

**AOL1424**  
**N-Channel Enhancement Mode Field Effect Transistor**

**General Description**

The AOL1424 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V, while retaining a 20V  $V_{GS(MAX)}$  rating. It is ESD protected. This device is suitable for use as a load switch. *Standard Product AOL1424 is Pb-free (meets ROHS & Sony 259 specifications).*

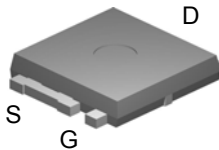
**Features**

$V_{DS}$  (V) = 30V  
 $I_D$  = 70A ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 5.4m\Omega$  ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 8m\Omega$  ( $V_{GS}$  = 4.5V)

ESD Protected

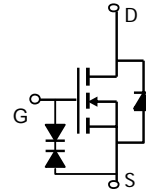
**UIS Tested!**  
***R<sub>g</sub>, C<sub>iss</sub>, C<sub>oss</sub>, C<sub>rss</sub> Tested***

UltraSO-8™ Top View



Bottom tab  
 connected to  
 drain

**Fits SOIC8  
 footprint !**


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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>B</sup>	$I_D$	$T_C=25^\circ\text{C}$	70
		$T_C=100^\circ\text{C}$	50
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	120	A
Continuous Drain Current <sup>A</sup>	$I_{DSM}$	$T_A=25^\circ\text{C}$	23
		$T_A=70^\circ\text{C}$	18
Avalanche Current <sup>H</sup>	$I_{AR}$	30	A
Repetitive avalanche energy $L=0.3\text{mH}$ <sup>H</sup>	$E_{AR}$	135	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ\text{C}$	50
		$T_C=100^\circ\text{C}$	25
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ\text{C}$	5
		$T_A=70^\circ\text{C}$	3
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	$t \leq 10\text{s}$	20	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	45	$^\circ\text{C/W}$
Maximum Junction-to-Case <sup>D</sup>	$R_{\theta JC}$	2.5	3.0	$^\circ\text{C/W}$

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	μA
			5			
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±16V			10	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA	1.4	1.8	2.5	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	120			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		4.5	5.4	mΩ
				6.3	7.6	
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A		6.5	8.0	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		67		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.7	1.0	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				70	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		1803	2170	pF
C <sub>oss</sub>	Output Capacitance			387		pF
C <sub>riss</sub>	Reverse Transfer Capacitance			238		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		1.3	2	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A		36	48	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge			19		nC
Q <sub>gs</sub>	Gate Source Charge			3.9		nC
Q <sub>gd</sub>	Gate Drain Charge			8.7		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		7.6		ns
t <sub>r</sub>	Turn-On Rise Time			6.4		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			27		ns
t <sub>f</sub>	Turn-Off Fall Time			8.5		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =20A, dI/dt=100A/μs		27	33	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =20A, dI/dt=100A/μs		17		nC

A: The value of R<sub>θJA</sub> is measured with the device in a still air environment with T<sub>A</sub>=25°C. The power dissipation P<sub>DSM</sub> and current rating I<sub>BSM</sub> are based on T<sub>J(MAX)</sub>=150°C, using t ≤ 10s junction-to-ambient thermal resistance.

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: 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. The SOA curve provides a single pulse rating.

H: EAR and IAR ratings are based on low frequency and duty cycles such that T<sub>J(start)</sub>=25C for each pulse.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

