

**AOL1428**  
**N-Channel Enhancement Mode Field Effect Transistor**

**General Description**

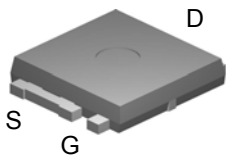
The AOL1428 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. This device is suitable for use as a high side switch in SMPS and general purpose applications. *Standard Product AOL1428 is Pb-free (meets ROHS & Sony 259 specifications). AOL1428L is a Green Product ordering option. AOL1428 and AOL1428L are electrically identical.*

**Features**

$V_{DS}$  (V) = 30V  
 $I_D$  = 45A ( $V_{GS}$  = 10V)  
 $R_{DS(ON)}$  < 9.5m $\Omega$  ( $V_{GS}$  = 10V)  
 $R_{DS(ON)}$  < 16m $\Omega$  ( $V_{GS}$  = 4.5V)

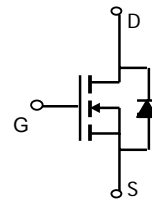
**UIS Tested**  
**Rg, Ciss, Coss, Crss Tested**

Ultra SO-8™ Top View



**Fits SOIC8 footprint !**

Bottom tab connected to drain


**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>	$I_D$	$T_C=25^\circ\text{C}$	49
		$T_C=100^\circ\text{C}$	34
Pulsed Drain Current	$I_{DM}$	120	A
Continuous Drain Current <sup>H</sup>	$I_{DSM}$	$T_A=25^\circ\text{C}$	18
		$T_A=70^\circ\text{C}$	14
Avalanche Current <sup>C</sup>	$I_{AR}$	30	A
Repetitive avalanche energy $L=0.3\text{mH}^C$	$E_{AR}$	135	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ\text{C}$	43
		$T_C=100^\circ\text{C}$	21
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>	$R_{\theta JA}$	$t \leq 10\text{s}$	19	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	45	$^\circ\text{C/W}$
Maximum Junction-to-Case <sup>C</sup>	$R_{\theta JC}$	2.5	3.5	$^\circ\text{C/W}$

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> =24V, 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> = ±20V			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	1.9	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		7.7 11.0	9.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A		13	16.0	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		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				46	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance			1000		pF
C <sub>oss</sub>	Output Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		340		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			100		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		1.3		Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge			18		nC
Q <sub>g</sub> (4.5V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A		8.5		nC
Q <sub>gs</sub>	Gate Source Charge			3.1		nC
Q <sub>gd</sub>	Gate Drain Charge			4.8		nC
t <sub>D(on)</sub>	Turn-On Delay Time			5.6		ns
t <sub>r</sub>	Turn-On Rise Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.75Ω,		5.5		ns
t <sub>D(off)</sub>	Turn-Off Delay Time	R <sub>GEN</sub> =3Ω		18.5		ns
t <sub>f</sub>	Turn-Off Fall Time			5		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =20A, dI/dt=100A/μs		29		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =20A, dI/dt=100A/μs		24		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.

B: The power dissipation P<sub>D</sub> is based on T<sub>J</sub>(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 T<sub>J</sub>(MAX)=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 <300 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<sub>J</sub>(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<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

H: Surface mounted on a 1 in 2 FR-4 board with 2oz. Copper.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

