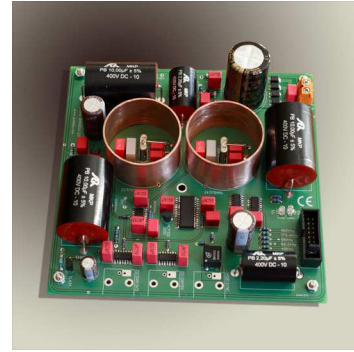# 44.1 to 192KHz Audio clock

ASSEMBLY INSTRUCTIONS

December 2011 - Rev 1.0, © Eric Juaneda - www.junilabs.com

FEATURES

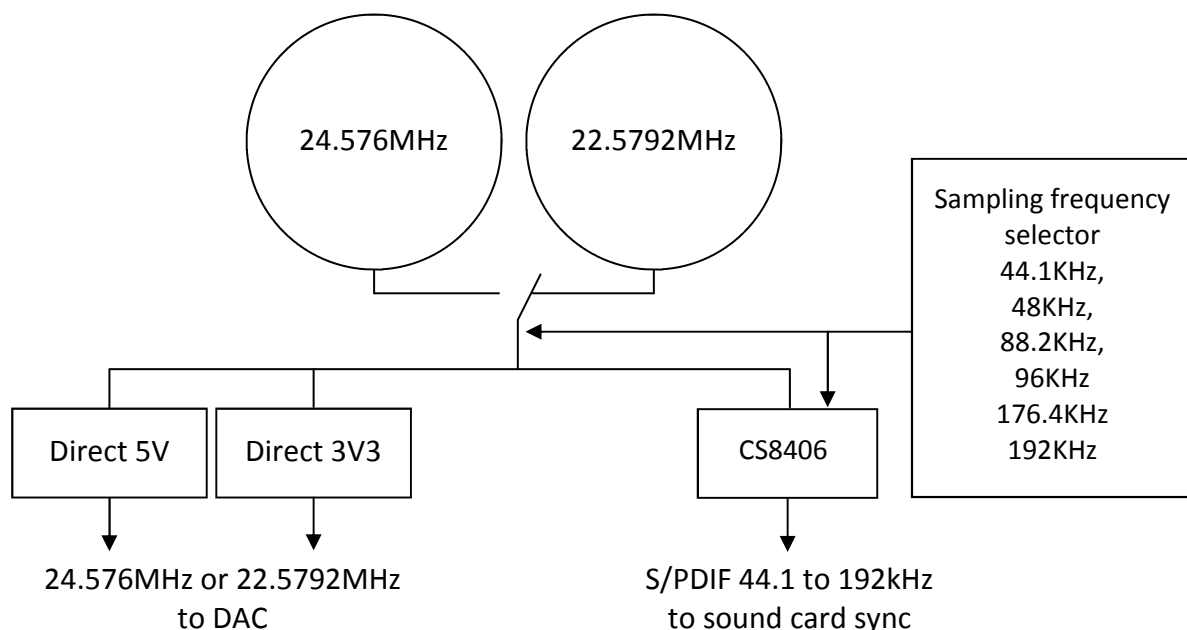- **BNC OUTPUT 22.5792MHz/24.576MHz with 5V et 3V3 LVCMOS level**
- **S/PDIF OUTPUT FOR SLAVED SOUND CARD 44.1KHz to 192KHz.**
- **SINEWAVE CRYSTAL DRIVING**
- **WARM SOUND RENDERING**
- **IDEAL COMPANION FOR Jundac Three Jundac Five Jundac XI**
- **LOW NOISE REGULATORS LT1763**
- **BOARD SIZE : 137mm X 137mm**

DESCRIPTION

The JUNICLOCK FIVE is a low jitter clock for audio DAC. It allows synchronization for common sampling audio frequencies from 44.1Kz to 192KHz. Multiple outputs allows connecting to DAC and various slaved sound card.

High speed ICs are of the 74LVC family with symmetrical output impedance and balanced propagation delay. To minimize reflection, all digital lines are loaded and PCB is 75ohm compliant. To minimize noise in power supply, critical capacitors are Wima© FKP2 polypropylene film and foil, SCR© polypropylene capacitors, Elna© Silmic II and Nichicon© KG gold tune electrolytic capacitor.

