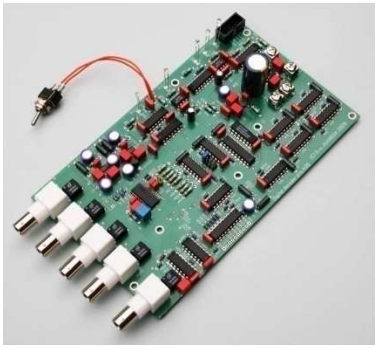
DIGITAL DECODER PRO for NON-OVERSAMPLING DAC



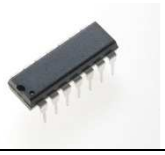
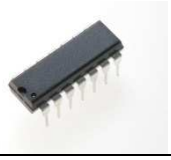
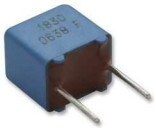
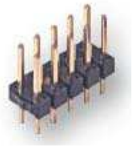
ASSEMBLY INSTRUCTIONS

October 2009, © Eric Juaneda

PART LIST

You should do a complete inventory. Place components on pictures.

2x LT1763-3 	LT1763-5 
CS8416 	**4x** 75 Ohm or 110 Ohm MF12 resistor *See CHOOSING INPUT CONNECTOR*
910K,33K, 22K, 75 ohm MF12 resistor	**2x** 10 ohm MF12 resistor
7x 51K ohm MF12 resistor	**28x** 110 ohm MF12 resistor
3K, 100 ohm resistor 	**5x** 2K ohm resistor 
20x 47K ohm resistor 	**4x** 1N4148 
2x BYT01-400 	**13x** Ferrite bead 
7x 100µF 10V OSCon 	**6x** 10nF MKS02 Wima (2.5mm) 

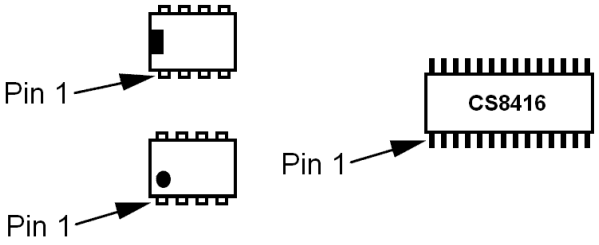
74ACT00 	74HC148 
74HC4040 	**6x** 74AC00 
2x 74AC574 	**6x** 74ACT164 
2x NE555 	**5x** DA101C 
11x 10nF FKP2 63V Wima (5mm) 	DS1233-A10 
25X 10nF MKS2 63V Wima (5mm) 	1nF FKP2 63V Wima (5mm) 
22nF 63V MKP 1% (5mm)  Vishay KP1830322061	Header, one row, two way (optional) 
Header, two row, four way (optional) 	Header straight 10 way 

4x Terminal screw vertical PCB (optional)  Keystone 8191	**2x** 10µF 35V 
5x BNC, PCB 75 ohm (BNC, RCA or XLR) 	3300µF 25V 
LED **2x** yellow, **2x** green, red, blue 	Socket, IDC, 10 way (optional) 
Ribbon cable 10way (optional) 	Rotary switch 4 positions (optional) 
Transformer 2x6V or 2x9V 	Switch (optional) 

