24bit 192KHz DIGITAL TO ANALOG CONVERTER WITH SELECTABLE DIGITAL FILTER

ASSEMBLY INSTRUCTIONS

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FEATURES

- **ONE DIGITAL INPUT S/PDIF or AES3**
- **DIGITAL TRANSFORMER INPUT**
- **RCA, BNC or XLR input connector**
- **24 BIT DAC**
- **ANALOG DIRECT DC COUPLING**
- **32K TO 192KHz**
- **UPSAMPLE TO 352/384KHz**
- **SELECTABLE DIGITAL FILTER Apodising without pre-ringing or linear phase filter**
- **OPTIONAL EXTERNAL CLOCK to minimize jitter**
- **LOW NOISE REGULATORS LT1763, LT3080**
- **BOARD SIZE : 109mm X 109mm**

DESCRIPTION

The JUNDAC XI is a 24bit 8x oversampling digital to analog converter. Incoming data is upsampled to 352.8KHz/384KHz. The board incorporates one S/PDIF, AES3 (AES/EBU) digital input and an optional external clock for very low jitter operation.

High speed ICs are of the 74LV 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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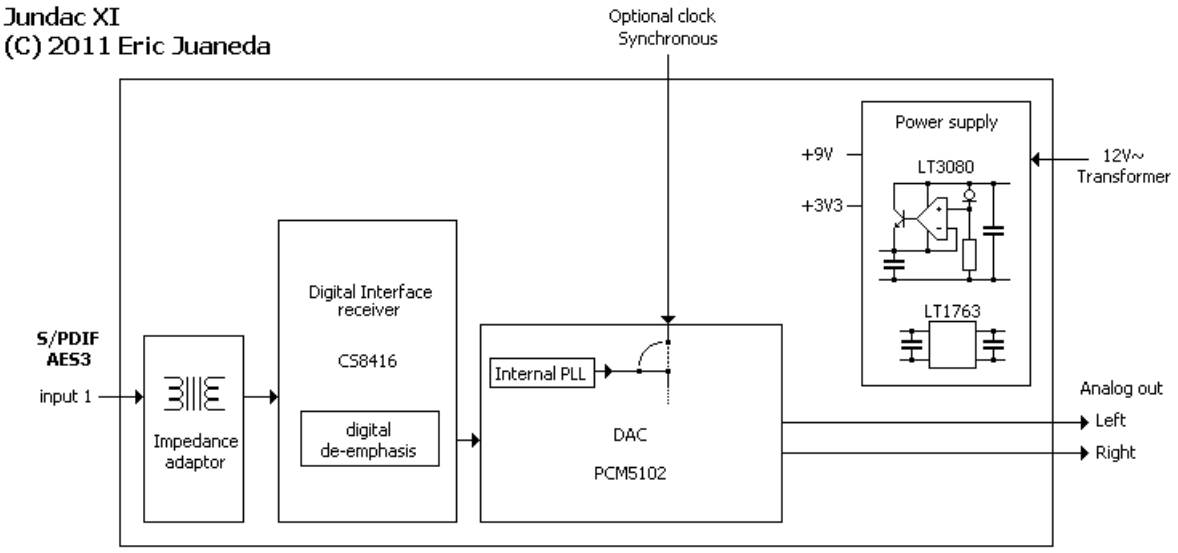


SPECIFICATIONS

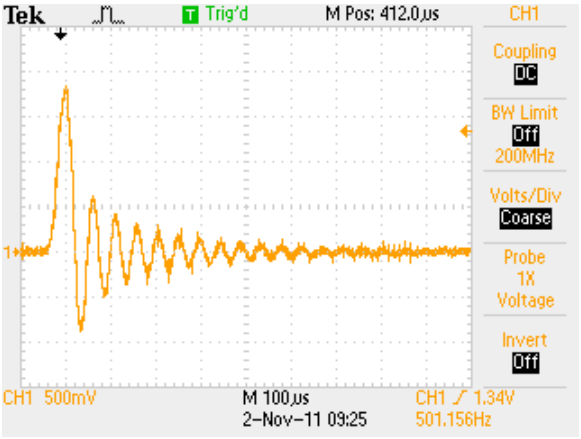
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input sensitivity	RX1	0.15	0.5	3.3	Vp-p
	EXT CLOCK		3.3	5	Vp-p
Load input [1]	S/PDIF or AES	50	75	110	Ohm
Input signal	Resolution	16		24	Bit
	Sample frequency	30		200	KHz
	Number of channels		2		
	Audio format		PCM		
Digital filter [2]	Selectable				
	Apodising		IIR		
	Linear phase		FIR		
Upsampling	Sampling frequency				
	44.1, 88.2, 176.4KHz		352.8		KHz
	48, 96, 192KHz		384		KHz
Additional clock	Sampling frequency				
for low jitter operation	*44.1, 88.2, 176.4KHz*		22.5792		MHz
	48, 96, 192KHz		24.576		MHz
Power supply			12		V~
requirements		40		130	mA
	44.1kHz		88		mA
	96kHz		102		mA
	192kHz		126		mA
Analog output	Unbalanced		2.1		V_{RMS}
Led indicator					
ON	Power ON				
Ext clock	External clock detected				
Error	PLL unlock				
Switch					
Filter	Digital filter select				

[1] Load input can be adjusted at any value. However, 75 ohm is recommended since PCB have 75 ohm impedance.
[2] See on page 3 for digital filter response.

