

MSQ39N12

30V N-Channel 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,6.5A, RDS(ON) =24mΩ @VGS = 10V
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available
- RoHS compliant package

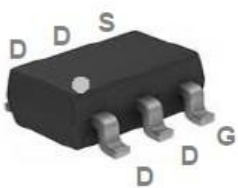
Application

- MB / VGA / Vcore
- Load Switch
- Hand-Held Instrument

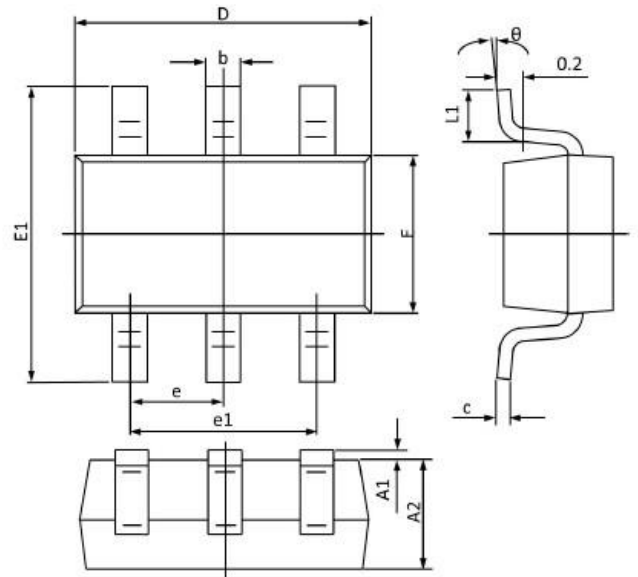
Package type : SOT23-6

Packing & Order Information

3,000/Reel

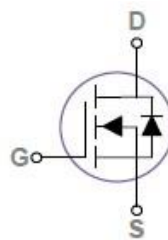


**RoHS
COMPLIANT**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A1	0.000	0.100	0.000	0.004
A2	1.000	1.200	0.040	0.047
b	0.300	0.500	0.012	0.019
c	0.047	0.207	0.002	0.008
D	2.800	3.000	0.110	0.118
E1	2.600	3.000	0.103	0.118
e	0.950 TYP		0.037 TYP	
e1	1.900 TYP		0.075 TYP	
L1	0.250	0.550	0.010	0.021
θ	0° - 8°		0° - 8°	

Graphic symbol



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage	30	V
V _{GS}	Gate-Source Voltage	±30	V
I _D	Drain Current -Continuous (TC=25°C)	6.5	A
	Drain Current -Continuous (TC=100°C)	4.1	A
I _{DM}	Drain Current Pulsed ¹	26	A

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Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
E_{AS}	Single Pulsed Avalanche Energy ²	32	mJ
I_{AS}	Single Pulsed Avalanched Current ²	8	A
P_D	Power Dissipation (TC = 25 °C)	1.56	W
	Power Dissipation – Derate above 25 °C	0.012	W/°C
T_J	Operating and Storage Temperature Range	-55 to +150	°C
T_{STG}	Storage Temperature Range	-55 to +150	°C

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Thermal resistance Junction-to-Ambient	--	80	°C/W

Electrical Characteristics (Tj=25 °C, unless otherwise noted)

Off Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
BV_{DSS}	$V_{GS} = 0\text{ V}$, $I_D = 250\mu\text{A}$	30	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	$I_D = 1\text{ mA}$, Referenced to 25°C	--	0.04	--	V/°C
I_{DSS}	$V_{DS} = 30\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 25^\circ\text{C}$	--	--	1	μA
	$V_{DS} = 24\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 125^\circ\text{C}$	--	--	10	μA
I_{GSS}	$V_{GS} = \pm 20\text{ V}$, $V_{DS} = 0\text{ V}$	--	--	± 100	nA

On Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
V_{GS}	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	1.2	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	--	-4	--	mV/°C
$*R_{DS(ON)}$	$V_{GS} = 10\text{ V}$, $I_D = 6\text{ A}$	--	19	24	Ω
	$V_{GS} = 4.5\text{ V}$, $I_D = 4\text{ A}$	--	25	34	Ω
g_{fs}	$V_{DS} = 10\text{ V}$, $I_D = 4\text{ A}$	--	6.5	--	S

