Best of

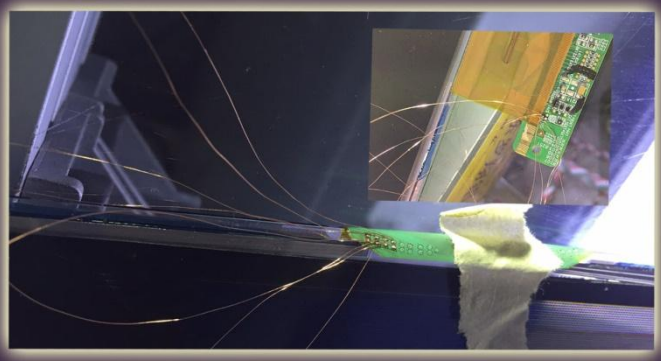
Troubleshooting & Repairing

LCD/LED Screen Panel Repair

2018

by Kent Liew

V2.0



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All these tools and equipments will help you in troubleshooting and repairing the electronics devices.

Thank You for Contribution

Here is to thank you to Mr. Vladimir, Mr. Xiang (升沃机械), Mr. Marian, Mr. Jonathan, Mr. Ji Chun, Mr. Ganesh and Mr. Huang. Because they had contributed the good repair information in part of this repair guides.

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BONUS-A: LG LED/LCD TV Interconnect Schematic Diagrams

BONUS-A: T-Con Board Schematic/Circuit Diagrams

BONUS-B

(This bonus NOT listed in this Ebook, it's on the Download Page)

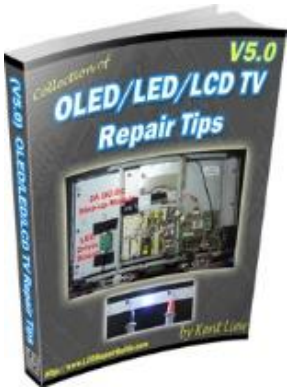
*** Collection of LG T-CON Board Testing Point & Voltages (Over 120 pages)**

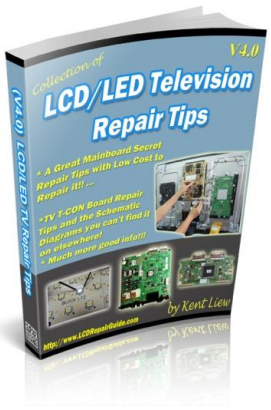
*** T-CON Board P-GAMMA & DC-DC IC Firmware's**

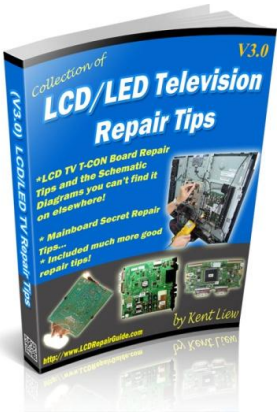
*** T-CON Board EEPROM Data/Firmware's**

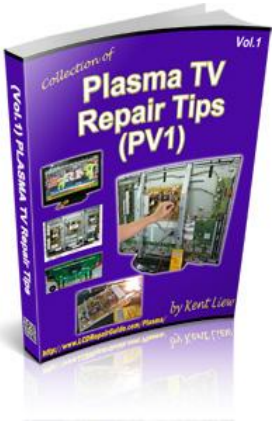
Highly recommended other great related repair information for you:

With all these great repair information, it will help and improve your skills in troubleshooting and repairing OLED/LED/LCD/Plasma TV quickly and easily: (Please click on the ebook cover to get more details)









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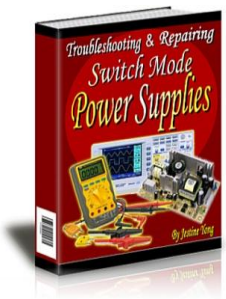
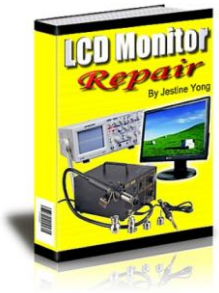
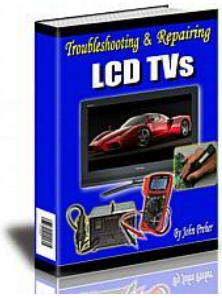






How to Use This Repair Guide

1) Yes, this repair guide not only can save you time and money, it also can help to earn more profit from repairing LCD/LED panel. Because of LCD/LED Panel is the most expensive spare part inside the TV and Monitor. If we can repair it, so the profit is quite high to compare repairing other section like PSU in TV.

2) With the help of LCD/LED Screen Panel Repair Guide (V1), when you read this ebook, it will improve your knowledge and repairing skills quickly and easily. Because all the basic theory of how Panel working was written inside the LCD/LED Screen Panel Repair Guide (V1). Highly recommend to grab this ebook too.

3) If you don't want to start from the basic theory, but just want to solve your TV display problem, you can direct refer to the chapter you're interesting. So it will directly to show you what's wrong on this type of display symptom. Also the LCD and LED Backlight is not writing in this ebook, because I had wrote a lot this title in my V2, V3, V4 and V5 LED/LCD TV Repair Tips ebook series.

4) When I'm mention **"LCD"** word in this ebook, actually it is included the **"LED"** at the same time. So I don't write too many LED word in this ebook to save more space and reduce some file sizes in this ebook.

5) After you have finished reading this repair guide, I believe that you will have the confident to repair LCD/LED TV Panel now. It is because of we know how the LCD/LED Panel is working, why this display symptom is occur and also know how to troubleshooting it!

The LCD/LED Screen is the most expensive cost of the TV. Normally when the Panel is beyond repair, this TV will no point to continue repair. Either replaces a new or working Panel with reasonable price, or just selling their PCB board as it to the used spare part market. Nowadays, repairing the LCD/LED Panel has a high profit margin in TV or Monitor repair!

Isolate the LED/LCD TV Screen Problem Made Easy

How to isolate the LED/LCD TV screen problem easily? I've received lots of this type of question from the TV repairer. And my answer is:

1) The Good Tools

a) LCD/LED Panel Tester

- A tester to test the T-con + Panel is working or not. So this tester can generate and send the Testing Color Bar to the Panel through T-con Board. The tester like picture below:

b) LVDS convert to VGA Tester

- This type of tester have two design, one is their tester build in the LCD screen and another one is need to connect to a monitor to see the video output is normal or not. Normally, this tester can test Mainboard output video signals LVDS to VGA and see the result on its own LCD screen or connect it to a monitor to see the display result. This tester is looks like the picture below:

c) V-by-One converts to LVDS (also to VGA) for 4K TV Mainboard.

- This type of tester is more expensive than the above two. Because of this tester can support to the latest 2K~4K TV Panel. It also same as the LVDS convert to VGA Tester, the display result can see on its own LCD screen or connect to a VGA monitor. Please see on the picture below:

The item (b) & (c) tester also use for TV mainboard repair. Because the mainboard just supply the voltage input and their LVDS output just connects to the Tester and you will know this Mainboard can output a good display or not.

2) The Knowledge of how to Trobleshoot and Repair TV Panel

So from the TV screen symptom, you will know what the TV or panel problem is. All these knowledge you can learn from my previous ebooks like: V3 & V4 LED/LCD TV Repair Tips and LCD/LED Screen Panel Repair Guide. For more details of these ebooks, please visit to http://www.LCDRepairGuide.com .

Types of LCD/LED TV Screen Problem

1) No Display (Grey Screen: you can feel that their backlight is lit)

This type of screen problem, you need to see their backlight is lit or not. If the backlight lit but no display, then use the volt meter to check their T-con board VCC supplies input voltage. If the Vcc has 12V or a similar voltage, that's mean the problem is on T-CON board or Panel. If the T-con VCC input voltage missing, you need to trace it back to mainboard.

We can use the LCD/LED Panel Tester to checking their T-con + Panel are working or not. So to confirm the problem is on Mainboard or Panel. Also we can use the other two testers too.

2) Display Upside Down & Painting Display Problem

Normally this type of problem is causing by their setting in between Mainboard and their T-con board. So the solution is to login to TV service mode (Mainboard) to change their Panel setting. Or you can modify their T-con like inside the LCD/LED Screen Panel Repair ebook. If cannot modify, then change the T-con board to solve this problem.

3) White Display

Normally this type of problem is the T-con or Panel damage. If you use the LVDS convert to VGA Tester, the TV Mainboard can output a perfect display on its LCD screen there.

4) Display Slow Motion

Normally this type of problem is the T-con or Panel damage. If you use the LVDS convert to VGA Tester, the TV Mainboard can output a perfect display on its LCD screen there.

5) Display Double Images/ Jittering or Jumping

Normally this type of problem is the T-con or Panel damage. If you use the LVDS convert to VGA Tester, the TV Mainboard can output a perfect display on its LCD screen there.

6) Whole Screen of Vertical Colors Lines (Static or Dynamic)

Most of the time, this type of screen problem is causing by their T-con. If you're not sure, you can call out their TV OSD Menu. It is also same problem too. If their OSD Menu can show a perfect image on the screen, that's mean the problem is in the Mainboard there.

Or just use the LCD Panel Tester to testing it, you will know the result directly.

7) Screen Display Divided to Several Section or Display Content Opposites

This type of problem is causing be their T-con board EEPROM firmware abnormal.

8) One or Several Horizontal/Vertical Bar or Lines on Screen

Normally this type of problem is causing by their TV Panel.

9) Abnormal Display (Not mention the above)

This type of screen symptom, you can try call out their OSD Menu to see it is normal or not. If OSD Menu normal, that's mean the problem is on the Mainboard. If still same problem, then you needs to use the LCD Panel Tester or another two testers to testing this TV.

Notes:

If these voltage lines abnormal on T-CON Board, what will happen on TV Screen?

a) Vin (12V), VDD (3.3V), VAA/VDA(~17V)
   If these voltage missing or abnormal, the screen will no display.

b) VGH, VGL
   If these voltage missing or abnormal, the screen will become slow motion or abnormal display.

c) Vcom
   If this voltage missing or abnormal, the screen will flashing or display not sharp (like low level contrast screen).

How to Use the LCD/LED Panel Tester Correctly

Nowadays, the LCD/LED Panel Tester is a must have tool to repair an LCD/LED TV. It is cheaper than the LVDS Convert to VGA & V-By-One Panel Testers. So lots of the TV repairer purchased this type of Panel Tester.

Unfortunately, they bought the wrong package of this LCD/LED Panel Tester. Please look at the picture below:

The above LCD Panel Tester is a standard package only. The seller put their advertisement say this Tester can support LCD Panel from 10 inches until 55 or higher inches too! But from the above picture to see that, it is not user friendly for the TV repair!! When you bought the above LCD Panel Tester package, this tester will not help much in TV Panel repair.

Because of the seller not put all type of the LVDS cables to standard package of LCD/LED Panel Tester. When you want to testing the 32, 37, 39, 40, 42, 47, 50, 55 inches TV panel with this tool, you will feel the lack of the LVDS cables to testing the above TV Panel.

So I will recommend you when purchase this type of LCD/LED Panel, you must ask the seller to purchase extra LVDS cables like: 8-bits Single & Dual Channels types, and also for the 10-bits Single & Dual Channels LVDS cables.

Especially this type of **connector** LVDS cable:

How to Know Which LVDS Cable is Suitable to this TV Panel?

That's easy to just refer to back to their LCD Panel specification sheet, and then you will know what type of LVDS cable of this Panel (T-con board) use. Below is an example Panel datasheet of AUO T315XW02 VC. Inside the ""General Description" section there, it is shows their cable type already is 8-Bits and 1 Channel LVDS cable like picture below:

1. General Description

This specification applies to the 31.5 inch Color TFT-LCD Module T315XW02 VC. This LCD module has a TFT active matrix type liquid crystal panel 1366x768 pixels, and diagonal size of 31.51 inch. This module supports 1366x768 XGA-WIDE mode (Non-interlace). Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 8-bit gray scale signal for each dot.
The T315XW02 VC has been designed to apply the 8-bit 1 channel LVDS interface method. It is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth are very important.

Important Note:

1) Make sure that the T-CON Vcc input voltage pins are connected correctly to LCD/LED Panel Tester.
2) Also choose the correct LCD Panel voltage values for the TV Panel need to test.

If just wrong doing the above either one, it can damage and burn the LCD/LED TV Panel!!! So be careful on this part, if not, afterward you will regret.

One more thing is make sure the TV backlight is working properly. If not you can't see anything on TV screen.

You Must Know Why Repair LED/LCD TV Screen Unsuccessfully

Repair LCD/LED TV Panel is a challenging job. So we always need to find and learn the good & helpful TV Panel repairing information to improve our skills. When the skills improved, that's mean repair the TV Panel successful rate will increase at the same time too!

But I received several members email said they hard to successful repair the TV Panel. Finally, I found that they have a same mistake to learn the knowledge of repair TV Panel.

For example:

An LCD TV with display slow motion problem. Normally it is causing by their abnormal VGH voltage. So the member emails me about this problem and I told him to checking the VGH voltage. After next day, he replied my email and said all voltages on the T-CON board are normal.

I asked him, did you check the VGH voltage until to the X-COF pin there? He said no. Then I asked him to check again. But I forgot to tell him that LCD Panel has 3 x external Gate COF and also need to check too. So next email, he told me that the VGH voltage normal even measure until the X-COF pins there. So he feels like this TV Panel is beyond repair and need to return back to customer.

So I encourage him try again. Because he never finish check the VGH yet. Luckily, when he check the Gate COF-1 (COF BoardView or my previously call it as Bypass Modification) and found that VGH voltage missing! So he connects a wire from T-con board VGH point to the Gate COF-1 VGH point. Finally, his TV Panel problem solved!

From the above story, we know that different people even learn from a same book, but get a different result! Hopefully, the entire TV repairers don't do this mistake again.

A Good Workbench and Tools will Help to Increase Successful Repair Rate

Yes, a good environment workbench with the entire necessary tools standby to use will help to increase the successful TV panel repair rate. These things and tools will helps to you:

1) A clean workbench with the proper lighting.
2) Magnifier
3) LCD/LED Panel Tester
4) LCD & LED Backlight Tester
5) Sharp & Fine tip Needle Soldering Iron
6) Universal ISP Programmer
7) Good sharp knife and etc accessories.
8) TV Panel repairing information like: Panel datasheet specification info, Panel schematic diagram and my ebooks: V3, V4, LCD/LED Screen Panel Repair Guide (V1.0) and this ebook also.

Terminology of the T-CON Board and LCD/LED Panel PCB

No.	Marking Code	Description	Remark (Typically)
1.	VON, VGH, VGON, VDDG	Gate-On Supply. VON is the positive supply voltage for the CKV_, CKVB_, and STVP high-voltage driver outputs. Bypass to GND with a minimum 1uF ceramic capacitor. This VGH ($V_{Gate\ High}$) voltage was generated by DC-DC circuits. And their voltage is about 20V ~30V but it will depends on the T-con board design. The feature of VGH voltage is to supply to the Gate Driver Board as a "Switch ON" feature. It can switch on the TFT cells in LCD Panel and display shows.	20V~ 35V
2.	VOFF, VGL, VGOFF, VEEG	Gate-Off Supply. VOFF is the negative supply voltage for the CKV_, CKVB_, and STVP high-voltage driver outputs. Bypass to GND with a minimum 1uF ceramic capacitor. The VGL ($V_{GateLow}$) voltage was generated by the DC-DC section too. Some T-con board will use a higher voltage as -15V or a lower voltage as -1V. So it will depend on the T-con design and it's not much on the market. Typically is -5V~ -7V. This negative voltage is supply to Gate Driver Board. The VGL voltage is as "Switch Off" feature. When VGL negative voltage is supply, the VGH voltage on TFT cells will "Clear" by VGL voltage, so that the next data can shows on that TFT cells.	-5V~ -12V (Commonly is -5V ~ -8V)
3.	VDD, Vlogic, Vddd, Dvdd	Supply Input. VDD is the logic supply input for the scan driver. Bypass to GND through a minimum 0.1uF capacitor. This VDD voltage is output from the DC-DC IC or using an external Voltage Regulator IC to generate. It is 3.3V and other voltages like 2.5V (VDD25) and 1.8V (VDD18) was using the VDD 3.3V voltage to convert. After VDD voltage generate it is supply to Timing Control section, Source Driver Board and Gate Driver Board.	3.3V
4.	VDA, Avdd, Vdda, Vsource	This VDA voltage is about 14V ~20V and it will depends on their T-con board design. The VDA voltage is generated by DC-DC Converter circuits. It is use to supply to the GAMMA circuits and reaching to the Source Driver Board	13V~ 25V

	VCOM	Common Voltage. Normally their voltage is nearly half of the VDD voltages. (if VDD is 16V, then VCOM is about 7V)	
5.	AGND	Ground	
6.	BGND	Amplifier Ground	
7.	GND	Ground/ Logic Ground	
8.	PGND	Power Ground. Source connection of the internal step-up regulator power switch.	
9.	STV	Vertical Sync Input. The rising edge of STV begins a frame of data. The STV input is used to generate the high-voltage STVP output.	
10.	STVP	High-Voltage Scan-Drive Output. STVP is connected to VOFF when STV is low and is connected to VON when STV is high and CPV1 is low. When both STV and CPV1 are high, STVP is high impedance.	
11.	CPV1	CPV (Clock Pulse Vertical) -Vertical Clock Pulse Input. CPV1 controls the timing of the CKV1 and CKVB1 outputs, which change state (by first sharing charge) on its falling edge.	
12.	CPV2	Vertical Clock Pulse Input. CPV2 controls the timing of the CKV2 and CKVB2 outputs, which change state (by first sharing charge) on its falling edge.	
13.	CPV3	Vertical Clock Pulse Input. CPV3 controls the timing of the CKV3 and CKVB3 outputs, which change state (by first sharing charge) on its falling edge.	
14.	CKV1	CKV(Clock Signal)- High-Voltage Scan-Drive Output. When enabled, CKV1 toggles between its high state (connected to VON) and its low state (connected to VOFF) on each falling edge of the CPV1 input. Further, CKV1 is high impedance whenever CPV1 and STV are both low.	
15.	CKV2	High-Voltage Scan-Drive Output. When enabled, CKV2 toggles between its high state (connected to VON) and its low state (connected to VOFF) on each falling edge of the CPV2 input. Further, CKV2 is high impedance whenever CPV2 and STV are both low.	
16.	CKV3	High-Voltage Scan-Drive Output. When enabled, CKV3 toggles between its high state (connected to VON) and its low state (connected to VOFF) on each falling edge of the CPV3 input. Further, CKV3 is high impedance whenever CPV3 and STV are both low.	

17.	CKVB1	CKVB (Inverted Clock Signal)- High-Voltage Scan-Drive Output. CKVB1 is the inverse of CKV1 during active states and is high impedance whenever CKV1 is high impedance.	
18.	CKVB2	High-Voltage Scan-Drive Output. CKVB2 is the inverse of CKV2 during active states and is high impedance whenever CKV2 is high impedance.	
19.	CKVB3	High-Voltage Scan-Drive Output. CKVB3 is the inverse of CKV3 during active states and is high impedance whenever CKV3 is high impedance.	
20.	CKVCS1	CKV1 Charge Sharing Connection. CKVCS1 connects to CKVBCS1 whenever CPV1 and STV are both low (to make CKV1 and CKVB1 high impedance) to allow CKVB1 to connect to CKV1, sharing charge between the capacitive loads on these two outputs.	
21.	CKVCS2	CKV2 Charge-Sharing Connection. CKVCS2 connects to CKVBCS2 whenever CPV2 and STV are both low (to make CKV2 and CKVB2 high impedance) to allow CKVB2 to connect to CKV2, sharing charge between the capacitive loads on these two outputs.	
22.	CKVCS3	CKV3 Charge-Sharing Connection. CKVCS3 connects to CKVBCS3 whenever CPV3 and STV are both low (to make CKV3 and CKVB3 high impedance) to allow CKVB3 to connect to CKV3, sharing charge between the capacitive loads on these two outputs.	
23.	CKVBCS1	CKVB1 Charge-Sharing Connection. CKVBCS1 connects to CKVCS1 whenever CPV1 and STV are both low (to make CKV1 and CKVB1 high impedance) to allow CKV1 to connect to CKVB1, sharing charge between the capacitive loads on these two outputs.	
24.	CKVBCS2	CKVB2 Charge-Sharing Connection. CKVBCS2 connects to CKVCS2 whenever CPV2 and STV are both low (to make CKV2 and CKVB2 high impedance) to allow CKV2 to connect to CKVB2, sharing charge between the capacitive loads on these two outputs.	
25.	CKVBCS3	CKVB3 Charge-Sharing Connection. CKVBCS3 connects to CKVCS3 whenever CPV3 and STV are both low (to make CKV3 and CKVB3 high impedance) to allow CKV3 to connect to CKVB3, sharing charge between the capacitive loads on these two outputs.	
26.	BOOST	Operational Amplifier Supply Input. Connect to VMAIN	

		(Figure 2) and bypass to BGND with a 1µF or greater ceramic capacitor.	
27.	COMP	Compensation Input for Error Amplifier. Connect a series RC from COMP to AGND. Typical values are 180k and 470pF.	
28.	DISH	VOFF Discharge Connection. Pulling DISH below ground activates an internal connection between VOFF and GND, rapidly discharging the VOFF supply. Typically, DISH is capacitively connected to VDD, so that when VDD falls, VOFF is discharged.	
29.	DLY	Startup Delay Setting. Connect a capacitor to adjust the delay.	
30.	EN	Enables the Scan IC. Drive EN high to start up the Scan IC after a delay time, which is set by a capacitor at DLY.	
31.	FB	Feedback Input. Reference voltage is 1.24V nominal. Connect external resistor-divider midpoint here and minimize trace area. Set VOUT according to: VOUT = 1.24V (1 + R1/R2).	
32.	GOFF	Gate-Off Supply. GOFF is the negative supply voltage for the CKV_, CKVB_, and STVP_ high-voltage driver outputs. Bypass to AGND with a minimum of 1µF ceramic capacitor.	
33.	GON	Gate-On Supply. GON is the positive supply voltage for the CKV_, CKVB_, and STVP_ high-voltage driver outputs. Bypass to AGND with a minimum of 1µF ceramic capacitor.	
34.	IN	Step-Up Regulator Supply Input. Bypass IN to AGND (pin 34) with a 1µF or greater ceramic capacitor.	
35.	LX	Switching Node. Connect inductor/catch diode here and minimize trace area for lowest EMI.	
36.	NEG	Operational Amplifier Inverting Input	
37.	OE	Active-High Gate-Pulse Output Enable. CKV_ and CKVB_ leave the floating charge-sharing state on the rising edge of OE.	
38.	OECON	Active-Low Output-Enable Timing Input. OECON is driven by an RC-filtered version of the OE input signal. If OE remains high long enough for the resistor to charge the capacitor up to the OECON threshold, the OE signal is masked until OE goes low and the capacitor is discharged below the threshold through the resistor.	

39.	OUT	Adjustable Sink-Current Output. OUT connects to the resistive voltage-divider at the op amp input POS (between BOOST and GND) that determines the VCOM output voltage. IOUT lowers the divider voltage by a programmable amount.	
40.	POS	Operational Amplifier Non-inverting Input	
41.	SET	Full-Scale, Sink-Current Adjustment Input. Connect a resistor, RSET, from SET to GND to set the full scale adjustable sink current that is VBOOST / (20 x RSET). IOUT is equal to the current through RSET.	
42.	VCOM	Operational Amplifier Output	
43.	VL	3.3V On-Chip Regulator Output. This regulator powers internal analog circuitry for the step-up regulator, op amp, and VCOM calibrator. External loads up to 10mA can be powered. Bypass VL to GND with a 0.22µF or greater ceramic capacitor.	
44.	WPN	Active-Low, Write-Protect Input. When WPN is low, I2C commands are ignored and the VCOM calibrator settings cannot be modified.	
45.	WPP	Write-Protect Output. WPP is the inverse of WPN. It can be used to control active-high, write-protect inputs on other devices.	
46.	XAO	In order to solve the problem of image-retention effect of TFT-LCD, the technique of XAO function (power off control) is mostly used at present. XAO function means that XAO is set to low level when the display is turned off. For example, the logic low level is set to 0˜3.3 v, and thus all outputs of the gate driver will be shifted to high level at the same time and all TFT will be turned on. The charge stored on the CS can thus be discharged and the image-retention effect can be eliminated. However, the common method of using XAO function is to send XAO signal into logic control circuit and to convert low level to high level output through level shifter. After the display is turned off, much charge on the capacitor will be discharged since the voltage of power supply is maintained only by the capacitor and all TFT at low level will function at the same time. Therefore, when the pulse of XAO reaches, the gate voltage of all TFT are all shifted to VGH, and thus a large current is produced at the moment in which the gate of TFT on gate driver circuit is activated. This large current may cause the trace on gate driver circuit to burn. Furthermore, VDD voltage will also decrease rapidly and	

		thus causes the conversion of the level shifter to fail and the XAO function to lose efficacy.	
47.	GSC	Gate Shift Clock- Two clock signals GSC of a gate driver IC occur in a horizontal synchronous interval, and a GSC gate pulse is generated with each clock signal GSC of the gate driver IC. The gate start pulse has to occur so as to operate the gates	
48.	GOE	Gate Operation Enable- A timing controller supplying a gate operation enable (GOE) signal to the gate driver. a reset circuit supplying a reset signal to the timing controller, the reset signal enabling the GOE signal; and a filtering circuit connected to the reset circuit, the filtering circuit permitting a GOE mask time of the GOE signal to be longer than about 16 msec and reducing an impulse of the clock signal.	
49.	GSP	Gate Start Pulse	
50.	POL	Polarity Reverse	
51.	SSC	Source Sampling Clock	
52.	SOE	Source Output Enable	
53.	SSP	Source Start Pulse	

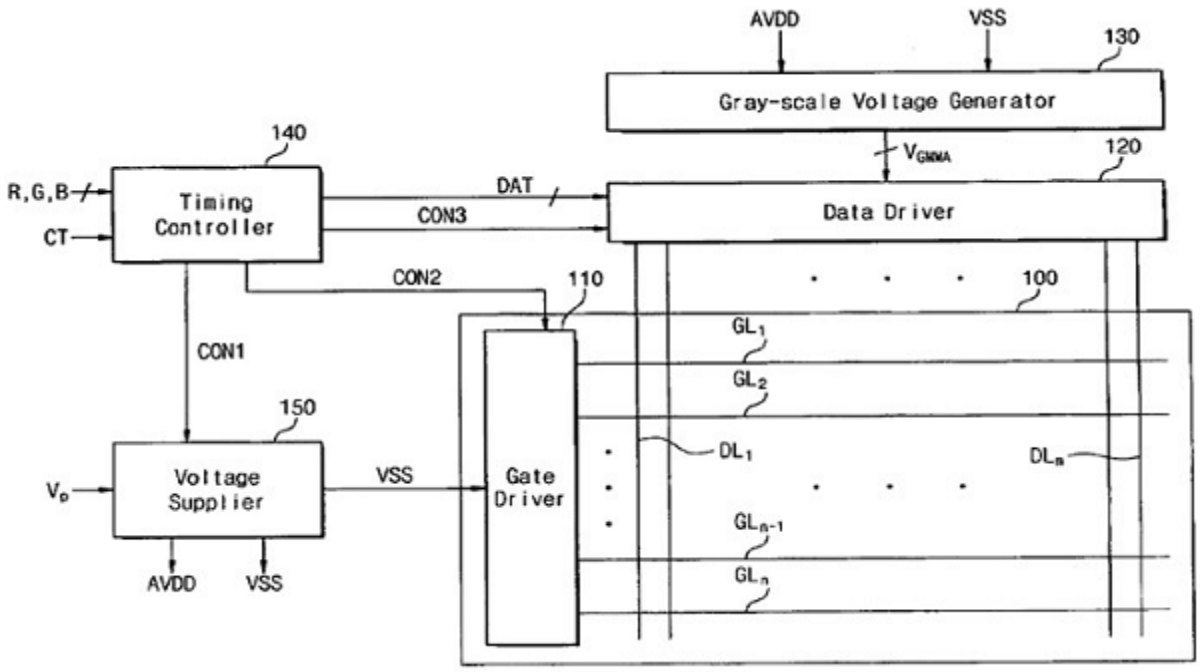
Procedure to Repair Samsung LCD/LED Panel without External Gate COF

This chapter will help you repair a Samsung 2008-2013 type panel screens that use gate circuits embodied in glass screen cell (chip on glass COG). But the knowledge you learn from this chapter, also can apply to other brands of panel repair. The procedure has a rate of success of 0-90%, but it will depend on your screen panel type, the tools you use and the knowledge you've learn from my previous ebook (Also included this chapter too). You have to accept that sometimes, even the screen panel will work but a thin line may appear randomly on screen. Also, sometimes, the screen will not respond to any procedure described here. In this file, I will refer only on repairing gate problems of fault in Samsung screen panels.

1. About Samsung Panels

A display device includes multiple pairs of field generating electrodes and an electro-optical active layer interposed there between. Generally, one of the pair of field generating electrodes is connected to a switching element to receive an electric signal and the electro-optical active layer converts electric signal into an optical signal to display images.

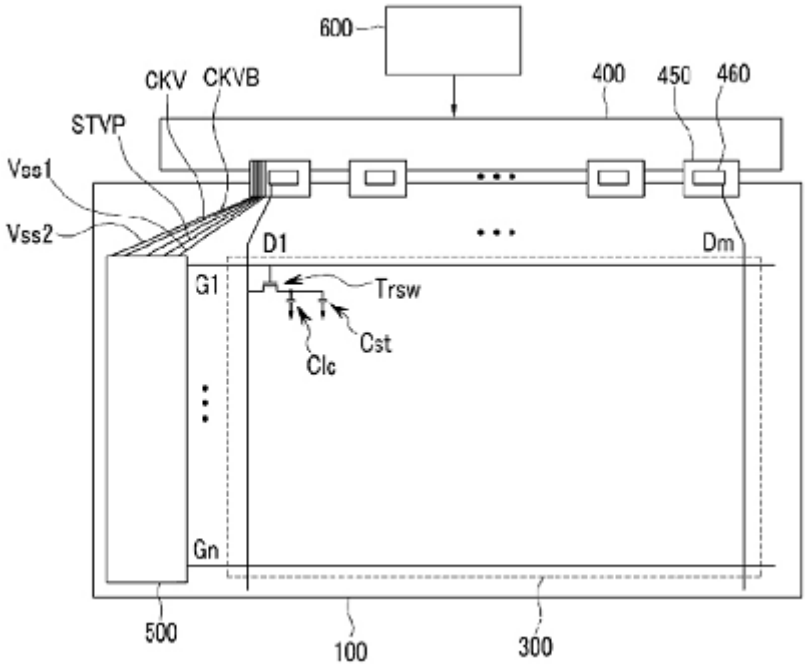
The display device typically includes a gate driver and a data driver. The gate driver applies to a gate line a gate signal that turns a pixel on and off, and the data driver converts image data into data voltages and then applies the converted data voltage to a data line.



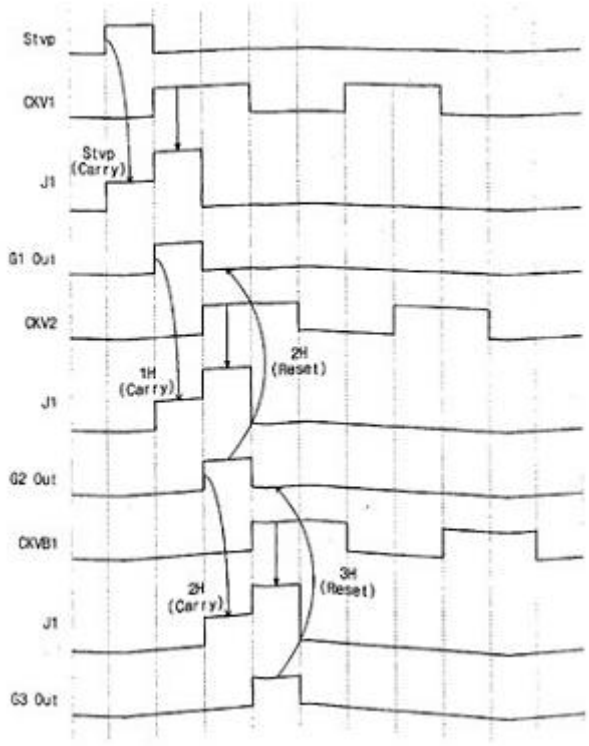
“We are interested only in gate signal circuit, this is the one that faults and need to be fixed”

The gate signals are processed by the scan driver circuits and amplified by the level shifter to analog signals, which are outputted as the gate pulses for scanning the display panel.

Gate driving circuits can be mounted - (TCP) tape carrier package or printed on glass - (COG) chip on glass. On Samsung panels, gate driving circuits were replaced since 2008-2009 with gate drivers on glass mounted transistors, using ASG technology (Amorphous Silicon Gate).



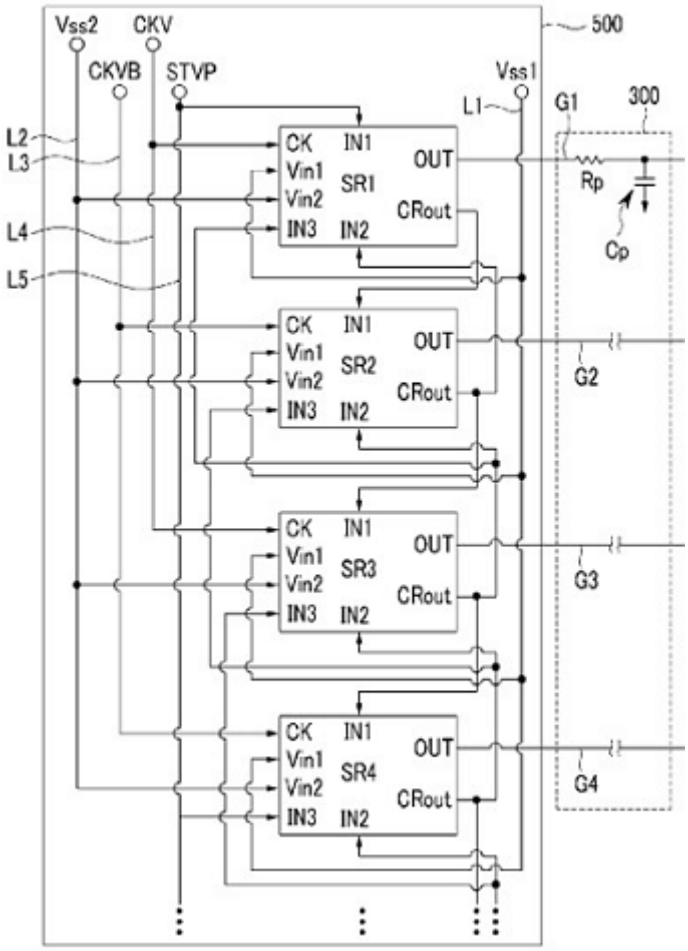
Each gate line has a block circuit glass mounted transistors called SR, made using ASG technology. The gate driver receives clock signals CKV and CKVB and the start signal STVP, and sequentially apply on voltages to gate lines G1-Gn.



The display area 300 is represented by the resistor Rp and the capacitor

Cp. As show below, the gate lines G1-Gn, and the liquid crystal capacitor CIc and storage capacitor Cst , respectively have the resistance and capacitance, and the sum thereof is represented by one resistor Rp and one capacitor Cp. The gate voltage output from each line block SR1-SRn is analog transmitted through the gate line corresponding.

The SR blocks are connected between, with glass printed connections, and when a component of one SR block faults, owing to the fact that is on glass, the repair is impossible.



However, with some trickery made on command signals of gate driver's blocks, you can partially or totally repair the faults.

CKV and phase opposition CKVB signal, and start STVP signal, are synchronizing the gate outputs to screen lines. For a small screen, we will have only one set of signals: CKV, CKVB and STVP. For a bigger screen, we will have 2 gate drivers blocks and 2 sets of signals, CKV1, CKVB1, STVP1 and CKV2, CKVB2, STVP2, each of this signals sets will command a gate driver on down or upper side of the screen.

The fault can be visible on whole screen, half of screen, so we need to cut in either signals sets, or one by one, depending on each situation. On large screen panels, starting with 32 inch, there are gate drivers on both sides of the screen, and we can have 2, 3 or 4 sets of signals. In this case, the command of 4 blocks gate drivers (CKV1. ...CKV4, etc) are made in various ways, one way it is as below:

- First gate signal will command upper side of screen odd lines, second gate signal - lower side of screen odd lines, third gate signal will command upper side of screen even lines, fourth gate signal lower side of screen even lines.

A fault screen will display in many ways:

- Doubled image on all screen, on vertical, or image stop.
- Half of screen, upper or lower, doubled or static image, the other half will be correct displayed.
- On whole screen are horizontal lines where image is reversed or static.
- A part of the screen is darker and with lines.
- Vertical flickering image on all screen or upper or lower half of the screen
- In an area of the screen, the image has lines on it.
- On area where image is not right, can also to have a certain color or fail of color.

2. General Considerate Regarding Samsung Panel by Disconnecting Gate Drivers Signals

This method also called as “Cut-Off Modification” in my previous ebook “LCD/LED Screen Panel Repair Guide”.

(2.1) The generating circuit for gate drivers, called LEVEL SHIFTER or SCAN DRIVER, can be mounted on T-CON drivers, on PCB (printed wire board) connected to screen, or in glass screen.

(2.2) When level shifter is in glass cell, you cannot disconnect it, but you can try to disconnect the input signal – CPV, STV and OE. This signals will go on both sides of the screen, thru left and right PCB, you can disconnect one side first,

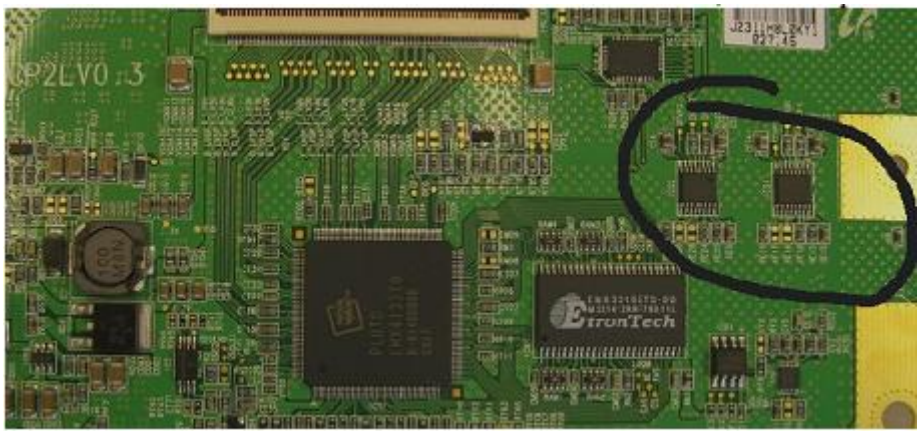
check if any improvement, and if not, disconnect other side and re-connect first one.

(2.3) First of all you have to check is: where is the LEVER SHIFTER IC, by finding check points CKV CKVB and STVP. Usually the LEVER SHIFTER is on TCON board or on T-CON PCB attached to the screen glass cell.

(2.4) When you cut CKV, CKVB and STVP signals on printed wire circuit, you have to be sure that the disconnection will be made to screen direction, there are several situations when connection with level shifter is between check points and screen, so cutting the printed wire circuit near this check points to be with no result.

(2.5) The T-CON processor generates only low voltage gate signals, like CPV, STV and OE, the level shifter circuit is not integrated in t-con processor, is a separate IC.

(2.6) Sometimes there are 2 or 3 LEVEL SHIFTER IC, like in picture below:



But latest t-con boards have the same IC for LEVEL SHIFTER and DC-DC source, especially on small size screens (15-32”).

(2.7) Generally, if screen configuration permits, you have to check the printed wire circuit from T-con to both left/right PCBs, in connection to panel for all signals CKV, CKVB and STVP. The best way to repair is to cut the signals near screen, on left/right PCB, or left/right connection to screen on PCB (if only one board attached to screen cell).

(2.8) Sometimes, cutting some signals only from left or right will solve the image problems but cutting same signals from both right / left connection to screen to generate more errors.

