

# MSKSEMI

SEMICONDUCTOR



ESD



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Product data sheet

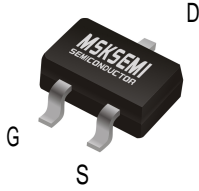
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**Features**

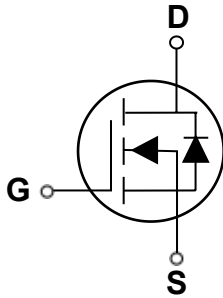
- 30V, 3.5A ,  $R_{DS(ON)}=35m\Omega@V_{GS}=10V$
- Improved  $dv/dt$  capability
- Fast switching
- Green Device Available

**Applications**

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



SOT-23-3L



BVDSS	RDSON	ID
30V	35mΩ	3.5A

**Absolute Maximum Ratings**  $T_c=25^\circ C$  unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous ( $T_A=25^\circ C$ )	3.5	A
	Drain Current – Continuous ( $T_A=70^\circ C$ )	1.68	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	14	A
$P_D$	Power Dissipation ( $T_A=25^\circ C$ )	278	mW
	Power Dissipation – Derate above 25C	2.22	mW/ C
$T_{STG}$	Storage Temperature Range	-50 to 150	C
$T_J$	Operating Junction Temperature Range	-50 to 150	C

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	450	C/ W

**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	30	---	---	V
Δ BV <sub>DSS</sub> / Δ T <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.018	---	V/ °C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =24V, 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> = ±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> =3.5A	---	35	50	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =2.5A	---	45	70	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1	1.5	2.5	V
Δ V <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-3.2	---	mV/ °C
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =2A	---	2.3	---	S

**Dynamic and switching Characteristics**

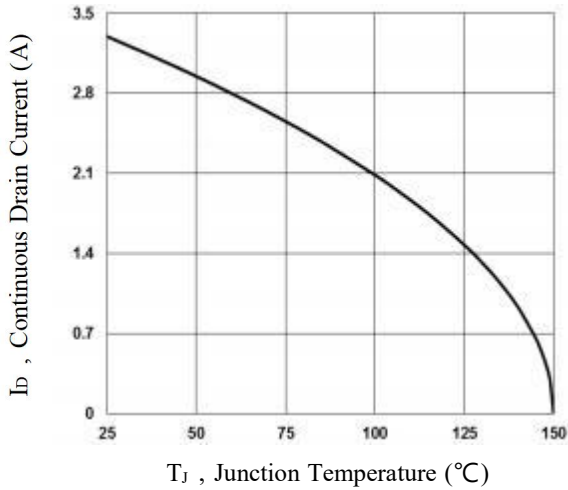
Q <sub>g</sub>	Total Gate Charge <sup>2, 3</sup>	V <sub>DS</sub> =24V, V <sub>GS</sub> =10V, I <sub>D</sub> =1A	---	3.1	---	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>2, 3</sup>		---	0.1	---	
Q <sub>gd</sub>	Gate-Drain Charge <sup>2, 3</sup>		---	1.7	---	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>2, 3</sup>	V <sub>DD</sub> =24V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω I <sub>D</sub> =1A	---	2.2	---	ns
T <sub>r</sub>	Rise Time <sup>2, 3</sup>		---	6.9	---	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>2, 3</sup>		---	15.2	---	
T <sub>f</sub>	Fall Time <sup>2, 3</sup>		---	4.5	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1MHz	---	245	---	pF
C <sub>oss</sub>	Output Capacitance		---	40	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	78	---	

**Drain Source Diode Characteristics and Maximum Ratings**

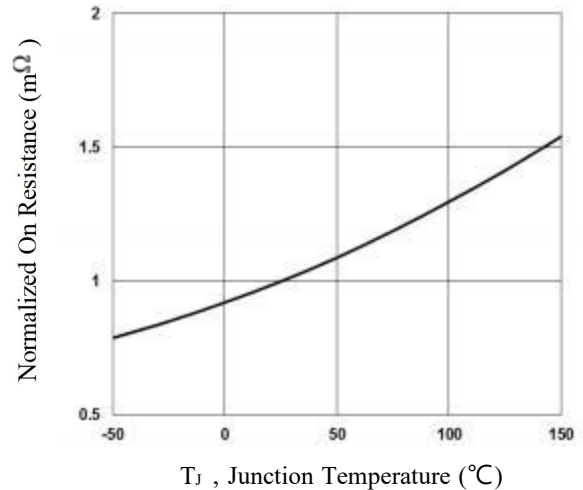
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	3.5	A
I <sub>SM</sub>	Pulsed Source Current		---	---	7.0	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.3	V

