



# AppIO 2 AC Input Module System User's Guide



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Mailing address:

Spectrum Digital, Inc  
PO Box 1559  
Sugar Land, TX. 77487-1559

Web site: [www.spectrumdigital.com](http://www.spectrumdigital.com)  
Sales: [sales@spectrumdigital.com](mailto:sales@spectrumdigital.com)  
Support: [support@spectrumdigital.com](mailto:support@spectrumdigital.com)

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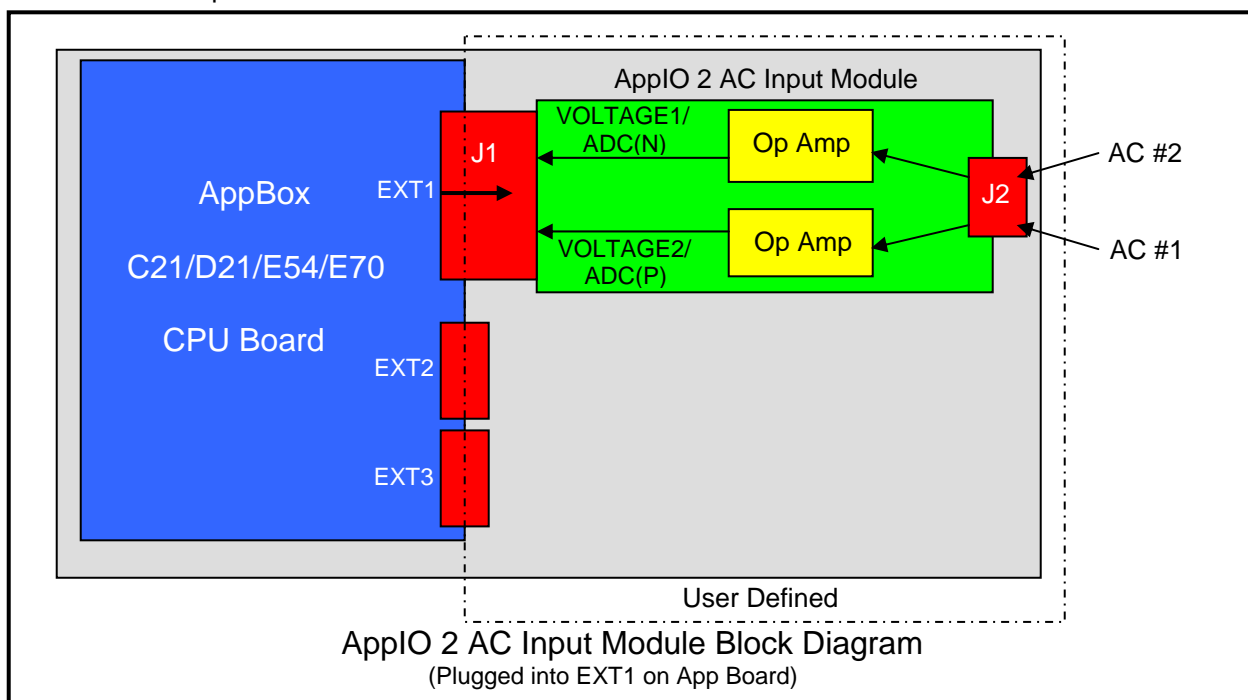
## 1.0 Introduction

This document describes the features of the AppIO 2 AC Input Module (Part/SKU number: 703941-0001). The AppIO 2 AC Input Module is designed to be used with a Spectrum Digital AppBox in an industrial application. The AppIO 2 AC Input Module can be plugged into any of the 3 expansion connectors on the AppBox.

