 $BVDSS$ = 250V (Min.)
- ◆ Low drain-source On resistance:
 $R_{DS(on)}$ = 30m Ω (Max.)
- ◆ 100% avalanche tested
- ◆ RoHS compliant device



Absolute Maximum Ratings

T_C = 25°C 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 *	$T_C = 25^\circ\text{C}$	110	A
		$T_C = 100^\circ\text{C}$	70	A
I_{DM}	Pulsed Drain Current *		440	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	4500	mJ
I_{AS}	Repetitive avalanche current	(Note 1)	60	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	69.4	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)		694	W
T_J	Junction temperature		150	°C
T_{stg}	Storage temperature range		-55~150	°C

* Limited only maximum junction temperature

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	0.18	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	62.5	°C/W

Electrical Characteristics $T_c=25\text{ }^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0	--	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 55\text{ A}$	--	25	30	m Ω
R_g	Internal gate resistance	Open drain, $f=1\text{ MHz}$	--	0.74	--	Ω

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	250	--	--	V
I_{DSS}	Drain-source cut-off current	$V_{DS}=250\text{ V}, V_{GS} = 0\text{ V}$	--	--	25	μA
		$V_{DS}=200\text{ V}, T_c=125^{\circ}\text{C}$	--	--	100	μA
I_{GSS}	Gate leakage current	$V_{DS}=0\text{ V}, V_{GS}=\pm 30\text{ V}$	--	--	± 250	nA

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	10009	--	pF
C_{oss}	Output Capacitance		--	1065	--	pF
C_{rss}	Reverse Transfer Capacitance		--	114	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Time (Note 3,4)	$V_{DD}=125\text{ V}, I_D = 55\text{ A},$ $R_G = 25\text{ }\Omega$	--	104	--	ns
t_r	Turn-On Rise Time (Note 3,4)		--	49	--	ns
$t_{d(off)}$	Turn-Off Delay Time (Note 4,5)		--	552	--	ns
t_f	Turn-Off Fall Time (Note 3,4)		--	71	--	ns
Q_g	Total Gate Charge (Note 3,4)	$V_{DS}=200\text{ V}, I_D = 55\text{ A},$ $V_{GS} = 10\text{ V}$	--	202	--	nC
Q_{gs}	Gate-Source Charge (Note 3,4)		--	45	--	nC
Q_{gd}	Gate-Drain Charge (Note 3,4)		--	65	--	nC

Source-Drain Diode Maximum Ratings and Characteristics

I_S	Continuous Source-Drain Diode Forward Current		--	--	110	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	440	
V_{SD}	Source-Drain Diode Forward Voltage	$I_S=55\text{ A}, V_{GS} = 0\text{ V}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=55\text{ A}, V_{GS} = 0\text{ V}$ $dI_F/dt=-100\text{ A}/\mu\text{s}$ (Note 3, 4)	--	279	--	ns
Q_{rr}	Reverse Recovery Charge		--	3.17	--	μC

NOTES:

1. Repeated rating: Pulse width limited by safe operating area
2. $L=2\text{ mH}, I_{AS}=60\text{ A}, V_{DD}=50\text{ V}, R_G=25\text{ }\Omega$, Starting $T_J=25^{\circ}\text{C}$
3. Pulse test: Pulse width $\leq 300\text{ }\mu\text{s}$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature typical characteristics

