

## EE322: Analog and Mixed Signal Circuits

### Project Report

### Team: Waveform Wizards

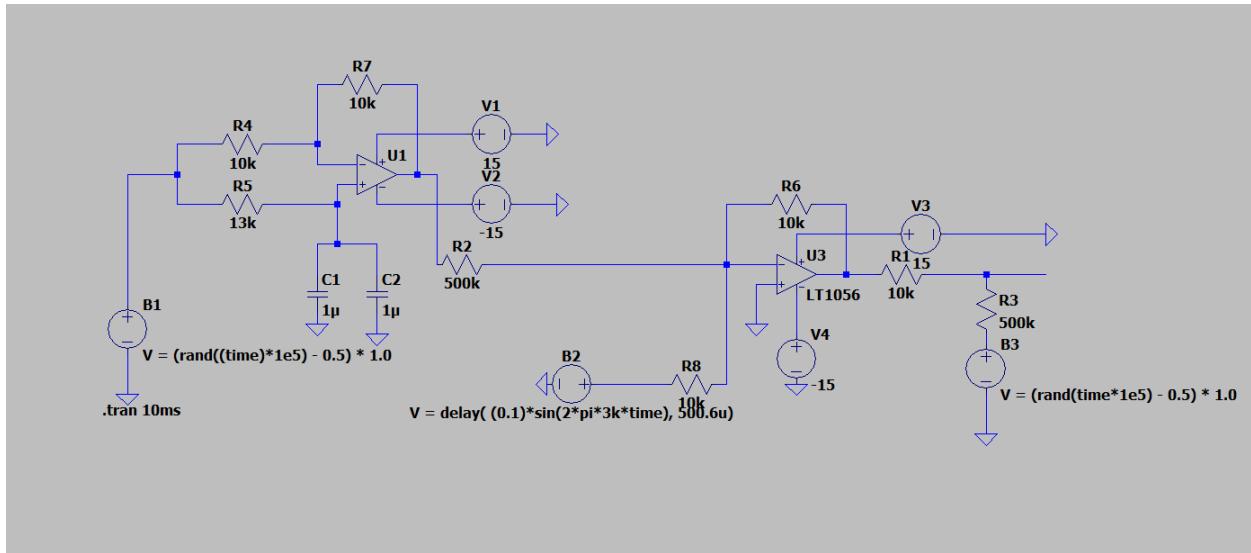
Member 1: Swayam Borate(23110066)

Member 2: Parth Dembla(23110234)

Member 3: Shriniket Behera(23110306)

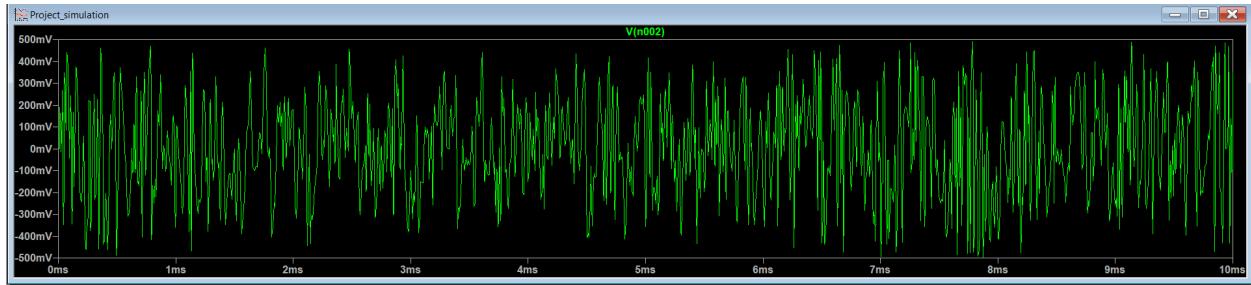
Project Title: Analog Noise Cancellation

