ALPHA & OMEGA SEMICONDUCTOR

AON7401
P-Channel Enhancement Mode Field Effect Transistor

General Description

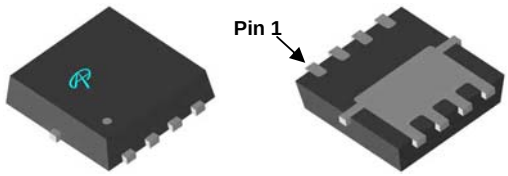
The AON7401/L uses advanced trench technology to provide excellent $R_{DS(ON)}$, and ultra-low low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications.
AON7401 and AON7401L are electrically identical.
-RoHS Compliant
-AON7401L is Halogen Free

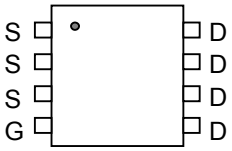
Features

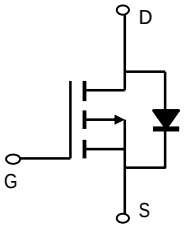
V_{DS} (V) = -30V
I_D = -9A (V_{GS} = -10V)
$R_{DS(ON)}$ < 14mΩ (V_{GS} = -10V)
$R_{DS(ON)}$ < 36mΩ (V_{GS} = -4.5V)

DFN 3x3

Top View **Bottom 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}	±25	V
Continuous Drain Current [B,G]	T_C=25°C	I_D	-20	A
	T_C=100°C		-20	
Pulsed Drain Current [C]		I_{DM}	-80	
Continuous Drain Current	T_A=25°C	I_{DSM}	-9	
	T_A=70°C		-7	
Power Dissipation [B]	T_C=25°C	P_D	27	W
	T_C=100°C		11	
Power Dissipation [A]	T_A=25°C	P_{DSM}	1.6	
	T_A=70°C		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	$R_{\theta JA}$	30	40	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		60	75	°C/W
Maximum Junction-to-Case [D]	Steady-State	$R_{\theta JC}$	4	4.5	°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}=-30V, V_{GS}=0V			-1	µA
		T_J=55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±25V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250µA	-1.7	-2.2	-3	V
$I_{D(ON)}$	On state drain current	V_{GS}=-10V, V_{DS}=-5V	-80			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-9A		11	14	mΩ
		T_J=125°C		14	17	
		V_{GS}=-4.5V, I_D=-5A		28	36	
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-10A		27		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}=-15V, f=1MHz		2060	2600	pF
C_{oss}	Output Capacitance			370		pF
C_{rss}	Reverse Transfer Capacitance			295		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		2.4	3.6	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-9A		30	39	nC
Q_{gs}	Gate Source Charge			4.6		nC
Q_{gd}	Gate Drain Charge			10		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=1.6Ω, R_{GEN}=3Ω		11		ns
t_r	Turn-On Rise Time			9.4		ns
$t_{D(off)}$	Turn-Off DelayTime			24		ns
t_f	Turn-Off Fall Time			12		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-9A, dI/dt=500A/µs		14	18	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-9A, dI/dt=500A/µs		35		nC

A: The value of $R_{\theta JA}$ is measured with the device in a still air environment with T_A =25°C. The power dissipation P_{DSM} and current rating I_{DSM} are based on $T_{J(MAX)}$=150°C, using steady state junction-to-ambient thermal resistance.

B. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C: Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.

D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to case $R_{\theta JC}$ and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300 µs pulses, duty cycle 0.5% max.

