

**AOL1400**  
**N-Channel Enhancement Mode Field Effect Transistor**

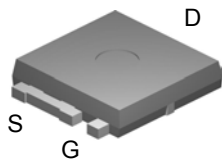
**General Description**

The AOL1400 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , shoot-through immunity and good body diode characteristics. This device is ideally suited for use as a low side switch in CPU core power conversion. *Standard product AOL1400 is Pb-free (meets ROHS & Sony 259 specifications). AOL1400L is a Green Product ordering option. AOL1400 and AOL1400L are electrically identical.*

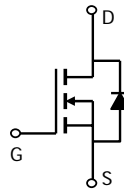
**Features**

$V_{DS} (V) = 30V$   
 $I_D = 85A \quad (V_{GS} = 10V)$   
 $R_{DS(ON)} < 4.5m\Omega \quad (V_{GS} = 10V)$   
 $R_{DS(ON)} < 5.5m\Omega \quad (V_{GS} = 4.5V)$

Ultra SO-8™ Top View


**Fits SOIC8 footprint !**

Bottom tab connected to drain


**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>B</sup>	$I_D$	$T_C=25^\circ C^G$	A
		$T_C=100^\circ C^B$	
Pulsed Drain Current	$I_{DM}$	200	A
Continuous Drain Current <sup>G</sup>	$I_{DSM}$	$T_A=25^\circ C$	W
		$T_A=70^\circ C$	
Avalanche Current <sup>C</sup>	$I_{AR}$	30	A
Repetitive avalanche energy $L=0.3mH^C$	$E_{AR}$	145	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ C$	W
		$T_C=100^\circ C$	
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ C$	W
		$T_A=70^\circ C$	
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 <sup>A</sup>	$R_{\theta JA}$	21	25	$^\circ C/W$
$t \leq 10s$				
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JC}$	1	1.5	$^\circ C/W$
Steady-State				
Maximum Junction-to-Case <sup>C</sup>				

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> =24V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C		0.005	1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±12V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA	0.6	1.1	1.8	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V	100			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A T <sub>J</sub> =125°C		3.9 5	4.5 6	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A		4.6	5.5	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		102		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.64	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				85	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		9130	10500	pF
C <sub>oss</sub>	Output Capacitance			625		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			387		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		0.4	0.8	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g(4.5V)</sub>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A		72.4	85	nC
Q <sub>gs</sub>	Gate Source Charge			13.4		nC
Q <sub>gd</sub>	Gate Drain Charge			16.8		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.75Ω, R <sub>GEN</sub> =3Ω		14.7	22	ns
t <sub>r</sub>	Turn-On Rise Time			14.2	21	ns
t <sub>D(off)</sub>	Turn-Off DelayTime			105.5	150	ns
t <sub>f</sub>	Turn-Off Fall Time			23.5	35	ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =20A, dI/dt=100A/μs		30.5	40	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =20A, dI/dt=100A/μs		21	33	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 Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

B: The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=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 T<sub>J(MAX)</sub>=175°C.

D: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using <300μs 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<sub>J(MAX)</sub>=175°C.

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

H: 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<sub>A</sub>=25°C.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

