

LinearPi MkII

Ultra-low noise high current linear power supply

By IanCanada Ver. 1.5



A. Introduction

LinearPi MkII is a high-quality audiophile grade manageable and expandable ultra-low noise high current linear power supply. It could be the one of the greatest Linear power supply solutions for both digital and linear audio applications. Multiple LinearPi MkIIs can be grouped into a whole power supply system. LinearPi MkII can also be upgraded to ultra capacitor power supply by integrating with UcConditioner.

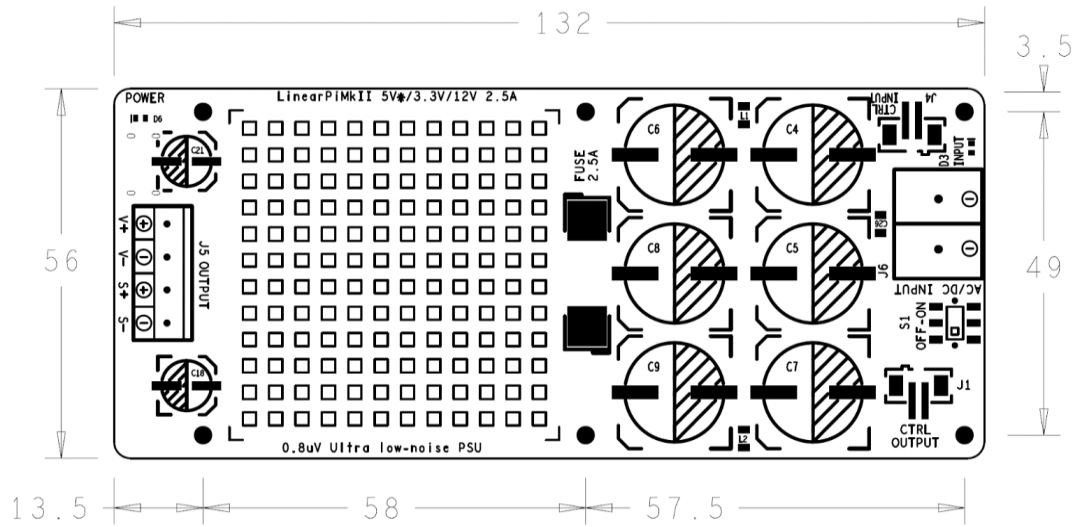
B. Specifications and Highlighted Features

- 0.8uV Ultra-low noise level.
- Ultra-low output impedance.
- High speed high current low noise soft recovery Schottky rectifiers with optional shunt capacitors.
- Built-in on/off control logic with on-board or possible external on/off control switch.
- Multiple LinearPi MkIIs can be grouped as a whole power supply system by making use of the built-in isolated master/slave control signal chain.
- Seamlessly integrates with UcConditioner to upgrade to an ultra capacitor power supply.
- Continuous AC input mode for best possible sound quality
- Optional Kelvin sense input for better possible performance.
- Deal with MLCC piezoelectric effect noise.
- Double thickness 2oz PCB copper layers for ultra-lower ESR performance.
- Heavy duty fully SMT design.

