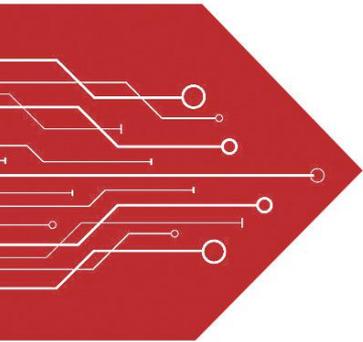


# MSKSEMI

SEMICONDUCTOR



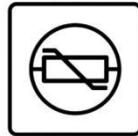
ESD



TVS



TSS



MOV

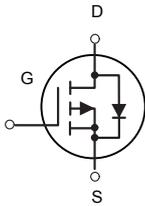


GDT



PLED

Product data sheet



P-Channel MOSFET

TO-252

**Description**

The AOD417-MS uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

**General Features**

$V_{DS} = -30V$   $I_D = -40A$

$R_{DS(ON)} < 20m\Omega @ V_{GS}=10V$

**Application**

- Battery protection
- Load switch
- Uninterruptible power supply

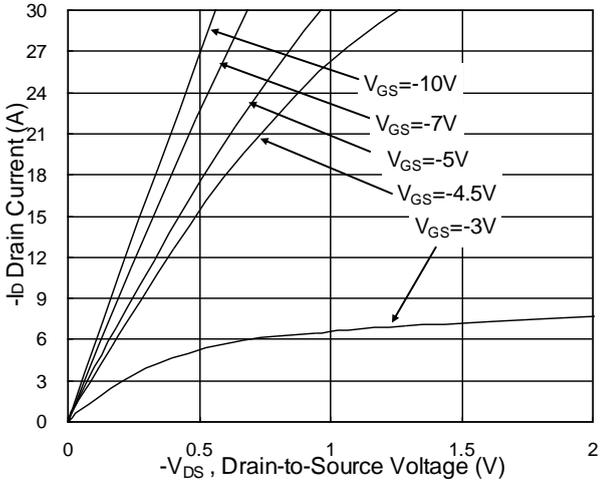
**Absolute Maximum Ratings ( $T_C=25^\circ C$  unless otherwise noted)**

Symbol	Parameter	Rating		Units
		10s	Steady State	
$V_{DS}$	Drain-Source Voltage	-30		V
$V_{GS}$	Gate-Source Voltage	$\pm 20$		V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-40		A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-22		A
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-13.4	-8.5	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-10.7	-6.8	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	-70		A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	72.2		mJ
$I_{AS}$	Avalanche Current	-38		A
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	34.7		W
$P_D@T_A=25^\circ C$	Total Power Dissipation <sup>4</sup>	5	2	W
$T_{STG}$	Storage Temperature Range	-55 to 150		$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150		$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	62		$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup> ( $t \leq 10s$ )	25		$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	3.6		$^\circ C/W$

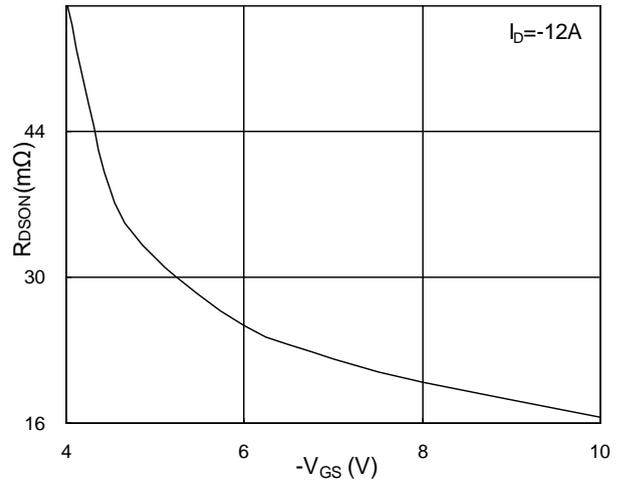
**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

