

TSP45N30M

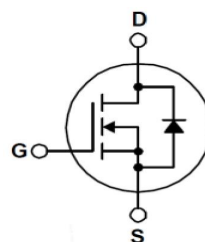
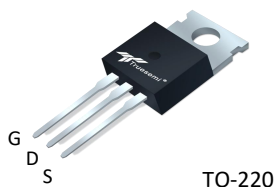
300V N-Channel MOSFET

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

- 45A,300V,Max. $R_{DS(on)}$ =85m Ω
@ VGS =10V
- Low gate charge: Qg=94nC (Typ.)
- RoHS compliant device
- 100% avalanche tested



Absolute Maximum Ratings Tc=25°C unless otherwise specified

Symbol	Parameter		Value	Units
V _{DSS}	Drain-Source Voltage		300	V
V _{GS}	Gate-Source Voltage		± 30	V
I _D	Drain Current	T _C = 25°C	45	A
		T _C = 100°C	28.5	A
I _{DM}	Pulsed Drain Current	(Note 1)	180	A
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	2000	mJ
E _{AR}	Repetitive Avalanche Energy	(Note 1)	30	mJ
I _{AS}	Single pulsed avalanche current	(Note 2)	20	A
P _D	Power Dissipation (T _C = 25°C)		300	W
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +150	°C

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
R _{θJC}	Thermal Resistance,Junction-to-Case	--	0.42	°C/W
R _{θJA}	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	$V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$	--	70	85	m Ω
g_{fs}	Forward transfer conductance	$V_{DS} = 10\text{ V}$, $I_D = 20\text{ A}$ (Note3)	--	2	--	S

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	300	--	--	V
I_{DSS}	Drain-source cut-off current	$V_{DS} = 300\text{ V}$, $V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 300\text{ V}$, $T_C = 125^{\circ}\text{C}$	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}$, $V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}$, $V_{DS} = 0\text{ V}$	--	--	-100	nA

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$	--	4554	--	pF
C_{oss}	Output Capacitance		--	453	--	pF
C_{rss}	Reverse Transfer Capacitance		--	46	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Time	$V_{DS} = 150\text{ V}$, $I_D = 45\text{ A}$, $R_G = 25\text{ }\Omega$ (Note 3,4)	--	54	--	ns
t_r	Turn-On Rise Time		--	30	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	224	--	ns
t_f	Turn-Off Fall Time		--	40	--	ns
Q_g	Total Gate Charge	$V_{DS} = 240\text{ V}$, $I_D = 45\text{ A}$, $V_{GS} = 10\text{ V}$ (Note 3,4)	--	94	--	nC
Q_{gs}	Gate-Source Charge		--	22	--	nC
Q_{gd}	Gate-Drain Charge		--	32	--	nC

Source-Drain Diode Maximum Ratings and Characteristics

I _S	Continuous Source-Drain Diode Forward Current		--	--	45	A
I _{SM}	Pulsed Source-Drain Diode Forward Current		--	--	180	
V _{SD}	Source-Drain Diode Forward Voltage	I _{SD} =45A, V _{GS} = 0 V	--	1.2	1.5	V
t _{rr}	Reverse Recovery Time	I _{SD} = 45A, V _{GS} = 0 V di _p /dt = 100 A/μs (Note 3,4)	--	316	--	ns
Q _{rr}	Reverse Recovery Charge		--	3.40	--	uC

NOTES:

1. Repeated rating: Pulse width limited by safe operating area
2. $L=10\text{ mH}$, $I_{AS}=20\text{ A}$, $V_{DD}=50\text{ V}$, $R_G=25\text{ }\Omega$, 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 Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

