

# MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

## MS400N06HTL

Product specification

## General Description

These N-Channel enhancement mode power field effect transistors are using trench SGT 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

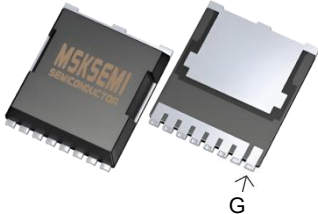
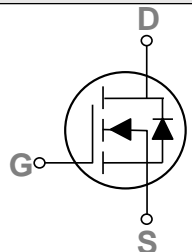

## Features

- 60V,400A,  $R_{DS(ON)} = 1.25m\Omega @ V_{GS} = 10V$
- Improved  $dv/dt$  capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

## Application

- Networking
- Load Switch
- LED applications
- Quick Charger

## Reference News

TOLL-8	Pin Configuration	Marking
		

## Absolute Maximum Ratings $T_C=25^{\circ}C$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current - Continuous ( $T_C=25^{\circ}C$ )	400	A
	Drain Current - Continuous ( $T_C=100^{\circ}C$ )	270	A
$I_{DM}$	Drain Current - Pulsed <sup>1</sup>	1515	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	500	mJ
$P_D$	Power Dissipation ( $T_C=25^{\circ}C$ )	455	W
	Power Dissipation - Derate above $25^{\circ}C$	1.78	W/ $^{\circ}C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^{\circ}C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$

## Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	0.56	$^{\circ}C/W$

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**
**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	60	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =60V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =48V , V <sub>GS</sub> =0V , T <sub>J</sub> =85°C	---	---	10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V , V <sub>DS</sub> =0V	---	---	±100	nA

**On Characteristics**

R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V , I <sub>D</sub> =20A	---	1.2	1.6	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2.0	2.9	4.0	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V , I <sub>D</sub> =3A	---	15	---	S

**Dynamic and switching Characteristics**

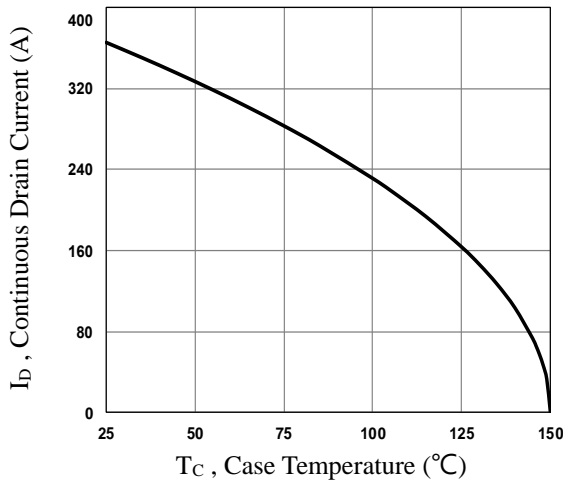
Q <sub>g</sub>	Total Gate Charge <sup>3, 4</sup>	V <sub>DS</sub> =30V , V <sub>GS</sub> =10V , I <sub>D</sub> =50A	---	98	---	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>3, 4</sup>		---	24	---	
Q <sub>gd</sub>	Gate-Drain Charge <sup>3, 4</sup>		---	27	---	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>3, 4</sup>	V <sub>DD</sub> =30V , V <sub>GS</sub> =10V , R <sub>G</sub> =3.3Ω I <sub>D</sub> =50A	---	19	---	ns
T <sub>r</sub>	Rise Time <sup>3, 4</sup>		---	12	---	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>3, 4</sup>		---	62	---	
T <sub>f</sub>	Fall Time <sup>3, 4</sup>		---	130	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =30V , V <sub>GS</sub> =0V , F=1MHz	---	5930	---	pF
C <sub>oss</sub>	Output Capacitance		---	2240	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	85	---	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	2.5	---	Ω

**Drain-Source Diode Characteristics and Maximum Ratings**

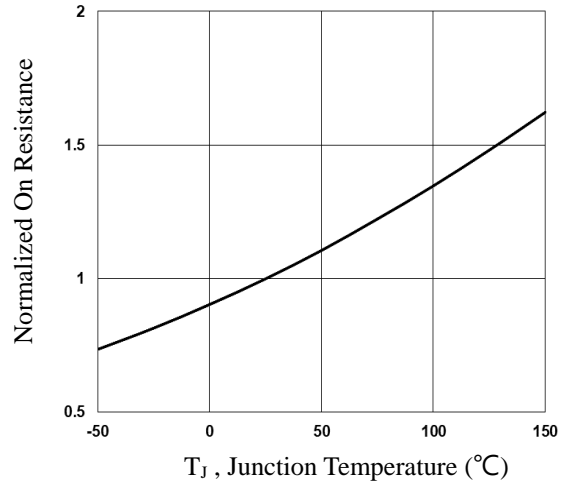
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>b</sub> =0V , Force Current	---	---	400	A
I <sub>SM</sub>	Pulsed Source Current		---	---	800	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25°C	---	---	1.2	V