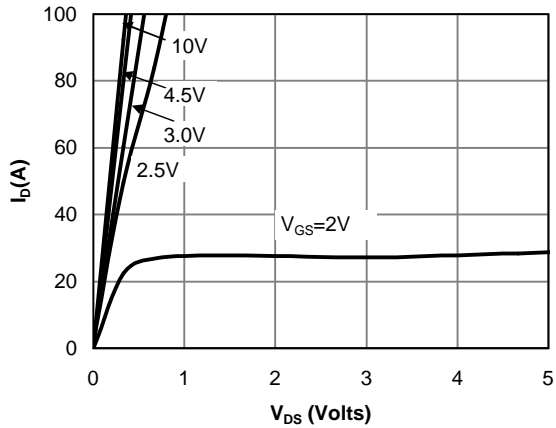


Figure 1: On-Region Characteristics

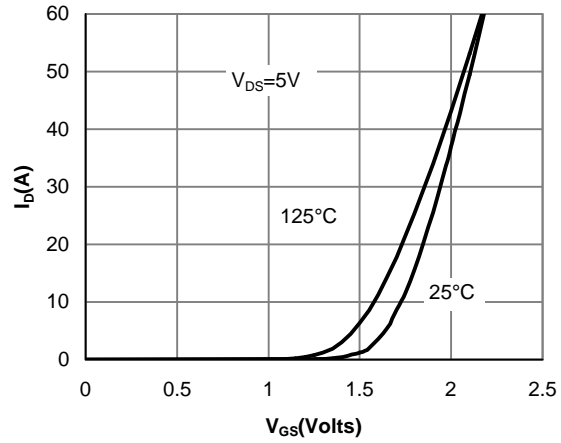


Figure 2: Transfer Characteristics

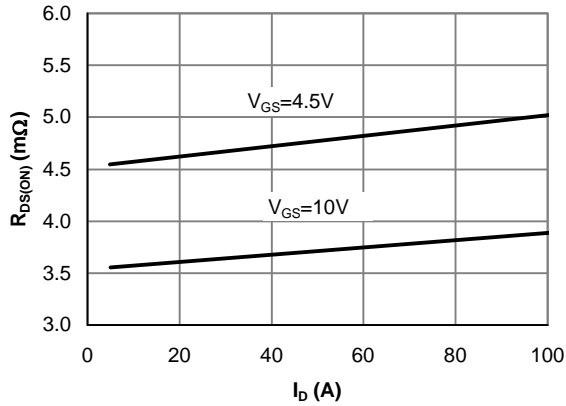


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

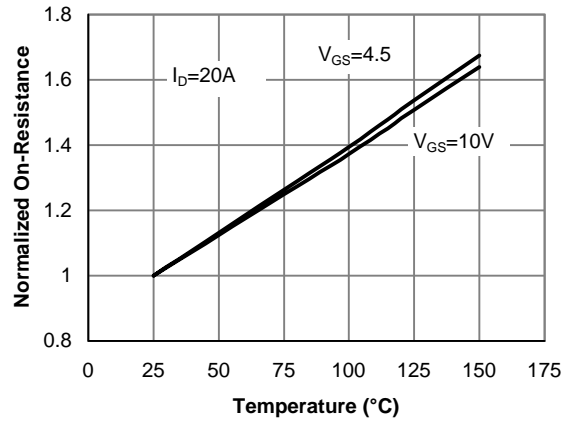


Figure 4: On-Resistance vs. Junction Temperature

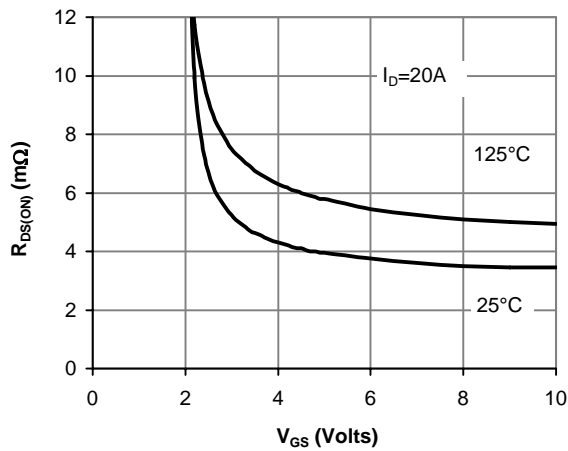


Figure 5: On-Resistance vs. Gate-Source Voltage

