ReceiverPi Pro II

SPDIF / I2S over HDMI Receiver for RaspberryPi DDC or DAC

user's guide

By IanCanada Sep. 8, 2023 Ver. 1.1

A. Introduction

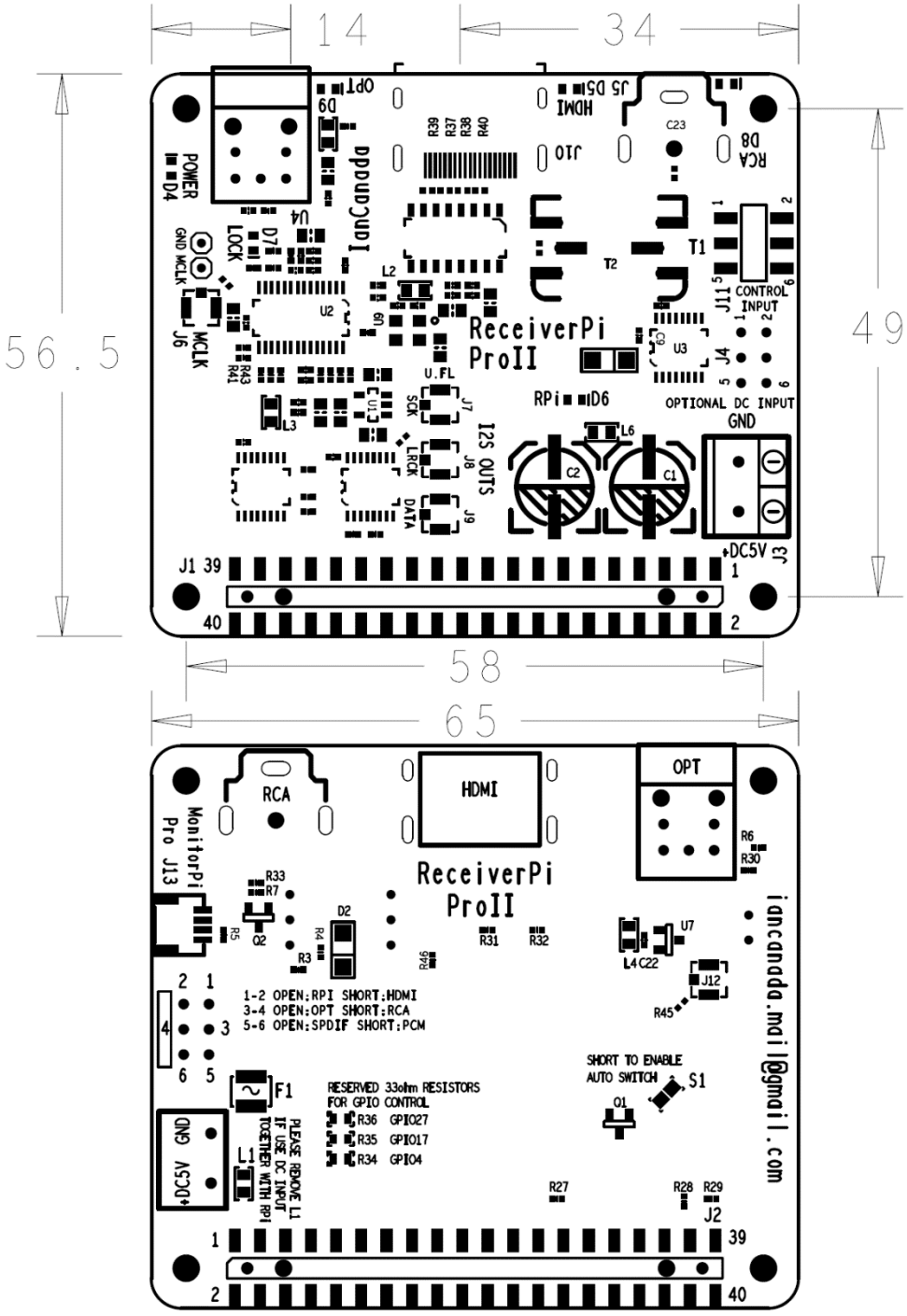
ReceiverPi Pro II is designed for Raspberry Pi based DDC or DAC projects to input digital music from multiple sources rather than RPi itself. ReceiverPi Pro II can select digital music signals from one of the four inputs: RCA (S/PDIF coaxial), OPT (S/PDIF Toslink), HDMI (I2S/DSD over lVDS) and RaspberryPi GPIO.

