

### AOD4120-VB Datasheet

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## N-Channel 30-V (D-S) MOSFET

FE.	UR	ES

- Trench Power MOSFET •
- ٠
- 100 % R<sub>g</sub> and UIS Tested Compliant to RoHS Directive 2011/65/EU •

3.25<sup>b, c</sup>

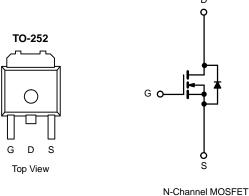
2.33<sup>b, c</sup>

- 55 to 175

#### **APPLICATIONS**

- OR-ing
- Server
- DC/DC

PRODUCT SUMMARY						
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a, e</sup>	Q <sub>g</sub> (Typ)			
30	0.007 at V <sub>GS</sub> = 10 V	70	25 nC			
	0.009 at V <sub>GS</sub> = 4.5 V	60	20110			



ABSOLUTE MAXIMUM RATING	<b>S</b> (T <sub>A</sub> = 25 °C, unle	ss otherwise not	ed)		
Parameter	Symbol	Limit	Unit		
Drain-Source Voltage		V <sub>DS</sub>	30	V	
Gate-Source Voltage		V <sub>GS</sub>	± 20	V	
	T <sub>C</sub> = 25 °C		70		
Continuous Drain Current (T $= 175$ °C)	T <sub>C</sub> = 70 °C		50		
Continuous Drain Current (T <sub>J</sub> = 175 °C)	T <sub>A</sub> = 25 °C	I <sub>D</sub>	21.8 <sup>b, c</sup>	A	
	T <sub>A</sub> = 70 °C		18 <sup>b, c</sup>	A	
Pulsed Drain Current	I <sub>DM</sub>	200			
Avalanche Current Pulse	L = 0.1 mH	I <sub>AS</sub>	39		
Single Pulse Avalanche Energy	L = 0.1 mH	E <sub>AS</sub>	94.8	mJ	
Continuous Source Drain Diada Current	T <sub>C</sub> = 25 °C	1	50 <sup>a, e</sup>	— A	
Continuous Source-Drain Diode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub>	3.13 <sup>b, c</sup>		
	T <sub>C</sub> = 25 °C		100 <sup>a</sup>		
Mariana Davis Disatenting	T <sub>C</sub> = 70 °C	P	75	14/	
Maximum Power Dissipation	T 25 °C	P <sub>D</sub>	a arb. c	W	

 $T_A = 25 \degree C$ 

 $T_A = 70 \degree C$ Operating Junction and Storage Temperature Range T<sub>J</sub>, T<sub>stg</sub>

THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Тур.	Max.	Unit	
Maximum Junction-to-Ambient <sup>b, d</sup>	$t \le 10 \text{ sec}$	R <sub>thJA</sub>	32	40	°C/W	
Maximum Junction-to-Case	Steady State	R <sub>thJC</sub>	0.5	0.6	0,00	

Notes:

a. Based on  $T_C = 25 \text{ °C}$ . b. Surface mounted on 1" x 1" FR4 board.

c. t = 10 sec.
d. Maximum under steady state conditions is 90 °C/W.
e. Calculated based on maximum junction temperature. Package limitation current is 90 A.