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24.576MHz   22.5792MHz

Sampling frequency selector
44.1KHz,
48KHz,
88.2KHz,
96KHz
176.4KHz
192KHz

Direct 5V   Direct 3V3   CS8406

24.576MHz or 22.5792MHz to DAC

S/PDIF 44.1 to 192kHz to sound card sync

SPECIFICATIONS

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output level	BNC 22/24 5V BNC 22/24 3V3 S/PDIF		5 3.3 1		Vp-p Vp-p Vp-p
Recommended load output	BNC 22/24 S/PDIF		75 75		Ohm Ohm
Oscillators	Crystal oscillator drove in sinewave mode		22.5792 24.576		MHz MHz
Signal output	*44.1, 88.2, 176.4KHz* **22/24 5V output** **22/24 3V3 output** *48, 96, 192KHz* **22/24 5V output** **22/24 3V3 output** **S/PDIF output** S/PDIF signal with all zero data according to selected sampling frequency.		 22.5792 22.5792 24.576 24.576		 MHz MHz MHz MHZ
Power supply requirements	 *44.1kHz* *96kHz* *192kHz*	 210	9 240 250 260	12 260	V~ mA mA mA mA
Led indicator 22MHz 24MHz					
Switch Sampling frequency	44.1KHz, 48KHz, 88.2KHz, 96KHz, 176.4KHz, 192KHz.				

OVERVIEW

The Juniclock Five is a low jitter clock dedicated to be used with DAC and slaved sound card or CD player. It interfaces with various DAC and is an ideal companion for **Jundac Three, Jundac Five** and **Jundac XI**.

It implements two crystal oscillators drove in sinewave mode. Each oscillator stage is in a circular copper shield.

A six position selector allows selecting the desired sampling frequency from 44.1KHz to 192KHz.

Digital stages use fast LVCMOS ICs and can easily drive 75 ohm lines and load. The Juniclock Five integrates three outputs. Two outputs provides direct clock signal (22.5792MHz or 24.576MHz) to directly drive a DAC clock stage. With 44.1KHz, 88.2KHz and 176.4KHz, clock output signal is 22.5792MHz. With 48KHz, 96KHz and 192KHz, clock output signal is 24.576MHz. Output levels are respectively 5V and 3V3. A third output provides an S/PDIF signal according with selected sampling frequency. This S/PDIF signal is used by sound card for synchronization, it contains all zero data.