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	---	-0.022	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V , I <sub>D</sub> =-15A	---	18	20	mΩ
		V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-10A	---	25	32	
V <sub>GS(th)</sub>	Gate Threshold Voltage		-1.0	---	-2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	---	4.6	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-24V , 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> =55°C	---	---	-5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =± 20V , V <sub>DS</sub> =0V	---	---	± 100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-5V , I <sub>D</sub> =-10A	---	5	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz	---	13	---	Ω
Q <sub>g</sub>	Total Gate Charge (-4.5V)		---	12.5	---	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =-15V , V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-15A	---	5.4	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	5	---	
T <sub>d(on)</sub>	Turn-On Delay Time		---	4.4	---	ns
T <sub>r</sub>	Rise Time	V <sub>DD</sub> =-15V , V <sub>GS</sub> =-10V , R <sub>G</sub> =3.3 Ω ,	---	11.2	---	
T <sub>d(off)</sub>	Turn-Off Delay Time	I <sub>D</sub> =-15A	---	34	---	
T <sub>f</sub>	Fall Time		---	18	---	
C <sub>iss</sub>	Input Capacitance		---	1345	---	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =-15V , V <sub>GS</sub> =0V , f=1MHz	---	194	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	158	---	
I <sub>s</sub>	Continuous Source Current <sup>1,5</sup>		---	---	-35	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	-70	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V , I <sub>s</sub> =-1A , T <sub>J</sub> =25°C	---	---	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =-15A , dI/dt=100A/μs , T <sub>J</sub> =25°C	---	12.4	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	5	---	nC

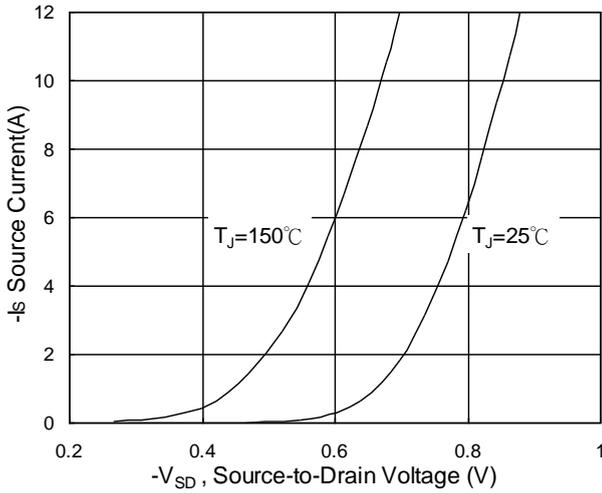
**Typical Characteristics**



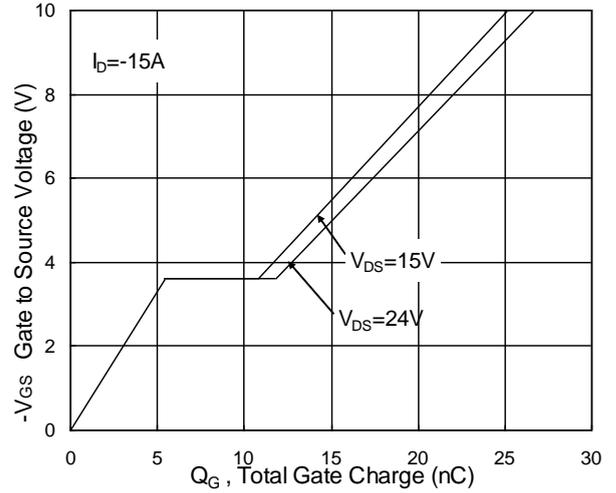
**Fig.1 Typical Output Characteristics**



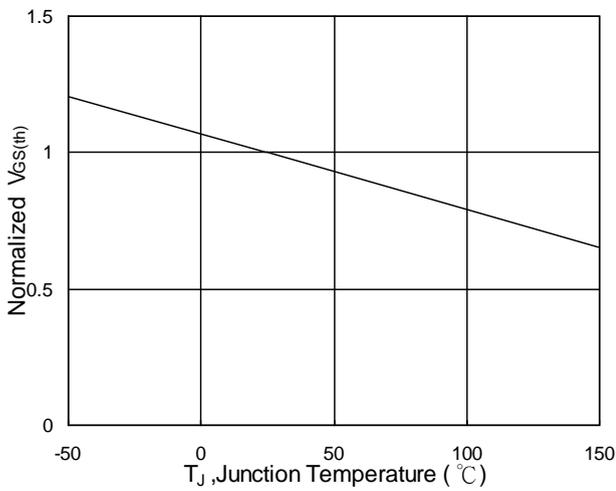
**Fig.2 On-Resistance v.s Gate-Source**



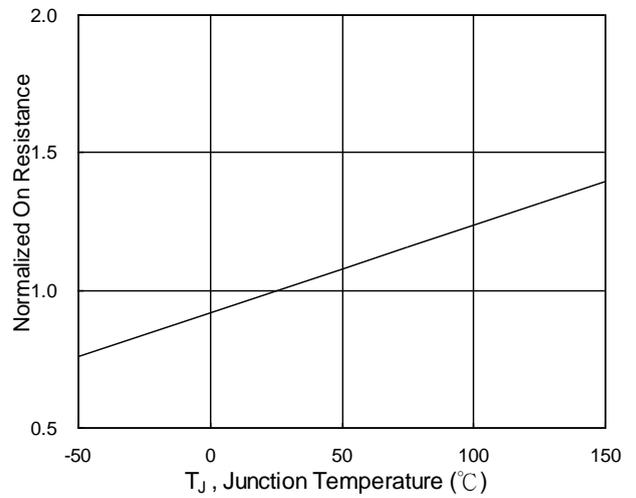
**Fig.3 Forward Characteristics of Reverse**