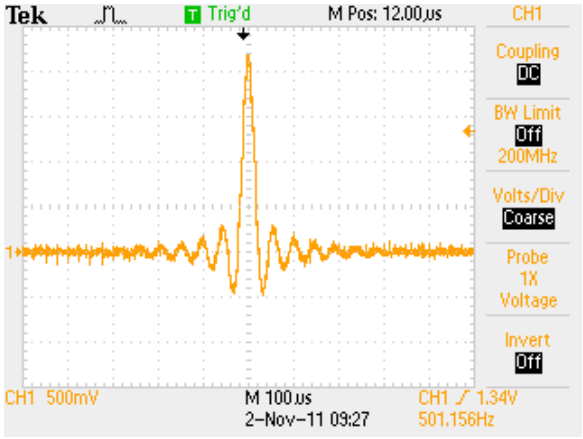
DIGITAL FILTER RESPONSE

The Jundac XI integrates two digital filters. The filter response can be selected by switching FILTER pin to GND.

LEFT OPEN = Apodising filter
CLOSED TO GND = Linear phase filter



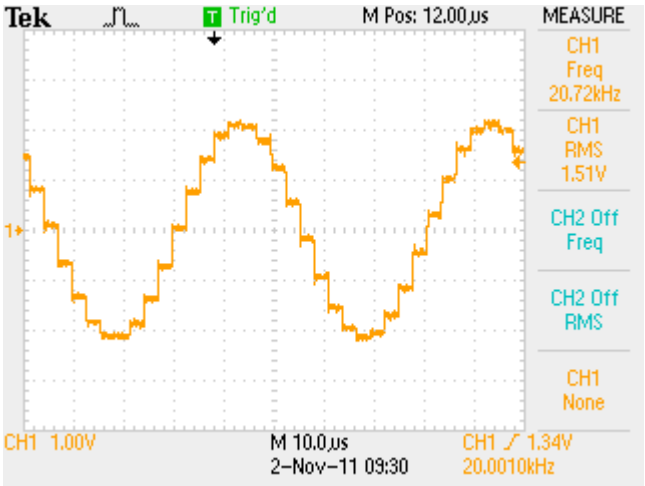
Apodising filter



Linear phase filter

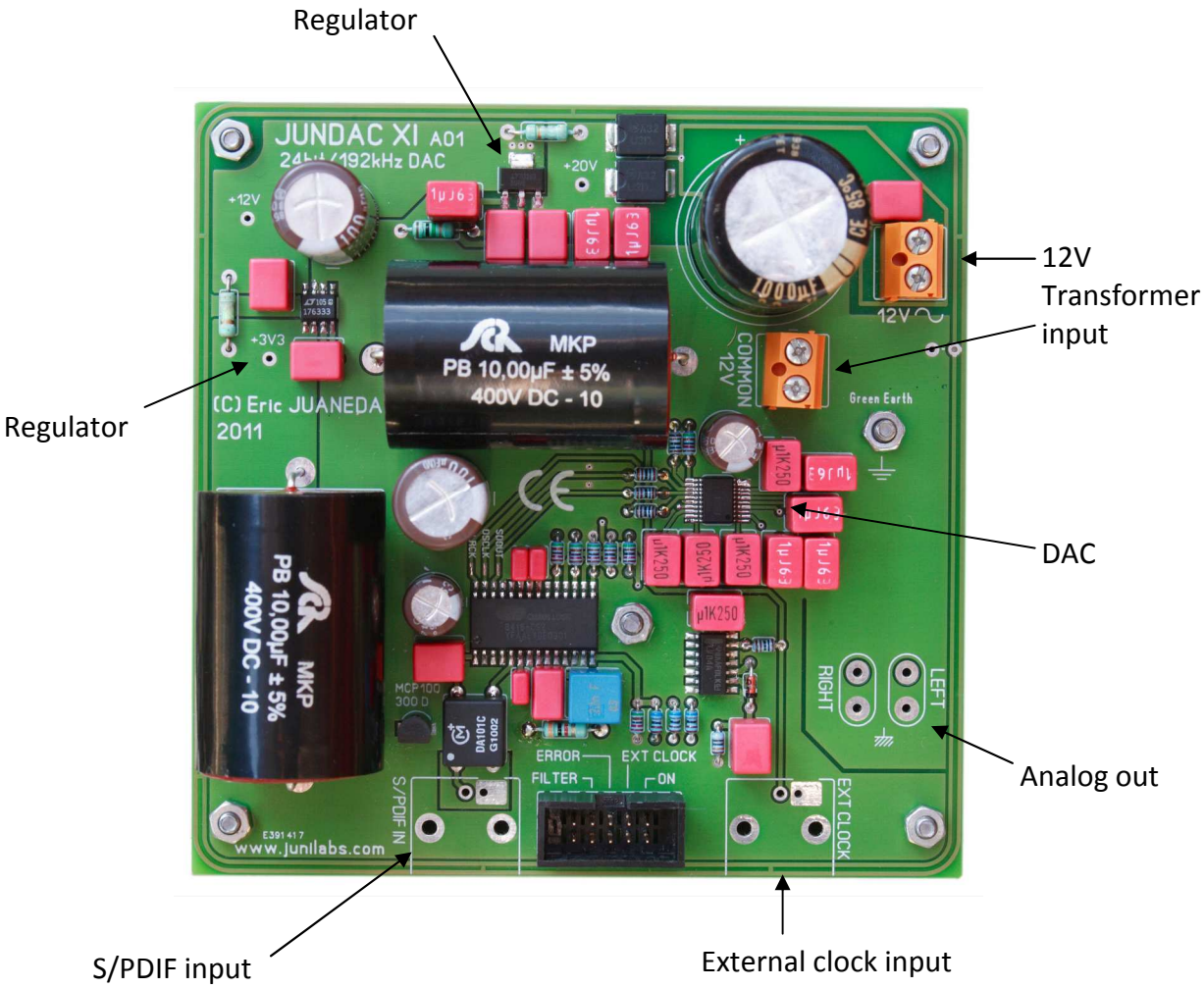
ANALOG OUTPUT

The Jundac XI integrates a DC coupled direct output. **No** low pass filter or capacitor are in the signal path.
The PCM5102 integrates an interesting advanced segment DAC modulator, there is few HF noise on output. The analog signal looks like an unfiltered standard R2R DAC. You can see each step computed by the digital filter.



20KHz output signal

