

## General Description

The AO4496 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use as a DC-DC converter application.

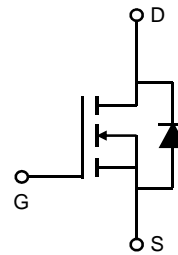
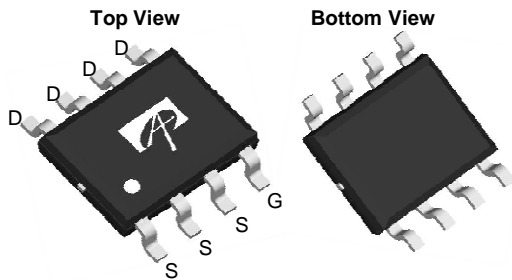
## Product Summary

$V_{DS}$  (V) = 30V  
 $I_D$  = 10A ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 19.5m\Omega$  ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 26m\Omega$  ( $V_{GS}$  = 4.5V)

100% UIS Tested  
 100% Rg Tested



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 <sup>A</sup>	$I_D$	$T_A=25^\circ\text{C}$	A
		$T_A=70^\circ\text{C}$	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	50	
Avalanche Current <sup>G</sup>	$I_{AR}$	17	
Repetitive avalanche energy $L=0.1\text{mH}$ <sup>G</sup>	$E_{AR}$	14	mJ
Power Dissipation <sup>A</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	$^\circ\text{C}$

## Thermal Characteristics

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>A</sup>		Steady State	59	75
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	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> = ±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	1.8	2.5	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 5V	50			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A T <sub>J</sub> = 125°C		16 24	19.5 29	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 7.5A		21	26	
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 5V, I <sub>D</sub> = 10A		30		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> = 1A, V <sub>GS</sub> = 0V		0.76	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		550	715	pF
C <sub>oss</sub>	Output Capacitance			110		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			55		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1MHz	3	4	4.9	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> = 10A		9.8	13	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge			4.6	6.1	nC
Q <sub>gs</sub>	Gate Source Charge			1.8		nC
Q <sub>gd</sub>	Gate Drain Charge			2.2		nC
t <sub>D(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, R <sub>L</sub> = 1.5Ω, R <sub>GEN</sub> = 3Ω		5		ns
t <sub>r</sub>	Turn-On Rise Time			3.2		ns
t <sub>D(off)</sub>	Turn-Off Delay Time			24		ns
t <sub>f</sub>	Turn-Off Fall Time			6		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> = 10A, di/dt = 500A/μs		22	29	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> = 10A, di/dt = 500A/μs		14		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: Repetitive rating, pulse width limited by junction temperature.

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

D: The static characteristics in Figures 1 to 6 are obtained using t ≤ 300μs 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.

F: The current rating is based on the t ≤ 10s thermal resistance rating.

G: E<sub>AR</sub> and I<sub>AR</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = 25°C.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

