

# MSKSEMI

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



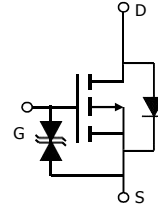
PLED

Product data sheet

[www.msksemi.com](http://www.msksemi.com)

$V_{DS}$	-20V
$I_D$ (at $V_{GS}=-4.5V$ )	-4A
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$ )	< 41m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=-2.5V$ )	< 53m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=-1.8V$ )	< 65m $\Omega$

ESD protected



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Continuous Drain Current	$I_D$	$T_A=25^\circ C$	-4
		$T_A=70^\circ C$	-3.5
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	-30	A
Power Dissipation <sup>B</sup>	$P_D$	$T_A=25^\circ C$	1.5
		$T_A=70^\circ C$	1
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

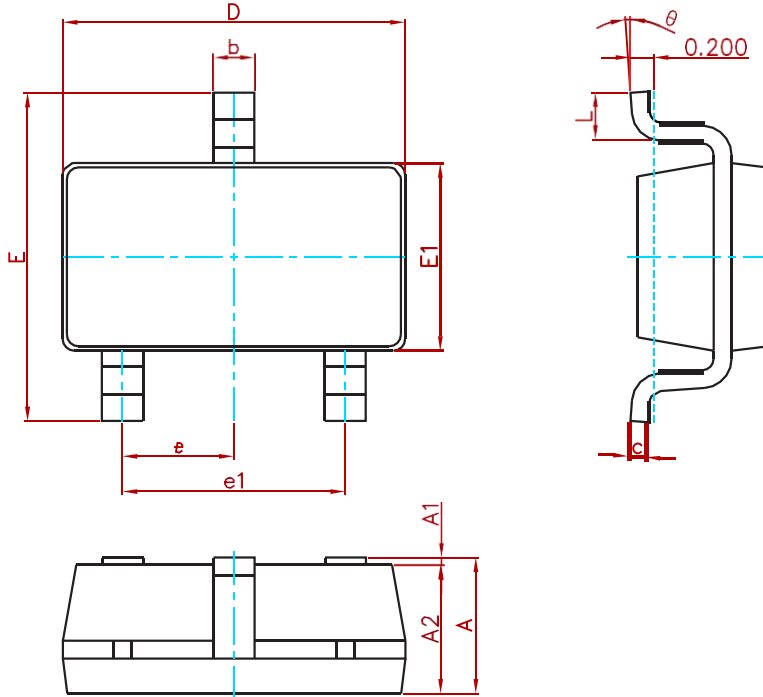
**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	65	80	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A D</sup>		Steady-State	85	100
Maximum Junction-to-Lead	$R_{\theta JL}$	43	52	$^\circ C/W$

**Electrical Characteristics ( $T_J=25^\circ C$  unless otherwise noted)**

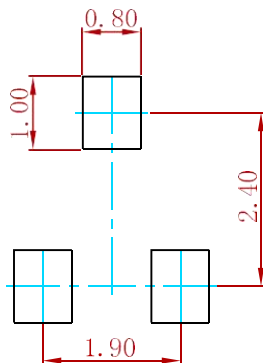
Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=-250\mu A, V_{GS}=0V$	-20			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-20V, V_{GS}=0V$ $T_J=55^\circ C$			-1 -5	$\mu A$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0V, V_{GS}=\pm 8V$			$\pm 10$	$\mu A$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.3	-0.57	-0.9	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-4.5V, V_{DS}=-5V$	-30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5V, I_D=-4A$ $T_J=125^\circ C$		34 49	41 59	m $\Omega$
		$V_{GS}=-2.5V, I_D=-4A$		42	53	m $\Omega$
		$V_{GS}=-1.8V, I_D=-2A$		52	65	m $\Omega$
		$V_{GS}=-1.5V, I_D=-1A$		61		m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=-5V, I_D=-4A$		20		S
$V_{SD}$	Diode Forward Voltage	$I_S=-1A, V_{GS}=0V$		-0.64	-1	V
$I_S$	Maximum Body-Diode Continuous Current				-2	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=-10V, f=1MHz$	600	751	905	pF
$C_{oss}$	Output Capacitance		80	115	150	pF
$C_{rss}$	Reverse Transfer Capacitance		48	80	115	pF
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	6	13	20	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g$	Total Gate Charge	$V_{GS}=-4.5V, V_{DS}=-10V, I_D=-4A$	7.4	9.3	11	nC
$Q_{gs}$	Gate Source Charge		0.8	1	1.2	nC
$Q_{gd}$	Gate Drain Charge		1.3	2.2	3.1	nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-4.5V, V_{DS}=-10V, R_L=2.5\Omega, R_{GEN}=3\Omega$		13		ns
$t_r$	Turn-On Rise Time			9		ns
$t_{D(off)}$	Turn-Off DelayTime			19		ns
$t_f$	Turn-Off Fall Time			29		ns
$t_{rr}$	Body Diode Reverse Recovery Time		$I_F=-4A, di/dt=500A/\mu s$	20	26	32
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=-4A, di/dt=500A/\mu s$	40	51	62	nC

**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
AO3415AI-MS	SOT-23	3000

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