ALPHA & OMEGA SEMICONDUCTOR, INC.

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AO4411
P-Channel Enhancement Mode Field Effect Transistor

General Description

The AO4411 uses advanced trench technology to provide excellent $R_{DS(ON)}$, and ultra-low low gate charge. This device is suitable for use as a load switch or in PWM applications.

Features

V_{DS} (V) = -30V
I_D = -7.5 A
$R_{DS(ON)}$ < 35mΩ (V_{GS} = -10V)
$R_{DS(ON)}$ < 60mΩ (V_{GS} = -4.5V)

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [A]	T_A=25°C	I_D	-7.5	A
	T_A=70°C		-6.3	
Pulsed Drain Current [B]		I_{DM}	-40	
Power Dissipation [A]	T_A=25°C	P_D	3	W
	T_A=70°C		2.1	
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	$R_{\theta JA}$	24	40	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		54	75	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	21		°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	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-24V, 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	-1.2	-1.8	-2.2	V
$I_{D(ON)}$	On state drain current	V_{GS}=-10V, V_{DS}=-5V	40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-5A		26	35	mΩ
		T_J=125°C		37		
		V_{GS}=-4.5V, I_D=-5A		36	60	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-10A				S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V		-0.75	-1	V
I_S	Maximum Body-Diode Continuous Current				-4.2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz		920		pF
C_{oss}	Output Capacitance			190		pF
C_{rss}	Reverse Transfer Capacitance			122		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		3.6		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-7.5A		2.4		nC
Q_{gs}	Gate Source Charge			4.5		nC
Q_{gd}	Gate Drain Charge			9.3		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=2Ω, R_{GEN}=3Ω		7.6		ns
t_r	Turn-On Rise Time			5.2		ns
$t_{D(off)}$	Turn-Off DelayTime			21.6		ns
t_f	Turn-Off Fall Time			8		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-7.5A, dI/dt=100A/µs				ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-7.5A, dI/dt=100A/µs				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 a given application depends on the user's specific board design. The current rating is based on the t≤ 10s thermal resistance rating.

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 6,12,14 are obtained using 80µs 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.