

## Part list

Reference	Part	Marking/notes
R5	1k2 SMD resistor	122
R6,R10-13	100R SMD resistor	101
R7,R15	680R SMD resistor	681
R16	0R resistor or SMD choke	
R3,R8-9,R14	47k SMD resistor	473
C1,C2,C4, C6,C8,C11	100nF SMD cap	no marking
C3	22pF SMD cap	no marking
C5	4n7 SMD cap	no marking
C7,C10	1nF SMD cap	no marking
R1	100R SMD resistor network	
R2	237R resistor	red - orange - violet - black - brown
R4	110R resistor	brown - brown - black - black - brown
L1	47µF choke	yellow - violet - black - silver
R17	10k resistor network	something including 103
C9,C12	1µF SMD electrolytic	
F1,F2	RFI filter	
J1	Header for phono input	2-pin header
JP2,JP3,JP6	Setup headers	3-pin header
JP4	DC input	4-pin header
JP5	Master clock output	2-pin header
JP7	Setup header	18-pin header
JP8	OMCK input	2-pin header
JP9	Digital audio out	10-pin header
JP10	SPI input	10-pin header
D1,D2	5mm LED	
S1	AES/EBU or S/P-DIF selector	
S2	Electrical/optical selector	
TR1	PE-65612 transformer	
JP1	TORX179 Toslink input connector	
U1	CS8415A chip	
J2	XLR input connector	

## Introduction

This board is a receiver circuit for the S/P-DIF optical/electrical digital audio protocol. The board converts the input signal to a serial PCM data streams, a master clock, a bit clock and a word clock.

The circuit, assembly and use is described in the following pages.

## Circuit Description

The circuit has three inputs. Optical and balanced/unbalanced electrical. Both the S/P-DIF and the AES/EBU protocols are supported. The electrical inputs are transformer isolated. Using the setup jumpers the three commonly used serial audio formats can be selected.

## Power Supply

The circuit does not include a power supply. It needs to be supplied by a regulated 5V DC supply. The current requirements are small at about 50mA max. The board can be run on a common supply, or on separate analog and digital supplies.

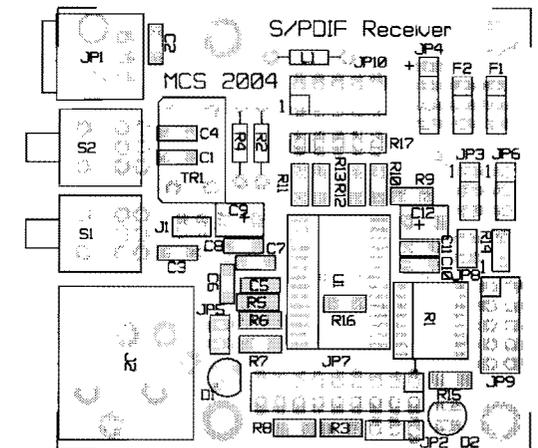
## Assembly

The parts are fitted on a PCB. The mounting plans is shown on the right. The parts can be fitted in the order shown in the part list.

