



ALPHA & OMEGA
SEMICONDUCTOR, LTD.

Rev 4: Nov 2004

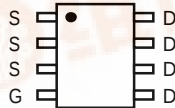
AO4420, AO4420L (Green Product) N-Channel Enhancement Mode Field Effect Transistor

General Description

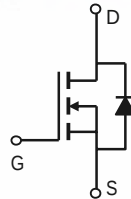
The AO4420 uses advanced trench technology to provide excellent $R_{DS(ON)}$, shoot-through immunity and body diode characteristics. This device is suitable for use as a synchronous switch in PWM applications. AO4420L is offered in a lead-free package. AO4420L (Green Product) is offered in a lead-free package.

Features

V_{DS} (V) = 30V
 I_D = 13.7A
 $R_{DS(ON)} < 10.5m\Omega$ ($V_{GS} = 10V$)
 $R_{DS(ON)} < 12m\Omega$ ($V_{GS} = 4.5V$)



SOIC-8



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}	± 12	V
Continuous Drain Current ^A	I_D	13.7	A
$T_A=25^\circ\text{C}$		9.7	
Pulsed Drain Current ^B	I_{DM}	60	
Power Dissipation	P_D	3.1	W
		2	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	28	40	$^\circ\text{C/W}$
$t \leq 10s$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	54	75	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	21	30	$^\circ\text{C/W}$
Steady-State				



Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V T _J =55°C		0.004	1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} = ±12V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} I _D =250μA	0.6	1.1	2	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	40			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =13.7A T _J =125°C		8.3 12.5	10.5 15	mΩ
		V _{GS} =4.5V, I _D =12.7A		9.7	12	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =13.7A	30	37		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.76	1	V
I _S	Maximum Body-Diode Continuous Current				5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		3656	4050	pF
C _{oss}	Output Capacitance			256		pF
C _{rss}	Reverse Transfer Capacitance			168		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		0.86	1.1	Ω
SWITCHING PARAMETERS						
Q _g (4.5V)	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =13.7A		30.5	36	nC
Q _{gs}	Gate Source Charge			4.6		nC
Q _{gd}	Gate Drain Charge			8.6		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =1.1Ω, R _{GEN} =0Ω		5.5	9	ns
t _r	Turn-On Rise Time			3.4	7	ns
t _{D(off)}	Turn-Off DelayTime			49.8	75	ns
t _f	Turn-Off Fall Time			5.9	11	ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =13.7A, dI/dt=100A/μs		22.5	28	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =13.7A, dI/dt=100A/μs		12.5	16	nC

A: The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any a given application depends on the user's specific board design. The current rating is based on the t_s ≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