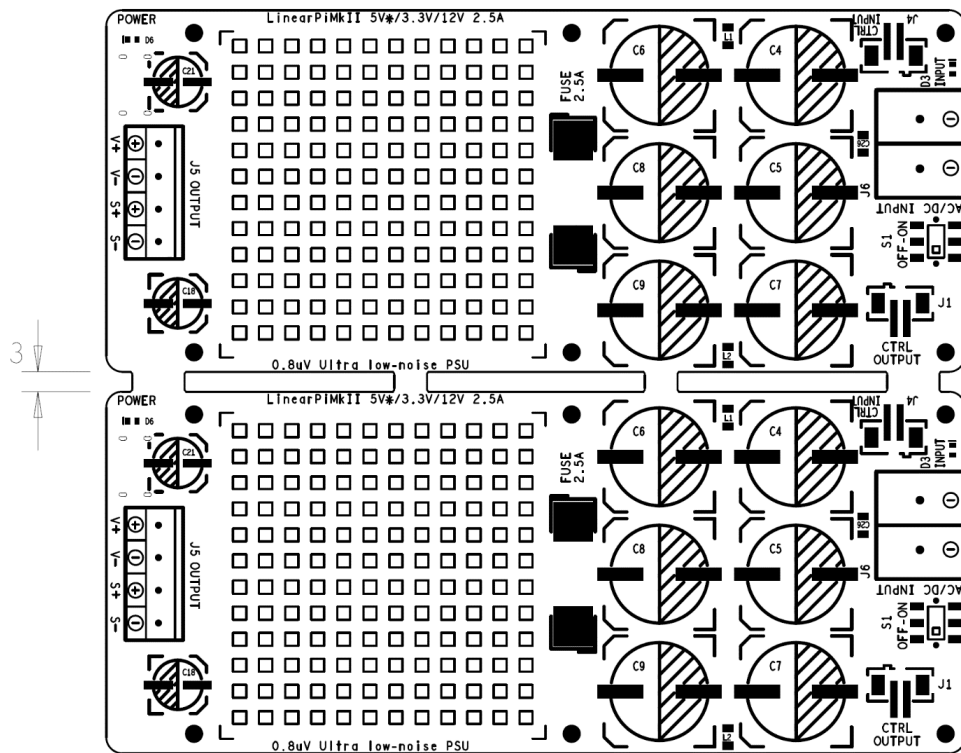
C. LinearPi MkII new improvements

- 5V, 3.3V and 12V configuration pure linear DC power supply, 2.5A rated output current
- Two stages ultra-low noise soft start feature great for both digital and analog application
- Total 13,200uF enhanced high capacitance high current ultra-low ESR filtering network for a significant improvement
- Standard 5*20mm high performance glass fuse
- Bigger and stronger ON/OFF switch

D. Layout and Dimensions (in mm)



LinearPi MkII Solo



LinearPi MkII Dual

E. Getting start

1. Make sure setting jumper S2 and S3 (at back side of the PCB) is configured correctly to the desired output voltage 3.3V, 5V(default) or 12V.
2. Connect an AC power supply to J2 barrier terminal block. AC6-9V for 3.3V or 5V configuration. Or AC 12V for 12V configuration. Turn on the AC power supply. Input LED D3 will be lit.
3. Turn the on-board on-off control switch S1 to on position. Power LED D6 will be lit. Make sure output voltage between V+ and V- at output terminal block J5 is correct (Please tighten the screws to ensure the connections)
4. Turn S1 to the off position. Connect the V+ and V- of J5 to the device by high quality wires (18 AWG or bigger).

LinearPi MkII is now ready to work.

F. Connectors

J2: AC input in 2-pin barrier terminal block

An AC or DC power much be connected to J2 to operate. 2.5A or higher would be recommended.

3.3V configuration: AC6V or DC9V

5V configuration: AC6-9V or DC9-12V (AC6V or DC9V when work with UcConditioner)

12V configuration: AC12V or DC15V

Input voltage can be a litter bit high than the above numbers to get more headroom, but have to make sure that the temperature at heat sink is not exceeding 85°C.

AC power supply must be from an independent coil of a power transformer.

DC power supply will be non-polarity but must be totally isolated. Never share ground with other power supplies.

