

Service  
Service  
Service



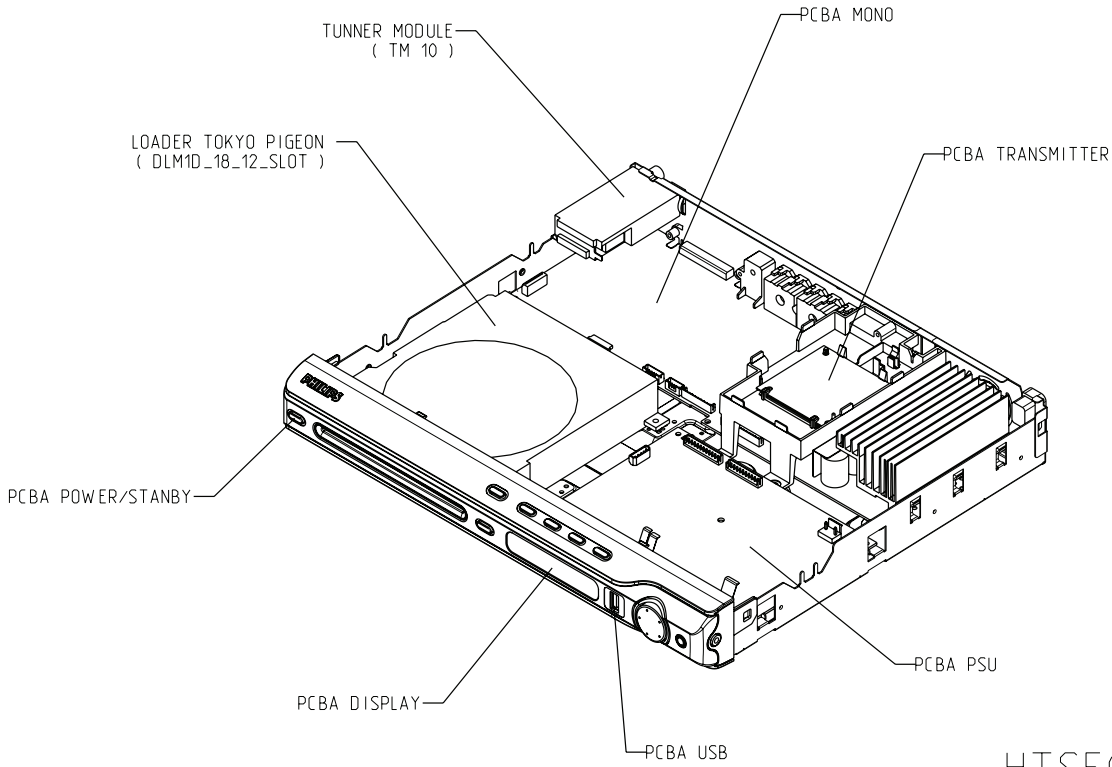
# Service Manual



Contents	Page	Contents	Page
1 Technical Specifications and Connection Facilities	2	Layout: Standby Board (Bottom view)	35
2 Measurements Setup, Service Aid & Lead Free Requirements	4	USB Board: Circuit Diagram	36
3 Directions For Use	8	Layout: USB Board (Topview)	37
4 Dismantling Instructions & Service Positions	10	Layout: USB Board (Bottom view)	38
5 Service Test Program	13	PSU Circuit Diagram (For information only)	39
6 FTD Display Pin Connection	15	9 Exploded View &	
7 Block Diagram	17	Module PWR 04-01 Non-Wireless	41
Wiring Diagram	18	Exploded View of the set	41
8 Circuit Diagram and PWB Layout	19	Module PWR 04-01 Non-Wireless	42
Front: Display	19	Overview - introduction	42
Front: Display (Top view)	20	Electrical specification	42
Front: Display (Bottom view)	21	Key components	42
Mono Board: Circuit Diagram (Part 1)	22	Introduction & definitions	43
Mono Board: Circuit Diagram (Part 2)	23	Overview of Testpoints	44
Mono Board: Circuit Diagram (Part 3)	24	Test Setup and start up	44
Mono Board: Circuit Diagram (Part 4)	25	DC MEASUREMENTS	45
Mono Board: Circuit Diagram (Part 5)	26	AUDIO MEASUREMENTS	48
Mono Board: Circuit Diagram (Part 6)	27	Connections	50
Mono Board: Circuit Diagram (Part 7)	28	Block diagram	51
Mono Board: Circuit Diagram (Part 8)	29	Mute circuitry	52
Mono Board: Circuit Diagram (Part 9)	30	Amplifier considerations	53
Layout: Mono Board (Top View)	31	Volume chip M62429FP	54
Layout: Mono Board (Bottom View)	32	Module PWR 04-01 Non-Wireless:	
Standby Board: Circuit Diagram	33	Circuit Diagram (Part 1)	55
Layout: Standby Board (Topview)	34	Module PWR 04-01 Non-Wireless:	
		Circuit Diagram (Part 2)	56
		Module PWR 04-01 Non-Wireless:	
		Circuit Diagram (Part 3)	57
		Layout: Module PWR 04-01	
		Non-Wireless (Topview)	58
		Layout: Module PWR 04-01	
		Non-Wireless (Bottom view)	59
		10 Spare Parts List	61

© Copyright 2005 Philips Consumer Electronics B.V. Eindhoven, The Netherlands. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise without the prior permission of Philips.





HTS5000W

**VERSION VARIATIONS:**

	HTS5000W/12	HTS5000W/51
Video (Yellow, Cinch)	X	X
Component Video, (Y/Pb/Pr) -P-scan	X	X
SCART (CVBS/RGB)	X	-
Digital In - Coaxial	X	X
TV In (Left/Right)	-	X
Auxiliary (Left/Right)	X	X
Line out (Audio)	X	X

# 1. Specifications

## 1.1 General:

Mains voltage	: 230V for /12, /51
Mains frequency	: 50Hz for /12, /51
Power consumption	: 100W < 0.5W Eco standby power < 100W at 1/8 P <sub>rated</sub> (For main unit)
Dimension main unit	: 360 x 54 x 324mm

## 1.2 Tuner FM

Tuning range	: 87.5-108MHz
Grid	: 50kHz for /12, /05, /51
IF frequency	: 10.7MHz ± 25kHz
Aerial input	: 75Ω coaxial
Sensitivity at 26dB S/N	: < 7μV
Selectivity at 600kHz bandwidth	: > 25dB
IF rejection	: > 60dB
Image rejection	: > 25dB
Distortion at RF=1mV, dev. 75kHz	: < 3%
-3dB Limiting point	: < 8μV
Crosstalk at RF=1mV, dev. 67.5kHz	: > 28dB
Crosstalk at RF=1mV, dev. 40kHz	: > 18dB

## MW

Tuning range	: 531-1602kHz for /12, /51, /98
Grid	: 9kHz for /12, /51,
IF frequency	: 450kHz ± 1kHz
Aerial input	: Frame aerial
Sensitivity at 26dB S/N	: < 4.0mV/M
Selectivity at 18kHz bandwidth	: > 20dB
IF rejection	: > 45dB
Image rejection	: > 28dB
Distortion at RF=50mV, m=80%	: < 5%

## 1.3 AMPLIFIER:

Output power	
Front	: 75W RMS / channel
Rear	: 75W RMS / channel
Center	: 100W RMS
Subwoofer	: 100W RMS
Frequency response ±0.5dB	: 120Hz-20kHz
Hum (Volume Minimum)	: 200nW
Residual noise (Volume Minimum)	: 40nW

Input sensitivity	
Aux In	: 1V ± 3dB at 22kΩ
Scart In	: 1V ± 3dB at 22kΩ

Output sensitivity	
Line Out (Left/Right)	: 1V ± 2dB at 10kΩ
Scart Out (Left/Right)	: 1V ± 2dB at 10kΩ

## 1.4 COMPACT DISC/VCD/DVD:

Video Decoding	: MPEG-1/MPEG-2/ MPEG-4/DivX 3.11, 4.x & 5.x
Video DAC	: 12 Bits
Signal System	: PAL / NTSC
Video Format	: 4:3 / 16:9

CVBS Out <sup>1)</sup>	
CVBS level	: 1.0 ± 0.1V <sub>p-p</sub>
Luminance S/N	: ≥ 60dB

S-Video Out <sup>1)</sup>	
Y level	: 1.0 ± 0.1V <sub>p-p</sub>
Y S/N	: ≥ 60dB
C level (burst)	: 286mV <sub>pp</sub> +1/-4 dB

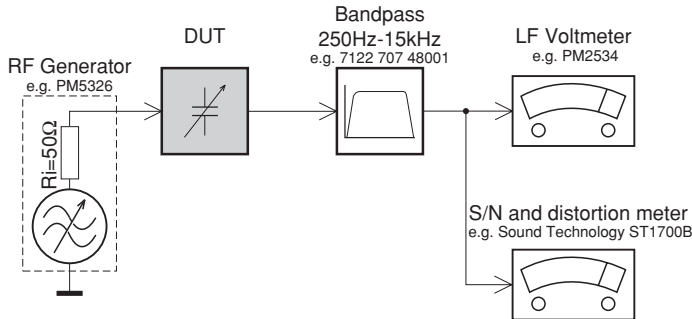
RGB/YUV Out 1)	
Amplitude	: 1.0 ± 0.1V <sub>p-p</sub>
S/N	: ≥ 60dB

<sup>1)</sup> Output terminals to be terminated with 75Ω

## 2. Measurements Setup, Service Aid & Lead Free Requirements

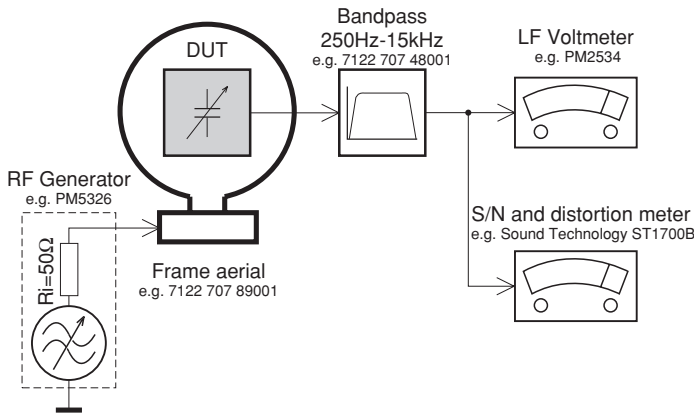
### MEASUREMENT SETUP

#### Tuner FM



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

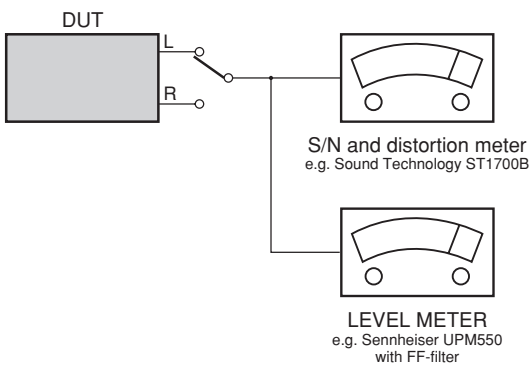
#### Tuner AM (MW,LW)



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).

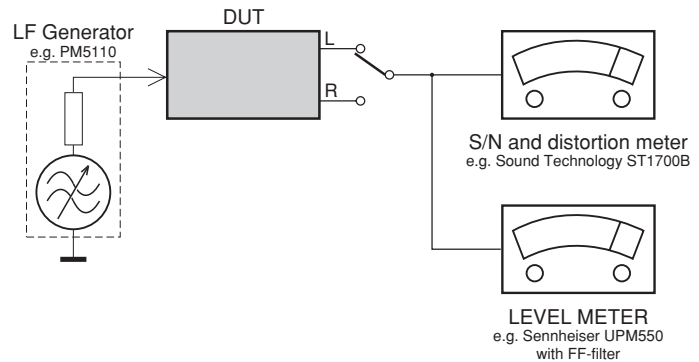
#### CD

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



#### Recorder

Use Universal Test Cassette **CrO2** SBC419 4822 397 30069 or Universal Test Cassette **Fe** SBC420 4822 397 30071





## SERVICE AIDS

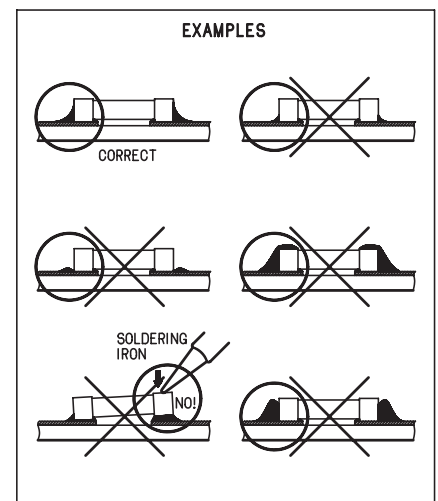
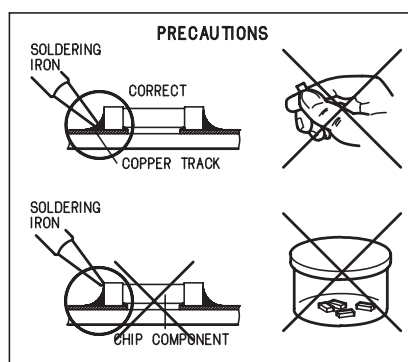
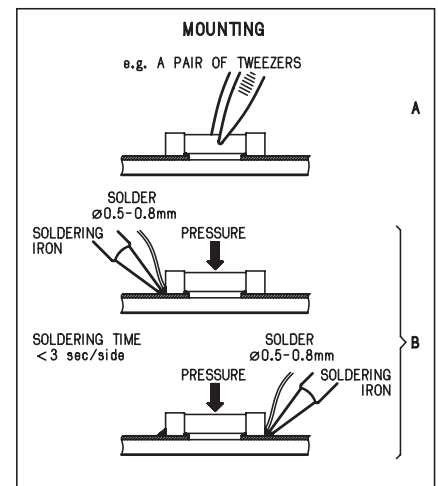
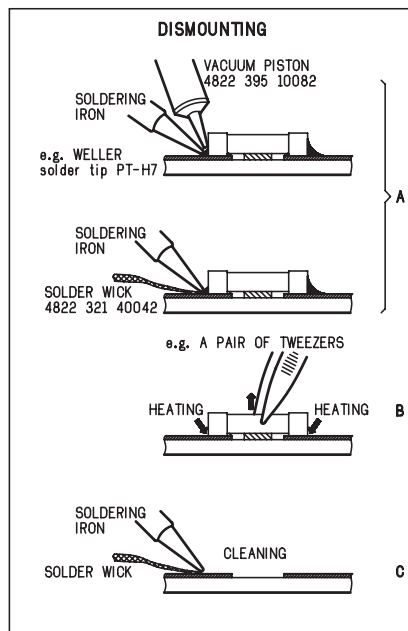
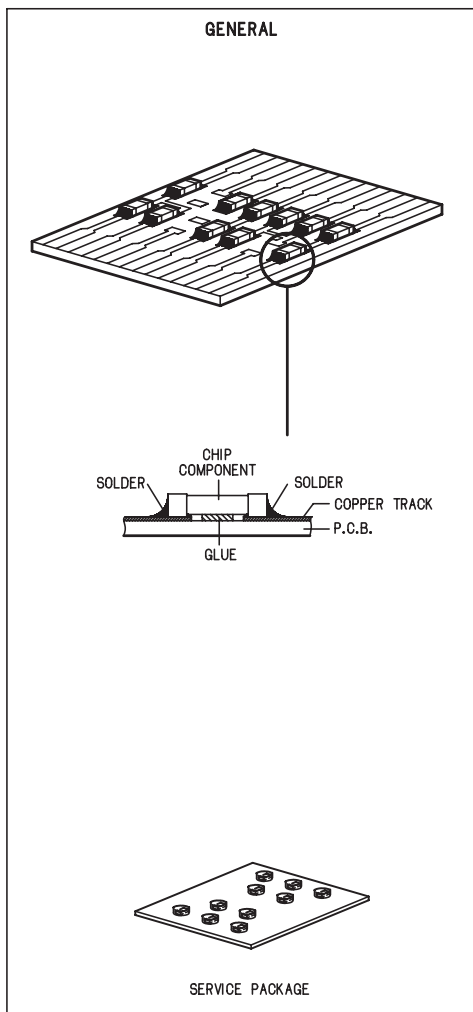
### Service Tools:

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



**(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.

**ESD****(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 hetzelfde 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).

Unvorsichtige Behandlung im Reparaturfall kann 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 ridotta 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, extension 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  $\triangle$ .

**(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 symbool  $\triangle$ .

**(F)**

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

Les composants de sécurité sont marqués  $\triangle$ .

**(D)**

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

Sicherheitsbauteile sind durch das Symbol  $\triangle$  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.

Componenti di sicurezza sono marcati con  $\triangle$ .

**(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 spårren är urkopplad. Betrakta ej strålen.

**(SF) Varoitus !**

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

**(DK) Advarse !**

Usynlig laserstrålning ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse for strålning.

**(F)**

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

## 2.1 Lead Free Requirements

### Pb(Lead) Free Solder

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

#### IDENTIFICATION:



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
    - o To reach at least a solder-temperature of 400°C,
    - o To stabilize the adjusted temperature at the solder-tip
    - o 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](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

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

For additional questions please contact your local repair-helpdesk.

### 3. Directions For Use

The following excerpt of the Quick Use Guide serves as an introduction to the set. The Complete Direction for the Use can be downloaded in different languages from the internet site of Philips Customer care Center: [www.p4c.philips.com](http://www.p4c.philips.com)

# QUICK START GUIDE

HTS5000W

12nc: 3139 115 63522

## 1 what's in the box

**A main unit**

**B Subwoofer**

**C Remote control**  
includes 2x AA batteries

**D Front/Rear/Center speakers**

**E Scart cable**

**F FM wire antenna**

**G MW loop antenna**

**H Wireless Receiver**

**I Table stand**

## 2 connect TV

**Note:** For connecting to a Progressive Scan TV, refer to the user manual for proper connections and detailed set up.

## 3 connect subwoofer, speakers and antennas

**3a Placement of speakers**

**3b Connect the front speakers and subwoofer to the DVD system** (refer to the user manual for "Individual speaker volume adjustment")

**3c Connect the wireless rear speakers to the wireless receiver** (refer to the user manual for "Wireless Receiver system")

**3d Connect the FM and MW antennas**

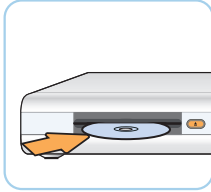
**3e Connect the mains cord to the power supply**

## 4 play a disc



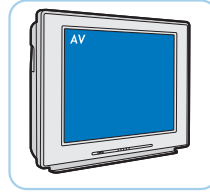
**4a** Press **DISC**.

Point the remote control towards the DVD system.



**4b** Insert a disc.

Press **EJECT** to eject the disc.



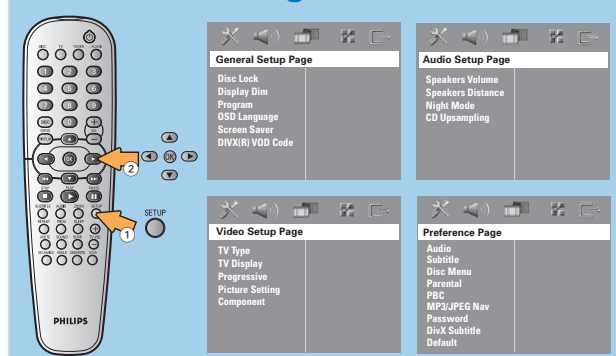
**4c** Select correct **AV In** channel

Switch to the correct input source by using the TV remote control.

### GET PICTURE

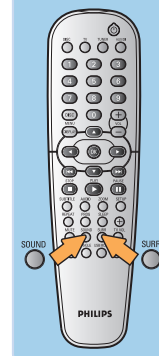
- Check the connection of the DVD system to TV is in place (see **2 Connect TV**).
- Check the AV mode on TV. It may be called **FRONT, A/V IN**, or **VIDEO**. Choose the different modes using TV remote control.
- Or, use the TV remote control to select Channel 1 on TV, then press Channel down button until you get the picture.
- See your TV manual for more details.

### More settings and features



Refer to chapters "DVD Setup Menu Options" in the user manual for detailed descriptions.

### GET SOUND



**No sound from rear speakers?**  
Press **SURR** button to select "Multi-Channel".

**To enhance the sound quality**  
Press **SOUND** button to select a predefined digital sound effect.

Detailed playback features and additional functions are described in the user manual.

## 5 wireless receiver setup

**5a** Turn on the DVD system and playback a disc.

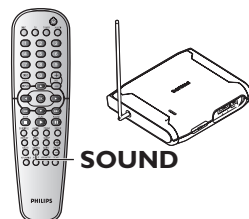
**5b** Select the same transmission frequency channel for both wireless transmitter and receiver.

The wireless system will automatically turn on when receiving an audio signal and vice versa.)

**On the wireless transmitter :**

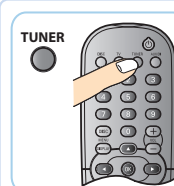
The default preset frequency is (1).

Press and hold **SOUND** button on the remote until the best frequency that obtains optimal reception.



Refer to chapters "Wireless Receiver system" in the user manual for detailed descriptions.

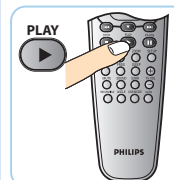
## 6 programme radio stations



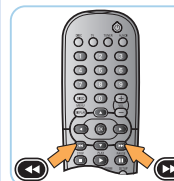
**6a** Press **TUNER**.

AUTO INSTALL PRESS PLAY

**Note:** This feature is only available for first time setup.



**6b** Press **PLAY** to start auto installation. It will start to programme all available radio stations.



**6c** Once complete, use **◀▶** to select a preset radio station.

**NEEDS HELP? Visit our website [www.philips.com/support](http://www.philips.com/support)**



## 4. Dismantling Instructions

### 4.1 Dismantling of the PSU Board

- 1) The disc can be manually remove by inserting a minus screw driver and push the lever in the direction as shown in Figure 3-1 to unlock the tray and eject the disc out.



Figure 4-1

- 2) Loosen 5 screws Pos 272 to remove the Front Top.
  - 1 screw each on the left and right side.
  - 3 screws at the rear of the set.
- 3) Loosen 4 screws Pos 258 to remove PSU Board as shown in Figure 3-2.

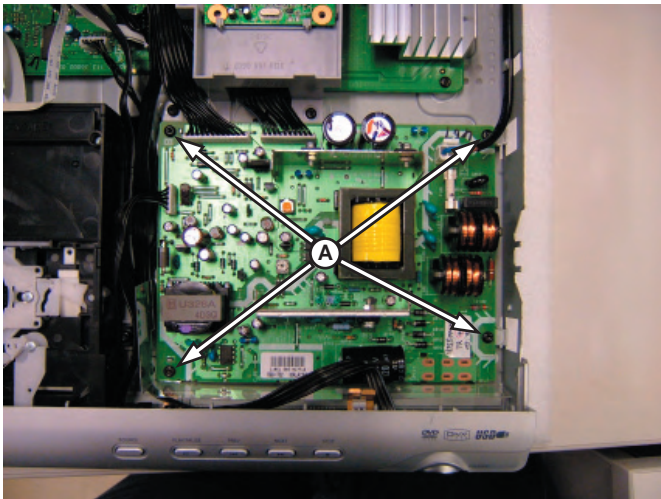


Figure 4-2

### 4.2 Dismantling of the Front Panel

- 1) Release 4 catches to remove the Front Panel Assy.
  - 1 catch each on the left and the right side.
  - 2 catches at the bottom of the set.

### 4.3 Dismantling of the Mono Board

- 1) Loosen 2 screws Pos 273 to remove the Transmitter Board. (See Figure 3-3 & 3-4)

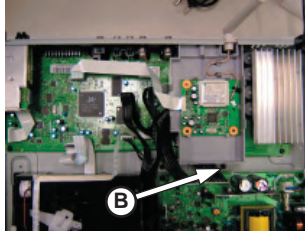


Figure 4-3

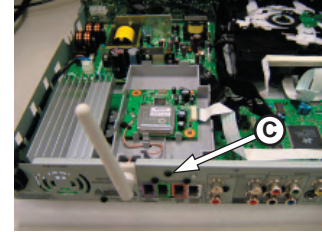


Figure 4-4

- 2) Loosen 1 screw Pos 260 to remove Tuner Module.



Figure 4-5

- 3) Loosen 4 screws Pos 257 as shown in Figure 3-6

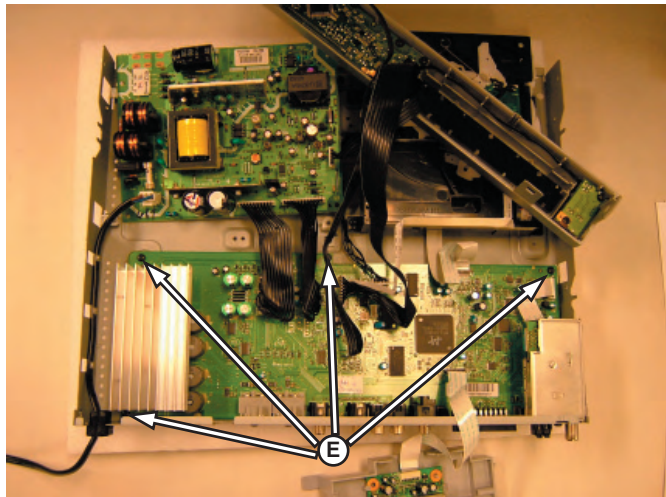


Figure 4-6

- 4) Loosen 8 screws to remove Mono Board.
  - 2 screws Pos 262
  - 1 screw Pos 265
  - 1 screw Pos 268
  - 1 screw Pos 264
  - 1 screw Pos 267
  - 2 screws Pos 269

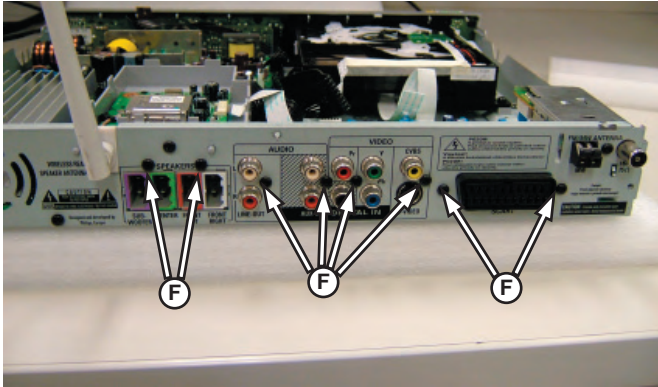


Figure 4-7

#### 4.4 Dismantling of the DVD LOADER

- 1) Loosen 4 screws Pos 254 to remove the DVD LOADER.

