

# EVVOSEMI<sup>®</sup>

THINK CHANGE DO



ESD



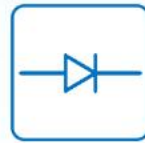
TVS



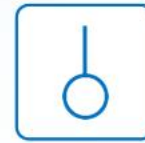
MOS



LDO



Diode



Sensor



DC-DC

## Product Specification

▶ Domestic	Part Number	AO4406A
▶ Overseas	Part Number	AO4406A
▶ Equivalent	Part Number	AO4406A

EV is the abbreviation of name EVVO

## 30V N-Channel Enhancement Mode MOSFET

### Description

The AO4406A 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

$V_{DS} = 30V$   $I_D = 12A$

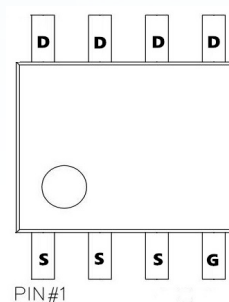
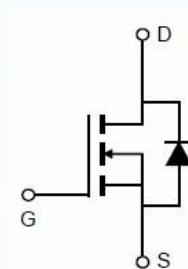
$R_{DS(ON)} < 13m\Omega$  @  $V_{GS} = 10V$

### Application

Battery protection

Load switch

Uninterruptible power supply



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	12	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	8	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	30	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	20	mJ
$I_{AS}$	Avalanche Current	22	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation <sup>4</sup>	4.5	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>	50	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	30	$^\circ C/W$

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### 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>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.027	---	V/°C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	---	10	13	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A	---	12	16	
V <sub>GS(th)</sub>	Gate Threshold Voltage		1.2	1.5	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	---	-5.8	---	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	---	5.8	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	2.2	3.8	
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	---	12.6	17.6	nC
Q <sub>gs</sub>	Gate-Source Charge		---	4.2	5.9	
Q <sub>gd</sub>	Gate-Drain Charge		---	5.1	7.1	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3 I <sub>D</sub> =10A	---	6.2	12.4	ns
T <sub>r</sub>	Rise Time		---	59	106	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	27.6	55	
T <sub>f</sub>	Fall Time		---	8.4	16.8	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	---	960	---	pF
C <sub>oss</sub>	Output Capacitance		---	139	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	87	---	
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	10.3	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	42	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> =10A, di/dt=100A/μs T <sub>J</sub> =25°C	---	12.5	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	5	---	nC

Note :

- 1 .The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3 .The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=35A
- 4.The power dissipation is limited by 150°C junction temperature 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