**Note :**

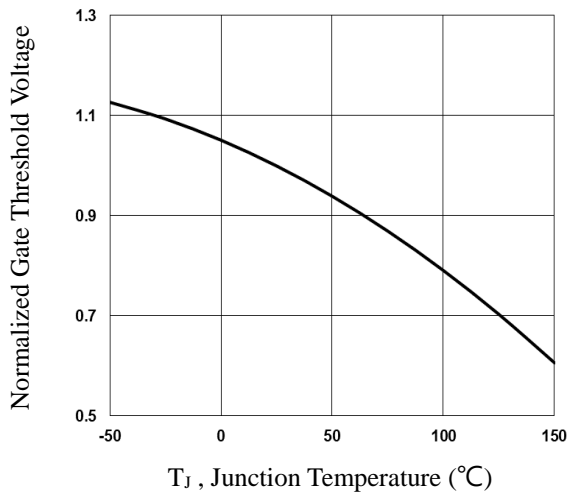
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=95A., R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C .
3. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



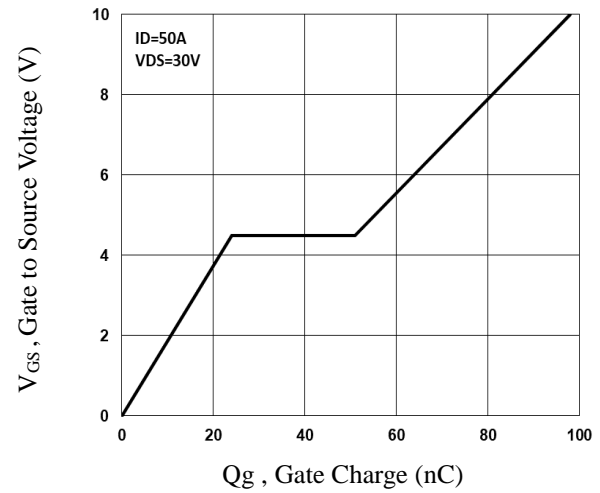
**Fig.1 Continuous Drain Current vs.  $T_C$**



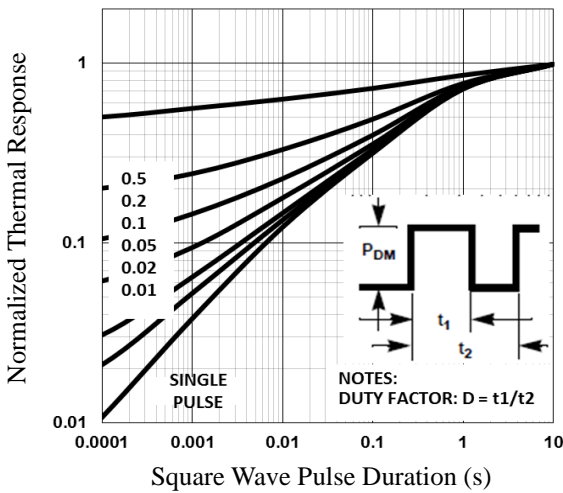
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$**



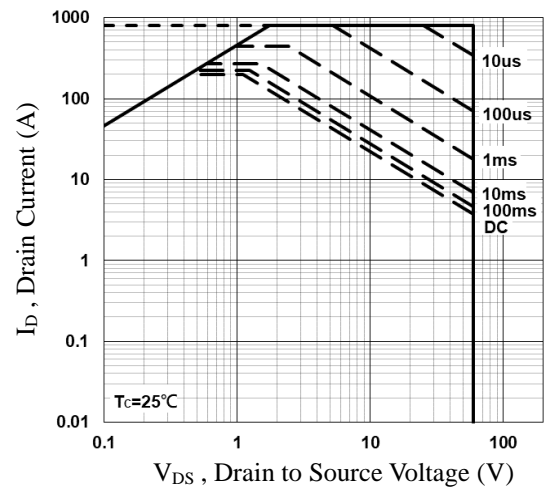
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



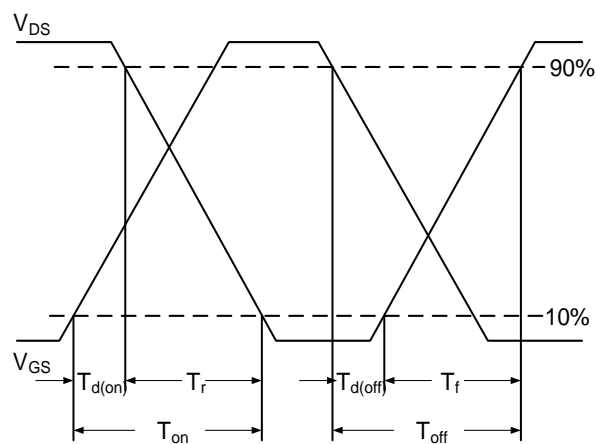
**Fig.4 Gate Charge Characteristics**



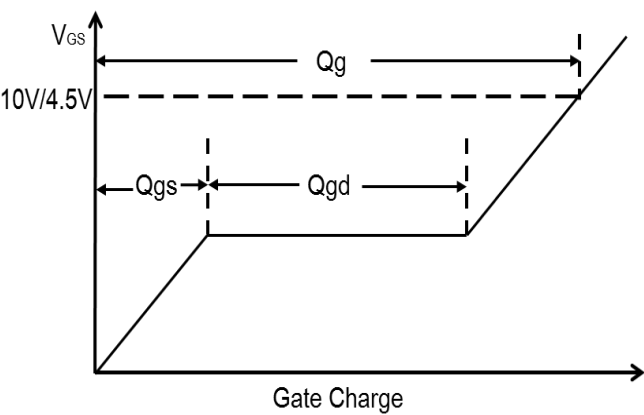
**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**