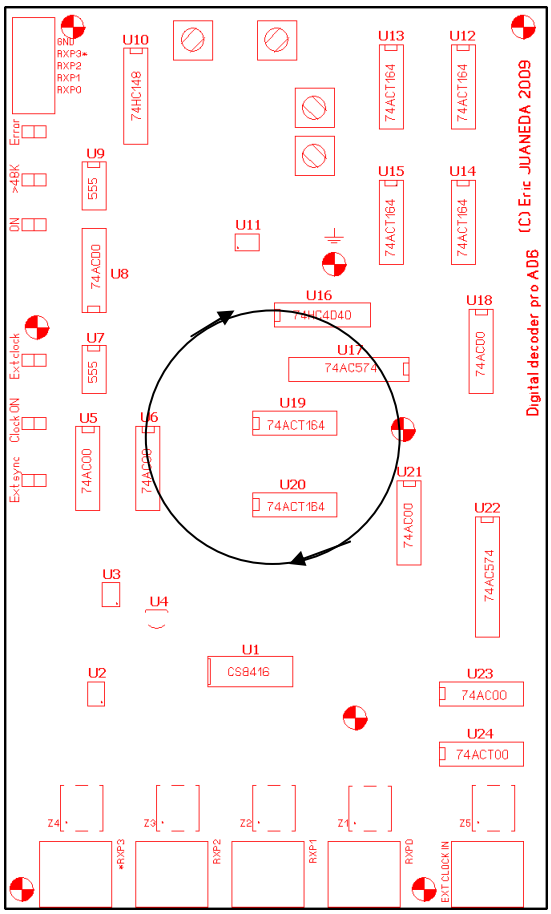
MOUNTING INSTRUCTION

- Before handling ICs, touch a metal surface. ICs damaged by electrostatic discharge can become intermittent, and the resulting problem may difficult to troubleshoot.

Note: The pin 1 of ICs can be identified by a notch, dimple or marking.



Part numbering is circular.



CHOOSING AN INPUT CONNECTOR

DIGITAL DECODER PRO integrates four digital inputs (RXP0, RXP1, RXP2 and RXP3). Load impedance of each input depends on which connector and standard you want to implement. DIGITAL DECODER PRO accepts S/PDIF or AES3 standard. Table I gives normalized input impedance for each standard.

STANDARD	CONNECTOR	CABLE	IMPEDANCE
S/PDIF	RCA phono BNC 75 Ohm[(1)]	COAX COAX	75 Ohm 75 Ohm
AES3	XLR BNC 75 Ohm	3 wires balanced and shielded COAX	110 Ohm 75 Ohm
Other	BNC 50 Ohm	COAX	50 Ohm

Table I

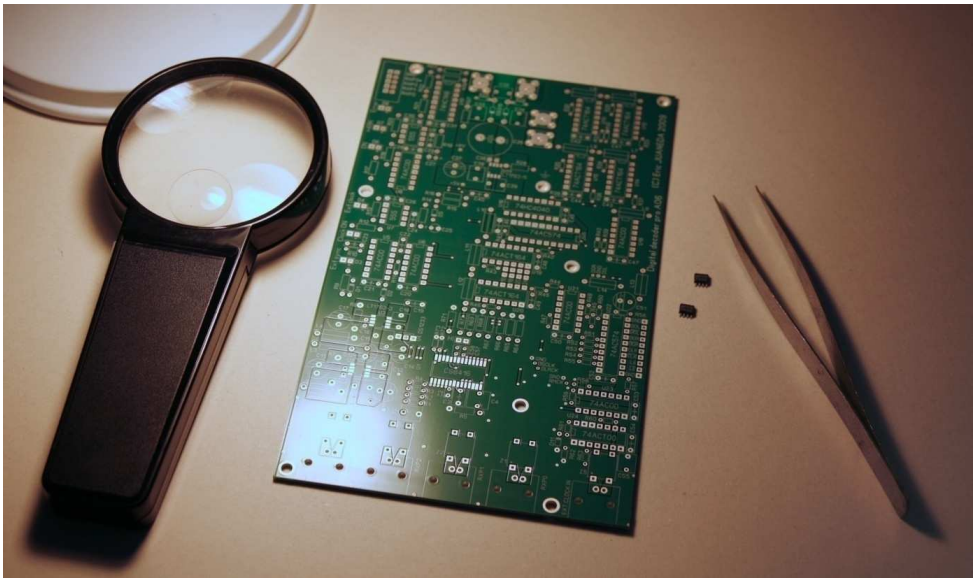
[(1)] To avoid reflection in digital link prefer using 75 Ohm BNC and coaxial cable.

