



AppIO Novos Module System User's Guide



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519329-4001

Table of Contents

Section	Title	Page
1.0	Introduction	4
1.1	AppIO Novos Demo Module Features	4
1.2	AppIO Novos Module Product Contents	5
1.3	AppBox Products and Accessories	5
1.4	Software Development Tools	5
2.0	Installation	6
2.1	Installation of the AppIO Novos Module	6
3.0	Interfaces	7
3.1	Connectors	8
3.1.1	J1, AppBox CPU Board Interface Connector	9
3.1.2	J2, COM USB Interface Connector	10
3.1.3	J3, Factory Test Connector	10
3.1.4	J4, Programming Interface Connector	10
3.1.5	J5, SWD USB Interface Connector	10
3.2	AppIO Novos Module Potentiometer	10
3.3	AppIO Novos Module LEDs	10
3.4	AppIO Novos Module Test Points	11
4.0	Physical Characteristics	12
5.0	Mechanical Information	12
6.0	Schematics	12

1.0 Introduction

This document describes the features of the AppIO Novos Module. The AppIO Novos Module is designed to be used with a Spectrum Digital AppBox C21. This will allow the user to demonstrate and verify some features of the AppBox C21 CPU Board. The AppIO Novos Module uses the EXT2 connector on the AppBox C21 CPU Board and occupies 2 slots on the AppIO connector bulkhead. In other words it is a double wide as far as bulkhead is concerned. This leaves EXT1 to be used for other AppIO modules

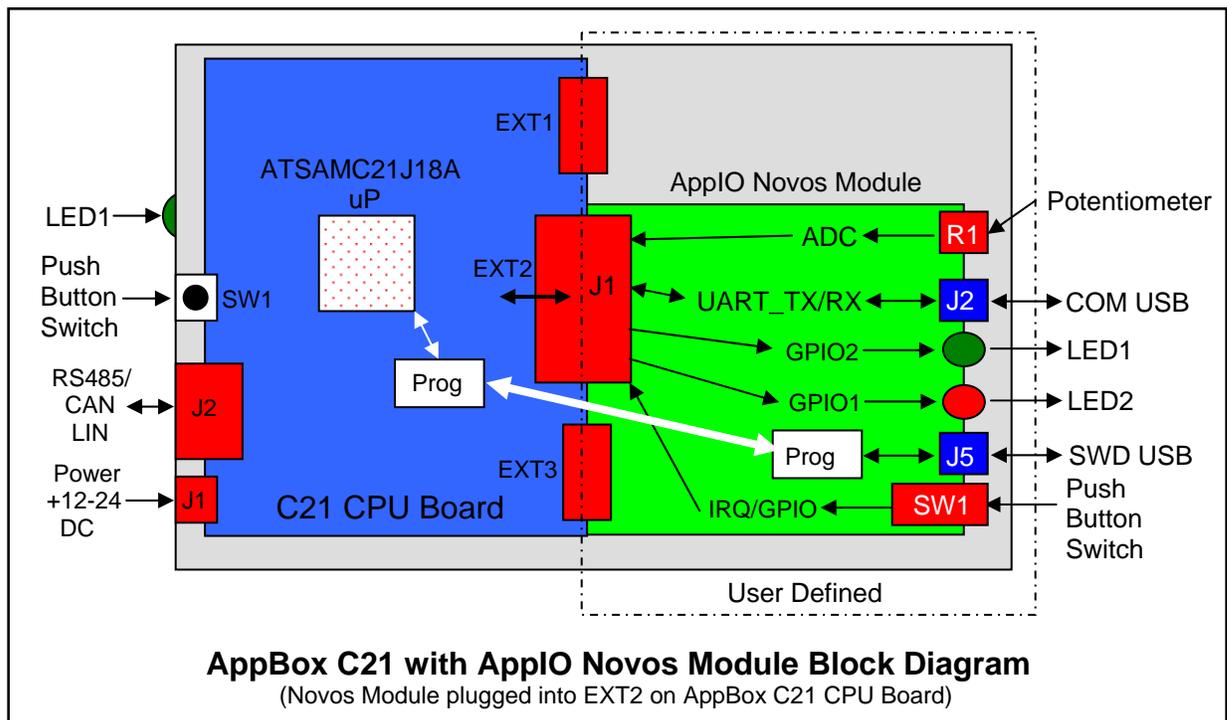
A preconfigured demonstration system that includes an AppBox C21, AppIO Novos Module, and the Novos FB Application Framework and Demonstration software is available as part/SKU #: 703932-0001.