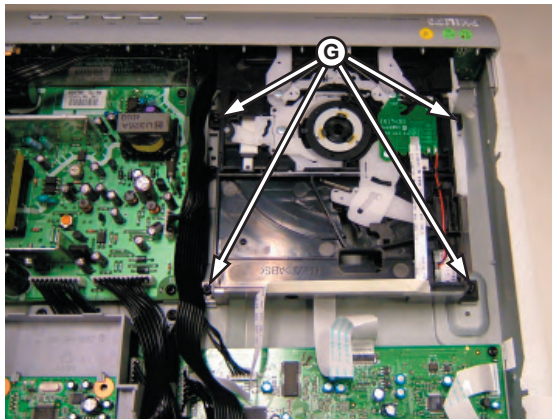


Figure 4-8



### 4.5 Service Positions

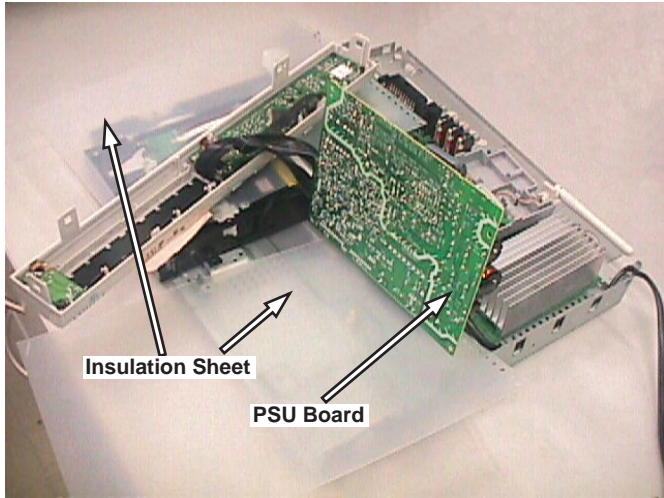


Figure 4-9  
Service Position  
PSU Board

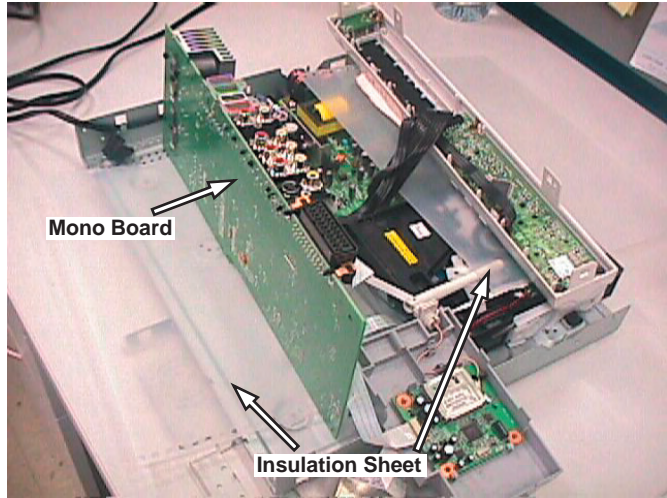


Figure 4-10  
Service Position  
Mono Board

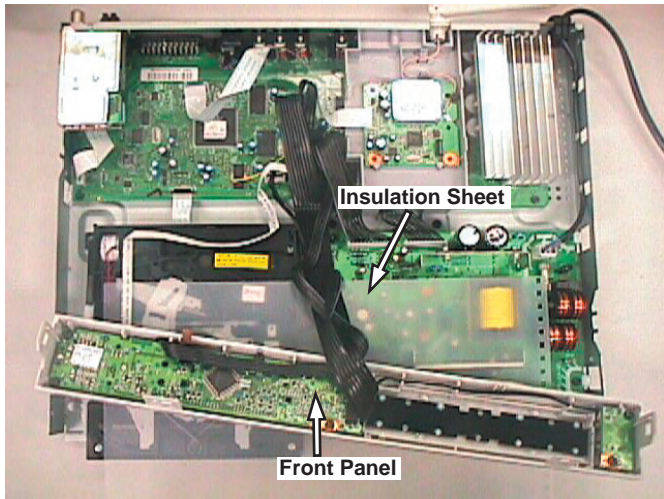


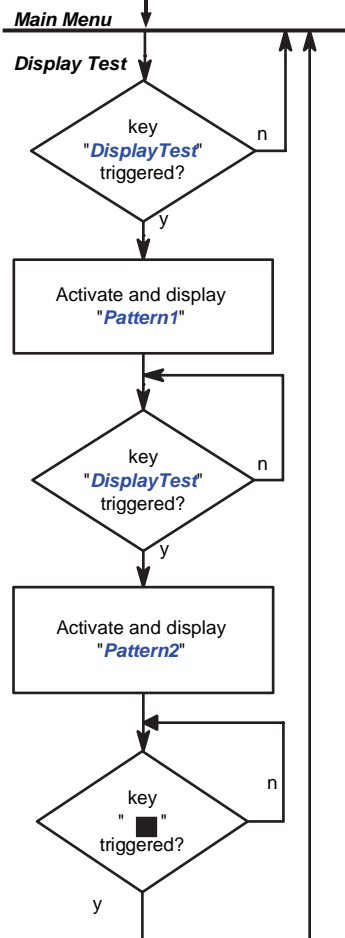
Figure 4-11  
Service Position  
Front Panel



# 5. Service Test Program

To start service test program open the tray with remote control or front panel key, while plugging in the mains cord press 2, 5, 8 on remote control, the tray will close by itself and the set will display shown "S-Vxx-yy"

Display shows "SERVICE" followed by ROM version "S-Vxx-yy"



S refers to Service Mode  
 V refers to Version  
 xx refers to Software version number of BEA (counting up from 01 to 99)  
 yy refers to Software version number of Front uP (counting up from 01 to 99)

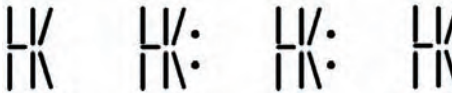
## 4.1 Display Test

**Purpose:**  
 This test is used to check the driving circuits, the display and whether there are any short-circuits, open-circuits or any other defects.

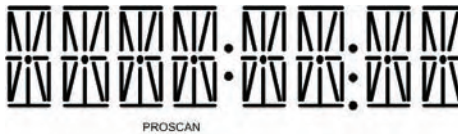
**Player:**  
 Following display patterns are used to test the display and its connections to μP.  
 Pattern 1: *Default: All display control pins are ON*  
 - to check the open-circuits



Pattern 2: *Alternate display control pins are on (Test Pattern: 0x55)*  
 - to check the short-circuits on Data port



**Receiver:**  
 Following display patterns are used to test the display and its connections to μP.  
 Pattern 1: *Default: All display control pins are ON*  
 - to check the open-circuits



Pattern 2: *Alternate display control pins are on (Test Pattern: 0x55)*  
 - to check the short-circuits on Data port



TEST	Activated with	ACTION
ROTARY ENCODER TEST	Volume Knob	Display shows value for 2 seconds. Volume values increases or decreases in steps of 1 until 0 (VOL MIN) or 40 (VOL MAX) is reached.
LEAVE SERVICE TEST PROGRAM	Disconnect mains cord	

### 5.1.1 Reprogramming of DVD version Matrix

After repair, the customer setting and region code may be lost. Reprogramming will put the set back in the state in which it has left the factory, ie. with the default setting and the allowed region code.

Model	Region	Region Code	TV Type
HTS 5000W/12	EU	2	PAL
HTS 5000W/51	Russia	5	PAL

To reprogram do as follows:

- 1) Power up the set and select DISC source.
- 2) Open tray by press "OPEN/CLOSE" button on the set or press and hold "STOP" button on the RC.
- 3) Press the following buttons on the Remote Control:  
<9> <9> <9> <9> <AUDIO> <6> ..... for HTS 5000W/12  
<9> <9> <9> <9> <AUDIO> <7> ..... for HTS 5000W/51
- 4) The display shows 'YYYY-ZZ' and the tray will close.  
YYYY = model number (eg. 8300, 8500, etc.)  
ZZ = slash stroke version (eg. 01, 69, etc.)

### 5.1.2 Procedure for check Software version

- 1) Power up the set and select DISC source.
- 2) Open tray by press "OPEN/CLOSE" button on the set or press and hold "STOP" button on the RC.
- 3) Press "DISPLAY" button on the Remote control.
- 4) The TV screen will shows:

**PPPP-Vxx YYYYY-ZZ**  
**SERVO: GGGG GGGG REG:DD**

PPPP = LX1S, LX1D or LX2W  
xx = version number  
YYYYY = model # - 3000S/20000/5000W  
ZZ = stroke version  
DD = region code  
GGGG GGGG = version for servo code

### 5.1.3 Burning of firmware

1. Unzip the zip-archive attached with this service information.
2. Start the CD burning software and create a new CD Project (Data disc) with the following settings:
  - a. File System: ISO9660
  - b. Format: MODE 2/XA
  - c. Recording format: Single Session (Track at once), Finalized CD
3. Place the content of the zip-archive into the root directory of the new CD project.
4. Burn the data onto a blank CDR or CDRW.

Note: ISO9660 is mandatory, UDF discs are not supported!  
The final CDROM must not contain any other data except the file from the zip-archive.

### 5.1.4 Procedure to upgrade the firmware

1. Power up the set and open tray.
2. Insert the prepared Upgrade CDROM and close the tray.
3. The set will display:

LOAD -> MULTICH ->..... ->UPG END.  
The whole process takes less than 2 minutes.

*Note: Do not press any button or interrupt the main supply upgrading process, Otherwise the set may become defective.*

4. When the upgrade is completed, the tray will close automatic.
5. The tray will close and the set will go to Standby mode automatically when the upgrade process is completed.

### 5.1.5 Procedure to check the firmware version to confirm upgrading

1. Power up the set and open tray.
2. Press the <Menu Display> button on the Remote Control.
3. The firmware version will be displayed on the top left hand corner of the OSD.

### 5.1.6 Trade Mode

Trade mode is a feature that will block all set keys when enabled. It is for dealers to prevent customers from removing disc, changing source etc using the set keys. Rotary and Remote Control (RC) keys are still allowed in Trade mode.

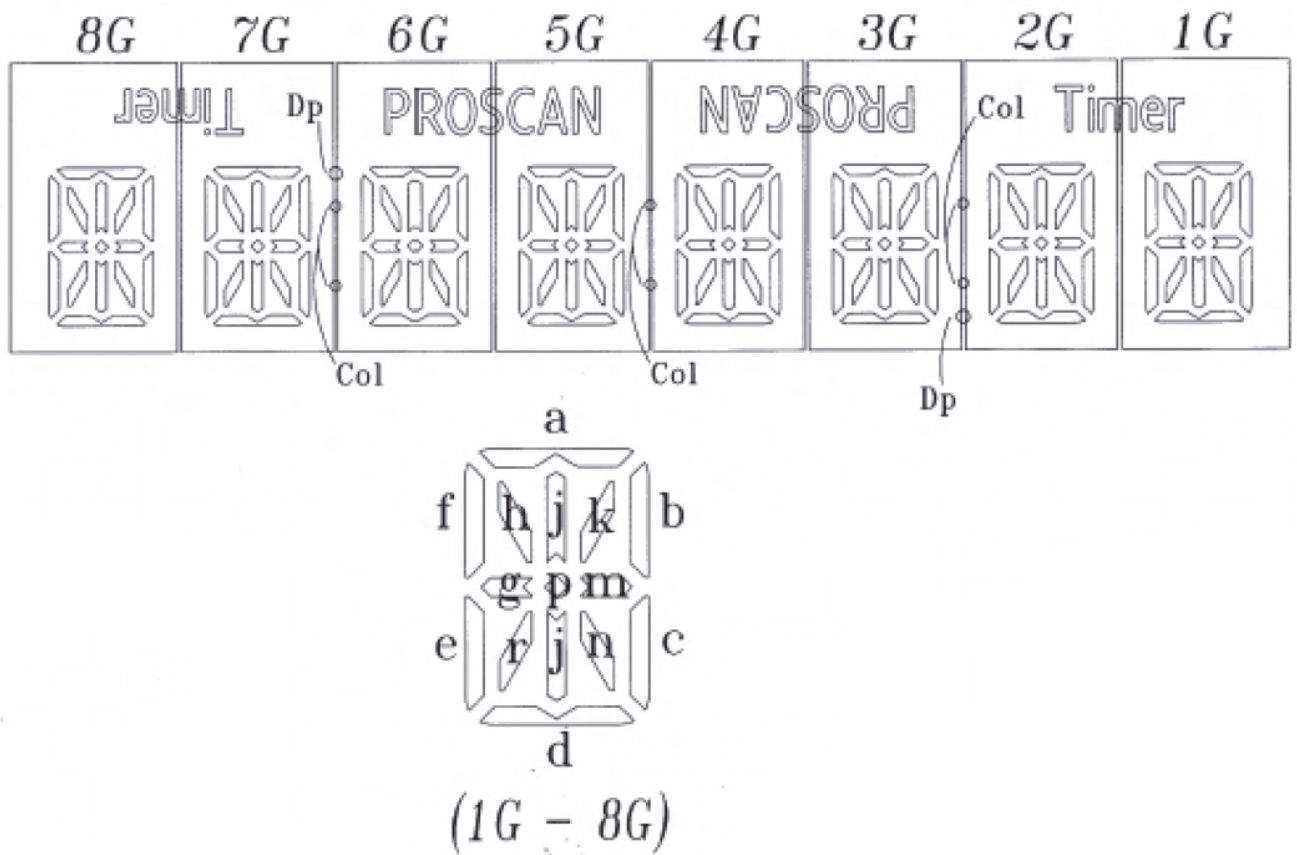
#### To activate Trade Mode:

- 1) Power up the set and select DISC source.
- 2) Open tray by press "OPEN/CLOSE" button on the set or press and hold "STOP" button on the RC.
- 3) Then press buttons <2> <5> <9> on the RC.
- 4) The display shows 'TRA ON' and the tray will close.  
Trade Mode is now enabled.

#### To deactivate Trade Mode:

- 1) Power up the set and select DISC source.
- 2) Open tray by press and hold "STOP" button on the RC.
- 3) Then press buttons <2> <5> <9> on the RC.
- 4) The display shows 'TRA OFF' and the tray will close.  
Trade Mode is now disabled.

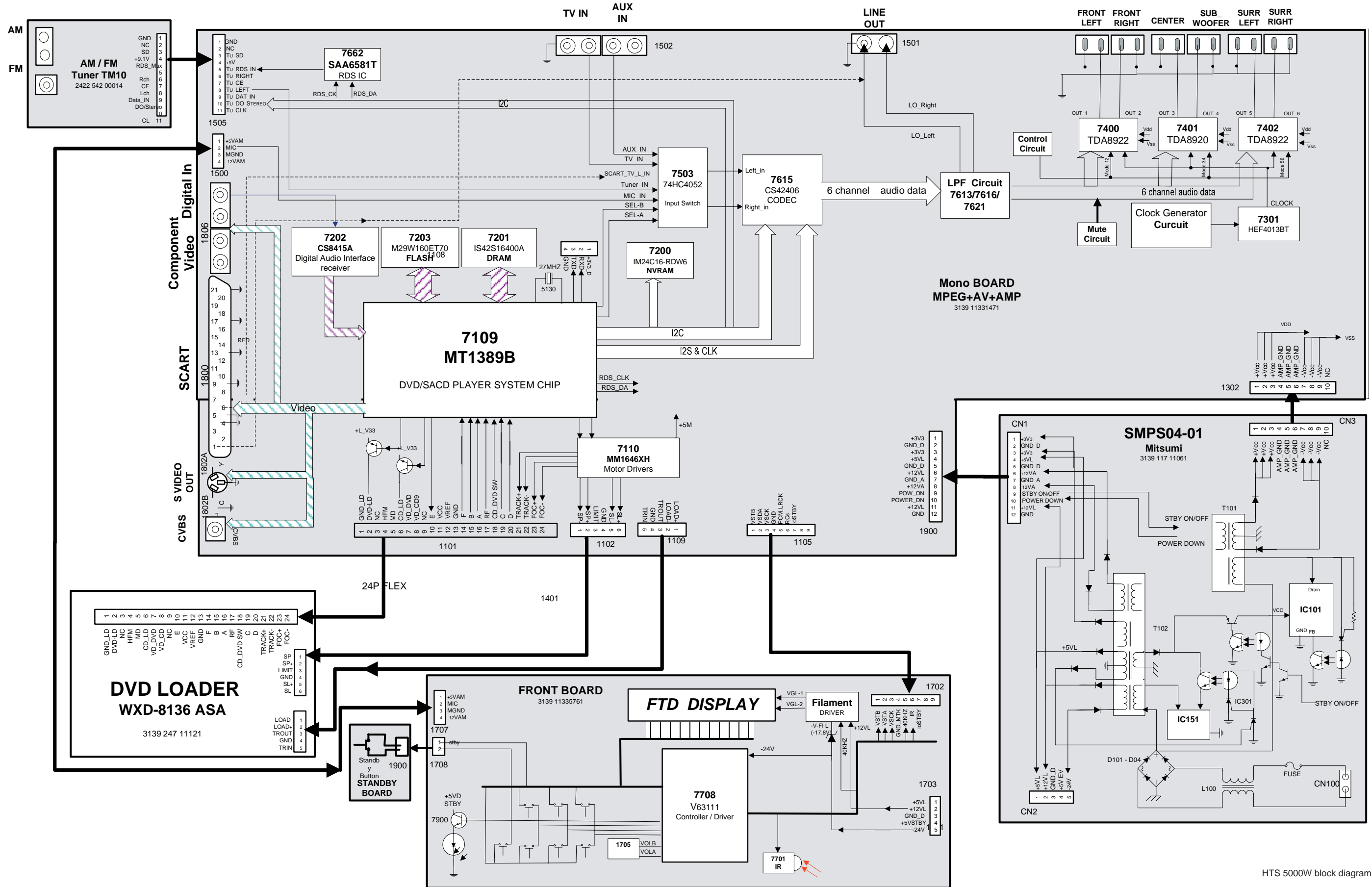
### 6. FTD Display Pin Connection



	8G	7G	6G	5G	4G	3G	2G	1G	
P1	a	a	a	a	a	a	a	a	
P2	j	j	j	j	j	j	j	j	
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	p	p	p	p	p	p	p	p	
P16	Timer		PROSCAN			PROSCAN		Timer	
P17		dp			dp				

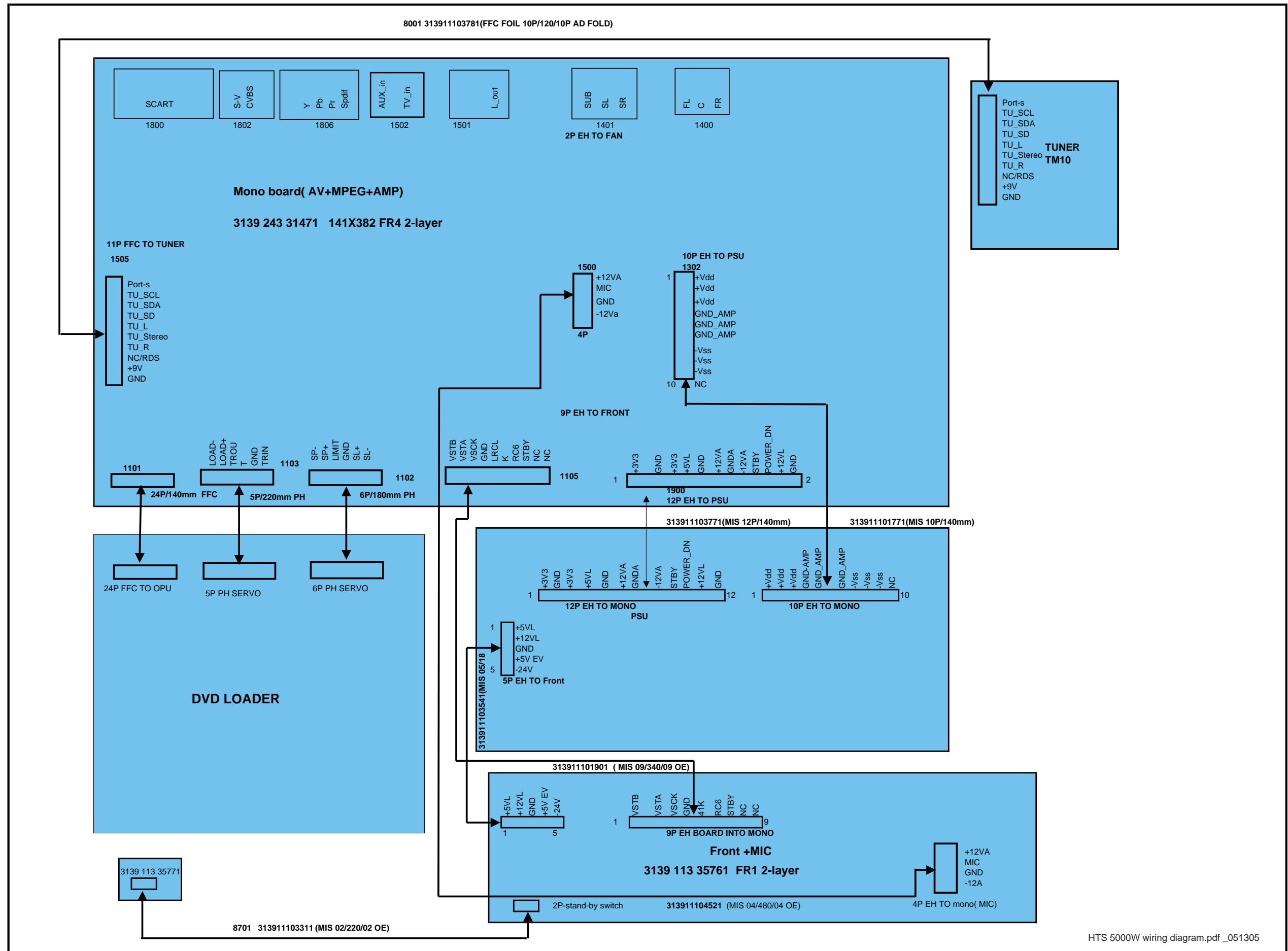
**Notes:**

# 7. Block Diagram

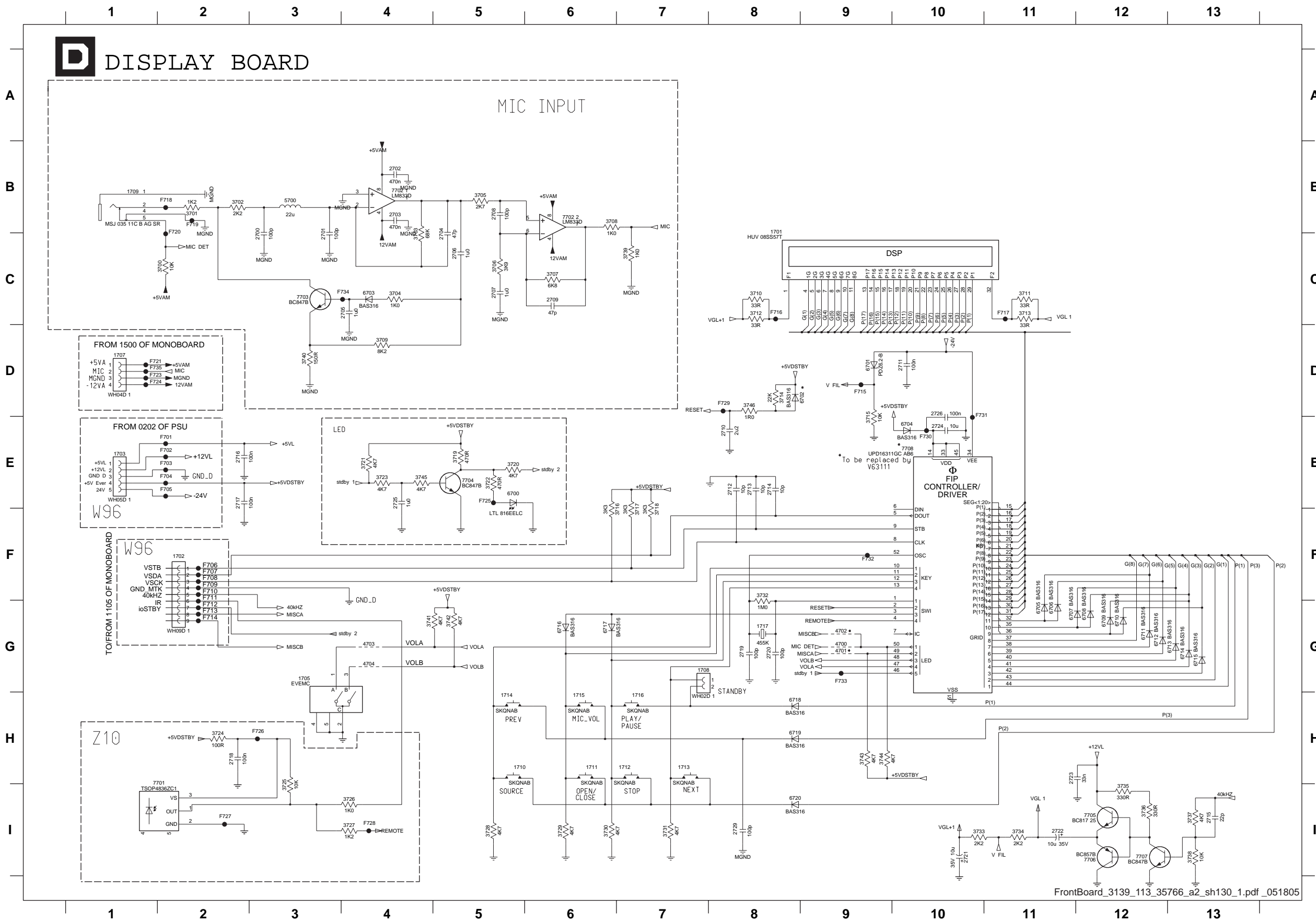


HTS 5000W block diagram

# Wiring Diagram



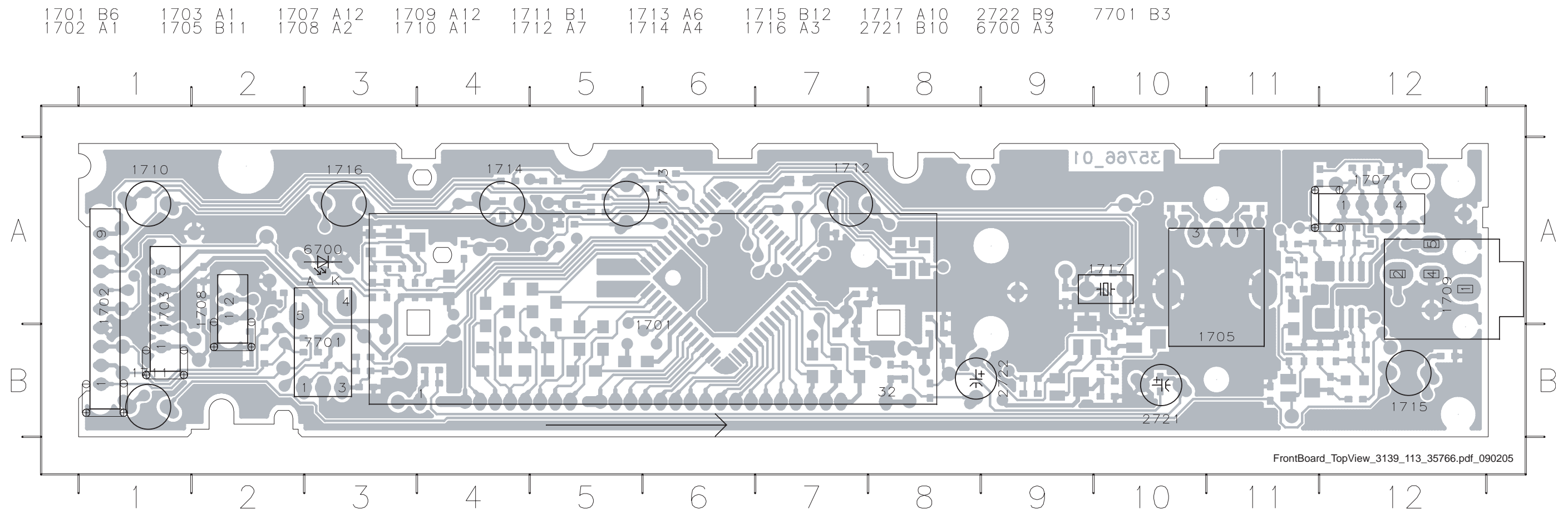
# 8. Front: Display



- 1701 C8
- 1702 F2
- 1703 E1
- 1705 G3
- 1707 D1
- 1708 G7
- 1709 B1
- 1710 H5
- 1711 H6
- 1712 H7
- 1713 H7
- 1714 H5
- 1715 H6
- 1716 H7
- 1717 G8
- 2700 C3
- 2701 C3
- 2702 B4
- 2703 B4
- 2704 C5
- 2705 C4
- 2706 C5
- 2707 C5
- 2708 B5
- 2710 E8
- 2711 D10
- 2712 E8
- 2713 E8
- 2714 E8
- 2715 I13
- 2716 E2
- 2717 E2
- 2718 H2
- 2719 G8
- 2720 G8
- 2721 I10
- 2722 I11
- 2723 H11
- 2724 E10
- 2725 E4
- 2726 D10
- 2729 I8
- 3700 C2
- 3701 B2
- 3702 B2
- 3703 C4
- 3704 C4
- 3705 B5
- 3706 C5
- 3707 C6
- 3708 B6
- 3709 D4
- 3710 C8
- 3711 C11
- 3712 C8
- 3713 C11
- 3714 D8
- 3715 E9
- 3716 F6
- 3717 F7
- 3718 F7
- 3719 E5
- 3720 E5
- 3721 E4
- 3722 E5
- 3723 E4
- 3724 H2
- 3725 I3
- 3726 I4
- 3727 I4
- 3728 I5
- 3729 I6
- 3730 I6
- 3731 I7
- 3732 F8
- 3733 I10
- 3734 I11
- 3735 I12
- 3736 I12
- 3737 I13
- 3738 I13
- 3739 C7
- 3740 D3
- 3741 G4
- 3742 G5
- 3743 H9
- 3744 H9
- 3745 E4
- 3746 D8
- 4700 G9
- 4701 G9
- 4702 G9
- 4703 G4
- 4704 G4
- 5700 B3
- 6700 E5
- 6701 D9
- 6702 D8
- 6703 C4
- 6704 E10
- 6705 G11
- 6706 G11
- 6707 G11
- 6708 G12
- 6709 G12
- 6710 G12
- 6711 G12
- 6712 G12
- 6713 G13
- 6714 G13
- 6715 G13
- 6716 G6
- 6717 G6
- 6718 H8
- 6719 H8
- 6720 I8
- 6721 I2
- 6722 B6
- 6723 C3
- 6724 E5
- 6725 H2
- 6726 H2
- 6727 B4
- 6728 E2
- 6729 F2
- 6730 E2
- 6731 E2
- 6732 B4
- 6733 B4
- 6734 C4
- 6735 C4
- 6736 F2
- 6737 F2
- 6738 F2
- 6739 F2
- 6740 E2
- 6741 G2
- 6742 G2
- 6743 C8
- 6744 C11
- 6745 B2
- 6746 B2
- 6747 C2
- 6748 D1
- 6749 D1
- 6750 E5
- 6751 D9
- 6752 E5
- 6753 D9
- 6754 D1
- 6755 D1
- 6756 D1
- 6757 C9
- 6758 C9
- 6759 C9
- 6760 C9
- 6761 C9
- 6762 C9
- 6763 C9
- 6764 C9
- 6765 C9
- 6766 C9
- 6767 C9
- 6768 C9
- 6769 C9
- 6770 C9
- 6771 C9
- 6772 C9
- 6773 C9
- 6774 C9
- 6775 C9
- 6776 C9
- 6777 C9
- 6778 C9
- 6779 C9
- 6780 C9
- 6781 C9
- 6782 C9
- 6783 C9
- 6784 C9
- 6785 C9
- 6786 C9
- 6787 C9
- 6788 C9
- 6789 C9
- 6790 C9
- 6791 C9
- 6792 C9
- 6793 C9
- 6794 C9
- 6795 C9
- 6796 C9
- 6797 C9
- 6798 C9
- 6799 C9
- 6800 C9



