Service
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Service Manual

DOLBY DIGITAL DIVX ULTRA USB DIRECT

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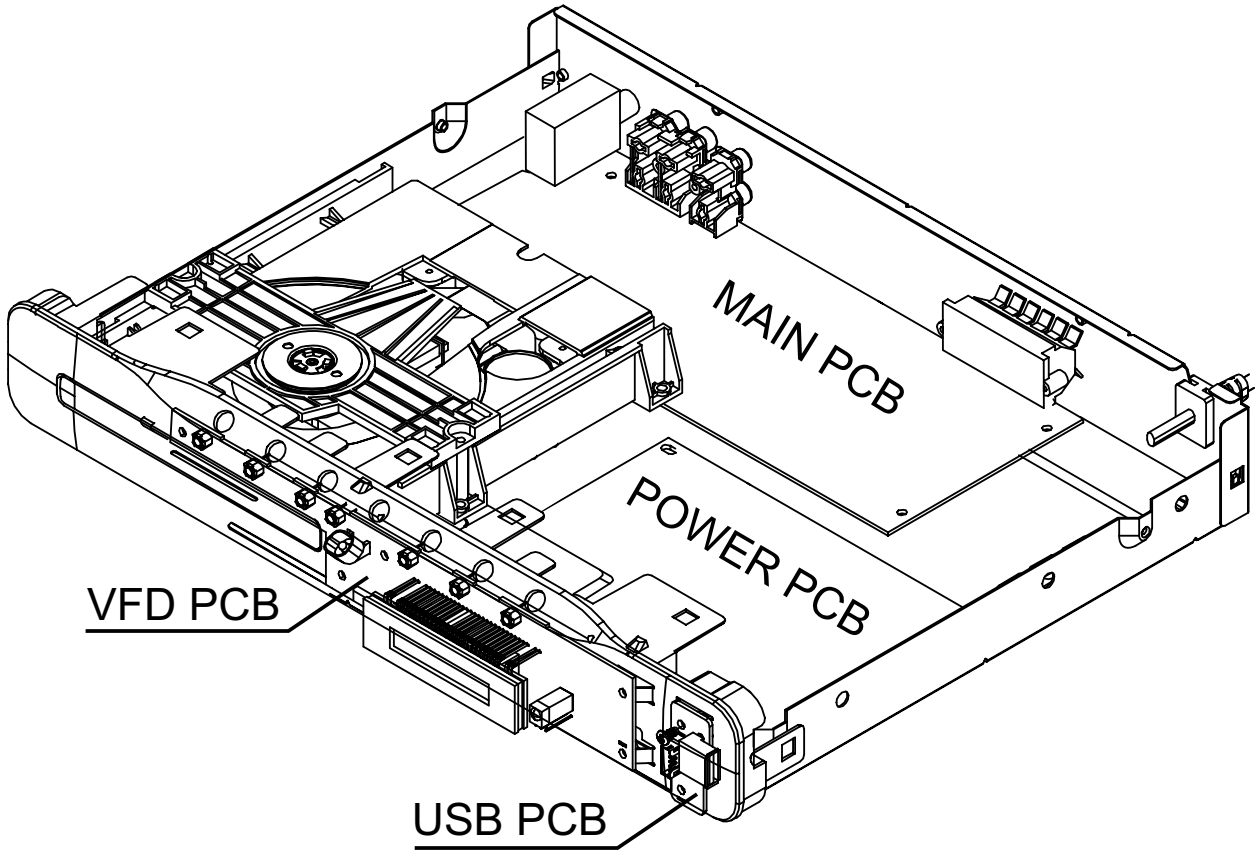
GB 3139 785 35454

Version 1.4

PHILIPS

LOCATION OF PCB BOARDS



VERSION VARIATION:

Type/Versions / Features	HTS2500					
	/12	/55	/94	/98	/78	/05
Output Power - 240W			X	X		
Output Power - 300W	X	X	X	X	X	X
Voltage (110-240V)	X	X	X	X	X	X
AUX	X	X	X	X	X	X

REPAIR SCENARIO MATRIX:

Type/Versions / Board in used	HTS2500					
	/12	/55	/94	/98	/78	/05
Main Board	C	C	C	C	C	C
Power Board	C	C	C	C	C	C
VFD+USB Board	C	C	C	C	C	C

*C = Component Level Repair

SPECIFICATIONS

Playback media

DVD-Video, DVD+R/+RW, DVD-R/-RW, CD-R/CD-RW, Audio CD, Video CD/SVCD, Picture CD, MP3-CD, WMA-CD, DivX-CD, USB storage device

File Format

Audio ..... .mp3, .wma
Video ..... .divx, .divx ultra, .mpeg, .mpg, .wmv (simple profile)
Picture ..... .jpeg, .jpg

Amplifier

Total output power..... 300 W RMS (30% THD) (for:/12/55/05)
Total output power..... 240 W RMS (10% THD),
..... 300 W RMS (30% THD) (for:/94/98/78)
Frequency response..... 20 Hz-20 kHz /±3dB
Signal-to-noise ratio..... > 65 dB (CCIR) /(A-weighted)
Input sensitivity.....
AUX ..... 1000 mV

Video

Signal system ..... PAL / NTSC

Audio

Sampling frequency.....
MP3 ..... 32 kHz, 44.1 kHz, 48 kHz
WMA..... 44.1 kHz, 48 kHz
Constant bit rate .....
MP3 ..... 112 kbps - 320 kbps
WMA..... 48 kbps - 192 kbps

Radio

Tuning range ..... FM 87.5-108 MHz (50 kHz)
Signal-to-noise ratio..... FM 50 dB
Frequency response..... FM 180 Hz-10 kHz/ ±6dB

USB

Compatibility ..... USB
Class support..... UMS (USB Mass Storage Class)
File system FAT16, FAT32
Maximum memory support ..... < 160GB

Main Unit

Power supply ..... 110-240V, ~50-60 Hz;
Power consumption ..... 55 W
Standby power consumption ..... ≤ 0.9 W
Dimensions (WxHxD) ..... 360 x 58 x 303(mm)
Weight ..... 2.3 kg

Speakers

System..... full range satellite
Speaker impedance..... 3 ohm
Speaker drivers ..... 3” full range
Frequency response..... 150 Hz-20 kHz
Dimensions (WxHxD) ..... 100 x 100 x 75(mm)
Weight ..... 0.30~0.66 kg/each
Cable length .....
Center..... 1 m
Front ..... 2 m
Rear..... 10 m

Subwoofer

Impedance..... 12 ohm
Speaker drivers ..... 133 mm (5.25”) woofer
Frequency response..... 40 Hz-150 kHz
Dimensions (WxHxD) ..... 60 x 267.5 x 265 (mm)
Weight ..... 2.65 kg
Cable length ..... 2 m

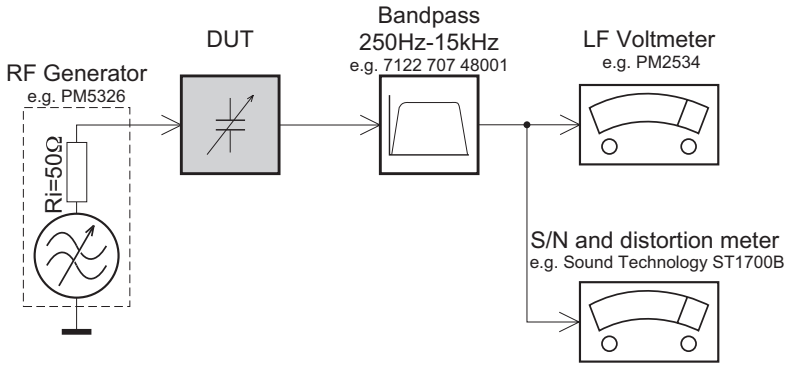
Laser specification

Type..... Semiconductor laser GaAlAs (CD)
Wave length..... 645 - 665 nm (DVD), 770 - 800 nm (CD)
Output power..... 6 mW (DVD), 7 mW (VCD/CD)
Beam divergence..... 60 degrees.

Specifications subject to change without prior notice.

MEASUREMENT SETUP

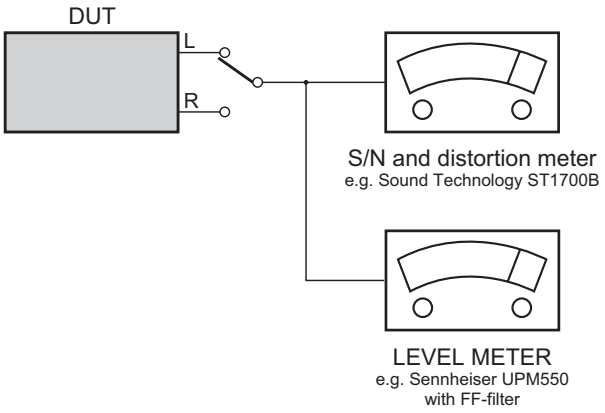
Tuner FM



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

CD

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



SERVICE AIDS

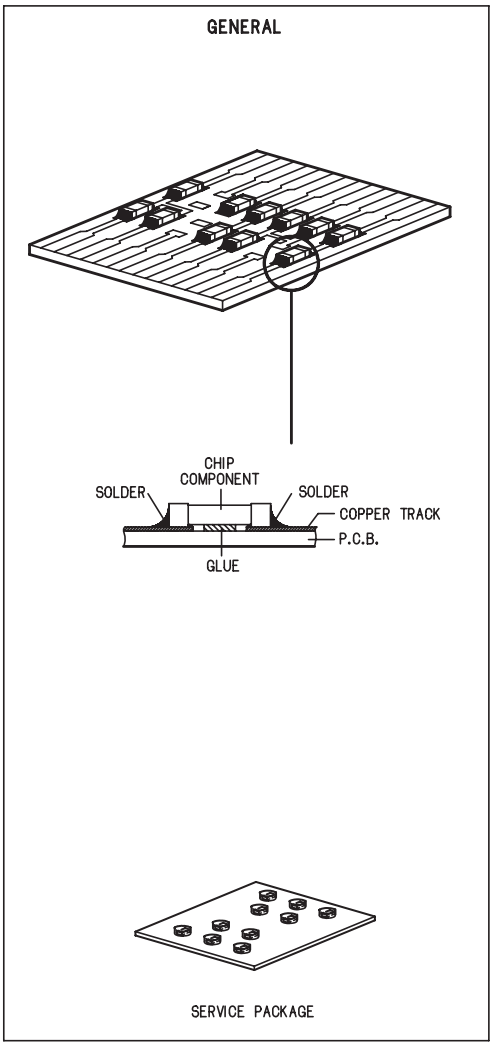
Service Tools:

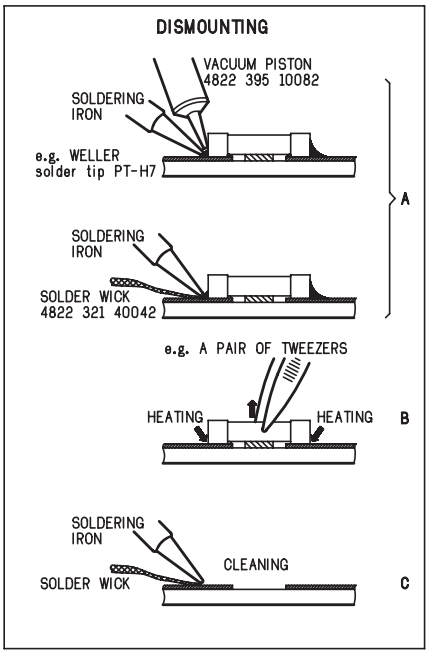
Universal Torx driver holder 4822 395 91019
Torx bit T10 150mm 4822 395 50456
Torx driver set T6-T20 .....4822 395 50145
Torx driver T10 extended 4822 395 50423

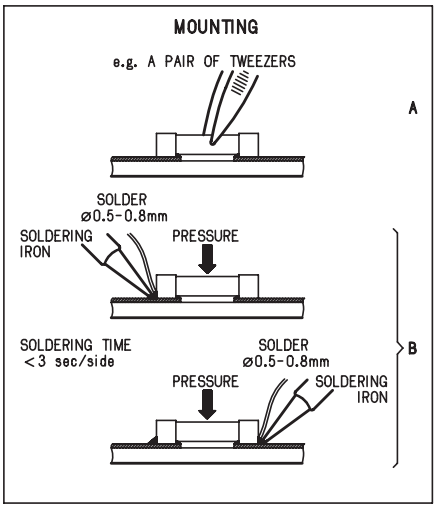
Compact Disc:

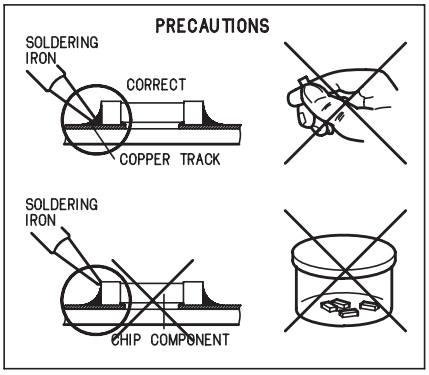
SBC426/426A Test disc 5 + 5A 4822 397 30096
SBC442 Audio Burn-in test disc 1kHz 4822 397 30155
SBC429 Audio Signals disc 4822 397 30184
Dolby Pro-logic Test Disc 4822 395 10216

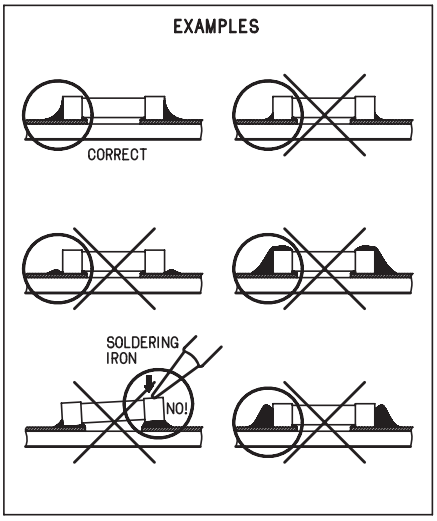
HANDLING CHIP COMPONENTS











ESD

GB **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.

NL **WAARSCHUWING**

Alle IC's en vele andere halfgeleiders zijn gevoelig voor electrostatische ontladingen (ESD).
Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen.
Zorg ervoor dat u tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat.
Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.

F **ATTENTION**

Tous les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharges statiques (ESD).
Leur longévité pourrait être considérablement écourtée par le fait qu'aucune précaution n'est prise à leur manipulation.
Lors de réparations, s'assurer de bien être relié au même potentiel que la masse de l'appareil et enfiler le bracelet serti d'une résistance de sécurité.
Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.

D **WARNUNG**

Alle ICs und viele andere Halbleiter sind empfindlich gegenüber elektrostatischen Entladungen (ESD).
Unsorgfältige Behandlung im Reparaturfall kan die Lebensdauer drastisch reduzieren.
Veranlassen Sie, dass Sie im Reparaturfall über ein Pulsarmband mit Widerstand verbunden sind mit dem gleichen Potential wie die Masse des Gerätes.
Bauteile und Hilfsmittel auch auf dieses gleiche Potential halten.

I **AVVERTIMENTO**

Tutti IC e parecchi semi-conduttori sono sensibili alle scariche statiche (ESD).
La loro longevità potrebbe essere fortemente ridatta in caso di non osservazione della più grande cauzione alla loro manipolazione.
Durante le riparazioni occorre quindi essere collegato allo stesso potenziale che quello della massa dell'apparecchio tramite un braccialetto a resistenza.
Assicurarsi che i componenti e anche gli utensili con quali si lavora siano anche a questo potenziale.

GB **ESD PROTECTION EQUIPMENT**

Complete Kit ESD3 (small tablemat, wristband, connection box, estention cable and earth cable 4822 310 10671
Wristband tester 4822 344 13999

GB

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 ⚠ .

NL

Veiligheidsbepalingen vereisen, dat het apparaat bij reparatie in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, identiek aan de gespecificeerde, worden toegepast.

De Veiligheidsonderdelen zijn aangeduid met het symbol ⚠ .

F

Les normes de sécurité exigent que l'appareil soit remis à l'état d'origine et que soient utiliséés les piéces de rechange identiques à celles spécifiées.

Less composants de sécurité sont marqués ⚠ .

D

Bei jeder Reparatur sind die geltenden Sicherheitsvorschriften zu beachten. Der Original zustand des Geräts darf nicht verändert werden; für Reparaturen sind Original-Ersatzteile zu verwenden.

Sicherheitsbauteile sind durch das Symbol ⚠ markiert.

I

Le norme di sicurezza esigono che l'apparecchio venga rimesso nelle condizioni originali e che siano utilizzati i pezzi di ricambio identici a quelli specificati.

Componenty di sicurezza sono marcati con ⚠ .

GB

After servicing and before returning set to customer perform a leakage current measurement test from all exposed metal parts to earth ground to assure no shock hazard exist, The leakage current must not exceed 0.5mA.

GB **Warning !**

Invisible laser radiation when open.
Avoid direct exposure to beam.

S **Varning !**

Osynlig laserstrålning när apparaten är öppnad och spärren är urkopplad. Betrakta ej strålen.

SF **Varoitus !**

Avatussa laitteessa ja suojalukituksen ohitettaessa olet alttiina näkymättömälle laserisäteilylle. Älä katso säteeseen!

DK **Advarse !**

Usynlig laserstråling ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsaettelse for stråling.

F

"Pour votre sécurité, ces documents doivent être utilisés par des spécialistes agréés, seuls habilités à réparer votre appareil en panne".

Pb(Lead) Free Solder

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

INDENTIFICATION:
Regardless of special logo (not always indicated) 

one must treat all sets from **1 Jan 2005** onwards, according next rules:

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.

Setting procedure & Repair instruction

1) Restore factory setting

a) Press <SETUP> button on R/C.
b) Select <preference setup> ,then press < OK >.
c) Select <default>,then press <OK> to confirm.