Typical Characteristics Curve

Fig. 1 Typical Output Characteristics

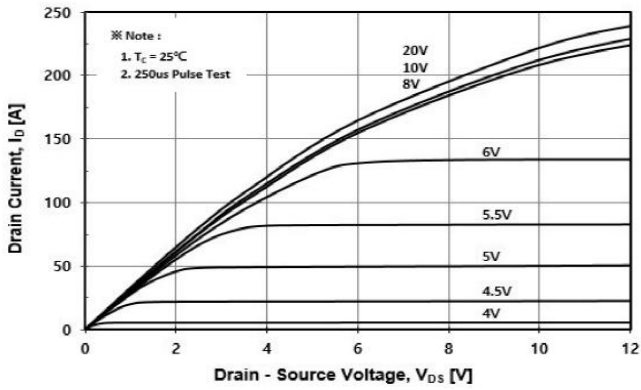


Fig. 2 Typical Transfer Characteristics

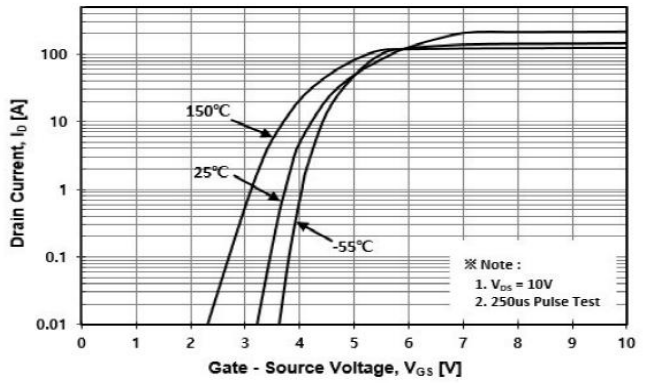


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

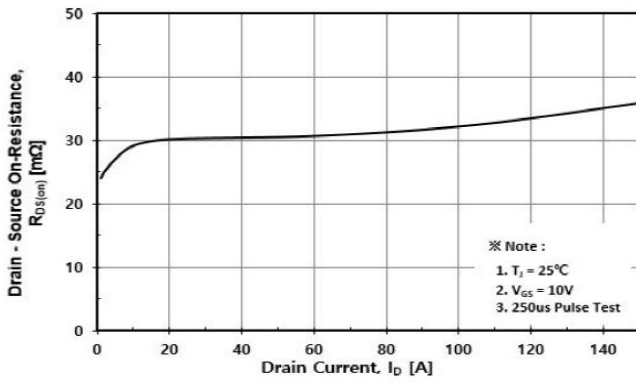


Fig. 4 Body Diode Forward Voltage Variation with Source Current

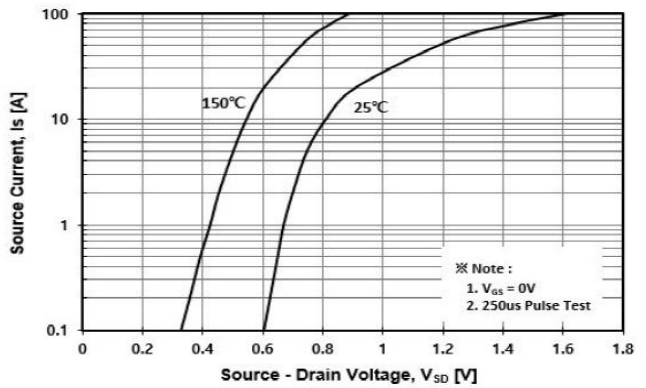


Fig. 5 Typical Capacitance Characteristics

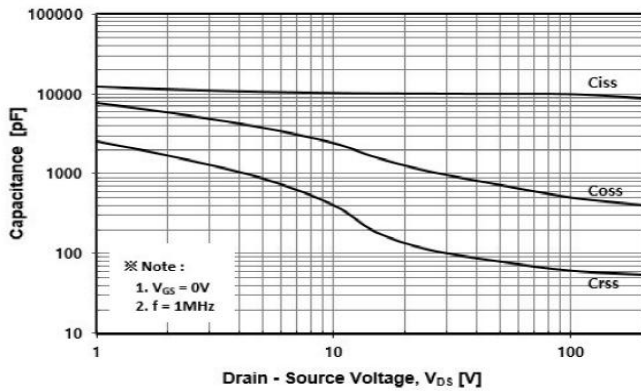
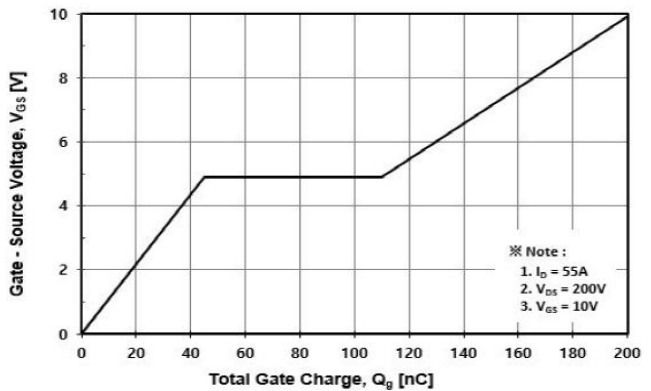


Fig. 6 Typical Total Gate Charge Characteristics



Typical Characteristics Curve (Continue)

