

MSD39N60

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, 90A, $R_{DS(ON)} = 2.6m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- RoHS compliant package

Applications

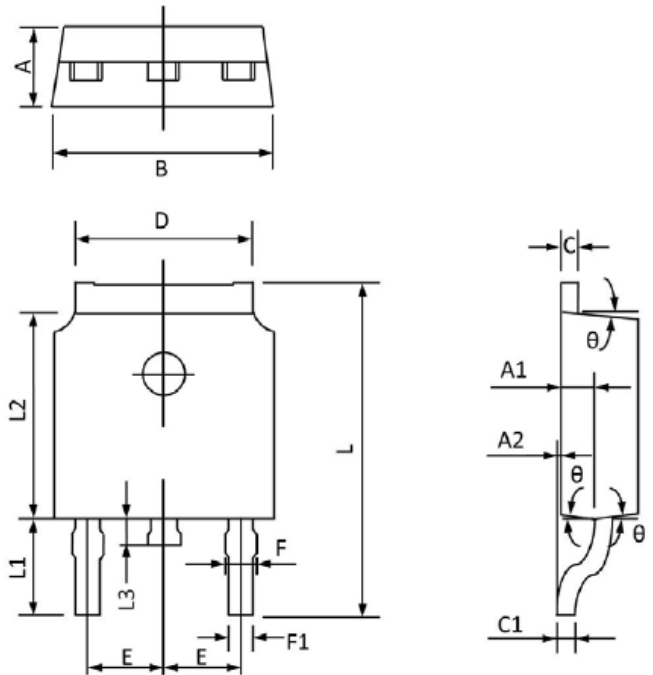
- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR

Package type : TO-252

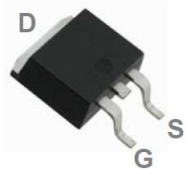
Packing & Order Information

R : 2,500/Reel

T : 80/Tube ; 4,000/Box

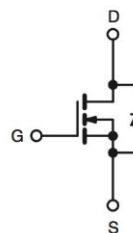


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.20	2.40	0.087	0.094
A1	0.91	1.11	0.036	0.044
A2	0.00	0.15	0.000	0.006
B	6.50	6.70	0.256	0.264
C	0.46	0.580	0.018	0.230
C1	0.46	0.580	0.018	0.030
D	5.10	5.46	0.201	0.215
E	2.186	2.386	0.086	0.094
F	0.74	0.94	0.029	0.037
F1	0.660	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 ($T_C=25^{\circ}\text{C}$)	90	A
	Drain Current - Continuous ($T_C=100^{\circ}\text{C}$)	57	A
I_{DM}	Drain Current - Pulsed ¹	360	A
EAS	Single Pulse Avalanche Energy ²	180	mJ
IAS	Single Pulse Avalanche Current ²	60	A
P_D	Power Dissipation ($T_C=25^{\circ}\text{C}$)	100	W
	Power Dissipation - Derate above 25°C	0.8	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	--	1.25	

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

Off 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 , $I_D = 1\text{mA}$		0.03		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	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, T_J = 25^{\circ}\text{C}$			1	uA
		$V_{DS} = 24\text{V}, V_{GS} = 0\text{V}, T_J = 125^{\circ}\text{C}$			10	

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$R_{DS(on)}$	Drain-Source On-Resistance ³	$V_{GS} = 10\text{V}, I_D = 30\text{A}$		1.9	2.6	m Ω
		$V_{GS} = 4.5\text{V}, I_D = 15\text{A}$		2.5	3.4	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	1.2	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$		-5		mV/ $^{\circ}\text{C}$
g_{fs}	Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 2\text{A}$		16		S