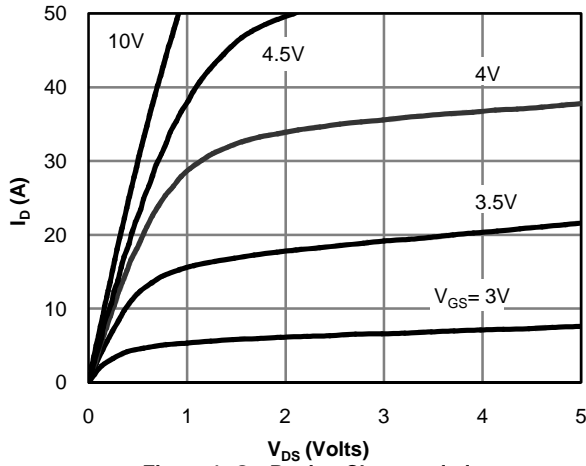


Figure 1: On-Region Characteristics

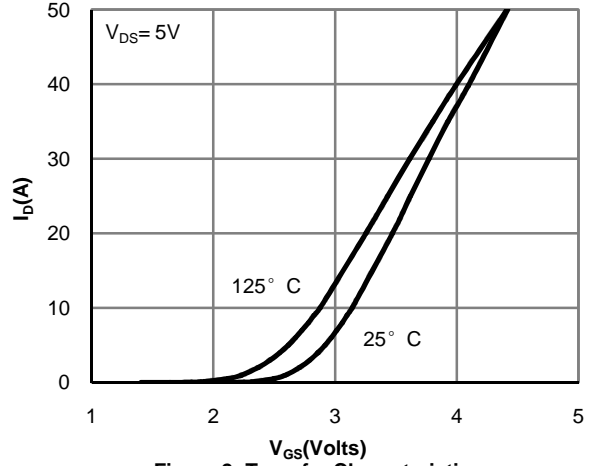


Figure 2: Transfer Characteristics

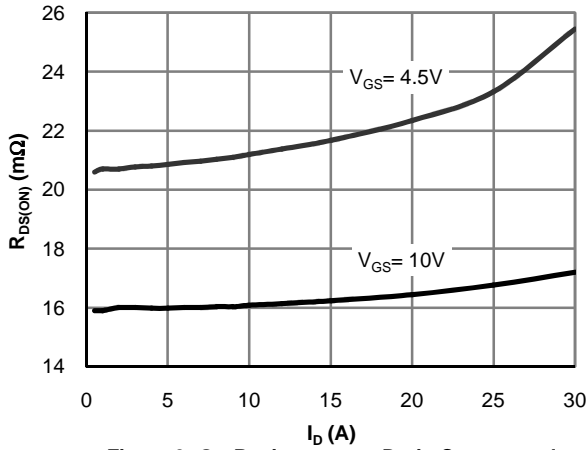


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

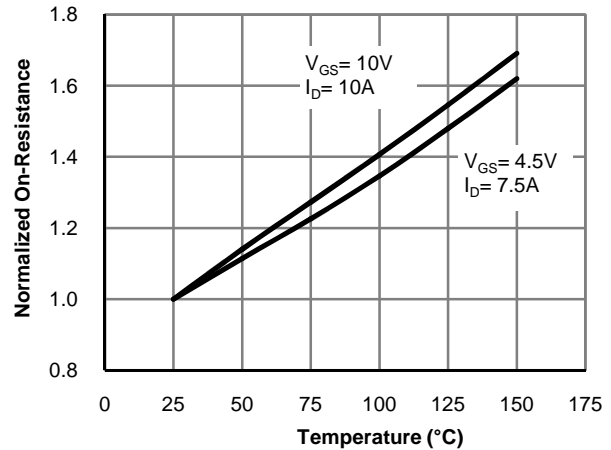


Figure 4: On-Resistance vs. Junction Temperature

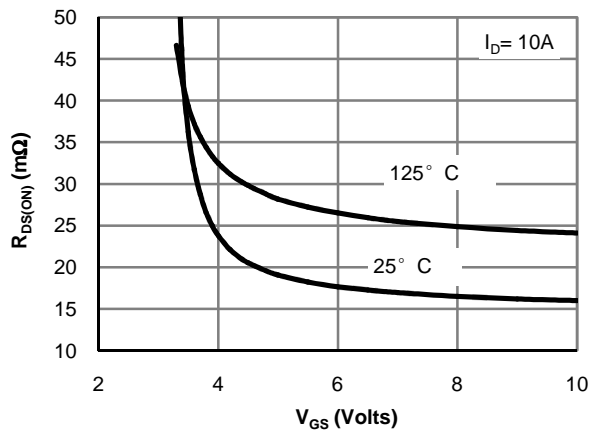