BOARD OVERVIEW



MOUNTING AN INPUT CONNECTOR

You can put input connectors directly onto the PCB or on the chassis box linked by wire. You can use RCA, BNC or XLR. S/PDIF input 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

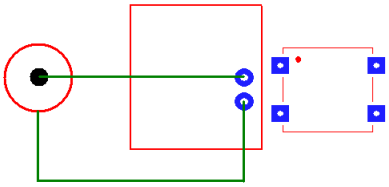


Figure 3

Wiring XLR

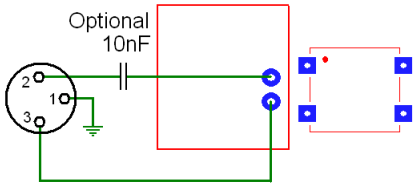


Figure 4

ANALOG OUTPUT CONNECTOR

The Jundac XI integrates a stereo analog outputs (LEFT and RIGHT). The ground is the bottom pin, see figure 6. Isolation of the RCA chassis is **not** recommended.

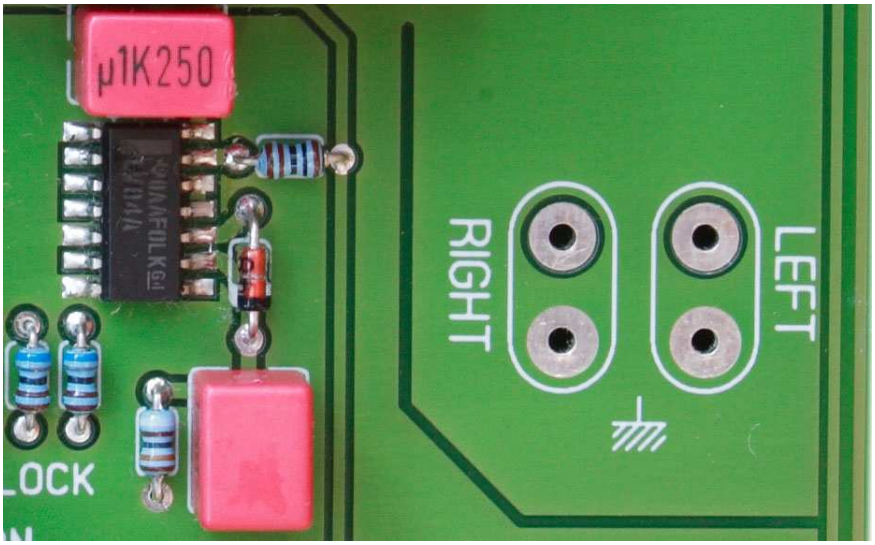


Figure 6

LED INDICATORS AND SWITCHES

The PCB integrates three LED indicators. Each LED are current limited by resistors. There is no risk of short circuit.

