ALPHA & OMEGA SEMICONDUCTOR

AOL1434
N-Channel Enhancement Mode Field Effect Transistor

General Description

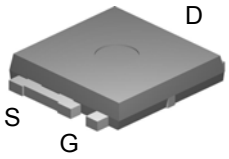
The AOL1434 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications. Standard product AOL1434 is Pb-free (meets ROHS & Sony 259 specifications). AOL1434L is a Green Product ordering option. AOL1434 and AOL1434L are electrically identical.

Features

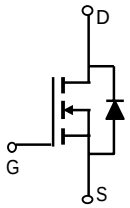
V_{DS} (V) = 25V
I_D = 50A (V_{GS} = 10V)
$R_{DS(ON)}$ <6.3 mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 10 mΩ (V_{GS} = 4.5V)

Ultra SO-8™ Top View

Fits SOIC8 footprint !



Bottom tab connected to drain



Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	25	V
Gate-Source Voltage		V_{GS}	20	V
Continuous Drain Current [B]	T_C=25°C	I_D	50	A
	T_C=100°C [B]		34	
Pulsed Drain Current		I_{DM}	150	
Continuous Drain Current [H]	T_A=25°C	I_{DSM}	14	A
	T_A=70°C		11	
Avalanche Current [C]		I_{AR}	30	A
Repetitive avalanche energy L=0.3mH [C]		E_{AR}	135	mJ
Power Dissipation [B]	T_C=25°C	P_D	38	W
	T_C=100°C		13	
Power Dissipation [A]	T_A=25°C	P_{DSM}	2.1	W
	T_A=70°C		1	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	18	25	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		49	60	°C/W
Maximum Junction-to-Case [C]	Steady-State	$R_{\theta JC}$	2.5	4	°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	25			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V			1	µA
		T_J=55°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±20V			0.1	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA	0.8	1.4	2.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V	150			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=30A		5.2	6.3	mΩ
		T_J=125°C		7.8	9.4	
		V_{GS}=4.5V, I_D=20A		7.8	10	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A		49		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.74	1.0	V
I_S	Maximum Body-Diode Continuous Current				50	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=12.5V, f=1MHz		2050	2460	pF
C_{oss}	Output Capacitance			485		pF
C_{rss}	Reverse Transfer Capacitance			280		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		0.86	1.5	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=12.5V, I_D=20A		34	41	nC
Q_g(4.5V)	Total Gate Charge			17	22	nC
Q_{gs}	Gate Source Charge			5		nC
Q_{gd}	Gate Drain Charge			3.5		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=12.5V, R_L=0.68Ω, R_{GEN}=3Ω		7.5		ns
t_r	Turn-On Rise Time			11		ns
$t_{D(off)}$	Turn-Off DelayTime			27		ns
t_f	Turn-Off Fall Time			8		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, dI/dt=100A/µs		30	36	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, dI/dt=100A/µs		19		nC

A: The value of $R_{\theta JA}$ is measured with the device in a still air environment with T_A =25°C.
B. The power dissipation P_D is based on TJ(MAX)=175°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 TJ(MAX)=175°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 ms pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assumir a maximum junction temperature of TJ(MAX)=175°C.
G. 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.
H. Surface mounted on a 1 in 2 FR-4 board with 2oz. Copper.
Rev0: Mar 2006

