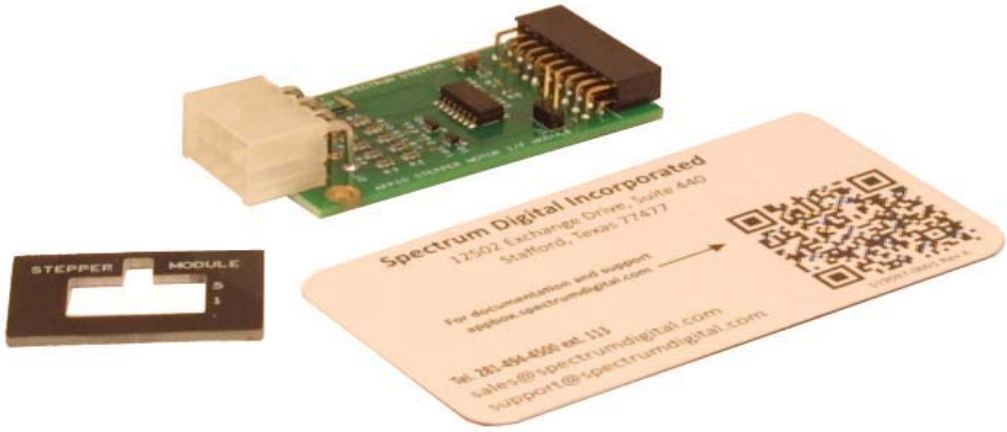




# AppIO Stepper Motor Interface Module System User's Guide



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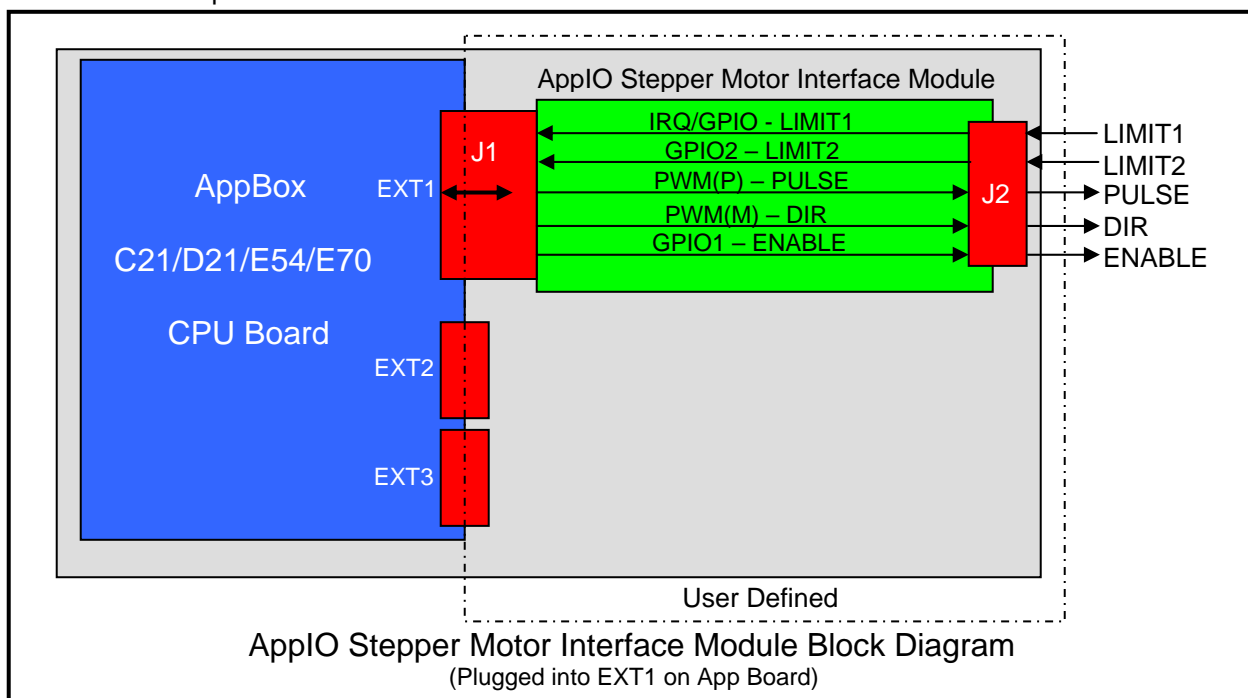
## 1.0 Introduction

This document describes the features of the AppIO Stepper Motor Interface Module (Part/SKU number: 703938-0001). The AppIO Stepper Motor Interface Module is designed to be used with a Spectrum Digital AppBox in an industrial application. The AppIO Stepper Motor Interface Module can be plugged into any of the 3 expansion connectors on the AppBox.

