



AOL1434

N-Channel Enhancement Mode Field Effect Transistor



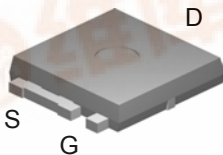
General Description

The AOL1434 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ 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

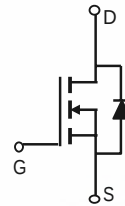
$V_{DS} (V) = 25V$
 $I_D = 50A (V_{GS} = 10V)$
 $R_{DS(ON)} < 6.3 m\Omega (V_{GS} = 10V)$
 $R_{DS(ON)} < 10 m\Omega (V_{GS} = 4.5V)$

Ultra SO-8™ Top View



Bottom tab
connected to
drain

**Fits SOIC8
footprint !**



Absolute Maximum Ratings $T_A=25^\circ C$ 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	I_D	50	A
$T_C=25^\circ C$		34	
$T_C=100^\circ C$ ^B			
Pulsed Drain Current	I_{DM}	150	
Continuous Drain Current ^H	I_{DSM}	14	A
$T_A=25^\circ C$		11	
$T_A=70^\circ C$			
Avalanche Current ^C	I_{AR}	30	A
Repetitive avalanche energy $L=0.3mH$ ^C	E_{AR}	135	mJ
Power Dissipation ^B	P_D	38	W
$T_C=25^\circ C$		13	
$T_C=100^\circ C$			
Power Dissipation ^A	P_{DSM}	2.1	W
$T_A=25^\circ C$		1	
$T_A=70^\circ C$			
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	18	25	$^\circ C/W$
$t \leq 10s$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	49	60	$^\circ C/W$
Steady-State				
Maximum Junction-to-Case ^C	$R_{\theta JC}$	2.5	4	$^\circ C/W$
Steady-State				

Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	25			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=20\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^{\circ}\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			0.1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	0.8	1.4	2.5	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	150			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=30\text{A}$ $T_J=125^{\circ}\text{C}$		5.2 7.8	6.3 9.4	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=20\text{A}$		7.8	10	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=20\text{A}$		49		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.74	1.0	V
I_S	Maximum Body-Diode Continuous Current				50	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=12.5\text{V}$, $f=1\text{MHz}$		2050	2460	pF
C_{oss}	Output Capacitance			485		pF
C_{rss}	Reverse Transfer Capacitance			280		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		0.86	1.5	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=12.5\text{V}$, $I_D=20\text{A}$		34	41	nC
$Q_g(4.5\text{V})$	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 Delay Time	$V_{GS}=10\text{V}$, $V_{DS}=12.5\text{V}$, $R_L=0.68\Omega$, $R_{GEN}=3\Omega$		7.5		ns
t_r	Turn-On Rise Time			11		ns
$t_{D(off)}$	Turn-Off Delay Time			27		ns
t_f	Turn-Off Fall Time			8		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=20\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		30	36	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=20\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		19		nC

A: The value of $R_{\theta JA}$ is measured with the device in a still air environment with $T_A=25^{\circ}\text{C}$.

B: The power dissipation P_D is based on $T_J(\text{MAX})=175^{\circ}\text{C}$, 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 $T_J(\text{MAX})=175^{\circ}\text{C}$.

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

E: The static characteristics in Figures 1 to 6 are obtained using $<300\text{ ms}$ pulses, duty cycle 0.5% max.

F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_J(\text{MAX})=175^{\circ}\text{C}$.

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 $T_A=25^{\circ}\text{C}$. 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

