MonitorPi Pro

Integrated control center and signal analyzer

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A. Introduction

MonitorPi Pro is a powerful integrated control center and universal OLED display panel that works for all kinds of Raspberry Pi audio applications. To install a MonitorPi Pro, all you need to do is just simply plug it into the GPIO port. It has never been that easy to add a high-performance display/controller to an RPi audio system until MonitorPi Pro was developed.

Benefiting from the unique built-in high speed signal analyzer, MonitorPi Pro detects the digital audio format and the I2S/DSD signal status in real time and shows the true music information on the OLED screen.

MonitorPi Pro is a big step forward upgrade from the MonitorPi with a lot of new additional features. As an integrated controller, it works like a bridge that can link a lot of different boards together for a well accomplished system. MonitorPi Pro can also support RaspberryPi free applications.

B. Features and Specifications

- Built-in high speed real-time digital analyzer monitors the true digital music signals up to 128MHz

- Music format display range up to PCM1536KHz and DSD1024

- 1.54" replaceable PMOLED screen

- Integrates a DDC controller that can control ReceiverPiPro II, ReceiverPi DDC and even StationPiPro to build a fully functional DDC streamer or DAC

- Integrates a UcPure MkII SYNC charging controller and will support PurePi II for this funciton

- Integrates a built-in ESS controller that can auto detect and control Ian ESS DACs, as well as Audiophonics ESS DAC

- Integrates FifoPi Q7 Controller

- Support Apple IR remote

- Control knob pre-installed

- Adjustable Brightness

- Configurable screen saver function

- Stop OLED display power during dim

- Software free architecture no need any additional Linux driver.

- Can be an external display screen when working with a universal GPIO extension KIT

- Works with any Raspberry Pi audio applications as long as they use GPIO port

- Would be a great help to debug an audio system by inspecting the real music signals

- Save all the settings automatically into Internal flash memory.

- DIY friendly and easy to install. Plug and play.

- Compact size

- GPIO I2S/DSD signal configurations:

  Pin12 (GPIO18): SCK

  Pin35 (GPIO19): LRCK/DL

  Pin40 (GPIO21): DATA/DR

C. Getting started

1. Plug the MonitorPi Pro into the GPIO port that contains the digital music signals.

   The GPIO port can be:

   A. The GPIO port of a Raspberry Pi

   B. The GPIO port on your DAC or streamer HAT

   C. The non-isolated GPIO or AUX GPIO on FifoPiQ3, Q7 or FifoPiMa

   D. The GPIO on the universal GPIO extension KIT

   E. The AUX GPIO on the ShieldPi Pro I/II

2. Connect the DDC control cable from J6 to the J13 of a ReceiverPi Pro II or J7 of ReceiverPi DDC if you have any it your system.

3. Connect the PH2.0 control cable from J5 MUTE output to either J11 or J12 of a UcPure MkIII, or the J10 of a PurePi II to enable the ultracapacitor/battery power supply SYNC charge function.

4. Play music and then the real time digital music signal information will be displayed on the OLED screen. You can also use either the control knob or an Apple IR- remote control to operate the MonitorPi Pro.

Note1: The glass of the OLED screen is very thin. To prevent from cracking, please don't press the screen at any time. Please hold the ears of the MonitorPi Pro PCB when plugging in and out.

Note2: The MonitorPi Pro pins have to be properly installed into the GPIO port. Wrong or shift positions can cause damage when turning on the power supply.

D. Normal Operations

1. Dim screen

   Press the control knob or the play/confirm button of the IR remote, a countdown page will appear. And then the screen will go dim in three seconds. After the screen is dimmed, press the control knob or the play/confirm key of IR again, the screen will be back to display.

2. Access main setting menu

   Pressing the control knob or the play/confirm key of IR again within the three seconds of the showing of the countdown page, the main setting menu will be open. And then, you can go through all the settings by turn the knob or press the up and down key of the IR. Press the knob or play/confirm key and then turn the knob or the up and down key of the IR can change the settings. Press those keys again or wait for three seconds, the new settings will be saved.

3. OLED brightness setup

   There will be four brightness options:

   LOW, MID, MIDHI, HIGH.

   Lower brightness can help to extend the lifetime of the OLED screen. The default brightness is the MID.

