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SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

AOD413A-MS

Product specification

FEATURES

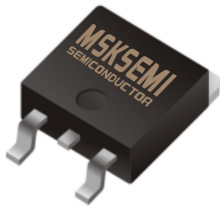
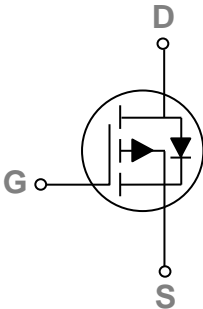

- -40V, -12A, RDS(ON) =34mΩ@VGS = -10V
- Improved dv/dt capability
- Fast switching
- 100% PB free and Green Device Available

Applications

- Motor Drive
- Power Tools
- LED Lighting

BVDSS	RDSON	ID
-40V	34mΩ	-12A

Reference News

PACKAGE OUTLINE	Pin Configuration	Marking
		
TO-252		

Absolute Maximum Ratings Tc=25°C unless otherwise noted

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	-40	V
V _{GS}	Gate-Source Voltage	±20	V
I _D	Drain Current - Continuous (Tc=25°C)	-12	A
	Drain Current - Continuous (Tc=100°C)	-10	A
I _{DM}	Drain Current - Pulsed ¹	-36	A
P _D	Power Dissipation (Tc=25°C)	50	W
	Power Dissipation - Derate above 25°C	0.28	W/°C
T _{STG}	Storage Temperature Range	-50 to 150	°C
T _J	Operating Junction Temperature Range	-50 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction to ambient	---	62	°C/W
R _{θJC}	Thermal Resistance Junction to Case	---	3.6	°C/W

Electrical Characteristics (T_J=25 °C, unless otherwise noted)
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	---	-0.02	---	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 =-10A	---	34	44	mΩ
		V _{GS} =-4.5V , I _D =-5A	---	50	60	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.6	-2.5	V
			---	4.18	---	mV/°C
g _{fs}	Forward Transconductance	V _{DS} =-10V , I _D =-5A	---	7	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{3, 4}	V _{DS} =-20V , V _{GS} =-4.5V , I _D =-5A	---	7.6	---	nC
Q _{gs}	Gate-Source Charge ^{3, 4}		---	2.3	---	
Q _{gd}	Gate-Drain Charge ^{3, 4}		---	3.1	---	
T _{d(on)}	Turn-On Delay Time ^{3, 4}	V _{DD} =-20V , V _{GS} =-10V , R _G =6Ω I _D =-1A	---	12	---	ns
T _r	Rise Time ^{3, 4}		---	13.2	---	
T _{d(off)}	Turn-Off Delay Time ^{3, 4}		---	46.8	---	
T _f	Fall Time ^{3, 4}		---	20.4	---	
C _{iss}	Input Capacitance	V _{DS} =-25V , V _{GS} =0V , F=1MHz	---	1076	---	pF
C _{oss}	Output Capacitance		---	83	---	
C _{rss}	Reverse Transfer Capacitance		---	64	---	
R _g	Gate resistance	V _{GS} =0V , V _{DS} =0V , F=1MHz	---	16	---	Ω

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 :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-28.6A., R_G=25Ω, Starting T_J=25°C
3. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
4. Essentially independent of operating temperature

