

# MSKSEMI

SEMICONDUCTOR



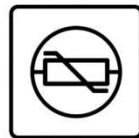
ESD



TVS



TSS



MOV



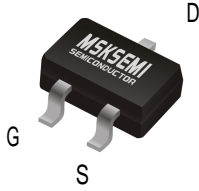
GDT



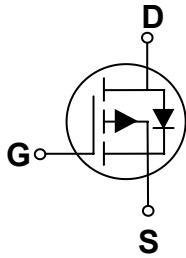
PLED

Product data sheet

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SOT-23-3L



**Features**

- 30V, 3.0A,  $R_{DS(ON)} = 75m\Omega @ V_{GS} = -10V$
- Fast switching
- Green Device Available
- Suit for -4 5V Gate Drive Applications

**Applications**

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

BVDSS	RDSON	ID
-30V	75mΩ	-3.0A

**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	±20	V
$I_D$	Drain Current – Continuous ( $T_A=25^\circ C$ )	-3.0	A
	Drain Current – Continuous ( $T_A=70^\circ C$ )	-2.0	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	-12.0	A
$P_D$	Power Dissipation ( $T_A=25^\circ C$ )	1.56	W
	Power Dissipation – Derate above 25°C	0.012	W/°C
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	80	°C/W

**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to 25°C, $I_D=-1mA$	---	-0.02	---	V/°C
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-27V, V_{GS}=0V, T_J=25^\circ C$	---	---	-1	$\mu A$
		$V_{DS}=-24V, V_{GS}=0V, T_J=125^\circ C$	---	---	-10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

**On Characteristics**

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10V, I_D=-3A$	---	75	115	$m\Omega$
		$V_{GS}=-4.5V, I_D=-2A$	---	110	145	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.6	-2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-2.8	---	mV/°C
$g_{fs}$	Forward Transconductance	$V_{DS}=-10V, I_D=-1A$	---	3	---	S

**Dynamic and switching Characteristics**

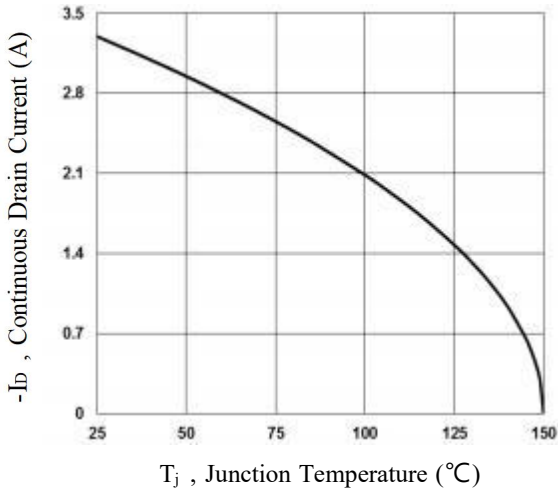
$Q_g$	Total Gate Charge <sup>2,3</sup>	$V_{DS}=-24V, V_{GS}=-4.5V, I_D=-2A$	---	2.5	---	nC
$Q_{gs}$	Gate-Source Charge <sup>2,3</sup>		---	0.1	---	
$Q_{gd}$	Gate-Drain Charge <sup>2,3</sup>		---	1.8	---	
$T_{d(on)}$	Turn-On Delay Time <sup>2,3</sup>	$V_{DD}=-15V, V_{GS}=-10V, R_G=6\Omega$ $I_D=-1A$	---	6.1	---	ns
$T_r$	Rise Time <sup>2,3</sup>		---	8.7	---	
$T_{d(off)}$	Turn-Off Delay Time <sup>2,3</sup>		---	33.2	---	
$T_f$	Fall Time <sup>2,3</sup>		---	3.7	---	
$C_{iss}$	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, F=1MHz$	---	226	---	pF
$C_{oss}$	Output Capacitance		---	39	---	
$C_{rss}$	Reverse Transfer Capacitance		---	29	---	

