TransportPi Digi II

Audiophile master mode all-in-one RaspberryPi digi re-clock transport user’s guide

IanCanada, Jun 27, 2024 Ver. 1.0

A. Introduction

TransportPi Digi II is an audiophile grade high-performance low-cost master mode all-in-one Raspberry Pi re-clock transport. It successfully achieves an ultra-low jitter low noise signal quality by using IanCanada's well reputed 1-bit three stages discrete re-clock technology for the S/PDIF signals and two-stages multi-bits re-clockers for the I2S over HDMI signals. TransportPi Digi II also has dual XOs sockets for local audio clocks to make it possible to be upgraded to even higher sound quality level by installing SC-Pure or other kinds of ultra-low phase noise clocks.

As an all-in-one digi transport, it provides almost all kinds of high quality re-clocked output: RCA, OPT, HDMI and GPIO. Because of the most advanced low-jitter and low-low noise technologies it employs, TransportPiDigi II could be the best sound quality compact size RPi streamer transport when working with UcPi, PurePi or other high quality power supplies.

TransportPi Digi II is functionally equivalent to a I2S FIFO re-clocker plus a TransportPi

B. Features and Specifications

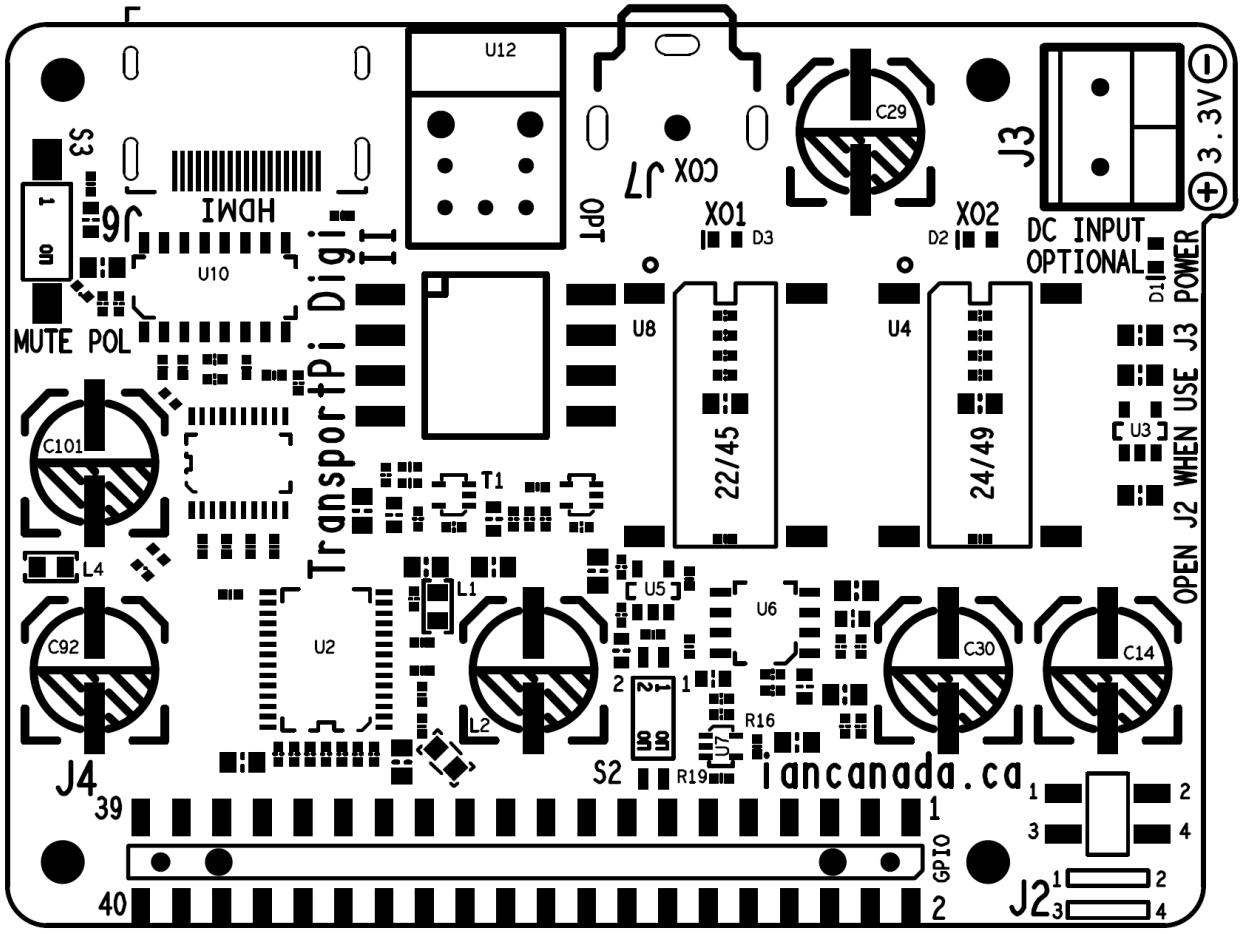
- 4 high quality outputs: re-clocked S/PDIF output in RCA (Isolated) and OPT, re-clocked I2S output over HDMI, re-clocked I2S output over GPIO
- Low noise 1-bit discrete re-clocker for S/PDIF signals (three stages in total)
- Two-stages multi-bits re-clocker for I2S over HDMI signals
- 45.1584/49.1520 MHz dual low phase noise local clocks were pre-installed in the upgradeable/swappable XO sockets which are compatible with FifoPi. 22.5792 /24.5760 MHz clocks can also be used
- Has high quality local MCLK output in U.FL coaxial cable connector
- Can also work as an I2S FIFO re-clocker.
- Has low noise clean 3.3V/5V power supply input which is great for directly work with the LifePO4 battery or ultracapacitor power supply. On-board LDO can also be bypassed.
- Can also share Raspberry Pi ‘s power supply
- Works with SinePi to take external high quality sine clocks
- Great for compact size audiophile integrated Raspberry Pi streamer transport solution
- Up to 192KHz
- Four layers PCB design with two inner PCB layers as dedicated shield plates to lower the noise more
- Enhanced power supply filtering network with more than 130 ultra-low ESR decoupling capacitors
- No need a FifoPi to work with
- uses standard WM8805 Linux driver

