

Service  
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# Service Manual



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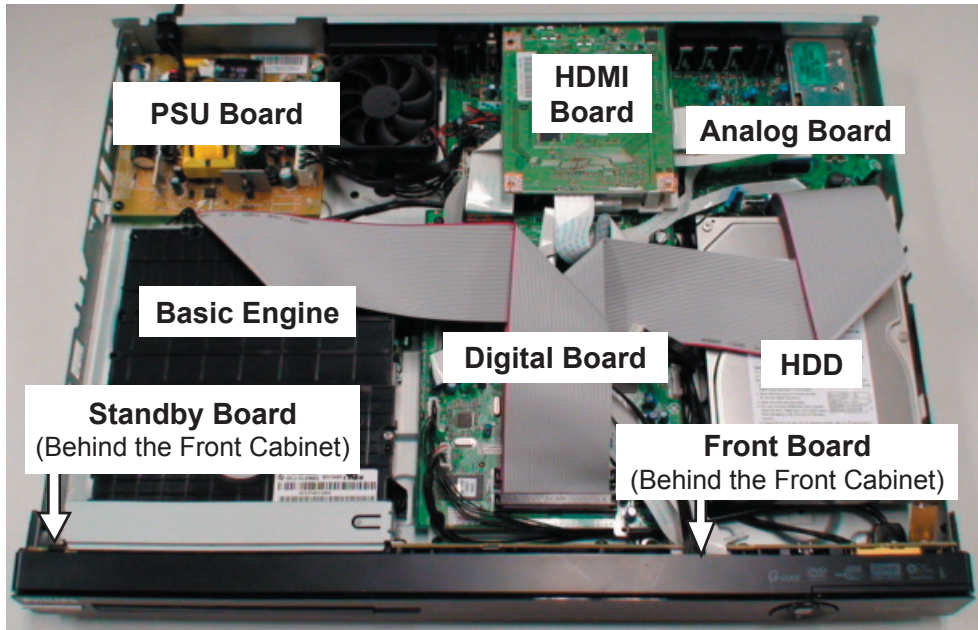
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# 1. Technical Specifications and Connection Facilities

## 1.1 PCB Locations



### 1.2 General:

Power supply	: 220-240V, ~50 Hz
Power consumption	: 35 W
Standby power consumption	: < 3.7 W

#### Audio analogue Mono :

Frequency Response relative to 1 kHz	: 0 ± 3dB (100 Hz to 12 kHz)
S/N unweighted	: ≥ 40dB (Quasi peak, 22 Hz – 22 kHz)
S/N weighted	: ≥ 45dB (Quasi peak, CCIR 468)
Harmonic distortion at 1 kHz	: ≤ 1.5% (FM: ± 25 kHz)
Harmonic distortion at 1 kHz	: ≤ 2 % (AM: m = 54% L/L')

### 1.3 RF Tuner (Analogue)

Test equipment: Fluke 54200 TV Signal generator  
 Test streams: Philips Standard test pattern

#### 1.3.1 System

B/G, I, L/L', D/K

#### Audio NICAM Stereo/Dual :

Frequency Response relative to 1 kHz	: 0 ± 3dB (40 Hz to 15 kHz)
S/N unweighted	: ≥ 65dB (Quasi peak, 22 Hz – 22 kHz)
S/N weighted	: ≥ 70dB (Quasi peak, CCIR 468)
Harmonic distortion at 1 kHz	: ≤ 0.5% (Headroom: System I – 21.1dB, all others – 16.5dB)
Channel Separation	: ≥ 45dB

#### 1.3.2 RF - Loop Through:

Frequency range	: 43 MHz – 860 MHz
Gain (ANT IN – ANT OUT) without amplifier	: -4dB ± 2dB
Gain (ANT IN – ANT OUT) with amplifier	: From 2dB + 3dB until 2dB – 2dB

#### 1.3.4 Tuning

Tuning Frequency Range	: 45.25 MHz – 857 MHz
Antenna Level for 40dB luminance	
S/N (video unweighted) at 75Ω	: ≤ 40dBμV (High End) ≤ 60dBμV (Low End)

#### 1.3.3 Receiver:

Output of Cinch connector to be used for measurements (direct output from front end)

##### Video Performance:

Frequency Response	: 0 ± 4dB (0 to 4.4 MHz)
Group Delay	: 0 ± 150 n sec (0 to 4.4 MHz)

##### Automatic Search Tuning:

Scanning time auto search without RF Signal	: < 2.5 min. (Typical 3 minutes)
Stop level (vision carrier)	: ≥ 40dBμV
Maximum tuning error during operation (drift)	: ± 100 kHz
Maximum tuning error of a recalled program :	± 62.5 kHz
Tuning Principles:	
Automatic system recognition	

##### Audio Performance:

Manual Selection in "Store" mode  
Storage of frequencies at each random position number

**1.4 Analog Inputs / Outputs**

**1.4.1 Audio/Video Front Input Connectors**

**(CAM 1) AUDIO – Cinch (L/R):**

Input voltage : 2.2Vrms max  
Input impedance : > 10kΩ

**(CAM1) VIDEO – Cinch:**

Input voltage : 1Vpp ± 3dB  
Input impedance : 75Ω

**1.4.2 Audio/Video Rear Input Connectors**

**AUDIO IN (AUDIO 1/2) – Cinch (L/R):**

Input voltage : 2.2Vrms max  
Input impedance : > 10kΩ

**CVBS IN (VIDEO IN) – Cinch:**

Input voltage : 1Vpp ± 3dB  
Input impedance : 75Ω

**S-VIDEO IN (VIDEO IN) – Hosiden:**

According to IEC 933-5  
Superimposed DC-level on pin 4 (load > 100kΩ)  
< 2.4V is detected as 4:3 aspect ratio  
> 3.5V is detected as 16:9 aspect ratio

Input voltage Y : 1Vpp ± 3dB  
Input impedance Y : 75Ω  
Input voltage C : 300mVpp ± 3dB  
Input impedance C : 75Ω

**COMPONENT VIDEO IN – Cinch (Y/Pb/Pr):**

According to EIO-770-1-A, EIA-770-2

**1.4.3 Audio/Video Output Connectors**

**(AUDIO OUT) AUDIO – Cinch (L/R):**

Output voltage : 2Vrms max  
Output impedance : > 10kΩ

**(VIDEO OUT) CVBS OUT– Cinch:**

Output voltage : 1Vpp ± 3dB  
Output impedance : 75Ω

**(VIDEO OUT) S-VIDEO OUT - Hosiden:**

According to IEC 933-5  
Superimposed DC-level on pin 4 (load > 100kΩ)  
< 2.4V is detected as 4:3 aspect ratio  
> 3.5V is detected as 16:9 aspect ratio

Output voltage Y : 1Vpp ± 3dB  
Output impedance Y : 75Ω  
Output voltage C : 300mVpp ± 3dB  
Output impedance C : 75Ω

**COMPONENT VIDEO OUT – Cinch (Y/Pb/Pr):**

According to EIA-770-1-A, EIA-770-2-A

**1.5 Digital Inputs / Outputs**

**1.5.1 CAM 2 DV IN (IEEE 1394 Digital Video Input)**

**Implementation Standard according:**

IEEE Std 1394-1995  
IEC61883 - Part1  
IEC61883 - Part 2 SD-DVCR (02-01-1997)

Specification of consumer use digital VCR's using 6.3mm magnetic tape – dec.1994  
Mechanical connection according to Annex of IEC 61883-1

**1.5.2 (AUDIO OUT) COAXIAL DIGITAL OUT – Cinch**

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

**1.5.3 USB**

Compatibility : USB 2.0  
Type of connector : Series A Connector

**1.5.4 HDMI Output**

Compatibility : HDMI version 1.1  
Type of connector : Type A connector (19 pins)

**1.6 Video Performance**

**1.6.1 SNR**

**PAL**

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

**NTSC**

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

**1.6.2 Bandwidth**

**PAL**

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

**NTSC**

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

**1.7 Audio Performance CDDA (PCM)**

**1.7.1 Cinch Output Rear**

Output voltage	: 1.8Vrms ± 2dB
Channel unbalance	: < 0.22dB
Crosstalk 1kHz	: > 110 dB
Crosstalk 16Hz – 20kHz	: > 110 dB
Signal to noise ratio (unweighted)	
20Hz – 20kHz bandwidth limited	: > 95dB (mute)
Signal to noise ratio (A-weighted)	
RMS 20Hz – 20kHz	
bandwidth limited	: > 112dBA (mute)
Dynamic range 1kHz	: > 90dB
Distortion and noise 1kHz	: > 85dB
Distortion and noise 16Hz – 20kHz	: > 78dB
Mute (spin-up, pause, access)	: > 78dB

**1.8 Dimension and Weight**

Set Dimension W x H x D	: 435 x 43 x 324 mm
Net Weight	: 3.8 kg

**1.9 Laser Output Power & Wavelength**

**1.9.1 DVD**

Output power during reading	: 1.0mW
Output power during writing	: 69mW
Wavelength	: 658nm (at 25 °C)

**1.9.2 CD**

Output power	: 1.2mW
Wavelength	: 783nm (at 25 °C)

**1.10 Playability**

**1.11 Supported Disc Types and Media Speed for Recording**

Disc	Media Speeds
DVD+R	1x - 16x
DVD+RW	2.4x - 8x
DVD-R	1x - 16x
DVD-RW	2.4x - 4x
DVD+R DL	2.4x


Video Playback		
1.	Playback Media: CD-R/CD-RW, DVD+R/+RW, DVD-R/-RW, DVD-Video, Video CD/SVCD, DVD+R DL, DVD-R DL, USB flash drive	x
2.	Compression Formats: MPEG2, MPEG1, DivX 3.11, DivX 4.x, DivX 5.x, DivX 6.0, MPEG4	x
Audio Playback		
1.	Playback Media: Audio CD, CD-R/RW, DVD+R DL, DVD+R/+RW, DVD-R/-RW, MP3- CD, MP3-DVD, USB flash drive, WMA-CD	x
2.	Compression Format: Dolby Digital, MP3, MPEG2 Multichannel, PCM, WMA	x
3.	MPEG1 bit rates: 64-384 kbps and VBR	x
Still Picture Playback		
1.	Playback Media: CD-R/RW, DVD+R DL, DVD+R/+RW, DVD- R/-RW, Picture CD, USB Digital Camera (PTP), USB flash drive	x
2.	Picture Compression Format: JPEG, JPEG digital camera photos	x
3.	Picture enhancement: Slideshow with MP3 playback, Create albums, Rotate, Slideshow with music playback, Zoom	x

## 2. Safety Information, General Notes & Lead Free Requirements

### 2.1 Safety Instructions

#### 2.1.1 General Safety

Safety regulations require that during a repair:

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

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

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

#### 2.1.2 Laser Safety

This unit employs a laser. Only qualified service personnel may remove the cover, or attempt to service this device (due to possible eye injury).

##### Laser Device Unit

Type	: Semiconductor laser GaAlAs
Wavelength	: 650 nm (DVD) 780 nm (VCD/CD)
Output Power	: 20 mW (DVD+RW writing) 0.8 mW (DVD reading) 0.3 mW (VCD/CD reading)
Beam divergence	: 60 degree




Figure 2-1

**Note:** Use of controls or adjustments or performance of procedure other than those specified herein, may result in hazardous radiation exposure. Avoid direct exposure to beam.

### 2.2 Warnings

#### 2.2.1 General

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

#### 2.2.2 Laser

- The use of optical instruments with this product, will increase eye hazard.
- Only qualified service personnel may remove the cover or attempt to service this device, due to possible eye injury.
- Repair handling should take place as much as possible with a disc loaded inside the player.
- Text below is placed inside the unit, on the laser cover shield:

CAUTION VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM  
 ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING VED ÅBNING UNDGÅ UDSÆTTELSE FOR STRÅLING  
 ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES UNNGÅ EKSPONERING FOR STRÅLEN  
 VARNING SYNLIG OCH OSYNLIG LASERSTRÅLING NÅR DENNA DEL ÅR ÖPPNAD BETRÄKTA EJ STRÅLEN  
 VARO! AVATTAESSA OLET ALTTIINA NÄKYVÄLLE JA NÄKYMÄTTÖMÄLLE LASER SÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN  
 VORSICHT SICHTBARE UND UNSICHTBARE LASERSTRALHUNG WENN ABDECKUNG GEOFFNET NICHT DEM STRAHLAUSSETZEN  
 DANGER VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID DIRECT EXPOSURE TO BEAM  
 ATTENTION RAYONNEMENT LASER VISIBLE ET INVISIBLE EN CAS D'OUVERTURE EXPOSITION DANGEREUSE AU FAISCEAU

Figure 2-2

## 2.3 Lead Free Requirement

### Information about Lead-free produced sets

Philips CE is starting production of lead-free sets from 1.1.2005 onwards.

#### IDENTIFICATION:

Regardless of special logo (not always indicated)



One must treat all sets from **1 Jan 2005** onwards, according next rules.

Example S/N:



Bottom line of typeplate gives a 14-digit S/N. Digit 5&6 is the year, digit 7&8 is the week number, so in this case 1991 wk 18

So from 0501 onwards = from 1 Jan 2005 onwards

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

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

- Use only lead-free solder alloy Philips SAC305 with order code 0622 149 00106. If lead-free solder-pate 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.

Register your product and get support at  
[www.philips.com/welcome](http://www.philips.com/welcome)



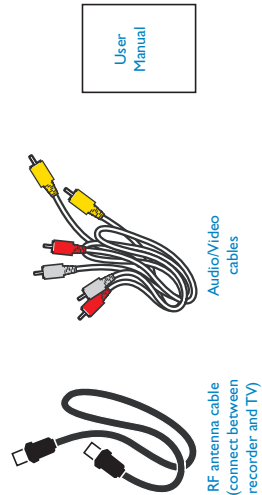
- 1 Connect
- 2 Set up
- 3 Enjoy

# Quick Start Guide

What's in the box?



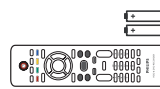
Hard Disk/ DVD Recorder



RF antenna cable (connect between recorder and TV)

Audio/Video cables

User Manual



Remote Control and 2 batteries

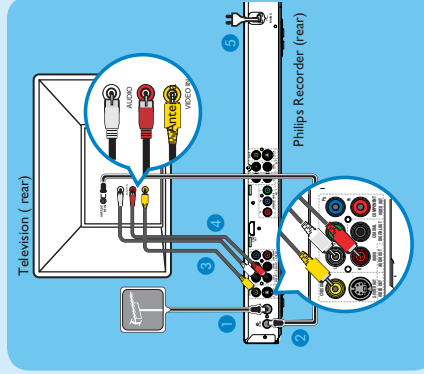
# 1 Connect

## Before connecting

Select the most suitable connection (A or B) based on the type of device you have and your home set up.

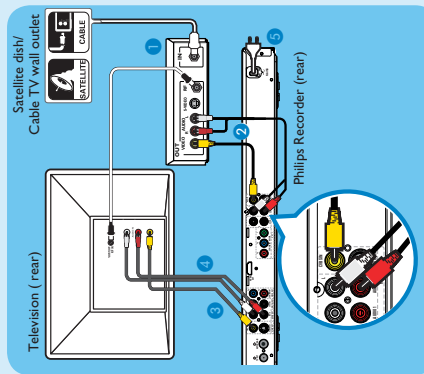
You can also refer to the accompanying User Manual for other possible connections.

### A Connecting Recorder and TV with antenna only



- 1 Unplug the existing antenna cable from your TV and connect it to the **ANTENNA IN** socket on this recorder.
- 2 Connect an RF antenna cable (supplied) from the **TV-OUT** socket on this recorder to the Antenna In socket on the TV.
- 3 Connect a composite cable (supplied) from the **CVBS OUT** socket on this recorder to the video input socket on your TV.
- 4 Connect an audio cables (supplied) from the **AUDIO OUT** sockets on this recorder to the audio input sockets on your TV.
- 5 Plug in the power cable from the recorder to an AC power outlet.

### B Connecting Recorder and TV with Cable TV or Satellite Receiver



- 1 Keep the existing antenna connection from the Cable Box/Satellite Receiver to your TV.
- 2 Connect the **CVBS IN** and **AUDIO IN** sockets on the recorder to the corresponding video and audio output sockets on the Cable Box/Satellite Receiver.
  - Alternatively, you may use **COMPONENT VIDEO** or **S-VIDEO** connection.
- 3 Connect a composite cable (supplied) from the **CVBS OUT** socket on this recorder to the video input socket on your TV.
- 4 Connect an audio cables (supplied) from the **AUDIO OUT** sockets on this recorder to the audio input sockets on your TV.
- 5 Plug in the power cable from the recorder to an AC power outlet.

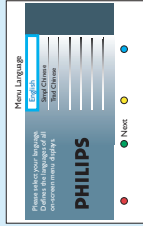
## 3. Directions For Use

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)

# 2 Set up

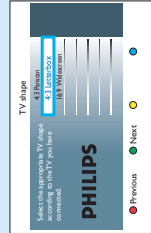
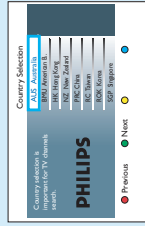
## A Finding the viewing channel

- 1 Press **STANDBY-ON** on the recorder.
- 2 Turn on the TV.  
You should see the installation menu.
- 3 In case you don't see the recorder's setting menu, press the Channel Down button on the TV's remote control repeatedly (or AV, SELECT, -D button) until you see the menu. This is the correct viewing channel for the recorder.



## B Start initial installation

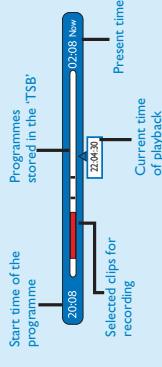
- Use the recorder's remote control and follow the on-screen instructions to complete the installation.
- 1 Select the desired language for this recorder's on-screen menu display and press the **Green** button to continue.
  - 2 Select the country you live in and press the **Green** button to continue.
  - 3 Select the appropriate TV shape in the way you want the wide-screen movies to be displayed and press the **Green** button to continue.



# 3 Enjoy

## About the Time Shift Buffer (TSB)

Once you turn on the recorder, the selected TV programme will be stored in a temporary hard disk storage called Time Shift Buffer. 'TSB'. The 'TSB' can store up to 6 hours of programmes temporarily. Press **INFO** to display the Time Shift video bar.



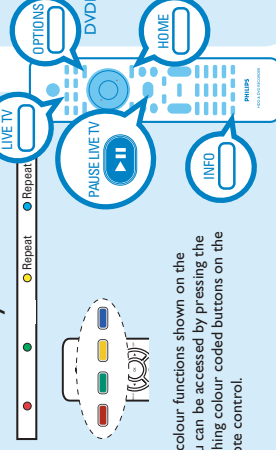
- Notes:**
- The contents in the time shift video bar will be cleared when you press **STANDBY ON** (⏻).
  - The blue LED on the recorder will be lit up when the Time Shift Buffer is active or when you playback a recording from the hard disk drive.

## Watch TV – Pause live TV

Your Philips Recorder allows you to control the TV programme. You can **PAUSE** it as if you were in control of the live broadcast.

- 1 Turn on your recorder to the live TV mode and press **P +/-** to select a TV programme.
- 2 Press **PAUSE LIVE TV** to suspend it.
- 3 Press **PAUSE LIVE TV** again to continue.
- 4 To return to live broadcast, press **LIVE TV**.

## Colour Softkeys function



The colour functions shown on the menu can be accessed by pressing the matching colour coded buttons on the remote control.

## About the internal hard disk drive

This recorder's hard disk drive can be used as a Media Jukebox, allowing you to store and playback your TV programmes, videos, music and photos files. Press **HOME** on the remote control to access your contents stored in the { Hard Disk }.

## Select a record mode

Select an appropriate recording mode is important as it determines the picture quality and recording time to the hard disk.

- 1 Before recording, press **OPTIONS** on the remote control.
- 2 Select { **Settings** } in the menu and press **OK**.
- 3 Move to { **Recording** } and press **right**.
- 4 Move to { **Record mode** } and press **right**.
- 5 Select a record mode and press **OK** to confirm.

### DVDR3570H

Record Mode	Hours of recordings can be stored on the HDD or an empty DVD recordable disc.	Hours of recordings can be stored on the DVD-R DVD+RW
HO (high quality)	23	1 1 hr-55 mins
SP (standard play)	45	2 3 hrs 40 mins
SFP (standard play)	56	2.5 4 hrs 35 mins
LP (long play)	68	3 5 hrs 30 mins
SLP (super long play)	135	6 11 hrs 20 mins
SEP (super extended play)	180	8 14 hrs 45 mins

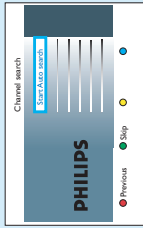
### DVDR3590H

Record Mode	Hours of recordings can be stored on the HDD or an empty DVD recordable disc.	Hours of recordings can be stored on the DVD-R DVD+RW
HO (high quality)	40	1 1 hr-55 mins
SP (standard play)	77	2 3 hrs 40 mins
SFP (standard play)	96	2.5 4 hrs 35 mins
LP (long play)	115	3 5 hrs 30 mins
SLP (super long play)	230	6 11 hrs 20 mins
SEP (super extended play)	300	8 14 hrs 45 mins

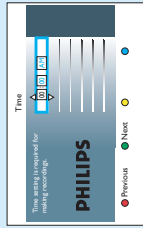
### DVDR5590H

Record Mode	Hours of recordings can be stored on the HDD or an empty DVD recordable disc.	Hours of recordings can be stored on the DVD-R DVD+RW
HO (high quality)	86	1 1 hr-55 mins
SP (standard play)	165	2 3 hrs 40 mins
SFP (standard play)	206	2.5 4 hrs 35 mins
LP (long play)	248	3 5 hrs 30 mins
SLP (super long play)	330	4 7 hrs 20 mins
SEP (super extended play)	426	6 11 hrs 45 mins

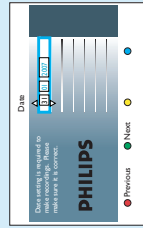
- 4 Press **OK** to start automatic analogue channel search.



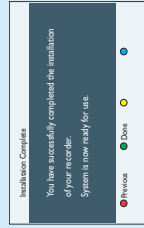
- 5 Once complete, press the **Green** button to continue.



- 6 Enter the correct time in the entry field and press **OK** to confirm.



- 7 Enter the correct date in the entry field and press **OK** to confirm.



- 8 The installation is completed now, press the **Green** button to close the menu.



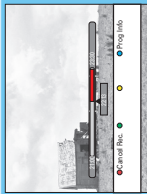
# 3 Enjoy

## Record to hard disk

### A Record current TV programme

- 1 Press **REC** to start recording. It can record up to 6 hours.  
**Note** To set the recording time length, press **REC** repeatedly to extend the recording time in 30-minute increments, up to 6 hours.
- 2 To stop the recording before the scheduled time, press **STOP**.

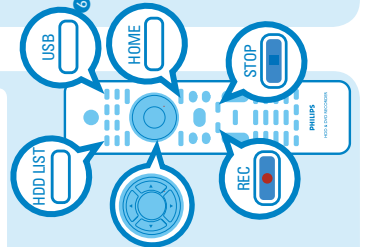
### B Mark a specific segment in the Time Shift Buffer for recording



- 1 Press **◀** or **▶** to search for the scene where you want to record.
- 2 Press **REC** to start recording from here.  
**Note** Pressing the **Red** button will cancel the recording.

- 3 Press **▶** to search for the scene to end the recording, then press **STOP**.

**Note** The title will be marked in red and the recording will only take effect when you turn off the recorder.



## Copy TV programmes or files

### A Copy TV programmes from hard disk

- 1 Insert a recordable DVD into the recorder.
- 2 Press **HDD LIST** on the remote control.
- 3 Select a title to copy and press the **Green** button on the remote control for { **Copy** }.
- 4 The making disc copy information appears. Press the **Green** button again to start copying.

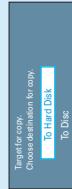
**Note** It is not possible to copy the TV recordings to USB device.

### B Copy files from USB

You can only copy the data files (MP3, WMA, DivX and JPEG) from your USB device to the recorder's hard disk drive or recordable DVD.

- 1 Insert your USB device to the USB port at the front panel of the recorder.
- 2 Press **USB** on the remote control to view the content menu.
- 3 Use **◀▶** keys to reach the file you want to copy.
- 4 Press the **Green** button on the remote control for { **Copy** }.

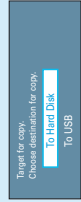
- 5 Select the destination for copying and press **OK** to confirm.  
**Note** If select { To Disc }, insert an empty recordable DVD into the recorder.
- 6 Press **OK** again to start copying.



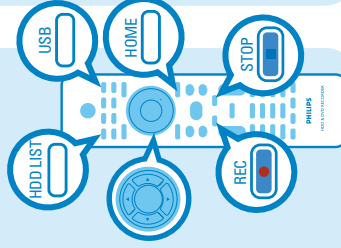
### C Copy files from Disc

Copy prohibited contents cannot be copied to this recorder.

- 1 Insert a CD/DVD into the recorder.
- 2 Press **HOME** and select { **Disc Tray** }.
- 3 Use **◀▶** keys to reach the title/file you want to copy.
- 4 Press the **Green** button on the remote control for { **Copy** }.

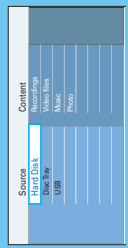


- 5 Select the destination for copying and press **OK** to confirm.  
**Note** Only data files are able to copy to USB device.
- 6 Press **OK** again to start copying.



## Start playback

### A Playback from hard disk

- 1 Press **HOME**.  

- 2 Select { **Hard Disk** } and press **▶** **right**.
- 3 Select the contents type and press **▶** **right**.
- 4 Use **◀▶** keys to reach the title/file you want to play and press **▶** **right** to start playback.

### B Playback from disc

- 1 Hold down **STOP** until the disc tray opens. Load a disc and close the disc tray.
- 2 Press **HOME** and select { **Disc Tray** }.
- 3 Use **◀▶** keys to reach the title/file you want to play and press **▶** **right** to start playback.

### C Playback from USB device

- 1 Insert the USB device to the USB port.
- 2 Press **USB** to show the contents list.
- 3 Select the contents type and press **▶** **right**.
- 4 Select a data file (MP3, WMA, DivX and JPEG) and press **▶** **right** to start playback.

## Need help? User Manual

See the user manual that came with your Philips Recorder

## Online

Register your product and get support at [www.philips.com/welcome](http://www.philips.com/welcome)



## 4. Mechanical Instructions

**Note:** The position numbers given here refers to the Exploded view on chapter 8.

### 4.1 Dismantling of the DVD Tray cover manually

- 1) Insert a screwdriver into the slot provided at the bottom of the set and push in the direction as shown in Figure 1 to unlock before sliding the Tray cover 110 out.

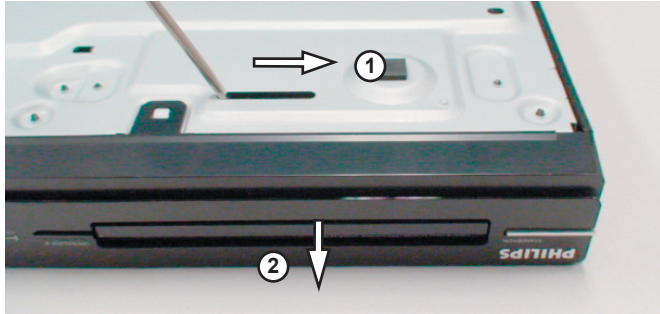


Figure 4-1: Unlock the tray loader

- 2) Remove the Tray cover 110 as shown in Figure 2.

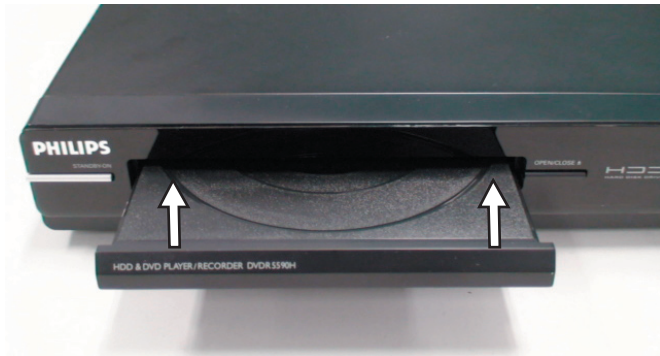


Figure 4-2: Remove the tray cover

### 4.2 Dismantling of the Front Panel

- 1) Remove 7 screws to loosen Top cover 240.
- 2) Remove 2 screws to loosen the Plate Front Loader 183 and detach the Front Cabinet Assembly P001 as shown in Figure 3. The Front Panel Service Position is shown in Figure 4.

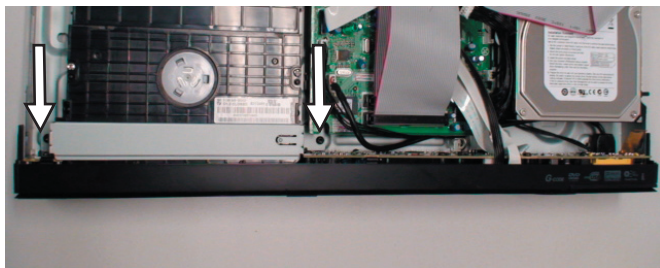


Figure 4-3: Unscrew the screws to detach front panel

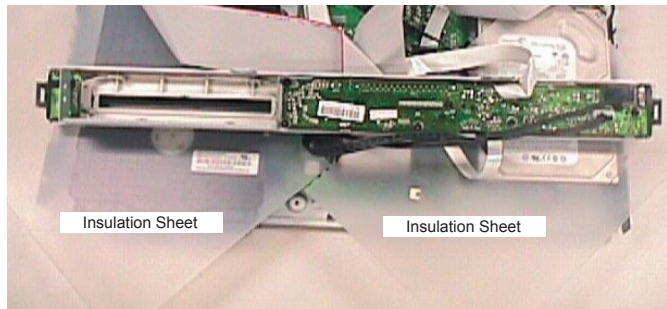


Figure 4-4: Front Panel Service Position

### 4.3 Dismantling of the Basic Engine

- 1) Remove 4 mounting screws as shown in figure 5 to dismantle the Basic Engine. 1007.

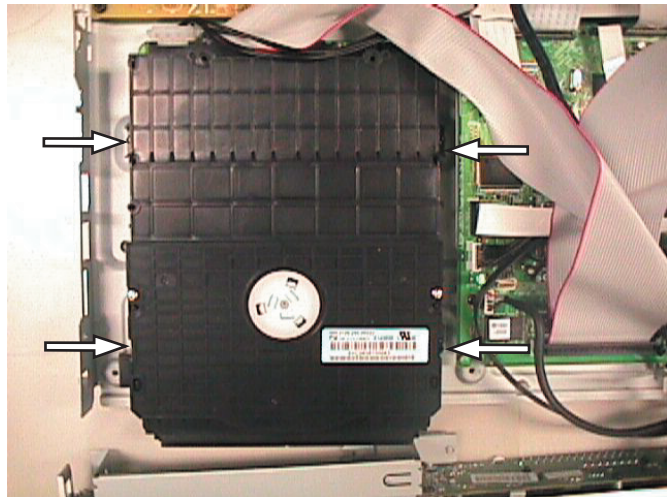


Figure 4-5: Basic Engine mounting screw

- 2) Flip over the Basic Engine to remove 4 screws from the PCB protection plate. Service Position of the Basic Engine is shown in Figure 6.

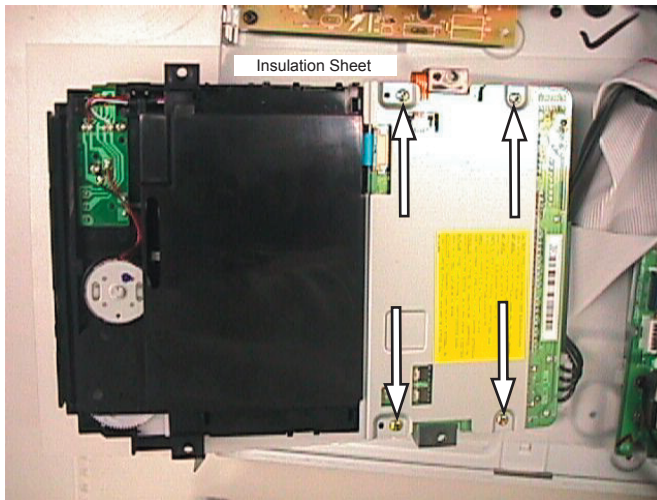


Figure 4-6: Basic Engine Service Position

#### 4.4 Dismantling of the PSU Board

- 1) Remove 3 screws to loosen the PSU Board 1004 as shown in Figure 7.

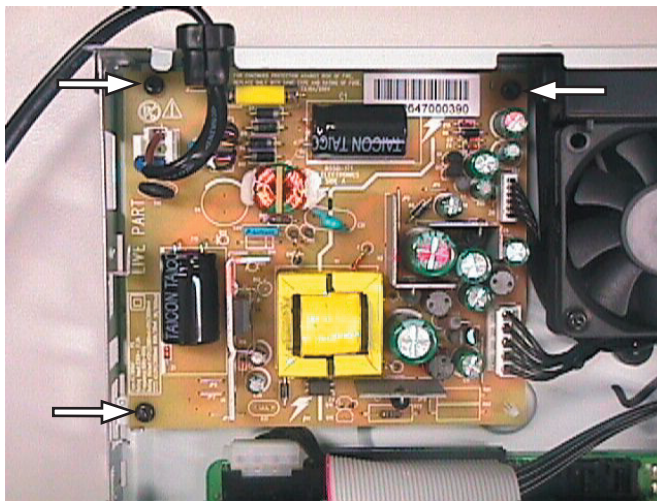


Figure 4-7: PSU remove mounting screws

- 2) Service position for PSU Board is given in Figure 8.

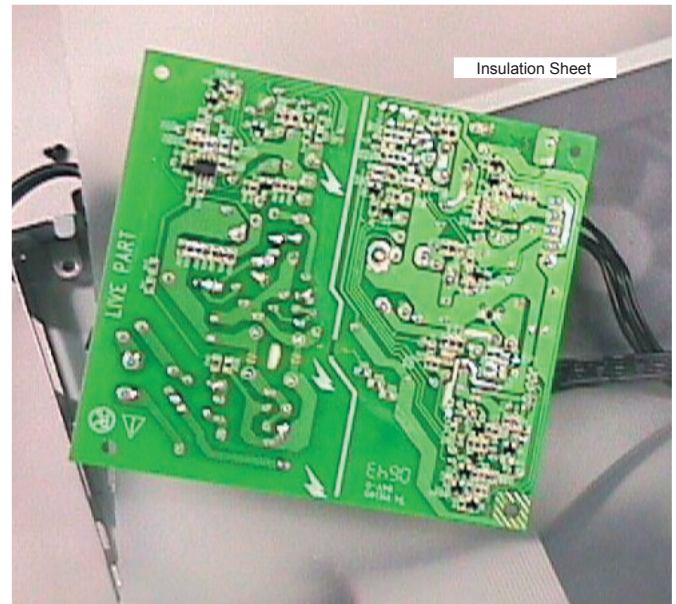


Figure 4-8: PSU Board Service Position

#### 4.5 Dismantling of the HDD

- 1) Remove 4 screws to loosen the HDD assembly (pos 1005+186+191+192) as shown in Figure 9.

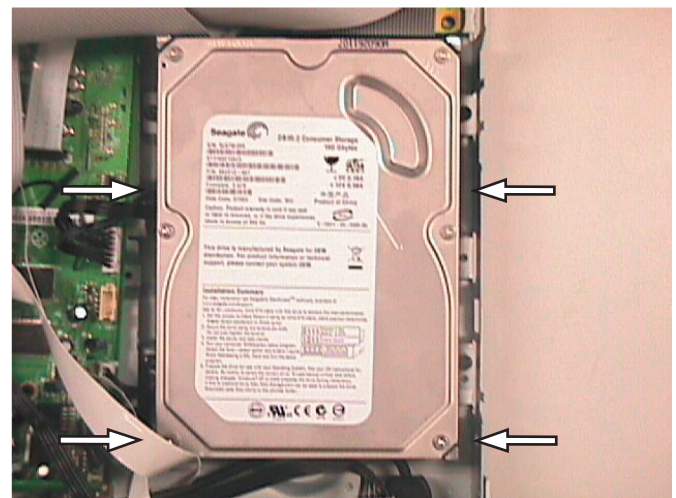


Figure 4-9: Remove mounting screws for HDD

- 2) Flip over the HDD Assembly to see the mounting screws 271. Remove the screws to dismantle the HDD 1005 from the HDD assembly.

Notes: Only the special type of screws as described in Service Parts List must be used for position number 271. Using improper screws may damage the mounting holes on the HDD.

#### 4.6 Dismantling of HDMI Board

- 1) Remove 2 screws to loosen the HDMI Board 1006 and HDMI Shield 190 from the Rear Plate 230. The mounting screws are shown in figure 10.

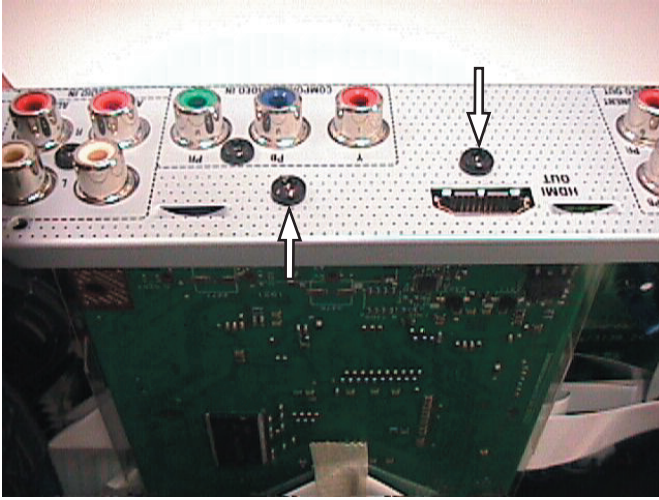


Figure 4-10: Remove mounting screws for HDMI Board

- 2) Remove the HDMI Shield 190 for HDMI Board Service Position. The HDMI Board Service Position is shown in figure 11.

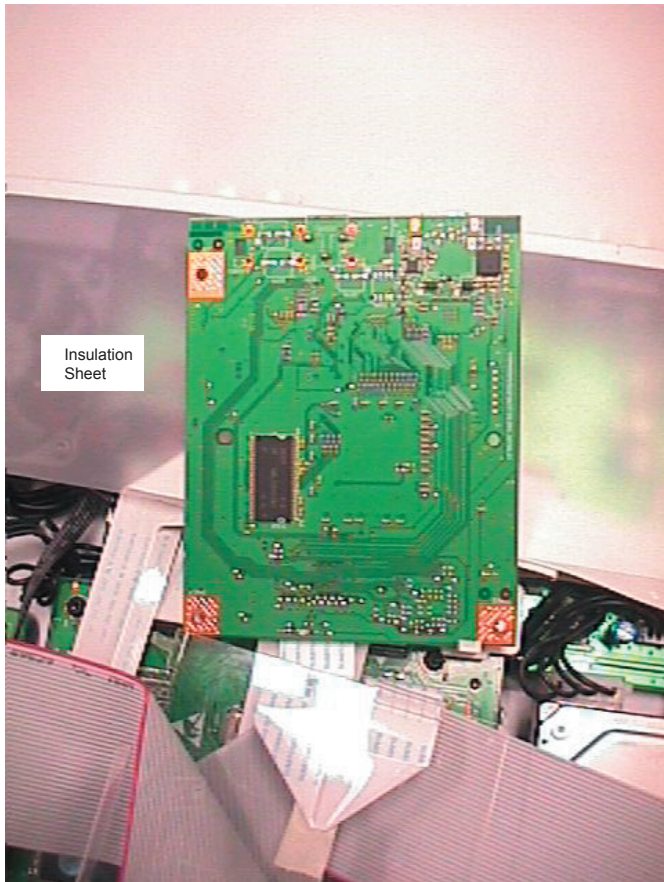


Figure 4-11: HDMI Board Service Position.

#### 4.7 Dismantling of the Digital Board

- 1) Remove the HDMI Board first, and remove the HDMI Bracket 131 by unscrewing one screw.
- 2) Then remove 4 screws to loosen the Digital Board 1003 as shown in Figure 12.

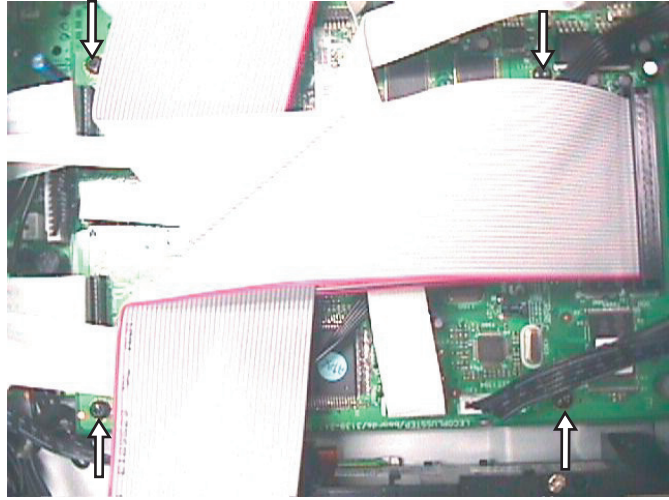


Figure 4-12: Remove mounting screws for Digital Board

- 3) Service position for Digital Board is given in Figure 13. (It may be necessary to remove the Digital Board Bracket 187 and take out the cables beneath it to make it easier to flip over the digital board. Put the insulation sheets under the PC Boards. Refer to the set-wiring diagram in chapter 6 and make it sure to have the correct cable connections among the PC Boards.)

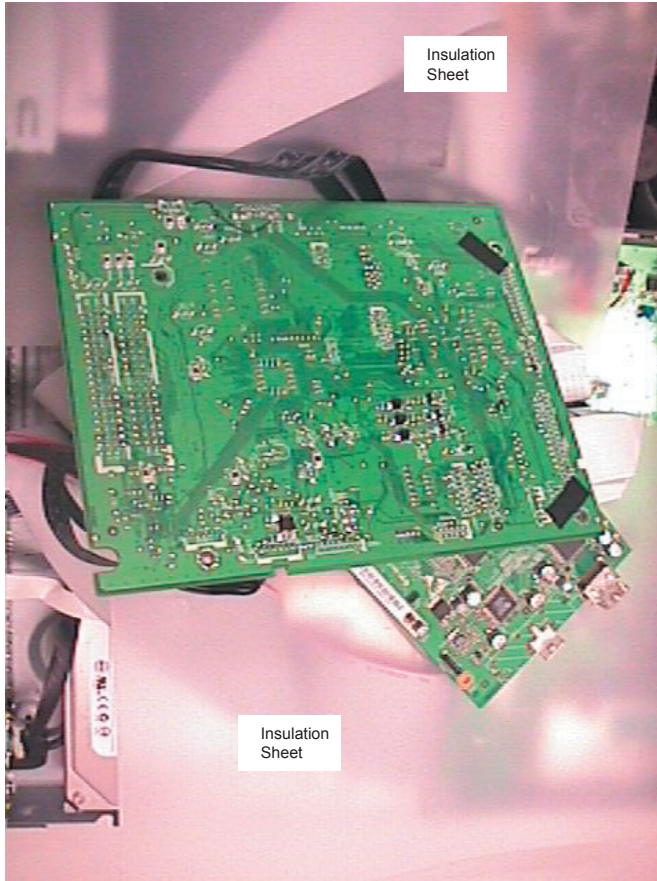


Figure 4-13: Digital Board Service Position

#### 4.8 Dismantling of the Analog Board

- 1) Remove the HDMI Board 1006 with its Shield 190 and the HDMI bracket 189 first. Remove 3 screws that attach the Analog Board 1001 to the Frame 161. Remove 6 more screws that attach the Analog Board 1001 to the rear panel 230. Then dismantle the Analog Board. It may be easier to dismantle the Analog Board if the rear panel 230 is detached first by removing 3 more screws.
- 2) Service position for Analogue Board is given in Figure 12.

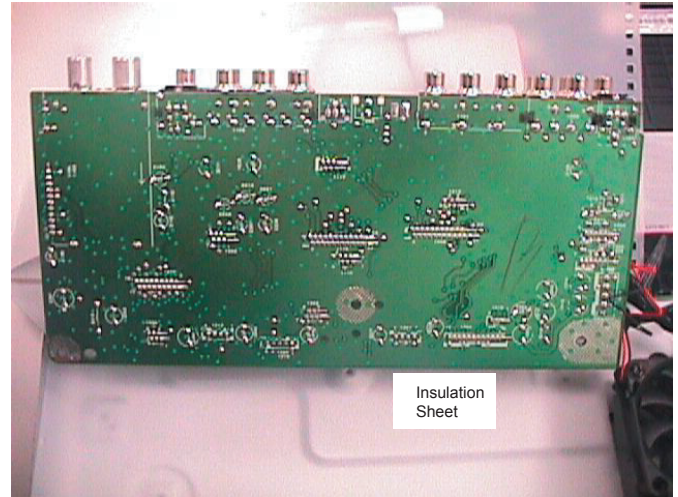


Figure 4-14: Analogue Board Service Position (Rear Plate 230 detached)

## 5. Firmware Upgrading and other useful firmware hints

### 5.1 Firmware Upgrading

#### 5.1.1. Preparation to upgrade firmware

1. Unzip the zip-archive file
2. Start the CD Burning software and create a new CD project (data disc) with the following settings:
  - File system: Joliet
  - Format: MODE 2: CDROM XA
  - Recording mode: SINGLE SESSION (TRACK-AT-ONCE), FINALIZED CD
  - Note: Long file name is necessary for the preparation of the upgrade disc
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 CD-RW

#### 5.1.2. Procedure to apply the firmware upgrade:

There are 2 upgrade processes supported for DVDR5590H: - Normal Upgrade and Forced Download.

##### Normal Software Upgrade

For normal upgrading, power up the set, open the tray, insert the upgrade disc, close the tray and follow the on-screen instruction.

##### Forced Download Software Upgrade

1. Press and Hold the <Record> + <Next> buttons and Power up the set.
2. The tray will open and set will display:  
DOWNLOAD ->.....PUT DISC
3. Insert the prepared Upgrade CDROM and close the tray.
4. The set will display:

INIT DSC -> ..... DOWNLOAD ->...

Note: The whole process takes less than 10 minutes. Do not press any buttons or interrupt the mains supply during the upgrading process, otherwise the set may become defective.

5. When the software upgrading is completed the tray will open automatically and the set will display:  
REMOVE
6. Close the tray and the set will display:  
DONE

Then the firmware upgrade process is completed successfully.

#### 5.1.3. How to read out the firmware version to confirm set has been upgraded:

1. Power up the set
2. Press <OPTIONS> button on the Remote control and go to <Settings> option
3. Then go to <Setup> and choose <Version Info> by pressing OK.
4. The TV connected to the set will display the user version info.  
For example, a DVDR5590H/97 with software release version 1.50 will be displayed by the set on TV screen as shown below:

Version Info
PHILIPS DVDR5590H/97 Software version:1.50 Please visit our website <a href="http://www.philips.com/support">www.philips.com/su            pport</a> for software updates and additional Product information.

5. Press <OPTIONS> button to exit.

Note: The above-mentioned information displayed by the set only shows CTN, stroke version and software version of the set. For the software information in more details, check the development version information as described in the next section (section 5.2).

## 5.2. Procedure for checking Development Version Info Screen (Software information in more details)

- 1) Power up the set
- 2) Press <OPTIONS> button on the Remote control and go to <Settings> option
- 3) Then go to <Setup> and choose <Version Info> by pressing OK.
- 4) When the user version info screen is appeared, press the blue key on the remote control.
- 5) The TV connected to the set will display the Development Version Info Screen.  
For example, the version information screen for DVDR5590H/97 with software release version 1.50 will be displayed by the set on TV screen as shown below:

Version Info
(c)PHILIPS 2007 Version Information: DI L+06_6/6650 SV 13601 RC3 BE 52.07.02.23 ASP 5,5,255,255 LP 2_b 20080111_1800 pro lecoplusleadV2 1.50 EPG: DPMS:

where:

DI:	Digital Board,
L+06_6:	Digital Board name,
66:	Hardware ID for DVDR5590/97,
50:	Work Area,
SV13601:	Slash Version,
BE 52.07.02.23:	Basic Engine Firmware Version 02.23 of model 52.07 for Optical Drive D5.2
ASP 5,5:	Version of ASP
255,255:	Version of VFD Driver

## 5.3. Procedure to Virginize the set

- 1) Press and hold down the Standby key on the front while connecting to the power outlet.
- 2) Release the keys when the scrolling messages appear on VFD.
- 3) Press Standby key again and follow the instructions when the set wakes up.

Note: All the user information will be lost after virginizing the set.

## 5.4. Procedure for HDD replacement (when a defective HDD is replaced by a brand new HDD)

- 1) Remove the defective HDD and install a new HDD.
- 2) Upgrade the software (forced download) to the latest software. (follow the procedures as described in 5.1)
- 3) Format the HDD
  - a. Press and Hold the <Previous> + <Stop> key combination while powering on the mains.
  - b. The set will start to display "FMT KEY", and then it will show "FMT HDD" while formatting HDD.
  - c. If the formatting is completed successfully, the set will display "FMT DONE". If the formatting is failed, it will show "FMT FAIL".

Then the HDD is ready to use.

Notes: Do not power off the set immediately when the "FMT DONE" is seen. Wait until the time or - - : - - is displayed before powering off the set. Some of the user information may be lost after HDD replacement.

# Diagnostic Software

Due to the complexity of the DVD recorder, the time to find a defect in the recorder can become long. To reduce this time, the recorder has been equipped with Diagnostic and Service software (DS). The DS offers functionality to diagnose the DVDR hardware and tests the following:

- Interconnections between components
- Accessibility of components
- Functionality of the audio and video paths

This functionality can be accessed via several interfaces:

1. End user/Dealer script interface
2. Command Interface

## 5.6 End User/Dealer Script Interface

### 5.6.1 Description

The End user/Dealer script interface gives a diagnosis on a stand alone DVD recorder. During this mode, a number of hardware tests (nuclei) are automatically executed to check if the recorder is faulty. The diagnosis is simply a "fail" or "pass" message. If the message "FAIL" appears on the display, there is apparently a failure in the recorder. If the message "PASS" appears, the nuclei in this mode have been executed successfully. There can be still a failure in the recorder because the nuclei in this mode do not cover the complete functionality of the recorder.

### 5.5.2 Structure

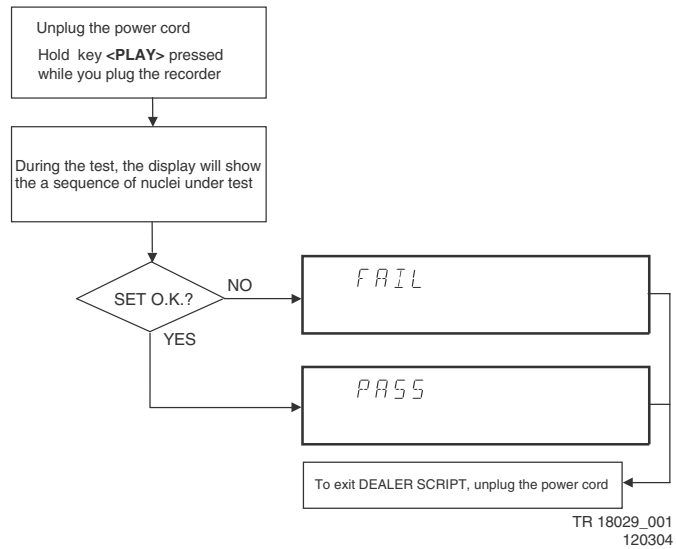


Figure 5-1

The End use/Dealer script executes all diagnostic nuclei that do not need any user interaction and are meaningful on a standalone DVD recorder.

### 5.6.2 Contents

Included tests:	<ol style="list-style-type: none"> <li>1. DS_CHR_DEVTYPEGET_NUC</li> <li>2. DS_SDRAM_WRITEREADFAST_NUC</li> <li>3. DS_FLASH_DEVTYPEGET_NUC</li> <li>4. DS_FLASH_CHECKSUMPROGRAM_NUC</li> <li>5. DS_VIP_COMMUNICATION_NUC</li> <li>6. DS_VIP_DEVTYPEGET_NUC</li> <li>7. DS_DVIO_LINKDEVTYPEGET_NUC</li> <li>8. DS_DVIO_PHYCOMMUNICATION_NUC</li> <li>9. DS_DVIO_PHYDEVTYPEGET_NUC</li> <li>10. DS_BE_COMMUNICATIONECHO_NUC</li> <li>11. DS_BE_VERSIONGET_NUC</li> <li>12. DS_SYS_HARDWAREVERSIONGET_NUC</li> <li>13. DS_SYS_SOFTWAREVERSIONBOOTGET_NUC</li> <li>14. DS_SYS_SOFTWAREVERSIONDOWNLOADGET_NUC</li> <li>15. DS_SYS_SOFTWAREVERSIONAPPLGET_NUC</li> <li>16. DS_SYS_DVIDNUMBERGET_NUC</li> <li>17. DS_SYS_SLASHVERSIONGET_NUC</li> <li>18. DS_SYS_SETTINGSDISPLAY_NUC</li> <li>19. DS_SYS_BUILDINFOGET_NUC</li> <li>20. DS_ASP_COMM_NUC</li> <li>21. DS_ASP_VERSION_NUC</li> <li>22. DS_FRE_COMM_NUC</li> <li>23. DS_HDD_COMMUNICATION_NUC</li> <li>24. DS_HDD_VERSION_NUC</li> <li>25. DS_USB_DEVTYPEGET_NUC</li> </ol>
-----------------	--



## 5.7 Menu and Command Mode Interface

### 5.7.1 Nuclei Numeration

Each nucleus has a unique number of four digits. This number is the input of the command mode.

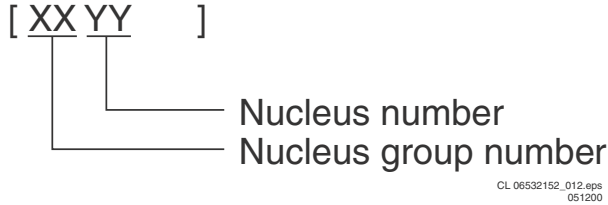


Figure 5-2

Group number	Group name
0	Scripts
1	Codec (e.g. LeCo+)
2	Boot EEPROM*
3	NVRAM (EEPROM of FLASH)*
4	SDRAM (or DDR-RAM)
5	FLASH
6	Video Input Processor
7	DVIO
9	Basic Engine
12	System
15	HDMI
16	Analogue Slave Processor
20	Front End
21	Hard Disk
22	DTTM*
23	USB

\* Not applicable for DVDR3570H,

### 5.7.2 Error Handling

Each nucleus returns an error code. This code contains six numerals, which means:

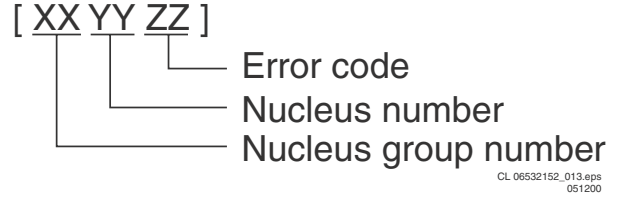


Figure 5-3

The nucleus group numbers and nucleus numbers are the same as above.

### 5.7.3 Command Mode Interface

#### Set-Up Physical Interface Components

Hardware required:

- Service PC
- one free COM port on the Service PC
- special cable to connect DVD recorder to Service PC

The service PC must have a terminal emulation program (e.g. Hyperterminal) installed and must have a free COM port (e.g. COM1). Activate the terminal emulation program and check that the port settings for the free COM port are: 19200 bps, 8 data bits, no parity, 1 stop bit and no flow control. The free COM port must be connected via a special cable to the RS232 port of the DVD recorder. This special cable will also connect the test pin, which is available on the connector, to ground (i.e. activate test pin).

**Code number of PC interface cable: 3122 785 90017**

#### Activation of Diagnostic Software

1. Pull the mains cord from the recorder and reconnect it again (reboot).
2. The next welcome message will appear on the PC:

#### Welcome screen D&S program

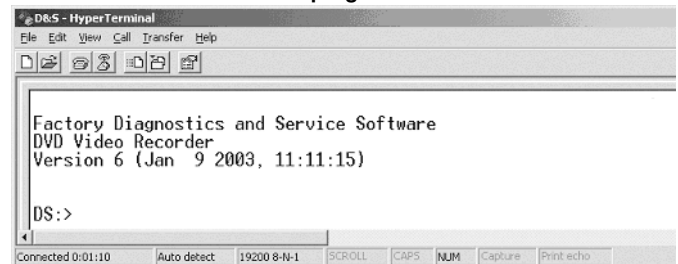


Figure 5-4

Now, the prompt 'DS:>' will appear. The diagnostic software is now ready to receive commands. The commands that can be given are the numbers of the nuclei. If you see above shown screen, continue with paragraph 'Nuclei Codes'.

- It is possible that the next messages will appear when starting the DVD+RW for the first time

**Error messages D&S program**

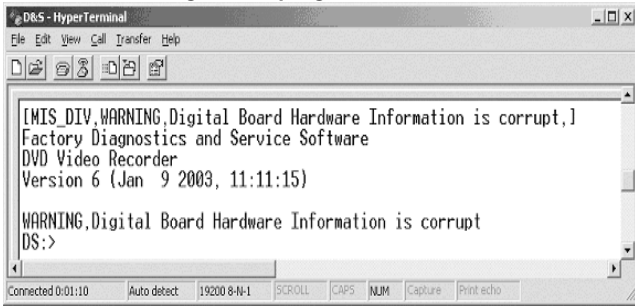


Figure 5-5a

**Error messages D&S program**

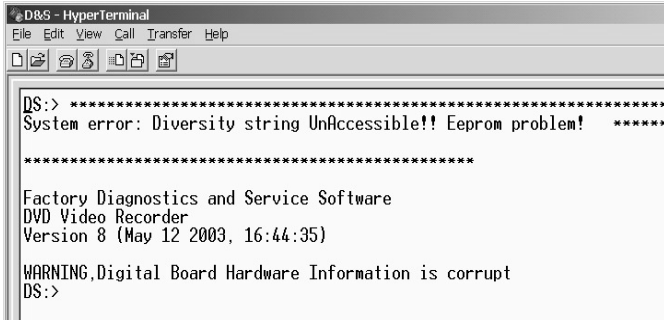


Figure 5-5b

In these cases, the boot EEPROM of the Digital Board does not contain the required string with the hardware information. To update the Digital Board with the correct string, nucleus 1226 must be executed.

See next section 'Diversity String Input'. There can also be the next error message.



Figure 5-5c

Enter "Y" to program a safe string. With this automatically generated string the board will work in principle but it has to be checked if all board settings were detected correctly.

**Diversity String Input**

- Execute nucleus 1226 to enter the string. Please see chapter 8 for details

**Nucleus 1226 execution with string**

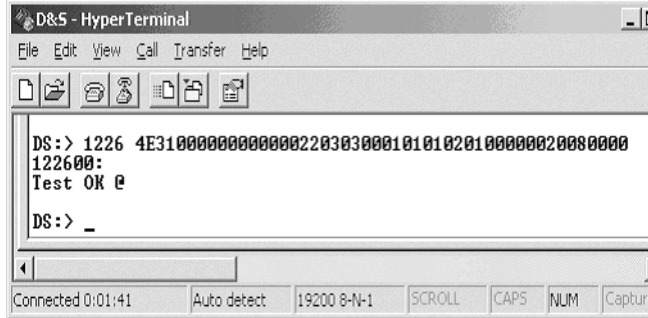


Figure 5-6

- To check if the hardware info is filled correctly, you can execute nucleus 1228.

**Nucleus 1228 info example**

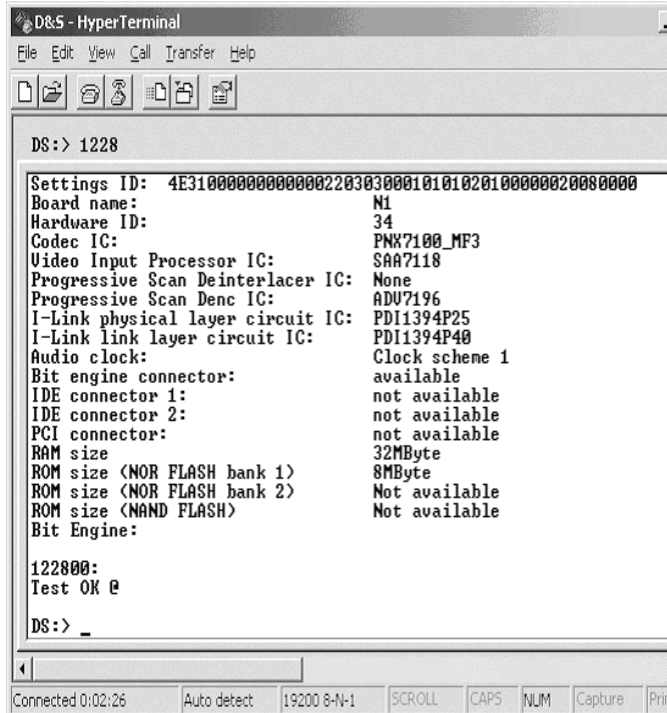


Figure 5-7

- Exit the 'Terminal' program.
- Reboot the DVD recorder to allow the software to start.

**Command overview Digital Board**

Below you will find an overview of the nuclei, their numbers, and their error codes. This overview is preliminary and subject to modifications.

