ALPHA & OMEGA SEMICONDUCTOR

AO3400A
N-Channel Enhancement Mode Field Effect Transistor

General Description

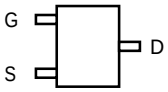
The AO3400A/L uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications. *AO3400A and AO3400AL are electrically identical.*
-RoHS Compliant
-AO3400AL is Halogen Free

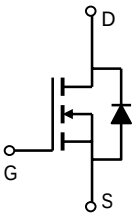
Features

V_{DS} (V) = 30V
I_D = 5.7A (V_{GS} = 10V)
$R_{DS(ON)}$ < 26.5mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 32mΩ (V_{GS} = 4.5V)
$R_{DS(ON)}$ < 48mΩ (V_{GS} = 2.5V)

Rg,Ciss,Coss,Crss Tested

TO-236
(SOT-23)
Top View





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}	±12	V
Continuous Drain Current [AF]	T_A=25°C	I_D	5.7	A
	T_A=70°C		4.7	
Pulsed Drain Current [B]		I_{DM}	25	A
Power Dissipation	T_A=25°C	P_D	1.4	W
	T_A=70°C		0.9	
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	$R_{\theta JA}$	70	90	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		100	125	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	63	80	°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=250uA, V_{GS}=0V	30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V			1	uA
		T_J=125°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±12V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA	0.7	1	1.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=4.5V, V_{DS}=5V	25			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=5.7A		22	26.5	mΩ
		T_J=125°C		31	38	
		V_{GS}=4.5V, I_D=5A		25.4	32	
		V_{GS}=2.5V, I_D=3A		34	48	
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=5.7A		26		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.72	1.0	V
I_S	Maximum Body-Diode Continuous Current				2.0	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		900	1100	pF
C_{oss}	Output Capacitance			88		pF
C_{rss}	Reverse Transfer Capacitance			65		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		0.95	1.5	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=15V, I_D=5.7A		10	13	nC
Q_{gs}	Gate Source Charge			1.8		nC
Q_{gd}	Gate Drain Charge			3.75		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=2.6Ω, R_{GEN}=3Ω		3.2		ns
t_r	Turn-On Rise Time			3.5		ns
$t_{D(off)}$	Turn-Off DelayTime			21.5		ns
t_f	Turn-Off Fall Time			2.7		ns
t_{rr}	Body Diode Reverse Recovery Time	IF=5.7A, dI/dt=100A/us		16.8	20	ns
Q_{rr}	Body Diode Reverse Recovery Charge	IF=5.7A, dI/dt=100A/us		8		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 $T_{J(MAX)}$=150°C.

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 <300 us 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.