Choose value for:

- R1 resistor which is RXP0 input impedance,
- R2 resistor which is RXP1 input impedance,
- R3 resistor which is RXP2 input impedance,
- R4 resistor which is RXP3 input impedance.

Example: for S/PDIF use 75 Ohm BNC, 75 Ohm coax cable, R1 value = 75 Ohm.

WE CAN START…



SOLDERING COMPONENTS

Each component is assembled step by step. At the end of the step verify check point. It avoid complex problem resolution.

Install small components

	MF12	*small size resistor*	❑	R48	110 MF12	❑	R64	47K
				R49	110 MF12		R65	47K
❑	R11	910K MF12		R50	110 MF12		R66	47K
	R61	33K MF12		R51	110 MF12		R67	47K
	R62	22K MF12		R52	110 MF12		R68	47K
	R63	75 MF12		R53	110 MF12		R69	47K
				R54	110 MF12		R70	47K
❑	R25	10 MF12		R55	110 MF12		R71	47K
	R26	10 MF12		R57	110 MF12			
				R58	110 MF12	❑	D9	BYT01-400
❑	R10	51K MF12		R60	110 MF12		D10	BYT01-400
	R32	51K MF12						
	R40	51K MF12	❑	D1	1N4148	❑	L2	Ferrite bead
	R56	51K MF12		D2	1N4148		L3	Ferrite bead
	R59	51K MF12		D5	1N4148		L4	Ferrite bead
				D11	1N4148		L5	Ferrite bead
❑	R29	110 MF12					L6	Ferrite bead
	R30	110 MF12	❑	R5	3K		L7	Ferrite bead
	R31	110 MF12		R16	100		L8	Ferrite bead
	R33	110 MF12					L9	Ferrite bead
	R34	110 MF12	❑	R9	2K		L10	Ferrite bead
❑	R35	110 MF12		R13	2K		L11	Ferrite bead
	R36	110 MF12		R17	2K		L12	Ferrite bead
	R37	110 MF12		R18	2K		L13	Ferrite bead
	R38	110 MF12		R20	2K		L14	Ferrite bead
	R39	110 MF12						
	R41	110 MF12	❑	R7	47K			
	R42	110 MF12		R8	47K			
	R43	110 MF12		R12	47K			
	R44	110 MF12		R14	47K			
	R45	110 MF12		R15	47K			
	R46	110 MF12		R19	47K			
	R47	110 MF12		R21	47K			
				R22	47K			
				R23	47K			
				R24	47K			
				R27	47K			
				R28	47K			

SOLDERING +5V POWER SUPPLY

❑ Install U11, **LT1763-5**. Take care this kit includes some LT1763-3 and LT1763-5.
Use a magnifier if necessary when soldering SMD devices and a pliers to place integrated circuits. Solder just one pin and verify horizontal and vertical position. Use desoldering braid to remove excess of tin.

