

## General Description

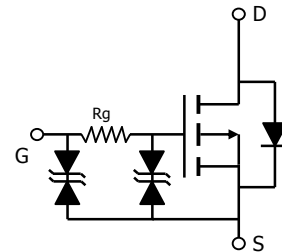
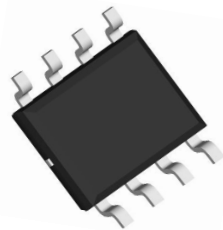
The AO4447A uses advanced trench technology to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is ideal for load switch and battery protection applications.

## Features

$V_{DS}$  (V) = -30V  
 $I_D$  = -17A ( $V_{GS}$  = -10V)  
 $R_{DS(ON)}$  < 7m $\Omega$  ( $V_{GS}$  = -10V)  
 $R_{DS(ON)}$  < 8m $\Omega$  ( $V_{GS}$  = -4.5V)  
 $R_{DS(ON)}$  < 9m $\Omega$  ( $V_{GS}$  = -4V)



SOIC-8



### Absolute Maximum Ratings $T_J=25^\circ\text{C}$ 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	$I_D$	$T_A=25^\circ\text{C}$	A
Current		$T_A=70^\circ\text{C}$	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	-160	
Power Dissipation <sup>B</sup>	$P_D$	$T_A=25^\circ\text{C}$	W
		$T_A=70^\circ\text{C}$	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	31	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>AD</sup>				
Maximum Junction-to-Lead	$R_{\theta JL}$	16	24	$^\circ\text{C/W}$

**Electrical Characteristics (T<sub>J</sub>=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> = -250μA, 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 T <sub>J</sub> = 55°C			-1 -5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±16V			±10	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-0.8	-1.3	-1.6	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -5V	-160			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = -10V, I <sub>D</sub> = -17A T <sub>J</sub> = 125°C		5.5 7	7 8.5	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -15A		6.5	8	
		V <sub>GS</sub> = -4V, I <sub>D</sub> = -13A		6.9	9	
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = -5V, I <sub>D</sub> = -17A		70		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> = -1A, V <sub>GS</sub> = 0V		-0.62	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-3	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = -15V, f = 1MHz		4580	5500	pF
C <sub>oss</sub>	Output Capacitance		755		pF	
C <sub>rss</sub>	Reverse Transfer Capacitance		564		pF	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1MHz		160	210	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (-10V)	Total Gate Charge	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -15V, I <sub>D</sub> = -17A		87	105	nC
Q <sub>g</sub> (-4.5V)	Total Gate Charge		41		nC	
Q <sub>gs</sub>	Gate Source Charge		12.8		nC	
Q <sub>gd</sub>	Gate Drain Charge		17		nC	
t <sub>D(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -15V R <sub>L</sub> = -0.9Ω, R <sub>GEN</sub> = 3Ω		180		ns
t <sub>r</sub>	Turn-On Rise Time		260		ns	
t <sub>D(off)</sub>	Turn-Off Delay Time		1.2		μs	
t <sub>f</sub>	Turn-Off Fall Time		9.7		μs	
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> = -17A, dI/dt = 300A/μs		32	40	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> = -17A, dI/dt = 300A/μs		77		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 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>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</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 1in<sup>2</sup> 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.

Rev 1: Nov. 2010

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

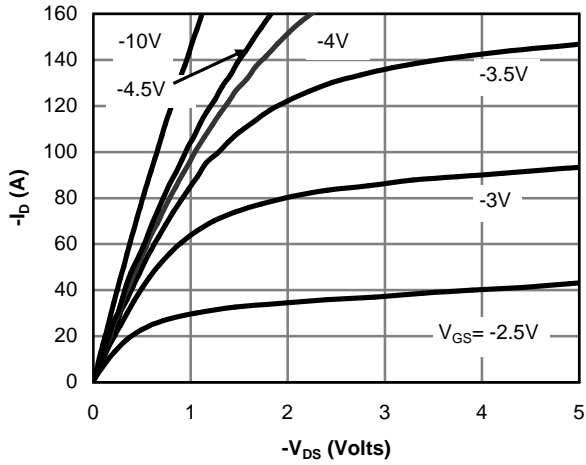


Figure 1: On-Region Characteristics(Note E)