Rev1:May. 2008

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

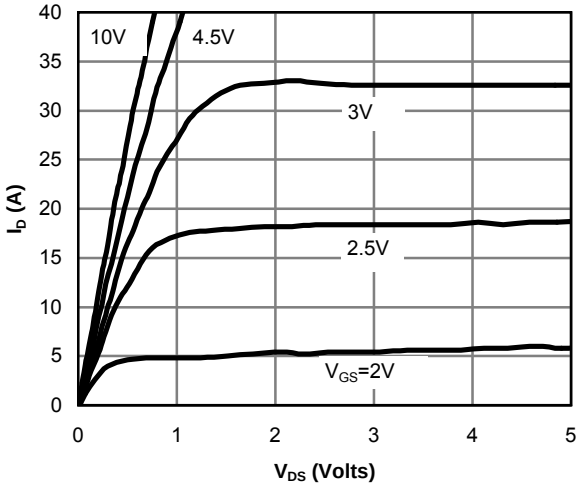


Figure 1: On-Region Characteristics

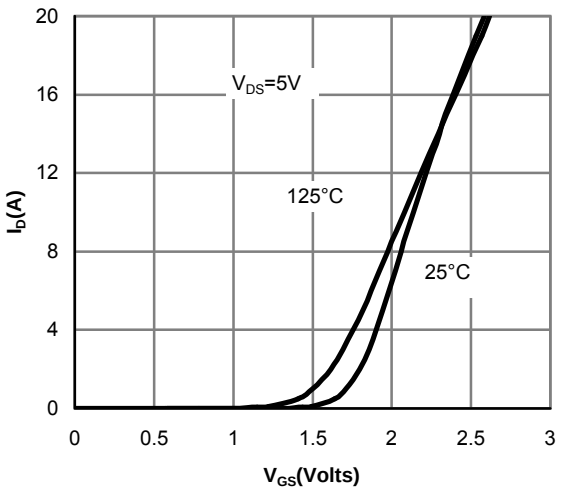


Figure 2: Transfer Characteristics

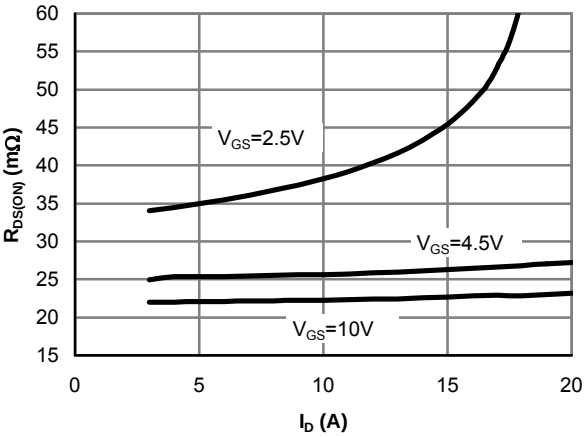


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

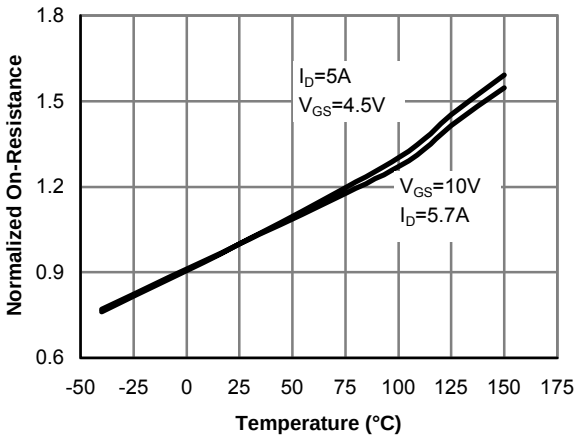


Figure 4: On-Resistance vs. Junction Temperature

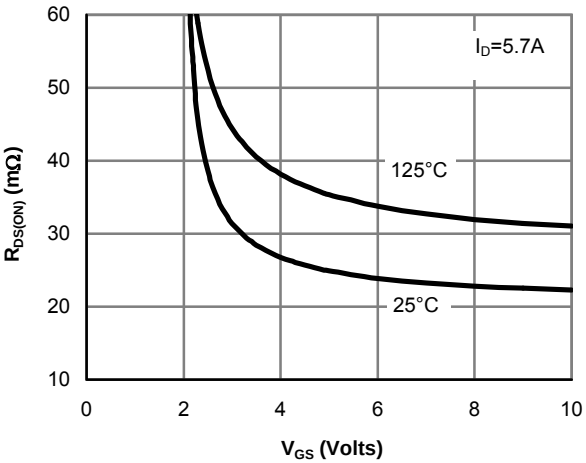


Figure 5: On-Resistance vs. Gate-Source Voltage

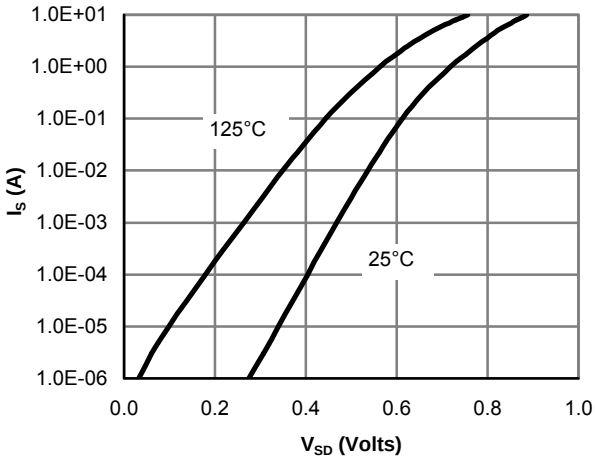


