ReceiverPi DDC

Full Function Receiver Board for DDC or DAC Projects

user's guide

By IanCanada Oct. 23, 2023 Ver. 1.0b

A. Introduction

ReceiverPi DDC is a smart designed high quality full-input digital music receiver board. It could be one of the greatest solutions to build full function compact size network streamer, DDC or DAC projects.

ReceiverPi DDC works either with or without a RaspberryPi. A MonitorPro can also be used as a control center.

With a ReceiverPi DDC, it would be very flexible to integrate with FifoPi, Amanero USB, TransportPi/AES, HdmiPi/Pro, ES9038Q2M Dual Mono DAC and many other boards for well finished audiophile grade audio systems.

ReceiverPi DDC equivalent to a ReceiverPi Pro plus a BridgePi and more.

B. Highlighted Features and Specifications

- Full range of inputs: USB, RCA, OPT, I2S over HDMI and Raspberry Pi

- Capable of 768KHz PCM/DoP or native DSD 1024 for USB and I2S over HDMI inputs

- Up to 192KHz PCM/DoP for S/PDIF inputs

- Works at either RPi free mode or with a RPi

- All connectors are placed at the side edge of the PCB to make the configuration more organized

- A MonitorPiPro can be used as a control center

- USB adapter (Amanero or compatible) can be installed at either bottom side for RPi free applications or at top side when works with a RPi

