

FishWand.PrjPcb

Variant: Development

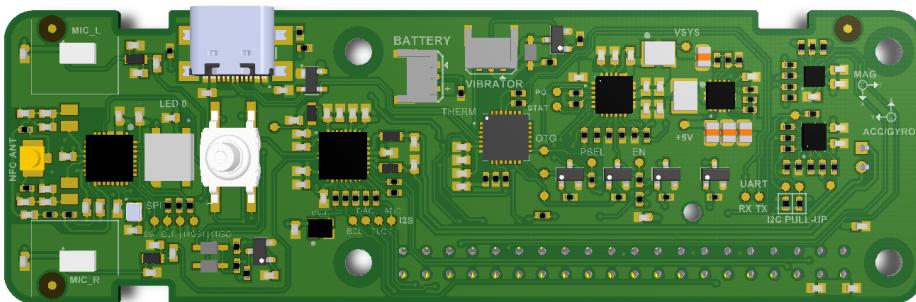
Released: 2022-08-20

Revision 1

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- 1 Cover Page
- 2 Top Level Design
- 3 Raspberry Pi Interface
- 4 Power
- 5 IMU
- 6 AUDIO
- 7 USB Debugger
- 8 NFC

TOP View



I2C Bus 1

Device	Address (7 bit)
Battery Charger	0x6Bh
IMU	0x6Ah
Magnetometer	0x1Eh
Audio Codec	0x34h

Interrupts

Device	GPIO

SPI Bus

Device
NFC Reader

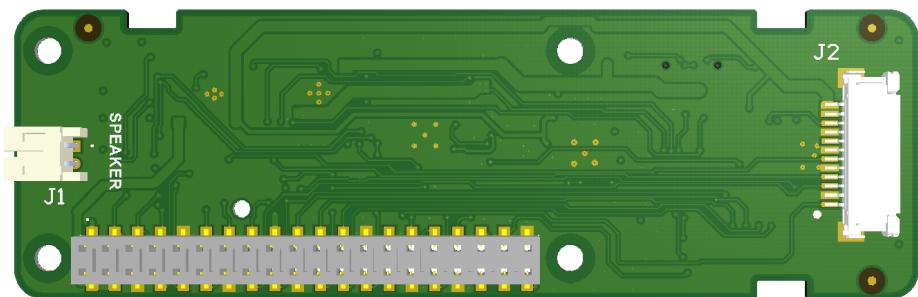
I2S Bus

Device
Audio Codec

UART

Device
USB Debugger

Bottom View

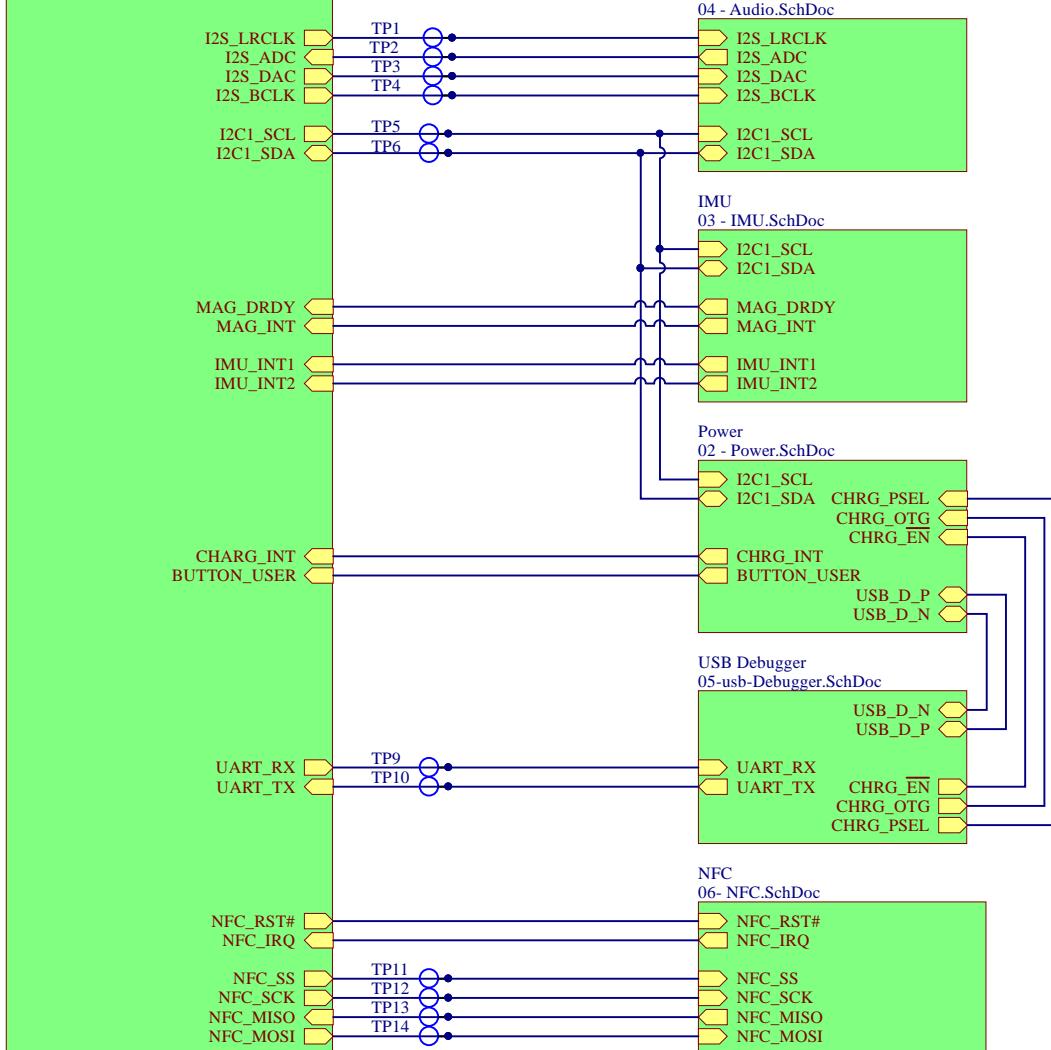


Title **Cover Page**

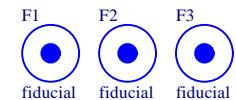
Size: A4	Number:1	Revision:1
Date: 2022-08-25	Sheet 1	of 8
File: CoverPage.SchDoc	Drawn By:	Trevor Charmley

FISHWAND

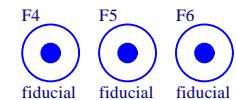
A

Cover Page
CoverPage.SchDocRPI-Interface
01 - rpiInterface.SchDoc

TOP LAYER FIDUCIALS



BOTTOM LAYER FIDUCIALS



B

A

B

C

C

D

D

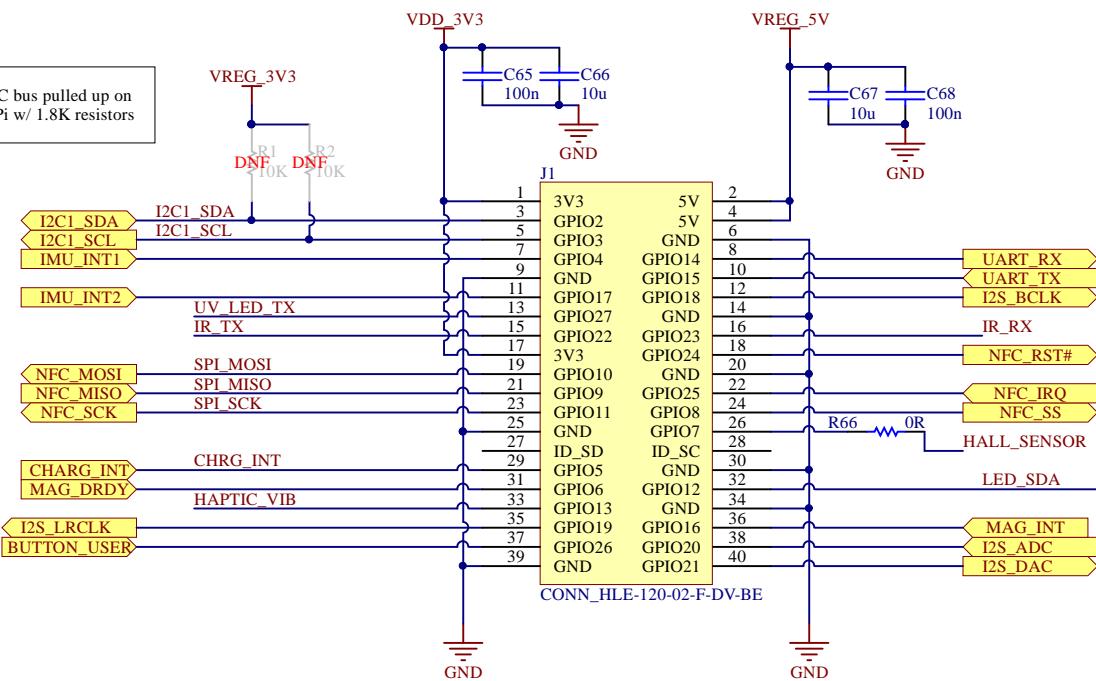
Title **Top Level Design**

Size: A4	Number: 2	Revision: 1
Date: 2022-08-25		Sheet 2 of 8
File: 00 - TitlePage.SchDoc	Drawn By: *	