**Codec Host Controller (CHR)**

Nucleus Name	<b>DS_CHR_DevTypeGet</b>	
Nucleus Number	100	
Description	Retrieves the device id, the module ids and revisions of the Codec and returns them to the stdout port.	
Technical	<ul style="list-style-type: none"> <li>- Determine the codec id by means of comparing version ids of the modules.</li> <li>- Read the module-id register of every module and display it to the user.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	10000	Getting the information succeeded
	10001	Wrong codec id detected
Example	<pre> DS:&gt; 100 010000: Device ID 7300 Codec ID PNX7350 F-BCU (0x0102) 4.0 INTC (0x011d) 3.0 SIF (0xa04b) 2.0 BOOT (0x010a) 3.1 CONFIG (0x013f) 5.0 RESET (0x0123) 5.0 CLOCK (0x013e) 7.0 DEBUG (0x0116) 0.1 UART0 (0x0107) 1.2 UART1 (0x0107) 1.2 I2C0 (0x0105) 0.1 I2C1 (0x0105) 0.1 GPIO (0x013c) 3.1 SYNC (0x013a) 4.0 OSD (0x0136) 1.0 SPU (0xa00e) 1.1 MIXER (0x0137) 3.0 DENC (0x0138) 5.0 CCIR (0x0139) 2.1 VDEC (0x0133) 1.0 PARSER (0xa00d) 0.0 DV (0xa00c) 0.0 IDE0 (0xa009) 1.2 IDE1 (0xa009) 1.2 SGDX (0xa008) 4.0 BYTE (0xa00b) 1.0 OUTPUT (0xa003) 8.0 ACOMP (0xa000) 8.0 VFE (0xa001) 8.0 VCOMP (0xa002) 8.0 SCR (0xa004) 8.0 SIFF (0xa011) 3.0 PSCAN (0xa05d) 0.1 ADEC (0x0134) 1.1 IR (0x0131) 2.0 AOI (0xa08c) 0.0 PIP (0xa04d) 1.0 AVLINK (0x3601) 2.1 USBLINK (0xa08e) 0.0 MSVD (0xa087) 0.0 FEBCU (0xa05e) 1.0 BM (0xa085) 0.0 BMI (0xa084) 0.0 DISP (0xa04d) 1.0 Test OK @ </pre>	

Nucleus Name	<b>DS_CHR_TestImageOn</b>																																													
Nucleus Number	101																																													
Description	Generates a test-image of a selected video standard on selected video output on the digital board. When no input is given, the default values will be used (see user input description below). Make sure to use the proper nuclei to route the video signal on the VIP to get the video signal to the proper output.																																													
Technical	<ul style="list-style-type: none"> <li>- Validate the user input.</li> <li>- Initialise the SYNC module.</li> <li>- Initialise the DISPLAY module.</li> <li>- Initialise the MIXER module.</li> <li>- Initialise the DENC module.</li> <li>- Set the selected video standard.</li> <li>- Generate the selected test image in memory.</li> <li>- Start the DISPLAY module.</li> <li>- Start the MIXER module.</li> <li>- Start the DENC module according to the selected test image id.</li> </ul>																																													
Execution Time	6 seconds.																																													
User Input	<p>The user has to decide which test image, video standard and video output must be used: &lt; Test image id &gt; &lt; Video standard &gt; &lt; Video output &gt;</p> <p>Test image id:</p> <table border="1"> <tr><td>0</td><td>VERTICAL_COLOURBAR (default)</td></tr> <tr><td>1</td><td>HORIZONTAL_COLOURBAR</td></tr> <tr><td>2</td><td>WHITE</td></tr> <tr><td>3</td><td>YELLOW</td></tr> <tr><td>4</td><td>CYAN</td></tr> <tr><td>5</td><td>GREEN</td></tr> <tr><td>6</td><td>MAGENTA</td></tr> <tr><td>7</td><td>RED</td></tr> <tr><td>8</td><td>BLUE</td></tr> <tr><td>9</td><td>BLACK</td></tr> <tr><td>10</td><td>GRAY</td></tr> <tr><td>11</td><td>TEST_IMAGE_FOR_PROGRESSIVE_SCAN</td></tr> </table> <p>Video standard:</p> <table border="1"> <tr><td>PAL</td><td>Standard PAL 50 Hz (default)</td></tr> <tr><td>NTSC</td><td>Standard NTSC 60 Hz</td></tr> </table> <p>Video output:</p> <table border="1"> <tr><td>ALL</td><td>CVBS and YC and RGB signals are enabled (default)</td></tr> <tr><td>ALL_RGB</td><td>CVBS and YC and RGB signals are enabled (default)</td></tr> <tr><td>ALL_YUV</td><td>CVBS and YC and YUV signals are enabled</td></tr> <tr><td>CVBS</td><td>CVBS signal is enabled</td></tr> <tr><td>YC</td><td>YC signal are enabled</td></tr> <tr><td>RGB</td><td>CVBS, and RGB signals are enabled</td></tr> <tr><td>YUV</td><td>YUV signals are enabled</td></tr> <tr><td>PSCAN</td><td>Progressive scan is enabled</td></tr> </table>		0	VERTICAL_COLOURBAR (default)	1	HORIZONTAL_COLOURBAR	2	WHITE	3	YELLOW	4	CYAN	5	GREEN	6	MAGENTA	7	RED	8	BLUE	9	BLACK	10	GRAY	11	TEST_IMAGE_FOR_PROGRESSIVE_SCAN	PAL	Standard PAL 50 Hz (default)	NTSC	Standard NTSC 60 Hz	ALL	CVBS and YC and RGB signals are enabled (default)	ALL_RGB	CVBS and YC and RGB signals are enabled (default)	ALL_YUV	CVBS and YC and YUV signals are enabled	CVBS	CVBS signal is enabled	YC	YC signal are enabled	RGB	CVBS, and RGB signals are enabled	YUV	YUV signals are enabled	PSCAN	Progressive scan is enabled
0	VERTICAL_COLOURBAR (default)																																													
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ALL	CVBS and YC and RGB signals are enabled (default)																																													
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YUV	YUV signals are enabled																																													
PSCAN	Progressive scan is enabled																																													
Error	Number	Description																																												
	10100	Generating the test image succeeded.																																												
	10101	Invalid input was provided.																																												
	10102	The Codec SYNC-module cannot be initialised.																																												
	10103	The Codec MIXER-module cannot be initialised.																																												
	10104	The Codec VPP-module cannot be initialised.																																												
	10105	The Codec DENC-module cannot be initialised.																																												
	10106	The digital board hardware information is corrupt																																												
Example	<pre>DS:&gt; 101 010100: Test OK @  DS:&gt; 101 0 pal cvbs 010100: Test OK @  DS:&gt; 101 4 ntsc yc 010100: Test OK @</pre>																																													

Nucleus Name	<b>DS_CHR_TestImageOff</b>	
Nucleus Number	102	
Description	Switches the test-image off.	
Technical	- Stop the DENC module.	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	10200	Stopping the test image generation succeeded
	10201	The Codec DENC-module failed.
Example	<pre>DS:&gt; 102 010200: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_SineOn</b>	
Nucleus Number	103	
Description	<p>Generate an audio sine signal on the audio output of the digital board.  Note: Left channel 6kHz, right channel 12 kHz sine. Make sure to route the signal first.  When 'SPDIF' is entered as a parameter, the SPDIF path will be activated correctly to generate a PCM sine wave on the digital audio output.</p>	
Technical	<ul style="list-style-type: none"> <li>- De-mute the analogue board</li> <li>- Set fifo parameters for audio</li> <li>- Set the volume</li> <li>- Set the I2S outputs and configuration paths</li> <li>- Set the decoder mode</li> <li>- Configure the audio decoder</li> <li>- Put the AC3 audio in the fifo</li> <li>- Send 'prepare' command to the audio decoder</li> <li>- Send 'play' command to the audio decoder</li> </ul>	
Execution Time	Less than 1 second	
User Input	None or 'SPDIF'	
Error	Number	Description
	10300	The sine signal was successfully generated
	10301	The analogue board could not be de-muted
	10302	The audio decoder did not initialise
	10303	The dsp2 (DUET) of the audio decoder did not configure
	10304	The dsp1 (PALM) of the audio decoder did not configure
	10305	There was a delay-error before starting
	10306	Wrong input was given to the decoder function
	10307	Wrong input was given to the decoder function @@@@
	10308	The audio decoder did not get into the 'prepared' state
Example	<pre>DS:&gt; 103 010300: Test OK @  DS:&gt; 103 spdif 010300: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_SineOff</b>	
Nucleus Number	104	
Description	Stop generating the audio sine signal	
Technical	- Reset the audio block of the Codec	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	10400	Switching off the audio sine signal succeeded
	10401	Failed to reset the audio decoder
Example	<pre>DS:&gt; 104 010400: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_SineBurst</b>	
Nucleus Number	105	
Description	Generate an audio sine signal on the audio output of the digital board for 4 seconds. Note: Left channel 6kHz, right channel 12 kHz sine with some known hick-ups	
Technical	<ul style="list-style-type: none"> <li>- Call the DS_CHR_SineOn nucleus</li> <li>- Delay for 4 seconds</li> <li>- Call the DS_CHR_SineOff nucleus</li> </ul>	
Execution Time	4 seconds	
User Input	None	
Error	Number	Description
	10500	The sine signal burst was successfully generated
	10501	The delay did not succeed during the burst
	10502	The audio sine could not be generated
Example	<pre>DS:&gt; 105 010500: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_MuteOn</b>	
Nucleus Number	106	
Description	Mute the audio outputs of the digital board	
Technical	<ul style="list-style-type: none"> <li>- Send the 'Mute' command to the audio decoder</li> <li>- Activate the 'audio mute' PIO pin</li> </ul>	
Execution Time	Less than 1 second.	
User Input	"PIO" to just use the PIO pin mute. When muting using this, also de-mute using this as this works 'paired'.	
Error	Number	Description
	10600	Muting the audio succeeded
	10601	Muting the audio through the PIO-pin failed
Example	<pre>DS:&gt; 106 010600: Test OK @  DS:&gt; 106 PIO 010600: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_MuteOff</b>	
Nucleus Number	107	
Description	De-mute the audio outputs of the digital board	
Technical	<ul style="list-style-type: none"> <li>- Send the 'DeMute' command to the audio decoder</li> <li>- Deactivate the 'audio mute' PIO pin</li> </ul>	
Execution Time	"PIO" to just use the PIO pin de-mute. Only de-mute using this when you muted using the PIO parameter, as this works "paired.	
User Input	None	
Error	Number	Description
	10700	De-muting the audio succeeded
	10701	De-muting the audio through the PIO-pin failed
Example	<pre>DS:&gt; 107 010700: Test OK @  DS:&gt; 107 PIO 010700: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_MacroVisionOn</b>	
Nucleus Number	110	
Description	Turn on MacroVision.	
Technical	- Set some registers of the DENC module in the Codec.	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	11000	Turning on MacroVision succeeded
	11001	Turning on MacroVision failed
Example	<pre>DS:&gt; 110 011000: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_MacroVisionOff</b>	
Nucleus Number	111	
Description	Turn off MacroVision.	
Technical	- Set some registers of the DENC module in the Codec.	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	11100	Turning off MacroVision succeeded
	11101	Turning off MacroVision failed
Example	<pre>DS:&gt; 111 011100: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_Peek</b>	
Nucleus Number	112	
Description	Peek a value on a specified address	
Technical	<ul style="list-style-type: none"> <li>- Check the user input</li> <li>- Read out the address specified</li> <li>- Check whether the address to be read is aligned on 4 bytes</li> </ul>	
Execution Time	Less than 1 second.	
User Input	The address to peek on	
Error	Number	Description
	11200	Peeking on the specified address succeeded
	11201	Peeking on the specified address failed, wrong user input
	11202	Peeking on the specified address failed due to misalignment
Example	<pre>DS:&gt; 112 0xa0700000 011200: Value read = 0x000001BD Test OK @</pre>	

Nucleus Name	<b>DS_CHR_Poke</b>	
Nucleus Number	113	
Description	Poke a value on a specified address	
Technical	<ul style="list-style-type: none"> <li>- Check the user input</li> <li>- Change the value on the address specified</li> <li>- Check whether the address to be modified is aligned on 4 bytes</li> </ul>	
Execution Time	Less than 1 second.	
User Input	The address to poke and the value: <address><value>	
Error	Number	Description
	11300	Poking the specified address succeeded
	11301	Poking the specified address failed, wrong user input
	11302	Poking the specified address failed due to misalignment
Example	<pre>DS:&gt; 113 0xa0700000 0xaabbccdd 011300: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_INT_PICInterrupts</b>	
Nucleus Number	114	
Description	Test all interrupts of the priority interrupt controller	
Technical	<ul style="list-style-type: none"> <li>- Install interrupt handlers</li> <li>- Generate interrupts</li> <li>- Test whether all interrupts were received</li> </ul>	
Execution Time	Less than 1 second.	
User Input	-	
Error	Number	Description
	11400	Testing all the PIC interrupts succeeded
	11401	Testing all the PIC interrupts failed
Example	<pre>DS:&gt; 114 011400: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_DMA_TestDMA</b>	
Nucleus Number	115	
Description	Test the memory to memory DMA transfer	
Technical	<ul style="list-style-type: none"> <li>- Create a block with known data in memory</li> <li>- Copy this block to the consecutive area using 4 different DMAs</li> <li>- Check whether all DMAs transferred the data properly</li> </ul>	
Execution Time	Less than 2 seconds.	
User Input	-	
Error	Number	Description
	11500	The testing of the DMAs succeeded
	11501	The initialisation of the DMAs failed for one or more DMA
	11502	One or more DMAs failed the test
Example	<pre>DS:&gt; 115 011500: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_PioGet</b>	
Nucleus Number	116	
Description	Get a value from a PIO pin	
Technical	<ul style="list-style-type: none"> <li>- Decode user input</li> <li>- Read the PIO input register of the codec and return the requested pio line value</li> </ul>	
Execution Time	Less than 1 second.	
User Input	<PIN> where PIN is the pio pin to get (0..31)	
Error	Number	Description
	11600	Getting PIO value succeeded
	11601	Invalid parameter
Example	<pre>DS:&gt; 116 15 011600: Value read = 0x1 Test OK @</pre>	



Nucleus Name	<b>DS_CHR_PioSet</b>	
Nucleus Number	117	
Description	Set a value on a PIO pin. Make sure that the pin is configured as output first	
Technical	<ul style="list-style-type: none"> <li>- Decode user input</li> <li>- Update the PIO output register of the codec</li> </ul>	
Execution Time	Less than 1 second.	
User Input	<PIN> <VALUE> where PIN is the pio pin to set (0..31) and VALUE the value of the pin (0..1)	
Error	Number	Description
	11700	Setting PIO value succeeded
	11701	Invalid parameter
Example	<pre>DS:&gt; 117 15 0 011700: Test OK @</pre>	

Nucleus Name	<b>DS_CHR_PioConfig</b>	
Nucleus Number	118	
Description	Configure a PIO pin	
Technical	<ul style="list-style-type: none"> <li>- Decode user input</li> <li>- Update the PIO configuration register of the codec</li> </ul>	
Execution Time	Less than 1 second.	
User Input	<PIN> <DIR> where PIN is the pio pin to set (0..31) and DIR the direction of the pin (0=IN 1=OUT)	
Error	Number	Description
	11800	Setting PIO configuration succeeded
	11801	Invalid parameter
Example	<pre>DS:&gt; 118 14 0 011700: Test OK @</pre>	

## SDRAM (SDRAM OR DDR-RAM)

Nucleus Name	<b>DS_SDRAM_WriteRead</b>	
Nucleus Number	400	
Description	Check all data lines, address lines and memory locations of the RAM	
Technical	<ul style="list-style-type: none"> <li>- Test the data bus</li> <li>- Test the address bus</li> <li>- Test the integrity of the device itself (memory locations)</li> </ul>	
Execution Time	11 seconds for 32 Mb 23 seconds for 64 Mb	
User Input	None	
Error	Number	Description
	40000	The write-read test succeeded
	40001	The data bus contains an error
	40002	The address bus contains an error
	40003	The RAM itself contains an error
Example	<pre>DS:&gt; 400 040000: Test OK @</pre>	

Nucleus Name	<b>DS_SDRAM_WriteReadFast</b>	
Nucleus Number	401	
Description	Check all data lines and address lines of the RAM	
Technical	<ul style="list-style-type: none"> <li>- Test the data bus</li> <li>- Test the address bus</li> </ul>	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	40100	The write-read test succeeded
	40101	The data bus contains an error
	40102	The address bus contains an error
Example	<pre>DS:&gt; 401 040100: Test OK @</pre>	

Nucleus Name	<b>DS_SDRAM_Write</b>	
Nucleus Number	402	
Description	Write to a specific un-cached memory address	
Technical	<ul style="list-style-type: none"> <li>- Decode the user input and check its ranges and alignment on 4 bytes</li> <li>- Write the data to the RAM</li> </ul>	
Execution Time	Less than 1 second	
User Input	<ol style="list-style-type: none"> <li>1. The location that must be modified (RAM starts at address 0xA0000000)</li> <li>2. The value to put on the selected location</li> </ol>	
Error	Number	Description
	40200	Writing to the RAM succeeded
	40201	Writing to the RAM failed; Wrong user input
	40202	Address is not dividable by 4
Example	<pre>DS:&gt; 402 0xa1000010 0xad112222 040200: Test OK @</pre>	

Nucleus Name	<b>DS_SDRAM_Read</b>	
Nucleus Number	403	
Description	Read from a specific un-cached memory address	
Technical	<ul style="list-style-type: none"> <li>- Decode the user input and check the ranges</li> <li>- Read from the RAM and return this info to the user</li> </ul>	
Execution Time	Less than 1 second	
User Input	The location from which the data must be read (RAM starts at address 0xA0000000)	
Error	Number	Description
	40300	Reading from the RAM succeeded
	40301	Reading from the RAM failed; Wrong user input
	40302	Address is not dividable by 4
Example	<pre>DS:&gt; 403 0xa1000010 040300: Value read = 0xAD112222 Test OK @</pre>	

Nucleus Name	<b>DS_SDRAM_DmaWriteRead</b>	
Nucleus Number	404	
Description	Write a pattern to the entire RAM using DMA and check the data	
Technical	<ul style="list-style-type: none"> <li>- Check if the Stack pointer is not in the write range</li> <li>- Clear a 64kb block and then fill it with a pattern</li> <li>- Initialise the DMA controller and write the data to the SDRAM</li> <li>- Then check if all the data was written correctly (except descriptor tables)</li> <li>- Repeat the process 4 times with 4 different patterns</li> </ul>	
Execution Time	24 seconds	
User Input	None.	
Error	Number	Description
	40400	Writing to the RAM succeeded
	40401	Stack area definition ERROR!
	40402	DMA controller could not be initialised.
	40403	Not all data was transferred correctly
Example	<pre>DS:&gt; 404 040400: Test OK @</pre>	

## FLASH (FLASH)

Nucleus Name	<b>DS_FLASH_DevTypeGet</b>	
Nucleus Number	500	
Description	Get the device (revision) type information of the FLASH ICs. (type, manufacturer, device ID and size)	
Technical	<ul style="list-style-type: none"> <li>- Set the timing for the flash writing</li> <li>- Write a command sequence to determine device type information</li> <li>- Return the information to the user</li> </ul>	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	50000	Getting the information from the FLASH succeeded
	50001	Getting the information from the FLASH failed
Example	<pre>DS:&gt; 500 050000: Found FLASH memory: NOR AMD 29DL640G 8MB,NOR AMD 29DL640G 8MB Test OK @</pre>	

Nucleus Name	<b>DS_FLASH_Read</b>	
Nucleus Number	502	
Description	Read from a specific memory address in FLASH	
Technical	<ul style="list-style-type: none"> <li>- Decode the user input and check the ranges and whether the address is aligned on 4 bytes</li> <li>- Read the data and return this to the user</li> </ul>	
Execution Time	Less than 1 second.	
User Input	The location from which data must be read (FLASH starts at address 0xB8000000)	
Error	Number	Description
	50200	Reading the FLASH succeeded
	50201	Reading the FLASH failed; Wrong user input
	50202	Address is not dividable by 4
Example	<pre>DS:&gt; 502 0xb8000000 050200: Value read = 0x3C08A000 Test OK @</pre>	

Nucleus Name	<b>DS_FLASH_ChecksumProgram</b>	
Nucleus Number	503	
Description	Check the checksum of the application partitions by recalculating and comparing partition checksums	
Technical	<ul style="list-style-type: none"> <li>- Determine the number of segments</li> <li>- Find the application in each segment and determine its checksum</li> <li>- Check whether the checksums stored match the newly calculated</li> </ul>	
Execution Time	6 seconds	
User Input	None	
Error	Number	Description
	50300	The checksum is valid, the test succeeded
	50301	The checksum is invalid
Example	<pre>DS:&gt; 503 050300: BootCode   checksum is: 0xBABE5B6F, which is correct Diagnostics checksum is: 0xBABEBAFF, which is correct Download   checksum is: 0xBABEEDBF, which is correct Application checksum is: 0xBABE8EEC, which is correct Test OK @</pre>	

Nucleus Name	<b>DS_FLASH_CalculateChecksum</b>	
Nucleus Number	504	
Description	Calculate the checksum over all memory addresses. Used to check entire FLASH contents	
Technical	- Run the checksum calculation algorithm on all flash memory addresses	
Execution Time	6 seconds	
User Input	None	
Error	Number	Description
	50400	Calculating the checksum over all addresses succeeded
Example	<pre>DS:&gt; 504 050400: The Checksum = 0xBABE30A4 Test OK @</pre>	

Nucleus Name	<b>DS_FLASH_CalculateChecksumFast</b>	
Nucleus Number	505	
Description	Calculate a checksum over a selected number of address locations	
Technical	- Run the checksum calculation algorithm on a selected number of flash memory addresses	
Execution Time	6 seconds	
User Input	None	
Error	Number	Description
	50500	Calculating the checksum over selected addresses succeeded
Example	<pre>DS:&gt; 505 050500: The Checksum = 0xBABEB064 Test OK @</pre>	

Nucleus Name	<b>DS_FLASH_EraseFlfs</b>	
Nucleus Number	506	
Description	Erase the complete Flash File system segment in flash memory. This will erase all non volatile data including diversity string, DV unique ID number and DivX model ID.	
Technical	<ul style="list-style-type: none"> <li>- Initialise Flash access</li> <li>- Search in flash for the segment with the “FLFS” and “FLF2” signature</li> <li>- Ask the user whether he is sure to erase all data</li> <li>- If available erase the sector containing the FLFS signature</li> <li>- If available erase the sector containing the FLF2 signature</li> </ul>	
<b>Important note:</b>	<b>This nucleus will erase all data, make sure to reboot after this and program a diversity string</b>	
Execution Time	About 1 second per block erased.	
User Input	None	
Error	Number	Description
	50600	FLFS successfully erased
	50601	User aborted the test
	50602	FLFS segment is not available
Examples	<pre>DS:&gt; 506 Do you readlly want to erase the entire FLFS ? [Y /N(Default)] :y Erasing FLFS...  050600: All data has been erased Test OK @  DS:&gt; 506 Do you readlly want to erase the entire FLFS ? [Y /N(Default)] :n FLFS not erased.  050601: User abort Test OK @  DS:&gt; 506 Do you readlly want to erase the entire FLFS ? [Y /N(Default)] :y Erasing FLFS...  050602: No FLFS segment found Error @</pre>	

\* Beware that when nucleus 506 erases DivX model ID, the DivX VOD registration code of the set will change. The set will not play back the previously purchased (downloaded) videos from DivX Video On Demand service. Refer to section 5.11 “Setting DivX Model ID” for details

## VIDEO INPUT PROCESSOR (VIP)

Nucleus Name	<b>DS_VIP_DevTypeGet</b>	
Nucleus Number	600	
Description	Get the device (revision) type information of the VIP IC	
Technical	<ul style="list-style-type: none"> <li>- Initialise IIC</li> <li>- Read out the device (revision) type information of the VIP IC</li> </ul>	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	60000	Getting the information from the VIP succeeded
	60001	The IIC bus initialisation failed
	60002	The was an error getting the information from the VIP
	60003	Type not according to type stored in HW diversity string
Example	<pre>DS:&gt; 600 060000: Found SAA7136 Test OK @</pre>	

Nucleus Name	<b>DS_VIP_Communication</b>	
Nucleus Number	601	
Description	Check the communication between the IIC controller of the Codec and the VIP IC	
Technical	<ul style="list-style-type: none"> <li>- Initialise IIC</li> <li>- Read data from a location in the VIP</li> </ul>	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	60100	Communicating with the VIP succeeded
	60101	The IIC bus was not accessible
	60102	There was a timeout reading the device
	60103	The IIC acknowledge was not received
	60104	The communication with the device failed
	60105	The IIC bus initialisation failed
Example	<pre>DS:&gt; 601 060100: Test OK @</pre>	

Nucleus Name	<b>DS_VIP_SelectInput</b>																																																					
Nucleus Number	604																																																					
Description	Select an input video path to be switched to the analogue output pin (AOUT) of the VIP																																																					
User Input	<p>Select an input video path (id) to be switched to the analogue output pin (AOUT1) of the VIP.</p> <p>Available channels for input of the SAA7136 and their description:</p> <table border="1"> <thead> <tr> <th>Id</th> <th>VIP input</th> <th>Input source EURO</th> <th>Input source NAFTA</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>AI11</td> <td>tuner_scart2-cvbs_in</td> <td>reserved</td> </tr> <tr> <td>2</td> <td>AI12</td> <td>leco-cvbs_in1</td> <td>rear-y_cvbs_in</td> </tr> <tr> <td>3</td> <td>AI13</td> <td>front-y_in</td> <td>front-y_in</td> </tr> <tr> <td>4</td> <td>AI21</td> <td>scart2_c_r_in</td> <td>rear-pr_in</td> </tr> <tr> <td>5</td> <td>AI22</td> <td>scart1-cvbs_in</td> <td>rear-c_in</td> </tr> <tr> <td>6</td> <td>AI23</td> <td>front-c_in</td> <td>front-c_in</td> </tr> <tr> <td>7</td> <td>AI31</td> <td>scart2-g_in</td> <td>rear-y_in (YPbPr)</td> </tr> <tr> <td>8</td> <td>AI32</td> <td>scart2-cvbs_in</td> <td>front-cvbs_in</td> </tr> <tr> <td>9</td> <td>AI33</td> <td>scart2-tuner-dttm-cvbs_in</td> <td>tuner-cvbs_in</td> </tr> <tr> <td>10</td> <td>AI41</td> <td>scart2-b_in</td> <td>rear-pb_in</td> </tr> <tr> <td>11</td> <td>AI42</td> <td>leco-cvbs_in2</td> <td>reserved</td> </tr> <tr> <td>12</td> <td>AI43</td> <td>front-cvbs_in</td> <td>leco-cvbs_in</td> </tr> </tbody> </table>		Id	VIP input	Input source EURO	Input source NAFTA	1	AI11	tuner_scart2-cvbs_in	reserved	2	AI12	leco-cvbs_in1	rear-y_cvbs_in	3	AI13	front-y_in	front-y_in	4	AI21	scart2_c_r_in	rear-pr_in	5	AI22	scart1-cvbs_in	rear-c_in	6	AI23	front-c_in	front-c_in	7	AI31	scart2-g_in	rear-y_in (YPbPr)	8	AI32	scart2-cvbs_in	front-cvbs_in	9	AI33	scart2-tuner-dttm-cvbs_in	tuner-cvbs_in	10	AI41	scart2-b_in	rear-pb_in	11	AI42	leco-cvbs_in2	reserved	12	AI43	front-cvbs_in	leco-cvbs_in
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Technical	<ul style="list-style-type: none"> <li>- Check the user input</li> <li>- Initialise IIC</li> <li>- Read out the VIP id</li> <li>- Write the set of registers required for the input specified</li> </ul>																																																					
Execution Time	Less than 1 second																																																					
Error	Number	Description																																																				
	60400	Selecting the input of the VIP succeeded																																																				
	60401	The user provided wrong input																																																				
	60402	The VIP was not accessible																																																				
	60403	An unsupported VIP was found																																																				
Example	<pre>DS:&gt; 604 1 060400: Test OK @</pre>																																																					

Nucleus Name	<b>DS_VIP_Routing</b>	
Nucleus Number	605	
Description	<p>Perform the routing of the audio and video signals in the set. It sets the audio and video path according to the user input.</p> <p>The user inputs the path id of choice, as specified in the table below for EURO and NAFTA.</p>	
User Input	<REGION> <PATH_ID> For details see next tables	
Technical	<ul style="list-style-type: none"> <li>- Check the user input</li> <li>- Initialise IIC</li> <li>- Read out the VIP id</li> <li>- Write the set of registers required for the input specified</li> </ul>	
Execution Time	Less than 1 second	
Error	Number	Description
	60500	Selecting the input of the VIP succeeded
	60501	The user provided wrong input
	60502	The VIP was not accessible
	60503	An unsupported VIP was found
Example	<pre>DS:&gt; 605 euro 00 060500: Test OK @</pre>	

## Available VIDEO path-Ids for NAFTA / APAC routing

NAFTA Path id	Description
nafta 00	<u>cvbs, yc, yuv and audio rear out.</u>
nafta 01	<u>cvbs and iis loop through (via itu656 c).</u>
nafta 02	<u>cvbs and iis loop through (via itu656 d).</u>
nafta 03	<u>cvbs and audio front in,</u> <u>cvbs and audio rear out.</u>
nafta 04	<u>yc and audio rear in,</u> <u>yc and audio rear out.</u>
nafta 05	<u>yc and audio front in,</u> <u>yc and audio rear out.</u>
nafta 06	<u>yuv and audio rear out,</u> <u>yuv and audio rear in.</u>
nafta 07	<u>cvbs, yc, yuv and audio rear out,</u> <u>tuner in.</u>
nafta 08	<u>spdif rear out,</u> <u>spdif1 rear in.</u>
nafta 09	<u>spdif rear out,</u> <u>spdif2 rear in.</u>
nafta 10	<u>cvbs, spdif rear out,</u> <u>dtm itu656 spdif in..</u>
nafta 11	<u>cvbs and audio front in,</u> <u>cvbs and audio rear out (via external audio ADC).</u>
nafta 12	<u>cvbs and iis loop through (via itu656 c and external audio ADC).</u>
nafta 13	<u>yuv and audio rear out(via external audio ADC),</u> <u>yuv and audio rear in.</u>

Nucleus Name	<b>DS_VIP_Reset</b>	
Nucleus Number	606	
Description	Reset the Video input processor	
Technical	- Toggle the VIP_RESET PIO line of the codec	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	60600	Resetting VIP succeeded
	60601	Resetting VIP failed
Example	DS:> 606 060600: Ok Test OK @	



Nucleus Name	<b>DS_VIP_FastBlankingCheck</b>	
Nucleus Number	607	
Description	Checks the fast blanking signal on SCART2 in	
Technical	- Read out the SCART1_P16 GPIO pin of the ASP	
Execution Time	Less than 3 second	
User Input	None	
Error	Number	Description
	60700	Value of Fast Blanking Pin is detected
	60701	Error Cannot read Fast Blanking Pin
Example	<pre>DS:&gt; 607 060700: Fast Blanking is ON Test OK @</pre>	

Nucleus Name	<b>DS_VIP_WssCheck</b>	
Nucleus Number	608	
Description	Check if the wide screen signal can be set low and high.	
Technical	- Get the WSS Rear Y/C Out value	
Execution Time	Less than 3 second	
User Input	None	
Error	Number	Description
	60800	
	60801	
Example	<pre>DS:&gt; 608 060800: WSS is ON Test OK @</pre>	

Nucleus Name	<b>DS_VIP_DetectVideo</b>	
Nucleus Number	609	
Description	Checks if an active video signal is available on the CVBS input of SCART 1 or SCART 2.	
Technical	<ul style="list-style-type: none"> <li>- Reset the VIP.</li> <li>- Implement the following video route in the VIP : SCART1 (A32) to ITU656_C</li> <li>- Tell user to remove all active video input from SCART1.</li> <li>- Enable sdtv(hlvIn) mask in 0x500(First level interrupt enable) and 0x50d (SDTV interrupt enable).</li> <li>- Set GPIO 55 on ASP to input.</li> <li>- Tell user to connect active video into SCART1.</li> <li>- Read GPIO 55.</li> <li>- The line should be LOW if there is active video on SCART1, else LOW.</li> <li>- Clear the VIP *INTA interrupt.</li> </ul>	
Execution Time	Depending on user input	
User Input	None	
Error	Number	Description
	609000	Detecting the Active video succeeded.
	609001	Detecting the Active video failed.
	609002	This test is not applicable for current HW layout.
	609003	Could not retrieve hardware version from ASP.
Example	<pre>DS:&gt; 609 Please remove video input from the SCART1 connector. Press any key when ready ... Please input video input into the SCART1 connector. Press any key when ready ... 609000: Active video is ON Test OK @</pre>	

## DIGITAL VIDEO INPUT OUTPUT CIRCUIT (DVIO)

Nucleus Name	<b>DS_DVIO_LinkDevTypeGet</b>	
Nucleus Number	700	
Description	Get the device (revision) type information of the 1394 Link layer IC	
Technical	<ul style="list-style-type: none"> <li>- Initialise the PIO pins on the Codec</li> <li>- Read out the ID register</li> </ul>	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	70000	Getting the information from the link layer IC succeeded
	70001	Getting the information from the link layer IC failed
	70002	Type not according to type stored in HW diversity string
Example	<pre>DS:&gt; 700 070000: Device type of the link layer IC: ffc00301 Test OK @</pre>	

Nucleus Name	<b>DS_DVIO_PhyDevTypeGet</b>	
Nucleus Number	701	
Description	Get the device (revision) type information of the 1394 Physical layer IC	
Technical	<ul style="list-style-type: none"> <li>- Initialise the PIO pins of the Codec</li> <li>- Write the PHY-access register in the Link chip to indicate phy read access</li> <li>- Wait until the link chip has obtained the value from the phy-chip</li> <li>- Read this out and filter the data to be returned to the user</li> </ul>	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	70100	Getting the information from the physical layer IC succeeded
	70101	The physical layer IC was not accessible
	70102	Getting the information from the physical layer IC failed
	70103	Type not according to type stored in HW diversity
Example	<pre>DS:&gt; 701 070100: Physical layer IC: VendorID: 0x006037, ProductID: 0x412801 Test OK @</pre>	

Nucleus Name	<b>DS_DVIO_PhyCommunication</b>	
Nucleus Number	703	
Description	Check the accessibility of the 1394 Physical layer IC by writing to and reading from a specific address	
Technical	<ul style="list-style-type: none"> <li>- Initialise the PIO pins of the Codec</li> <li>- Initialise IIC</li> <li>- Write the data to be written to the PHY-chip to the link chip first</li> <li>- Wait until the link chip indicates that the data has been written to the PHY</li> <li>- Write the PHY-access register in the Link chip to indicate PHY read access</li> <li>- Wait until the link chip has obtained the value from the PHY-chip</li> <li>- Test whether the value read back equals the one previously written</li> </ul>	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	70300	Communicating with the physical layer IC succeeded
	70301	The physical layer IC was not accessible
	70302	Communicating with the physical layer IC failed
	70303	Result of nucleus not according to HW diversity string
Example	<pre>DS:&gt; 703 070300: Test OK @</pre>	

Nucleus Name	<b>DS_DVIO_Routing</b>	
Nucleus Number	704	
Description	Route a DV stream containing an audio and video signal through the physical and link layer ICs to the Codec. This test works for both NTSC and PAL.	
Technical	<ul style="list-style-type: none"> <li>- Initialise the DMA to transfer 5 frames PAL/NTSC</li> <li>- Initialise the DV de-multiplexer</li> <li>- Initialise the 1394 interface and start reception of the DV stream</li> <li>- Check whether the stream was copied to memory properly by the byte input interface (port to memory type DMA)</li> </ul>	
Execution Time	6-10 seconds (6 when OK, 10 when no stream or error)	
User Input	None	
Error	Number	Description
	70400	Routing the signals succeeded
	70401	The 1394 link chip could not be initialised properly
	70402	There was a syntax error in the DV stream
	70403	DMA could not copy DV stream to memory. Stream connected?
	70404	DMA not working properly
Example	<pre>DS:&gt; 704 070400: Test OK @</pre>	

Nucleus Name	<b>DS_DVIO_DetectNode</b>	
Nucleus Number	705	
Description	Check whether a DV node can be detected by the hardware. This test works for both NTSC and PAL.	
Technical	<ul style="list-style-type: none"> <li>- Initialise the 1394 interface</li> <li>- Detect whether a node is in range</li> </ul>	
Execution Time	3 or 5 seconds (3 when OK, 5 when no stream or error)	
User Input	None	
Error	Number	Description
	70500	The node was detected OK
	70501	The 1394 link chip could not be initialised properly
	70502	Unable to write to 1394 PHY chip
	70503	Unable to read from 1394 PHY chip
	70504	No node was detected
Example	<pre>DS:&gt; 705 070500: Test OK @</pre>	

Nucleus Name	<b>DS_DVIO_DetectStream</b>	
Nucleus Number	706	
Description	Check whether a DV stream can be detected by the hardware. This test works for both NTSC and PAL.	
Technical	<ul style="list-style-type: none"> <li>- Initialise the 1394 interface</li> <li>- Start receiving the stream</li> <li>- Detect whether the stream is OK</li> </ul>	
Execution Time	3 or 5 seconds (3 when OK, 5 when no stream or error)	
User Input	None	
Error	Number	Description
	70600	The stream was detected
	70601	The 1394 link chip could not be initialised properly
	70602	No stream detected
Example	<pre>DS:&gt; 706 070600: Test OK @</pre>	

## BASIC ENGINE (BE)

Nucleus Name	<b>DS_BE_CommunicationEcho</b>	
Nucleus Number	900	
Description	Check the communication between the digital board and the BE by issuing a TEST_UNIT_READY ATAPI command	
Technical	- Send an ATAPI TEST_UNIT_READY command	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	90000	Communicating with the BE over the IDE interface succeeded
	90001	There was a time-out while communicating
	90002	The Basic Engine returned an unexpected result
	90003	The Basic Engine returned an error code
	90004	No acknowledge received from BE
	90005	Communicating with the Basic Engine failed
	90006	Echo check failed, no ready status received
	90007	Echo check failed, received wrong pattern
Example	<pre>DS:&gt; 900 090000: Test OK @</pre>	

Nucleus Name	<b>DS_BE_Reset</b>	
Nucleus Number	901	
Description	Reset the basic engine	
Technical	- Toggle the reset pin of the IDE interface and wait for the BE to become ready	
Execution Time	9 seconds (when disc inside)	
User Input	None	
Error	Number	Description
	90100	Resetting the Basic Engine succeeded
	90101	Resetting the Basic Engine failed
Example	<pre>DS:&gt; 901 090100: Test OK @</pre>	

Nucleus Name	<b>DS_BE_GetSelftestResult</b>	
Nucleus Number	902	
Description	Return the self-test results through the service port	
Technical	<ul style="list-style-type: none"> <li>- Send the ATAPI REPORT_DRIVE_DIAGNOSTICS command</li> <li>- On error display the specific error codes received from the BE</li> </ul>	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	90200	Self test succeeded, no errors
	90201	There was a time-out while communicating
	90202	The Basic Engine returned an unexpected result
	90203	The BE returned an error code
	90204	No acknowledge received from BE
	90205	Communicating with the Basic Engine failed
	90206	Basic Engine returned no info
	90207	Self test failed, errors are echoed
Example	<pre>DS:&gt; 902 090200: Self-test result byte : 00000000 Self-test result byte : 00000000 Self-test result byte : 00000000 Test OK @</pre>	

Nucleus Name	<b>DS_BE_VersionGet</b>	
Nucleus Number	903	
Description	Get the version of the basic engine and that of the optical unit	
Technical	<ul style="list-style-type: none"> <li>- send the ATAPI INQUIRY command</li> <li>- Send the GET_OPU_VERSION command</li> <li>- Display the returned version information</li> </ul>	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	90300	BE version OK
	90301	There was a time-out while communicating
	90302	The Basic Engine returned an unexpected result
	90303	The BE returned an error code
	90304	No acknowledge received from BE
	90305	Communicating with the Basic Engine failed
	90306	The BE returned no info
Example	<pre>DS:&gt; 903 090300: BE version = 31.30.24. PHILIPS ,VAD8031 ,31302400,REL_8031_313024 2073, Optical unit version = 00.06.82.19.00 Test OK @</pre>	

Nucleus Name	<b>DS_BE_TrayOut</b>	
Nucleus Number	904	
Description	Open the tray of the basic engine	
Technical	<ul style="list-style-type: none"> <li>- Send an ATAPI START_STOP_UNIT command</li> </ul>	
Execution Time	Approximately 2 seconds	
User Input	None	
Error	Number	Description
	90400	The command executed successfully
	90401	There was a time-out while communicating
	90402	The Basic Engine returned an unexpected result
	90403	The BE returned an error code
	90404	No acknowledge received from BE
	90405	Unable to enter normal mode
	90406	Communicating with the Basic Engine failed
Example	<pre>DS:&gt; 904 090400: Test OK @</pre>	

Nucleus Name	<b>DS_BE_TrayIn</b>	
Nucleus Number	905	
Description	Close the tray of the basic engine	
Technical	<ul style="list-style-type: none"> <li>- Send an ATAPI START_STOP_UNIT command</li> </ul>	
Execution Time	Approximately 1 - 2 seconds	
User Input	None	
Error	Number	Description
	90500	The command executed successfully
	90501	There was a time-out while communicating
	90502	The Basic Engine returned an unexpected result
	90503	The BE returned an error code
	90504	No acknowledge received from BE
	90505	Unable to enter normal mode
	90506	Communicating with the Basic Engine failed
Example	<pre>DS:&gt; 905 090500: Test OK @</pre>	

Nucleus Name	<b>DS_BE_WriteReadDvdRw</b>	
Nucleus Number	906	
Description	Write data to and read data from a DVD+RW or DVD-RW disc through the basic engine for verification of the writing	
Technical	<ul style="list-style-type: none"> <li>- Send an ATAPI START_STOP_UNIT command to insert the tray</li> <li>- Send the READ_TOC command</li> <li>- Generate a random disc location</li> <li>- Generate test data to write to the DVD+RW</li> <li>- Transfer the test data to the disc location using PIO mode ATAPI WRITE_10</li> <li>- Transfer the test data from the disc location using PIO mode ATAPI READ_10</li> <li>- Compare the two data areas and check whether the areas are equal</li> </ul>	
Execution Time	Approximately 20 seconds	
User Input	None	
Error	Number	Description
	90600	The command executed successfully
	90601	This nucleus cannot be executed because the Self-Test failed
	90602	The BE cannot enter normal operating mode
	90603	Unable to send the tray in
	90604	Unable to read TOC from disc
	90605	Invalid disc is loaded, please insert a DVD+RW or DVD-RW disc
	90606	Writing the test pattern to DVD+RW or DVD-RW failed
	90607	Reading back the test pattern from DVD+RW or DVD-RW failed
	90608	Compare check failed
	90609	Calibrating DVD+RW or DVD-RW failed
Example	<pre>DS:&gt; 906 090600: DVD+RW test on sector 0x5dbe0: OK Test OK @</pre>	
	<pre>DS:&gt; 906 090600: DVD-RW test on sector 0x304e0: OK Test OK @</pre>	

Nucleus Name	<b>DS_BE_WriteReadDvdR</b>	
Nucleus Number	907	
Description	Write data to and read data from a DVD+R or DVD-R disc through the basic engine for verification of the writing	
Technical	<ul style="list-style-type: none"> <li>- Send an ATAPI START_STOP_UNIT command to insert the tray</li> <li>- Send the READ_TOC command</li> <li>- Use the OPC area to test if the DVD+R or DVD-R is (still) writable</li> <li>- Generate test data to write to the DVD+R or DVD-R</li> <li>- Transfer the test data to the disc location using PIO mode ATAPI WRITE_10</li> <li>- Transfer the test data from the disc location using PIO mode ATAPI READ_10</li> <li>- Compare the two data areas and check whether the areas are equal</li> </ul>	
Execution Time	Approximately 20 seconds	
User Input	None	
Error	Number	Description
	90700	The command executed successfully
	90701	This nucleus cannot be executed because the Self-Test failed
	90702	The BE cannot enter normal operating mode
	90703	Unable to send the tray in
	90704	Unable to read TOC from disc
	90705	Invalid disc is loaded, please insert a DVD+RW disc
	90706	Unable to write, the DVD+R or DVD-R disc is full
	90707	No writable DVD+R or DVD-R sector found
	90708	Writing the test pattern to DVD failed
	90709	Reading back the test pattern from DVD failed
	90710	Compare check failed
Example	<pre>DS:&gt; 907 090700: DVD+R test on sector 0x36210: OK Test OK @</pre>	
	<pre>DS:&gt; 907 090700: DVD-R test on sector 0x30000: OK Test OK @</pre>	

Nucleus Name	<b>DS_BE_JitterOptimise</b>	
Nucleus Number	912	
Description	Perform jitter optimisation: A formatted DVD must be loaded into the engine before executing this nucleus	
Technical	<ul style="list-style-type: none"> <li>- Send the START_STOP_UNIT command to insert the tray</li> <li>- Send the READ_TOC command</li> <li>- Send the MEASURE_JITTER_BLER_PPN command and display the average jitter and bler values</li> </ul>	
Execution Time	Approximately 20 seconds	
User Input	None	
Error	Number	Description
	91200	Optimising jitter succeeded
	91201	There was a time-out while communicating
	91202	The Basic Engine returned an unexpected result
	91203	The Basic Engine returned an error code
	91204	No acknowledge received from BE
	91205	Unable to send tray in
	91206	Unable to read the disc
	91207	No disc is loaded
	91208	Unknown disc is loaded
	91209	Unable to enter service mode
Example	<pre>DS:&gt; 912 091200: Average Jitter, Bler C1, Bler C2: (92,4,254) Test OK @</pre>	

Nucleus Name	<b>DS_BE_FocusOn</b>	
Nucleus Number	913	
Description	Put the laser of the bit-engine into focus by issuing a <i>TRANSPARENT SEND</i> and <i>TRANSPARENT_RECEIVE</i> command. This nucleus is not guaranteed to work on all connected BEs	
Technical	<ul style="list-style-type: none"> <li>- Send the transparent BIT engine FOCUS command</li> </ul>	
<b>Important note:</b>	<b>This nucleus uses the transparent bit engine interface of the drive. It is not guaranteed to work on all drives. Only use this nucleus if you are sure that the drive supports this interface</b>	
Execution Time	3 seconds	
User Input	None	
Error	Number	Description
	91300	Focus on succeeded
	91301	There was a time-out while communicating
	91302	The Basic Engine returned an unexpected result
	91303	The BE returned an error code
	91304	No acknowledge received from BE
	91305	Communicating with the Basic Engine failed
	91306	Unable to enter service mode
Example	<pre>DS:&gt; 913 091300: Test OK @</pre>	

Nucleus Name	<b>DS_BE_FocusOff</b>	
Nucleus Number	914	
Description	Turn off putting the laser of the bit-engine into focus by issuing a <i>TRANSPARENT SEND</i> and <i>TRANSPARENT_RECEIVE</i> command. This nucleus is not guaranteed to work on all connected BEs	
Technical	- Send the transparent BIT engine FOCUS command	
<b>Important note:</b>	<b>This nucleus uses the transparent bit engine interface of the drive. It is not guaranteed to work on all drives. Only use this nucleus if you are sure that the drive supports this interface</b>	
Execution Time	2 seconds	
User Input	None	
Error	Number	Description
	91400	Focus off succeeded
	91401	There was a time-out while communicating
	91402	The Basic Engine returned an unexpected result
	91403	The BE returned an error code
	91404	No acknowledge received from BE
	91405	Communicating with the Basic Engine failed
	91406	Unable to enter service mode
Example	DS:> 914 091400: Test OK @	

Nucleus Name	<b>DS_BE_MotorOn</b>	
Nucleus Number	915	
Description	Turn on the turntable motor by issuing a <i>TRANSPARENT SEND</i> and <i>TRANSPARENT_RECEIVE</i> command. This nucleus is not guaranteed to work on all connected Bes	
Technical	- Send the transparent BIT engine TTM command	
<b>Important note:</b>	<b>This nucleus uses the transparent bit engine interface of the drive. It is not guaranteed to work on all drives. Only use this nucleus if you are sure that the drive supports this interface</b>	
Execution Time	4 seconds	
User Input	None	
Error	Number	Description
	91500	Turn table motor is on
	91501	There was a time-out while communicating
	91502	The Basic Engine returned an unexpected result
	91503	The BE returned an error code
	91504	No acknowledge received from BE
	91505	Communicating with the Basic Engine failed
	91506	Unable to enter service mode
Example	DS:> 915 091500: Test OK @	

Nucleus Name	<b>DS_BE_MotorOff</b>	
Nucleus Number	916	
Description	Turn off the turntable motor by issuing a <i>TRANSPARENT SEND</i> and <i>TRANSPARENT_RECEIVE</i> command. This nucleus is not guaranteed to work on all connected Bes	
Technical	- Send the transparent BIT engine TTM command	
<b>Important note:</b>	<b>This nucleus uses the transparent bit engine interface of the drive. It is not guaranteed to work on all drives. Only use this nucleus if you are sure that the drive supports this interface</b>	
Execution Time	4 seconds	
User Input	None	
Error	Number	Description
	91600	Turn table motor is off
	91601	There was a time-out while communicating
	91602	The Basic Engine returned an unexpected result
	91603	The BE returned an error code
	91604	No acknowledge received from BE
	91605	Communicating with the Basic Engine failed
	91606	Unable to enter service mode
Example	DS:> 916 091600: Test OK @	



Nucleus Name	<b>DS_BE_CheckDisc</b>	
Nucleus Number	921	
Description	Check whether there is a disc inside the BE	
Technical	<ul style="list-style-type: none"> <li>- Send the START_STOP_UNIT command to insert the tray</li> <li>- Send the READ_TOC command</li> <li>- Display the Disc type info</li> <li>- If Disc type is a DVD+R(W), then read ADIP info.</li> <li>- Display manufacturer and media type.</li> </ul>	
Execution Time	Approximately 10 seconds	
User Input	None	
Error	Number	Description
	92100	There was a disc inside the set
	92101	Unable to load the tray
	92102	Error received from BE
Example	<pre>DS:&gt; 921 092100: Disc type: DVD+RW disc Disc manufacturer id: PHILIPS Media type id: 010 Test OK @  DS:&gt; 921 090500: Disc type: None Test OK @  DS:&gt; 921 092100: Disc type: DVD+R disc Disc manufacturer id: RICOHJPN Media type id: R00 Test OK @</pre>	

Nucleus Name	<b>DS_BE_ReadTocInfo</b>	
Nucleus Number	924	
Description	Read the TOC from the disc. This gives a good indication if the BE works properly.	
Technical	<ul style="list-style-type: none"> <li>- Send the START_STOP_UNIT command to insert the tray</li> <li>- Send the READ_TOC command</li> <li>- Display the TOC info.</li> </ul>	
Execution Time	Approximately 10 seconds	
User Input	None	
Error	Number	Description
	92400	A disc is loaded, TOC info if echoed
	92401	Unable to load the tray
	92402	The BE has not returned TOC info
	92403	Error received from BE
Example	<pre>DS:&gt; 924 092400: TOC info [hex] = 91 3A 0C Test OK @  DS:&gt; 924 092403: The BE returned: 0x10 #{no_disc_error} No disc is detected Error @  DS:&gt; 924 092403: The BE returned: 0x1e #{illegal_medium_error} Engine unable to handle current disc. Probably illegal medium. Error @</pre>	

Nucleus Name	<b>DS_BE_RegionCodeSet</b>	
Nucleus Number	928	
Description	Set the region code in the AV3.	
Technical	- Send the ATAPI SEND_KEY command	
Execution Time		
User Input	Region code	
Error	Number	Description
	92800	The command executed successfully
	92801	There was a time-out while communicating
	92802	The Basic Engine returned an unexpected result
	92803	The BE returned an error code
	92804	No acknowledge received from BE
	92805	Communicating with the Basic Engine failed
	92806	No disc is present, please insert disc
	92807	Region code out of range
	92808	User input wrong
	92809	Region counter expired
	92810	This nucleus is not supported by the engine
Example	<pre>DS:&gt; 928 1 092800: Test OK @</pre>	

Nucleus Name	<b>DS_BE_RegionCodeGet</b>	
Nucleus Number	929	
Description	Read the region code from the AV3.	
Technical	- Send the ATAPI REPORT_KEY command	
Execution Time		
User Input	None	
Error	Number	Description
	92900	The command executed successfully
	92901	There was a time-out while communicating
	92902	The Basic Engine returned an unexpected result
	92903	The BE returned an error code
	92904	No acknowledge received from BE
	92905	Communicating with the Basic Engine failed
	92906	This nucleus is not supported by the engine
Example	<pre>DS:&gt; 929 092900: DVD region 1 Test OK @</pre>	

Nucleus Name	<b>DS_BE_RegionCounterReset</b>	
Nucleus Number	930	
Description	Reset the region counter in the AV3.	
Technical	- Send a special ATAPI RESET_REGION_COUNTER command	
Execution Time		
User Input	None	
Error	Number	Description
	93000	The command executed successfully
	93001	There was a time-out while communicating
	93002	The Basic Engine returned an unexpected result
	93003	The BE returned an error code
	93004	No acknowledge received from BE
	93005	Communicating with the Basic Engine failed
	93006	This nucleus is not supported by the engine
Example	<pre>DS:&gt; 930 093000: Test OK @</pre>	

Nucleus Name	<b>DS_BE_AdjustLaserControl</b>	
Nucleus Number	931	
Description	Adjust the DVD-M (with the OPU) with PCBA. (So adjusts the two PCBS to each other)	
Technical	- Sending a transparent BIT engine command to align the PCBs to each other.	
Important note:	<b>This nucleus uses the transparent bit engine interface of the drive. It is not guaranteed to work on all drives. Only use this nucleus if you are sure that the drive supports this interface</b>	
Execution Time	30 seconds	
User Input	None	
Error	Number	Description
	93100	The command executed successfully
	93101	There was a time-out while communicating
	93102	The Basic Engine returned an unexpected result
	93103	The BE returned an error code
	93104	No acknowledge received from BE
	93105	Communicating with the Basic Engine failed
	93106	Unable to enter service mode
	93107	This nucleus is not supported by the engine
Example	<pre>DS:&gt; 931 093100: Test OK @</pre>	

Nucleus Name	<b>DS_BE_WriteReadDvdRDualLayer</b>	
Nucleus Number	932	
Description	Write data to and read data from both layers of a DVD+R DL disc through the basic engine for verification of the writing	
Technical	<ul style="list-style-type: none"> <li>- Send the TRAY_IN command</li> <li>- Send the READ_TOC command</li> <li>- Use READ_TRACK_INFORMATION to determine the next free writable address on Layer 0.</li> <li>- In case of address 0, reserve a track of 0x1FD800 sectors for Layer 0</li> <li>- Use command SEND_OPC_INFORMATION to calibrate Layer 0</li> <li>- Generate test data to write to the disc</li> <li>- Transfer the test data to Layer 0 using PIO mode ATAPI WRITE_12</li> <li>- Use READ_TRACK_INFORMATION to determine the next free writable address on Layer 1</li> <li>- Use command SEND_OPC_INFORMATION to calibrate Layer 1</li> <li>- Transfer the test data to Layer 1 using PIO mode ATAPI WRITE_12</li> <li>- Read back the data of Layer 0 using PIO mode ATAPI READ_12</li> <li>- Compare the original data with the read data and check whether the areas are equal</li> <li>- Read back the data of Layer 1 using PIO mode ATAPI READ_12</li> <li>- Compare the original data with the read data and check whether the areas are equal</li> </ul>	
Execution Time	Approximately 30 seconds	
User Input	None	
Error	Number	Description
	93200	The command executed successfully
	93201	This nucleus cannot be executed because the Self-Test failed
	93202	The BE cannot enter normal operating mode
	93203	Unable to send the tray in
	93204	Unable to read TOC from disc
	93205	Invalid disc is loaded, please insert a DVD+R DL disc
	93206	Unable to write, the DVD+R DL disc is full
	93207	No writable sector found
	93208	Writing the test pattern to Layer 0 failed
	93209	Writing the test pattern to Layer 1 failed
	93210	Reading back the test pattern from Layer 0 failed
	93211	Reading back the test pattern from Layer 1 failed
	93212	Compare check for Layer 0 failed
	93213	Compare check for Layer 1 failed
Example	<pre>DS:&gt; 932 093200: Dual Layer DVD+R test on LBA 0x750 and 0x1fdf60 OK Test OK @</pre>	

Nucleus Name	<b>DS_SYS_HardwareVersionGet</b>	
Nucleus Number	1200	
Description	Get the hardware version and type of the digital board	
Technical	- Read the segment header in FLASH and determine hardware version	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	120000	Getting the hardware version and type of the digital board succeeded
	120001	Getting the hardware version and type of the digital board failed
	120002	Wrong hardware version read from FLASH
Example	<pre>DS:&gt; 1200 120000: Hardware ID = 0x29 Test OK @</pre>	

Nucleus Name	<b>DS_SYS_SoftwareVersionBootGet</b>	
Nucleus Number	1201	
Description	Get the version of the boot software on the digital board	
Technical	- Read the segment header in FLASH and determine Boot software version	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	120100	Getting the Boot software version succeeded
	120101	Getting the Boot software version failed
Example	<pre>DS:&gt; 1201 120100: Software Boot Version = 0331 Test OK @</pre>	

Nucleus Name	<b>DS_SYS_SoftwareVersionDownloadGet</b>	
Nucleus Number	1202	
Description	Get the version of the download software on the digital board	
Technical	- Read the segment header in FLASH and determine Download software version	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	120200	Getting the Download software version succeeded
	120201	Getting the Download software version failed
Example	<pre>DS:&gt; 1202 120200: Software Download Version = 0001 Test OK @</pre>	

Nucleus Name	<b>DS_SYS_SoftwareVersionApplGet</b>	
Nucleus Number	1203	
Description	Get the version of the application software on the digital board	
Technical	- Read the segment header in FLASH and determine Application software version	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	120300	Getting the Application software version succeeded
	120301	Getting the Application software version failed
Example	<pre>DS:&gt; 1203 120300: Software Application Version = 0001 Test OK @</pre>	

Nucleus Name	<b>DS_SYS_SoftwareVersionDiagnosticsGet</b>	
Nucleus Number	1204	
Description	Get the version of the diagnostics software on the digital board	
Technical	- Read the segment header in FLASH and determine Diagnostics software version	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	120400	Getting the Diagnostics software version succeeded
	120401	Getting the Diagnostics software version failed
Example	<pre>DS:&gt; 1204 120400: Software Diagnostics Version = 0001 Test OK @</pre>	

Nucleus Name	<b>DS_SYS_DvidNumberSet</b>	
Nucleus Number	1207	
Description	Set the IEEE 1394 unique ID	
Technical	<ul style="list-style-type: none"> <li>- Decode the user input</li> <li>- Store the id (&lt;b4&gt;&lt;b3&gt;&lt;b2&gt;&lt;b1&gt;&lt;b0&gt;) into NVRAM (offset + &lt;b4&gt;&lt;b3&gt;&lt;b2&gt;&lt;b1&gt;&lt;b0&gt;)</li> <li>- Validate the segment of storage by updating the checksum</li> </ul>	
Execution Time	Less than 1 second.	
User Input	The unique ID to be set.	
Error	Number	Description
	120700	Setting the unique DV ID succeeded
	120701	User input is not valid.
	120702	Setting the unique DV ID failed.
	120703	Write succeeded, but checksum is corrupt.
Example	<pre>DS:&gt; 1207 1234567890 120700: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_DvidNumberGet</b>	
Nucleus Number	1208	
Description	Get the IEEE1394 unique ID	
Technical	- Read out the ID from the configuration segment and return this info to the user	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	120800	Getting the unique DV ID succeeded
	120801	Getting the unique DV ID failed
	120802	Reading an unexpected section version in NVRAM
Example	<pre>DS:&gt; 1208 120800: The DvIdNumber is: 1234567890 Test OK @</pre>	

Nucleus Name	<b>DS_SYS_licWrite</b>	
Nucleus Number	1209	
Description	Perform an IIC write action on the digital board	
Technical	<ul style="list-style-type: none"> <li>- Determine bus ID, slave address, number of bytes to be written and the byte array of data from the user input</li> <li>- Initialise IIC</li> <li>- Write the data to the slave specified through IIC</li> </ul>	
Execution Time	Less than 1 second	
User Input	<p>The user input the number of bytes to write followed by the bytes to write:          &lt;BusID&gt;&lt;Slave address to write to&gt;&lt;number of bytes to write&gt;&lt;d1&gt;&lt;d2&gt;.&gt;&lt;dx&gt;          Where the bus id is either 0 (normally used) or 1</p>	
Error	Number	Description
	120900	Writing the data over IIC succeeded
	120901	The IIC bus was not accessible
	120902	There was a timeout writing to the device
	120903	The IIC acknowledge was not received
	120904	The communication with the device failed
	120905	Got unknown IIC bus error:
	120906	Unable to initialise IIC bus
	120907	Decoding bus ID unsigned value failed
	120908	Decoding slaveAddr unsigned value failed
	120909	Decoding nrBytes unsigned value failed
	120910	Bus ID out of range
	120911	nrBytes out of range
	120912	Unable to decode parameters
Example	<pre>DS:&gt; 1209 0 0xa0 1 0x6 120900: 1 Bytes written Test OK @</pre>	

Nucleus Name	<b>DS_SYS_licRead</b>	
Nucleus Number	1210	
Description	Perform an IIC read action on the digital board	
Technical	<ul style="list-style-type: none"> <li>- Determine the bus ID, slave address and number of bytes to read from the user input</li> <li>- Initialise IIC</li> <li>- Read the data form the slave specified</li> </ul>	
Execution Time	Less than 1 second	
User Input	<p>The user inputs the bus number, the address to read them from and the number of bytes to read:          &lt;BusID&gt;&lt;Slave address to read from&gt;&lt;Number of bytes to read&gt;          Where the bus id is either 0 (normally used) or 1</p>	
Error	Number	Description
	121000	Reading the data over IIC succeeded
	121001	The IIC bus was not accessible
	121002	There was a timeout writing to the device
	121003	The IIC acknowledge was not received
	121004	The communication with the device failed
	121005	There was an unknown IIC bus error
	121006	IIC bus initialisation failed
	121007	Decoding bus ID unsigned value failed
	121008	Decoding slave address unsigned value failed
	121009	Decoding number of bytes unsigned value failed
	121010	Bus ID out of range
	121011	nrBytes out of range
Example	<pre>DS:&gt; 1210 0 0xa0 0x20 Read : 0x0000: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x0008: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x0010: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x0018: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00  121000: 0 0xa0 0x20 Test OK @</pre>	

Nucleus Name	<b>DS_SYS_UartWrite</b>	
Nucleus Number	1211	
Description	Perform an UART write action on the digital board on a specified UART	
Technical	<ul style="list-style-type: none"> <li>- Decode the user input for the proper port to use</li> <li>- Write out the bytes through the indicated port</li> </ul>	
Execution Time	Less than 1 second.	
User Input	<p>The user inputs the UART to write to, the number of bytes and the bytes to be written to the UART.</p> <p>1=UART port 1 : not used  2=UART port 2 : Bit Engine  3=UART port 3 : Analogue board</p> <p>&lt;UartNr&gt;&lt;Number of bytes to write&gt;&lt;d1&gt;&lt;d2&gt;&lt;.&gt;&lt;dx&gt;</p>	
Error	Number	Description
	121100	Writing the bytes to the UART succeeded
	121101	The user provided wrong input
	121102	Writing to the UART failed
Example	<pre>DS:&gt; 1211 2 2 0xd1 0x01 121100: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_UartRead</b>	
Nucleus Number	1212	
Description	Perform an UART read action on the digital board on a specified UART	
Technical	<ul style="list-style-type: none"> <li>- Decode the user input for the port to read from</li> <li>- Read from the port and return data read to the user</li> </ul>	
Execution Time	Less than 1 second.	
User Input	<p>The user inputs the UART to read from.</p> <p>1=UART port 1 : not used  2=UART port 2 : Bit Engine  3=UART port 3 : Analogue board</p> <p>&lt;UartNr &gt;</p>	
Error	Number	Description
	121200	Reading the data from the UART succeeded
	121201	The user provided wrong input
	121202	Reading the data from the UART failed
Example	<pre>DS:&gt; 1212 2 121200: The HEX value that was read is: 0x50 0xD1 0x00 Test OK @</pre>	

Nucleus Name	<b>DS_SYS_VideoLoopThroughStart</b>	
Nucleus Number	1213	
Description	The video signal, which is conform the user input, is routed from the input to the output. The input is set using the proper nucleus to route the signal on the board(s). All outputs are enabled. <b>Note:</b> Before executing this nucleus the user must route the video signal on the VIP using <b>DS_VIP_Routing</b>	
Technical	<ul style="list-style-type: none"> <li>- Decode the videosignal: PAL / NTSC and Y/C, RGB, CVBS, YUV</li> <li>- Initialise the Video Input Processor and check for valid signal</li> <li>- Initialise the Video Front End and start capturing frames to memory</li> <li>- Initialise the SYNC module</li> <li>- Initialise the Video Post Processing and retrieve frames from memory</li> <li>- Initialise the mixer</li> <li>- Initialise the DENC module</li> <li>- Route the signal to all outputs</li> </ul>	
Execution Time	Less than 1 second, but stays running.	
Note:	First set the correct video route using	
User Input	<VideoSignal> <VideoStandard> 1. Video Signal (CVBS, YC, RGB, YUV). 2. VideoStandard (PAL, NTSC).	
Error	Number	Description
	121300	Video LoopthroughStart succeeded
	121301	User input is not valid.
	121302	Initialisation of the VIP failed.
	121303	Unable to stop the loop through before restarting.
	121304	Video Signal on the input is not a valid signal.
	121305	Initialisation of the VFE failed.
Example	121306	The digital board hardware information is corrupt
	<pre>DS:&gt; 1213 rgb pal 121300: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_VideoLoopThroughStop</b>	
Nucleus Number	1214	
Description	Stop routing the video input to all the outputs.	
Technical	- Stop the DENC and the Video Front End	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	121400	VideoLoopthroughStop succeeded
	121401	DENC module on Codec failed.
Example	<pre>DS:&gt; 1214 121400: Test OK @</pre>	



Nucleus Name	<b>DS_SYS_VideoLoop</b>	
Nucleus Number	1215	
Description	<p>The Codec generates a video signal with a specific signature and sends it to the output of the digital board. The user selects which video input path must be routed on the digital board and a video standard. The Codec encodes the video signal, checks the signature, and returns a conclusion.</p> <p><b>Note:</b> Before executing this nucleus the user must route the video signal on the VIP using <b>DS_VIP_Routing</b>.</p>	
Technical	<ul style="list-style-type: none"> <li>- Evaluate user input.</li> <li>- Reset the global variables, video memory.</li> <li>- Fill the video memory with a vertical colourbar.</li> <li>- Initialise the Codec SYNC-module.</li> <li>- Initialise the Codec MIXER-module.</li> <li>- Initialise the Codec VPP-module.</li> <li>- Initialise the Codec DENC-module.</li> <li>- Display the original image.</li> <li>- Initialise the VIP.</li> <li>- Initialise the Codec VFE-module.</li> <li>- Try to detect a sync in the VIP input.</li> <li>- Catch the received image in memory.</li> <li>- Display the received image.</li> <li>- Compare the received image with original image.</li> <li>- Create a conclusion.</li> </ul>	
Execution Time	3 seconds.	
User Input	<p>&lt;VideoSignal&gt; &lt;VideoStandard&gt;</p> <ol style="list-style-type: none"> <li>1. Video Signal (CVBS, YC, RGB, YUV, DTT).</li> <li>2. VideoStandard (PAL, NTSC).</li> </ol>	
Error	Number	Description
	121500	Videoloop test succeeded.
	121501	Wrong user input.
	121502	The Codec SYNC-module cannot be initialised.
	121503	The Codec MIXER-module cannot be initialised.
	121504	The Codec VideoPostProcessor-module cannot be initialised.
	121505	The Codec DENC-module cannot be initialised.
	121506	The VideoInputProcessor cannot be initialised.
	121507	The VideoInputProcessor cannot detect a sync-signal.
	121508	The Codec VideoFrontEnd-module cannot be initialised.
	121509	The Codec VideoFrontEnd-module cannot capture a video field.
	121510	<p>When selected the RGB video input:</p> <p>Error in colour red signal and/or</p> <p>Error in colour green signal and/or</p> <p>Error in colour blue signal.</p> <p>When selected one of the other video inputs:</p> <p>Error in luminance signal (Y) and/or</p> <p>Error in chrominance signal (U) and/or</p> <p>Error in chrominance signal (V).</p>
	121511	The digital board hardware information is corrupt
Example	<pre>DS:&gt; 1215 cvbs ntsc 121500: Test OK @  DS:&gt; 1215 cvbs pal 121508: The VideoInputProcessor cannot detect a sync-signal. Error @  DS:&gt; 1215 yuv ntsc 121511: Error in luminance signal(Y) Error in chrominance signal(U) Error in chrominance signal(V) Error @</pre>	

Nucleus Name	<b>DS_SYS_AudioLoop</b>	
Nucleus Number	1216	
Description	<p>In this nucleus the Codec generates an audio sine signal with a specific signature and sends it to the output of the digital board. The Codec encodes the audio signal to MPEG I layer II and after this the signature of the signal will be checked.</p> <p><b>Note:</b> Before executing this nucleus the user must route the audio signal on the VIP using <b>DS_VIP_Routing</b>.</p>	
Technical	<ul style="list-style-type: none"> <li>- The user needs to route the signal to the audio inputs so the test can encode the audio to MPEG I layer II</li> <li>- An audio signal is generated, resulting in a sine of 6kHz on the left and 12kHz on the right channel.</li> <li>- Then the signal is decoded in memory.</li> <li>- When both signals are detected correctly in the MPEG, the test succeeded.</li> </ul>	
Execution Time	Approximately 9 seconds	
User Input	<p>InputType:</p> <ul style="list-style-type: none"> <li>- I2S (default, when no user input is given)</li> <li>- SPDIF: This input needs a second parameter: <ul style="list-style-type: none"> <li>- OPT (optical, <b>default</b>, when no user input is given)</li> <li>- COAX</li> </ul> </li> </ul>	
Error	Number	Description
	121600	Testing the components on the audio signal path succeeded
	121601	The audio encoder did not initialise.
	121602	No audio could be generated.
	121603	The audio encoder did not encode audio.
	121604	The audio could not be decoded.
	121605	Frequency on left channel out of range.
	121606	Frequency on right channel out of range.
	121607	The frequencies on both channels are out of range.
	121608	Frequency on left channel out of range. Right channel silent.
	121609	Right channel is silent.
	121610	Frequency on right channel out of range. Left channel silent.
	121611	Left channel is silent.
	121612	Both channels are silent.
Example	<pre>DS:&gt; 1216 121600: Test OK @  DS:&gt; 1216 spdif coax 121600: Test OK @  DS:&gt; 1216 spdif opt 121600: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_SlashVersionSet</b>	
Nucleus Number	1217	
Description	Set the slash version of the system	
Technical	<ul style="list-style-type: none"> <li>- Decode the user input for the slash version to set</li> <li>- Issue the command to set the slash version to the analogue board</li> </ul>	
Execution Time	Less than 1 second.	
User Input	The slash version	
Error	Number	Description
	121700	Setting the slash version succeeded
	121701	Invalid slash version, no slash version is set.
	121702	Setting the slash version on the Analogue Board fails.
	121703	Invalid input.
	121704	The returned error code from the analogue board is unknown:
	121705	No DS error code known for analogue board error:
	121706	There was no response from the analogue board.
	121707	Retrieving the current version failed
	121708	Unknown recorder layout type
	121709	Validating the section where the version is stored failed
	121710	Getting the configuration section from NVRAM failed
	121711	Initialisation of IIC or reaching NVRAM failed
Example	<pre>DS:&gt; 1217 82 121700: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_SlashVersionGet</b>	
Nucleus Number	1218	
Description	Get the slash version of the system	
Technical	<ul style="list-style-type: none"> <li>- Issue the command to get the slash version to the analogue board</li> <li>- Return the received information to the user</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	121800	Getting the slash version succeeded
	121801	Getting the slash version failed
	121802	The IIC write failed
	121803	The IIC read failed
	121804	There was no response from the analogue board.
	121805	No DS error code known for analogue board error:
	121806	Reading the slash version failed
	121807	Initialisation of IIC or reaching NVRAM failed
	121808	Reading an unexpected section version in NVRAM
Example	<pre>DS:&gt; 1218 121800: The slash version is: 82 Test OK @</pre>	