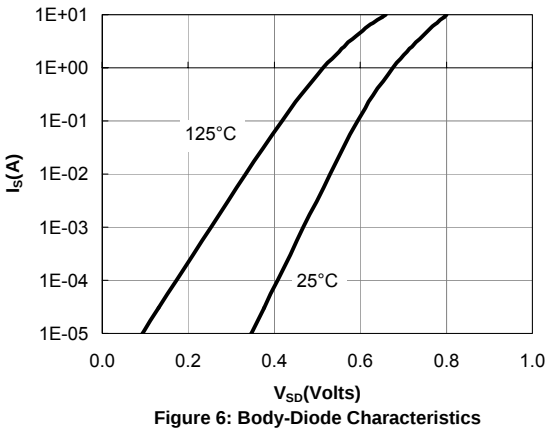
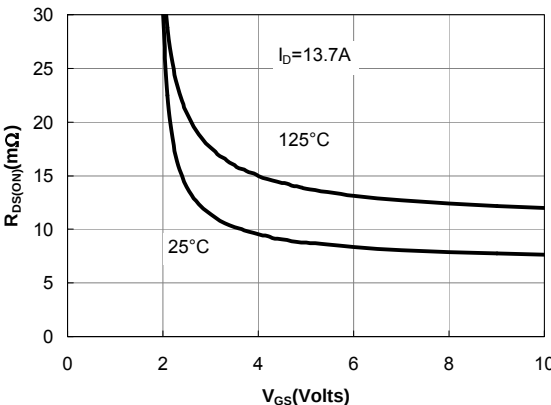
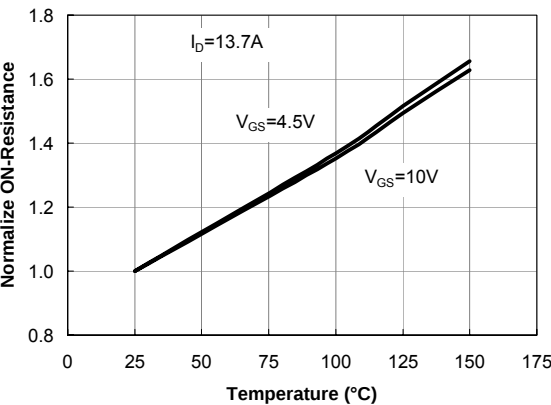
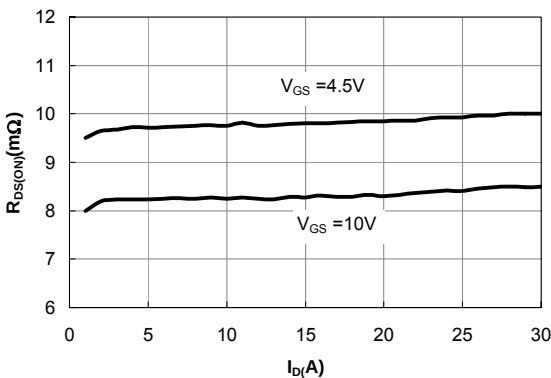
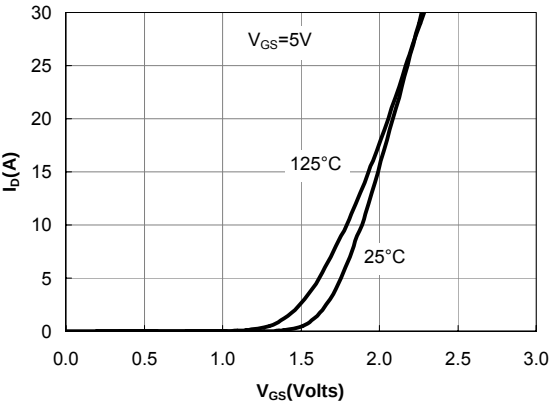
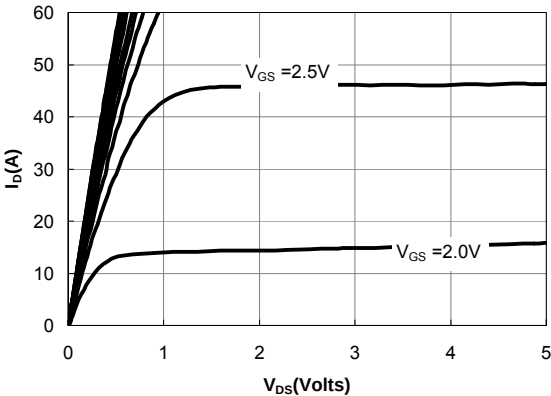
C: The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using 80μs pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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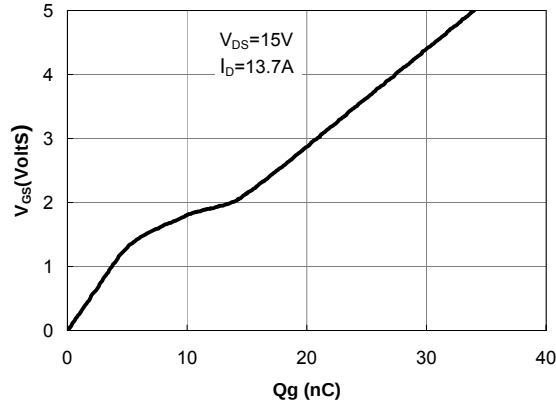


