

## 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.

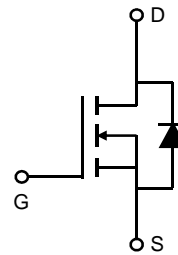
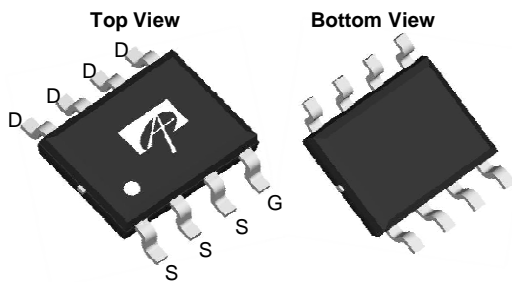
## Product Summary

$V_{DS}$  (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	A
Avalanche Current <sup>G</sup>	$I_{AR}$	17	A
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 ( $T_J=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 30\text{V}$ , $V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$			1 5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS} = 0\text{V}$ , $V_{GS} = \pm 20\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$	1.4	1.8	2.5	V
$I_{D(ON)}$	On state drain current	$V_{GS} = 10\text{V}$ , $V_{DS} = 5\text{V}$	50			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{V}$ , $I_D = 10\text{A}$ $T_J = 125^\circ\text{C}$ $V_{GS} = 4.5\text{V}$ , $I_D = 7.5\text{A}$		16 24 21	19.5 29 26	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 5\text{V}$ , $I_D = 10\text{A}$		30		S
$V_{SD}$	Diode Forward Voltage	$I_S = 1\text{A}$ , $V_{GS} = 0\text{V}$		0.76	1	V
$I_S$	Maximum Body-Diode Continuous Current				3	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=15\text{V}$ , $f=1\text{MHz}$		550	715	pF
$C_{oss}$	Output Capacitance			110		pF
$C_{rss}$	Reverse Transfer Capacitance			55		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$	3	4	4.9	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $I_D=10\text{A}$		9.8	13	nC
$Q_g(4.5\text{V})$	Total Gate Charge			4.6	6.1	nC
$Q_{gs}$	Gate Source Charge			1.8		nC
$Q_{gd}$	Gate Drain Charge			2.2		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $R_L=1.5\Omega$ , $R_{GEN}=3\Omega$		5		ns
$t_r$	Turn-On Rise Time			3.2		ns
$t_{D(off)}$	Turn-Off Delay Time			24		ns
$t_f$	Turn-Off Fall Time			6		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=10\text{A}$ , $dI/dt=500\text{A}/\mu\text{s}$		22	29	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=10\text{A}$ , $dI/dt=500\text{A}/\mu\text{s}$		14		nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ . 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  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using  $t \leq 300\mu\text{s}$  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  $T_A=25^\circ\text{C}$ . The SOA curve provides a single pulse rating.

F: The current rating is based on the  $t \leq 10\text{s}$  thermal resistance rating.

G:  $E_{AR}$  and  $I_{AR}$  ratings are based on low frequency and duty cycles to keep  $T_J=25\text{C}$ .