2) Version control change

a) Open the Door,then,press “1” “5” “9” on RC.
b) Press <OK> button on RC.
c) TV will show message as follow:

Current model: 2500-12/55/94/98/78/05
Version:00.07.02_0 Release:2010.06.10
Region:0 Servo:62.10.00.07
8032: 0F.01.00.09 Risc:01.00.00.04
MCU: 07.00 BootLoader: Er

if current model doesnot match your set,
use down arrow key on the remote to change
OK

d) If current model doesnot match your set, use down arrow key on the remote to change.

3) Password change

a) Press <SETUP> button on R/C.
b) Select <preference setup> ,then press <OK>.
c) Select <password> <change>,then press <OK> to confirm “0000” is default password supplied.

4) Trade model

a) Press <Open/Close>button on R/C.
b) Press “2” “5” “9” on R/C,VFD will display “TRA ON “ or “TRA OFF“.

5) Check on software version

a) Press <SETUP> button on R/C.
b) Select <preference setup> ,then press <OK>.
c) Select <version info>,then press <OK>.
d) TV will show message as follow:

Current model: 2500-12/55/94/98/78/05
Version:00.07.02_0 Release:2010.06.10
Region:0 Servo:62.10.00.07
8032: 0F.01.00.09 Risc:01.00.00.04
MCU: 07.00 BootLoader: Er

OK

Press SETUP to exit menu

6) Upgrading new software

a) Check for the latest software version on
www.philips.com/support.
Search for your model and click on ‘software&drivers’.
b) Copy the latest upgrading software onto a CD-R or USB storage device.
c) Insert the CD-R program disc or connect the USB storage device to the home theater.
d) Press <USB> button on R/C.
e) TV will show message as follow:

Upgrade file detected

Upgrade?
Press PLAY to start

f) Press <PLAY> “►II” button on R/C.
g) TV will show message as follow:

Upgrade file detected

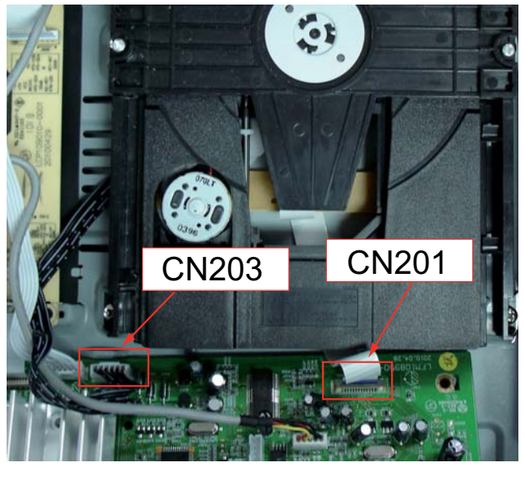
Upgrade?
Press PLAY to start
Upgrading

h) When the updated is complete ,the home theater automatically switch to standby.

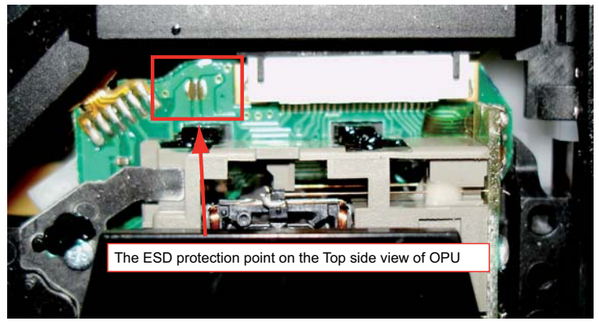
Note: when upgrade in progress, please do not unplug or switch off the device.

7) How to replace the defective DVD Loader

a) Remove the defective DVD Loader (see chapter 3).
b) Accordingly connect DVD Loader and “CN201”, “CN203” on the top of main board as shown below:



c) Remove solder joint on the ESD protection point.



The Top side view of OPU

Note: The ESD protection point on the Top side view of OPU must be soldered if
- the DVD Loader is OK and needs to be disconnected from connector “CN201” and “CN203” of the main board.
- the defective DVD Loader is needed to be send back to supplier for failure analysis and to support back charging evidence.

8) Produce to change Tuner grid (only for /98 version)

In some countries, you can switch the FM tuning grid between 50 kHz and 100 kHz. Changing the tuning grid erases all preset radio stations.
a) Press<radio> button on R/C
b) Press <Stop> button on R/C.
c) Press and hold <Play> until (50 kHz) or (100 kHz) is displayed.
Note: repeaing the same action will toggle back to it previous tunning grid setting.

CAUTION!

This information is confidential and may not be distributed.Only a qualified service person should reprogram the Region Code.

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REPAIR INSTRUCTION

MAIN UNIT REPAIR CHART

- A — All Function No Working
- B — All Function No Sound
- C — Aux In No Sound
- D — Tuner Function No Sound
- E — DISC Function No Sound
- F — USB NO FUNCTION
- G — Power Supply No working

A — All Function No Working

- Check all system all cable is loose or bad INT — YES → RE-insert and fix the cable
- NO → Panel standby LED whether light — NO → Check power board BK3V3 out
- YES → Check MAIN PCB IC305 and their conjoint part.

B — All Function No Sound

- Check MAIN PCB CN302 whether at PIN29 +30.4V,CN302 PIN19 +12V. — NO → Check SW power and conjoint part
- YES → Check MAIN PCB C425 Pin1 VCC whether at +3.3V — NO → Check MAIN PCB Q402 and their conjoint part whether OK
- YES → Check MAIN PCB IC401 IC403 IC404 and their conjoint part whether OK

C — Aux In No Sound

- Check MAIN PCB IC302 Pin 3/13 Whether output OK — NO → Check MAIN PCB IC302 Pin6/7 Whether at +-5V and their conjoint part whether OK.
- YES → Check MAIN PCB IC303 Pin 5/ 13 whether at 5v/3.3v . — NO → Check MAIN PCB R333/R340 Whether OK.
- YES → Check MAIN PCB IC303 and their conjoint art whether OK

D — Tuner Function No Sound

- Check MAIN PCB TU301Pin7/8 output whether OK. — NO → Check MAIN PCB TU301 PIN5whether is5V and their conjoint part whether OK
- YES → Check MAIN PCB IC302 Pin1/12 whether out OK. — NO → Check MAIN PCB IC301Pin8/4 Whether at +/-12V and their conjoint part whether OK.
- YES → Check MAIN PCB IC302and their conjiont part whether OK.

E — DISC Function No Sound

- Check MAIN PCB IC202 Pin111-122 and their conjoint part whether OK.
- YES → Check MAIN PCB IC304 and their conjoint part whether OK.
- YES → Check MAIN PCB IC401 Pin124-32 and their conjoint part whether OK.

F — USB NO FUNCTION

- Check USB cable and CN204 Whether OK — NO → RE-insert CN204 and fix the cable
- YES → Check Main PCB F201 whether 5V.

G — Power Supply No working

- All Voltage No Output — NO → AC1 AC2 Voltage No Output → Check D905 Q901 IC901 ZD903 And Its Conjoint Part
- NO → +32.5V Voltage No Output → Check D908 Q901 IC901 And Its Conjoint Part
- NO → -27V Voltage No Output → Check D906 Q901 IC901 And Its Conjoint Part
- NO → +12V Voltage No Output → Check D904 Q901 IC901 And Its Conjoint Part
- NO → +5.1V Voltage No Output → Check D902 Q901 IC901 And Its Conjoint Part
- NO → BK3.3V Voltage No Output → Check D910 IC904 Q901 IC901 And Its Conjoint Part
- YES → Check F901 Bad Causc Damage
- NO → Check BK3.3V Working or Not — NO → Check Requir IC901 IC904 And Its conn circuit

DISASSEMBLY INSTRUCTIONS

Dismantling of theTop & Front Panel Assemble

1) Open the DVD Tray by using the Open/Close Button while the Set is ON and disconnect the mains supply after removing the Tray Cover.
   Note: If this is not possible, the DVD Tray has to be open manually.
   Take a mini screw driver about 2mm diameter and make a marking 24mm from the tip as shown in figure 2 . Place the set on its side, insert the mini screw driver till the marking and slide it towards the left as shown in figure 1 until the Tray moves out of the Front Panel.
2) Return the set to its upright position and remove the Tray Cover as shown in Figure 3 and close the tray manually by pushing it back in.

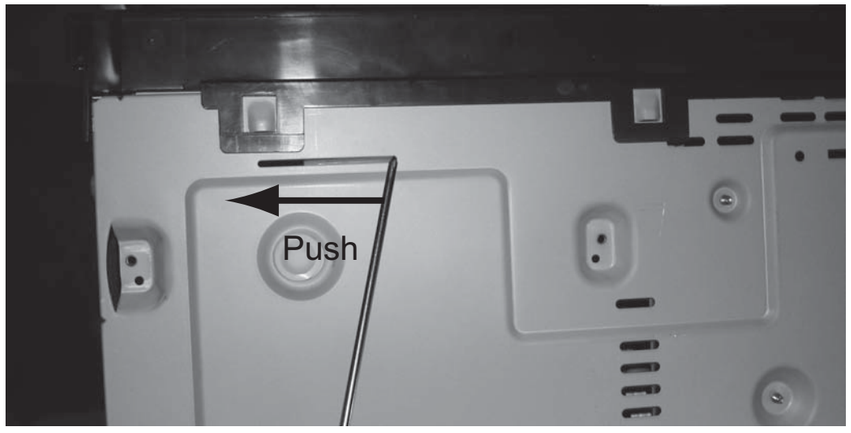


Figure 1

Figure 2

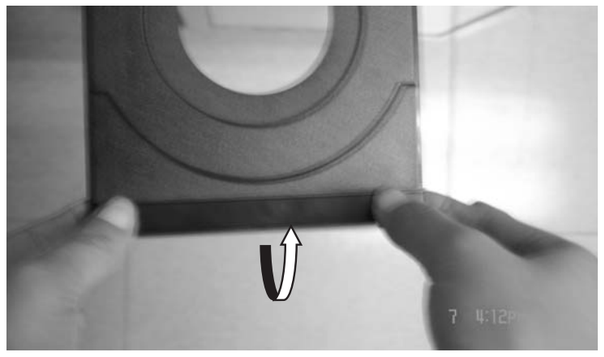


Figure 3

3 - 1

3) Loosen 6 screws and remove the Top Cover by lifting the rear portion upwards before sliding it out towards the rear.
   - 4 screws “A” at the back panel as shown in figure 4.
   - 1 screw “B” each on the left & right side as shown in figure 5.

Figure 4

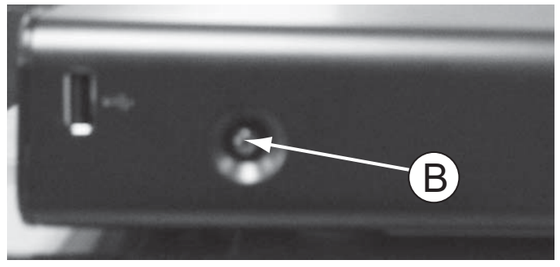


Figure 5

Dismantling of the DVD Loader Module

1) Loosen 4 screws “ C “ at the DVD Loader Module as shown in figure 6.

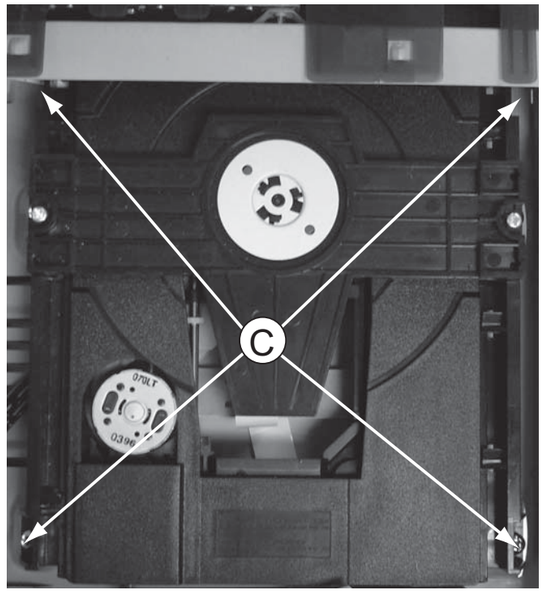


Figure 6

Dismantling of the VFD+USB Board

1) Loosen 7 screws “D” on the top of VFD+USB Board as shown in figure 7.

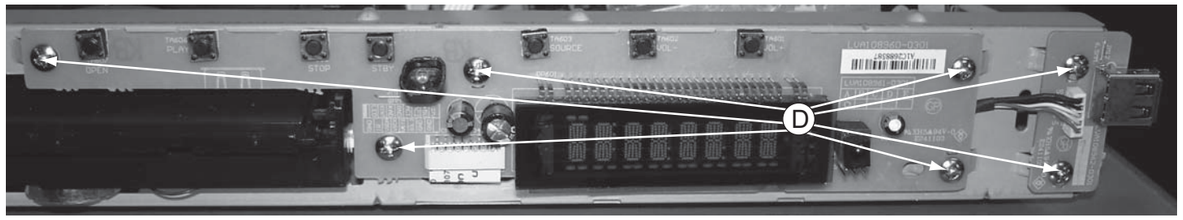


Figure 7

Dismantling of the MAIN Board

1) Loosen 4 screws “ E ” on the top of MAIN Board as shown in figure 8.
2) Loosen 5 screws “ F ” at the back panel as shown in figure 9.

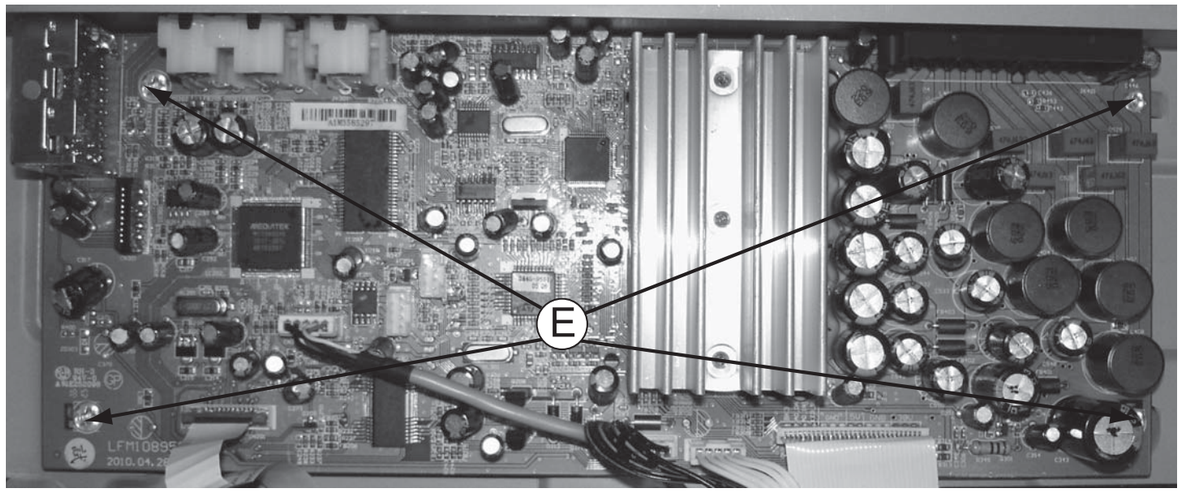


Figure 8

Figure 9

Dismantling of the POWER Board

1) Loosen 5 screws “G ” on the top of Power Board as shown in figure 10.

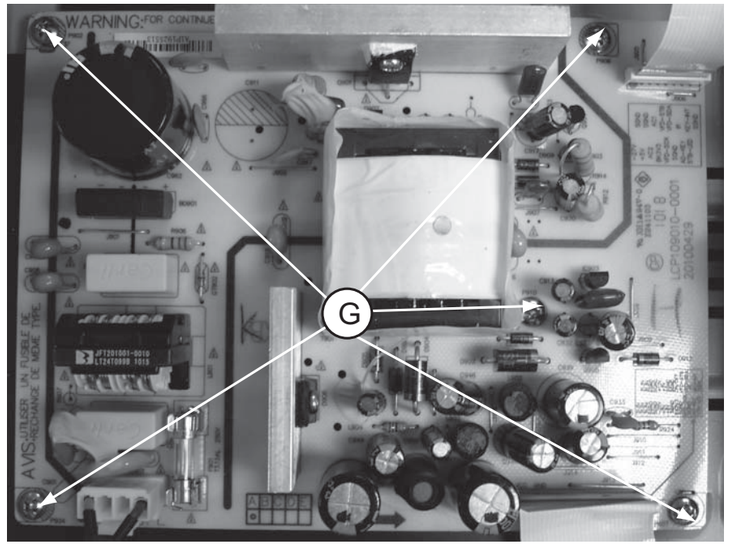
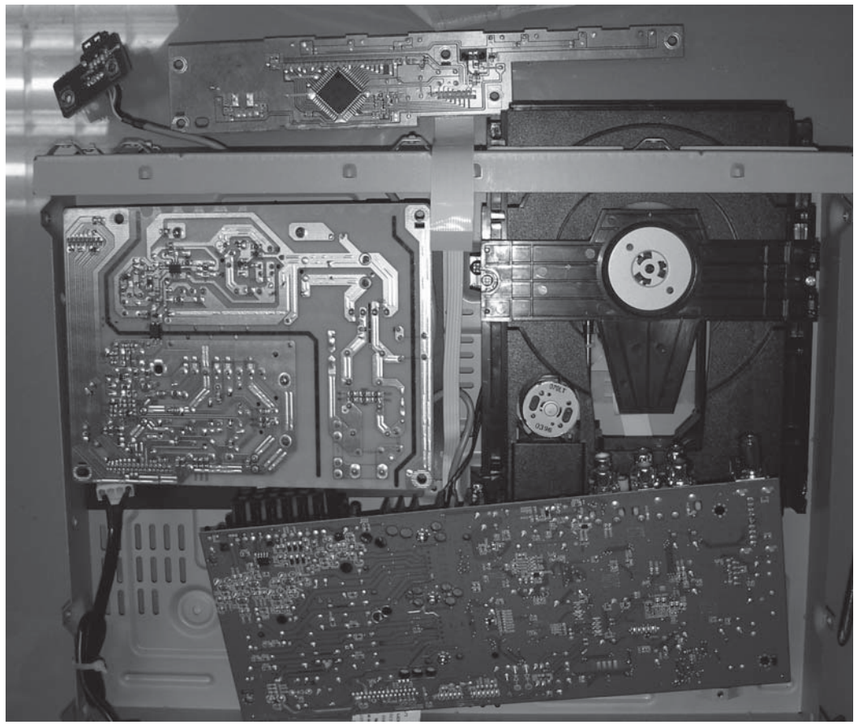


Figure 10

SERVICE POSITIONS

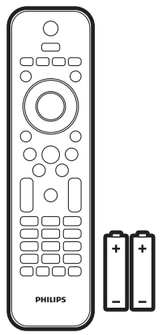


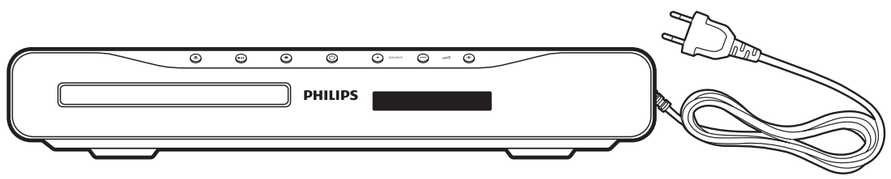
Note:In some service positions the components or copper patterns of one board may risk touching its neighbouring pc boards or metallic parts. To prevent such short-circuit use a piece of hard paper or other insulating material between them.

