

MSD39N08

N-Channel 30V MOSFETs

Description

These N-Channel enhancement mode power field effect transistors are using trench 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. These devices are well suited for high efficiency fast switching applications.

Features

- 30V, 55A, $R_{DS(ON)} = 9m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- RoHS compliant package

Applications

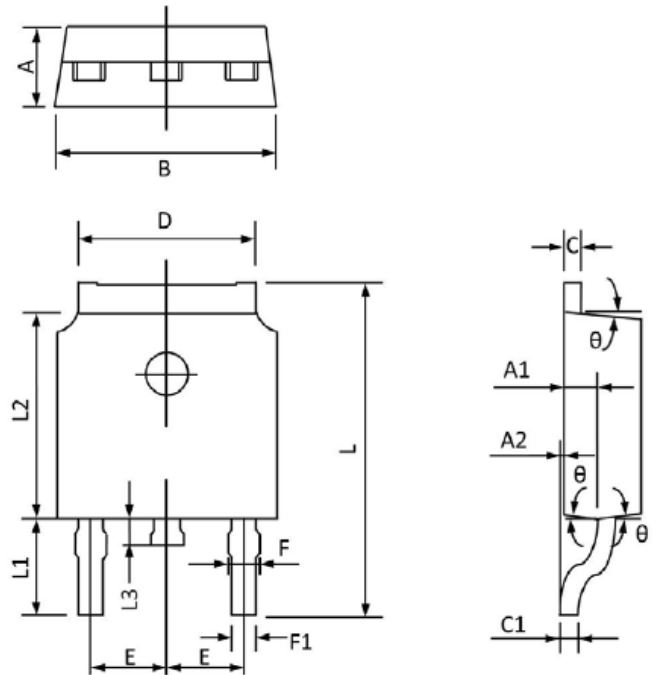
- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR

Package type : TO-252

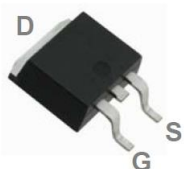
Packing & Order Information

R : 2,500/Reel

T : 80/Tube ; 4,000/Box

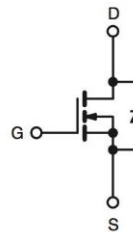


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.20	2.40	0.087	0.094
A1	0.91	1.11	0.036	0.044
A2	0.00	0.15	0.000	0.006
B	6.50	6.70	0.256	0.264
C	0.46	0.580	0.018	0.230
C1	0.46	0.580	0.018	0.030
D	5.10	5.46	0.201	0.215
E	2.186	2.386	0.086	0.094
F	0.74	0.94	0.029	0.037
F1	0.660	0.860	0.026	0.034
L	9.80	10.40	0.386	0.409
L1	2.9REF		0.114REF	
L2	6.00	6.20	0.236	0.244
L3	0.60	1.00	0.024	0.039
θ	3°	9°	3°	9°



**RoHS
COMPLIANT**

Graphic symbol



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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous ($T_C=25^{\circ}\text{C}$)	55	A
	Drain Current - Continuous ($T_C=100^{\circ}\text{C}$)	35	A
I_{DM}	Drain Current - Pulsed ¹	220	A
EAS	Single Pulse Avalanche Energy ²	45	mJ
IAS	Single Pulse Avalanche Current ²	30	A
P_D	Power Dissipation ($T_C=25^{\circ}\text{C}$)	40	W
	Power Dissipation - Derate above 25°C	0.32	W/ $^{\circ}\text{C}$
T_J	Operating Junction Temperature Range	-55 to +150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-55 to +150	$^{\circ}\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Thermal Resistance Junction to ambient	--	62	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	--	3.1	

Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Static State Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = V_{GS}, I_D = 250\mu\text{A}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D = 1\text{mA}$		0.04		V/ $^{\circ}\text{C}$
I_{GSS}	Gate-Source Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$			± 100	nA
I_{DSS}	Drain-Source Leakage Current	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, T_J = 25^{\circ}\text{C}$ $V_{DS} = 24\text{V}, V_{GS} = 0\text{V}, T_J = 125^{\circ}\text{C}$			1 10	μA
$R_{DS(on)}$	Drain-Source On-Resistance ³	$V_{GS} = 10\text{V}, I_D = 16\text{A}$ $V_{GS} = 4.5\text{V}, I_D = 8\text{A}$		7.5 10	9 13	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	1	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$		-4		mV/ $^{\circ}\text{C}$
g_{fs}	Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 8\text{A}$		14		S