Refer to the “Software Users Guide for the AppBox C21 with the AppIO Novos Module” for a description of the Novos FB Application Framework and Demonstration Software. This is document part #: 519328-4001. It is available on the Spectrum Digital AppBox support web page.

1.1 AppIO Novos Module Features

This AppIO Novos Module has the following features:

- Provides two (2) LEDs
- One (1) push button switch
- One (1) potentiometer
- One (1) communications USB (RS232) port
- One (1) software debug USB (RS232) port
- Compatible with Spectrum Digital AppBox C21 CPU Board
- Power provided by AppBox C21 CPU Board
- Operates 0 - +70C



1.2 AppIO Novos Module Product Contents

The following items are contained in the AppIO Novos Module product:

- AppBox C21 with AppIO Novos Module installed
- Mating power connector
- USB cable
- Product information card
- Documentation coupon

1.3 AppBox Products and Accessories

The following AppBox products and accessories work with the AppBox C21 and can be ordered from Spectrum Digital or authorized resellers:

Accessory Description	Part/SKU Number
AppBox Power Supply with cable, 110/220 VAC to 12V, 1.5A	703925-0001
Distribution Box	703924-0001
AppBox Cable	703923-0001
RS485 Cable	703917-0001
CAN Cable	703912-0001
LIN Cable	703922-0001

1.4 Software Development Tools

The AppIO Novos Module is compatible with the software and hardware development tools from Microchip/Atmel. These tools are described on the Microchip/Atmel website:

<https://www.microchip.com/development-tools/>

These tools include the following:

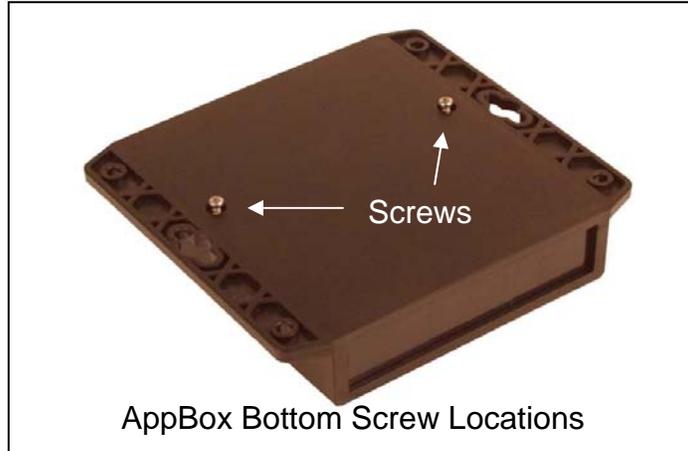
- Editor
- Compiler/assembler/linker
- Libraries
- Operating System
- Debugger
- JTAG Emulator