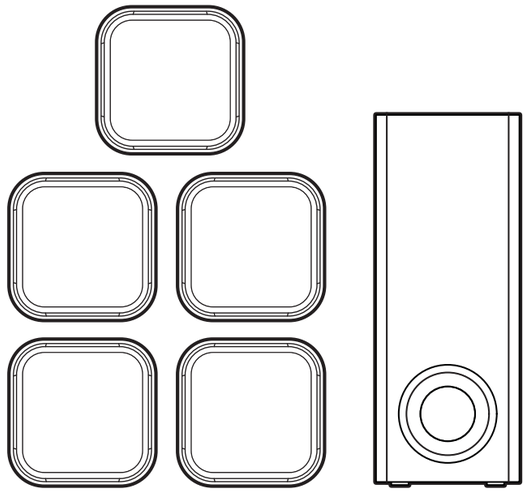
4 - 1

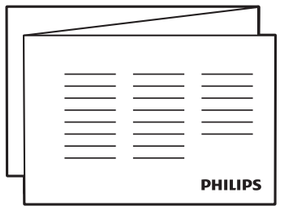
CIRCUIT DIAGRAM

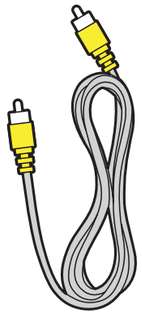
The following excerpt of the QSG/DFU serves as an introduction to the set.
The complete Direction for Use can be download in the different languages from the internet site of Philips Consumer care Center: www.support.philips.com





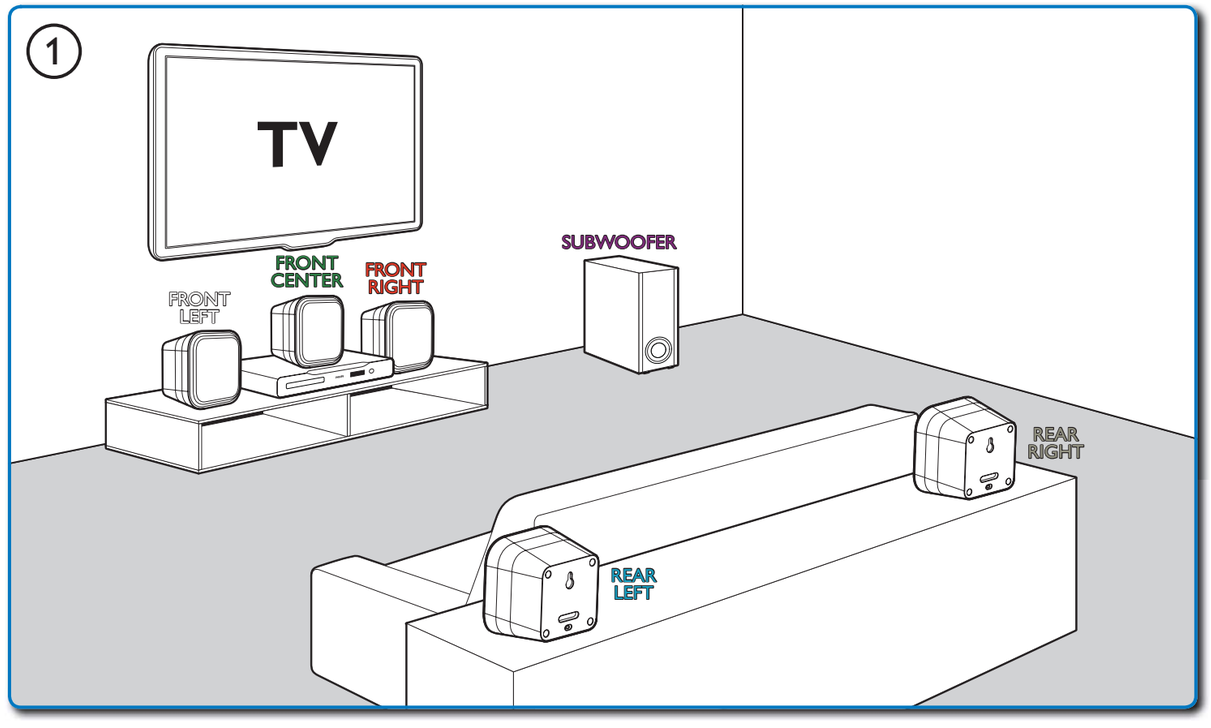


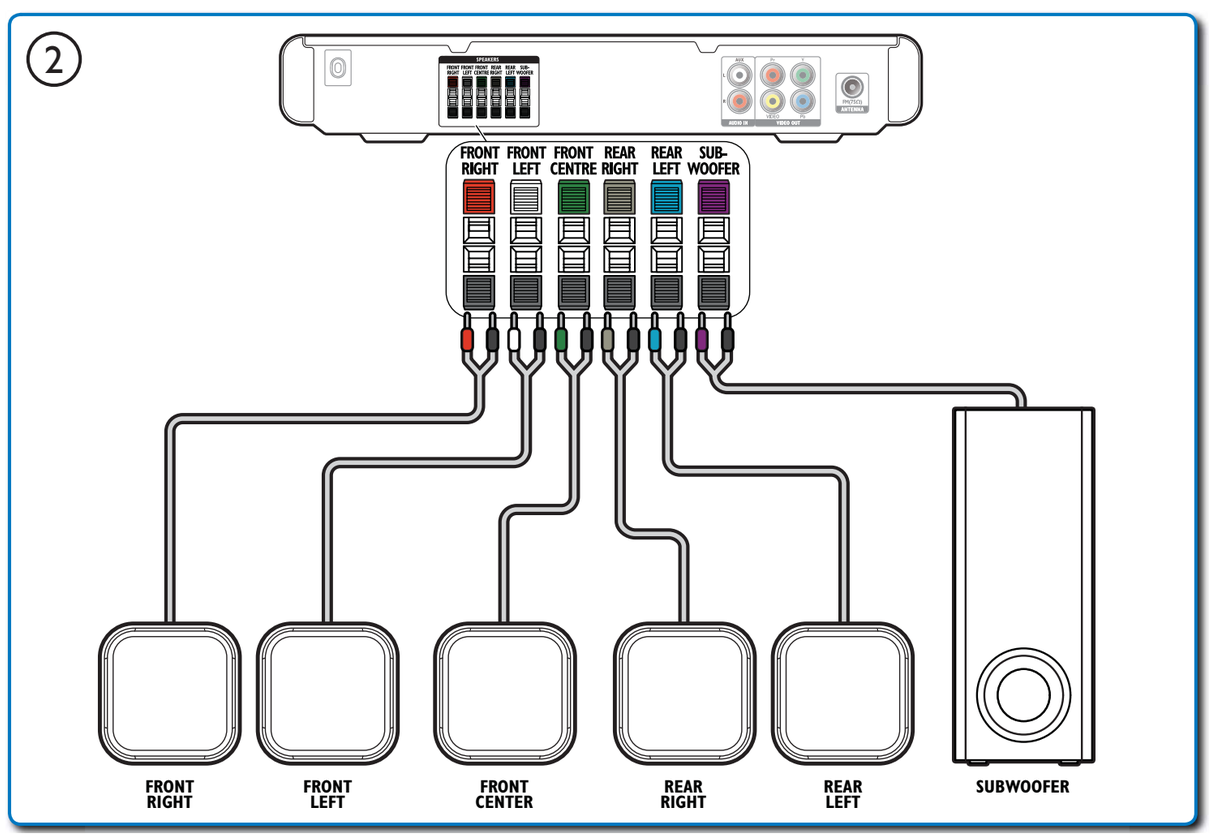




Composite

FM Antenna





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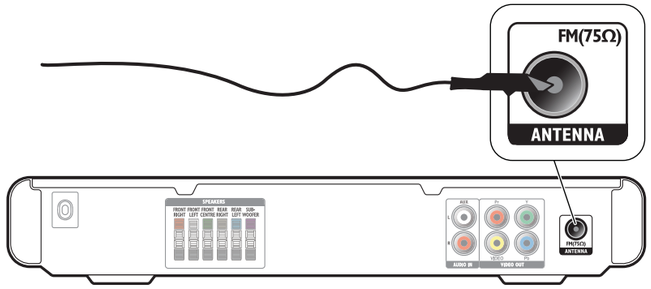
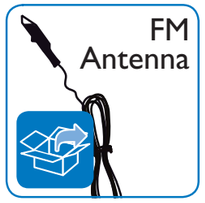
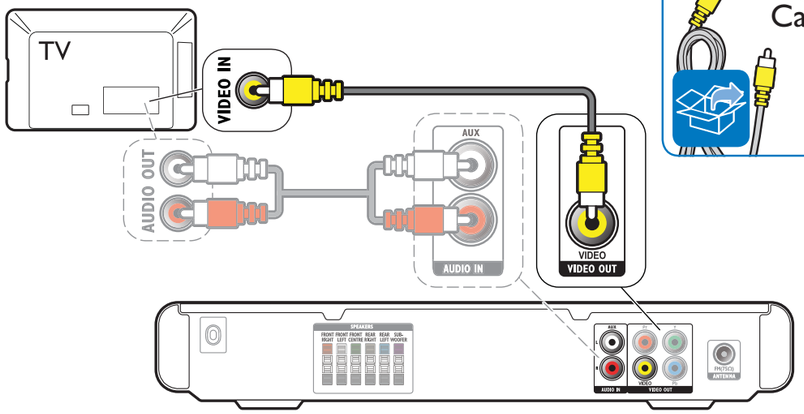

FM(75Ω)
ANTENNA


FM
Antenna

4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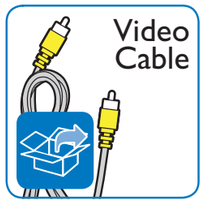
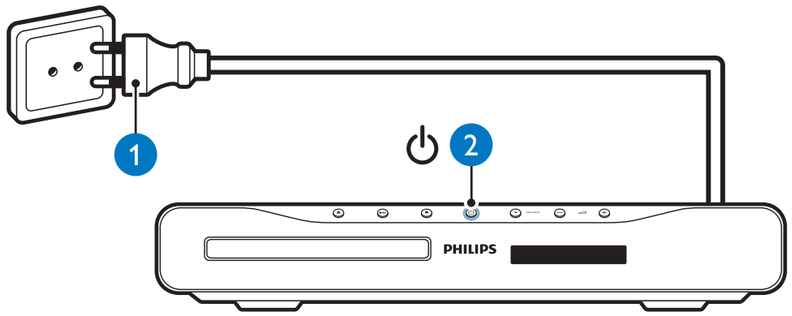
VIDEO IN
AUDIO OUT
AUX
AUDIO IN
VIDEO
VIDEO OUT


Video
Cable

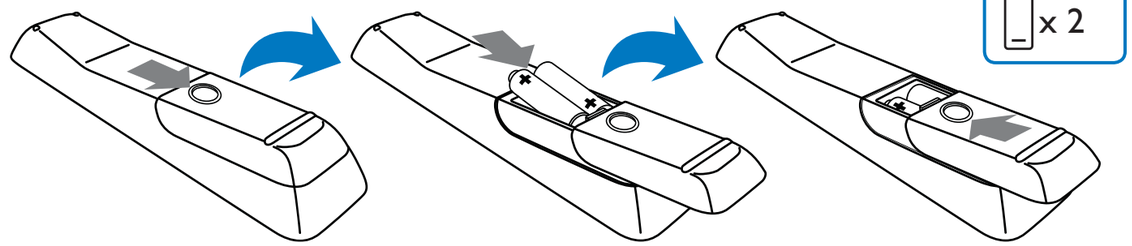

Audio
Cable

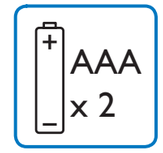
5

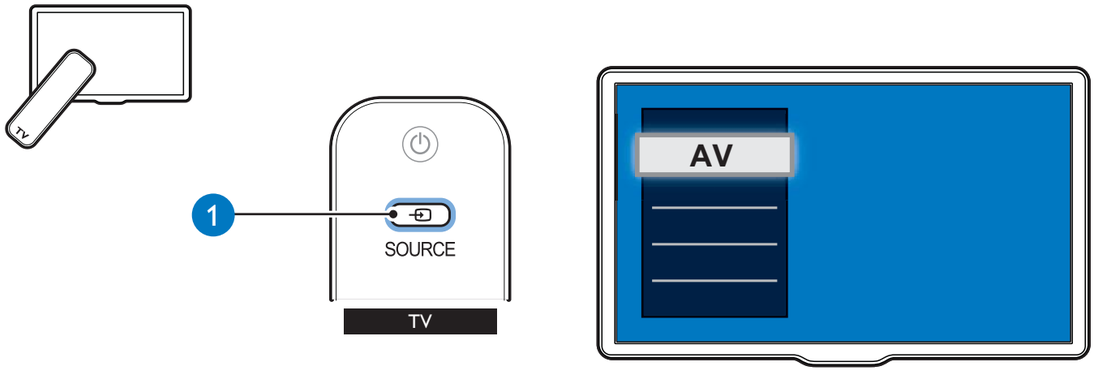

1
2
PHILIPS

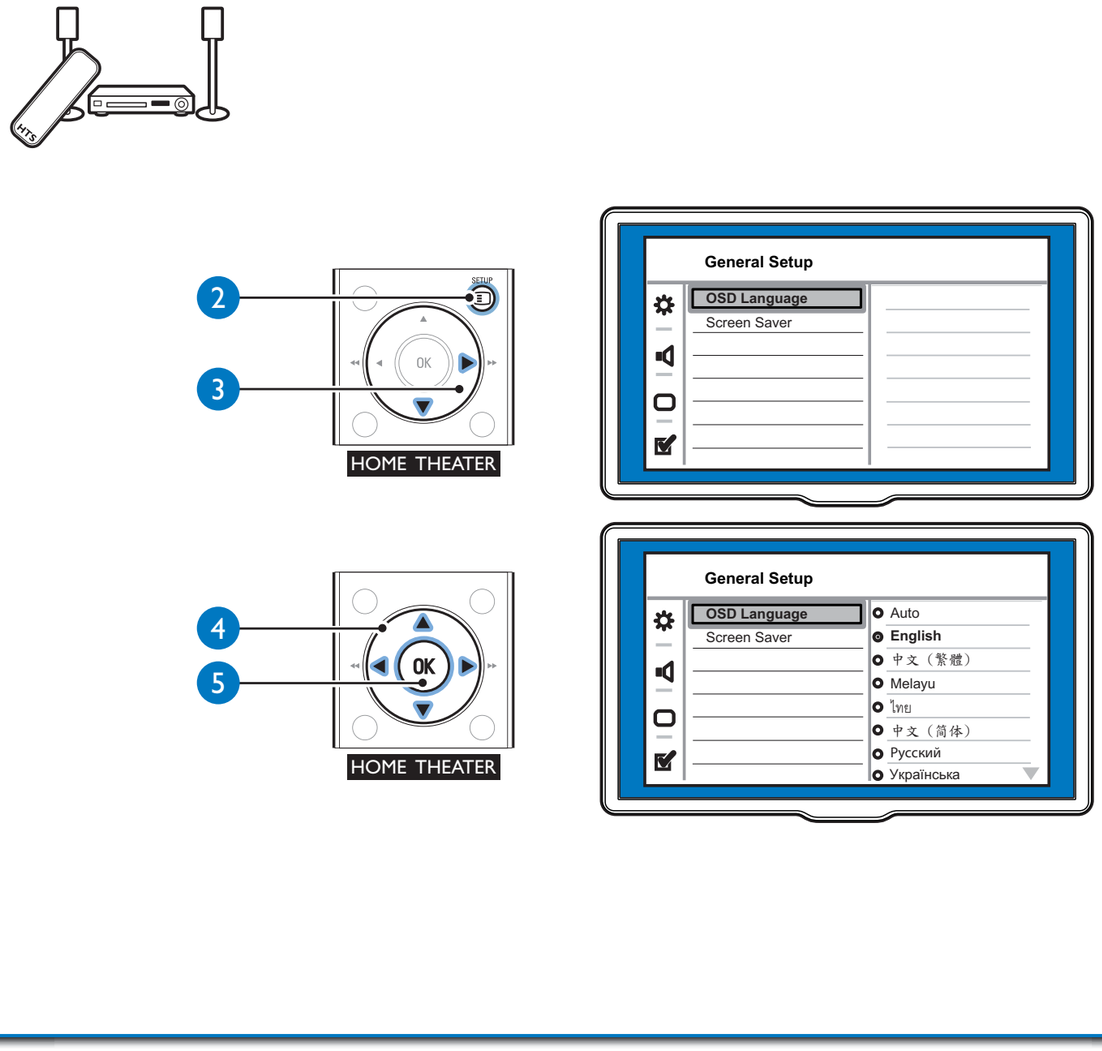
4 - 2

6




AAA
x 2


TV
1
SOURCE
TV
AV


HTS
2
3
SETUP
OK
HOME THEATER
General Setup
OSD Language
Screen Saver
4
5
OK
HOME THEATER
General Setup
OSD Language
Screen Saver
Auto
English
中文（繁體）
Melayu
ไทย
中文（简体）
Русский
Українська

