

## AOL1408

### N-Channel Enhancement Mode Field Effect Transistor

#### General Description

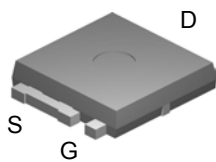
The AOL1408 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , shoot-through immunity and body diode characteristics. This device is ideally suited for use as a low side switch in CPU core power conversion. *Standard Product AOL1408 is Pb-free (meets ROHS & Sony 259 specifications). AOL1408L is a Green Product ordering option. AOL1408 and AOL1408L are electrically identical.*

#### Features

$V_{DS} (V) = 30V$   
 $I_D = 85A (V_{GS} = 10V)$   
 $R_{DS(ON)} < 4m\Omega (V_{GS} = 10V)$   
 $R_{DS(ON)} < 6m\Omega (V_{GS} = 4.5V)$

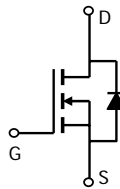
*UIS Tested*  
*Rg, Ciss, Coss, Crss Tested*

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	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>B,G</sup>	$I_D$	$T_C=25^\circ C^G$ 85	A
		$T_C=100^\circ C^B$ 73	
Pulsed Drain Current	$I_{DM}$	200	
Continuous Drain Current <sup>G</sup>	$I_{DSM}$	$T_A=25^\circ C$ 27	
		$T_A=70^\circ C$ 22	
Avalanche Current <sup>C</sup>	$I_{AR}$	30	A
Repetitive avalanche energy $L=0.1mH^C$	$E_{AR}$	45	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ C$ 100	W
		$T_C=100^\circ C$ 50	
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ C$ 5	W
		$T_A=70^\circ C$ 3	
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>	$R_{\theta JA}$	$t \leq 10s$ 19.6	25	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State 48	60	$^\circ C/W$
Maximum Junction-to-Case <sup>C</sup>	$R_{\theta JC}$	Steady-State 1	1.5	$^\circ C/W$

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		0.005	1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA	1	1.8	3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	200			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		3.2 4.3	4 5.2	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A		4.9	6	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		85		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.7	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		6060	7000	pF
C <sub>oss</sub>	Output Capacitance			638		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			355		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		0.45	0.6	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A		96.4	115	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge			46.4	55	nC
Q <sub>gs</sub>	Gate Source Charge			13.6		nC
Q <sub>gd</sub>	Gate Drain Charge			15.6		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		15.7	21	ns
t <sub>r</sub>	Turn-On Rise Time			14.2	21	ns
t <sub>D(off)</sub>	Turn-Off DelayTime			55.5	75	ns
t <sub>f</sub>	Turn-Off Fall Time			14	21	ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =20A, dI/dt=100A/μs		31	38	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =20A, dI/dt=100A/μs		24	29	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 PD 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.