### 1.1 AppIO 2 AC Input Module Features

This AppIO 2 AC Input Module has the following features:

- Provides two (2) AC Inputs
- Compatible with Spectrum Digital C21, D21, E54, and E70 AppBox CPU Boards and Atmel X PLAINED processor boards
- Power provided by AppBox CPU Board
- Operates 0 - +70C



### 1.2 AppIO 2 AC Input Module Applications

The AppIO 2 AC Input Module can be used in the following applications:

- To samples 2 AC inputs
- Used in industrial control systems to AC inputs
- Brings AC sampling into IoT applications
- Allows up to 6 inputs per AppBox

### 1.3 AppIO 2 AC Input Module Product Contents

The following items are contained in the AppIO 2 AC Input Module product:

- AppIO 2 AC Input Module
- Knock out panel for 2 AC Input connector
- 2 mounting screws
- Product information card

### 1.4 AppIO 2 AC Input Module Accessories

The following AppBox products can be used with the AppIO 2 Channel 2 AC Input Module and ordered from Spectrum Digital or authorized resellers:

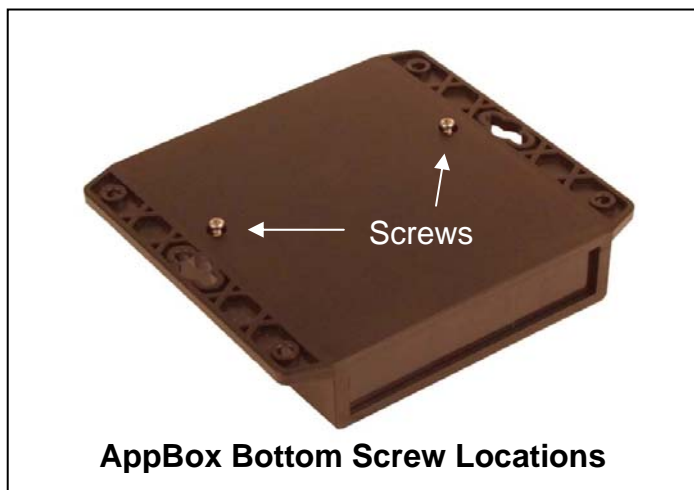
Accessory Description	Part Number
AppBox C21	703909-0001
AppBox D21	703910-0001
AppBox E54	703919-0001
AppBox E70	703911-0001

## 2.0 Installation

### 2.1 Installation of the AppIO 2 AC Input Module

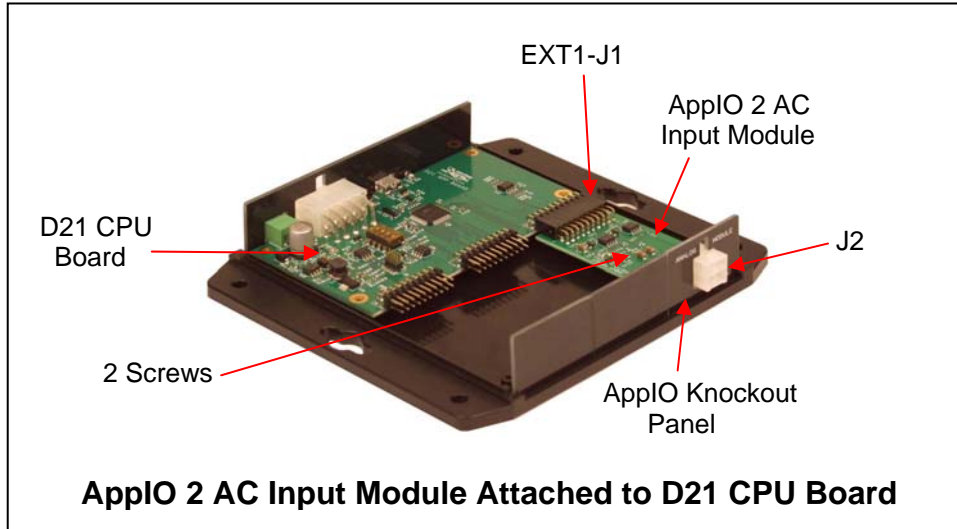
Listed below are the steps to install the AppIO 2 AC Input Module in an AppBox C21/D21/E54/E70:

1. Remove **ALL** power to the AppBox enclosure
2. Remove all interface connections attached to the installed AppIO Modules
3. Remove the connections (CAN/RS-485/LIN/USB/Enet) to the AppBox CPU board
4. Turn the AppBox over and remove the 2 screws from the bottom of the enclosure as shown below.