(2.9) If you have a T-con apart from screen cell, first step is to find which part of the screen is fault. Disconnect left FFC between T-con and left PCB and power the tv. If you have now on right part of the screen a normal image, means that you have a fault in left side of the cell. If still a fault image, re-connect the left FFC and disconnect right FFC between T-con and left PCB and power the tv. If you have now on left part of the screen a normal image, means that you have a fault in right side of the cell.

(2.10) On some screens, Level Shifter IC have on outputs, some zero ohms resistors, so, you can first remove this resistors and check if any improvements. You should remove on signal groups, for example, when you remove output of CKV2, you have to remove also CKVB2 signal.

(2.11) Sometimes, you have on left/right PCB, some zero ohms resistors that connect Level Shifter to right/left screen cell. In this case, just remove those resistors for groups that fault. In example below, RM1 connects to screen the STVP signal, RM2 connects to screen CKV1 signal, RM3-CKV2, RM4-CKV3, RM5-CKVB1, RM6-CKVB2, and RM7-CKVB3 .

(2.12) As I explained in previous presentation, the CKV, CKVB and STVP signals scan between positive voltage VONE and negative voltage VOFFE. Sometimes, a small raise of VOFFE negative voltage will remove faults of the screen.

3. Steps You Have To Do When Repairing A Samsung Panel

(3.1) identify the Level Shifter generator, by finding the inputs CPV, OE and STV check points, or finding the outputs CKV1...CKVn, CKVB1...CKVBn, and STVP1...STVPn check points.

(3.2) Check the VONE and VOFF voltages and note the values.

(3.3) First, disconnect the CKV1, CKVB1 and STVP signals, after that CKV2, CKVB2, and so on.

(3.4) Disconnections will be made so the wires from screen panel to be “on air”

(3.5) when disconnect the printed wire board near screen entrance, by cutting the printed circuit, you have to be sure that you will be able to solder this wires, so the cut has to be made with some distance from data driver flexible circuit.

(3.6) First disconnect, CKV1 and CKVB1- if image still have thin lines, just strap the wires coming from screen panel CKV1 and CKVB1 with a thin wire.

(3.7) After connecting CKV1 and CKVB1 with a thin wire, try also to ground this 2 points, or try to connect to VOFF.

(3.8) If no improvements, try to disconnect CKV2 and CKVB2 (with STVP disconnected) and make same steps as for CKV1 and CKVB1 (3,6 and 3.7).

(3.9) If we have also CKV3, CKVB3 and CKV4 and CKVB4, make the same procedure as CKV1 and CKVB1, described on 3.6-3.7.

(3.10) If, for example, by disconnecting CKV3 and CKVB3 we have a normal screen display, re-connect the former signals to panel screen, one by one in pairs (CKV1 and CKVB1, and so on).

(3.11) It is possible that, sometimes only by disconnecting pair 1 and 4 to have a normal screen, but by disconnecting all 4 pairs to have a fault image.

(3.12) Sometimes, even the image is correct displayed, you'll have a thin line in the area where gain glass circuit is failure - this cannot be repairable. You have to advice the client about this, and ask him to put in balance the final result of this procedure against the cost of a new panel screen.

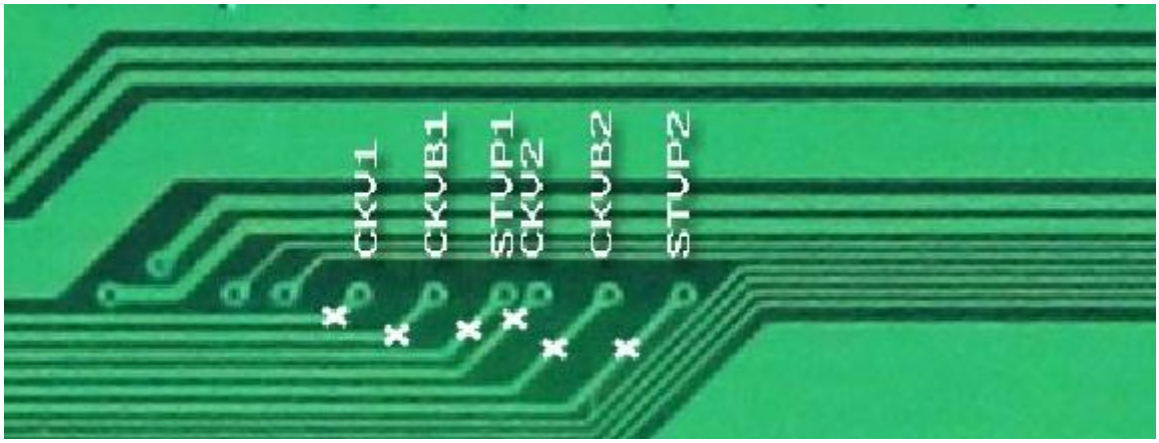
4. Samsung Panel Screen Repair Case

(4.1) Panel Screen: LTA260AP02

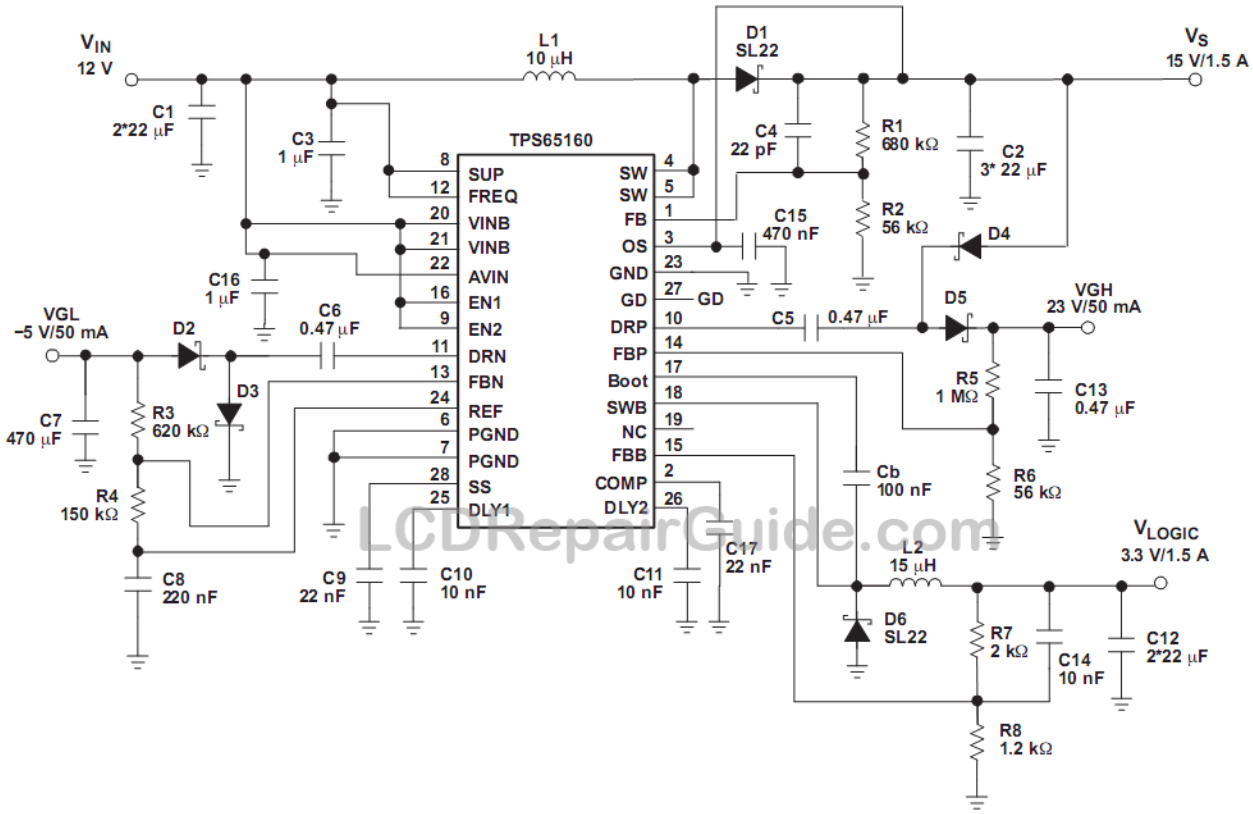
T-CON: 260AP02C2LV0.2
Level Shifter IC: IC8-AG32AE2

Level shifter receives from processor this low voltage signals: OE, STV and CPV1, CPV2, and from DC-DC source, VON and VOFF voltages Output signals that controls 2 gate drivers are CKV1, CKVB1 and STVP1, respectively, CKV2, CKVB2 and STVP2.

Clock signals are starting from T-con Board, and you don't have to open the screen panel. First, cut and disconnect on printed side, where indicated in picture, CKV1 and CKVB1, strap on the check point on component side only CKV1 and CKVB1



If still image fault, proceed identical with CKV2 and CKVB2. If there is no image, just rebuild the CKV1 and CKVB1 connections on printed side. Sometimes, you need to disconnect also STVP1 (2) signal. Be patience, and check all combinations possible to have a normal picture. If fault solved but after a while appears some vertical white lines in an area with a static image, like a channel logo, you have to connect strapped pair to VOFF, instead of GND, and raise a little the VOFF with minus 3-5v. You can do that by lowering the resistor connected between REF and FBN of bias power supply IC7. Have TPS65160 schematic below:



Another fault, over all image there are vertical thin colored lines. All voltages are correct. SDRAM – IC4 EM638325TS-7G is fault. Change T-con or replace memory.

Another fault: Black screen, after a while will appear vertical colored lines. Check all voltages – AVDD, VCC, VON, VOFF. Usually there is a problem with Von voltage, bias power supply TPS65160 fault. Change T-con or replace IC.

(4.2) Panel Screen: LTA320AB02 and LTF320AB01

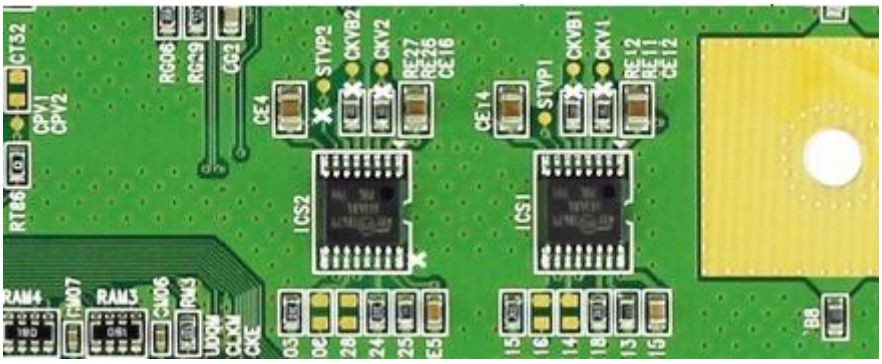
T-CON: 320AB02CP2LV0.3
Level Shifter IC: 2x AG16BG

On this panel, we have 2 versions of repairing it.

a) On T-con board: There are 2 gate drivers and clock signals are outputted by 2 level shifter IC's, ICS1 and ICS2, located on T-con board.

First, cut the circuits between ICS1 - CKV1 and CKVB1, right near resistors, as shown in image below. If image still fault, try to strap CKV1 and CKVB1, connect to the ground, or connect with an wire to Voff. ATTENTION! Make sure the connection between check point and ICS1 is opened with diode instrument, before strapping CKV1 and CKVB1. If there is still connection to the level shifter IC, you can burn it by connecting to the ground or Voff.

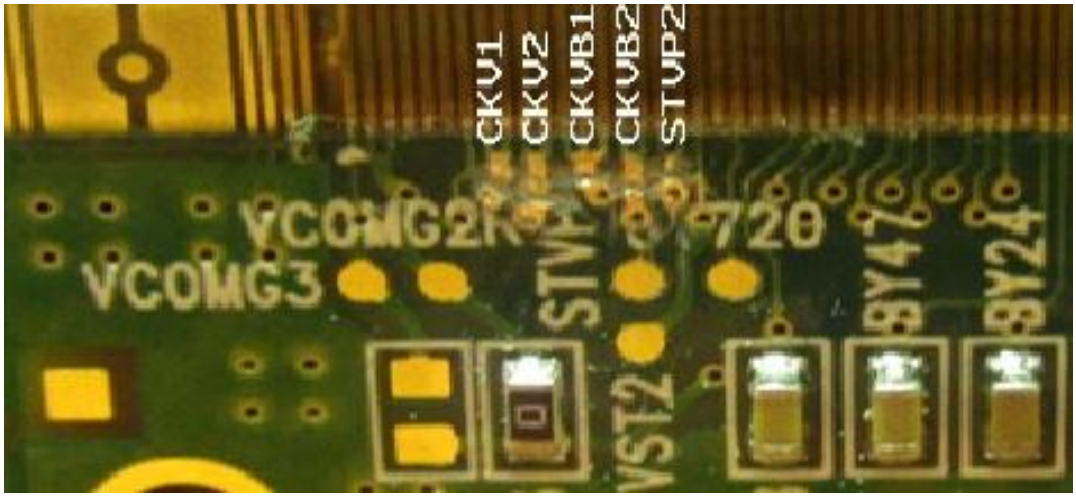
If image still faults, make a similar procedure with ICS2, by disconnecting CKV2 and CKVB2. Reconnect CKVB1 and CKVB2 to ICS1, and follow the same procedure.



If image is correct, but on still images there are some white vertical artifacts', you have to connect strapped pair to VOFF, instead of GND.

b) On PCB connected to glass screen panel

Cut the connections CKV1, CKVB1, CKV2, CKVB2 and STVP1 (2) on side with gate block fault (left or right) . You can see where the fault is by checking left/right margin of the screen with a magnifier lens, or a microscope. You will see a burned glass circuit, in the area where screen faults.

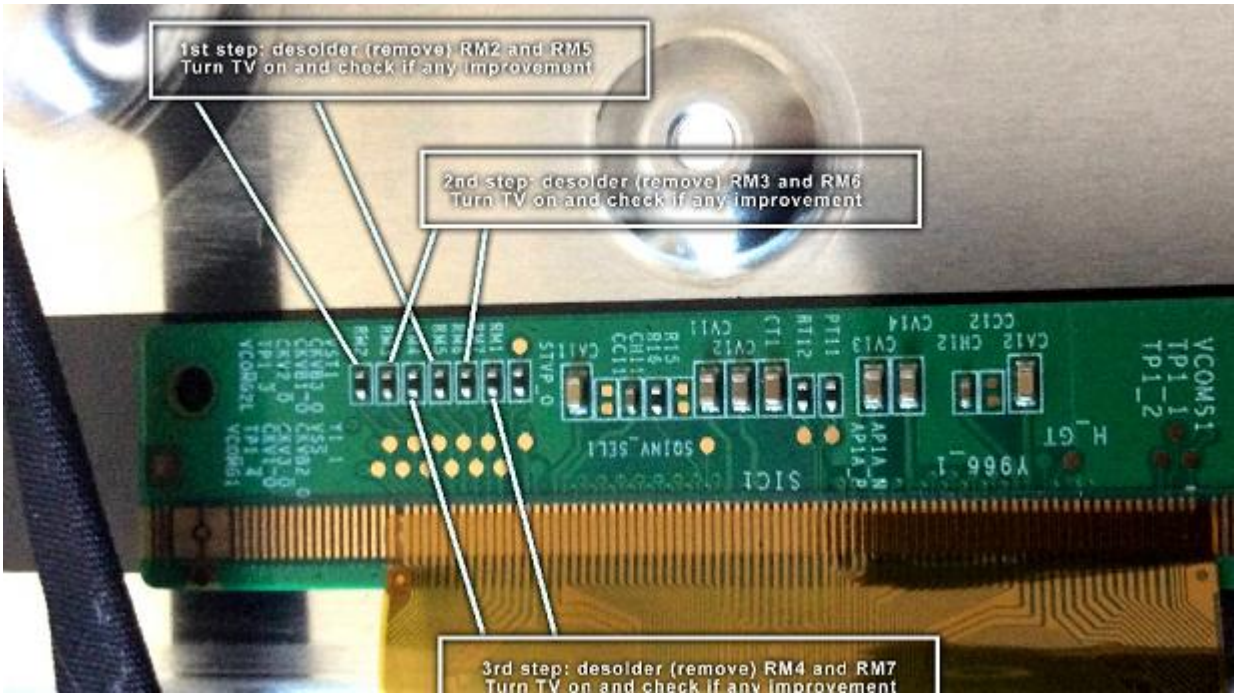


(4.3) Panel Screen: LTJ400HM03 B

T-CON: S100FAPC2LV0.3

Screen is flickering and has a part/all the screen with doubled image.

First step is to find which part of the screen is fault. Disconnect left FFC between T-con and left PCB and power the tv. If you have now on right part of the screen a normal image, means that you have a fault in left side of the cell. If still a fault image, re-connect the left FFC and disconnect right FFC between T-con and left PCB and power the TV. If you have now on left part of the screen a normal image, means that you have a fault in right side of the cell. On the right side (with problems) just remove the CKV1 and CKVB1 resistors RM2 and RM5 and see any improvements.



If not, remove CKV2 and CKVB2 resistors RM2 and RM6, check if any improvements, and if not, remove CKV3 and CKVB3 resistors RM3 and RM7. If still no improvements, remove STVP resistor, RM1 see picture.

You will have a normal picture now, but sometimes, you will have, on side with problems, a little ODD/EVEN lines distance. Strap with a wire, on check points, CKV1 with CKVB1, see if lines are now correct displayed. If not, strap with a wire, on check points, CKV2 with CKVB2, check, and repeat procedure with CKV3 with CKVB3. Now you will have a clean image. Sometimes, it will be better to put back the resistors for the blocks pair that have no problem. For example if only by disconnecting CKV3 and CKVB3 will solve image problem, that means pair 1 and 2 have no problems. Sometimes, if you have a bigger problem on cell circuit, the image will be correct but a/some thin line/s will be displayed sometimes on screen, noticeable on lighter/darker images. Try to connect the strapped pair that not works on GND or Voff. You can also raise Voff voltage with 3~5 volts to minus and the line will disappear. You can do that by changing the input resistors from FBN input of BiasPS/Level Shifter ICD1 – SM4109.

(4.4) Panel Screen: LTF320AP11

T-CON: S100FAPC2LV0.3
Processor: BD8193MWV, Gamma MAX9694E
Panel screen used in Samsung LE32D450G1W TV

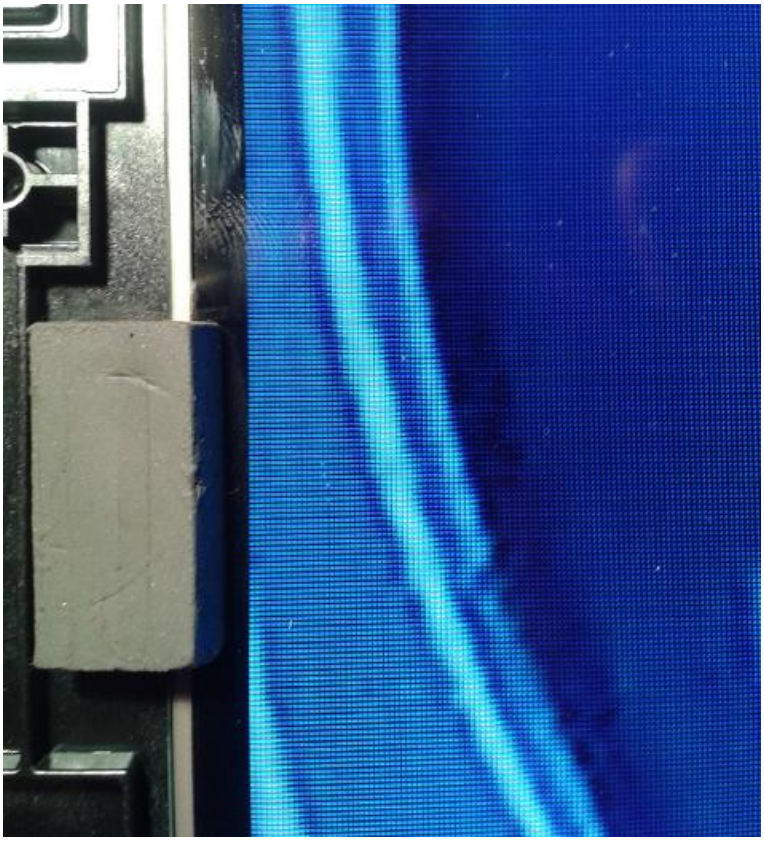
VONE = 28v, VOFFE= -11,5v
Gain signals CKV1, CKVB1, CKV2, CKVB2 and STVP are outputted to screen cell thru 4 resistors, 0 ohms, as in image below:

When all image is colorless or with hue of green/red pale, the fault is from NVM EEPROM IC, 24C64WP. Replace it, with another one, need to use the Universal Programmer to write the good firmware into it before solder back to PCB.

A very often fault found with this type of panel: Image is ok only on lower part of the screen, and upper side is discolored and full of visible horizontal lines, as in picture below:

The reason for this fault is a fried connection of a SR gate block, from left or right side of the screen (check after you remove the metal rim that covers the screen).

The repair procedure: The fault starts after a few minutes, when faulty SR gate run too hot, so you can add a thermal sponge pressed by metal rim, or you can cut the signals CKV1, CKVB1, CKV2, CKVB2 and STVP only on fault side.



(4.5) Panel Screen: LTJ400HM07

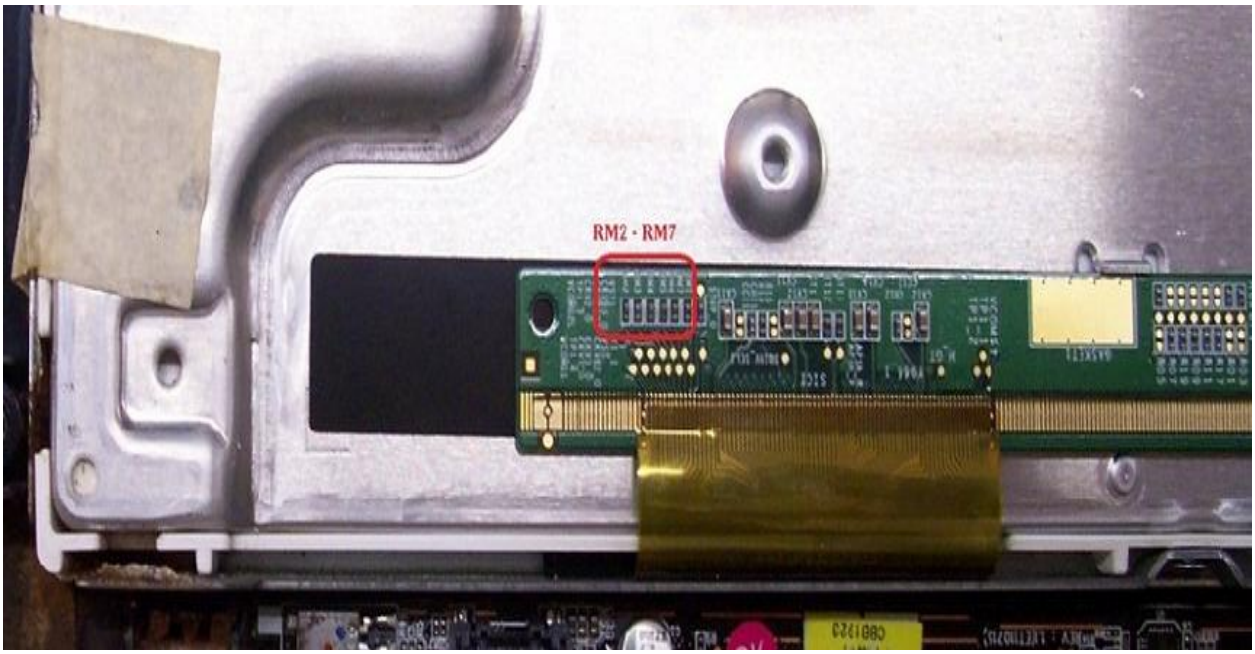
T-CON: S100FAPC2L v0.3 (BN41-01687A)

Fault:

The thin horizontal stripes were at the top of the screen. Cause of the defect: burned SR block in the higher right/left corner of the panel.

Repair procedure:
Disconnect left FFC between T-con and left PCB and power the tv. If you have now on right part of the screen a normal image, means that you have a fault in left side of the cell. If still a fault image, re-connect the left FFC and disconnect right FFC between T-con and left PCB and power on the tv. If you have now on left part of the screen a normal image, means that you have a fault in right side of the cell. The right side (with problems) resistors are RM2, RM3, RM4, RM5 RM6 and RM7.

You will have a normal picture now, but sometimes, you will have, on side with problems, a little ODD/EVEN lines distance. Strap with a wire, on check points, CKV1 with CKVB1, see if lines are now correct displayed. If not, strap with a wire, on check points CKV2 with CKVB2, check, and repeat procedure with CKV3 with CKVB3. Now you will have a clean image. Sometimes, if you have a bigger problem on SR circuit, the image will be correct but a / some thin line (s) will be displayed sometimes on screen, noticeable on lighter/darker images. Check if any improvements if connect all pairs of check points on fault side on GND or Voff.



(4.6) Panel Screen: LTF400HM03

T-CON: S100FAPC2L v0.3

Fault:

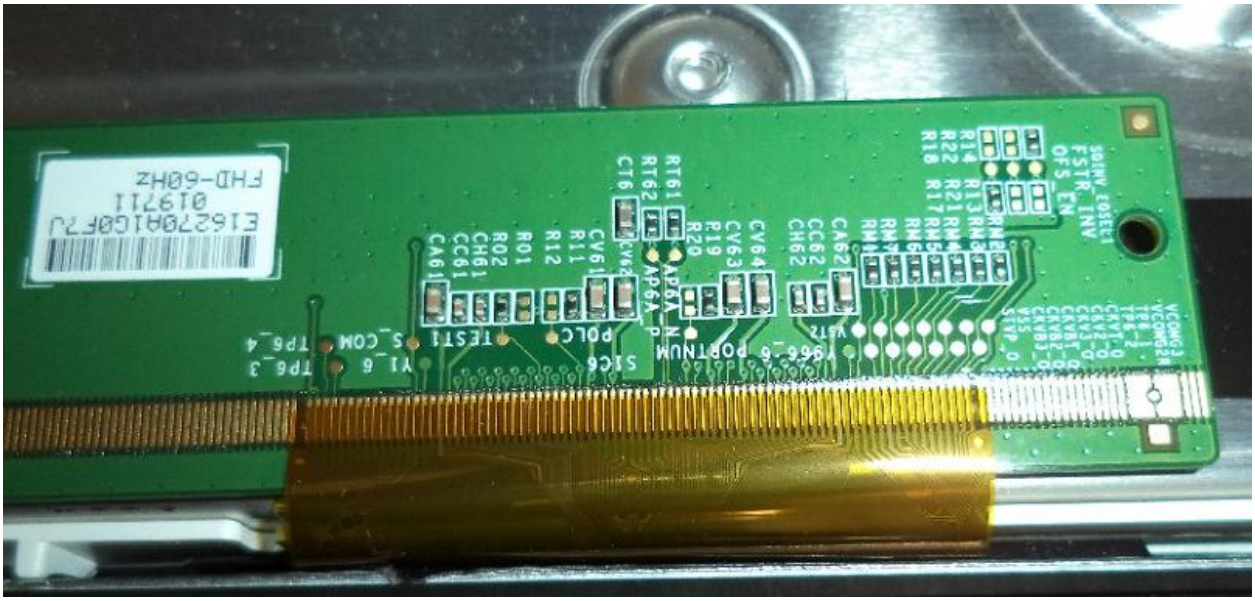
15 - 30 minutes of good image, begins to trembling, double vertically. If you check on strips of glass with your fingers, you will find that hot broken drivers are on one of the left/right bar.

Repair procedure:

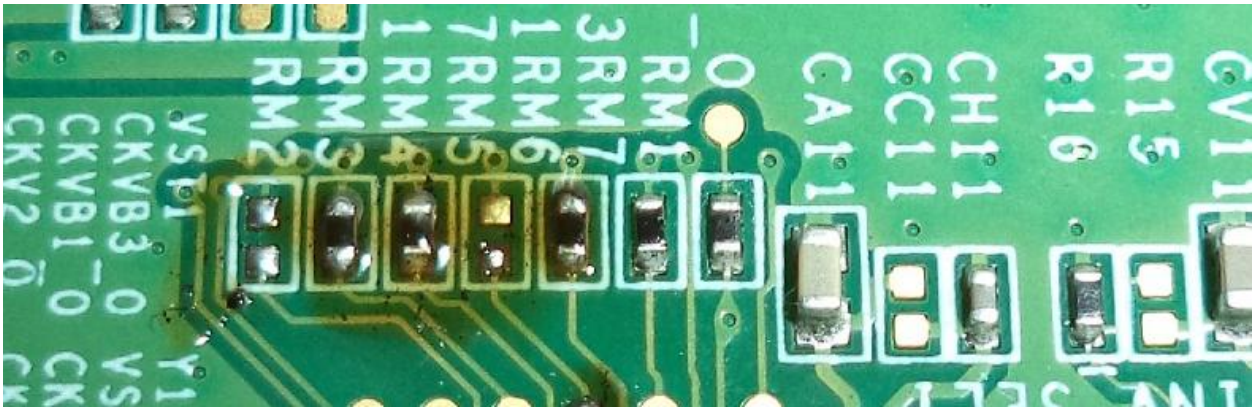
Disconnect left/right FFC cable between T-con and left/right PCB one by one, and check which part is fault. Remove on pairs (CKV1 and CKVB1 and so on), the 7 resistors from fault side RM1-RM7. If needed, strap pairs coming from screen, on check points (CKV1 with CKVB1, CKV2 and CKVB2, and so on). You can also try to strap pairs to GND or Voff and see if better picture.

Left PCB:

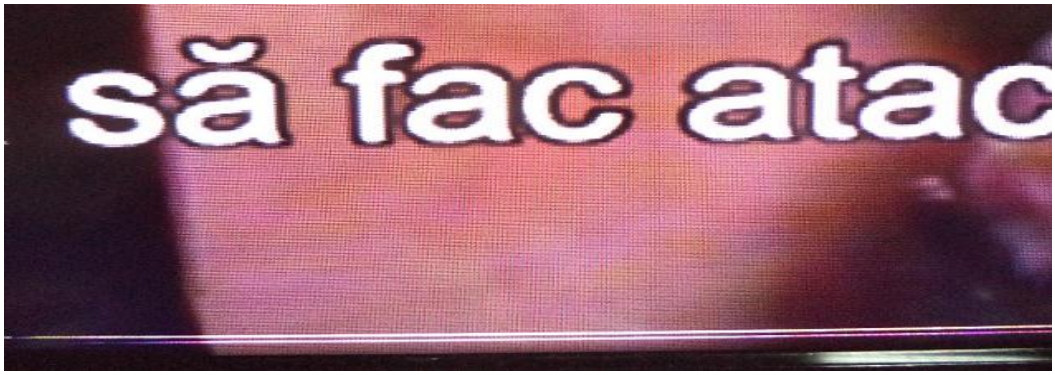
Right PCB:

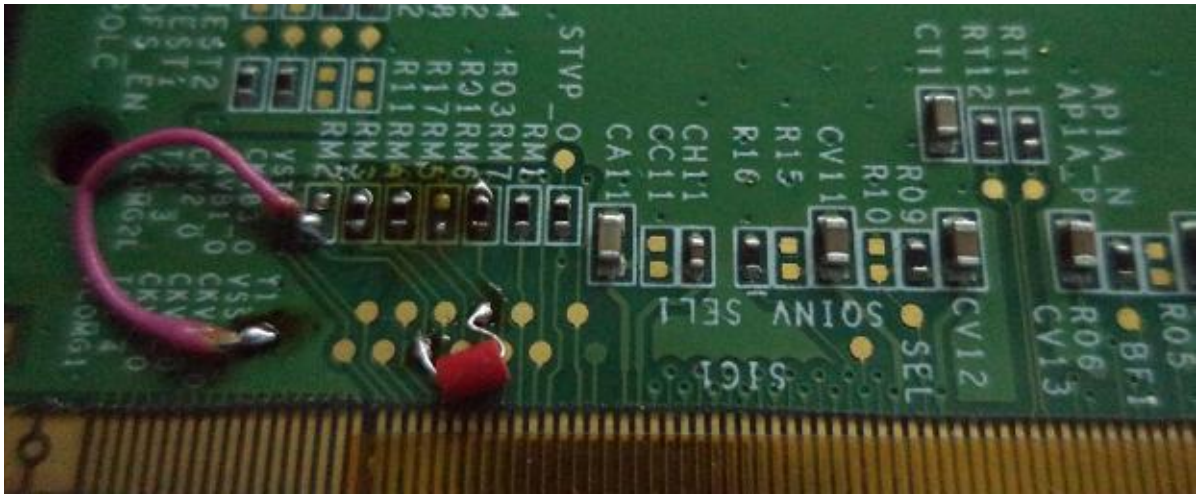


On example below, was enough to cut CKV1-CKVB1 pair on fault side, by removing corresponding resistors, and the image came back to normal.



Some thin lines can appear sometimes. Just Strap CKV1-CKVB1 pair, and connect it to GND or VSS, and the lines will disappear.



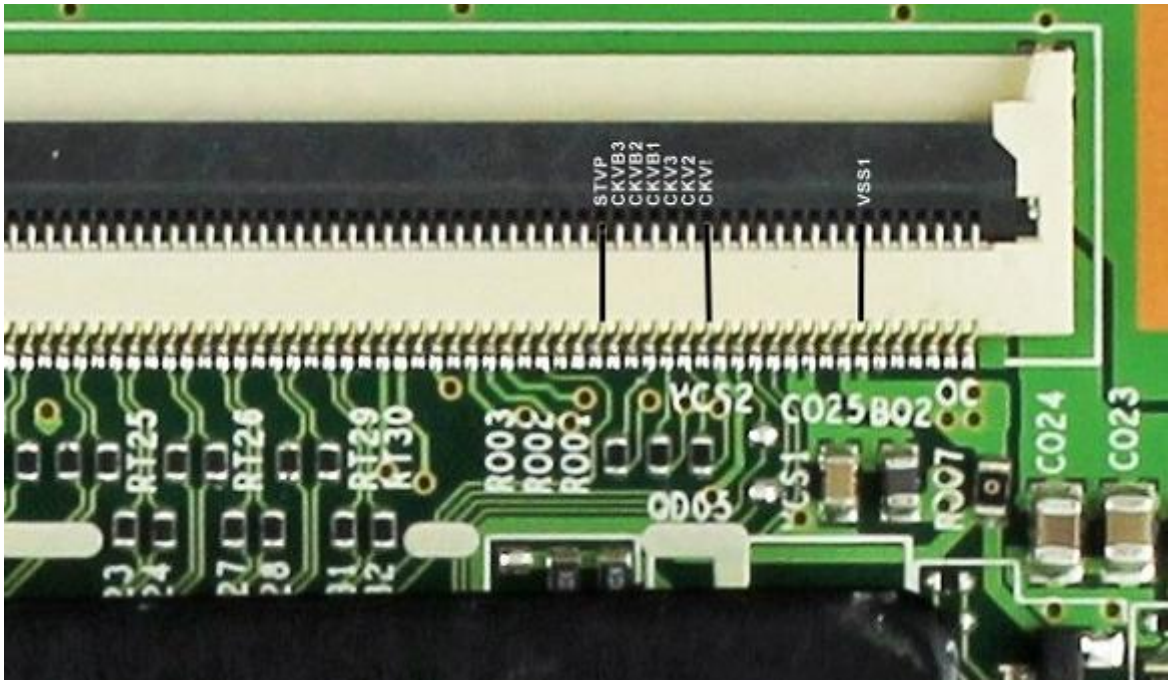


(4.7) Panel Screen: LSF320HJ01

T-CON: 2013_TCON_FOX_FT1 (BN41-01939)

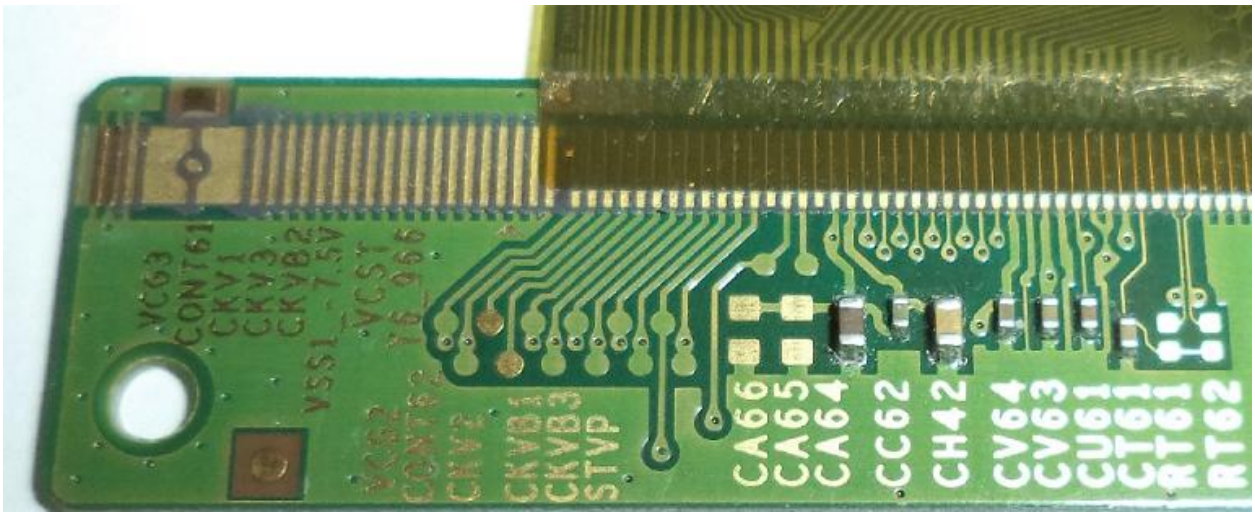
Fault:
Horizontal lines are partial or whole of the screen.

Repair procedure:
Disconnect one by one the left/right FFC cable between T-con and left/right PCB and start the tv, this way you can easy check which part is fault. Level shifter IC is connected to left/right gate blocks, thru some zero ohms resistors fitted on T-con, thru left/right FFC cable, thru left/right PCB and extreme left/right flexible data driver circuit.

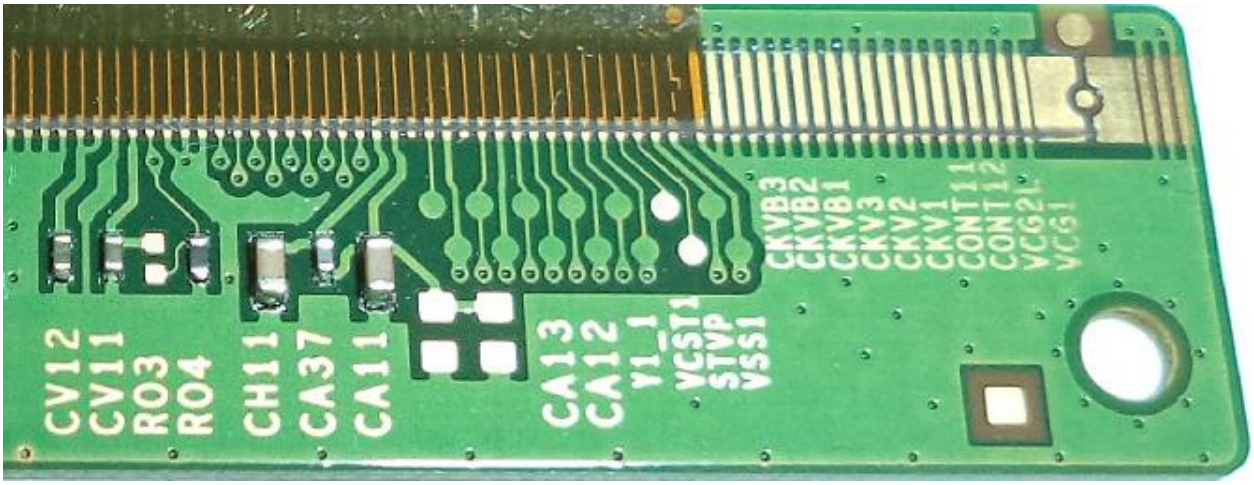


The clock signal pairs CKV1-CKVB1, CKV2-CKVB2, CKV3-CKVB3 and start signal STVP have check points on each side, but they are covered with paint and are very close to PCB's through-holes, so cutting the circuits is an hard operation.

