

MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

AOD609-MS

Product specification

Features

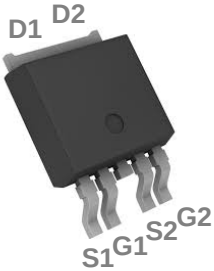
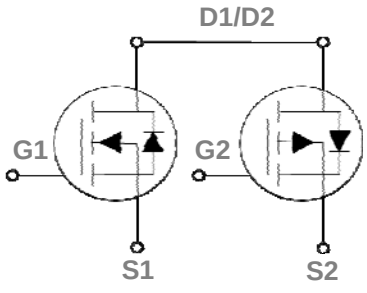
- Fast switching
- Green Device Available
- Suit for 4.5V Gate Drive Applications

Applications

- DC Fan
- Motor Drive Applications
- Networking
- Half/ Full Bridge Topology

BVDSS	RDSON	ID
40V	18mΩ	30A
-40V	35mΩ	-20A

Reference News

PACKAGE OUTLINE	PIN Configuration	Marking
 TO-252-4		

Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Rating		Units
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D	Drain Current – Continuous ($T_C=25^{\circ}\text{C}$)	30	-20	A
	Drain Current – Continuous ($T_C=100^{\circ}\text{C}$)	28	-19	A
I_{DM}	Drain Current – Pulsed ¹	50	-48	A
P_D	Power Dissipation ($T_C=25^{\circ}\text{C}$)	30		W
	Power Dissipation – Derate above 25°C	0.16		W/ $^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150		$^{\circ}\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150		$^{\circ}\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	30	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Thermal Resistnce Junction to Ambient	---	62	$^{\circ}\text{C/W}$

N-CH Electrical Characteristics (T_J=25 °C, unless otherwise)
Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =250uA	40	---	---	V
$\frac{\partial BV_{DSS}}{\partial T_J}$	BV _{DSS} Temperature Coefficient	Reference to 25°C , I _D =1mA	---	0.04	---	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =40V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =32V , V _{GS} =0V , T _J =125°C	---	---	10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V , V _{DS} =0V	---	---	±100	nA

On Characteristics

R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V , I _D =6A	---	19	30	mΩ
		V _{GS} =4.5V , I _D =4A	---	28	40	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.0	1.5	2.5	V
$\frac{\partial V_{GS(th)}}{\partial T_J}$	V _{GS(th)} Temperature Coefficient		---	-3	---	mV/°C
gfs	Forward Transconductance	V _{DS} =10V , I _D =3A	---	6.5	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{2, 3}	V _{DS} =20V , V _{GS} =4.5V , I _D =6A	---	5.2	---	nC
Q _{gs}	Gate-Source Charge ^{2, 3}		---	1.2	---	
Q _{gd}	Gate-Drain Charge ^{2, 3}		---	2.5	---	
T _{d(on)}	Turn-On Delay Time ^{2, 3}	V _{DD} =20V , V _{GS} =4.5V , R _G =25Ω I _D =1A	---	3.2	---	ns
T _r	Rise Time ^{2, 3}		---	8.6	---	
T _{d(off)}	Turn-Off Delay Time ^{2, 3}		---	18	---	
T _f	Fall Time ^{2, 3}		---	6	---	
C _{iss}	Input Capacitance	V _{DS} =15V , V _{GS} =0V , F=1MHz	---	420	---	pF
C _{oss}	Output Capacitance		---	65	---	
C _{rss}	Reverse Transfer Capacitance		---	40	---	

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	---	---	15	A
I _{SM}	Pulsed Source Current		---	---	30	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 ≤ 300us , duty cycle ≤ 2%.
3. Essentially independent of operating temperature.