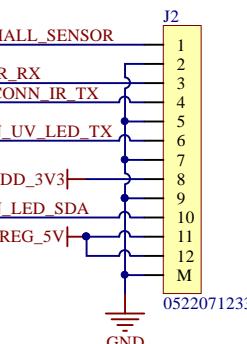
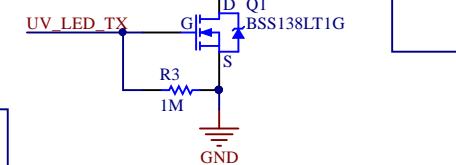
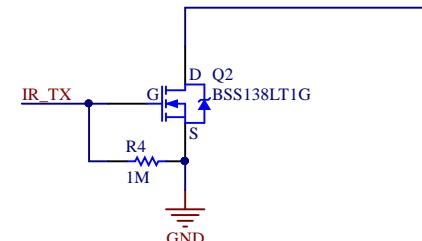
FISHWAND

RASPBERRY PI INTERFACE

I2C bus pulled up on RPi w/ 1.8K resistors

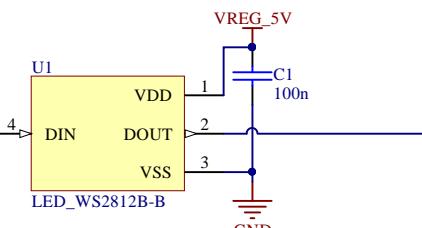
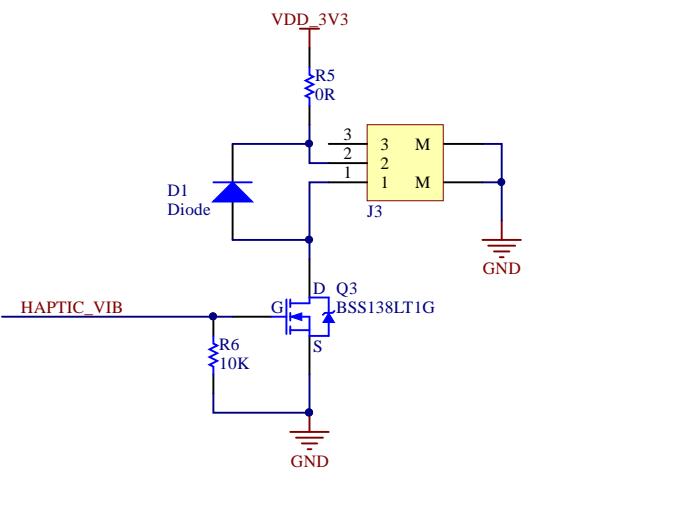


TIP CONNECTOR



0522071233

Haptic Vibrator



TP25 TP26

Rated Current 1A
5V = 2A Max
3V = 1A Max

Title **Raspberry Pi Interface**

Size: **A4** Number:**3** Revision:**1**

Date: **2022-08-25** Sheet **3** of **8**

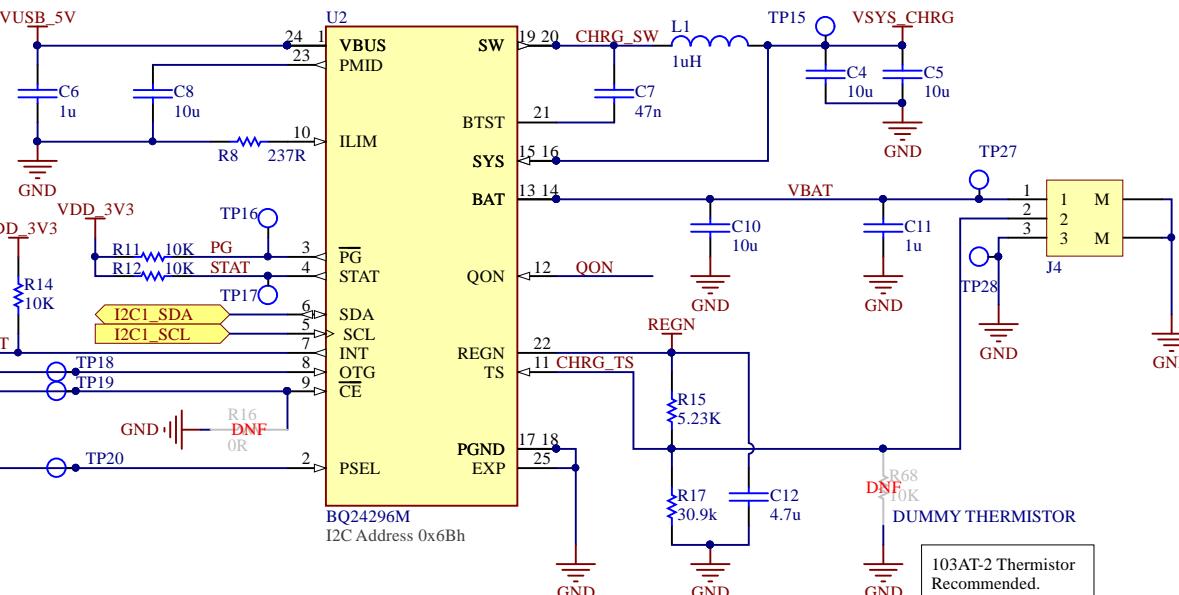
File: **01 - rpiInterface.SchDoc** Drawn By: **Trevor Charmley**

FISHWAND

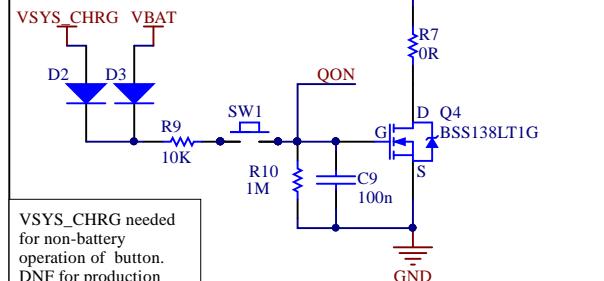
Battery Charger

$$R_{\text{Lim}} = 457 / 2A = 237\Omega$$

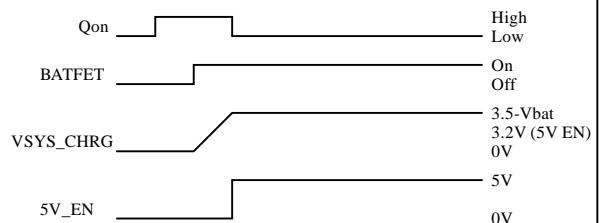
PSEL OTG Ilim
High Low 100mA
High High 500mA
Low --- 3A
VQon min 1.3V



