

COLOR TELEVISION

SERVICE MANUAL

SERVICE MANUAL



LC-37K7



Functional Board List LCD/Plasma Televisions

Please note that this BOM list may vary from the original documentation. This part list supersedes the parts list contained within the body of the service manual. Please reference the part numbers below when ordering replacement boards of the servicing of this model.

If you require additional technical support, please contact our Tech Support line at **1-866-396-6322**

Model	Part Number	Description	Boards
FLM-3701	667-L37K5-20A	Power Supply Board KAS20	1
	667-L37K7-05	Keypress Board	1
	667-L37K7-09	IR Receive Board	1
	667-L37K7-10	Earphone Assy	1
	667-L37K7N-40	Audio/Video Processing Board	1
	667-L37K7N-56	CPU Board	1
	301-DL26K7-01A	Remote RC-D01-0A	1
	615-10507-02	Stand Assy	1
	615-20430-00	Speaker (left)	1
	615-20431-00	Speaker (right)	1

CONTENTS

Safety instructions.....	1
Adjustment instruction	3
Trouble shooting	5
Method of software upgrading	7
LC-37K7 working principle analysis.....	9
LC-37K7 block diagram.....	10
IC block diagram.....	11
Main assembly.....	18
Identification criteria for the bright spot and dark spot of the LCD screen.....	19
Wiring diagram	20
Troubleshooting charts.....	21
Schematic diagram	24

Attention: This service manual is only for service personnel to take reference with. Before servicing please read the following points carefully.

Safety instructions

1. Instructions

Be sure to switch off the power supply before replacing or welding any components or inserting/plugging in connection wire. Anti static measures to be taken (throughout the entire production process!):

- a) Do not touch here and there by hand at will;
- b) Be sure to use anti static electric iron;
- c) It's a must for the welder to wear anti static gloves.

Please refer to the detailed list before replacing components that have special safety requirements. Do not change the specs and type at will.

2. Points for attention in servicing of LCD

2.1 Screens are different from one model to another and therefore not interchangeable. Be sure to use the screen of the original model for replacement.

2.2 The operation voltage of LCD screen is 700-825V. Be sure to take proper measures in protecting yourself and the machine when testing the system in the course of normal operation or right after the power is switched off. Please do not touch the circuit or the metal part of the module that is in operation mode. Relevant operation is possible only one minute after the power is switched off.

2.3 Do not use any adapter that is not identical with the TV set. Otherwise it will cause fire or damage to the set.

2.4 Never operate the set or do any installation work in bad environment such as wet bathroom, laundry, kitchen, or nearby fire source, heating equipment and devices or exposure to sunlight etc. Otherwise bad effect will result.

2.5 If any foreign substance such as water, liquid, metal slices or other matters happens to fall into the module, be sure to cut the power off immediately and do not move anything on the module lest it should cause fire or electric shock due to contact with the high voltage or short circuit.

2.6 Should there be smoke, abnormal smell or sound from the module, please shut the power off at once. Likewise, if the screen is not working after the power is on or in the course of operation, the power must be cut off immediately and no more operation is allowed under the same condition.

2.7 Do not pull out or plug in the connection wire when the module is in operation or just after the power is off because in this case relatively high voltage still remains in the capacitor of the driving circuit. Please wait at least one minute before the pulling out or plugging in the connection wire.

2.8 When operating or installing LCD please don't subject the LCD components to bending, twisting or extrusion, collision lest mishap should result.

2.9 As most of the circuitry in LCD TV set is composed of CMOS integrated circuits, it's necessary to pay attention to anti statics. Before servicing LCD TV make sure to take anti static measure and ensure full grounding for all the parts that have to be grounded.

2.10 There are lots of connection wires between parts behind the LCD screen. When servicing or moving the set please take care not to touch or scratch them. Once they are damaged the screen

would be unable to work and no way to get it repaired.

2.11 Special care must be taken in transporting or handling it. Exquisite shock vibration may lead to breakage of screen glass or damage to driving circuit. Therefore it must be packed in a strong case before the transportation or handling.

2.12 For the storage make sure to put it in a place where the environment can be controlled so as to prevent the temperature and humidity from exceeding the limits as specified in the manual. For prolonged storage, it is necessary to house it in an anti-moisture bag and put them altogether in one place. The ambient conditions are tabulated as follows:

Temperature	Scope for operation	0 ~ +50 °C
	Scope for storage	-20 ~ +60 °C
humidity	Scope for operation	20% ~ 85%
	Scope for storage	10% ~ 90%

2.13 Display of a fixed picture for a long time may result in appearance of picture residue on the screen, as commonly called “ghost shadow”. The extent of the residual picture varies with the maker of LCD screen. This phenomenon doesn’t represent failure. This “ghost shadow” may remain in the picture for a period of time (several minutes). But when operating it please avoid displaying still picture in high brightness for a long time.

3. Points for attention during installation

3.1 The front panel of LCD screen is of glass. When installing it please make sure to put it in place.

3.2 For service or installation it’s necessary to use specified screw lest it should damage the screen.

3.3 Be sure to take anti dust measures. Any foreign substance that happens to fall down between the screen and the glass will affect the receiving and viewing effect

3.4 When dismantling or mounting the protective partition plate that is used for anti vibration and insulation please take care to keep it in intactness so as to avoid hidden trouble.

3.5 Be sure to protect the cabinet from damage or scratch during service, dismantling or mounting.

Alignment instruction

1 Alignment equipment

PM5518 (video signal generator)

K-7253 (VGA signal generator)

CA210 (white balancer)

2 Alignment flow-chart

The alignment flow-chart is shown as fig-1

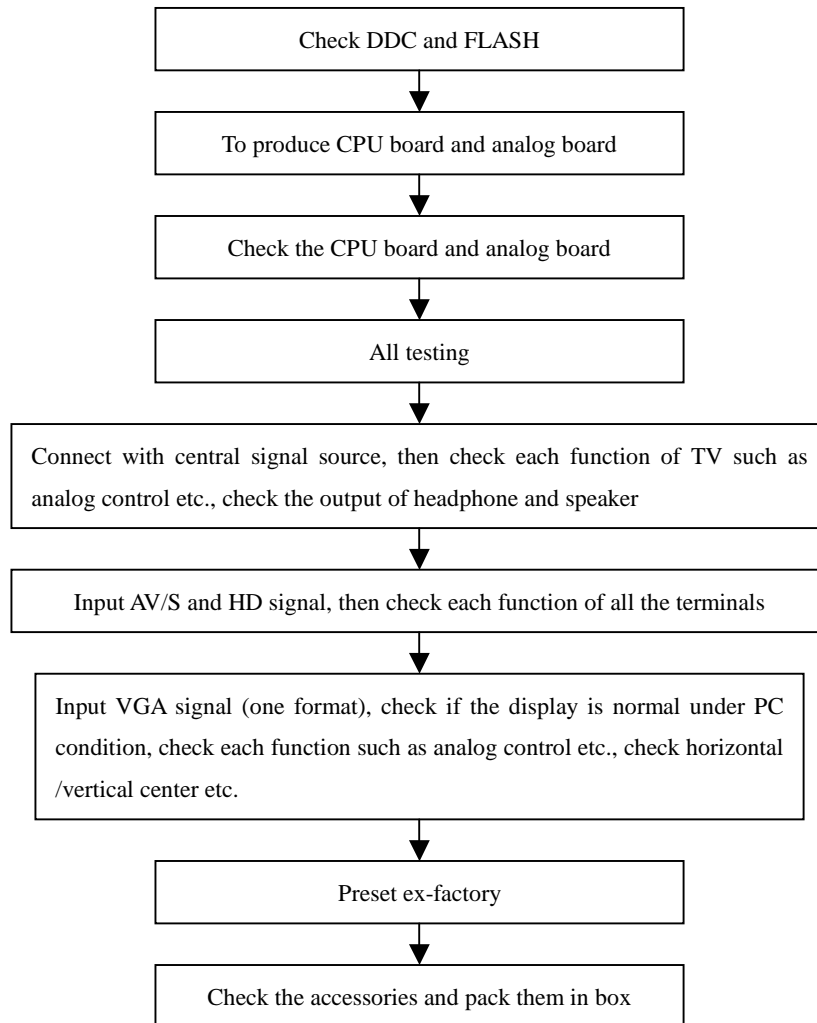


Fig-1 adjustment flow-chart

3 Unit adjustment

Connect CPU board and analog board according to wiring diagram of 203-L37K70-01JL, connect with power and observe the display.

Method for entering factory menu: press “VOL+”, “MUTE” and “VIDEO” repeatedly to enter factory menu; press “ENTER” to select different items when the first line of each adjustment item just lights up; input VGA and DVI signal, then select the “mode” item; after that, you can press “enter” to select three kinds of color temperature namely 6500K, 9300K and 12000K press “MENU” to exit.

Note: the white balance adjustment should be done under “nature” picture mode.

3.1 EEPROM initialization

Enter the first page of factory menu, select “clear eeprom” and then press “enter”, shut down the unit after “ok” appears.

3.2 VGA/DVI channel adjustment

3.2.1 Preset VGA channel mode

Input VGA signal (PATTERN 5: Final Test) of K-7253, select TIME301(640*350/70Hz), press “AUTO” to do the auto adjustment until the screen is filled with picture. Use the same method to do auto adjustment for the following items:

TIME302 (720*400/70Hz)	TIME303 (640*480/60Hz)	TIME311 (800*600/60Hz)
TIME313 (1024*768/60Hz)	TIME315 (640*480/75Hz)	TIME316 (800*600/75Hz)
TIME317 (1024*768/75Hz)	TIME319 (1280*1024/75Hz)	TIME339 (1280*1024/60Hz)

3.2.2 ADC adjustment of VGA channel

Adjust ADC-gain to 15.

3.2.3 White balance adjustment VGA/DVI channel

Input K-7253 8 level gray-scale signal of TIME311 and PATTERN474, enter white balance adjustment menu; adjust the third and seventh levels using white balance.

Select 6500k of “mode”, adjustment offset_R, offset_G and offset_B, let the color coordinate of the third level be 308 and 316 and its brightness be 16nit more or less. Adjust gain_R, gain_G and gain_B, let the color coordinate of seventh level be 308 and 316. Adjustment offset_R, offset_G, offset_B, gain_R, gain_G and gain_B repeatedly until the value of the two levels gray-scale be 308 and 316.

Select 9300k of “mode”, adjustment offset_R,offset_G and offset_B,let the color coordinate of the third level be 285 and 290 and its brightness be 16nit more or less. Adjust gain_R,gain_G and gain_B, let the color coordinate of seventh level be 285 and 290.

Select 12000k of “mode”, adjustment offset_R, offset_G and offset_B, let the color coordinate of the third level be 270 and 283 and its brightness be 16nit more or less. Adjustment offset_R, offset_G, offset_B, gain_R, gain_G and gain_B repeatedly until the value of the two levels gray-scale be 270 and 283.

Note: gain_R, gain_G, gain_B is value not above 128 and let its value 128 at least.

3.3 Adjustment TV channel

3.3.1 Adjustment VCO, OPTION, sub-brightness and sub-contrast

Input AV color bar signal (PM5518 COLOR BAR 100%) to VIDEO 1 terminal, enter the first page of factory menu, press “enter” selecting “auto color”, display “OK” after 2 seconds; then you can finish the VCO adjustment; set the value of “option” to 10, “back light” to 0 and “s-bright” to 140 as well as S-contrast to 140. set the MaxVolume according to its product standard.

3.3.2 white balance adjustment of TV channel

Input AV signal (PM5518, NTSC system, 8 level gray-scale signal), enter adjustment menu of white balance, adjust the third level and seventh level using white balance. Adjust offset_R, offset_G and offset_B to let color coordinate of the third level be 270 and 275 and its brightness be about 21nit. fixate gain_B to 128, adjust gain_R, gain_G to color coordinate of the seventh level be 280 and 280. adjust offset_R, offset_G,offset_B, gain_R and gain_G, repeatedly using the same method until

the value of the two levels gray-scale be the specified value.

3.4 white balance adjustment YPbPr channel

input YpbPr signal of K-7253 to YPbPr-1 terminal, input TIME380(480i) PATTERN471 8 level gray-scale signal, set the value of Hor-width to 23, Ver-width to 5, S-bright to 120 and S-contrast to 140. Enter adjustment menu of white balance, adjust the third level using white balancer. Adjust offset_R, offset_G and offset_B, to let color coordinate of the third level be 270 and 275 and its brightness be about 24nit.

Input 8 level gray-scale signal of TIME392(480p), TIME394(720p) and TIME396(1080i) separately, repeat the above operations to let color coordinate of the third level be 270 and 275 and its brightness be about 24nit.

4 Performance check

4.1 TV function

Enter searching menu → auto search, connect RF-TV terminal with central signal source and check if there are channels be skipped

4.2 AV/S, YpbPr terminals

Input AV/S, HD signal, check if it is normal.

4.3 VGA terminal

Insert VGA terminal, input VGA format signal of 640 X 480@60 Hz, check if the display is normal. If interference exists, press the auto adjust button on remote control again and check if it is normal.

4.4 DVI terminal

Insert DVI terminal, input signal of 640 X 480@60 Hz signal and check if the display is normal.

4.5 check sound channel

Check the speaker and headphone of each channel.

4.6 presetting before ex-factory

item	setting
Picture mode	NATURE
Sound mode	NEWS
N/R	WEAK
SCREEN	16:9

item	setting
OSD language	English
VGA color temperature	9300
SPEAKER	ON
HEAD PHONE	ON

item	setting
BALANCE	50
SRS	OFF
CCD	OFF
Turn off	TV

Trouble shooting

Before servicing please check to find the possible causes of the troubles according to the table below.

1. Antenna(signal):

Picture is out of focus or jumping	<ul style="list-style-type: none"> ● Bad status in signal receiving ● Poor signal ● Check if there are failures with the electrical connector or the antenna. ● Check if the antenna is properly connected.
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Fringe in picture	<ul style="list-style-type: none"> ● Check if the antenna is correctly oriented. ● Maybe there is electric wave reflected from hilltop or building.
Picture is interfered by stripe shaped bright spots	<ul style="list-style-type: none"> ● Possibly due to interference from automobile, train, high voltage transmission line, neon lamp etc. ● Maybe there is interference between antenna and power supply line. Please try to separate them in a longer distance. ● Maybe the shielded-layer of signal wire is not connected properly to the connector.
There appear streaks or light color on the screen	<ul style="list-style-type: none"> ● Check if interfered by other equipment and if interfered possibly by the equipment like transmitting antenna, non professional radio station and cellular phone.

