

MSC39N02X

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, 130A, $R_{DS(ON)} = 1.6\text{m}\Omega @ V_{GS} = 10\text{V}$
- Improved dv/dt capability
- Fast switching

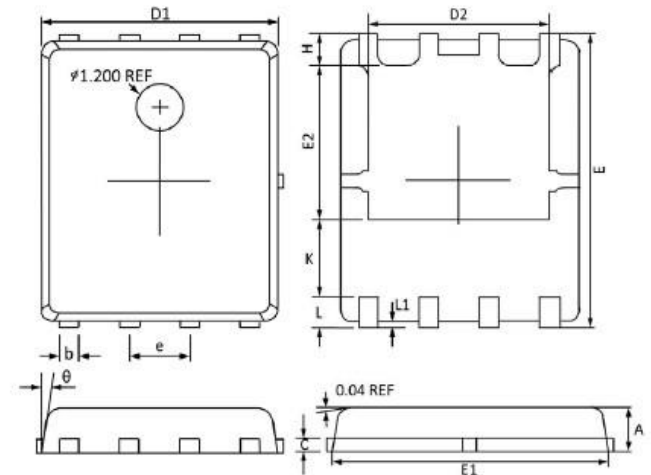
- Green Device Available
- RoHS compliant package

Applications

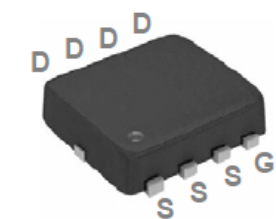
- MB / VGA / Server Vcore
- POL Applications
- SMPS 2nd SR
- BMS System

Package type : DFN5X6-8L

Packing & Order Information

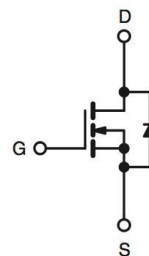


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.100	0.800	0.043	0.031
b	0.510	0.330	0.020	0.013
C	0.300	0.200	0.012	0.008
D1	5.100	4.800	0.201	0.189
D2	4.100	3.610	0.161	0.142
E	6.200	5.900	0.244	0.232
E1	5.900	5.700	0.232	0.224
E2	3.780	3.350	0.149	0.132
e	1.27BSC		0.05BSC	
H	0.700	0.410	0.028	0.016
K	1.500	1.100	0.059	0.043
L	0.710	0.510	0.028	0.020
L1	0.200	0.060	0.008	0.002
θ	12°	0°	12°	0°



**RoHS
COMPLIANT**

Graphic symbol



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 ($T_C = 25^\circ\text{C}$) (Chip Limitation)	130	A
	Drain Current - Continuous ($T_C = 100^\circ\text{C}$) (Chip Limitation)	82	A
I_{DM}	Drain Current - Pulsed ¹	520	A
EAS	Single Pulse Avalanche Energy ²	245	mJ

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

Symbol	Parameter	Value	Unit
IAS	Single Pulse Avalanche Current ²	70	A
P _D	Power Dissipation ($T_C=25^\circ\text{C}$)	166	W
	Power Dissipation - Derate above 25°C	1.33	W/°C
T _J	Operating Junction Temperature Range	-55 to +175	°C
T _{STG}	Storage Temperature Range	-55 to +175	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
R _{θJA}	Thermal Resistance Junction to ambient	--	62	°C/W
R _{θJC}	Thermal Resistance Junction to Case	--	0.9	