ON - yellow LED, is on when power is on.

EXT CLOCK - blue LED, is on when a signal is present on EXT CLOCK input.

ERROR - red LED, is on when CS8416 is unlocked.

LED connector wiring

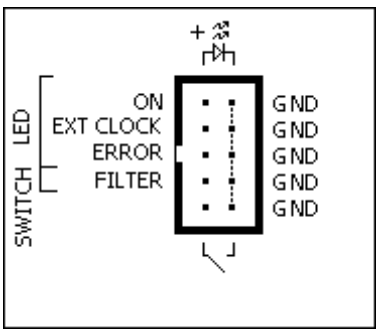


Figure 7

Wire number	Function
1	ON
2	GND
3	EXT CLOCK
4	GND
5	ERROR
6	GND
7	FILTER
8	GND

CONNECTING TRANSFORMERS

The Jundac XI uses a single transformer for digital section and DAC. We recommend using toroidal transformer with the following values:

- 2 x 12V, 200VA to 300VA

Working with only 50VA results in cramped sound.

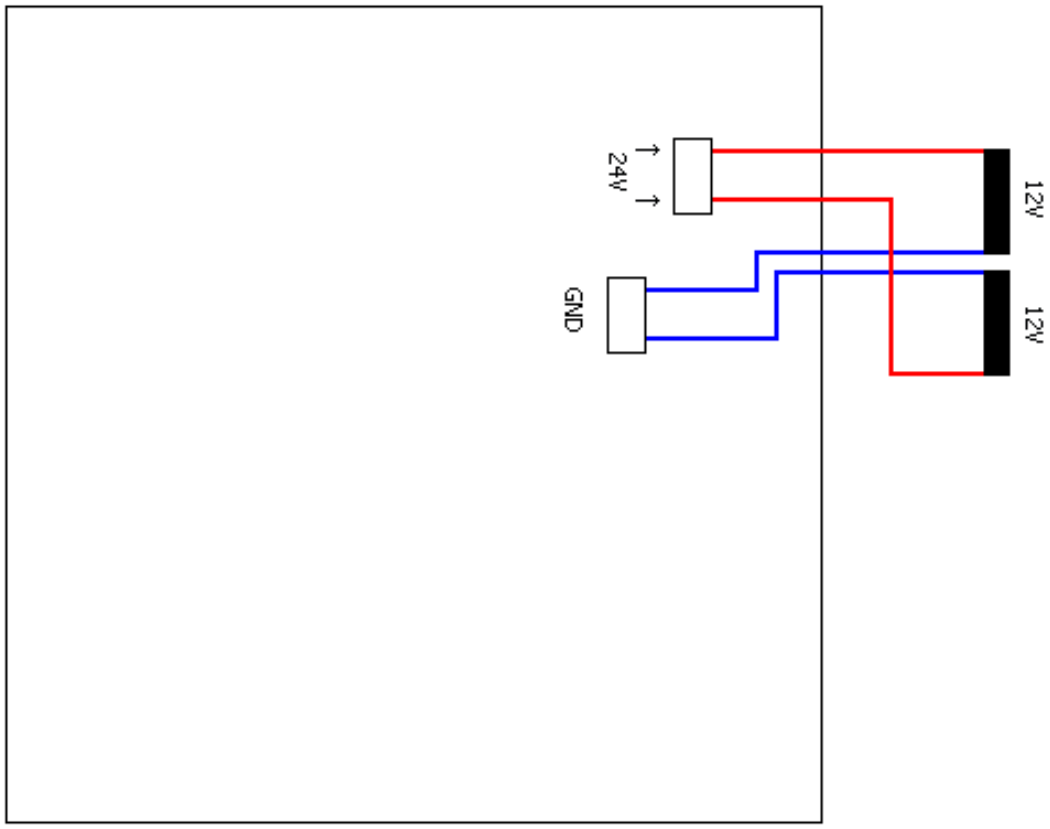
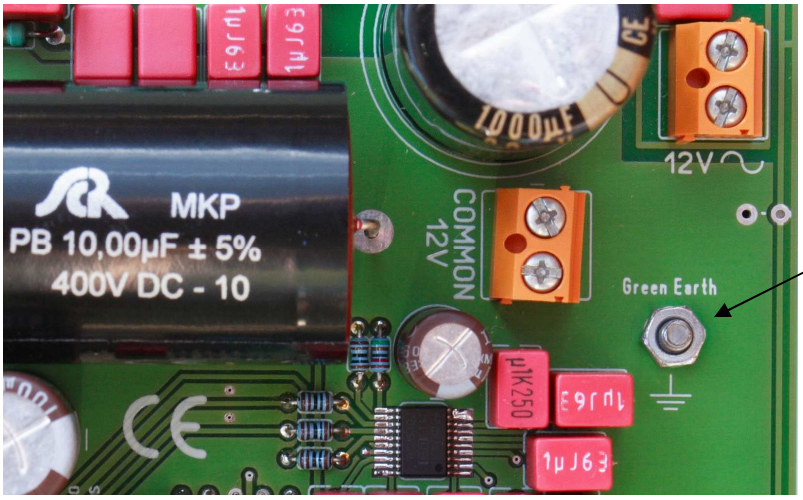


Figure 12 – connecting transformer

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



CHASSIS ENCLOSURE

Managing vibration is very important for 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.