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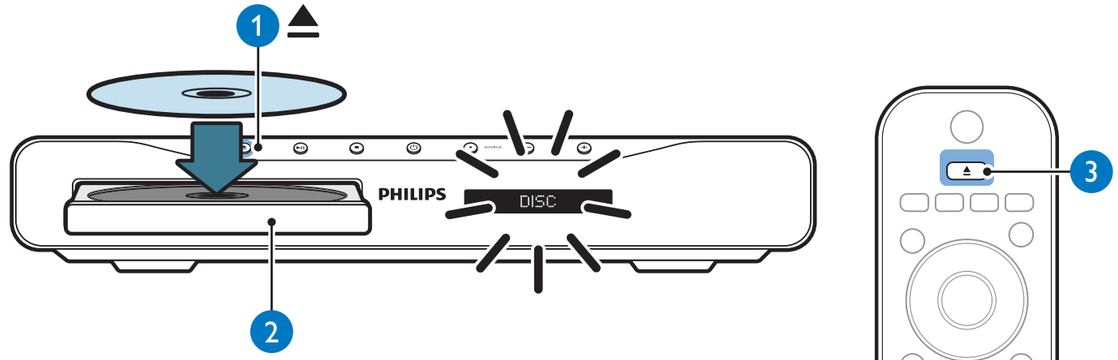
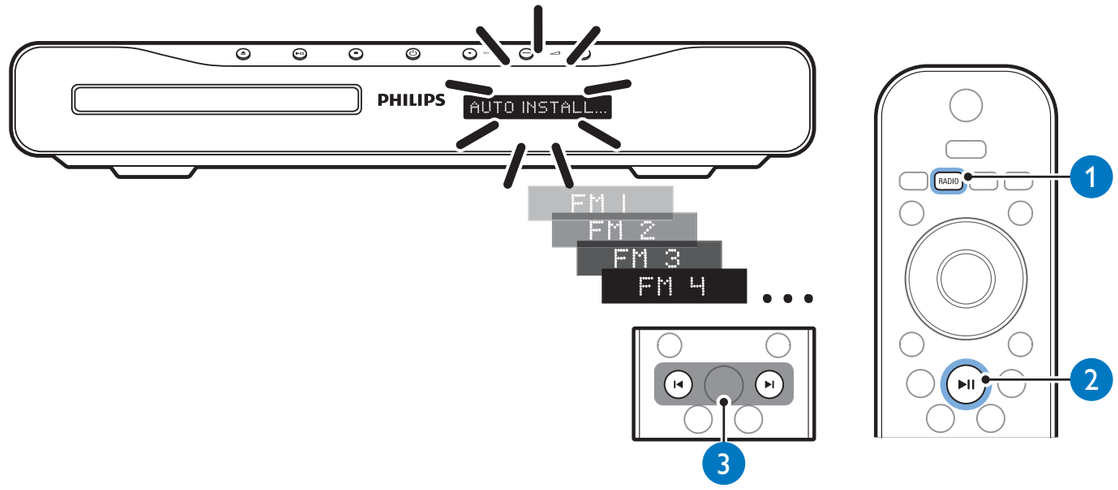
DISC


1
PHILIPS
DISC
2
3

FM


PHILIPS
AUTO INSTALL...
FM 1
FM 2
FM 3
FM 4
RADIO
1
2
3

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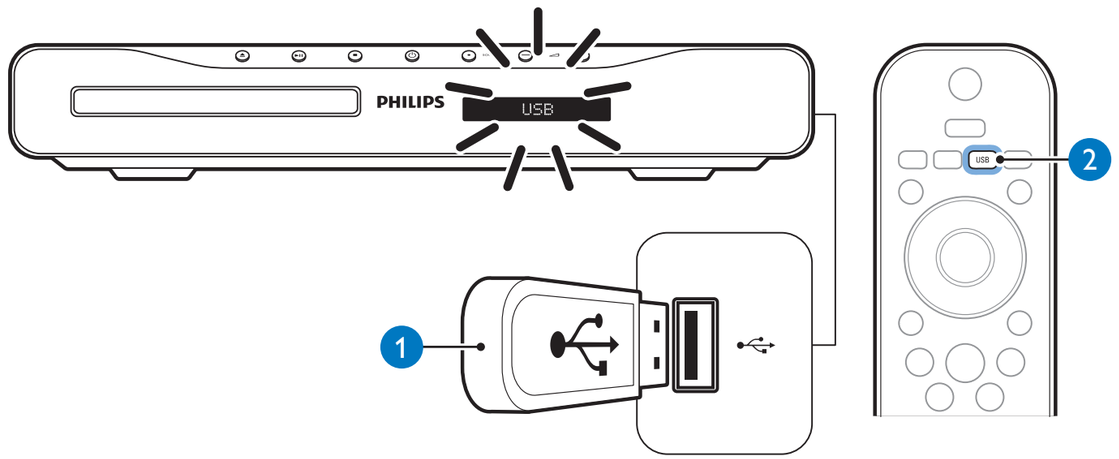
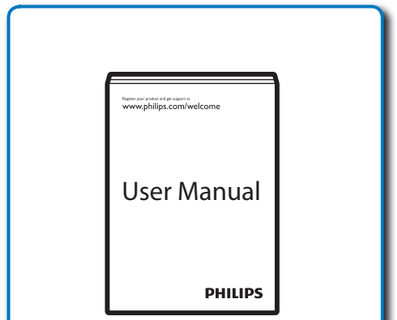
USB





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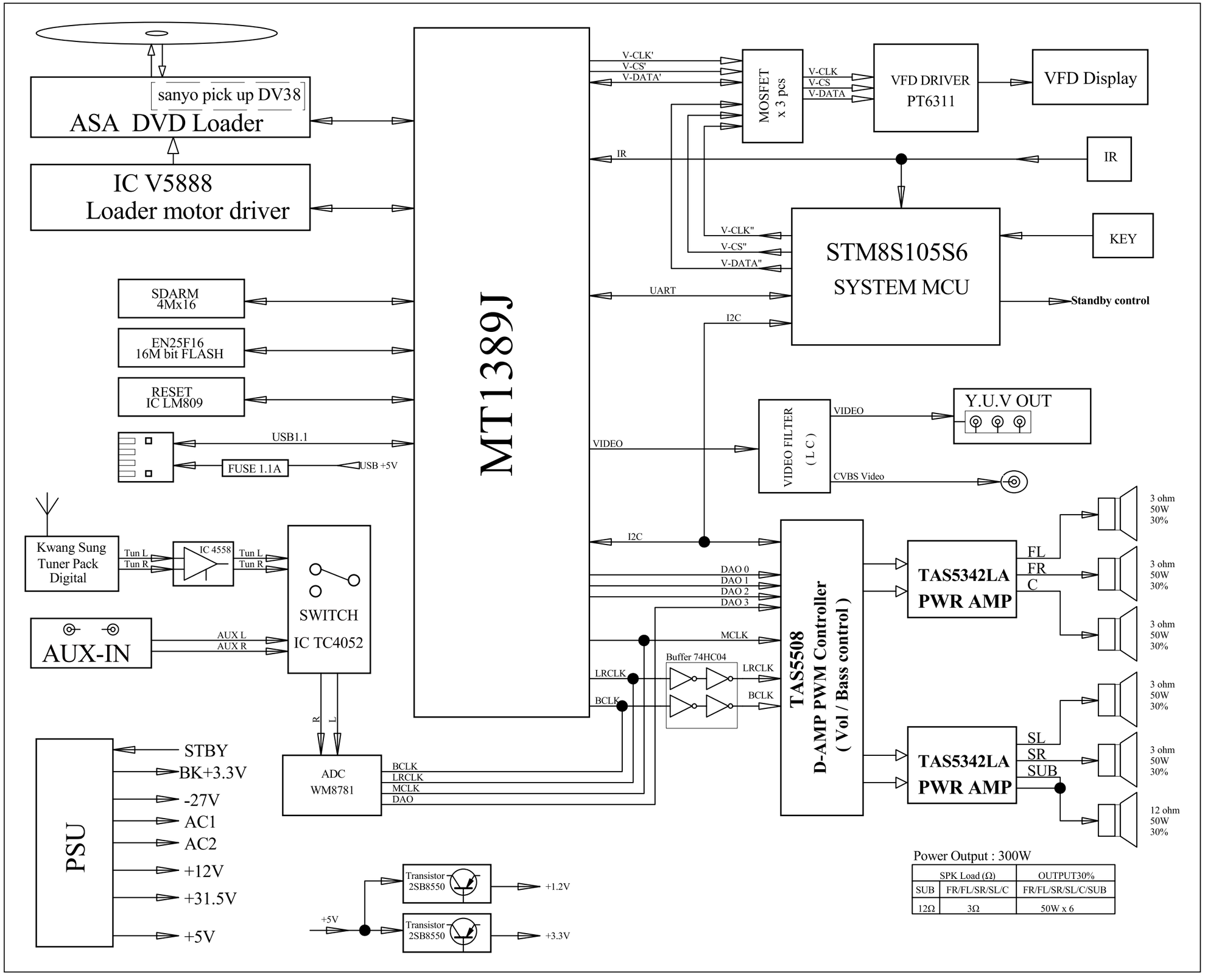
BLOCK DIAGRAM



Power Output : 300W

SPK Load (Ω)		OUTPUT30%
SUB	FR/FL/SR/SL/C	FR/FL/SR/SL/C/SUB
12Ω	3Ω	50W x 6

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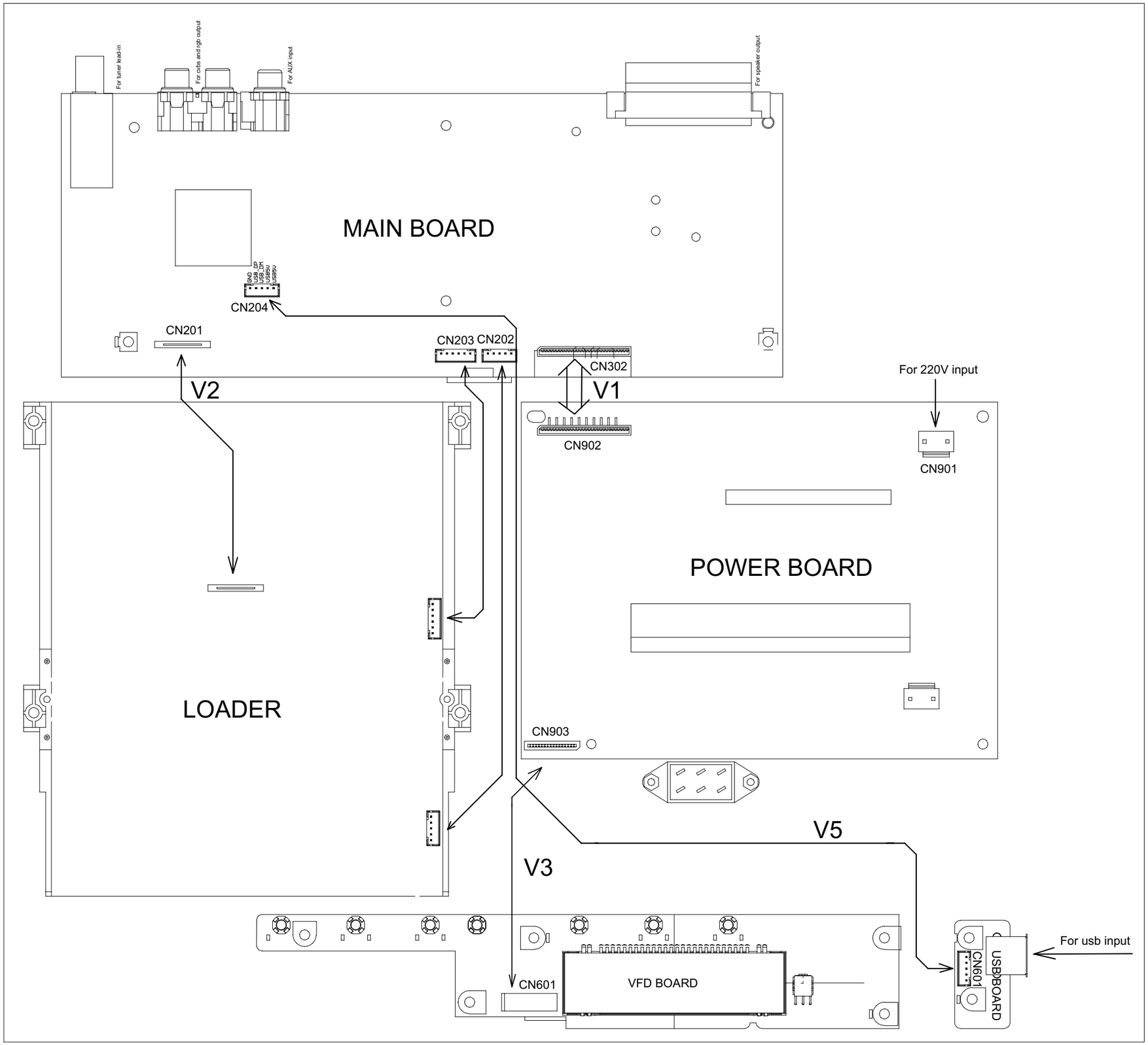
WIRING DIAGRAM



VFD+USB BOARD

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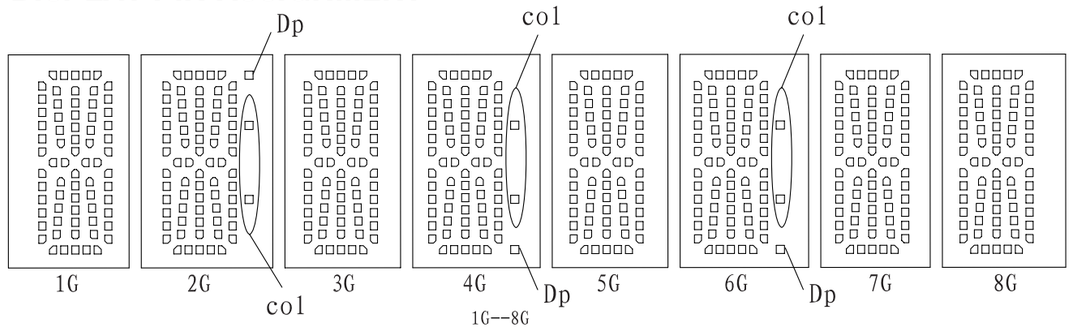
FTD DISPLAY PIN ASSIGNMENT



	1G	2G	3G	4G	5G	6G	7G	8G
P1	a	a	a	a	a	a	a	a
P2	j, p	j, p	j, p	j, p	j, p	j, p	j, p	j, p
P3	h	h	h	h	h	h	h	h
P4	k	k	k	k	k	k	k	k
P5	b	b	b	b	b	b	b	b
P6	f	f	f	f	f	f	f	f
P7	m	m	m	m	m	m	m	m
P8	g	g	g	g	g	g	g	g
P9	c	c	c	c	c	c	c	c
P10	e	e	e	e	e	e	e	e
P11	r	r	r	r	r	r	r	r
P12	n	n	n	n	n	n	n	n
P13	d	d	d	d	d	d	d	d
P14		col		col		col		
P15		Dp		Dp		Dp		

PIN CONNECTION

(Pin NO.)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
(Connection)	F1	F1	NP	NC	P15	P14	NC	P13	P12	P11	P10	P9	P8	P7	P6	P5
(Pin NO.)	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
(Connection)	P4	P3	P2	P1	NC	1G	2G	3G	4G	5G	6G	7G	8G	NP	F2	F2

(Notes) : Fn : (Filament Pin) nG : (Grid Pin)
Pn : (Anode Pin) NP : (No Pin)
NC : (No connection Pin)