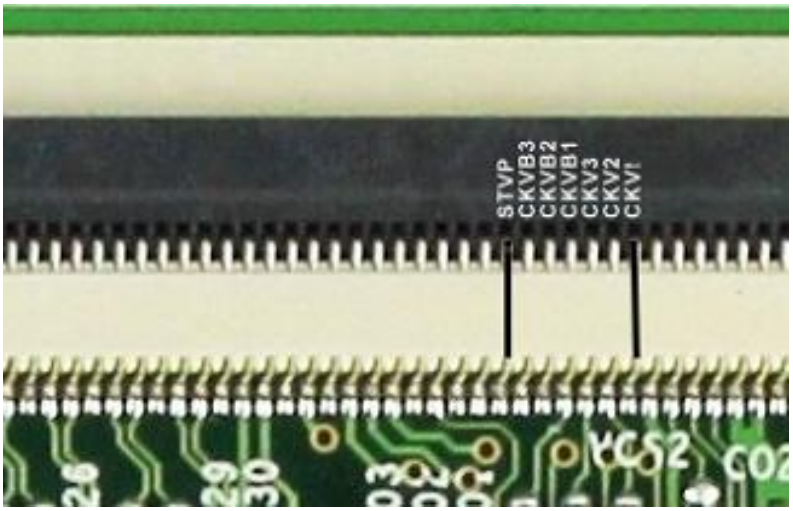
Right PCB:



Left PCB:



The easiest way to repair the panel is to cut all 7 signal connectors from FFC cable, only on the side with fault, on T-con side.



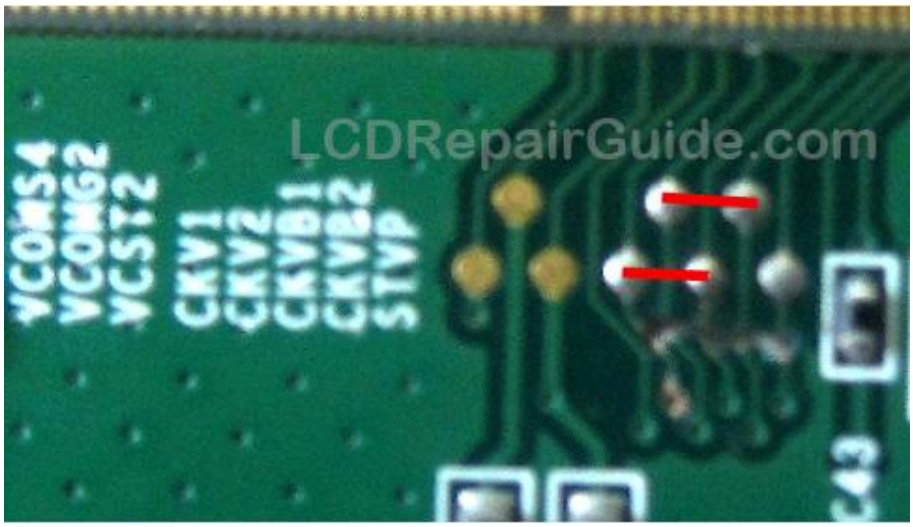
If any horizontal thin lines remains over normal displayed image, clean the paint from check points on PCB side with fault, and strap with a wire the pair check points CKV1- CKVB1, see if lines disappeared. If not, connect the strapped to GND or Voff. Repeat procedure with pairs CKV2-CKVB2, and CKV3-CKVB3 for best results.

(4.8) Panel Screen: LTY320AP04 and LTZ320AP04

TCON: 320AP04S4LV1.5 and 320AP04S4LV1.7

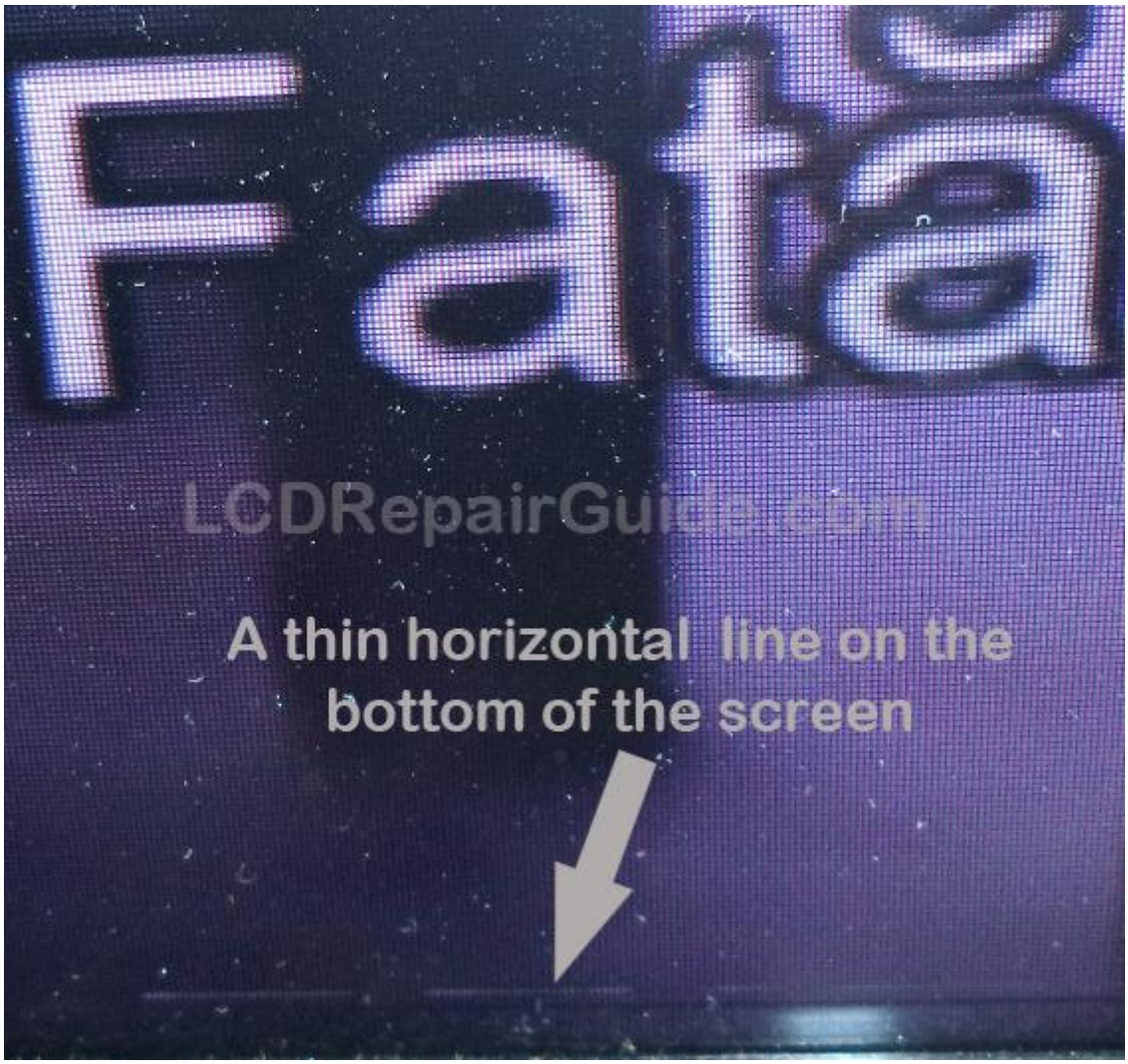
Fault:
Image trembling, double vertically, horizontal lines are partial or whole of the screen.

T-CON board is not detachable, and signals to left/right gate blocks, is transmitted thru left/right flexible data driver circuits. So, it's almost impossible to check which gate is fault. Usually, the right part faults more often, so you can start to disconnect signals from there. You must cut the connections between PCB's through-holes and check points, so the check points to remain connected to panel, as in picture.



Disconnect first the pair CKV1-CKVB1 and STVP and power the tv and check if any improvement. If not, try to strap CKV1-CKVB1. Check again. Try to connect CKV1- CKVB1 to GND. Disconnect the pair CKV2-CKVB2 and power the tv and check if clear display. If not, try to strap CKV2-CKVB2. Try to connect CKV2-CKVB2 to GND.

If CKV2-CKVB2 faults, try to rebuild connection for pair CKV1-CKVB1. Your goal is to have best image you can achieve. Sometimes a thin horizontal line will be displayed even you have a perfect image. You can not eliminate this failing. The line is not noticeable from normal view distance, but its position depends on the position of faulty SR gate block. On image below, the line is very close to lower part of the screen.



(4.9) Panel Screen: LTA400HW03 J

TCON: SH120PMB45V0.3

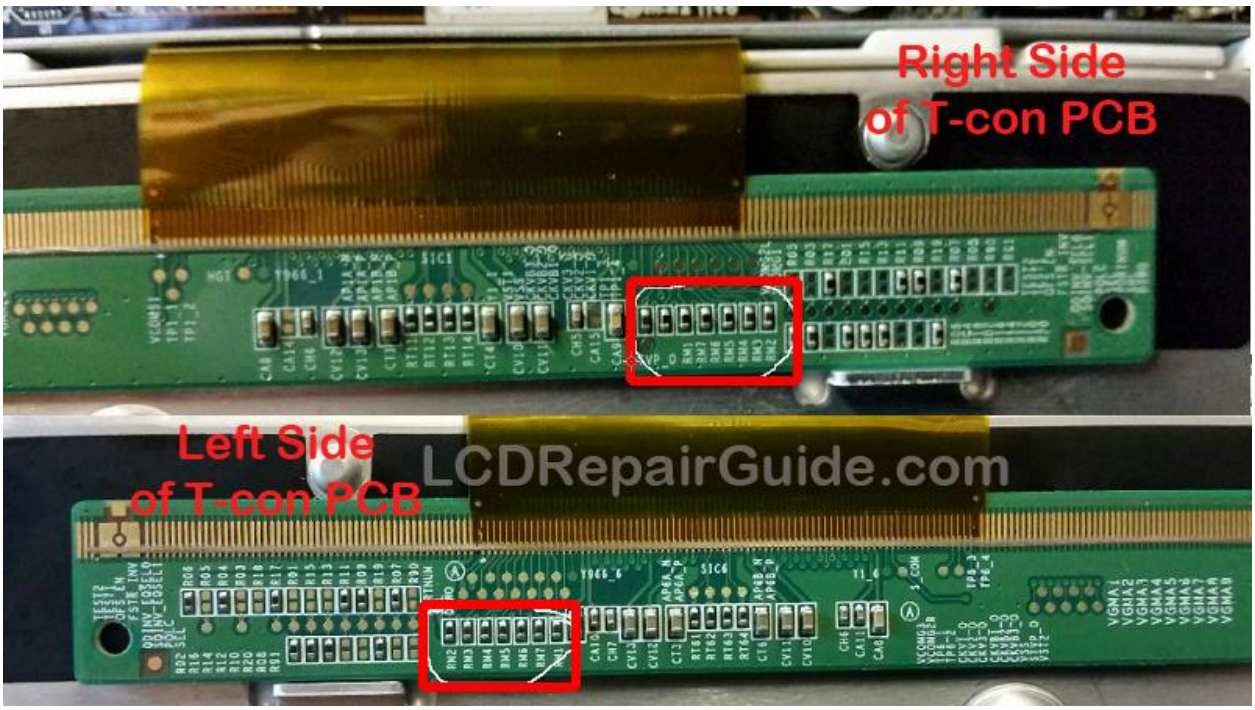
Fault:

Image trembling, double vertically, horizontal lines are partial or whole of the screen.

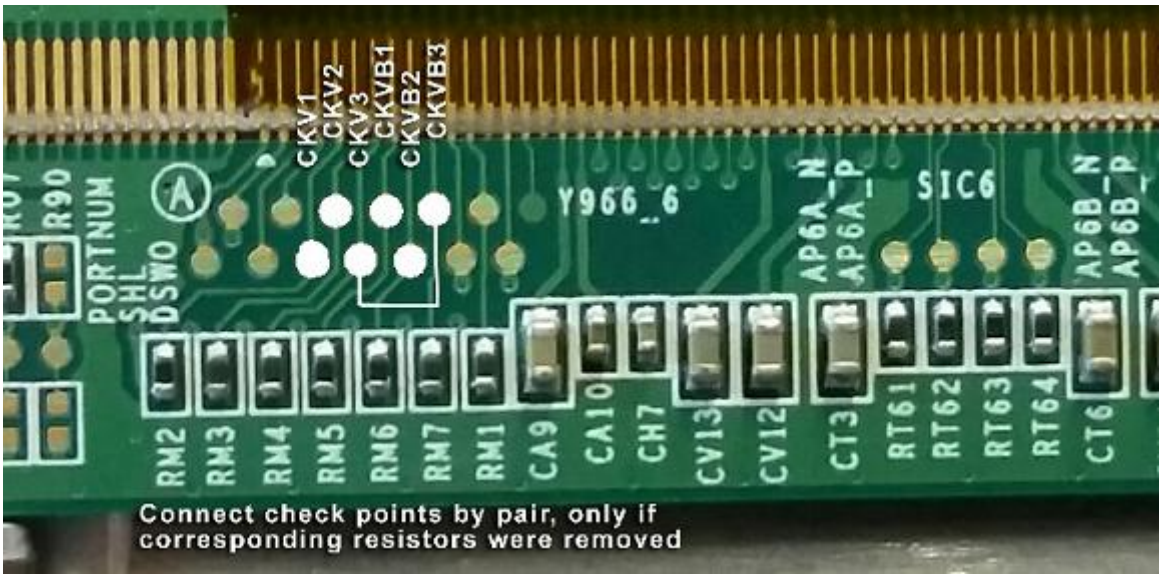
Repair procedure:

Disconnect left FFC between T-con and left PCB and power the tv. If you have now on right part of the screen a normal image, means that you have a fault in left side of the cell. If still a fault image, re-connect the left FFC and disconnect right FFC between T-con and left PCB and power the tv. If you have now on left part of the screen a normal image, means that you have a fault in right side of the cell. On upper image, there is a problem in the right side gate screen driver.

On the side with problems remove from PCB the resistors RM1-RM7, in this order: first remove the CKV1 and CKVB1 resistors RM2 and RM5 and see any improvements. If not, remove CKV2 and CKVB2 resistors RM2 and RM6, check if any improvements, and if not, remove CKV3 and CKVB3 resistors RM3 and RM7. If still no improvements, remove STVP resistor, RM1 see picture.

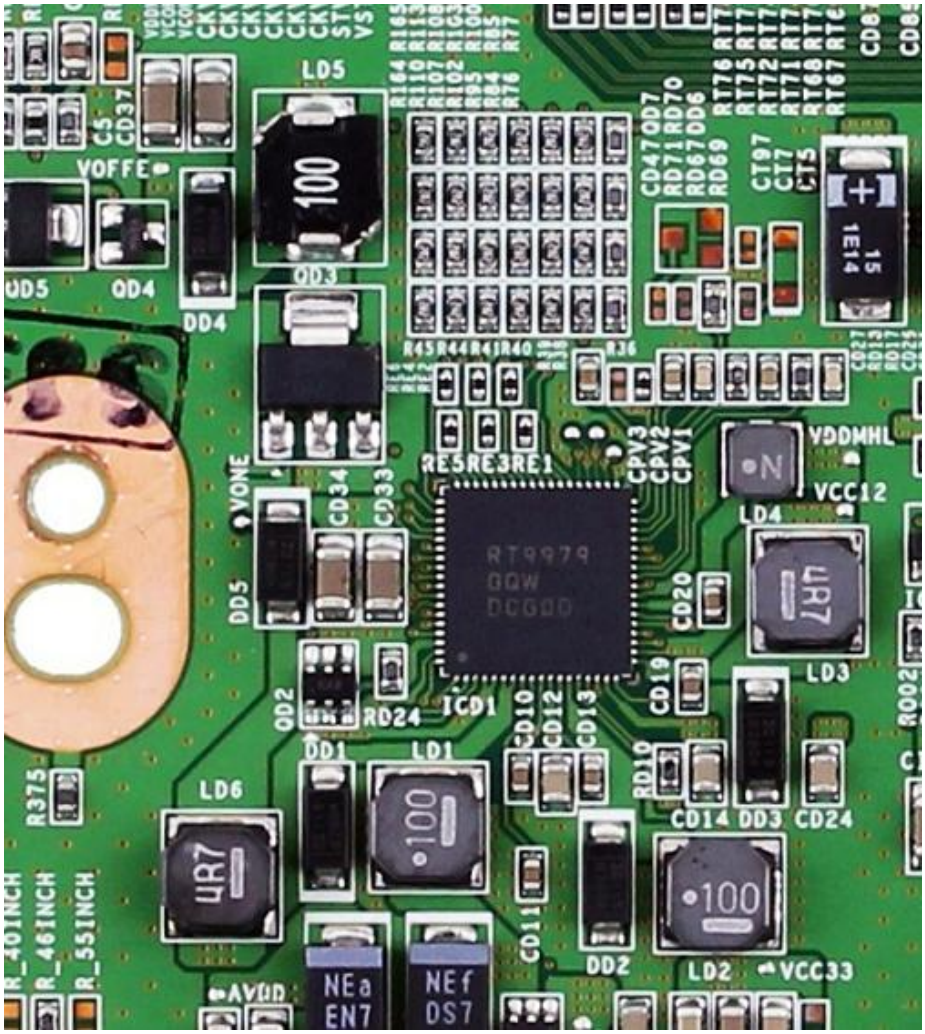


You will have a normal picture now, but sometimes, you will have, on side with problems, a little ODD/EVEN lines distance. Strap with a wire, on check points, CKV1 with CKVB1, see if lines are now correct displayed. If not, strap with a wire, on check points, CKV2 with CKVB2, check, and repeat procedure with CKV3 with CKVB3. In example bellow, the pair CKV3- CKVB3 was strapped Connect check points by pair, but only if corresponding resistors were removed, or else you can burn the LEVEL SHIFTER IC from T-CON.



Sometimes, it will be better to put back the resistors for the blocks pair that have no problem. For example if only by disconnecting CKV3 and CKVB3 will solve image problem, that means pair 1 and 2 have no problems. Sometimes, if you have a bigger problem on cell circuit, the image will be correct but a / some thin line (s) will be displayed sometimes on screen, noticeable on lighter/darker images.

Try to connect the pair that not works on GND or Voff. You can also raise Voff voltage with 3~5 volts to minus and the line will disappear. You have to do this on T-con Board, by raising the value of the resistor connected between FBN input of BiasPS/Level Shifter ICD1 - RT9979 and VOFFE.

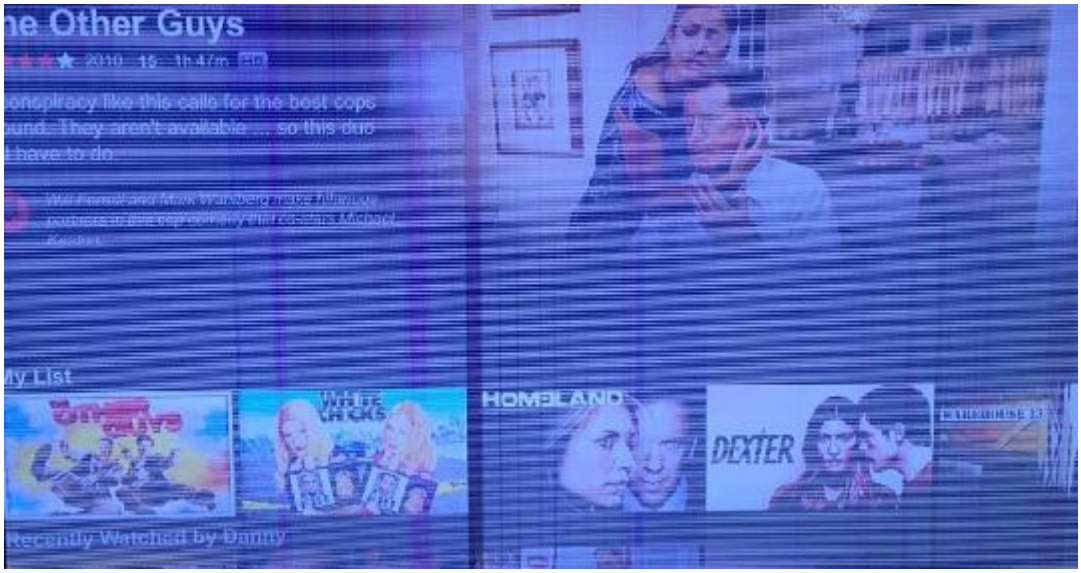


(4.10) Panel Screen: LSY320AN02

TCON: 320KSB_S2LV0.2

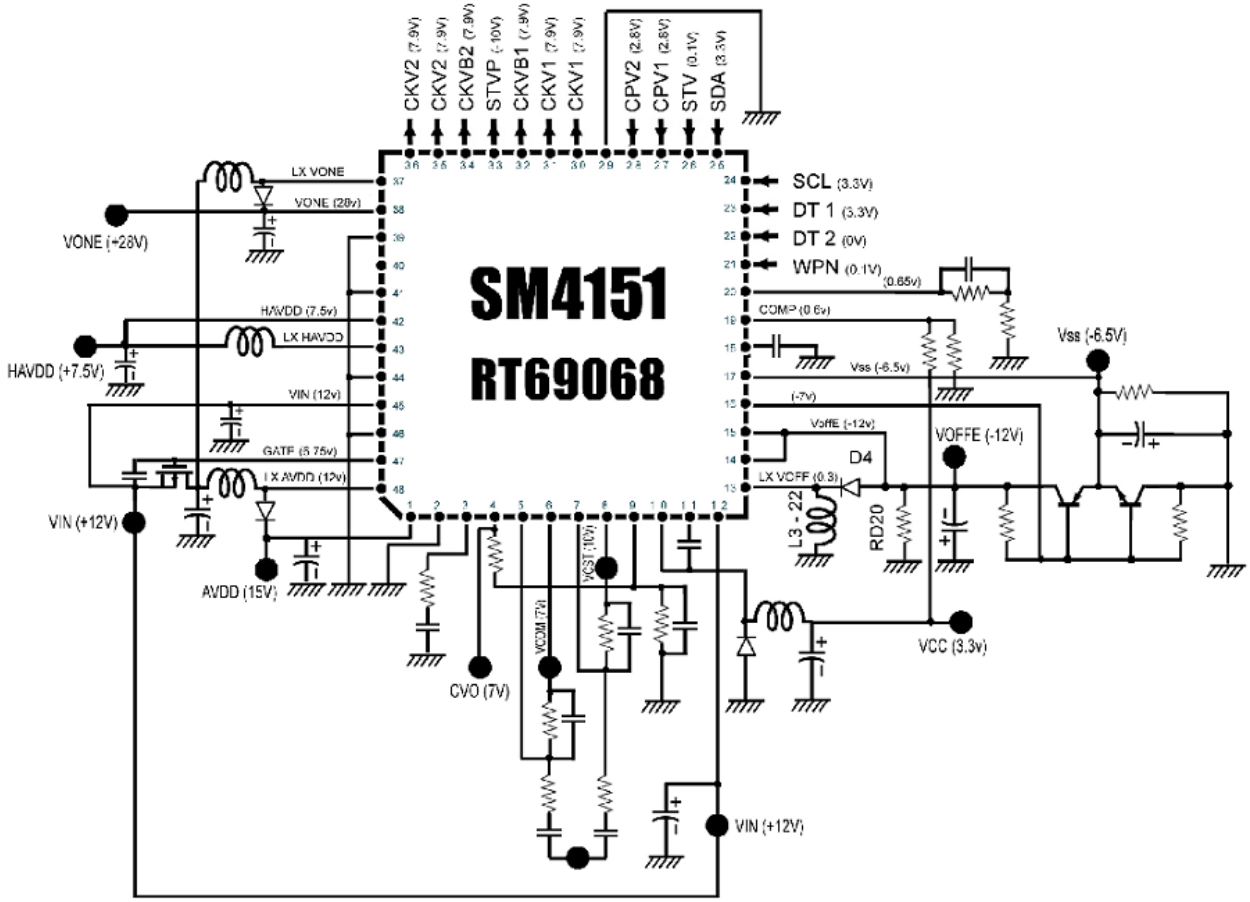
Fault:
Screen is flickering, have a part/whole of the screen with doubled image, white ghosting on part / whole screen.

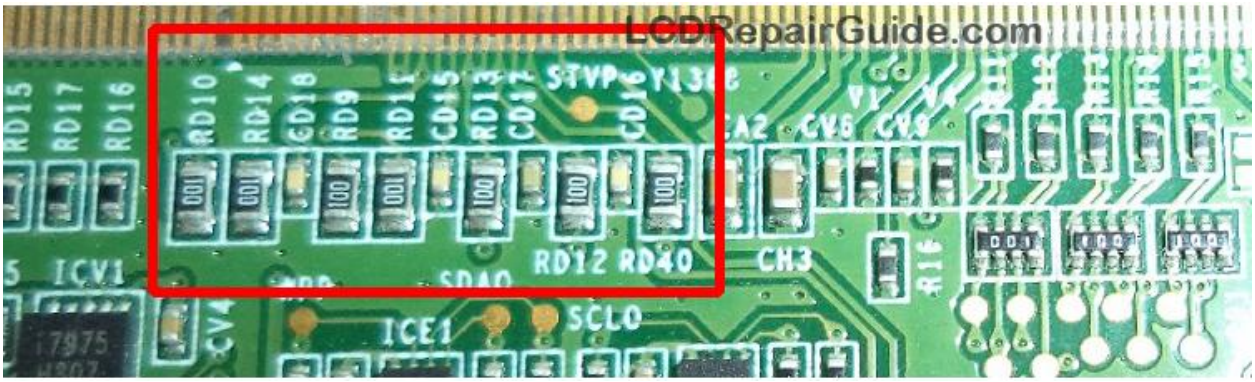
T-CON board is not detachable, and signals to left/right gate blocks, is transmitted thru extreme left/right flexible data driver circuit. It's only one data driver flexible circuit, so, it's almost impossible to check which gate is fault (left/right).



But sometimes, if you detach and reverse the cell glass, you will see burned circuits on glass, so you can now know which side is fault. There are several connections that you have to cut on fault side: CKV1-CKVB1, CKV2-CKVB2, Vss, Vcom and Vcst.

The LEVEL SHIFTER is integrated in DC-DC source drive IC2 - RT69068, or SM4151. The IC's have same configuration, the only difference is the Vreff voltage (pin18) 3,3V or 5v.



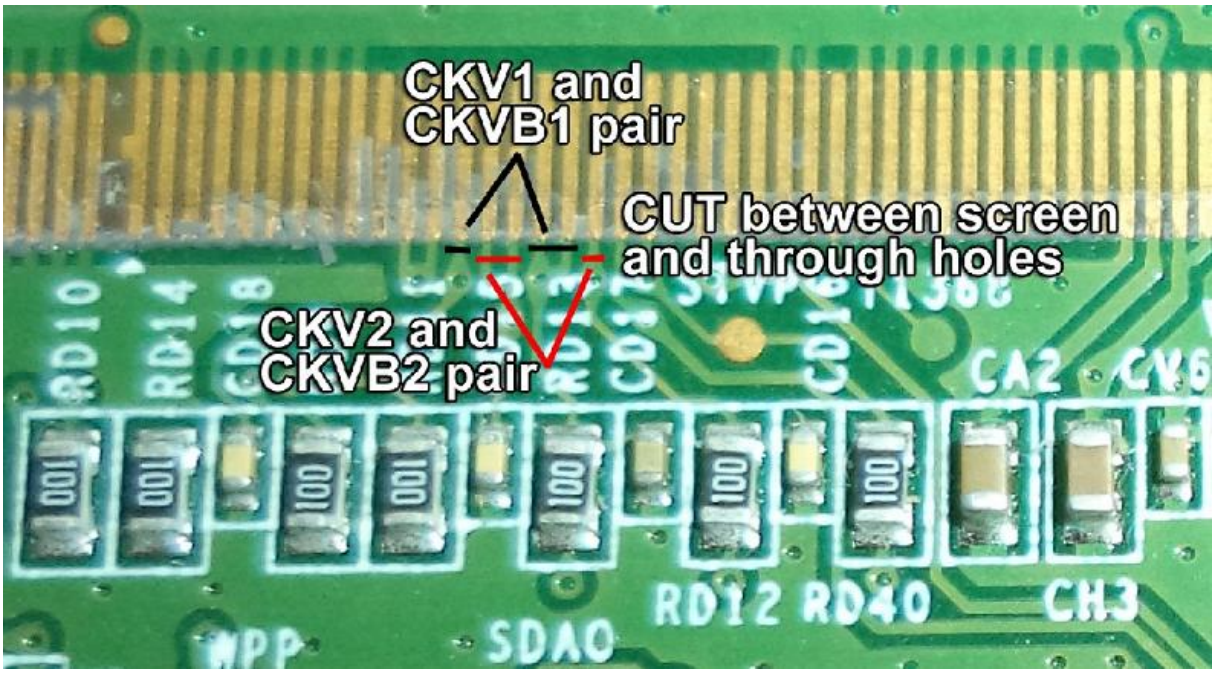


The connections from LEVEL SHIFTER and left/right gate blocks are made thru some 10 ohms resistors, RD10, RD14, RD9, RD11, RD13, RD12 and RD40, as in picture. CKV1 and CKV2 have 2 outputs on each side to double the current and to avoid LEVEL SHIFTER overheating.

Repair Procedure:

On fault side, you must cut the connections to left/right side, between PCB's through-holes and panel, so the check points to remain connected to working side of the panel, as in picture. PCB's through-holes, connects the other side of the cell with gate signals, so cutting the connections between resistors and through-holes, will cut signals on both sides of the screen. If no burned circuits

on reverse side of the cell, first try to find out which pair creates problems on screen. First, remove RD10, RD14 and RD13, and check if CKV1- CKVB1 pair creates problems. If not, solder back the resistors, and remove RD9, RD11 and RD 12, and see if CKV2-CKVB2 pair creates problems. Cut only pair with problems, as in picture:



Attention:

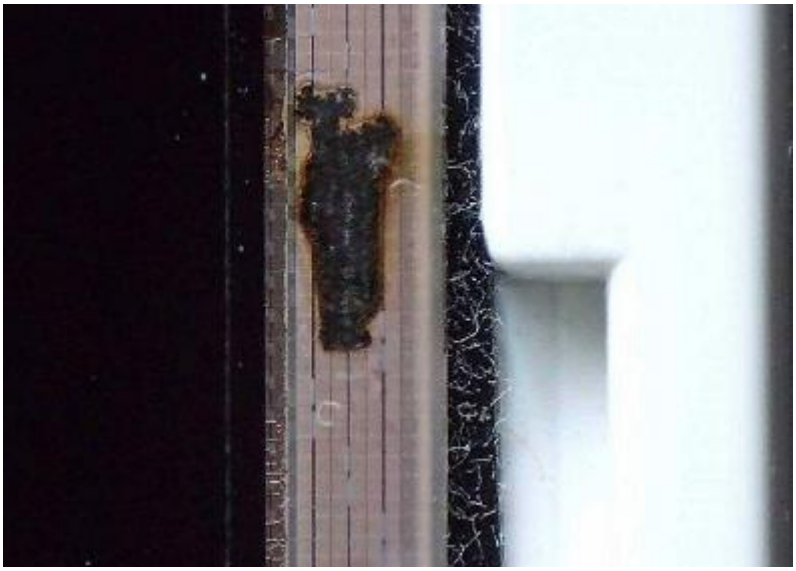
It's a very difficult procedure. Do not try it, if you don't have the good tools like: a thin & sharp knife/cutter, microscope or a power magnifier lens! Now you will have a clean and almost perfect image like the picture below:

(4.11) Panel Screen: LTJ400HM05

T-CON: 400HR42S4LV0A, 400HR42S4LV0B

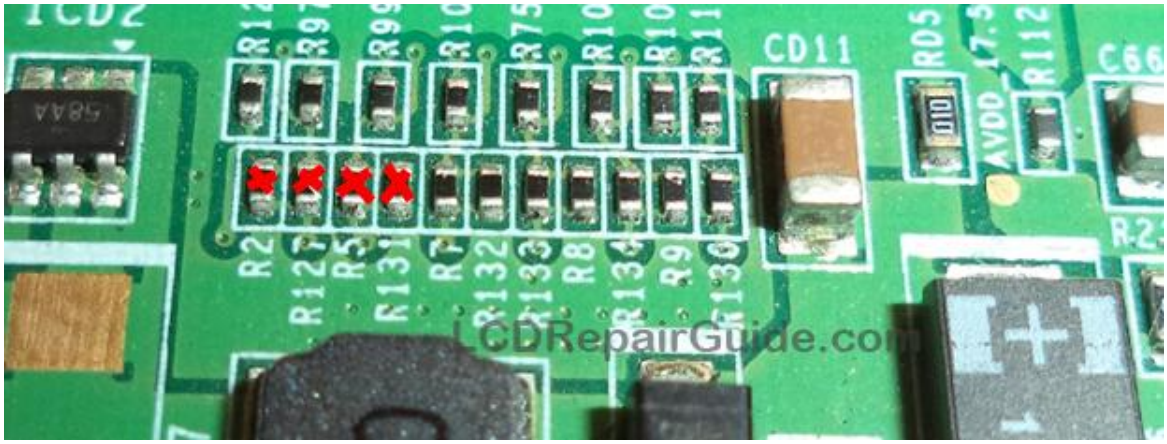
Fault:
Screen is flickering, have a part/whole the screen with doubled image, upper side is discoloured and have visible horizontal lines.

First step is to find which part of the screen is fault.
This operation is very hard and the t-con is attached to cell glass thru data drivers. We don't have resistors on CKV-CKVB left-right pair signals, so we have to make a big effort to find out where is the fault. If you have a point where fault starts, you can try to see if a burned SR block can be seen on fault side. You can detach and reverse the cell glass, so you will see burned circuits on glass and you can now know which side is fault. There are several connections that you have to cut on fault side: CKV1-CKVB1, CKV2-CKVB2, CKV3-CKVB3 and STVP.

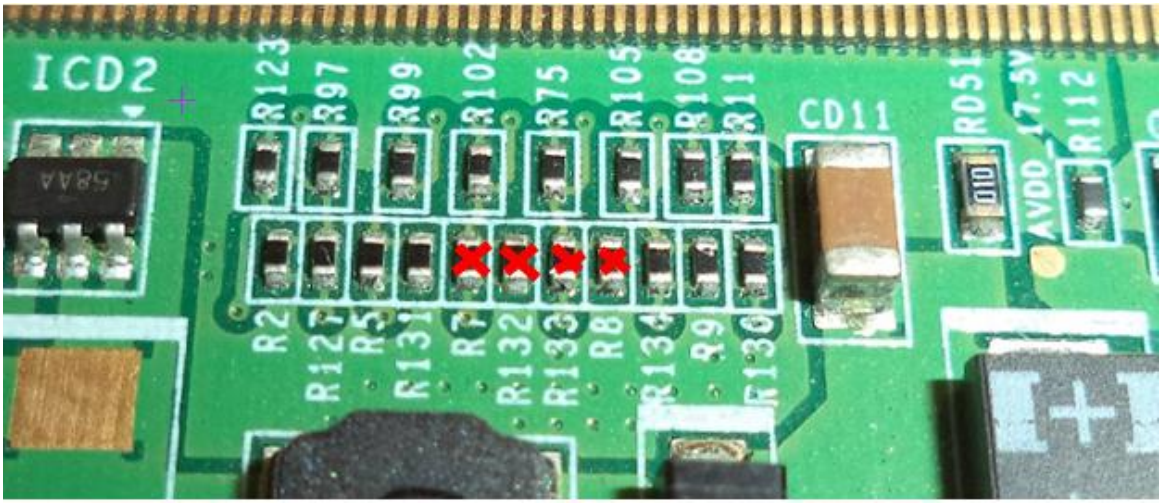


This operation is very hard (the screen is 40 inches), so do not try this if you don't have 2 clean and large tables, covered with some bubble wrap or white paper. If you cannot see any burned blocks, even with a microscope or magnifier, follow this step:

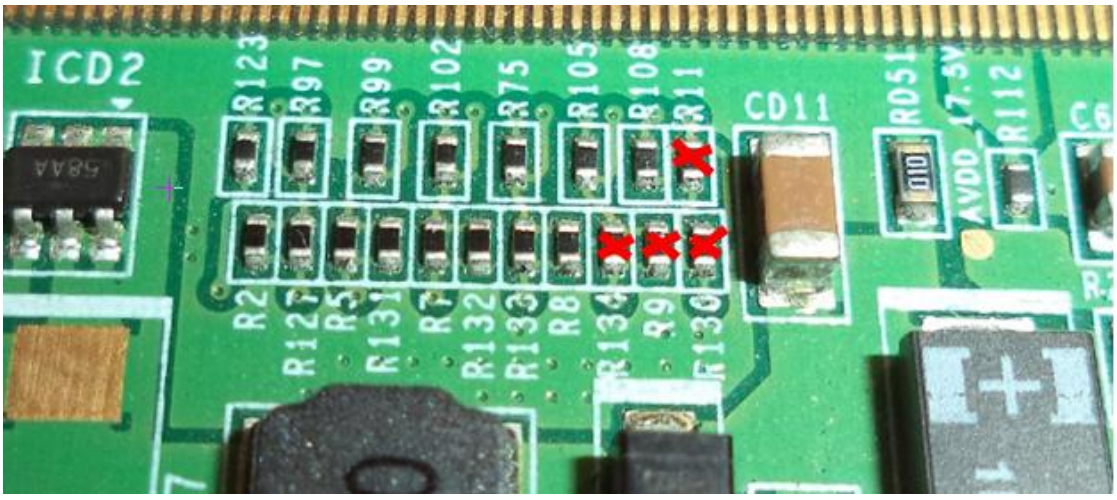
a) Remove resistors R2, R127, R5 and R131 (zero ohms) for pair CKV1-CKVB1 that connects LEVEL SHIFTER IC with both left-right SR blocks. R2 and R127 are connected parallel for CKVB1 signal. R5 and R131 are in parallel connection for CKV1. You can find the resistors in the left side of level shifter IC - SM4109, as in image below:



Power on the tv and check if any improvements on screen. If not, solder back the resistors from 1st pair and remove CKV2 and CKVB2 resistors R7+R132 and R8+R133, power up the tv and check if any improvements.

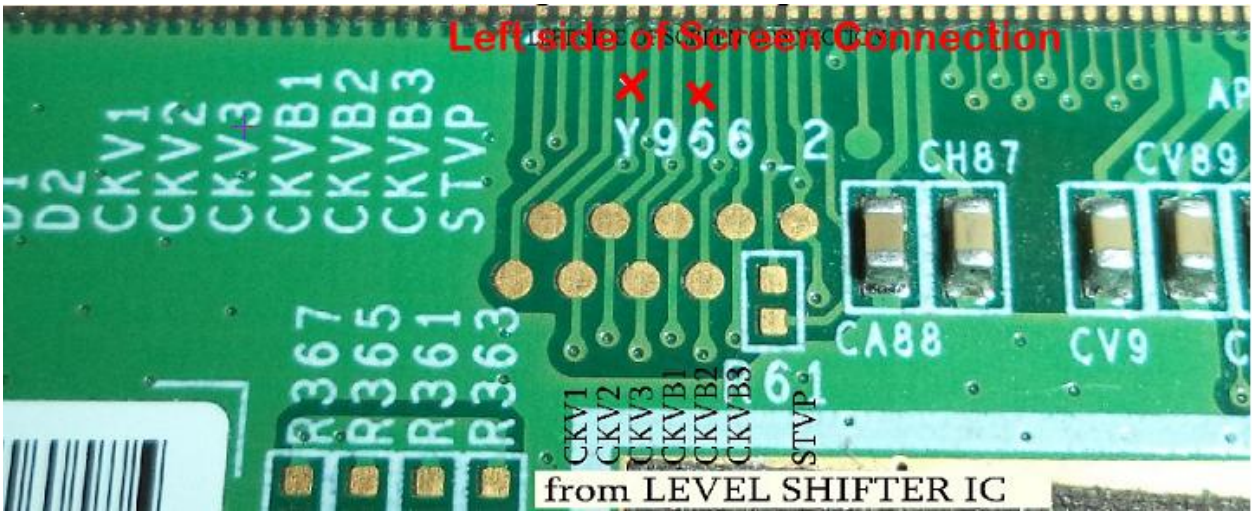


If still no change, solder back the resistors from 2nd pair and remove CKV3 and CKVB3 resistors R9+R134 and R11+R136.