5. Turn the AppBox back over (label showing) and lift the top off the enclosure being careful not to lose the knock out panels
6. If necessary remove one or more existing AppIO Modules

7. Plug the AppIO 2 AC Input Module into an AppIO Module expansion connector (EXT1, EXT2, or EXT3)



8. Insert the knock out panel associated with the AppIO 2 AC Input Module
9. Secure the AppIO Module to the AppBox base with the 2 provided screws
10. Insert the knock out panels in any unused positions
11. Place the cover back over the AppBox CPU Board and AppIO Modules. Make sure the cover closes tight on both sides.
12. Turn the AppBox back over and insert the 2 screws back in and tighten until snug, do not over tighten/strip the screws

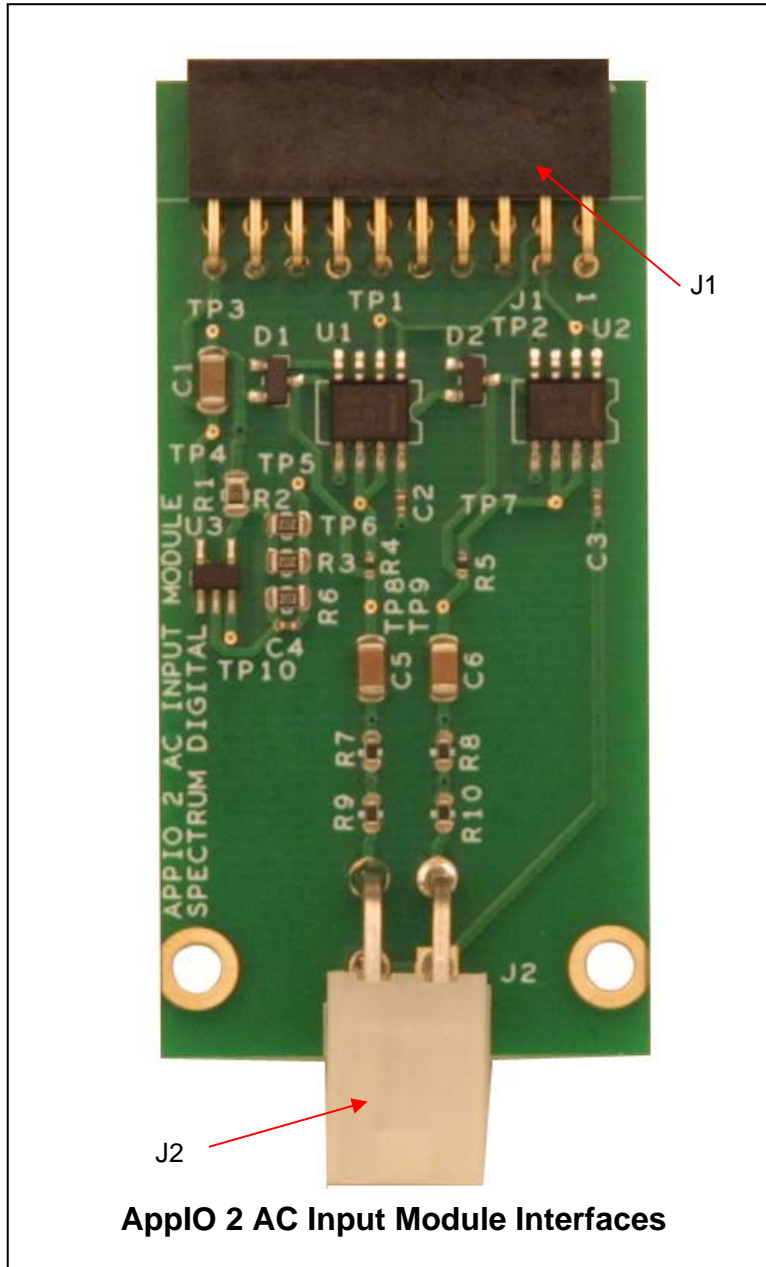


13. Re-attach the connections (CAN/RS-485/LIN/USB/Enet) to the AppBox CPU board
14. Re-attach all interface connections to the AppIO Modules
15. Apply power to the AppBox enclosure

