

MSKSEMI

SEMICONDUCTOR



ESD



TVS



TSS



MOV



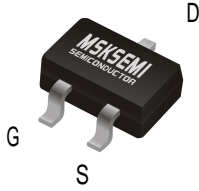
GDT



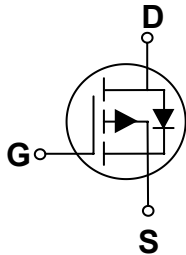
PLED

Product data sheet

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SOT-23-3L



Features

- -20V,-3A, $R_{DS(ON)} = 60m\Omega @ V_{GS} = -4.5V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

Applications

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

BVDSS	RDSON	ID
-20V	60mΩ	-3A

Absolute Maximum Ratings $T_c=25$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Drain Current – Continuous ($T_c=25C$)	-3.0	A
	Drain Current – Continuous ($T_c=100C$)	-2.0	A
I_{DM}	Drain Current – Pulsed ¹	-12	A
P_D	Power Dissipation ($T_c=25C$)	1.56	W
	Power Dissipation – Derate above 25C	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
$B_{V_{DS}}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	---	---	V
$\Delta B_{V_{DS}} / \Delta T_J$	$B_{V_{DS}}$ Temperature Coefficient	Reference to 25°C, $I_D=-1mA$	---	-0.01	---	V/°C
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V, T_J=25°C$	---	---	-1	μA
		$V_{DS}=-16V, V_{GS}=0V, T_J=125°C$	---	---	-10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	± 10	μA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5V, I_D=-3A$	---	60	80	$m\Omega$
		$V_{GS}=-2.5V, I_D=-2A$	---	80	120	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.3	-0.65	-1.1	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3	---	mV/°C
g_{fs}	Forward Transconductance	$V_{DS}=-10V, I_S=-1A$	---	2.2	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{2, 3}	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-3A$	---	4.8	---	nC
Q_{gs}	Gate-Source Charge ^{2, 3}		---	0.5	---	
Q_{gd}	Gate-Drain Charge ^{2, 3}		---	1.9	---	
$T_{d(on)}$	Turn-On Delay Time ^{2, 3}	$V_{DD}=-10V, V_{GS}=-4.5V, R_G=25\Omega$ $I_D=-1A$	---	3.5	---	nS
T_r	Rise Time ^{2, 3}		---	12.6	---	
$T_{d(off)}$	Turn-Off Delay Time ^{2, 3}		---	32.6	---	
T_f	Fall Time ^{2, 3}		---	8.4	---	
C_{iss}	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, F=1MHz$	---	550	---	pF
C_{oss}	Output Capacitance		---	65	---	
C_{rss}	Reverse Transfer Capacitance		---	55	---	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	-3.0	A
I_{SM}	Pulsed Source Current		---	---	-13	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25°C$	---	---	-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.