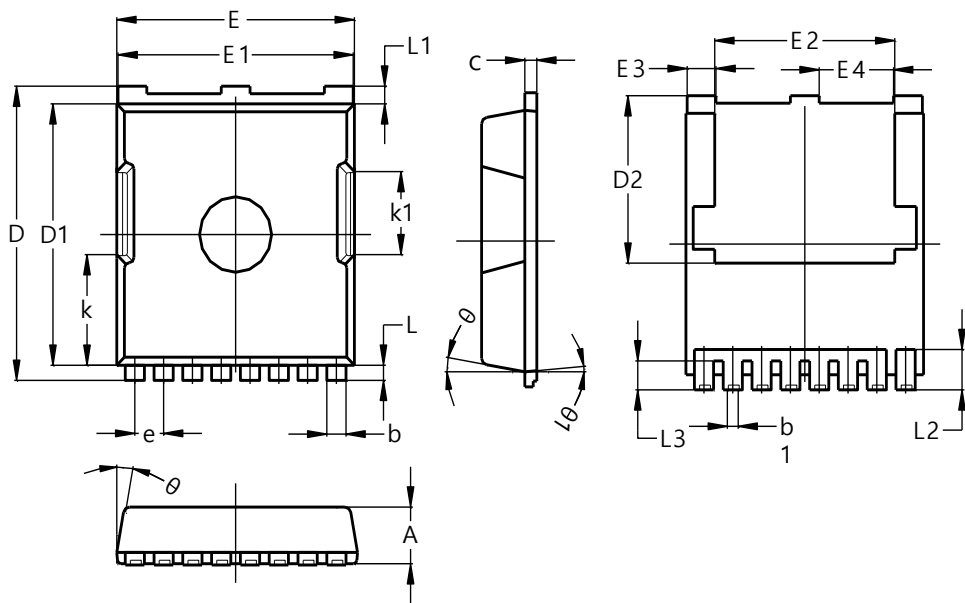


**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**

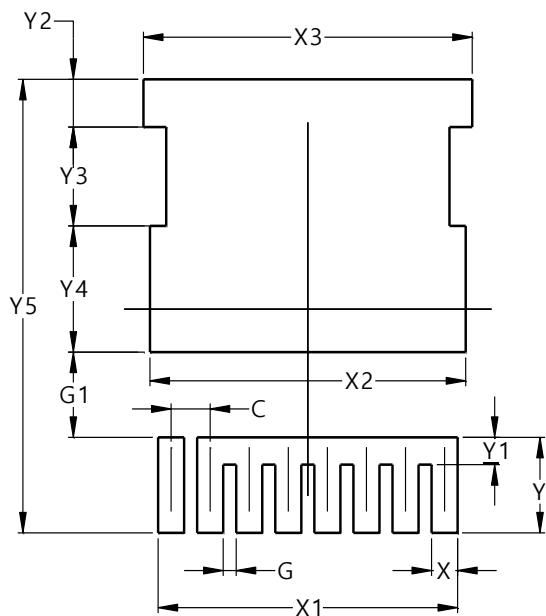
PACKAGE MECHANICAL DATA



TOLL-8			
Dim	Min	Max	Typ
A	2.20	2.40	2.30
b	0.70	0.90	0.80
b1	0.42	0.50	0.45
c	0.40	0.60	0.50
D	11.48	11.88	11.68
D1	10.23	10.53	10.38
D2	6.45	6.85	6.65
E	9.70	10.10	9.90
E1	9.70	9.90	9.80
E2	7.00	8.00	7.50
E3	1.10	1.30	1.20
E4	3.00	3.20	3.10
e	1.20 BSC		
k	4.39 REF		
k1	3.30 REF		
L	0.50	0.70	0.60
L1	0.50	0.90	0.70
L2	1.40	1.80	1.60
L3	1.00	1.30	1.15
θ	0°	15°	10°
θ1	0°	10°	5°
All Dimensions in mm			

Suggested Pad Layout

TOLL-8



Dimensions	Value (in mm)
C	1.200
G	0.400
G1	2.500
X	0.800
X1	9.200
X2	9.700
X3	10.100
Y	2.800
Y1	0.800
Y2	1.400
Y3	2.900
Y4	3.700
Y5	13.300

REEL SPECIFICATION

P/N	PKG	QTY
MS400N06HTL	TOLL-8	2000

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