Juniclock: The analog sound for your digital system

We particularly take care with sound rendering. We choose topology and parts with great attention. Crystals are mechanically coupled to PCB and enclosed in a copper tube. The power supply uses MKP and electrolytic audio grades capacitors. The Juniclock Five have a warm and analog sound rendering.
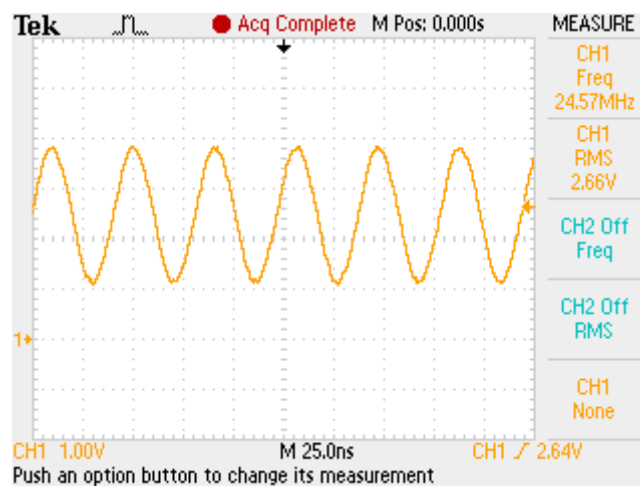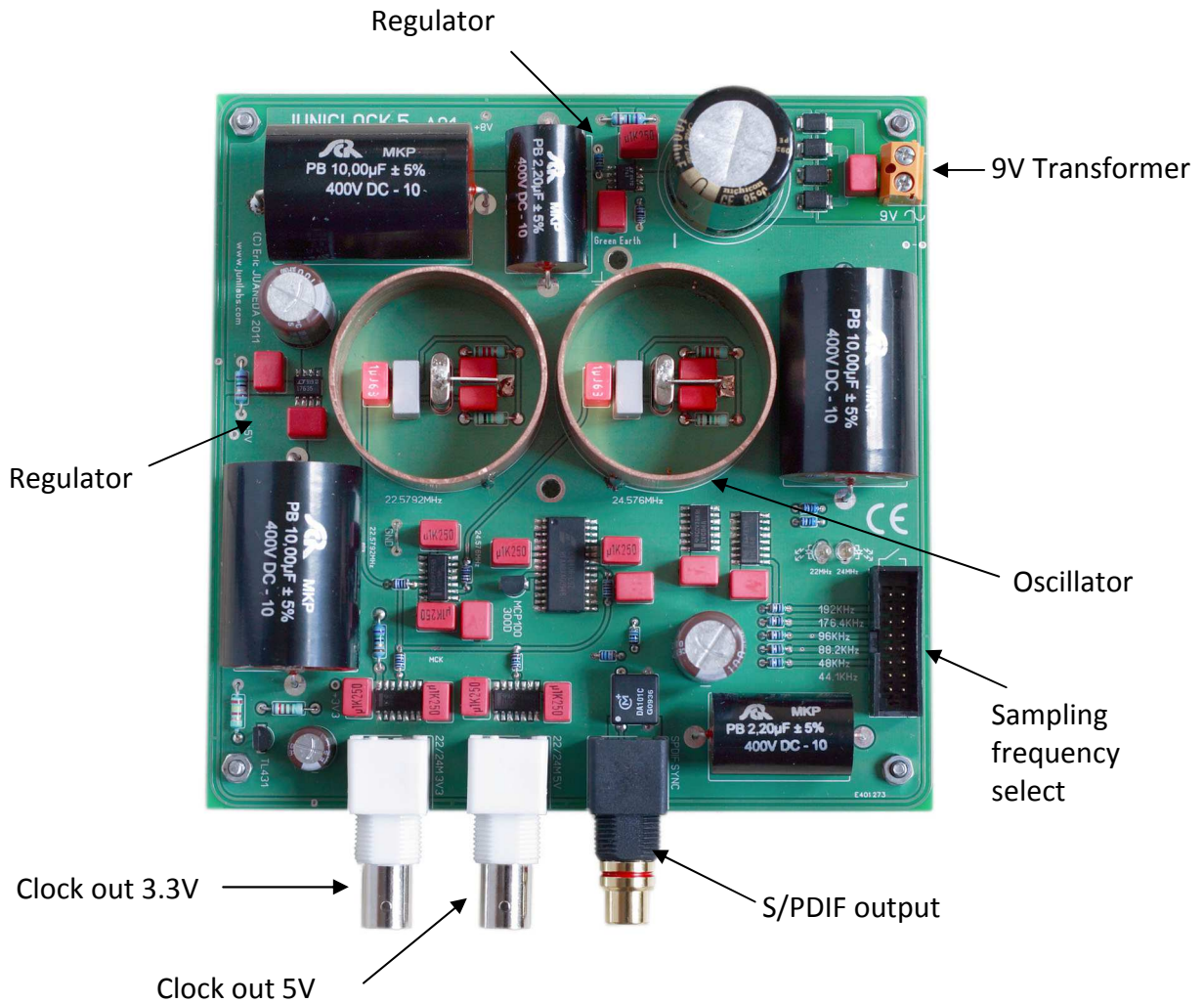

Figure 2 – Crystal drove in sinewave mode

BOARD OVERVIEW

MOUNTING AN OUTPUT CONNECTOR

You can put input connectors directly onto the PCB or on the chassis box linked by wire. You can use RCA, BNC. S/PDIF output transformer DA101C allows complete isolation from ground. The ground pin of the connector can be isolated from chassis, or directly linked to chassis. See figure 3 & 4 for wiring hot and cold pin.
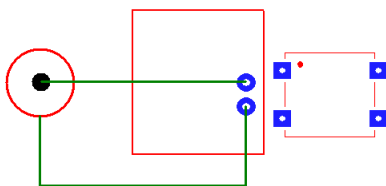
Wiring RCA or BNC

