TDA1541A DAC

User Manual

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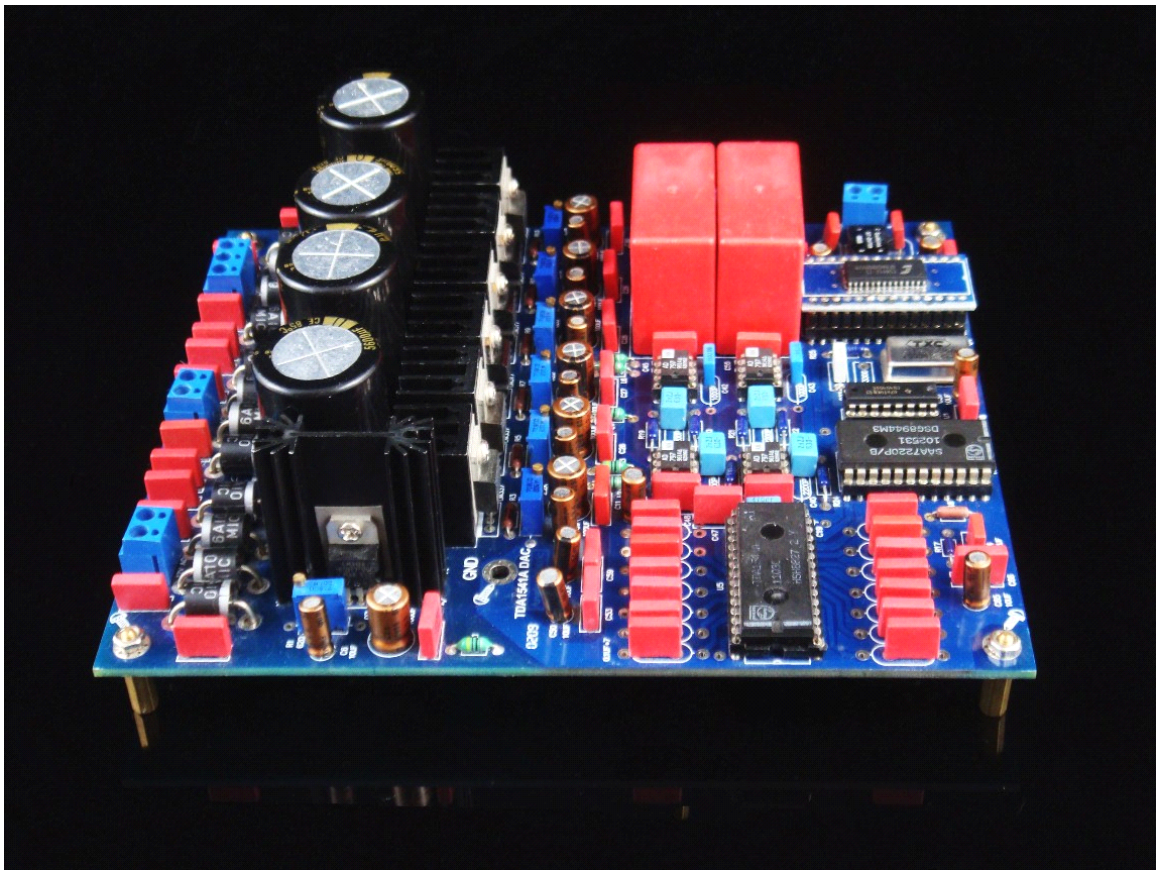
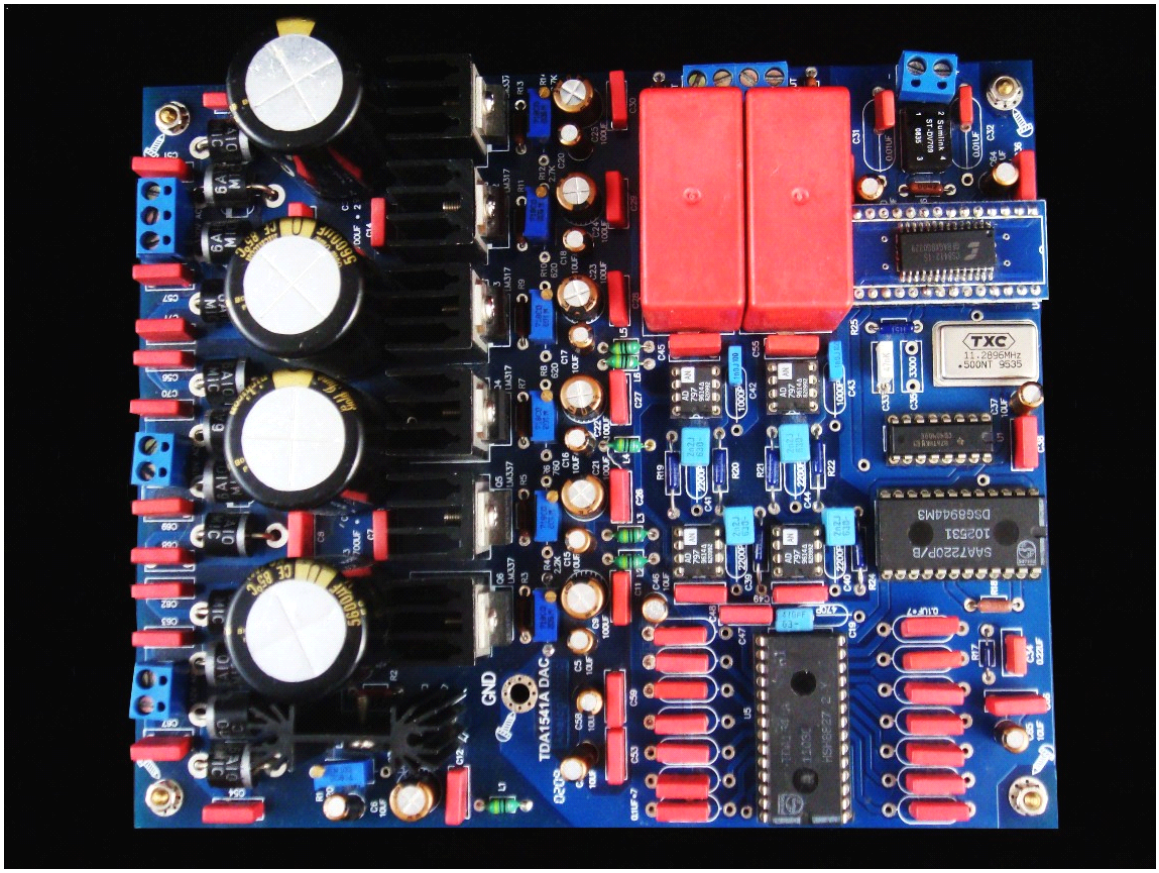


