

### General Description

The AO4485 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.

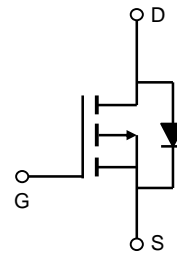
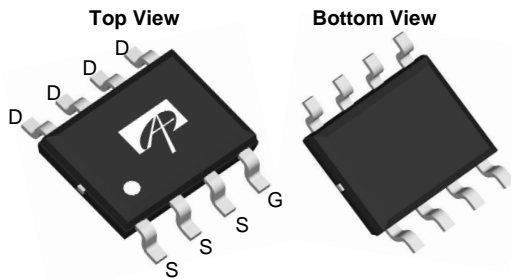
### Product Summary

$V_{DS} (V) = -40V$   
 $I_D = -10A$  ( $V_{GS} = -10V$ )  
 $R_{DS(ON)} < 15m\Omega$  ( $V_{GS} = -10V$ )  
 $R_{DS(ON)} < 20m\Omega$  ( $V_{GS} = -4.5V$ )

100% UIS Tested  
 100% Rg Tested



SOIC-8



### Absolute Maximum Ratings $T_J=25^\circ C$ unless otherwise noted

Parameter	Symbol	10 Sec	Steady State	Units
Drain-Source Voltage	$V_{DS}$	-40		V
Gate-Source Voltage	$V_{GS}$	$\pm 20$		V
Continuous Drain Current <sup>A</sup>	$I_D$	-12	-10	A
		$T_A=25^\circ C$		
	$T_A=70^\circ C$	-9	-8	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	-120		
Avalanche Current <sup>G</sup>	$I_{AR}$	-28		
Repetitive avalanche energy $L=0.3mH$ <sup>G</sup>	$E_{AR}$	118		mJ
Power Dissipation <sup>A</sup>	$P_D$	3.1	1.7	W
		$T_A=25^\circ C$		
	$T_A=70^\circ C$	2.0	1.1	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150		$^\circ C$

### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	31	40	$^\circ C/W$
		$t \leq 10s$		
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	59	75	$^\circ C/W$
		Steady State		
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	16	24	$^\circ C/W$

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	$I_D = -250\mu\text{A}$ , $V_{GS} = 0\text{V}$	-40			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -40\text{V}$ , $V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$			-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	$V_{DS} = V_{GS}$ , $I_D = -250\mu\text{A}$	-1.7	-1.9	-2.5	V
$I_{D(ON)}$	On state drain current	$V_{GS} = -10\text{V}$ , $V_{DS} = -5\text{V}$	-120			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{V}$ , $I_D = -10\text{A}$ $T_J = 125^\circ\text{C}$		12.5 19	15 23	m $\Omega$
		$V_{GS} = -4.5\text{V}$ , $I_D = -8\text{A}$		16	20	
$g_{FS}$	Forward Transconductance	$V_{DS} = -5\text{V}$ , $I_D = -10\text{A}$		25		S
$V_{SD}$	Diode Forward Voltage	$I_S = -1\text{A}$ , $V_{GS} = 0\text{V}$		-0.7	-1	V
$I_S$	Maximum Body-Diode Continuous Current				-3	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=-20\text{V}$ , $f=1\text{MHz}$		2500	3000	pF
$C_{oss}$	Output Capacitance			260		pF
$C_{rss}$	Reverse Transfer Capacitance			180		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$	2.5	4	6	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=-10\text{V}$ , $V_{DS}=-20\text{V}$ , $I_D=-10\text{A}$		42	55	nC
$Q_g(4.5\text{V})$	Total Gate Charge			18.6		nC
$Q_{gs}$	Gate Source Charge			7		nC
$Q_{gd}$	Gate Drain Charge			8.6		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}$ , $V_{DS}=-20\text{V}$ , $R_L = 2\Omega$ , $R_{GEN}=3\Omega$		9.4		ns
$t_r$	Turn-On Rise Time			20		ns
$t_{D(off)}$	Turn-Off DelayTime			55		ns
$t_f$	Turn-Off Fall Time			30		ns
$t_{rr}$	Body Diode Reverse Recovery Time		$I_F=-10\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		38	49
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=-10\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		47		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  $T_J=25^\circ\text{C}$ .

Rev1: Nov. 2010

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

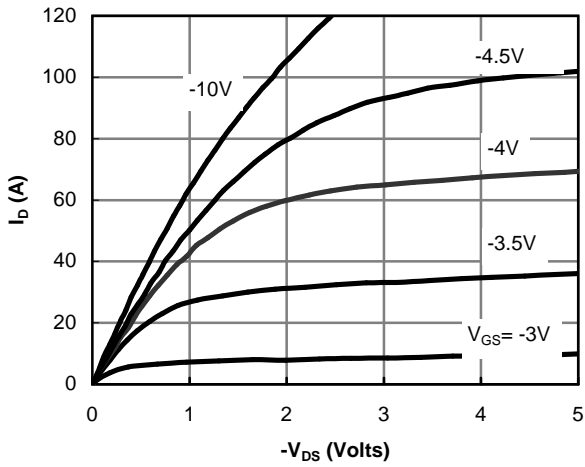


Figure 1: On-Region Characteristics

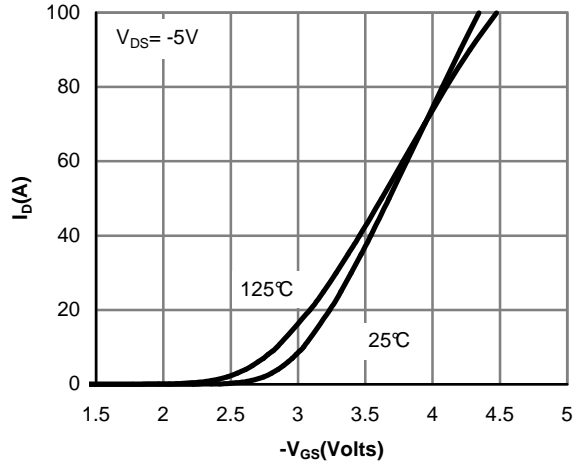


Figure 2: Transfer Characteristics

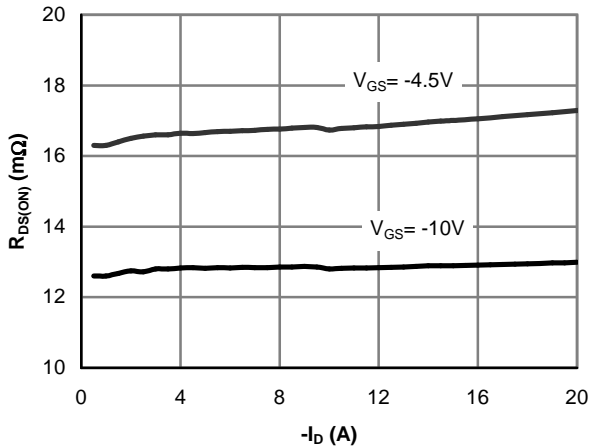


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

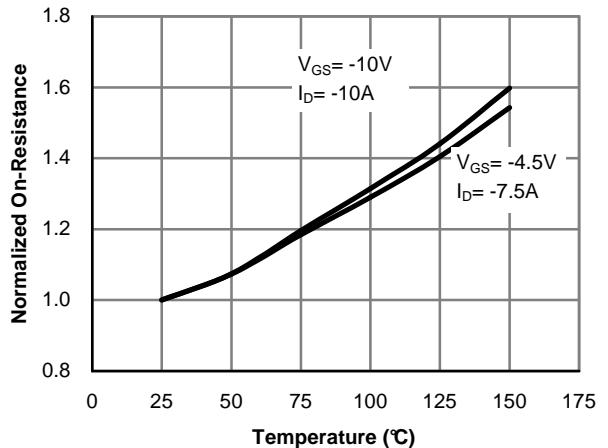