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

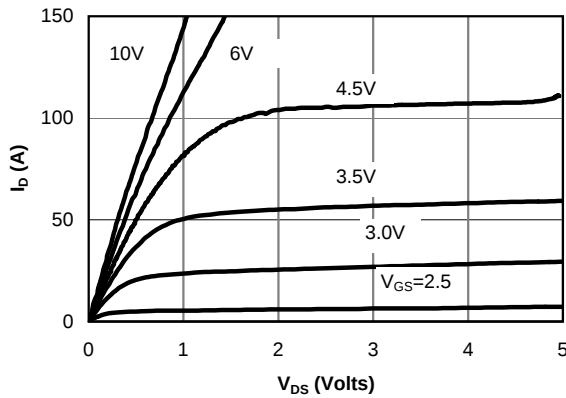


Fig 1: On-Region Characteristics

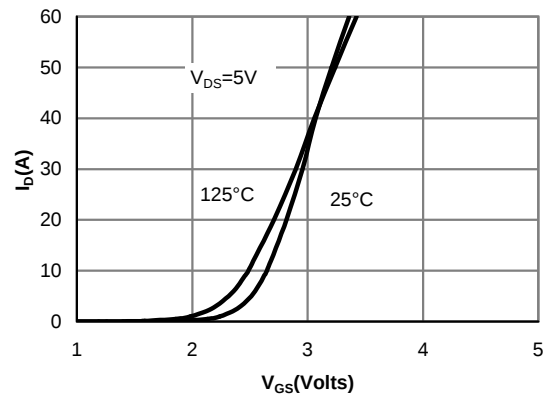


Figure 2: Transfer Characteristics

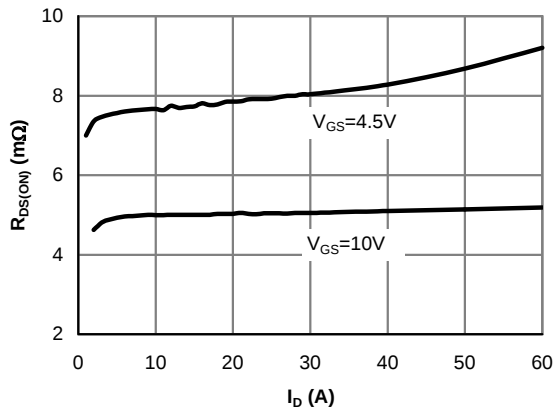


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

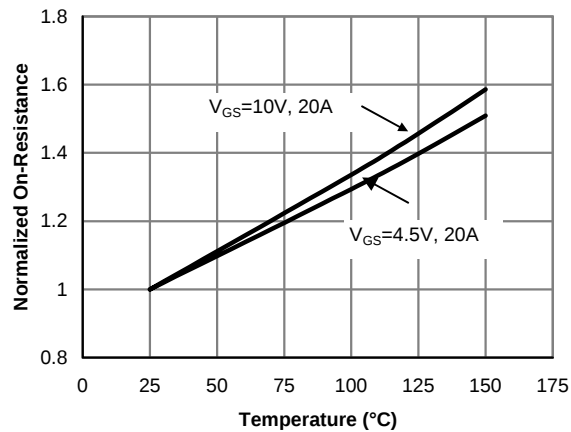


Figure 4: On-Resistance vs. Junction Temperature

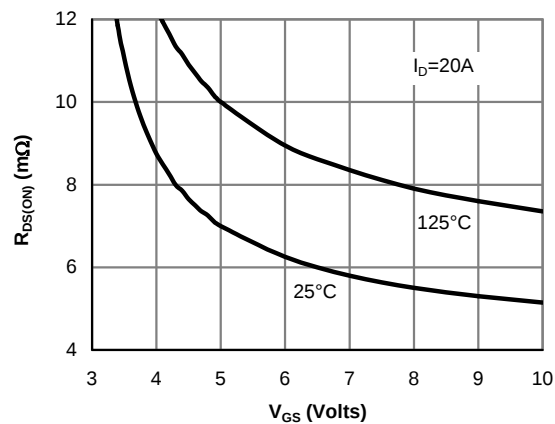


Figure 5: On-Resistance vs. Gate-Source Voltage

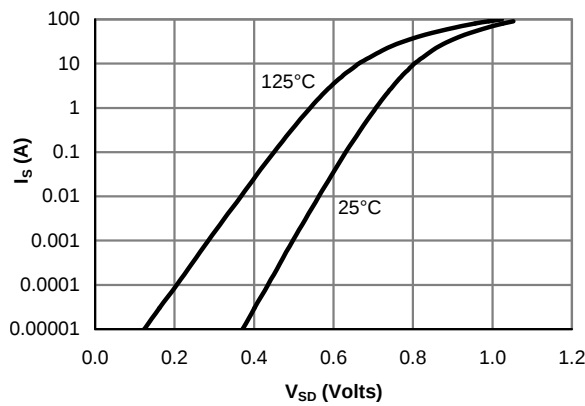