### 3.0 Interfaces

This section describes the interfaces on the AppIO 2 AC Input Module. These interfaces include the connectors, and jumpers. The jumpers are shown in section 3.2

The location of each of these interfaces is shown in the figure below:



The table below lists all the interfaces on the AppIO 2 AC Input Module.

AppIO 2 AC INPUT MODULE INTERFACES	
INTERFACE NAME	TYPE OF INTERFACE
J1	Connector to AppBox CPU Board
J2	Connector for 2 AC Inputs
JP1	Short input resistor, AC1
JP2	Short input resistor, AC2
TP4	Test point(top side)
TP5	Test point(top side)
TP8	Test point(top side)
TP9	Test point(top side)
TP10	Test point(top side)
TP11	Test point(top side)
TP12	Test point(top side)
TP13	Test point(top side)
TP14	Test point(top side)

### 3.1 Connectors

The following section describes the connectors on the AppIO 2 AC Input Module.

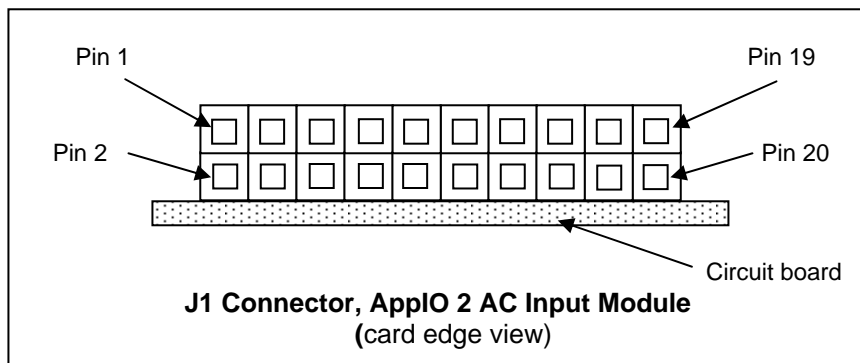
INTERFACE NAME	TYPE OF INTERFACE	MATING CONNECTOR
J1	Connector to AppBox CPU Board, 20 position, 2 x 10	
J2	4 position minifit, 2 x 2	



### 3.1.1 J1 Connector, AppBox CPU Board Interface

The J1 connector on the AppIO 2 AC Input Module can be plugged into any one of the 3 expansion connectors (EXT1, EXT2, or EXT3) on the C21/D21/E54/E70 AppBox CPU boards. The J1 connector is a 20 pin, 2 x 10 double row female right angle connector with centers on .1 inch (2.54 mm) centers.

The following diagram shows the physical layout of the J1 connector.



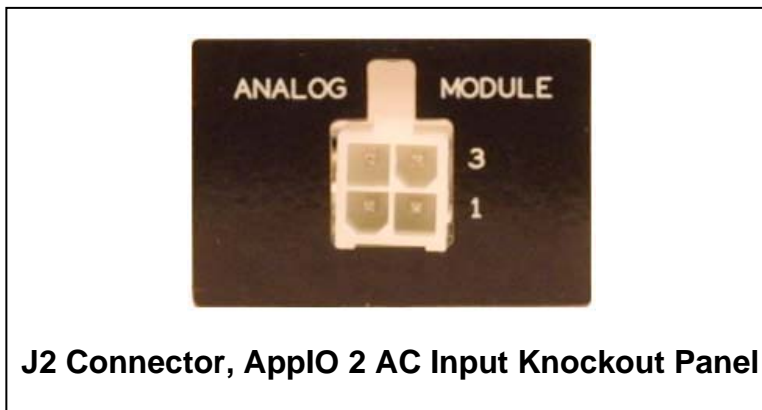
The following table shows the signals present on the J1 connector.