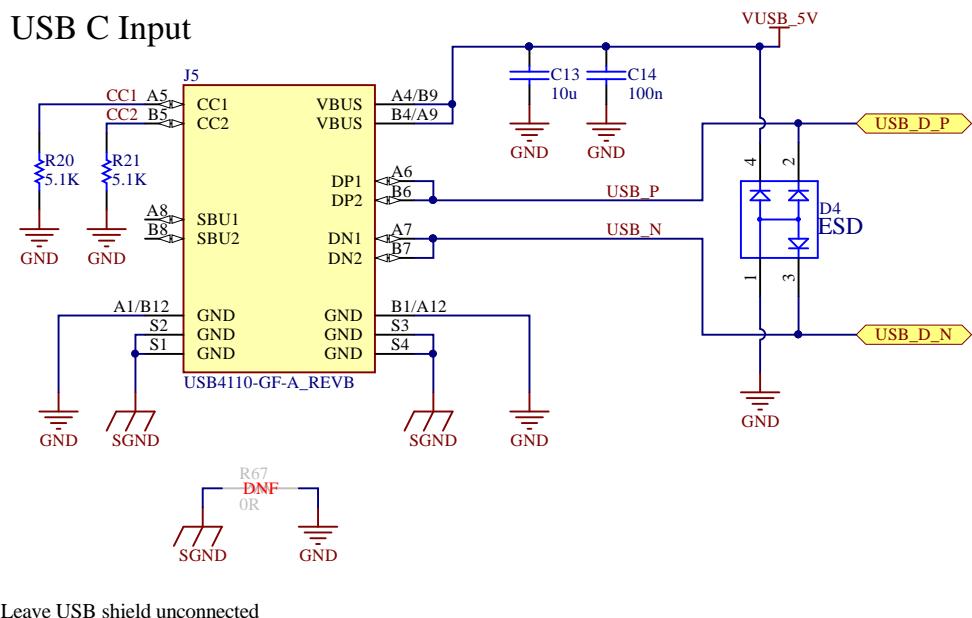
POWER/USER BUTTON



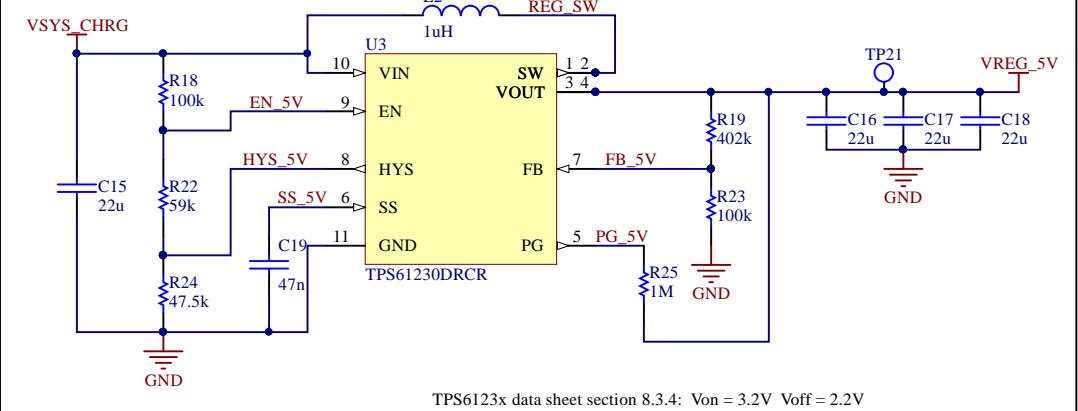
Power Up Sequence from Battery



USB C Input



5V Boost Converter



TPS6123x data sheet section 8.3.4: Von = 3.2V Voff = 2.2V
bq24296m data sheet section 8.3.1.4 : Ilim limited to 100mA until Vsyst_chrg > 2.2V.

Title **Power Supply**

Size: A4	Number:4	Revision:1
Date: 2022-08-25		Sheet 4 of 8
File: 02 - Power.SchDoc		Drawn By: Trevor Charmley

FISHWAND

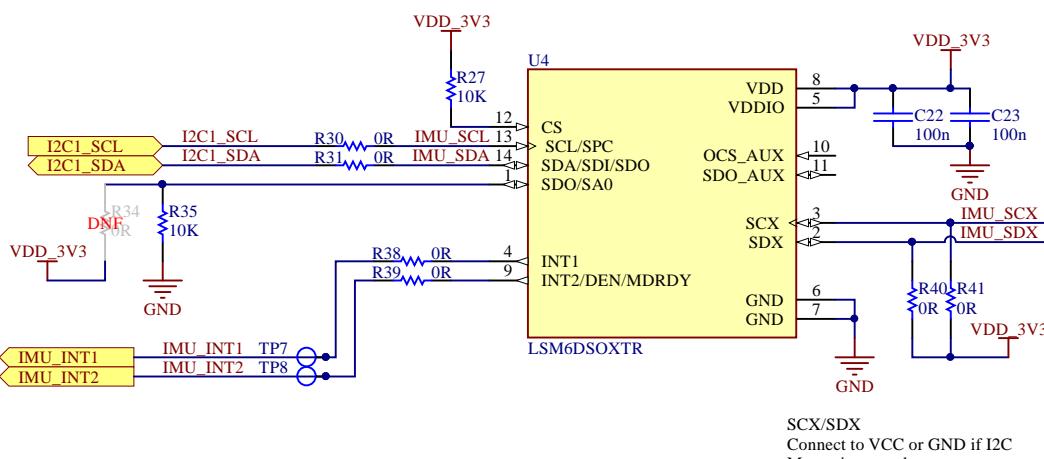
A Accelerometer / Gyroscope

I2C Address Configuration

SDO/SA0 Address

LOW 0x6A

HIGH 0x6B



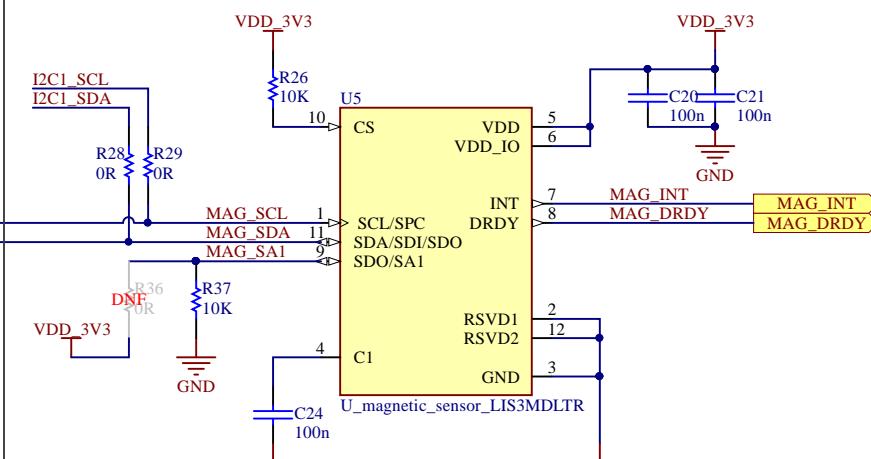
B Magnetic Sensor

I2C Address Configuration

SDO/SA0 Address (7 BIT)