Figure 7: Gate-Charge Characteristics

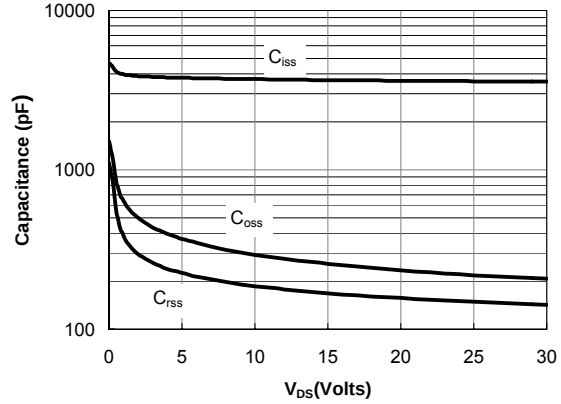


Figure 8: Capacitance Characteristics

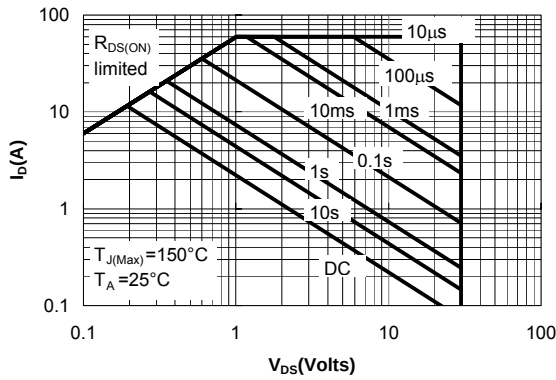


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

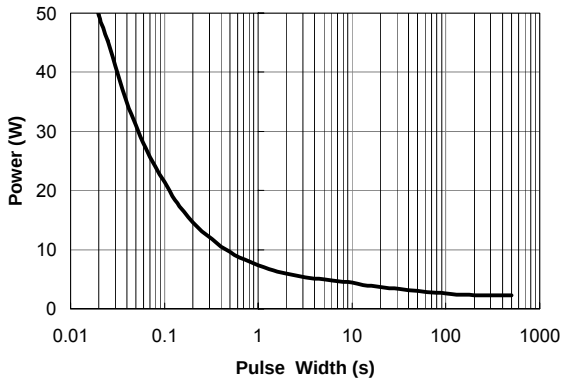


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

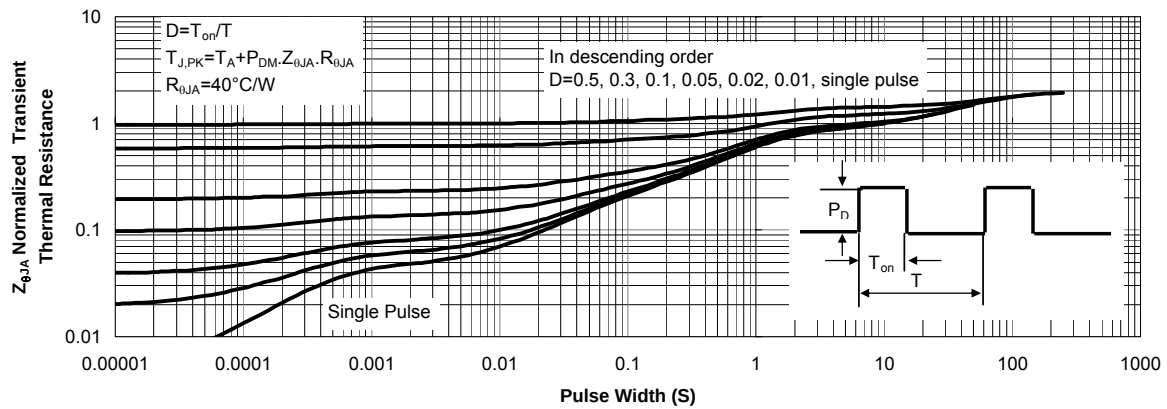


Figure 11: Normalized Maximum Transient Thermal Impedance



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Document No.	PD-00139
Version	rev C
Title	AO4420 Marking Description