<b>J1 Connector, AppIO 2 AC Input Module</b>			
<b>Pin #</b>	<b>Signal Name</b>	<b>Function</b>	<b>Shared Functionality</b>
1	No connect		
2	DGND	Ground	Ground
3	VOLTAGE1	ADC(P) to AppBox CPU board	
4	VOLTAGE2	ADC(N) to AppBox CPU board	
5	No connect		
6	No connect		
7	No connect		
8	No connect		
9	No connect		
10	No connect		
11	No connect		
12	No connect		
13	No connect		
14	No connect		
15	No connect		
16	No connect		
17	No connect		
18	No connect		
19	DGND	Ground	Ground
20	VDD_3V3	+3.3 volts	VDD_3V3

### 3.1.2 J2 Connector, 2 AC Input Interface

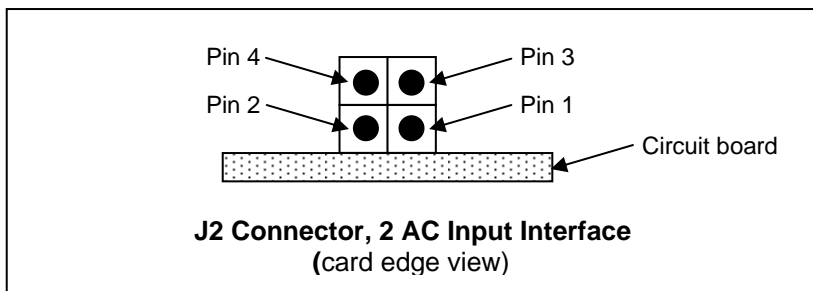
This section describes the J2 input connector. This connector allows 2 different AC inputs to be attached to the module. Both inputs have identical circuitry. They both connect to an Op Amp and then are routed to an A/D channel on the AppBox CPU board. Each AC input can accept 0-xx volts.

The J2 connector is shown with it's knockout panel in the diagram below.



This is a 4 position (2 rows by 2 pins each) male connector. The bottom row of pins, (1, and 2) have the DGND signals for each of the input pair. The top row of pins, (3, and 4) have the “AC” signals for each input pair.

The diagram below shows the physical layout of the J2 connector.