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Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
Q_g	Total Gate Charge ^{3,4}	$V_{DS} = 15\text{ V}$, $I_D = 24\text{ A}$, $V_{GS} = 4.5\text{ V}$	--	40	75	nC
Q_{gs}	Gate-Source Charge ^{3,4}		--	6	12	nC
Q_{gd}	Gate-Drain Charge ^{3,4}		--	19	35	nC
$t_{d(on)}$	Turn-On Delay Time ^{3,4}	$I_D = 1\text{ A}$, $R_G = 1\ \Omega$, $V_{GS} = 10\text{ V}$, $V_{DD} = 15\text{ V}$	--	20	40	ns
t_r	Rise Time ^{3,4}		--	32	60	ns
$t_{d(off)}$	Turn-Off Delay Time ^{3,4}		--	75	130	ns
t_f	Fall Time ^{3,4}		--	28	55	ns
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	--	4800	8000	pF
C_{oss}	Output Capacitance		--	735	1300	pF
C_{rss}	Reverse Transfer Capacitance		--	420	800	pF
R_g	Gate Charge	$V_{DS} = 0\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	--	1.6	3.5	Ω

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	--	--	90	A
I_{SM}	Pulsed Source Current ³		--	--	180	A
V_{SD}	Diode Forward Voltage ³	$V_{GS} = 0\text{ V}$, $I_s = 1\text{ A}$, $T_J = 25^\circ\text{C}$	--	--	1	V
T_{rr}	Reverse Recovery Time	$V_{DS} = 0\text{ V}$, $I_s = 1\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25^\circ\text{C}$	--	49	85	ns
Q_{rr}	Reverse Recovery Charge		--	18	35	nC

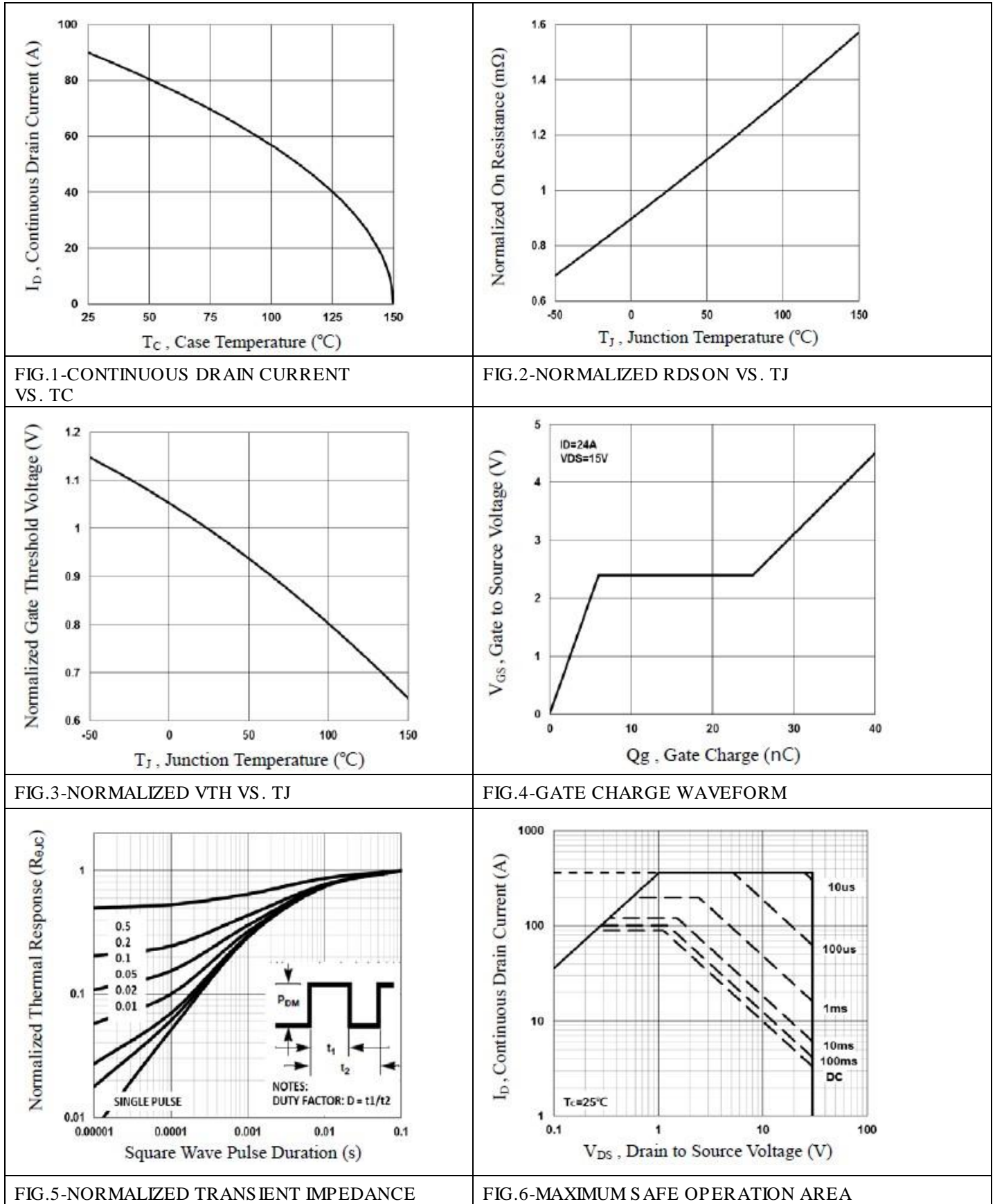
Note :

