

Service
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Service Manual

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1. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- Chapter 5 added section [Fault Finding](#).

2. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

[2.1 Technical Specifications](#)

[2.2 Directions for Use](#)

[2.3 Connection Overview](#)

[2.4 Chassis Overview](#)

Notes:

- Data below can deviate slightly from the actual situation, 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. Here is product information available, as well as getting started, user manuals, frequently asked questions and software & drivers.

Table 2-1 Described Model Numbers:

Model Number	Styling	Published in
BDL5231V/00		3122 785 18430

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 Connection Overview

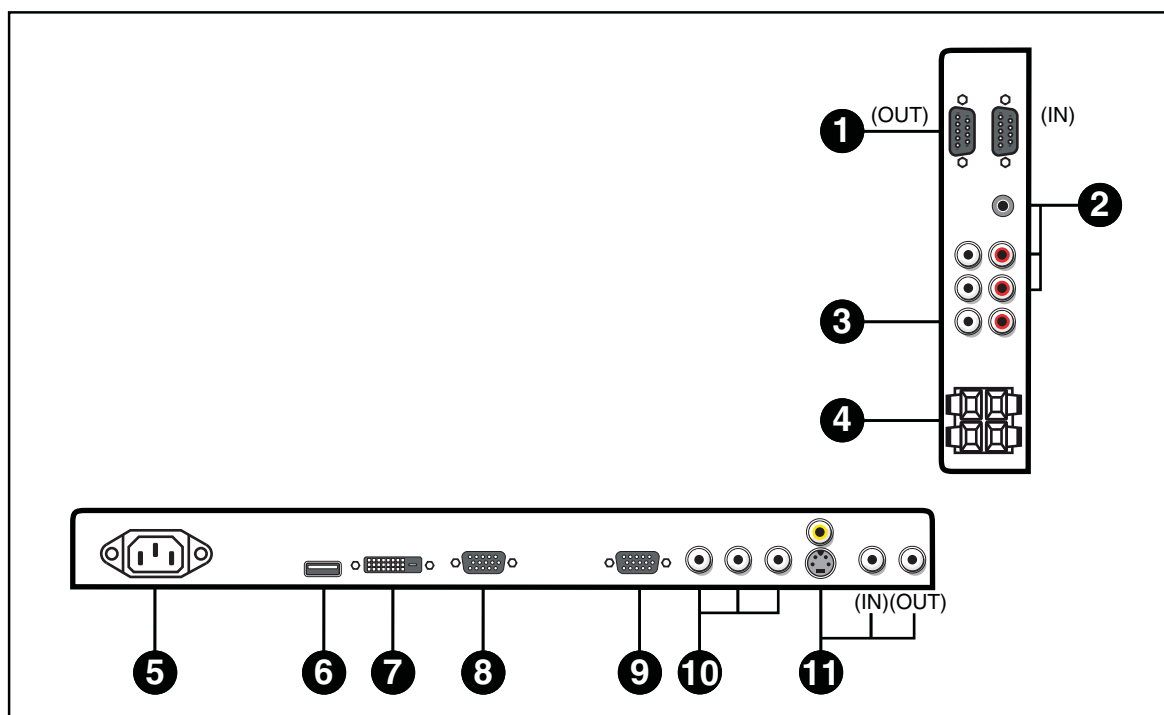
18430_001_090122.eps
090218

Figure 2-1 Rear and Side I/O connections

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

2.3.1 Side Connections

1 - External Control Connector (RS232-UART) Out - In

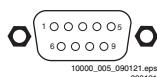


Figure 2-2 9-pin Sub-D Connector

1	- DCD	Carrier Detect	⊕
2	- RxD	Receive	⊕
3	- TxD	Transmit	⊖
4	- DTR	Data Terminal Ready	⊖
5	- Gnd	Ground	⊕
6	- DSR	Data Set Ready	⊕
7	- RTS	Request To Send	⊖
8	- CTS	Clear To Send	⊕
9	- RI	Ring Indicator	⊖

2 - Mini Jack: Audio IN1 - In

Wh	- Audio L	0.5 V _{RMS} / 10 kΩ	⊕
Rd	- Audio R	0.5 V _{RMS} / 10 kΩ	⊖

2 - Cinch: Audio IN 2 & 3 - In

Wh	- Audio L	0.5 V _{RMS} / 10 kΩ	⊕
Rd	- Audio R	0.5 V _{RMS} / 10 kΩ	⊖

3 - Cinch: Audio - Out

Rd	- Audio - R	0.5 V _{RMS} / 10 kΩ	⊕
Wh	- Audio - L	0.5 V _{RMS} / 10 kΩ	⊖

4 - Spring Clip Speaker Connections: Audio - Out

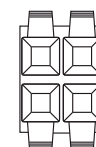
10000_047_090121.eps
090121

Figure 2-3 Spring Clip Speaker Terminals

Bk	- Speaker Left	Gnd	⊕
Rd	- Speaker Left	5 W / 8 Ω	⊖
Bk	- Speaker Right	Gnd	⊕
Rd	- Speaker Right	5 W / 8 Ω	⊖

2.3.2 Rear Connections

5 - IEC C14 MAINS socket - In

10000_048_090126.eps
090126

Figure 2-4 IEC C14 Mains socket

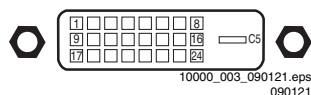
L	- Phase	Power	⊕
E	- Earth	Gnd	⊖
3	- Zero	Power	⊕

6 - HDMI: Digital Video, Digital Audio - In

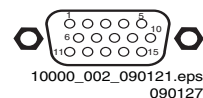
10000_017_090121.eps
090227

Figure 2-5 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	- n.c.	
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

7 - DVI-D: Digital Video - In**Figure 2-6 DVI-D connector**

1	- D2-	
2	- D2+	
3	- Shield	Gnd
4	- D4-	
5	- D4+	
6	- DDC_SCL	DDC clock
7	- DDC_SDA	DDC data
8	- n.c.	
9	- D1-	
10	- D1+	
11	- Shield	Gnd
12	- D3-	
13	- D3+	
14	- +5V	
15	- Ground	Gnd
16	- HPD	Hot Plug Detect
17	- D0-	
18	- D0+	
19	- Shield	Gnd
20	- D5-	
21	- D5+	
22	- Shield	Gnd
23	- CLK+	
24	- CLK-	

8 - VGA RGB 3 & RGB IN: Video RGB - In**Figure 2-7 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

9 - VGA RGB 3 & RGB OUT: Video RGB - Out

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

10 - BNC: Video YPbPr - In

Wh	- Video Y	1 V _{PP} / 75 Ω
Wh	- Video Pb	0.7 V _{PP} / 75 Ω
Wh	- Video Pr	0.7 V _{PP} / 75 Ω

11 - Cinch: Composite Video CVBS - In

Ye	- Video CVBS	1 V _{PP} / 75 Ω
----	--------------	--------------------------

11 - S-Video (Hosiden): Composite 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

11 - BNC: Composite Video CVBS - In

Wh	- Video CVBS	1 V _{PP} / 75 Ω
----	--------------	--------------------------

11 - BNC: Composite Video CVBS - Out

Wh	- Video CVBS	1 V _{PP} / 75 Ω
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2.4 Chassis Overview

Refer to chapter [9. Block Diagrams, Test Point Overview](#) 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. Of de set ontploft!

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.



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
2DNR	Spatial (2D) Noise Reduction
3DNR	Temporal (3D) Noise Reduction
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
ANR	Automatic Noise Reduction: one of the algorithms of Auto TV
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
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
COLUMBUS	COLOR LUMinance Baseband Universal Sub-system
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
DDC	See "E-DDC"

D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz		lines. The fields are written in "pairs", causing line flicker.
DFI	Dynamic Frame Insertion	IR	Infra Red
DFU	Directions For Use: owner's manual	IRQ	Interrupt Request
DMR	Digital Media Reader: card reader	ITU-656	The ITU Radio communication Sector (ITU-R) is a standards body
DMSD	Digital Multi Standard Decoding		subcommittee of the International
DNM	Digital Natural Motion		Telecommunication Union relating to
DNR	Digital Noise Reduction: noise reduction feature of the set		radio communication. ITU-656 (a.k.a. SDI), is a digitized video format used for broadcast grade video.
DRAM	Dynamic RAM		Uncompressed digital component or digital composite signals can be used.
DRM	Digital Rights Management		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.
DSP	Digital Signal Processing		
DST	Dealer Service Tool: special remote control designed for service technicians		
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	ITV	Institutional TeleVision; TV sets for hotels, hospitals etc.
DVB-C	Digital Video Broadcast - Cable	JOP	Jaguar Output Processor
DVB-T	Digital Video Broadcast - Terrestrial	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
DVD	Digital Versatile Disc		Latin America
DVI(-d)	Digital Visual Interface (d= digital only)		Liquid Crystal Display
E-DDC	Enhanced Display Data Channel (VESA standard for communication channel and display). Using E-DDC, the video source can read the EDID information from the display.	LATAM	Light Emitting Diode
EDID	Extended Display Identification Data (VESA standard)	LCD	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
EEPROM	Electrically Erasable and Programmable Read Only Memory	LED	LOcal REGression approximation noise reduction
EMI	Electro Magnetic Interference	L/L'	LG.Philips LCD (supplier)
EPLD	Erasable Programmable Logic Device		Loudspeaker
EU	Europe	LORE	Low Voltage Differential Signalling
EXT	EXternal (source), entering the set by SCART or by cinches (jacks)	LPL	Mega bits per second
FBL	Fast BLanking: DC signal accompanying RGB signals	LS	Monochrome TV system. Sound carrier distance is 4.5 MHz
FDS	Full Dual Screen (same as FDW)	LVDS	Microprocessor without Interlocked Pipeline-Stages; A RISC-based microprocessor
FDW	Full Dual Window (same as FDS)	Mbps	Matrix Output Processor
FLASH	FLASH memory	M/N	Metal Oxide Silicon Field Effect Transistor, switching device
FM	Field Memory or Frequency Modulation	MIPS	Motion Pictures Experts Group
FPGA	Field-Programmable Gate Array		Multi Platform InterFace
FTV	Flat TeleVision	MOP	MUTE Line
Gb/s	Giga bits per second	MOSFET	Not Connected
G-TXT	Green TeleteXT		Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
H	H_sync to the module	MPEG	Negative Temperature Coefficient, non-linear resistor
HD	High Definition	MPIF	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)
HDD	Hard Disk Drive	MUTE	Non-Volatile Memory: IC containing TV related data such as alignments
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.	NC	Open Circuit
HDMI	High Definition Multimedia Interface	NICAM	On Screen Display
HP	HeadPhone		On screen display Teletext and Control; also called Artistic (SAA5800)
I	Monochrome TV system. Sound carrier distance is 6.0 MHz	NTC	Project 50: communication protocol between TV and peripherals
I ² C	Inter IC bus	NTSC	Phase Alternating Line. Color system mainly used in West Europe (color carrier= 4.433619 MHz) and South America (color carrier PAL M=
I ² D	Inter IC Data bus		
I ² S	Inter IC Sound bus	NVM	
IF	Intermediate Frequency	O/C	
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of	OSD	
		OTC	
		P50	
		PAL	

	3.575612 MHz and PAL N= 3.582056 MHz)	THD	Total Harmonic Distortion
PCB	Printed Circuit Board (same as "PWB")	TMDs	Transmission Minimized Differential Signalling
PCM	Pulse Code Modulation	TXT	TeleteXT
PDP	Plasma Display Panel	TXT-DW	Dual Window with TeleteXT
PFC	Power Factor Corrector (or Pre-conditioner)	UI	User Interface
PIP	Picture In Picture	uP	Microprocessor
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency	UXGA	1600x1200 (4:3)
		V	V-sync to the module
POD	Point Of Deployment: a removable CAM module, implementing the CA system for a host (e.g. a TV-set)	VCR	Video Cassette Recorder
		VESA	Video Electronics Standards Association
POR	Power On Reset, signal to reset the uP	VGA	640x480 (4:3)
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.	VL	Variable Level out: processed audio output toward external amplifier
		VSb	Vestigial Side Band; modulation method
PTC	Positive Temperature Coefficient, non-linear resistor	WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
PWB	Printed Wiring Board (same as "PCB")	WXGA	1280x768 (15:9)
PWM	Pulse Width Modulation	XTAL	Quartz crystal
QRC	Quasi Resonant Converter	XGA	1024x768 (4:3)
QTNr	Quality Temporal Noise Reduction	Y	Luminance signal
QVCP	Quality Video Composition Processor	Y/C	Luminance (Y) and Chrominance (C) signal
RAM	Random Access Memory	YPbPr	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
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.	YUV	Component video
RC	Remote Control		
RC5 / RC6	Signal protocol from the remote control receiver		
RESET	RESET signal		
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		
STBY	STand-BY		
SVGA	800x600 (4:3)		
SVHS	Super Video Home System		
SW	Software		
SWAN	Spatial temporal Weighted Averaging Noise reduction		
SXGA	1280x1024		
TFT	Thin Film Transistor		

4. Mechanical Instructions

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- [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.
- Follow the disassembly instructions in the described order.

4.1 Cable Dressing



18430_100_090206.eps
090206

Figure 4-1 Cable dressing

4.2 Service Positions

When moving or laying down an LCD set, at least two people should handle the set. Avoid any impact towards the LCD set. For easy servicing of this set, it must be placed screen down on Foam bars (created for Service).

4.2.1 Foam Bars

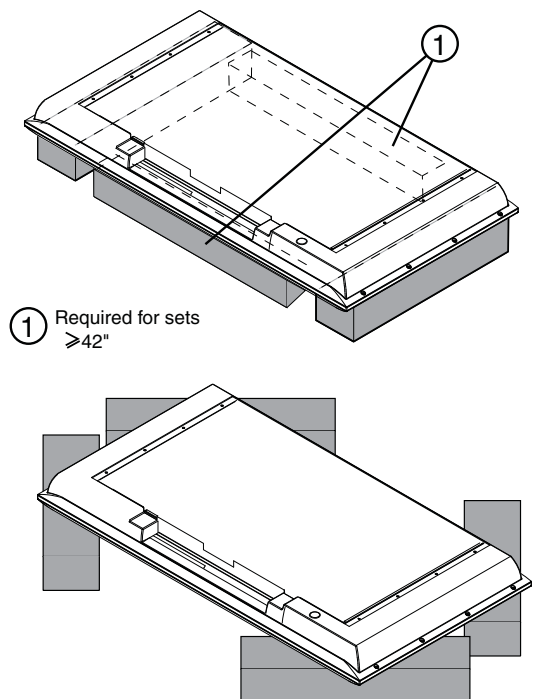
The foam bars (order code 3122 785 90580 for two pieces) can be used for all types and sizes of Flat TVs. See [Figure 4-2](#) for details. Sets with a display of 42" and larger, require **four** foam bars [1]. Ensure that the foam bars are always supporting the cabinet and **never** only the display. **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

4.3.1 Stands

For this set separately orderable stands are available. Remove the stands before opening the set.



10000_018_090121.eps
090121

Figure 4-2 Foam bars

4.3.2 Rear Cover

Warning: Disconnect the mains power cord before you open the set.

1. Place the set in the service position, see [Service Positions](#).
2. Remove the fixing screws from the handles and remove the handles.
3. Remove all screws from the rear cover.
4. Lift the rear cover from the cabinet.

4.3.3 Front Cover

Before removing the front cover the rear cover should already be removed.

1. Put the set with the back down on a flat table.
2. Remove all screws that secure the front cover.
3. Gently lift the cover from the set.

4.3.4 Temperature Sensor Panel

1. Place the set in the service position, see [Service Positions](#).
 2. Disconnect the connector from the panel.
 3. Remove the fixation screws and take out the board.
- When defective, replace the whole unit.

4.3.5 Fan

1. Place the set in the service position, see [Service Positions](#).
2. Disconnect the respective connector from the SSB.
3. Remove the fan brackets fixation screws.
4. Take out the bracket with the fan.
5. Remove the fixation screws from the fan and take the fan out of the bracket.

When defective, replace the fan.

4.3.6 LED / IR Panel

1. Place the set in the service position, see [Service Positions](#).
 2. Disconnect the connector from the rear of the panel.
 3. Remove the fixation screws and take out the board.
- When defective, replace the whole unit.

4.3.7 Keyboard Control Panel

1. Place the set in the service position, see [Service Positions](#).
 2. Remove the fixation screws that hold the keyboard control panel.
 3. Take out the panel assembly and release the connector.
- When defective, replace the whole unit.

4.3.8 Power Supply Switch

1. Place the set in the service position, see [Service Positions](#).
 2. Now the clips that hold the power switch can be released via the backside of the switch.
- When defective, replace the whole unit.

4.3.9 Main Supply Panel

1. Place the set in the service position, see [Service Positions](#).
 2. Unplug connectors.
 3. Remove the grounding screw and cable.
 4. Remove the all other fixation screws.
 5. Take the board out.
- When defective, replace the whole unit.

4.3.10 Speakers

1. Place the set in the service position, see [Service Positions](#).
2. Unplug the respective speaker connector from the SSB.
3. Release the wiring.
4. Remove the fixation screws that hold the speaker and take it from the set.

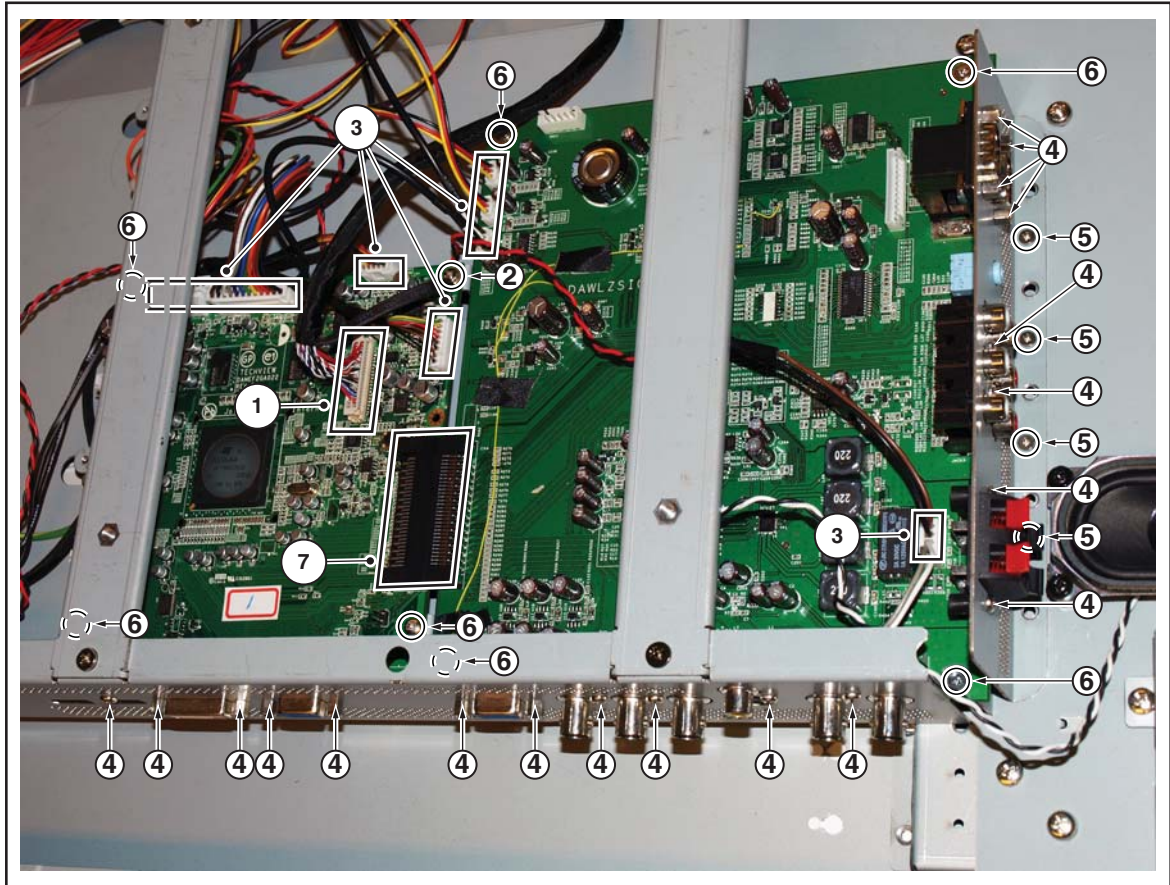
When defective, replace the whole unit.

4.3.11 Small Signal Board (SSB)

The SSB is split in two parts connected by a 60 pin connector. The main small SSB and the bigger extension board. See [Figure 4-3](#).

1. **Do NOT forget** to unplug the LVDS connector [1] from the SSB. **Important:** Be careful, as this is a very fragile connector!
2. Remove the screw [2] securing and grounding the LVDS cable.

3. Unplug the other connectors [3] from the SSB.
 4. Remove all screws [4] securing the SSB connectors.
 5. Remove all screws [5] securing the rim and take it out.
 6. Remove all other screws [6].
 7. Release connector [7] that interconnects the SSB with the extension board.
 8. Lift out the SSB and the extension board separately.
- When defective, replace either the SSB or extension board.

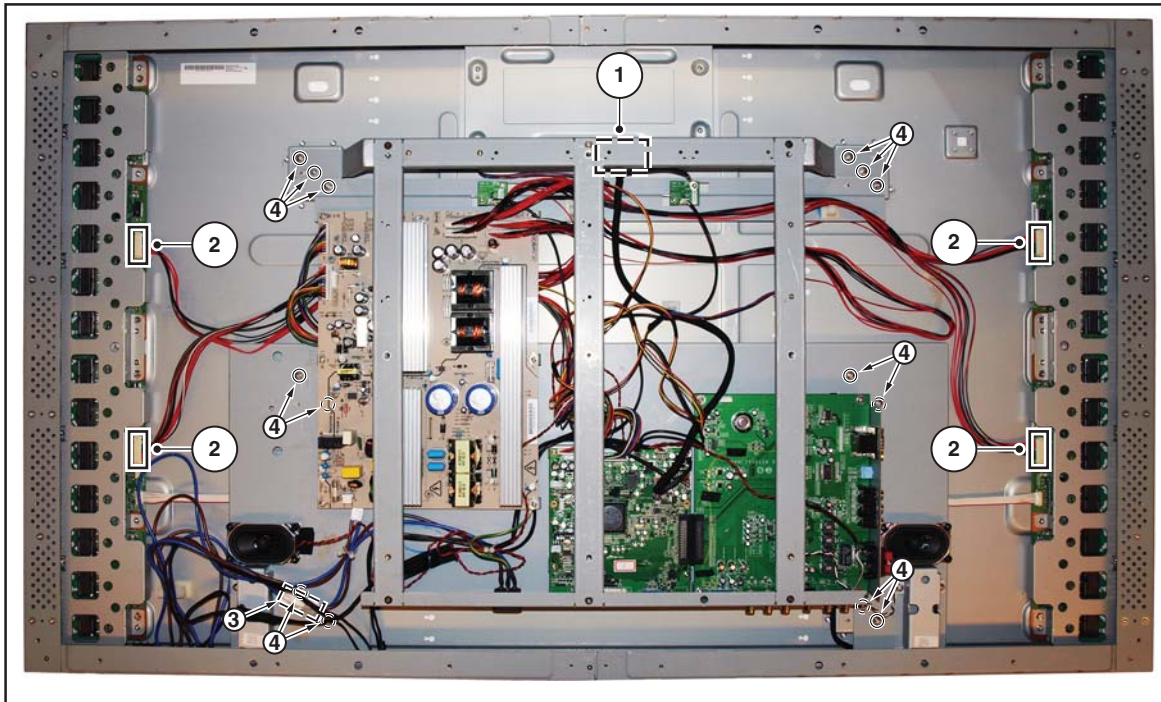


18430_101_090211.eps
090211

Figure 4-3 SSB removal

4.3.12 LCD Panel

Important: Be sure to work in a dust free environment during the following activities. In addition, the use of (fabric) hand gloves is advised.



18430_102_090211.eps.eps
090211

Figure 4-4 LCD panel disassembly

1. First remove front cover, back cover as described earlier.
2. Place the set in the service position, see [Service Positions](#).
3. Remove the PSU as described earlier.
4. **Do NOT forget** to unplug the LVDS connector [1] from the SSB. **Important:** Be careful, as this is a very fragile connector!
5. Unplug the connectors from the backlight inverters [2].
6. Release connector [3] to the main power switch.
7. Release the cabling to the keyboard and the IR/LED panel.
8. Now remove all screws at the side of the surrounding rims.
9. Gently remove the rims.
10. Remove the screws [4].
11. Now gently lift the complete subframe from the LCD panel. When defective, replace the whole unit.

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 4-1](#).

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

[5.1 Compatibility Mode](#)

[5.2 Service Mode](#)

[5.3 Fault Finding](#)

AV over scan: 5~9%

HDMI over scan: No over scan for PC input, 5~9% for video source.

PC: No over scan

5.1 Compatibility Mode

This chassis does not contain specific test points, since all defective boards should be replaced.

Perform measurements under the following conditions:

- Environmental: $t_{env} = 25 \pm 2^{\circ}\text{C}$, RH = $65 \pm 10\%$
- Service signal: 100% Full White signal

This monitor saves all previously made settings, unless separately made user settings override this. All timings must be properly phased, sized and centred. The aspect ratio is depending on the input signal scaled and centred. At full screen the input timing is set to completely fill the screen, regards less of scaling artifacts.

5.1.1 Overscan

Component over scan: 5~8%

5.1.3 Compatibility

5.1.2 Display Processor performance

The display processor performance (excluding scaling artifacts) has to be judged according to the following definitions:

- Compatibility mode: correctly recognizes the proper resolution and applies the correct display scaling to the image (i.e. a 1280×768 signal is properly recognized).
- Properly sized/centred: The entire image (use display mate "side tics" pattern) perfectly fits the screen. Even one pixel off in horizontal or vertical direction, makes this test fail.
- Properly phased: The display processor automatically computes the correct A/D response so that a Win98 shutdown or all display mate moire patterns are correctly displayed. Most critical on the panels native mode, no unstableness of the image may be observed.
- HD compatibility: All HD timings have to work through YPbPr, HDMI, and RGB.