Figure 3

SWITCHES

The PCB integrates a connector to select working sampling frequency. Switch the pin to ground to select desired frequency. You can use a 6 position rotary switch or a single jumper. With all pins left open, 44.1KHz is selected.
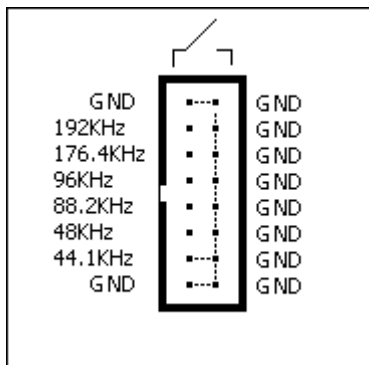
Switch connector wiring

Figure 7

Wire number	Function
1	GND
2	GND
3	192KHz
4	GND
5	176.4KHz
6	GND
7	96KHz
8	GND
9	88.2KHz
10	GND
11	48KHz
12	GND
13	44.1KHz
14	GND
15	GND
16	GND

CONNECTING TRANSFORMERS

The Juniclock Five uses a single transformer. We recommend using toroidal transformer with the following values:
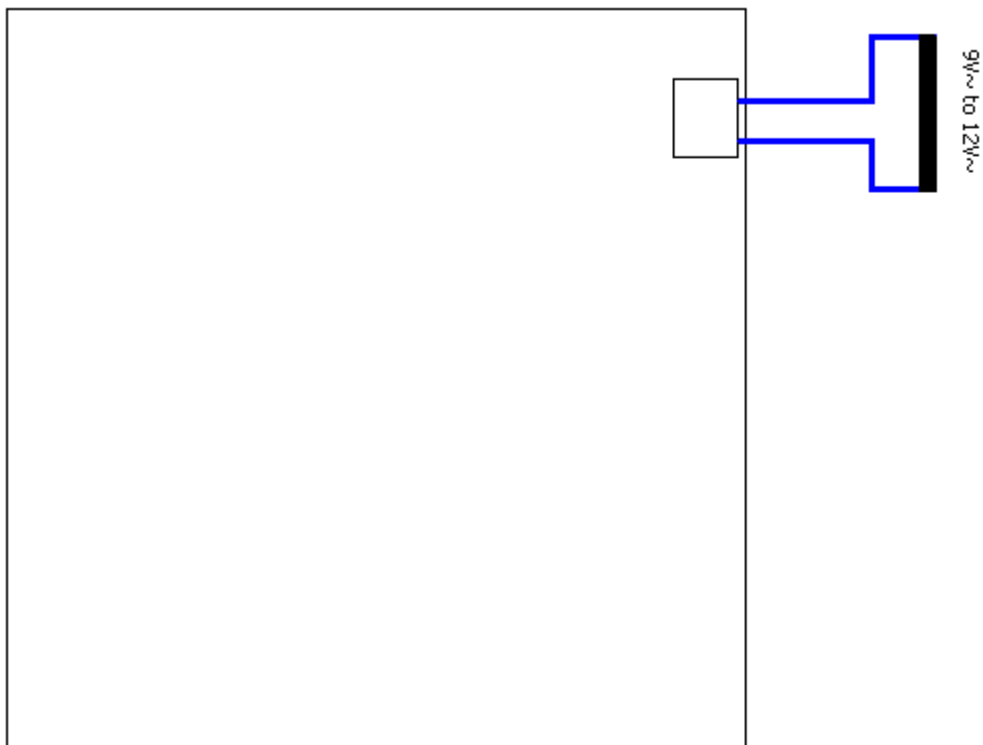
- 1 x 9V, 10VA to 50VA
  or

- 1 x 12V, 10VA to 50VA

Figure 12 – connecting transformer

EARTH

To reach best performance it is recommended to connect chassis and PCB to safety Earth. A special point *Green Earth* is dedicated to connect a (second) strong cable to safety Earth or to virtual ground. Connecting this crucial point cleans residuals low frequencies coming from transformers and dramatically improves sonic performances.