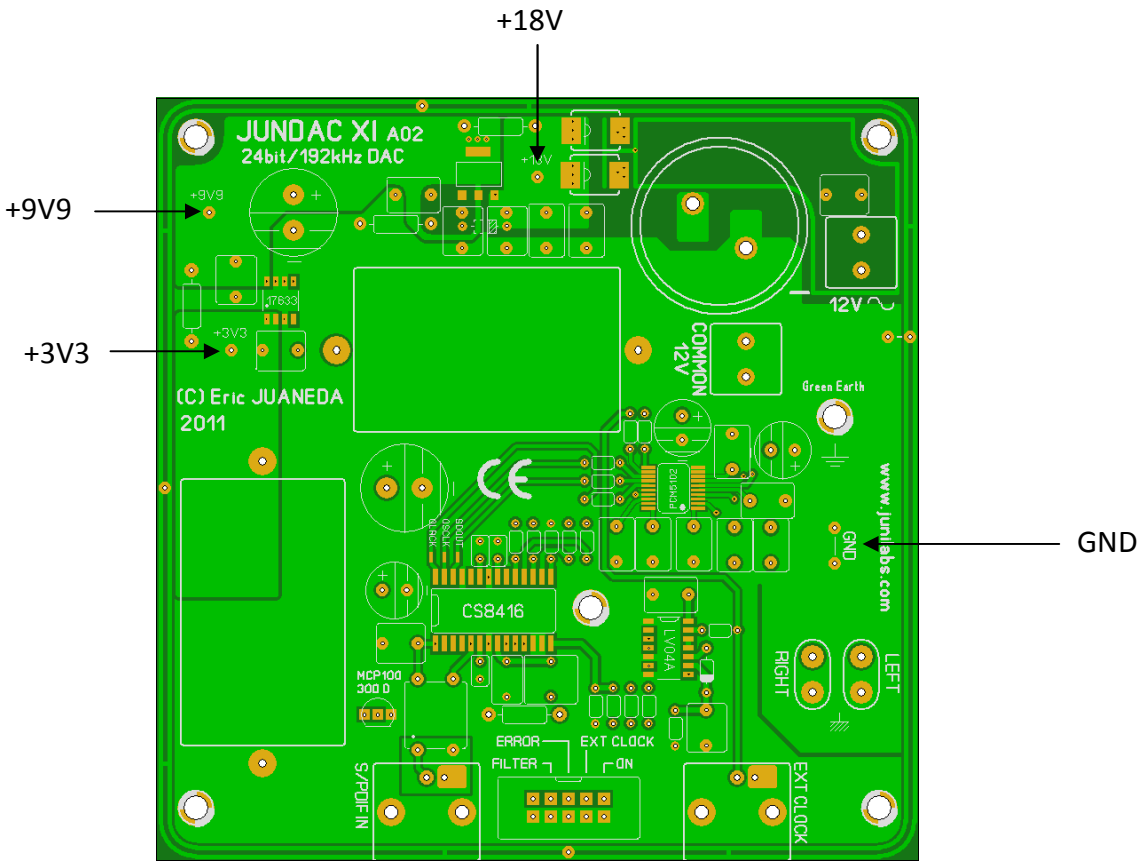
You can find more information on managing vibration:
http://tech.juaneda.com/en/articles/managingvibration.html

DIGITAL INPUT 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.