2.TV set:

Symptoms	Possible cause
Unable to switch the power on	<ul style="list-style-type: none"> ● Check to see if the power plug has been inserted properly into the socket.
No picture and sound	<ul style="list-style-type: none"> ● Check to see if the power supply of liquid crystal TV has been switched on. (as can be indicated by the red LED at the front of the TV set) ● See if it's receiving the signal that is transmitted from other source than the station ● Check if it's connected to the wrong terminal or if the input mode is correct. ● Check if the signal cable connection between video frequency source and the liquid crystal TV set is correct.
Deterioration of color phase or color tone	<ul style="list-style-type: none"> ● Check if all the picture setups have been corrected.
Screen position or size is not proper	<ul style="list-style-type: none"> ● Check is the screen position and size is correctly set up.
Picture is twisted and deformed	<ul style="list-style-type: none"> ● Check to see if the picture-frame ratio is properly set up.
Picture color changed or colorless	<ul style="list-style-type: none"> ● Check the "Component" or "RGB" settings of the liquid crystal TV set and make proper adjustment according to the signal types.
Picture too bright and there is distortion in the brightest area	<ul style="list-style-type: none"> ● Check if the contrast setting is too high. ● Possibly the output quality of DVD broadcaster is set too high. ● It maybe also due to improper terminal connection of the video frequency signal in a certain position of the system.
Picture is whitish or too bright in the	<ul style="list-style-type: none"> ● Check if the setting for the brightness is too high

darkest area of the picture	<ul style="list-style-type: none"> ● Possibly the brightness grade of DVD player (broadcaster) is set too high.
No picture or signal produced from the displayer if “XXX in search” appears.	<ul style="list-style-type: none"> ● Check if the cable is disconnected. ● Check if it’s connected to the proper terminal or if the input mode is correct.
There appears an indication - “outside the receivable scope)	<ul style="list-style-type: none"> ● Check if the TV set can receive input signal. The signal is not correctly identified and VGA format is beyond the specified scope.
Remote control cannot work properly	<ul style="list-style-type: none"> ● Check if the batteries are installed in the reverse order. ● Check if the battery is effective. ● Check the distance or angle from the monitor. ● Check if there is any obstruct between the remote control and the TV set. ● Check if the remote control signal- receiving window is exposed to strong fluorescence.
No picture and sound, but only hash.	<ul style="list-style-type: none"> ● Check if the antenna cable is correctly connected, or if it has received the video signal correctly.
Blur picture	<ul style="list-style-type: none"> ● Check if the antenna cable is correctly connected. ● Of if it has received the right video signal.
No sound	<ul style="list-style-type: none"> ● Check if the “mute” audio frequency setting is selected. ● Check if the sound volume is set to minimum. ● Make sure the earphone is not connected. ● Check if the cable connection is loose.
When playing VHS picture search tape, there are lines at the top or bottom of the picture.	<ul style="list-style-type: none"> ● When being played or in pause VHS picture search tape sometimes can’t provide stable picture, which may lead to incorrect display of the liquid crystal TV, In this case please press “auto” key on the remote control so as to enable the liquid crystal TV set to recheck the signal and then to display correct picture signal

Method of software upgrading

Steps of software upgrading are as follows:

1. Select a serial connection wire and a VGA connection wire and then connect them by means of a patch panel;
 2. Use a serial wire to connect the PC to the patch panel and set TV set to off state;
- Open the software upgrade file holder and double click



FlashUpgraderNT (use under window 2000/XP/NT)

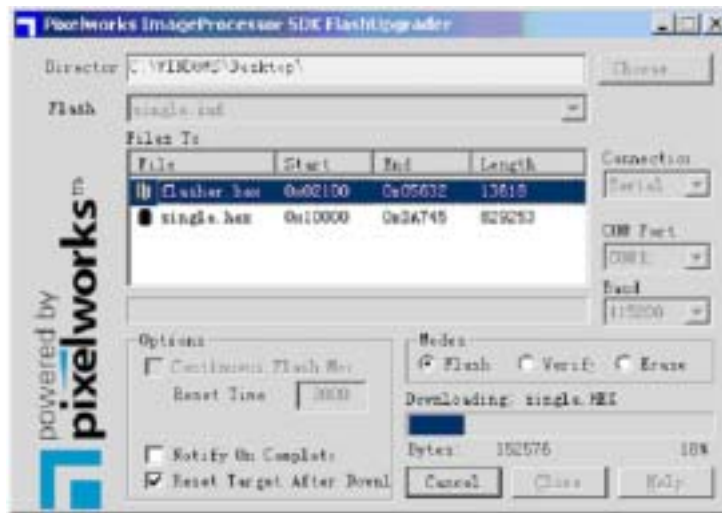


FlashUpgrader (use under window 98),

The following interfaces will show up after running the program:



Based on the computer features, set up the serial port (COM Port). Select corresponding serial port (if it's unable to FLASH WRITE, change to another port). Baud is selected to be 115200. Then select Reset Target After Download. Click FLASH pushbutton, it's ready to run. For other settings, please refer to the Fig. Above (already defaulted by the system, normally no need to change). Switch on TV set the FLASH write program begins to run;



After FLASH write is over, push button "cancel" will become flash. Then shut the main power supply and it's OK just switch it on again.

Note: Do not shut the power off or turn the TV set on during the FLASH write. Otherwise it may lead to no way for flash to rewrite.

LC-37K7 working principle analysis

Please refer to LC-37K7 BLOCK DIAGRAM in order to know the working principle of LC-37K7 brief introduction to its signal flow is shown as follows:

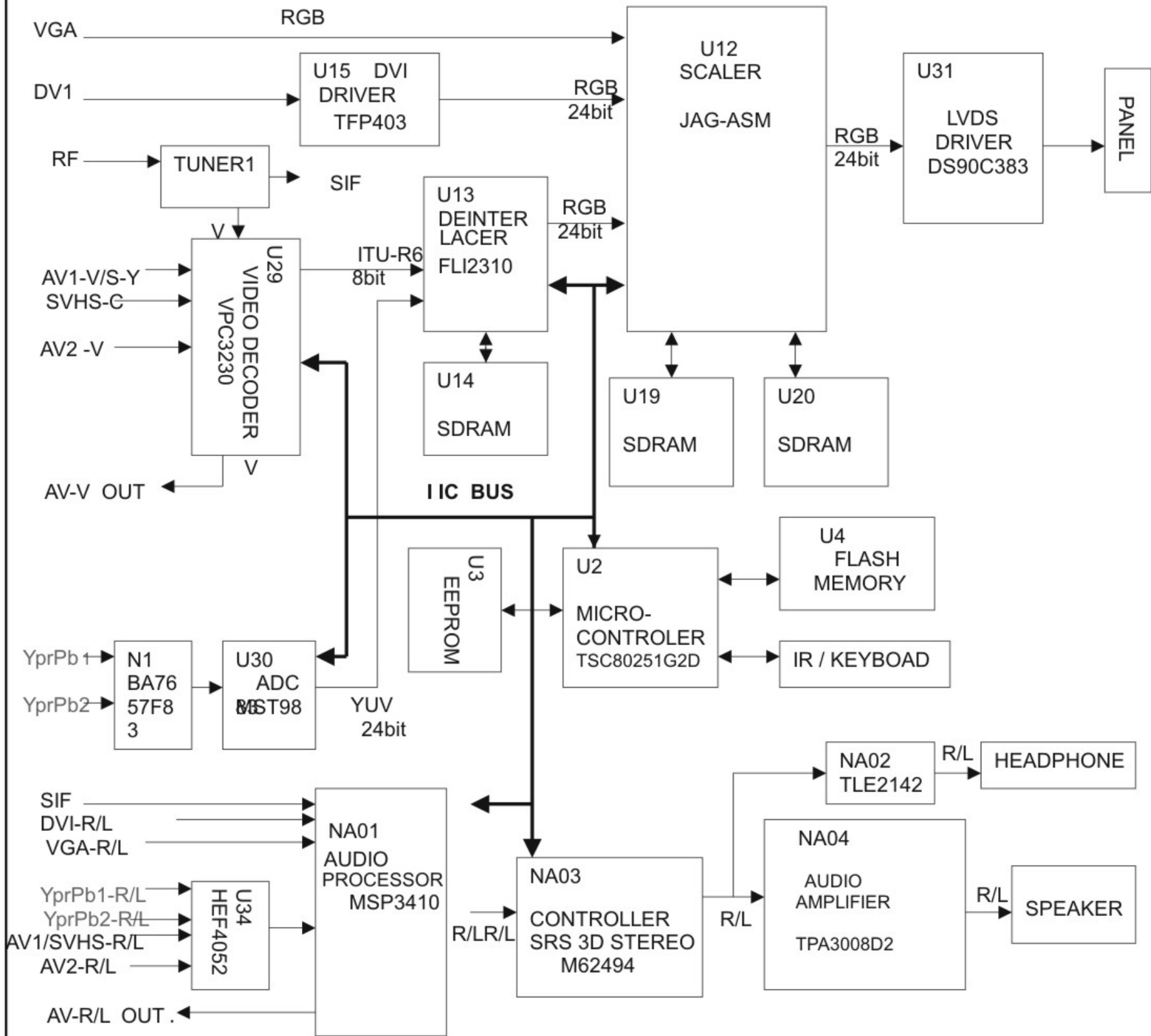
RF signal produces composite color television signal through TUNER201, the signal together with AV1/SVHS(SVHS priority) and AV2 etc. are sent to U29 VPC3230D to decode and do switching selection. In addition to decode the selected video signal, part of the selected video signal is also sent to AV terminal and 21 line decoder U32 Z86229 which is exclusive to decode CCD/V-CHIP to decode. After decoded by U32, the signal will be sent back to U29 in the form of R G B and FB, then it will be added to the decoded picture and then it will be sent to U13 FL12310 in the form of ITU-R656 signal format of 8BIT to do line-by-line process.

Send two ways YPRPB signal to U30 MST9883 through selection by N2 PI5V330 in order to do the A/D conversion. After this, the signal will be converted into YUV signal of 24BIT, send it to FL12310 also.

After a series of procedure such as matrix, chroma and tint etc. by FL12310, the two ways signal will be converted into RGB of 24bit, then send it to the main processing chip U12 JAG-ASM. send RGB signal it to the main processing chip U12 at the same time. There has another signal which should be sent to U12 together with the above two kinds of signal that is: RGB signal of 24BIT produced by DV1 through U15 TFP403/501. Do the picture format processing for the three kinds of signal in U12. Firstly do the A/D conversion for RGB signal of VGA, then do the switching selection together with the other two kinds of signal. And then they will be converted into 1024*768 format through digital display processing such as OSD and GAMMA correction etc. output it in the form of 24BIT RGB signal. Send it to LVDS convertor U31 DS90C383A, then it will be converted into signal format which can be accepted by LCD screen namely 3 low-voltage differential signal and 1 clock signal, finally send it to LCD screen to do the picture display PWM of U12 can also be used to control the brightness of back light-source.

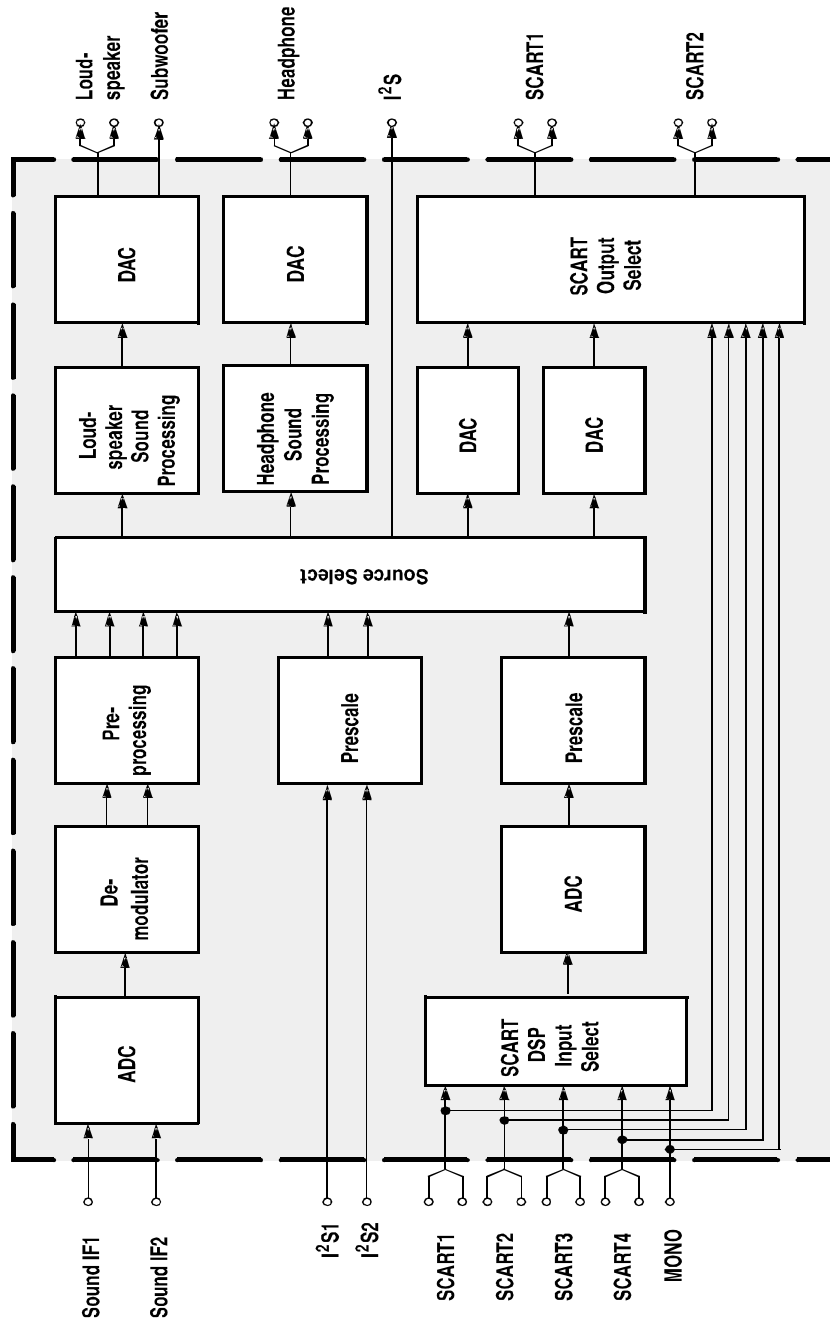
Send SIF (the second IF) outputted by tuner to audio processor NA01 MSP3420; send YPRPB and audio signal of DVI to NA01 through switching selection by U34 HEF4052; Send AV1/SVHS, AV2 and audio signal of VGA to NA01 also. Firstly SIF will be done the switching selection together with another four ways of audio signal, finally volume control and sound effect processing will be done. Output left-right sound channel signal R/L. one will be sent to SRS sound field processor NA03 M62494 to do SRS processing and finally amplified by NA03 and NA04 TPA3008D2 to drive the speaker, one will be used to drive the headphone through NA02 TLE2142 and the last part will be outputted as R/L of AV OUT.

LC-37K7 Block diagram



IC block diagram

1.MSP3420



Pins description:

2,3 PIN: SCL,SDA applied for control the operation of IC .

27,28 PIN: output left and right sound channel R/L to speaker processor.

36,37 PIN:AV OUT of sound R/L.

47,48 PIN:D4-1/D4-2/PCMCIA selected input R/L.