LT Spice Schematic:-

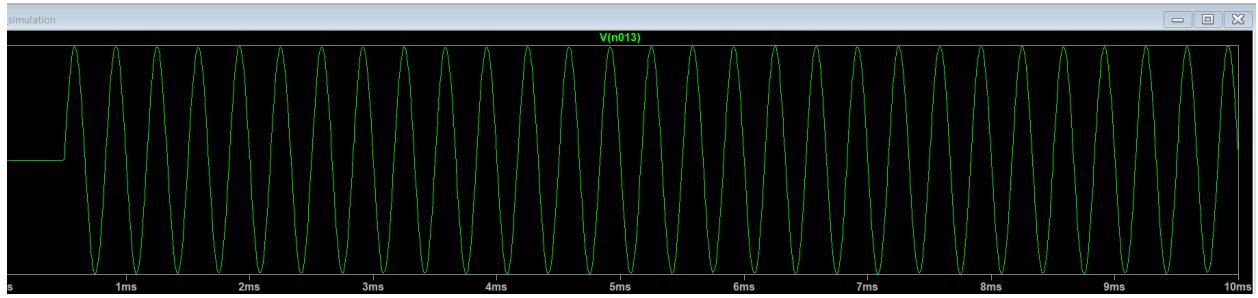


### **LTSPICE Simulation Results**

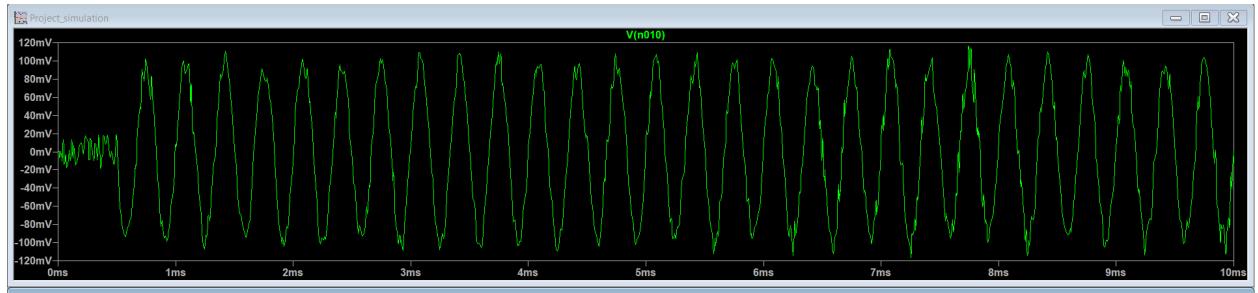
Ambient Noise -



## Music Signal -

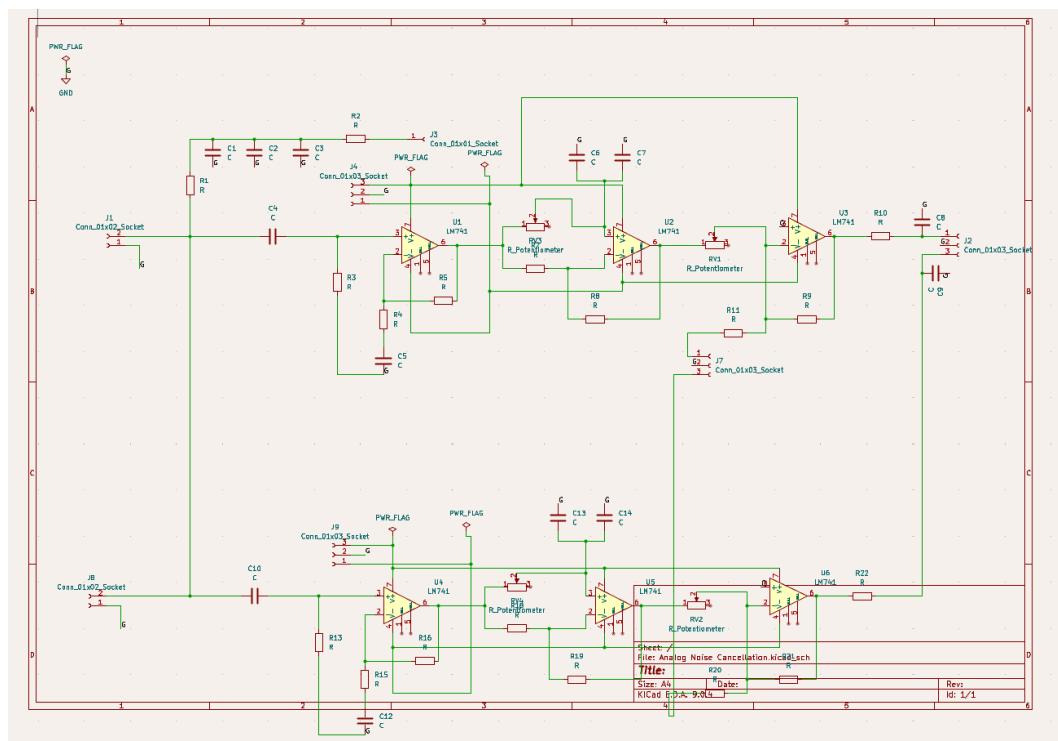


## Music after Analog Active Noise Cancellation(Some Noise is Still There)

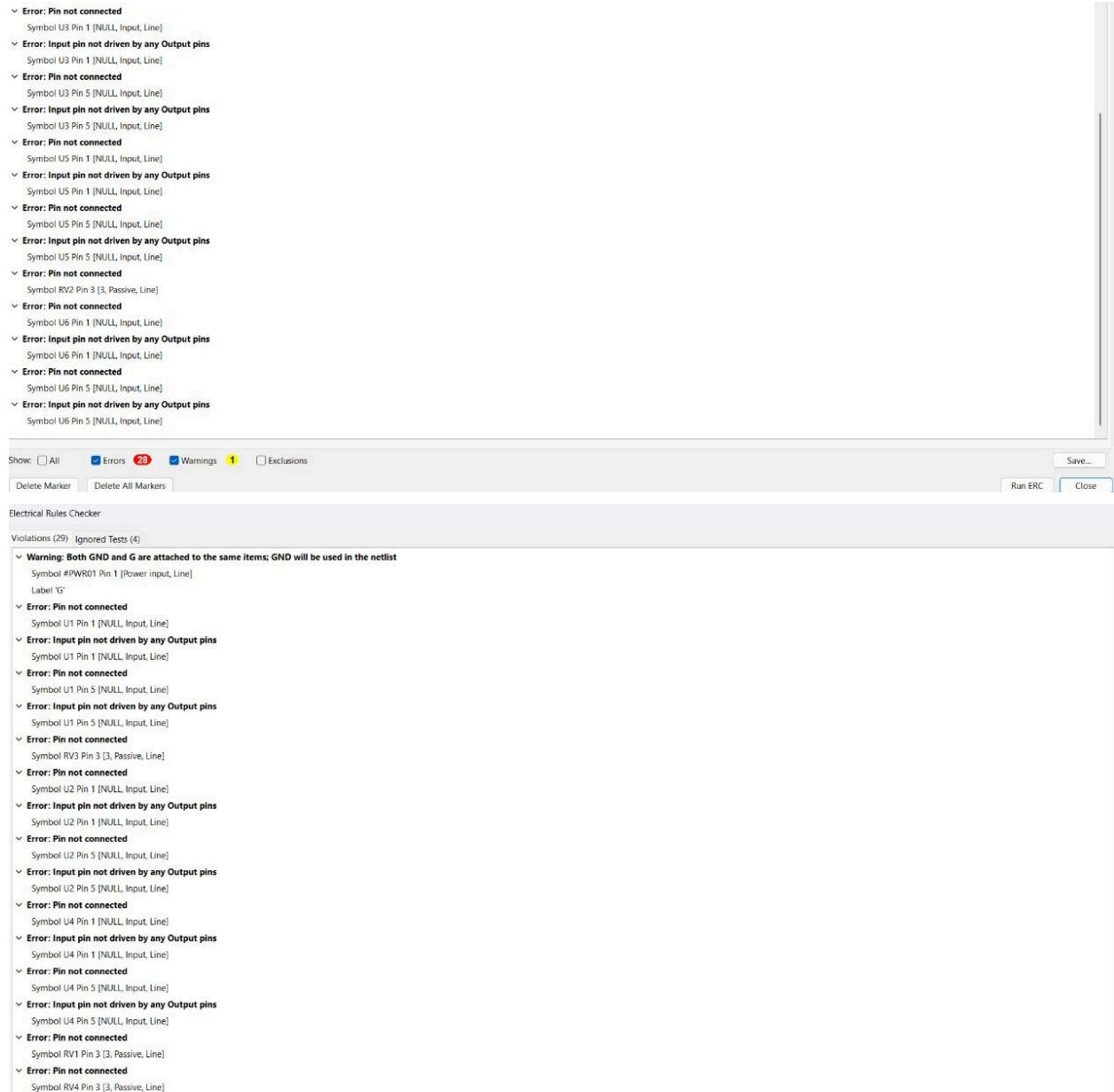


## PCB Design:-

Following Image shows the Schematic(contains both stereo channels):-



## ERC Error screenshot(Some Unconnected Pins Error like NULL pin in LM741 can be ignored)



## Footprints Assignments

Below Screenshot shows the footprint assignments , all the components used are THT components(to be soldered separately)