INTRODUCTION

TDA1541A DAC is the classic 16 bit DAC developed by Philips, which has been employed for high-end audio equipments for over many years. This DAC uses with digital filter SAA7220 and the digital audio receiver IC CS8412 or CS8414, with 8x oversampling. The output stages are implemented by two stage opamps and large AC coupling capacitors. There are totally 14 decoupling capacitors around the TDA1541A chip, also large decoupling are used for each supply lines. The digital and analog grounds are well separated before they meet at the terminal ground. Also, this DAC can be re-configured into to non-oversampling mode.

FEATURES

- One TDA1541A/TDA1541, one CS8412/CS8414, and one SAA7220.
- Input: S/PDIF
- Output: stereo single-ended signals (2Vrms)
- Seven independent built-in voltage regulation circuits to power different units.
- Built-in full wave rectification circuits for AC power supply.
- Signal paths are designed with minimum parasitic.
- Dedicated ground and power rails layout design.
- Four large reservoir decoupling capacitors for power rails.
- Power requirements: two 18-20V DC, one 15V AC, and one 9-12V AC.
- PCB dimension: 150mm (W) x 180mm (L)
- PCB thickness: 2.4mm, double layer, 2oz copper.



PROCEDURES

1. Solder all the components according to the schematic, part list and the photo. Notice the direction of the polarities of the electrolytic capacitors. There is no direction for the thin film capacitors. Either uses 1K ohm for R25, 0.047uF for C33 for CS8412. Do not assemble C35; R25 = 470ohm and C33 = 68nF for CS8414 Or Use 470 Ohm for R25 and 0.22uF for C33, 3300pF for C35.

2. To ensure power supply is functional, please do the follow test before plugging in any ICs and adjust the resistor trimmer (blue) so that the following requirement are met:

    - Measure L1, 47uH (5V supply for SAA7220)
    - Measure L2, 47uH (-15V supply for TDA1541)
    - Measure L3, 47uH (-5V supply for TDA1541)
    - Measure L4, 47uH (5V supply for TDA1541)
    - Measure L5, 47uH (5V supply for CS8412)
    - Measure L6, 47uH (5V supply for CS8412)
    - Measure C29, 100nF (+18V supply for AD797/NE5534/OPA627)
    - Measure C30, 100nF (-18V supply for AD797/NE5534/OPA627)

3. After checked the power supply, plug in the ICs and turn on the power supply.
4. Enjoy it.

For Non-Overclock Sampling (NOS)