ReceiverPi Pro II has an additional control input that can be connected directly to a MonitorPi Pro which works as an integrated control center. The PCB layout of the ReceiverPi Pro II was also optimized so no longer has problem when installed right under a FifoPiQ7. ReveiverPi Pro II works with a StationPi Pro too as same as a ReceiverPi Pro.

B. Highlighted Features and Specifications

- RCA (75 ohms coaxial cable) S/PDIF input up to 192KHz, isolated
- Optical S/PDIF input up to 192KHz, isolated
- I2S/DSD over HDMI input up to PCM 768KHz and DSD1024
- I2S/DoP input from RPi GPIO up to PCM 768KHz and DSD128
- Support RPi free applications
- Can be easily configured as S/PDIF FIFO by integrating together with FifoPi and TransportPi
- Can be easily configured as HDMI transport by integrating with HdmiPi or HdmiPi Pro
- Works with StationPi Pro and StationPi Pro controller
- Can be connected to a MonitorPi Pro as a DDC control center
- Optimized for FifoPi Q7
- Great to build multi-input DDC or DAC projects
- Generate standard 48KHz dummy signals when S/PDIF is unlocked
- Reserved GPIO port for possible Linux/Web based software control
- DIY friendly and plug and play

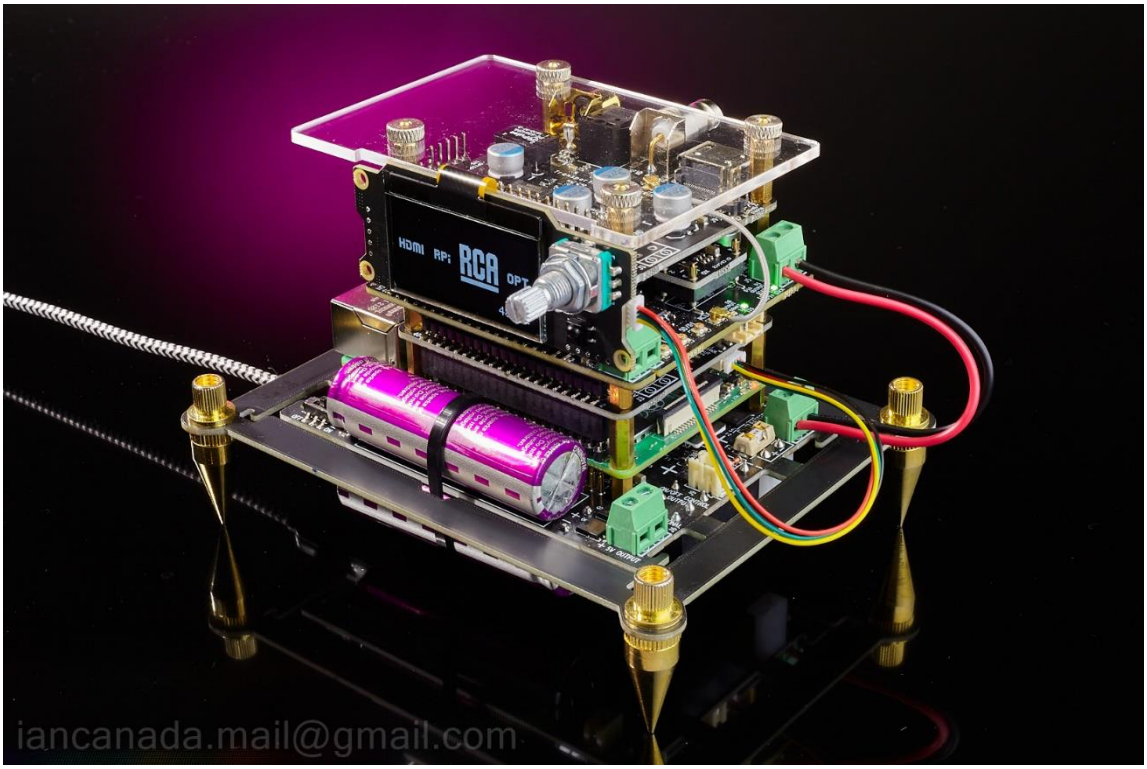
C. Layout and Dimensions (in mm)



