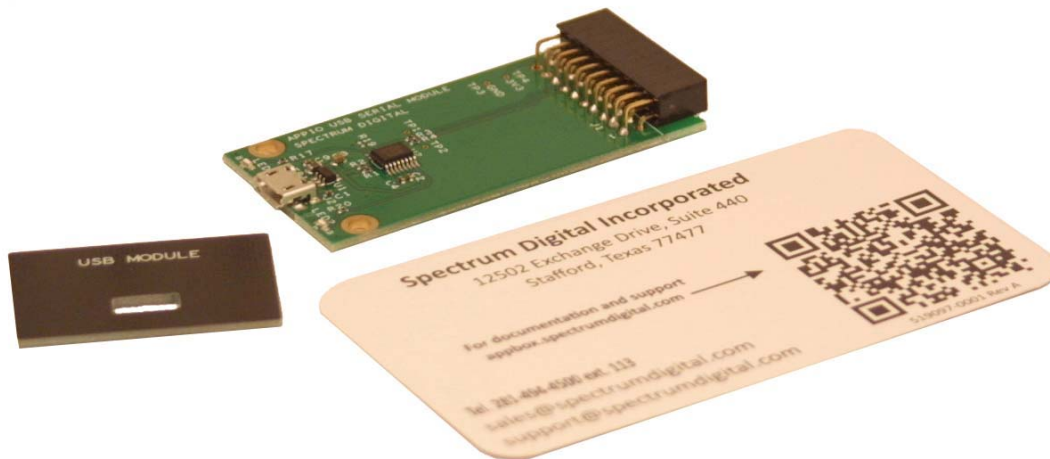




AppIO USB Serial Module System User's Guide



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519428-4001

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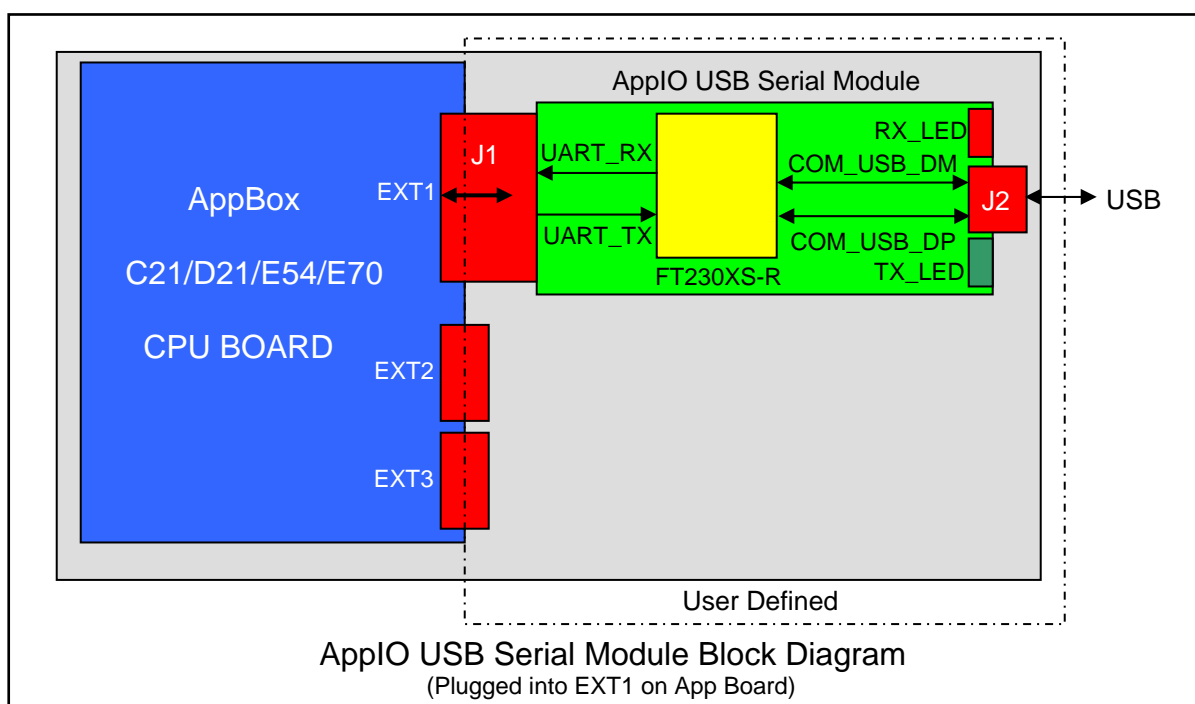
1.0 Introduction

This document describes the features of the AppIO USB Serial Module. The AppIO USB Serial Module is designed to be used with a Spectrum Digital AppBox in an industrial application. The AppIO USB Serial Module can be plugged into any of the 3 expansion connectors on the AppBox. Be aware that some AppBoxes have shared TX/RX signals on the EXT connectors which could reduce the number of AppIO USB Serial Modules that can be used in a system.