- Low cost but no compromise on performance
- bit-perfect and lossless
- Diy friendly plug-and-play

C. TransportPi Digi II new features

- Supplied with higher grade FemtoMck 45.1584/49.1520 MHz clocks
- Direct 3.3V input optimized for high quality low noise battery/ultracapacitor power supply
- Mute control for I2S over HDMI
- New S/PDIF digital transformer
- Better coaxial signal quality

D. Layout



E. Quick-Start Guide

1. Install the TransportPi Digi II on top of a Raspberry Pi using four 11mm standoffs.
2. Install a micro-SD card loaded with your player image into your Raspberry Pi.
3. Power the Raspberry Pi by a standard USB-C power adapter (5V/2.5A). The power LED D1 will be lit.
4. In the player software settings, select the standard WM8805 I2S device, such as **Hifiberry Digi+ Pro**, as the Linux driver. Make other configurations as needed to enable your Raspberry Pi player to operate.
5. Connect to your DAC through a RAC coaxial cable, a HDMI cable or a TOSLINK optical cable
6. Start to play music. Either XO1 or XO2 LED will be lit corresponding to the music Fs frequency
7. Enjoy the music

F. Connectors

J7: RCA S/PDIF output

Isolated standard 75-ohm S/PDIF output in RCA connector.