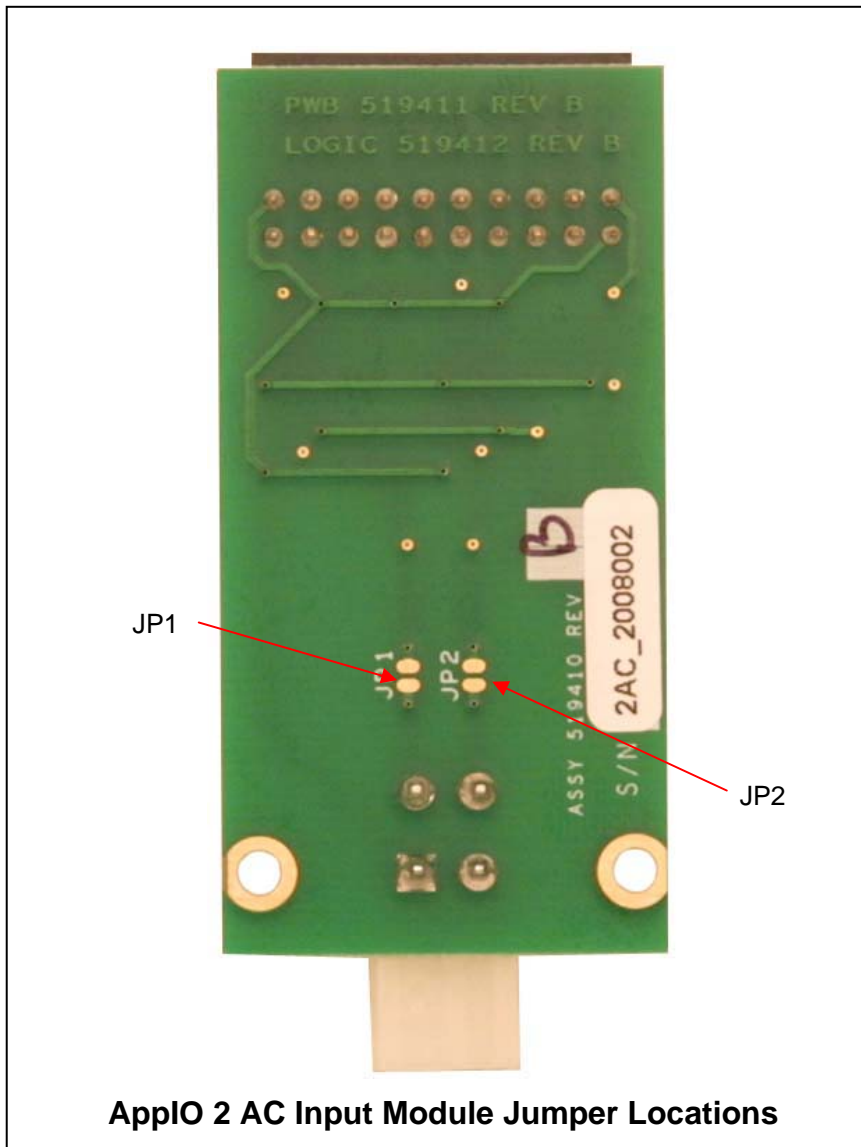


The following table shows the signals present on the J2 connector.

J2 Connector, AC Inputs	
Pin number	Signal name
1	DGND
2	DGND
3	AC2
4	AC1

### 3.2 Jumpers

This section describes the jumpers on the AppIO 2 AC Input Module. All jumpers are located on the bottom side of the Module. All jumpers are surface mount jumpers. The figure below shows the location of each jumper.