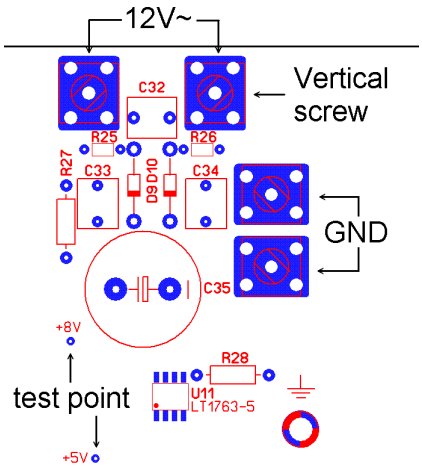


Figure 1

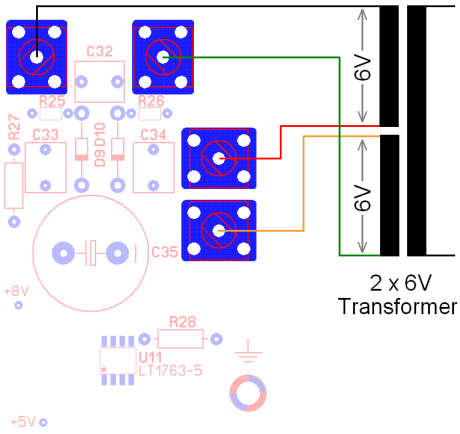


Figure 2 – connecting transformer

Mount +5V power supply components – part I

❑	U11	LT1763-5		Screw	vertical screw[1]		C35	3300µF 35V
				Screw	vertical screw[1]			
	C32	10nF FKP2		Screw	vertical screw[1]			
	C33	10nF FKP2		Screw	vertical screw[1]			
	C34	10nF FKP2						

[1] Vertical screws are optional, you can solder the transformer directly onto the PCB.

❑ CHECK POINT

Put the power transformer 2x6V or 2x9V, see figure 2 and verify 12V~, unregulated +8V tension and regulated +5V tension. See figure 1 for test point and measure.

Switching off. Wait for one minute, C35 must be empty before soldering other components and avoid a short circuit.

Mount +5V power supply components – part II

❑	C36 C37	10nF MKS02 100µF oscon		C38 C39	10nF FKP2 10nF FKP2		D6	Test LED[2]

[2] Mount test LED as shown in figure 4 (minimize high). This LED is lights up when +5V power supply is on.

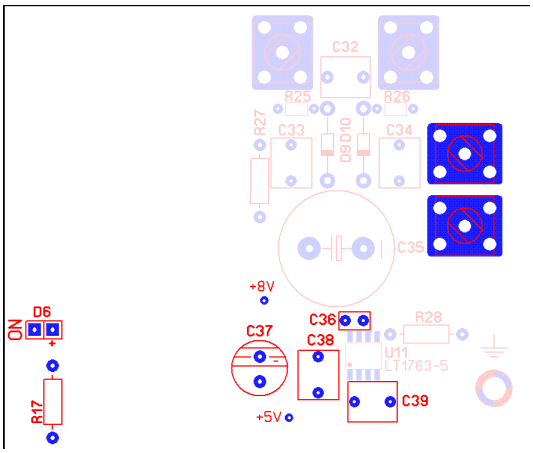


Figure 3

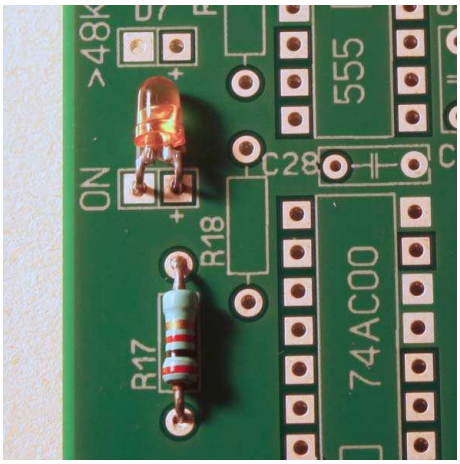


Figure 4

❑ **CHECK POINT**

Power ON. Verify regulated +5V tension. Yellow LED might be light up.

Never solder components until test LED is alight. Power off before soldering operation.

SOLDERING +3.3V POWER SUPPLY

Mount +3.3V power supply components – part I

❑	U2 U3	LT1763-3 LT1763-3						

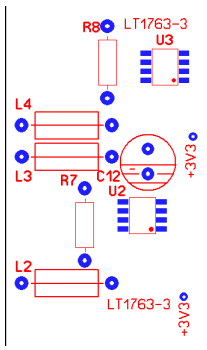


Figure 5

❑ **CHECK POINT**
Verify regulated +3.3V tension for U2 and U3. See figure 5 for test point and measure.

