

Service  
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# Service Manual



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**CLASS 1  
LASER PRODUCT**

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Published by DB 0818 Service Audio Printed in The Netherlands Subject to modification

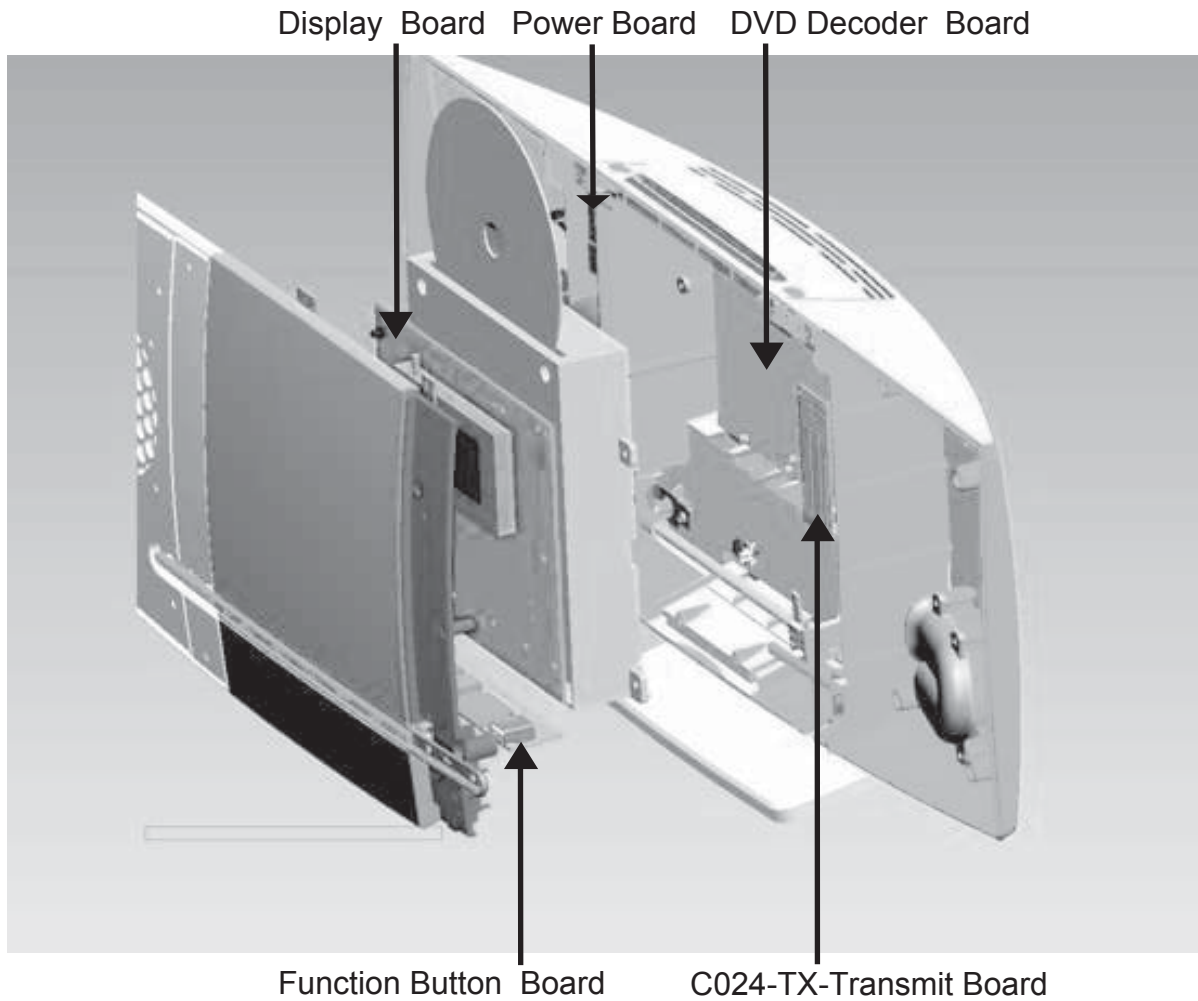
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Version 1.1



**PHILIPS**

## Location of PC Boards



## VERSION VARIATIONS :

Type /Versions:		MCD388										
Board in used:	Service policy	/05	/12	/37	/55	/58	/61	/79	/93	/94	/96	/98
STANDBY BUTTON BOARD			M		M				M			M
DECODER BOARD			M		M				M			M
OPEN/CLOSE BUTTON BOARD			M		M				M			M
USB BOARD			M		M				M			M
DISPLAY BOARD			C		C				C			C
LAMP BOARD-1			M		M				M			M
LAMP BOARD-2			M		M				M			M
POWER BOARD			M		M				M			M
RADIO TRANSMIT BOARD			M		M				M			M
RADIO RECEIVE BOARD			M		M				M			M
AMP POWER BOARD			M		M				M			M

Type /Versions:		MCD388										
Features	Feature dffrence	/05	/12	/37	/55	/58	/61	/79	/93	/94	/96	/98
RDS			√									
VOLTAGE SELECTOR					√							√
ECO STANDBY - DARK			√									
TDS												

\* TIPS : C -- Component Level Repair  
M -- Module Level Repair  
√ -- Used

## Electronic Specification

### AMPLIFIER

Rated Output Power ..... 20W × 2 + 60W RMS  
 Signal-to-noise ratio ..... ≥67dBA  
 Frequency response ..... 20Hz ±3dB~20KHz  
 Aux Input ..... 0.5V RMS 20K ohm

### DISC

Laser Type ..... Simeconductor  
 Disc Diameter ..... 12cm/8cm  
 Support Disc ..... CD-DA,  
 CD-R,CD-RW,MP3,DVD,DVD-RW,DVD+RW  
 Audio DAC ..... 1kHz  
 Total Harmonic Distortion ..... < 1%  
 Frequency Response ..... 4Hz ~ 20KHz  
 S/N Ration ..... >65dBA

### TUNER

FM Tuning Range ..... 87.5 -- 108 MHz  
 Tuning firid ..... 100K/50KHz

### Sensitivity

– Mono, 26db S/N Ratio ..... 5uV  
 – Stereo, 46db S/N Ratio ..... 100uV  
 Selectivity ..... >28db  
 Image Rejection ..... >25db  
 Total Harmonic Distouion ..... <2%  
 Signal to Noise Ration ..... ≥55dBA

### SPEAKERS

Speaker Impedance ..... 4ohm  
 Speaker Driver, base ..... 3"  
 Speaker Driver, tweeter ..... NA  
 Frequency Response ..... 20Hz ±3dB~20KHz

### GENERAL INFORMATION

Total Output power ..... 100W RMS  
 AC Power ..... 230V / 50Hz  
 Operation Power Consumption ..... 22W  
 Standby Power Consumption ..... <10w  
 Eco Standby Power Consumption ..... <1W  
 Headphone Output ..... 2×15mV 32ohm  
 USB Direct ..... Version 2.0

### Dimensions

– Main unit (w x h x d) ..... 525x90x200mm  
 – Speaker box (w x h x d) ..... NA  
 – SUBwoofer(w x h x d) ..... 170x197x302mm

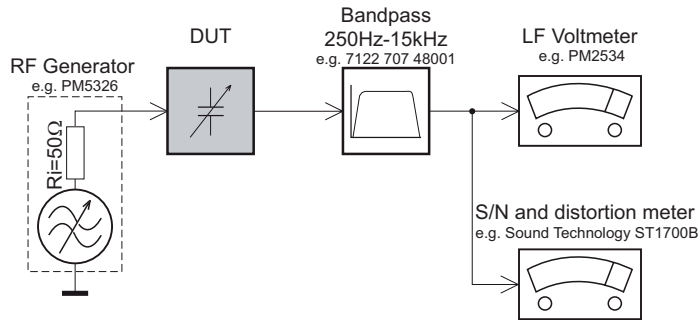
### Weight

– With Packing ..... 8KG  
 – Main Unit ..... 2.4 KG  
 – Speaker box ..... NA  
 – SUBwoofer..... 4.5KG

Specifications and external appearance are subject to change without notice.

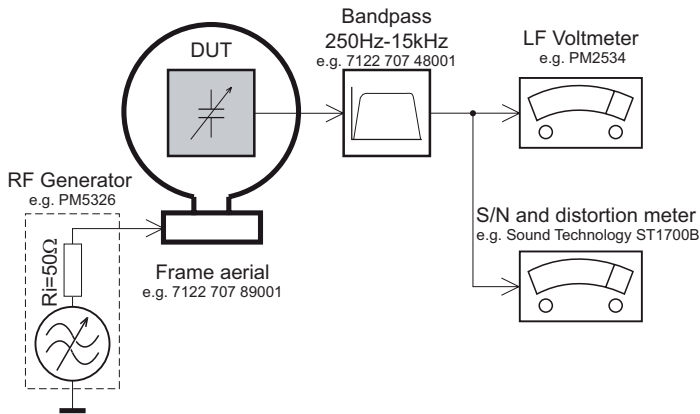
## MEASUREMENT SETUP

### Tuner FM



Use a bandpass filter to eliminate hum (50Hz, 100Hz) and disturbance from the pilotone (19kHz, 38kHz).

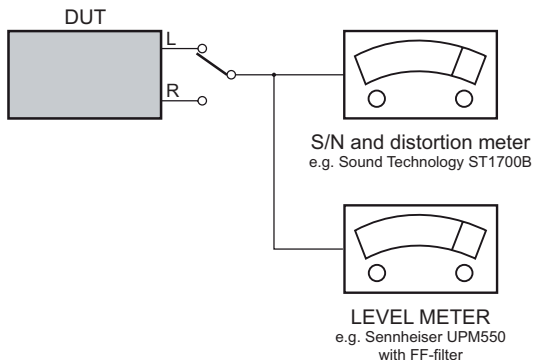
### Tuner AM (MW,LW)



To avoid atmospheric interference all AM-measurements have to be carried out in a Faraday's cage.  
Use a bandpass filter (or at least a high pass filter with 250Hz) to eliminate hum (50Hz, 100Hz).

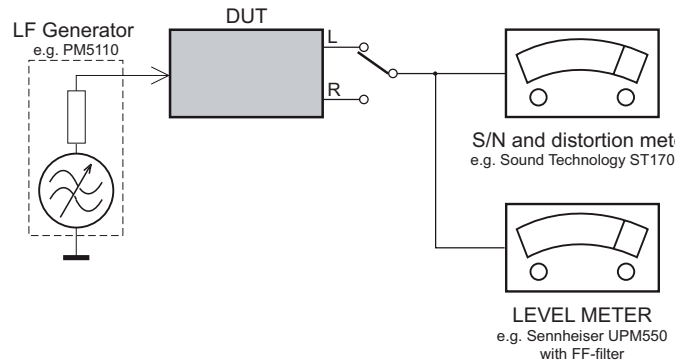
### CD

Use Audio Signal Disc SBC429 4822 397 30184  
(replaces test disc 3)



### Recorder

Use Universal Test Cassette **Cr02** SBC419 4822 397 30069  
or Universal Test Cassette **Fe** SBC420 4822 397 30071



## SERVICE AIDS



### WARNING


All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically.

When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools also at this potential.

### ESD



Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified, be used

Safety components are marked by the symbol .

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## 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 next rules:



- On our website [www.atyourservice.ce.Philips.com](http://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
- \* Lead free

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

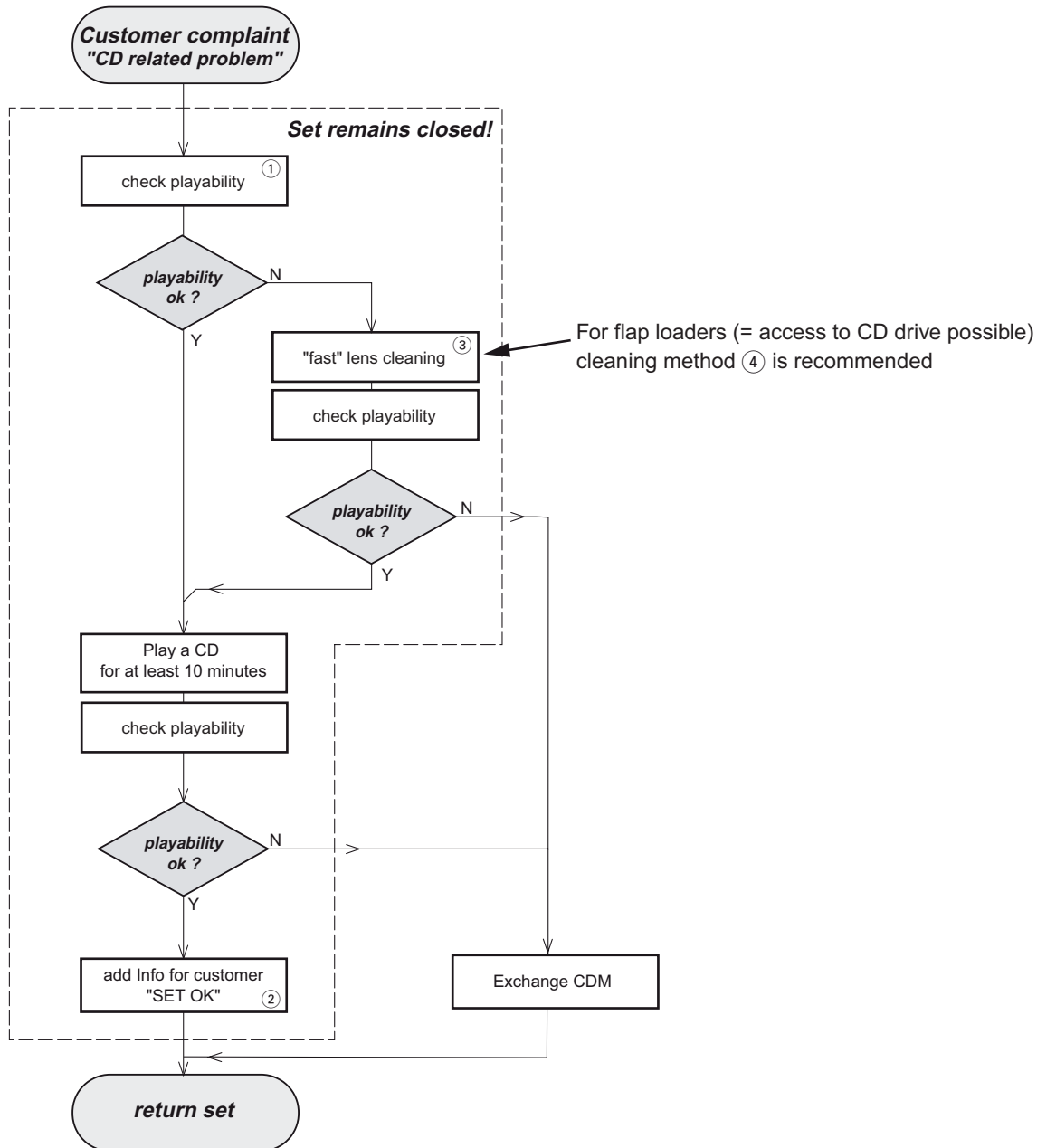
For additional questions please contact your local repair-helpdesk.

## SERVICE INSTRUCTION

Safety regulations require that after a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the AC Power lead for external damage.
- Check the strain relief of the AC Power cord for proper function.
- Check the electrical DC resistance between the AC Power Plug and the secondary side (only for sets which have a AC Power isolated power supply):
  1. Unplug the AC Power cord and connect a wire between the two pins of the AC Power plug.
  2. Set the AC Power switch to the "on" position (keep the AC Power cord unplugged!).
  3. Measure the resistance value between the pins of the AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be larger than 4.5 Mohm (For U.S. it should be between 4.2 Mohm and 12 Mohm).
  4. Switch "off" the set, and remove the wire between the two pins of the AC Power plug.
- Check the cabinet for defects, to avoid touching of any inner parts by the customer.

## INSTRUCTIONS ON CD PLAYABILITY



① - ④ For description - see following pages

## INSTRUCTIONS ON CD PLAYABILITY

①

### PLAYABILITY CHECK

For sets which are compatible with **CD-RW** discs  
 use CD-RW Printed Audio Disc .....7104 099 96611  
 TR 3 (Fingerprint)  
 TR 8 (600µ Black dot) **maximum at 01:00**

- playback of these two tracks without audible disturbance  
 playing time for: Fingerprint  $\geq 10$ seconds  
 Black dot from 00:50 to 01:10
- jump forward/backward (search) within a reasonable time

For all other sets  
 use CD-DA SBC 444A .....4822 397 30245  
 TR 14 (600µ Black dot) **maximum at 01:15**  
 TR 19 (Fingerprint)  
 TR 10 (1000µ wedge)

- playback of all these tracks without audible disturbance  
 playing time for: 1000µ wedge  $\geq 10$ seconds  
 Fingerprint  $\geq 10$ seconds  
 Black dot from 01:05 to 01:25
- jump forward/backward (search) within a reasonable time

②

### CUSTOMER INFORMATION

It is proposed to add an addendum sheet to the set which informs the customer that the set has been checked carefully - but no fault was found.

The problem was obviously caused by a scratched, dirty or copy-protected CD. In case problems remain, the customer is requested to contact the workshop directly.

The lens cleaning (method ③) should be mentioned in the addendum sheet.

The final wording in national language as well as the printing is under responsibility of the Regional Service Organizations.

④

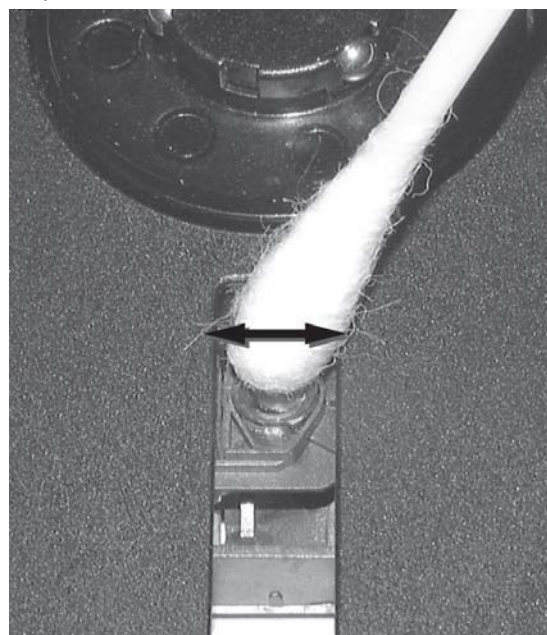
### LIQUID LENS CLEANING

**Before touching the lens it is advised to clean the surface of the lens by blowing clean air over it. This to avoid that little particles make scratches on the lens.**

Because the material of the lens is synthetic and coated with a special anti-reflectivity layer, cleaning must be done with a non-aggressive cleaning fluid. It is advised to use "Cleaning Solvent

The actuator is a very precise mechanical component and may not be damaged in order to guarantee its full function. Clean the lens gently (don't press too hard) with a soft and clean cotton bud moistened with the special lens cleaner.

The direction of cleaning must be in the way as indicated in the picture below.



## Software Version Check & Upgrade

### Upgrade software

---

1. Download the software from Philips support website  
<http://www.philips.com/support>
2. Load the Software CD Disc or USB, when it is loading, the TV screen showing as below:

Upgrade File detected  
Upgrade?  
Press PLAY to start  
Upgrading

Waiting half to one minute, till the TV screen showing disappear.  
Turnoff electrical source and re-open.

3. Press SYSTEM on the remote controller to open menu, press Left or Right to select "Preference Page", TV screen shows as below:

--Preference Page--

TV type	PAL	
Audio	CHI	English
Subtitle	CHI	French
Disc menu	CHI	Spanish
Parental		Chinese
		Japanese
Default		Korean
		Russian
		Tjai

Press Up or Down to select "Default" on remote controller, Press OK to exit reset.  
Software upgrade finish.

