ALPHA & OMEGA SEMICONDUCTOR

AO4474

N-Channel Enhancement Mode Field Effect Transistor

General Description

The AO4474/L uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge.This device is suitable for use as a high side switch in SMPS and general purpose applications.

AO4474 and AO4474L are electrically identical.

-RoHS Compliant

-AO4474L is Halogen Free

Features

V_{DS} (V) = 30V

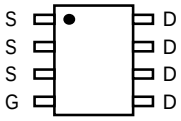
I_D = 13.4A (V_{GS} = 10V)

$R_{DS(ON)}$ < 11.5mΩ (V_{GS} = 10V)

$R_{DS(ON)}$ < 13.5mΩ (V_{GS} = 4.5V)

UIS Tested

Rg,Ciss,Coss,Crss Tested



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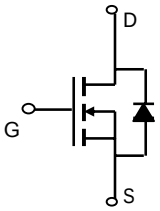

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current [A, F]	T_A=25°C	I_{DSM}	13.4	A
	T_A=70°C		10.7	
Pulsed Drain Current [B]		I_{DM}	60	
Power Dissipation	T_A=25°C	P_D	3.7	W
	T_A=70°C		2.4	
Avalanche Current [B, G]		I_{AR}	42	A
Repetitive avalanche energy 0.1mH [B, G]		E_{AR}	88	mJ
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	$R_{\theta JA}$	28	34	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		57	71	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	16	23	°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}= ±12V			0.1	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA	1	1.55	2.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V	60			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=13.4A		9.5	11.5	mΩ
		T_J=125°C		16.2	18	
		V_{GS}=4.5V, I_D=10A		11	13.5	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=13.4A		40		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.74	1.0	V
I_S	Maximum Body-Diode Continuous Current				5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		1210	1452	pF
C_{oss}	Output Capacitance			330	396	pF
C_{rss}	Reverse Transfer Capacitance			85	119	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.8	1.2	1.6	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=15V, I_D=13.4A		22	28	nC
Q_g(4.5V)	Total Gate Charge			10	13	nC
Q_{gs}	Gate Source Charge			3.7		nC
Q_{gd}	Gate Drain Charge			2.7		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=1.1Ω, R_{GEN}=3Ω		10		ns
t_r	Turn-On Rise Time			6.3		ns
$t_{D(off)}$	Turn-Off DelayTime			21		ns
t_f	Turn-Off Fall Time			2.8		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=13.4A, dI/dt=100A/µs		36	45	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=13.4A, dI/dt=100A/µs		47		nC
t_{rr}	Body Diode Reverse Recovery Time	I_F=13.4A, dI/dt=500A/µs		20	27	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=13.4A, dI/dt=500A/µs		55		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 <300 µs 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 junction to ambient thermal resistance rating.