1. U6 pin2 (BCK) to U6 pin 16, U6 pin3 (DATA) to U6 pin 15, U6 pin1 (WS) to U6 pin 18.

2. The CS8412 must be put into "master" mode because the standard way its done on the PCB uses the CS8412 in "slave" mode for the re-clocking. To put into master

mode: remove one leg on the CS8142 adaptor board which is for M0 selector pin to remove the +5V to this pin then attach M0 to GND. Then the CS8412 is in master mode and will generate word clock and LR clock from the SPDIF. Master mode is m0=0V m1=+5V m2=0V m3=0V

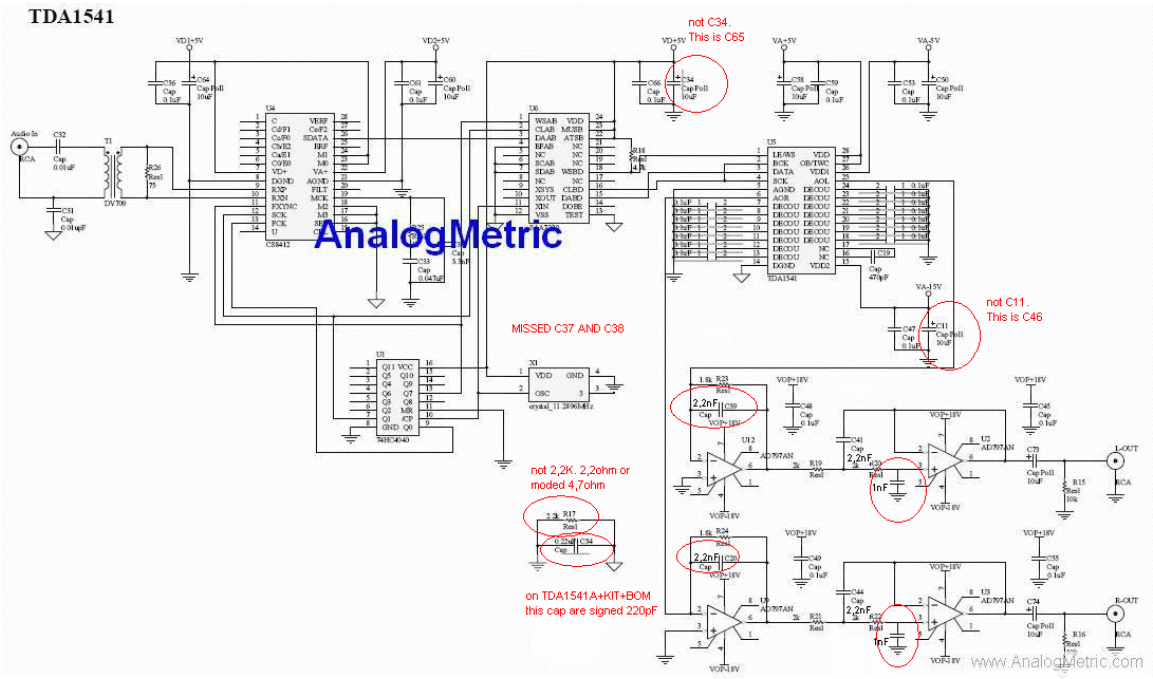
Thanks Erin for providing the information

