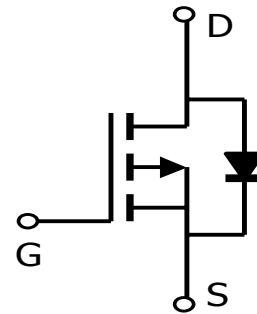


### General Description

The AO4409 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , and ultra-low low gate charge. This device is suitable for use as a load switch or in PWM applications.



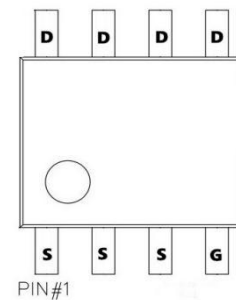
### Features

$V_{DS}$  (V) = -30V

$I_D$  = -15 A

Max  $R_{DS(ON)}$  < 7.5m $\Omega$  ( $V_{GS}$  = -10V)

Max  $R_{DS(ON)}$  < 12m $\Omega$  ( $V_{GS}$  = -4.5V)



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ\text{C}$	-15	A
	$T_A=70^\circ\text{C}$	-12.8	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	-80	
Power Dissipation <sup>A</sup>	$T_A=25^\circ\text{C}$	3	W
	$T_A=70^\circ\text{C}$	2.1	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	26	40	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	50	75
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	14	24	$^\circ\text{C}/\text{W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			-5 -25	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =-250μA	-1.4	-1.9	-2.7	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	80			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-15A V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A		6.2 9.5	7.5 12	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-15A	35	50		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.71	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-5	A
C <sub>ISS</sub>	Input Capacitance			5270		pF
C <sub>OSS</sub>	Output Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz		945		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			745		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		2		Ω
Q <sub>g</sub>	Total Gate Charge			100		nC
Q <sub>g(4.5V)</sub>	Gate Charge	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-15A		51.5		nC
Q <sub>gs</sub>	Gate Source Charge			14.5		nC
Q <sub>gd</sub>	Gate Drain Charge			23		nC
t <sub>D(on)</sub>	Turn-On DelayTime			14		ns
t <sub>r</sub>	Turn-On Rise Time	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =1Ω, R <sub>GEN</sub> =3Ω		16.5		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			76.5		ns
t <sub>f</sub>	Turn-Off Fall Time			37.5		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-15A, di/dt=100A/μs		36.7		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-15A, di/dt=100A/μs		28		nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The value in any a given application depends on the user's specific board design. The current rating is based on the t<sub>s</sub> ≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The R<sub>θJA</sub> is the sum of the thermal impedence from junction to lead R<sub>θJL</sub> and lead to ambient.

D. The static characteristics in Figures 1 to 6,12,14 are obtained using 80μs pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