### 1.1 AppIO Stepper Motor Interface Module Features

This AppIO Stepper Motor Interface Module has the following features:

- Provides all the control signals for controlling a stepper motor
- Compatible with Spectrum Digital C21, D21, E54, and E70 AppBox CPU Boards and Atmel X PLAINED processor boards
- Occupies one (1) EXT and bulkhead position in the AppBox
- Power provided by AppBox CPU Board
- Operates 0 - +70C



### 1.2 AppIO Stepper Motor Interface Module Applications

The AppIO Stepper Motor Interface Module can be used in the following applications:

- Provide stepper motor control with the AppBoxes
- Up to 3 motors can be controlled from one AppBox
- Brings stepper motor control into IoT applications, aka edge devices

### 1.3 AppIO Stepper Motor Interface Module Product Contents

The following items are contained in the AppIO Stepper Motor Interface Module product (Part/SKU number 703938-0001):

- AppIO Stepper Motor Interface Module
- 2 mounting screws
- Knock out panel for Stepper Motor Interface output connector
- Product information card

### 1.4 AppIO Stepper Motor Interface Module Accessories

The following AppBox products can be used with the AppIO Stepper Motor Interface Module and ordered from Spectrum Digital or authorized resellers:

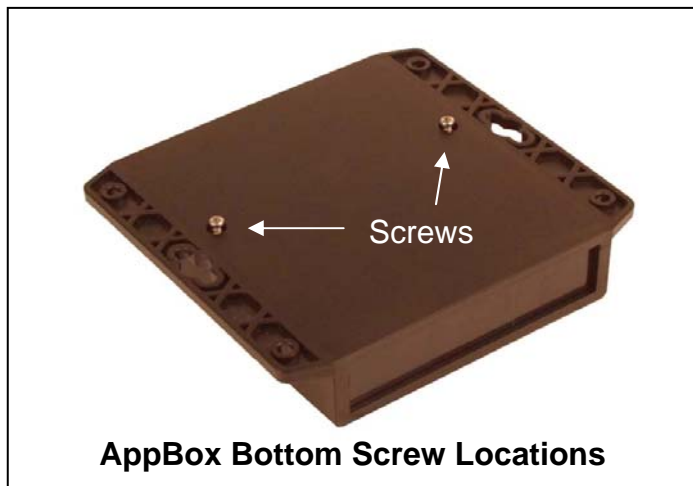
Accessory Description	Part Number
AppBox C21	703909-0001
AppBox D21	703910-0001
AppBox E54	703919-0001
AppBox E70	703911-0001

## 2.0 Installation

### 2.1 Installation of the AppIO Stepper Motor Interface Module

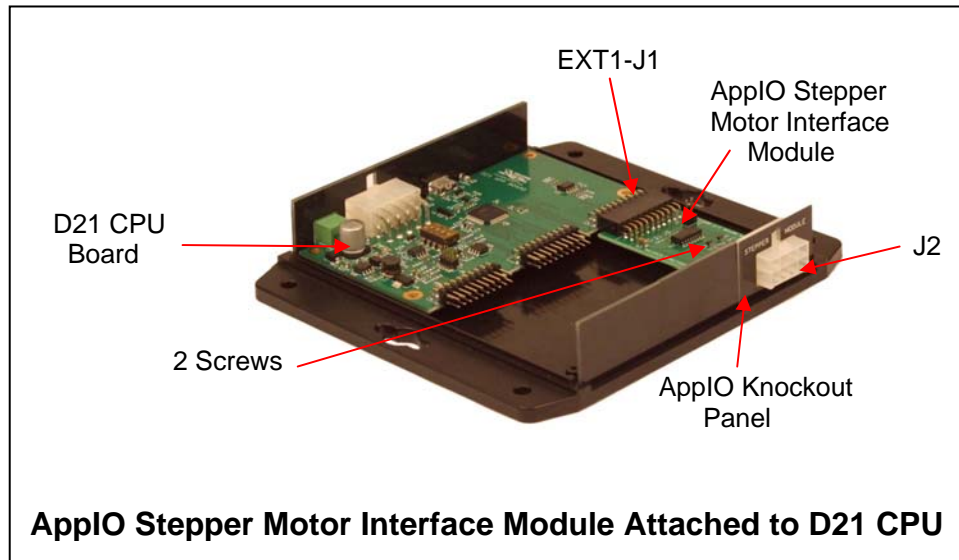
Listed below are the steps to install the AppIO Stepper Motor Interface Module in an AppBox C21/D21/E54/E70:

1. Remove **ALL** power to the 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

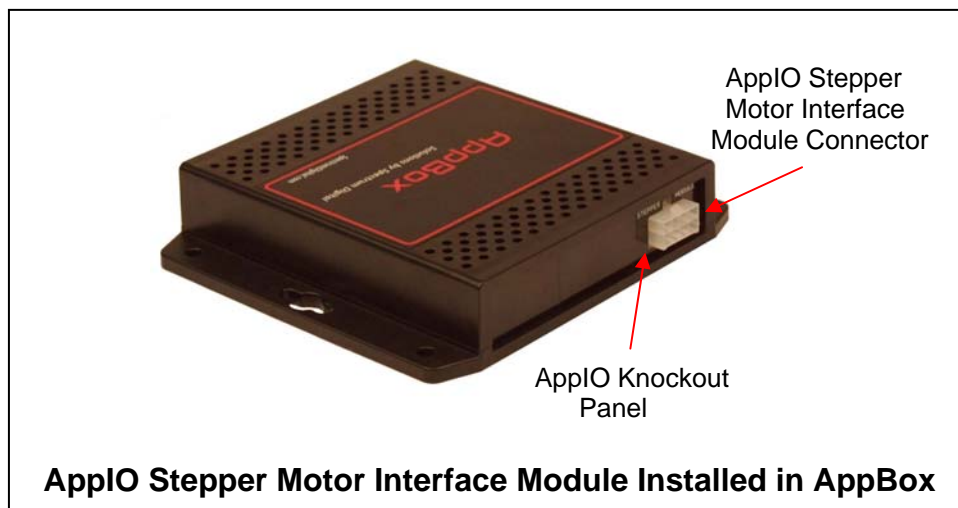


5. Turn the AppBox back over (label showing) and lift the top off the enclosure being careful not to lose the knockout panels
6. If necessary remove one or more existing AppIO Modules

7. If necessary add or remove any jumpers on the AppIO Stepper Motor Interface Module necessary for your application.
8. Plug the AppIO Stepper Motor Interface Module into an AppIO Module expansion connector (EXT1, EXT2, or EXT3)