Fig. 7 Breakdown Voltage Variation vs. Temperature

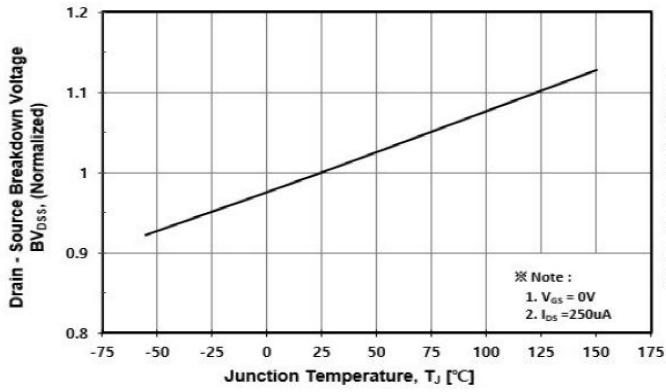


Fig. 8 On-Resistance Variation vs. Temperature

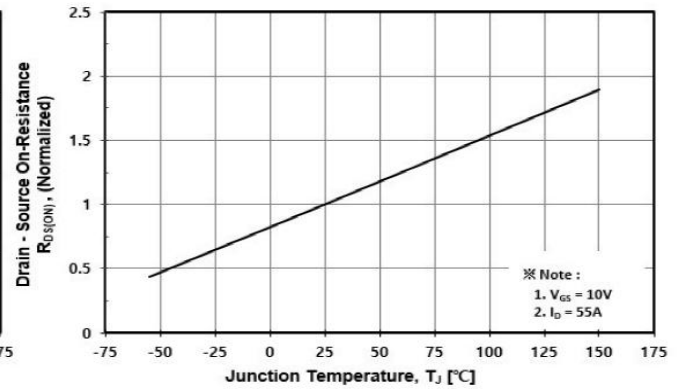


Fig. 9 Maximum Drain Current vs. Case Temperature

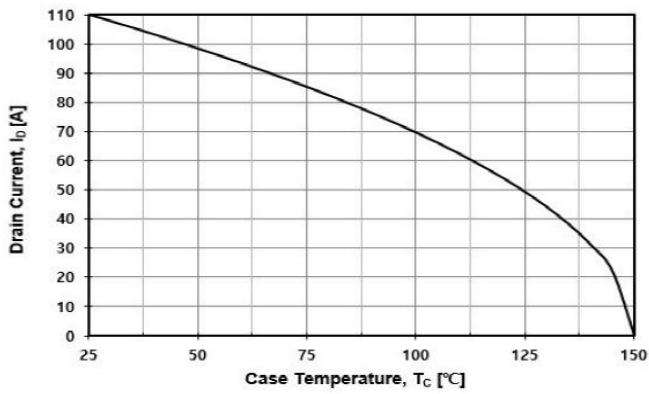


Fig. 10 Maximum Safe Operating Area

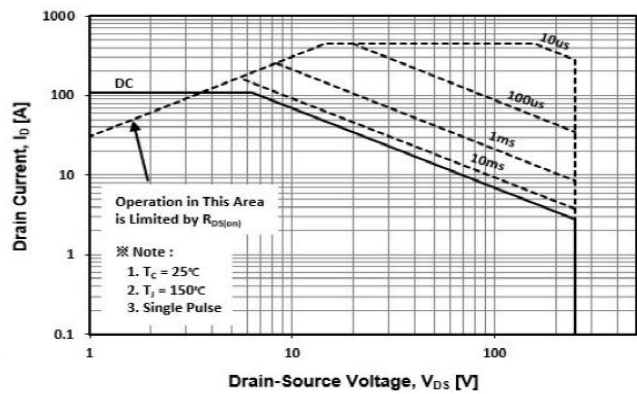


Fig. 11 Transient Thermal Impedance

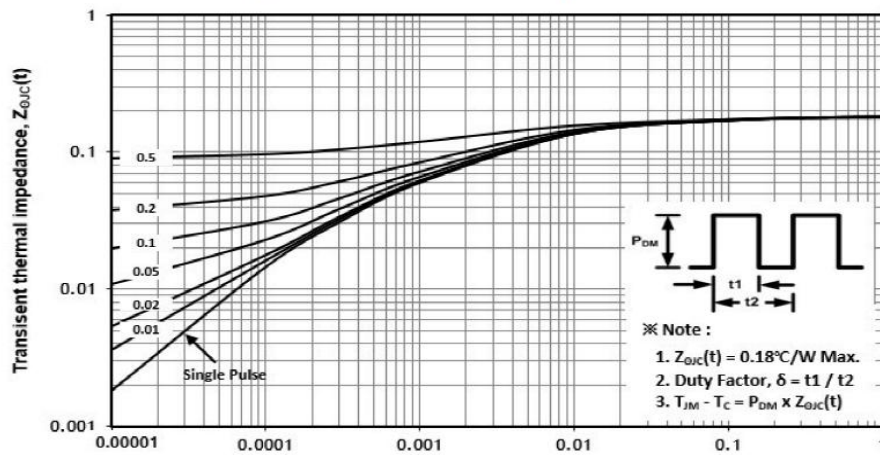