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

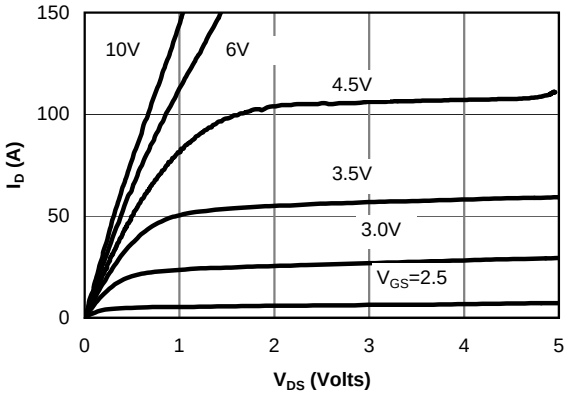


Fig 1: On-Region Characteristics

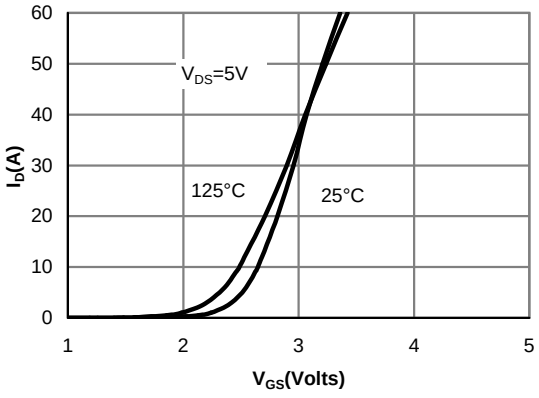


Figure 2: Transfer Characteristics

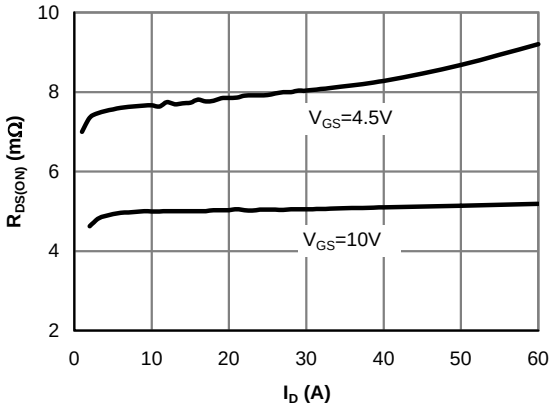


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

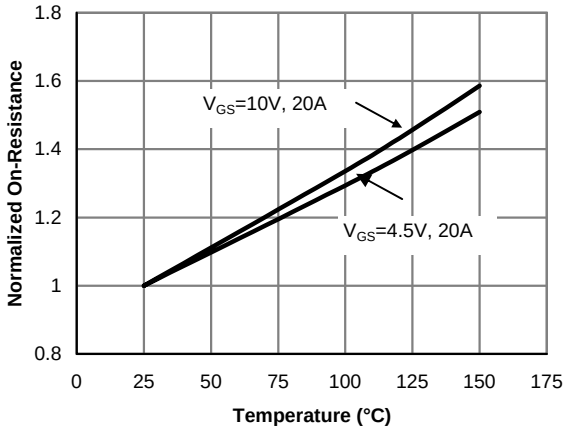


Figure 4: On-Resistance vs. Junction Temperature

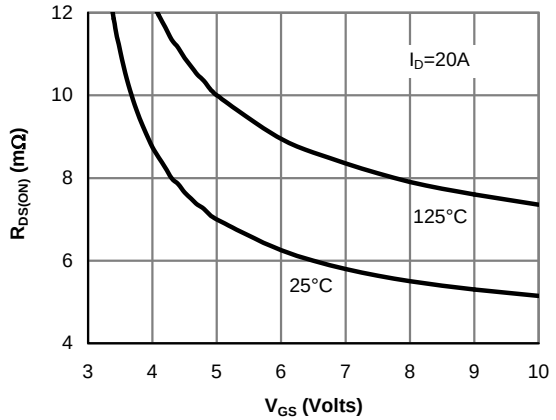


Figure 5: On-Resistance vs. Gate-Source Voltage