SO-8 PACKAGE MARKING DESCRIPTION



Standard product

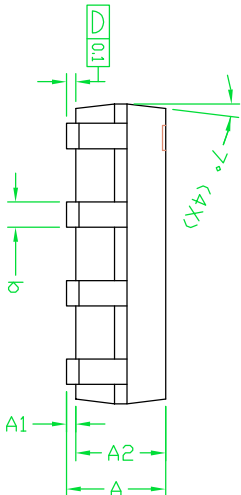
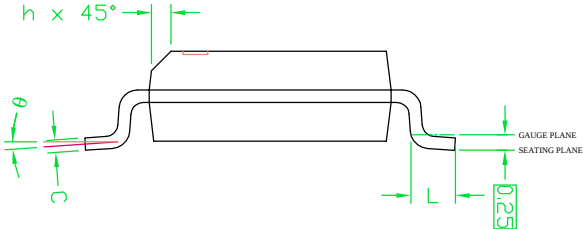
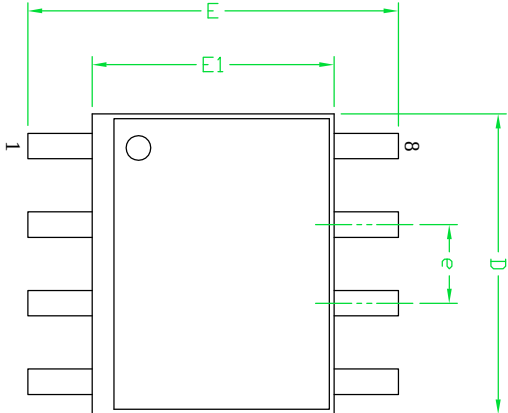


Green product

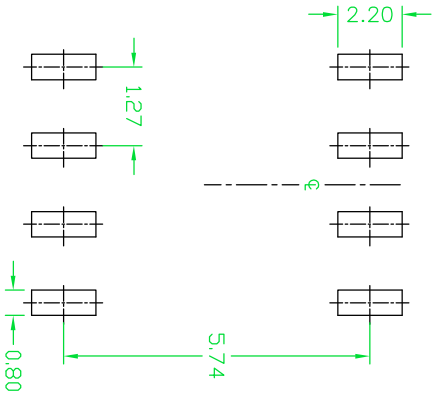
NOTE:

LOGO - AOS LOGO
4420 - PART NUMBER CODE.
F&A - FOUNDRY AND ASSEMBLY LOCATION
Y - YEAR CODE
W - WEEK CODE.
L T - ASSEMBLY LOT CODE

PART NO.	DESCRIPTION	CODE
AO4420	Standard product	4420
AO4420L	Green product	<u>4420</u>



RECOMMENDED LAND PATTERN



UNIT: mm

- NOTE
1. ALL DIMENSIONS ARE IN MILLIMETERS.
 2. DIMENSIONS ARE INCLUSIVE OF PLATING.
 3. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
 4. DIMENSION L IS MEASURED IN GAUGE PLANE.
 5. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	1.65	1.75	0.053	0.065	0.069
A1	0.10	—	0.25	0.004	—	0.010
A2	1.25	1.50	1.65	0.049	0.059	0.065
b	0.31	—	0.51	0.012	—	0.020
c	0.17	—	0.25	0.007	—	0.010
D	4.80	4.90	5.00	0.189	0.193	0.197
E1	3.80	3.90	4.00	0.150	0.154	0.157
e	1.27 BSC			0.050 BSC		
E	5.80	6.00	6.20	0.228	0.236	0.244
h	0.25	—	0.50	0.010	—	0.020
L	0.40	—	1.27	0.016	—	0.050
θ	0°	—	8°	0°	—	8°