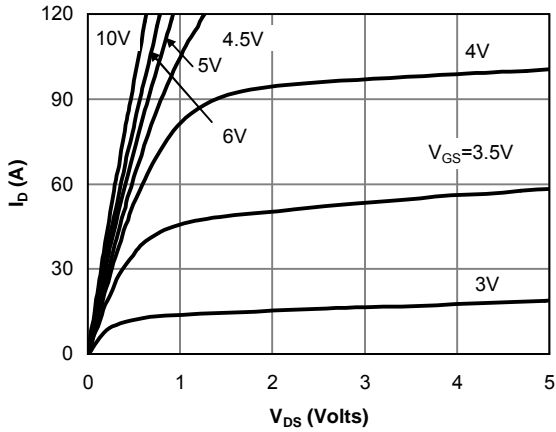


Figure 1: On-Region Characteristics

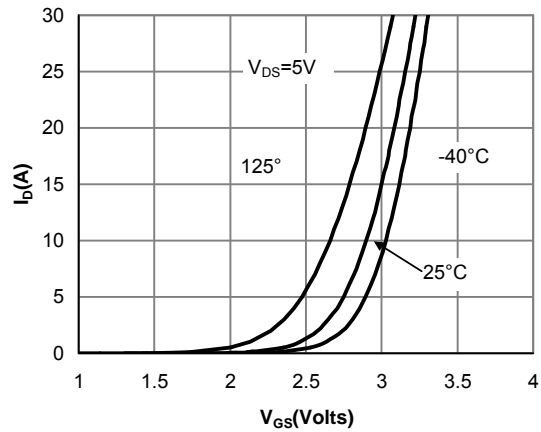


Figure 2: Transfer Characteristics

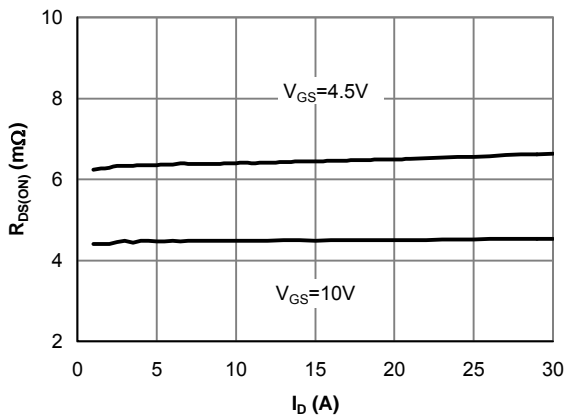


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

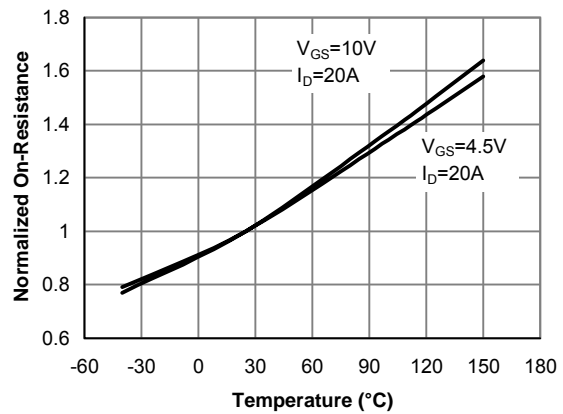


Figure 4: On-Resistance vs. Junction Temperature

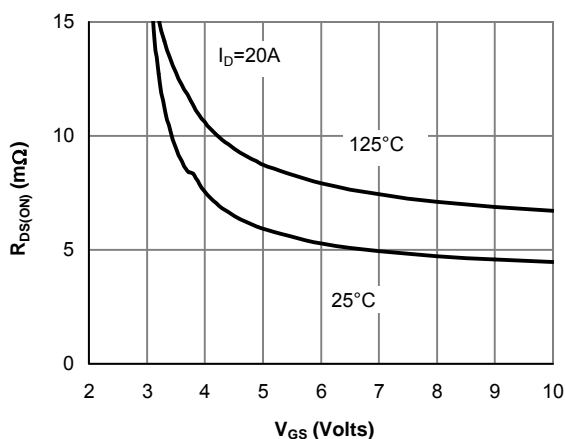


Figure 5: On-Resistance vs. Gate-Source Voltage

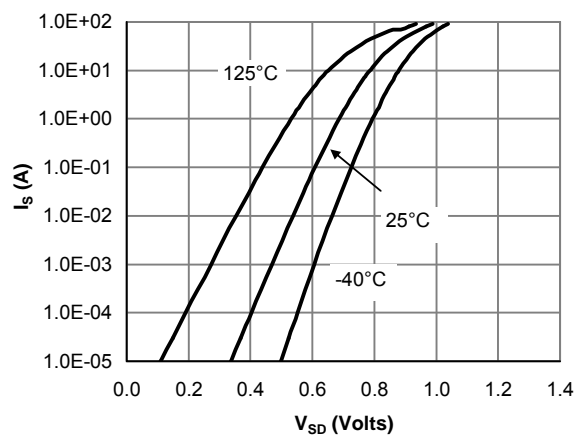


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