CHECKLIST

1. The polarity of the electrolytic capacitors.
2. The supply voltages at connectors (HT, HT2, and HV)

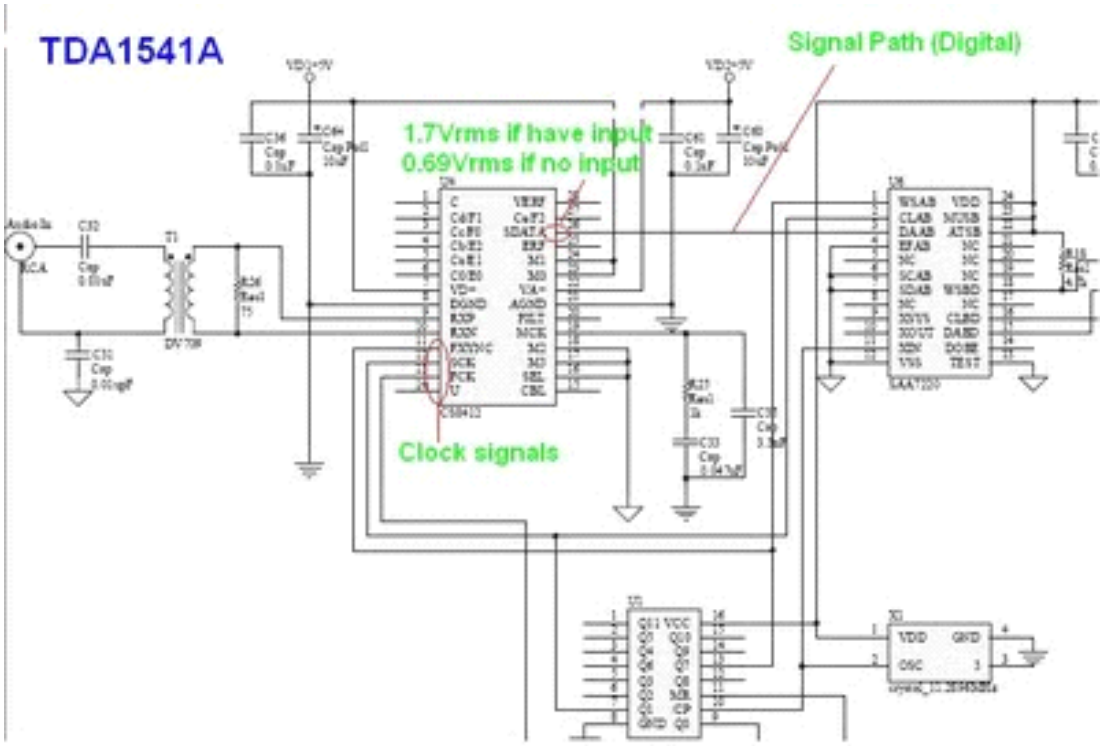
CORRECTIONS

Provided by Duka(Montenegro)



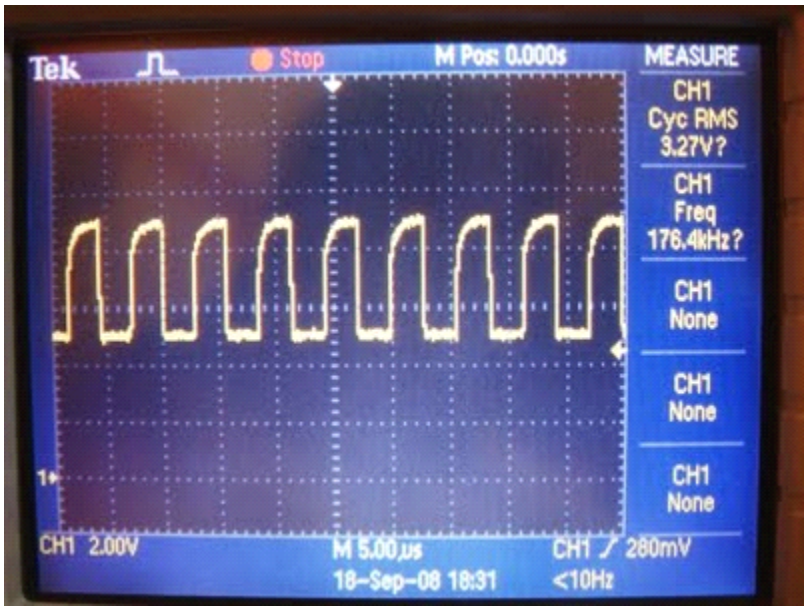
TESTING & DEBUGGING

For CS8412/C8414 and SAA7220, check the rms voltages in the following diagram.