- Manage music sources and clocks by advanced FPGA/SoC logic

- Generate standard 48KHz dummy signals for S/PDIF inputs when not unlocked

- Can be installed on to a PurePi as one of the good power supply solutions

- Great and flexible to build full function DDC or DAC projects

- DIY friendly and plug and play. No need for any software driver

C. PCB Layout
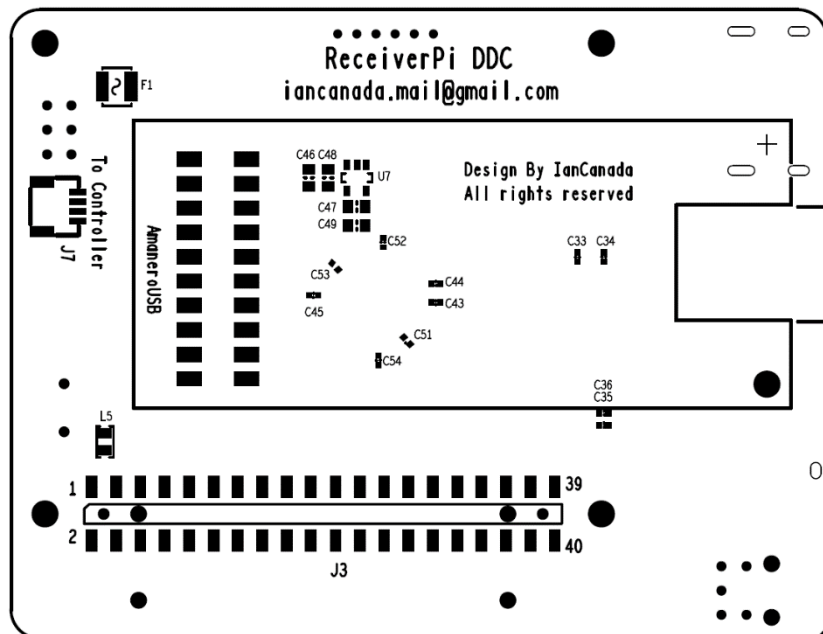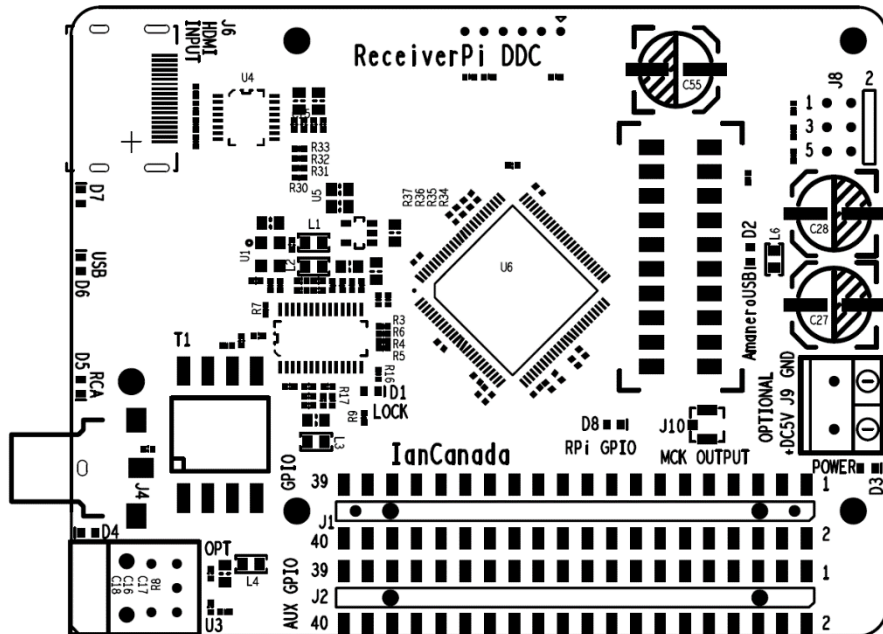
D. Principle of operating

1. How to install a USB adapter

Any Amanero Combo384 or size compatible USB adapter can be installed to the ReveiverPi DDC as a USB input source.

For Raspberry Pi free applications, the USB adapter needs to be installed to the bottom side of the PCB. While for applications with a Raspberry Pi, the USB adapter can be installed to the top side the PCB.

Please use the supplied 12mm M2.5 standoff/screw/nut to mount the USB adapter to the PCB.

USB adapter can be optional. You don't have to install one if you don't need it.

2. Raspberry Pi free mode

ReceiverPi DDC can work without a Raspberry Pi.

There are two power supply options for this mode:

a. Mount the ReceiverPi DDC directly on top of a PurePi. You need to use the supplied GPIO female to male connector and the 17mm standoffs. Have to make sure the GPIO pins are touched properly at the spring contacts.

b. Feed a 5V power supply to either J9 of the ReceiverPi DDC or J3 of the FifoPi (if installed on top). GPIO socket J3 must be kept unconnected in this case.

FifoPi or other boards will be installed to the GPIO J1 of the ReceiverPi DDC through the 13mm standoffs.

A MonitorPi Pro controller can be installed to either J2 of a FifoPi (recommended) or J2 of the ReceiverPi DDC. At the MonitorPi setup page, please select "DDC PiFree".

Even in this RPi free mode, a RaspberryPi can still be connected as an input source through USB. The good thing is that the RPi native DSD output feature can be enabled. So, the DSD256 or higher DSD frequencies can be achieved under this configuration. A PC or other USB source can also be connected through USB.

3. Works with a Raspberry Pi

The ReceiverPi DDC needs to be installed in to the GPIO of a RaspberryPi when works with it. The supplied 17mm standoffs will be used to mount them together. ReceiverPi DDC will be powered through the RPi GPIO, so J9 must be kept un connected under this mode.

A GPIO spacer may need to be installed to J1 of the ReceiverPi DDC if a USB adapter is mounted at the top side of the PCB. FifoPi or other boards can be installed through the GPIO spacer.