2.0 Installation

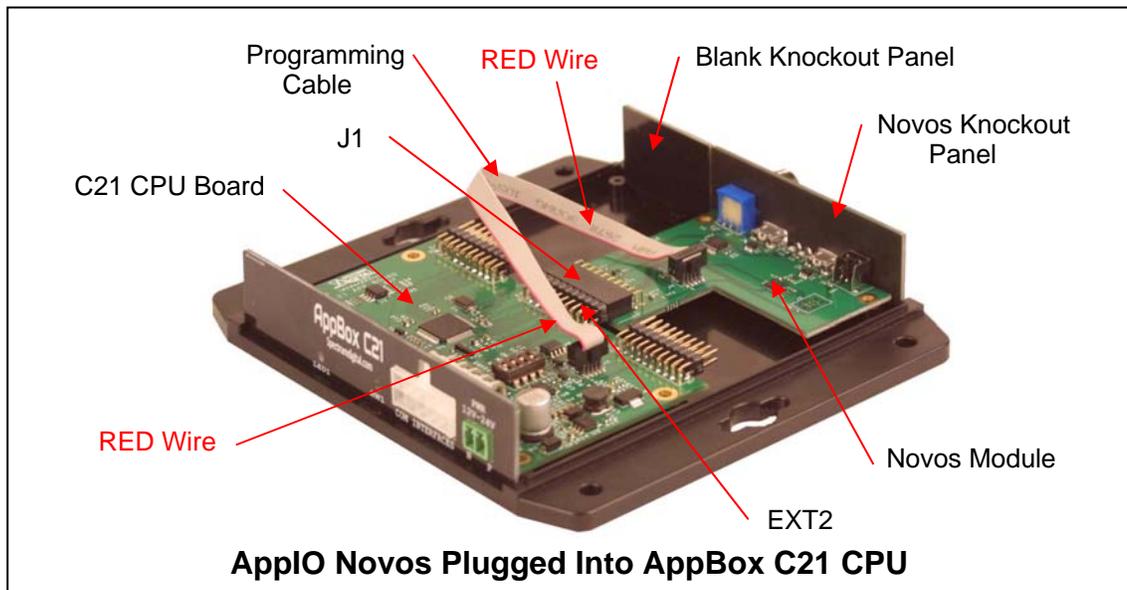
2.1 Installation of the AppIO Novos Module

Listed below are the steps to install the AppIO Novos Module in an AppBox C21:

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) to the AppBox C21 CPU Board
4. Turn the AppBox over and remove the 2 screws from the bottom of the enclosure as shown below



5. Lift the top off the enclosure being careful not to lose the knockout panels
6. If necessary remove one or more existing AppIO Modules in EXT2, and EXT3 and their associated knockout panels
7. Plug the AppIO Novos Module into an C21 CPU Board expansion connector EXT2
8. Attach the debug cable from Novos Module J4 to C21 CPU Board J6. Be sure Pin 1 is connected to Pin 1 (**RED** Wire) on both connectors. See the diagram below.
9. Insert the Novos knockout panel associated with the AppIO Novos Module
10. Insert a blank knockout panel in the EXT1 position if no AppIO Module present.