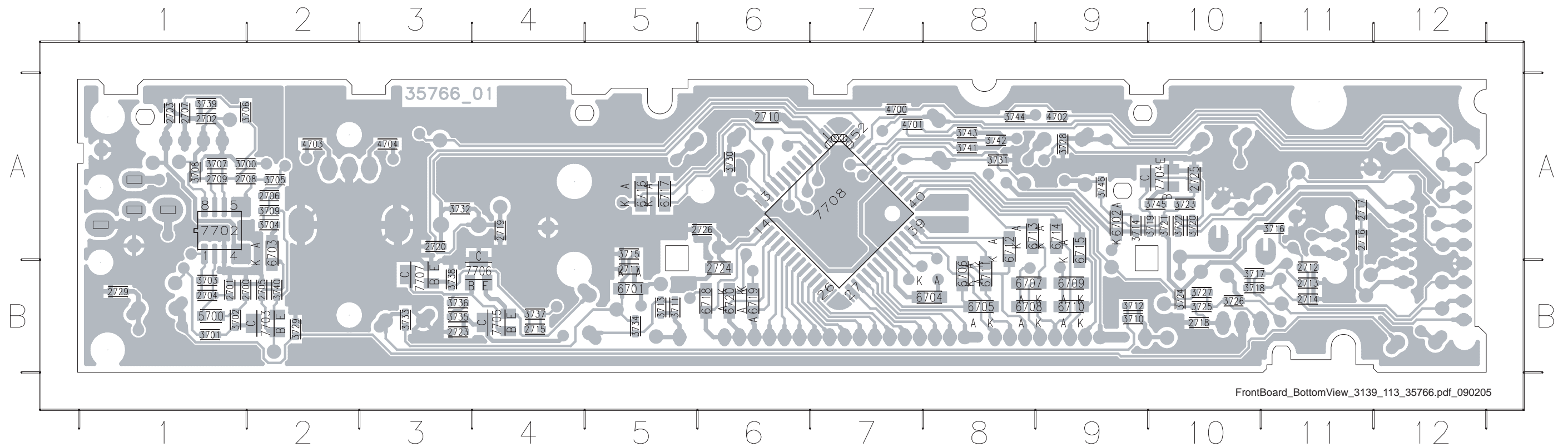
### Front: Display (topview)



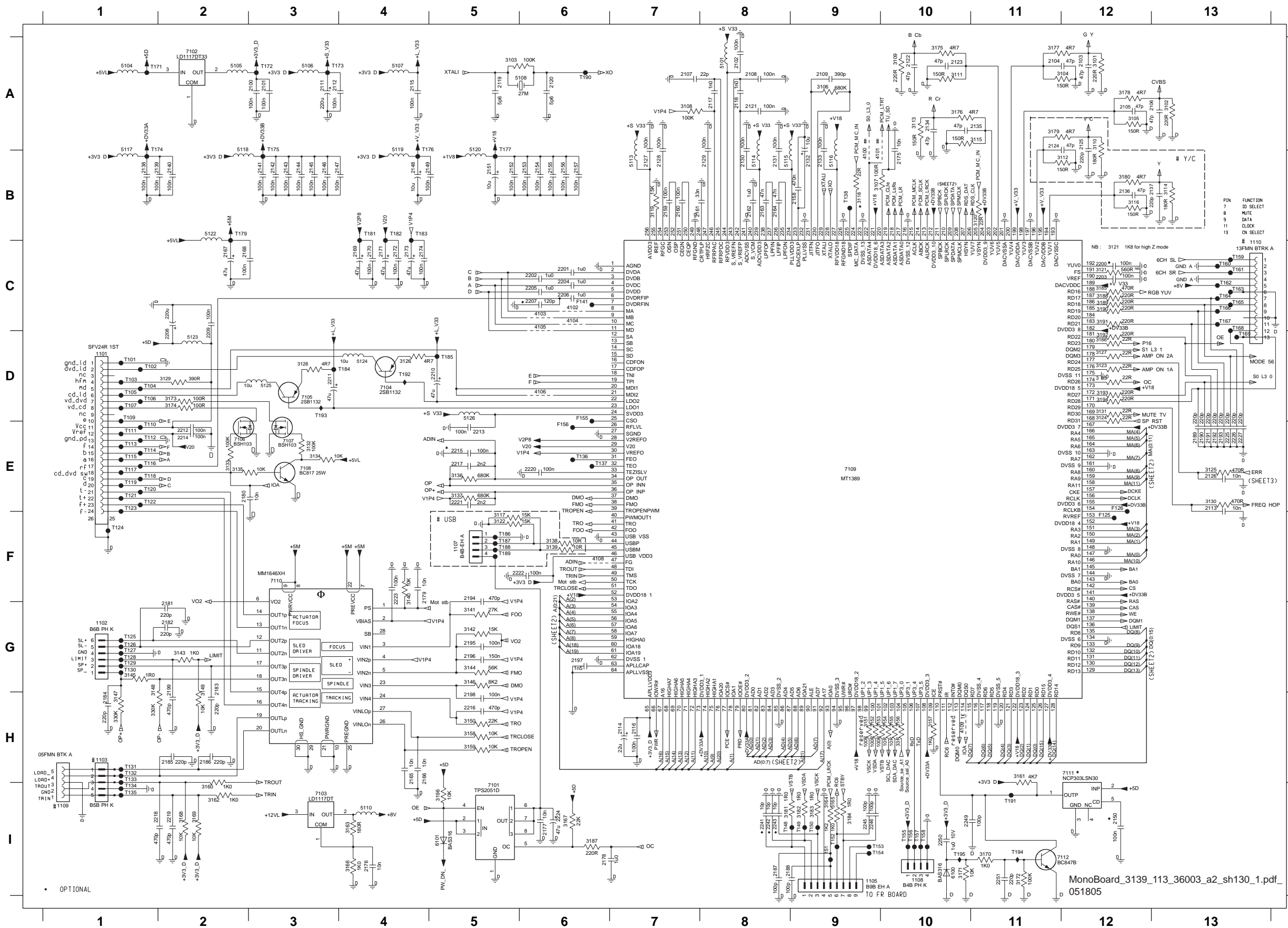


Front: Display (Bottom view)

2700	B1	2709	A1	2718	B10	3701	B1	3710	B9	3719	A10	3728	A9	3737	B4	3746	A9	6703	A2	6712	A8	7702	A1
2701	B1	2710	A6	2719	A4	3702	B1	3711	B9	3720	A10	3729	B2	3738	B3	4700	A7	6704	A8	6713	A8	7703	B2
2702	A1	2711	B5	2720	A3	3703	B1	3712	B9	3721	A10	3730	A6	3739	A1	4701	A7	6705	A9	6714	A9	7704	A10
2703	A1	2712	B11	2723	B3	3704	A2	3713	B9	3722	A10	3731	A8	3740	B2	4702	A9	6706	A9	6715	A9	7705	B4
2704	B1	2713	B11	2724	B6	3705	A2	3714	A9	3723	A10	3732	A3	3741	A8	4703	A2	6707	A9	6716	A5	7706	B4
2705	B2	2714	B11	2725	A10	3706	A1	3715	A5	3724	B10	3733	B3	3742	A8	4704	A3	6708	A3	6717	A5	7707	B3
2706	A2	2715	B4	2726	A6	3707	A1	3716	A11	3725	B10	3734	B5	3743	A8	5700	B1	6709	B5	6718	B6	7708	A7
2707	A1	2716	A11	2729	B1	3708	A1	3717	B10	3726	B10	3735	B3	3744	A8	5701	B5	6710	B5	6719	B6		
2708	A1	2717	A11	3700	A1	3709	A2	3718	B10	3727	B10	3736	B3	3745	A10	6702	A9	6711	B8	6720	B6		



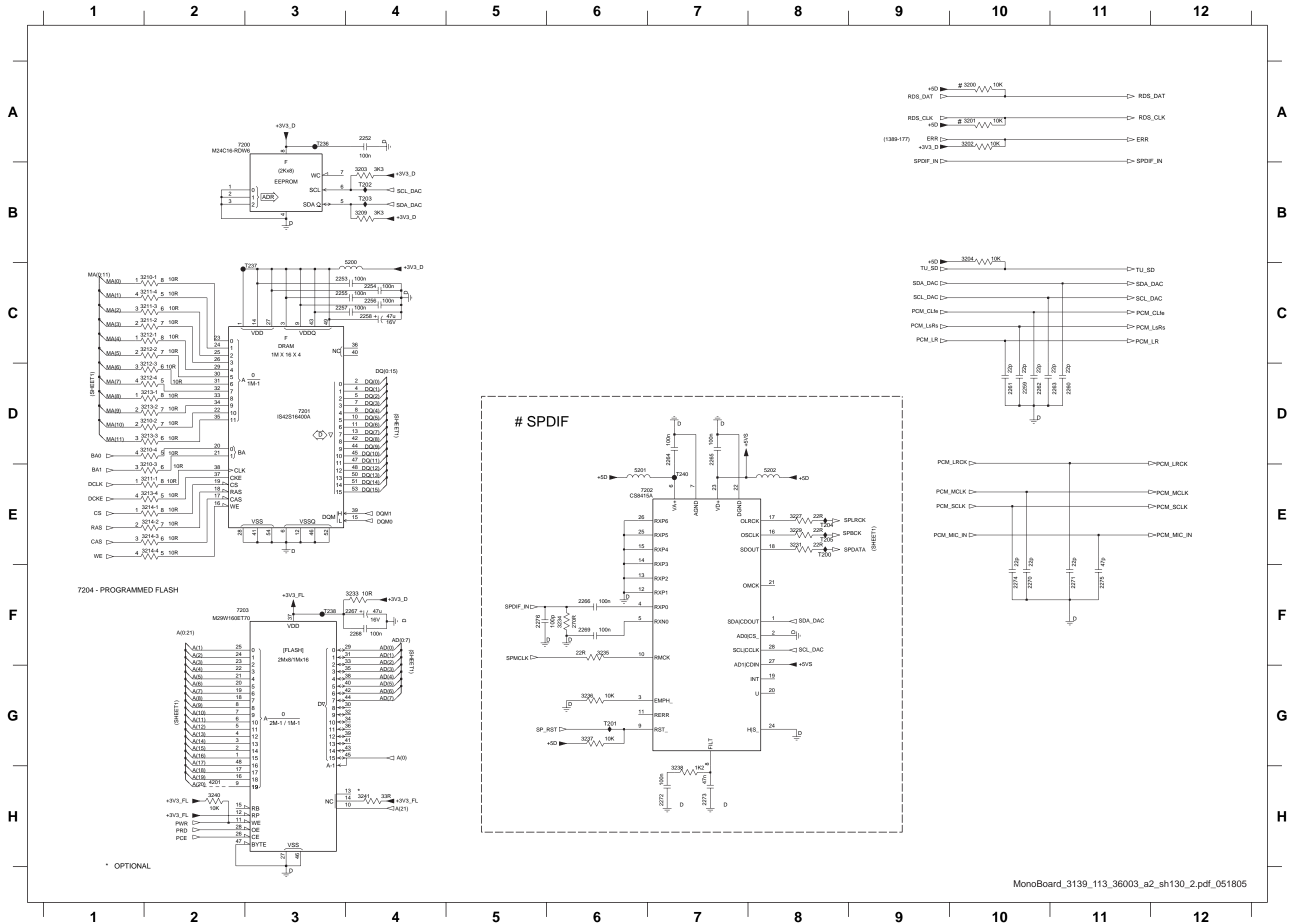
# Mono Board: Circuit Diagram (Part 1)



1101 D1	2209 D2	3190 C12	T173 A3
1102 G1	2210 D5	3191 C12	T174 B1
1103 H1	2211 D3	3192 D12	T175 B3
1105 I9	2212 E2	3193 D12	T176 B4
1107 F5	2213 E5	3194 D12	T177 B5
1108 H0	2214 E2	3195 D12	T179 B2
1109 H1	2215 E5	3196 D12	T181 B4
1110 C13	2216 H5	4100 B9	T182 B4
2100 A3	2217 E5	4101 B9	T183 B4
2101 A3	2218 H1	4102 C6	T184 D4
2102 A8	2219 I2	4103 C6	T185 D5
2103 A12	2220 E6	4104 C6	T186 F5
2104 A11	2221 E5	4105 C6	T187 F5
2105 A12	2222 F5	4106 D6	T188 F5
2106 A12	2223 F4	4106 F6	T189 F5
2107 A7	2224 E3	4106 H10	T190 A6
2108 A8	2225 E13	5101 A8	T191 H1
2109 A9	2226 E13	5104 A1	T192 D4
2111 A3	2227 E13	5105 A2	T193 D3
2112 A3	2241 I8	5106 A3	T194 H1
2113 E13	2242 I8	5107 A4	
2114 H7	2243 I8	5108 A6	
2115 A4	2244 I9	5109 A6	
2116 H7	2246 I9	5113 B7	
2117 A8	2249 H0	5114 B8	
2118 A8	2250 H0	5115 B8	
2119 A5	2251 H1	5116 B9	
2120 A6	3101 A12	5117 B1	
2121 A8	3102 A13	5118 B2	
2122 A10	3103 A5	5119 B4	
2123 A10	3104 A12	5120 B5	
2124 A11	3105 A12	5122 B2	
2125 A12	3106 A9	5123 D2	
2126 E13	3107 B9	5124 D4	
2127 B7	3108 A7	5125 D3	
2128 B7	3109 A10	5126 D5	
2129 B8	3110 A12	6100 B4	
2130 B8	3111 A10	6101 F5	
2131 B8	3112 B12	7101 F5	
2132 B9	3113 A10	7102 A2	
2133 B9	3114 B13	7103 I3	
2134 A10	3115 A11	7104 D4	
2135 A11	3116 B12	7105 D3	
2136 B12	3117 F5	7106 E2	
2137 B12	3118 B9	7107 E1	
2138 B1	3119 B7	7108 E3	
2139 B2	3120 B11	7109 E9	
2140 B2	3121 C2	7110 F3	
2141 B3	3122 F5	7111 H12	
2142 B3	3123 D12	7112 H1	
2143 B3	3124 D12	7112 F12	
2144 B3	3125 E13	7112 E2	
2145 B3	3126 D4	F141 C6	
2146 B3	3127 D12	F155 D6	
2147 B4	3128 D3	F156 E6	
2148 B4	3129 D2	T101 D1	
2149 B5	3130 E13	T102 D1	
2150 H2	3131 D12	T103 D1	
2151 B5	3132 E3	T104 D1	
2152 B5	3133 E2	T105 D1	
2153 B6	3134 E3	T106 D1	
2154 B6	3135 E2	T107 D1	
2155 B6	3136 E5	T109 D1	
2156 B6	3137 E5	T110 E1	
2157 B6	3138 F6	T111 E1	
2158 B9	3139 F6	T112 E1	
2159 B9	3140 G5	T113 E1	
2160 B7	3141 G5	T114 E1	
2161 B7	3142 G5	T115 E1	
2162 B8	3143 G2	T116 E1	
2163 B8	3144 G5	T117 E1	
2164 B8	3145 G1	T118 E1	
2165 H4	3146 G5	T119 E1	
2166 H4	3147 H1	T120 E1	
2167 C2	3148 G1	T121 E1	
2168 C2	3149 G2	T122 E1	
2169 C4	3150 H5	T123 E1	
2170 C4	3151 H9	T124 F1	
2171 C4	3152 H9	T125 G1	
2172 C4	3153 H9	T126 G1	
2173 C4	3154 H10	T127 G1	
2174 C4	3155 H10	T128 G1	
2175 B10	3156 H10	T129 G1	
2176 I4	3157 H10	T130 G1	
2177 I6	3158 H5	T131 H1	
2178 I6	3159 H5	T132 H1	
2179 F4	3160 I2	T133 H1	
2180 E2	3161 H11	T134 H1	
2181 G2	3162 I2	T135 H1	
2182 G2	3163 I4	T136 E6	
2183 G2	3164 I9	T137 E6	
2184 H1	3165 I9	T138 B9	
2185 H2	3166 I4	T148 B8	
2186 H2	3167 I6	T149 I9	
2187 I8	3168 I2	T150 I9	
2188 I8	3169 I2	T151 I9	
2189 E13	3170 H11	T152 I9	
2190 E13	3171 H10	T153 I9	
2191 E13	3172 H11	T154 I9	
2192 E13	3173 D2	T155 H0	
2193 E13	3174 D2	T156 H0	
2194 F5	3175 A10	T157 H0	
2195 G5	3176 A10	T158 H0	
2196 G5	3177 A11	T159 C13	
2197 G6	3178 A12	T160 C13	
2198 H5	3179 A11	T161 C13	
2199 G2	3180 B12	T162 C13	
2200 C12	3181 I8	T163 C13	
2201 C6	3182 I9	T164 C13	
2202 C6	3183 I9	T165 C13	
2203 C12	3184 I9	T166 C13	
2204 C6	3185 C12	T167 C13	
2205 C6	3186 D12	T168 C13	
2206 C6	3187 I6	T169 D13	
2207 C6	3188 C12	T171 A1	
2208 D2	3189 C12	T172 A3	

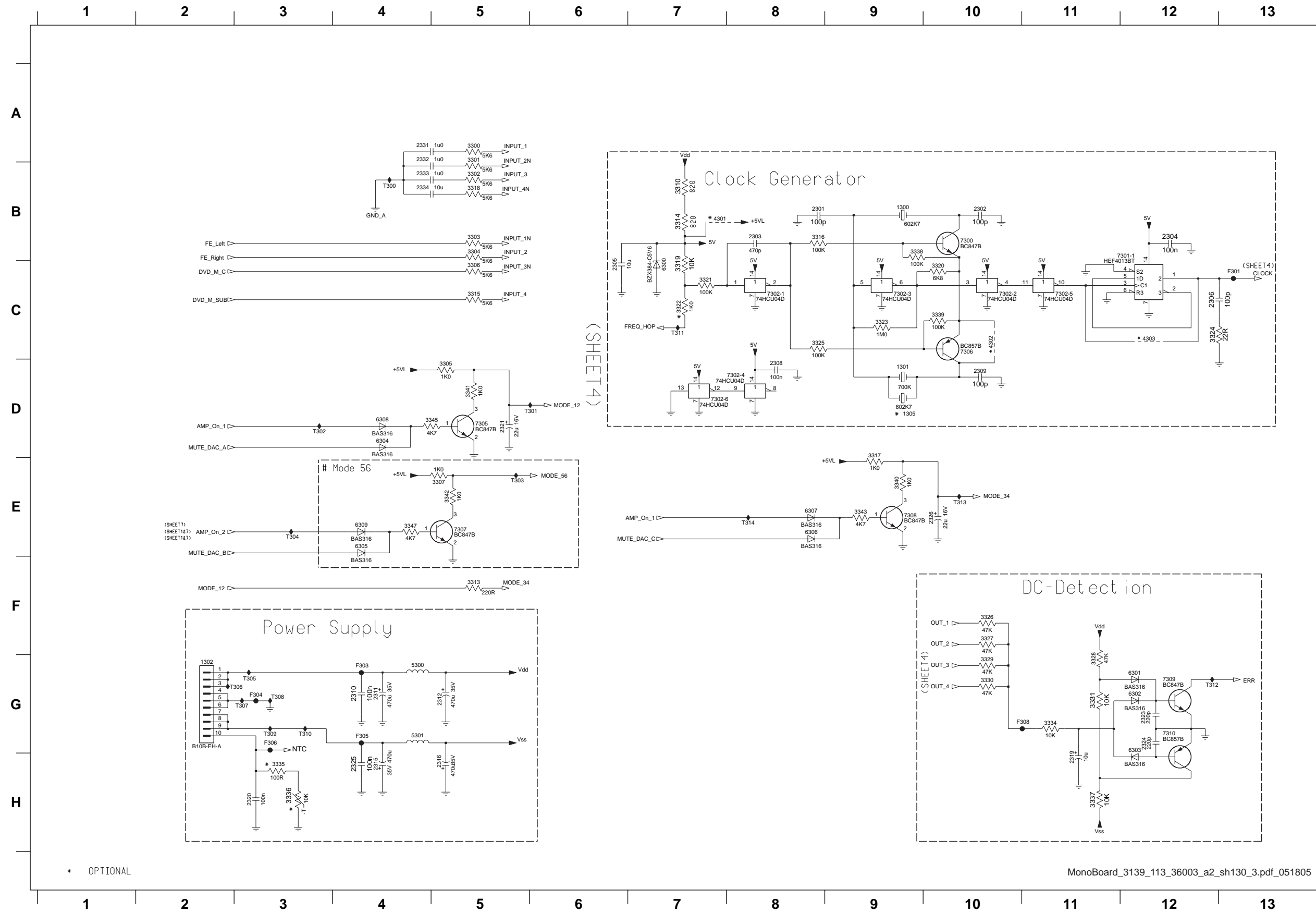
MonoBoard\_3139\_113\_36003\_a2\_sh130\_1.pdf  
051805

# Mono Board: Circuit Diagram (Part 2)



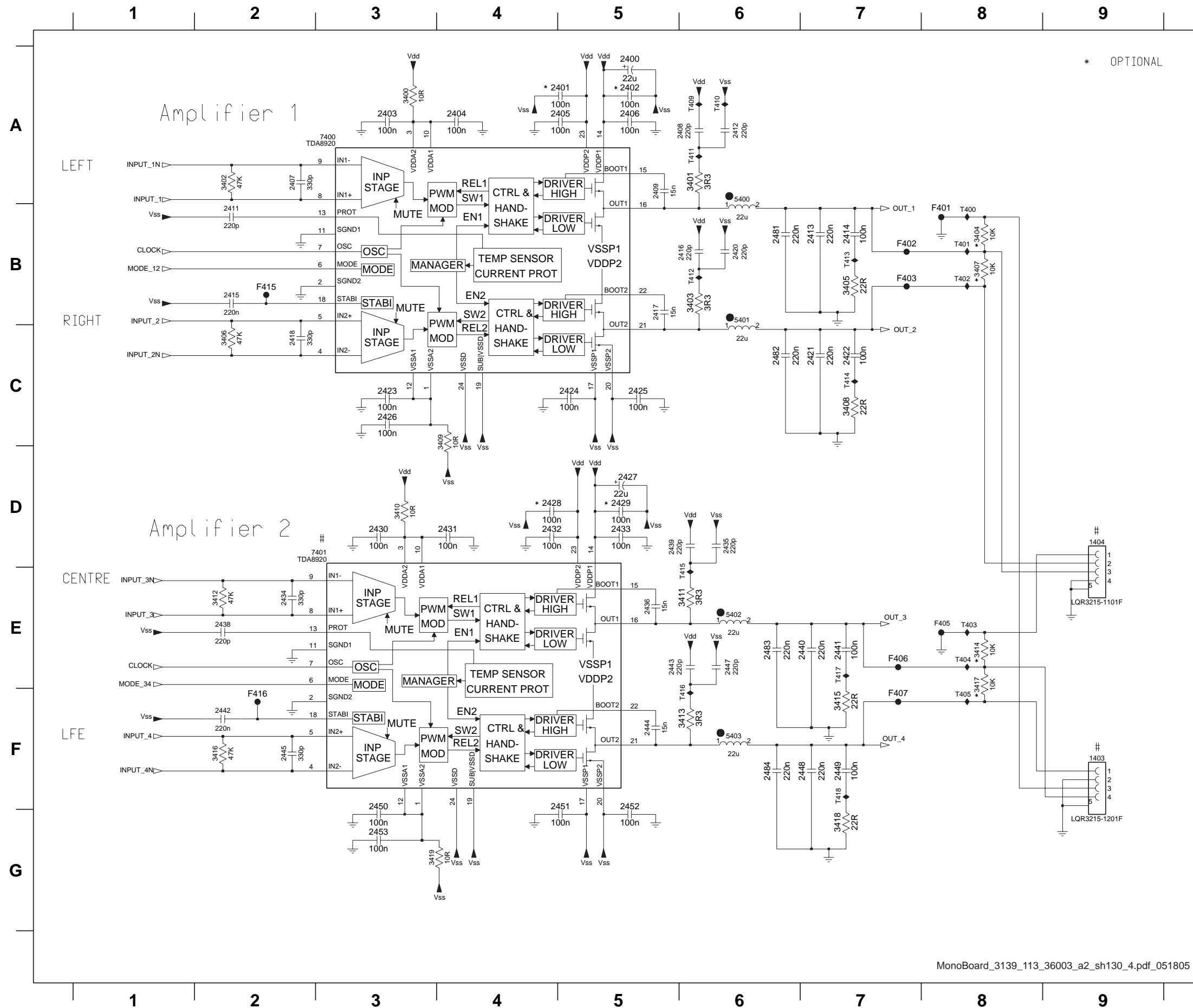
- 2252 A4
- 2253 C3
- 2254 C4
- 2255 C3
- 2256 C4
- 2257 C3
- 2258 C4
- 2259 D10
- 2260 D11
- 2261 D10
- 2262 D10
- 2263 D11
- 2264 D7
- 2265 D7
- 2266 F6
- 2267 F4
- 2268 F4
- 2269 F6
- 2270 F10
- 2271 F11
- 2272 H7
- 2273 H7
- 2274 F10
- 2275 F11
- 2276 F5
- 3200 A10
- 3201 A10
- 3202 A10
- 3203 B4
- 3204 B10
- 3209 B4
- 3210-1 C2
- 3210-2 D2
- 3210-3 E2
- 3210-4 D2
- 3211-1 E2
- 3211-2 C2
- 3211-3 C2
- 3211-4 C2
- 3212-1 C2
- 3212-2 C2
- 3212-3 D2
- 3212-4 D2
- 3213-1 D2
- 3213-2 D2
- 3213-3 D2
- 3213-4 E2
- 3214-1 E2
- 3214-2 E2
- 3214-3 E2
- 3214-4 E2
- 3227 E8
- 3229 E8
- 3231 E8
- 3233 F4
- 3234 F6
- 3235 F6
- 3236 G6
- 3237 G6
- 3238 H7
- 3240 H2
- 3241 H4
- 4201 H2
- 5200 C4
- 5201 E6
- 5202 E8
- 7200 A3
- 7201 D3
- 7202 E7
- 7203 F3
- 7200 E8
- T201 G6
- T202 B4
- T203 B4
- T204 E8
- T205 E8
- T236 A3
- T237 C3
- T238 F3
- T240 E7

