



**AO4474**

**N-Channel Enhancement Mode Field Effect Transistor**



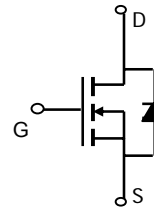
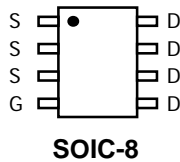
**General Description**

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)  
 $R_{DS(ON)} < 11.5m\Omega$  ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 13.5m\Omega$  ( $V_{GS}$  = 4.5V)

**UIS Tested**  
**Rg,Ciss,Coss,Crss Tested**



**Absolute Maximum Ratings  $T_A=25^\circ C$  unless otherwise noted**

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current <sup>A, F</sup>	$I_{DSM}$	$T_A=25^\circ C$	13.4
		$T_A=70^\circ C$	10.7
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	60	A
Power Dissipation	$P_D$	$T_A=25^\circ C$	3.7
		$T_A=70^\circ C$	2.4
Avalanche Current <sup>B, G</sup>	$I_{AR}$	42	A
Repetitive avalanche energy 0.1mH <sup>B, G</sup>	$E_{AR}$	88	mJ
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	$t \leq 10s$	28	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	57	$^\circ C/W$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	16	23	$^\circ C/W$

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±12V			0.1	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.55	2.5	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	60			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =13.4A T <sub>J</sub> =125°C		9.5 16.2	11.5 18	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A		11	13.5	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =13.4A		40		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.74	1.0	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				5	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance			1210	1452	pF
C <sub>oss</sub>	Output Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		330	396	pF
C <sub>rss</sub>	Reverse Transfer Capacitance			85	119	pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	0.8	1.2	1.6	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge			22	28	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =13.4A		10	13	nC
Q <sub>gs</sub>	Gate Source Charge			3.7		nC
Q <sub>gd</sub>	Gate Drain Charge			2.7		nC
t <sub>D(on)</sub>	Turn-On Delay Time			10		ns
t <sub>r</sub>	Turn-On Rise Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =1.1Ω,		6.3		ns
t <sub>D(off)</sub>	Turn-Off Delay Time	R <sub>GEN</sub> =3Ω		21		ns
t <sub>f</sub>	Turn-Off Fall Time			2.8		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =13.4A, dI/dt=100A/μs		36	45	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =13.4A, dI/dt=100A/μs		47		nC
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =13.4A, dI/dt=500A/μs		20	27	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =13.4A, dI/dt=500A/μs		55		nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=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<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

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

E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

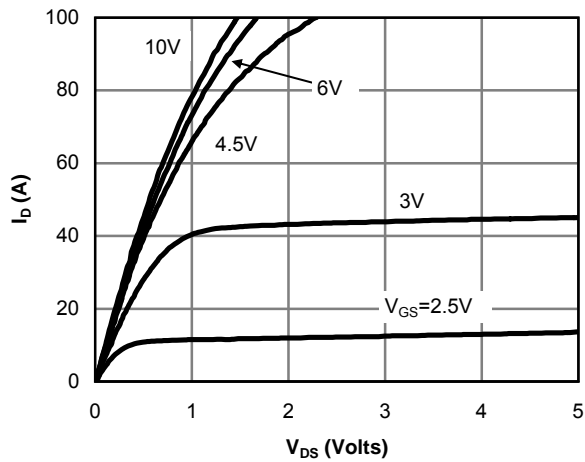
F: The current rating is based on the t ≤ 10s junction to ambient thermal resistance rating.