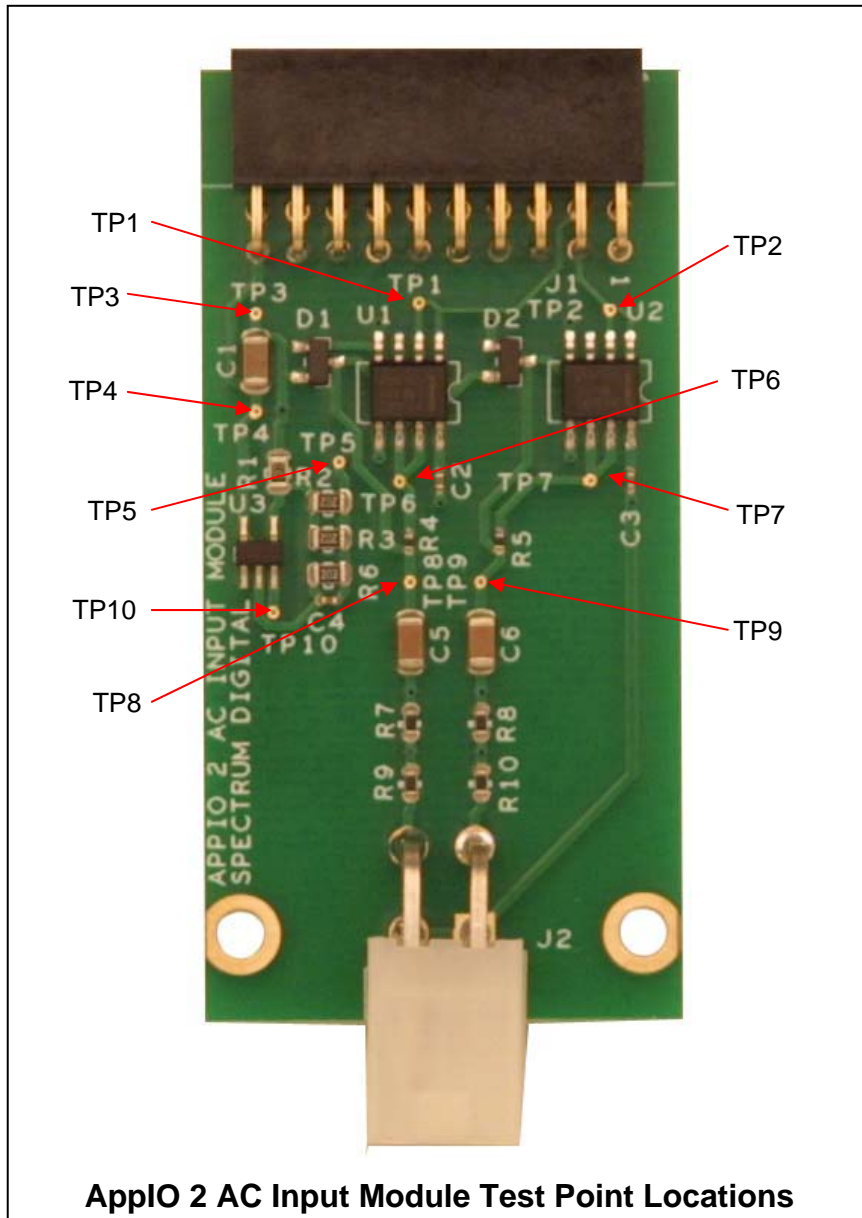


The table below describes the jumpers on the AppIO 2 AC Input Module.

JUMPER NAME	POSITION DESCRIPTION	FACTORY SHIPPED POSITION
JP1	If installed = short resistor	Open
JP2	If installed = short resistor	Open

### 3.3 Test Points

This section describes the test points on the AppIO 2 AC Input Module. All test points are located on the top (component) side of the Module. The figure below shows the location of each test point.



The table below describes the signals on the test points on the AppIO 2 AC Input Module.

TEST POINT NAME	ATTACHED SIGNAL
TP1	Pin 2, U1A
TP2	Pin 2, U2A
TP3	VDD_3V3, Pin 20, J1
TP4	DGND, Pin 19, J1
TP5	0V825, through resistor to DGND
TP6	Pin 6, U1B
TP7	Pin 6, U2B
TP8	AC2, Pin 3, U1A
TP9	AC1, Pin 3, U2A
TP10	1V24, U3

#### 4.0 Physical Characteristics

The physical characteristics of the AppIO 2 AC Input Module are described below:

AppIO 2 AC Input Module (without connectors): L: 2.25 in. (57.15 mm.) x W: 1.20 in. (30.48 mm.)

AppIO 2 AC Input Module (width with connectors): L: 2.75 in. (69.85 mm.)

AppIO 2 AC Input Module (maximum height): H: 0.75 in. (19.05 mm.)

Weight of 2 AC Input Module: 0.96 oz. / 0.027 kg

Operating Temperature: -0C to +70C

Storage Temperature: -40C to +85 C

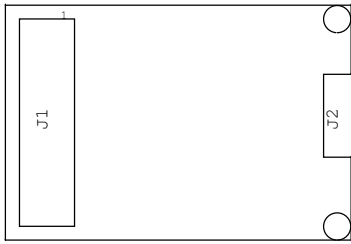
Relative Humidity: 0 to 90% (non-condensing)