# Mono Board: Circuit Diagram (Part 3)



- 1300 B9
- 1301 D9
- 1302 G2
- 1305 E9
- 2301 B8
- 2302 B10
- 2303 B8
- 2304 B12
- 2305 C6
- 2306 C12
- 2308 D8
- 2309 D10
- 2310 G4
- 2311 G4
- 2312 G5
- 2315 H4
- 2316 H5
- 2319 H11
- 2320 H3
- 2321 D5
- 2323 G12
- 2324 G12
- 2325 H4
- 2328 E10
- 2331 A4
- 2332 A4
- 2333 B4
- 2334 B4
- 3300 A5
- 3301 A5
- 3302 B5
- 3303 B5
- 3304 B5
- 3305 D5
- 3306 C5
- 3307 E5
- 3310 B7
- 3313 F5
- 3314 B7
- 3315 C5
- 3316 B8
- 3317 D9
- 3318 B5
- 3319 C7
- 3320 C10
- 3321 C7
- 3322 C7
- 3323 C9
- 3324 C12
- 3325 C8
- 3326 F10
- 3327 F10
- 3328 G11
- 3329 G10
- 3330 G10
- 3331 G11
- 3334 G11
- 3335 H3
- 3336 H3
- 3337 H11
- 3338 B9
- 3339 C10
- 3340 E9
- 3341 D5
- 3342 E5
- 3343 E9
- 3345 D5
- 3347 E4
- 4301 B7
- 4302 C10
- 4303 C12
- 5300 G4
- 5301 G4
- 6300 C7
- 6301 G12
- 6302 G12
- 6303 G12
- 6304 D4
- 6305 E4
- 6306 E8
- 6307 E8
- 6308 D4
- 6309 E4
- 7300 B10
- 7301-1 B12
- 7302-1 C8
- 7302-2 C10
- 7302-3 C9
- 7302-4 D8
- 7302-5 C11
- 7302-6 D8
- 7305 D5
- 7306 C10
- 7307 E5
- 7308 E9
- 7309 G12
- 7310 G12
- F301 C13
- F303 G4
- F304 G3
- F305 G4
- F306 G3
- F308 G11
- T300 B4
- T301 D6
- T302 D3
- T303 E5
- T304 E3
- T305 G3
- T306 G3
- T307 G3
- T308 G3
- T309 G3
- T310 G3
- T311 C7
- T312 G12
- T313 E10
- T314 E8

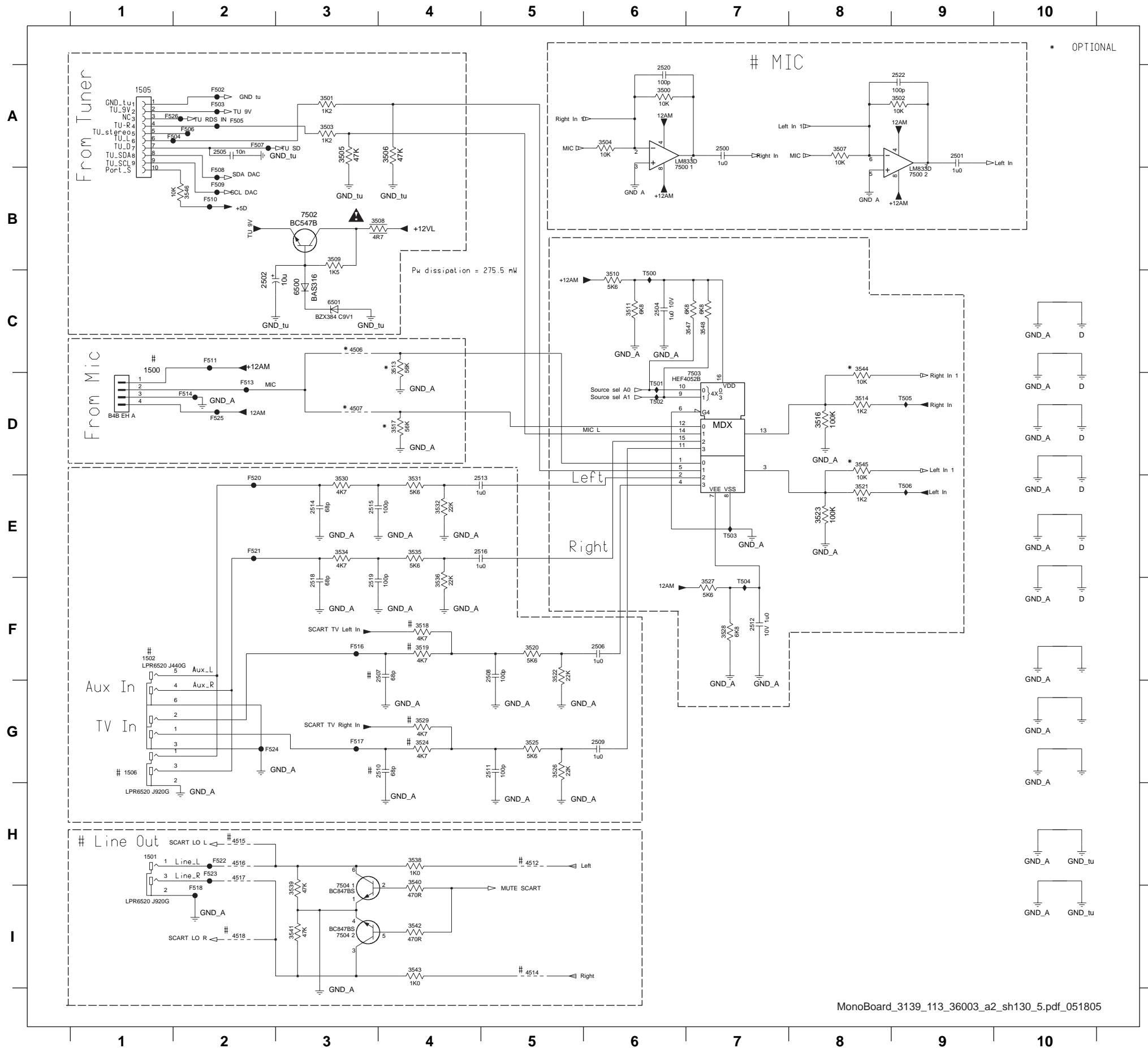
# Mono Board: Circuit Diagram (Part 4)



- 1403 F9
- 1404 D9
- 2400 A5
- 2401 A5
- 2402 A5
- 2403 A3
- 2404 A4
- 2405 A5
- 2406 A5
- 2407 A2
- 2408 A6
- 2409 A5
- 2411 B2
- 2412 A6
- 2413 B7
- 2414 B7
- 2415 B2
- 2416 B6
- 2417 B5
- 2418 C2
- 2420 B6
- 2421 C7
- 2422 C7
- 2423 C3
- 2424 C5
- 2425 C5
- 2426 C3
- 2427 D5
- 2428 D4
- 2429 D5
- 2430 D3
- 2431 D4
- 2432 D4
- 2433 D5
- 2434 E2
- 2435 D6
- 2436 E5
- 2438 E2
- 2439 D5
- 2440 E7
- 2441 E7
- 2442 F2
- 2443 E5
- 2444 F5
- 2445 F2
- 2447 E6
- 2448 F7
- 2449 F3
- 2450 F7
- 2451 F5
- 2452 F5
- 2453 G3
- 2481 B6
- 2482 C6
- 2483 E6
- 2484 F6
- 3400 A3
- 3401 A6
- 3402 A2
- 3403 B6
- 3404 B8
- 3405 B7
- 3406 C2
- 3407 B8
- 3408 C7
- 3409 C4
- 3410 D3
- 3411 E6
- 3412 E2
- 3413 F6
- 3414 E8
- 3415 F7
- 3416 F2
- 3417 E8
- 3418 G7
- 3419 G3
- 5400 A6
- 5401 B6
- 5402 E6
- 5403 F6
- 7400 A3
- 7401 D3
- F401 B8
- F402 B7
- F403 B7
- F405 E8
- F406 E7
- F407 F7
- F415 B2
- F416 F2
- T400 B8
- T401 B8
- T402 B8
- T403 E8
- T404 E8
- T405 F8
- T409 A6
- T410 A6
- T411 A6
- T412 B6
- T413 B7
- T414 C7
- T415 E6
- T416 F6
- T417 E7
- T418 F7

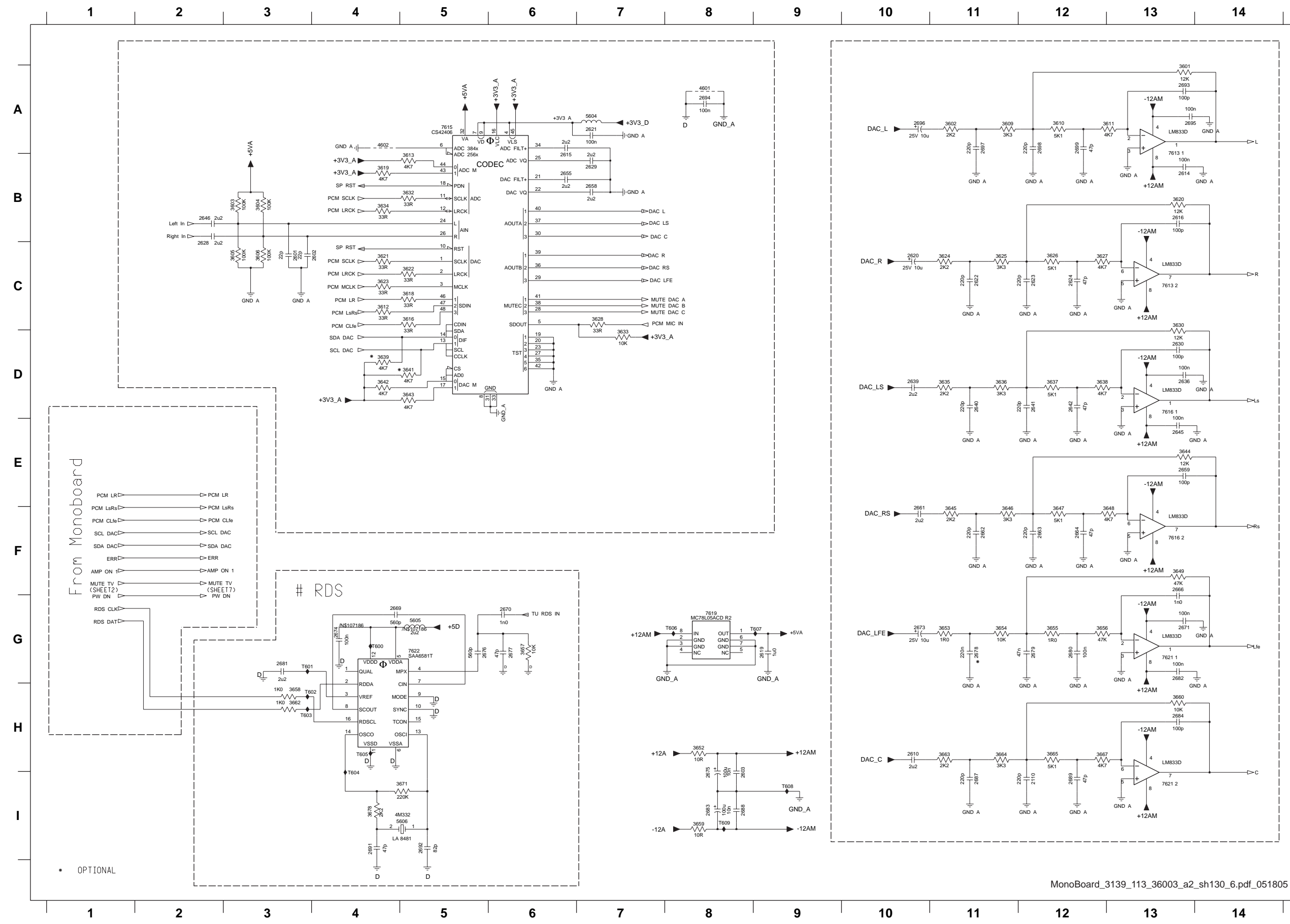


# Mono Board: Circuit Diagram (Part 5)



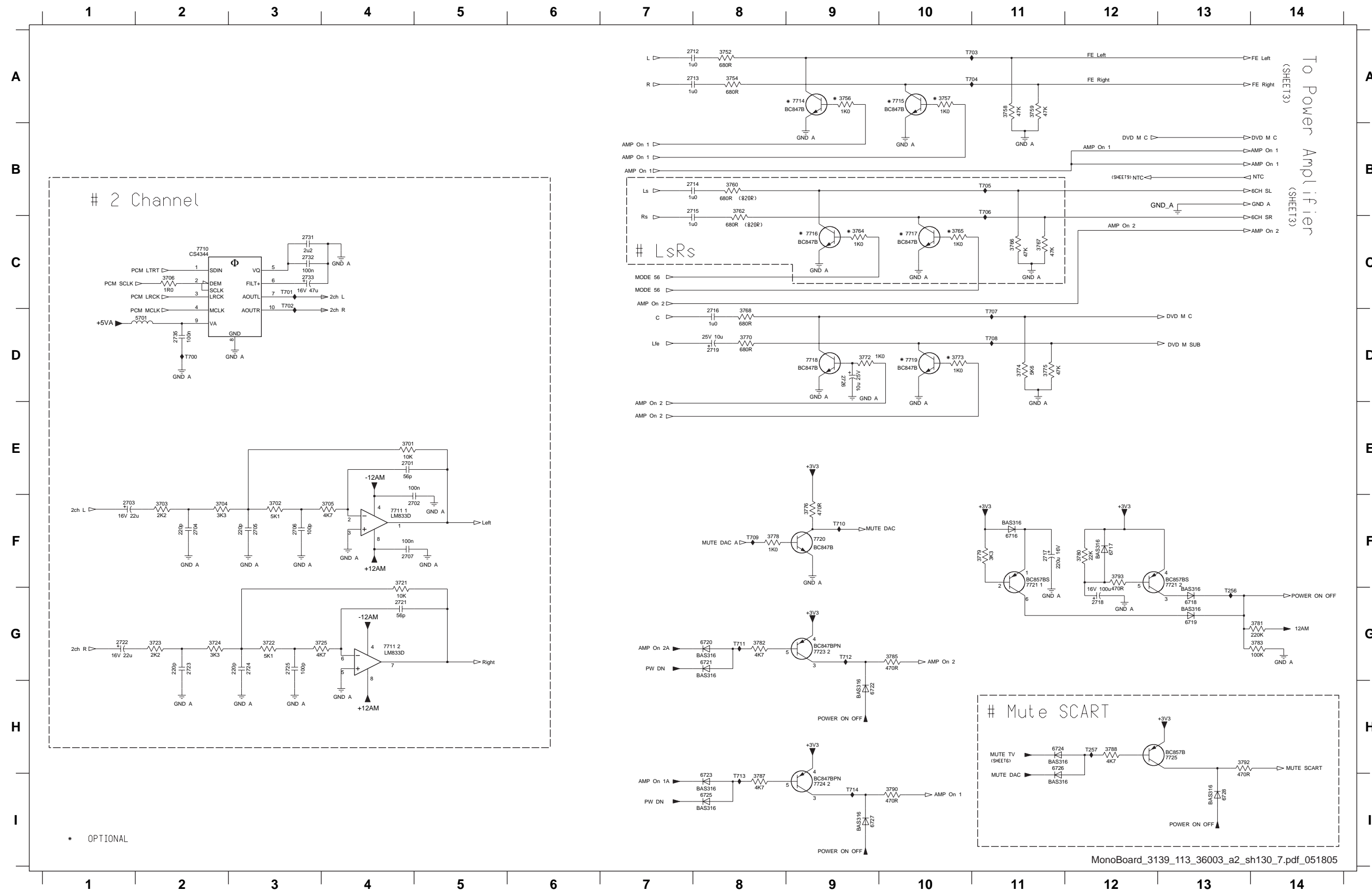
- 1500 C1
- 1501 H1
- 1502 F1
- 1506 G1
- 2500 A7
- 2501 A9
- 2502 C2
- 2504 C6
- 2505 A2
- 2506 F6
- 2507 F4
- 2508 F5
- 2509 G6
- 2510 G4
- 2511 G5
- 2517 F7
- 2513 E4
- 2514 E3
- 2515 E3
- 2516 E4
- 2518 F3
- 2519 F3
- 2520 A6
- 2522 A9
- 3500 A6
- 3501 A3
- 3502 A9
- 3503 A3
- 3504 A6
- 3505 A3
- 3506 A4
- 3507 A8
- 3508 B3
- 3509 B3
- 3510 C6
- 3511 C6
- 3513 C4
- 3514 D8
- 3516 D8
- 3517 D4
- 3518 F4
- 3519 F4
- 3520 F5
- 3521 E8
- 3522 F5
- 3523 E8
- 3524 G4
- 3525 G5
- 3526 G5
- 3527 F7
- 3528 F7
- 3529 G4
- 3530 E3
- 3531 E4
- 3532 E4
- 3534 E3
- 3535 E4
- 3536 F4
- 3538 H4
- 3539 I3
- 3540 H4
- 3541 I3
- 3542 I4
- 3543 I4
- 3544 C8
- 3545 D8
- 3546 B2
- 3547 C7
- 3548 C7
- 4506 C3
- 4507 D3
- 4512 H5
- 4514 I5
- 4515 H2
- 4516 H2
- 4517 H2
- 4518 I2
- 6500 C3
- 6501 C3
- 7500-1 A6
- 7500-2 B9
- 7502 B3
- 7503 D7
- 7504-1 I3
- 7504-2 I3
- F502 A2
- F503 A2
- F504 A2
- F505 A2
- F506 A2
- F507 A2
- F508 B2
- F509 B2
- F510 B2
- F511 C2
- F513 D2
- F514 D2
- F516 F3
- F517 G3
- F518 I2
- F520 E2
- F521 E2
- F522 H2
- F523 H2
- F524 G2
- F525 D2
- F526 A1
- T500 C6
- T501 D6
- T502 D6
- T503 E7
- T504 F7
- T505 D9
- T506 E9

# Mono Board: Circuit Diagram (Part 6)



- 2110 H12
- 2601 C3
- 2602 C4
- 2603 I8
- 2610 H10
- 2614 B13
- 2615 A6
- 2616 B13
- 2619 G9
- 2620 C10
- 2621 A7
- 2622 C11
- 2623 C12
- 2624 C12
- 2628 C2
- 2629 B7
- 2630 D13
- 2635 D13
- 2639 D10
- 2640 D11
- 2641 D12
- 2642 D12
- 2645 E13
- 2646 B2
- 2655 B6
- 2658 B7
- 2659 E12
- 2661 F10
- 2662 F11
- 2663 F12
- 2664 F12
- 2666 F13
- 2669 G4
- 2670 G6
- 2671 G13
- 2673 G10
- 2674 G4
- 2675 I8
- 2676 G5
- 2677 G6
- 2678 G11
- 2679 G12
- 2680 G12
- 2681 G3
- 2682 G13
- 2683 I8
- 2684 H13
- 2687 I11
- 2688 I8
- 2689 I12
- 2691 I4
- 2692 I5
- 2693 A13
- 2694 A8
- 2695 A13
- 2696 A10
- 2697 A11
- 2698 A12
- 2699 A12
- 3601 A13
- 3602 A11
- 3603 B3
- 3604 B3
- 3605 C3
- 3606 C3
- 3609 A11
- 3610 A12
- 3611 A13
- 3612 C4
- 3613 B5
- 3616 C5
- 3618 C5
- 3619 B4
- 3620 B13
- 3621 C4
- 3622 C5
- 3623 C4
- 3624 C11
- 3625 C11
- 3626 C12
- 3627 C12
- 3628 C7
- 3630 C13
- 3632 B5
- 3633 D7
- 3634 B4
- 3635 D11
- 3636 D11
- 3637 D12
- 3638 D12
- 3639 D4
- 3641 D5
- 3642 D4
- 3643 D5
- 3644 E13
- 3645 F11
- 3646 F11
- 3647 F12
- 3648 F13
- 3649 F13
- 3652 H8
- 3652 H8
- 3653 G11
- 3654 G11
- 3655 G12
- 3656 G12
- 3657 G6
- 3658 H3
- 3659 I8
- 3660 H13
- 3662 H3
- 3663 H11
- 3664 H11
- 3665 H12
- 3667 H12
- 3671 I5
- 3678 I4
- 4601 A8
- 4602 A4
- 5604 A7
- 5605 G5
- 5606 I5
- 7613-1 A13
- 7613-2 C13
- 7615 A5
- 7616-1 D13
- 7616-2 F13
- 7619 G8
- 7621-1 G13
- 7621-2 H13
- 7622 G5
- 7623 G5
- 7624 G4
- 7625 G3
- 7626 H3
- 7629 H3
- 7630 G4
- 7631-1 A13
- 7631-2 C13
- 7632 G5
- 7633 G5
- 7634 G4
- 7635 G4
- 7636 G8
- 7637 G9
- 7638 I9
- 7639 I8

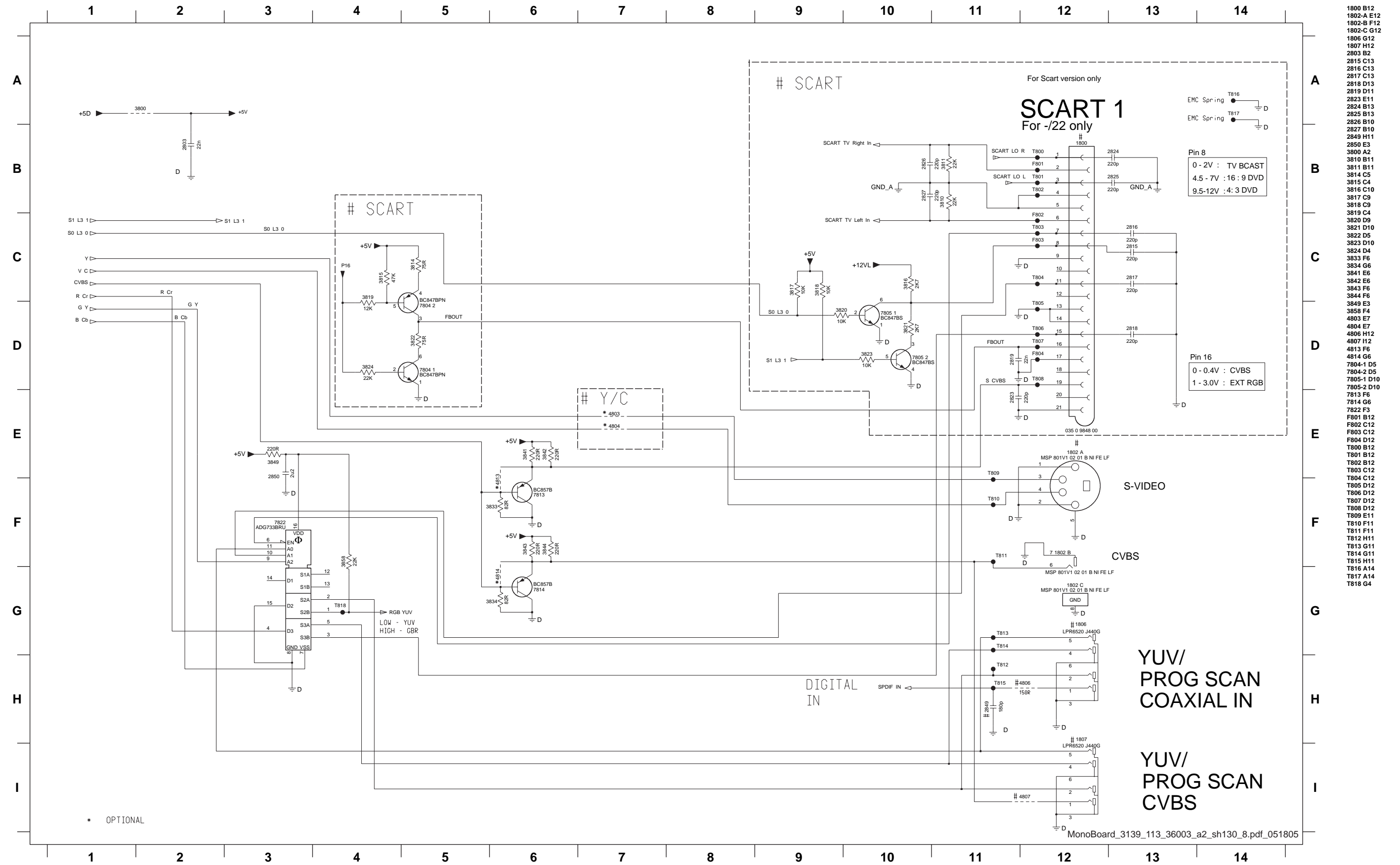
# Mono Board: Circuit Diagram (Part 7)



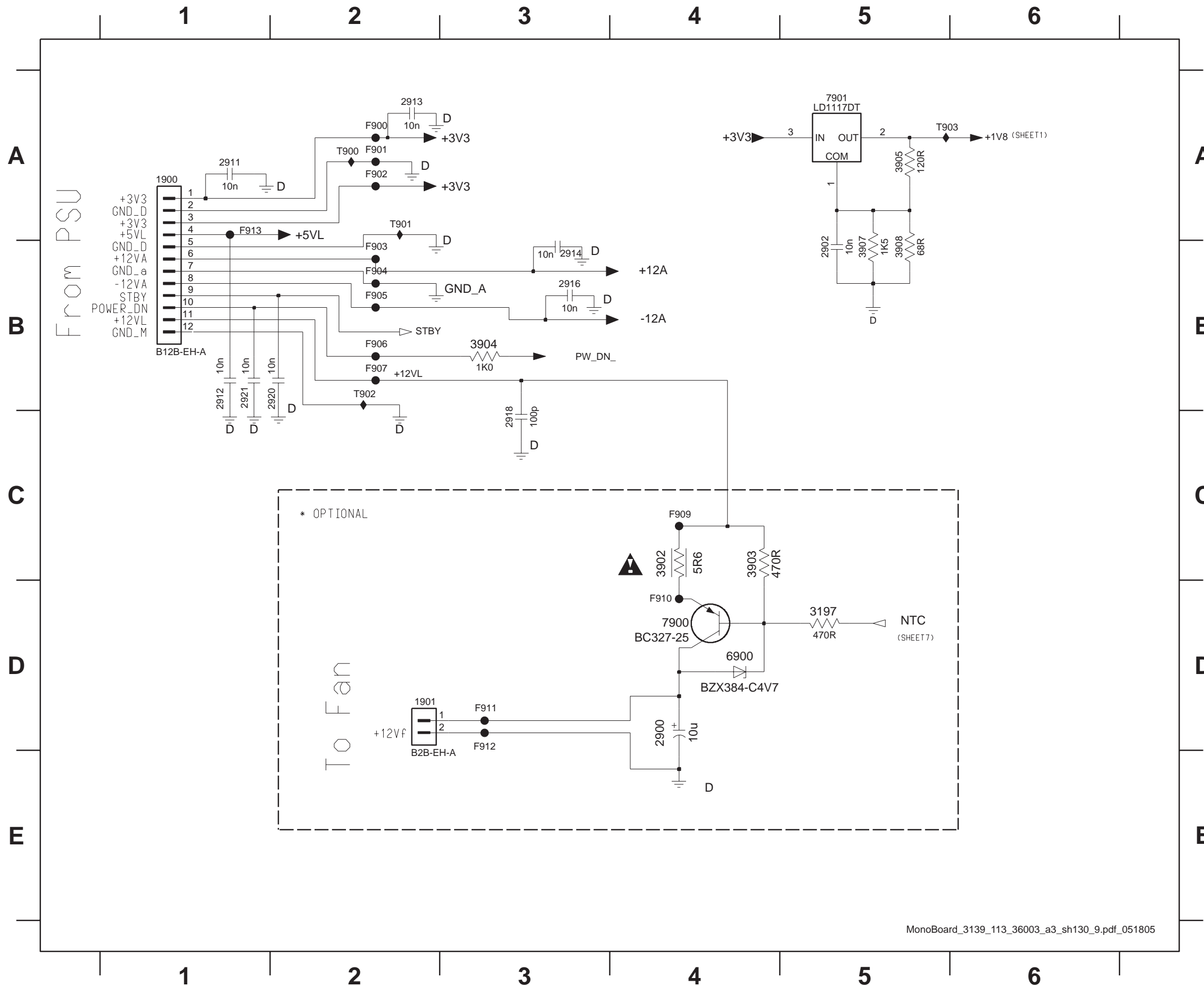
- 2701 E4
- 2702 F4
- 2703 F1
- 2704 F2
- 2705 F3
- 2706 F3
- 2707 F4
- 2712 A7
- 2713 A7
- 2714 B7
- 2715 B7
- 2716 D8
- 2717 F11
- 2718 G12
- 2719 D8
- 2721 G4
- 2722 G1
- 2723 G2
- 2724 G3
- 2725 G3
- 2726 D9
- 2731 C3
- 2732 C3
- 2733 C3
- 2735 D2
- 3701 E4
- 3702 F3
- 3703 F2
- 3704 F2
- 3705 F4
- 3706 C2
- 3721 F4
- 3722 G3
- 3723 G2
- 3724 G2
- 3725 G3
- 3752 A8
- 3754 A8
- 3756 A9
- 3757 A10
- 3758 A11
- 3759 A11
- 3760 B8
- 3762 B8
- 3764 C9
- 3765 C10
- 3766 C11
- 3767 C11
- 3768 D8
- 3770 D8
- 3772 D9
- 3773 D10
- 3774 D11
- 3775 D11
- 3776 F9
- 3778 F8
- 3779 F11
- 3780 F12
- 3781 G14
- 3782 G8
- 3783 G14
- 3785 G10
- 3787 I8
- 3788 H12
- 3790 H10
- 3792 H13
- 3793 F12
- 5701 D2
- 6716 F11
- 6717 F12
- 6718 G13
- 6719 G13
- 6720 G8
- 6721 G8
- 6722 H9
- 6723 I8
- 6724 H11
- 6725 I8
- 6726 H11
- 6727 I9
- 6728 H13
- 7710 C2
- 7711-1 F4
- 7711-2 G4
- 7714 A9
- 7715 A10
- 7716 C9
- 7717 C10
- 7718 D9
- 7719 D10
- 7720 F9
- 7721-1 F11
- 7721-2 F13
- 7723-2 G9
- 7724-2 I9
- 7725 H13
- T256 G13
- T257 H12
- T700 D2
- T701 C3
- T702 C3
- T703 A10
- T704 A10
- T705 B11
- T706 B11
- T707 D11
- T708 D11
- T709 F8
- T710 E4
- T711 G8
- T712 G9
- T713 I8
- T714 I9