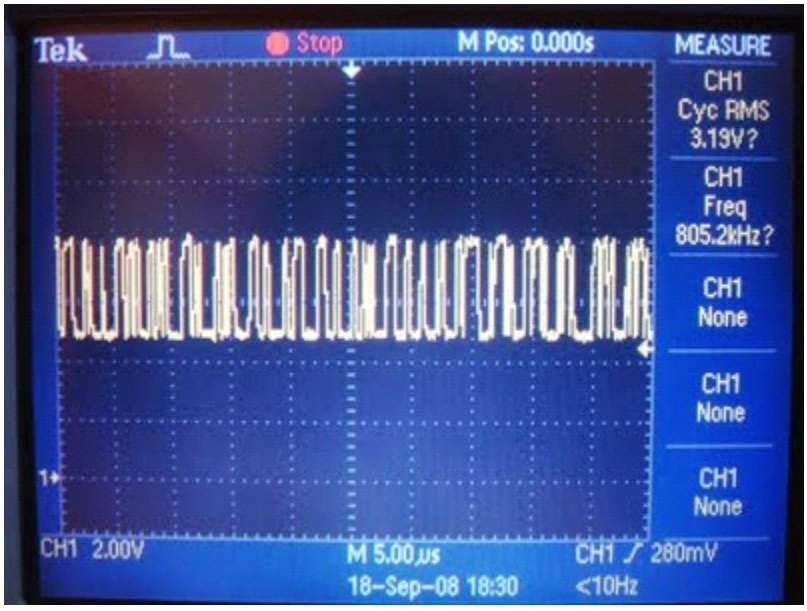


1. For TDA1541A, PIN28, PIN27: +5V; PIN26: -5V; PIN15: -15V; PIN5: 0V
2. The signal amplitude (RMS) and the clock frequency: PIN1 LE: ~176.4KHz, PIN4 SCK: ~5.63MHz, PIN3 SDATA: 5V digital signal.
3. It is normal that the output PIN6 AOR and PIN25 AOL is very weak ~50mV.The corresponding waveforms are shown as following:

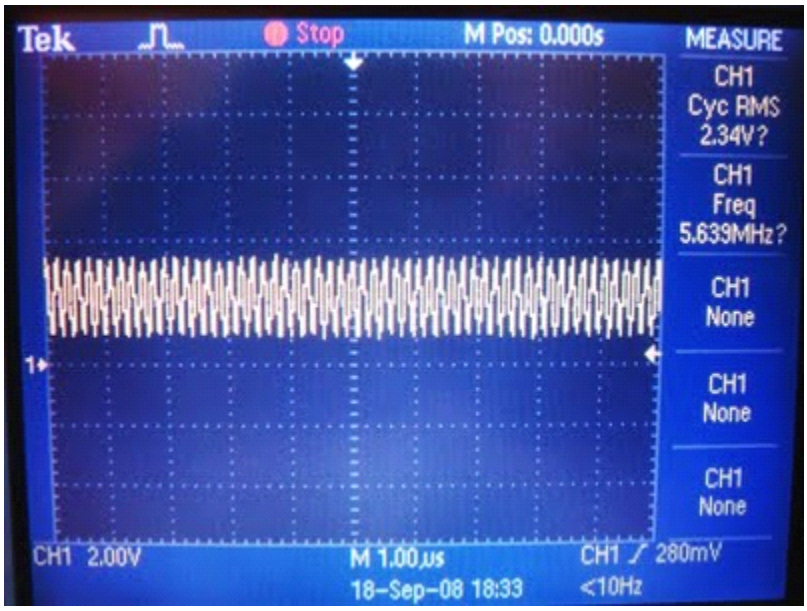
The waveform at TDA1541A PIN 1 LE:



The waveform at TDA1541A PIN 3:



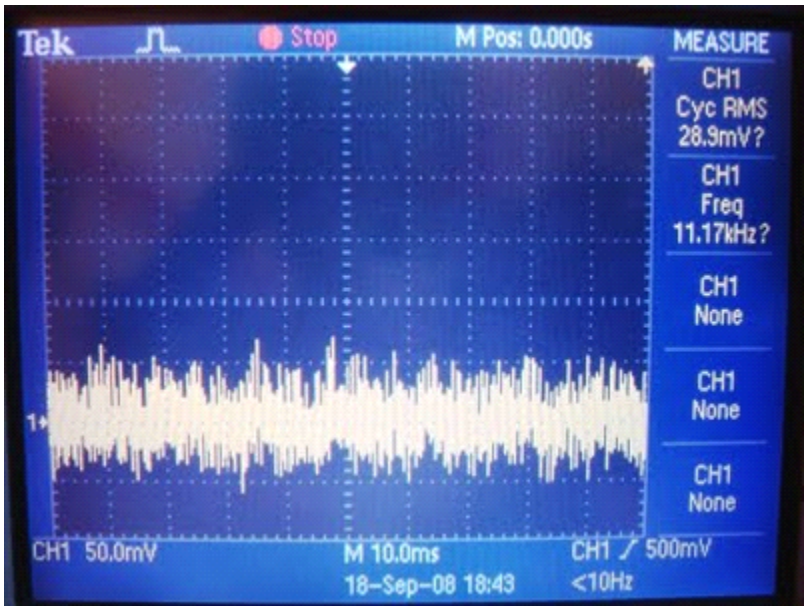
The waveform at TDA1541A PIN 4 SCK:



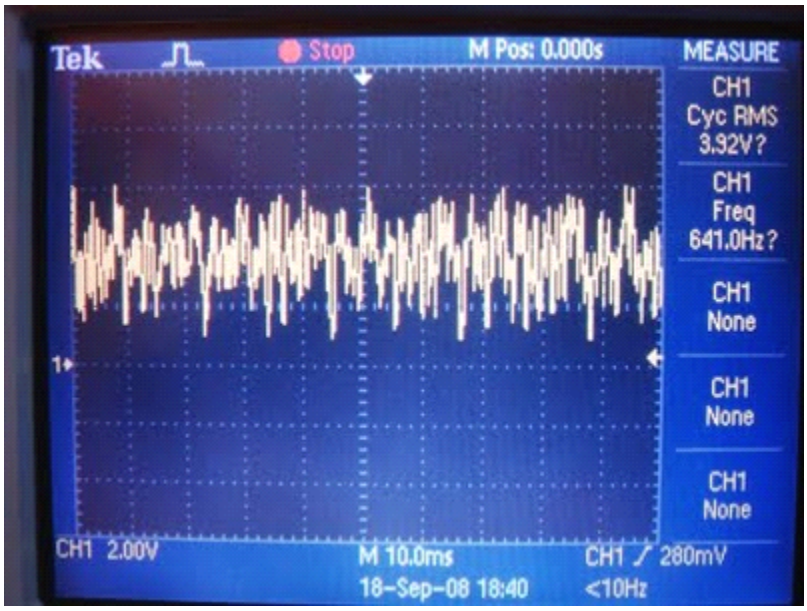
The waveform of the output signals at PIN25 AOL, R19 (output of 1st opamp) and connector L-OUT as shown in the following diagrams.

By inspection, the output signal can reach +/- 2V.

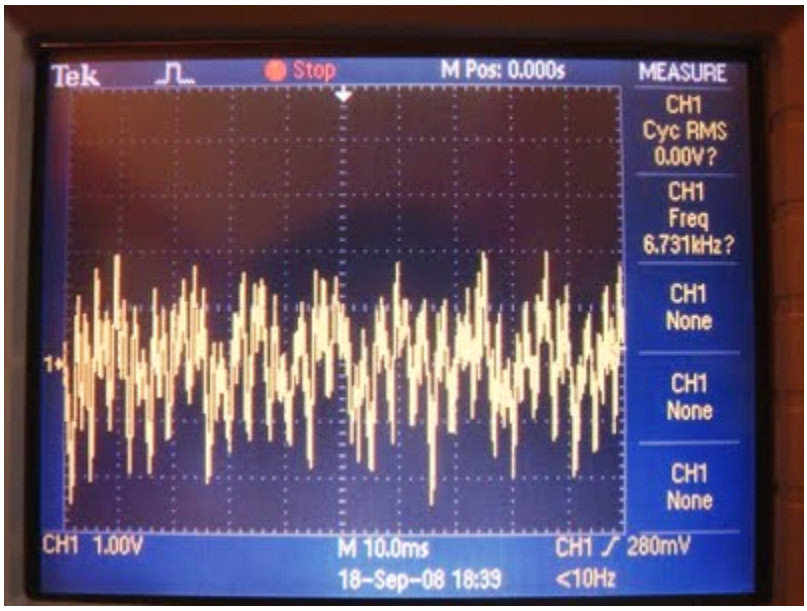
The waveform at TDA1541A PIN25 AOL:



The waveform at OPAMP out R19:

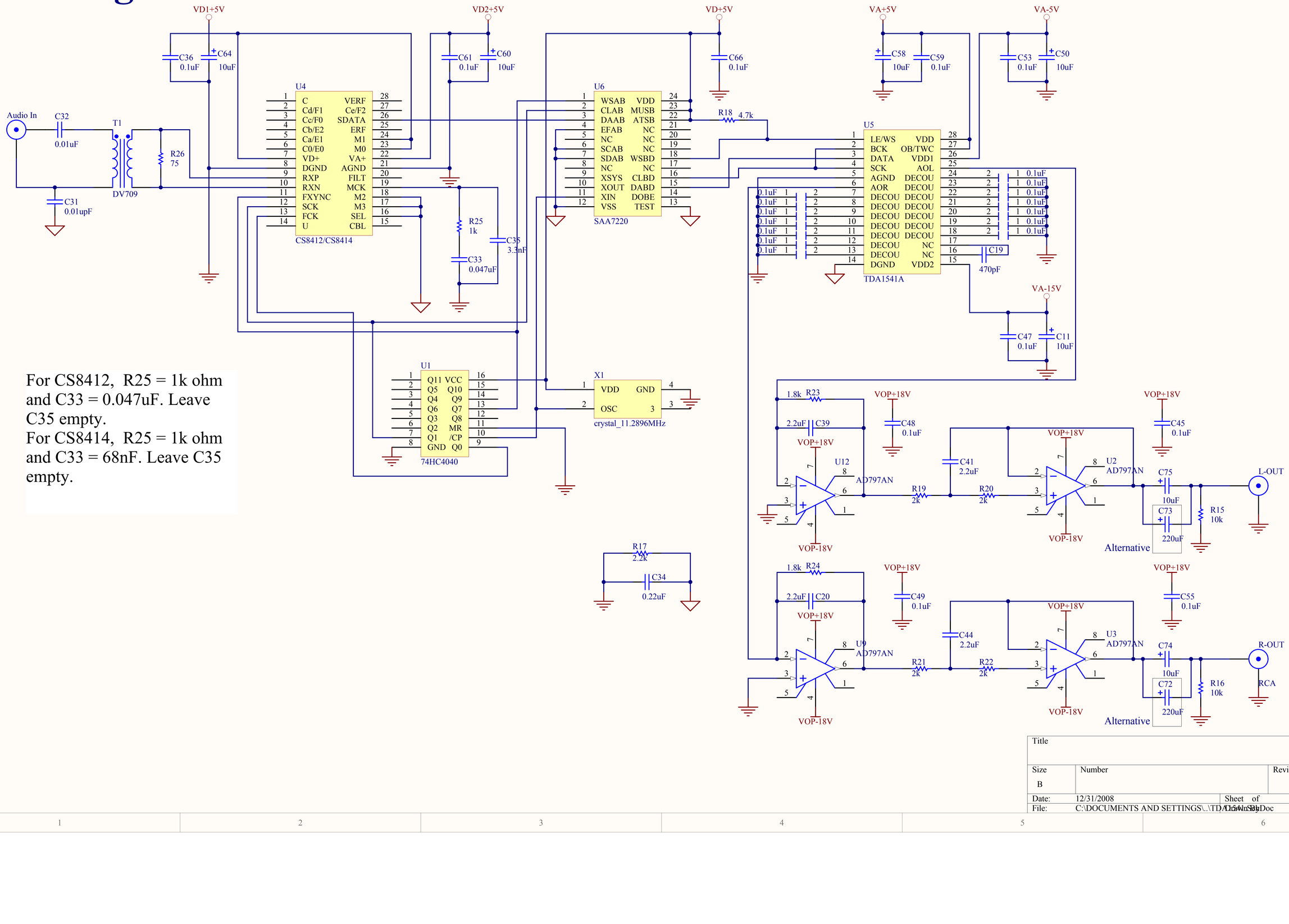


The waveform at audio output at the connector:



If you have any problem in assembly, please contact us by email to tech@analogmetric.com

AnalogMetric TDA1541A DAC Kit



For CS8412, R25 = 1k ohm and C33 = 0.047uF. Leave C35 empty.
For CS8414, R25 = 1k ohm and C33 = 68nF. Leave C35 empty.

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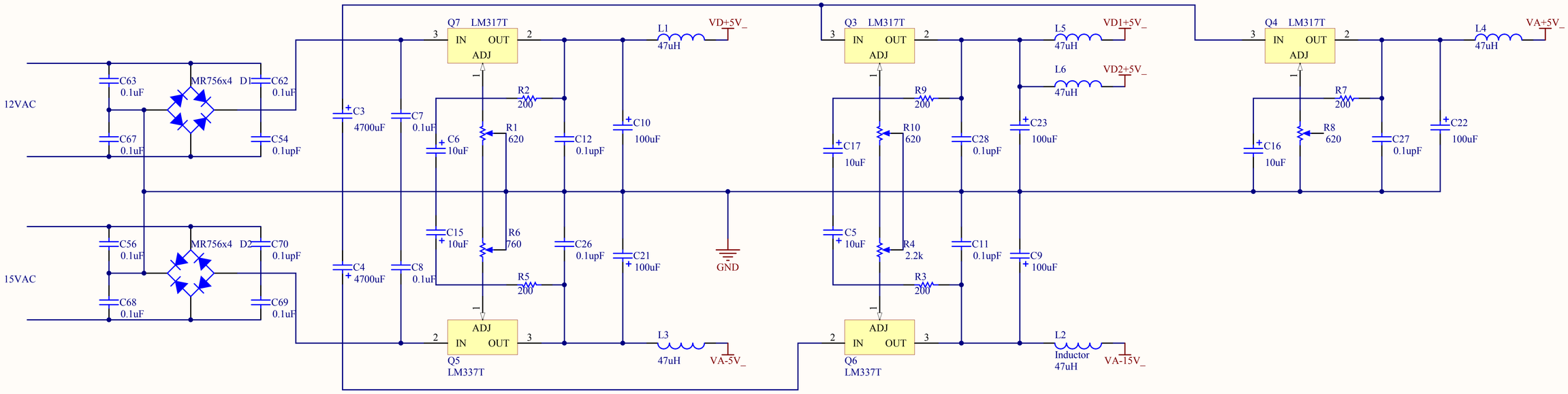
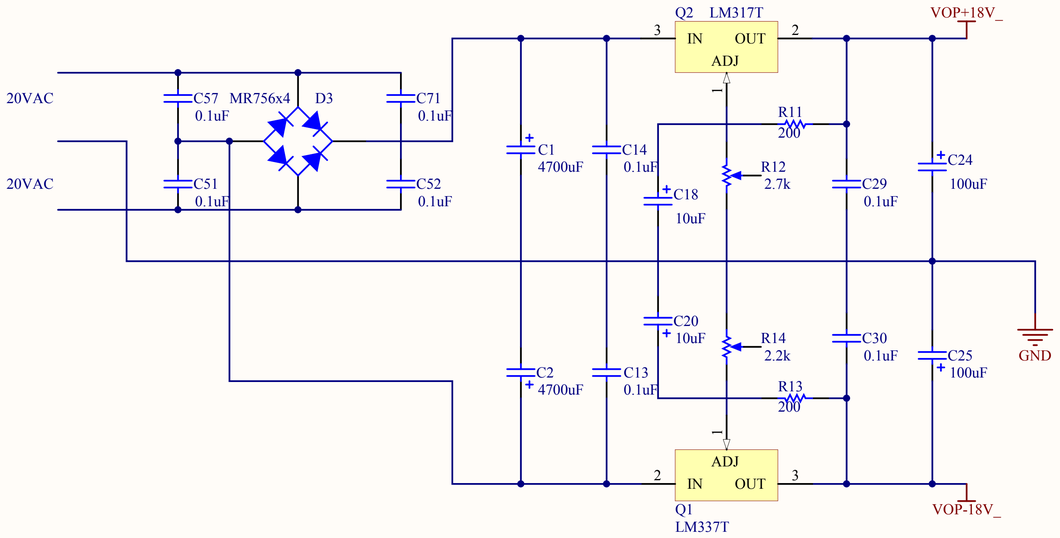
AnalogMetric TDA1541A DAC Kit (PSU)