Dynamic Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	$V_{DD} = 15\text{ V}$, $I_D = 1\text{ A}$, $R_G = 6\ \Omega$, $V_{GS} = 10\text{ V}$	--	2.8	5	ns
t_r		--	7.2	14	ns
$t_{d(off)}$		--	15.8	30	ns
t_f		--	4.6	9	ns

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Dynamic Characteristics					
Symbol	Test Conditions	Min	Typ.	Max.	Units
C_{ISS}	$V_{DS} = 25\text{ V}$, $V_{GS} = 0\text{ V}$, $F = 1.0\text{ MHz}$	--	345	500	pF
C_{OSS}		--	55	80	pF
C_{RSS}		--	32	45	pF
Q_g	$V_{DS} = 15\text{ V}$, $I_D = 6\text{ A}$, $V_{GS} = 4.5\text{ V}$	--	4.1	8	nC
Q_{gs}		--	1	2	nC
Q_{gd}		--	2.1	4	nC
R_g	$V_{GS} = 0\text{ V}$, $V_{DS} = 0\text{ V}$, $F=1\text{ MHz}$	--	3.2	6.4	Ω

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S	$V_G = V_D = 0\text{ V}$, Force Current		--	--	6.5	A
I_{SM}			--	--	26	
V_{SD}	$I_S = 1\text{ A}$, $V_{GS} = 0\text{ V}$, $T_J=25^\circ\text{C}$		--	--	1	V
t_{rr}	$I_S = 1\text{ A}$, $V_{GS} = 0\text{ V}$, $T_J=25^\circ\text{C}$ $diF/dt = 100\text{ A}/\mu\text{s}$		--	--	--	ns
Q_{rr}			--	--	--	nC

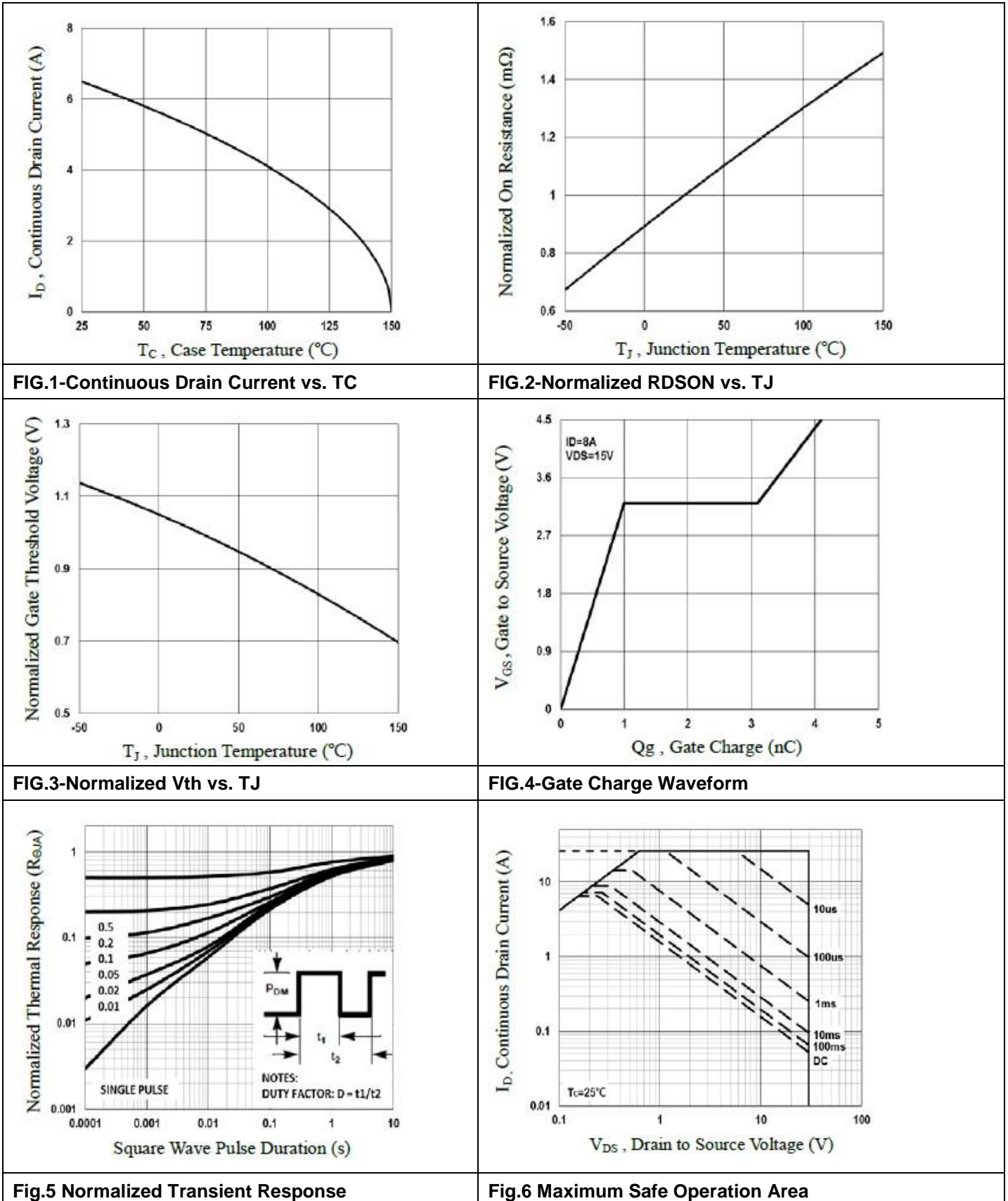
Notes;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $V_{DD}=25\text{ V}$, $V_{GS}=10\text{ V}$, $L=1\text{ mH}$, $I_{AS}=8\text{ A}$, $R_G=25\Omega$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