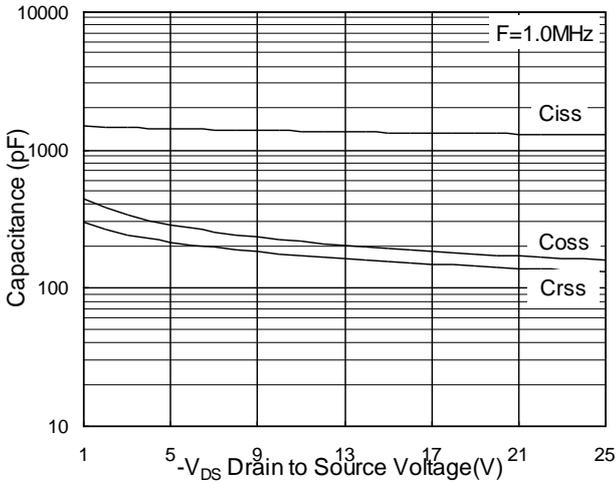
**Fig.4 Gate-Charge Characteristics**



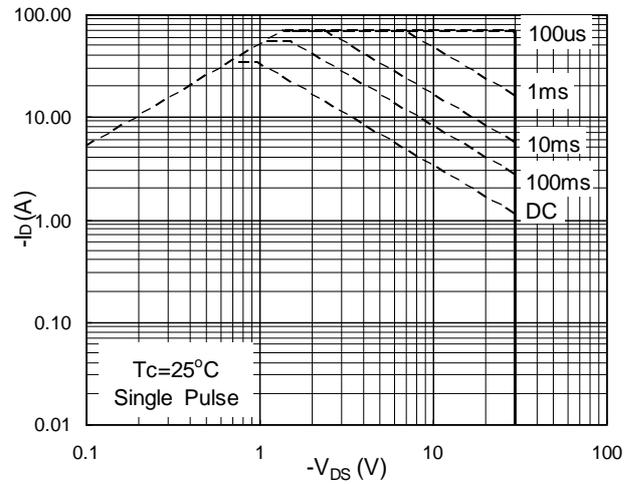
**Fig.5 Normalized V<sub>GS(th)</sub> v.s T<sub>J</sub>**



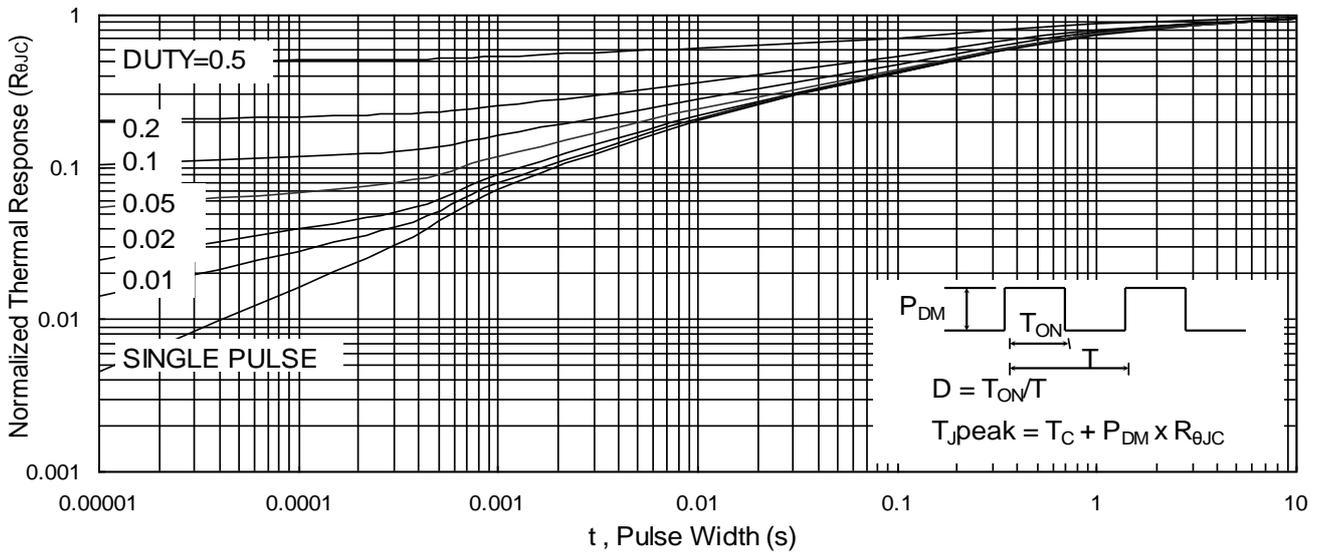
**Fig.6 Normalized R<sub>DSon</sub> v.s T<sub>J</sub>**