G: L=100uH, V<sub>DD</sub>=0V, R<sub>G</sub>=0Ω, rated V<sub>DS</sub>=30V and V<sub>GS</sub>=10V

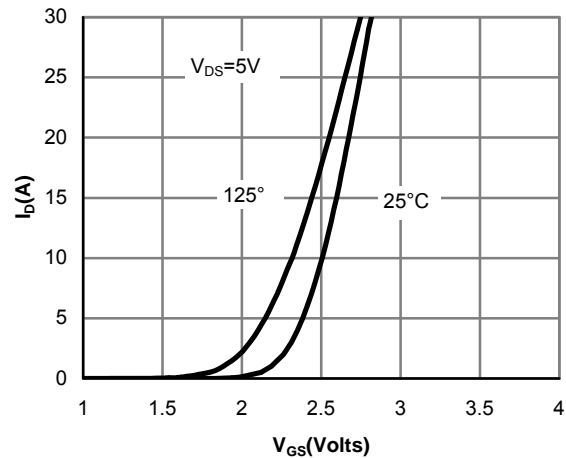
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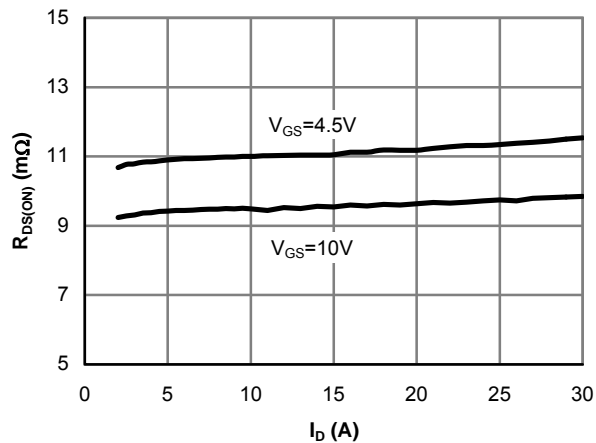
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



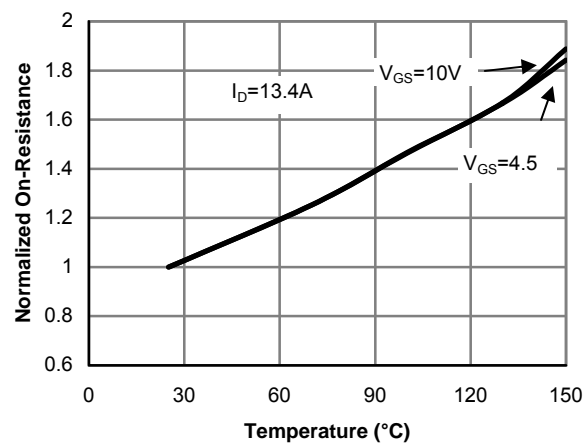
**Fig 1: On-Region Characteristics**



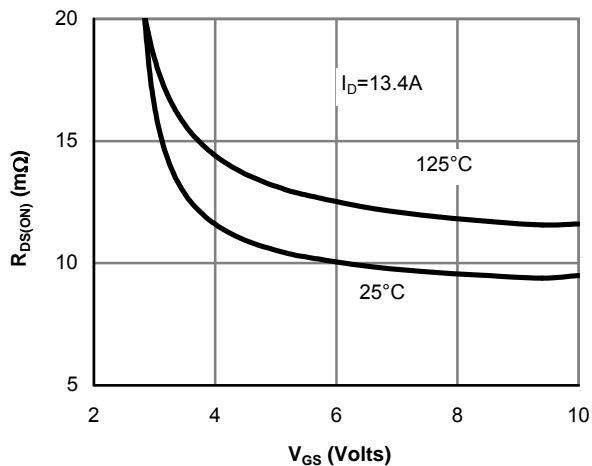
**Figure 2: Transfer Characteristics**



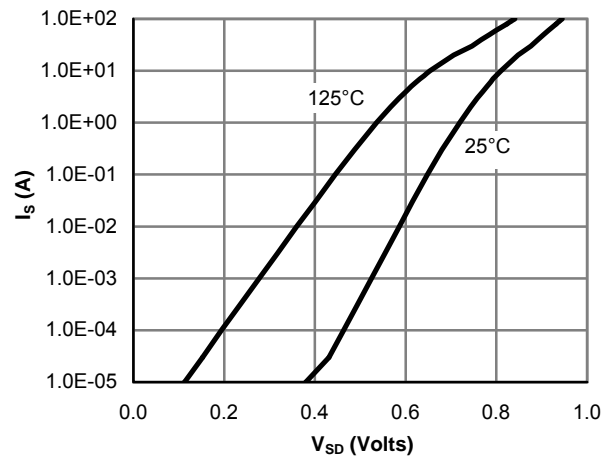
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**Figure 4: On-Resistance vs. Junction Temperature**