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

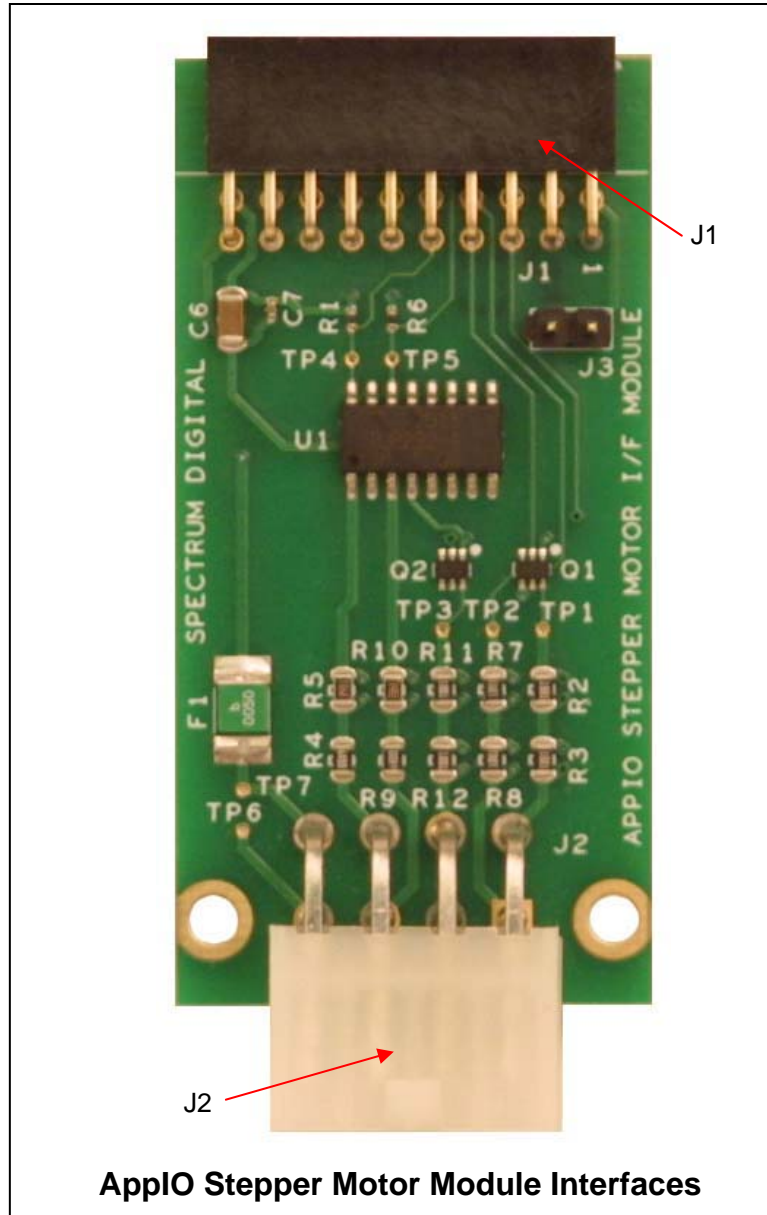


14. Re-attach the connections (CAN/RS-485/LIN/USB/Enet) to the AppBox CPU Board
15. Re-attach all interface connections to the AppIO Modules
16. Apply power to the AppBox

### 3.0 Interfaces

This section describes the interfaces on the AppIO Stepper Motor Interface Module. These interfaces include 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 Stepper Motor Interface Module.

AppIO STEPPER MOTOR INTERFACE MODULE INTERFACES	
INTERFACE NAME	TYPE OF INTERFACE
J1	Connector to AppBox CPU Board
J2	Connector for Stepper Motor Interfaces
JP1	Short resistor R2, Not connected
JP2	Short resistor R3, Not connected
JP3	Short resistor R7, Not connected
JP4	Short resistor R8, Not connected
JP5	Short resistor R11, Not connected
JP6	Short resistor R12, Not connected
JP7	Short resistor R7, Not connected
JP8	Short resistor R10, Not connected
JP9	If shorted, brings +5V from AppBox CPU Board, Not connected
TP1	Test point(top side)
TP2	Test point(top side)
TP3	Test point(top side)
TP4	Test point(top side)
TP5	Test point(top side)
TP6	Test point(top side)
TP7	Test point(top side)

### 3.1 Connectors

The following section describes the connectors on the AppIO Stepper Motor Interface Module.

INTERFACE NAME	TYPE OF INTERFACE	MATING CONNECTOR
J1	Connector to AppBox CPU Board, 20 position, 2 x 10	
J2	8 position, 4 x 2, Molex 35318-0820	Molex 0039012080

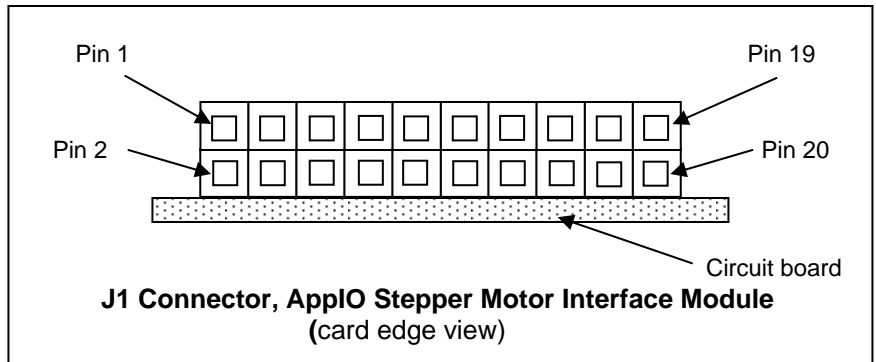
A connector kit for connector J2 is available from Spectrum Digital under part/SKU number: 703920-0008.



### 3.1.1 J1 Connector, AppBox CPU Board Interface

The J1 connector on the AppIO Stepper Motor Interface 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.



