Home Theater System

HTS5110/12/51/98

Service
Service
Service

Service Manual

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Feature Different / Features	/12	/51	/98			
RDS	√					
Voltage Selector			√			
ECO Standby	√					
DTS						

Published by KC-LQ 1004 AVM Printed in he Netherlands Subject to modification EN 3139 785 35230

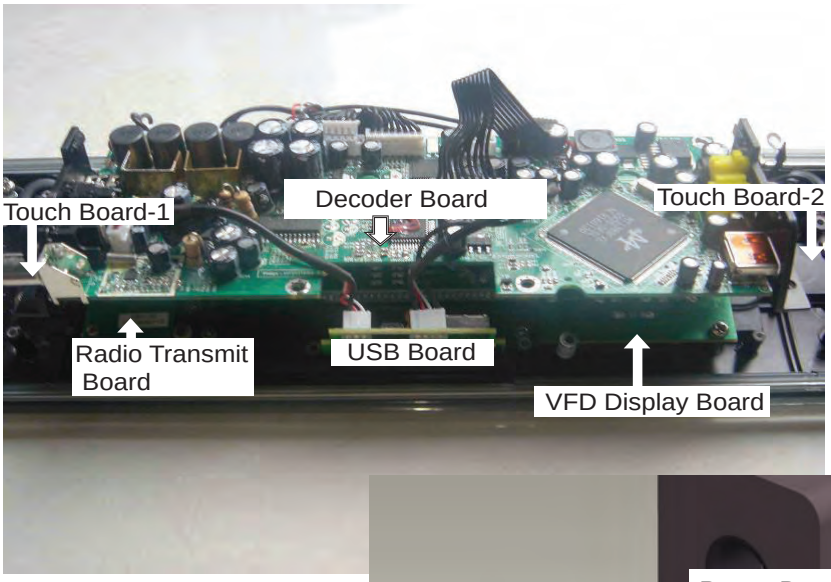
Version 1.0

PHILIPS

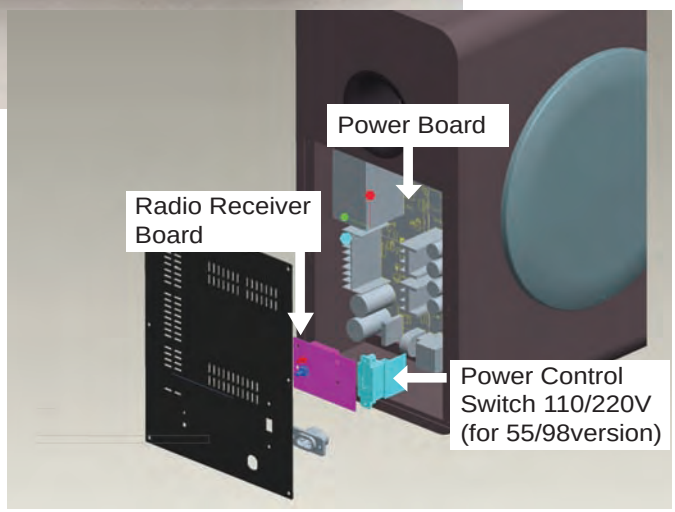
1. Technical Specifications and Connection Facilities

1.1 PCB Locations

Main Unit



Subwoofer



1.2 General:

Power supply	:	100-240V, ~50 Hz
Power consumption	:	35 W
Standby power consumption	:	< 1 W

1.3 Radio

Tuning Frequency Range	:	87.5 MHz – 108 MHz
Antenna Level for 40dB luminance S/N (video unweighted) at 75Ω	:	≤ 71dBµV (High End) ≤ 50dBµV (Low End)
Automatic Search Tuning: Scanning time auto search without RF Signal	:	< 2.5 min. (Typical 3 minutes)
Stop level (vision carrier)	:	≥ 31dBµV
Maximum tuning error during operation (drift)	:	≤ 50kHz
Maximum tuning error of a recalled program :		± 22.5 kHz
Tuning Principles: Automatic system recognition		

1.4 Analog Inputs/Outputs

1.4.1 MP3 LINK IN of Cinch connector to be used for measurements(direct input from Front end)

MP3 LINK Performance:

Frequency Response	:	-1 ± 3dB (150 to 20KHz)
Input and output voltages	:	500 mV / 20 kOhm

1.4.2 Video Rear output Connector

CVBS output:

DC Level	:	0V+1V
Amplitude output:	:	1.04V

1.5 (AUDIO OUT) Coaxial Digital

LPCM	:	according IEC 60958
MPEG 1, MPEG 2, AC3	:	according IEC 61937
DTS	:	according IEC 61937 + addendum

1.5.1 USB

Compatibility	:	USB 2.0
Type of connector	:	Series A Connector

1.5.2 HDMI Output

Compatibility	:	HDMI version 1.3
Type of connector	:	Type A connector (19 pins)

1.6 Dimension and Weight

Set Dimension W x H x D	:	790.6 x 100.3 x 50mm
Net Weight	:	1.5kg
Subwoofer Dimension W x H x D	:	182 x 365 x 306mm
Net Weight	:	6kg

1.7 Video Performance

1.7.1 SNR

PAL

RGB	CVBS	Y/C
≥ 55 dB	Lumincance: ≥ 55 dB Chroma: ≥ 55 dB (AM) ≥ 52 dB (PM)	Y: ≥ 57 dB C: ≥ 57 dB (AM) ≥ 54 dB (PM)

NTSC

Y Pb Pr	CVBS	Y/C
≥ 55 dB	Lumincance: ≥ 55 dB Chroma: ≥ 54 dB (AM) ≥ 54 dB (PM)	Y: ≥ 55 dB C: ≥ 54 dB (AM) ≥ 54 dB (PM)

1.7.2 Bandwidth

PAL

RGB	CVBS	Y/C
0.5 to 4 MHz:+1dB/ -2dB	0.5 to 4 MHz:+1dB/ -2dB	Y:4.8MHz-3dB
4.8 MHz:-3dB	4.8 MHz:-3dB	C:700 kHz
5.8 MHz:-6dB	5.8 MHz:-6dB	

NTSC

YPbPr	CVBS	Y/C
4.2 MHz:-3dB	4.2 MHz:-3dB	Y:4.2MHz-3dB
5.8 MHz:-6dB	5.8 MHz:-6dB	C:≥ 700 kHz
With Pscan: 8.4MHz -3dB		

Important

Read and understand all instructions before you use your home theater. If damage is caused by failure to follow instructions, the warranty does not apply.

Safety

Riskof electric shockor fire!

- Never expose the product and accessories to rain or water. Never place liquid containers, such as vases, near the product. If liquids are spilt on or into the product, disconnect it from the power outlet immediately. Contact Philips Consumer Care to have the product checked before use.
- Never place the product and accessories near naked flames or other heat sources, including direct sunlight.
- Never insert objects into the ventilation slots or other openings on the product.
- Where the mains plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.
- Disconnect the product from the power outlet before lightning storms.
- When you disconnect the power cord, always pull the plug, never the cable.

Riskof short circuit or fire!

- Before you connect the product to the power outlet, ensure that the power voltage matches the value printed on the back or bottom of the product. Never connect the product to the power outlet if the voltage is different.

Risk of injury or damage to the home theater!

- For wall-mountable products, use only the supplied wall mount bracket. Secure the wall mount to a wall that can support the combined weight of the product and the wall mount. Koninklijke Philips Electronics N.V. bears no responsibility for improper wall mounting that results in accident, injury or damage.
- For speakers with stands, use only the supplied stands. Secure the stands to the speakers tightly. Place the assembled stands on flat, level surfaces that can support the combined weight of the speaker and stand.
- Never place the product or any objects on power cords or on other electrical equipment.
- If the product is transported in temperatures below 5°C, unpack the product and wait until its temperature matches room temperature before connecting it to the power outlet.
- Visible and invisible laser radiation when open. Avoid exposure to beam.
- Do not touch the disc optical lens inside the disc compartment.

Risk of overheating!

- Never install this product in a confined space. Always leave a space of at least four inches around the product for ventilation. Ensure curtains or other objects never cover the ventilation slots on the product.

Risk of contamination!

- Do not mix batteries (old and new or carbon and alkaline, etc.).
- Remove batteries if they are exhausted or if the remote control is not to be used for a long time.
- Batteries contain chemical substances, they should be disposed of properly.

Product care

- Do not insert any objects other than discs into the disc compartment.
- Do not insert warped or cracked discs into the disc compartment.
- Remove discs from the disc compartment if you are not using the product for an extended period of time.
- Only use microfiber cloth to clean the product.

Disposal of your old product and batteries

Your product is designed and manufactured with high quality materials and components, which can be recycled and reused.

When this crossed-out wheeled bin symbol is attached to a product it means that the product is covered by the European Directive 2002/96/EC. Please inform yourself about the local separate collection system for electrical and electronic products.
Please act according to your local rules and do not dispose of your old products with your normal household waste.
Correct disposal of your old product helps to prevent potential negative consequences for the environment and human health.

Your product contains batteries covered by the European Directive 2006/66/EC, which cannot be disposed with normal household waste.
Please inform yourself about the local rules on separate collection of batteries because correct disposal helps to prevent negative consequences for the environmental and human health.

Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts, and wires have been returned to their original positions. Afterwards, do the following tests and confirm the specified values to verify compliance with safety standards.

1. Clearance Distance

When replacing primary circuit components, confirm specified clearance distance (d) and (d') between soldered terminals, and between terminals and surrounding metallic parts. (See Fig. 1)

Table 1: Ratings for selected area

AC Line Voltage	Clearance Distance (d), (d')
110V~220V	≥ 3.2 mm (0.126 inches)

Note: This table is unofficial and for reference only. Be sure to confirm the precise values.

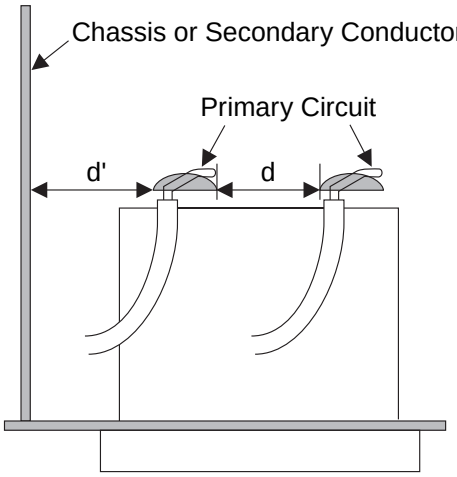


Fig. 1

2. Leakage Current Test

Confirm the specified (or lower) leakage current between B (earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.) is lower than or equal to the specified value in the table below.

Measuring Method (Power ON):

Insert load Z between B (earth ground, power cord plug prongs) and exposed accessible parts. Use an AC voltmeter to measure across the terminals of load Z. See Fig. 2 and the following table.

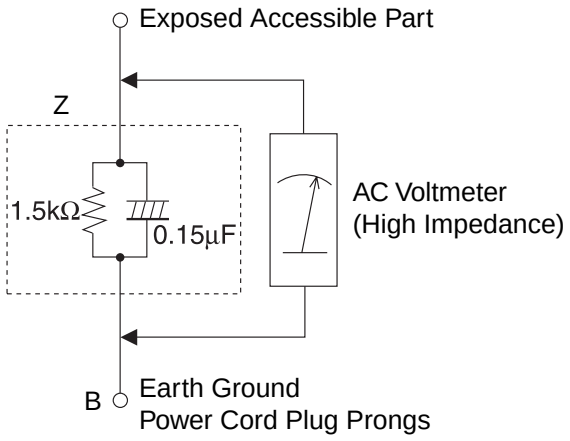


Fig. 2

Table 2: Leakage current ratings for selected areas

AC Line Voltage	Load Z	Leakage Current (i)	Earth Ground (B) to:
110V~220V	0.15 μF CAP. & 1.5 kΩ RES. Connected in parallel	i ≤ 0.5 mA Peak	Exposed accessible parts

Note: This table is unofficial and for reference only. Be sure to confirm the precise values.

Safety Information, General Notes & Lead Free Requirements

1 Safety Instructions

1.1 General Safety

Safety regulations require that during a repair:

- Connect the unit to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol ⚠ , only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that after a repair, you must return the unit in its original condition. Pay, in particular, attention to the following points:

- Route the wires/cables correctly, and fix them with the mounted cable clamps.
- Check the insulation of the mains lead for external damage.
- Check the electrical DC resistance between the mains plug and the secondary side:
  1. Unplug the mains cord, and connect a wire between the two pins of the mains plug.
  2. Set the mains switch to the 'on' position (keep the mains cord unplugged!).
  3. Measure the resistance value between the mains plug and the front panel, controls, and chassis bottom.
  4. Repair or correct unit when the resistance measurement is less than 1 MΩ.
  5. Verify this, before you return the unit to the customer/ user (ref. UL-standard no. 1492).
  6. Switch the unit 'off', and remove the wire between the two pins of the mains plug.

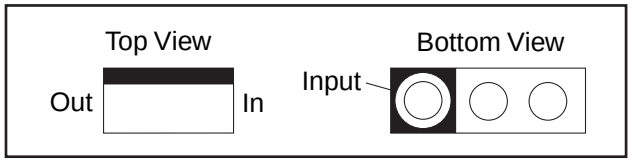
2 Warnings

2.1 General

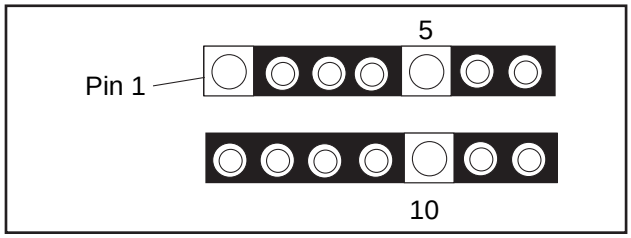
- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD, ⚠). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are at the same potential as the mass of the set by a wristband with resistance. Keep components and tools at this same potential.
  Available ESD protection equipment:
  - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
  - Wristband tester 4822 344 13999.
- Be careful during measurements in the live voltage section. The primary side of the power supply, including the heatsink, carries live mains voltage when you connect the player to the mains (even when the player is 'off'!). It is possible to touch copper tracks and/ or components in this unshielded primary area, when you service the player. Service personnel must take precautions to prevent touching this area or components in this area. A 'lightning stroke' and a stripe-marked printing on the printed wiring board, indicate the primary side of the power supply.
- Never replace modules, or components, while the unit is 'on'.

Circuit Board Indications

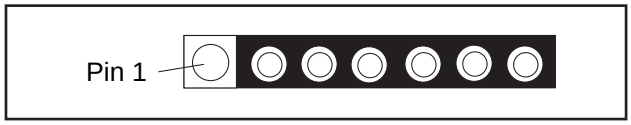
1. The output pin of the 3 pin Regulator ICs is indicated as shown.



2. For other ICs, pin 1 and every fifth pin are indicated as shown.

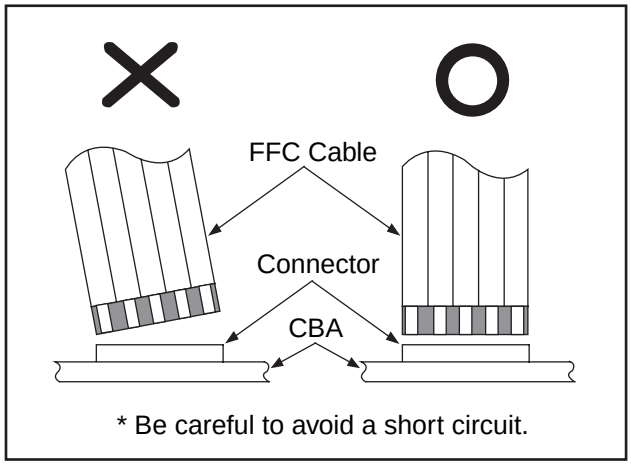


3. The 1st pin of every male connector is indicated as shown.



Instructions for Connectors

1. When you connect or disconnect the FFC (Flexible Foil Connector) cable, be sure to first disconnect the AC cord.
2. FFC (Flexible Foil Connector) cable should be inserted parallel into the connector, not at an angle.



Pb (Lead) Free Solder

When soldering, be sure to use the Pb free solder.

Information about lead-free soldering

Philips CE is producing lead-free sets from 1.1.2005 onwards.

IDENTIFICATION

Regardless of special logo (not always indicated)

One must treat all sets from 1 Jan 2005 onwards, according to the next rule:
Serial Number gives a 14-digit. Digit 5&6 shows the YEAR, and digit 7&8 shows the WEEK.

So from 0501 onwards=from 1 Jan 2005 onwards

Important note : In fact also products of year 2004 must be treated in this way as long as you avoid mixing solder-alloys (leaded/ lead-free). So best to always use SAC305 and the higher temperatures belong to this.

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free solder alloy Philips SAC305 with order code 0622 149 00106. If lead-free solder-paste is required, please contact the manufacturer of your solder-equipment. In general use of solder-paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free solder alloy. The solder tool must be able
  - To reach at least a solder-temperature of 400°C,
  - To stabilize the adjusted temperature at the solder-tip
  - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature around 360°C - 380°C is reached and stabilized at the solder joint. Heating-time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C otherwise wear-out of tips will rise drastically and flux-fluid will be destroyed. To avoid wear-out of tips switch off un-used equipment, or reduce heat.
- Mix of lead-free solder alloy / parts with leaded solder alloy / parts is possible but PHILIPS recommends strongly to avoid mixed solder alloy types (leaded and lead-free).
  If one cannot avoid or does not know whether product is lead-free, clean carefully the solder-joint from old solder alloy and re-solder with new solder alloy (SAC305).
- Use only original spare-parts listed in the Service-Manuals. Not listed standard-material (commodities) has to be purchased at external companies.

- Special information for BGA-ICs:
  - always use the 12nc-recognizable soldering temperature profile of the specific BGA (for de-soldering always use the lead-free temperature profile, in case of doubt)
  - lead free BGA-ICs will be delivered in so-called 'dry-packaging' (sealed pack including a silica gel pack) to protect the IC against moisture. After opening, dependent of MSL-level seen on indicator-label in the bag, the BGA-IC possibly still has to be baked dry. (MSL=Moisture Sensitivity Level). This will be communicated via AYS-website.
  Do not re-use BGAs at all.
- For sets produced before 1.1.2005 (except products of 2004), containing leaded solder-alloy and components, all needed spare-parts will be available till the end of the service-period. For repair of such sets nothing changes.
- On our website www.atyourservice.ce.Philips.com you find more information to:
  - BGA-de-/soldering (+ baking instructions)
  - Heating-profiles of BGAs and other ICs used in Philips-sets

You will find this and more technical information within the “magazine”, chapter “workshop news”.

For additional questions please contact your local repair-helpdesk.

How to Remove / Install Flat Pack-IC

1. Removal

With Hot-Air Flat Pack-IC Desoldering Machine:

1. Prepare the hot-air flat pack-IC desoldering machine, then apply hot air to the Flat Pack-IC (about 5 to 6 seconds). (Fig. S-1-1)

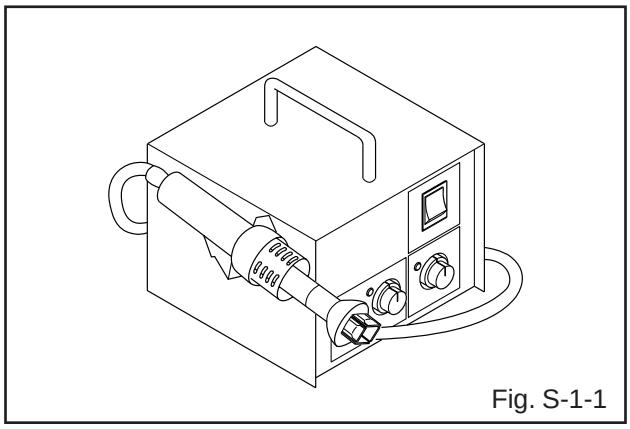


Fig. S-1-1

2. Remove the flat pack-IC with tweezers while applying the hot air.
3. Bottom of the flat pack-IC is fixed with glue to the CBA; when removing entire flat pack-IC, first apply soldering iron to center of the flat pack-IC and heat up. Then remove (glue will be melted). (Fig. S-1-6)
4. Release the flat pack-IC from the CBA using tweezers. (Fig. S-1-6)

CAUTION:

1. The Flat Pack-IC shape may differ by models. Use an appropriate hot-air flat pack-IC desoldering machine, whose shape matches that of the Flat Pack-IC.
2. Do not supply hot air to the chip parts around the flat pack-IC for over 6 seconds because damage to the chip parts may occur. Put masking tape around the flat pack-IC to protect other parts from damage. (Fig. S-1-2)

3. The flat pack-IC on the CBA is affixed with glue, so be careful not to break or damage the foil of each pin or the solder lands under the IC when removing it.

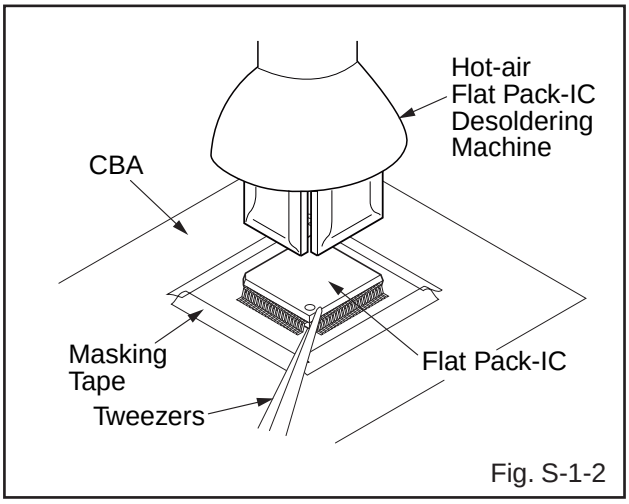


Fig. S-1-2

With Soldering Iron:

1. Using desoldering braid, remove the solder from all pins of the flat pack-IC. When you use solder flux which is applied to all pins of the flat pack-IC, you can remove it easily. (Fig. S-1-3)

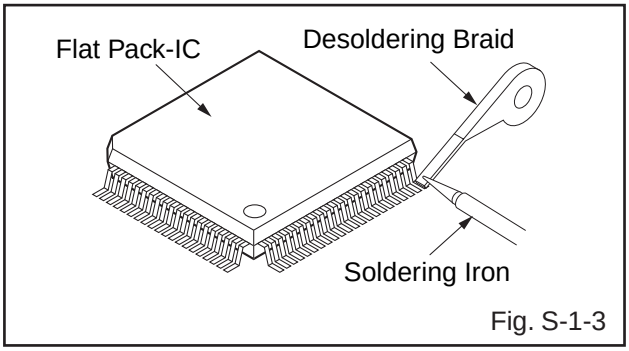


Fig. S-1-3

2. Lift each lead of the flat pack-IC upward one by one, using a sharp pin or wire to which solder will not adhere (iron wire). When heating the pins, use a fine tip soldering iron or a hot air desoldering machine. (Fig. S-1-4)

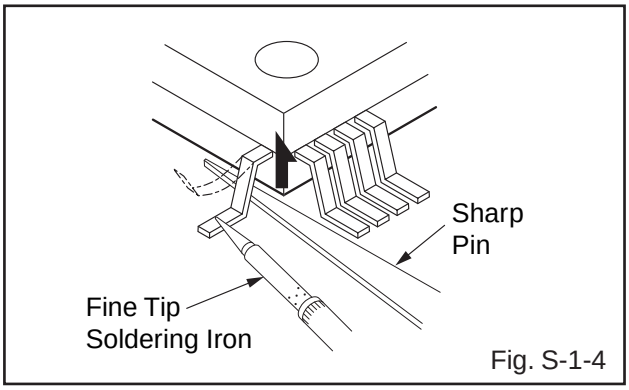


Fig. S-1-4

3. Bottom of the flat pack-IC is fixed with glue to the CBA; when removing entire flat pack-IC, first apply soldering iron to center of the flat pack-IC and heat up. Then remove (glue will be melted). (Fig. S-1-6)
4. Release the flat pack-IC from the CBA using tweezers. (Fig. S-1-6)

With Iron Wire:

1. Using desoldering braid, remove the solder from all pins of the flat pack-IC. When you use solder flux which is applied to all pins of the flat pack-IC, you can remove it easily. (Fig. S-1-3)
2. Affix the wire to a workbench or solid mounting point, as shown in Fig. S-1-5.
3. While heating the pins using a fine tip soldering iron or hot air blower, pull up the wire as the solder melts so as to lift the IC leads from the CBA contact pads as shown in Fig. S-1-5.
4. Bottom of the flat pack-IC is fixed with glue to the CBA; when removing entire flat pack-IC, first apply soldering iron to center of the flat pack-IC and heat up. Then remove (glue will be melted). (Fig. S-1-6)
5. Release the flat pack-IC from the CBA using tweezers. (Fig. S-1-6)

Note: When using a soldering iron, care must be taken to ensure that the flat pack-IC is not being held by glue. When the flat pack-IC is removed from the CBA, handle it gently because it may be damaged if force is applied.