F. 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.

G. The maximum current rating is limited by bond-wires.

Rev0: Jun 2008

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

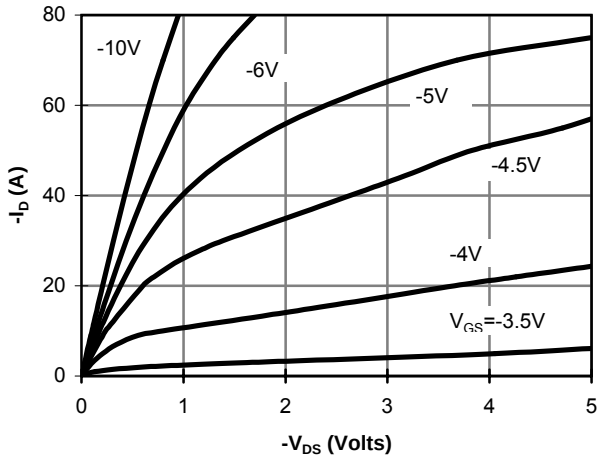


Figure 1: On-Region Characteristics

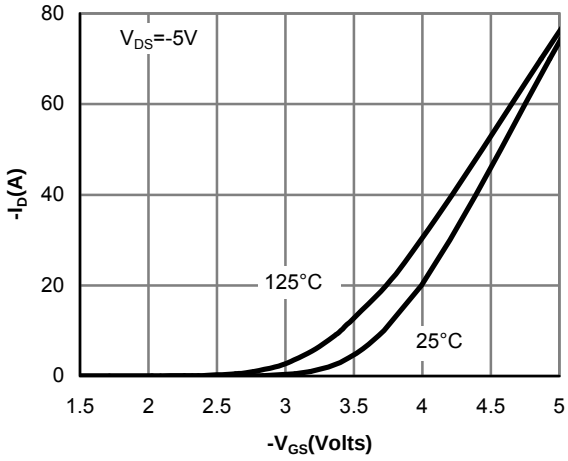


Figure 2: Transfer Characteristics

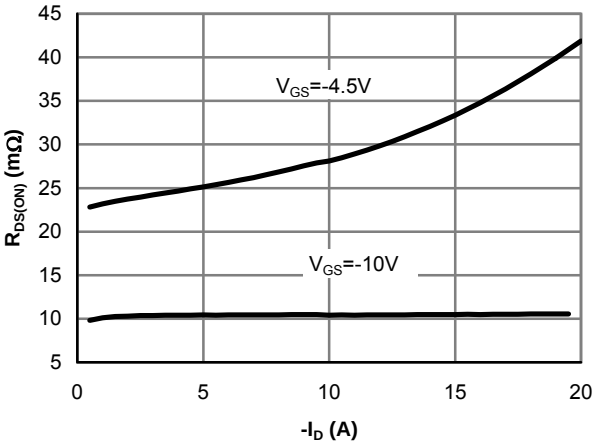


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

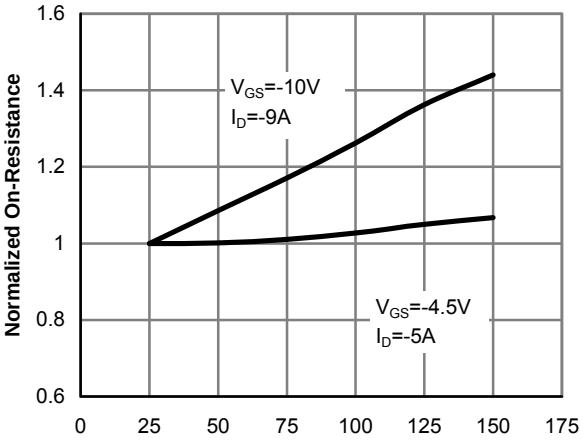


Figure 4: On-Resistance vs. Junction Temperature

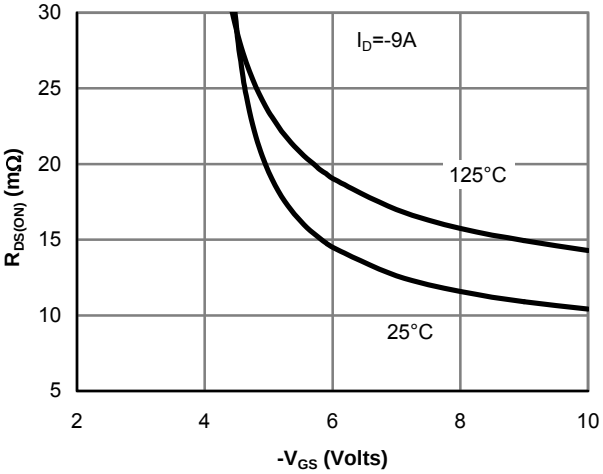