### Software check

---

Input password "811502" on remote controller, TV screen showing as below:

Ver : MCD388 / xxxx  
Date mm dd yyyy  
Time hh : mm : ss  
Region code x

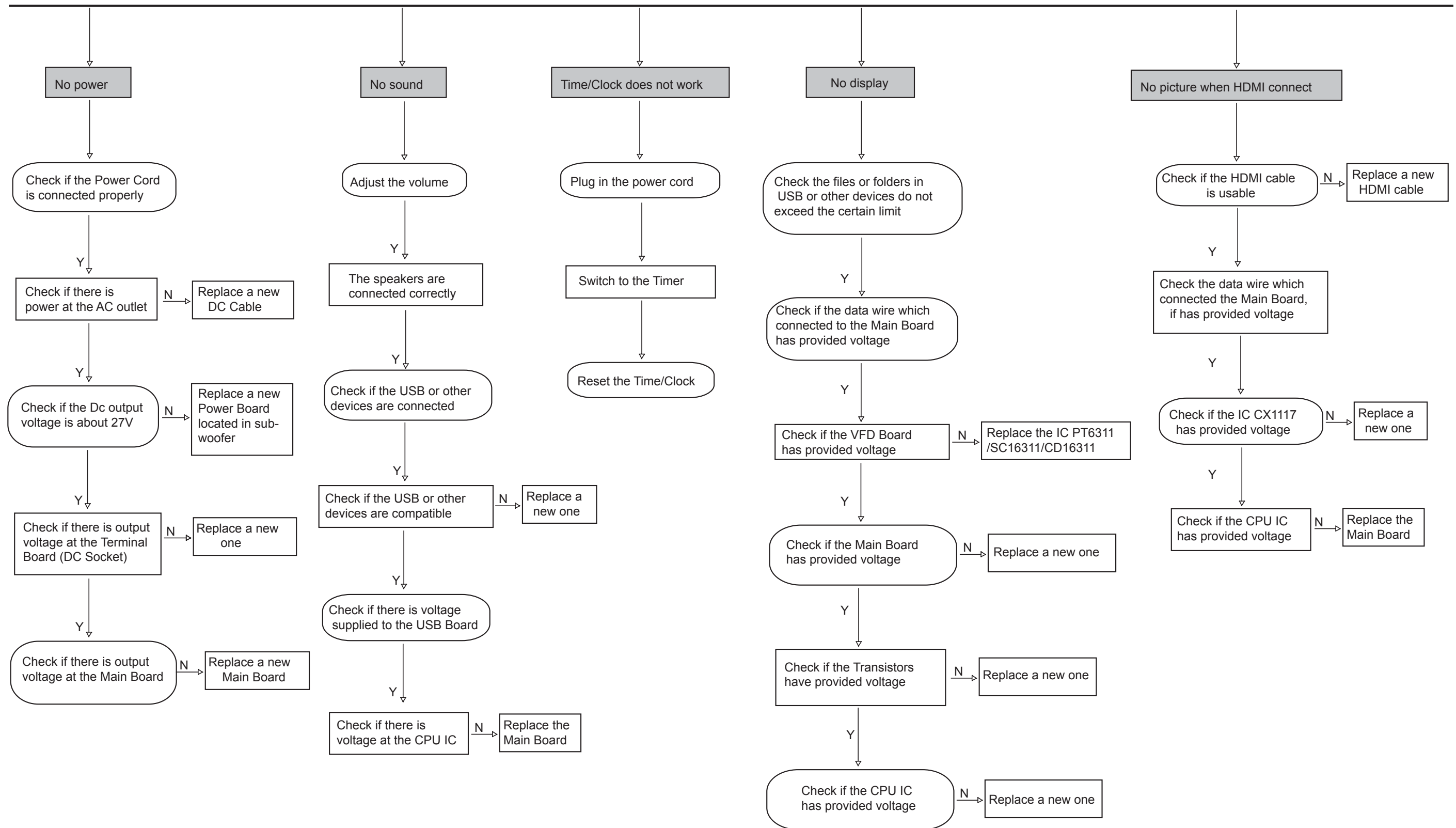
### CPU version check

1. Keep press PLAY/PAUSE and STOP buttons, plug into the power cord at the same time, TV showing as below:

MCD388 Vxx

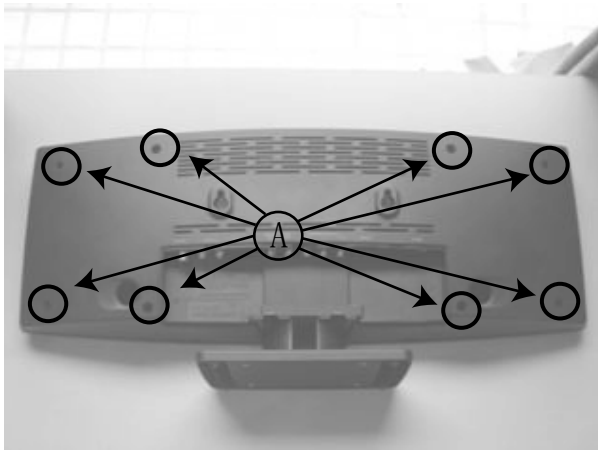


## Malfunction Follow Check Chart

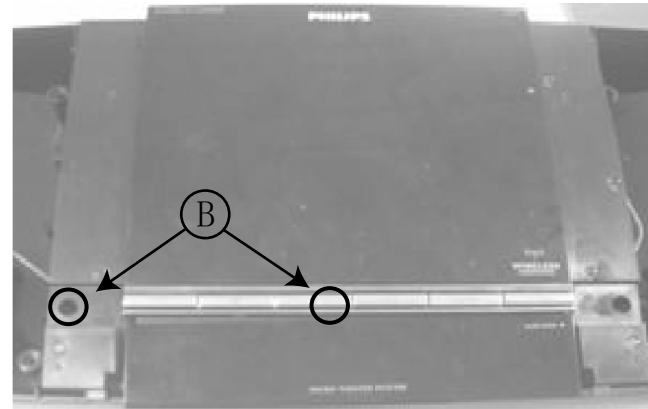


## Disassembly Diagram

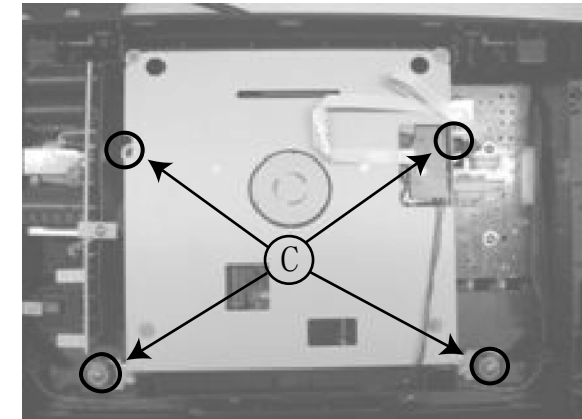
A. Loose 8pcs screws (3 x 10 BA)  
to remove Back Cabinet



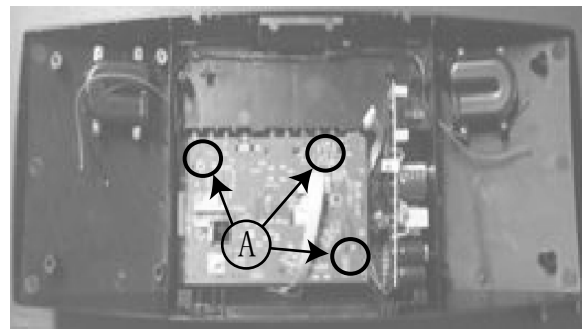
B. Loose 2pcs screws (3 x 8 FA)  
to remove Front Cabinet



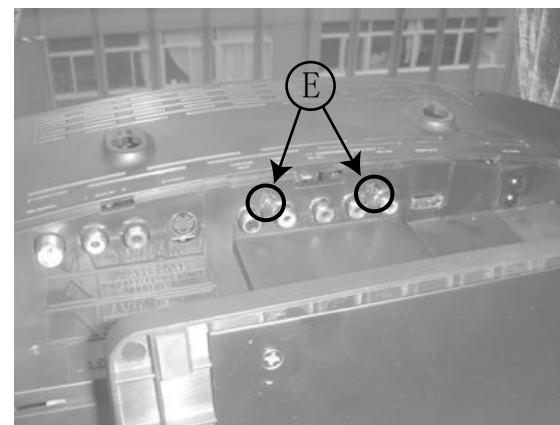
C. Loose these 4pcs screws (3 x 10 PWA)  
to remove Loader Tray Mechanism



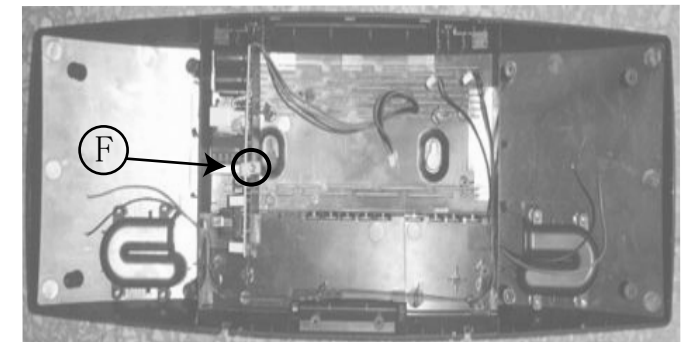
D. Loose 3pcs screws (3 x 10 PA)



E. Loose 2pcs screws (3 x 8 PA)  
to remove Decoder Board

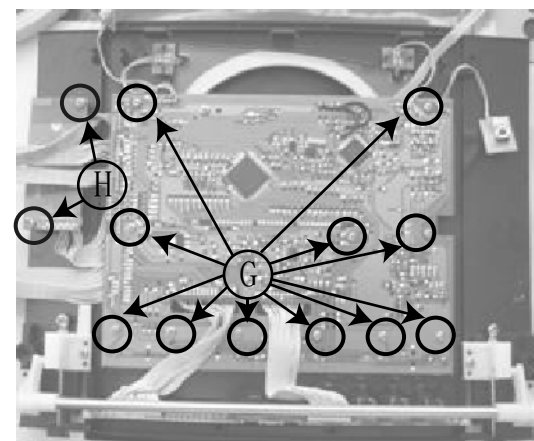


F. Loose 1pcs screw (3 x 10 PWA)  
to remove Power Board

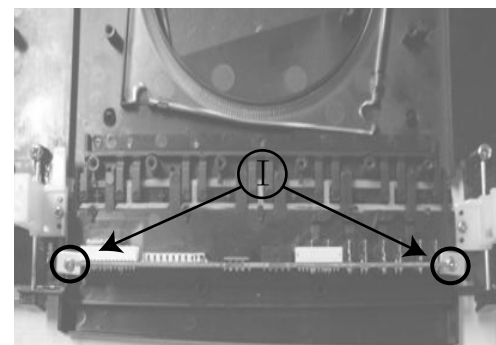


G. Loose 10pcs screws (2.6 x 8 PA)  
to remove Display Board

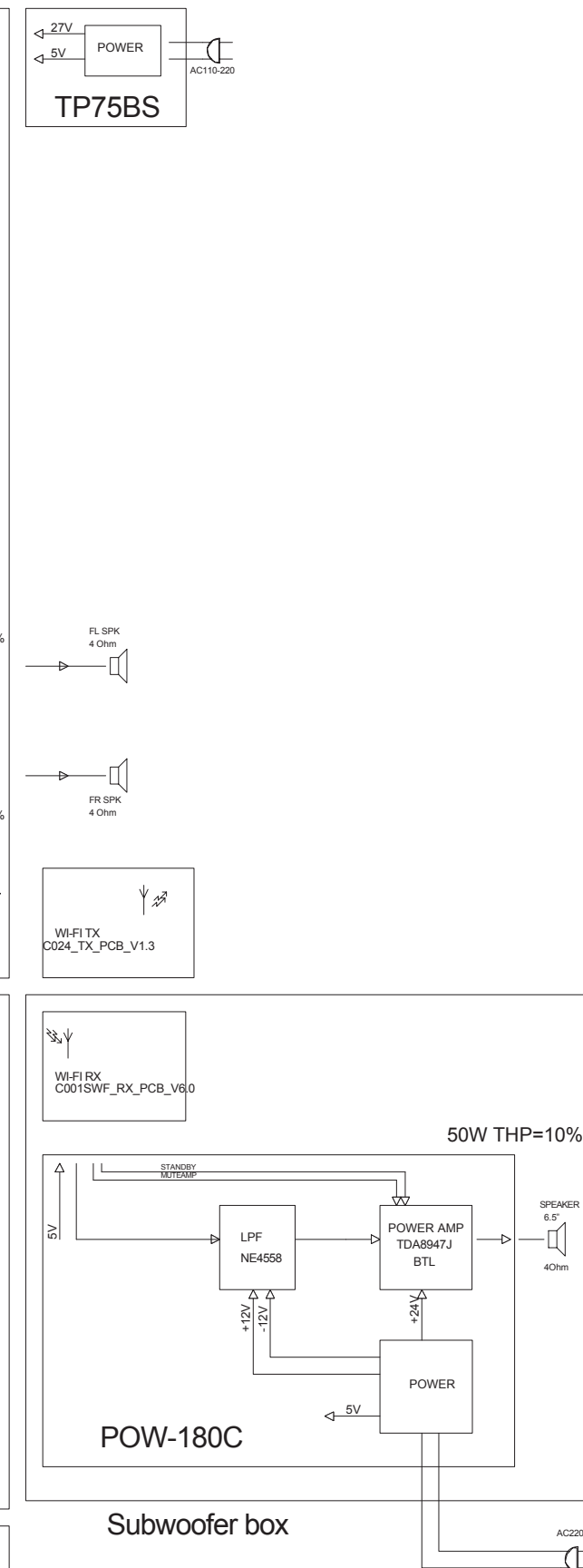
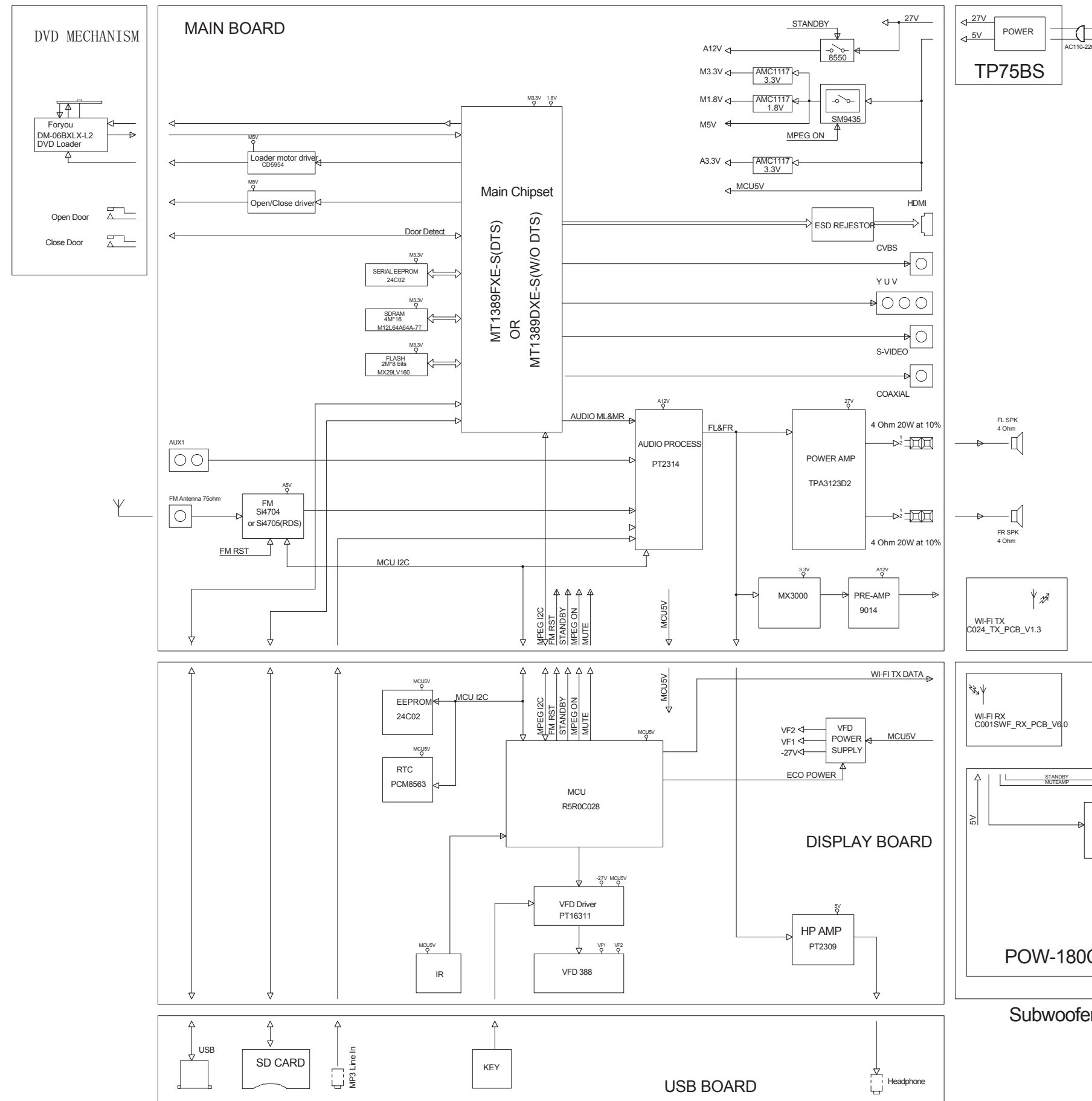
H. Loose 2pcs screws (3 x 8 PA)  
to remove TX-Transmit Board



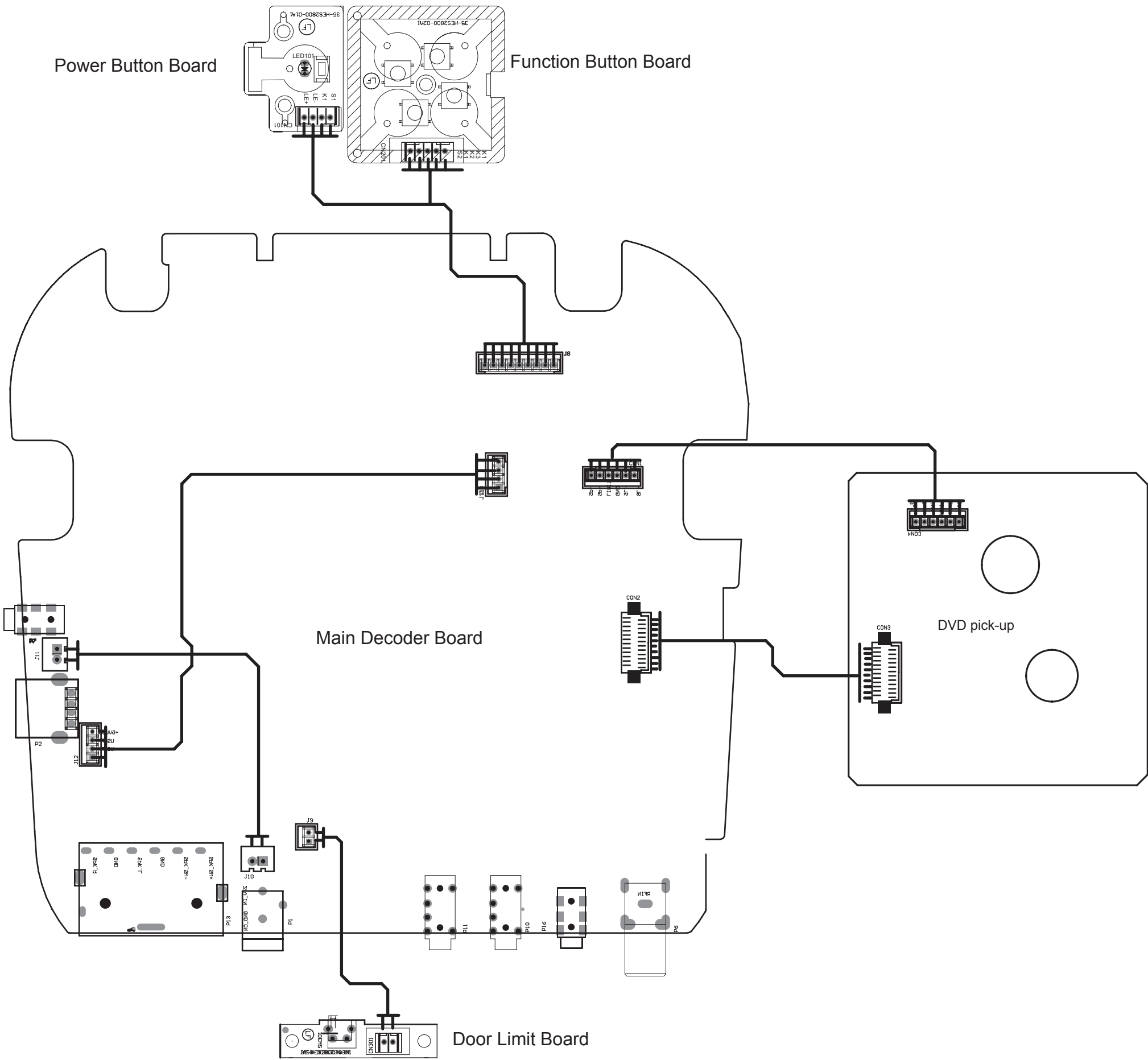
I. Loose 2pcs screws (2.6 x 8 PWT)  
to remove Display Board