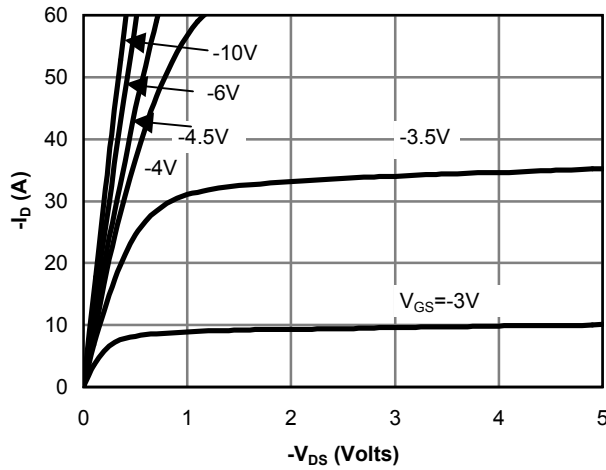


Fig 1: On-Region Characteristics

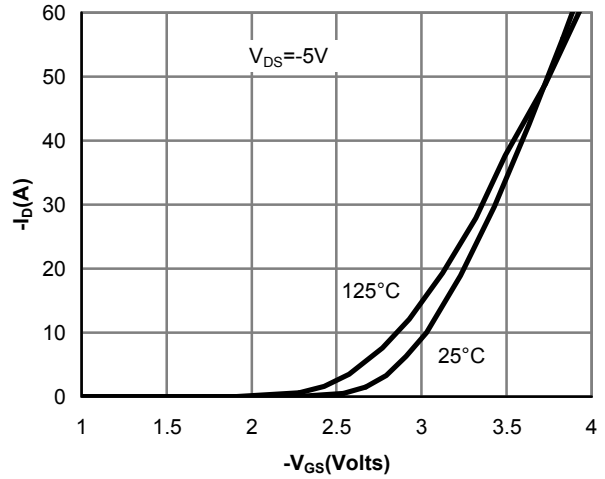


Figure 2: Transfer Characteristics

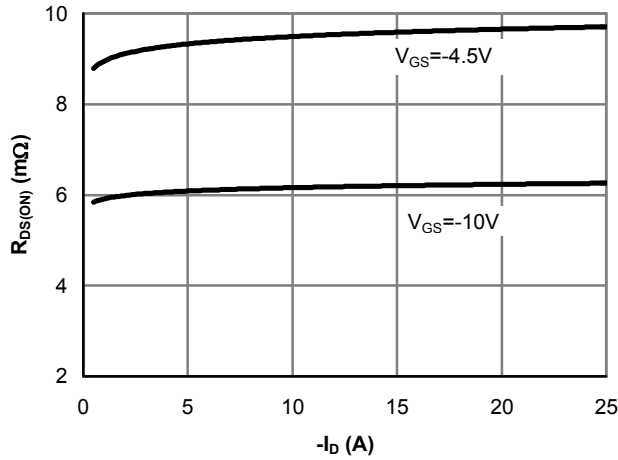


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

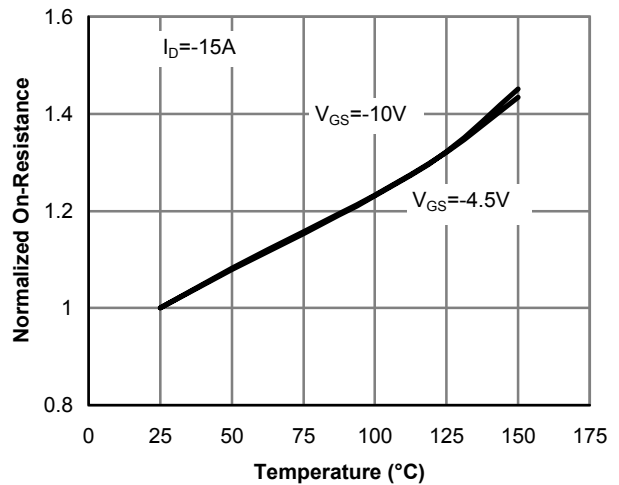


Figure 4: On-Resistance vs. Junction Temperature

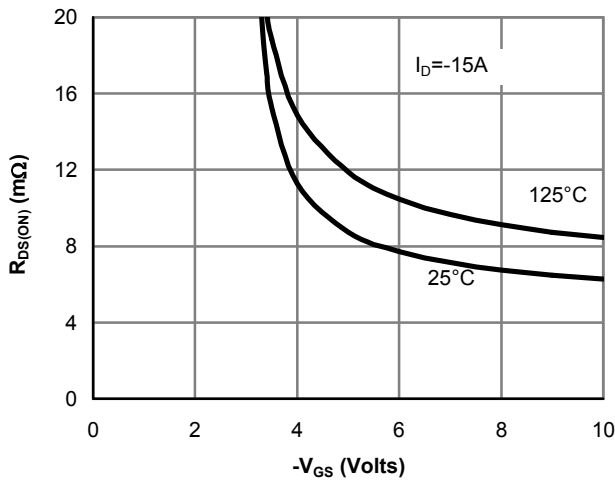


Figure 5: On-Resistance vs. Gate-Source Voltage

