

Service
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Service Manual

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1. Revision List

Manual xxxx xxx xxxx.0

- First release.

2. Technical Specifications and Connections

Index of this chapter:

[2.1 Technical Specifications](#)

[2.2 Directions for Use](#)

[2.3 Connections](#)

[2.4 Chassis Overview](#)

Notes:

- Figures can deviate due to the different set executions.
- Specifications are indicative (subject to change).

2.1 Technical Specifications

For on-line product support please use the links in [Table 2-1](#).

Here is product information available, as well as getting started, user manuals, frequently asked questions and software & drivers.

Table 2-1 Described Model numbers

CTN	Styling	Published in:
32PFL5609D/30	P & S	3122 785 18610
42PFL5609D/30	P & S	3122 785 18610
42PFL7409D/30	Frame	3122 785 18610
47PFL5609D/30	P & S	3122 785 18610
47PFL7409D/30	Frame	3122 785 18610

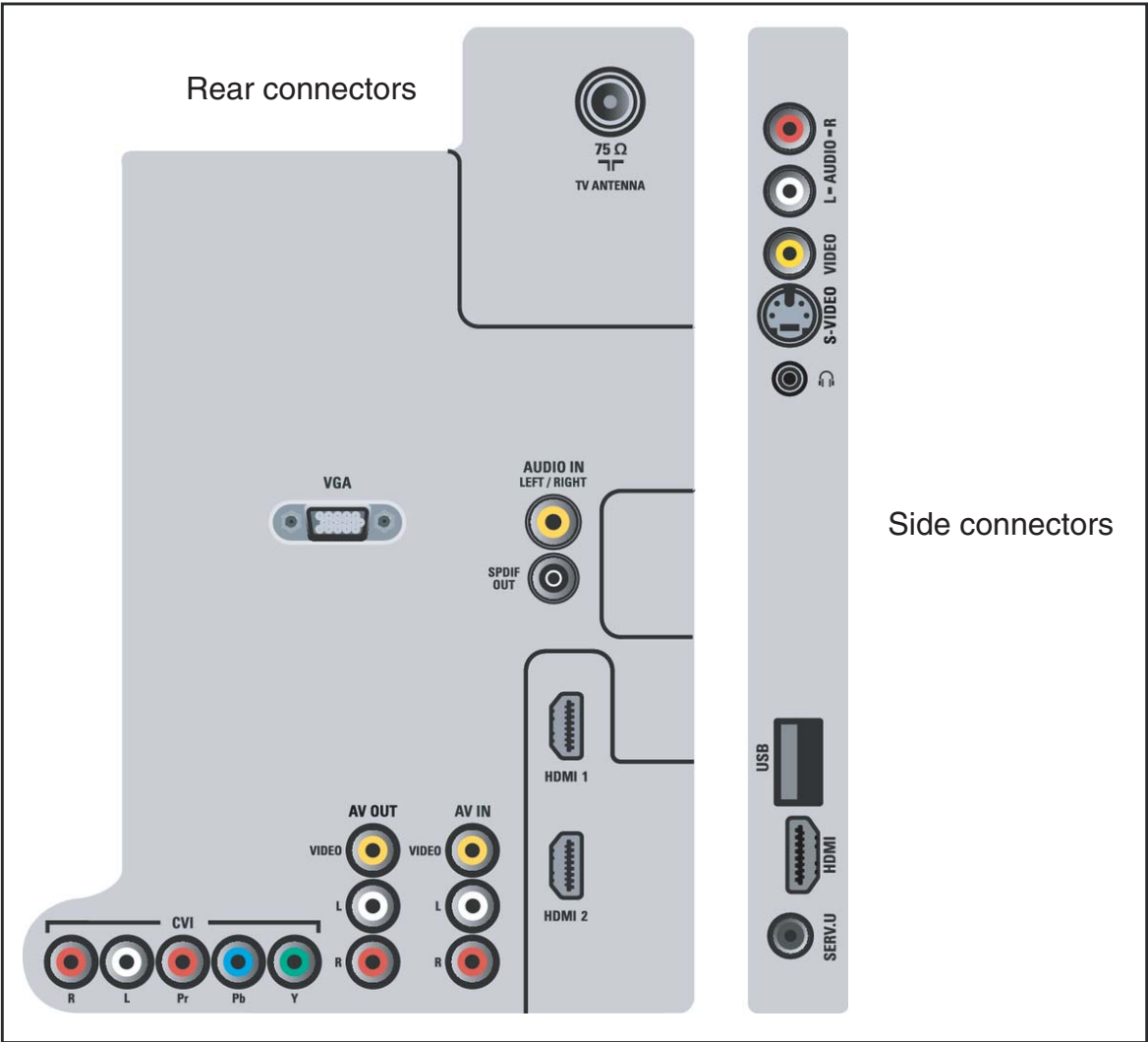
2.2 Directions for Use

You can download this information from the following websites:

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

<http://www.p4c.philips.com>

2.3 Connections



18610_001_090603.eps
090603

Figure 2-1 Connection overview

Note: The following connector colour abbreviations are used (according to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, Ye= Yellow.

2.3.1 Side Connections

Cinch: Audio - In

Rd - Audio R 0.5 V_{RMS} / 10 kΩ
Wh - Audio L 0.5 V_{RMS} / 10 kΩ



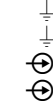
Cinch: Video CVBS - In

Ye - Video CVBS 1 V_{PP} / 75 Ω



S-Video (Hosiden): Video Y/C - In

1 - Ground Y Gnd
2 - Ground C Gnd
3 - Video Y 1 V_{PP} / 75 Ω
4 - Video C 0.3 V_{PP} / 75 Ω

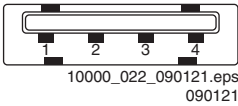


Head phone (Output)

Bk - Head phone 32 - 600 Ω / 10 mW



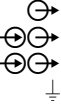
USB2.0



10000_022_090121.eps
090121

Figure 2-2 USB (type A)

1 - +5V
2 - Data (-)
3 - Data (+)
4 - Ground Gnd



HDMI: Digital Video, Digital Audio - In
(see HDMI 1 & 2)

Service Connector (UART)

1 - Ground Gnd
2 - UART_TX Transmit
3 - UART_RX Receive



2.3.2 Rear Connections

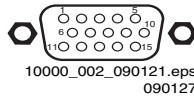
Aerial - In- - IEC-type (EU) Coax, 75 Ω **VGA: Video RGB - In**

Figure 2-3 VGA Connector

1	- Video Red	0.7 V _{PP} / 75 Ω	⊕
2	- Video Green	0.7 V _{PP} / 75 Ω	⊕
3	- Video Blue	0.7 V _{PP} / 75 Ω	⊕
4	- n.c.		
5	- Ground	Gnd	⊥
6	- Ground Red	Gnd	⊥
7	- Ground Green	Gnd	⊥
8	- Ground Blue	Gnd	⊥
9	- +5V _{DC}	+5 V	⊕
10	- Ground Sync	Gnd	⊥
11	- n.c.		
12	- DDC_SDA	DDC data	⊕
13	- H-sync	0 - 5 V	⊕
14	- V-sync	0 - 5 V	⊕
15	- DDC_SCL	DDC clock	⊕

Mini Jack: Audio - In

Wh - Audio L 0.5 V_{RMS} / 10 k Ω

Rd - Audio R 0.5 V_{RMS} / 10 k Ω

**Cinch: S/PDIF - Out**Bk - Coaxial 0.4 - 0.6V_{PP} / 75 ohm**CVI: Cinch: Video YPbPr - In, Audio - In**

Gn - Video Y 1 V_{PP} / 75 Ω

Bu - Video Pb 0.7 V_{PP} / 75 Ω

Rd - Video Pr 0.7 V_{PP} / 75 Ω



Rd - Audio - R 0.5 V_{RMS} / 10 k Ω

Wh - Audio - L 0.5 V_{RMS} / 10 k Ω

**Cinch: Video CVBS - Out, Audio - Out**

Ye - Video CVBS 1 V_{PP} / 75 ohm

Wh - Audio L 0.5 V_{RMS} / 10 kohm

Rd - Audio R 0.5 V_{RMS} / 10 kohm

**Cinch: Video CVBS - In, Audio - In**

Ye - Video CVBS 1 V_{PP} / 75 ohm

Wh - Audio L 0.5 V_{RMS} / 10 kohm

Rd - Audio R 0.5 V_{RMS} / 10 kohm

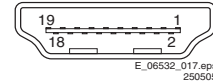
**HDMI 1 & 2: Digital Video, Digital Audio - In**

Figure 2-4 HDMI (type A) connector

1	- D2+	Data channel	⊕
2	- Shield	Gnd	⊥
3	- D2-	Data channel	⊕
4	- D1+	Data channel	⊕
5	- Shield	Gnd	⊥
6	- D1-	Data channel	⊕
7	- D0+	Data channel	⊕
8	- Shield	Gnd	⊥
9	- D0-	Data channel	⊕
10	- CLK+	Data channel	⊕
11	- Shield	Gnd	⊥
12	- CLK-	Data channel	⊕
13	- Easylink	Control channel	⊕
14	- n.c.		
15	- DDC_SCL	DDC clock	⊕
16	- DDC_SDA	DDC data	⊕
17	- Ground	Gnd	⊥
18	- +5V		⊕
19	- HPD	Hot Plug Detect	⊕
20	- Ground	Gnd	⊥

2.4 Chassis Overview

Refer to chapter [9. Block Diagrams](#) for PWB/CBA locations.

3. Precautions, Notes, and Abbreviation List

Index of this chapter:

[3.1 Safety Instructions](#)

[3.2 Warnings](#)

[3.3 Notes](#)

[3.4 Abbreviation List](#)

3.1 Safety Instructions

Safety regulations require the following **during** a repair:

- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- 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, the set must be returned in its original condition. Pay in particular attention to the following points:

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

3.2 Warnings

- 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 connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

3.3 Notes

3.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⊥), or hot ground (↗), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).

- Where necessary, measure the waveforms and voltages with (⊥) and without (↗) aerial signal. Measure the voltages in the power supply section both in normal operation (ⓘ) and in stand-by (Ⓢ). These values are indicated by means of the appropriate symbols.

3.3.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kΩ).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 Ω).
- All capacitor values are given in micro-farads ($\mu = \times 10^{-6}$), nano-farads ($n = \times 10^{-9}$), or pico-farads ($p = \times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed on the Philips Spare Parts Web Portal.

3.3.3 Spare Parts

For the latest spare part overview, consult your Philips Spare Part web portal.

3.3.4 BGA (Ball Grid Array) ICs

Introduction

For more information on how to handle BGA devices, visit this URL: <http://www.atyourservice-magazine.com>. Select "Magazine", then go to "Repair downloads". Here you will find information on how to deal with BGA-ICs.

BGA Temperature Profiles

For BGA-ICs, you **must** use the correct temperature-profile. Where applicable and available, this profile is added to the IC Data Sheet information section in this manual.

3.3.5 Lead-free Soldering

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

- Use only lead-free soldering tin. If lead-free solder paste is required, please contact the manufacturer of your soldering 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 soldering tin. The solder tool must be able:
 - To reach a solder-tip temperature of at least 400°C.
 - To stabilize the adjusted temperature at the solder-tip.
 - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of 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 increase drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch "off" unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly to **avoid** mixed regimes. If this cannot be avoided, carefully clear the solder-joint from old tin and re-solder with new tin.

3.3.6 Alternative BOM identification

It should be noted that on the European Service website, "Alternative BOM" is referred to as "Design variant".

The **third digit** in the serial number (example: AG2B0335000001) indicates the number of the alternative B.O.M. (Bill Of Materials) that has been used for producing the specific TV set. In general, it is possible that the same TV model on the market is produced with e.g. two different types of displays, coming from two different suppliers. This will then result in sets which have the same CTN (Commercial Type Number; e.g. 28PW9515/12) but which have a different B.O.M. number.

By looking at the third digit of the serial number, one can identify which B.O.M. is used for the TV set he is working with. If the third digit of the serial number contains the number "1" (example: AG1B0335000001), then the TV set has been manufactured according to B.O.M. number 1. If the third digit is a "2" (example: AG2B0335000001), then the set has been produced according to B.O.M. no. 2. This is important for ordering the correct spare parts!

For the third digit, the numbers 1...9 and the characters A...Z can be used, so in total: 9 plus 26 = 35 different B.O.M.s can be indicated by the third digit of the serial number.

Identification: The bottom line of a type plate gives a 14-digit serial number. Digits 1 and 2 refer to the production centre (e.g. AG is Bruges), digit 3 refers to the B.O.M. code, digit 4 refers to the Service version change code, digits 5 and 6 refer to the production year, and digits 7 and 8 refer to production week (in example below it is 2006 week 17). The 6 last digits contain the serial number.



10000_024_090121.eps
100105

Figure 3-1 Serial number (example)

3.3.7 Board Level Repair (BLR) or Component Level Repair (CLR)

If a board is defective, consult your repair procedure to decide if the board has to be exchanged or if it should be repaired on component level.

If your repair procedure says the board should be exchanged completely, do not solder on the defective board. Otherwise, it cannot be returned to the O.E.M. supplier for back charging!

3.3.8 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages.** While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3.4 Abbreviation List

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16 : 9 format, 12 = play 4 : 3 format
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeps the original aspect ratio
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars without discarding video information
ATSC	Advanced Television Systems Committee, the digital TV standard in the USA
ATV	See Auto TV
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way
AV	External Audio Video
AVC	Audio Video Controller
AVIP	Audio Video Input Processor
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BDS	Business Display Solutions (iTV)
BLR	Board-Level Repair
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
B-TXT	Blue TeleteXT
C	Centre channel (audio)
CEC	Consumer Electronics Control bus: remote control bus on HDMI connections
CL	Constant Level: audio output to connect with an external amplifier
CLR	Component Level Repair
ComPair	Computer aided rePair
CP	Connected Planet / Copy Protection
CSM	Customer Service Mode
CTI	Color Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DCM	Data Communication Module. Also referred to as System Card or Smartcard (for iTV).
DDC	See "E-DDC"
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFI	Dynamic Frame Insertion

DFU	Directions For Use: owner's manual		SDI), is a digitized video format used for broadcast grade video.
DMR	Digital Media Reader: card reader		Uncompressed digital component or digital composite signals can be used.
DMSD	Digital Multi Standard Decoding		The SDI signal is self-synchronizing, uses 8 bit or 10 bit data words, and has a maximum data rate of 270 Mbit/s, with a minimum bandwidth of 135 MHz.
DNM	Digital Natural Motion		
DNR	Digital Noise Reduction: noise reduction feature of the set		
DRAM	Dynamic RAM		
DRM	Digital Rights Management		
DSP	Digital Signal Processing		
DST	Dealer Service Tool: special remote control designed for service technicians	ITV	Institutional TeleVision; TV sets for hotels, hospitals etc.
DTCP	Digital Transmission Content Protection; A protocol for protecting digital audio/video content that is traversing a high speed serial bus, such as IEEE-1394	LS	Last Status; The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences
DVB-C	Digital Video Broadcast - Cable	LATAM	Latin America
DVB-T	Digital Video Broadcast - Terrestrial	LCD	Liquid Crystal Display
DVD	Digital Versatile Disc	LED	Light Emitting Diode
DVI(-d)	Digital Visual Interface (d= digital only)	L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
E-DDC	Enhanced Display Data Channel (VESA standard for communication channel and display). Using E-DDC, the video source can read the EDID information form the display.	LPL	LG.Philips LCD (supplier)
EDID	Extended Display Identification Data (VESA standard)	LS	Loudspeaker
EEPROM	Electrically Erasable and Programmable Read Only Memory	LVDS	Low Voltage Differential Signalling
EMI	Electro Magnetic Interference	Mbps	Mega bits per second
EPG	Electronic Program Guide	M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
EPLD	Erasable Programmable Logic Device	MHEG	Part of a set of international standards related to the presentation of multimedia information, standardised by the Multimedia and Hypermedia Experts Group. It is commonly used as a language to describe interactive television services
EU	Europe		
EXT	EXTeRnal (source), entering the set by SCART or by cinches (jacks)		
FDS	Full Dual Screen (same as FDW)	MIPS	Microprocessor without Interlocked Pipeline-Stages; A RISC-based microprocessor
FDW	Full Dual Window (same as FDS)		
FLASH	FLASH memory		
FM	Field Memory or Frequency Modulation	MOP	Matrix Output Processor
FPGA	Field-Programmable Gate Array	MOSFET	Metal Oxide Silicon Field Effect Transistor, switching device
FTV	Flat TeleVision	MPEG	Motion Pictures Experts Group
Gb/s	Giga bits per second	MPIF	Multi Platform InterFace
G-TXT	Green TeleteXT	MUTE	MUTE Line
H	H_sync to the module	MTV	Mainstream TV: TV-mode with Consumer TV features enabled (iTV)
HD	High Definition		
HDD	Hard Disk Drive	NC	Not Connected
HDCP	High-bandwidth Digital Content Protection: A "key" encoded into the HDMI/DVI signal that prevents video data piracy. If a source is HDCP coded and connected via HDMI/DVI without the proper HDCP decoding, the picture is put into a "snow vision" mode or changed to a low resolution. For normal content distribution the source and the display device must be enabled for HDCP "software key" decoding.	NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
HDMI	High Definition Multimedia Interface	NTC	Negative Temperature Coefficient, non-linear resistor
HP	HeadPhone	NTSC	National Television Standard Committee. Color system mainly used in North America and Japan. Color carrier NTSC M/N= 3.579545 MHz, NTSC 4.43= 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
I	Monochrome TV system. Sound carrier distance is 6.0 MHz	NVM	Non-Volatile Memory: IC containing TV related data such as alignments
I ² C	Inter IC bus	O/C	Open Circuit
I ² D	Inter IC Data bus	OSD	On Screen Display
I ² S	Inter IC Sound bus	OAD	Over the Air Download. Method of software upgrade via RF transmission.
IF	Intermediate Frequency		Upgrade software is broadcasted in TS with TV channels.
IR	Infra Red	OTC	On screen display Teletext and Control; also called Artistic (SAA5800)
IRQ	Interrupt Request	P50	Project 50: communication protocol between TV and peripherals
ITU-656	The ITU Radio communication Sector (ITU-R) is a standards body subcommittee of the International Telecommunication Union relating to radio communication. ITU-656 (a.k.a.	PAL	Phase Alternating Line. Color system mainly used in West Europe (color carrier= 4.433619 MHz) and South America (color carrier PAL M=

	3.575612 MHz and PAL N= 3.582056 MHz)	SVHS	Super Video Home System
PCB	Printed Circuit Board (same as "PWB")	SW	Software
PCM	Pulse Code Modulation	SWAN	Spatial temporal Weighted Averaging
PDP	Plasma Display Panel		Noise reduction
PFC	Power Factor Corrector (or Pre-conditioner)	SXGA	1280 × 1024
PIP	Picture In Picture	TFT	Thin Film Transistor
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency	THD	Total Harmonic Distortion
		TMDS	Transmission Minimized Differential Signalling
POD	Point Of Deployment: a removable CAM module, implementing the CA system for a host (e.g. a TV-set)	TS	Transport Stream
		TXT	Teletext
POR	Power On Reset, signal to reset the uP	TXT-DW	Dual Window with Teletext
PSDL	Power Supply for Direct view LED backlight with 2D-dimming	UI	User Interface
		uP	Microprocessor
PSL	Power Supply with integrated LED drivers	UXGA	1600 × 1200 (4:3)
PSLS	Power Supply with integrated LED drivers with added Scanning functionality	V	V-sync to the module
		VESA	Video Electronics Standards Association
PTC	Positive Temperature Coefficient, non-linear resistor	VGA	640 × 480 (4:3)
PWB	Printed Wiring Board (same as "PCB")	VL	Variable Level out: processed audio output toward external amplifier
PWM	Pulse Width Modulation	VS	Vestigial Side Band; modulation method
QRC	Quasi Resonant Converter	WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
QTNR	Quality Temporal Noise Reduction		
QVCP	Quality Video Composition Processor	WXGA	1280 × 768 (15:9)
RAM	Random Access Memory	XTAL	Quartz crystal
RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.	XGA	1024 × 768 (4:3)
		Y	Luminance signal
RC	Remote Control	Y/C	Luminance (Y) and Chrominance (C) signal
RC5 / RC6	Signal protocol from the remote control receiver	YPbPr	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
RESET	RESET signal	YUV	Component video
ROM	Read Only Memory		
RSDS	Reduced Swing Differential Signalling data interface		
R-TXT	Red Teletext		
SAM	Service Alignment Mode		
S/C	Short Circuit		
SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs		
SCL	Serial Clock I ² C		
SCL-F	CLock Signal on Fast I ² C bus		
SD	Standard Definition		
SDA	Serial Data I ² C		
SDA-F	DAta Signal on Fast I ² C bus		
SDI	Serial Digital Interface, see "ITU-656"		
SDRAM	Synchronous DRAM		
SECAM	SEquence Couleur Avec Mémoire. Color system mainly used in France and East Europe. Color carriers= 4.406250 MHz and 4.250000 MHz		
SIF	Sound Intermediate Frequency		
SMPS	Switched Mode Power Supply		
SoC	System on Chip		
SOG	Sync On Green		
SOPS	Self Oscillating Power Supply		
SPI	Serial Peripheral Interface bus; a 4-wire synchronous serial data link standard		
S/PDIF	Sony Philips Digital InterFace		
SRAM	Static RAM		
SRP	Service Reference Protocol		
SSB	Small Signal Board		
SSC	Spread Spectrum Clocking, used to reduce the effects of EMI		
STB	Set Top Box		
STBY	STand-BY		
SVGA	800 × 600 (4:3)		

4. Mechanical Instructions

Index of this chapter:

[4.1 Cable Dressing](#)

[4.2 Service Positions](#)

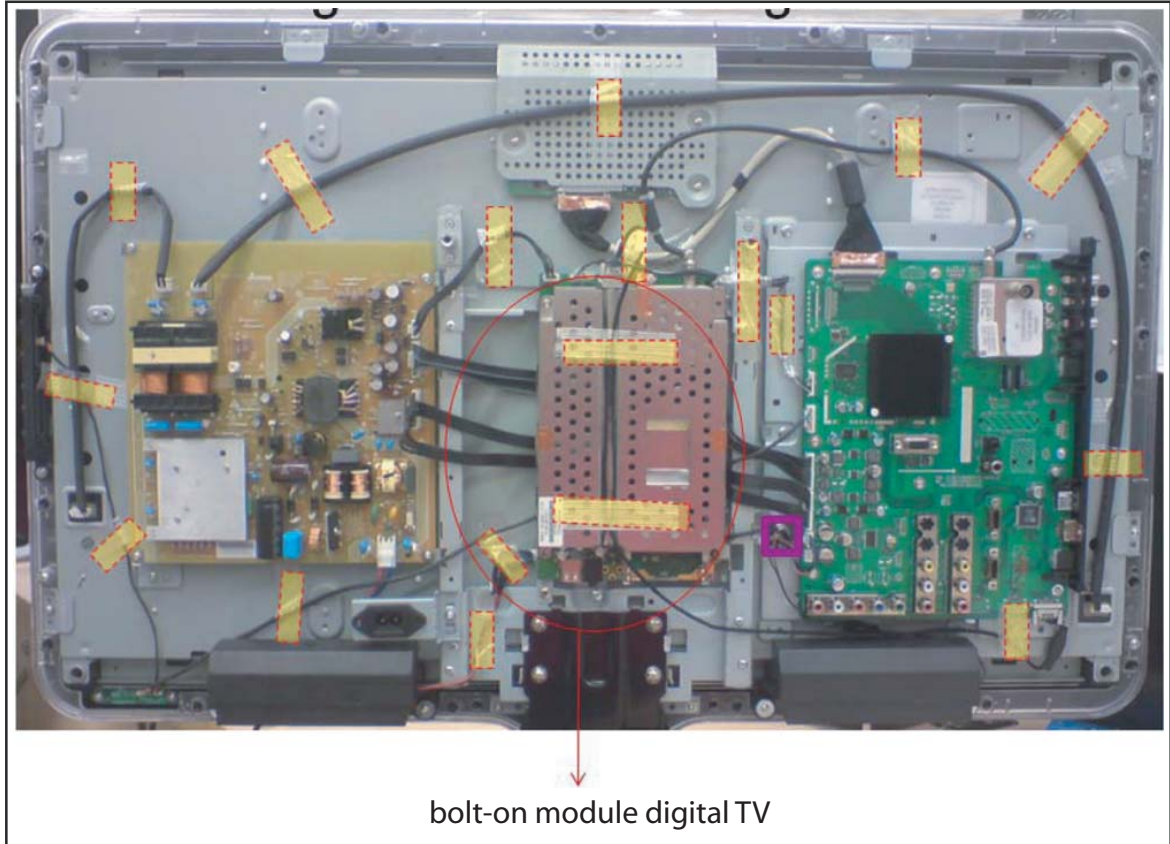
[4.3 Assy/Panel Removal](#)

[4.4 Set Re-assembly](#)

Notes:

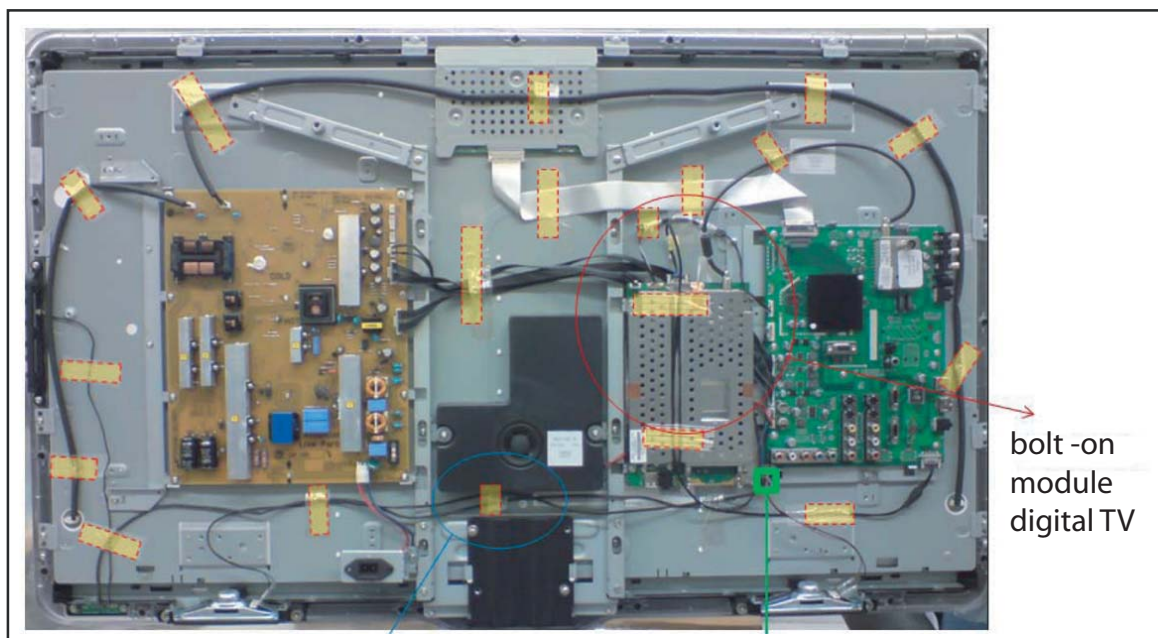
- Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Cable Dressing



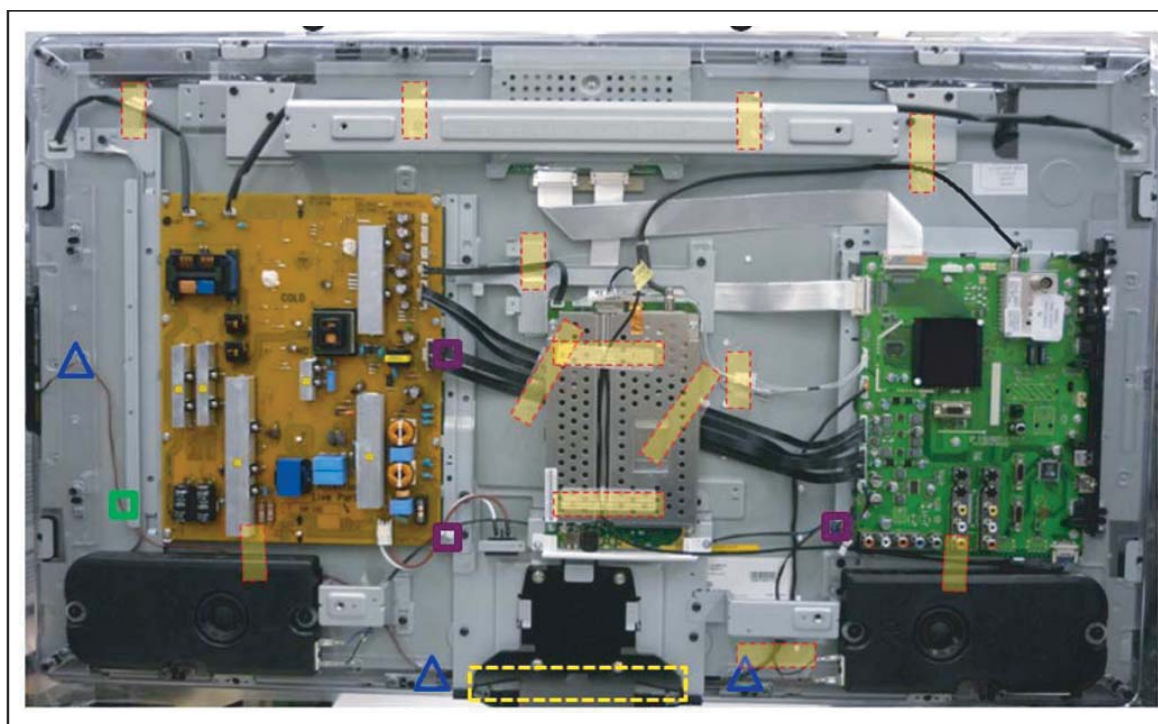
18610_100_090603.eps
090603

Figure 4-1 Cable dressing 32PFL5609D/30



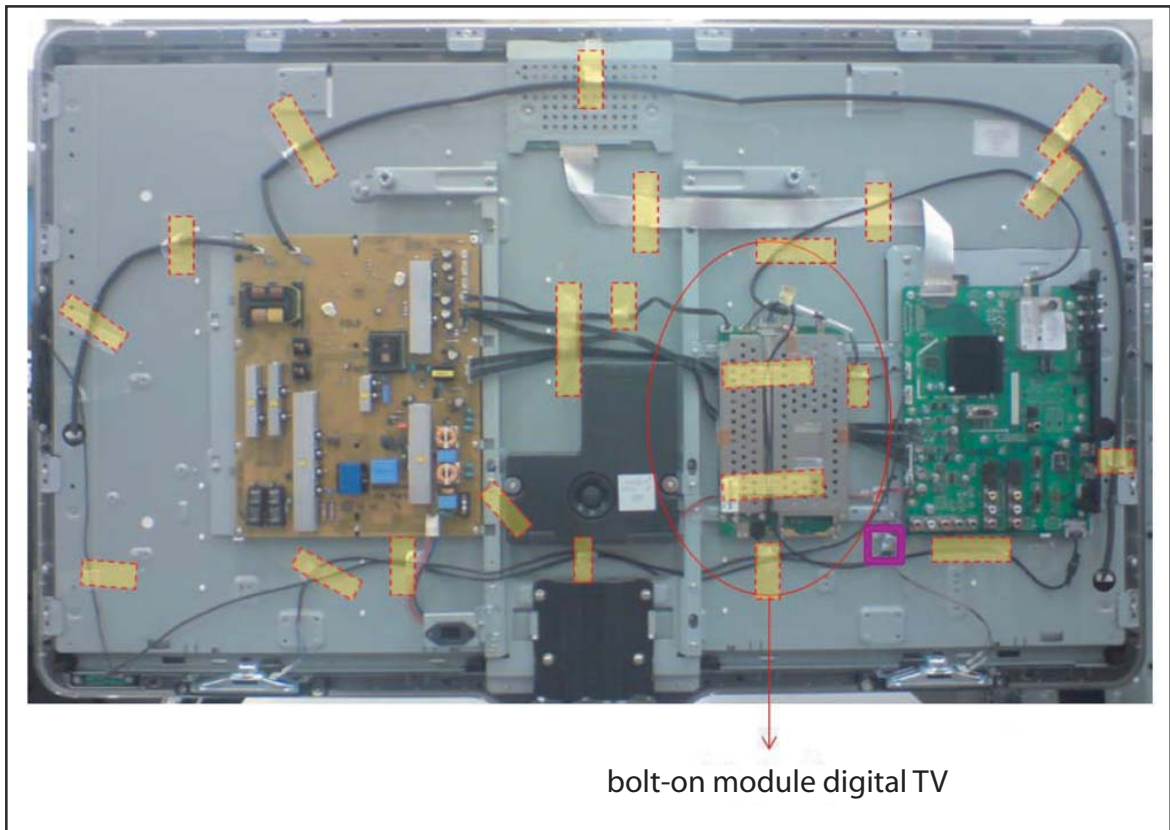
18610_101_090603.eps
090603

Figure 4-2 Cable dressing 42PFL5609D/30



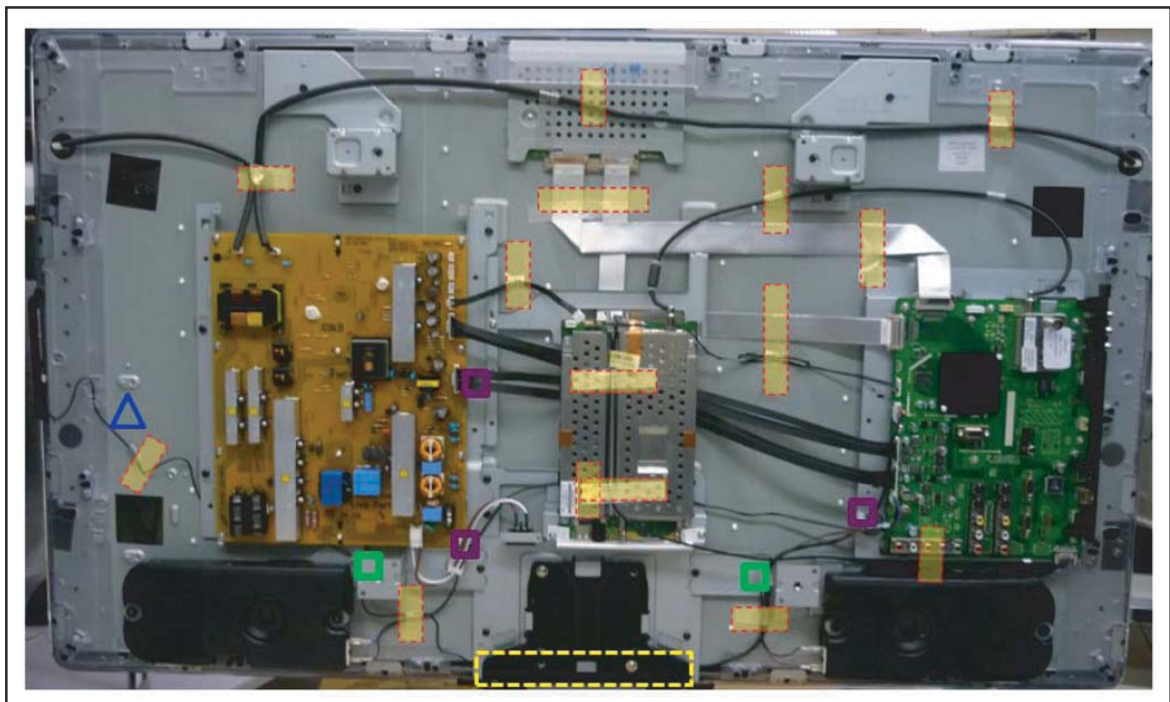
18610_102_090603.eps
090603

Figure 4-3 Cable dressing 42PFL7409D/30



18610_103_090603.eps
090603

Figure 4-4 Cable dressing 47PFL5609D/30



18610_104_090603.eps
090603

Figure 4-5 Cable dressing 47PFL7409D/30

4.2 Service Positions

For easy servicing of this set, there are a few possibilities created:

- The buffers from the packaging.
- Foam bars (created for Service).

4.2.1 Foam Bars

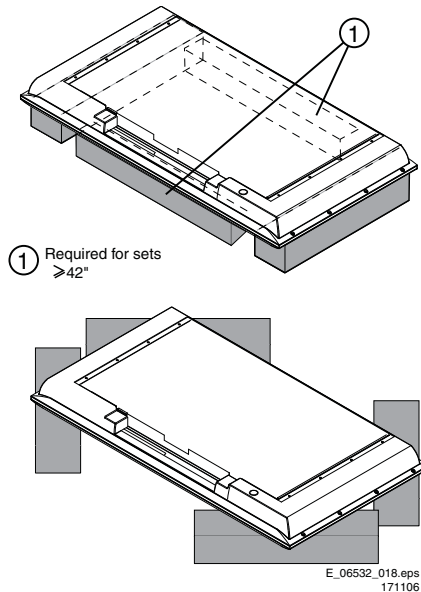


Figure 4-6 Foam bars

The foam bars (order code 3122 785 90580 for two pieces) can be used for all types and sizes of Flat TVs. See [Figure 4-6](#) for details. Sets with a display of 42" and larger, require **four** foam bars [1]. Ensure that the foam bars are always supporting the cabinet and **never** only the display.

Caution: Failure to follow these guidelines can seriously damage the display!