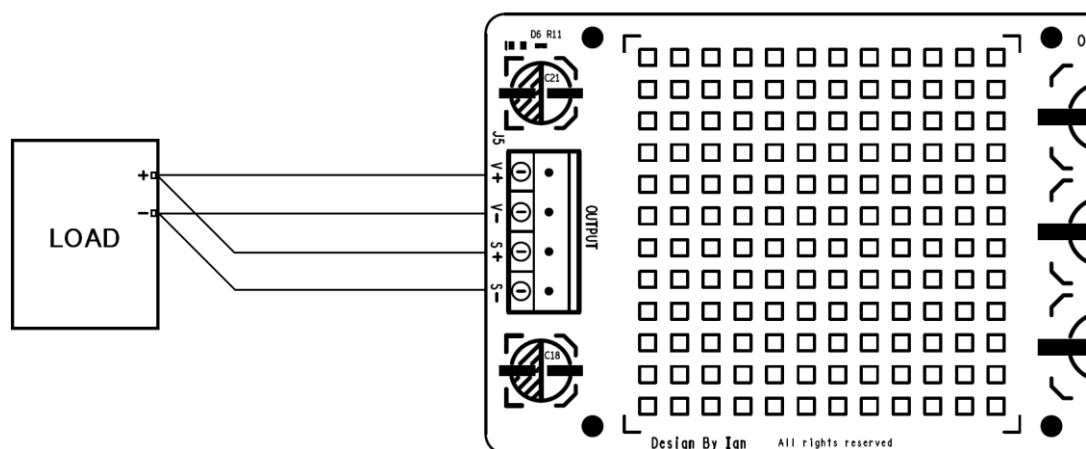
J5: Output in 4-pin 5.0mm terminal

V+ and V-: Output, 5V or 3.3V according to the jumper setting.

S+ and S-: Optional Kelvin sense input.

For normal applications, S+ and S- can be left unconnected.

However, if the power cable is longer than 5 inches, we can use this optional Kelvin sense input to keep the ultra-low output impedance and the good regulation performance.



J3: External on/off control switch connector, in 2-pin PH2.0 (at bottom side of the PCB)

External on/off control switch is functionally equivalent to the on-board switch S1.

To use the external on/off control switch, On-board switch S1 must be at off position.

External on/off switch is not included in the package.

J4: Slave on/off control input in 2-pin PH2.0, isolated

LinearPi MkII can be controlled remotely by this slave control input. LinearPi MkII will be turned on when a 3V-12V control voltage is applied to this input. The control signal is non-polarity and optical isolated from LinearPi MkII.

To use the remote on/off control, On-board switch S1 must be at off position.

J1: Master on/off control output in 2-pin PH2.0

1: Control signal –

2: Control signal +

To set up a control chain of a power supply group, please connect J1 to the slave input J4 of the following LinearPi MkII through the supplied control cable.

G. Switch and jumper

S1: ON-board on/off switch

On position: LinearPi MkII will be enabled and output voltage will be applied to the output connector.

Off position: LinearPi MkII will be disabled and no output.

S1 must be at off position if external on/off switch or slave control input is used.

S2, S3: Output voltage setting jumper

S2	S3	Output voltage
short	short	3.3V
short	open	5V (default)
open	open	12V
open	short	5.3V

H. LED indicators

D3: Power input indicator. Indicating that the AC input voltage is applied when lit.

D6: Power on indicator. Indicating that the LinearPi MkII is turned on and output voltage is applied to J5 when lit.

I. Fuse

The fuse is a standard 5*20mm fast-action glass fuse, For better protection, the default fuse is 3.0A current rating Recommend P/N: Littelfuse **0235003.MXP**

If you user DC input higher than 12V or AC input higher than 9V when works with a UcConditioner, you may need to increase the fuse to 5A current rating.

Recommend P/N: Littelfuse **0235005.MXP**

J. Application notes

1. Two stages soft start up

0V-3.0V: Fast startup stage to meet the reset timing requirements of some digital circuit, such as FifoPi Ma and so on.

After 3.0V: Slow startup stage to keep the ultra-low noise performance for both analog and digital circuit.

2. Continuous AC input mode

Though we can use AC power to turn on and turn off the LinearPi MkII (on/off switch S1 has to be at on position). However, for the best possible sound quality, it's highly recommended to use the continuous AC input mode by powering the AC input continuously while using the on/off control logic to turn on or turn off the LinearPi MkII.

There will be no additional power consumption during the continuous AC input mode. Only the smoothing capacitors (capacitor array) will be kept in charged all the time.