Resolution	Refresh Rate (Hz)	Horizontal frequency	Pixel Frequency	Aspect Ratio Handling							
				Full Screen	Aspect Ratio	Composite	SVHS	YPbPr	RGB	HDMI	DVI
720 × 400	85	37.9 kHz	35.500 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
640 × 480	60	31.5 kHz	25.175 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
640 × 480	72	37.9 kHz	31.500 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
640 × 480	75	37.5 kHz	31.500 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
800 × 600	56	35.1 kHz	36.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
800 × 600	60	37.9 kHz	40.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
800 × 600	72	48.1 kHz	50.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
800 × 600	75	46.9 kHz	49.500 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
848 × 480	60	31.0 kHz	33.750 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1024 × 768	60	48.4 kHz	65.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1024 × 768	70	56.5 kHz	75.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1024 × 768	75	60.0 kHz	78.750 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1152 × 864	75	67.5 kHz	108.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1280 × 768	60	47.4 kHz	68.250 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1280 × 768	60	47.8 kHz	79.500 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1280 × 768	75	60.3 kHz	102.250 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1280 × 800	60	49.3 kHz	68.250 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1280 × 800	60	49.7 kHz	79.500 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1280 × 800	75	62.8 kHz	106.500 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1280 × 960	60	60.0 kHz	108.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1280 × 1024	60	64.0 kHz	108.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1280 × 1024	75	80.0 kHz	135.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1360 × 768	60	47.7 kHz	85.500 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1366 × 768	60	47.7 kHz	85.500 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1400 × 1050	60	64.7 kHz	101.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1440 × 900	60	55.5 kHz	88.750 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1200 × 1600	60	75.0 kHz	162.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1920 × 1080	60	67.5 kHz	148.500 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
1920 × 1200	60	74.0 kHz	154.000 MHz	1920 × 1080	16 : 9	No	No	No	Yes	Yes	Yes
480i	60	60 Hz	SD NTSC	1920 × 1080	16 : 9	Yes	Yes	Yes	No	Yes	No
480p	60	60 Hz	ED	1920 × 1080	16 : 9	Yes	No	Yes	No	Yes	No
576i	50	50 Hz	SD PAL	1920 × 1080	16 : 9	Yes	Yes	Yes	No	Yes	No
576p	50	50 Hz	ED	1920 × 1080	16 : 9	Yes	No	Yes	No	Yes	No
720p	50	50 Hz	HD progressive	1920 × 1080	16 : 9	Yes	No	Yes	No	Yes	No
720p	60	60 Hz	HD progressive	1920 × 1080	16 : 9	Yes	No	Yes	No	Yes	No
1080i	50	50 Hz	HD interlaced	1920 × 1080	16 : 9	Yes	No	Yes	No	Yes	No
1080i	60	60 Hz	HD interlaced	1920 × 1080	16 : 9	Yes	No	Yes	No	Yes	No
1080p	50	50 Hz	Full HD	1920 × 1080	16 : 9	Yes	No	Yes	No	Yes	No
1080p	60	60 Hz	Full HD	1920 × 1080	16 : 9	Yes	No	Yes	No	Yes	No

5.2 Service Mode

5.2.1 Factory Mode

There are two ways to enter the factory mode:

1. On the set:
- Push the ▼ button and turn on the AC power.
2. With the remote control:
- Turn on the set and provide a signal source on an input (this to prevent to enter the power save mode). On the remote control press “-”, “-”, “+”, “+”, “-”, “+”, “-”, “+”, “SET”, “MENU”.
 - Please note that this set does not respond on the standard Philips remote controllers, but only responds to the with the set supplied remote control.

- When in the factory mode at the top right of the menu an “F” is displayed.
- To exit the factory mode turn off the set.



Figure 5-1 Remote control.

5.3 Fault Finding

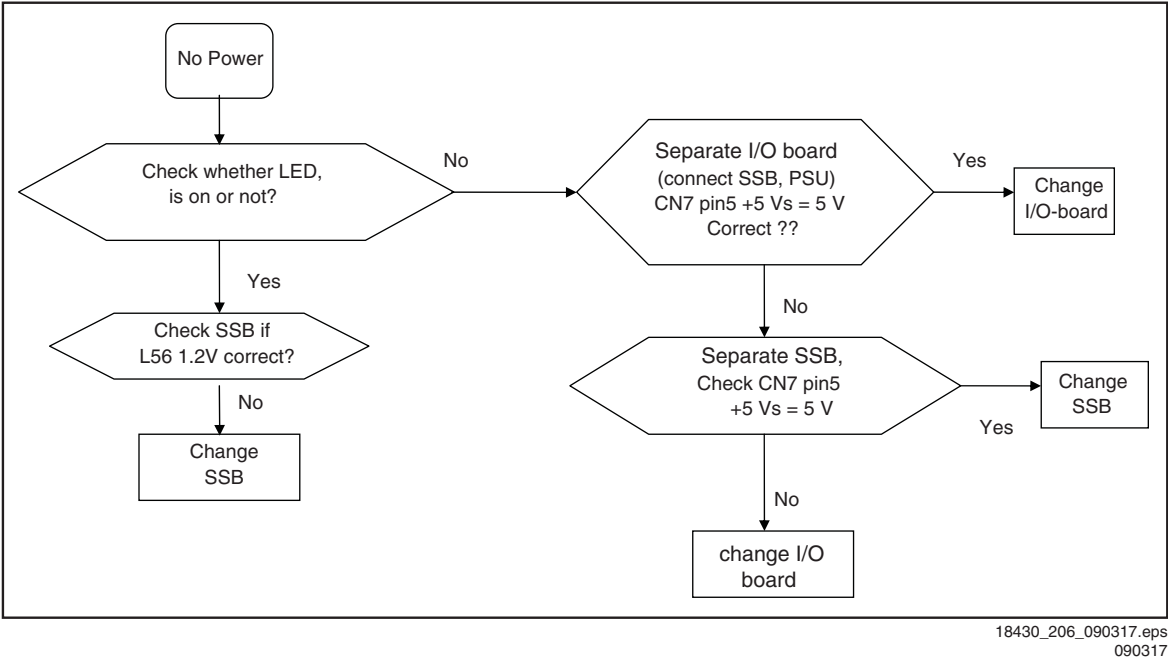


Figure 5-2 No power.

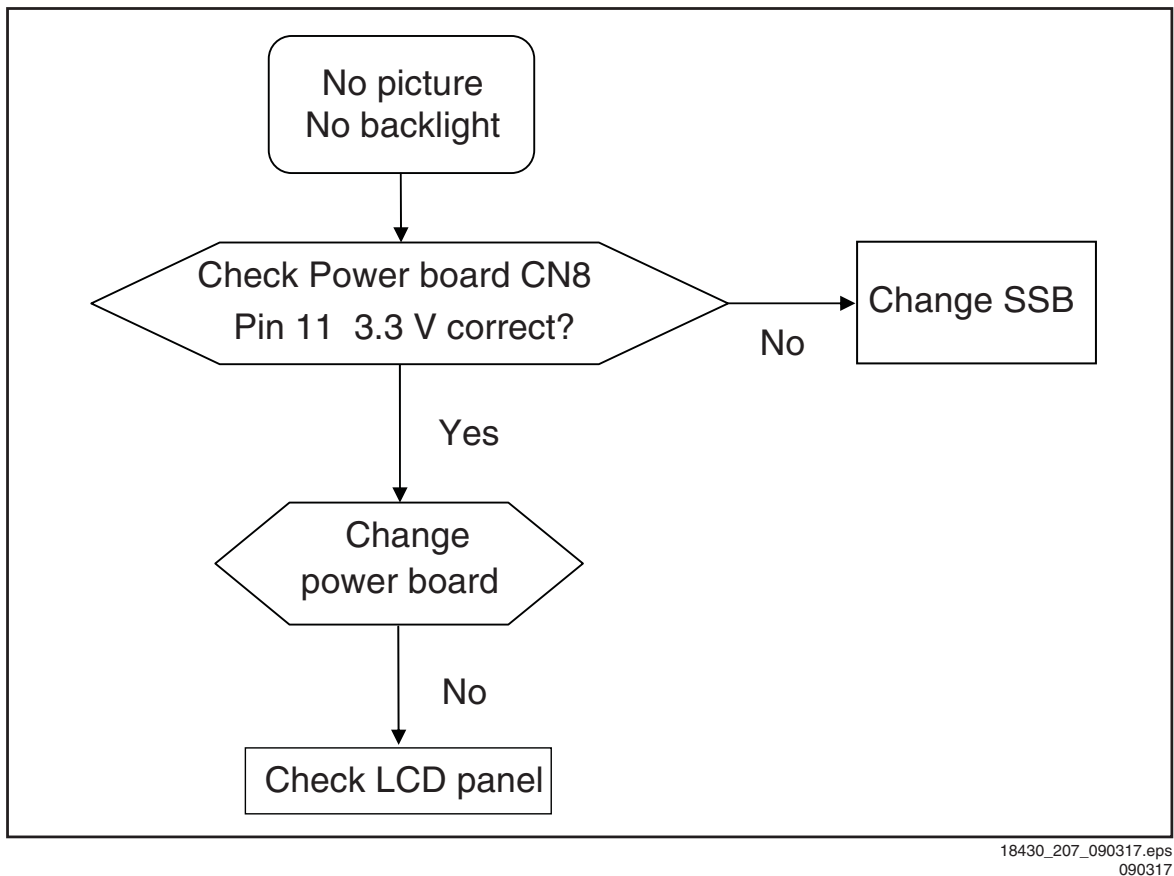


Figure 5-3 No picture, No backlight.

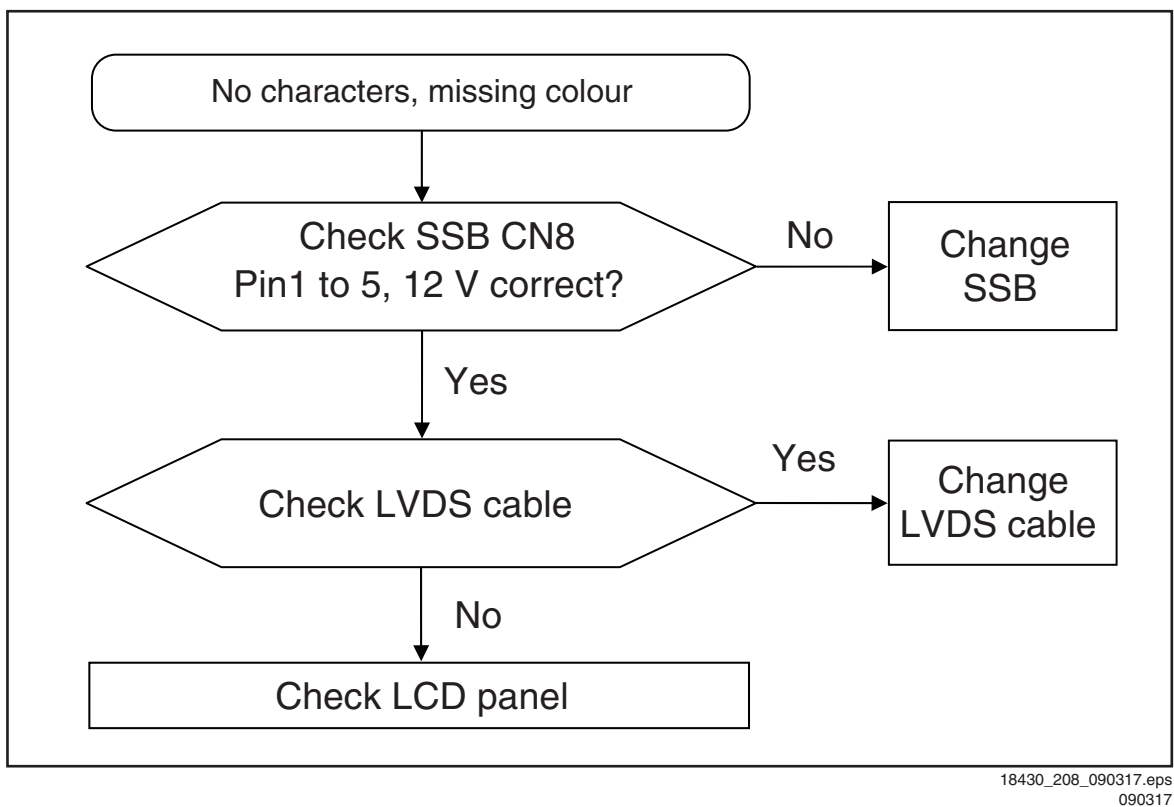


Figure 5-4 No characters, missing colour.

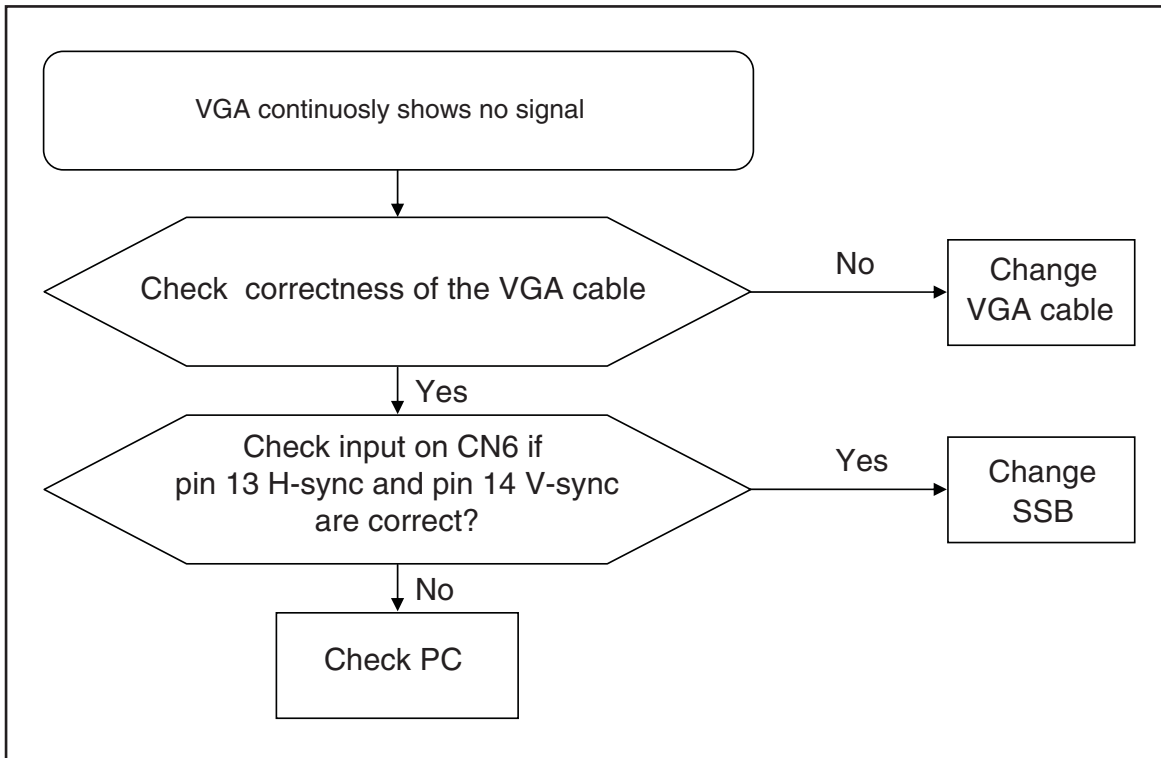


Figure 5-5 VGA continuously shows no signal.

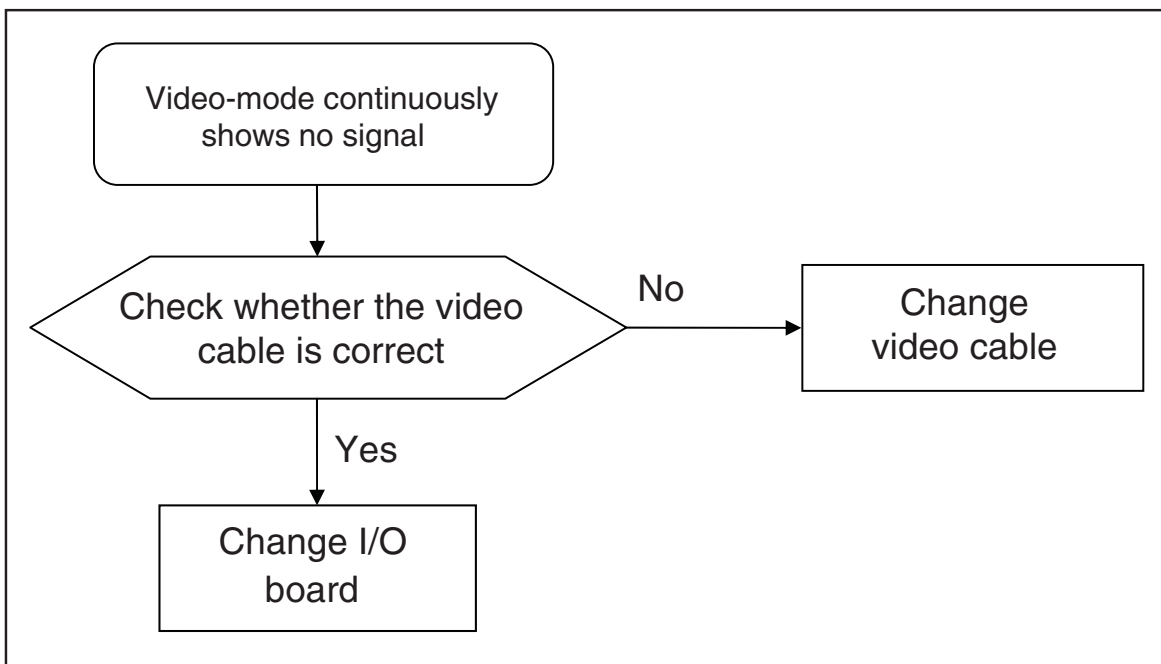


Figure 5-6 Video-mode continuously shows no signal.

6. Alignments

Index of this chapter:

[6.1 General Alignment Conditions](#)

[6.2 Hardware Alignments](#)

[6.3 Software Alignments](#)

[6.4 Option Settings](#)

[6.5 Software upgrade](#)

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 25 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: R_i > 10 MΩ, C_i < 20 pF.
- Use an isolated trimmer/screwdriver to perform alignments.

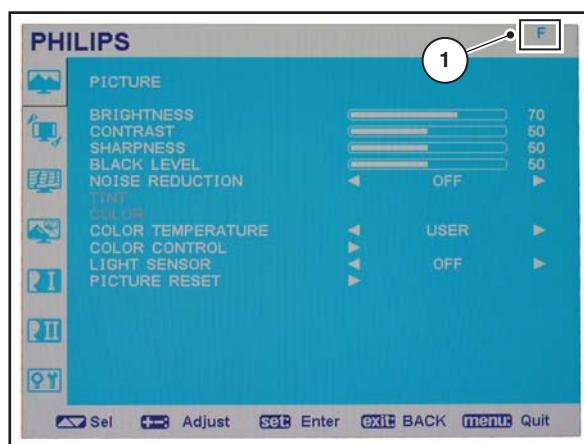
6.2 Hardware Alignments

This chassis does not contain any hardware alignments.

6.3 Software Alignments

Refer to [Figure 6-1](#) for details.

Put the set in the Factory mode see section [Factory Mode](#). The "F" [1] in the picture menu indicates the set is in factory mode. Use the navigation keys to browse through the menu. Note that even when in Factory mode, no icon for the Factory Setting defaults is shown.



18430_201_090212.eps
090212

Figure 6-1 Factory Mode Indication

6.3.1 Picture defaults

Setting	Range	Default value
Brightness	0 to 100	70
Contrast	0 to 100	50

Setting	Range	Default value
Sharpness	0 to 100	50
Black level	0 to 100	50
Noise reduction	-	OFF
Tint	0 to 100	50
Color	0 to 100	50
Color temperature		9300 K
Color control	Submenu	-
Light sensor	-	OFF
Picture reset	Submenu	-

Color control

Setting	Range	Default value
User R	0 to 255	128
User G	0 to 255	128
User B	0 to 255	128

Picture reset

Setting	Range	Default value
Picture reset	Yes/No	No

6.3.2 Screen defaults

Setting	Range	Default value
H position	0 to 100	50
V position	0 to 100	50
Clock	0 to 100	20
Clock phase	0 to 100	0
Zoom mode	Full, Real, Custom, Normal	Full
Custom zoom	Submenu	-
Screen reset	Submenu	-

Custom zoom

Setting	Range	Default value
Zoom	0-100	0
H zoom	0-100	0
V zoom	0-100	0
H position	0-100	50
V position	0-100	50

Screen reset

Setting	Range	Default value
Screen reset	Yes/No	No

6.3.3 Audio defaults

Setting	Range	Default value
Balance	0 to 100	50
Treble	0 to 100	50
Bass	0 to 100	50
Speaker	Internal/External	Internal
Audio reset	Submenu	-

Audio reset

Setting	Range	Default value
Audio reset	Yes/No	No

6.3.4 PIP defaults

Setting	Range	Default value
PIP size	Small, Middle, Large	Small
PIP audio	Main, Sub	Main
PIP reset	Submenu	-

PIP reset

Setting	Range	Default value
PIP reset	Yes/No	No

6.3.5 Configuration 1 defaults

Setting	Range	Default value
Auto adjust	Submenu	-
Power save	Submenu	-
Language	en, de, ru, cn, pl, fr, it, es, tr	English
Panel saving	Submenu	-
Color system	-	N/A
Configuration reset	Submenu	-
Factory reset	Submenu	-

Auto adjust

Setting	Range	Default value
Auto adjust	-	N/A

Power save

Setting	Range	Default value
RGB	On/Off	Off
Video	On/Off	Off

Panel saving

Setting	Range	Default value
Cooling fan	Auto, On	Auto
Brightness	On/Off	Off
Pixel Shift	On/10-900	Off

Configuration reset

Setting	Range	Default value
Configuration reset	Yes/No	No

Factory reset

Setting	Range	Default value
Factory reset	Yes/No	No

6.3.6 Configuration 2 defaults

Setting	Range	Default value
OSD turn off	0 to 120	50
Information OSD	1 to 10 sec / Off	10 sec
Sleep timer	1 to 24 hrs. / Off	Off
OSD H position	0 to 100	50
OSD V position	0 to 100	50
Flip OSD	On/Off	Off
Monitor information	Submenu	-

Monitor information

Setting	Range	Default value
Model name	-	Type number
Serial no	-	Serial number
Operating hours	-	Operating hours
SW version	-	Software version

6.3.7 Advanced option defaults

Setting	Range	Default value
Input resolution	Auto	Auto
Black level expansion	-	-
Gamma selection	Native, 2.2, 2.4, S gamma	Native
Scan mode	-	Overscan
Scan conversion	-	Progressive
Film mode	-	Auto
IR control	Submenu	-
Keyboard control	Submenu	-
Tiling	Submenu	-
Heat status	Submenu	-
Date and time	Submenu	-
Schedule	Submenu	-
Monitor ID	Submenu	-
DDC/CI	On/off	On
Smart power	Off/Medium/High	Off
Advanced option reset	Submenu	-

IR control

Setting	Range	Default value
IR control	Normal, Primary, Secondary, Lock	Normal

Keyboard control

Setting	Range	Default value
Keyboard control	Lock/Unlock	Unlock

Tiling

Setting	Range	Default value
H monitors	1-5	1
V monitors	1-5	1
Position	1-25	1
Frame comp.	No/Yes	No
Enable	No/Yes	No

Heat status

Setting	Range	Default value
Cooling fan 1	On/Off	-
V monitors	1-5	-
Temperature sensor 1	-	-
Temperature sensor 2	-	-

Date and time

Setting	Range	Default value
Year	2000/2099	2000
Month	01-12	01
Day	01-31	01
Hour	00-23	00
Minute	00-59	00
Daylight saving time	On/off	Off

Schedule

Setting	Range	Default value
Schedule setting by user	-	-

Monitor ID

Setting	Range	Default value
Monitor ID	-	1

DDC/CI

Setting	Range	Default value
DDC/CI	On/Off	On

Smart power

Setting	Range	Default value
Smart power	Medium/ High/Off	Off

Advanced option reset

Setting	Range	Default value
Advanced option reset	Yes/No	No

6.3.8 Factory Setting defaults

Remark: The entry for the factory setting is not visible, but is located below the Advanced option menu. This menu is only available when the set is in factory mode.

Setting	Range	Default value
Burn in	On/off (see note 1)	Off
Hours running	Submenu	-
Factory reset	Submenu	-
ADC adjust	Submenu	-
Brightness	Submenu	-
Color temperature	Submenu	-
Input timing	Submenu	-
Baud rate	2400, 4800, 9600, 19200, 38400, 57600, 115200	9600
EDID write protect	On/off	On
ISP mode	On/Off	Off
OSD display	On/off	On
Frame lock	On/off	On
DDR control	Submenu	N/A
Version	Submenu	-
SSC	Submenu	N/A

Note:

1. This function turns enables a monitor to burn in without an input signal by showing the following burn in pattern cycle: white, black, red, green, blue.

Hours running

Setting	Resetable	Default value
Resetable on	Yes	Monitor power on time
Unresetable on	No	monitor power on time

Factory reset

Setting	Range	Default value
Factory reset	Yes/No	No

ADC adjust

Setting	Range	Default value
D sub ADC adjust	Submenu	-
BNC ADC adjust	Submenu	-
YPbPr ADC adjust	Submenu	-
Video ADC adjust	Submenu	-

Dsub ADC adjust

Setting	Range	Default value
Auto setup	-	-
ADC R-gain	0-255	255
ADC G-gain	0-255	255
ADC B-gain	0-255	255
ADC R-offset	0-255	96
ADC G-offset	0-255	91
ADC B-offset	0-255	92

BNC ADC adjust

Setting	Range	Default value
Auto setup	-	-
ADC R-gain	0-255	255
ADC G-gain	0-255	255
ADC B-gain	0-255	255
ADC R-offset	0-255	96
ADC G-offset	0-255	91
ADC B-offset	0-255	92

YPbPr ADC adjust

Setting	Range	Default value
Auto setup	-	-
ADC R-gain	0-255	255
ADC G-gain	0-255	255
ADC B-gain	0-255	255
ADC R-offset	0-255	96
ADC G-offset	0-255	91
ADC B-offset	0-255	92

Video ADC adjust

Setting	Range	Default value
Auto setup	-	-
Y-gain	0-2048	1024
Y-offset	0-255	0
Color	0-2048	1024
IRE	0-255	0

ADC alignment for ANALOG inputs

1. Enter the Factory mode as described in section [Factory Mode](#).
2. Enter the Factory Setting defaults.
3. Go to item "ADC ADJUST".
4. Select proper input to adjust.
5. Select "AUTO SETUP" and press "SET".
6. ADC is aligned.