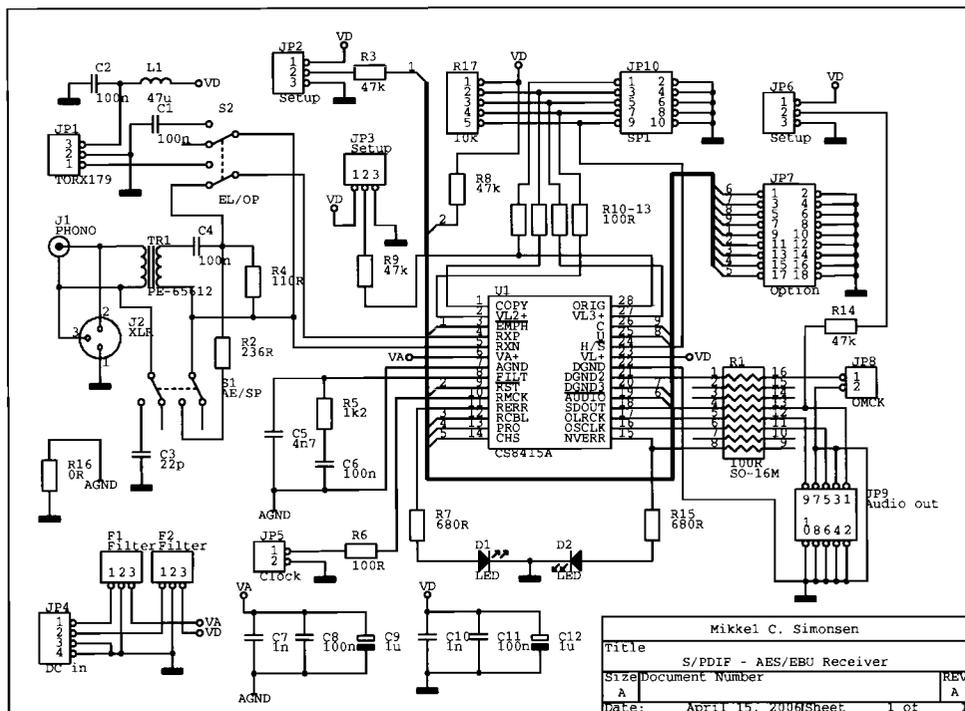
Some of the parts have to be fitted in the right direction. The electrolytics, the IC, the LEDs, the transformer and the SIL-resistor network should be fitted as indicated on the PCB silk-screen. The LEDs should be fitted with the anode (long leg) closest to the JP7 header.

The negative pole on the electrolytic capacitor is marked with a black stripe - the positive pole is marked on the PCB.

Note that some parts (C1, C4 and R16) are fitted on the bottom of the PCB.



# Schematic



## Using the Board

To use the board you need a 5V power supply (or two separate 5V supplies). The serial audio output can be connected to equipment like a DAC, an ADAT encoder or a re-sampler. The SPI input can be connected to a control board for using the receiver chip in software mode. Hardware mode (without a control board) is also possible. The pinouts of the SPI and output connector can be seen in the table.

Pin	Output (JP9)	SPI (JP10)	
1	Audio out	SCL/Clock	2 4 6 8 10
3	GND	SDA/Dout	1
5	Bit clock	AD1/Din	1 3 5 7 9
7	GND	AD0/CS'	
9	Word clock (L/R clock)	Hardware/software select	

All even-numbered pins are GND. To use the board in software mode, pin 9 of JP10 has to be grounded. Although the connector is called "SPI", you can use either SPI or I<sup>2</sup>C to control the board.

The OMCK input (JP8) can only be used in software mode. In hardware mode (or if you don't use the input) JP8 should be shorted with a jumper.

The unbalanced (phono/RCA) digital input can be connected to the J1 header (if needed). The master clock output is available on JP5. On these headers pin 1 is the signal and pin 2 is ground.

The setup headers JP2, 3, 6 and 7 can be used to setup the board in hardware mode. The functions of the different headers are listed below.

JP6 is used for selecting master or slave mode for the serial output. Connect pins 1 and 2 to select master or connect pins 2 and 3 for slave. In master mode the bit and wordclock pins are outputs, and in slave mode they are inputs. Which mode to select depends on the equipment connected to the audio output.

JP2 and 3 are used to select the serial data format. The four options are:

- JP2 (1-2), JP3 (1-2): Direct AES3 data
- JP2 (1-2), JP3 (2-3): I<sup>2</sup>S 24-bit format
- JP2 (2-3), JP3 (1-2): Right justified format
- JP2 (2-3), JP3 (2-3): Left justified format

JP7 is mostly status outputs. The hardware mode functions are listed below. Some functions are different in software mode. See the CS8415A datasheet for more information.

### Header pin Chip pin Function

Header pin	Chip pin	Function
1	19	AUDIO' (output)
3	20	DGND3 (connect jumper across pins 3 and 4)
5	25	U (output)
7	26	C (output)
9	3	EMPH' (output)
11	9	RST' (input) connect to ground (pin 12) for resetting chip
13	12	RCBL (output)
15	13	PRO (output)
17	14	CHS (input)

The power connector has the following pinout. Pin 1 analog supply, pin 2 digital supply, pin 3 and 4 ground. If you use a common +5V supply, connect it to both pin 1 and 2.

The switch S1 is used to select between the unbalanced and balanced electrical inputs. S2 selects optical or electrical input.