

# MSKSEMI

SEMICONDUCTOR



ESD



TVS



TSS



MOV

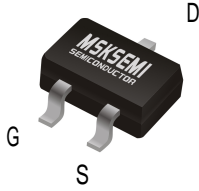


GDT

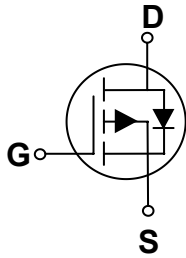


PLED

Product data sheet



SOT-23-3L



**Features**

- -30V, -4.0A,  $R_{DS(ON)} = 51m\Omega @ V_{GS} = -10V$
- Fast switching
- Green Device Available
- Suit for -2.5V Gate Drive Applications

**Applications**

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

BVDSS	R <sub>DS(ON)</sub>	ID
-30V	51mΩ	-4.0A

**Absolute Maximum Ratings** T<sub>C</sub>=25°C unless otherwise noted

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	-30	V
V <sub>GS</sub>	Gate-Source Voltage	±12	V
I <sub>D</sub>	Drain Current – Continuous (T <sub>A</sub> =25°C)	-4.0	A
	Drain Current – Continuous (T <sub>A</sub> =70°C)	-3.0	A
I <sub>DM</sub>	Drain Current – Pulsed <sup>1</sup>	-15.4	A
P <sub>D</sub>	Power Dissipation (T <sub>A</sub> =25°C)	1.56	W
	Power Dissipation – Derate above 25°C	0.012	W/°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to ambient	---	80	°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
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.03	---	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> = ±12V, 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> =-4A	---	51	65	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A	---	65	80	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2A	---	85	100	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-0.4	-0.9	-1.3	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	3	---	mV/°C
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-3A	---	5.4	---	S

**Dynamic and switching Characteristics**

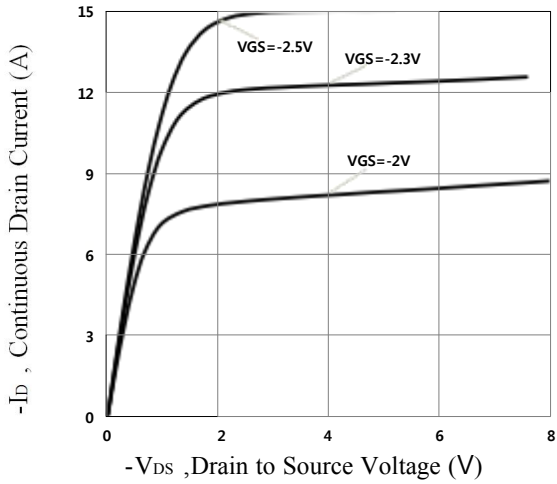
Q <sub>g</sub>	Total Gate Charge <sup>2, 3</sup>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A	---	8	---	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>2, 3</sup>		---	1.9	---	
Q <sub>gd</sub>	Gate-Drain Charge <sup>2, 3</sup>		---	1.4	---	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>2, 3</sup>	V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V, R <sub>G</sub> =6Ω I <sub>D</sub> =-1A	---	5.4	---	ns
T <sub>r</sub>	Rise Time <sup>2, 3</sup>		---	19.4	---	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>2, 3</sup>		---	45.9	---	
T <sub>f</sub>	Fall Time <sup>2, 3</sup>		---	12.4	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, F=1MHz	---	810	---	pF
C <sub>oss</sub>	Output Capacitance		---	85	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	50	---	

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

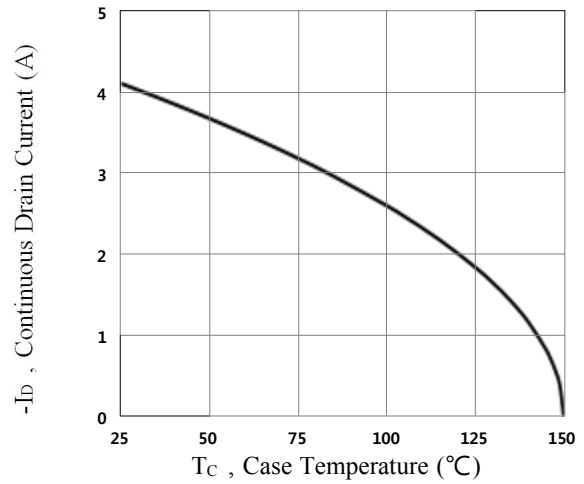
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-4.0	A
I <sub>SM</sub>	Pulsed Source Current		---	---	-8.0	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1.5	V