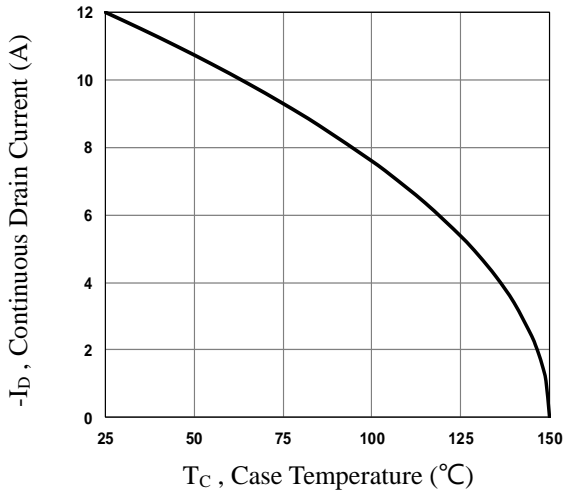


Fig.1 Continuous Drain Current vs. T_C

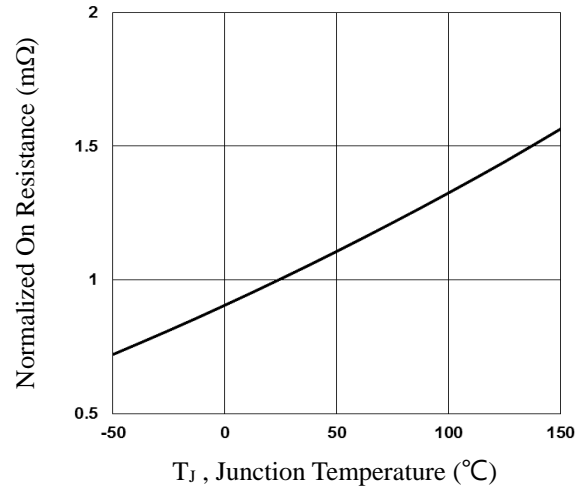


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

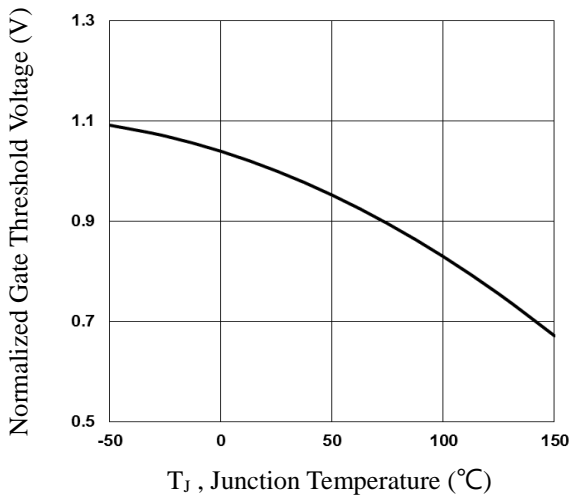


Fig.3 Normalized V_{th} vs. T_J

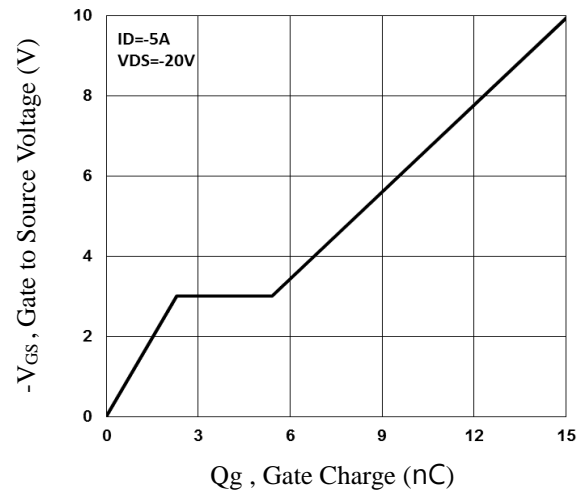


Fig.4 Gate Charge Waveform

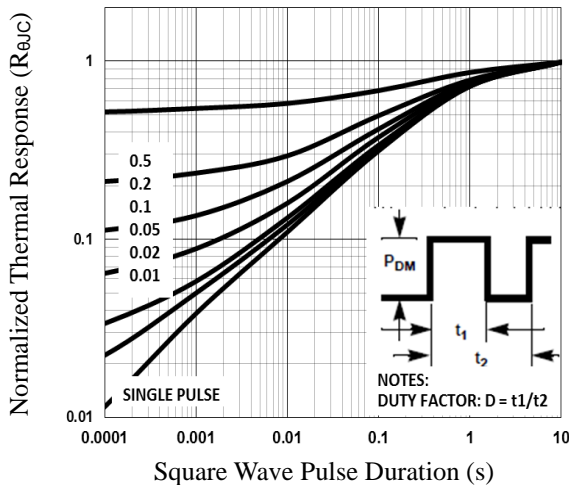


Fig.5 Normalized Transient Impedance