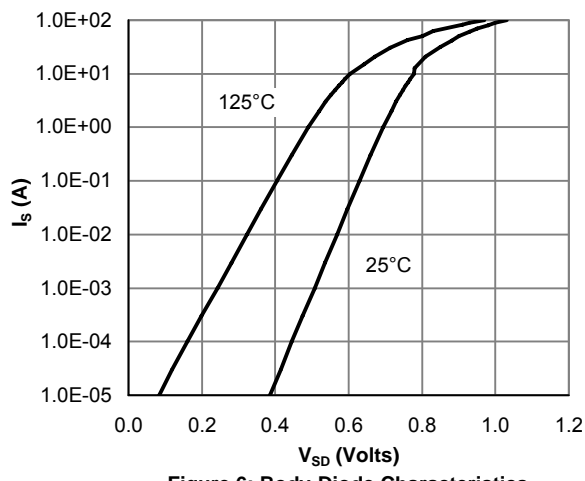
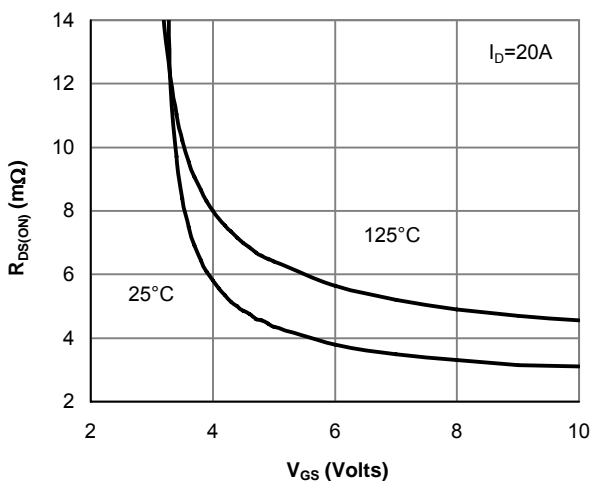
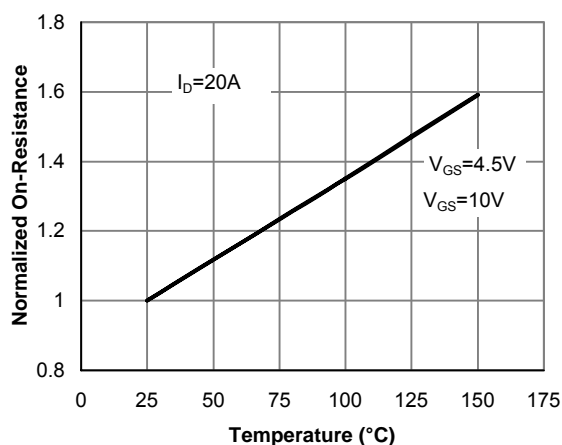
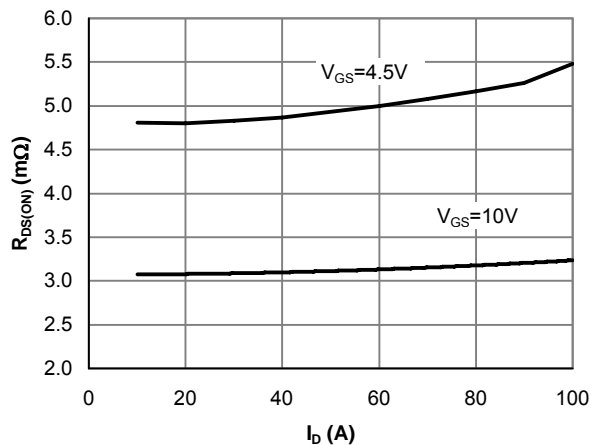
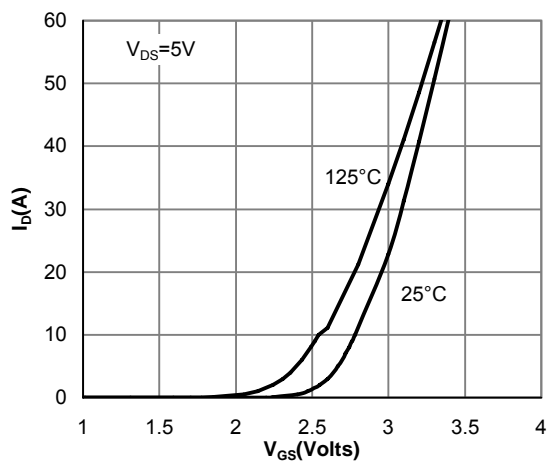
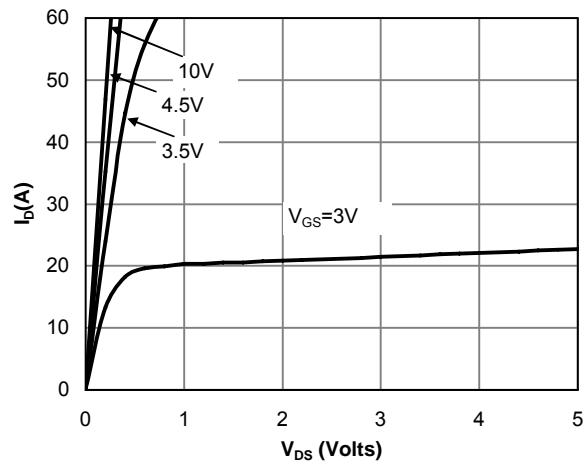
F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J</sub>(MAX)=175°C.