Nucleus Name	<b>DS_SYS_VirginModeOn</b>	
Nucleus Number	1220	
Description	Turn on the virgin mode functionality (e.g. the auto channel search upon start-up)	
Technical	<ul style="list-style-type: none"> <li>- Issue the command to set the bit for the virgin mode to the analogue board</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122000	Turning on the virgin mode succeeded
	122001	Turning on VirginMode on the Analogue Board failed.
	122002	The returned error code from the analogue board is unknown:
	122003	No DS error code known for analogue board error:
	122004	There was no response from the analogue board.
	122005	Section validation or write failed in NVRAM
	122006	Reading the CONFIG section from NVRAM failed
	122007	Initialisation of IIC or reaching NVRAM failed
Example	<pre>DS:&gt; 1220 122000: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_VirginModeOff</b>	
Nucleus Number	1221	
Description	Turn off the virgin mode functionality (e.g. the auto channel search upon start-up)	
Technical	- Issue the command to reset the bit for the virgin mode to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122100	Turning off the virgin mode succeeded
	122101	Turning off VirginMode on the Analogue Board failed.
	122102	The returned error code from the analogue board is unknown:
	122103	No DS error code known for analogue board error:
	122104	There was no response from the analogue board.
	122105	Section validation or write failed in NVRAM
	122106	Reading the CONFIG section from NVRAM failed
	122107	Initialisation of IIC or reaching NVRAM failed
Example	<pre>DS:&gt; 1221 122100: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_VirginModeGet</b>	
Nucleus Number	1222	
Description	Get the virgin mode functionality status (e.g. the auto channel search upon start-up)	
Technical	- Issue the command to reset the bit for the virgin mode to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122200	Getting the virgin mode succeeded
	122201	Reading the Virgin Mode flag from NVRAM failed
	122202	Initialisation of IIC or reaching the NVRAM failed
	122203	Reading an unexpected version of the section in NVRAM
Example	<pre>DS:&gt; 1222 122200: The Virgin Mode functionality is: ON Test OK @</pre>	

Nucleus Name	<b>DS_SYS_DisplayFatalOn</b>	
Nucleus Number	1223	
Description	Turn on the display-fatal functionality which displays debug-information on the display when encountering a fatal error condition from which could not be recovered automatically	
Technical	- Issue the command to use the display-fatal functionality to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122300	Turning on the display-fatal functionality succeeded
	122301	Turning on the display-fatal functionality failed
	122302	The returned error code from the analogue board is unknown:
	122303	No DS error code known for analogue board error:
	122304	There was no response from the analogue board.
	122305	Section validation or write failed in NVRAM
	122306	Reading the section from NVRAM failed
	122307	Initialisation of IIC or reaching NVRAM failed
Example	<pre>DS:&gt; 1223 122300: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_DisplayFatalOff</b>	
Nucleus Number	1224	
Description	Turn off the display-fatal functionality which displays debug-information on the display when encountering a fatal error condition from which could not be recovered automatically	
Technical	- Issue the command to stop using the display-fatal functionality to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122400	Turning off the display-fatal functionality succeeded
	122401	Turning off the display-fatal functionality failed
	122402	The returned errorcode from the analogue board is unknown:
	122403	No DS errCode known for analogue board error:
	122404	There was no response from the analogue board.
	122405	Section validation or write failed in NVRAM
	122406	Reading the section from NVRAM failed
	122407	Initialisation of IIC or reaching NVRAM failed
Example	<pre>DS:&gt; 1224 122400: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_DisplayFatalGet</b>	
Nucleus Number	1225	
Description	Get the display-fatal flag of the recorder	
Technical	- Issue the command to get the status of the display-fatal functionality to the analogue board	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	122500	Getting the display-fatal flag succeeded
	122501	Getting the display-fatal flag failed
	122502	The returned errorcode from the analogue board is unknown:
	122503	No DS errCode known for analogue board error:
	122504	There was no response from the analogue board.
	122505	Reading the <i>display fatal</i> flag failed
	122506	Initialisation of IIC or reaching NVRAM failed
	122507	Unexpected version read from NVRAM section
	122508	Reading the fatal flag from NVRAM failed
Example	<pre>DS:&gt; 1225 122500: The Display Fatal functionality is ON Test OK @</pre>	

Nucleus Name	<b>DS_SYS_SettingsSet</b>	
Nucleus Number	1226	
Description	Programs the digital board settings into the boot EEPROM on the digital board.	
Technical	<ul style="list-style-type: none"> <li>- Evaluate user input.</li> <li>- Set-up IIC-bus.</li> <li>- Write data to boot EEPROM.</li> <li>- Update checksum.</li> </ul>	
Execution Time	1 second	
User Input	A large hexadecimal value that represents the digital board hardware information string	
Error	Number	Description
	122600	The settings were successfully programmed.
	122601	User input is invalid.
	122602	IIC access failed.
Example	<pre>DS:&gt;1226 44424849716040014C45434F2B0000006020070000010200000101008 008000044564452323030312E303031020200000001030000000020100000000000 00000 122600: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_SettingsDisplay</b>	
Nucleus Number	1228	
Description	Show the settings that are programmed in the BROM on the digital board.	
Technical	<ul style="list-style-type: none"> <li>- Set-up IIC-bus.</li> <li>- Read Digital Board Settings from boot EEPROM.</li> <li>- Display the settings.</li> </ul>	
Execution Time	1 second	
User Input	None.	
Error	Number	Description
	122800	The settings were successfully displayed.
	122801	IIC access failed.
	122802	Invalid settings
Example	<pre> DS:&gt; 1228 Investigating the system, please wait... DBHI-string      : 44424849716040014C45434F2B0000006020070000010200000101008008000044 56445232303031 2E3030310202000000010300000002010000000000000000 Boardname       : LECO+ Hardware ID     : 60 Download Table Filename : DVDR2001.001 RAM type        : DDRAM RAM size [MB]   : 128 ROM bank 1 type : NOR ROM bank 1 size [MB] : 8 ROM bank 2 type : none ROM bank 2 size [MB] : 0 EEPROM I2C-bus0 size [KB] : 0 EEPROM I2C-bus1 size [KB] : 0 Codec id        : PNx7350 VIP id          : SAA7136 Progressive scan id : codec internal Dvio physical layer id : PDI1394P25 Dvio link layer id  : PDI1394L41 USB id          : Internal Connector S2B     : not available Connector IDE1    : available Connector IDE2    : available Connector PCI     : not available Connector AVI     : not available Connector HDMI    : not available Connector DVB-T   : not available Interface analog board : IIC-bus Audio output      : stereo Audio clock scheme : none YUV matrix       : not available Bit Engine drive  : D 4.3 122800: Test OK @ </pre>	

Nucleus Name	<b>DS_SYS_SettingsGet</b>	
Nucleus Number	1229	
Description	Get the digital board diversity settings string that is programmed in the BROM on the digital board.	
Technical	<ul style="list-style-type: none"> <li>- Set-up IIC-bus.</li> <li>- Read Digital Board Settings from boot EEPROM.</li> <li>- Read System Settings from boot EEPROM.</li> <li>- Display the settings.</li> </ul>	
Execution Time	1 second	
User Input	None.	
Error	Number	Description
	122900	The settings were successfully displayed.
	122901	IIC access failed.
	122902	The settings are invalid
Example	<pre> DS:&gt; 1229 122900: 44424849716040014C45434F2B0000006020070000010200000101008008000044 564452 323030312E3030310202000000010300000002010000000000000000 Test OK @ </pre>	

Nucleus Name	<b>DS_SYS_AudioLoopThroughStart</b>	
Nucleus Number	1230	
Description	Description: The audio input is routed from the input to all outputs. The input is set routing the signal with the proper nucleus. All outputs are enabled.	
Technical	<ul style="list-style-type: none"> <li>- Encode the audio to AC3 in memory</li> <li>- Decode the AC3 in memory to audio on the outputs</li> </ul>	
Execution Time	1second buffer time and 30 seconds playing.	
User Input	InputType: <ul style="list-style-type: none"> <li>- I2S (default)</li> <li>- SPDIF (Only for recorders with 5.1 input and DTT module)</li> </ul> InputPort: (Only for recorders with 5.1 input. For DTT modules no parameter should be filled in, so default is chosen ) <ul style="list-style-type: none"> <li>- OPT : Optical input path is selected (default)</li> <li>- COAX : Coax input path is selected</li> </ul>	
Error	Number	Description
	123000	AudioLoopthroughStart succeeded
	123001	Resetting the audio decoder failed
	123002	Resetting the audio encoder failed
	123003	Encoding the audio failed
	123004	Decoding the audio failed
Example	<pre>DS:&gt; 1230 123000: Test OK @</pre>	
Example DTT	<pre>DS:&gt; 1230 spdif 123000: Test OK @</pre>	
Example 5.1 input	<pre>DS:&gt; 1230 spdif coax 123000: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_AudioLoopThroughStop</b>	
Nucleus Number	1231	
Description	Stop routing the audio input to all the outputs	
Technical	<ul style="list-style-type: none"> <li>- Send the 'Mute' command to the audio decoder and reset the audio decoder</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None.	
Error	Number	Description
	123100	AudioLoopthroughStop succeeded
	123101	Resetting the audio decoder failed
	123102	Resetting the audio encoder failed
Example	<pre>DS:&gt; 1231 123100: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_SettingsHwIdSet</b>	
Nucleus Number	1232	
Description	This nucleus sets the HW-Id in the HW-diversity string	
Technical	<ul style="list-style-type: none"> <li>- Read out the HW-diversity string</li> <li>- Modify the HW-ID in that string as requested</li> <li>- Write the modified HW-diversity string to the EEPROM</li> </ul>	
Execution Time	Less than 1 second.	
User Input	<ul style="list-style-type: none"> <li>- &lt;HW-ID&gt; - The hardware ID to set</li> <li>- No input - The user will be asked for the ID</li> </ul>	
Error	Number	Description
	123200	Setting the hardware ID succeeded
	123201	Setting the hardware ID failed
	123202	The user aborted setting the hardware ID, no changes made
Example	<pre> DS:&gt; 1232 Enter the new HW ID of the digital board (Currently equals 21) Enter a value between 0 and 99: &gt; 22 The HW ID will be set to: 22. Is that correct? ([Y/N]):y 123200: Test OK @  DS:&gt; 1232 Enter the new HW ID of the digital board (Currently equals 22) Enter a value between 0 and 99: &gt; The HW ID will be set to: 0. Is that correct? ([Y/N]):N 123202: Setting the HW ID was aborted by the user. Error @  DS:&gt; 1232 99 123200: Test OK @ </pre>	



Nucleus Name	<b>DS_SYS_SettingsDoubleCheck</b>	
Nucleus Number	1233	
Description	Double check whether stored HW-string equals actual HW as far as we can automatically detect this. An automatic and a manual mode is supported.	
Technical	<ul style="list-style-type: none"> <li>- Read out the HW diversity string</li> <li>- Check whether these settings correspond the actual hardware</li> <li>- In case of modification: Write back the new HW-diversity settings.</li> </ul>	
Execution Time	4 seconds in auto mode when everything matches	
User Input	<ul style="list-style-type: none"> <li>- 'manual' or 'MANUAL' to enter manual mode</li> <li>- default is automatic mode where the nucleus stops upon and reports the first encountered error</li> </ul>	
Error	Number	Description
	123300	Double checking the HW-diversity settings succeeded
	123301	Double check failed, a difference in settings was encountered
	123302	Reading the HW-diversity settings failed
	123303	Writing the modified HW-diversity settings failed
Example	<pre> DS:&gt; 1233 123300: Test OK @  DS:&gt; 1233 manual 123300: Test OK @  DS:&gt; 1233 123301: Hardware ID mismatch: in HW-Diversity string:99, actual in FLASH:0  Error @  DS:&gt; 1233 manual Hardware ID mismatch! in HW-Diversity string:99, actual in FLASH:0  Enter the correct HW ID of the digital board. &gt; 0 The HW-diversity string has been modified by you. Settings:  Board name:                DIAG Hardware ID:                0 Codec IC:                   PNX7100_MF3 Video Input Processor IC:   SAA7118 Progressive Scan Deinterlacer IC: None Progressive Scan Denc IC:   ADV7196 I-Link physical layer circuit IC: PDI1394P25 I-Link link layer circuit IC: PDI1394P40 Audio clock:                Clock scheme 1 Bit engine connector:       available IDE connector 1:            available IDE connector 2:            not available PCI connector:              not available RAM size                    32MByte ROM size (NOR FLASH bank 1) 8MByte ROM size (NOR FLASH bank 2) Not available ROM size (NAND FLASH)       Not available Is it OK to program this in the new HW-diversity string? ([y]es/[n]o):y Diversity HW-string programmed successfully.  123300: Test OK @  DS:&gt; </pre>	

Nucleus Name	<b>DS_SYS_SettingsDItableFilenameSet</b>	
Nucleus Number	1234	
Description	This nucleus sets the Download table filename in the HW-diversity string	
Technical	<ul style="list-style-type: none"> <li>- Retrieve the new filename from the user</li> <li>- Ask the user whether the filename is correct before setting it</li> <li>- Update the diversity settings to use the newly entered filename</li> </ul>	
Execution Time	Dependent on the user confirmation	
User Input	<ul style="list-style-type: none"> <li>- The filename to be set</li> <li>- No input - No new filename will be set</li> </ul>	
Error	Number	Description
	123400	Setting the new filename succeeded
	123401	Unsupported setting of the current HW-diversity settings
	123402	Setting the filename was aborted by the user.
Example	<pre>DS:&gt; 1234 Enter the new Download Table Filename (Currently equals DVDR2001.001) Enter a filename: &gt; The Download Table Filename will be set to: DVDR2001.001. Is that correct? ([Y/N]): 123402: Setting the filename was aborted by the user. Error @  DS:&gt; 1234 Enter the new Download Table Filename (Currently equals DVDR2001.001) Enter a filename: &gt;DVDR2002.001 The Download Table Filename will be set to: DVDR2002.001. Is that correct? ([Y/N]):Y 123400: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_licWriteRead</b>	
Nucleus Number	1235	
Description	Perform an IIC write-read action on the digital board	
Technical	<ul style="list-style-type: none"> <li>- Determine bus ID, slave address, number of bytes to be written and the byte array of data from the user input</li> <li>- Initialise IIC</li> <li>- Write the data to the IIC slave</li> <li>- Read the data from the IIC slave</li> </ul>	
Execution Time	Less than 1 second	
User Input	<p>The user inputs the Bus ID, Slave Address, number of bytes to read, number of bytes to write and the bytes to be written  &lt;NucNr&gt;&lt;BusId&gt;&lt;SlaveAddr&gt;&lt;ReadLen&gt;&lt;WriteLen&gt;&lt;WrByte0...WrByteN&gt;  Max number of bytes to write: 255  Max number of bytes to read: 255</p>	
Error	Number	Description
	123500	Writing data to and reading data from the IIC slave succeeded
	123501	The IIC bus was not accessible
	123502	There was a bus timeout reading the device
	123503	The IIC acknowledge was not received
	123504	Unable to initialise IIC bus
	123505	The communication with the device failed
	123506	Unknown IIC bus error received
	123507	Decoding bus ID unsigned value failed
	123508	Decoding slave address unsigned value failed
	123509	Decoding number of bytes unsigned value failed
	123510	Bus ID out of range
	123511	Number of bytes out of range
Example	<pre>DS:&gt; 1235 0 0xa0 0xf 1 0 0x0000: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x0008: 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 123500: Test OK @</pre>	

Nucleus Name	<b>DS_SYS_BuildInfoGet</b>	
Nucleus Number	1236	
Description	Retrieve the software build information of the Diagnostics & Service application	
Technical	- Show the information that is stored in the DVDR_BuildInfoType structure	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	123600	Retrieving build info succeeded
	123601	Retrieving build info failed
Example	<pre>DS:&gt; 1236 123600: Version   :1091 Build     :20050823_0630 Release   :SG1_1 Buildtype :dev Baseline  :SGP29atl#SG1_1_20050609_base Variant   :genlecoplus  Test OK @</pre>	

Nucleus Name	<b>DS_SYS_UartSetup</b>	
Nucleus Number	1237	
Description	Set up a configuration for the selected UART	
Technical	<ul style="list-style-type: none"> <li>- Parse user input</li> <li>- Use MIS_UART_Setup to setup the selected UART with the requested parameters</li> </ul>	
Execution Time	Less than 1 second	
User Input	<p>The user inputs 6 parameters:          &lt;UartNr&gt;&lt;baudrate&gt;&lt;flowcontrol&gt;&lt;databits&gt;&lt;parity&gt;&lt;stopbits&gt;</p> <p>UartNr:          1=UART port 1 : not used (Chrysalis only)          2=UART port 2 : Bit Engine or DTTM (Chrysalis only)          3=UART port 3 : Analogue board</p> <p>baudrate:          115200,62500,57600,38400,19200,9600,4800,2400,1200</p> <p>flowcontrol:          0=disabled 1=enabled</p> <p>databits:          7 or 8</p> <p>parity:          "NO", "ODD" or "EVEN"</p> <p>stopbits:          1 or 2</p>	
Error	Number	Description
	123700	Setting up the selected UART succeeded
	123701	User provided Invalid setup parameters
	123702	Setting up the selected UART Failed
	123703	Selected UART is not available
Example (Chrysalis)	<pre>DS:&gt; 1237 2 38400 0 8 NO 1 123700: Test OK @</pre>	
Example (Leco)	<pre>DS:&gt; 1237 2 38400 0 8 NO 1 123703: The selected UART is not available Error @</pre>	

Nucleus Name	<b>DS_SYS_LowPowerStandby</b>	
Nucleus Number	1239	
Description	Send wakeup reason to ASP and set the set to low power standby.	
Technical	<ul style="list-style-type: none"> <li>- Set up ASP</li> <li>- Send wakeup reason to ASP</li> <li>- Send low power standby command to ASP</li> </ul>	
Execution Time	Vary (Maximum time will depend on the relative timer used)	
User Input	<ul style="list-style-type: none"> <li>- wakeup reason - the wakeup reason for the DB to power up</li> <li>- timer - relative timing for the DB to power up if wakeup reason 1 or 3 is chosen</li> </ul>	
Error	Number	Description
	123901	Invalid data was given by the user
	123902	Failed to communication to ASP
Example	<pre>DS:&gt; 1239  Wakeup reason from Low Power Standby 1) timer only 2) local key or RC pressed only 3) any reason or press 'a' to abort 1 Enter time to wake up from low power standby. Range 1 - 5 mins: 1  Entering low power standby</pre>	

Nucleus Name	<b>DS_SYS_DivxModelIdSet</b>	
Nucleus Number	1240	
Description	Sets the Divx Model Id in NVRAM.	
Technical	<ul style="list-style-type: none"> <li>- Initialize the NVM interface.</li> <li>- Read the NVRAM CONFIG section into RAM</li> <li>- Store the Divx model id into the CONFIG section in RAM</li> <li>- Validate the CONFIG section in RAM</li> <li>- Write the CONFIG section in RAM back into the non-volatile storage.</li> </ul>	
Execution Time	Less than 2 seconds	
User Input	<ul style="list-style-type: none"> <li>- 16-bit word containing the 12-bit Divx model Id.</li> <li>- For example : <ul style="list-style-type: none"> <li>o 0x4BF0 (means Low Byte : 0x4B and High Byte 0xF0)</li> </ul> </li> </ul>	
Error	Number	Description
	124001	Validate CONFIG section failed
	124002	Cannot read CONFIG section
	124003	Invalid user parameters
	124004	Error initializing NVRAM interfaces
Example	<pre>DS:&gt; 1240 0x4BF0  124000:  Test OK @</pre>	

Nucleus Name	<b>DS_SYS_DivxModelIdGet</b>	
Nucleus Number	1241	
Description	Retrieves the Divx Model Id from NVRAM.	
Technical	<ul style="list-style-type: none"> <li>- Read the CONFIG section from NVRAM</li> <li>- Check the header information of the CONFIG section to ensure that it is Version 4</li> <li>- If Version 4 is detected, proceed to read and display the High Byte and Low byte of the Divx Model Id.</li> </ul>	
Execution Time	Less than 2 seconds	
User Input	None.	
Error	Number	Description
	124101	Section version not Version 4
	124102	Cannot read CONFIG section
	124103	Error initializing NVRAM interfaces
Example	<pre>DS:&gt; 1241  124100: Divx model id high byte = 0xF0, low byte = 0x4B  Test OK @</pre>	

**HIIGH-DEFINITION MULTIMEDIA INTERFACE (HDMI)**

## Note:

Nuclei 1512 to 1519 are applicable only for Faroudja HDMI Board 3139 248 89141

Nuclei 1531 to 1535 are applicable only for ABT HDMI Board 3139 248 51901

Nucleus Name	<b>DS_HDMI_DevTypeGet</b>	
Nucleus Number	1500	
Description	Get the device (revision) type information of the HDMI-IC.	
Technical	- Read out the information through IIC	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	150000	Getting the device type of the nucleus succeeded
	150001	Failed to retrieve the hardware diversity string
	150002	Failed to initialise the IIC communication
	150003	The hardware was not detected although indicated by Diversity
	150004	Failed to access HDMI transmitter chip SI9030
Example	<pre>DS:&gt; 1500 150000: Vendor ID      : 0x 0 0x 1 Device ID     : 0x91 0x42 Device Revision : 0x 0 Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_Communication</b>	
Nucleus Number	1501	
Description	Check the communication between the I2C controller on the Codec and the HDMI-IC by reading and writing data to one device register. This test detects faults of the I2C lines or a defected HDMI transmitter IC.	
Technical	<ul style="list-style-type: none"> <li>- Read out an accessible register in the HDMI transmitter IC</li> <li>- Modify this register by writing a known value to it</li> <li>- Read back and check this value for correctness</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	150100	Communicating with the HDMI tx chip succeeded
	150101	Failed to retrieve the hardware diversity string
	150102	Failed to initialise the IIC communication
	150103	The hardware was not detected although indicated by Diversity
	150104	An IIC-bus error occurred
	150105	There was a timeout reading the device
	150106	The IIC bus was not accessible
	150107	The IIC acknowledge was not received
	150108	There was an IIC error upon the stop-condition
	150109	The IIC bus was chosen wrong
	150110	The IIC functionality is not running
	150111	An unknown error was returned by the IIC read
	150112	The data written did not equal the date read
Example	<pre>DS:&gt; 1501 150100: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_EdidParse</b>	
Nucleus Number	1502	
Description	Return the E-EDID (Enhanced Extended Display Identification Data) contained in the HDMI / DVI able TV attached to the DVD+RW. Parse the information retrieved to print the capabilities of the TV in user understandable format	
Technical	<ul style="list-style-type: none"> <li>- Read out the E-EDID through the DDC channel (IIC)</li> <li>- Parse the information contained in the E-EDID</li> <li>- Print out the information to the user in understandable format</li> </ul>	
Execution Time	2 seconds.	
User Input	None	
Error	Number	Description
	150200	Getting the configuration of the HDMI-IC succeeded
	150201	Failed to retrieve the hardware diversity string
	150202	Failed to initialise the IIC communication
	150203	The hardware was not detected although indicated by Diversity
	150204	Retrieving the E-EDID failed
Example	<pre> DS:&gt; 1502 Checksum OK of EDID block 0.  Checking EDID Structure with 1 extensions:   Checking each Extension for consistency. E-EDID structure contains no errors. EDID structure OK. Vendor Specific Data Block: 03 0c 00 10 00 Attached Display is an HDMI device.   EDID Version 1.3   Total Native DTD Formats = 0   Monitor Features (CEA Byte 3):  BasicAudio YCbCr444 YCbCr422 HDMI compatible EDID Supported video format 1 Supported video format 2 Supported video format 3 Supported video format 5 Supported video format 6 Supported video format 7 index:0 Linear PCM  1 channels,  48KHz, 44KHz, 32KHz,  SPK:RLC FLC RC  RL  FC  LFE FL     RRC FRC ..  RR  ..  ... FR  Attached display is HDMI compatible. Display is YCbCr444 compatible. Display is YCbCr422 compatible.  150200: Test OK @ </pre>	

Nucleus Name	<b>DS_HDMI_DefaultVideoSet</b>							
Nucleus Number	1503							
Description	Set a default video configuration in the HDMI TX chip (720x480p)							
Technical	- Write a known configuration for 720x480P in the registers of the HDMI transmitter chip							
Execution Time	Less than 1 second.							
User Input	<p>&lt;Id&gt; configures the HDMI transmitter to receive an embedded or a separated sync signal at its input.</p> <p>Chose embedded sync if signal comes directly from Leco+ (ITU656) or separated sync if signal comes from Fli2310.</p> <p>Id:</p> <table border="1"> <thead> <tr> <th>&lt;id &gt;</th> <th>HDMI Tx input configuration</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Separated sync input (default)</td> </tr> <tr> <td>1</td> <td>Embedded sync input</td> </tr> </tbody> </table>		<id >	HDMI Tx input configuration	0	Separated sync input (default)	1	Embedded sync input
<id >	HDMI Tx input configuration							
0	Separated sync input (default)							
1	Embedded sync input							
Error	Number	Description						
	150300	Setting the video configuration succeeded						
	150301	Failed to retrieve the hardware diversity string						
	150302	Failed to initialise the IIC communication						
	150303	The hardware was not detected although indicated by Diversity						
	150304	Setting the video configuration failed						
Example	<pre>DS:&gt; 101 11 ntsc all 010100: Test OK @  DS:&gt; 1516 151600: Test OK @  DS:&gt; 1503 150300: Test OK @  or  DS:&gt; 101 0 ntsc pscan 010100: Test OK @  DS:&gt; 1503 1 150300: Test OK @</pre>							

Nucleus Name	<b>DS_HDMI_Reset</b>	
Nucleus Number	1504	
Description	Reset the HDMI transmitter chip by means of a hardware reset and re-initialize in order to have the HDMI transmitter chip accessible again.	
Technical	<ul style="list-style-type: none"> <li>- Pull the reset line connected to the HDMI transmitter low</li> <li>- Wait a little while</li> <li>- Enable the HDMI chip again by setting the reset line high</li> </ul>	
Execution Time	9 seconds.	
User Input	None	
Error	Number	Description
	150400	Resetting the HDMI tx chip succeeded
	150401	Failed to retrieve the hardware diversity string
	150402	Failed to initialise the IIC communication
	150403	The hardware was not detected although indicated by Diversity
	150404	Resetting the HDMI tx chip through PIO failed.
	150405	Software Reset of the HDMI tx chip failed.
Example	<pre>DS:&gt; 1504 150400: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_DdclWrite</b>	
Nucleus Number	1506	
Description	Perform an IIC write action to a device on the DDC bus	
Technical	-	
Execution Time	Less than 1 second.	
User Input	<TimeOut> <Slave address> <offset> <nr of bytes> <d1> <.> <dx>	
Error	Number	Description
	150600	Writing to the device was OK, number of bytes is echoed
	150601	Failed to retrieve the hardware diversity string
	150602	Failed to initialise the IIC communication
	150603	The hardware was not detected although indicated by Diversity
	150604	Writing the bytes to the device failed
	150605	Decoding time-out unsigned value failed
	150606	Decoding slave address unsigned value failed
	150607	Decoding offset unsigned value failed
	150608	Decoding number of bytes unsigned value failed
	150609	Number of bytes out of range. Should be less than 17.
	150610	Incorrect number of data bytes entered
	150611	Unable to initialise IIC
Example	<pre>DS:&gt; 1506 1 0xa0 1 0 150600: Test OK @  DS:&gt; 1506 1 0xa8 1 0 150604: Writing the bytes to the device failed. Error @</pre>	

Nucleus Name	<b>DS_HDMI_DdclRead</b>	
Nucleus Number	1507	
Description	Perform an IIC read action to a device on the DDC bus	
Technical	-	
Execution Time	Less than 1 second.	
User Input	<TimeOut> <Slave address> <Offset> <Number of bytes>	
Error	Number	Description
	150700	
	150701	Failed to retrieve the hardware diversity string
	150702	Failed to initialise the IIC communication
	150703	The hardware was not detected although indicated by Diversity
	150704	Reading from the device on the DDC bus failed
	150705	Decoding time-out unsigned value failed
	150706	Decoding slave address unsigned value failed
	150707	Decoding offset unsigned value failed
	150708	Decoding number of bytes unsigned value failed
	150709	Unable to initialise IIC bus
Example	<pre>DS:&gt; 1507 1 0xa0 0 15 [ 0]:0x0 [ 1]:0xff [ 2]:0xff [ 3]:0xff [ 4]:0xff [ 5]:0xff [ 6]:0xff [ 7]:0x0 [ 8]:0x34 [ 9]:0xa9 [10]:0x53 [11]:0xc0 [12]:0x1a [13]:0x0 [14]:0x0 150700: Test OK @</pre>	



Nucleus Name	<b>DS_HDMI_ExtendedWrite</b>	
Nucleus Number	1508	
Description	Perform an IIC write action on port 0/1 of the HDMI transmitter	
Technical	-	
Execution Time	Less than 1 second.	
User Input	<Port> <Register> <Data> Where 0 == Port 0 and 1 == Port 1	
Error	Number	Description
	150800	Byte was written OK
	150801	Failed to retrieve the hardware diversity string
	150802	Failed to initialise the IIC communication
	150803	The hardware was not detected although indicated by Diversity
	150804	A wrong port number was given by the user
	150805	An invalid register was given by the user
	150806	Invalid data was given by the user
	150807	There was an error writing to the register indicated
Example	<pre>DS:&gt; 1508 0 0x10 0x22 150800: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_ExtendedRead</b>	
Nucleus Number	1509	
Description	Perform an IIC read action on port 0 or 1 of the HDMI transmitter	
Technical	-	
Execution Time	Less than 1 second.	
User Input	<Port> <Register> Where 0 == Port0 and 1 == Port 1	
Error	Number	Description
	150900	Byte was read and echoed OK
	150901	Failed to retrieve the hardware diversity string
	150902	Failed to initialise the IIC communication
	150903	The hardware was not detected although indicated by Diversity
	150904	A wrong port number was given by the user
	150905	An invalid register was given by the user
	150906	There was an error reading the register indicated
Example	<pre>DS:&gt; 1509 0 0x10 150900: Data read: 0x22 Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_CheckHPDTx</b>	
Nucleus Number	1510	
Description	Check whether Hot-Plugging of the HDMI cable is detected by the SII9030 HDMI transmitter.	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	151000	The Hot Plug was detected OK by the HDMI transmitter
	151001	Failed to retrieve the hardware diversity string
	151002	Failed to initialise the IIC communication
	151003	The hardware was not detected although indicated by Diversity
	151004	Error writing to interrupt register
	151005	Error reading interrupt register
	151006	Test aborted by user
	151007	Unknown action
Example	<pre>DS:&gt; 1510 Insert or remove the HDMI cable.(or type 'a' to abort): 151006: Test aborted by user. Test OK @  DS:&gt; 1510 Insert or remove the HDMI cable.(or type 'a' to abort): 151000: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_CheckHPDChrysalis</b>	
Nucleus Number	1511	
Description	Check whether Hot-Plugging of the HDMI cable is detected by the software. This tests the interrupt line to the Chrysalis.	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	151100	The Hot Plug was detected OK by software. Interrupt line OK.
	151101	Failed to retrieve the hardware diversity string
	151102	Failed to initialise the IIC communication
	151103	The hardware was not detected although indicated by Diversity
	151104	Error writing to HDMI tx register
	151105	User aborted HPD test
	151106	Error reading from HDMI tx register
Example	<pre>DS:&gt; 1511 Insert or remove the HDMI cable.(or type 'a' to abort): 151100: Test OK @  DS:&gt; 1511 Insert or remove the HDMI cable.(or type 'a' to abort): 151105: User aborted HPD test. Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_FLI2310_DevTypeGet</b>	
Nucleus Number	1512	
Description	Get the device and revision information of the FLI2310	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	151200	Retrieving the device type information succeeded
	151201	Failed to retrieve the hardware diversity string
	151202	Failed to initialise the IIC communication
	151203	The hardware was not detected although indicated by Diversity
	151204	The communication with the device failed
Example	<pre>DS:&gt; 1512 151200: Chip name      : 2300 Chip version   : 4 Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_FLI2310_Communication</b>	
Nucleus Number	1513	
Description	Test whether the communication to the FLI2310 can be established	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	151300	Something is properly read so the communication is OK
	151301	Failed to retrieve the hardware diversity string
	151302	Failed to initialise the IIC communication
	151303	The hardware was not detected although indicated by Diversity
	151304	The IIC bus was not accessible
	151305	There was a timeout reading the device
	151306	The IIC acknowledge was not received
	151307	The communication with the device failed
	151308	The IIC bus initialisation failed
	151309	The read data is not the same as the written data
Example	<pre>DS:&gt; 1513 151300: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_FLI2310_TestImageOn</b>	
Nucleus Number	1514	
Description	Generate a test image using the FLI2310	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	151400	Test image is generated successfully
	151401	Failed to retrieve the hardware diversity string
	151402	Failed to initialise the IIC communication
	151403	The hardware was not detected although indicated by Diversity
	151404	Unable to generate image
	151405	Unable to initialise De-inter-lacer
Example	<pre>DS:&gt; 1514 151400: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_FLI2310_TestImageOff</b>	
Nucleus Number	1515	
Description	Switch of test-image generation by the FLI2310	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	151500	Test image is turned off successfully
	151501	Failed to retrieve the hardware diversity string
	151502	Failed to initialise the IIC communication
	151503	The hardware was not detected although indicated by Diversity
	151504	Unable to initialise De-Inter-lacer
	151505	IIC Error during writing DENC
Example	<pre>DS:&gt; 1515 151500: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_FLI2310_Routing</b>	
Nucleus Number	1516	
Description	Have the FLI2310 pass the video from its input to its output	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	151600	Routing path is created successfully
	151601	Failed to retrieve the hardware diversity string
	151602	Failed to initialise the IIC communication
	151603	The hardware was not detected although indicated by Diversity
	151604	Unable to initialise the Chrysalis.
	151605	Unable to access de-inter-lacer
Example	<pre>DS:&gt; 1516 151600: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_FLI2310_ExtendedWrite</b>	
Nucleus Number	1517	
Description	Write to any register of the FLI2310	
Technical	-	
Execution Time	Less than 1 second.	
User Input	<Register> <RegLen:1=8bits;2=16bits> <Data>	
Error	Number	Description
	151700	The IIC write action succeeded
	151701	Failed to retrieve the hardware diversity string
	151702	Failed to initialise the IIC communication
	151703	The hardware was not detected although indicated by Diversity
	151704	Decoding register unsigned value failed
	151705	Decoding register length unsigned value failed
	151706	Decoding register data unsigned value failed
	151707	Error writing to register
Example	DS:> 1517 0x303 1 0x9a 151700: Test OK @	

Nucleus Name	<b>DS_HDMI_FLI2310_ExtendedRead</b>	
Nucleus Number	1518	
Description	Read from any register of the FLI2310	
Technical	-	
Execution Time	Less than 1 second.	
User Input	<Register> <RegLen:1=8bits;2=16bits>	
Error	Number	Description
	151800	The IIC read action succeeded
	151801	Failed to retrieve the hardware diversity string
	151802	Failed to initialise the IIC communication
	151803	The hardware was not detected although indicated by Diversity
	151804	Decoding register unsigned value failed
	151805	Decoding register length unsigned value failed
	151806	Error reading from the register
Example	DS:> 1518 0x303 1 151800: Data read: 0x009A Test OK @	

Nucleus Name	<b>DS_HDMI_FLI2310_1080I</b>	
Nucleus Number	1519	
Description	Set the Faroudja FLI2310 to generate a 1080I image from the video on its inputs.	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	151900	Generating the up-scaled image succeeded
	151901	Failed to retrieve the hardware diversity string
	151902	Failed to initialise the IIC communication
	151903	The hardware was not detected although indicated by Diversity
	151904	Generating the up-scaled image failed
	151905	Unable to configure HDMI Tx.
Example	DS:> 1519 151900: Test OK @	

Nucleus Name	<b>DS_HDMI_Audio</b>	
Nucleus Number	1528	
Description	<p>Set the proper audio settings to the HDMI transmitter.</p> <p><b>Note:</b> When <b>1528 spdif</b> is used to set the HDMI transmitter audio settings correctly and just <b>103</b> is entered i.s.o. <b>103 spdif</b> then 'clicking' audio is heard because the Chrysalis audio decoder does not use its SPDIF-path explicitly.</p> <p><b>Note:</b> Currently there is an issue in the order of the tests:</p> <ul style="list-style-type: none"> <li>- Reboot the set.</li> <li>- First create the video, as audio is passed alongside the video on HDMI</li> <li>- Create the spdif audio using nucleus <b>103 spdif</b></li> <li>- Create the spdif audio settings in the HDMI transmitter using nucleus <b>1528 spdif</b></li> <li>- The spdif audio will be audible</li> <li>- Switch off spdif audio using nucleus <b>104</b></li> <li>- Create i2s audio using nucleus <b>103</b></li> <li>- Create the i2s audio settings in the HDMI transmitter using nucleus <b>1528 or 1528 I2S</b></li> <li>- The audio will be audible</li> <li>- Switch off the audio using nucleus <b>104</b></li> </ul>	
Technical	-	
Execution Time	Less than 1 second.	
User Input	'SPDIF' - Set the HDMI transmitter's audio path to SPDIF 'I2S' or nothing - Set the HDMI transmitter's audio path to I2S	
Error	Number	Description
	152800	Creating the proper audio settings succeeded
	152801	Failed to retrieve the hardware diversity string
	152802	Failed to initialise the IIC communication
	152803	The hardware was not detected although indicated by Diversity
Example	<pre>DS:&gt; 1528 i2s 152800: i2s Test OK @  DS:&gt; 1528 spdif 152800: spdif Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_ColumbusTestImage</b>	
Nucleus Number	1529	
Description	Have the Columbus IC generate a test image	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	152900	Generating the test-image on the Columbus succeeded
	152901	Failed to retrieve the hardware diversity string
	152902	Failed to initialise the IIC communication
	152903	The hardware was not detected although indicated by Diversity
	152904	Generating the test-image on the Columbus failed
	152905	Soft reset of the Columbus failed
	152906	IIC initialisation failed
	152907	Columbus did not answer the call (reading dig. ID)
Example	<pre>DS:&gt; 1529 152905: Soft reset of Columbus failed. Test OK @  DS:&gt; 1529 152900: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_ColumbusPass</b>	
Nucleus Number	1530	
Description	Have the Columbus pass the video from its inputs to its outputs	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	153000	Getting the columbus to pass the video succeeded
	153001	Failed to retrieve the hardware diversity string
	153002	Failed to initialise the IIC communication
	153003	The hardware was not detected although indicated by Diversity
	153004	Getting the columbus to pass the video failed
Example	<pre>DS:&gt; 1530 153000: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_AB1010_Communication</b>	
Nucleus Number	1531	
Description	Test whether the communication to the ABT1010 can be established	
Technical	<ul style="list-style-type: none"> <li>- Read ABT test pattern generator register value</li> <li>- Write a default value (0x9A) to test pattern generator register</li> <li>- Read from that register</li> <li>- Compare written and read value</li> <li>- Restore original value of register</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	153100	Something is properly read so the communication is OK
	153101	Failed to retrieve the hardware diversity string
	153102	Failed to initialise the IIC communication
	153103	The hardware was not detected although indicated by Diversity
	153104	The read data is not the same as the written data
	153105	IIC Error during accessing ABT1010
Example	<pre>DS:&gt; 1531 151300: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_AB1010_DevTypeGet</b>	
Nucleus Number	1532	
Description	Get the device and scaler version of the ABT1010	
Technical	-	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	153200	Retrieving the device type information succeeded
	153201	Failed to retrieve the hardware diversity string
	153202	Failed to initialise the IIC communication
	153203	The hardware was not detected although indicated by Diversity
	153204	The ABT chip was not detected.
	153205	IIC Error during accessing ABT1010
Example	<pre>DS:&gt; 1532 153200: Scaler version : 0xF0 ABT version    : 0xF1 Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_AB1010_Routing</b>												
Nucleus Number	1533												
Description	Have the ABT1010 pass or upscale the video if necessary from its input through its output												
Technical	-												
Execution Time	Less than 1 second.												
User Input	<p>&lt;Video output&gt; &lt;Output resolution&gt;</p> <p>Video output:</p> <table border="1"> <tr> <td>PAL</td> <td>Standard PAL 50Hz</td> </tr> <tr> <td>NTSC</td> <td>Standard NTSC 60Hz</td> </tr> </table> <p>Output resolution:</p> <table border="1"> <thead> <tr> <th>Out put resolution (remarks)</th> </tr> </thead> <tbody> <tr> <td>LT (Loop through)</td> </tr> <tr> <td>480p</td> </tr> <tr> <td>576p</td> </tr> <tr> <td>720p</td> </tr> <tr> <td>1080i</td> </tr> <tr> <td>1080p</td> </tr> </tbody> </table>		PAL	Standard PAL 50Hz	NTSC	Standard NTSC 60Hz	Out put resolution (remarks)	LT (Loop through)	480p	576p	720p	1080i	1080p
PAL	Standard PAL 50Hz												
NTSC	Standard NTSC 60Hz												
Out put resolution (remarks)													
LT (Loop through)													
480p													
576p													
720p													
1080i													
1080p													
Error	Number	Description											
	153300	Routing path is created successfully											
	153301	Failed to retrieve the hardware diversity string											
	153302	Failed to initialise the IIC communication											
	153303	The hardware was not detected although indicated by Diversity											
	153304	The ABT chip was not detected.											
	153305	Unable to decode input parameters.											
	153306	IIC Error during accessing ABT1010.											
Example	<pre>DS:&gt; 1533 NTSC LT 153300: Test OK @</pre>												

Nucleus Name	<b>DS_HDMI_ABT1010_ExtendedWrite</b>	
Nucleus Number	1534	
Description	Write to any register of the ABT1010	
Technical	-	
Execution Time	Less than 1 second.	
User Input	<Register> <RegLen:1=8bits;2=16bits; 3=24bit s> <Data>	
Error	Number	Description
	153400	The IIC write action succeeded
	153401	Failed to retrieve the hardware diversity string
	153402	Failed to initialise the IIC communication
	153403	The hardware was not detected although indicated by Diversity
	153404	The ABT chip was not detected.
	153405	Decoding register unsigned value failed
	153406	Decoding register length unsigned value failed
	153407	Decoding register data unsigned value failed
	153408	Error writing to register
Example	<pre>DS:&gt; 1534 0x0C0 3 0x012000 153400: Test OK @</pre>	

Nucleus Name	<b>DS_HDMI_ABT1010_ExtendedRead</b>	
Nucleus Number	1535	
Description	Read from any register of the ABT1010	
Technical	-	
Execution Time	Less than 1 second.	
User Input	<Register> <RegLen:1=8bits;2=16bits; 3=24bits>	
Error	Number	Description
	153500	The IIC read action succeeded
	153501	Failed to retrieve the hardware diversity string
	153502	Failed to initialise the IIC communication
	153503	The hardware was not detected although indicated by Diversity
	153504	The ABT chip was not detected.
	153505	Decoding register unsigned value failed
	153506	Decoding register length unsigned value failed
	153507	Error reading from the register
Example	<pre>DS:&gt; 1535 0x0C0 3 153500: Data read: 0x012000 Test OK @</pre>	



## ANALOGUE SLAVE PROCESSOR (ASP)

Nucleus Name	<b>DS_ASP_Communication</b>	
Nucleus Number	1600	
Description	This nucleus checks the communication between the IIC controller of the Codec and the ASP.	
Technical	<ul style="list-style-type: none"> <li>- Initialise IIC-bus.</li> <li>- Read something from ASP.</li> <li>- Handle the errorcode.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160000	Communicating with the ASP succeeded
	160001	The IIC bus was not accessible
	160002	There was a timeout reading the device
	160003	The IIC acknowledge was not received
	160004	An IIC-bus error occurred
	160005	Got unknown IIC bus error
	160006	The IIC bus initialisation failed
Example	<pre>DS:&gt; 1600 160000: Test OK @</pre>	

Nucleus Name	<b>DS_ASP_Version</b>	
Nucleus Number	1601	
Description	This nucleus returns the version number of the software running on the ASP or MCU and if available that of the display driver.	
Technical	<ul style="list-style-type: none"> <li>- Read versions from ASP and display it.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160100	Retrieving the software versions succeeded
	160101	The IIC bus initialisation failed.
	160102	The IIC bus failed.
	160103	The CRC checksum of the message is wrong.
Example	<pre>DS:&gt; 1601 160100: Software version      : 0.9 Display driver version: 0.1 Hardware version      : 0x02 Hardware layout       : 0x03 Hardware revision     : 0x00 Test OK @</pre>	

Nucleus Name	<b>DS_ASP_RealTimeClockSetValues</b>	
Nucleus Number	1602	
Description	This nucleus is used to set the real time clock to the correct values.	
Technical	<ul style="list-style-type: none"> <li>- Decode the user input.</li> <li>- Write RTC value to ASP.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	User must give time and date like this: hh:mm:ss dd/mm/yy	
Error	Number	Description
	160200	Setting the real time clock succeeded
	160201	The ASP initialisation failed.
	160202	The IIC bus failed.
	160203	Wrong user input.
Example	<pre>DS:&gt; 1602 03:20:01 22/06/03 160200: Test OK @</pre>	

Nucleus Name	<b>DS_ASP_RealTimeClockGetValues</b>	
Nucleus Number	1603	
Description	This nucleus is used to retrieve the actual real time from the ASP	
Technical	<ul style="list-style-type: none"> <li>- Read RTC value from ASP.</li> <li>- Decode the RTC value.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160300	Retrieving the real time succeeded
	160301	The ASP initialisation failed.
	160302	The IIC bus failed.
	160303	The CRC checksum of the message is wrong.
	160304	The Real Time Clock has been found invalid or was not found.
Example	<pre>DS:&gt; 1603 Time: 03:20:17 Date: 22/06/03 (dd/mm/yy) 160300: Test OK @</pre>	

Nucleus Name	<b>DS_ASP_NTCGet</b>	
Nucleus Number	1606	
Description	This nucleus reads the value of the NTC-resistor connected to the ASP, which tells the ambient temperature to the processor.	
Technical	<ul style="list-style-type: none"> <li>- Read the ADC input pin of the ASP that is connected to the NTC-resistor.</li> <li>- Display this value.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160600	Getting the NTC-value succeeded
	160601	The IIC bus failed
Example	<pre>DS:&gt; 1606 160600: Temperature (NTC) ADC input value = 0x94 Test OK @</pre>	

Nucleus Name	<b>DS_ASP_FanSpeedSet</b>	
Nucleus Number	1607	
Description	This nucleus sets the speed of the fan that controls the temperature within the set.	
Technical	<ul style="list-style-type: none"> <li>- Decode user input.</li> <li>- Set pio-pins FAN_C1 and FAN_C2.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	Speed to be set: off, low, medium, high	
Error	Number	Description
	160700	Setting the new fan speed succeeded
	160701	The IIC bus failed
	160702	The user provided wrong input
Example	<pre>DS:&gt; 1607 low 160700: Test OK @</pre>	

Nucleus Name	<b>DS_ASP_LightDisplay</b>	
Nucleus Number	1608	
Description	This nucleus lights the entire display.	
Technical	<ul style="list-style-type: none"> <li>- Set all segments on in the display buffer.</li> <li>- Set the grids correct in the display buffer.</li> <li>- Send the display buffer to the ASP.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	160800	Lighting the entire display succeeded
	160801	IIC-bus communication failed
Example	<pre>DS:&gt; 1608 160800: Test OK @</pre>	

Nucleus Name	<b>DS_ASP_DimmingDisplay</b>	
Nucleus Number	1610	
Description	This nucleus lights the entire display, and dims it.	
Technical	- Change in a loop the display brightness from maximum to minimum.	
Execution Time	Less than 1 second.	
User Input	'ON' or 'OFF'	
Error	Number	Description
	161000	The test succeeded
	161001	IIC-bus communication failed
	161002	The user provided wrong input
Example	<pre>DS:&gt; 1610 ON 161000: Test OK @</pre>	

Nucleus Name	<b>DS_ASP_ClearDisplay</b>	
Nucleus Number	1611	
Description	This nucleus clears the display and deactivates dimming/blinking functionality	
Technical	<ul style="list-style-type: none"> <li>- Make the display buffer empty.</li> <li>- Make the blink buffer empty.</li> <li>- Send the display buffer to the ASP.</li> <li>- Send the blink buffer to the ASP.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	161100	The test succeeded
	161101	IIC-bus communication failed
Example	<pre>DS:&gt; 1611 161100: Test OK @</pre>	

Nucleus Name	<b>DS_ASP_KeyBoard</b>	
Nucleus Number	1612	
Description	<p>This nucleus checks all keys of the keyboard by having the user confirm the key-code displayed of all keys. If the user presses 'a' or 'A' the test is aborted. If the user presses 'o' or 'O' the test is indicated as OK.</p> <p>If the user holds down 'PLAY' for more than a second the test is indicated as OK, if the user holds down 'RECORD' the test is indicated as failed.</p> <p>Indicate the number of keys pressed to the user, both in the terminal logging and on the display.</p>	
Technical	<ul style="list-style-type: none"> <li>- Initialise the display.</li> <li>- Display the key pressed by the user on the display.</li> <li>- Monitor the service port for an abort and get the next key pressed.</li> <li>- Update the display and repeat previous steps until user stops / confirms.</li> <li>- Display the number of keys that were pressed.</li> </ul>	
Execution Time	Depends on the user.	
User Input	None	
Error	Number	Description
	161200	Checking all keys succeeded
	161201	IIC-bus communication failed
	161202	The user signals a failure of the keyboard
	161203	The user aborted the test
Example	<pre>DS:&gt; 1612 161200: 3 keys were pressed. Test OK @</pre>	

Nucleus Name	<b>DS_ASP_RemoteControl</b>	
Nucleus Number	1613	
Description	<p>This nucleus checks the interface to the remote control by having the user confirm the key-code displayed. At least one key must be tested. If the user presses 'a' or 'A' the test is aborted. If the user presses 'o' or 'O' the test is indicated as OK. If the user holds down 'PLAY' for more than a second the test is indicated as OK, if the user holds down 'RECORD' the test is indicated as failed. Indicate the number of keys pressed to the user, both in the terminal logging and on the display.</p>	
Technical	<ul style="list-style-type: none"> <li>- Initialise the display.</li> <li>- Display the key pressed by the user on the display.</li> <li>- Monitor the service port for an abort and get the next key pressed.</li> <li>- Update the display and repeat previous steps until user stops / confirms.</li> <li>- Display the number of keys that were pressed.</li> </ul>	
Execution Time	Depends on the user.	
User Input	None	
Error	Number	Description
	161300	The test succeeded
	161301	IIC-bus communication failed
	161302	The user signals a failure of the remote control
	161303	The user aborted the test
Example	<pre>DS:&gt; 1613 161300: 4 keys were pressed. Test OK @</pre>	

Nucleus Name	<b>DS_ASP_LEDsOn</b>	
Nucleus Number	1614	
Description	Switches on the display leds.	
Technical	<p>ASP specific</p> <ul style="list-style-type: none"> <li>- Check if the analogue board is a MOBO board, if so:</li> <li>- Read the ASP pio port.</li> <li>- Set the RECORD-LED bit on in this port.</li> <li>- Write the ASP pio port.</li> <li>- Read the ASP pio port.</li> <li>- Set the TRAY-LED bit on in this port.</li> <li>- Write the ASP pio port.</li> <li>- Read the ASP pio port.</li> <li>- Set the EPG-LED bit on in this port.</li> <li>- Write the ASP pio port.</li> <li>- Else</li> <li>- Set the RECORD-LED bit on.</li> <li>- Write the external ASP pio port.</li> <li>- Set the TRAY-LED bit on.</li> <li>- Write the external ASP pio port.</li> <li>- Set the EPG-LED bit on.</li> <li>- Write the external ASP pio port.</li> </ul> <p>MCU Specific</p> <ul style="list-style-type: none"> <li>- Get the user input and capitalize it and check validity</li> <li>- Check which lights should be turned on</li> <li>- Write the command to the MCU</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None, Green or Red: Choose which colour of the bi-led should be lit with the rest (only for OLAL22PREMIER variant)	
Error	Number	Description
	161400	Switching on the LEDs succeeded
	161401	IIC-bus communication failed
	161402	Invalid parameter
Example	<pre>DS:&gt; 1614 161400: Test OK @</pre>	

Nucleus Name	<b>DS_ASP_LEDsOff</b>	
Nucleus Number	1615	
Description	This nucleus switches off the display leds.	
Technical	ASP specific <ul style="list-style-type: none"> <li>- Check if the analogue board is a MOBO board, if so:</li> <li>- Read the ASP pio port.</li> <li>- Set the RECORD-LED bit off in this port.</li> <li>- Write the ASP pio port.</li> <li>- Read the ASP pio port.</li> <li>- Set the TRAY-LED bit off in this port.</li> <li>- Write the ASP pio port.</li> <li>- Read the ASP pio port.</li> <li>- Set the EPG-LED bit off in this port.</li> <li>- Write the ASP pio port.</li> <li>- Else</li> <li>- Set the RECORD-LED bit off.</li> <li>- Write the external ASP pio port.</li> <li>- Set the TRAY-LED bit off.</li> <li>- Write the external ASP pio port.</li> <li>- Set the EPG-LED bit off.</li> <li>- Write the external ASP pio port.</li> </ul> MCU Specific <ul style="list-style-type: none"> <li>- Write the command to the MCU to turn all display leds off</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	161500	Switching off the LEDs succeeded
	161501	IIC-bus communication failed
Example	DS:> 1615 161500: Test OK @	

Nucleus Name	<b>DS_ASP_Reset</b>	
Nucleus Number	1616	
Description	This nucleus resets the ASP.	
Technical	<ul style="list-style-type: none"> <li>- Reset the ASP by toggling the reset wire by a GPIO pin of the codec.</li> <li>- Wait 500ms according to the HSI.</li> <li>- Read Status from ASP.</li> <li>- Put ASP in normal mode.</li> <li>- Configure general ASP PIO.</li> <li>- Make a ASP pio pin low to read the version.</li> <li>- Get GPP40 - GPP47 and GPP48 - GPP55.</li> <li>- Decode hardware version, revision, and layout.</li> <li>- Configure the ASP clock.</li> <li>- Configure display, part 1.</li> <li>- Configure display, part 2.</li> <li>- Configure blinking.</li> <li>- Configure external ASP PIO.</li> <li>- Configure ADC input.</li> <li>- Configure remote control input.</li> <li>- Enable power on the AV3.</li> </ul>	
Execution Time	3 seconds.	
User Input	None	
Error	Number	Description
	161600	Reset command succeeded
	161601	IIC-bus communication failed
Example	DS:> 1616 161600: Test OK @	

Nucleus Name	<b>DS_ASP_Watchdog</b>	
Nucleus Number	1618	
Description	<p>This nucleus configures the watchdog timer of the ASP, and waits till the watchdog expires. The watchdog time-out is 10 seconds. On expiry of the watchdog timer, the ASP switching off, and on its power supply, and resets the main controller.</p> <p>So, this nucleus will not return an error code when the test succeeded, but the system will restart again.</p>	
Technical	<ul style="list-style-type: none"> <li>- Configure watchdog timer.</li> <li>- Wait till the watchdog expired.</li> </ul>	
Execution Time	10 seconds.	
User Input	None	
Error	Number	Description
	161801	IIC-bus communication failed.
	161802	The ASP did not reset the host processor.
Example	<pre>DS:&gt; 1618 Waiting till the watchdog expires.  Factory Diagnostics and Service Software DVD Video Recorder (Sep 10 2004, 08:11:24)  Version :662           Build      :20040910_0515 Release  :C1_1         Buildtype  :no Baseline :F_C1_195    Variant   :verum:dvdrw2_lib  DS:&gt;</pre>	

Nucleus Name	<b>DS_ASP_Reboot</b>	
Nucleus Number	1619	
Description	<p>This command forces a reboot of the main controller. The ASP shutdown the digital board power supply and then switch it on to force reset.</p> <p>So, this nucleus will not return an error code when the test succeeded, but the system will restart again.</p>	
Technical	<ul style="list-style-type: none"> <li>- Send command reboot to ASP.</li> </ul>	
Execution Time	2 seconds.	
User Input	None	
Error	Number	Description
	161901	IIC-bus communication failed.
	161902	The ASP did not reset the host processor.
Example	<pre>DS:&gt; 1619 Factory Diagnostics and Service Software DVD Video Recorder (Sep 10 2004, 08:11:24)  Version :662           Build      :20040910_0515 Release  :C1_1         Buildtype  :no Baseline :F_C1_195    Variant   :verum:dvdrw2_lib  DS:&gt;</pre>	

Nucleus Name	<b>DS_ASP_PioExtended</b>	
Nucleus Number	1623	
Description	This nucleus enables the user to switch all the General Purpose Pins of the ASP.	
Technical	<ul style="list-style-type: none"> <li>- Decode user input.</li> <li>- Execute the parameter command.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	<p>One of the next parameters can be used</p> <ul style="list-style-type: none"> <li>• "GPIO CONFIG &lt;GPP&gt; &lt;DIR&gt; &lt;MODE&gt;"</li> <li>• "GPIO SET &lt;GPP&gt; &lt;VALUE&gt;"</li> <li>• "GPIO GET &lt;GPP&gt;"</li> <li>• "ADC GET &lt;GPP&gt;"</li> <li>• "ADC CONFIG &lt;BYTE0&gt; &lt;BYTE1&gt; &lt;BYTE2&gt;"</li> </ul> <p>(See CONFIG_ADC command parameters)</p> <p>where &lt;GPP&gt; = 0 .. number of GPP pins  where &lt;DIR&gt; = 0 (input) or 1 (output)  where &lt;MODE&gt; = 0 or 1      0 = input without notification/push-pull output      1 = input with notification/open drain output  where &lt;VALUE&gt; = 0 (low) or 1 (high)</p>	
Error	Number	Description
	162300	The test succeeded
	162301	Invalid user input.
Example	<pre>DS:&gt; 1623 GPIO SET 45 0 162300: Test OK @</pre>	

Nucleus Name	<b>DS_ASP_8SC2Check</b>	
Nucleus Number	1624	
Description	Check if the 8SC2 signal (slow blanking) can be set low, medium and high. The user must connect SCART2 (pin8) to SCART1 (pin8) on the outside of the set. Works on EURO sets only.	
Technical	<ul style="list-style-type: none"> <li>- Set the SCART1_PIN8_OUT pin low</li> <li>- Measure the value on the ASP 8SC2 input ADC</li> <li>- Set the SCART1_PIN8_OUT pin to medium level</li> <li>- Measure the value on the 8SC2 input ADC</li> <li>- Set the SCART1_PIN8_OUT pin Matrix high</li> <li>- Measure the value on the ASP 8SC2 input ADC</li> </ul>	
Execution Time	Less than 1 second	
User Input	None	
Error	Number	Description
	162400	Detecting 8SC2 signal succeeded
	162401	Detecting 8SC2 signal failed
	162402	This test is not applicable for current HW layout
	162403	Could not retrieve hardware version from ASP
Example	<pre>DS:&gt; 1624 162400: Test OK @</pre>	



**FRONTEND (TUNER) (FRE)**

Nucleus Name	<b>DS_FRE_Communication</b>	
Nucleus Number	2000	
Description	This nucleus checks the communication between the IIC controller of the Codec and the Front End (Tuner) on the analogue board	
Technical	- Determine whether anything can be read from the FRE through IIC	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	200000	Communicating with the front end succeeded
	200001	The IIC bus was not accessible
	200002	There was a timeout reading the device
	200003	The IIC acknowledge was not received
	200004	An IIC-bus error occurred
	200005	Got unknown IIC bus error
	200006	The IIC bus initialisation failed
Example	<pre>DS:&gt; 2000 200000: Test OK @</pre>	

Nucleus Name	<b>DS_FRE_ChannelSelect</b>																																																																																															
Nucleus Number	2001																																																																																															
Description	This nucleus sets the tuner to receive a valid audio and video signal																																																																																															
Technical	<ul style="list-style-type: none"> <li>- Parse the user input to determine all parameters to set</li> <li>- Pass these parameters to the respective parts using IIC</li> </ul>																																																																																															
Execution Time	Less than 1 second																																																																																															
User Input	<p>&lt;Frequency*16&gt; &lt;video standard id&gt; &lt;Tuner&gt;</p> <p>Tuner frequency: to tune the tuner to e.g. 216 MHz, this parameter must be 3456. (Since 216*16 = 3456. This is to avoid the decimal points to the parameter list.)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Name</th> <th>Colour system</th> <th>Transmission standard</th> <th>Sound modulation</th> </tr> </thead> <tbody> <tr> <td>PAL_BG_S</td> <td>PAL</td> <td>BG</td> <td>FM-Stereo</td> </tr> <tr> <td>PAL_BG_M</td> <td>PAL</td> <td>BG</td> <td>FM-Mono / NICAM</td> </tr> <tr> <td>PAL_I_M</td> <td>PAL</td> <td>I</td> <td>FM-Mono / NICAM</td> </tr> <tr> <td>PAL_DK_S</td> <td>PAL</td> <td>DK</td> <td>FM-Stereo</td> </tr> <tr> <td>PAL_DK_M</td> <td>PAL</td> <td>DK</td> <td>FM-Mono / NICAM</td> </tr> <tr> <td>NTSC_M_S</td> <td>NTSC</td> <td>M</td> <td>FM-Stereo</td> </tr> </tbody> </table> <p>Video Standard ID: The table below shows which video standards are possible</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>ID</th> <th>Europe</th> <th>Nafta / Apac</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>PAL_BG_S</td> <td>NTSC</td> </tr> <tr> <td>1</td> <td>PAL_BG_M</td> <td>Invalid</td> </tr> <tr> <td>2</td> <td>PAL_I_M</td> <td>Invalid</td> </tr> <tr> <td>3</td> <td>PAL_DK_S</td> <td>Invalid</td> </tr> <tr> <td>4</td> <td>PAL_DK_M</td> <td>Invalid</td> </tr> </tbody> </table> <p>* Video Standard ID: For TCSM0601PD25F tuner only</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>ID</th> <th>Europe</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>PAL_BG</td> </tr> <tr> <td>1</td> <td>PA_I</td> </tr> <tr> <td>2</td> <td>PAL_DK</td> </tr> <tr> <td>3</td> <td>SECMA L</td> </tr> <tr> <td>4</td> <td>SECAM L'</td> </tr> </tbody> </table> <p>Tuner: Select the tuner type that you want to tune. This input is not mandatory. (If no input is detected, tuner will be defined run-time (if recognised).)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Tuner</th> <th>Tuner ID</th> <th>Runtime Detected</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>FE1316 (Europe Philips)</td> <td>V</td> </tr> <tr> <td>2</td> <td>FE1319 (Europe Philips)</td> <td>V</td> </tr> <tr> <td>3</td> <td>TMQZ2-403A (Europe ALPS)</td> <td></td> </tr> <tr> <td>4</td> <td>JS6B2-L121 (Europe Xuguang)</td> <td></td> </tr> <tr> <td>5</td> <td>TCPK0601 (APAC Samsung)</td> <td></td> </tr> <tr> <td>6</td> <td>TCMN0682 (NAFTA Samsung)</td> <td>V</td> </tr> <tr> <td>7</td> <td>TCPK0600 (APAC Samsung)</td> <td></td> </tr> <tr> <td>8</td> <td>TCPD0601 (APAC Samsung)</td> <td></td> </tr> <tr> <td>9</td> <td>VPC12R_ENG56PPG1F (Panasonic)</td> <td></td> </tr> <tr> <td>10 *</td> <td>TCSM0601PD25F (Europe Samsung)</td> <td></td> </tr> <tr> <td>11</td> <td>TCSN9082PA26AF (Nafta Samsung)</td> <td></td> </tr> </tbody> </table> <p>* Refer to Video Standard ID table for TCSM0601PD25F tuner</p>		Name	Colour system	Transmission standard	Sound modulation	PAL_BG_S	PAL	BG	FM-Stereo	PAL_BG_M	PAL	BG	FM-Mono / NICAM	PAL_I_M	PAL	I	FM-Mono / NICAM	PAL_DK_S	PAL	DK	FM-Stereo	PAL_DK_M	PAL	DK	FM-Mono / NICAM	NTSC_M_S	NTSC	M	FM-Stereo	ID	Europe	Nafta / Apac	0	PAL_BG_S	NTSC	1	PAL_BG_M	Invalid	2	PAL_I_M	Invalid	3	PAL_DK_S	Invalid	4	PAL_DK_M	Invalid	ID	Europe	0	PAL_BG	1	PA_I	2	PAL_DK	3	SECMA L	4	SECAM L'	Tuner	Tuner ID	Runtime Detected	1	FE1316 (Europe Philips)	V	2	FE1319 (Europe Philips)	V	3	TMQZ2-403A (Europe ALPS)		4	JS6B2-L121 (Europe Xuguang)		5	TCPK0601 (APAC Samsung)		6	TCMN0682 (NAFTA Samsung)	V	7	TCPK0600 (APAC Samsung)		8	TCPD0601 (APAC Samsung)		9	VPC12R_ENG56PPG1F (Panasonic)		10 *	TCSM0601PD25F (Europe Samsung)		11	TCSN9082PA26AF (Nafta Samsung)	
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	200100	Setting the tuner channel succeeded																																																																																														
	200101	Invalid user input																																																																																														
	200102	Getting the version of the set failed																																																																																														
	200103	Configuration of the tuner failed																																																																																														
	200104	Configuration of the IF module failed																																																																																														
Example	<pre>DS:&gt; 2001 3456 0 1 200100: Test OK @</pre>																																																																																															

**HARD DISK DRIVE (HDD)**

Nucleus Name	<b>DS_HDD_Communication</b>	
Nucleus Number	2100	
Description	Check the communication between the digital board and the hard disk drive by querying the device type of the hard disk drive	
Technical	<ul style="list-style-type: none"> <li>- Initialise/start IDE</li> <li>- Check for an ATA device on the IDE interface</li> </ul>	
Execution Time	3 seconds	
User Input	None	
Error	Number	Description
	210000	Communication with the hard disk drive succeeded
	210001	The initialisation of IDE failed
	210002	Communication with the hard disk drive failed
Example	<pre>DS:&gt; 2100 210000: Found a hard disk drive: MASTER device on IDE interface 1 Test OK @</pre>	