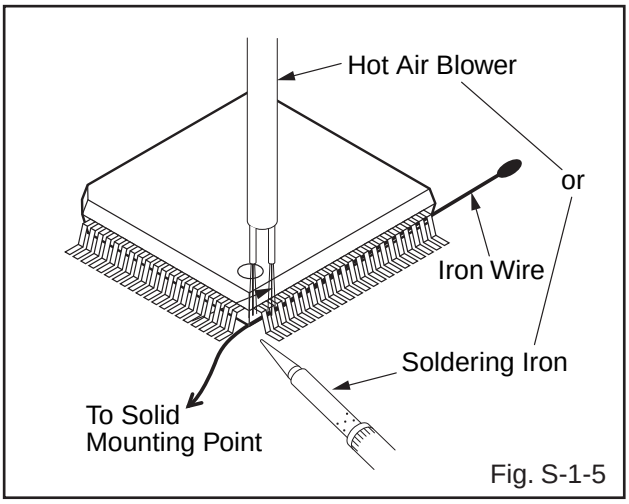


Fig. S-1-5

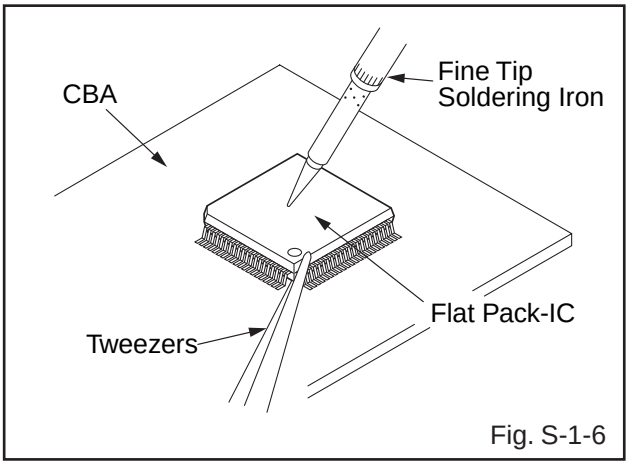
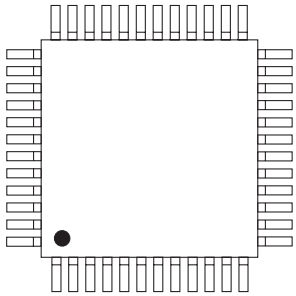


Fig. S-1-6

2. Installation

1. Using desoldering braid, remove the solder from the foil of each pin of the flat pack-IC on the CBA so you can install a replacement flat pack-IC more easily.
2. The "●" mark on the flat pack-IC indicates pin 1. (See Fig. S-1-7.) Be sure this mark matches the 1 on the PCB when positioning for installation. Then presolder the four corners of the flat pack-IC. (See Fig. S-1-8.)
3. Solder all pins of the flat pack-IC. Be sure that none of the pins have solder bridges.

Example :



Pin 1 of the Flat Pack-IC is indicated by a " ● " mark.

Fig. S-1-7

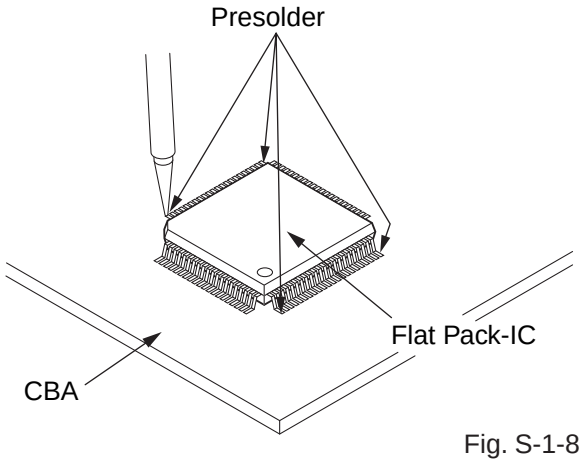


Fig. S-1-8

Instructions for Handling Semi-conductors

Electrostatic breakdown of the semi-conductors may occur due to a potential difference caused by electrostatic charge during unpacking or repair work.

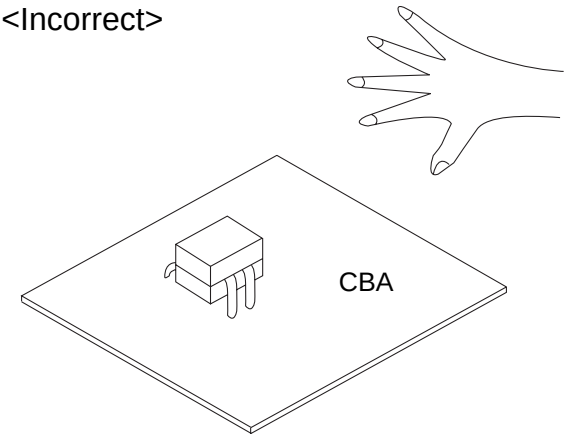
1. Ground for Human Body

Be sure to wear a grounding band (1 MΩ) that is properly grounded to remove any static electricity that may be charged on the body.

2. Ground for Workbench

Be sure to place a conductive sheet or copper plate with proper grounding (1 MΩ) on the workbench or other surface, where the semi-conductors are to be placed. Because the static electricity charge on clothing will not escape through the body grounding band, be careful to avoid contacting semi-conductors with your clothing.

<Incorrect>



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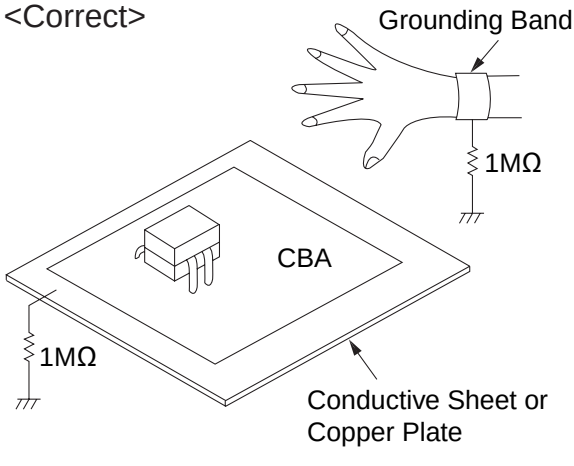
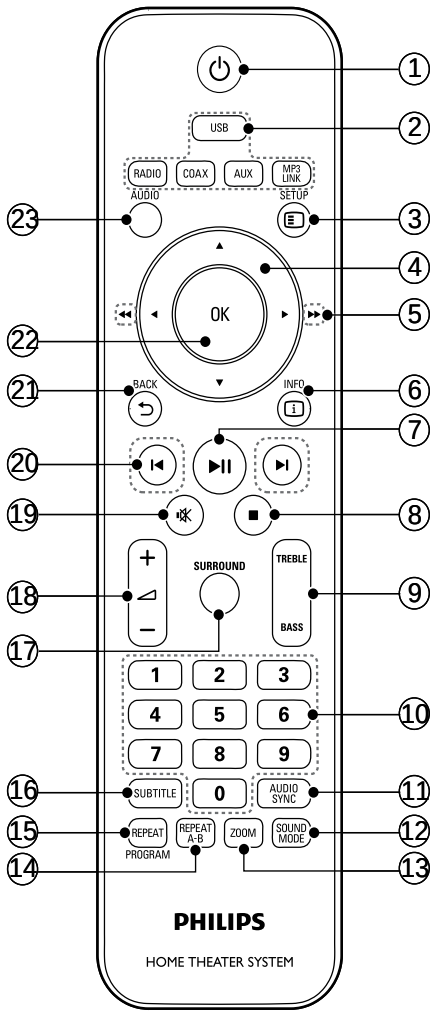


*The following excerpt of the DFU/QSG serves as an introduction to the set. The Complete Direction for Use can be download in different languages from the internet site of Philips Customer care Center: www.p4c.philips.com

Remote Control



a ⏻ (Standby-On)
- Switches the home theater on or to standby.
- When EasyLink is enabled, press and hold for at least three seconds to switch all connected HDMI CEC compliant devices to standby.

b Audio Source
- USB Switches to USB storage device.
- RADIO: Switches to FM radio.
- COAX: Switches to coaxial digital input source.
- AUX: Switches to auxiliary input source.
- MP3 LINK: Switches to MP3 Link input source.

c SETUP
Accesses or exits the setup menu.

d ▲▼◀▶ (Navigation buttons)
- Navigate menus.
- In video mode, press left or right to fast backward or fast forward.
- In radio mode, press left or right to search a radio station; press up or down to fine tune a radio frequency.

e ◀◀ (Fast Backward) ▶▶ (Fast Forward)
Fast backwards or fast forwards. Press repeatedly to change the search speed.

f INFO
Displays information about what is playing.

g ▶❚❚ (Play/Pause)
Starts, pauses or resumes playback.

h ■ (Stop)
- Stops playback.
- In radio mode, erases the current preset radio station.

i TREBLE / BASS
Changes treble or bass. Use with +/-.

j Numeric buttons
Selects an item to play.

k AUDIO SYNC
Press and hold to access the setting for audio sync, then press +/- to set the audio delay time.

l SOUND MODE
Selects a predefined sound effect.

m ZOOM
Zooms into a video scene or picture.

n REPEAT A-B

Remote Control

Marks two points within a chapter or track for repeat play, or turns off repeat mode.

o REPEAT / PROGRAM
- Selects a repeat or shuffle mode.
- In radio mode, programs radio stations.

p SUBTITLE
Selects a subtitle language for video.

q SURROUND
Selects Dolby Virtual Speaker surround sound.

r ◿ +/-
Increases or decreases volume.

s 🔇 (Mute)
Mutes or restores volume.

t ⏮ / ⏭ (Previous/Next)
Skips to the previous or next track, chapter or file.

u ⮌ BACK
Returns to a previous menu screen.

v OK
Confirms an entry or selection.

w AUDIO
Selects an audio language or channel.

Connect your home theater

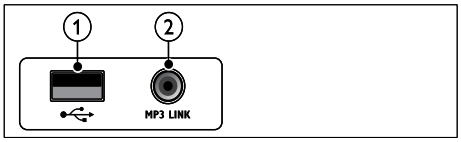
This section helps you connect your home theater to a TV and other devices. The basic connections of the home theater with its accessories are provided in the Quick Start. For a comprehensive interactive guide, see www.connectivityguide.philips.com.

Note

- Refer to the type plate at the back or bottom of the product for identification and supply ratings.
- Before you make or change any connections, ensure that all devices are disconnected from the power outlet.

Connectors

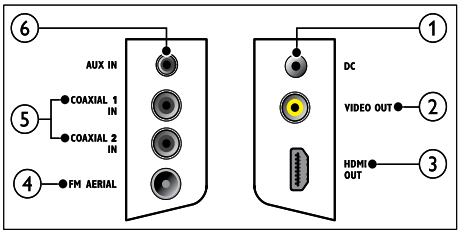
Front connectors



a ⇐ (USB)
Audio, video or picture input from a USB storage device.

b MP3 LINK
Audio input from an MP3 player.

Back connectors



a DC IN
Connects to the AC-DC adapter.

b VIDEO OUT (CVBS)
Connects to the composite video input on the TV.

c HDMI OUT
Connects to the HDMI input on the TV.

d FM75Ω
Connects the FM antenna for radio reception.

e DIGITAL IN-COAXIAL
Connects to the coaxial audio output on the TV or a digital device.

f AUX IN
Connects to the analog audio output on the TV or an analog device.

Connect to the TV

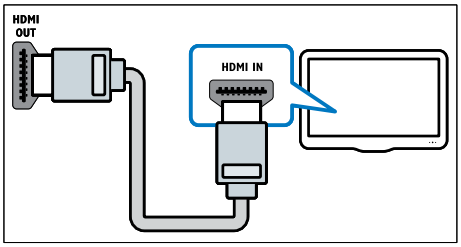
Connect your home theater directly to a TV through one of the following connectors (from highest to basic quality video):

a HDMI

b Composite video

c SCART

Option 1: Connect to the TV through HDMI



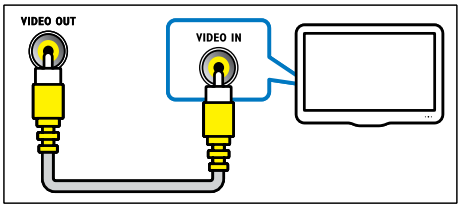
Note

- If the HDTV has a DVI connector, connect using an HDMI/DVI adaptor.
- If the TV supports EasyLink HDMI CEC, control the home theater and TV with one remote control (see 'Use Philips EasyLink' on page 17).

Option 2: Connect to the TV through composite video (CVBS)

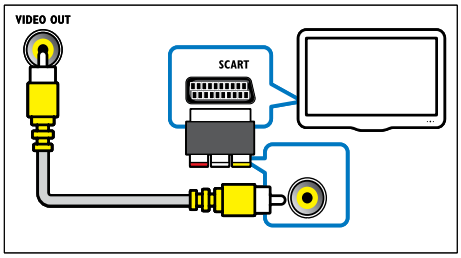
Note

- The composite video cable or connector might be labeled AV IN, VIDEO IN, COMPOSITE or BASEBAND



Option 3: Connect to the TV through SCART

Use the supplied scart adapter.



Connect audio from TV or other devices

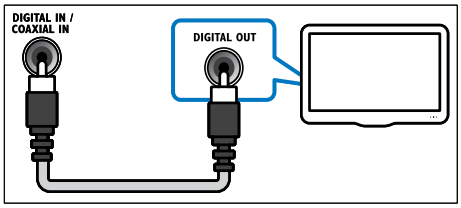
Use your home theater to play audio from the TV or other devices such as a cable box. Choose from the following connectors.

Option 1: Connect audio through a digital coaxial cable

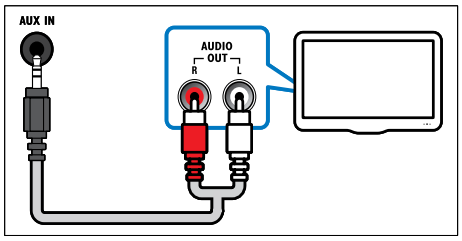
Note

- The digital coaxial cable or connector might be labeled COAXIAL DIGITAL OUT or SPDIF OUT.

(Cable not supplied)



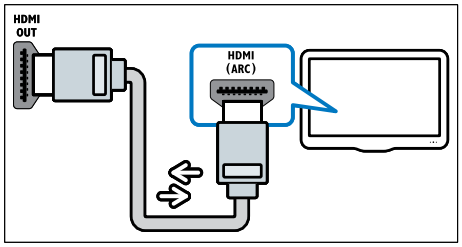
Option 2: Connect audio through analog audio cables



Option 3: Connect audio through an HDMI cable

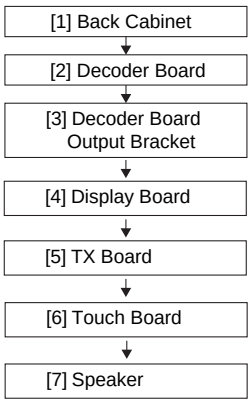
Note

- The HDMI connector on the TV might be labeled HDMI 1 or HDMI ARC. This feature works with Audio Return Channel (ARC) compatible devices only.



1. Disassembly Flowchart

This flowchart indicates the disassembly steps to gain access to item(s) to be serviced. When reassembling, follow the steps in reverse order. Bend, route, and dress the cables as they were originally.



Note:

(1) Identification (location) No. of parts in the figures

(2) Name of the part

(3) Figure Number for reference

(4) Identification of parts to be removed, unhooked, unlocked, released, unplugged, unclamped, or desoldered.
Axx = Screw, CNxx/Jxx/CONxx = Connector
D3.5X12BA is specification of screw.

* = Unhook, Unlock, Release, Unplug, or Desolder

e.g. 7(A01) = seven Screws

2. Disassembly Method

ID/ Loc. No.	Part	Removal		
		Fig. No.	Remove/*Unhook/ Unlock/Release/ Unplug/Desolder	Note
[1]	Back Cabinet	D1	7(A01) D3.5x12BA 4(A01) D3x10FA	
[2]	Decoder Board	D2	3(A06) D3x8PA J2, J4, J7, J8, P2, CON6, CON8	
[3]	Decoder Board Output Bracket	D2	2(A05) D3x10PA	
[4]	Display Board	D3	3(A06) D3x8PA CN200, CN201, CN202, CN203	
[5]	Radio Transfer Board	D3	2(A07) D3x6PT J11	
[6]	Touch Board	D4	13(A09) D2x4PWB CN101, CN102	
[7]	Speaker	D5	24(A08) D3x8BA	