30V N-Channel Enhancement Mode MOSFET

Typical Characteristics

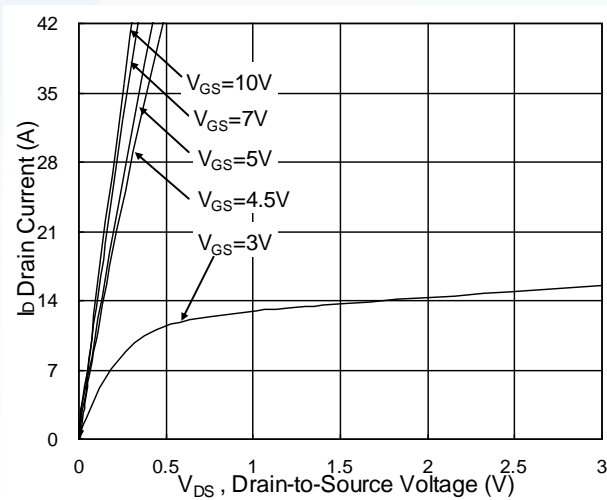


Fig.1 Typical Output Characteristics

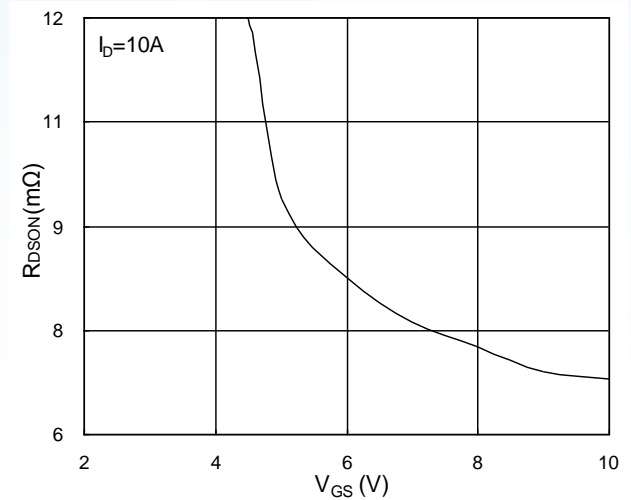


Fig.2 On-Resistance vs. Gate-Source

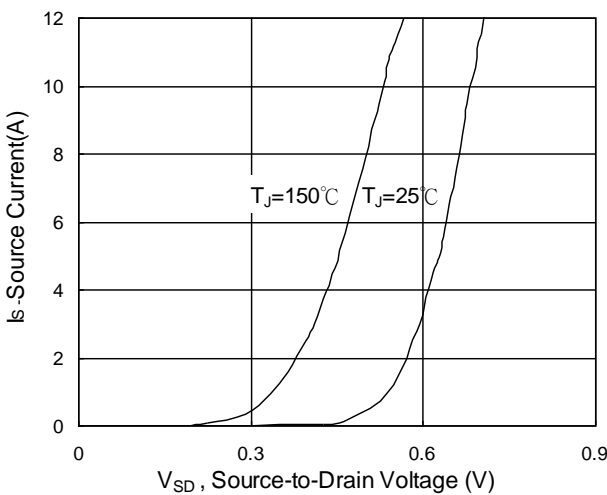


Fig.3 Forward Characteristics of reverse

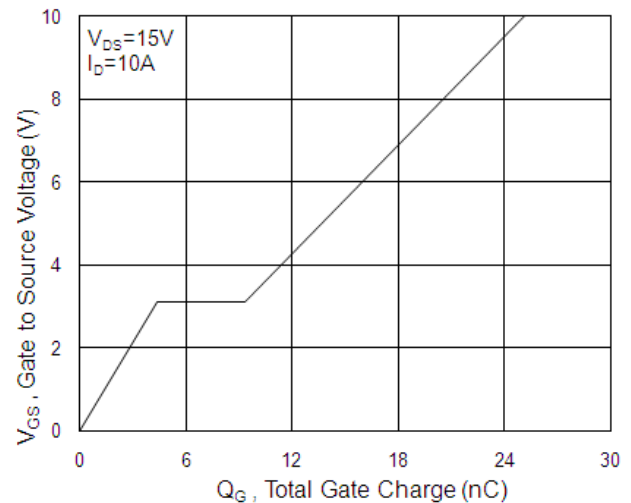


Fig.4 Gate-Charge Characteristics

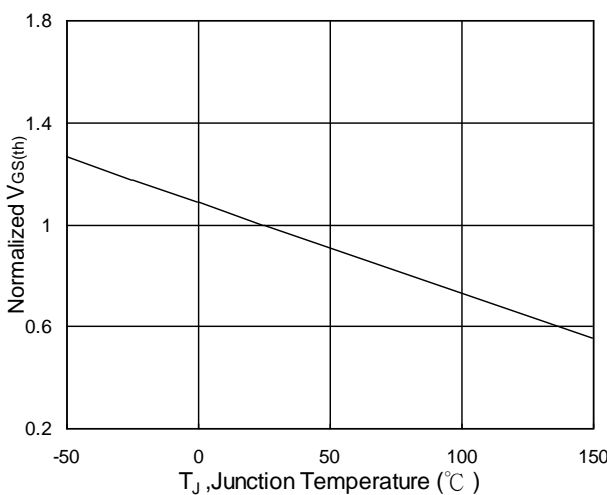


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

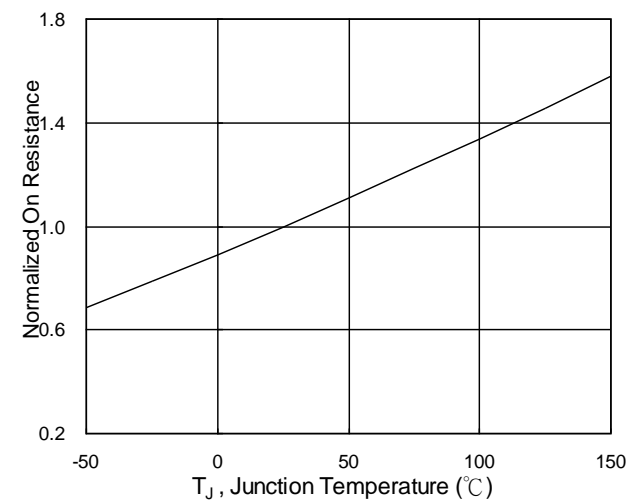


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

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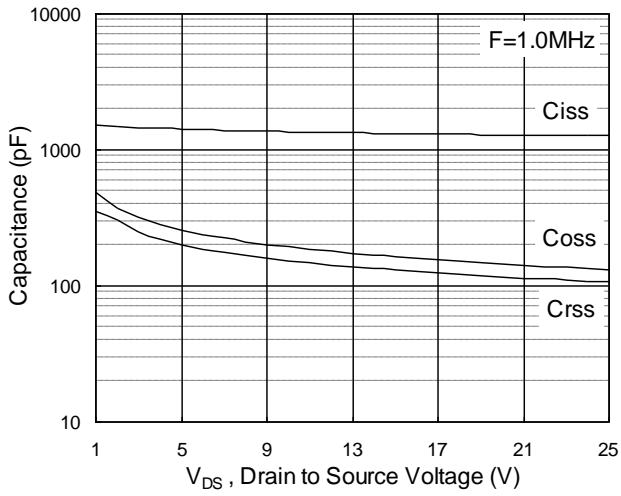