Mount +3.3V power supply components – part II

❑	C8	100µF oscon		C10	10nF FKP2		U4	DS1233-A10
	C11	100µF oscon		C16	10nF FKP2			
	C12	100µF oscon					C19	10nF
	C14	100µF oscon		C9	10nF FKP2			
	C17	100µF oscon		C13	10nF FKP2			
				C15	10nF FKP2			
				C18	10nF FKP2			

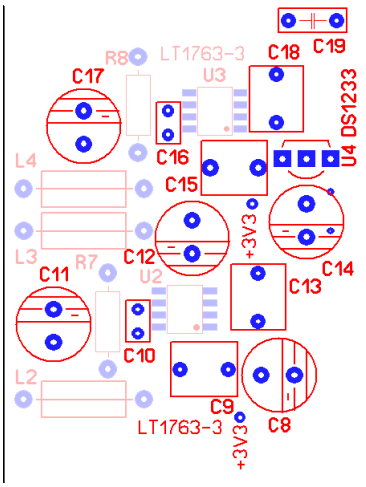


Figure 6

❑ **CHECK POINT**
Verify regulated +3.3V tension for U2 and U3. See figure 5 for test point and measure (same measure as previously.)

SOLDERING CS8416

❑ Install U1, **CS8416**.

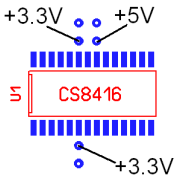


Figure 7

❑ **CHECK POINT**
Verify regulated tension around U1. +3.3V **VA**, +3.3V **VD**, +5V **VL,** see figure 7.

Mount IC for CS8416 hardware configuration.