Nucleus Name	<b>DS_HDD_Reset</b>	
Nucleus Number	2101	
Description	Reset the hard disk drive	
Technical	<ul style="list-style-type: none"> <li>- Initialise/start IDE</li> <li>- Check for an ATA device on the IDE interface</li> <li>- Toggle the IDE reset pin of the selected interface</li> </ul>	
Execution Time	1 second	
User Input	None	
Error	Number	Description
	210100	Resetting the hard disk drive succeeded
	210101	The initialisation of IDE failed
	210102	Communication with the hard disk drive failed
	210103	Failed to reset the hard disk drive
Example	<pre>DS:&gt; 2101 210100: Resetting IDE interface 1 succeeded Test OK @</pre>	

Nucleus Name	<b>DS_HDD_VersionGet</b>	
Nucleus Number	2102	
Description	Get the vendor- and product identification and the product revision level of the hard disk drive	
Technical	<ul style="list-style-type: none"> <li>- Initialise/start IDE</li> <li>- Send ATA command IDENTIFY DRIVE</li> <li>- Display the serial, firmware revision and model information</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	210200	Version info successfully
	210201	The initialisation of IDE failed
	210202	Communication with the hard disk drive failed
	210203	Failed to get version info from the hard disk drive
Example	<pre>DS:&gt; 2102 210200: Serial number = F19LP8WE, Firmware rev. = VAM51JJ0 , Model nu mber = Maxtor 2F040L0 Test OK @</pre>	

Nucleus Name	<b>DS_HDD_WriteRead</b>	
Nucleus Number	2103	
Description	Write data to the hard disk, read it back and verify the data read back.	
Technical	<ul style="list-style-type: none"> <li>- Initialise/start IDE</li> <li>- Generate a random sector number</li> <li>- Generate test data to write to the disk</li> <li>- Read the data from the sector using READ_SECTOR(S) and store this in a temporarily buffer</li> <li>- Transfer the test data to the disk location using ATA command WRITE_SECTOR(S)</li> <li>- Read back the data from the disk location using ATA command READ_SECTOR(S)</li> <li>- Compare the two data areas and check whether the areas are equal</li> <li>- Write back the data from the temporarily buffer</li> </ul>	
Execution Time	3 seconds	
User Input	None	
Error	210300	Version info successfully
	210301	The initialisation of IDE failed
	210302	Communication with the hard disk drive failed
	210303	Unable to retrieve device capabilities from HDD
	210304	Writing data to HDD failed
	210305	Reading back data from HDD failed
	210306	Data read back did not equal written data
Example	<pre>DS:&gt; 2103 210300: OK, writing to sector 3f95776 Test OK @</pre>	

Nucleus Name	<b>DS_HDD_CapabilitiesGet</b>	
Nucleus Number	2104	
Description	Get the cylinders, heads and track information of the hard disk drive	
Technical	<ul style="list-style-type: none"> <li>- Initialise/start IDE</li> <li>- Send ATA command Identify drive information</li> <li>- Display all required capabilities</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	210400	Capabilities are displayed correctly
	210401	The initialisation of IDE failed
	210402	Communication with the hard disk drive failed
	210403	Failed to get information from the hard disk drive
Example	<pre>DS:&gt; 2104 Number of cylinders           16383 Number of heads               16 Number of sectors per track   63 Capacity in sectors           80293248 Number of current cylinders   16383 Number of current heads       16 Number of current sectors per track 63 Current capacity in sectors   16514064 Number of unformatted bytes per track 0 Number of unformatted bytes per sector 0 210400: Test OK @</pre>	

Nucleus Name	<b>DS_HDD_Diagnostics</b>	
Nucleus Number	2105	
Description	Shall perform the internal diagnostic tests implemented by the hard disk drive.	
Technical	<ul style="list-style-type: none"> <li>- Initialise/start IDE</li> <li>- Send the diagnostic (ATA) command to the HDD device</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None	
Error	Number	Description
	210500	The Diagnostic test on the hard disk drive device succeeded
	210501	The initialisation of IDE failed
	210501	The hard disk drive failed
	210501	The diagnostics ATA command failed
Example	<pre>DS:&gt; 2105 210500: Test OK @</pre>	

Nucleus Name	<b>DS_HDD_UploadImage</b>	
Nucleus Number	2106	
Description	Upload raw data from the HDD to a DVD+RW	
Technical	<ul style="list-style-type: none"> <li>- Initialise/start IDE</li> <li>- Check for an ATA device on the IDE interface</li> <li>- Check for an ATAPI DVD+RW drive</li> <li>- Calibrate the DVD+RW laser</li> <li>- Repeat until transfer is completed</li> <li>- Read x MB from HDD source sector into SDRAM</li> <li>- Write x MB from SDRAM to the destination sector on DVD+RW</li> <li>- Read sector 0x34000 on DVD containing the transfer table to use</li> <li>- Update the contents of the table and write it back</li> </ul>	
Execution Time	Depending on the number of sectors to transfer it may take approximately 2 MB per second.	
User Input	<p>The user can enter 3 parameters in the next format:          &lt;COMMAND&gt; &lt;HDD sector&gt; &lt;nr of HDD sectors&gt;          &lt;COMMAND&gt; is one of the next strings:</p> <ul style="list-style-type: none"> <li>• NEW: Create a new transfer image table, &lt;HDD sector&gt; and &lt;nr of HDD sectors&gt; must be entered.</li> <li>• ADD: Add a section to the current transfer table, &lt;HDD sector&gt; and &lt;nr of HDD sectors&gt; must be entered</li> <li>• READ: Read the current transfer image table from the DVD. The tray of the DVD drive is sent out an the user is asked to insert a DVD+RW</li> <li>• VIEW: View the contents of the current transfer table</li> <li>• GO: Copy data from the HDD to the DVD+RW according to the currently entered transfer table</li> </ul> <p>&lt;HDD sector&gt; = the sector on HDD to start reading from          &lt;HDD sectors&gt; = the number of HDD sectors to transfer</p>	
Error	Number	Description
	210600	Uploading image succeeded
	210601	The initialisation of IDE failed
	210602	Communication with the hard disk drive failed
	210603	Communication with the AV3 failed
	210604	No DVD+RW is available
	210605	Calibrating DVD+RW failed
	210607	Error while reading image data from HDD
	210608	Error while writing image to DVD+RW
	210609	Unable to update the transfer table on the DVD+RW

## Example

```
DS:> 2106
210605: Invalid user input
Error @

DS:> 2106 READ
Please insert a writable DVD+RW
210609: Unable to update transfer table
Error @

DS:> 2106 NEW 0x1 2048
Creating new transfer table
Adding entry 1 to transfer table
Length 1 entries
210605: NEW 0X1 2048
Test OK @

DS:> 2106 VIEW
Length 1 entries
Entry 1:
  hddPosition : 0x1
  nrHddSectors : 0x800
  dvdPosition : 0x34040
  nrDvdSectors : 0x200
210605: VIEW
Test OK @

DS:> 2106 ADD 0x2001 20480
Adding entry 2 to transfer table
Length 2 entries
210605: ADD 0X2001 20480
Test OK @

DS:> 2106 GO
Please insert a writable DVD+RW
Executing transfer table 1 of 1, size 1048576 bytes (=1 MB)
Calibrating laser of DVD drive
Start creating image on DVD at 0x34040. Checking ... <OK>
210600: Transfer OK
Test OK @
```

Nucleus Name	<b>DS_HDD_DownloadImage</b>	
Nucleus Number	2107	
Description	Download a raw image from a DVD+RW disc to the hard disc drive. This image will be written on the hard disc drive.	
Technical	<ul style="list-style-type: none"> <li>- Initialise/start IDE</li> <li>- Check for an ATA device on the IDE interface</li> <li>- Check for an ATAPI DVD+RW drive</li> <li>- Mount the DVD containing the image to transfer</li> <li>- Read sector x containing the transfer table to use</li> <li>- Read the source sector, destination sector and transfer length from the transfer table</li> <li>- Repeat until transfer is completed</li> <li>- Read x MB from DVD source sector into SDRAM</li> <li>- Write x MB from SDRAM to the destination sector on HDD</li> </ul>	
Execution Time	Assumption based on 4.3GB data → 11 movies of 3 minutes. 33 minutes	
User Input	Actions: The tray of the DVD drive is sent out and the user is asked to insert a DVD+RW	
Error	Number	Description
	210700	Downloading image succeeded
	210701	The initialisation of IDE failed
	210702	Communication with the hard disk drive failed
	210703	Communication with the AV3 failed
	210704	No disc is available
	210705	Invalid medium is mounted
	210706	Unable to read the transfer table from DVD
	210707	Error while reading image from DVD
	210708	Error while writing image to HDD
Example	<pre> DS:&gt; 2107 Please insert the Master DVD &lt;OK&gt; Executing transfer table 1 of 4 524288 bytes   Dvd Sector      0x50000   Dvd Sector Count 256   Hdd Sector      0x40000   Hdd Sector Count 1024 please wait ..&lt;OK&gt; Executing transfer table 2 of 4 10485760 bytes (=10 MB)   Dvd Sector      0x70000   Dvd Sector Count 5120   Hdd Sector      0x60000   Hdd Sector Count 20480 please wait ..&lt;OK&gt; Executing transfer table 3 of 4 524288 bytes   Dvd Sector      0x50000   Dvd Sector Count 256   Hdd Sector      0x40000   Hdd Sector Count 1024 please wait ..&lt;OK&gt; Executing transfer table 4 of 4 524288 bytes   Dvd Sector      0x50000   Dvd Sector Count 256   Hdd Sector      0x40000   Hdd Sector Count 1024 please wait ..&lt;OK&gt; 210700: Transfer OK Test OK @ </pre>	

Nucleus Name	<b>DS_HDD_RandomReadScan</b>	
Nucleus Number	2108	
Description	Perform a short random read scan of x times 1000 commands (x is selectable between 1 to 20) to test the servo. If anything would be wrong with the servo or tracking, the result would be too slow. Recheck the LBA addresses that caused the disc to fail in order to avoid incorrect failure caused by shock or vibrations during the measurement.	
Technical	<ul style="list-style-type: none"> <li>- Initialise the HDD connection</li> <li>- Get the user input</li> <li>- Generate a random sequence of test sectors</li> <li>- For every sector in the random sequence do <ul style="list-style-type: none"> <li>- Read 1000 sectors and measure the time to perform this action</li> <li>- Update a list of statistics about the measurement</li> </ul> </li> <li>- Display statistical information about the test sequence</li> <li>- If more than 10% above 160 ms and/or more than 1 request in between 200 &amp; 250ms and/or requests above 250 ms make the result of the test fail.</li> </ul>	
Execution Time	Depending on the user input x times 4 minutes	
User Input	parameters in the next format: <nr_cmds><GRAPH> - Number of commands to send (in multiples of 1000), if no input is given 1000 commands will be sent - "GRAPH" optional to print out the measured read scan graph	
Error	Number	Description
	210800	Communication with the hard disk drive succeeded
	210801	The initialisation of the HDD failed
	210802	Invalid user input
	210803	Performance failure: more than 10% above 160 ms and/or more than 1 request in between 200 & 250ms and/or requests above 250 msec
	210804	Read error, unable to read a specified sector from disc
Example	<pre>DS:&gt; 2108 1 210800: Minimum access time = 142 msec Maximum access time = 159 msec Average access time = 146 msec Number of commands below 160 msec = 1000 Number of commands between 160 and 200 msec = 0 Number of commands between 200 and 250 msec = 0 Number of commands above 250 = 0 Test OK @</pre>	



Nucleus Name	<b>DS_HDD_LinearSurfaceScan</b>	
Nucleus Number	2109	
Description	Perform a linear surface scan so that most of the disc is covered.	
Technical	<ul style="list-style-type: none"> <li>- Initialise the HDD connection</li> <li>- Get the user input</li> <li>- Generate a sequence of test sectors according to the user input</li> <li>- For every sector in the sequence do <ul style="list-style-type: none"> <li>- Read the sector and measure the time to perform this action</li> <li>- Update a list of statistics about the measurement</li> </ul> </li> <li>- Display statistical information about the test sequence</li> <li>- If more than 1% above 100 ms and/or more than 0.1% above 200 msec and/or requests above 300 msec make the result of the test fail.</li> </ul>	
Execution Time	Depending on the user input and HDD size	
User Input	parameters in the next format: <SECTORS> <STEP> <LOW> <HIGH> where <ul style="list-style-type: none"> <li>- SECTORS: Specifies the number of sectors to read in each access</li> <li>- STEP: Specifies the step (in sectors) between each access.</li> <li>- LOW: The start sector address of an explicit range of LBA addresses to be used for testing. If no value is entered LBA 0 will be used</li> <li>- HIGH: The end sector address of an explicit range of LBA addresses to be used for testing. If no value is entered the maximum LBA will be used.</li> </ul> The user must enter either no parameter or all parameters If no parameters are entered the next defaults will be used: 1000 sector each access, steps of 1000 sectors and an address range from 0 to the maximum LBA	
Error	Number	Description
	210900	Communication with the hard disk drive succeeded
	210901	The initialisation of the HDD failed
	210902	Invalid user input
	210903	Performance failure: more than 10% above 160 ms and/or more than 1 request in between 200 & 250ms and/or requests above 250 msec
	210904	Read error, unable to read a specified sector from disc
Example	<pre>DS:&gt; 2109 1000 1000 0 100000 210900: Executed 100 linear seeks of 1000 sectors each Minimum access time = 141 msec Maximum access time = 148 msec Average access time = 141 msec Number of commands below 160 msec = 100 Number of commands between 160 and 200 msec = 0 Number of commands between 200 and 250 msec = 0 Number of commands above 250 = 0 Test OK @</pre>	



Nucleus Name	<b>DS_HDD_SetPower</b>	
Nucleus Number	2112	
Description	Set the power of the HDD On or Off	
Technical	<ul style="list-style-type: none"> <li>- Get user input</li> <li>- Set the IDE1_POWER PIO line to the desired value</li> </ul>	
Execution Time	Less than 1 second.	
User Input	1 parameter: "ON" , enables the power of the HDD "OFF" , turn off the power of the HDD	
Error	Number	Description
	211200	Setting the HDD power mode succeeded
	211201	Setting the HDD power mode failed
	211202	Invalid user input
Note	<b>All other HDD nuclei will not work until DS_HDD_Reset is executed</b>	
Example	<pre>DS:&gt; 2112 off 211200: Test OK @</pre>	

Nucleus Name	<b>DS_HDD_ValidateBootSegmentHeader</b>	
Nucleus Number	2113	
Description	Validates the Boot Segment Header in the HDD.	
Technical	<ul style="list-style-type: none"> <li>- Initializes the HDD interface.</li> <li>- Reads 8 bytes from LBA 0x8001</li> <li>- Compares these 8 bytes with 0x42,0x4F,0x4F,0x54,0x2D,0x48,0x44,0x4D</li> <li>- If identical, returns pass. Else Hard Disk Boot Segment Header is corrupt.</li> </ul>	
Execution Time	Less than 1 second.	
User Input	None.	
Error	Number	Description
	211300	Validation of Hard Disk Boot Segment Header passed.
	211301	Hard Disk Boot Segment Header corrupt or does not match expected values.
	211302	HDD init failed.
	211303	Starting HDD failed.
	211304	Reading from HDD failed.
Example	<pre>DS:&gt; 2113 211300: Test OK @</pre>	

**UNIVERSAL SERIAL BUS (USB)**

Nucleus Name	<b>DS_USB_DevTypeGet</b>	
Nucleus Number	2300	
Description	This nucleus retrieves the device and type information of the USB controller	
Technical	- Read out the chip-ID and revision register and return the info to the user	
Execution Time	< 1 sec.	
User Input	None	
Error	Number	Description
	230000	Retrieving the device type information succeeded
Example	<pre>DS:&gt; 2300 230000: USB Controller chip ID: 0x6123 Revision:0x10. Test OK @</pre>	

Nucleus Name	<b>DS_USB_Reset</b>	
Nucleus Number	2301	
Description	This nucleus performs a software reset of the controller and tests whether the functional state of the controller has become USBReset	
Technical	- Write the command to software reset the controller and read back the functional status of the controller	
Execution Time	< 1 sec.	
User Input	None	
Error	Number	Description
	230100	Resetting the host controller succeeded
	230101	Resetting the host controller failed
Example	<pre>DS:&gt; 2301 230100: Test OK @</pre>	

Nucleus Name	<b>DS_USB_CheckDeviceConnect</b>	
Nucleus Number	2302	
Description	This nucleus checks whether a device connect / disconnect can be aught by the software	
Technical	<ul style="list-style-type: none"> <li>- Initialise the host controller and its interrupts</li> <li>- wait for the port connect status change interrupt</li> <li>- display the status cause (connect/disconnect) of the interrupt</li> </ul>	
Execution Time	Depending on user actions	
User Input	None	
Error	Number	Description
	230200	The device connect was noticed by the hardware correctly
	230201	Retrieving the information from the diversity string failed
	230202	User aborted HPD test
Example	<pre>DS:&gt; 2302 Insert or remove the USB cable (or type 'a' to abort): 230200: Test OK @</pre>	

Nucleus Name	<b>DS_USB_CheckDeviceSpeed</b>	
Nucleus Number	2303	
Description	This nucleus checks whether the connected device functions at low / full or high speed.	
Technical	<ul style="list-style-type: none"><li>- Initialise the host controller and its interrupts</li><li>- Find out the total number of ports</li><li>- Read out the port status and display it</li></ul>	
Execution Time	< 1 sec.	
User Input	None	
Error	Number	Description
	230300	The device connect was noticed by the hardware correctly
	230301	Retrieving the information from the diversity string failed
	230302	User aborted the test
Example	DS:> 2302 230200: Full Speed device on port number: 1 Test OK @	

**SCRIPT (SCRIPT)**

Nucleus Name	<b>DS_IH_ScriptHandler</b>
Nucleus Number	Script
Description	The test requires no user interaction. A number of nuclei will be run before a message is returned indicating if there is a failure in the DVD Recorder. When a nucleus failed, the script stops and displays the message " <b>FAIL</b> ". Otherwise it displays " <b>PASS</b> " at the end when all nuclei are executed. During the execution of a script, a progress indicator is displayed on the display of the DVD Recorder.
Technical	Execute the included nuclei one by one If a nucleus fails quit and display the failed nucleus on the local display and service port
Execution Time	16 seconds
Included tests:	<ol style="list-style-type: none"> <li>1. DS_CHR_DEVTYPEGET_NUC</li> <li>2. DS_SDRAM_WRITEREADFAST_NUC</li> <li>3. DS_FLASH_DEVTYPEGET_NUC</li> <li>4. DS_FLASH_CHECKSUMPROGRAM_NUC</li> <li>5. DS_VIP_COMMUNICATION_NUC</li> <li>6. DS_VIP_DEVTYPEGET_NUC</li> <li>7. DS_DVIO_LINKDEVTYPEGET_NUC</li> <li>8. DS_DVIO_PHYCOMMUNICATION_NUC</li> <li>9. DS_DVIO_PHYDEVTYPEGET_NUC</li> <li>10. DS_BE_COMMUNICATIONECHO_NUC</li> <li>11. DS_BE_VERSIONGET_NUC</li> <li>12. DS_SYS_HARDWAREVERSIONGET_NUC</li> <li>13. DS_SYS_SOFTWAREVERSIONBOOTGET_NUC</li> <li>14. DS_SYS_SOFTWAREVERSIONDOWNLOADGET_NUC</li> <li>15. DS_SYS_SOFTWAREVERSIONAPPLGET_NUC</li> <li>16. DS_SYS_DVIDNUMBERGET_NUC</li> <li>17. DS_SYS_SLASHVERSIONGET_NUC</li> <li>18. DS_SYS_SETTINGSDISPLAY_NUC</li> <li>19. DS_SYS_BUILDINFOGET_NUC</li> <li>20. DS_ASP_COMM_NUC</li> <li>21. DS_ASP_VERSION_NUC</li> <li>22. DS_FRE_COMM_NUC</li> <li>23. DS_HDD_COMMUNICATION_NUC</li> <li>24. DS_HDD_VERSION_NUC</li> <li>DS_USB_DEVTYPEGET_NUC</li> </ol>
<b>Note!</b>	<b>Invocation by holding down the PLAY button when powering up the system</b>
<b>Note!</b>	The following example is for Lecoplus variant only
Example	<pre> Factory Diagnostics and Service Software DVD Video Recorder (Dec 15 2006, 14:14:54)  Version :1463          Build      :20061215_1352 Release  :SG1_1       Buildtype :dev Baseline :SGP29atl#SG1_1_20050609_base Variant  :lecoplusleadV1  Executing User/Dealer script.  Busy executing NUC100 </pre>

```
Device ID 7300

Codec ID PNX7350
F-BCU (0x0102) 4.0 INTC (0x011d) 3.0 SIF (0xa04b) 2.0
BOOT (0x010a) 3.1 CONFIG (0x013f) 5.0 RESET (0x0123) 5.0
CLOCK (0x013e) 7.0 DEBUG (0x0116) 0.1 UART0 (0x0107) 1.2
UART1 (0x0107) 1.2 I2C0 (0x0105) 0.1 I2C1 (0x0105) 0.1
GPIO (0x013c) 3.1 SYNC (0x013a) 4.0 OSD (0x0136) 1.0
SPU (0xa00e) 1.1 MIXER (0x0137) 3.0 DENC (0x0138) 5.0
CCIR (0x0139) 2.1 VDEC (0x0133) 1.0 PARSER (0xa00d) 0.0
DV (0xa00c) 0.0 IDE0 (0xa009) 1.2 IDE1 (0xa009) 1.2
SGDX (0xa008) 4.0 BYTE (0xa00b) 1.0 OUTPUT (0xa003) 8.0
ACOMP (0xa000) 8.0 VFE (0xa001) 8.0 VCOMP (0xa002) 8.0
SCR (0xa004) 8.0 SIFF (0xa011) 3.0 PSCAN (0xa05d) 0.1
ADEC (0x0134) 1.1 IR (0x0131) 2.0 AOI (0xa08c) 0.0
PIP (0xa04d) 1.0 AVLINK (0xdead) 10.11 USBLINK (0xa08e) 0.0
MSVD (0xa087) 0.0 FEBCU (0xa05e) 1.0 BM (0xa085) 0.0
BMI (0xa084) 0.0 DISP (0xa04d) 1.0

Busy executing NUC401

Busy executing NUC500
Found FLASH memory:

NOR ST M29DW160ET 2MB

Busy executing NUC503

BootCode , in FLASH, checksum is: 0xBABE7E83, which is correct
Diagnostics, in FLASH, checksum is: 0xBABED436, which is correct
Download , in FLASH, checksum is: 0xBABE7C57, which is correct
Application, on HDD , checksum is: 0xBABE5D76, which is correct

Busy executing NUC601

Busy executing NUC600
Found SAA7136

Busy executing NUC900

Busy executing NUC903
Be version = 52.07.02.10.PHILIPS ,D5.2, 52070210,5VC0635130300,
Basic Engine returned no OPU info

Busy executing NUC1200
Hardware ID = 0x66

Busy executing NUC1201
Software Boot Version = 1463

Busy executing NUC1202
Software Download Version = 1463

Busy executing NUC1203
Software Application Version = 1463

Busy executing NUC1208
The DvIdNumber is: 0000000000

Busy executing NUC1218
The slash version is = 11602

PASS

DS:>
```

## Alignments & Test Procedures

### Restoration of settings in NVM after Digital Board Replacement

In a new Digital Board, the non-volatile memory (NVM), where the factory settings of the set are stored, is an empty device. If the factory settings such as Slash Version and Hard Diversity String are not initialized properly after Digital Board replacement, the set can only start up in Diagnostic Software Mode.

For the set to start up and function normally with a new digital board, using the commands in Diagnostic Software (DS) from the PC via HyperTerminal connection to the set, the following settings should be restored.

- Slash information (or slash version)
- IEEE Unique number (or DV ID)
- Hard Ware Diversity String (or Hardware ID)
- DivX Model ID

#### 5.8. Setting Slash Version

The slash version is stored with DS command 1217 followed by the slash version as parameter.

The slash version for DVDR5590H/97 is: 13601

The slash version for DVDR5590H/75 is: 13602

Example:  
 DS:> 1217 13601  
 121700:  
 Test OK@

With DS command 1218 the slash version can be displayed

#### 5.9 Setting IEEE Unique Number

1. Note the serial number of the set example:  
 VN19 0650 100070
  - VN = production center (VN...Szekesfehervar).  
 According to UAW-500: V=22 and N=14 (A = 1, B = 2, C =3, etc)
  - 19 = change code (this is not used for this calculation)
  - 06 = YEAR
  - 50 = Production WEEK
  - 100070 = Lot and SERIAL number
2. Calculate the unique number: this number always exists out of 10 hexadecimal numbers
3. First 5 numbers: First we calculate a decimal number according to formula below:
  - $35828 * \text{YEAR} + 676 * \text{WEEK} + 26 * V + N + 8788$
  - The figures are fixed, YEAR, WEEK and production center codes V, N are variables
  - Example:  $35828 * 06 + 676 * 50 + 26 * 22 + 14 + 8788 = 258142$  (decimal)
  - Then we translate this decimal number to a hexadecimal number.
  - Example:  $258142 = 3F05E$  (hex)
4. Last 5 numbers: The last 5 numbers exist out of the Lot and SERIAL number.  
 We have to translate the decimal number to the next 5 hexadecimal numbers:  
 Example:  $100070$  (decimal) =  $186E6$  (hex)
5. This IEEE Unique number (10-digit hexadecimal number) is stored with DS command 1207.

Example:  
 DS:>1207 3F05E186E6  
 120700:  
 Test OK@

The set has now its original IEEE unique number.

With DS command 1208 the number can be displayed



### 5.10 Setting Hardware ID.

With DS command 1228 (command mode interface) the system settings including the Hardware "Diversity String" can be displayed

**Note:** An error in the Diversity string will render the set not able to boot-up and the Digital board will be defective.

Via the Diagnostic Software the "Diversity String" can be stored with the command 1226, followed by the "Diversity String" as parameter. That stored "Diversity String" can be checked with the DS command 1229.

The Diversity String used in DVDR5590H is as follows:

```
44424849E38840014C2B30365F3600006620070000020300000101004002000044564452323030312E303031020200000010300010002010000410000000000
```

Example:

```
DS:> 1226 44424849E38840014C2B30365F3600006620070000020300000101004002000044564452323030312E303031020200000010300010002010000410000000000
122600:
Test OK @
```

### 5.11. Checking and Setting DivX Model ID

DivX Model ID is stored in NVM on the Digital Board to generate the DivX VOD (Video On Demand) registration code. The DivX VOD registration code allows the user to rent or purchase videos from DivX VOD Service at DivX website and play back them on the set.

If the DivX Model ID is wrongly set, the DivX VOD registration will be wrongly calculated and, as a result, the playback of the videos downloaded from the DivX website will not be possible.

The DivX Model ID Assigned to all Philips Models is "0x4BF0".

#### Checking DivX Model ID

The DivX Model ID can be checked with DS Command 1241.

Example:

```
DS:> 1241
124100: DivX model id high byte = 0xf0, low byte = 0x4b
```

Test OK @

#### Setting DivX Model ID

The DivX Model ID can be stored via Diagnostic Software with the DS Command 1240, followed by "0x4BF0" as a parameter.

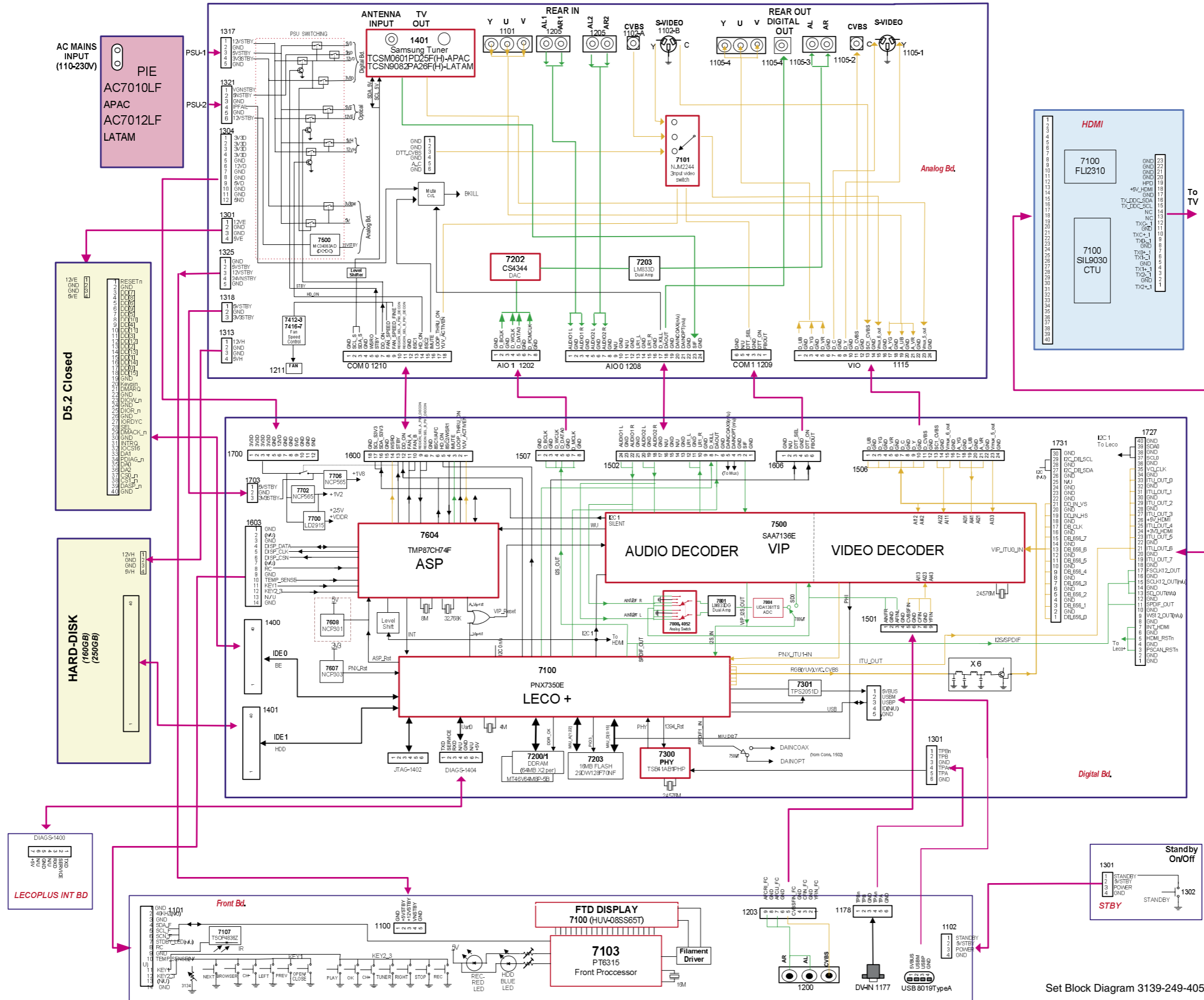
Example:

```
DS:> 1240 0x4BF0
124000:
Test OK @
```

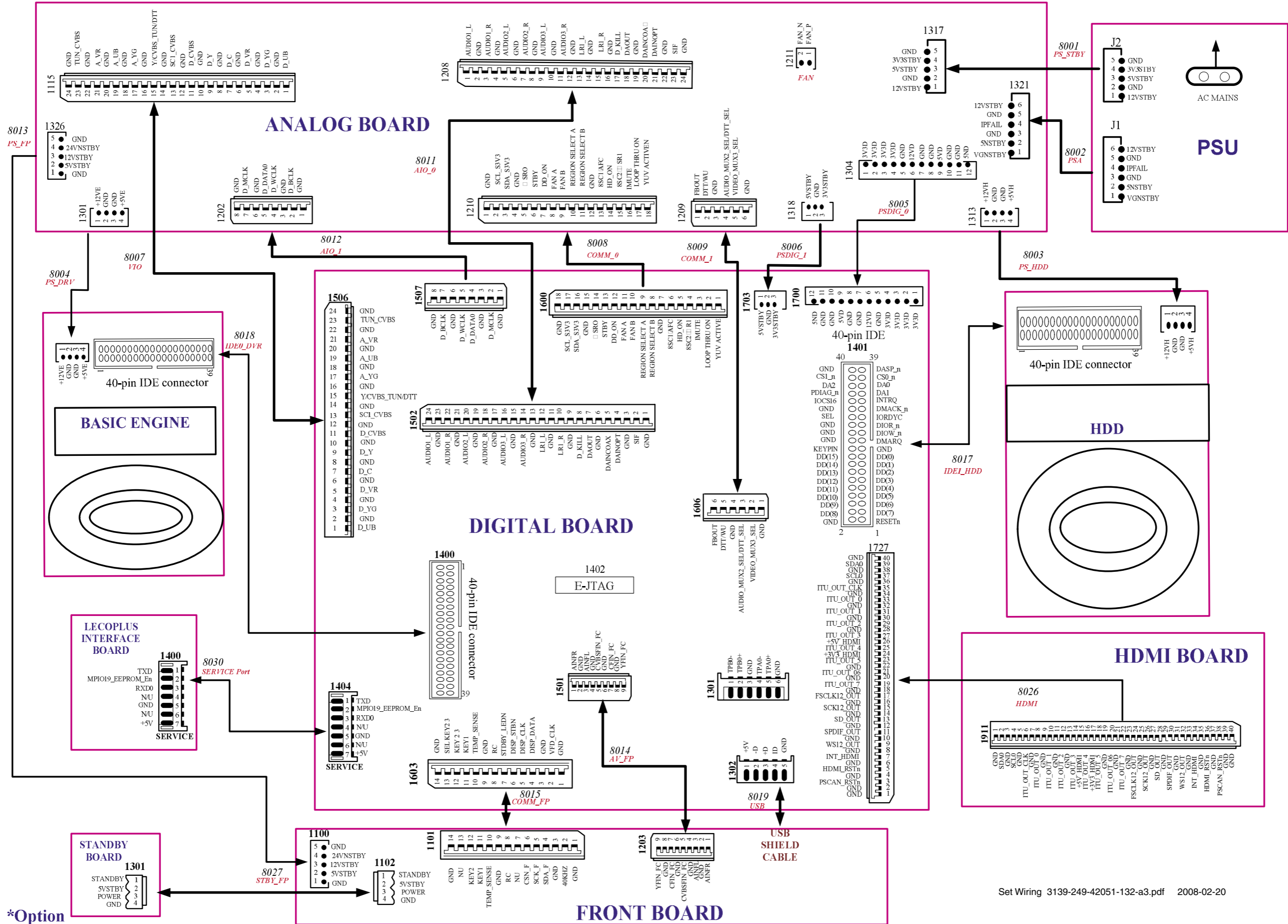
Note: Returning the set to the user after digital board replacement, inform the user that the device will generate a new DivX VOD code, the previous purchased titles may not play anymore and they need to re-activate this device again in the DivX Website under the same user account.

### 6. Block Diagrams, Waveforms, Wiring Diagram

#### Overall Block Diagram



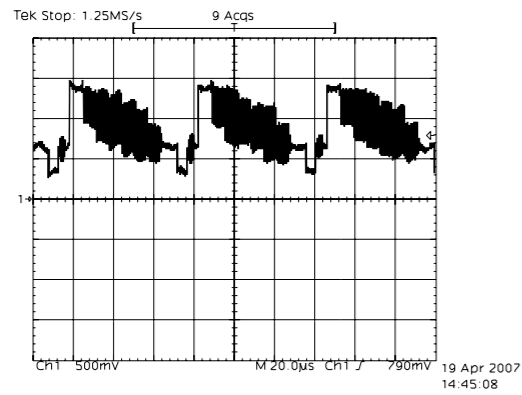
# Wiring Diagram



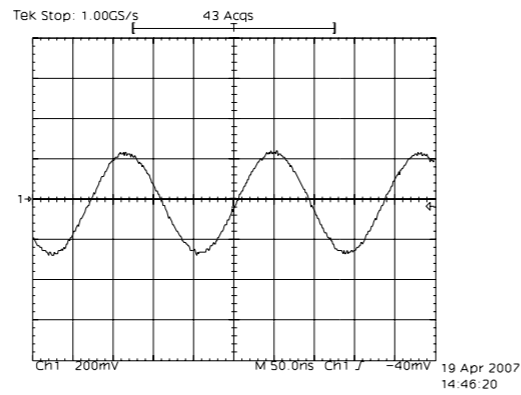
\*Option

# Waveforms of Analog Board

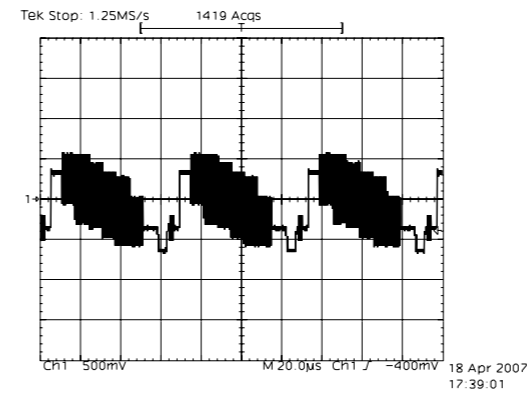
### F115 Tuner CVBS



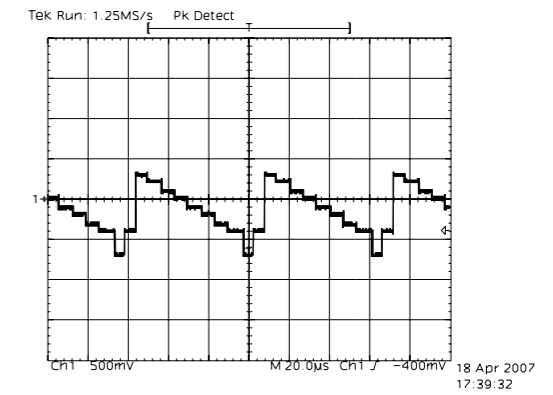
### F117 Tuner SIF



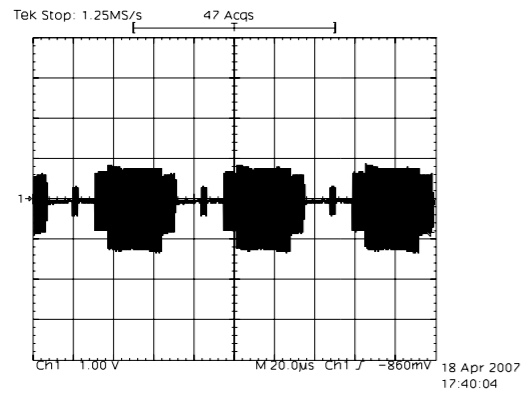
### F124 CVBS



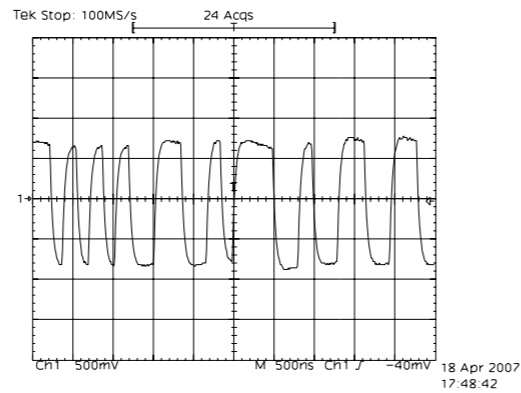
### F126 SY



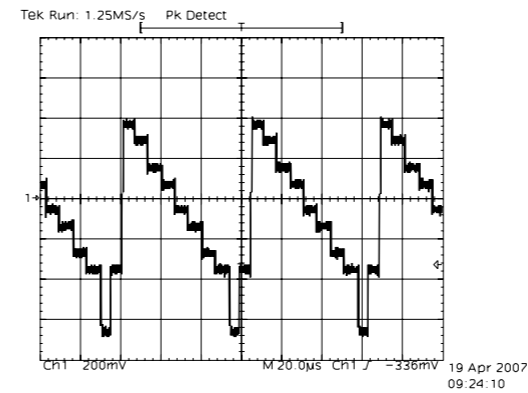
### F127 SC



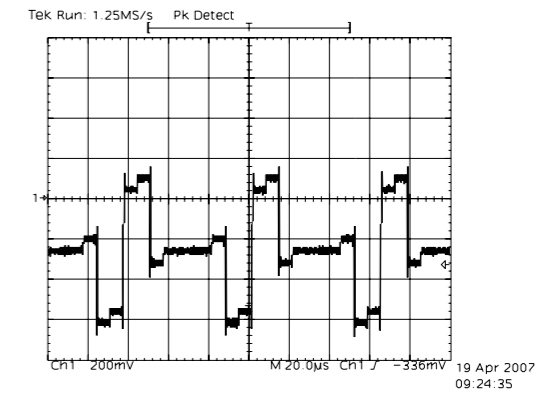
### F132 Digital Out Black



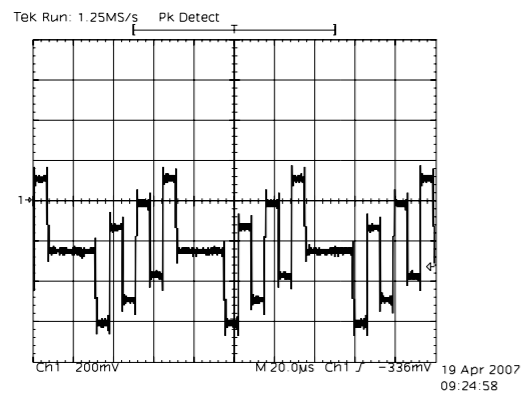
### F133 Yout Green



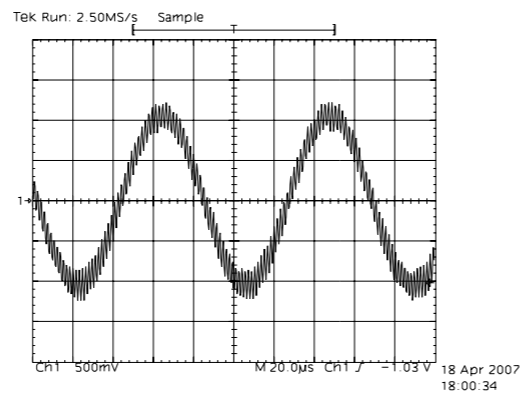
### F135 Pr out Red



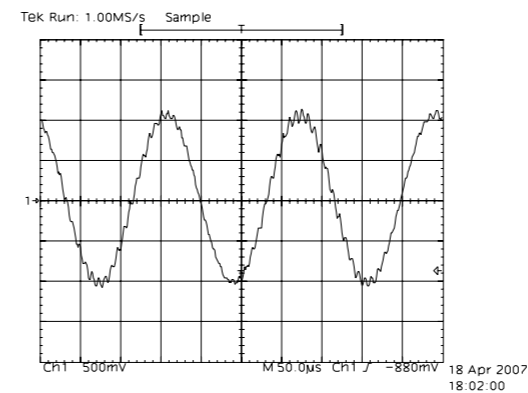
### F136 Pb out blue



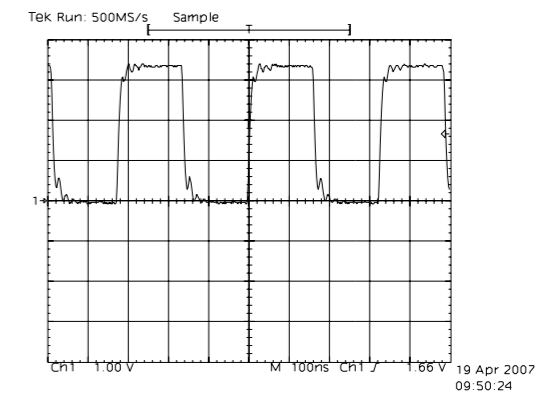
### F138 Audio R Out



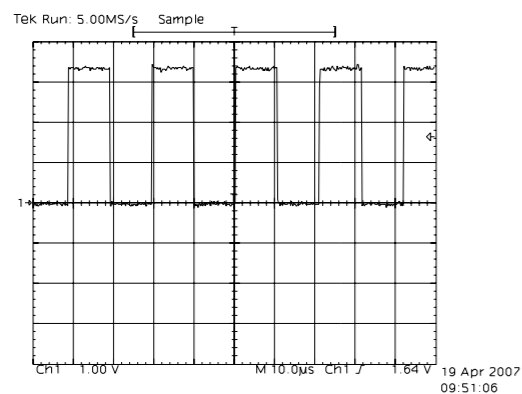
### F139 Audio L Out



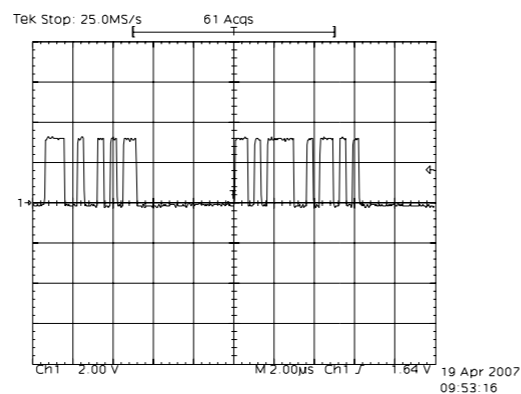
### F201 AIO D\_BCLK



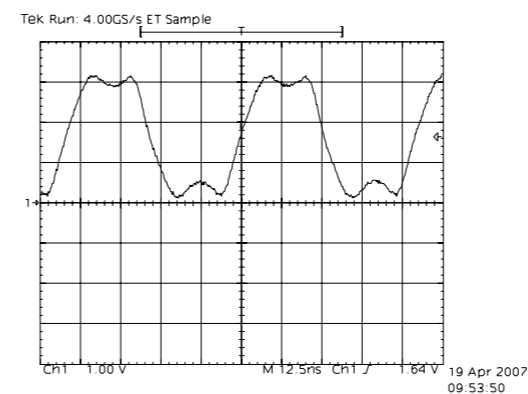
### F202 AIO D\_WCLK



### F203 AIO D\_DATA0

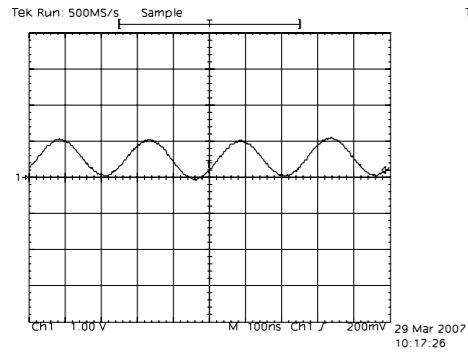


### F204 AIO D\_MCLK

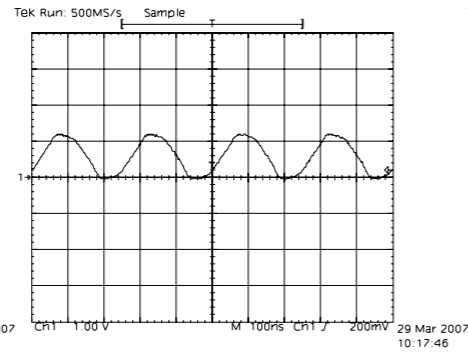


# Waveforms of Digital Board

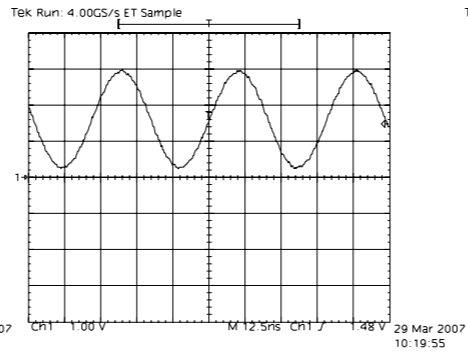
F101 (1100)



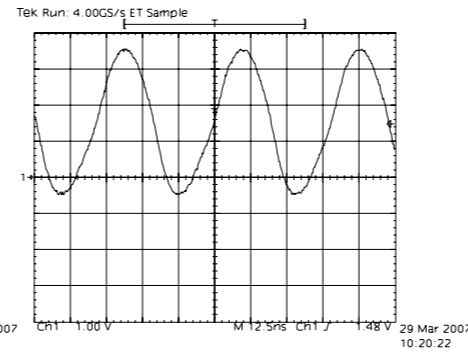
F102 (1100)



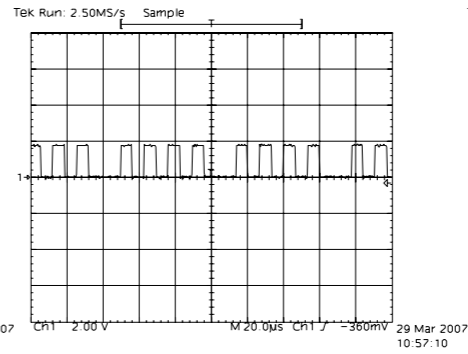
F303 (1303)



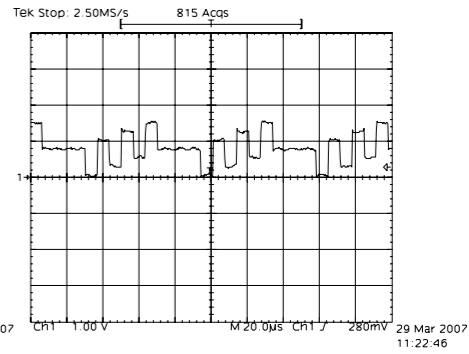
F304 (1303)



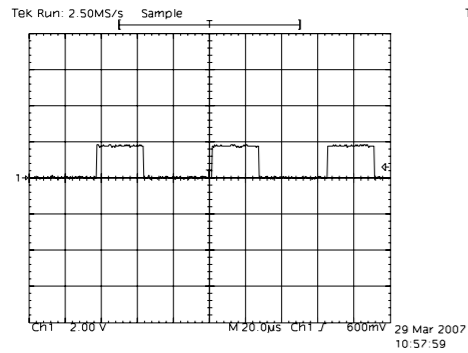
F500\_D\_B



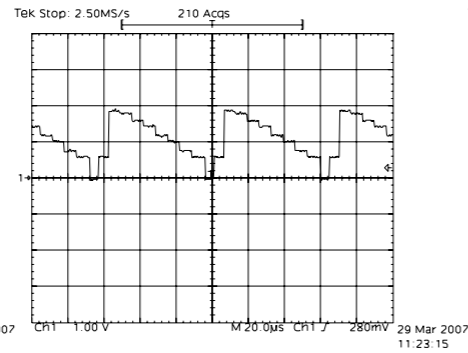
F500\_D\_U



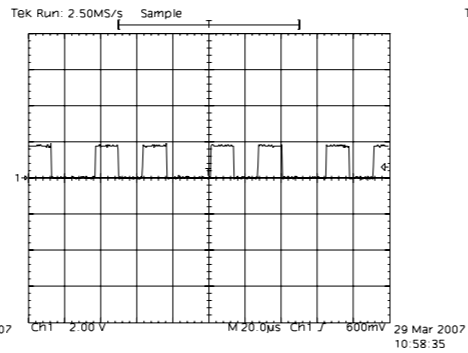
F501\_D\_G



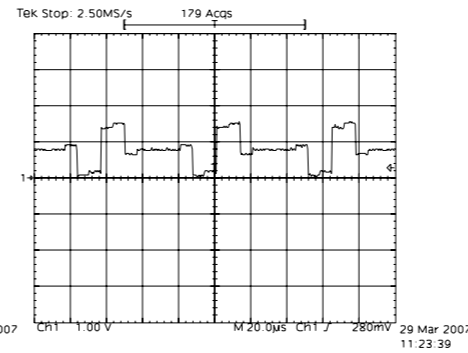
F501\_D\_Y



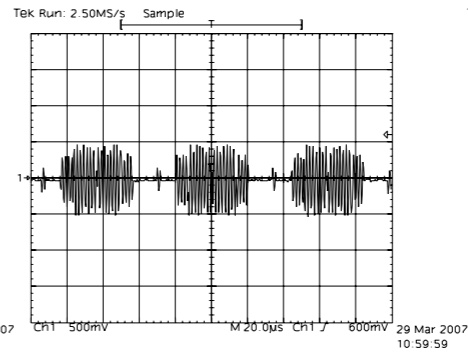
F502\_D\_R



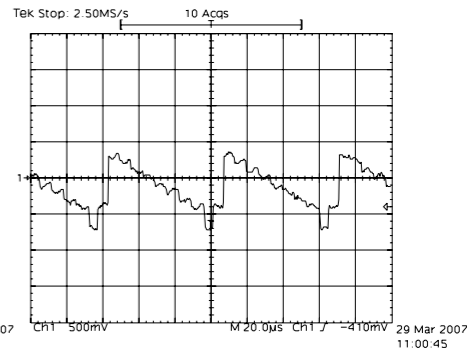
F502\_D\_V



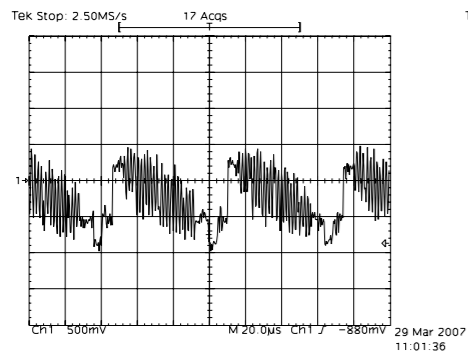
F503\_D\_C



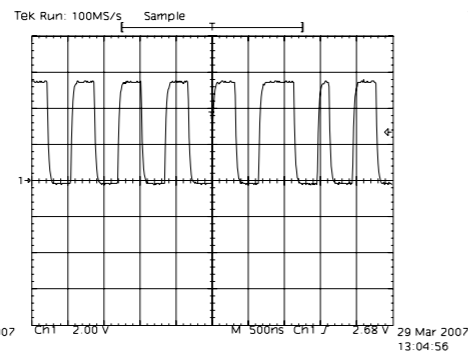
F504\_D\_Y



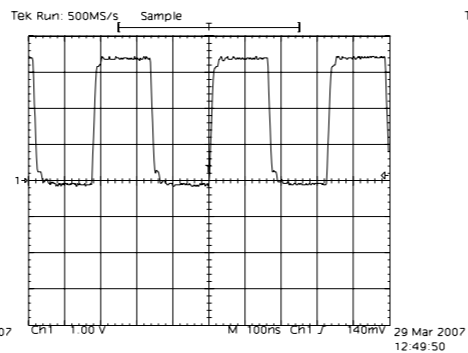
F505\_D\_CVBS



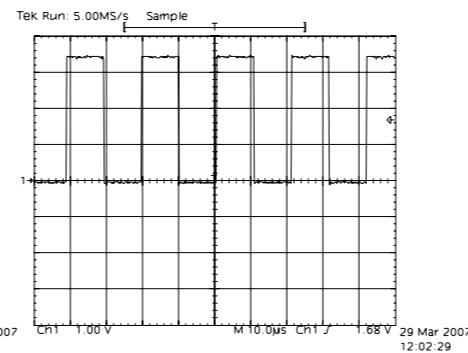
F531\_DAOUT



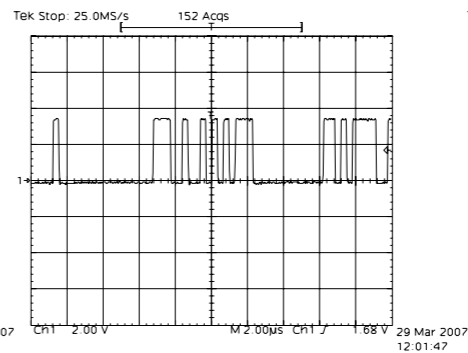
F537\_D\_BCLK



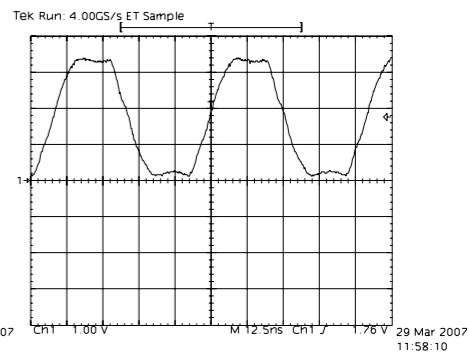
F538\_D\_WCLK



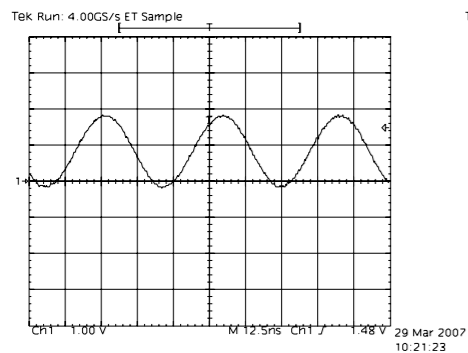
F539\_D\_DATA0



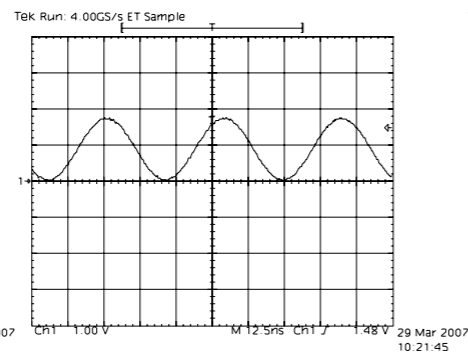
F540\_D\_MCLK



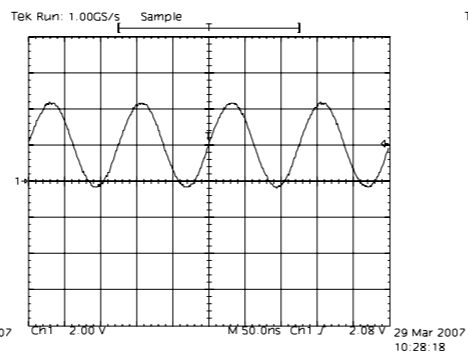
F550 (1504 Top View)



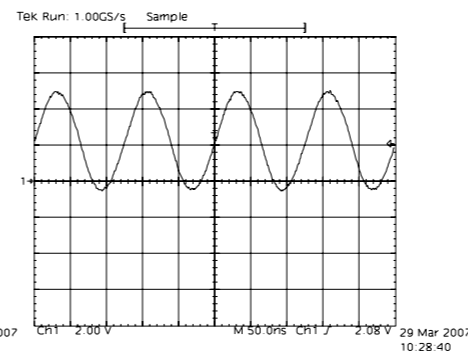
F551 (1504 Top View)



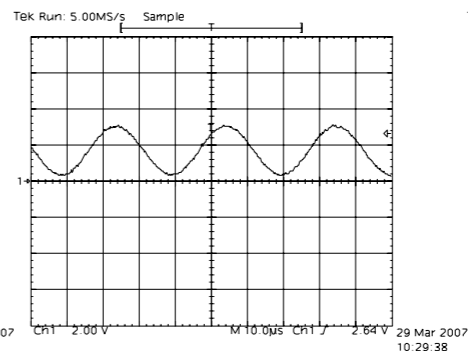
F651 (1605)



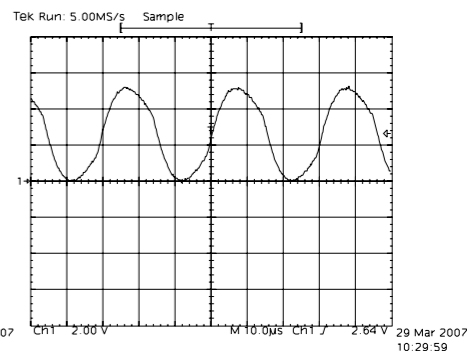
F652 (1605)



F654 (1604)

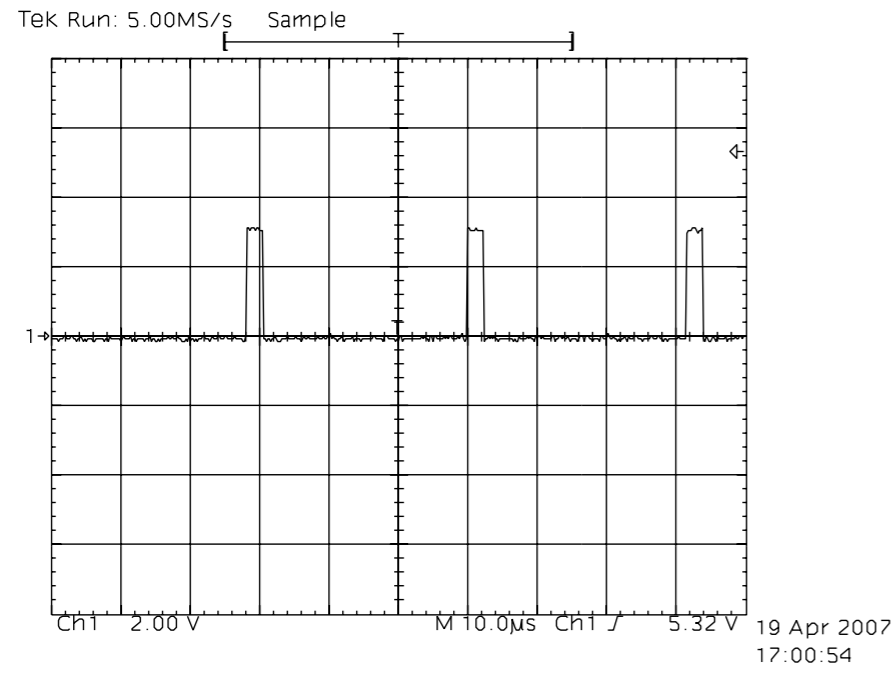


F655 (1604)