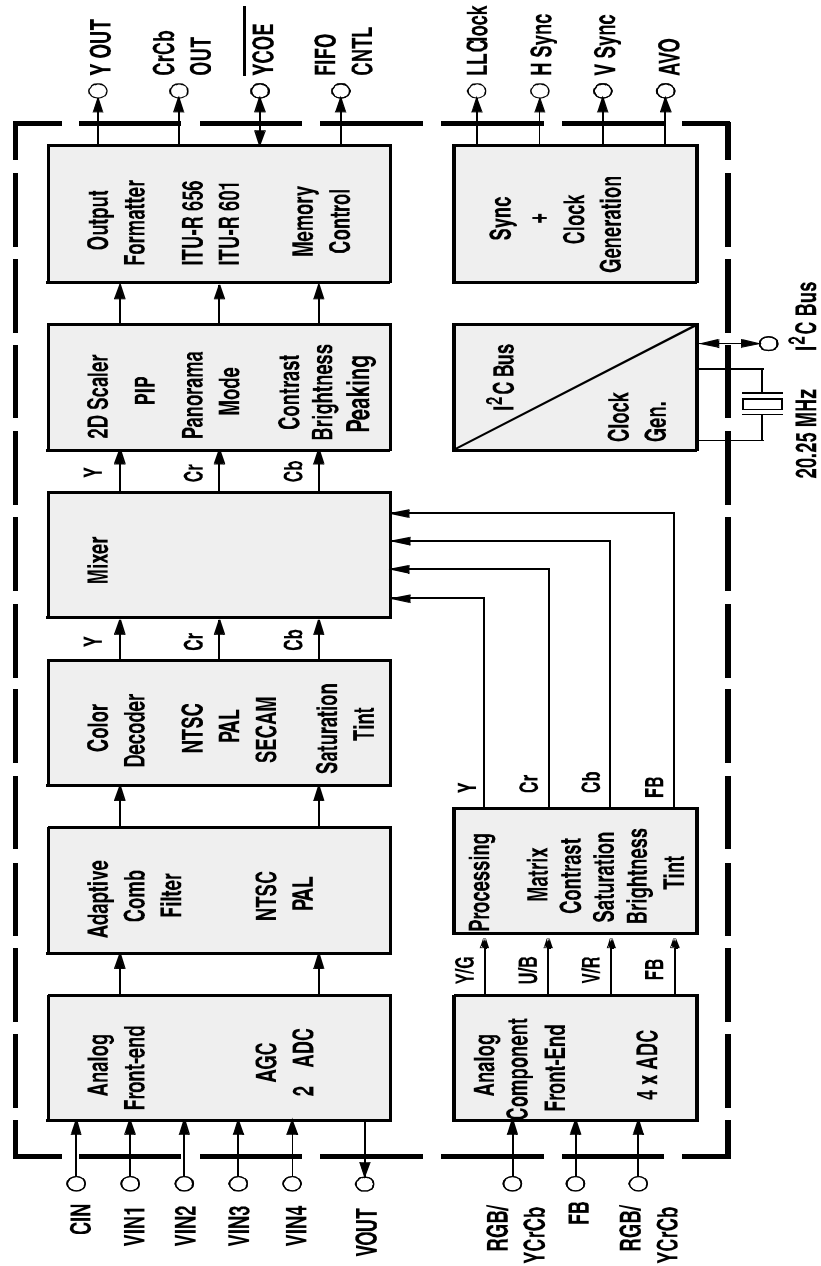
50,51 PIN:Input of VGA. R/L

53,54 PIN:Input of AV1/SVHS and AV2 R/L.

56,57 PIN:Input R/L of BS

67 PIN: Input TV SIF.

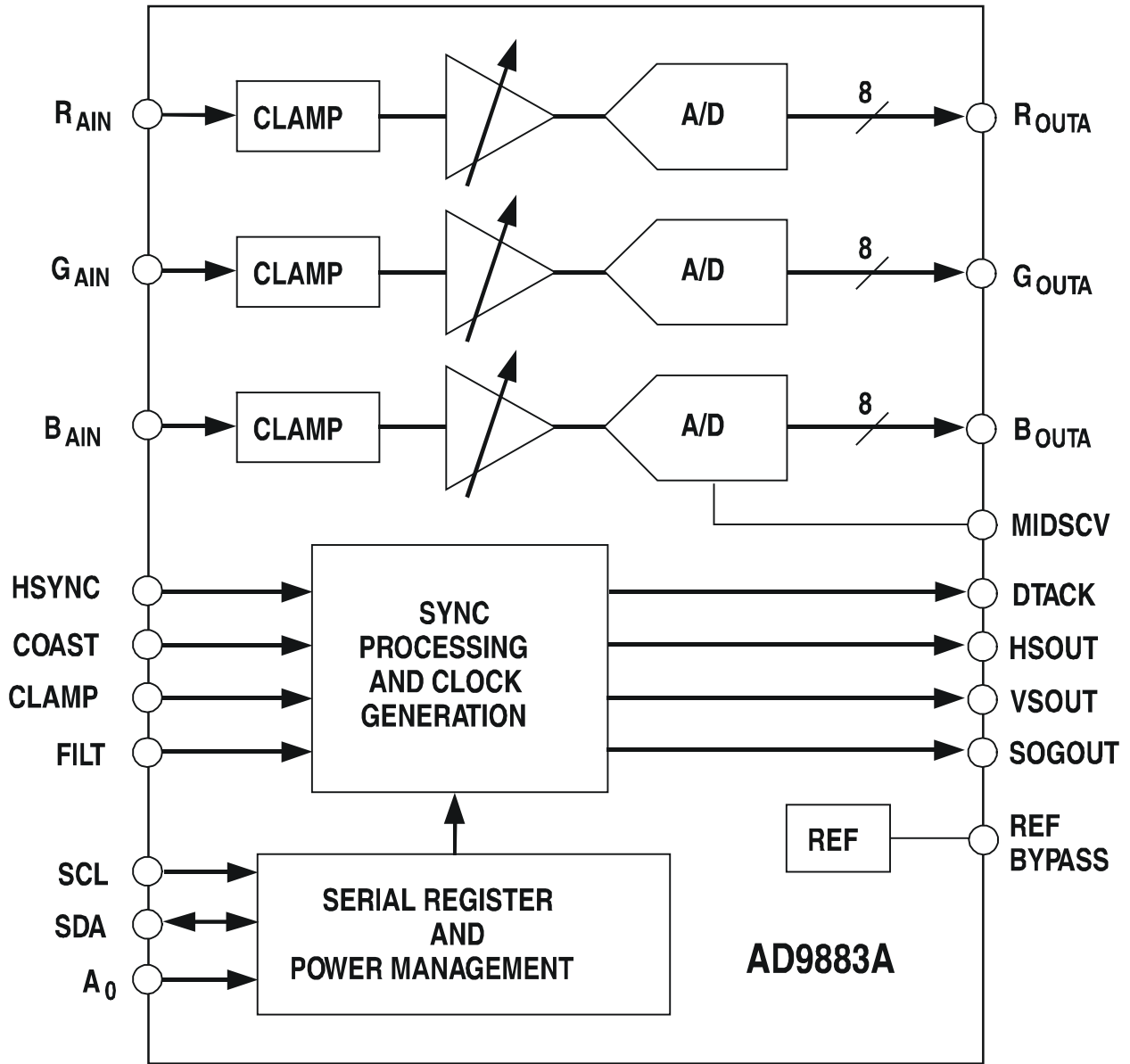
2.VPC3230



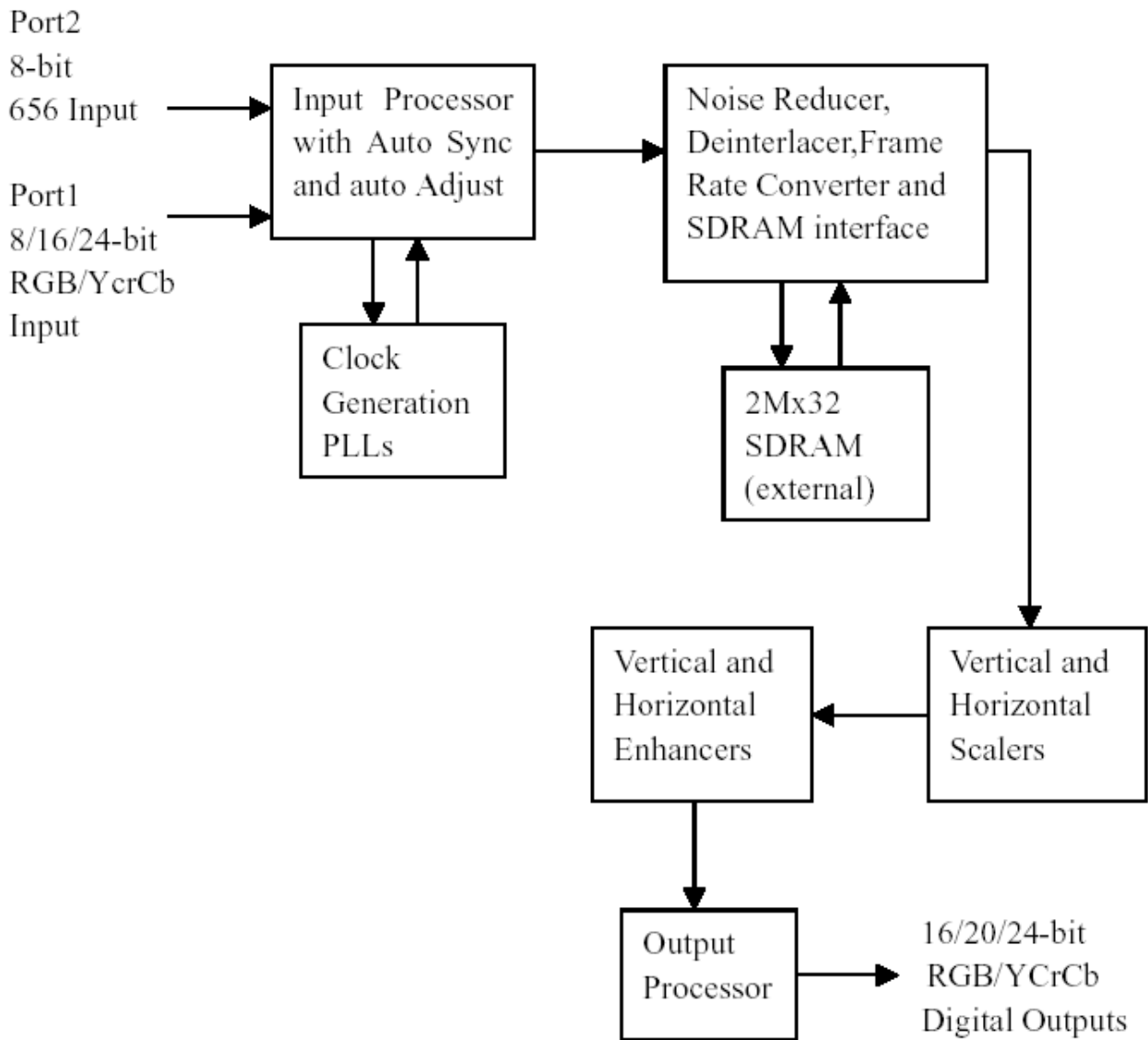
Pins description:

- 4 PIN: Input U of PCMCIA.
- 5,73 PIN: Input Y of PCMCIA.
- 6 PIN: Input V of PCMCIA
- 31-34, 37-40 PIN: output format signal of. ITU-R656
- 70 PIN:Video of AV OUT
- 71 PIN:Input C of SVHS.
- 72 PIN:input Video (SVHS in priority) of Y or AV1 of SVHS.
- 74 PIN:input Video of AV2.
- 75 PIN:input Video of TV/BS.

3.AD9883



4.FLI2310-Simplified Internal Block Diagram



5.JAG-ASM

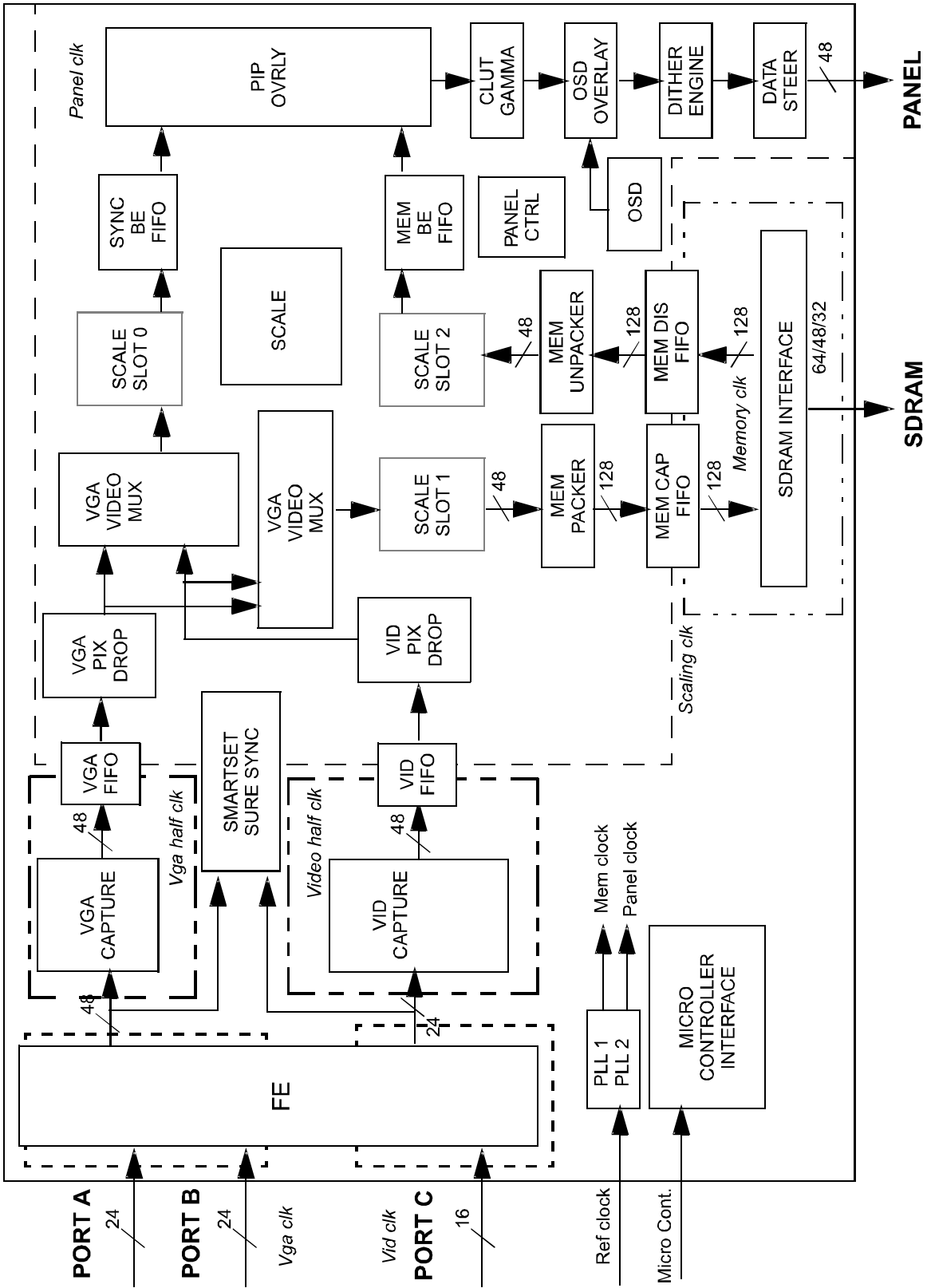
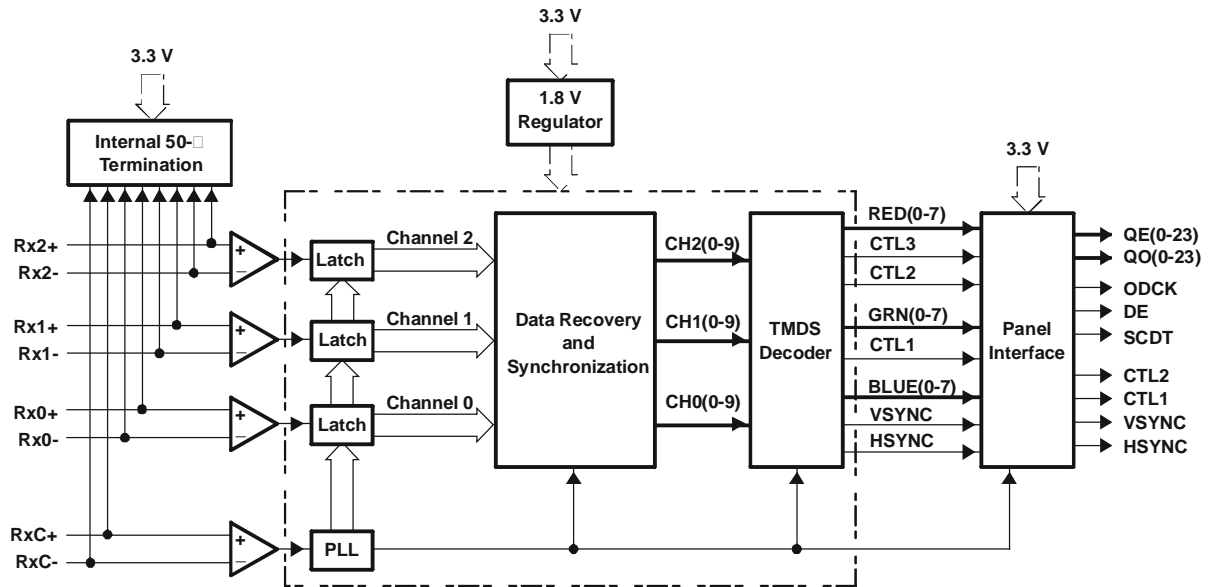