By laying the TV face down on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments. By placing a mirror under the TV, you can monitor the screen.

4.3 Assy/Panel Removal

The instructions apply to the P & S styling - 5000 series.

4.3.1 Rear Cover

Warning: Disconnect the mains power cord before you remove the rear cover.

Note: it is **not** necessary to remove the stand while removing the rear cover.

1. Remove all screws of the rear cover.
2. Lift the rear cover from the TV. Make sure that wires and flat coils are not damaged while lifting the rear cover from the set.

4.3.2 Speakers

Each speaker unit is mounted with two screws. A sticker on the unit indicates if it is the right ("R") or left ("L") box, seen from the backside of the set, and an arrow points to the bottom of the set.

When defective, replace the whole unit.

4.3.3 IR & LED Board

1. Unplug the connectors leading to the SSB and IR & LED Board.
 2. Lift the board and take it out.
- When defective, replace the whole unit.

4.3.4 Key Board Control Panel

1. Unplug the key board connector from the IR & LED board.
 2. Release the clamp on the topside using a screwdriver.
 3. Lift the unit and take it out of the set.
- When defective, replace the whole unit.

4.3.5 Main Supply Panel

1. Unplug all connectors.
 2. Remove the fixation screws.
 3. Take the board out.
- When defective, replace the whole unit.

4.3.6 Small Signal Board (SSB)

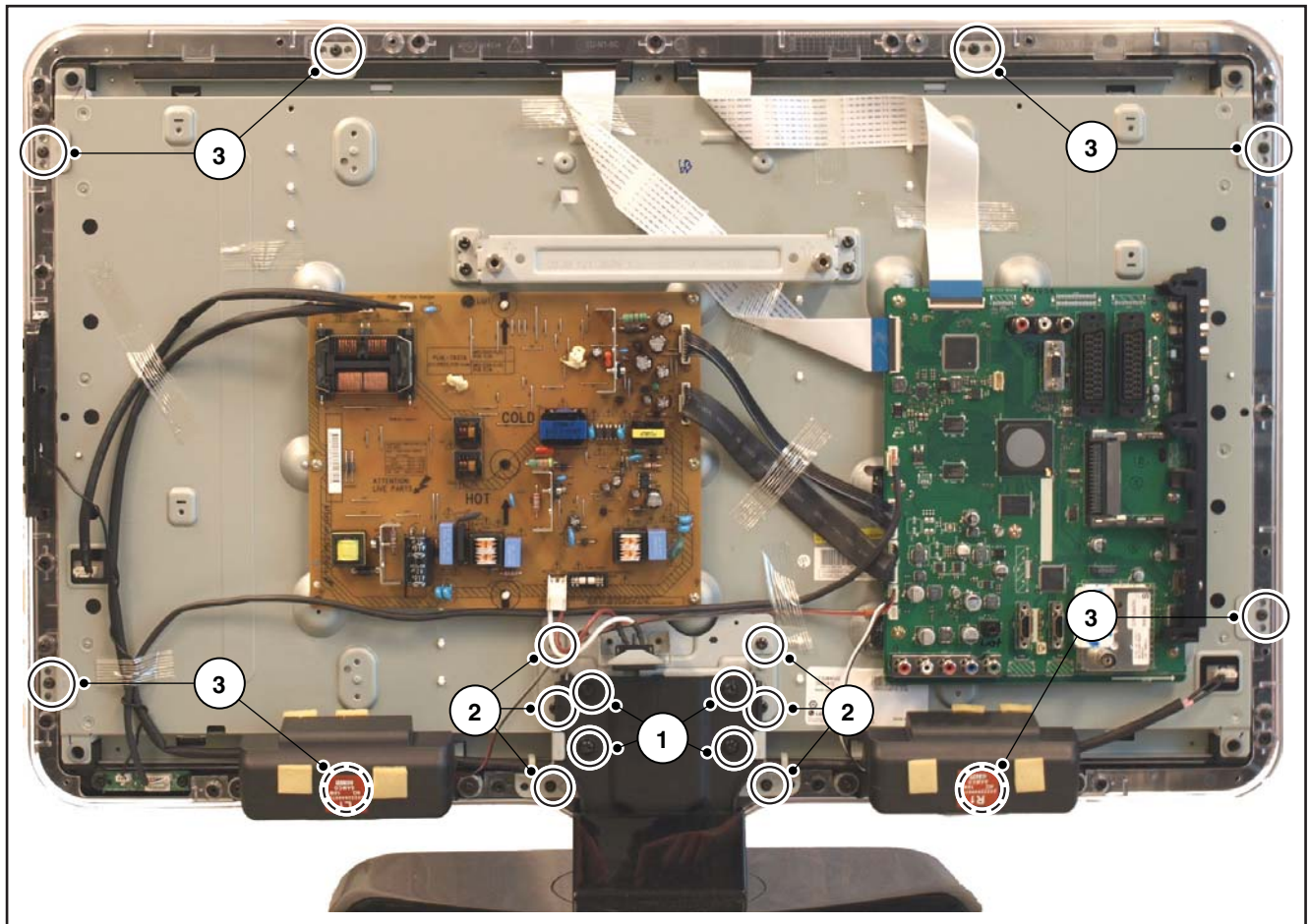
Caution: It is mandatory to remount screws at their original position during re-assembly. Failure to do so may result in damaging the SSB.

1. Unplug all connectors.
2. Remove all screws that secure the board.
3. The SSB can now be taken out of the set, together with the side cover.
4. To remove the side cover, push the clamp with a screwdriver in the middle of the cover and pull the cover sideways from the SSB.

4.3.7 LCD Panel

Refer to [Figure 4-7](#) for details. As every screen size has a (slightly) different mechanical construction (some have the boards directly mounted on the LCD display, others use brackets), we only describe one model. Disassembly method of other LCD panels is similar to the one described below. This particular photo is taken from a set with the timing controller (TCON) located on the SSB.

1. Remove the Main Supply Panel and Small Signal Board as earlier described.
2. Unplug the connectors to and from the Speakers, IR & LED Board and Key Board Control Panel.
3. Remove the stand [1].
4. Release the subframe of the stand [2].
5. Remove the brackets [3] that secure the LCD Panel.
6. The LCD panel can now be lifted from the front cabinet.



18440_103_090223.eps
090709

Figure 4-7 LCD Panel removal

4.4 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

Notes:

- While re-assembling, make sure that all cables are placed and connected in their original position. See figure [Figure 4-1](#) to [Figure 4-5](#).
- Pay special attention not to damage the EMC foams on the SSB shields. Ensure that EMC foams are mounted correctly.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

- [5.1 Test Points](#)
- [5.2 Service Modes](#)
- [5.3 Service Tools](#)
- [5.4 Error Codes](#)
- [5.5 The Blinking LED Procedure](#)
- [5.6 Fault Finding and Repair Tips](#)
- [5.7 Software Upgrading](#)

5.1 Test Points

In the chassis schematics and layout overviews, the test points are mentioned. In the schematics, test points are indicated with “Fxxx” or “Ixxx”, in the layout overviews with a “half-moon” sign. As most signals are digital, it will be difficult to measure waveforms with a standard oscilloscope. Several key ICs are capable of generating test patterns, which can be controlled via ComPair. In this way it is possible to determine which part is defective.

Perform measurements under the following conditions:

- Service Default Mode.
- Video: Colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

The Service Mode feature is split into four parts:

- Service Default Mode (SDM).
- Service Alignment Mode (SAM).
- Customer Service Mode (CSM).
- Computer Aided Repair Mode (ComPair).

SDM and SAM offer features, which can be used by the Service engineer to repair/align a TV set. Some features are:

- A pre-defined situation to ensure measurements can be made under uniform conditions (SDM).
- Activates the blinking LED procedure for error identification when no picture is available (SDM).
- The possibility to overrule software protections when SDM is entered via the Service pins.
- Make alignments (e.g. White Tone), (de)select options, enter options codes, reset the error buffer (SAM).
- Display information (“SDM” or “SAM” indication in upper right corner of screen, error buffer, software version, operating hours, options and option codes, sub menus).

The CSM is a Service Mode that can be enabled by the consumer. The CSM displays diagnosis information, which the customer can forward to the dealer or call centre. In CSM mode, “CSM”, is displayed in the top right corner of the screen. The information provided in CSM and the purpose of CSM is to:

- Increase the home repair hit rate.
- Decrease the number of nuisance calls.
- Solved customers' problem without home visit.

ComPair Mode is used for communication between a computer and a TV on I2C /UART level and can be used by a Service engineer to quickly diagnose the TV set by reading out error codes, read and write in NVMs, communicate with ICs and the uP (PWM, registers, etc.), and by making use of a fault finding database. It will also be possible to up and download the software of the TV set via I2C with help of ComPair. To do this, ComPair has to be connected to the TV set via the ComPair connector, which will be accessible through the rear of the set (without removing the rear cover).

5.2.1 General

Some items are applicable to all Service Modes or are general. These are listed below.

Life Timer

During the life time cycle of the TV set, a timer is kept (called “Op. Hour”). It counts the normal operation hours (not the Stand-by hours). The actual value of the timer is displayed in SDM and SAM in a decimal value. Every two soft-resets increase the hour by +1. Standby hours are not counted.

Software Identification, Version, and Cluster

The software ID, version, and cluster will be shown in the main menu display of SDM, SAM, and CSM.

The screen will show: “**AAAABCD X.YY**”, where:

- **AAAA** is the chassis name: LC92.
- **B** is the region indication: E= Europe, A= AP/China, U= NAFTA, L= LATAM.
- **C** is the display indication: L= LCD, P= Plasma.
- **D** is the language/feature indication: 1= Standard, H= Full HD.
- **X** is the main version number: this is updated with a major change of specification (incompatible with the previous software version). Numbering will go from 1 - 9 and A - Z.
 - If the main version number changes, the new version number is written in the NVM.
 - If the main version number changes, the default settings are loaded.
- **YY** is the sub version number: this is updated with a minor change (backwards compatible with the previous versions) Numbering will go from 00 - 99.
 - If the sub version number changes, the new version number is written in the NVM.
 - If the NVM is fresh, the software identification, version, and cluster will be written to NVM.

Display Option Code Selection

When after an SSB or display exchange, the display option code is not set properly, it will result in a TV with “no display”. Therefore, **it is required** to set this display option code after such a repair.

To do so, press the following key sequence on a standard RC transmitter: “**062598**” directly followed by **MENU** and “**xxx**”, where “xxx” is a 3 digit decimal value of the panel type: see column “Display Code” in [Table 6-5](#), or see sticker on the side/bottom of the cabinet. When the value is accepted and stored in NVM, the set will switch to Stand-by, to indicate that the process has been completed.

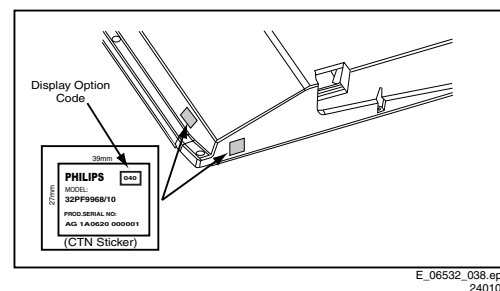


Figure 5-1 Location of Display Option Code sticker

During this algorithm, the NVM-content must be filtered, because several items in the NVM are TV-related and not SSB-related (e.g. Model and Prod. S/N). Therefore, “Model” and “Prod. S/N” data is changed into “See Type Plate”. In case a call centre or consumer reads “See Type Plate” in CSM mode, he needs to look to the side/bottom sticker to identify the set, for further actions.

5.2.2 Service Default Mode (SDM)

Purpose

Set the TV in SDM mode in order to be able to create a pre-defined setting for measurements to be made. In this platform, a simplified SDM is introduced (without protection override and without tuning to a frequency of 475.25 MHz).

Specifications

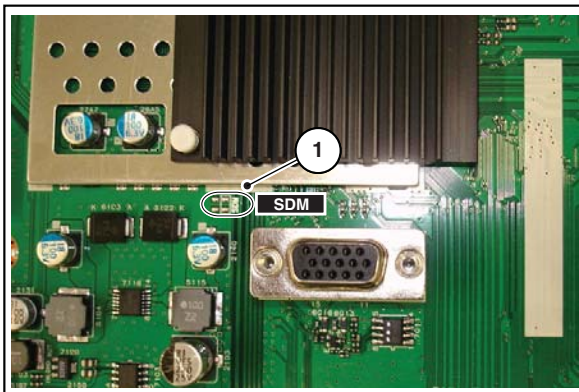
- Set linear video and audio settings to 50%, but volume to 25%. Stored user settings are not affected.
- All service-unfriendly modes (if present) are disabled, since they interfere with diagnosing/repairing a set. These service unfriendly modes are:
 - (Sleep) timer.
 - Blue mute/Wall paper.
 - Auto switch “off” (when there is no “ident” signal).
 - Hotel or hospital mode.
 - Child lock or parental lock (manual or via V-chip).
 - Skipping, blanking of “Not favourite”, “Skipped” or “Locked” presets/channels.
 - Automatic storing of Personal Preset or Last Status settings.
 - Automatic user menu time-out (menu switches back/OFF automatically).
 - Auto Volume levelling (AVL).

How to Activate

To activate SDM, use **one** of the following methods:

- Press the following key sequence on the remote control transmitter: “**062596**” directly followed by the **MENU** button (do not allow the display to time out between entries while keying the sequence).
- Short one of the “Service” jumpers on the TV board during cold start (see [Figure 5-2](#)). Then press the mains button (remove the short after start-up).

Caution: Activating SDM by shorting “Service” jumpers will override the DC speaker protection (error 1), the General I2C error (error 4), and the Trident video processor error (error 5). When doing this, the service-technician must know exactly what he is doing, as it could damage the television set.

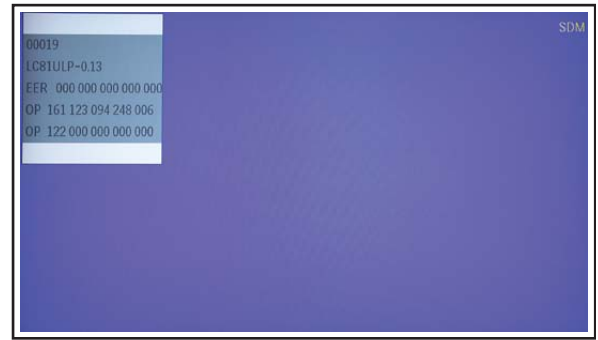


18490_201_090409.eps
090409

Figure 5-2 Service jumper (SSB component side)

On Screen Menu

After activating SDM, the following screen is visible, with SDM in the upper right corner of the screen to indicate that the television is in Service Default Mode.



H_17740_030.eps
230108

Figure 5-3 SDM menu

Menu explanation:

- **HHHHH:** Are the operating hours (in decimal).
- **AAAABCD-X.YY:** See paragraph [Software Identification, Version, and Cluster](#) for the SW name definition.
- **ERR:** Shows all errors detected since the last time the buffer was erased in format <xxx> <xxx> <xxx> <xxx> <xxx> (five errors possible).
- **OP:** Used to read-out the option bytes. See “Options” in the Alignments section for a detailed description. Ten codes (in two rows) are possible.

How to Navigate

As this mode is read only, there is not much to navigate. To switch to other modes, use one of the following methods:

- Command MENU from the user remote will enter the normal user menu (brightness, contrast, colour, etc...) with “SDM” OSD remaining, and pressing MENU key again will return to the last status of SDM again.
- To prevent the OSD from interfering with measurements in SDM, command “OSD” or “i+” (“STATUS” or “INFO” for NAFTA and LATAM) from the user remote will toggle the OSD “on/off” with “SDM” OSD remaining always “on”.
- Press the following key sequence on the remote control transmitter: “**062596**” directly followed by the **OSD/STATUS/INFO/i+** button to switch to SAM (do not allow the display to time out between entries while keying the sequence).

How to Exit

Switch the set to STANDBY by pressing the mains button on the remote control transmitter or on the television set.

If you switch the television set “off” by removing the mains (i.e., unplugging the television), the television set will remain in SDM when mains is re-applied, and the error buffer is not cleared. The error buffer will only be cleared when the “clear” command is used in the SAM menu.

Note:

- If the TV is switched “off” by a power interrupt while in SDM, the TV will show up in the last status of SDM menu as soon as the power is supplied again. The error buffer will not be cleared.
- In case the set is in Factory mode by accident (with “F” displayed on screen), by pressing and hold “VOL-” and “CH-” together should leave Factory mode.

5.2.3 Service Alignment Mode (SAM)

Purpose

- To change option settings.
- To display / clear the error code buffer.
- To perform alignments.

Specifications

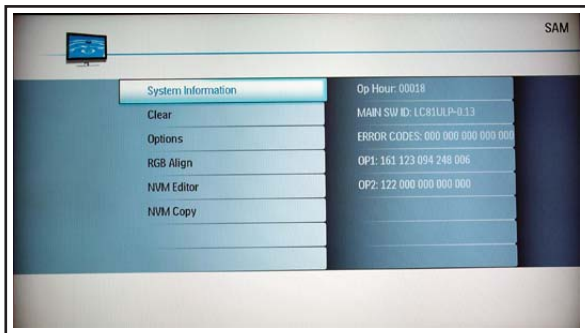
- Operation hours counter (maximum five digits displayed).
- Software version, error codes, and option settings display.
- Error buffer clearing.
- Option settings.
- Software alignments (White Tone).
- NVM Editor.
- Set screen mode to full screen (all content is visible).

How to Activate

To activate SAM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: **"062596"** directly followed by the **OSD/STATUS/INFO/i+** button (it depends on region which button is present on the RC). Do not allow the display to time out between entries while keying the sequence.
- Or via ComPair.

After entering SAM, the following screen is visible, with SAM in the upper right corner of the screen to indicate that the television is in Service Alignment Mode.



H_17740_025.eps
230108

Figure 5-4 SAM menu

Menu explanation:

1. System Information:

- **Op. Hour.** This represents the life timer. The timer counts normal operation hours, but does not count Stand-by hours.
 - **MAIN SW ID.** See paragraph Software Identification, Version, and Cluster for the SW name definition.
 - **ERROR CODES.** Shows all errors detected since the last time the buffer was erased. Five errors possible.
 - **OP1 / OP2.** Used to read-out the option bytes. See paragraph 6.4 Option Settings in the Alignments section for a detailed description. Ten codes are possible.
2. **Clear.** Erases the contents of the error buffer. Select the CLEAR menu item and press the MENU RIGHT key. The content of the error buffer is cleared.
 3. **Options.** To set the option bits. See paragraph 6.4 Option Settings in the "Alignments" chapter for a detailed description.
 4. **RGB Align.** To align the White Tone. See White Tone Alignment; for a detailed description.
 5. **NVM Editor.** To change the NVM data in the television set. See also paragraph 5.6 Fault Finding and Repair Tips.
 6. **NVM Copy.** Gives the possibility to copy/load the NVM file to/from a USB stick. NVM data copied to a USB memory device is named **"NVM_COPY.BIN"**. When copied back to a TV, the file first must have the same name.

How to Navigate

- In the SAM menu, select menu items with the UP/DOWN keys on the remote control transmitter. The selected item will be indicated. When not all menu items fit on the screen, use the UP/DOWN keys to display the next / previous menu items.
- With the LEFT/RIGHT keys, it is possible to:
 - Activate the selected menu item.
 - Change the value of the selected menu item.
 - Activate the selected sub menu.
- When you press the MENU button twice while in top level SAM, the set will switch to the normal user menu (with the SAM mode still active in the background). To return to the SAM menu press the MENU button.
- The **"OSD/STATUS/INFO/i+"** key from the user remote will toggle the OSD "on/off" with "SAM" OSD remaining always "on".
- Press the following key sequence on the remote control transmitter: **"062596"** directly followed by the **MENU** button to switch to SDM (do not allow the display to time out between entries while keying the sequence).

How to Store SAM Settings

To store the settings changed in SAM mode (except the OPTIONS and RGB ALIGN settings), leave the top level SAM menu by using the POWER button on the remote control transmitter or the television set. The mentioned exceptions must be stored separately via the STORE button.

How to Exit

Switch the set to STANDBY by pressing the mains button on the remote control transmitter or the television set.

Note:

- When the TV is switched "off" by a power interrupt while in SAM, the TV will show up in "normal operation mode" as soon as the power is supplied again. The error buffer will not be cleared.
- In case the set is in Factory mode by accident (with "F" displayed on screen), by pressing and hold "VOL-" and "CH-" together should leave Factory mode.

5.2.4 Customer Service Mode (CSM)

Purpose

The Customer Service Mode shows error codes and information on the TV's operation settings. A call centre can instruct the customer (by telephone) to enter CSM in order to identify the status of the set. This helps them to diagnose problems and failures in the TV before making a service call. The CSM is a read-only mode; therefore, modifications are not possible in this mode.

Specifications

- Ignore "Service unfriendly modes".
- Line number for every line (to make CSM language independent).
- Set the screen mode to full screen (all contents on screen is visible).
- After leaving the Customer Service Mode, the original settings are restored.
- Possibility to use "CH+" or "CH-" for channel surfing, or enter the specific channel number on the RC.

How to Activate

To activate CSM, press the following key sequence on a standard remote control transmitter: "123654" (do not allow the display to time out between entries while keying the sequence).

Upon entering the Customer Service Mode, the following screen will appear:

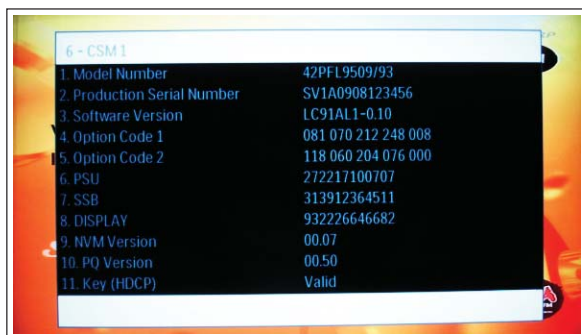


Figure 5-5 CSM menu -1- (example)

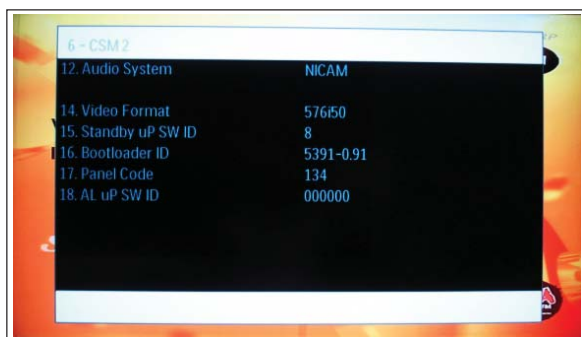


Figure 5-6 CSM menu -2- (example)

Menu Explanation

1. **Model Number.** Type number, e.g. 42PFL9509/93. (*)
2. **Production Serial Number.** Product serial no., e.g. SV1A0908123456 (*). SV= Production centre, 1= BOM code, A= Service version change code, 09= Production year, 08= Production week, 123456= Serial number.
3. **Software Version.** Main software cluster and version is displayed.
4. **Option Code 1.** Option code information (group 1).
5. **Option Code 2.** Option code information (group 2).
6. **PSU.** Indication of the PSU factory ID (= 12nc).
7. **SSB.** Indication of the SSB factory ID (= 12nc). (*)
8. **Display.** Indication of the display ID (=12 nc). (*)
9. **NVM Version.** The NVM software version no.
10. **PQ Version.** PQ (picture quality) data version. This is a subset of the main SW.
11. **Key (HDCP).** Indicates if the HDMI keys (or HDCP keys) are valid or not.
12. **Audio System.** Gives information about the audio system of the selected transmitter.
13. Blank.
14. **Video Format.** Gives information about the video format of the selected transmitter (480p30/720p60/1080i50/1080i60, etc...). Is applicable to both HDMI and CVI sources.
15. **Standby uP SW ID.** Shows the Standby Processor software version.
16. **Bootloader ID.** Shows the Bootloader software ID.
17. **Panel code.** Gives the number of the panel as stored in NVM.
18. **AP uP SW ID.** Shows the AL uP software version.

(*) If an NVM IC is replaced or initialized, these items must be re-written to the NVM. ComPair will foresee in a possibility to do this.

How to Exit

To exit CSM, use one of the following methods:

- Press the MENU button twice on the remote control transmitter.
- Press the POWER button on the remote control transmitter.
- Press the POWER button on the television set.

5.3 Service Tools

5.3.1 ComPair

Introduction

ComPair (Computer Aided Repair) is a Service tool for Philips Consumer Lifestyle products. and offers the following:

1. ComPair helps you to quickly get an understanding on how to repair the chassis in a short and effective way.
2. ComPair allows very detailed diagnostics and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C or UART commands yourself, because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the uP is working) and all repair information is directly available.
4. ComPair features TV software up possibilities.

Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The (new) ComPair II interface box is connected **to the PC** via an USB cable. For the TV chassis, the ComPair interface box and the TV communicate via a bi-directional cable via the service connector(s).

How to Connect

This is described in the ComPair chassis fault finding database.

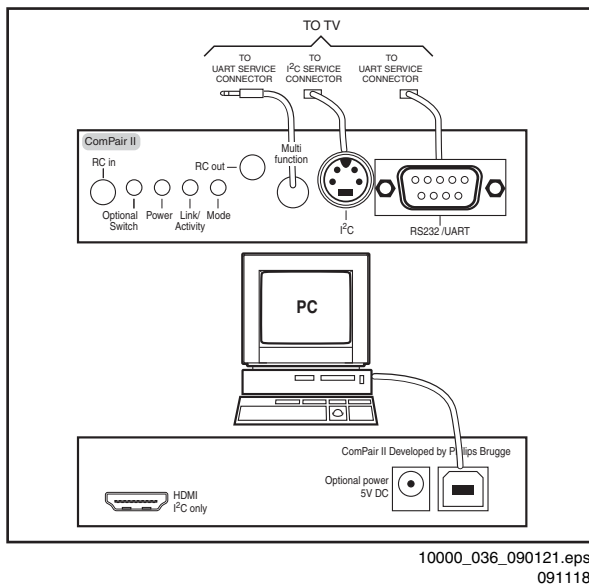


Figure 5-7 ComPair II interface connection

Caution: It is compulsory to connect the TV to the PC as shown in the picture above (with the ComPair interface in between), as the ComPair interface acts as a level shifter. If one connects the TV directly to the PC (via UART), ICs will be blown!

How to Order

ComPair II order codes:

- ComPair II interface: 3122 785 91020.
- ComPair UART interface cable: 3138 188 75051.
- Program software can be downloaded from the Philips Service website.

Note: If you encounter any problems, contact your local support desk.

5.3.2 LVDS Tool

Support of the LVDS Tool has been discontinued.

5.4 Error Codes

5.4.1 Introduction

Error codes are required to indicate failures in the TV set. In principle a unique error code is available for every:

- Activated (SW) protection.
- Failing I²C device.
- General I²C error.

The last five errors, stored in the NVM, are shown in the Service menu's. This is called the error buffer.

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.

An error will be added to the buffer if this error differs from any error in the buffer. The last found error is displayed on the left. An error with a designated error code may **never** lead to a deadlock situation. This means that it must always be diagnosable (e.g. error buffer via OSD or blinking LED procedure, ComPair to read from the NVM).

In case a failure identified by an error code automatically results in other error codes (cause and effect), only the error code of the MAIN failure is displayed.

Example: In case of a failure of the I2C bus (CAUSE), the error code for a "General I2C failure" and "Protection errors" is displayed. The error codes for the single devices (EFFECT) is not displayed. All error codes are stored in the same error buffer (TV's NVM) except when the NVM itself is defective.

5.4.2 How to Read the Error Buffer

You can read the error buffer in 3 ways:

- On screen via the SAM/SDM/CSM (if you have a picture).
Example:
 - **ERROR: 0 0 0 0 0** : No errors detected
 - **ERROR: 6 0 0 0 0** : Error code 6 is the last and only detected error
 - **ERROR: 9 6 0 0 0** : Error code 6 was detected first and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See paragraph 5.5 The Blinking LED Procedure.
- Via ComPair.

5.4.3 Error codes

The layer 1 error codes are pointing to the defective board. They are triggered by LED blinking when CSM is activated. In the LC09M platform, only two boards are present: the SSB and the PSU, meaning only two layer 1 errors are defined (or three in case an additional bolt-on module is added):

- 2: SSB
- 4: PSU
- 6: Bolt-on.

The following layer 2 errors have been assigned:

- 00: no error
- 11: DC protection of speakers, detected by MT539x
- 12: +12V protection error (or 12V failure), detected by standby processor during start-up
- 13: POK line error
- 14: General I²C bus error when all the devices I²C devices on the same bus had no response
- 15: I²C error while communicating with the main EEPROM
- 16: I²C error while communicating with the PLL/hybrid tuner
- 17: I²C error while communicating with the HDMI Mux IC ADV3002
- 18: IF demodulator TDA9886
- 19: Reserved

- 21: Digital Bolt-on module communication error (where applicable).

5.4.4 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:

- By using the CLEAR command in the SAM menu:
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

Note: If you exit SAM by disconnecting the mains from the television set, the error buffer is not reset.

5.5 The Blinking LED Procedure

5.5.1 Introduction

The software is capable of identifying different kinds of errors. Because it is possible that more than one error can occur over time, an error buffer is available, which is capable of storing the last five errors that occurred. This is useful if the OSD is not working properly.

Errors can also be displayed by the blinking LED procedure. The method is to repeatedly let the front LED pulse with as many pulses as the error code number, followed by a period of 1.5 seconds in which the LED is "off". Then this sequence is repeated.

Example (1): error code 4 will result in four times the sequence LED "on" for 0.25 seconds / LED "off" for 0.25 seconds. After this sequence, the LED will be "off" for 1.5 seconds. Any RC5 command terminates the sequence. Error code LED blinking is in red colour.

Example (2): the content of the error buffer is "12 9 6 0 0" After entering SDM, the following occurs:

- 1 long blink of 5 seconds to start the sequence,
- 12 short blinks followed by a pause of 1.5 seconds,
- 9 short blinks followed by a pause of 1.5 seconds,
- 6 short blinks followed by a pause of 1.5 seconds,
- 1 long blink of 1.5 seconds to finish the sequence,
- The sequence starts again with 12 short blinks.

5.5.2 Displaying the Entire Error Buffer

Additionally, the entire error buffer is displayed when Service Mode "SDM" is entered. In case the TV set is in protection or Stand-by: The blinking LED procedure sequence (as in SDM-mode in normal operation) must be triggered by the following RC sequence: "MUTE" "062500" "OK".

In order to avoid confusion with RC5 signal reception blinking, this blinking procedure is terminated when a RC5 command is received.

5.6 Fault Finding and Repair Tips

Notes:

- It is assumed that the components are mounted correctly with correct values and no bad solder joints.
- **Before** any fault finding actions, check if the correct options are set.

5.6.1 Software Protections

Most of the protections and errors use either the stand-by or the micro processor as detection device. Since in these cases, checking of observers, polling of ADCs, and filtering of input values are all heavily software based, these protections are referred to as software protections.

There are several types of software related protections, solving a variety of fault conditions:

- **Protections related to supplies:** check of the 12V.
- **Protections related to breakdown of the safety check mechanism.** E.g. since the protection detections are done by means of software, failing of the software will have to initiate a protection mode since safety cannot be guaranteed any more.

Remark on the Supply Errors

The detection of a supply dip or supply loss during the normal playing of the set does not lead to a protection, but to a cold reboot of the set. If the supply is still missing after the reboot, the TV will go to protection.

Protections during Start-up

During TV start-up, some voltages and IC observers are actively monitored to be able to optimise the start-up speed, and to assure good operation of all components. If these monitors do not respond in a defined way, this indicates a malfunction of the system and leads to a protection.

5.6.2 Hardware Protections

The only real hardware protection in this chassis is (in case of an audio problem) the audio protection circuit that will trigger the uP to switch "off" the TV.

Repair Tip

- It is also possible that you have an audio DC protection because of an interruption in one or both speakers (the DC voltage that is still on the circuit cannot disappear through the speakers).

Caution: (dis)connecting the speaker wires during the ON state of the TV at high volume can damage the audio amplifier.

5.6.3 NVM Editor

In some cases, it can be convenient if one directly can change the NVM contents. This can be done with the "NVM Editor" in SAM mode. With this option, single bytes can be changed.

Caution:

- **Do not change these, without understanding the function of each setting, because incorrect NVM settings may seriously hamper the correct functioning of the TV set!**
- Always write down the existing NVM settings, before changing the settings. This will enable you to return to the original settings, if the new settings turn out to be incorrect.

Table 5-1 NVM editor overview

	Hex	Dec	Description
Address	0x000A	10	Existing value
Value	0x0000	0	New value
Store	Store?		

5.6.4 Load Default NVM Values

It is possible to download default values automatically into the NVM in case a blank NVM is placed or when the NVM first 20 address contents are "FF". After the default values are downloaded, it is possible to start-up and to start aligning the TV set. To initiate a forced default download the following action has to be performed:

1. Switch "off" the TV set with the mains cord disconnected from the wall outlet (it does not matter if this is from "Stand-by" or "Off" situation).
2. Short-circuit the SDM jumpers on the SSB (keep short circuited).
3. Press "P+" or "CH+" on the local keyboard (and keep it pressed).
4. Reconnect the mains supply to the wall outlet.
5. Release the "P+" or "CH+" when the set is started up and has entered SDM.

When the downloading has completed successfully, the set should be into Stand-by, i.e. red LED on.

Alternative method:

It is also possible to upload the default values to the NVM with ComPair in case the SW is changed, the NVM is replaced with a new (empty) one, or when the NVM content is corrupted.

After replacing an EEPROM (or with a defective/no EEPROM), default settings should be used to enable the set to start-up and allow the Service Default Mode and Service Alignment Mode to be accessed.

5.6.5 Display option code

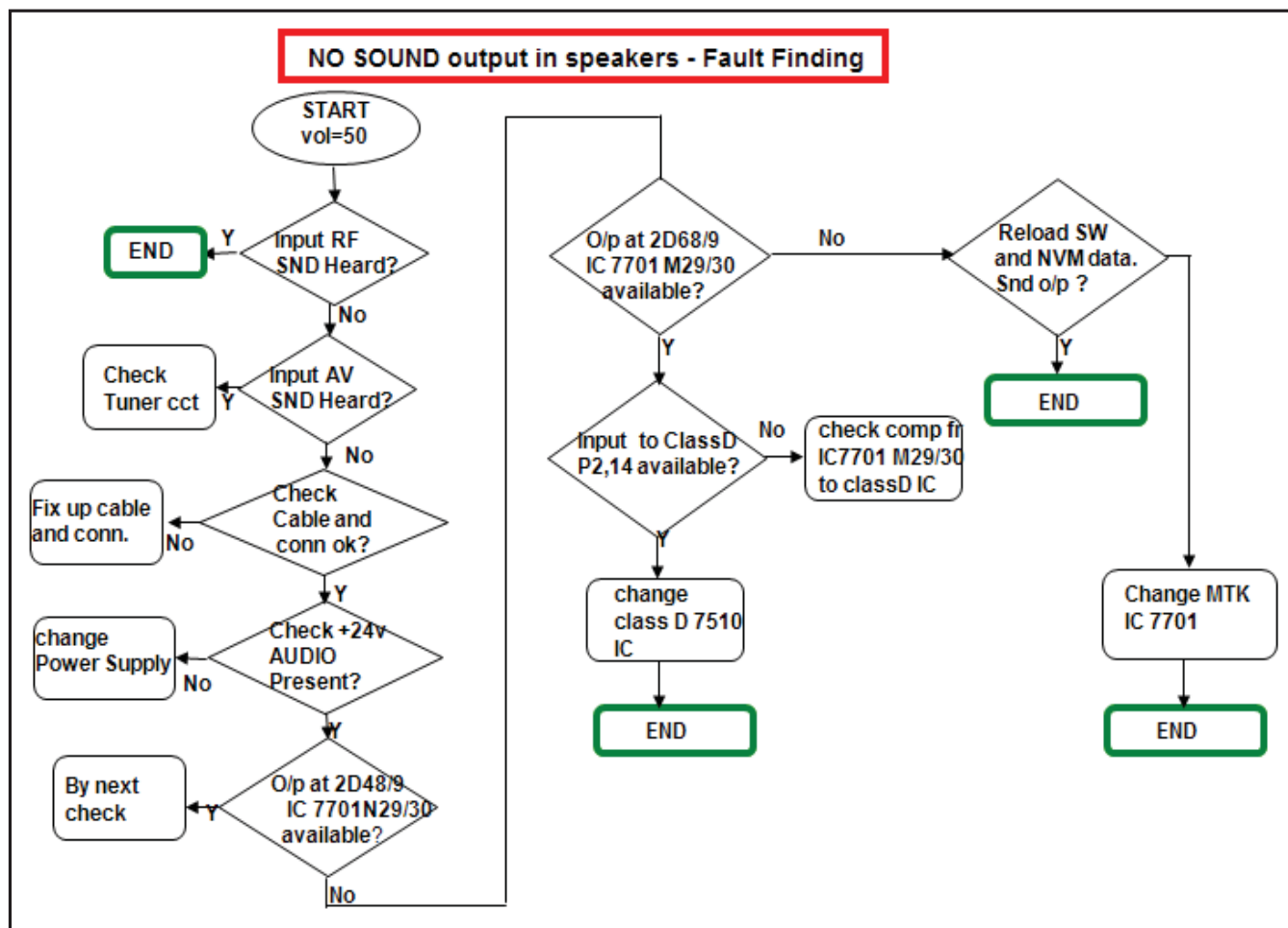
Caution: In case you have replaced the SSB, always check the display option code in SAM, even if you have picture. With a wrong display option code it is possible that you have picture, but that in certain conditions you have unwanted side-effects.