Brightness

Setting	Range	Default value
PC max brightness	0 to 255	255
PC min brightness	0 to 255	0
Video max brightness	0 to 255	255
Video min brightness	0 to 255	0

Color temperature

Setting	Range	Default value
Color temperature	5000K, 6500K, 7500K, 9300K, 10000K, 11000K	11000K
R-gain	0 to 255	128
G-gain	0 to 255	128
B-gain	0 to 255	128
R-offset	0 to 50	0
G-offset	0 to 50	0
B-offset	0 to 50	0

Input timing

Setting	Range	Default value
HDMI input	Auto, Video, PC	Auto
DVI-D input	Auto, Video, PC	Auto
PC-A input	Auto, Video, PC	Auto

DDR control

Setting	Range	Default value
Write T0	0-255	0
Read T0 even	0-255	0
Read T0 odd	0-255	0
Write T1	0-255	0
Read T1 even	0-255	0
Read T1 odd	0-255	0
Write T2	0-255	0
Read T2 even	0-255	0
Read T2 odd	0-255	0
Write T3	0-255	0
Read T3 even	0-255	0
Read T3 odd	0-255	0

Version

Setting	Range	Default value
Version ID	-	-

SSC

Setting	Range	Default value
DRAMCLK	Submenu	-
AUDDS1	Submenu	-
AUDDS2	Submenu	-
AUDDS3	Submenu	-
AUDDS4	Submenu	-
DDDS	Submenu	-
VDDS1	Submenu	-
VDDS2	Submenu	-

DRAMCLK

Setting	Range	Default value
On/Off	On/Off	Off
Amplitude	0-127	0
Period	0-31	0

AUDDS1

Setting	Range	Default value
On/Off	On/Off	Off
Amplitude	0-3	0
Period	0-63	0

AUDDS2

Setting	Range	Default value
On/Off	On/Off	Off
Amplitude	0-3	0
Period	0-63	0

AUDDS3

Setting	Range	Default value
On/Off	On/Off	Off
Amplitude	0-255	0
Period	0-255	0

AUDDS4

Setting	Range	Default value
On/Off	On/Off	Off
Amplitude	0-255	0
Period	0-255	0

DDDS

Setting	Range	Default value
On/Off	On/Off	On
Amplitude	0-255	3
Period	0-255	6

VDDS1

Setting	Range	Default value
On/Off	On/Off	Off
Amplitude	0-255	0
Period	0-255	0

VDDS2

Setting	Range	Default value
On/Off	On/Off	Off
Amplitude	0-255	0
Period	0-255	0

6.4 Option Settings

Not applicable.

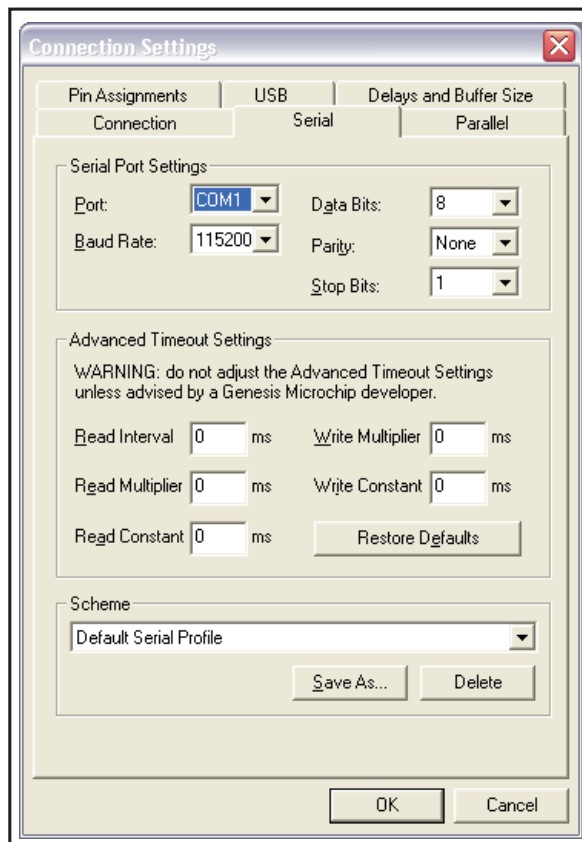
6.5 Software upgrade

6.5.1 Hardware

Connect the cable of RS232 with PC COM port by jump wire.

6.5.2 Software

1. Install the Serial upgrade program *GProbe5.1.0.17.EXE* on a PC and run it.
2. Check "Options", "Connection settings", "Serial", "Port" and "Baud Rate", see [Figure 6-2](#).
3. Make a directory called ISP on e.g. C-drive and copy the files, see [Figure 6-3](#).
4. The latest Firmware file must be renamed into: "fli326xxBx_rd2_32626_board_ext.hex".
5. In the "Execute" field enter: "batch D:\ISP\isp_spi_ext_Sequoia.txt".
6. Put the set in the Factory mode, see section [Factory Mode](#).
7. Press UP on the remote control to enter Factory Setting defaults and set the ISP MODE to ON.
8. Click the Execute button in the GProbe program, see [Figure 6-4](#).
9. Erasing and programming will start, see [Figure 6-5](#).
10. Monitor will show a black screen. When ready (see GProbe command window) the monitor will show picture again, see [Figure 6-5](#).



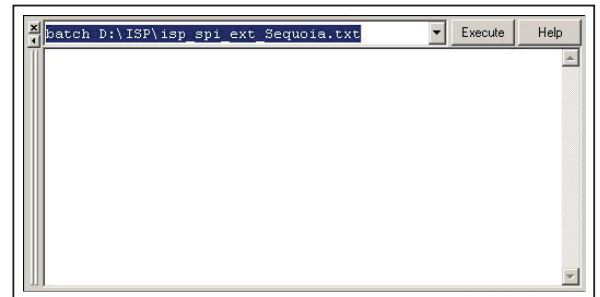
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Figure 6-2 Gprobe connection setup



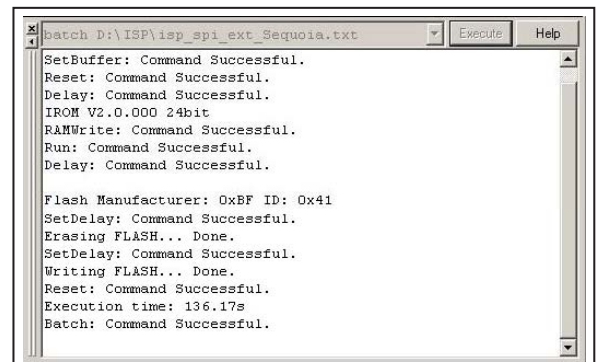
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Figure 6-3 File names



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Figure 6-4 Gprobe Execute



18430_205_090213.eps
090213

Figure 6-5 Gprobe Erasing and programming

7. Circuit Descriptions

Index of this chapter:

- [7.1 ST FLI32626H Single-chip enhanced TV](#)
- [7.2 Fairchild NC7SB3157 Low-Voltage SPDT Analog Switch](#)
- [7.3 Microchip 24LC64](#)
- [7.4 NXP PCA9555 16-bit I²C and SMBus I/O port with interrupt](#)
- [7.5 Diodes Inc. AP1117 1A Low dropout positive regulator](#)
- [7.6 NSC LM1881 Video Sync Separator](#)
- [7.7 Pericom PI5V331 Video Mux/DeMux](#)
- [7.8 JRC NJW1141 Audio Processor](#)
- [7.9 ST TL062 Low power J-FET dual op-amp](#)
- [7.10 YAMAHA YDA148 Audio Amplifier](#)
- [7.11 Sipex SP3243 RS-232 transceiver](#)
- [7.12 Intersil ISL29010 Light-to-Digital output sensor](#)

7.1 ST FLI32626H Single-chip enhanced TV

The FLI32626H is an innovative System-on-Chip (SoC) controller designed for flat panel display TVs, LCD TVs, and other emerging digital display applications. The FLI32626H handles video and computer graphics inputs in virtually any format and resolution. The output port delivers unparalleled image quality and supports display resolutions of up to 1080p. It has a rich feature set and high level of integration. Its sophisticated technologies for colour management, scaling, video processing, and audio processing make the FLI32626H the ideal solution for a high-quality, cost-effective, integrated TV solution. The FLI32626H IC offers a high integration SoC solution for advanced analog TV dual channel applications (e.g. PIP) and for TV products that require superior video and audio quality with extensive feature sets. The FLI32626H includes a flexible analog and digital front-end with a wide range of integrated components for different application needs as well as state-of-the-art dual channel video processing based on renowned Faroudja technologies. The FLI32626H is the only device needed for a complete LCD TV solution chassis supporting worldwide video and audio standards where exceptional quality is required. For regional variations, only connector and firmware changes are needed.

7.2 Fairchild NC7SB3157 Low-Voltage SPDT Analog Switch

The NC7SB3157 / FSA3157 is a high-performance, single-pole / double-throw (SPDT) analog switch or 2:1 multiplexer / demultiplexer bus switch. The device is fabricated with advanced sub-micron CMOS technology to achieve high-speed enable and disable times and low on resistance. The break-before-make select circuitry prevents disruption of signals on the B Port due to both switches temporarily being enabled during select pin switching. The device is specified to operate over the 1.65 to 5.5V VCC operating range. The control input tolerates voltages up to 5.5V, independent of the VCC operating range.

7.3 Microchip 24LC64

The Microchip Technology Inc. 24AA64/24LC64 (24XX64*) is a 64 Kbit Electrically Erasable PROM. The device is organized as eight blocks of 1K x 8-bit memory with a 2-wire serial interface. Low voltage design permits operation down to 1.8V with standby and active currents of only 1 μ A and 1 mA respectively. It has been developed for advanced, low power applications such as personal communications or data acquisition. The 24XX64 also has a page-write capability for up to 32 bytes of data. Functional address lines allow up to eight devices on the same bus, for up to 512 Kbits address space.

7.4 NXP PCA9555 16-bit I²C and SMBus I/O port with interrupt

The PCA9555 consist of two 8-bit Configuration (Input or Output selection); Input, Output and Polarity inversion (Active high or Active low operation) registers. The system master can enable the I/Os as either inputs or outputs by writing to the I/O configuration bits. The data for each Input or Output is kept in the corresponding Input or Output register. The polarity of the read register can be inverted with the Polarity Inversion Register. All registers can be read by the system master. The PCA9555 open-drain interrupt output is activated when any input state differs from its corresponding input port register state and is used to indicate to the system master that an input state has changed. The power-on reset sets the registers to their default values and initializes the device state machine. Three hardware pins (A0, A1, A2) vary the fixed I²C address and allow up to eight devices to share the same I²C/SMBus. The fixed I²C address of the PCA9555 is the same as the PCA9554 allowing up to eight of these devices in any combination to share the same I²C/SMBus.

7.5 Diodes Inc. AP1117 1A Low dropout positive regulator

AP1117 is a low dropout positive adjustable or fixed-mode regulator with 1A output current capability. The product is voltage specifically designed to provide well-regulated supply for low IC applications such as high-speed bus termination and low current 3.3 V logic supply. AP1117 is also well suited for other applications such as VGA cards. AP1117 is guaranteed to have lower than 1.4V dropout at full load current making it ideal to provide well-regulated outputs of 1.25 to 5.0 V with 6.4 to 18 V input supply.

7.6 NSC LM1881 Video Sync Separator

The LM1881 Video sync separator extracts timing information including composite and vertical sync, burst/back porch timing, and odd/even field information from standard negative going sync NTSC, PAL* and SECAM video signals with amplitude from 0.5 to 2 V_{p-p}. The integrated circuit is also capable of providing sync separation for non-standard, faster horizontal rate video signals. The vertical output is produced on the rising edge of the first serration in the vertical sync period. A default vertical output is produced after a time delay if the rising edge mentioned above does not occur within the externally set delay period, such as might be the case for a non-standard video signal.

7.7 Pericom PI5V331 Video Mux/DeMux

Pericom Semiconductor's PI5V331 is a true bidirectional Dual 4-channel multiplexer/demultiplexer that is recommended for both S-Video or composite video switching applications. The switch can be driven from a current output RAMDAC or voltage output composite video source. Low On-resistance and wide bandwidth make it ideal for video and other applications. Also this device has exceptionally high current capability which is far greater than most analog switches offered today. A single 5 V supply is all that is required for operation. The PI5V331 offers a high-performance, low-cost solution to switch between video sources.

7.8 JRC NJW1141 Audio Processor

The NJW1141 is a sound processor includes all of the functions required to process the audio signal for TV, such as tone control, balance, volume, mute, and AGC functions. All of the internal status and variables are controlled by I²C bus interface.

7.9 ST TL062 Low power J-FET dual op-amp

The TL062 is an high speed J-FET input dual operational amplifier. This J-FET input operational amplifiers incorporates well matched, high voltage J-FET and bipolar transistors in a monolithic integrated circuit. The device features high slew rates, low input bias and offset currents, and a low offset voltage temperature coefficient.

7.10 YAMAHA YDA148 Audio Amplifier

YDA148 (D-510) is a high-efficiency digital audio power amplifier IC with the maximum output of 2×15 W. The YDA148 has a "Pure pulse direct speaker drive circuit" that directly drives speakers while reducing distortion of pulse output signal and reducing noise on the signal, which realizes the highest standard low distortion rate characteristics and low noise characteristics among digital amplifier ICs in the same class. In addition, supporting filterless design allows circuit design with fewer external parts to be realized depending on use conditions. The YDA148 features a power limit function, a non-clip function, and DRC (dynamic range control) function that were developed by Yamaha original digital amplifier technology. The YDA148 has overcurrent protection for speaker output terminals, high temperature protection, and low supply voltage malfunction prevention.

7.11 Sipex SP3243 RS-232 transceiver

The SP3243 transceivers meet the EIA/TIA-232 and ITU-T V.28/V.24 communication protocols. Generates 5.5V RS-232 voltage levels from a single +3.0V to +5.5V power supply and operates at a data rate of 120 kbps fully loaded. The SP3243 devices feature AUTO ON-LINE[®] circuitry automatically wakes up from a 1 μ A shutdown. It occurs after a RS-232 cable being disconnected. Under this condition, the internal charge pump and the drivers will be shut down. Otherwise, the system automatically comes on-line.

7.12 Intersil ISL29010 Light-to-Digital output sensor

The ISL29010 is an integrated light sensor with I²C interface. It has an internal signed 15-bit integrating type ADC designed based on the charge-balancing conversion technique. This ADC is capable of rejecting 50 Hz and 60 Hz flicker caused by artificial light sources. The lux range select feature allows the user to program the lux range for optimised counts/lux. In normal operation, power consumption is typically 250 μ A. Furthermore, a power-down mode can be controlled by software via the I²C interface, reducing power consumption to less than 1 μ A. Designed to operate on supplies from 2.5 V to 3.3 V, the ISL29010 is specified for operation over the -40°C to +85°C ambient temperature range.

8. IC Data Sheets

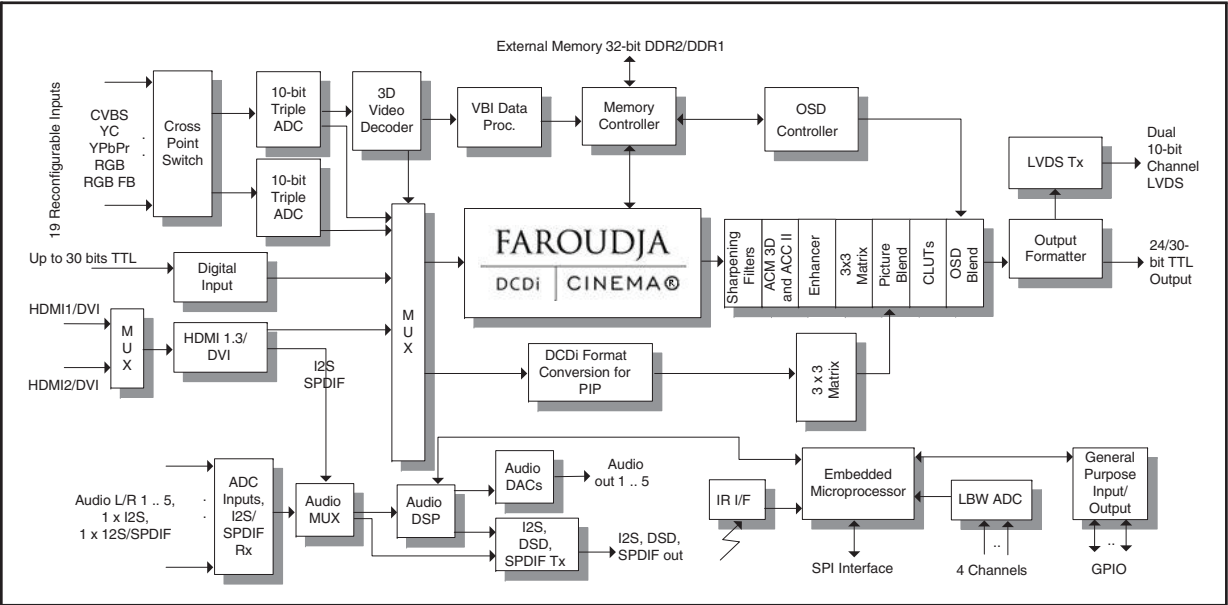
Index of this chapter:

- [8.1 Diagram Main Board: HDMI In Sequoia, FLI32626H \(IC UD8\)](#)
[8.2 Diagram Main Board: ISP, NC7SB3157 \(IC U18\)](#)
[8.3 Diagram Main Board: OCM Peripherals, 24LC64 \(IC U25\)](#)
[8.4 Diagram Main Board: OCM Peripherals, PCA9555 \(IC U29\)](#)
[8.5 Diagram Main Board: Power System, AP1117ELA \(IC U46\)](#)
[8.6 Diagram Extension Board: Video input, MM1671 \(IC U1\)](#)
[8.7 Diagram Extension Board: Video input, LM1881 \(IC U2\)](#)
[8.8 Diagram Extension Board: Video input, PI5V331 \(IC U3\)](#)
[8.9 Diagram Extension Board: Audio input, NJW1141M \(IC U24\)](#)
[8.10 Diagram Extension Board: Audio input, TL062 \(IC U25\)](#)
[8.11 Diagram Extension Board: Audio amplifier, YDA148 \(IC U27\)](#)
[8.12 Diagram Extension Board: RS232, SP3243 \(IC U29\)](#)
[8.13 Diagram IR LED board, ISL29010 \(IC U1\)](#)

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

8.1 Diagram [Main Board: HDMI In Sequoia, FLI32626H \(IC UD8\)](#)

Block Diagram

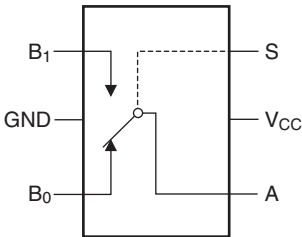


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Figure 8-1 Internal block diagram

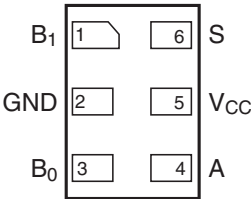
8.2 Diagram [Main Board: ISP](#), NC7SB3157 (IC U18)

Block Diagram



Input (S)	Function
Logic Level Low	B ₀ Connected to A
Logic Level High	B ₁ Connected to A

Pin Configuration



Pin Descriptions

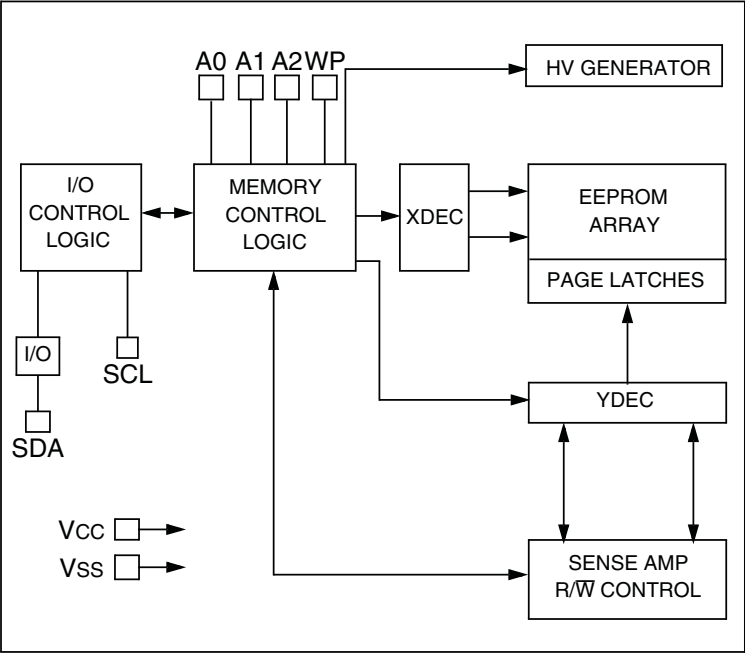
Pin Names	Description
A, B ₀ , B ₁	Data Ports
S	Control Input

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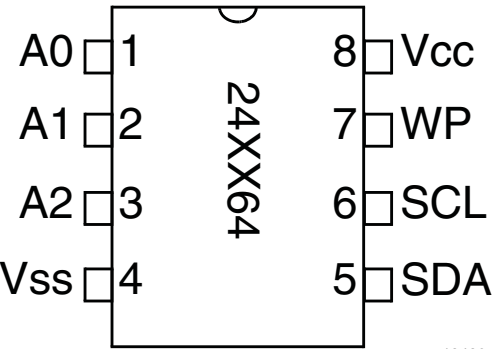
Figure 8-2 Internal block diagram and pin configuration

8.3 Diagram [Main Board: OCM Peripherals, 24LC64 \(IC U25\)](#)

Block Diagram



Pin Configuration

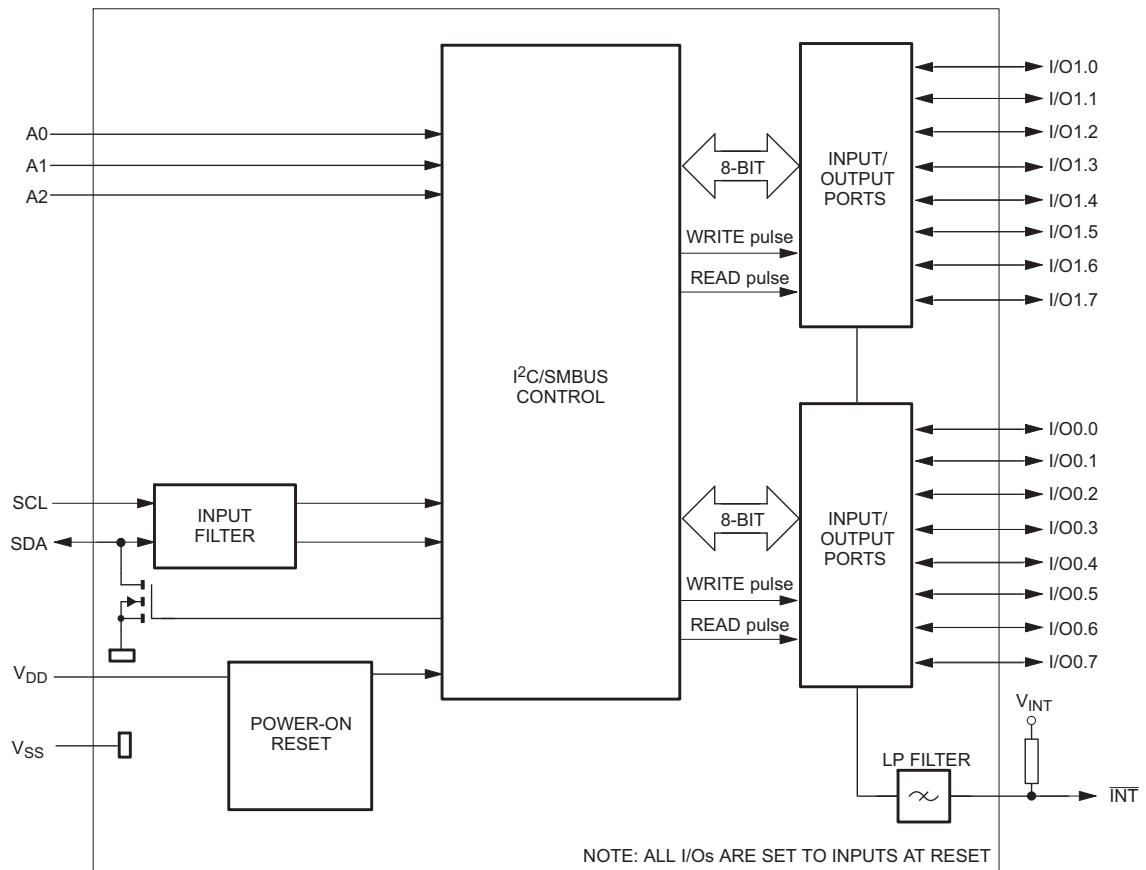


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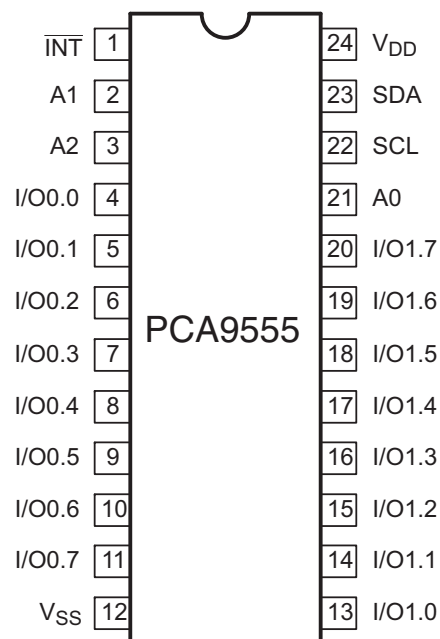
Figure 8-3 Internal block diagram and pin configuration