For more information about Earth see: www.junilabs.com

Green Earth pin
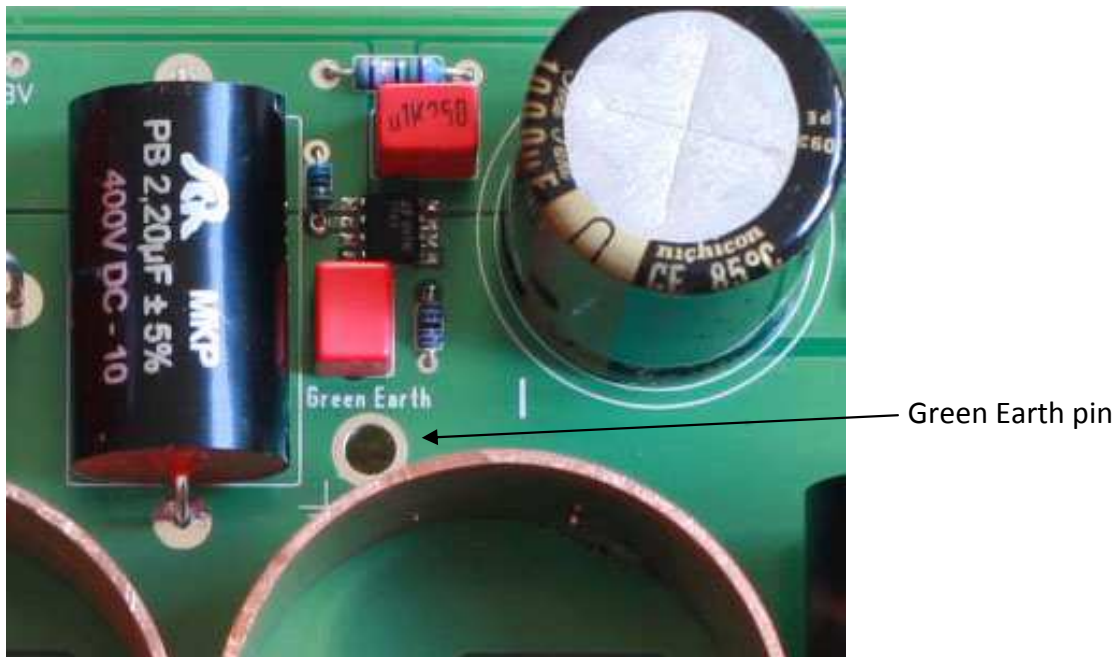
CHASSIS ENCLOSURE

Managing vibration is very important for digital audio devices. Chassis box must be assembled with great attention. A simplistic chassis box or no chassis at all will ruin audio qualities. Good managing is the only way to achieve the full music sonic attributes. An ideal box enclosure integrates rigid chassis box and internal damping with various materials.

You can find more information on managing vibration:
http://tech.juaneda.com/en/articles/managingvibration.html

DIGITAL OUTPUT CABLE

If any 75 ohm cable is able to reproduce sound, only high quality cable allow to reach full music potential. Taking care about this component is not a waste of time or money.

TEST POINTS

The Juniclock Five integrates test points to evaluate if it works within normal conditions.