COMPLIANT

°C



SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)         Parameter       Symbol       Test Conditions       Min.       Typ.       Max.						Unit
Static	Symbol	Test conditions	WIIII.	тур.	IVIAA.	Unit
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$			35		
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I <sub>D</sub> = 250 μA		- 7.5		mV/°C
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_{D} = 250 \ \mu A$	1.5	1.0	2.0	V
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 20 V$	1.0		± 100	nA
Cale Course Leakage	.635	$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$			1	μΑ
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{J} = 55 \text{ °C}$			10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 V, V_{GS} = 10 V$	90		10	A
		$V_{GS} = 10 \text{ V}, \text{ I}_{D} = 21.8 \text{ A}$		0.007		Ω
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	$V_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 18\text{ A}$		0.009		
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	$V_{DS} = 15 \text{ V}, \text{ I}_{D} = 21.8 \text{ A}$		160		S
Dynamic <sup>b</sup>	-10			1	1	
Input Capacitance	C <sub>iss</sub>			2201		
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		525		pF
Reverse Transfer Capacitance	C <sub>rss</sub>			370		
Total Gate Charge	Qg	$V_{DS}$ = 15 V, $V_{GS}$ = 10 V, $I_{D}$ = 21.8 A		35	45	nC
				25	35	
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS}$ = 15 V, $V_{GS}$ = 4.5 V, $I_{D}$ = 21.8 A		15		
Gate-Drain Charge	Q <sub>gd</sub>			20		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		1.4	2.1	Ω
Turn-On Delay Time	t <sub>d(on)</sub>			18	27	
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 0.625 $\Omega$		11	17	
Turn-Off Delay Time	t <sub>d(off)</sub>	${\rm I}_{\rm D} \cong$ 24 A, ${\rm V}_{\rm GEN}$ = 10 V, ${\rm R}_{\rm g}$ = 1 $\Omega$		70	105	
Fall Time	t <sub>f</sub>			10	15	
Turn-On Delay Time	t <sub>d(on)</sub>			55	83	ns
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, R <sub>L</sub> = 0.67 $\Omega$		180	270	
Turn-Off Delay Time	t <sub>d(off)</sub>	$\rm I_D\cong$ 22.5 A, $\rm V_{GEN}$ = 4.5 V, $\rm R_g$ = 1 $\Omega$		55	83	
Fall Time	t <sub>f</sub>			12	18	
Drain-Source Body Diode Characteristic	s					
Continuous Source-Drain Diode Current	۱ <sub>S</sub>	T <sub>C</sub> = 25 °C			120	A
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				120	~
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 22 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>			52	78	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> = 20 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C		70.2	105	nC
Reverse Recovery Fall Time	t <sub>a</sub>	$r_F = 20 \text{ A}, \text{ u/ul} = 100 \text{ A/µs}, 1 \text{ J} = 23 \text{ °C}$		27		
Reverse Recovery Rise Time	t <sub>b</sub>			25		ns

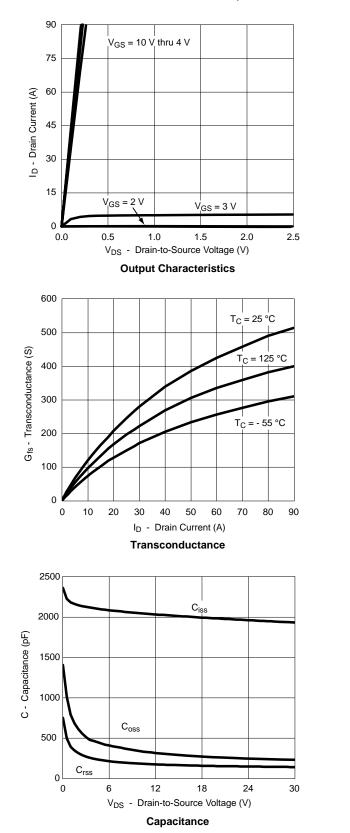
Notes:

a. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2$  %.

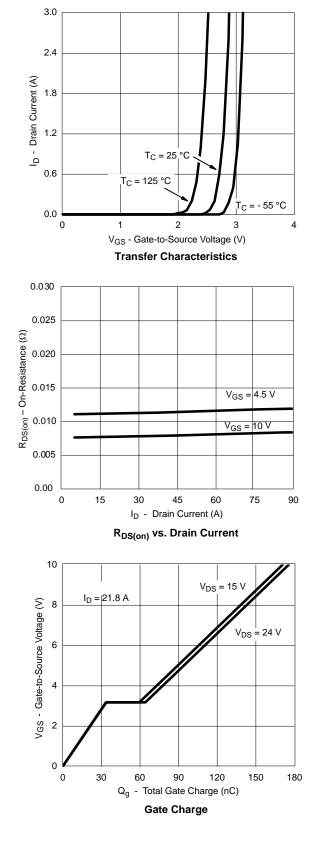
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



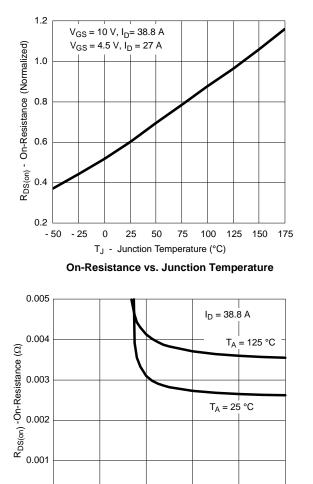


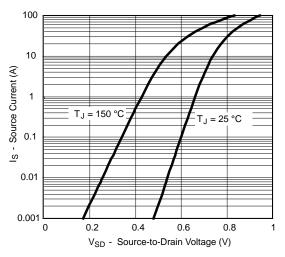
#### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