4. Screen saver

When the screen saver is enabled, MonitorPi Pro will dim the screen automatically after the dim time is up. The screen can wake up for display if the music signal is changed or the control knob or IR remote is pressed. The screen will be dimmed again after the next dim time up. It's highly recommended to enable the screen save function to extend the life time of the OLED screen.

To enable the screen saver, you need to enable the ScreenSave setting in the main setting menu. There will be four options:

Manual: Disable screen saver (default)

AFT3s: Enable screen saver, dim time is 3 seconds

AFT8s: Enable screen saver, dim time is 8 seconds

AFT15s: Enable screen saver, dim time is 15 seconds

5. Enable/Disable the IR remote

Apple compatible IR remote was enabled by default. You can disable it in the main setting menu if it is conflict with other devices.

E. DDC control

1. Install a ReceiverPi Pro II or ReceiverPi DDC into the system according to the corresponding user's manual.

2. Connect the supplied DDC control cable form J6 of the MonitorPi Pro to J13 of ReveiverPi Pro II or J7 of ReceiverPi DDC.

3. Enable the DDC controller in main setting menu according to hardware configuration

Settings	Descriptions
Disable	No DDC control (default)
RCP enable	Install both ReceiverPi Pro II and RaspberryPi
RCP PiFree	Install ReceiverPi Pro II only without a RPi
DDC enable	Install both ReceiverPi DDC and RaspberryPi
DDC PiFree	Install ReceiverPi DDC only without a RPi

4. Turn the knob or press the left and right key on the IR remote to select in between the input sources.

F. ESS DAC control

1. Enable the ESS Ctrl in main setting menu

Settings	Descriptions
Disable	Disable ESSC. No longer scan I2C bus
AUTO (Default)	Enable ESSC. Auto scan/detect DAC. Show less DAC information. No software volume control.
ENABLE	Enable ESSC. Auto scan/detect DAC. Show more DAC information. No software volume control.
AUTO wSFV	Enable ESSC. Auto scan/detect DAC. Show less DAC information. With software volume control.
EN wSFV	Enable ESSC. Auto scan/detect DAC. Show more DAC information. With software volume control.

2. Install Ian ESS DAC or Audiophonics ESS DAC into system.

3. Install the MonotorPi Pro into the non-isolated GPIO of FifoPi (recommended) or the AUX GPIO of the a ShieldPi Pro I/II or directly to the GPIO of on the DAC.

4. After turn on the system power, MoniotorPi pro will automatically scan the I2C bus to detect the DAC. A dot on the top right corner or full DAC information will be displayed on the OLED screen if the DAC is connected.

5. There are three ways to change the volume (keep the volume at 0dB and use the analog volume control on the pre-amplifier would be highly recommended the keep the best sound quality)

   a. Press the up and down key on the IR remote.

   b. Turn the knob. If DDC is enabled, need to press the knob at the DDC menu before change the volume.

   c. Change the volume in the player software if the EEC Ctrl setting is AUTO wSFV or EN wSFV. Please always select the **Audiophonics I-Sabre** ESS DAC as the I2S device in the player software.

6. To access Ian ESS DAC setting menu:

   Press the knob key or the confirm/play key of the IR remote at the volume page will open the Ian ESS DAC setting page. Please read the ESS controller user's manual for the register settings

G. FifoPi controller

1. Install the MonitorPi pro into the non-isolated GPIO connector of a FifoPi Q7 or higher version.

2. Turn the power supply of the system. The FifoPi will be detected automatically. FifoPi status will be displayed on the OLED screen. And the FifoPi settings will be listed in the main menu page.

3. Please refer to the FifoPi Q7 user's menu for the settings.

H. Power supply SYNC charging controller

1. Make sure the MonitorPi Pro and the whole system is running properly.

2. Connect the supplied PH2.0 control cable from J5 MUTE output on the MonitorPi Pro to either J11 or J12 of a UcPure MkIII, or the J10 of a PurePi II.

3. Play music normally. When music is stopped or paused, the UcPure MkIII or the PurePi II will go to SYNC charging mode. It will be back to the PURE mode immediately after the music is playing again.