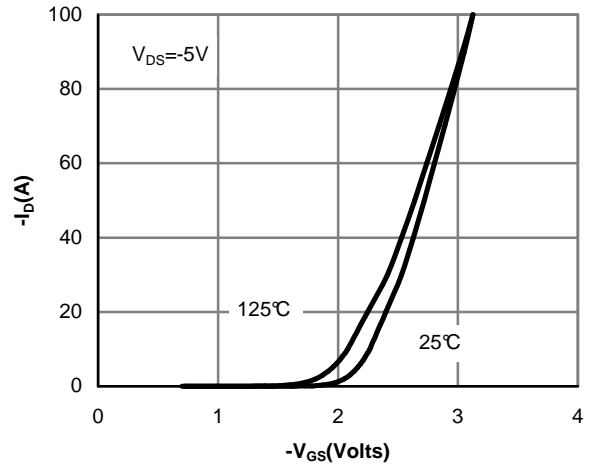


Figure 2: Transfer Characteristics(Note E)

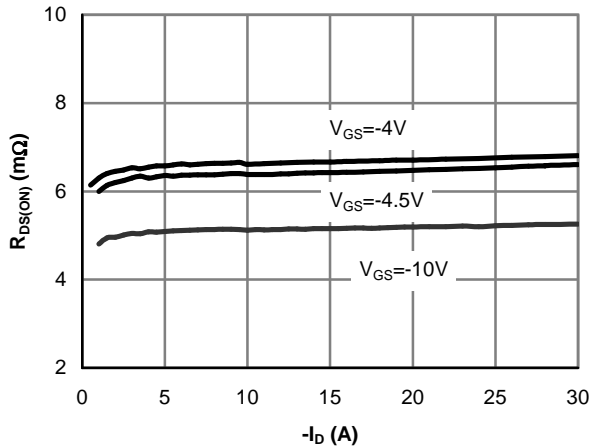


Figure 3: On-Resistance vs. Drain Current and Gate Voltage(Note E)

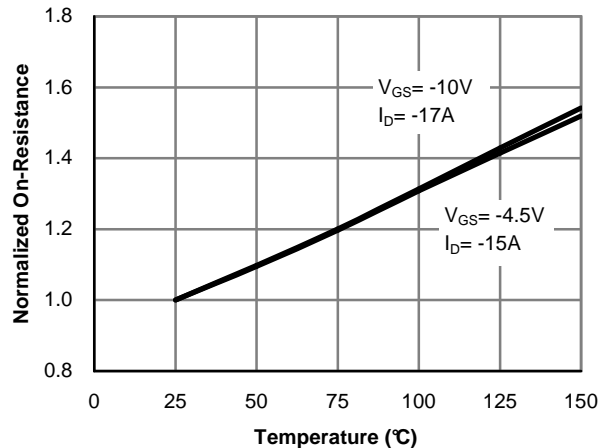


Figure 4: On-Resistance vs. Junction Temperature(Note E)

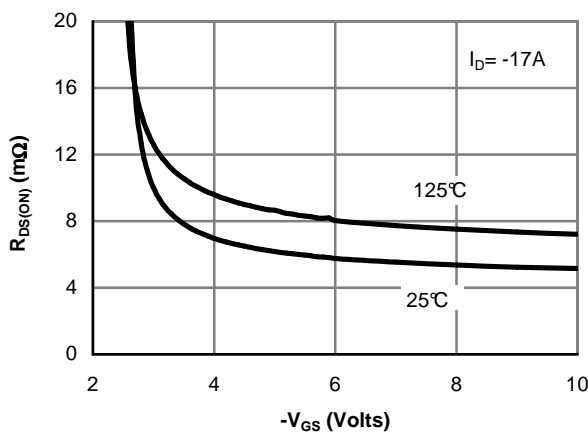


Figure 5: On-Resistance vs. Gate-Source Voltage(Note E)