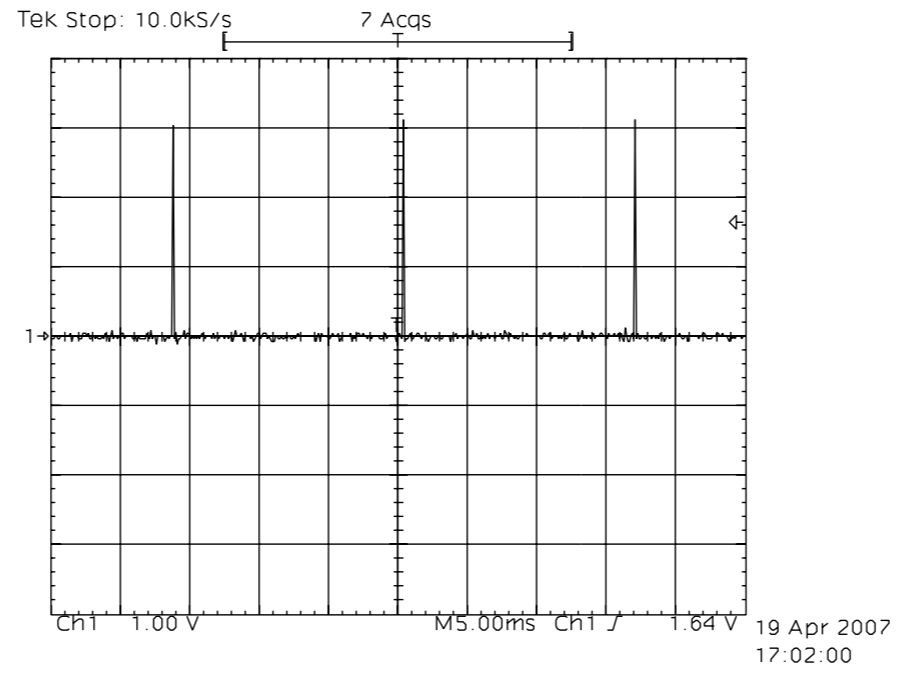


### HDMI Board 3139 248 89141 waveforms

#### F111 HDMI P\_HSYNC

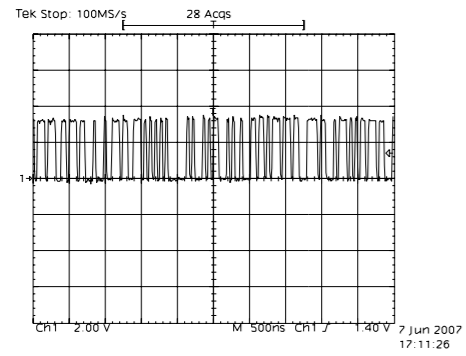


#### F112 HDMI P\_VSYNC

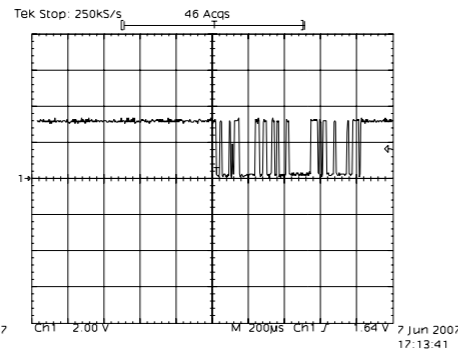


### HDMI Board 3139 248 51901 waveforms

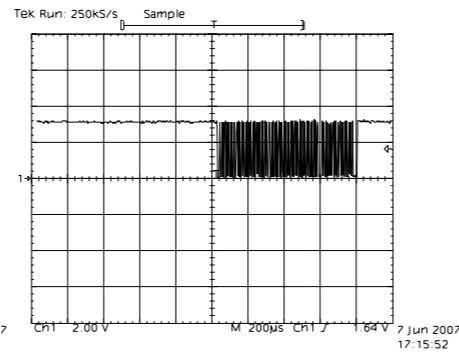
F100 ITU OUT 4



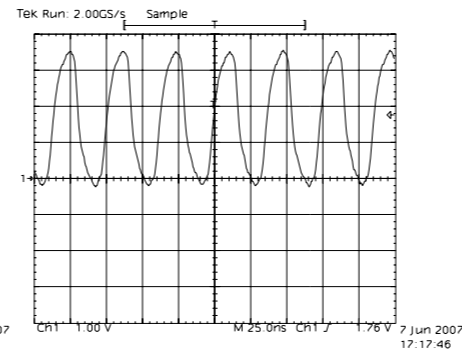
F101 SDA1



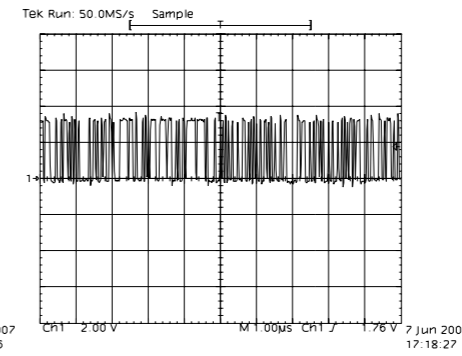
F103 SCL1



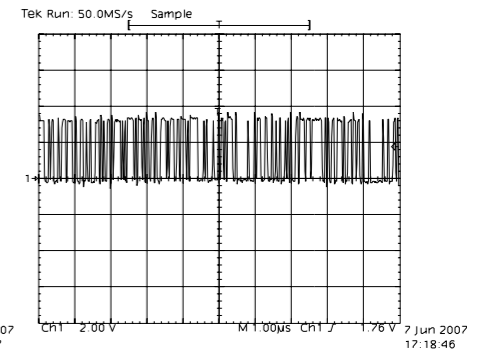
F104 VO CLK



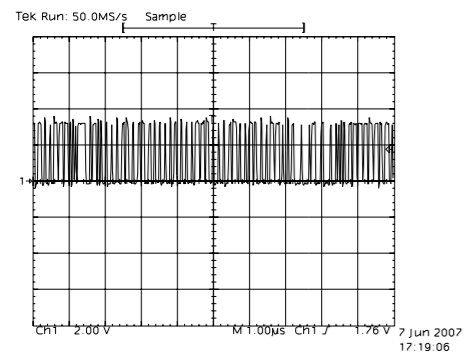
F105 ITU OUT 0



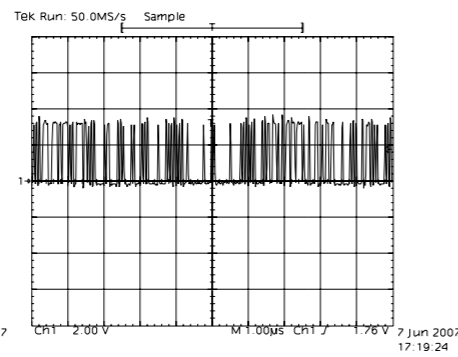
F106 ITU OUT 1



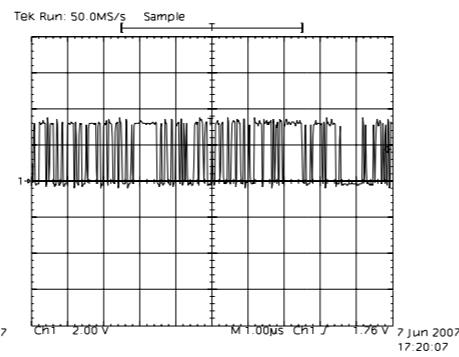
F107 ITU OUT 2



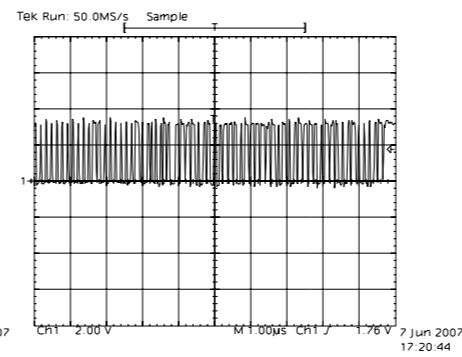
F108 ITU OUT 3



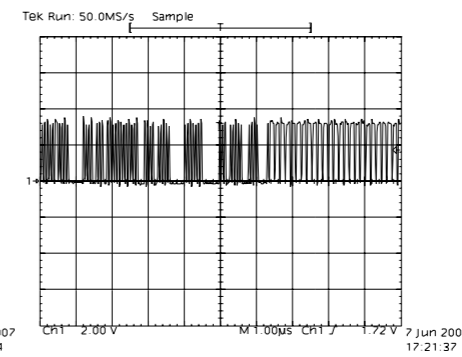
F111 ITU OUT 5



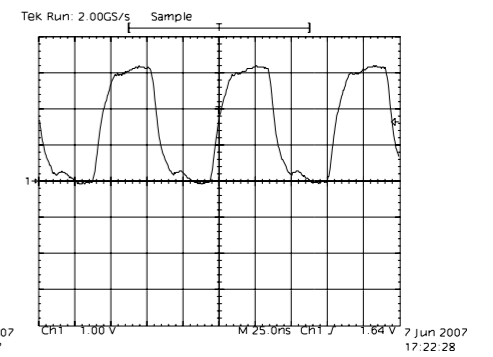
F112 ITU OUT 6



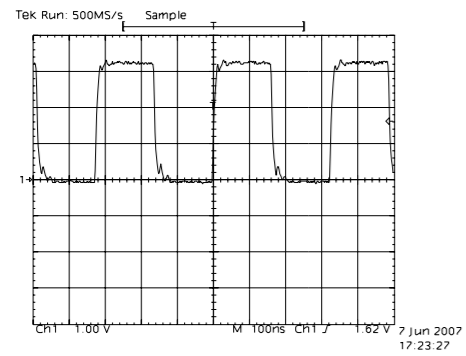
F113 ITU OUT 7



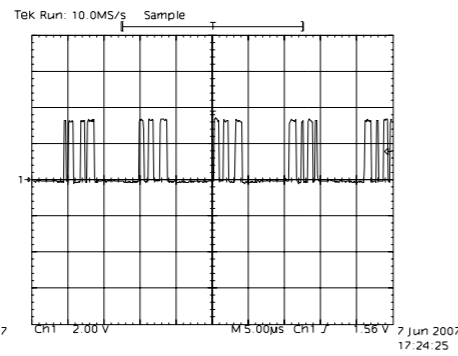
F114 FSCLK12 OUT



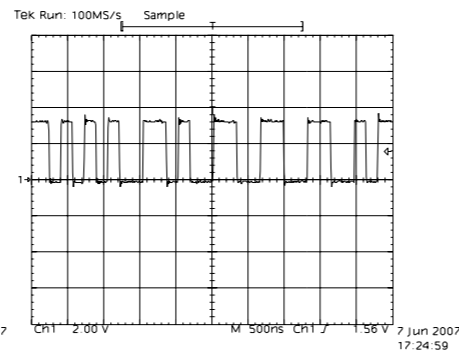
F115 SCLK12 OUT



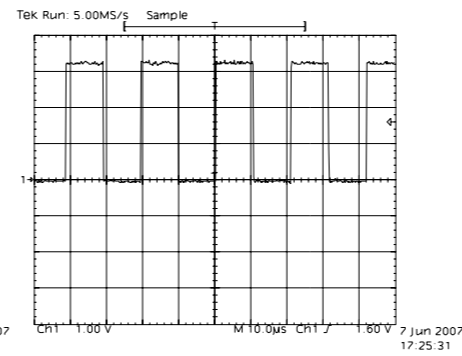
F116 SD OUT



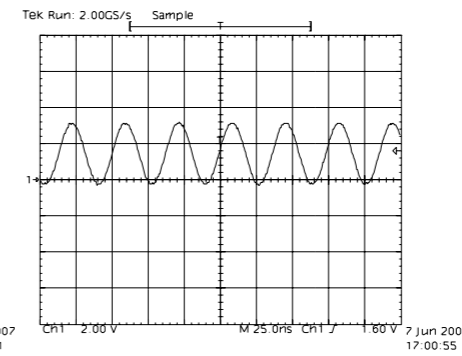
F117 SPDIF OUT



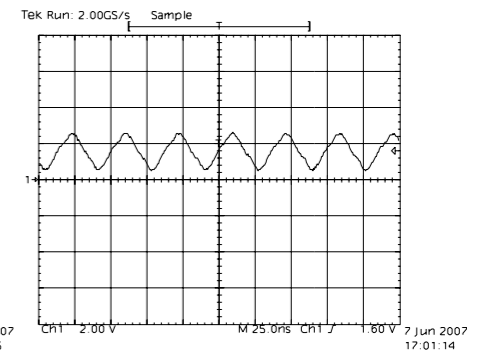
F118 WS12 OUT



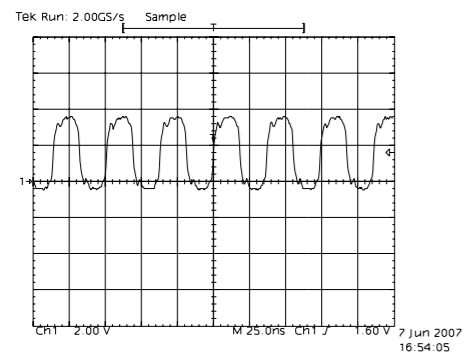
F161 7113-pin2



F162 7113-pin4



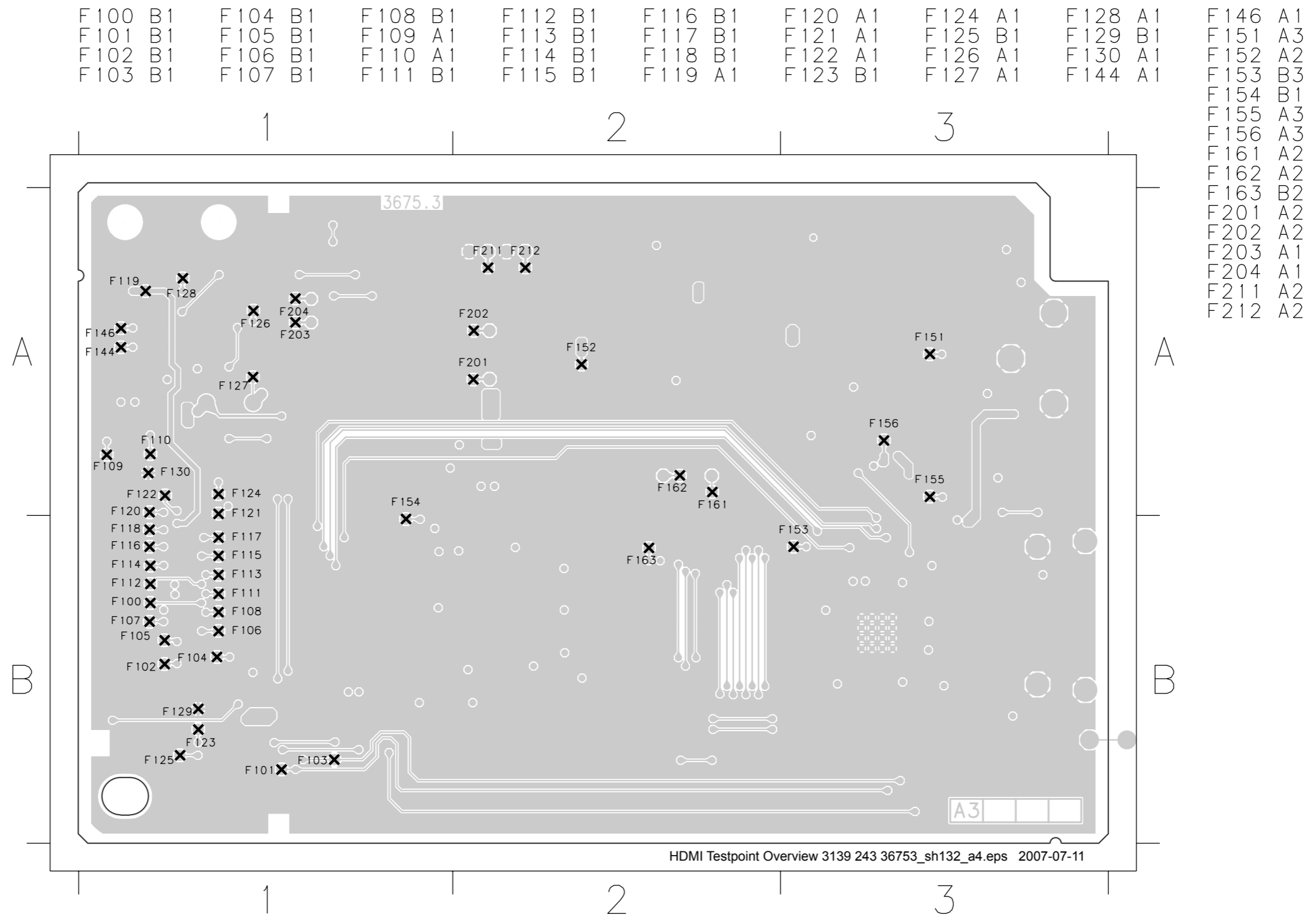
F163 SYS CLK ABT



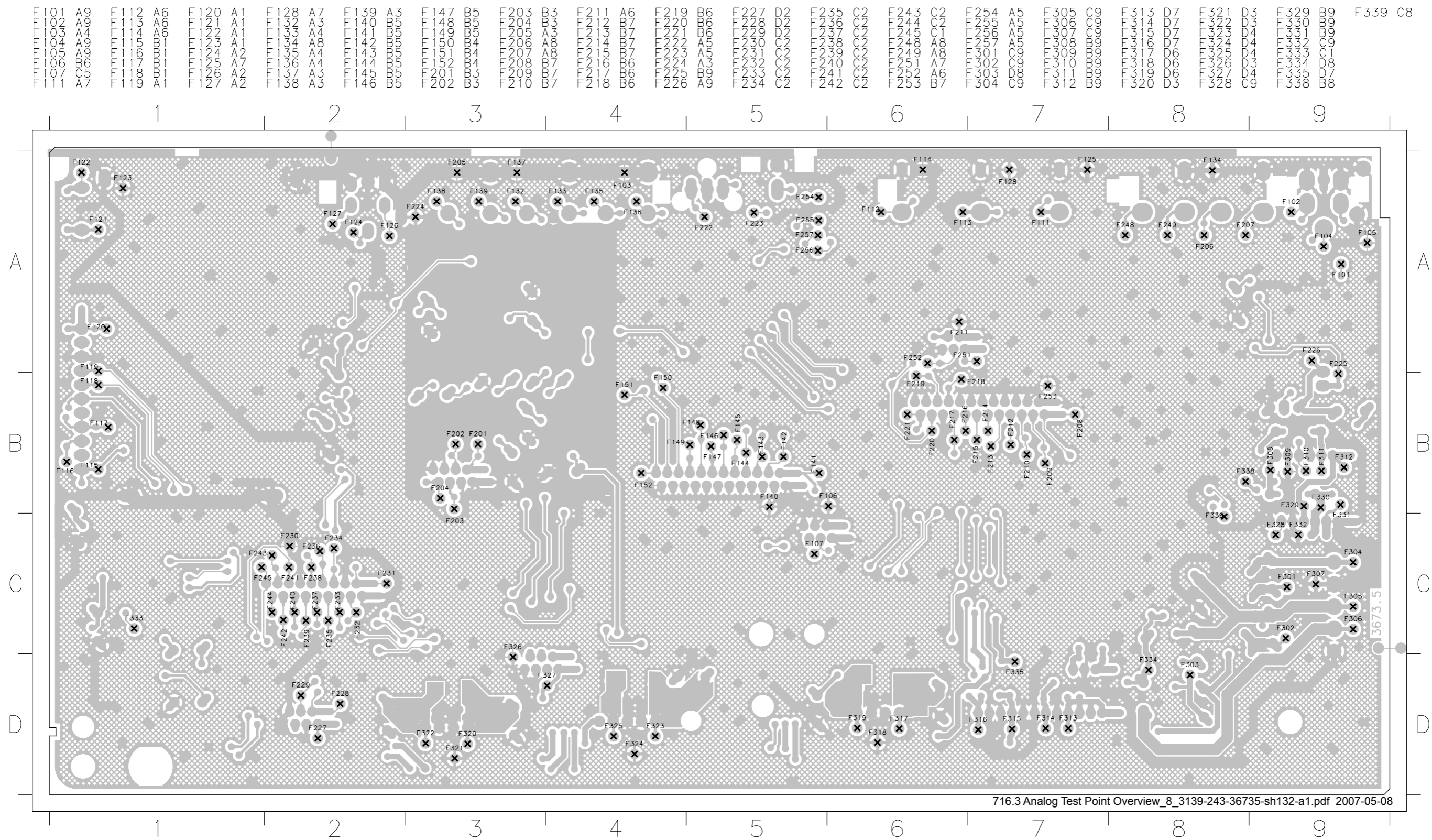




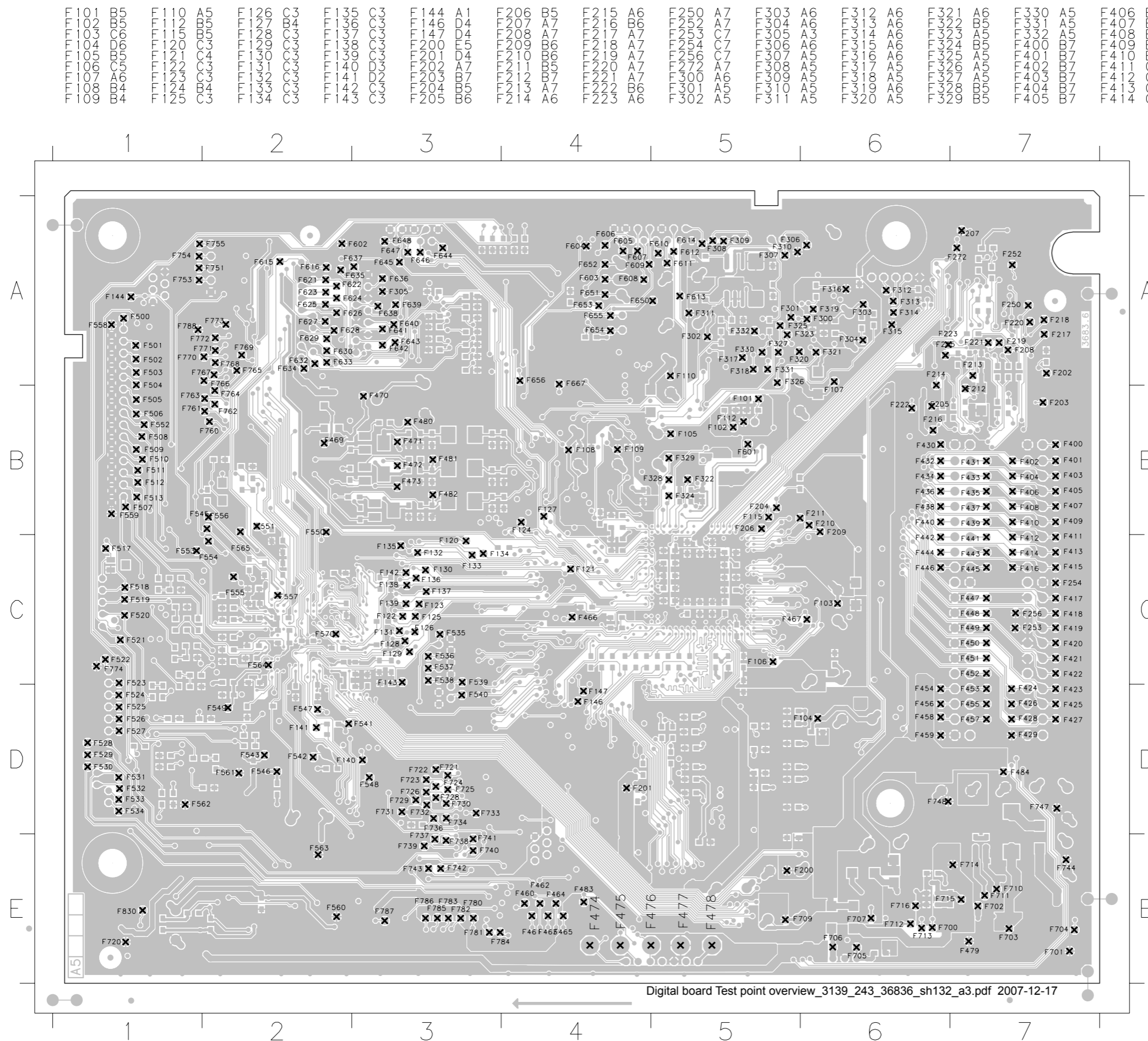
**Test Point Overview for HDMI Board 3139 248 51901**



### Test Points Overview for Analog Board



### Test point overview for Digital Board

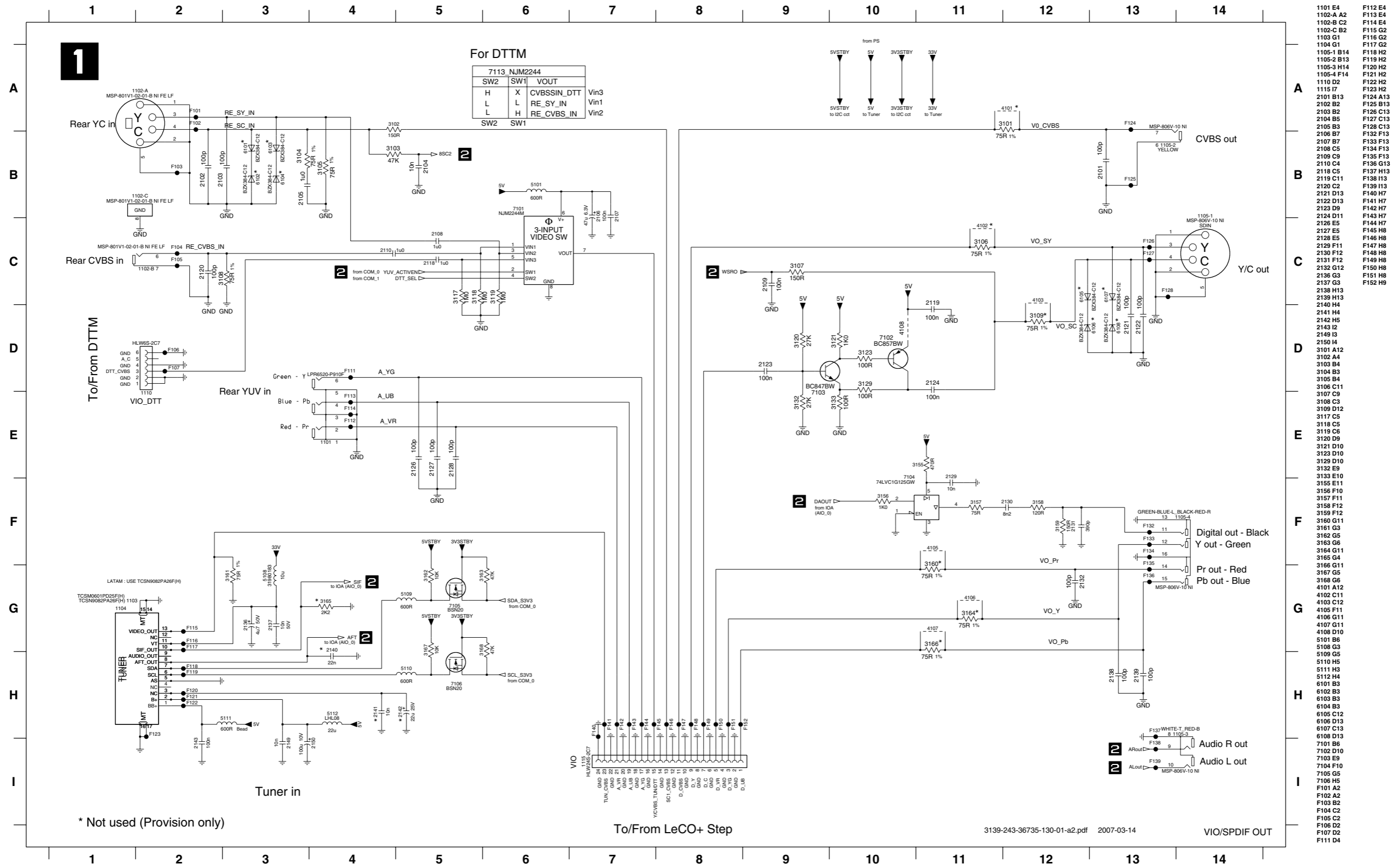


F101	B5	F110	A5	F120	C3	F130	C3	F140	A1	F206	B5	F215	A6	F225	A7	F303	A6	F313	A6	F323	A6	F333	A6	F403	A5	F413	B7
102	B5	111	B5	120	B5	130	C3	140	C3	207	A7	216	B6	226	A7	304	A6	314	A6	324	A6	334	A6	404	B7	414	B7
103	B5	121	C3	131	C3	141	C3	208	A7	217	A7	227	A7	305	A5	315	A5	325	A5	335	A5	405	B7	415	B7	425	B7
104	B5	122	C3	132	C3	142	C3	209	A7	218	A7	228	A7	306	A6	316	A6	326	A6	336	A6	406	B7	416	B7	426	B7
105	B5	123	C3	133	C3	143	C3	210	A7	219	A7	229	A7	307	A5	317	A5	327	A5	337	A5	407	B7	417	B7	427	B7
106	B5	124	C3	134	C3	144	C3	211	A7	220	A7	230	A6	308	A5	318	A5	328	A5	338	A5	408	B7	418	B7	428	B7
107	B5	125	C3	135	C3	145	C3	212	A7	221	A7	231	A6	309	A5	319	A5	329	A5	339	A5	409	B7	419	B7	429	B7
108	B5							213	A7	222	A7	232	A6	310	A5	320	A5	330	A5	400	B7	410	B7	420	B7		
109	B5							214	A6	223	A6	233	A6	311	A5	321	A5	331	A5	401	B7	411	B7	421	B7		

F101	B5	F110	A5	F120	C3	F130	C3	F140	A1	F206	B5	F215	A6	F225	A7	F303	A6	F313	A6	F323	A6	F333	A6	F403	A5	F413	B7
102	B5	111	B5	120	B5	130	C3	140	C3	207	A7	216	B6	226	A7	304	A6	314	A6	324	A6	334	A6	404	B7	414	B7
103	B5	121	C3	131	C3	141	C3	208	A7	217	A7	227	A7	305	A5	315	A5	325	A5	335	A5	405	B7	415	B7	425	B7
104	B5	122	C3	132	C3	142	C3	209	A7	218	A7	228	A7	306	A6	316	A6	326	A6	336	A6	406	B7	416	B7	426	B7
105	B5	123	C3	133	C3	143	C3	210	A7	219	A7	229	A7	307	A5	317	A5	327	A5	337	A5	407	B7	417	B7	427	B7
106	B5	124	C3	134	C3	144	C3	211	A7	220	A7	230	A6	308	A5	318	A5	328	A5	338	A5	408	B7	418	B7	428	B7
107	B5	125	C3	135	C3	145	C3	212	A7	221	A7	231	A6	309	A5	319	A5	329	A5	339	A5	409	B7	419	B7	429	B7
108	B5							213	A7	222	A7	232	A6	310	A5	320	A5	330	A5	400	B7	410	B7	420	B7		
109	B5							214	A6	223	A6	233	A6	311	A5	321	A5	331	A5	401	B7	411	B7	421	B7		

# 7. Circuit Diagrams and PWB Layouts

## Analog: VIO/SPDIF OUT



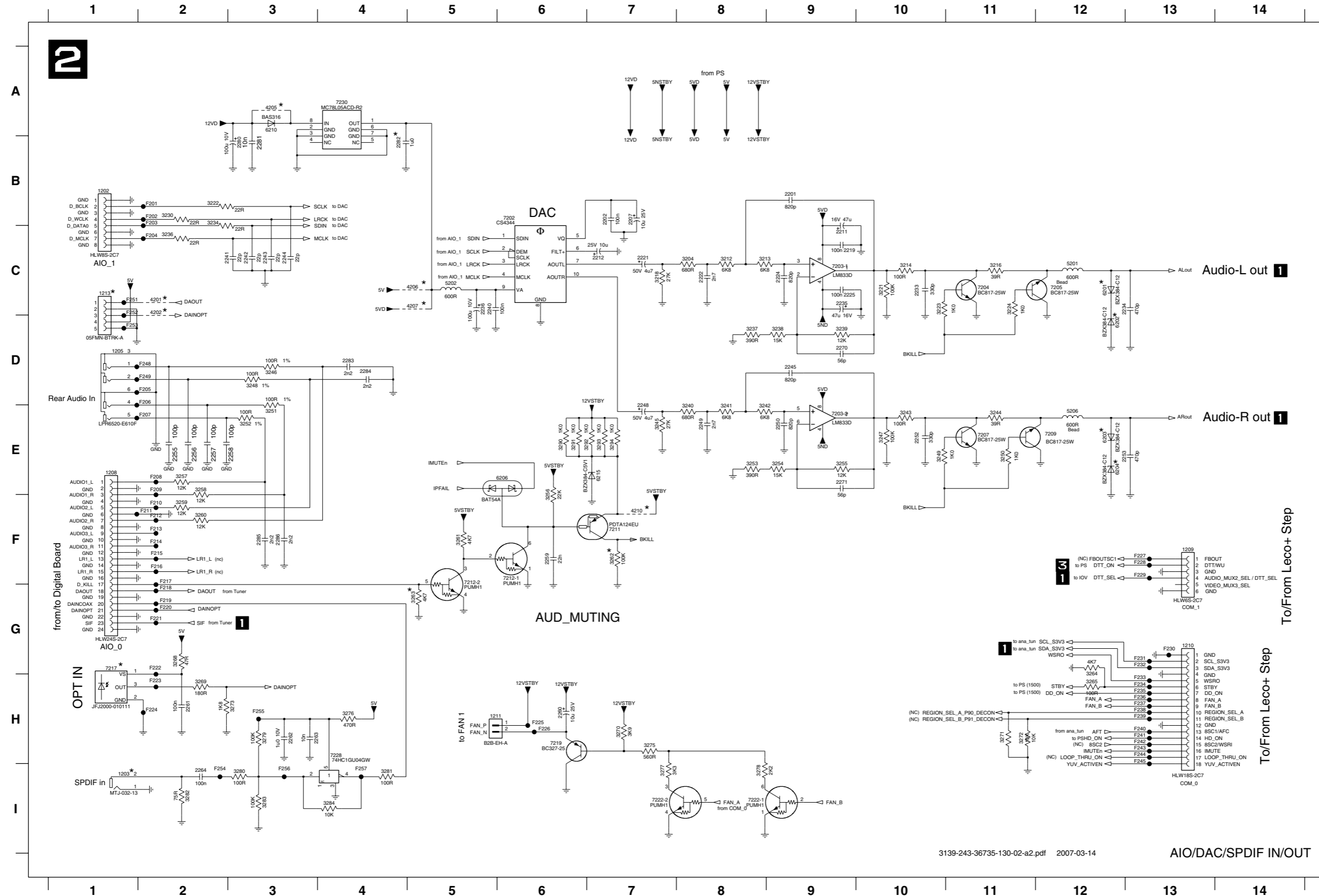
\* Not used (Provision only)

To/From LeCO+ Step

3139-243-36735-130-01-a2.pdf 2007-03-14

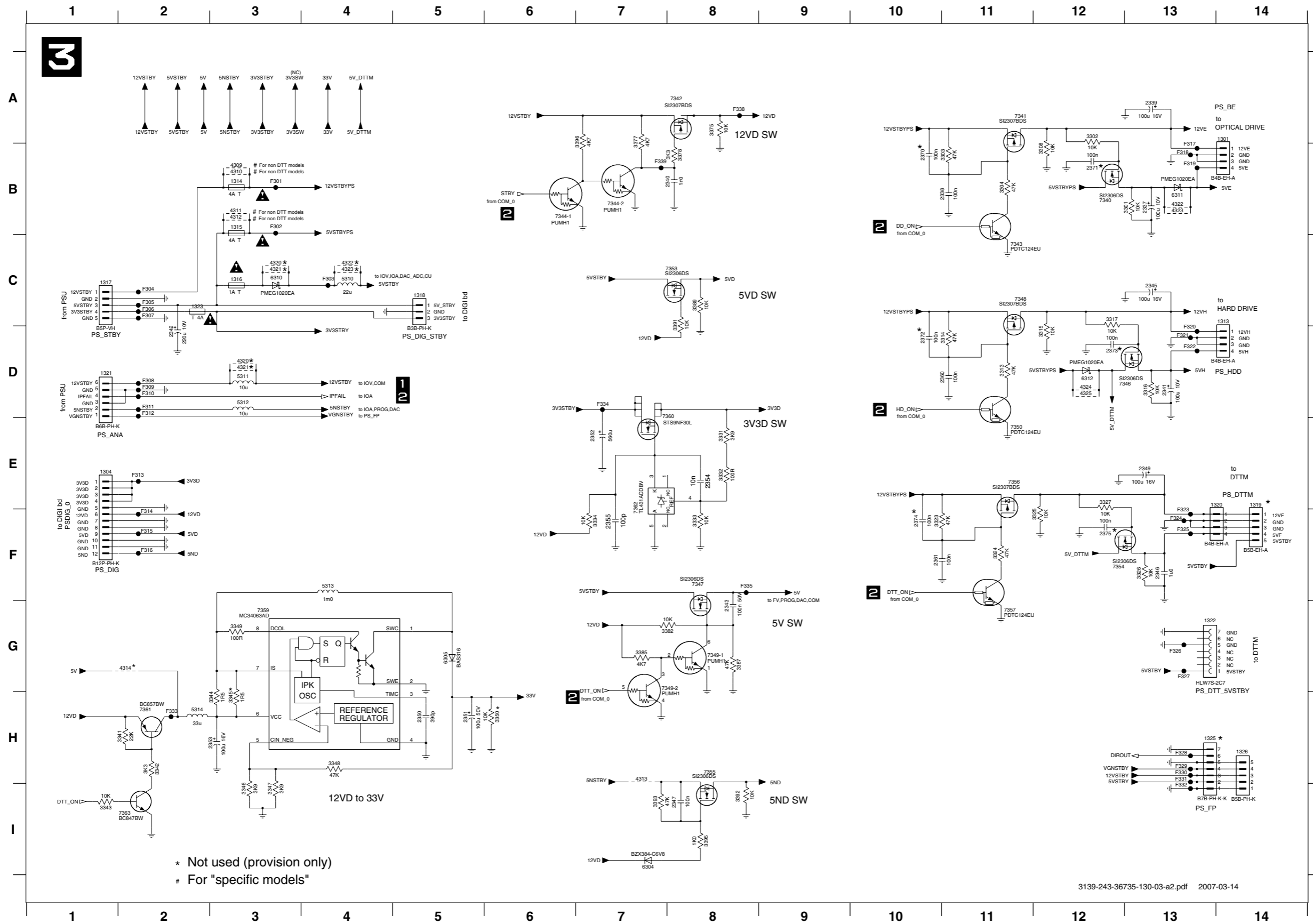
VIO/SPDIF OUT

Analog: AIO/DAC/SPDIF IN/OUT



1202 B1	3293 E7
1203 H1	3294 E7
1205 D1	4201 C2
1208 E1	4202 C2
1209 F13	4205 A3
1210 G13	4206 C5
1211 H5	4207 C5
1213 C1	4210 F7
2201 B9	5201 C12
2202 B7	5202 C5
2207 B7	5206 E12
2211 C9	6201 C12
2212 C7	6202 D12
2219 C9	6203 E12
2221 C7	6204 E12
2222 C8	6206 E6
2224 C9	6210 A3
2225 C9	6215 E7
2233 C10	7202 B6
2234 C13	7203-1 C9
2235 C9	7203-2 E9
2236 C5	7204 C11
2240 C5	7205 C12
2241 C3	7207 E11
2242 C3	7209 E12
2243 C3	7211 F7
2244 C3	7212-1 F6
2245 D9	7212-2 F5
2248 E7	7217 G1
2249 E8	7219 H6
2250 E9	7222-1 I8
2252 E10	7222-2 I7
2253 E13	7228 H4
2255 E2	7230 A4
2256 E2	F201 B2
2257 E2	F202 E2
2258 E3	F203 B2
2259 F6	F204 C2
2260 H6	F205 D2
2261 H2	F206 D2
2262 H3	F207 E2
2263 H3	F208 E2
2264 I2	F209 E2
2270 D9	F210 F2
2271 E9	F211 F2
2280 B3	F212 F2
2281 B3	F213 F2
2282 B4	F214 F2
2283 D4	F215 F2
2284 D4	F216 F2
2285 F3	F217 F2
2286 F3	F218 G2
3204 C8	F219 G2
3212 C8	F220 G2
3213 C8	F221 G2
3214 C10	F222 G2
3216 C11	F223 H2
3218 C7	F224 H2
3221 C10	F225 H6
3222 B2	F226 H6
3223 C10	F227 F13
3224 C11	F228 F13
3230 B2	F229 F13
3234 B2	F230 G13
3236 C2	F231 G13
3237 D8	F232 G13
3238 D9	F233 H13
3239 D9	F234 H13
3240 E8	F235 H13
3241 E8	F236 H13
3242 E8	F237 H13
3243 E10	F238 H13
3244 E11	F239 H13
3245 E7	F240 H13
3246 D3	F241 H13
3247 E10	F242 H13
3248 D3	F243 H13
3249 E10	F244 H13
3250 E11	F245 H13
3251 E3	F248 D2
3252 E3	F249 D2
3253 E8	F251 C1
3254 E9	F252 C1
3255 E9	F253 D1
3256 F6	F254 I2
3257 E2	F255 H3
3258 E2	F256 I3
3259 F2	F257 I4
3260 F2	
3261 F5	
3262 F7	
3263 G5	
3264 G12	
3265 H12	
3268 G2	
3269 H2	
3270 H7	
3271 H11	
3272 H11	
3273 H3	
3274 H4	
3275 H7	
3276 H4	
3277 H7	
3278 I8	
3279 H3	
3280 I3	
3281 I4	
3282 I2	
3283 I3	
3284 I4	
3290 E6	
3291 E6	
3292 E7	

Analog: Power Supply (PS)

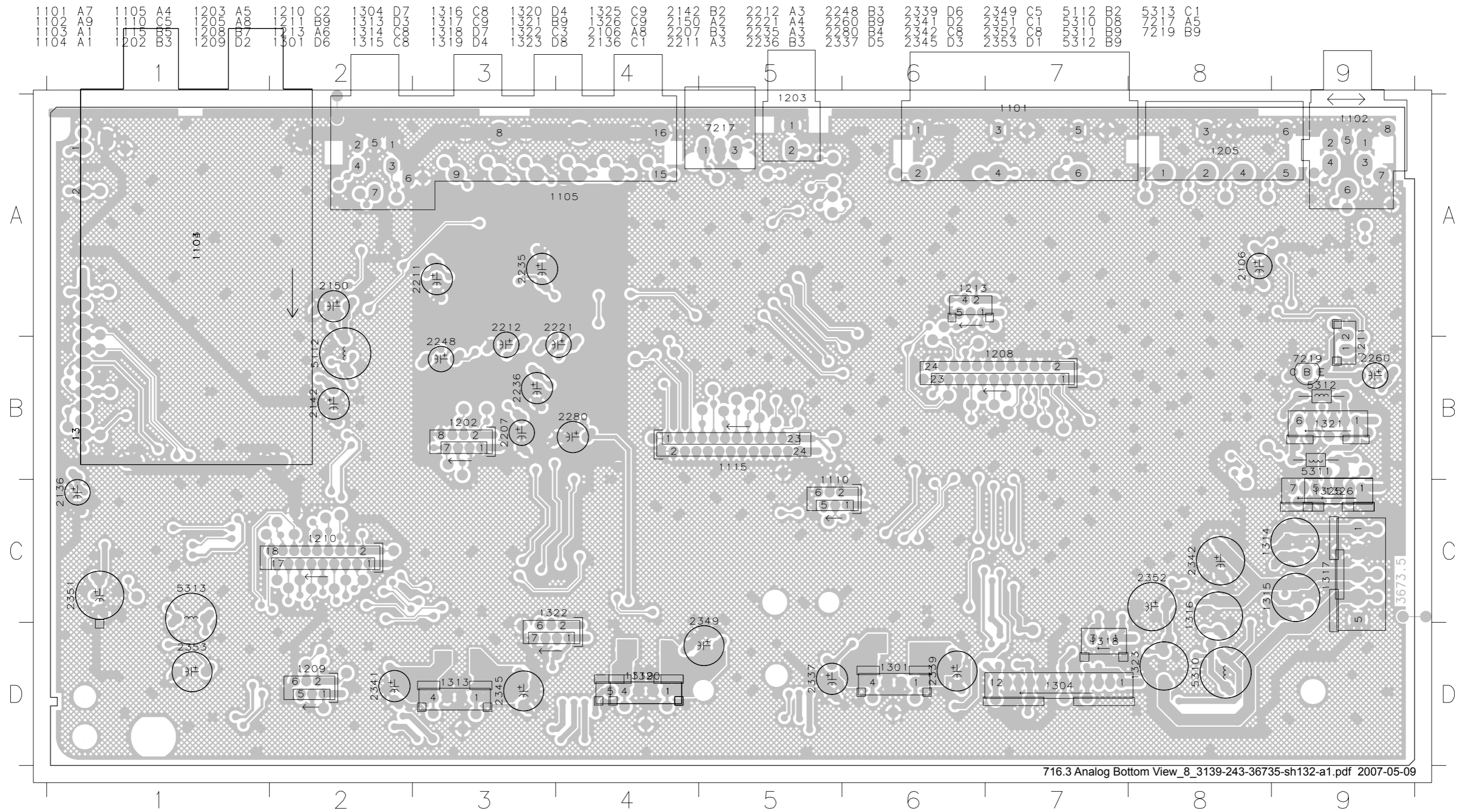


\* Not used (provision only)  
# For "specific models"

1301 A14	7347 F8
1304 E1	7348 C11
1313 C14	7349-1 G8
1314 B3	7349-2 G7
1315 B3	7350 E11
1316 C3	7353 C7
1317 C1	7354 F12
1318 C5	7355 H8
1319 E14	7356 E11
1320 E14	7357 G11
1321 D1	7359 G3
1322 G13	7360 E7
1323 C2	7361 H2
1325 H13	7362 F7
1326 H14	7363 I2
2337 B13	F301 B3
2338 B11	F302 B3
2339 A13	F303 C4
2340 B7	F304 C2
2341 D13	F305 C2
2342 D2	F306 C2
2343 G8	F307 C2
2345 C13	F308 D2
2346 F13	F309 D2
2347 I8	F310 D2
2349 E13	F311 D2
2349 H5	F312 D2
2351 H5	F313 E2
2352 E7	F314 F2
2353 H3	F315 F2
2354 E8	F316 F2
2355 F7	F317 B13
2360 D11	F318 B13
2361 F10	F319 B13
2370 B10	F320 D13
2371 B12	F321 D13
2372 D10	F322 D13
2373 D12	F323 F13
2374 F10	F324 F13
2375 F12	F325 F13
3301 B13	F326 G13
3302 A12	F327 G13
3303 B11	F328 H13
3304 B11	F329 H13
3308 B12	F330 H13
3313 D11	F331 H13
3314 D11	F332 H13
3315 D12	F333 H2
3316 D12	F334 D7
3317 C13	F335 F8
3323 F10	F338 A8
3324 F11	F339 B7
3325 F12	
3326 F13	
3327 E12	
3331 E8	
3332 E8	
3333 F8	
3334 F7	
3341 H2	
3342 H2	
3343 I1	
3344 H3	
3345 H3	
3346 I3	
3347 I3	
3348 H4	
3349 G3	
3350 H6	
3375 A8	
3377 A7	
3378 B8	
3382 G8	
3385 G7	
3387 G8	
3389 C8	
3391 C8	
3392 I8	
3393 I7	
3396 I8	
3396 A7	
4309 B3	
4310 B3	
4311 B3	
4312 B3	
4313 H7	
4314 G2	
4320 C3	
4320 D3	
4321 C3	
4321 D3	
4322 B13	
4323 C4	
4323 C4	
4324 D12	
4325 D12	
5310 C4	
5311 D3	
5312 D3	
5313 F4	
5314 H2	
6304 I7	
6305 G5	
6310 C3	
6311 B13	
6312 D12	
7340 B12	
7341 A11	
7342 A8	
7343 C11	
7344-1 B6	
7344-2 B7	
7346 D12	

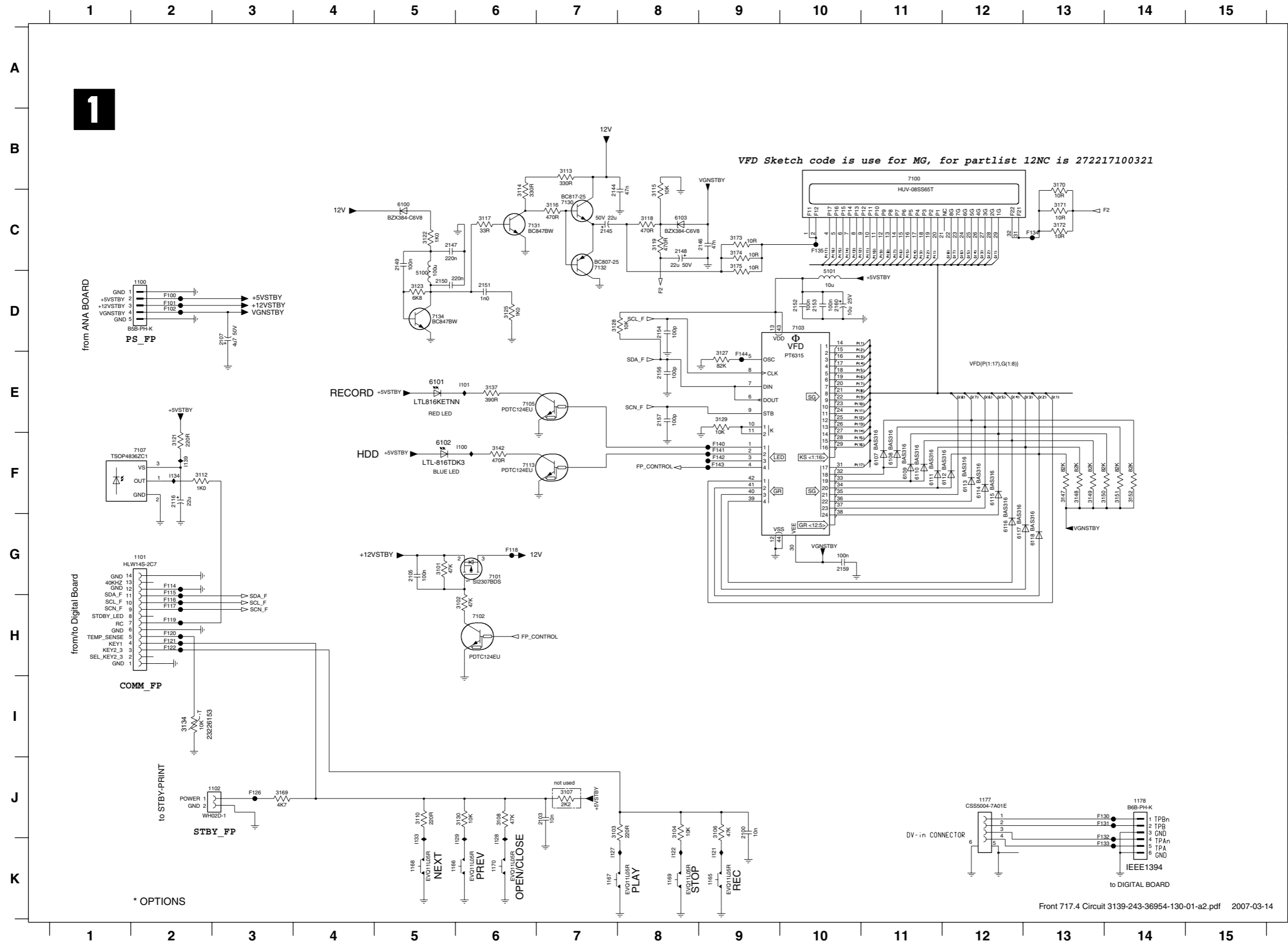


Layout: Analog Bottom View





Front: Display Part (DISP)

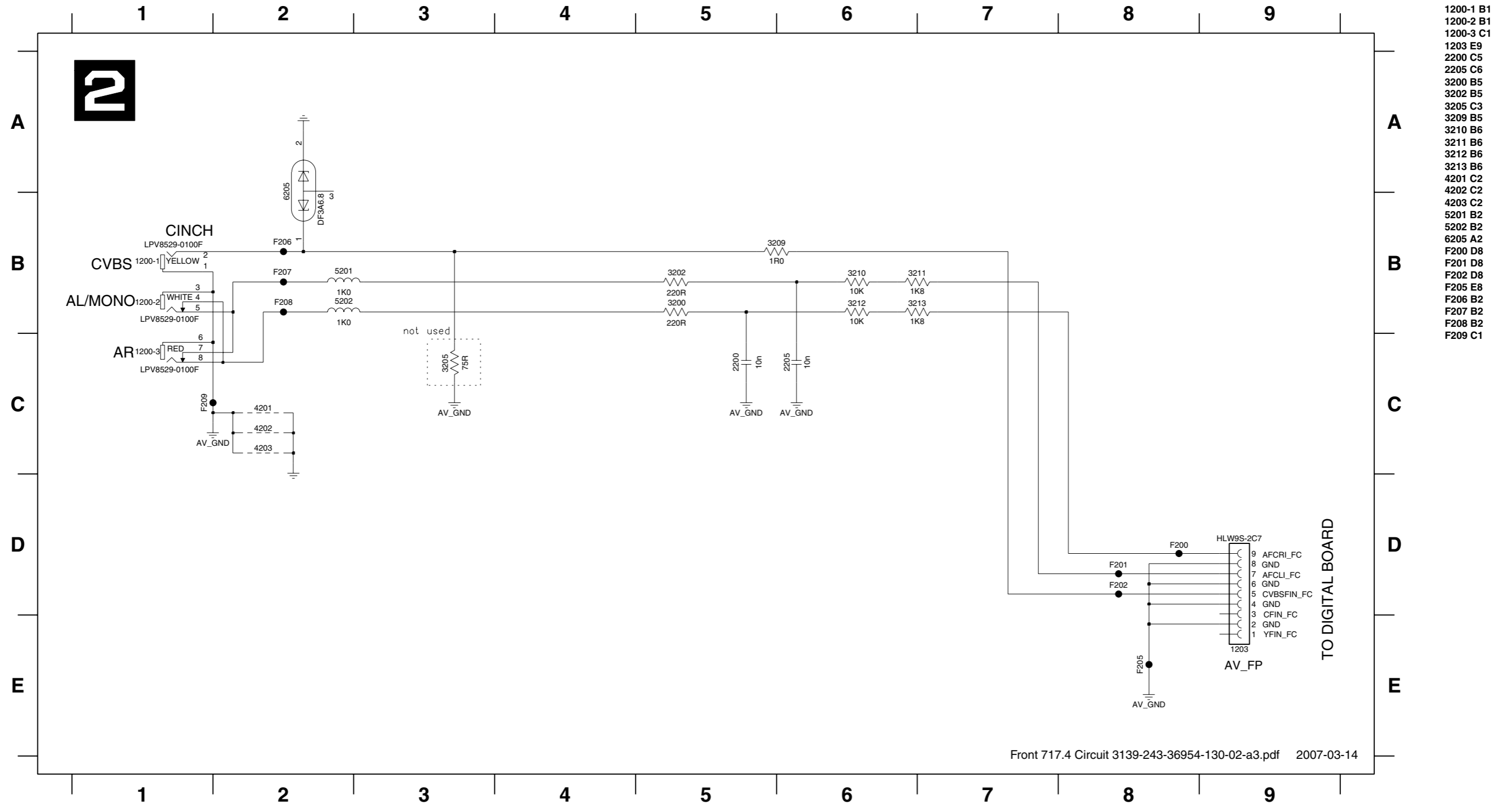


- 1100 D2
- 1101 G2
- 1102 J3
- 1165 K9
- 1166 K5
- 1167 K7
- 1168 K5
- 1169 K8
- 1170 K6
- 1177 J12
- 1178 J14
- 2100 J9
- 2103 J7
- 2105 G5
- 2107 D3
- 2116 F2
- 2144 C7
- 2145 C7
- 2146 C8
- 2147 C5
- 2148 C8
- 2149 C5
- 2150 D5
- 2151 D6
- 2152 D10
- 2153 D10
- 2154 D8
- 2156 E8
- 2157 E8
- 2159 G10
- 2160 D10
- 3101 G5
- 3102 H6
- 3103 J7
- 3104 J8
- 3106 J9
- 3107 J7
- 3108 J6
- 3110 J5
- 3112 F2
- 3113 B7
- 3114 C6
- 3115 C8
- 3116 C7
- 3117 C6
- 3118 C8
- 3119 C8
- 3121 F2
- 3122 C5
- 3123 D5
- 3125 D6
- 3127 D9
- 3128 D7
- 3129 E9
- 3130 J6
- 3134 J2
- 3137 E6
- 3142 F6
- 3147 F13
- 3148 F13
- 3149 F13
- 3150 F14
- 3151 F14
- 3152 F14
- 3169 J3
- 3170 B13
- 3171 C13
- 3172 C13
- 3173 C9
- 3174 C9
- 3175 C9
- 5100 D5
- 5101 D10
- 6100 C5
- 6101 E5
- 6102 F5
- 6103 C8
- 6107 F11
- 6108 F11
- 6109 F11
- 6110 F11
- 6111 F11
- 6112 F12
- 6113 F12
- 6114 F12
- 6115 F12
- 6116 G12
- 6117 G12
- 6118 G13
- 7100 B11
- 7101 G6
- 7102 H6
- 7103 D10
- 7105 E6
- 7107 F2
- 7113 F6
- 7130 C7
- 7131 C6
- 7132 C7
- F100 D2
- F101 D2
- F102 D2
- F114 G2
- F115 G2
- F116 H2
- F117 H2
- F118 G6
- F119 H2
- F120 H2
- F121 H2
- F122 H2
- F126 J3
- F130 J13
- F131 J13
- F132 K13
- F133 K13
- F134 C13
- F135 C10
- F140 F9
- F141 F9
- F142 F9
- F143 F9
- F144 E9
- I100 F6
- I101 E6
- I121 K9
- I122 K8
- I127 K7
- I128 K6
- I129 K6
- I133 K5
- I134 F2
- I139 F2

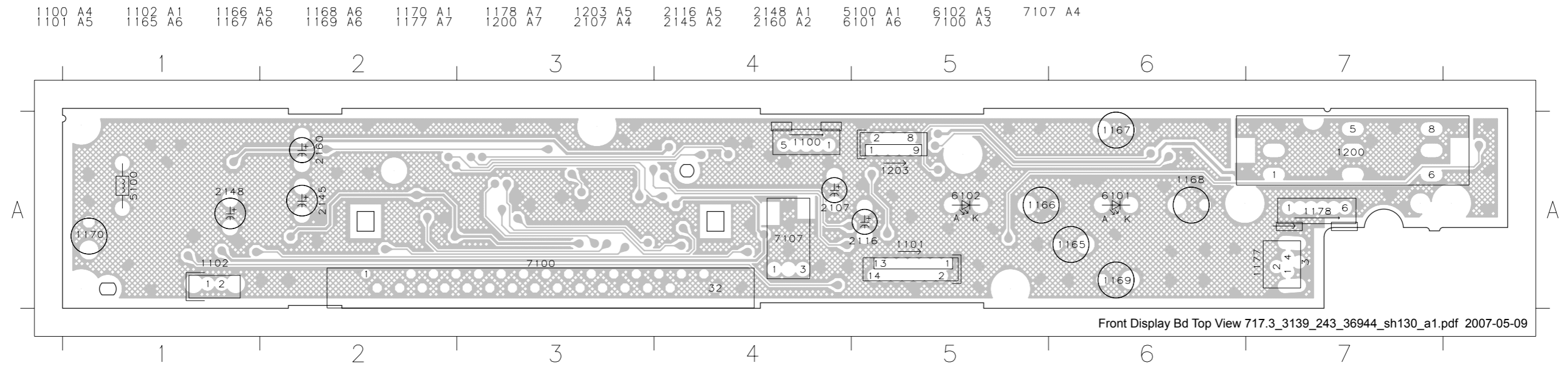


\* OPTIONS

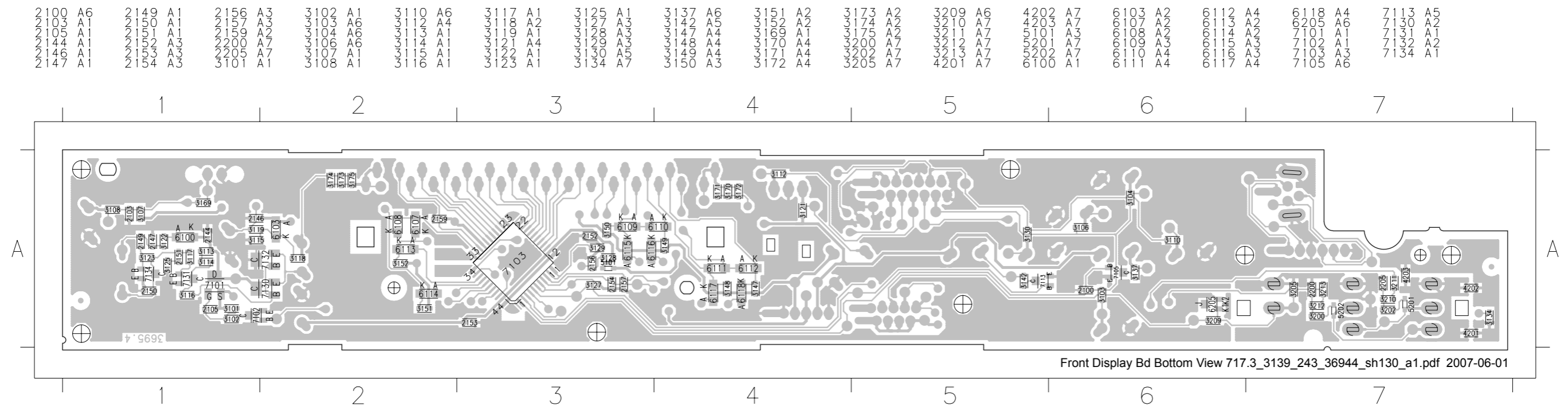
Front: Front Connector Part (FC)



### Layout: Display / Front Connector (Top View)

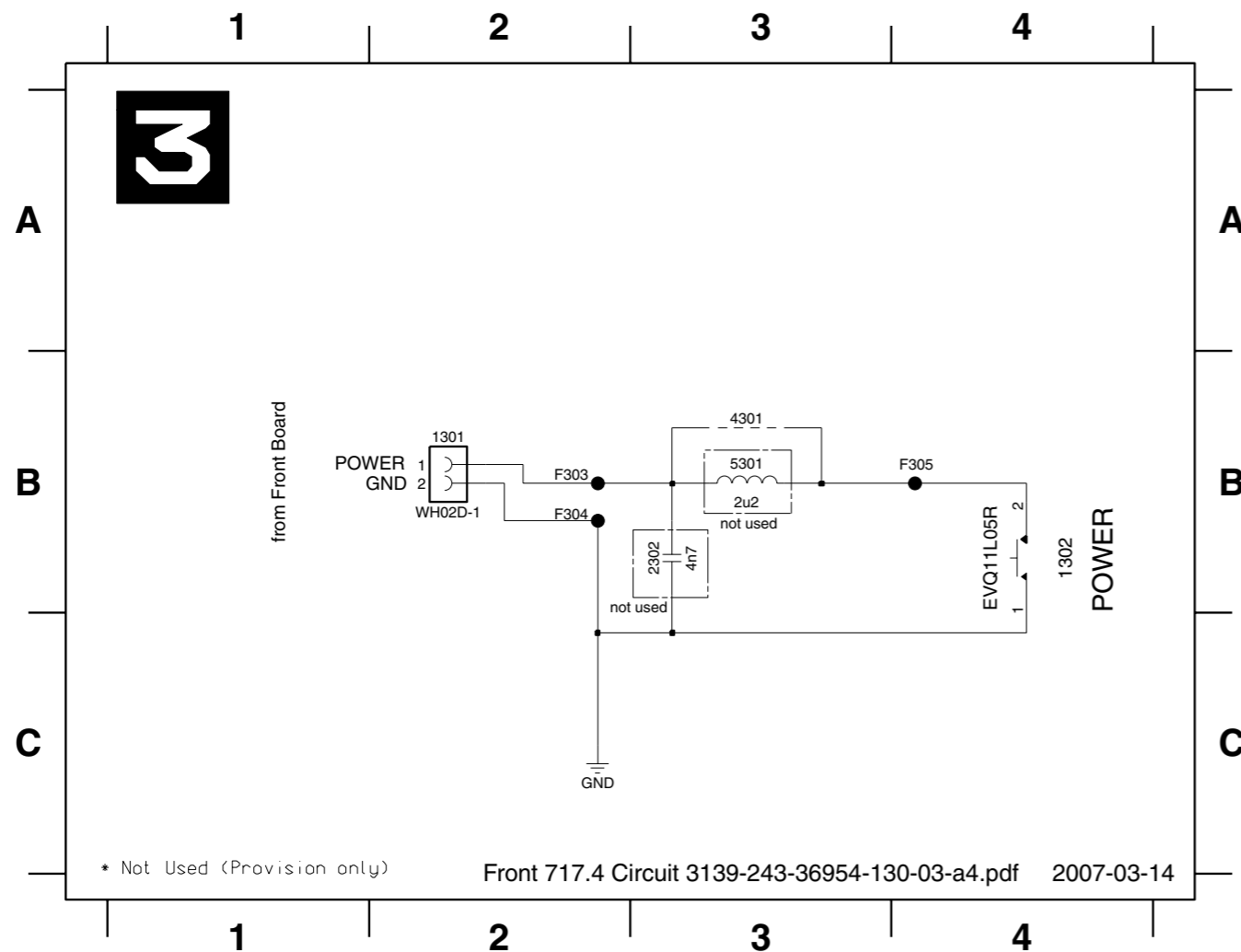


### Layout: Display / Front Connector (Bottom View)



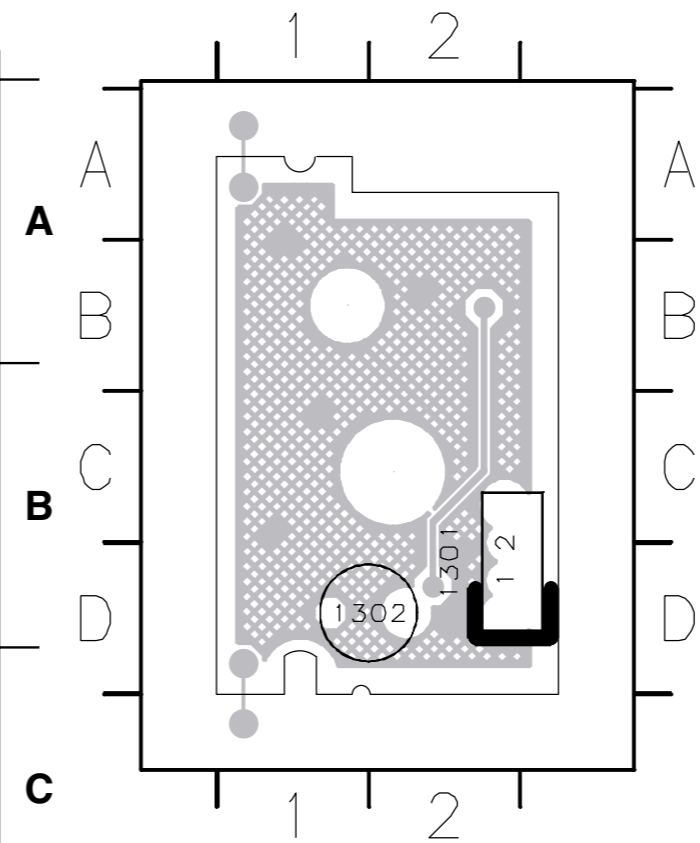
Front: Standby (STBY)

1301 B2 1302 B4 2302 B3 4301 B3 5301 B3 F303 B2 F304 B2 F305 B4



Layout: Standby (STBY) (Top View)

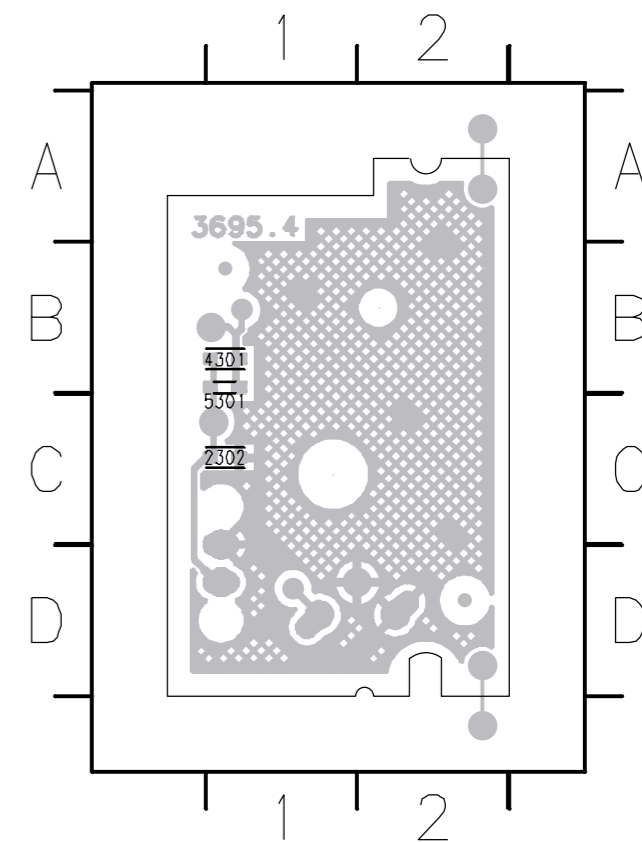
1301 D2 1302 D1



Front Standby Top\_3139-243-36934-132-a1.pdf 2007-05-10

Layout: Standby (STBY) (Bottom View)

2302 C1 5301 C1  
4301 B1



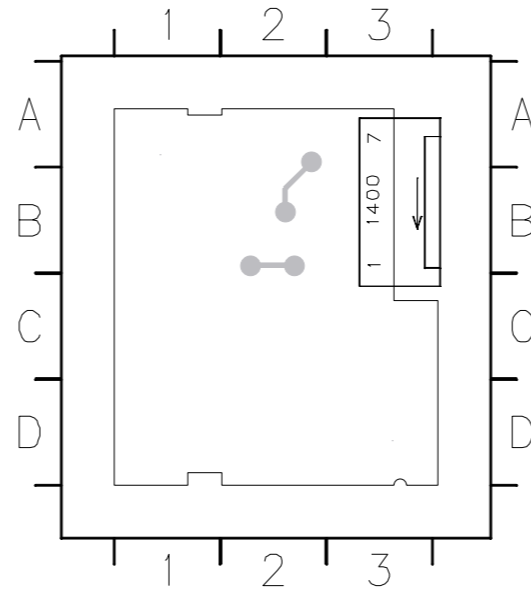
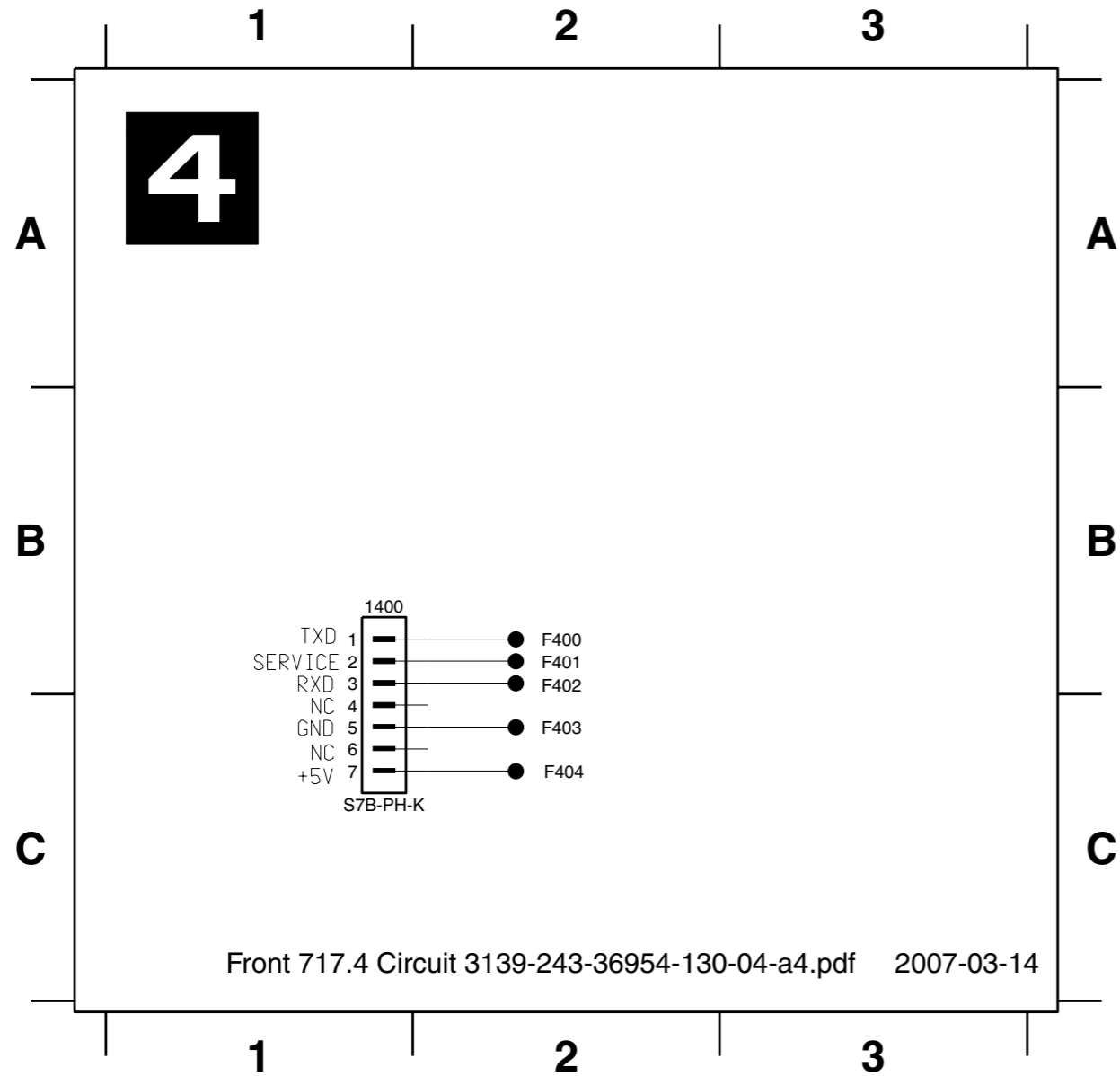
Front Standby Bot\_3139-243-36934-132-a1.pdf 2007-05-10