# Mono Board: Circuit Diagram(Part 8)

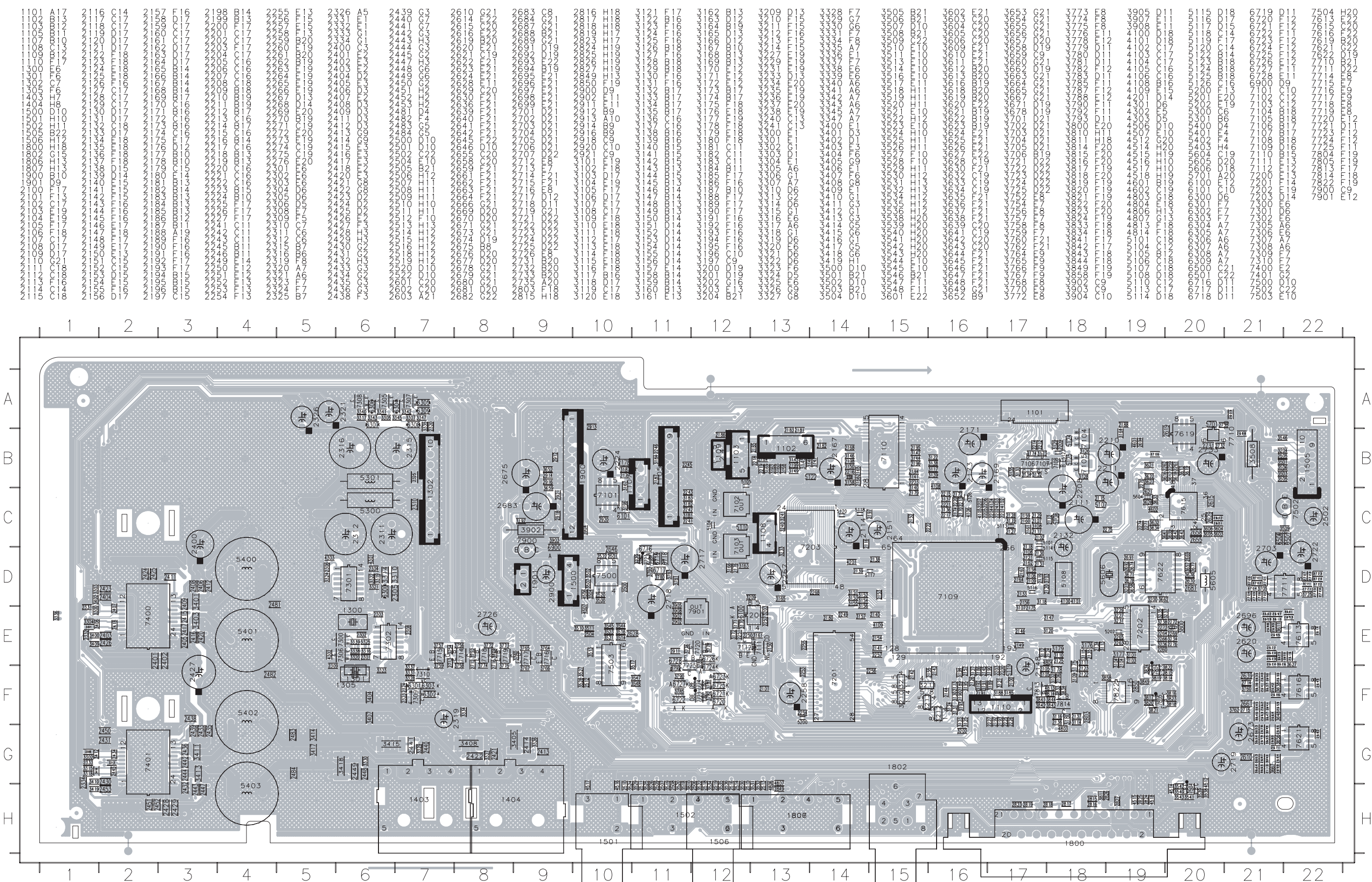


Mono Board: Circuit Diagram (Part 9)



- 1900 A1
- 1901 D2
- 2900 D4
- 2902 B5
- 2911 A1
- 2912 B1
- 2913 A2
- 2914 B3
- 2916 B3
- 2918 C3
- 2920 B2
- 2921 B1
- 3197 D5
- 3902 C4
- 3903 C4
- 3904 B3
- 3905 A5
- 3907 B5
- 3908 B5
- 6900 D4
- 7900 D4
- 7901 A5
- F900 A2
- F901 A2
- F902 A2
- F903 B2
- F904 B2
- F905 B2
- F906 B2
- F907 B2
- F909 C4
- F910 D4
- F911 D3
- F912 D3
- F913 A1
- T900 A2
- T901 B2
- T902 B2
- T903 A5

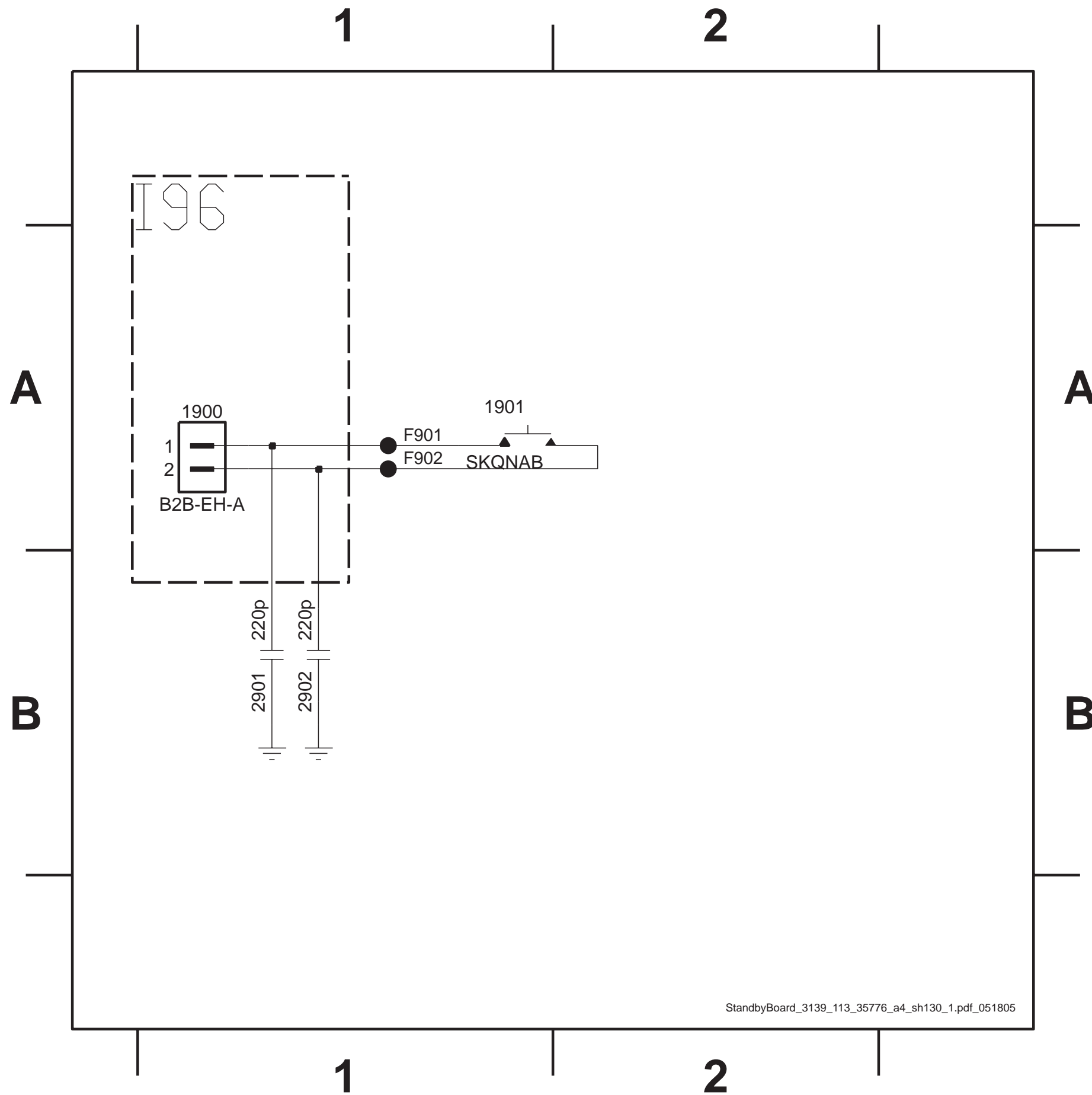
# Layout: Mono Board (Topview)





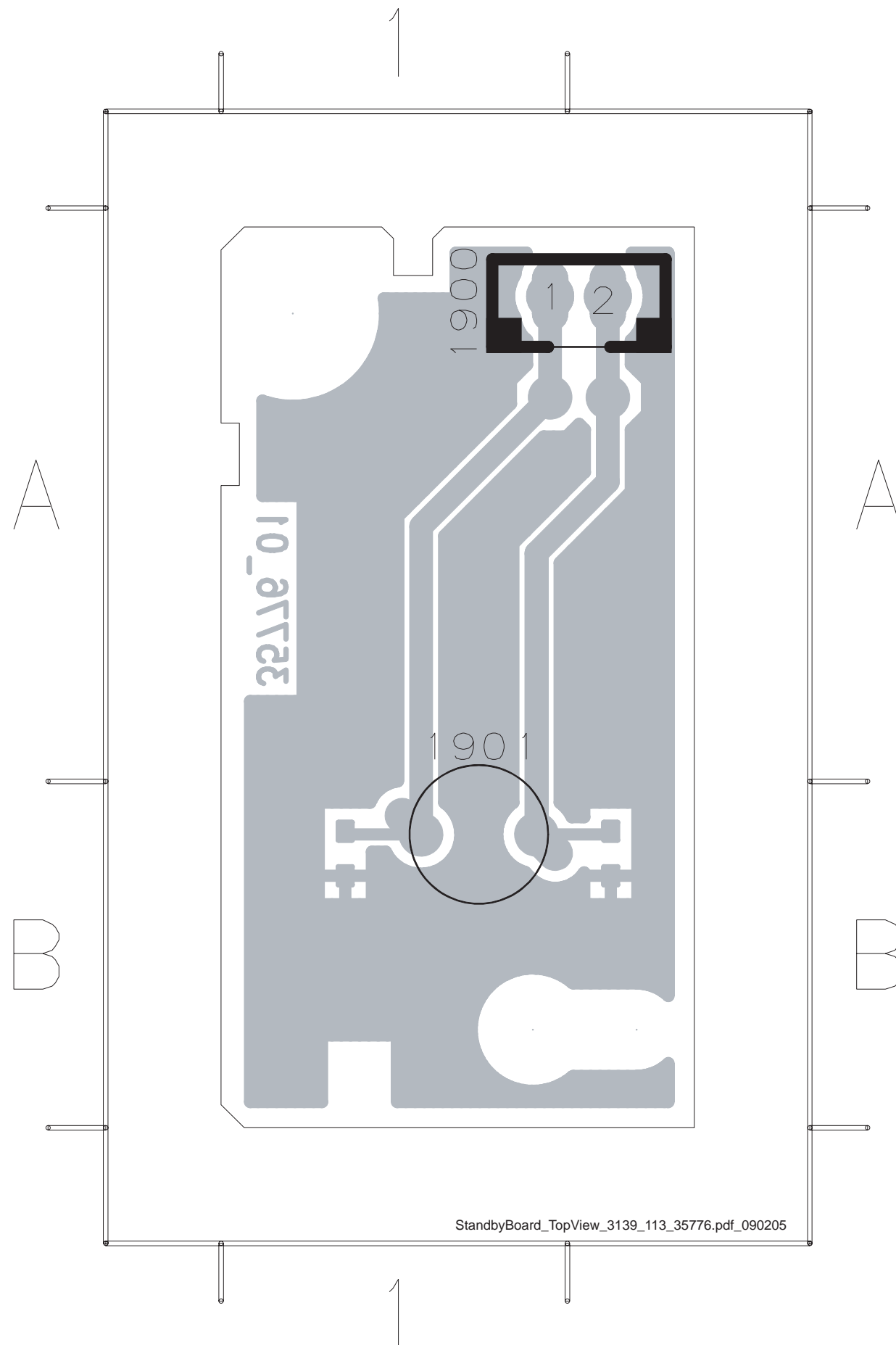


### Standby Board: Circuit Diagram



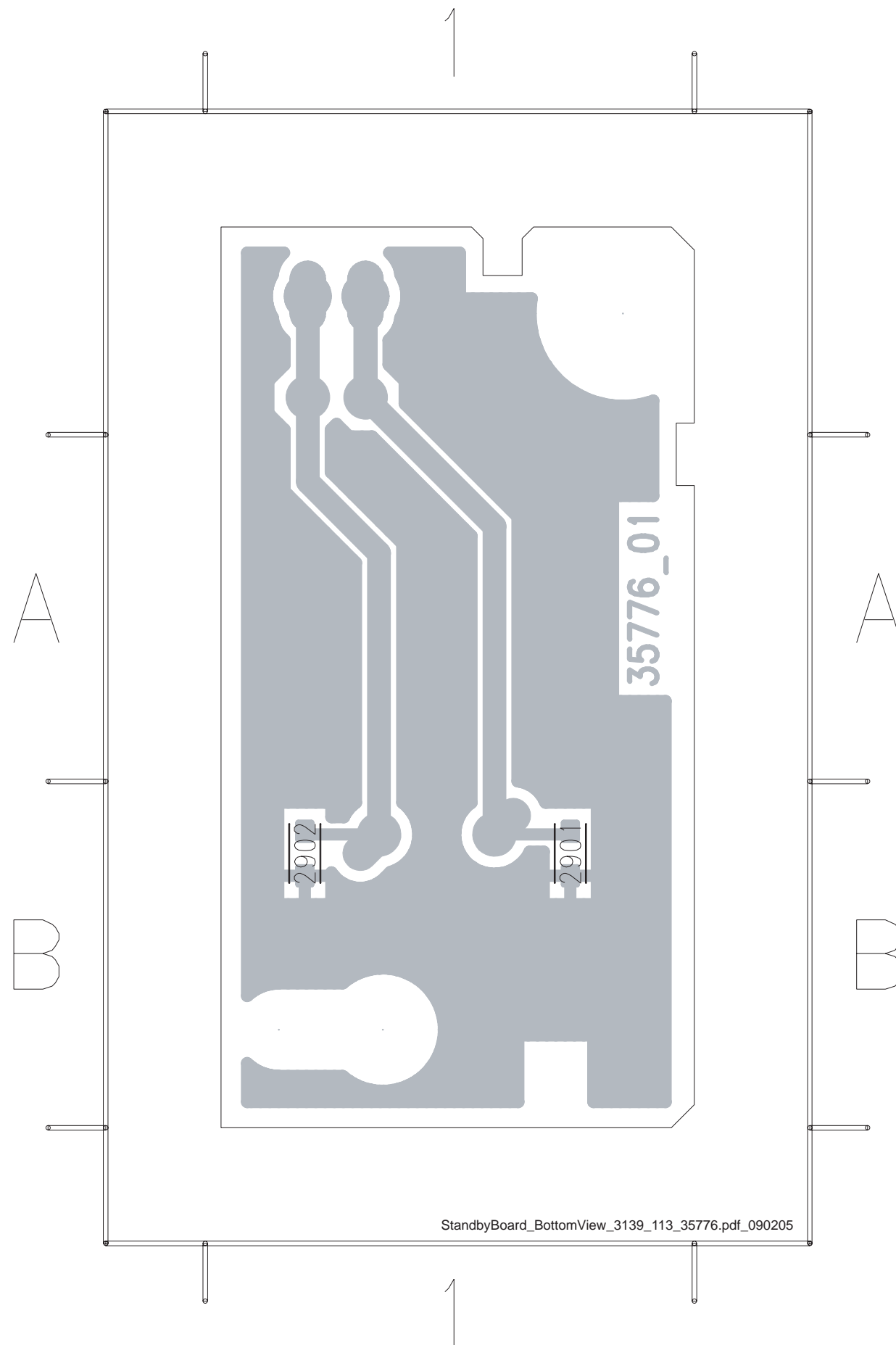
- 1900 A1
- 1901 A1
- 2901 B1
- 2902 B1
- F901 A1
- F902 A1

### Layout: Standby Board (Topview)



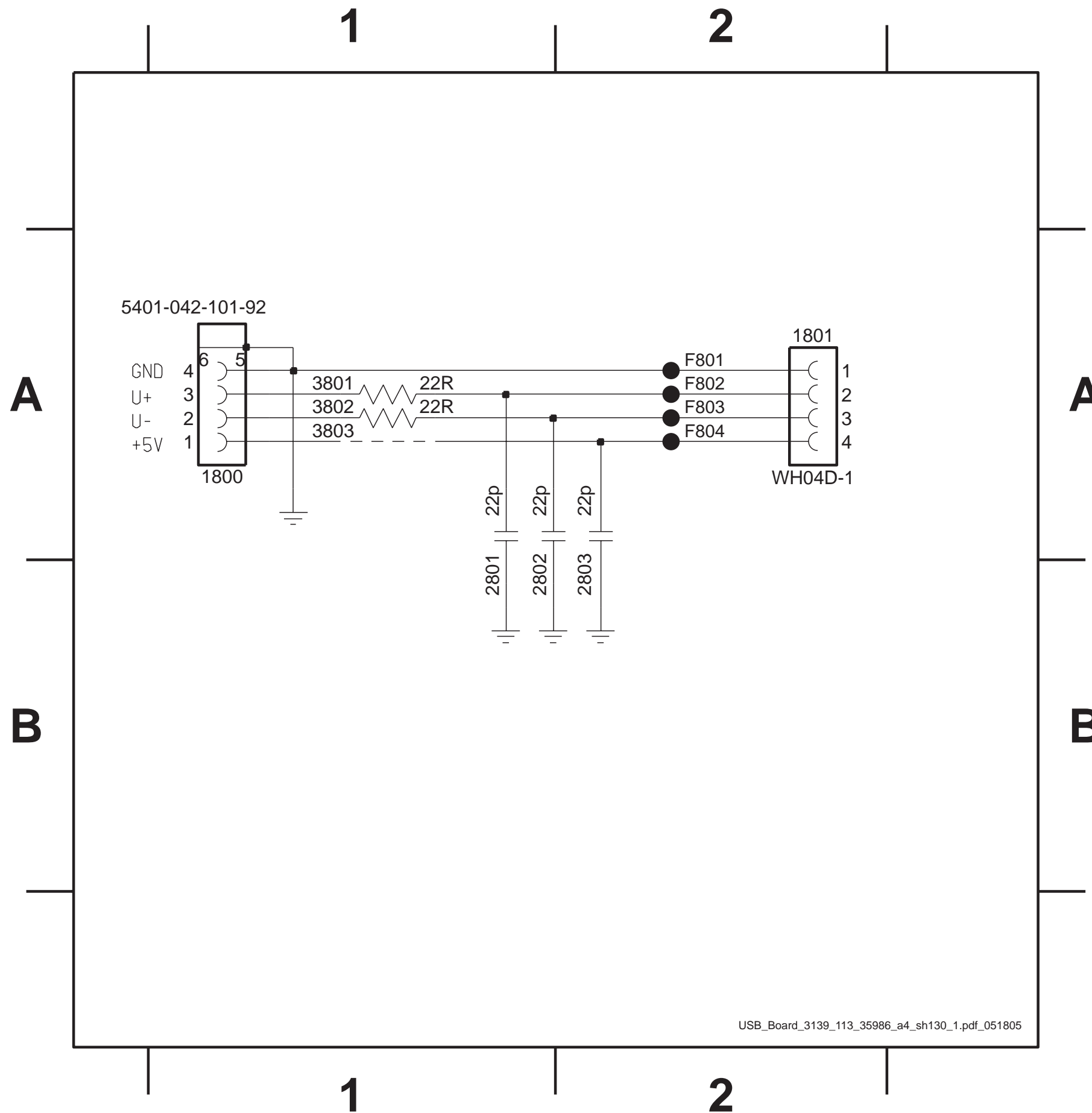
1900 A 1  
1901 A 1

Layout: Standby Board (Bottom view)