3. How to group LinearPi MkIIs together

For LinearPi MkII Dual, please connect the Master control output J1 of first LinearPi MkII to the Slave control input J4 of second LinearPi MkII by the supplied control cable.

For a bigger group, please connect the Master control output to the Slave control input between LinearPi MkIIs as a chain. Please use the on/off logic of the master LinearPi MkII to control the whole power supply group.

4. How to upgrade to ultra capacitor power supply

Mount a UcConditioner on top of the LinearPi MkII by the LinearPi MkII screw/standoff sets (sold separately). Connect V+ and V- of the LinearPi MkII output J5 to the + and – of UcConditionerPi input J2 through power cables 18 AWG or bigger. And then, connect the UcConditioner output J6 to the device to be powered. Because UcConditioner is mainly a passive power supply, please use power cable as bigger and shorter as

possible.

Please make sure using the UcConditioner 5V for 5V LinearPi MkII, and using the UcConditioner 3.3V for the LinearPi MkII 3.3V configuration.

Have to use **AC 6V transformer** coils when works with UcConditioner 5V/3.3V. UcConditioner can demand very high charging current at the moment before full, higher input voltage can result-in power transistors over heat and have risk of damage.

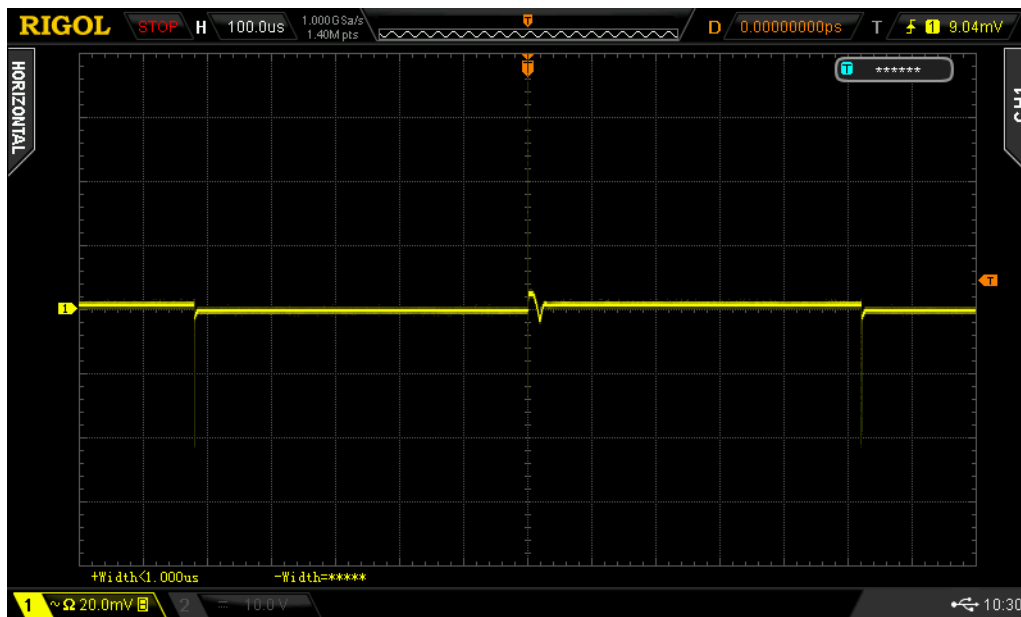
5. Recommended transformers

Hammond 1182N6 is recommended for LinearPi MkII 3.3V/5V configuration. 1182L6 is also good as a less expensive option.

Someone reported that a higher voltage can make the sound quality better. So, the AC 9V transformer 1182M9 is also recommended as long as not working with the UcConditioner and the heat sink temperature is not higher than 85°C.

1182M9 is also recommended for 12V configuration.