❑	U10 U6	74HC148 74AC00	❑	R72 R73	51K MF12 51K MF12			

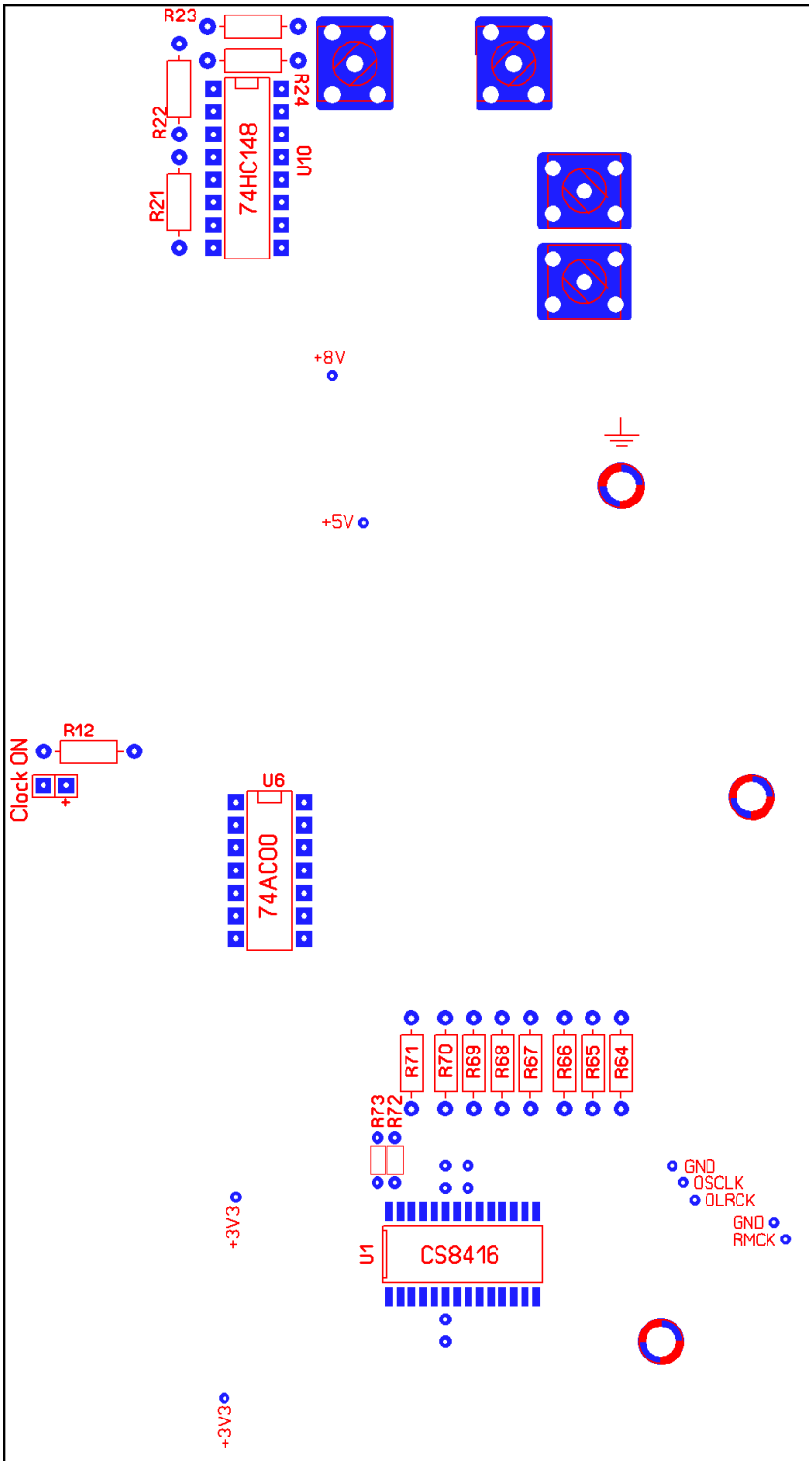


Figure 8

❑ **CHECK POINT**

Without input signal, CS8416 generates signal clock. Put an oscilloscope or frequency meter on the following test point (see figure 8 for test point)

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

Mount low frequency IC for user information.

❑	U8	74AC00 - **WARNING ORIENTATION**
	U5	74AC00
❑	U7	NE555
	U9	NE555

❑ **CHECK POINT**

Verify +5V regulated tension. Error LED D8 is ON see figure 9.

Mount high speed IC

❑	U17	74AC574 - **WARNING ORIENTATION**						
	U22	74AC574						
			❑	U18	74AC00	❑	U12	74ACT164
❑	U24	74**ACT**00		U21	74AC00		U13	74ACT164
				U23	74AC00		U14	74ACT164
❑	U16	74HC4040					U15	74ACT164
							U19	74ACT164
							U20	74ACT164

❑ **CHECK POINT**

Verify +5V regulated tension.

Install capacitors and isolation transformers

❑	C51	100µF oscon	❑	C20	10nF	❑	C2	10nF MKS02
				C21	10nF		C57	10nF MKS02
❑	C1	10nF FKP2		C22	10nF		C58	10nF MKS02
	C55	10nF FKP2		C23	10nF			
				C24	10nF	❑	C3	1nF FKP2
				C26	10nF		C4	22nF MKP
				C28	10nF			
				C29	10nF	❑	Z1	DA101C
				C30	10nF		Z2	DA101C
				C31	10nF		Z3	DA101C
				C40	10nF		Z4	DA101C
				C41	10nF		Z5	DA101C
				C42	10nF			
				C43	10nF			
				C44	10nF			
				C45	10nF			
				C46	10nF			
				C47	10nF			
				C48	10nF			
				C49	10nF			
				C50	10nF			
				C52	10nF			
				C53	10nF			
				C54	10nF			

❑ **CHECK POINT**

Verify regulated tension +3.3V **VA**, +3.3V **VD**, +5V **VL**.

Mount input load near CS8416. See choosing input connector at the beginning of this manual.

❑	R1	75		*optional part*
	R2	75	❑	header 2 row, 4 way - *near U19, center of the board.*
	R3	75		header 1row, 2 way - *near CS8416*
	R4	75		header straight 10 way see figure 9
❑	C25	10µF 35V		
	C27	10µF 35V		

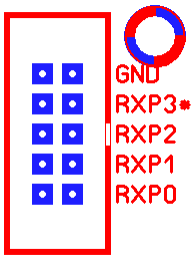


Figure 9

MOUNTING AN INPUT CONNECTOR

You can mount an input connector directly onto the PCB or on the chassis box linked by wire. You can use RCA, BNC or XLR. The external clock is designed to accept 75 Ohm BNC connector. Input transformer DA101C allows complete isolation from ground. The negative pin of the connector can be isolated from chassis, or directly linked to chassis. See figure 10 & 11 for wiring hot and cold pin.