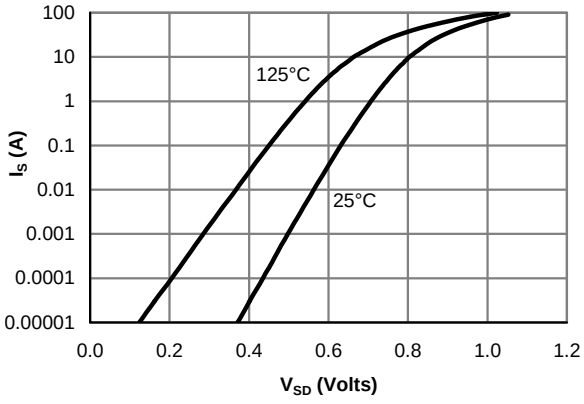


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

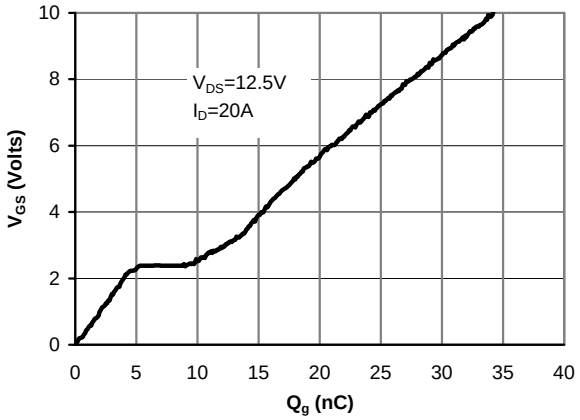


Figure 7: Gate-Charge Characteristics

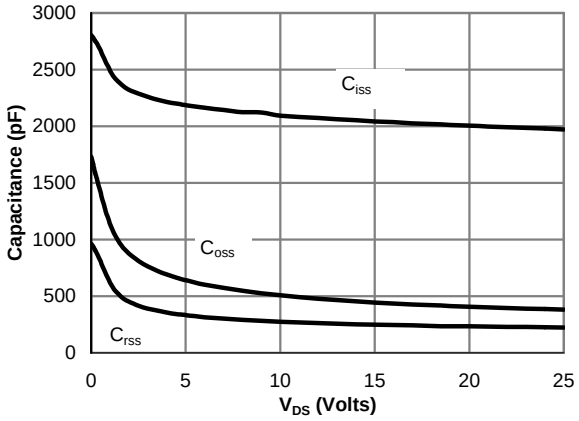


Figure 8: Capacitance Characteristics

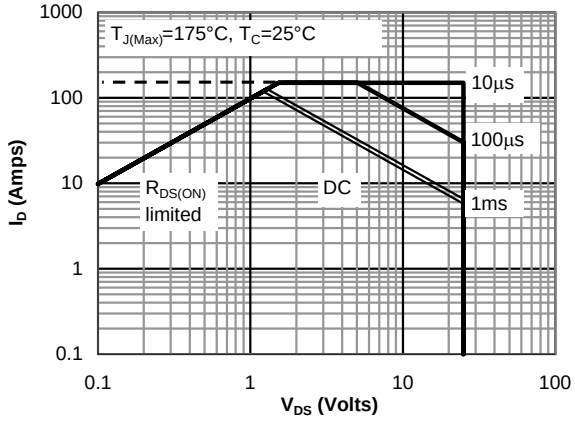


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

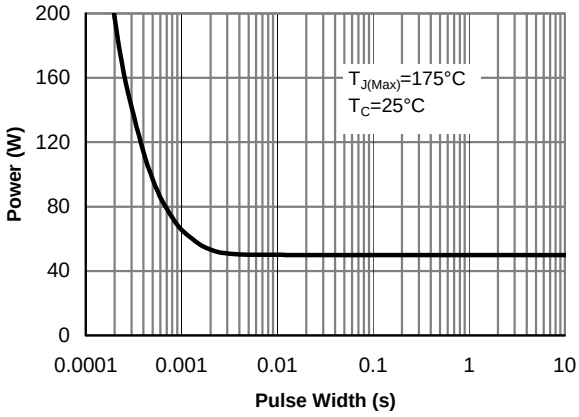


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

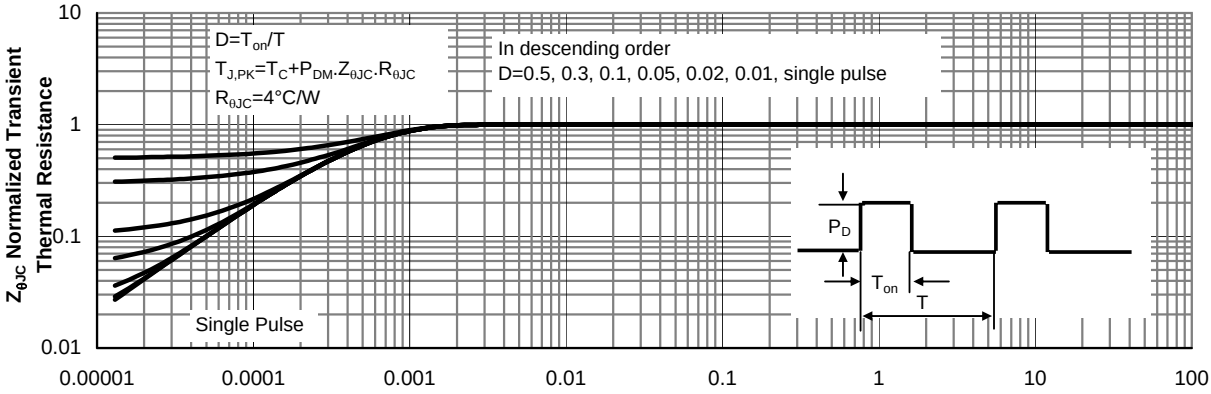