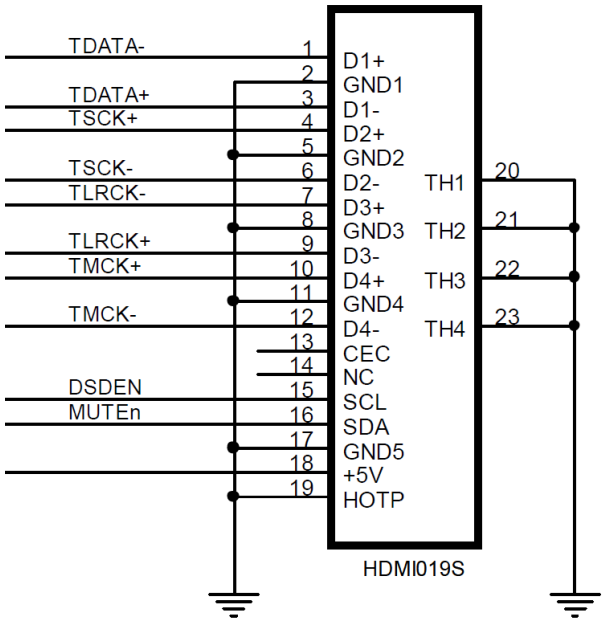
U12: OPT S/PDIF output

Standard S/PDIF output in TOSLINK optical connector.

J6: I2S/DSD over HDMI output connector

Standard HDMI connector. To output I2S signals to the receiver through HDMI LVDS cable.
For higher signal quality, high speed HDMI cables version 2.0 or higher are recommended.
Please refer the following schematic for signal configurations.

Note: There are two kinds of I2S to HDMI configuration, mode A and mode B. TransportPi Digi II uses mode B (PSaudio format) to optimize to high-speed PCB layout for best possible signal quality. Please make sure your DAC is set up in the same configuration.



J5: MCLK output (U.FL coaxial cable socket)

MCLK (master clock) output for audio HAT or external DAC. As the same as the MCLK signal from a FifoPi.

J8: MUTE input for I2S/DSD over HDMI (optional)

Can be connected to J5 of a MonitorPiPro to take the MUTE signal. For HDMI output J6 only.
You can keep J8 unconnected if you don’t have click sound problem when change the music.

40PIN GPIO connectors

	J1	J4
PIN#	GPIO connecting Raspberry Pi to TransportPi Digi II	Prime GPIO for a DAC HAT or other audio devices
1	Raspberry Pi 3.3V output	TransportPi Digi II clean 3.3V
2,4	Raspberry Pi 5V input/output	Raspberry Pi 5V
6,9,14,20, 25,30,34, 39	GND	GND
3	I2C DA	I2C DA
5	I2C CL	I2C CL
12	SCK Input	Re-clocked SCK output
35	LRCK Input	Re-clocked LRCK output
40	SD/D2 Input	Re-clocked DATA output
All other pins	Connected to the GPIO pins of the Raspberry Pi	Not connected

XO1, XO2: XO sockets for local audio clocks

The TransportPi Digi II has two sockets for local clocks, XO1 (U8) and XO2 (U4). Low-jitter 45.1584/49.1520 MHz clocks were installed in to the sockets as default. Standard DIP14 3.3V clock oscillators **with OE pin** are good for XO1 and XO2. Surface mount (SMT) oscillators can also be used by mounting them on the SMT XO adapters.

J3: Optional DC power input

By default, TransportPi Digi II shares the RPi 5V power supply through the GPIO at the bottom side of the PCB. To upgrade sound quality, you can connect a 3.3V low noise DC power supply to this J3. MAINTAINING CORRECT POLARITY!!! Direct-connected 3.3V ultra capacitor / LifePO4 battery power supply would be highly recommended for the best possible performance.

J2 1-2, 3-4 must be open when TransportPi Digi II takes 3.3V power form J3.