5.6.6 Trouble Shooting Tuner section

When there is no picture in analog RF mode:

1. Check whether picture is present in AV mode. If not, tuner section is okay. Check video processing section.
2. Check if option settings are correct. Tuner profile in OP10: OPA7..OPA5=000 (China region), 010 (AP region).
3. Check if 5 V supply is available at test points F256, F228, F229 and F219, and if 33 V is available at test point F257.
4. Check if the I²C lines are working correctly (3.3 V).
5. Manually store a known channel and check if there is IF output at tuner pin 11. If not, tuner is faulty.
6. Feed in 105 dBuV at tuner pin 11 and check whether there is CVBS output from IF demodulator IC. If not, IF demodulator might be faulty. Check components in this area.

5.6.7 Trouble Shooting Sound section



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Figure 5-8 Fault finding tree sound section

5.6.8 Trouble Shooting HDMI section

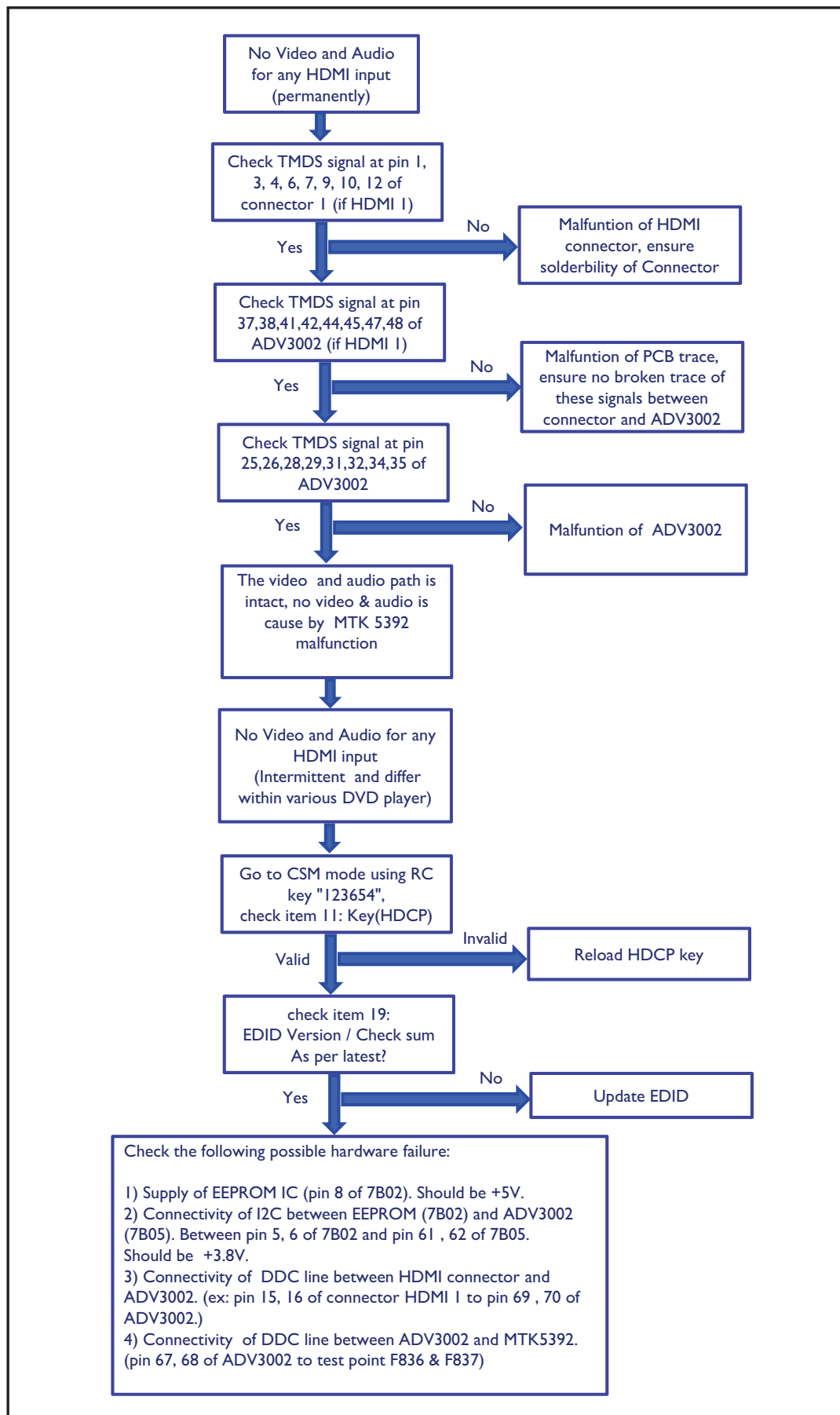
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Figure 5-9 Fault finding tree HDMI section

5.6.9 Start-up/Shut-down Flowcharts

On the next pages you will find start-up and shut-down flowcharts, which might be helpful during fault finding.

POWER STATES

In this chassis, there are six possible power states as follows:

- Power OFF
- Power ON
- STANDBY
- SEMI-STANDBY
- Special Panel Mode
- PROTECTION

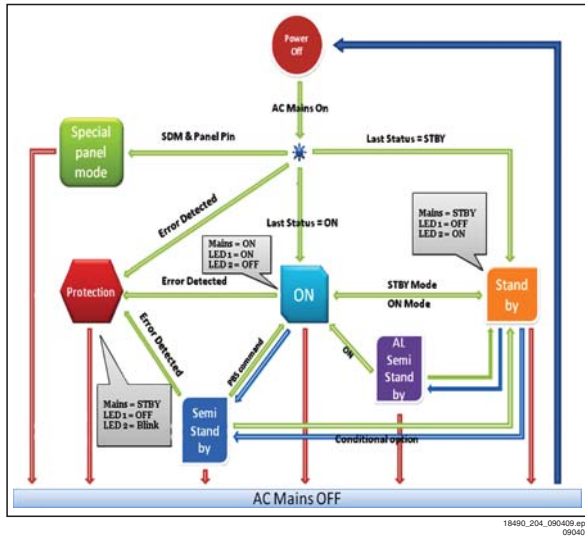


Figure 5-10 Power States

POWER OFF

In "Power OFF" mode, the system is completely switched "off" from AC mains. When AC power is applied, the system checks for last status. Depending on the last standby status stored in the system EEPROM, this mode can then transit to "ON" or "STANDBY" mode.

ON

This is the normal operating mode, indicated by the "on" LED. All the power supply lines are available and depending on the sub-mode, all the circuits in the system may be active. From this mode it shall be possible to transit to "STANDBY" and "PROTECTION" mode, or to "Power OFF" mode if AC mains are switched "off". The sub-modes are:

- Active Mode (Normal Consumer Mode)
- Service Modes
- Panel Modes
- Factory Modes

STANDBY

The total power consumption of the system in this mode shall be equal or less than 150 mW. This state is indicated by white LED when AC mains is switched "on". Only the standby controller is operational in this state, where only +3V3stby power supply is available. From this mode it shall be possible to transit to the "ACTIVE" or "Power OFF" mode if AC mains are switched "off".

SEMI-STANDBY

The semi-standby state is required to perform the following tasks:

- AmbiLight wakeup control
- PBS SemiStandby.

SPECIAL PANEL MODE

The Special Panel Mode is **only** used during manufacturing process to program the system EEPROM. In this mode, the SDA0 and SCL0 ports of MT5392 are set to high impedance after SDM and PANEL pins are both detected as "low" during start-up. This mode can be exited using a power recycle.

PROTECTION

This state is entered when an error has been detected at start-up or in the "ACTIVE" mode. All switched power supply lines are turned "off" with only +3V3stby remaining "on"; similar to "STANDBY" mode. This state is indicated by the blinking red front LED with the blinking sequence denoting the type of error detected.

When the system enters the protection mode due to a critical error, it should be turned "off" and the failure cause needs to be resolved. The system will function normally again after performing a power recycling once all protection causing failures have been resolved.

START-UP SEQUENCE

There are two cases of start-up sequences, namely:

- AC On and
- Standby Wake-up.

See also [Figure 5-11](#).

AC ON

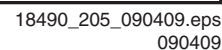
In the case of start-up from AC mains, all PSU voltages start to turn "on" as the hardware default of the active "low" STANDBY (controlled by Standby Controller STANDBY signal) signal to the PSU is pulled "low" with respect to ground.

The MT5392 starts running boot loader once the hardware reset circuit is released. The system will then check the last standby status from the system EEPROM to determine whether to complete the system start-up (load image, turn on the audio, display etc) or proceed to standby and wait for wake-up command from user. The Standby Controller then proceeds to verify the power status of the +12V and sends the system to protection in case of any failures. Special Panel, SDM, and PANEL modes are detected as well.

STANDBY WAKEUP

When the system receives a command to wake-up from standby, the Standby Controller sets the STANDBY signal "low" to turn "on" the switched power, and similarly detects for the presence of +12V. The MT5392 waits for +3V3_SW to be available before loading its image. The significance of this voltage detection is due to the flash is also being powered by the same mentioned voltage.

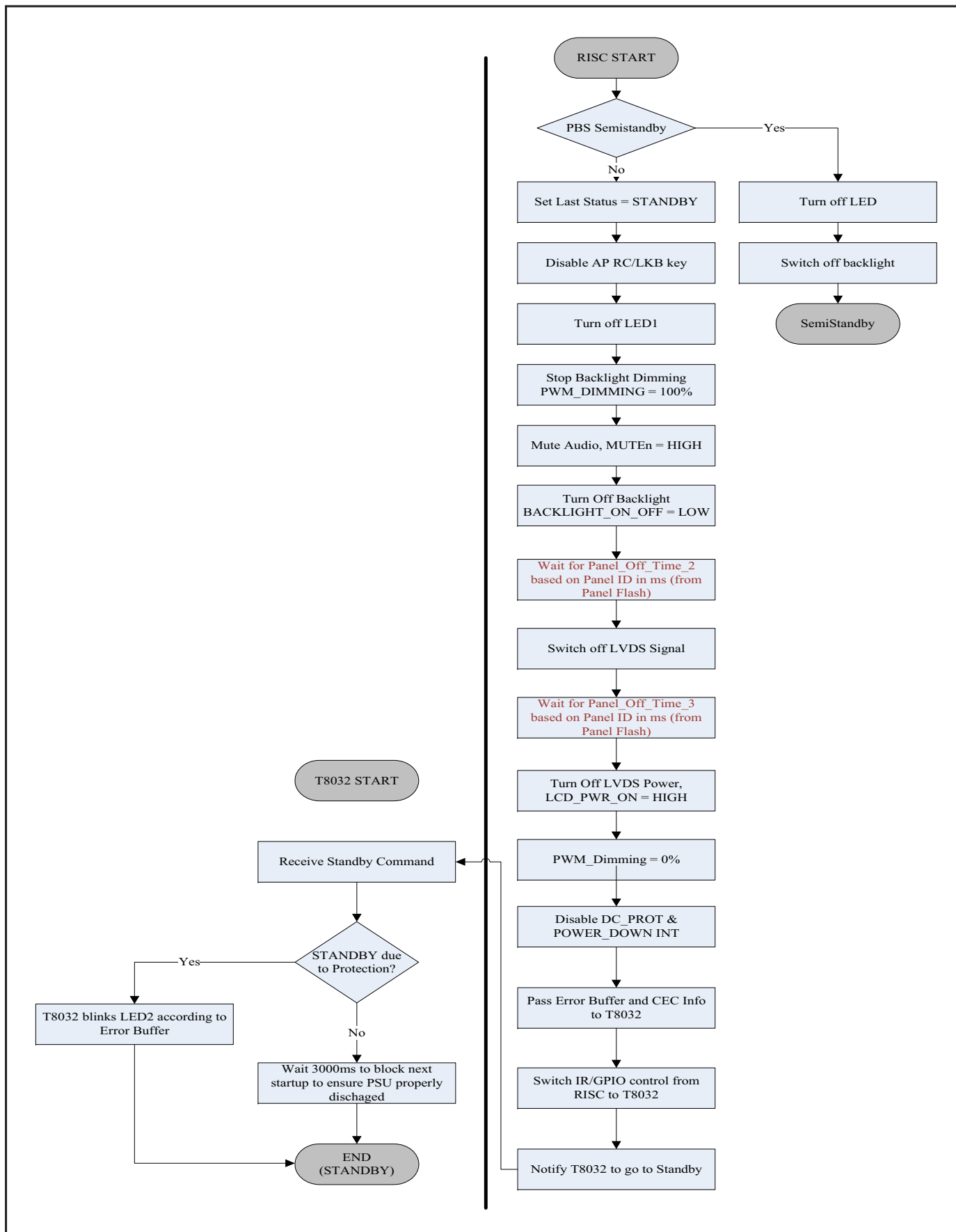
The following figure shows the start-up flowchart for both "AC On" and "Standby Wake-up":



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STANDBY SEQUENCE

The following flowchart depicts the Standby (plus Semi-Standby condition) sequence:



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Figure 5-12 Standby flowchart

POWERDOWN SEQUENCE

The following figure shows the power-down sequence flowchart:

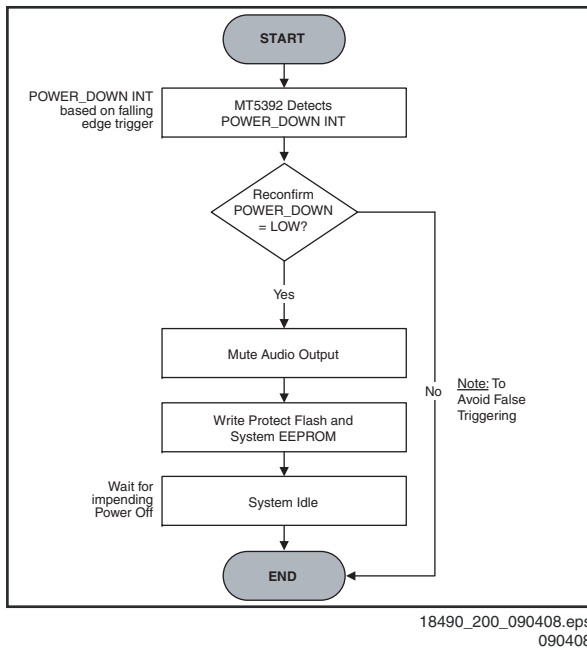


Figure 5-13 Power-down flowchart

The power-down condition is detected by the MT5392 POWER_DOWN signal which is an interrupt pin. A “low” level on this line signifies that power-down is detected. The two major activities that occur over this operation is the muting of audio output and write protecting the system flash and EEPROM.

DC PROTECTION

The following figure shows the DC_PROT interrupt flowchart:

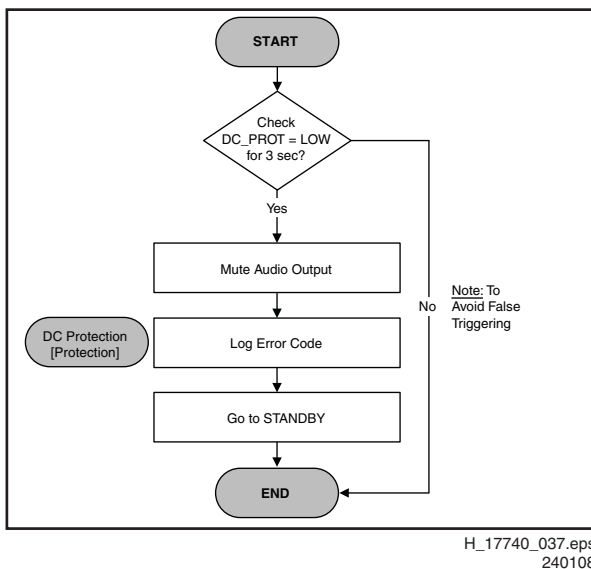
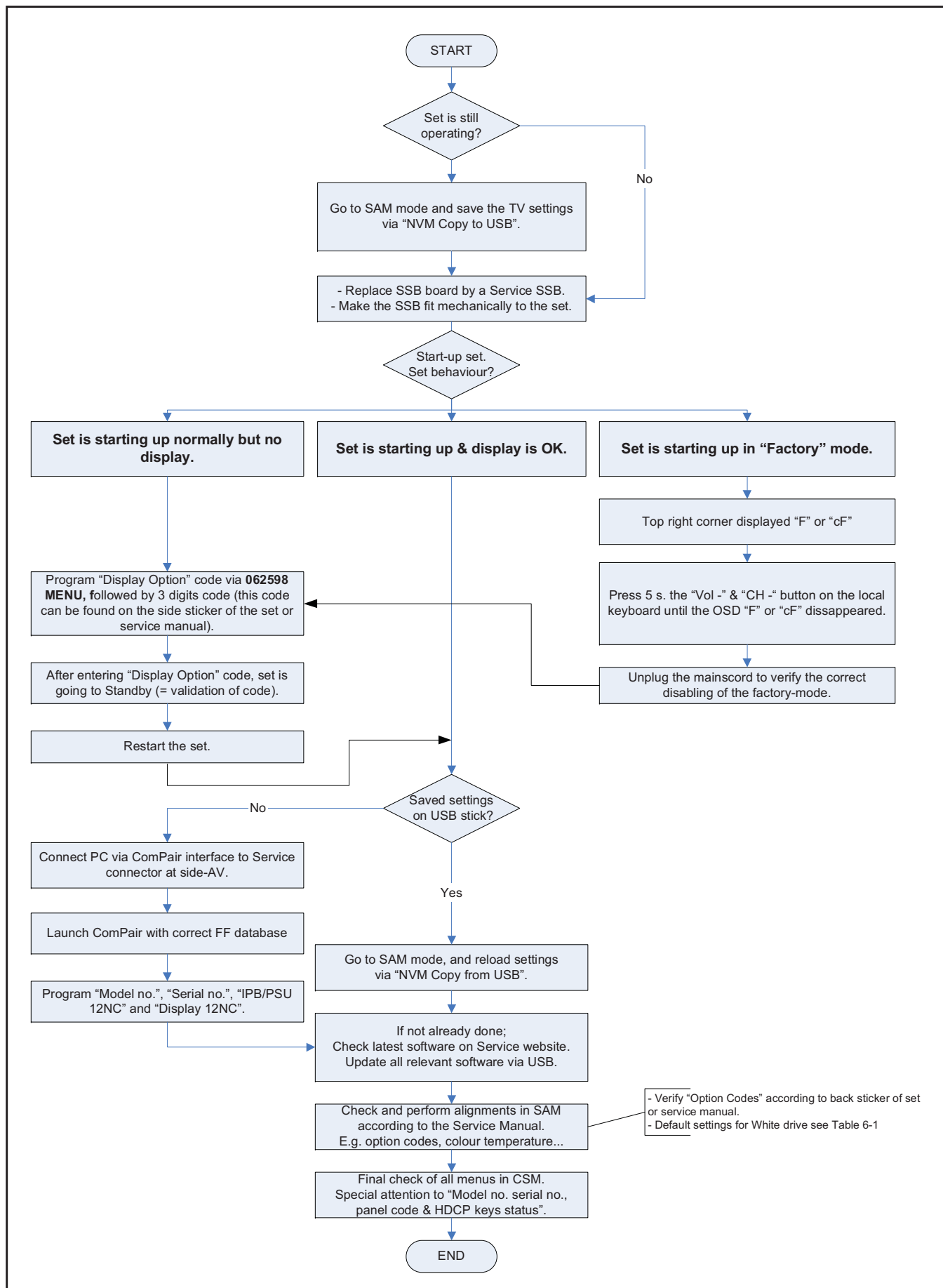


Figure 5-14 DC Protection flowchart

5.6.10 SSB replacement

Follow the instructions in the flowchart in case a SSB has to be swapped.



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Figure 5-15 SSB replacement flowchart

5.7 Software Upgrading

5.7.1 Introduction

It is possible **for the user** to upgrade the **main** software via the USB port. This allows replacement of a software image in a stand alone set, without the need of an E-JTAG debugger. A description on how to upgrade the main software can be found in the DFU or on the Philips website.

5.7.2 Main Software Upgrade

Automatic Software Upgrade

In “normal” conditions, so when there is no major problem with the TV, the main software and the default software upgrade application can be upgraded with the “autorun.upg” (FUS part in the one-zip file). This can also be done by the consumers themselves, but they will have to get their software from the commercial Philips website or via the Software Update Assistant in the user menu (see DFU). The “autorun.upg” file must be placed in the root of your USB stick.

How to upgrade:

1. Copy “autorun.upg” to the root of your USB stick.
2. Insert USB stick in the side I/O while the set is in “On” mode. The set will prompt for software upgrade acknowledge, after which the upgrading will start automatically. As soon as the programming is finished, you have to give a “restart” command, after which the set will restart. In the “Setup” menu you can check if the latest software is running.

5.7.3 Content and Usage of the One-Zip Software File

Below you find a content explanation of the One-Zip file, and instructions on how and when to use it.

- **Ambi_clustername_version.zip**. Not to be used by Service technicians.
- **Panel_clustername_version.zip**. Not to be used by Service technicians.
- **EDID_clustername_version.zip**. Contains the EDID content of the different EDID NVMs. See ComPair for further instructions.
- **FUS_clustername_version.zip**. Contains the “autorun.upg” which is needed to upgrade the TV main software and the software download application.
- **NVM_clustername_version.zip**. Default NVM content. Must be programmed via ComPair.

5.7.4 How to Copy NVM Data to/from USB

Write NVM data to USB

1. Insert the USB stick into the USB slot while in SAM mode.
2. Execute the command “NVM Copy” > “NVM Copy to USB”, to copy the NVM data to the USB stick. The NVM filename on the USB stick will be named “**NVM_COPY.BIN**” (this takes a couple of seconds).

Write NVM data to TV

1. First, ensure (via a PC) that the filename on the USB stick has the correct format: “**NVM_COPY.BIN**”.
2. Insert the USB stick into the USB slot while in SAM mode.
3. Execute the command “NVM Copy” > “NVM Copy from USB” to copy the USB data to NVM (this takes about a minute to complete).

Important: The file must be located in the **root directory** of the USB stick.

6. Alignments

- Index of this chapter:**
- [6.1 General Alignment Conditions](#)
 - [6.2 Hardware Alignments](#)
 - [6.3 Software Alignments](#)
 - [6.4 Option Settings](#)

Note: Figures below can deviate slightly from the actual situation, due to the different set executions.

General: The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5. Menu navigation is done with the CURSOR UP, DOWN, LEFT or RIGHT keys of the remote control transmitter.

6.1 General Alignment Conditions

- Perform all electrical adjustments under the following conditions:
- Power supply voltage (depends on region):
 - AP-NTSC: 120 V_{AC} or 230 V_{AC} / 50 Hz (± 10%).
 - AP-PAL-multi: 120 - 230 V_{AC} / 50 Hz (± 10%).
 - EU: 230 V_{AC} / 50 Hz (± 10%).
 - LATAM-NTSC: 120 - 230 V_{AC} / 50 Hz (± 10%).
 - US: 120 V_{AC} / 60 Hz (± 10%).
 - Connect the set to the mains via an isolation transformer with low internal resistance.
 - Allow the set to warm up for approximately 15 minutes.
 - Measure voltages and waveforms in relation to correct ground (e.g. measure audio signals in relation to AUDIO_GND).
- Caution:** It is not allowed to use heatsinks as ground.
- Test probe: Ri > 10 Mohm, Ci < 20 pF.
 - Use an isolated trimmer/screwdriver to perform alignments.

6.2 Hardware Alignments

There are no hardware alignments foreseen for this chassis, but below find an overview of the most important DC voltages on the SSB. These can be used for checking proper functioning of the DC/DC converters.

Description	Test Point	Specifications (V)			Diagram
		Min.	Typ.	Max.	
+12VS	F124	11.40	12.00	12.60	B01_DC-DC
+3V3_STBY	F101	3.20	3.30	3.40	B01_DC-DC
+3V3_SW	F133	3.14	3.3	3.46	B01_DC-DC
+1V2_SW	F131	1.18	1.25	1.31	B01_DC-DC
+5V_SW	F132	4.94	5.2	5.46	B01_DC-DC
+1V8_SW	F125	1.71	1.80	1.89	B01_DC-DC
+1V0_SW	F134	0.99	1.05	1.10	B01_DC-DC
+8V_SW	F122	7.6	8.0	8.4	B01_DC-DC
+5VS	F228	4.75	5	5.25	B02_Tuner_IF
+VDISP	F934	11.40	12.00	12.60	B04D_LVDS
+VTUN	F123	30	33	36	B01_DC-DC
+5V_IF	F229	4.75	5	5.25	B02_Tuner_IF
+5VTUN	F219	4.75	5	5.25	B02_Tuner_IF

6.3 Software Alignments

With the software alignments of the Service Alignment Mode (SAM) the Tuner and RGB settings can be aligned. To store the data: Use the RC button "Menu" to switch to the main menu and next, switch to "Stand-by" mode.

6.3.1 Tuner Adjustment (RF AGC Take Over Point)

Purpose: To keep the tuner output signal constant as the input signal amplitude varies.

The LC9.2A LA chassis comes with the UV1856L analogue tuner with splitter. No alignment is necessary, as the AGC alignment is done automatically (standard value: "15"). However in case of problems use the following method (use multimeter and RF generator):

- Apply a vision IF carrier of 38.9 MHz (105 dBuV = 178 mVrms) to injection point A258 (input via 50 ohm coaxial cable terminated with an RC network of series 10nF with 120 ohm to ground).
- Measure voltage on pin 1 of the tuner (test point F250).
- Adjust AGC (via SAM menu: TUNER -> AGC), until voltage on pin 1 is 3.3 +0.5/-1.0 V.
- Store settings and exit SAM.

6.3.2 RGB Alignment

Before alignment, choose "Setup" -> "Picture" and set:

- "Brightness" to "50".
- "Colour" to "50".
- "Contrast" to "100".

White Tone Alignment:

- Activate SAM.
- Select "RGB Align" and choose a colour temperature.
- Use a 100% white screen as input signal and set the following values:
 - All "White point" values initial to "256".
 - All "BlackL Offset" values to "0".

In case you have a colour analyser:

- Measure with a calibrated (phosphor- independent) colour analyser (e.g. Minolta CA-210) in the centre of the screen. Consequently, the measurement needs to be done in a dark environment.
- Adjust the correct x,y coordinates (while holding one of the White point registers R, G or B on "256") by means of decreasing the value of one or two other white points to the correct x,y coordinates (see Table 6-1 White D alignment values). Tolerance: dx: ± 0.004, dy: ± 0.004.
- Repeat this step for the other colour Temperatures that need to be aligned.
- When finished return to the SAM root menu and press STANDBY on the RC to store the aligned values to the NVM.

Table 6-1 White D alignment values

Value	Cool (11000 K)	Normal (9000 K)	Warm (6500 K)
x	0.278	0.289	0.314
y	0.278	0.291	0.319

If you do **not** have a colour analyser, you can use the default values. This is the next best solution. The default values are average values coming from production (statistics).

- Set the RED, GREEN and BLUE default values per temperature according to the values in the "Tint settings" table.
- When finished return to the SAM root menu and press STANDBY on the RC to store the aligned values to the NVM.

Table 6-2 Tint settings 32"

Colour Temp.	R	G	B
Cool	254	211	252
Normal	255	206	218
Warm	255	193	148

Table 6-3 Tint settings 42"

Colour Temp.	R	G	B
Cool	234	211	255
Normal	255	225	240
Warm	255	209	166

Table 6-4 Tint settings 47"

Colour Temp.	R	G	B
Cool	tbh	tbh	tbh
Normal	tbh	tbh	tbh
Warm	tbh	tbh	tbh

6.4 Option Settings

6.4.1 Introduction

The microprocessor communicates with a large number of I²C ICs in the set. To ensure good communication and to make digital diagnosis possible, the microprocessor has to know which ICs to address. The presence/absence of these specific ICs (or functions) is made known by the option codes.

Notes:

- After changing the option(s), save them with the STORE command.
- The new option setting becomes active after the TV is switched "off" and "on" again with the mains switch (the EARAM is then read again).

6.4.2 How To Set Option Codes

When the NVM is replaced, all options will require resetting. To be certain that the factory settings are reproduced exactly, you must set all option numbers. You can find the correct option numbers in table "Option Codes OP1...OP7" below.

How to Change Options Codes

An option code (or "option byte") represents eight different options (bits). When you change these numbers directly, you can set all options very quickly. All options are controlled via ten option bytes (OP1... OPA).

Activate SAM and select "Options". Now you can select the option byte (OP1 to OPA) with the CURSOR UP/ DOWN keys, and enter the new 3 digit (decimal) value. For the correct factory default settings, see Table 6-5 Option code overview. For more detailed information, see Table 6-6 Option codes at bit level (OP1-OP7). If an option is set (value "1"), it represents a certain decimal value.

When all the correct options (bits) are set, the sum of the decimal values of each Option Byte (OP) will give the option code.

Table 6-5 Option code overview

CTN	Option Code	Display Code
32PFL5609D/30	037 068 208 248 136 087 188 066 076 005	204
42PFL5609D/30	037 068 208 248 136 087 188 066 076 006	205
42PFL7409D/30	085 068 208 248 136 087 188 066 076 001	183
47PFL5609D/30	037 068 208 248 136 087 188 066 076 006	203
47PFL7409D/30	085 068 208 248 136 087 188 066 076 001	186

Option Bit Overview

Below find an overview of the Option Codes on **bit** level.

Table 6-6 Option codes at bit level (OP1-OP7)

Option Byte & Bit	Dec. Value	Option Name	Description
Byte OP1			
Bit 7 (MSB)	128	Reserved	not used (Reserved)
Bit 6	64	OPC_MJC_3	0 = MJC is not available; 1 = MJC (60 Hz) is for 768p is available; 2 = MJC (60 Hz) for 1080p is available (Provision); 3 = Reserved; 4 = MJC (100/120 Hz) for 768p is available (Provision); 5 = MJC (100/120 Hz) for 1080p is available; 6-7 = Reserved
Bit 5	32	OPC_MJC_2	
Bit 4	16	OPC_MJC	
Bit 3	8	OPC_REGION_SPECIFIC2	EU: 0-3 = Provision for ATS & ACI; LATAM: 0 = VChip is not available; 1 = VChip is available; 2-3: Reserved; AP: 0 = China set; 1 = Hong Kong set; 2 = India set; 3 = Rest of AP
Bit 2	4	OPC_REGION_SPECIFIC	
Bit 1	2	OPC_REGION2	
Bit 0 (LSB)	1	OPC_REGION	0 = EU; 1 = AP; 2 = LATAM; 3 = Reserved
Byte OP2			
Bit 7 (MSB)	128	OPC_AV2_SCART2_2	EU: (Provision): 0 = SCART 2 is not available; 1 = SCART 2 is available (CVBS + RGB); 2 = SCART 2 is available (CVBS + YC) (Provision); 3 = Reserved; Non-EU (Provision): 0 = AV2 is not available; 1 = AV2_CVBS is available; 2 = AV2_CVBS_SVHS is available; 3 = AV2_CVI is available
Bit 6	64	OPC_AV2_SCART2	
Bit 5	32	Reserved	not used (Reserved)
Bit 4	16	Reserved	not used (Reserved)
Bit 3	8	OPC_CI_PLUS (Provision	EU: ON = CI+ is available; OFF = CI+ is not available
Bit 2	4	OPC_LIGHT_SENSOR	ON = Light Sensor is available; OFF = Light Sensor is not available
Bit 1	2	OPC_AMBILIGHT_2	0 = AmbiLight is not available; 1 = Mono AmbiLight is available; 2 = Stereo AmbiLight is available; 3 = Reserved
Bit 0 (LSB)	1	OPC_AMBILIGHT	
Byte OP3			
Bit 7 (MSB)	128	OPC_SideHDMI	ON = sideHDMI (HDMI4) is available; OFF = sideHDMI (HDMI4) is not available
Bit 6	64	OPC_SideAV_2	0 = SideAV is not available; 1 = SideAV_CVBS is available; 2 = SideAV_CVBS_SVHS is available; 3 = SideAV_CVI is available
Bit 5	32	OPC_SideAV	
Bit 4	16	OPC_VGA	ON = VGA is available; OFF = VGA is not available
Bit 3	8	Reserved	not used (Reserved)
Bit 2	4	OPC_HDMI3	ON = HDMI3 is available; OFF = HDMI3 is not available
Bit 1	2	OPC_AV3_2	0 = AV3 is not available; 1 = AV3_CVBS is available; 2 = AV3_CVBS_SVHS is available; 3 = AV3_CVI is available
Bit 0 (LSB)	1	OPC_AV3	
Byte OP4			
Bit 7 (MSB)	128	OPC_SHOP_MODE	ON = Shop mode is available; OFF = Shop mode is not available
Bit 6	64	OPC_BACKLIGHT_DEEPPDIMMING	ON = Backlight Deep Dimming is available; OFF = Backlight Deep Dimming is not available
Bit 5	32	OPC_BACKLIGHT_BOOST	ON = Backlight Boosting is available; OFF = Backlight Boosting is not available
Bit 4	16	OPC_BACKLIGHT_DIMMING	ON = Backlight Dimming is available; OFF = Backlight Dimming is not available
Bit 3	8	OPC_BBD	ON = Black Bar Detection is available; OFF = Black Bar Detection is not available
Bit 2	4	Reserved	not used (Reserved)
Bit 1	2	Reserved	not used (Reserved)
Bit 0 (LSB)	1	Reserved	not used (Reserved)
Byte OP5			
Bit 7 (MSB)	128	OPC_DIGITAL_OPTION_2	EU: 0 = DVB-T; 1 = DVB-T + DVB-C; 2 = DVB MPEG4 (with DVB-T); DVB MPEG4 (with DVB-C); AP: 0 = Analog; 1 = China DTV; 2 = Hong Kong DTV; 3 = Reserved
Bit 6	64	OPC_DIGITAL_OPTION	
Bit 5	32	Reserved	not used (Reserved)
Bit 4	16	OPC_ADC (Provision)	ON = Auto Description Channel is supported; OFF = Auto Description Channel is not supported
Bit 3	8	OPC_LIP_SYNC	ON = Lip Sync is available; OFF = Lip Sync is not available
Bit 2	4	OPC_SURROUND_VDOLBY	ON = Virtual Dolby available; OFF = Incredible Surround available
Bit 1	2	Reserved	not used (Reserved)
Bit 0 (LSB)	1	Reserved	not used (Reserved)
Byte OP6			
Bit 7 (MSB)	128	Reserved	not used (Reserved)
Bit 6	64	OPC_VPB_4	0 = Video playback (VPB) is not supported 1-16 = Combination of OPC_VBP: MP2 (0 = not support, 1 = support) OPC_VBP_2: MP4 (0 = not support, 1 = support) OPC_VBP_3: VC1 (0 = not support, 1 = support) OPC_VBP_4: DivX (0 = not support, 1 = support)
Bit 5	32	OPC_VPB_3	
Bit 4	16	OPC_VPB_2	
Bit 3	8	OPC_VPB	
Bit 2	4	OPC_MP3_PHOTO	ON = Photo viewer & MP3 player are available; OFF = Photo viewer & MP3 player are not available
Bit 1	2	OPC_VIEW_FOR_YOU	ON = View for you feature is available; OFF = View for you feature is not available
Bit 0 (LSB)	1	OPC_VIRGIN_MODE	ON = Virgin Mode (PNP) is available; OFF = Virgin Mode (PNP) is not available
Byte OP7			
Bit 7 (MSB)	128	OPD_MHEG (Provision)	ON = MHEG is supported; OFF = MHEG is not supported
Bit 6	64	Reserved	not used (Reserved)
Bit 5	32	OPC_PIXELPLUS_LINK	ON = CEC pixelplus link is supported; OFF = CEC pixelplus link is not supported
Bit 4	16	OPC_SYS_AUD_CTRL	ON = CEC system audio control is supported; OFF = CEC system audio control is not supported
Bit 3	8	OPC_RC_PASSTHROUGH	ON = CEC RC pass through is supported; OFF = CEC RC pass through is not supported
Bit 2	4	OPC_CEC	ON = CEC is available; OFF = CEC is not available
Bit 1	2	OPC_OAD2 (Provision)	0 = OFF (OAD/OTA is not supported); 1 = Country dependent; 2 = Always ON
Bit 0 (LSB)	1	OPC_OAD (Provision)	
Byte OP8			
Bit 7 (MSB)	128	OPC_DEMO_AMBILIGHT	ON = AmbiLight demo is available; OFF = AmbiLight demo is not available
Bit 6	64	OPC_DEMO_PP_PLUS	ON = PP+ demo is available (Provision); OFF = PP+ demo is not available

Option Byte & Bit	Dec. Value	Option Name	Description
Bit 5	32	Reserved	not used (Reserved)
Bit 4	16	Reserved	not used (Reserved)
Bit 3	8	OPC_TXT2_5	EU/AP: ON = TXT Level 2.5 supported; OFF = TXT Level 2.5 is not supported; LATAM: Reserved
Bit 2	4	OPC_TXT_CC	EU/AP: ON = TXT is supported (Level 1.5); OFF = TXT is not supported; LATAM: ON = CC is supported; OFF = CC is not supported
Bit 1	2	OPC_EPG	ON = EPG is available; OFF = EPG is not available
Bit 0 (LSB)	1	Reserved	not used (Reserved)
Byte OP9			
Bit 7 (MSB)	128	Reserved	not used (Reserved)
Bit 6	64	OPC_SYS_RECOVERY	ON = System Recovery is available; OFF = System Recovery is not available
Bit 5	32	Reserved	not used (Reserved)
Bit 4	16	Reserved	not used (Reserved)
Bit 3	8	OPC_SCENEA	ON = SCENEA is supported; OFF = SCENEA is not supported
Bit 2	4	OPC_ESTICKER	ON = E-sticker is supported; OFF = E-sticker is not supported
Bit 1	2	Reserved	not used (Reserved)
Bit 0 (LSB)	1	Reserved	not used (Reserved)
Byte OPA			
Bit 7 (MSB)	128	Tuner Profile_2	0 = UV1856 MK5 (China) 1 = UV1836 MK5 (LT) 2 = UV1816E MK5 (AP) 3 = not used (Reserved) 4 = not used (Reserved) 5 = not used (Reserved) 6 = not used (Reserved) 7 = not used (Reserved)
Bit 6	64	Tuner Profile_1	
Bit 5	32	Tuner Profile_0	
Bit 4	16	Cabinet Profile_4	
Bit 3	8	Cabinet Profile_3	0 = Cabinet_Profile_0_Flat 1 = Cabinet_Profile_1_FrameROW_42_47_52 2 = Cabinet_Profile_2 (Reserved) 3 = Cabinet_Profile_3 (Reserved) 4 = Cabinet_Profile_4 (Reserved) 5 = Cabinet_Profile_5_PnS_32_HKD 6 = Cabinet_Profile_6_PnS_42_47_HKD 7 = Cabinet_Profile_7 (Reserved) 8 = Cabinet_Profile_8 (Reserved) 9 = Cabinet_Profile_9 (Reserved) 10 - 32 = not used (Reserved)
Bit 2	4	Cabinet Profile_2	
Bit 1	2	Cabinet Profile_1	
Bit 0 (LSB)	1	Cabinet Profile_0	

7. Circuit Descriptions

Index of this chapter:

[7.1 Introduction](#)

[7.2 Front-End](#)

[7.3 “Zinwell” digital bolt-on module](#)

Notes:

- Only **new** circuits (circuits that are not published recently) are described.
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use chapter [9. Block Diagrams](#) and [10. Circuit Diagrams and PWB Layouts](#). Where necessary, you will find a separate drawing for clarification.