Wiring RCA or BNC

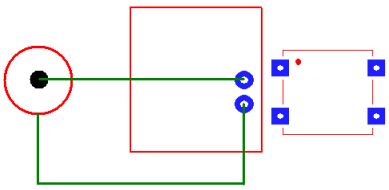


Figure 10

Wiring XLR

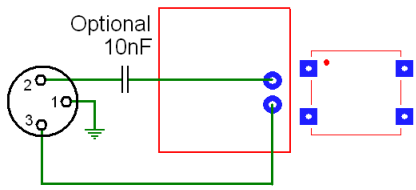


Figure 11

LED INDICATOR AND SWITCH

The PCB integrates 5 LED indicators and a switch. The current flowing through the hot pin of the LED and switch is limited by a resistor. There is no risk of a short circuit. Put the switch and LEDs on the front panel of the chassis box. Link LED's anode on the + pin, cold pin is common ground. See figure 12 for LED position and wiring.

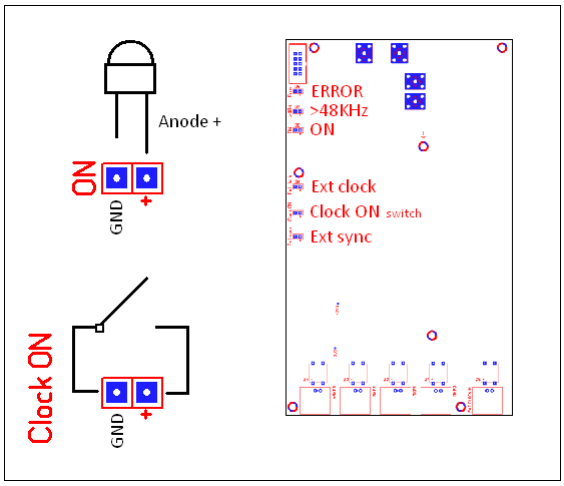


Figure 12

LED indicators

ERROR - red LED, is on when CS8416 is unlocked. Error indicator is maintained during one second, this allows seeing each error.

>48KHz - blue LED, is on when digital audio signal's sampling frequency is greater than 48KHz. At startup without input signal this LED can be at any state.

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

Ext clock - green LED, is on when an external clock is present. There is no control matching sampling frequency and external clock. For correct operation, external clock must be 128 x sampling frequency.

Ext sync - green LED, is on when external clock is present AND **Clock On** switch is closed. In this mode, clock operations are mastered by the external clock.

Clock ON switch - this switch is necessary only if you plan to use an external clock. When switch is closed AND an external clock is present, clock operations are mastered by the external clock. When this switch is open, CS8416 perform all clock operations.

Each action on **Clock ON** switch performs a reset for one second.

SELECT RESOLUTION

Put a jumper on bit resolution's header. Bit resolution MUST match with DAC chip resolution. If bit resolution doesn't match with DAC resolution analog output will be totally erroneous because MSB will be at the wrong position. Without jumper, there is no data on DOL and DOR pin. See figure 13.