Symbol : Footprint Assignments

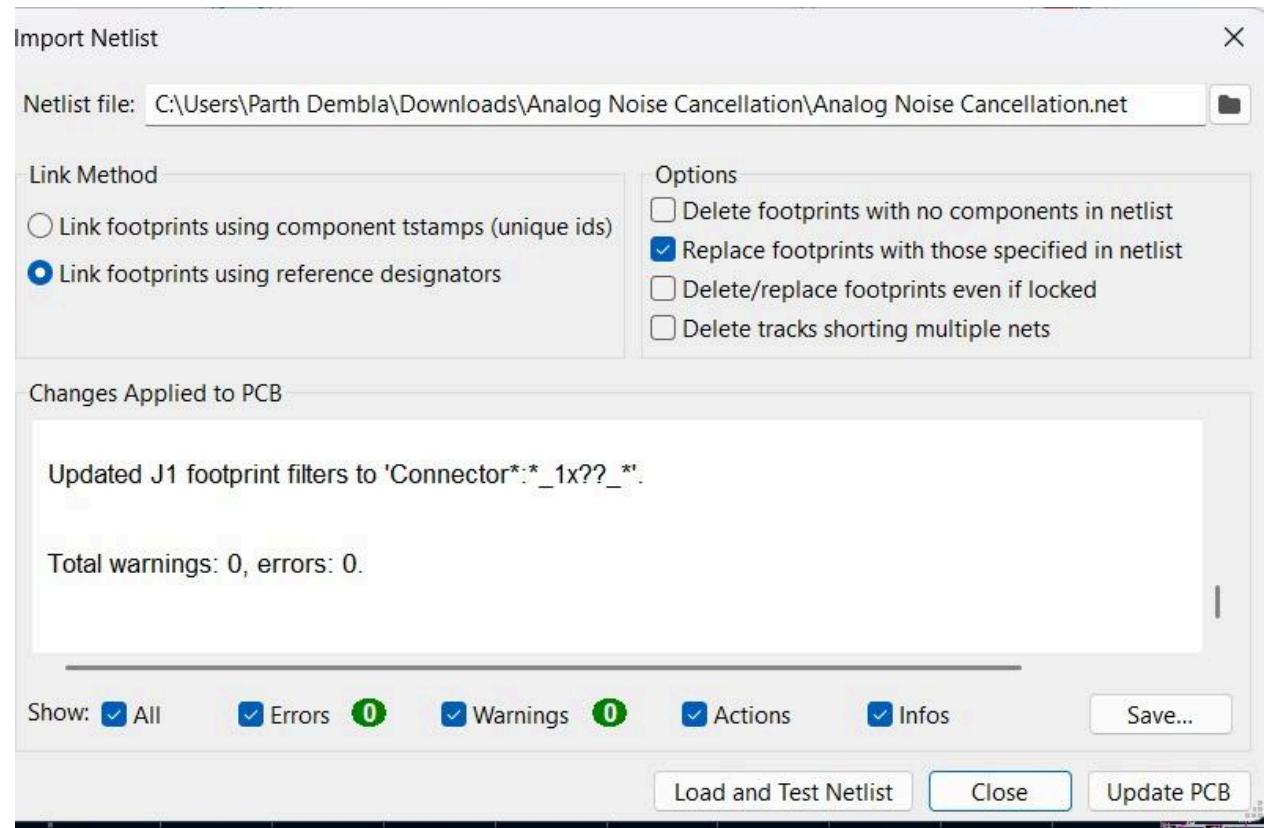
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1      C1 -          C : Capacitor_THT:CP_Radial_D5.0mm_P2.50mm
2      C2 -          C : Capacitor_THT:CP_Radial_D5.0mm_P2.50mm
3      C3 -          C : Capacitor_THT:CP_Radial_D5.0mm_P2.50mm
4      C4 -          C : Capacitor_THT:C_Rect_L7.0mm_W6.0mm_P5.00mm
5      C5 -          C : Capacitor_THT:CP_Radial_D5.0mm_P2.50mm
6      C6 -          C : Capacitor_THT:C_Rect_L7.0mm_W6.0mm_P5.00mm
7      C7 -          C : Capacitor_THT:C_Rect_L7.0mm_W6.0mm_P5.00mm
8      C8 -          C : Capacitor_THT:CP_Radial_D5.0mm_P2.50mm
9      C9 -          C : Capacitor_THT:CP_Radial_D5.0mm_P2.50mm
10     C10 -         C : Capacitor_THT:C_Rect_L7.0mm_W6.0mm_P5.00mm
11     C12 -         C : Capacitor_THT:CP_Radial_D5.0mm_P2.50mm
12     C13 -         C : Capacitor_THT:C_Rect_L7.0mm_W6.0mm_P5.00mm
13     C14 -         C : Capacitor_THT:C_Rect_L7.0mm_W6.0mm_P5.00mm
14     J1 - Conn_01x02_Socket : Connector_PinSocket_2.54mm:PinSocket_1x02_P2.54mm_Vertical
15     J2 - Conn_01x03_Socket : Connector_PinSocket_2.54mm:PinSocket_1x03_P2.54mm_Vertical
16     J3 - Conn_01x01_Socket : Connector_PinSocket_2.54mm:PinSocket_1x01_P2.54mm_Vertical
17     J4 - Conn_01x03_Socket : Connector_PinSocket_2.54mm:PinSocket_1x03_P2.54mm_Vertical
18     J7 - Conn_01x03_Socket : Connector_PinSocket_2.54mm:PinSocket_1x03_P2.54mm_Vertical
19     J8 - Conn_01x02_Socket : Connector_PinSocket_2.54mm:PinSocket_1x02_P2.54mm_Vertical
20     J9 - Conn_01x03_Socket : Connector_PinSocket_2.54mm:PinSocket_1x03_P2.54mm_Vertical
21     R1 -          R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
22     R2 -          R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
23     R3 -          R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
24     R4 -          R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
25     R5 -          R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
26     R7 -          R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
27     R8 -          R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
28     R9 -          R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
29     R10 -         R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
30     R11 -         R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
31     R13 -         R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
32     R15 -         R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
33     R16 -         R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
34     R18 -         R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
35     R19 -         R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
36     R20 -         R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
37     R21 -         R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
38     R22 -         R : Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal
39     RV1 - R_Potentiometer : Potentiometer_THT:Potentiometer_Bourns_3386P_Vertical
40     RV2 - R_Potentiometer : Potentiometer_THT:Potentiometer_Bourns_3386P_Vertical
41     RV3 - R_Potentiometer : Potentiometer_THT:Potentiometer_Bourns_3386P_Vertical
42     RV4 - R_Potentiometer : Potentiometer_THT:Potentiometer_Bourns_3386P_Vertical