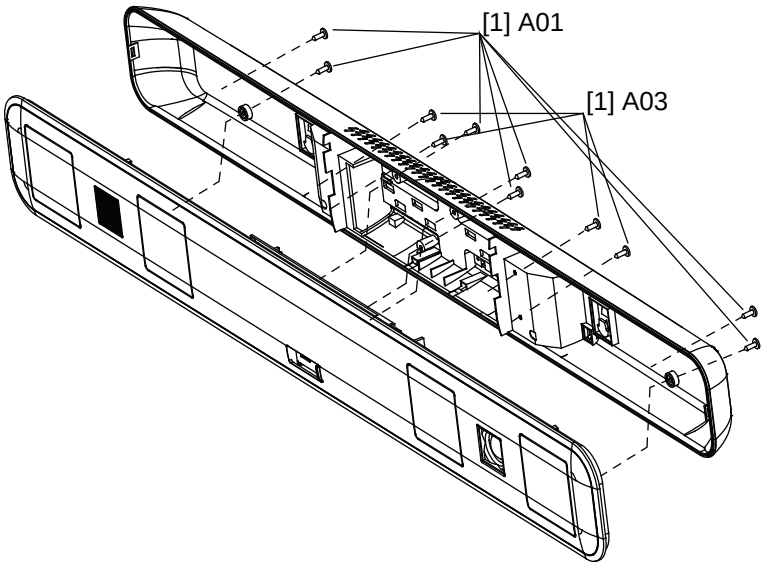


Fig. D1

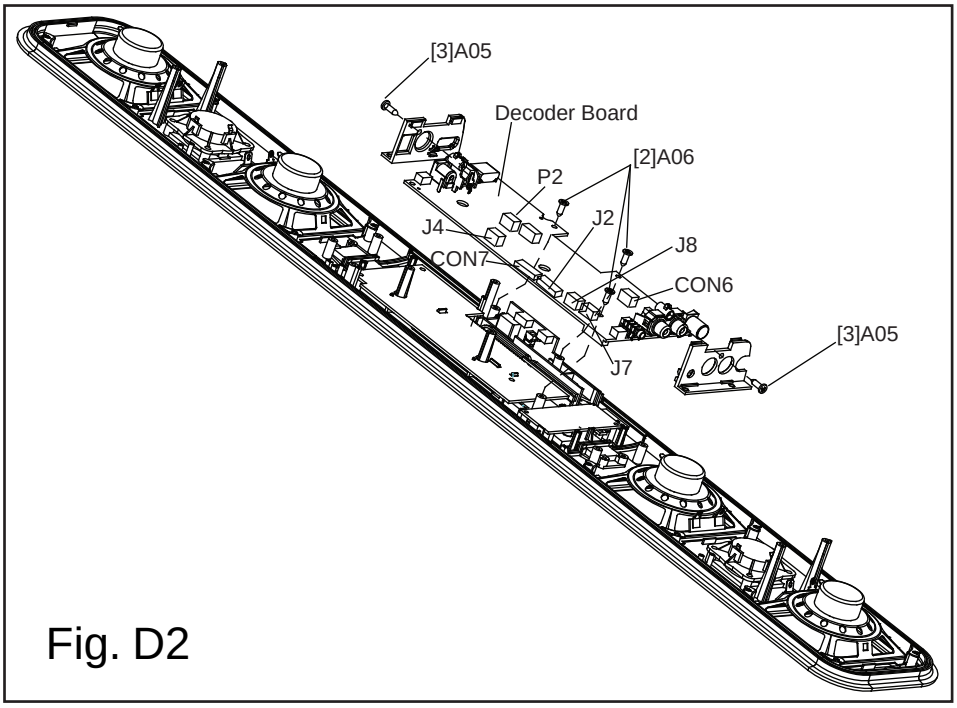

[3]A05
Decoder Board
[2]A06
P2
J2
J4
J8
CON7
CON6
[3]A05
J7

Fig. D2

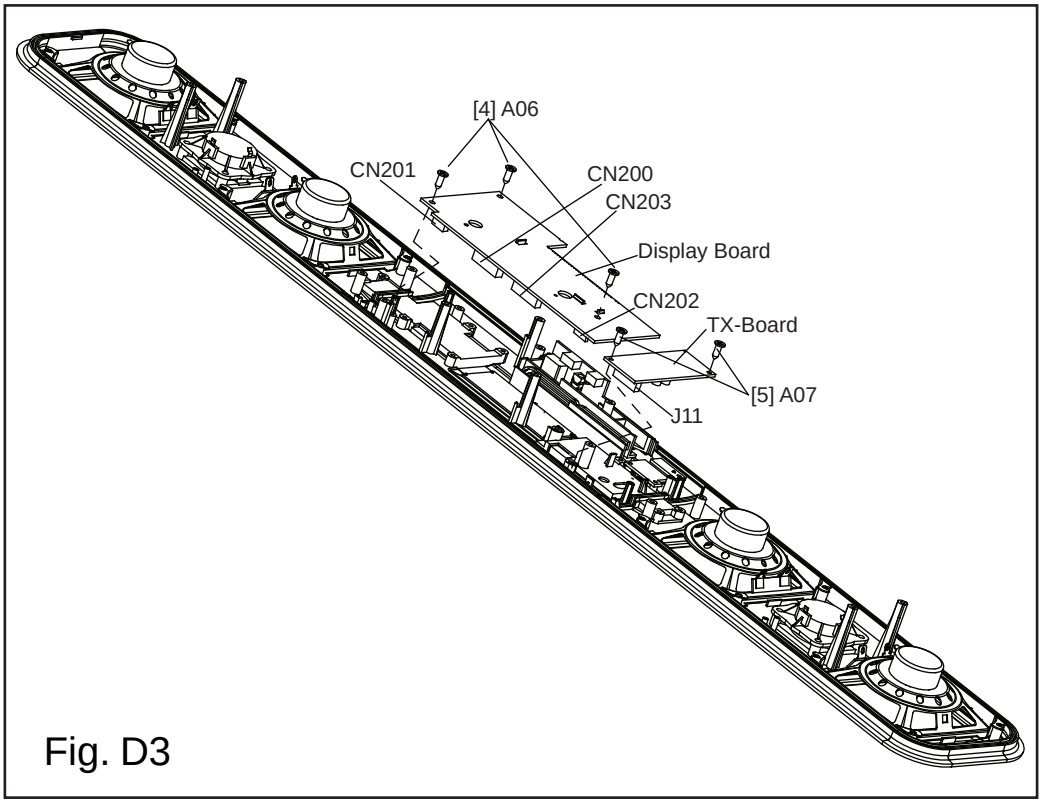

[4] A06
CN201
CN200
CN203
Display Board
CN202
TX-Board
[5] A07
J11

Fig. D3

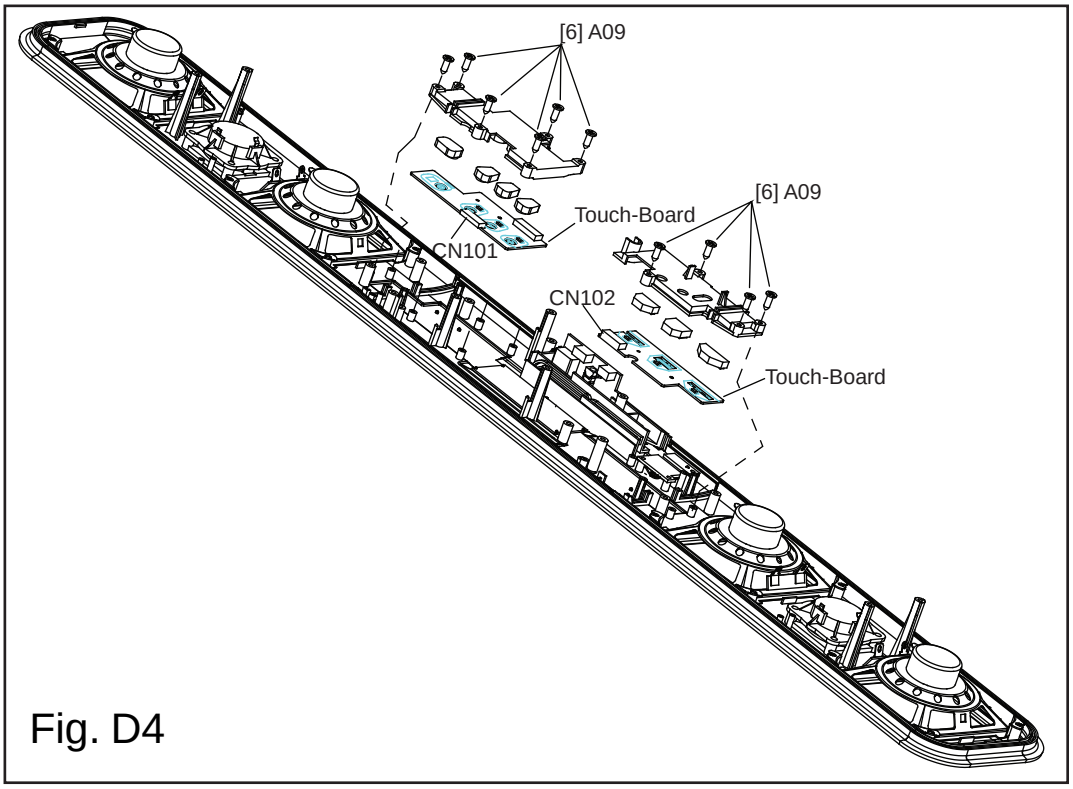

[6] A09
[6] A09
Touch-Board
CN101
CN102
Touch-Board

Fig. D4

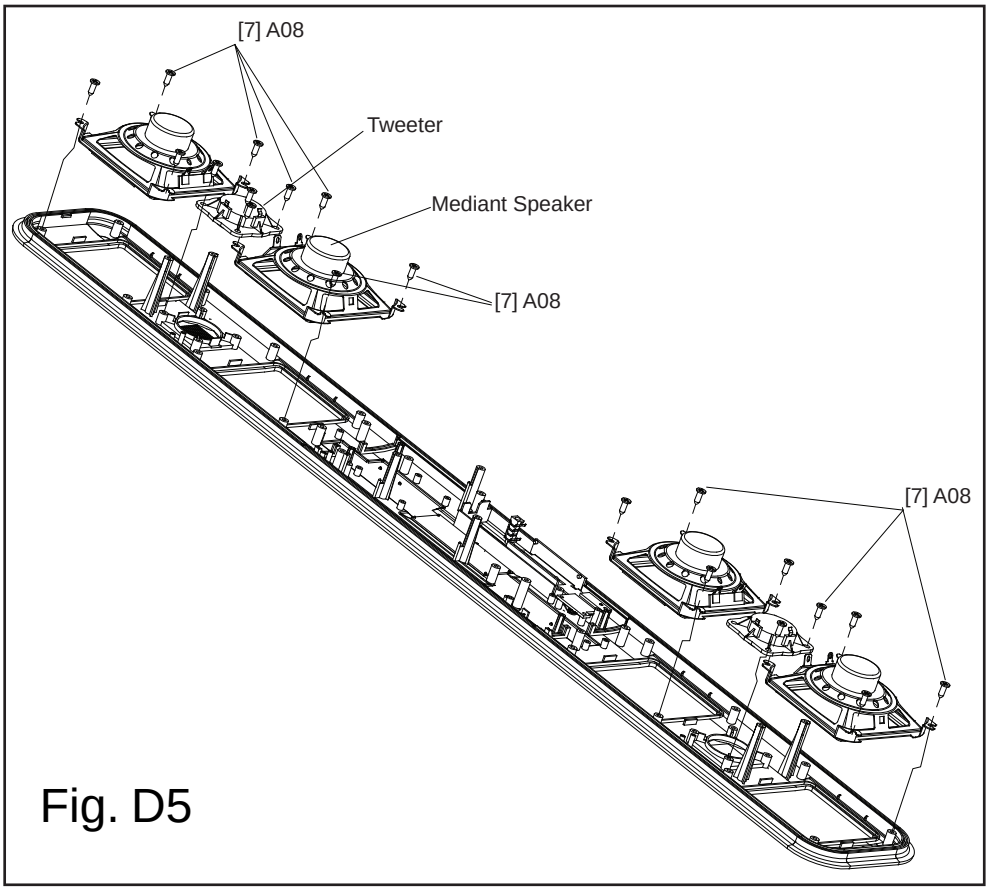
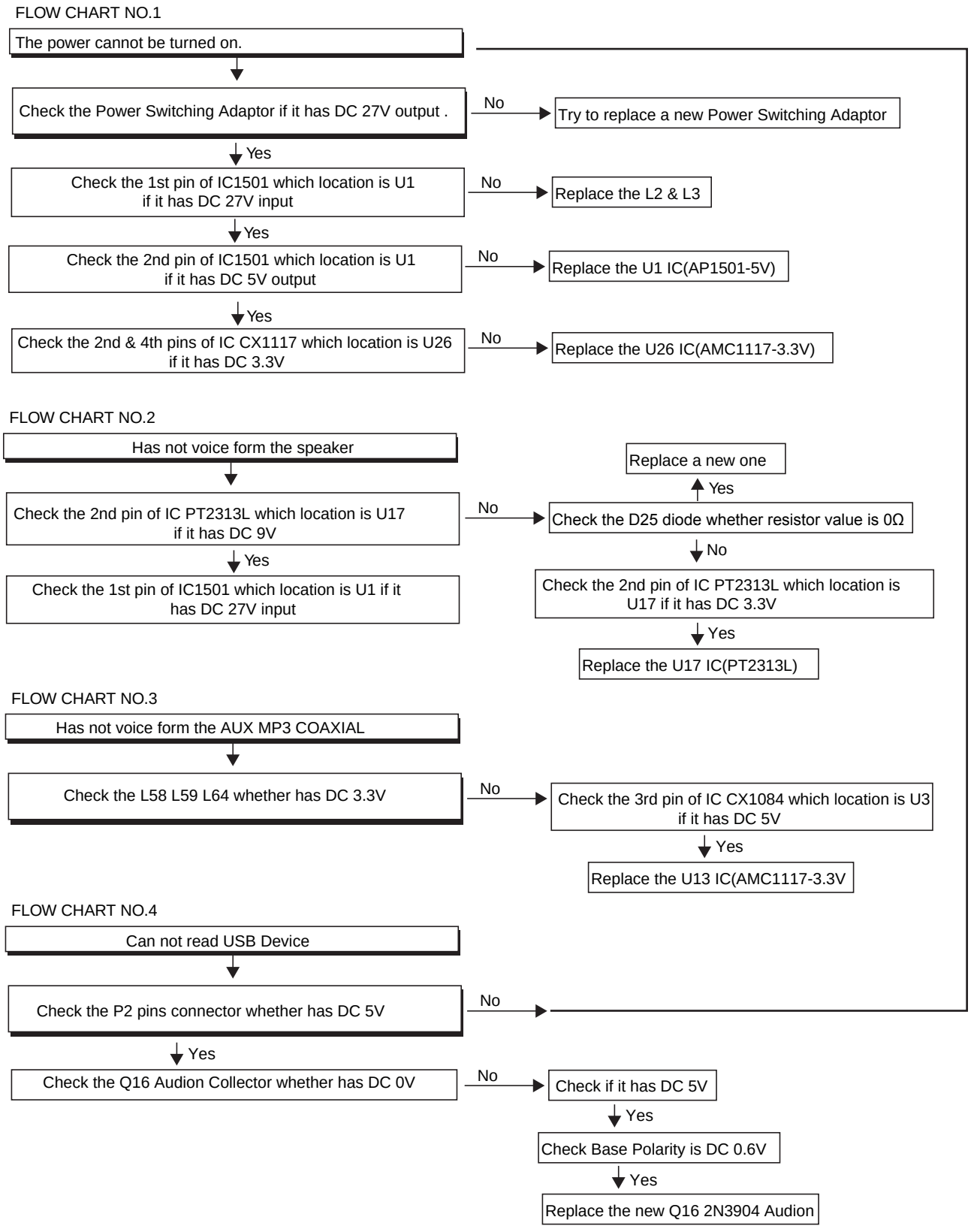

[7] A08
Tweeter
Mediant Speaker
[7] A08
[7] A08

Fig. D5

Troubleshooting



Software Upgrading Procedure

1, Download the Software from Philips support Website:

http://www.philips.com/support.

2, Copy the Software upgrade file into USB Device.

A, Connect to TV and Turn on Main Unit

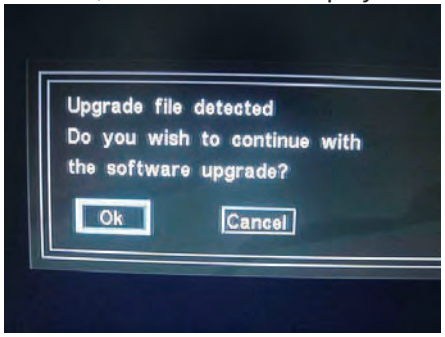
Main unit Screen Display:

TV Screen Display:

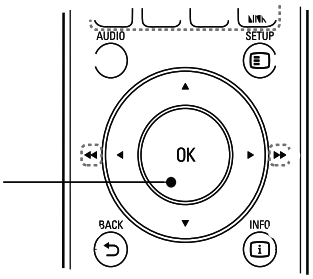
B, When insert the USB Device with software

Main unit Screen Display:

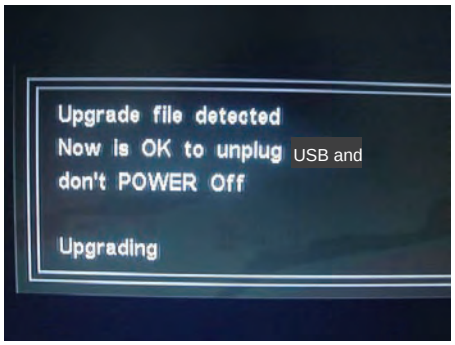
Meanwhile, the TV Screen Display:



C, Press the “OK” on the Remote Control.



D, Software Upgrading, TV Screen Display:



At that time, can unplug the USB Device.

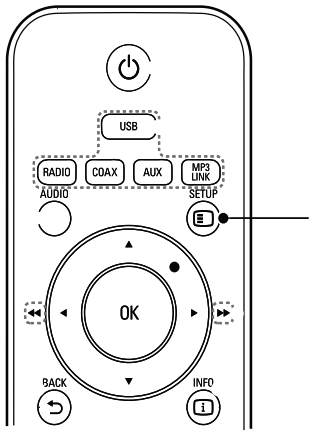
E, After 1 or 2 minute, the TV Screen Display will power off automatically.

Just a moment, the TV Screen will reset and Display:

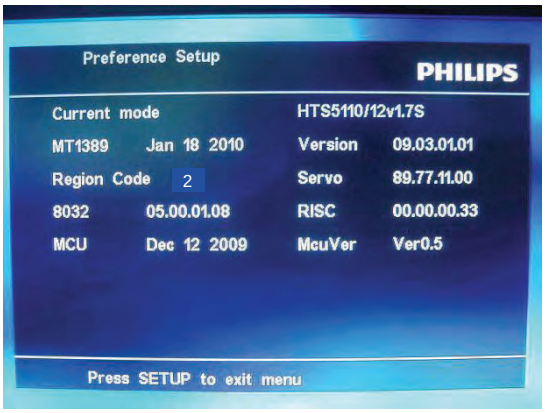
Software Upgrade finish.

Software Version Check

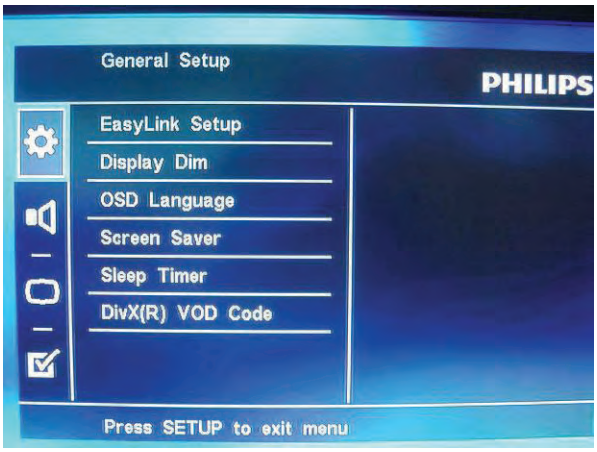
1, Select the “Menu”, like below show:



Press OK on Remote Control:

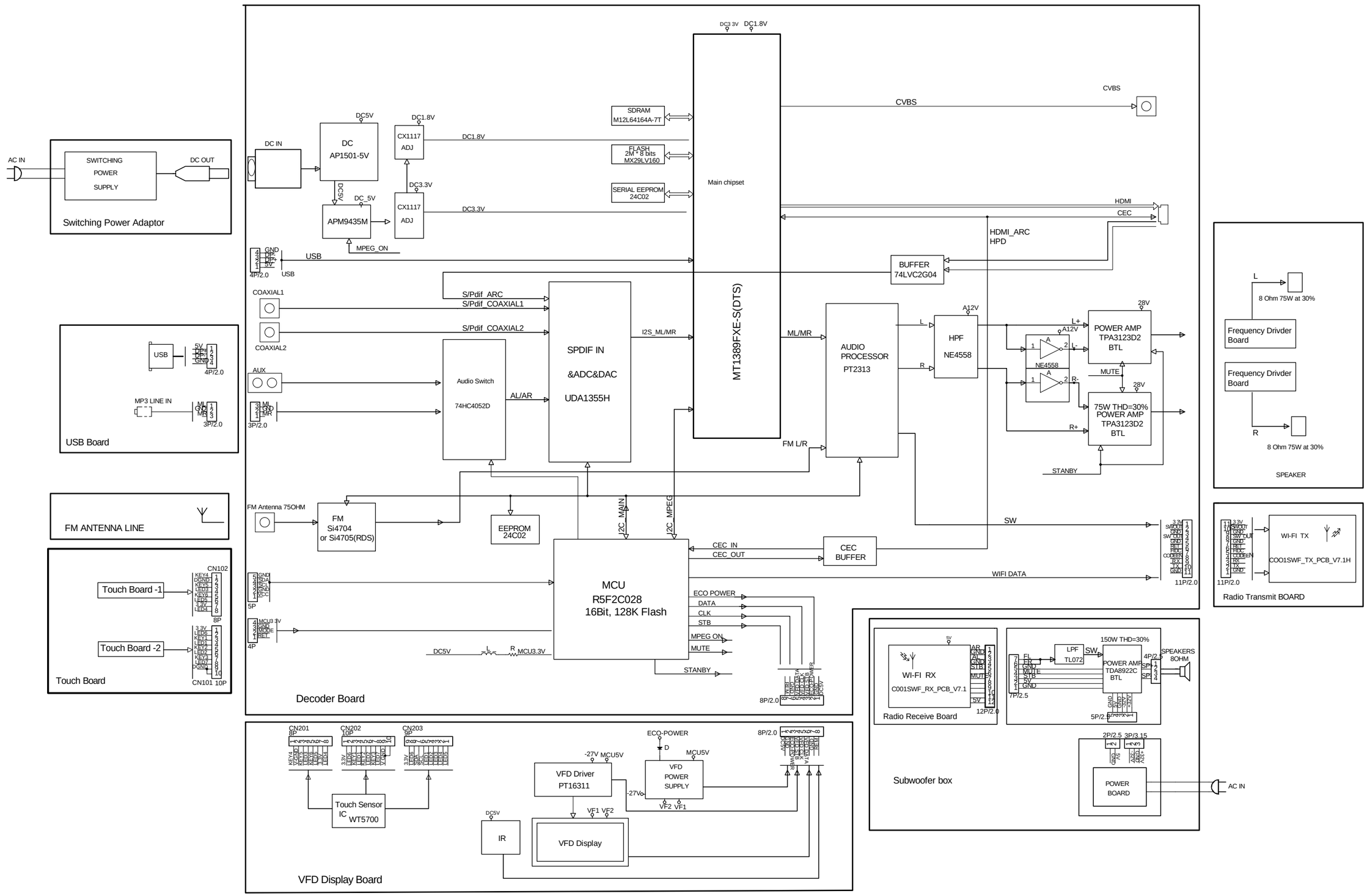


2, TV Screen Display:



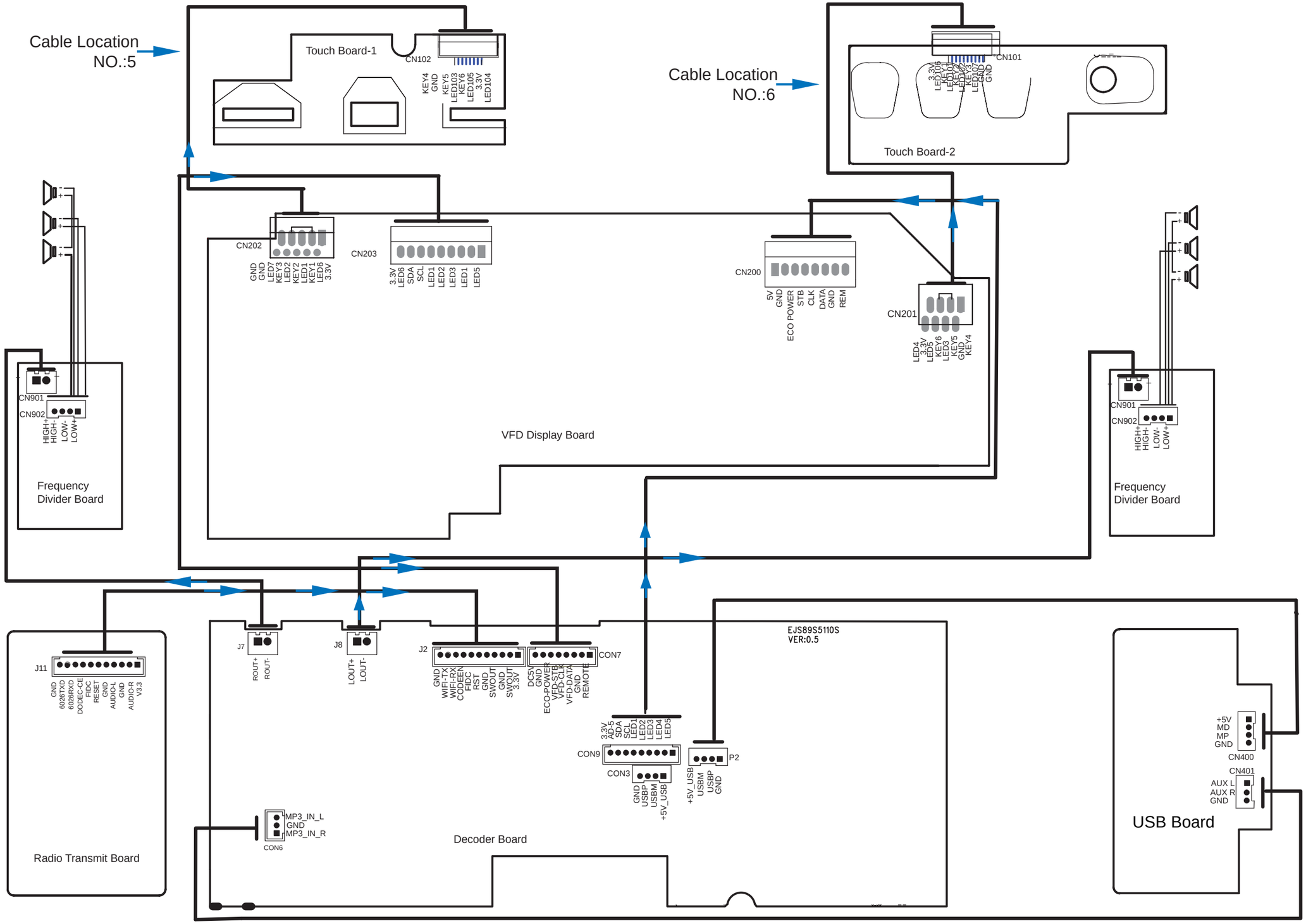
2, Select ☑ to get the Version information :

Block Diagram



11-1

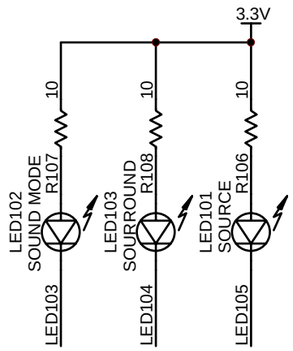
Wiring Diagram

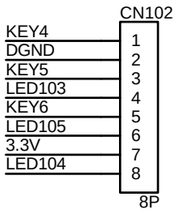


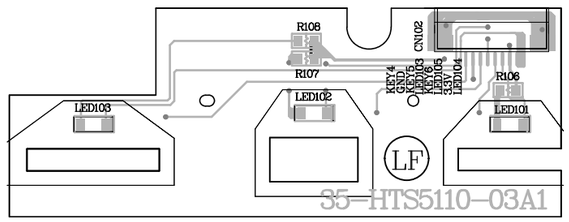
12-1

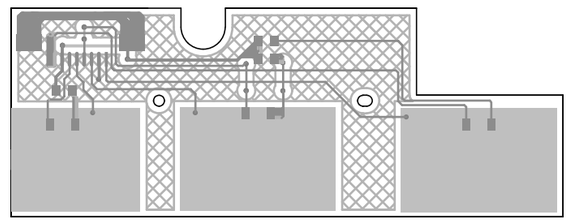
Main Unit--Touch Board Circuit & Layout Diagram