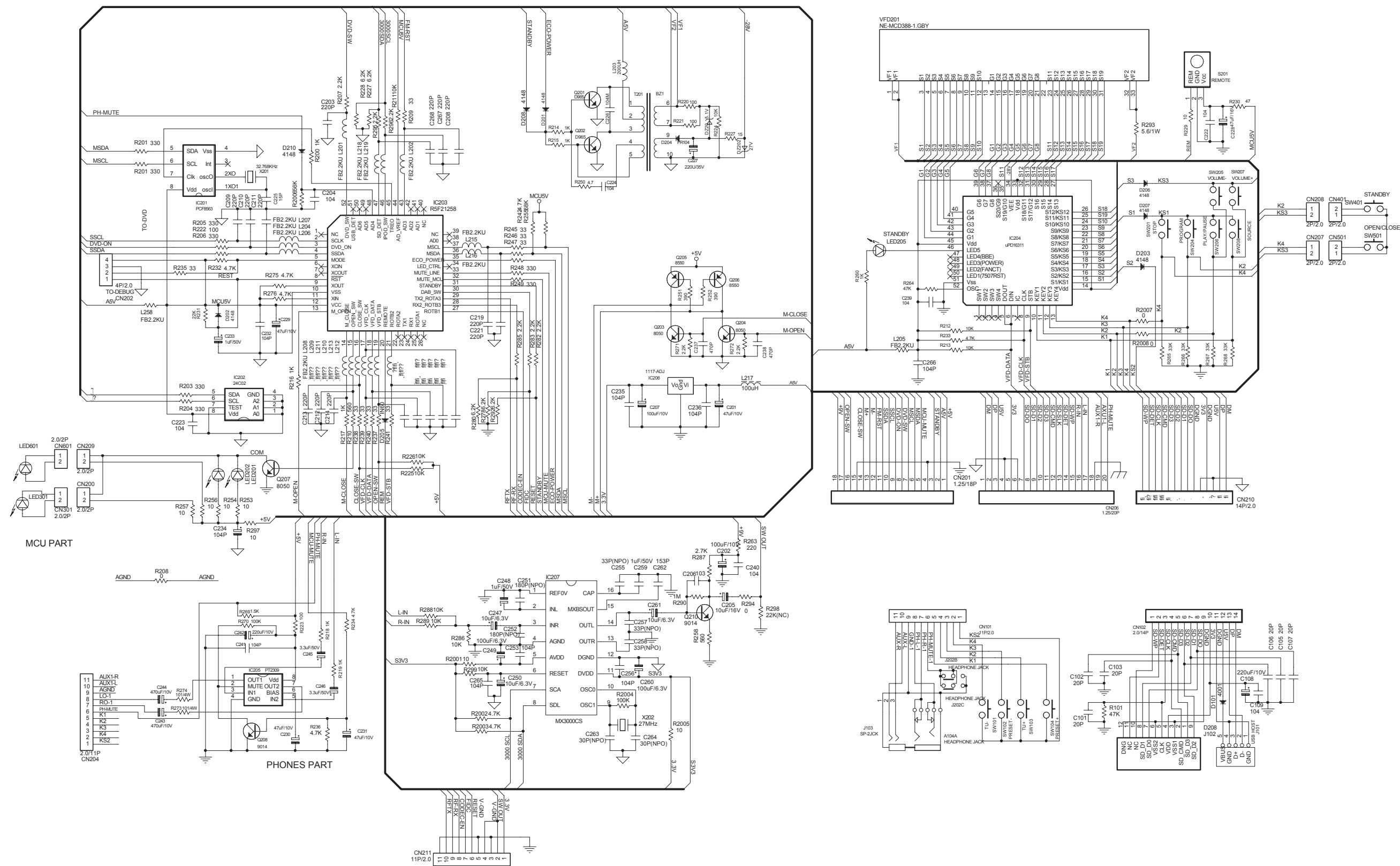
### Block Diagram



Wiring Diagram



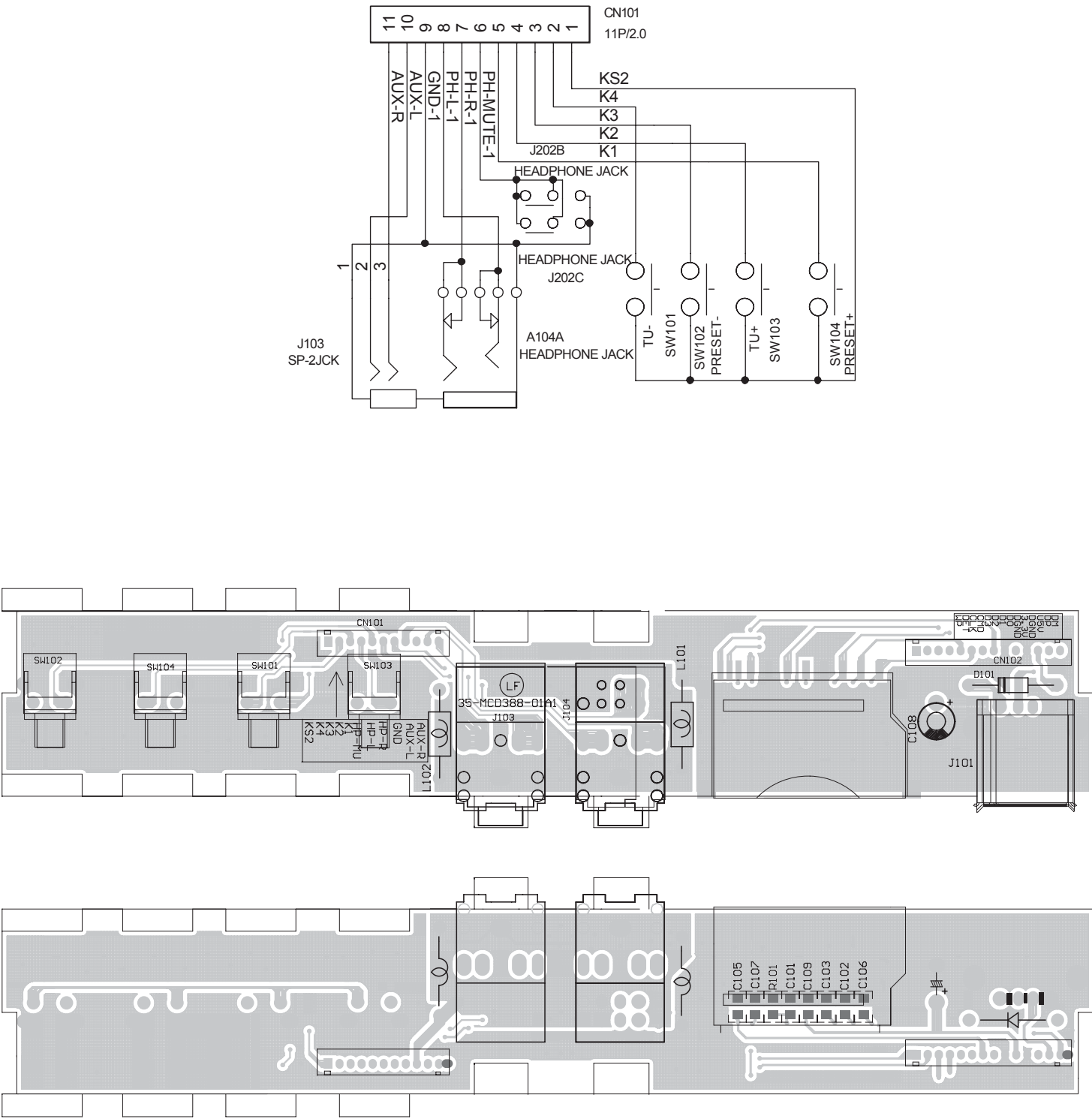
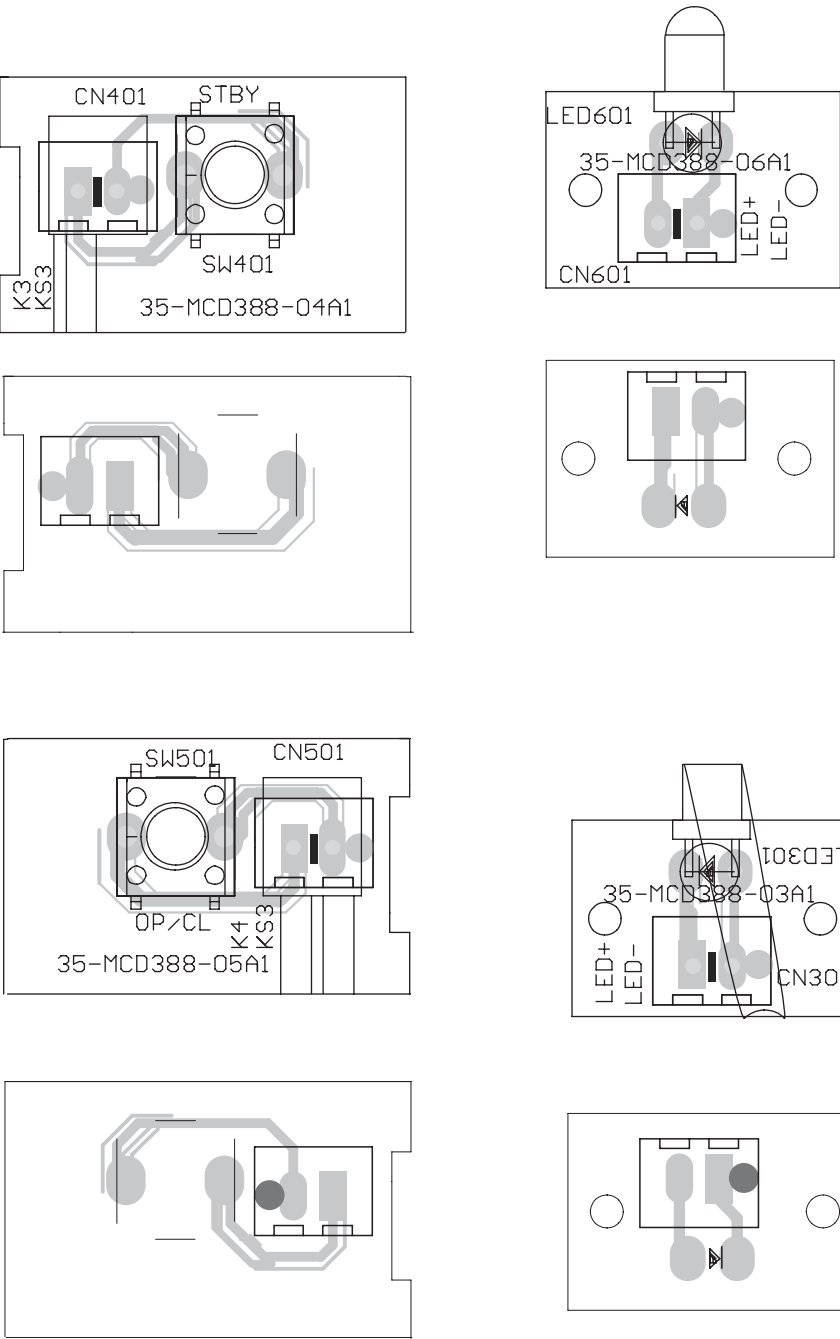
Display Board -- Circuit Diagram



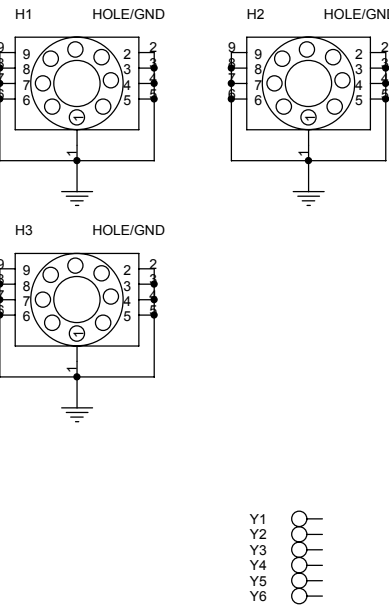
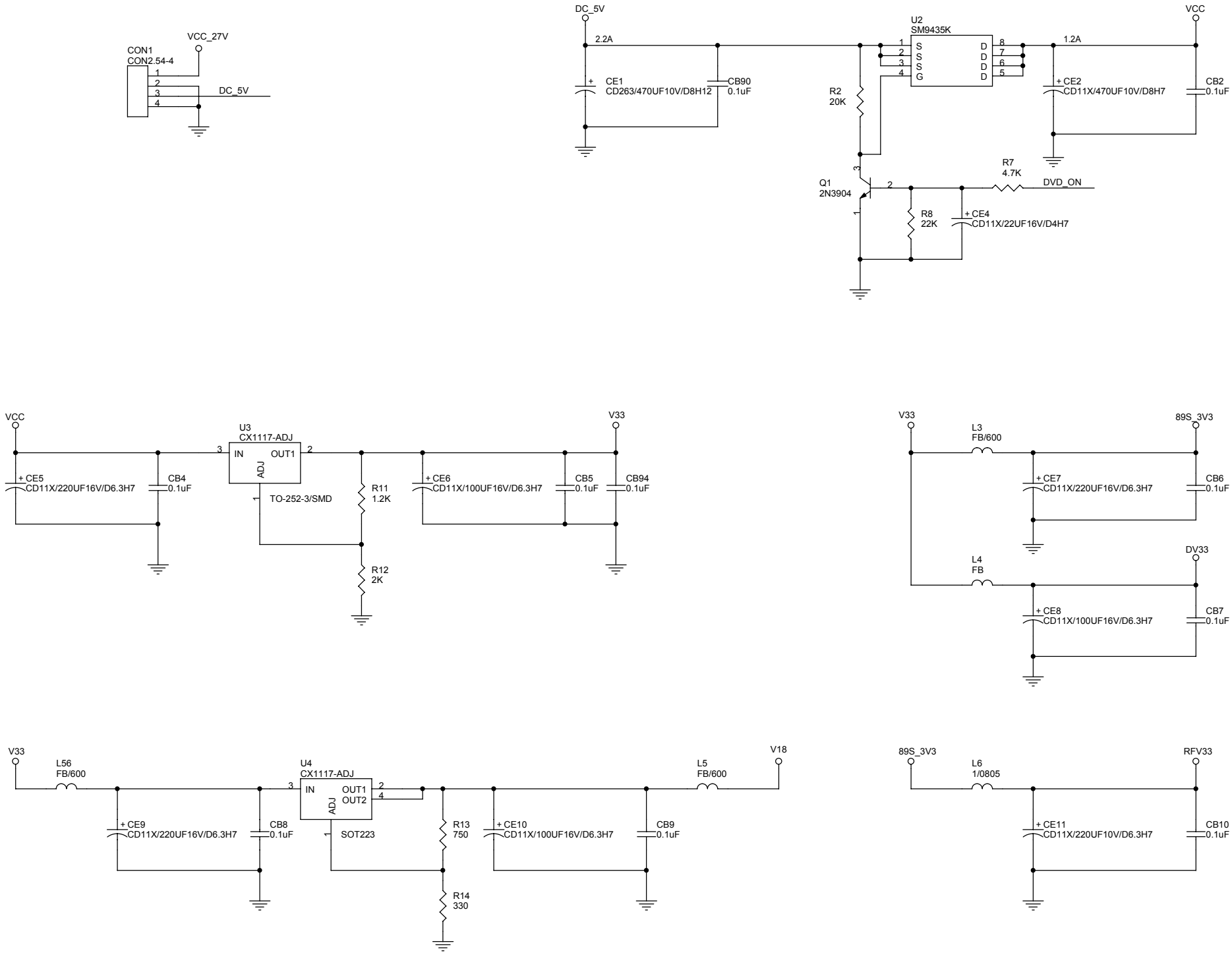
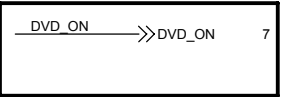




Small Board

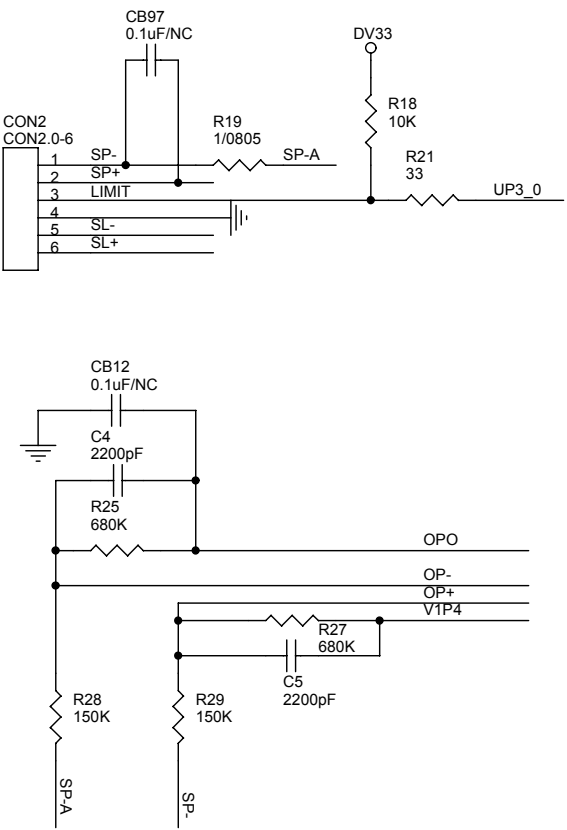
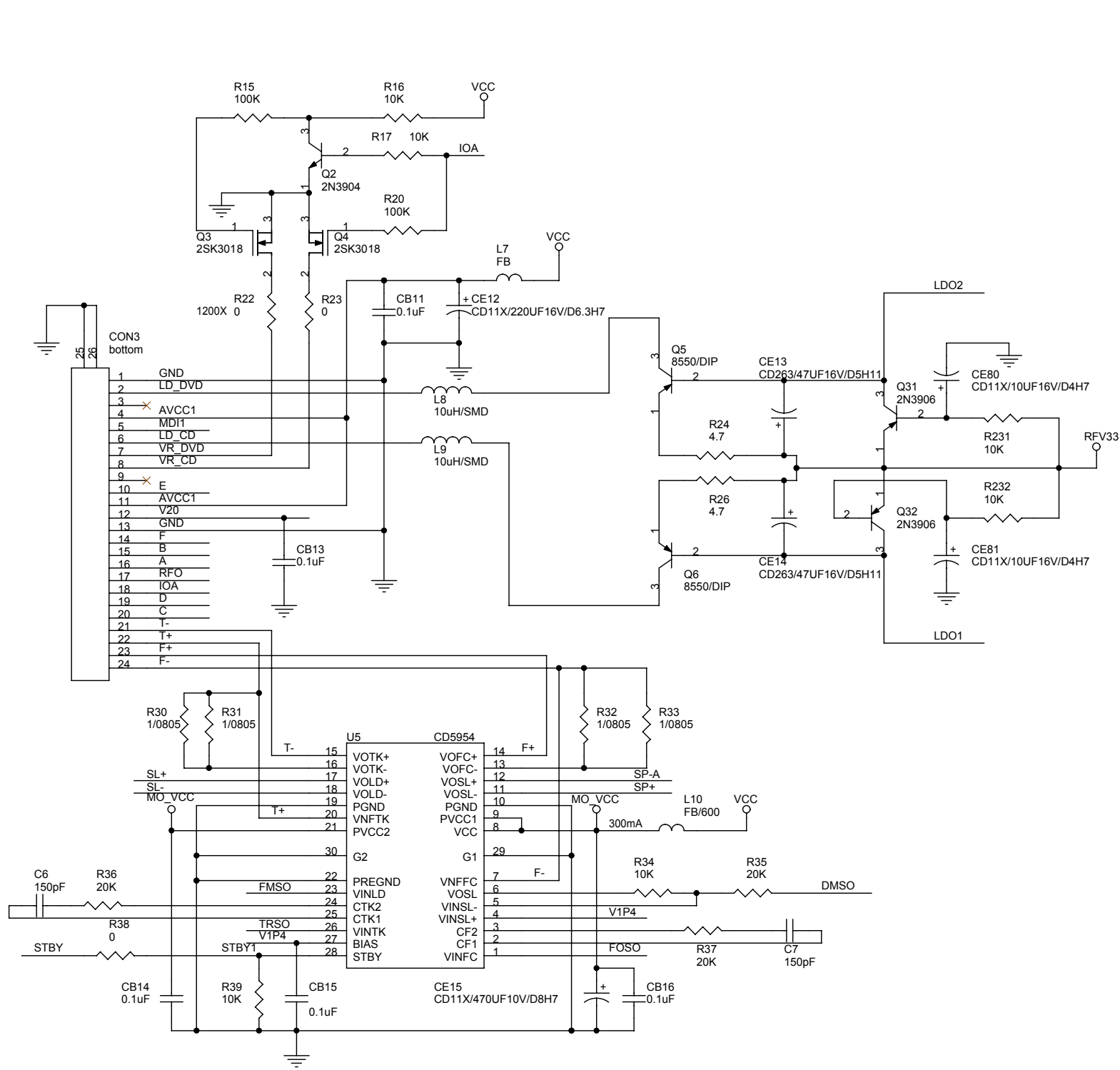


Decoder Board -- Circuit Diagram -- Part1



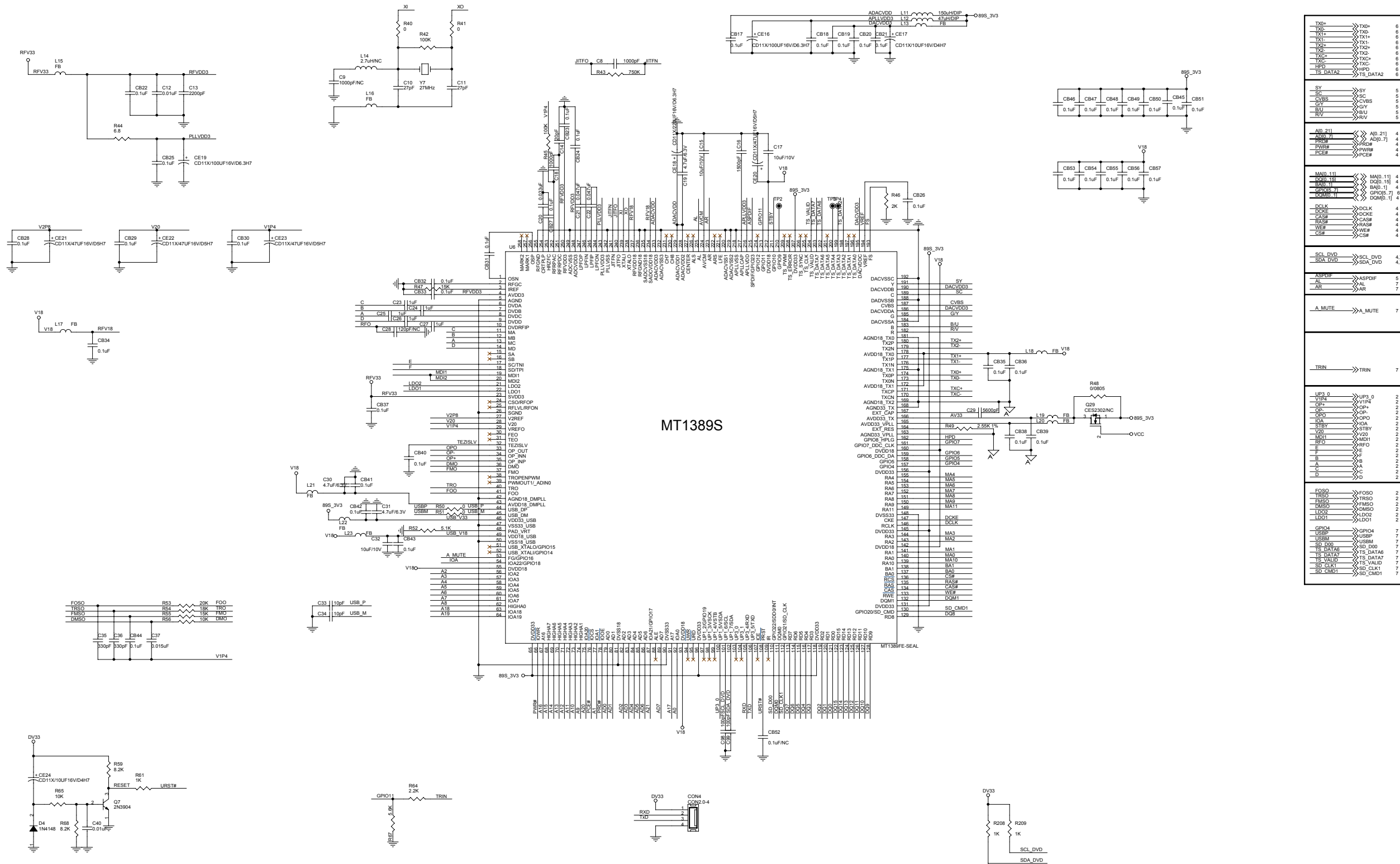


Decoder Board -- Circuit Diagram -- Part2

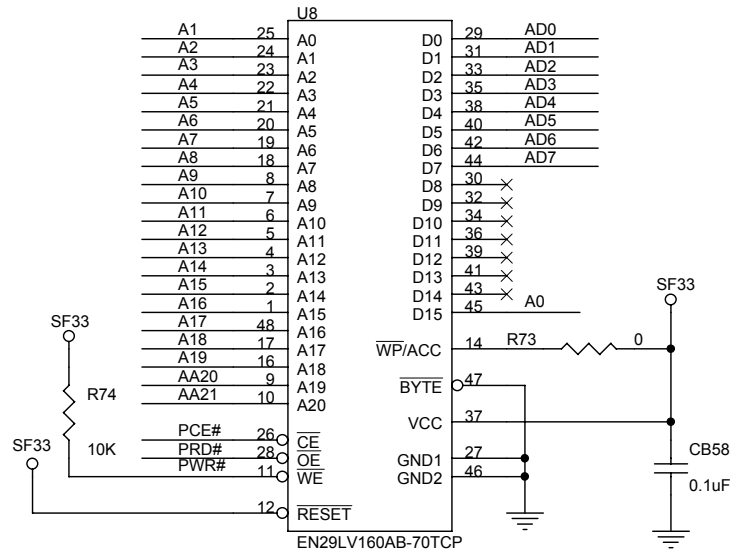
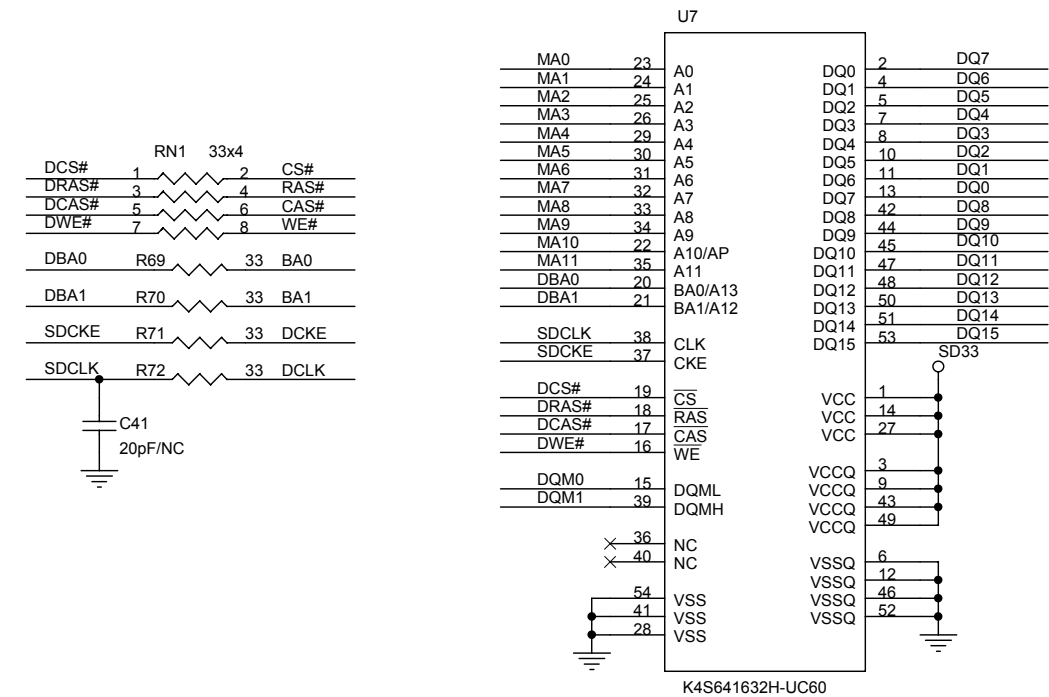