G: L=100uH, V_{DD}=0V, R_G=0Ω, rated V_{DS}=30V and V_{GS}=10V

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

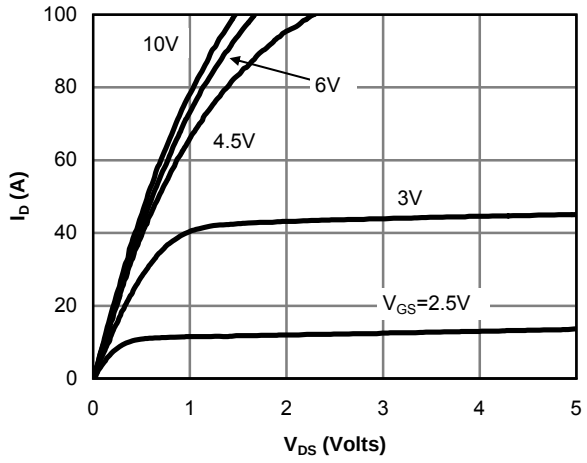

Fig 1: On-Region Characteristics

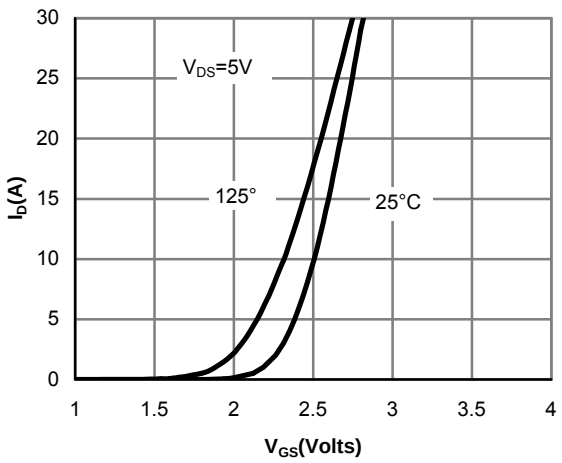

Figure 2: Transfer Characteristics

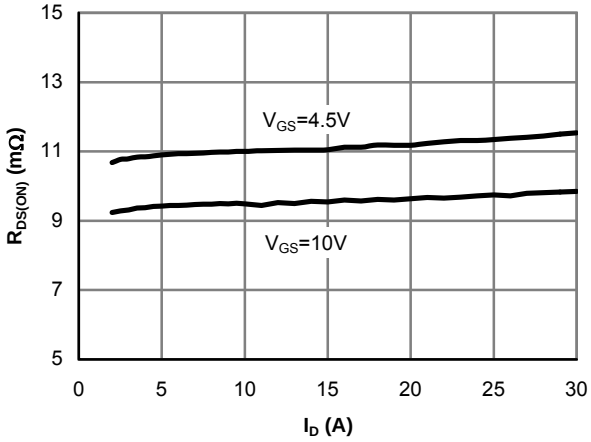

Figure 3: On-Resistance vs. Drain Current and Gate Voltage

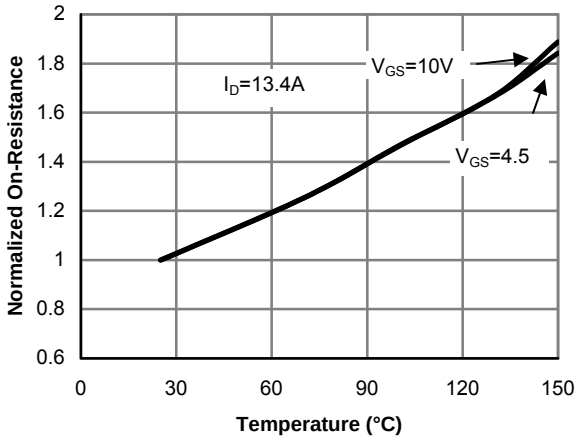

Figure 4: On-Resistance vs. Junction Temperature

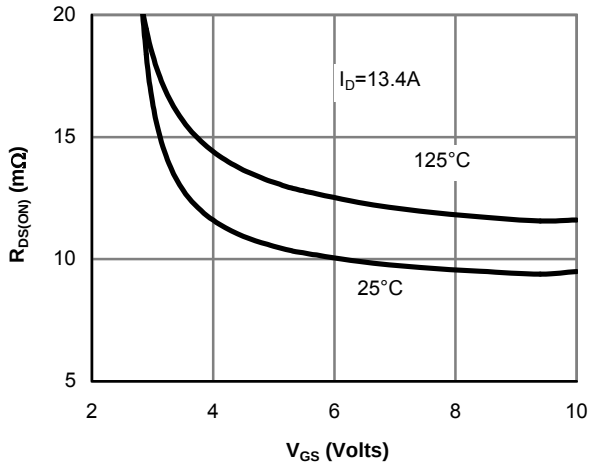