7.1 Introduction

The LC9.2A LA chassis is a digital derivative from the LC9.1A LA chassis. It has an additional “Zinwell” module for digital reception. Only this module is depicted in this manual. For all other circuitry, refer to the LC9.1A LA Service Manual.

7.2 Front-End

Key components for the analogue tuner section (AP region) are:

- UV1856L analog tuner with splitter
- K7257 video SAW filter
- K9362 audio SAW filter
- TDA9886T analogue IF demodulator.

For trouble shooting info, refer to paragraph 5.6.6 Trouble Shooting Tuner section.

The analogue tuner routes an analogue signal directly to the IF demodulator (via the SAW filters), whereas a digital signal is passed to the Zinwell digital bolt-on module via the splitter. The output signal from this module is fed back to the SSB via a HDMI connection.

7.3 “Zinwell” digital bolt-on module

This chassis is equipped with the digital “Zinwell” bolt-on module with the TD1318AF digital tuner, for digital reception. It has the following specifications:

General:

- 12 V supply
- RF input: RF DTMB multi-carrier signal input
- Digital output: HDMI
- Analogue output: CVBS and Audio L/R
- Control: UART and Reset
- Service: UART port
- Others: USB software update.

Tuner:

- TD1318AF
- Input frequency: 47 - 862 MHz
- IF frequency: 36.0 MHz
- Channel bandwidth: 8 MHz

Demodulator:

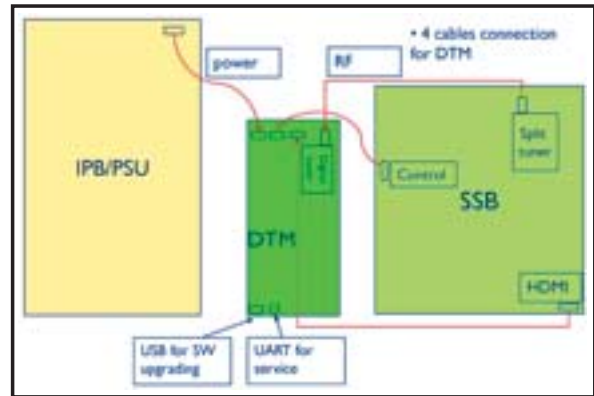
- LGS-8913-A1 (Legend Silicon)
- Constellation: 64-QAM, 16-QAM, 4-QAM
- Guard interval: PN945 (1/4)
- Code Rate: 0.4, 0.6
- De-interleaving: M = 720

Video

- Decoding: MPEG2 (including MPEG still-picture decoding)
- Output format: HDMI (1080i), CVBS

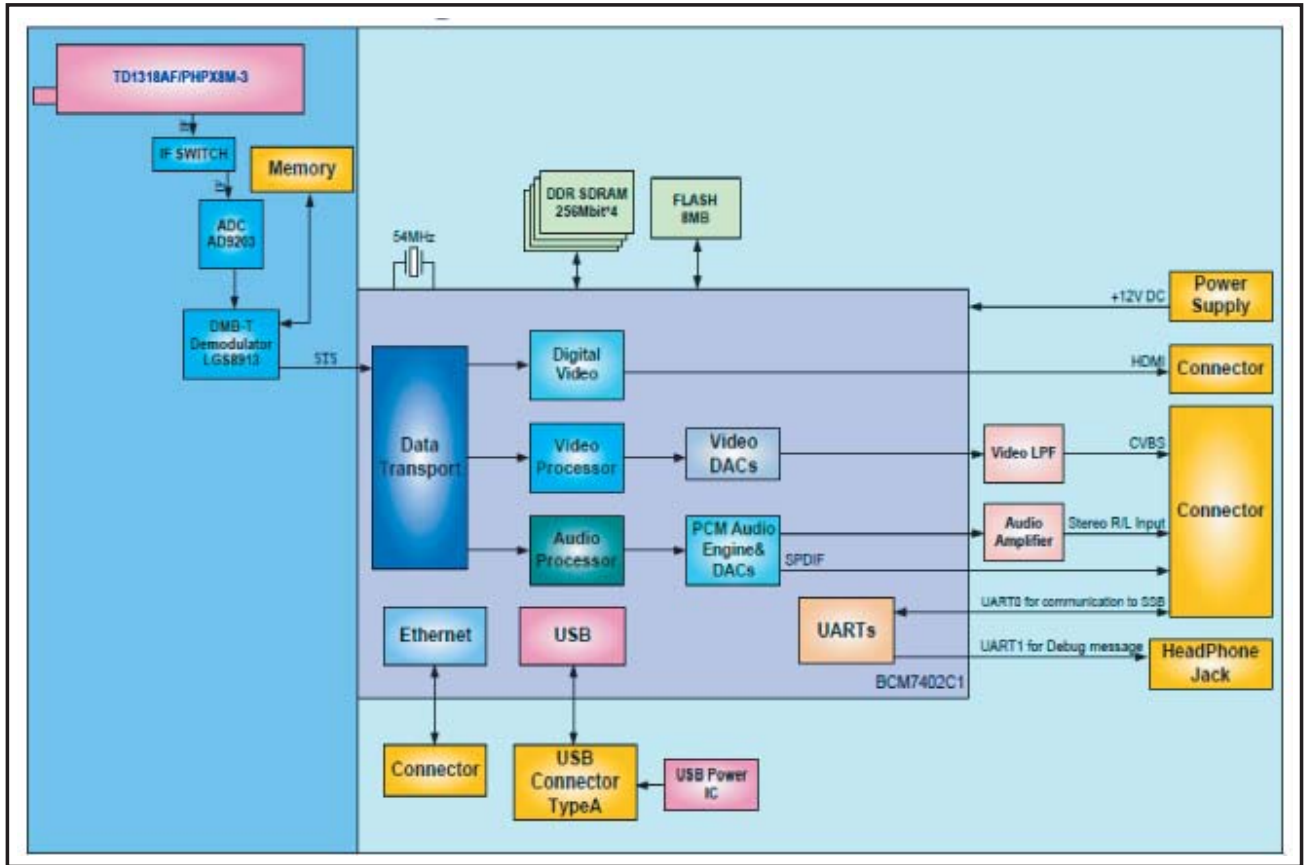
Audio

- Decoding: MPEG1 Layer I/II, MPEG2 Layer I/II, Dolby Digital
- Output format: HDMI, analogue stereo 2-channel



18610_201_090604.eps
090604

Figure 7-1 Digital bolt-on module system connection



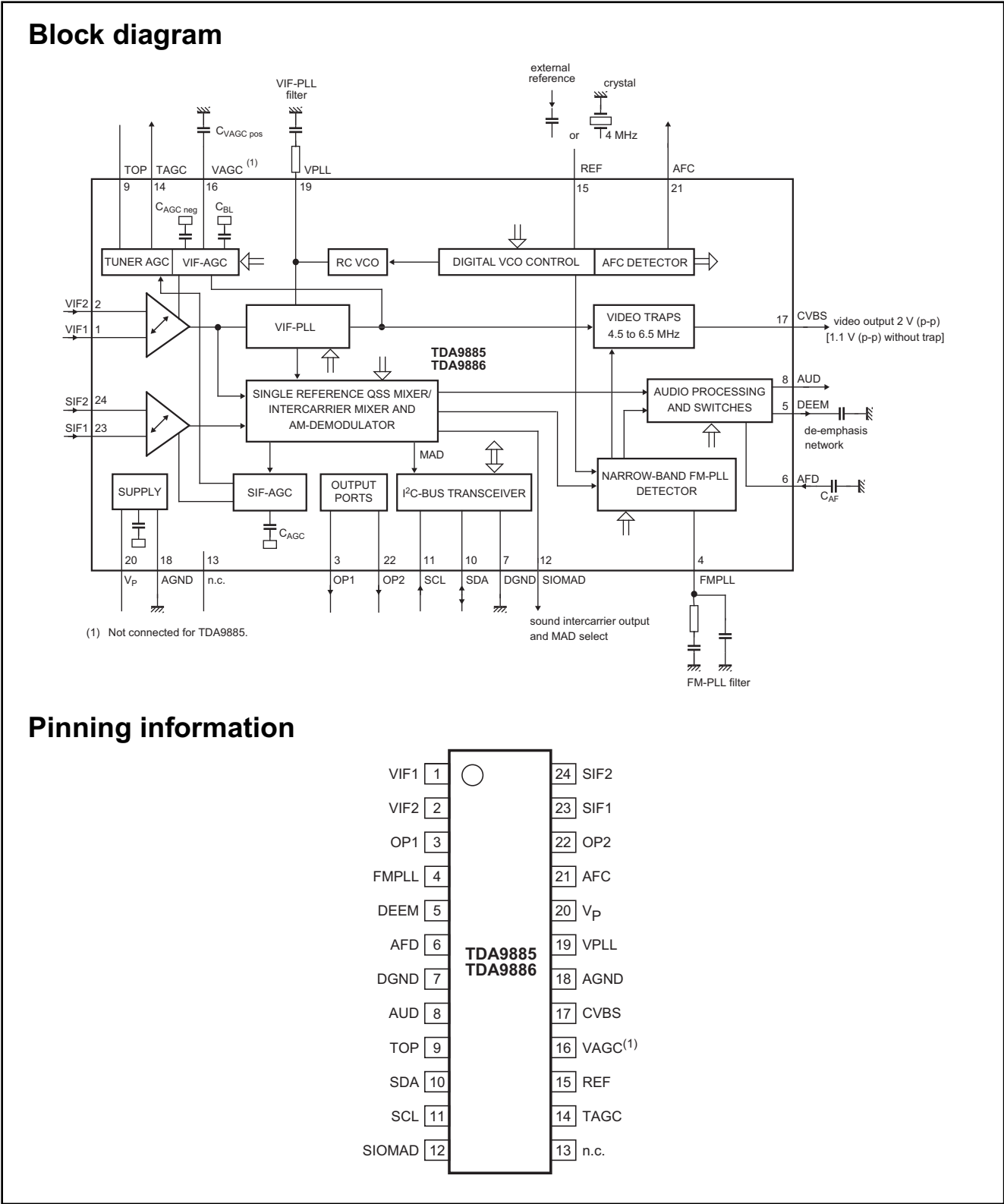
18610_200_090604.eps
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Figure 7-2 Digital bolt-on module block diagram

8. IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

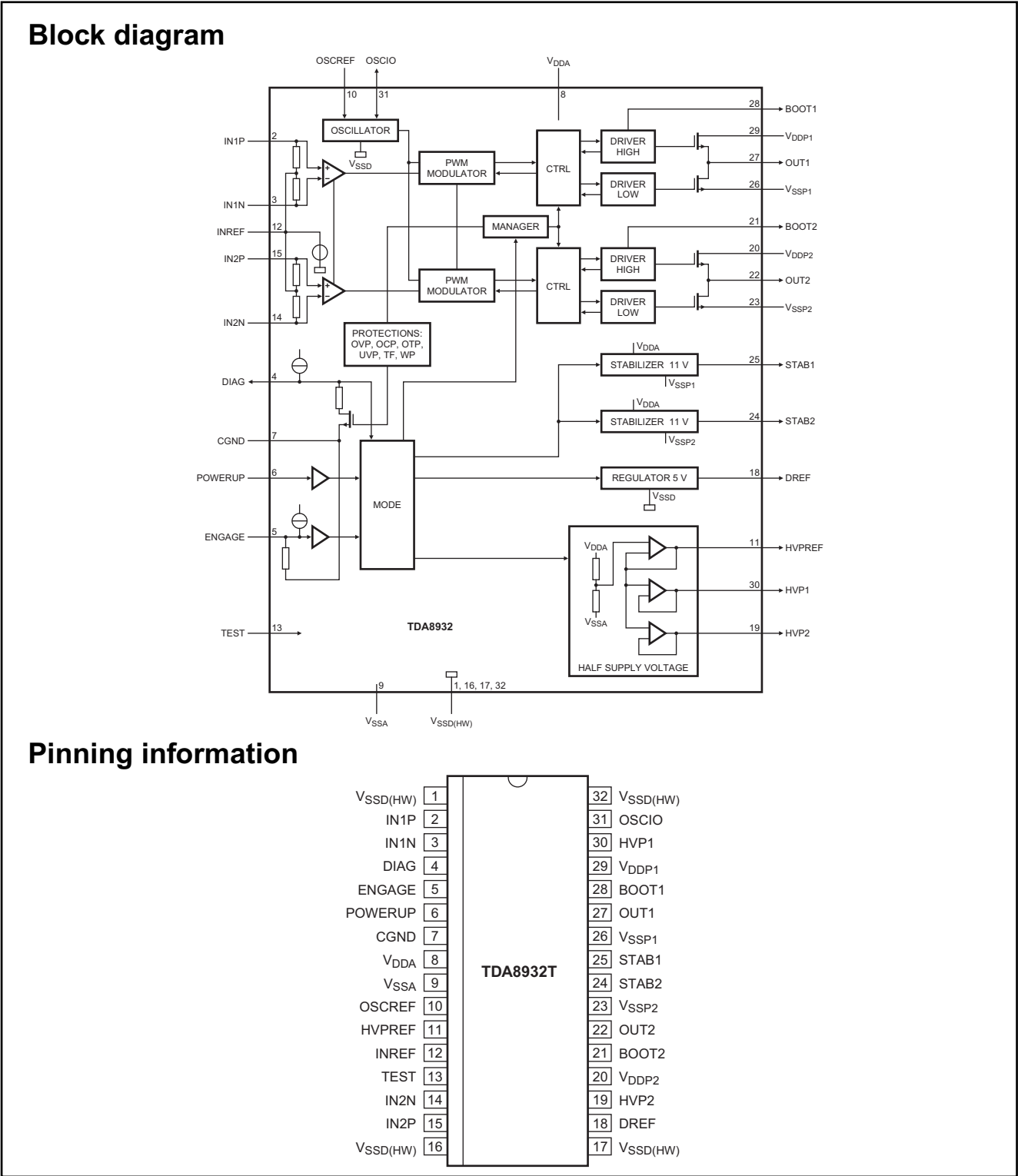
8.1 Diagram B02, Type TDA9886T (IC7113), Demodulator



G_16510_059.eps
100318

Figure 8-1 Internal block diagram and pin configuration

8.2 Diagram B03, Type TDA8932BT (IC7510), Audio Amplifier



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100326

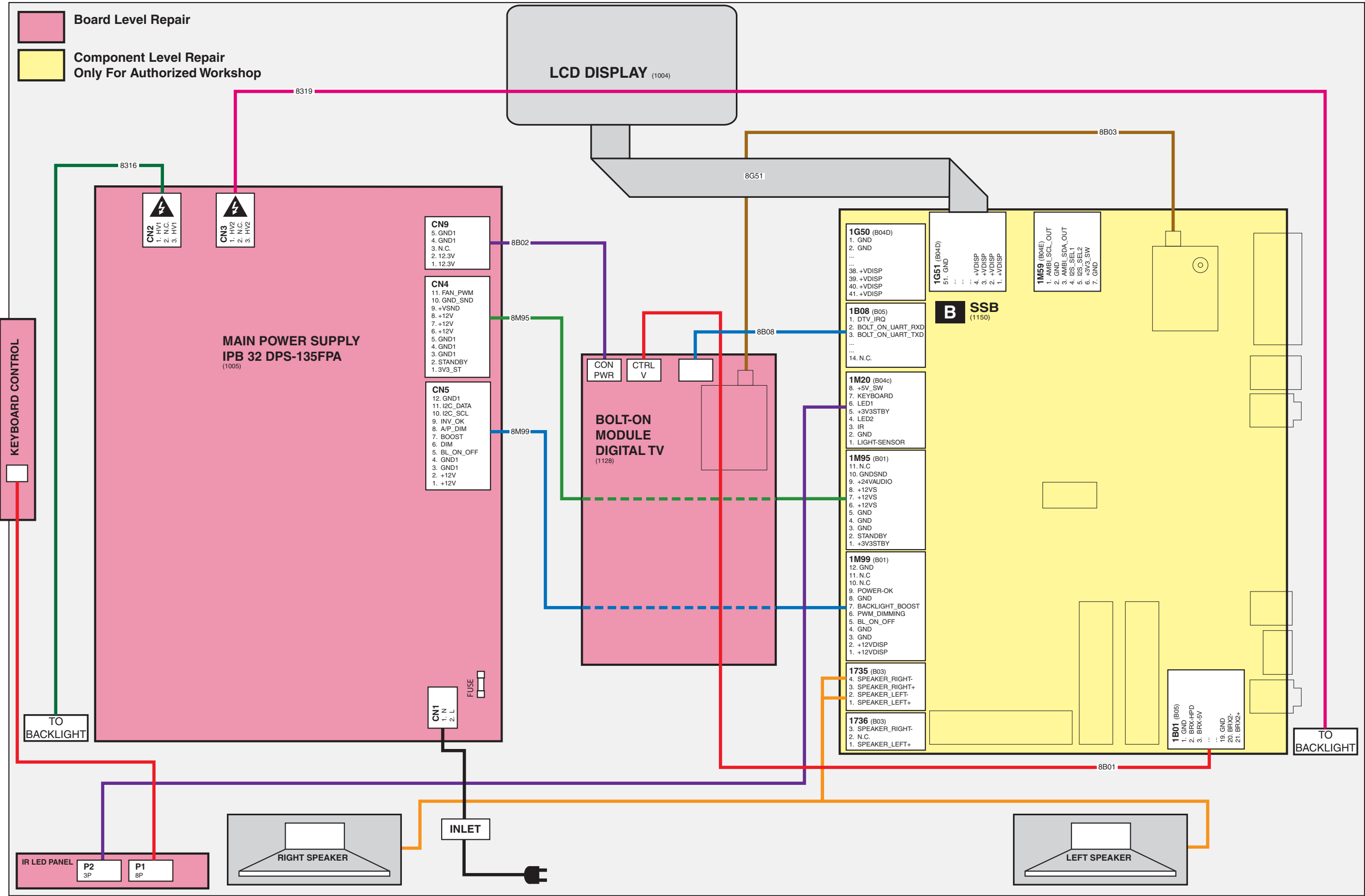
Figure 8-2 Internal block diagram and pin configuration

Personal Notes:

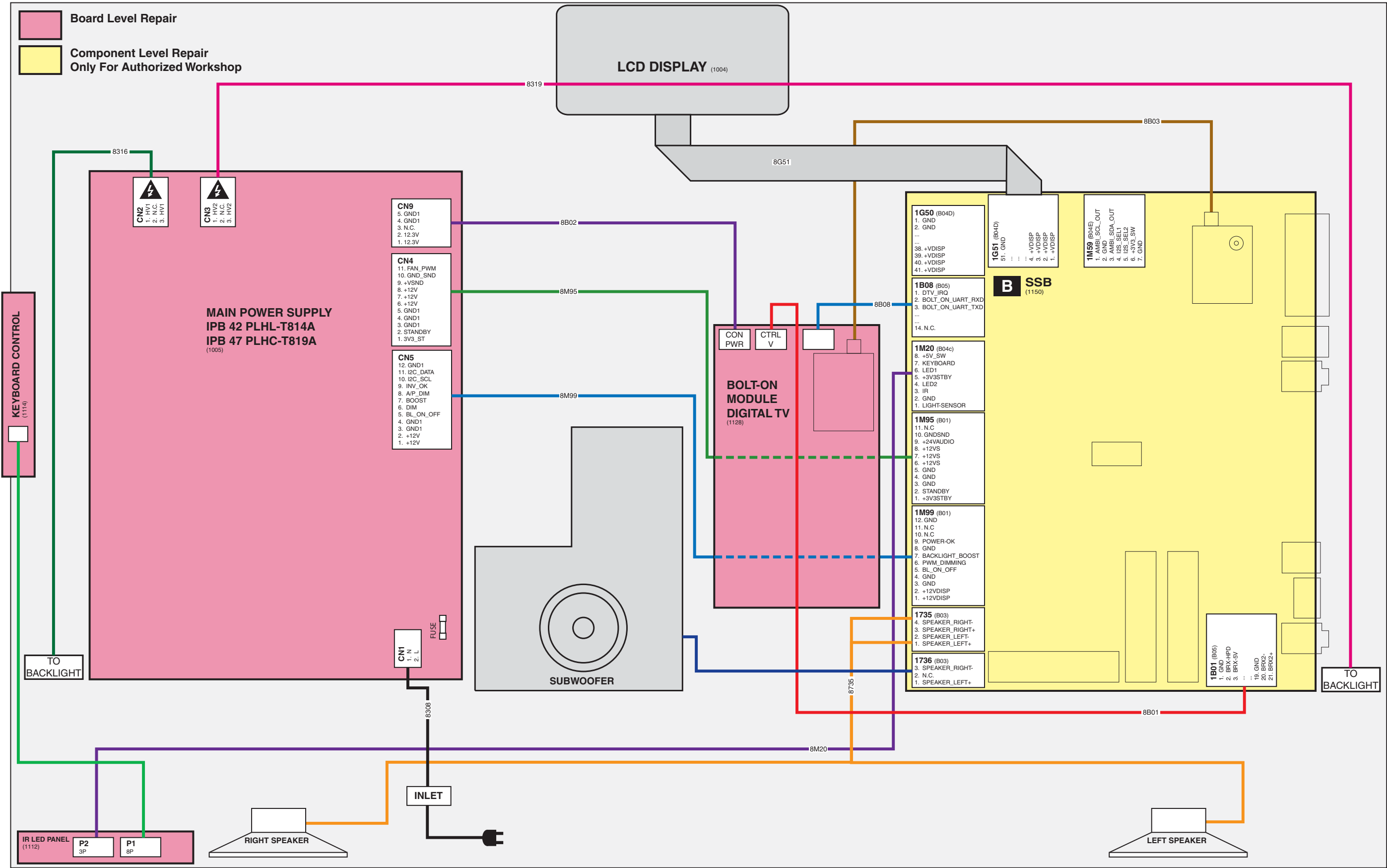
9. Block Diagrams

Wiring Diagram 32" (P & S)

WIRING DIAGRAM 32" (P&S)

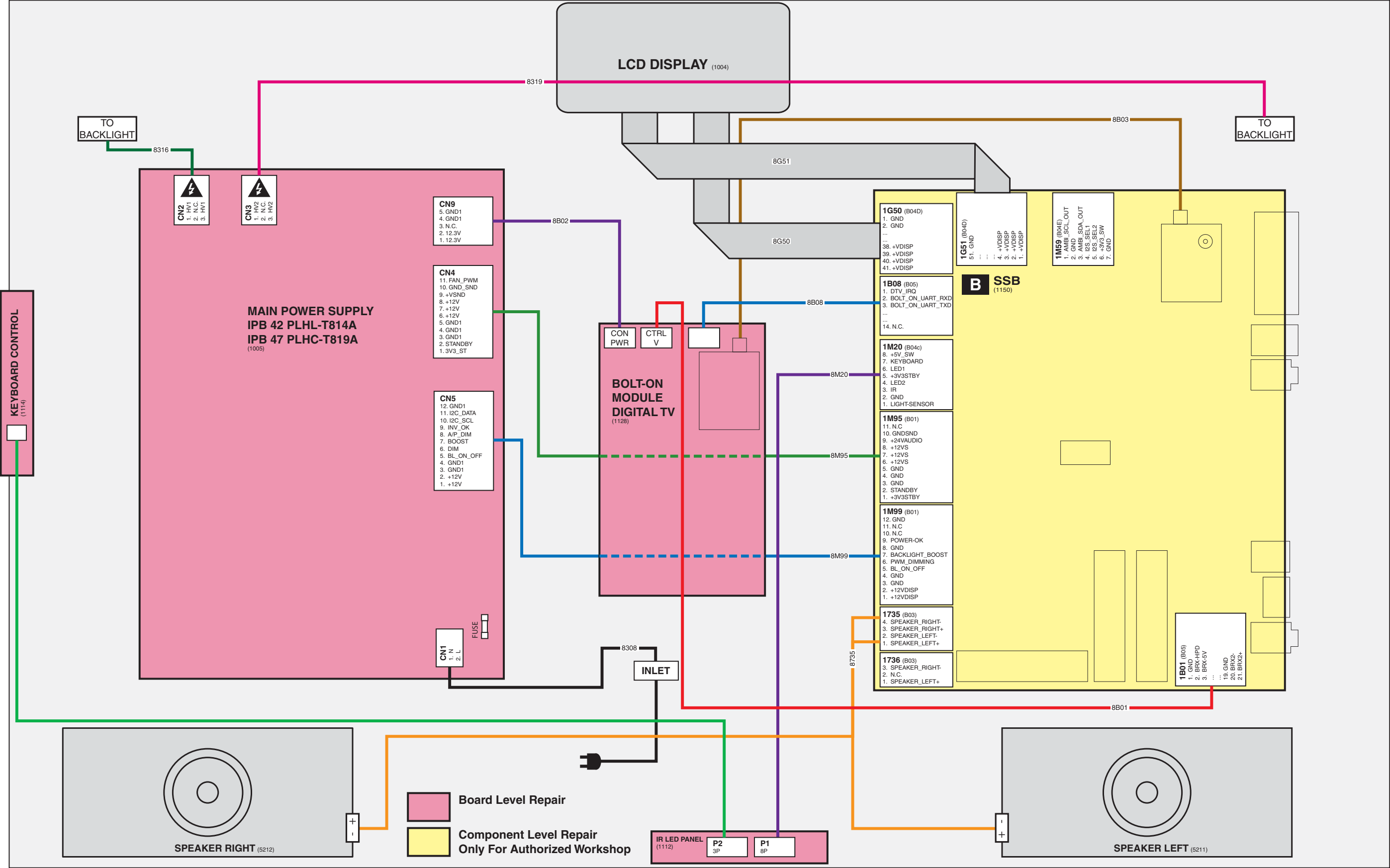


Wiring Diagram 42" & 47" (P & S)
WIRING DIAGRAM 42"- 47" (P&S)



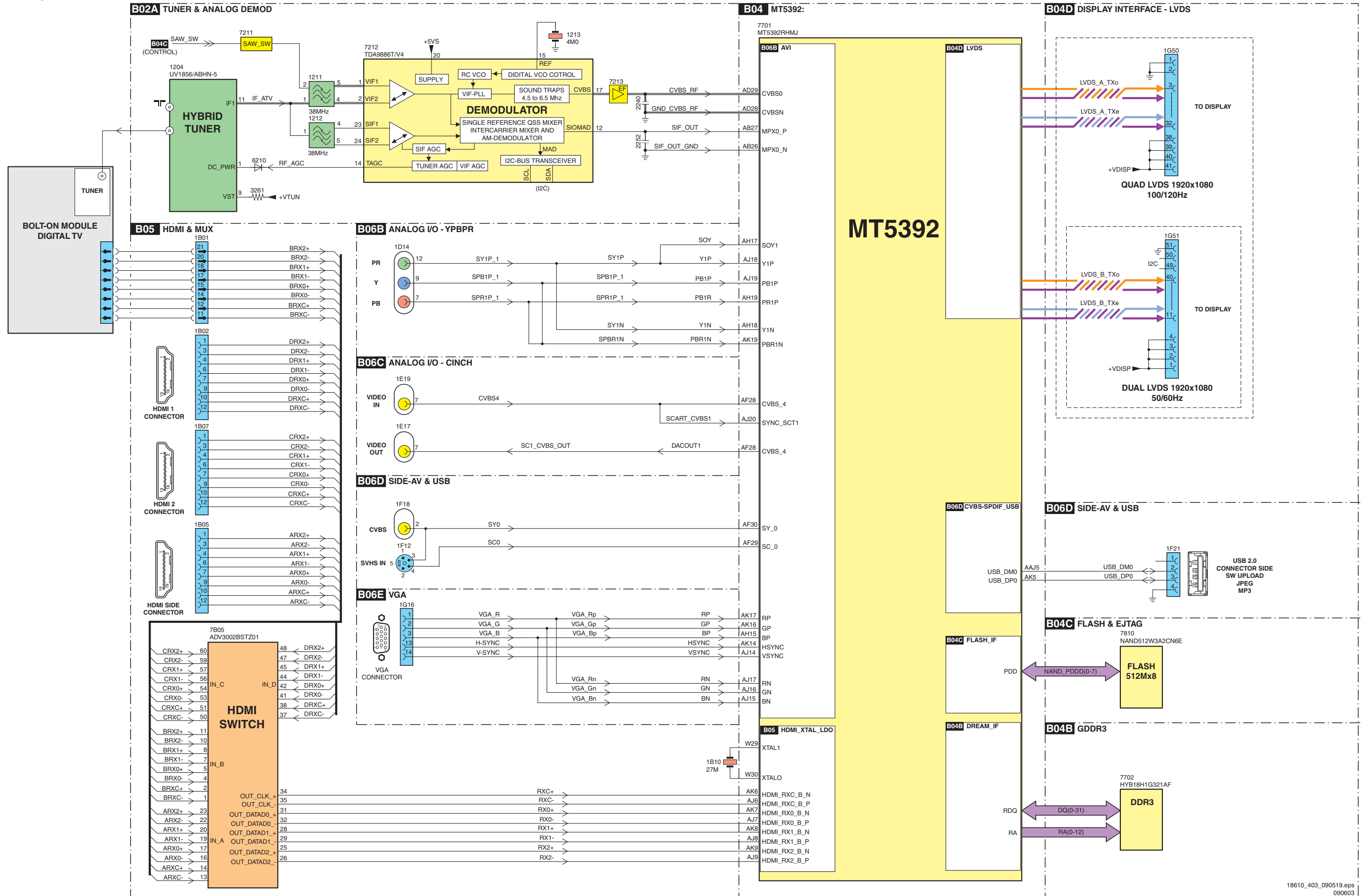
Wiring Diagram 42" & 47" (Frame, 100 Hz)

WIRING DIAGRAM 42"- 47" (FRAME, 100 Hz)



