ALPHA & OMEGA SEMICONDUCTOR, LTD

AO4485

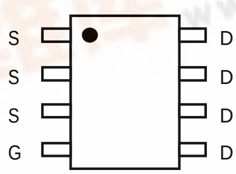
P-Channel Enhancement Mode Field Effect Transistor

General Description

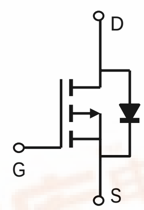
The AO4485/L uses advanced trench technology to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use as a DC-DC converter application.
AO4485 and AO4485L are electrically identical.
-RoHS Compliant
-AO4485L is Halogen Free

Features

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



SOIC-8



Absolute Maximum Ratings T_J=25°C unless otherwise noted					
Parameter		**Symbol**	**10 Sec**	**Steady State**	**Units**
Drain-Source Voltage		V_{DS}	-40		V
Gate-Source Voltage		V_{GS}	±20		V
Continuous Drain Current A	T_A=25°C	I_D	-12	-10	A
	T_A=70°C		-9	-8	
Pulsed Drain Current B		I_{DM}	-120		
Avalanche Current G		I_{AR}	-28		
Repetitive avalanche energy L=0.3mH G		E_{AR}	118		mJ
Power Dissipation A	T_A=25°C	P_D	3.1	1.7	W
	T_A=70°C		2.0	1.1	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150		°C

Thermal Characteristics					
Parameter		**Symbol**	**Typ**	**Max**	**Units**
Maximum Junction-to-Ambient A	t ≤ 10s	$R_{\theta JA}$	31	40	°C/W
Maximum Junction-to-Ambient A	Steady State		59	75	°C/W
Maximum Junction-to-Lead C	Steady State	$R_{\theta JL}$	16	24	°C/W

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D = -250µA, V_{GS} = 0V	-40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -40V, V_{GS} = 0V			-1	µA
		T_J = 55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS} = 0V, V_{GS} = ±20V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} I_D = -250µA	-1.7	-1.9	-2.5	V
$I_{D(ON)}$	On state drain current	V_{GS} = -10V, V_{DS} = -5V	-120			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = -10V, I_D = -10A		12.5	15	mΩ
		T_J=125°C		19	23	
		V_{GS} = -4.5V, I_D = -8A		16	20	
g_{FS}	Forward Transconductance	V_{DS} = -5V, I_D = -10A		25		S
V_{SD}	Diode Forward Voltage	I_S = -1A,V_{GS} = 0V		-0.7	-1	V
I_S	Maximum Body-Diode Continuous Current				-3	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-20V, f=1MHz		2500	3000	pF
C_{oss}	Output Capacitance			260		pF
C_{rss}	Reverse Transfer Capacitance			180		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	2.5	4	6	Ω
SWITCHING PARAMETERS						
Q_g (10V)	Total Gate Charge	V_{GS}=-10V, V_{DS}=-20V, I_D=-10A		42	55	nC
Q_g (4.5V)	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}=-10V, V_{DS}=-20V, R_L= 2Ω, R_{GEN}=3Ω		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=-10A, dI/dt=100A/µs		38	49	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-10A, dI/dt=100A/µs		47		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A = 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 $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ 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^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=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_{AR} and I_{AR} ratings are based on low frequency and duty cycles to keep T_j=25C.
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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