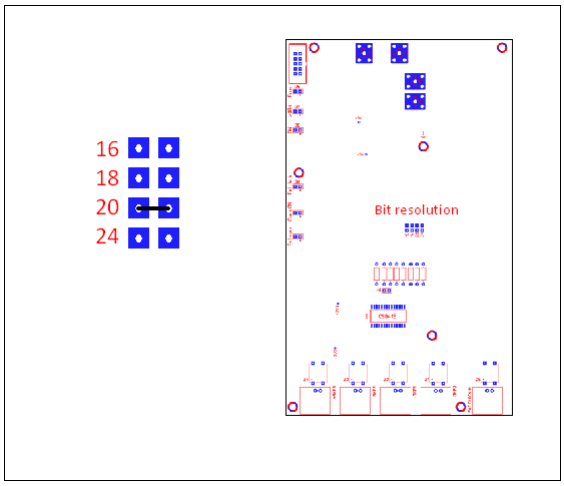


Figure 13

INPUT SELECTOR

Input selector allows selecting which input is active (RXP3, RXP2, RXP1, RXP0). See figure 14 and 15 for connecting rotary switch to ribbon cable. To select an input, link the desired input pin to ground. There is internal pull-up resistor on each pin selector; there is no risk of short circuit. Without connection, RXP3 is selected.

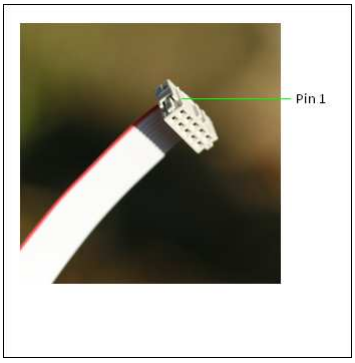


Figure 14

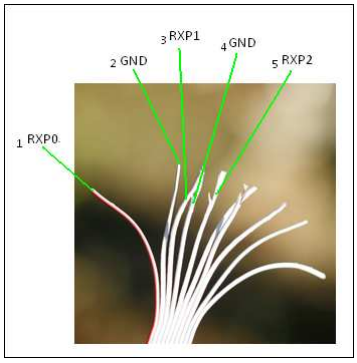


Figure 15

Wiring of ribbon cable

Wire number	Function		Wire number	Function
1	RXP0		6	GND
2	GND		7	RXP3
3	RXP1		8	GND
4	GND		9	GND
5	RXP2		10	GND

The input can be selected by setting a jumper as shown in figure 16.

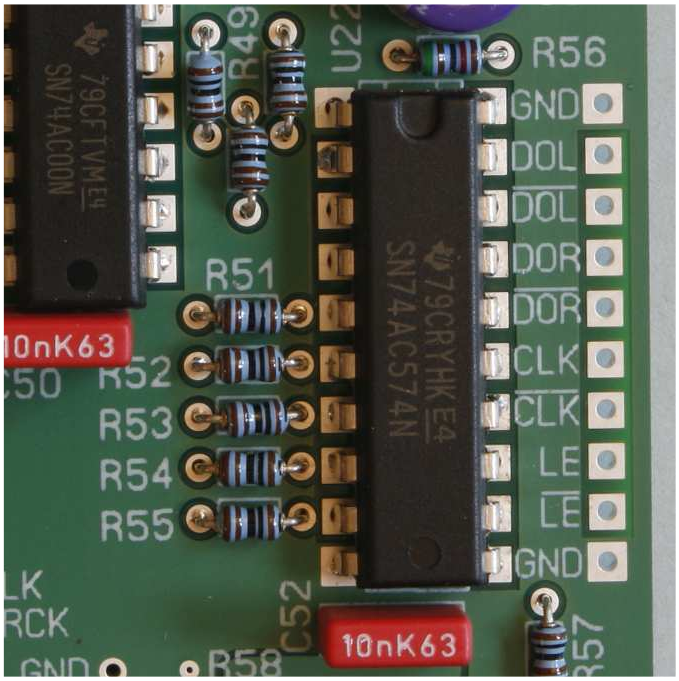
Figure 16

CONNECTING DIGITAL DECODER TO ANALOG BOARD

Now you can connect the ***digital decoder pro*** to your analog board. The connection pins are near U22- 74AC574. Keep wire between digital decoder and analog board as short as possible.

DOL - data output for left channel
DOR - data output right for right channel
CLK - bit clock
LE - end of data word.

Refer to **Digital Decoder Pro** datasheets for more information.
Available at http://www.junilabs.com



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