LOW 0x1C

HIGH 0x1E

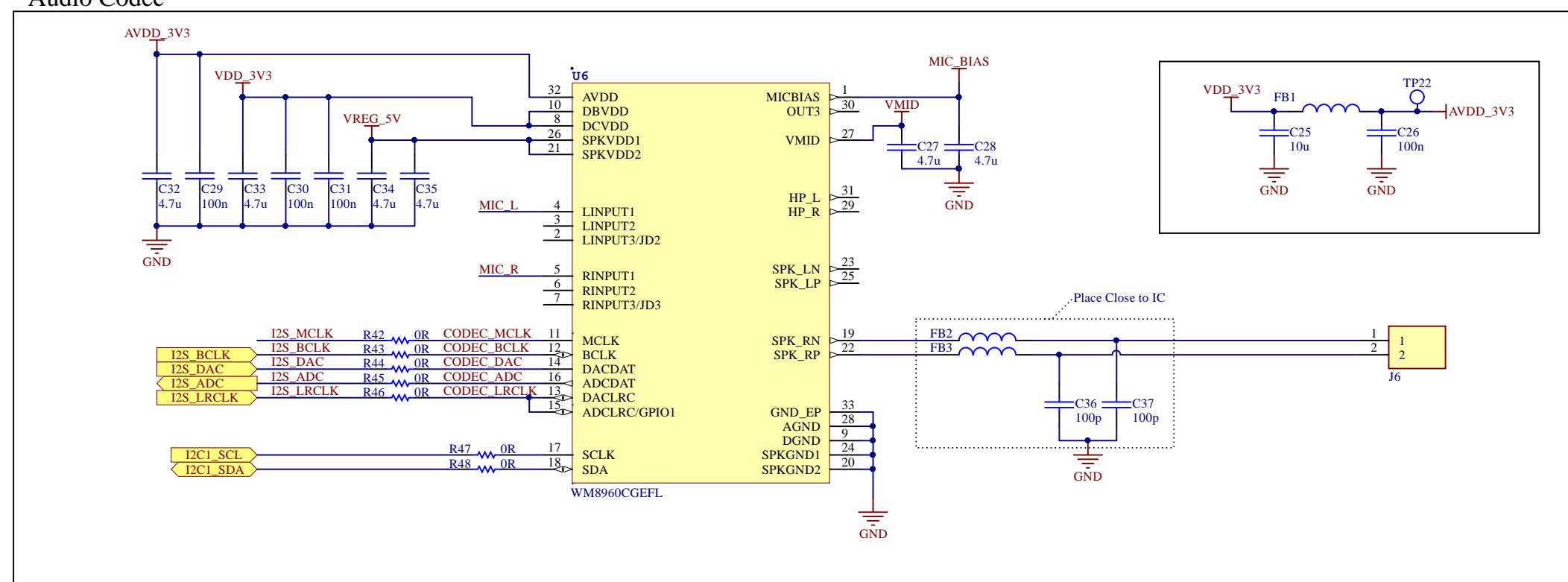
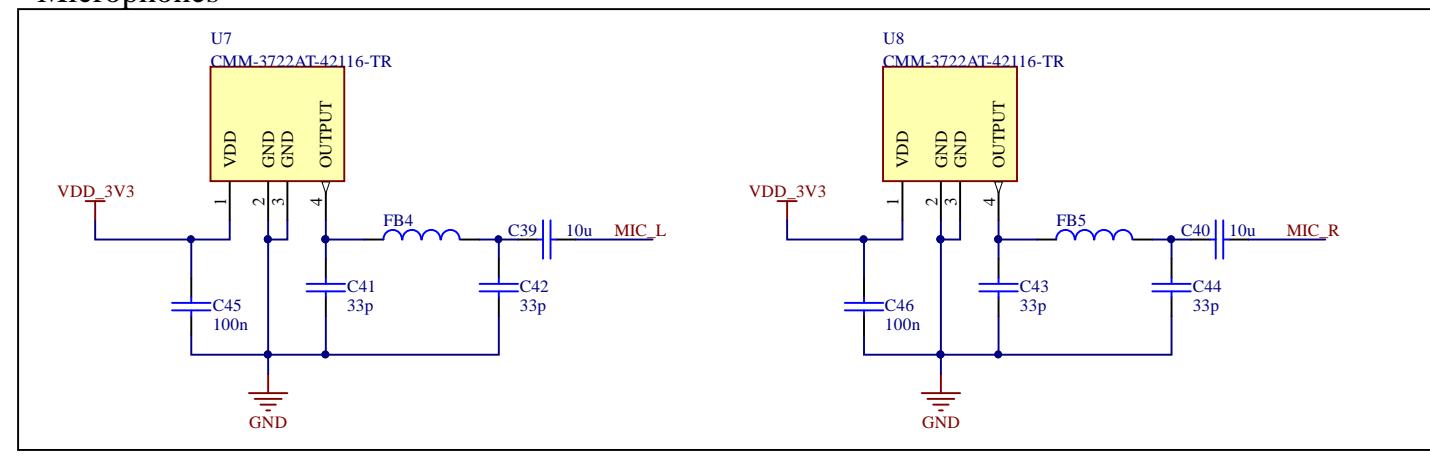
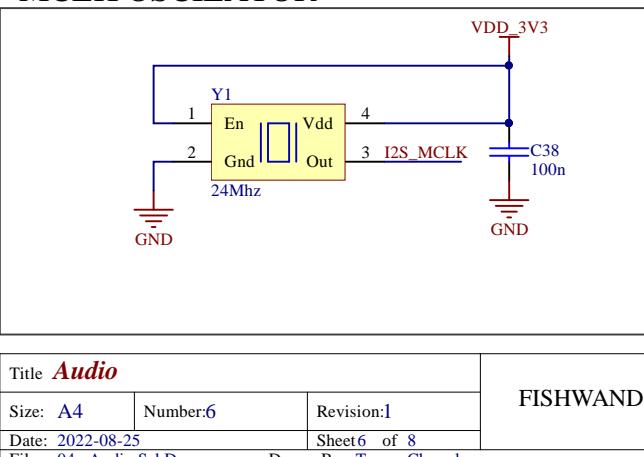


Title **IMU**

Size: A4	Number: 5	Revision: 1
Date: 2022-08-25		Sheet 5 of 8
File: 03 - IMU.SchDoc		Drawn By: Trevor Charmley

FISHWAND

1 2 3 4

Audio Codec**Microphones****MCLK OSCILATOR**

1 2 3 4

USB Debugger

A

B

C

D

A

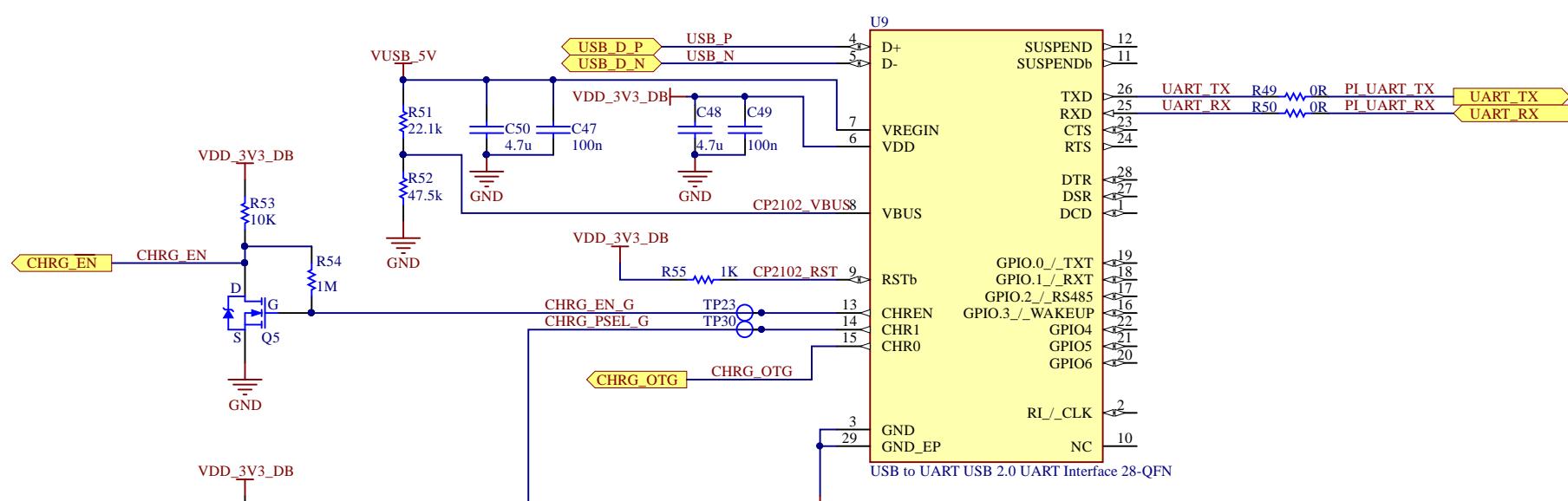
B

C

D

USB Charger Detection

CHR0/OTG		CHR1 / Psel
100mA	Low / Low	Low / High
500mA	High / High	Low / High
1.5A	High / ---	High / Low

Title **USB to Uart Bridge**

Size: A4	Number: 7	Revision: 1
Date: 2022-08-25		Sheet 7 of 8
File: 05-usb-Debugger.SchDoc	Drawn By: Trevor Charmley	

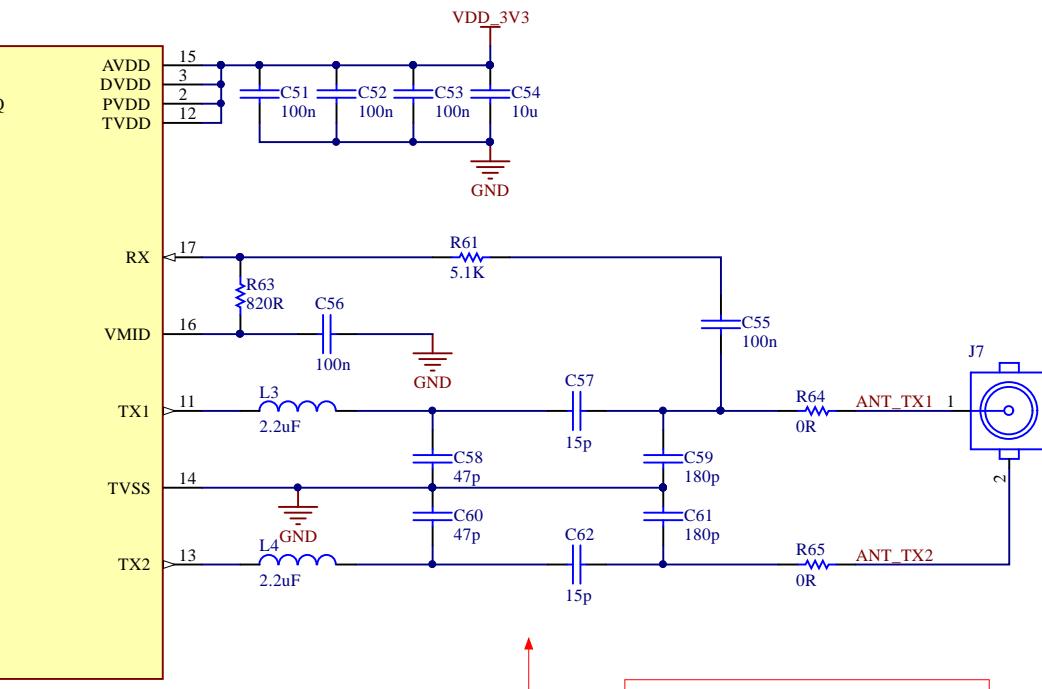
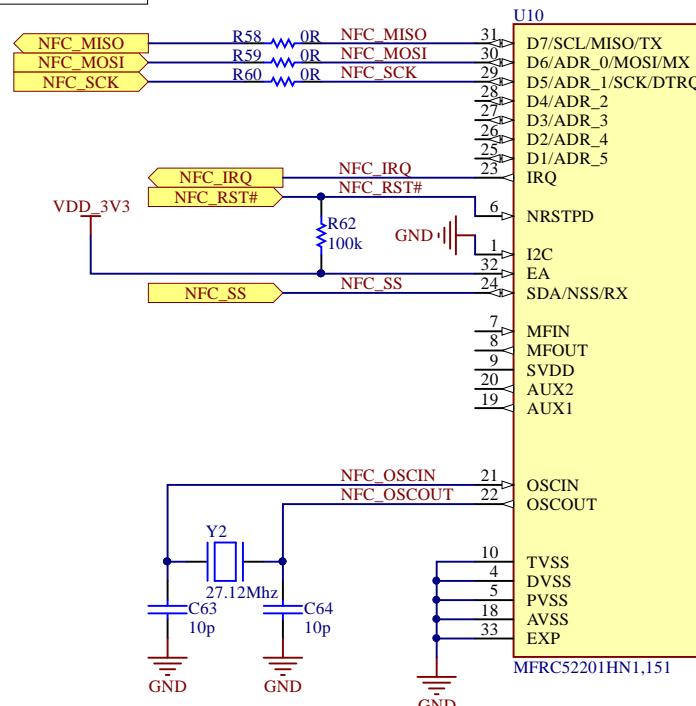
FISHWAND