LecoPlus INIT

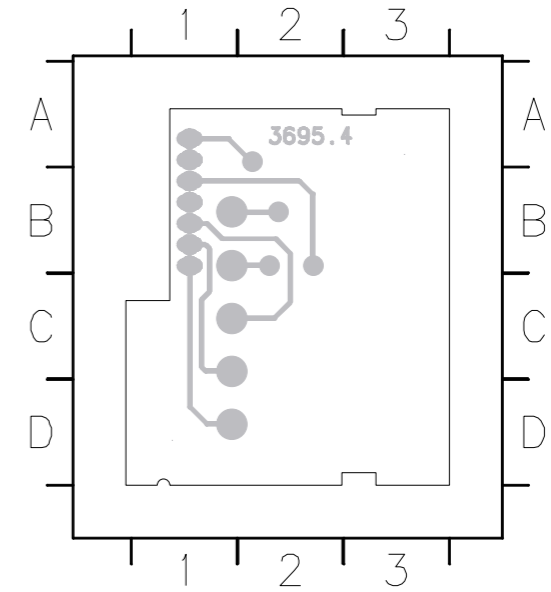
Layout: LecoPlus INIT (Top View)

Layout: LecoPlus INIT (Bottom View)

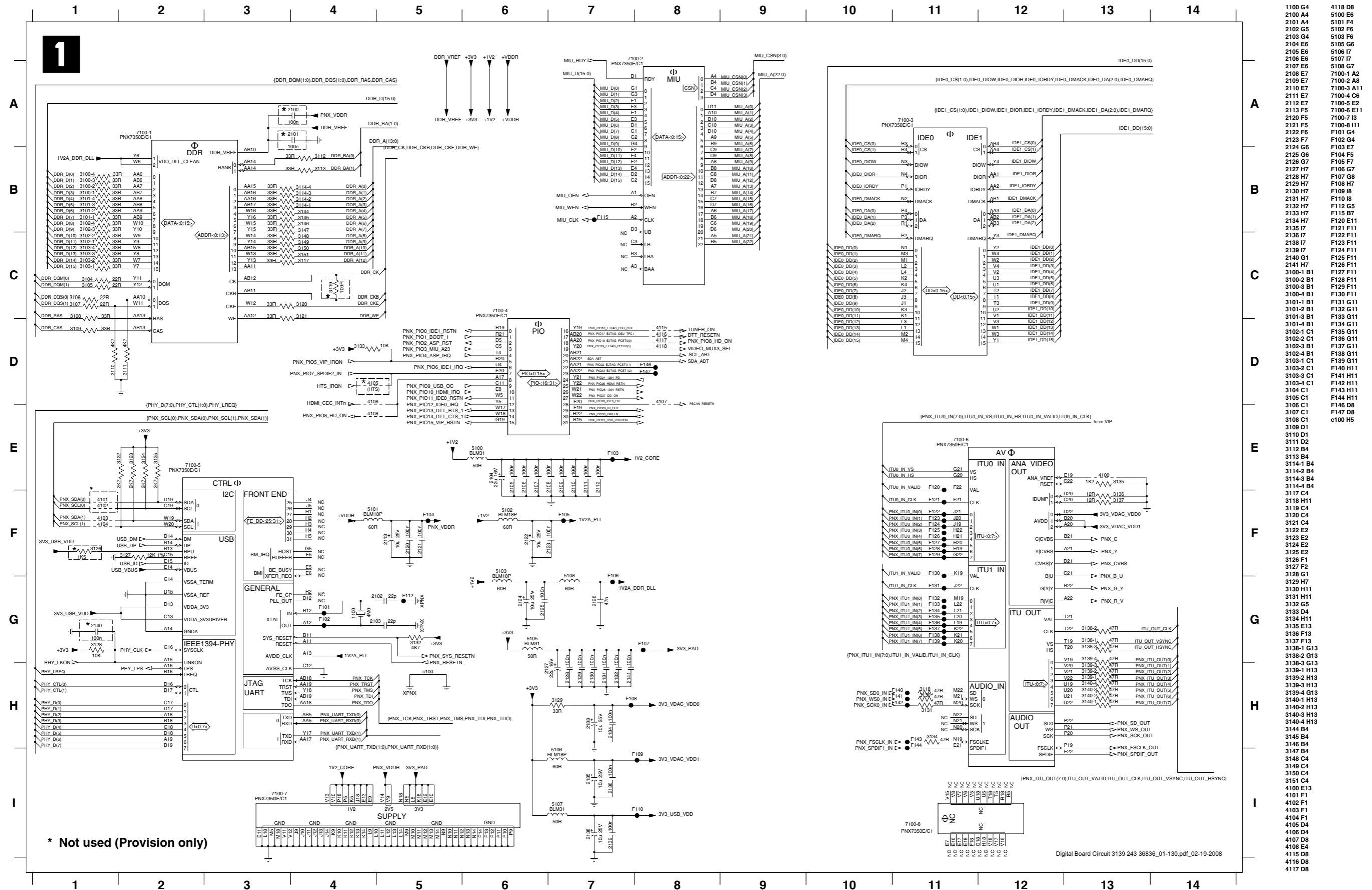
1400 B1 F400 B2 F401 B2 F402 B2 F403 C2 F404 C2



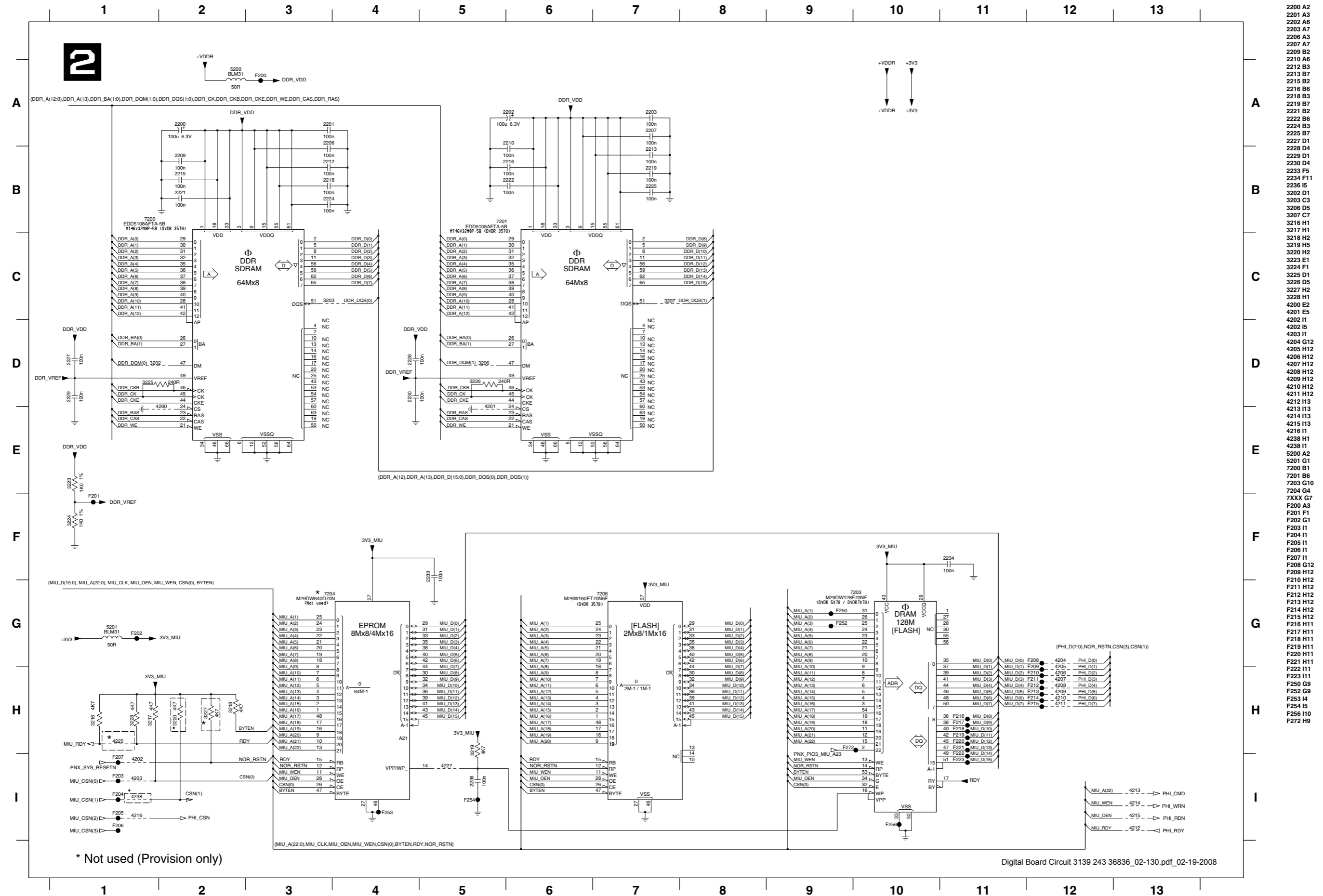
1400 B3



Digital: LeCoplus (LECO)

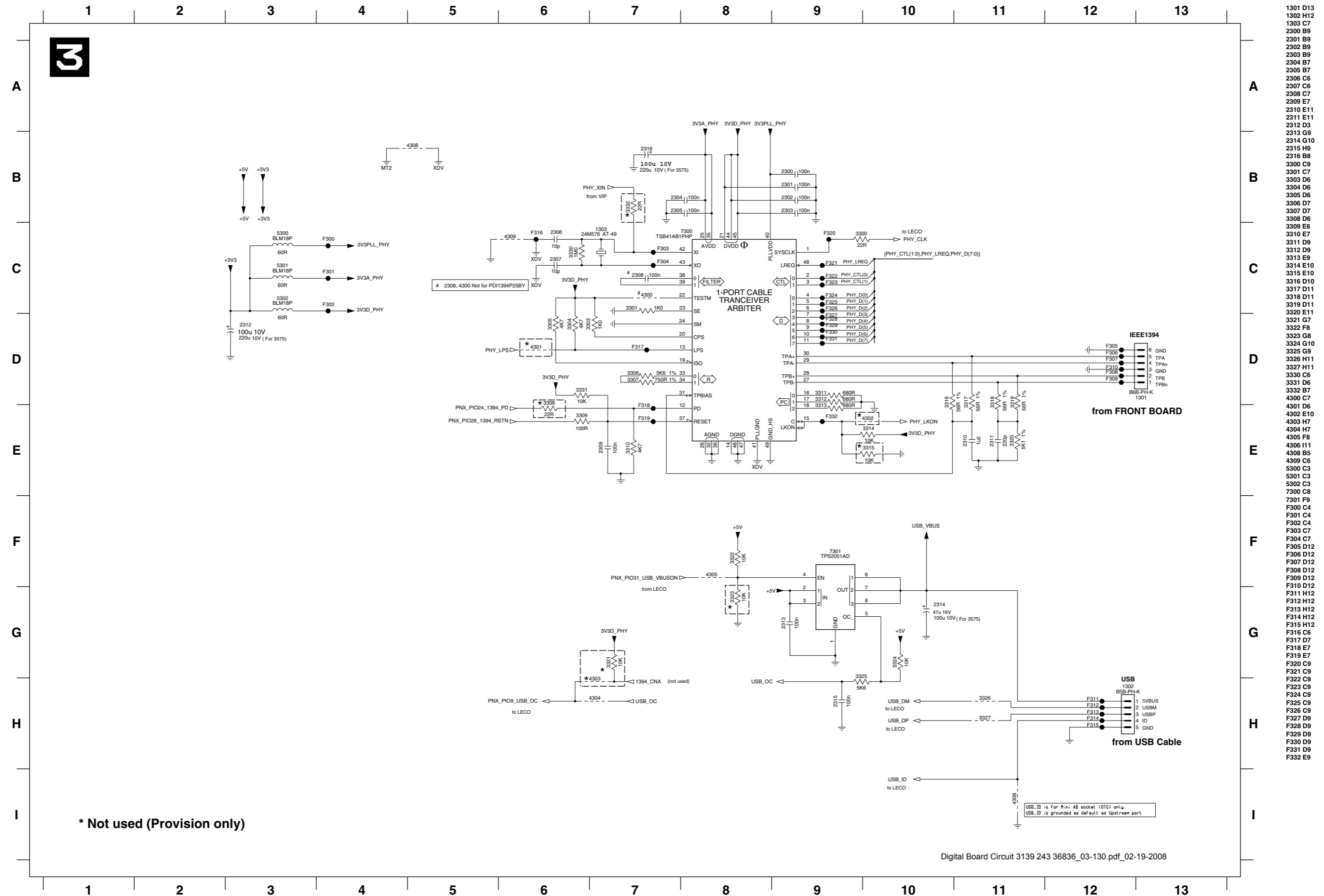


Digital: FLASH+SDRAM (MEM)



- 2200 A2
- 2201 A3
- 2202 A6
- 2203 A7
- 2206 A3
- 2207 A7
- 2209 B2
- 2210 A6
- 2212 B3
- 2213 B7
- 2215 B2
- 2216 B6
- 2218 B3
- 2219 B7
- 2221 B2
- 2222 B6
- 2224 B3
- 2225 B7
- 2227 D1
- 2228 D4
- 2229 D1
- 2230 D4
- 2233 F5
- 2234 F11
- 2236 I5
- 3202 D1
- 3203 C3
- 3206 D5
- 3207 C7
- 3216 H1
- 3217 H1
- 3218 H2
- 3219 H5
- 3220 H2
- 3223 E1
- 3224 F1
- 3225 D5
- 3226 D5
- 3227 H2
- 3228 H1
- 4200 E2
- 4201 E5
- 4202 I5
- 4202 I5
- 4203 I1
- 4204 G12
- 4205 H12
- 4206 H12
- 4207 H12
- 4208 H12
- 4209 H12
- 4210 H12
- 4211 H12
- 4212 H13
- 4213 H13
- 4214 H13
- 4215 H13
- 4216 H13
- 4238 H1
- 4238 I1
- 5200 A2
- 5201 G1
- 7200 B1
- 7201 B6
- 7203 G10
- 7204 G4
- 7XXX G7
- F200 A3
- F201 F1
- F202 G1
- F203 I1
- F204 I1
- F205 I1
- F206 I1
- F207 I1
- F208 G12
- F209 H12
- F210 H12
- F211 H12
- F212 H12
- F213 H12
- F214 H12
- F215 H12
- F216 H11
- F217 H11
- F218 H11
- F219 H11
- F220 H11
- F221 H11
- F222 I11
- F223 I11
- F250 G9
- F252 G9
- F253 I4
- F254 I5
- F256 I10
- F272 H9

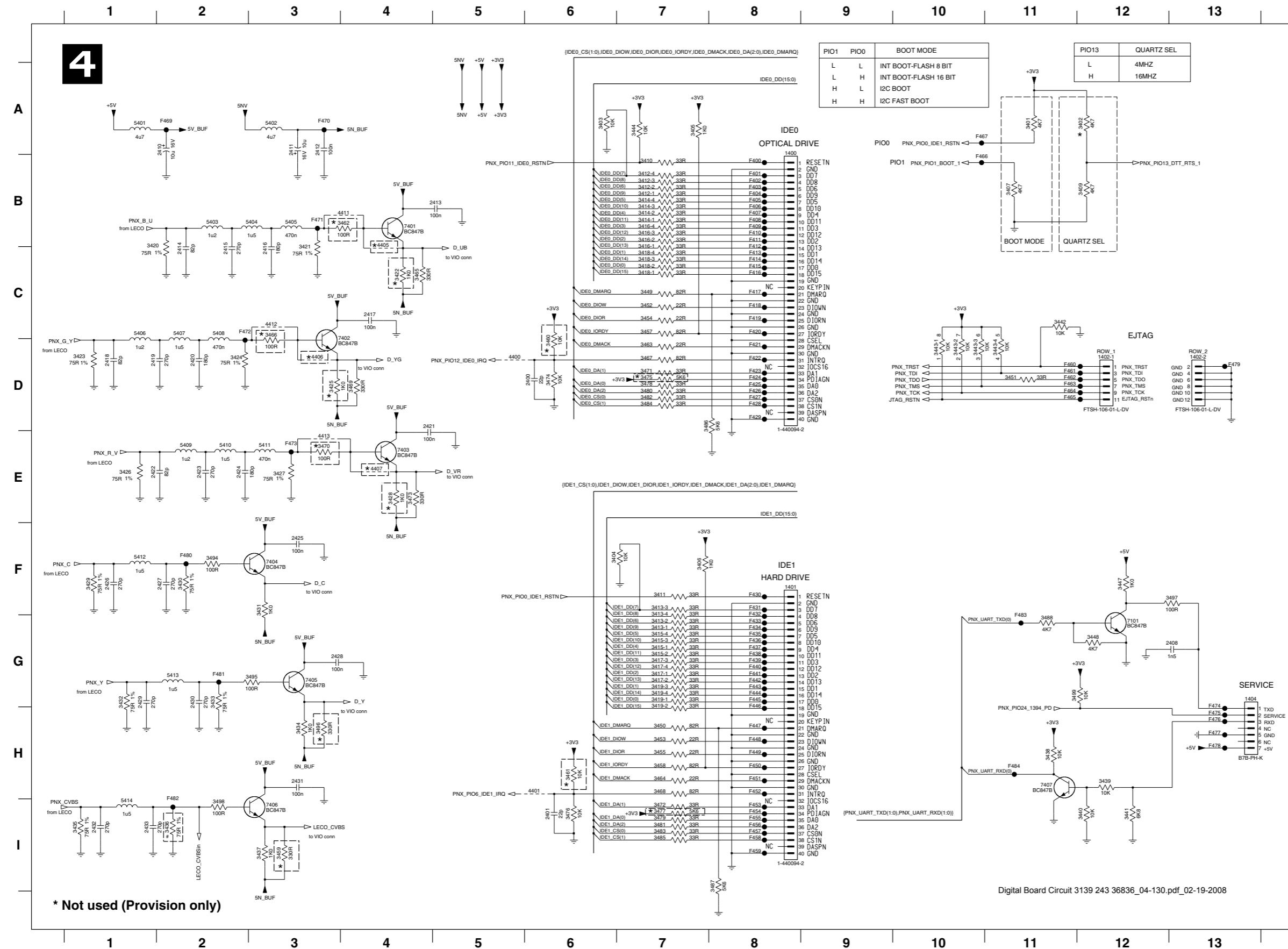
Digital: IEEE 1394+USB (DV+USB)



\* Not used (Provision only)



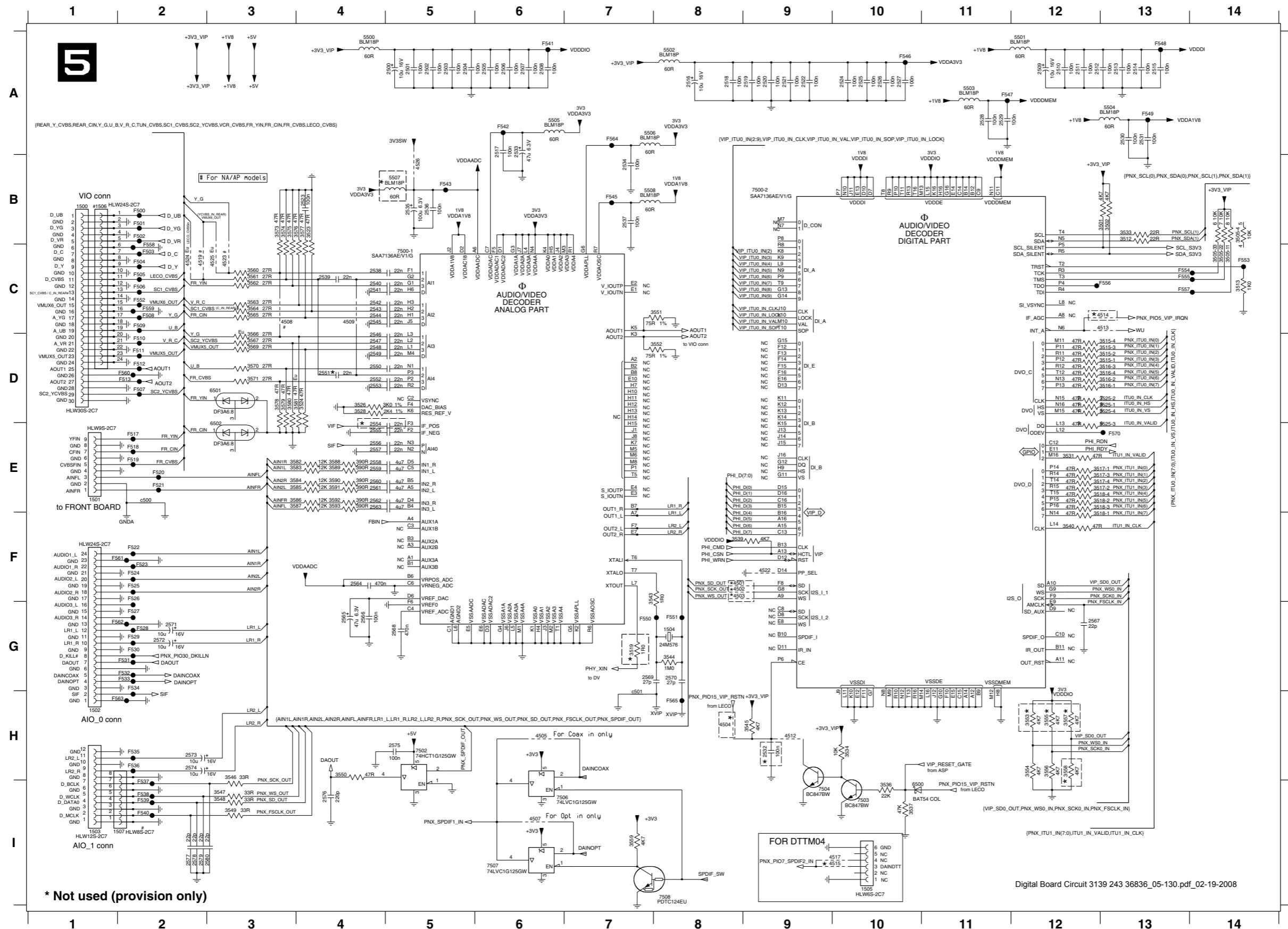
Digital: VIDEO+IDE+BOOT PROM+ EJTAG



- 1400 B8
- 1401 F8
- 1402-1 D12
- 1402-2 D13
- 1404 G13
- 2400 D6
- 2401 I6
- 2408 G13
- 2410 A2
- 2411 A3
- 2412 A3
- 2413 B5
- 2414 C2
- 2415 C2
- 2416 C3
- 2417 C4
- 2418 D1
- 2419 D1
- 2420 D2
- 2421 D4
- 2422 E1
- 2423 E2
- 2424 E2
- 2425 F3
- 2426 F1
- 2427 F2
- 2428 G3
- 2429 G1
- 2430 G2
- 2431 H3
- 2432 I1
- 2433 I1
- 3401 A11
- 3402 A12
- 3403 A6
- 3404 F6
- 3405 A7
- 3406 F7
- 3407 B11
- 3408 B12
- 3409 B12
- 3410 B7
- 3411 F7
- 3412-1 B7
- 3412-2 B7
- 3412-3 B7
- 3412-4 B7
- 3413-1 G7
- 3413-2 G7
- 3413-3 G7
- 3413-4 G7
- 3414-1 B7
- 3414-2 B7
- 3414-3 B7
- 3414-4 B7
- 3415-1 G7
- 3415-2 G7
- 3415-3 G7
- 3415-4 G7
- 3416-1 C7
- 3416-2 B7
- 3416-3 B7
- 3416-4 B7
- 3417-1 G7
- 3417-2 G7
- 3417-3 G7
- 3417-4 G7
- 3418-1 C7
- 3418-2 C7
- 3418-3 C7
- 3418-4 C7
- 3419-1 G7
- 3419-2 H7
- 3419-3 H7
- 3419-4 G7
- 3420 B1
- 3421 B3
- 3422 C4
- 3423 D1
- 3424 D2
- 3425 D3
- 3426 E1
- 3427 E3
- 3428 E4
- 3429 F1
- 3430 F2
- 3431 F3
- 3432 G1
- 3433 G2
- 3434 H3
- 3435 I1
- 3436 I2
- 3437 I3
- 3442 C11
- 3447 F12
- 3448 G12
- 3449 C7
- 3450 H7
- 3451 D11
- 3452 C7
- 3453 H7
- 3454 C7
- 3455 H7
- 3456 H7
- 3457 H7
- 3458 H7
- 3460 D6
- 3461 H6
- 3463 D7
- 3464 H7
- 3466 H7
- 3471 D7
- 3472 I7
- 3474 D6
- 3475 D7
- 3476 I6
- 3477 I7
- 3478 D7
- 3479 I7
- 3480 D7
- 3481 I7
- 3482 D7
- 3483 D7
- 3484 D7
- 3485 I7
- 3486 D7
- 3487 I7
- 3488 G11
- 3489 F13
- 3490 G11
- 3491 H11
- 3492 H12
- 3493 H12
- 3494 I2
- 3495 H12
- 3496 A2
- 3497 A3
- 3498 H11
- 3499 H12
- 3500 H12
- 3501 I2
- 3502 I2
- 3503 G3
- 3504 H3
- 3505 B10
- 3506 H11
- 3507 G2
- 3508 G2
- 3509 B4
- 3510 C4
- 3511 E3
- 3512 F1
- 3513 G2
- 3514 H2
- 3515 G3
- 3516 I3
- 3517 H11
- 3518 B8
- 3519 B8
- 3520 B8
- 3521 B8
- 3522 B8
- 3523 B8
- 3524 B8
- 3525 B8
- 3526 B8
- 3527 B8
- 3528 B8
- 3529 B8
- 3530 B8
- 3531 B8
- 3532 B8
- 3533 B8
- 3534 B8
- 3535 B8
- 3536 B8
- 3537 B8
- 3538 B8
- 3539 B8
- 3540 B8
- 3541 B8
- 3542 B8
- 3543 B8
- 3544 B8
- 3545 B8
- 3546 B8
- 3547 B8
- 3548 B8
- 3549 B8
- 3550 B8
- 3551 B8
- 3552 B8
- 3553 B8
- 3554 B8
- 3555 B8
- 3556 B8
- 3557 B8
- 3558 B8
- 3559 B8
- 3560 B8
- 3561 B8
- 3562 B8
- 3563 B8
- 3564 B8
- 3565 B8
- 3566 B8
- 3567 B8
- 3568 B8
- 3569 B8
- 3570 B8
- 3571 B8
- 3572 B8
- 3573 B8
- 3574 B8
- 3575 B8
- 3576 B8
- 3577 B8
- 3578 B8
- 3579 B8
- 3580 B8
- 3581 B8
- 3582 B8
- 3583 B8
- 3584 B8
- 3585 B8
- 3586 B8
- 3587 B8
- 3588 B8
- 3589 B8
- 3590 B8
- 3591 B8
- 3592 B8
- 3593 B8
- 3594 B8
- 3595 B8
- 3596 B8
- 3597 B8
- 3598 B8
- 3599 B8
- 3600 B8

\* Not used (Provision only)

Digital: Audio/Video Decoder (VIP)

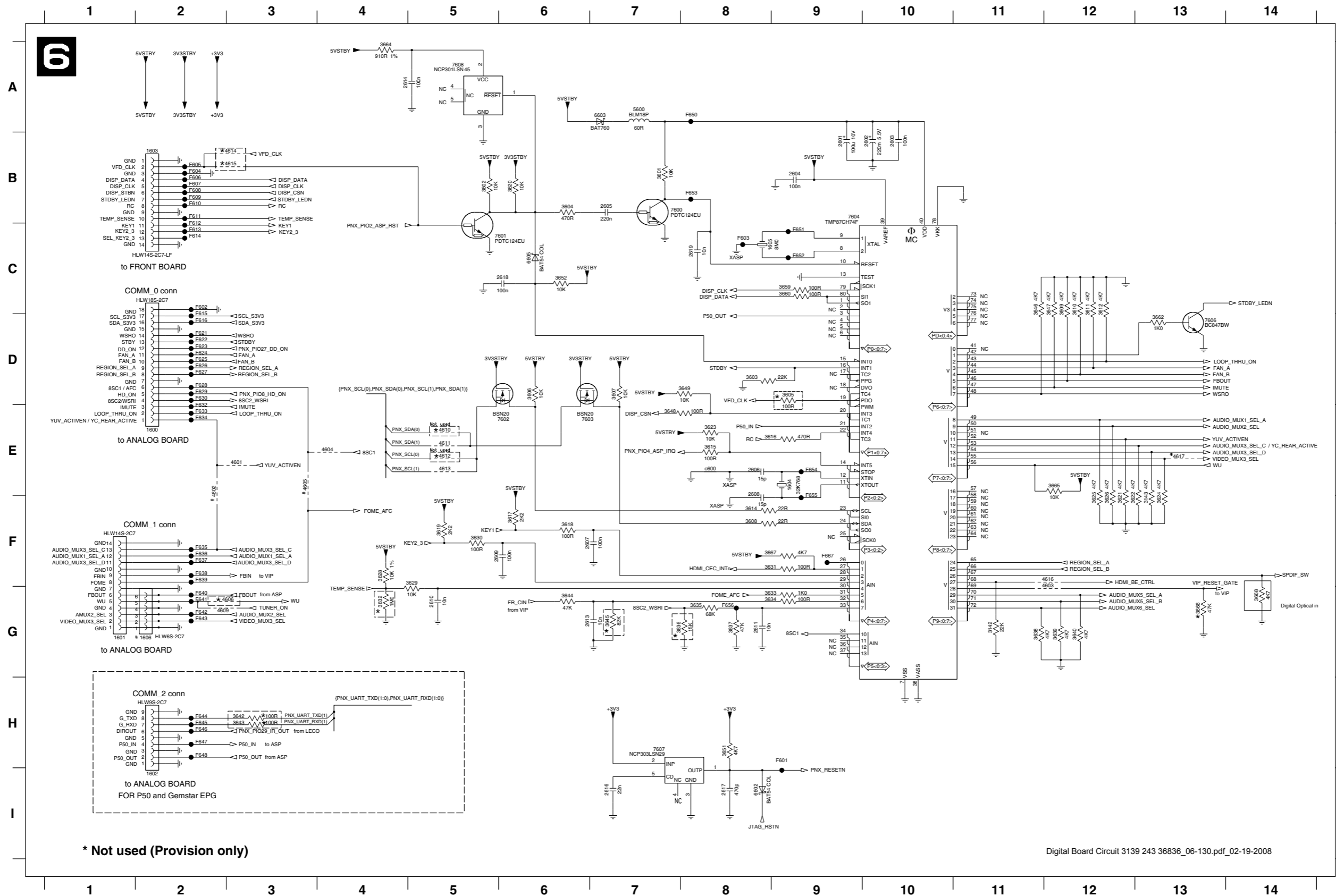


1500 B1	3525-4 D13	F525 F2
1501 E1	3526 D4	F526 F2
1502 H1	3528 D4	F527 G2
1503 I1	3531 E12	F528 G2
1504 G8	3533 B13	F529 G2
1505 H10	3534 H10	F530 G2
1506 B1	3536 I10	F531 G2
1507 I2	3537 I10	F532 G2
2500 A5	3539 F8	F533 G2
2501 A5	3540 F12	F534 G2
2502 A5	3543 F7	F535 H2
2503 A5	3544 G8	F536 H2
2504 A5	3545 H9	F537 I2
2505 A6	3546 H3	F538 I2
2506 A6	3547 I3	F539 I2
2507 A6	3548 I3	F540 I2
2508 A6	3549 I3	F541 A6
2509 A12	3550 H4	F542 A6
2510 A12	3551 C8	F543 B5
2511 A12	3552 D8	F545 B7
2512 A12	3553 H12	F546 A10
2513 A13	3554 H12	F547 A11
2514 A13	3555 H12	F548 A13
2515 A13	3556 H12	F549 A13
2516 A8	3557 H12	F550 F7
2517 A6	3558 H12	F551 G8
2518 A8	3559 I7	F552 C2
2519 A9	3560 C3	F553 C14
2520 A9	3561 C3	F554 C13
2521 A9	3562 C3	F555 C13
2522 A9	3563 C3	F556 C13
2523 A4	3564 C3	F557 C13
2524 B10	3565 C3	F558 C2
2525 A10	3566 D3	F559 C2
2526 A10	3567 D3	F560 D2
2527 A10	3568 D3	F561 F2
2528 A11	3570 D3	F562 G2
2529 A11	3571 D3	F563 H2
2530 A13	3573 B3	F564 A7
2531 A13	3574 B4	F565 H8
2532 B9	3575 B4	F570 E13
2533 B9	3576 B4	c500 E2
2534 B7	3577 B4	c501 H7
2535 B5	3578 D3	
2536 B5	3579 D4	
2537 B7	3580 D4	
2538 C4	3581 D4	
2539 C4	3582 E3	
2540 C4	3583 E3	
2541 C4	3584 E3	
2542 C4	3585 E3	
2543 C4	3586 E3	
2544 C4	3587 E3	
2545 C4	3588 E4	
2546 C4	3589 E4	
2547 D4	3590 E4	
2548 D4	3591 E4	
2549 D4	3592 E4	
2550 D4	3593 E4	
2551 D4	3594 E4	
2552 D4	3595 E4	
2553 D4	3596 E4	
2554 E4	3597 E4	
2555 E4	3598 E4	
2556 E4	3599 E4	
2557 E4	3600 E4	
2558 E4	3601 E4	
2559 E4	3602 E4	
2560 E4	3603 E4	
2561 E4	3604 E4	
2562 E4	3605 E4	
2563 E4	3606 E4	
2564 F4	3607 E4	
2565 F4	3608 E4	
2566 G4	3609 E4	
2567 G12	3610 E4	
2568 G5	3611 E4	
2569 G7	3612 E4	
2570 G8	3613 E4	
2571 G2	3614 E4	
2572 G2	3615 E4	
2573 H2	3616 E4	
2574 H2	3617 E4	
2575 H5	3618 E4	
2576 H5	3619 E4	
2577 I2	3620 E4	
2578 I2	3621 E4	
2579 I2	3622 E4	
2580 I3	3623 E4	
3501 B13	7500-1 C5	
3502 B13	7500-2 B9	
3505-2 C14	7502 H5	
3505-3 C14	7504 I9	
3505-4 B14	7506 I6	
3512 B13	7507 I6	
3513 C14	7508 I8	
3515-1 D13	F500 B2	
3515-2 D13	F501 B2	
3515-3 D13	F502 B2	
3515-4 D13	F503 C2	
3516-1 D13	F504 C2	
3516-2 D13	F505 C2	
3516-3 D13	F506 C2	
3516-4 D13	F507 D2	
3517-1 E13	F508 C2	
3517-2 E13	F509 C2	
3517-3 E13	F510 D2	
3517-4 E13	F511 D2	
3518-1 F13	F512 D2	
3518-2 E13	F513 D2	
3518-3 E13	F517 E2	
3518-4 E13	F518 E2	
3519 G7	F519 E2	
3523 B4	F520 E2	
3524 D4	F521 E2	
3525-1 D13	F522 F2	
3525-2 D13	F523 F2	
3525-3 E13	F524 F2	

\* Not used (provision only)

Digital Board Circuit 3139 243 36836\_05-130.pdf\_02-19-2008

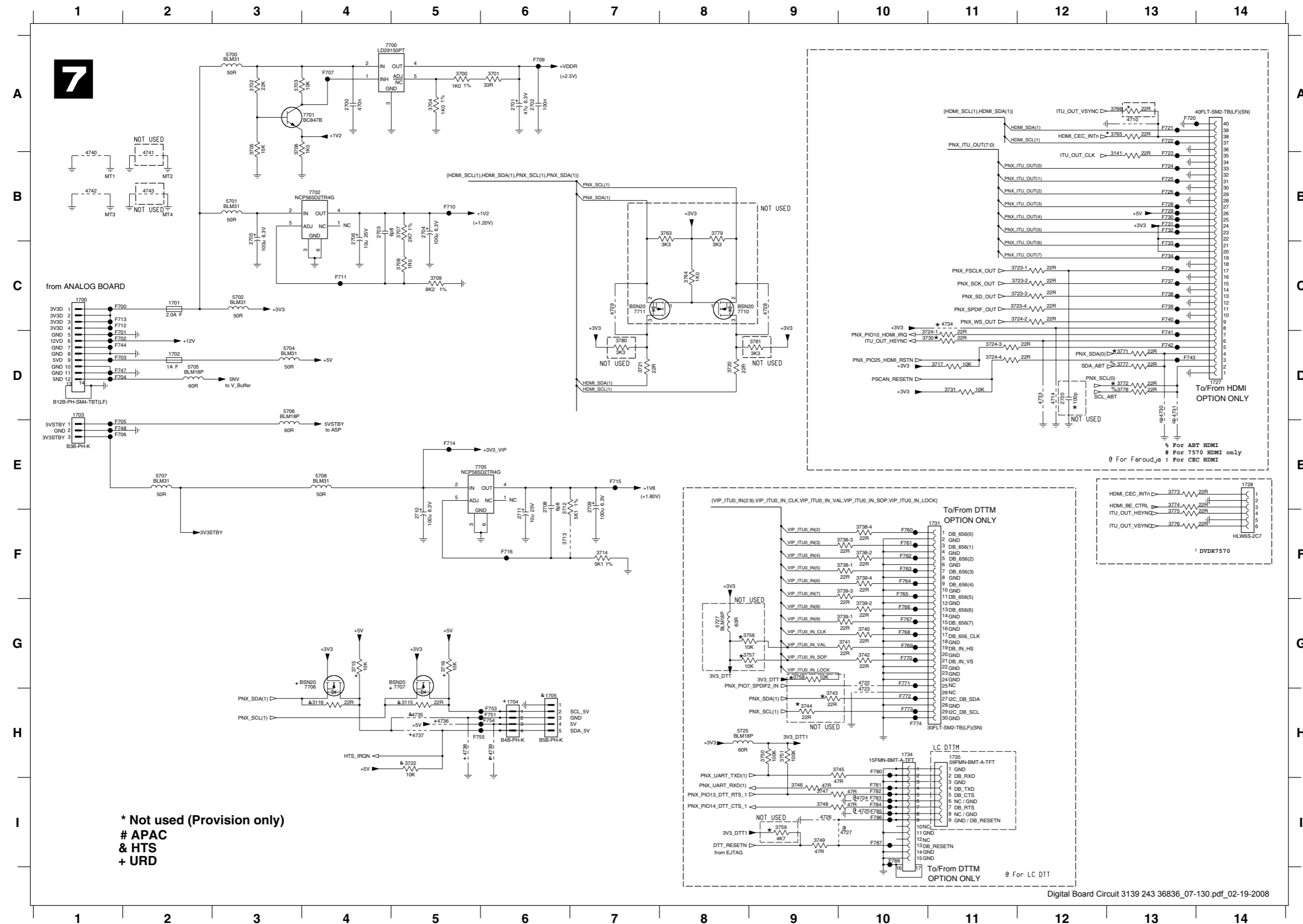
Digital: Microcontroller+Reset ASP+RESET



- 1600 E2
- 1601 G1
- 1602 I2
- 1603 B2
- 1604 E9
- 1605 C8
- 1606 G2
- 2601 B9
- 2602 B10
- 2603 B10
- 2604 B9
- 2605 B7
- 2606 E8
- 2607 F6
- 2608 F8
- 2609 F5
- 2610 G5
- 2611 G8
- 2613 G6
- 2614 A4
- 2616 I7
- 2617 I8
- 2618 C6
- 2619 C8
- 3142 G11
- 3143 F13
- 3600 B7
- 3602 B5
- 3603 D8
- 3604 B6
- 3605 D9
- 3606 D6
- 3607 D7
- 3608 F8
- 3609 C12
- 3610 C12
- 3611 C12
- 3612 C12
- 3614 F8
- 3615 E8
- 3616 E8
- 3617 F6
- 3618 F6
- 3619 F5
- 3620 B6
- 3621 F12
- 3622 F12
- 3623 E8
- 3624 F13
- 3625 F12
- 3626 F4
- 3629 F5
- 3630 F5
- 3631 F8
- 3632 G4
- 3633 G8
- 3634 G8
- 3635 G8
- 3636 G7
- 3637 G8
- 3638 G11
- 3639 G12
- 3640 G12
- 3642 H3
- 3643 H3
- 3644 G6
- 3645 G7
- 3646 C11
- 3647 C12
- 3648 D8
- 3651 H8
- 3652 C6
- 3659 C9
- 3660 C9
- 3662 D13
- 3664 A4
- 3665 E12
- 3666 G13
- 3667 F8
- 3668 G14
- 4601 E3
- 4602 E2
- 4603 G12
- 4604 E4
- 4605 E3
- 4606 G3
- 4609 G2
- 4610 E5
- 4611 E5
- 4612 E5
- 4613 E5
- 4614 B3
- 4615 B3
- 4616 F12
- 4617 E13
- 5600 A7
- 6602 I6
- 6603 A7
- 6605 C6
- 7600 B7
- 7601 C5
- 7602 E6
- 7603 E7
- 7604 B9
- 7606 D13
- 7607 H7
- 7608 A5
- F601 H9
- F602 C2
- F603 C8
- F604 B2
- F605 B2
- F606 B2
- F607 B2
- F608 B2
- F609 B2
- F610 B2
- F611 B2
- F612 C2
- F613 C2
- F614 C2
- F615 D2
- F616 D2
- F617 D2
- F618 D2
- F619 D2
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- F627 D2
- F628 D2
- F629 D2
- F630 D2
- F632 E2
- F633 E2
- F634 E2
- F635 F2
- F636 F2
- F637 F2
- F638 F2
- F639 F2
- F640 G2
- F641 G2
- F642 G2
- F643 G2
- F644 H2
- F645 H2
- F646 H2
- F647 H2
- F648 H2
- F650 A8
- F651 C9
- F652 C9
- F653 B8
- F654 E9
- F655 F9
- F656 G8
- F657 F9
- F658 F9
- F659 F9
- F660 E8

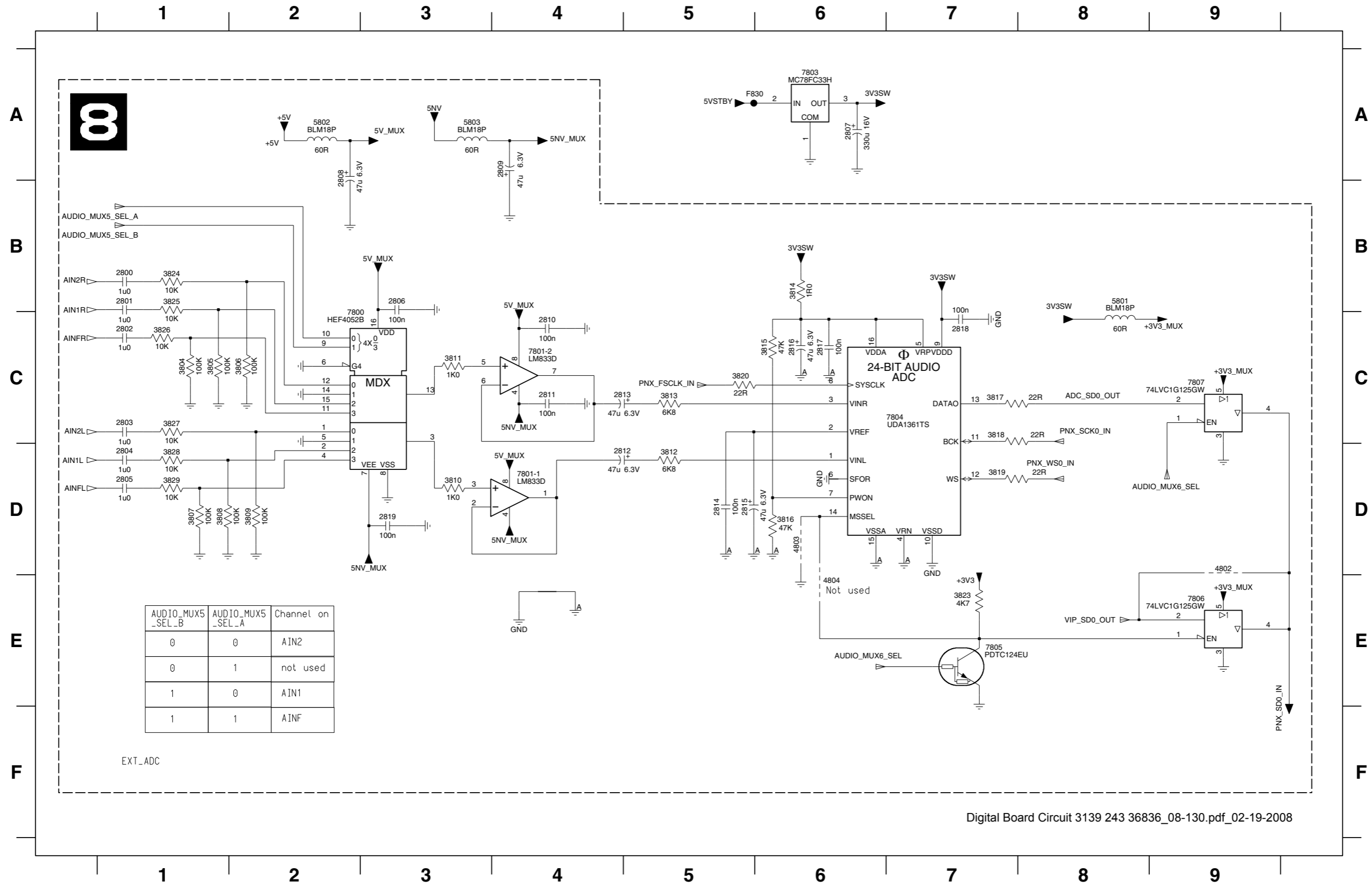
\* Not used (Provision only)

Digital: Power Supply (PS)



1700 C1	5700 A3
1701 C2	5701 B3
1702 D2	5702 C3
1703 D1	5704 D3
1704 H6	5705 D3
1705 H6	5706 D3
1727 D14	5707 E2
1728 E14	5708 E4
1731 F11	5725 H8
1734 H10	5727 G8
1735 H11	7700 A5
2700 A4	7701 A4
2701 A6	7702 B4
2702 A6	7705 E6
2703 B4	7706 G4
2704 B5	7707 G5
2705 B3	7710 C8
2706 B4	7711 C7
2708 E6	F700 C1
2709 E7	F701 D1
F700 F5	F702 D1
2711 F6	F703 D1
2720 D12	F704 D1
3115 H5	F705 E1
3116 H4	F706 E1
3141 B13	F707 A4
3700 A5	F709 A6
3701 A6	F710 B5
3702 A3	F711 C4
3703 A3	F712 C1
3704 A5	F713 C1
3705 A3	F714 E5
3706 A3	F715 E7
3707 B5	F716 F6
3708 C5	F720 A13
3709 C5	F721 A13
3712 E6	F722 A13
3713 F6	F723 B13
3714 F7	F724 B13
3715 G4	F725 B13
3716 G5	F726 B13
3717 D11	F728 B13
3720 D8	F729 B13
3721 D7	F730 B13
3722 H5	F731 B13
3723-1 C12	F732 B13
3723-2 C12	F733 C13
3723-3 C12	F734 C13
3723-4 C12	F735 C13
3724-1 D11	F737 C13
3724-2 C12	F738 C13
3724-3 D11	F739 C13
3724-4 D11	F740 C13
3730 D11	F741 D13
3731 D11	F742 D13
3738-1 F10	F743 D13
3738-2 F10	F744 D1
3738-3 F10	F747 D1
3738-4 F10	F748 E1
3739-1 G10	F751 H6
3739-2 G10	F753 H6
3739-3 F10	F754 H6
3739-4 F10	F755 H5
3740 G10	F760 F10
3741 G10	F761 F10
3742 G10	F762 F10
3743 H9	F763 F10
3744 H9	F764 F10
3745 H10	F765 F10
3746 I9	F766 G10
3747 I9	F767 G10
3748 I9	F768 G10
3749 I9	F769 G10
3750 H9	F770 G10
3751 H9	F771 G10
3756 G9	F772 H10
3757 G9	F773 H10
3758 G9	F774 H10
3759 I9	F780 H10
3763 B8	F781 I10
3764 C8	F782 I10
3765 A13	F783 I10
3766 A13	F784 I10
3771 D13	F785 I10
3772 D13	F786 I10
3773 E13	F787 I10
3774 E13	F788 I10
3775 F13	
3776 F13	
3777 D13	
3778 D13	
3779 B8	
3780 D7	
3781 D9	
4710 A13	
4714 D12	
4722 G10	
4723 H10	
4724 I10	
4725 I10	
4726 I9	
4727 I10	
4728 C9	
4729 C7	
4730 D13	
4731 D13	
4733 D12	
4734 C11	
4735 H5	
4736 H5	
4737 H5	
4738 H5	
4739 H6	
4740 B1	
4741 B2	
4742 B1	
4743 B2	

Digital: External ADC

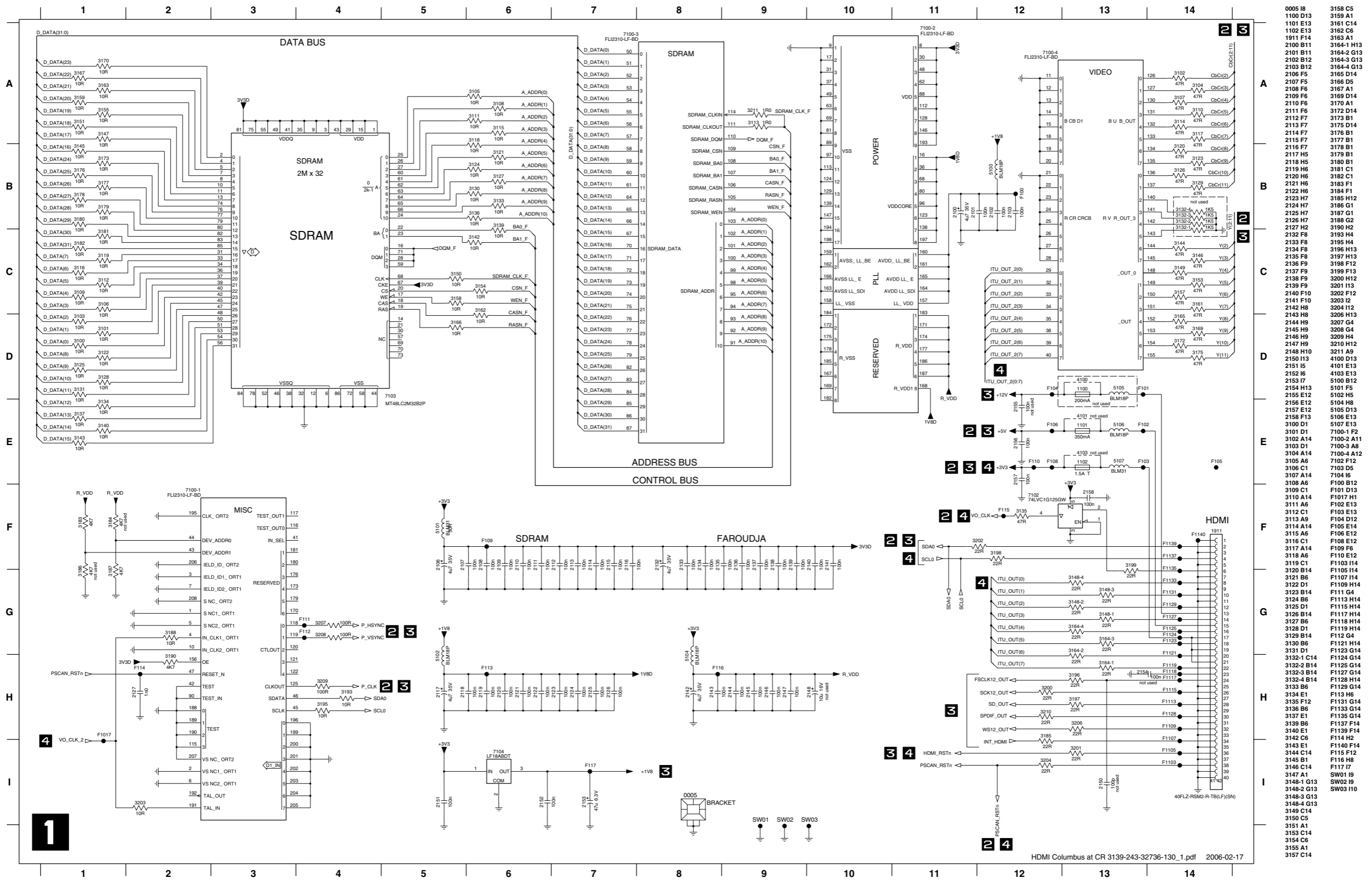


- 2800 B1
- 2801 B1
- 2802 C1
- 2803 C1
- 2804 D1
- 2805 D1
- 2806 B3
- 2807 A6
- 2808 A2
- 2809 A4
- 2810 C4
- 2811 C4
- 2812 D4
- 2813 C4
- 2814 D5
- 2815 D5
- 2816 C6
- 2817 C6
- 2818 C7
- 2819 D3
- 3804 C1
- 3805 C1
- 3806 C2
- 3807 D1
- 3808 D1
- 3809 D2
- 3810 D3
- 3811 C3
- 3812 D5
- 3813 C5
- 3814 B6
- 3815 C6
- 3816 D6
- 3817 C7
- 3818 C7
- 3819 D7
- 3820 C5
- 3823 E7
- 3824 B1
- 3825 B1
- 3826 C1
- 3827 C1
- 3828 D1
- 3829 D1
- 4802 D9
- 4803 D6
- 4804 E6
- 5801 B8
- 5802 A2
- 5803 A3
- 7800 C3
- 7801-1 D4
- 7801-2 C4
- 7803 A6
- 7804 C7
- 7805 E7
- 7806 E9
- 7807 C9
- F830 A5





HDMI: FAROUDJA

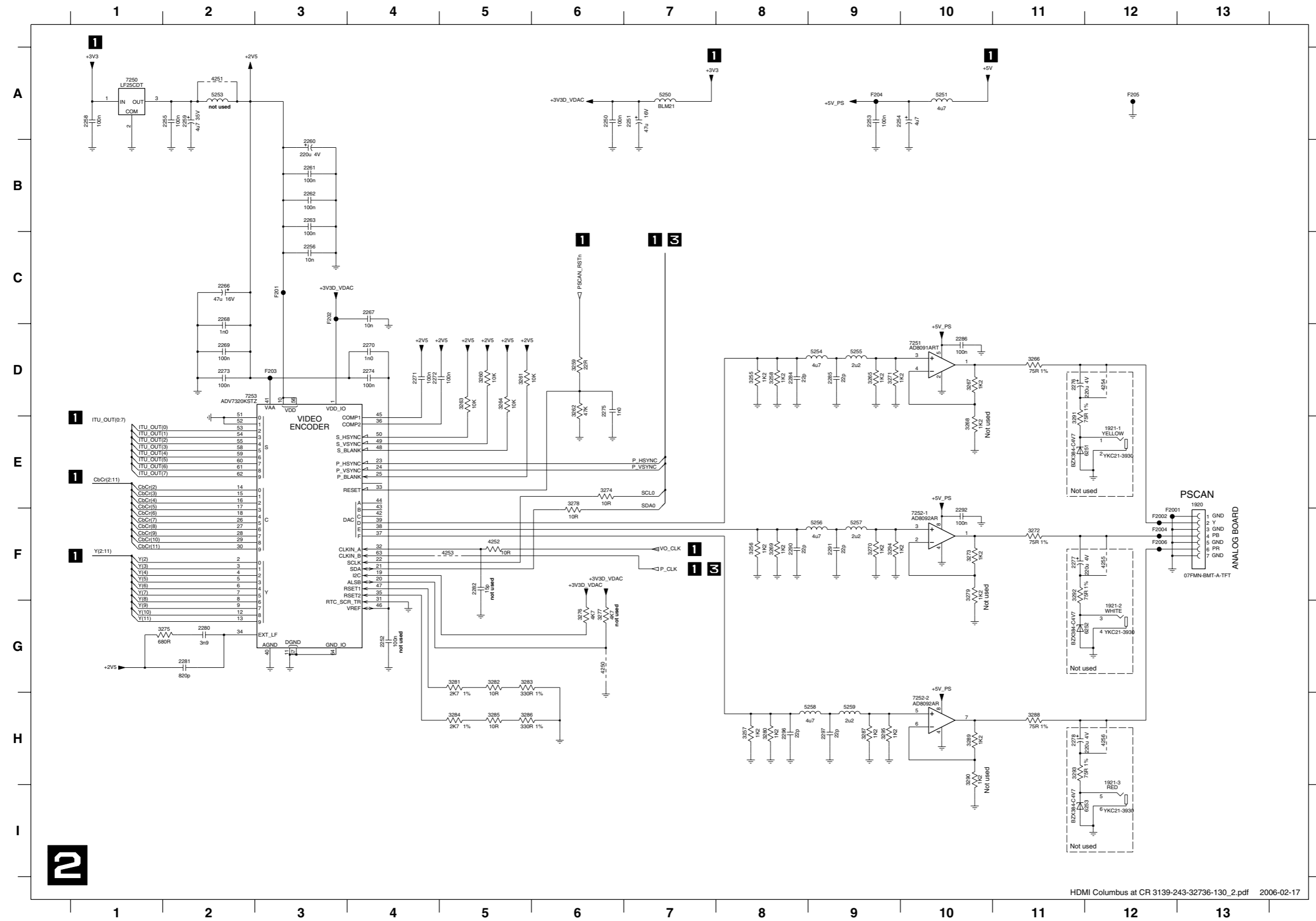


- 0005 B
- 1100 D13
- 1101 E13
- 1102 E13
- 1911 F14
- 2100 B11
- 2101 B11
- 2102 B12
- 2103 B12
- 2106 F5
- 2107 F5
- 2108 F6
- 2109 F6
- 2110 F6
- 2111 F6
- 2112 F7
- 2113 F7
- 2114 F7
- 2115 F7
- 2116 F7
- 2117 H5
- 2118 H5
- 2119 H6
- 2120 H6
- 2121 H6
- 2122 H6
- 2123 H7
- 2124 H7
- 2125 H7
- 2126 H7
- 2127 H2
- 2132 F8
- 2133 F8
- 2134 F8
- 2135 F9
- 2136 F9
- 2137 F9
- 2138 F9
- 2139 F9
- 2140 F10
- 2141 F10
- 2142 H8
- 2143 H8
- 2144 H9
- 2145 H9
- 2146 H9
- 2147 H9
- 2148 H10
- 2150 H13
- 2151 I5
- 2152 I6
- 2153 I7
- 2154 H13
- 2155 H12
- 2156 E12
- 2157 E12
- 2158 F13
- 3100 D1
- 3101 D1
- 3102 A14
- 3103 D1
- 3104 A14
- 3105 A6
- 3106 C1
- 3107 A14
- 3108 A6
- 3109 C1
- 3110 A14
- 3111 A6
- 3112 C1
- 3113 A9
- 3114 A14
- 3115 A6
- 3116 C1
- 3117 A14
- 3118 A6
- 3119 C1
- 3120 B14
- 3121 B6
- 3122 D1
- 3123 B14
- 3124 B6
- 3125 D1
- 3126 B14
- 3127 B6
- 3128 D1
- 3129 B14
- 3130 B6
- 3131 D1
- 3132-1 C14
- 3132-2 B14
- 3132-3 B14
- 3132-4 B14
- 3133 B6
- 3134 E1
- 3135 F12
- 3136 B6
- 3137 E1
- 3139 B6
- 3140 E1
- 3142 C6
- 3143 E1
- 3144 C14
- 3145 B1
- 3146 C14
- 3147 A1
- 3148-1 G13
- 3148-2 G13
- 3148-3 G13
- 3148-4 G13
- 3149 C14
- 3150 C5
- 3151 A1
- 3153 C14
- 3154 C6
- 3155 A1
- 3157 C14
- 3158 C5
- 3161 C14
- 3162 C6
- 3163 A1
- 3164-1 H13
- 3164-2 G13
- 3164-3 G13
- 3164-4 G13
- 3165 D14
- 3166 D5
- 3167 A1
- 3169 D14
- 3170 A1
- 3172 D14
- 3173 B1
- 3175 D14
- 3176 B1
- 3177 B1
- 3178 B1
- 3179 B1
- 3180 B1
- 3181 C1
- 3182 C1
- 3183 F1
- 3184 F1
- 3185 H12
- 3186 G1
- 3187 G1
- 3188 G2
- 3189 H2
- 3193 H4
- 3195 H4
- 3196 H13
- 3197 H13
- 3198 F12
- 3199 F13
- 3200 H12
- 3201 I3
- 3202 F12
- 3203 I2
- 3204 I2
- 3206 H13
- 3207 G4
- 3208 G4
- 3209 H4
- 3210 H12
- 3211 A9
- 4100 D13
- 4101 E13
- 4103 E13
- 5100 B12
- 5101 F5
- 5102 H5
- 5104 H8
- 5105 D13
- 5106 E13
- 5107 E3
- 7100-2 A11
- 7100-3 A8
- 7100-4 A12
- 7102 F12
- 7103 D5
- 7104 H6
- 7106 B12
- 7107 D13
- 7107 H1
- 7108 E13
- 7109 A14
- 7110 D12
- 7111 A14
- 7112 E12
- 7113 H14
- 7114 A14
- 7115 H14
- 7116 H14
- 7117 H14
- 7118 H14
- 7119 H14
- 7120 G14
- 7121 G14
- 7122 H14
- 7123 G14
- 7124 G14
- 7125 G14
- 7126 G14
- 7127 G14
- 7128 H14
- 7129 G14
- 7131 H6
- 7131 G14
- 7132 G14
- 7133 G14
- 7135 G14
- 7137 F14
- 7139 F14
- 7142 H2
- 7144 H2
- 7145 F12
- 7146 H8
- 7147 I7
- 7150 I9
- 7152 I9
- 7153 I9

\*HDMI Board 3139 248 89141 used only in older DVDR5590H/97 sets produced before week 817



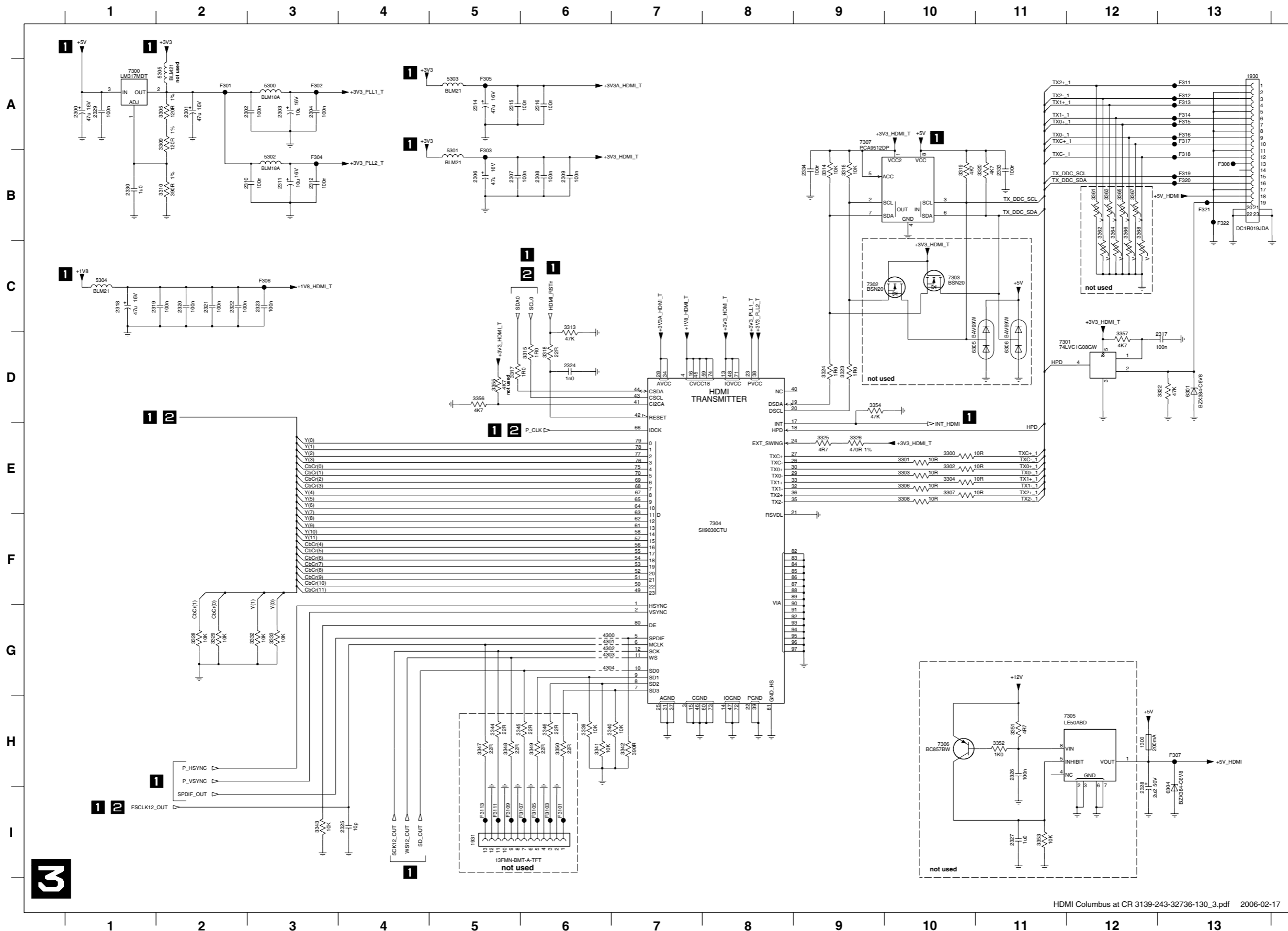
HDMI: PROG SCAN DAC



- 1920 E13
- 1921-1 E12
- 1921-2 G12
- 1921-3 H12
- 2250 A6
- 2251 A7
- 2252 G4
- 2253 A9
- 2254 A10
- 2255 A2
- 2256 C3
- 2258 A1
- 2259 A2
- 2260 B3
- 2261 B3
- 2262 B3
- 2263 B3
- 2266 C2
- 2267 C4
- 2268 C2
- 2269 D2
- 2270 D4
- 2271 D4
- 2272 D4
- 2273 D2
- 2274 D4
- 2275 D6
- 2276 D11
- 2277 F11
- 2278 H11
- 2280 G2
- 2281 G2
- 2282 F5
- 2284 D8
- 2285 D9
- 2286 D10
- 2290 F8
- 2291 F9
- 2292 F10
- 2296 H8
- 2297 H9
- 3255 D8
- 3256 F8
- 3257 H8
- 3258 D8
- 3259 D6
- 3260 D5
- 3261 D5
- 3262 D6
- 3263 D5
- 3264 D5
- 3265 D9
- 3266 D11
- 3267 D10
- 3268 E10
- 3269 F8
- 3270 F9
- 3271 D9
- 3272 F11
- 3273 F10
- 3274 E6
- 3275 G2
- 3276 G6
- 3277 G6
- 3278 E6
- 3279 F10
- 3280 H8
- 3281 G5
- 3282 G5
- 3283 G5
- 3284 H5
- 3285 H5
- 3286 H5
- 3287 H9
- 3288 H11
- 3289 H10
- 3290 H10
- 3291 E11
- 3292 F11
- 3293 H11
- 3294 F9
- 3295 H9
- 4250 G6
- 4251 A2
- 4252 F5
- 4253 F5
- 4254 D12
- 4255 F12
- 4256 H12
- 5250 A7
- 5251 A10
- 5253 A2
- 5254 D9
- 5255 D9
- 5256 F9
- 5257 F9
- 5258 H9
- 5259 H9
- 6251 E11
- 6252 G11
- 6253 H11
- 7250 A1
- 7251 D10
- 7252-1 F10
- 7252-2 H10
- 7253 D3
- F2001 F12
- F2002 F12
- F2004 F12
- F2006 F12
- F201 C3
- F202 C3
- F203 D3