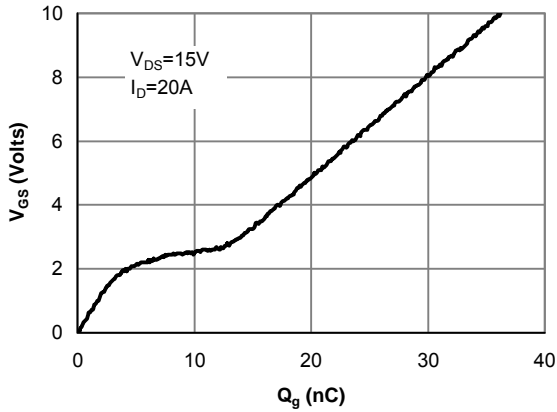


Figure 7: Gate-Charge Characteristics

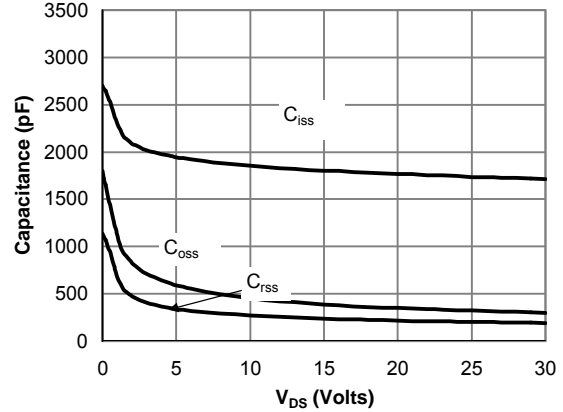


Figure 8: Capacitance Characteristics

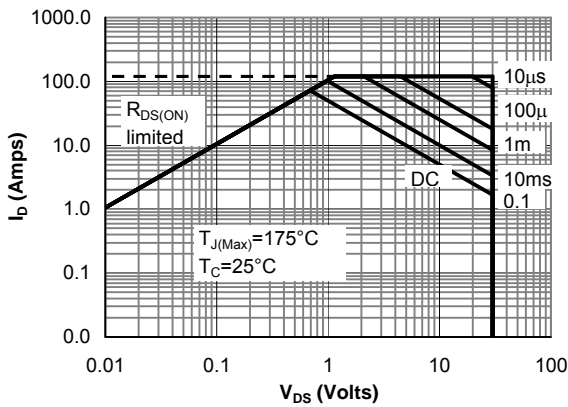


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

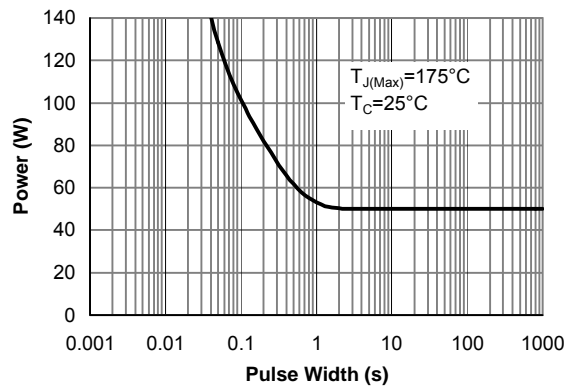


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

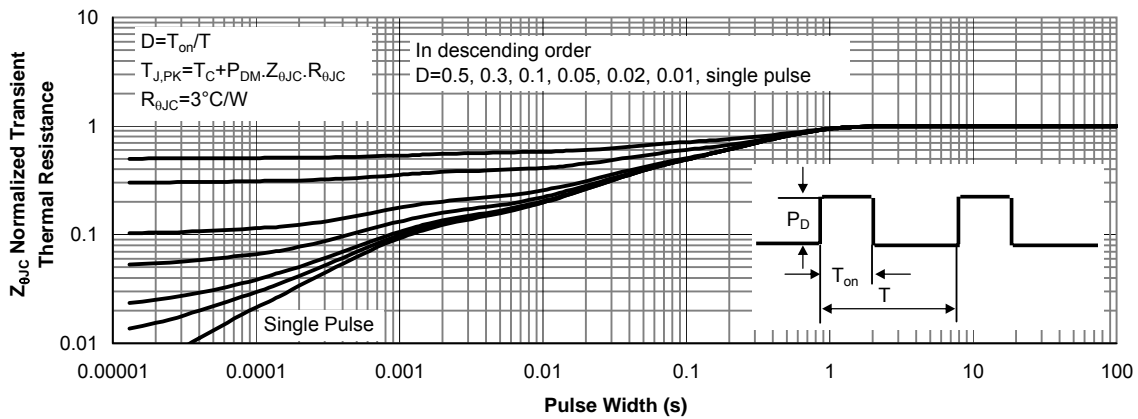


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

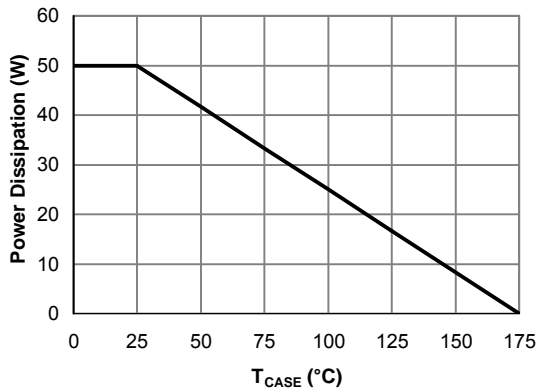


Figure 12: Power De-rating (Note B)