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Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
Q_g	Total Gate Charge ^{3,4}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A},$ $V_{GS} = 4.5\text{ V}$	--	7.5	--	nC
Q_{gs}	Gate-Source Charge ^{3,4}		--	1.3	--	nC
Q_{gd}	Gate-Drain Charge ^{3,4}		--	4.5	--	nC
$t_{d(on)}$	Turn-On Delay Time ^{3,4}	$I_D = 15\text{ A}, R_G = 3.3\ \Omega,$ $V_{GS} = 10\text{ V}, V_{DD} = 15\text{ V}$	--	4.8	--	ns
t_r	Rise Time ^{3,4}		--	12.5	--	ns
$t_{d(off)}$	Turn-Off Delay Time ^{3,4}		--	27.6	--	ns
t_f	Fall Time ^{3,4}		--	8.2	--	ns
C_{ISS}	Input Capacitance	$V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}, V_{GS} = 0\text{ V}$	--	750	--	pF
C_{OSS}	Output Capacitance		--	150	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	110	--	pF
R_g	Gate Charge	$V_{DS} = 0\text{ V}, f = 1\text{ MHz}, V_{GS} = 0\text{ V}$	--	2.7	--	Ω

Drain-Source Diode Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
EAS	Single Pulse Avalanche Energy	$V_{DD} = 25\text{ V}, L = 0.1\text{ mH}, I_{AS} = 15\text{ A}$	12	--	--	mJ

Drain-Source Diode Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S	Continuous Source Current	$V_G = V_D = 0\text{ V},$ Force Current	--	--	55	A
I_{SM}	Pulsed Source Current		--	--	220	A
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 1\text{ A}, T_J = 25^\circ\text{C}$	--	--	1	V
T_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=1A, di/dt=100A/\mu s$ $T_J=25^\circ\text{C}$	--	--	--	ns
Q_{rr}	Reverse Recovery Charge		--	--	--	nC

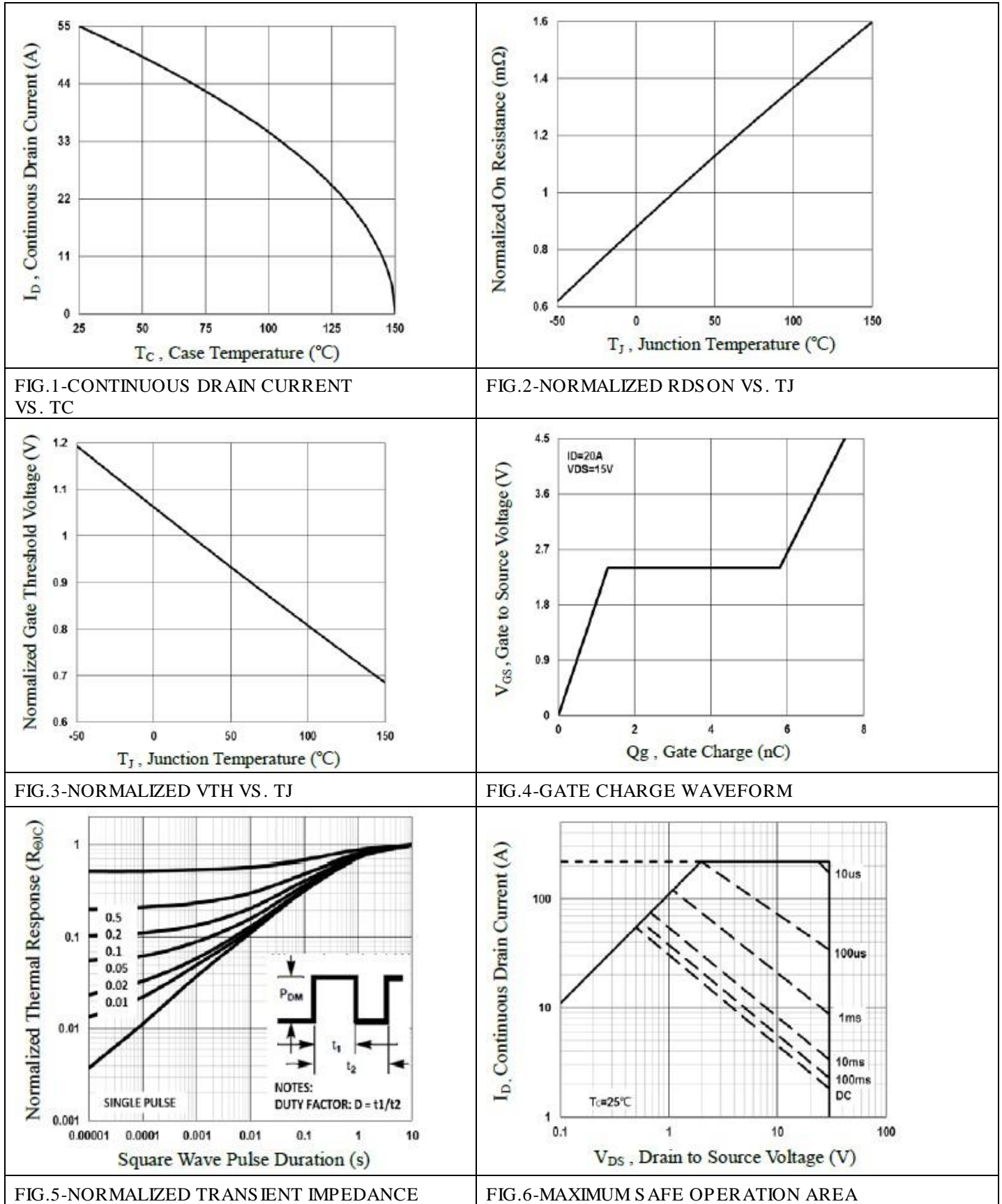
Note :

