ALPHA & OMEGA SEMICONDUCTOR

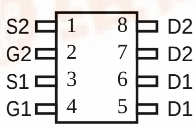
AO4806
Dual N-Channel Enhancement Mode Field Effect Transistor

General Description

The AO4806 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. They offer operation over a wide gate drive range from 1.8V to 12V. It is ESD protected. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration.
Standard Product AO4806 is Pb-free (meets ROHS & Sony 259 specifications). AO4806L is a Green Product ordering option. AO4806 and AO4806L are electrically identical.

Features

V_{DS} (V) = 20V
I_D = 9.4A (V_{GS} = 10V)
$R_{DS(ON)}$ < 14mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 15mΩ (V_{GS} = 4.5V)
$R_{DS(ON)}$ < 21mΩ (V_{GS} = 2.5V)
$R_{DS(ON)}$ < 30mΩ (V_{GS} = 1.8V)
ESD Rating: 2000V HBM



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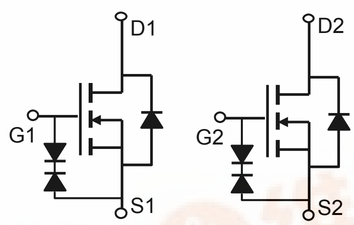

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current [A]	T_A=25°C	I_D	9.4	A
	T_A=70°C		7.5	
Pulsed Drain Current [B]		I_{DM}	40	
Power Dissipation	T_A=25°C	P_D	2	W
	T_A=70°C		1.28	
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	$R_{\theta JA}$	45	62.5	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		72	110	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	34	40	°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	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=16V, V_{GS}=0V			10	µA
		T_J=55°C			25	
I_{GSS}	Gate-Source leakage current	V_{DS}=0V, V_{GS}=±10V			±10	µA
BV_{GSO}	Gate-Source Breakdown Voltage	V_{DS}=0V, I_G=±250uA	±12			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA	0.5	0.75	1	V
$I_{D(ON)}$	On state drain current	V_{GS}=4.5V, V_{DS}=5V	30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=9.4A		11	14	mΩ
		T_J=125°C		14.3	17	
		V_{GS}=4.5V, I_D=8A		12.6	16	mΩ
		V_{GS}=2.5V, I_D=6A		16.5	22	mΩ
		V_{GS}=1.8V, I_D=4A		23.4	30	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=9.4A		37		S
V_{SD}	Diode Forward Voltage	I_S=1A		0.72	1	V
I_S	Maximum Body-Diode Continuous Current				3	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, f=1MHz		1810		pF
C_{oss}	Output Capacitance			232		pF
C_{rss}	Reverse Transfer Capacitance			200		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		1.6		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=10V, I_D=9.4A		17.9		nC
Q_{gs}	Gate Source Charge			1.5		nC
Q_{gd}	Gate Drain Charge			4.7		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=10V, R_L=1.1Ω, R_{GEN}=3Ω		3.3		ns
t_r	Turn-On Rise Time			5.9		ns
$t_{D(off)}$	Turn-Off DelayTime			44		ns
t_f	Turn-Off Fall Time			7.7		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=9.4A, dI/dt=100A/µs		22		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=9.4A, dI/dt=100A/µs		8.6		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. 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 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