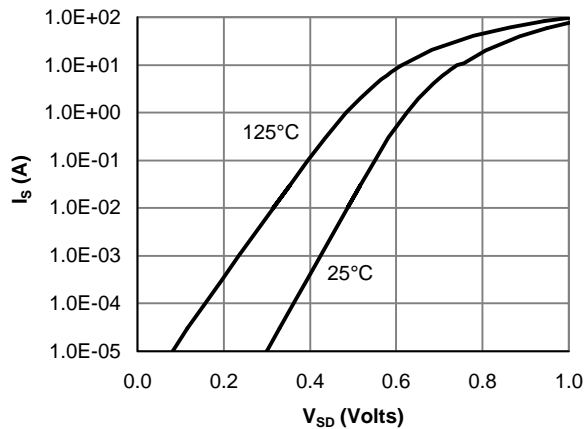


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

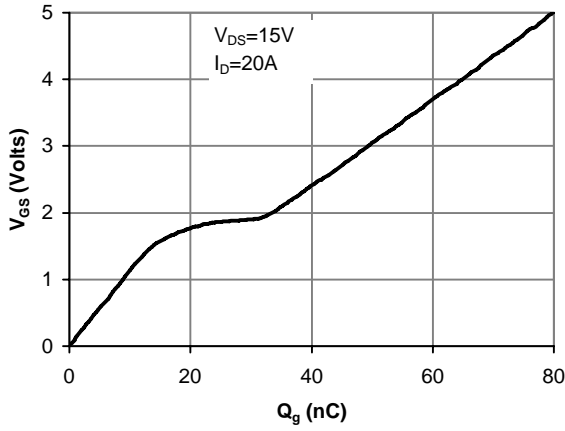


Figure 7: Gate-Charge Characteristics

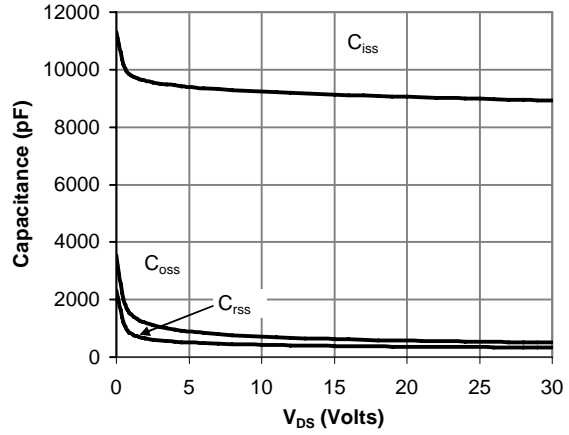


Figure 8: Capacitance Characteristics

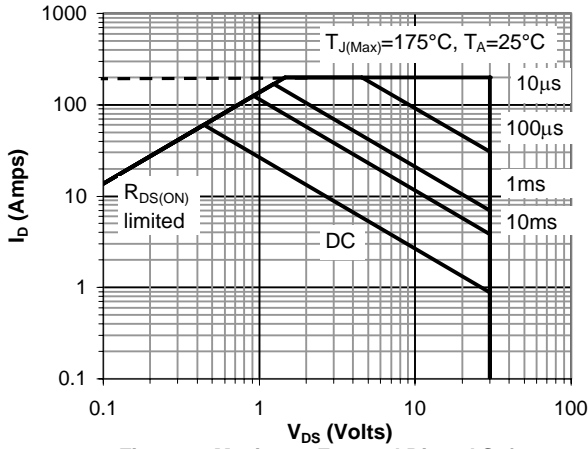


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

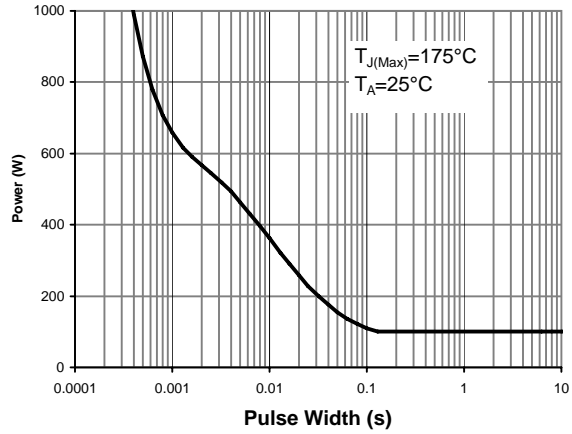


Figure 10: Single Pulse Power Rating Junction-to-Case (Note B)