2901 B1  
2902 B1

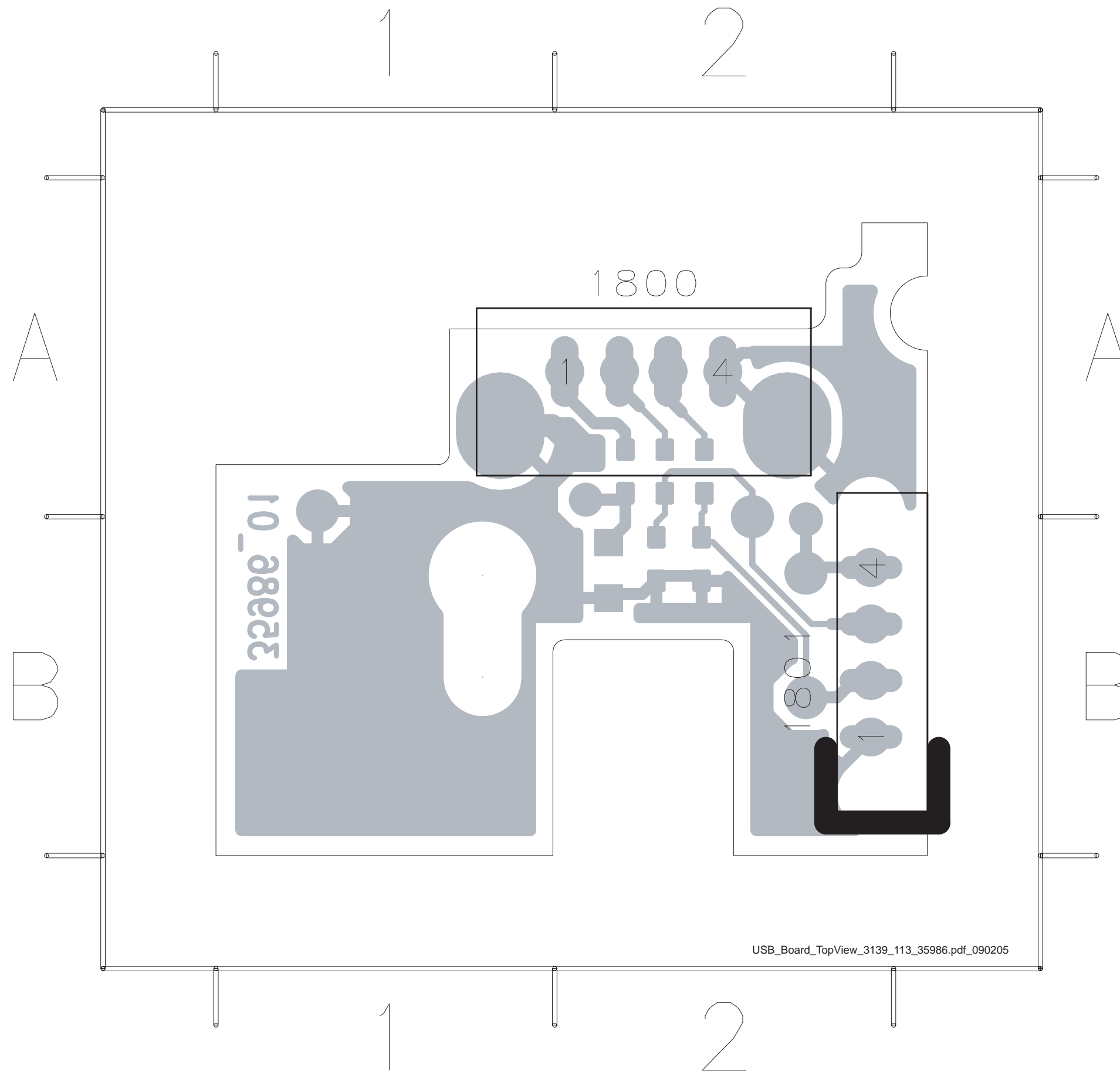
### USB Board: Circuit Diagram



- 1800 A1
- 1801 A2
- 2801 B1
- 2802 B1
- 2803 B2
- 3801 A1
- 3802 A1
- 3803 A1
- F801 A2
- F802 A2
- F803 A2
- F804 A2

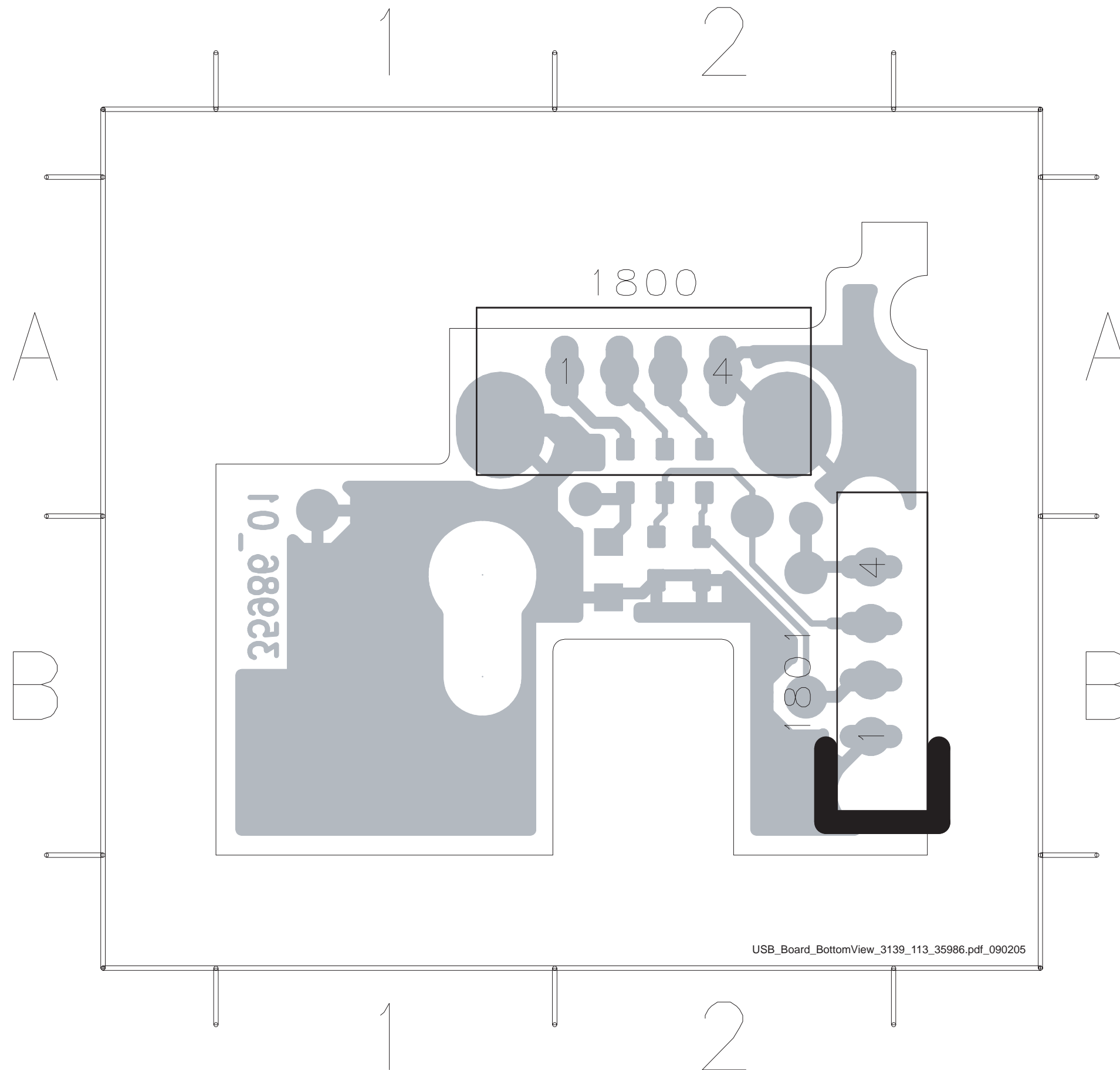


### Layout: USB Board (Topview)



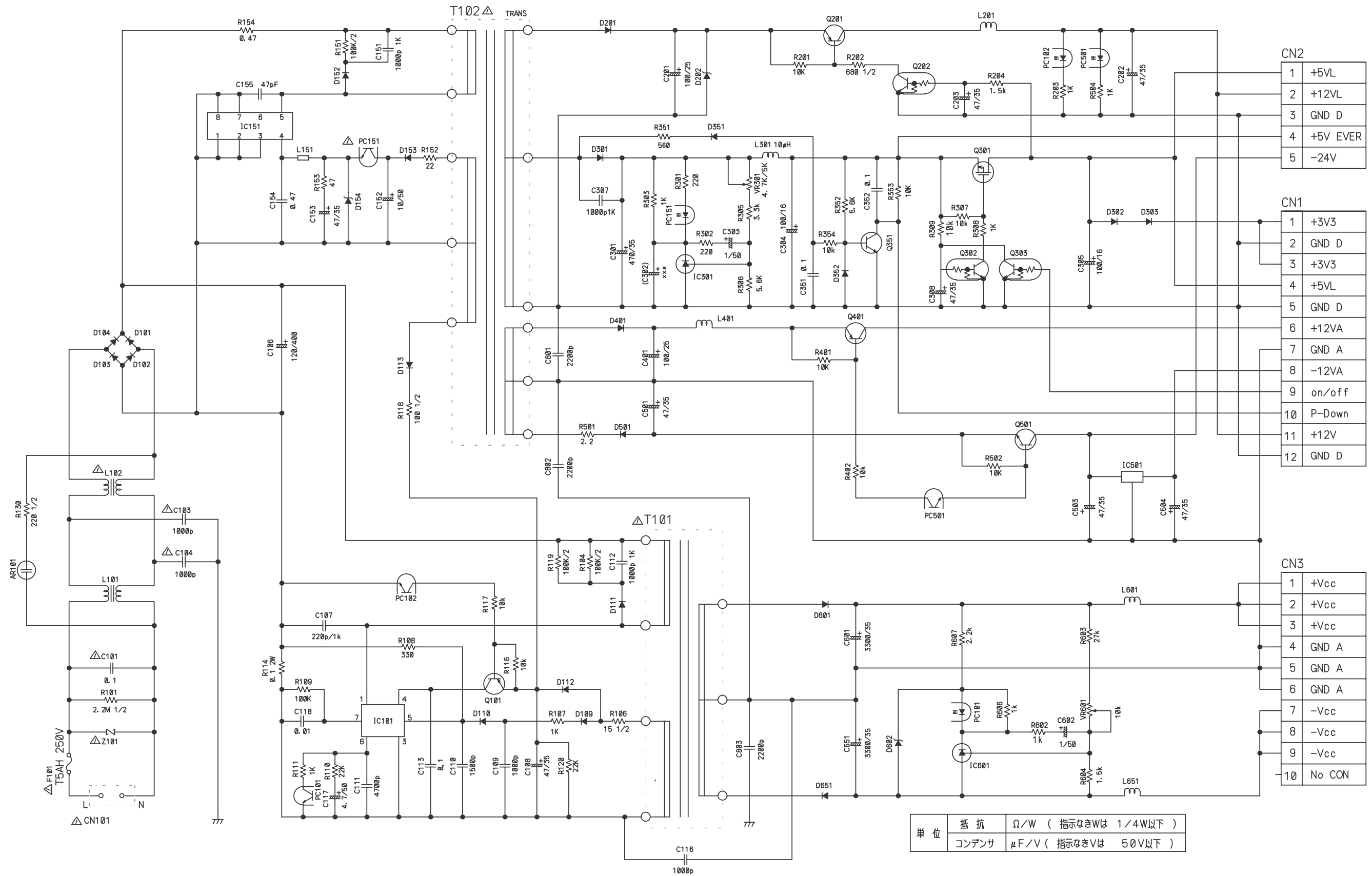
1800 A2  
1801 B2

Layout: USB Board (Bottom view)



1800 A2  
1801 B2

PSU Circuit Diagram (For information only)



CN2

1	+5VL
2	+12VL
3	GND D
4	+5V EVER
5	-24V

CN1

1	+3V3
2	GND D
3	+3V3
4	+5VL
5	GND D
6	+12VA
7	GND A
8	-12VA
9	on/off
10	P-Down
11	+12V
12	GND D

CN3

1	+Vcc
2	+Vcc
3	+Vcc
4	GND A
5	GND A
6	GND A
7	-Vcc
8	-Vcc
9	-Vcc
10	No CON

単位	抵抗	Ω/W (指示なきWは 1/4W以下)
	コンデンサ	μF/V (指示なきVは 50V以下)

( ) : no stuff

**Notes:**

# 9. Exploded View of the Set

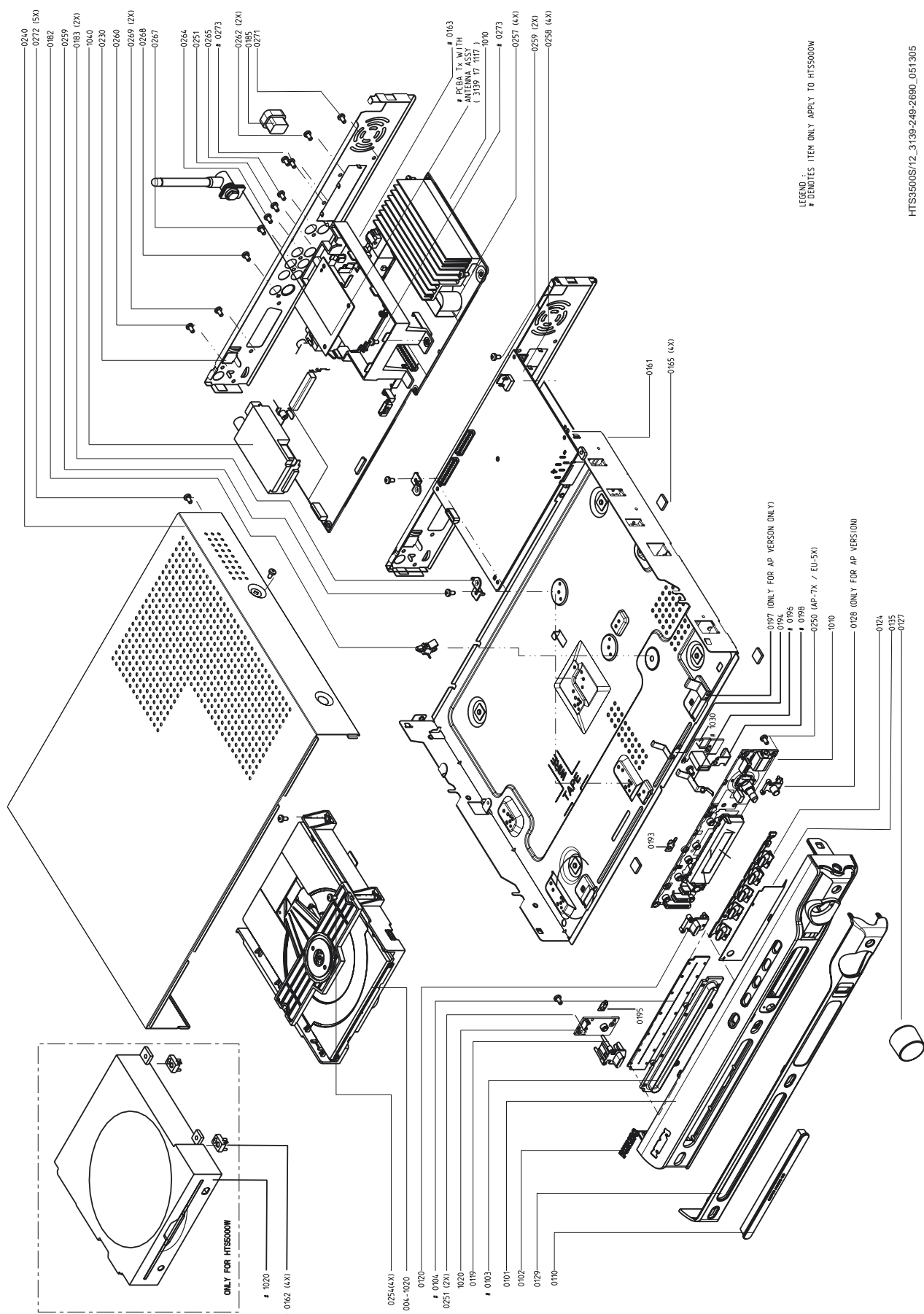
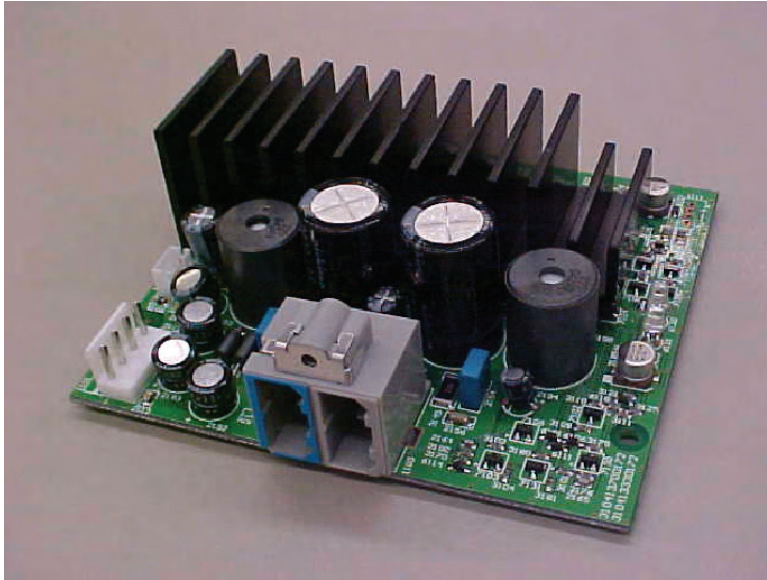


Figure 8-1



## Module PWR 04-01 Non-Wireless (For Information Only)



### 1 Overview - introduction

This wireless audio amplifier is a Stereo 2 x 50 Watt class D amplifier for use in Wireless Audio Sets. The FR4 PCB is build up with through hole components and SMD 0603, 0805 components. Volumecontrol is done with a unidirectional serial signal from the receiver towards the M62429 volumechip. A black extruded AL heatsink (4°C/W) is mounted on the amplifierchip with 2 screws. On board is also all conditioning for the wireless receivermodule from Freesystems. Power supply and interfacing from / to the receiver is done with a 16 pole FFC flexlink. Also on board are 2 LEDs to indicate the operating condition of the amplifier.

### 2 Electrical specification

Rated Power	2 x 50W in 6 Ohm @ 10%THD maximum (FTC)
Sensitivity (2 x 50 W)	0.5 V RMS input for 50Watt into 6 ohm / see annex 1: FTC - power
THD	<0.1% at 1/8 P rated ( each channel separately measured)
Frequency response	flat between 30Hz - 20kHz // +/- 1 dB
Phase	Input and output in phase
Typical DC – supply	+ 27 VDC / -27 VDC & 6VDC
Load output	6 ohm - Both channels should be loaded with 6 ohms to avoid audioholes
Mute input	Active low
Standby input	Active low
Leds	Green = playmode or muted // red is standbymode
Standby output to SMPS	active high (6V unloaded) = SMPS in standbymode
Input impedance	< 20K ohm both channels
Output of amplifier is short circuit proof	
No audible plops at power on or power down	
Operating temperature:	0 to + 45 °C
Storage temperature	-25 to + 80 °C
Pcb material	FR4 / 2 layers / 0603, 0805 & through hole / Dimensions 90 x 100 mm
PB – free components and full pB free processing	

### 3 Key components

class D amplifier: TDA8920BTH / Philips Semiconductor  
 outputfilter: 22µH / 470nF polyester  
 Conditioning preamp: NJM4560 / JRC  
 Volumechip: M62429 / Renesas – Mitsubishi  
 3V3 regulator: MC78FC33 / Motorola  
 Connectors : all JST except speakerconnector  
 Output to speakers: Easyconnector LQR3215-0102F / SMK

#### 4 Introduction & definitions

This amplifier delivers 2 x 50 watts into 6 ohm loads. It is intended for a wireless surround system containing transmitter coupled to a DVD main set and a so called receiver-amplifierunit. Audiotransmission is purely digital and done on 2.4Ghz with "Polaris 2" TX and RX modules from Freesystems.

The amplifier powersupply combination can deliver continuously 1/8 of the 2 x 50 watts into 6 ohm loads. Regarding FTC rules: the amplifier can deliver 1 x 50 Watts in left or right channel for 5 minutes ( only one channel driven) after a period of preheating for 1 hour on 1/8 of 50 watts in each channel.

Full power: 50 Watts in 6 ohm = 17.3 Vrms

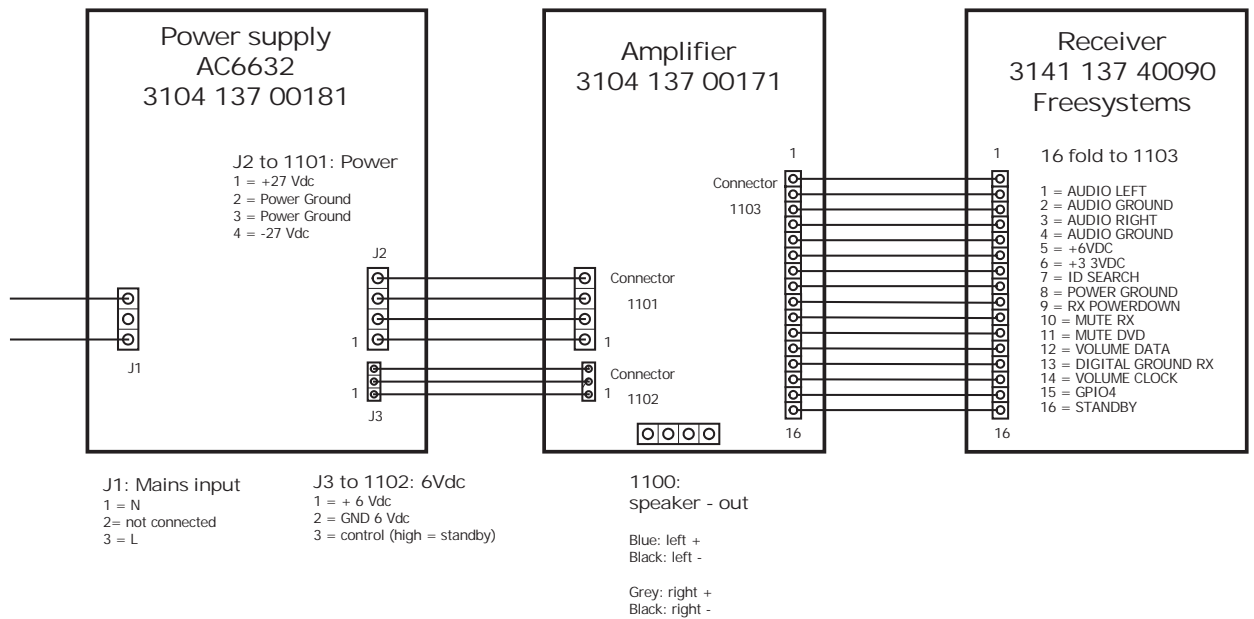
1/8 of full power : 6.25 Watts in 6 ohm = 6.12 Vrms

The amplifier has a built in highpass filter ( around JRC 4560 opamp) and volumecontrol with M62429 chip from Renesas. One has to use the by PSS developed tool to give the correct serial data to the volumechip, otherwise no testing is possible. (testtool 3104 137 00231)

Also, before connecting the amplifier to the power supply and applying inputsignals, be sure that the heatsink is mounted. (in all other cases excessive temp-rise and thermal shutdown of the TDA8920TH is possible)

\*\*\* See below picture / schematic to have an idea how the final receiverset is built up using amplifier 3104 137 0017

Connectiondiagram  
Amplifier - receiver assy HTS5000



## 5 Overview of Testpoints

F1	AUDIO LEFT IN
F2	AUDIO GROUND
F3	AUDIO RIGHT IN
F4	AUDIO GROUND
F5	+6VDC
F6	+3.3VDC
F7	ID SEARCH *
F8	POWER GROUND RX
F9	POWERDOWN *
F10	MUTE RX *
F11	MUTE DVD *
F12	VOLUME DATA
F13	DIGITAL GROUND RX
F14	VOLUME CLOCK
F15	GPIO4 *

F16	STANDBY *
F17	+POWER (27Vdc)
F18	GROUND POWER
F19	-POWER (-27Vdc)
F20	+6VDC IN
F21	GROUND 6Vdc
F22	STBY_OUT
F23	RIGHT OUT SPEAKER
F24	LEFT OUT SPEAKER
F25	GROUND OUT
F26	GREEN LED
F27	RED LED
F28	MUTE ALL
F29	6V DETECT
F30	IN RIGHT

F31	IN LEFT
F32	+5Vdc
F33	VOL_CLK
F34	VOL_DAT
F35	+15Vdc
F36	-15Vdc
F37	IN RIGHT TDA
F38	IN LEFT TDA
F39	MODE AMP
F40	- ANALOG
F41	+ ANALOG
F42	- POWER TDA
F43	+ POWER TDA

F1 to F16 correspond with the pinning of connector 1103

\*F7, F15 are not used in the application

\*F9, F10, F11, F16 are active low signals // see also all info on the Freesystems modules (document PRD017002)

F22 is active high ( high = switch off the main supply +/-27Vdc)

## 6 Test Setup and start up

Input signals are generated by an audio sine-signal generator with  $Z_{out} < 600$  ohms.

Power supply voltages to the PCB:

F17	+POWER (27Vdc)
F18	GROUND POWER
F19	-POWER (-27Vdc)

F20	+6VDC IN
F21	GROUND 6Vdc

Speaker outputs should be loaded with 6 ohm / minimum 50 Watt resistors.

F23	RIGHT OUT SPEAKER
F24	LEFT OUT SPEAKER
F25	GROUND OUT

Use the dedicated PSS testtool **3104 137 00231** to control all inputs of the amplifier.

\*\*\* See annex for more info on 3104 137 00231 \*\*\*\*

Also, the by PSS developed software (serial data – tool) has to be used to control the serial data and clock towards the volumechip. (via DB9 serial cable towards any IBM PC)

DTR = clock = pin 4 of DB9

RTS = DATA = pin 7 of DB9

This testtool has on board loads 50 ohms for the 6Vdc and 100 ohms for the 3.3Vdc.

Two cinch connectors are forseen to connect an audiosource with  $Z_{out} < 600$ ohms

Mute and standby can be simulated on this testboard. ( with switches or with relay's to an automated testsystem)

See overview of testpoints for better understanding.

Best condition is to start every testsequence with F16 ( Standby) and also both Mutelines F10, F11 low. This gives a minimum load startup condition. Initially, at first startup, the volumechip will be on maximum attenuation (-80dB), so no sound will come out of the amplifier. However, after disconnecting and again connecting the amplifier to the powersupply , the volumechip "can" be on the last initial setting, but this is not always the case. So, it is best to load a certain "save" attenuation ( -50dB) towards the amplifier at startup. ( startup = amp muted and / or standby)

Be sure the heatsink is mounted in the correct way.

## 7 DC MEASUREMENTS

Pcb connected to the testtool, all supplies connected as described above

No audioinput signals to the PCB.

F1 an F3 to ground ( Audio inputs)

F10 (standby), F11 (mute DVD), F16 (mute RX) low at startup by use of the switches on the tool

**Static DC measurements.** ( all values Vdc)

	<b>F32 +5Vdc</b>	<b>F35 +15Vdc</b>	<b>F36 -15Vdc</b>	<b>F6 +3.3Vdc</b>	<b>F34 VOL_DAT</b>	<b>F33 VOL_CLOCK</b>	<b>F29 6V DETECT</b>	<b>F9 POWERDOWN</b>
<b>Typical</b>	5.4	15.7	-15.7	3.25	0.3	0.3	0	3.1
Lower Limit	5.2	15	-15	3.1	0	0	0	2.9
Higher Limit	5.6	16.4	-16.4	3.5	0.45	0.45	0.1	3.3

Values below valid if the +5 is 5.4 Vdc typical.

	<b>F30 In Right</b>	<b>F31 In Left</b>	<b>F37 IN Right TDA</b>	<b>F38 IN Left TDA</b>
<b>Typical</b>	2.65	2.65	0	0
Lower Limit	2.2	2.2	-0.1	-0.1
Higher Limit	2.8	2.8	0.1	0.1

Dynamic DC measurements / Mute and Standby. ( all values Vdc)

Condition	F39 MODE AMP	F28 MUTE ALL	F22 STBY OUT	F26 GREEN LED	F27 RED LED	F29 6V DETECT	F9 POWER DOWN	LIMITS
F16 low F10, F11 low (Standby, muted)	0.25	3.2	6	4.22	0.1	0.1	3.1	Typical
	0	2.9	5.7	3.8	0			Lower
	0.4	3.5	6	4.5	0.3			Higher
F16 to 3.3Vdc F10, F11 low (Amp on, but muted)	2.5	3.2	0.1	0.1	4.5	0.1	3.1	Typical
	2.2	2.9	0	0	3.8			Lower
	2.7	3.5	0.3	0.3	4.7			Higher
F16 to 3.3Vdc F10, F11 to 3.3Vdc (Amp on, demuted, playmode)	5	0.1	0.1	0.1	4.5	0.1	3.1	Typical
	4.6	0	0	0	3.8			Lower
	5.3	0.3	0.3	0.3	4.7			Higher
Condition: Amplifier in Play mode  Action: Switch off the + 27v dc supply and check the levels on F39 (MODE_AMP)	2.5							Typical
	2.2							Lower
	2.7							Higher
Condition: Amplifier powered  Action: Connect F9 to ground F13 and check if a puls appears on F29 (this test to be done on samplebase)						Puls 0.7 Vdc 15mSec	0	Typical
						Puls 0.7 Vdc 10mSec	0	Lower
						Puls 0.7 Vdc 20mSec	0	Higher



**Dynamic DC measurements - currentconsumption / Mute and Standby.** ( all values mA DC)  
 ( amplifierpcb loaded with 100 Ohm on F6 (3.3Vdc) and 50 Ohm on F5 (6VDC) // no audio input

Condition	Current in + 27Vdc	Current in - 27Vdc	Current in + 6Vdc	LIMITS
<b>F16 low F10, F11 low (Standby, muted)</b>	<b>13</b>	<b>17</b>	<b>170</b>	<b>Typical</b>
	10	10	160	Lower
	20	22	180	Higher
<b>F16 to 3.3Vdc F10, F11 low (Amp on, but muted)</b>	<b>80</b>	<b>84</b>	<b>173</b>	<b>Typical</b>
	72	75	171	Lower
	87	90	175	Higher
<b>F16 to 3.3Vdc F10, F11 to 3.3Vdc (Amp on, demuted, playmode)</b>	<b>88</b>	<b>80</b>	<b>172</b>	<b>Typical</b>
	80	75	170	Lower
	100	95	175	Higher

**Dynamic DC measurements / Serial communication** ( all values Vdc)  
 The below table is valid if the 5Vdc supply is at its typical value of 5.4Vdc

Condition	F34 VOL_DAT	F33 VOL_CLOCK	F32 +5Vdc	LIMITS
<b>F12 DATA F14 CLOCK To F13 Ground with 330 ohms series resistor</b>	<b>0.3</b>	<b>0.3</b>	<b>5.4</b>	<b>Typical</b>
	0	0	5.6	Lower
	0.45	0.45	5.2	Higher
<b>F12 DATA F14 CLOCK To F6 3.3 Vdc</b>	<b>5.3</b>	<b>5.3</b>	<b>5.4</b>	<b>Typical</b>
	5.1	5.1	5.6	Lower
	5.5	5.5	5.2	Higher

Also read the datasheets of the M62429 for better understanding  
 For good serial communication to the Renesas chip:  
 The "low" level of Data and Clock should be max 0.2 x VCC  
 The "high" level of Data and Clock should be minimum 0.8 x VCC  
 (Reflected to our application: low level < 1.08 Vdc and high level > 4.3Vdc)

## 8 AUDIO MEASUREMENTS

\*\*\* Measurements done with LP filter 24dB / octave / 30kHz except otherwise indicated  
(all voltages are RMS values)

<b>Attenuator M62429 is set to 0dB</b>			
	Input with testtool to 1103 pin 1 and 1103 pin 3	Measure on load of 6 ohm / 50 Watt	
		1100 R_speaker-out	1100 L_speaker-out
<b>SENSITIVITY 1KHz</b>	250 mV	9 V ± 0.25V	9 V ± 0.25V
<b>SENSITIVITY 15kHz</b>	250 mV	9.25 V ± 0.25V	9.25 V ± 0.25V
<b>FREQUENCY RESPONSE</b>		<b>9V = 0dB</b>	<b>9V = 0dB</b>
<b>50Hz</b>	250 mV	-0.7 ± 0.5dB	-0.7 ± 0.5dB
<b>100Hz</b>	250 mV	0 ± 0.5dB	0 ± 0.5dB
<b>1KHz</b>	250 mV	0 ± 0.5dB	0 ± 0.5dB
<b>10KHz</b>	250 mV	0 ± 0.5dB	0 ± 0.5dB
<b>20KHz</b>	250 mV	-0.25 ± 0.5dB	-0.25 ± 0.5dB
<b>DISTORTION @ 1/8 P rated 1KHz</b>	170mV	6.2Vrms THD<0.25%	6.2Vrms THD<0.25%
<b>OUTPUT POWER 1KHz</b>	500 mV RMS	18 Vrms @ THD <=10%	18 Vrms @ THD <=10%
<b>RESIDUAL VOLTAGE (Approx 315 kHz) No filter applied</b>	Input shorted	< 0.7 V	< 0.7 V
<b>RESIDUAL VOLTAGE (filter as above described applied)</b>	Input shorted	< 1 mV	< 1 mV

\*\*\* Measurements done with LP filter 24dB / octave / 30kHz except otherwise indicated  
(all voltages are RMS values)

<b>Inputsignal is set to 500mV 1Khz</b>			
<b>Attenuatorsetting ***</b>	<b>Input with testtool to 1103 pin 1 and 1103 pin 3</b>	<b>Measure on load of 6 ohm / 50 Watt</b>	
		<b>1100 RIGHT speaker out</b>	<b>1100 LEFT speaker out</b>
<b>LEFT &amp; RIGHT 0dB</b>	250 mV	9 V ± 0.25V	9 V ± 0.25V
<b>LEFT 0dB RIGHT -80dB</b>	250 mV	< 5mV	9 V ± 0.25V
<b>RIGHT 0dB LEFT -80dB</b>	250 mV	9 V ± 0.25V	< 5mV
<b>LEFT 0dB RIGHT 6DB</b>	250 mV	4.5 V +/-0.2V	9 V ± 0.25V
<b>LEFT 6dB RIGHT 0DB</b>	250 mV	9 V ± 0.25V	4.5 V +/-0.2V
<b>LEFT -6dB RIGHT -6DB</b>	250 mV	4.5 V +/-0.2V	4.5 V +/-0.2V
<b>LEFT -80dB RIGHT -80DB</b>	250 mV	< 5mV	< 5mV