8.4 Diagram [Main Board: OCM Peripherals](#), PCA9555 (IC U29)

Block Diagram



Pin Configuration

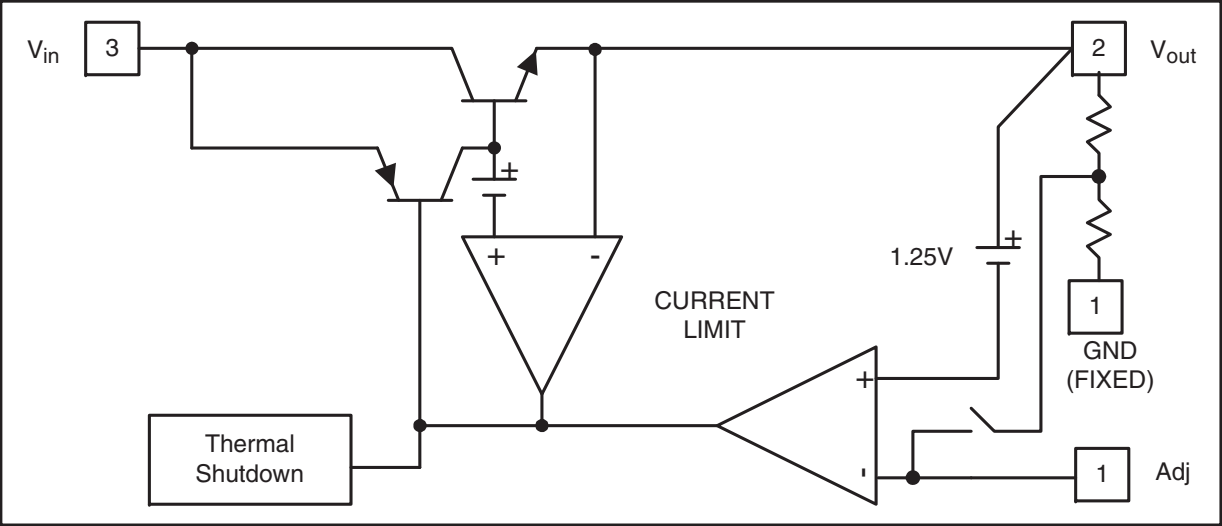


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Figure 8-4 Internal block diagram and pin configuration

8.5
 Diagram
 [Main Board: Power System](#), AP1117ELA (IC U46)

Block Diagram



Pin Configuration

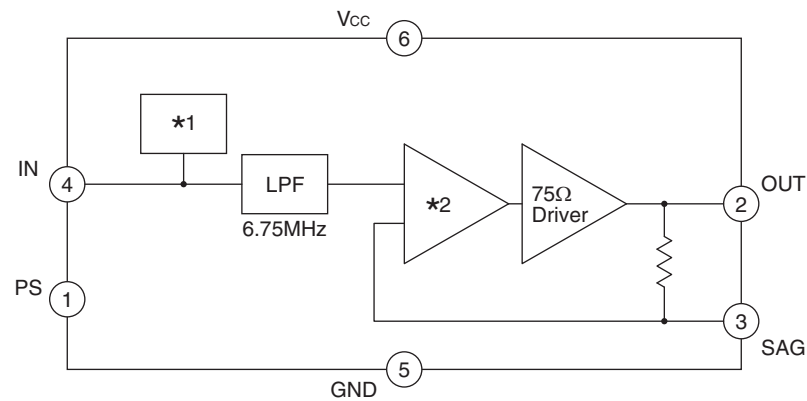
NAME	I/O	PIN #	FUNCTION
Adj (GND)	I	1	A resistor divider from this pin to the V _{out} pin and ground sets the output voltage (Ground only for Fixed-Mode).
V _{out}	O	2	The output of the regulator. A minimum of 10uF capacitor (0.15? ? ESR ? 20?) must be connected from this pin to ground to insure stability.
V _{in}	I	3	The input pin of regulator. Typically a large storage capacitor (0.15? ? ESR ? 20?) is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 1.3V higher than V _{out} in order for the device to regulate properly.

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Figure 8-5 Internal block diagram and pin configuration

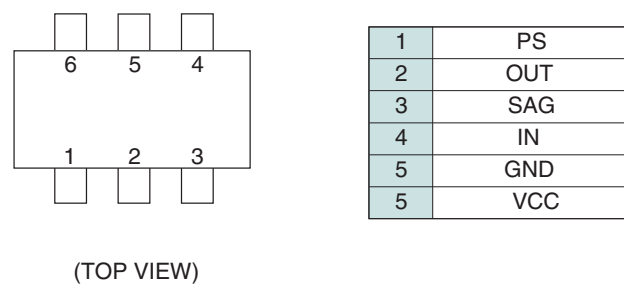
8.6 Diagram [Extension Board: Video input](#), MM1671 (IC U1)

Block Diagram



	*1 Input Clamp		*2 Built-in amplifier			
	bias	clamp	6dB (*2)	9dB(*2)	12dB (*2)	16.5dB (*2)
MM1671		☐	☐			
MM1672		☐		☐		
MM1673		☐			☐	
MM1674	☐		☐			
MM1675	☐			☐		
MM1676	☐				☐	
MM1677		☐				☐

Pin Configuration



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Figure 8-6 Internal block diagram and pin configuration

8.7 Diagram [Extension Board: Video input](#), LM1881 (IC U2)

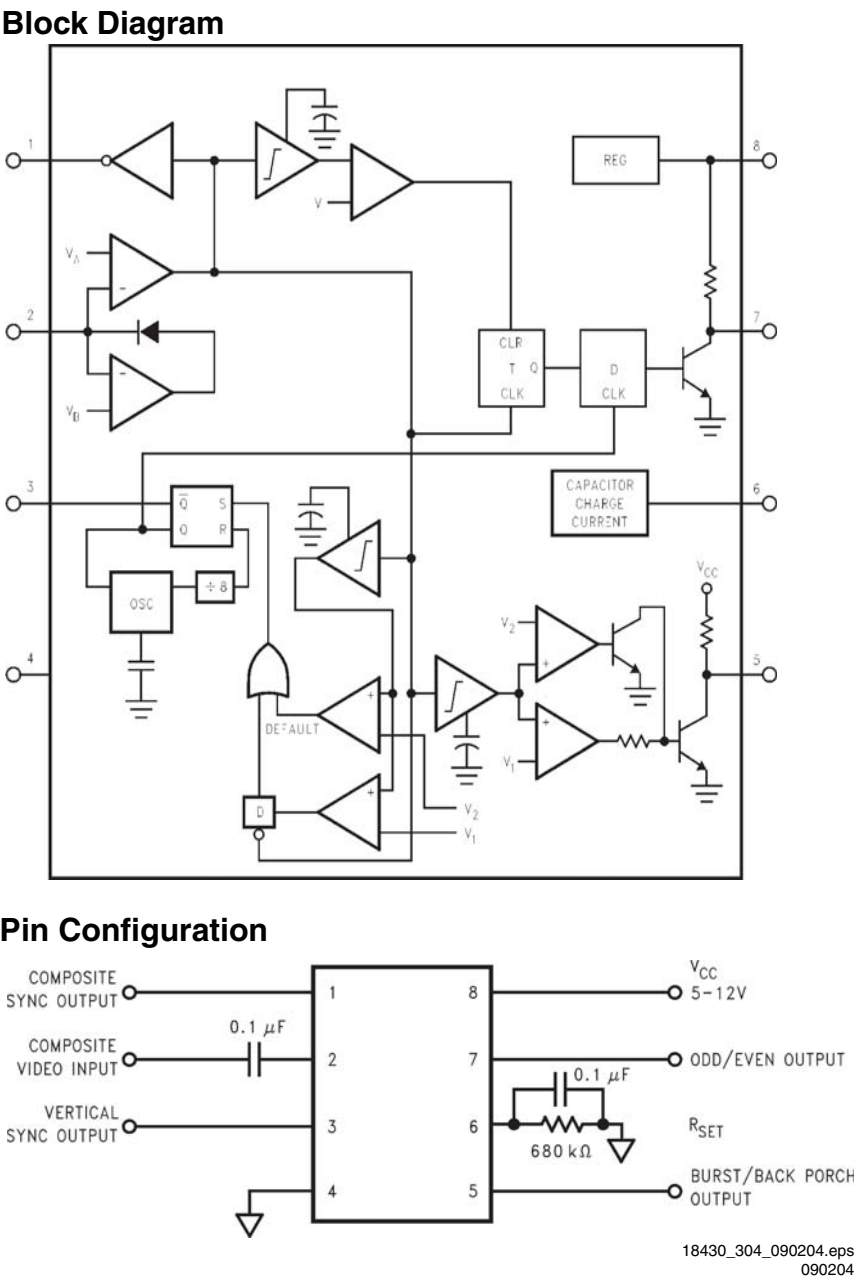
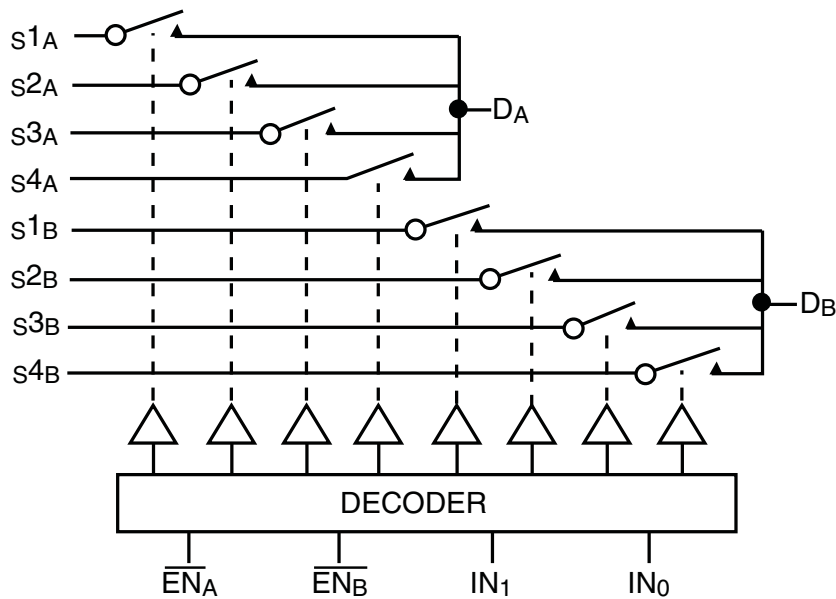


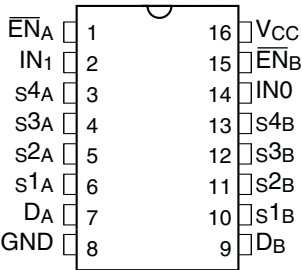
Figure 8-7 Internal block diagram and pin configuration

8.8 Diagram [Extension Board: Video input](#), PI5V331 (IC U3)

Block Diagram



Pin Configuration



Pin Description

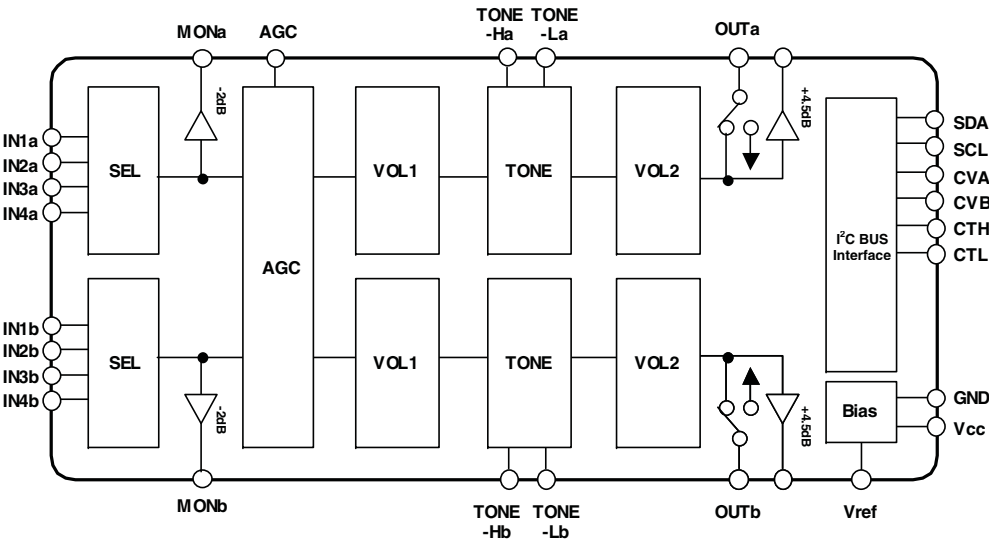
Pin Name	Description
s1A, s2A, s3A, s4A s1B, s2B, s3B, s4B	Analog Video I/O (Usually Inputs)
S ₀ , S ₁	Select Input
EN _A , EN _B	Enable
D _A , D _B	Analog Video I/O (Usually Outputs)
GND	Ground
V _{CC}	Power

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Figure 8-8 Internal block diagram and pin configuration

8.9 Diagram [Extension Board: Audio input](#), NJW1141M (IC U24)

Block Diagram



Pin Configuration

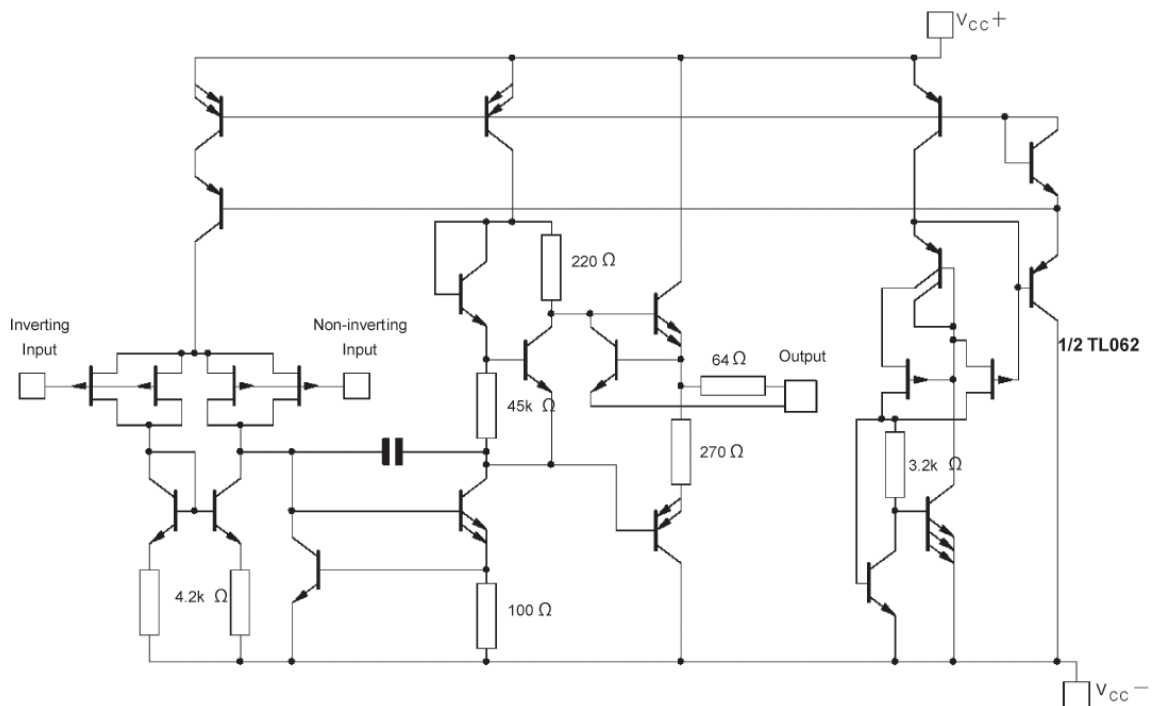
				No.	Symbol	Function
1	IN1a	IN1b	30	1	IN1a	Ach Input1
2	IN2a	IN2b	29	2	IN2a	Ach Input2
3	IN3a	IN3b	28	3	IN3a	Ach Input3
4	IN4a	IN4b	27	4	IN4a	Ach Input4
5	MONa	MONb	26	5	MONa	Ach Monitor Output
6	NC	NC	25	6	NC	No Connect
7	TONE-Ha	TONE-Hb	24	7	TONE-Ha	Ach Treble Filter
8	TONE-La	TONE-Lb	23	8	TONE-La	Ach Bass Filter
9	LINEa	LINEb	22	9	LINEa	Ach LINE Output (+4.5dB)
10	OUTa	OUTb	21	10	OUTa	Ach Output
11	CVa	AGC	20	11	CVB	DAC Output for Bch Volume & Balance
12	CVb	CTH	19	12	CVA	DAC Output for Ach Volume & Balance
13	SDA	CTL	18	13	SDA	SDA Data Input (I²C BUS)
14	SCL	Vref	17	14	SCL	SCL Clock Input (I²C BUS)
15	GND	V+	16	15	GND	GND Terminal
				16	V+	Power Supply Terminal
				17	Vref	Reference Voltage
				18	CTL	Pop Noise reduction for Bass Control
				19	CTH	Pop Noise reduction for Treble Control
				20	AGC	AGC Filter
				21	OUTb	Bch Output
				22	LINEb	Bch LINE Output (+4.5dB)
				23	TONE-Lb	Bch Bass Filter
				24	TONE-Hb	Bch Treble Filter
				25	NC	No Connect
				26	MONb	Bch Monitor Output
				27	IN4b	Bch Input4
				28	IN3b	Bch Input3
				29	IN2b	Bch Input2
				30	IN1b	Bch Input1

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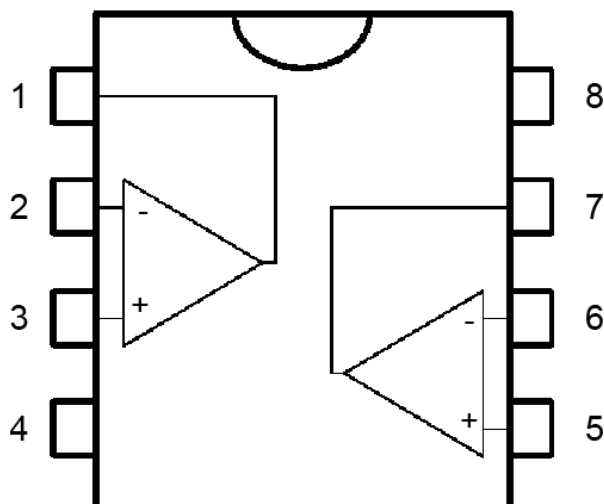
Figure 8-9 Internal block diagram and pin configuration

8.10 Diagram [Extension Board: Audio input](#), TL062 (IC U25)

Block Diagram



Pin Configuration

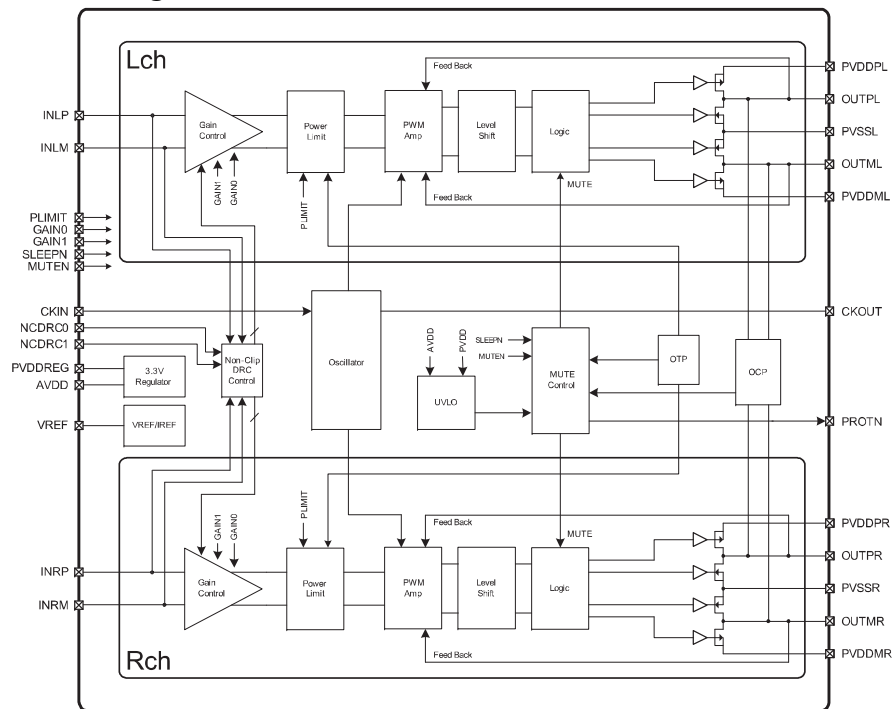


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Figure 8-10 Internal block diagram and pin configuration

8.11 Diagram [Extension Board: Audio amplifier](#), YDA148 (IC U27)

Block Diagram



Pin Configuration

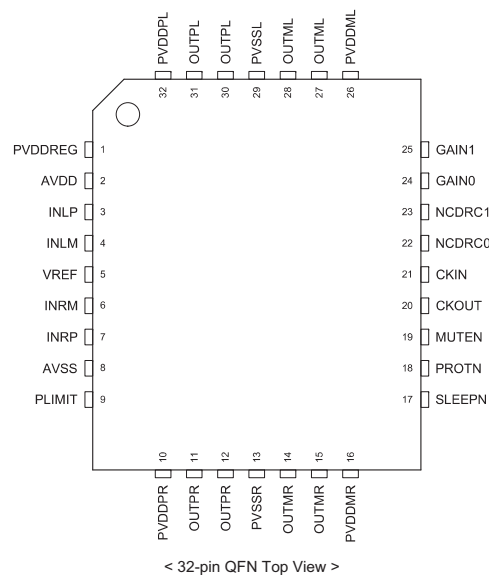
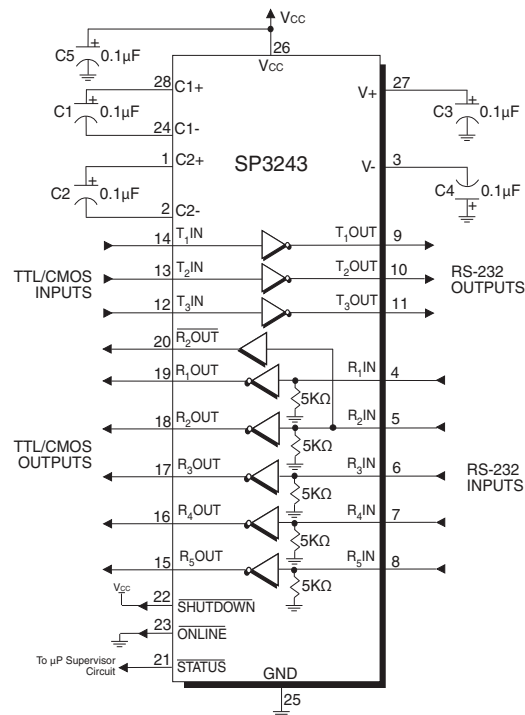


Figure 8-11 Internal block diagram and pin configuration

8.12 Diagram [Extension Board: RS232, SP3243 \(IC U29\)](#)

Block Diagram



Pin Configuration

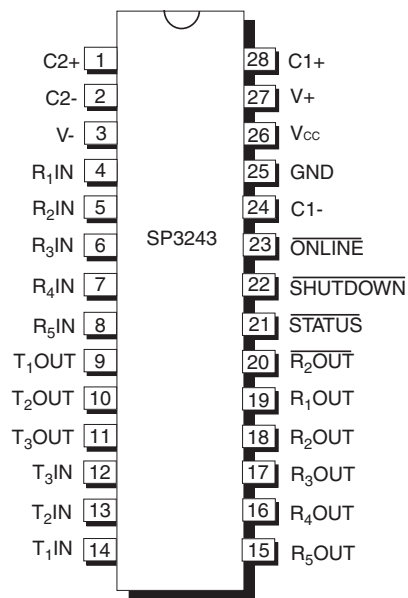
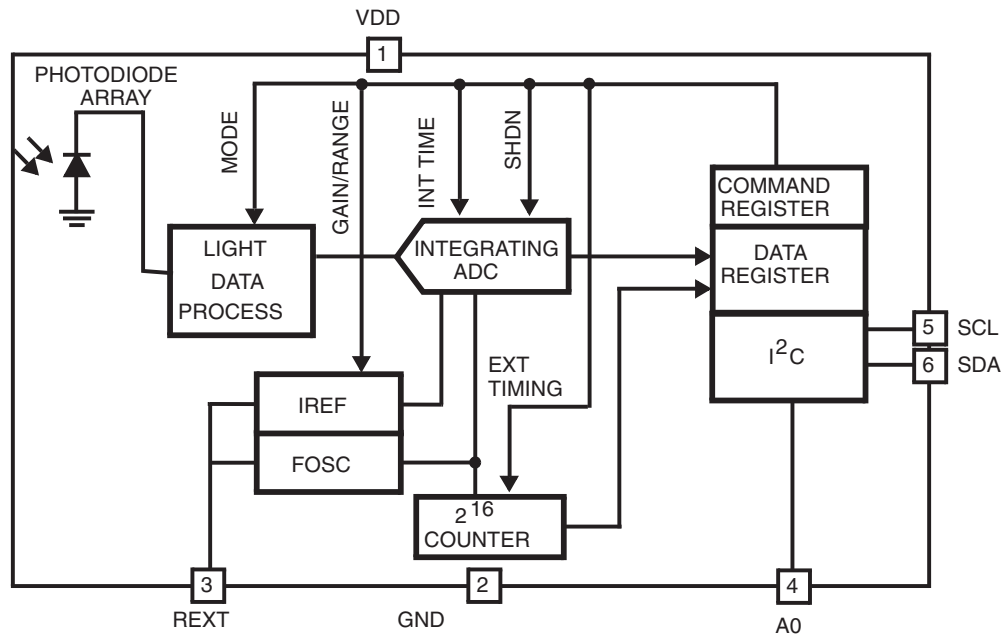
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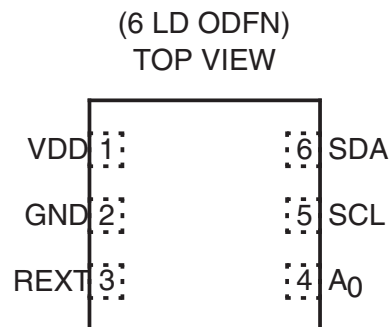
Figure 8-12 Internal block diagram and pin configuration