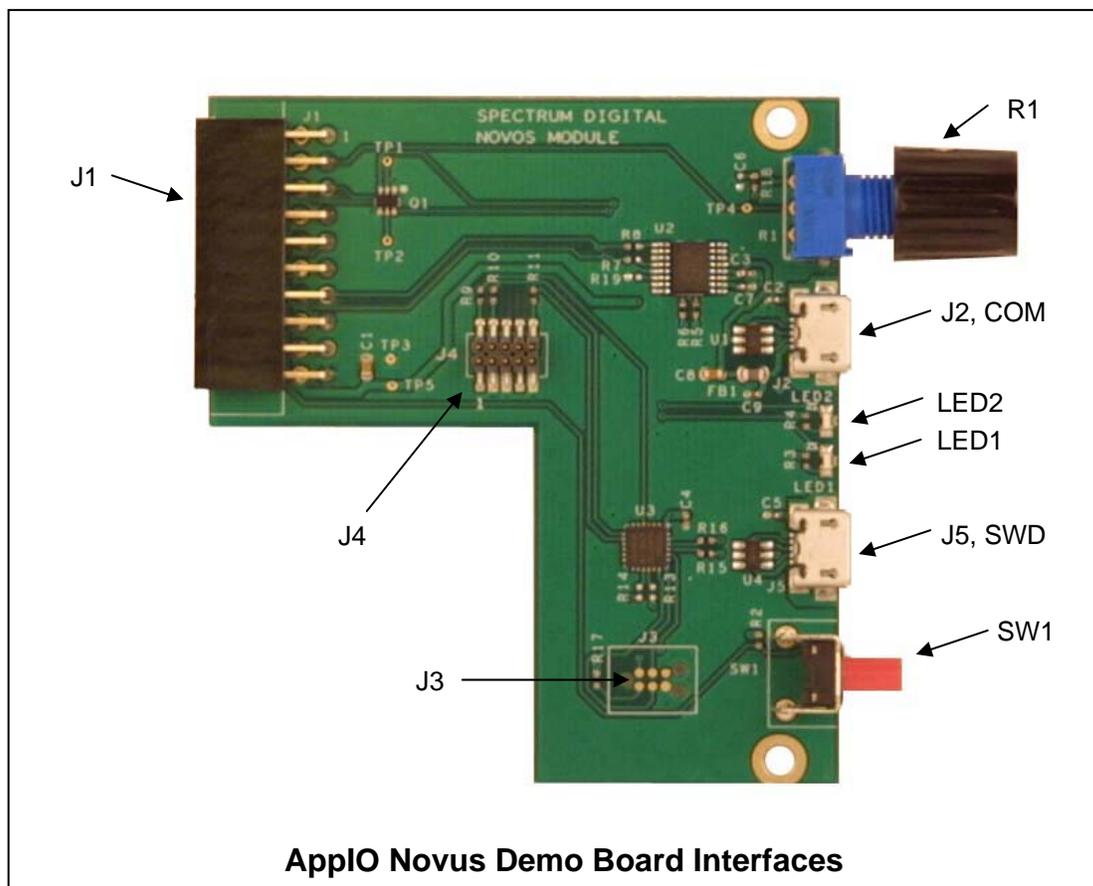


11. Place the cover back over the C21 CPU Board and AppIO Modules
12. Insert the 2 screws back in and tighten until snug, do not over tighten/strip the screws
13. Re-attach the connections (CAN/RS-485/LIN) to the C21 CPU Board
14. Re-attach all interface connections to the AppIO Module connected to EXT1 if present
15. Apply power to the AppBox

3.0 Interfaces

This section describes the interfaces on the AppIO Novos Module. These interfaces include the connectors, switches, LEDs, potentiometer, and test points.

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



The table below lists all the interfaces on the AppIO Novos Module.

AppIO NOVOS MODULE INTERFACES	
INTERFACE NAME	TYPE OF INTERFACE
J1	Connector to C21 CPU Board
J2	Communications USB
J3	Factory test
J4	Programming header
J5	SWD USB
R1	Potentiometer
LED1	Light emitting diode
LED2	Light emitting diode
TP1	Test point
TP2	Test point
TP3	Test point
TP4	Test point
TP5	Test point

3.1 Connectors

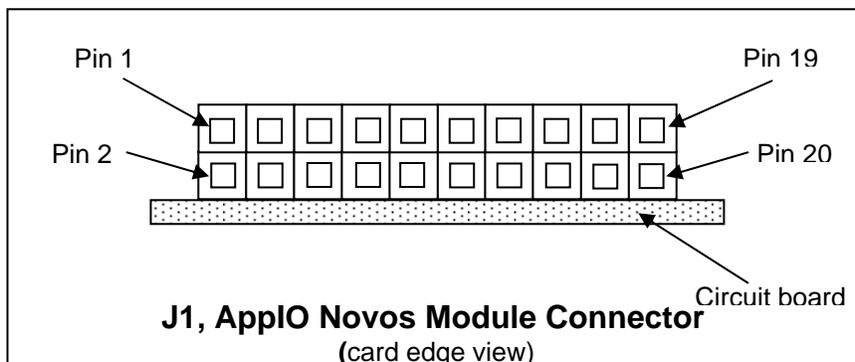
The following section describes the connectors on the AppIO Novos Module.