Fig. 12 Gate Charge Test Circuit & Waveform

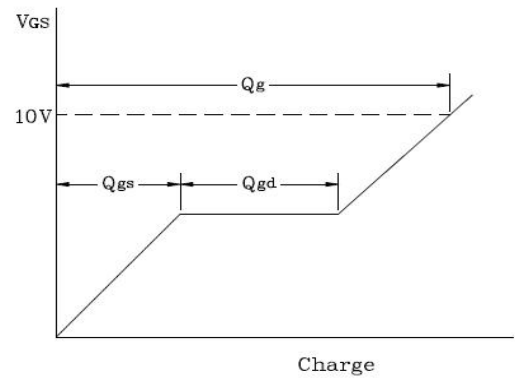
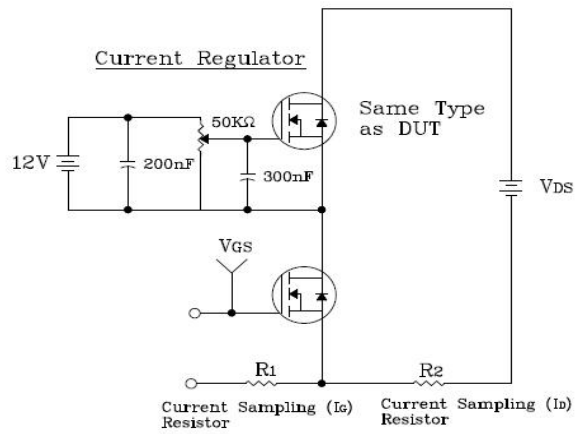


Fig. 13 Resistive Switching Test Circuit & Waveform

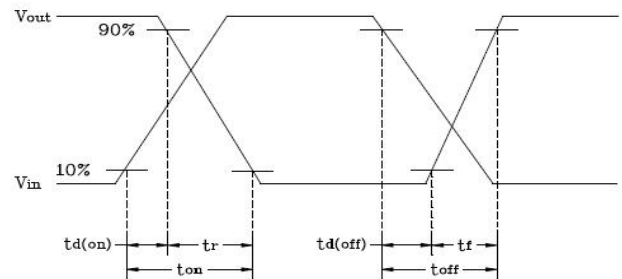
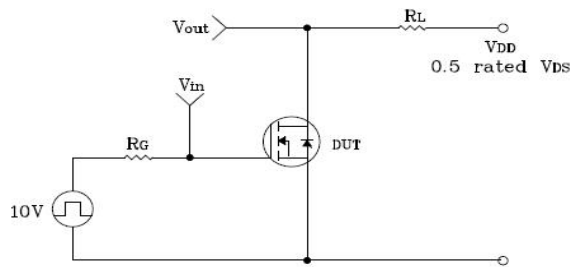


Fig. 14 E_{AS} Test Circuit & Waveform

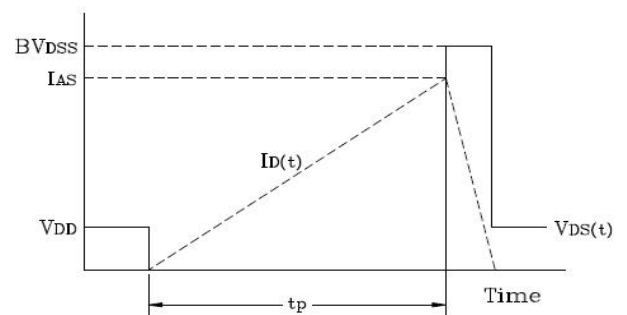
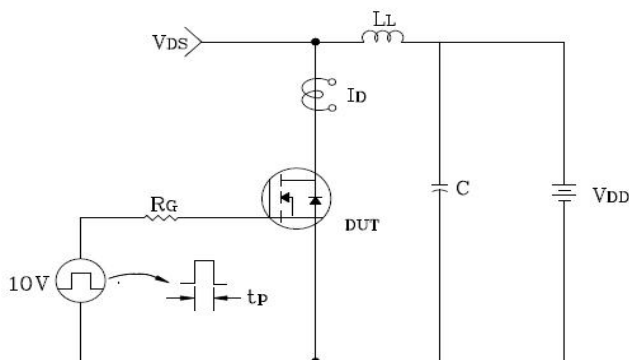


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform