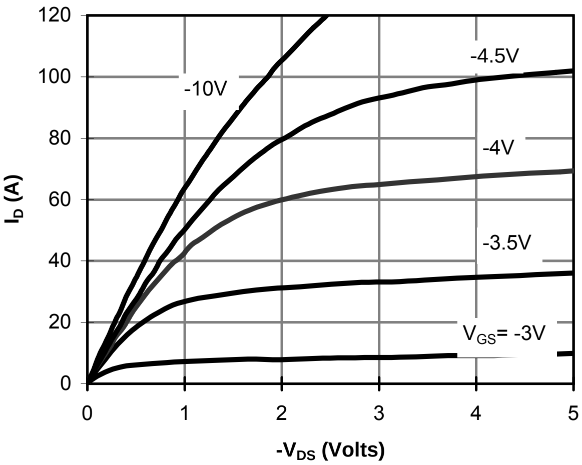

Figure 1: On-Region Characteristics

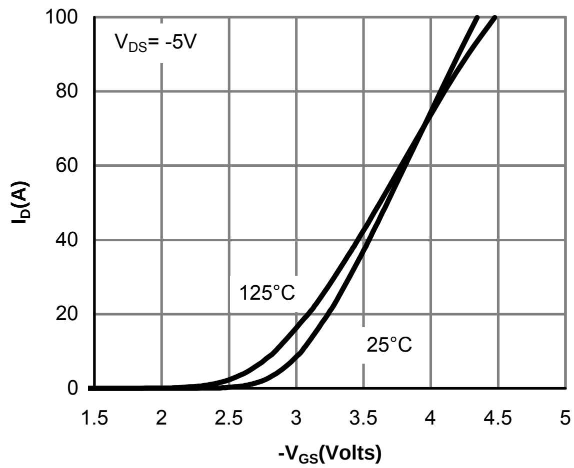

Figure 2: Transfer Characteristics

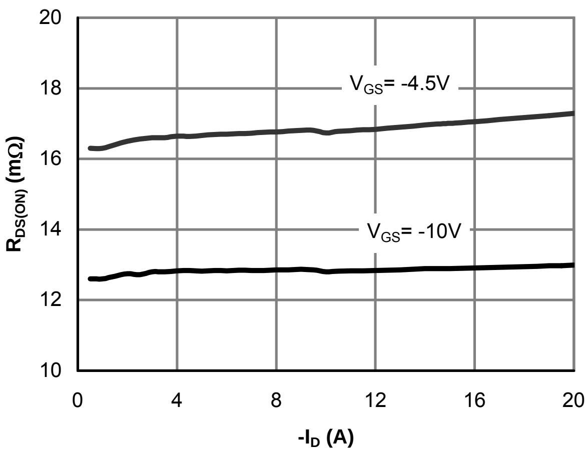

Figure 3: On-Resistance vs. Drain Current and Gate Voltage

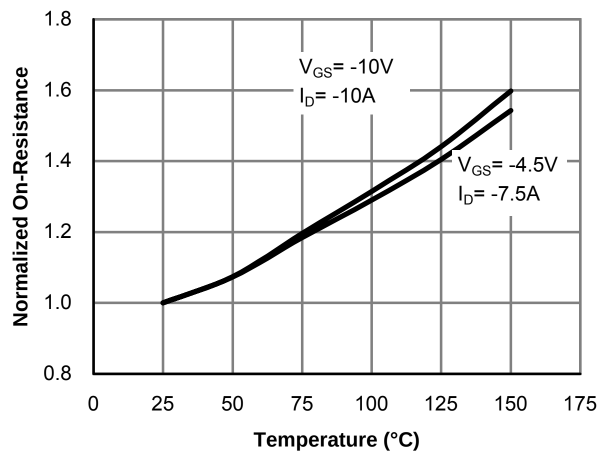

Figure 4: On-Resistance vs. Junction Temperature

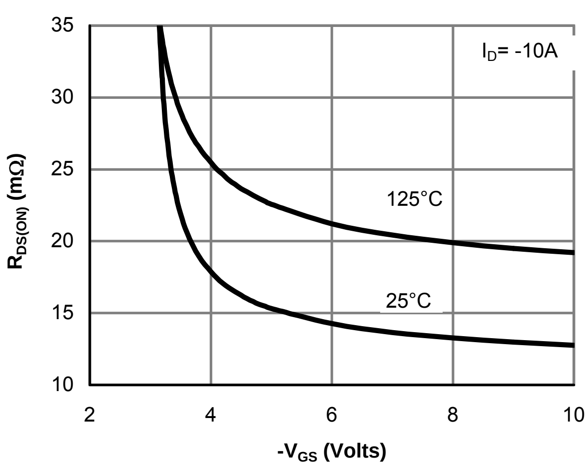

Figure 5: On-Resistance vs. Gate-Source Voltage

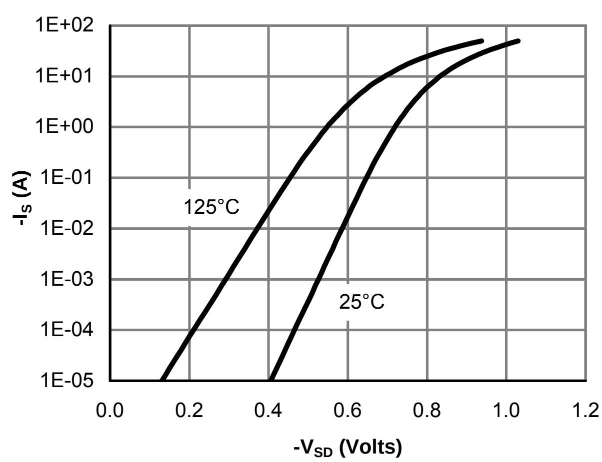

Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

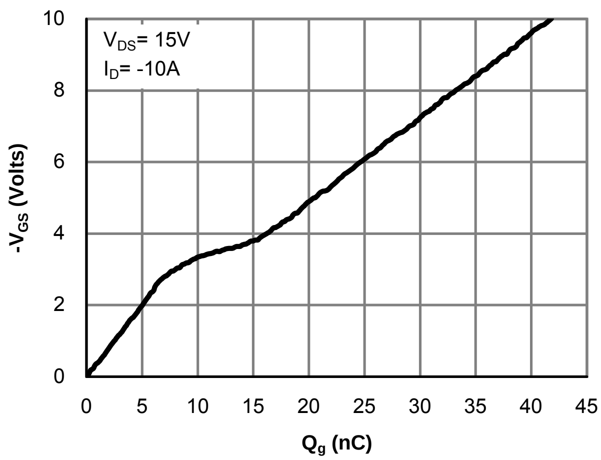

Figure 7: Gate-Charge Characteristics

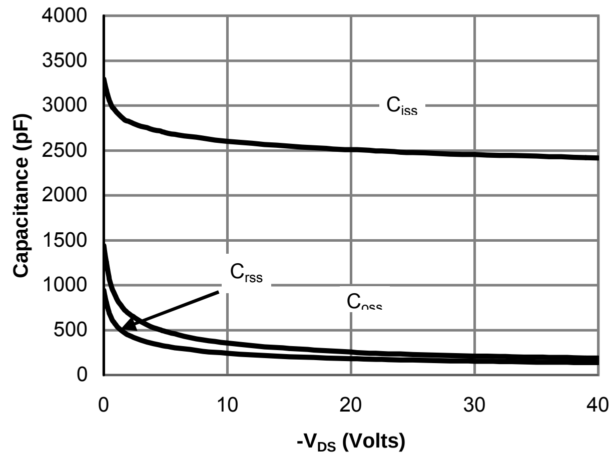

Figure 8: Capacitance Characteristics

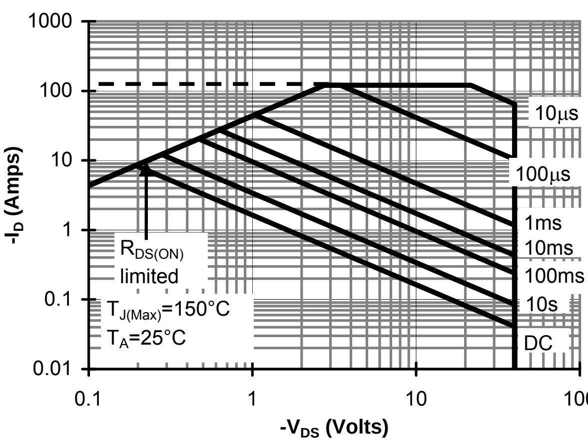

Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

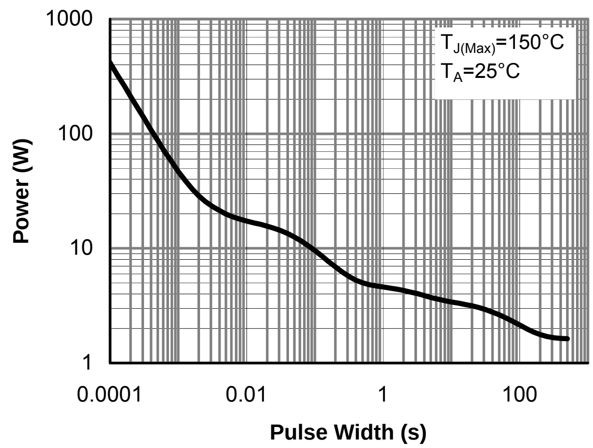

Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

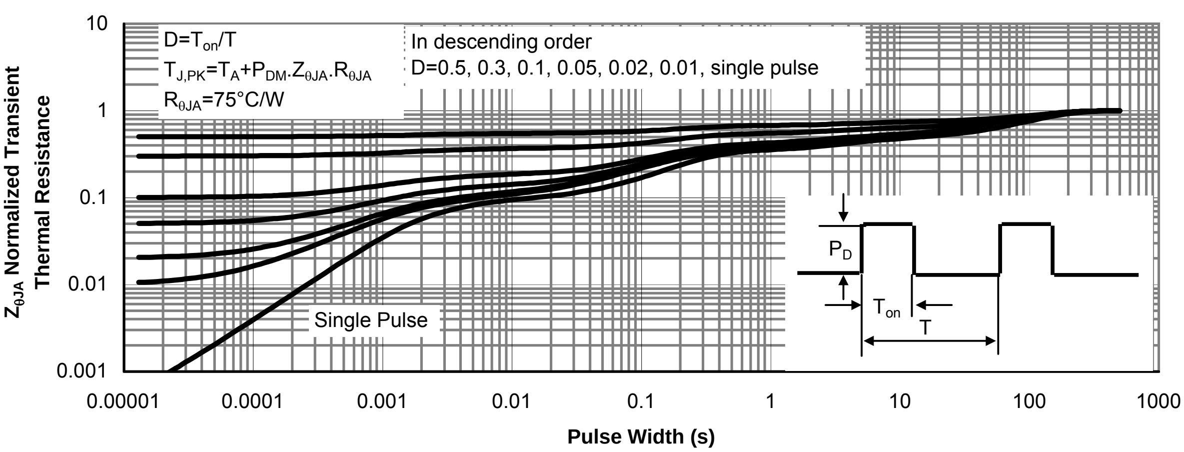

Figure 11: Normalized Maximum Transient Thermal Impedance(Note E)