Figure 2. Functional Block Diagram

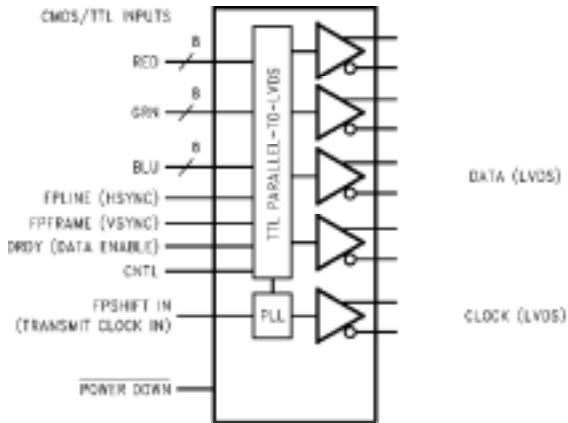
6. TFP403 functional block diagram



Terminal Functions

TERMINAL NAME	NO.	I/O	DESCRIPTION
AGND	79	GND	Analog ground? Ground reference and current return for analog circuitry
AVDD	82,85,88,91	V _{DD}	Analog V _{DD} ? Power supply for analog circuitry. Nominally 3.3 V
CAP	67	V _{DD}	Bypass capacitor? 4.7µF tantalum and 0.01 µF ceramic connected to ground. This capacitor is optional for the TFP403, but is required for the TFP501.
CTL[2:1]	41,40	DO	General-purpose control signals? Used for user defined control. In normal mode CTL1 is not powered down via PDO.
DE	46	DO	Output data enable? Used to indicate time of active video display versus nonactive display or blank time. During blank, only HSYNC, VSYNC, and CTL1-2 are transmitted. During times of active display, or nonblank, only pixel data, QE[23:0] and QO[23:0], is transmitted. High : Active display time Low: Blank time
DFO	1	DI	Output clock data format? Controls the output clock (ODCK) format for either TFT or DSTN panel support. For TFT support ODCK clock runs continuously. For DSTN support ODCK only clocks when DE is high; otherwise ODCK is held low when DE is low. High : DSTN support/ODCK held low when DE = low Low: TFT support/ODCK runs continuously.
DGND	5,39,68	GND	Digital ground? Ground reference and current return for digital core
DVDD	6,38	V _{DD}	Digital V _{DD} ? Power supply for digital core. Nominally 3.3 V
HSYNC	48	DO	Horizontal sync output
OCK_INV	100	DI	ODCK polarity? Selects ODCK edge on which pixel data (QE[23:0] and QO[23:0]) and control signals (HSYNC, VSYNC, DE, CTL1-2) are latched Normal mode: High : Latches output data on rising ODCK edge Low : Latches output data on falling ODCK edge

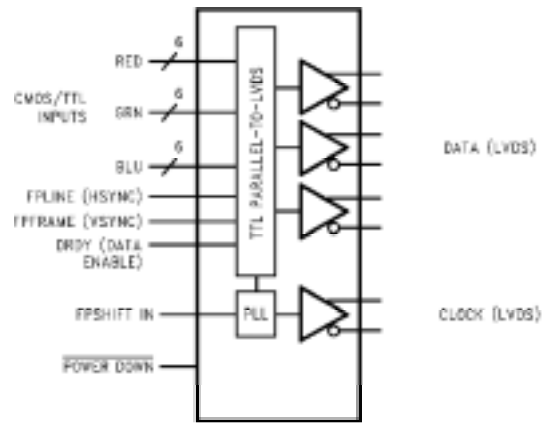
7. DS90C385



DS100868-1

Order Number DS90C385MTD or DS90C385SLC
See NS Package Number MTD56 or SLC64A

DS90C365



DS100868-29

Order Number DS90C365MTD
See NS Package Number MTD48

Main assembly

NAME	NO.	MAIN COMPONENT AND it'S NO.	
AV processing board	667-L37K7-40	NA01 NA03 N04	MSP3410 (353-34100-80) M62494FP (353-62494-20) TPA3008D2 (353-30080-10)
CPU board	667-L37K7-56	U12 U13 U15 U29 U30 U31 U2 U4	JAG-ASM (353-0JAG0-00) FLI2310 (353-23100-00) TFP403PZP (353-04030-10) VPC3230D (353-32300-80) MST9883B (353-98830-10) DS90C385 (353-03850-20) TSC80251G2D (353-80251-10) AT49F002NT (352-49002-70)
IR board	667-L40D9-09		
Keypad board	667-L37K7-05		
Earphone assy	667-L37K7-10		
Power supply board	667-L23K7-20		
Remote control (RC-Y01-0AR)	301-YP42K9-010A		
Panel (LC370W01)	335-37010-00		

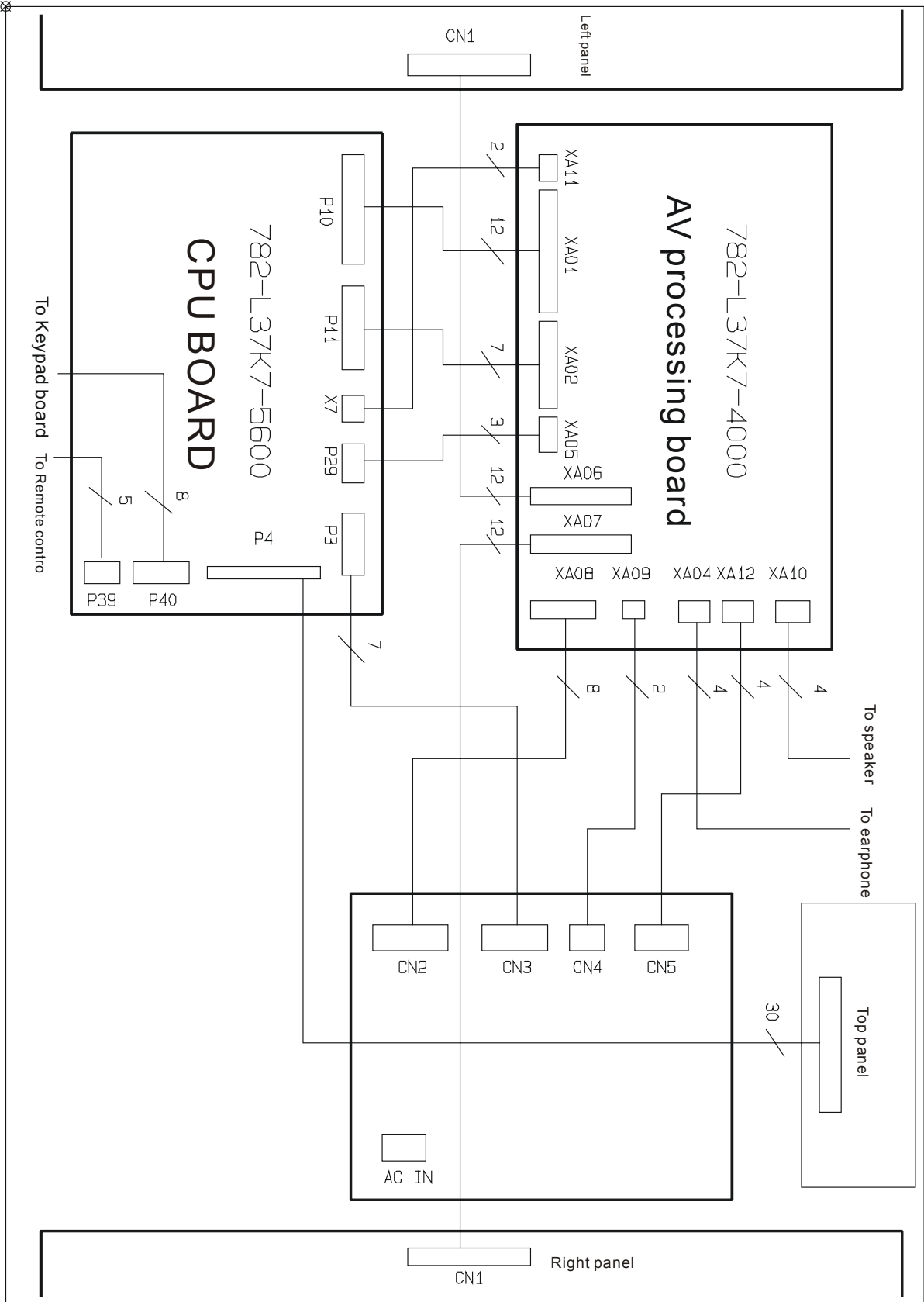
Identification criteria for the bright spot and dark spot of the LCD screen

Category	criteria	Q'ty allowed					Distance between two spots					
		15"	20"	22"	30"	40"	15"	20"	22"	30"	40"	
Bright spot	One single spot	≤5	≤2	≤5	≤2	≤3	≥15mm	≥15mm				
	2 neighboring spots	≤2	≤1	≤2	≤1	≤1						
	Total No.	≤5	≤2	≤5	≤2	≤3						
Dark spots	One single spot	≤6	≤7	≤5	≤4	≤10		≥15mm	≥10mm	≥5mm		
	Two neighboring spots	≤2	≤2	≤2	≤1	≤5						
	Total No.	≤6	≤7	≤5	≤4	≤10						
Total defected point		≤8	≤7	≤5	≤4	/						

Notes:

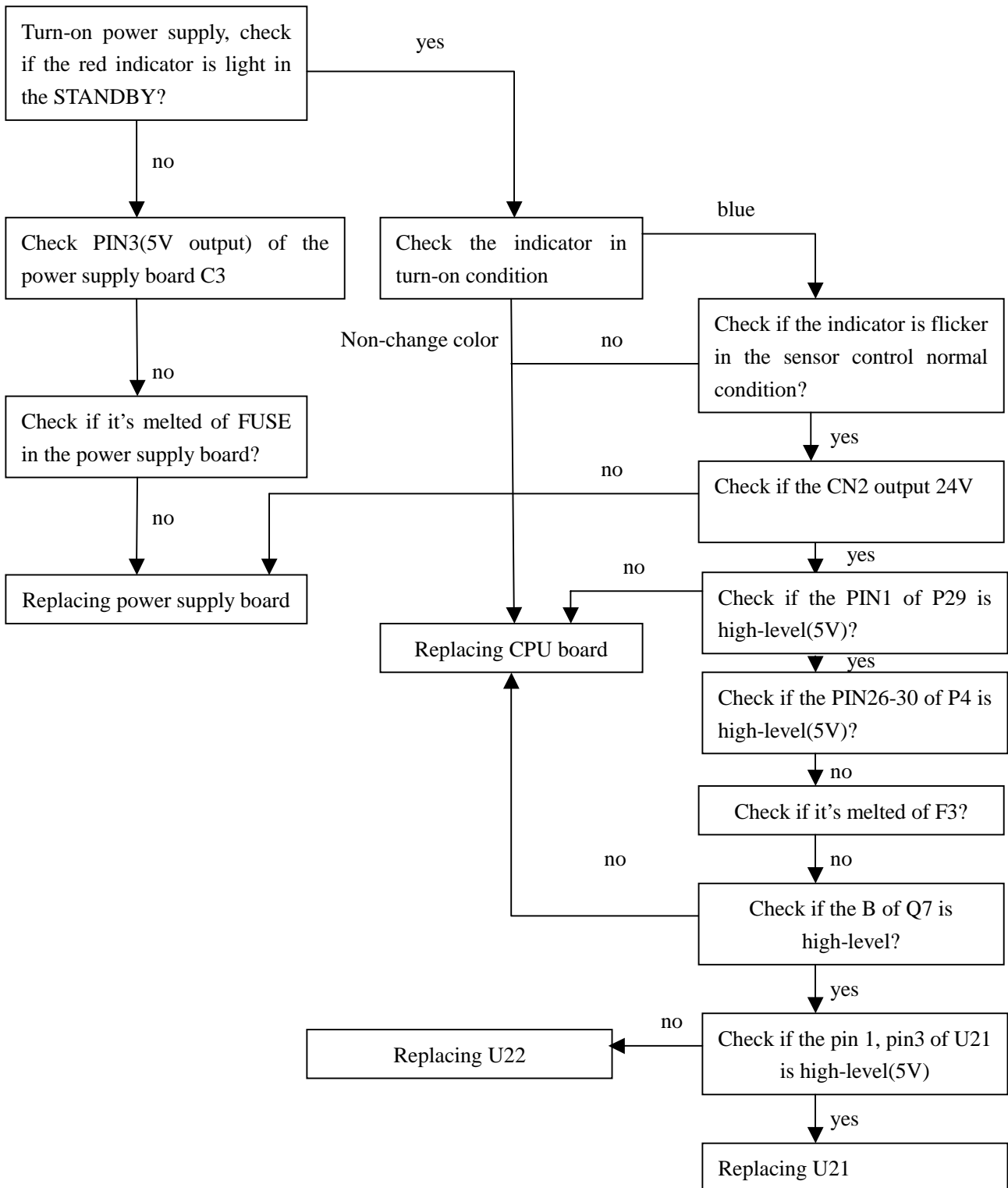
1. Definition of defected point (bright spot, dark spot): It is identified as a defected point if its area exceeds 1/2 of a single picture element (R,G,B).
2. Definition of bright spot: It is identified as a bright spot if it is bright in the state of dark field and its bright size remains unchanged
3. Definition of dark spot: It is identified as a dark spot if it is dark in the state of white field and its dark size remains unchanged
4. Definition of two neighboring points: Defects of a group of picture elements(RB,RG,GB).