Figure 5: On-Resistance vs. Gate-Source Voltage

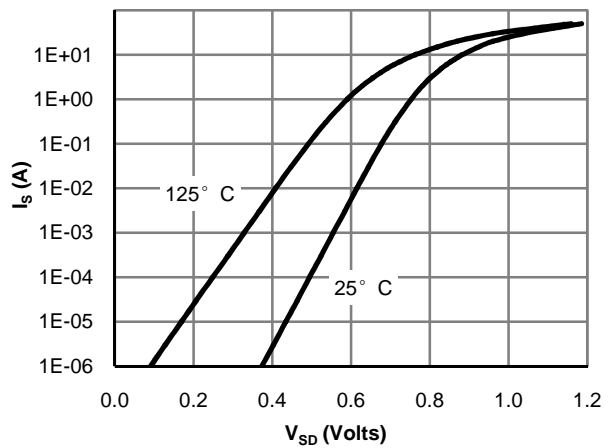


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

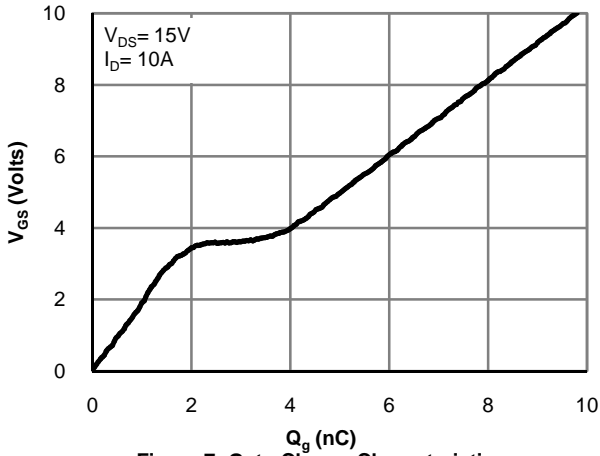


Figure 7: Gate-Charge Characteristics

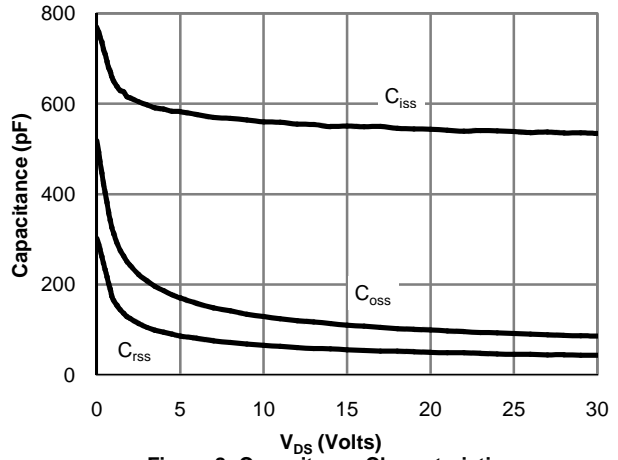


Figure 8: Capacitance Characteristics

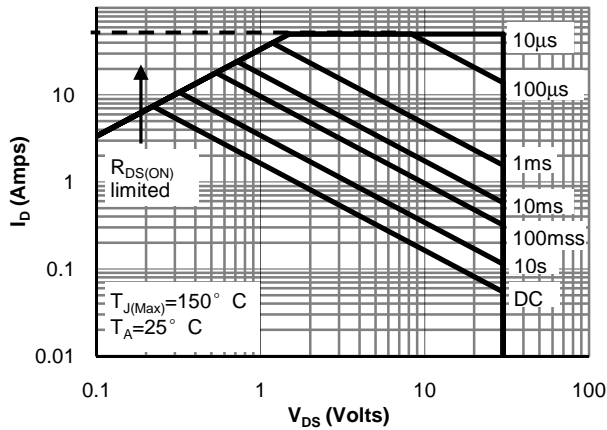


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