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

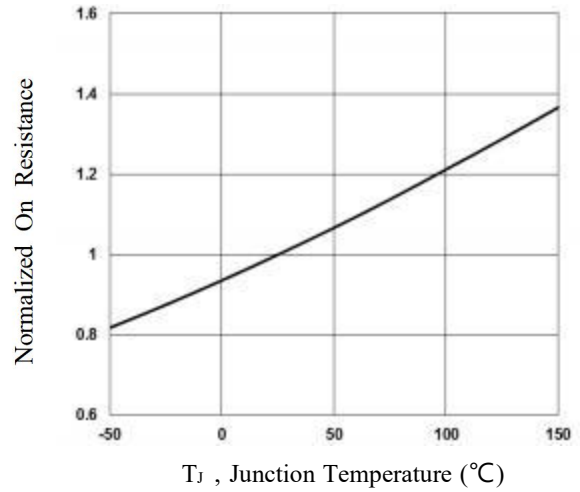
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	---	---	-3.0	A
$I_{SM}$	Pulsed Source Current		---	---	-6.0	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ C$	---	---	-1.2	V

## Note :

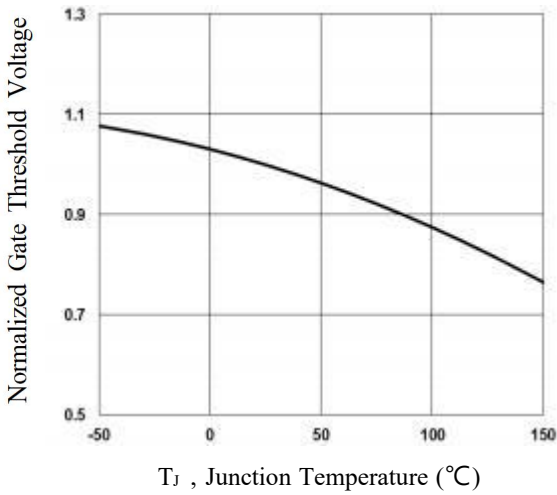
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.



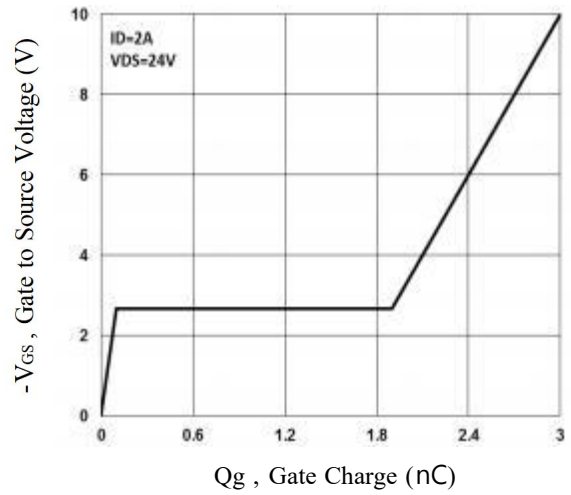
**Fig. 1 Continuous Drain Current vs. Tc**



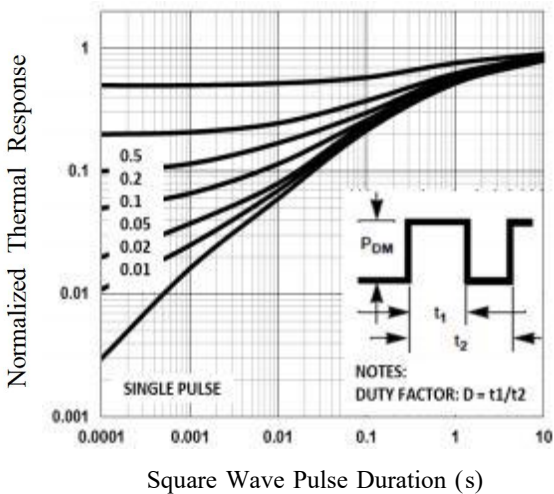
**Fig. 2 Normalized RDS(on) vs. Tj**



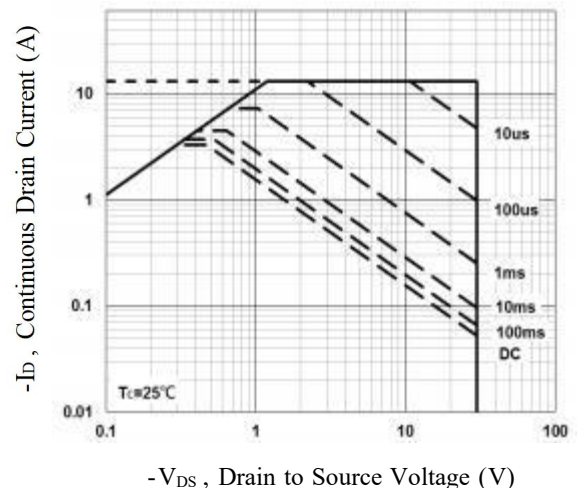
**Fig. 3 Normalized V<sub>th</sub> vs. Tj**