Touch Board-1

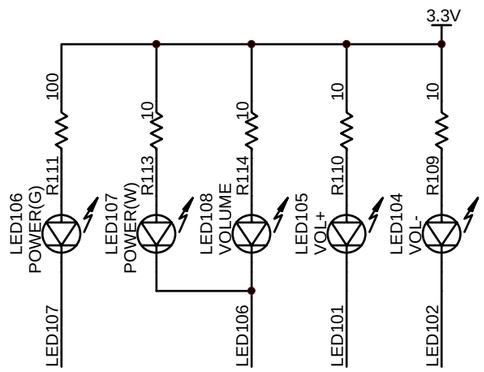


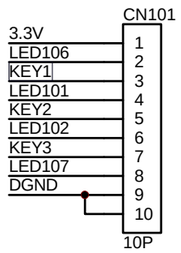


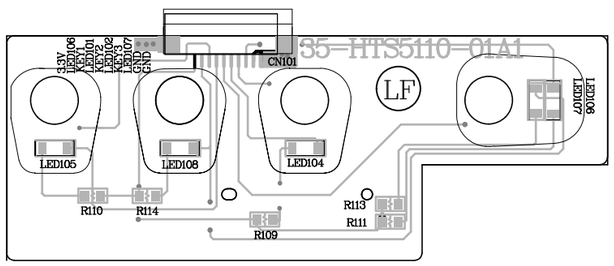


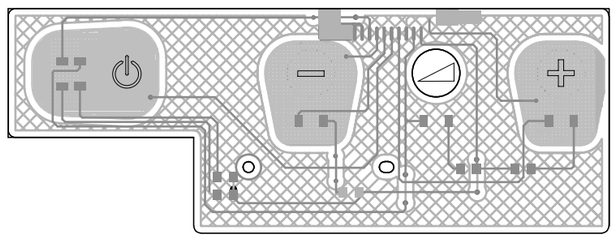


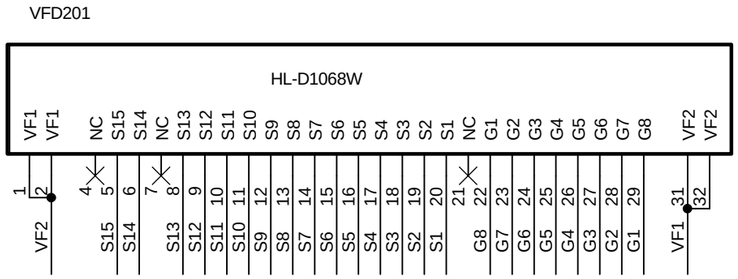
Touch Board-2

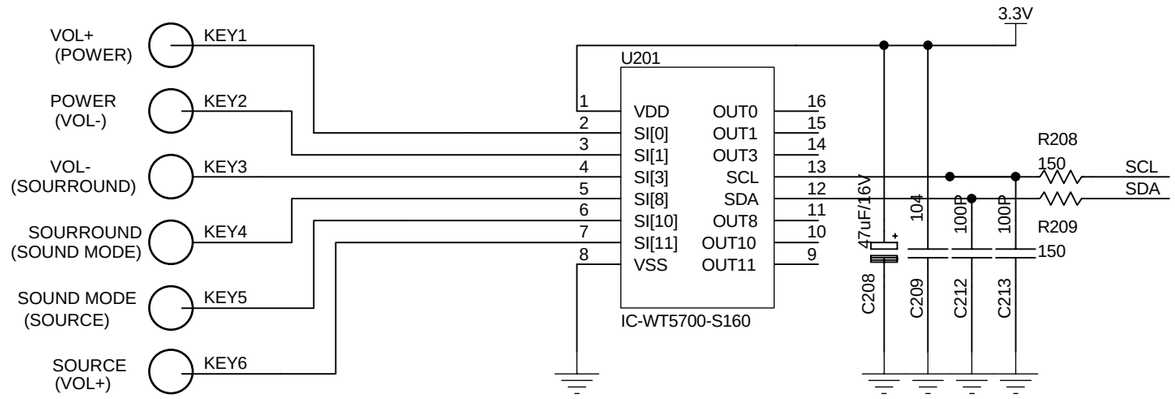


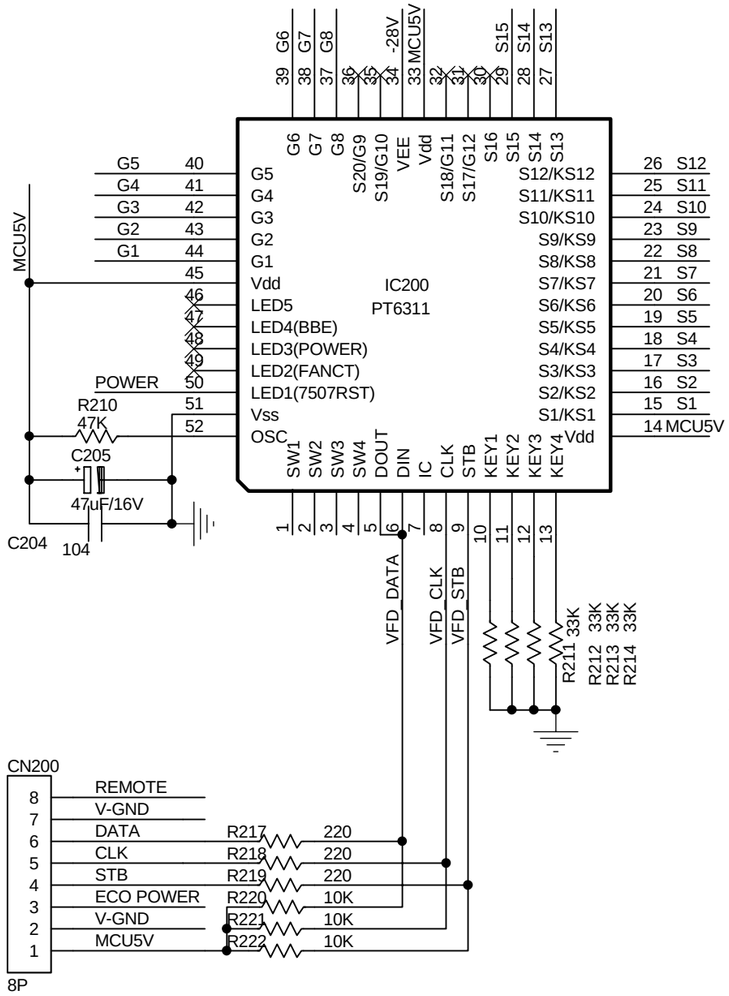


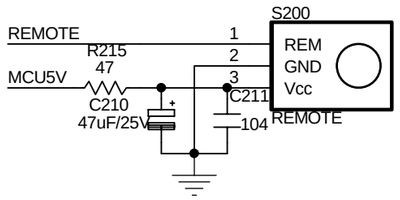


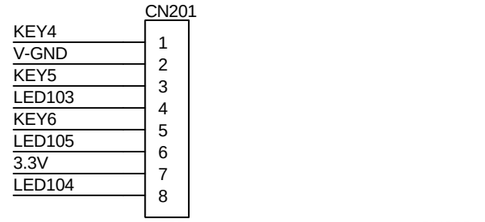


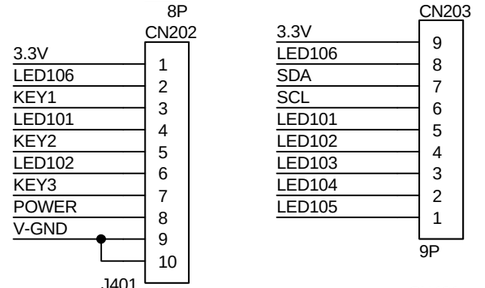

VFD201
HL-D1068W
VF1 VF1 NC S15 S14 NC S13 S12 S11 S10 S9 S8 S7 S6 S5 S4 S3 S2 S1 NC G1 G2 G3 G4 G5 G6 G7 G8 VF2 VF2
1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 31 32
VF2 S15 S14 S13 S12 S11 S10 S9 S8 S7 S6 S5 S4 S3 S2 S1 G8 G7 G6 G5 G4 G3 G2 G1 VF1

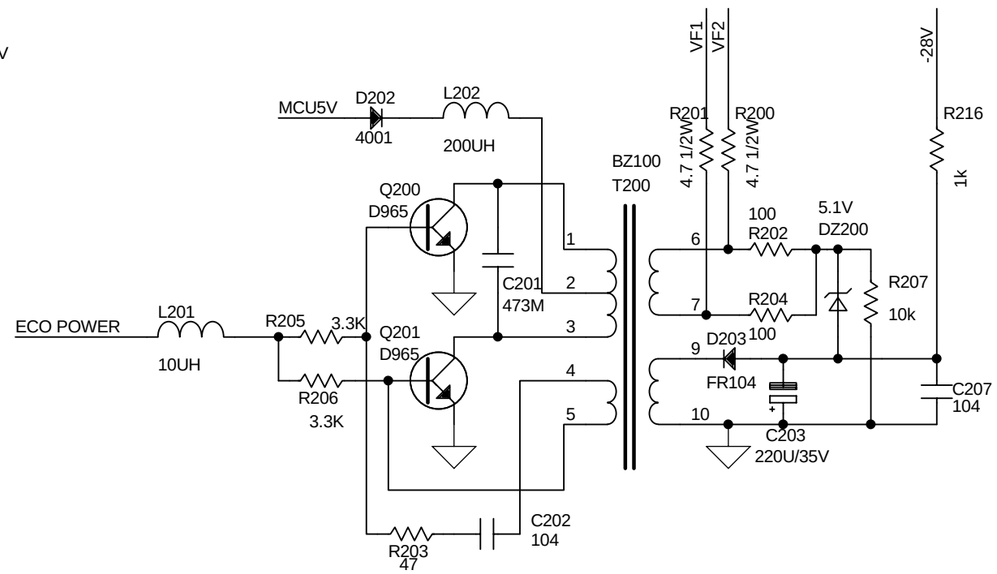

VOL+ (POWER)
KEY1
POWER (VOL-)
KEY2
VOL- (SOURROUND)
KEY3
SOURROUND (SOUND MODE)
KEY4
SOUND MODE (SOURCE)
KEY5
SOURCE (VOL+)
KEY6
U201
VDD SI[0] SI[1] SI[3] SI[8] SI[10] SI[11] VSS
OUT0 OUT1 OUT3 SCL SDA OUT8 OUT10 OUT11
1 2 3 4 5 6 7 8
16 15 14 13 12 11 10 9
IC-WT5700-S160
3.3V
R208 150 SCL
SDA
R209 150
47uF/16V 104 100P 100P
C208 C209 C212 C213


G6 G7 G8 -28V MCU5V S15 S14 S13
39 38 37 36 35 34 33 32 31 30 29 28 27
IC200
PT6311
G5 G4 G3 G2 G1 Vdd LED5 LED4(BBE) LED3(POWER) LED2(FANCT) LED1(7507RST) Vss OSC
S20/G9 S19/G10 VEE Vdd S18/G11 S17/G12 S16 S15 S14 S13
S12/KS12 S11/KS11 S10/KS10 S9/KS9 S8/KS8 S7/KS7 S6/KS6 S5/KS5 S4/KS4 S3/KS3 S2/KS2 S1/KS1 Vdd
40 41 42 43 44 45 46 47 48 49 50 51 52
26 25 24 23 22 21 20 19 18 17 16 15 14
SW1 SW2 SW3 SW4 DOUT DIN IC CLK STB KEY1 KEY2 KEY3 KEY4
1 2 3 4 5 6 7 8 9 10 11 12 13
MCU5V
POWER
R210 47K
C205 47uF/16V
C204 104
VFD_DATA VFD_CLK VFD_STB
R211 33K R212 33K R213 33K R214 33K
CN200
REMOTE V-GND DATA CLK STB ECO POWER V-GND MCU5V
8 7 6 5 4 3 2 1
8P
R217 220 R218 220 R219 220 R220 10K R221 10K R222 10K

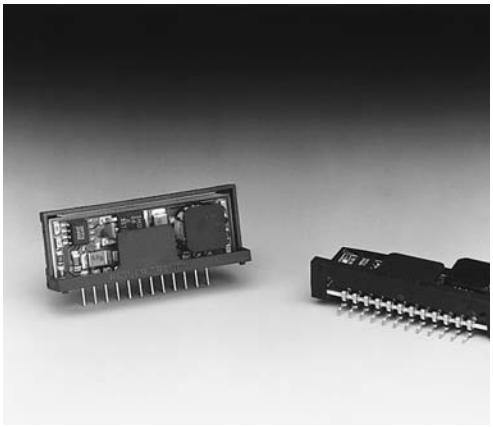

REMOTE
MCU5V
R215 47
C210 47uF/25V
S200
REM GND Vcc
1 2 3
C211 104
REMOTE


CN201
KEY4 V-GND KEY5 LED103 KEY6 LED105 3.3V LED104
1 2 3 4 5 6 7 8
8P


CN202
3.3V LED106 KEY1 LED101 KEY2 LED102 KEY3 POWER V-GND
1 2 3 4 5 6 7 8 9 10
10P
CN203
3.3V LED106 SDA SCL LED101 LED102 LED103 LED104 LED105
9 8 7 6 5 4 3 2 1
9P
J401
SP-2JCK
3 AUX-L
2 AUX-R
1 GND-1
CN401
3 2 1
3P/2.0
USB400
USB-1
Shield GND DP DM vbus
5 4 3 2 1
C401 104
UGND MP DM UVCC
CN400
1 2 3 4
4P/2.0


MCU5V
D202 4001
L202 200UH
VF1 VF2
R201 4.7 1/2W
R200 4.7 1/2W
-28V
R216 1k
BZ100
T200
Q200 D965
C201 473M
R202 100
5.1V DZ200
R204
R207 10k
D203 FR104
C203 220U/35V
C207 104
ECO POWER
L201 10UH
R205 3.3K
Q201 D965
R206 3.3K
C202 104
R203 47

PT6311 IC Specification

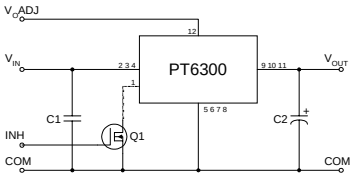


- 87% Efficiency
- Adjustable Output Voltage
- Internal Short Circuit Protection
- Over-Temperature Protection
- On/Off Control (Ground Off)
- Small SIP Footprint
- Wide Input Range

The PT6310 series is a High-Performance 2 Amp, 12-Pin SIP (Single In-line Package) Integrated Switching Regulator (ISR) designed to meet the on-board power conversion needs of battery powered or other equipment requiring high efficiency and small size. This high perfomance ISR offers a unique combination of features combining 87% typical efficiency with open-collector on/off control and adjustable output voltage.

Quiescent current in the shutdown mode is typically less than 100µA.

Standard Application



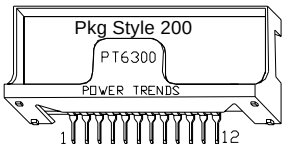
C_1 = Optional 1µF ceramic
C_2 = Required 100µF electrolytic
Q_1 = NFET

Pin-Out Information

Pin	Function
1	Inhibit (30V max)
2	V_{in}
3	V_{in}
4	V_{in}
5	GND
6	GND
7	GND
8	GND
9	V_{out}
10	V_{out}
11	V_{out}
12	V_{out} Adj

Ordering Information

PT6310	= +14.6 Volts
PT6311	= +15.5 Volts
PT6312	= +15.0 Volts
PT6313	= +8.0 Volts



PT Series Suffix (PT1234)X

Case/Pin Configuration	
Vertical Through-Hole	N
Horizontal Through-Hole	A
Horizontal Surface Mount	C

Specifications

Characteristics (T_a = 25°C unless noted)	Symbols	Conditions	PT6310Series Min	Typ	Max	Units
Output Current	I_o	Over V_{in} range	0.1*	—	2.0	A
Short Circuit Current	I_{sc}	$V_{in} = V_o + 5V$	—	5.0	—	Apk
Input Voltage Range	V_{in}	$0.1 \le I_o \le 2.0$ A	$V_o + 4$	—	38**	V
Output Voltage Tolerance	ΔV_o	Over V_{in} Range, I_o = 2.0 A T_a = 0°C to +60°C	—	±1.0	±2.0	$\%V_o$
Line Regulation	Reg_{line}	Over V_{in} range	—	±0.25	±0.5	$\%V_o$
Load Regulation	Reg_{load}	$0.1 \le I_o \le 2.0$ A	—	±0.25	±0.5	$\%V_o$
V_o Ripple/Noise	V_n	$V_{in} = V_{in}$ min, I_o = 2.0A	—	±2	—	$\%V_o$
Transient Response with C_o = 100µF	t_t V_{os}	50% load change V_o over/undershoot	— —	100 5.0	200 —	µSec $\%V_o$
Efficiency	η	V_{in}=24V, I_o = 2.0 A	—	87	—	%
Switching Frequency	f_o	Over V_{in} and I_o ranges PT6312 only	600 500	700 550	800 600	kHz kHz
Shutdown Current	I_{sc}	V_{in} = 15V	—	100	—	µA
Quiescent Current	I_{nl}	I_o = 0A, V_{in} =10V	—	10	—	mA
Output Voltage Adjustment Range	V_o	Below V_o Above V_o	See Application Notes.			
Absolute Maximum Operating Temperature Range	T_a		-40	—	+85	°C
Recommended Operating Temperature Range	T_a	Free Air Convection, (40-60LFM) At V_{in} = 18V, I_o = 2.0A	-40	—	+70	°C
Thermal Resistance	θ_{ja}	Free Air Convection (40-60LFM)	—	30	—	°C/W
Storage Temperature	T_s	—	-40	—	+125	°C
Mechanical Shock		Per Mil-STD-883D, Method 2002.3, 1 msec, Half Sine, mounted to a fixture	—	500	—	G's
Mechanical Vibration		Per Mil-STD-883D, Method 2007.2, 20-2000 Hz, Soldered in a PC board	—	10	—	G's
Weight	—	—	—	6.5	—	grams

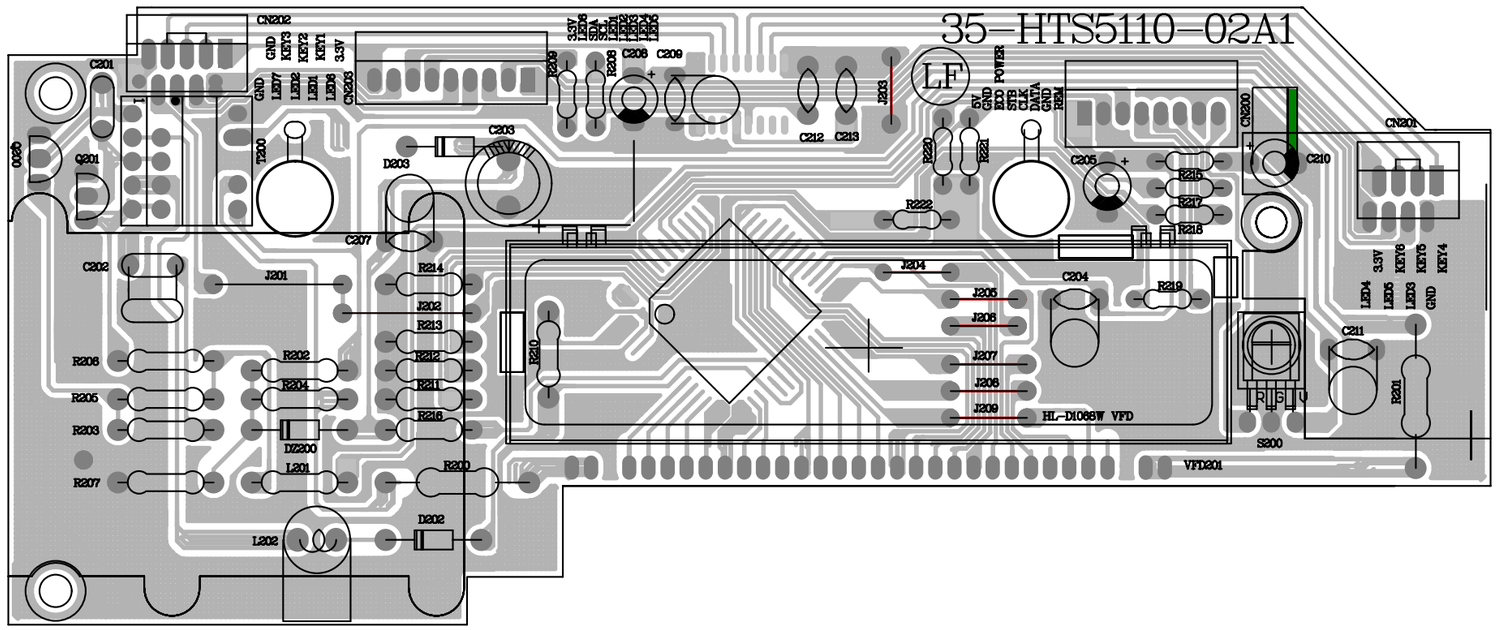
* ISR will operate to no load with reduced specifications.

** Input voltage cannot exceed 30V when the inhibit function is used.

Note: The PT6310 requires a 100µF electrolytic or tantalum output capacitor for proper operation in all applications.