Wiring diagram

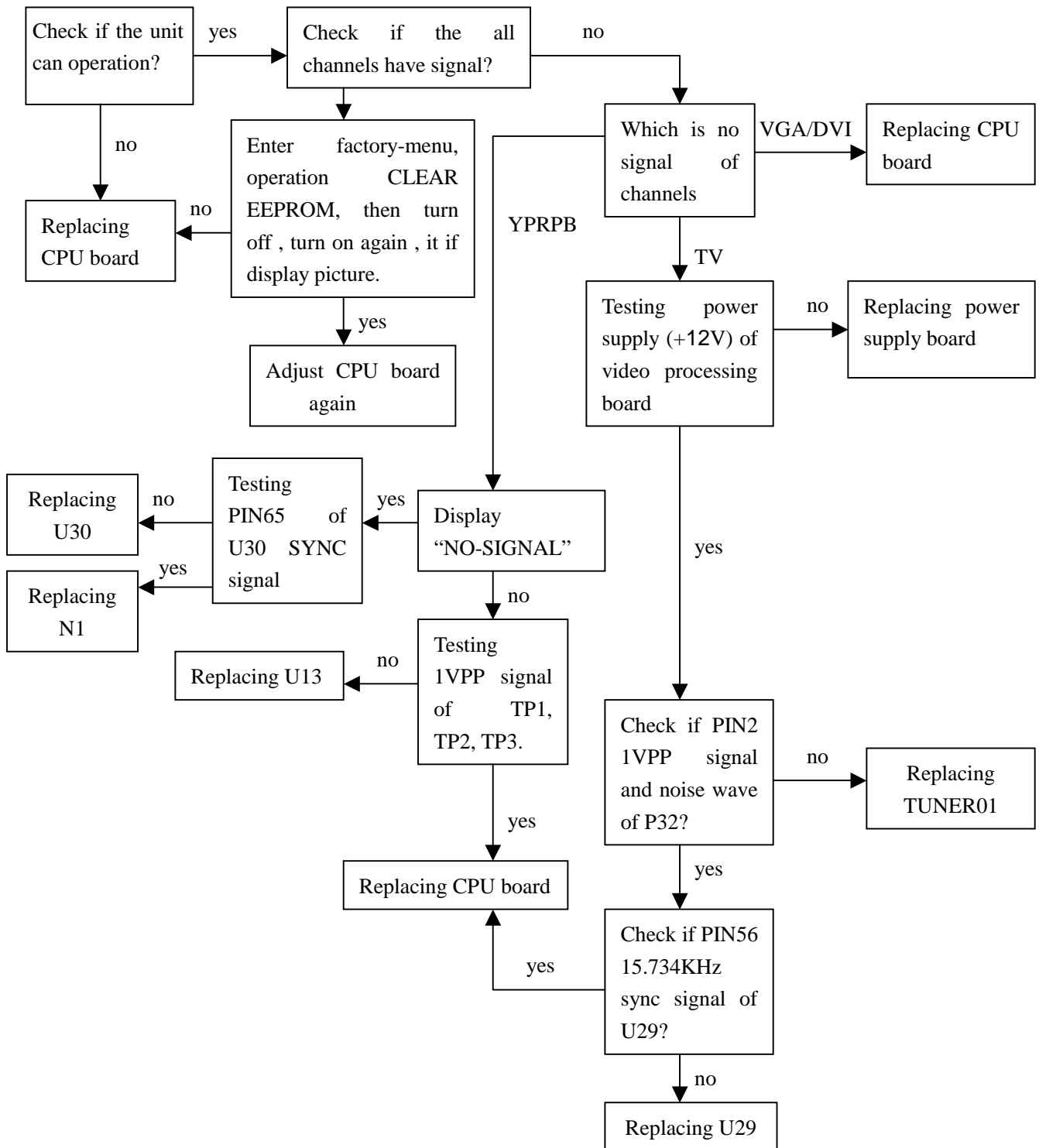


Troubleshooting charts

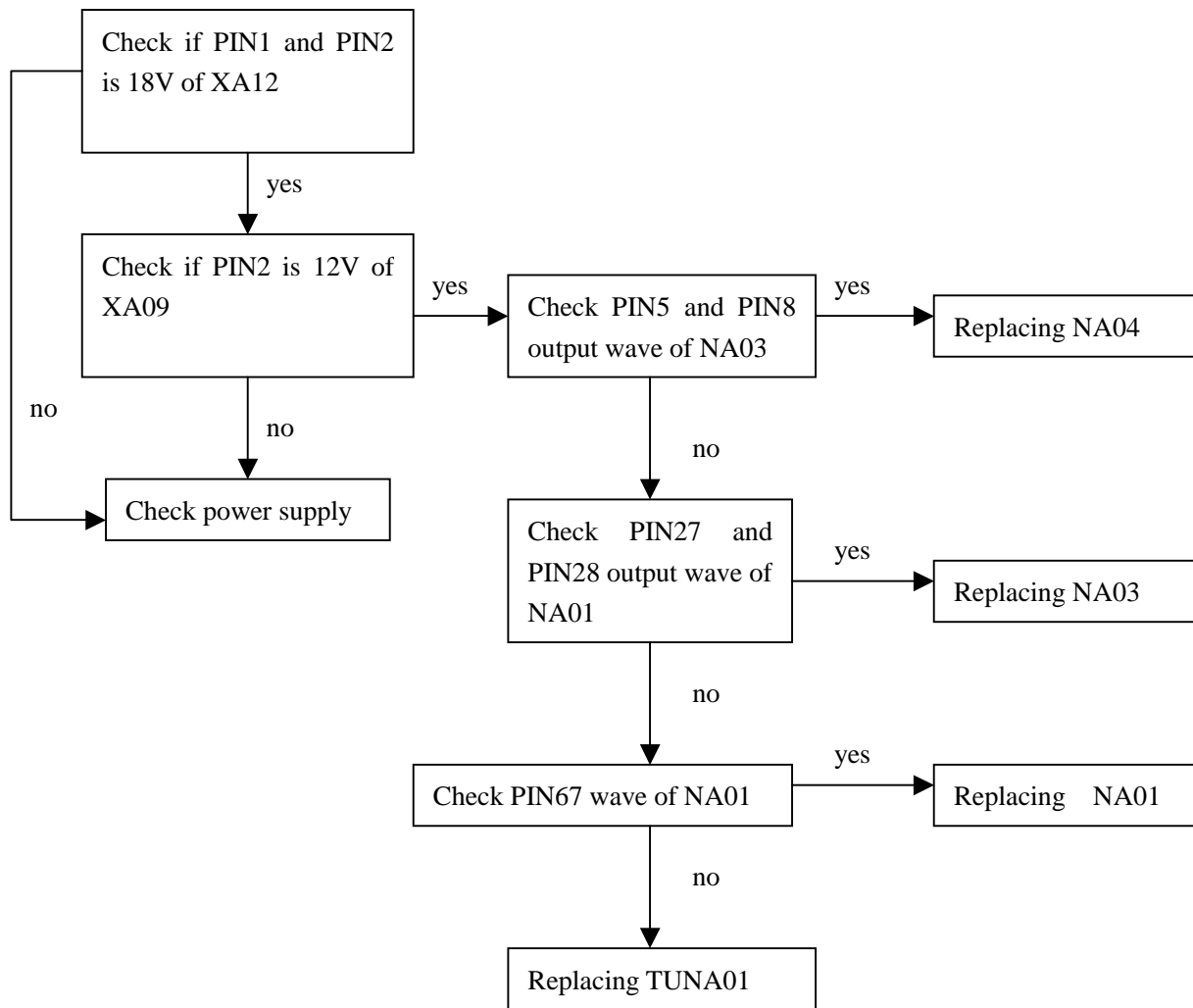
1. No raster

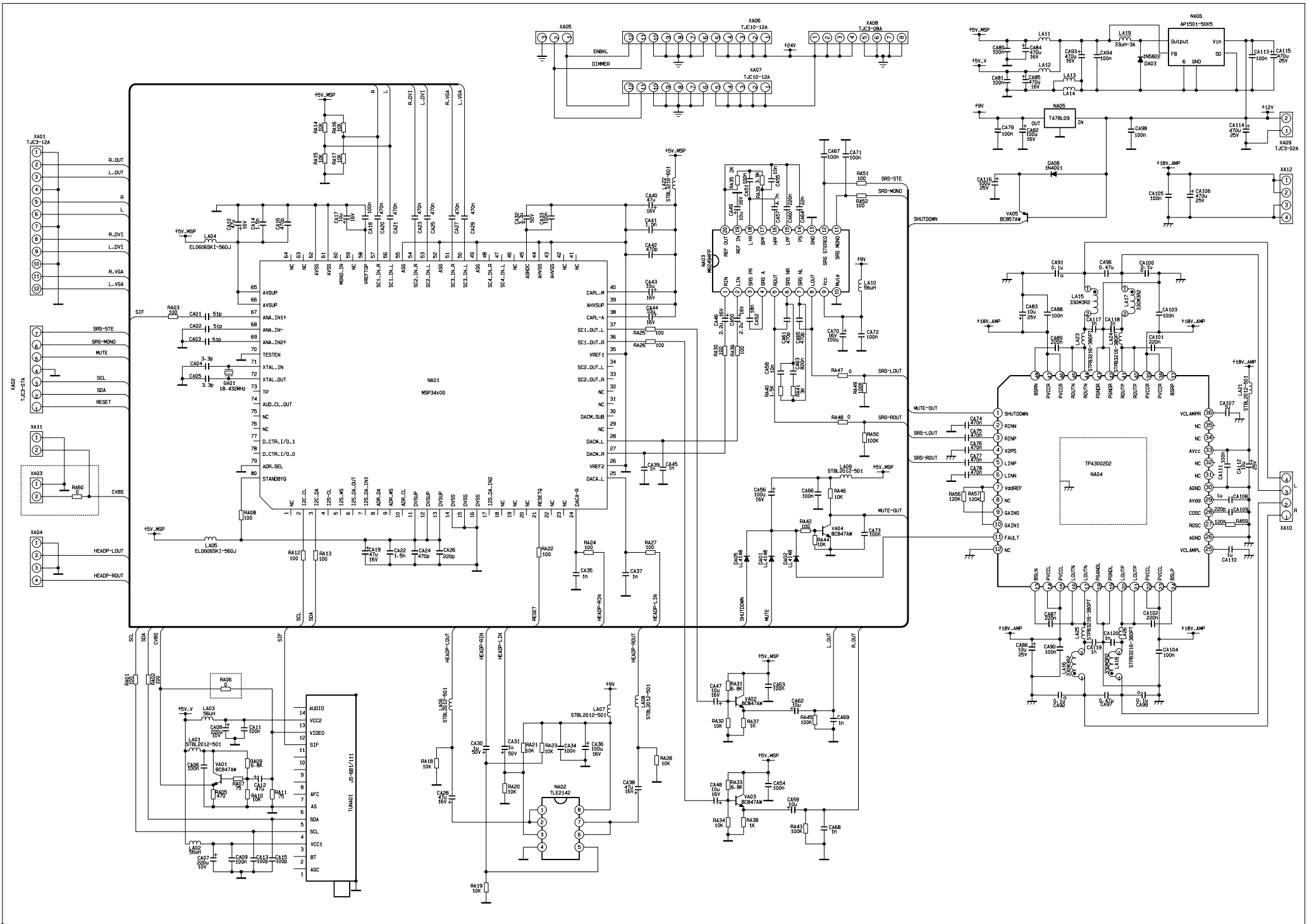


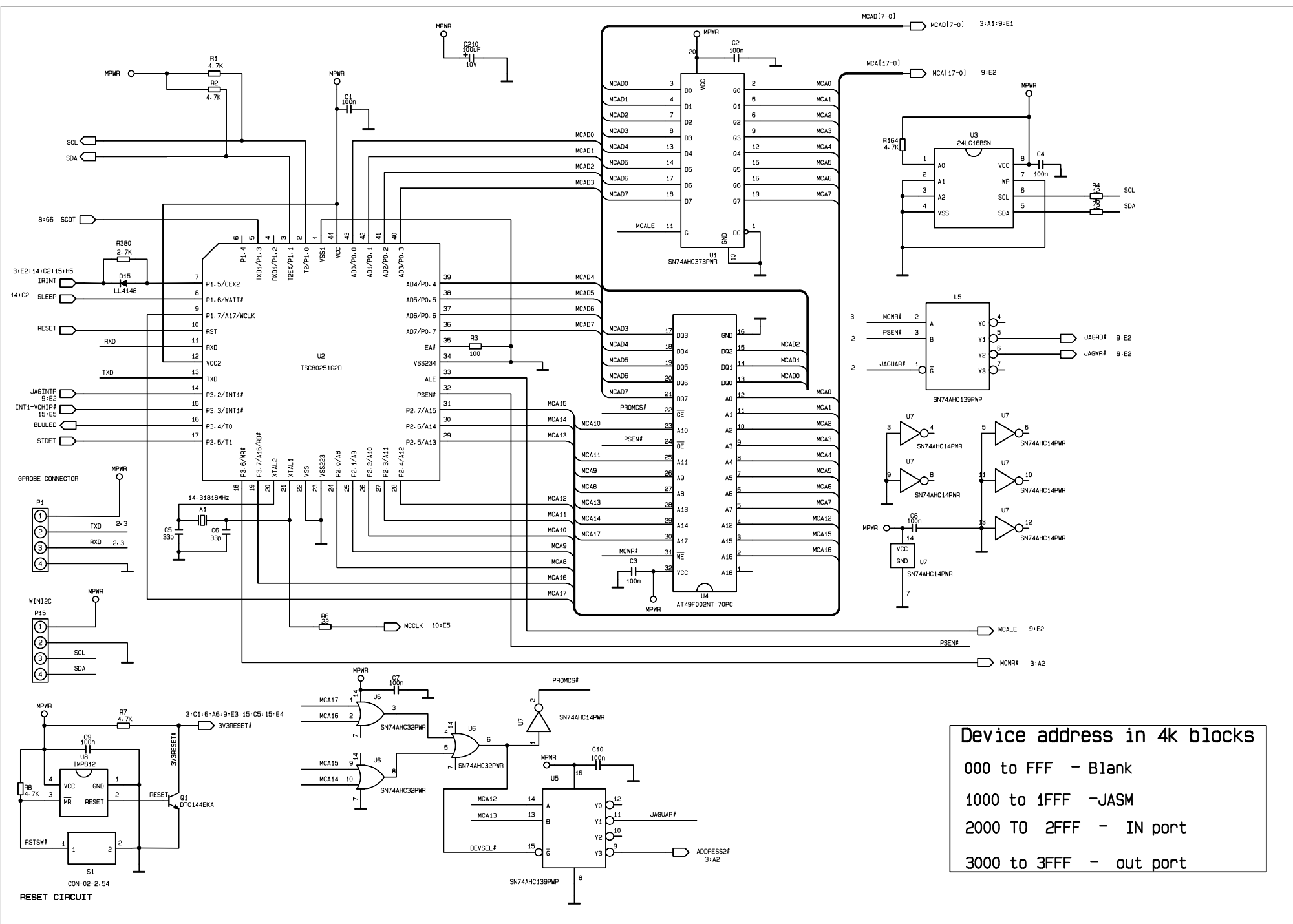
2. raster, but no picture



3.no sound



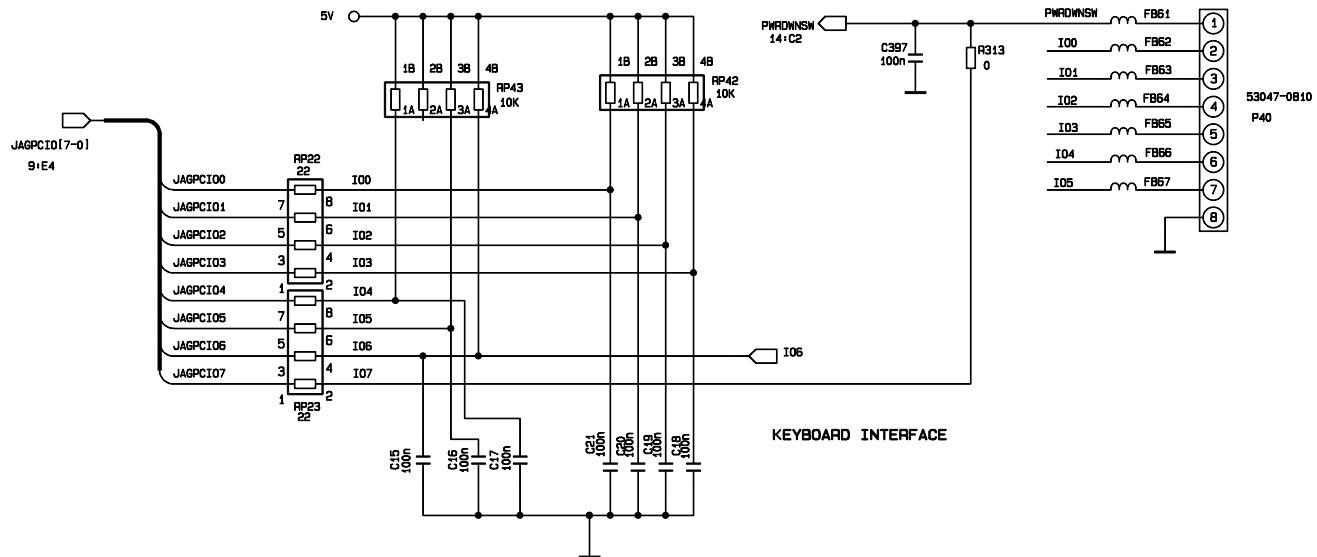
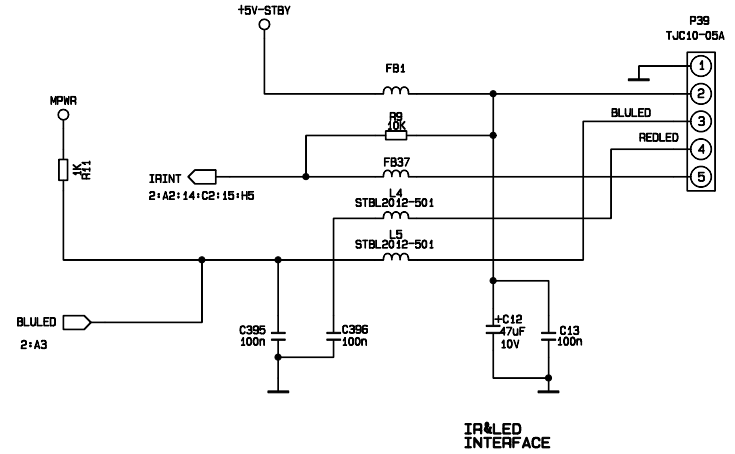
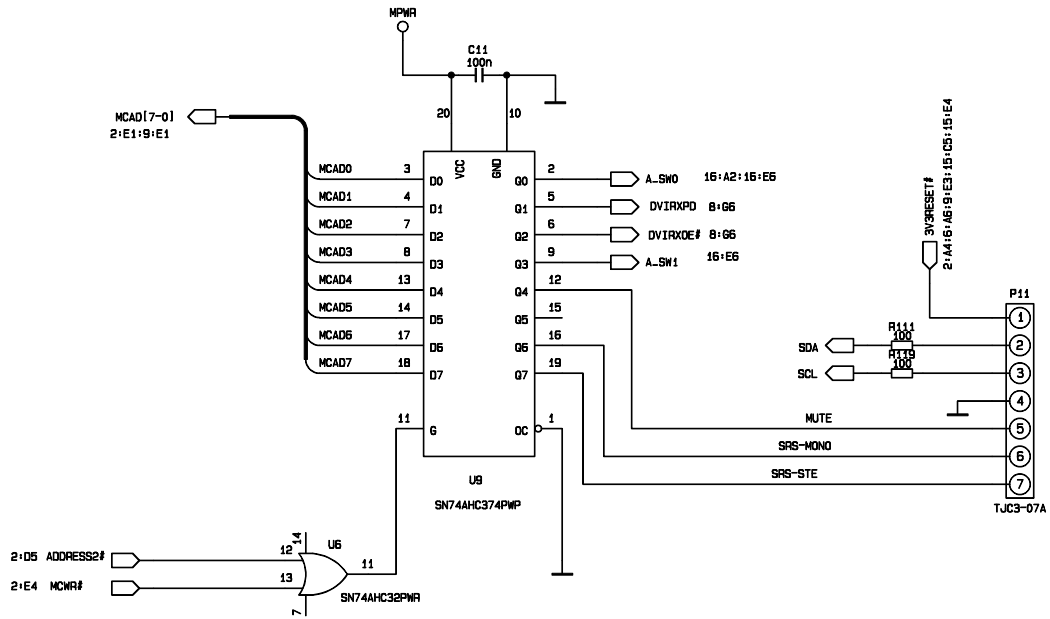