1.1 AppIO USB Serial Module Features

This AppIO USB Serial Module has the following features:

- Provides a USB serial interface
- Compatible with Spectrum Digital C21, D21, E54, and E70 AppBox Boards and Atmel X PLAINED processor boards
- Occupies one (1) EXT connector and bulkhead slot on AppBox
- Power provided by AppBox CPU Board
- Operates 0 - +70C



1.2 AppIO USB Serial Module Applications

The AppIO USB Serial Module can be used in the following applications:

- Provides a USB compatible console to AppBox applications
- Provides USB connections to PC or other USB devices
- Brings USB compatible devices into IoT applications
- Allows the AppBox to become a communication medium converter

1.3 AppIO USB Serial Module Product Contents

The following items are contained in the AppIO USB Serial Module product (Part/SKU number 703943-0001):

- AppIO USB Serial Module
- Knock out panel for USB connector
- 2 mounting screws
- Product information card

1.4 AppIO USB Serial Module Accessories

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

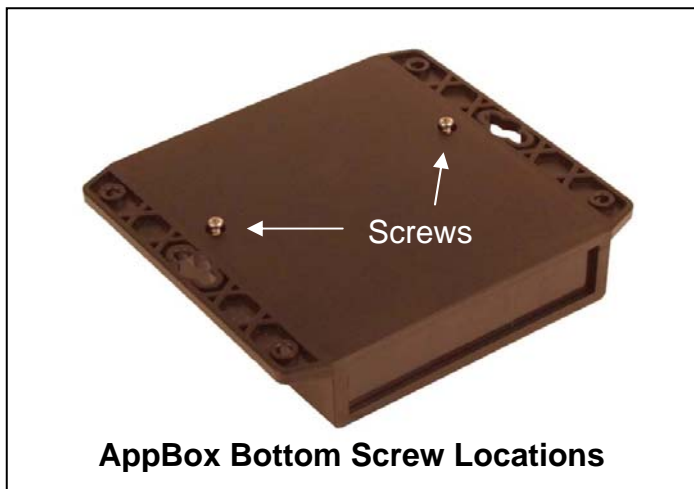
Accessory Description	Part Number
AppBox C21	703909-0001
AppBox D21	703910-0001
AppBox E54	703919-0001
AppBox E70	703911-0001

2.0 Installation

2.1 Installation of the AppIO USB Serial Module

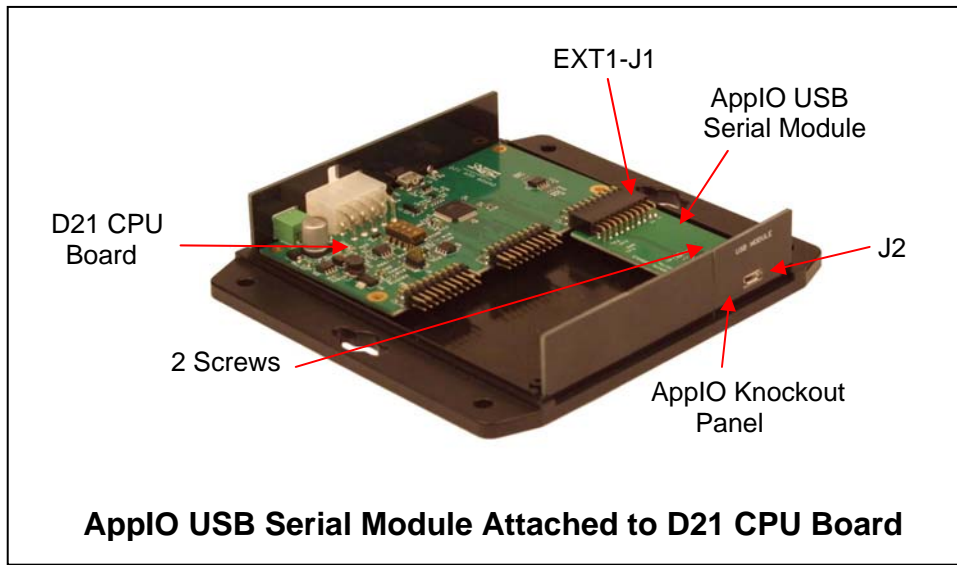
Listed below are the steps to install the AppIO USB Serial Module in an AppBox C21/D21/E54/E70:

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

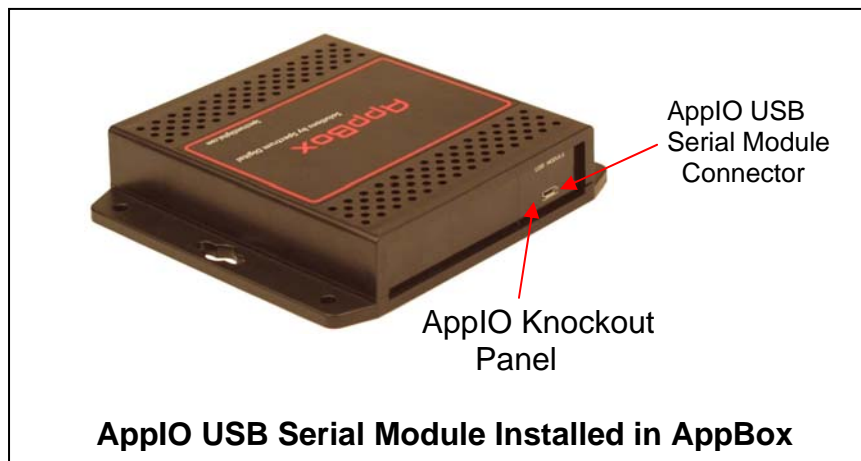


5. Turn the AppBox back over (label showing) and lift the top off the enclosure being careful not to lose the knockout panels
6. If necessary remove one or more existing AppIO Modules

7. Plug the AppIO USB Serial Module into an AppIO Module expansion connector (EXT1, EXT2, or EXT3).



8. Insert the knock out panel associated with the AppIO USB Serial 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 over and insert the 2 screws back in and tighten until snug, do not over tighten/strip the screws