IOA	>>>	IOA	3
LDO2	>>>	LDO2	3
LDO1	>>>	LDO1	3
MDI1	>>>	MDI1	3
E	>>>	E	3
V20	>>>	V20	3
F	>>>	F	3
B	>>>	B	3
A	>>>	A	3
RFO	>>>	RFO	3
D	>>>	D	3
C	>>>	C	3
FMSO	>>>	FMSO	3
TRSO	>>>	TRSO	3
STBY	>>>	STBY	3
FOSO	>>>	FOSO	3
DMSO	>>>	DMSO	3
UP3_0	>>>	UP3_0	3
OPO	>>>	OPO	3
OP-	>>>	OP-	3
OP+	>>>	OP+	3
V1P4	>>>	V1P4	3

## 7-3



Decoder Board -- Circuit Diagram -- Part4



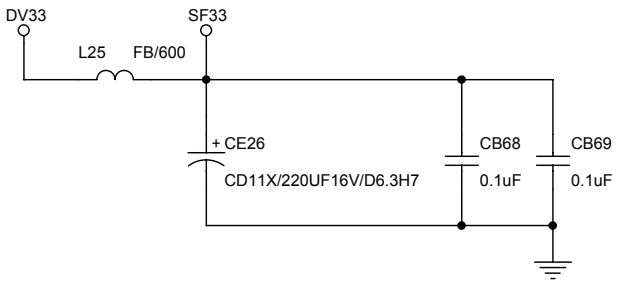
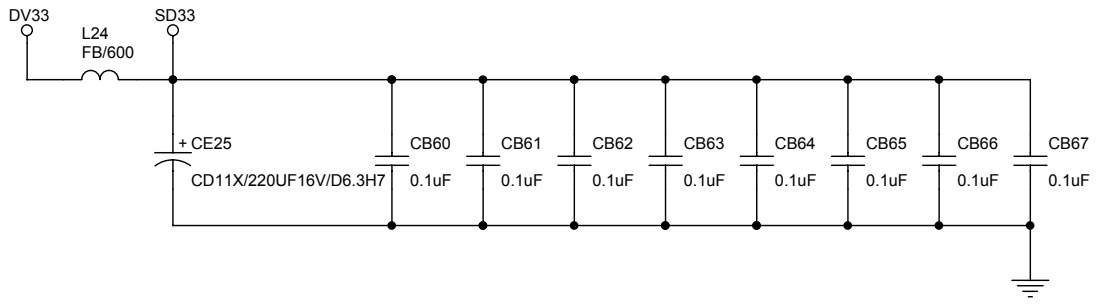
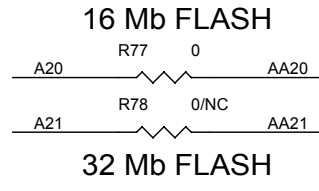
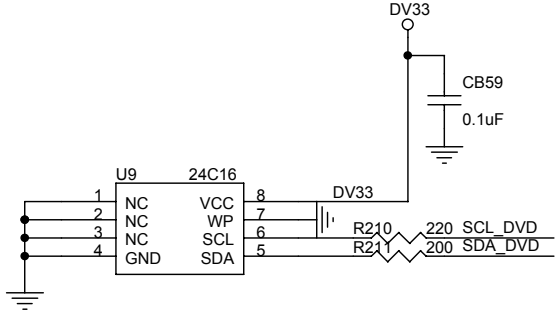
DQ[0..15]	>>>	DQ[0..15]	3
MA[0..11]	>>>	MA[0..11]	3
BA[0..1]	>>>	BA[0..1]	3
DQM[0..1]	>>>	DQM[0..1]	3
DCLK	>>>	DCLK	3
DCKE	>>>	DCKE	3
CAS#	>>>	CAS#	3
RAS#	>>>	RAS#	3
WE#	>>>	WE#	3
CS#	>>>	CS#	3

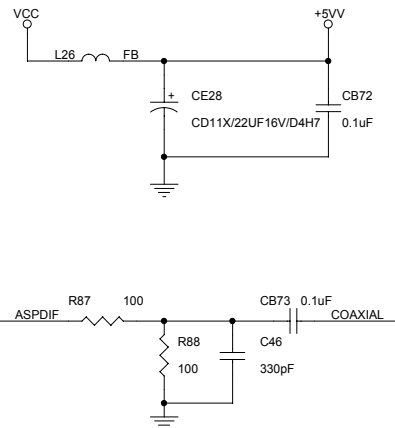
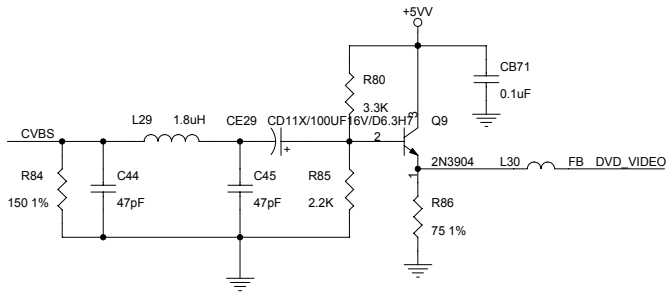
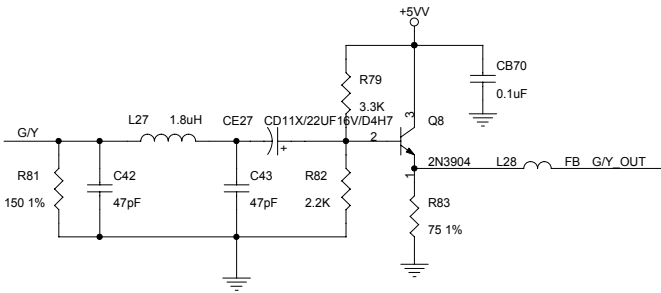
PCE#	>>>	PCE#	3
PRD#	>>>	PRD#	3
PWR#	>>>	PWR#	3
A[0..21]	>>>	A[0..21]	3
AD[0..7]	>>>	AD[0..7]	3

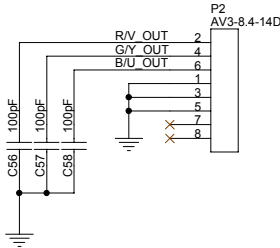
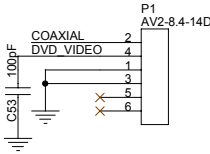
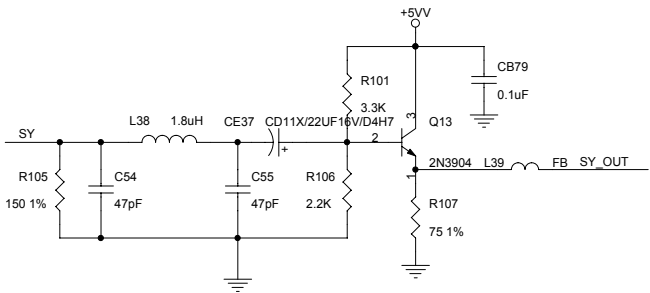
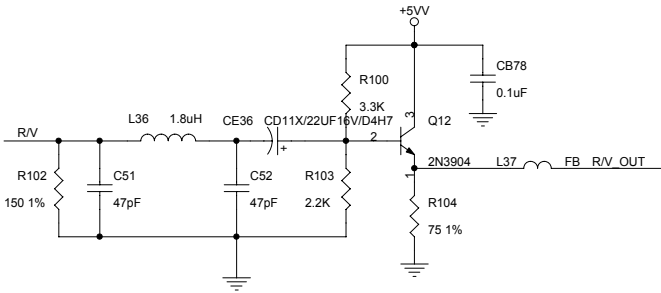
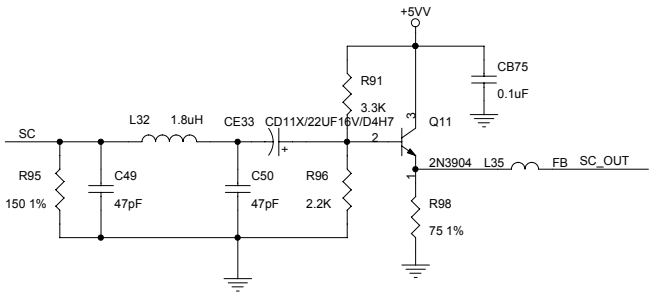
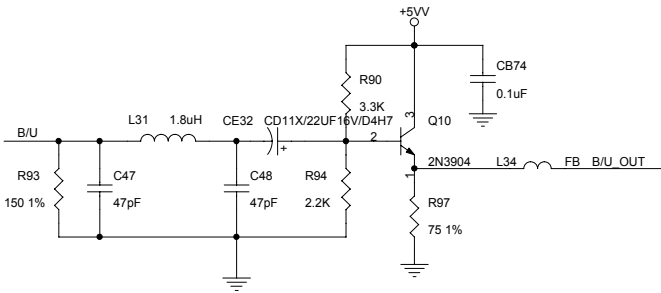
SCL_DVD	>>>	SCL_DVD	3
SDA_DVD	>>>	SDA_DVD	3



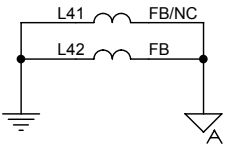
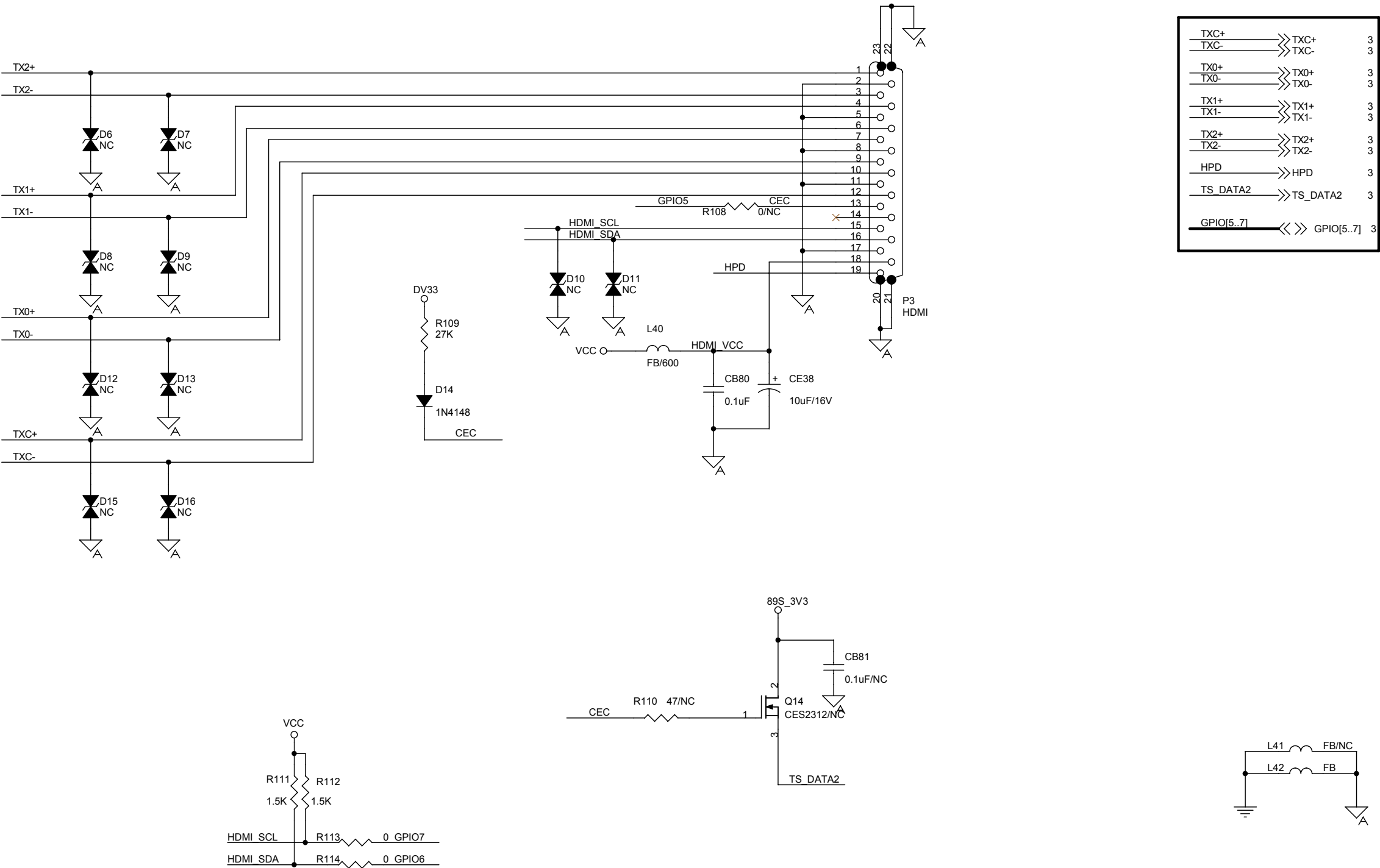
Decoder Board -- Circuit Diagram -- Part5



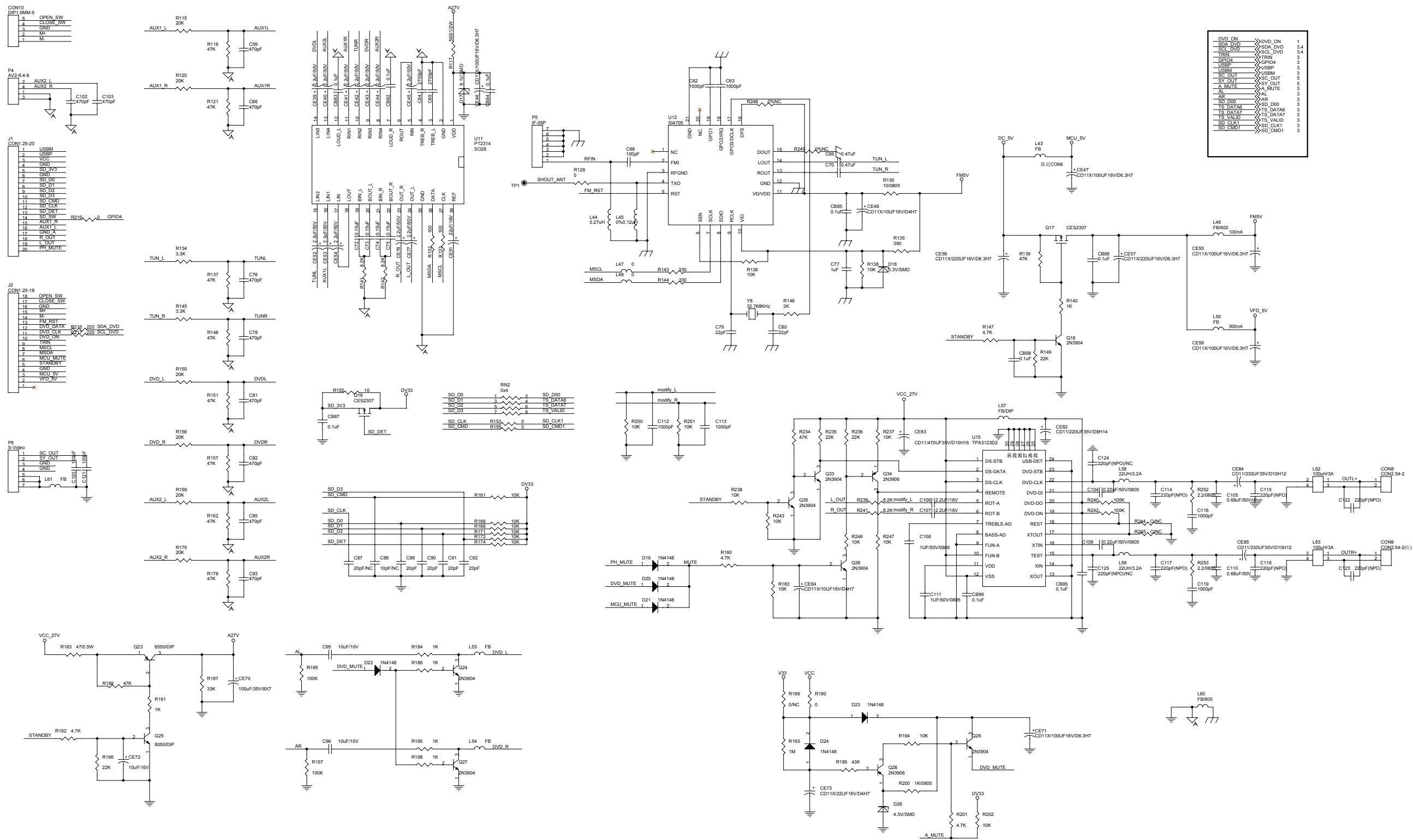
ASPDIF	>>	ASPDIF	3
CVBS	>>	CVBS	3
G/Y	>>	G/Y	3
B/U	>>	B/U	3
R/V	>>	R/V	3
SY	>>	SY	3
SC	>>	SC	3
SC_OUT	>>	SC_OUT	7
SY_OUT	>>	SY_OUT	7