8.13 Diagram [IR LED board](#), ISL29010 (IC U1)

Block Diagram



Pin Configuration



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Figure 8-13 Internal block diagram and pin configuration

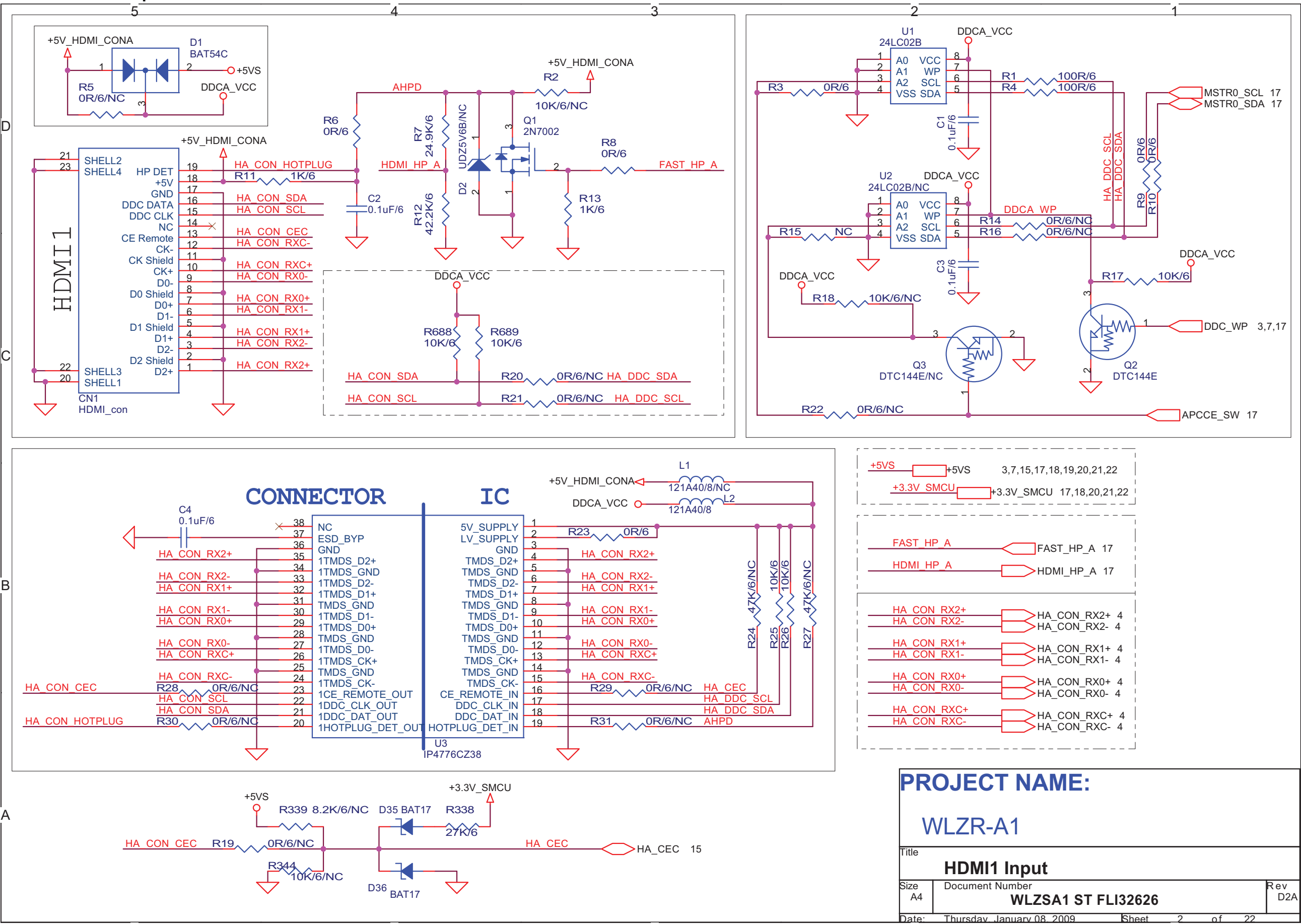
Wiring Diagram 52"

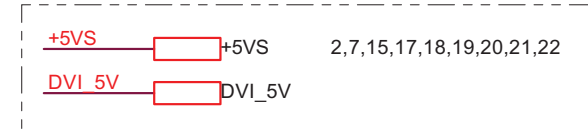
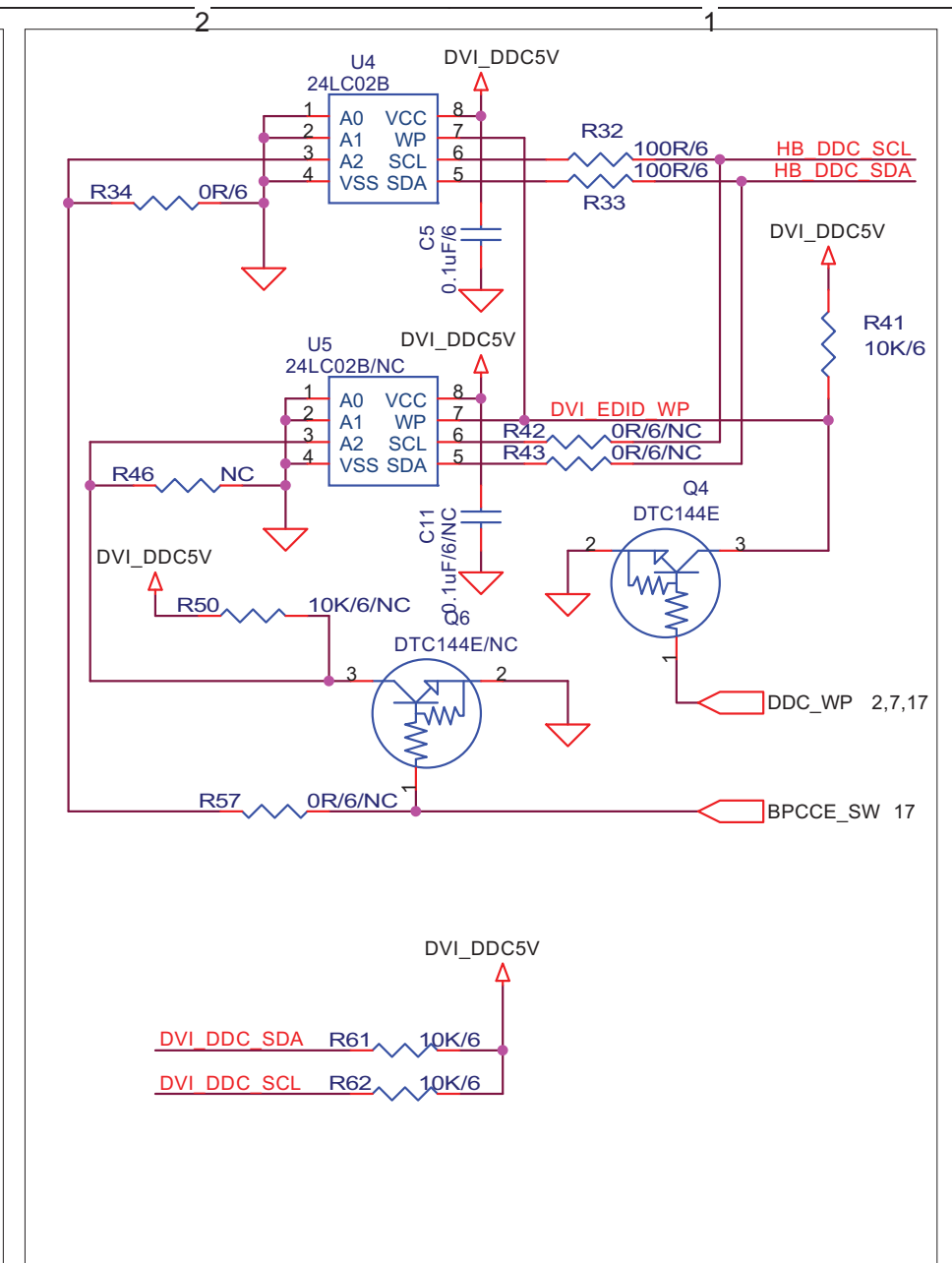
WIRING DIAGRAM 52"



10. Circuit Diagrams and PWB Layouts

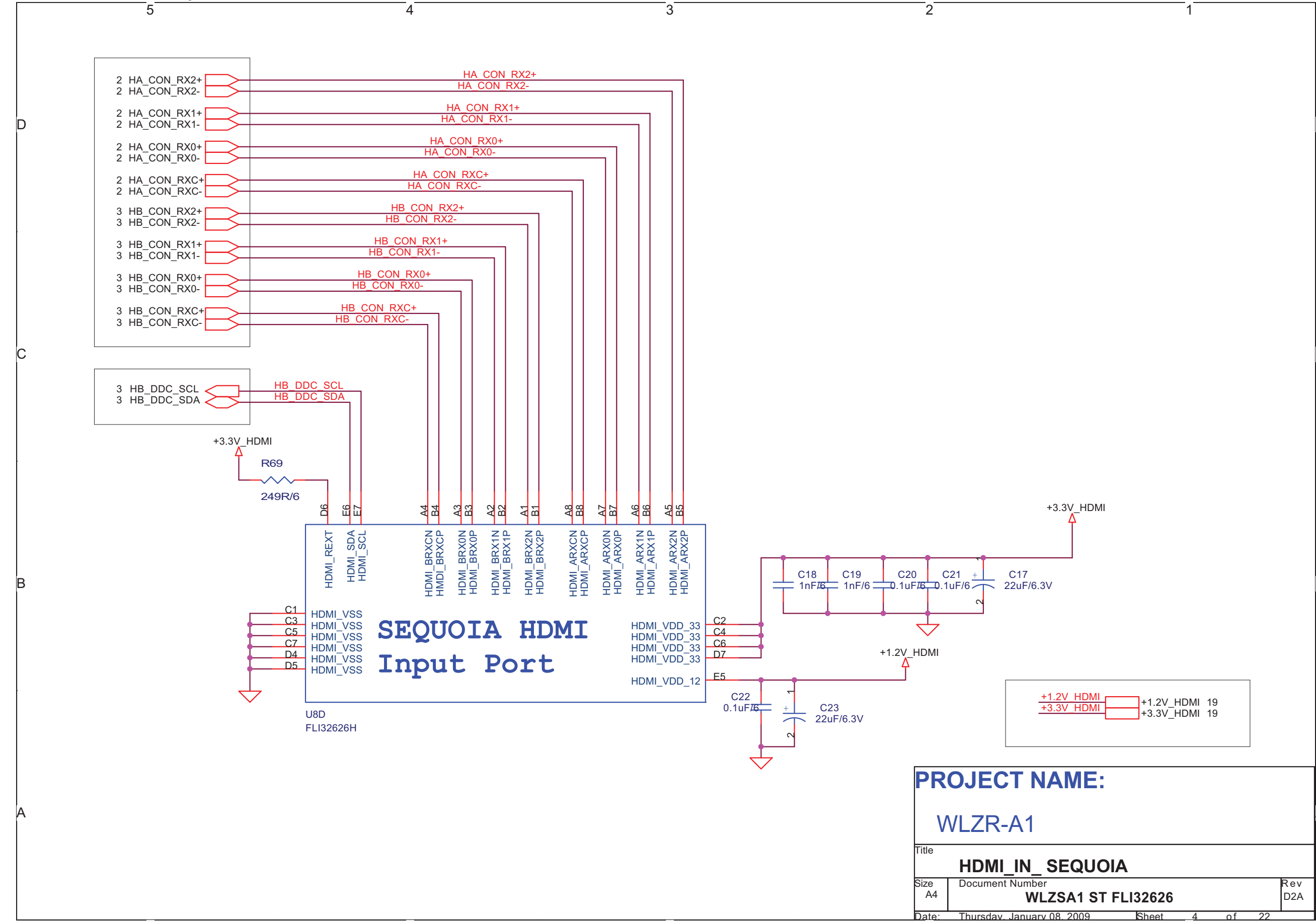
Main Board: HDMI Input



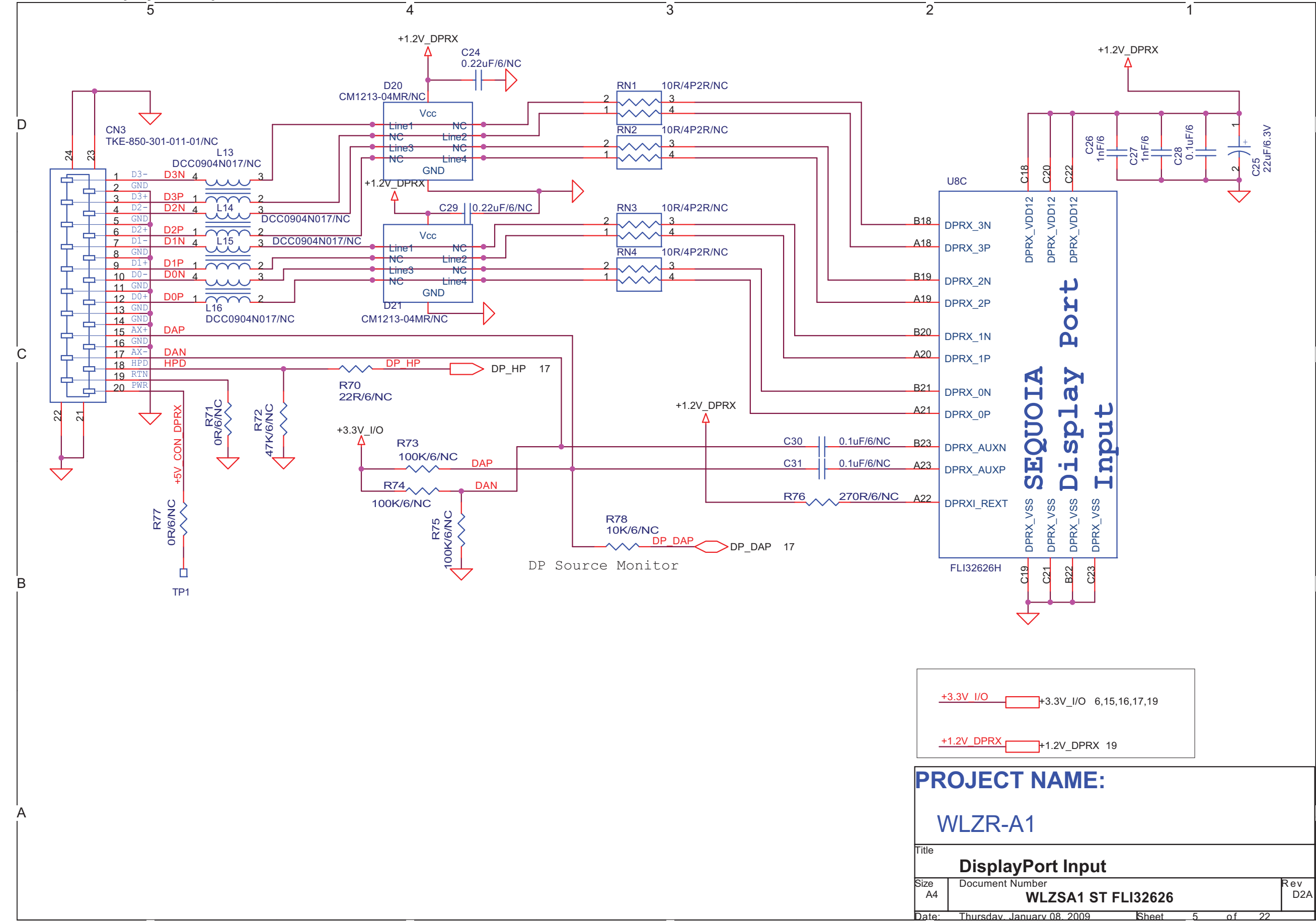
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Title			
DVI Input			
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Date:	Thursday, January 08, 2009	Sheet	3 of 22