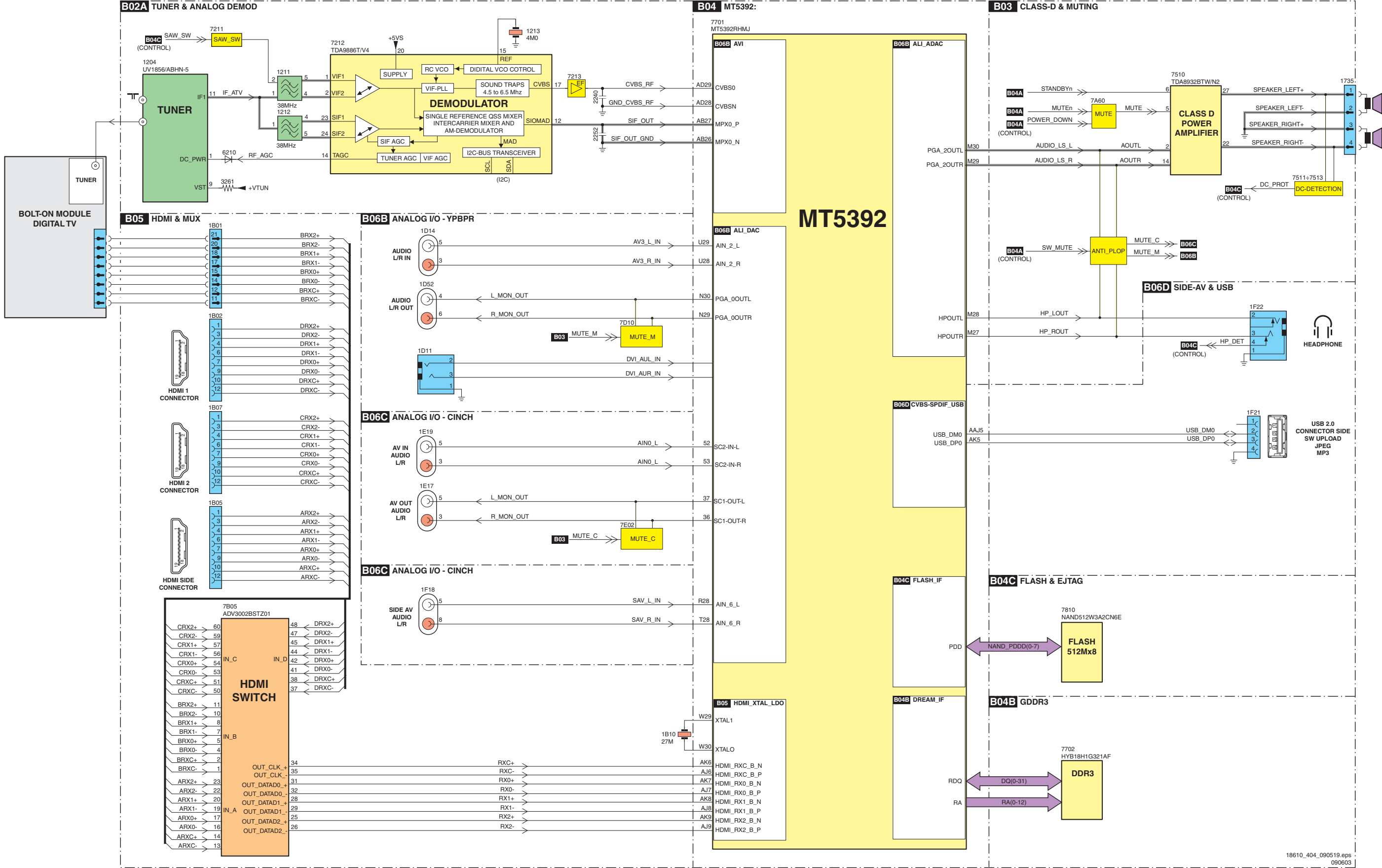
Block Diagram Video

VIDEO

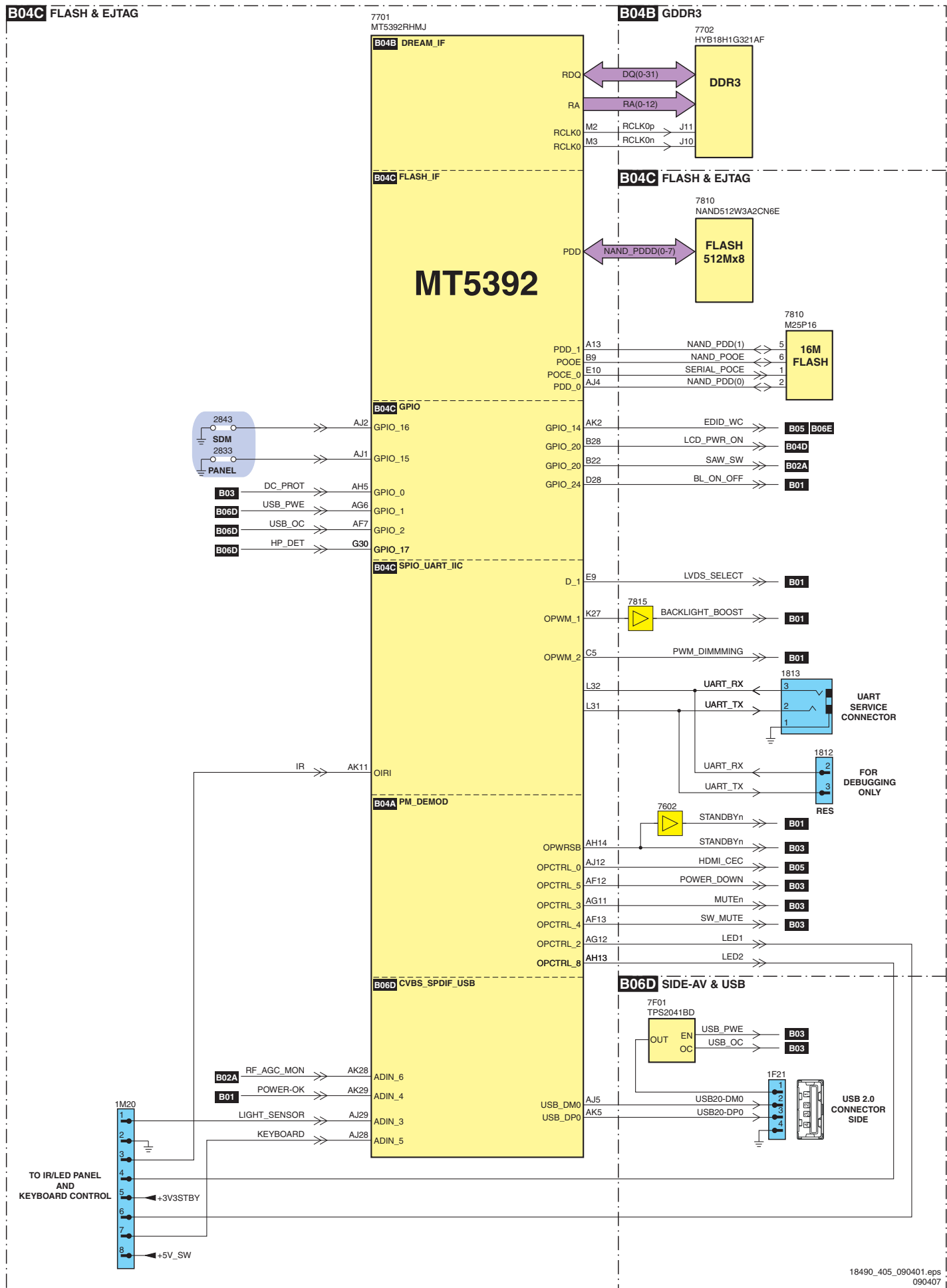


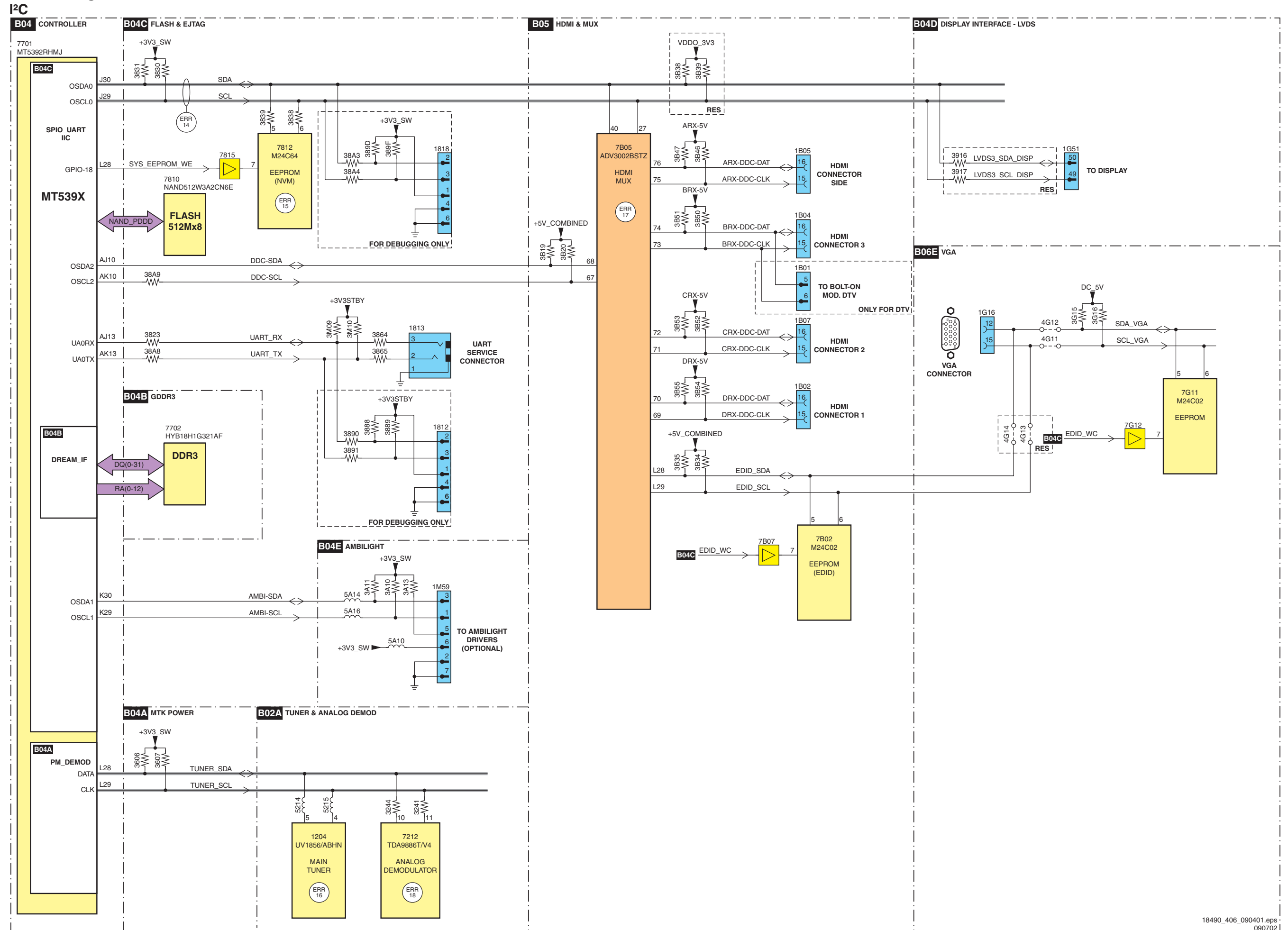
Block Diagram Audio

AUDIO



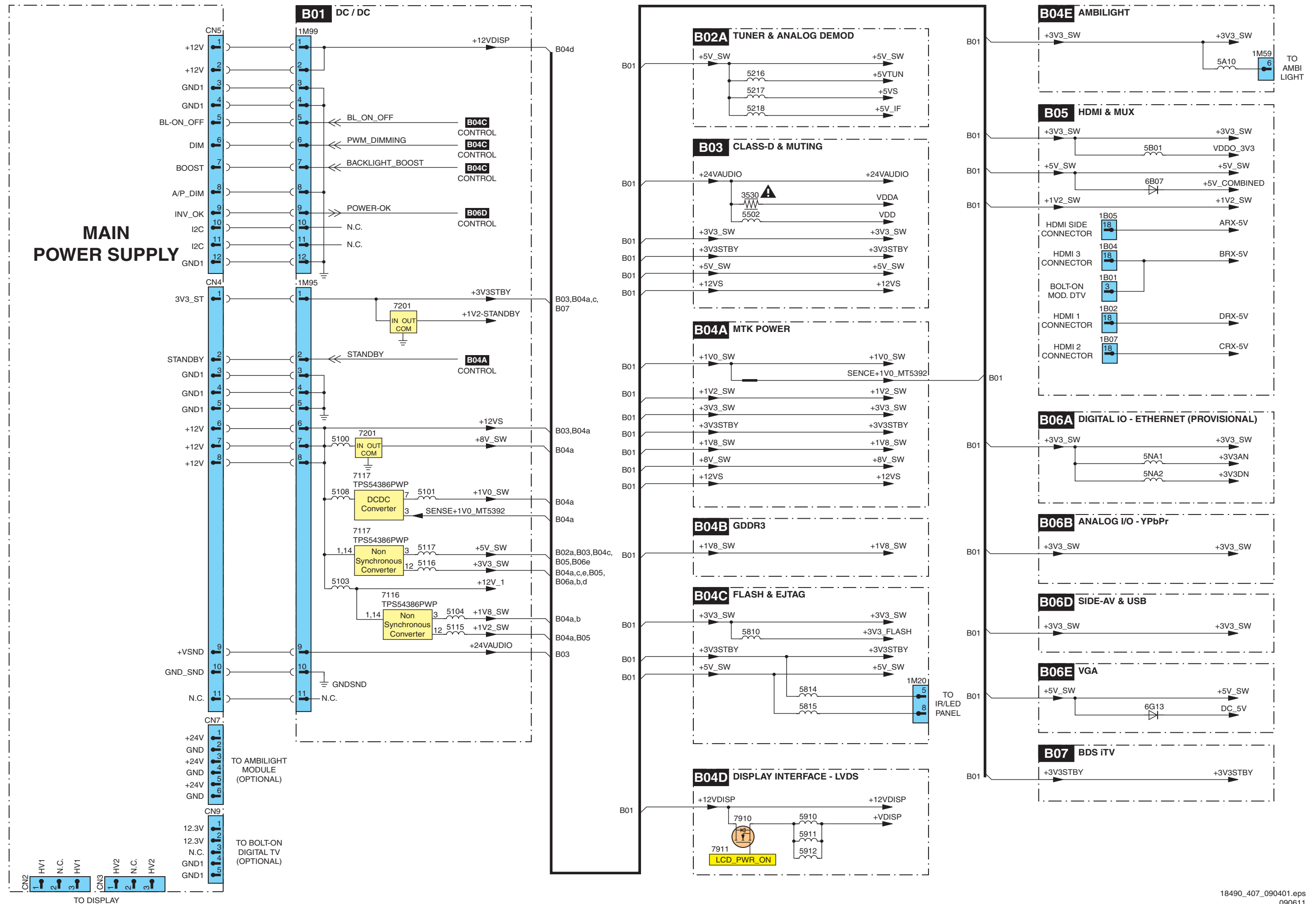
Block Diagram Control & Clock Signals
CONTROL + CLOCK SIGNALS



Block Diagram I²C

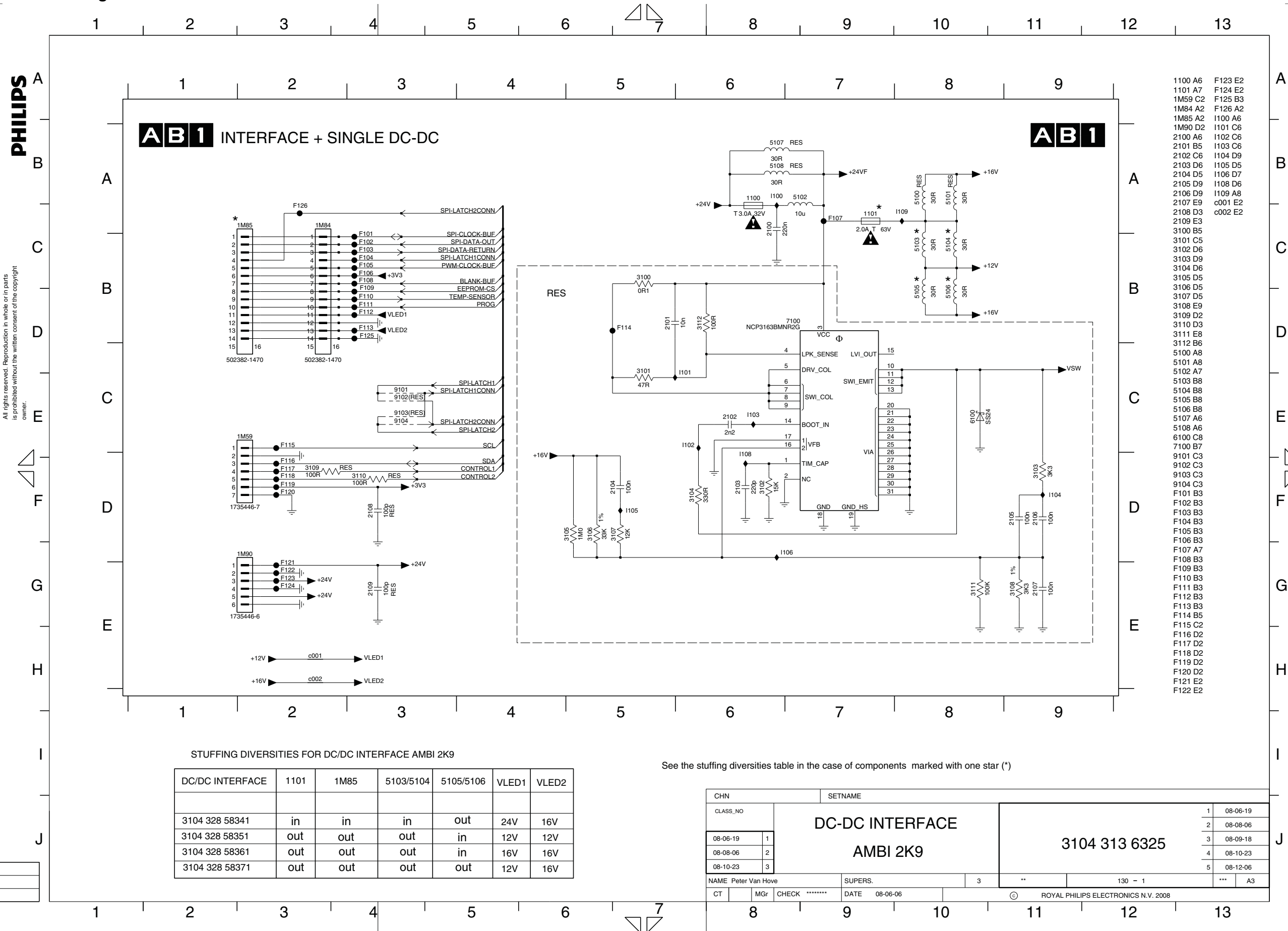
Supply Lines Overview

SUPPLY LINES OVERVIEW



10. Circuit Diagrams and PWB Layouts

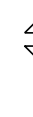
Interface Ambilight: Interface + DC-DC



Interface Ambilight: Dual DC-DC

PHILIPS

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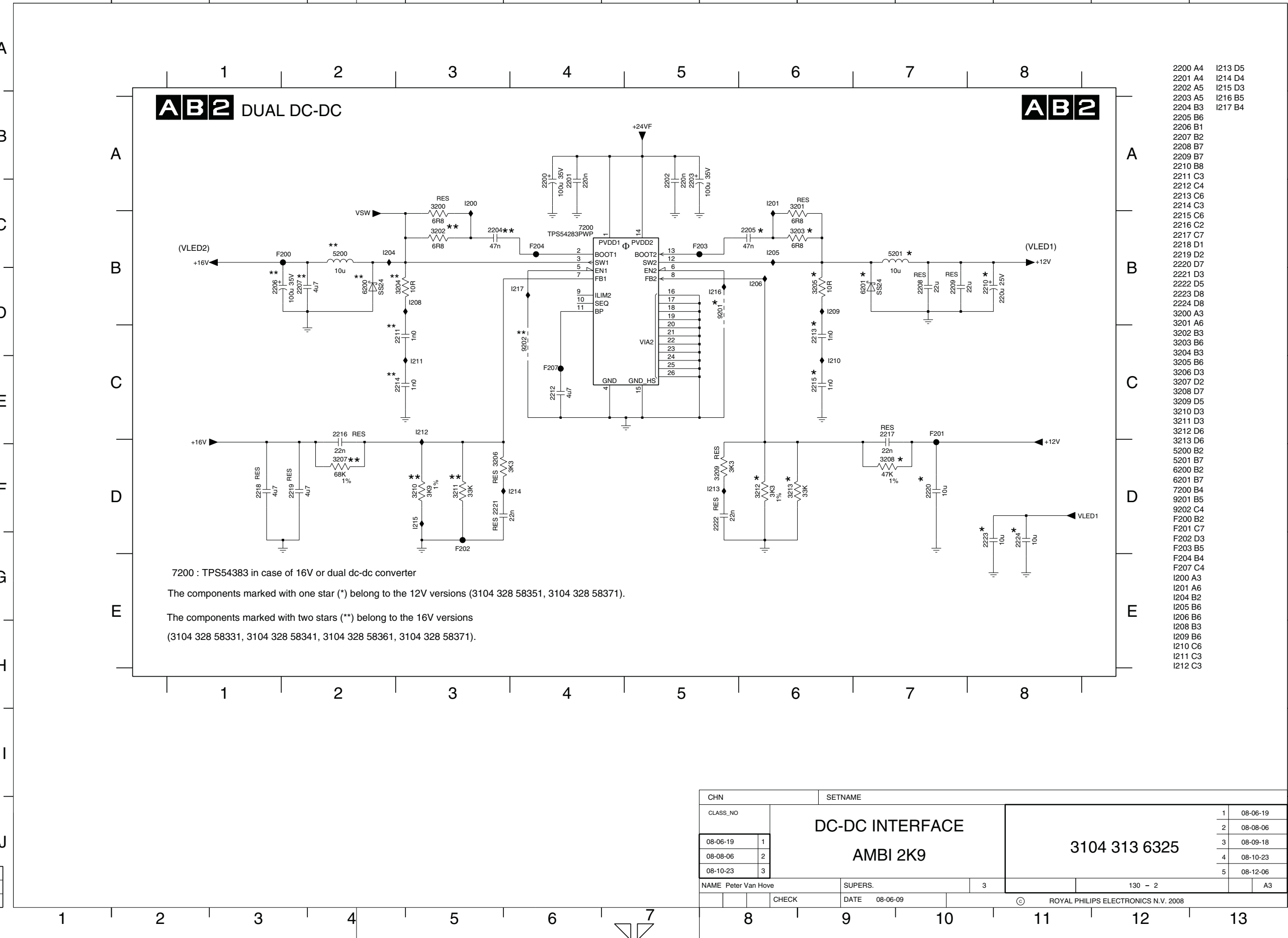


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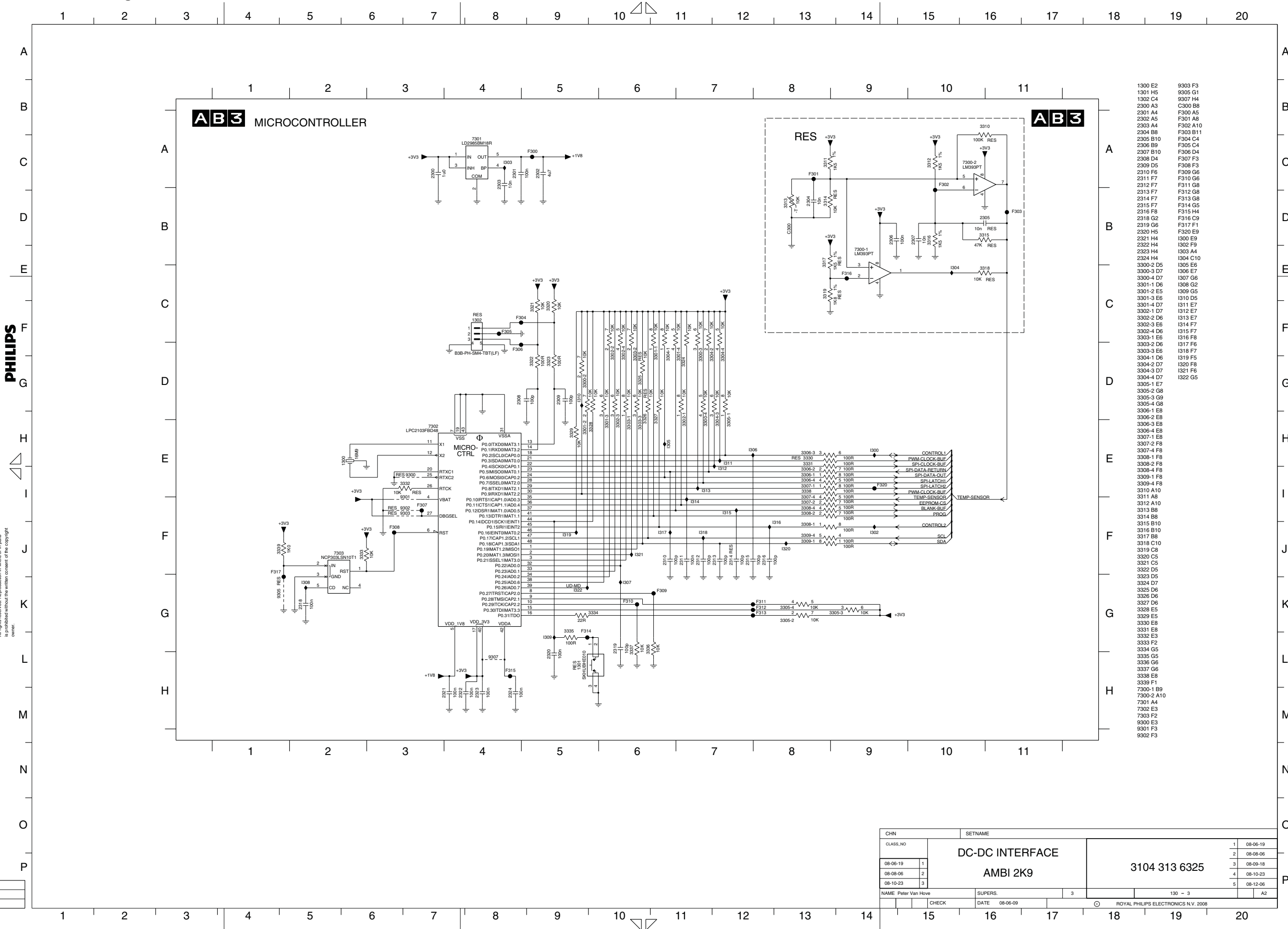
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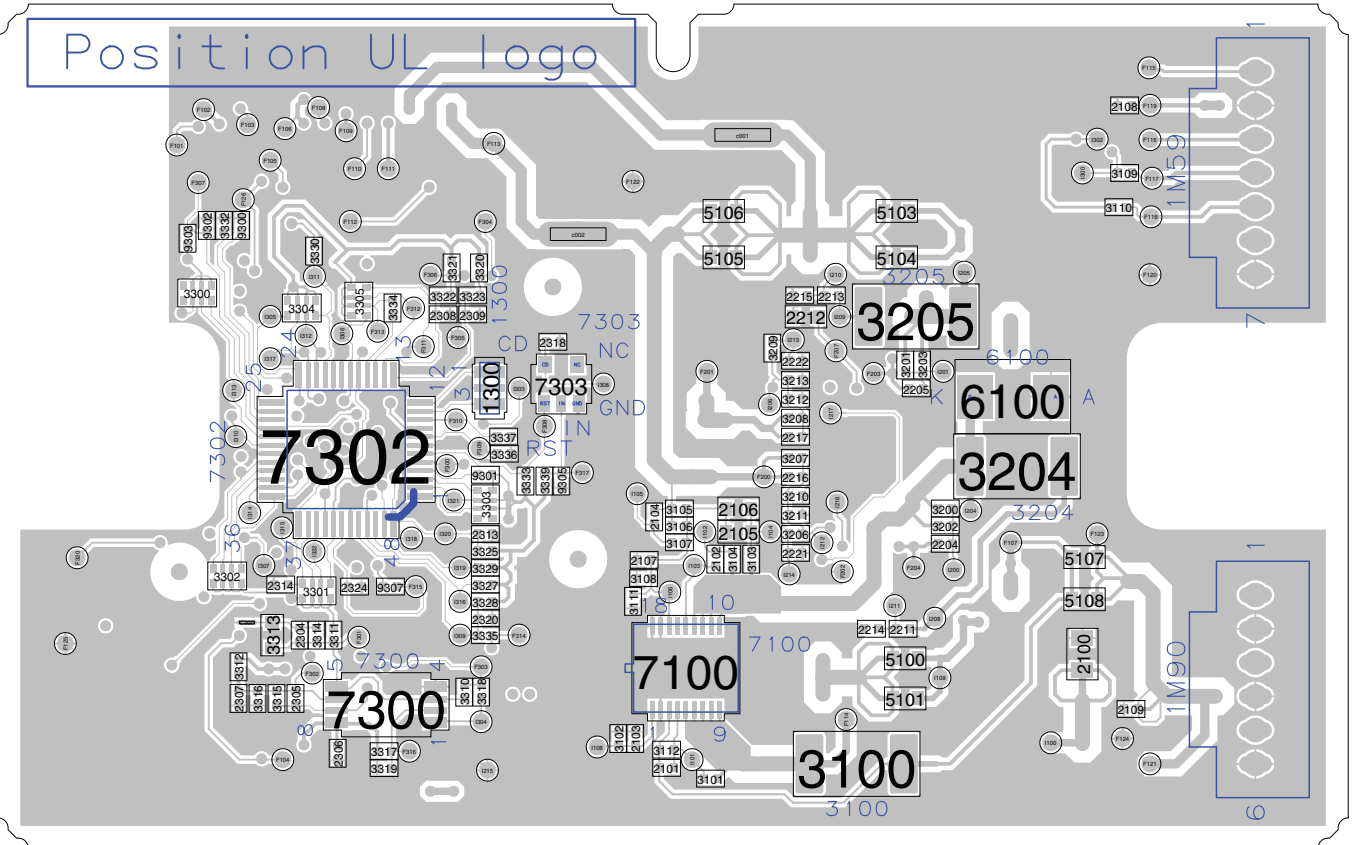
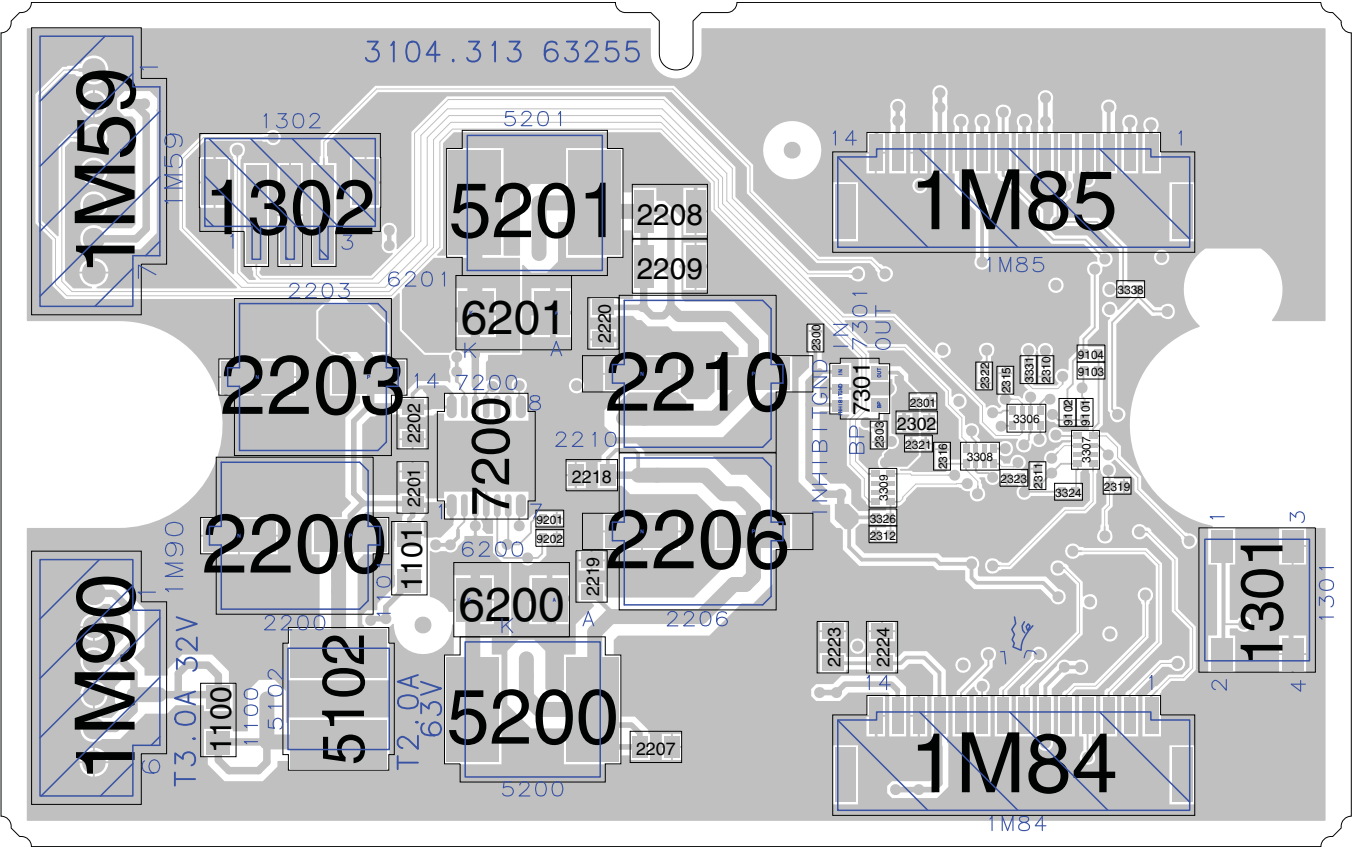
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Interface Ambilight: Microcontroller



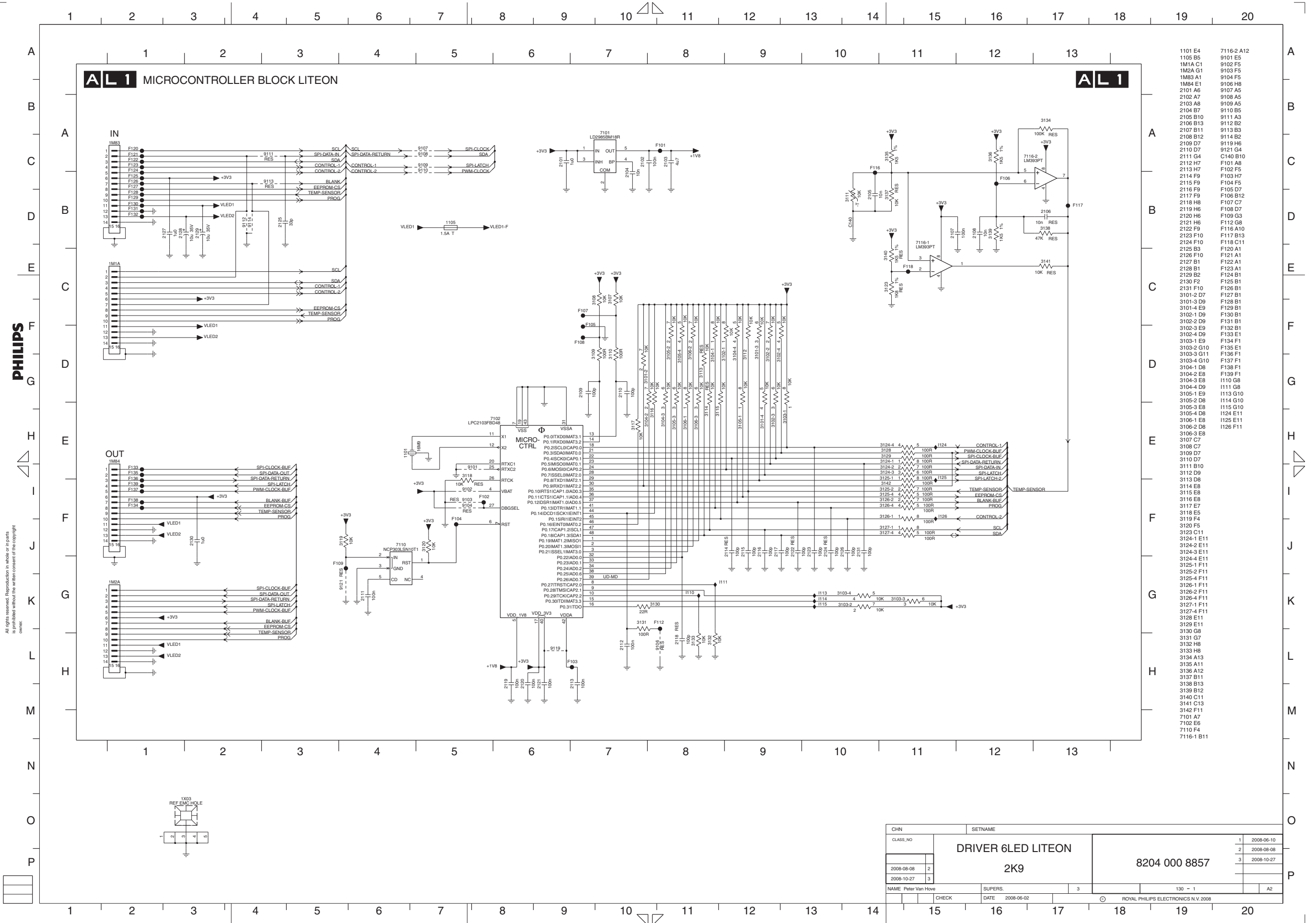
Layout DC/DC Interface Ambilight



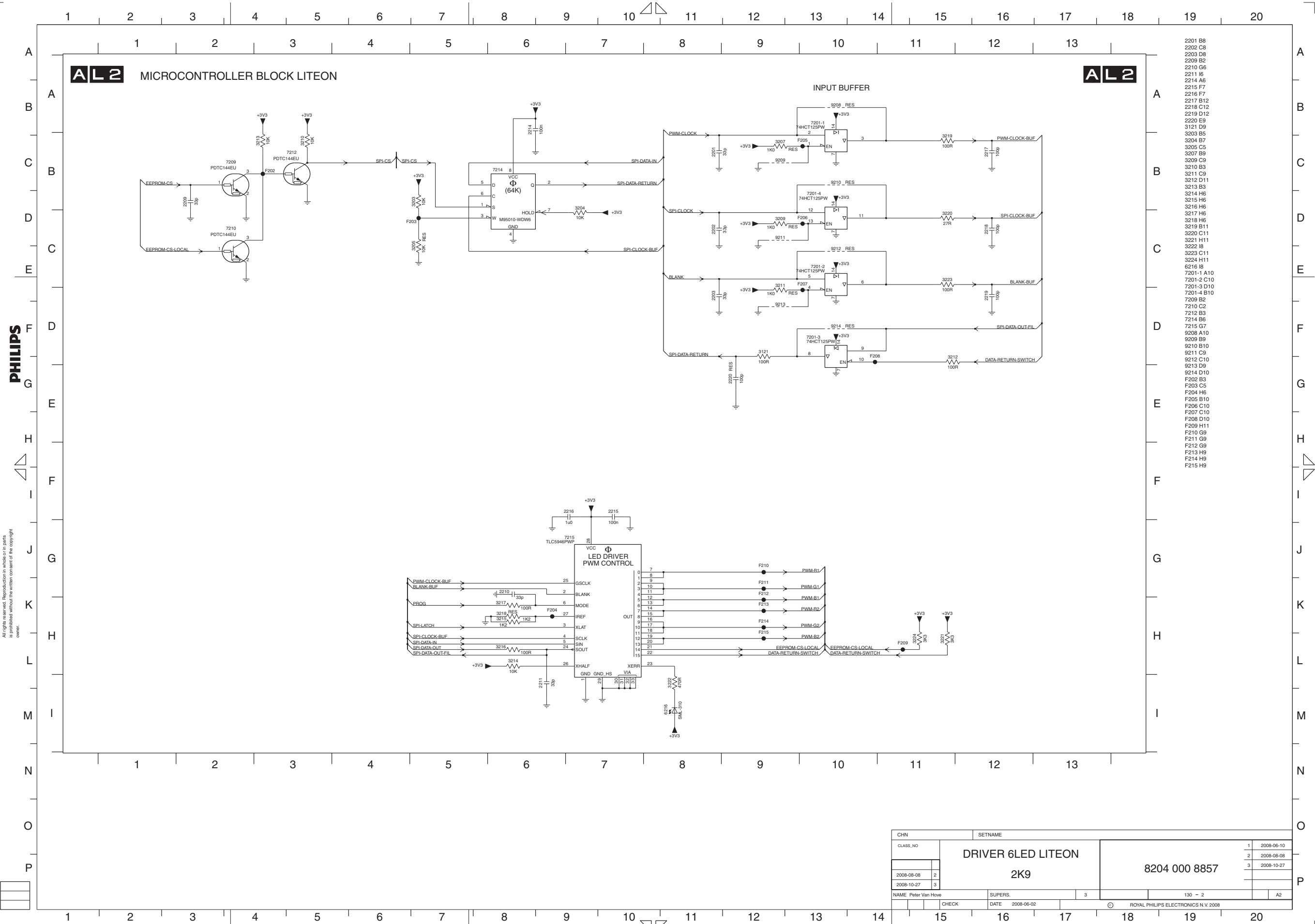
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6 LED Low-Pow: Microcontroller Liteon