+8V +12V

+5V

GND

+3V3

22.5792MHz 24.576MHz
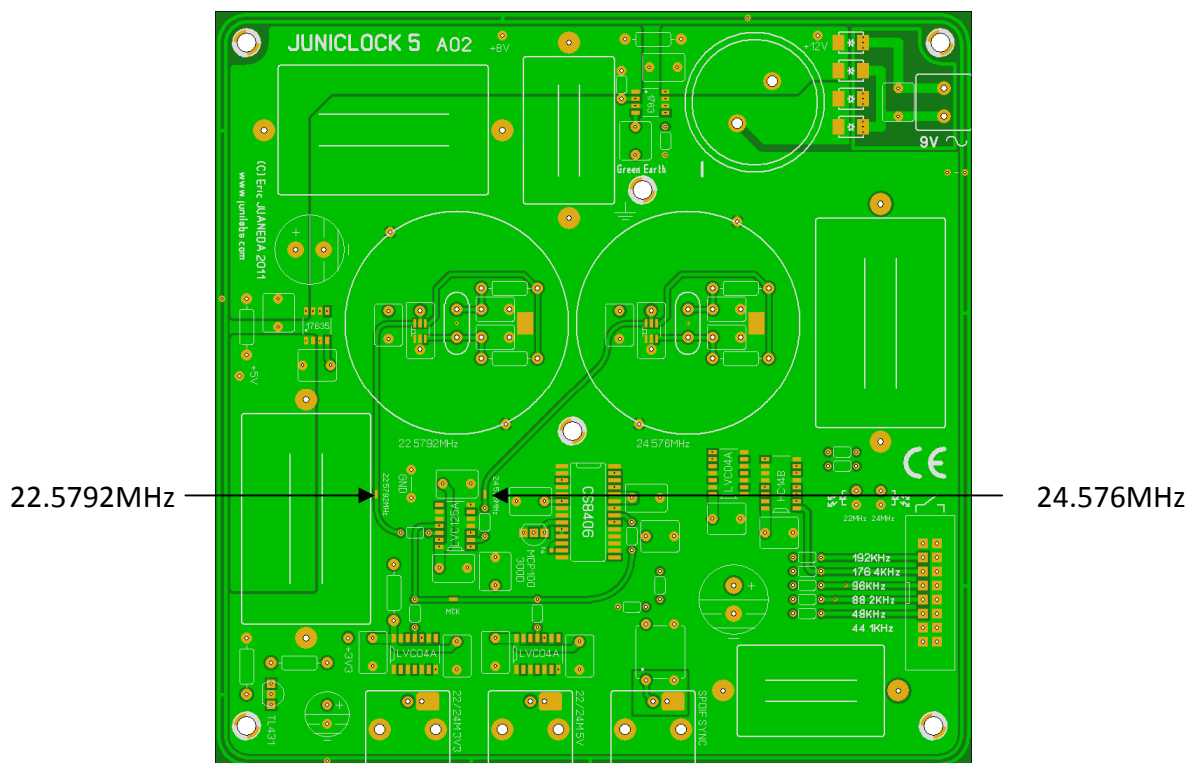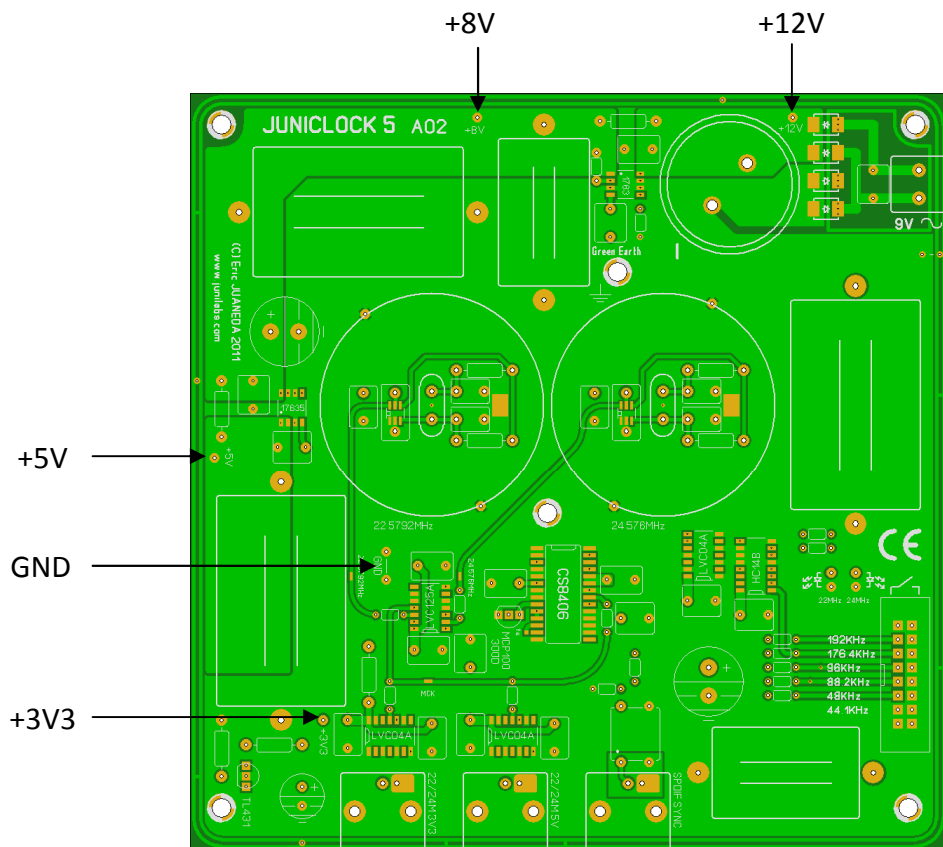
CONNECTING DAC

The Juniclock Five can be used for synchronous or asynchronous clocking. The clock is compatible with various DAC and is an ideal companion for **Jundac Three, Jundac Five** and **Jundac XI**.