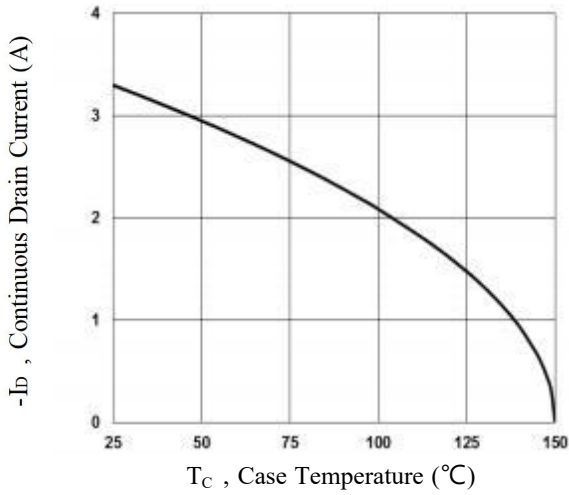


Fig.1 Continuous Drain Current vs. T_C

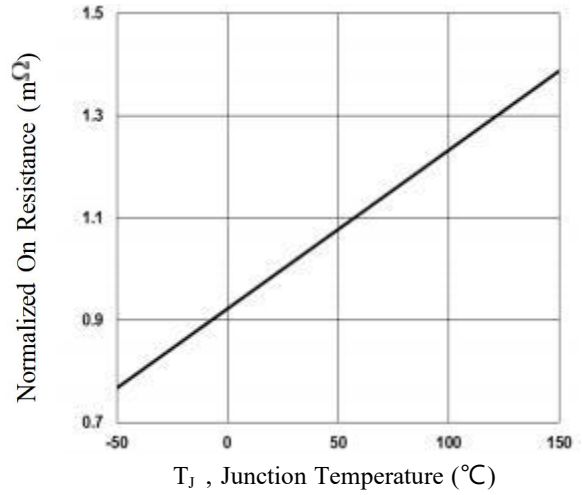


Fig.2 Normalized R_{DS(on)} vs. T_J

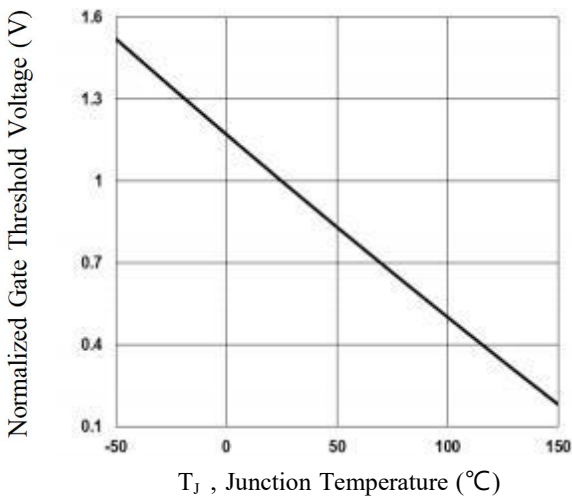


Fig.3 Normalized V_{th} vs. T_J

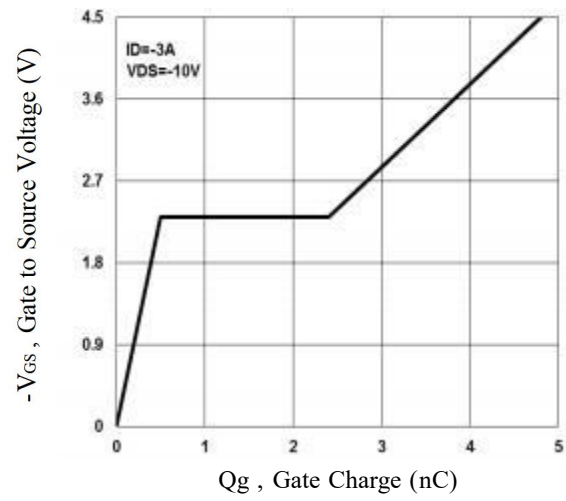


Fig.4 Gate Charge Waveform

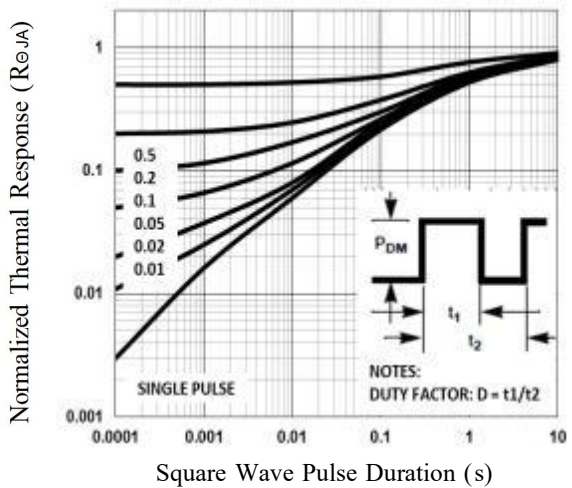


Fig.5 Normalized Transient Response

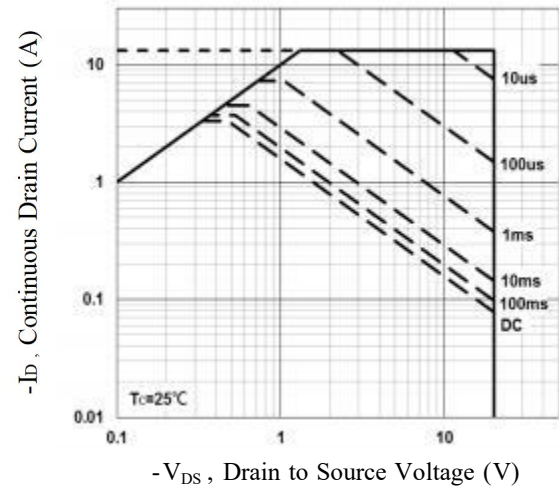