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

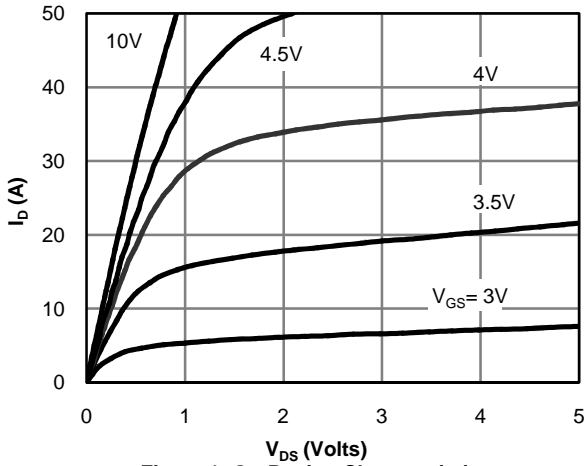


Figure 1: On-Region Characteristics

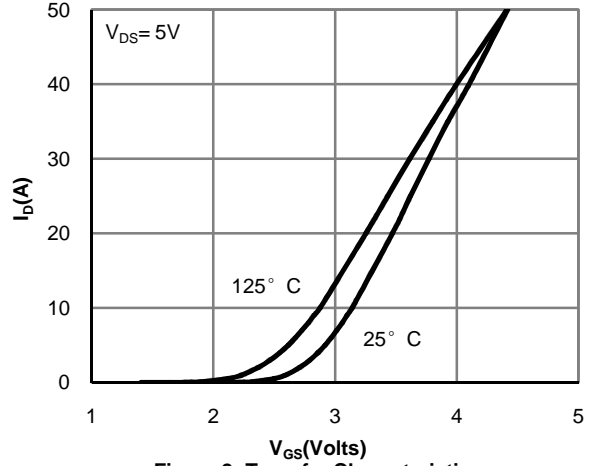


Figure 2: Transfer Characteristics

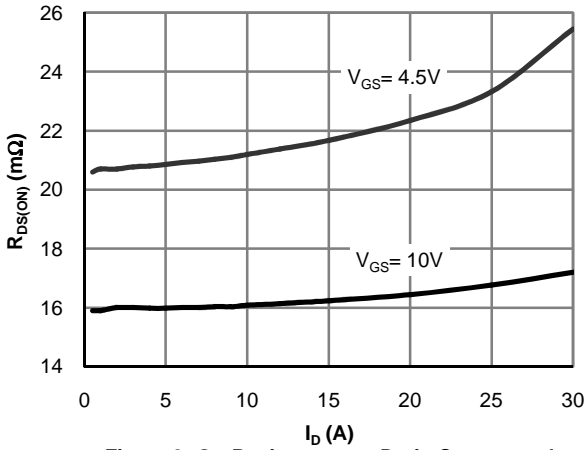


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

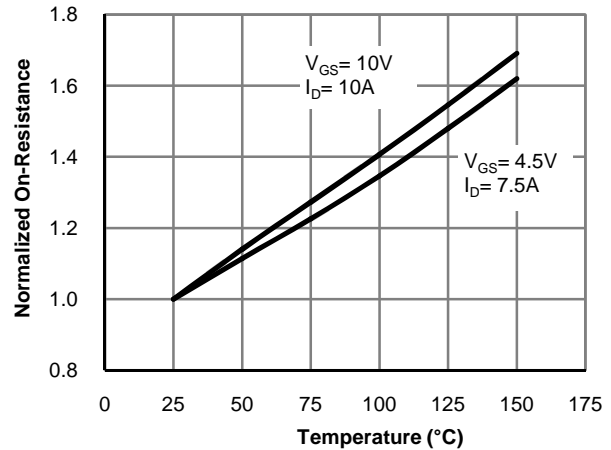