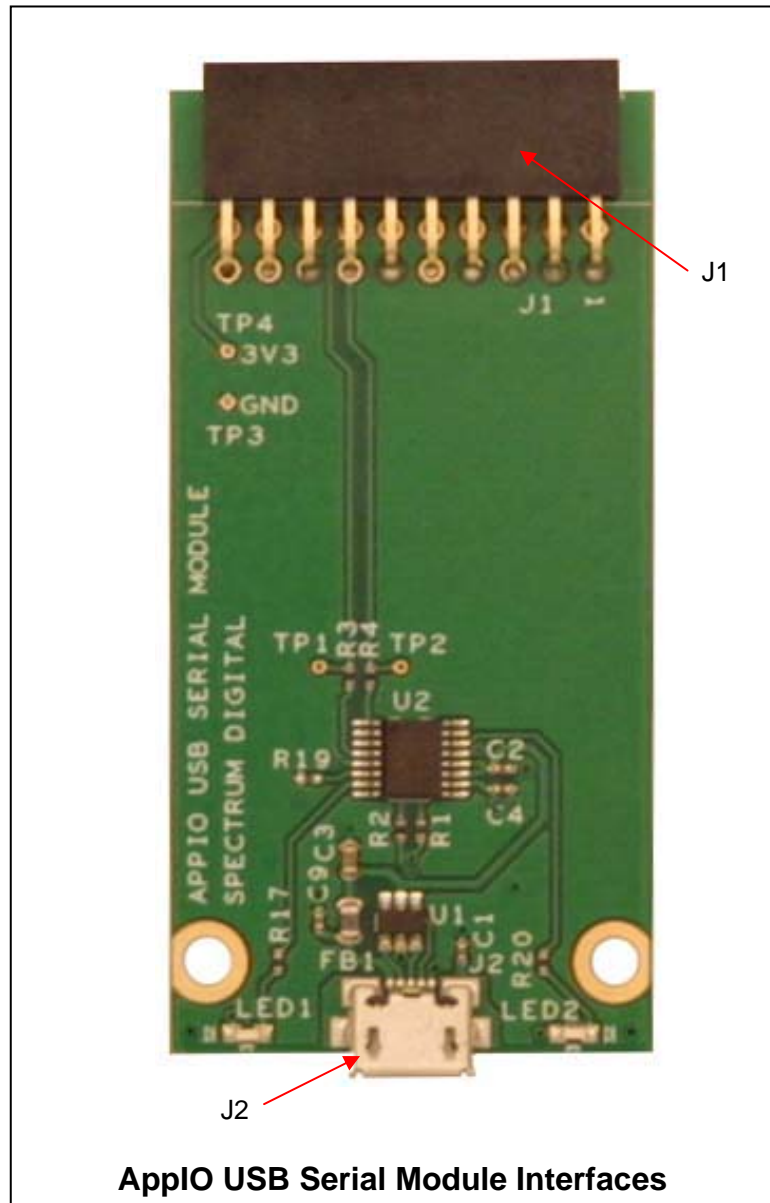


13. Re-attach the connections (CAN/RS-485/LIN/USB/Enet) to the AppBox CPU board
14. Re-attach all interface connections to the AppIO Modules
15. Apply power to the AppBox enclosure

3.0 Interfaces

This section describes the interfaces on the AppIO USB Serial Module. These interfaces include the Connectors, and test points. Test points are shown in section 3.3.

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



The table below lists all the interfaces on the AppIO USB Serial Module.

AppIO USB SERIAL MODULE INTERFACES	
INTERFACE NAME	TYPE OF INTERFACE
J1	Connector to CPU board
J2	USB Connector
TP1	Test Point
TP2	Test Point
TP3	Test Point
TP4	Test Point

3.1 Connectors

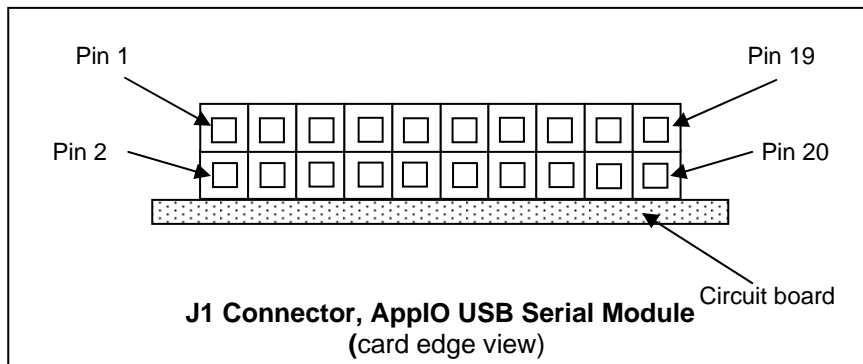
The following section describes the connectors on the AppIO USB Serial Module.

INTERFACE NAME	TYPE OF INTERFACE
J1	Connector to App Board, 20 position, 2 x 10
J2	USB Connector

3.1.1 J1 Connector, AppBox CPU Board Interface

The J1 connector on the AppIO USB Serial Module can be plugged into any one of the 3 expansion connectors (EXT1, EXT2, or EXT3) on the C21/D21/E54/E70 App 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.

J1 Connector, AppIO USB Serial Module			
Pin #	Signal Name	Function	Shared Functionality
1	No connect		
2	DGND	Ground	Ground
3	No connect		
4	No connect		
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	UART_RX	UART Receive	
14	UART_TX	UART Transmit	
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, USB Interface

The following section describes J2, the USB connector. This connector allows a USB cable to be plugged into the module.

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



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

J2, USB Connector	
Pin number	Connector Signal Name – Attach Signal Name
1	VBUS to Pin 5, U1
2	D- to USB_DM, Pin 1, U1
3	D+ to USB_DP, Pin 3, U1
4	ID to IO3, Pin 4, U1
5	GND to DGND, Pin 2, U1
6	Shield1, DGND via a capacitor
7	Shield2, DGND via a capacitor
8	Shield3, DGND via a capacitor
9	Shield4, DGND via a capacitor
10	Shield5, DGND via a capacitor
11	Shield6, DGND via a capacitor

The USB Serial Module allows the user to use the UART_TX/UART_RX interface on an EXT connector as a console or USB interface for applications running on the AppBox CPU Board.

The USB Serial interface requires the user to connect a USB cable between the AppIO Module and a host computer or other USB device. When connected to a host computer a terminal emulation package should be used. PUTTY and Tera Term are two such terminal emulation packages.