D. Getting start with building a Raspberry Pi DDC project

1. PurePi II as power supply
2. Raspberry Pi
3. ReceiverPi Pro II (mount by the supplied 11mm standoffs)
4. FifoPi Q7
5. MonitorPi Pro
6. TransportPi MkII or HdmiPi or TransportPi AES or HdmiPi Pro
7. Acrylic cover (Optional)
8. Apple IR remote controller (optional)

Connect a control cable from J6 of MonitorPi Pro to J13 of ReceiverPi Pro II. MonitorPi Pro need to be installed into the non-isolated GPIO J2 of the FifoPi Q7. Other installations and connections are as the picture.

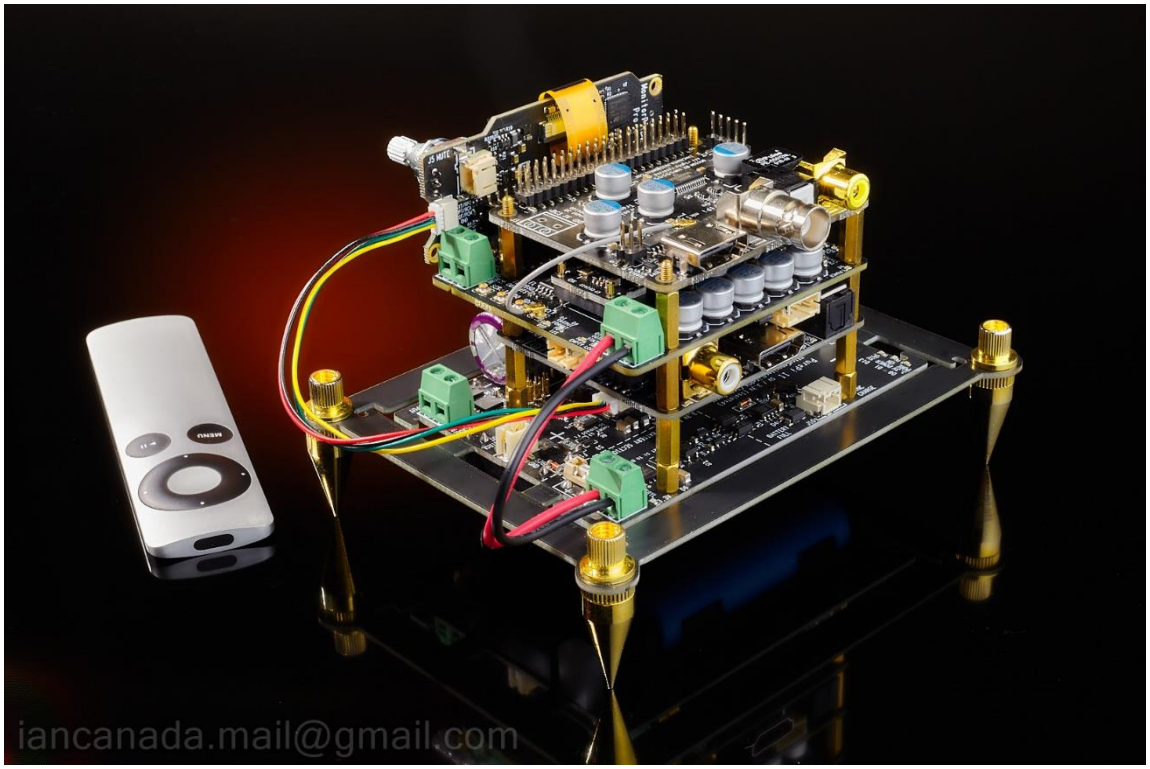


E. Works with a StationPi Pro

1. Upside down the ReceiverPi Pro II and then plug it into J1 and J10 of the StationPi pro.
2. Install a StationPi controller.
3. Build the rest of the system, such as RaspberryPi, USB, FifoPi, DAC or transport.
4. Enjoy the music.