\*\*\* Use the by PSS delivered software to control the Renesas chip

## 9 Connections

<b>Connector 1100 (Amplifier to Speakers)</b>	
1	out Left +
2	out Left -
3	out Right -
4	out Right +

<b>Blue Left +</b>	<b>Grey Right +</b>
<b>Black Left -</b>	<b>Black Right -</b>

\*\* Since the TDA 8920B is connected "antiphase" at its right and left input, the speakers should also be connected antiphase to obtain good phase behavior. Follow the connections as above described. Note also that Right + and Left - on Connector 1100 are interconnected to ground. This is important when measuring on this outputs

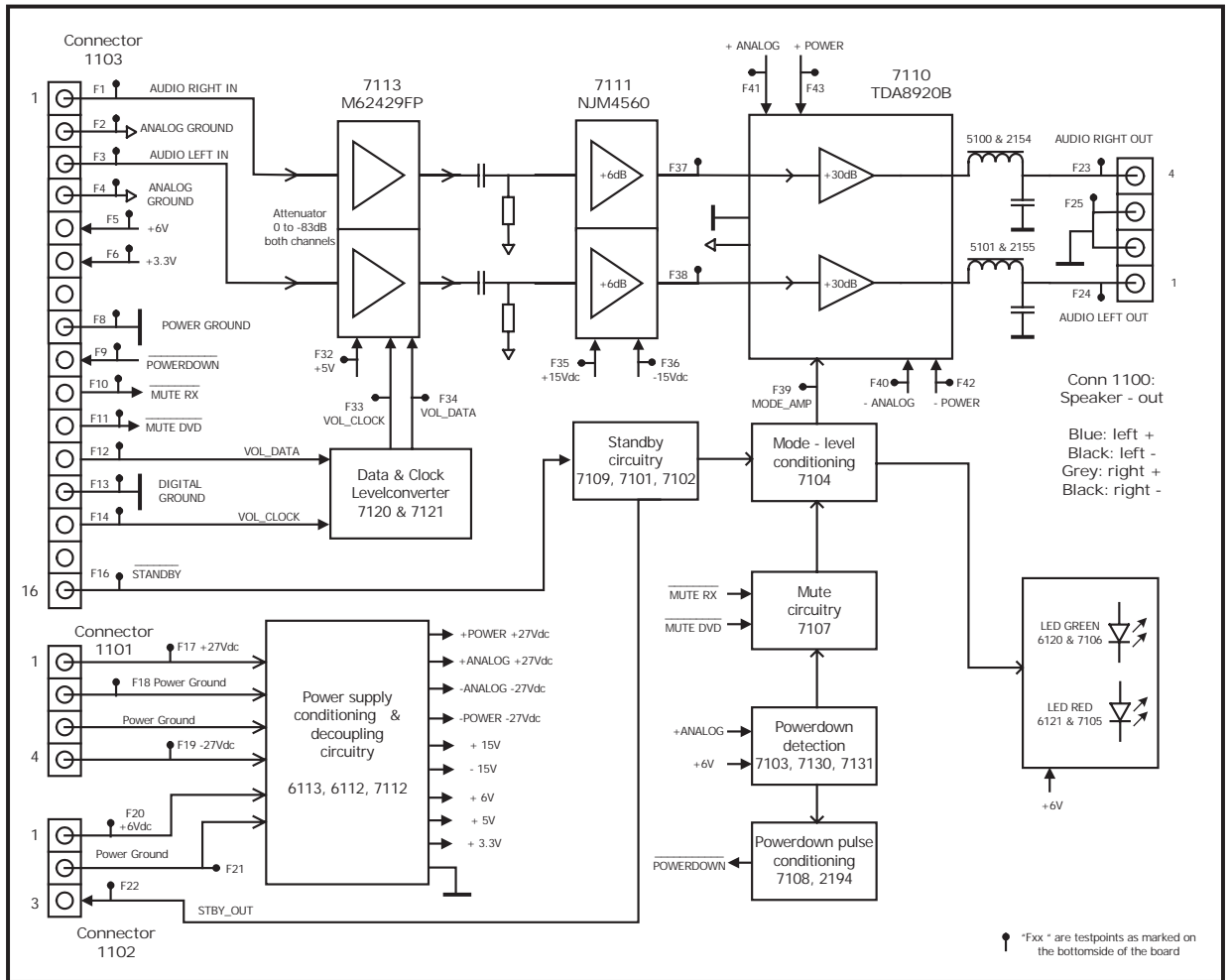
<b>Connector 1101 (Amplifier to SMPS - powersection)</b>	
1	+POWER 27Vdc from AC6632 SMPS / max consumption on this line: 1.4 A
2	GROUND POWER
3	GROUND POWER
4	-POWER -27Vdc from AC6632 SMPS / max consumption on this line: 1.4 A

<b>Connector 1102 (Amplifier to SMPS – 6 Vdc section)</b>	
1	+6VDC IN from AC6632 SMPS / max consumption on this line: 0.2 A
2	GROUND 6Vdc
3	STBY_OUT to the AC6632 supply / active high / High is SMPS off

<b>Connector 1103(Amplifier to Receiver)</b>	
1	<b>AUDIO LEFT IN</b> / maximum is 1Vrms from RX
2	<b>AUDIO GROUND</b>
3	<b>AUDIO RIGHT IN</b> / maximum is 1Vrms from RX
4	<b>AUDIO GROUND</b>
5	<b>+6VDC</b> for the receiver /max consumption is 200mA on this line
6	<b>+3.3VDC</b> / max consumption is 100mA on this line
7	<b>ID SEARCH</b> / Not used*
8	<b>POWER GROUND</b> for RX part
9	<b>POWERDOWN</b> from Amplifierboard / Detection of mains switch off / normal level is 3.2V / Pulse to ground of minimum 15mSec when mains interrupted*
10	<b>MUTE RX</b> / normal 3.3V on this line / groundlevel when mute by RX*
11	<b>MUTE DVD</b> / normal 3.3V on this line / groundlevel when mute by DVD / This command is transmitted from key1 at TX side to GPIO 1 on the RX board.
12	<b>VOLUME DATA</b> / dataline on 3V3 logic level for volumecontrol
13	<b>DIGITAL GROUND RX</b>
14	<b>VOLUME CLOCK</b> / clockline on 3V3 logic level for volumecontrol
15	<b>GPIO4</b> Not used - spare*
16	<b>STANDBY</b> / normal 3.3V on this line / groundlevel when standby by the RX / Normally this line drops low when no signal is received for a time > 4minutes. – timing by the Freesystems board*

10 Block diagram

Audio amplifier board 3104 137 00173



## 11 Mute circuitry

1. Normal operating condition or **PLAY mode**: the voltage on the "mode" pin of the amplifier TDA8920B will be 5Vdc. (level to be checked on F39) This mainly due to the resistors R3125, R3122, R3110 and saturated transistors 7106, 7102). Transistor 7104 and 7101 are not saturated at that moment. The green Led is on.

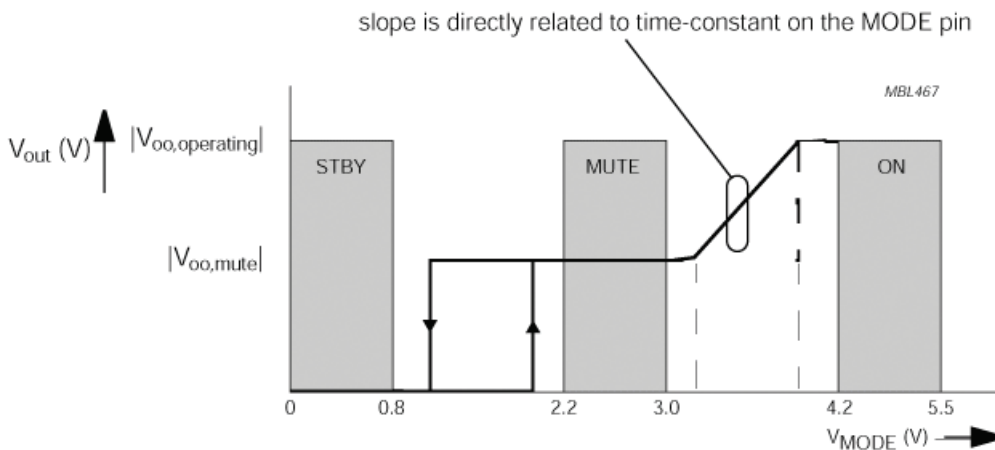
2. Pulling the amplifier into **MUTE condition** can be mainly done by the command MUTE\_RX, MUTE\_DVD or the powerdown mute circuitry around 7130 and 7103.
  - The RX module internally generates MUTE\_RX when e.g. the fieldstrength of the 2.4Ghz carrier is too low or severe multipath reception occurs.
  - MUTE\_DVD is a command generated by the DVD main unit e.g. mute button on the remote or volume "0".
  - When the main supply +/- 27Vdc drops below +/- 15V or when the 6Vdc supply drops below 4.5 V a fast mute command is produced via diodes 6106 and / or 6101 towards 7104. (= this action happens when someone disconnect the unit from the mains)

All "Mute" commands initiate the same fast action via 7107 and 7104 towards the amplifier mode pin. Both main mute commands are active low, and forces the level on the base of 7104 to 0.7Vdc, this results in a saturated 7104.

The powerdown transistors 7103 and 7130 are normally always saturated. At voltage drops, a fast positive level is applied via diodes 6106 and 6101 on the base of 7104, resulting in 2.5Vdc on the mode pin of the amplifier. This avoids pops in the surroundspeakers. The resistors 3125 and 3121 define in this condition the level on the mode pin 6 of 7110 = TDA8920B: about 2.5Vdc. (level to be checked on F39). The slope of then transient between play and mute mode is the result of R3121 and C2185 (see below picture)

When muted, all DC references of the amplifier stay as they were; the class D keeps on oscillating, the status led stays green but no sound is produced on the outputs. The control line (F22; connector 1102-pin 3) to the power supply stays low.

3. **The RX module initiates STANDBY or powersavemode.** When this module does not receive a valid signal for a time > 4minutes (time set in Eeprom of the RX module), pin 16 of 1103 drops low, 7109 saturates and the mode pin of the TDA8920 is pulled low by 7101 to about 0.15V. (level to be checked on F39). At this level the amplifierchip is in standbymode, all references are disabled, the oscillator stops. At the same moment the level on STBY\_OUT becomes high (6Vdc) and disables the main +/- 27Vdc supply. Also the green led is switched off and the red led is switched on. In this condition the average power consumption (with the specified supply AC6632) out of the mains is about 1W @ 230V





4. \*\* Disconnecting the surround amplifier from the mains results in the following: A fast mutecommand is produced by the circuitry around 7103. This helps assuring plopfree operation. At the same moment 7131 saturates and enables an extra load of 47 ohm on the 6Vdc line: result is a clean drop-down of the 6Vdc line. Out of the pulse on the base of 7131, 7108 and C 2194 produce a clean powerdown signal. This powerdown pulse is used by the receiver to start up a powerdown sequence and an additional fast mute on the audiolines of the RX-board. All these additional circuitry assures absolute plop- and glitch free operation in any circumstance.
5. \*\* At start up of the amplifier-receiver combination: there is always a delay on the mode pin of the TDA8920, this is done with R3125 / C2185 (100µF). Result is a plop-free startup.

## 12 Amplifier considerations

The chosen amplifier TDA8920BTH operates on symmetrical  $\pm 27.5$  Vdc and can deliver  $2 \times 50$  Watts into 6 ohm loads. In this application the heat sink, the housing and the power supply have been designed to assure  $2 \times 50$  watts FTC (\*\*\*) or  $2 \times 50$  watts with music-like signals. Class D - technology minimizes the dissipation, thus resulting in an efficient high power amplifier in a rather small housing with limited heatsink. The class - D chip runs on a about 300kHz oscillator, therefore a 12dB / octave output filter is needed for EMI approval (coil 5100, 5101, and caps 2154, 2155)

Right input signals are  $180^\circ$  phase shifted by using the IN1 - (pin 9of 7110) input.

Left input signals are not phase shifted and applied on IN2 +(pin5 of 7110) input.

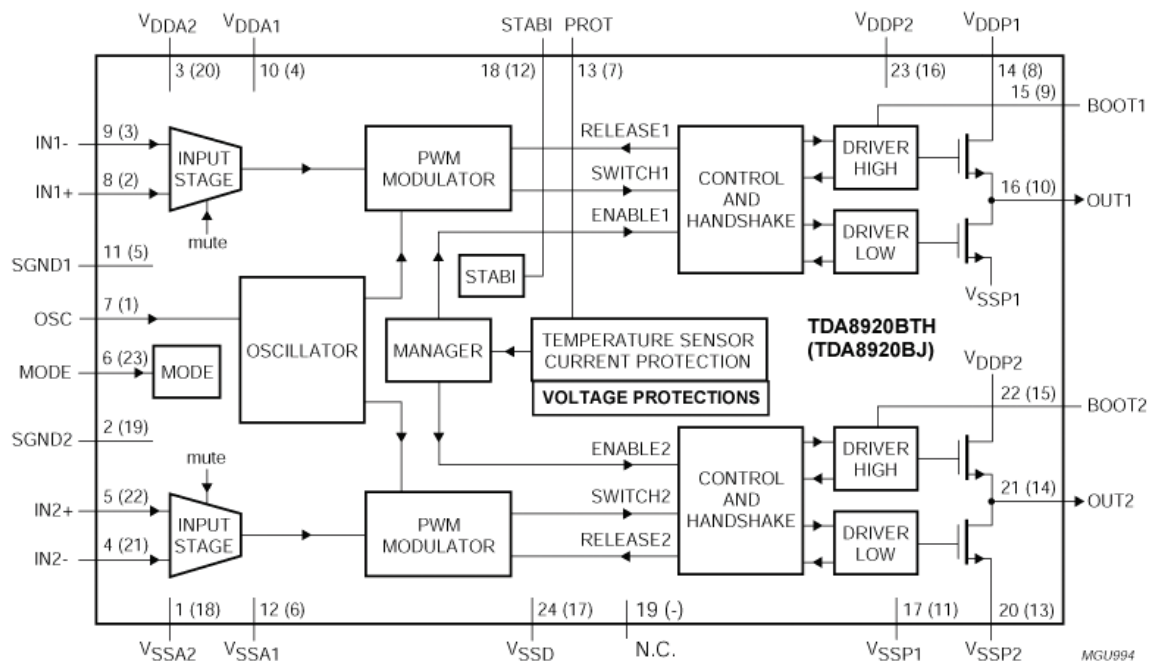
This is not a problem since the speaker connections in plug 1100 are managed in such a way that left and right are again in phase. This configuration is used to have a good balanced current handling of the power supply at low frequencies.

Input signals are filtered in the two-section high pass Sallen Key filter around 7111-1 and 7111-2. The  $-3$  db point is somewhere around 30Hz. This filter section has also an additional 6dB gain to assure good sound balance with the used DVD set. Also notice that a lot of EMI capacitors (100pF – 1nF) are designed in this amplifier board, since the final unit has to pass severe immunity tests up to 2 GHz. Input sensitivity of the amplifier for maximum output when the attenuator chip 7113 is set to 0dB: typical 0.5 Vrms. (see also datasheets concerning this device).

\*\*\* FTC power considerations & definitions.

both loaded channels are preheated for 1 hour at  $1/8$  of rated output power with a 1kHz sinewave. Immediately after follows a 5-min measurement where one channel is driven at specified power (= 50 watts @ max 10% THD) whereas the other channel is not driven. The full power operated channel has to deliver its power for the whole-specified bandwidth for the full 5 minutes. (T-ambient =  $25^\circ\text{C}$ ).

Blockdiagram of TDA8920B



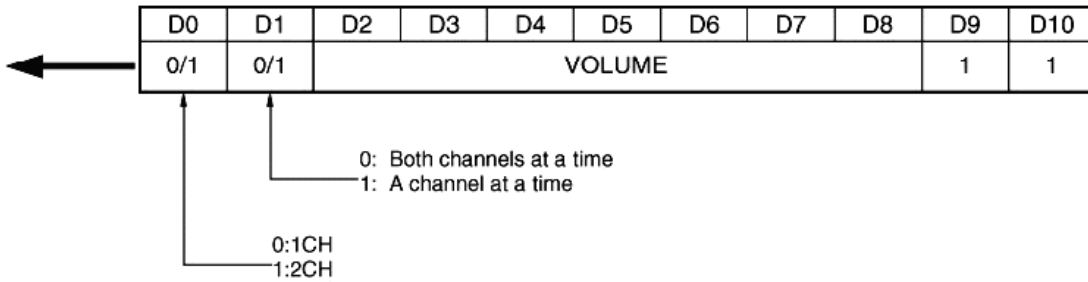
Pin numbers in parenthesis refer to the TDA8920BJ.

**13 Volume chip M62429FP**

A serial driven volumechip is used in the amplifierdesign. Control of this device is fully done by 2 lines out of the RX module. A clock and data signal is coming from pin 12 and 14 of 1103; these lines are on 3.3Vdc logic level. However, the volumechip operates on 5V logic. Therefore, transistors 7120 and 7121 form a level converter. The chip M62429 from Renesas has to receive a serial 10 bits data signal to set the desired attenuation (see below datapattern + volume code)

Note: At start-up the chip is in its initial maximum attenuation of – 83dB // so, when powering up the surroundreceiver with the mains plug, no sound at all will be heard in the speakers. The transmitter in the DVD player has to send a valid volume data and clockstream to the receiver to set a volume. Of course, if the surroundreceiver starts up from standby, the volumesetting will be at its last value (The volumechip is continuously powered from the 5Vdc when the surroundreceiver is in standby condition)

The DVD set sends every 4 seconds the last volumesetting to the receiver, this assures reliable volumesetting under all conditions.

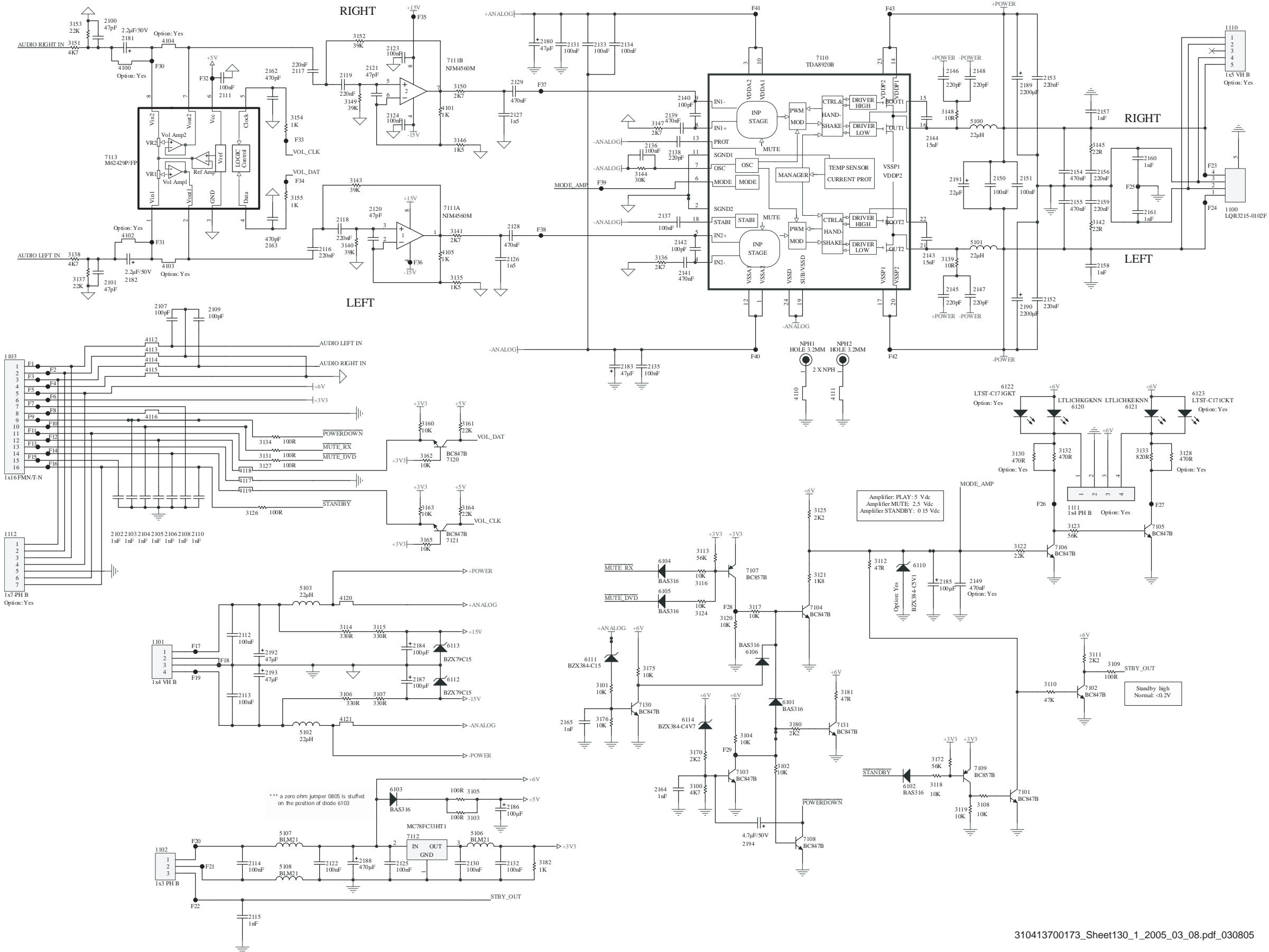


**VOLUME CODE**

ATT1	D2	D3	D4	D5	D6
0dB	H	L	H	L	H
-4dB	L	L	H	L	H
-8dB	H	H	L	L	H
-12dB	L	H	L	L	H
-16dB	H	L	L	L	H
-20dB	L	L	L	L	H
-24dB	H	H	H	H	L
-28dB	L	H	H	H	L
-32dB	H	L	H	H	L
-36dB	L	L	H	H	L
-40dB	H	H	L	H	L
-44dB	L	H	L	H	L
-48dB	H	L	L	H	L
-52dB	L	L	L	H	L
-56dB	H	H	H	L	L
-60dB	L	H	H	L	L
-64dB	H	L	H	L	L
-68dB	L	L	H	L	L
-72dB	H	H	L	L	L
-76dB	L	H	L	L	L
-80dB	H	L	L	L	L
-	L	L	L	L	L

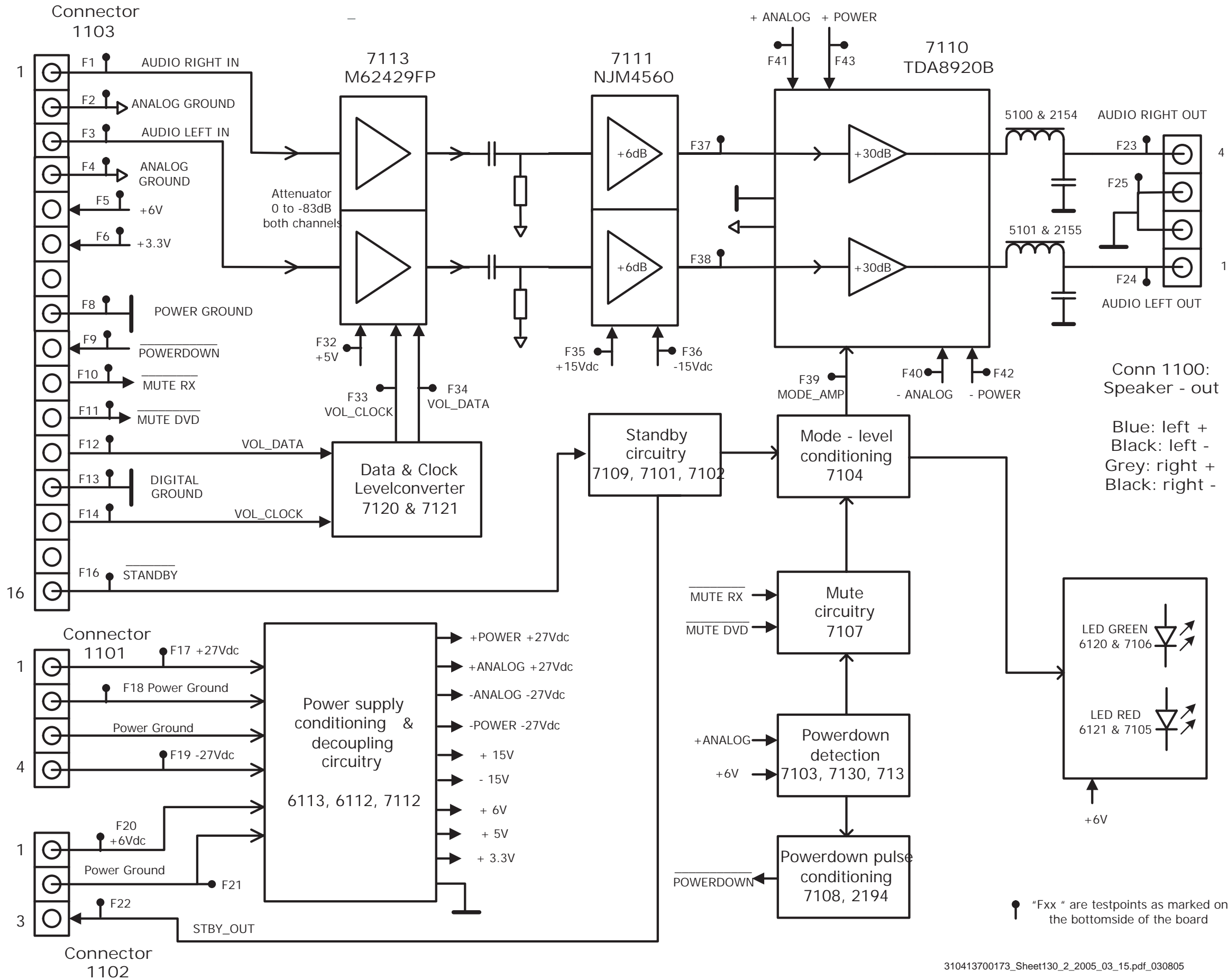
ATT2	D7	D8
0dB	H	H
-1dB	L	H
-2dB	H	L
-3dB	L	L