I. MonitorPi Pro application examples

1. Full function DDC transport, low jitter audiophile grade

(1). MonitorPi Pro

(2). TransportPi MkII

(3). FifoPi Q7

(4). RaspberryPi (Optional)

(5). ReceiverPi Pro II

(6). PurePi power supply

(7). Acrylic cover (optional)
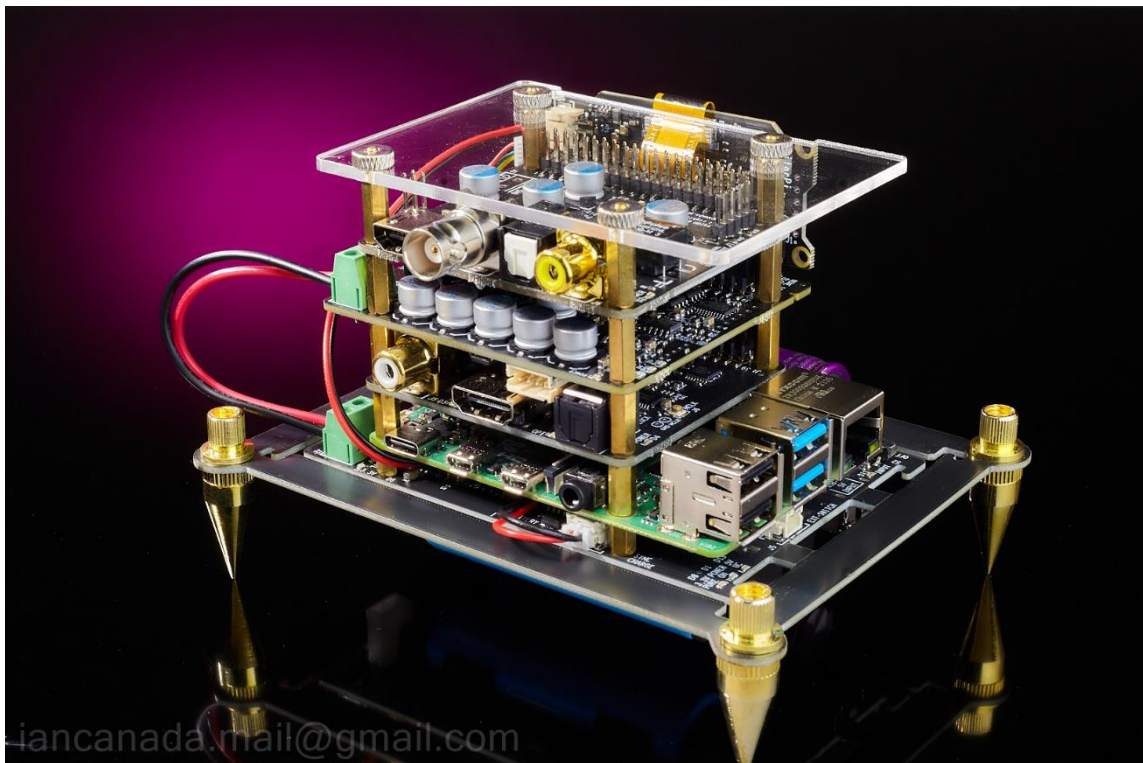
2. **Flagship audiophile DDC transport**
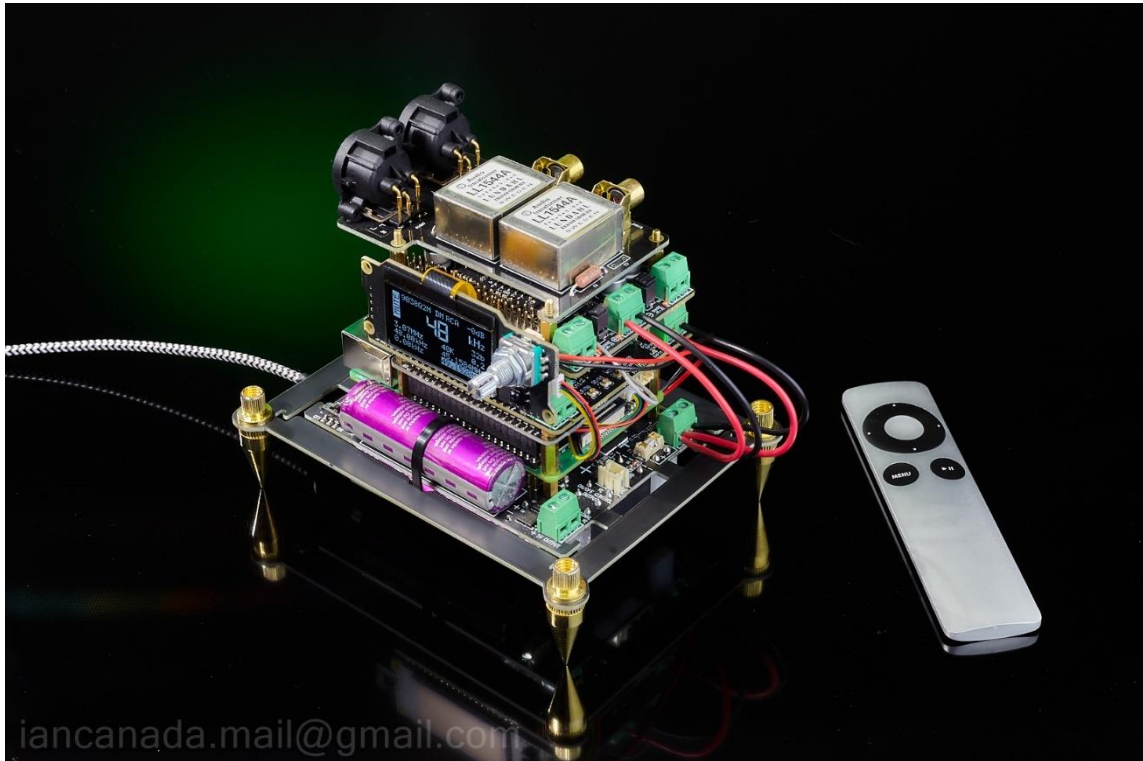
    (1). MonitorPi Pro