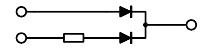
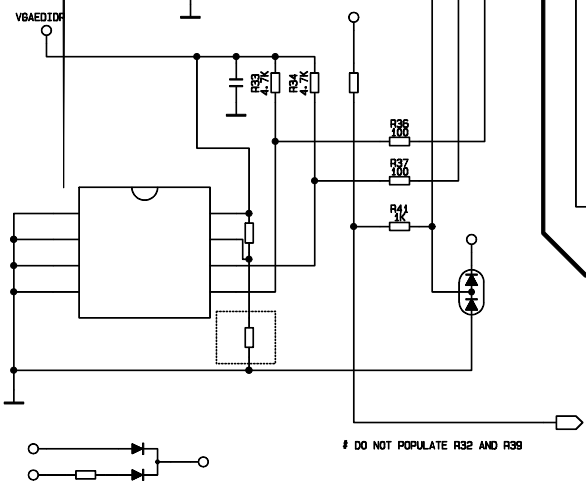
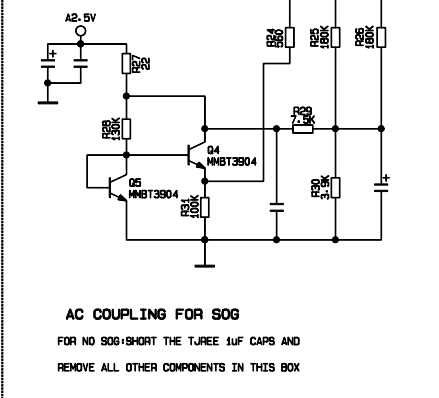
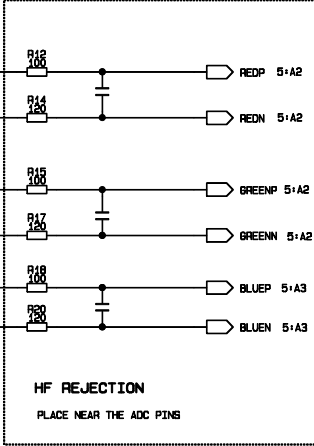
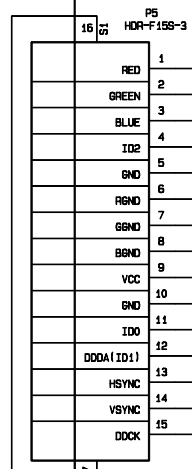
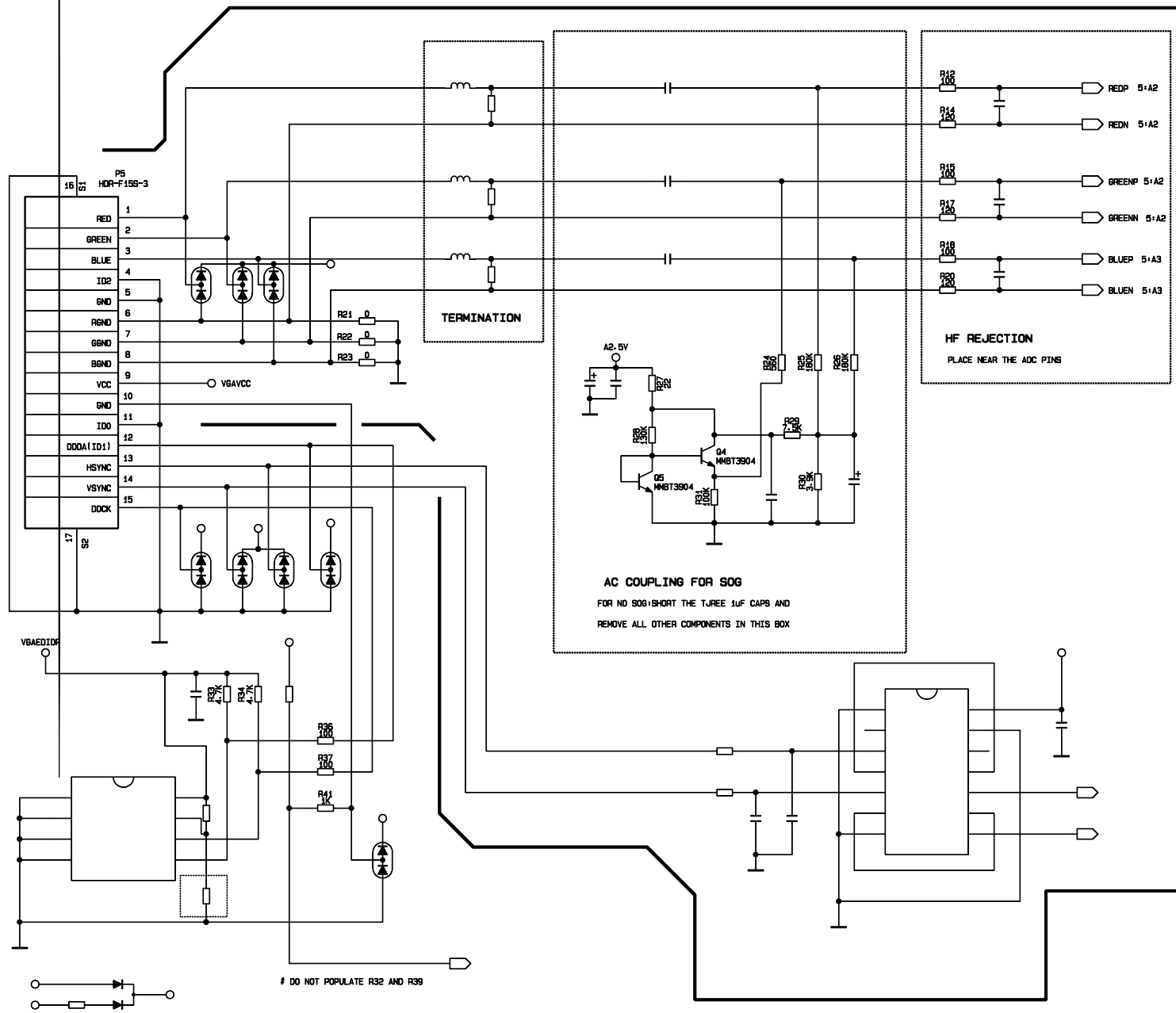


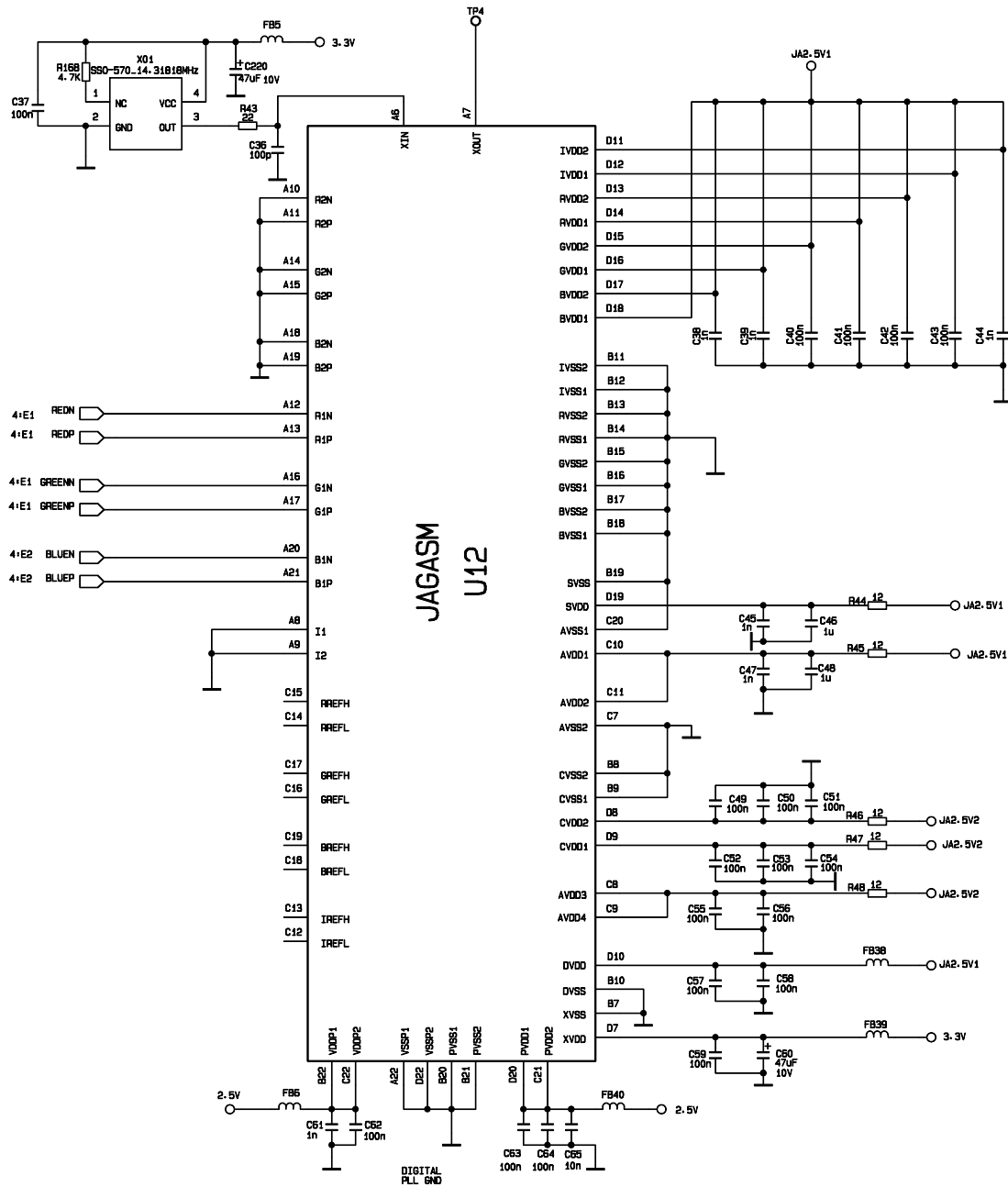
Device address in 4k blocks

- 000 to FFF - Blank
- 1000 to 1FFF - JASM
- 2000 TO 2FFF - IN port
- 3000 to 3FFF - out port