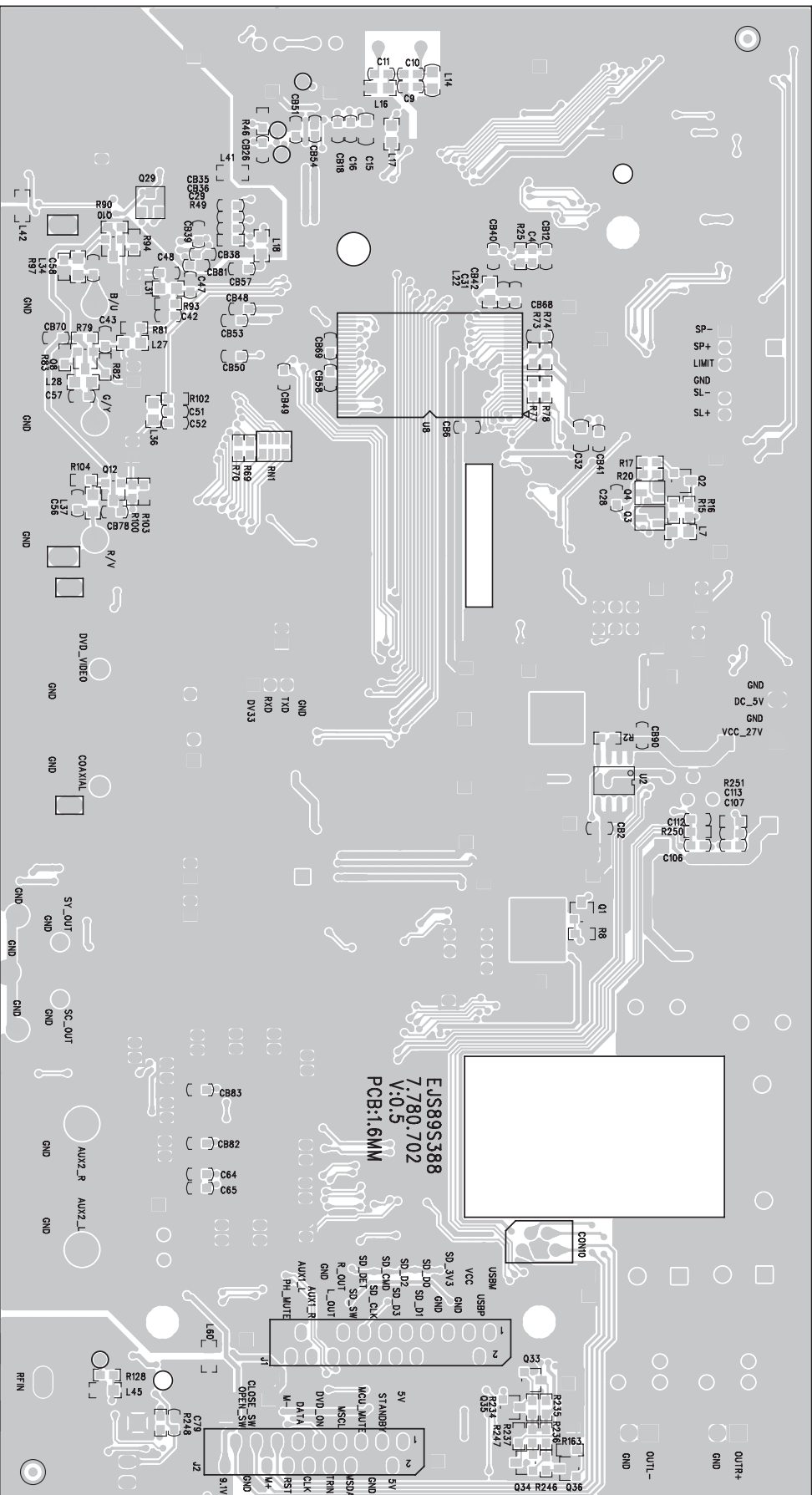
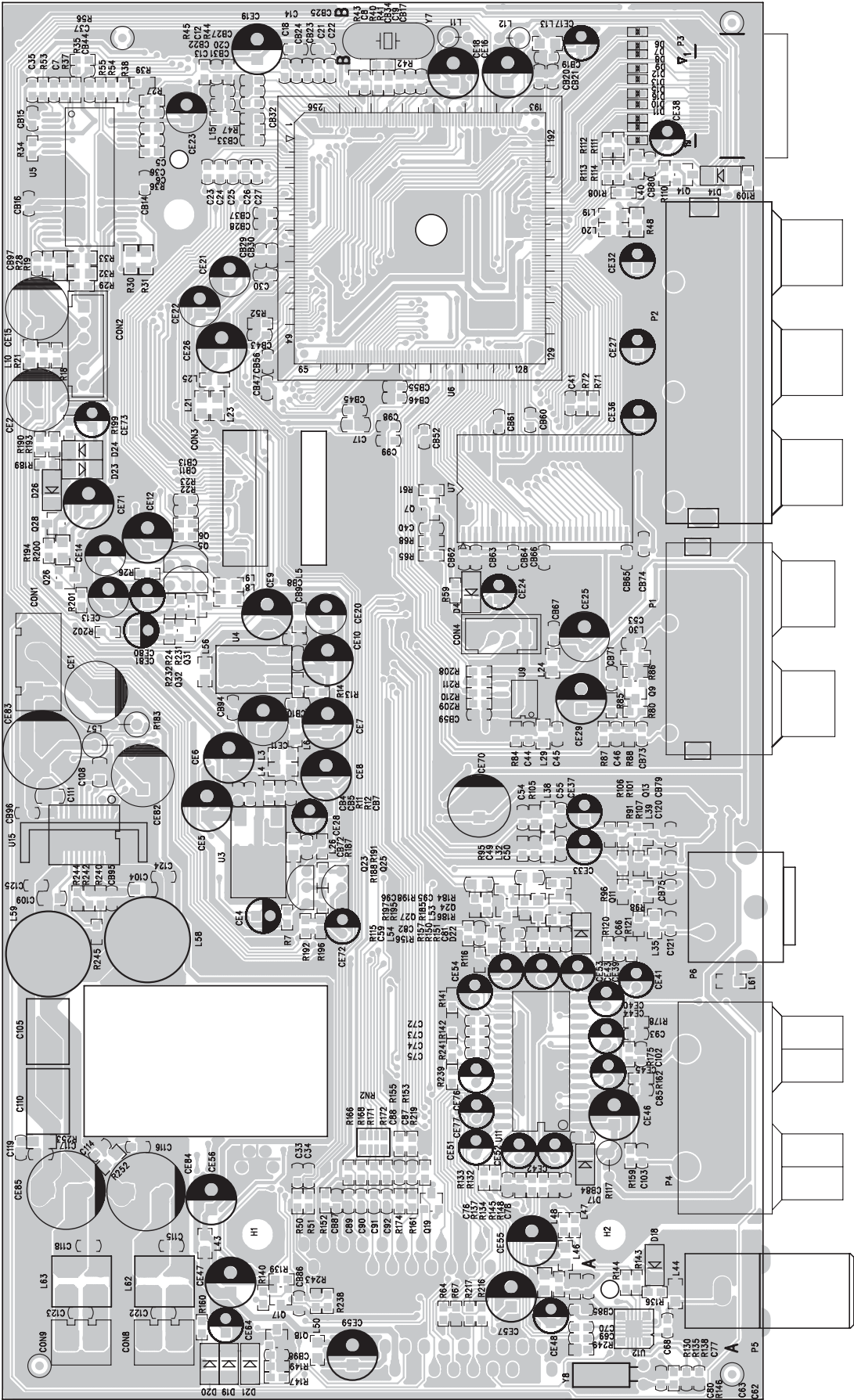
Decoder Board -- Circuit Diagram -- Part6



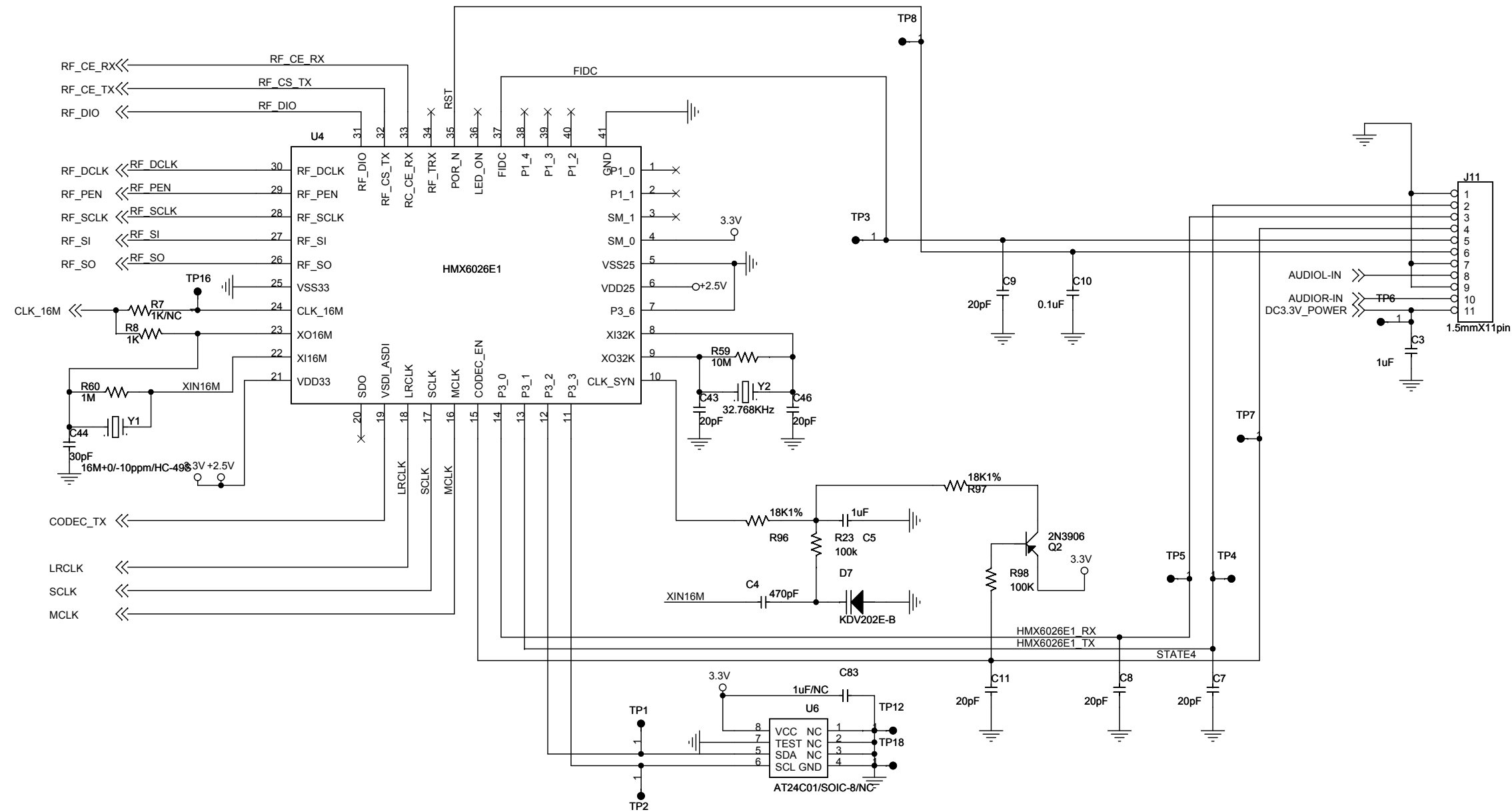
7-7



Decoder Board -- Layout Diagram

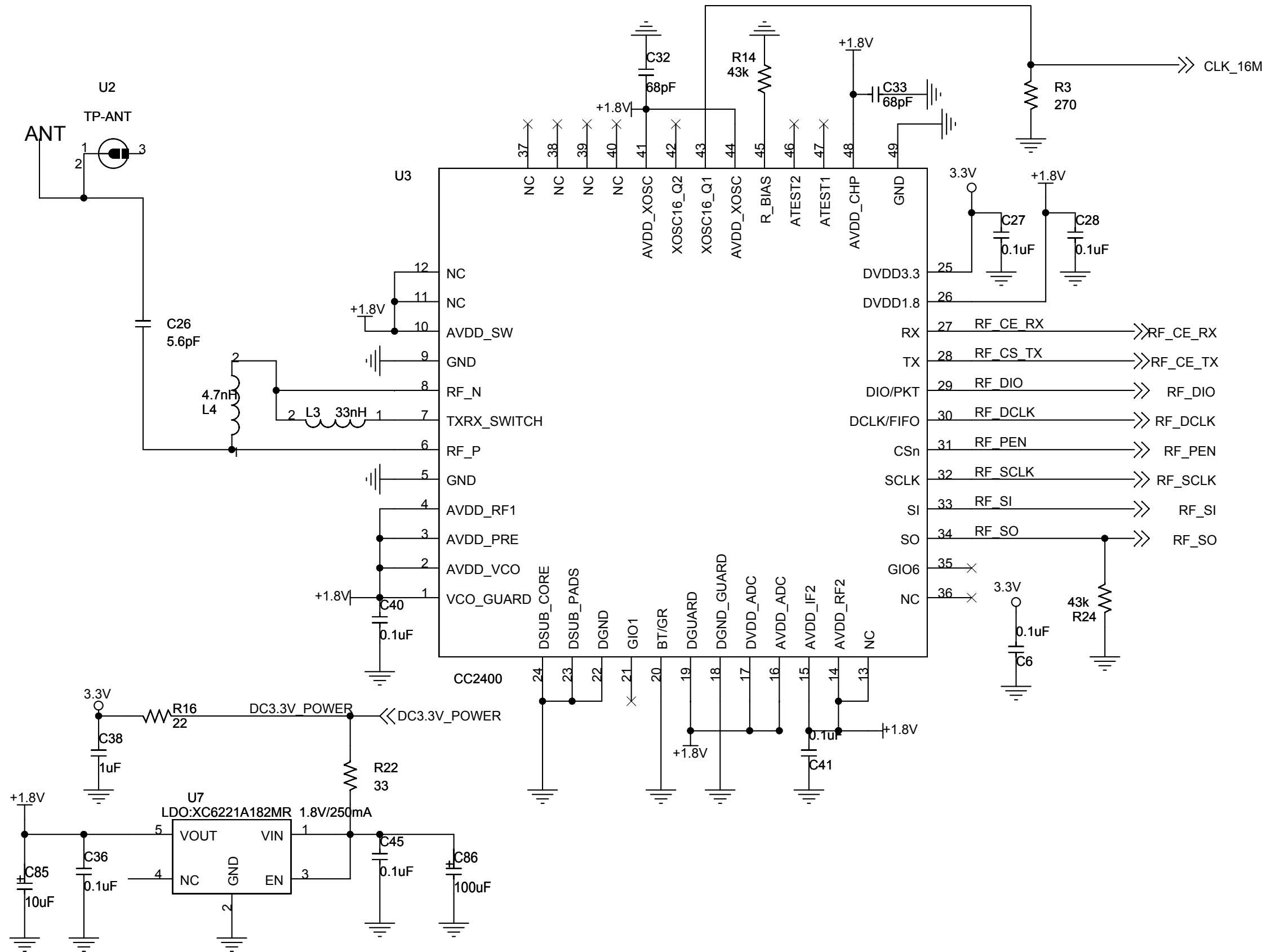


## C024\_TX-Transmit Board -- Circuit Diagram -- Part1

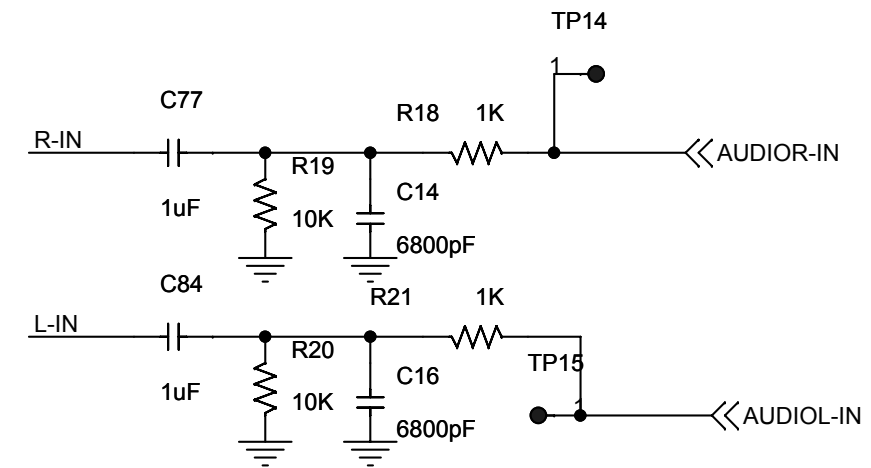
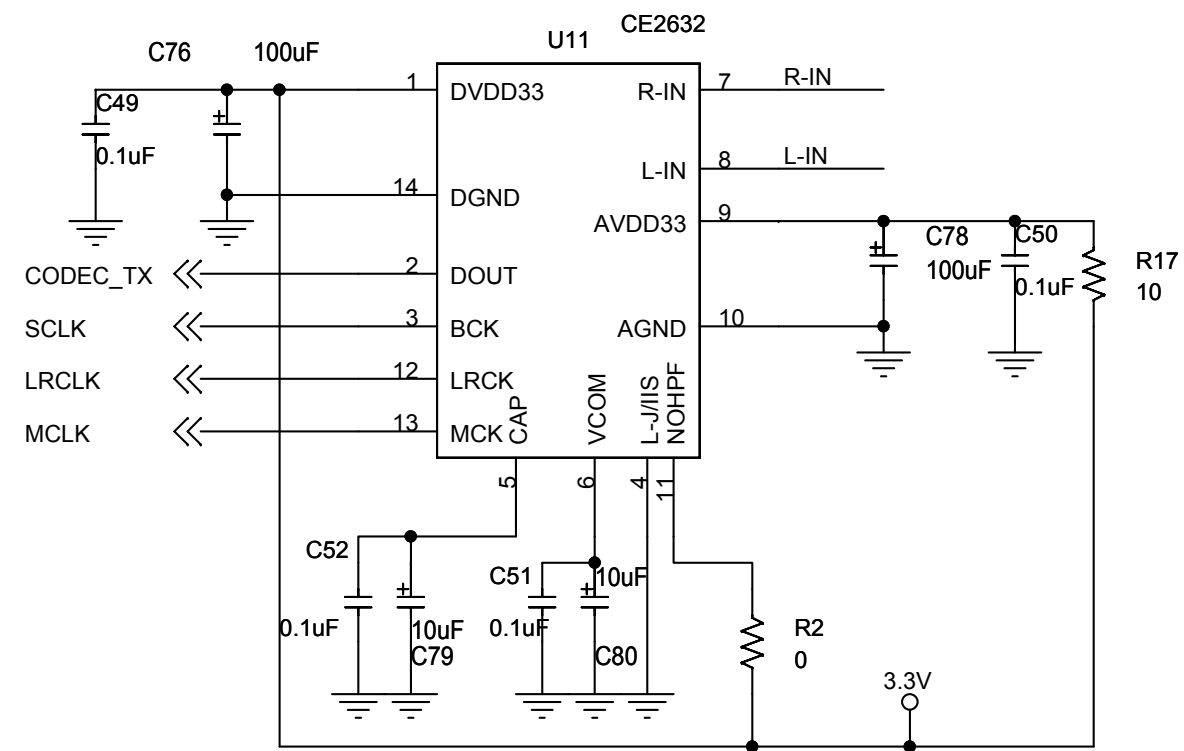




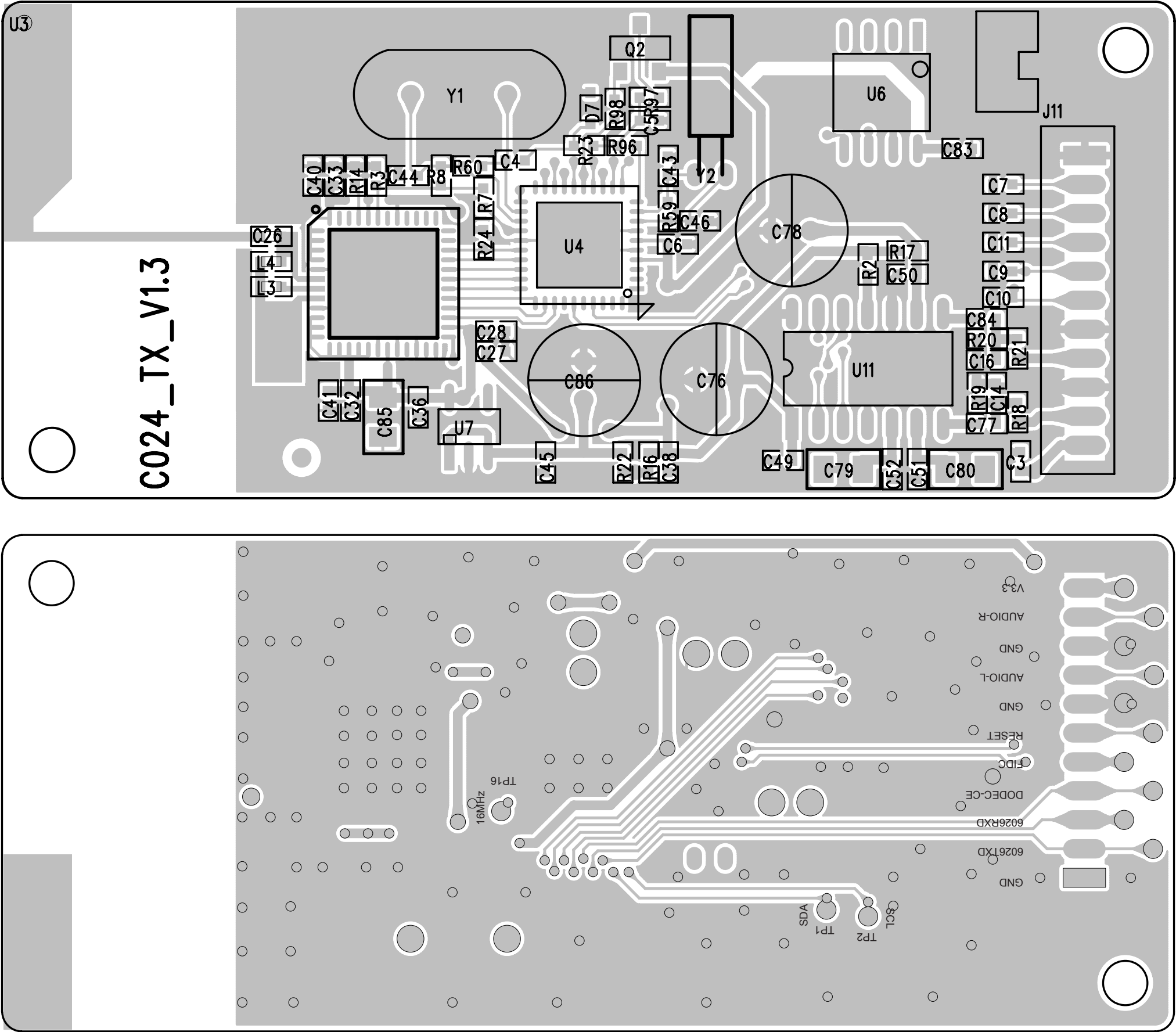
## C024\_TX--Transmit Board -- Circuit Diagram -- Part2