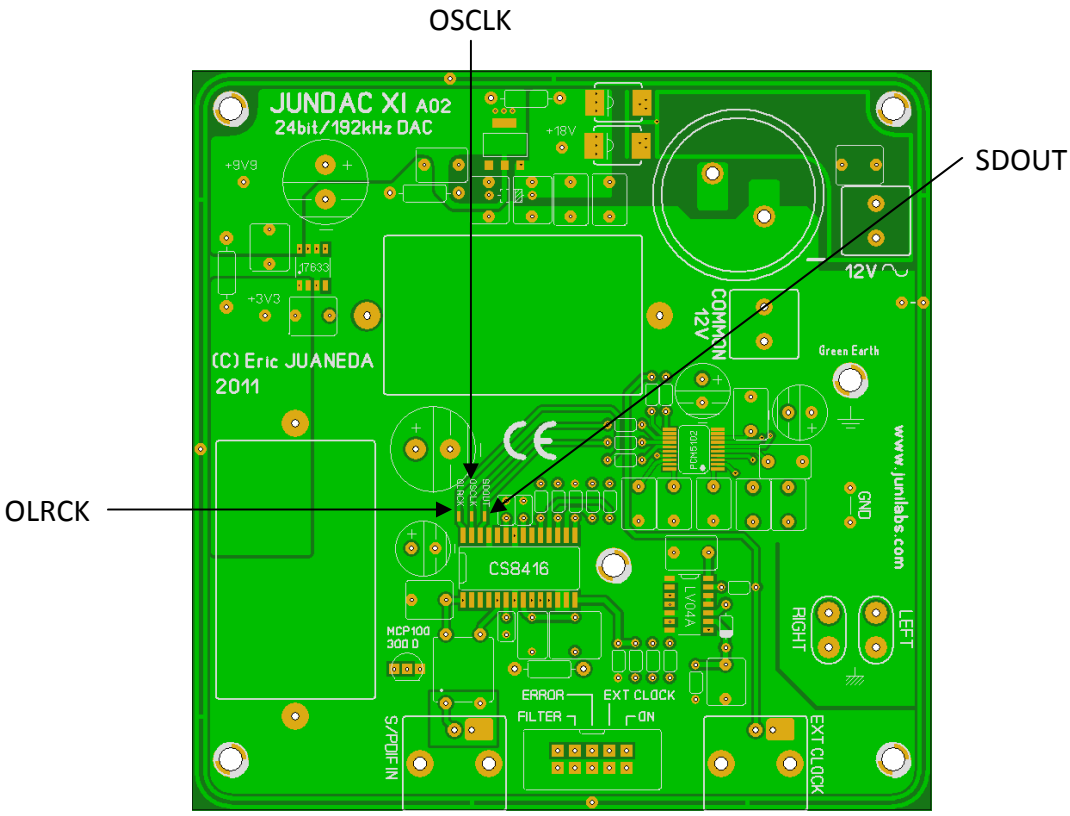
TEST POINTS

The Jundac XI integrates test points to evaluate if it works within normal conditions.



Without input signal, CS8416 generates signal clock. Put an oscilloscope or frequency meter on the following test point.

- OSCLK 175.4KHz 5.70µs
- OLRCK 2.74KHz 365µs
- RMCK 701.2KHz 1.425µs



WORKING WITH ADDITIONAL CLOCK

For very low jitter operation, you can use an additional clock.

A single clock to master source and DAC must be used. PCM5102 don't accepts any form of asynchronous clock.

This clock must be 22.5792MHz for the following sampling frequencies: 44.1KHz, 88.2KHz and 176.4KHz. The clock must be 24.576MHz for the following sampling frequencies: 48KHz, 96KHz and 192KHz.

Without additional clock, the PCM5102 internally generates master clock.

For more details show the PCM5102 datasheet from Texas Instruments.

Clock detect
PCM5102 auto switch to external clock when signal is detected on EXT CLOCK input.