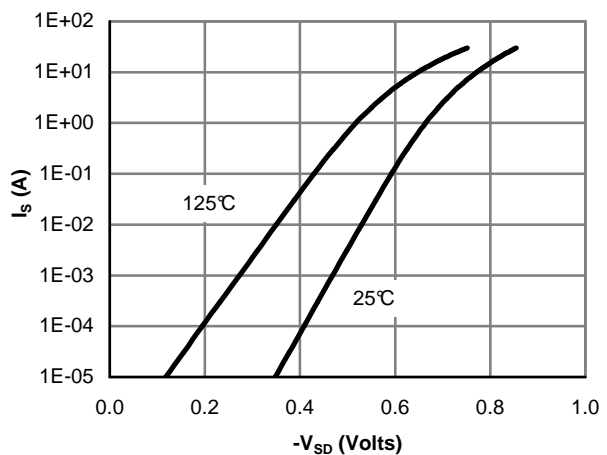
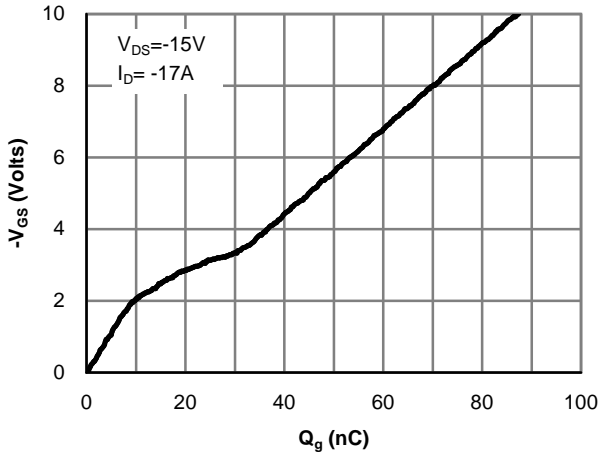
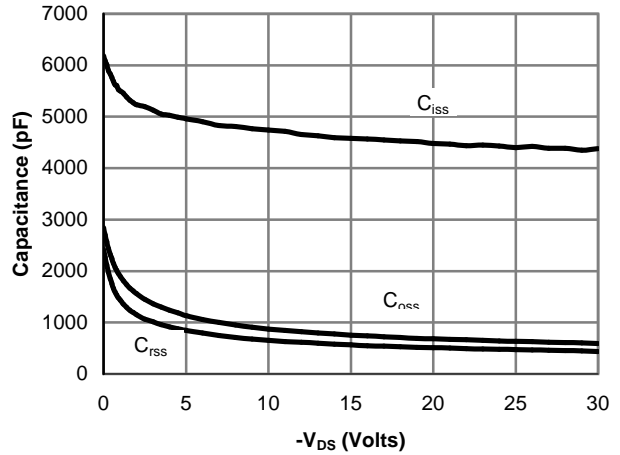


Figure 6: Body-Diode Characteristics(Note E)

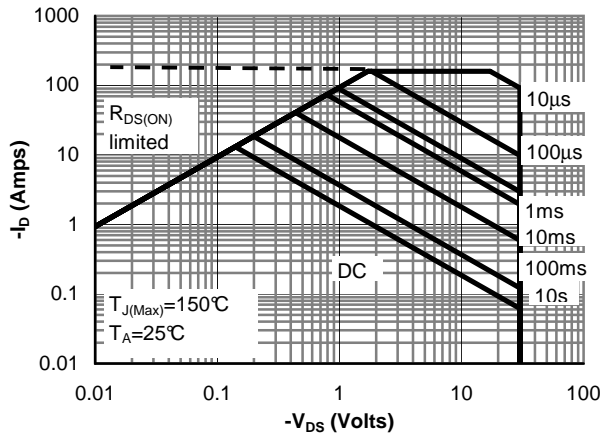
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



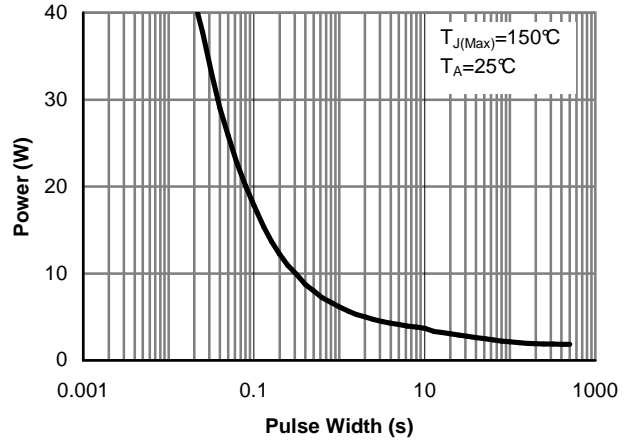
**Figure 7: Gate-Charge Characteristics**