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TDA1541A DAC

Components	Values	Quantity	Remarks
C1, C2, C3, C4	4700uF/50V	4	Electrolytic Capacitor
C5, C6, C15, C16, C17, C18, C20, C37, C50, C58	10uF/50V	11	Electrolytic Capacitor
C7, C8, C11, C12, C13, C14, C26, C27, C28, C29, C30, C36, C38, C45, C47, C48, C49, C51, C52, C53, C54, C55, C56, C57, C59, C61, C62, C63, C66, C67, C68, C69, C71	100nF/100V	33	Thin Film Capacitor
C9, C10, C21, C22,C23	100uF/16V	5	Electrolytic Capacitor
C24, C25	100uF/50V	2	Electrolytic Capacitor
C19	470pF/50V	1	Thin Film Capacitor
C31, C32	10nF/100V	2	Thin Film Capacitor
C33	10nF/50V	1	Changed to 10nF
C34	220nF/50V	1	Electrolytic Capacitor
C35	3300pF/50V	1	Optional
C37	10uF/50V	1	Electrolytic Capacitor
C39, C40, C41, C44	2200pF/50V	4	Thin Film Capacitor
C42, C43	1000pF/50V	2	Thin Film Capacitor
C73, C74	10uF/250V	2	Thin Film Capacitor
C	100nF/100V	14	Decoupling cap surrounding TDA1541A IC
D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12	Diode 6A10	12	
L1, L2, L3, L4, L5, L6	47uH	6	
Q1, Q5, Q6	LM337	3	
Q2, Q3, Q4, Q7	LM317	4	
R1, R6, R8, R10	VR Trimmer 1K (102)	4	
R4, R12, R14	VR Trimmer 5K (502)	3	
R2, R3, R4, R5, R7, R9, R11, R13	200R (2000) 1/4W	7	
R15, R16	10K (1002) 1/4W	2	
R17	2.2R 1/4W	1	
R18	4.7K (4701) 1/4W	1	
R25	1K (1001) 1/4W	1	
R26	75R 1/4W	1	
R19, R20, R21, R22	2K (2001) 1/4W	4	
R23, R24	1.8K (1801) 1/4W	2	
U1	74HC4040	1	
U2, U3, U9, U12	AD797/NE5534	4	
U4	CS8412/CS8414 & PCB adaptor	1	
U5	TDA1541A	1	
U6	SAA7220P/B	1	
DV709		1	
Crystal	11.2896MHz	1	
Small Heat Sink		6	
Medium Heat Sink		1	
screw 3mm		7	
2 PIN connector	Blue	5	
3 PIN connector	Blue	1	