Note :

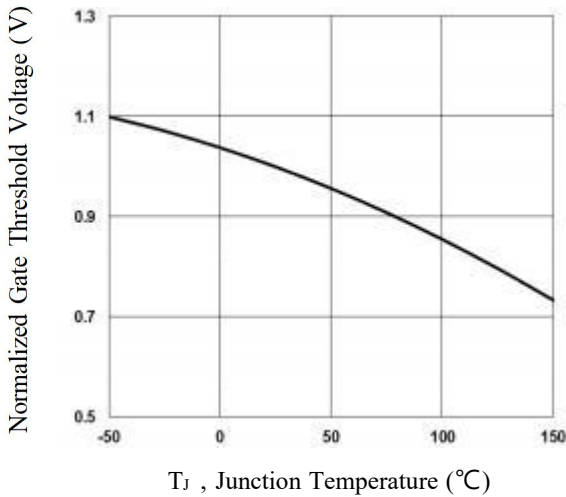
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.



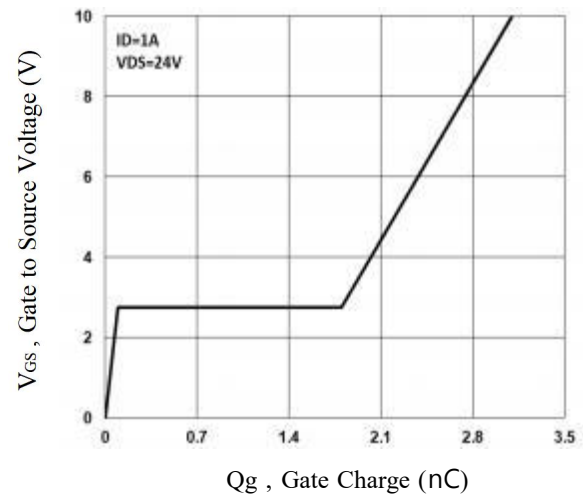
**Fig. 1 Continuous Drain Current vs.  $T_J$**



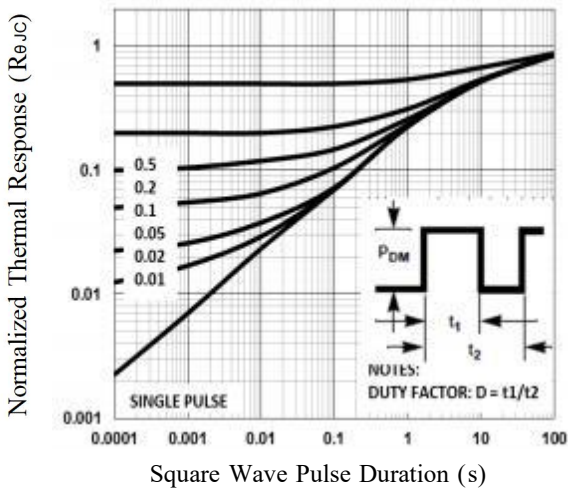
**Fig. 2 Normalized  $R_{DS(on)}$  vs.  $T_J$**



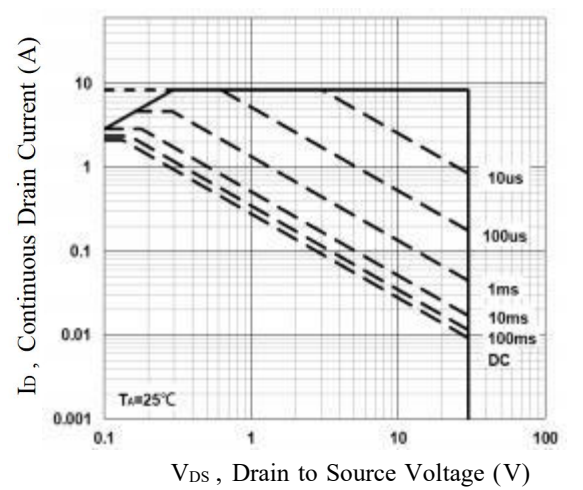
**Fig. 3 Normalized  $V_{th}$  vs.  $T_J$**