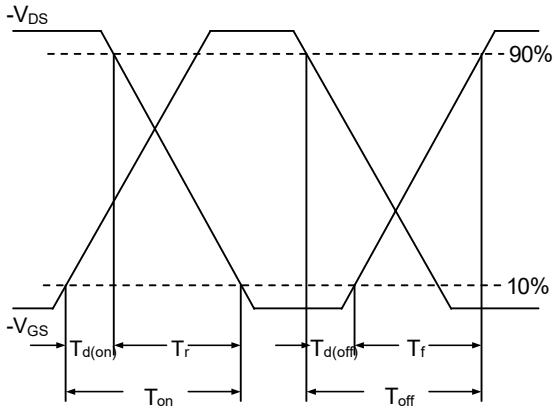
**Fig. 4 Gate Charge Waveform**



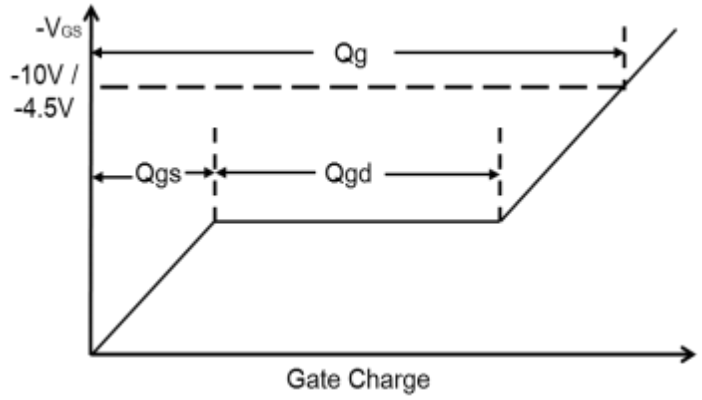
**Fig. 5 Normalized Transient Impedance**



**Fig. 6 Maximum Safe Operation Area**

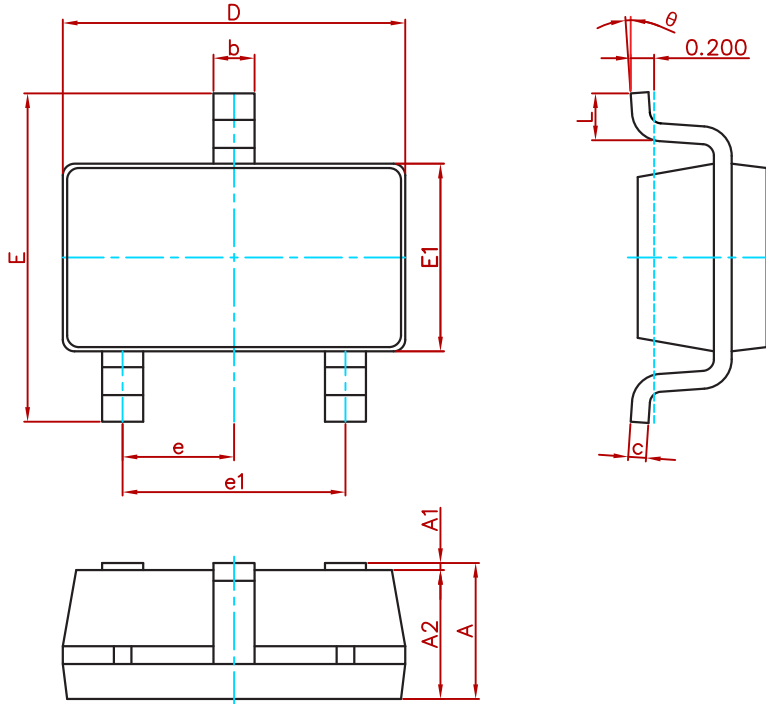


**Fig. 7 Switching Time Waveform**



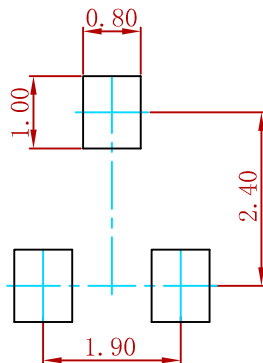
**Fig. 8 Gate Charge Waveform**

**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:  $\pm 0.05\text{mm}$ .  
 3. The pad layout is for reference purposes only.

**REEL SPECIFICATION**

P/N	PKG	QTY
AO3409	SOT-23-3L	3000

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