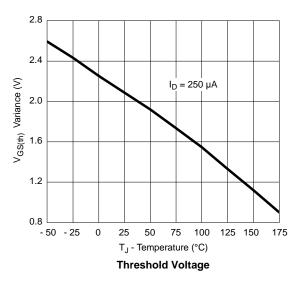


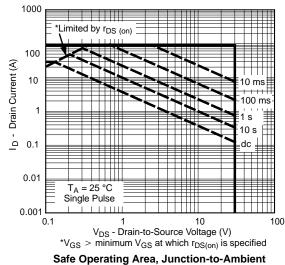
#### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)





Forward Diode Voltage vs. Temperature





0.000

0

2

4

6

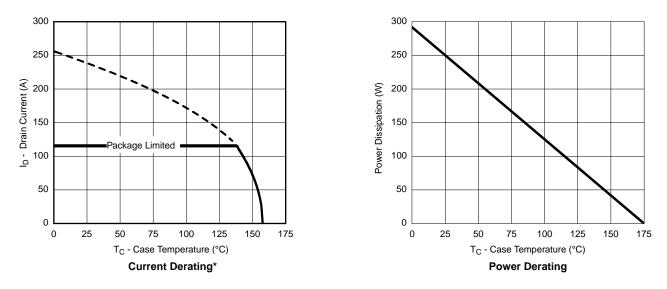
 $V_{GS}$  - Gate-to-Source Voltage (V)

R<sub>DS(on)</sub> vs. V<sub>GS</sub> vs. Temperature

8

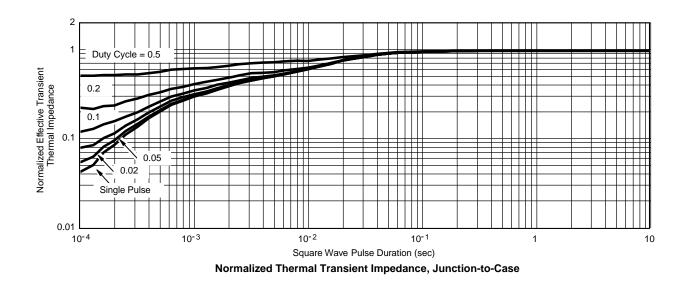
10





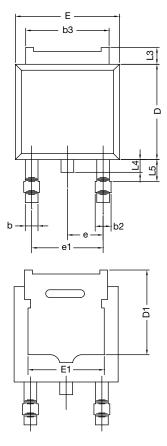
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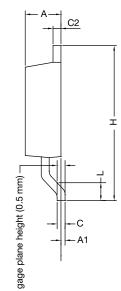
\*The power dissipation  $P_D$  is based on  $T_{J(max)} = 175$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.





# **TO-252AA CASE OUTLINE**





	MILLIMETERS		INCHES		
DIM.	MIN.	MAX.	MIN.	MAX.	
А	2.18	2.38	0.086	0.094	
A1	-	0.127	-	0.005	
b	0.64	0.88	0.025	0.035	
b2	0.76	1.14	0.030	0.045	
b3	4.95	5.46	0.195	0.215	
С	0.46	0.61	0.018	0.024	
C2	0.46	0.89	0.018	0.035	
D	5.97	6.22	0.235	0.245	
D1	5.21	-	0.205	-	
E	6.35	6.73	0.250	0.265	
E1	4.32	-	0.170	-	
Н	9.40	10.41	0.370	0.410	
е	2.28	BSC	0.090 BSC		
e1	4.56	BSC	0.180 BSC		
L	1.40	1.78	0.055	0.070	
L3	0.89	1.27	0.035	0.050	
L4	-	1.02	-	0.040	
L5	1.14	1.52	0.045	0.060	
ECN: X12-0247-Rev. M, 24-Dec-12 DWG: 5347					

Note

• Dimension L3 is for reference only.



#### **RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)**



Recommended Minimum Pads Dimensions in Inches/(mm)



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