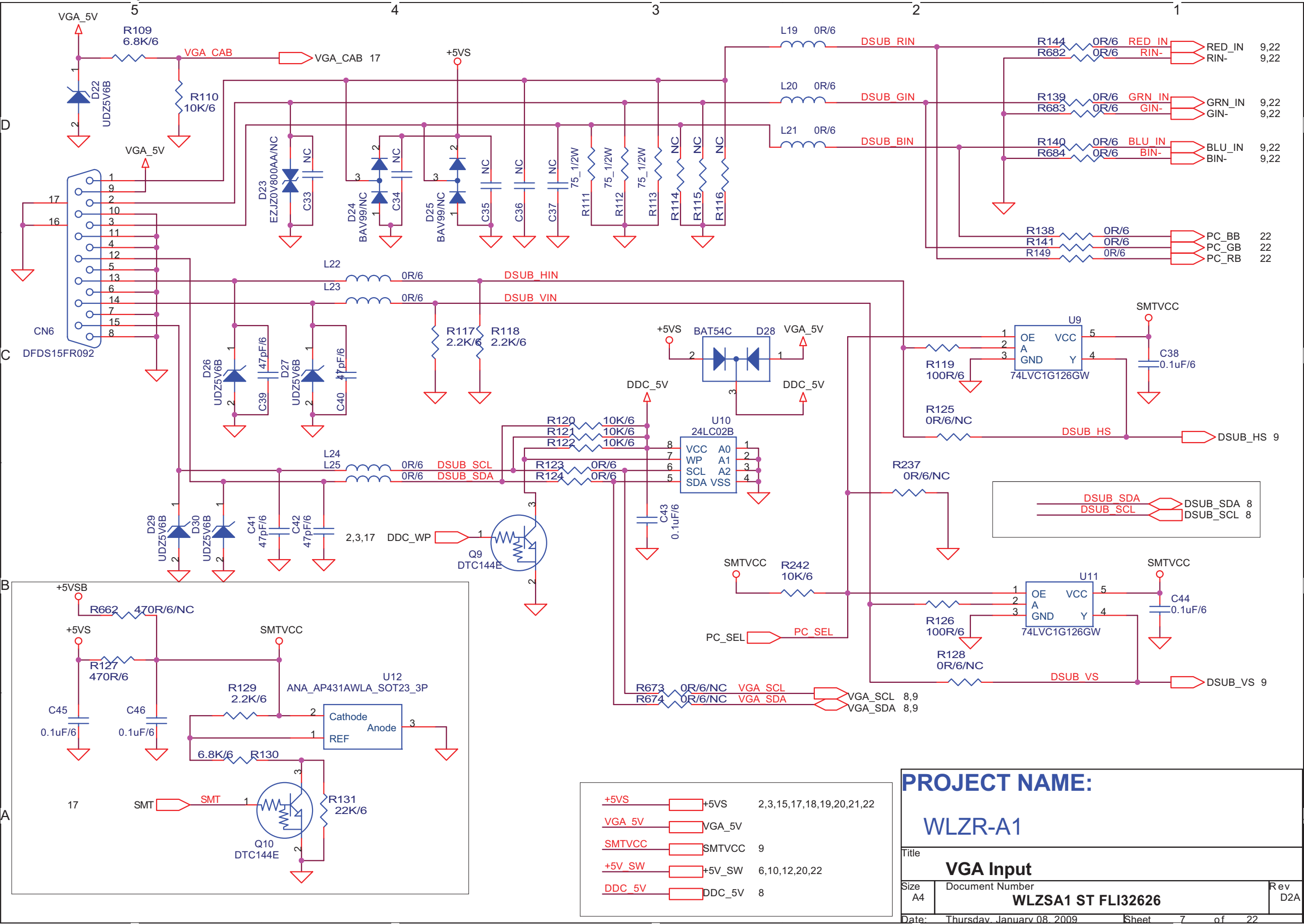
Main Board: HDMI In Sequoia



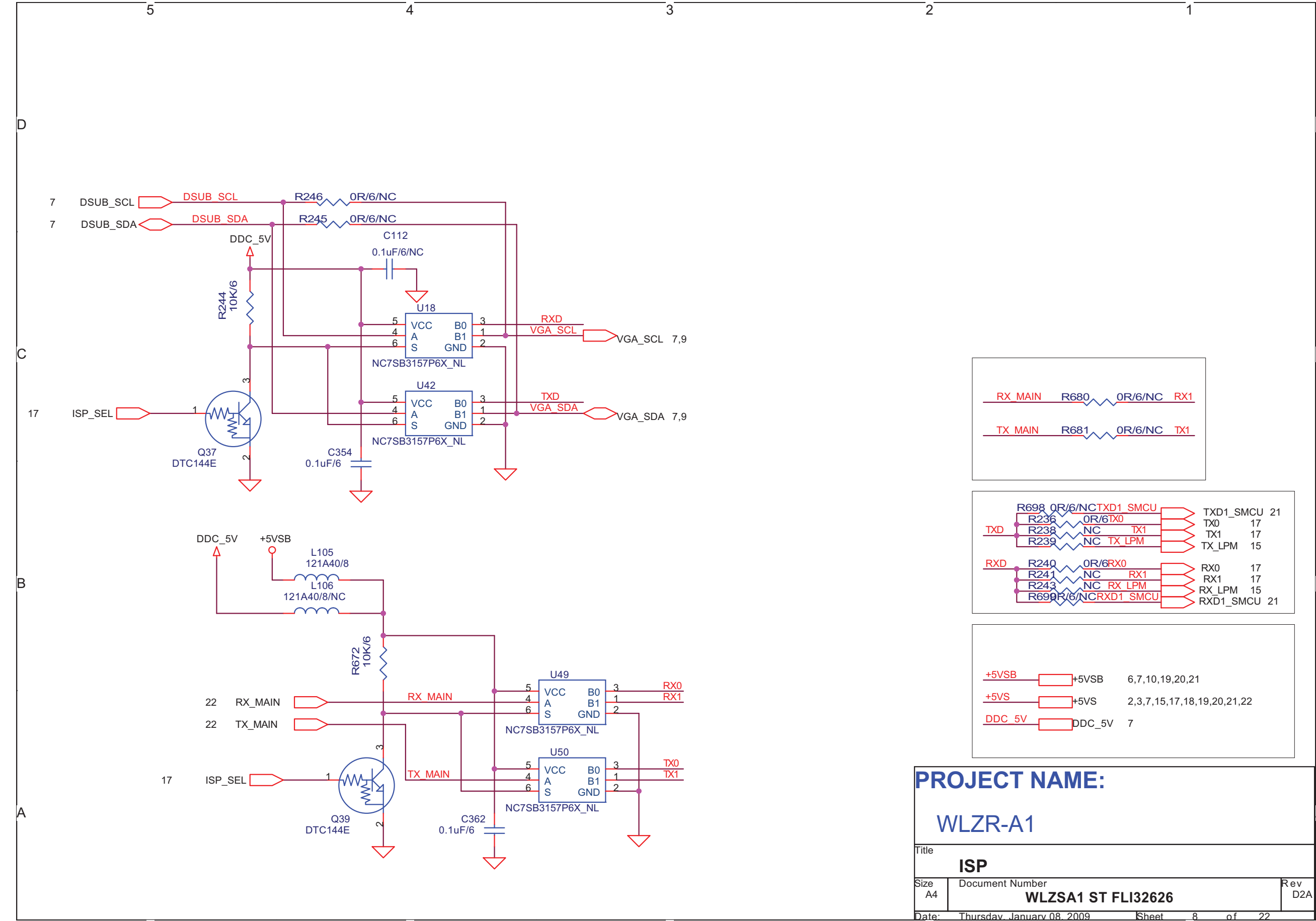
Main Board: Display Port Input



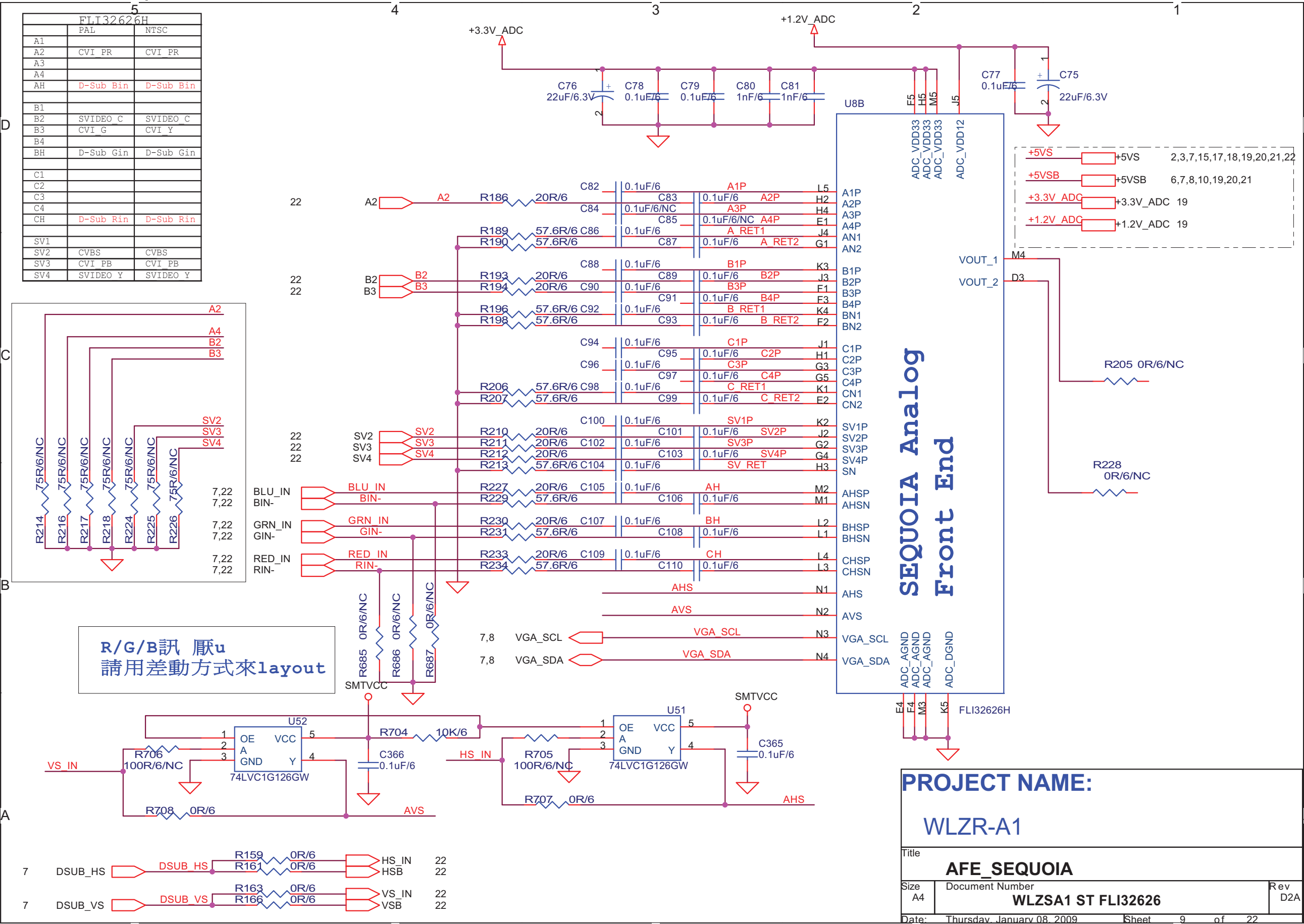
Main Board: VGA Input



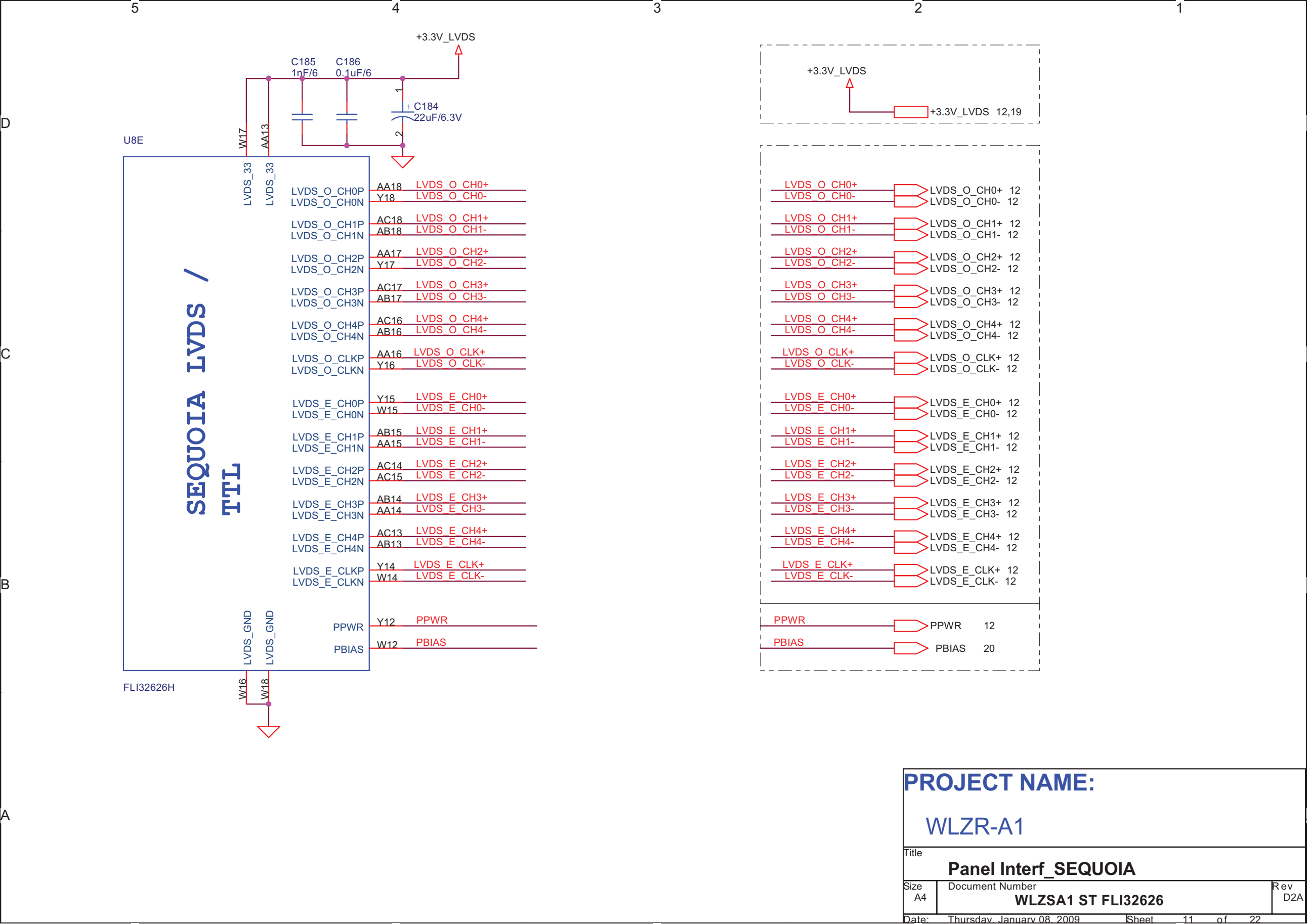
Main Board: ISP



Main Board: AFE Sequoia



Main Board: Panel Interface Sequoia



PROJECT NAME:

WLZR-A1

Title

Panel Interf_SEQUOIA

Size

A4

Document Number

WLZSA1 ST FLI32626

Rev

D2A

Date:

Thursday, January 08, 2009

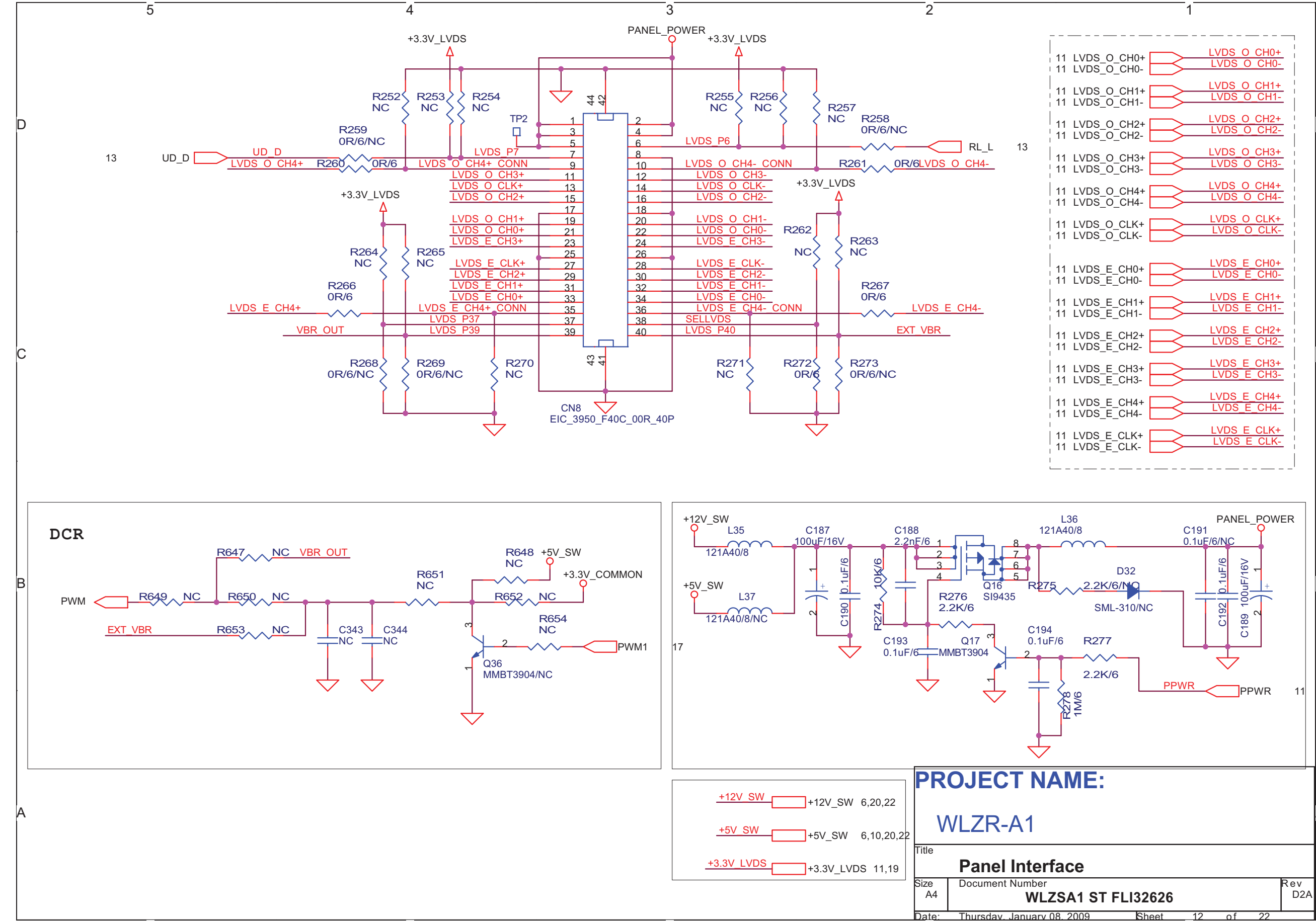
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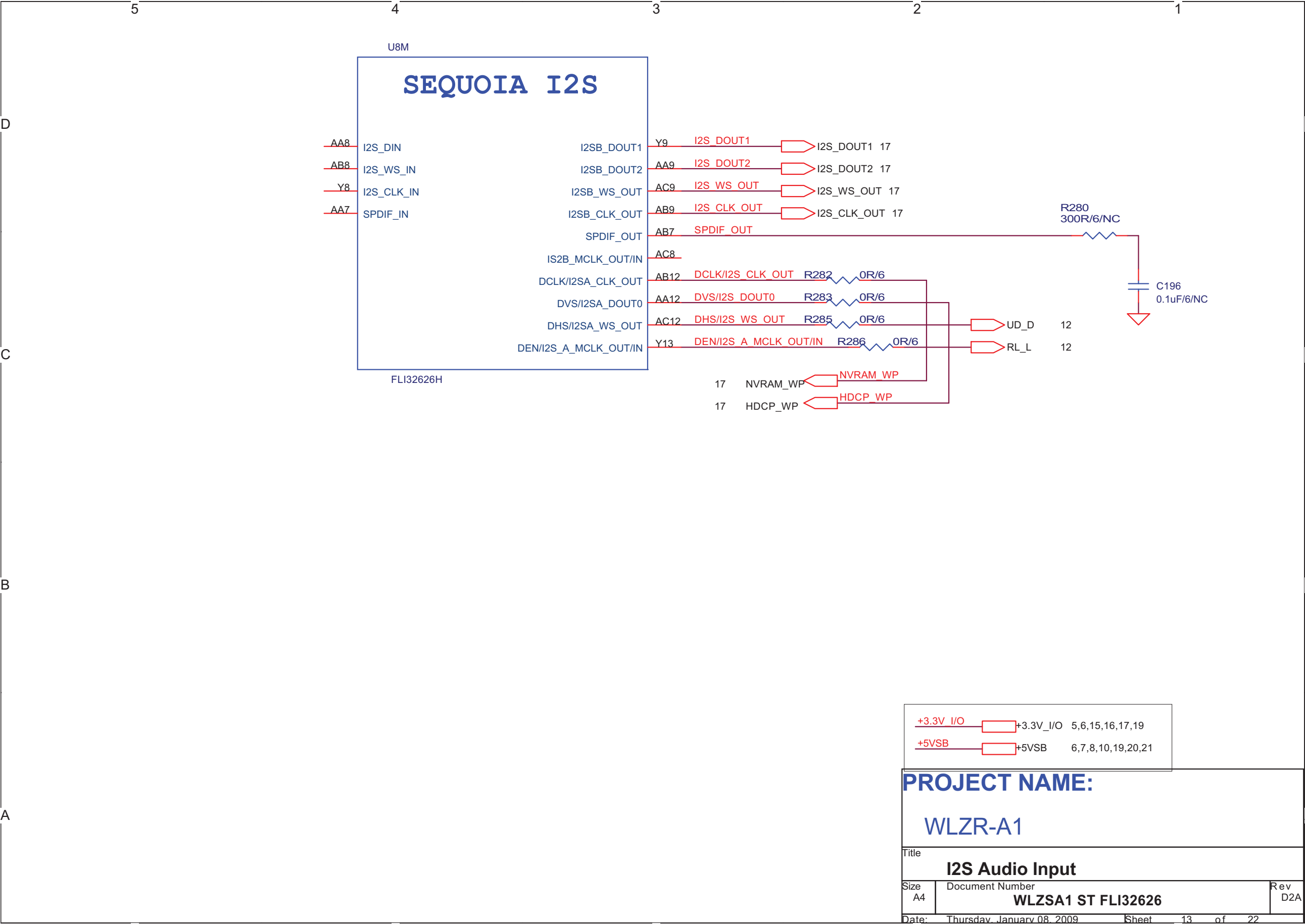
of

22

Main Board: Panel Interface



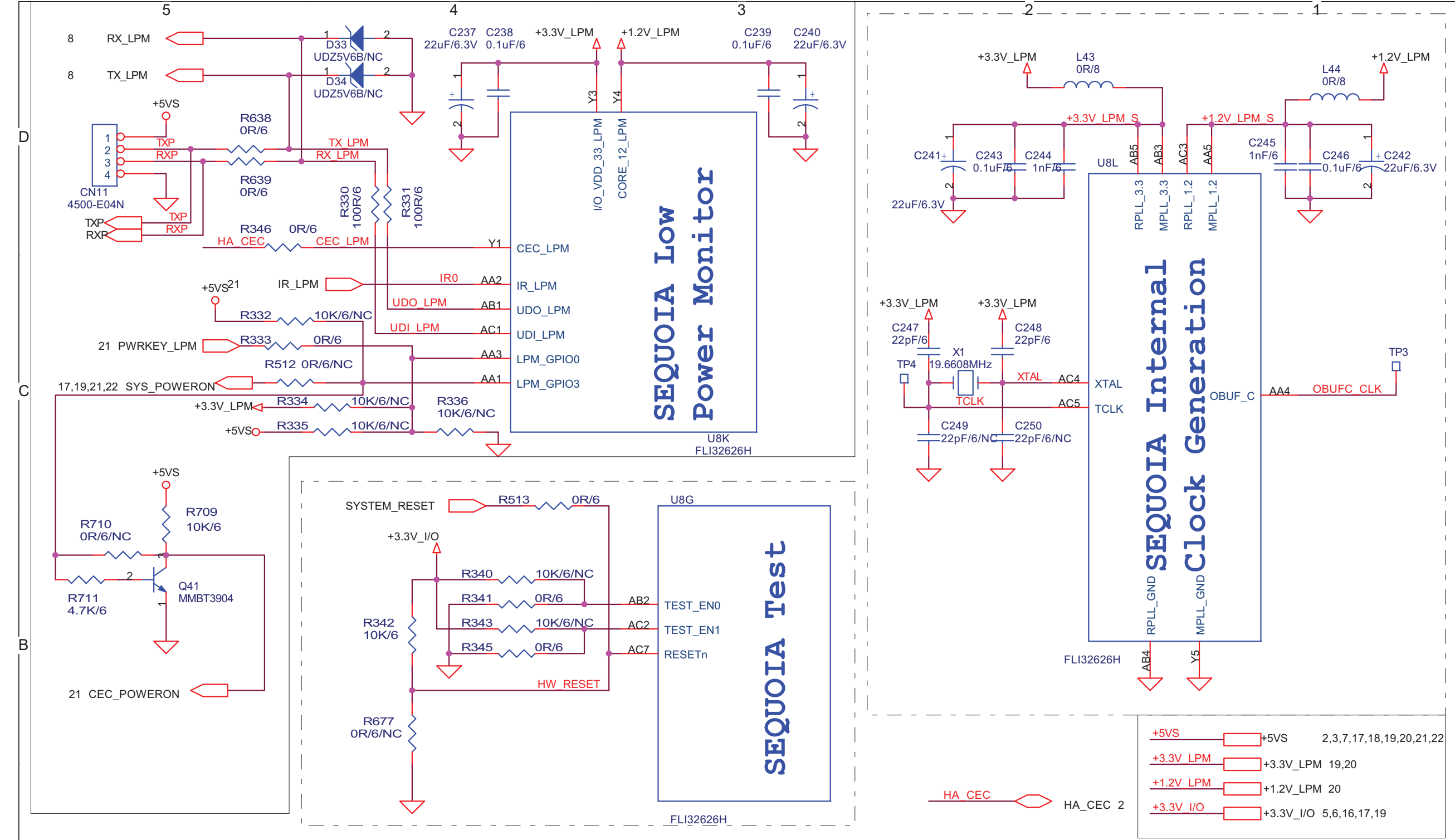
Main Board: I2S Audio Input



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090202

PROJECT NAME:			
WLZR-A1			
Title			
Analog Audio Input			
Size A4	Document Number WLZSA1 ST FLI32626		Rev D2A
Date:	Thursday, January 08, 2009	Sheet	14 of 22

Main Board: Low Power Monitor



TEST EN1	TEST EN0	FUNCTION
0	0	Regular mission mode with POR delayed output tied to internal Resetn
0	1	Regular mission mode with POR non-delayed output tied to internal RESETn (For ATE vectors)
1	0	JTAG boundary scan enable. 5-additional pins become enabled for JTAG
1	1	SCAN is enabled here and ALTERNATE(TBD) pad is used as internal RESETn substitute

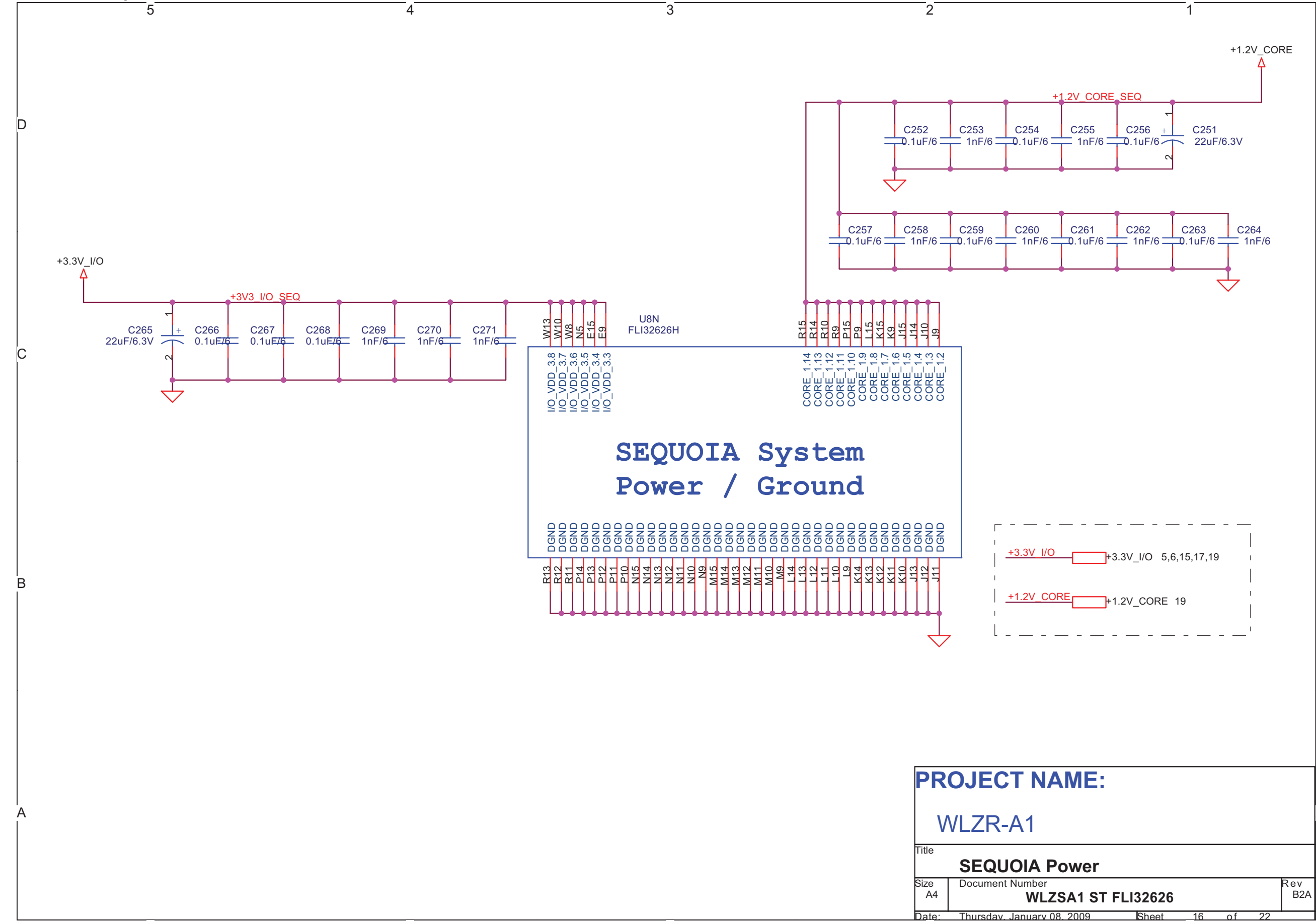
PROJECT NAME:
WLZR-A1

Title
Low Power Monitor

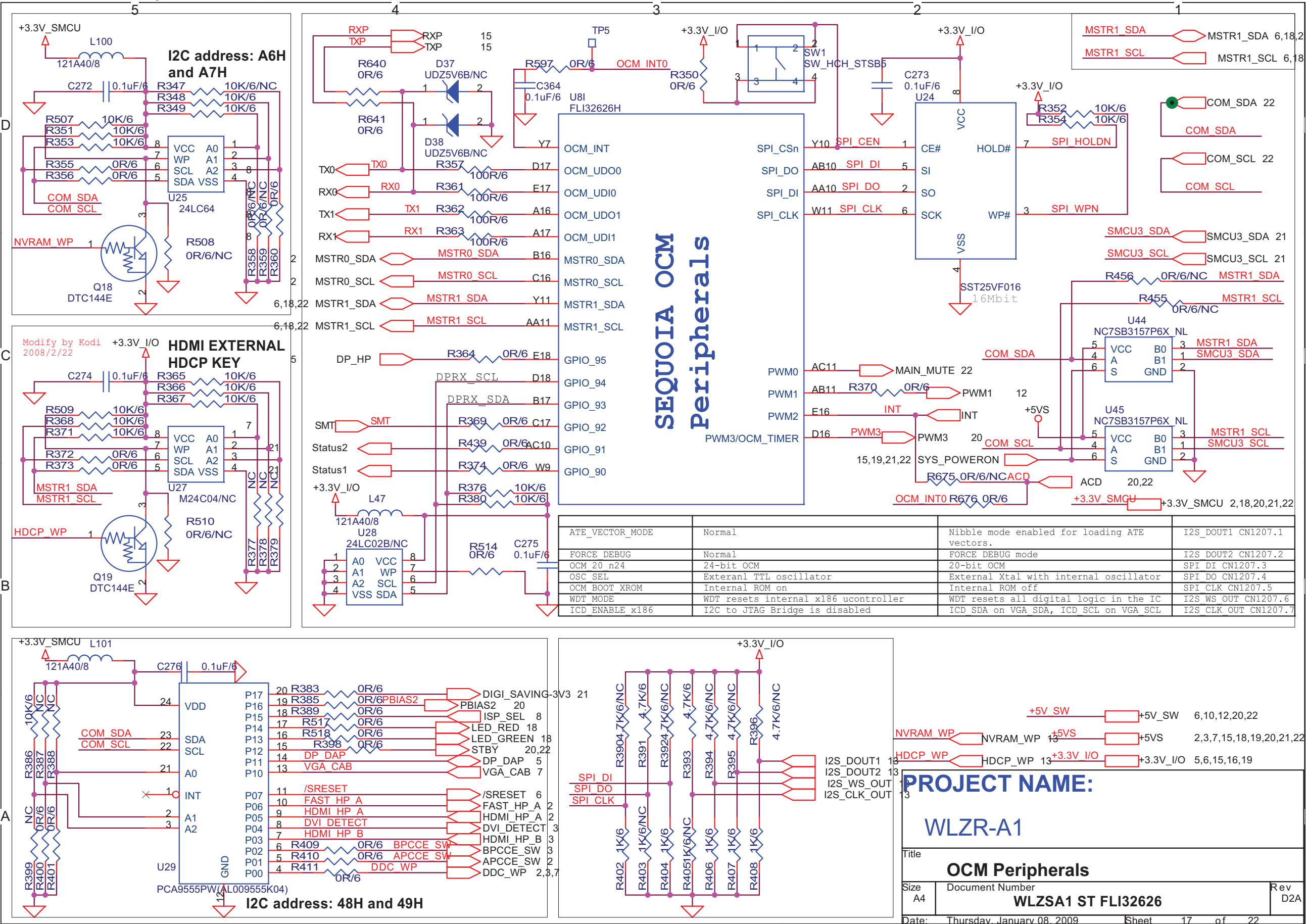
Size A4
Document Number
WLZSA1 ST FLI32626
Rev D2A