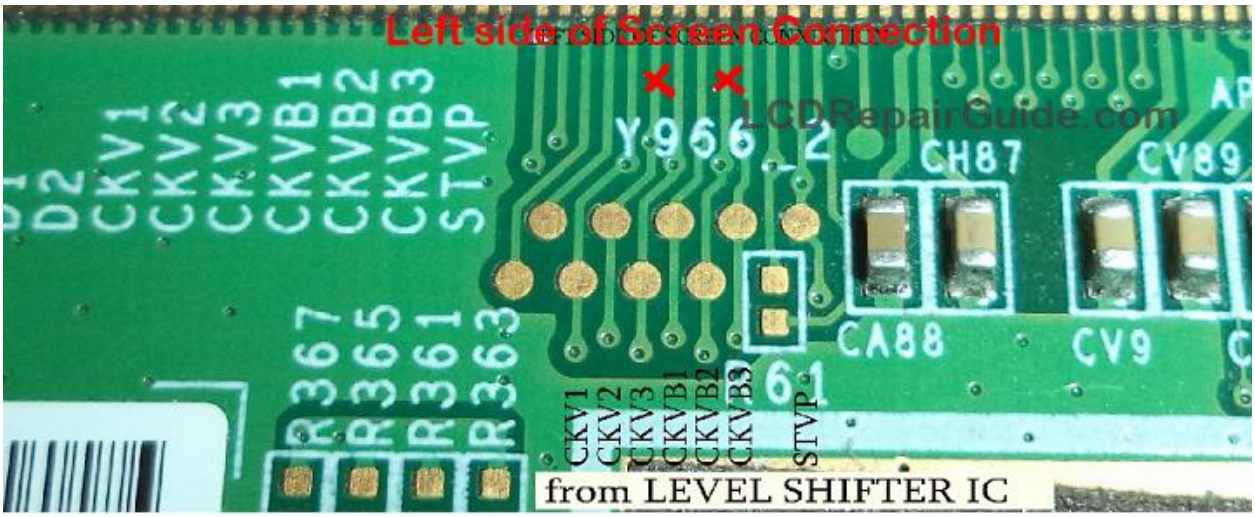


b) We know now which pair creates the fault on screen, solder back all resistors and let's find on what side (left or right) is the defective SR block. If, for example CKV1-CKVB1 pair is fault, we will disconnect the signal from left side of the screen (if you could see with a magnifier where is the fault, cut connections on fault side) We will disconnect left side because we have more space to re-connect the signals if there is no problem on this side, and the fault is on the right side. Cut the signals' corresponding that goes on left side of the screen:

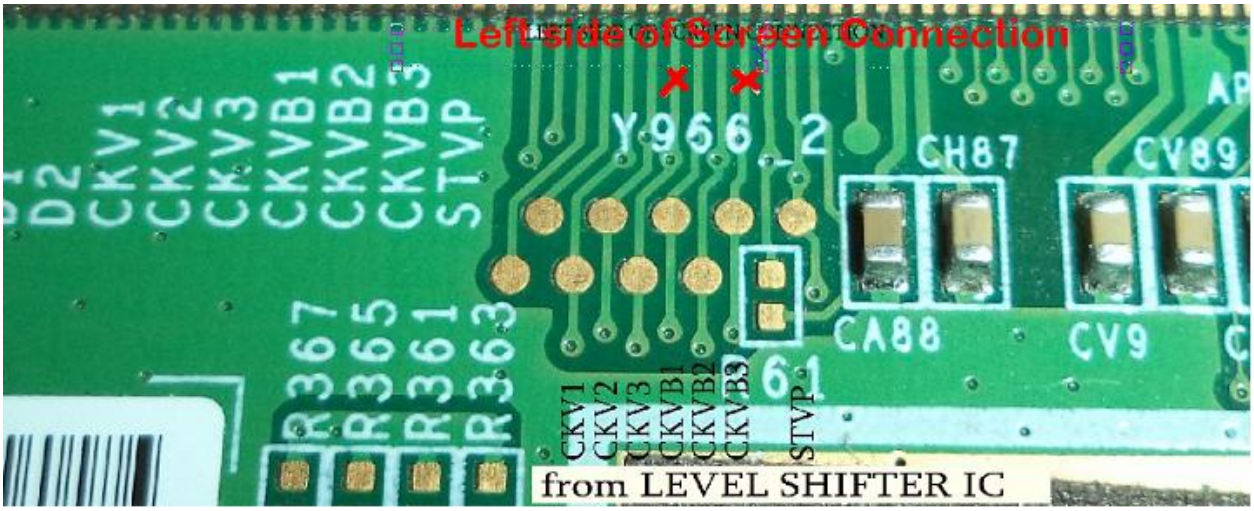
IF PAIR CKV1-CKVB1 faults, cut signals as in image below:



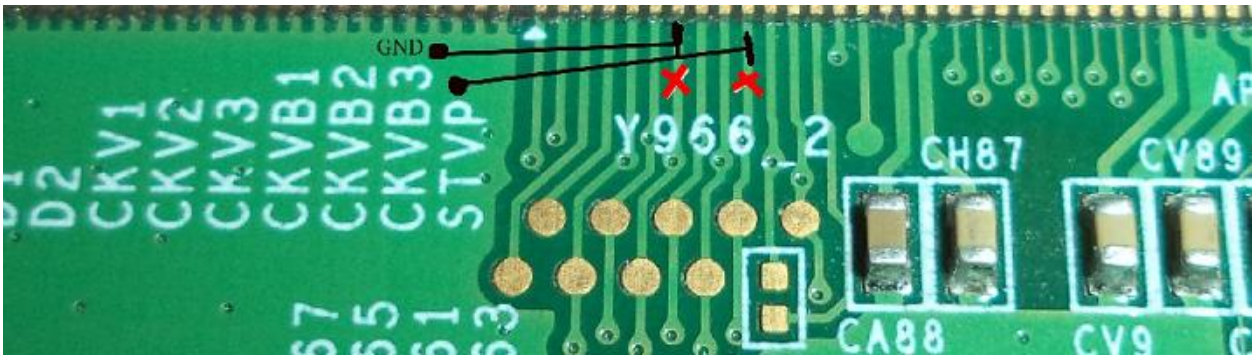
IF PAIR CKV2-CKVB2 faults, cut signals as in image below:



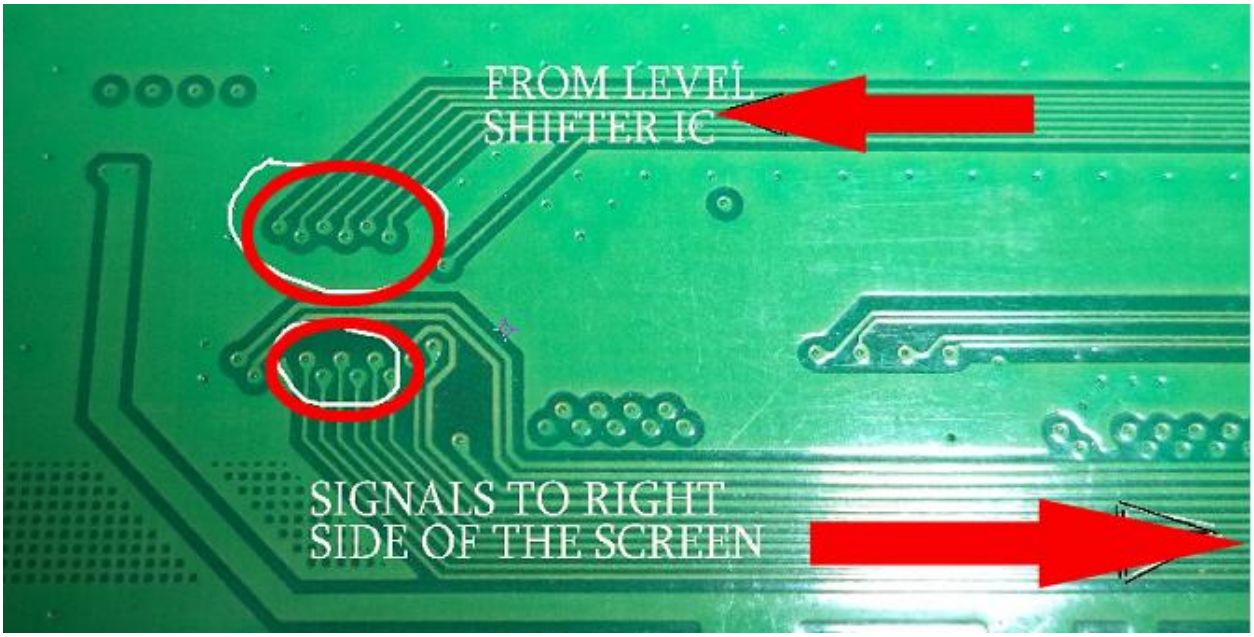
IF PAIR CKV3-CKVB3 faults, cut signals as in image below:



There is a 50 % chance that the left side of the cell to be fault. If the image is ok now, but some thin line (s) will be displayed on screen, noticeable on lighter/darker images, try to connect the pair that not works on GND or Voff. ATTENTION! Connect the fault screen inputs to GND, only if this inputs were disconnected from LEVEL SHIFTER IC, as in image bellow. Just clean with a cutter the green paint from upper side that goes in screen and solder a thin wire from GND to both inputs. Now the SR blocks are closed by connecting to GND, the analogue gate outputs from fault side will be opened, and the lines will disappear from the image. Before connecting the power, check with diode measurement instrument for any shorts from outputs of LEVEL SHIFTER IC to GND (check on all re-soldered resistors and GND).

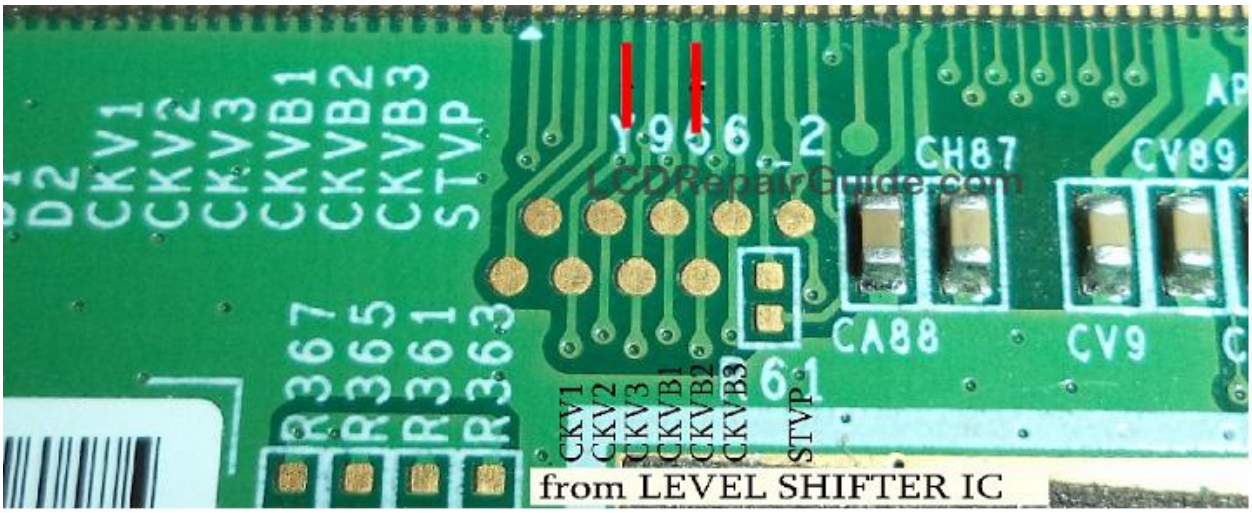


On left side, we have check points for all LEVEL SHIFTER signals CKV-CKVB1-3 signals. Lower PCB's through-holes, are connected with back circuits to LEVEL SHIFTER IC. On upper PCB's through-holes are connected all signals to right side of the cell:

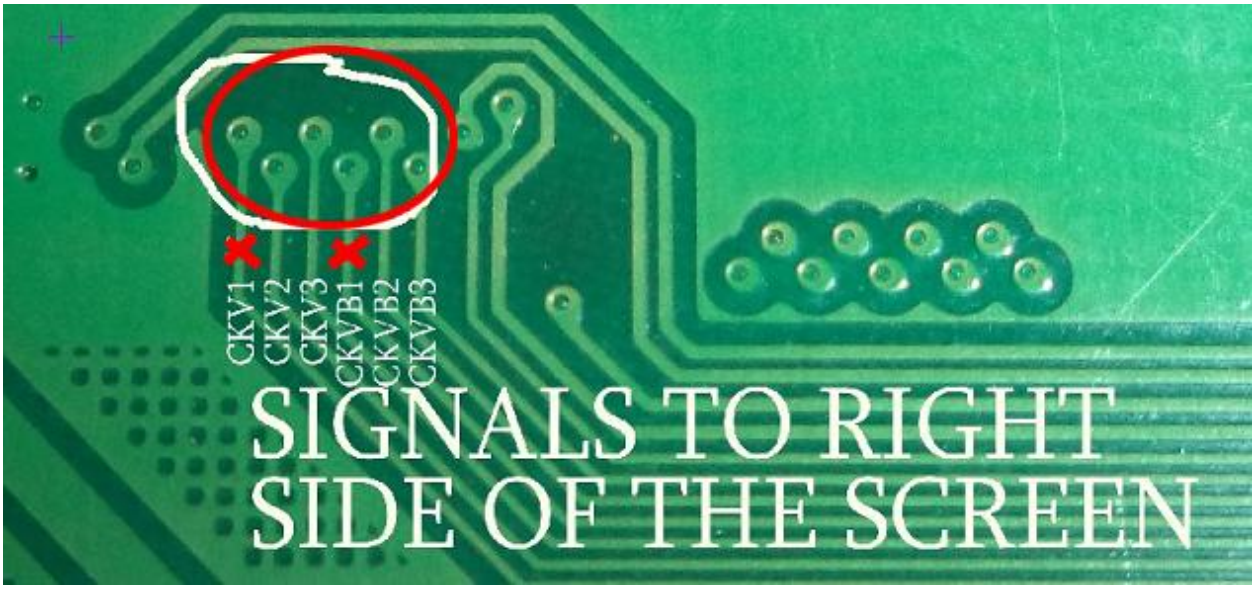


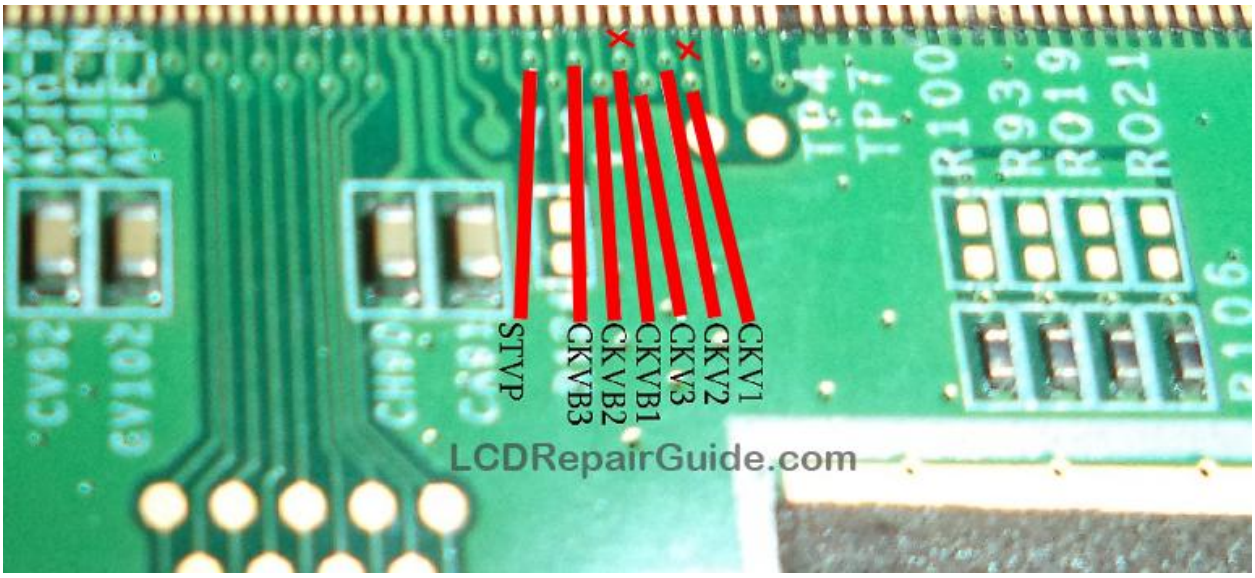
If the right side is fault, we have to re-connect the left inputs of the screen to signals and cut the right side of corresponding pair signals.

On example below, if CKV1-CKVB1 pair faults, on left side clean with a cutter the paint where initially were cut the signals, add some thermal paste and solder a thin wire.



Also, cut the signals from right side from back of the t-con PCB or near right inputs as in images.



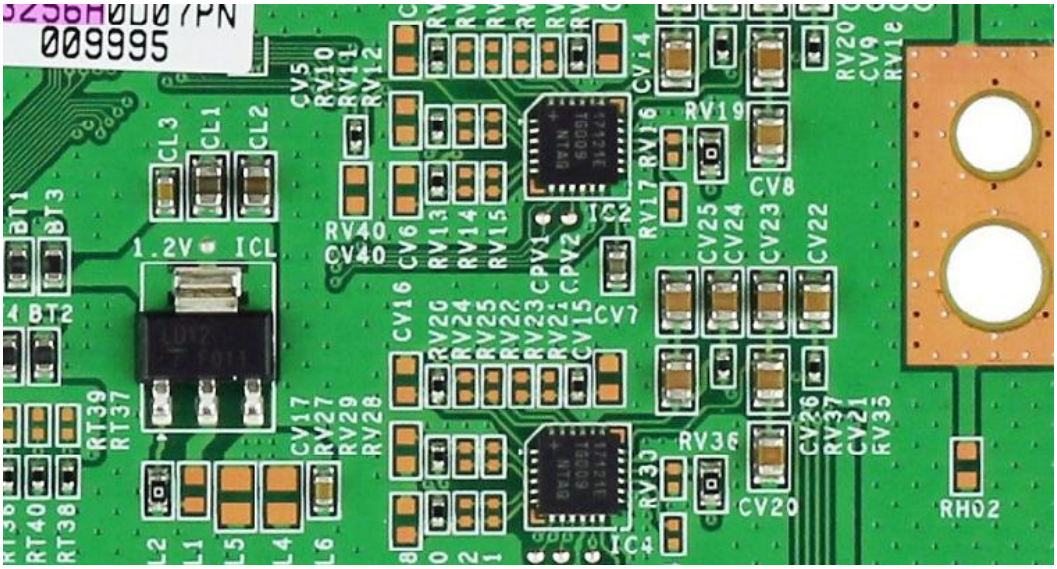


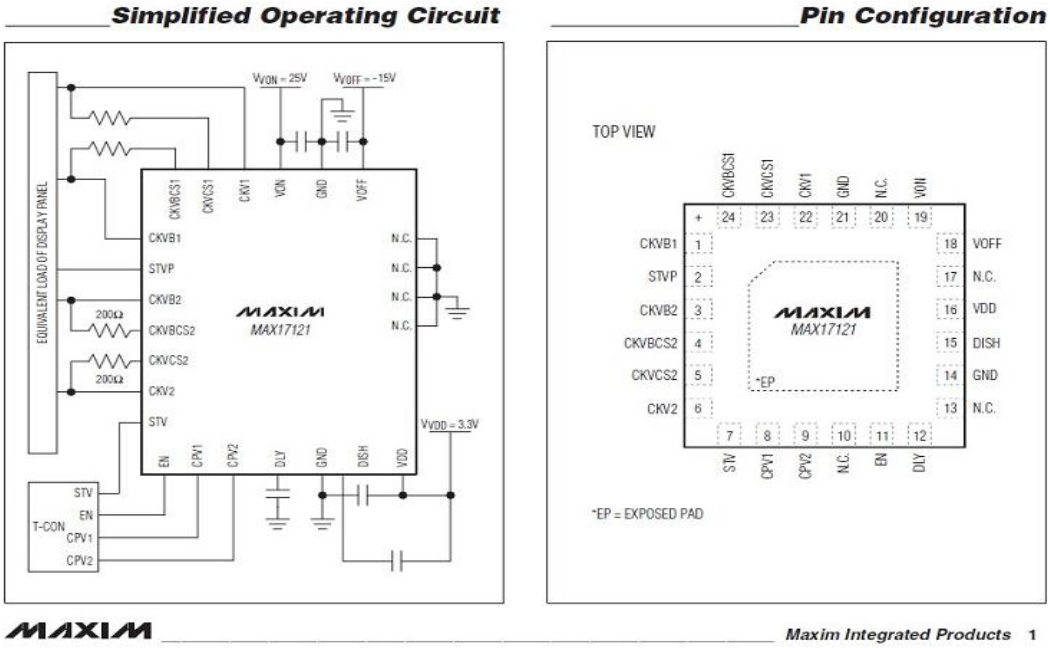
(4.12) Panel Screen: LTF320HM01, LTA320HM03

T-CON: LJ94- 03256H (F 60M B4C2LV0. 6)

Fault:
Image trembling, flickering, double vertically or horizontal lines are on whole/partial of the screen.

This panel have 4 pairs of high voltage scan drive gate signals: CKV1-4 and inverse signals CKVB1-4. There are 2 x Level Shifter IC's, MAX17121E.

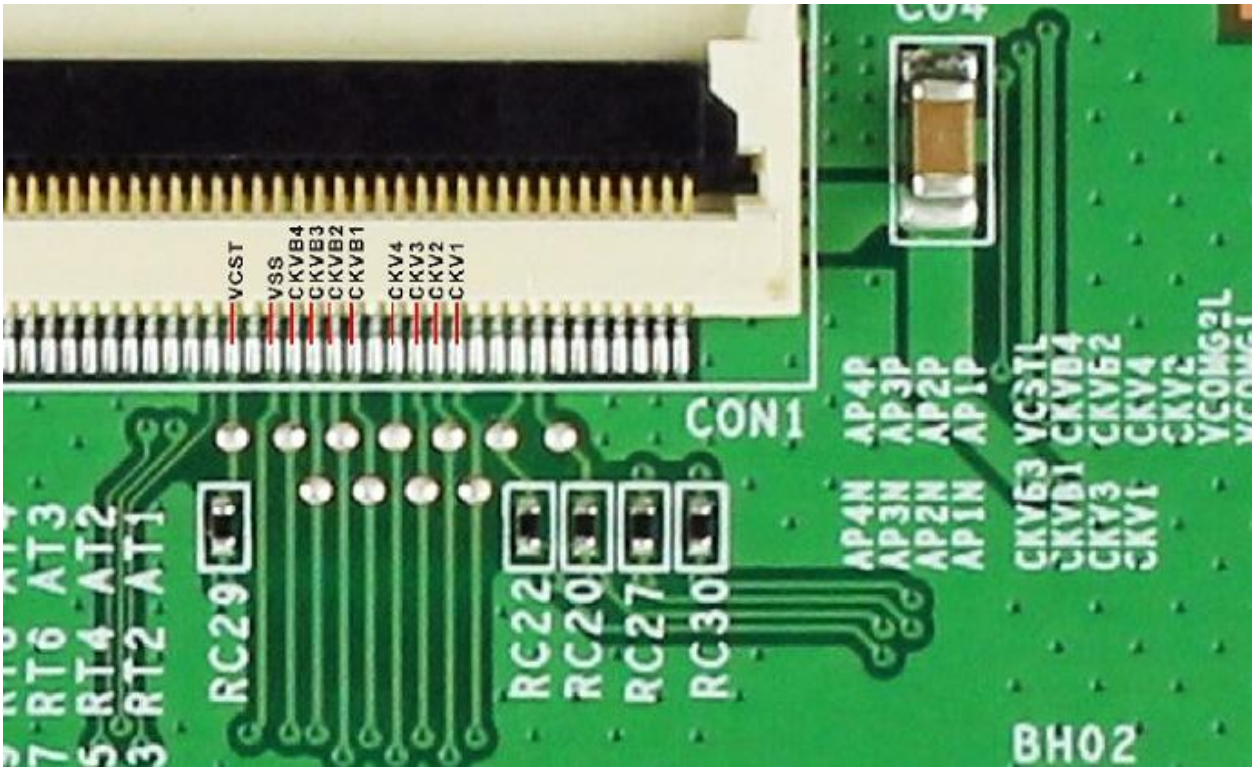




Have above the simplified schematic diagram for MAX17121E and pin configuration.

Repair procedure:

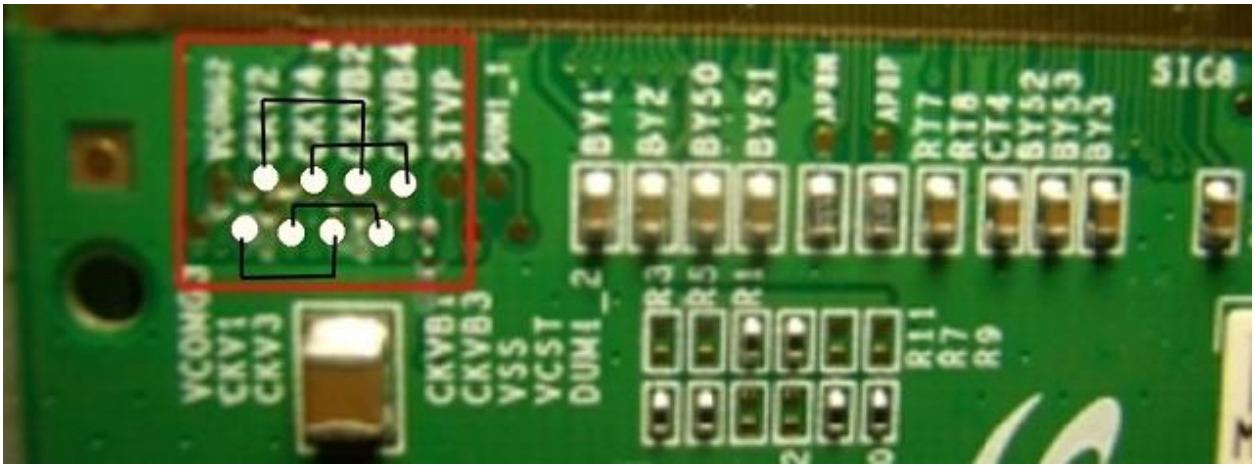
Disconnect left FFC between T-con and left PCB and power the tv. If you have now on right part of the screen a normal image, means that you have a fault in left side of the cell. If still a fault image, re-connect the left FFC and disconnect right FFC between T-con and left PCB and power the tv. If you have now on left part of the screen a normal image, means that you have a fault in right side of the cell.



There are 4 pairs of signals that commands gain SR Blocks, but you cannot cut the CKV- CKVB signals on T-Con Board. The signals are going from Level Shifter IC's to RIGHT FFC connector CON1, and from right CON1 thru PCB's through-holes and back connections, signals are going to left connector CON2.

The easiest way to cut signals is to cut corresponding FFC terminals, on fault side. For example, if you need to cut signals from CON1, first cut pair 1 of CKVB1-CKVB1, but removing end terminals 12 and 17 from FFC cable, on T-CON side.

If still no improvement, cut pair 2 of CKVB2-CKVB2, but removing end terminals 13 and 18 from FFC cable, and so on with pair 3 and 4. Sometimes, some thin lines will appear on area where SR gate block fault and especially, when is a TV logo on dark images. Strap on fault side PCB that the input cell (glass) connections by pair: first CKV1 with CKVB1. Connect this pair to ground or Vss or Voff. Check every time if lines will go or not. If no any improvements, just repeat procedure with pair 2, 3 and 4.



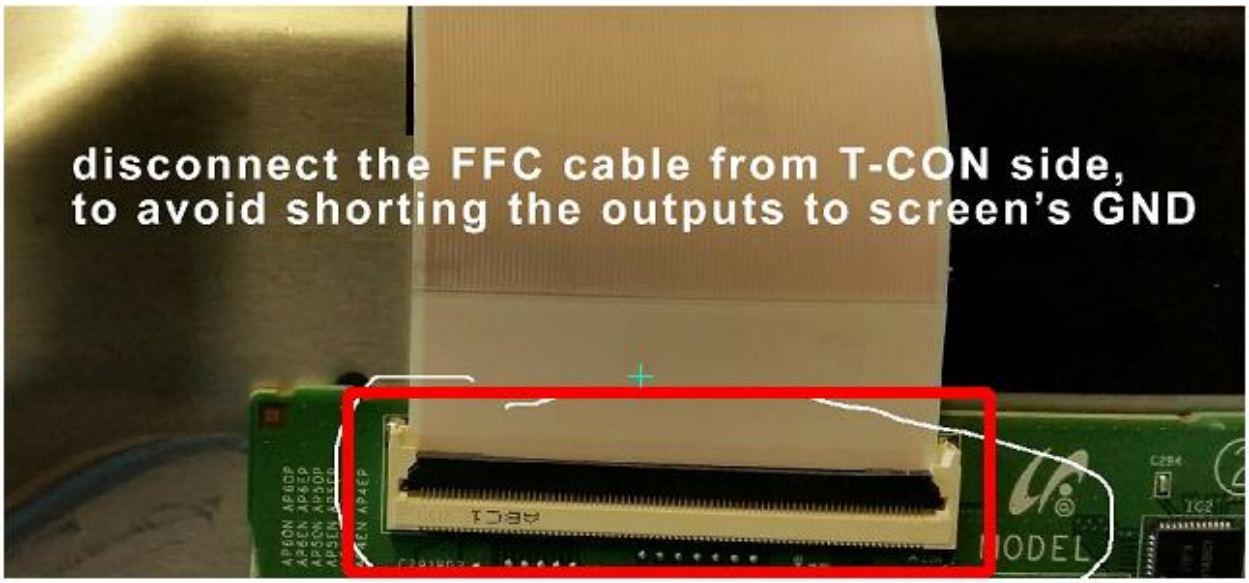
(4.13) Panel Screen: LTJ400HV01-J

T-CON: SH120PMB4SV0.3

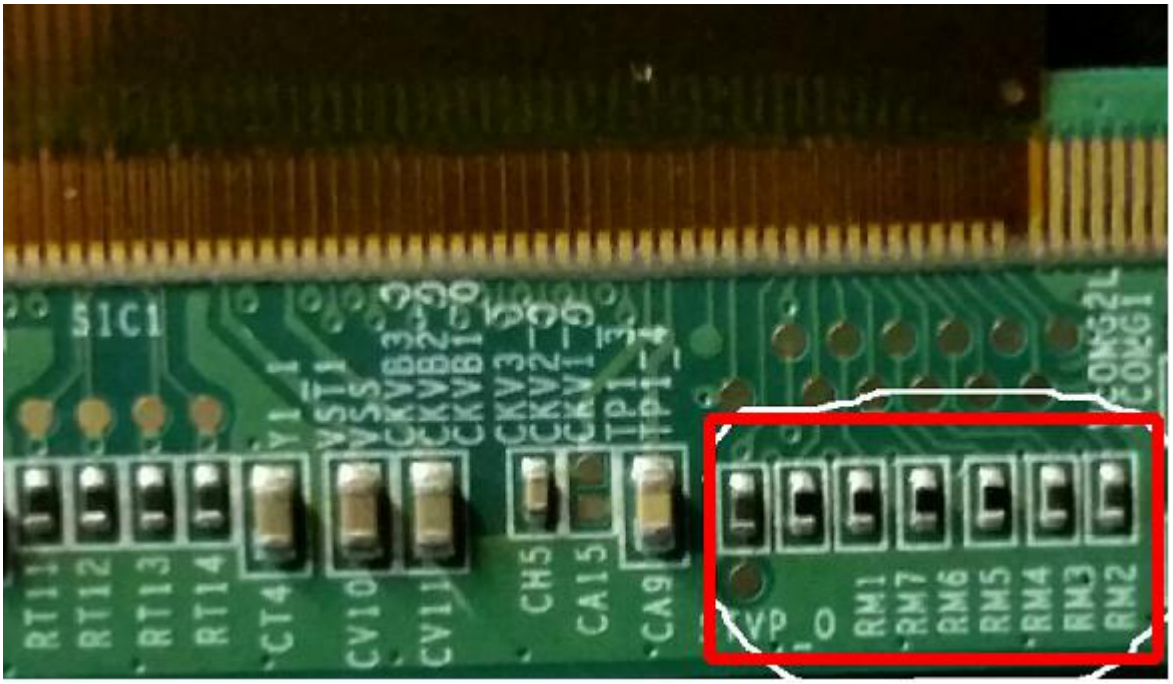
Fault:
Image trembling, double vertically, horizontal lines on all/partial screen USED ON Samsung 3D TV, D series, Class 6-8 (EX: UE40D6530).

Repair procedure: First step is to find which part of the screen is fault.

Disconnect left FFC between T-con and left PCB and power the tv. If you have now on right part of the screen a normal image, means that you have a fault in left side of the cell. If still a fault image, re-connect the left FFC and disconnect right FFC between T-con and left PCB and power the tv. If you have now on left part of the screen a normal image, means that you have a fault in right side of the cell. On upper image, there is a problem in the right side gate screen driver. NOW WE KNOW WHICH GATE DRIVER FAULTS (LEFT OR RIGHT), so we will step in with repair, only on fault side.



On the side with problems, remove from PCB the resistors RM1-RM7, in this order: first remove the CKV1 and CKVB1 resistors RM2 and RM5 and see any improvements. If not, remove CKV2 and CKVB2 resistors RM2 and RM6, check if any improvements, and if not, remove CKV3 and CKVB3 resistors RM3 and RM7. If still no improvements, remove STVP resistor, RM1 see picture.



You will have a normal picture now, but sometimes, you will have, on side with problems, a little ODD/EVEN lines distance. Strap with a wire, on check points, CKV1 with CKVB1, see if lines are now correct displayed. If not, strap with a wire, on check points, CKV2 with CKVB2, check, and repeat procedure with CKV3 with CKVB3. USUALLY, CKV1-CKVB1 pair faults so will be enough to remove corresponding resistors, and strap with a wire check points CKV1-CKVB1 to GND.

Connect check points by pair, but only if corresponding resistors were removed, or else you can burn the LEVEL SHIFTER IC from T-CON.

Sometimes, it will be better to put back the resistors for the blocks pair that have no problems. For example if only by disconnecting CKV3 and CKVB3 will solve image problem, that means pair 1 and 2 have no problems. Sometimes, if you have a bigger problem on cell circuit, the image will be correct but a / some thin line (s) will be displayed sometimes on screen, noticeable on lighter/darker images. Try to connect the pair that not works on GND or Voff. You can also raise Voff voltage with 3-5 volts to minus and the line will disappear. You have to do this on T-con Board, by raising the value of the resistor connected between FBN input of BiasPS/Level Shifter ICD1- C RT9979 and VOFFE.

Thank you for Mr. Vladimir for his contribution of this useful chapter.

COF BoardView List

In my previous ebook: LCD/LED Screen Panel Repair Guide, I called it as: **TAB/COF Bypass List**. But for more accurate to describe this feature for the TAB/COF photo, I think it is similar like the Laptop schematic BoardView file. So I decided to call it as “COF BoardView”.

This repair information is quite important to the TV Panel repairer. Even they have the TAB Bonding Machine in their workbench. If that panel Gate signals & voltage lines opened circuit in the half way of it, the TAB Bonding Machine also cannot help. Especially some panel broken cases, like the panel glass crack their edge side of the Gate lines. Causing some Gate signals & voltage lines broken. So we can use this COF BoardView to connect back their signals and voltage lines from T-con board to their Gate COF.

If you need to increase the success rate to repair the panel through this method, you need to have these tools before start to repair the panel:

1) A good and sharp/fine needle tip of Soldering Iron and quality flux.
2) Magnifier- No matter what brands or type of this magnifier, at least it can help you to see the Gate signals & voltage lines clearly.
3) Thin copper wire (0.1mm): Normally use it in Laptop mainboard repair.