Main Unit--VFD Display Board Layout Diagram

TOP Layout Diagram

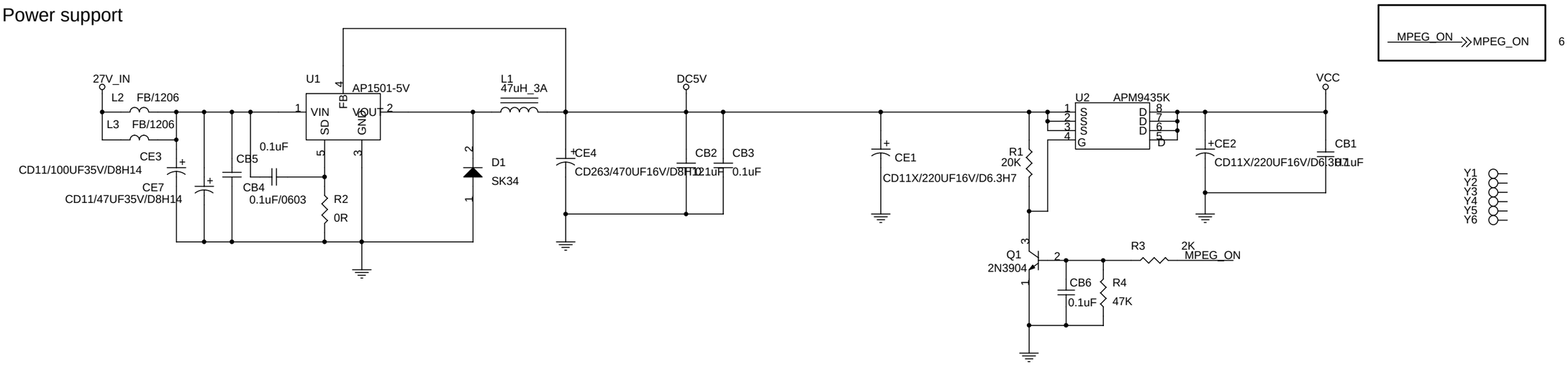


Bottom Layout Diagram

14-3

Main Unit--Decoder Board Circuit Diagram

Power support



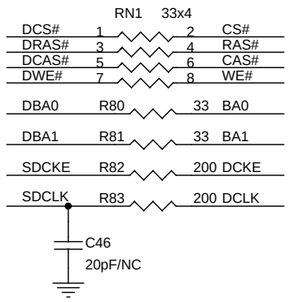
Main Unit--Decoder Board Circuit Diagram

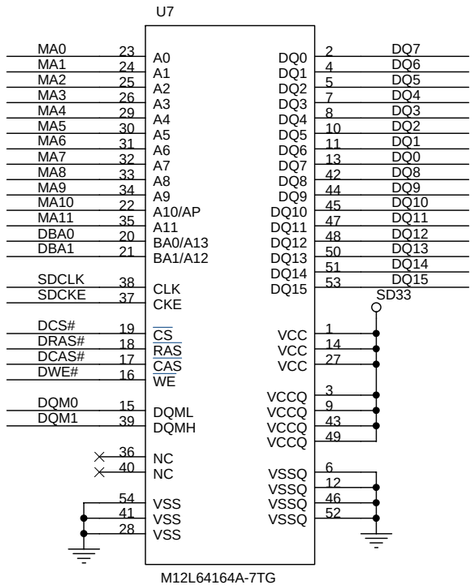
Main Chip

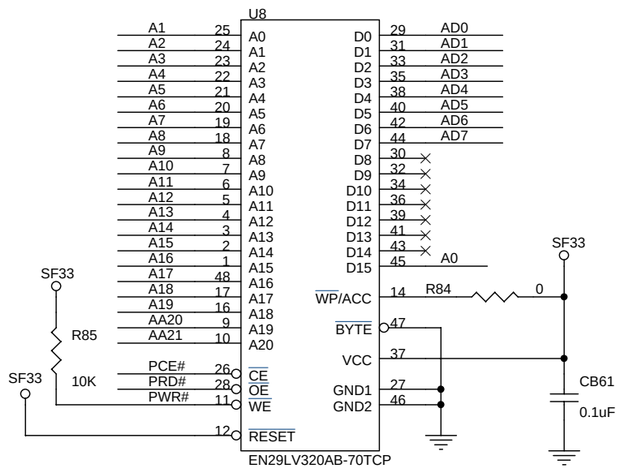
MT1389S

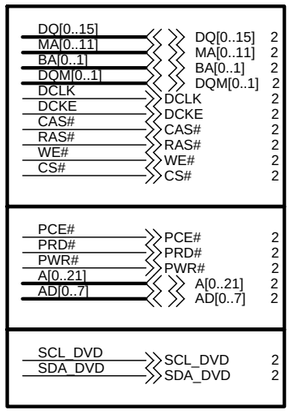
15-2

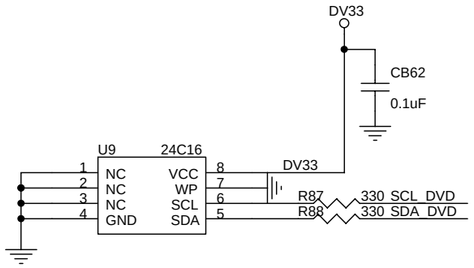
SDRAM & FLASH

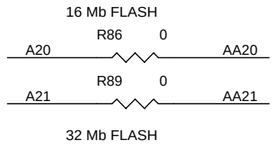


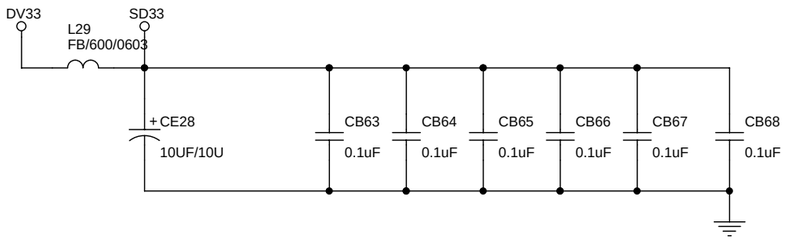


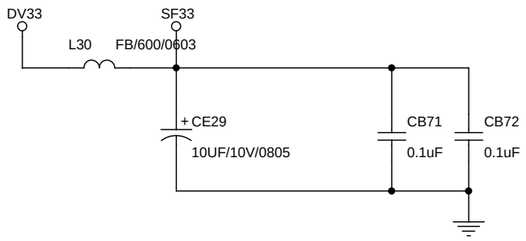












15-3

SDRAM

1M x 16 Bit x 4 Banks Synchronous DRAM

FEATURES

- JEDEC standard 3.3V power supply
- LVTTL compatible with multiplexed address
- Four banks operation
- MRS cycle with address key programs
  - CAS Latency (2 & 3)
  - Burst Length (1, 2, 4, 8 & full page)
  - Burst Type (Sequential & Interleave)
- All inputs are sampled at the positive going edge of the system clock
- DQM for masking
- Auto & self refresh
- 15.6 μ s refresh interval

ORDERING INFORMATION

54 Pin TSOP (Type II)
(400mil x 875mil)

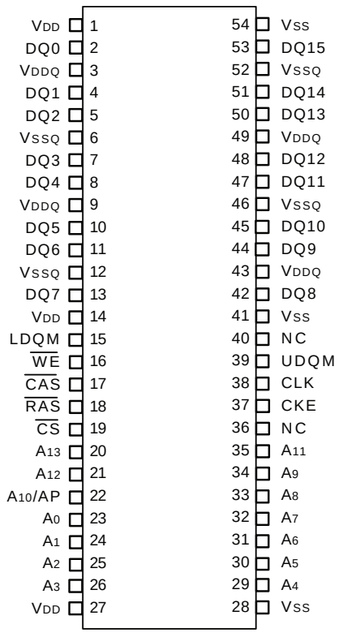
PRODUCT NO.	MAX FREQ.	PACKAGE	Comments
M12L64164A-5TG	200MHz	TSOP II	Pb-free
M12L64164A-6TG	166MHz	TSOP II	Pb-free
M12L64164A-7TG	143MHz	TSOP II	Pb-free

GENERAL DESCRIPTION

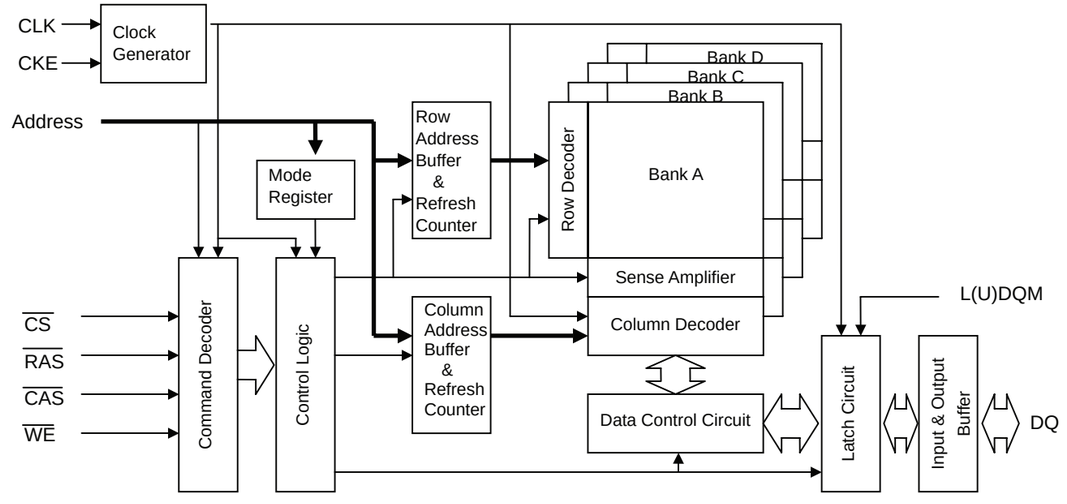
The M12L64164A is 67,108,864 bits synchronous high data rate Dynamic RAM organized as 4 x 1,048,576 words by 16 bits. Synchronous design allows precise cycle controls with the use of system clock I/O transactions are possible on every clock cycle. Range of operating frequencies, programmable burst length and programmable latencies allow the same device to be useful for a variety of high bandwidth, high performance memory system applications.

PIN ASSIGNMENT

Top View



FUNCTIONAL BLOCK DIAGRAM



PIN FUNCTION DESCRIPTION

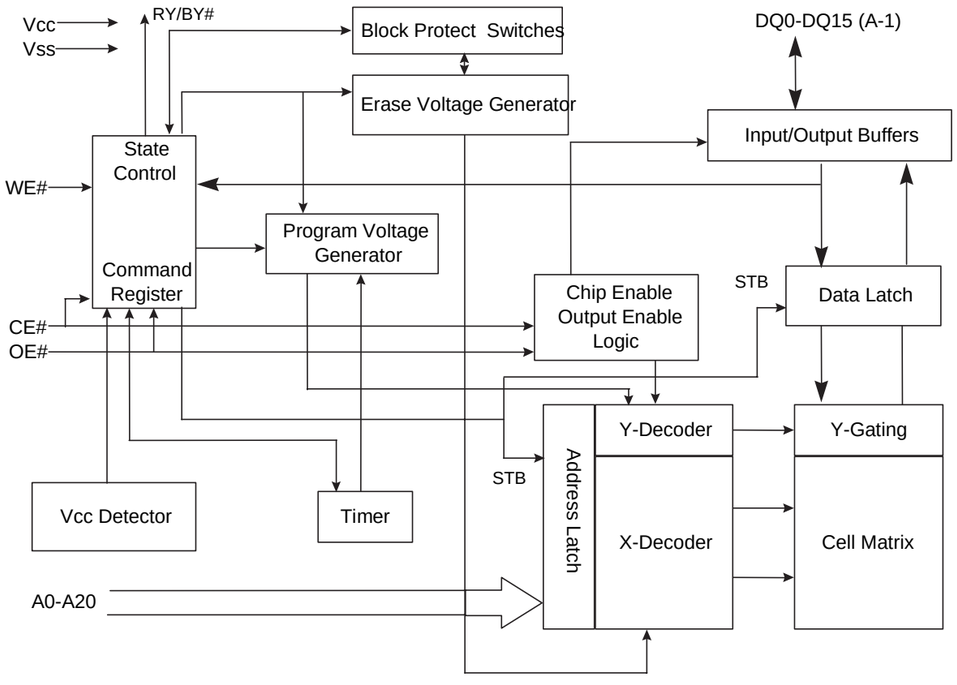
PIN	NAME	INPUT FUNCTION
CLK	System Clock	Active on the positive going edge to sample all inputs
$\overline{CS}$	Chip Select	Disables or enables device operation by masking or enabling all inputs except CLK , CKE and L(U)DQM
CKE	Clock Enable	Masks system clock to freeze operation from the next clock cycle. CKE should be enabled at least one cycle prior new command. Disable input buffers for power down in standby.
A0 ~ A11	Address	Row / column address are multiplexed on the same pins. Row address : RA0~RA11, column address : CA0~CA7
A12 , A13	Bank Select Address	Selects bank to be activated during row address latch time. Selects bank for read / write during column address latch time.
$\overline{RAS}$	Row Address Strobe	Latches row addresses on the positive going edge of the CLK with $\overline{RAS}$ low. Enables row access & precharge.
$\overline{CAS}$	Column Address Strobe	Latches column address on the positive going edge of the CLK with $\overline{CAS}$ low. Enables column access.
$\overline{WE}$	Write Enable	Enables write operation and row precharge. Latches data in starting from $\overline{CAS}$, $\overline{WE}$ active.
L(U)DQM	Data Input / Output Mask	Makes data output Hi-Z, t_{SHZ} after the clock and masks the output. Blocks data input when L(U)DQM active.
DQ0 ~ DQ15	Data Input / Output	Data inputs / outputs are multiplexed on the same pins.
VDD / VSS	Power Supply / Ground	Power and ground for the input buffers and the core logic.
VDDQ / VSSQ	Data Output Power / Ground	Isolated power supply and ground for the output buffers to provide improved noise immunity.
NC	No Connection	This pin is recommended to be left No Connection on the device.

PRODUCT SELECTOR GUIDE

Product Number	EN29LV320A	
Speed Option	-70	-90
Max Access Time, ns (t_{acc})	70	90
Max CE# Access, ns (t_{ce})	70	90
Max OE# Access, ns (t_{oe})	30	35

Notes:
1. Vcc=3.0 – 3.6 V for 70ns read operation

BLOCK DIAGRAM



32M FLASH USER MODE TABLE

Operation	CE#	OE#	WE#	RESET#	WP#/ACC	A0-A20	DQ0-DQ7	DQ8-DQ15 BYTE# = V_{IH}	DQ8-DQ15 BYTE# = V_{IL}
Read	L	L	H	H	L/H	A_{IN}	D_{OUT}	D_{OUT}	DQ8-DQ14= High-Z, DQ15 = A-1
Write	L	H	L	H	(Note 1)	A_{IN}	D_{IN}	D_{IN}	
Accelerated Program	L	H	L	H	V_{HH}	A_{IN}	D_{IN}	D_{IN}	
CMOS Standby	V_{CC} ± 0.3V	X	X	V_{CC} ± 0.3V	H	X	High-Z	High-Z	High-Z
TTL Standby	H	X	X	H	H	X	High-Z	High-Z	High-Z
Output Disable	L	H	H	H	L/H	X	High-Z	High-Z	High-Z
Hardware Reset	X	X	X	L	L/H	X	High-Z	High-Z	High-Z
Sector (Group) Protect	L	H	L	V_{ID}	L/H	SA, A6=L, A1=H, A0=L	(Note 2)	X	X
Sector Unprotect	L	H	L	V_{ID}	(Note 1)	SA, A6=H, A1=H, A0=L	(Note 2)	X	X
Temporary Sector Unprotect	X	X	X	V_{ID}	(Note 1)	A_{IN}	(Note 2)	(Note 2)	High-Z

L=logic low= V_{IL}, H=Logic High= V_{IH}, V_{ID} =V_{HH} =11 ± 0.5V = 10.5-11.5V, X=Don't Care (either L or H, but not floating), SA=Sector Addresses, D_{IN}=Data In, D_{OUT}=Data Out, A_{IN}=Address In

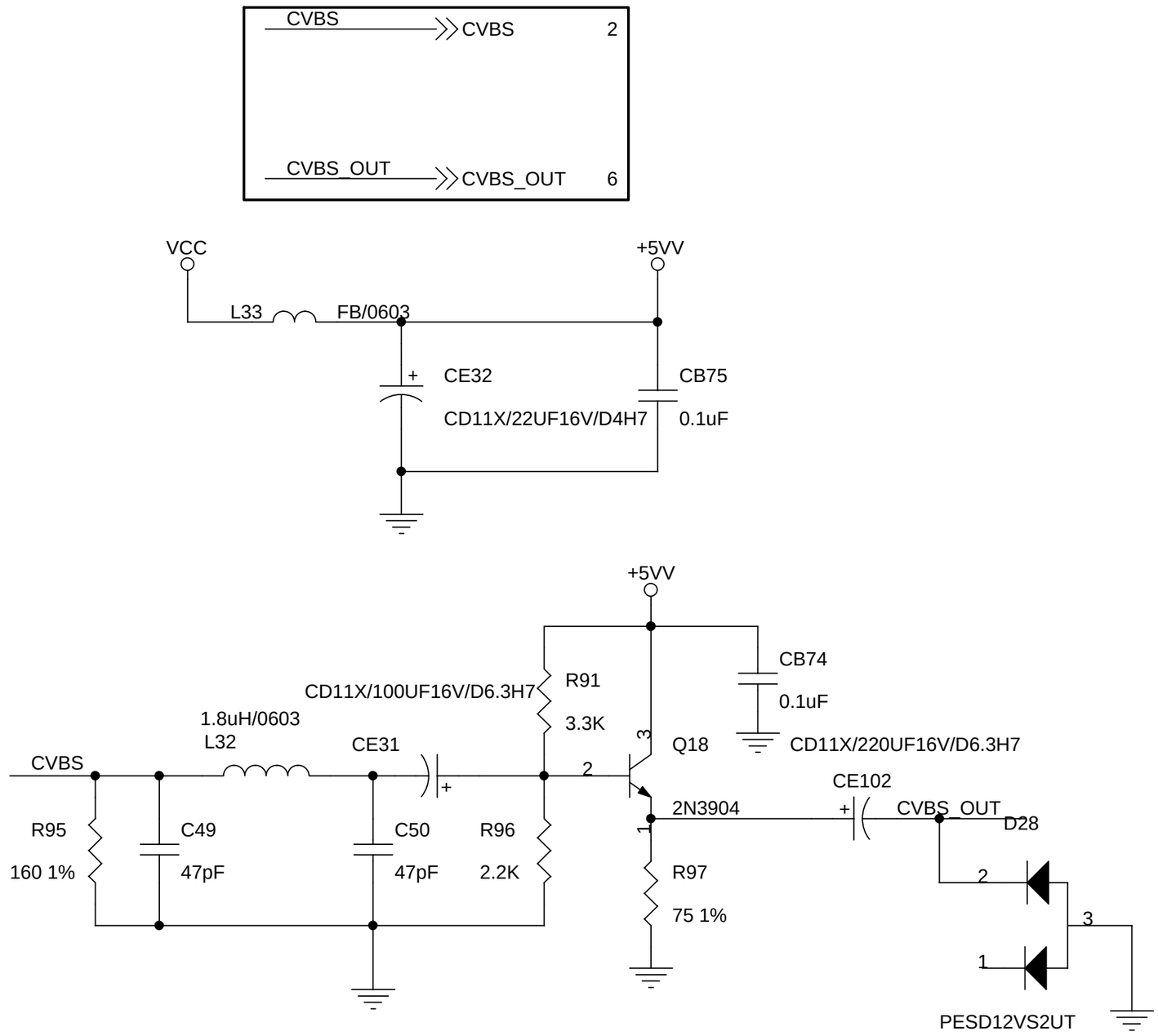
Notes:
1. If WP#/ACC = V_{IL} , the two outermost boot sectors remain protected. If WP# / ACC = V_{IH}, the outermost boot sector protection depends on whether they were last protected or unprotected. If WP#/ACC = V_{HH}, all sectors will be unprotected.

2. Please refer to "Sector/Sector Group Protection & Chip Unprotection", Flowchart 7a and Flowchart 7b.

15-5

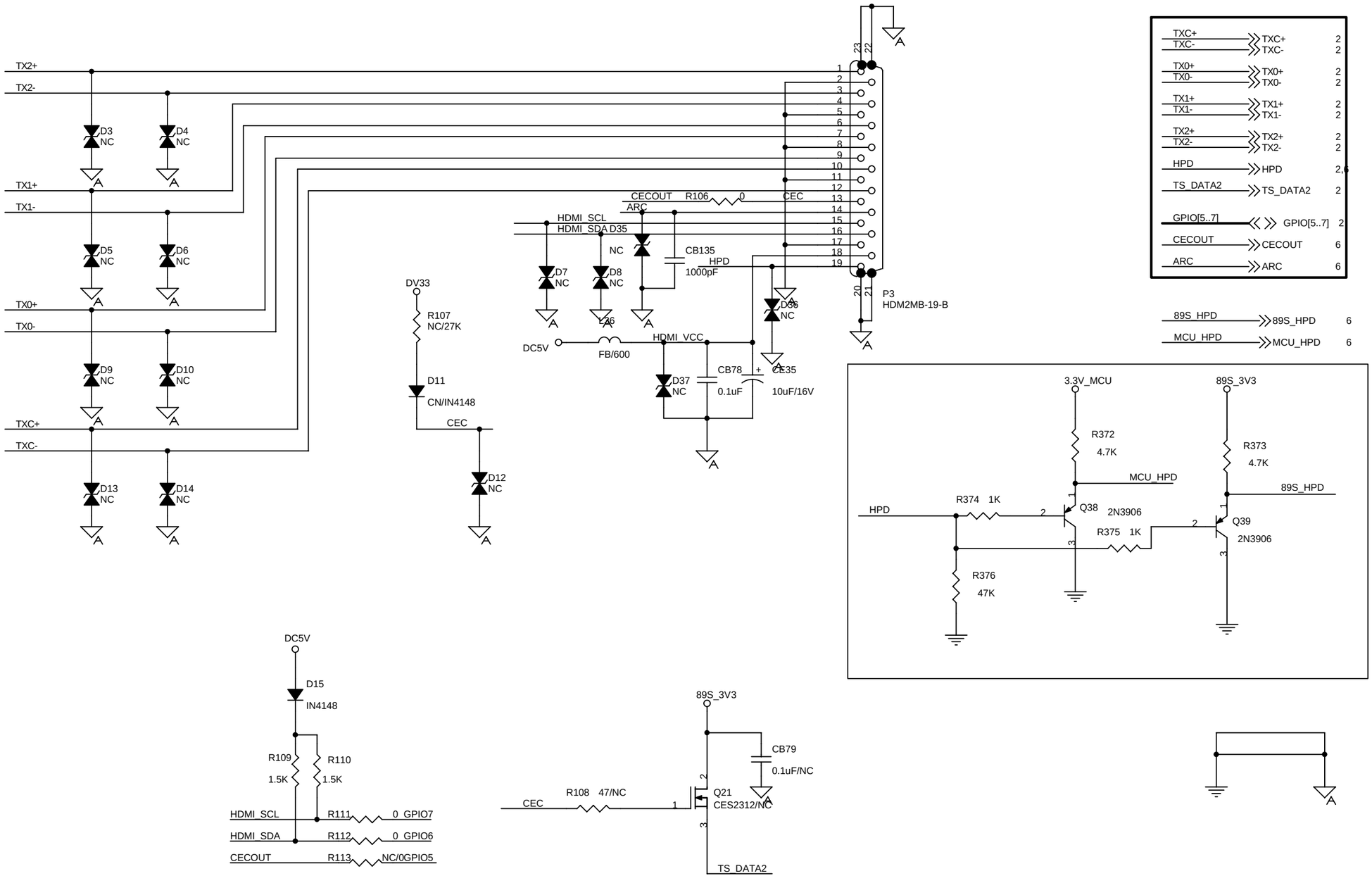
Main Unit--Decoder Board Circuit Diagram

Decoder Board Video Out



15-6

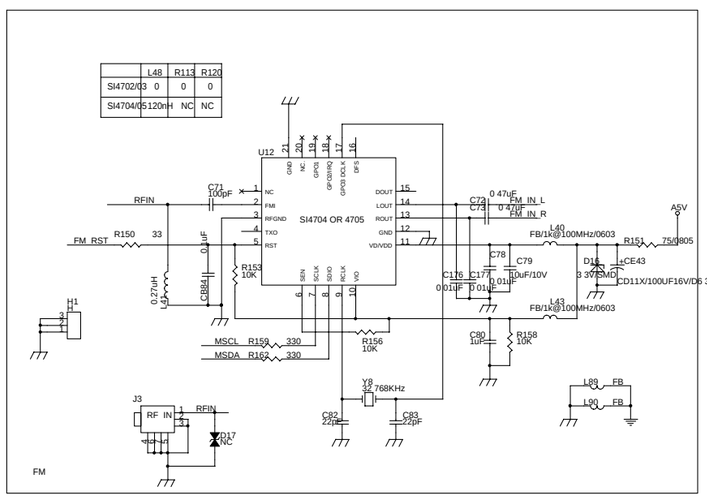
HDMI Circuit Diagram

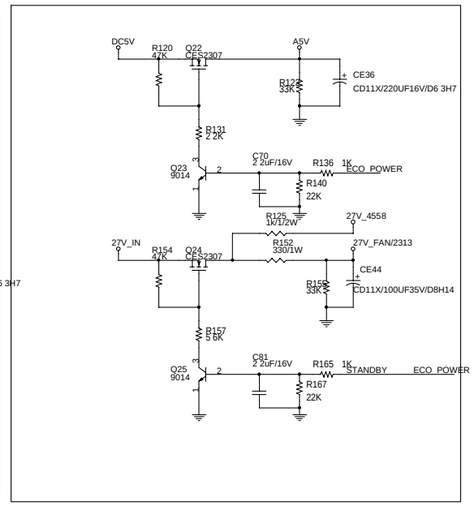


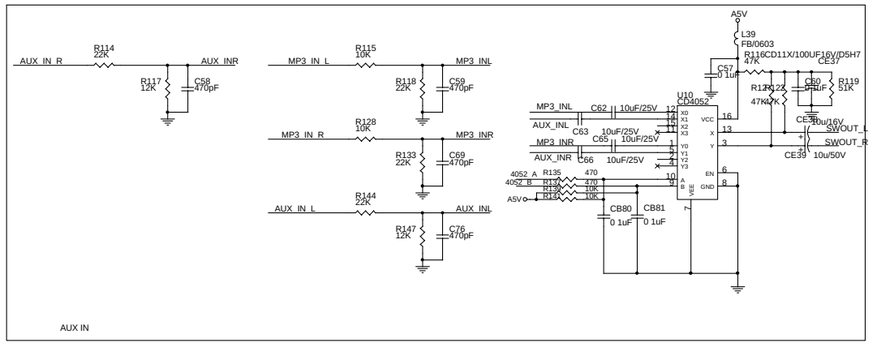
15-7

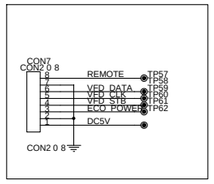
Main Unit--Decoder Board Circuit Diagram