Figure 4: On-Resistance vs. Junction Temperature

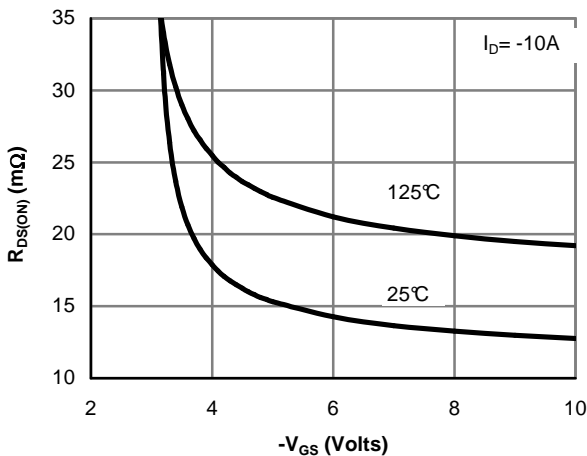


Figure 5: On-Resistance vs. Gate-Source Voltage

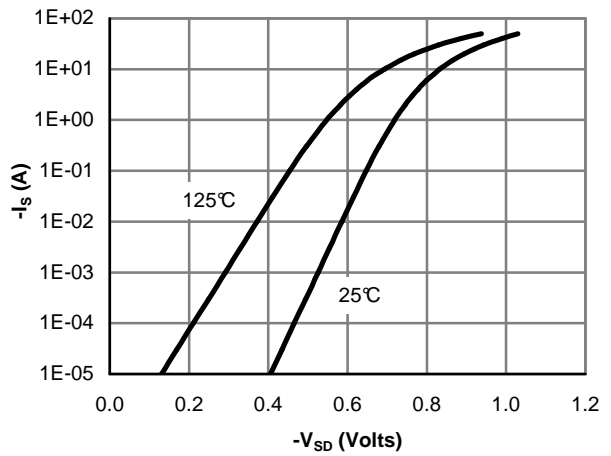


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

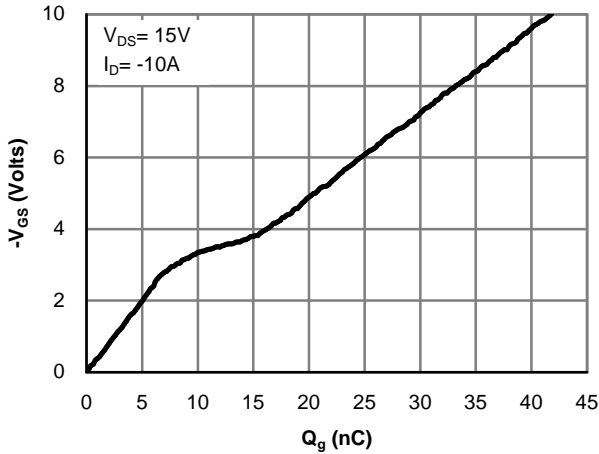


Figure 7: Gate-Charge Characteristics