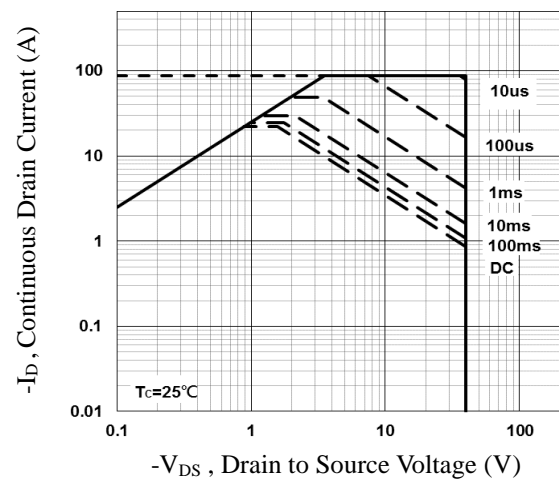


Fig.6 Maximum Safe Operation Area

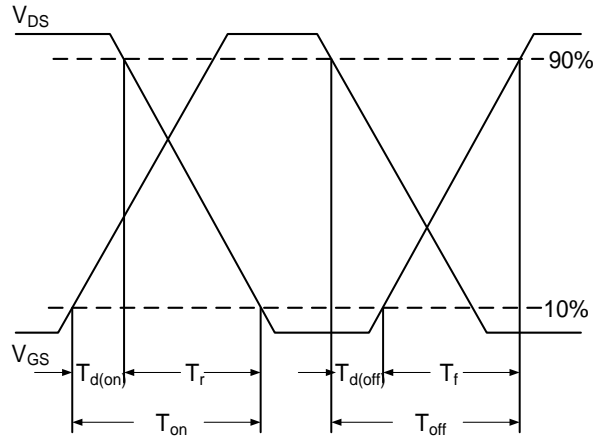
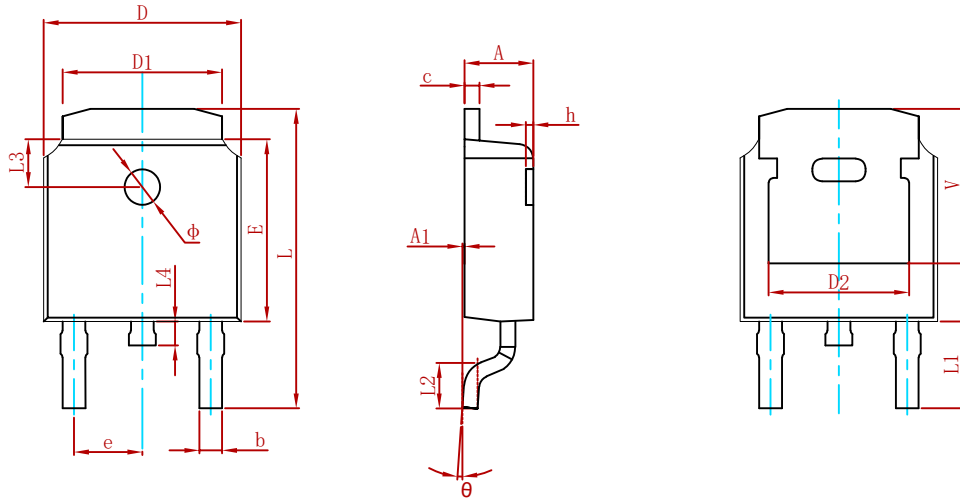


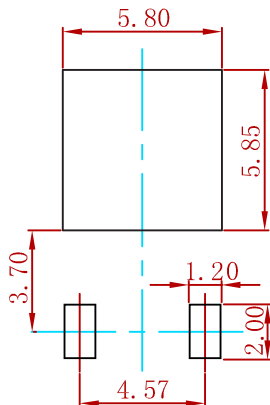
Fig.7 Switching Time Waveform

PACKAGE MECHANICAL DATA



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

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
AOD413A-MS	TO-252	2500

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