NFC READER

A

Connection Protocol for Interface selection section

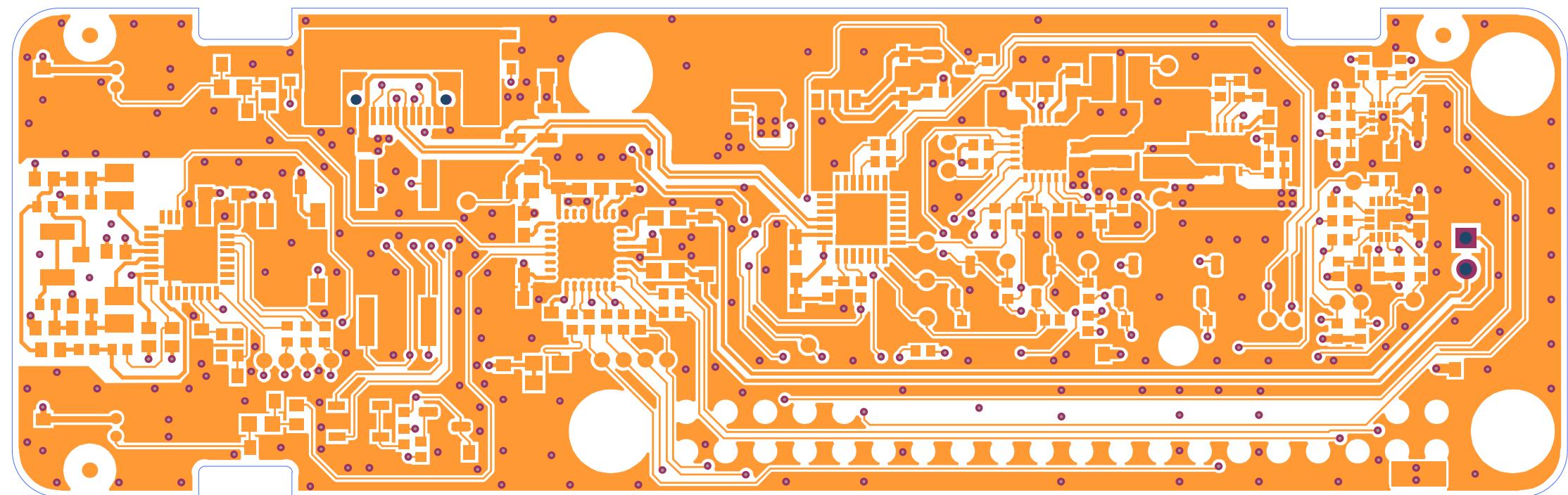
8.1.1	SPI
Pin	SDA
I2C	0
EA	1
D7	MISO
D6	MOSI
D5	SCK