Figure 5: On-Resistance vs. Gate-Source Voltage

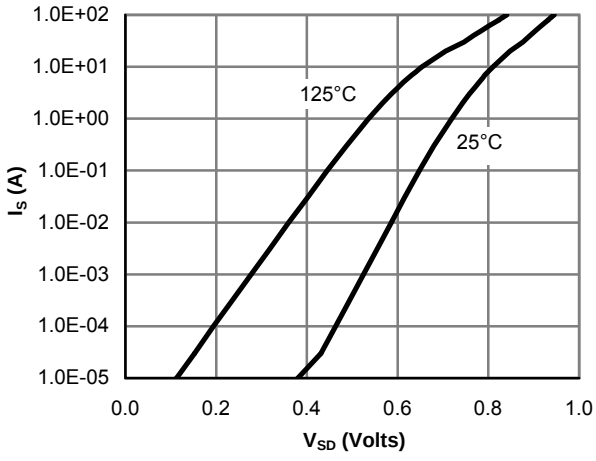

Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

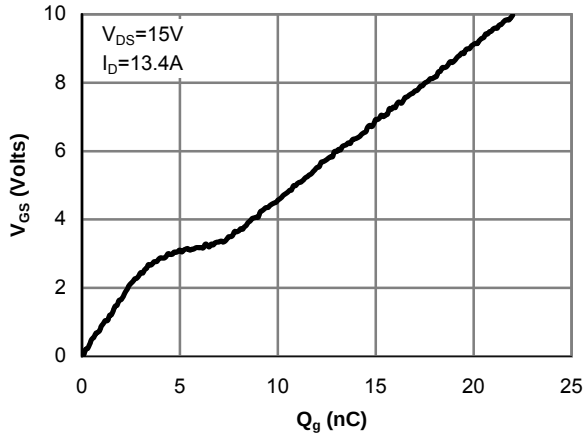

Figure 7: Gate-Charge Characteristics

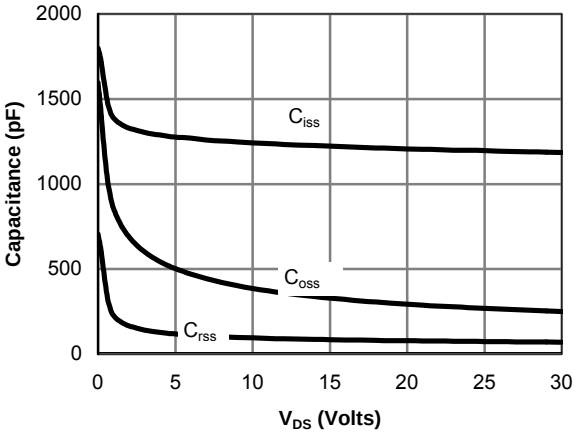

Figure 8: Capacitance Characteristics

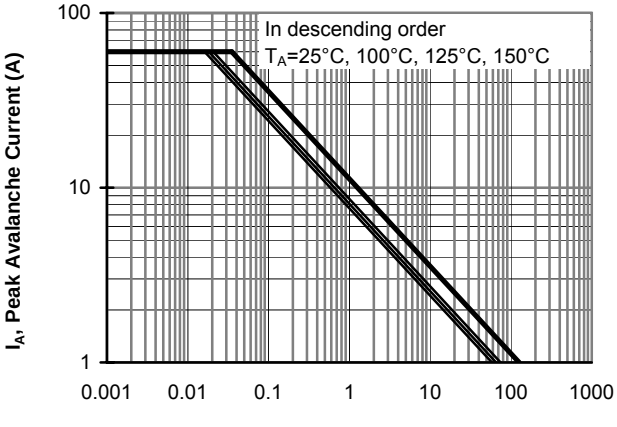

Figure 9: Single Pulse Avalanche Capability

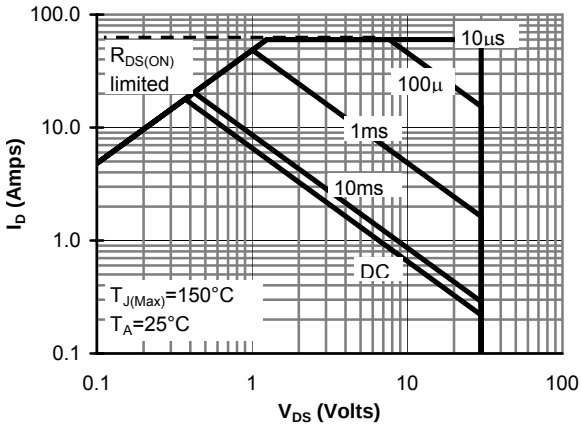

Figure 10: Maximum Forward Biased Safe Operating Area (Note F)