1) COF P/N: 5253-ACBPQ

Panel Model:

COF Part Number: 5253-ACBPQ			
Point	Features	Point	Features
1	VGH	6	STV2
2	VGL	7	STV1R
3	3.3L	8	OE
4	GND	9	OE2
5	STV1	10	CKV
http://www.LCDRepairGuide.com			

2) COF P/N: 8651-A CBD7

Panel Model:

COF Part Number: 8651-A CBD7			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV_OUT
2	VGL	7	STV-R
3	3.3V	8	CKV
4	GND	9	OE
5	STV	10	GRL1
http://www.LCDRepairGuide.com			

3) COF P/N: 8656-B CBJV

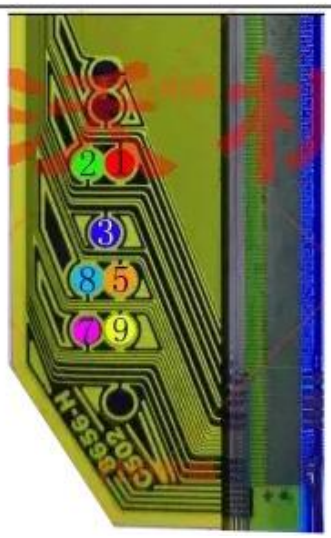
Panel Model:

COF Part Number: 8656-B CBJV			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV_OUT
2	VGL	7	STV-R (NC)
3	3.3V	8	CKV
4	GND	9	OE
5	STV	10	-
http://www.LCDRepairGuide.com			

4) COF P/N: 8656H-C502

Panel Model:

COF Part Number: 8656-H C502			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV_OUT
2	VGL	7	STV-R
3	3.3V	8	CKV
4	GND	9	OE
5	STV	10	-
http://www.LCDRepairGuide.com			



5) COF P/N: 8656-M CY40

Panel Model:

COF Part Number: 8656-M CY40			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV1_OUT
2	VGL	7	STV2
3	3.3V	8	CPV
4	GND	9	-
5	STV1	10	-
http://www.LCDRepairGuide.com			

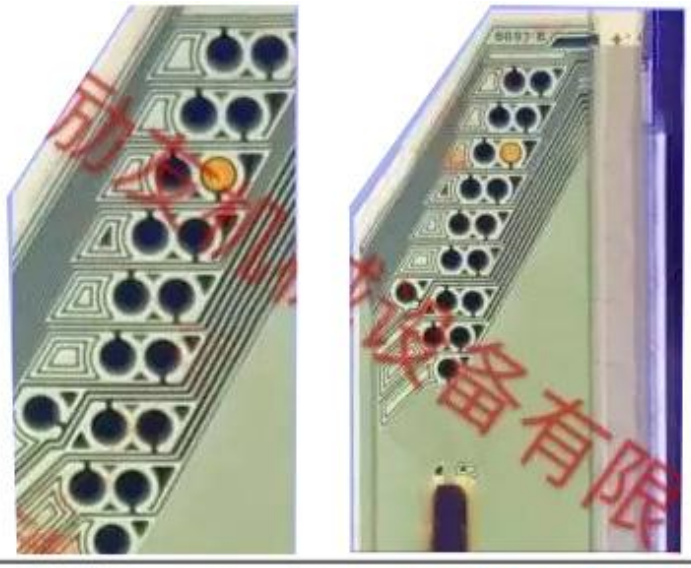
6) COF P/N: 8656-M CY61

Panel Model:

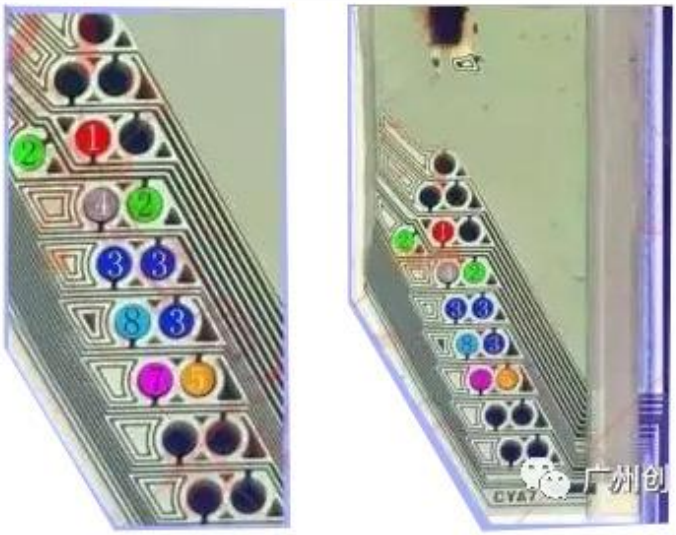
COF Part Number: 8656-M CY61			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV_OUT
2	VGL	7	CPV
3	3.3V	8	OE
4	GND	9	XAO
5	STV	10	-
http://www.LCDRepairGuide.com			

7) COF P/N: 8656-M CYA7

Panel Model:



COF Part Number: 8697-B CYA7			
Point	**Features**	**Point**	**Features**
1	VON	6	STV_OUT
2	VOFF	7	CPV
3	3.3V	8	OE
4	GND	9	-
5	STV (STVD)	10	-
http://www.LCDRepairGuide.com			



8) COF P/N: D10C30G023-CF0C1SSR

Panel Model: LTA460HT-LH2

Panel: LTA460HT-LH2 COF P/N: D10C30G0023-CF0C1SSR			
Point	**Features**	**Point**	**Features**
1	VON	6	STV_OUT
2	VOFF	7	CPV1
3	3.3V	8	CPV2
4	GND	9	-
5	STV	10	-
http://www.LCDRepairGuide.com			

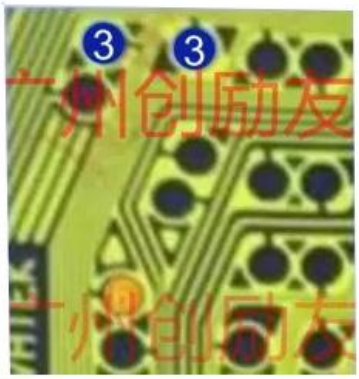
9) COF P/N: MT3807VC

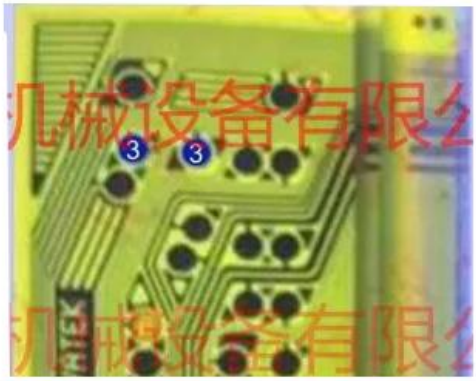
Panel Model:

COF P/N: MT3807VC			
Point	**Features**	**Point**	**Features**
1	VGH	6	GSP_OUT
2	VGL	7	GSC
3	3.3V	8	GOE
4	GND	9	-
5	GSP-IN	10	-
http://www.LCDRepairGuide.com			

10) COF P/N: NT39530H-C5203B

Panel Model:

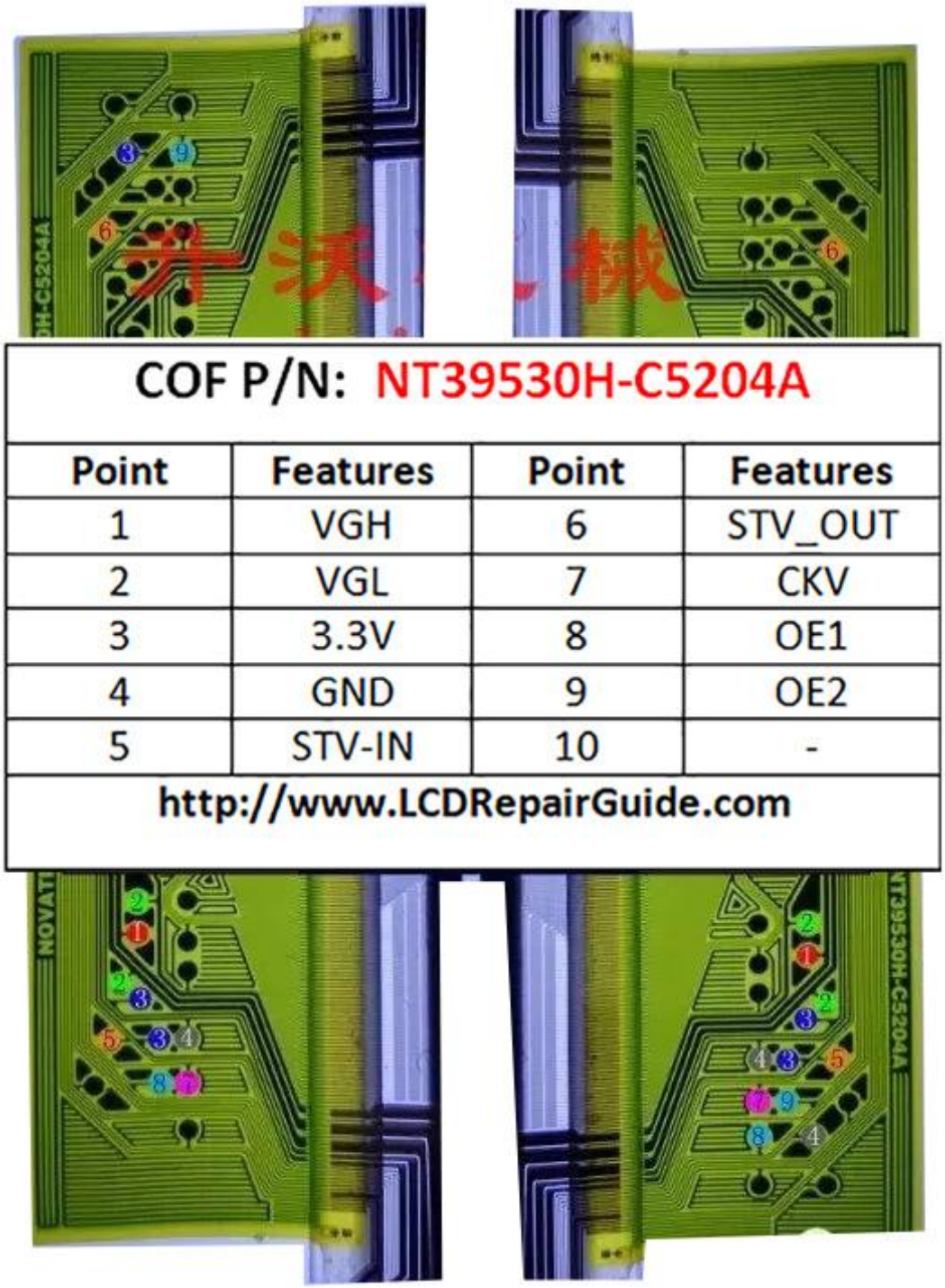




COF P/N: NT39530H-C5203B			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV_OUT
2	VGL	7	CKV
3	3.3V	8	OE
4	GND	9	-
5	STV	10	-
http://www.LCDRepairGuide.com			

11) COF P/N: NT39530H-C5204A

Panel Model:



COF P/N: NT39530H-C5204A			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV_OUT
2	VGL	7	CKV
3	3.3V	8	OE1
4	GND	9	OE2
5	STV-IN	10	-
http://www.LCDRepairGuide.com			

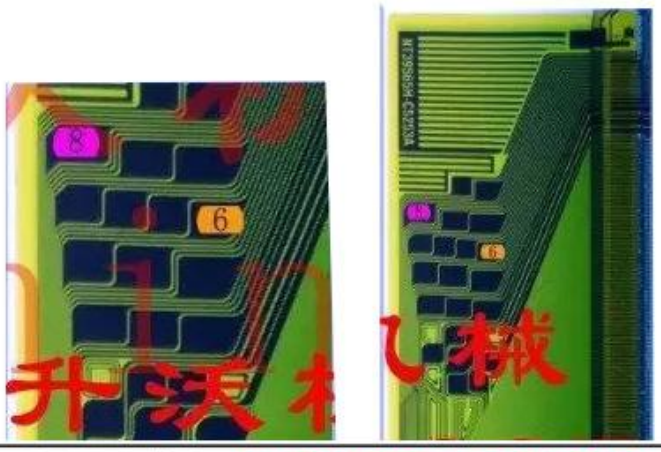
12) COF P/N: NT39538H-C1260A

Panel Model:

COF P/N: NT39538H-C1260A			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV1_OUT
2	VGL	7	CPV
3	3.3V	8	OE1
4	GND	9	XAO
5	STV	10	-
http://www.LCDRepairGuide.com			

13) COF P/N: NT39565H-C5253A

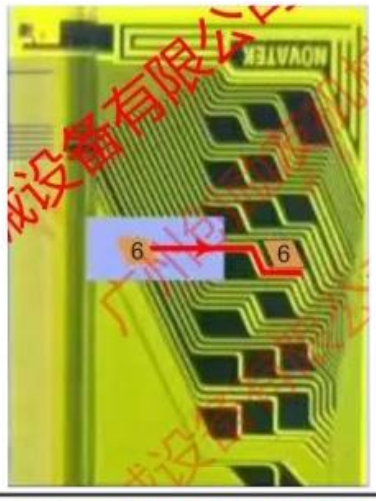
Panel Model:



COF P/N: NT39565H-C5253A			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV1_OUT
2	VGL	7	STV1_R
3	3.3V	8	STV2_R
4	GND	9	CKV
5	STV1 (IN)	10	OE1
		11	OE2
http://www.LCDRepairGuide.com			

14) COF P/N: NT39567H-C525B

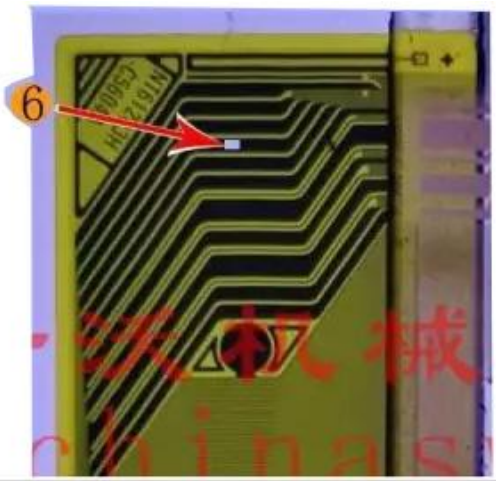
Panel Model:



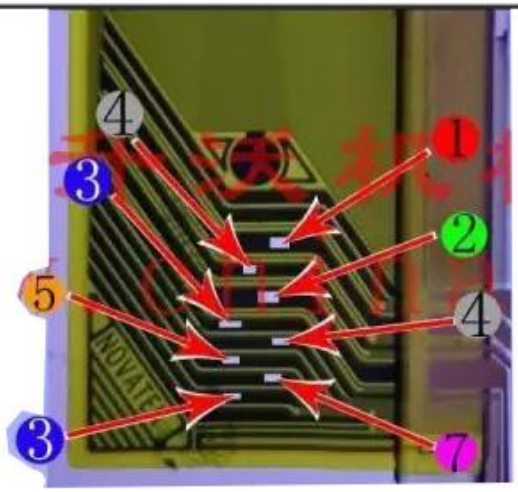
COF P/N: NT39567H-C525B			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV_OUT
2	VGL	7	CKV
3	3.3V	8	OE1
4	GND	9	OE2
5	STV	10	-
http://www.LCDRepairGuide.com			

15) COF P/N: NT61203H-C5604A

Panel Model:

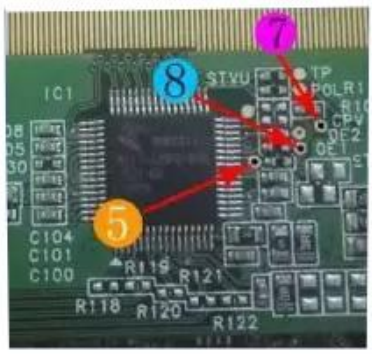


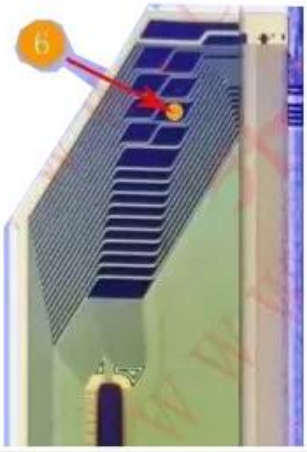
COF P/N: NT61203H-C5604A			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV_OUT
2	VGL	7	CPV
3	3.3V	8	-
4	GND	9	-
5	STV	10	-
http://www.LCDRepairGuide.com			



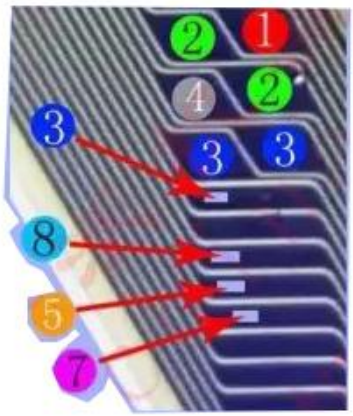
16) COF P/N: NT61227H-C1217B

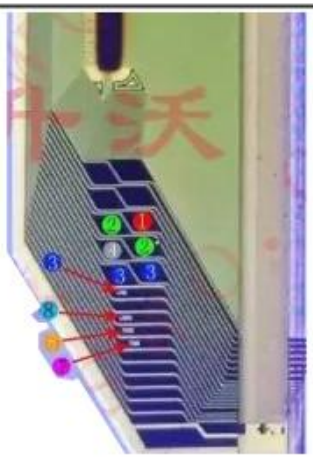
Panel Model:





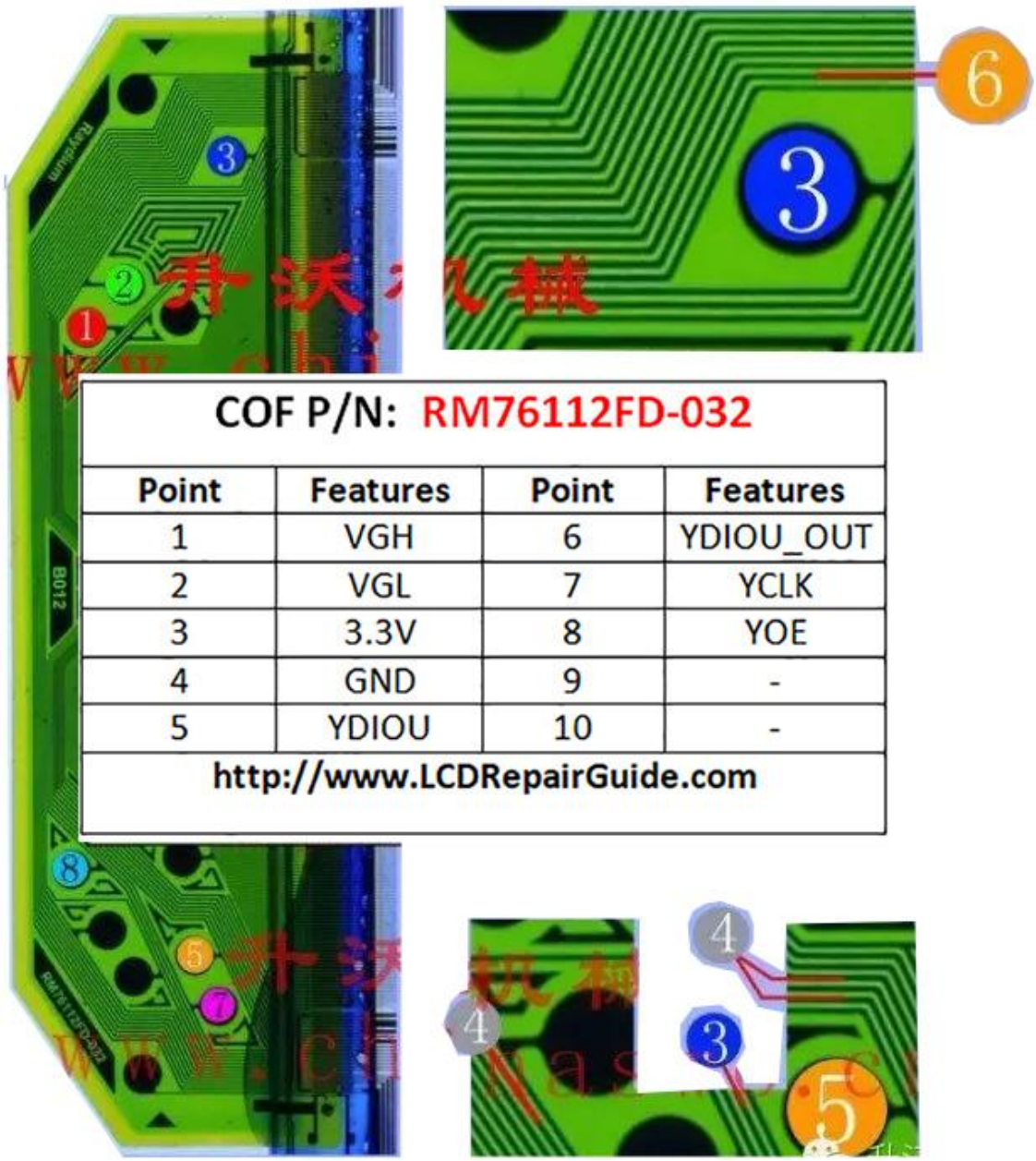
COF P/N: NT61227H-C1217B			
Point	Features	Point	Features
1	VON	6	STV_OUT
2	VOFF	7	CPV
3	3.3V	8	OE1
4	GND	9	-
5	STVD	10	-
http://www.LCDRepairGuide.com			





17) COF P/N: RM76112FD-032

Panel Model:



18) COF P/N: RM76151FH-061

Panel Model: T420HW04 V0

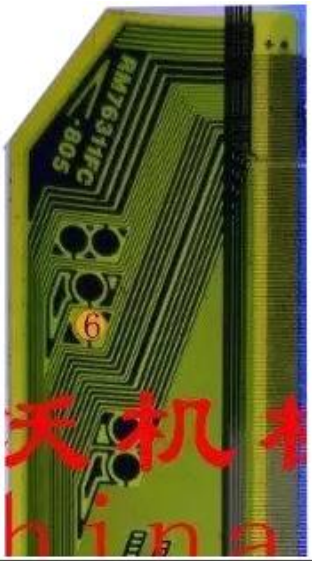
COF P/N: RM76151FH-061			
Point	**Features**	**Point**	**Features**
1	VGH	6	No record
2	VGL	7	YCLK
3	3.3V	8	YOE
4	No record	9	-
5	YDIOU	10	-
http://www.LCDRepairGuide.com			

19) COF P/N: RM76153FJ-0A1

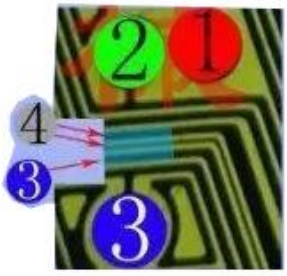
Panel Model: T315HW07 V7/120Hz

20) COF P/N: RM76311FC-805

Panel Model:

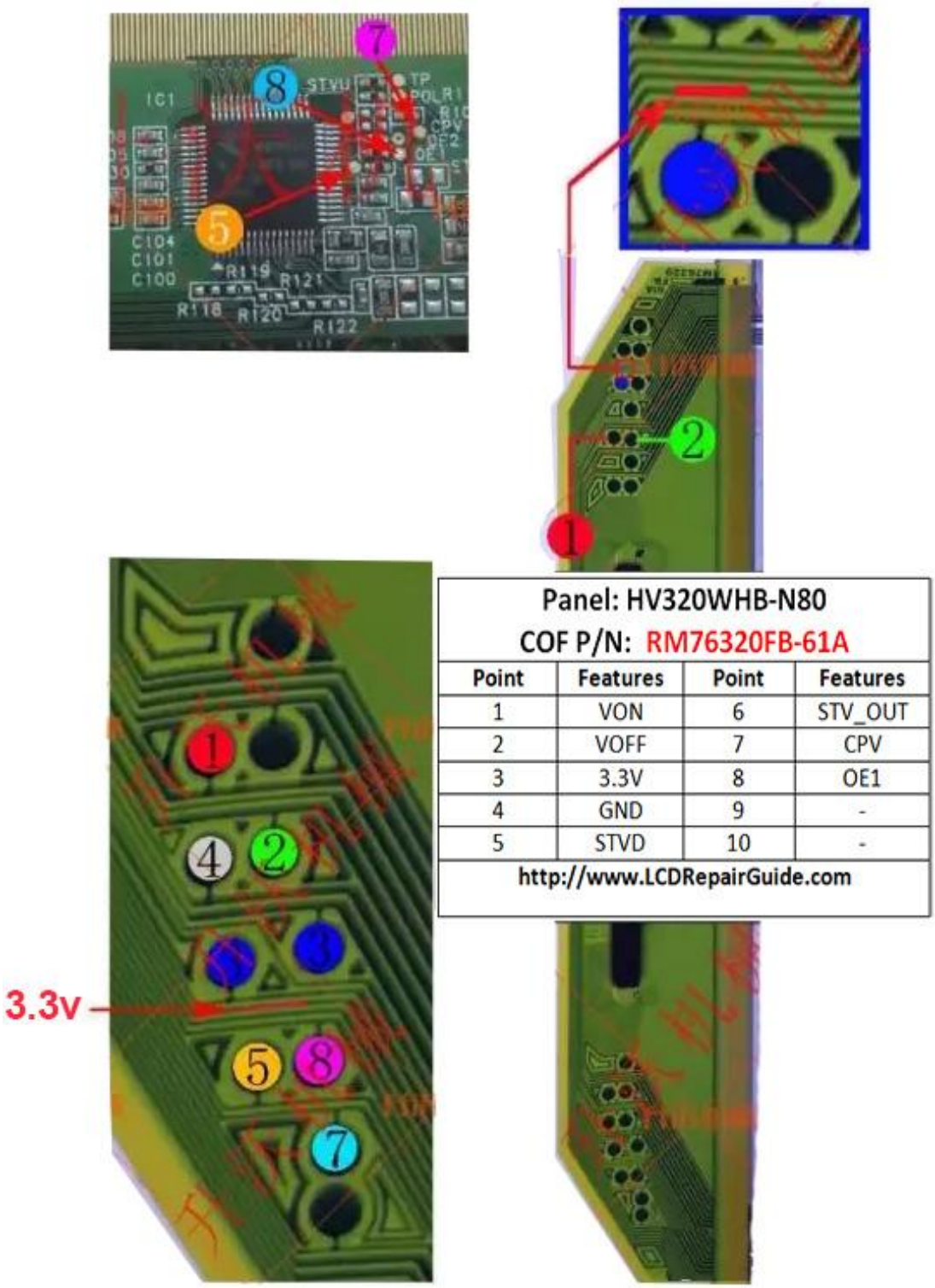


COF P/N: RM76311FC-805			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV_OUT
2	VGL	7	STV-R
3	3.3V	8	CKV
4	GND	9	OE
5	STV	10	-
http://www.LCDRepairGuide.com			



21) COF P/N: RM76320FB-61A

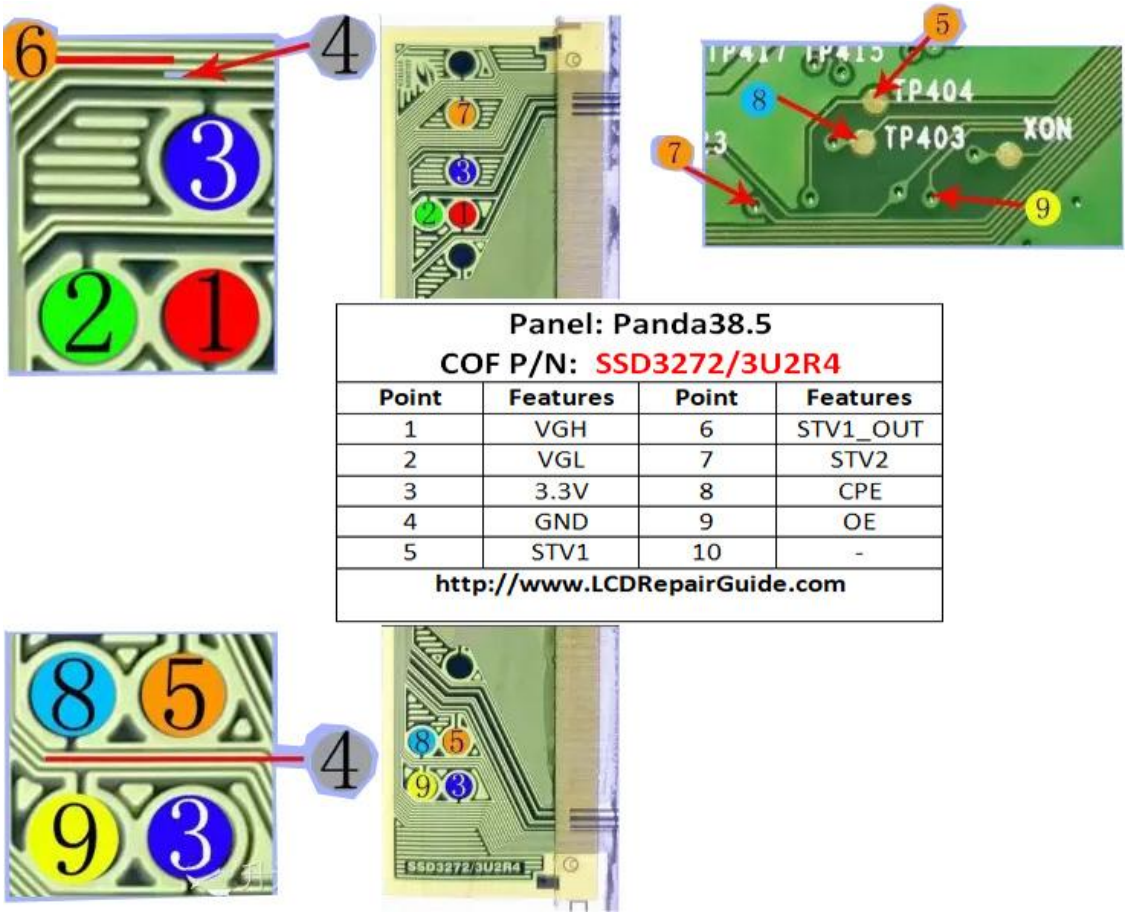
Panel Model: HV320WHB-N80



Panel: HV320WHB-N80 COF P/N: RM76320FB-61A			
Point	Features	Point	Features
1	VON	6	STV_OUT
2	VOFF	7	CPV
3	3.3V	8	OE1
4	GND	9	-
5	STVD	10	-
http://www.LCDRepairGuide.com			

22) COF P/N: SSD3272/3U2R4

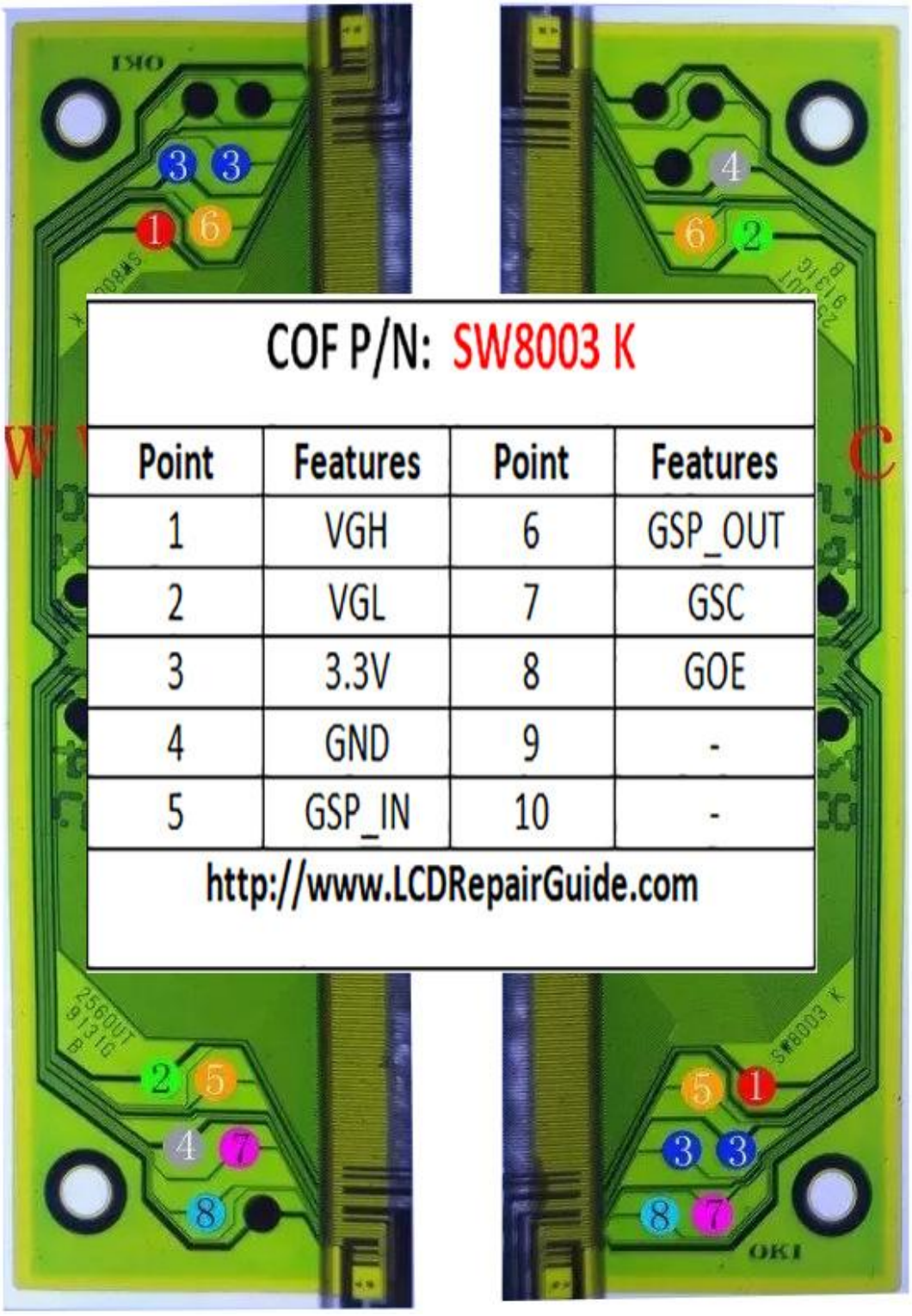
Panel Model: PANDA 38.5



Panel: Panda38.5 COF P/N: SSD3272/3U2R4			
Point	**Features**	**Point**	**Features**
1	VGH	6	STV1_OUT
2	VGL	7	STV2
3	3.3V	8	CPE
4	GND	9	OE
5	STV1	10	-
http://www.LCDRepairGuide.com			

23) COF P/N: SW8003 K

Panel Model:



LCD Panel TAB/COF Equivalent List

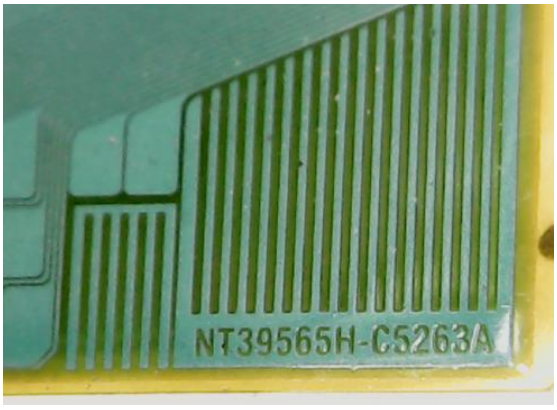
This equivalent list is to let you easily find out a replacement TAB or COF IC when the original TAB/COF is not available or no stock. It is a common issue for the TAB Bonding Machine owner. Even they have the expensive TAB Bonding Machine in their workbench, if the failure COF IC is not available or no stock, it will quite frustration. Because we use lots of time to bring in this TV, dismantle the TV cover, PCB board and troubleshooting time, but the part is not available or no stock. So the repairer will waste lots of time and money or even reduce the repair income too.

So this TAB/COF Equivalent List is to let repairer easily to find out the suitable replacement TAB/COF IC for their Panel repair.

Note-1:

1) Some of the replacement COF maybe a bit longer than original COF. But it can use as an equivalent COF, just need to readjust their pins position to the right place and you need to cut out some unused area before bonding the TAB into glass & PCB board.

2) If after replace one of their Gate COF and showing an abnormal display, a very thin of the horizontal line or half horizontal top more brighter than the bottom half horizontal area, that's mean, you need to replace the other Gate COF together with the equivalent part number Gate COF. For example, if this TV Panel has 3 Gate COF (Y1, Y2 & Y3), then you cannot just replace one COF only (for example Y1), you need to replace together with another same part number 2 Y-COF (Y2 & Y3) also. If you can find the original part number of this Y-COF, so the other two Y-COF no need to replace. This will also same as the X-COF/TAB (Source Driver Board) too.



No.	TAB/COF Part Number	Equivalent Part Number
1.	8019-FCCA0	S6C1162-52
2.	8019-KCBCX	LH16B5D2
3.	8020-A CH23C	S6C1127-51B
4.	8020-GCBJ4	NT39646H-C5103A
5.	8031-DCBKO	NT39962H-C5107A
6.	8031-DCV17	VSM21074A
7.	8033-DCY0D	NT399658H-C1294A
8.	8033-GCY07	NT39658H-C1294A
9.	8033-DCYOE	NT39911H-C1275
10.	8154-ECBL6	NT39935H-L5206B
11.	8154-ECBML	S6C2774-54U
12.	8157-BCBNM	8157-ACBMX
13.	8157-BCBNM	8157-BCBOD
14.	8159-CCBQ	NT39980H-C5256A 8159-ACBPU
15.	8656-CYOB	NT39538H-1272A
16	8658-GCYOU	RM76730FA-603
17.	8674-BCC96	S6CG221-51
	D	
18.	D160132RNL-092	S6C1125-65 S6C1125-61
19.	D160252NL-051	S6C2792-52

20.	D160407NL-056	D160407NL-055-C1-0A
21.	D160407NL-055-C1-0A	D160407NL-056
22.	D160418ANL-051	RM9216FB-0AN
23.	D160418NL-054	RM92165FC-0CC
24.	D160962NL-51	NT39381H-C0265 NT39386H-C0265A D160975-051
25.	D160971NL-055	NT39662H-C02D5D
26.	D160975ANL-051	RM92120FA-038 RM92122FA-058 NT39921H-C02B7H
27.	D160975NL-051	D160962NL-051 D160975ANL-051 D160975NL-058
28.	D160987NL-052	S6C2A72-52U D160987NL-055
29.	D160987NL-055	D160987NL-052 S6C2A72-52U
30.	D160994NL-051	NT39931H-C02F7A D160994NL-054
31.	D160994NL-054	D160994NL-051 NT39931H-C02F7A
32.	D160998NL-053	D160998NL-054-C1 RM92150FB-095

33.	D160998NL-054-C1	D160998NL-053
34.	DB7899A-FL01U	DB7899-FS05U
35.	DB7899-FL02U	LS08S6HE11-C4LX
36.	D10D4SS8310A-CFOC1LX	LS08S2M7-C3LX
37.	D10D4SS8310-CFOC2LX	LS08S201-C3LX
	L	
38.	LH16B5D2	8019-KCBCX
39.	LH16DD01	LH165V138
40.	LH16DD07	NT39990H-C6003A SSD3258UR1
41.	LH163T06	LH163Y06 G0054-C1TS
42.	LS0306M1-C2LX	MT3807VC T7C89A1
43.	LS0610BT1-C2LX	MT3725VB
44.	LS08S6HH3-C2LX	LS08S6HHT1-C2LX
45.	LS08S6HT1-C2LX	MT3728VC LS08S6HT3A-C3LX LS08S6HH3-C2LX
46.	LS08S6HT3A-C3LX	LS08S6HT1-C2LX MT3728VC
47.	LS08S2M7-C3LX	SS8310-C1LX LS08S6HT3A-C3LX
	M	

48.	MT3113VA	NT39610H-C2006A
49.	MT3197B-VA	MT3197B-VC
50.	MT3197B-VC	MT3197B-VA
51.	MT3407VC	NT39338H-C2005A
52.	MT3411VD	NT39329H-COF1433
53.	MT3725VB	LS0610BT1-C2LX
54.	MT3728VC	LS08S6HT1-C2LX LS08S6HT3A-C3LX
55.	MT3728VC	SS8303A-C2SS
	N	
56.	NT39338H-C2005A	MT3407VC
57.	NT39386H-C0265A	D160962NL-051
58.	NT39389H-C0255	D160985NL-052（Perfect replacement）
59.	NT39530H-C5203A	NT39538H-C5203A
60.	NT39538H-1272A	8656-CYOB
61.	NT39610H-C2006A	MT3113VA
62.	NT39658H-C1294A	8033-GCYO7
63.	NT39686H-C5117A	8033-DCB02
64.	NT39809H-C1455	NT39808H-C14A4A MT3102A-VE
65.	NT39810H-C5215A	S6C27A7-52B 8157-CCBP4
66.	NT39812H-C1261A	S6C27A7-51V

67.	NT39911H-C1275A	8033-DCYOE
68.	NT39918H-C02K6A (Long)	NT39918H-C02M2A
69.	NT39921H-C02B7H	RM92120FA-038 RM92122FA-058 D160974NL-051
70.	NT39981H-C02M2A	NT39918H-C02K6A
71.	NT39931H-C02F7A	D160994NL-054 D160994NL-051
72.	NT39935H-C5213A	NT39935H-C5226A
73.	NT39935H-C5226A	NT39935H-C5213A
74.	NT39935H-L5206B	8154-ECBL6
75.	NT39938H-1272A	8656-COYB
76.	NT39941H-C0217B	RM92150FC-0CC
77.	NT39962H-C05D5D	D160971NL-055
78.	NT39941H-C02J4A	RM92160FB
79.	NT39941H-C0217B	RM92150FB-095
80.	NT39658H-C1294A	8033-GCY07
81.	NT39962H-C5107A	8031-DCBKO
82.	NT39980H-C5256A	8159-CCBQ
83.	NT39981H-C02J5C	NT39981H-C02J1C RM92160FE-OAD
84.	NT39981H-C02J1C	NT39981H-C02J5C RM92160FE-OAD
85.	NT39985H-C02M9A	RM92161FD-OAS

86.	NT39985H-C02P1A	RM92161FB-OAN
87.	NT39985H-C02M4A	LS0896BD3-CBLX
88.	NT39986H-C0265A	D160962NL-051
89.	NT39990H-C6003A	LH16DD07
	R	
90.	RM76730FA-603	8658-GCYOU
91.	RM92120FA-038	RM92122FA-058 D160974ANL-051 NT39921H-C02B7H
92.	RM92122FA-058	RM92120FA-038 D160974ANL-051 NT39921H-C02B7H
93.	RM92150FB-095	NT39941H-C0217B D160998NL-053
94.	RM92160FE-OAD	NT39981H-C2J1C NT39981H-C02J1
95.	RM92160FG-OAF	RM92160FE-OAD（Perfect replacement）
96.	RM92161FA-OAM	RM92161FB-OAN
97.	RM92161FB-OAN	RM92161FA-OAM D160418ANL-051 RM39985H-C02P1A
98.	RM92161FB-OAS	RM92161FE-OBO

99.	RM92161FD-OAS	NT39985H-C02M9A NT39985H-C02M9A RM92161FF-0C0
100.	RM92161FF-0C0	RM92161FD-OAS NT39985H-C02M9A NT39985H-C02M9A
101.	RM92161FE-OBO	RM92161FB-OAS
102.	RM92165FC-0CC	D160418NL-054
103.	RM92165FK-0CU	NT39985H-C028A
104.	RM92312FC-80B	RM92312FC-80D
105.	RM92312FC-80D	RM92312FC-80B
106.	RM92370FB-801	RM92370FA-809
107.	RM92370FA-809	RM92370FB-801
	S	
108.	S6C1125-65	D160132RNL-092 S6C1125-61
109.	S6C1127-51B	8020-A CH23C
110.	S6C1162-52	8019-FCCA0
111.	S6C2141-51C	S6C2274-82B
112.	S6C2141-51C	8109F-CBF6
113.	S6C2709-51B	S6C2732-51H X1(If can't, use another one) S6C2709-51D S6C2710-84

114.	S6C2709-51D	S6C2709-51B S6C2709-51H S6C2709-61 S6C242-51U
115.	S6C2732-51H	S6C2732-61 S6C2732-51B
116.	S6C2732-51H	S6C2709-51B
117.	S6C2732-51H	CXD3826F1-1
118.	S6C2732-52	S6C2732-52G
119.	S6C2732-52	S6C2732-61 (Can replace -52, but a bit long)
120.	S6C2732-52G	S6C2732-52
121.	S6C2732-61	S6C2732-51H
122.	S6C2741-81XN	S6C2771-04
123.	S6C2772-52	S6C2775-51 S6C2775-21 S6C3101-53
124.	S6C2774-54U	8154-ECBML
125.	S6C2792-52	D160252NL-051
126.	S6C2792-54	D160252NL-051
127.	S6C2792-54	S6C2792-52
128.	S6C2792-61	S6C2B91-64
129.	S6C2A72-52U	D160987NL-052 D160987NL-055

130.	S6C27A7-51V	NT39812H-C1261A
131.	S6C2B91-54	S6C2B91-51
132.	S6C2B91-61	S6C2B94-61 S6C2B91-63
133.	S6C2B91-63	S6C2B94-1 S6C2B91-61
134.	S6C2B94-61	S6C2B91-61 S6C2B91-63
135.	S6CG221-51	8674-BCC96
136.	SS8303A-C2SS	MT3728VC
137.	SS8310-C1LX	LS08S2M7-C3LX
138.	SSD3258UR1	LH16DD07
	V	
139.	VSM21074A	8031-DCV17

Notes:

- Again, if after replaced the TAB or COF, the display show something abnormal, for example one of the Y1 COF (Gate Driver side) replaced. But the display showing half horizontal top more brighter than the half horizontal bottom, in this case, you need to replace another Y2 and Y3 (If their Y COF IC have Y1, Y2 & Y3). Also same as the X TAB (Source Driver Board) too.