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

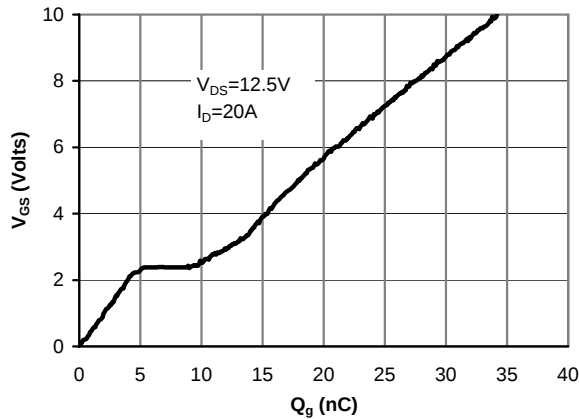


Figure 7: Gate-Charge Characteristics

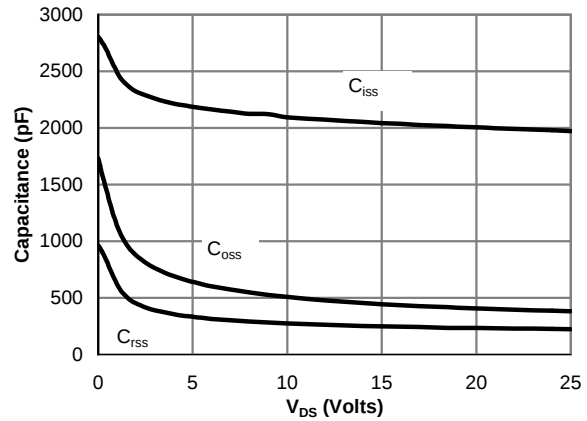


Figure 8: Capacitance Characteristics

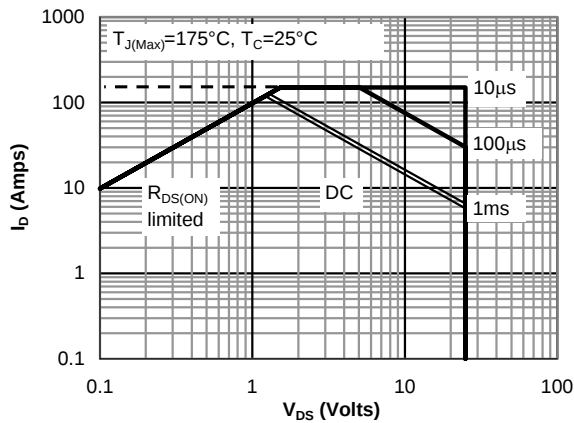


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

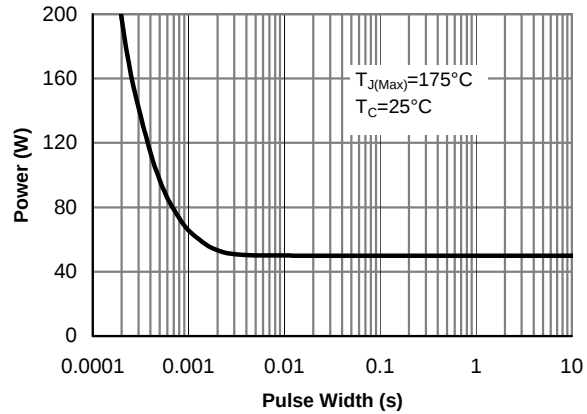


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

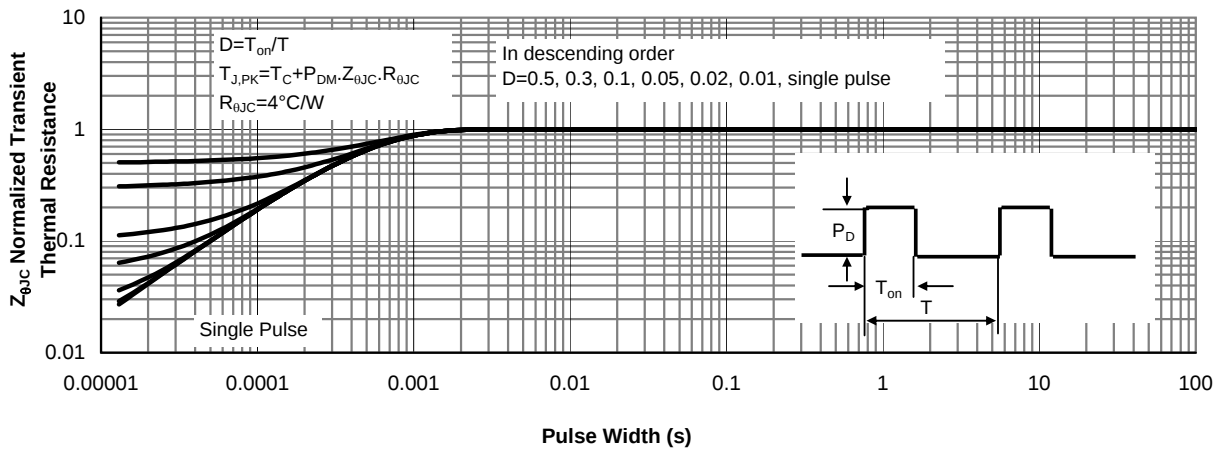


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