INTERFACE NAME	TYPE OF INTERFACE
J1	Connector to C21 CPU Board, 20 position, 2 x 10
J2	COM USB Connector
J3	Factory test
J4	Programming header
J5	SWD USB Connector

3.1.1 J1, AppBox C21 CPU Board Interface Connector

The J1 connector on the AppIO Novos Module is designed to be plugged into the EXT2 expansion connector on the AppBox C21 CPU Board.

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.

J1, AppIO Novos Module Connector			
Pin #	Signal Name	Function	Shared Functionality
1	No Connect		
2	DGND	Ground	Ground
3	ADC(+)	Tied to Potentiometer, R1	
4	No connect		
5	GPIO1	Tied to LED1	
6	GPIO2	Tied to LED2	
7	No Connect		
8	No connect		
9	IRQ/GPIO	Tied to push button switch, SW1	
10	No connect		
11	No connect		
12	No connect		
13	UART_RX	Connected to COM_USB, J2	
14	UART_TX	Connected to COM_USB, J2	
15	No connect		
16	No connect		
17	No connect		
18	No connect		
19	DGND	Ground	Ground
20	VDD_3V3	+3.3 volts	+3.3 volts

3.1.2 J2, COM USB Interface Connector

This J2 connector is used by Novos FB Application Framework and Demonstration Software as a terminal interface. It can be used with a host computer running a terminal emulation program like Tera Term.

3.1.3 J3, Factory Test Connector

This J3 connector is used in the manufacturing process. It is not used outside the factory.

3.1.4 J4, Programming Interface Connector

This J4 connector is used with the J5 connector to program application software into the non-volatile memory in the C21 processor. A ribbon cable is attached between this connector and the J6 connector on the C21 CPU board. This is ribbon installed at the factory. There is no need to remove the ribbon cable from the C21 CPU Board J6 connector unless a JTAG emulator is to be attached.

Care should be taken to make sure AppIO Novos Module J4, Pin 1 is always connected to C21 CPU J6, Pin1. A **RED** wire is used to indicate this. See the diagram above for the correct ribbon cable orientation.

3.1.5 J5, SWD USB Interface Connector

The SWD USB connector J5 is the external interface for programming. The other end of the USB cable should be attached to a host computer to run the programming software. Refer to the “Software Users Guide for the AppBox C21 with the AppIO Novos Module” for programming instructions.

3.2 AppIO Novos Module Potentiometer

This section describes R1, a potentiometer. The R1 potentiometer allows the user to vary the voltage from 0 to +3.3 volts. This voltage is connected to the ADC(+) on the AppBox C21 CPU Board.

The Novos demonstration software is able to read this ADC and dim LED2 in accordance with the position of the potentiometer. In addition the demonstration software will also print the voltage being read.

3.3 AppIO Novos Module LEDs

The AppIO Novos Module has 2 LEDs. These LEDs are under software control from the AppBox C21 CPU.

The Novos demonstration software controls these LEDs in several ways (on, off, blink/flash, dimming)

The table below shows the details for the LEDs.