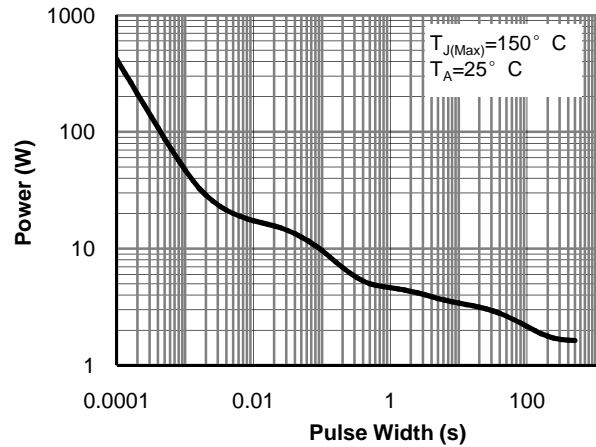


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

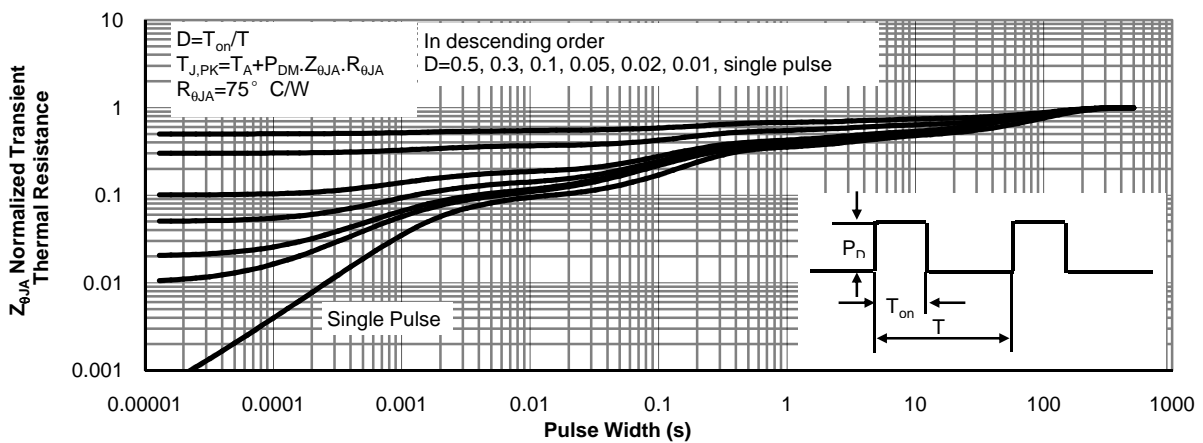
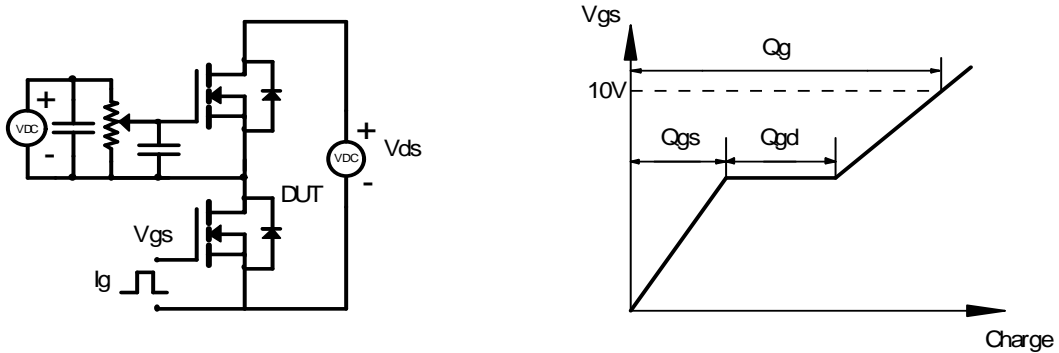
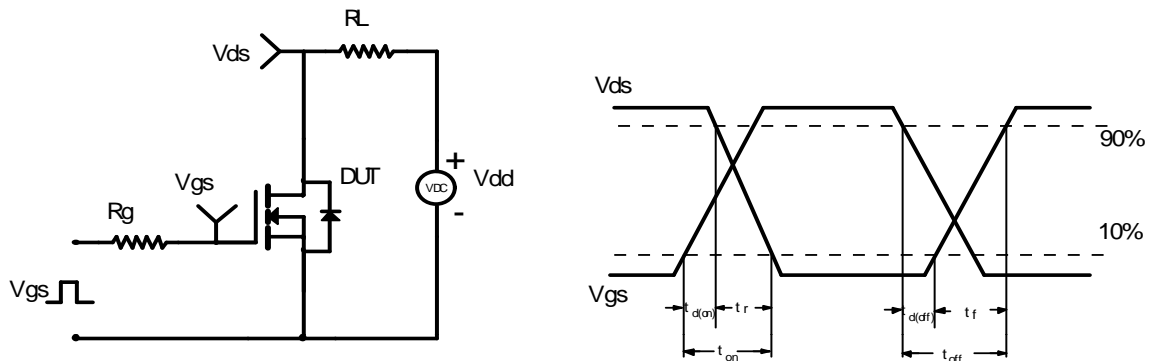


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

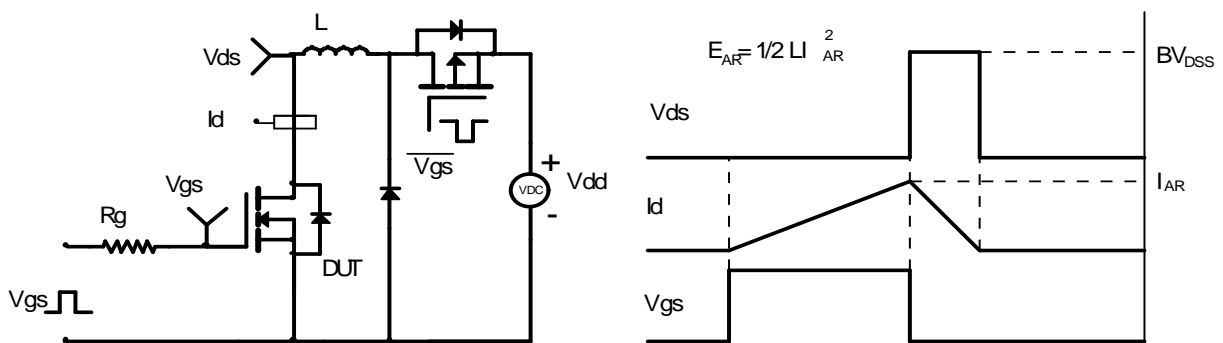
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