Date: Thursday, January 08, 2009
Sheet 15 of 22

Main Board: Sequoia Power



Main Board: OCM Peripherals



17 LED_RED

17 LED_GREEN

LED_RED

LED_GREEN

R429 NC

R430 NC

R432 4.7K/6

R435 4.7K/6

C288 0.1uF/6

C289 0.1uF/6

R520 0R/6

R521 0R/6

Q20 MMBT3906/NC

Q21 MMBT3906/NC

+3.3V_SMCU

+5VS

L49 121A40/8/NC

L107 121A40/8

+3.3V_SMCU

IR_IN

R433 470R/6

R434 470R/6

C285 0.1uF/6

C286 0.1uF/6

C287 100pF/6

C284 22uF/6.3V

L50 0R/6

L51 0R/6

L52 0R/6

8

7

6

5

4

3

2

1

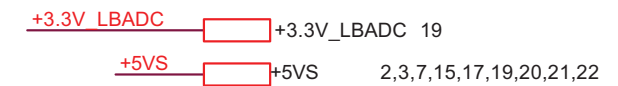
CN14 EIC_4500-E08N

6,17,22 MSTR1_SDA

6,17,22 MSTR1_SCL

MSTR1_SDA

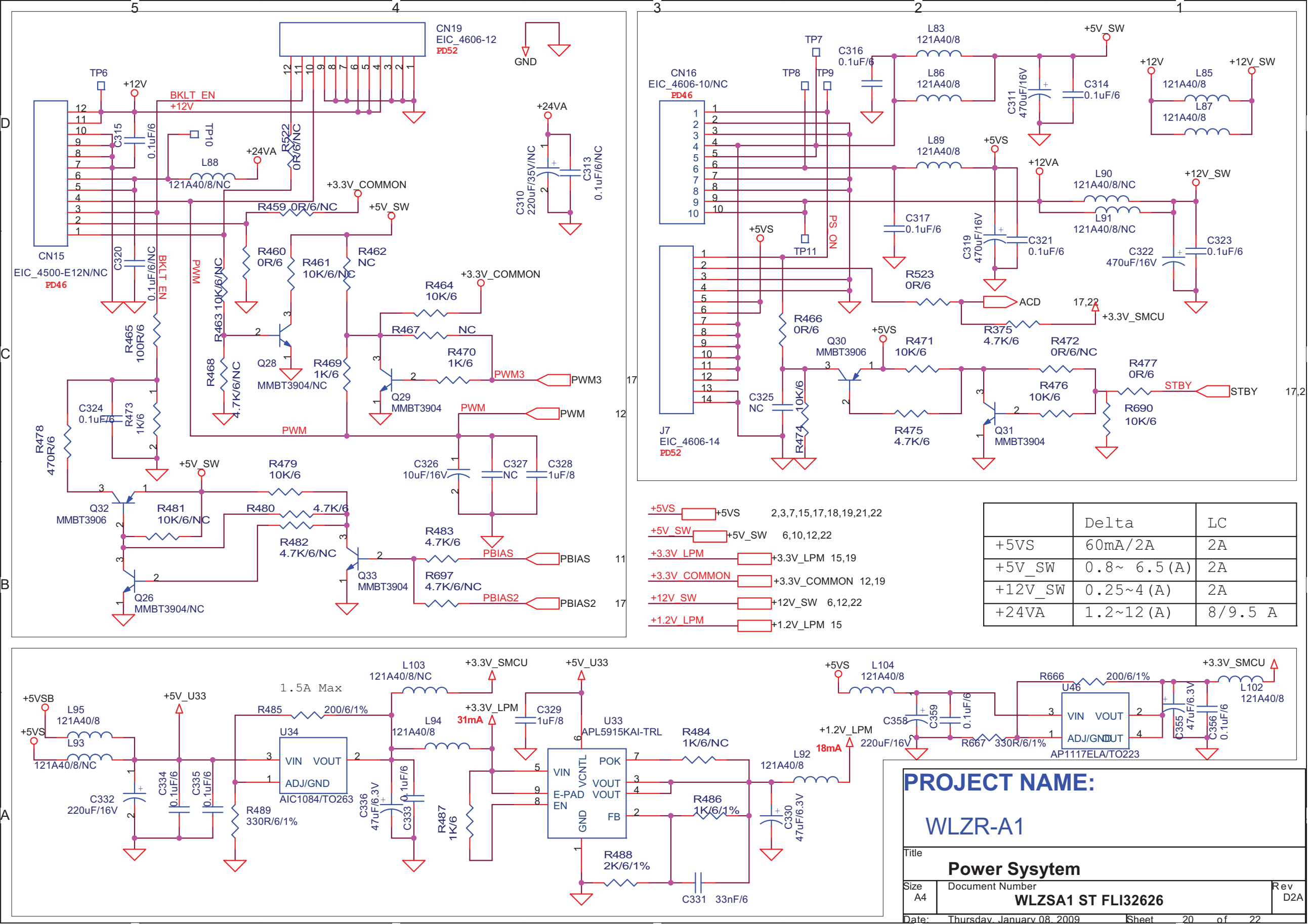
MSTR1_SCL



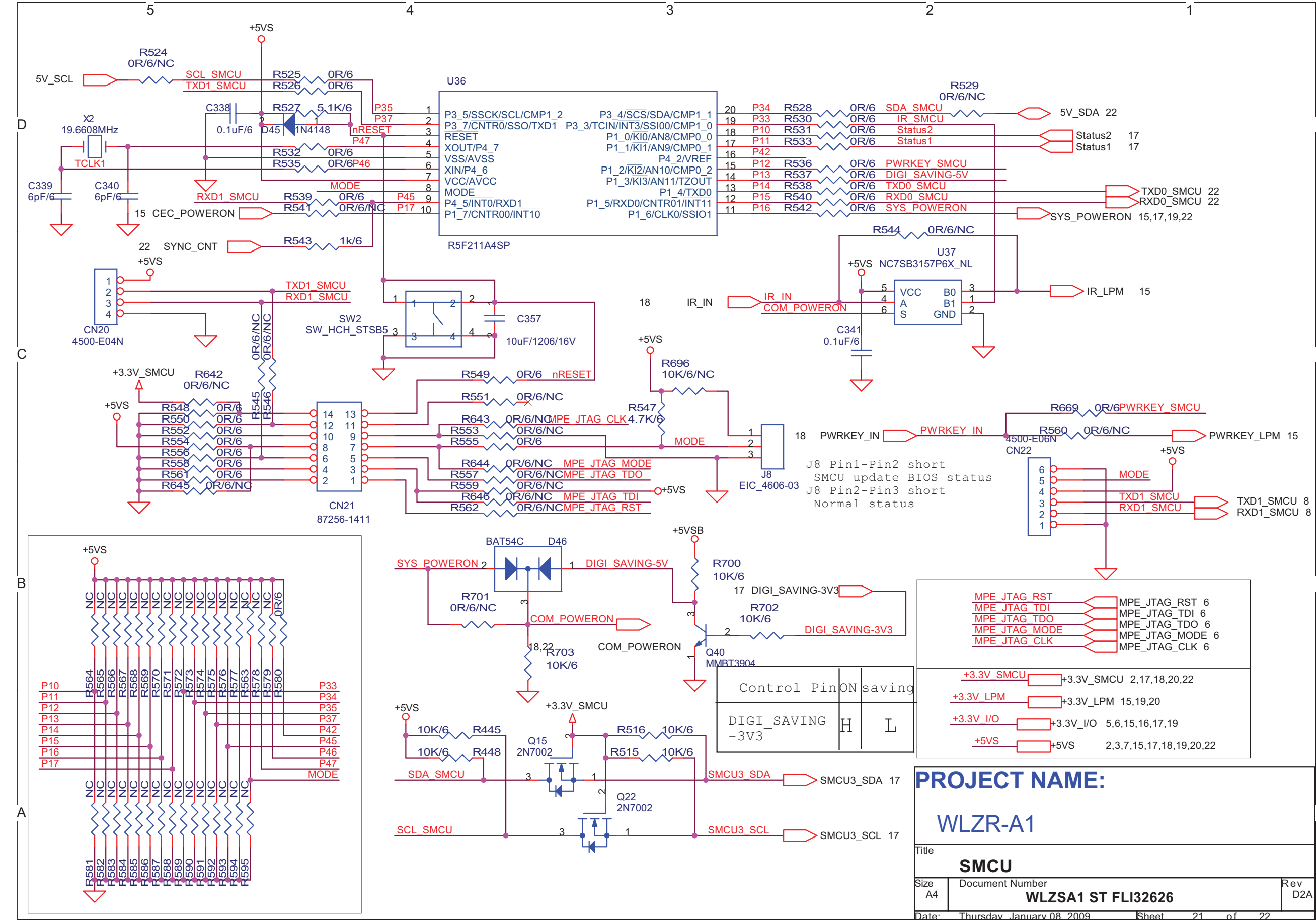
18430_516_090202.eps
090202

Title		
Power Sequoia		
Size A4	Document Number WLZSA1 ST FLI32626	Rev D2A
Date:	Thursday, January 08, 2009	Sheet 19 of 22

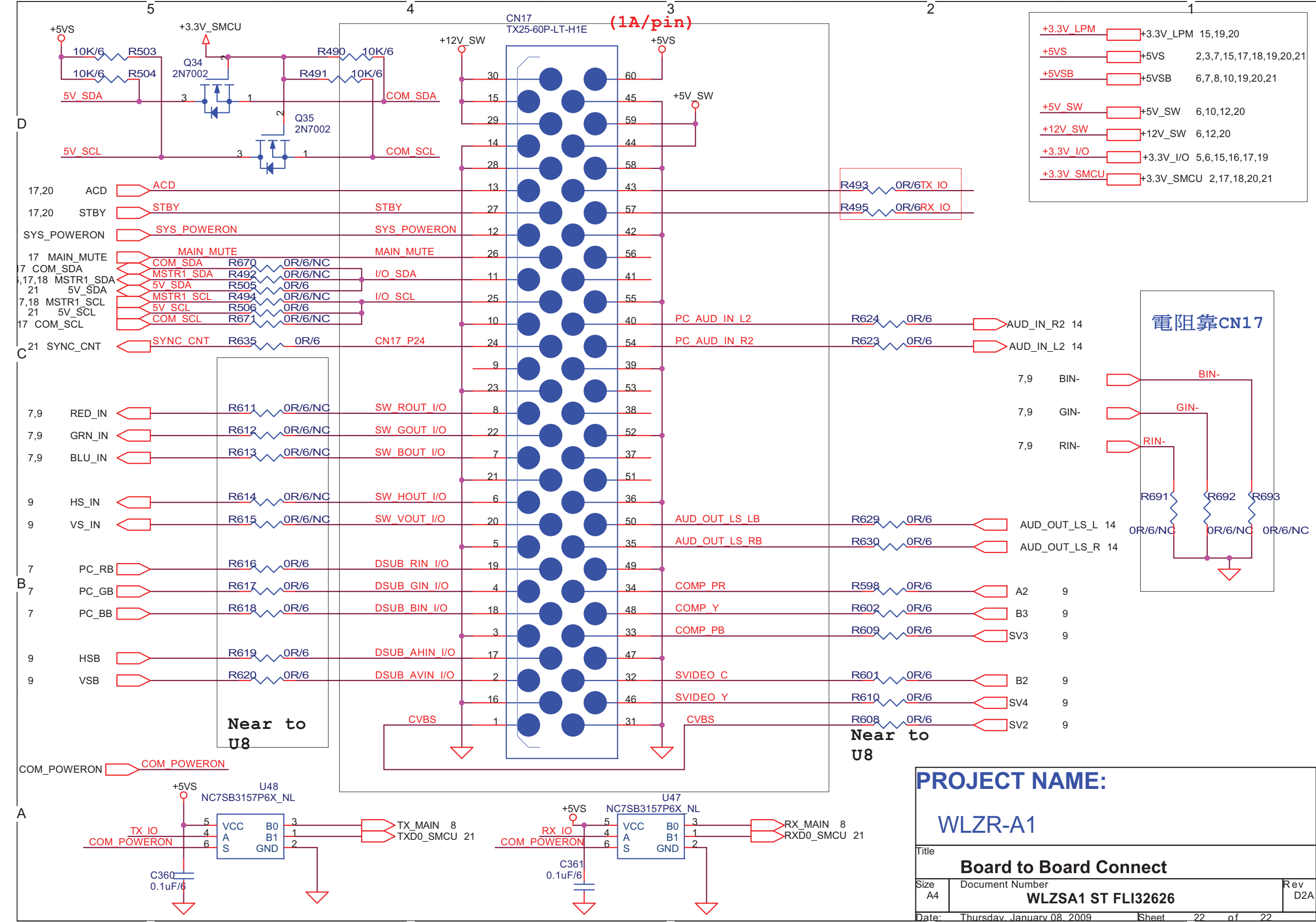
Main Board: Power System



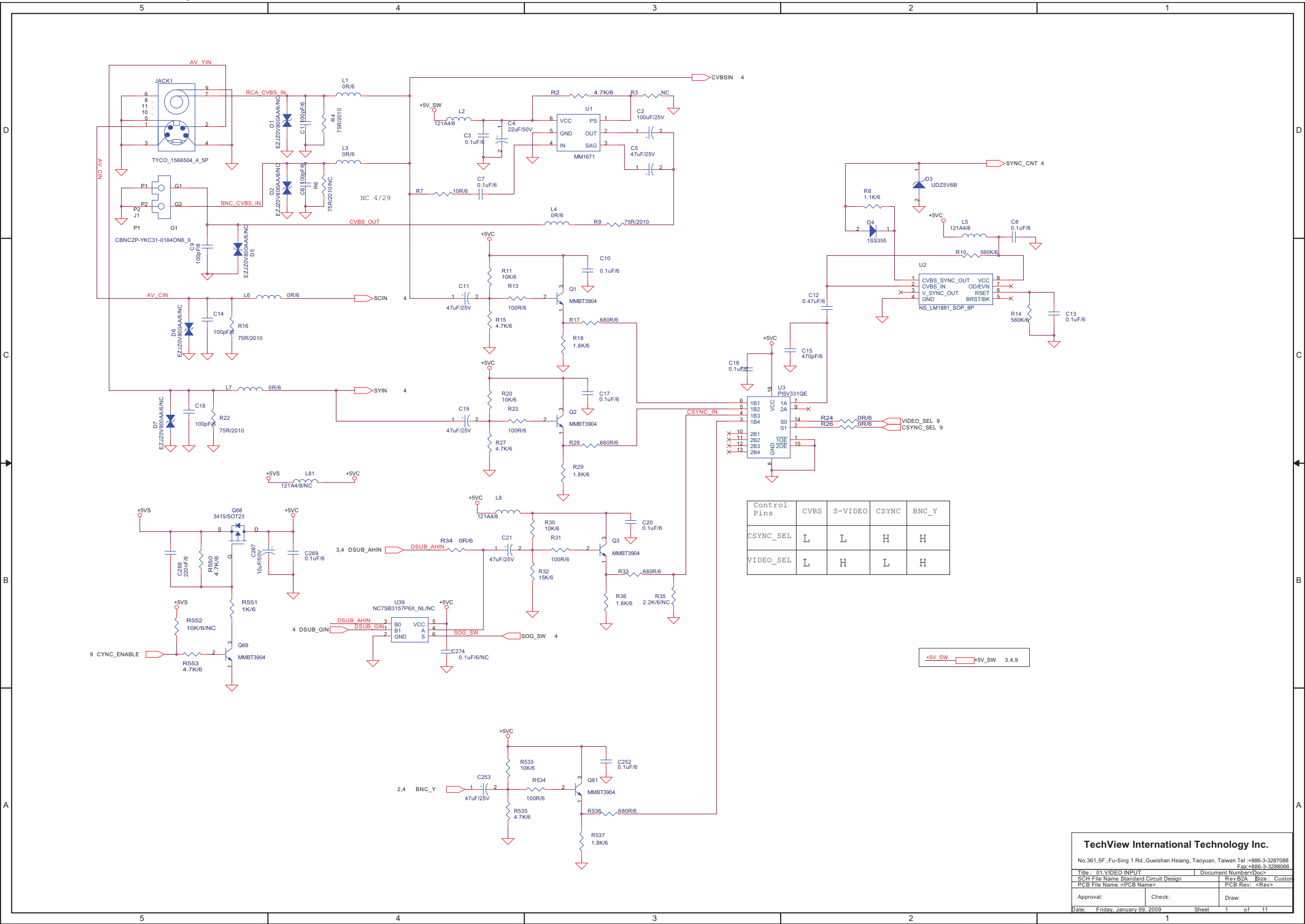
Main Board: SMCU



Main Board: Board to board connect



Extension Board: Video input



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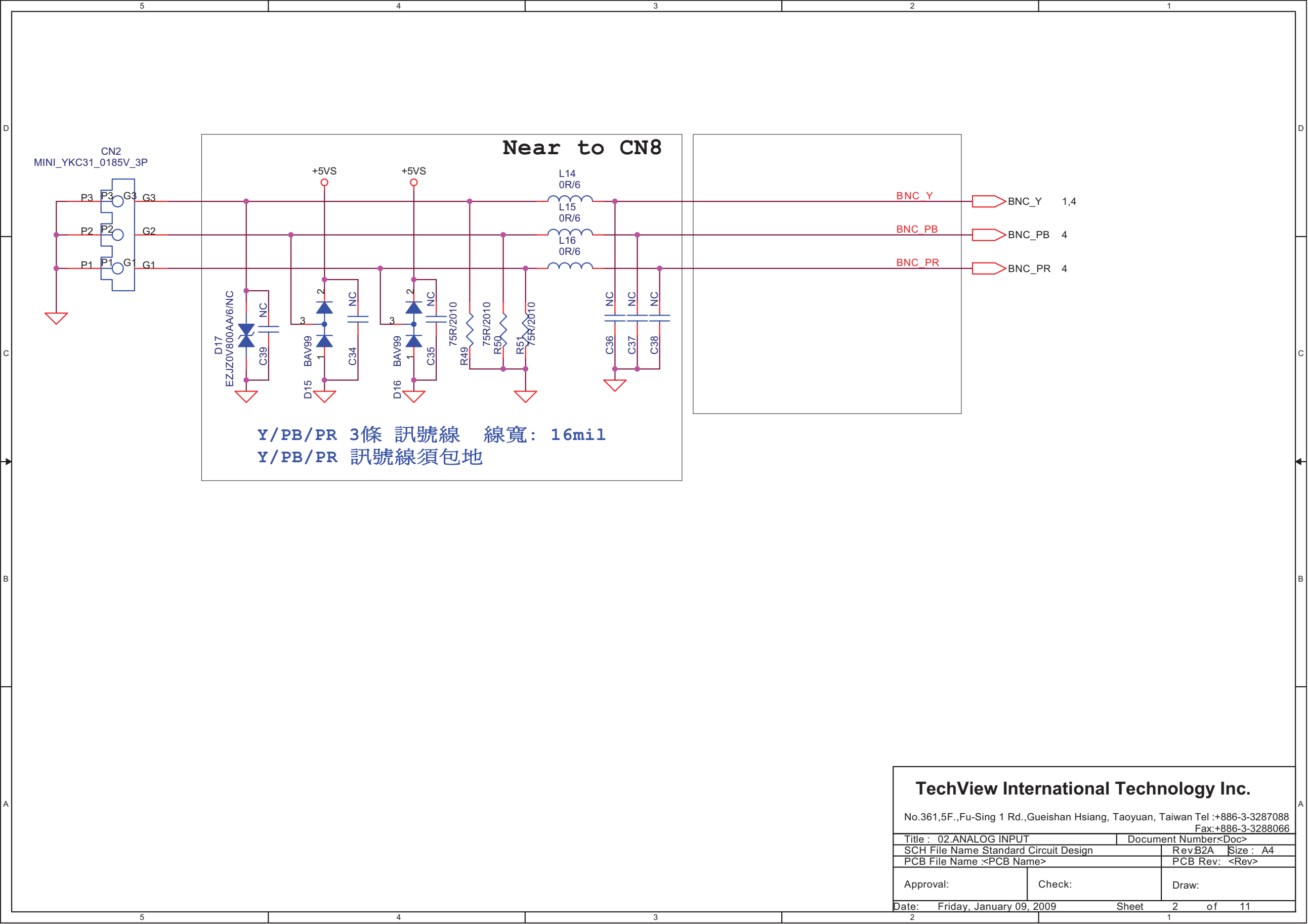
Title: 01 VIDEO INPUT Document Number: Doc: Rev B2A Size: Custom

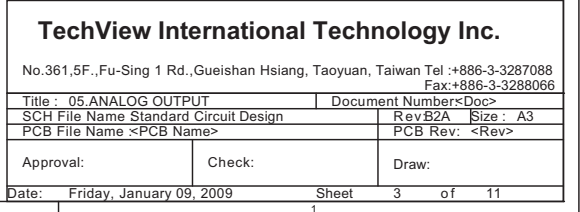
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Approval: Check: Draw:

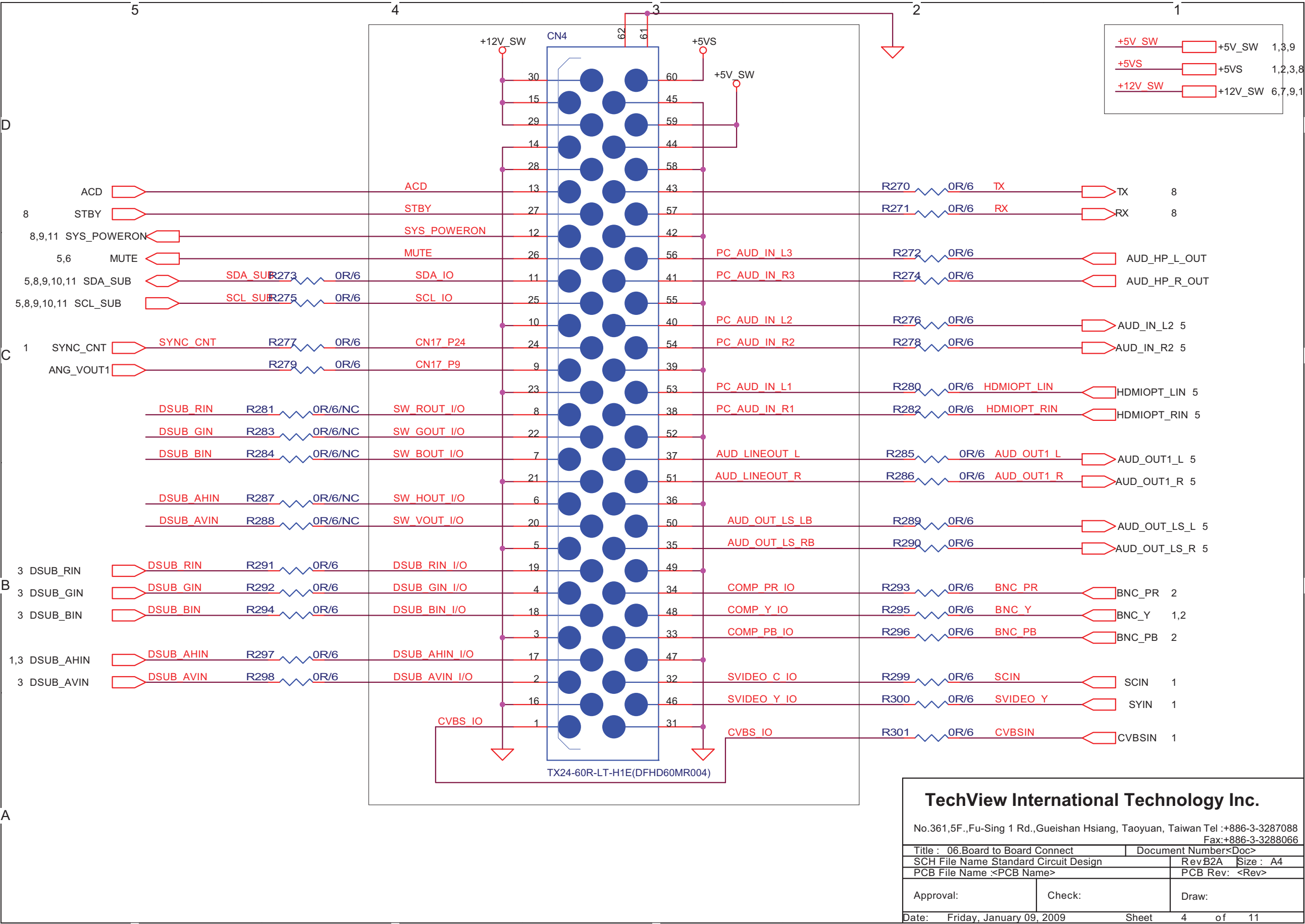
Date: Friday, January 09, 2009 Sheet 1 of 11

Extension Board: Analog input



$\frac{1}{2}u$ 距 : 7mil

Extension Board: Board to board connect



TechView International Technology Inc.