Note :

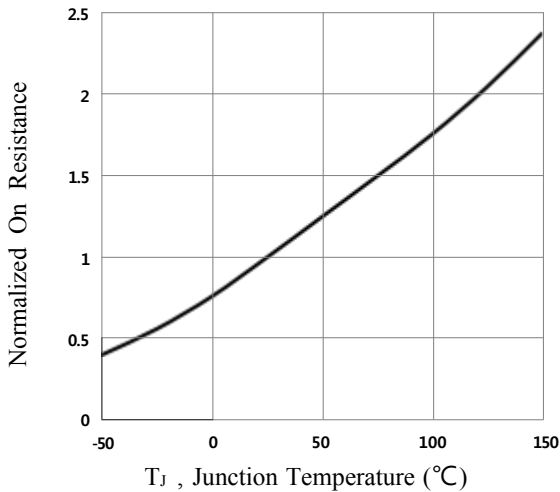
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.



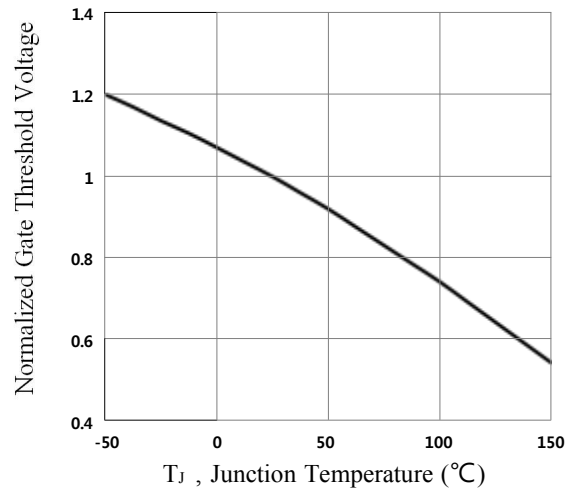
**Fig.1 Typical Output Characteristics**



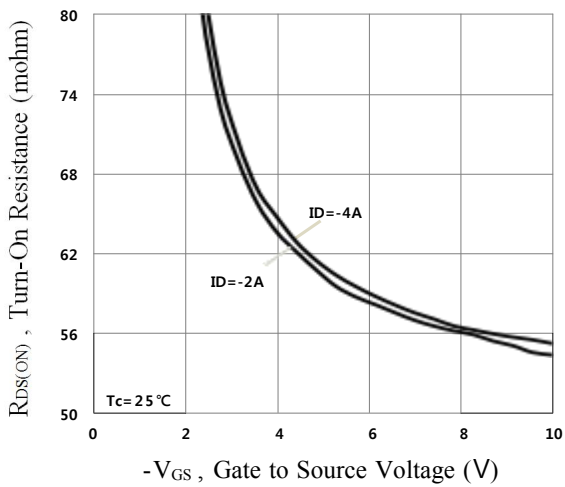
**Fig.2 Continuous Drain Current vs. Tc**