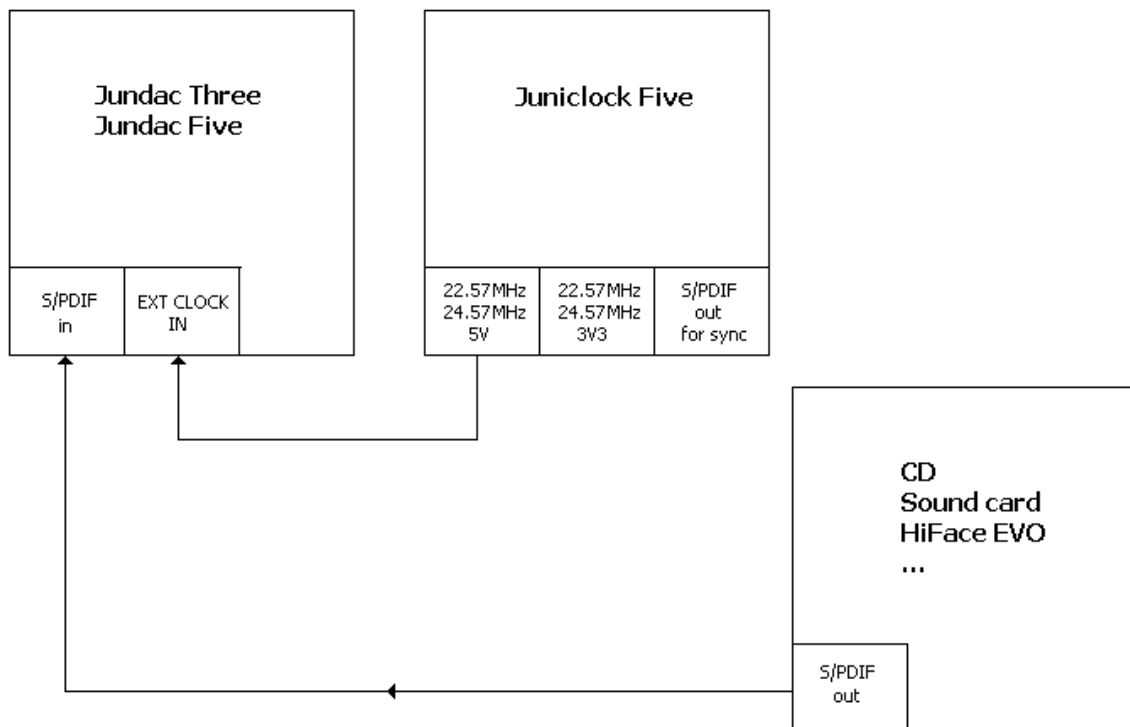The following picture shows various configurations.
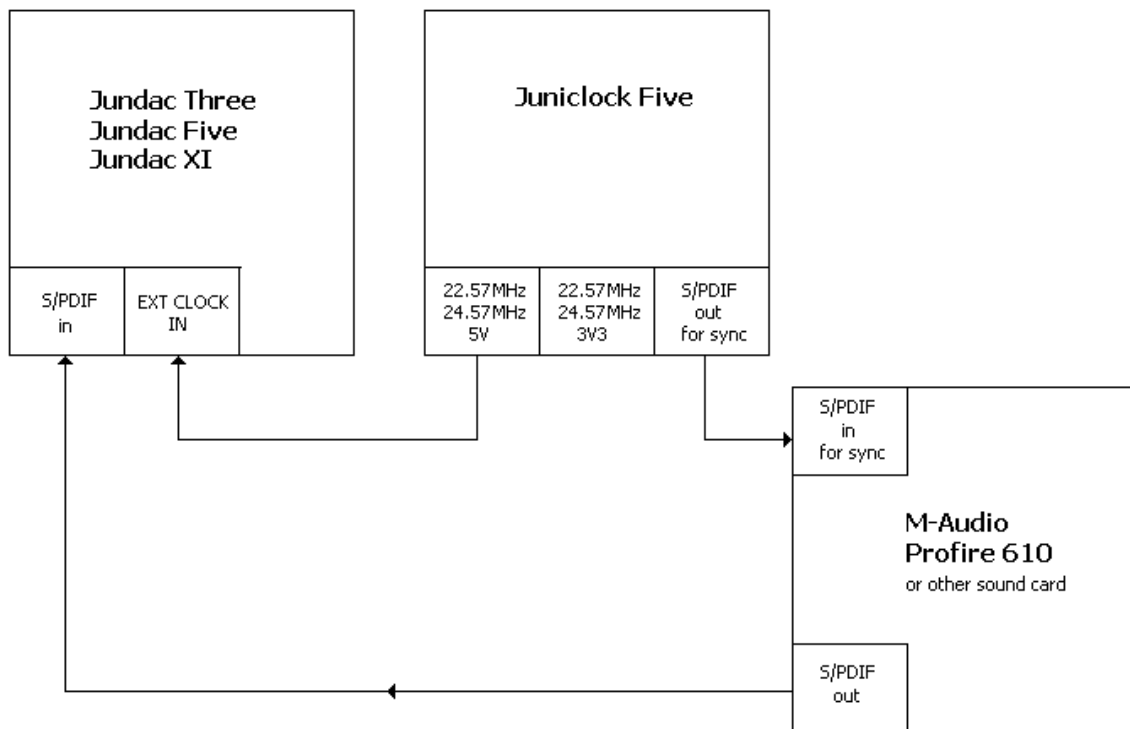