G. Jumper settings

S2: Clock frequency group selection

1. 1-ON, 2-OFF: Install 45.1584 MHz in XO1 socket (U13) and 49.1520MHz in XO2 socket (U7) **(default).**
2. 1-OFF, 2-ON: Install 22.5792 MHz in XO1 socket (U13) and 24.5760MHz in XO2 socket (U7)

J2: Power supply sharing jumpers

1. Short 1-2 and 3-4 to share Raspberry Pi power supply through GPIO (default)
2. Open 1-2 and 3-4 When TransportPi Digi II taks independent clean 3.3V power supply from J3

S1: LDO enable/bypass (located at top side of the PCB)

Please always keep S1 open

S3: HDMI MUTE signals polarity

1. OFF: Mute I2S/DSD over HDMI when mute signal is low **(defult)**
2. ON: Mute I2S/DSD over HDMI when mute signal is high

Note: Please switch S3 to the opposite position if HDMI device is muted when music is playing.

H. LED indicators

Group	LED	Description	On Indicates...
Power indication	D1	POWER LED	TransportPi Digi II is powered
Clock Selection	D6	XO1	XO1 is selected for MCLK
	D5	XO2	XO2 is selected for MCLK

I. Application examples

1. **Low-cost good sound quality compact size Raspberry Pi Digi re-clock transport using UcPi ultracapacitor power supply**

Configuration:

(1). Raspberry Pi
(2). TransportPi Digi II
(3). MonitorPi Pro (optional)

Power supply:
UcPi ultracapacitor power supply

Settings:
Keep J2 shorted
Connections:
No need any additional connections

2. **Audiophile grade compact size RaspberryPi Digi re-clock Transport using PurePi ultracapacitor/LifePO4 pure battery power supply**

Configuration:

(1). Raspberry Pi
(2). TransportPi Digi II
(3). MonitorPi Pro (optional)

Power supply:
PurePi ultracapacitor/LifePO4 battery power supply

Settings:
J2 open

Connections:
3.3V power wires from J2 of UcPure to J3

3. **High-end compact size RaspberryPi Digi re-clock Transport using IsolatorPi and PurePi ultracapacitor/LifePO4 pure battery power supply (Recommended)**

Configuration:

(1). Raspberry Pi
(2). TransportPi Digi II
(3). IsolatorPi III
(4). MonitorPi Pro (optional)

Power supply:
PurePi ultracapacitor/LifePO4 battery power supply

Settings:
Digi II: J2 open
IsolatorPi III: Master
J13 short, J12 open

Connections:
3.3V power wires from J2 of UcPure to both J3 of TransportPi Digi II and the J1 of an IsolatorPi III

Note:

1. Most HDMI DACs have no problem at the moment of music start, stop or change. But if there is click sound during those time, you can connect the MUTE signal from MonitorPi Pro to the TransportPi Digi to address.
2. If it is required, the MUTE signal from MonitorPi can also be connected to the PurePi as SYNC charge control signal.
3. Please use 11mm standoffs on top of the RPi and 13mm standoffs on to of the IsolatorPi III.
4. MonitorPi has to be installed into GPIO connector correctly. Installed into wrong position with pins shifted can cause sa hort circuit and can not be covered by the warranty. Please be very careful.