Maximum power consumption of controller board: xx ma. at +yy volts

RoHS Compliant: Yes

#### 5.0 Schematics

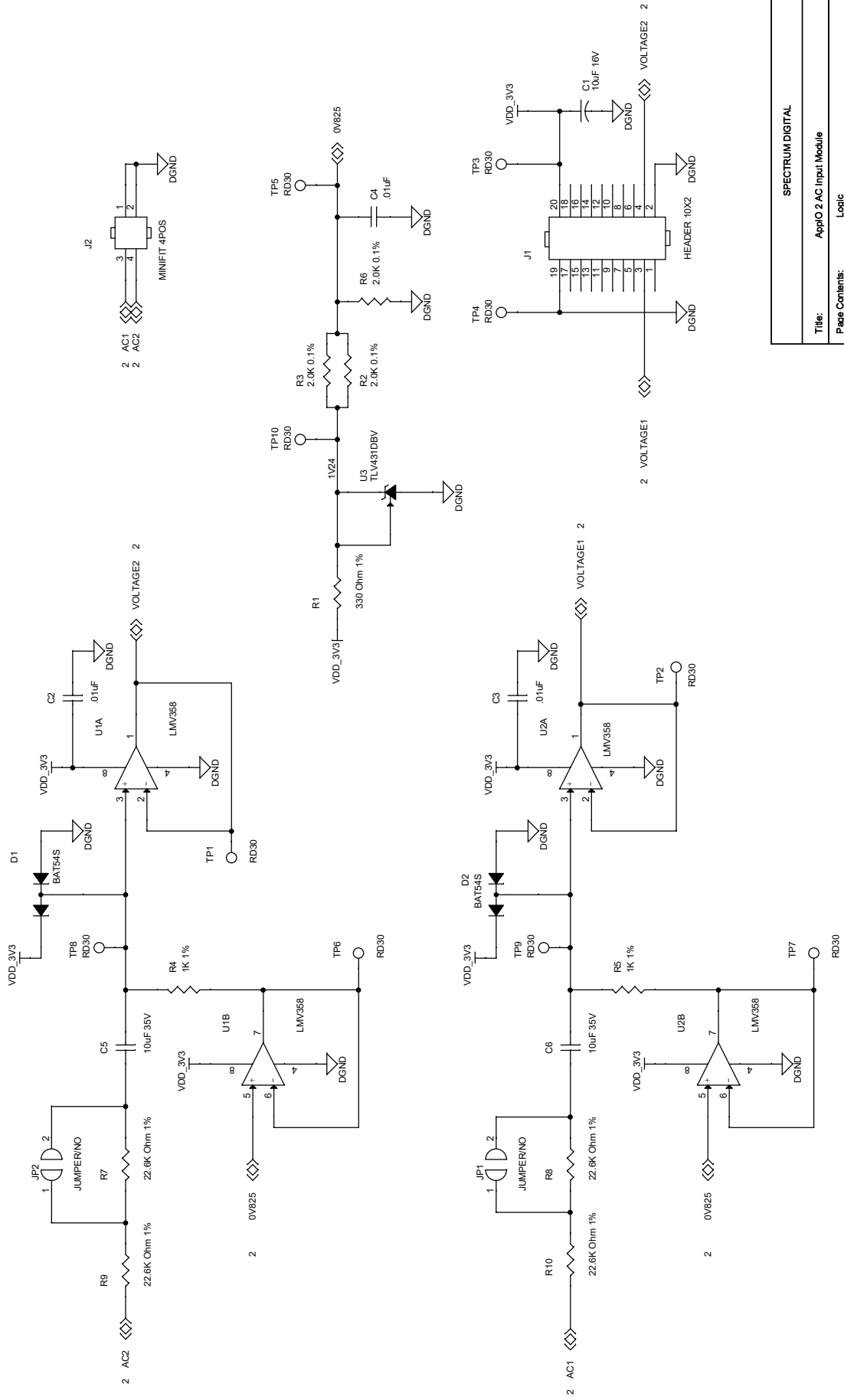
The following pages contain the schematics for the 2 AC Input Module.



12VAC	JP1, JP2 Closed
24VAC	JP1, JP2 Open

4	3
2	1

SPECTRUM DIGITAL INCORPORATED			
Title:	AppIO 2 AC Input Module		
Page Contents:	TITLE		
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Size: B	DWG NO	516412	Revision: B
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Spectrum Digital, Inc  
PO Box 1559  
Sugar Land, TX. 77487-1559

Web site: [www.spectrumdigital.com](http://www.spectrumdigital.com)  
Sales: [sales@spectrumdigital.com](mailto:sales@spectrumdigital.com)  
Support: [support@spectrumdigital.com](mailto:support@spectrumdigital.com)

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