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
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	$V_{DS} = 27\text{ V}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$ $V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			1 10	uA
R _{DS(on)}	Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$ $V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$		1.2 1.8	1.6 2.4	mΩ
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	1	1.6	2.5	V
g _{fs}	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 15\text{ A}$		30		S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
Q _g	Total Gate Charge ^{3,4}	$V_{DS} = 15\text{ V}, I_D = 10\text{ A},$ $V_{GS} = 4.5\text{ V}$	--	65	120	nC
Q _{gs}	Gate-Source Charge ^{3,4}		--	16	30	nC
Q _{gd}	Gate-Drain Charge ^{3,4}		--	21	40	nC
C _{ISS}	Input Capacitance	$V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}, V_{GS} = 0\text{ V}$	--	7720	11000	pF
C _{OSS}	Output Capacitance		--	945	1400	pF
C _{RSS}	Reverse Transfer Capacitance		--	435	650	pF
R _g	Total Gate Charge	$V_{DS} = 0\text{ V}, f = 1\text{ MHz}, V_{GS} = 0\text{ V}$	--	1.2	2.4	Ω
t _{d(on)}	Turn-On Delay Time ^{3,4}	$I_D = 10\text{ A}, R_G = 10\text{ Ω},$ $V_{GS} = 10\text{ V}, V_{DD} = 20\text{ V}$	--	24.6	48	ns
t _r	Rise Time ^{3,4}		--	62.8	120	ns
t _{d(off)}	Turn-Off Delay Time ^{3,4}		--	224	440	ns
t _f	Fall Time ^{3,4}		--	162	320	ns

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Static State Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
EAS	Single Pulse Avalanche Energy	$V_{DD}=25V, L=0.1mH, I_{AS}=30A$	45			mJ

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S	Continuous Source Current	$V_G = V_D = 0 V$, Force Current	--	--	130	A
I_{SM}	Pulsed Source Current ³		--	--	260	A
V_{SD}	Diode Forward Voltage ³	$V_{GS} = 0 V, I_S = 1 A, T_J = 25^\circ C$	--	--	1	V

Note :

- 1.Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=1mH, I_{AS}=70A, R_G=25\Omega$, Starting $T_J=25^\circ C$.
- 3.The data tested by pulsed , pulse width $\leq 300us$, duty cycle $\leq 2\%$.
- 4.Essentially independent of operating temperature.

