

# MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

## **MS3139KDFN**

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### **Product specification**

## Features

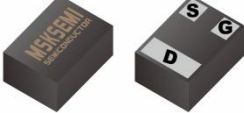
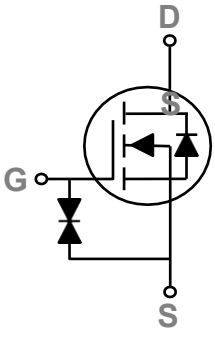

- -20V,-600mA, RDS(ON) =500mΩ@VGS = -4.5V
- Improved dv/dt capability
- Fast switching
- Green Device Available

## Application

- Notebook
- Load Switch
- Battery Protection
- Hand-held Instruments

BVDSS	RDSON	ID
-20V	500mΩ	-600mA

## Reference News

PACKAGE OUTLINE	Pin Configuration	Marking
 <p>DFN1006-3</p>		

## Absolute Maximum Ratings Tc=25°C unless otherwise noted

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	-20	V
V <sub>GS</sub>	Gate-Source Voltage	±10	V
I <sub>D</sub>	Drain Current - Continuous (T <sub>A</sub> =25°C)	-600	mA
	Drain Current - Continuous (T <sub>A</sub> =100°C)	-250	mA
I <sub>DM</sub>	Drain Current - Pulsed <sup>1</sup>	-1.6	A
P <sub>D</sub>	Power Dissipation (T <sub>A</sub> =25°C)	450	mW
	Power Dissipation - Derate above 25°C	3.6	mW/°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 125	°C

## Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to ambient	---	280	°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	-20	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C , I <sub>D</sub> =-1mA	---	-0.01	---	V/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-20V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> =-16V , V <sub>GS</sub> =0V , T <sub>J</sub> =125°C	---	---	-10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =± 10V , V <sub>DS</sub> =0V	---	---	±20	uA

**On Characteristics**

R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-0.3A	---	500	650	mΩ
		V <sub>GS</sub> =-2.5V , I <sub>D</sub> =-0.2A	---	650	900	
		V <sub>GS</sub> =-1.8V , I <sub>D</sub> =-0.1A	---	900	1400	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-0.3	-0.7	-1.0	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	3	---	mV/°C

**Dynamic and switching Characteristics**

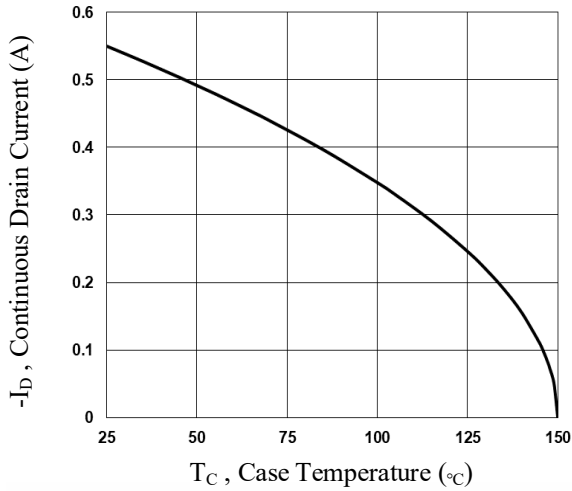
Q <sub>g</sub>	Total Gate Charge <sup>2, 3</sup>	V <sub>DS</sub> =-10V , V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-0.2A	---	1	---	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>2, 3</sup>		---	0.28	---	
Q <sub>gd</sub>	Gate-Drain Charge <sup>2, 3</sup>		---	0.18	---	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>2, 3</sup>	V <sub>DD</sub> =-10V , V <sub>GS</sub> =-4.5V , R <sub>G</sub> =10Ω I <sub>D</sub> =-0.2A	---	8	---	ns
T <sub>r</sub>	Rise Time <sup>2, 3</sup>		---	5.2	---	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>2, 3</sup>		---	30	---	
T <sub>f</sub>	Fall Time <sup>2, 3</sup>		---	18	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-10V , V <sub>GS</sub> =0V , F=1MHz	---	40	---	pF
C <sub>oss</sub>	Output Capacitance		---	15	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	6.5	---	

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

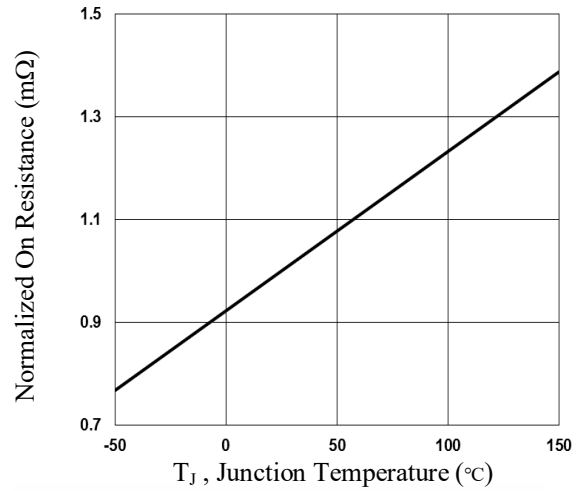
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	-0.6	A
I <sub>SM</sub>	Pulsed Source Current		---	---	-1.2	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V , I <sub>S</sub> =-0.2A , T <sub>J</sub> =25°C	---	---	-1.3	V