- 1.Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{ mH}, I_{AS}=30A, R_G=25\Omega,$ Starting $T_J=25^\circ\text{C}$.
- 3.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 4.Essentially independent of operating temperature.

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■ Characteristics Curve



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■ Characteristics Curve

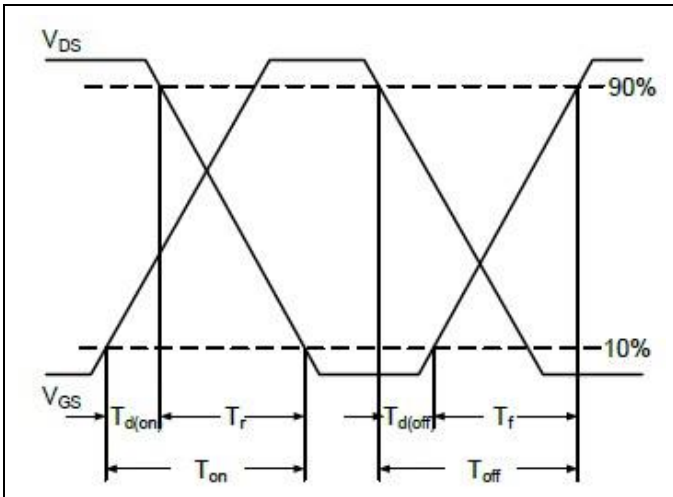


FIG.7-SWITCHING TIME WAVEFORM

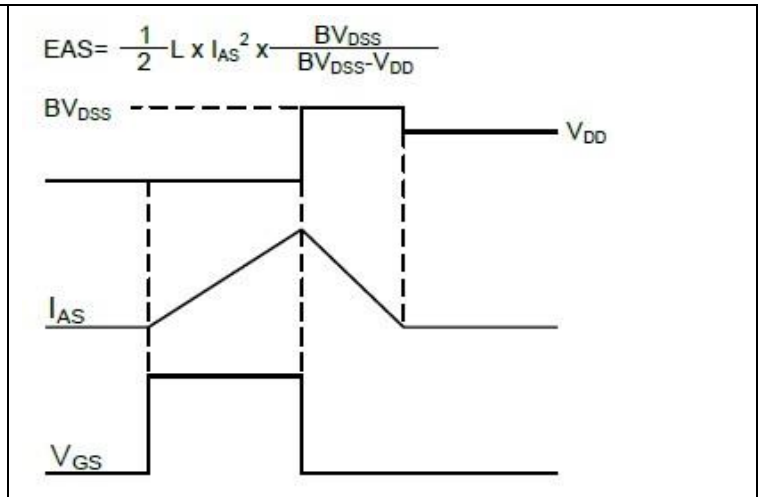


FIG.8-EAS WAVEFORM

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