Figure 5: On-Resistance vs. Gate-Source Voltage

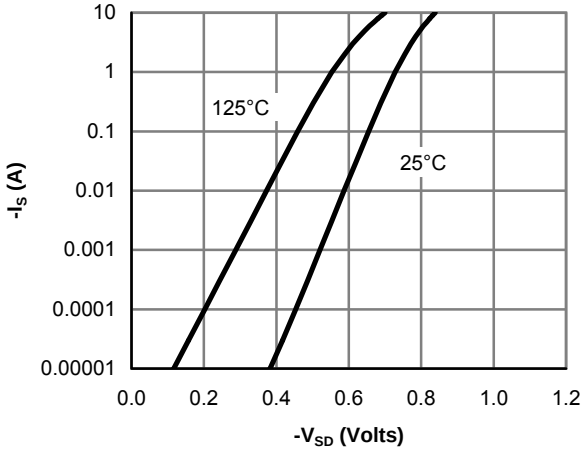


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

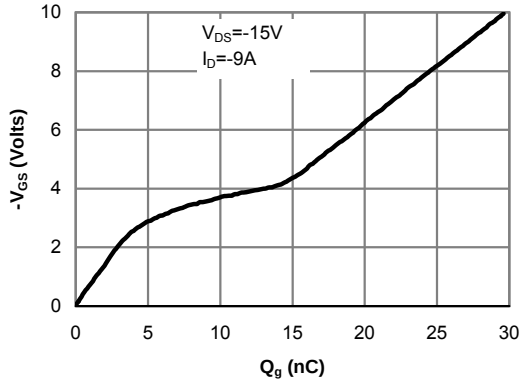


Figure 7: Gate-Charge Characteristics

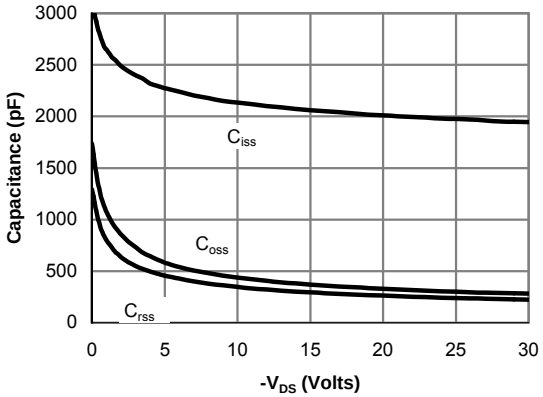


Figure 8: Capacitance Characteristics

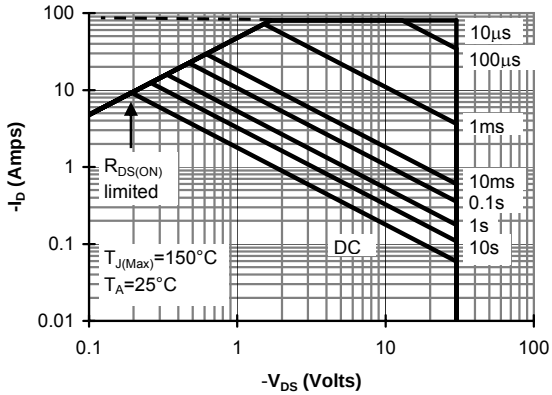


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

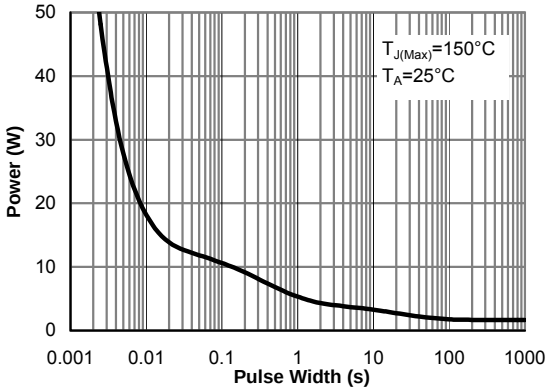


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

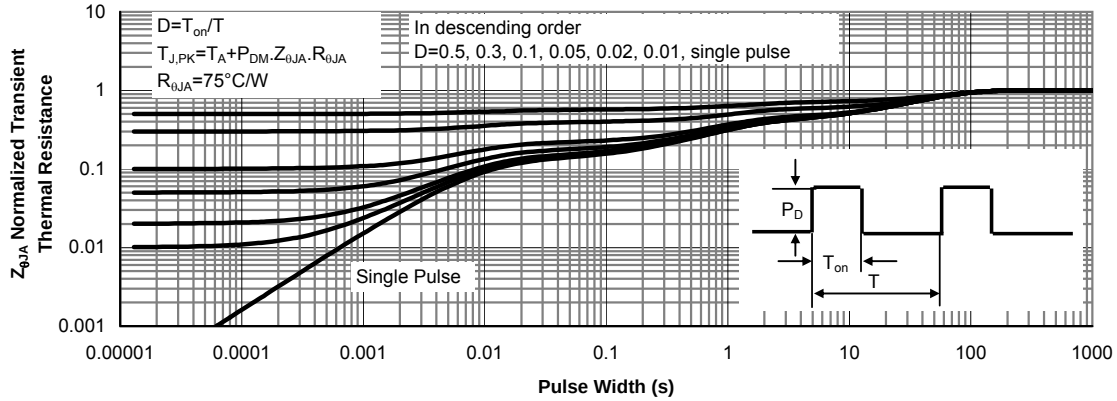


Figure 11: Normalized Maximum Transient Thermal Impedance(Note F)