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



**Figure 6: Body-Diode Characteristics**

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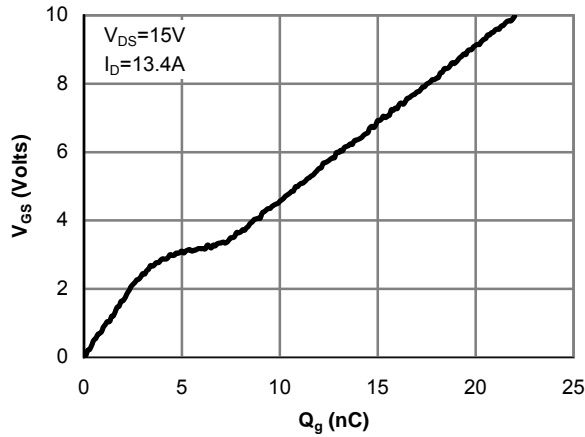


Figure 7: Gate-Charge Characteristics

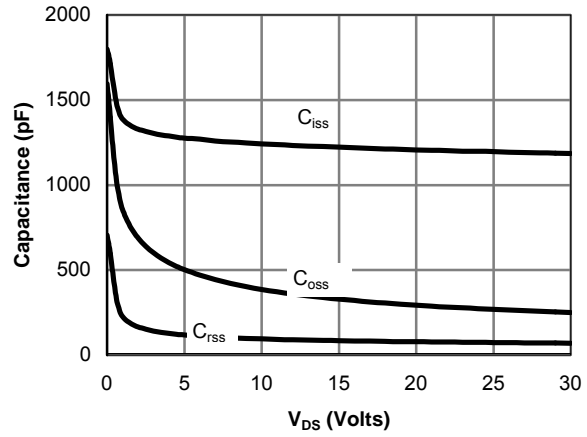


Figure 8: Capacitance Characteristics

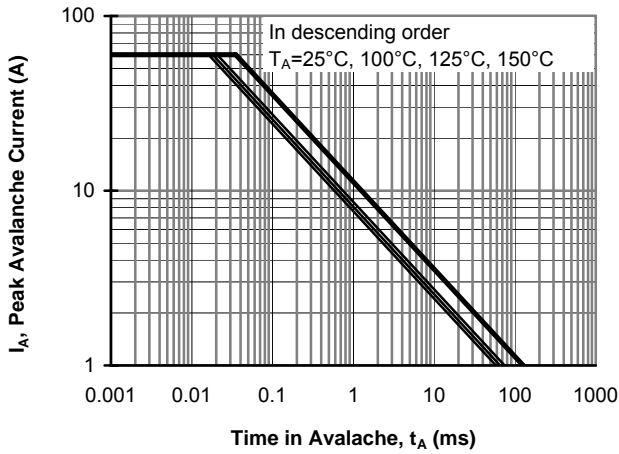


Figure 9: Single Pulse Avalanche Capability

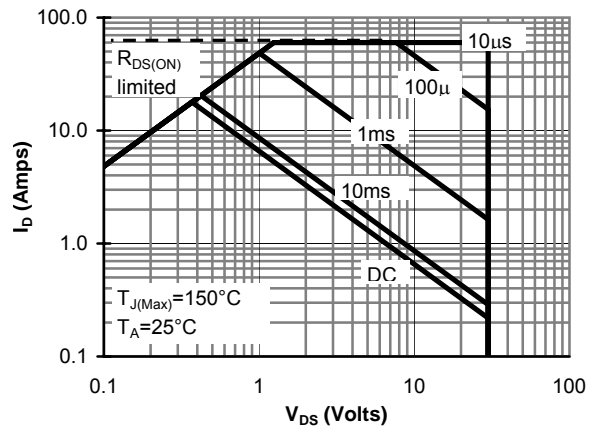


Figure 10: Maximum Forward Biased Safe Operating Area (Note F)