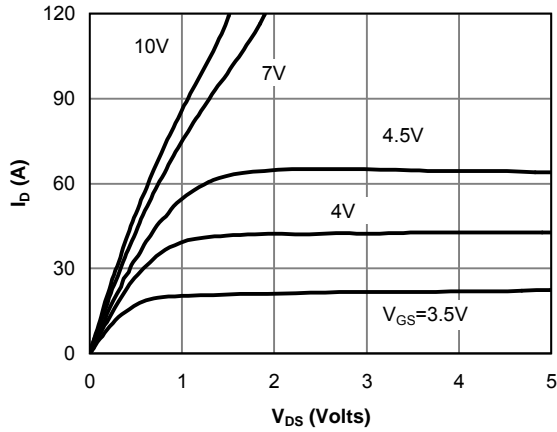


Figure 1: On-Region Characteristics

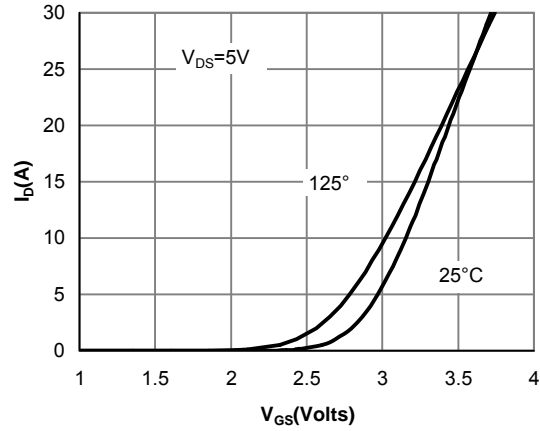


Figure 2: Transfer Characteristics

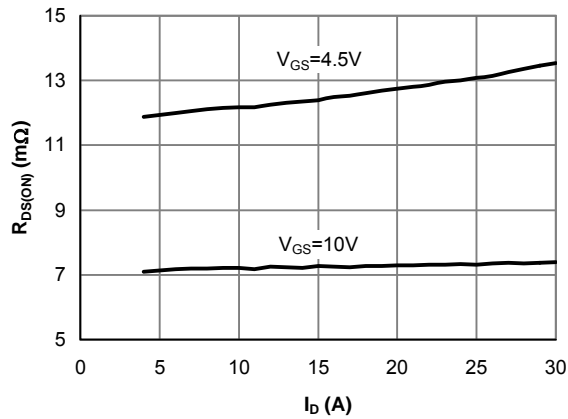


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

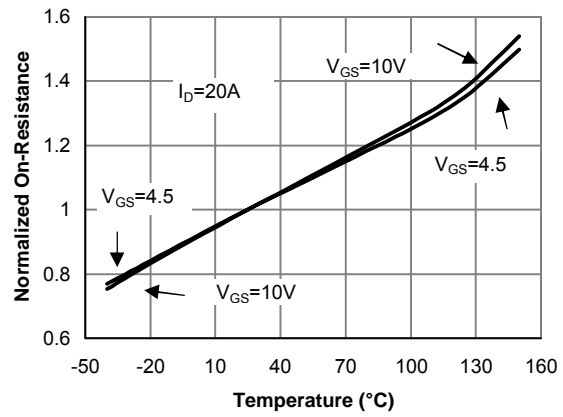


Figure 4: On-Resistance vs. Junction Temperature

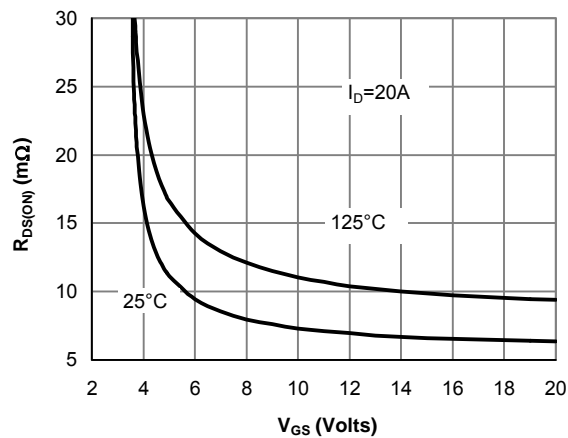


Figure 5: On-Resistance vs. Gate-Source Voltage

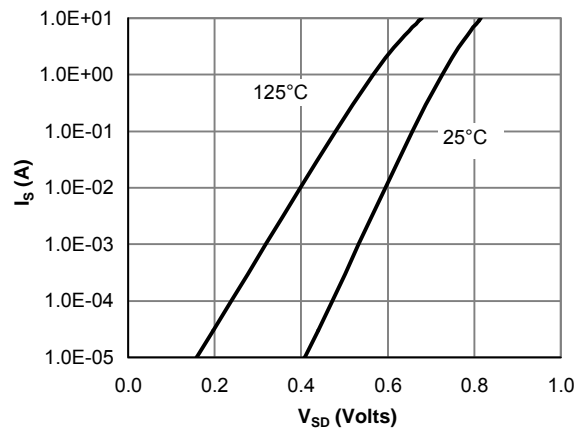