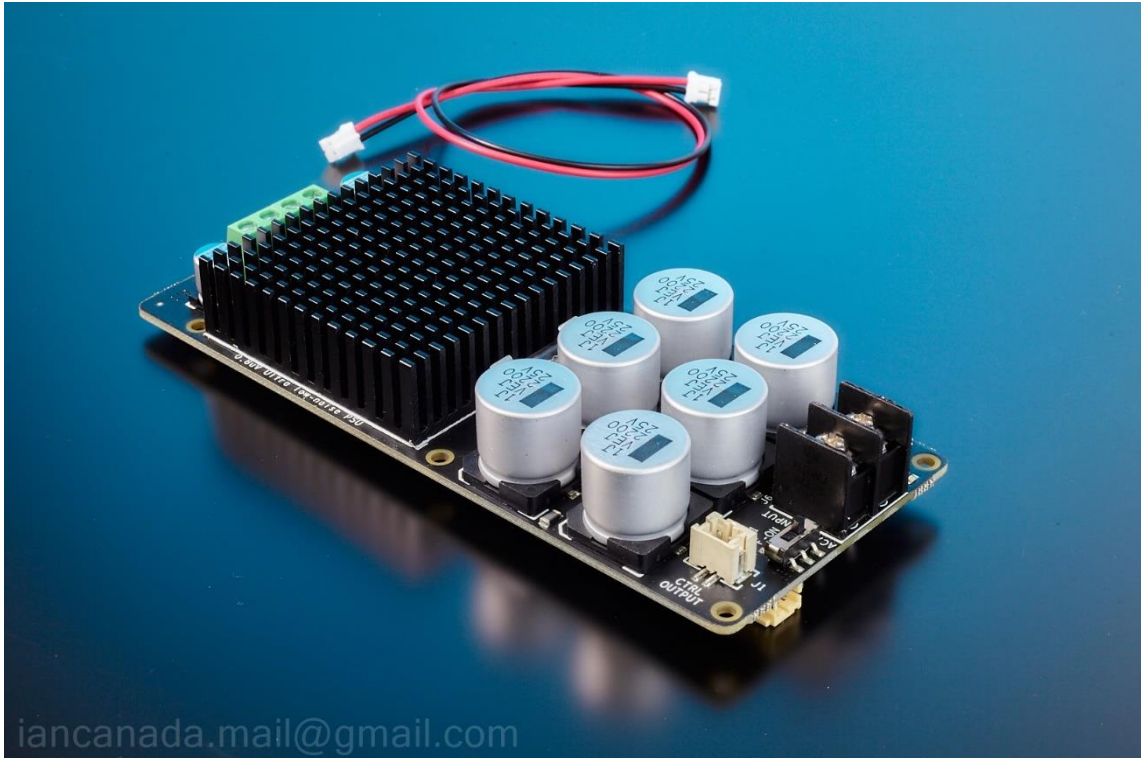
K. LinearPi MkII load transient response