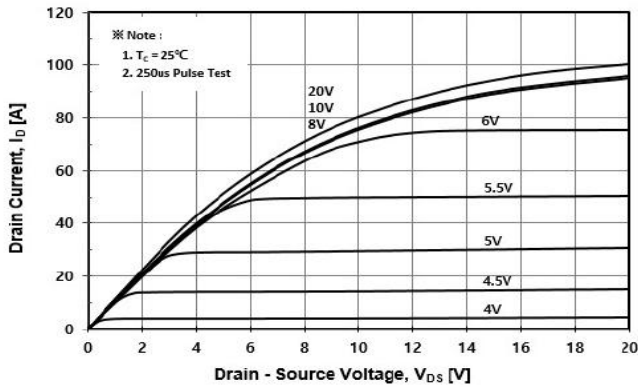


Fig. 2 Typical Transfer Characteristics

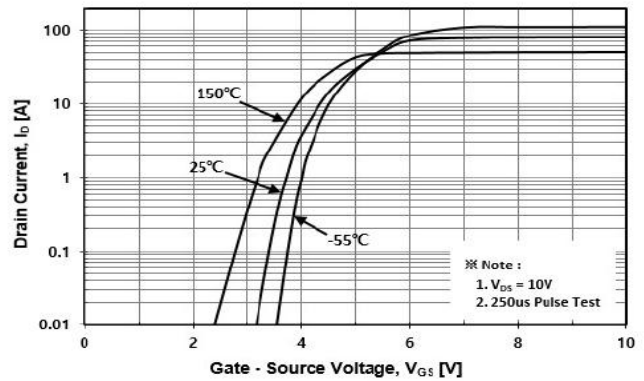


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

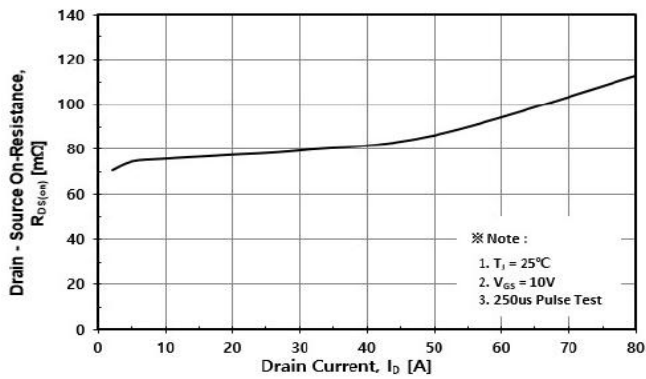


Fig. 4 Body Diode Forward Voltage Variation with Source Current

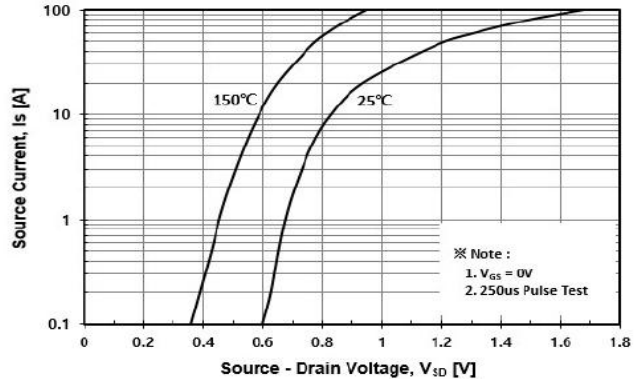


Fig. 5 Typical Capacitance Characteristics

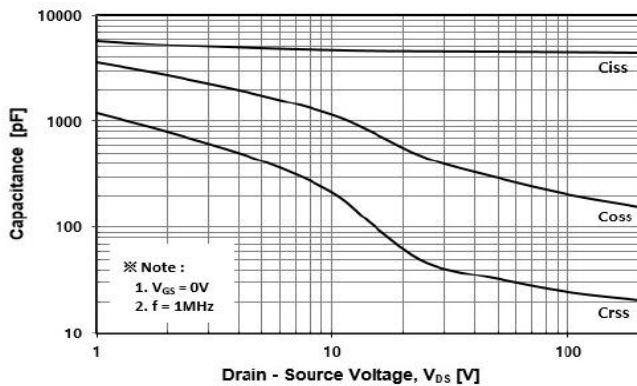
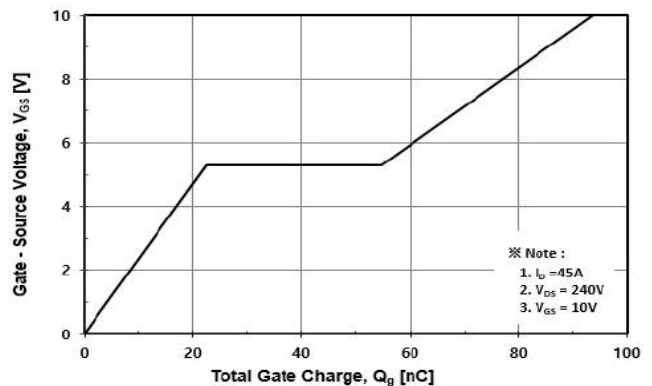