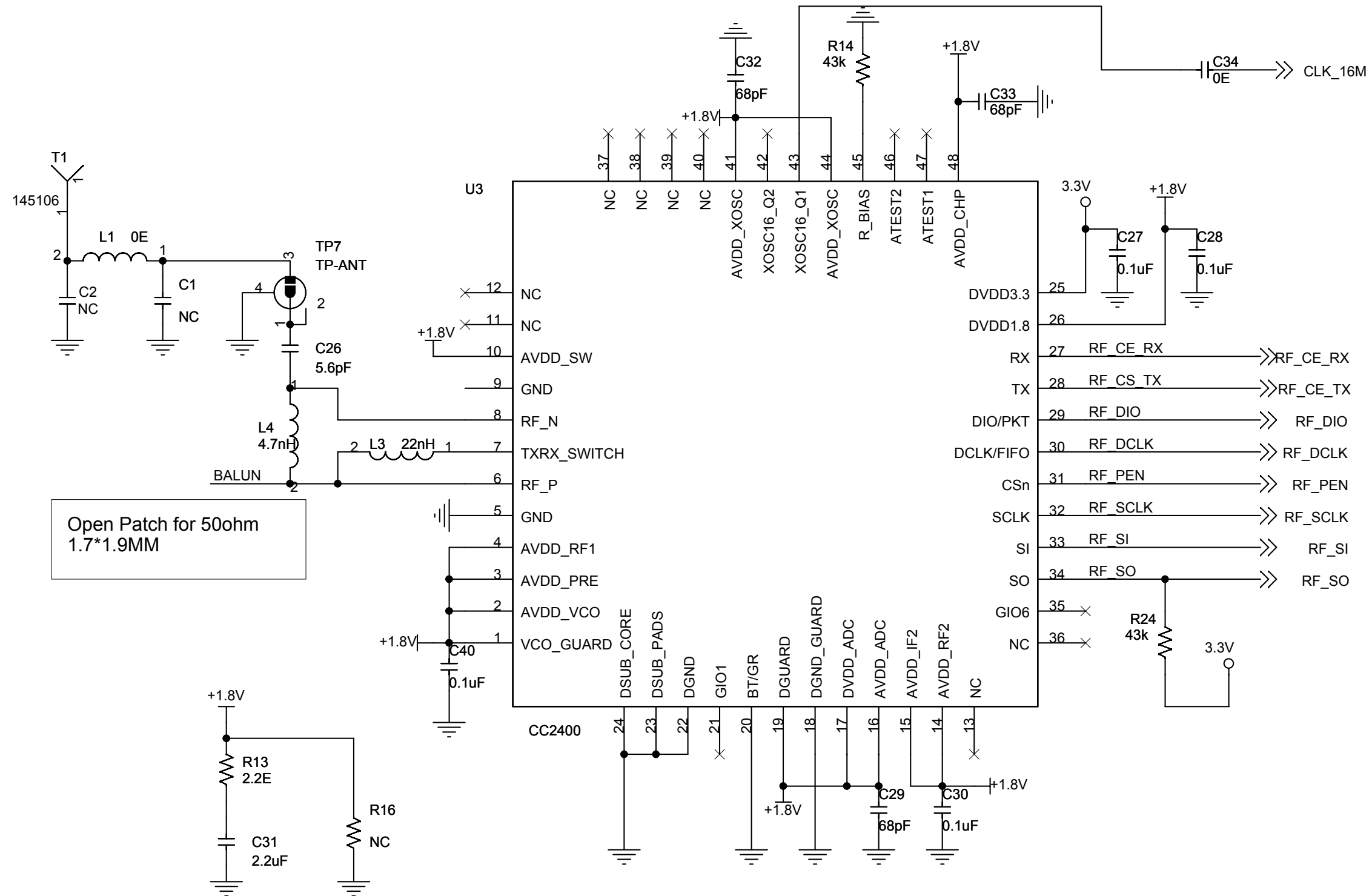
## C024\_TX--Transment Board -- Circuit Diagram -- Part3



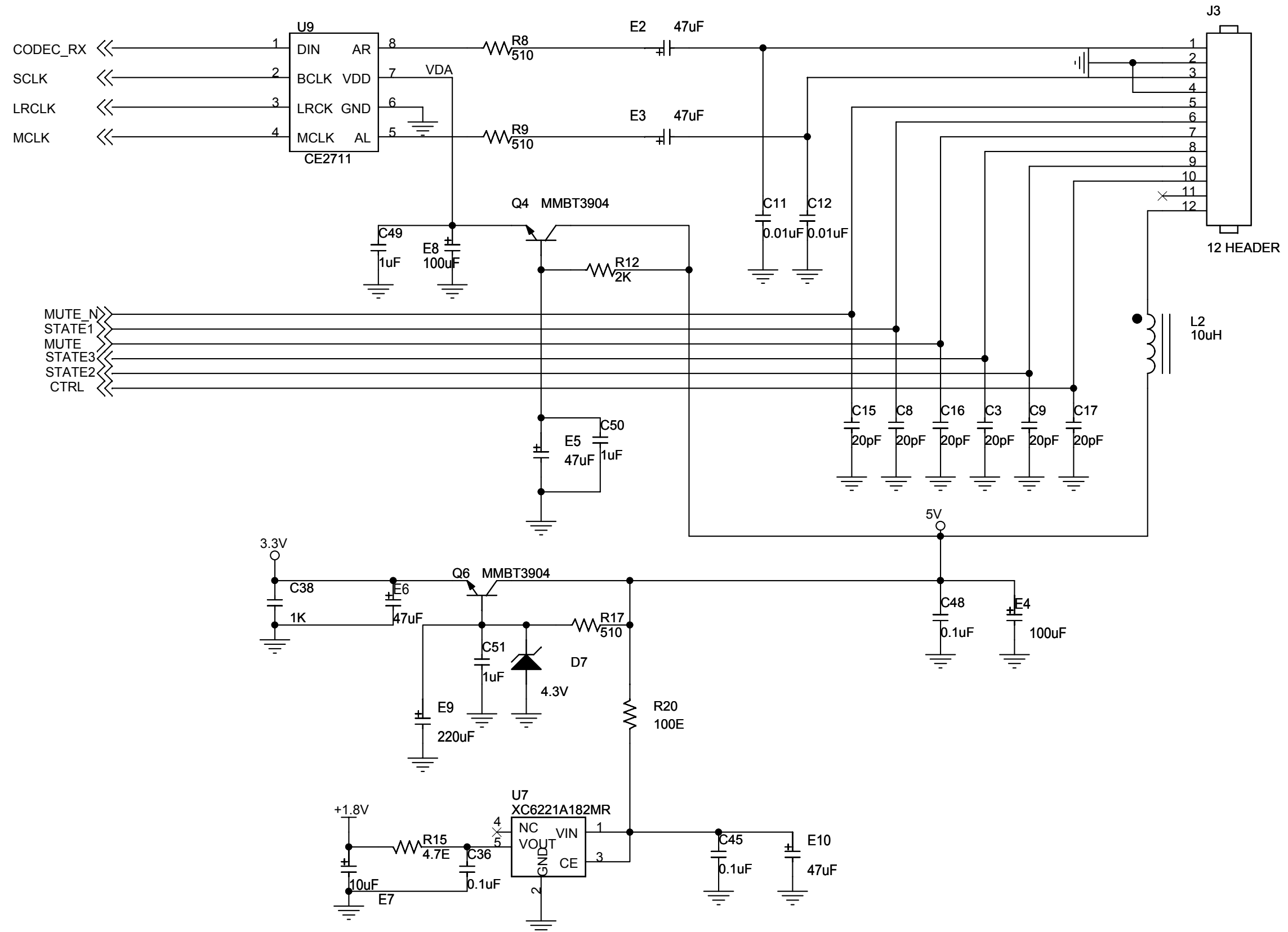
C024\_TX--Transmit Board -- Layout Diagram



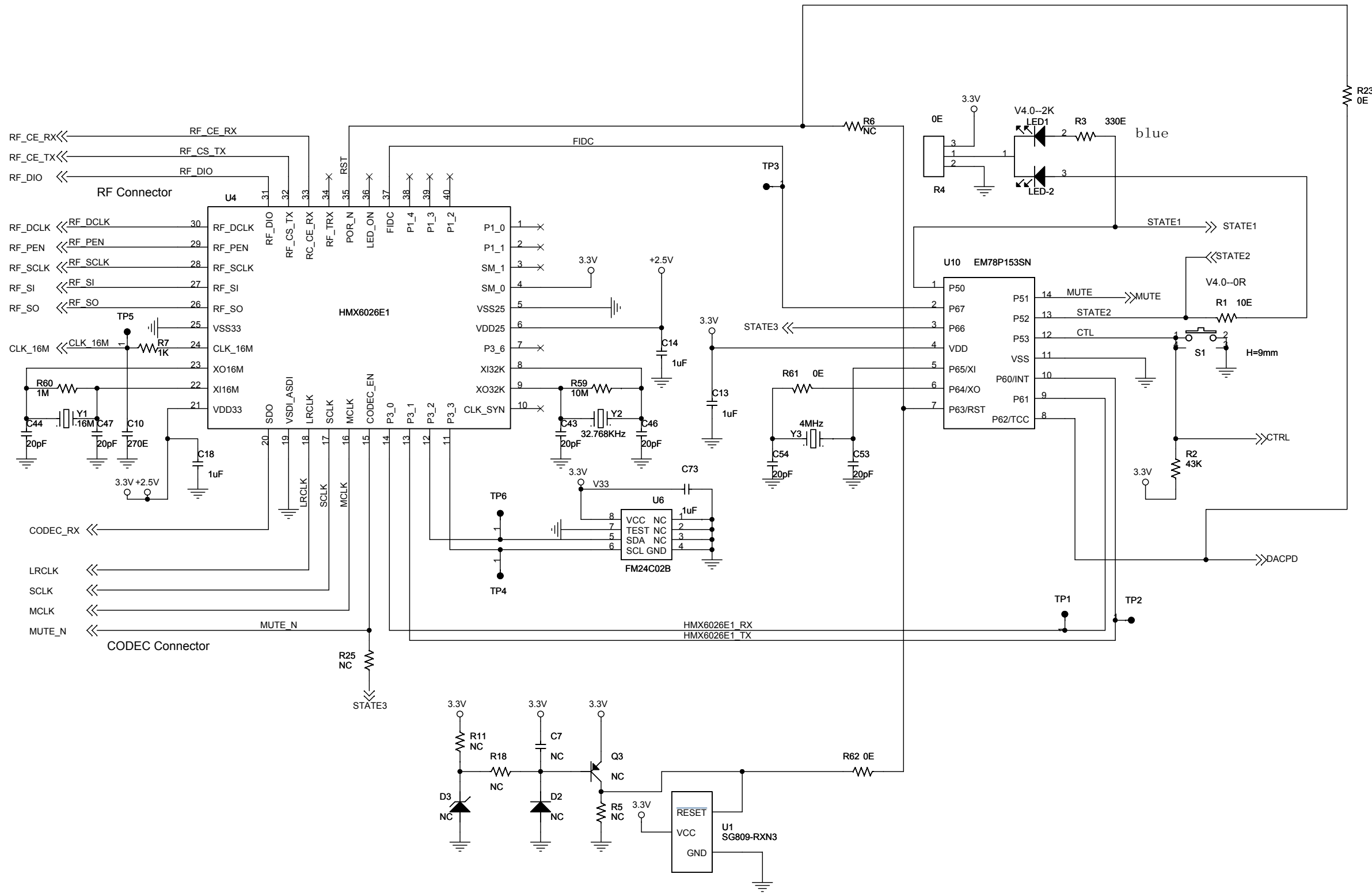
## C001SWF\_RX-Receive Board -- Circuit Diagram -- Part1

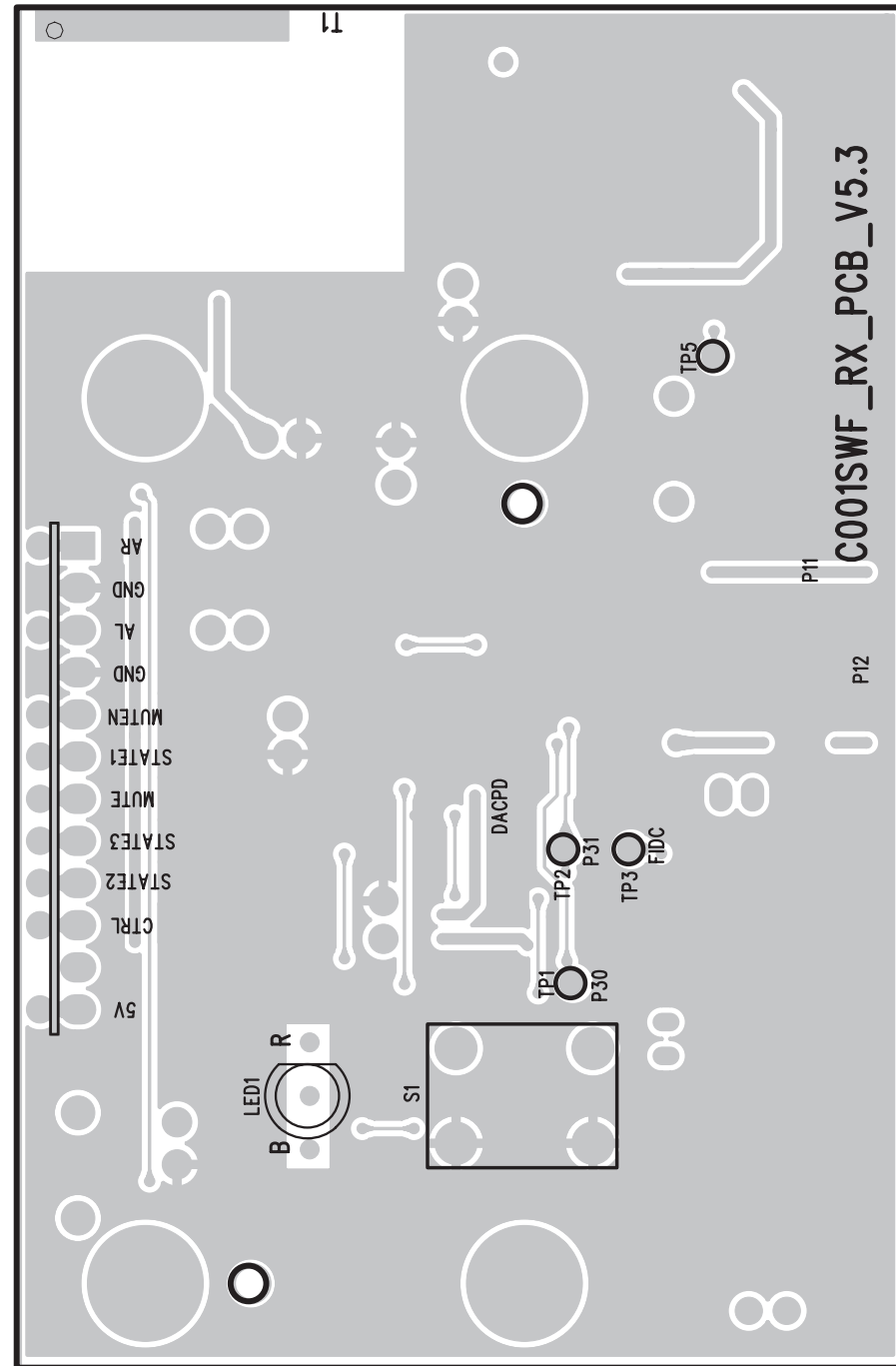


## C001SWF\_RX-Receive Board -- Circuit Diagram -- Part2

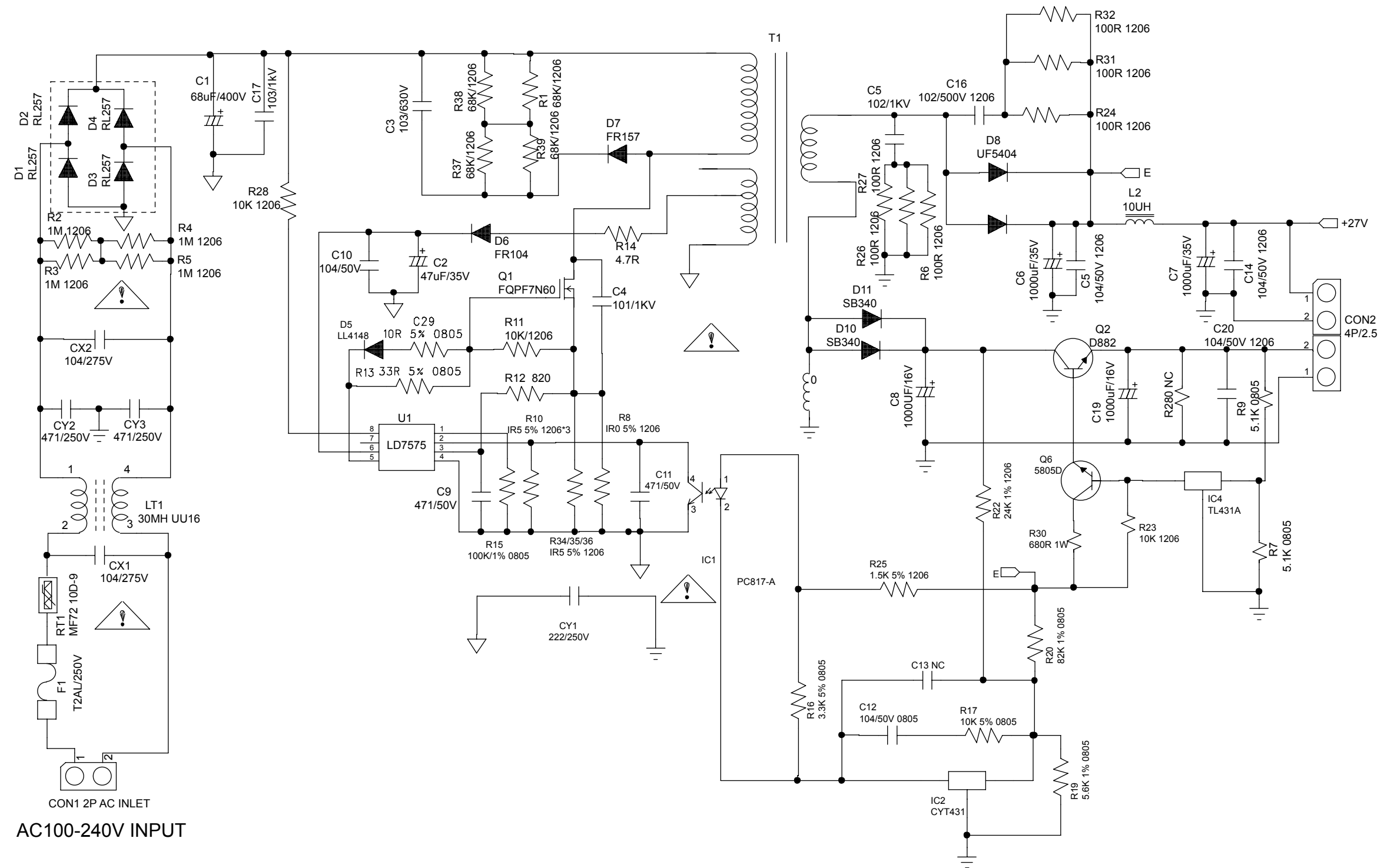


C001SWF\_RX-Receive Board -- Circuit Diagram -- Part3

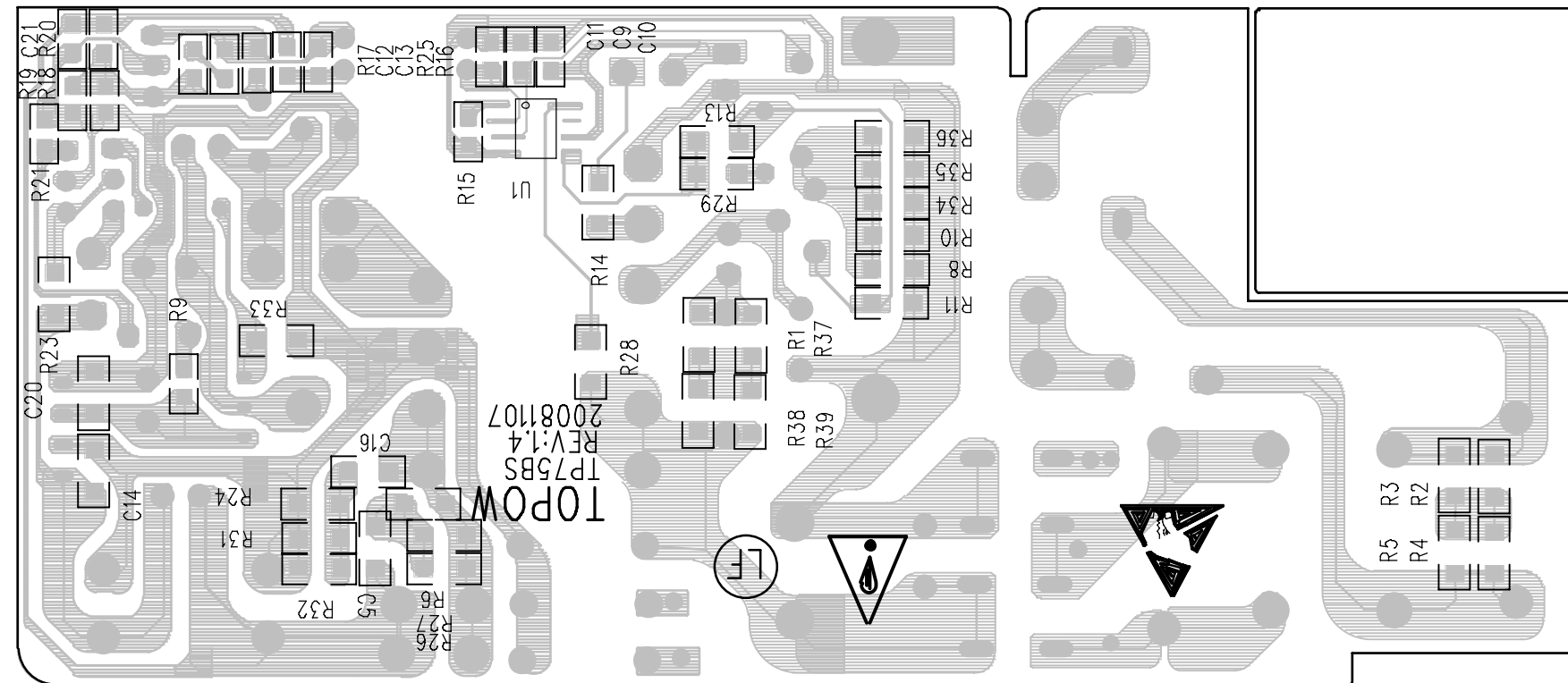
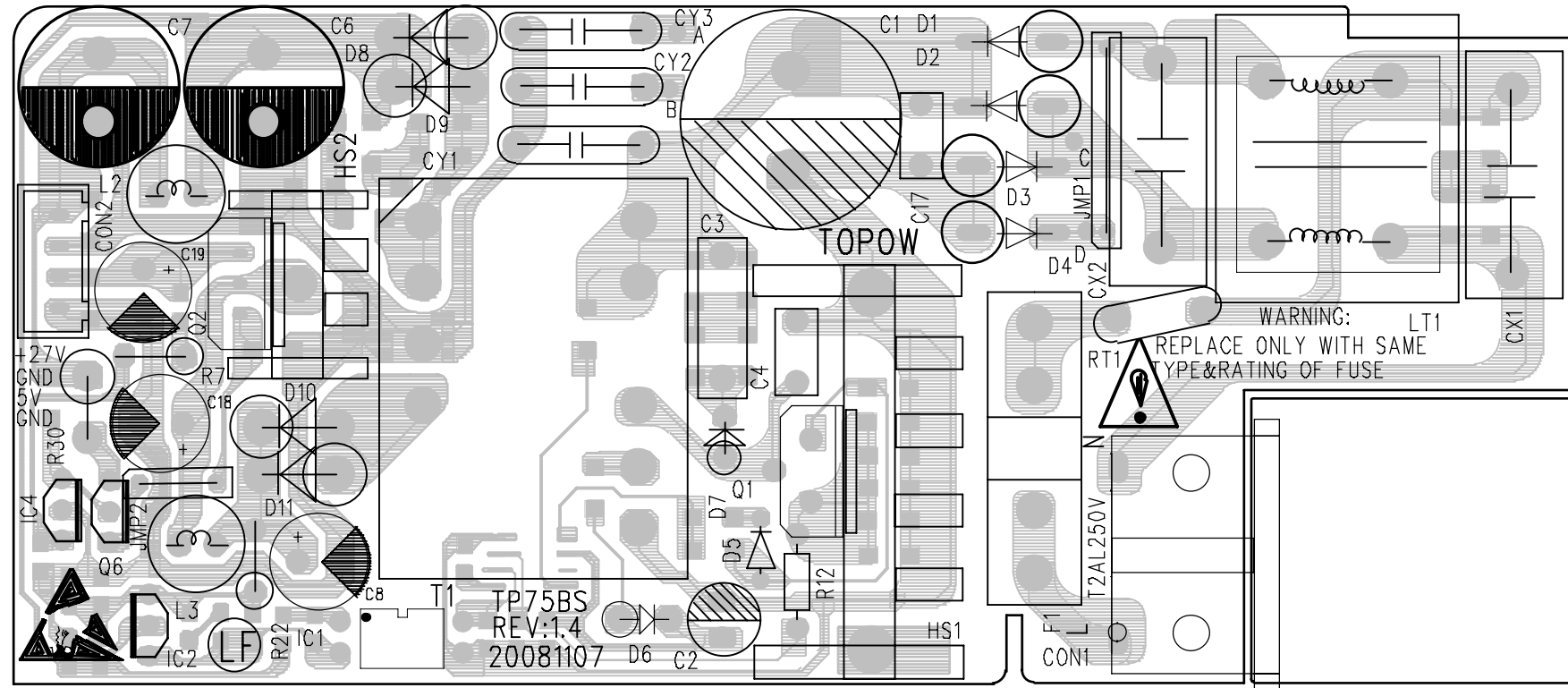