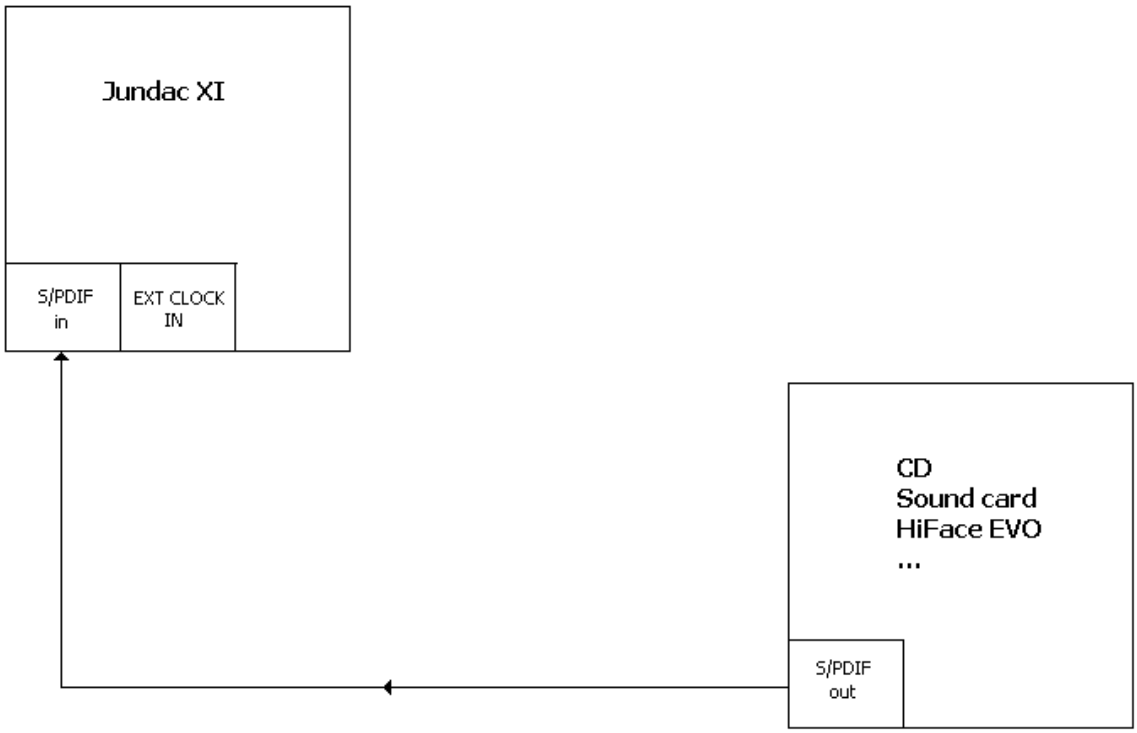


Figure 13 – working without external clock

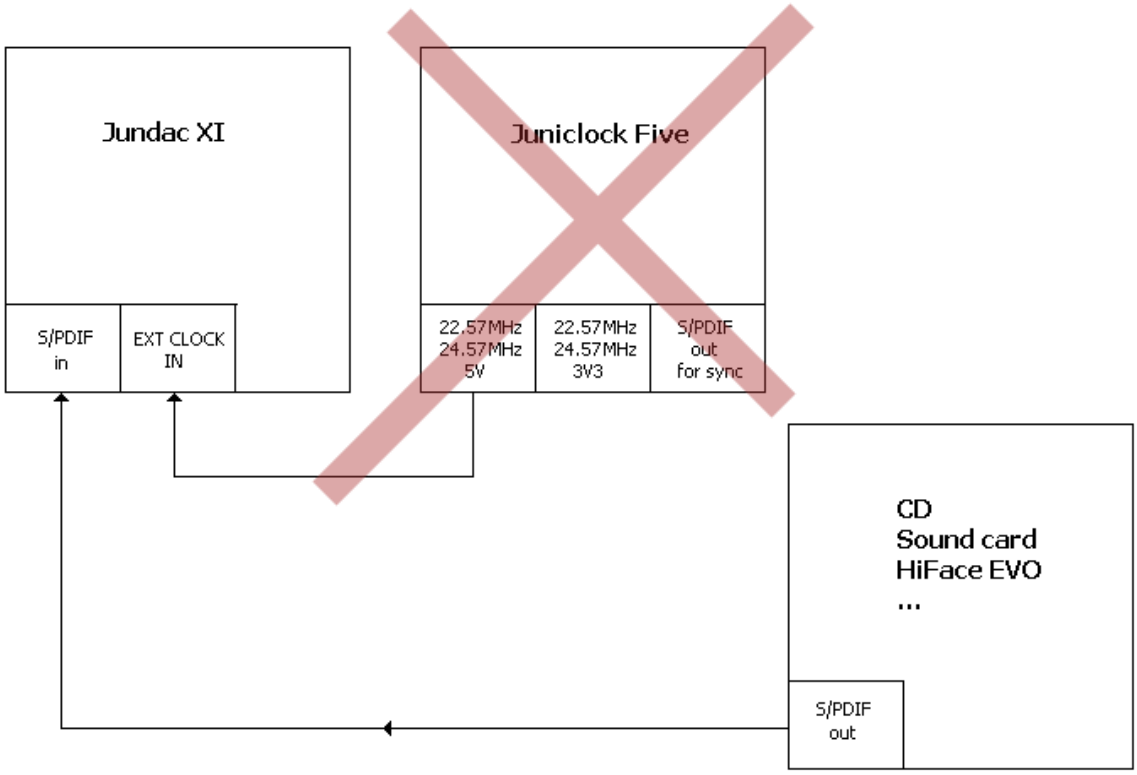


Figure 14 – Working with asynchronous clock is NOT possible