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

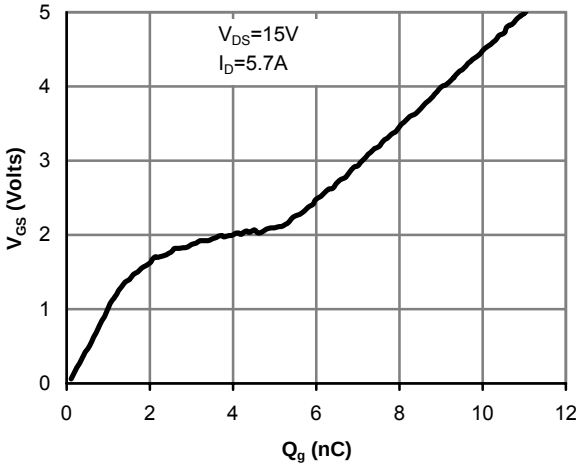


Figure 7: Gate-Charge Characteristics

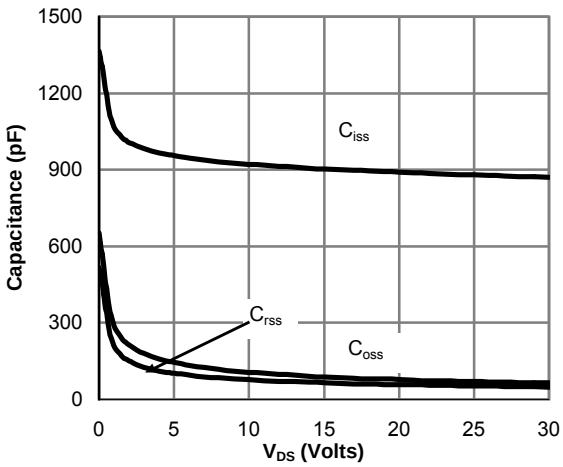


Figure 8: Capacitance Characteristics

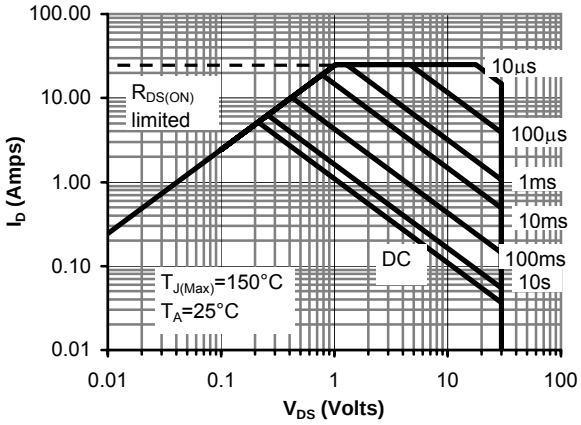


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

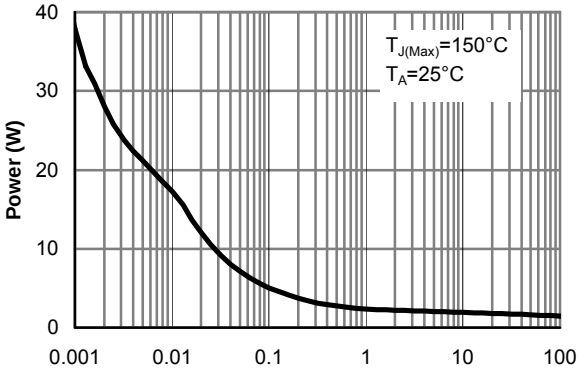


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

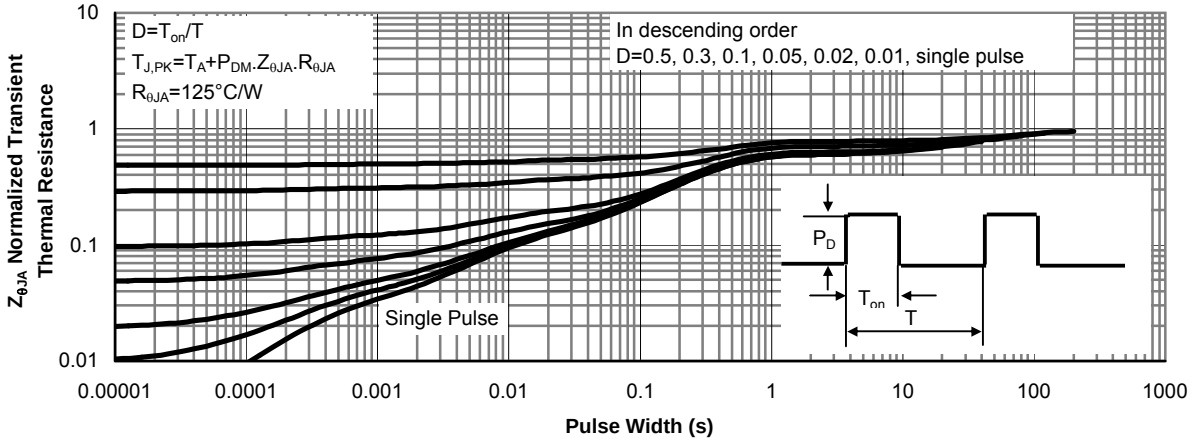


Figure 11: Normalized Maximum Transient Thermal Impedance