RESET CIRCUIT





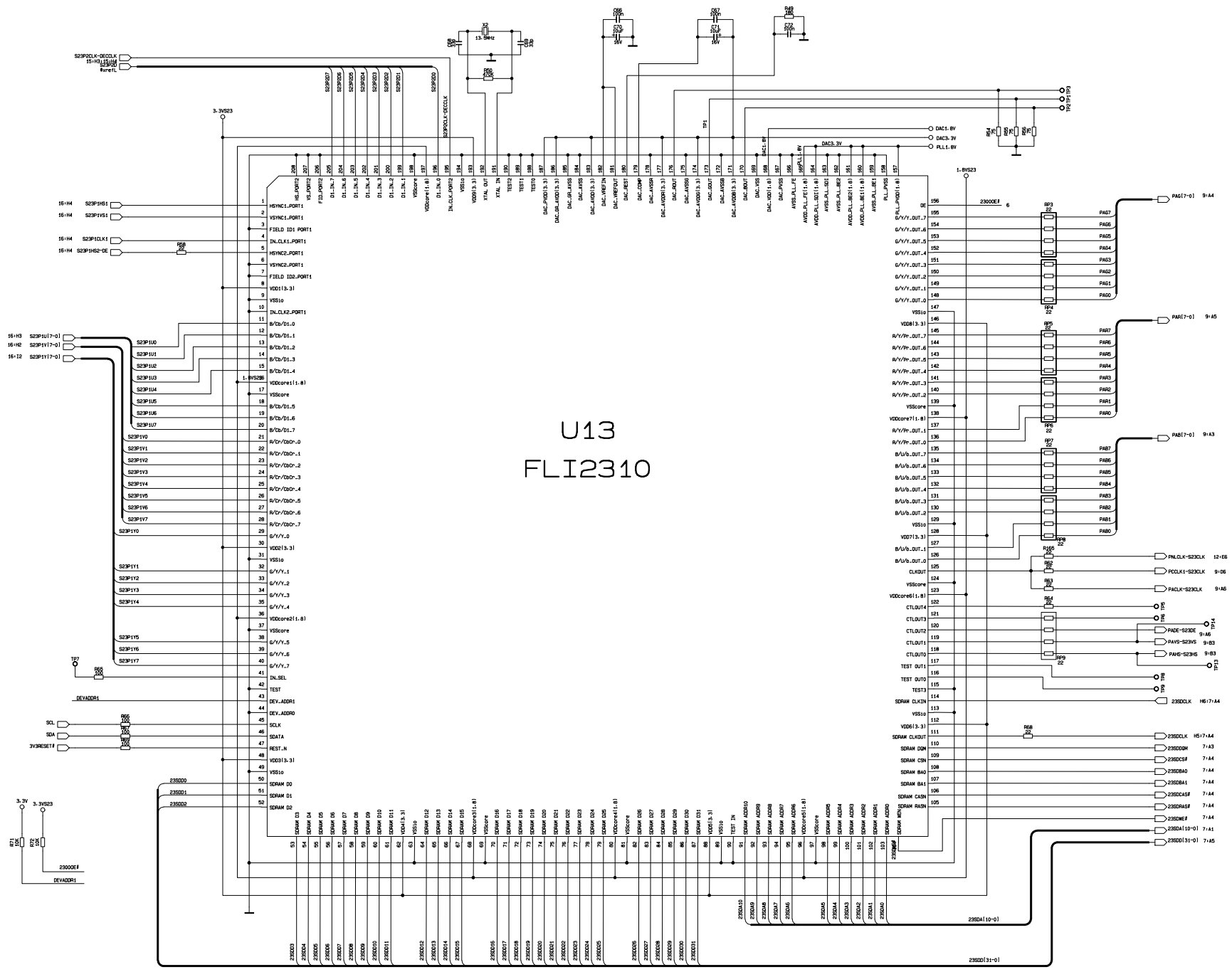


1

2

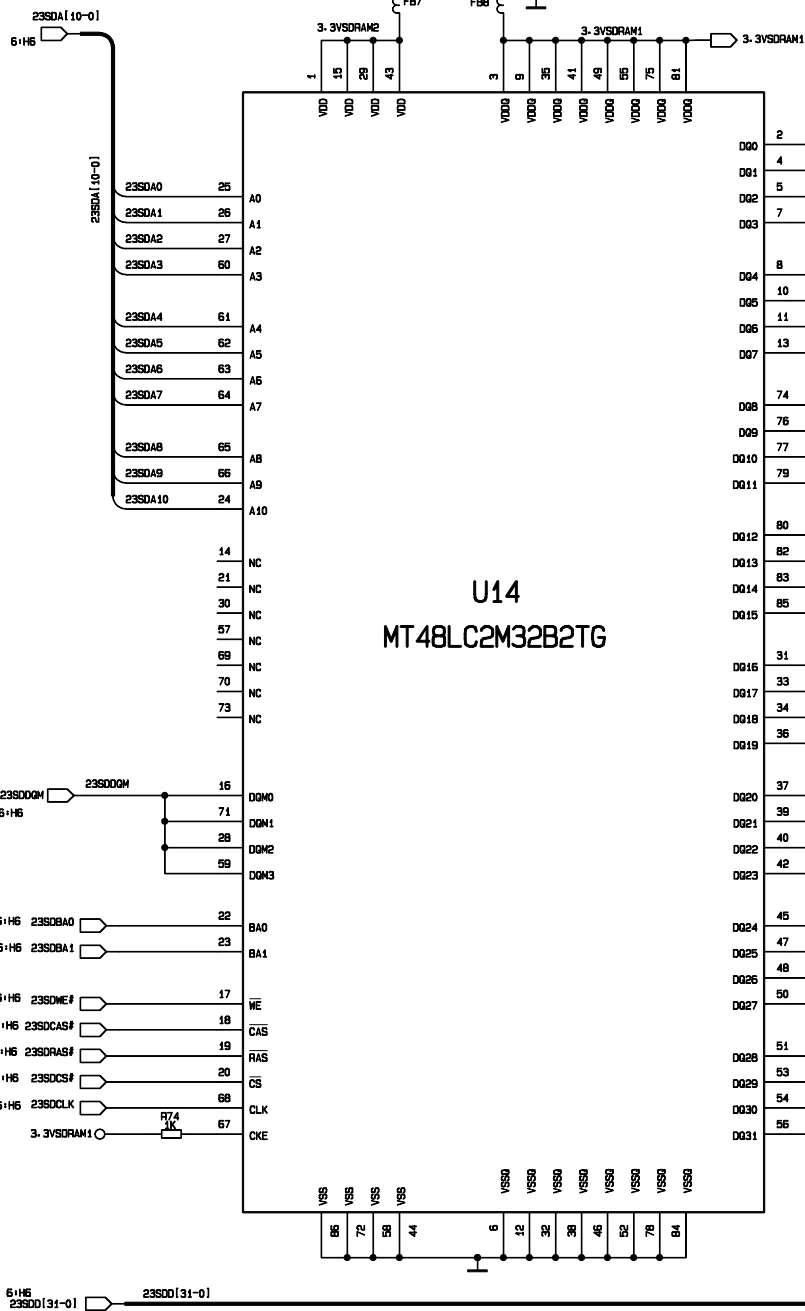
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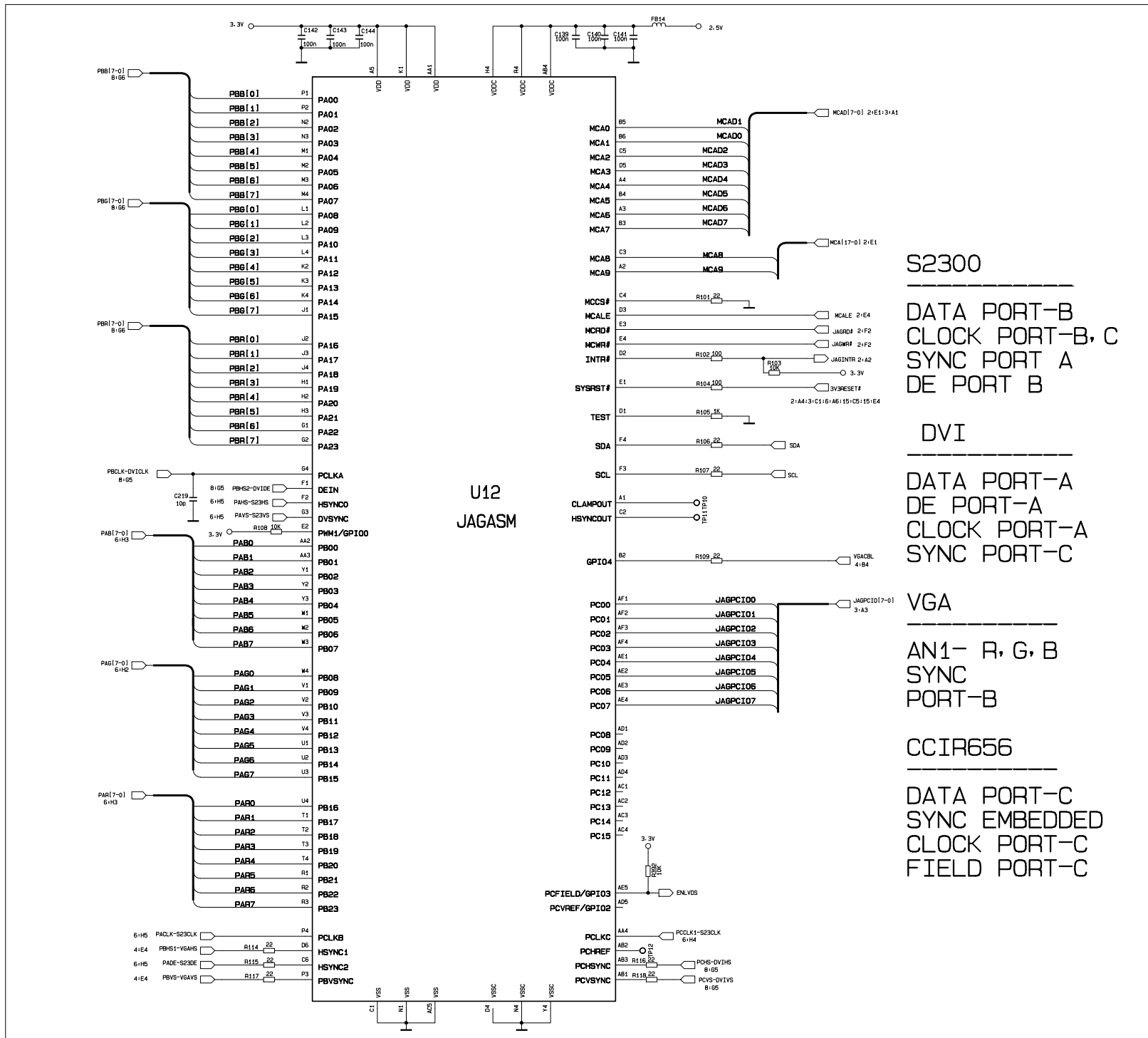
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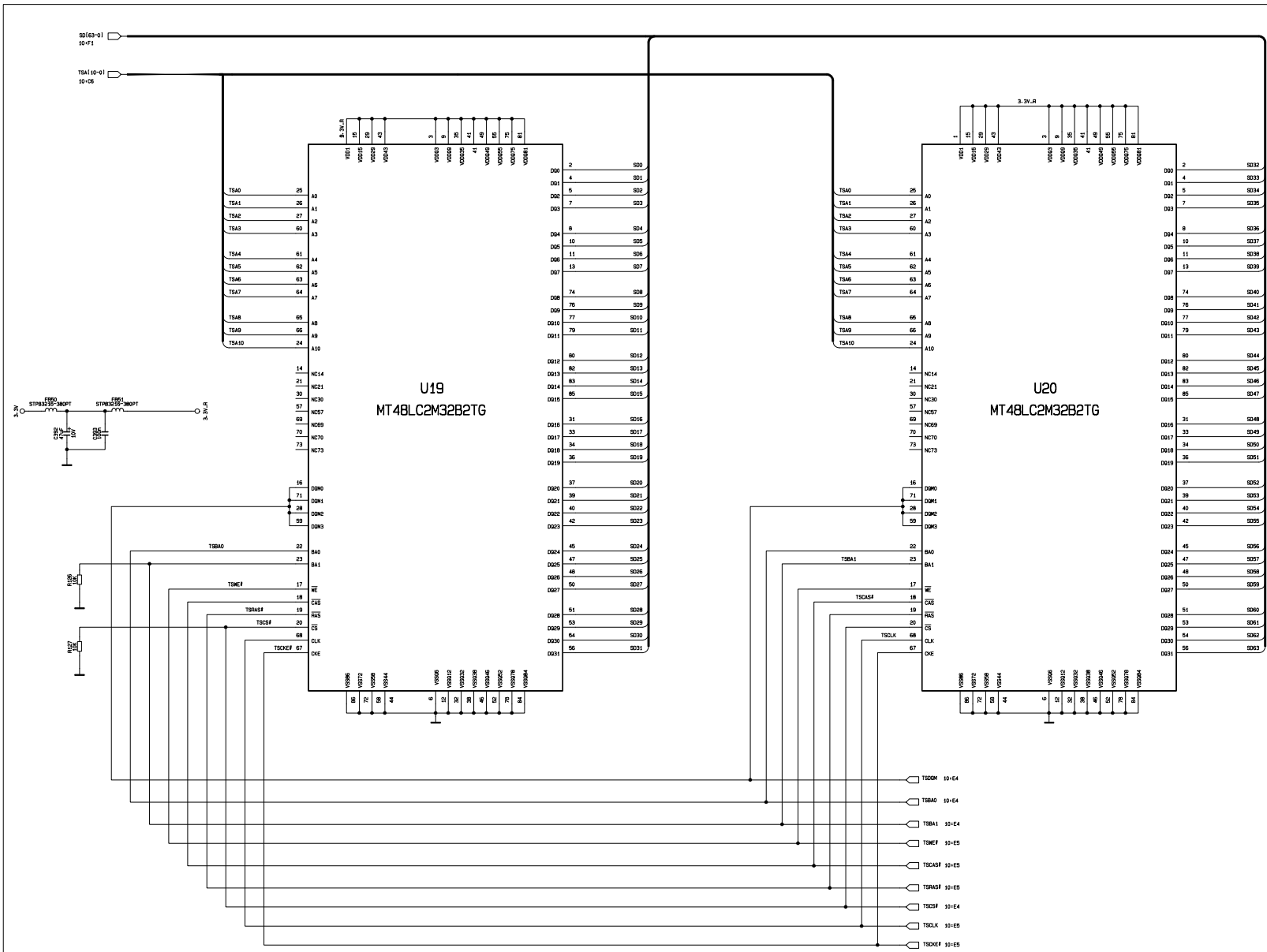


U13
FLI2310

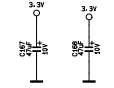
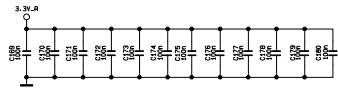
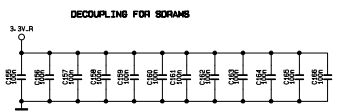
1
2
3
4
5
6
7