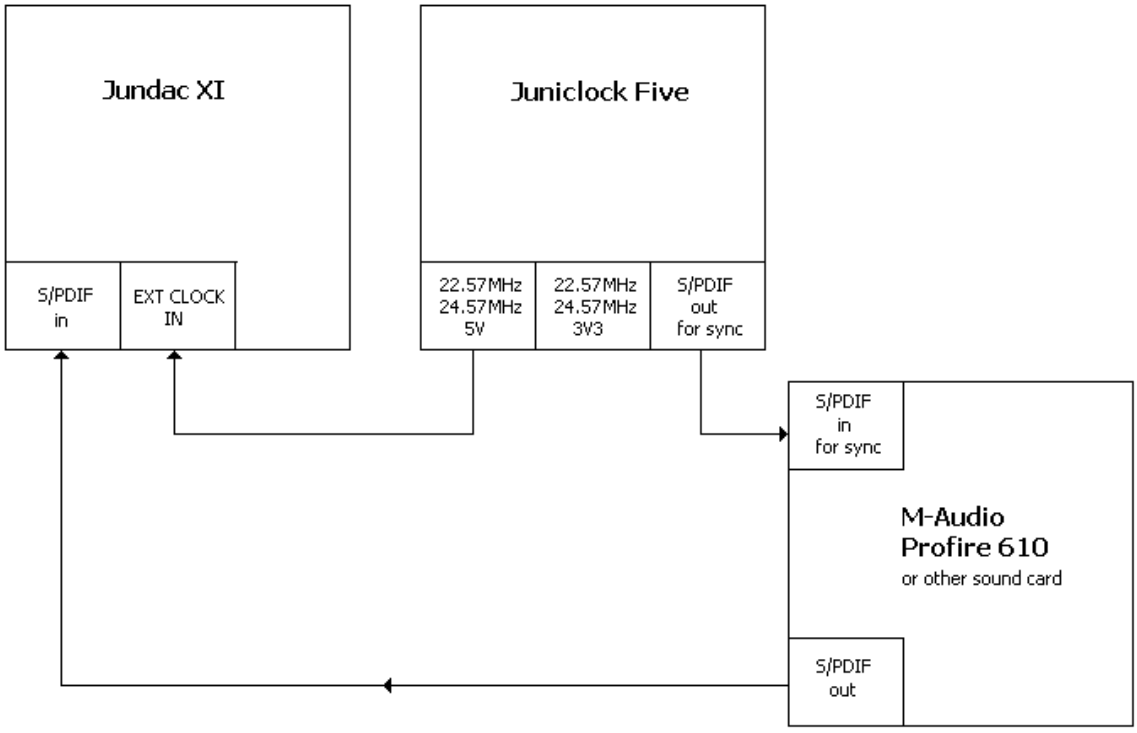


Figure 15 – Working with synchronous clock and slaved sound card

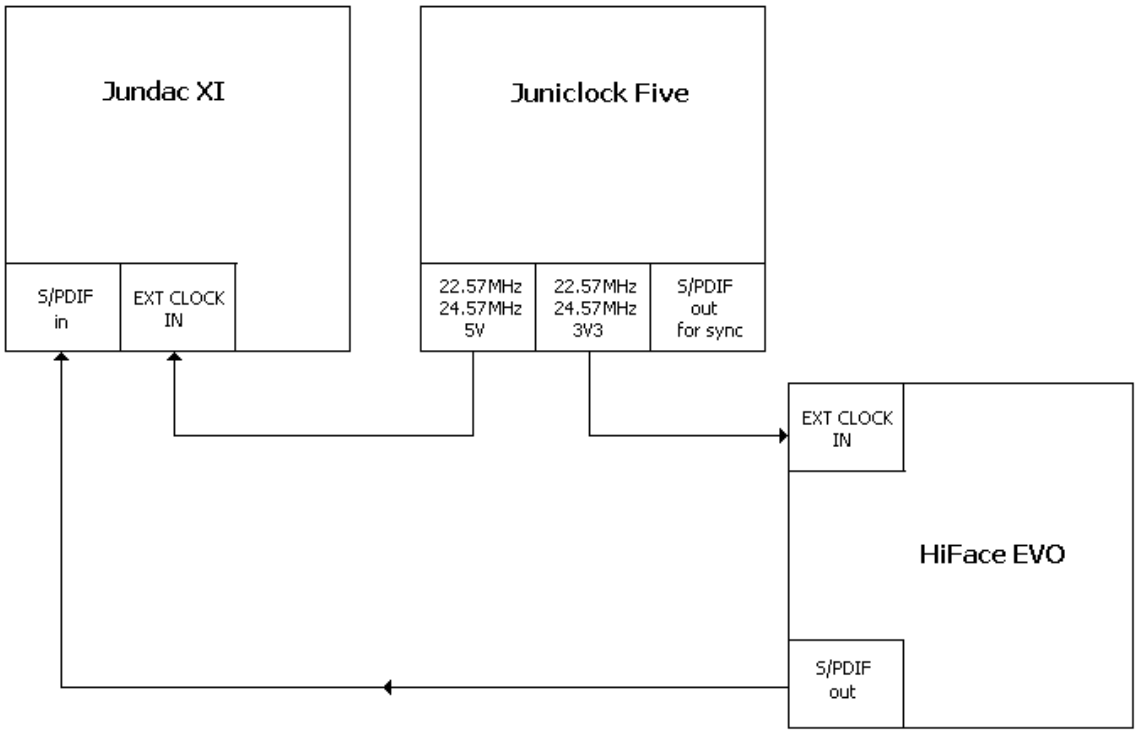


Figure 15 – Working with synchronous clock and HiFace EVO