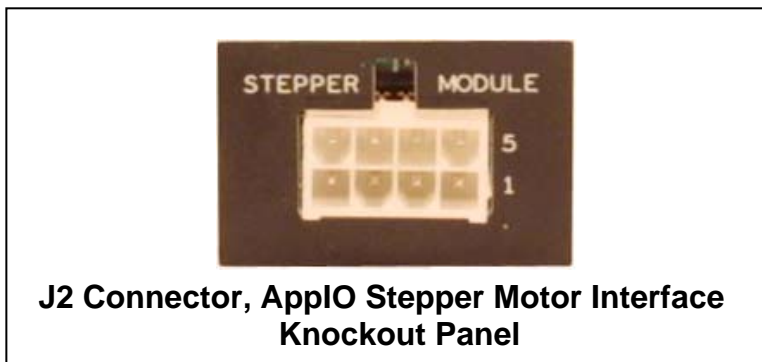
The following table shows the signals present on the J1 connector.

<b>J1 Connector, AppIO Stepper Motor Interface Module</b>			
<b>Pin #</b>	<b>Signal Name</b>	<b>Function</b>	<b>Shared Functionality</b>
1	5V0	+ 5 Volts from AppBox CPU board	
2	DGND	Ground	Ground
3	No connect		
4	No connect		
5	GPIO1	ENABLE output	
6	GPIO2	LIMIT2 input	
7	PWM(P)	PULSE output	
8	PWM(M)	DIR output	
9	IRQ/GPIO	LIMIT1 input	
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, Stepper Motor Interface

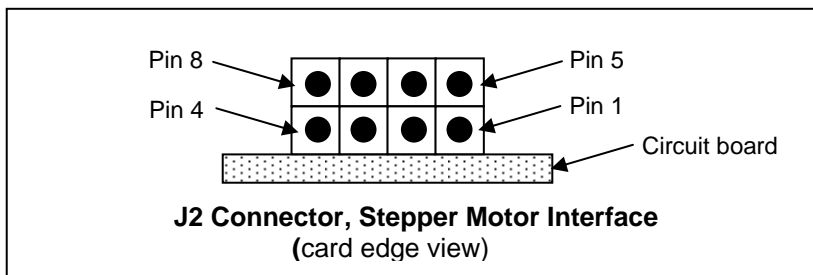
This section describes the J2 input connector. This connector allows stepper motor signals to be attached to the module.

The J2 connector is shown with its knockout panel in the diagram below.



This is an 8 position (2 rows by 4 pins each) male connector. The bottom row has of pins 1-4, and the top row has pins 5-8.