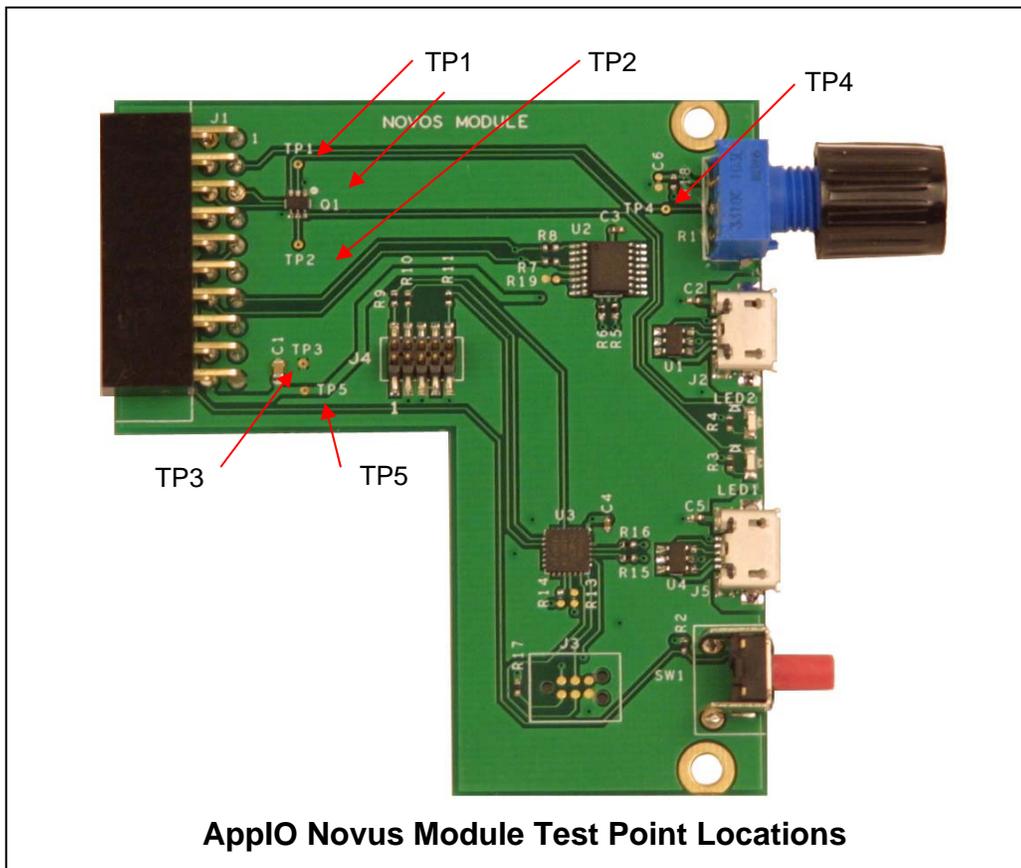
AppIO Novos Module LEDs			
LED number	Color	Control signal	Associated Test Point
LED1	Green	GPIO1	TP1
LED2	Red	GPIO2	TP2

3.4 AppIO Novos Module Test Points

The AppIO Novos Module has 5 test points. These test points are attached to signals on the AppIO Novos Module.

These test points are only accessible if the cover is removed from the AppBox. The levels on these test points can be sensed with an oscilloscope.

The location of each test point is shown in the figure below:



The table below shows the details for the test points.

AppIO Novos Module Test Points		
Test Point Number	Associated Signal	Comment
TP1	GPIO1	Output from CPU
TP2	GPIO2	Output from CPU
TP3	DGND	Ground from C21 CPU
TP4	ADC(+)	Input to ADC on CPU
TP5	VDD_3V3	+3.3 from C21 CPU

4.0 Physical Characteristics

The physical characteristics of the AppIO Novos Module are described below:

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

AppIO Novos Module (width with connectors): L: 2.75 in. (69.85 mm.)

AppIO Novos Module (maximum height): H: 0.75 In. (19.05 mm.)