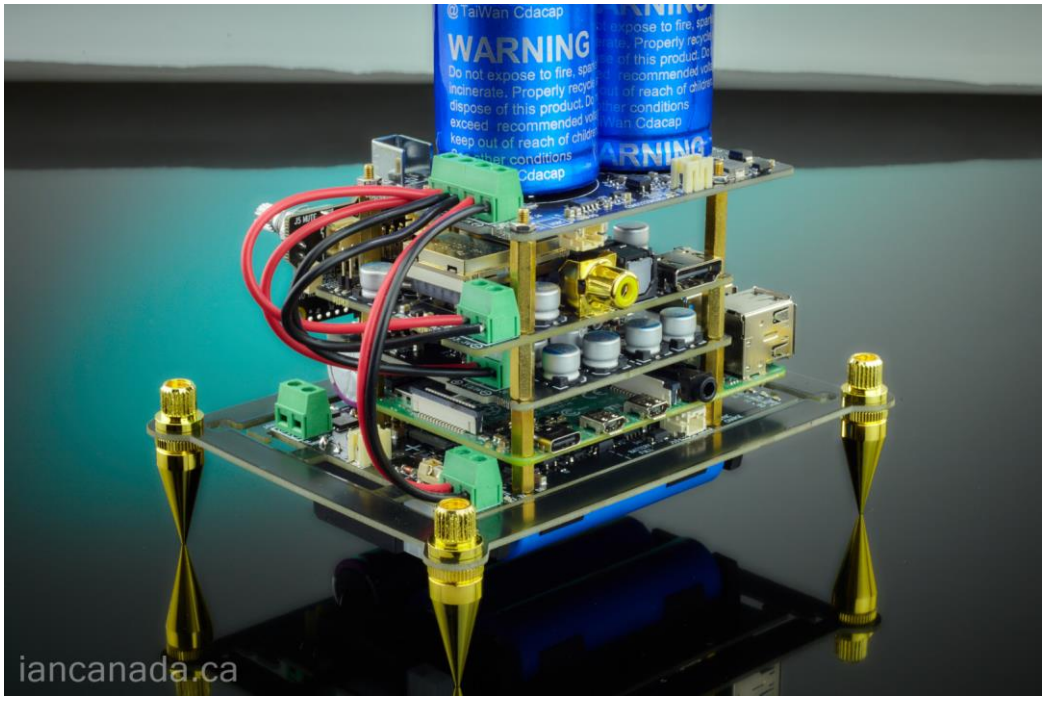
J. Possible upgrades

1. Upgrade to SC-Pure extremely-low phase noise clocks

The primary mechanism that TransportPi Digi II uses to improve the sound is by re-clocking the audio stream with low-phase noise clocks. The better clock you use, the more improvement you can get from your TransportPi Digi II.

We highly recommend to upgrade both XOs to SC-Pure 45/49 or 22/24 extremely-low phase noise audio clock. To save cost, you can also upgrade one by one and keep the other one default.

2. Upgrade with UcConditioner Pro 3.3V to improve the 3.3V clean power supply



The quality of the power supply directly impacts both signal and clock performance. The 3.3V LiFePO4 battery from the PurePi is already very good. But upgrading it with a UcConditioner Pro 3.3V can lower the power supply ESR more and improve the overall performance to a higher level.

Note: Please use 20mm standoffs between TransportPiDigi and UcConditioner Pro.

K. Some application notes

1. How to install a MonitorPi

MonitorPi or MonitorPi Pro can be a good OLED real time display for TransportPi Digi II. To install it, you just need to plug it on to the GPIO connector J4. Please make sure all the pins are properly installed. MonitorPi is plug-and-play. No need any software support.

When you have IsolatorPi III in the system, MonitorPi Pro can be installed into the J4 of IsolatorPi III to make it isolated from the output.

2. How to use TransportPi Digi II's FIFO function

TransportPi Digi II has basic I2S FIFO function. The re-clocked I2S FIFO outputs are at:

MCLK: J5

SCK: GPIO J4 PIN12

LRCK: GPIO J4 PIN35

DATA: GPIUO J4 PIN40

To use the FIFO function, you can

a. Install a SYNC mode DAC or other audio HAT on top of the GPIO J4. Connect the MCLK through a U.FL cable as required.

b. Or, connect the above FIFO output signals to an external SYNC mode DAC or other digital audio devices.

3. Be very careful when you install the XOs

a. Wrong origination can cause malfunction and make damage to the XO.

b. The position of XOs: 45/22 MHz left side. 49/24MHz right side. Can not be changed.

c. How to remove/replace SMT XO sockets

XO sockets may get loose if being used for many times. In this case, we need to replace the sockets.

Cut the four pins by a side cutter at bottom of a SMT XO socket.

Clean the pads by de-soldering wick

Solder a new SMT XO socket at the same position.

d. XO warm-up time

All XO and OCXO oscillators take time to warm-up and stabilize before producing their lowest jitter, best sounding clock signal. This will take anywhere from a couple of minutes to a half hour or even longer. Please allow for your clocks to warm up and stabilize before performing any critical evaluations.