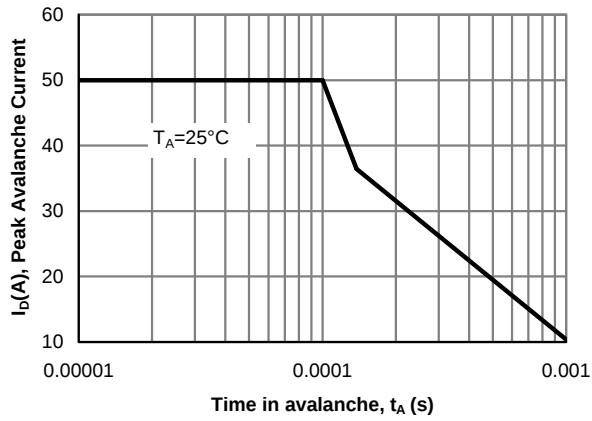


Figure 12: Single Pulse Avalanche capability

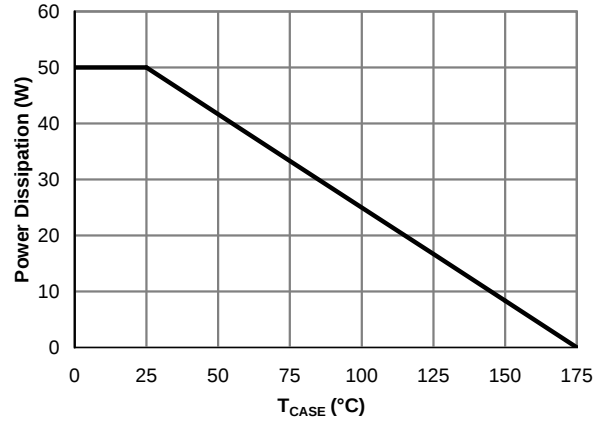


Figure 13: Power De-rating (Note B)

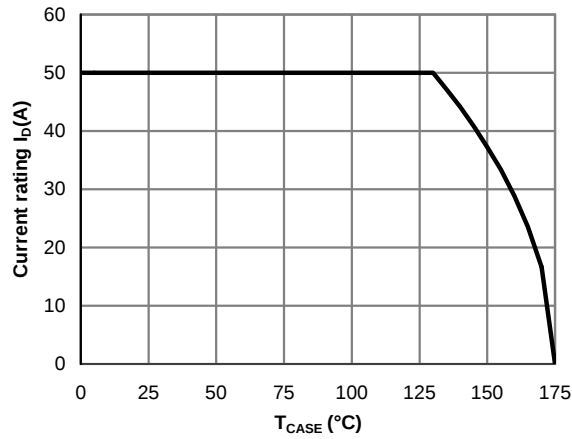


Figure 14: Current De-rating (Note B)

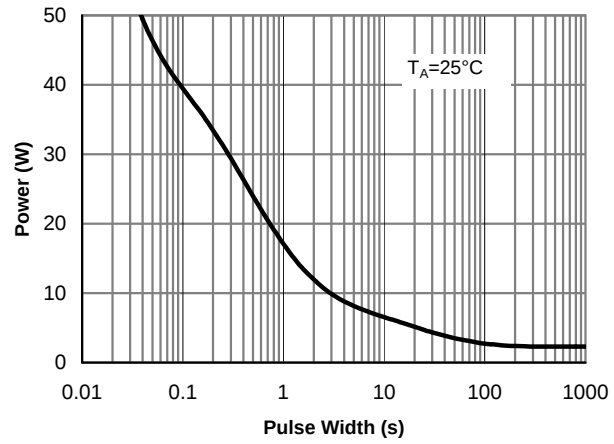


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

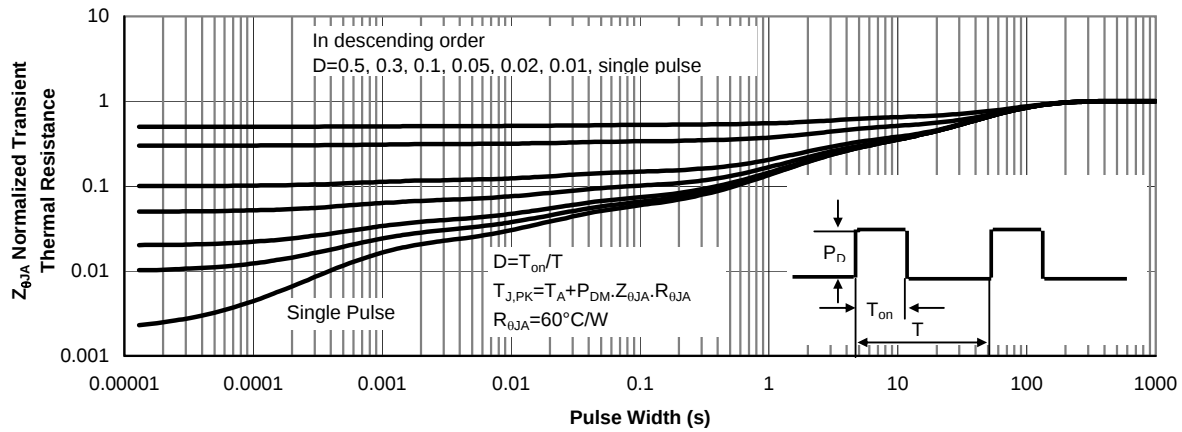


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

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