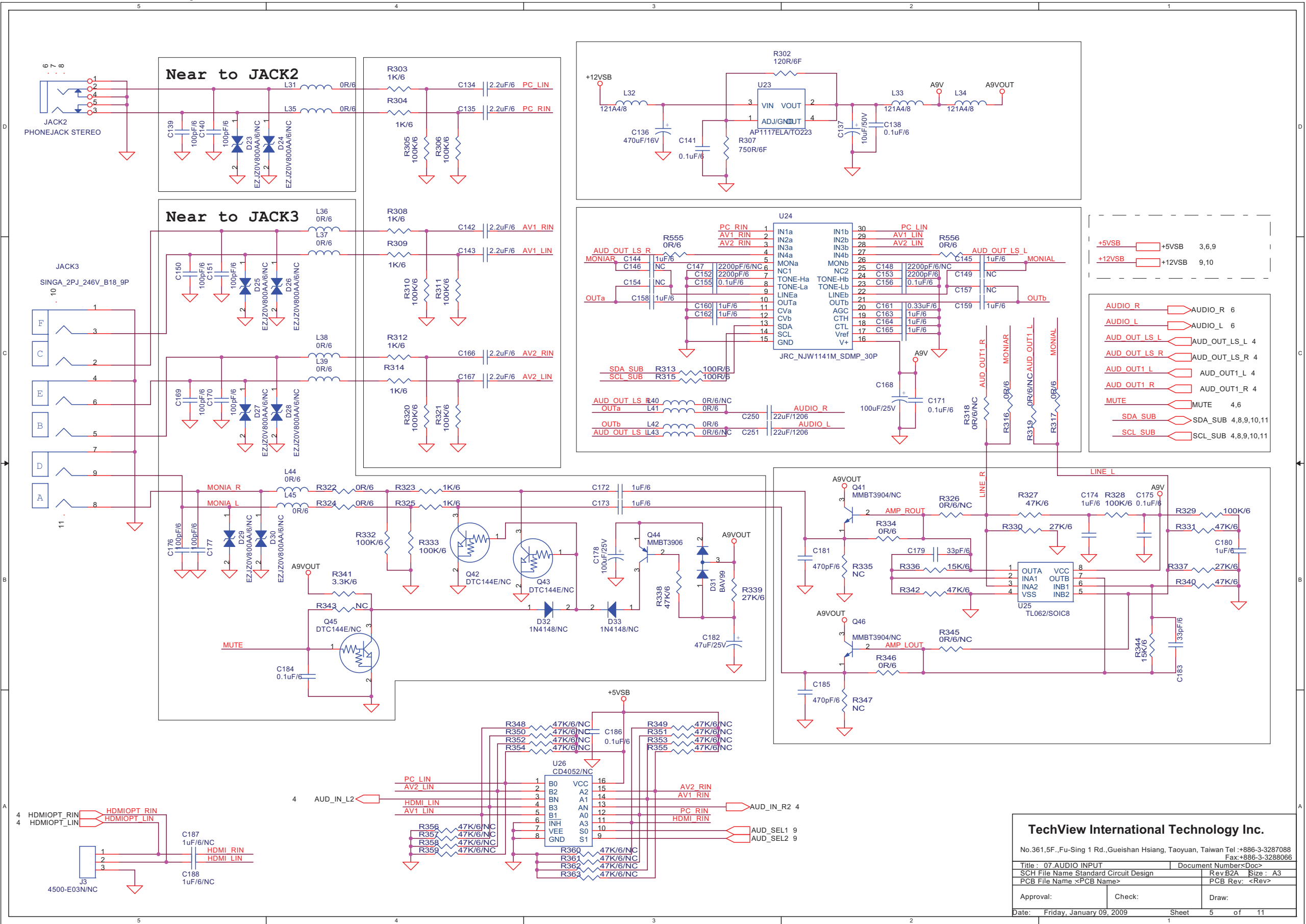
No.361,5F.,Fu-Sing 1 Rd.,Gueishan Hsiang, Taoyuan, Taiwan Tel :+886-3-3287088 Fax:+886-3-3288066

Title : 06.Board to Board Connect Document Number:<Doc>
SCH File Name Standard Circuit Design RevB2A Size : A4
PCB File Name :<PCB Name> PCB Rev: <Rev>

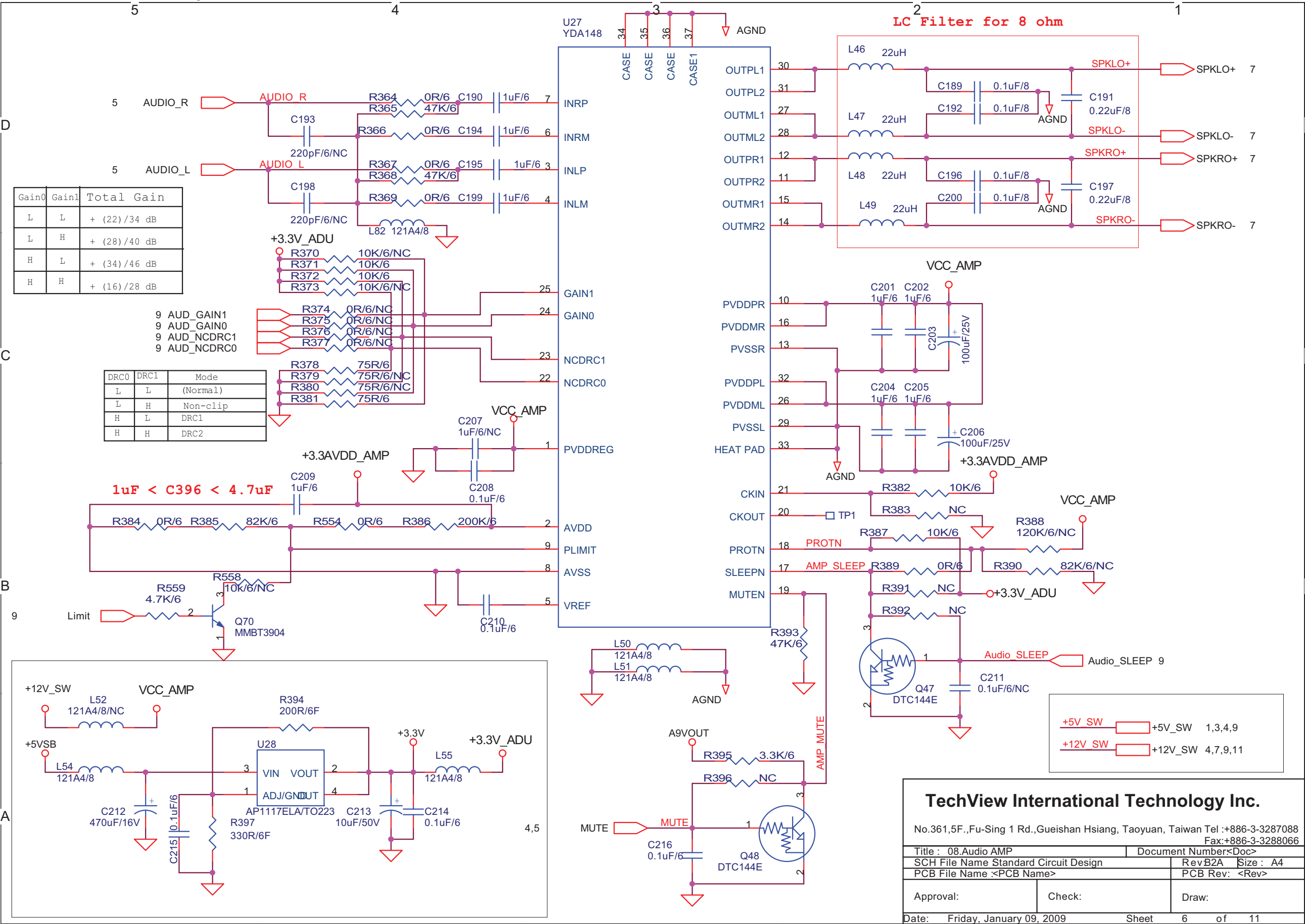
Approval: Check: Draw:
Date: Friday, January 09, 2009 Sheet 4 of 11

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Extension Board: Audio input



Extension Board: Audio amplifier



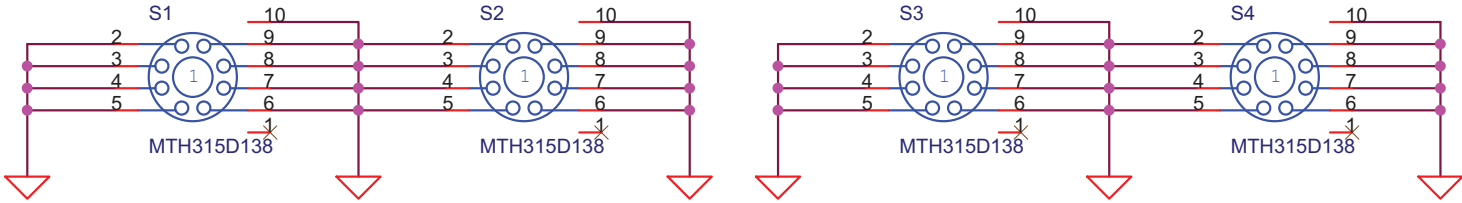
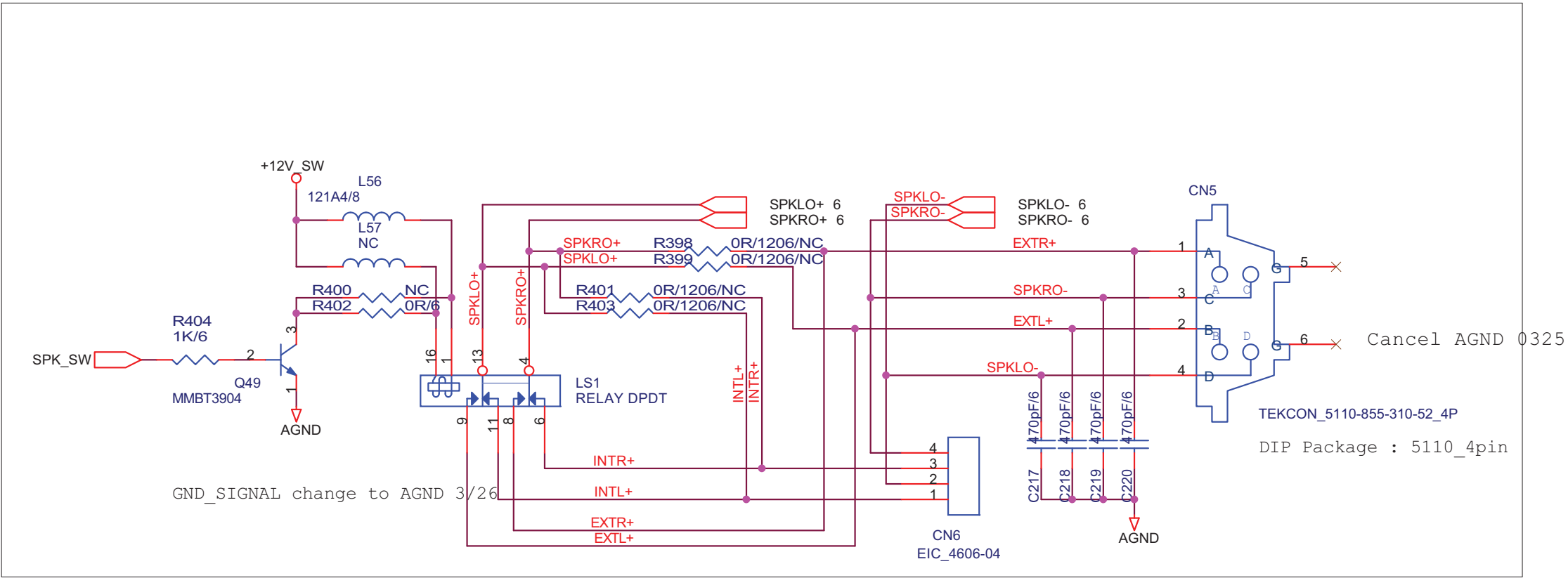
TechView International Technology Inc.

No.361,5F.,Fu-Sing 1 Rd.,Gueishan Hsiang, Taoyuan, Taiwan Tel :+886-3-3287088 Fax:+886-3-3288066

Title : 08.Audio AMP Document Number<Doc>
SCH File Name Standard Circuit Design RevB2A Size : A4
PCB File Name <PCB Name> PCB Rev: <Rev>

Approval: Check: Draw:
Date: Friday, January 09, 2009 Sheet 6 of 11

Extension Board: Speaker switch



+12V SW +12V_SW 4,6,9,11

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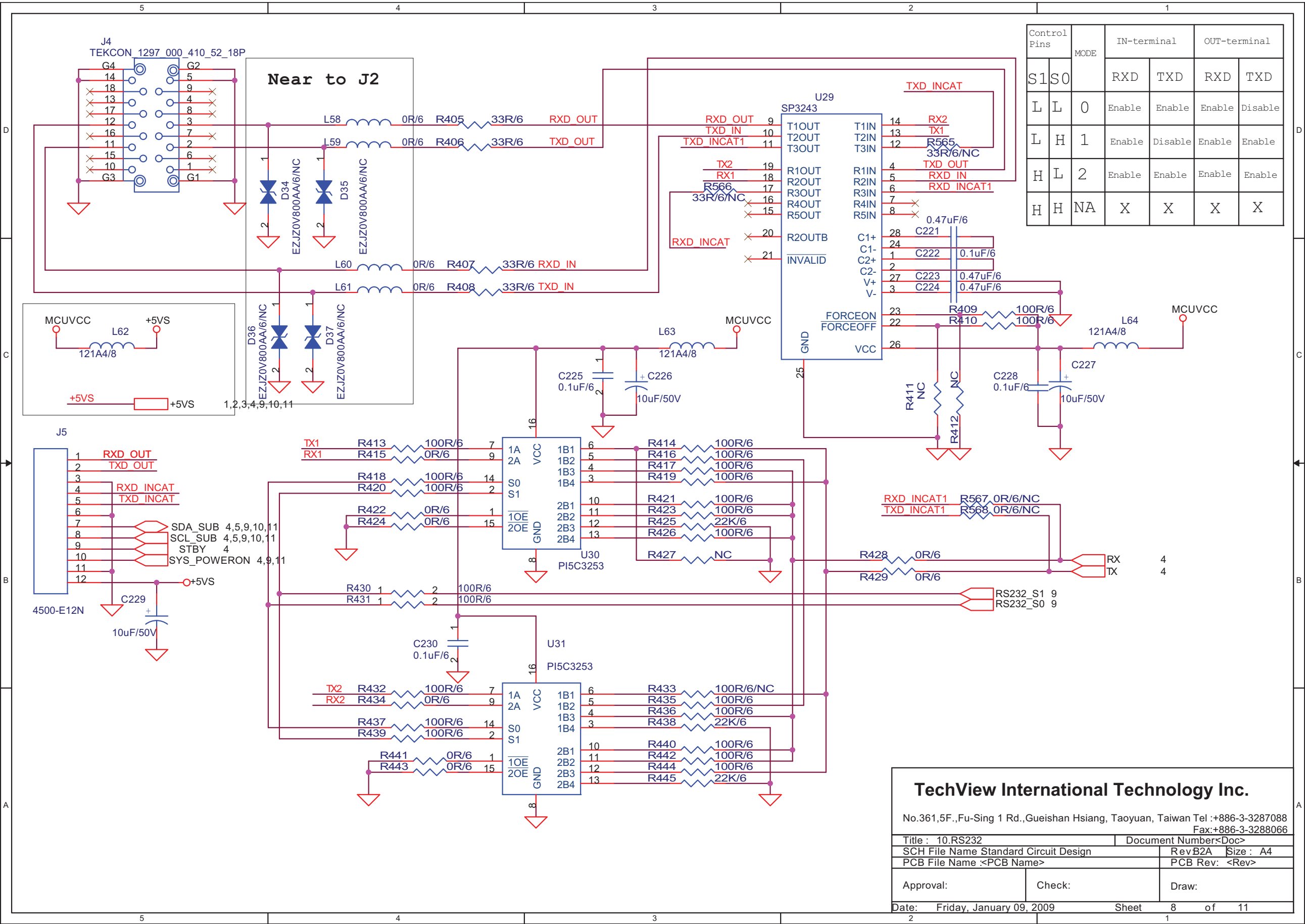
No.361,5F.,Fu-Sing 1 Rd.,Gueishan Hsiang, Taoyuan, Taiwan Tel :+886-3-3287088 Fax:+886-3-3288066

Title : 09.SPEAKER SW	Document Number<Doc>
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PCB File Name <PCB Name>	PCB Rev: <Rev>

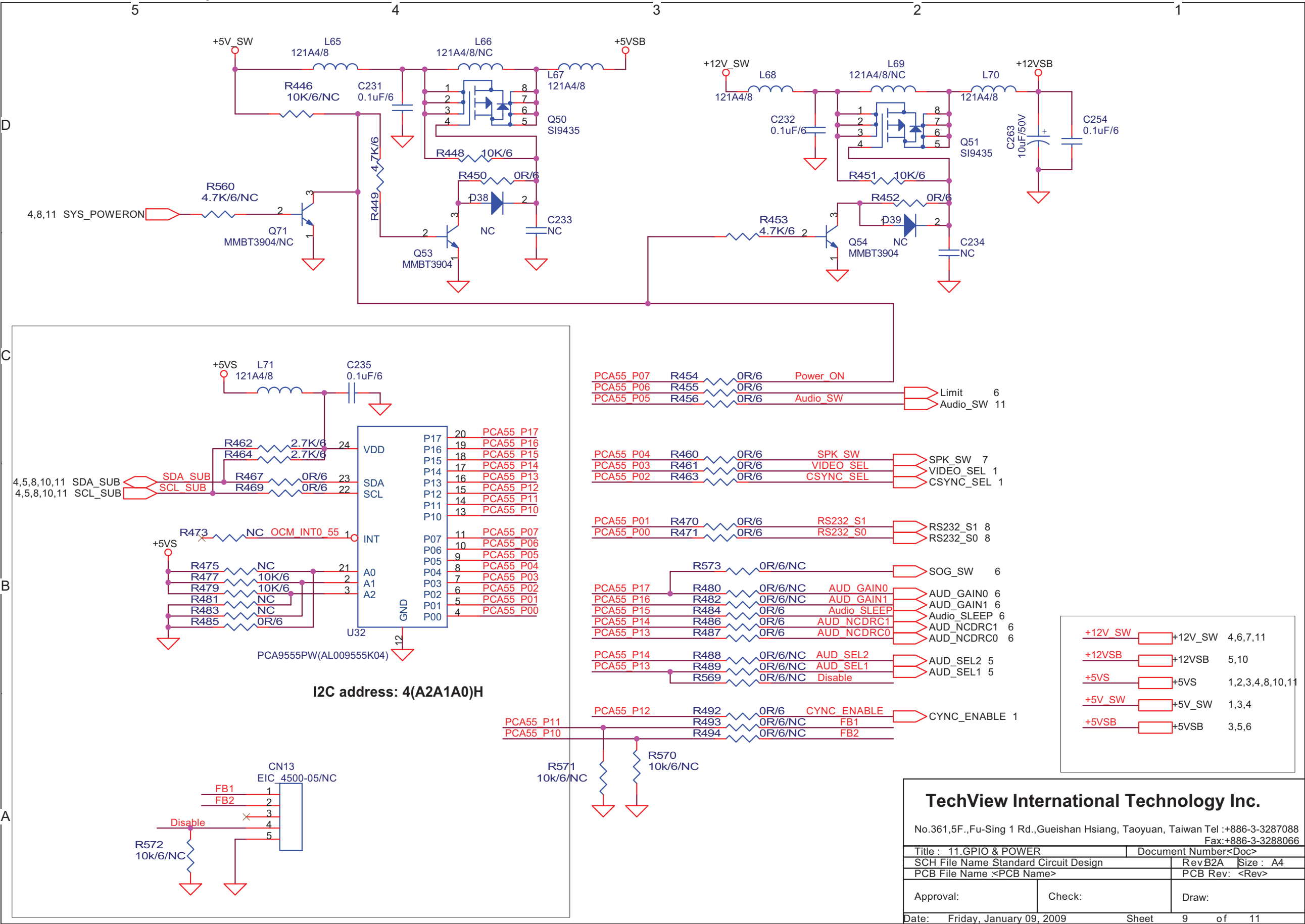
Approval:	Check:	Draw:
Date: Friday, January 09, 2009	Sheet 7 of 11	

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090204

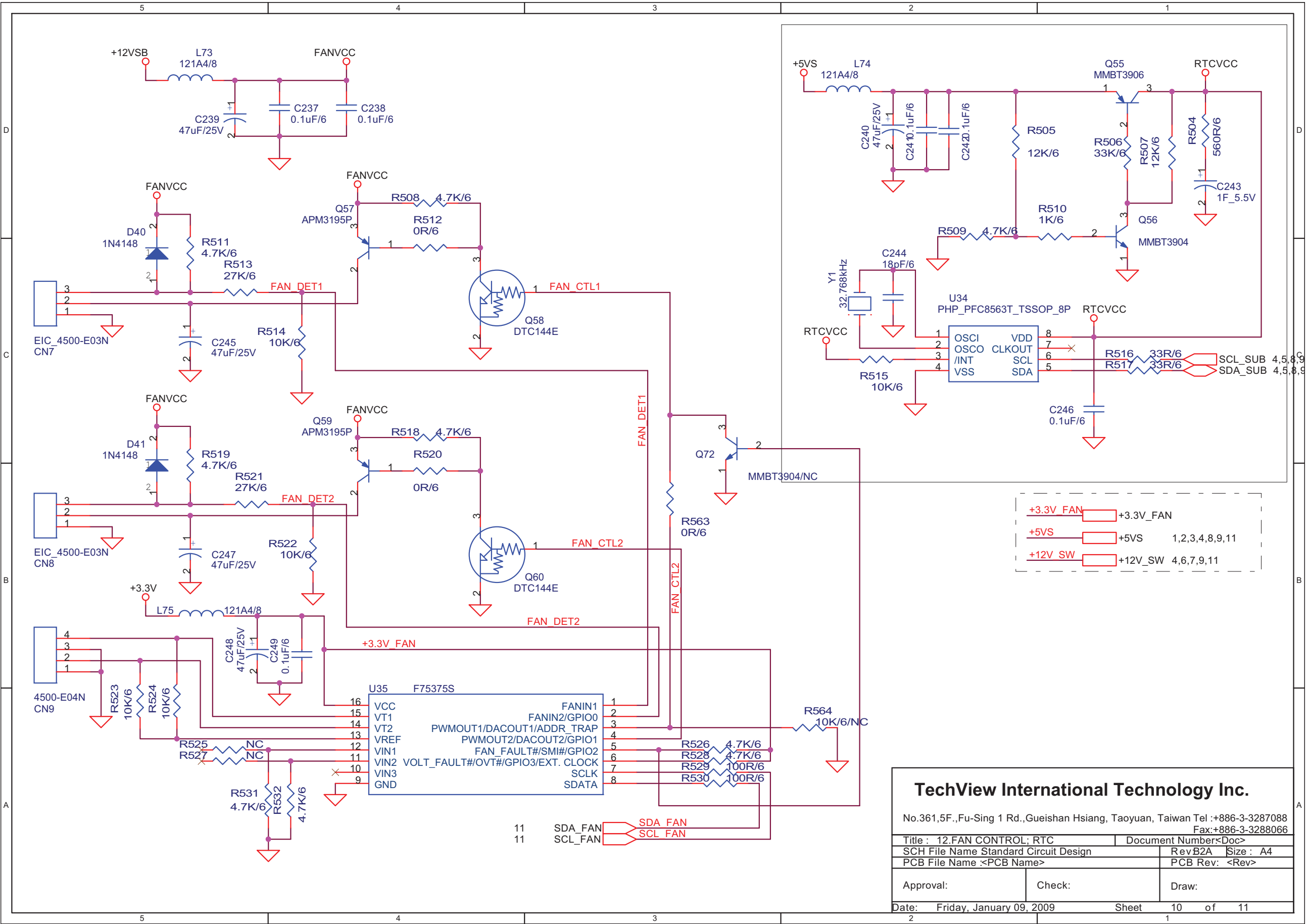
Extension Board: RS232



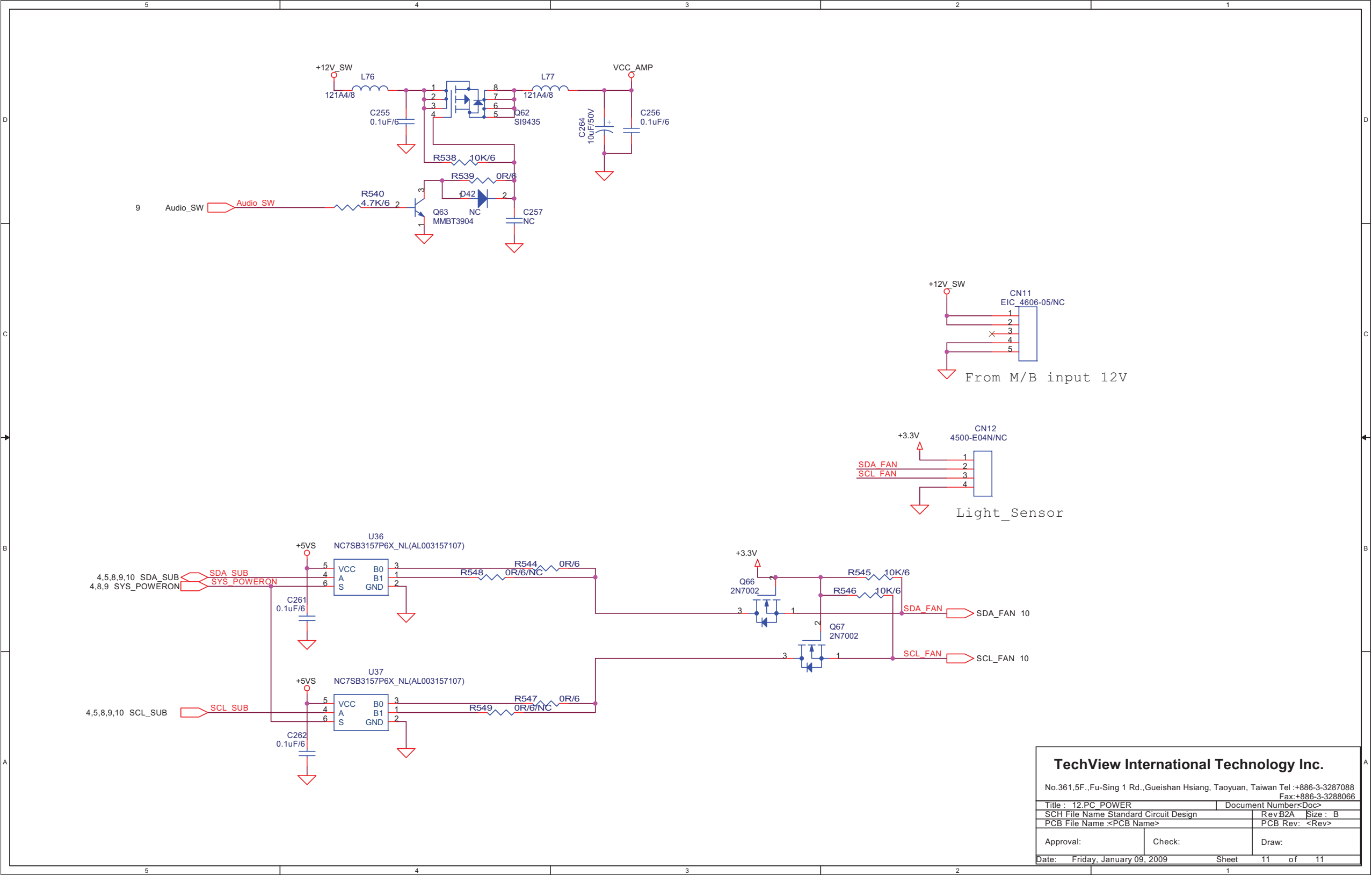
Extension Board: GP IO and power



Extension Board: Fan control; RTC



Extension Board: PC power



18430_531_090204.eps
090204

IR LED board