Fig. 6 Typical Total Gate Charge Characteristics



Typical Electrical Characteristics Curves

Fig. 7 Breakdown Voltage Variation vs. Temperature

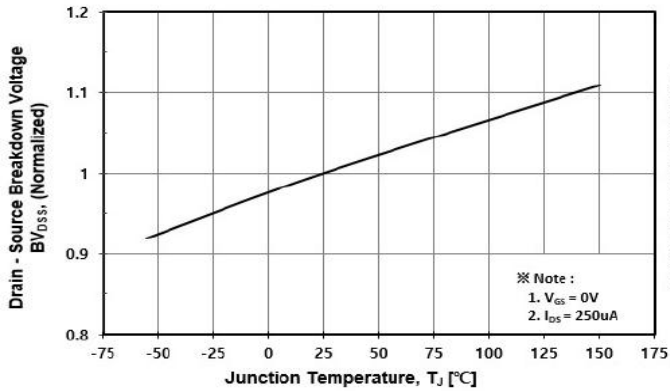


Fig. 8 On-Resistance Variation vs. Temperature

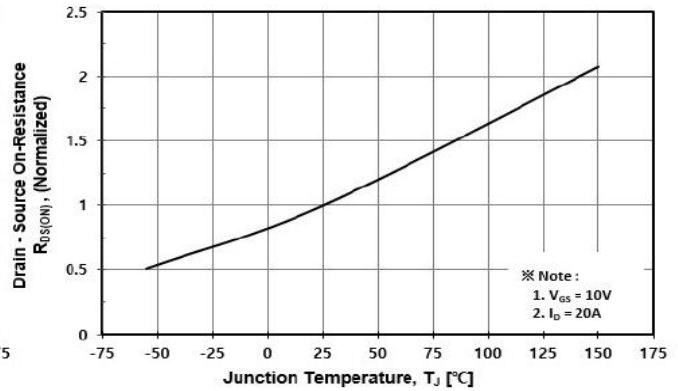


Fig. 9 Maximum Drain Current vs. Case Temperature

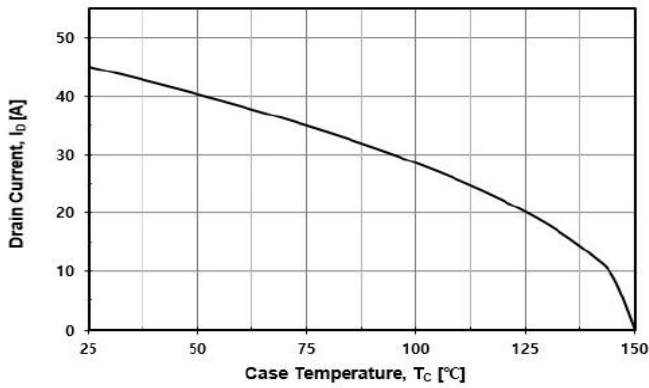


Fig. 10 Maximum Safe Operating Area