Figure 13 – Working with asynchronous clock

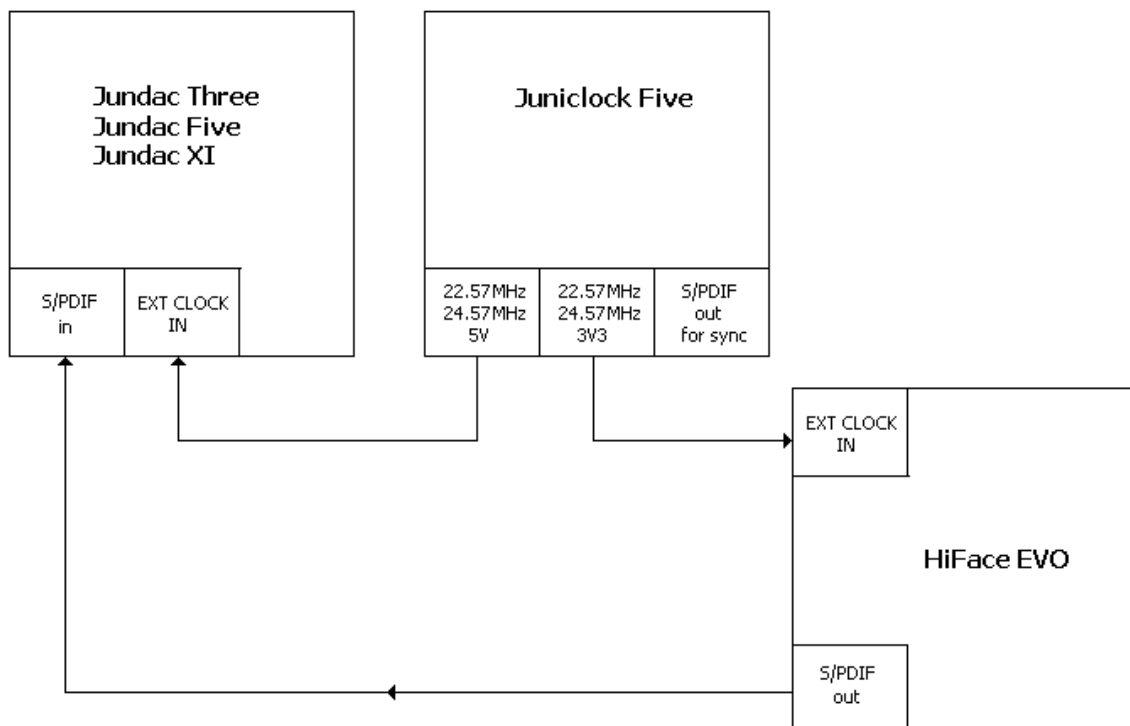Figure 14 – Working with synchronous clock and slaved sound card

Figure 15 – Working with synchronous clock and HiFace EVO