- If the equivalent TAB IC is a bit bigger than the original, you need to cut out some unused area before bonding the TAB into glass & PCB board.

T-CON Board P-GAMMA IC & DC-DC IC Programming Method

Do you know, why repair some T-CON board after replaced their GAMMA IC or DC-DC IC, the T-CON board will change to other screen problem?

This is because of these IC having built-in the ROM or EEPROM to save the configuration data (or firmware) to control its operation of the IC. So when we repair the T-CON board and replace a new GAMMA or DC-DC IC without this firmware inside, so this new IC also not working on a T-CON board! That's why after replaced the new IC for the T-CON board, but it still got another problem will appear.

Here is a Programmable type P-GAMMA & DC-DC IC list:

AUO	AUO-G1422.29	MAXIM	MAX9668	TI	TPS65175
	AUO-G1422.2H		MAX9669		TPS65178
CHIMEI	CM601		MAX9672		TPS65168
	CM602		MAX9673		BUF08630
SMGE	SM4051D		MAX9674		BUF08821
SMGE	SM4053B		MAX9679		BUF8821B
SIW	SW5084A		MAX9696		BUF08832
INTERSIL	ISL24837A		DS3501		BUF16821
			DS3502		BUF22821

Normally what will happen when the new IC replace without writing firmware into their IC? The T-CON board of this TV after replaced this type of programmable IC without writing (programming) their firmware into it and it will happen to the symptom like: Screen becomes white display, display distortion or bad grey scale.

So with this type of symptom after replace the P-GAMMA or DC-DC IC, you need to write their firmware into the new IC through a RT809F ISP Universal Programmer.

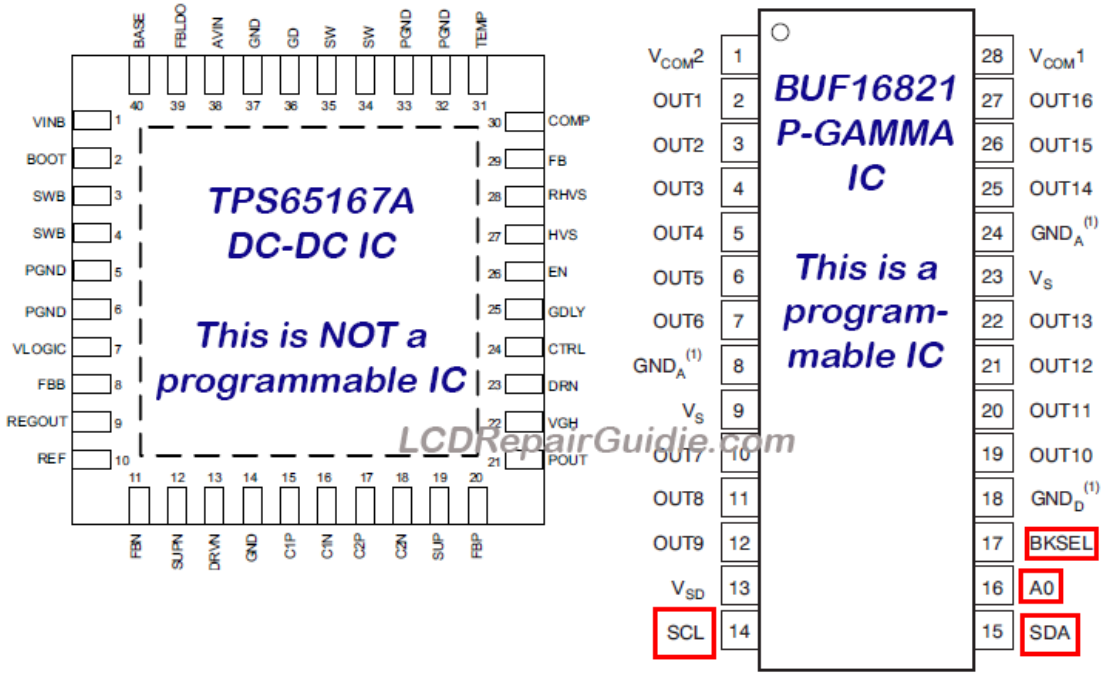
How do I know the GAMMA IC & DC-DC IC is programmable type?

This is a good question. Every year, the manufacturers will production new part number of P-GAMMA & DC-DC IC. So how do I know which IC is a programmable type P-GAMMA & DC-DC IC?

The answer is:

1) Check their IC datasheet file, normally the datasheet IC description there will write it as a "Programmable" xxxxxx IC.

2) The IC datasheet pins description there if you found have these pins: SDA & SCL inside the IC. You can refer to picture below:



3) The DC-DC IC, look at each output voltages their feedback circuit has resistive divider or not. If this IC output voltage feedback circuit didn't have the resistive divider, then this IC is a Programmable type DC-DC IC.

4) For the GAMMA IC, look at their IC corresponding components. If you found several series connection resistive divider is around the GAMMA IC, so this GAMMA IC not a programmable type IC. If around this GAMMA IC you can't find any series connection resistive divider, then this is a P-GAMMA IC, programmable type IC.

5) If you've bought the RT809F programmer, just simply look at the software there. If you found this IC was in the IC list there, that's mean, it's a Programmable type IC!

Note:

These IC are no need to write/programming the firmware into the IC: TPS65160, TPS65161, TPS65162, TPS65167 and so on.

How to Programming/Write the T-CON Board P-GAMMA & DC-DC IC?

1) First, you need to buy a RT809F (or H) ISP Universal Programmer (you can order it at: http://www.lcdrepairguide.com/tools/) and install it correct in your computer or laptop.

2) You need to create a "cable" and DIY it to suitable for your Programmer to connect to the T-CON board. Just use the LVDS cable with 51-pins connector like picture below to DIY it:

3) Please prepare the working "firmware" to write it to the IC you want. But the IC firmware must use the same T-CON & Panel. Even the Programmable IC and T-CON board both same, but the T-con Board is using in different inches Panel, so the firmware is cannot be used. Even it is the same programmable IC.

If the programmable IC & T-CON board both same, same Panel size but different Panel model number, then you can give it a try, but not guarantee.

So where to get this programmable IC "firmware"?

a) You can use the Programmer to copy it from a good T-CON board.
b) Ask the other repairer to help on the forum site or social media.
c) Buying this "firmware" online, if you can find who are selling it.

These 5 Pins of T-CON Board P-GAMMA & DC-DC IC You Must Know

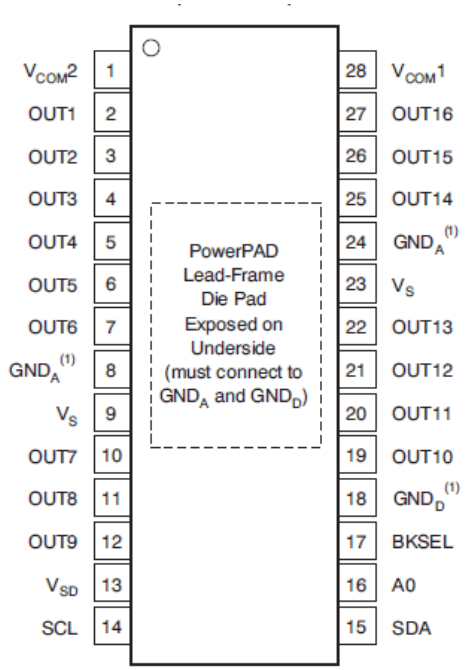
1) **SDA**
   Serial Data Input/Output

2) **SCL**
   Serial Clock Input

3) **A0/WP**
   Two-wire Serial Interface address select pin. This pin must be active low or connect to ground (GND), so that the RT809F programmer can continue and successful to write the firmware into the programmable IC.

4) **BKSEL/BANKSEL**
   This pin is control to select which memory bank be use, select memory bank 0 or 1. Connect to either logic 1 (active high, is about 3.3V) to select bank 1 or logic 0 (Active low, normally connect to GND) to select bank 0.

5) **AVDD, DVDD, VS, VSD & VCC**
   Make sure these voltage supply pins are in normal voltage range. If these pins are in abnormal voltage range, it will affect the programmer to programming the IC. For the correct voltage range of programmable IC, please refer to the list.



T-CON Board P-GAMMA & DC-DC IC Programming Tutorials

For the programmable IC pins configuration, please refer to the IC specification datasheet or the list: "T-CON Board P-GAMMA & DC-DC IC Read/Write Pins List".

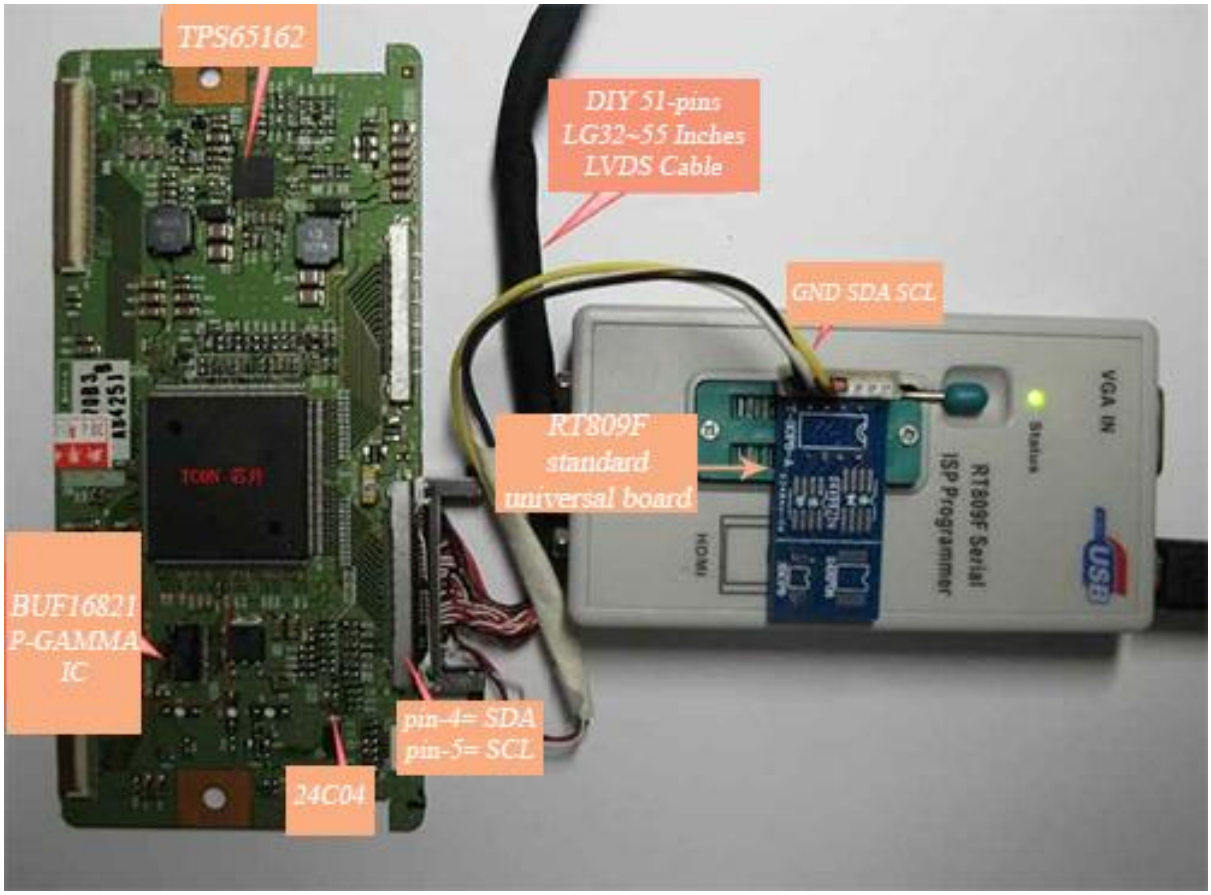
1) BUF16821 P-GAMMA IC

The **T-CON board 6870C-3500C** is come with this BUF16821 IC. This T-CON board is usually using in LG 32~55 inches TV. This GAMMA IC inside ROM has two BANKS. Normally just use 1 BANK only.

The BUF16821 IC pin-14= SCL and pin-15= SDA usually is connect to the T-con Board LVDS connector pin-4= SDA and pin-5= SCL. IC BUF16821 pin-16= AO must connect to GND (use multimeter/ohm meter to measure it), pin-17= BKSEL (default setting is connected to ground).

Use a **DIY 51-pins LG32~52 inches LVDS cable** with 51-pins connector, one side connect to RT809F programmer socket pin-6= SCL,

pin-7= SDA, pin-8= GND. Another side is connected to T-CON board LVDS connector (for T-con board 6870C-3500C) pin-4= SDA, pin-5= SCL and connect the GND pins. The DIY LVDS cable Vcc input one side connects to 12V DC Power Supply. Another side is connecting to the T-CON Board LVDS connector VCC input pin/s.



Attention: Actually you can just use the cables direct connect to their IC pins and supply the Vcc 12V to their T-con Vcc input. After that, this cable is connects to the RT809F programmer and do the write/programming IC. So it will depend on which method you're feeling better to use, and then just use it **(also for the other Programmable IC tutorials too)**.

Notes:

a) Please refer to their **Panel datasheet** or T-CON Board LVDS connector for the correct VCC voltage values & pins **configuration (also for the other Programmable IC tutorials too)**.

b) This BUF16821 IC has a limit times to their each BANK to write/programming. Maximum per BANK is **limit to 16 times**. But read/copy is unlimited times to the IC. When the IC reached 16 times to write/programming, the RT809F software will show "Checksum Error" message on screen and it is because the IC itself has blocking it.

   If this IC has two BANKS, then we can disconnect their BKSEL pin from ground (GND) and connect it to 3V (active high). The IC will automatically change to another BANK to save the data. So for the new BANK, we can continue to write/programming another 16 times again.

c) If unsuccessful to write/programming the IC, please double check the above connection and also their VS and VSD voltage range is in the normal values or not.

2) TPS65178 DC-DC IC

The **T-CON board 6870C-0401B** is come with this TPS65178 IC. This T-CON board is usually using in LG 32~55 inches TV. This DC-DC IC inside has built-in an EEPROM with a limitation allow to WRITE 16 times only.

The connection of the T-CON board (SDA & SCL lines) and RT809F Programmer is same as the BUF16821 IC.

The **TPS65175** **&** **TPS65168** also use the same method like TPS6178 IC to do write/programming the programmable IC.

Notes:

a) Please refer to their **Panel datasheet** or T-CON Board LVDS connector for the correct VCC voltage values & pins **configuration (also for the other Programmable IC tutorials too)**.

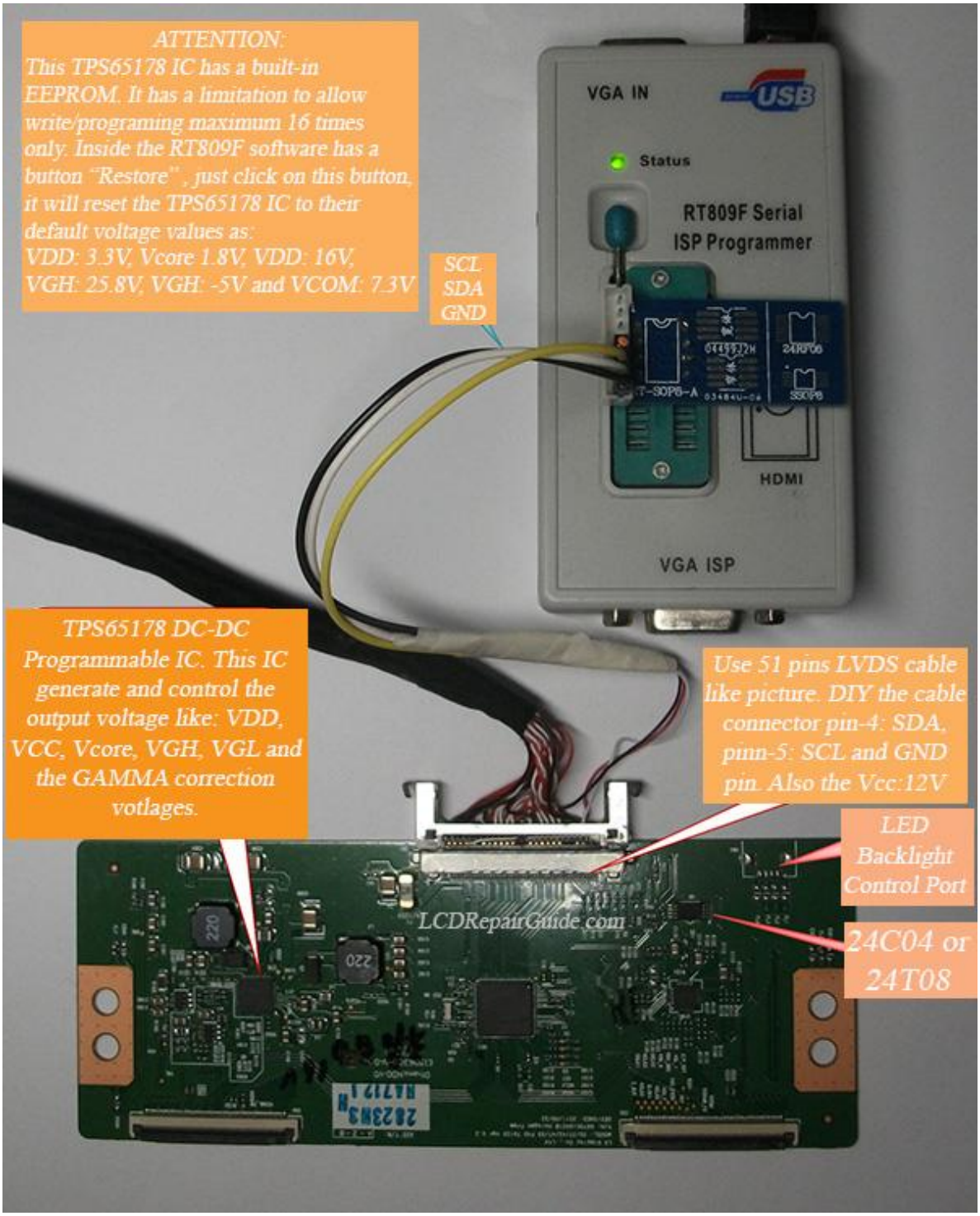
b) Because of this TPS65178 has 1 EEPROM built-in, so don't write/programming this IC more than 16 times. If not, it will cause the write/programming fail or checksum error appear and can't write/programming the new data/firmware into it. But reading IC is unlimited times to use.

c) Inside the RT809F software, you will found a button call "Restore". When this IC TPS65178 connected successfully on RT809F, if click on this "Restore" button, the software can help this IC reset to their default voltage output setting like below:

VCC: 3.3V
Vcore: 1.8V
VDD: 16V
VGH: 25.8V
VGL: -5V
VCOM: 7.3V

d) The **TPS65168** IC after click on "Restore" button, IC will reset to their default voltage output setting like below:

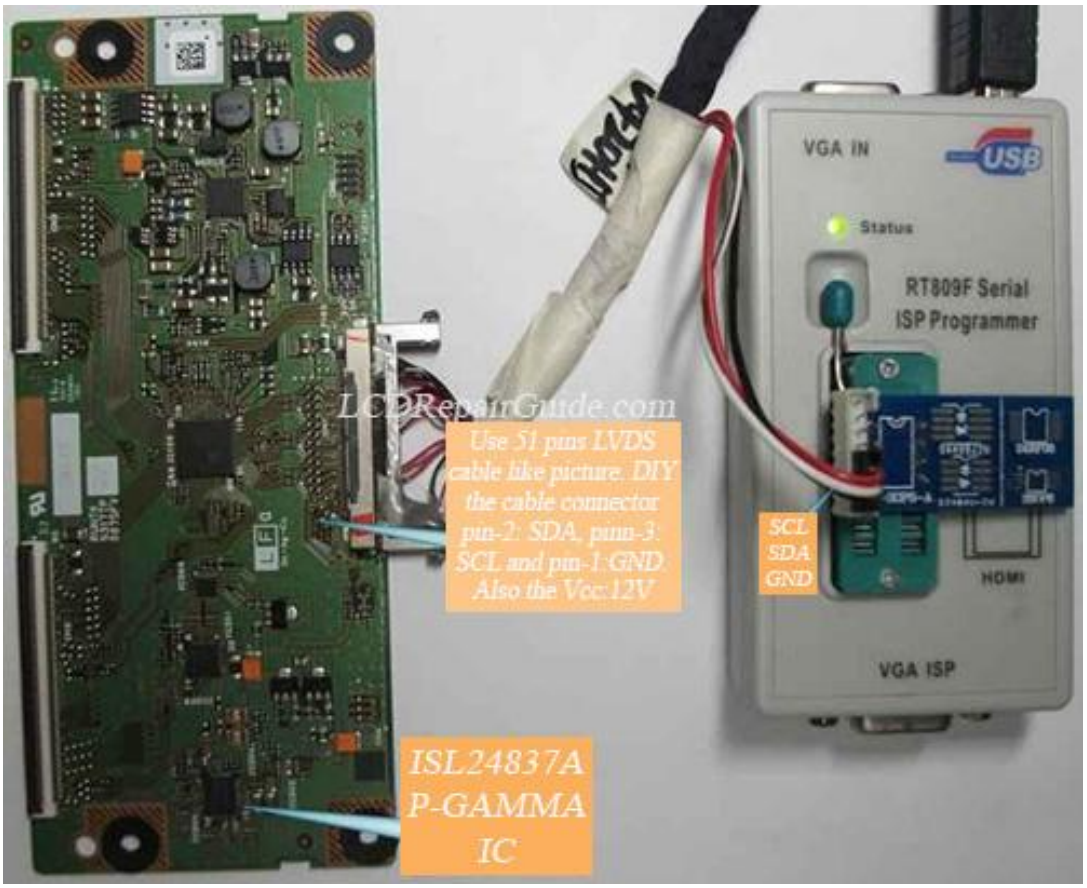
VCC: 3.3V
Vcore: 1.0V
VDD: 16V
VGH: 25.7V
VGL: -5.24V
VCOM: 8V


ATTENTION:
This TPS65178 IC has a built-in EEPROM. It has a limitation to allow write/programing maximum 16 times only. Inside the RT809F software has a button "Restore", just click on this button, it will reset the TPS65178 IC to their default voltage values as:
VDD: 3.3V, Vcore 1.8V, VDD: 16V, VGH: 25.8V, VGH: -5V and VCOM: 7.3V
SCL
SDA
GND
VGA IN
USB
Status
RT809F Serial ISP Programmer
HDMI
VGA ISP
TPS65178 DC-DC Programmable IC. This IC generate and control the output voltage like: VDD, VCC, Vcore, VGH, VGL and the GAMMA correction votlages.
Use 51 pins LVDS cable like picture. DIY the cable connector pin-4: SDA, pinn-5: SCL and GND pin. Also the Vcc:12V
LED Backlight Control Port
24C04 or 24T08
LCDRepairGuide.com

3) ISL24837A P-GAMMA IC

The **T-CON board: Sharp RUNTK_5317TP_0075FV** is come with this ISL24837A IC. This T-CON board also can use the 51-pins LVDS cable to do the write/programming as usually using in LG 32~55 inches TV. This GAMMA IC inside has built-in an EEPROM (260-bits) with a limitation allow to WRITE/PROGRAMMING not more than **300 times** only.

The connection of the T-CON board (SDA & SCL lines) and RT809F Programmer is same as the BUF16821 IC. But the pin number is a bit different. The DIY 51-pins LVDS cable connector **pin-2 is SDA**, **pin-3 is SCL** and **pin-1 is GND**. Also don't forget to provide 12V to their VCC input pin/s.



RT809F Software Programming Programmable IC Process

1) Connect the RT809F Programmer with T-CON Board through DIY 51-pins LG32~55 Inches LVDS Cable. You can refer to the above Programmable IC tutorial. Double check all the connection and supply the correct voltages to the VCC pin/s.

2) Open RT809F software.

3) Click on the AUTO ISP button, it will detected the programmable IC and it will pop-up a screen with Programmable IC list.

4) Choose the correct Programmable IC part number and click OK.

5) After select Programmable IC, click on the “READ” button to start reading the Programmable IC data/firmware.

6) After finished successful reading the Programmable IC, you can click on the “SAVE” button to copy this data/firmware into your computer or laptop.

7) If you want to WRITE/PROGRAMMING the programmable IC, click on the “OPEN” button and go to the computer folder to select the correct part number (also other part number/model same information). Click on the “WRITE” button to write/programming Programmable IC.

8) If finished successful to write/programming the Programmable IC, it will show “Checksum” ok/success.

9) So you can remove all the cable and connector and put it back the T-CON board to TV and give it a try. Good luck!

T-CON Board P-GAMMA & DC-DC IC Read/Write Pins List

IC Manufacturer	IC Part Number	IC Package	Pin: SDA	Pin: SCL	Pin: BKSEL	Pin: A0 (to GND)
TI	TPS65175	VQFN 56	21	20		
	TPS65178	VQFN 48	28	27		
	TPS65168	VQFN 40	29	28		
	BUF08630	VQFN 20	1	20	9	2
	BUF08821	HTTSSOP20	10	9	12	11
	BUF8821B	HTTSSOP20	10	9	12	11
	BUF08832	HTTSSOP20	10	9	12	11
	BUF16821	HTTSSOP28	15	14	17	16
	BUF22821	HTTSSOP38	19	18	21	20
MAXIM	MAX9668	TQFN 20	1	20		2
	MAX9669	TQFN 28	3	2		4
	MAX9672	TQFN 28	3	2		4
	MAX9673	TQFN 28	3	2		4
	MAX9674	TQFN 28	3	2		4
	MAX9679	TQFN 24	4	3		6
	MAX9696	TQFN 24	3	2		4
	DS3501	MSOP 10	1	10		Pin-4 & 5
	DS3502	MSOP 10	1	10		Pin-4 & 5
AUO	AUO-G1422.29	TQNF 32	15	14	Pin-16= WP connect to GND	
	AUO-G1422.2H	TQNF 32	15	14	Pin-16= WP connect to GND	
CHIMEI	CM601	QFN 24	4	3	5	
	CM602	QFN28	4	3	5	
SMGE	SM4051D	VQFN 56	21	20		
	SM4053B	VQFN 56	21	20		
SIW	SW5084A	VQFN 56	21	20		
INTERSIL	ISL24873A	QFN 32	12	13		

IC Manufacturer	IC Part Number	IC Package	Other IC Pin/s	
TI	TPS65175	VQFN 56	Digital Supply =3.3V	Analog Supply= 12V
	TPS65178	VQFN 48	Digital Supply =3.3V	Analog Supply= 12V
	TPS65168	VQFN 40	Digital Supply =3.3V	Analog Supply= 12V
	BUF08630	VQFN 20	3, VSD= 2~5.5V	8,VS= 9~20V
	BUF08821	HTTSSOP20	8, VSD= 2~5.5V	6,15,VS= 9~20V
	BUF8821B	HTTSSOP20	8, VSD= 2~5.5V	6,15,VS= 9~20V
	BUF08832	HTTSSOP20	8, VSD= 2~5.5V	7,19,VS= 9~20V
	BUF16821	HTTSSOP28	13, VSD= 2~5.5V	9,23,VS= 9~20V
	BUF22821	HTTSSOP38	17, VSD= 2~5.5V	12,27,VS= 9~20V
MAXIM	MAX9668	TQFN 20	3,DVDD= 2.7~3.6V	8,AVDD= 9~20V
	MAX9669	TQFN 28	5,DVDD= 2.7~3.6V	9/10/20, AVDD= 9~20V
	MAX9672	TQFN 28	5,DVDD= 2.7~3.6V	9/10/20, AVDD= 9~20V
	MAX9673	TQFN 28	5,DVDD= 2.7~3.6V	9/10/20, AVDD= 9~20V
	MAX9674	TQFN 28	5,DVDD= 2.7~3.6V	9/10/20, AVDD= 9~20V
	MAX9679	TQFN 24	2,DVDD= 2.7~3.6V	8/21/22, AVDD= 9~20V
	MAX9696	TQFN 24	5,DVDD= 2.7~3.6V	7/22, AVDD= 9~20V
	DS3501	MSOP 10	3, VCC= 2.7~5.5V	9, V+ = 4.5~15.5V
	DS3502	MSOP 10	3, VCC= 2.7~5.5V	9, V+ = 4.5~15.5V
AUO	AUO-G1422.29	TQNF 32	Digital Supply= 2.7~3.6V	Analog Supply= 9~20V
	AUO-G1422.2H	TQNF 32	Digital Supply= 2.7~3.6V	Analog Supply= 9~20V
CHIMEI	CM601	QFN 24	2,DVDD= 2.7~3.6V	8,21,22,VAA= 9~20V
	CM602	QFN28	2,DVDD= 2.7~3.6V	8,25,26,VAA= 9~20V
SMGE	SM4051D	VQFN 56	Digital Supply =3.3V	Analog Supply= 12V
	SM4053B	VQFN 56	Digital Supply =3.3V	Analog Supply= 12V
SIW	SW5084A	VQFN 56	Digital Supply =3.3V	Analog Supply= 12V
INTERSIL	ISL24873A	QFN 32	29, Digital Supply =3.3V	21,32, Analog Supply= 15V

Tips:

If the T-CON board problem causing by P-GAMMA or DC-DC IC, you can try to writing their firmware into it first without replace a new one. So you can try the T-CON problem solved or not. But it is needed to confirm it is not the IC shorted first, and then writing/programming the firmware into this IC.

Because this type of programmable IC also like the normal EEPROM IC, their data will easy to lost due to any environment issues too.

Download the T-CON Board P-GAMMA IC & DC-DC IC Data/Firmware

I've attached some of the T-CON Board P-GAMMA IC & DC-DC IC data configuration/firmware files at **Bonus-B section** there.

Here is the firmware list:

AUO-G1422.2H_T315HW07_VB

BUF8821B_LC320WXN-SBA1_6870C-0238B

BUF16821_LG T-CON Board_6870C-3500C

BUF16821B_LC320WUD_T-CON_6870C-0249C

BUF16821B_LG_LC420WUE Panel PCB

CM601_CHIMEI INNOLUX_V390HJ1-CE1_CM2805A

CM601_CHIMEI INNOLUX_V420HJ1-P01_REV.C1

CM602_CHIMEI INNOLUX_V236H3-CS3-C_CM602

DS3501_LG LM240WU3-TLC1_6870C-0221A

EPM3064A_LC370WX1_T-CON_6870C-0060G

ISL24837A_SHARP_RUNTK_5317TP_0075FV_T-CON

MAX9668_LC320EXN 6870C-0370A 2010_11_03

MAX9668_LC320EXN_6870C-0370A.BIN

MAX9668_LC320EXN-SEA1-K31 6870C-0414A 2011_11_04

MAX9668_LG LC420WUN-SCA1 6870C-0310C 2010_01_19

MAX9668_LG LC420WUN-SCA1_T-CON_6870C-0310C

MAX9669_CHIMEI-E150630-V460H1-C11

MAX9674_CHIMEI-E150630-V460H1-CPE5

SM4051D_LG500DUE-SFR1_6870C-0452A

SM4053B_LG T-CON Board_6870C-0488A

SW508A_LG T-CON Board_6870C-0480A

TPS65168_LG Panel with T-CON_6870C-0369C_VER0.2

TPS65175A_LG T-CON Board_6870C-0471D

TPS65178A_LG Panel with T-CON_6870C-0401B

ATTENTION:

This is very important! Before you do the write/programming programmable IC, you MUST first to “COPY” and save their original data/firmware into your computer/laptop. After that, you can write a new data/firmware into the programmable IC.

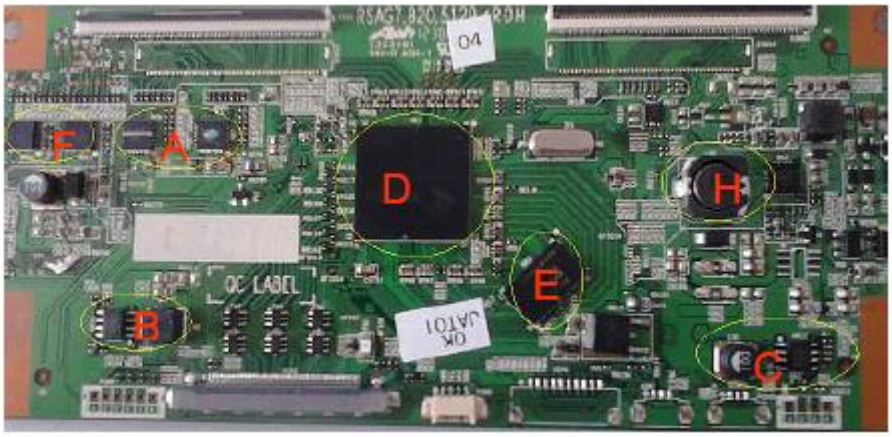
Also find the data/firmware with correct programmable IC part number, T-CON Board p/n and same “Inches” of the LCD/LED Panel (or model).

Troubleshooting & Repairing Hisense RSAG7.820.5129 T-CON Board

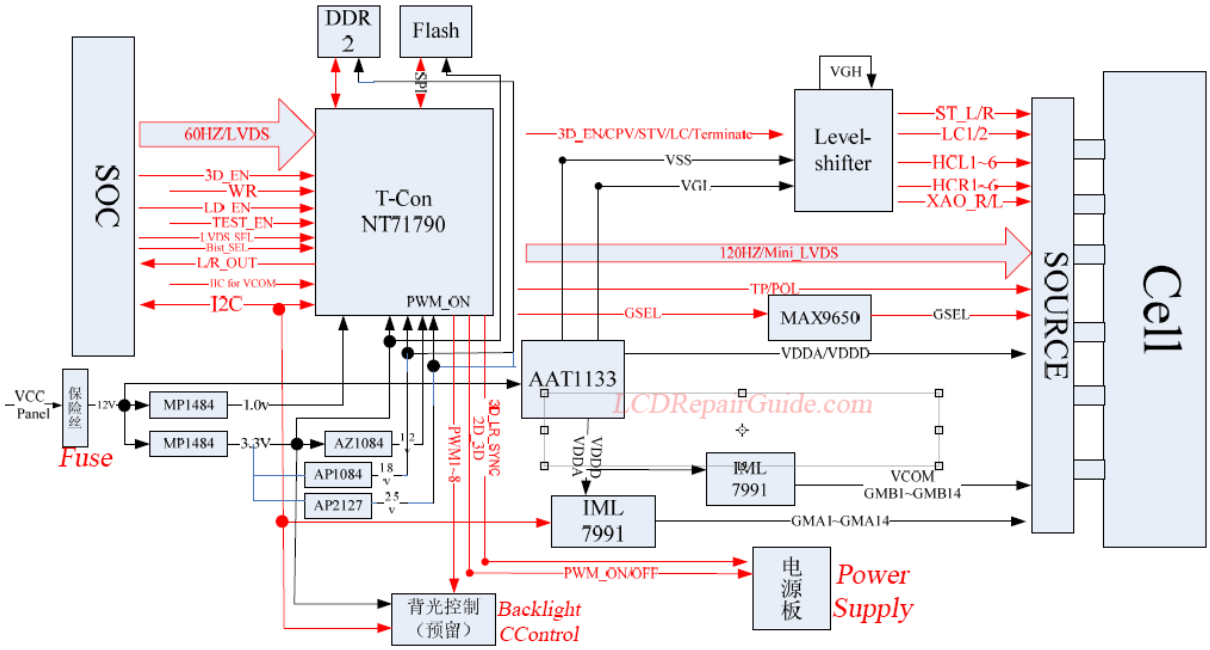
This T-CON board schematic diagram was included in this ebook. The RSAG7.820.5129 T-CON board is widely used in these HISENSE TV Model:

HE390GF-B51, HE460HFR-B51, HE500HF-B52 and HE500HFR-B52.

All the above TV is using this T-CON board, but their program/firmware is different only.