F. Build a standard RPi free DDC or S/PDIF FIFO

1. PurePi II as power supply (or other power supply options). GPIO pin head connectors and 12mm standoffs are required to install ReceiverPi Pro II onto the PurePi
2. ReceiverPi Pro II
3. FifoPi Q7
4. MonitorPi Pro
5. TransportPi MkII or HdmiPi or TransportPi AES or HdmiPi Pro
6. Acrylic cover (Optional)
7. Apple IR remote controller (optional)



G. LED indicators

D4: Power indicator, indicating that ReceiverPi Pro II is powered

D7: Lock indicator, indicating that valid S/PDIF is received and locked. Either OPT or RCA

D9: OPT indicator, indicating that valid S/PDIF signal in OPT is received and switched to

D8: RCA indicator, indicating that valid S/PDIF signal in RCA is received and switched to

D6: RPi indicator, indicating that ReceiverPi Pro II is currently switched to RPi GPIO input

D5: HDMI indicator, indicating that ReceiverPi Pro II is currently switched to HDMI I2S/DSD input

H. Connectors

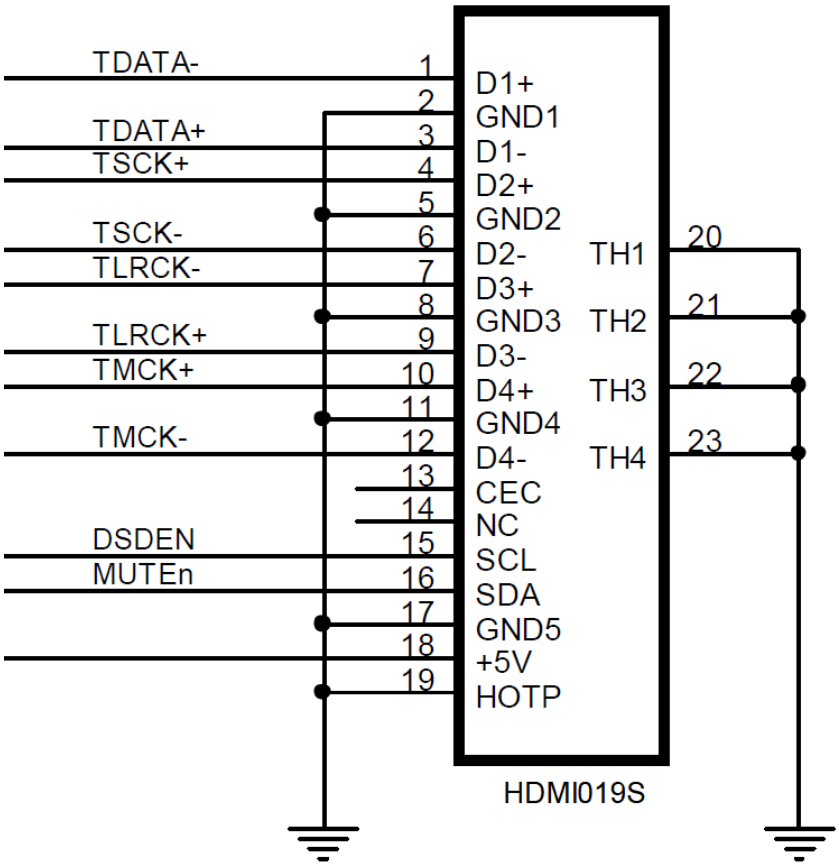
U4: Optical S/PDIF input

U4 is a standard TOSLINK optical connector.

J5: RCA coaxial S/PDIF input

J10: I2S/DSD over HDMI input

ReceicerPi Pro II takes I2S/DSD over HDMI in PS audio configuration



J6: MCLK output in u.fl coaxial cable socket (Optional)

This MCLK is enabled only when valid S/PDIF is in receiving. Lock LED should be lit at same time. FifoPi doesn't need this MCLK signal to function. So normally we don't need J6.

J11, J13, J4: Music sources selection control input

Music source selection	1-2	3-4	5-6
GPIO (RPi)	OPEN	X	SHORT
HDMI	SHORT	X	SHORT
RCA S/PDIF	X	SHORT	OPEN
OPT S/PDIF	X	OPEN	OPEN

J11, J13 and J4 are equivalent to each other.

J13 is recommended to connect directly to a MonitorPi Pro as the controller.

J11 will be install into the J10 of a StationPi Pro when works with.

J11 and J4 can also be used for the manual jumper selection. However manual selection is no longer recommended except for testing purpose. And J4 was not installed by default.