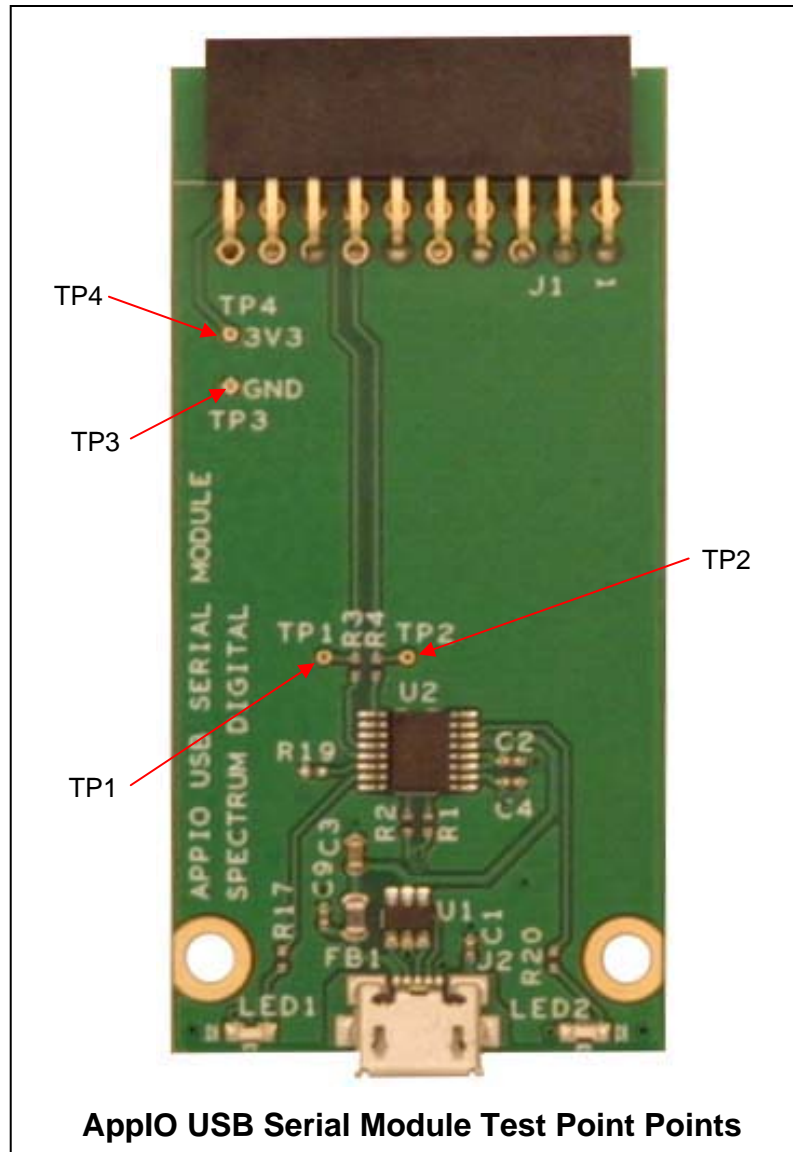
When using a terminal emulation package be sure to initialize the UART on the host computer with the same settings (baud rate, number of data bits, number of stop bits, parity, and flow control) that the AppBox application software uses.

The figure below shows the USB Serial connection to the AppIO USB Serial Module.



3.2 Test Points

This section describes the test points on the AppIO USB Serial Module. All test points are located on the top side of the circuit board. The figure below shows the location of each test point.



The table below describes the test points on the AppIO USB Serial Module.

TEST POINT NAME	ATTACHED SIGNAL
TP1	UART_TX
TP2	UART_RX
TP3	VDD_3V3
TP4	DGND

3.3 LEDs

The AppIO USB Serial Module has two LEDs. The LEDs are tied to the transmit and receive signals going to the AppBox CPU. The LEDs do not show through the knockout panel. The LEDs and their functions are shown in the table below.

LED Name	Signal Attached To	Color
LED1	TX_LED	Green
LED2	RX_LED	Red

4.0 Physical Characteristics

The physical characteristics of the AppIO USB Serial Module are described below:

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

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

AppIO USB Serial Module (maximum height): H: 0.75 in. (19.05 mm.)

Weight of USB Serial Module: 0.96 oz. / 0.027 kg

Operating Temperature: -0C to +70C

Storage Temperature: -40C to +85 C

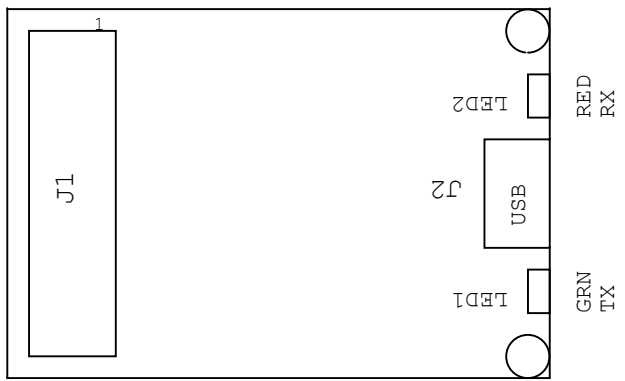
Relative Humidity: 0 to 90% (non-condensing)

Maximum power consumption of AppIO USB Serial Module: 50 ma. at +3.3 volts

RoHS Compliant: Yes

5.0 Schematics

The following pages contain the schematics for the USB Serial Module.