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

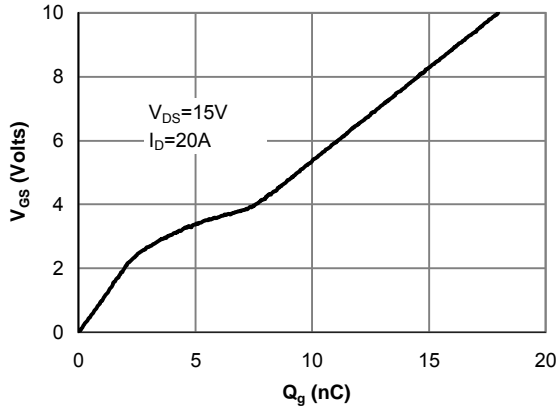


Figure 7: Gate-Charge Characteristics

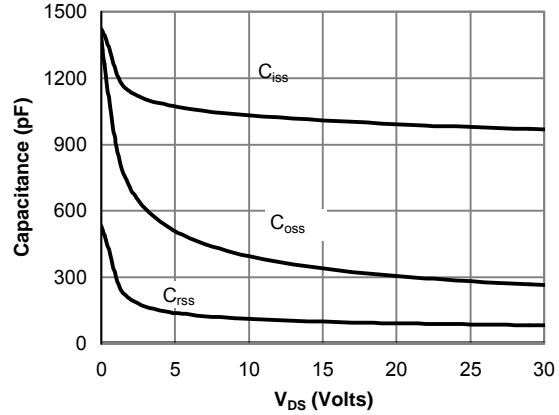


Figure 8: Capacitance Characteristics

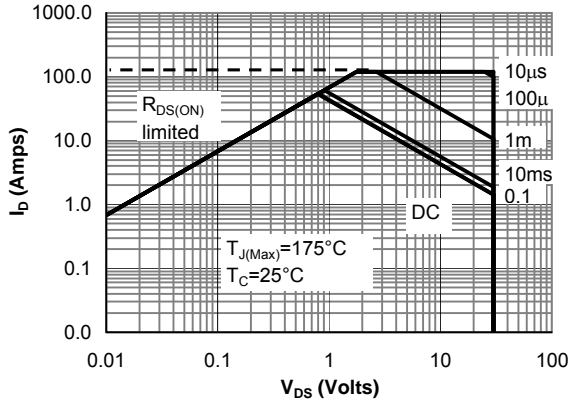


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

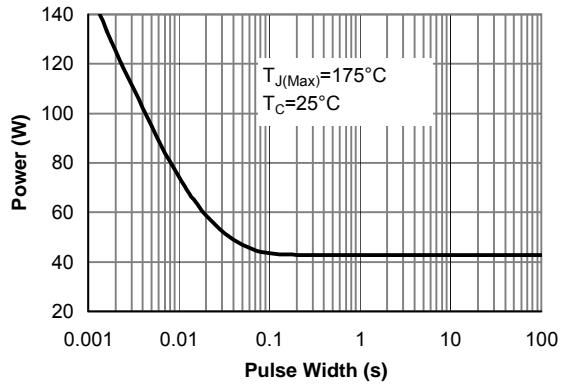


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

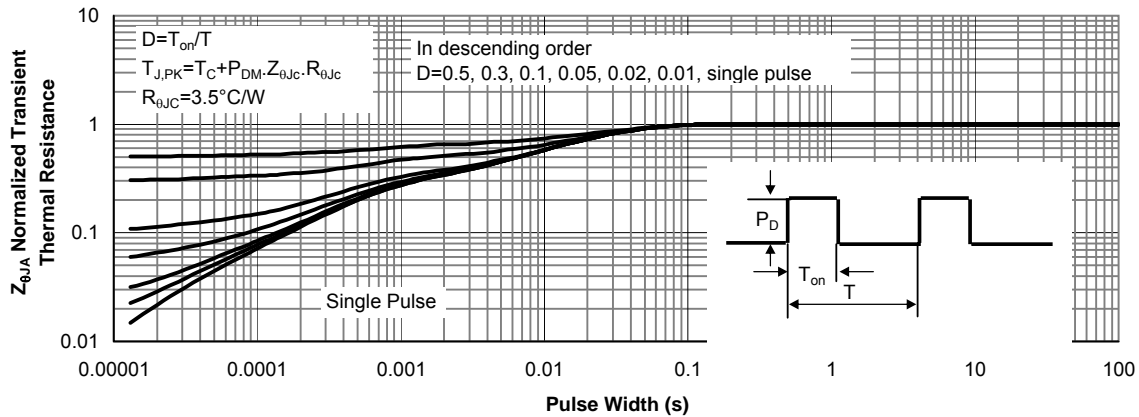


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