Figure 4: On-Resistance vs. Junction Temperature

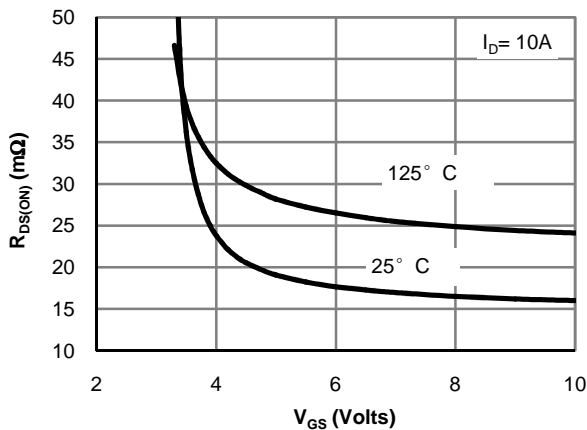


Figure 5: On-Resistance vs. Gate-Source Voltage

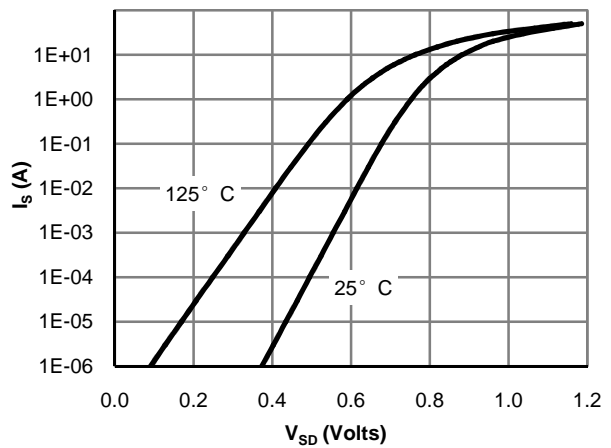


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

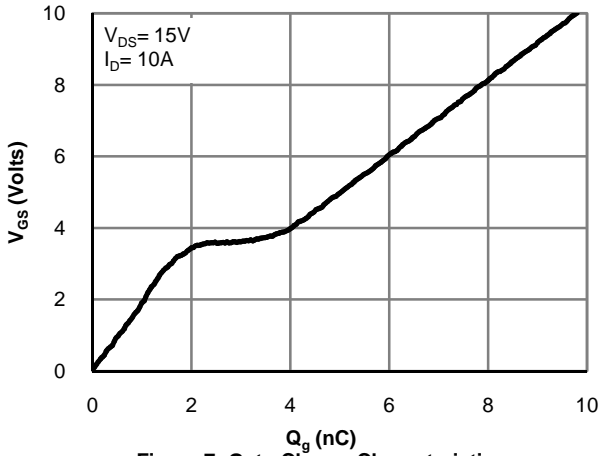


Figure 7: Gate-Charge Characteristics

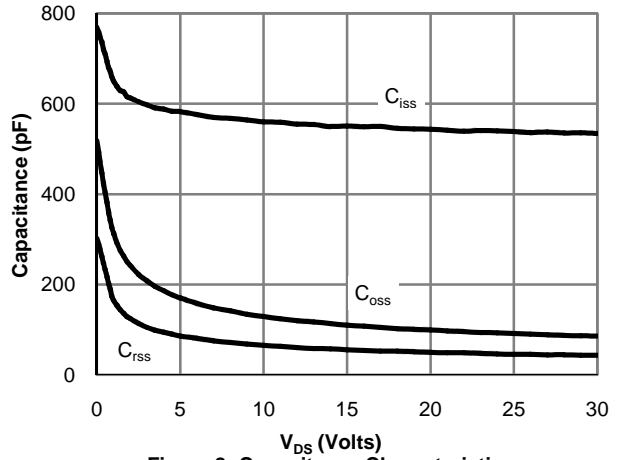