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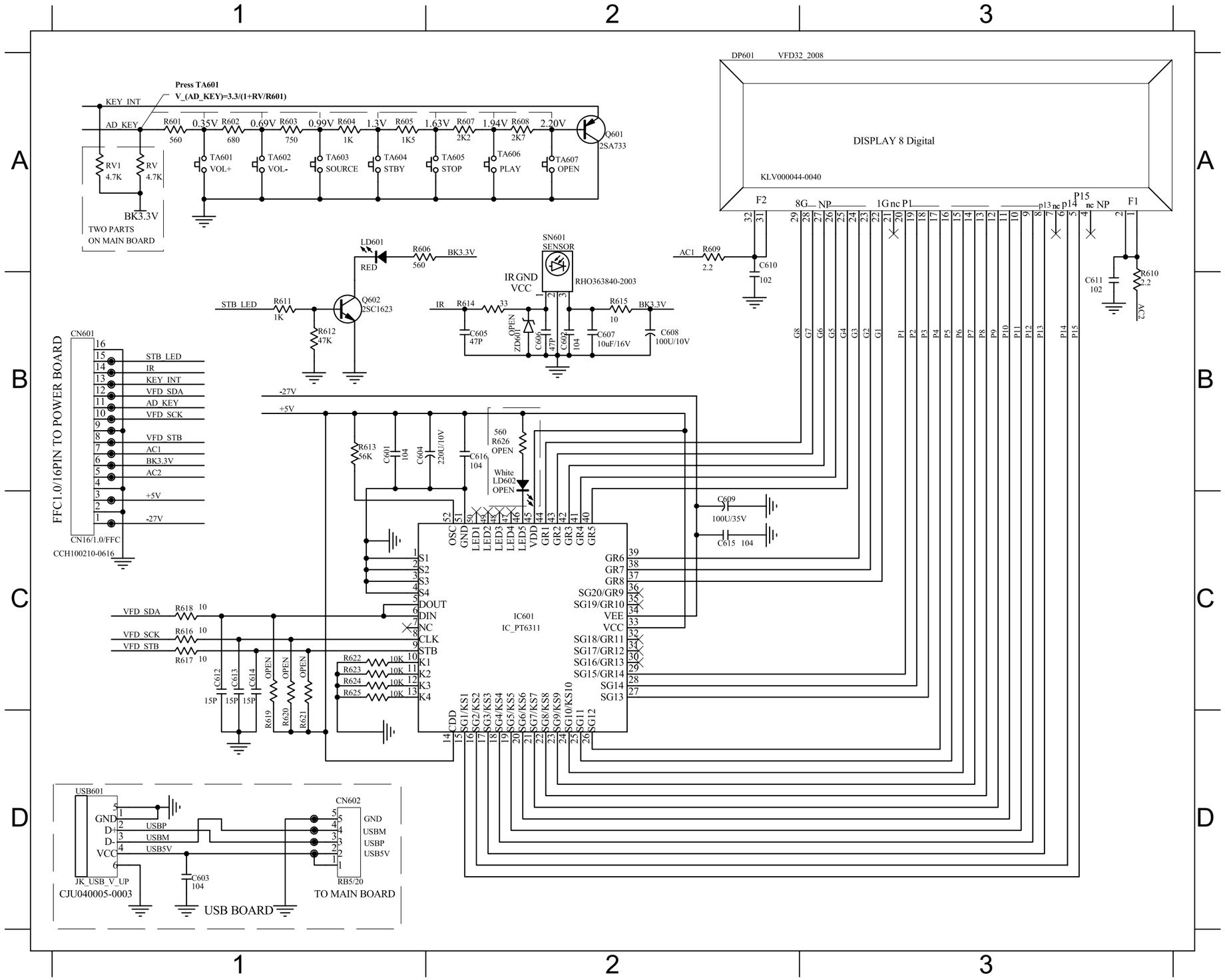
CIRCUIT DIAGRAM

C601	B1	C604	B1	C607	B2	C610	A2	C613	C1	C616	B2	DP601	A2	Q601	A2	R602	A1	R605	A1	R608	A2	R611	B1	R614	B2	R617	C1	R620	D1	R623	C1	SN601	A2	TA603	A1	TA606	A2
C602	B2	C605	B2	C608	B2	C611	B3	C614	C1	CN601	B1	IC601	C2	Q602	B1	R603	A1	R606	A1	R609	A2	R612	B1	R615	B2	R618	C1	R621	D1	R624	C1	TA601	A1	TA604	A1	TA607	A2
C603	D1	C606	B2	C609	C2	C612	C1	C615	C2	CN602	D1	LD601	A1	R601	A1	R604	A1	R607	A2	R610	B3	R613	B1	R616	C1	R619	D1	R622	C1	R625	C1	TA602	A1	TA605	A2	USB601	D1



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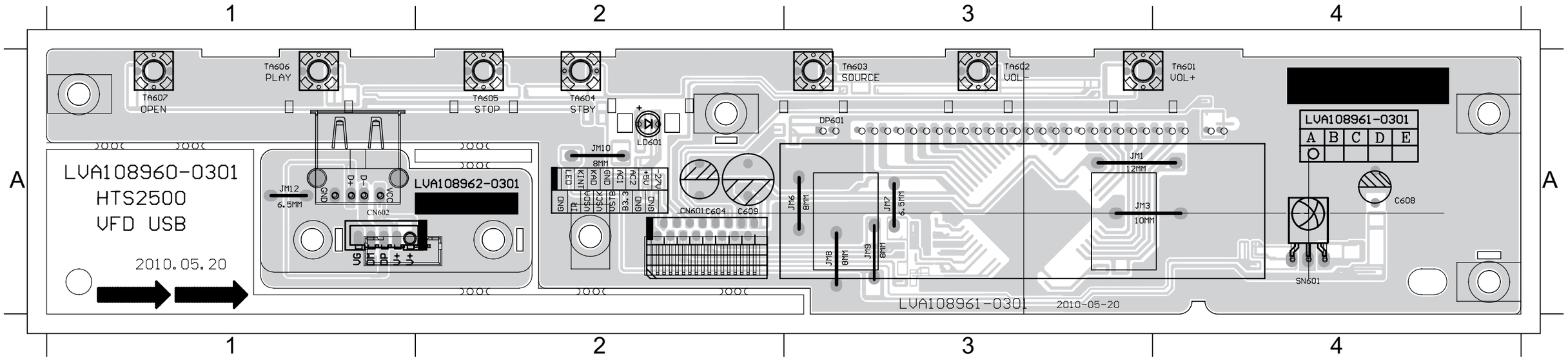
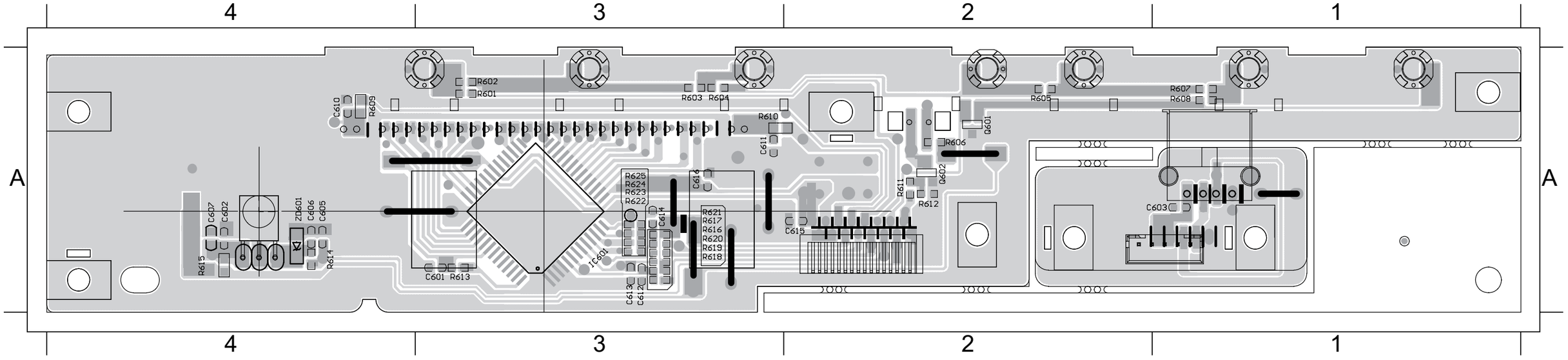
PCB LAYOUT - TOP VIEW

C604	A2	C609	A2	CN602	A1	JM1	A3	JM12	A2	JM6	A3	JM8	A3	LD601	A2	TA601	A4	TA603	A3	TA605	A2	TA607	A1
C608	A4	CN601	A2	DP601	A3	JM10	A2	JM3	A3	JM7	A3	JM9	A3	SN601	A4	TA602	A3	TA604	A2	TA606	A1	USB601	A1



PCB LAYOUT - BOTTOM VIEW

C601	A3	C603	A1	C606	A4	C610	A4	C612	A3	C614	A3	C616	A3	Q601	A2	R601	A3	R603	A3	R605	A2	R607	A1	R609	A4	R611	A2	R613	A3	R615	A4	R617	A3	R619	A3	R621	A3	R623	A3	R625	A3
C602	A4	C605	A4	C607	A4	C611	A3	C613	A3	C615	A2	IC601	A3	Q602	A2	R602	A3	R604	A3	R606	A2	R608	A1	R610	A3	R612	A2	R614	A4	R616	A3	R618	A3	R620	A3	R622	A3	R624	A3		



MAIN+LED BOARD

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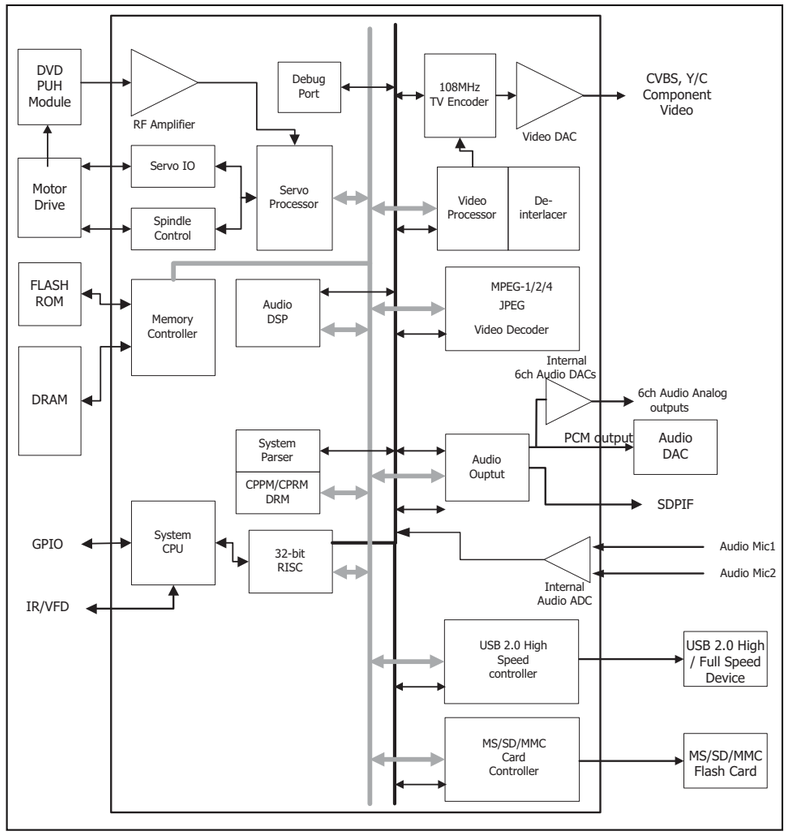
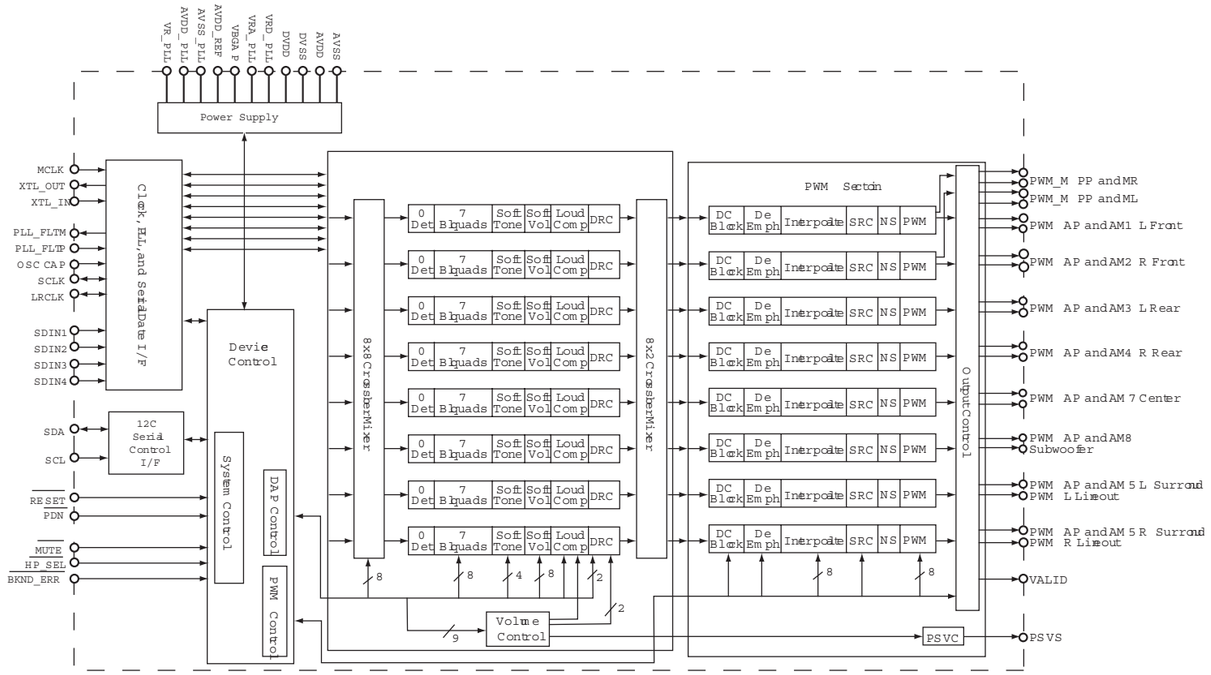
INTERNAL IC DIAGRAM - MT1389DXE/J