G: 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. The SOA curve provides a single pulse rating. Rev1. Dec. 2005

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

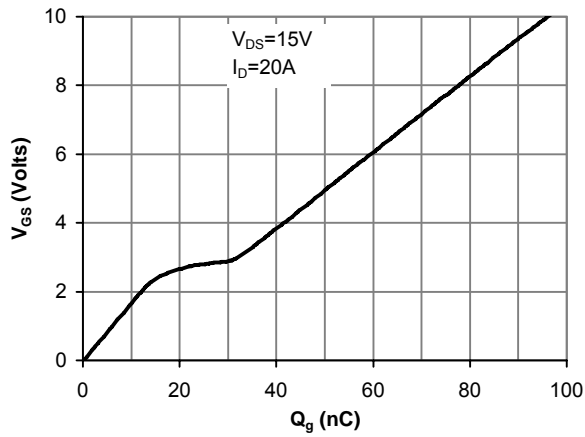


Figure 7: Gate-Charge Characteristics

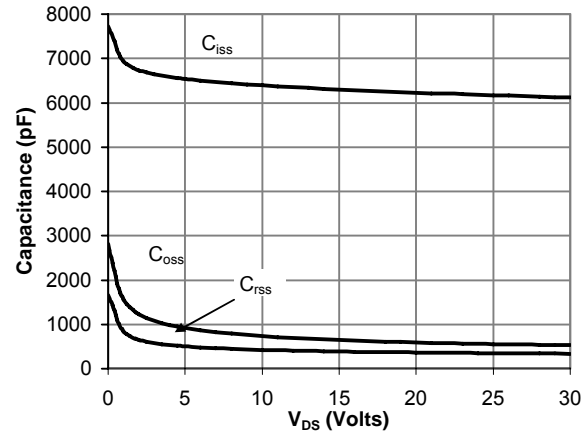


Figure 8: Capacitance Characteristics

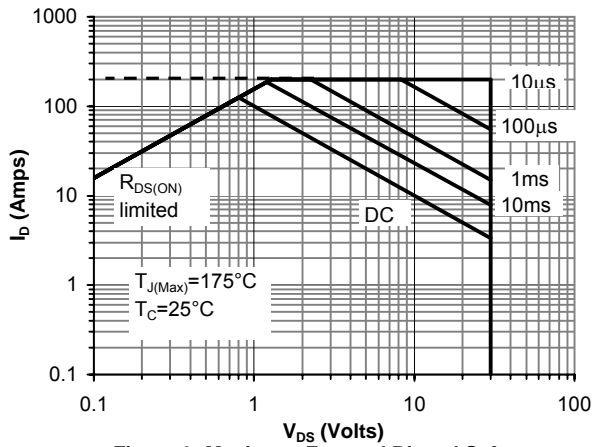


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