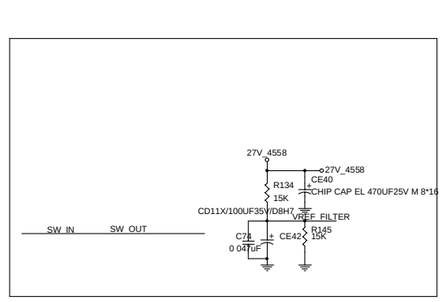
AUDIO & FM

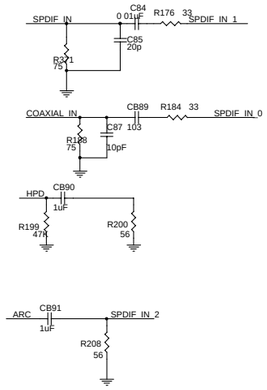


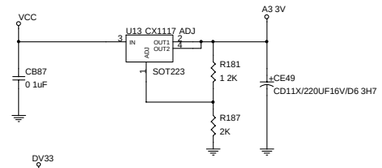


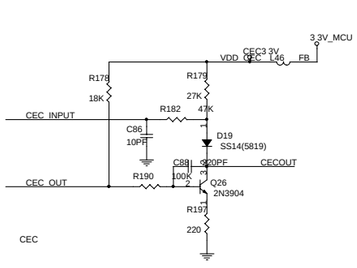


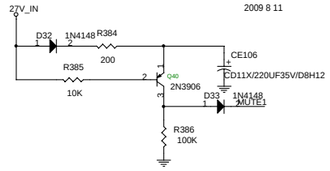


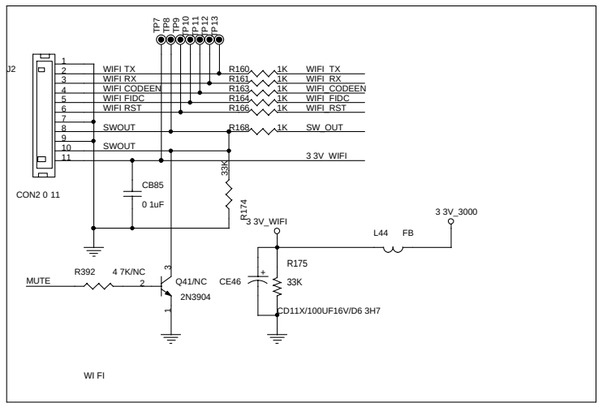


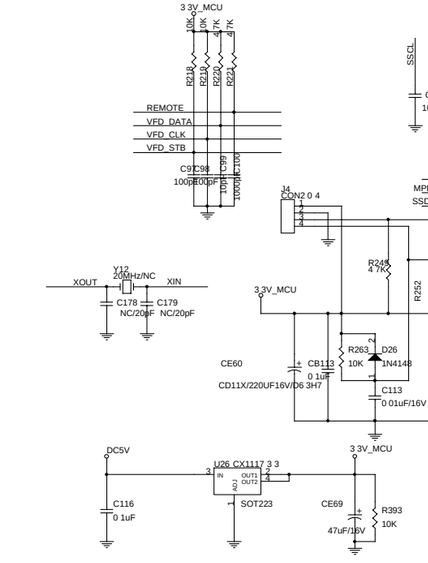


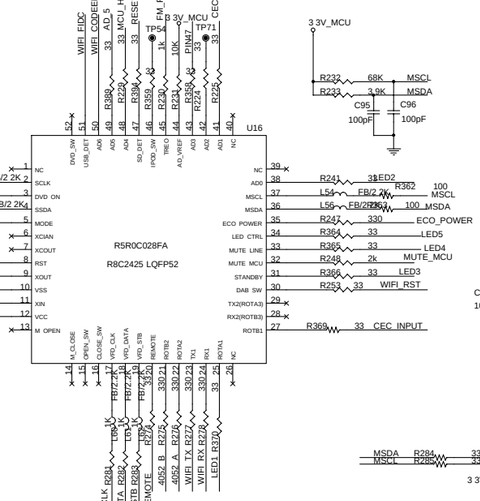


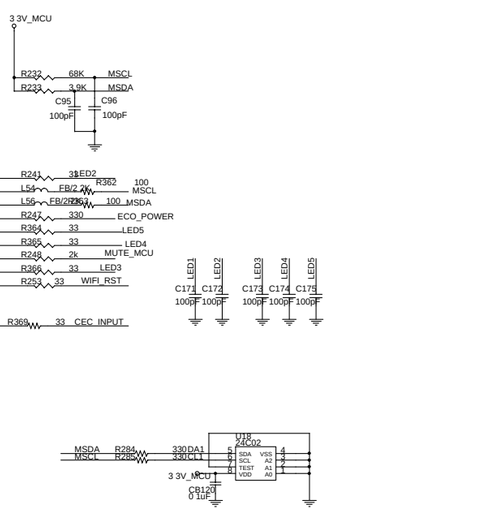




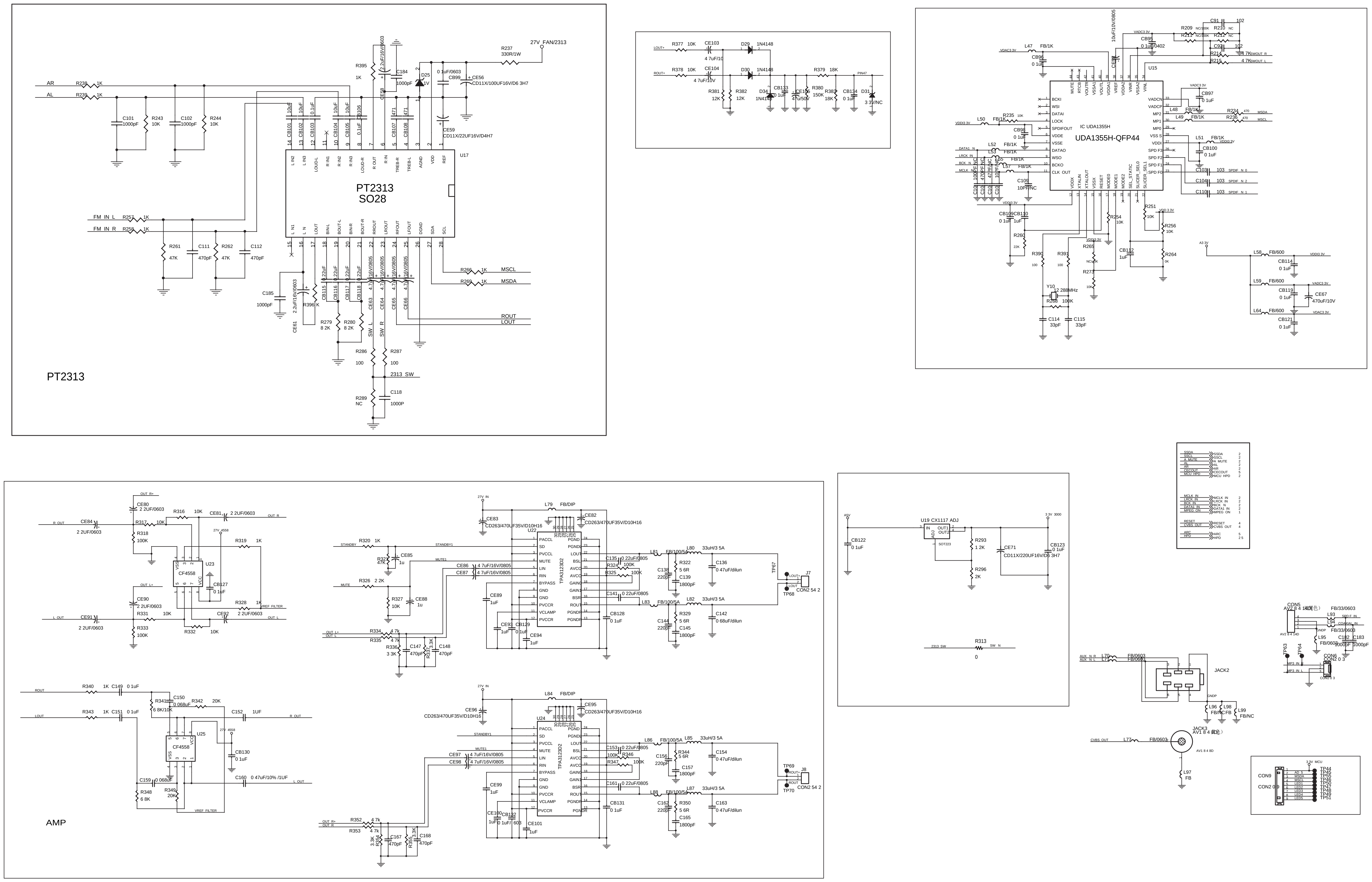




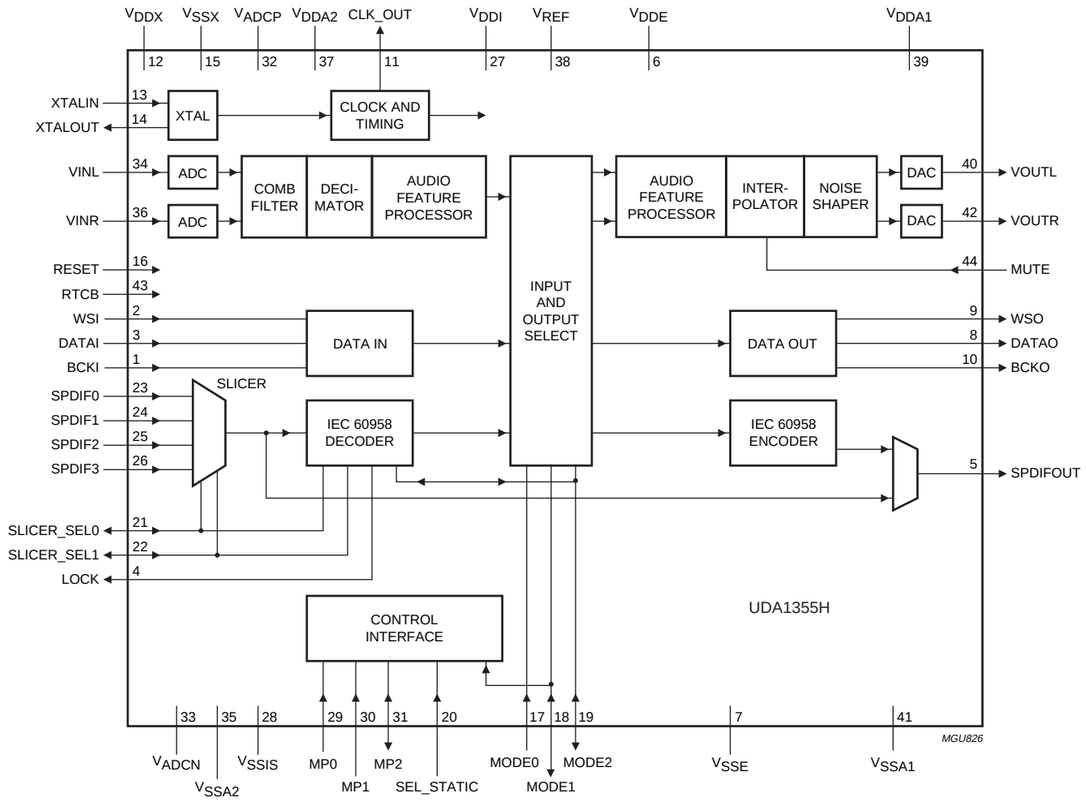




Main Unit--Decoder Board Circuit Diagram



BLOCK DIAGRAM



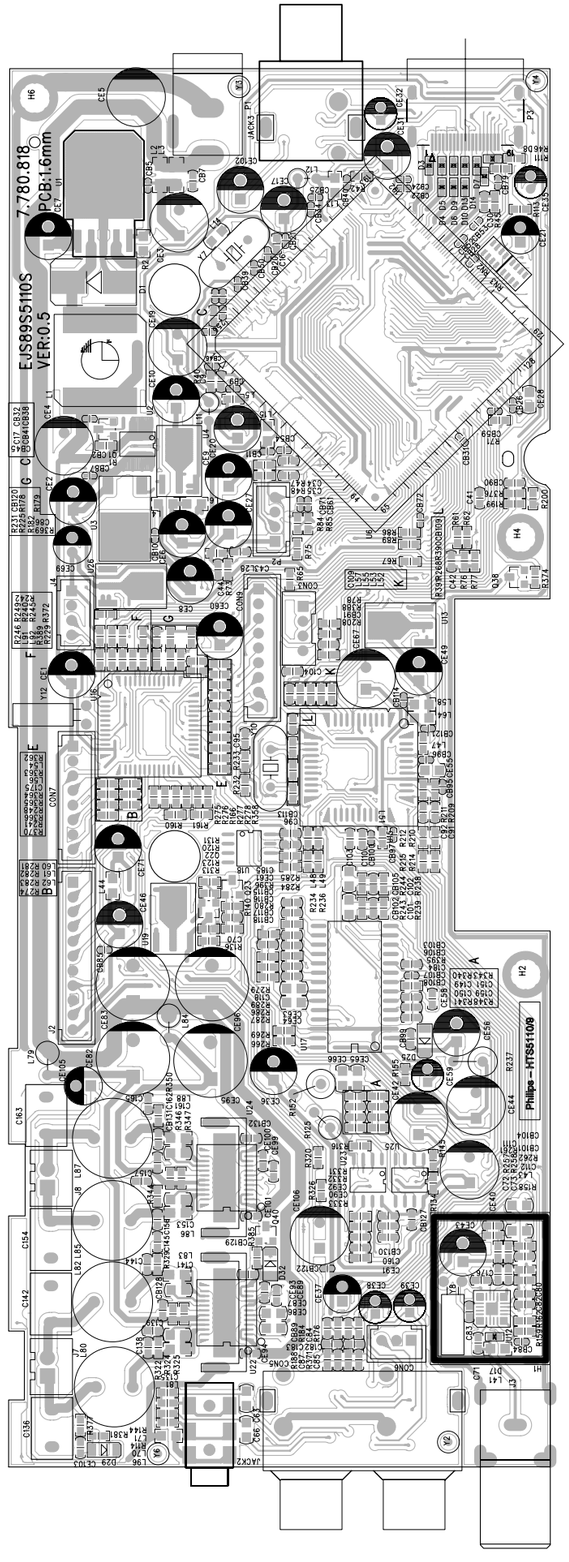
PINNING

SYMBOL	PIN	PAD[1]	DESCRIPTION
BCKI	1	bpt4mtht5v	bit clock input (master or slave)
WSI	2	bpt4mtht5v	word select input (master or slave)
DATAI	3	ipttht5v	digital data input
LOCK	4	op4mc	PLL lock indicator output
SPDIFOUT	5	op4mc	SPDIF output
V_{DDE}	6	vdde	digital pad supply voltage
V_{SSE}	7	vsse	digital pad ground
DATAO	8	ops5c	digital data output
WSO	9	bpt4mtht5v	word select output (master or slave)
BCKO	10	bpt4mtht5v	bit clock output (master or slave)
CLK_OUT	11	op4mc	clock output; $256f_s$ or $384f_s$
V_{DDX}	12	vddco	crystal oscillator and PLL supply voltage
XTALIN	13	apio	crystal oscillator input
XTALOUT	14	apio	crystal oscillator output
V_{SSX}	15	vssco	crystal oscillator and PLL ground
RESET	16	ipthdt5v	reset input
MODE0	17	apio	mode selection input 0 for static mode or microcontroller mode (grounded for I^2C-bus)
MODE1	18	bpts5tht5v	mode selection input 1 for static mode or AO address input and output for microcontroller mode
MODE2	19	bpts5tht5v	mode selection input 2 for static mode or U_RDY output for microcontroller mode
SEL_STATIC	20	apio	selection input for static mode, I^2C-bus mode or L3-bus mode
SLICER_SEL0	21	bpts5tht5v	SPDIF slicer selection input 0 for static mode and USER bit output for microcontroller mode
SLICER_SEL1	22	bpts5tht5v	SPDIF slicer selection input 1 for static mode and AC3 preamble detect output for microcontroller mode
SPDIF0	23	apio	SPDIF input 0
SPDIF1	24	apio	SPDIF input 1
SPDIF2	25	apio	SPDIF input 2
SPDIF3	26	apio	SPDIF input 3
V_{DDI}	27	vddi	digital core supply voltage
V_{SSIS}	28	vssis	digital core ground
MP0	29	apio	multi-purpose pin 0: frequency select for static mode, not used for microcontroller mode
MP1	30	ipttht5v	multi-purpose pin 1: SFOR1 for static mode, SCL for I^2C-bus mode and L3CLOCK for L3-bus mode
MP2	31	iic400kt5v	multi-purpose pin 2: SFOR0 for static mode, SDA for I^2C-bus mode and L3DATA for L3-bus mode
V_{ADCP}	32	vddco	positive ADC reference voltage
V_{ADCN}	33	vssco	negative ADC reference voltage
VINL	34	apio	ADC left channel input
V_{SSA2}	35	vssco	ADC ground
VINR	36	apio	ADC right channel input
V_{DDA2}	37	vddco	ADC supply voltage
V_{REF}	38	apio	reference voltage for ADC and DAC
V_{DDA1}	39	vddco	DAC supply voltage
VOUTL	40	apio	DAC left channel output
V_{SSA1}	41	vssco	DAC ground
VOUTR	42	apio	DAC right channel output
RTCB	43	ipthdt5v	test control input
MUTE	44	iipthdt5v	DAC mute input

