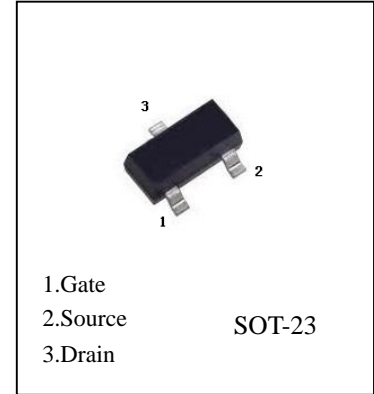
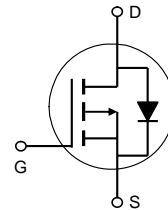


FEATURES

- The AO3409 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. This device is suitable for use as a load switch or in PWM applications.

**AO3409**

P-Channel MOSFET



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

Parameter	Symbol	Maximum	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_A=25^{\circ}\text{C}$	-2.6
		$T_A=70^{\circ}\text{C}$	-2.2
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	-20	A
Power Dissipation <sup>B</sup>	$P_D$	$T_A=25^{\circ}\text{C}$	1.4
		$T_A=70^{\circ}\text{C}$	1
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit	
Maximum Junction-to-Ambient <sup>A</sup>	$R_{JA}$	t 10s	70	90	$^{\circ}\text{C/W}$
Maximum Junction-to-Ambient <sup>A,D</sup>			Steady-State	100	125
Maximum Junction-to-Lead	$R_{JL}$	Steady-State	63	80	$^{\circ}\text{C/W}$

## AO3409

Electrical Characteristics (TA=25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =-250 A, V <sub>GS</sub> =0V	-30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V			-1	uA
		T <sub>J</sub> =55°C			-5	
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> =-250 A	-1.4	-1.9	-2.4	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-20			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-2.6A		77	110	m
		T <sub>J</sub> =125°C		100	140	
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2A		125	180	m
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-2.6A		5		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.8	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-1.5	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz		197	240	pF
C <sub>oss</sub>	Output Capacitance			42		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			26	37	pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	3.5	7.2	11.0	
<b>SWITCHING PARAMETERS</b>						
Q <sub>g(10V)</sub>	Total Gate Charge	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-2.6A		4.3	5.2	nC
Q <sub>g(4.5V)</sub>	Total Gate Charge			2.2	3	nC
Q <sub>gs</sub>	Gate Source Charge			0.7		nC
Q <sub>gd</sub>	Gate Drain Charge			1.1		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =5.8 Ω, R <sub>GEN</sub> =3		7.5		ns
t <sub>r</sub>	Turn-On Rise Time			4.1		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			11.8		ns
t <sub>f</sub>	Turn-Off Fall Time			3.8		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-2.6A, dI/dt=100A/ us		11.3	14	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-2.6A, dI/dt=100A/ us		4.4		nC

A. The value of R<sub>JA</sub> is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C. The value in any given application depends on the user's specific board design.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150° C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25°C.

D. The R<sub>JA</sub> is the sum of the thermal impedance from junction to lead R<sub>JL</sub> and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

**AO3409** Typical Characteristics

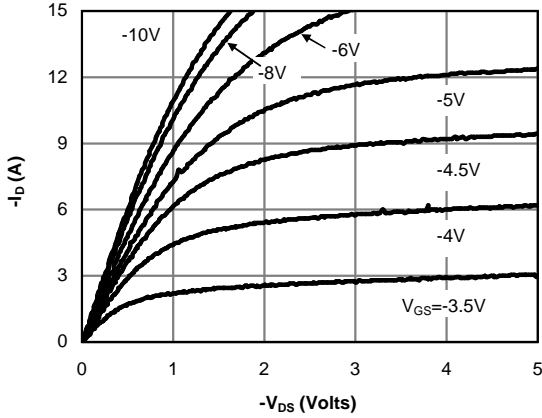


Fig 1: On-Region Characteristics (Note E)