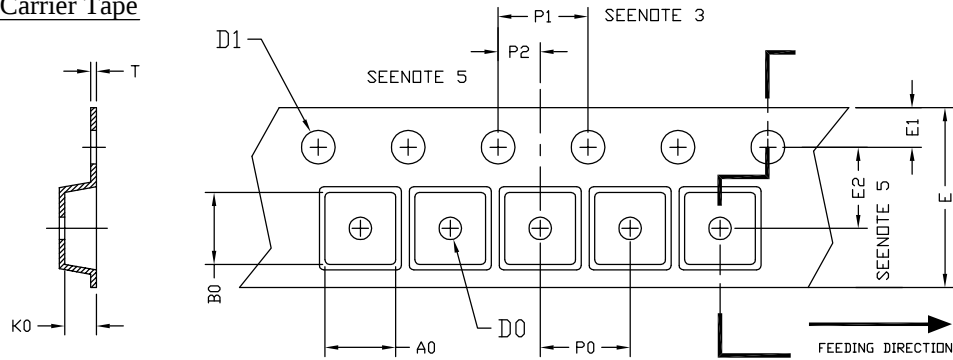
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		THIRD ANGLE PROJECTION	
DECIMAL	ANGULAR		
X.X ±	±		
X.XX ±			
X.XXX ±			
INTERPRET DIM AND TOL PER ASME Y14.5M - 1994		Document No.	PD-00004
PRINTING IS SCALED TO FIT DO NOT SCALE DRAWING		Version	rev D
Title		SO-8 PACKAGE OUTLINE	



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SO-8 Tape and Reel Data

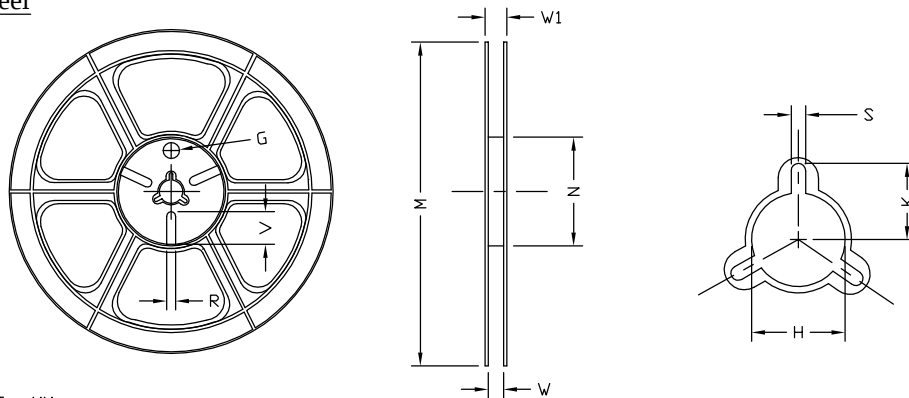
SO-8 Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SO-8 (12 mm)	6.40 ± 0.10	5.20 ± 0.10	2.10 ± 0.10	1.60 ± 0.10	1.50 ± 0.10	12.00 ± 0.30	1.75 ± 0.10	5.50 ± 0.05	8.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	0.25 ± 0.05

SO-8 Reel



UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
12 mm	$\phi 330$	$\phi 330.00$ ± 0.50	$\phi 97.00$ ± 0.10	13.00 ± 0.30	17.40 ± 1.00	$\phi 13.00$ $+0.50$ -0.20	10.60	2.00 ± 0.50	---	---	---

SO-8 Tape

Leader / Trailer
& Orientation