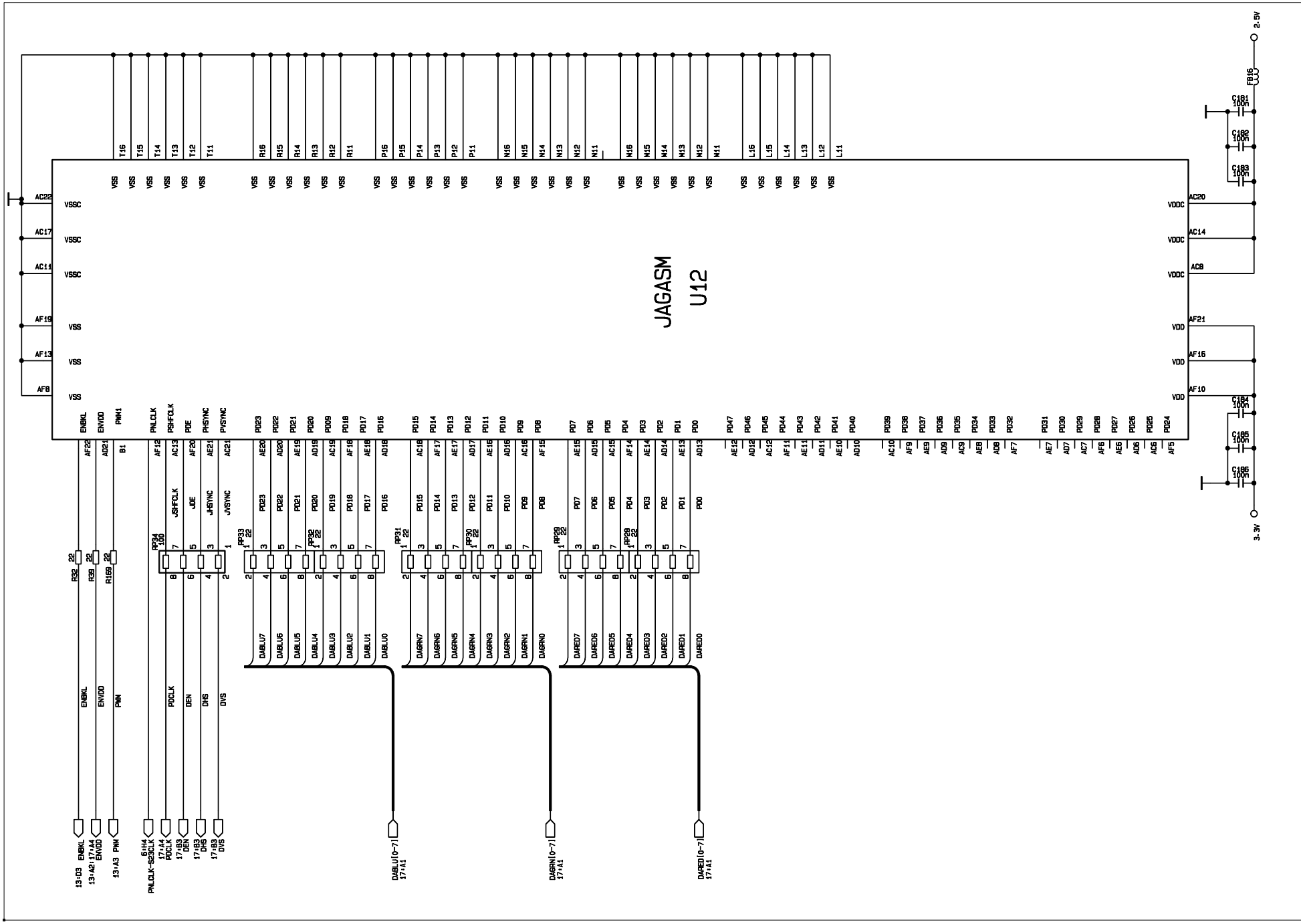


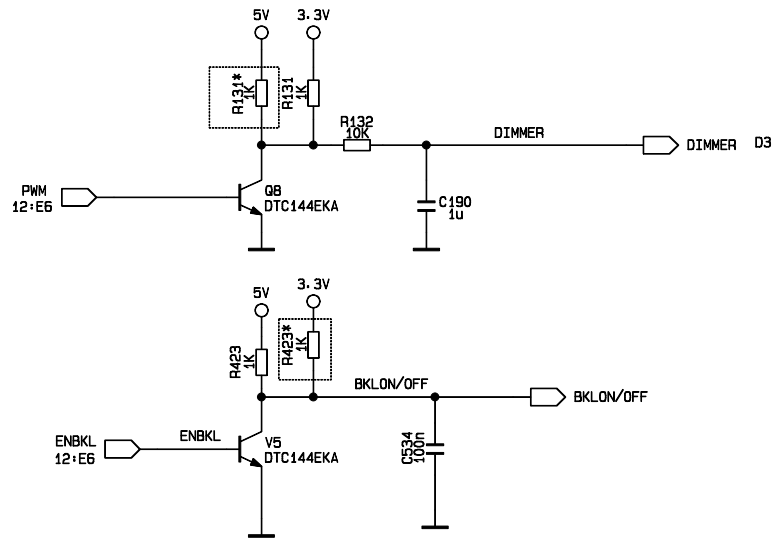
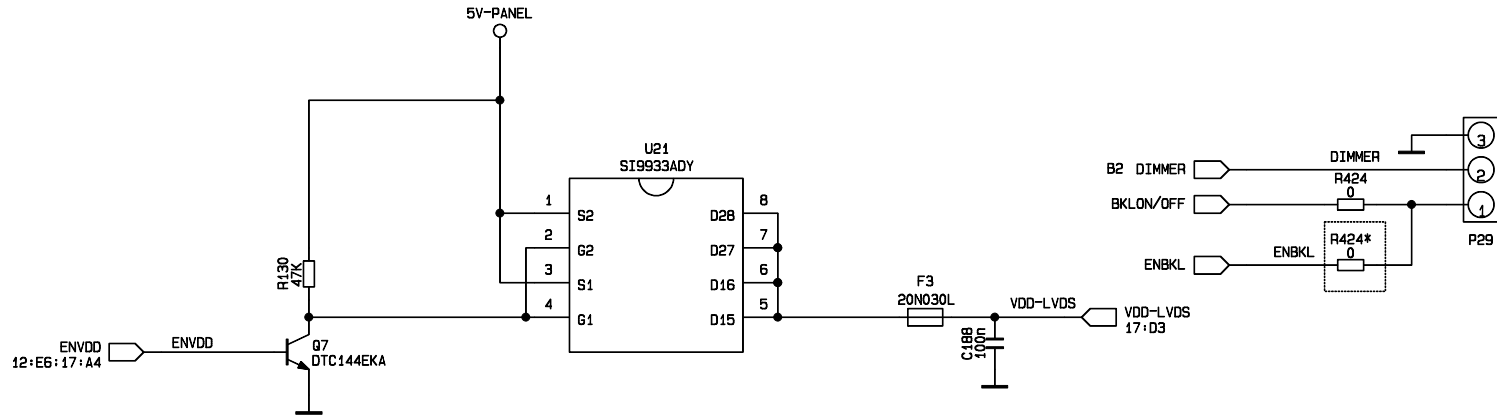


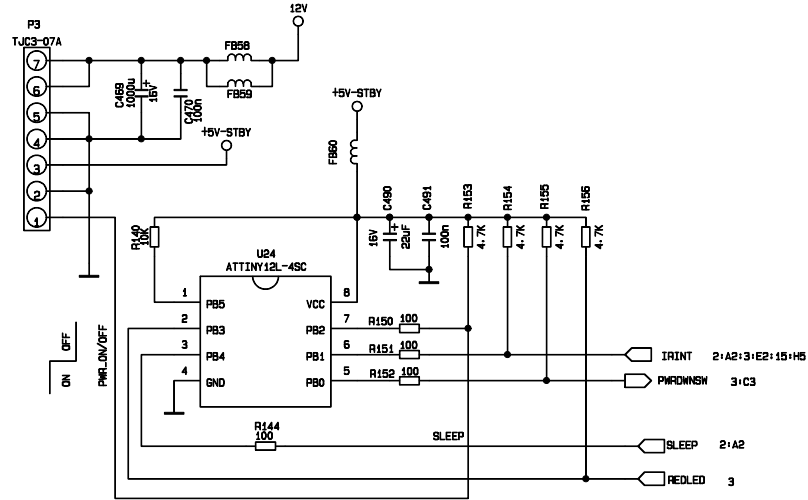


SDRAM ALTERNATIVES
 FUJITSU MB515432B2
 HYDWIN H48LC32B2
 SAMSUNG K48432DC

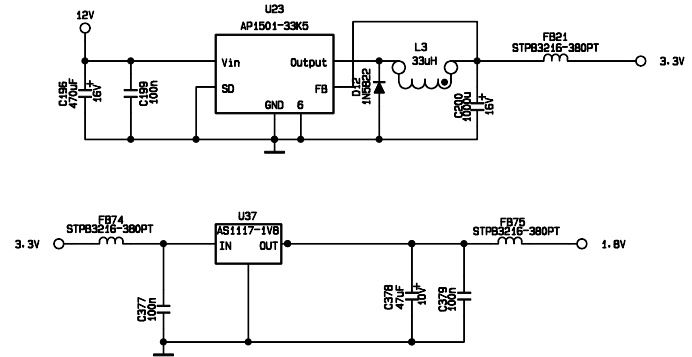
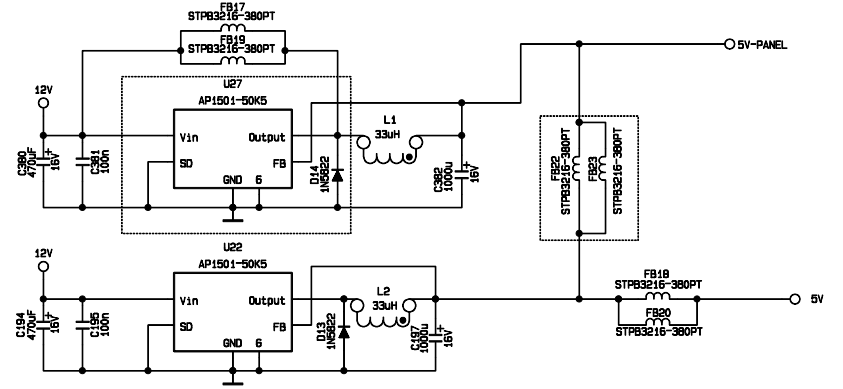
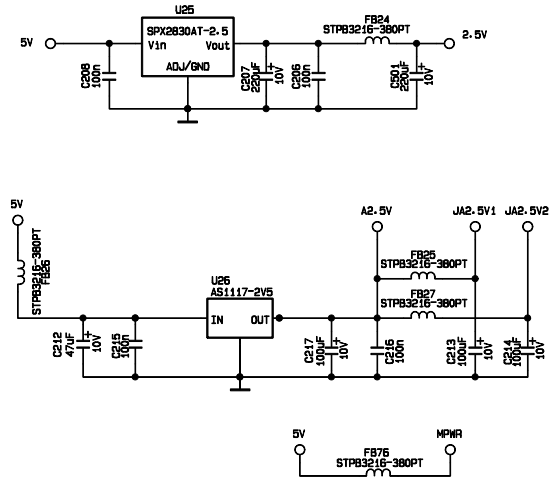


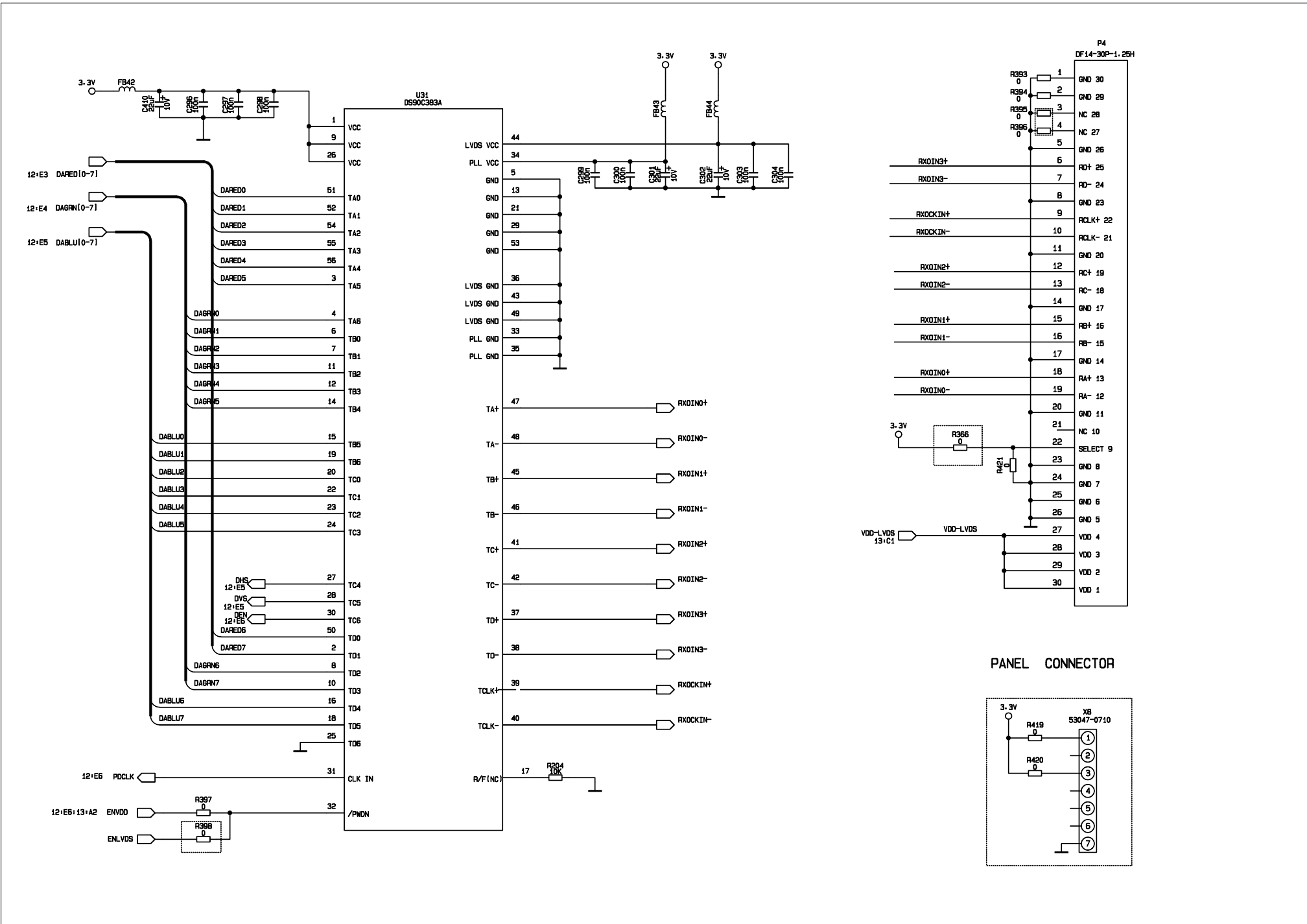






2.5V DIGITAL POWER SUPPLY





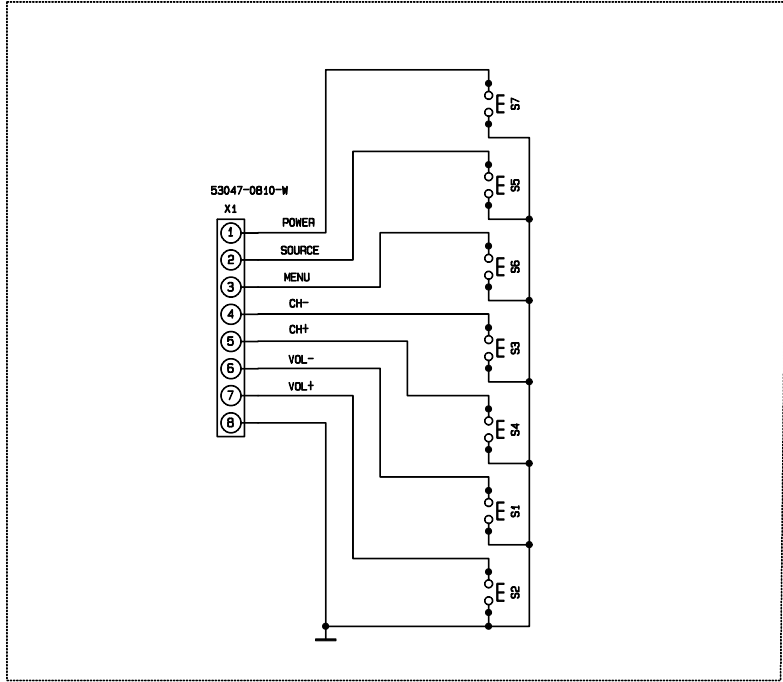
1

2

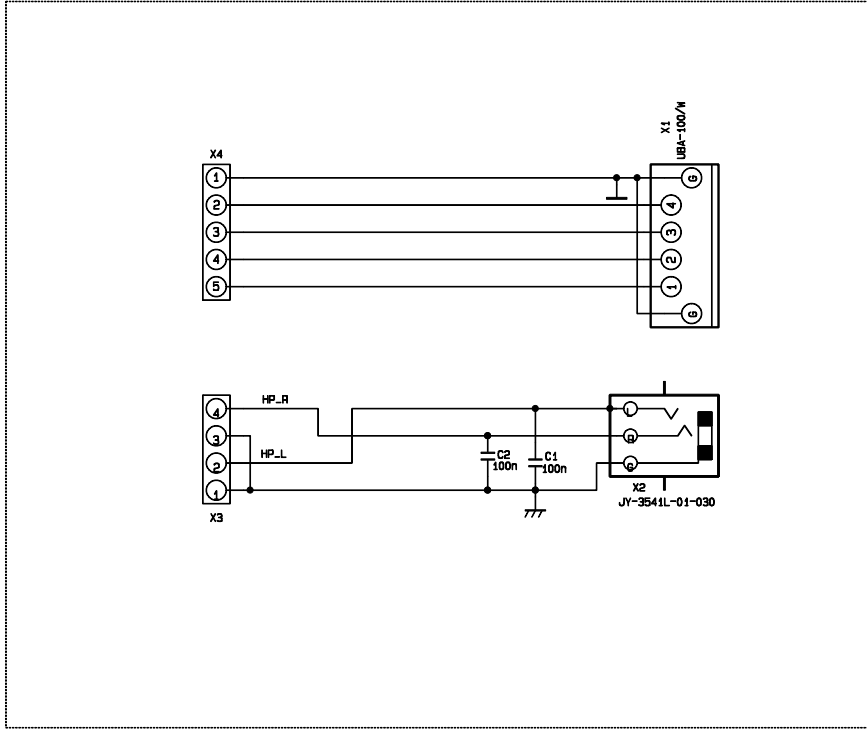
3

4

1



2



3

4