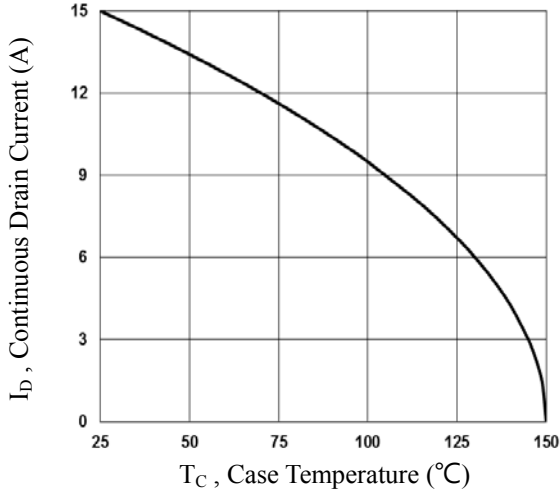


Fig.1 Continuous Drain Current vs. T_c

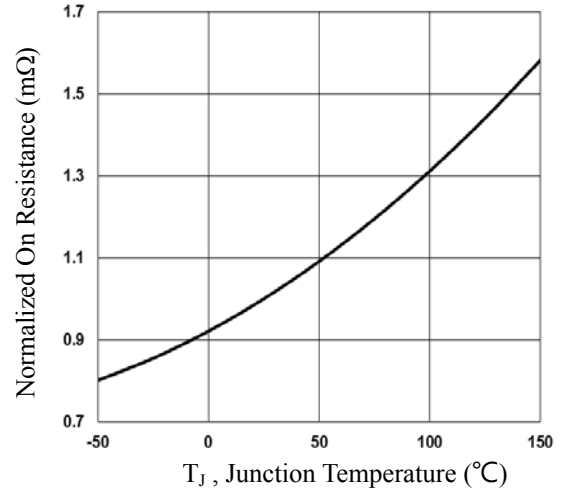


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

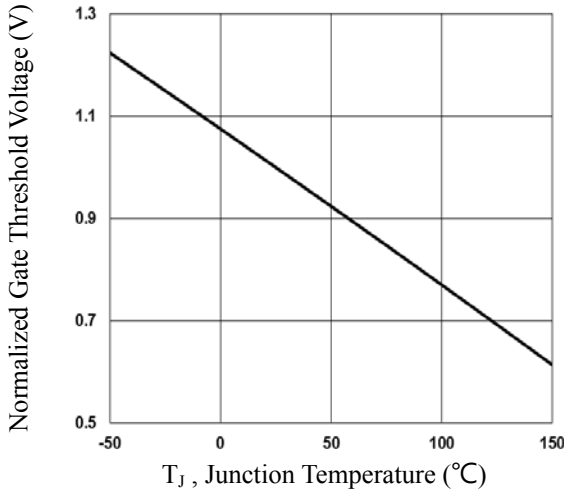


Fig.3 Normalized V_{th} vs. T_j

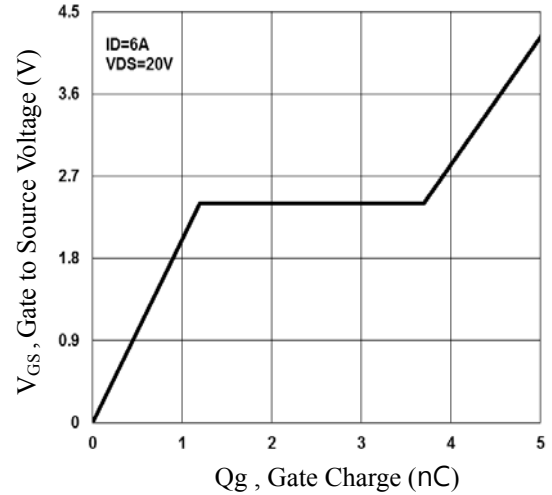


Fig.4 Gate Charge Waveform

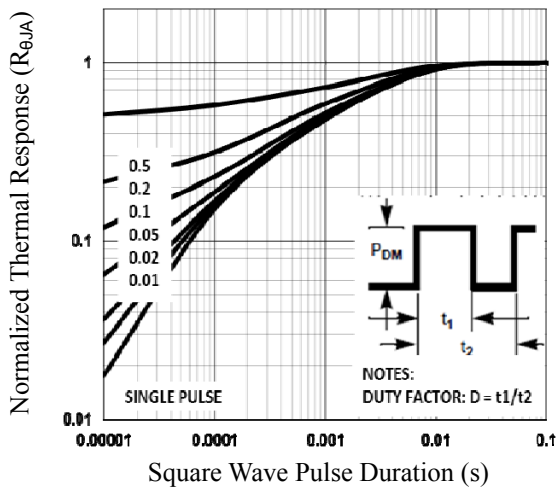


Fig.5 Normalized Transient Impedance

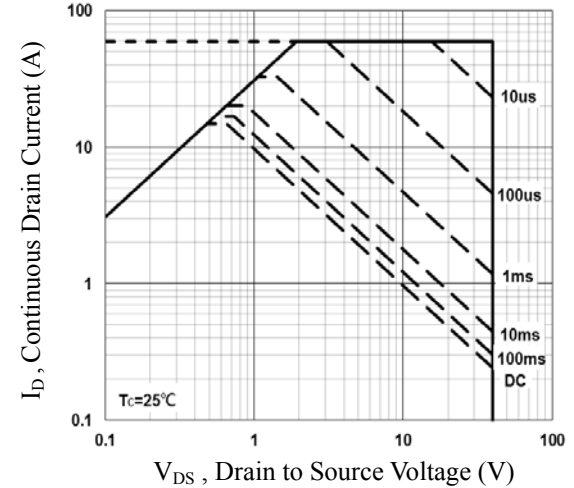


Fig.6 Maximum Safe Operation Area

P-CH Electrical Characteristics (T_J=25 °C, unless otherwise)
Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =-250uA	-40	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C , I _D =-1mA	---	-0.04	---	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-40V , V _{GS} =0V , T _J =25°C	.	---	-1	uA
		V _{DS} =-32V , V _{GS} =0V , T _J =125°C	---	---	-10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} = ±10V , V _{DS} =0V	---	---	±100	nA

On Characteristics

R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V , I _D =-5A	---	38	45	mΩ