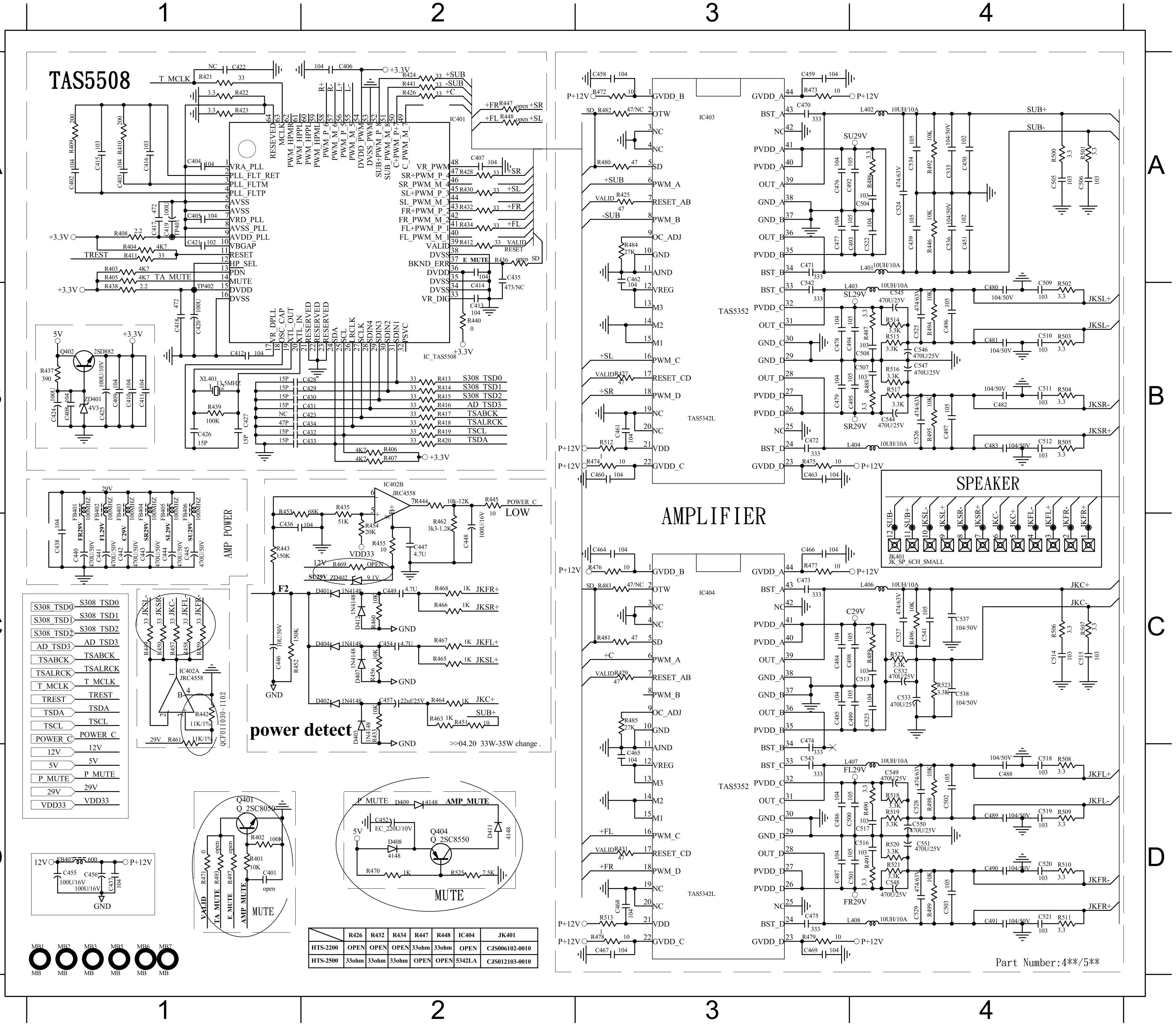


INTERNAL IC DIAGRAM - TAS5508BPAG



CIRCUIT DIAGRAM - part one

C401 D1	C413 B2	C427 B1	C440 C1	C452 D2	C465 D3	C477 A3	C489 D4	C501 D3	C513 C4	C525 B4	C541 C4	D402 C2	FB405 B1	L406 C4	R407 B2	R419 B2	R431 D3	R444 B2	R458 C1	R472 A3	R486 A4	R500 A4	R512 B3	R525 D2
C402 A1	C414 B2	C428 B2	C441 C1	C454 C2	C466 C3	C478 B3	C490 D4	C502 D4	C514 C4	C526 B4	C542 A3	D403 C2	FB406 B1	L407 D3	R408 A1	R420 B2	R432 A2	R445 B2	R459 C1	R473 A3	R487 B4	R501 A4	R513 D3	XL401 B1
C403 A1	C415 A1	C429 B2	C442 C1	C455 D1	C467 D3	C479 B3	C491 D4	C503 D4	C515 C4	C527 C4	C543 D3	D404 C2	FB407 D1	L408 D4	R409 A1	R421 A1	R433 C2	R446 A4	R460 C2	R474 B3	R488 B4	R502 B4	R514 B4	ZD401 B1
C404 A1	C416 A1	C430 B2	C443 C1	C456 D1	C468 D3	C480 B4	C492 A3	C504 A4	C516 D4	C528 D4	C544 B4	D407 C2	IC401 A2	Q401 D1	R410 A1	R422 A1	R434 A2	R449 C1	R462 C2	R475 B3	R489 C4	R503 B4	R515 B4	ZD402 C2
C405 A1	C417 A1	C431 B2	C444 C1	C457 C2	C469 D3	C481 B4	C493 A3	C505 A4	C517 D4	C529 D4	C545 B4	D408 D2	IC402 B2	Q402 B1	R411 A1	R423 A1	R435 B2	R450 C1	R463 C2	R476 C3	R490 D4	R504 B4	R516 B4	
C406 A2	C418 B1	C432 B2	C445 C1	C458 A3	C470 A3	C482 B4	C494 B3	C506 A4	C518 D4	C532 C4	C546 B4	D409 D2	IC403 A3	Q404 D2	R412 A2	R424 A2	R437 B1	R451 C2	R464 C2	R477 C3	R491 D4	R505 B4	R517 B4	
C407 A2	C419 A1	C433 B2	C446 C1	C459 A3	C471 A3	C483 B4	C495 B3	C507 B4	C519 D4	C533 C4	C547 B4	D411 D2	IC404 C3	R401 D1	R413 B2	R425 A3	R438 B1	R452 C1	R465 C2	R478 D3	R492 A4	R506 C4	R518 D4	
C408 B1	C420 B1	C434 B2	C447 C2	C460 B3	C472 B3	C484 C3	C496 B4	C508 B4	C520 D4	C534 A4	C548 D4	D412 C2	JK401 C4	R402 D1	R414 B2	R426 A2	R439 B1	R453 B1	R466 C2	R479 D3	R494 B4	R507 C4	R519 D4	
C409 B1	C421 A1	C436 C1	C448 C2	C461 B3	C473 C3	C485 C3	C497 B4	C509 B4	C521 D4	C535 A4	C549 D4	FB401 B1	L401 A4	R403 A1	R415 B2	R427 B3	R440 B2	R454 C2	R467 C2	R480 A3	R495 B4	R508 D4	R520 D4	
C410 B1	C424 B1	C437 D1	C449 C2	C462 A3	C474 C3	C486 D3	C498 C3	C510 B4	C522 A4	C536 A4	C550 D4	FB402 B1	L402 A4	R404 A1	R416 B2	R428 A2	R441 A2	R455 C2	R468 C2	R481 C3	R496 C4	R509 D4	R521 D4	
C411 B1	C425 B1	C438 C1	C450 A4	C463 B3	C475 D3	C487 D3	C499 C3	C511 B4	C523 C4	C537 C4	C551 D4	FB403 B1	L403 B4	R405 A1	R417 B2	R429 C3	R442 C1	R456 C2	R470 D2	R484 A3	R498 D4	R510 D4	R522 C4	
C412 B1	C426 B2	C439 A4	C451 A4	C464 C3	C476 A3	C488 D4	C500 D3	C512 B4	C524 A4	C538 C4	D401 C2	FB404 B1	L404 B4	R406 B2	R418 B2	R430 A2	R443 C1	R457 C1	R471 D1	R485 C3	R499 D4	R511 D4	R523 C4	



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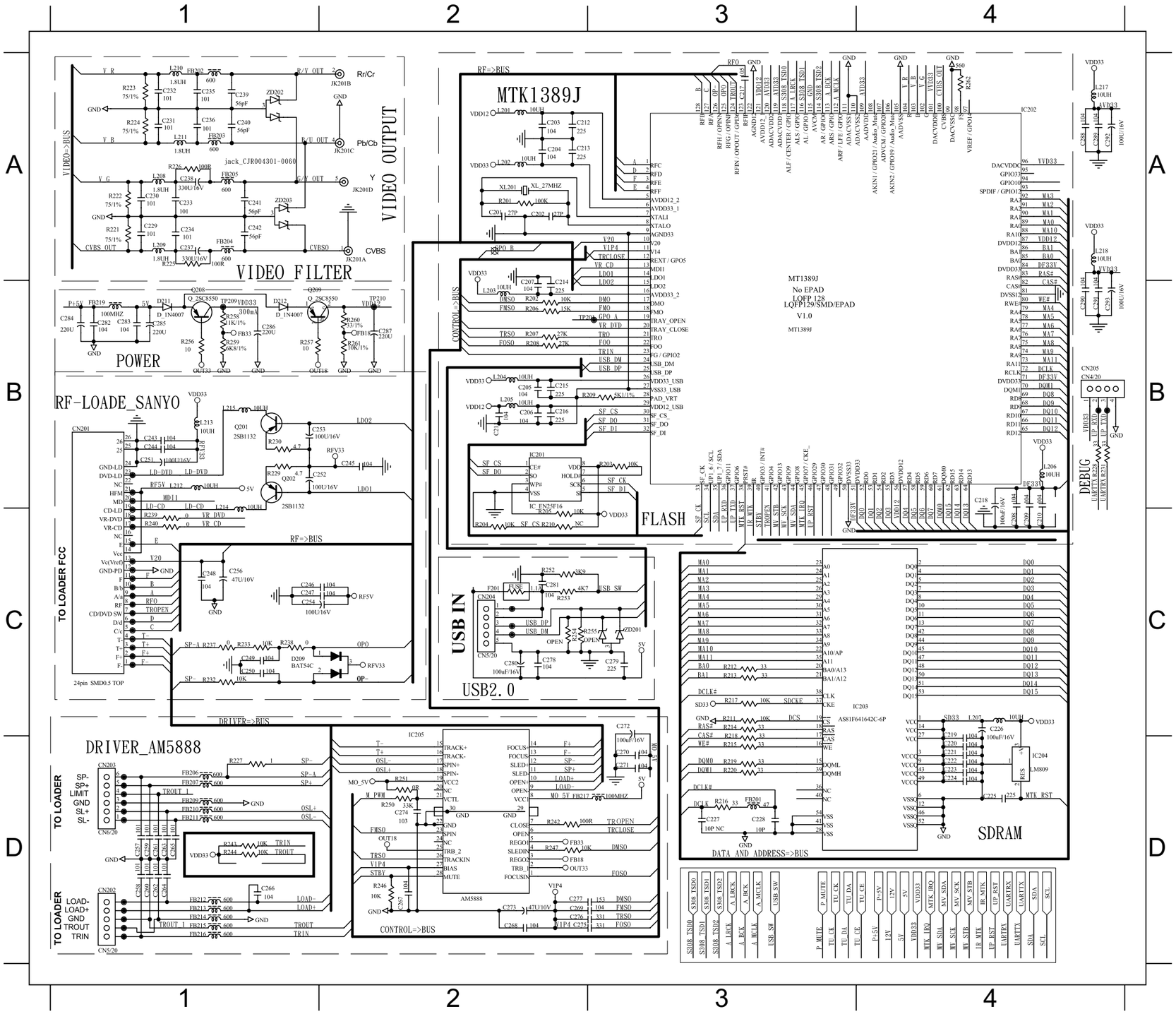
CIRCUIT DIAGRAM - part two



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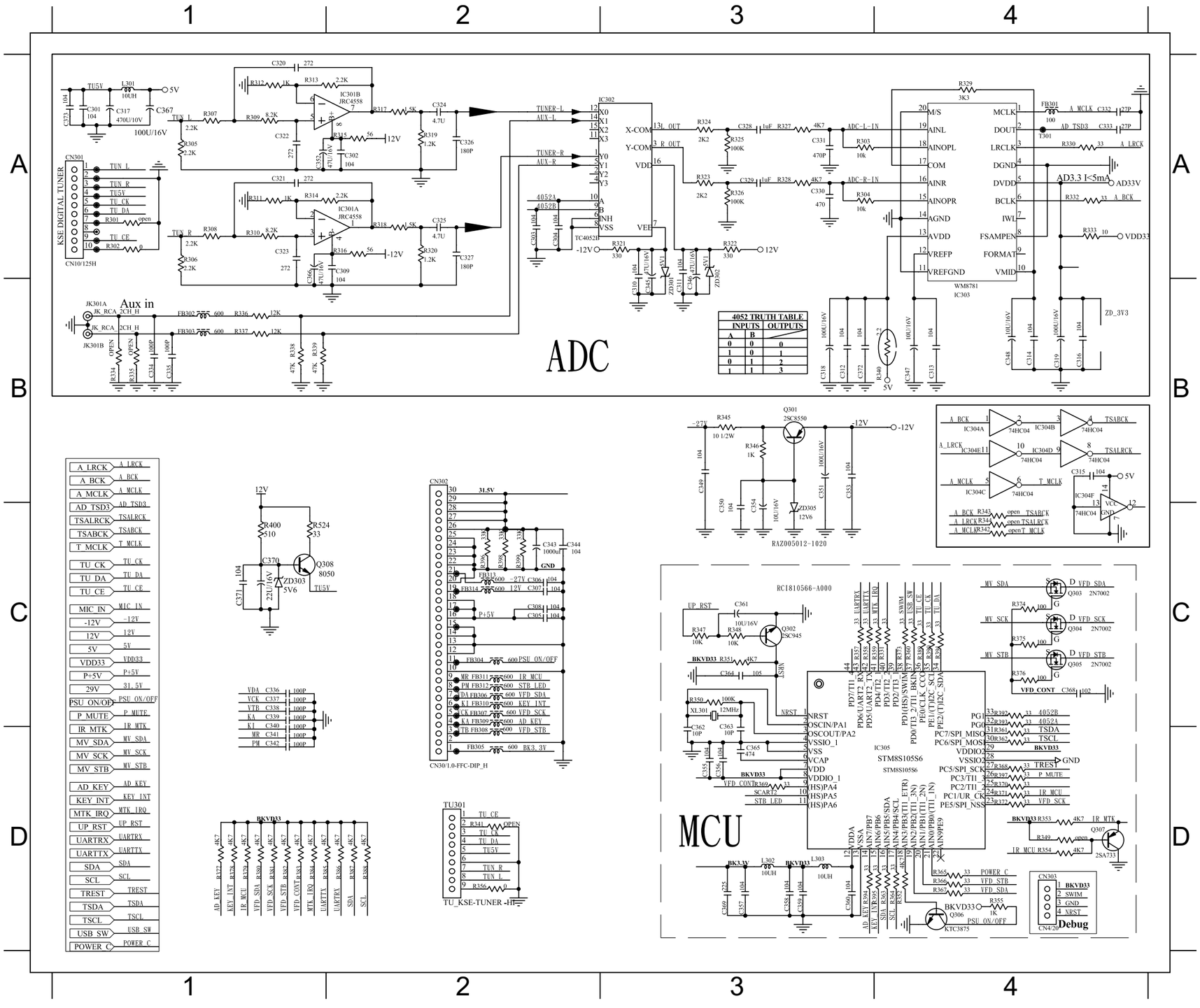
CIRCUIT DIAGRAM - part three

C301	A1	C309	A2	C317	A1	C325	A2	C333	A4	C341	D1	C349	B3	C357	D3	C365	D3	CN303	D4	FB308	D2	IC302	A3	Q301	B3	R303	A3	R311	A1	R319	A2	R327	A3	R337	B1	R350	C3	R358	C3	R366	D4	R374	C4	R385	D1	R393	C4	XL301	C3
C302	A2	C310	B3	C318	B3	C326	A2	C334	B1	C342	D1	C350	B3	C358	D3	C366	A1	FB301	A4	FB309	C2	IC303	B4	Q302	C3	R304	A3	R312	A1	R320	A2	R328	A3	R338	B1	R351	C3	R359	C3	R367	D4	R375	C4	R386	D2	R394	D3	ZD301	B3
C303	A2	C311	B3	C319	B4	C327	A2	C335	B1	C343	C2	C351	B3	C359	D3	C367	A1	FB302	B1	FB310	C2	IC304	B4	Q303	C4	R305	A1	R313	A1	R321	A3	R329	A4	R339	B1	R352	D4	R360	C4	R368	D4	R376	C4	R387	D2	R395	D3	ZD302	B3
C304	A2	C312	B3	C320	A1	C328	A3	C336	C1	C344	C2	C352	A1	C360	D3	C368	C4	FB303	B1	FB311	C2	IC305	D4	Q304	C4	R306	A1	R314	A1	R322	A3	R330	A4	R340	B4	R353	D4	R361	D4	R369	D3	R377	D1	R388	D2	R396	C2	ZD305	C3
C305	C2	C313	B4	C321	A1	C329	A3	C337	C1	C345	B3	C353	B3	C361	C3	C369	D3	FB304	C2	FB312	C2	JK301	B1	Q305	C4	R307	A1	R315	A2	R323	A3	R331	C4	R345	B3	R354	D4	R362	D4	R370	D4	R378	D1	R389	C4	R397	D4		
C306	C2	C314	B4	C322	A1	C330	A3	C338	C1	C346	B3	C354	B3	C362	C3	C372	B3	FB305	D2	FB313	C2	L301	A1	Q306	D4	R308	A1	R316	A2	R324	A3	R332	A4	R346	B3	R355	D4	R363	D4	R371	D4	R379	D1	R390	C4	R398	C2		
C307	C2	C315	B4	C323	A1	C331	A3	C339	C1	C347	B4	C355	D3	C363	C3	C373	A1	FB306	C2	FB314	C2	L302	D3	Q307	D4	R309	A1	R317	A2	R325	A3	R333	A4	R347	C3	R356	D2	R364	D4	R372	D4	R383	D1	R391	C4	R399	C2		
C308	C2	C316	B4	C324	A2	C332	A4	C340	C1	C348	B4	C356	D3	C364	C3	CN302	B2	FB307	C2	IC301	A2	L303	D3	R302	A1	R310	A1	R318	A2	R326	A3	R336	B1	R348	C3	R357	C3	R365	D4	R373	C4	R384	D1	R392	C4	TU301	D2		