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

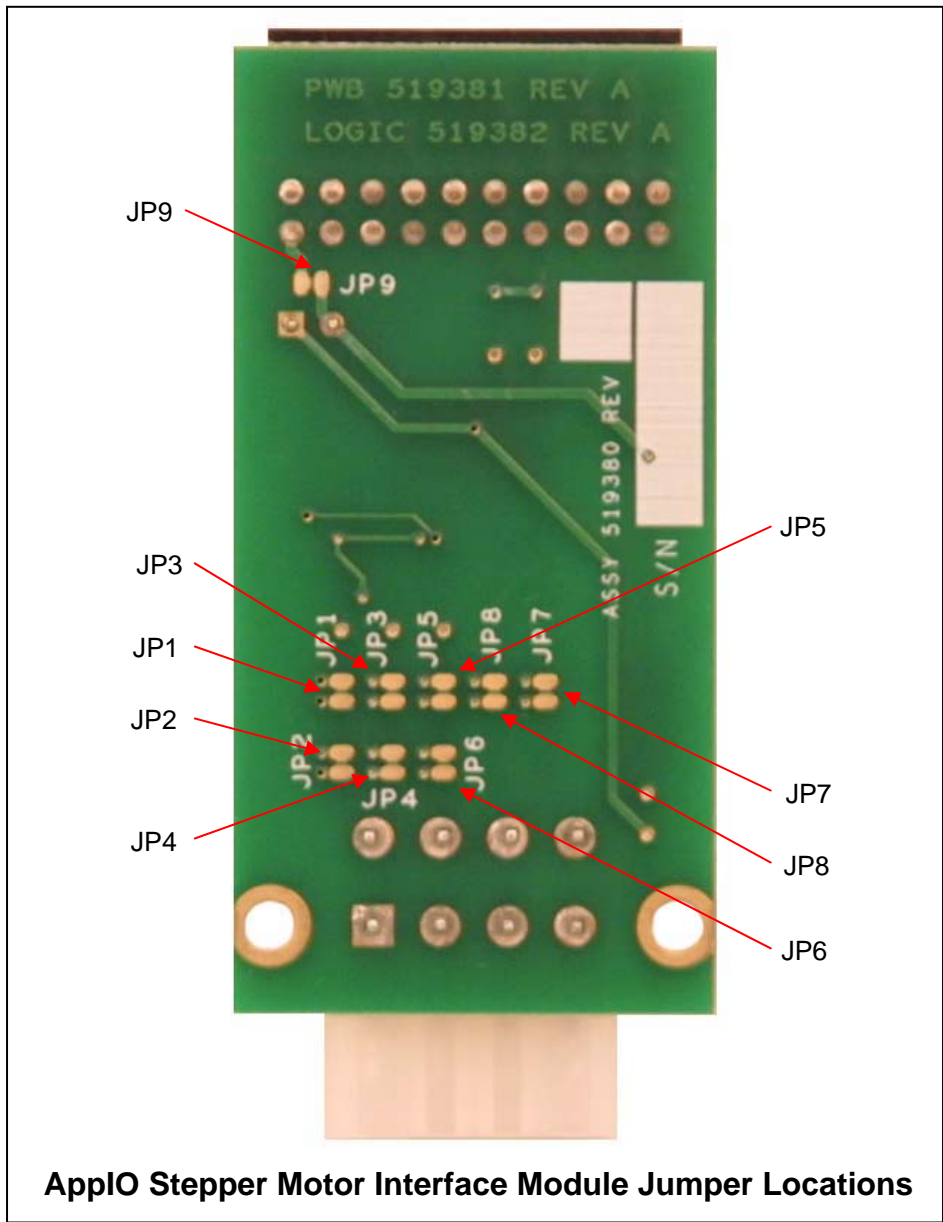


The following table shows the signals present on the J2 connector.

<b>J2 Connector, Stepper Motor Interfaces</b>	
<b>Pin number</b>	<b>Signal name</b>
1	DIR
2	No connect
3	LIMIT2
4	DGND
5	PULSE
6	ENABLE
7	LIMIT1
8	5V0, + 5 volts

### 3.2 Jumpers

This section describes the jumpers on the AppIO Stepper Motor Interface 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.



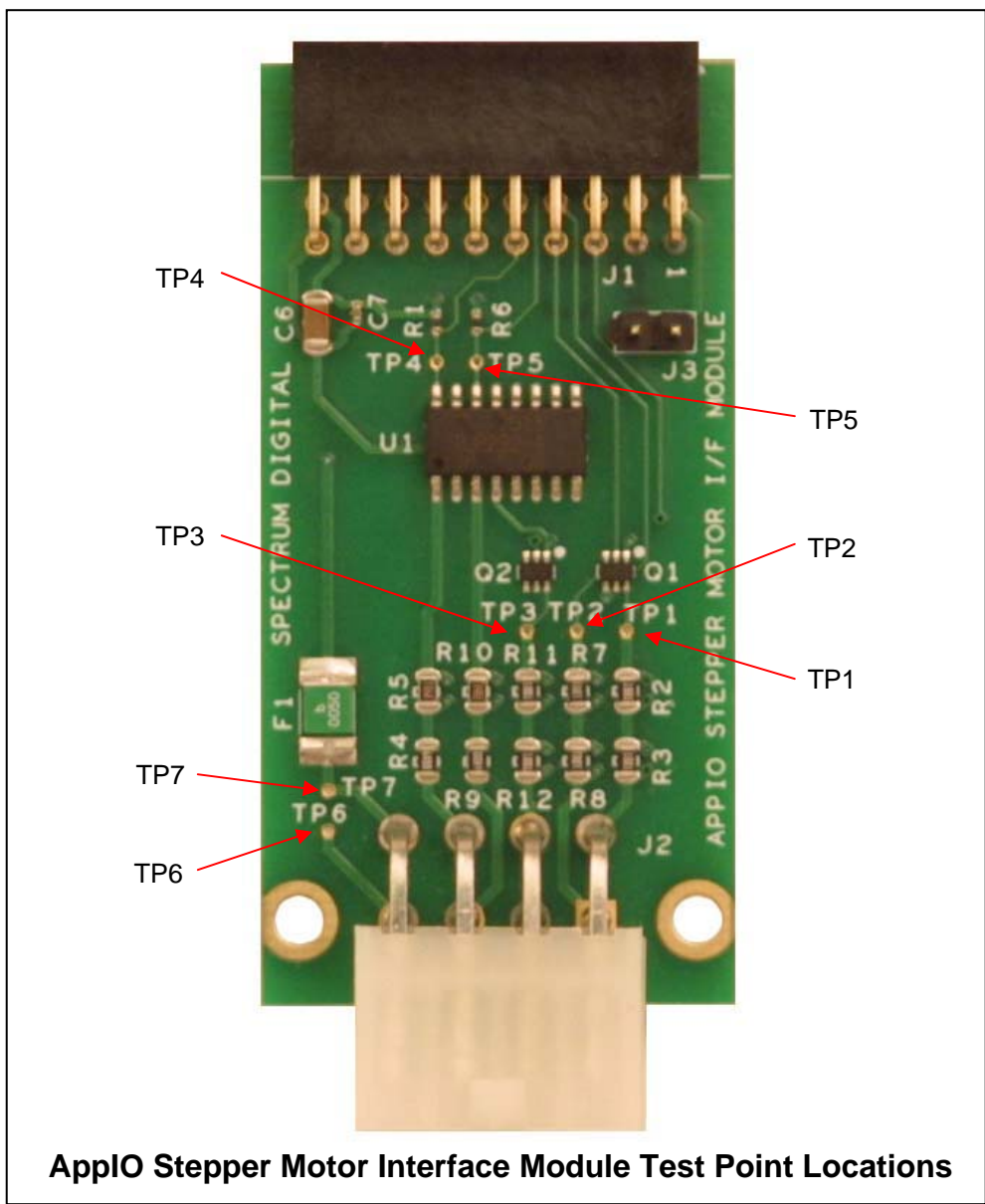
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The table below describes the jumpers on the AppIO Stepper Motor Interface Module.