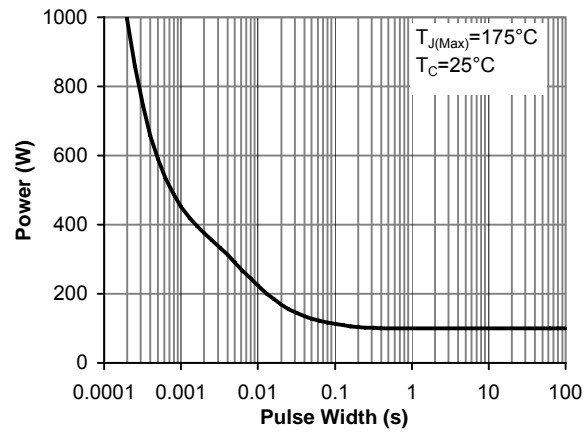


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

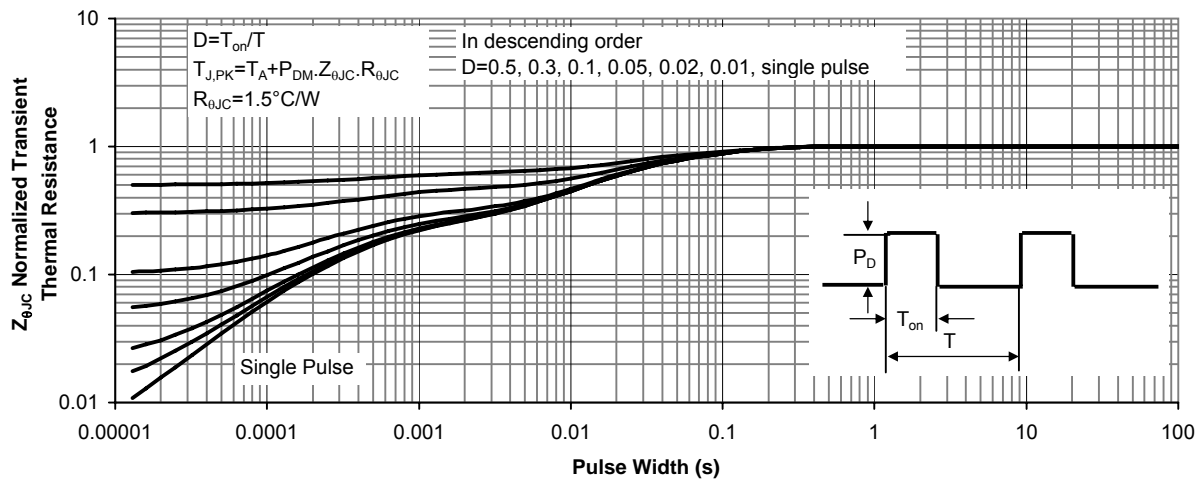


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

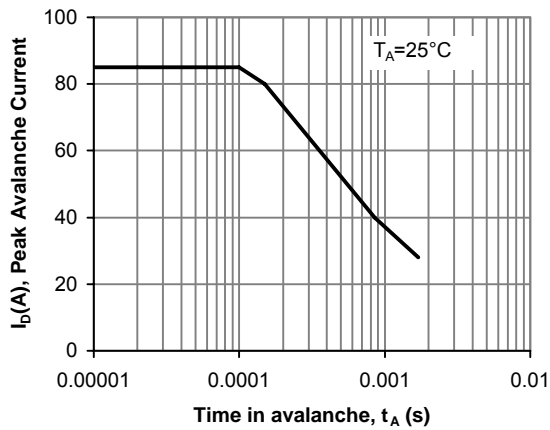


Figure 12: Single Pulse Avalanche capability

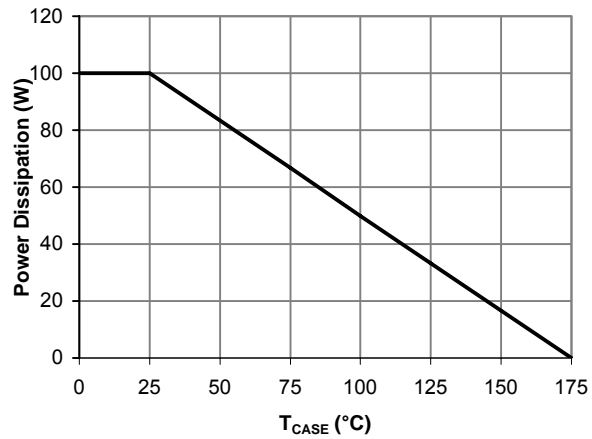


Figure 13: Power De-rating (Note B)

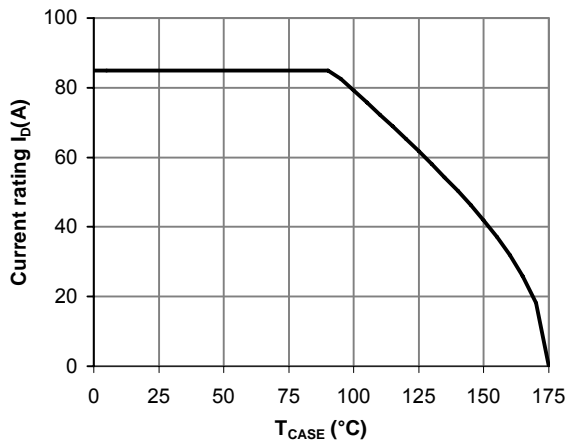


Figure 14: Current De-rating (Note B)