Figure 8: Capacitance Characteristics

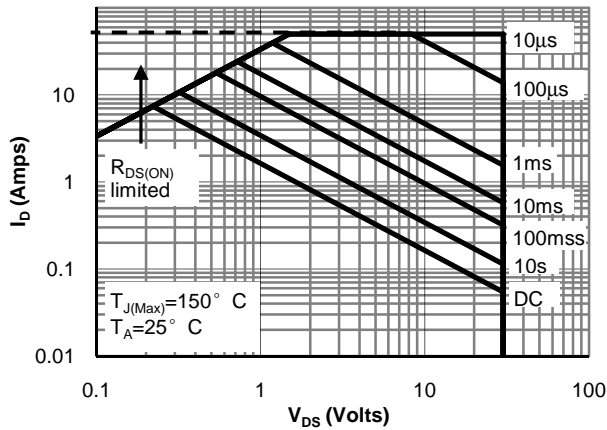


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

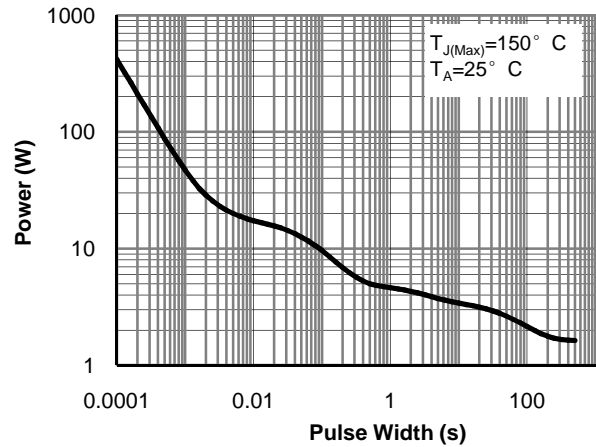


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

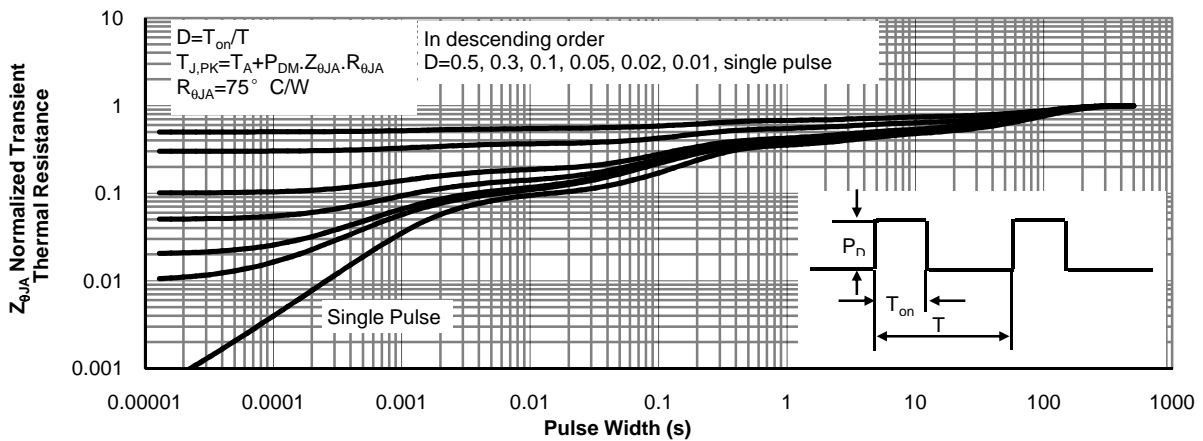
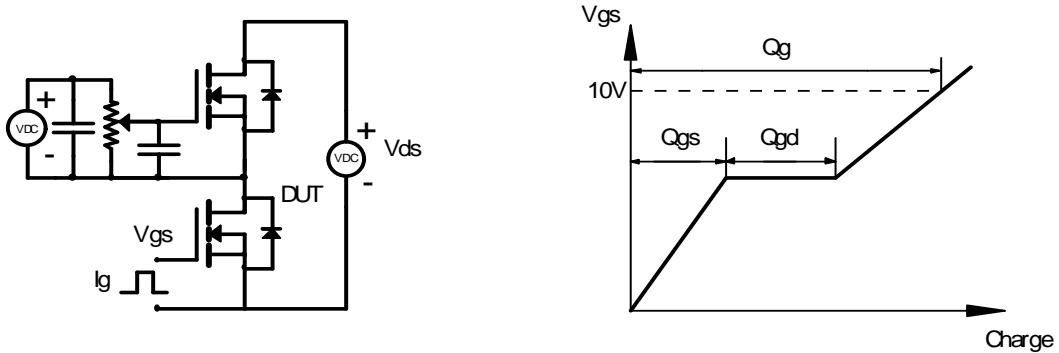
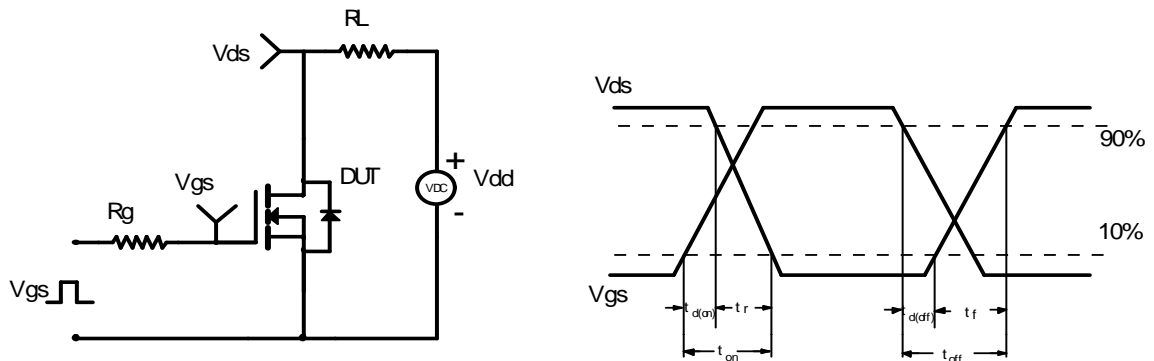