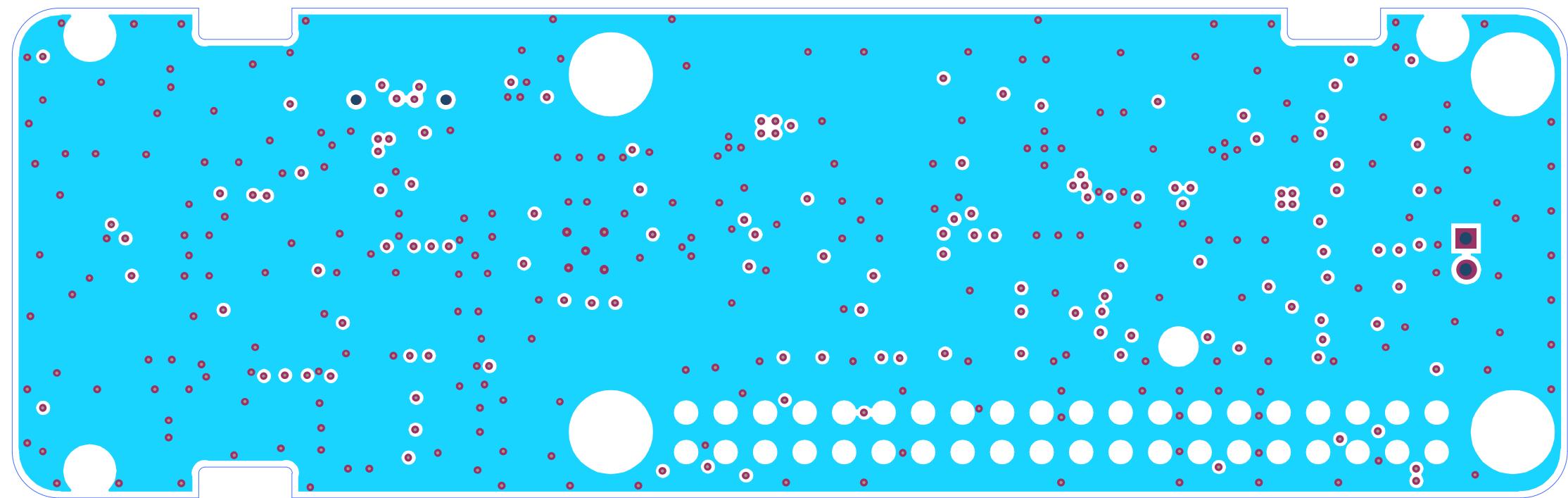


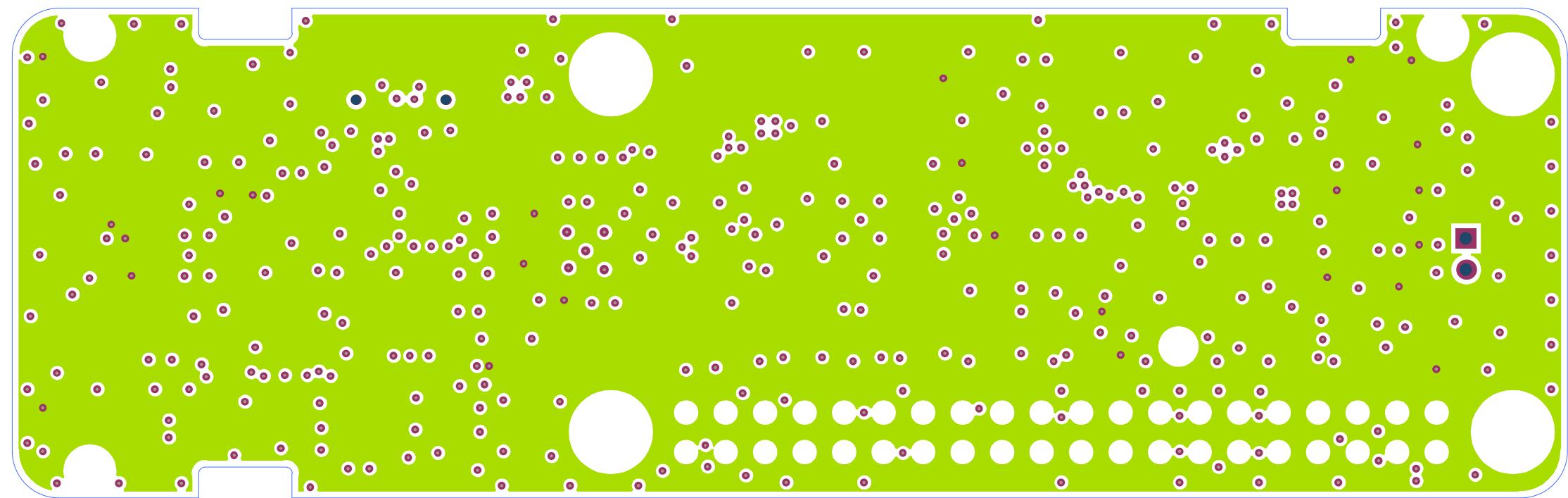
Title **NFC**

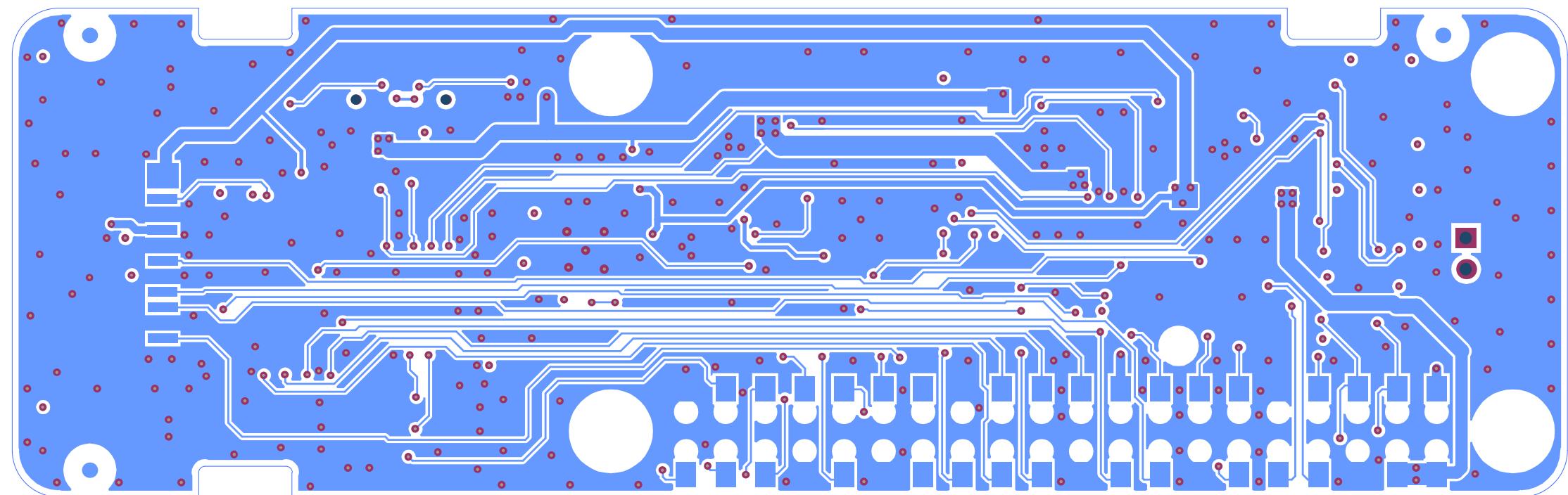
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Date: 2022-08-25	Sheet 8 of 8	
File: 06-NFC.SchDoc		Drawn By: Trevor Charmley