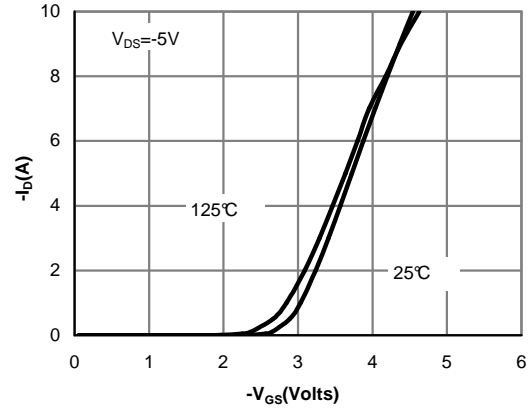


Figure 2: Transfer Characteristics (Note E)

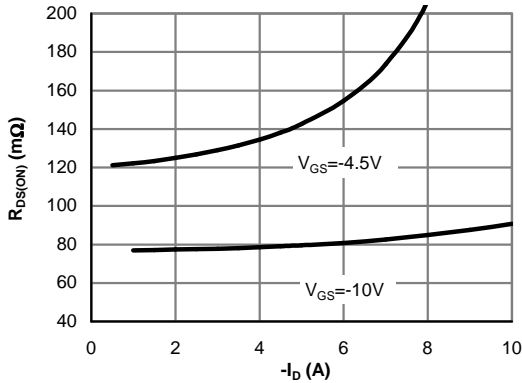


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

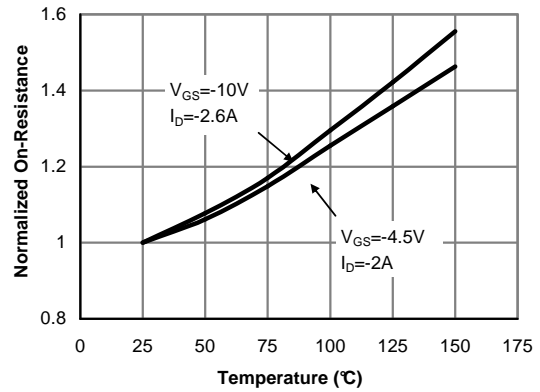


Figure 4: On-Resistance vs. Junction Temperature (Note E)

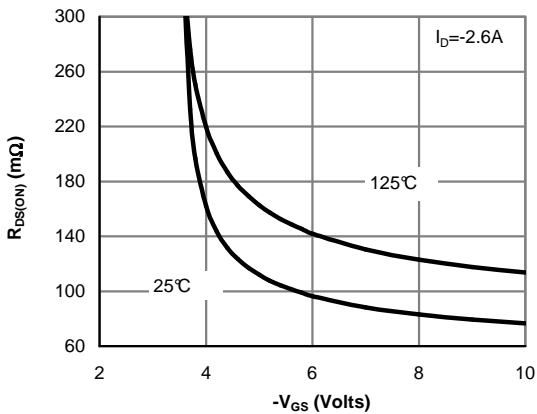


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

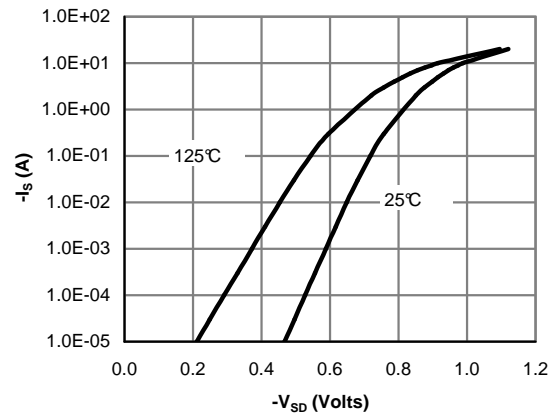


Figure 6: Body-Diode Characteristics (Note E)