<b>JUMPER NAME</b>	<b>POSITION DESCRIPTION</b>	<b>FACTORY SHIPPED POSITION</b>
JP1	Bypass R2 if shorted	Open – No connect
JP2	Bypass R3 if shorted	Open – No connect
JP3	Bypass R7 if shorted	Open – No connect
JP4	Bypass R8 if shorted	Open – No connect
JP5	Bypass R11 if shorted	Open – No connect
JP6	Bypass R12 if shorted	Open – No connect
JP7	Bypass R5 if shorted	Open – No connect
JP8	Bypass R10 if shorted	Open – No connect
JP9	If shorted, get +5 volts from AppBox CPU board	Open – No connect

### 3.3 Test Points

This section describes the test points on the AppIO Stepper Motor Interface 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 jumpers on the AppIO Stepper Motor Interface Module.

TEST POINT NAME	ATTACHED SIGNAL
TP1	PLS1 - Q1A, pin 6
TP2	DIR1 - Q1B, pin 3
TP3	EN1 - Q2A, pin 6
TP4	IRQ/GPIO - U1A, pin 16
TP5	GPIO2 - U1B, pin 14
TP6	DGND - J2, pin 4
TP7	5V0 - J2, pin 8

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## 4.0 Physical Characteristics

The physical characteristics of the AppIO Stepper Motor Interface Module are described below:

AppIO Stepper Motor Interface Module (without connectors): L: 2.25 in. (57.15 mm.) x  
W: 1.20 in. (30.48 mm.)

AppIO Stepper Motor Interface Module (width with connectors): L: 2.75 in. (69.85 mm.)

AppIO Stepper Motor Interface Module (maximum height): H: 0.75 In. (19.05 mm.)

Weight of Stepper Motor Interface 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: 50 ma. at +3.3 volts

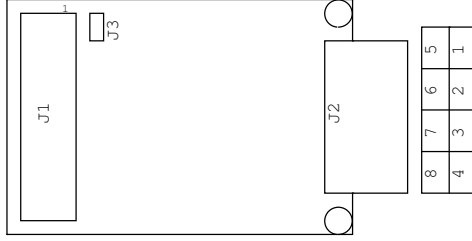
RoHS Compliant: Yes

## 5.0 Schematics

The following pages contain the schematics for the Stepper Motor Interface Module.

NOTES:

1. JUMPERS JP1, JP2, JP3, JP4, JP6 ARE ON THE BACK OF THE BOARD
2. INSTALL J3 AND CUT JUMPER JP6 FOR EXTERNAL 5V POWER



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Title: AppIO Stepper Motor Interface Module

Page Contents: TITLE

Size: B DWG NO 519382 Revision: A

Date: Tuesday, February 25, 2020 Sheet 1 of 2





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