\*HDMI Board 3139 248 89141 used only in older DVDR5590H/97 sets produced before week 817

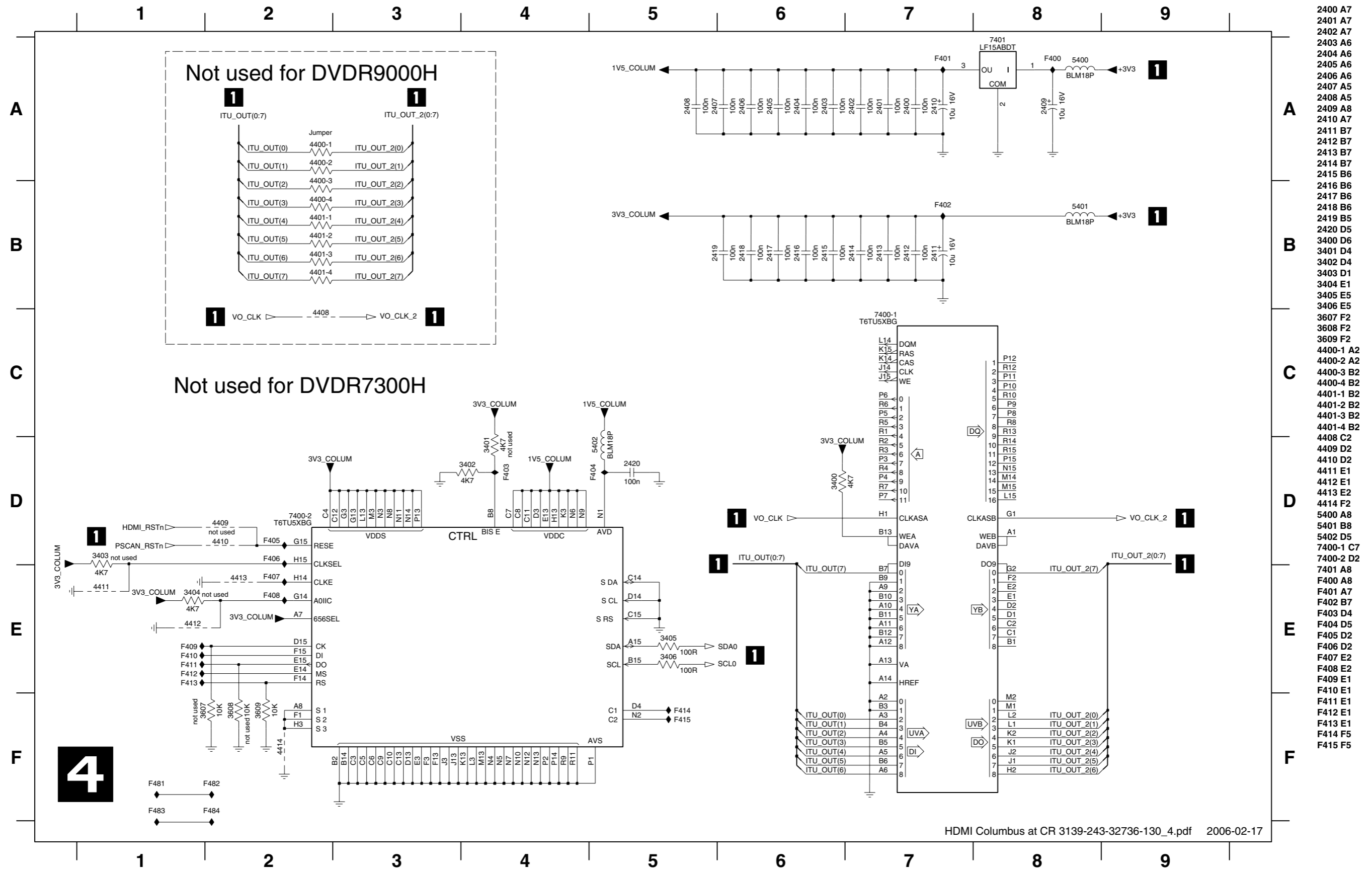
HDMI: HDMI Tx



- 1300 H12
- 1930 A13
- 1931 I5
- 2300 A1
- 2301 A2
- 2302 A3
- 2303 A3
- 2304 A3
- 2306 B5
- 2307 B5
- 2308 B6
- 2309 B6
- 2310 B3
- 2311 B3
- 2312 B3
- 2314 A5
- 2315 A5
- 2316 A6
- 2317 D13
- 2318 C1
- 2319 C1
- 2320 C2
- 2321 C2
- 2322 C2
- 2323 C3
- 2324 D6
- 2325 I4
- 2326 H11
- 2327 H11
- 2328 H12
- 2329 A1
- 2330 B1
- 2333 B11
- 2334 B9
- 3300 E10
- 3301 E10
- 3302 E10
- 3303 E10
- 3304 E10
- 3305 A2
- 3306 E10
- 3307 E10
- 3308 E10
- 3309 A2
- 3310 B2
- 3313 C6
- 3314 B9
- 3315 D6
- 3316 B9
- 3317 D5
- 3318 D6
- 3319 B10
- 3320 B11
- 3322 D13
- 3323 D9
- 3324 D9
- 3325 E9
- 3326 E9
- 3328 G2
- 3329 G2
- 3332 G3
- 3333 G3
- 3339 H6
- 3340 H6
- 3341 H6
- 3342 H7
- 3343 I3
- 3344 H5
- 3345 H5
- 3346 H6
- 3347 H5
- 3348 H5
- 3349 H6
- 3350 H6
- 3351 H11
- 3352 H11
- 3353 H11
- 3354 D9
- 3355 D5
- 3356 D5
- 3357 D12
- 3361 B12
- 3362 B12
- 3363 B12
- 3364 B12
- 3365 B12
- 3366 B12
- 3367 B12
- 3368 B12
- 4300 G6
- 4301 G6
- 4302 G6
- 4303 G6
- 4304 G6
- 5300 A3
- 5301 B5
- 5302 B3
- 5303 A5
- 5304 C1
- 5305 A2
- 6301 D13
- 6304 H3
- 6305 D10
- 6306 D11
- 7300 A1
- 7301 D11
- 7302 C9
- 7303 C10
- 7304 F8
- 7305 H11
- 7306 H10
- 7307 A9
- F301 A2
- F302 A3
- F303 B5
- F304 B3
- F305 A5
- F306 C3
- F307 H13
- F308 B13
- F310 I5
- F3103 I6
- F3105 I6
- F3107 I6
- F3109 I5
- F311 A13
- F311 I5
- F3113 I5
- F312 A13
- F313 A13
- F314 A13
- F315 A13
- F316 A13
- F317 A13
- F318 B13
- F319 B13
- F320 B13
- F321 B13
- F322 B13

\*HDMI Board 3139 248 89141 used only in older DVDR5590H/97 sets produced before week 817

HDMI: COLUMBUS



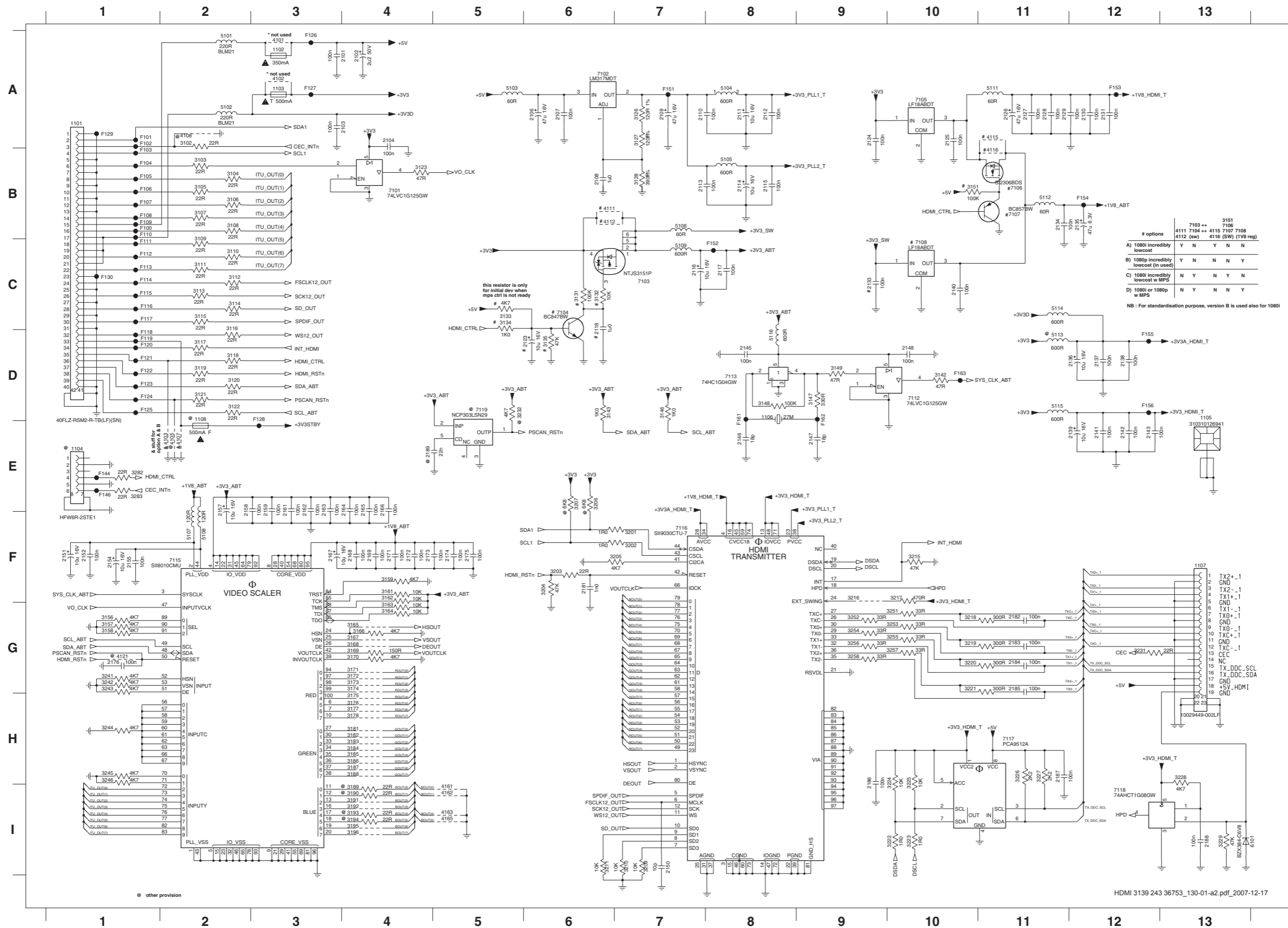
- 2400 A7
- 2401 A7
- 2402 A7
- 2403 A6
- 2404 A6
- 2405 A6
- 2406 A6
- 2407 A5
- 2408 A5
- 2409 A8
- 2410 B7
- 2411 B7
- 2412 B7
- 2413 B7
- 2414 B7
- 2415 B6
- 2416 B6
- 2417 B6
- 2418 B6
- 2419 B5
- 2420 D5
- 3400 D6
- 3401 D4
- 3402 D4
- 3403 D1
- 3404 E1
- 3405 E5
- 3406 E5
- 3607 F2
- 3608 F2
- 3609 F2
- 4400-1 A2
- 4400-2 A2
- 4400-3 B2
- 4400-4 B2
- 4401-1 B2
- 4401-2 B2
- 4401-3 B2
- 4401-4 B2
- 4408 C2
- 4409 D2
- 4410 D2
- 4411 E1
- 4412 E1
- 4413 E2
- 4414 F2
- 5400 A8
- 5401 B8
- 5402 D5
- 7400-1 C7
- 7400-2 D2
- 7401 A8
- F400 A8
- F401 A7
- F402 B7
- F403 D4
- F404 D5
- F405 D2
- F406 D2
- F407 E2
- F408 E2
- F409 E1
- F410 E1
- F411 E1
- F412 E1
- F413 E1
- F414 F5
- F415 F5

\*HDMI Board 3139 248 89141 used only in older DVDR5590H/97 sets produced before week 817





HDMI: LC 1080i PANEL



1101 A1	3149 D9	7103 C7
1102 A3	3151 B10	7104 C6
1103 A3	3156 G1	7105 A10
1104 E1	3157 G1	7106 B11
1105 D13	3158 G1	7107 B11
1106 D8	3159 F4	7108 C10
1107 F13	3165 H4	7112 D10
1108 E2	3162 F4	7113 D8
2101 A3	3163 G4	7115 F2
2102 A4	3164 G4	7116 F7
2103 A3	3165 G4	7117 H11
2104 A4	3166 G4	7118 I12
2106 A6	3167 G4	7119 D5
2107 A6	3168 G4	F100 B1
2108 B6	3169 G4	F101 A1
2109 A7	3170 G4	F102 A1
2110 A7	3171 G4	F103 B1
2111 A8	3172 G4	F104 B1
2112 A8	3173 G4	F105 B1
2113 B7	3174 G4	F106 B1
2114 B8	3175 H4	F107 B1
2115 B8	3176 H4	F108 B1
2116 C7	3177 H4	F109 B1
2117 C8	3178 H4	F110 B1
2118 C6	3181 H4	F111 C1
2123 D6	3182 H4	F112 C1
2124 A9	3183 H4	F113 C1
2125 A10	3184 H4	F114 C1
2126 A11	3185 H4	F115 C1
2127 A11	3186 H4	F116 C1
2128 A11	3187 H4	F117 C1
2129 A11	3188 H4	F118 D1
2130 A12	3189 I4	F119 D1
2131 A12	3190 I4	F120 D1
2133 C9	3191 I4	F121 D1
2134 B11	3192 I4	F122 D1
2135 B12	3193 I4	F123 D1
2136 D12	3194 I4	F124 D1
2137 D12	3195 I4	F125 D1
2138 D12	3196 I4	F126 A3
2139 E12	3201 F7	F127 A3
2140 C10	3202 F7	F128 E3
2141 E12	3203 F6	F129 A1
2142 E12	3204 F6	F130 C1
2143 E12	3205 F7	F144 E1
2145 D8	3206 E6	F146 E1
2146 E8	3207 E6	F151 A7
2147 E9	3209 I7	F152 C8
2148 D10	3210 I7	F153 A12
2150 I7	3211 I6	F154 B12
2151 F1	3215 F10	F155 D12
2152 F1	3216 F9	F156 D12
2154 F1	3217 G10	F161 D8
2155 F1	3218 F10	F162 D9
2157 E2	3219 G10	F163 D10
2158 E2	3220 G10	
2159 E3	3221 G10	
2161 E3	3222 I10	
2162 E3	3223 I10	
2163 E3	3224 I10	
2164 E4	3225 H10	
2165 E4	3226 H11	
2166 E4	3227 H11	
2167 F3	3228 H13	
2168 F4	3229 I13	
2169 F4	3231 G12	
2171 F4	3232 D5	
2172 F4	3241 G1	
2173 F4	3242 G1	
2174 F5	3243 G1	
2175 F5	3244 H1	
2176 G1	3245 H1	
2181 F6	3246 H1	
2182 G11	3251 G10	
2183 G11	3252 G9	
2184 G11	3253 G10	
2185 G11	3254 G9	
2186 H9	3255 G10	
2187 H11	3256 G9	
2188 I13	3257 G10	
2189 E4	3258 G9	
3102 A2	3282 E1	
3103 B2	3283 E1	
3104 B2	4101 A3	
3105 B2	4102 A3	
3106 B2	4103 E2	
3107 B2	4105 E2	
3108 B2	4107 E2	
3109 C2	4108 A2	
3110 C2	4111 B6	
3111 C2	4112 B6	
3112 C2	4115 A11	
3113 C2	4116 B11	
3114 C2	4121 G1	
3115 C2	4161 I5	
3116 C2	4162 I5	
3117 D2	4163 I5	
3118 D2	4165 I5	
3119 D2	5101 A2	
3120 D2	5102 A2	
3121 D2	5103 A5	
3122 D2	5104 A8	
3123 B4	5105 B8	
3126 A7	5106 B7	
3127 A7	5107 F2	
3128 B7	5108 F2	
3131 C6	5109 C7	
3132 C6	5111 A11	
3133 C5	5112 B11	
3134 C5	5113 D11	
3135 D6	5114 C11	
3142 D10	5115 D11	
3143 D6	5116 D8	
3146 D7	6101 I3	
3147 D9	7101 B4	
3148 D8	7102 A6	

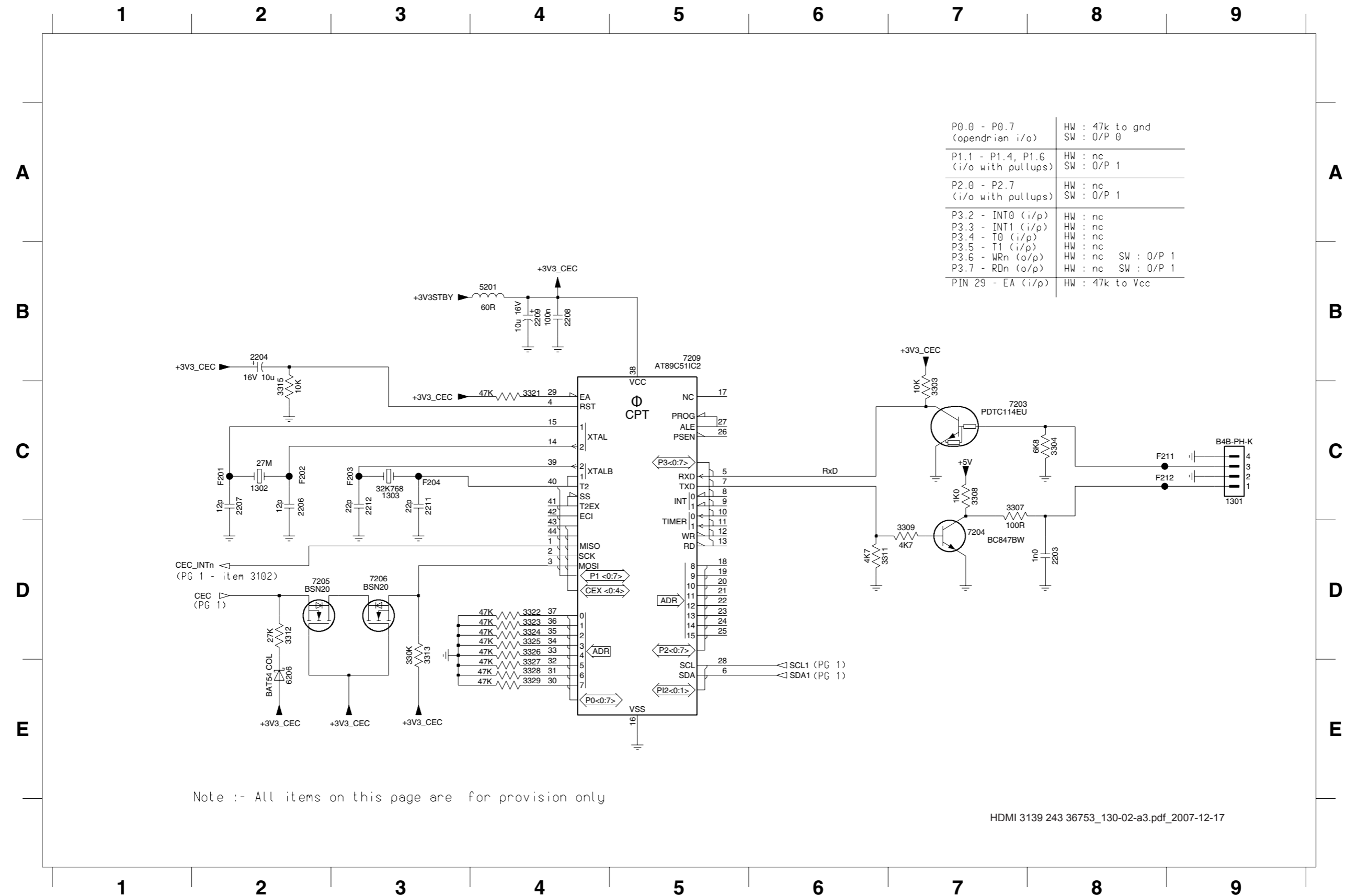
# options	7103 ++	3151
	4111 7104 ++	7106
	4112 (sw)	4116 (SW) (1V8 reg)
A) 1080i incredibly lowcost	Y	N
B) 1080p incredibly lowcost (in used)	Y	N
C) 1080i incredibly lowcost w MP5	N	Y
D) 1080p or 1080p w MP5	N	Y

NB: For standardisation purpose, version B is used also for 1080i

HDMI 3139 243 36753\_130-01-a2.pdf\_2007-12-17

\*HDMI Board 3139 248 51901 introduced in production from week 817 onwards

HDMI: LC 1080i PANEL



- 1301 C9
- 1302 C2
- 1303 C3
- 2203 D8
- 2204 B2
- 2206 C2
- 2207 C2
- 2208 B4
- 2209 B4
- 2211 C3
- 2212 C3
- 3303 C7
- 3304 C8
- 3307 C7
- 3308 C7
- 3309 D7
- 3311 D6
- 3312 D2
- 3313 D3
- 3315 C2
- 3321 C4
- 3322 D4
- 3323 D4
- 3324 D4
- 3325 D4
- 3326 D4
- 3327 E4
- 3328 E4
- 3329 E4
- 5201 B4
- 6206 E2
- 7203 C7
- 7204 D7
- 7205 D2
- 7206 D3
- 7209 B5
- F201 C2
- F202 C2
- F203 C3
- F204 C3
- F211 C8
- F212 C8

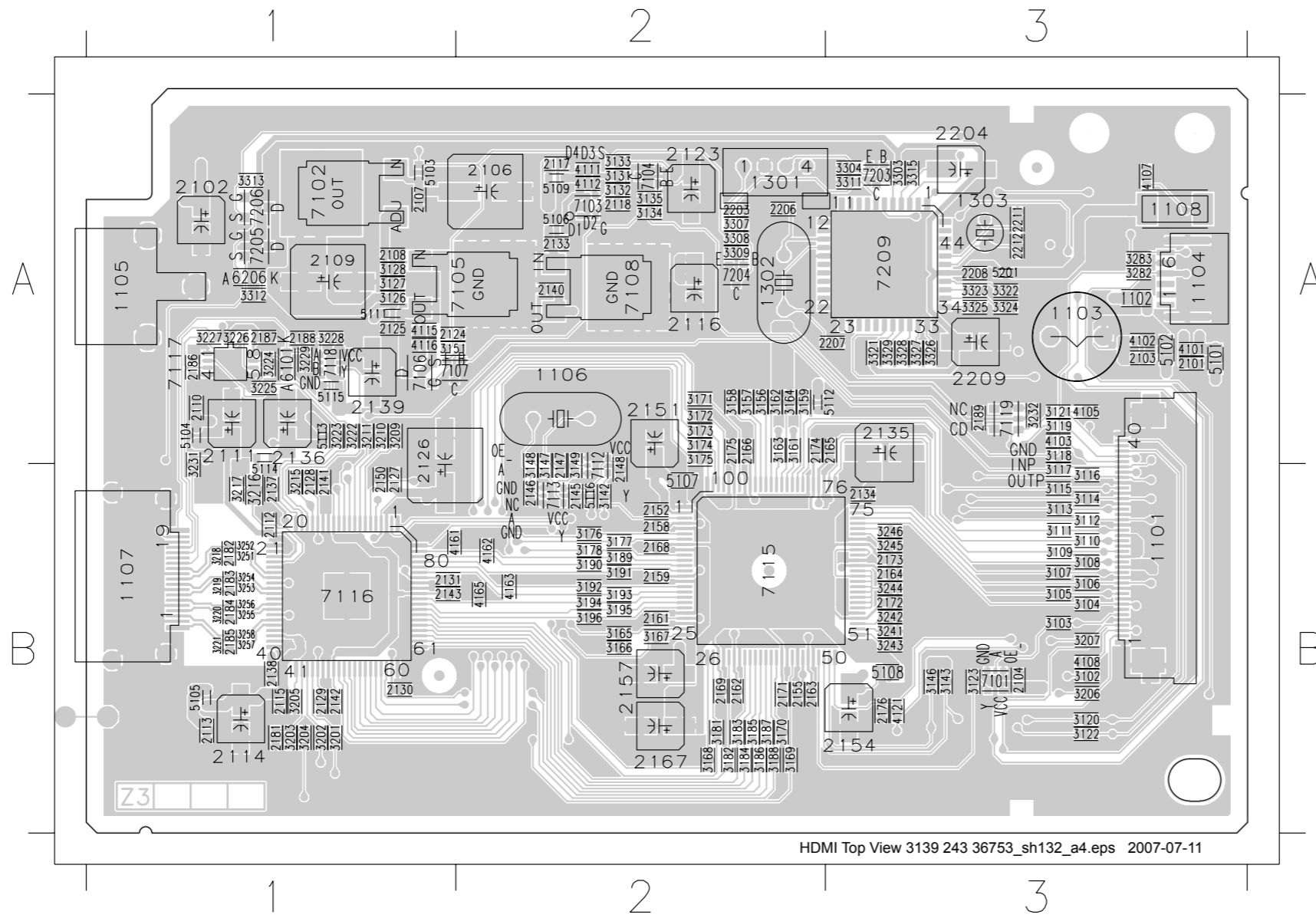
Note :- All items on this page are for provision only

HDMI 3139 243 36753\_130-02-a3.pdf\_2007-12-17

\*HDMI Board 3139 248 51901 introduced in production from week 817 onwards

Layout: HDMI (Top View)

1101 B3	2107 A1	2127 B1	2145 B2	2165 A3	2186 A1	3106 B3	3122 B3	3151 A1	3222 A1	4162 B2
1102 A3	2108 A1	2128 B1	2146 B2	2166 A2	2187 A1	3107 B3	3123 B3	3156 A2	3223 A1	4163 B2
1103 A3	2109 A1	2129 B1	2147 B2	2167 B2	2188 A1	3108 B3	3126 A1	3157 A2	3224 A1	4165 B2
1104 A3	2110 A1	2130 B1	2148 B2	2168 B2	2189 A3	3109 B3	3127 A1	3158 A2	3225 A1	5101 A3
1105 A1	2111 A1	2131 B1	2150 B1	2169 B2	2203 A2	3110 B3	3128 A1	3159 A2	3226 A1	5102 A3
1106 A2	2112 B1	2133 A2	2151 A2	2171 B2	2204 A3	3111 B3	3131 A2	3161 A2	3227 A1	5103 A1
1107 B1	2113 B1	2134 B3	2152 B2	2172 B3	2206 A2	3112 B3	3132 A2	3162 A2	3228 A1	5104 A1
1108 A3	2114 B1	2135 A3	2154 B3	2173 B3	2207 A3	3113 B3	3133 A2	3163 A2	3229 A1	5105 B1
1301 A2	2115 B1	2136 A1	2155 B2	2174 A2	2208 A3	3114 B3	3134 A2	3164 A2	3231 B1	5106 A2
1302 A2	2116 A2	2137 B1	2157 B2	2175 A2	2209 A3	3115 B3	3135 A2	3165 B2	3232 A3	5107 B2
1303 A3	2117 A2	2138 B1	2158 B2	2176 B3	2211 A3	3116 B3	3142 B2	3166 B2	3241 B3	5108 B3
2101 A3	2118 A2	2139 A1	2159 B2	2181 B1	2212 A3	3117 B3	3143 B3	3167 B2	3242 B3	5109 A2
2102 A1	2123 A2	2140 A2	2161 B2	2182 B1	3102 B3	3118 A3	3146 B3	3168 B2	3243 B3	5111 A1
2103 A3	2124 A1	2141 B1	2162 B2	2183 B1	3103 B3	3119 A3	3147 B2	3169 B2	3244 B3	5112 A3
2104 B3	2125 A1	2142 B1	2163 B2	2184 B1	3104 B3	3120 B3	3148 B2	3170 B2	3245 B3	5113 A1
2106 A2	2126 A1	2143 B1	2164 B3	2185 B1	3105 B3	3121 A3	3149 B2	3171 A2	3246 B3	5114 B1



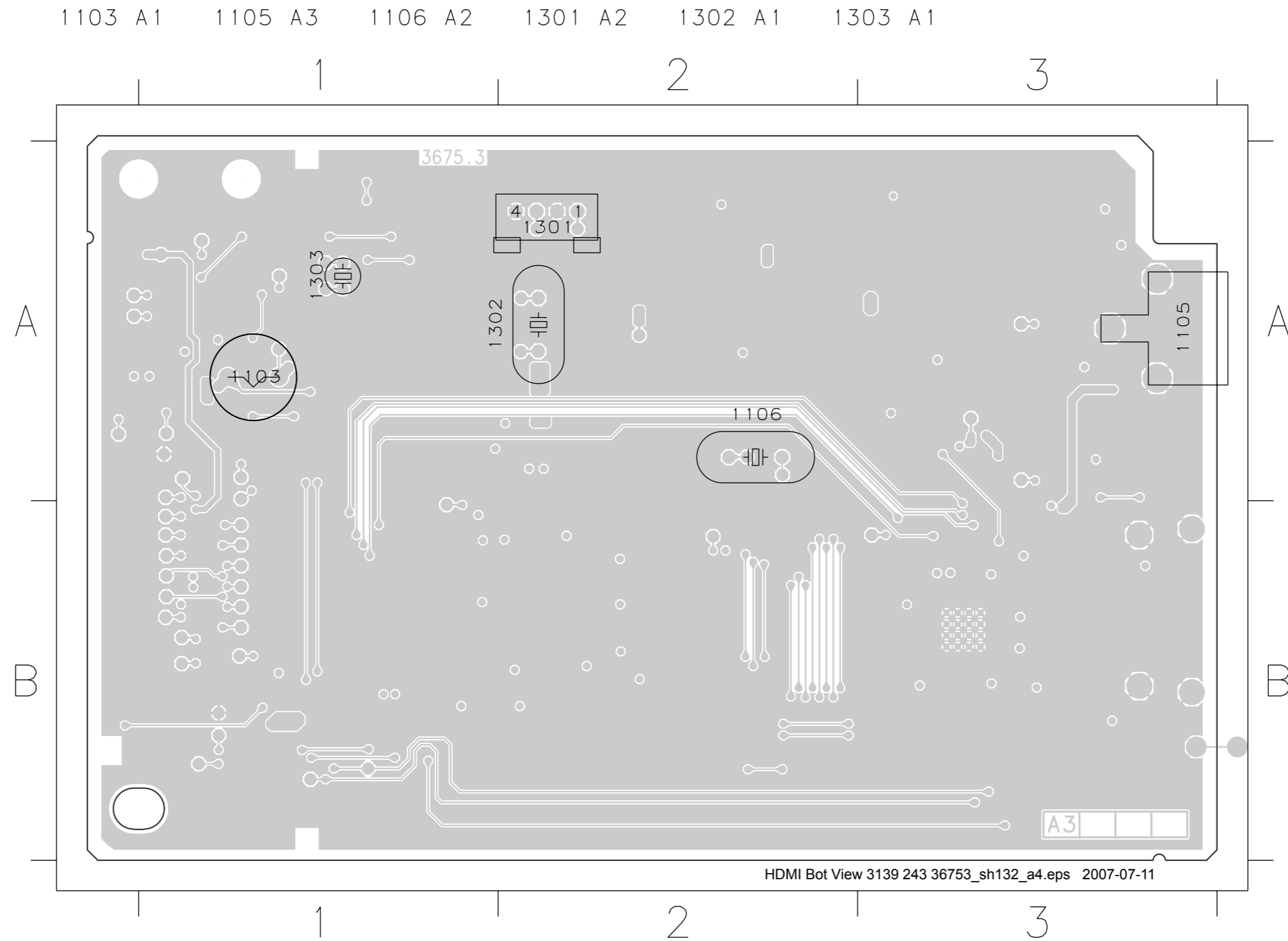
HDMI Top View 3139 243 36753\_sh132\_a4.eps 2007-07-11

3151 A1	3222 A1	4162 B2
3156 A2	3223 A1	4163 B2
3157 A2	3224 A1	4165 B2
3158 A2	3225 A1	5101 A3
3159 A2	3226 A1	5102 A3
3161 A2	3227 A1	5103 A1
3162 A2	3228 A1	5104 A1
3163 A2	3229 A1	5105 B1
3164 A2	3231 B1	5106 A2
3165 B2	3232 A3	5107 B2
3166 B2	3241 B3	5108 B3
3167 B2	3242 B3	5109 A2
3168 B2	3243 B3	5111 A1
3169 B2	3244 B3	5112 A3
3170 B2	3245 B3	5113 A1
3171 A2	3246 B3	5114 B1
3172 A2	3251 B1	5115 A1
3173 A2	3252 B1	5116 B2
3174 A2	3253 B1	5201 A3
3175 A2	3254 B1	6101 A1
3176 B2	3255 B1	6206 A1
3177 B2	3256 B1	7101 B3
3178 B2	3257 B1	7102 A1
3181 B2	3258 B1	7103 A2
3182 B2	3282 A3	7104 A2
3183 B2	3283 A3	7105 A2
3184 B2	3303 A3	7106 A1
3185 B2	3304 A3	7107 A1
3186 B2	3307 A2	7108 A2
3187 B2	3308 A2	7112 B2
3188 B2	3309 A2	7113 B2
3189 B2	3311 A3	7115 B2
3190 B2	3312 A1	7116 B1
3191 B2	3313 A1	7117 A1
3192 B2	3315 A3	7118 A1
3193 B2	3321 A3	7119 A3
3194 B2	3322 A3	7203 A3
3195 B2	3323 A3	7204 A2
3196 B2	3324 A3	7205 A1
3201 B1	3325 A3	7206 A1
3202 B1	3326 A3	7209 A3
3203 B1	3327 A3	
3204 B1	3328 A3	
3205 B1	3329 A3	
3206 B3	4101 A3	
3207 B3	4102 A3	
3209 A1	4103 A3	
3210 A1	4105 A3	
3211 A1	4107 A3	
3215 B1	4108 B3	
3216 B1	4111 A2	
3217 B1	4112 A2	
3218 B1	4115 A1	
3219 B1	4116 A1	
3220 B1	4121 B3	
3221 B1	4161 B1	

\*HDMI Board 3139 248 51901 introduced in production from week 817 onwards



Layout: HDMI (Bottom View)



\*HDMI Board 3139 248 51901 introduced in production from week 817 onwards

## 8. IC Internal Block Diagrams

### 8.1 Analog Board

IC7202 - CS4344 – Digital To Analogue Converter

#### BLOCK DIAGRAM

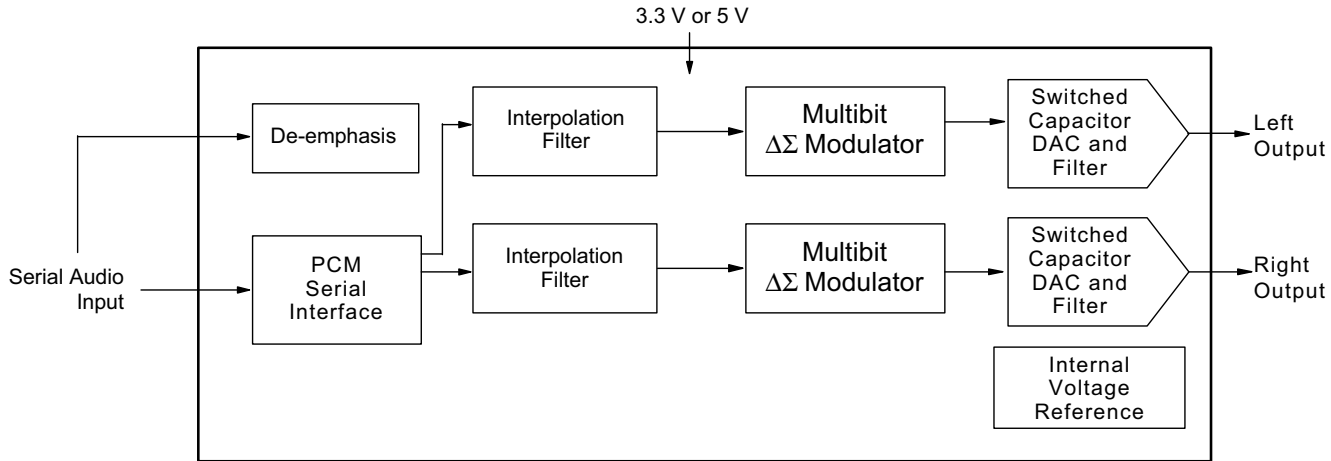
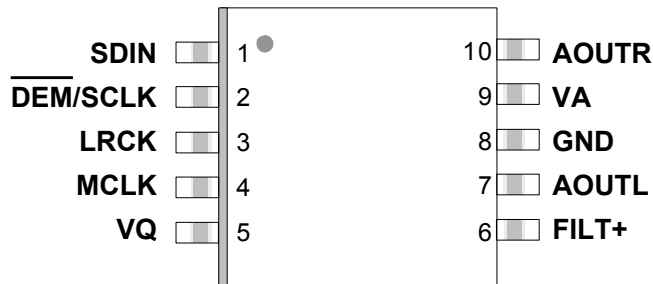


Figure 8-1

#### PIN DESCRIPTION AND CONFIGURATION



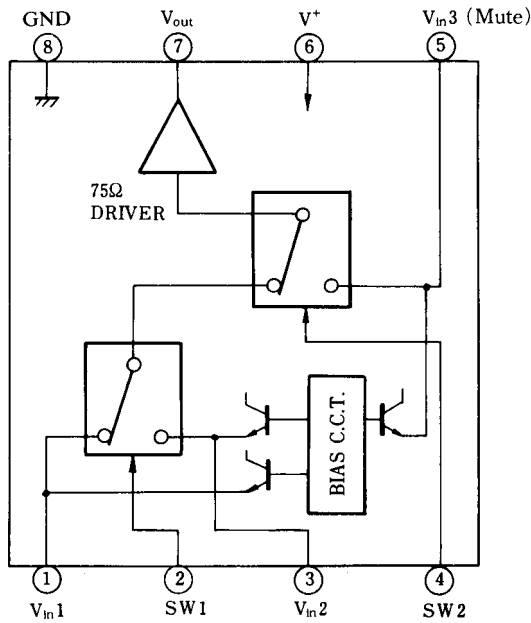
Pin Name	#	Pin Description
SDIN	1	<b>Serial Audio Data Input (Input)</b> - Input for two's complement serial audio data.
$\overline{\text{DEM/SCLK}}$	2	<b>De-Emphasis/External Serial Clock Input (Input)</b> - used for de-emphasis filter control or external serial clock input.
LRCK	3	<b>Left Right Clock (Input)</b> - Determines which channel, Left or Right, is currently active on the serial audio data line.
MCLK	4	<b>Master Clock (Input)</b> - Clock source for the delta-sigma modulator and digital filters.
VQ	5	<b>Quiescent Voltage (Output)</b> - Filter connection for internal quiescent voltage.
FILT+	6	<b>Positive Voltage Reference (Output)</b> - Positive reference voltage for the internal sampling circuits.
AOUTL	7	<b>Left Channel Analog Output (Output)</b> - The full scale analog output level is specified in the Analog Characteristics specification table.
GND	8	<b>Ground (Input)</b> - ground reference.
VA	9	<b>Analog Power (Input)</b> - Positive power for the analog and digital sections.
AOUTR	10	<b>Right Channel Analog Output (Output)</b> - The full scale analog output level is specified in the Analog Characteristics specification table.

IC 7101 - NJW2244M - 3-INPUT VIDEO SWITCH WITH 75Ω DRIVER

**BLOCK DIAGRAM**

■ **BLOCK DIAGRAM**

Pin Connection



■ **INPUT CONTROL SIGNAL-OUTPUT SIGNAL**

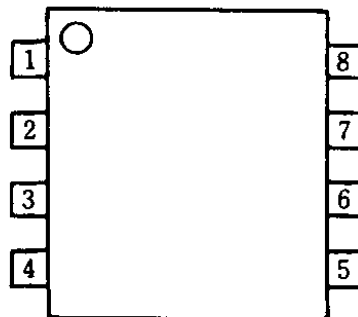
SW1	SW2	OUTPUT SIGNAL
L	L	V <sub>IN1</sub>
H	L	V <sub>IN2</sub>
L/H	H	V <sub>IN3</sub>

note): Input clamp Voltage is about 2/5 of Supply Voltage

Figure 8-2

**PIN DESCRIPTION AND CONFIGURATION**

■ **PIN CONFIGURATION**



**NJM2244D**  
**NJM2244M**

Figure 8-3

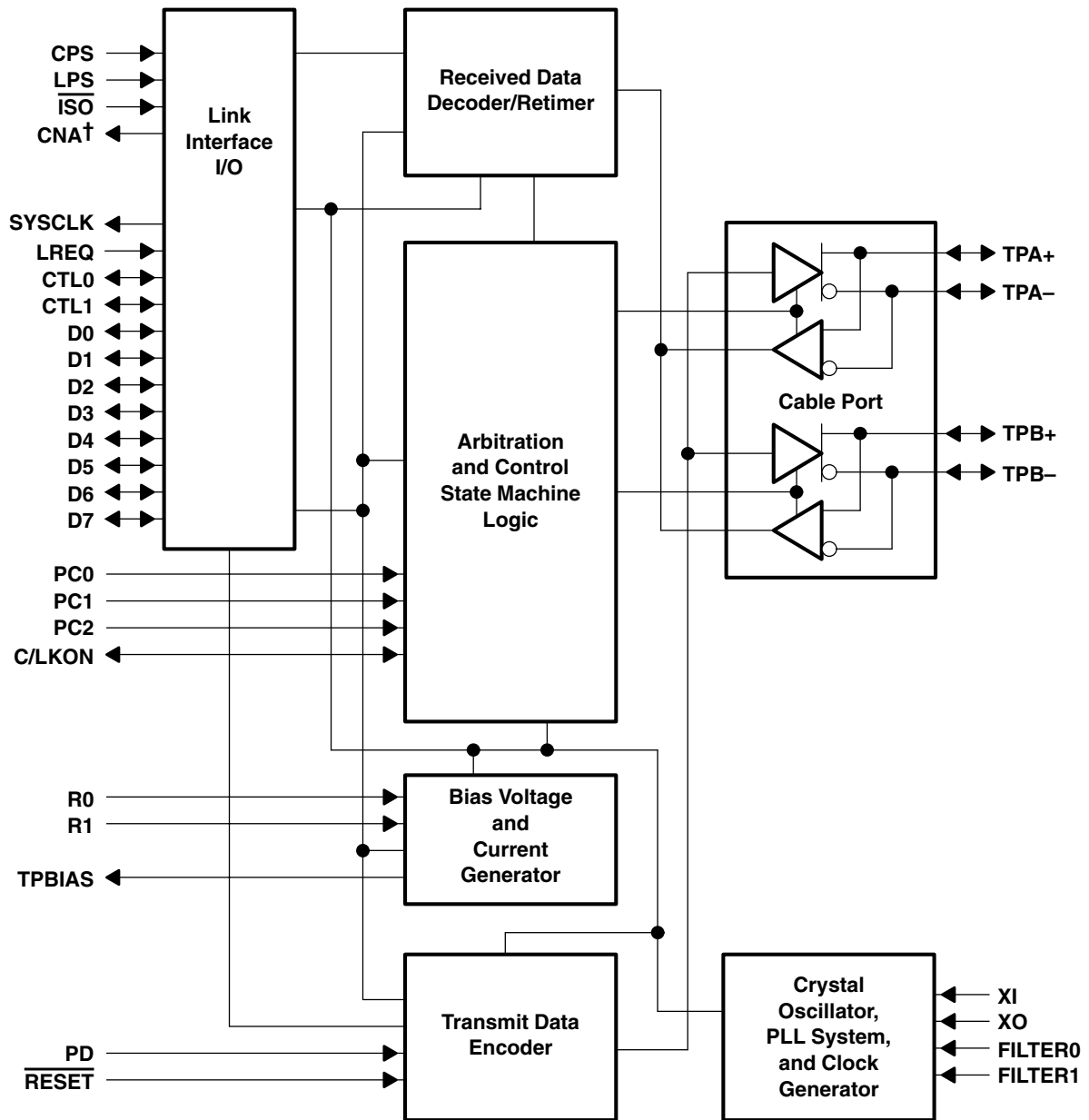
**PIN FUNCTION**

- 1 . V<sub>in1</sub>
- 2 . SW1
- 3 . V<sub>in2</sub>
- 4 . SW2
- 5 . V<sub>in3</sub>
- 6 . V<sup>+</sup>
- 7 . V<sub>out</sub>
- 8 . GND

8.2 Digital Board

IC7300 - TSB41AB1 - IEEE 1394a-2000 ONE-PORT CABLE TRANSCEIVER/ARBITER

BLOCK DIAGRAM



† CNA output is only available in the 64-pin PAP package

Figure 8-4

PIN CONFIGURATION

PHP PACKAGE  
(TOP VIEW)

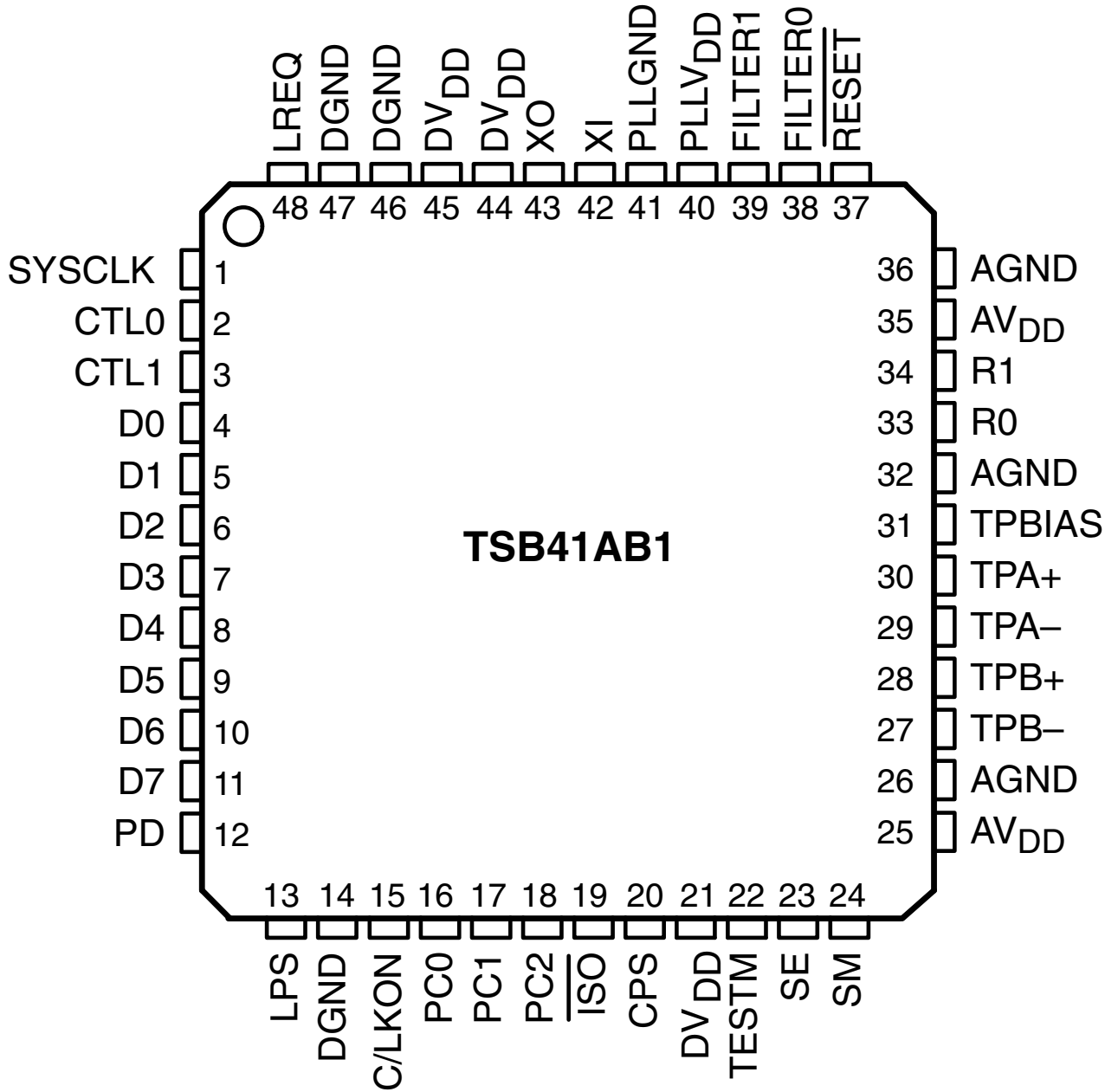


Figure 8-5

## PIN DESCRIPTION

TERMINAL			TYPE	I/O	DESCRIPTION
NAME	PAP NO.	PHP NO.			
AGND	32, 33, 39, 48, 49, 50	26, 32, 36	Supply	–	Analog circuit ground terminals. These terminals should be tied together to the low-impedance circuit board ground plane.
AVDD	30, 31, 42, 51, 52	25, 35	Supply	–	Analog circuit power terminals. A combination of high frequency decoupling capacitors near each terminal is suggested, such as paralleled 0.1 $\mu$ F and 0.001 $\mu$ F. Lower frequency 10 $\mu$ F filtering capacitors are also recommended. These supply terminals are separated from PLLVDD and DVDD inside the device to provide noise isolation. They should be tied at a low-impedance point on the circuit board.
C/LKON	19	15	CMOS	I/O	<p>Bus manager contender programming input and link-on output. On hardware reset, this terminal is used to set the default value of the contender status indicated during self-ID. Programming is done by tying the terminal through a 10-k<math>\Omega</math> resistor to a high (contender) or low (not contender). The resistor allows the link-on output to override the input. However, it is recommended that this terminal should be programmed low, and that the contender status be set via the C register bit.</p> <p>If the TSB41AB1 is used with an LLC that has a dedicated terminal for monitoring LKON and also setting the contender status, then a 1-k<math>\Omega</math> series resistor should be placed on the LKON line between the PHY and LLC to prevent bus contention.</p> <p>Following hardware reset, this terminal is the link-on output, which is used to notify the LLC to power up and become active. The link-on output is a square-wave signal with a period of approximately 163 ns (8 SYSCLK cycles) when active. The link-on output is otherwise driven low, except during hardware reset when it is high-impedance.</p> <p>The link-on output is activated if the LLC is inactive (LPS inactive or the LCtrl bit cleared) and when:</p> <ol style="list-style-type: none"> <li>the PHY receives a link-on PHY packet addressed to this node, or</li> <li>the PEI (port-event interrupt) register bit is 1, or</li> <li>any of the CTOI (configuration-time-out interrupt), CPSI (cable-power-status interrupt), or STOI (state-time-out interrupt) register bits are 1 and the RPIE (resuming-port interrupt enable) register bit is also 1.</li> </ol> <p>Once activated, the link-on output continues active until the LLC becomes active (both LPS active and the LCtrl bit set). The PHY also deasserts the link-on output when a bus reset occurs unless the link-on output would otherwise be active because one of the interrupt bits is set (that is, the link-on output is active due solely to the reception of a link-on PHY packet).</p> <p>NOTE: If an interrupt condition exists which would otherwise cause the link-on output to be activated if the LLC were inactive, the link-on output is activated when the LLC subsequently becomes inactive.</p>
CNA	3	N/A	CMOS	O	Cable-not-active output. This terminal is asserted high when there is no incoming bias voltage.
CPS	24	20	CMOS	I	Cable power status input. This terminal is normally connected to cable power through a 400-k $\Omega$ resistor. This circuit drives an internal comparator that is used to detect the presence of cable power. This terminal should be tied directly to DVDD supply if application does not require it to be used.
CTL0 CTL1	4 5	2 3	CMOS	I/O	Control I/Os. These bidirectional signals control communication between the TSB41AB1 and the LLC. Bus holders are built into these terminals.
D0 D1 D2 D3 D4 D5 D6 D7	6 7 8 9 10 11 12 13	4 5 6 7 8 9 10 11	CMOS	I/O	Data I/Os. These are bidirectional data signals between the TSB41AB1 and the LLC. Bus holders are built into these terminals.

TERMINAL			TYPE	I/O	DESCRIPTION
NAME	PAP NO.	PHP NO.			
DGND	17, 18, 63, 64	14, 46, 47	Supply	–	Digital circuit ground terminals. These terminals should be tied together to the low-impedance circuit board ground plane.
DV <sub>DD</sub>	25, 26, 61, 62	21, 44, 45	Supply	–	Digital circuit power terminals. A combination of high-frequency decoupling capacitors near each terminal is suggested, such as paralleled 0.1 $\mu$ F and 0.001 $\mu$ F. Lower frequency 10 $\mu$ F filtering capacitors are also recommended. These supply terminals are separated from PLLV <sub>DD</sub> and AV <sub>DD</sub> inside the device to provide noise isolation. They should be tied at a low-impedance point on the circuit board.
FILTER0 FILTER1	54 55	38 39	CMOS	I/O	PLL filter terminals. These terminals are connected to an external capacitor to form a lag-lead filter required for stable operation of the internal frequency multiplier PLL running from the crystal oscillator. A 0.1 $\mu$ F $\pm$ 10% capacitor is the only external component required to complete this filter.
$\overline{\text{ISO}}$	23	19	CMOS	I	Link interface isolation control input. This terminal controls the operation of output differentiation logic on the CTL and D terminals. If an optional Annex J type isolation barrier is implemented between the TSB41AB1 and LLC, the $\overline{\text{ISO}}$ terminal should be tied low to enable the differentiation logic. If no isolation barrier is implemented (direct connection), or TI bus holder isolation is implemented, the $\overline{\text{ISO}}$ terminal should be tied high to disable the differentiation logic. For additional information refer to TI application note <i>Galvanic Isolation of the IEEE 1394-1995 Serial Bus</i> , SLLA011.
LPS	15	13	CMOS	I	<p>Link power status input. This terminal monitors the active/power status of the link layer controller and controls the state of the PHY-LLC interface. This terminal should be connected through a 10-k<math>\Omega</math> resistor either to the V<sub>DD</sub> supplying the LLC, or to a pulsed output which is active when the LLC is powered (see Figure 9). A pulsed signal should be used when an isolation barrier exists between the LLC and PHY. (See Figure 10.)</p> <p>The LPS input is considered inactive if it is sampled low by the PHY for more than 2.6 <math>\mu</math>s (128 SYSCLK cycles), and is considered active otherwise (that is, asserted steady high or an oscillating signal with a low time less than 2.6 <math>\mu</math>s). The LPS input must be high for at least 21 ns to guarantee that a high is observed by the PHY.</p> <p>When the TSB41AB1 detects that LPS is inactive, it places the PHY-LLC interface into a low-power reset state. In the reset state, the CTL and D outputs are held in the logic zero state and the LREQ input is ignored; however, the SYSCLK output remains active. If the LPS input remains low for more than 26 <math>\mu</math>s (1280 SYSCLK cycles), the PHY-LLC interface is put into a low-power disabled state in which the SYSCLK output is also held inactive. The PHY-LLC interface is placed into the disabled state upon hardware reset.</p> <p>The LLC is considered active only if both the LPS input is active and the LCtrl register bit is set to 1, and is considered inactive if either the LPS input is inactive or the LCtrl register bit is cleared to 0.</p>
LREQ	1	48	CMOS	I	LLC request input. The LLC uses this input to initiate a service request to the TSB41AB1. Bus holder is built into this terminal.
PC0 PC1 PC2	20 21 22	16 17 18	CMOS	I	Power class programming inputs. On hardware reset, these inputs set the default value of the power class indicated during self-ID. Programming is done by tying these terminals high or low. Refer to Table 9 for encoding.
PD	14	12	CMOS	I	Power-down input. A high on this terminal turns off all internal circuitry except the cable-active monitor circuits, which control the CNA output (64-terminal PAP package only). Asserting the PD input high also activates an internal pulldown on the RESET terminal to force a reset of the internal control logic. (PD is provided for legacy compatibility and is not recommended for power management in place of IEEE 1394a-2000 suspend/resume LPS and C/LKON features.)

TERMINAL			TYPE	I/O	DESCRIPTION
NAME	PAP NO.	PHP NO.			
PLL <sub>GND</sub>	57, 58	41	Supply	–	PLL circuit ground terminals. These terminals should be tied together to the low-impedance circuit board ground plane.
PLL <sub>VDD</sub>	56	40	Supply	–	PLL circuit power terminals. A combination of high-frequency decoupling capacitors near each terminal is suggested, such as paralleled 0.1 $\mu$ F and 0.001 $\mu$ F. Lower frequency 10 $\mu$ F filtering capacitors are also recommended. This supply terminal is separated from DV <sub>DD</sub> and AV <sub>DD</sub> inside the device to provide noise isolation. It should be tied at a low-impedance point on the circuit board.
R0 R1	40 41	33 34	Bias	–	Current setting resistor terminals. These terminals are connected through an external resistor to set the internal operating currents and cable driver output currents. A resistance of 6.34 k $\Omega$ $\pm$ 1.0% is required to meet the IEEE Std 1394-1995 output voltage limits.
RESET	53	37	CMOS	I	Logic reset input. Asserting this terminal low resets the internal logic. An internal pullup resistor to V <sub>DD</sub> is provided so only an external delay capacitor is required for proper power-up operation (see <i>power-up reset</i> in the Application Information section). The RESET terminal also incorporates an internal pulldown which is activated when the PD input is asserted high. This input is otherwise a standard logic input, and may also be driven by an open-drain type driver.
SE	28	23	CMOS	I	Test control input. This input is used in manufacturing test of the TSB41AB1. For normal use this terminal may be tied to GND through a 1-k $\Omega$ pulldown resistor or it may be tied to GND directly.
SM	29	24	CMOS	I	Test control input. This input is used in manufacturing test of the TSB41AB1. For normal use this terminal should be tied to GND.
SYSC <sub>CLK</sub>	2	1	CMOS	O	System clock output. Provides a 49.152-MHz clock signal, synchronized with data transfers, to the LLC.
TEST <sub>M</sub>	27	22	CMOS	I	Test control input. This input is used in manufacturing test of the TSB41AB1. For normal use this terminal should be tied to V <sub>DD</sub> .
TPA <sub>+</sub>	37	30	Cable	I/O	Twisted-pair cable A differential signal terminals. Board traces from the pair of <b>positive and negative differential signal terminals should be kept matched and as short as possible to the external load resistors and to the cable connector.</b>
TPA <sub>–</sub>	36	29	Cable	I/O	
TPB <sub>+</sub>	35	28	Cable	I/O	Twisted-pair cable B differential signal terminals. Board traces from the pair of <b>positive and negative differential signal terminals should be kept matched and as short as possible to the external load resistors and to the cable connector.</b>
TPB <sub>–</sub>	34	27	Cable	I/O	
TPBIAS	38	31	Cable	I/O	Twisted-pair bias output. This provides the 1.86 V nominal bias voltage needed for proper operation of the twisted-pair cable drivers and receivers, and for signaling to the remote nodes that there is an active cable connection.
XI XO	59 60	42 43	Crystal	–	Crystal oscillator inputs. These terminals connect to a 24.576-MHz parallel resonant fundamental mode crystal. The optimum values for the external shunt capacitors are dependent on the specifications of the crystal used (see <i>crystal selection</i> in the Application Information section). When an external clock source is used, XI should be the input and XO should be left open, and the clock must be supplied before the device is powered on.