Note :

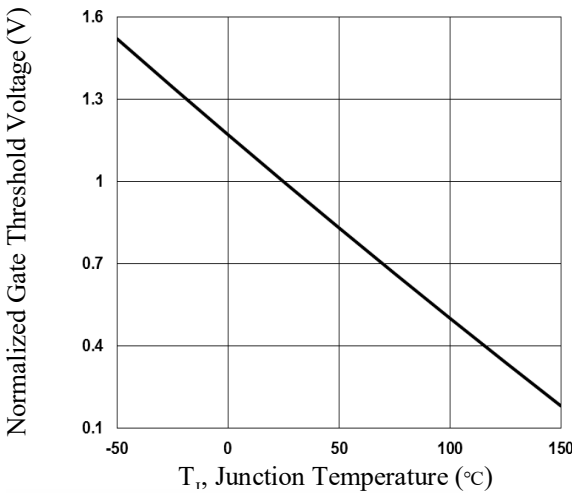
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
3. Essentially independent of operating temperature.



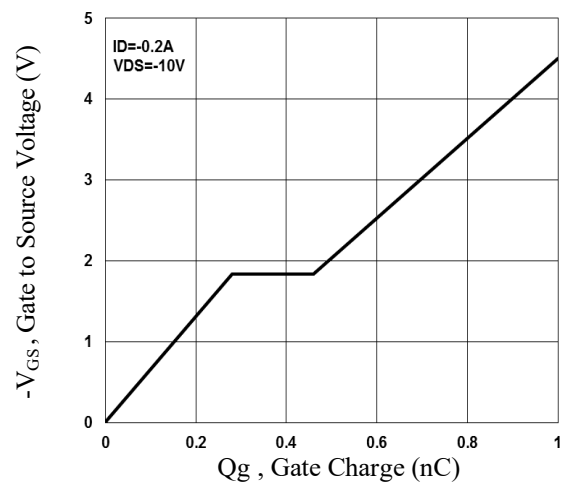
**Fig.1 Continuous Drain Current vs.  $T_C$**



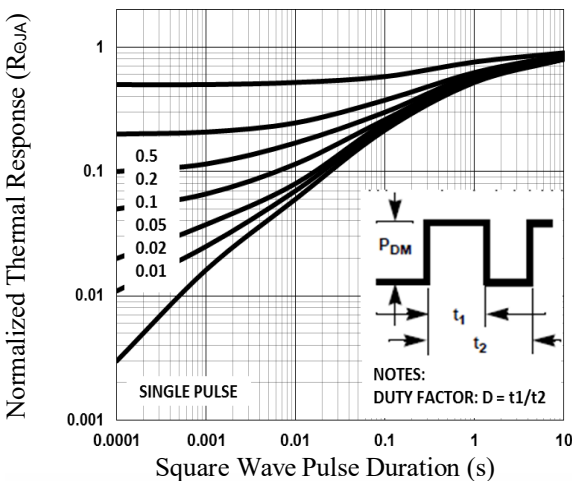
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$**



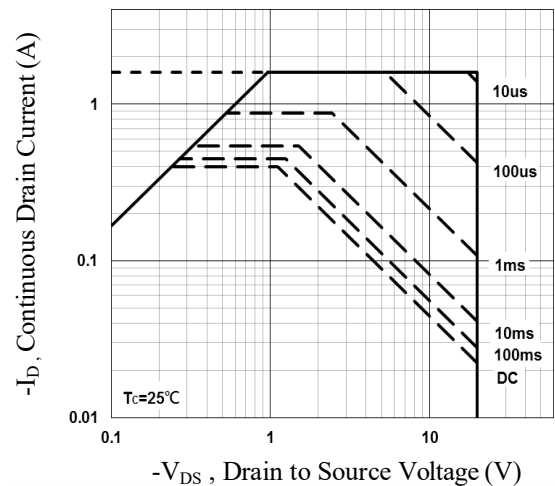
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