Weight of Novos 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)

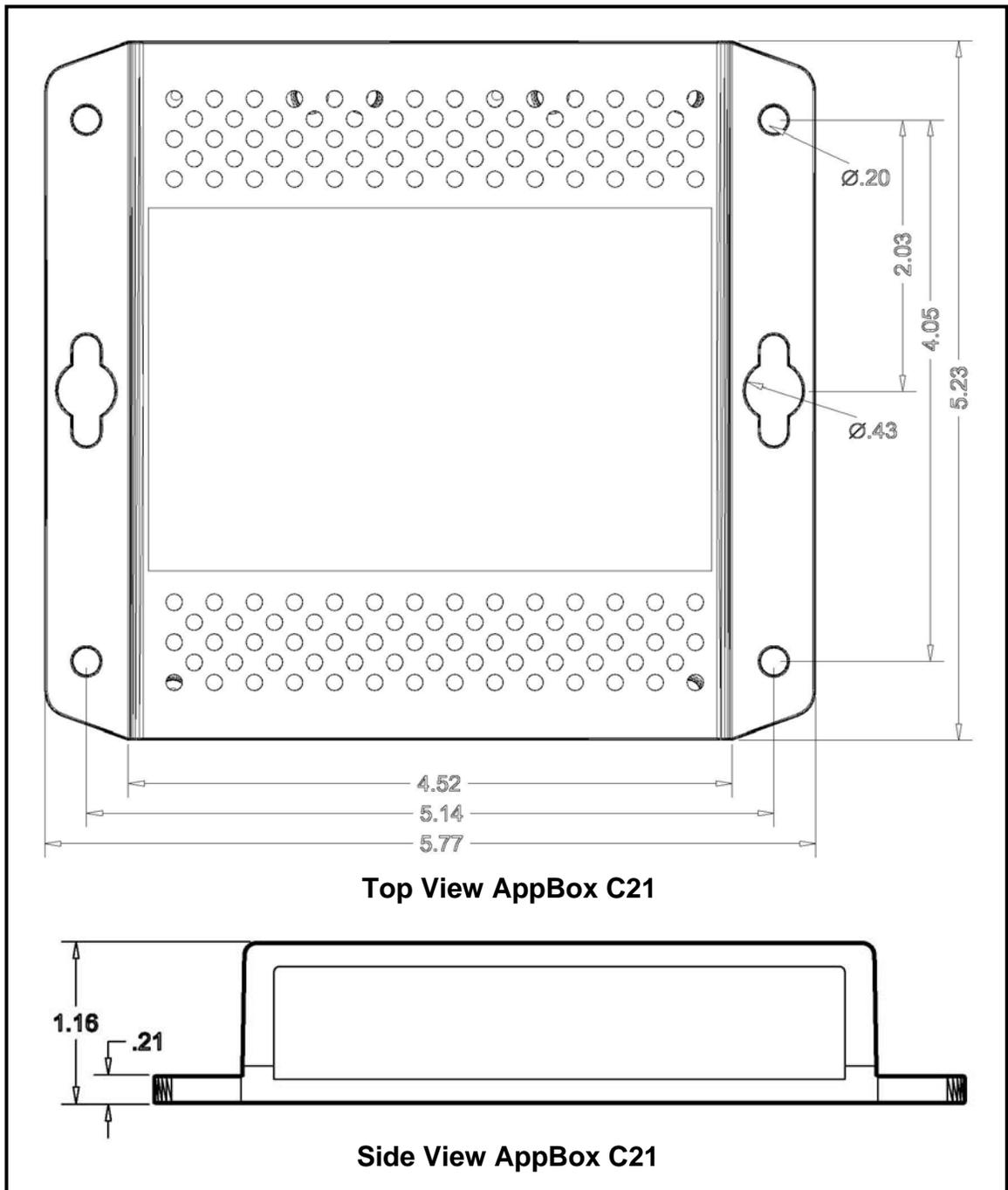
Maximum power consumption of AppIO Novos Module: 500 ma. at +12 volts

RoHS Compliant: Yes

5.0 Mechanical Information

The following drawing provides the mechanical information for the AppBox C21. All dimensions are in inches.

Note: Drawing is **NOT** to scale.



6.0 Schematics

The following pages include the schematics for the AppBox C21 CPU Board inside the AppBox C21.

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519329-4001