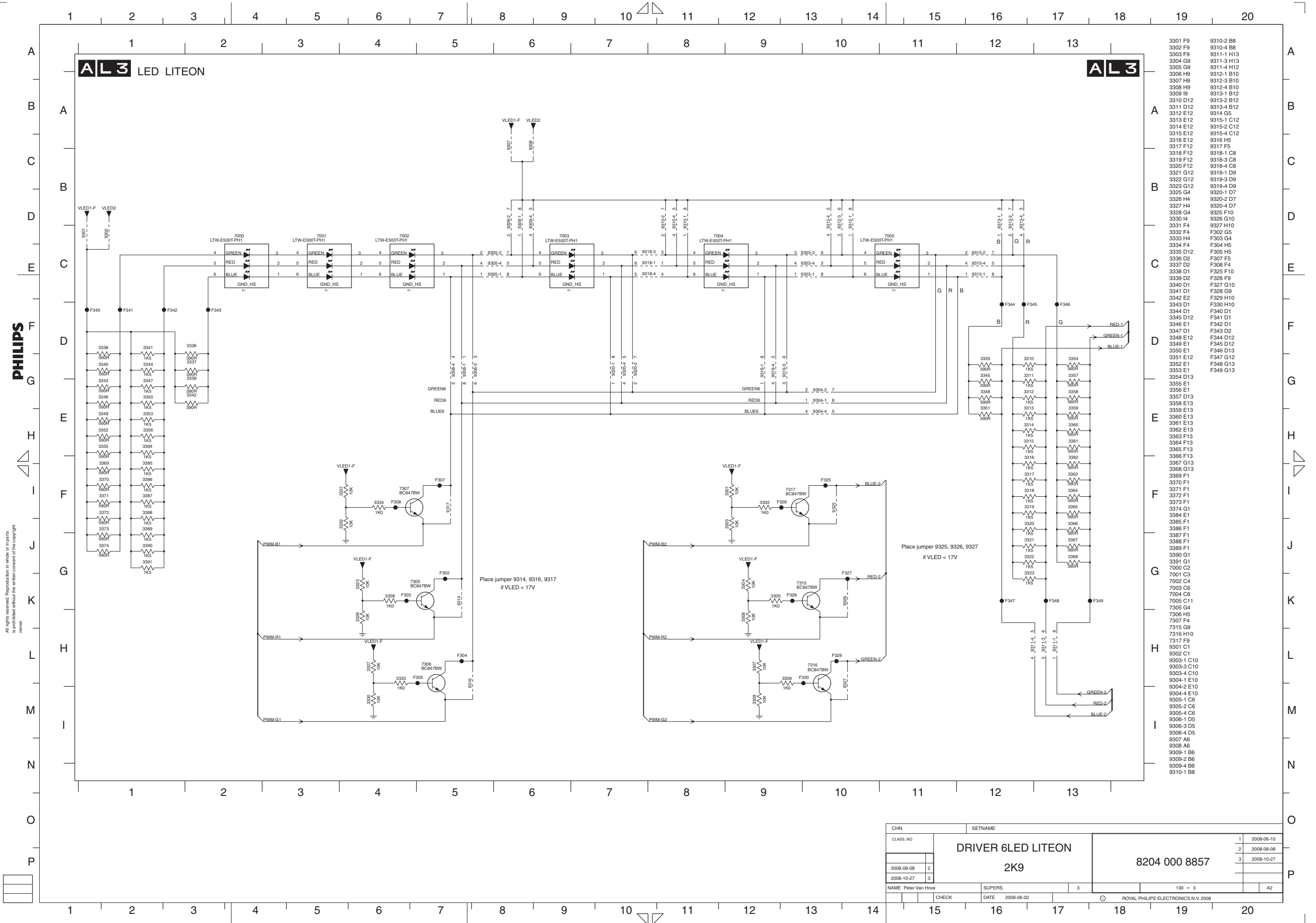
6 LED Low-Pow: Microcontroller Liteon



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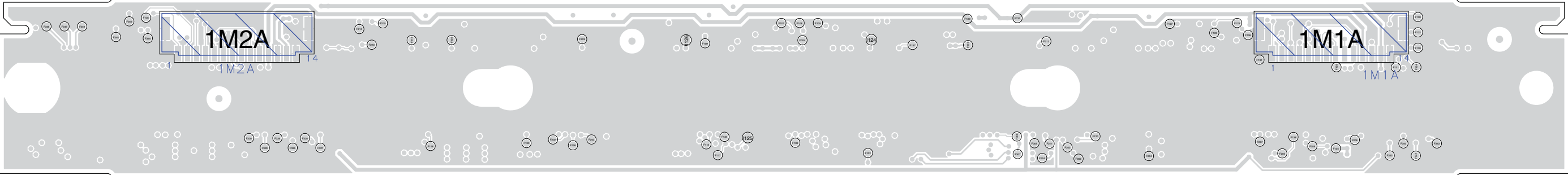
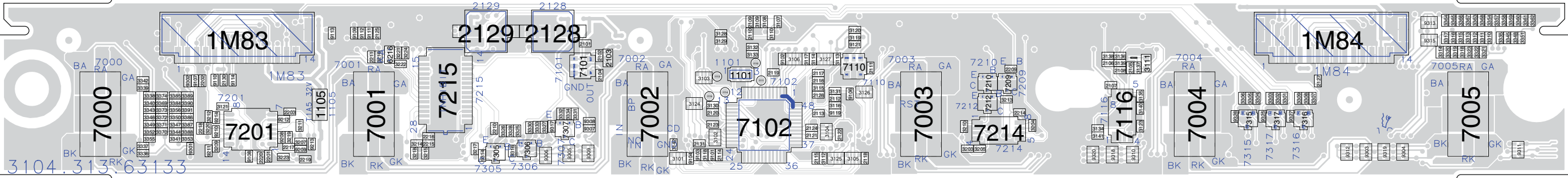
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			2 2008-08-08
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2008-10-27	3		
NAME Peter Van Hove		SUPERS.	130 - 2
CHECK		DATE 2008-06-02	ROYAL PHILIPS ELECTRONICS N.V. 2008

6 LED Low-Pow: LED Liteon



CHN		SETNAME	
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			2 2008-08-08
2008-08-08	2		3 2008-10-27
2008-10-27	3		
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		ROYAL PHILIPS ELECTRONICS N.V. 2008	

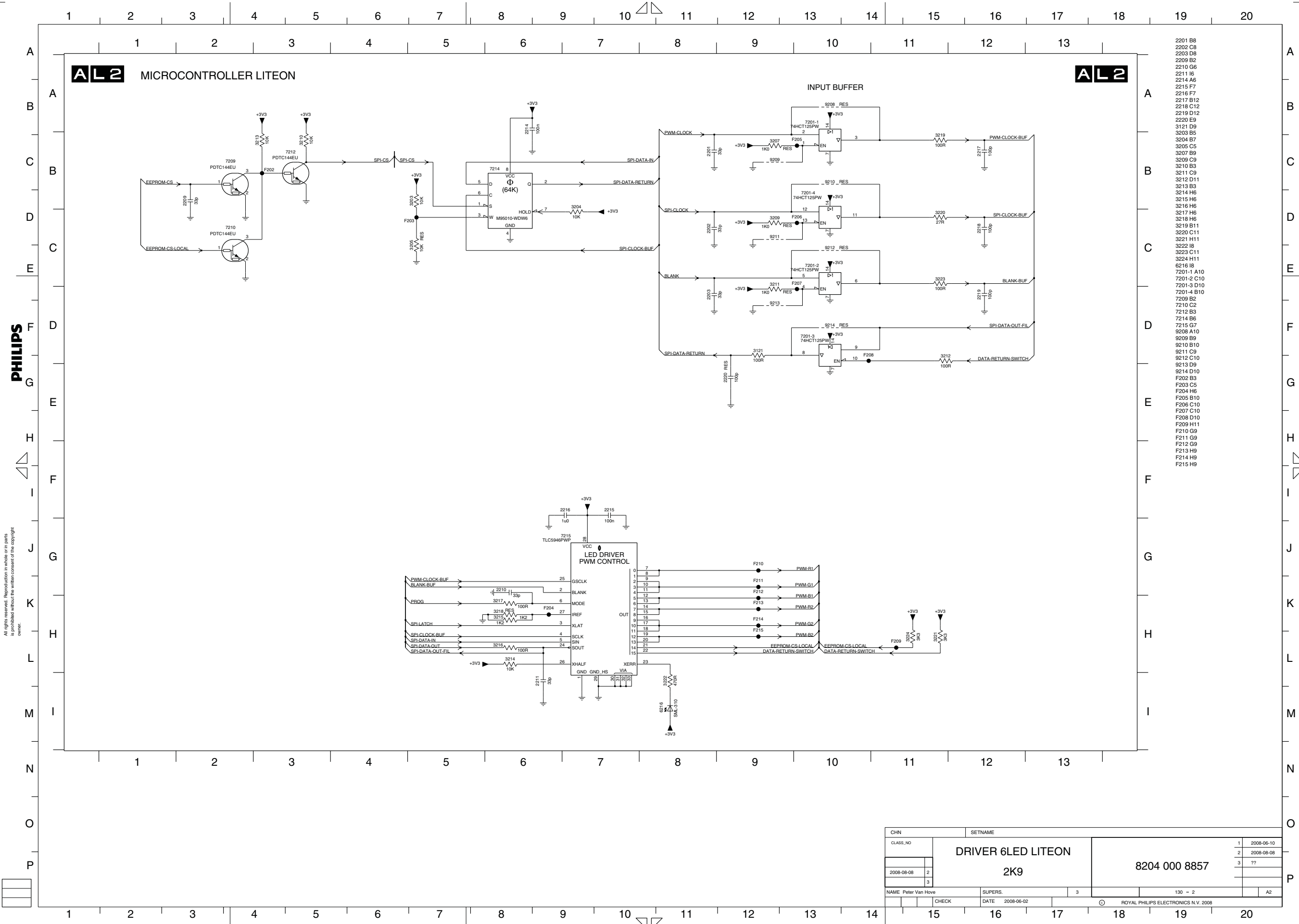
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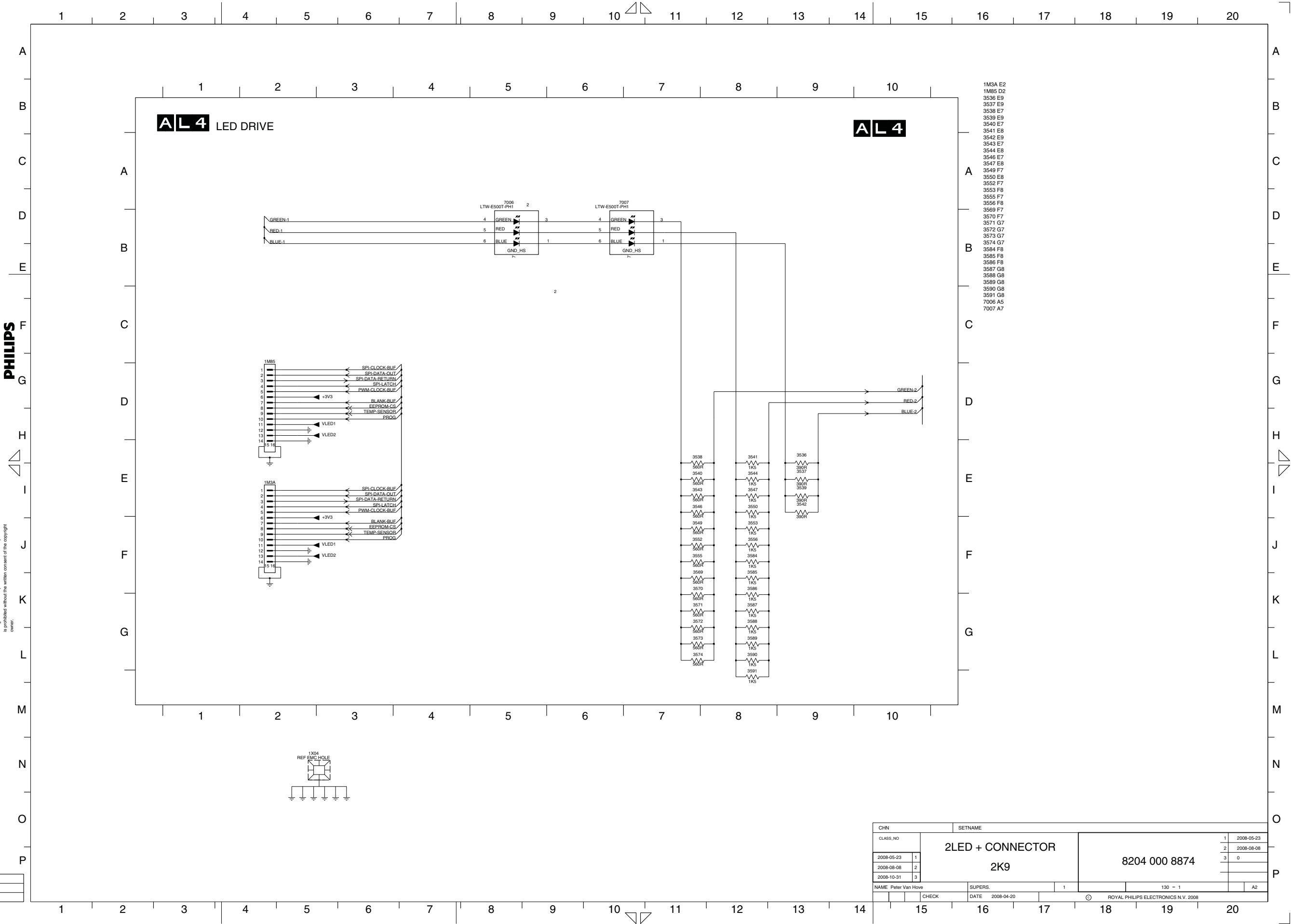
8 LED Low-Pow: Microcontroller Liteon



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		ROYAL PHILIPS ELECTRONICS N.V. 2008	

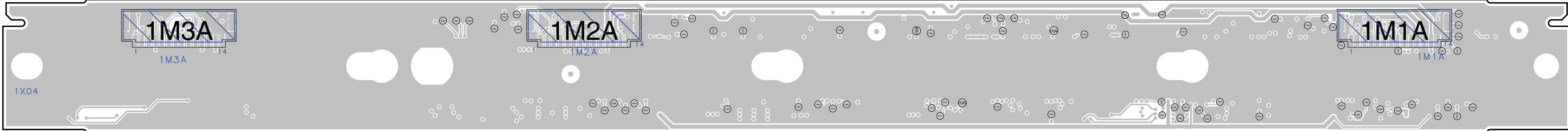
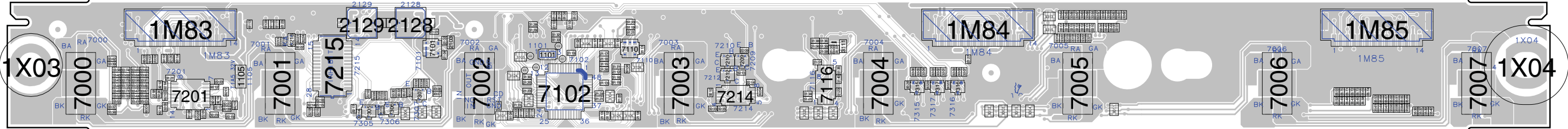
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8 LED Low-Pow: LED Drive Liteon



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2008-10-31	3		
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Layout 8 LED Low-Pow



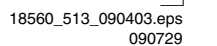
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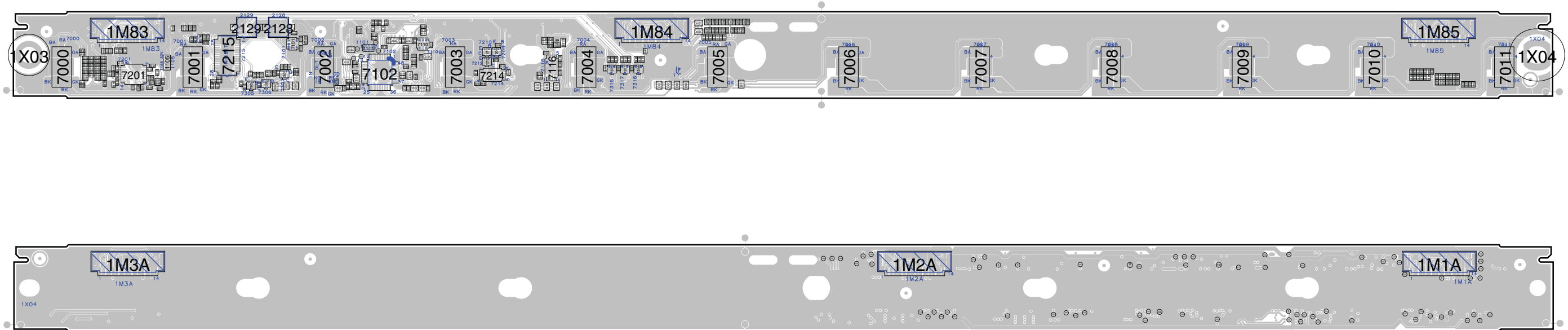
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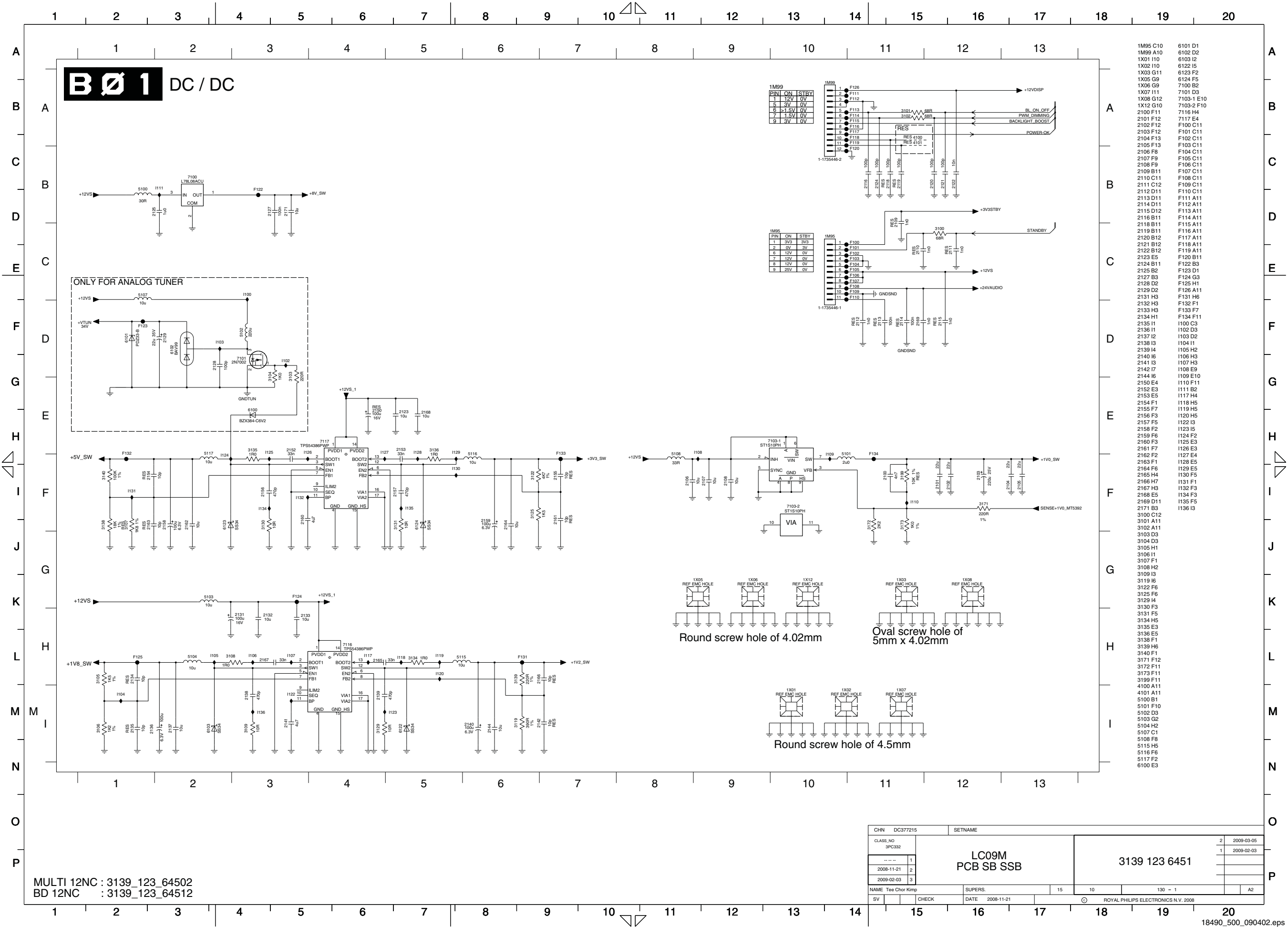
Layout 12 LED Low-Pow



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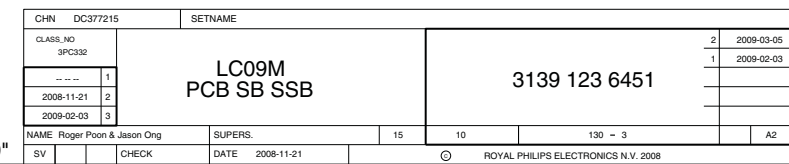
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BD 12NC : 3139_123_64512

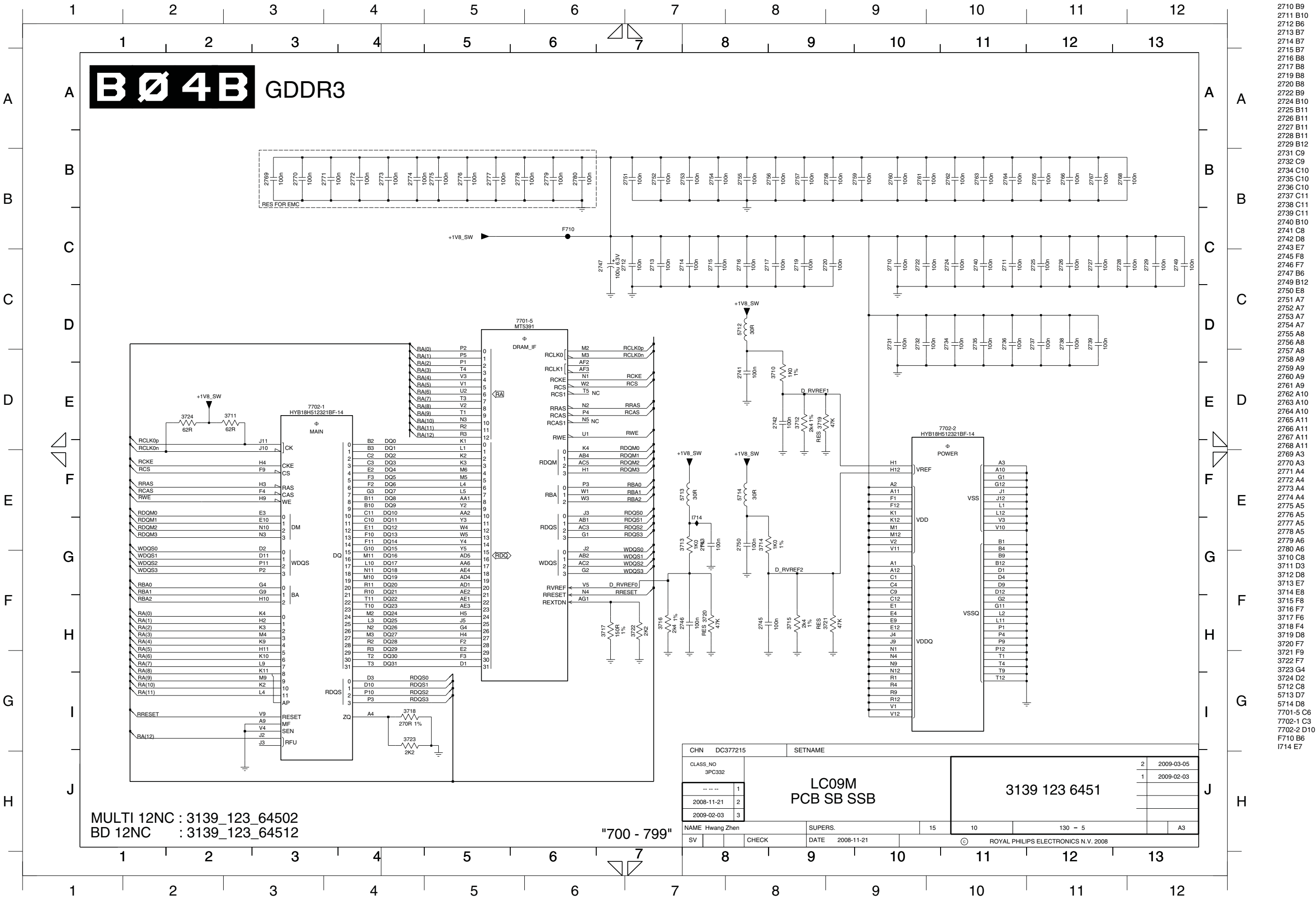
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2009-02-03	3		
NAME	Tee Chor Kimp	SUPERS.	15 10 130 - 1 A2
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BØ3 CLASS-D & MUTING



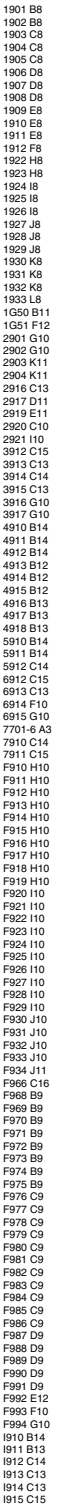
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2028 E12	F569 F9
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2030 E9	F580 D6
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2033 E9	611 B5
2034 E12	612 B3
2034 E12	613 D3
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2042 F13	621 E2
2043 F14	622 E2
2044 F11	623 H5
2044 F11	625 D3
2049 G9	627 G5
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2055 G13	638 I5
2055 G13	643 D3
2055 E15	644 I3
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2064 F16	664 D13
2065 F16	665 D3
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2067 F7	668 E8
2068 F5	670 E12
2068 G5	671 E12
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3001 B5	673 E9
3002 C2	675 E9
3002 C2	676 E9
3008 C2	677 E8
3009 D5	678 E8
3010 E3	680 F9
3011 E3	681 F9
3012 E2	682 F11
3013 E1	683 H13
3015 E1	684 F12
3015 E1	685 F14
3016 H5	686 F11
3017 F1	687 F11
3019 F12	688 F9
3021 F2	689 F9
3021 F2	690 F12
3023 G4	695 G12
3023 G4	696 G15
3025 I5	697 D5
3027 I3	698 D6
3028 G4	699 H4
3029 J5	
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3031 D14	
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3035 E8	
3036 E8	
3037 E8	
3038 F8	
3040 F8	
3041 F14	
3042 F12	
3044 G15	
3048 E16	
3049 G15	
3050 G15	
3053 H4	
3055 H6	
3057 E6	
3058 C3	
3059 C5	
3060 E5	
3061 F5	
3062 F6	
3063 F5	
3064 G6	
3065 E5	
3066 D5	
4002 E4	
5002 D12	
5003 D12	
5005 D12	
5007 E15	
5008 E15	
6000 E4	
6001 E1	
6002 F3	
6003 J4	
7000 F5	
7501-1 E2	
7501-2 E2	
7503 H6	
7504 F4	
7505 I6	
7506 J5	
7507 J5	
7508 G16	
7510 E10	
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7512 G16	
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7515-2 D5	
7516 D6	
7517 E4	
7518 F6	

SSB: GDDR3



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- 3716 F7
- 3717 F6
- 3718 F4
- 3719 D8
- 3720 F7
- 3721 F9
- 3722 F7
- 3723 G4
- 3724 D2
- 5712 C8
- 5713 D7
- 5714 D8
- 7701-5 C6
- 7702-1 C3
- 7702-2 D10
- F710 B6
- I714 E7

BØ4D DISPLAY INTERFACE - LVDS

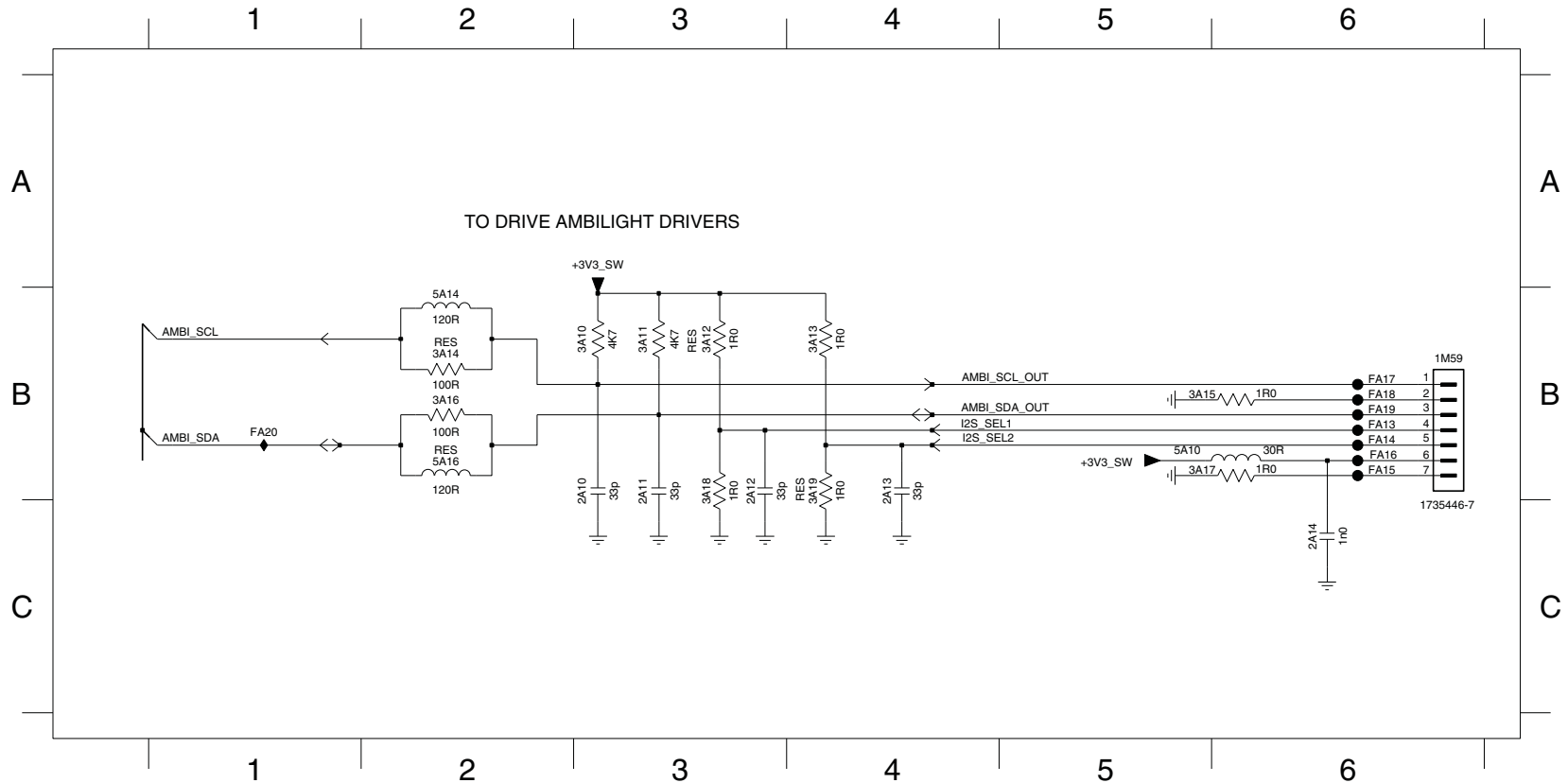


SSB: Ambilight

PHILIPS

B Ø 4E AMBILIGHT

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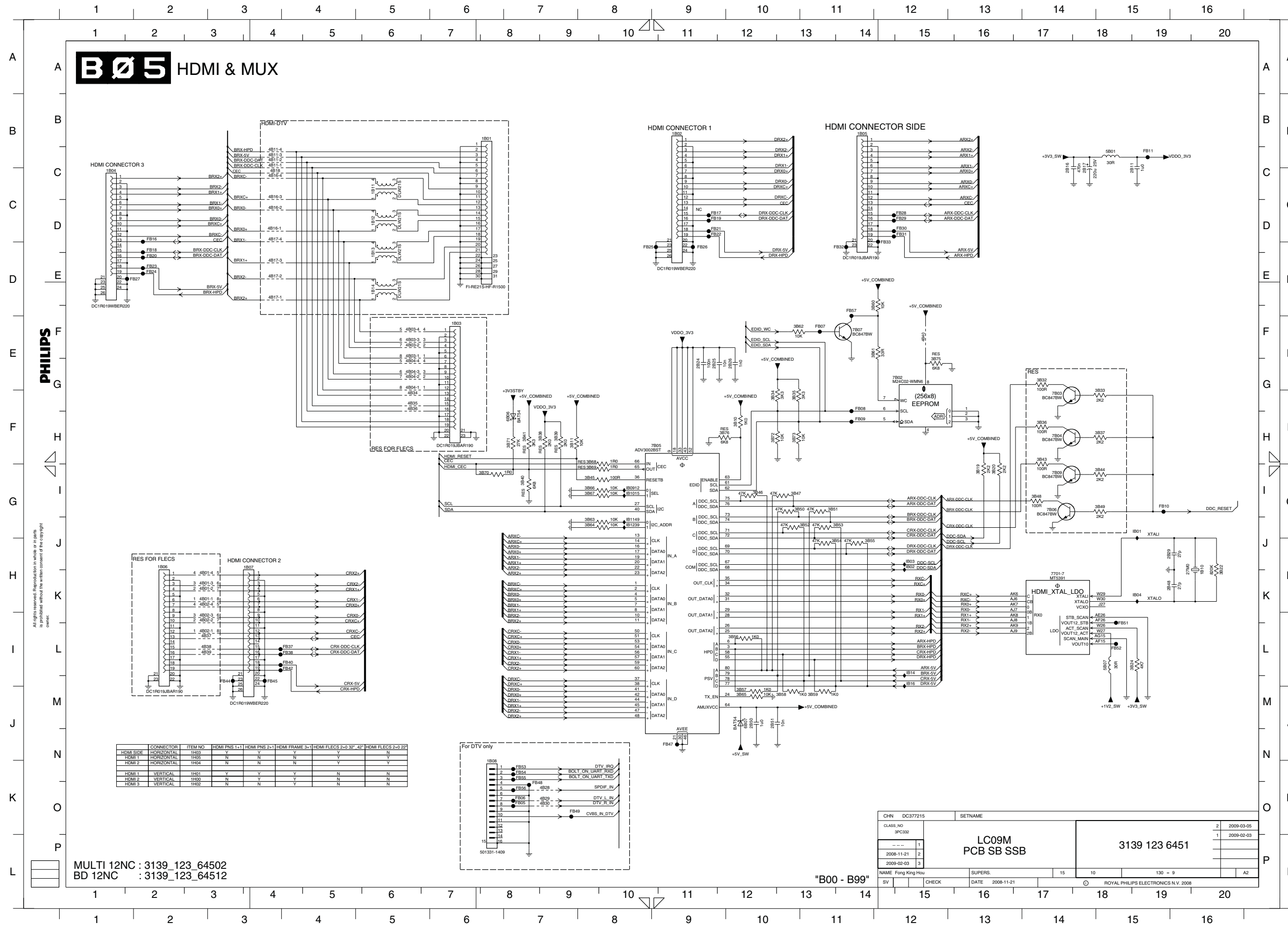
- 1M59 B6
- 2A10 B3
- 2A11 B3
- 2A12 B3
- 2A13 B4
- 2A14 C6
- 3A10 B3
- 3A11 B3
- 3A12 B3
- 3A13 B4
- 3A14 B2
- 3A15 B5
- 3A16 B2
- 3A17 B5
- 3A18 B3
- 3A19 B4
- 5A10 B5
- 5A14 B2
- 5A16 B2
- FA13 B6
- FA14 B6
- FA15 B6
- FA16 B6
- FA17 B6
- FA18 B6
- FA19 B6
- FA20 B1

MULTI 12NC : 3139_123_64502
BD 12NC : 3139_123_64512

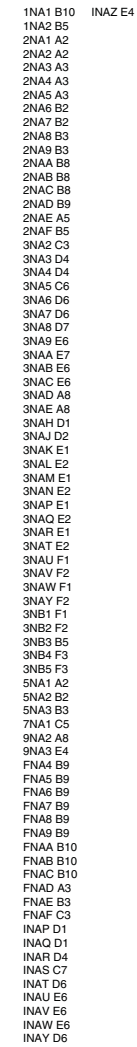
"A00 - A99"

CHN	DC377215	SETNAME	
CLASS_NO	3PC332		2 2009-03-05
			1 2009-02-03
NAME	Fong King Hou	SUPERS.	15
SV		CHECK	DATE 2008-11-21
			10 130 - 8
			A3
			ROYAL PHILIPS ELECTRONICS N.V. 2008