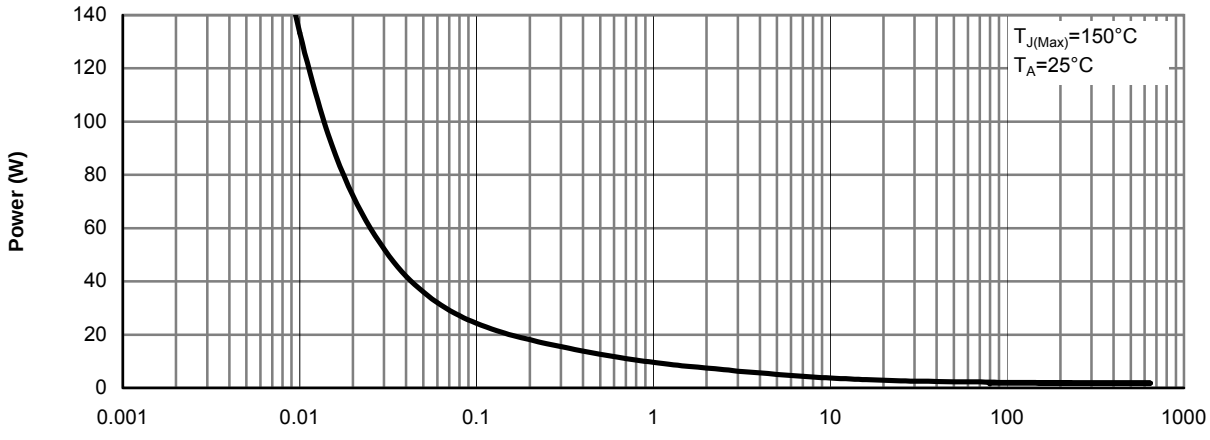

Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note G)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

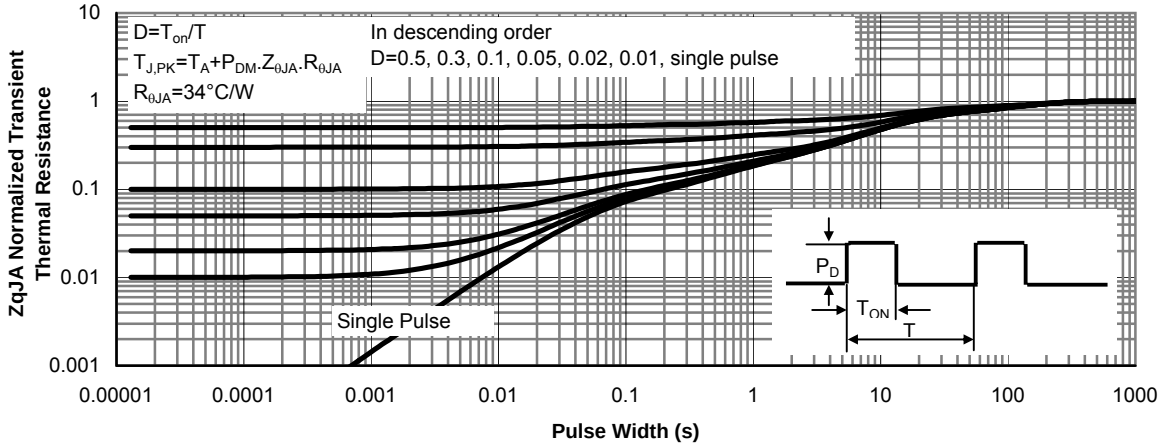

Figure 12: Normalized Maximum Transient Thermal Impedance (Note G)