IC7301 – TPS2051AD - CURRENT-LIMITED POWER-DISTRIBUTION SWITCHES

BLOCK DIAGRAM

TPS2041A

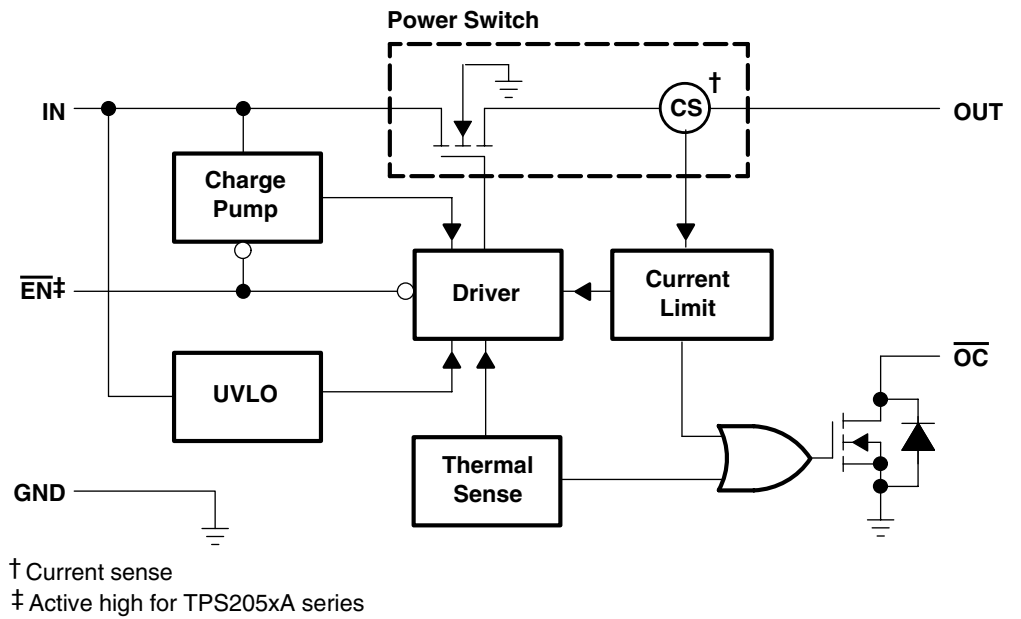


Figure 8-6

PIN CONFIGURATION

**TPS2041A, TPS2051A  
 D PACKAGE  
 (TOP VIEW)**

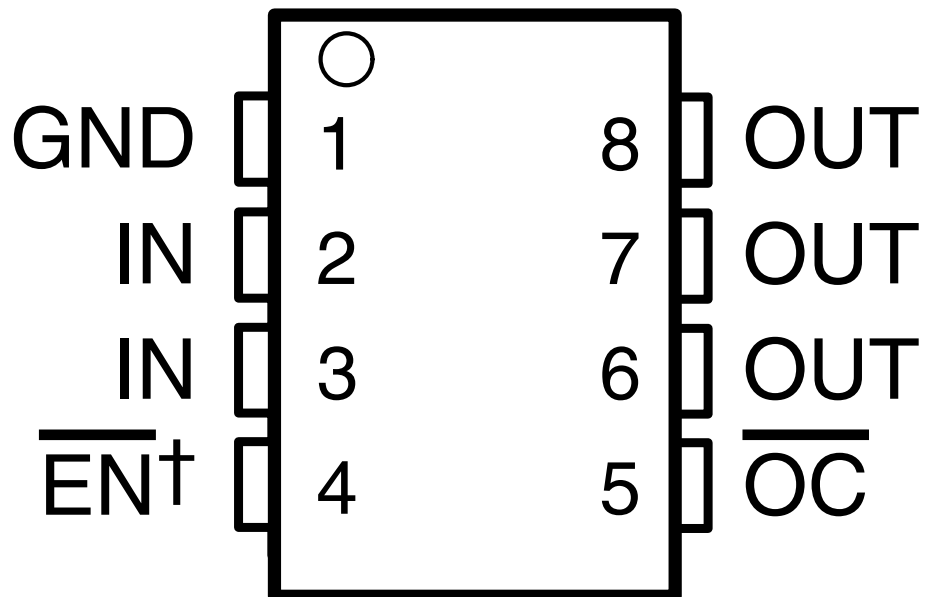


Figure 8-7

## PIN DESCRIPTION

## TPS2041A and TPS2051A

NAME	TERMINAL		I/O	DESCRIPTION
	NO.			
	TPS2041A	TPS2051A		
$\overline{\text{EN}}$	4	–	I	Enable input. Logic low turns on power switch.
EN	–	4	I	Enable input. Logic high turns on power switch.
GND	1	1	I	Ground
IN	2, 3	2, 3	I	Input voltage
$\overline{\text{OC}}$	5	5	O	Overcurrent. Logic output active low
OUT	6, 7, 8	6, 7, 8	O	Power-switch output

IC7500 – SAA7136AE – MULTISTANDARD AUDIO/VIDEO DECODER

BLOCK DIAGRAM

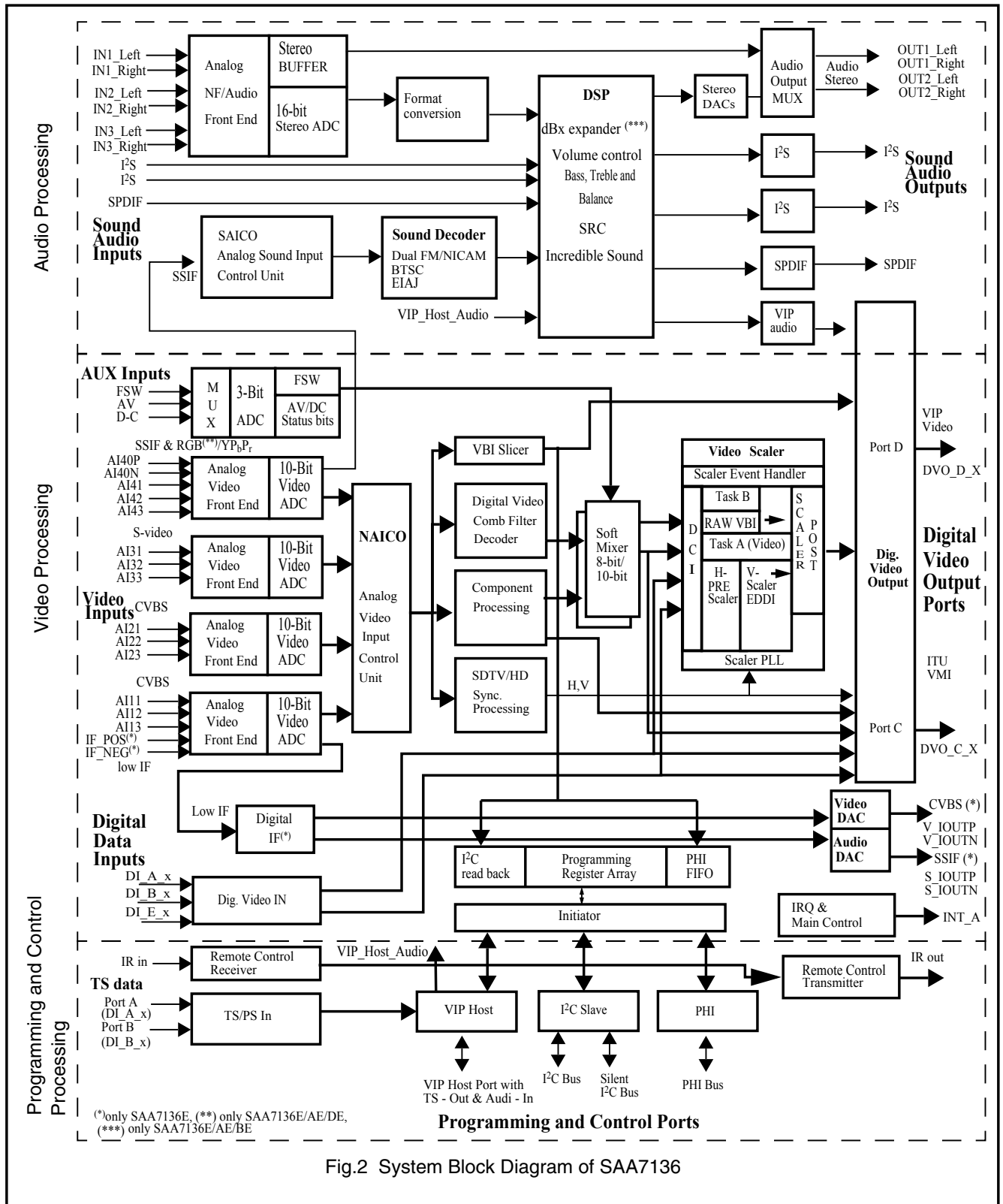


Fig.2 System Block Diagram of SAA7136

Figure 8-8

**PIN CONFIGURATION**

**Table 1** Pin Configuration (BGA 256 top view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	AUX3A	NC	AUX2B	AUX1A	IN2_Left	V <sub>DDA</sub> (3V3)	OUT1_Left	IF_AGC	I2S_I_1_WS	I2S_O_S	RST_OUT_N	V <sub>SSD</sub> (3V3)	VIP_HCTL	V <sub>SSD</sub>	VIP_D6	VIP_D5
B	AUX3B	NC	AUX2A	IN3_Left	IN2_Right	VRPOS_ADC	OUT1_Right	NC	V <sub>SSD</sub>	SPDIF_I	IR_OUT	V <sub>DDD</sub> (3V3)	VIP_CLK	V <sub>DDD</sub> (3V3)	VIP_D3	VIP_D4
C	AGND1	VS <sub>YN</sub> C	AUX1B	VREF_ADC	IN1_Left	VRNEG_ADC	V <sub>DDA</sub> (3V3)	I2S_I_2_SD	V <sub>DDD</sub> (3V3)	SPDIF_O	V <sub>DDD</sub> (1V8)	GPIO_0	VIP_D7	V <sub>DDD</sub> (3V3)	V <sub>SSD</sub>	VIP_D2
D	V <sub>DDA</sub> (3V3)	V <sub>DDA</sub> (1V8)	V <sub>SSA</sub>	IN3_Right	IN1_Right	VREF_DAC	V <sub>DDD</sub> (1V8)	I2S_I_2_SCK	I2S_O_SD_AUX	V <sub>DDD</sub> (1V8)	IR_IN	VIP_RSN	DI_E_7	PP_SEL	VIP_D0	VIP_D1
E	V_IOUTN	V_IOUTP	S_IOUTN	S_IOUTP	V <sub>SSA</sub>	V <sub>SSA</sub>	OUT2_Right	I2S_I_2_WS	I2S_O_AMCLK	NC	GPIO_1	V <sub>SSD</sub>	V <sub>DDD</sub> (1V8)	V <sub>DDD</sub> (3V3)	V <sub>SSD</sub>	DI_E_6
F	AI11	IF_NEG	IF_POS	DAC_Bias	V <sub>DDA</sub> (3V3)	VREF0	OUT2_Left	I2S_I_1_SD	I2S_O_SCK	V <sub>SSD</sub>	V <sub>SSD</sub>	DI_E_1	DI_E_2	DI_E_3	DI_E_4	DI_E_5
G	AI13	AI12	V <sub>DDA</sub> (3V3)	V <sub>SSA</sub>	V <sub>SSA</sub>	V <sub>DDA</sub> (3V3)	V <sub>SSD</sub>	I2S_I_1_SCK	I2S_O_WS	V <sub>SSD</sub>	DI_B_VS	DI_B_DQ	DI_A_8	DI_A_9	DI_E_0	V <sub>DDD</sub> (3V3)
H	AI23	AI22	AI21	V <sub>SSA</sub>	V <sub>DDA</sub> (3V3)	AI1D	NC	V <sub>SSD</sub>	DI_B_HS	NC	NC	NC	NC	NC	NC	V <sub>DDD</sub> (3V3)
J	NC	V <sub>DDA</sub> (1V8)	V <sub>SSA</sub>	V <sub>DDA</sub> (3V3)	AI2D	V <sub>SSA</sub>	V <sub>DDA</sub> (3V3)	NC	V <sub>SSD</sub>	DI_A_CLK	V <sub>DDD</sub> (1V8)	V <sub>SSD</sub>	DI_B_5	DI_B_6	DI_B_7	DI_B_CLK
K	V <sub>SSA</sub>	V <sub>SSA</sub>	AOUT2	V <sub>DDA</sub> (3V3)	AOUT1	RES_REF_V	NC	DI_A_2	DI_A_3	V <sub>SSD</sub>	DI_B_0	DI_B_1	DI_B_2	DI_B_3	DI_B_4	V <sub>DDD</sub> (3V3)
L	AI33	AI32	AI31	V <sub>DDA</sub> (3V3)	V <sub>SSA</sub>	AGND2	XTOUT	SI_VSYNC	DI_A_4	DI_A_LOCK	V <sub>SSD</sub>	DVO_ODEV	DVO_DQ	DVO_DCLK	V <sub>DDD</sub> (3V3)	V <sub>SSD</sub>
M	V <sub>SSA</sub>	V <sub>SSA</sub>	V <sub>DDA</sub> (3V3)	AI3D	NC	NC	D_CON_1	NC	V <sub>SSD</sub>	DI_A_VAL	DVO_C_0	V <sub>SSD</sub>	V <sub>DDD</sub> (3V3)	V <sub>SSD</sub>	DVO_VS	GPIO_2
N	AI41	AI40N	AI40P	V <sub>DDA</sub> (3V3)	SDA	INT_A	D_CON_2	V <sub>SSD</sub>	DI_A_5	V <sub>DDD</sub> (1V8)	V <sub>DDD</sub> (1V8)	V <sub>SSD</sub>	DVO_C_6	DVO_D_7	DVO_CLK_C	DVO_HS
P	NC	AI43	AI42	TDO	SCL_SILENT	CE	V <sub>DDD</sub> (1V8)	DI_A_0	DI_A_6	V <sub>DDD</sub> (3V3)	DVO_C_1	DVO_C_3	DVO_C_7	DVO_D_0	DVO_D_5	DVO_D_6
R	V <sub>DDA</sub> (3V3)	AI4D	TCK	TDI	SDA_SILENT	V <sub>SSA</sub>	V <sub>DDA</sub> (1V8)	DI_A_1	V <sub>DDD</sub> (3V3)	V <sub>SSD</sub>	DVO_C_2	DVO_C_4	V <sub>DDD</sub> (3V3)	DVO_D_1	DVO_D_3	V <sub>SSD</sub>
T	V <sub>SSA</sub>	TRST_N	TMS	SCL	NC	XTALI	XTALO	V <sub>DDD</sub> (3V3)	DI_A_7	DI_A_SOP	V <sub>DDD</sub> (3V3)	DVO_C_5	V <sub>SSD</sub>	DVO_D_2	DVO_D_4	V <sub>DDD</sub> (3V3)
	Analog Processing Pins								Digital Processing Pins							

**Figure 8-9**

### 8.3. HDMI Board

#### 8.3.1 IC7100 - FLI2310 - Faroudja Digital Video Format Converter (HDMI PCBA 3139 248 89141)

##### BLOCK DIAGRAM

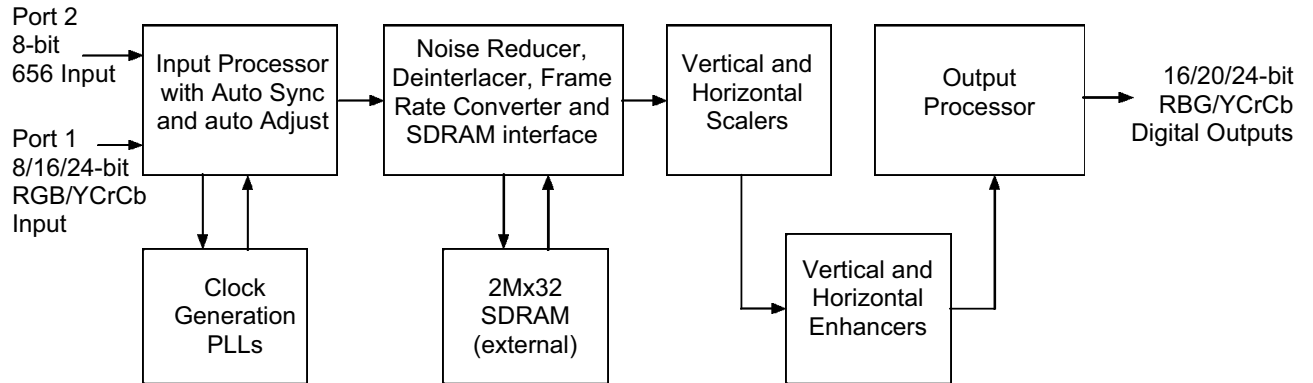
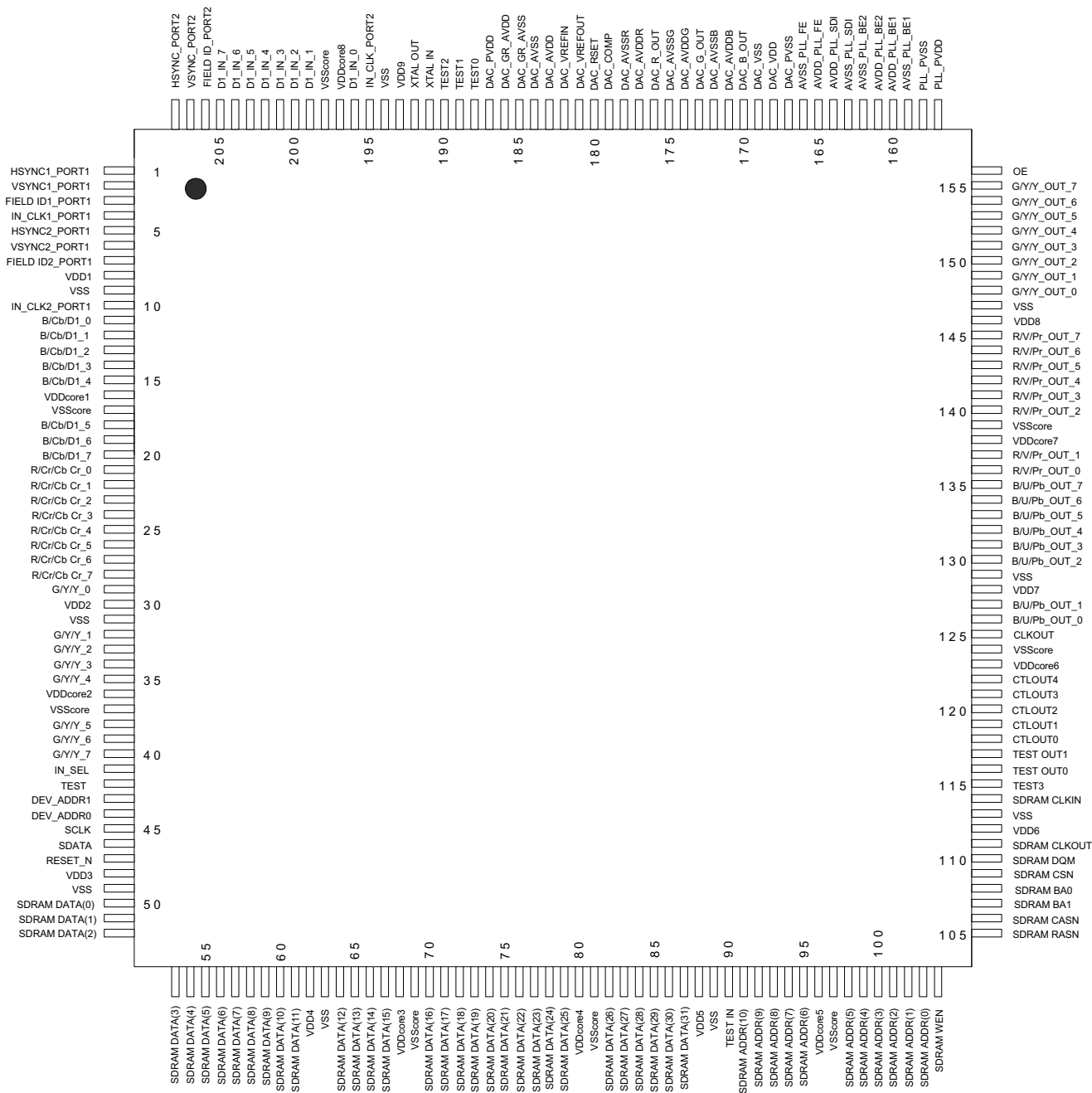


Figure 8-14

PIN CONFIGURATION



Package: 208-pin PQFP

Figure 8-15

## PIN DESCRIPTION

Pin No	Pin Name	I/O Type	Voltage Tolerance	Drive	Pull up/ Pulldown	Description
1	HSYNC1_PORT1	Input	5v			Horizontal sync or reference -CTL1 of Port 1
2	VSYNC1_PORT1	Input	5v			Vertical sync or reference -CTL1 of Port 1
3	FIELD ID1_PORT1	Input	5v			Odd/Even Field identification -CTL1 of Port 1
4	IN_CLK1_PORT1	Input	5v			Data Clock input -CTL1 of Port 1
5	HSYNC2_PORT1	Input	5v			Horizontal sync or reference -CTL2 of Port 1
6	VSYNC2_PORT1	Input	5v			Vertical sync or reference -CTL2 of Port 1
7	FIELD ID2_PORT1	Input	5v			Odd/Even Field identification -CTL2 of Port 1
8	VDD1	Power				3.3 V - Power pin for IO
9	VSS	Ground				Ground
10	IN_CLK2_PORT1	Input	5v			Data Clock input -CTL2 of Port 1
11	B/Cb/D1_0	Input	5v			Port 1 - Digital video input (Blue/Cb/D1)
12	B/Cb/D1_1	Input	5v			Port 1 - Digital video input (Blue/Cb/D1)
13	B/Cb/D1_2	Input	5v			Port 1 - Digital video input (Blue/Cb/D1)
14	B/Cb/D1_3	Input	5v			Port 1 - Digital video input (Blue/Cb/D1)
15	B/Cb/D1_4	Input	5v			Port 1 - Digital video input (Blue/Cb/D1)
16	VDDcore1	Power				1.8 V - Power pin for core
17	VSS	Ground				Ground
18	B/Cb/D1_5	Input	5v			Port 1 - Digital video input (Blue/Cb/D1)
19	B/Cb/D1_6	Input	5v			Port 1 - Digital video input (Blue/Cb/D1)
20	B/Cb/D1_7	Input	5v			Port 1 - Digital video input (Blue/Cb/D1)
21	R/Cr/CrCb_0	Input	5v			Port 1 - Digital video input (Red/Cr/CrCb)
22	R/Cr/CrCb_1	Input	5v			Port 1 - Digital video input (Red/Cr/CrCb)
23	R/Cr/CrCb_2	Input	5v			Port 1 - Digital video input (Red/Cr/CrCb)
24	R/Cr/CrCb_3	Input	5v			Port 1 - Digital video input (Red/Cr/CrCb)
25	R/Cr/CrCb_4	Input	5v			Port 1 - Digital video input (Red/Cr/CrCb)
26	R/Cr/CrCb_5	Input	5v			Port 1 - Digital video input (Red/Cr/CrCb)
27	R/Cr/CrCb_6	Input	5v			Port 1 - Digital video input (Red/Cr/CrCb)
28	R/Cr/CrCb_7	Input	5v			Port 1 - Digital video input (Red/Cr/CrCb)
29	G/Y/Y_0	Input	5v			Port 1 - Digital video input (Green/Y)
30	VDD2	Power				3.3 V - Power pin for IO
31	VSS	Ground				Ground
32	G/Y/Y_1	Input	5v			Port 1 - Digital video input (Green/Y)
33	G/Y/Y_2	Input	5v			Port 1 - Digital video input (Green/Y)
34	G/Y/Y_3	Input	5v			Port 1 - Digital video input (Green/Y)
35	G/Y/Y_4	Input	5v			Port 1 - Digital video input (Green/Y)
36	VDDcore2	Power				1.8 V - Power pin for core
37	VSS	Ground				Ground
38	G/Y/Y_5	Input	5v			Port 1 - Digital video input (Green/Y)
39	G/Y/Y_6	Input	5v			Port 1 - Digital video input (Green/Y)
40	G/Y/Y_7	Input	5v			Port 1 - Digital video input (Green/Y)
41	IN_SEL	Output	5v	8 mA		Output to select external video mux
42	TEST	Input	5v			Connect to Ground
43	DEV_ADDR1	Input	5v			Device address setting 1
44	DEV_ADDR0	Input	5v			Device address setting 0

Pin No	Pin Name	I/O Type	Voltage Tolerance	Drive	Pull up/ Pulldown	Description
45	SCLK	I/O	5v	8 mA		2-wire serial control bus clock
46	SDATA	I/O	5v	8 mA		2-wire serial control bus data
47	RESET_N	Input	5v		PU	Reset
48	VDD3	Power				3.3 V – Power pin for IO
49	VSS	Ground				Ground
50	SDRAM DATA(0)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
51	SDRAM DATA(1)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
52	SDRAM DATA(2)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
53	SDRAM DATA(3)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
54	SDRAM DATA(4)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
55	SDRAM DATA(5)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
56	SDRAM DATA(6)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
57	SDRAM DATA(7)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
58	SDRAM DATA(8)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
59	SDRAM DATA(9)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
60	SDRAM DATA(10)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
61	SDRAM DATA(11)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
62	VDD4	Power				3.3 V – Power pin for IO
63	VSS	Ground				Ground
64	SDRAM DATA(12)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
65	SDRAM DATA(13)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
66	SDRAM DATA(14)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
67	SDRAM DATA(15)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
68	VDDcore3	Power				1.8 V - Power pin for core
69	VSS	Ground				Ground
70	SDRAM DATA(16)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
71	SDRAM DATA(17)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
72	SDRAM DATA(18)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
73	SDRAM DATA(19)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
74	SDRAM DATA(20)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
75	SDRAM DATA(21)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
76	SDRAM DATA(22)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
77	SDRAM DATA(23)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
78	SDRAM DATA(24)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
79	SDRAM DATA(25)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
80	VDDcore4	Power				1.8 V – Power pin for core
81	VSS	Ground				Ground
82	SDRAM DATA(26)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
83	SDRAM DATA(27)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
84	SDRAM DATA(28)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
85	SDRAM DATA(29)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
86	SDRAM DATA(30)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
87	SDRAM DATA(31)	Tristate I/O	5v	4 mA	PD	SDRAM data bus *
88	VDD5	Power				3.3 V – Power pin for IO
89	VSS	Ground				Ground
90	TEST IN	Input	5V			Test input-Connect to ground



Pin No	Pin Name	I/O Type	Voltage Tolerance	Drive	Pull up/ Pulldown	Description
91	SDRAM ADDR(10)	Tristate O/P	5v	8 mA		SDRAM address bus *
92	SDRAM ADDR(9)	Tristate O/P	5v	8 mA		SDRAM address bus *
93	SDRAM ADDR(8)	Tristate O/P	5v	8 mA		SDRAM address bus *
94	SDRAM ADDR(7)	Tristate O/P	5v	8 mA		SDRAM address bus *
95	SDRAM ADDR(6)	Tristate O/P	5v	8 mA		SDRAM address bus *
96	VDDcore5	Power				1.8 V – Power pin for core
97	VSS	Ground				Ground
98	SDRAM ADDR(5)	Tristate O/P	5v	8 mA		SDRAM address bus *
99	SDRAM ADDR(4)	Tristate O/P	5v	8 mA		SDRAM address bus *
100	SDRAM ADDR(3)	Tristate O/P	5v	8 mA		SDRAM address bus *
101	SDRAM ADDR(2)	Tristate O/P	5v	8 mA		SDRAM address bus *
102	SDRAM ADDR(1)	Tristate O/P	5v	8 mA		SDRAM address bus *
103	SDRAM ADDR(0)	Tristate O/P	5v	8 mA		SDRAM address bus *
104	SDRAM WEN	Tristate O/P	5v	8 mA		SDRAM write enable *
105	SDRAM RASN	Tristate O/P	5v	8 mA		SDRAM row address select *
106	SDRAM CASN	Tristate O/P	5v	8 mA		SDRAM column address select *
107	SDRAM BA1	Tristate O/P	5v	8 mA		SDRAM bank select 1*
108	SDRAM BA0	Tristate O/P	5v	8 mA		SDRAM bank select 0*
109	SDRAM CSN	Tristate O/P	5v	4 mA		SDRAM CS *
110	SDRAM DQM	Tristate O/P	5v	8 mA		SDRAM DQM *
111	SDRAM CLKOUT	Output	5v	12 mA		Clock out to SDRAM *
112	VDD6	Power				3.3 V - Power pin for IO
113	VSS	Ground				Ground
114	SDRAM CLKIN	Input	5v			Trace delayed SDRAM Clock in
115	TEST3	Input				Test input – Connect to ground
116	TEST OUT0	Output				Test output – leave open
117	TEST OUT1	Output				Test output – leave open
118	CTL0UT0	Tristate O/P	5v	8 mA		Control signal output selectable as HSync1/ CSync/HRef/Monitor coast
119	CTL0UT1	Tristate O/P	5v	8 mA		Control signal output selectable as VSync1/CRef/VRef/Film Indicator
120	CTL0UT2	Tristate O/P	5v	8 mA		Control signal output selectable as Monitor coast/HRef/VDD_en / HSync2
121	CTL0UT3	Tristate O/P	5v	8 mA		Control signal output selectable as Film Indicator/VRef/backlight_en/VSync2
122	CTL0UT4	Tristate O/P	5v	8 mA		Control signal output selectable as CRef/Field ID/CSync/Monitor coast
123	VDDcore6	Power				1.8 V - Power pin for core
124	VSS	Ground				Ground
125	CLKOUT	Tristate O/P	5v	12 mA		Output data rate clock
126	B/U/Pb_OUT_0	Tristate O/P	5v	8 mA		Digital video output – Blue/U/Pb
127	B/U/Pb_OUT_1	Tristate O/P	5v	8 mA		Digital video output – Blue/U/Pb
128	VDD7	Power				3.3 V - Power pin for IO
129	VSS	Ground				Ground
130	B/U/Pb_OUT_2	Tristate O/P	5v	8 mA		Digital video output – Blue/U/Pb
131	B/U/Pb_OUT_3	Tristate O/P	5v	8 mA		Digital video output – Blue/U/Pb
132	B/U/Pb_OUT_4	Tristate O/P	5v	8 mA		Digital video output – Blue/U/Pb

Pin No	Pin Name	I/O Type	Voltage Tolerance	Drive	Pull up/ Pulldown	Description
133	B/U/Pb_OUT_5	Tristate O/P	5v	8 mA		Digital video output – Blue/U/Pb
134	B/U/Pb_OUT_6	Tristate O/P	5v	8 mA		Digital video output – Blue/U/Pb
135	B/U/Pb_OUT_7	Tristate O/P	5v	8 mA		Digital video output – Blue/U/Pb
136	R/V/Pr_OUT_0	Tristate O/P	5v	8 mA		Digital video output – Red/V/Pr
137	R/V/Pr_OUT_1	Tristate O/P	5v	8 mA		Digital video output – Red/V/Pr
138	VDDcore7	Power				1.8 V - Power pin for core
139	VSS	Ground				Ground
140	R/V/Pr_OUT_2	Tristate O/P	5v	8 mA		Digital video output – Red/V/Pr
141	R/V/Pr_OUT_3	Tristate O/P	5v	8 mA		Digital video output – Red/V/Pr
142	R/V/Pr_OUT_4	Tristate O/P	5v	8 mA		Digital video output – Red/V/Pr
143	R/V/Pr_OUT_5	Tristate O/P	5v	8 mA		Digital video output – Red/V/Pr
144	R/V/Pr_OUT_6	Tristate O/P	5v	8 mA		Digital video output – Red/V/Pr
145	R/V/Pr_OUT_7	Tristate O/P	5v	8 mA		Digital video output – Red/V/Pr
146	VDD8	Power				3.3 V - Power pin for IO
147	VSS	Ground				Ground
148	G/Y/Y_OUT_0	Tristate O/P	5v	8 mA		Digital video output – Green/Y
149	G/Y/Y_OUT_1	Tristate O/P	5v	8 mA		Digital video output – Green/Y
150	G/Y/Y_OUT_2	Tristate O/P	5v	8 mA		Digital video output – Green/Y
151	G/Y/Y_OUT_3	Tristate O/P	5v	8 mA		Digital video output – Green/Y
152	G/Y/Y_OUT_4	Tristate O/P	5v	8 mA		Digital video output – Green/Y
153	G/Y/Y_OUT_5	Tristate O/P	5v	8 mA		Digital video output – Green/Y
154	G/Y/Y_OUT_6	Tristate O/P	5v	8 mA		Digital video output – Green/Y
155	G/Y/Y_OUT_7	Tristate O/P	5v	8 mA		Digital video output – Green/Y
156	OE	Input	5v			Output data enable for Digital video output
157	PLL_PVDD	Power				1.8 V – Power pin for PLL pads
158	PLL_PVSS	Ground				Ground for PLL pads
159	AVSS_PLL_BE1	Ground				PLL Ground
160	AVDD_PLL_BE1	Power				1.8 V – Power pin for PLL
161	AVDD_PLL_BE2	Power				1.8 V – Power pin for PLL
162	AVSS_PLL_BE2	Ground				PLL Ground
163	AVSSPLL_SDI	Ground				PLL Ground
164	AVDDPLL_SDI	Power				1.8 V – Power pin for PLL
165	AVDDPLL_FE	Power				1.8 V – Power pin for PLL
166	AVSSPLL_FE	Ground				PLL Ground
167	R_VSS	Ground				Ground
168	R_VDD1.8	Power				1.8 V
169	R_VSS	Ground				Ground
170	Reserved	-				Leave open
171	R_VDD	Power				3.3 V
172	R_VSS	Ground				Ground
173	Reserved	-				Leave open
174	R_VDD	Power				3.3 V
175	R_VSS	Ground				Ground
176	Reserved	-				Leave open
177	R_VDD	Power				3.3 V
178	R_VSS	Ground				Ground

Pin No	Pin Name	I/O Type	Voltage Tolerance	Drive	Pull up/ Pulldown	Description
179	Reserved	-				Leave open
180	Reserved	-				Leave open
181	Reserved	-				Leave open
182	R_VSS	Ground				Ground
183	R_VDD	Power				3.3 V
184	R_VSS	Ground				Ground
185	R_VSS	Ground				Ground
186	R_VDD	Power				3.3 V
187	R_VDD	Power				3.3 V
188	TEST0	Input	5v			Test pin – connect to ground
189	TEST1	Input	5v			Test pin – connect to ground
190	TEST2	Input	5v			Test pin – connect to ground
191	XTAL IN	Input				External parallel crystal oscillator
192	XTAL OUT	Output				External parallel crystal oscillator
193	VDD9	Power				3.3 V - Power pin for IO
194	VSS	Ground				Ground
195	CLK_PORT 2	Input	5v	4 mA		Port 2 - Data Clock input
196	D1_IN_0	Input	5v	4 mA		Port 2 - ITU-R BT656 digital data input
197	VDDcore8	Power				1.8 V – Power pin for core
198	VSS	Ground				Ground
199	D1_IN_1	Input	5v	4 mA		Port 2 - ITU-R BT656 digital data input
200	D1_IN_2	Input	5v	4 mA		Port 2 - ITU-R BT656 digital data input
201	D1_IN_3	Input	5v	4 mA		Port 2 - ITU-R BT656 digital data input
202	D1_IN_4	Input	5v	4 mA		Port 2 - ITU-R BT656 digital data input
203	D1_IN_5	Input	5v	4 mA		Port 2 - ITU-R BT656 digital data input
204	D1_IN_6	Input	5v	4 mA		Port 2 - ITU-R BT656 digital data input
205	D1_IN_7	Input	5v	4 mA		Port 2 - ITU-R BT656 digital data input
206	FIELD ID_PORT 2	Input	5v	4 mA		Port 2 - Odd/Even Field identification
207	VSYNC_PORT 2	Input	5v	4 mA		Port 2 - Vertical sync or reference
208	HSYNC_PORT 2	Input	5v	4 mA		Port 2 - Horizontal sync or reference

8.3.2 IC7304 – SiI9030CTU-7 – HDMI Transmitter (HDMI PCBA 3139 248 89141)

BLOCK DIAGRAM

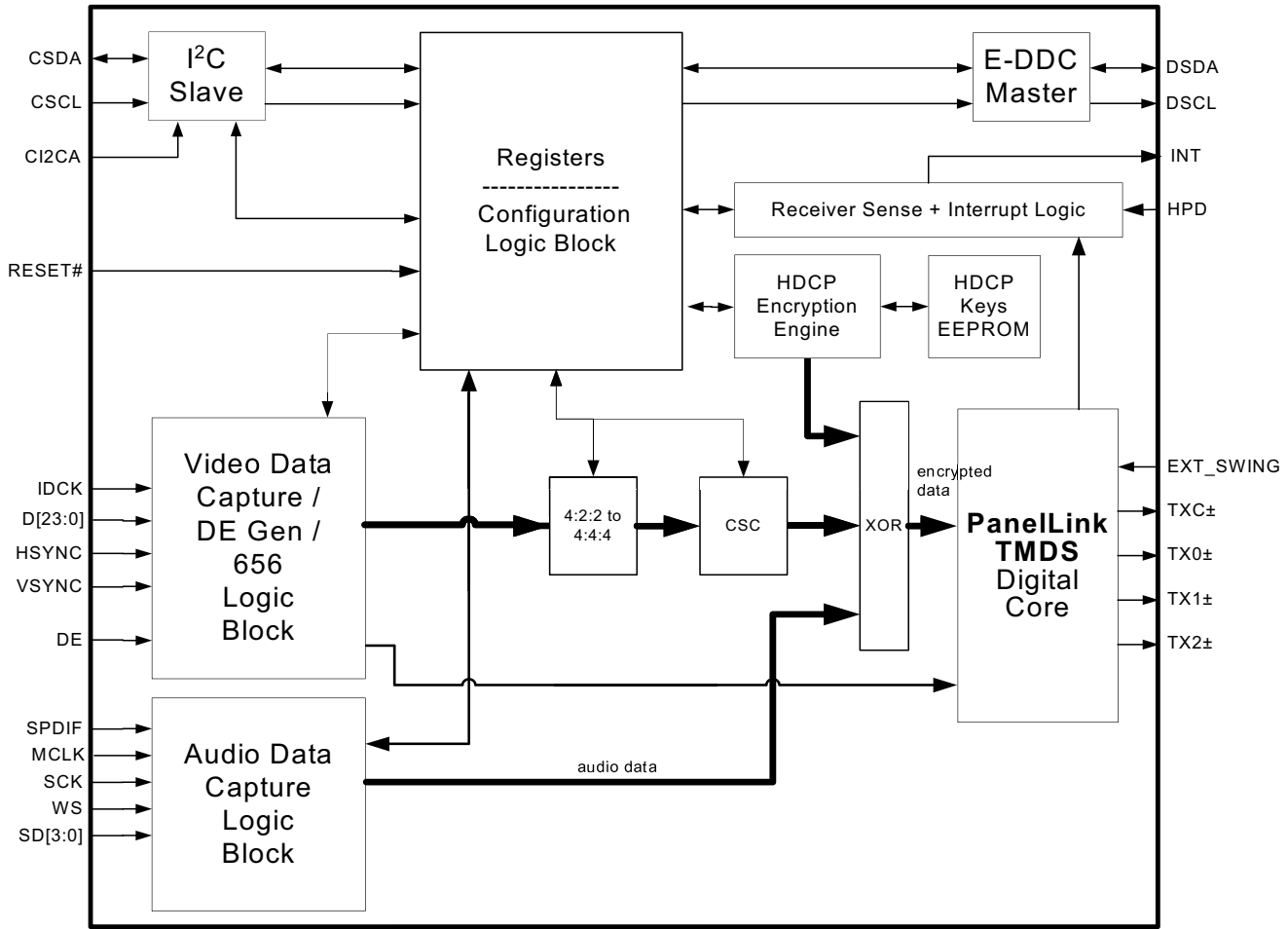


Figure 8-16

**PIN CONFIGURATION**

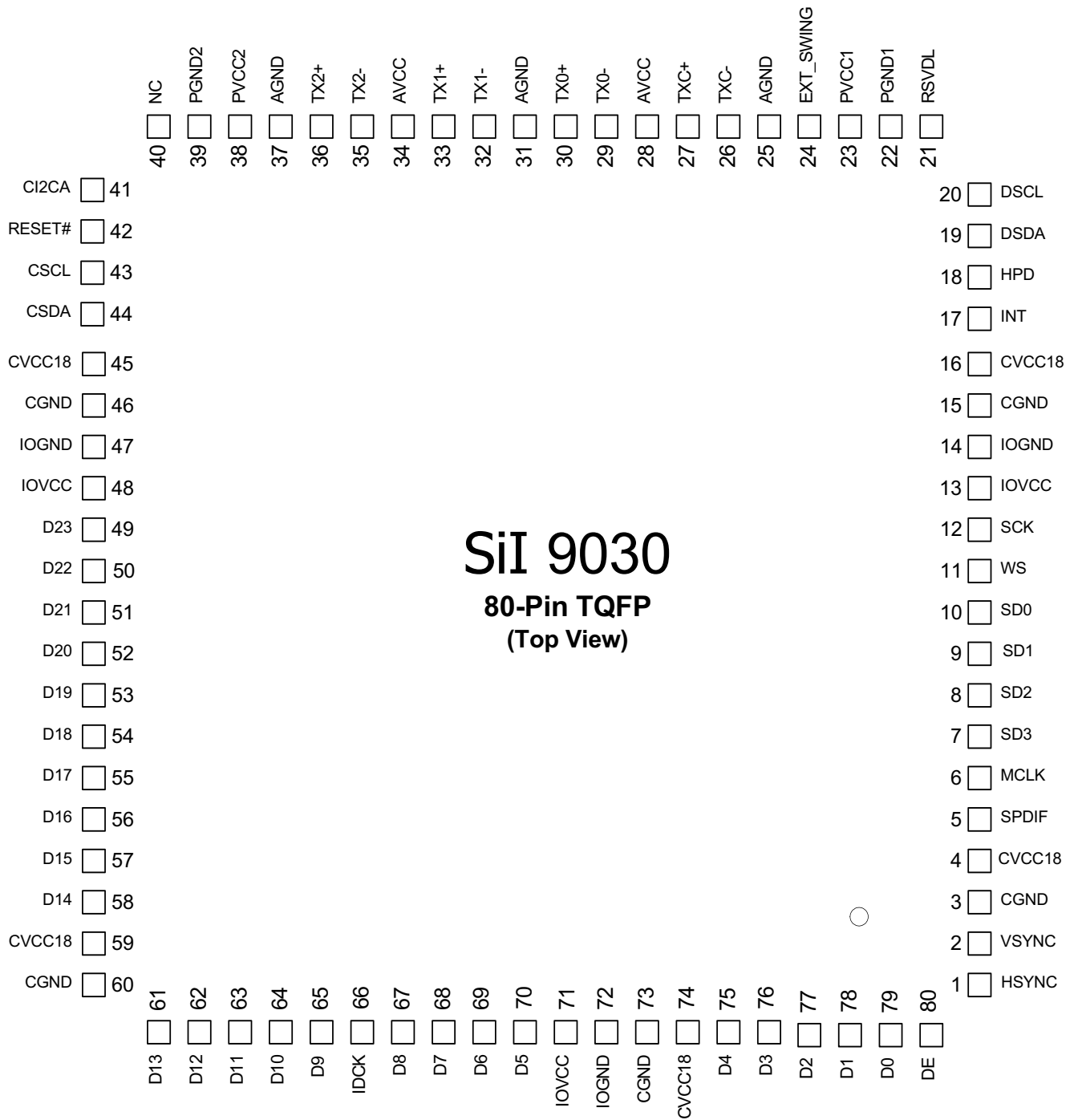


Figure 8-17

8.3.3 IC7115-Sil 8010-SINGLE CHIP VIDEO SCALER (HDMI PCBA 3139 248 51901)

Application

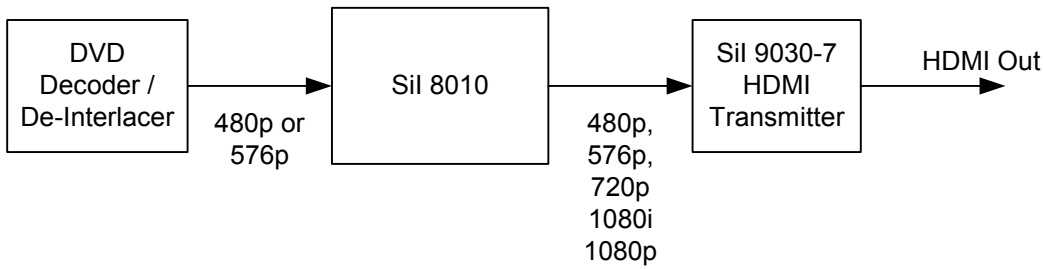


Figure 8-15

Pin Out Diagram

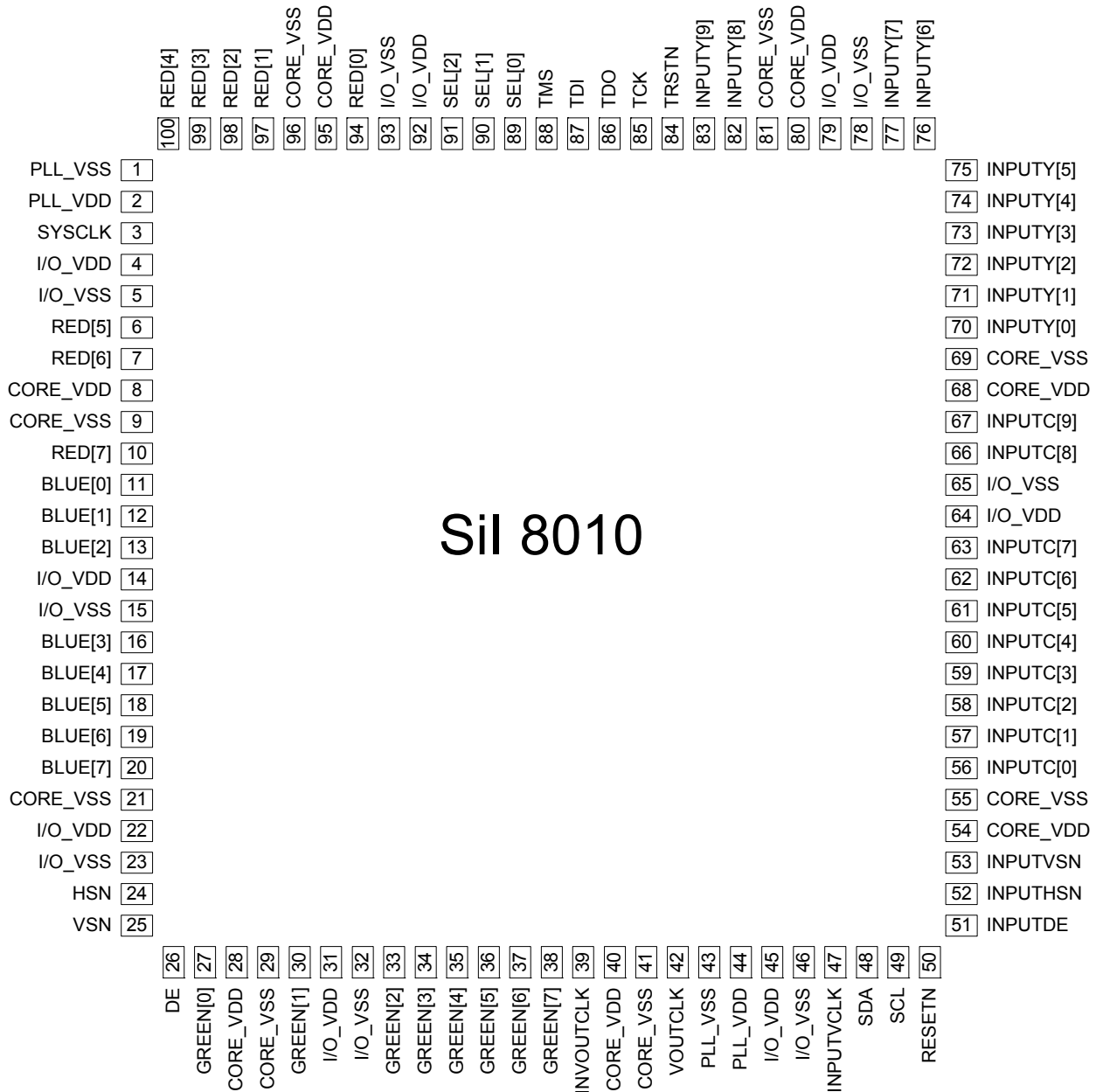


Figure 8-16

Functional Block Diagram

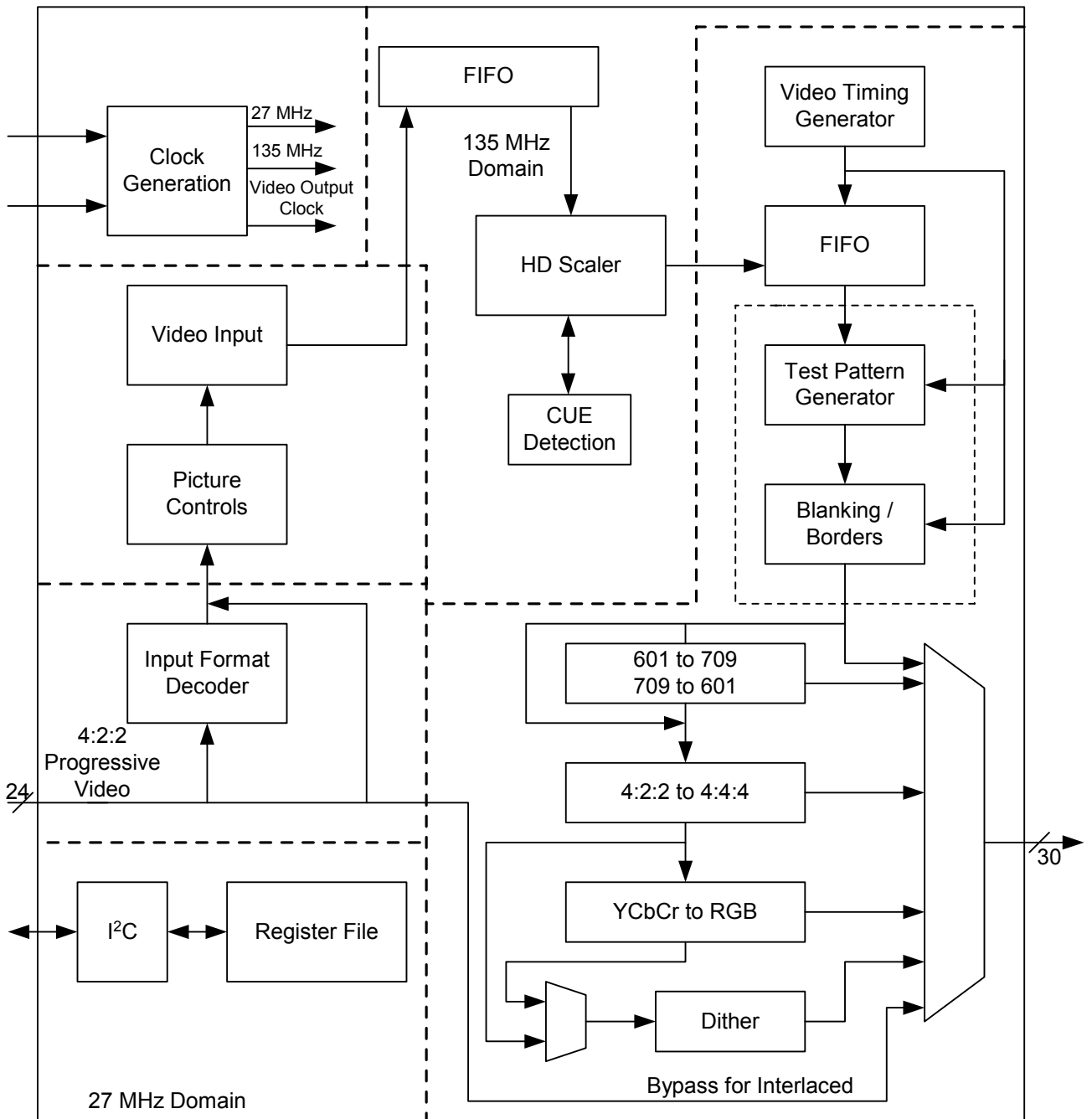


Figure 8-17

8.3.4 IC7304 – SiI9030CTU-7 – HDMI Transmitter (HDMI PCBA 3139 248 51901)

Block Diagram

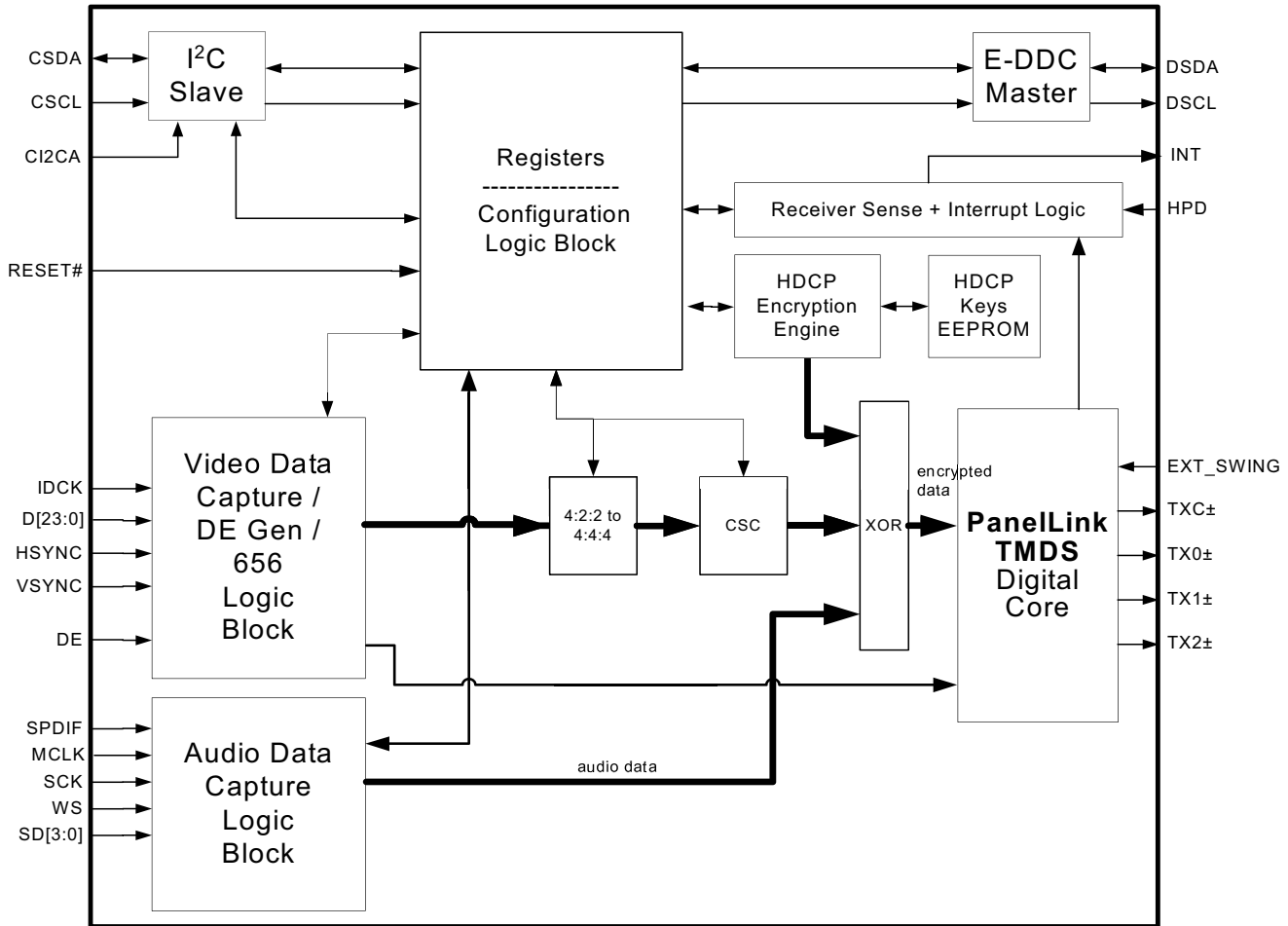


Figure 8-18



Pin Configuration

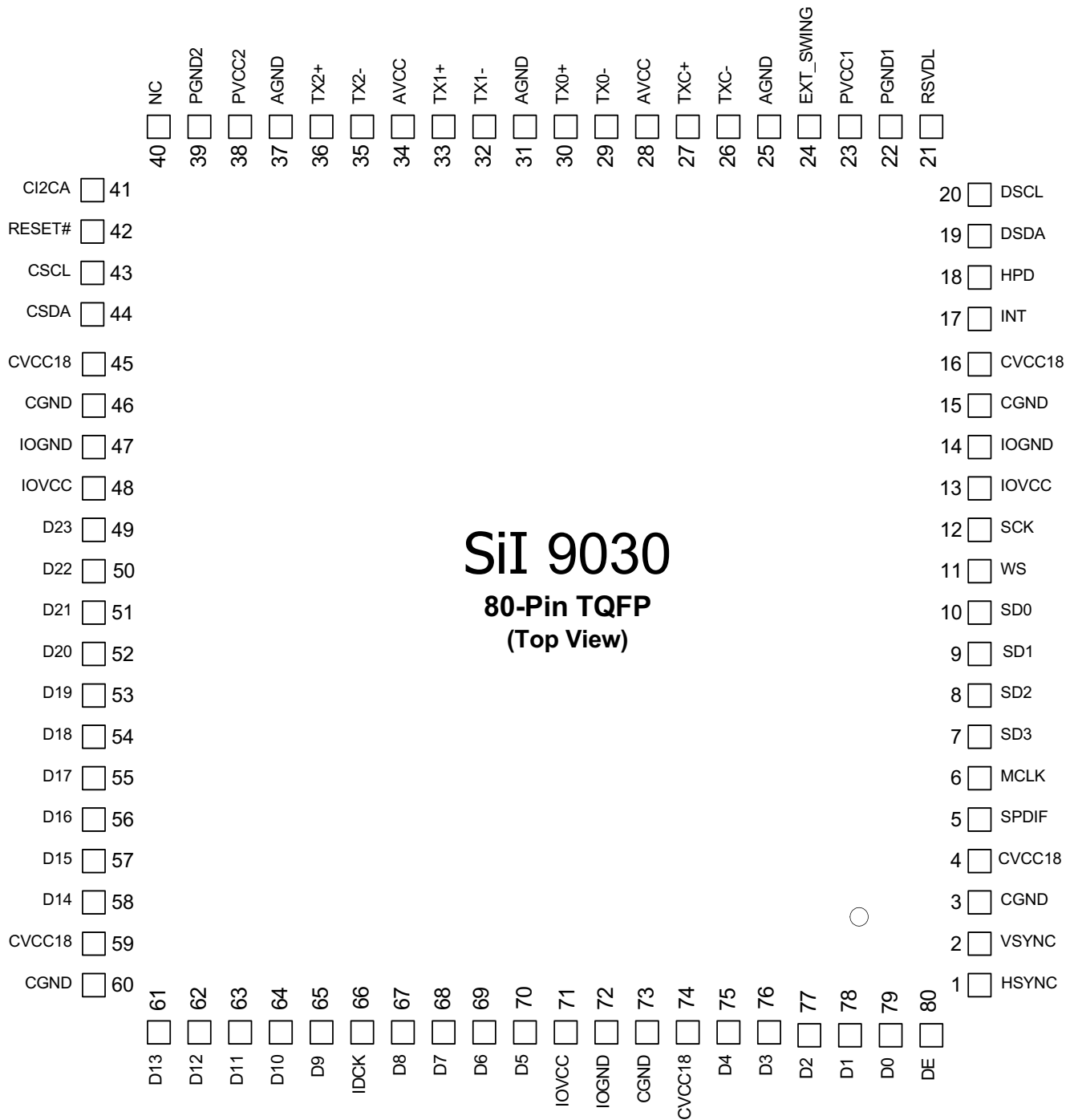
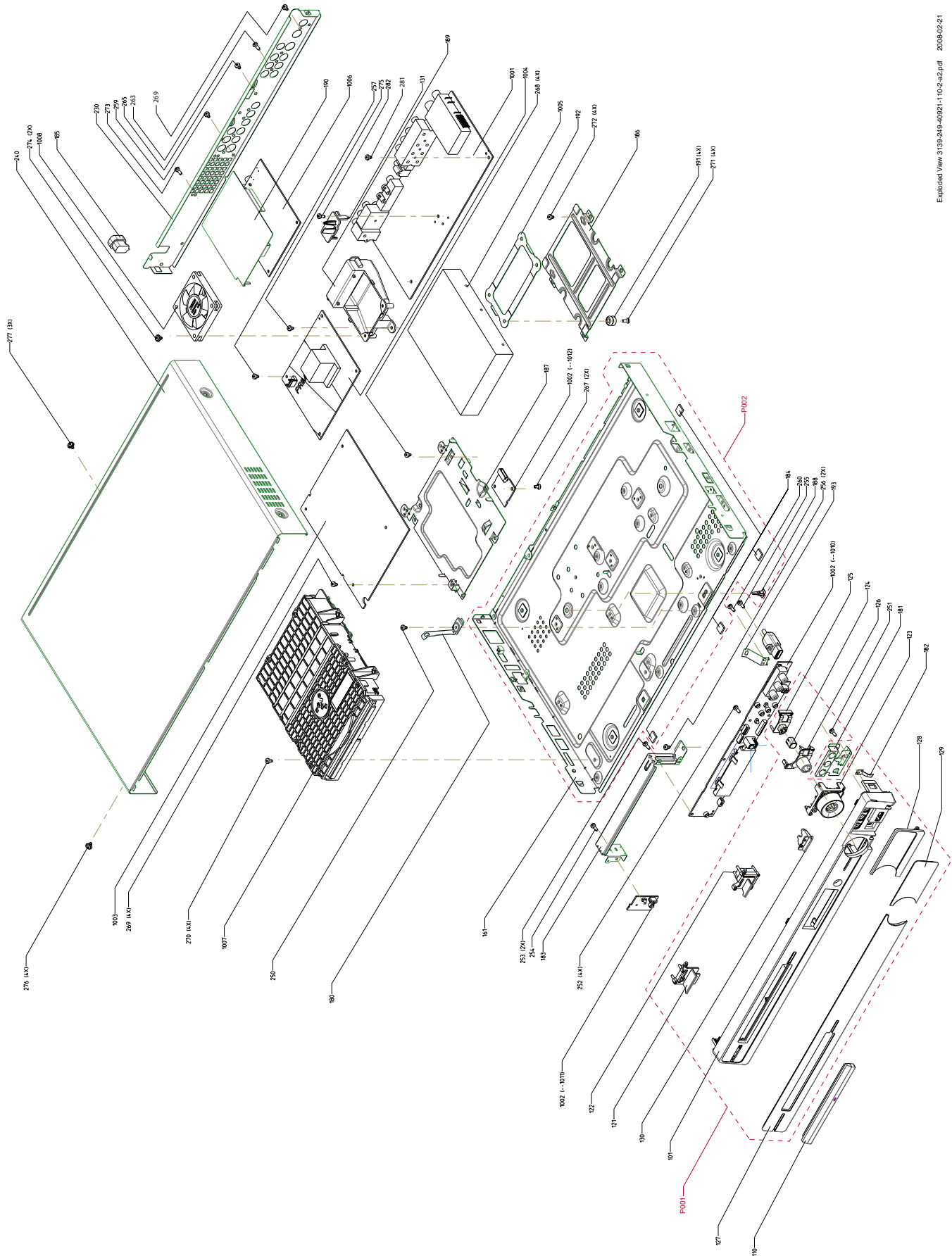


Figure 8-19

### Exploded View of the set



Exploded View 3139-249-40821-110-2-a2.pdf 2008-02-21

Figure 9-1

**DVDR5590H/75/97**

0110	313924418601	COVER TRAY
0180	313924126261	SPRING EMC
0181	313924126291	SPRING AV
0185	313911426671	BUSH, AC CORD
0190*	313924416811	SHIELD HDMI /97 only
0190*	313924320941	SHIELD HDMI ABT(running change for /97)
0191	313924409101	HDD DAMPER
0191	313924419081	HDD DAMPER (JTP) (alternative part)
0193	313924160931	SPRING ESD
0230*	313924126301	PLATE REAR /97 only
0230*	313924127101	PLATE REAR ABT (running change for /97)
0240	313924126941	COVER TOP
0271	252220000027	SCR WAFER PH STZN BU 6/32X12
0341	242254901506	REMOTE CONTROL
0345	242207098231	△ MAINS CORD IEC /97 only
0345	242207098233	△ MAINSCORD AUS 7A5 1M8 VH BK B /75 only
0350	242207600718	AV CABLE 1M5
0487	242207600885	RF CONNECTING CABLE
1001	313924851681	ANALOG BOARD
1002	313924852031	FRONT BOARD
1003	313924851712	PCBAS DIGI DVDR3570H AP BOARD
1004	313924713532	△ PSU BOARD PIE
1005	282206200174	HDD 3.5" 500GB ST3500830ACE B
1006*	313924889141	PCBAS PSCAN HDMI DVDR3570H /97 only
1006*	313924851901	PCBAS HDMI LC 1080I BOARD (running change for /97)
1007	313924800333	DRIVE D5.2 CLOSED
1008	282203100057	FAN 12VDC 1.2W
8001	313924102151	CBLE VH 05P/140/05P VH 20ST BK
8002	313911027881	CBLE PH 06P/180/06P PH 26ST BK
8003	313924103801	CBLE EH 04P/140/04P LC-L UL
8004	313924103761	CBLE EH 04P/280/04P LC-L UL
8005	313911028311	CBLE T PH 12P/280/12P PH 26ST BK
8006	310330890611	CWAS 03PH/03PH 220 BK AWG26
8007	313924102101	FFC FOIL 24P/220/24P BD 1MMP
8008	313924102511	FFC FOIL 18P/280/18P BD 1MMP
8009	313913103491	FFC FOIL 06P/220/06P BD 1MMP
8011	313924100301	FFC FOIL 24P/140/24P BD 1MMP
8012	313911035501	FFC FOIL 08P/180/08P 1MMP BD
8013	310330890562	CWAS 05PH/05PH 340 5P BK 26S
8014	313924102071	FFC FOIL 09P/340/09P BD 1MMP
8015	313924102181	FFC FOIL 14P/280/14P BD 1MMP
8017	313924102141	CBLE IDE 40P/340/40P IDE UL
8018	313924102651	CBLE IDE 40P/380/40P IDE UL
8019	242207600786	CBLE USB-A 0M3 PH 5P BK B
8026	313924102211	FFC FOIL 40P/140/40P BD 0.5MMP
8030	313911027931	CBLE PH 07P/100/07P PH 26ST BK
P001	314107944331	CAB FRONT ASSY DVDR5590H/97
P002	314107936761	FRAME ASSY

\* There was a running change in DVDR5590H/97 for HDMI board (Item 1006)

See Annex page for details

# Annex

## HDMI Board Running Change

From week 817 onwards, a new HDMI Board 12NC 3139 248 51901 (pos: 1006) has been introduced in production.

Serial number for the first DVDR5590H/97 Set implemented with new HDMI Board is NM000817000492.

The table below shows how the HDMI Board running change affects DVDR5590H/97 and DVDR5590H/75:

CTN	Production before week 817	Production from week 817 onwards	Remark
DVDR5590H/97	HDMI PCBA 3139 248 89141	HDMI PCBA 3139 248 51901	Running change
DVDR5590H/75	-	HDMI PCBA 3139 248 51901	Not affected

## HDMI Board Replacement

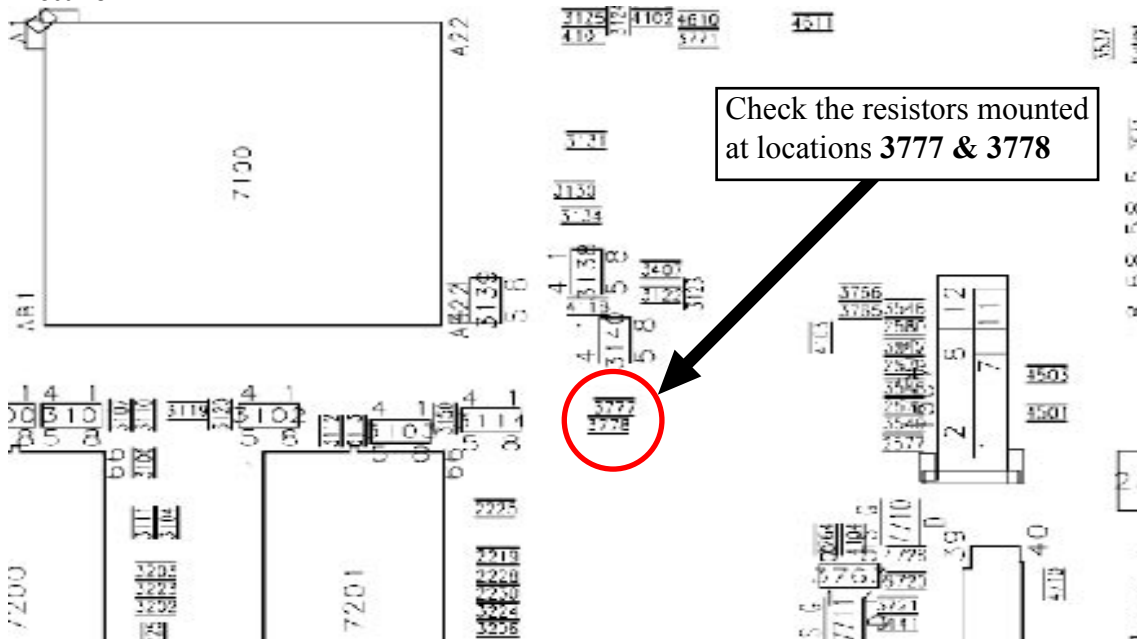
Defective HDMI boards 3139 248 89141 in older sets can be replaced by new HDMI Board 3139 248 51901 during service repair. Although the new HDMI Board is functionally backward compatible, it requires different rear plate 230 and HDMI Shield 190 for mounting it in the set. The table below shows 12NCs of the parts needed for mounting old and new HDMI Boards in the set.

Description	Old part 12NC	New Part 12NC
HDMI Board 1006	3139 248 89141	3139 248 51901
Rear Plate 230	3139 241 26301	3139 241 27101
HDMI Shield 190	3139 244 16811	3139 243 20941

## Procedure to replace a defective 3139 248 89141 HDMI Board with a new 3139 248 51901 HDMI Board

1. Remove the defective HDMI Board 3139 248 89141 (pos 1006) and HDMI shield 3139 244 16811 (pos 190).
  2. Change the rear plate 230 to 3139 241 27101.
  3. Install the new HDMI Board 3139 248 51901 and the new HDMI Shield 3139 243 20941.
  4. Check the Digital Board 1003 and rework if it is necessary.
- ⇒ Check the resistors. (See Picture A.)

## Picture A



- ⇒ If the resistors are already there at locations 3777 and 3778, no rework is necessary.
  - ⇒ If no resistor is found there, add resistors with specification: “**RST SM 0603 22R PM5 COL**” to location 3777 and 3778.
5. Download the latest software version available in the website [www.philips.com/support](http://www.philips.com/support) and upgrade the set. (From software version v1.61 onwards, the set software supports both old and new HDMI Boards )
  6. Connect the set to TV via HDMI output, play back DVD Video and verify that the set is functioning normally.

**10 REVISION LIST**

Version 1.0

\* Initial Release

Version 1.1

\*DVDR5590H/75 added

\*Annex Page for HDMI running change added