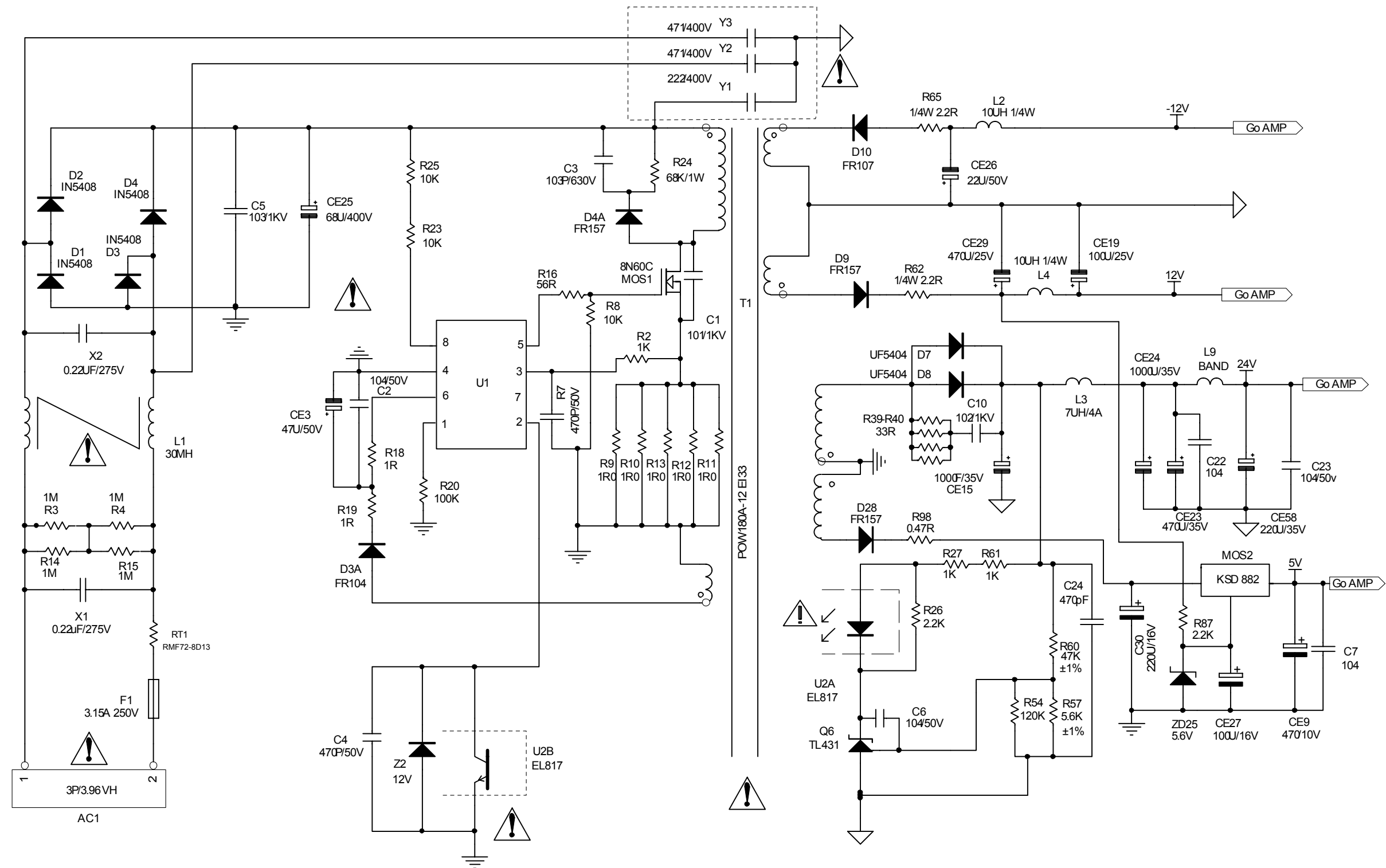
## Power Board -- Circuit Diagram

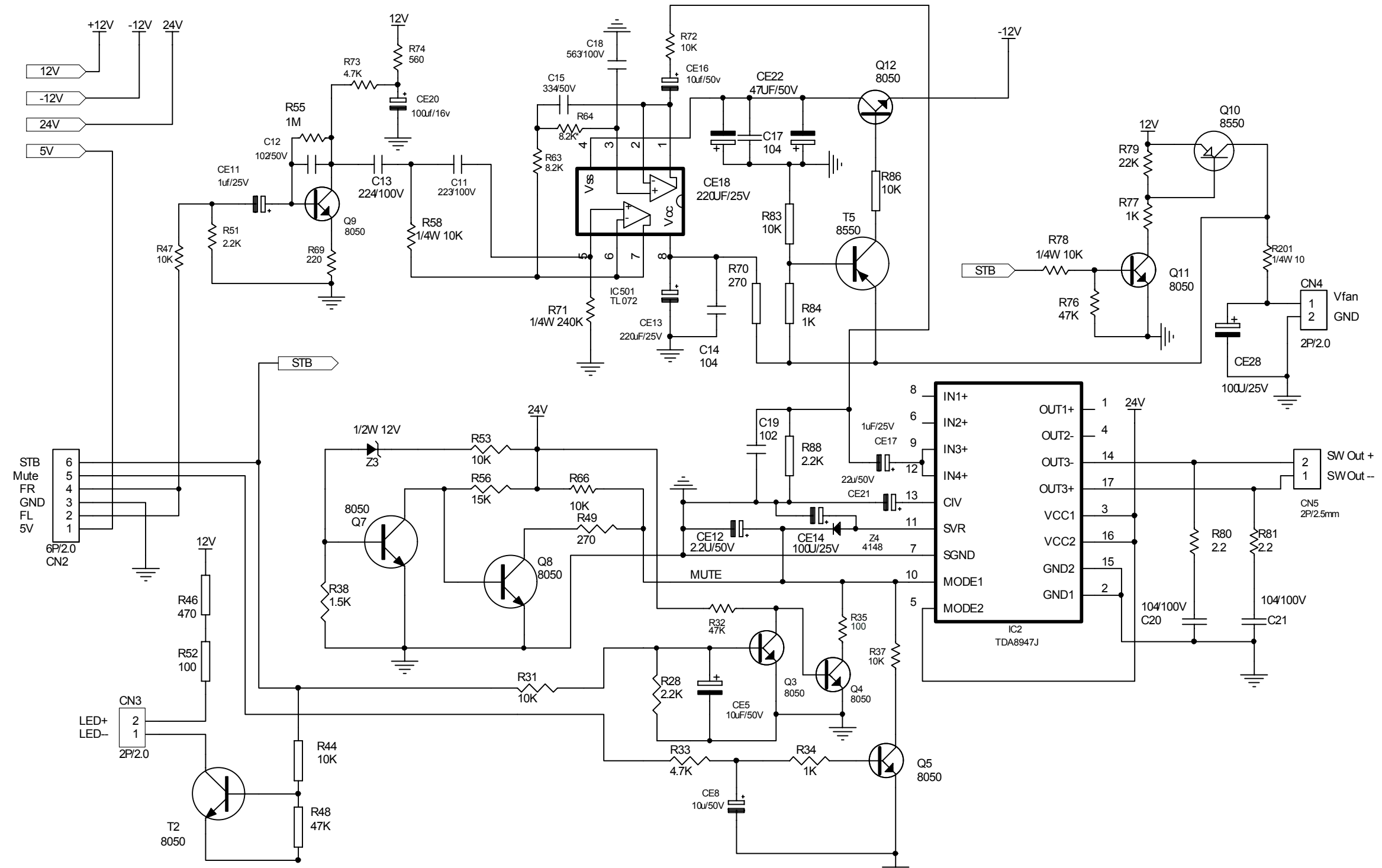


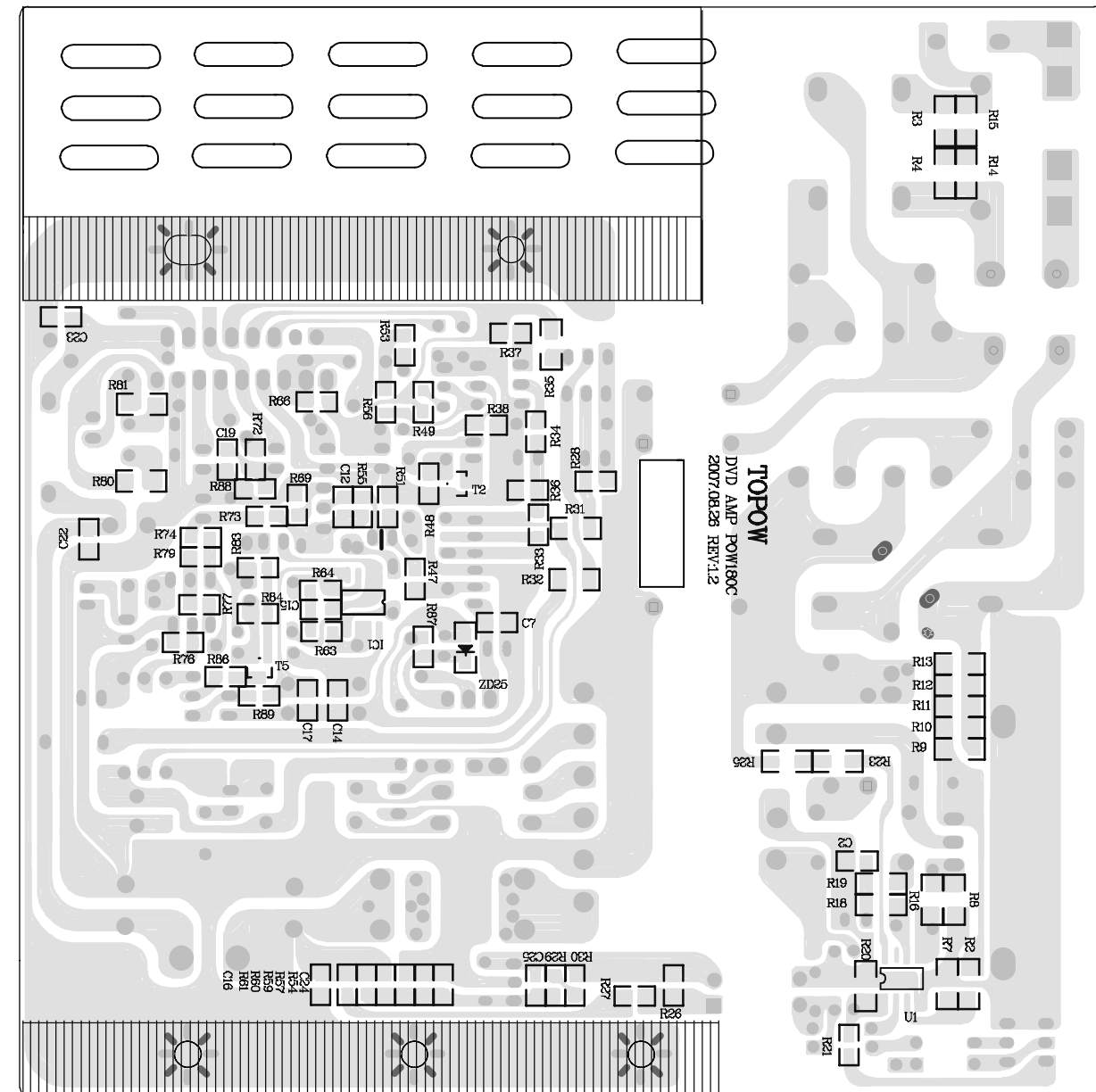
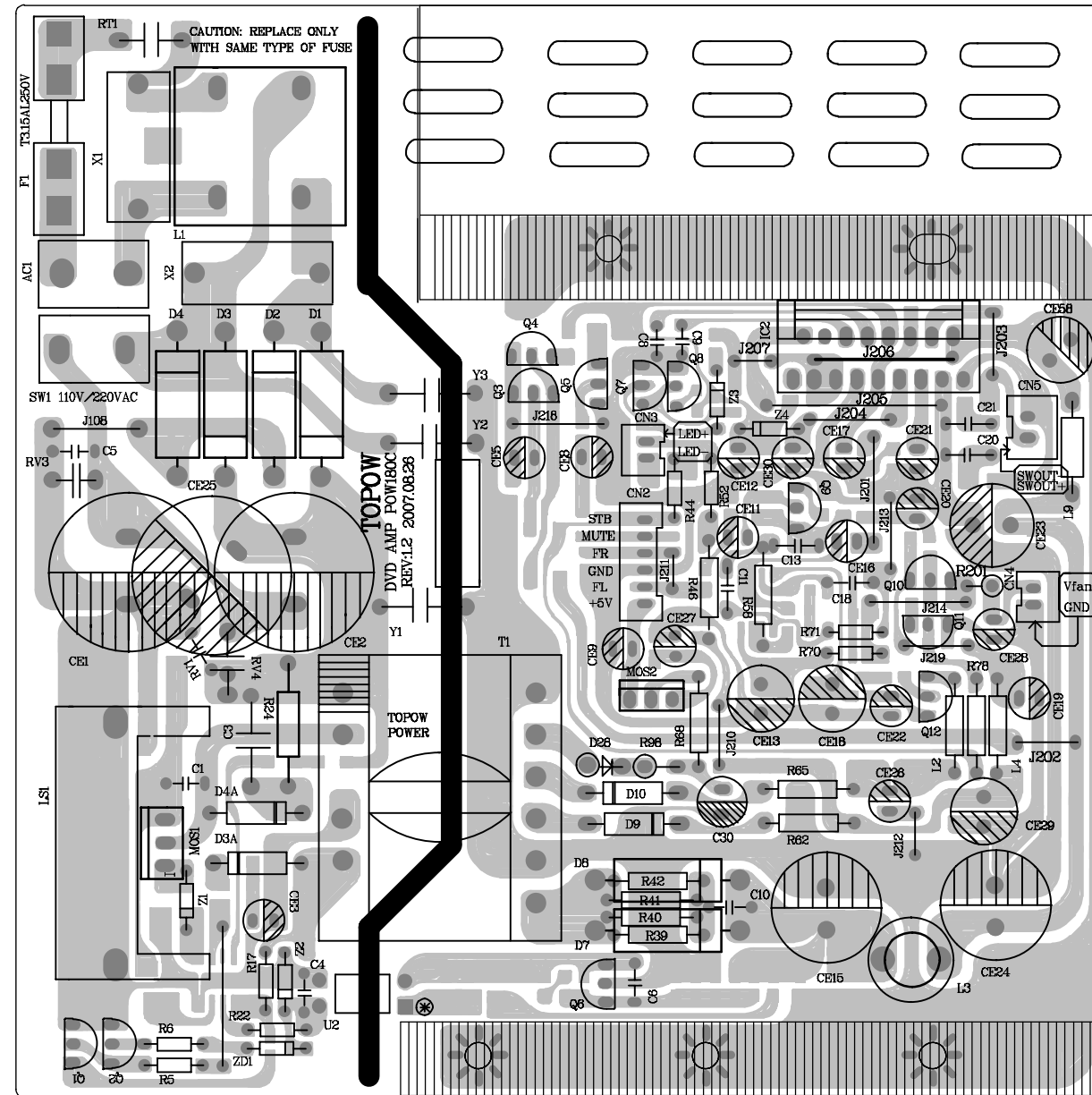




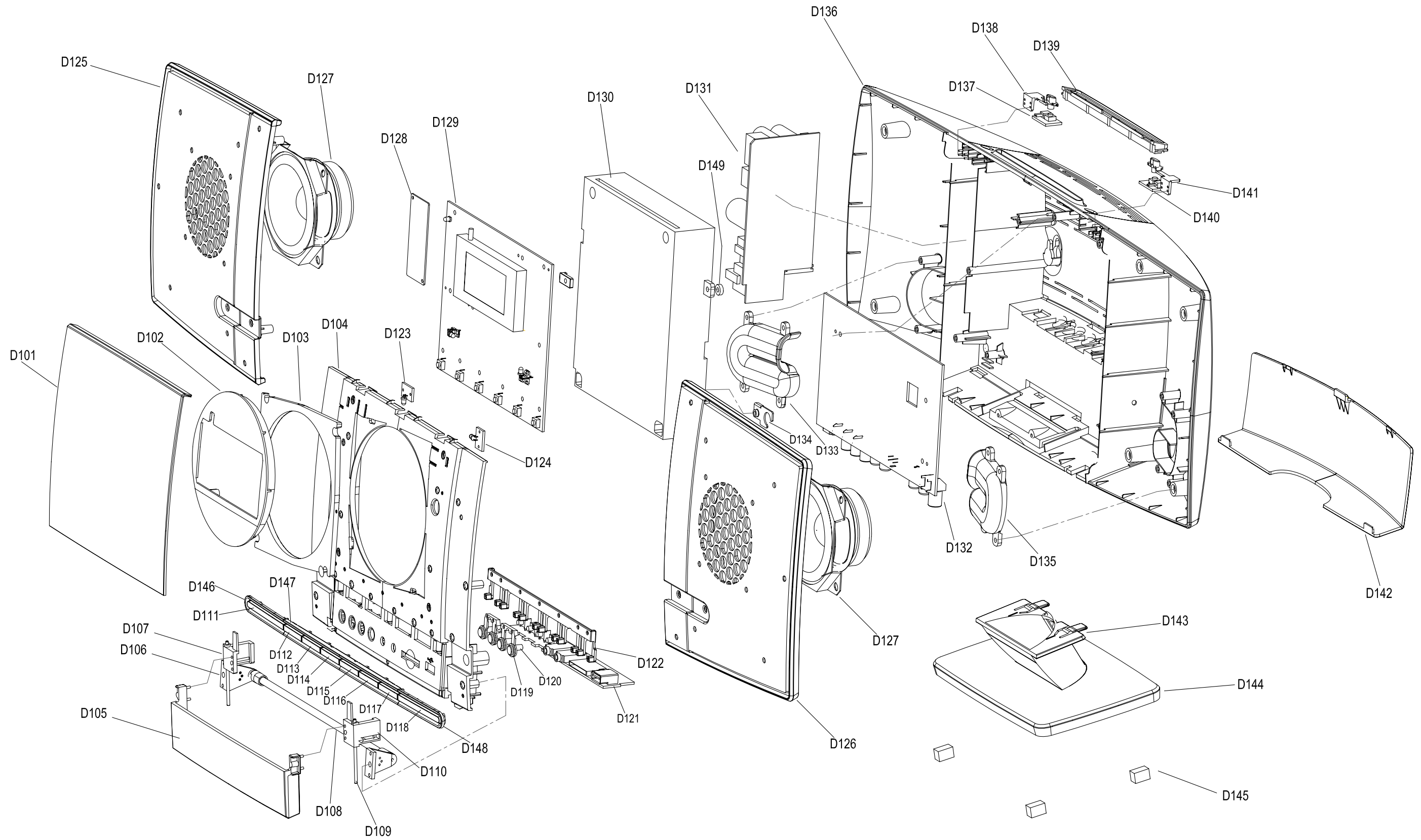
## AMP Power Board -- Circuit Diagram -- Part1







## Explode View



**ACCESSORIES PARTS LIST**

996500038637	POWER PLUG ADAPTOR(/55/98)
996510019410	POWER CORD 1.8m UC/INMETRO(/55)
994000004988	AC LINE CORD 1.8M(/98/55)
994000005078	AUDIO SINGLE WIRE W/RCA 1.5M
996510022666	DC3.5AUDIO FREQUENCY WIRE 500

996510018744	FM ANT CONNECTOR 1.5m BLACK
996510022729	PRC500-52 REMOTE CONTROL(/55)
996510022698	PRC500-52 REMOTE CONTROL(/98)
996510025351	PRC500-52 REMOTE CONTROL(/12)
996510024719	SCART CABLE/21P TO RCA JACK(/12)

996510006198	SCART SWITCH JACK RCA-329(IN)(/12)
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**SUBWOOFER BOX**

996510019990	RADIO RECEIVE BOARD C001SWF_RX
996510022734	POWER BOARD POW180C-55(/55)
996510022697	POWER BOARD POW180C-98(/98)
996510025364	POWER BOARD POW180C-12(/12)
996510000522	PW CTR SW ASS'Y 110/22V MCD7X(/55/98)

996510000523	SWITCH VSC-22-1-110/220V-m(/55/98)
996510022735	MCD388/55SUBWOOFER BOX CASING(/55)
996510022712	MCD388/98 SUBWOOFER CASING(/98)
996510025359	MCD388/12 WOOFER BOX CASING(/12)