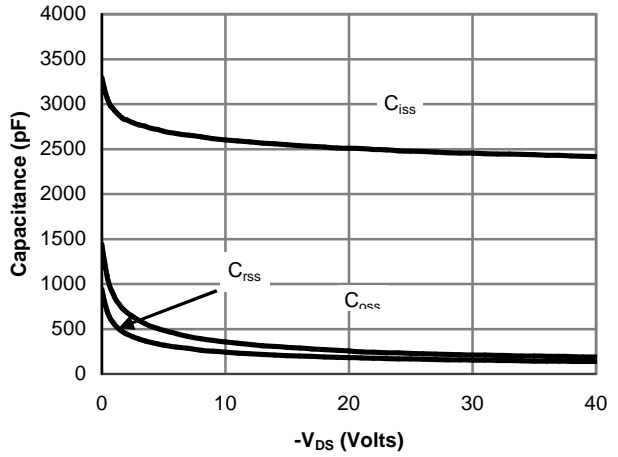


Figure 8: Capacitance Characteristics

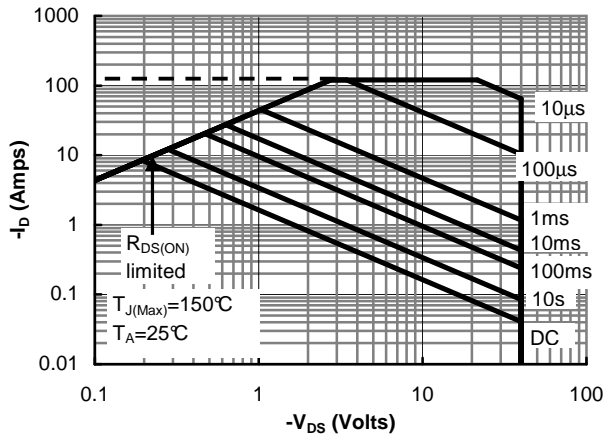


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

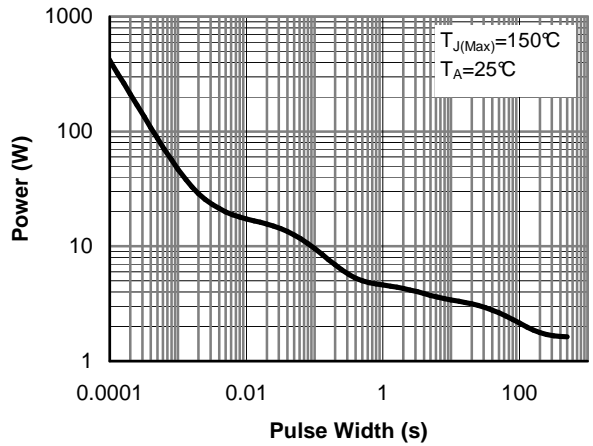


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

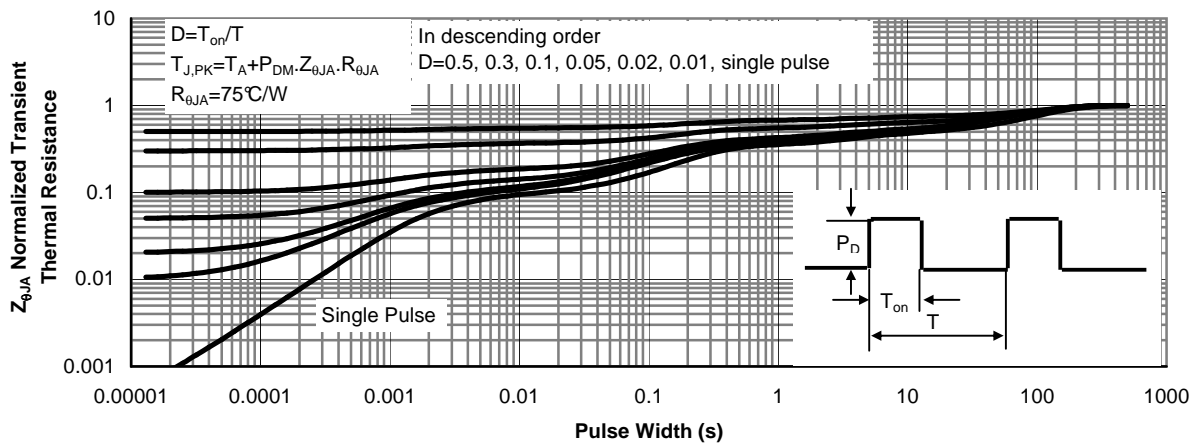


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)