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Characteristics Curve

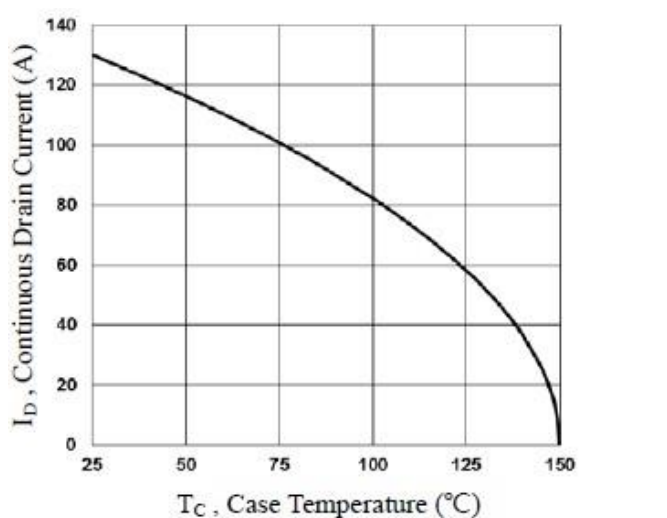


FIG.1-CONTINUOUS DRAIN CURRENT VS. T_C

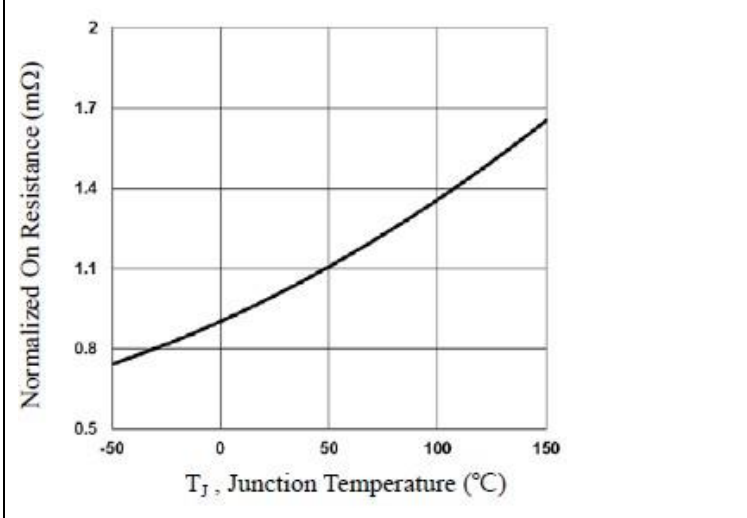


FIG.2-NORMALIZED $R_{DS(on)}$ VS. T_J

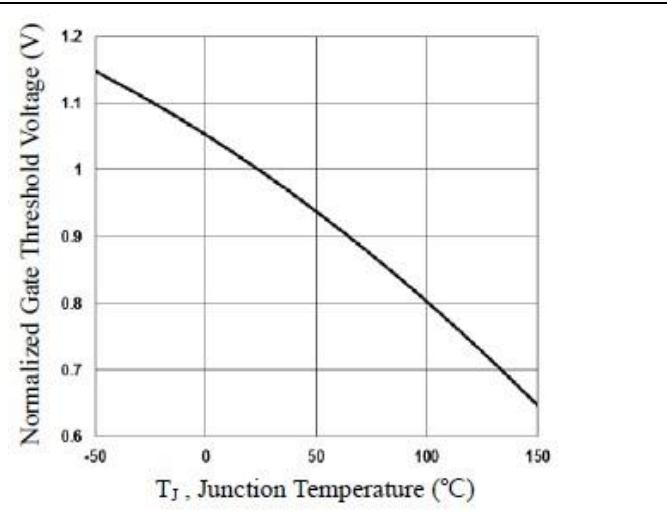


FIG.3-NORMALIZED V_{th} VS. T_J

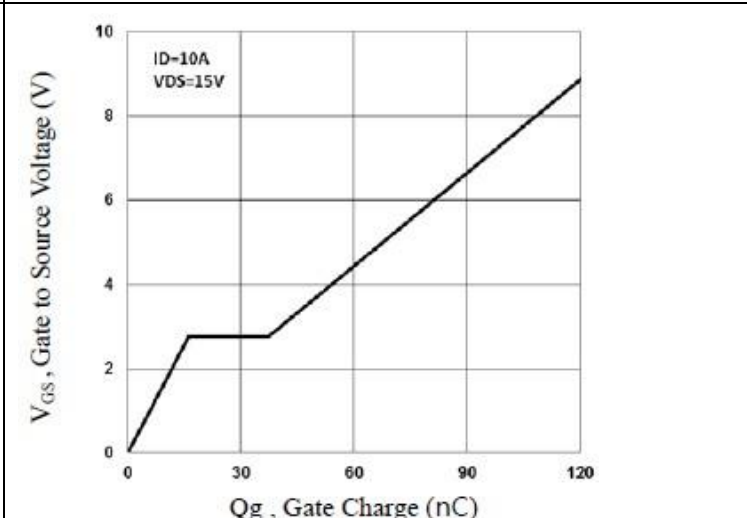