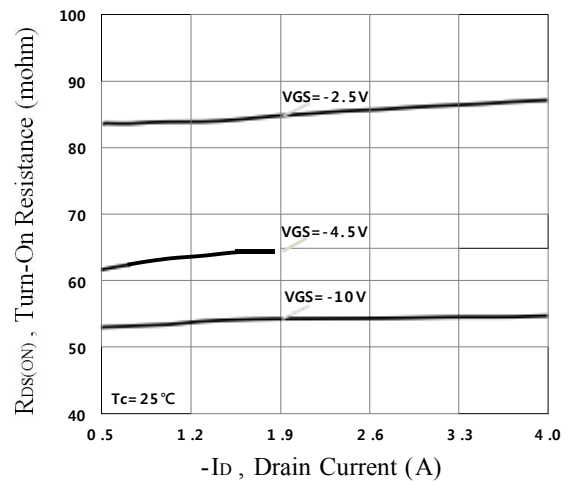
**Fig.3 Normalized RDS(on) vs. Tj**



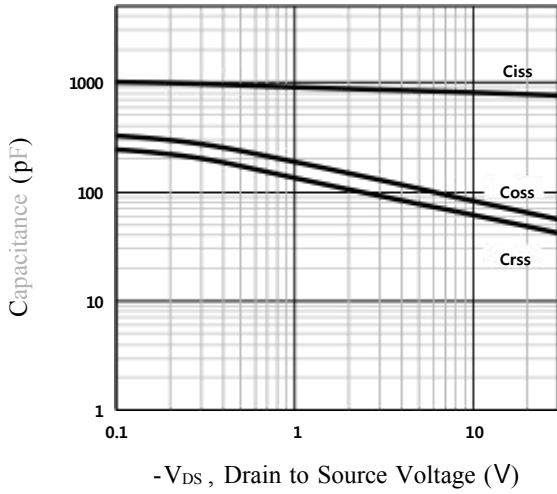
**Fig.4 Normalized Vth vs. Tj**



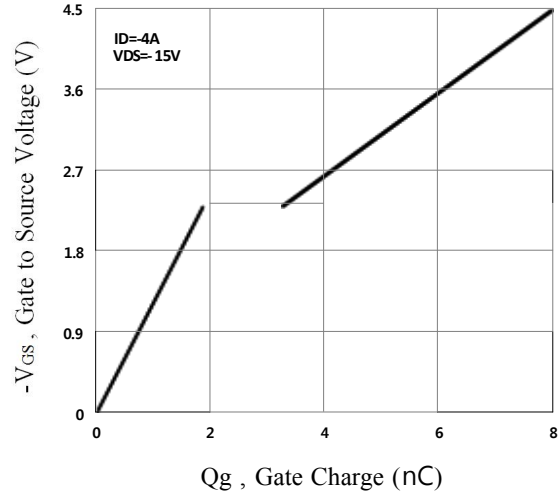
**Fig.5 Turn-On Resistance vs. VGS**



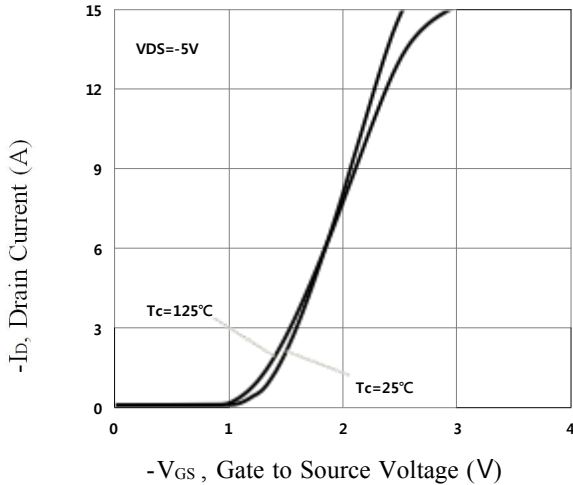
**Fig.6 Turn-On Resistance vs. ID**



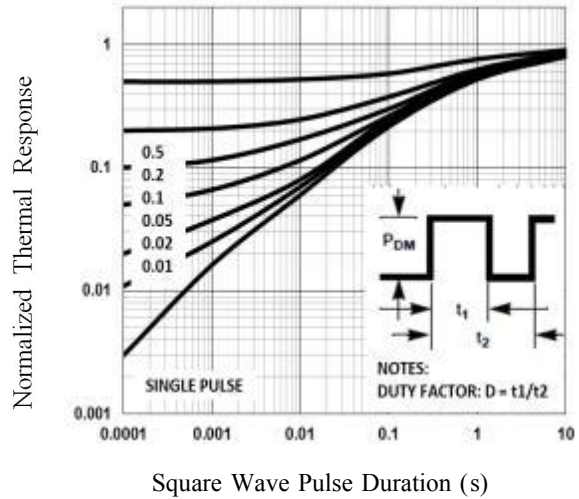
**Fig. 7 Capacitance Characteristics**



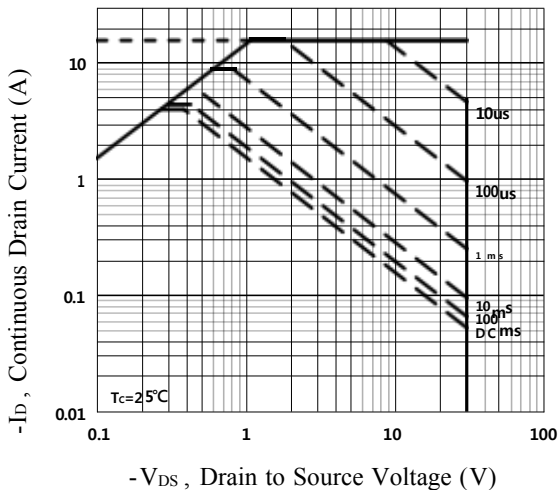