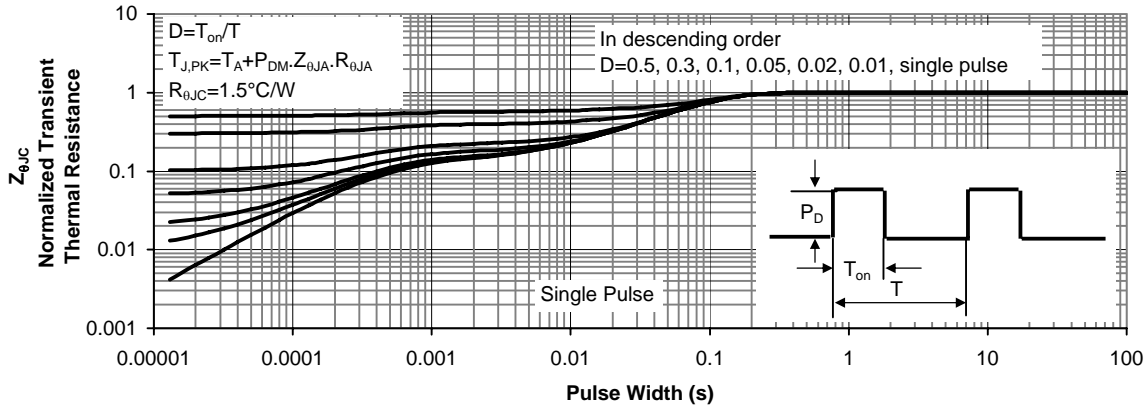


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

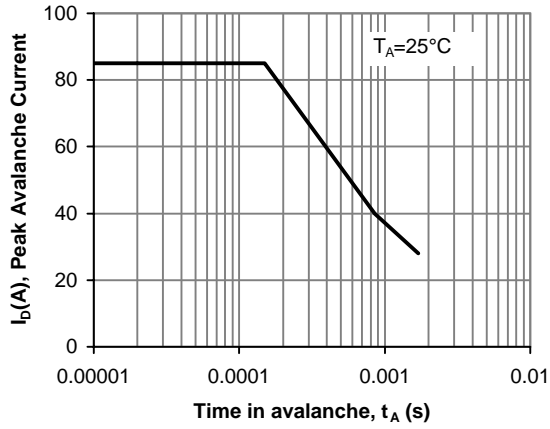


Figure 12: Single Pulse Avalanche capability

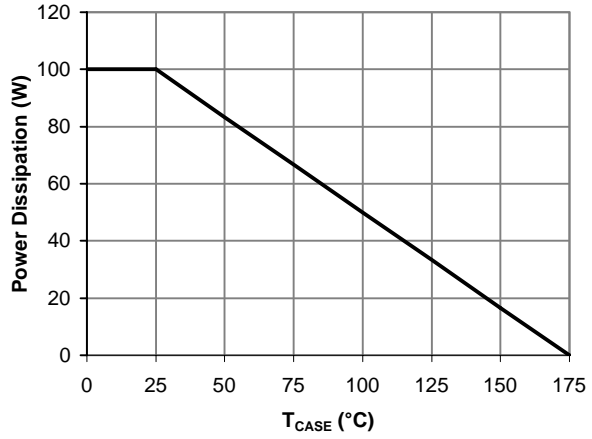


Figure 13: Power De-rating (Note B)

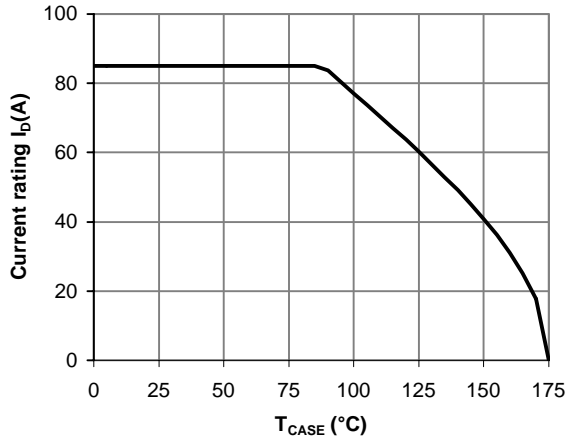


Figure 14: Current De-rating (Note B)

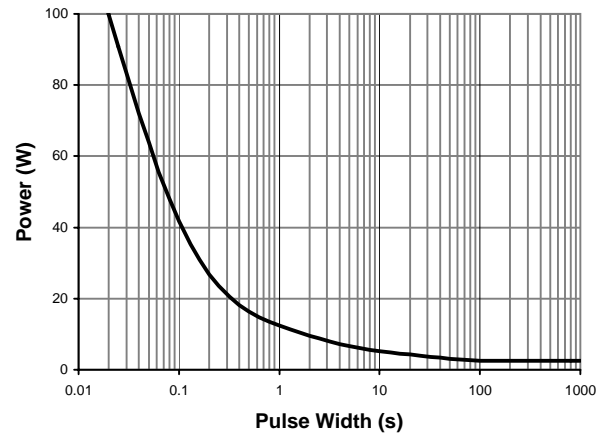


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

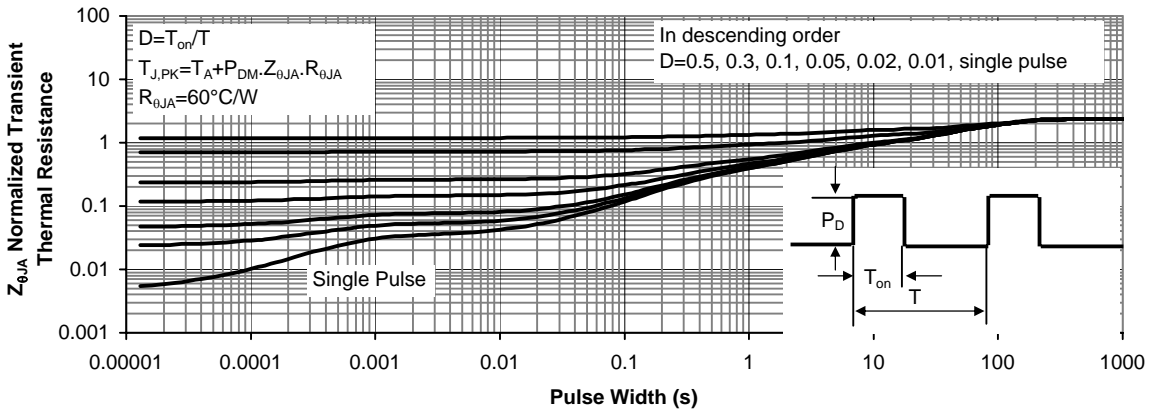


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)