FIG.4-GATE CHARGE WAVEFORM

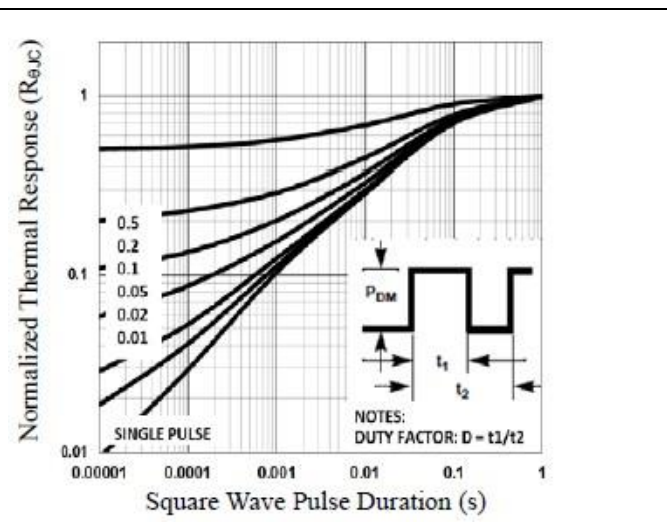


FIG.5-NORMALIZED TRANSIENT IMPEDANCE

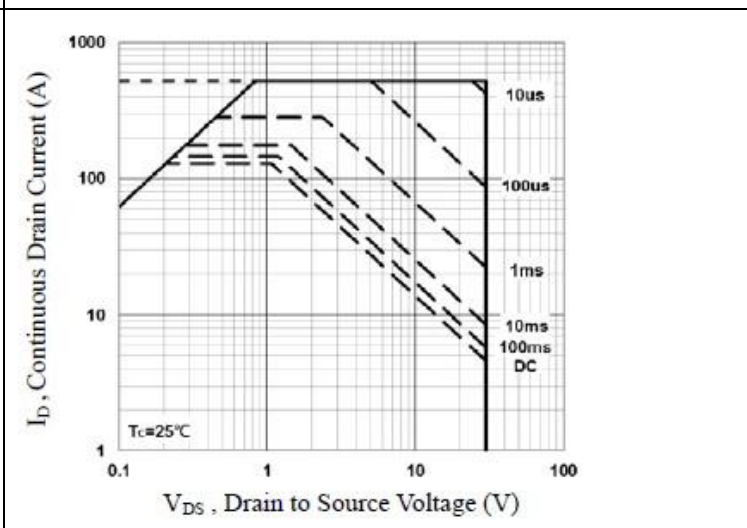
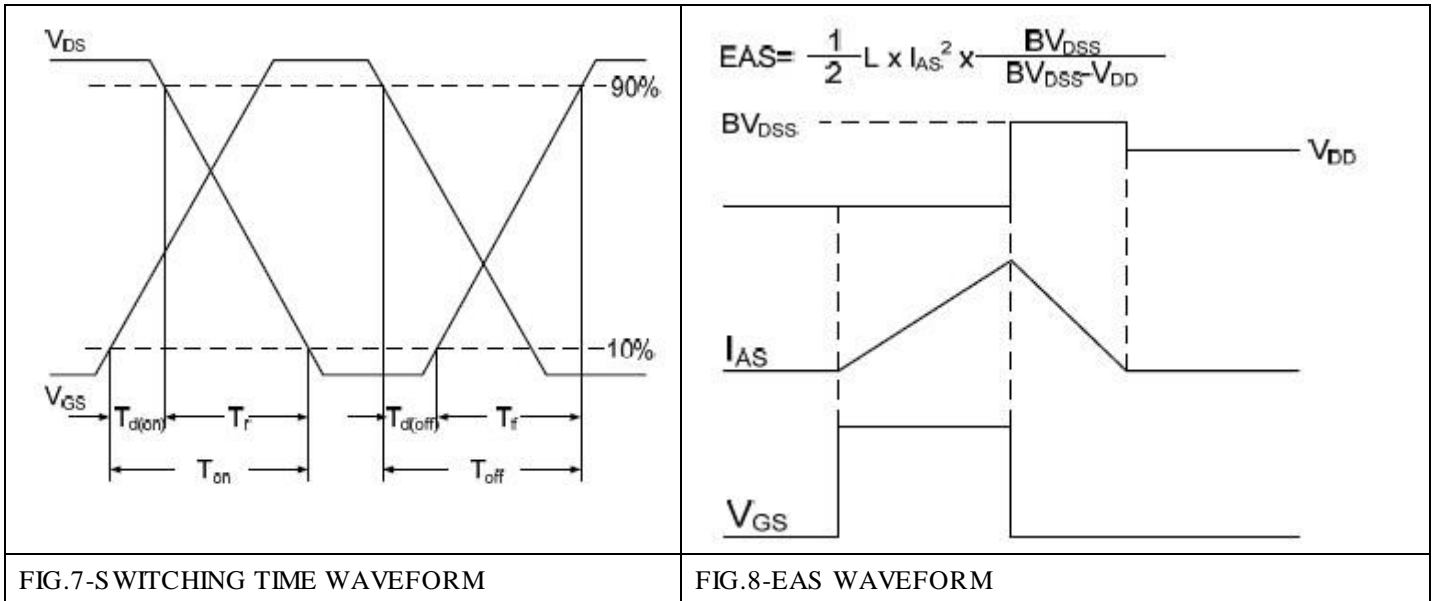


FIG.6-MAXIMUM SAFE OPERATION AREA

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■ Characteristics Curve



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