    (2). TransportPi AES or HdmiPi Pro or both

    (3). FifoPiQ7 with upgraded to SC-Pure clocks

    (4). GPIO spacer (optional)

    (5). ReceiverPi DDC with Amanero USB (optional)

    (6). RespberryPi (optional)

    (7). PurePi power supply

    (8). Apple remote control (optional)

3. Full function ES9038Q2M Dual Mono DAC

(1). MonitorPi Pro

(2). ES9038Q2M Dual Mono MkII DAC (in SYNC mode)

(3). Transformer I/V or OPA861 I/V

(4). FifoPiQ7

(5). ReceiverPi Pro II (optional)

(6). RespberryPi (optional)

(7). PurePi power supply

(8). Apple remote control (optional)

4. Flagship full-function StationPi Pro streamer transport or DAC

To build a full-size, full-function streamer transport or DAC, a MonitorPi Pro can also be used as StationPi Pro controller. To make it, you will need:

a. Install a ReceiverPi Pro II into StationPi Pro

b. Short pin3 and pin7 of StationPi Pro J14 by a jumper wire

c. Connect the control cable from J6 of the MonitorPi Pro to the J13 of ReceiverPi Pro II

Here is the project example:

(1). StationPi Pro

(2). ReceiverPi Pro II

(3). RespberryPi

(4). Amanero USB (optional)

(5). MonitorPi Pro with GPIO extension KIT

(6). FifoPiQ7

(7). TransportPi AES or HdmiPiPro or ESS DAC

(8). Apple remote control (optional)

5. **Upgrade AUDIOPHONICS DAC I-Sabre ES9038Q2M DAC with MonitorPi Pro**

MonitorPiPro will work with AUDIOPHONICS I-Sabre ES9038Q2M DAC to bring this DAC to a higher level and bigger application range. ReceiverPi Pro II and FifoPiQ7 can also be integrated with this DAC for upgrade.