**Fig.8 Gate Charge Characteristics**



**Fig.9 Transfer Characteristics**

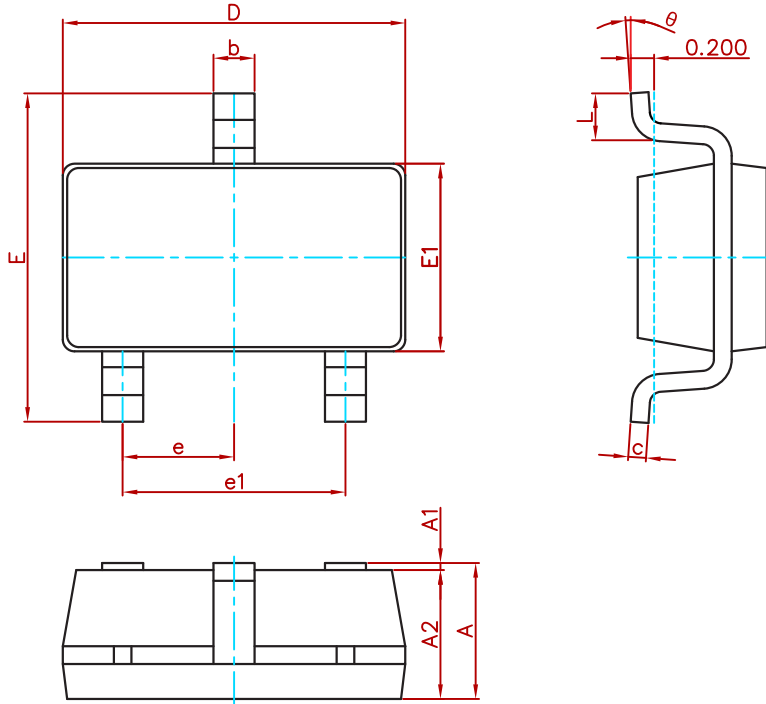


**Fig.10 Normalized Transient Impedance**



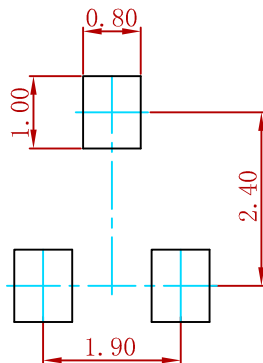
**Fig.11 Maximum Safe Operation Area**

**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
θ	0°	8°	0°	8°

**Suggested Pad Layout**



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

**REEL SPECIFICATION**

P/N	PKG	QTY
AO3401A	SOT-23-3L	3000

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