# Module PWR 04-01 Non-Wireless: Circuit Diagram (Part 1)

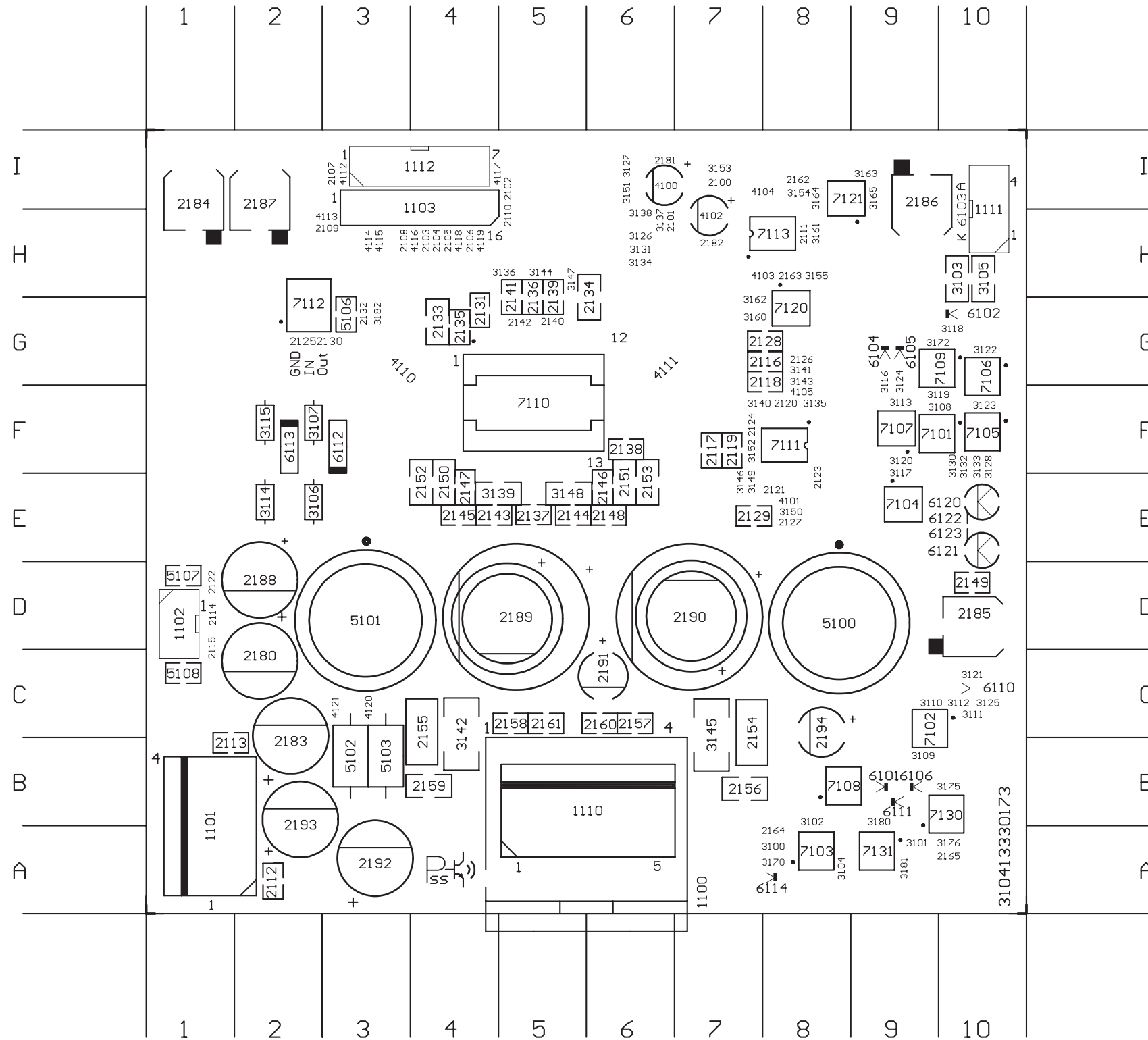


- 1100 B8
- 1101 C2
- 1102 D2
- 1103 B1
- 1110 A8
- 1111 C7
- 1112 C1
- 1100 A1
- 1101 B1
- 1102 C1
- 1103 A1
- 1104 C1
- 1105 C2
- 1106 C2
- 1107 C2
- 1108 C2
- 1109 B2
- 1110 C2
- 1111 C2
- 1112 C2
- 1113 C2
- 1114 C2
- 1115 C2
- 1116 B3
- 1117 A3
- 1118 B3
- 1119 A3
- 1120 B3
- 1121 A3
- 1122 D3
- 1123 A3
- 1124 A3
- 1125 D3
- 1126 B4
- 1127 A4
- 1128 B4
- 1129 A4
- 1130 D3
- 1131 A4
- 1132 D4
- 1133 A4
- 1134 A4
- 1135 B4
- 1136 A5
- 1137 B5
- 1138 A5
- 1139 A5
- 1140 A5
- 1141 B5
- 1142 B5
- 1143 B6
- 1144 A6
- 1145 B6
- 1146 A6
- 1147 B6
- 1148 A6
- 1149 C6
- 1150 A6
- 1151 A7
- 1152 B7
- 1153 A7
- 1154 A7
- 1155 B7
- 1156 A7
- 1157 A7
- 1158 B7
- 1159 B7
- 1160 A7
- 1161 B7
- 1162 A2
- 1163 B2
- 1164 D5
- 1165 D4
- 1166 A4
- 1167 A2
- 1168 B2
- 1169 B4
- 1170 C3
- 1171 B2
- 1172 C6
- 1173 C2
- 1174 C2
- 1175 C2
- 1176 C2
- 1177 C2
- 1178 C2
- 1179 C2
- 1180 C2
- 1181 C2
- 1182 C2
- 1183 C2
- 1184 C2
- 1185 C6
- 1186 D4
- 1187 C3
- 1188 D3
- 1189 A7
- 1190 B7
- 1191 A6
- 1192 C2
- 1193 C2
- 1194 D5
- 1195 D3
- 1196 D3
- 1197 B1
- 1198 B1
- 1199 B1
- 1200 B1
- 1201 B1
- 1202 B1
- 1203 B1
- 1204 B1
- 1205 B1
- 1206 B1
- 1207 B1
- 1208 B1
- 1209 B1
- 1210 B1
- 1211 B1
- 1212 B1
- 1213 B1
- 1214 B1
- 1215 B1
- 1216 B1
- 1217 B1
- 1218 B1
- 1219 B1
- 1220 B1
- 1221 B1
- 1222 B1
- 1223 B1
- 1224 B1
- 1225 B1
- 1226 B1
- 1227 B1
- 1228 B1
- 1229 B1
- 1230 B1
- 1231 B1
- 1232 B1
- 1233 B1
- 1234 B1
- 1235 B1
- 1236 B1
- 1237 B1
- 1238 B1
- 1239 B1
- 1240 B1
- 1241 B1
- 1242 B1
- 1243 B1
- 1244 B1
- 1245 B1
- 1246 B1
- 1247 B1
- 1248 B1
- 1249 B1
- 1250 B1
- 1251 B1
- 1252 B1
- 1253 B1
- 1254 B1
- 1255 B1
- 1256 B1
- 1257 B1
- 1258 B1
- 1259 B1
- 1260 B1
- 1261 B1
- 1262 B1
- 1263 B1
- 1264 B1
- 1265 B1
- 1266 B1
- 1267 B1
- 1268 B1
- 1269 B1
- 1270 B1
- 1271 B1
- 1272 B1
- 1273 B1
- 1274 B1
- 1275 B1
- 1276 B1
- 1277 B1
- 1278 B1
- 1279 B1
- 1280 B1
- 1281 B1
- 1282 B1
- 1283 B1
- 1284 B1
- 1285 B1
- 1286 B1
- 1287 B1
- 1288 B1
- 1289 B1
- 1290 B1
- 1291 B1
- 1292 B1
- 1293 B1
- 1294 B1
- 1295 B1
- 1296 B1
- 1297 B1
- 1298 B1
- 1299 B1
- 1300 B1
- 1301 B1
- 1302 B1
- 1303 B1
- 1304 B1
- 1305 B1
- 1306 B1
- 1307 B1
- 1308 B1
- 1309 B1
- 1310 B1
- 1311 B1
- 1312 B1
- 1313 B1
- 1314 B1
- 1315 B1
- 1316 B1
- 1317 B1
- 1318 B1
- 1319 B1
- 1320 B1
- 1321 B1
- 1322 B1
- 1323 B1
- 1324 B1
- 1325 B1
- 1326 B1
- 1327 B1
- 1328 B1
- 1329 B1
- 1330 B1
- 1331 B1
- 1332 B1
- 1333 B1
- 1334 B1
- 1335 B1
- 1336 B1
- 1337 B1
- 1338 B1
- 1339 B1
- 1340 B1
- 1341 B1
- 1342 B1
- 1343 B1
- 1344 B1
- 1345 B1
- 1346 B1
- 1347 B1
- 1348 B1
- 1349 B1
- 1350 B1
- 1351 B1
- 1352 B1
- 1353 B1
- 1354 B1
- 1355 B1
- 1356 B1
- 1357 B1
- 1358 B1
- 1359 B1
- 1360 B1
- 1361 B1
- 1362 B1
- 1363 B1
- 1364 B1
- 1365 B1
- 1366 B1
- 1367 B1
- 1368 B1
- 1369 B1
- 1370 B1
- 1371 B1
- 1372 B1
- 1373 B1
- 1374 B1
- 1375 B1
- 1376 B1
- 1377 B1
- 1378 B1
- 1379 B1
- 1380 B1
- 1381 B1
- 1382 B1
- 1383 B1
- 1384 B1
- 1385 B1
- 1386 B1
- 1387 B1
- 1388 B1
- 1389 B1
- 1390 B1
- 1391 B1
- 1392 B1
- 1393 B1
- 1394 B1
- 1395 B1
- 1396 B1
- 1397 B1
- 1398 B1
- 1399 B1
- 1400 B1

Module PWR 04-01 Non-Wireless: Circuit Diagram (Part 2)



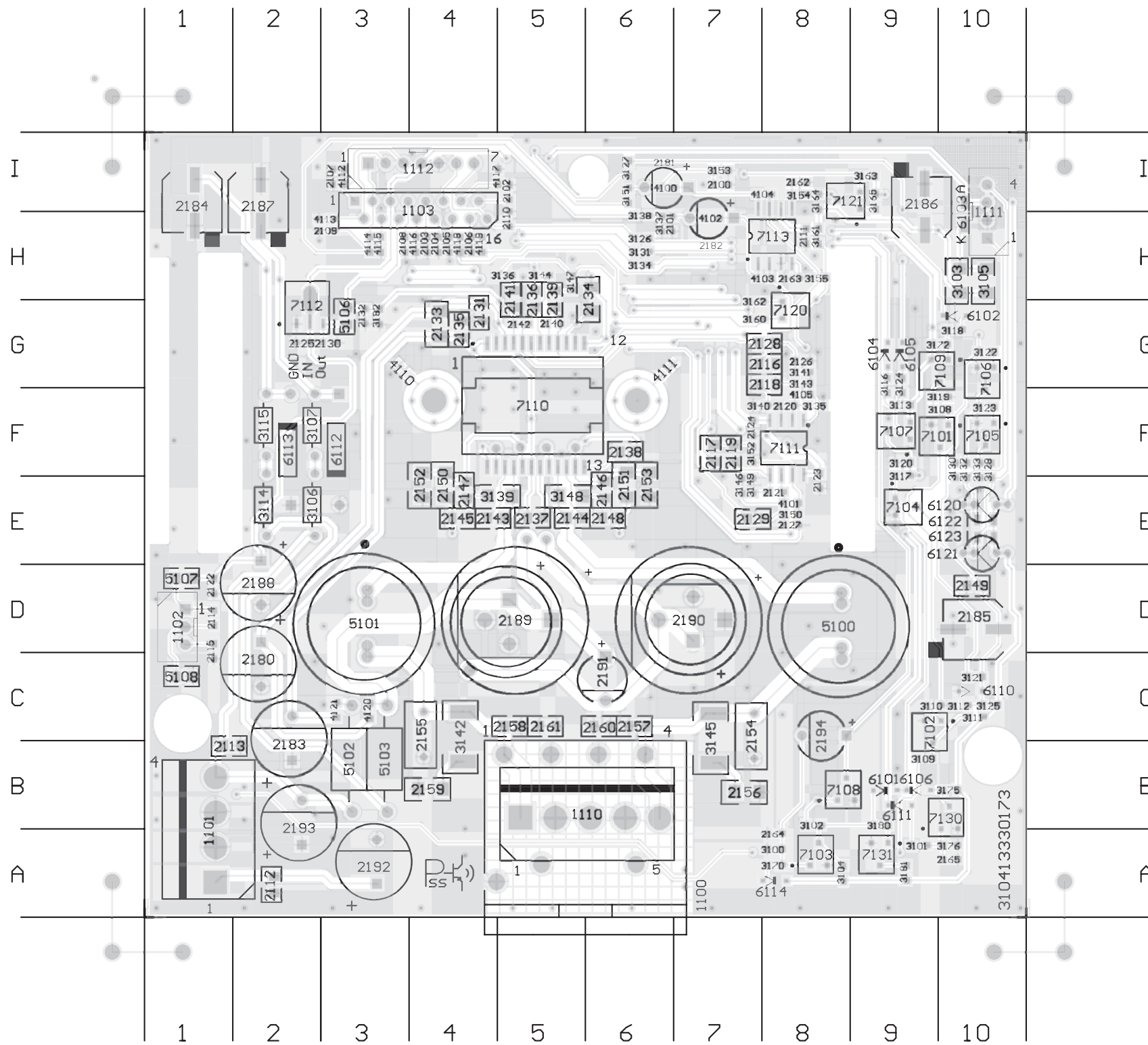
Module PWR 04-01 Non-Wireless: Circuit Diagram (Part 3)



1100 6A	2140 5G	3106 2E	3154 8I	6111 9B	F21 1D
1101 1A	2141 5H	3107 2F	3155 8H	6112 3F	F22 1C
1102 1D	2142 5G	3108 9F	3160 7G	6113 2F	F23 6A
1103 4I	2143 4E	3109 9B	3161 8H	6114 8A	F24 5A
1110 6B	2144 5E	3110 9C	3162 7G	6120 10E	F25 5C
1111 10I	2145 4E	3111 10C	3163 9I	6121 10E	F26 10G
1112 4I	2146 6E	3112 10C	3164 8I	6122 10E	F27 10F
2100 7I	2147 4E	3113 9F	3165 9I	6123 10E	F28 9F
2101 6H	2148 6E	3114 2E	3170 8A	7101 9F	F29 8B
2102 5I	2149 10D	3115 2F	3172 9G	7102 9C	F30 7I
2103 4H	2150 4E	3116 9G	3175 10B	7103 8A	F31 7H
2104 4H	2151 6E	3117 9F	3176 10A	7104 9E	F32 9I
2105 4H	2152 4E	3118 10G	3180 9B	7105 10F	F33 8I
2106 4H	2153 6E	3119 9F	3181 9A	7106 10G	F34 8H
2107 3I	2154 7C	3120 9F	3182 3G	7107 9F	F35 7G
2108 3H	2155 4C	3121 10C	4100 6I	7108 8B	F36 7H
2109 3H	2156 7B	3122 10G	4101 8E	7109 9G	F37 7G
2110 5H	2157 6C	3123 10F	4102 7H	7110 5F	F38 6G
2111 8H	2158 5C	3124 9G	4103 7H	7111 8F	F39 7G
2112 2A	2159 4B	3125 10C	4104 7I	7112 2G	F40 4G
2113 1B	2160 6C	3126 6H	4105 8F	7113 8H	F41 5G
2114 1D	2161 5C	3127 6I	4110 3G	7120 8G	F42 5F
2115 1D	2162 8I	3128 10F	4111 6G	7121 8I	F43 5F
2116 8G	2163 8H	3130 10F	4112 3I	7130 10B	
2117 7F	2164 8A	3131 6H	4113 3H	7131 9A	
2118 8G	2165 10A	3132 10F	4114 3H		
2119 7F	2180 2C	3133 10F	4115 3H		
2120 8F	2181 6I	3134 6H	4116 4H	F1 2I	
2121 8E	2182 7H	3135 8F	4117 4I	F2 2H	
2122 1D	2183 2C	3136 5H	4118 4H	F3 2I	
2123 8E	2184 1I	3137 6H	4119 4H	F4 3H	
2124 7F	2185 10D	3138 6H	4120 3C	F5 3I	
2125 2G	2186 9I	3139 5E	4121 3C	F6 3H	
2126 8G	2187 2I	3140 7F	5100 8D	F7 3I	
2127 8E	2188 2D	3141 8G	5101 3D	F8 4H	
2128 8G	2189 5D	3142 4C	5102 3B	F9 4I	
2129 7E	2190 7D	3143 8G	5103 3B	F10 6H	
2130 3G	2191 6C	3144 5H	5106 3G	F11 4I	
2131 4G	2192 3A	3145 7C	5107 1D	F12 5H	
2132 3G	2193 2B	3146 7E	5108 1C	F13 4I	
2133 4G	2194 8C	3147 5H	6101 9B	F14 5I	
2134 6H	3100 8A	3148 5E	6102 10G	F15 5I	
2135 4G	3101 9A	3149 7E	6103 10H	F16 5I	
2136 5H	3102 8B	3150 8E	6104 9G	F17 1A	
2137 5E	3103 10H	3151 6I	6105 9G	F18 1A	
2138 6F	3104 8A	3152 7F	6106 9B	F19 1B	
2139 5H	3105 10H	3153 7I	6110 10C	F20 1D	



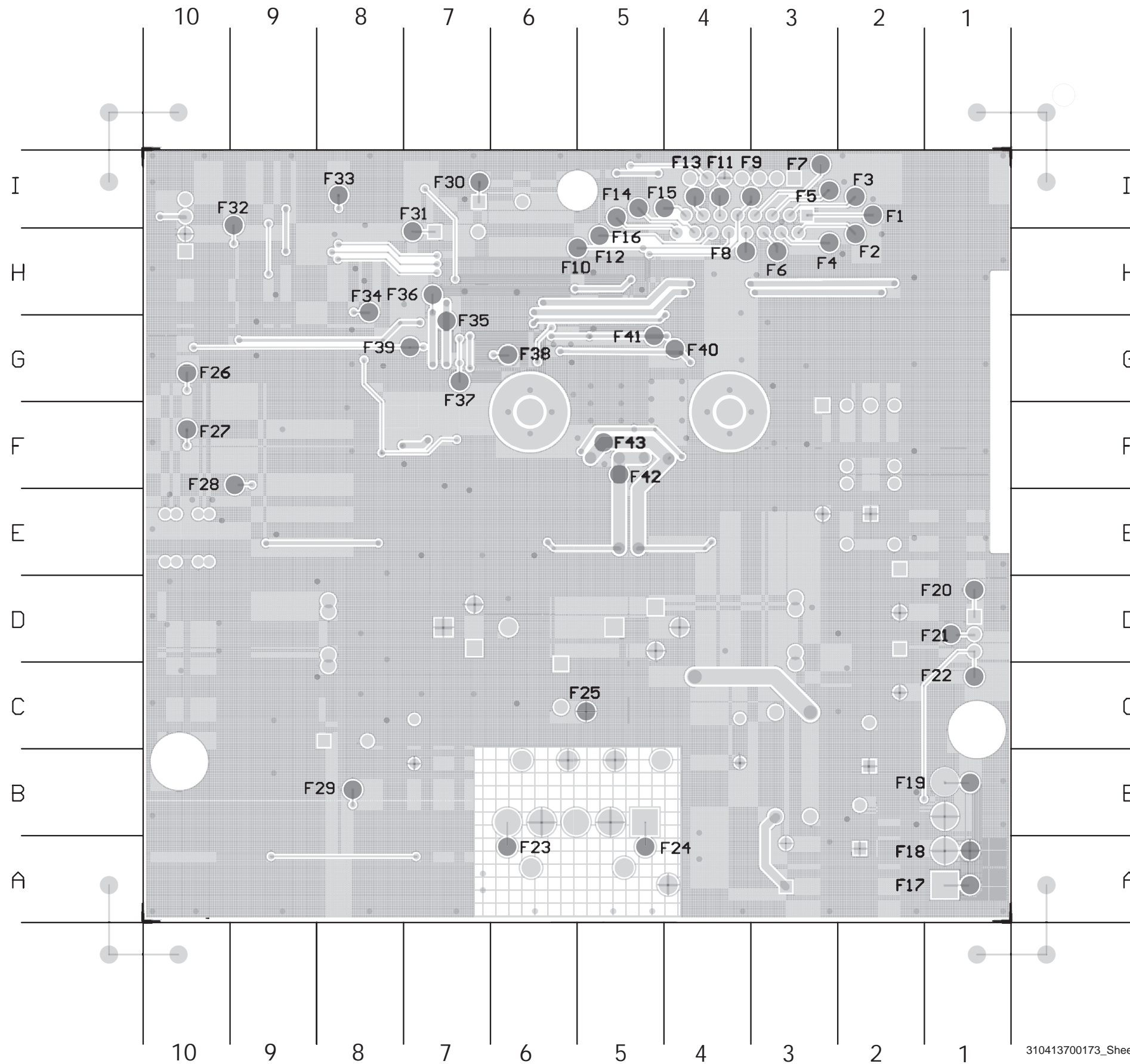
**Layout: Module PWR 04-01 Non-Wireless (Topview)**



1100 6A	2140 5G	3106 2E	3154 8I	6111 9B	F21 1D
1101 1A	2141 5H	3107 2F	3155 8H	6112 3F	F22 1C
1102 1D	2142 5G	3108 9F	3160 7G	6113 2F	F23 6A
1103 4I	2143 4E	3109 9B	3161 8H	6114 8A	F24 5A
1110 6B	2144 5E	3110 9C	3162 7G	6120 10E	F25 5C
1111 10I	2145 4E	3111 10C	3163 9I	6121 10E	F26 10G
1112 4I	2146 6E	3112 10C	3164 8I	6122 10E	F27 10F
2100 7I	2147 4E	3113 9F	3165 9I	6123 10E	F28 9F
2101 6H	2148 6E	3114 2E	3170 8A	7101 9F	F29 8B
2102 5I	2149 10D	3115 2F	3172 9G	7102 9C	F30 7I
2103 4H	2150 4E	3116 9G	3175 10B	7103 8A	F31 7H
2104 4H	2151 6E	3117 9F	3176 10A	7104 9E	F32 9I
2105 4H	2152 4E	3118 10G	3180 9B	7105 10F	F33 8I
2106 4H	2153 6E	3119 9F	3181 9A	7106 10G	F34 8H
2107 3I	2154 7C	3120 9F	3182 3G	7107 9F	F35 7G
2108 3H	2155 4C	3121 10C	4100 6I	7108 8B	F36 7H
2109 3H	2156 7B	3122 10G	4101 8E	7109 9G	F37 7G
2110 5H	2157 6C	3123 10F	4102 7H	7110 5F	F38 6G
2111 8H	2158 5C	3124 9G	4103 7H	7111 8F	F39 7G
2112 2A	2159 4B	3125 10C	4104 7I	7112 2G	F40 4G
2113 1B	2160 6C	3126 6H	4105 8F	7113 8H	F41 5G
2114 1D	2161 5C	3127 6I	4110 3G	7120 8G	F42 5F
2115 1D	2162 8I	3128 10F	4111 6G	7121 8I	F43 5F
2116 8G	2163 8H	3130 10F	4112 3I	7130 10B	
2117 7F	2164 8A	3131 6H	4113 3H	7131 9A	
2118 8G	2165 10A	3132 10F	4114 3H		
2119 7F	2180 2C	3133 10F	4115 3H		
2120 8F	2181 6I	3134 6H	4116 4H	F1 2I	
2121 8E	2182 7H	3135 8F	4117 4I	F2 2H	
2122 1D	2183 2C	3136 5H	4118 4H	F3 2I	
2123 8E	2184 1I	3137 6H	4119 4H	F4 3H	
2124 7F	2185 10D	3138 6H	4120 3C	F5 3I	
2125 2G	2186 9I	3139 5E	4121 3C	F6 3H	
2126 8G	2187 2I	3140 7F	5100 8D	F7 3I	
2127 8E	2188 2D	3141 8G	5101 3D	F8 4H	
2128 8G	2189 5D	3142 4C	5102 3B	F9 4I	
2129 7E	2190 7D	3143 8G	5103 3B	F10 6H	
2130 3G	2191 6C	3144 5H	5106 3G	F11 4I	
2131 4G	2192 3A	3145 7C	5107 1D	F12 5H	
2132 3G	2193 2B	3146 7E	5108 1C	F13 4I	
2133 4G	2194 8C	3147 5H	6101 9B	F14 5I	
2134 6H	3100 8A	3148 5E	6102 10G	F15 5I	
2135 4G	3101 9A	3149 7E	6103 10H	F16 5I	
2136 5H	3102 8B	3150 8E	6104 9G	F17 1A	
2137 5E	3103 10H	3151 6I	6105 9G	F18 1A	
2138 6F	3104 8A	3152 7F	6106 9B	F19 1B	
2139 5H	3105 10H	3153 7I	6110 10C	F20 1D	



Layout: Module PWR 04-01 Non-Wireless (Bottom view)



F1 2I	F21 1D	F41 5G
F2 2H	F22 1C	F42 5F
F3 2I	F23 6A	F43 5F
F4 3H	F24 5A	
F5 3I	F25 5C	
F6 3H	F26 10G	
F7 3I	F27 10F	
F8 4H	F28 9F	
F9 4I	F29 8B	
F10 6H	F30 7I	
F11 4I	F31 7H	
F12 5H	F32 9I	
F13 4I	F33 8I	
F14 5I	F34 8H	
F15 5I	F35 7G	
F16 5I	F36 7H	
F17 1A	F37 7G	
F18 1A	F38 6G	
F19 1B	F39 7G	
F20 1D	F40 4G	

**Notes:**

**HTS5000W/12/51  
MISCELLANEOUS**

0102	3139 247 51831	BADGE PHILIPS ASSY SILVER
0119	3139 244 06041	BUTTON POWER/STANDBY PNT PRT
0120	3139 244 06031	BUTTON OPEN/CLOSE PNT PRT
0124	3139 244 06021	BUTTON SET SOURCE/CTRL PNT PRT
0127	3139 244 06011	KNOB VOLUME CHROME
0129	3139 247 60792	WINDOW DISPLAY EU-USB PRT
0165	3139 243 10080	CUSHION FOOT
0327	3139 247 11491	W.LESS SPK SYSTEM AD908W/12
0331	2422 076 00546	CBLE FM AERIAL 24AWG BK B
0332	2422 549 45386	ANT AM LOOP LAN-011 B
0332	2422 549 45813	ANT AM LOOP 039S20014 B
0333	3139 258 70142	REMOTE CONTROL HTS5000W/12
0336	4822 321 11499 $\Delta$	MAINSCORD 2.0M - EU
0342	2422 076 00468 $\Delta$	CBLE SCART 1M1 SCART 21P BK B
1010	3139 118 58342	PCBA MONO HTS5000W EU
1010	3139 118 58512	PCBA DISPLAY HTS3000S EU
1020	3139 247 11451	LOADER ASSY(TP SONY)HTS5000W
1020	3139 118 58492	PCBA STAND-BY KEY HTS3000S
1030	3139 117 11061 $\Delta$	PCBA PSU 04-01 EU (MITSUMI)
1030	3139 118 58692	PCBAS USB BOARD HTS5000
1040	2422 542 00014	TUN A F ENGO78VVQF EUR B
8001	3139 241 01381	FFC FOIL10P/120/10P AD FOLD
8004	3139 241 01251	FFC 13P/180/13P AD 1MMP FOLD

**BOX SPK ASSY SW-5000HTS/12**

9965 000 30408	SUBWOOFER SPK HTS5000W
9965 000 28375	RUBBER FOOT
9965 000 28376	CABLE A'SSY 5.3M PURPLE SMK

**BOX SPK ASSY CS-5000HTS/12**

9965 000 30409	SPK BOX (FRONT L)
9965 000 30410	SPK BOX (FRONT R)
9965 000 30411	SPK BOX (REAR L)
9965 000 30412	SPK BOX (REAR R)
9965 000 28363	CABLE A'SSY 5.2M WHITE SMK
9965 000 28364	CABLE A'SSY 5.2M RED SMK
9965 000 28365	CABLE A'SSY 5.2M BLUE SMK
9965 000 28366	CABLE A'SSY 5.2M GREY SMK
9965 000 28370	RUBBER FOOT 40LX6WX2.5T
9965 000 30413	SPK BOX (CENTRE)
9965 000 28371	RUBBER FOOT 40.5LX6.0WX1.5T
9965 000 28367	CABLE A'SSY 5.2M GREEN SMK S

**PCBA DISPLAY HTS3000S EU  
MISCELLANEOUS**

1701	3139 111 04131	FTD HUV-08SS57T (LX-3900SA)
1705	2422 129 16836	ROT ENCODER 12P EVEGC2F2012B B
1710	4822 276 13775	SWITCH
1711	4822 276 13775	SWITCH
1712	4822 276 13775	SWITCH
1713	4822 276 13775	SWITCH
1714	4822 276 13775	SWITCH
1716	4822 276 13775	SWITCH
1717	2422 540 98011	RES CER 455KHZ CSB*E B

**DIODES**

6700	9322 179 76676	LED VS LTL-816EELC (LITO) A
6701	9340 548 54115	DIO REG SM PDZ6.2B (PHSE) R
6704	4822 130 11397	BAS316
6705	4822 130 11397	BAS316
6706	4822 130 11397	BAS316
6707	4822 130 11397	BAS316
6708	4822 130 11397	BAS316
6709	4822 130 11397	BAS316
6710	4822 130 11397	BAS316
6711	4822 130 11397	BAS316
6712	4822 130 11397	BAS316
6713	4822 130 11397	BAS316
6714	4822 130 11397	BAS316
6715	4822 130 11397	BAS316
6716	4822 130 11397	BAS316
6717	4822 130 11397	BAS316
6718	4822 130 11397	BAS316
6719	4822 130 11397	BAS316
6720	4822 130 11397	BAS316

**TRANSISTORS & INTEGRATED CIRCUITS**

7701	9322 185 95667	IR RECEIVER TSOP4836 (VISH)L
7704	5322 130 60159	BC846B
7705	4822 130 42804	BC817-25
7706	4822 130 60373	BC856B
7707	5322 130 60159	BC846B
7708	9322 217 04671	IC SM V63111LF (VAIT) Y

**PCBA STAND-BY KEY HTS3000S**

1901	4822 276 13775	SWITCH
------	----------------	--------