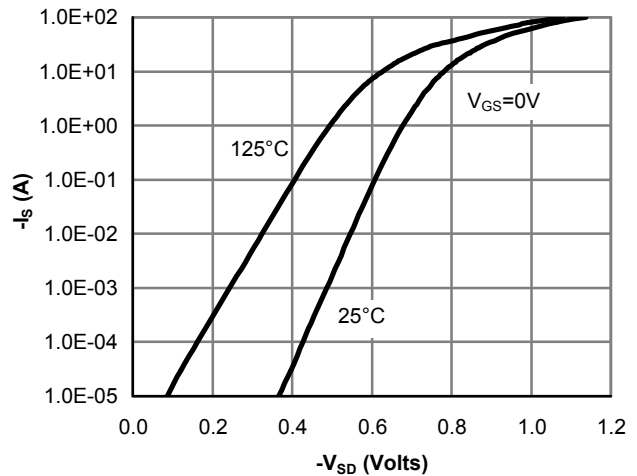


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

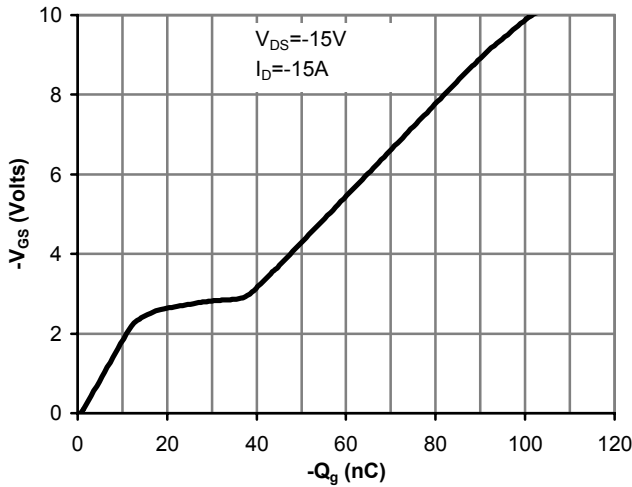


Figure 7: Gate-Charge Characteristics

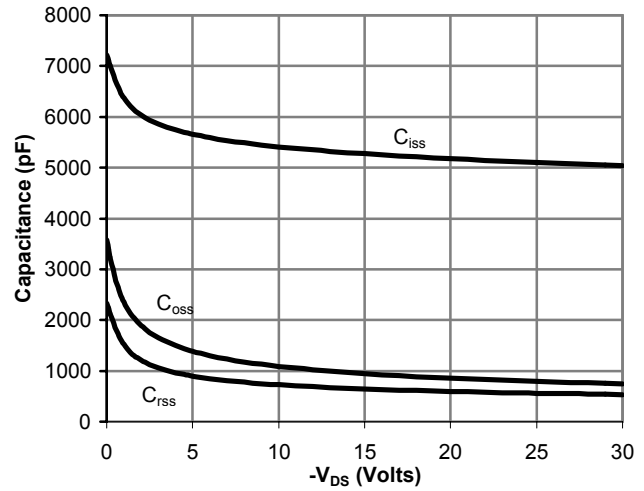


Figure 8: Capacitance Characteristics

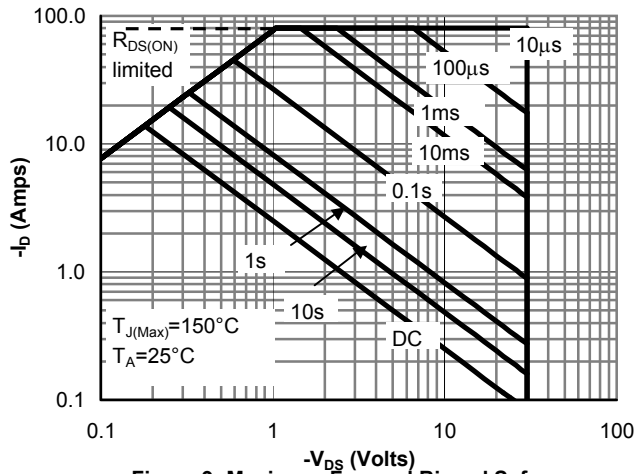


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

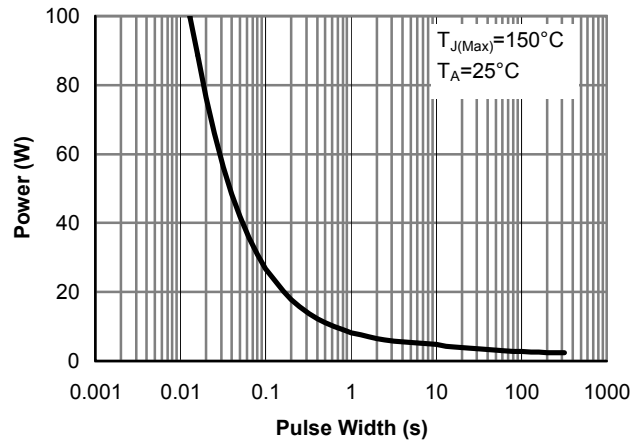


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