SSB: HDMI & MUX

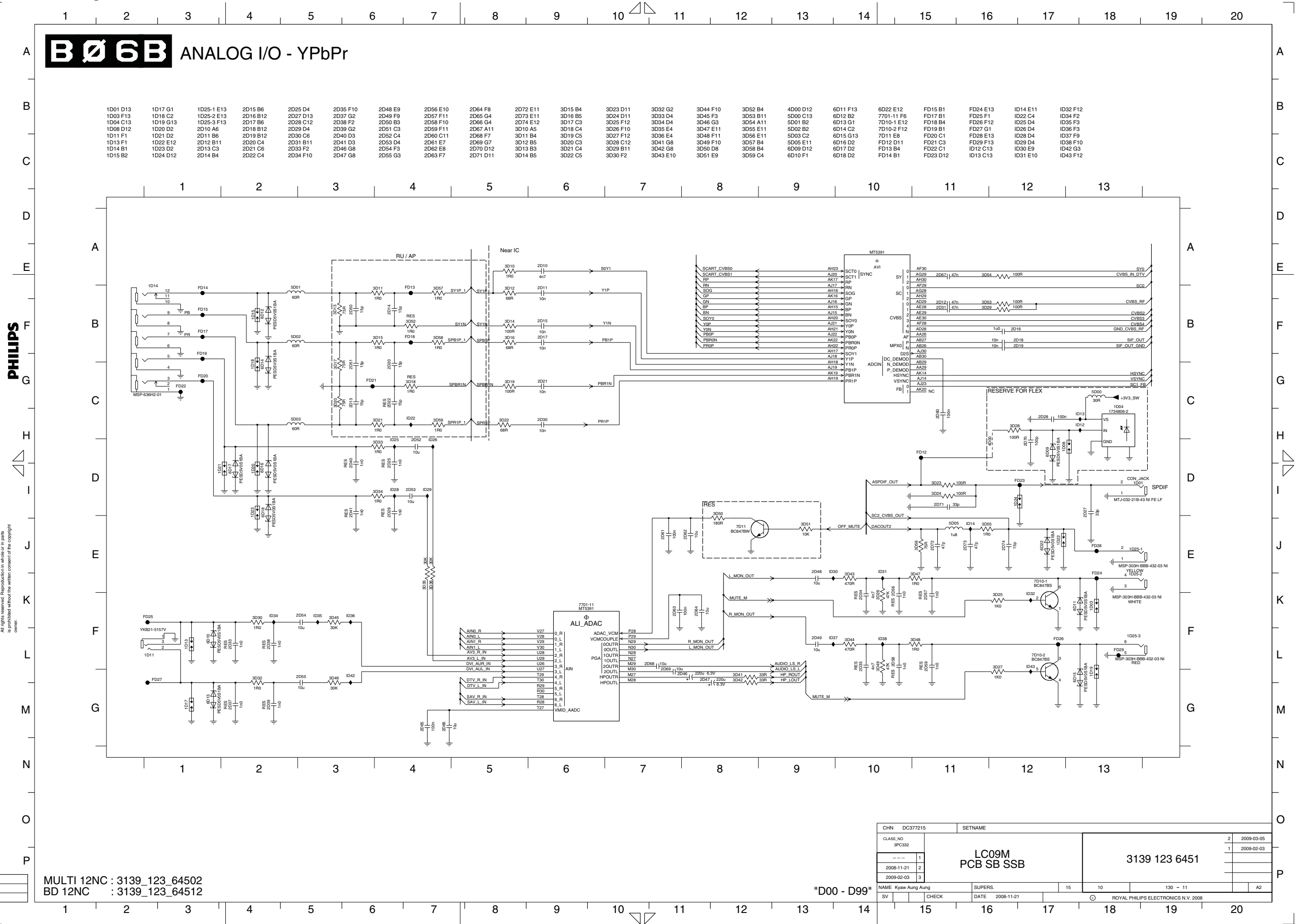


BØ6A DIGITAL I/O - ETHERNET (PROVISIONAL)

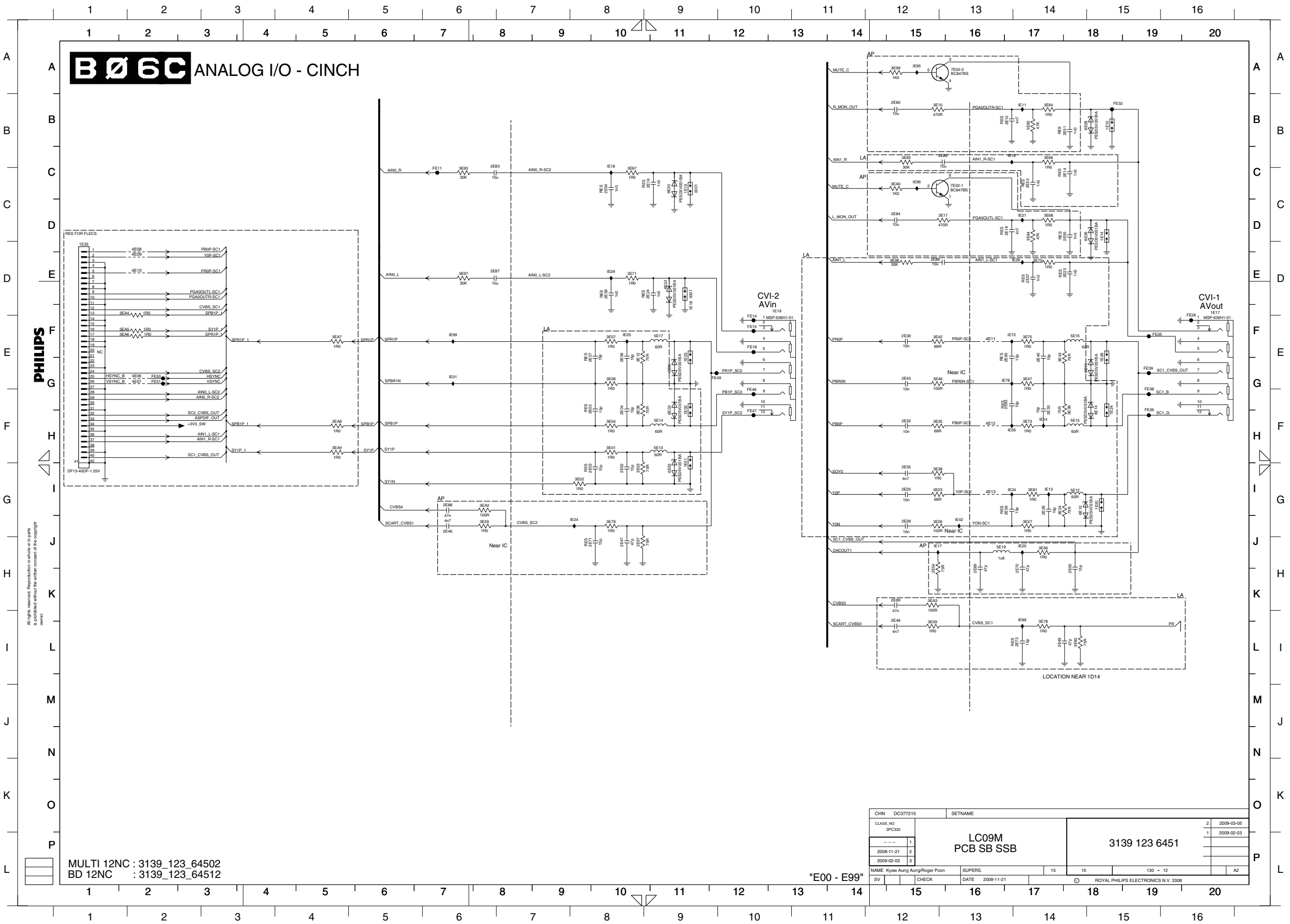


CHN DC377215		SETNAME					
CLASS_NO 3PC332		LC09M PCB SB SSB				2 2009-03-05	
						1 2009-02-03	
1							
2008-11-21 2							
2009-02-03 3							
		3139 123 6451					
NAME Hwang Zhen		SUPERS.		15		A2	
SV	CHECK	DATE 2008-11-21		(C)		ROYAL PHILIPS ELECTRONICS N.V. 2008	

SSB: Analog I/O - YPbPr

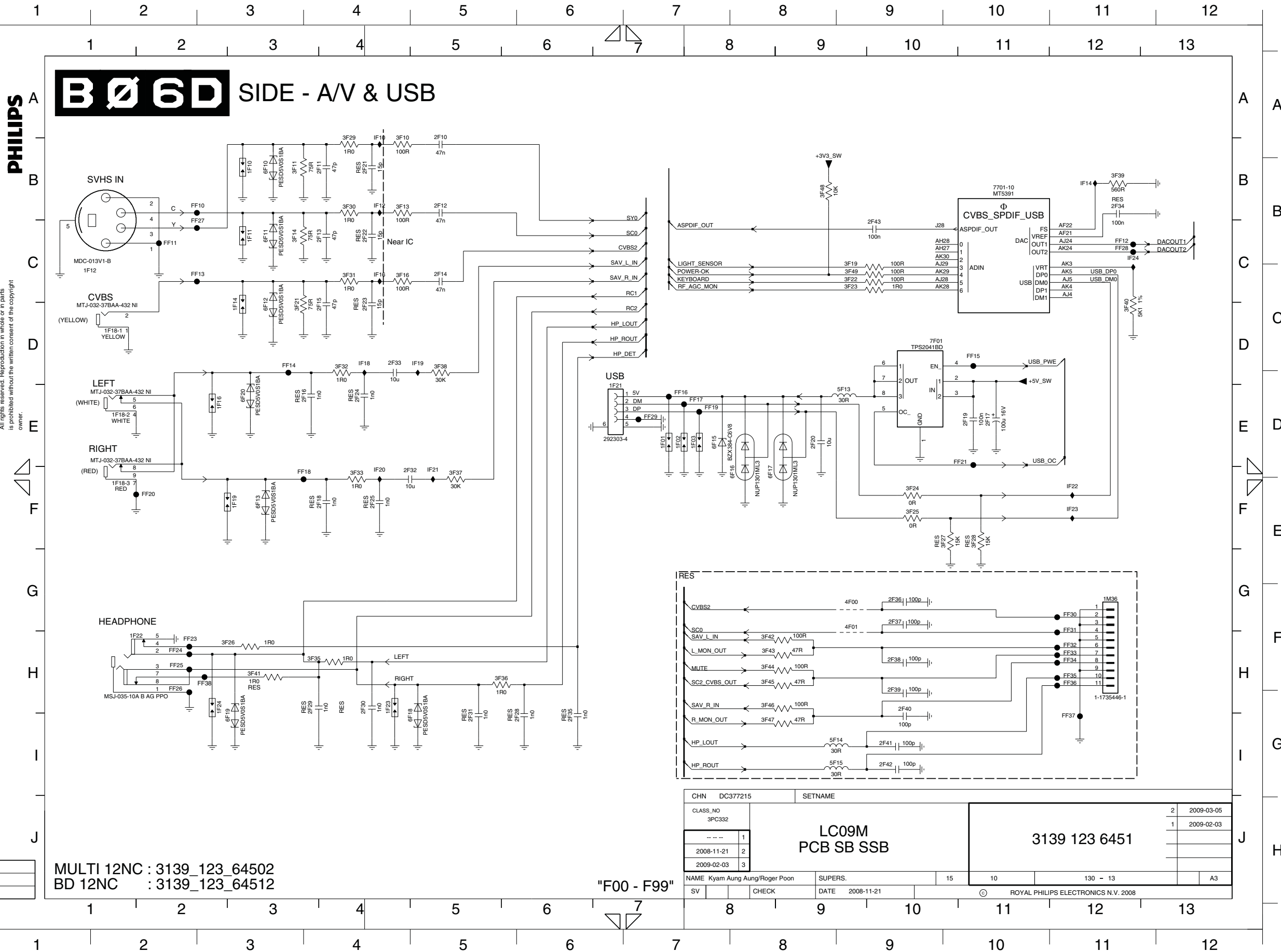


SSB: Analog I/O - Cinch



- 1E01 F9
 - 1E02 F9
 - 1E03 E9
 - 1E10 B15
 - 1E13 C9
 - 1E14 C15
 - 1E17 D16
 - 1E18 D9
 - 1E19 D10
 - 1E20 G15
 - 1E24 F15
 - 1E26 E15
 - 1E35 D1
 - 2E02 G8
 - 2E03 G8
 - 2E04 F8
 - 2E05 F8
 - 2E06 E8
 - 2E07 E8
 - 2E10 B13
 - 2E14 C14
 - 2E16 C9
 - 2E18 C13
 - 2E23 D14
 - 2E24 D9
 - 2E25 G12
 - 2E26 G14
 - 2E28 G12
 - 2E32 F12
 - 2E33 F14
 - 2E35 G12
 - 2E39 E12
 - 2E40 E14
 - 2E43 E12
 - 2E46 G6
 - 2E47 H8
 - 2E48 I12
 - 2E49 I14
 - 2E50 H14
 - 2E51 B14
 - 2E53 C14
 - 2E54 C8
 - 2E55 C14
 - 2E57 D14
 - 2E58 D8
 - 2E59 G13
 - 2E63 F13
 - 2E65 E13
 - 2E69 H13
 - 2E70 H14
 - 2E71 H8
 - 2E72 I14
 - 2E90 B12
 - 2E92 B13
 - 2E93 B6
 - 2E94 C12
 - 2E96 D12
 - 2E97 D6
 - 2E98 G6
 - 2E99 H12
 - 3E01 F8
 - 3E02 G8
 - 3E03 G8
 - 3E04 F8
 - 3E06 F8
 - 3E07 E8
 - 3E08 E8
 - 3E10 B12
 - 3E12 E8
 - 3E17 C13
 - 3E23 G12
 - 3E24 G14
 - 3E26 G12
 - 3E27 G14
 - 3E35 F12
 - 3E36 F14
 - 3E38 G12
 - 3E42 E12
 - 3E43 E14
 - 3E46 E12
 - 3E47 E14
 - 3E54 H12
 - 3E55 G6
 - 3E56 H14
 - 3E57 H8
 - 3E59 I12
 - 3E60 I14
 - 3E64 B14
 - 3E66 B14
 - 3E67 C8
 - 3E68 C14
 - 3E70 D14
 - 3E71 D8
 - 3E73 F14
 - 3E75 E14
 - 3E78 I14
 - 3E79 G8
 - 3E81 G14
 - 3E90 B14
 - 3E92 B12
 - 3E93 C2
 - 3E94 C14
 - 3E96 D12
 - 3E97 D6
 - 3E99 A12
 - 3EA0 C12
 - 3EA2 G6
 - 3EA3 H12
 - 3EA4 D1
 - 3EA5 E1
 - 3EA6 E1
 - 3EA7 E4
 - 3EA8 F4
 - 3EA9 F4
 - 4E06 E2
 - 4E07 E2
 - 4E08 D2
 - 4E09 D2
 - 4E10 D2
 - 4E11 E13
 - 4E12 F13
 - 4E13 G13
 - 5E12 G14
 - 5E13 F9
 - 5E14 F9
 - 5E15 F14
 - 5E16 E14
 - 5E17 E9
 - 5E19 H13
 - 6E02 G9
 - 6E03 F9
 - 6E04 E9
 - 6E10 G14
 - 6E14 F15
 - 6E16 E15
 - 6E28 C15
 - 6E28 B15
 - 6E30 C9
 - 6E32 D9
 - 7E02-1 C13
 - 7E02-2 A13
 - FE11 C6
- FE14 E10
 - FE15 E10
 - FE18 E10
 - FE26 E16
 - FE32 B15
 - FE35 E15
 - FE36 F15
 - FE38 F15
 - FE39 E15
 - FE47 F10
 - FE48 F10
 - FE49 E9
 - FE50 E2
 - FE51 E2
 - IE01 E6
 - IE11 B14
 - IE13 G14
 - IE14 F14
 - IE16 B13
 - IE17 H12
 - IE18 B8
 - IE20 H14
 - IE21 C14
 - IE24 G8
 - IE25 E8
 - IE26 D14
 - IE29 D8
 - IE34 G13
 - IE42 G13
 - IE56 F13
 - IE72 E13
 - IE78 E13
 - IE89 I14
 - IE95 A12
 - IE96 C12
 - IE99 E6

SSB: Side - A/V & USB



- 1F01 D7
- 1F02 D7
- 1F03 D7
- 1F10 A3
- 1F11 B3
- 1F12 B2
- 1F14 C3
- 1F16 D3
- 1F18-1 C2
- 1F18-2 D2
- 1F18-3 D2
- 1F19 D3
- 1F21 D6
- 1F22 F2
- 1F23 F4
- 1F24 F3
- 1M36 F11
- 2F10 A5
- 2F11 A4
- 2F12 B5
- 2F13 B4
- 2F14 B5
- 2F15 C4
- 2F16 C4
- 2F17 D10
- 2F18 D4
- 2F19 D10
- 2F20 D8
- 2F21 A4
- 2F22 B4
- 2F23 C4
- 2F24 C4
- 2F25 D4
- 2F28 F6
- 2F29 F4
- 2F30 F4
- 2F31 F5
- 2F32 D5
- 2F33 C4
- 2F34 B11
- 2F35 F6
- 2F36 F9
- 2F37 F9
- 2F38 F9
- 2F39 G9
- 2F40 G9
- 2F41 G9
- 2F42 G9
- 2F43 B9
- 3F10 A4
- 3F11 A3
- 3F13 B4
- 3F14 B3
- 3F16 B4
- 3F19 C9
- 3F21 C3
- 3F22 C9
- 3F23 C9
- 3F24 E9
- 3F25 E9
- 3F26 F3
- 3F27 E10
- 3F28 E10
- 3F29 A4
- 3F30 B4
- 3F31 B4
- 3F32 C4
- 3F33 D4
- 3F35 F4
- 3F36 F5
- 3F37 D5
- 3F38 C5
- 3F39 B11
- 3F40 C11
- 3F41 F3
- 3F42 F8
- 3F43 F8
- 3F44 F8
- 3F45 F8
- 3F46 G8
- 3F47 G8
- 3F48 B8
- 3F49 C9
- 4F00 F9
- 4F01 F9
- 5F13 D9
- 5F14 G9
- 5F15 G9
- 6F10 A3
- 6F11 B3
- 6F12 C3
- 6F13 D3
- 6F15 D7
- 6F16 D8
- 6F17 D8
- 6F18 F5
- 6F19 F3
- 6F20 C3
- 7701-10 B10
- 7F01 C10
- FF10 B3
- FF11 B2
- FF12 B11
- FF13 B3
- FF14 C3
- FF15 C10
- FF17 D7
- FF18 D4
- FF19 D7
- FF20 D2
- FF21 D10
- FF22 F2
- FF24 F2
- FF25 F2
- FF26 F2
- FF27 B3
- FF28 B11
- FF29 D7
- FF30 F11
- FF31 F11
- FF32 F11
- FF33 F11
- FF34 F11
- FF35 F11
- FF36 F11
- FF37 G11
- FF38 F3
- IF10 A4
- IF12 B4
- IF14 B11
- IF16 B4
- IF18 C4
- IF19 C5
- IF20 D4
- IF21 D5
- IF22 E11
- IF23 E11
- IF24 B11

BØ6E VGA



SSB: SRP List Explanation

Example

Net Name	Diagram
+12-15V	AP1 (4x)
+12-15V	AP4 (4x)
+12-15V	AP5 (12x)
+12-15V	AP6 (4x)
+12-15V	AP7 (8x)
+12V_NF	AP1 (4x)
+12V_NF	AP1 (2x)
+12VLP	AP1 (2x)
+25VLP	AP1 (4x)
+25VLP	AP2 (1x)
+3V3-STANDBY	AP5 (3x)
+400V-F	AP1 (2x)
+400V-F	AP2 (2x)
+400V-F	AP3 (2x)
+5V2	AP1 (6x)
+5V2	AP2 (1x)
+5V2-NF	AP1 (1x)
+5V2-NF	AP2 (1x)
+5V-SW	AP1 (6x)
+5V-SW	AP2 (1x)
+8V6	AP1 (3x)
+AUX	AP1 (2x)
+DC-F	AP2 (1x)
+DC-F	AP3 (2x)
+SUB-SPEAKER	AP5 (1x)
+SUB-SPEAKER	AP6 (2x)
-12-15V	AP1 (4x)
-12-15V	AP4 (6x)
-12-15V	AP5 (14x)
-12-15V	AP6 (6x)
-12-15V	AP7 (8x)
AL-OFF	AP1 (2x)
AUDIO-L	AP4 (1x)
AUDIO-L	AP5 (1x)
AUDIO-PROT	AP5 (3x)
AUDIO-R	AP4 (1x)
AUDIO-R	AP5 (1x)
AUDIO-SW	AP5 (1x)
AUDIO-SW	AP7 (1x)
BOOST	AP1 (2x)
CPROT	AP4 (2x)
CPROT	AP5 (1x)
CPROT-SW	AP5 (1x)
CPROT-SW	AP6 (2x)
-DC-F	AP1 (2x)
-DC-F	AP3 (2x)
DC-PROT	AP1 (1x)
DC-PROT	AP5 (2x)
DIM-CONTROL	AP1 (2x)
FEEDBACK+SW	AP1 (2x)
FEEDBACK-L	AP4 (2x)
FEEDBACK-R	AP4 (2x)
FEEDBACK-SW	AP6 (2x)
GND-AL	AP1 (2x)
GNDHA	AP1 (40x)
GNDHA	AP2 (20x)
GNDHA	AP3 (2x)
GNDHOT	AP2 (2x)
GND-L	AP1 (2x)
GND-L	AP4 (4x)
GND-L	AP5 (34x)
GND-LL	AP4 (7x)
GND-LS	AP5 (1x)
GND-LR	AP4 (7x)
GND-LR	AP5 (1x)
GND-LSW	AP5 (1x)
GND-LSW	AP6 (15x)
GND-S	AP1 (11x)
GND-SA	AP4 (8x)
GND-SA	AP5 (2x)
GND-SA	AP6 (8x)
GND-SA	AP7 (6x)
GNDScrow	AP3 (2x)
GNDScrow	AP5 (2x)
GND-SSB	AP5 (3x)
GND-SSP	AP1 (51x)
GND-SSP	AP2 (15x)
IN+SW	AP6 (2x)
IN-L	AP4 (2x)
IN-R	AP4 (2x)
IN-R	AP6 (2x)
INV-MUTE	AP4 (1x)
INV-MUTE	AP5 (1x)
INV-MUTE	AP6 (1x)
LEFT-SPEAKER	AP4 (1x)
LEFT-SPEAKER	AP5 (1x)
MUTE	AP4 (2x)
MUTE	AP5 (1x)
MUTE	AP6 (1x)
ON-OFF	AP1 (3x)
OUT	AP6 (1x)
OUT	AP7 (2x)
OUTN	AP6 (1x)
OUTN	AP7 (1x)
POWER-GOOD	AP1 (2x)
POWER-OK-PLATFORM	AP1 (2x)
RIGHT-SPEAKER	AP4 (1x)
RIGHT-SPEAKER	AP5 (1x)
SOUND-ENABLE	AP5 (3x)
STANDBY	AP1 (5x)
STANDBY	AP2 (1x)
-SUB-SPEAKER	AP5 (1x)
-SUB-SPEAKER	AP6 (2x)
V-CLAMP	AP1 (1x)
V-CLAMP	AP3 (2x)

1.1. Introduction

SRP (Service Reference Protocol) is a software tool that creates a list with all references to signal lines. The list contains references to the signals within all schematics of a PWB. It replaces the text references currently printed next to the signal names in the schematics. These printed references are created manually and are therefore not guaranteed to be 100% correct. In addition, in the current crowded schematics there is often none or very little place for these references. Either there will be an SRP reference list for a schematic, or there will be printed references in the schematic.

1.2. Non-SRP Schematics

There are several different signals available in a schematic:

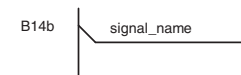
1.2.1. Power Supply Lines

All power supply lines are available in the supply line overview (see chapter 9). In the schematics (see chapter 10) is not indicated where supplies are coming from or going to.
It is however indicated if a supply is incoming (created elsewhere), or outgoing (created or adapted in the current schematic).



1.2.2. Normal Signals

For normal signals, a schematic reference (e.g. B14b) is placed next to the signals.

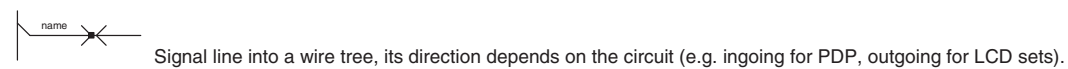
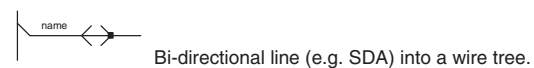
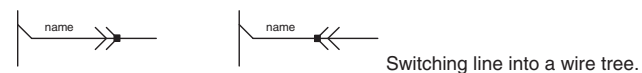
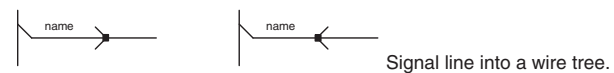
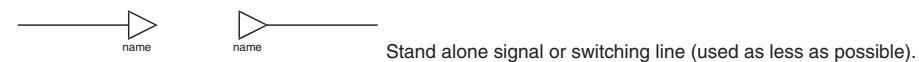


1.2.3. Grounds

For normal and special grounds (e.g. GNDHOT or GND3V3 etc.), nothing is indicated.

1.3. SRP Schematics

SRP is a tool, which automatically creates a list with signal references, indicating on which schematic the signals are used. A reference is created for all signals indicated with an SRP symbol, these symbols are:



Remarks:

- When there is a black dot on the “signal direction arrow” it is an SRP symbol, so there will be a reference to the signal name in the SRP list.
- All references to normal grounds (Ground symbols without additional text) are not listed in the reference list, this to keep it concise.
- Signals that are not used in multiple schematics, but only once or several times in the same schematic, are included in the SRP reference list, but only with one reference.

Additional Tip:

When using the PDF service manual file, you can very easily search for signal names and follow the signal over all the schematics. In Adobe PDF reader:

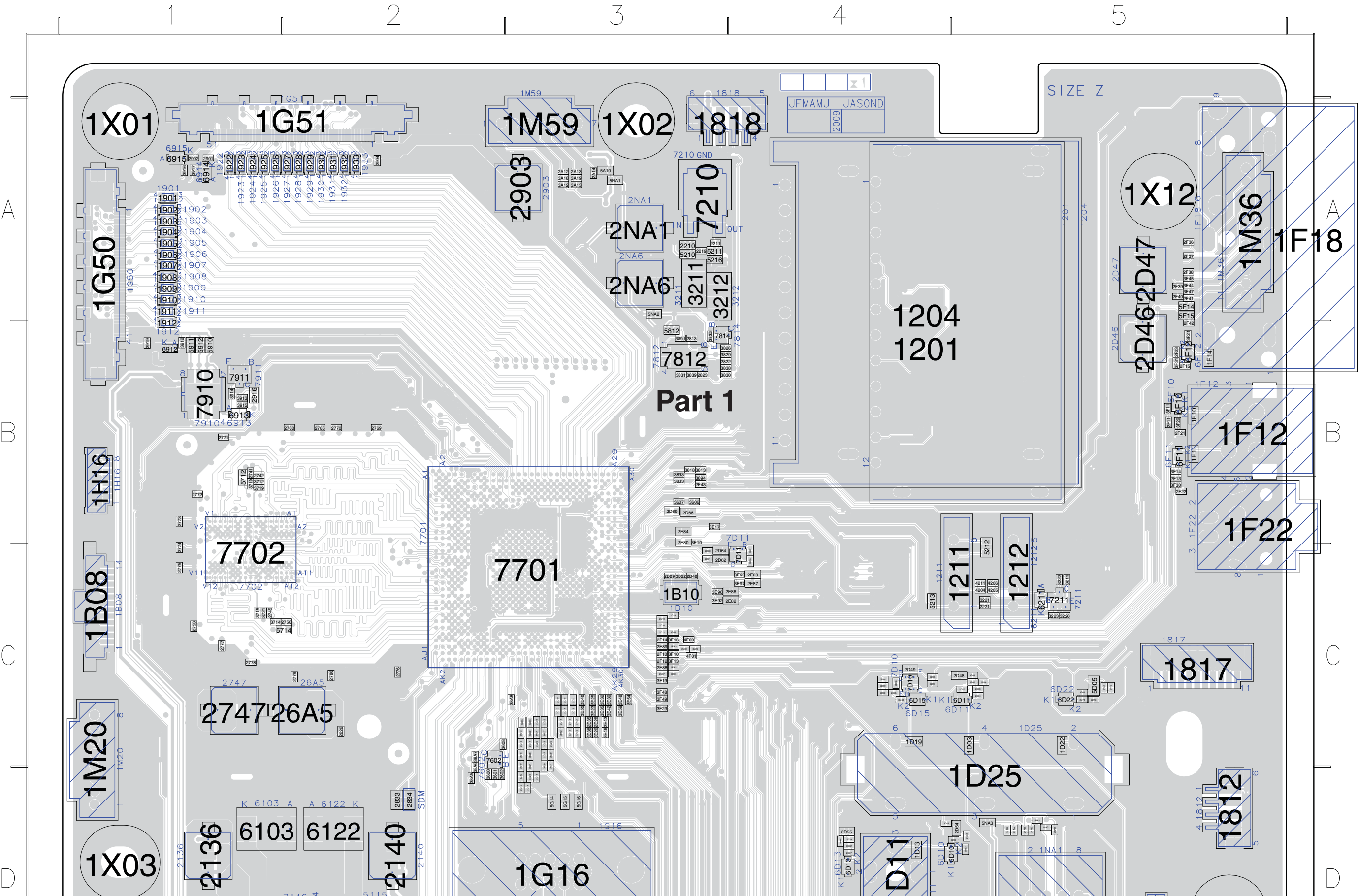
- Select the signal name you want to search for, with the “Select text” tool.
- Copy and paste the signal name in the “Search PDF” tool.
- Search for all occurrences of the signal name.
- Now you can quickly jump between the different occurrences and follow the signal over all schematics. It is advised to “zoom in” to e.g. 150% to see clearly, which text is selected. Then you can zoom out, to get an overview of the complete schematic.

PS. It is recommended to use at least Adobe PDF (reader) version 6.x, due to better search possibilities in this version.

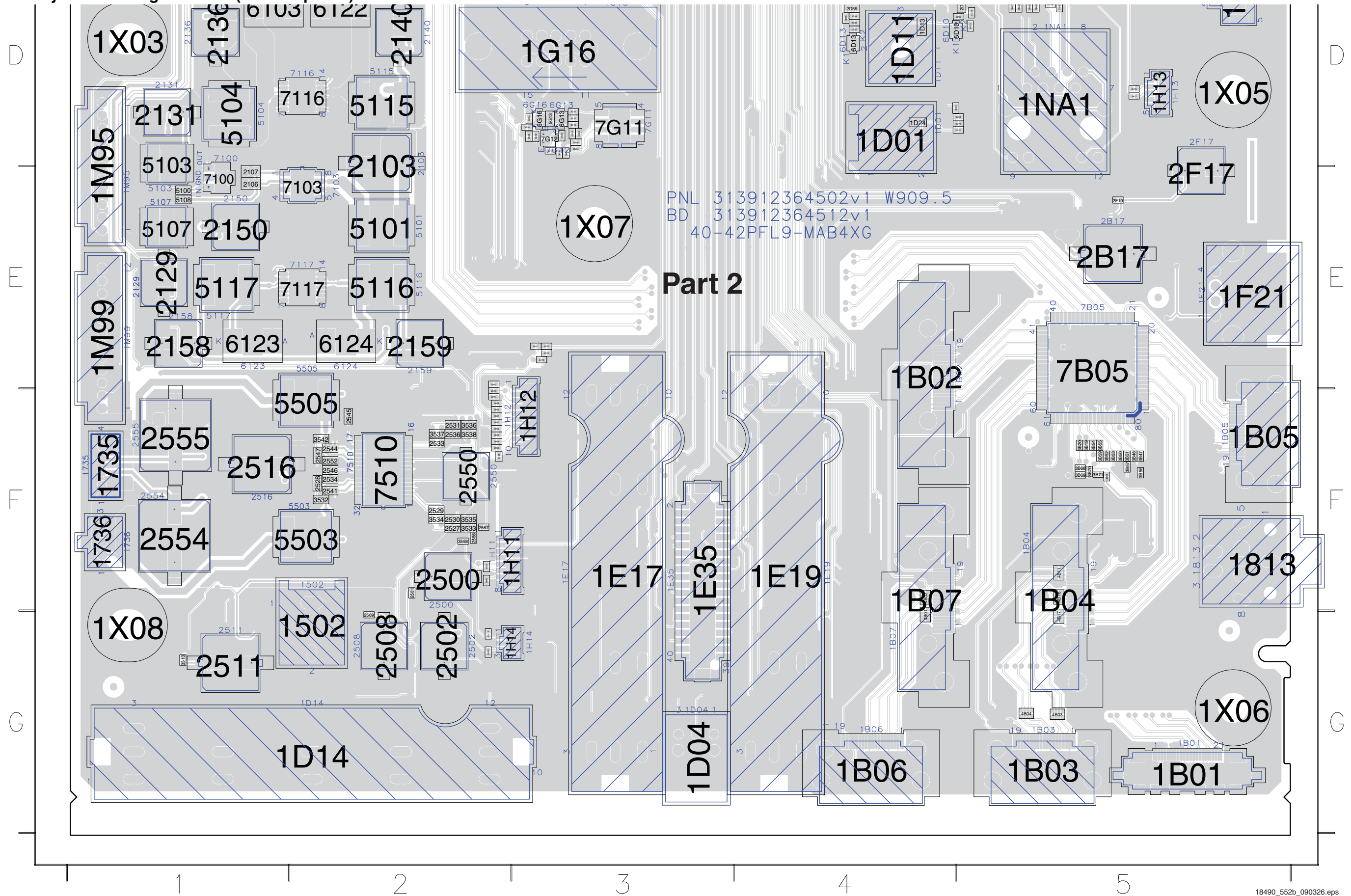
Personal Notes:

18490_552_090326.eps
090327

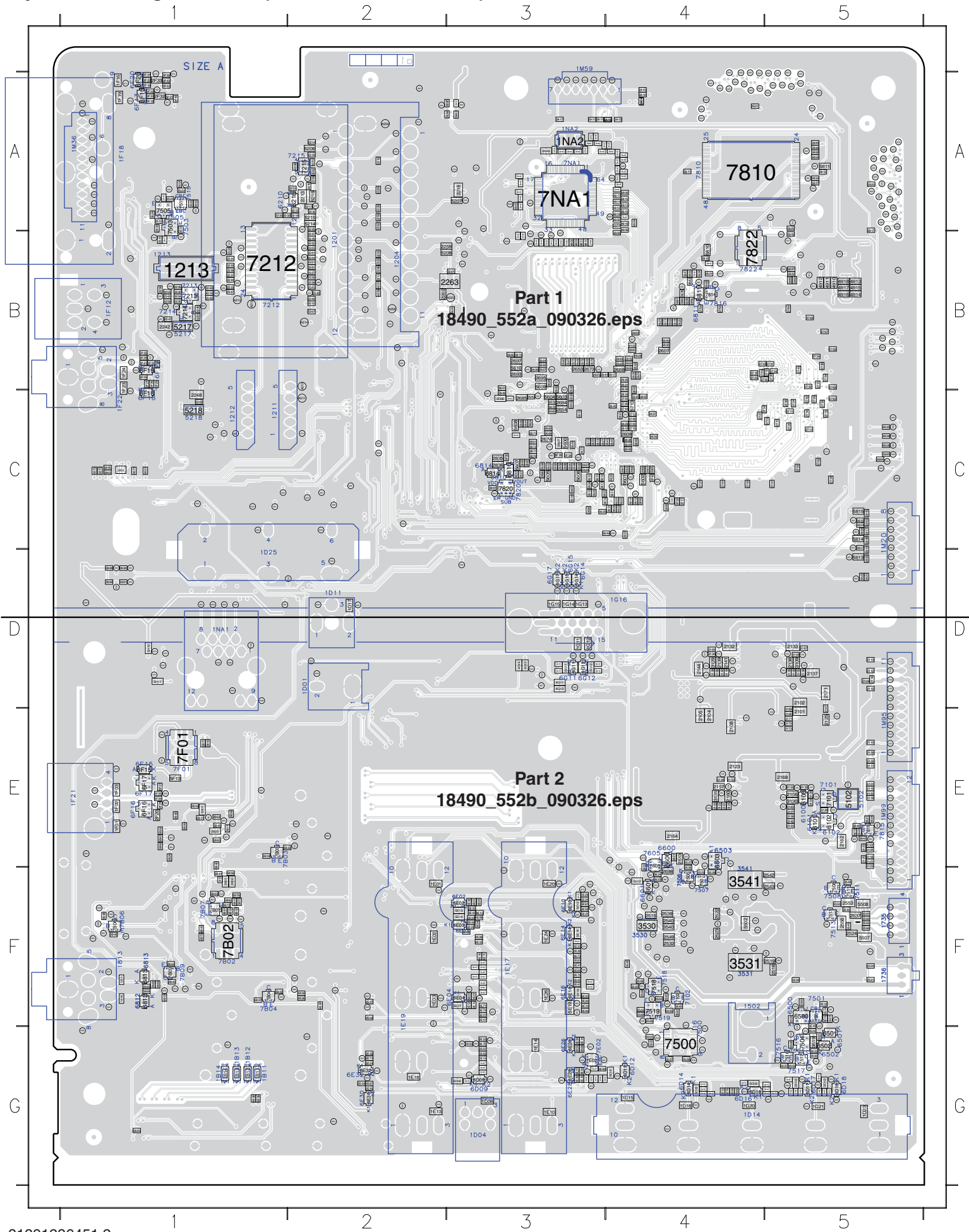
Layout Small Signal Board (Part 1 top side)



Layout Small Signal Board (Part 2 top side)



Layout Small Signal Board (Overview bottom side)