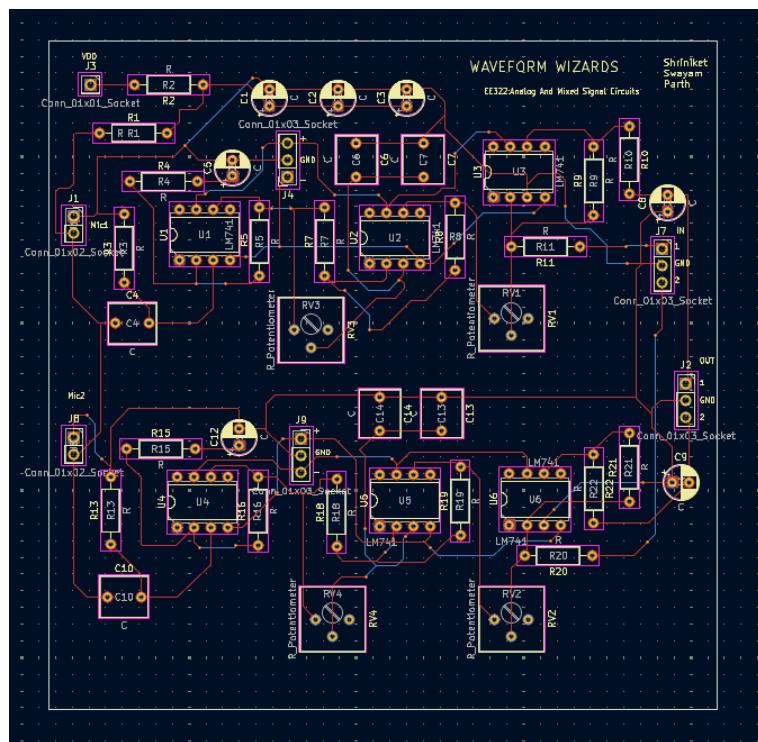
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43	U1 -	LM741 : Package_DIP:DIP-8_W7.62mm
44	U2 -	LM741 : Package_DIP:DIP-8_W7.62mm
45	U3 -	LM741 : Package_DIP:DIP-8_W7.62mm
46	U4 -	LM741 : Package_DIP:DIP-8_W7.62mm
47	U5 -	LM741 : Package_DIP:DIP-8_W7.62mm
48	U6 -	LM741 : Package_DIP:DIP-8_W7.62mm