**AO3409** Typical Characteristics

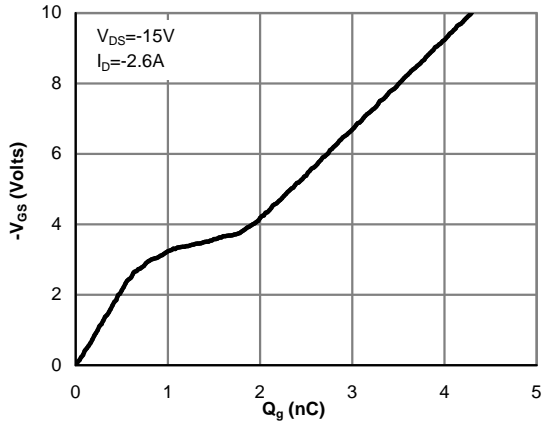


Figure 7: Gate-Charge Characteristics

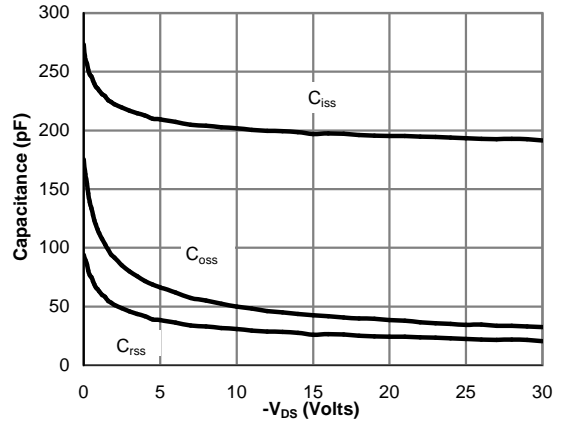


Figure 8: Capacitance Characteristics

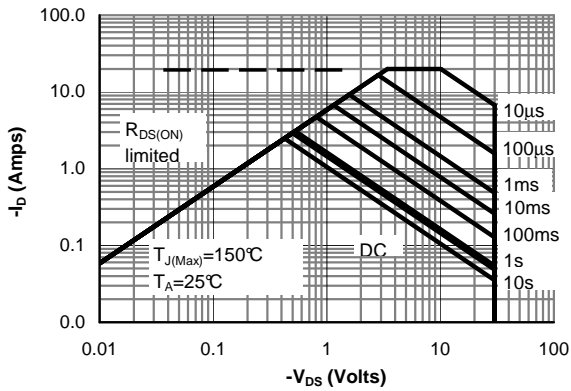


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

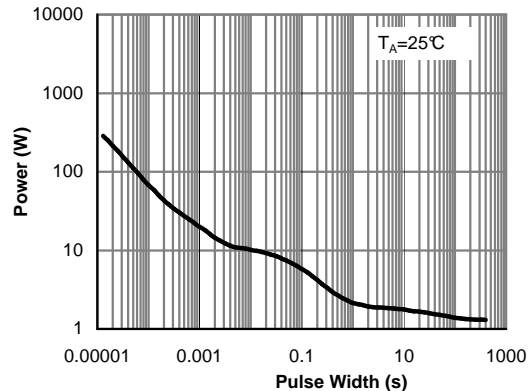


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

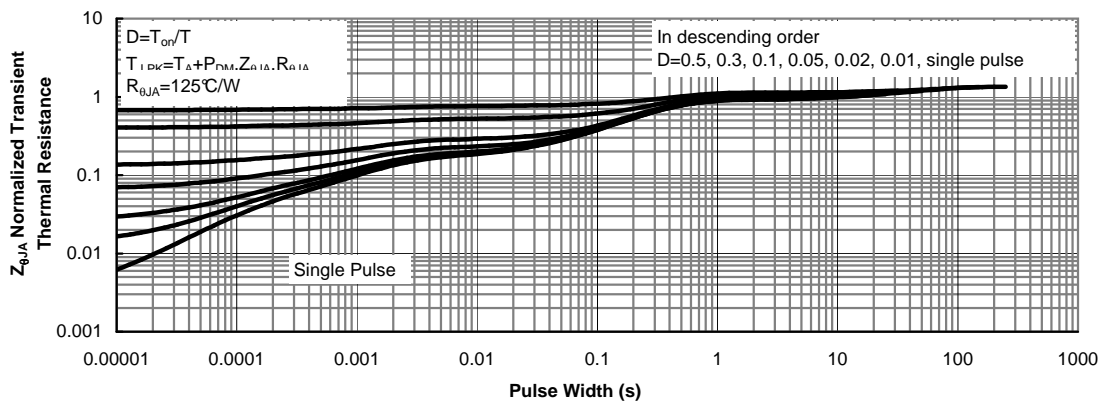


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)