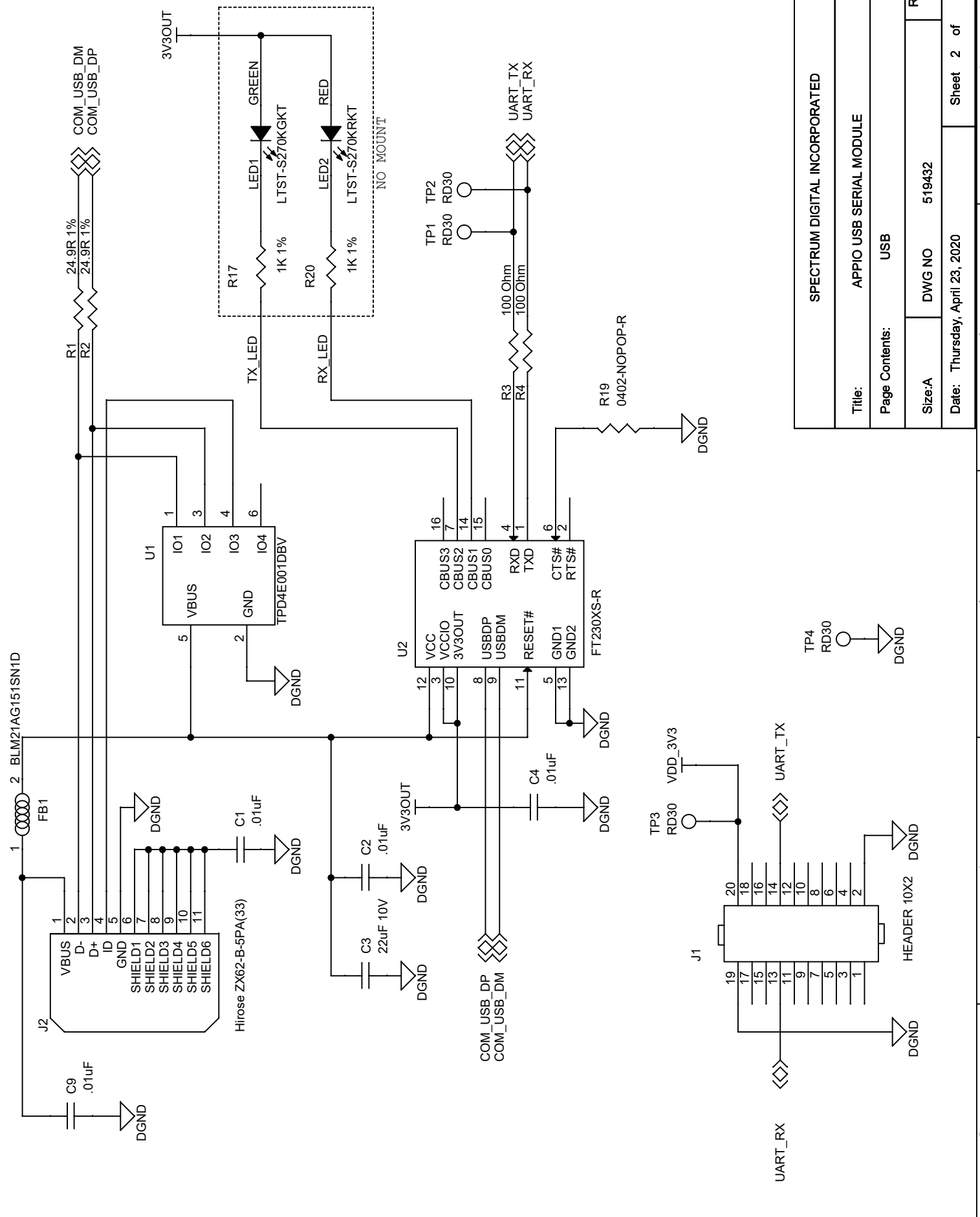
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