40 pin GPIO connectors

pin numbers	**J2** 40 PIN GPIO connector to board below (Normally Raspberry Pi)	**J1** 40 PIN GPIO connector to HAT on top (FifoPi or DAC or other audio board)
1,17	3.3V from preceding board	3.3V from preceding board
2,4	5V from preceding board	5V from preceding board
6,9,14,20, 25,30,34, 39	GND	GND
12	SCK input	SCK output
35	LRCK/DL input	LRCK/DL output
40	SD/DR input	SD/DR output
3	I2C DA	I2C DA
5	I2C CL	I2C CL
8	TXD0	TXD0
10	RXD0	RXD0
All other pins	same pin from preceding board	same pin from preceding board

Note: All input/output signals on the GPIO connectors are in LVTTL (3.3V) logic level except power and ground.

Optional I2S/DSD outputs in u.fl (not installed by default)

J7: SCK

J8: LRCK/DL

J9: DATA/DR

J3: Optional independent DC power input (not installed by default)

If don't want to take power from GPIO, you can connect a 5V DC / 100mA (minimum) power supply to this 2-pin 5.0mm terminal J3. MAINTAINING CORRECT POLARITY!!! Low noise linear 5V power supply will be good for ReceiverPi Pro II. Direct-connected 3.3V ultra capacitor / LifePO4 battery power supply can also be used.

J3 was not installed by default. L1 (at bottom side of the PCB) needs to be removed if you don't want new DC power being connected to GPIO. No need to remove L1 if ReceiverPi Pro II works independently without plugged into GPIO.

P/N of J3 can be Phoenix 5442206

I. Application notes

1. What's the recommended working configuration for the ReceiverPi Pro II

Working with a MonitorPi Pro and installing to a StationPi Pro are the two main recommended configurations of the ReceiverPi Pro II application.

2. What's the main difference between ReceiverPi Pro II and ReceiverPi for applications

When work with StatiopPiPro, there will be no difference. But to work with MonitorPiPro and FifoPi Q7, ReceiverPiPro II would be recommended because of the new control port and PCB layout.

3. RCA or OPT

With FifoPi installed in the system, ReceiverPi

Please Note: With FifoPi installed in the system, OPT and RCA will have no difference in sound quality. However, OPT has better isolation performance, while RCA is better for high Fs.

4. Can a ReceiverPi Pro II work independently without a FifoPi

Yes, ReceiverPi Pro II has no problem working independently without a FifoPi as a universal digital audio receiver. In this case, the terminal block connector J3 need to be installed to provide a 5V power supply. The music source selection can be controlled by manual jumper settings using J4 or J11. However, a MonitorPi Pro will be highly recommended to connected to J3 rather than using the manual selection.

5. How to use independent DC power supply?

The ReceiverPi Pro II was designed to take 5V power from GPIO. With FifoPi installed in the system, ReceiverPi Pro II's power supply may not affect the finial jitter performance. However real listening test shows that better power supply before FifoPi can still make slightly imPro IIvement to the finial sound quality. Because of the overall EMI noise can still have chance to be reduced when good power supply is used.

To use independent DC power, you will need:

a. Solder the supplied DC connector to the position of J3.
b. Remove FB L1 at bottom side of PCB if you don't want this power supply to be connected to GPIO.
c. Feed a good 5V linear/ultracapacitor voltage rail or a 3.3V LifePO4/ultracapacitor rail to J3.

6. About the possible software control

ReceiverPi Pro II can use three reserved GPIO pins for possible Linux/Web based software control.

To do so, you will need short R34, R35 and R36 with 0 to 50 ohm 0805 resistors or just jumper wires.

The GPIO pin numbers and control logic are listed as below:

GPIO pin number	Signal name	Resistor	Control logic
GPIO27	PCM or S/PDIF	R36	High: to select S/PDIF sources Low: to select PCM sources
GPIO17	S/PDIF selection	R35	High: OPT is selected as S/PDIF input Low: RCA is selected as S/PDIF input
GPIO4	PCM selection	R34	High: RPi GPIO is selected as PCM input Low: HDMI is selected as PCM input

Please note:

a. No any official control software is Pro II vided so far. Users need to write code by themselves or use the possible third-party software.
b. J4, J11 and J13 have to leave open after R34, R35 and R36 are installed.

J. History of release

Sep. 8, 2023 Ver. 1.0 released
Sep. 24.2023 Ver. 1.1 released