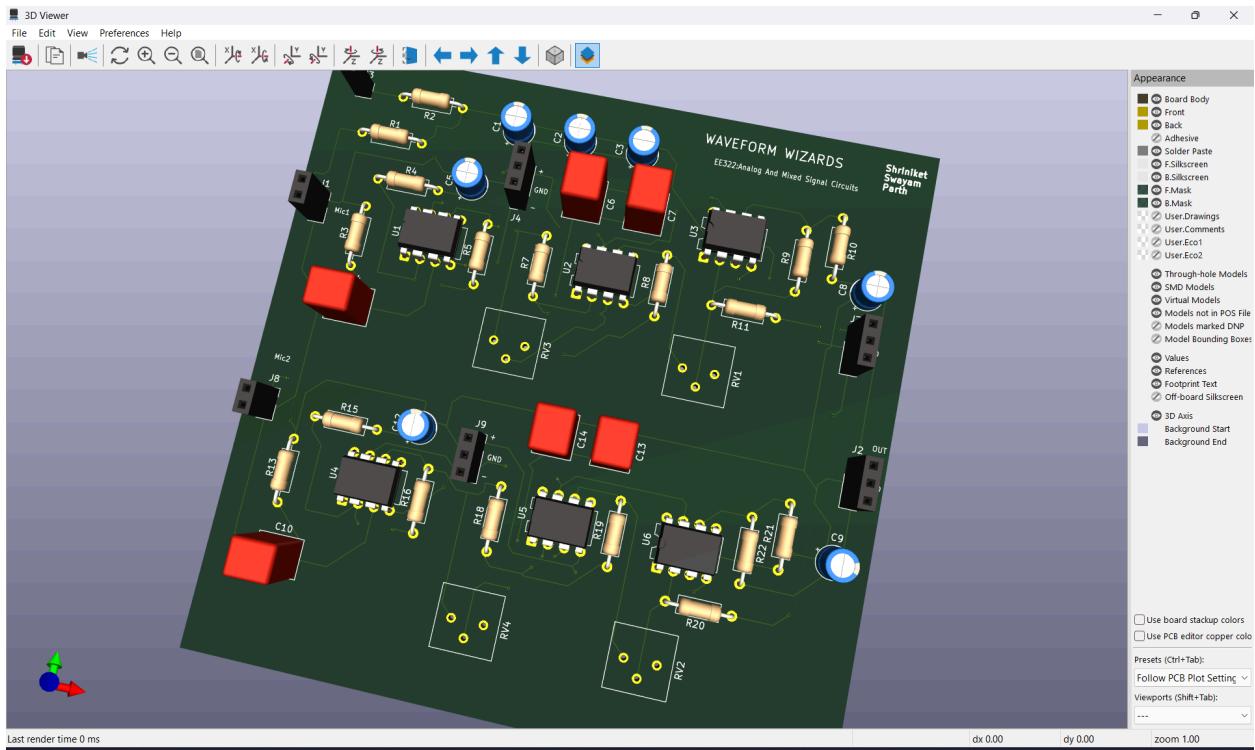
The Netlist is exported



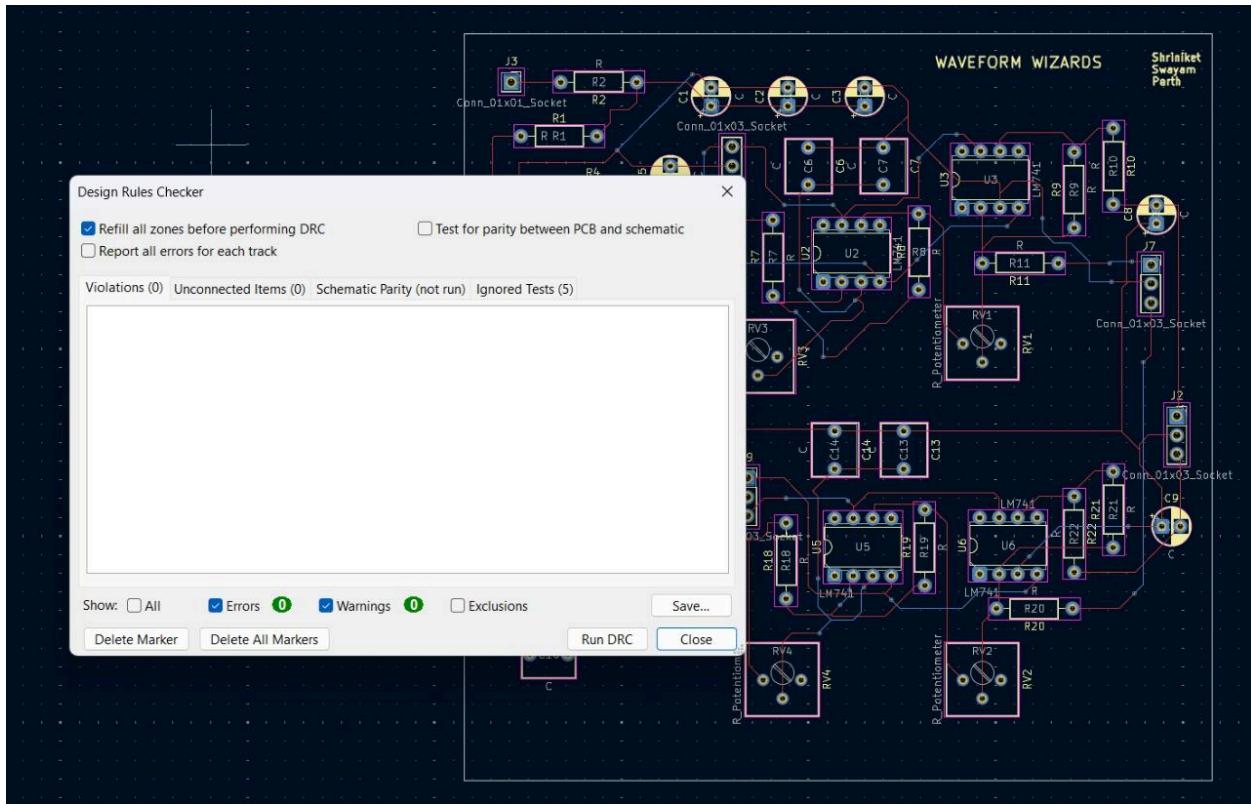
Using the OSHPark board settings in the PCB Editor, the PCB was designed