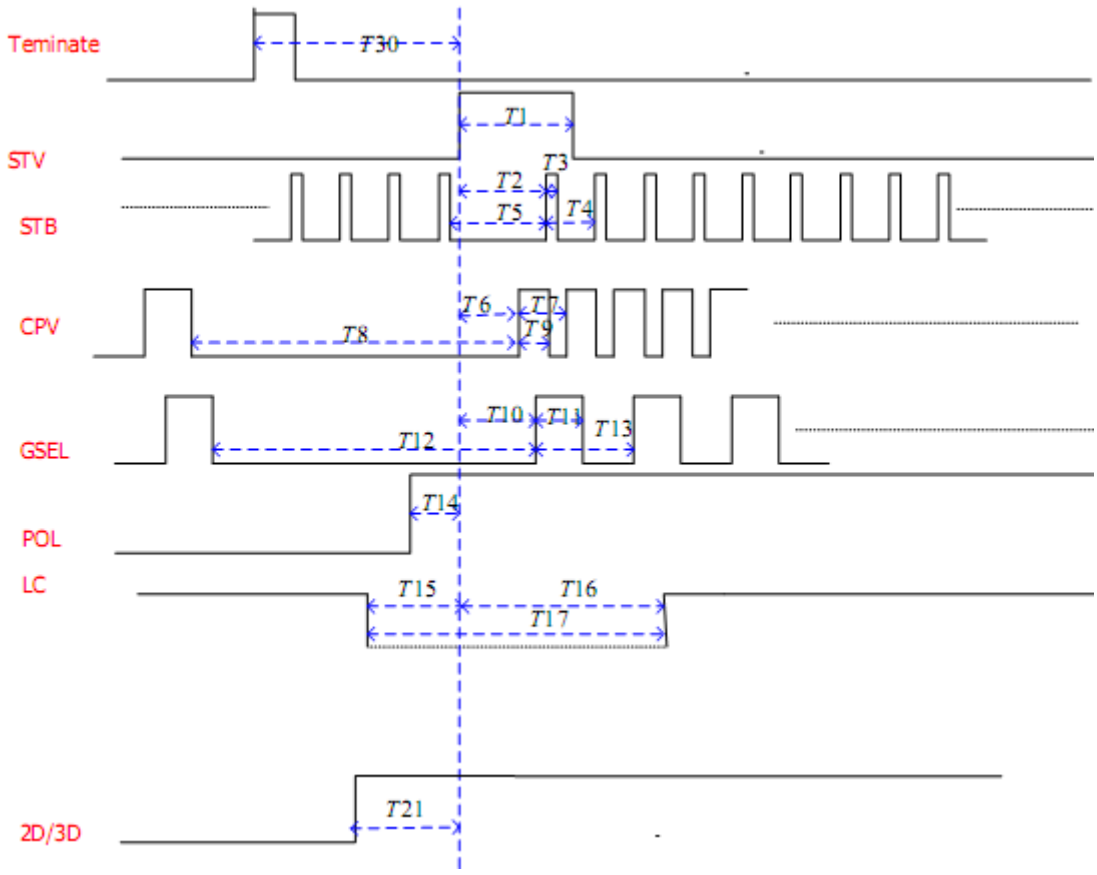
T-CON Board Circuit Structure



Test Point	Voltage (V)	Test Point	Voltage (V)	Test Point	Voltage (V)
1.2V	1.1~1.3	GMA1	15.1~15.4	GMB1	14.5~14.9
1.8V	1.7~1.9	GMA2	13.4~13.7	GMB2	12.4~12.8
3.3V	3.2~3.4	GMA3	11.8~12.1	GMB3	11.7~12.1
1V	0.9~1.1	GMA4	11.4~11.7	GMB4	10.6~11.0
2.5V	2.4 ~2.6	GMA5	10.7~11.0	GMB5	10.3~10.6
VGH	28 ~ 31	GMA6	8.7~9.0	GMB6	9.8~10.2
VGL	-9.0~ -10.0	GMA7	7.6~7.9	GMB7	7.4~7.8
VSS	-6.0~ -7.0	GMA8	7.0~7.3	GMB8	6.3~6.8
AVDD1	15.5~16.0	GMA9	6.8~7.1	GMB9	4.8~5.2
VDDD1	3.2~3.4	GMA10	4.8~5.1	GMB10	4.4~4.7
VCOM	6.2~6.8	GMA11	4.0~4.3	GMB11	4.0~4.4
		GMA12	3.5~3.9	GMB12	2.8~3.2
		GMA13	2.0~2.3	GMB13	2.2~2.5
		GMA14	0.6~0.9	GMB14	0.3~0.8

Panel Control Signals & Mini-LVDS Timing Chart Waveform

Timing Control Waveform:



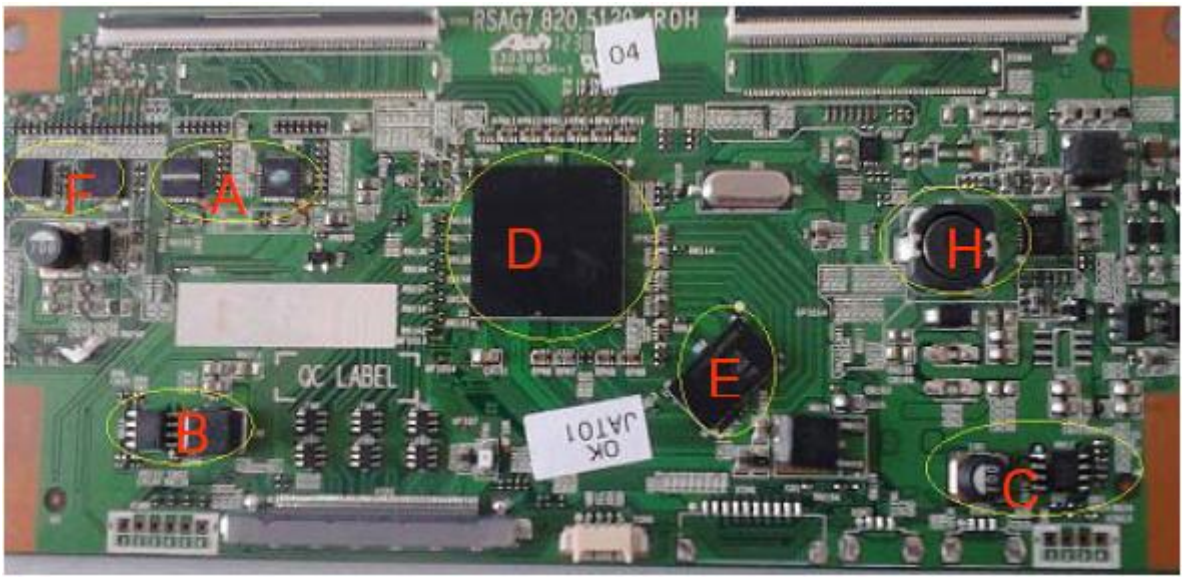
Control Signals DC Voltage Range

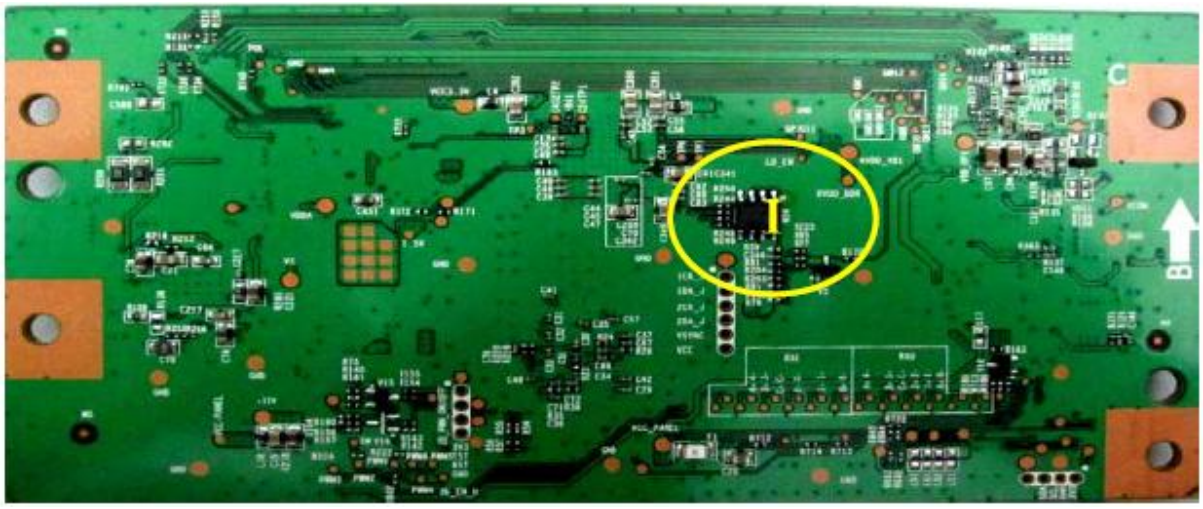
Control Signal	PCB Marking	DC Voltage (V)
STV	GSP	0.002 ~ 0.3
TP	SOE	0.2 ~ 0.5
DATA	-	1.0 ~ 1.5
POL	POL	1.2 ~ 1.9
CPV	GSC	0.15 ~ 0.5
LC	LC	2 ~ 3

Critical T-CON Board Output Voltage Values

Test Point	Standard Values (V)	Voltage Tolerance
VCC_PANEL	12	±1.2V
1.8V	1.8	±0.1V
3.3V	3.3	±0.15V
AVDDA1	15.8	±0.25V
VGH	29	±1.0V
VDDD	3.3	±0.15V
VGL	-5.8	±0.5V

RSAG7.820.5129 T-CON Board Module Features

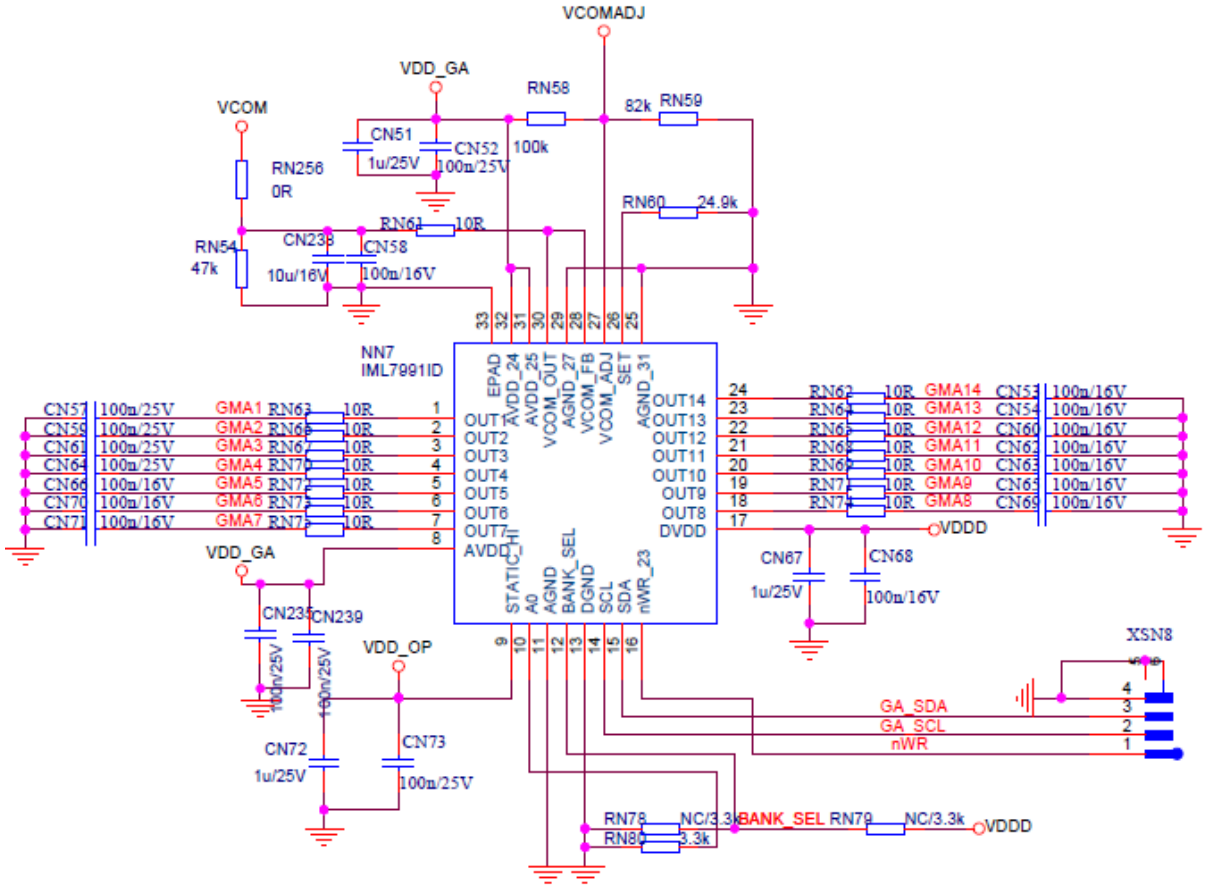




Module	Features	Location	Testing Point
A. Gamma Circuit	Generate GM1~GM14 & VCOM voltage	NN7 (IML7991D)	GMA1~GMA14\ VCOM
B. DC-DC	Generate 1.0V	NN14 (MP1484)	1.33V
C. DC-DC	Generate 3.3V	NN12 (MP1484)	3.3V
D. NT71790	T-CON IC	NN1	
E. DDR	DDR buffer	NN2	
F. Level Shifter	Gate driving signals	NN19 (RT8922)	HC_L1~ HC_L6
I. Flash	Memory save T-CON firmware	N24 or NN5 (25B40 or F40)	

Introduce Module Features & Their Common Faults in T-CON

1) Module -A => Generate the Gamma & VCOM voltage



Common Fault:

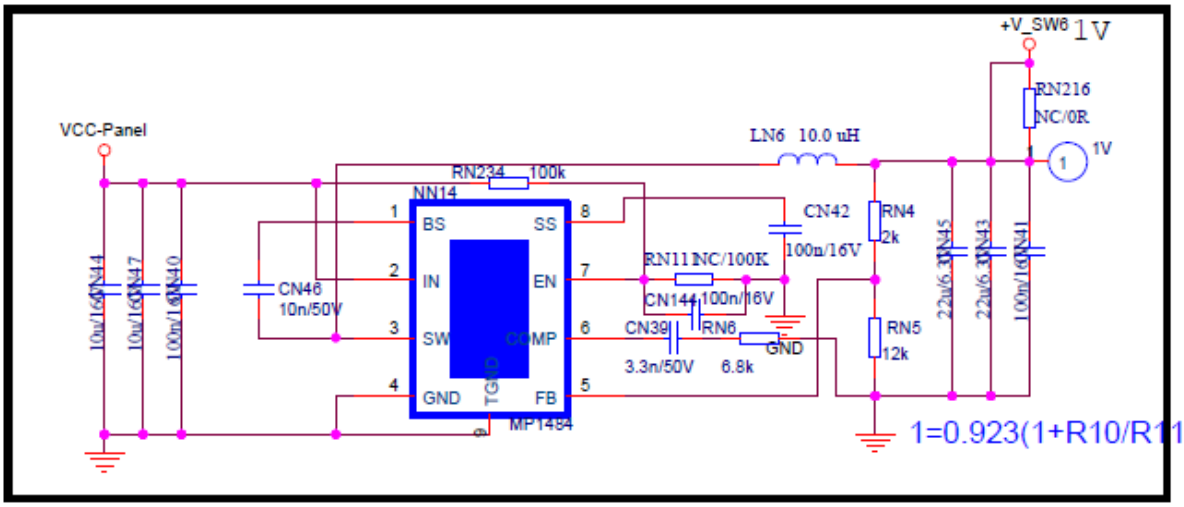
a) White Screen:
Because the VCOM voltage abnormal or NN7 failure.

b) Display compares to normal display more darkness:
One or more of their Gamma voltages is 0V. First check the VDD_OP1 is it in 15.85 ±0.2V normal voltage range. If yes, then check the VCOM & GM1~GM14. If their voltage is 0V, that's mean the problem is NN7 failure.

c) Left or Right side of the Screen their display darkness.

2) Module-B => 12V convert to 1.0V

This module provides the 1.0V core voltage to T-CON IC.



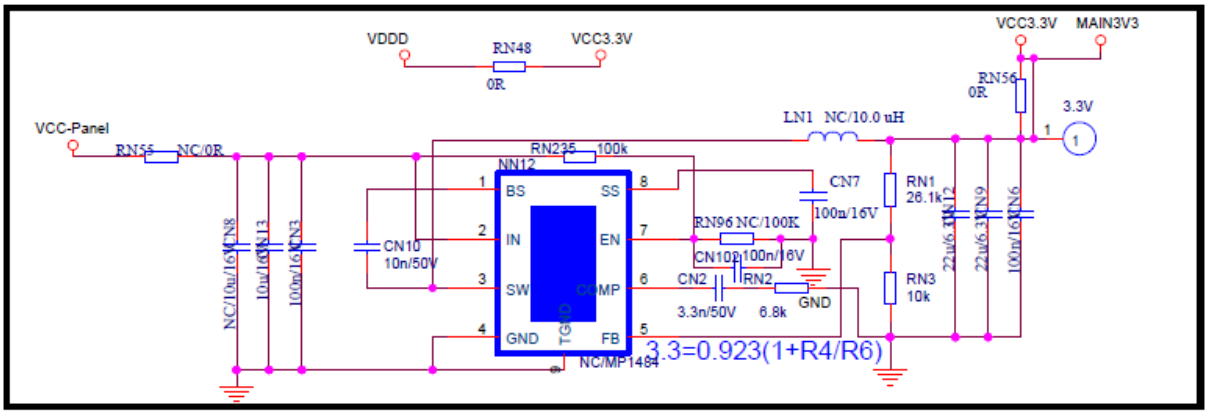
Common Fault:

a) 1.0V no voltage:
Normally is their NN14 dry solder joint or failure or RN234 & CN144 damage.

b) 1.0V voltage out of their normal tolerance range:
Normally is causing by the CN39 or RN6 failure.

3) Module-C => 12V convert to 3.3 Voltage Module

This module provides the T-CON board 3.3V



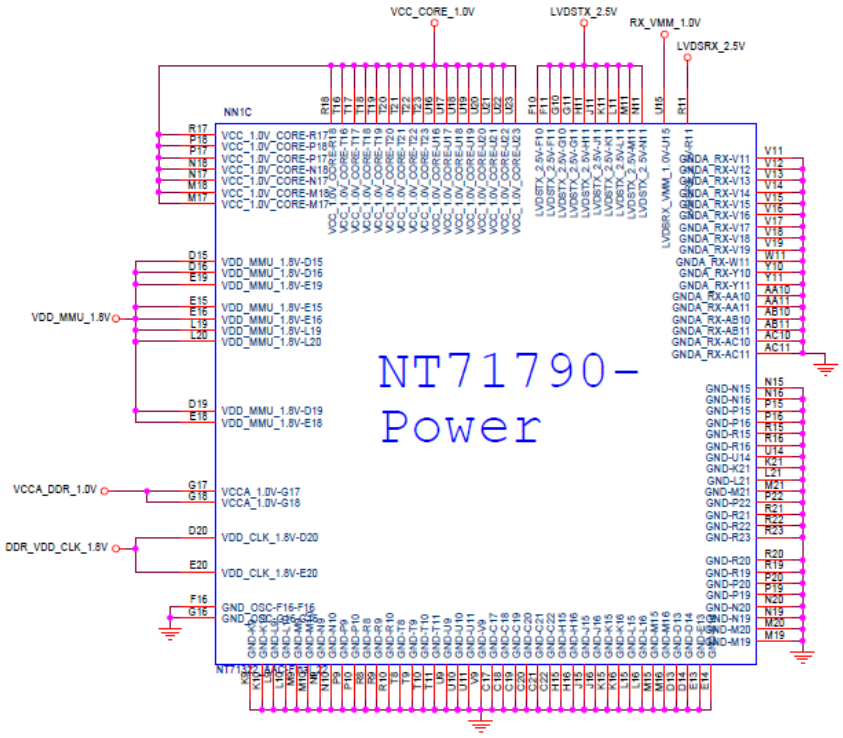
Common Fault:

a) No 3.3V:
It could be their NN12 dry solder joint, RN235 & CN102 failure.

b) 3.3V Voltage out of the normal range:
Commonly it's their CN2 or RN2 failure.

4) Module D & E => Is T-CON IC and DDR buffer IC.

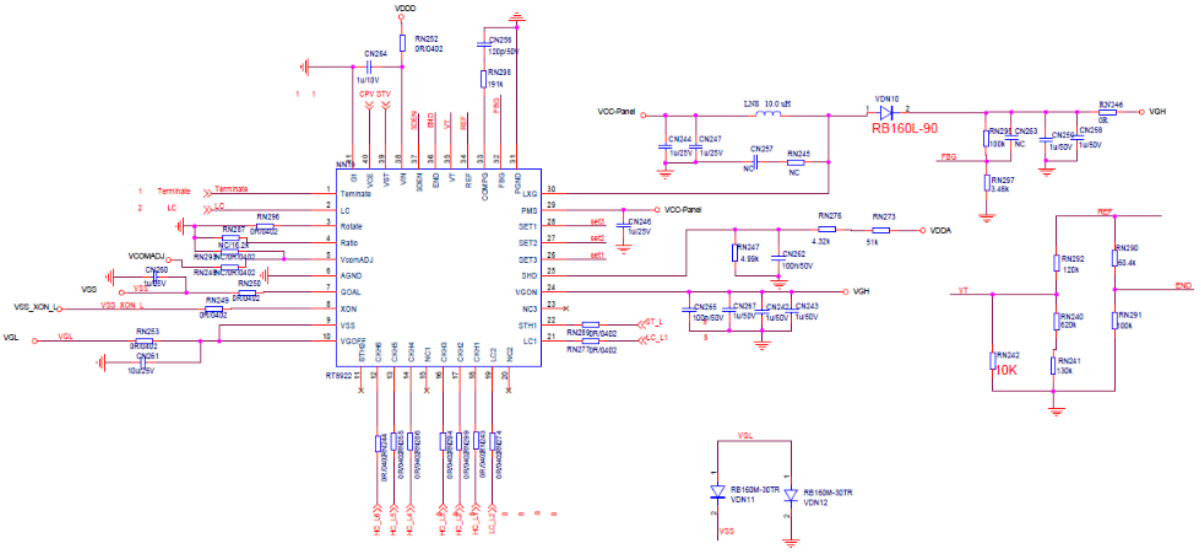
T-CON IC



Common Fault:

a) NN1 dry solder joint
b) IC NN1 & NN2 chip defective

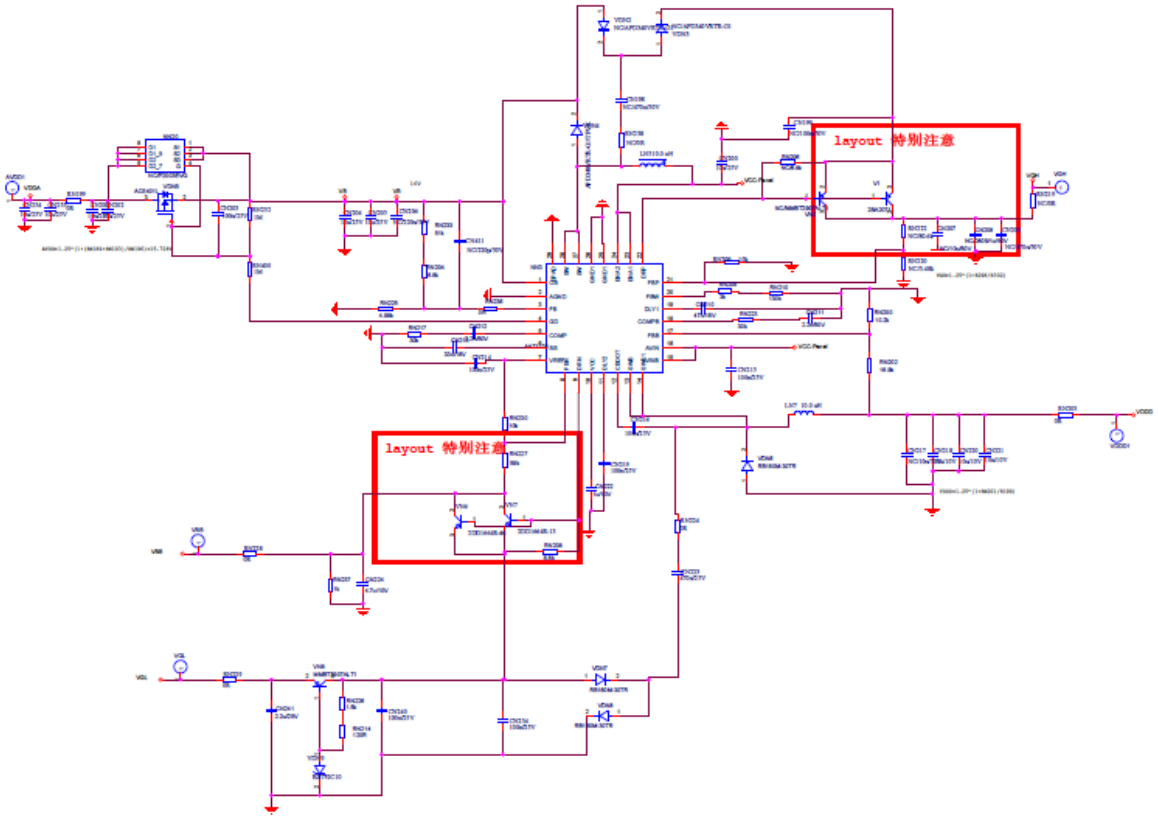
5) Module-F => GOA Signal Control IC



How to know this IC is working or not?

Use multimeter/voltmeter to measure the LC_L1 point, if the voltage range is in between 25V and -6V change, that's mean this IC is working normally. If not, then this IC is abnormal.

6) Module-H => Panel Voltage Generated Circuit (VDDD/AVDDA1/VGL)

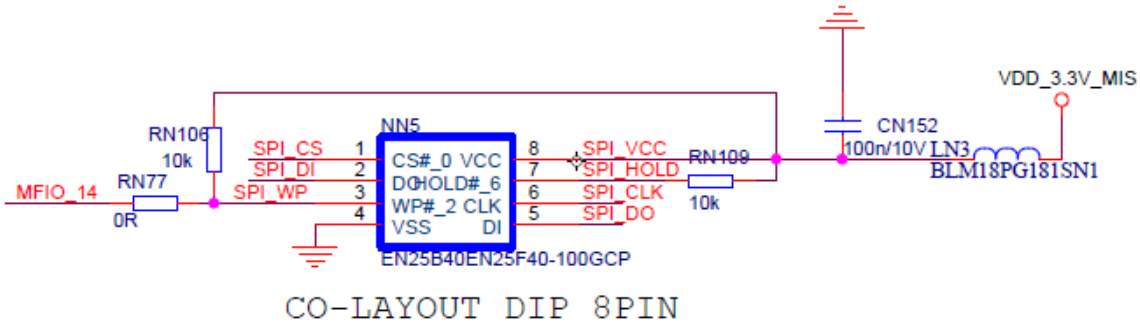


Common Fault:

a) VDDD/VDDA/VGL no output voltage. The TV screen is no display but the backlight is lit:
NN3 IC damage causes the VDDD/VDDA/VGL no output voltage. Check the NN3 pin-15 & 16 both pins is it short circuit. If yes, that's mean the IC NN3 is damage and need to replace.

b) When connect to Panel, the inductor noisy, screen display has horizontal line interference:
Normally it is the CN212 failure.

7) Module-I => Flash Memory to save the T-CON IC Firmware



Common Fault:

a) Flash memory NN5 failure
Will affect screen no display (but the backlight is lit).

b) NN5 IC lost firmware
Will affect screen no display (but the backlight is lit).

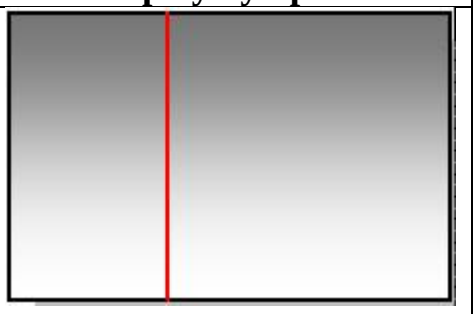
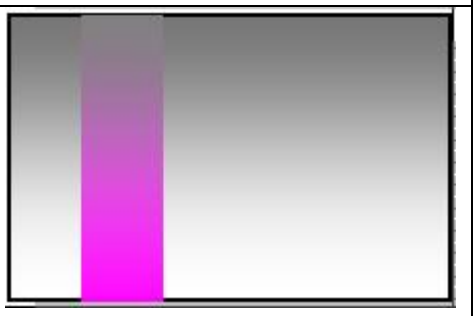
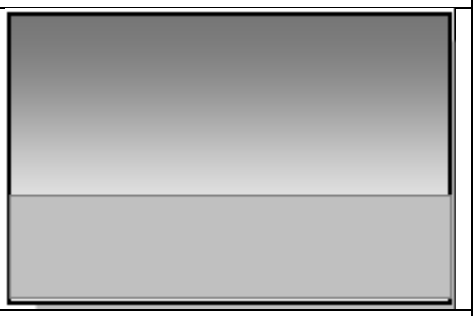
Other Common Faults in this T-CON Board

1) Dry Soldering Joint or Pins Shorted

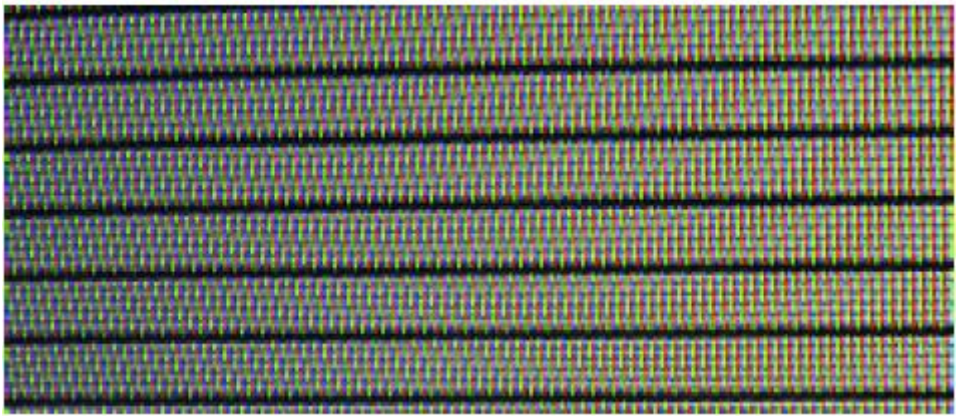
Display Symptom	Problem Location	Failure Reason
Left side screen no display or abnormal display		XSN3 connector dry solder joint
Right side screen no display or abnormal display		XSNN4 connector pins shorted
Left side screen abnormal display		NN19 or NN21 dry solder joint
Display Grey Scale abnormal		NN1 damage

2) Gate/Source COF Problem (Glass Cell Problem)

This type of screen problem is not repairable, unless you've TAB bonding machine. If their ITO line/s defective inside the screen glass then this type of problem is beyond repair.

Description	Display Symptom
Vertical Line	
Horizontal Line	
Vertical Block/Bar	
Horizontal Block/Bar	

3) GOA Horizontal Lines on the screen



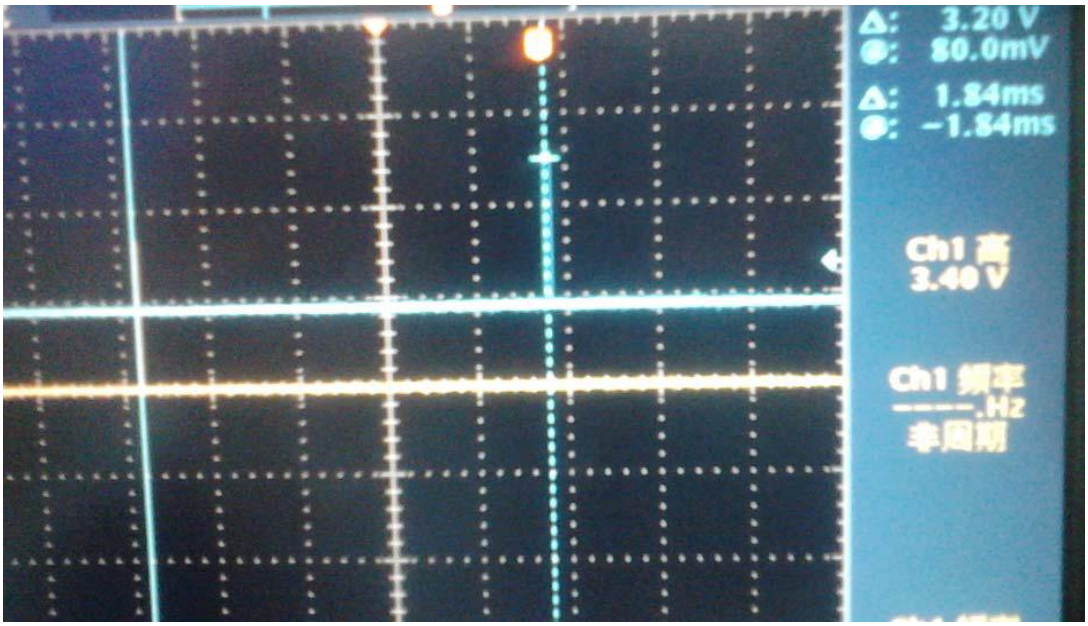
This GOA horizontal line evenly spaced (vertical 6 pixels). The Panel itself defective or the T-CON board Module-F (NN19 or NN21- RT8922) failure also can causing this type of screen problem.

Check the IC NN19 or NN21 pins have dry soldering joint or not. If soldering ok and just replace this IC.

4) The bottom of Screen have some horizontal line/s jumping

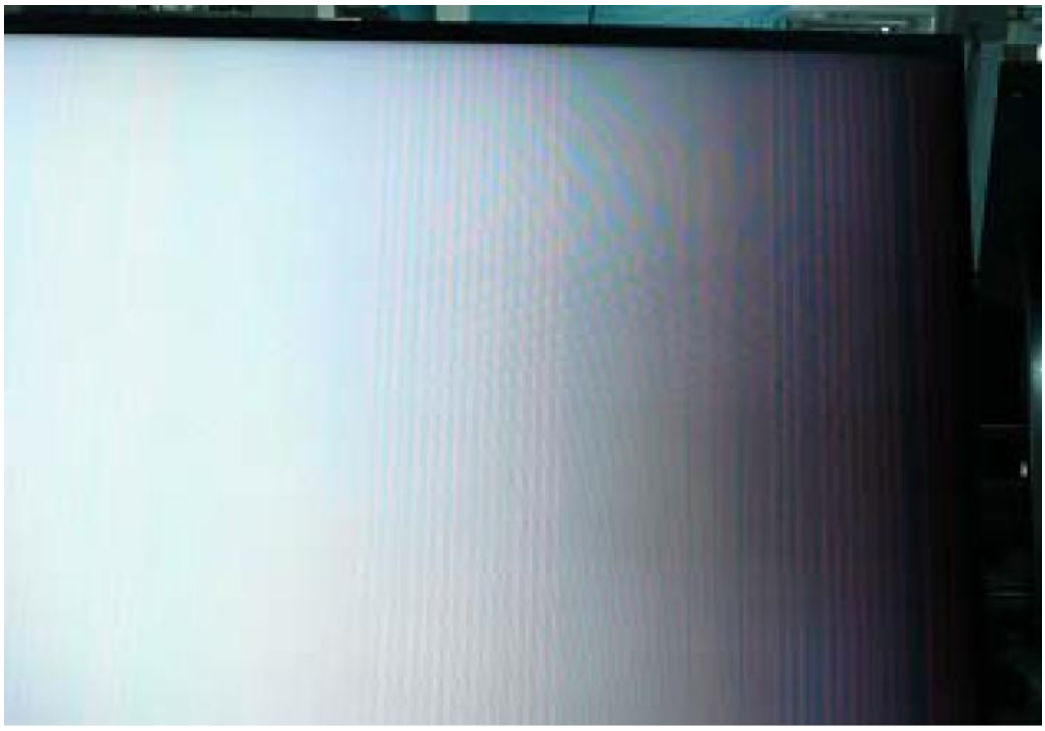
When the TV is in PC25 or HDMI mode, the screen bottom display has horizontal line/s (1 or 2 lines) jumping. But in other TV Mode, the screen is normal.

This is because of the TV when in high density signals, their LVDS output signals is not standard type. And causing the T-CON IC output TE & STV signals time interval is 1.84ms (~1840us), but the original design is requirement is 147us! Use the oscilloscope to check the STV and TE signals and found like picture below:



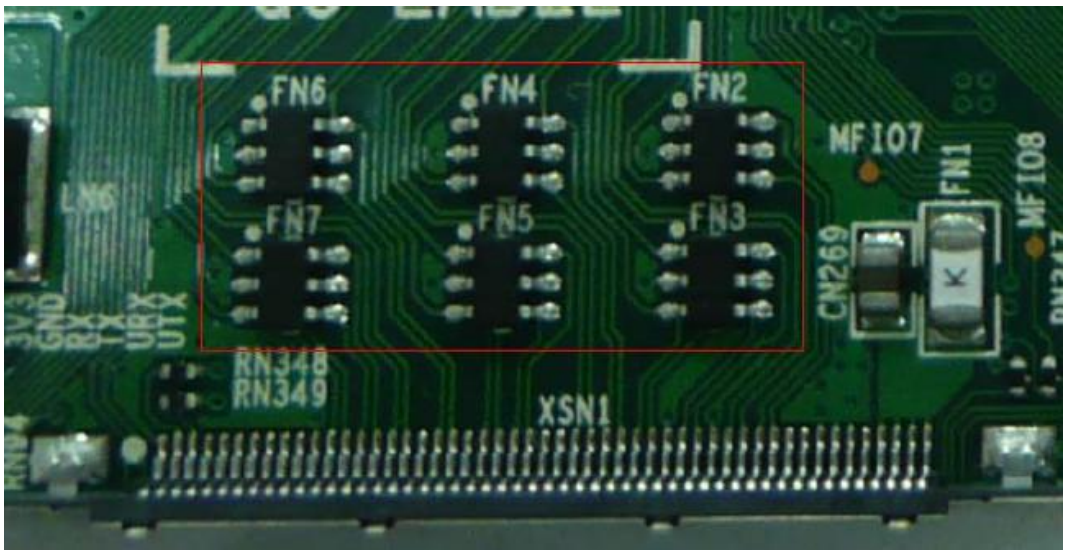
So the solution to solve this problem is updating the NN5 IC firmware to the latest version of LCM_T-TP_161240_B007.

5) Display Grey Scale Abnormal



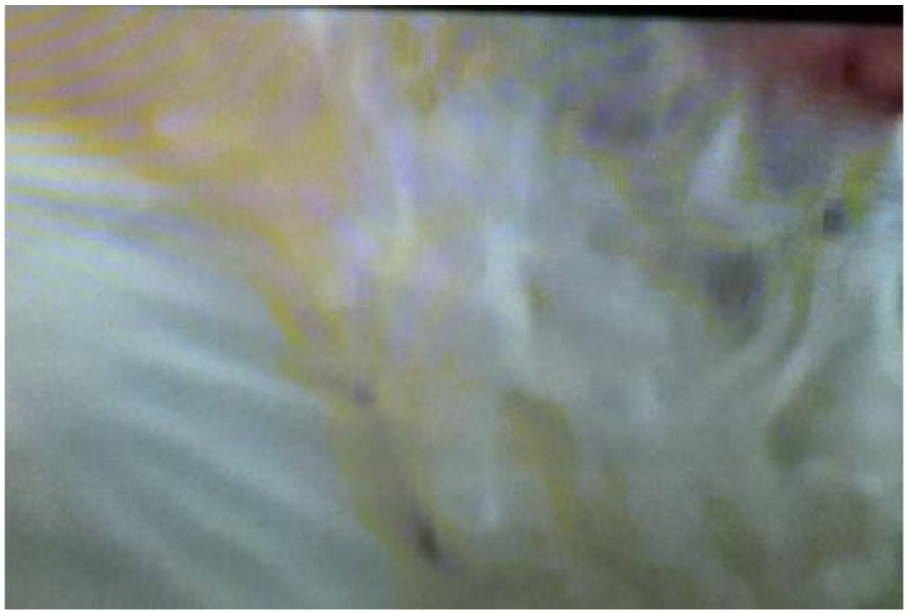
Mostly, this type of screen problem is causing by the T-CON IC, Especially the production before 1240, their T-CON IC is the common fault.

6) **After Power On TV, Screen will show the Red, Green & Blue Display Non-stop Testing Mode**



Normally this problem is causing by their TVS (FN2/FN3/FN4/FN5/FN6) damage. Use the Multimeter testing this TVS, is the ohm values to GND is lower than 1K ohm, that's mean this TVS is damage by ESD already. Need to replace it with a good one. Or you can just remove this damage TVS and without connect anything, power on the TV. The TV should be ok now!

7) **Display Abnormal in DTV Mode**



This problem is causing by the T-CON IC NT71790. Especially the T-CON Board production batch before 1240.

8) No Display/ Grey Display (Backlight Lit)

a) The PMU circuit abnormal (Module H), NN3 (AAT1133) abnormal and causing the VDDD/AVDDA1/VGL no output or output abnormal voltages. Replace NN3 IC.
b) Gamma circuit abnormal (Module-A). If Gamma IC output voltage abnormal, the output voltage range is about 6.7V~ 7.0V. Replace Gamma IC (iML7991D).
c) NN1 dry soldering joint inside the bottom of this T-CON IC. Because of this IC is BGA package type, so we can use the oscilloscope to check their STV, LC, TP, POL & etc control signals waveform to confirm the T-CON IC is ok or not. If these signals got output, then this IC is Ok, if not, then it is T-CON IC failure.

LCD/LED TV Display Problem Repair Tips

1) TV Model: Changhong LT32710 LCD TV

T-CON Board: T-con (CHIMEI) section was built-in TV Mainboard

Mainboard Chassis: LS23

Symptom:

Screen Fully of Vertical Color Bars

Repair/Solution:

This LCD TV T-CON section was built-in the TV Mainboard. Check their T-con section each output voltages from U26: TPS65161 (DC-DC IC) and found their VDD25 output voltage is just 1.36V only. Normally this VDD voltage should be 2.5V.