Standard configuration

(1). MonitorPi Pro

(2). AUDIOPHONICS DAC I-Sabre ES9038Q2M DAC

(3). ShilePiPro (Additional GPIO to connect to a MonitorPiPro, and the power supply filter)
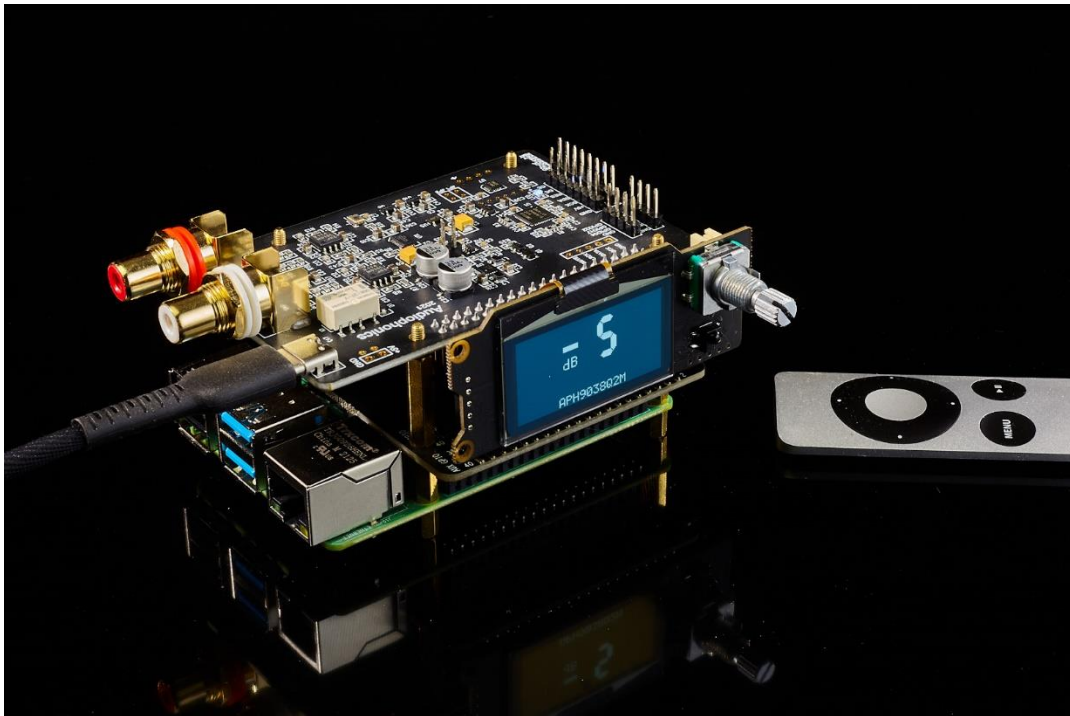
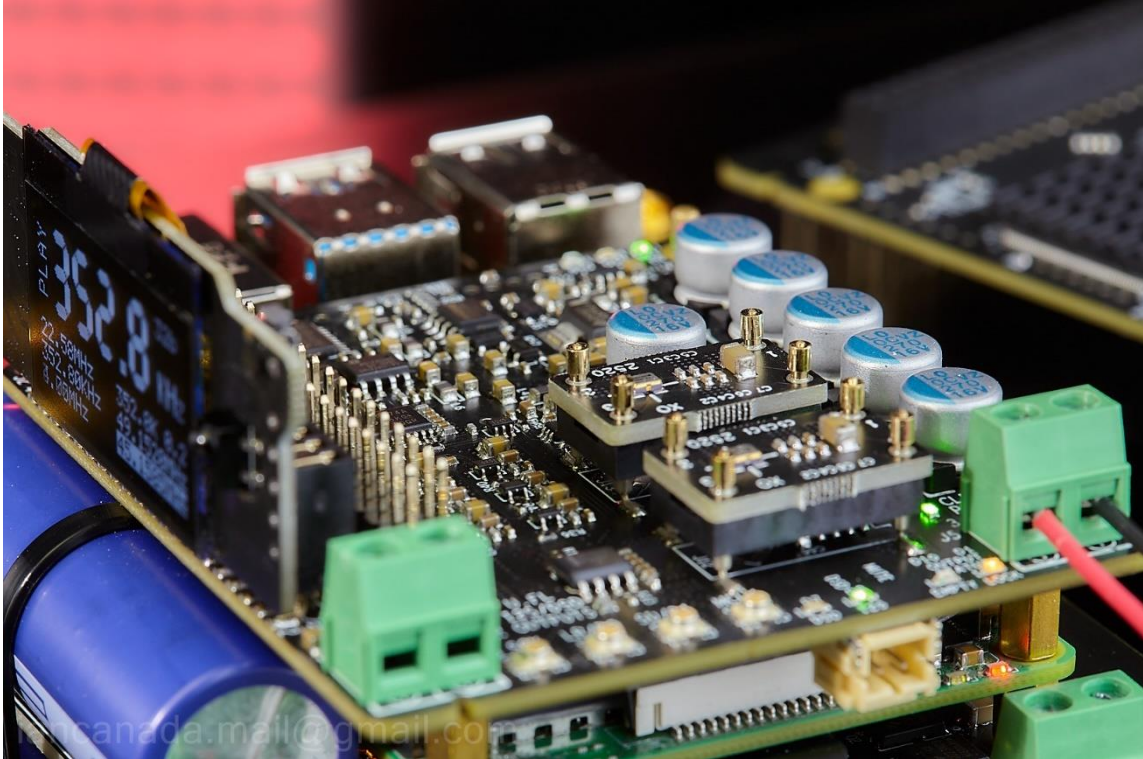**Power supply enhanced configuration**