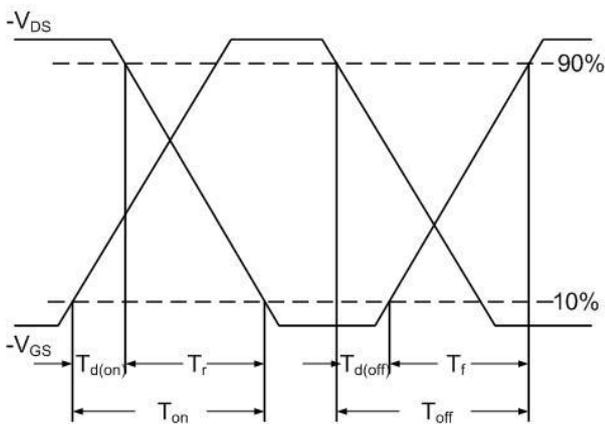
**Fig.7 Capacitance**



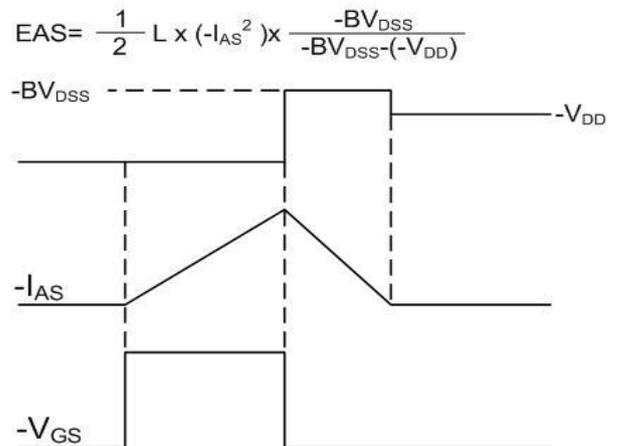
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

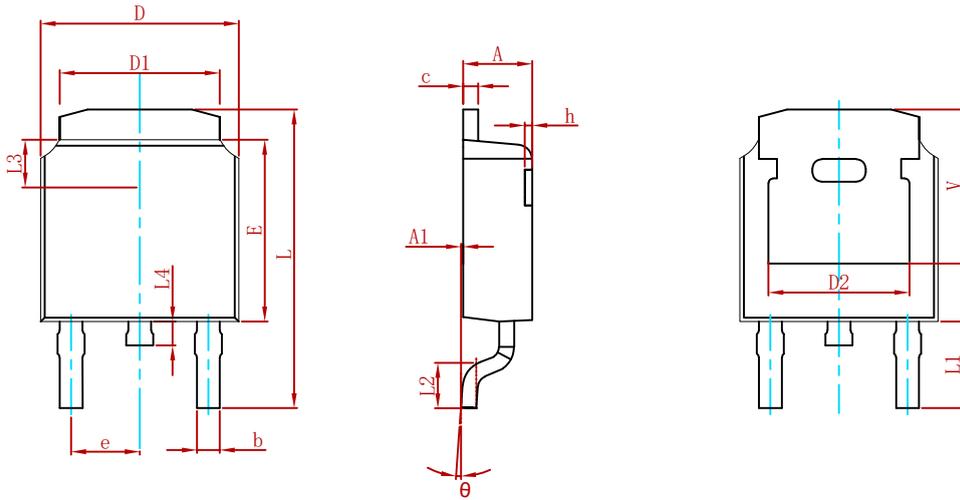


**Fig.10 Switching Time Waveform**



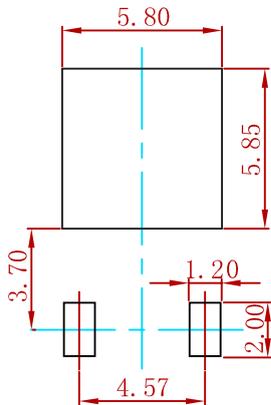
**Fig.11 Unclamped Inductive Switching Waveform**

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

**REEL SPECIFICATION**

P/N	PKG	QTY
AOD417-MS	TO-252	2500

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