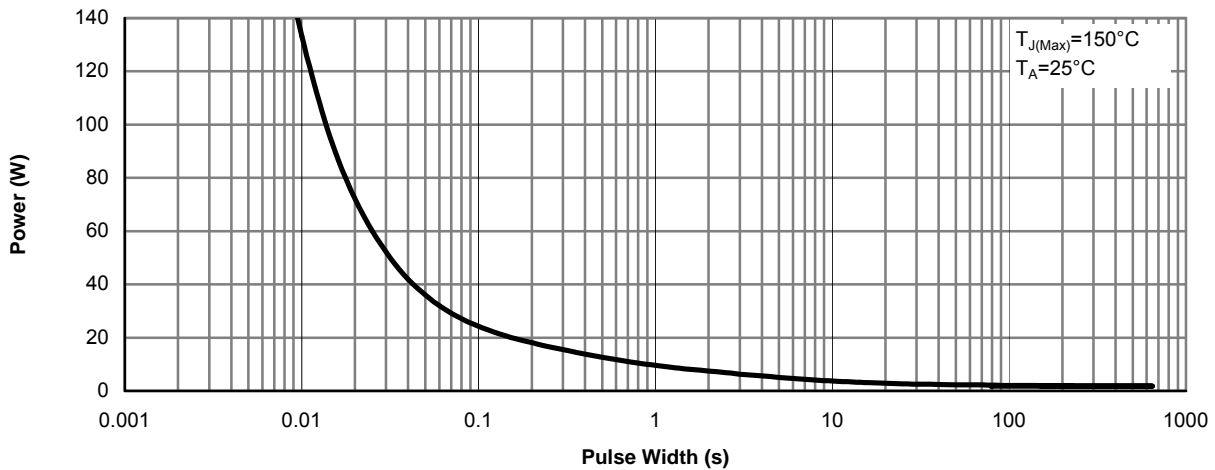


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note G)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

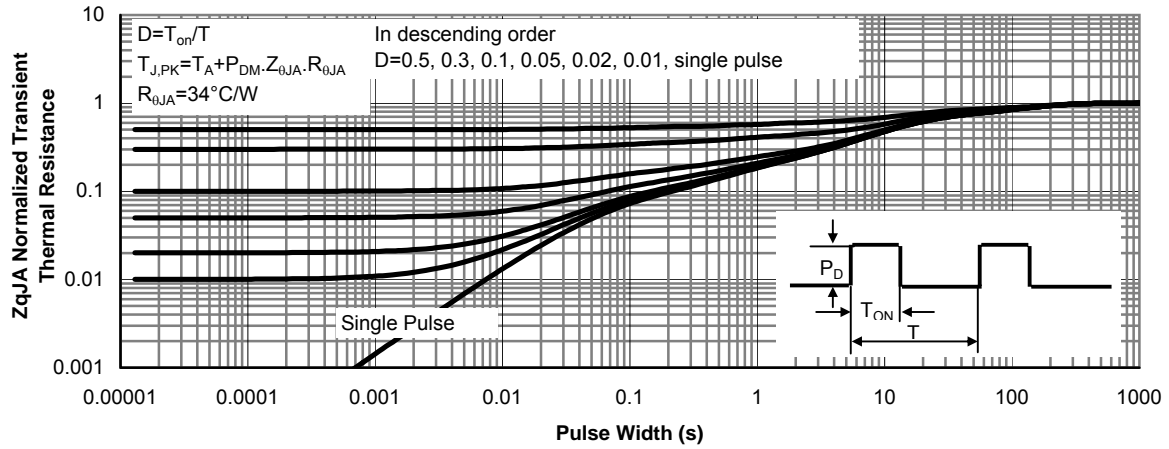


Figure 12: Normalized Maximum Transient Thermal Impedance (Note G)