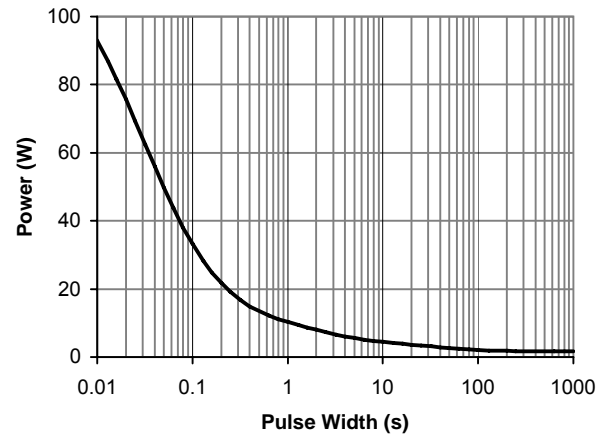


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

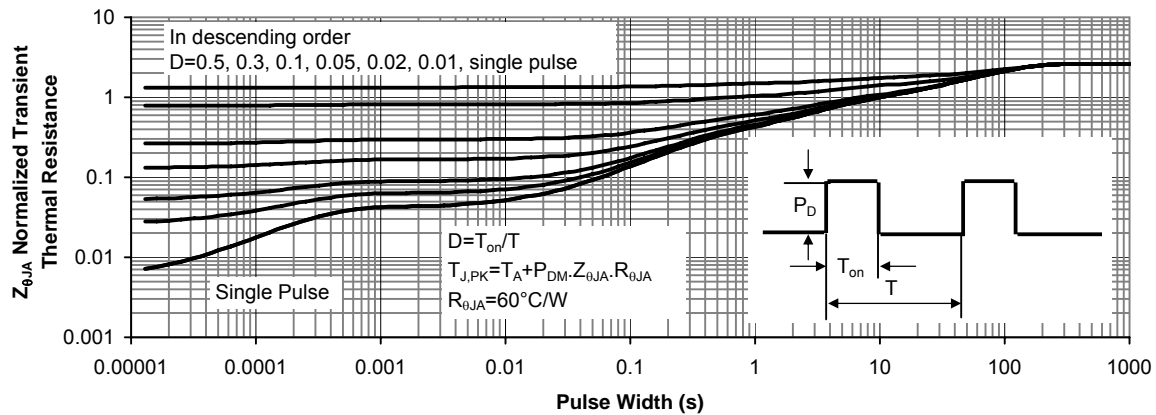
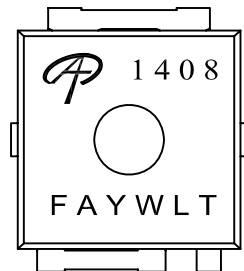