Fig.7 Capacitance

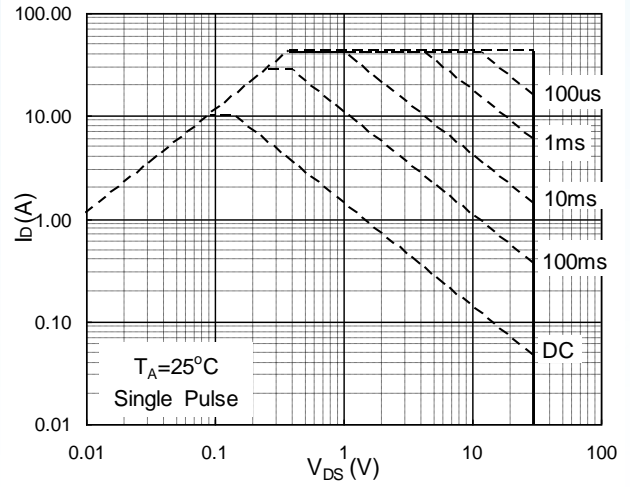


Fig.8 Safe Operating Area

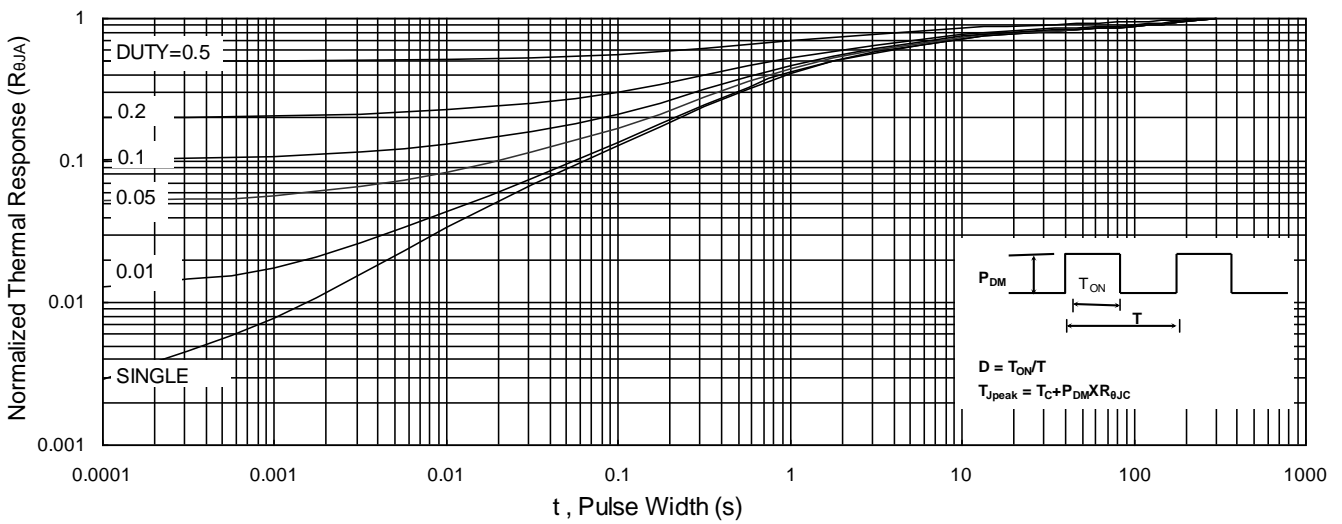


Fig.9 Normalized Maximum Transient Thermal Impedance

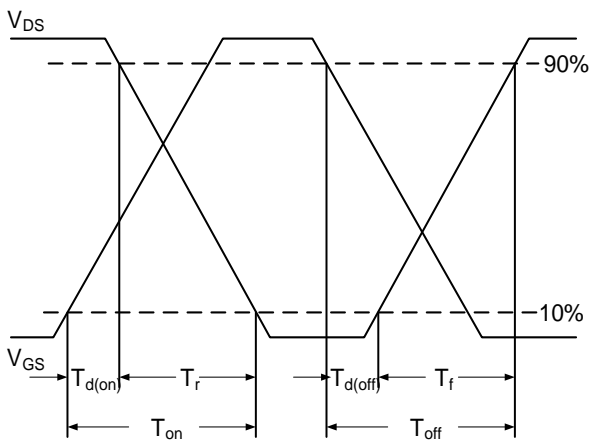


Fig.10 Switching Time Waveform

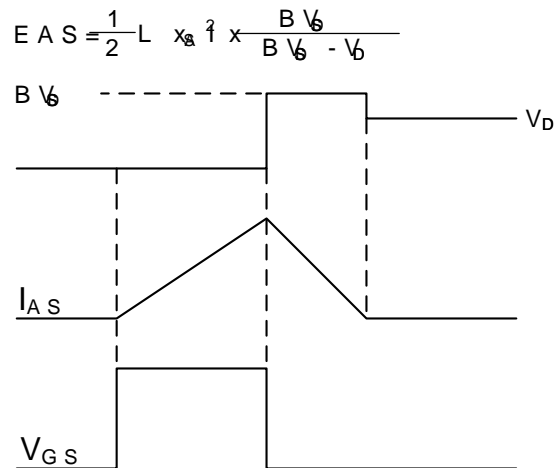
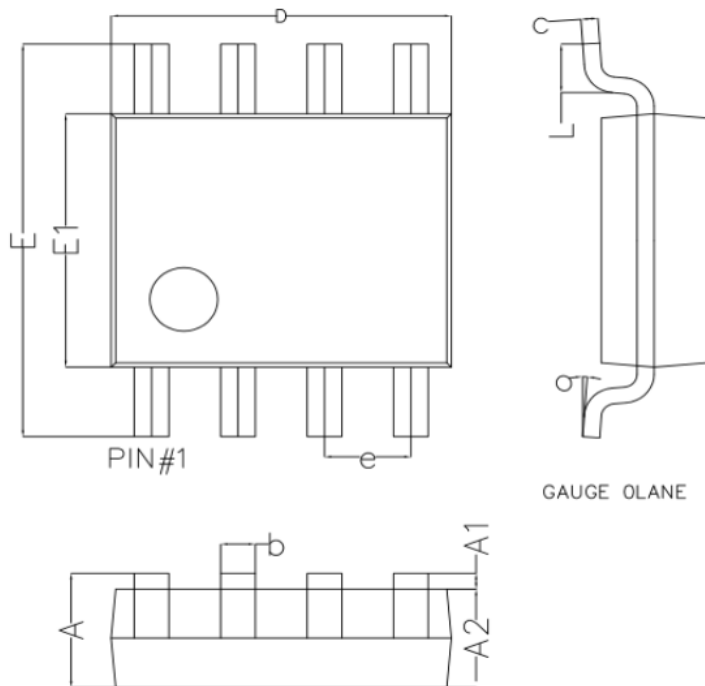


Fig.11 Unclamped Inductive Switching Waveform

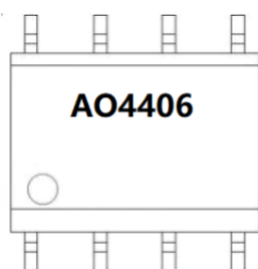
### 30V N-Channel Enhancement Mode MOSFET

#### SOP8 Package outline



Symbol	Dim in mm		
	Min	Nor	Max
A	1.350	1.550	1.750
A1	0.100	0.175	0.250
A2	1.350	1.450	1.550
b	0.330	0.420	0.510
c	0.170	0.210	0.250
D	4.800	4.900	5.000
e	1.270 (BSC)		
E	5.800	6.000	6.200
E1	3.800	3.900	4.000
L	0.400	0.835	1.2700
o	0°	4°	8°

#### Marking



#### Ordering information

Order code	Package	Baseqty	Deliverymode
AO4406A	SOP-8	3000	Tape and reel



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