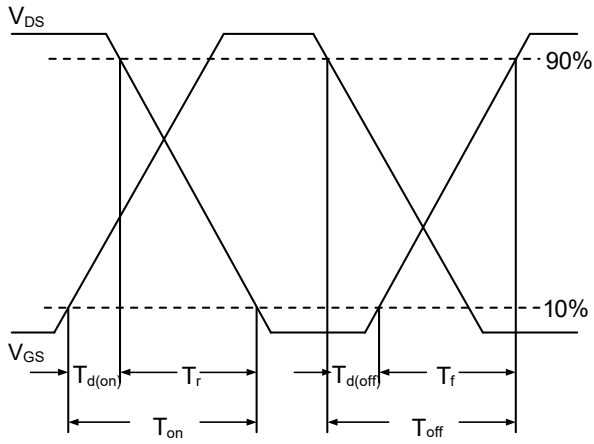
**Fig. 4 Gate Charge Waveform**



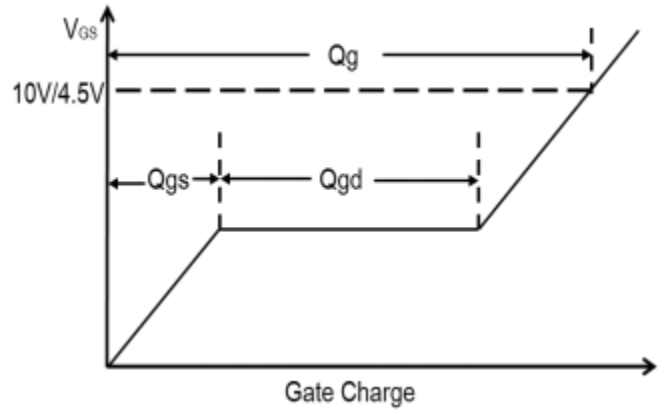
**Fig. 5 Normalized Transient Impedance**



**Fig. 6 Maximum Safe Operation Area**

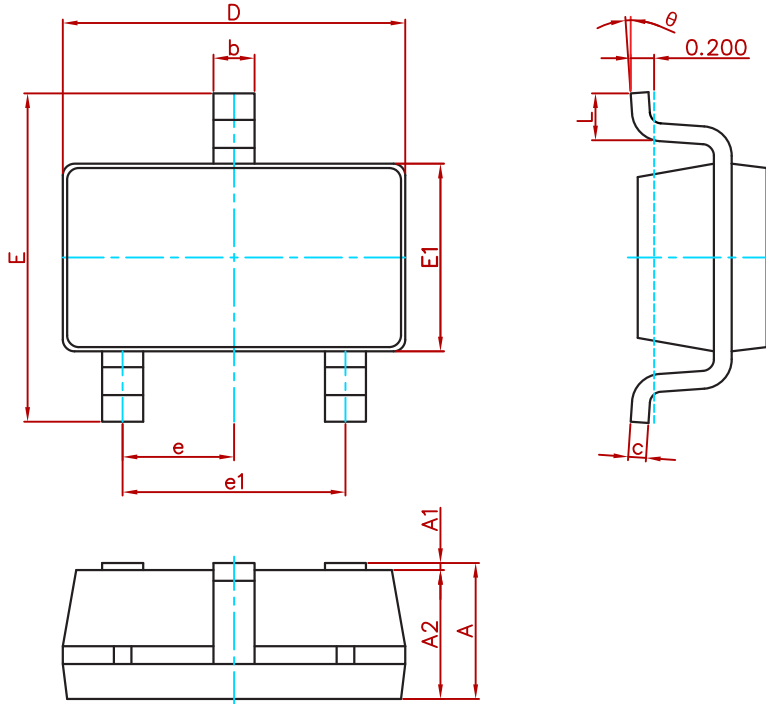


**Fig. 7** Switching Time Waveform



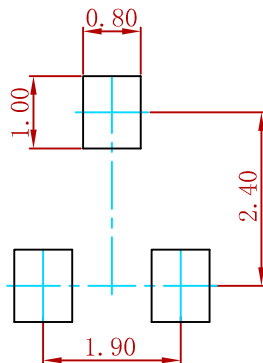
**Fig. 8** Gate Charge Waveform

**PACKAGE MECHANICAL DATA**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°

**Suggested Pad Layout**



Note:  
 1. Controlling dimension: in millimeters.  
 2. General tolerance:  $\pm 0.05$ mm.  
 3. The pad layout is for reference purposes only.

**REEL SPECIFICATION**

P/N	PKG	QTY
AO3406	SOT-23-3L	3000

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