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■ Characteristics Curve



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■ Characteristics Curve

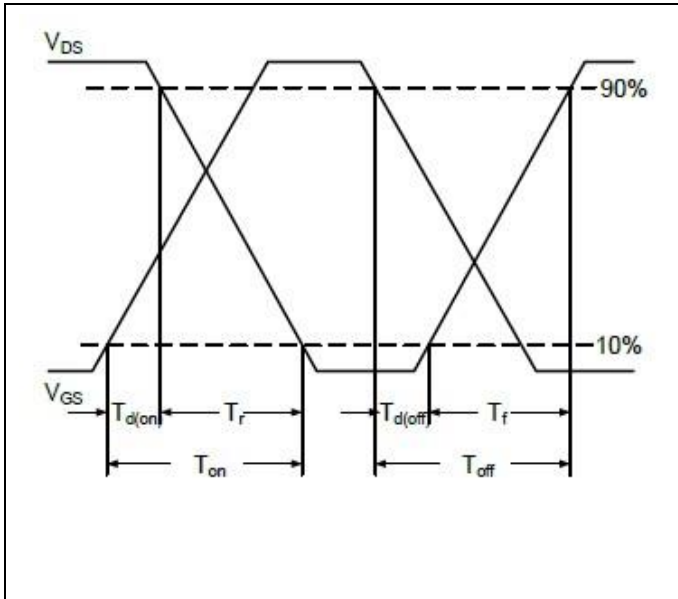


Fig.7 Switching Time Waveform

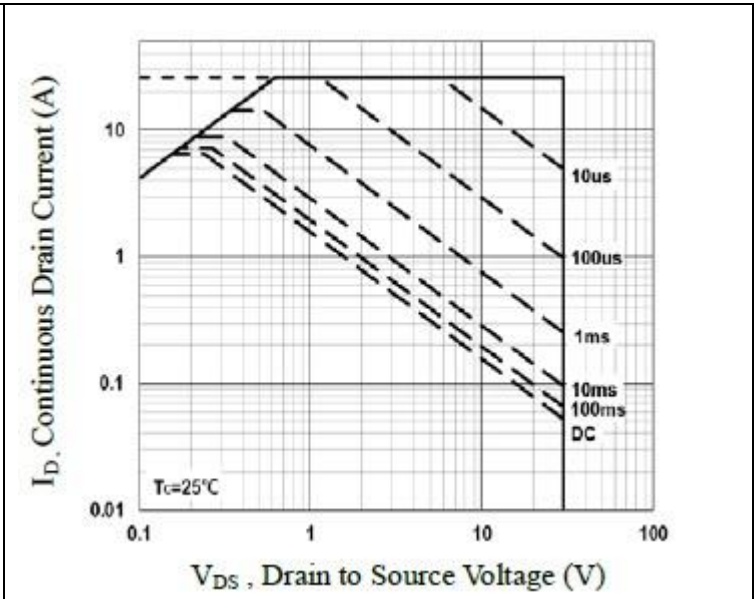


Fig.8 EAS Waveform

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