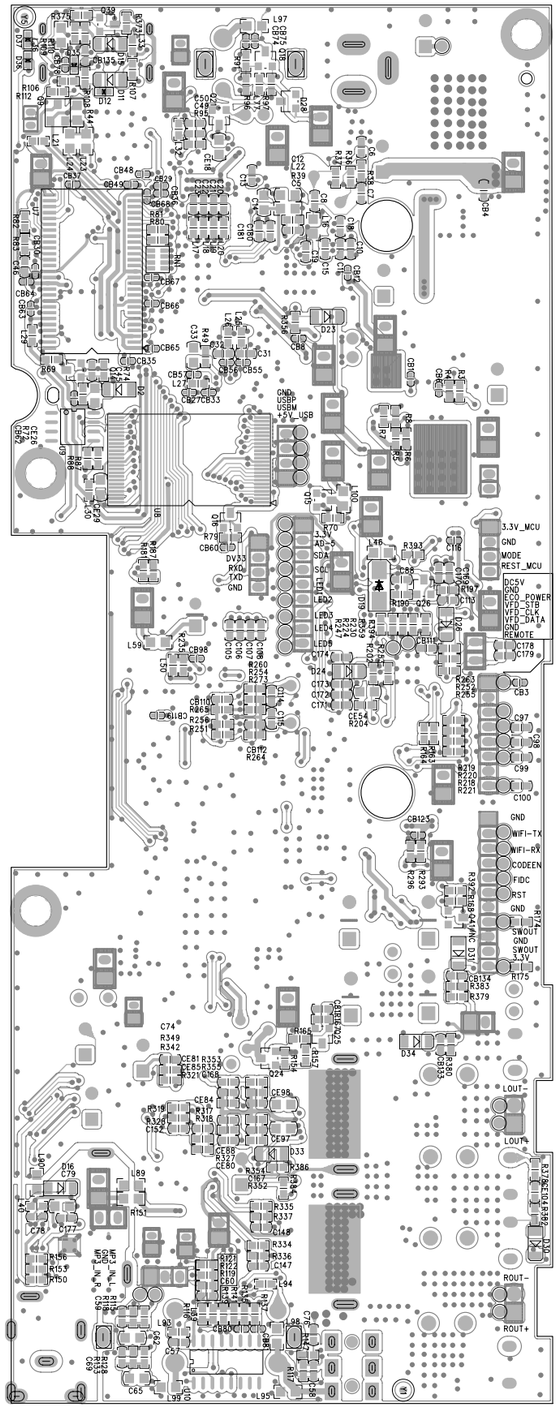
15-10

Main Unit--Decoder Board Layout Diagram

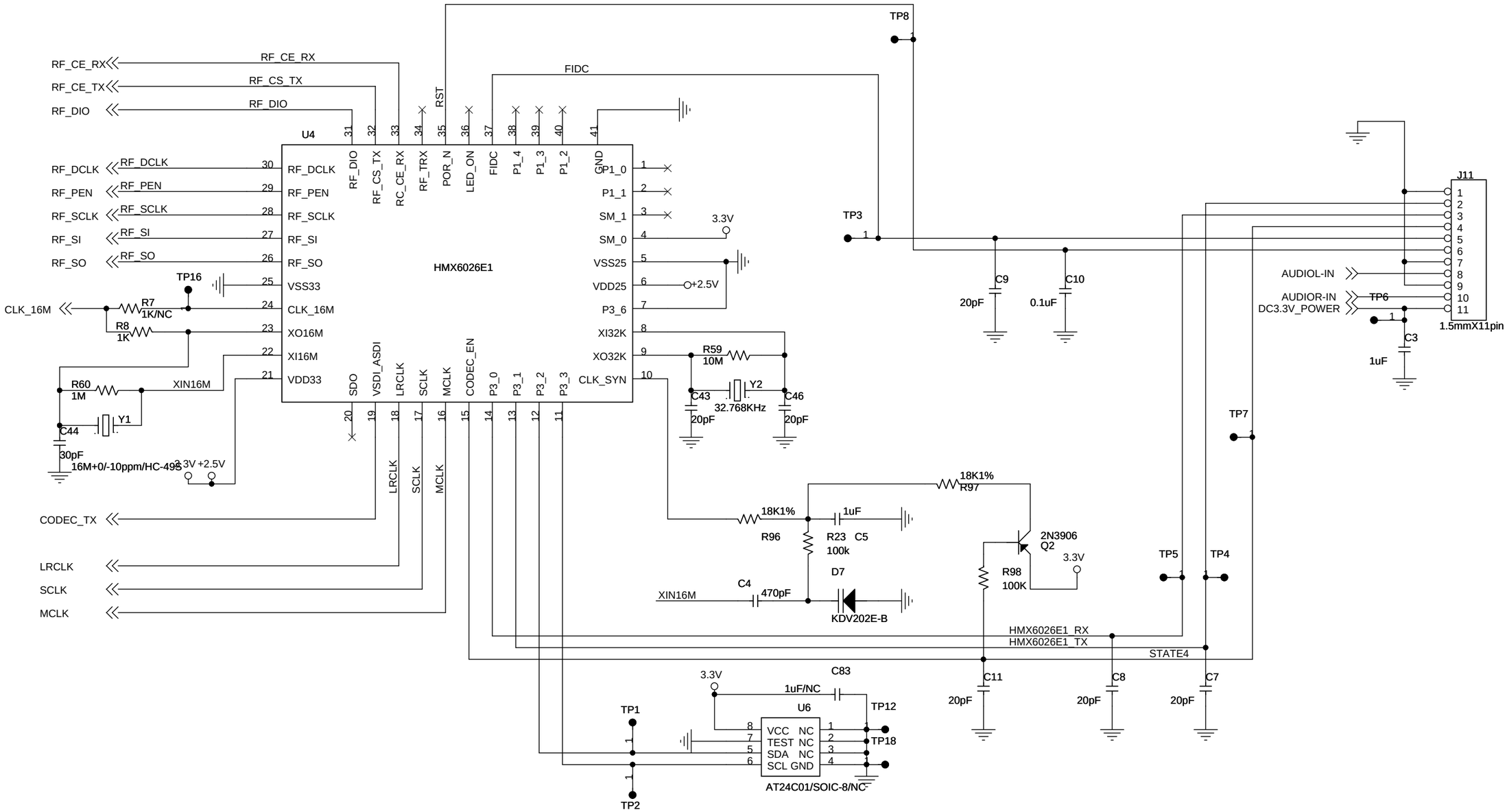
TOP Layout Diagram



Bottom Layout Diagram

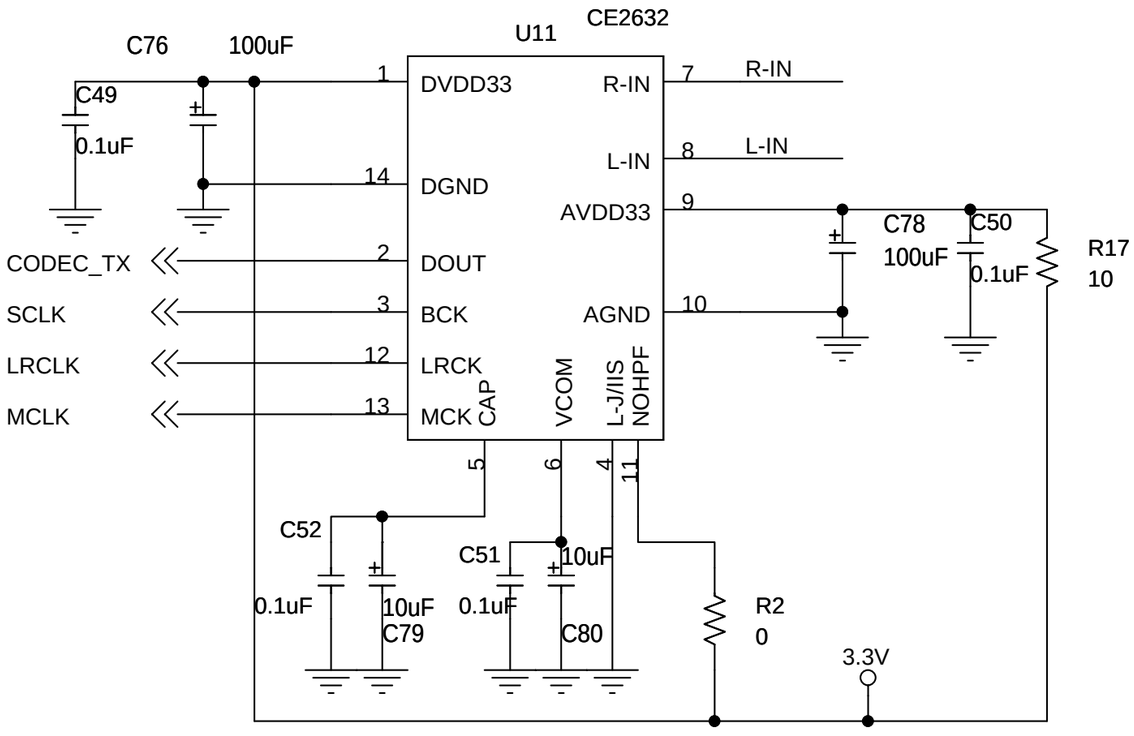


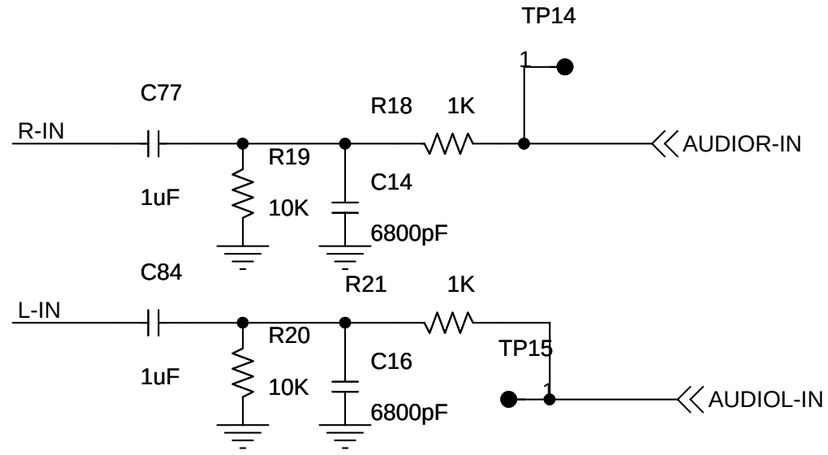
Main Unit--Radio Transmit Board Circuit Diagram



16-1

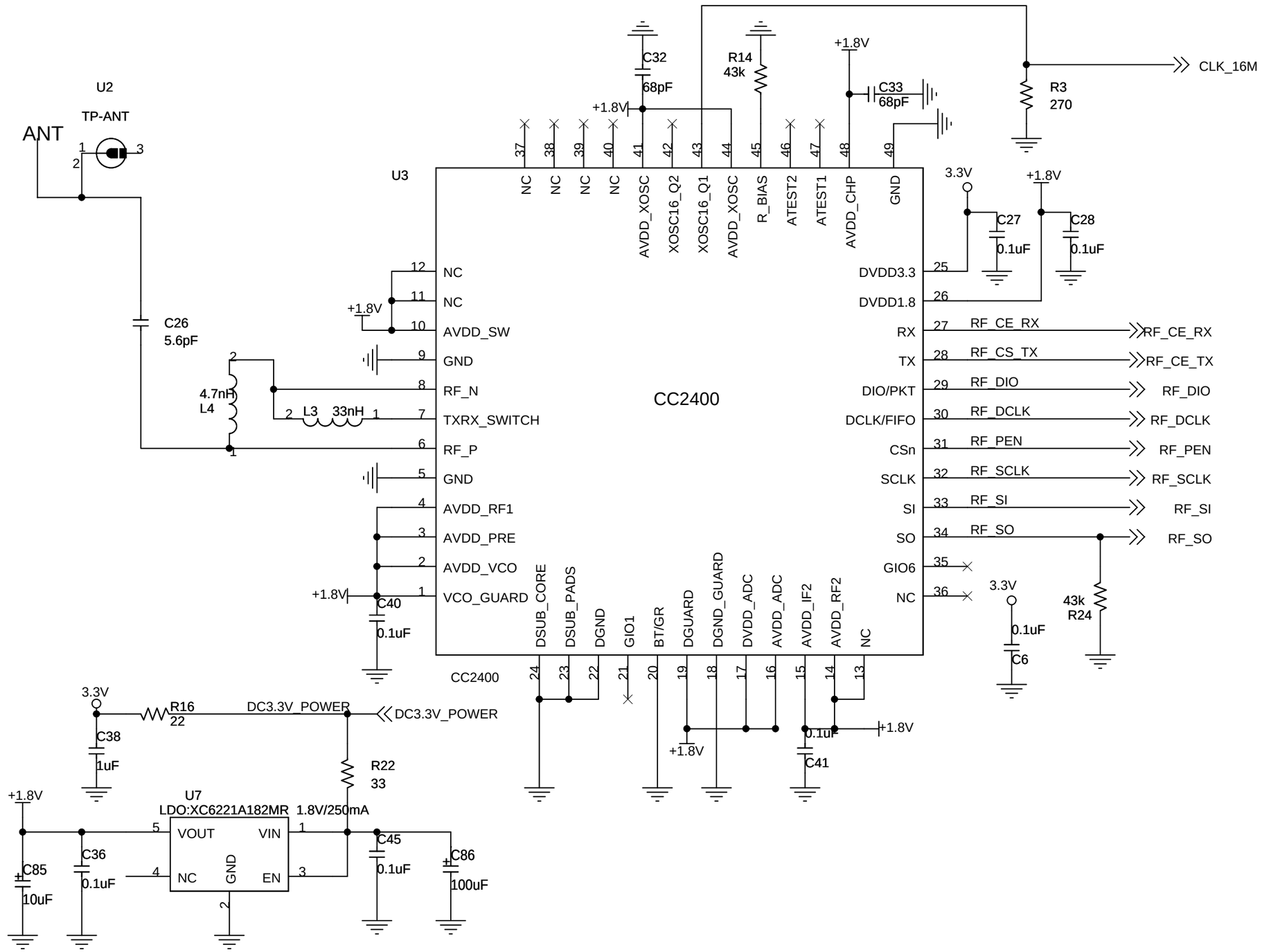
Main Unit--Radio Transmit Board Circuit Diagram





16-2

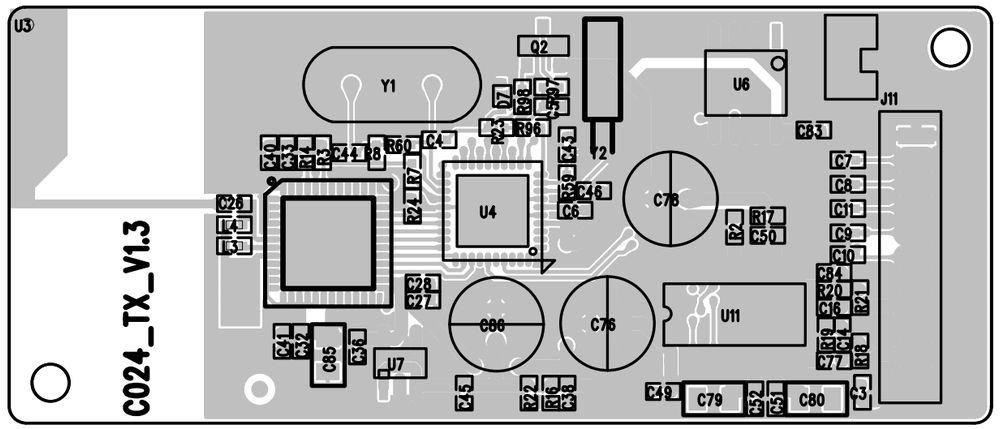
Main Unit--Radio Transmit Board Circuit Diagram



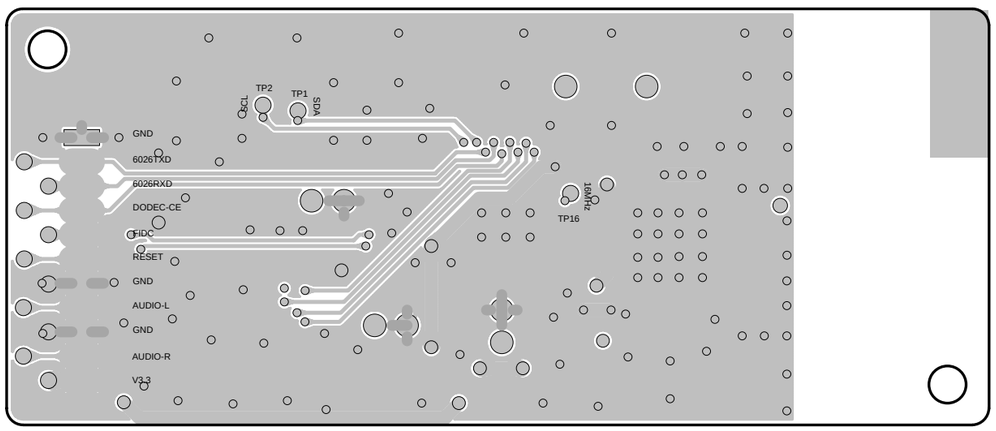
16-3

Main Unit--Radio Transmit Board Layout Diagram

TOP Layout

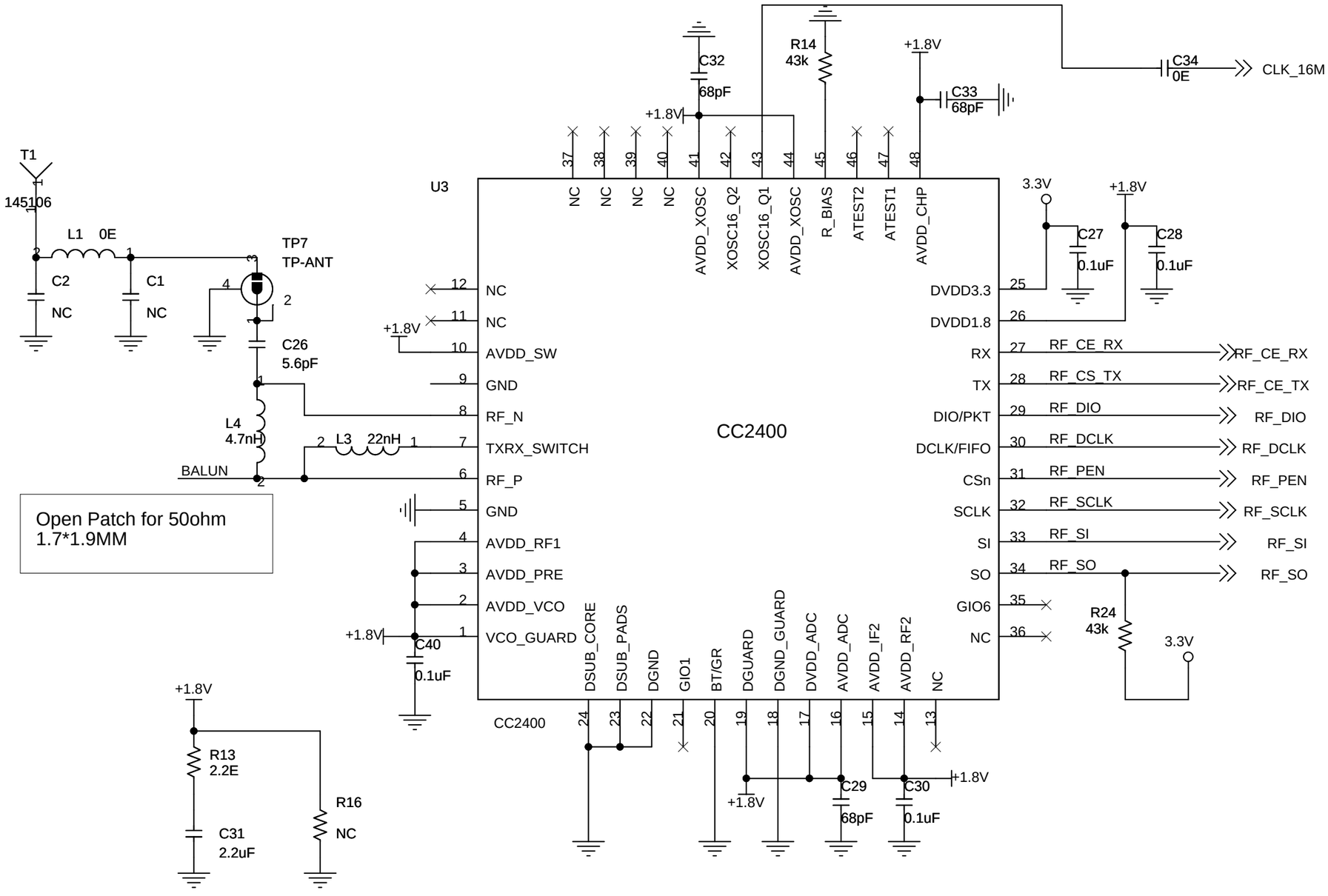


Bottom Layout



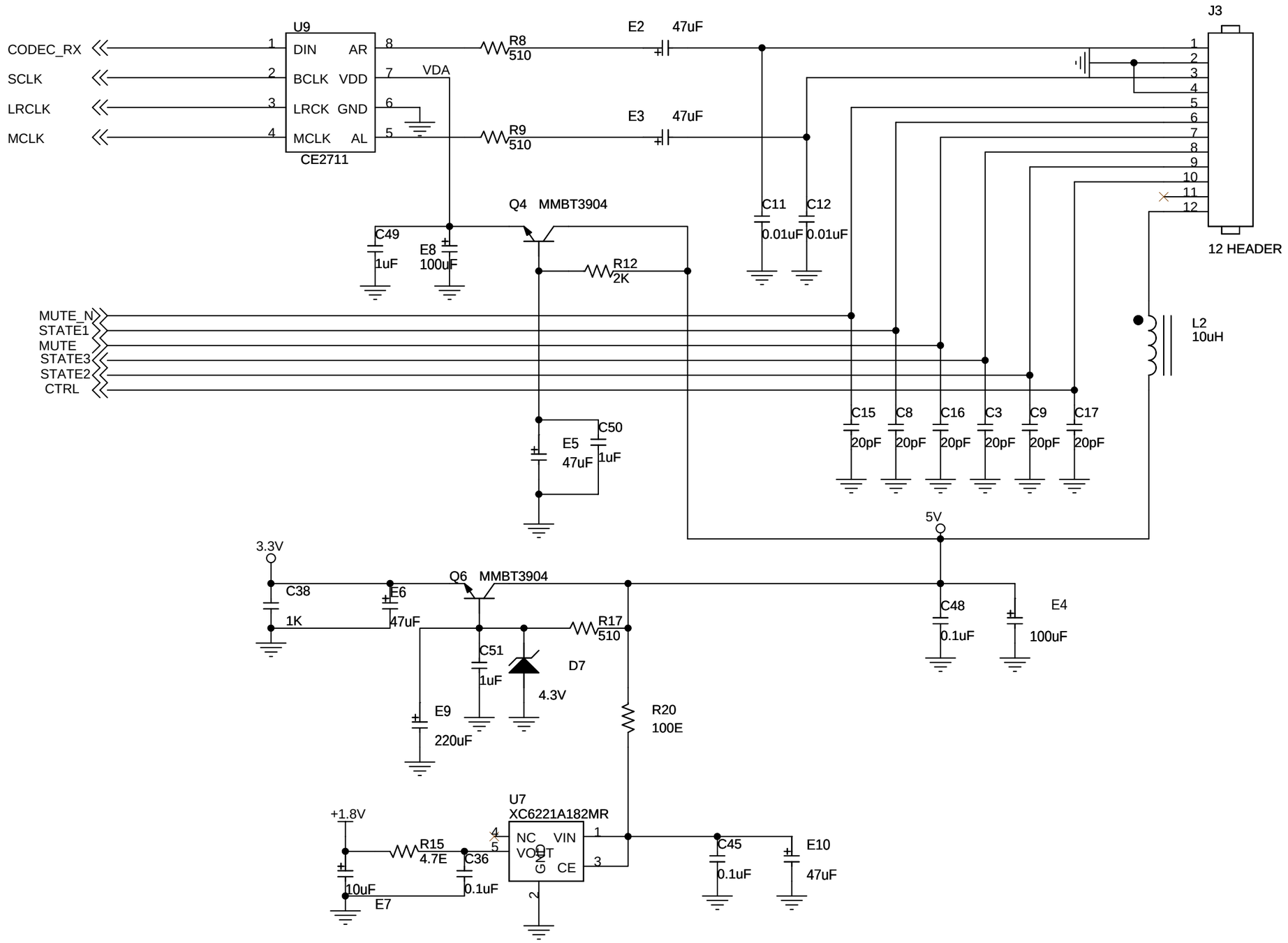
16-4

Subwoofer--Radio Receiver Board Circuit Diagram



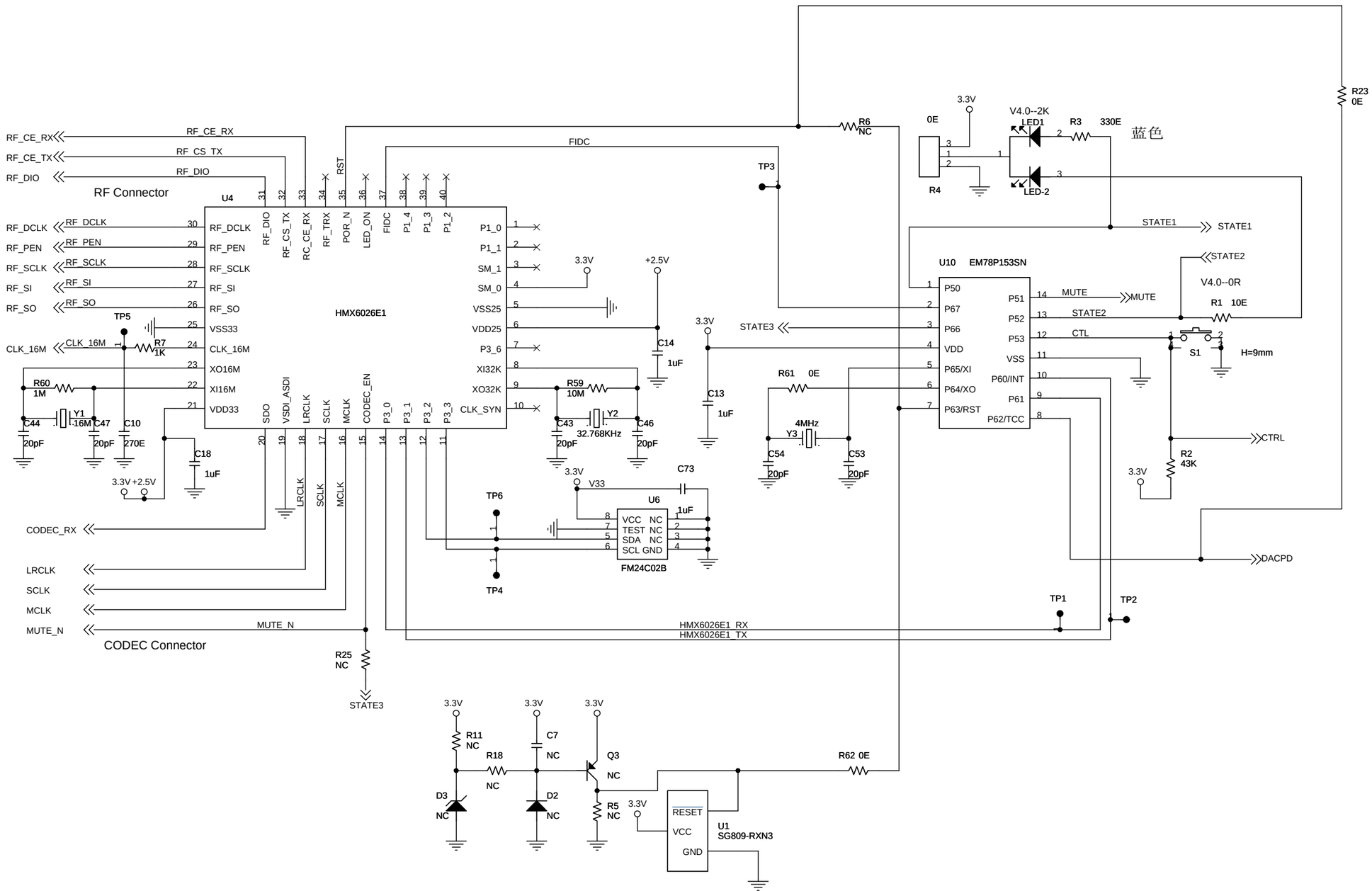
17-1

Subwoofer--Radio Receiver Board Circuit Diagram



17-2

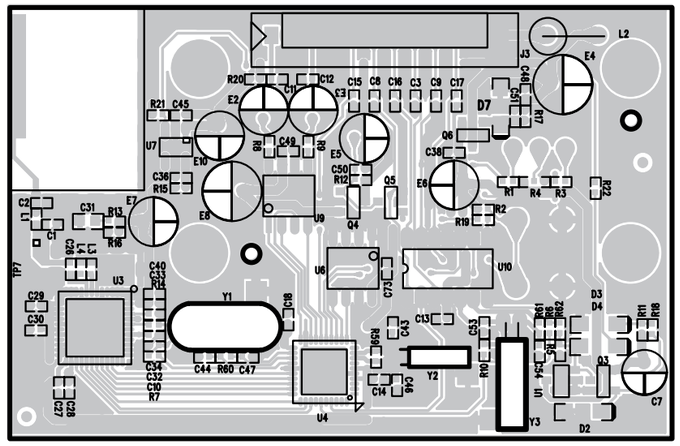
Subwoofer--Radio Receiver Board Circuit Diagram