(1). MonitorPi Pro

(2). AUDIOPHONICS DAC I-Sabre ES9038Q2M DAC

(3). ShilePiPro (Additional GPIO to connect to a MonitorPiPro, and the power supply filter)

(4). Raspberry Pi

(5). UcPi

(6). Acrylic cover (optional)
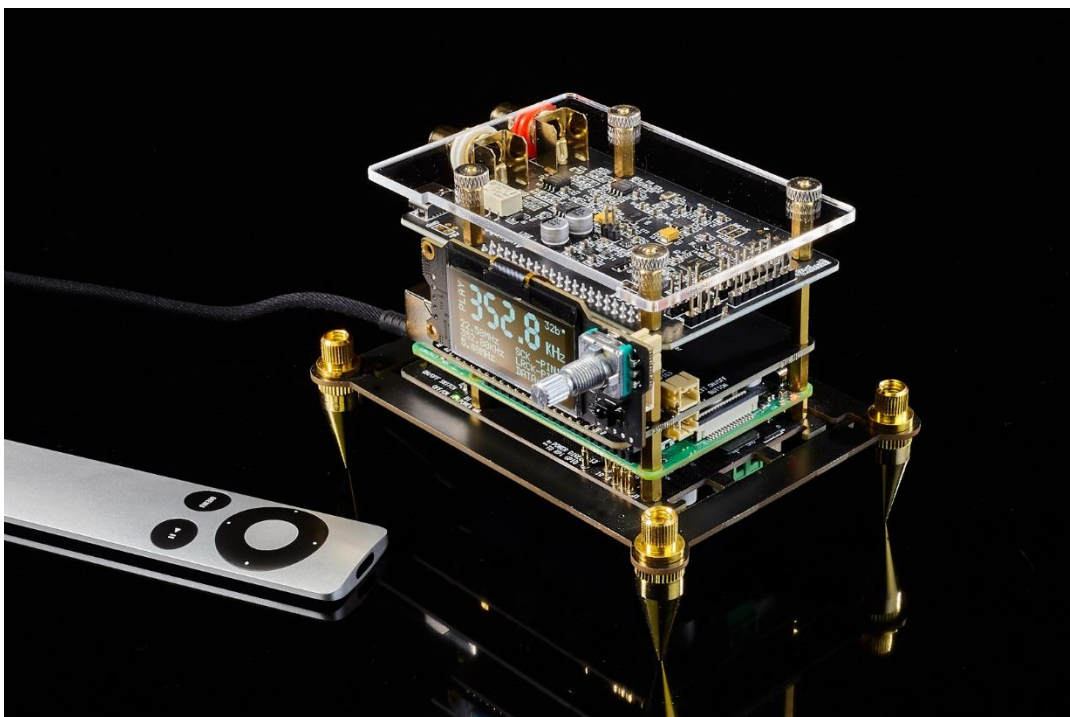
6. **Bast patterner of a FifoPiQ7 with the built-in FifoPi controller**

J. Difference between MonitorPi and MonitorPi Pro

MonitorPi Pro is upgraded from MonitorPi but has a lot of new features. They are suitable for different applications.