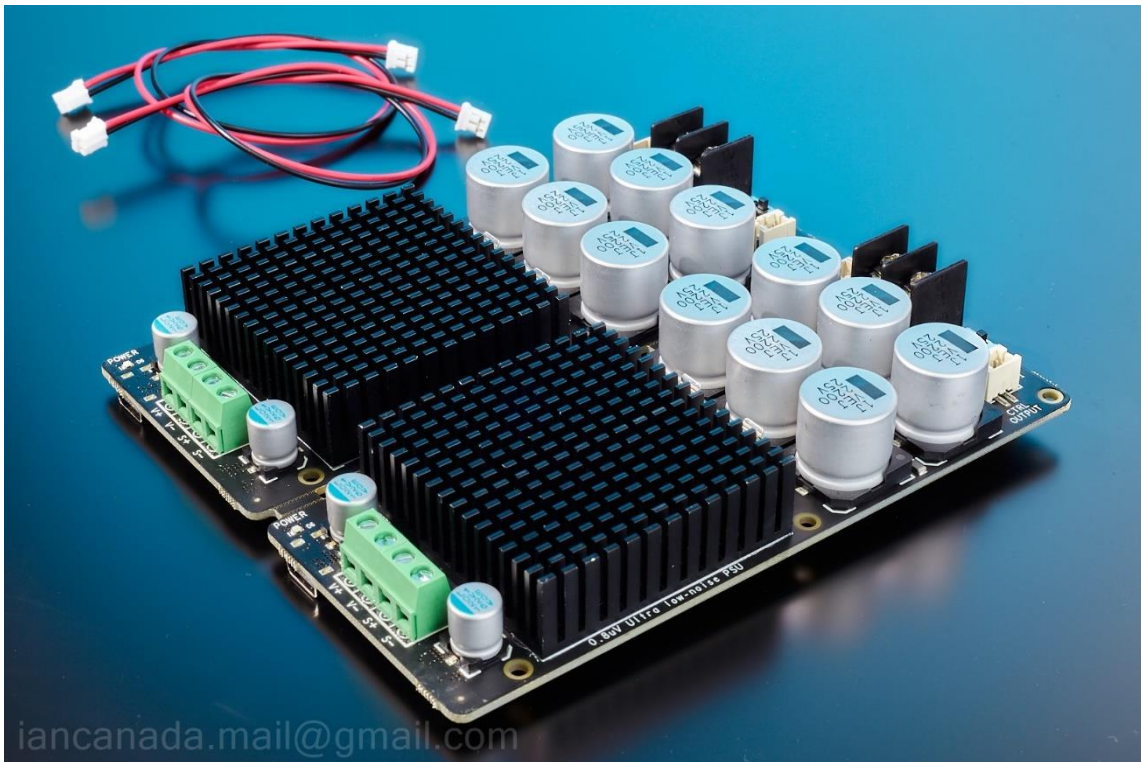
LOAD STEP = 100mA TO 1.5A, output voltage=5V, 20mV/DIV