**MECHNICAL&MISCELLANEOUS PARTS**

CASING1	996510022704	MCM322 FIXER PIECE(HIPS)
CASING2	996510022706	FLAT FLEXIBLE CABLE 18PX120
CASING3	996510022705	FLAT FLEXIBLE CABLE 20PX120
CASING4	996510008531	FLAT FLEX CABLE 24PX130X0.5XA
D101	996510022725	MCD388 /93 DVD DISPLAY LENS(/55/98)

D101	996510025362	MCD388 DVD DISPLAY LENS(/12)
D102	996510022696	MCD388 LIGHT-GUIDE BAFFLE
D104	996510022699	MCD388/12 FRONT CABINET PARTS
D106	996510022701	MCM322 CONNECT AXIS BRACKET
D125	996510022728	MCD388 PLASTIC GRILLE PARTS-L

D126	996510022711	MCD388 PLASTIC GRILLE PARTS-R
D136	996510022721	MCD388 BACK CABINET PARTS
D139	996510022714	MCM322 DISK EXIT BRACKET(ABS)
D142	996510022695	MCM322 BACK CABINET COVER
D143	996510022722	MCM322 MAIN SEAT

D121	996510022717	MCD388 USB BOARD
D123	996510022723	MCD388 LAMP BOARD-1
D124	996510022715	MCD388 LAMP BOARD-2
D128	996510021359	RADIO TRANSMIT BOARD
D129	996510022708	MCD388 DISPLAY BOARD(/98)

**MECHNICAL&MISCELLANEOUS PARTS**

D133	996510025349	MCM322 CANAL COVER-L(/12)
D135	996510025354	MCM322 CANEL COVER-R(/12)
D130	996510022718	DVD LOADER MECHANISM(FORYOU)
D131	996510022716	MCD388-98 POWER BOARD(/98)
D131	996510022732	MCD388-55 POWER BOARD(/55)
D131	996510025353	POWER BOARD MCD388-12(TP75BS)(/12)
D132	996510022707	DVD DECODER EJS89SCA388-98(/98)
D132	996510022731	DVD DECODER EJS89SCA388-55(/55)
D132	996510025356	DECODER 89SCA388-12(EJS89S388)(/12)
D138	996510022724	MCD388 STANDBY BUTTON BOARD
D141	996510022702	MCD388 OPEN/CLOSE BUTTON BOARD

**ELECTRICAL PARTS - DISPLAY PCB**

D204	996510002976	DIODE FR104
DZ201	996510005833	ZENER DIODE 5.1V 1/2W-52
DZ202	996510005832	ZENER DIODE 27V 1/2W-52
IC201	996510002918	IC PCF8563 SOP8
IC202	996510000009	IC AT24C02-PC27(2.7V)
IC203	996510022726	CPU 8332Z000-0C028(PLQP52)
IC204	996510000500	IC PT6311/SC16311/CD16311
IC205	994000004952	IC PT2309-S(L)
IC206	996510010926	IC AMC1117-3.3
IC207	996510022713	IC MX3000CS SOP16
L203	996510019915	FIXED INDUCTOR 200UH 6X5(/55/98)
L217	996510022727	AXIAL FIXED INDUCTOR 10u(/55/98)
LED201	996510021107	LED D3X4 1L034XW31B0CT201
LED202	996510021107	LED D3X4 1L034XW31B0CT201
LED205	994000004948	LED LAMP(BLUE) /12(/12)
S201	996510015840	IR SENSOR 1MA81P36D1TD001
Q201	996510015813	TRANSISTOR D965-R -5(/12)
Q202	996510015813	TRANSISTOR D965-R -5(/12)
SW201	996520033923	TACT SWITCH TS-1307-01 6X6X5
SW204	996520033923	TACT SWITCH TS-1307-01 6X6X5
SW205	996520033923	TACT SWITCH TS-1307-01 6X6X5
SW206	996520033923	TACT SWITCH TS-1307-01 6X6X5
SW207	996520033923	TACT SWITCH TS-1307-01 6X6X5
SW208	996520033923	TACT SWITCH TS-1307-01 6X6X5
T201	996510004185	TRANSFORMER EPC13 5V
VFD201	996510022719	VFD DISPLAY NE-MCD388-2.GRY(/55/98)
VFD201	996510025363	NE-MCD388-1.GBY VFD DISPLAY(/12)
X201	996510000012	CRYSTAL OSC FREQ.32.768KHz
X202	996510022709	CRYSTAL OSCILLATOR 27MHz 20PPM

**Note:** Only these parts mentioned in the list are normal service parts.

## Factory Parts List

DVD	MCD388/12 DVD NUIT PARTS
D138	MCD388 STANDBY BUTTON BOARD
SW401	TACT SWITCH TS-1307 6X6X4.3 170G STANDBY BUTTON PCB 35-MCD388-04A1
D141	MCD388 OPEN/CLOSE BUTTON BOARD
SW501	TACT SWITCH TS-1307 6X6X4.3 170G OPEN/CLOSE BUTTON PCB 35-MCD388-05A1
D123	MCD388 LAMP BOARD-1
LED301	LED Φ3X4 1L034XW31B0CT201(WHITE) LAMP PCB 35-MCD388-03A1 MCD388LED BRACKET/ABS
D124	MCD388 LAMP BOARD-2
LED601	LED Φ3X4 1L034XW31B0CT201(WHITE) LAMP PCB 35-MCD388-06A1 MCD388LED BRACKET/ABS
D121	MCD388 USB BOARD
R101	CHIP RESISTOR 47K 1/16W J (0805)
C101	CHIP CAP.20p 50V J(0805)NPO
C102	CHIP CAP.20p 50V J(0805)NPO
C103	CHIP CAP.20p 50V J(0805)NPO
C105	CHIP CAP.20p 50V J(0805)NPO
C106	CHIP CAP.20p 50V J(0805)NPO
C107	CHIP CAP.20p 50V J(0805)NPO
C108	ELECTROLYTIC CAP..220u 10V L-5 5-6.3X11
C109	CHIP CAP.104p 50V K (0805) X7R
D101	JUMPER WIRE Φ0.6X40mm (375m=1kG)
SW101	TACT SWITCH(TC-1106 6X6X7 170g)
SW102	TACT SWITCH(TC-1106 6X6X7 170g)
SW103	TACT SWITCH(TC-1106 6X6X7 170g)
SW104	TACT SWITCH(TC-1106 6X6X7 170g)
J103	HEADPHONE JACK Φ3.5 TE-03501S-05
J104	HEADPHONE JACK Φ3.5 TE-03501S-11
J101	USB JACK(A-TYPE 4P FEMALE 90°DIP BLACK)
J102	SD SOCKET 9P SDY-12-11-B
CN102	PINS CONNECTOR 1.5/14P
CN101	PINS CONNECTOR 1.5/11P USB PCB 35-MCD388-01A1 25X148X1.6
D129	MCD388 DISPLAY BOARD
T201	TRANSFORMER EPC13 5V 14X11X7
R2007	CHIP RESISTOR 0 1/16W J (0805)
R2008	CHIP RESISTOR 0 1/16W J (0805)
R2009	CHIP RESISTOR 0 1/16W J (0805)
R2010	CHIP RESISTOR 0 1/16W J (0805)
R2011	CHIP RESISTOR 0 1/16W J (0805)
R208,	CHIP RESISTOR 0 1/4W J (1206)
R293	CARBON FILM RESISTOR 2.2 1/2W J-52
R250	CHIP RESISTOR 4.7 1/4W J (1206)
R229	CHIP RESISTOR 10 1/16W J (0805)
R253	CHIP RESISTOR 10 1/16W J (0805)
R254	CHIP RESISTOR 10 1/16W J (0805)
R256	CHIP RESISTOR 10 1/16W J (0805)
R257	CHIP RESISTOR 10 1/16W J (0805)
R273	CHIP RESISTOR 10 1/4W J (1206)
R274	CHIP RESISTOR 10 1/4W J (1206)
R298	CHIP RESISTOR 10 1/4W J (1206)
R2001	CHIP RESISTOR 10 1/4W J (1206)



## Factory Parts List

R2005	CHIP RESISTOR 10 1/4W J (1206)
R227	CHIP RESISTOR 15 1/16W J (1206)
R209	CHIP RESISTOR 33 1/16W J (0805)
R235	CHIP RESISTOR 33 1/16W J (0805)
R237	CHIP RESISTOR 33 1/16W J (0805)
R239	CHIP RESISTOR 33 1/16W J (0805)
R240	CHIP RESISTOR 33 1/16W J (0805)
R241	CHIP RESISTOR 33 1/16W J (0805)
R245	CHIP RESISTOR 33 1/16W J (0805)
R246	CHIP RESISTOR 33 1/16W J (0805)
R247	CHIP RESISTOR 33 1/16W J (0805)
R238	CHIP RESISTOR 33 1/4W J (1206)
R230	CHIP RESISTOR 47 1/16W J (0805)
R220	CHIP RESISTOR 100 1/16W J (0805)
R221	CHIP RESISTOR 100 1/16W J (0805)
R222	CHIP RESISTOR 100 1/16W J (0805)
R223	CHIP RESISTOR 100 1/16W J (0805)
L258	CHIP RESISTOR 22 1/16W J (0805)
R201	CHIP RESISTOR 330 1/16W J (0805)
R202	CHIP RESISTOR 330 1/16W J (0805)
R203	CHIP RESISTOR 330 1/16W J (0805)
R204	CHIP RESISTOR 330 1/16W J (0805)
R205	CHIP RESISTOR 330 1/16W J (0805)
R206	CHIP RESISTOR 330 1/16W J (0805)
R248	CHIP RESISTOR 330 1/16W J (0805)
R249	CHIP RESISTOR 330 1/16W J (0805)
R251	CHIP RESISTOR 390 1/16W J (0805)
R252	CHIP RESISTOR 390 1/16W J (0805)
R210	CHIP RESISTOR 560 1/16W J (0805)
R200	CHIP RESISTOR 1K 1/16W J (0805)
R214	CHIP RESISTOR 1K 1/16W J (0805)
R215	CHIP RESISTOR 1K 1/16W J (0805)
R216	CHIP RESISTOR 1K 1/16W J (0805)
R217	CHIP RESISTOR 1K 1/16W J (0805)
R218	CHIP RESISTOR 1K 1/16W J (0805)
R219	CHIP RESISTOR 1K 1/16W J (0805)
R260	CHIP RESISTOR 1K 1/16W J (0805)
R258	CHIP RESISTOR 560 1/16W J (0805)
R271	CHIP RESISTOR 2.2K 1/16W J (0805)
R272	CHIP RESISTOR 2.2K 1/16W J (0805)
R207	CHIP RESISTOR 2.2K 1/16W J (0805)
R281	CHIP RESISTOR 2.2K 1/16W J (0805)
R282	CHIP RESISTOR 2.2K 1/16W J (0805)
R283	CHIP RESISTOR 2.2K 1/16W J (0805)
R285	CHIP RESISTOR 2.2K 1/16W J (0805)
R295	CHIP RESISTOR 2.2K 1/16W J (0805)
R296	CHIP RESISTOR 2.2K 1/16W J (0805)
R232	CHIP RESISTOR 4.7K 1/16W J (0805)
R233	CHIP RESISTOR 4.7K 1/16W J (0805)
R234	CHIP RESISTOR 4.7K 1/16W J (0805)
R236	CHIP RESISTOR 4.7K 1/16W J (0805)
R242	CHIP RESISTOR 4.7K 1/16W J (0805)
R275	CHIP RESISTOR 4.7K 1/16W J (0805)
R376	CHIP RESISTOR 4.7K 1/16W J (0805)
R2002	CHIP RESISTOR 4.7K 1/16W J (0805)
R2003	CHIP RESISTOR 4.7K 1/16W J (0805)

## Factory Parts List

R294	CHIP RESISTOR 0 1/16W J (0805)
R269	CHIP RESISTOR 1.5K 1/16W J (0805)
R287	CHIP RESISTOR 2.7K 1/16W J (0805)
R277	CHIP RESISTOR 6.2K 1/16W J (0805)
R278	CHIP RESISTOR 6.2K 1/16W J (0805)
R280	CHIP RESISTOR 6.2K 1/16W J (0805)
R292	CHIP RESISTOR 6.2K 1/16W J (0805)
R228	CHIP RESISTOR 6.2K 1/16W J (0805)
R2006	CHIP RESISTOR 56K 1/16W J (0805)
R288	CHIP RESISTOR 10K 1/16W J (0805)
R289	CHIP RESISTOR 10K 1/16W J (0805)
R263	CHIP RESISTOR 220 1/16W J (0805)
R212	CHIP RESISTOR 10K 1/16W J (0805)
R213	CHIP RESISTOR 10K 1/16W J (0805)
R224	CHIP RESISTOR 10K 1/16W J (0805)
R225	CHIP RESISTOR 10K 1/16W J (0805)
R226	CHIP RESISTOR 10K 1/16W J (0805)
R286	CHIP RESISTOR 10K 1/16W J (0805)
R211	CHIP RESISTOR 10K 1/16W J (0805)
R299	CHIP RESISTOR 10K 1/16W J (0805)
R231	CHIP RESISTOR 22K 1/16W J (0805)
R265	CHIP RESISTOR 33K 1/16W J (0805)
R266	CHIP RESISTOR 33K 1/16W J (0805)
R267	CHIP RESISTOR 33K 1/16W J (0805)
R268	CHIP RESISTOR 33K 1/16W J (0805)
R264	CHIP RESISTOR 47K 1/16W J (0805)
R255	CHIP RESISTOR 68K 1/16W J (0805)
R270	CHIP RESISTOR 100K 1/16W J (0805)
R2004	CHIP RESISTOR 100K 1/16W J (0805)
R290	CHIP RESISTOR 1M 1/16W J (0805)
C248	ELECTROLYTIC CAP. 1u 50V M-5 4X5
C245	ELECTROLYTIC CAP. 3.3u 50V M-5 4X5
C246	ELECTROLYTIC CAP. 3.3u 50V M-5 4X5
R279	CHIP RESISTOR 2.2K 1/4W J (1206)
C206	CHIP CAP. 103p 50V K (0805) X7R
C210	CHIP CAP. 103p 50V K (0805) X7R
C222	CHIP CAP. 104p 50V K (0805) X7R
C223	CHIP CAP. 104p 50V K (0805) X7R
C224	CHIP CAP. 104p 50V K (0805) X7R
C232	CHIP CAP. 104p 50V K (0805) X7R
C239	CHIP CAP. 104p 50V K (0805) X7R
C240	CHIP CAP. 104p 50V K (0805) X7R
C241	CHIP CAP. 104p 50V K (0805) X7R
C204	CHIP CAP. 104p 50V K (0805) X7R
C234	CHIP CAP. 104p 50V K (0805) X7R
C235	CHIP CAP. 104p 50V K (0805) X7R
C236	CHIP CAP. 104p 50V K (0805) X7R
C265	CHIP CAP. 104p 50V K (0805) X7R
C266	CHIP CAP. 104p 50V K (0805) X7R
C253	CHIP CAP. 104p 50V K (0805) X7R
C256	CHIP CAP. 104p 50V K (0805) X7R
C201	ELECTROLYTIC CAP. 47u 10V M 4X5
C228	ELECTROLYTIC CAP. 47u 10V M 4X5
C230	ELECTROLYTIC CAP. 47u 10V M 4X5
C231	ELECTROLYTIC CAP. 47u 10V M 4X5
C229	ELECTROLYTIC CAP. 4.7u 50V L-5 4X5

## Factory Parts List

C227	ELECTROLYTIC CAP.220u 35V L 8X11.5/12
C242	ELECTROLYTIC CAP.220u 10V M 6.3X7
C237	CHIP CAP.470p 50V J (0805) NPO
C238	CHIP CAP.470p 50V J (0805) NPO
C243	ELECTROLYTIC CAP.470u 10V L 6.3X11
C244	ELECTROLYTIC CAP.470u 10V L 6.3X11
C226	NONINDUCTIVE CAP.104J 100V K
C207	ELECTROLYTIC CAP.100u 10V L-5 5X7
C202	ELECTROLYTIC CAP.100u 10V L-5 5X7
C249	ELECTROLYTIC CAP.100u 10V L-5 5X7
C260	ELECTROLYTIC CAP.100u 10V L-5 5X7
C225	CHIP CAP.15p 50V J(0805) NPO
C203	CHIP CAP.220p 50V K (0805) X7R
C208	CHIP CAP.220p 50V K (0805) X7R
C212	CHIP CAP.220p 50V K (0805) X7R
C213	CHIP CAP.220p 50V K (0805) X7R
C214	CHIP CAP.220p 50V K (0805) X7R
C215	CHIP CAP.220p 50V K (0805) X7R
C216	CHIP CAP.220p 50V K (0805) X7R
C218	CHIP CAP.220p 50V K (0805) X7R
C219	CHIP CAP.220p 50V K (0805) X7R
C220	CHIP CAP.220p 50V K (0805) X7R
C221	CHIP CAP.220p 50V K (0805) X7R
C267	CHIP CAP.220p 50V K (0805) X7R
C268	CHIP CAP.220p 50V K (0805) X7R
C205	ELECTROLYTIC CAP. 10uF 16V M 4X7
C247	ELECTROLYTIC CAP. 10uF 16V M 4X7
C250	ELECTROLYTIC CAP. 10uF 16V M 4X7
C261	ELECTROLYTIC CAP. 10uF 16V M 4X7
C263	CHIP CAP.30p 50V J(0805) NPO
C264	CHIP CAP.30p 50V J(0805) NPO
C262	CHIP CAP.153p 50V M (0805) Y5V
C255	CHIP CAP.33p 50V J (0805) NPO
C257	CHIP CAP.33p 50V J (0805) NPO
C258	CHIP CAP.33p 50V J (0805) NPO
C259	CHIP CAP.1u 50V M (0805) Y5V
C251	CHIP CAP.180p 50V J(0805)NPO
C252	CHIP CAP.180p 50V J(0805)NPO
C233	CHIP CERAMIC CAP.153p 50V M
L203	INDUCTOR 200u 6X5
L217	AXIAL FIXED INDUCTOR 10u
LED201	LED Φ3X4 1L034XW31B0CT201(WHITE)
LED202	LED Φ3X4 1L034XW31B0CT201(WHITE)
DZ202	ZENER DIODE 27V 1/2W-52
LED205	LED 3R4CB71D-2B-208 (BLUE)
D201	CHIP DIODE 4148
D202	CHIP DIODE 4148
D203	CHIP DIODE 4148
D206	CHIP DIODE 4148
D207	CHIP DIODE 4148
D208	CHIP DIODE 4148
D210	CHIP DIODE 4148
D211	CHIP DIODE 4148
D212	CHIP DIODE 4148
D204	FASTER DIODE FR104 -52
D205	DIODE IN60-52 SILICON

## Factory Parts List

DZ201	ZENER DIODE 5.1V 1/2W-52
Q203	CHIP TRANSISTOR 8050(SOT-23)
Q204	CHIP TRANSISTOR 8050(SOT-23)
Q207	CHIP TRANSISTOR 8050(SOT-23)
Q205	CHIP TRANSISTOR 8550C(SOT-23)
Q206	CHIP TRANSISTOR 8550C(SOT-23)
Q208	CHIP TRANSISTOR 9014 (SOT-23)
Q210	CHIP TRANSISTOR 9014 (SOT-23)
Q201	TRANSISTOR D965-R -5
Q202	TRANSISTOR D965-R -5
IC207	IC MX3000CS SOP16
IC202	IC AT24C02 2.7~5.5V (SOP)
IC201	IC PCF8563/AMI8563 SOP8
IC205	IC PT2309-S(L) SOP
IC203	CPU 8332Z000-0C028(PLQP52)
IC204	IC PT6311/SC16311/CD16311 (H=1.4)
IC206	IC AMC1117-3.3 (SOT-223)
S201	IR SENSOR 1MA81P36D1TD001(36kHz)
X201	CRYSTAL OSCILLATOR 32.768KHz $\Phi$ 3XH8 $\pm$ 10PPM
X202	CRYSTAL OSCILLATOR 27MHz $\pm$ 20PPM
SW201	TACT SWITCH TS-1307-01 6X6X5 170g
SW204	TACT SWITCH TS-1307-01 6X6X5 170g
SW205	TACT SWITCH TS-1307-01 6X6X5 170g
SW206	TACT SWITCH TS-1307-01 6X6X5 170g
SW207	TACT SWITCH TS-1307-01 6X6X5 170g
SW208	TACT SWITCH TS-1307-01 6X6X5 170g
CN202	PINS CONNECTOR 2.0/4P
CN206	PINS CONNECTOR 1.25/20P
CN201	PINS CONNECTOR 1.25/18P
CN401	PINS CONNECTOR 2.0/2P (BENDING)
CN501	PINS CONNECTOR 2.0/2P (BENDING)
VFD201	VFD DISPLAY NE-MCD388-2.GRY
L201	CHIP BEAD CBG0805 2.2K 500mA
L202	CHIP BEAD CBG0805 2.2K 500mA
L204	CHIP BEAD CBG0805 2.2K 500mA
L206	CHIP BEAD CBG0805 2.2K 500mA
L207	CHIP BEAD CBG0805 2.2K 500mA
L208	CHIP BEAD CBG0805 2.2K 500mA
L209	CHIP BEAD CBG0805 2.2K 500mA
L210	CHIP BEAD CBG0805 2.2K 500mA
L211	CHIP BEAD CBG0805 2.2K 500mA
L212	CHIP BEAD CBG0805 2.2K 500mA
L213	CHIP BEAD CBG0805 2.2K 500mA
L214	CHIP BEAD CBG0805 2.2K 500mA
L215	CHIP BEAD CBG0805 2.2K 500mA
L216	CHIP BEAD CBG0805 2.2K 500mA
L218	CHIP BEAD CBG0805 2.2K 500mA
L219	CHIP BEAD CBG0805 2.2K 500mA
L205	CHIP RESISTOR 0 1/4W J (1206)
	DISPLAY PCB 35-MCD388-02A1 157X125.5
	BLACK SPONGE 8X5X3 40°
	BLACK SPONGE 20X15X2 40°
J201-281	JUMPER WIRE $\Phi$ 0.6X40mm (375m=1kG)
	28WIRE 50 2.0/2PX2
	28WIRE 50 2.0/11PX1 1.5/11PX1
	28WIRE 70 2.0/11PX1 1.5/11PX1

## Version List

Version 1.0 -- initial service manual of version /55 & /98

Version 1.1 -- add version /12