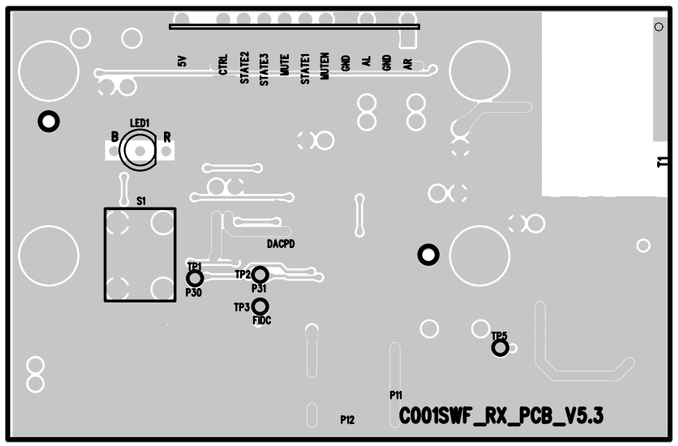
17-3

Subwoofer--Radio Receiver Board Layout Diagram

TOP Layout Diagram

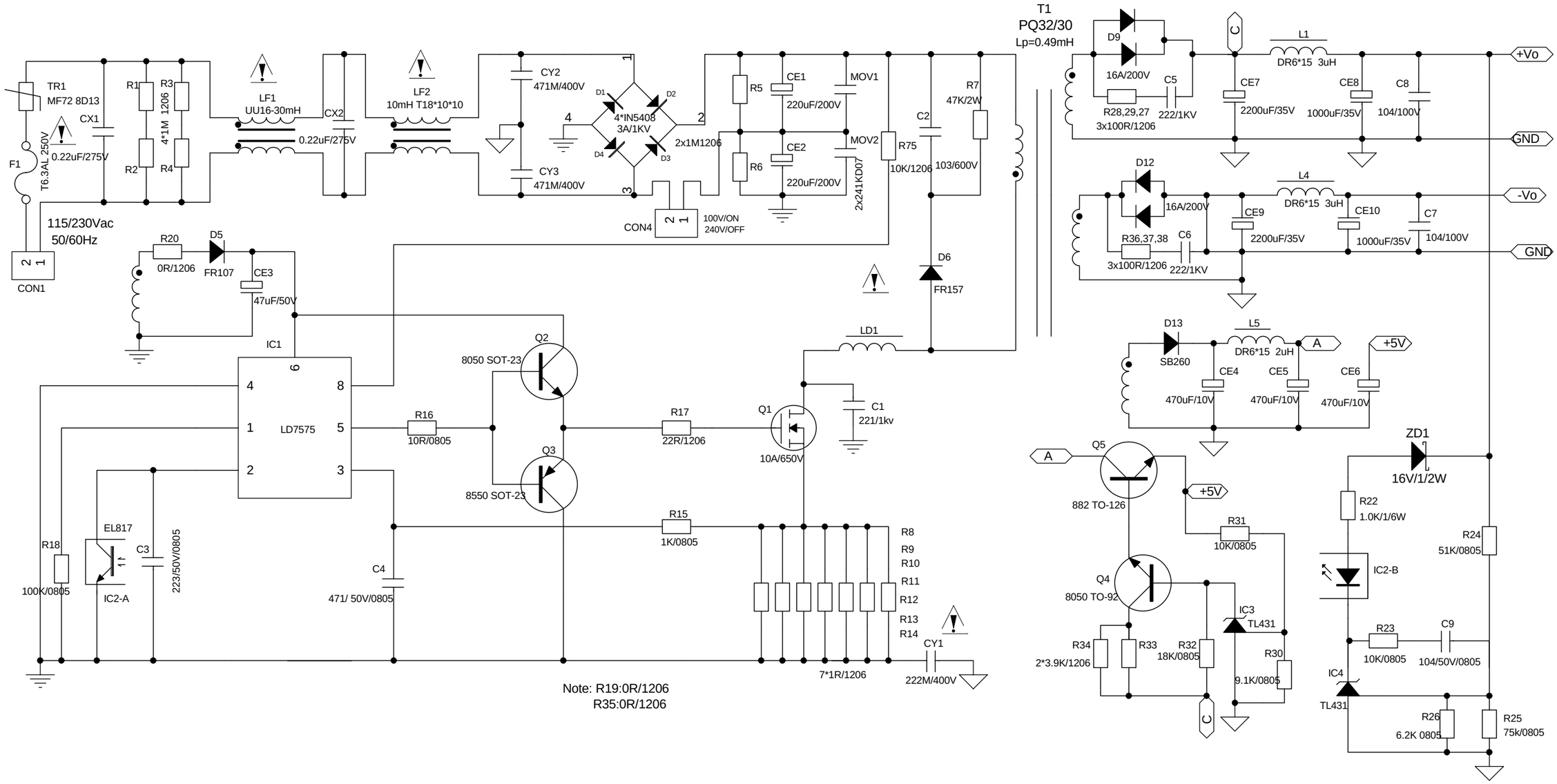


Bottom Layout Diagram



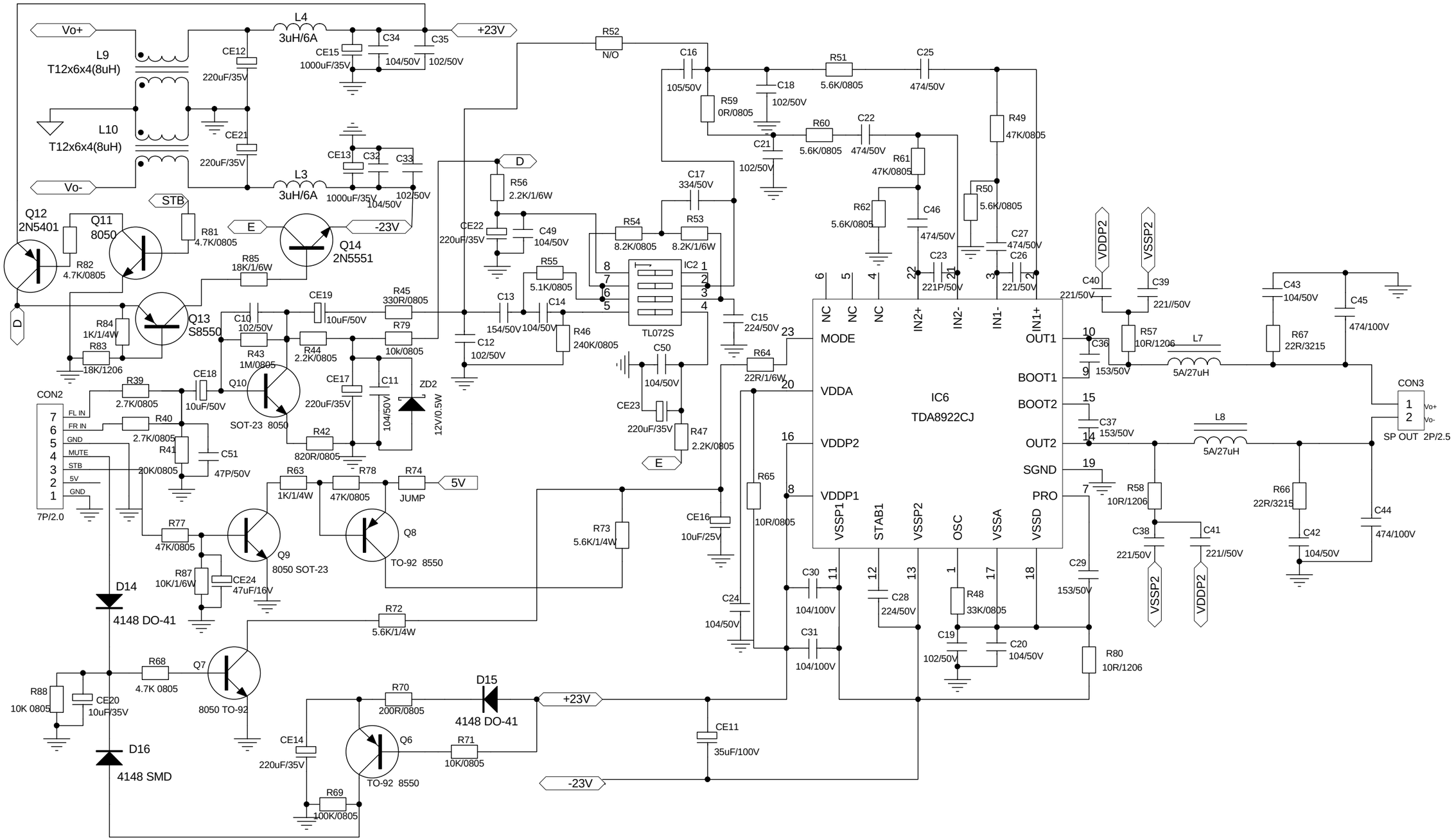
17-4

Subwoofer--Power Board Circuit Diagram



18-1

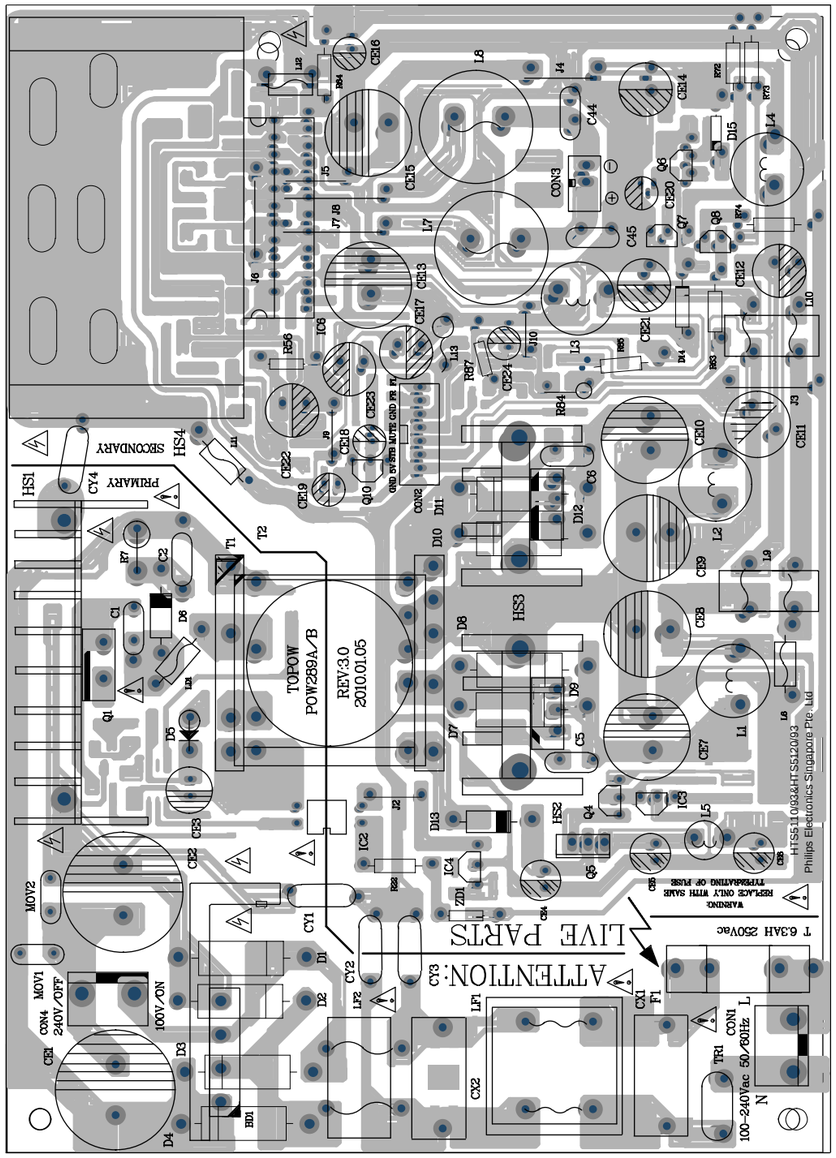
Subwoofer--Power Board Circuit Diagram



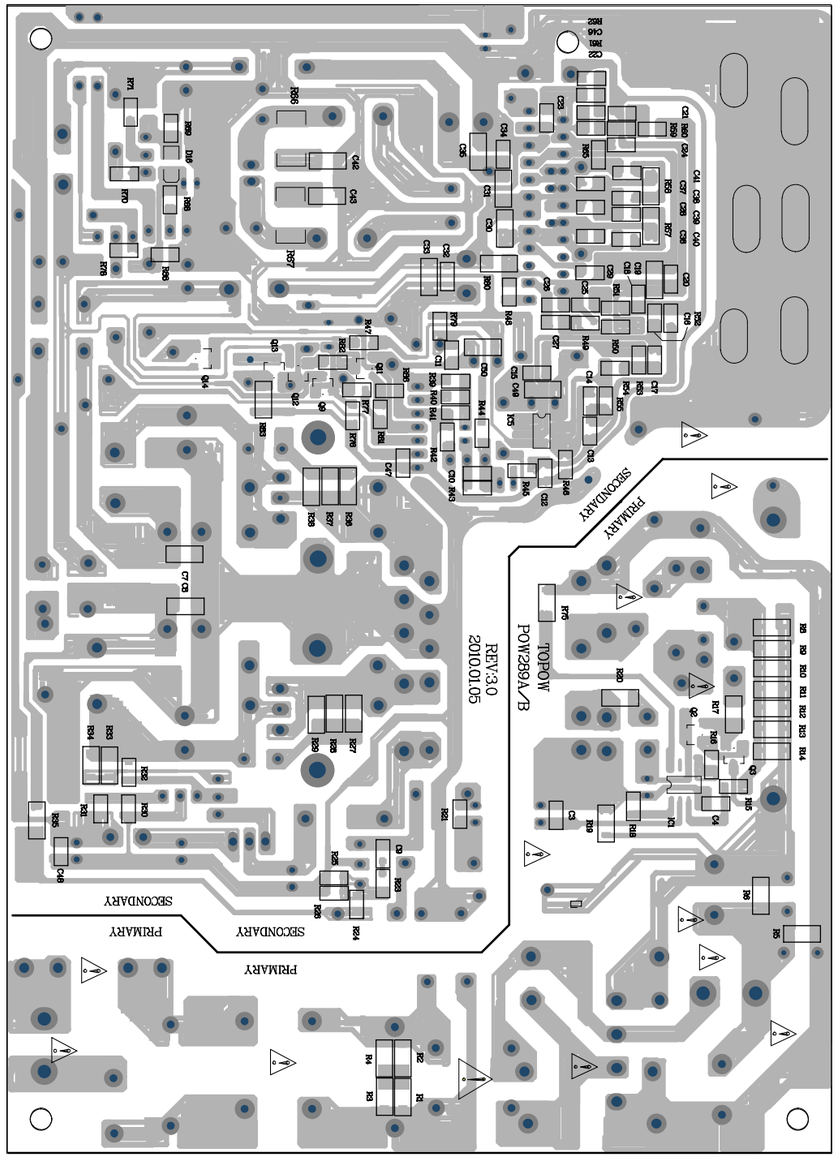
18-2

Subwoofer--Power Board Layout Diagram

TOP Layout Diagram

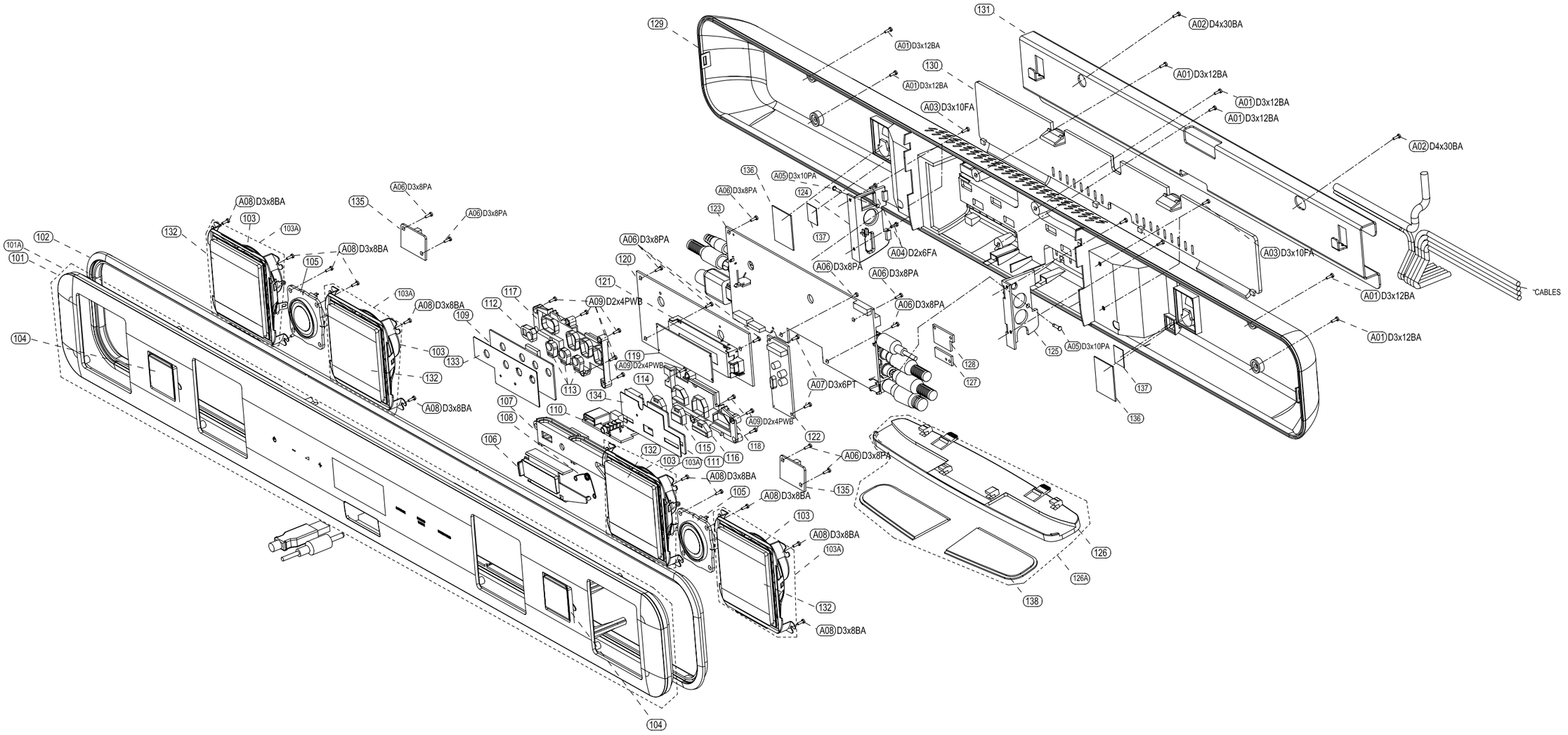


Bottom Layout Diagram



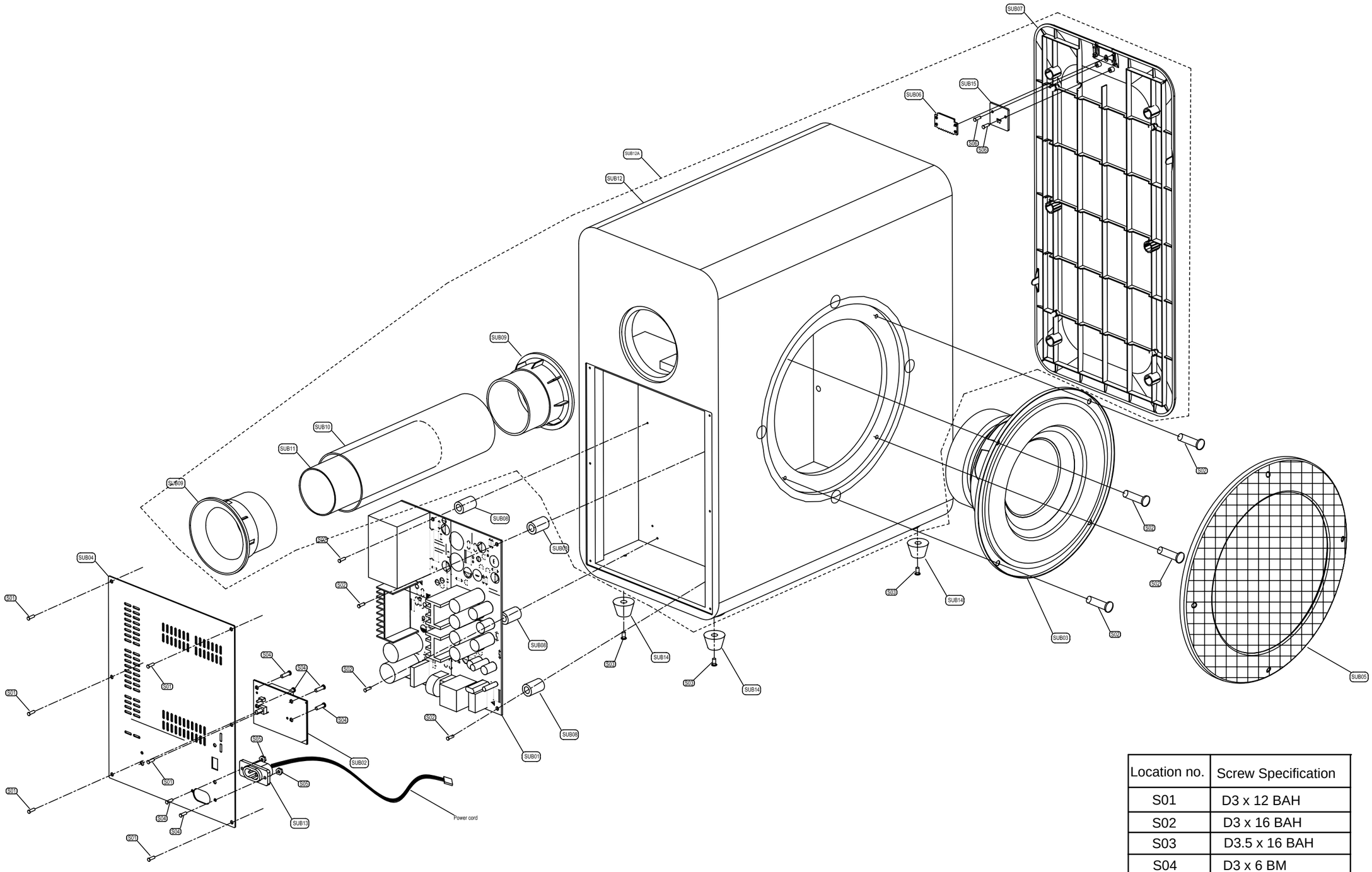
Main Unit Exploded View

Location no.	Screw Specification
A01	D3.5 x 12 BA
A02	D4 x 30 BA
A03	D3 x 10 FA
A04	D2 x 6 FA
A05	D3 x 10 PA
A06	D3 x 8 PA
A07	D3 x 6 PT
A08	D3 x 8 BA
A09	D2 x 4 PWB



19-1

Subwoofer Exploded View



Location no.	Screw Specification
S01	D3 x 12 BAH
S02	D3 x 16 BAH
S03	D3.5 x 16 BAH
S04	D3 x 6 BM
S05	M3 NUT
S06	D2 x 5 PT

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Revision List

Version 1.0

* Initial Release