L. Pictures of LinearPi MkII

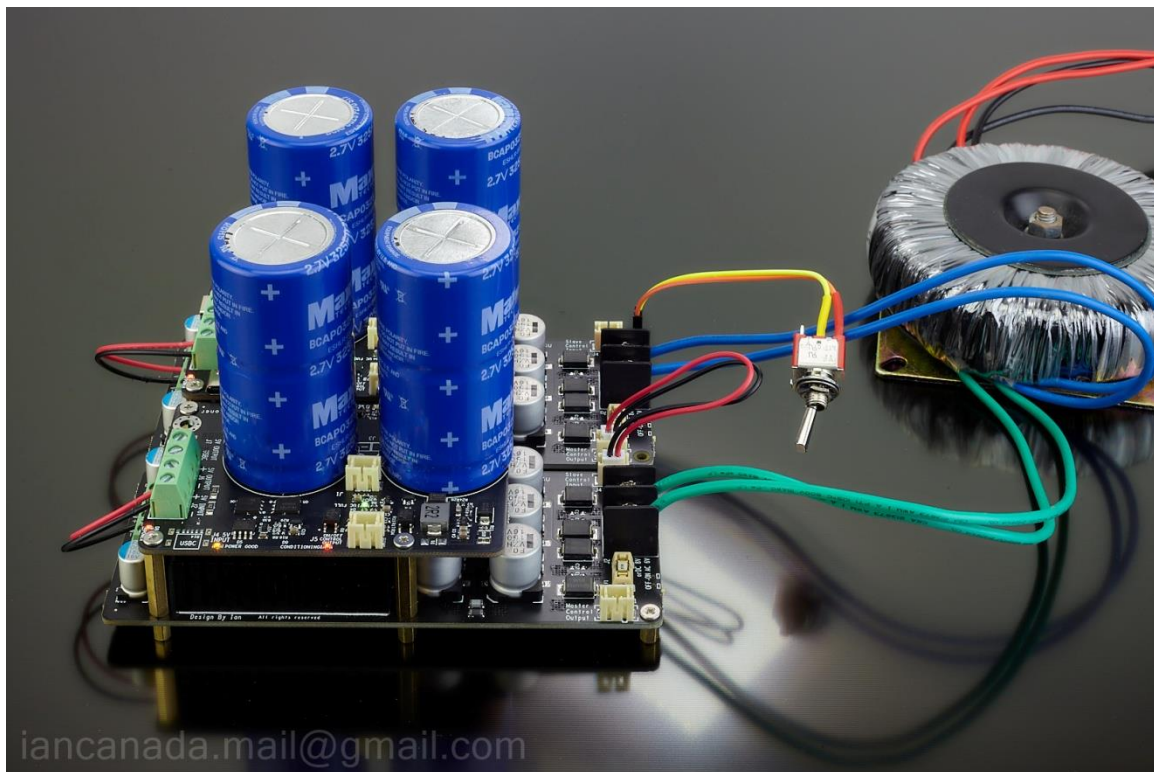
1. LinearPi MkII Solo



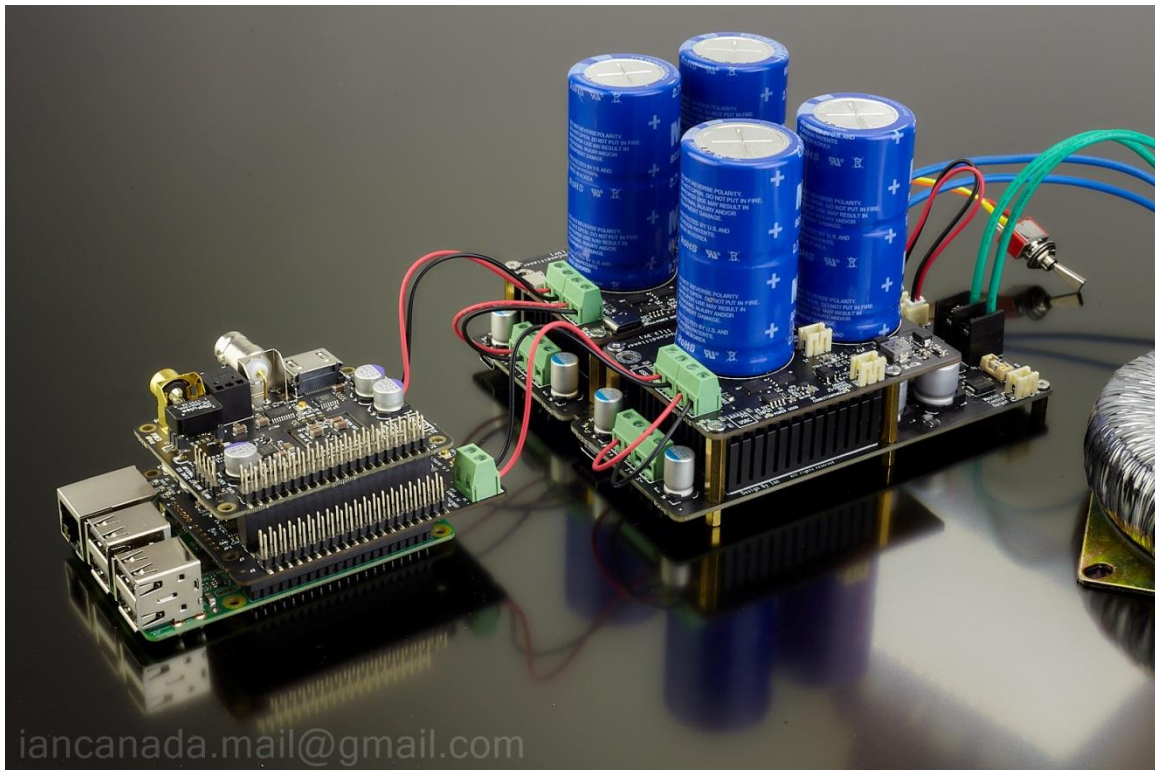
2. LinearPi MkII Dual



3. Upgrade LinearPi MkII to ultra capacitor power supply with UcConditioner



4. Power supply for high quality digital transport. (FifoPi + TransportPi)



M. History of revising

Aug 23, 2020 V0.9b released

Oct 30, 2021 V0.95 released

Apr2, 2023 V1.1b released for LinearPi MkII

Jan 1, 2024 V1.5

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