		V _{GS} =-4.5V , I _D =-3A	.	45	70	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.5	-2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	3	---	mV/°C
g _{fs}	Forward Transconductance	V _{DS} =-10V , I _D =-3A	---	9	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{2, 3}	V _{DS} =-20V , V _{GS} =-4.5V , I _D =-5A	---	9	---	nC
Q _{gs}	Gate-Source Charge ^{2, 3}		---	2.5	---	
Q _{gd}	Gate-Drain Charge ^{2, 3}		---	3.2	---	
T _{d(on)}	Turn-On Delay Time ^{2, 3}	V _{DD} =-20V , V _{GS} =-4.5V , R _G =25Ω I _D =-1A	---	20	---	ns
T _r	Rise Time ^{2, 3}		---	12	---	
T _{d(off)}	Turn-Off Delay Time ^{2, 3}		.	46	---	
T _f	Fall Time ^{2, 3}		---	6	---	
C _{iss}	Input Capacitance	V _{DS} =-15V , V _{GS} =0V , F=1MHz	---	1050	---	pF
C _{oss}	Output Capacitance		.	110	---	
C _{rss}	Reverse Transfer Capacitance		---	80	---	

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	---	---	-12	A
I _{SM}	Pulsed Source Current		---	---	-24	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V , I _S =-1A , T _J =25°C	---	---	-1.2	V

Note :