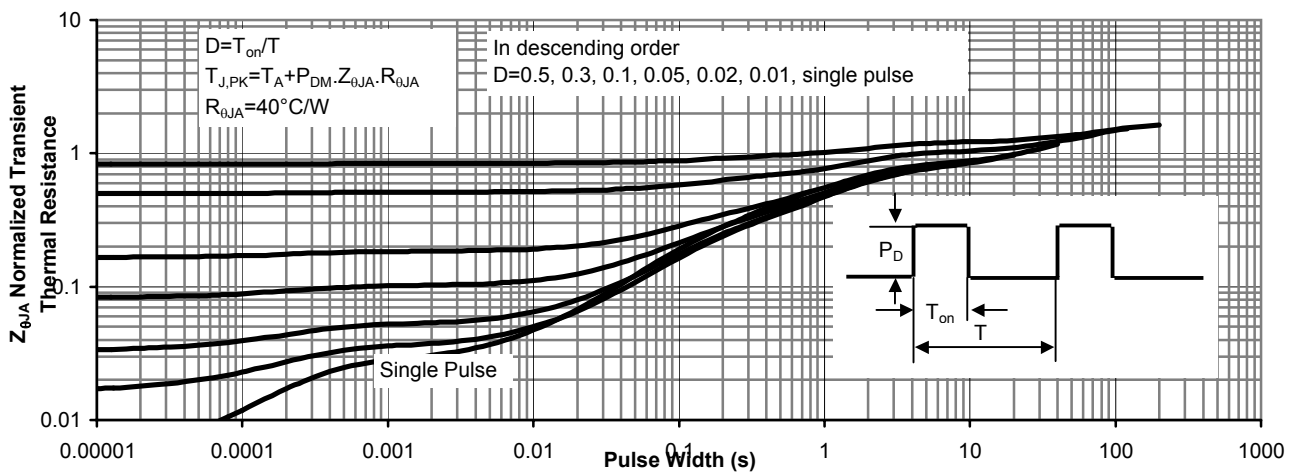
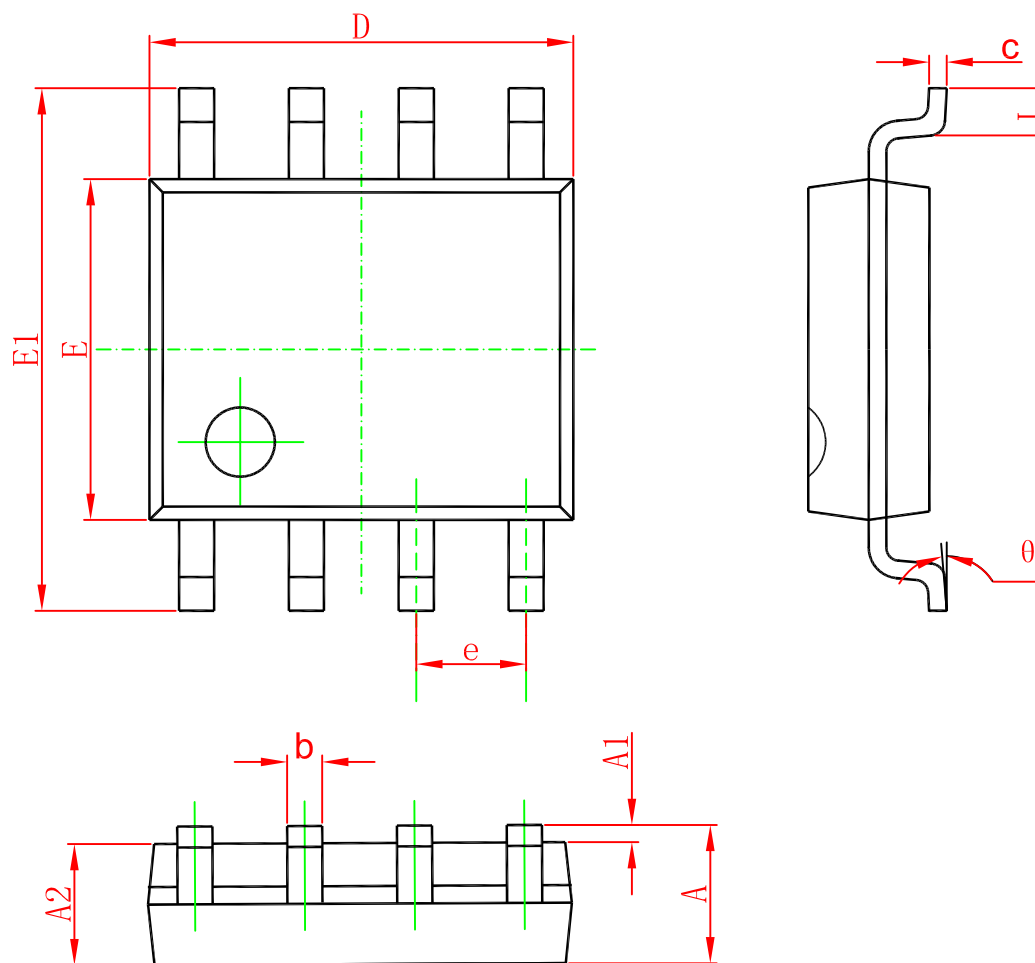


Figure 11: Normalized Maximum Transient Thermal Impedance

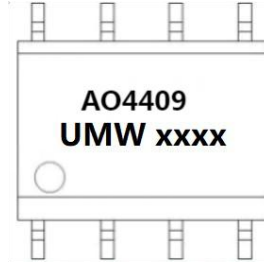
PACKAGE OUTLINE DIMENSIONS

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
$\theta$	0°	8°	0°	8°

**Marking**



("xxxx"代表年份周期)

**Ordering information**

Order code	Package	Baseqty	Deliverymode
UMW AO4409	SOP-8	3000	Tape and reel