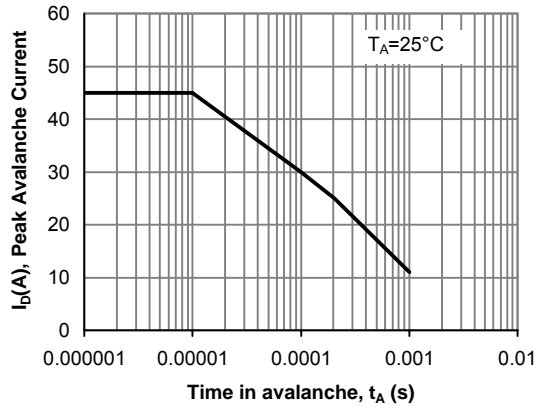


Figure 12: Single Pulse Avalanche capability

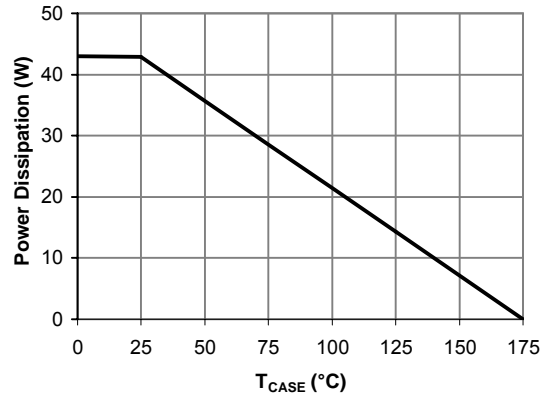


Figure 13: Power De-rating (Note B)

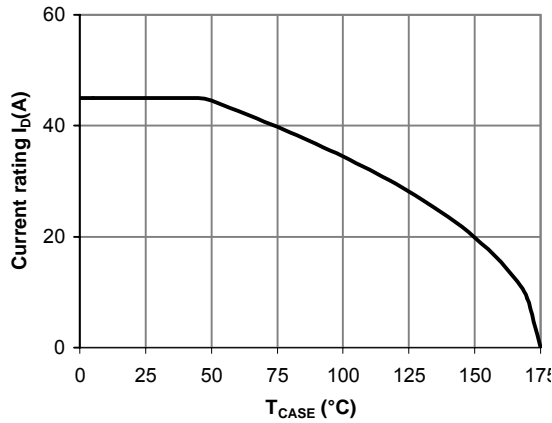


Figure 14: Current De-rating (Note B)

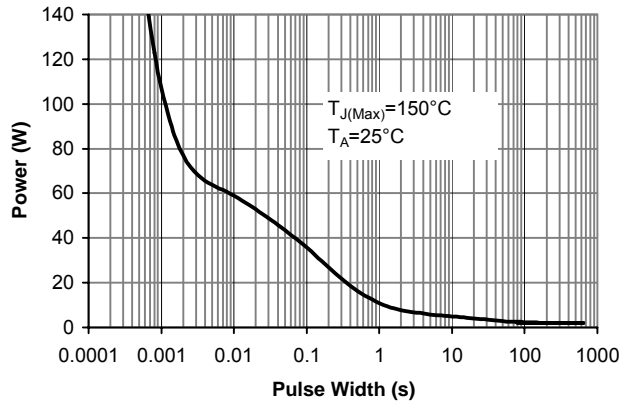


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note G)

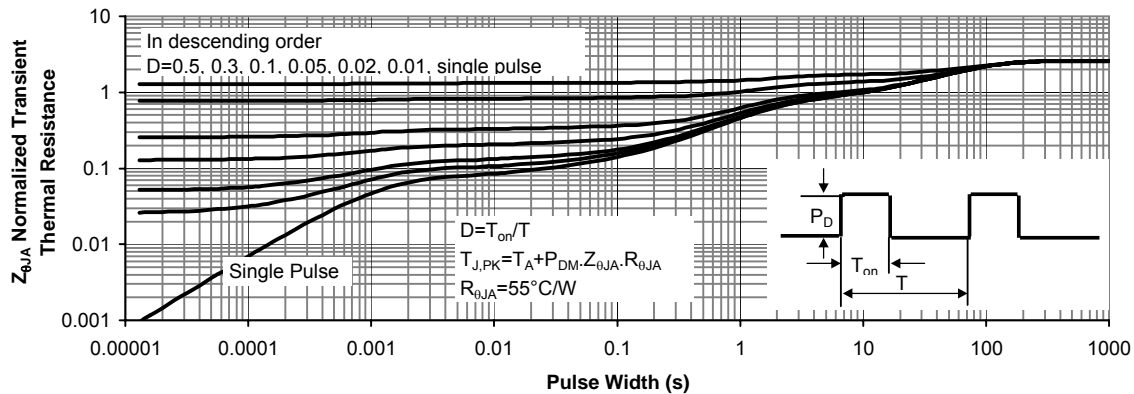


Figure 16: Normalized Maximum Transient Thermal Impedance (Note G)