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PCB LAYOUT - TOP VIEW

C201 B1 C237 A1 C277 C2 C319 A2 C353 C5 C415 A3 C447 A3 C471 A4 C501 C4 C544 B4 F201 C2 FB304 C3 IC202 B1 L212 C2 Q302 B2 R215 A2 R239 B2 R308 B1 R333 A2 R361 B2 R390 B3 R417 A3 R440 B3 R486 A4 ZD305 C5
C202 B1 C238 A1 C278 C2 C320 B1 C354 C5 C416 A3 C448 A4 C472 B4 C504 A4 C545 A4 FB201 A2 FB305 C3 IC203 B2 L213 B1 Q303 C3 R216 A2 R240 B1 R309 A1 R336 A2 R362 B2 R391 B3 R418 A3 R441 A3 R487 A4 ZD402 A3
C217 B1 C239 A1 C280 C2 C321 B1 C355 C3 C417 A3 C452 A3 C473 B4 C507 B4 C546 B5 FB202 A1 FB306 C3 IC204 B2 L214 C1 Q304 C3 R218 A2 R242 C2 R310 B1 R337 A2 R363 B3 R392 B2 R419 A3 R443 A5 R488 B4
C218 B2 C240 A2 C281 C2 C322 A1 C357 C3 C418 A3 C455 B3 C475 C4 C508 A4 C547 B5 FB203 A2 FB307 C3 IC205 C2 L215 C1 Q305 C3 R220 A2 R243 C2 R311 B1 R338 A2 R364 B3 R393 B2 R420 A3 R445 A3 R489 B4
C219 A2 C247 C2 C283 C3 C323 B1 C360 B3 C419 A3 C456 C4 C476 A4 C513 B4 C548 C5 FB204 A1 FB308 C3 IC301 B1 L301 C1 Q307 B3 R221 A1 R244 C2 R312 A1 R339 A3 R365 B3 R394 B3 R421 B3 R453 A5 R490 B4
C220 B2 C249 C2 C284 C4 C324 A1 C361 B3 C420 A3 C457 A4 C477 A4 C516 B4 C549 C4 FB205 A1 FB309 C4 IC302 A3 L302 C3 Q402 B3 R222 A1 R247 C2 R313 A1 R340 A2 R366 B3 R395 B3 R422 A3 R455 A3 R491 C4
C221 B2 C250 C2 C285 C3 C325 A1 C362 C2 C424 B3 C458 A3 C478 A4 C517 C4 C550 C4 FB206 C2 FB310 C4 IC303 A2 L303 B3 Q404 A3 R223 A1 R250 C2 R314 B1 R345 C5 R367 B3 R397 B2 R423 A3 R470 A3 R512 A3
C222 B2 C251 B1 C286 C2 C326 A1 C363 C3 C425 B3 C459 A4 C479 A4 C522 A4 C551 C5 FB207 C2 FB311 C4 IC304 B2 L401 A5 R201 B1 R224 A2 R251 C2 R315 A1 R346 C5 R368 B2 R403 A3 R424 A3 R472 A3 R513 B3
C223 A2 C252 B1 C287 C3 C327 A1 C364 B2 C426 A3 C460 B3 C484 B4 C523 B4 CN201 C1 FB210 C2 FB312 C4 IC305 B3 L402 A4 R202 B2 R225 A1 R252 B2 R316 A1 R347 B2 R369 C3 R404 A3 R425 A3 R473 A4 R515 B5
C225 B2 C253 B1 C292 B1 C328 A2 C366 B1 C427 A3 C461 A3 C485 B4 C524 A4 CN202 C3 FB211 C2 FB313 C5 IC401 A3 L403 B5 R203 B2 R226 A1 R253 C2 R317 A1 R348 B2 R370 B2 R405 A3 R426 B3 R474 B3 R519 B5
C226 B2 C254 C1 C293 B1 C329 A2 C367 C1 C436 A5 C462 A3 C486 B4 C525 A5 CN203 C3 FB212 C2 FB314 C4 IC403 A4 L404 B5 R204 B2 R227 C2 R256 C3 R318 B1 R350 C3 R371 B3 R408 A3 R427 A3 R475 B4 R520 B5
C229 A1 C256 C1 C302 A1 C343 C5 C368 C3 C437 C4 C463 B4 C487 B4 C526 A5 CN204 C2 FB213 C2 FB401 C5 IC404 B4 L406 B5 R205 B2 R228 B2 R258 C3 R319 A1 R351 B2 R372 B3 R409 A3 R428 B3 R476 B3 R525 A3
C230 A1 C266 C2 C306 C5 C345 A2 C369 C3 C440 C5 C464 B3 C492 A4 C527 A5 CN205 B2 FB215 C2 FB402 C5 JK201 A1 L407 B5 R206 C2 R229 B1 R259 C3 R320 B1 R352 B3 R373 B3 R410 A3 R429 B3 R477 B4 TU301 B1
C231 A2 C269 C2 C309 B1 C346 A2 C402 A3 C441 C4 C465 B3 C493 A4 C528 A5 CN302 C4 FB216 C2 FB403 B5 JK301 A2 L408 B5 R207 B2 R230 B1 R262 B1 R327 A3 R353 B3 R374 C3 R411 A3 R430 B3 R478 C3 XL201 B1
C232 A1 C272 C3 C314 A3 C347 A3 C403 A3 C442 B4 C466 B4 C494 A4 C529 A5 CN303 B2 FB217 C3 FB404 B4 JK401 A5 Q201 C1 R208 B2 R231 B2 R303 A3 R328 A3 R354 B3 R375 C3 R412 B3 R431 B3 R479 C4 XL301 C3
C233 A1 C273 C2 C315 A2 C348 A2 C404 A3 C443 B4 C467 B3 C495 B4 C532 B4 D209 C2 FB219 C3 FB405 B5 L208 A1 Q202 B1 R209 B2 R232 C2 R304 A3 R329 A2 R357 B3 R376 C3 R413 A3 R432 B3 R480 A3 XL401 A3
C234 A1 C274 C2 C316 A2 C349 C5 C405 A3 C444 B4 C468 B3 C498 B4 C533 B5 D211 C3 FB301 A2 FB406 B4 L209 A1 Q208 C3 R212 A2 R233 C2 R305 B1 R330 A2 R358 B3 R379 B3 R414 A3 R434 B3 R481 B3 ZD201 C2
C235 A1 C275 C2 C317 B1 C351 C5 C412 A3 C445 A4 C469 C4 C499 B4 C542 A4 D212 C3 FB302 A2 FB407 C4 L210 A1 Q209 C3 R213 A2 R237 C2 R306 B1 R331 B3 R359 B3 R383 C3 R415 A3 R438 A3 R484 A3 ZD202 A1
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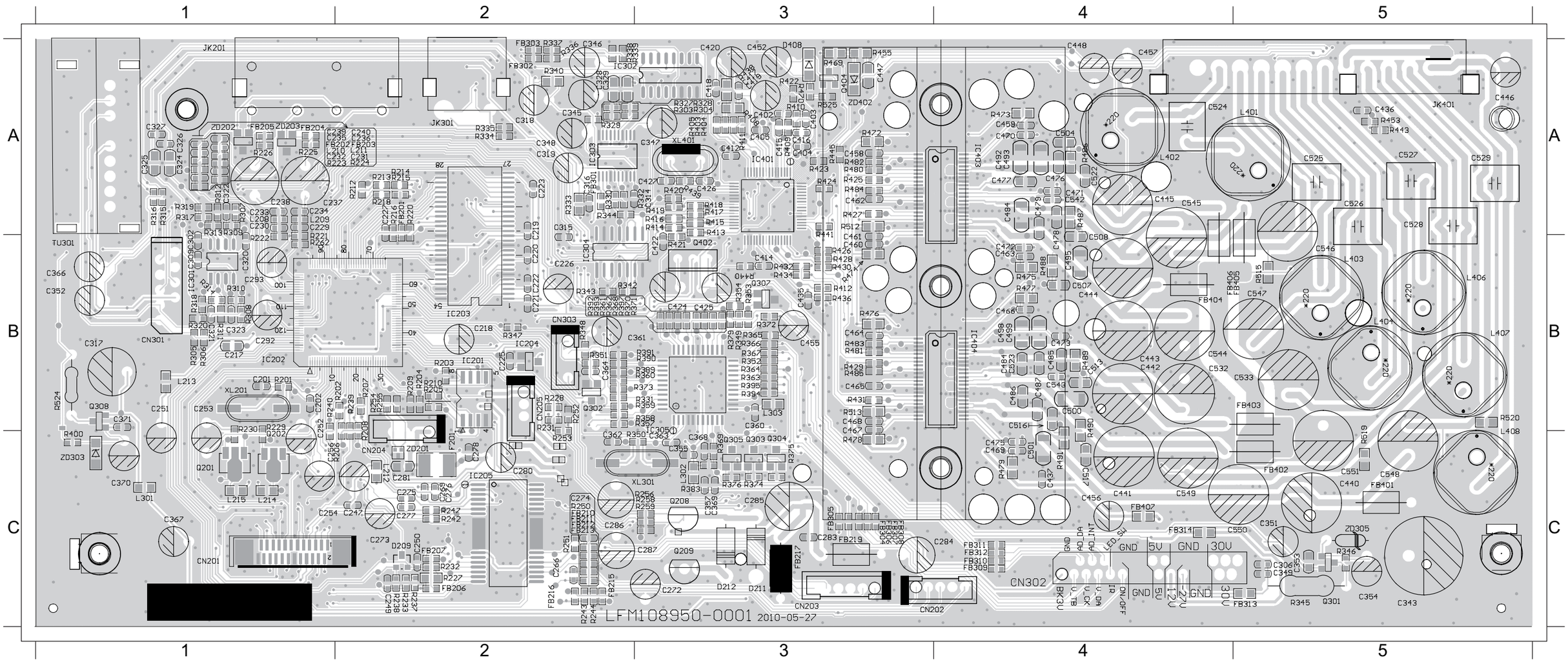

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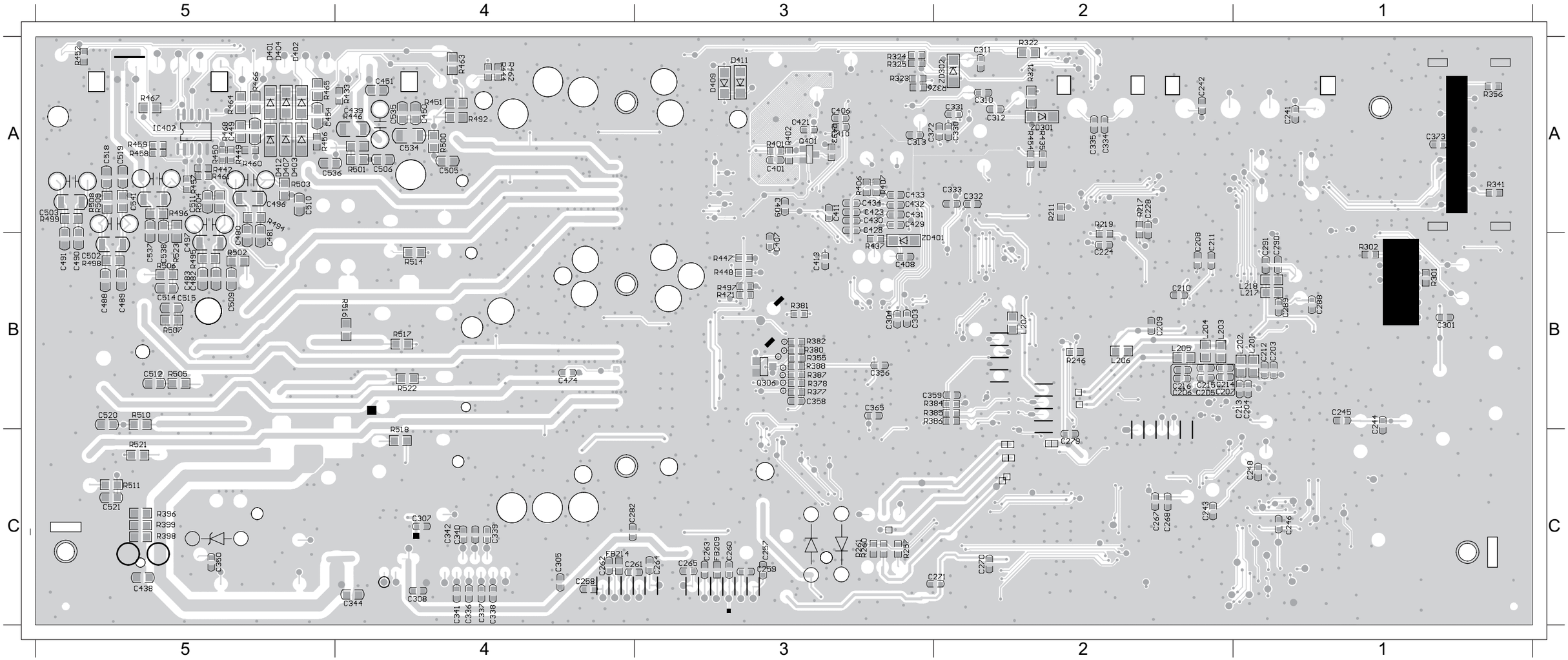
PCB LAYOUT - BOTTOM VIEW

C203	B1	C213	B1	C245	B1	C264	C3	C290	B1	C312	A2	C338	C4	C365	B3	C413	B3	C439	A4	C488	B5	C509	B5	C534	A4	D407	A5	L204	B2	R219	A2	R325	A3	R388	B3	R437	B3	R457	A5	R468	A5	R502	B5	R514	B4
C204	B1	C214	B2	C246	C1	C265	C3	C291	B1	C313	A3	C339	C4	C372	A3	C421	A3	C449	A5	C489	B5	C510	A5	C535	A4	D409	A3	L205	B2	R246	B2	R326	A3	R396	C5	R442	A5	R458	A5	R471	B3	R503	A5	R516	B4
C205	B2	C215	B2	C248	C1	C267	C2	C301	B1	C330	A2	C340	C4	C373	A1	C428	A3	C450	A4	C490	B5	C511	A5	C536	A5	D411	A3	L206	B2	R257	C3	R355	B3	R398	C5	R444	A4	R459	A5	R492	A4	R504	A5	R517	B4
C206	B2	C216	B2	C257	C3	C268	C2	C303	B3	C331	A2	C341	C4	C401	A3	C429	A3	C451	A4	C491	B5	C512	B5	C537	B5	D412	A5	L207	B2	R260	C3	R356	A1	R399	C5	R446	A4	R460	A5	R494	A5	R505	B5	R518	B4
C207	B2	C224	B2	C258	C4	C270	C2	C304	B3	C332	A2	C342	C4	C406	A3	C430	A3	C454	A5	C496	B5	C514	A5	C538	B5	FB209	C3	L217	B1	R261	C3	R377	B3	R401	A3	R449	A5	R462	A4	R495	B5	R506	B5	R521	C5
C208	B2	C228	A2	C259	C3	C271	C3	C305	C4	C333	A2	C344	C4	C407	B3	C431	A3	C474	B4	C497	B5	C515	B5	C541	A5	FB214	C4	L218	B1	R302	B1	R378	B3	R402	A3	R450	A5	R463	A4	R496	A5	R507	B5	R522	B4
C209	B2	C241	A1	C260	C3	C279	C2	C307	C4	C334	A2	C350	C5	C408	B3	C432	A3	C480	A5	C502	B5	C518	A5	D401	A5	IC402	A5	Q306	B3	R321	A2	R384	B3	R406	A3	R451	A4	R464	A5	R498	B5	R508	A5	R523	B5
C210	B2	C242	A2	C261	C4	C282	C4	C308	C4	C335	A2	C356	B3	C409	A3	C433	A3	C481	A5	C503	A5	C519	A5	D402	A5	L201	B1	Q401	A3	R322	A2	R385	B3	R407	A3	R452	A5	R465	A5	R499	A5	R509	A5	ZD301	A2
C211	B2	C243	C2	C262	C4	C288	B1	C310	A2	C336	C4	C358	B3	C410	A3	C434	A3	C482	B5	C505	A4	C520	B5	D403	A5	L202	B1	R211	A2	R323	A3	R386	B3	R433	A4	R454	A2	R466	A5	R500	A4	R510	B5	ZD302	A2
C212	B1	C244	B1	C263	C3	C289	B1	C311	A2	C337	C4	C359	B3	C411	A3	C438	C5	C483	B5	C506	A4	C521	C5	D404	A5	L203	B1	R217	A2	R324	A3	R387	B3	R435	A2	R456	A5	R467	A5	R501	A4	R511	C5	ZD401	B3



POWER BOARD

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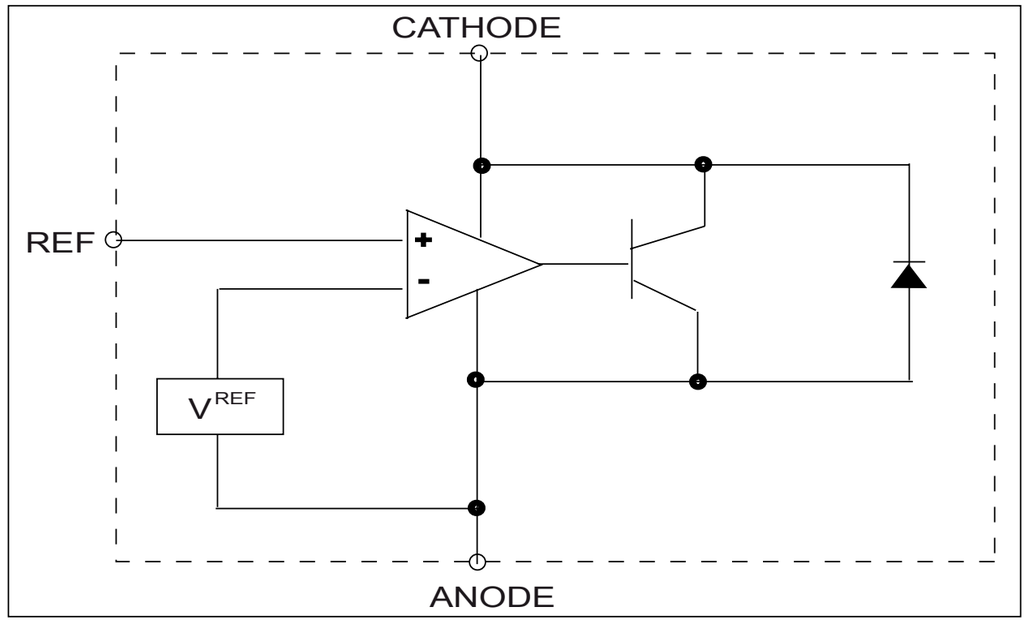
INTERNAL IC DIAGRAM - AZ431



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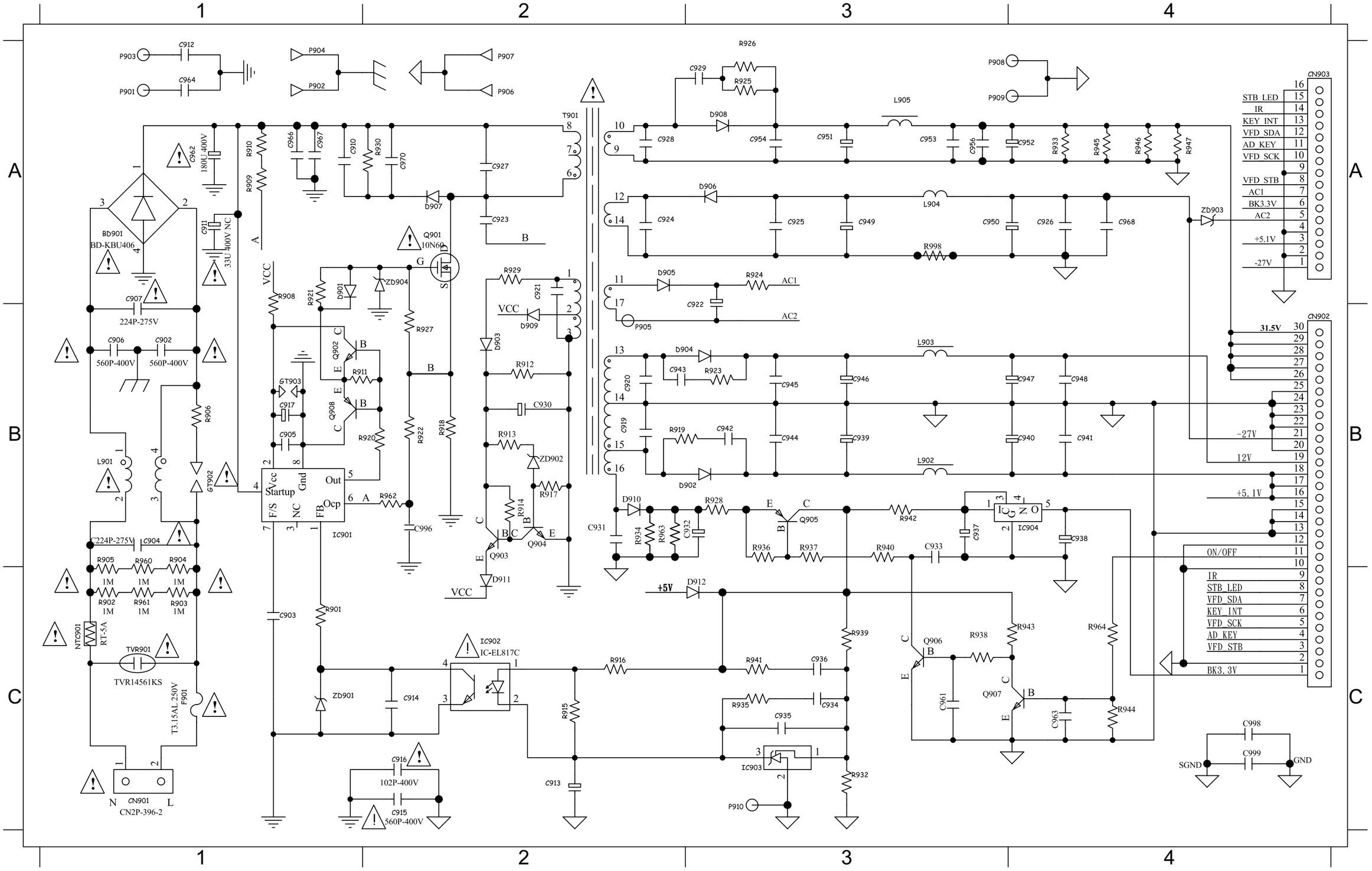
CIRCUIT DIAGRAM