- 1.Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25\text{V}$, $V_{GS}=10\text{V}$, $L=0.1\text{mH}$, $I_{AS}=60\text{A}$, $R_G=25$,Starting $T_J=25^\circ\text{C}$.
- 3.The data tested by pulsed , pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- 4.Essentially independent of operating temperature.

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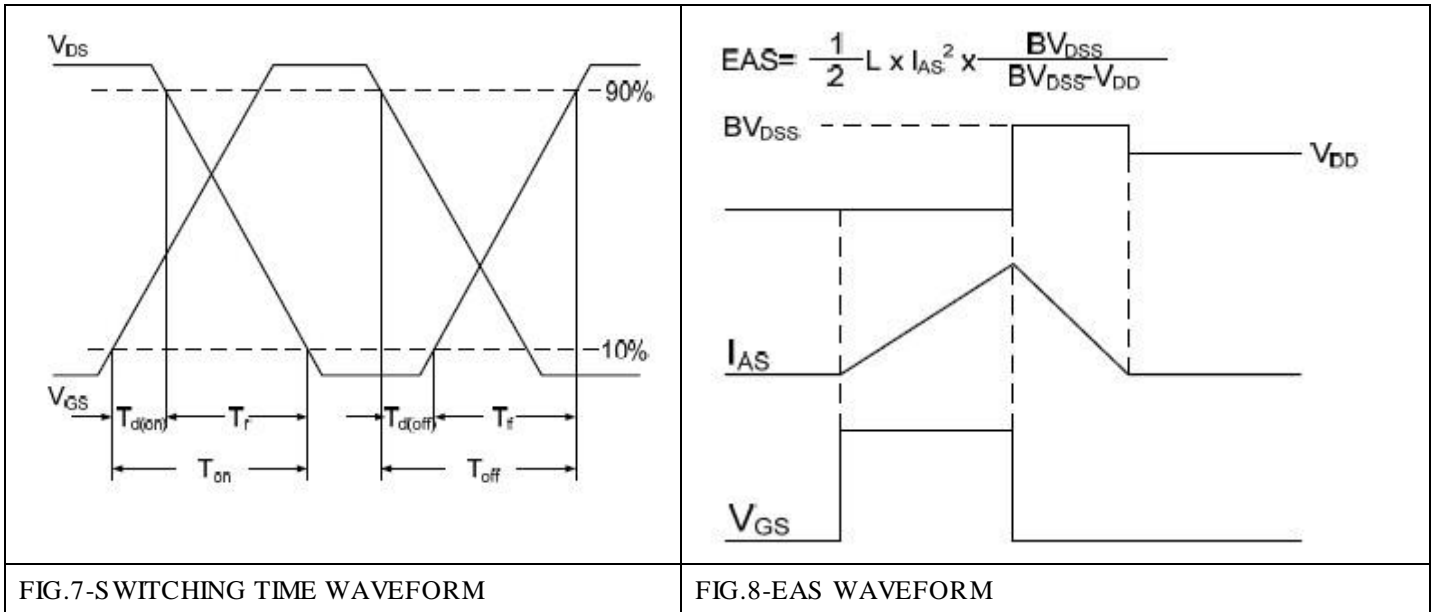
■ Characteristics Curve



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■ Characteristics Curve



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