MonitorPiComparison	MonitorPi	MonitorPi Pro
Suitable applications	Universal Rapberry autio applications	Audio project integration
OLED screen	1.3"	1.54"
Replace Screen	Need to de-solder and re-solder	Replaceable with FFC connector
Real Time Music Format Analyzer	Yes	Yes
FifoPi controller	Yes	Yes
ESS DAC controller	No	Yes
DDC controller	No	Yes
Control Knob	No	Yes
SYNC charging control	No	Yes
Apple IR Remote	Passthrough to RPi only	Yes
Stop OLED power when Dim	No	Yes
Screen Saver	Yes	Yes
Brightness adjustment	Yes	Yes
Mounting holes	No	Yes
Size	58mm x 23mm	73mm x 29mm

K. Q & A

1. **MonitorPi Pro is showing the 192KHz 32bit on the screen when I play a 192KHz 24bit music file, why?**

   Please no worries at all. That's normal. The reason is that the music file can be in 192KHz 24bit format, but the player outputs the signals in a 32bit package according to the I2S specification. MonitorPi Pro will tell the real signal status. Please always trust the MonitorPi Pro.

2. **I installed a MonitorPi Pro in a new system. But the screen shows no signal and all frequencies are zero. There is also no music output. What's happened?**

   There should be no real music signal at GPIO if the MonitorPi Pro shows all frequencies are zero. Normally this is a software setup issue. Please check the player settings. You need to enable the I2S DAC and select the correct driver according to the audio HAT that you are using.

3. **MonitorPi Pro is showing 176.4KHz rather than the DSD format on the screen when I play a DSD file. How can I get the correct native DSD output?**

   Raspberry Pi doesn't output the native DSD signals over GPIO, so we need to enable DoP output in

the settings of the player software. DoP is a kind of protocol that integrates the native DSD data into the PCM package. If DoP is enabled, a DSD64 music will be placed into a 176.4KHz PCM package. To play the DSD music file in real native DSD format, you need to install a FifoPiQ7 (Q3) or a FifoPiMa in the system because of they have built-in DoP decoder. After that, you will have correct DSD format displayed on the MonitorPi Pro screen.

4. **What kind of Remote controller works with MonitorPi Pro**

MonitorPi Pro works with Apple remote control. A1294, A1156 and so on. All IR remote control with NEC IR protocol should work with MonitorPi Pro.

To lower the cost, I recommend this compatible third part remote which can be easily sourced from Amarzon.

https://www.amazon.ca/gp/product/B07VMRZFMS/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&th=1

5. **How to know the revision number of my MonitorPi Pro?**

The revision number shows at countdown page. You can see the revision number at any time when you access the countdown page by pressing the control button.

6. **How to replace the OLED screen of the MonitorPi Pro?**

MonitorPi Pro is equipped with a replaceable OLED screen. It will be very easy to replace with a new screen of the old screen reaches the end of life. To do so, you will need the follow steps

a. Release the FCC cable by pulling up the actuator on connector J3.

b. Warm up the OLED screen with a hair blower.

c. When the double-side adhesive turns soft under the screen, gently pry up the screen from one corner. Clean the glue if there is any left on the PCB surface.

d. Mount the new screen to the PCB with the double-side adhesive, align to bottom edge of the PCB.

e. Fully Insert the FFC cable into the connector J3. Push the actuator down to lock the connector.

7. **How can I move the MonitorPi Pro to the front panel?**

You can move the MonitorPi Pro to the front panel by using a universal GPIO extension KIT. There are two FFC/FPC cables, 6" and 12". You can use any of them according to the requirement of the application.

Please refer the picture below for how to use the universal GPIO extension KIT to move the MonitorPi Pro.

8. **IR remote controller doesn't work when I have a RaspberryPi is system**

   The IR signal is also passed to RPi (pin22/GPIO25) over GPIO to for possible software control plug-ins. However, a RPi software may not initial that IR pin properly if the IR plug-in software is not installed.

   In this case the IR signal might be affected somehow because the wrong RPi GPIO initial logic levels. There are two solutions to solve this problem:

   a. Software solution

   Edit the config.txt file on a PC using a SD reader, add and copy the follow line as a last line to the file, then save it.

   gpio=25=ip,pu

   b. Hardware solution

   If you use a GPIO extension KIT, please bent or cut the pin22 (GPIO25).

   Or if you install the MonitorPi Pro to the non-isolated GPIO of a FifoPi, please bent or cut the same pin.

L. History of revising

SEP. 3, 2023 V2.0 released
NOV. 3,2023 V2.1 Add StationPi Pro controller
Jan.19,2024 V2.2