BD901	A1	C907	A1	C916	C2	C930	B2	C938	B4	C944	A3	C950	A3	C961	C3	C968	A4	D903	B2	D909	B2	IC901	B1	L902	A3	Q903	B2	R902	C1	R911	B1	R917	B2	R923	A3	R929	A2	R936	A3	R942	A3	R960	B1	T901	A2	ZD904	A2
C902	B1	C910	A1	C917	B1	C932	A3	C939	A3	C945	A3	C951	A3	C962	A1	CN901	C1	D904	A3	D910	B2	IC902	C2	L903	A3	Q904	B2	R903	C1	R912	B2	R918	B2	R924	A3	R930	A2	R937	A3	R943	C4	R961	C1	TVR901	C1		
C903	C1	C912	A1	C922	A3	C933	A3	C940	B4	C946	A3	C952	A4	C963	C4	CN902	B4	D905	A2	D911	C2	IC903	C3	L904	A3	Q905	A3	R904	B1	R913	B2	R919	B2	R925	A3	R932	C3	R938	C3	R944	C4	R962	B2	ZD901	C1		
C904	B1	C913	C2	C925	A3	C934	C3	C941	B4	C947	B4	C953	A3	C964	A1	CN903	A4	D906	A3	D912	C3	IC903	C3	L905	A3	Q906	C3	R905	B1	R914	B2	R920	B2	R926	A3	R933	A4	R939	C3	R945	A4	R963	B2	ZD901	C1		
C905	B1	C914	C2	C926	A4	C935	C3	C942	A3	C948	B4	C954	A3	C966	A1	D901	A1	D907	A2	F901	C1	IC904	B4	NTC901	C1	Q907	C3	R906	B1	R915	C2	R921	A1	R927	B2	R934	B2	R940	A3	R946	A4	R964	C4	ZD902	B2		
C906	B1	C915	C2	C929	A3	C936	C3	C943	B2	C949	A3	C956	A3	C967	A1	D902	A3	D908	A3	GT902	B1	L901	B1	Q901	A2	R901	C1	R908	A1	R916	C2	R922	B2	R928	A3	R935	C3	R941	C3	R947	A4	T901	A2	ZD903	A4		



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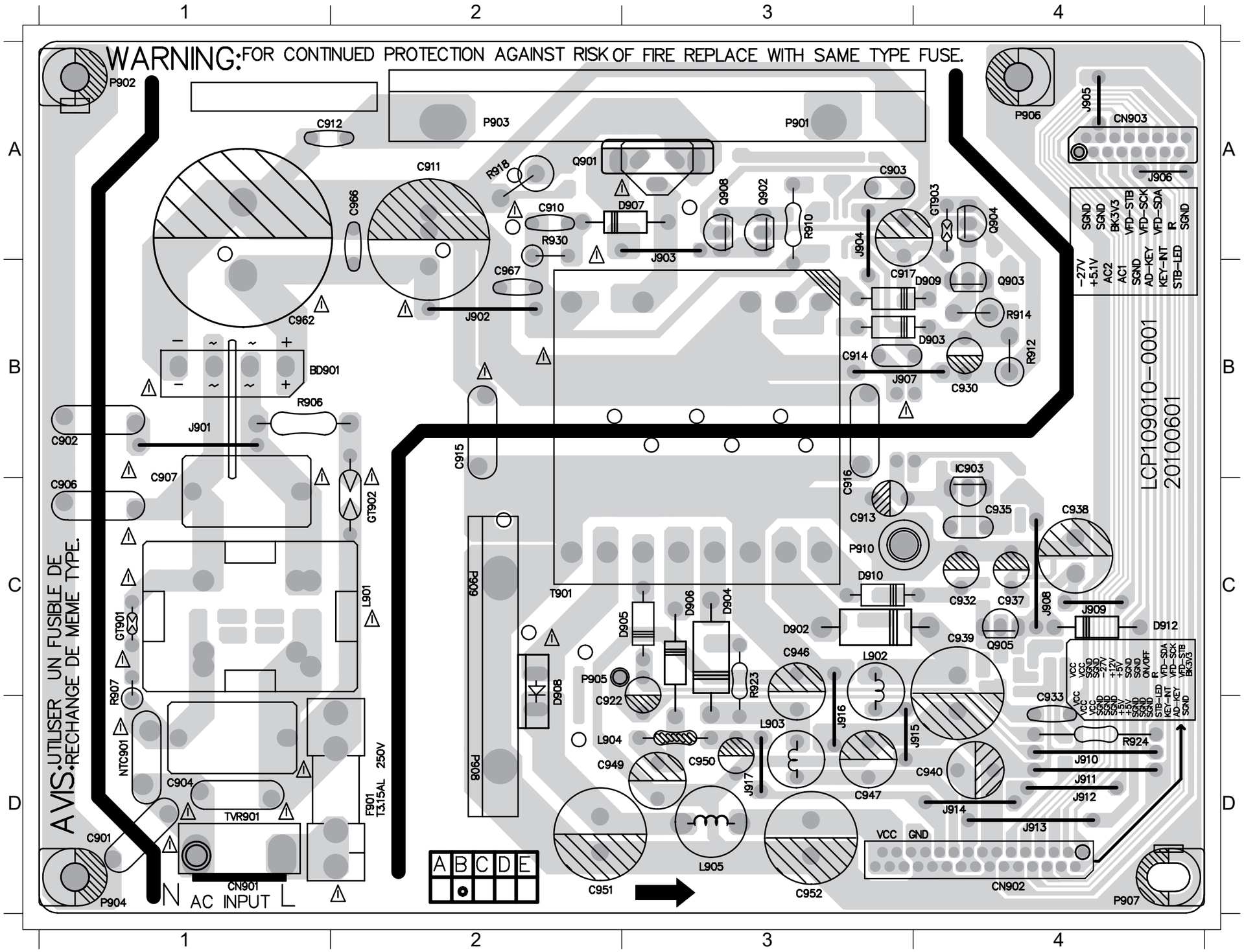
PCB LAYOUT - TOP VIEW

BD901	B1	C910	A2	C917	B3	C938	C4	C950	D3	CN901	D1	D905	C3	D912	C4	J902	B2	J908	C4	J915	D3	L904	D2	Q905	C4	R924	D4
C902	B1	C912	A1	C922	D2	C939	C4	C951	D2	CN902	D4	D906	C3	F901	D2	J903	A3	J909	C4	J916	D3	L905	D3	R906	B1	R930	A2
C903	A3	C913	C3	C930	B4	C940	D4	C952	D3	CN903	A4	D907	A3	GT902	C2	J904	A3	J910	D4	J917	D3	NTC901	D1	R912	B4	T901	C2
C904	D1	C914	B3	C932	C4	C946	C3	C962	B1	D902	C3	D908	D2	IC903	B4	J905	A4	J912	D4	L901	C2	Q901	A2	R914	B4	T901	C2
C906	C1	C915	B2	C933	D4	C947	D3	C966	A2	D903	B4	D909	B4	IC903	B4	J906	A4	J913	D4	L902	C3	Q903	B4	R918	A2	TVR901	D1
C907	B1	C916	B3	C935	C4	C949	D2	C967	B2	D904	C3	D910	C3	J901	B1	J907	B3	J914	D4	L903	D3	Q904	A4	R923	C3		



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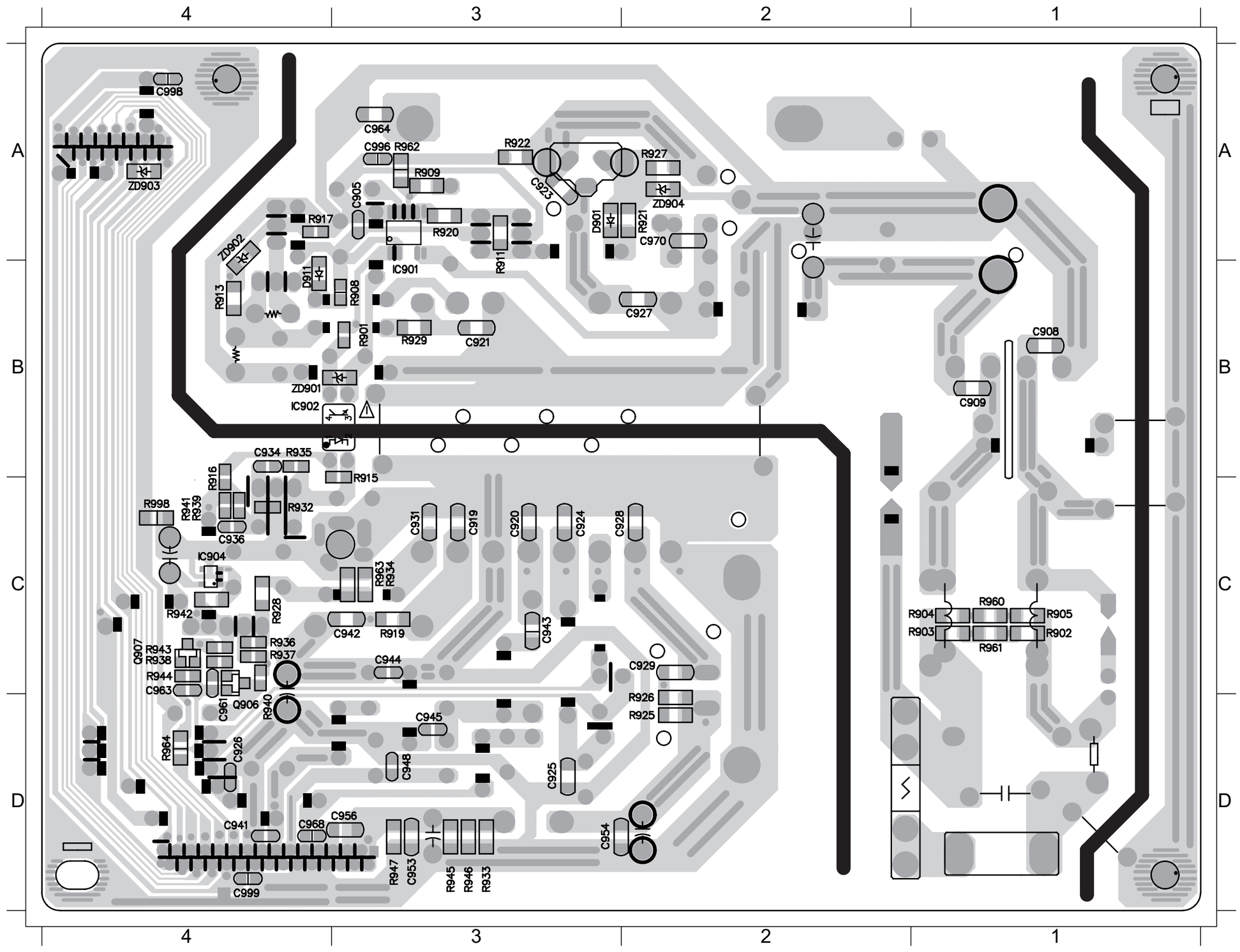
PCB LAYOUT - BOTTOM VIEW

C905	A3	C936	C4	C945	D3	C961	D4	D911	B4	Q907	C4	R905	C1	R916	B4	R922	A3	R929	B3	R936	C4	R941	C4	R946	D3	R963	C3	ZD903	A4
C925	D3	C941	D4	C948	D3	C963	C4	IC901	B3	R901	B3	R908	B3	R917	A4	R925	D2	R932	C4	R937	C4	R942	C4	R947	D3	R964	D4	ZD904	A2
C926	D4	C942	C3	C953	D3	C964	A3	IC902	B4	R902	C1	R911	B3	R919	C3	R926	D2	R933	D3	R938	C4	R943	C4	R960	C1	ZD901	B4		
C929	C2	C943	C3	C954	D3	C968	D4	IC904	C4	R903	C1	R913	B4	R920	A3	R927	A2	R934	C3	R939	C4	R944	C4	R961	C1	ZD901	B4		
C934	B4	C944	C3	C956	D3	D901	A3	Q906	D4	R904	C1	R915	C3	R921	A2	R928	C4	R935	B4	R940	D4	R945	D3	R962	A3	ZD902	A4		



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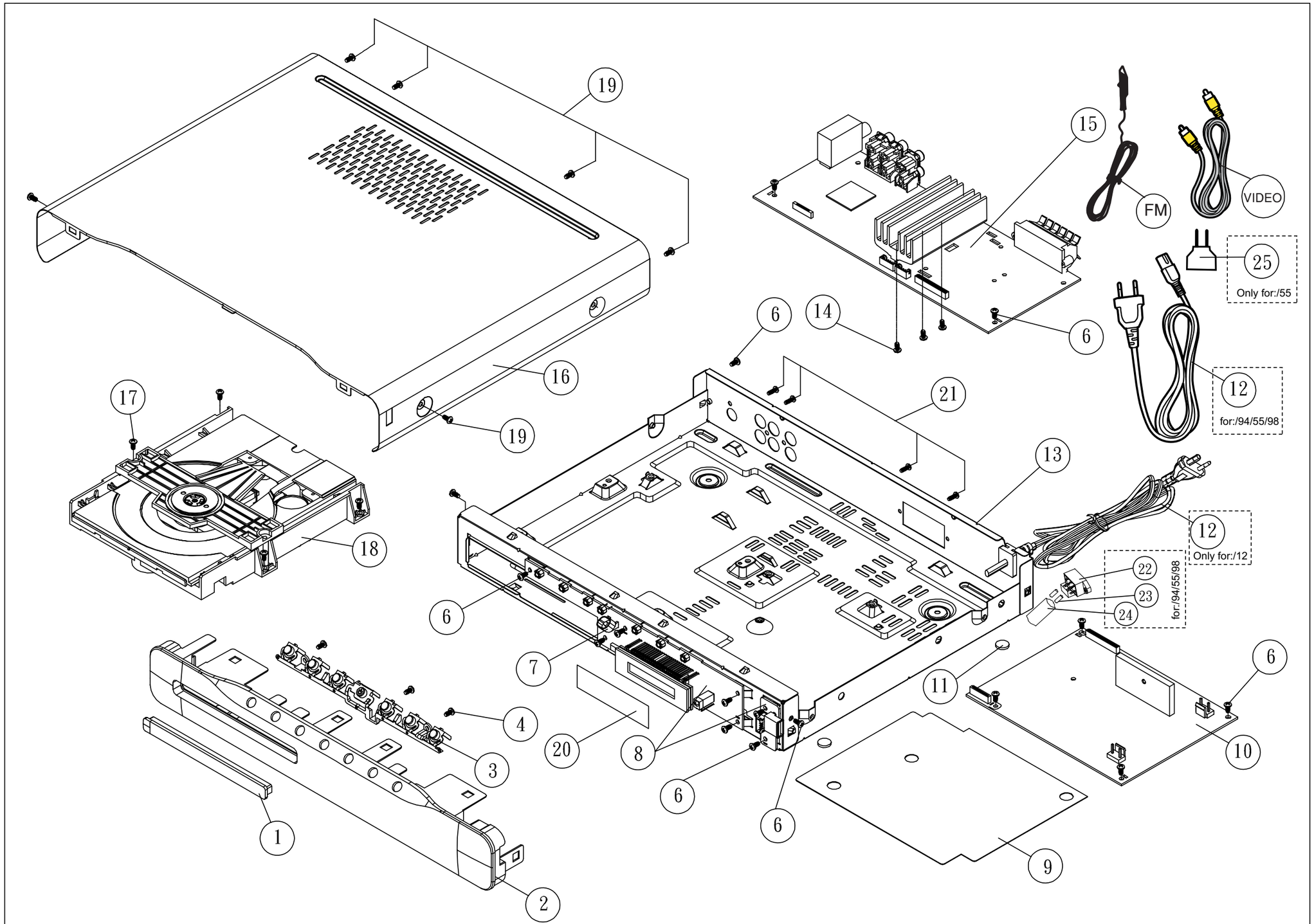
Mechanical Exploded View



4	HSP140054-1060	SCREW T3.0x1.06PxL6mm NICKEL	17	HST143084-1080	SCREW M3.0x0.5PxL8mm NICKEL
6	HST143084-1060	SCREW M3.0x0.5PxL6mm NICKEL	19	HST143084-3060	SCREW M3x0.5PxL6mm BLACK OXIDE
14	HSP140054-1100	SCREW T3.0x1.06PxL10mm NICKEL	21	HSP140054-1080	SCREW T3.0x1.06PxL8mm NICKEL

REVISION LIST

Version 1.0
*Initial release

Version 1.1
*Update to include /94 version.

Version 1.2
*Update to include /55/98 version.

Version 1.3
*Update to include /78 version.
*Output Power 250W change to 240W

Version 1.4
*Update to include /05 version.