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

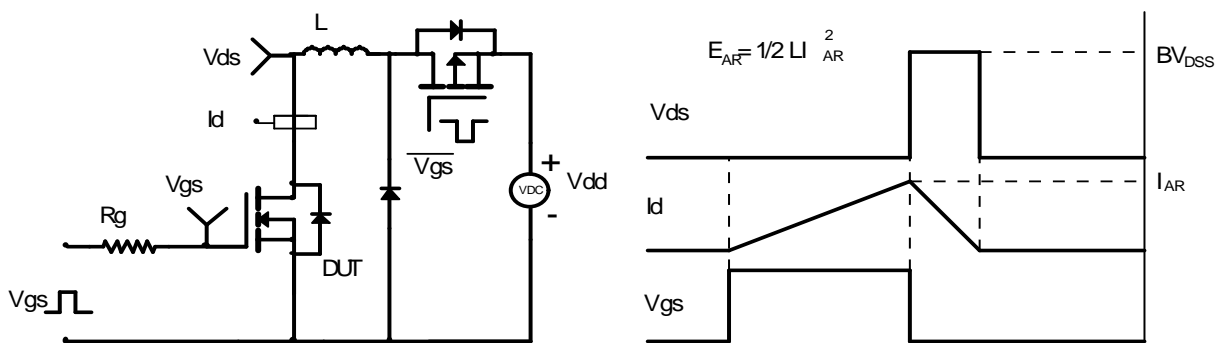
Gate Charge Test Circuit & Waveform



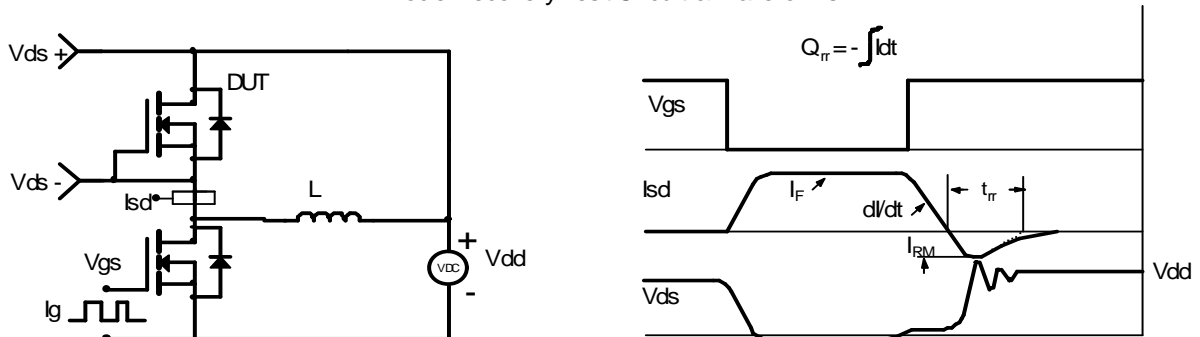
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



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