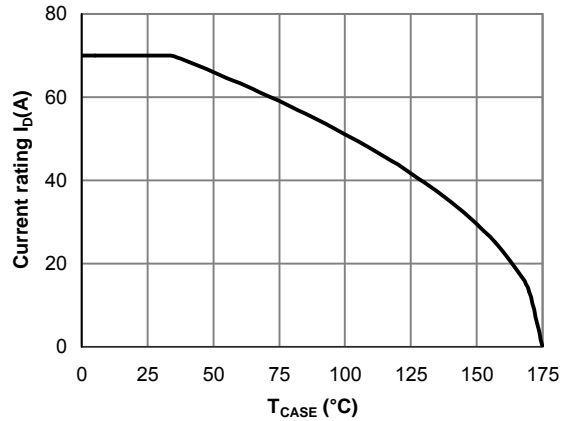


Figure 13: Current De-rating (Note B)

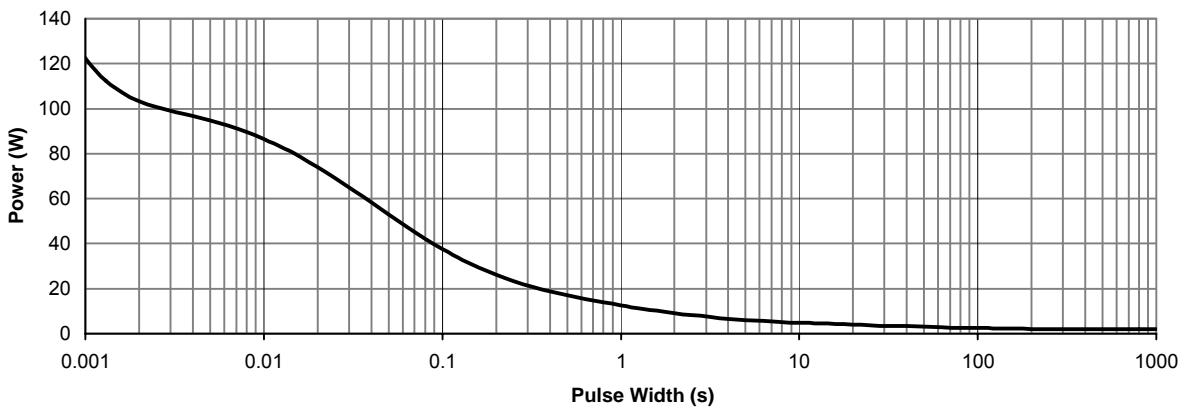


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

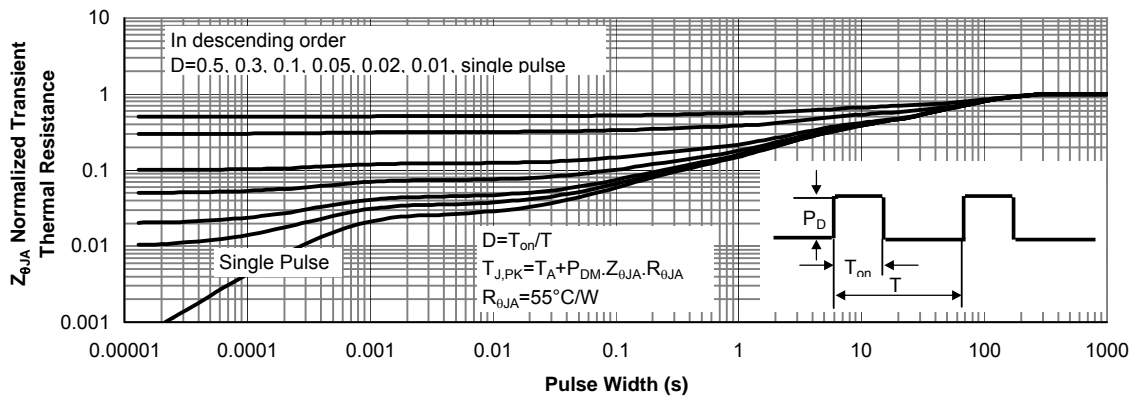


Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)