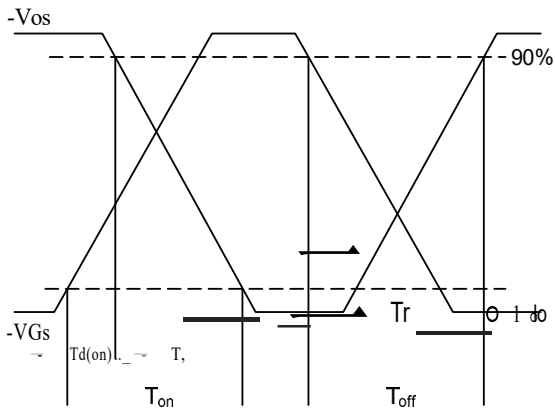
**Fig.4 Gate Charge Waveform**



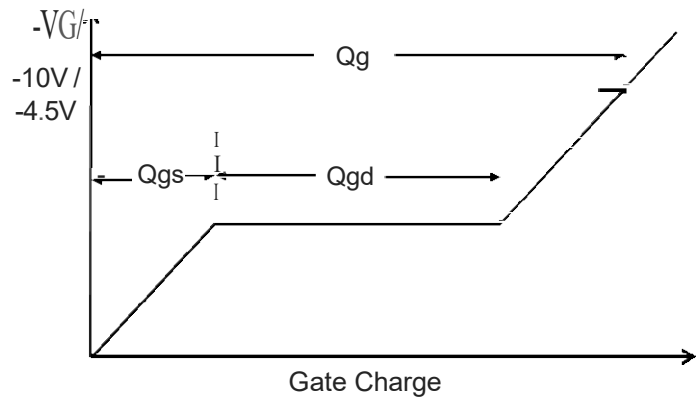
**Fig.5 Normalized Transient Response**



**Fig.6 Maximum Safe Operation Area**

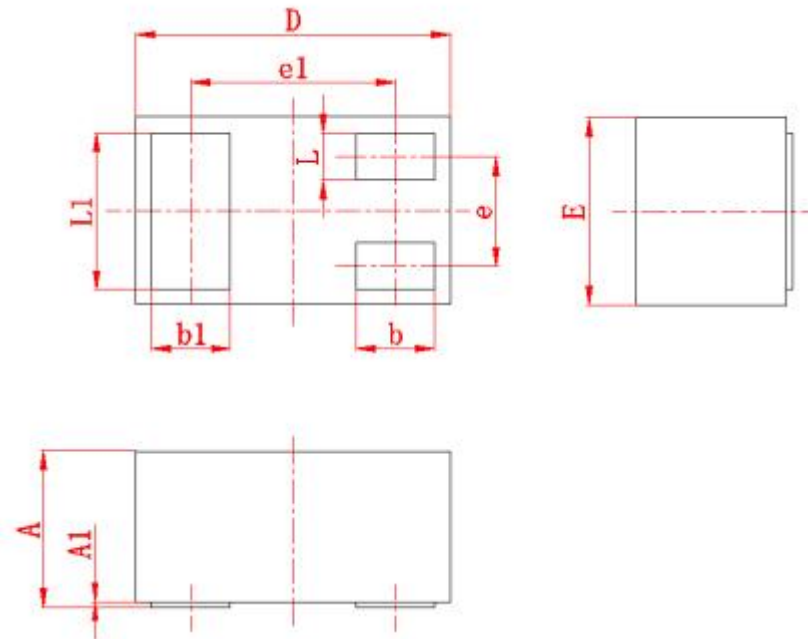


**Fig.7 Switching Time Waveform**



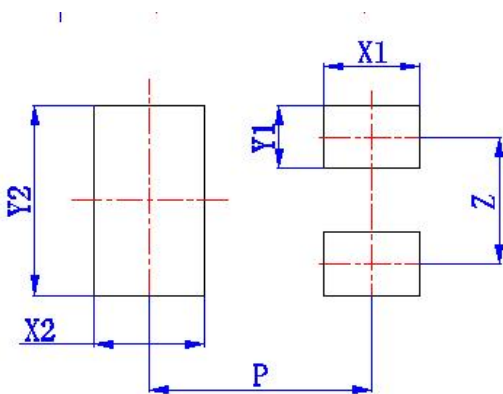
**Fig.8 Gate Charge Waveform**

**Package mechanical data**



Symbol	Millimeters	
	min	max
A	0.4	0.5
A1	0	0.05
D	0.9	1.1
E	0.55	0.65
e	(0.35)	
e1	(0.65)	
b	0.2	0.3
b1	0.2	0.3
L	0.1	0.2
L1	0.45	0.55

**Suggested Land Pattern**



Symbol	Dimension in Millimeters
	typ
X1	(0.3)
X2	(0.35)
Y1	(0.2)
Y2	(0.6)
Z	(0.4)
P	(0.7)

**REEL SPECIFICATION**

P/N	PKG	QTY
MS3139KDFN	DFN1006-3	10000

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