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

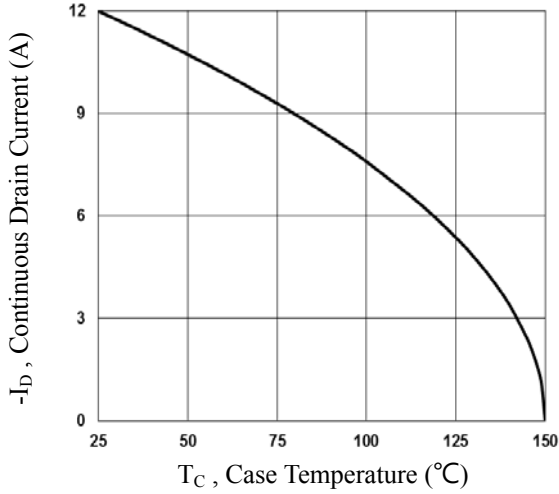


Fig.7 Continuous Drain Current vs. T_C

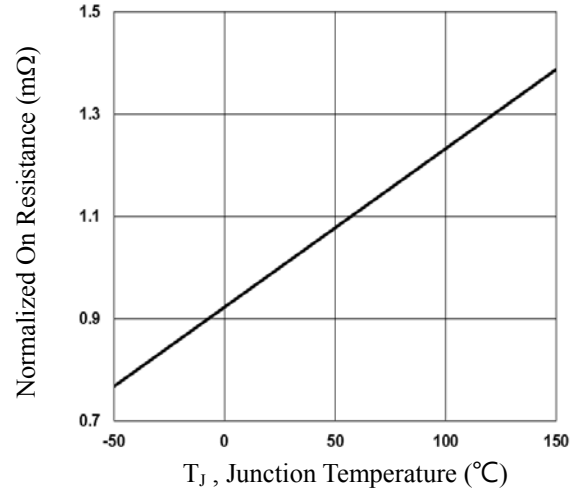


Fig.8 Normalized $R_{DS(on)}$ vs. T_J

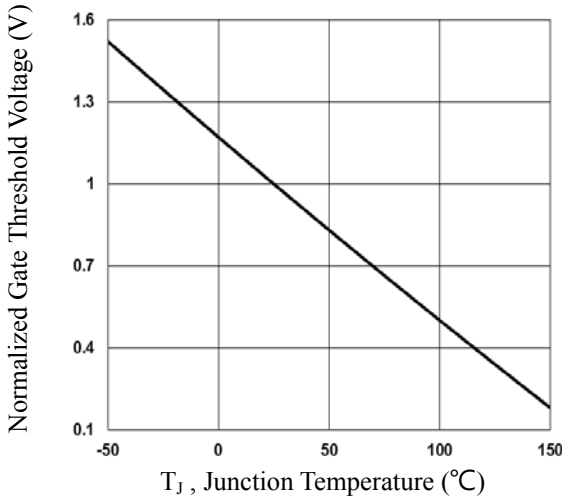


Fig.9 Normalized V_{th} vs. T_J

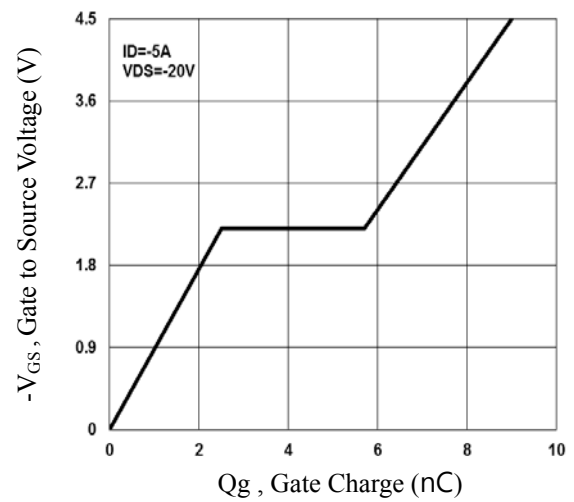


Fig.10 Gate Charge Waveform

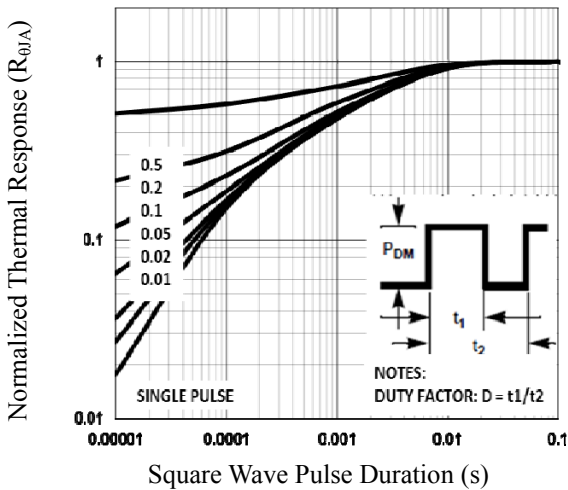


Fig.11 Normalized Transient Impedance

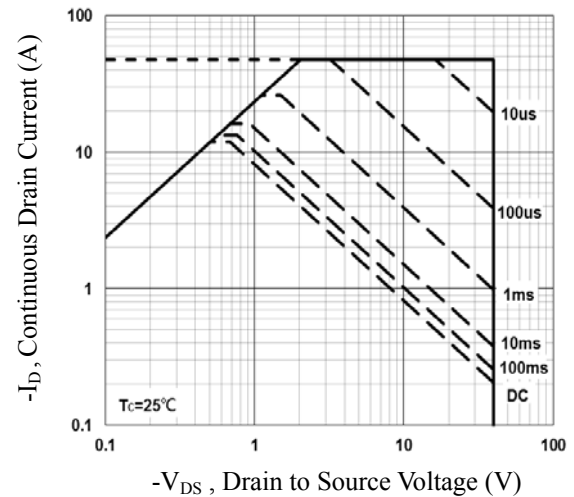
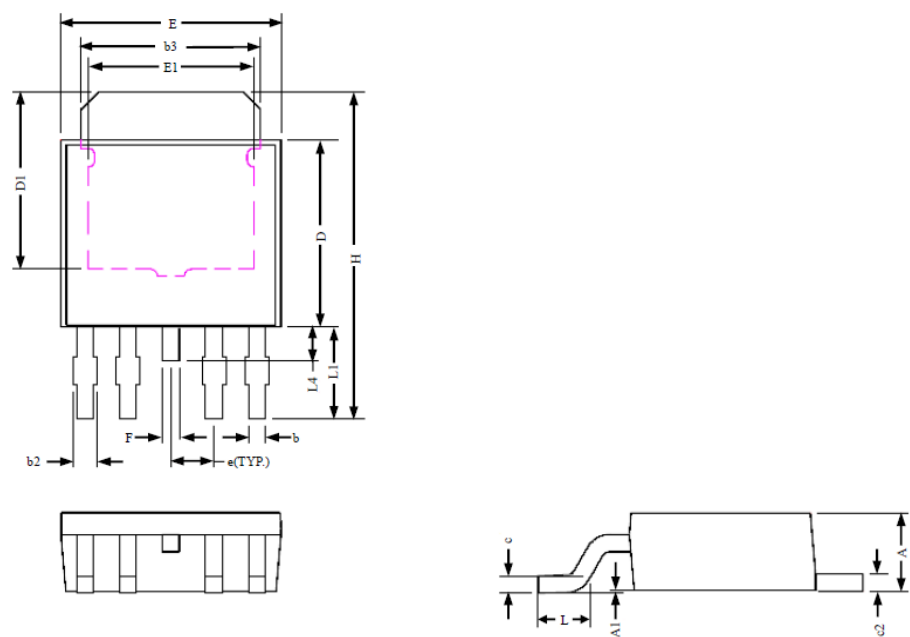


Fig.12 Maximum Safe Operation Area

TO252-4 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	2.400	2.200	0.094	0.087
A1	0.150	0.000	0.006	0.000
B	0.600	0.400	0.024	0.016
b2	0.800	0.500	0.031	0.020
b3	5.500	5.200	0.217	0.205
C	0.508typ.		0.02typ.	
c2	0.550	0.450	0.022	0.018
D	5.800	5.400	0.228	0.213
D1	---	4.570	---	0.180
E	6.800	6.400	0.268	0.252
E1	---	3.810	---	0.150
E	1.27ref.		0.05ref.	
F	0.600	0.400	0.024	0.016
H	10.200	9.400	0.402	0.370
L	1.770	1.400	0.070	0.055
L1	3.000	2.400	0.118	0.094
L4	1.200	0.800	0.047	0.031

REEL SPECIFICATION

P/N	PKG	QTY
AOD609-MS	TO-252-4	2500

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