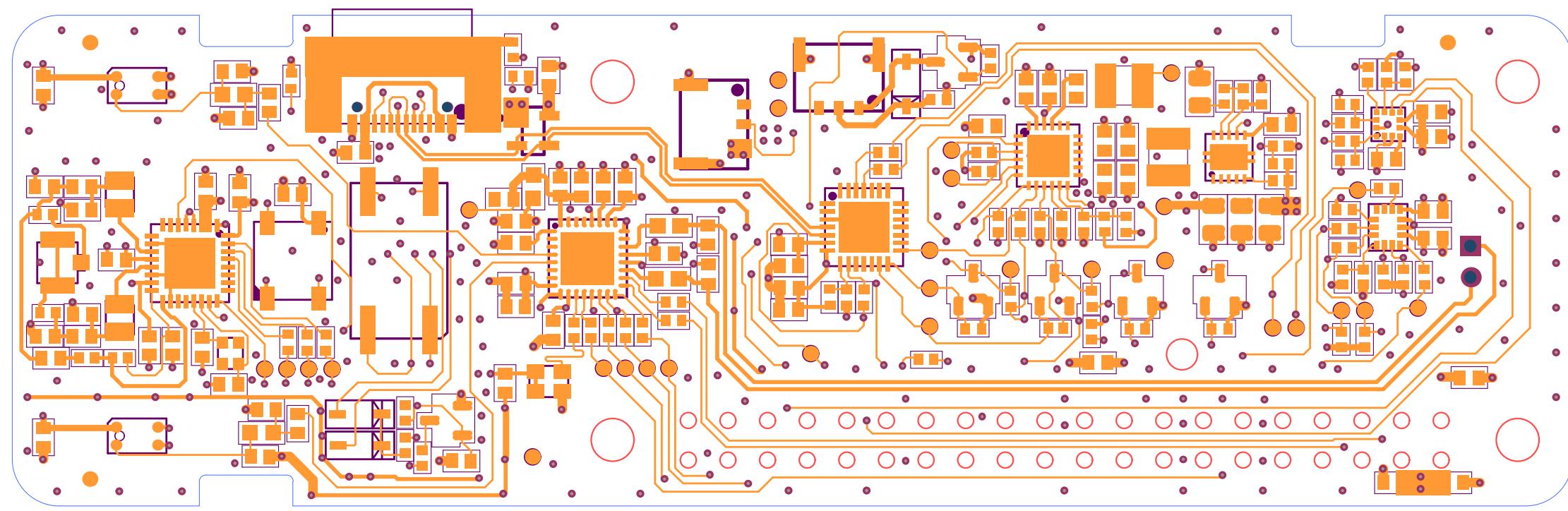
FISHWAND

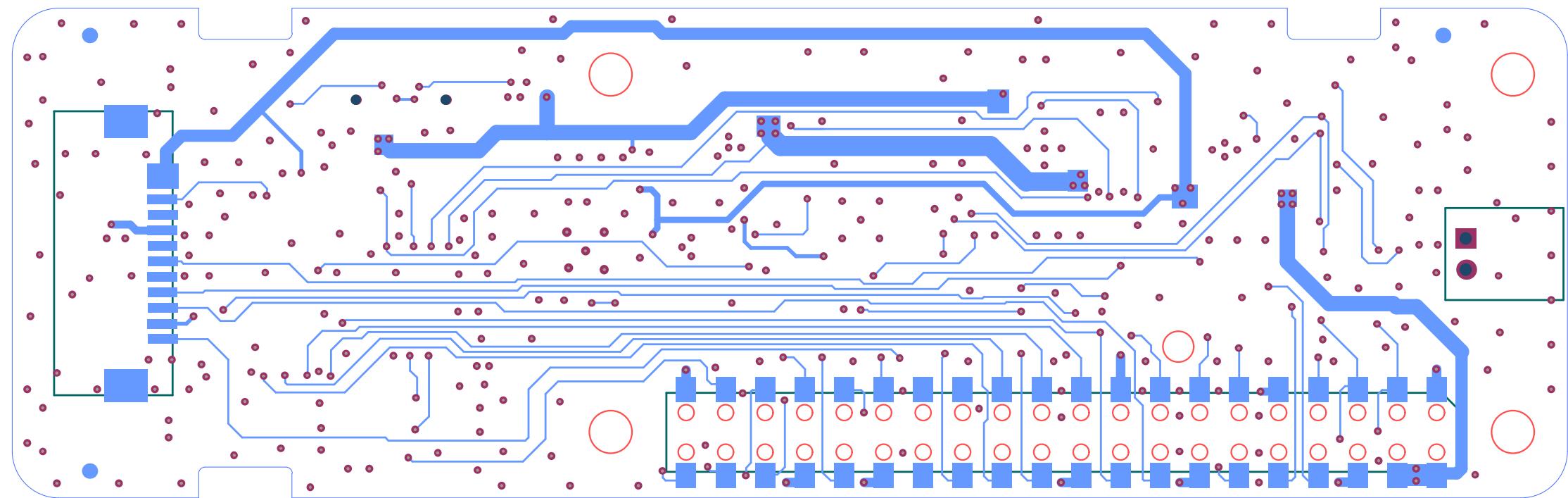


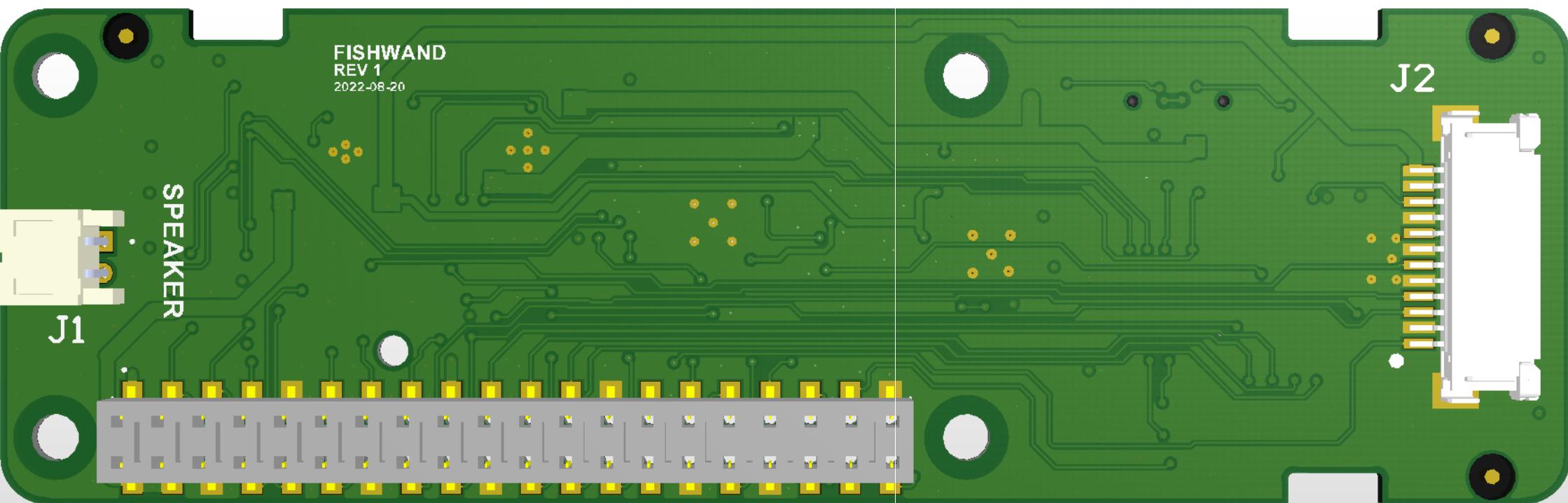


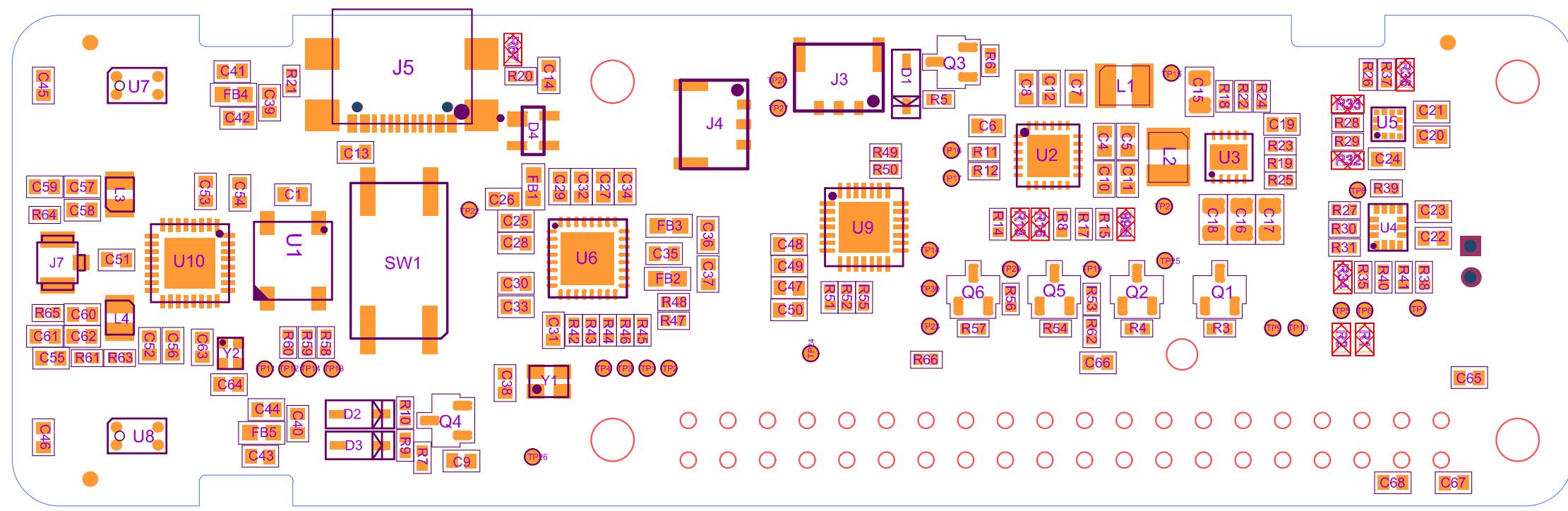


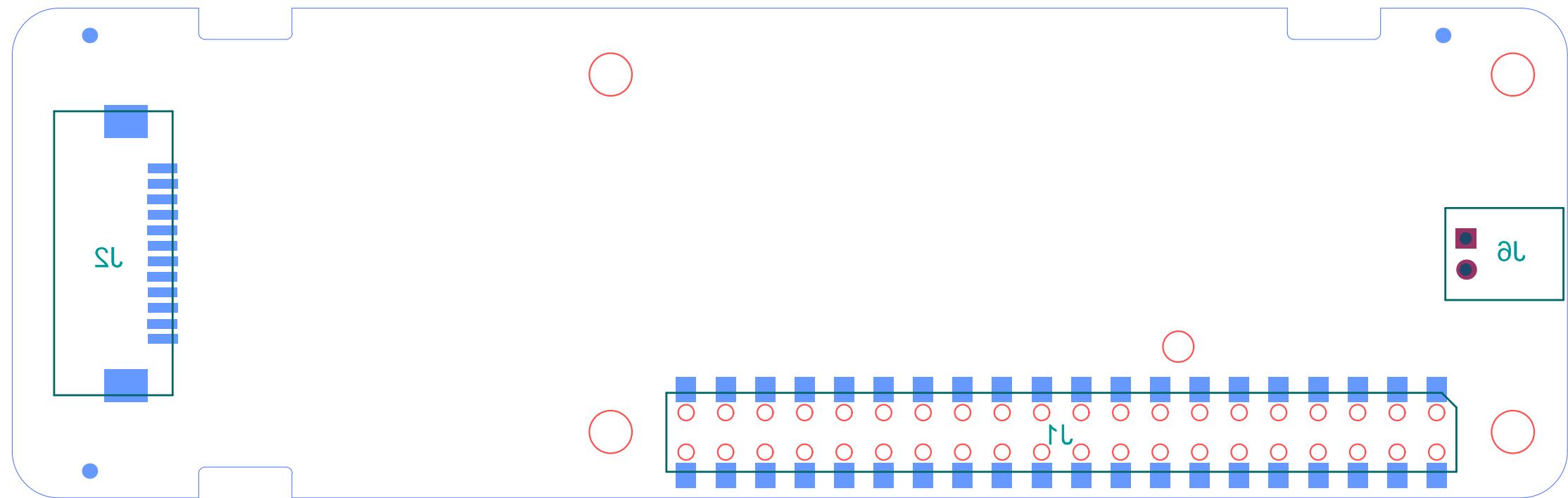












Design Rules Verification Report

Filename : D:\FishWand\PCB\FishWand\FishWand_wandPCB.CSPcbDoc

Warnings 2
Rule Violations 0

Warnings	
2 Net Ties failed verification	2
Total	2

Rule Violations	
Clearance Constraint (Gap=0mm) (InPolygonClass('All Polygons')), (All)	0
Clearance Constraint (Gap=0.127mm) (InNetClass('MIC_ANALOG')), (InNet('GND'))	0
Clearance Constraint (Gap=0.127mm) (All), (All)	0
Unpoured Polygon (Allow unpoured: False)	0
Unpoured Polygon (Allow unpoured: False)	0
Silk primitive without silk layer	0
Silk to Silk (Clearance=0mm) (All), (All)	0
Silk To Solder Mask (Clearance=0.127mm) (IsPad), (All)	0
Minimum Solder Mask Sliver (Gap=0mm) (All), (All)	0
Hole To Hole Clearance (Gap=0.5mm) (All), (All)	0
Differential Pairs Uncoupled Length using the Gap Constraints (Min=0.127mm) (Max=0.127mm) (Preferred=0.127mm)	0
Height Constraint (Min=0mm) (Max =1816.048mm) (Preferred=12.7mm) (All)	0
Hole Size Constraint (Min=0.2mm) (Max =6.3mm) (All)	0
Component Clearance Constraint (Horizontal Gap = 0.102mm, Vertical Gap = 0.102mm) (All), (All)	0
Minimum Annular Ring (Minimum=0.15mm) (All)	0
Un-Routed Net Constraint ((All))	0
Short-Circuit Constraint (Allowed=No) (All), (All)	0
Routing Via (MinHoleWidth=0.2mm) (MaxHoleWidth=6.3mm) (PreferredHoleWidth=0.2mm) (MinWidth=0.45mm)	0
Power Plane Connect Rule(Direct Connect)(Expansion=0.102mm) (Conductor Width=0.102mm) (Air Gap=0.102mm)	0
Width Constraint (Min=0.127mm) (Max =1816.048mm) (Preferred=0.127mm) (All)	0
Clearance Constraint (Gap=0mm) (InNetClass('MIC_ANALOG')), (All)	0
Clearance Constraint (Gap=0mm) (InPolygonClass('All Polygons')), (InNetClass('USB_DATA'))	0
Clearance Constraint (Gap=0mm) (InNetClass('USB_DATA')), (InNetClass('USB_DATA'))	0
Total	0

2 Net Ties failed verification
SMT Small Component R52-47.5k (3.5mm,-2.35mm) on Top Layer, SMT Small Component R52-47.5k (3.5mm,-2.35mm) on Top Layer, has isolated copper
Component SW1-KSC621GLFS (-25.2mm,0mm) on Top Layer, Component SW1-KSC621GLFS (-25.2mm,0mm) on Top Layer, has isolated copper

Electrical Rules Check Report

Class	Document	Message
Warning	05-usb-Debugger.SchDoc	Net CHRG_EN has no driving source (Pin Q5-3,Pin R16-2,Pin R53-1,Pin R54-2,Pin TP19-1,Pin U2-9)
Warning	05-usb-Debugger.SchDoc	Net CHRG_PSEL has no driving source (Pin Q6-3,Pin R56-1,Pin TP20-1,Pin U2-2)
Warning	02 - Power.SchDoc	Net CHRG_TS has no driving source (Pin J4-2,Pin R15-1,Pin R17-2,Pin R68-2,Pin U2-11)
Warning	02 - Power.SchDoc	Net EN_5V has no driving source (Pin R18-1,Pin R22-2,Pin U3-9)
Warning	02 - Power.SchDoc	Net FB_5V has no driving source (Pin R19-1,Pin R23-2,Pin U3-7)
Warning	04 - Audio.SchDoc	Net I2C1_SCL has no driving source (Pin J1-5,Pin R2-1,Pin R29-1,Pin R30-1,Pin R47-1,Pin TP5-1,Pin U2-5)
Warning	03 - IMU.SchDoc	Net IMU_SCL has no driving source (Pin R30-2,Pin U4-13)
Warning	01 - rpiInterface.SchDoc	Net LED_SDA has no driving source (Pin J1-32,Pin TP24-1,Pin U1-4)
Warning	03 - IMU.SchDoc	Net MAG_SCL has no driving source (Pin R29-2,Pin R32-1,Pin U5-1)
Warning	02 - Power.SchDoc	Net NetR8_2 has no driving source (Pin R8-2,Pin U2-10)
Warning	03 - IMU.SchDoc	Net NetR26_1 has no driving source (Pin R26-1,Pin U5-10)
Warning	03 - IMU.SchDoc	Net NetR27_1 has no driving source (Pin R27-1,Pin U4-12)