Fig.6 Maximum Safe Operation Area

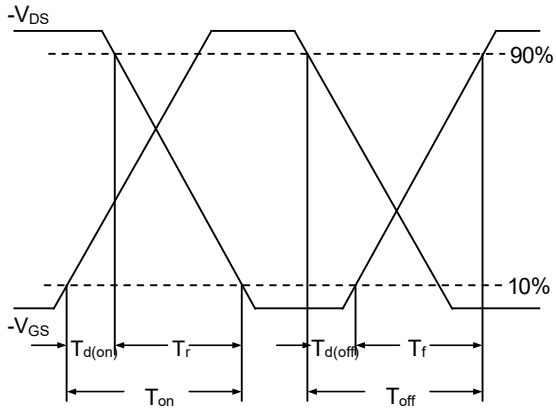


Fig.7 Switching Time Waveform

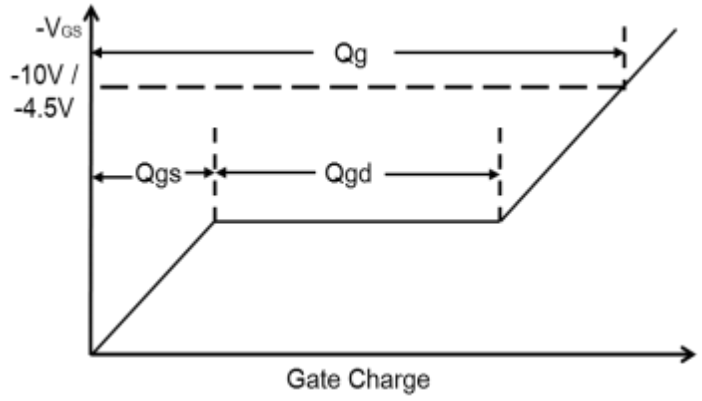
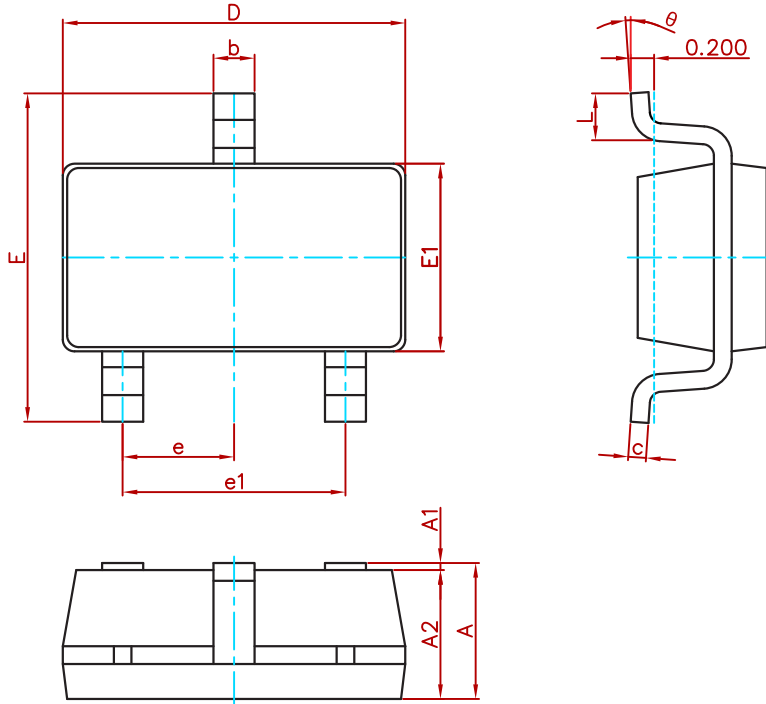


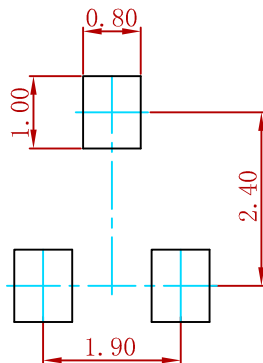
Fig.8 Gate Charge Waveform

PACKAGE MECHANICAL DATA



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

REEL SPECIFICATION

P/N	PKG	QTY
AO3413	SOT-23-3L	3000

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