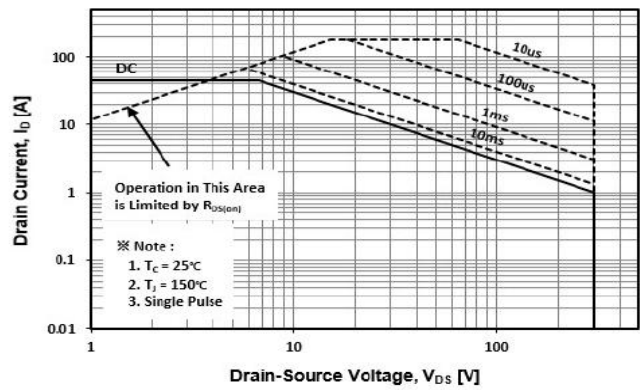


Fig. 11 Transient Thermal Impedance

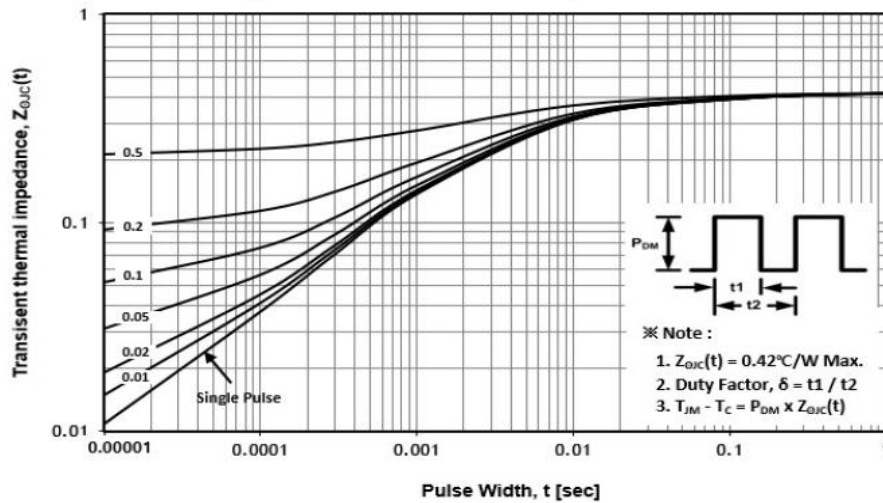


Fig. 12 Gate Charge Test Circuit & Waveform

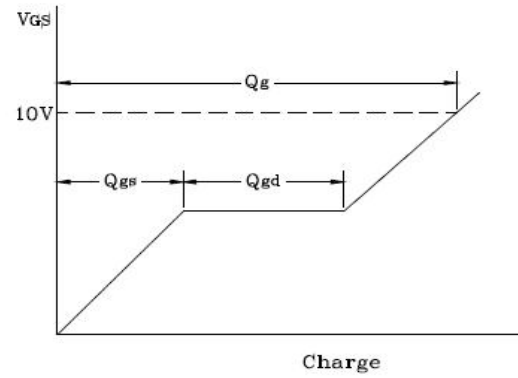
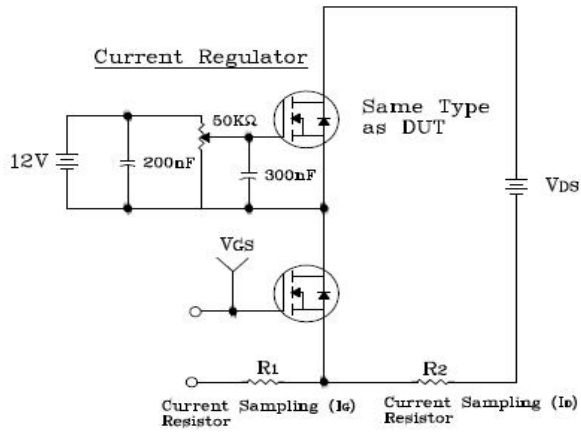


Fig. 13 Resistive Switching Test Circuit & Waveform

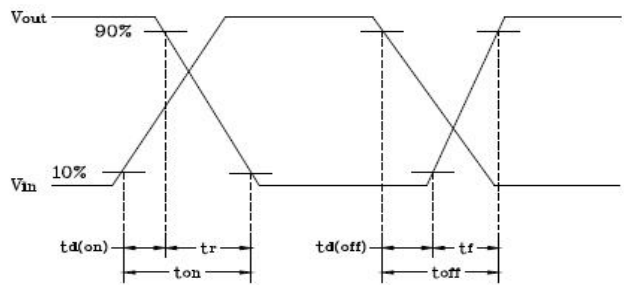
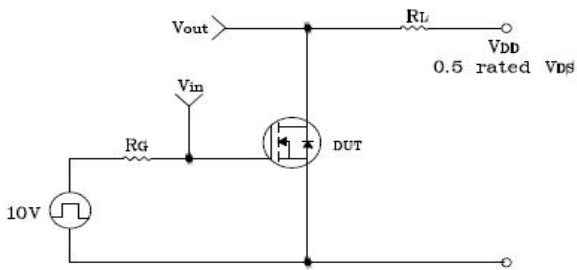


Fig. 14 E_{AS} Test Circuit & Waveform