Warning	06- NFC.SchDoc	Net NetR61_1 has no driving source (Pin R61-1,Pin R63-2,Pin U10-17)
Warning	06- NFC.SchDoc	Net NFC_OSCIN has no driving source (Pin C63-1,Pin U10-21,Pin Y2-1)
Warning	06- NFC.SchDoc	Net NFC_RST# has no driving source (Pin J1-18,Pin R62-2,Pin U10-6)
Warning	02 - Power.SchDoc	Net QON has no driving source (Pin C9-1,Pin Q4-1,Pin R10-2,Pin SW1-2,Pin SW1-4,Pin U2-12)
Warning	02 - Power.SchDoc	Net SS_5V has no driving source (Pin C19-1,Pin U3-6)
Warning	00 - TitlePage.SchDoc	Nets Wire CHRG_EN has multiple names (Net Label CHRG_EN,Sheet Entry Power-CHRG_E\N\(\Input\),Sheet Entry USB Debugger-CHRG_E\N\(\Output\))
Warning	00 - TitlePage.SchDoc	Nets Wire CHRG_INT has multiple names (Net Label CHRG_INT,Net Label CHRG_INT,Sheet Entry Power-CHRG_INT\(\Output\),Sheet Entry RPI-Interface-CHARG_INT\(\Input\))
Warning	00 - TitlePage.SchDoc	Nets Wire CHRG_INT has multiple names (Sheet Entry Power-CHRG_INT\(\Output\),Sheet Entry RPI-Interface-CHARG_INT\(\Input\))
Warning	00 - TitlePage.SchDoc	Nets Wire PI_UART_RX has multiple names (Net Label PI_UART_RX,Sheet Entry RPI-Interface-UART_RX\(\Output\),Sheet Entry USB Debugger-UART_RX\(\Input\))
Warning	00 - TitlePage.SchDoc	Nets Wire PI_UART_TX has multiple names (Net Label PI_UART_TX,Sheet Entry RPI-Interface-UART_TX\(\Input\),Sheet Entry USB Debugger-UART_TX\(\Output\))
Warning	00 - TitlePage.SchDoc	Nets Wire SPI_MISO has multiple names (Net Label SPI_MISO,Sheet Entry NFC-NFC_MISO\(\Output\),Sheet Entry RPI-Interface-NFC_MISO\(\Input\))
Warning	00 - TitlePage.SchDoc	Nets Wire SPI莫斯I has multiple names (Net Label SPI_MOSI,Sheet Entry NFC-NFC_MOSI\(\Input\),Sheet Entry RPI-Interface-NFC_MOSI\(\Output\))
Warning	00 - TitlePage.SchDoc	Nets Wire SPI_SCK has multiple names (Net Label SPI_SCK,Sheet Entry NFC-NFC_SCK\(\Input\),Sheet Entry RPI-Interface-NFC_SCK\(\Output\))
Warning	00 - TitlePage.SchDoc	Nets Wire USB_N has multiple names (Net Label USB_N,Net Label USB_N,Sheet Entry Power-USB_D_N\(\Passive\),Sheet Entry USB Debugger-USB_D_N\(\Passive\))
Warning	00 - TitlePage.SchDoc	Nets Wire USB_P has multiple names (Net Label USB_P,Net Label USB_P,Sheet Entry Power-USB_D_P\(\Passive\),Sheet Entry USB Debugger-USB_D_P\(\Passive\))
Warning	05-usb-Debugger.SchDoc	Net UART_RX has no driving source (Pin R50-1,Pin U9-25)
Warning	02 - Power.SchDoc	Net VSYS_CHRG has no driving source (Pin C4-1,Pin C5-1,Pin C15-2,Pin D2-2,Pin L1-2,Pin L2-1,Pin R18-2,Pin TP15-1,Pin U2-15,Pin U2-16,Pin U3-10)
Warning	06- NFC.SchDoc	NFC_SS contains IO Pin and Input Port objects (Port NFC_SS)
Warning	05-usb-Debugger.SchDoc	Off grid Net Label CP2102_RST at 524.819,430
Warning	02 - Power.SchDoc	Off grid Net Label HYS_5V at 686.384,245

Class	Document	Message
Warning	03 - IMU.SchDoc	Off grid Net Label IMU_SCL at 271.367,460
Warning	03 - IMU.SchDoc	Off grid Net Label IMU_SCX at 555.498,420
Warning	03 - IMU.SchDoc	Off grid Net Label IMU_SDA at 269.863,450
Warning	02 - Power.SchDoc	Off grid Net Label SS_5V at 704.405,225
Warning	02 - Power.SchDoc	USB_N contains IO Pin and Unspecified Port objects (Pin J5-A7,Pin J5-B7,Port USB_D_N)
Warning	05-usb-Debugger.SchDoc	USB_N contains IO Pin and Unspecified Port objects (Port USB_D_N)
Warning	02 - Power.SchDoc	USB_P contains IO Pin and Unspecified Port objects (Pin J5-A6,Pin J5-B6,Port USB_D_P)
Warning	05-usb-Debugger.SchDoc	USB_P contains IO Pin and Unspecified Port objects (Port USB_D_P)