## 3D Schematic of PCB



Design Rules Checker was also run and below image shows that there were no errors in the designs



GERBER Files were generated and converted to ZIP

Today				
	Analog Noise Cancellation-NPTH-drl.gbr	01-11-2025 06:33	GBR File	1 KB
	Analog Noise Cancellation-NPTH-drl_ma...	01-11-2025 06:33	GBR File	4 KB
	Analog Noise Cancellation-PTH-drl.gbr	01-11-2025 06:33	GBR File	7 KB
	Analog Noise Cancellation-PTH-drl_map....	01-11-2025 06:33	GBR File	68 KB
	Analog Noise Cancellation-Edge_Cuts.gbr	01-11-2025 06:30	GBR File	1 KB
	Analog Noise Cancellation-job.gbrjob	01-11-2025 06:30	GBRJOB File	3 KB
	Analog Noise Cancellation-B_Mask.gbr	01-11-2025 06:30	GBR File	7 KB
	Analog Noise Cancellation-B_Paste.gbr	01-11-2025 06:30	GBR File	1 KB
	Analog Noise Cancellation-B_SilkS.gbr	01-11-2025 06:30	GBR File	1 KB
	Analog Noise Cancellation-Back.gbr	01-11-2025 06:30	GBR File	17 KB
	Analog Noise Cancellation-F_Mask.gbr	01-11-2025 06:30	GBR File	7 KB
	Analog Noise Cancellation-F_Paste.gbr	01-11-2025 06:30	GBR File	1 KB
	Analog Noise Cancellation-F_SilkS.gbr	01-11-2025 06:30	GBR File	148 KB
	Analog Noise Cancellation-Front.gbr	01-11-2025 06:30	GBR File	32 KB

The ZIP File was uploaded on LION CIRCUITS to see the quotation

The screenshot shows the Lion Circuits quotation interface. On the left, there's a file upload section with a ZIP file named "WaveformWizards\_EE322Analog.zip". Below it are dropdowns for "Base Material" (FR4), "Layers" (2, 4, 6, 8, 10, 12, 14, 18, 20, 22), "Dimensions" (100 x 100 mm), and "Quantity" (5). To the right, under "Charge Details", it lists "Per Unit Cost" as ₹322.20 × 5, "NRE Cost" as ₹0, and "Sub Total" as ₹1611. It also shows "Build Time" options for 5-6 Days (selected) and 4-5 Days. Under "Shipping Method", it shows "DTDC Standard" (2-3 Working Days) selected over "DTDC Plus" (1-2 Working Days). The total cost breakdown includes "New Sub Total" (₹1611), "GST" (₹290), "Shipping Cost" (₹0), and "Total Cost" (₹1901). A "Save to Cart" button is at the bottom right.

One unit costs Rs. 322

(Our PCB contains both stereo right and left)