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

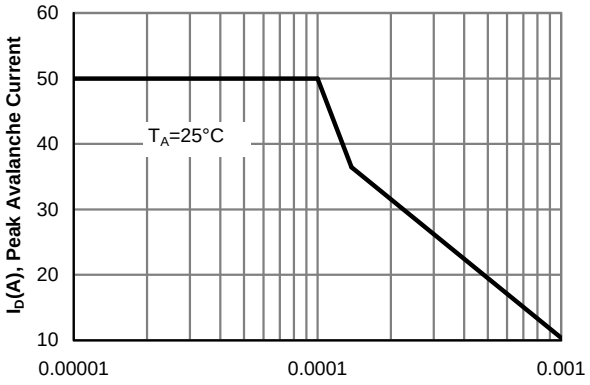


Figure 12: Single Pulse Avalanche capability

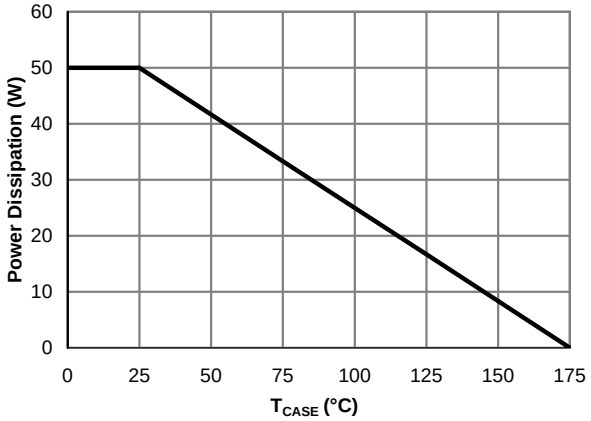


Figure 13: Power De-rating (Note B)

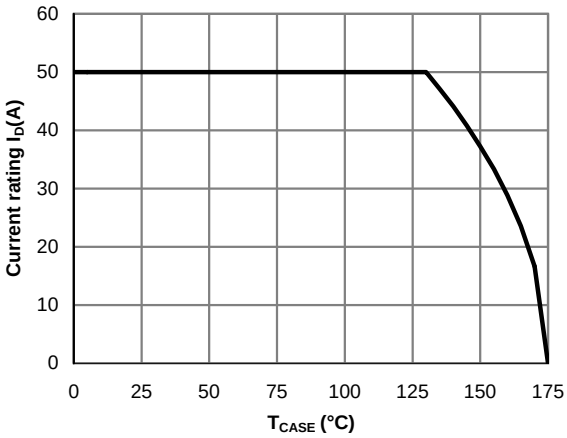


Figure 14: Current De-rating (Note B)

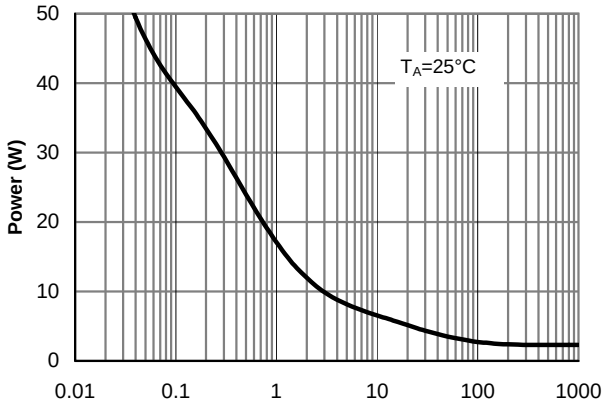


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

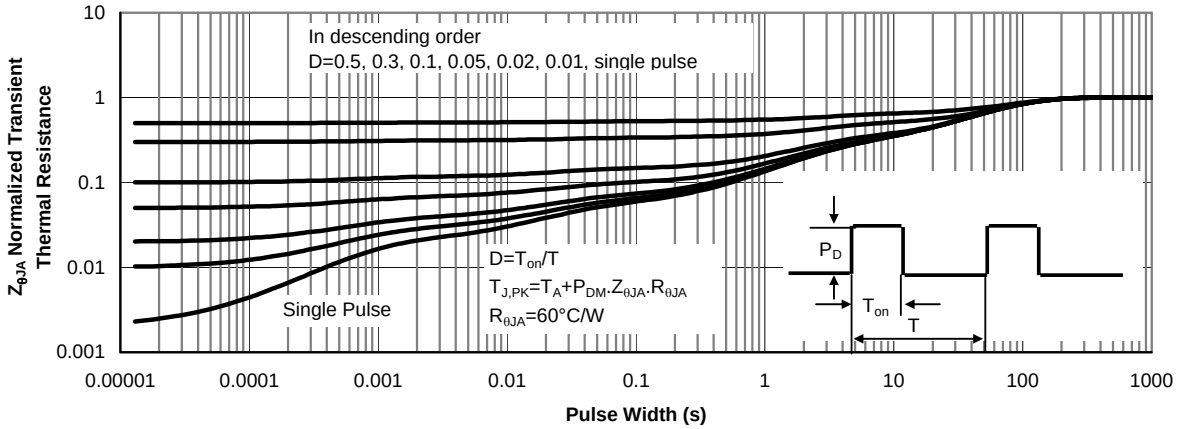


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)