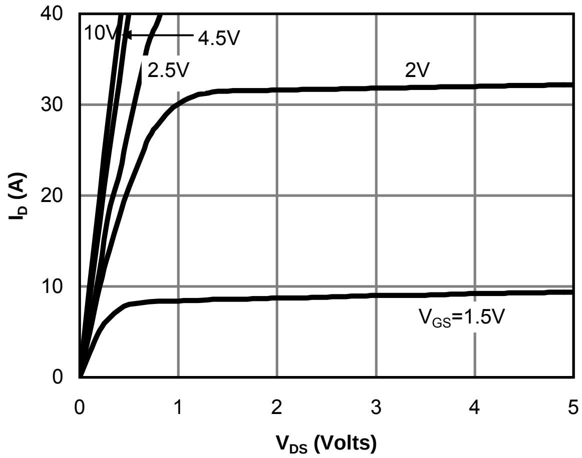

Fig 1: On-Region Characteristics

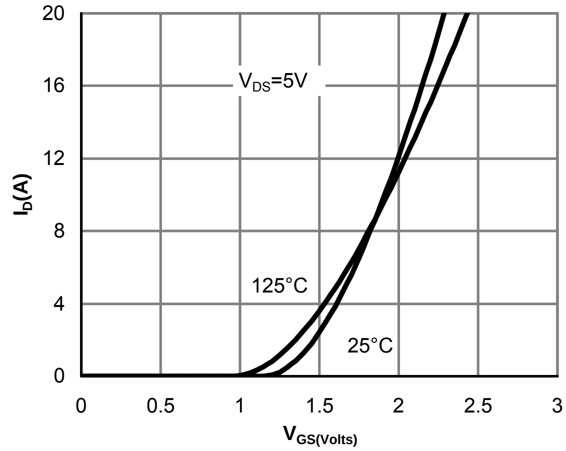

Figure 2: Transfer Characteristics

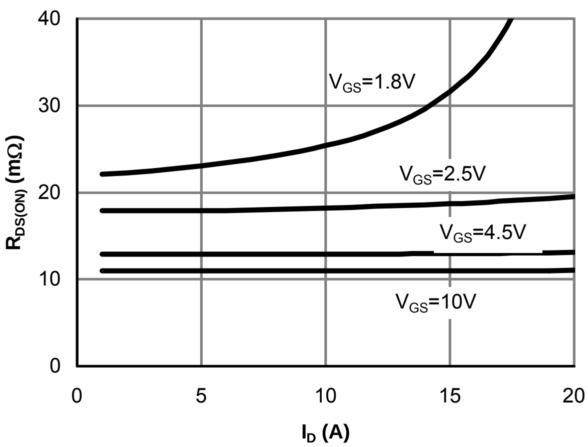

Figure 3: On-Resistance vs. Drain Current and Gate Voltage

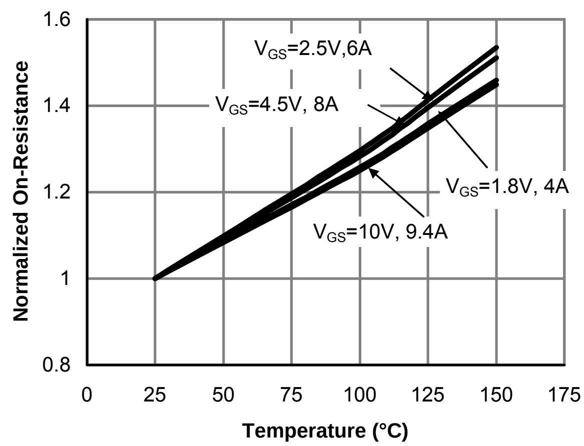

Figure 4: On-Resistance vs. Junction Temperature

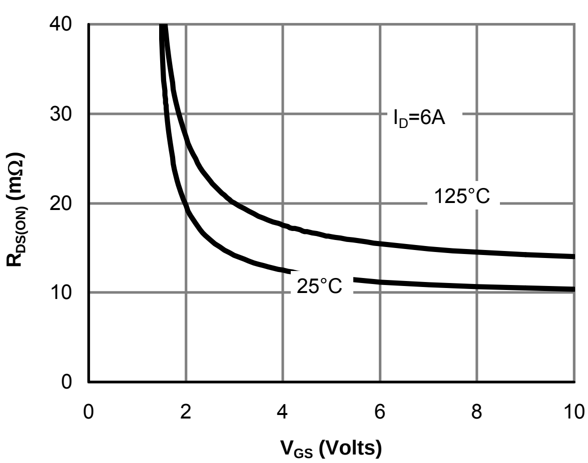

Figure 5: On-Resistance vs. Gate-Source Voltage

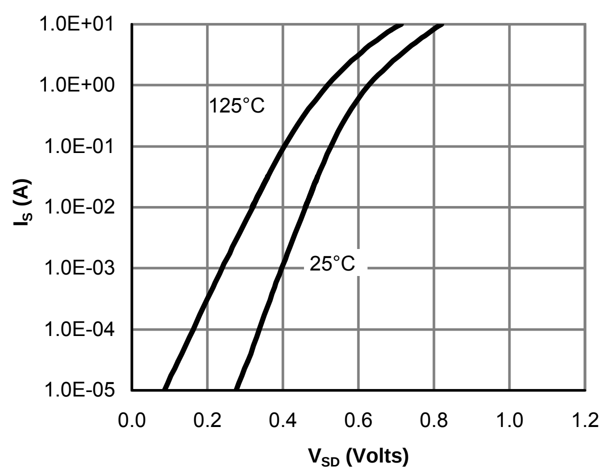

Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

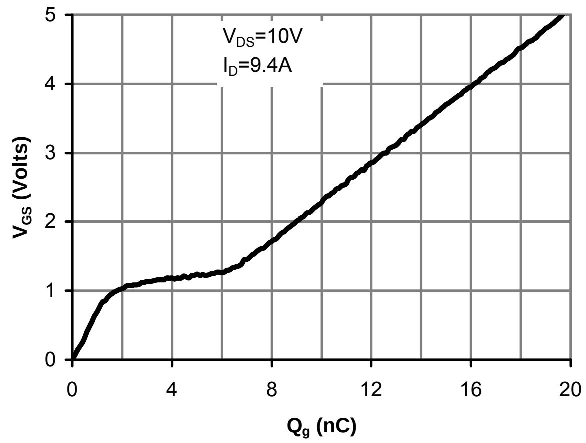

Figure 7: Gate-Charge Characteristics

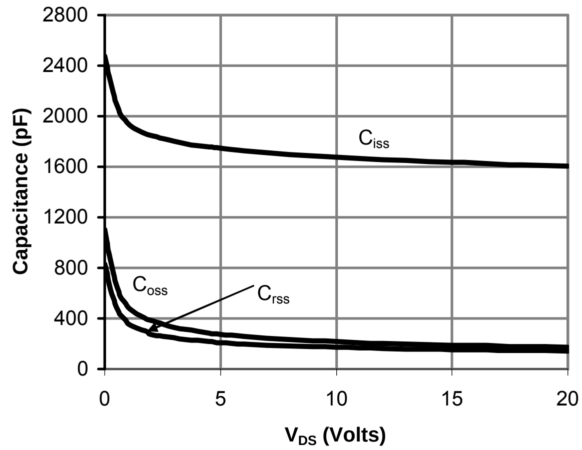

Figure 8: Capacitance Characteristics

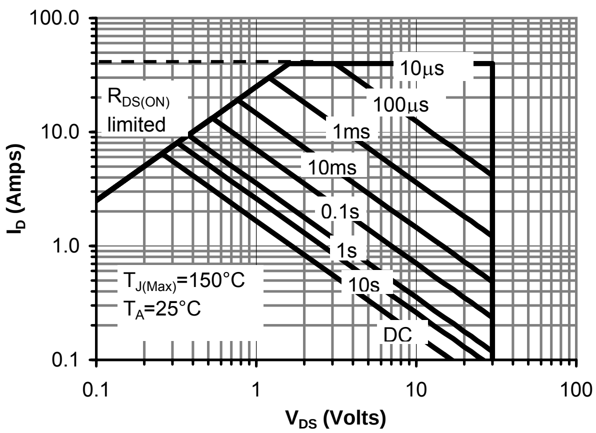

Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

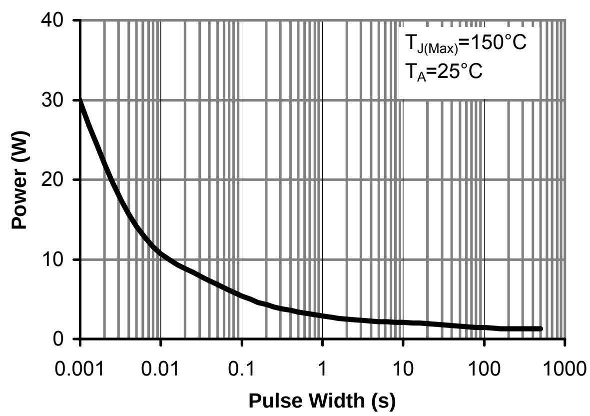

Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

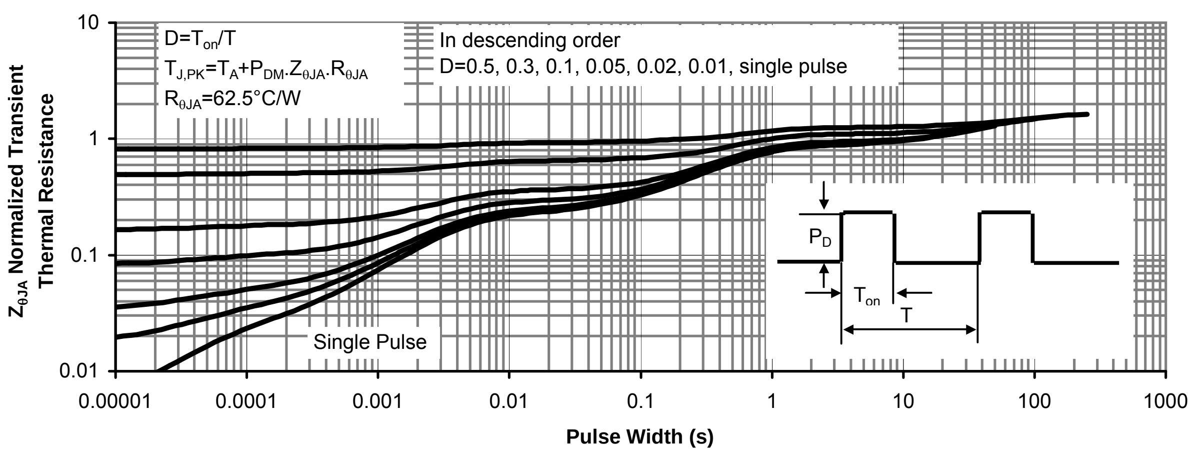

Figure 11: Normalized Maximum Transient Thermal Impedance