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

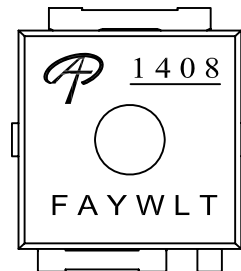


Document No.	PD-00400
Version	C
Title	AOL1408 Marking Description

*UltraSO-8*<sup>TM</sup> PACKAGE MARKING DESCRIPTION



Standard product



Green product

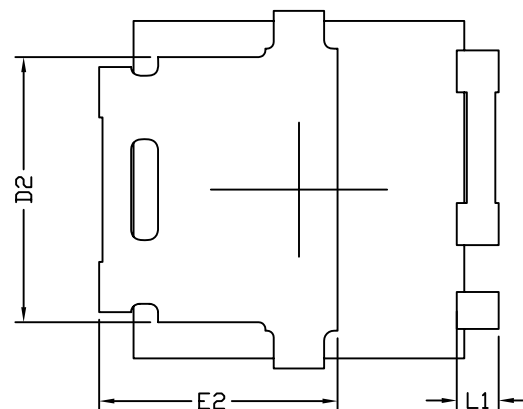
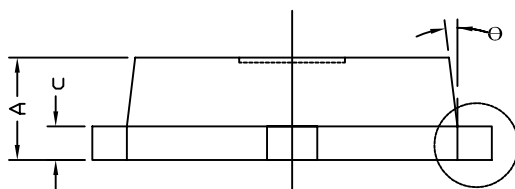
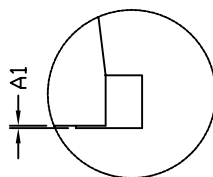
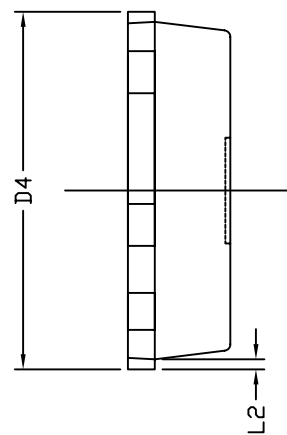
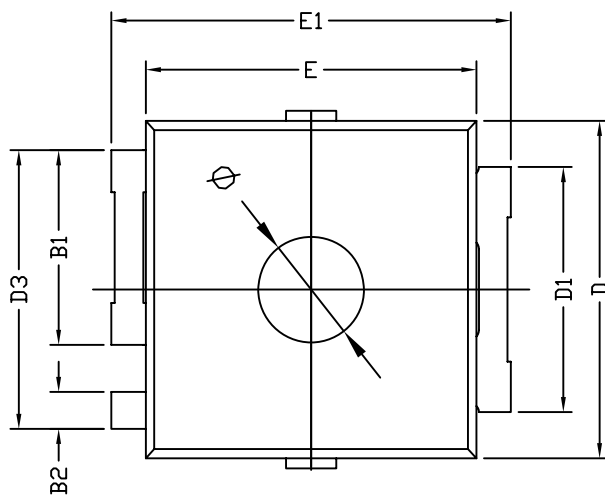
NOTE:

LOGO - AOS Logo  
1408 - Part number code  
F - Fab code  
A - Assembly location code  
Y - Year code  
W - Week code  
L&T - Assembly lot code

PART NO.	DESCRIPTION	CODE
AOL1408	Standard product	1408
AOL1408L	Green product	<u>1408</u>

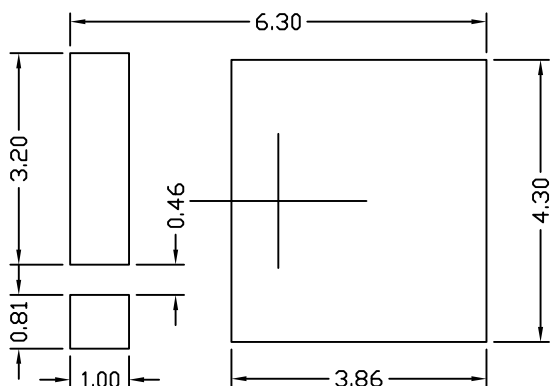


*UltraSO-8™* PACKAGE OUTLINE



**BOTTOM VIEW**

**RECOMMENDED LAND PATTERN**



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.45	1.55	1.70	0.057	0.061	0.067
A1	0.00	—	0.05	0.000	—	0.002
B1	2.75	2.95	3.15	0.108	0.116	0.124
B2	0.50	0.56	0.65	0.020	0.022	0.026
c	0.45	0.51	0.56	0.018	0.020	0.022
D	5.00	5.11	5.30	0.197	0.201	0.209
D1	3.60	3.71	4.30	0.142	0.146	0.169
D2	3.60	4.01	4.30	0.142	0.158	0.169
D3	4.00	4.22	4.30	0.157	0.166	0.169
D4	5.11	5.41	5.60	0.201	0.213	0.220
E	4.90	5.00	5.10	0.193	0.197	0.201
E1	5.90	6.05	6.20	0.232	0.238	0.244
E2	3.50	3.61	3.80	0.138	0.142	0.150
L1	0.50	0.64	1.00	0.020	0.025	0.039
L2	0.15TYP.			0.006 TYP.		
Ø	—			—		
θ	0	—	10°	0	—	10°

**NOTE**

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.  
MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 6 MILS.
2. CONTROLLING DIMENSION IS MILLIMETER.  
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.