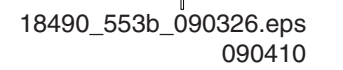
31391236451.2

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5

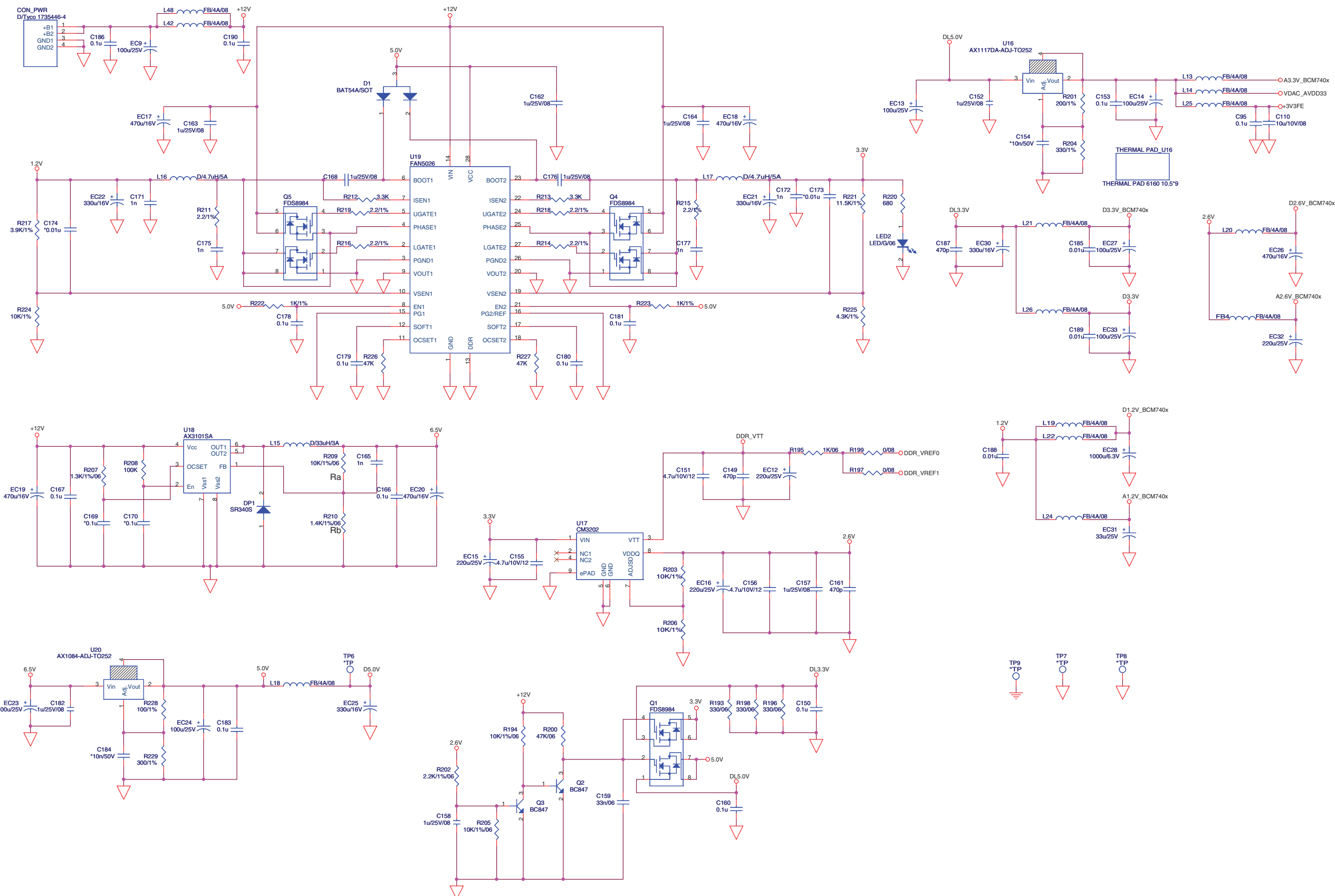


Part 2

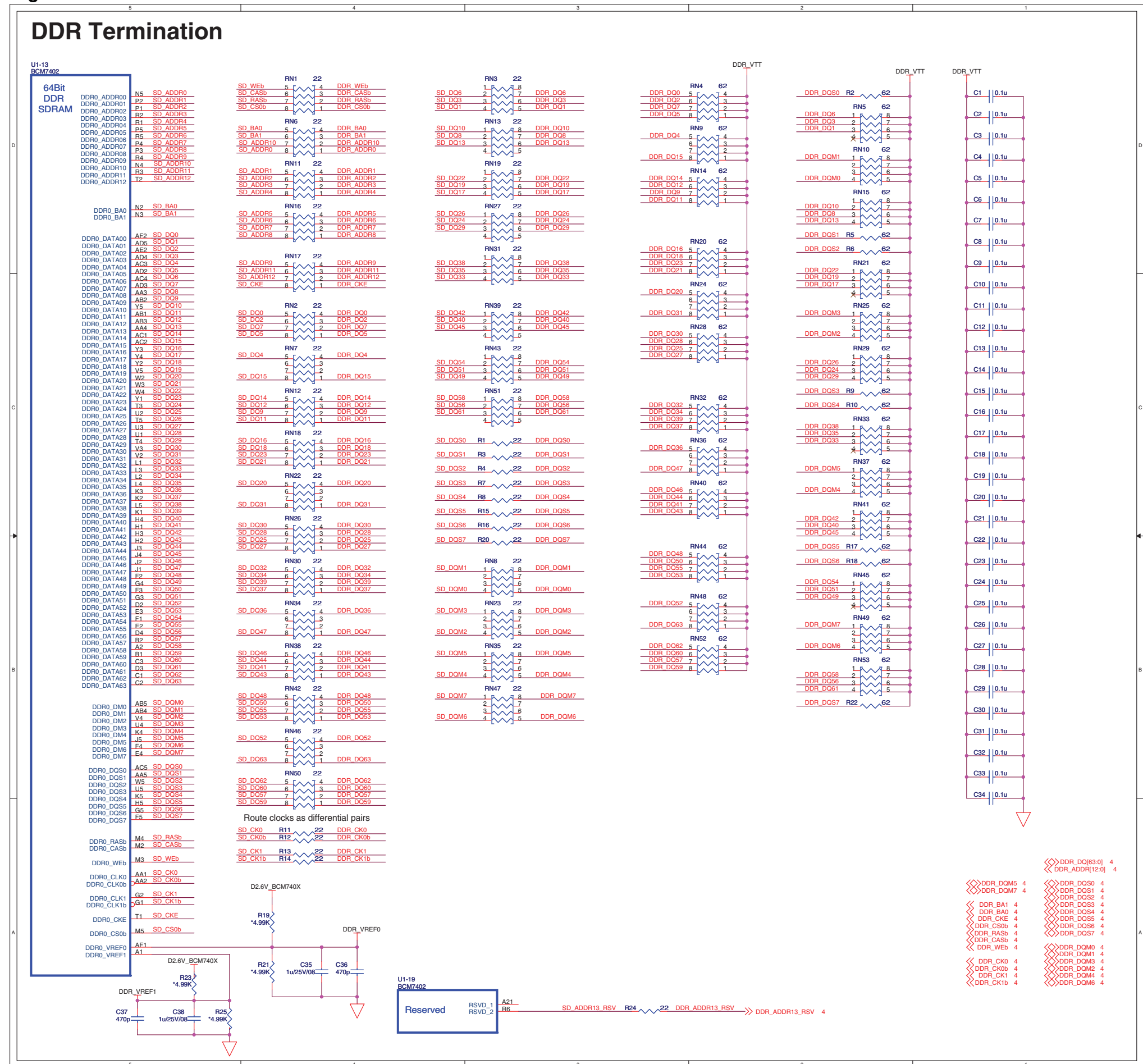


Digital Bolt-On: Power

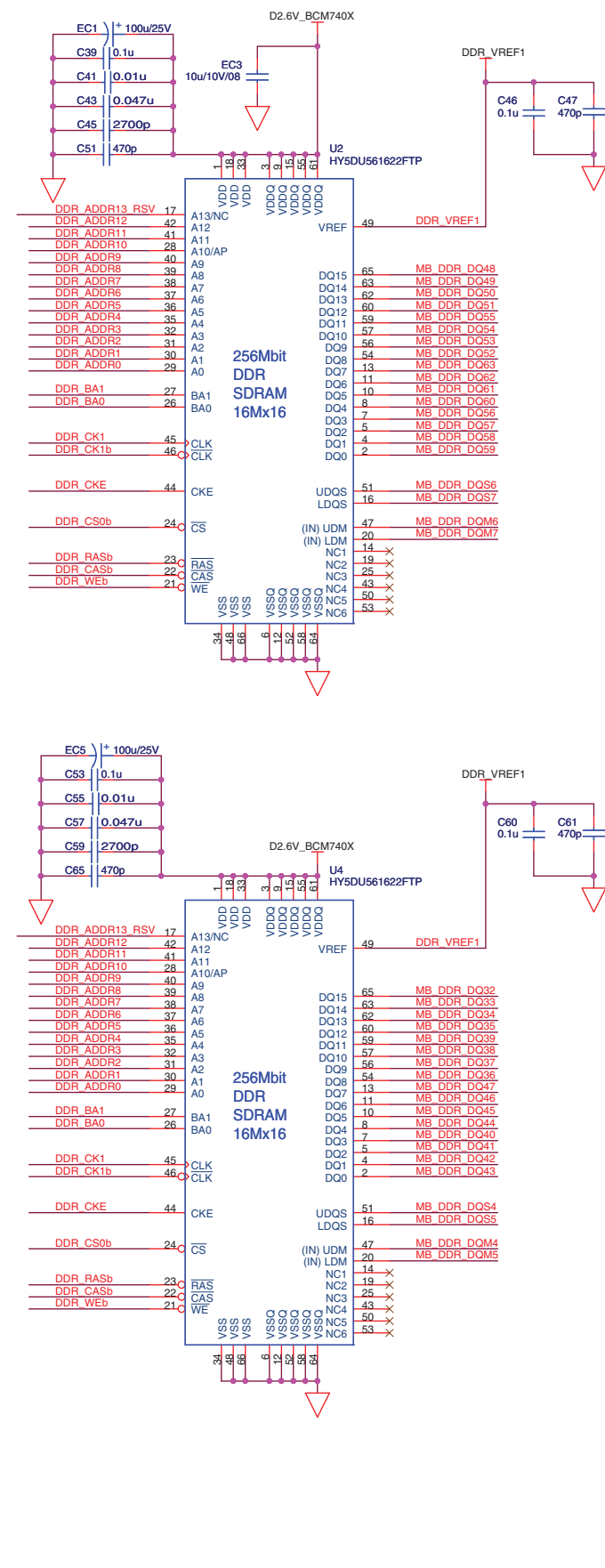
Power



Digital Bolt-On: DDR Termination

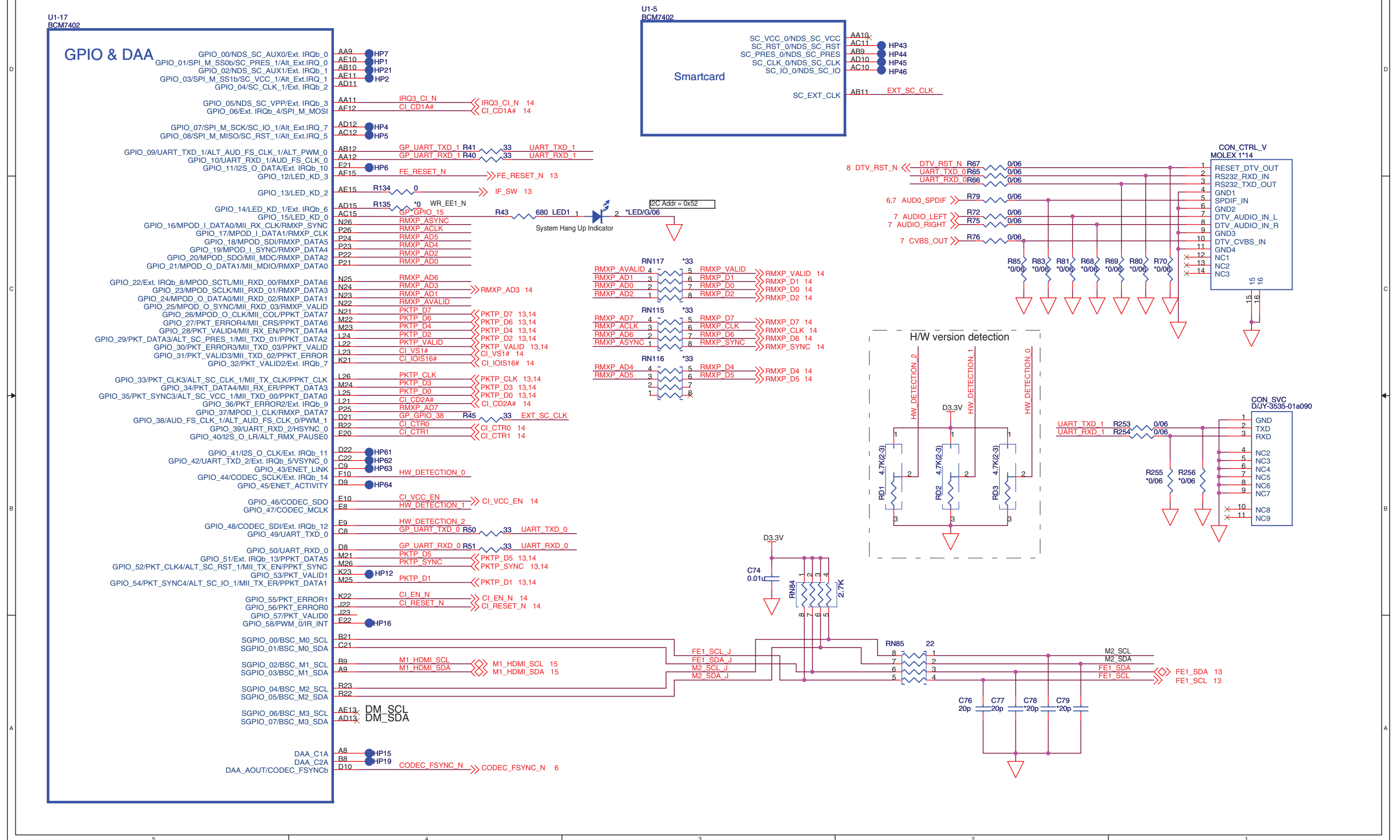


DDRAM



Digital Bolt-On: UART/GPIO

UART/GPIO

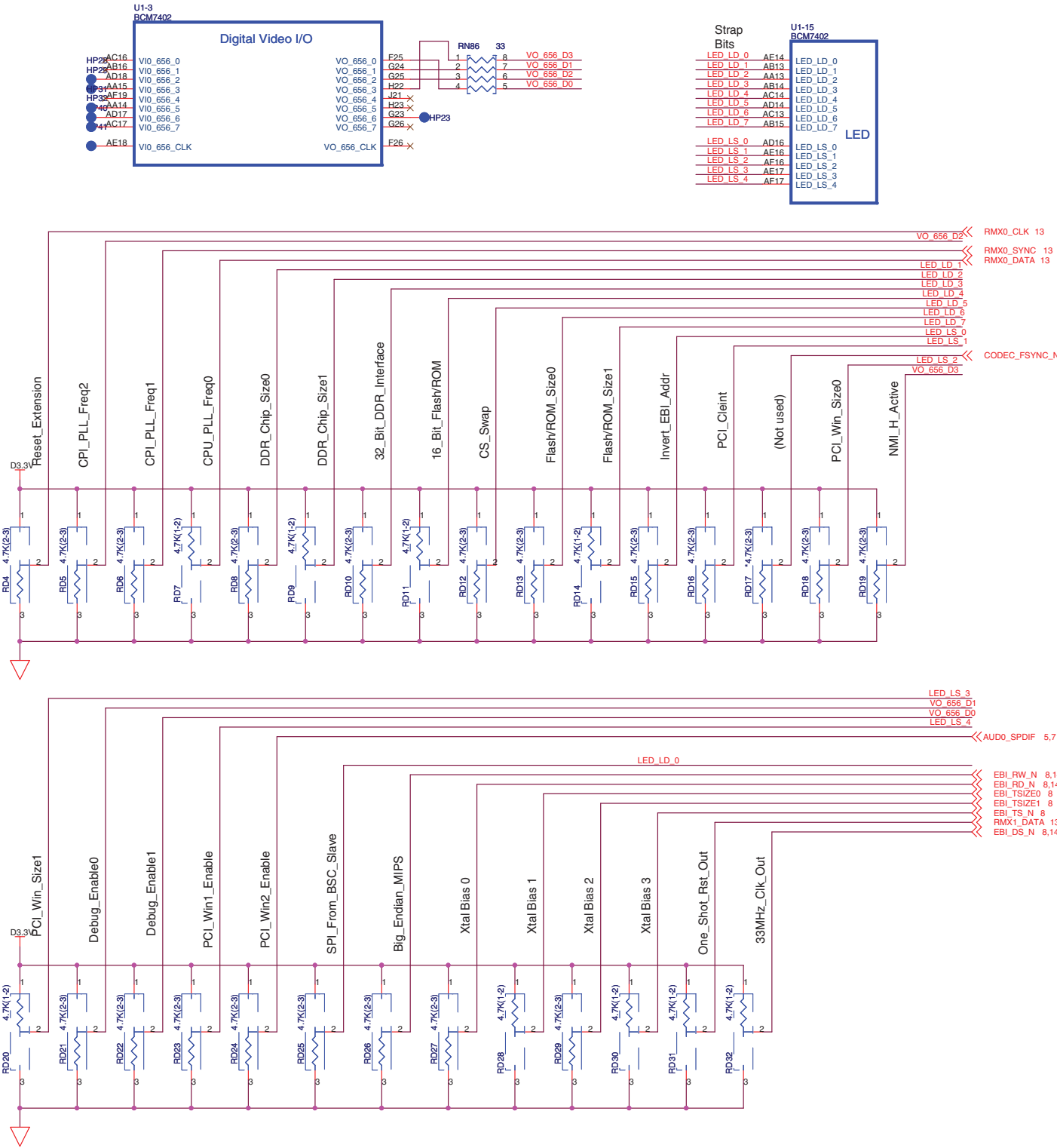


Digital Bolt-On: Pin Strap Option

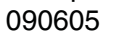
Pin Strap Option

BCM 7401 PIN STRAP

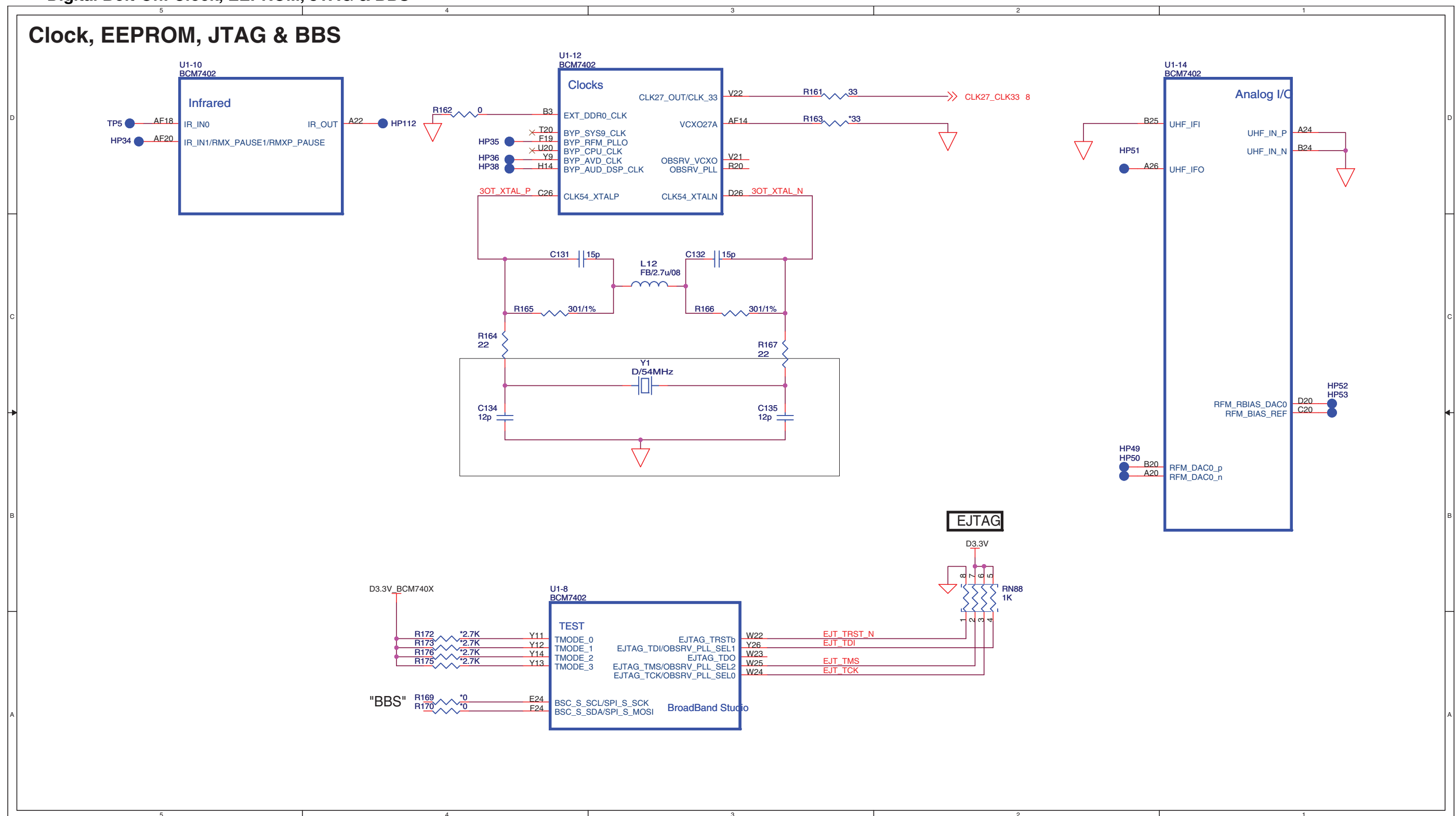
Strap Name	Strap Bit	Description	Pin	A0	B0	Comments
Reset_Extension	strap_reset_ext_mode	Reset Extension Mode 0: No delay 1: 200 ms (EBI_CS# delayed by 1.6 ms)	RMX_CLK0	0	0	
	strap_NAND_flash	0: Flash is NOR flash 1: Flash is NAND flash	VO_656_2	0	0	Per system configuration Always "0" in A0
CPU_PLL_Freq[1:0]	strap_cpu_pll_1 strap_cpu_pll_0	CPU PLL Clock Frequency Select	RMX_SYNC0 RMX_DATA0	01	01	Set to 'h01
DDR_Chip_Size[1:0]	strap_ddr_config_0 strap_ddr_config_1	0: Reserved 1: 8Mx16 bit parts 2: 16Mx16 bit parts 3: 32Mx16 bit parts (LSB is 0, MSB is 1)	LED_LD_1 LED_LD_2	10	10	Per memory configuration
	strap_ddr_config_2	0: 64-bit DDR mode 1: 32-bit DDR mode	LED_LD_3	0	0	Usually in 64-bit mode
16_Bit_Flah/ROM	strap_ebi_boot_memory	0: Boot memory is 8-bit ROM 1: Boot memory is 16-bit ROM	LED_LD_4	1	1	Per system configuration
CS_swap	strap_ebi_cs_swap	0: No swap 1: Swap CS_0 and CS_1 signals	LED_LD_5	0	0	Per system configuration
	strap_ebi_rom_size0 strap_ebi_rom_size1	0: 64 Mbyte ROM 1: 16 Mbyte ROM 2: 8 Mbyte ROM 3: 4 Mbyte ROM (LSB is 0, MSB is 1)	LED_LD_6 LED_LD_7	01	01	Per system configuration
Invert_EBI_Addr	strap_ebi_invert_addr	0: Do not invert EBI address 1: Invert upper bits of EBI address	LED_LS_0	0	0	Usually a don't care - set to do not invert
PCI_Client	strap_pci_client	0: PCI in bridge (master) mode 1: PCI in client (slave) mode	LED_LS_1	0	0	Usually in master mode
NMI_H_Active	strap_NMI_polarity	0: Low-active interrupt 1: High-active interrupt	VO_656_3	0	0	Per system configuration
	strap_pci_memwin_size_0 strap_pci_memwin_size_1	0: 32 Mbyte Window 1: 64 Mbyte Window 2: 128 Mbyte Window 3: 256 Mbyte Window (LSB is 0, MSB is 1)	LED_LS_2 LED_LS_3	10	10	Per memory configuration
Debug_Enable[1:0]	strap_test_debug_en_0 strap_test_debug_en_1	0: Debug Mode Disabled 1: Debug Mode Enabled	VO_656_1 VO_656_0	10	00	Internal Debug Port. Set to 0.
	strap_pci_request_2	0: EBI CS 4 and 5 1: PCI REQ/GNT 2	EBI_ADDR24	0	NI	Per system configuration
PCI_REQ-GNT3_Act_N	strap_pci_request_3	0: EBI CS 2 and 3 1: PCI REQ/GNT 3	EBI_ADDR25	0	NI	Per system configuration
PCI_Win1_Enable	strap_pci_memwin1_en	0: Disable PCI memory window 1 1: Enable PCI memory window 1	LED_LS_4	0	0	Per system configuration
PCI_Win2_Enable	strap_pci_memwin2_en	0: Disable PCI memory window 2 1: Enable PCI memory window 2	AUD0_SPDIF	0	0	Per system configuration
SPI_From_BSC_Slave	strap_spi_slave_enable	0: BSC slave port configured 1: SPI slave port configured	LED_LD_0	0	0	Per system configuration - usually in BSC slave
Big_Endian_MIPS	strap_system_big_endian	0: System is LITTLE endian 1: System is BIG endian	EBI_RWb	0	0	Per system configuration
Xtal_Bias[3:0]	strap_xtal_adj_0 strap_xtal_adj_1 strap_xtal_adj_2 strap_xtal_adj_3	Adjust the 54 MHz oscillator bias current. LSB is 0, MSB is 3 EBI_TSIZE0b EBI_TSIZE1b EBI_TSb	EBI_RDb	1010	1010	Set to 0.
	strap_reset_outb_def_val	0: Level reset output behavior 1: One shot reset output behavior	RMX_DATA1	1	1	Per system configuration
	strap_33_27_MHz_clock	0: 27-MHz clock output 1: 33-MHz clock output	EBI_DSb	1	1	Per system configuration



PCI, EBI, Flash, Reset & Clone

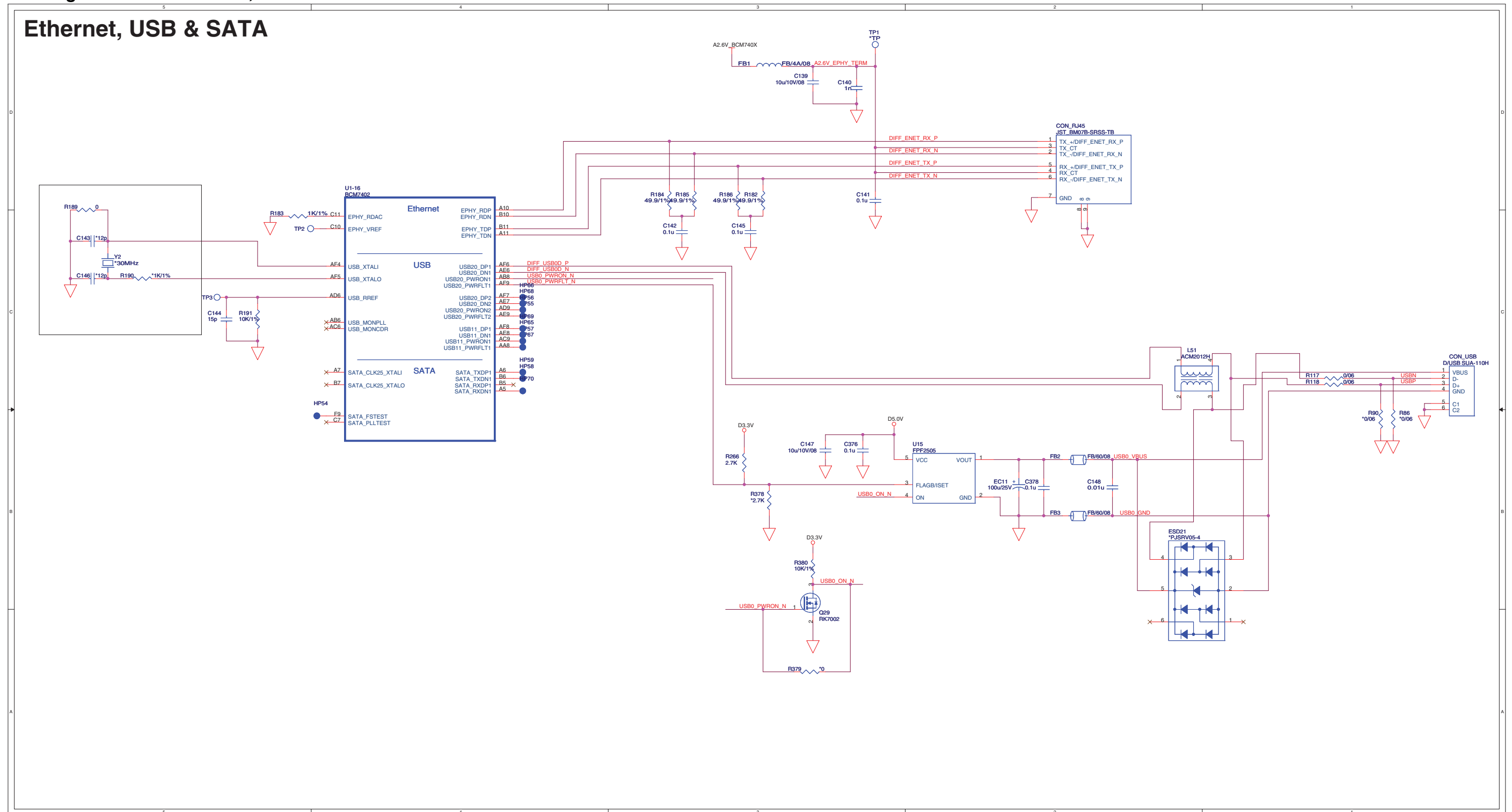


Digital Bolt-On: Clock, EEPROM, JTAG & BBS



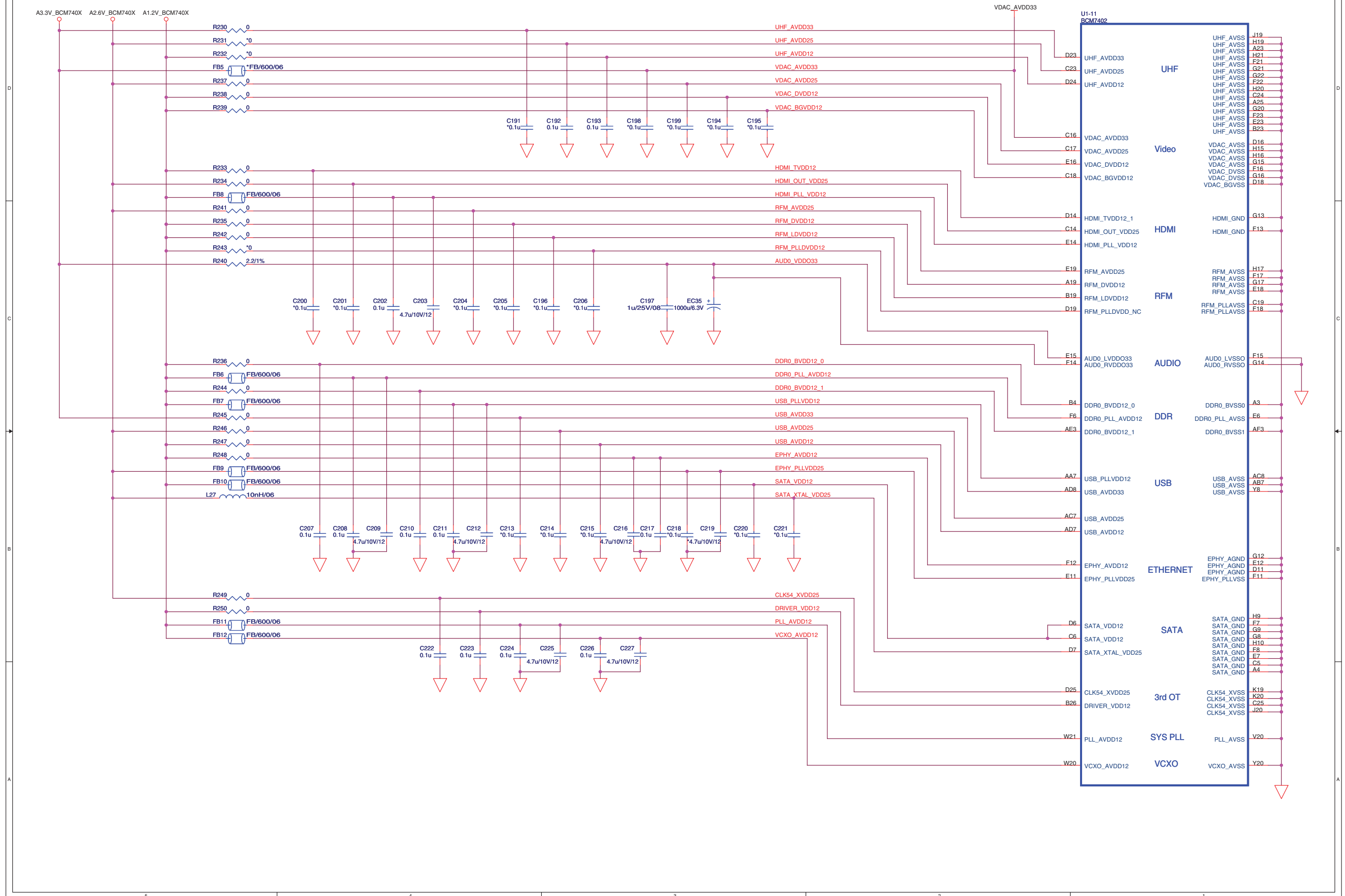
Digital Bolt-On: Ethernet, USB & SATA

Ethernet, USB & SATA

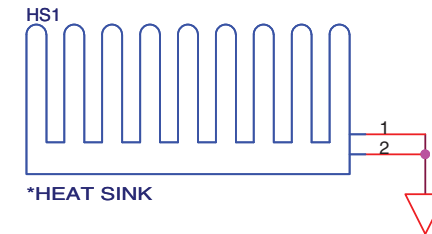
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Digital Bolt-On: 7401 Analog Supply Filtering

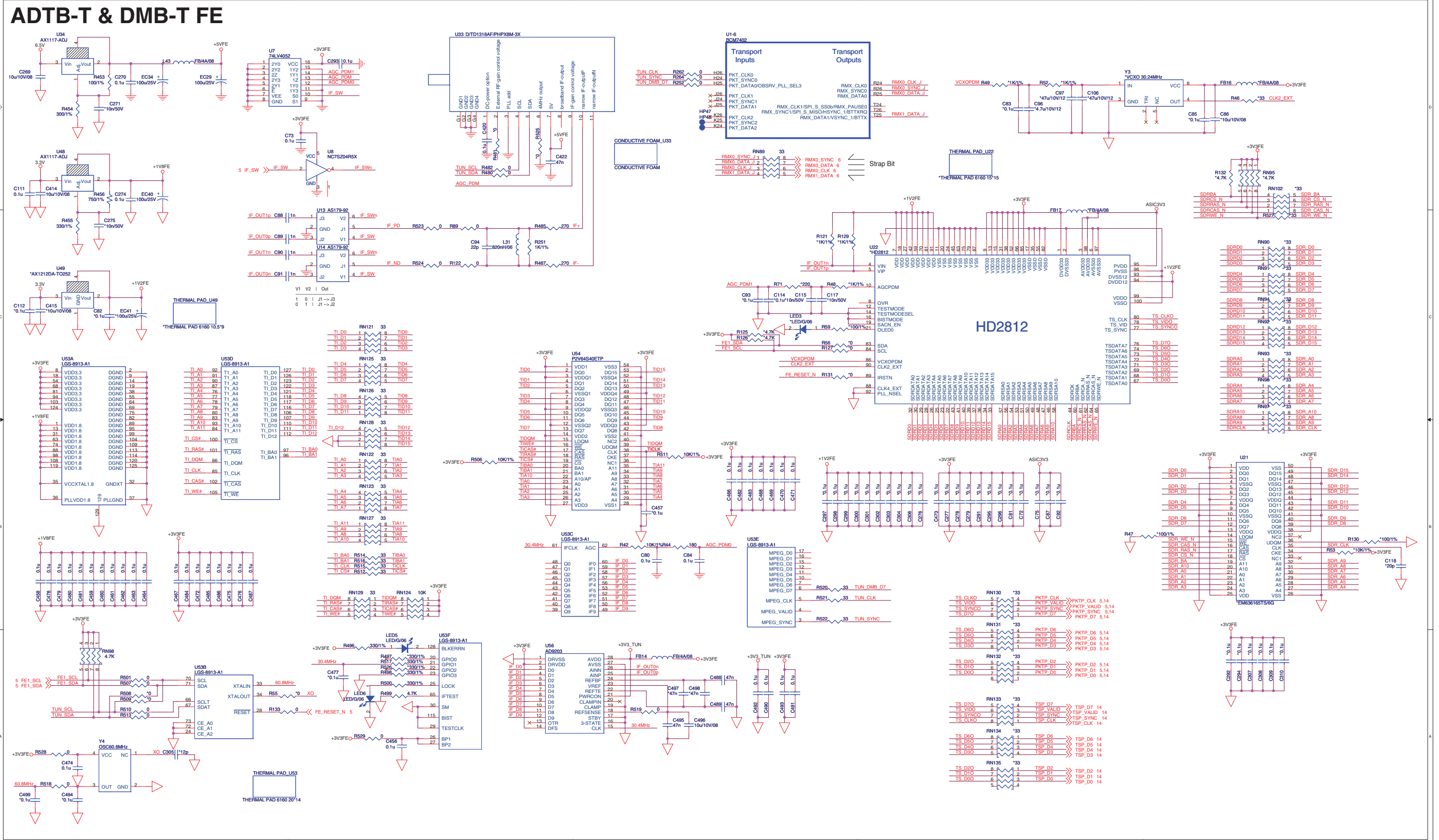
7401 Analog Supply Filtering



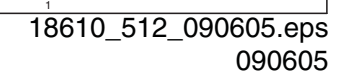
7401 Digital Decoupling



Digital Bolt-On: ADTB-T & DMB-T FE



Cimax



Digital Bolt-On: HDMI

HDMI