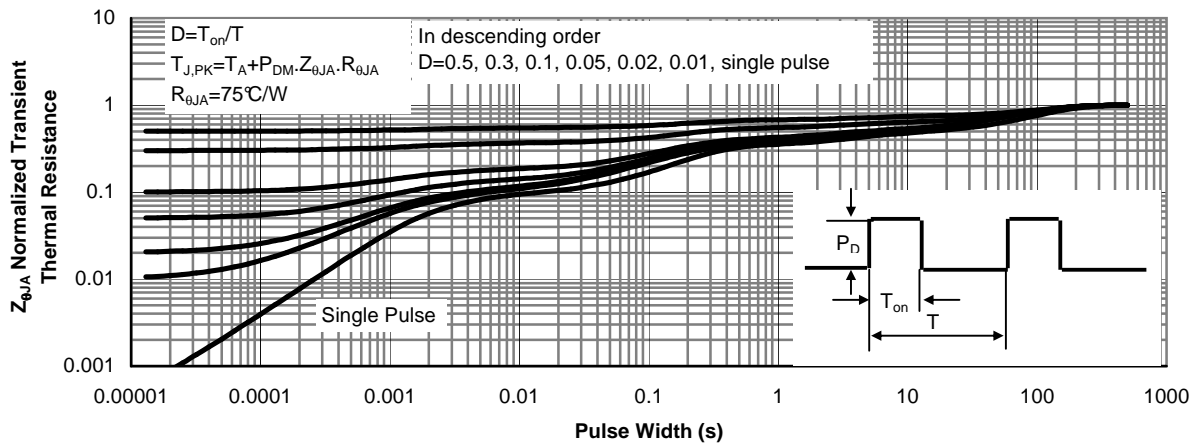
**Figure 8: Capacitance Characteristics**



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

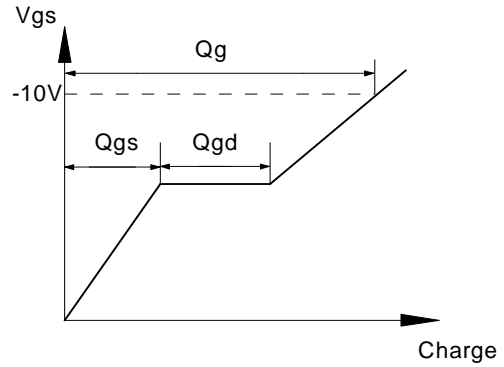
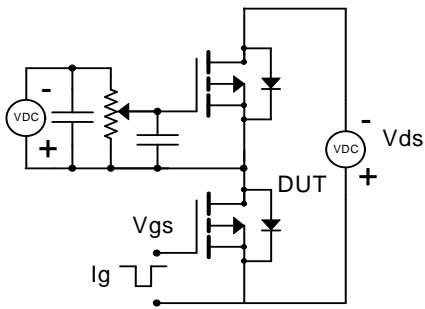


**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)**

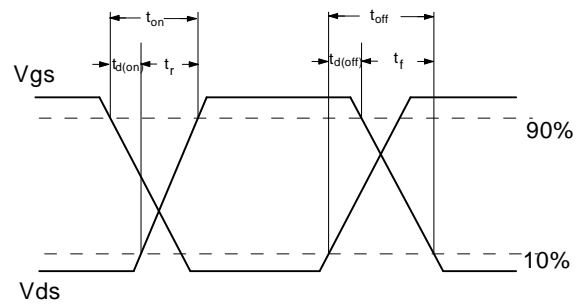
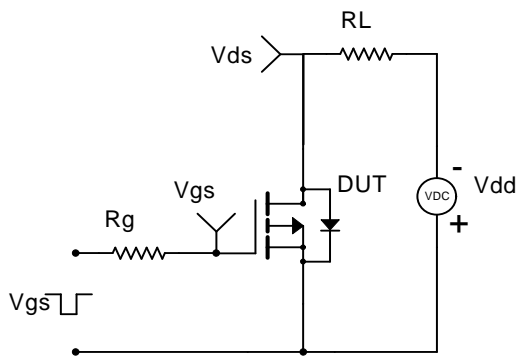


**Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)**

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