A MonitorPi Pro controller can be installed to either J2 of a FifoPi (recommended) or J2 of the ReceiverPi DDC. At the MonitorPi setup page, please select "DDC Enable".
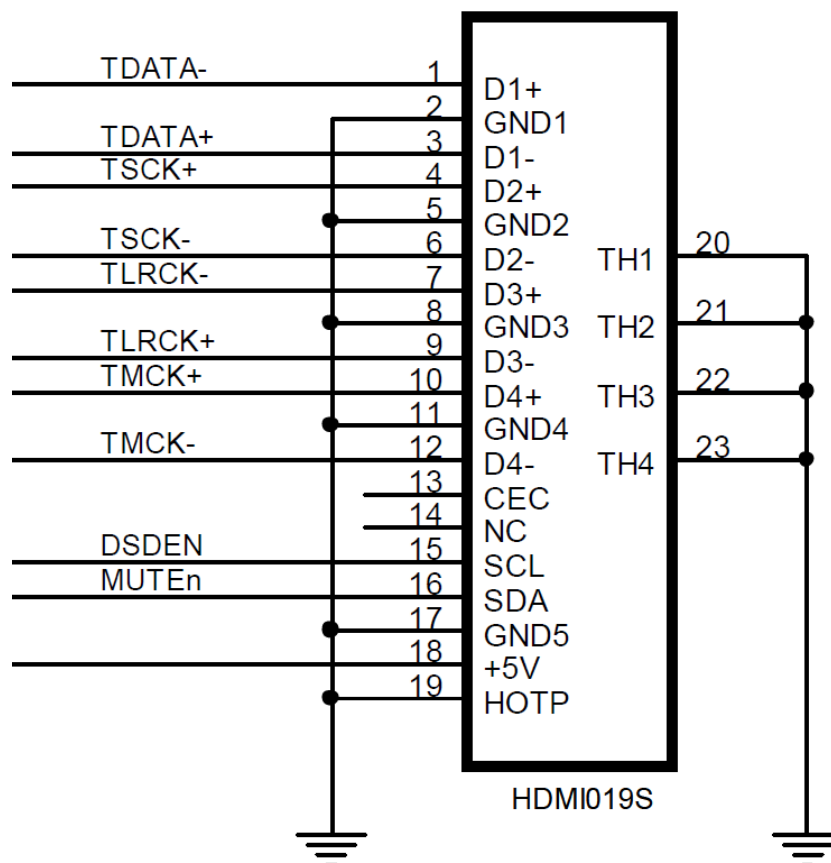
E. Connectors

U3: Optical S/PDIF input

U3 is a standard TOSLINK optical connector.

J4: RCA coaxial S/PDIF input

J6: I2S/DSD over HDMI input

ReceicerPi DDC takes I2S/DSD over HDMI in PS audio format configuration

HDMI019S

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

SYNC mode applications don't need this output so it's just optional. As an input source, Raspberry Pi doesn't provide MCLK.

J8: Manual sources selection control input (optional)

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

J7: Source selection control port

J7 is recommended to connect directly to a MonitorPi Pro as the controller. Please keep J8 unconnected if J7 is connected to a MonitorPi Pro

40 pin GPIO connectors

pin numbers	J3 40 PIN GPIO socket to board below (Normally Raspberry Pi)	J1, J2 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.
Note: As an AUX GPIO, J2 is reserved for installing a MonitorPi Pro if there is no FifoPi in the system.

J9: Optional 5V DC power input

If don't want to take power from GPIO, you can connect a 5V DC / 100mA (minimum) power supply to it. Internally J9 is connected to 5V and GND pins of J3. J9 must be kept unconnected when takes power from GPIO.

F. LED indicators

D3: Power indicator, indicating that ReceiverPi DDC is powered

D1: Lock indicator, indicating that valid S/PDIF input is received and locked. Either OPT or RCA

D4: OPT indicator, indicating that valid S/PDIF signal in OPT is selected as input

D5: RCA indicator, indicating that valid S/PDIF signal in RCA is selected as input

D8: RPi indicator, indicating that the Raspberry Pi is currently selected as input

D7: HDMI indicator, indicating that I2S over HDMI is selected as input

D6: USB indicator, indicating that USB adapter is selected as input

D2: USB adapter indicator, indicating that USB adapter is installed

G. ReceiverPi DDC based project examples

1. Flagship full-input Raspberry Pi free DDC streamer (or with a RPi)

Configurations:

#17B HdmiPi Pro or #20C TransportPi AES

#1D FifoPiQ7

#19D ReceiverPi DDC

#49B MonitorPi Pro

#48B PurePi II

#26B UcConditioner 3.3V (optional)

Apple remote control (optional)

RaspberryPi (optional, can also be installed as an additional input)

Installations:

- Install the boards as the picture

- Connect 3.3V wires from J2 of UcPure to J2 of the UcConditioner 3.3V

- Connect 3.3V wires from J6 of the UcConditioner 3.3V to J5 of FifoPi Q7 clean side

- Connect U.FL coaxial cable from MCLK of FifoPi to the HdmiPi Pro or TransportPi AES

- Connect the control cable from J6 of the MonitorPi Pro to J7 of the ReceiverPi DDC

- Connect SYNC charging control cable from J5 of the MonitorPi Pro to J10 of the PurePi II

Possible upgrade:

- Upgrade FifoPi Clocks to #80A and #80B SC-Pure 45/49 clocks

- Use a UcPure 3.3V to upgrade 3.3V power supply

2. **Raspberry Pi free audiophile grade full-input standard ESS Dual Mono DAC**
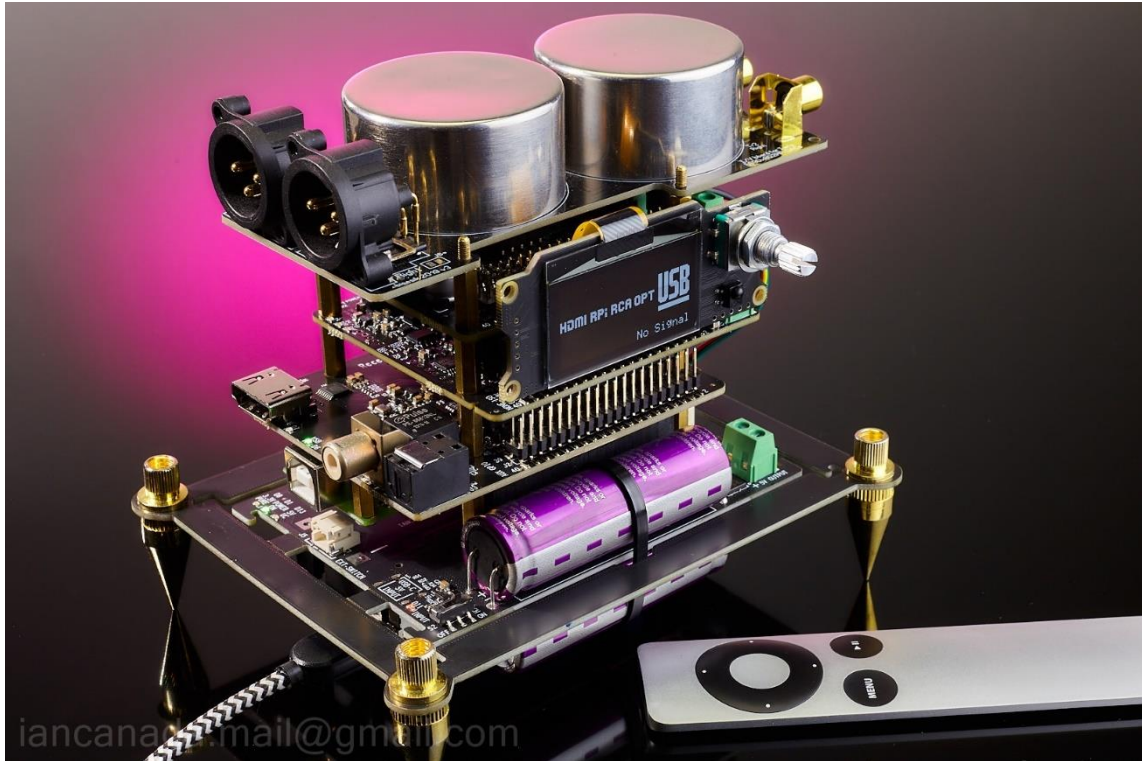
Configurations:

#4B ES9038Q2M Dual Mono II DAC

#7A Transformer I/V (Bisesik) or #6B OPA861 I/V

#1D FifoPiQ7

#49B MonitorPi Pro

#19C ReceiverPi DDC (has USB, I2S over HDMI, RPi, RCA and OPT inputs)

#48B PurePi II

Apple remote control (optional)

RaspberryPi (Can also be installed as an option)

Installations:

- Install the ReceiverPi DDC on to PurePi through an GPIO female to male connector and 17mm standoffs. Install a Amanero Combo384 or compatible USB interface on to the bottom side of the ReveiverPi DDC using a 12mm standoff. And then install the other boards using 13mm standoff as in the picture.

- Connect 3.3V wires from J2 of UcPure to both J5 of FifoPi clean side and J1 of the ES9038Q2M DM II DAC

- Connect U.FL coaxial cable from MCLK of FifoPi to J11 of the ES9038Q2M DM II DAC

- Connect the control cable from J6 of the MonitorPi Pro to J7 or the ReceiverPi DDC

- Connect the SYNC charging control cable from J5 of the MonitorPi Pro to J10 of the PurePi II

Possible upgrade:

- Upgrade FifoPi Clocks to SC-Pure

- Upgrade the 3.3V power supply to a PurePi MkIII 3.3V

- Upgrade the output board to OPA861 I/V

Note:

This configuration is recommended. It's not only because of the full range of inputs but also because there would be less EMI noise without the Raspberry Pi. And this configuration is very flexible, both Raspberry Pi and PC can also be connected through the USB input. Higher frequency native DSD such as DSD256 and DSD512 can also be achieved.

3. Flagship full-size full-function RPi free DDC streamer (or DAC)

Configurations:

#35C StationPi SMT

#20C TransportPi AES or #17B HdmiPi Pro or #4B ESS Dual Mono II DAC and I/V board

#1D FifoPiQ7

#19D ReceiverPi DDC

#49B MonitorPi Pro

#50A GPIO extender

Apple remote control (optional)

Power supplies:

#32B LinearPi Solo + #25B UcConditioner 5V (optional)

#41C UcPure MkIII 3.3V

Installations:

- Install the boards as the picture, use all 13mm standoffs

- Connect 5V to J3 of the StationPi SMT, make sure J9 1-2,2-4 are jumped

- Connect 3.3V to J5 of FifoPi from J9 of UcPure

- Connect U.FL coaxial cable from MCLK of FifoPi to the HdmiPi Pro or TransportPi AES or DAC

- Connect the control cable from J6 of the MonitorPi Pro to J7 of the ReceiverPi DDC

- Connect SYNC charging control cable from J5 of the MonitorPi Pro to J10 of the PurePi II

Possible upgrade:

- Upgrade FifoPi Clocks to #80A and #80B SC-Pure 45/49 clocks

- Connect 3.3V to J5 of FifoPi from the continuous output J10 or J13 of UcPure

4. **Upgrade an AUDIOPHONICS DAC I-Sabre ES9038Q2M into full-input standalone DAC**
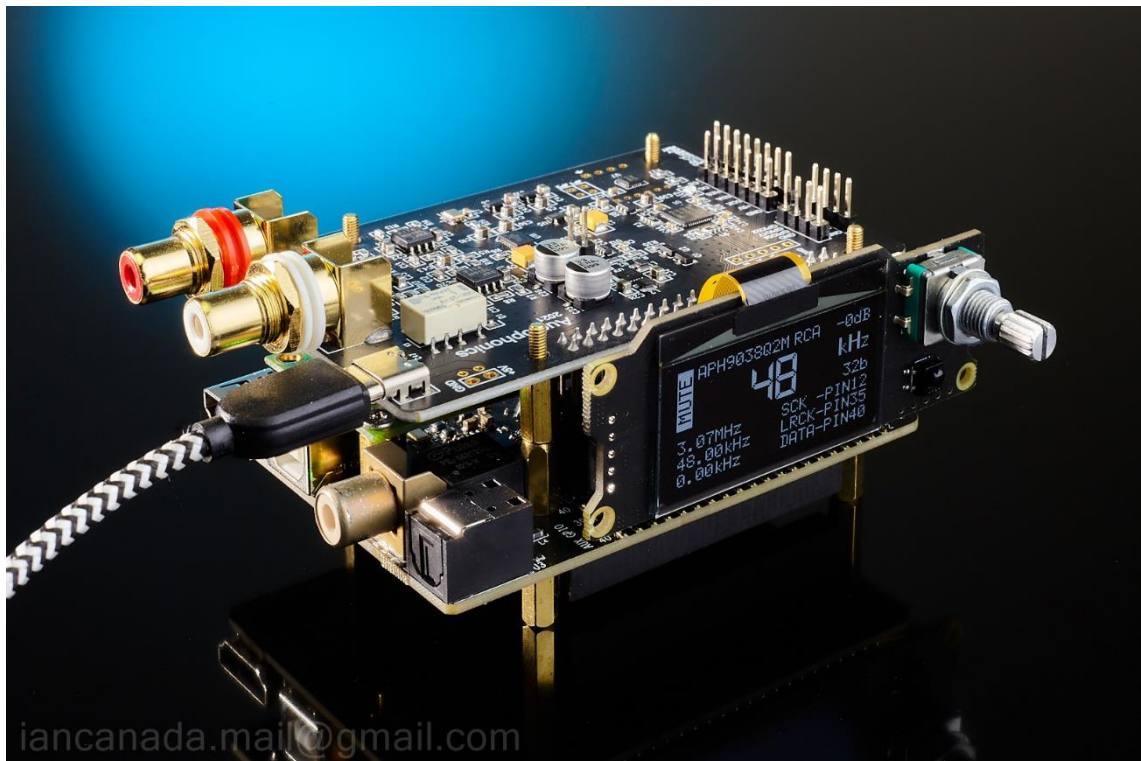
Configurations:

AUDIOPHONICS DAC I-Sabre ES9038Q2M DAC

#49B MonitorPi Pro

#19C ReceiverPi DDC (has USB, I2S over HDMI, RPi, RCA and OPT inputs)

Apple remote control (optional)

RaspberryPi (Can also be installed as an option)

Installations:

- Install the AUDIOPHONICS DAC I-Sabre ES9038Q2M DAC on top of the ReceiverPi DDC by 22mm standoffs

- Install the MonitorPiPro to the AUX GPIO J2 of the ReceiverPi DDC

- Connect the control cable from J6 of the MonitorPi Pro to J7 or the ReceiverPi DDC

Possible upgrade:

- Install the ReceiverPi DDC on to a #47A UcPi to upgrade the power supply

Note:

Master clock mode Raspberry Pi DAC cannot be upgraded by a ReceiverPi DDC.

H.   Q&A

1. **RCA or OPT which is better S/PDIF input**

With FifoPi installed in the system, RCA and OPT will have no difference in sound quality. However, OPT has better isolation performance, while RCA is better for high Fs. To use which one will be up to personal preference.

2. **Can a ReceiverPi DDC work independently without a FifoPi**

Yes, as a universal digital audio receiver, ReceiverPi DDC has no problem working independently without a FifoPi. A MonitorPi Pro will be highly recommended to connected to J7 to control the ReceiverPi DDC. You can also use the J8 jumpers to select the music sources but it's not recommended.

I. History of release

Oct23. 8, 2023 Ver. 1.0b released