This VDD 2.5V was generate by DC-DC IC U26 pin-18 through D55, L24, CA44 filter and get VDD 2.5V. After that the R339, R348 and R272 is the VDD sampling resistors and feedback to U26 pin-15 to control the VDD voltage output. After checking these component and found the R348 (24K ohm 1%)

ohm values increase to 40K ohm! Replace this resistor and the VDD output voltage is back to normal 2.5V. Finally this TV screen problem solved!

2) TV Model: Changhong LT37710 LCD TV

Mainboard Chassis: LS23

Panel Model: LG Panel

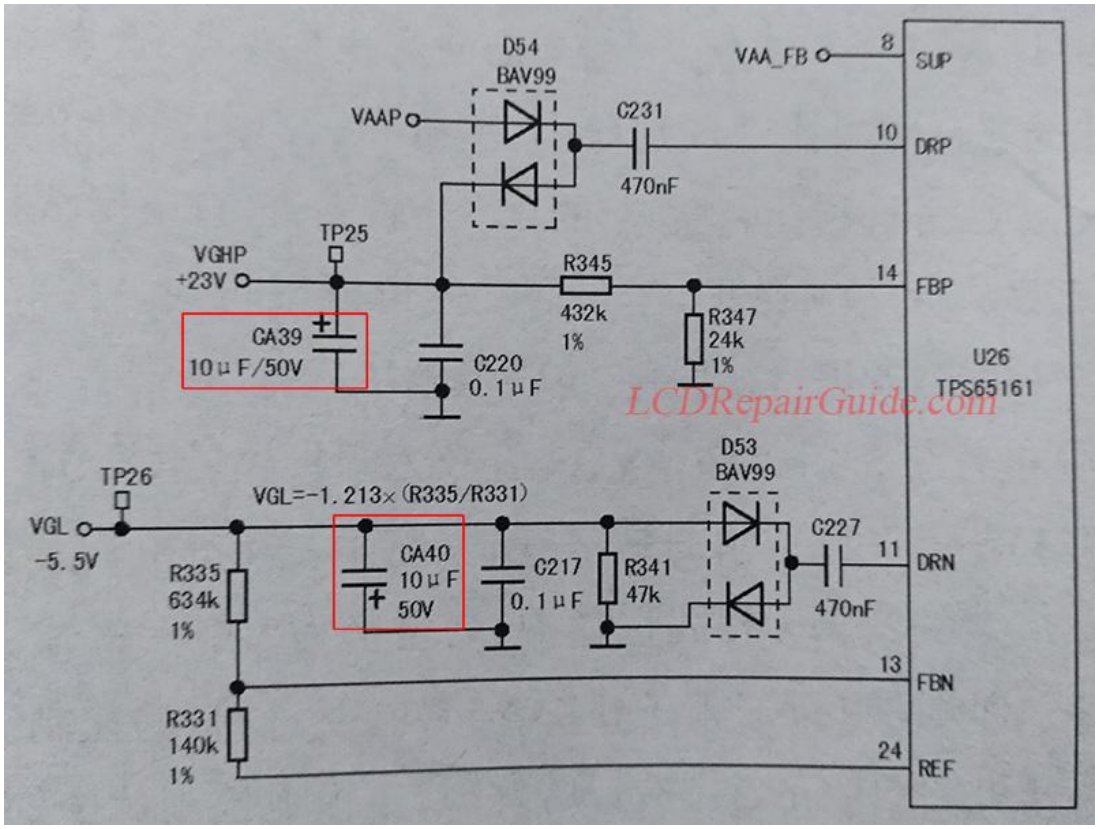
Symptom:

Display is not clear and slow motion problem.

Repair/Solution:

As usual, first check their T-con board each output voltages from DC-DC circuit. The Vin, VDD and VDA are all normal. But the VGHP is: 15.5V (normal is 23V) and VGL: -3.4V (normal is -5.5V).

These two voltage lines are generating by U26 DC-DC IC (TPS65161) pins-11, 13, 24 and pins-8, 10, 14.



The U26 IC pins-11, 13 & 24 generating the VGL voltage output, the pins-8, 10, 14 is generating the VGH voltage output. Check their corresponding components all looks good. Suspect their filter capacitor lost their capacitance and causing this TV screen problem.

Parallel connect with a 10uF/50V electrolytic capacitor to CA39 and another one to C40. Power on the TV and problem solved!

Removed the CA39 and CA40 found one of its capacitance was drop to 2uF and another one is totally opened circuit!

3) TV Model: Changhong LED46760 LED TV

T-CON Board: A60MB4C2V0.2 (same as A60HM01C2LV0 use LTA460HM04 Panel)

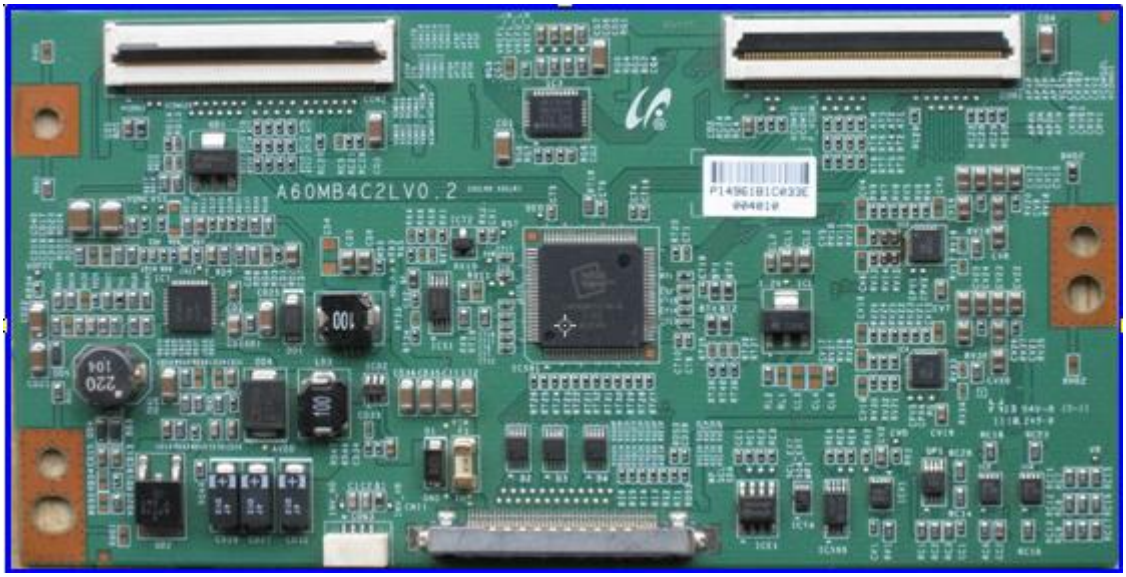
Panel Model: LTA460HM04

Symptom:

Display full of horizontal lines with bright and dark flashing. It also can see some irregular vertical bars.

Repair/Solution:

This TV backlight is steady lit and no any flashing. Use the LCD/LED Panel Tester check and found that's the LCD Panel or T-CON board problem. This TV Panel T-con board is using the A60MB4C2LV0.2 like picture below:



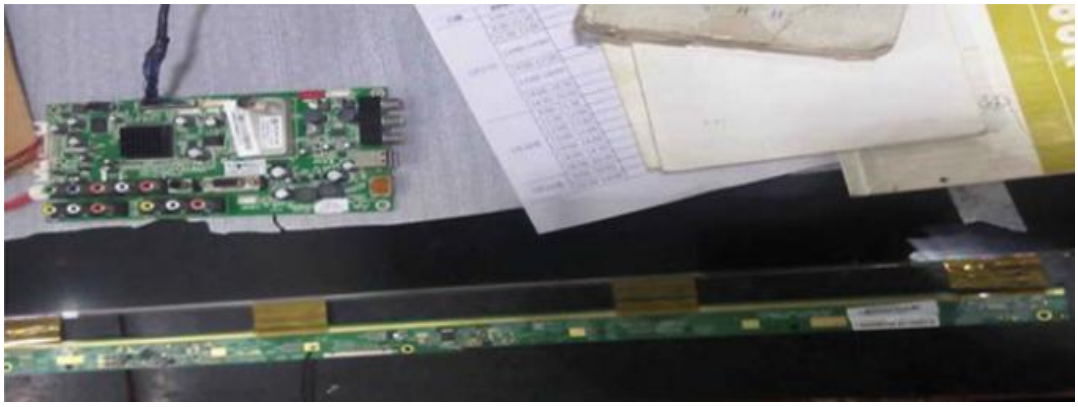
Check the T-con board voltage: VCC: 12V, VDD: 3.3V, Vcore: 1.2V, AVDD: jumping in between 7V~14.5V (normal is 15V), VOFF: 0V (normal is -5V~ -8V), the other VSS and VON also abnormal voltage reading. Remove the both FPC cables and power on the TV. The AVDD & VOFF voltages still same problem. So confirm the problem was on the T-CON board. Check each output voltage lines with their ohm values and found the VOFF line a bit low.

First check and measure the VOFF line corresponding components. When removed the filter cap, CD21 capacitor, all their voltage back to normal now! Measure CD21 and found it has 0.5uF only, the original values is 4.7uF. Replace a good CD21 capacitor, the T-CON each output voltages are back to normal as: AVDD: 148V, VOFF: -11V, VSS: -7.4V, VON: 27.6V. Reconnect back the both FPC cables and power on the TV, everything is ok now.

4) TV Model: Haier LE32A700, LE32A720, LE32A910, LH32E10 LED TV

T-CON Board: HV320WXC-200-X-PCB-X0.0

Panel Model: H320EHC-BB2, H320HC-YB30



Symptom:

No Display, Grey Screen

Repair/Solution:

The TV backlight is lit normally. Check their T-CON board and this PCB board was built-in the Panel glass. Found the VGH voltage line is 0V only! Continue to check their corresponding components especially smd filter capacitor C240, C241, C242, C243 & D2. Found the C240 shorted circuit. After replace with a good SMD capacitor, the TV is back to normal now.

Note: VGH voltage abnormal, commonly was causing by MOSFET opened circuit, capacitor shorted/leakage or shorted DC-DCIC.

BOE HV320WXC-200 T-CON Board Testing Points Voltage

Test Point	Voltage	Test Point	Voltage
VDDIN	12V	V2	15.2V
VCOM	7.41V	V3	13.2V
VGH	26.1V	V4	12.5V
VOFF	-7.9V	V5	11.7V
DVDD	3.28V	V6	10.7V
XAO	3.28V	V7	10.2V
VON	24.3V	V8	8.5V
OUT3078	7.7V	V10	7.5V
TP	0.2V	V11	6.5V
POL	1.6V	V12	5.3V
CPV	1.5V	V13	4.7V
SDA	2.1V	V14	3.8V
SCL	2.1V	V16	2.2V
LV0N	1.6V	V18	0.02V
LV0P	1.0V		
LV1N	1.5V		
LV1P	1.1V		
LV2N	1.2V		
LV2P	1.3V		
LCXN	1.3V		
LCKP	1.3V		
LV3N	1.4V		
LV3P	1.1V		

5) TV Model: Haier LE32A700, LE32A720, LE32A910, LH32E10 LED TV

T-CON Board: HV320WXC-200-X-PCB-X0.0

Panel Model: H320EHC-BB2, H320HC-YB30

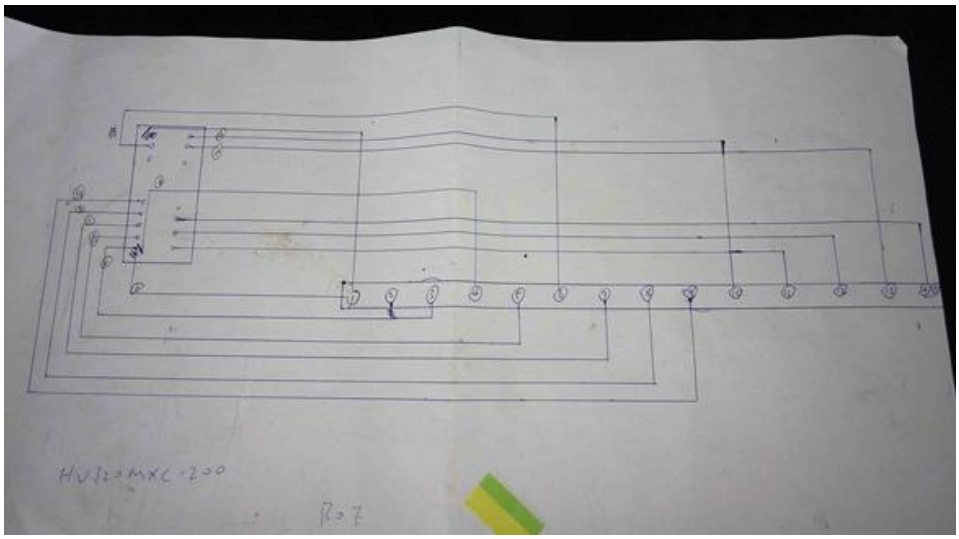
Symptom:

Display White Screen or Blue Screen without any characters on screen.

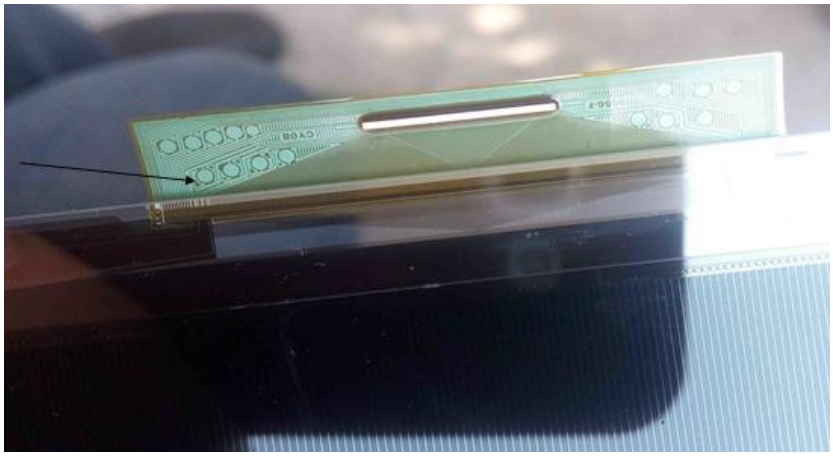
Repair/Solution:

Most of the time this model of Panel come with the problem mention the above is causing by abnormal VGH voltage in VGH line. So first step is check the VGH line until the X-COF contact pin there still has the VGH: 27V. After that check their first Gate COF and found VGH voltage missing.

For Gate COF: 8659-F



The Gate COF VGH point missing their voltage here:



Just connect a wire from T-CON Board VGH voltage line to this COF VGH point. The TV Panel is back to normal now.

For Gate COF: 8659-M

6) TV Model: Haier LE48A5000, LE48M6000, LE48AL88 & LH48UH3200 LED TV

T-CON Board: Samsung 13NVB_S60TMB4C4LV0.0

Panel Model:

Symptom:

Various problems occur in this T-CON Board.

Repair/Solution:

Because of their SMD filter capacitors often have leakage or shorted circuit on the T-CON Board.

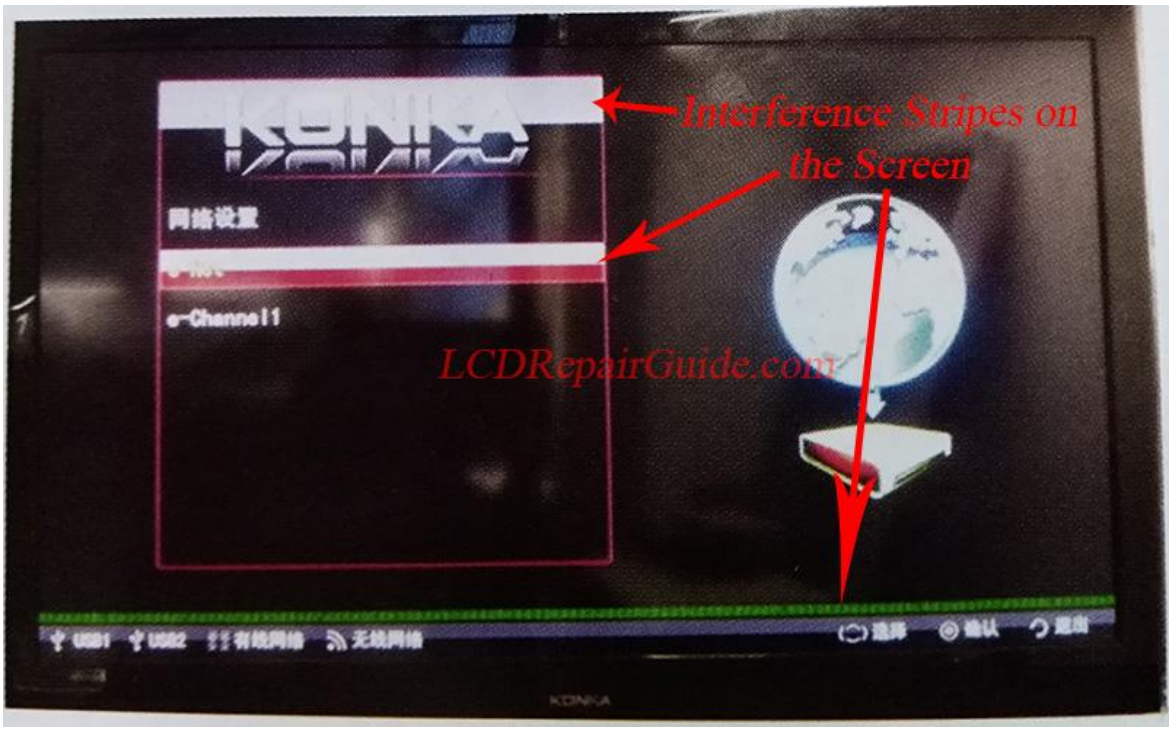
7) TV Model: Konka LED42R7000PD LED TV

T-CON Board:

Panel Model:

Symptom:

Interference Stripes on the Screen



Repair/Solution:

Use the LCD/LED Panel Tester to testing it and found their screen Panel is ok. So the problem is on the Mainboard. The sound and the other features are working properly.

Check their Mainboard LVDS connector output signals with oscilloscope and found several pairs of video signals is missing. Suspect the LVDS connector (XS501) pins dry solder joint problem.

Re-solder all the connector pins, but stills same problem. Trace it back these signal lines until the Main Chip N501 (MSD6I982BX). Again, re-solder the N501 video signals output pins. After finished re-solder (reflow) the N501, this TV is ok now.

8) TV Model: Skyworth 32L08HR LCD TV

T-CON Board: V315B3-L01REV.C1

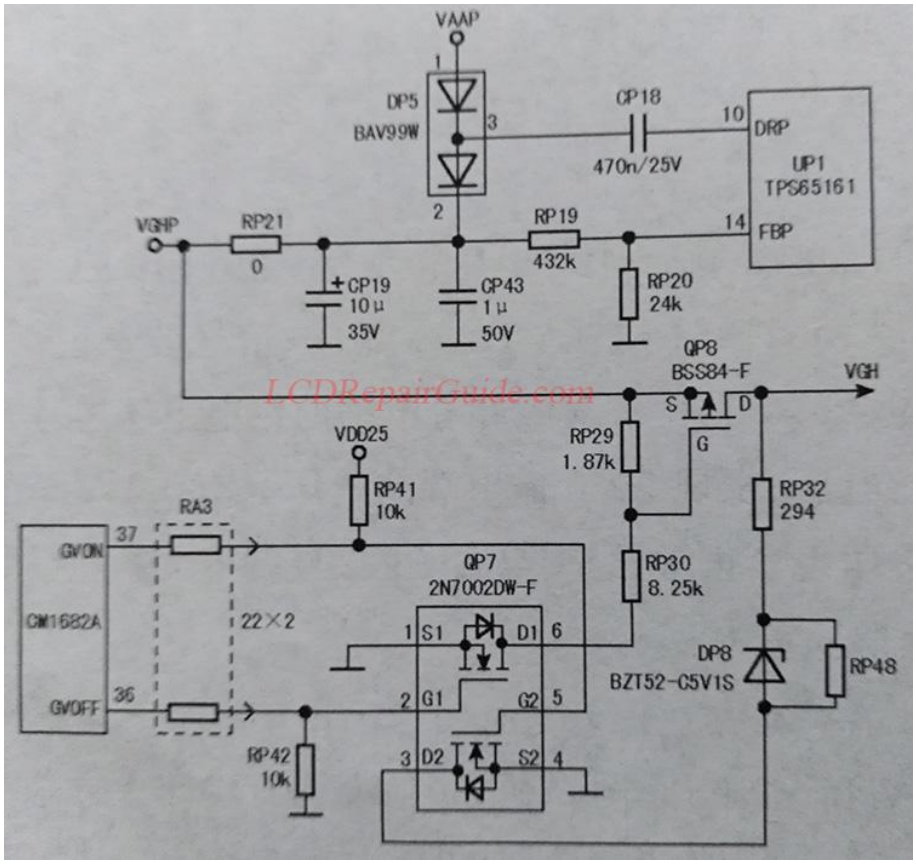
Panel Model:

Symptom:

Display become white screen and has some vertical bars. After a while, the vertical bars will slowly increase their quantity. Their vertical bars are not fixed and it will change randomly.

Repair/Solution:

Use the LCD/LED Panel Tester testing it and found the problem is on the T-CON or Panel. Check the T-CON board each output voltages, and found the VGH is just has 0.44V only! So the problem is on the VGH voltage line.



The VGH voltage is output from the P-Channel MOSFET QP8 pin-D (Drain). Check the QP8 pin-S (Source) has 22.3V and it is normal. From the above schematic diagram, the QP8 pin-G (Gate) is control by QP7 (2N7002DW, 2 x N-Channel MOSFET 6-pins SMD and marking code is: 702).

Check the QP7 pin-2 has 2.45V, but QP7 pin-6 has 22.1V! So suspect the QP7 one of the N-Channel MOSFET has opened circuit. Solder a wire from QP7 pin-6 to GND and then power on the TV. All the vertical bars are gone and the TV display back to normal now. So confirm the problem is QP7 one of their MOSFET was opened circuit. Because this QP7 6-pin SMD type is not available in my stock, so just use a normal 3-pin N-Channel SMD 2N7002 solder to the correct pins. Finally this problem solved!

Note: This T-CON board their VGHP voltage line filter capacitor CP19 or CP43, when its leakage, it will pull it down 2~3V of the VGHP voltage. And generate the same display problem like the above TV screen problem too.

Complete Flat Screen TV Troubleshooting & Repairing Ebooks:

Please visit to: http://www.LCDRepairGuide.com

*For searching the training manuals, service manuals or schematic diagram, please join the LED/LCD Television repair membership, highly recommended:

Http://www.LCD-Television-Repair.com

Please visit the Resources Page to get more useful repairing information at:

http://www.lcd-television-repair.com/newsletter/Recommend.html

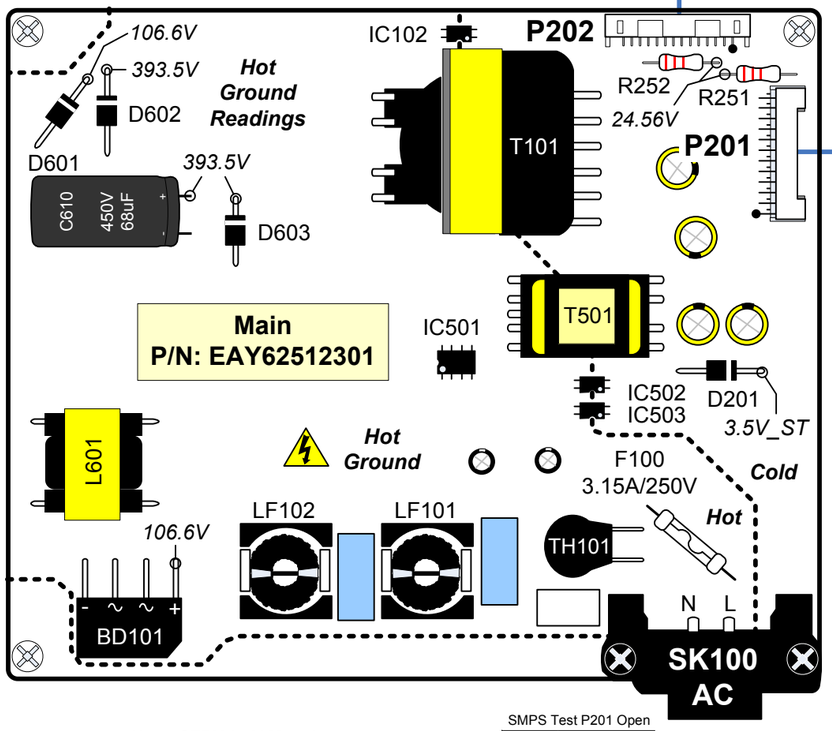
Bonus-A

LG OLED/LED/LCD TV Interconnect Schematic Diagrams

T-Con Board Schematic/Circuit Diagrams

32LS3500 INTERCONNECT DIAGRAM

(1) **PWR_ON** Pin 1: Turns on 12V, 24V to the Main and 24V to the LED Driver board.
(2) **INV_ON** Pin 18: Turns on the Backlights. (Special Note: This set turns on the backlights with only PWR_ON arriving. INV_ON is not needed).
(3) **ERROR_OUT** Pin 24: Is not used
(4) **A_DIM** Pin 20: Is not used (Fixed Voltage).
(5) **P_DIM** Pin 22 can vary according to incoming video IRE level and OSD Backlight setting Output from the Video Processor IC100. Range 0.22V to 3.22V.



P201 Jumper Test 1

Note: STBY 3.5V Must be present when AC applied.

SMPS TEST 1 : Forcing SMPS On.
Remove AC Power.
Disconnect P401 on Main Board.
Jump pin 1 (PWR_ON) to pin 9, 10, 11 or 12 .
Apply AC Power. This should force the SMPS to the on state. All Voltages should be produced. (24V and 12V to Main, 24V to the Backlight LED Driver Board). 41V Backlight Power.
Backlights are on.
Disconnect AC Power.

SMPS Test P201 Open

Pin	No Load
24	0.0V
23	n/c
22	3.54V
21	12.34V
20	0V
19	12.34V
18	3.41V
17	12.34V
13-16	Gnd
9-12	3.54V
5-8	Gnd
2-4	24.35V
1	3.54V

P201 "SMPS Board" To P401 "MAIN Board"

PIN	LABEL	STBY	RUN	Diode
24	ERROR	0V	0V	OL
23	n/c	n/c	n/c	OL
22	P_DIM	0V	*0.22V-3.22V	OL
21	12V	0V	12.15V	1.37V
20	A_DIM	0V	0V	OL
19	12V	0V	12.15V	1.37V
18	INV_ON	0V	3.41V	OL
17	12V	0V	12.15V	1.37V
16	n/c	n/c	n/c	OL
13-15	Gnd	Gnd	Gnd	Gnd
9-12	3.5V (Stby)	3.55V	3.51V	2.63V
5-8	Gnd	Gnd	Gnd	Gnd
2-4	24V	0V	24.56V	1.05V
1	PWR_ON	0V	3.4V	1.15V

*0% to 100%

P2401 "MAIN Board" To J1 "IR Board"

Pin	Label	STBY	Run	Diode Check
10	Gnd	Gnd	Gnd	Gnd
9	IR	3.52V	3.43V	2.72V
8	LED_R	2.71V	0V	2.01V
7	Gnd	Gnd	Gnd	Gnd
6	3.5V_ST	3.55V	3.48V	0.75V
5	KEY 2	3.54V	3.47V	OL
4	KEY 1	3.54V	3.47V	OL
3	Gnd	Gnd	Gnd	Gnd
2	Sensor_SDA	0.32V	3.36V	1.18V
1	Sensor_SCL	0.32V	3.36V	1.18V

Key 1 Line J1 or P2401 pin 4

Resistance		Voltage	
Volume (+)	17.96M Ω	Volume (+)	1.75V
Volume (-)	11.87M Ω	Volume (-)	1.17V
Settings	6M Ω	Menu	0.6V
OK	0.99M Ω	Enter	0.1V

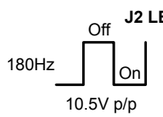
Key 2 Line J1 or P2401 pin 5

Resistance		Voltage	
CH (Up)	17.96M Ω	CH (Up)	1.75V
CH (Dn)	11.87M Ω	CH (Dn)	1.17V
Power	6M Ω	Power	0.6V
Input	0.99M Ω	Input	0.1V

Key 1 or 2, No Key Pressed, resistance: Open (Voltage 3.47V)

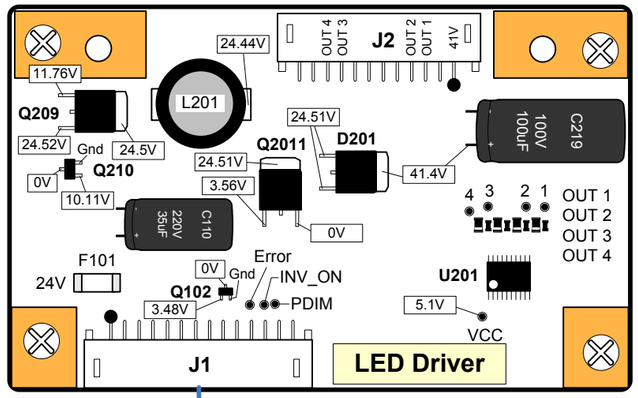
Front IR / Key Board Intelligent Sensor
J1
A

J2 LED Block Ground Pulses
OUT 1 Pin 3
OUT 2 Pin 4
OUT 3 Pin 9
OUT 4 Pin 10



Warning: Return the Screws when the Shield is removed for Service if Power is going to be applied.

To the Panel's LED Backlights



LED BLOCKS (4) LED BAR ON THE LEFT FRONT
J2 Pin 1 (41V) for LED Blocks
OUT 1: Drives the Top LED Block
OUT 2: Drives the 2nd from Top LED Block
OUT 3: Drives the 2nd from Bottom LED Block
OUT 4: Drives the Bottom LED Block

LED BLOCK TEST
Using a 220Ω resistor one end on Ground
The other end on any of the OUT lines will turn on the backlight block. (Providing the 41V is present J2 pin 1)

J2 "LED Driver" to "The Panel"

Pin	Label	Stby	Run	Diode Check
1	B+	0V	41.44V	OL
2	n/c	n/c	n/c	n/c
3	OUT 1	0V	1.38V~8.02V	OL
4	OUT 2	0V	1.38V~8.02V	OL
5-7	n/c	n/c	n/c	n/c
9	OUT 3	0V	1.38V~8.02V	OL
10	OUT 4	0V	1.38V~8.02V	OL
11	n/c	n/c	n/c	n/c
12	n/c	0V	41.44V	OL

Pins 3,4,9,10 White to Black

J1 "LED Driver" to P202 "SMPS"

Pin	Label	Stby	Run	Diode Check
1-5	24V	0V	24.56V	OL
6-10	Gnd	Gnd	Gnd	Gnd
11	ERROR	n/c	n/c	OL
12	INV_ON	0V	3.41V	OL
13	A_DIM	n/c	n/c	OL
14	P_DIM	0V	*0.22V~3.22V	OL

Error and A_DIM are not used. White to Black

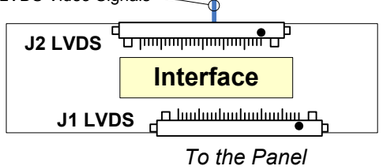
P401 to SMPS P201

Pin	Diode Check
1	OL
2-4	2.68V
5-8	Gnd
9-12	0.75V
13-15	Gnd
16	n/c
17	2.19V
18	1.59V
19	2.19V
20	OL
21	2.19V
22	2.66V
23	n/c
24	OL

For Voltages See P201 SMPS

See LVDS waveforms on Page 3 of Interconnect Diagram

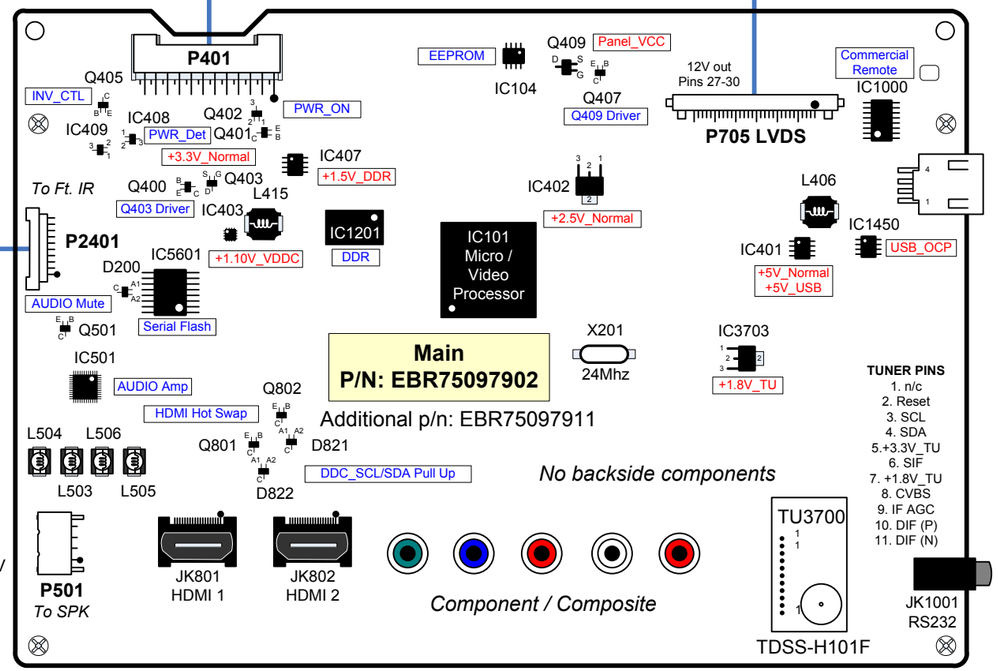
12V Pins 27 ~ 30 and LVDS Video Signals



To the Panel

To all Speakers
All pins 12.31V
Diode Test = 2.72V

To Front IR
A



See DC Voltages for Main Board on Page 3 of Interconnect Diagram

32LS3500 Main Board Component Voltages

IC104

Pin	Micro EEPROM
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	3.4V (SDA)
[6]	3.4V (SCL)
[7]	0V (Gnd)
[8]	3.4V (B+)

IC401

Pin	+5V_Normal +5V_USB
[1]	0V (Gnd)
[2]	12.0V (In)
[3]	0V (Gnd)
[4]	0.8V (FB)
[5]	0.95V (COMP)
[6]	12.0V (EN)
[7]	2.07V (SS)
[8]	0V (n/c)

For Output, use L406

IC402

Pin	+2.5V_Normal Regulator
[1]	0V (Gnd)
[2]	2.5V (Out)
[3]	3.4V (In)

IC403

Pin	+1.10V_VDDC Regulator
[1]	3.4V (In) +3.3V_ST
[2]	3.4V (In) +3.3V_ST
[3]	Do not Measure
[4]	0V (Gnd)
[5]	0V (Gnd)
[6]	Do not Measure
[7]	Do not Measure
[8]	Do not Measure
[9]	2.16V
[10]	1.23V (Out)
[11]	1.23V (Out)
[12]	1.23V (Out)
[13]	4.61V (BOOT)
[14]	0V (n/c)
[15]	3.24V (EN) 3.3V_Normal
[16]	3.48V (In) +3.3V_ST

IC407

Pin	(+1.5V_DDR) Regulator
[1]	3.47V (In) +3.3V_ST
[2]	0V (n/c)
[3]	3.47V (In) +3.3V_ST
[4]	3.4V (EN) +3.3V_Normal
[5]	0V (Gnd)
[6]	3.36V (SS)
[7]	0.8V (FB)
[8]	1.54V (Out)

IC408

Pin	Power_Det 12V
[1]	0V (Gnd)
[2]	3.6825V (Reset)
[3]	3.67V (In) +12V

IC409

Pin	Power_Det 24V
[1]	0V (Gnd)
[2]	3.58V (Reset)
[3]	3.81V (In) +24V

IC3703

Pin	+1.8V_TU Regulator
[1]	0V (Gnd)
[2]	1.80V (Reset)
[3]	3.39V (In)

IC1000

Pin	RS232 Data Buffer
[1]	3.34V (C1+)
[2]	8.8V (V+)
[3]	3.25V (C1-)
[4]	3.34V (C2+)
[5]	V (V+)
[6]	(-5.7V) (C2-)
[7]	0V (n/c)
[8]	3.34V (n/c)
[9]	3.36V (n/c)
[10]	5.79V (n/c)
[11]	0V (DN1)
[12]	0.04V (ROut1)
[13]	0V (RIn1)
[14]	(-5.73V) (DOut1)
[15]	0V (Gnd)
[16]	3.33V (In) +3.3V_ST

IC1450

Pin	5V Short Protection for USB
[1]	0V (Gnd)
[2]	5.24V (In1)
[3]	5.24V (In2)
[4]	3.39V (USB1_CTL)
[5]	5.19V (FLG)
[6]	5.24V (Out1)
[7]	5.24V (Out2)
[8]	0V (n/c)

IC5601

Pin	Serial Flash Memory
[1]	3.34V (Hold)
[2]	3.33V (In) +3.3V_ST
[3]	0V (n/c)
[4]	0V (n/c)
[5]	0V (n/c)
[6]	0V (n/c)
[7]	1.34V (/SPI_CS)
[8]	1.15V (SPI_SDO)
[9]	0V (WP)
[10]	0V (n/c)
[11]	0V (n/c)
[12]	0V (n/c)
[13]	0V (n/c)
[14]	0V (n/c)
[15]	0V (SPI_SDI)
[16]	0V (SPI_SCK)

Q400

Pin	+3.3V_Normal Driver for Q403
B	0.63V (POWER_ON/OFF_1)
C	0.05V (Ctrl)
E	0V (Gnd)

Q401

Pin	Power On/Off Driver for Q402
B	0.66V (RL_ON)
C	0.06V (Ctrl) to Q402
E	Gnd

Q402

Pin	Power On/Off Switch
1	3.4V (In) +3.3V_ST
2	3.35V (Ctrl) from Q401
3	3.39V (Out) PWR_ON

Q403

Pin	+3.3V_Normal Switch
S	3.48V (In) +3.3V_ST
G	0.07V (Enable)
D	3.41V (Out) +3.3V_Normal

Q405

Pin	Inverter On/Off Switch
B	0.02V (INV_CTL)
C	3.4V (INV_On)
E	0V (Gnd)

Q407

Pin	PANEL_VCC Drives Q409
B	0.65V (Pannel_Ctl)
C	0.53V (EN) to Q409
E	Gnd

Q409

Pin	PANEL_VCC Switch
S	12.0V (In) +12V
G	1.79V (Enable)
D	11.99V (Out)

Q801

Pin	HDMI 2 Hot Swap
B	0.66V (HPD2)
C	0.04V (HDMI HS)
E	Gnd

Q802

Pin	HDMI 1 Hot Swap
B	0.66V (HPD1)
C	0.04V (HDMI HS)
E	Gnd

Q501

Pin	Audio Mute Inputs to pin 14 IC501
B	0.02V (Mute_Ctl)
C	3.42V (Mute to IC501)
E	Gnd

D200

Pin	SOC_Reset Speed Up
[C]	0V
[A]	0V
[A-C]	0V (Gnd)

D821

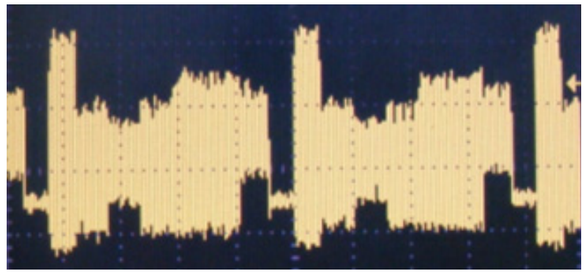
Pin	DDC_SCL1/SDA1 Pull Up
[A1]	V (5V_HDMI_1)
[A2]	5.32V (+5V_Normal)
[C]	5.14V (Pull_Up)

D822

Pin	DDC_SCL2/SDA2 Pull Up
[A1]	5.32V (5V_HDMI_1)
[A2]	5.32V (+5V_Normal)
[C]	5.14V (Pull_Up)

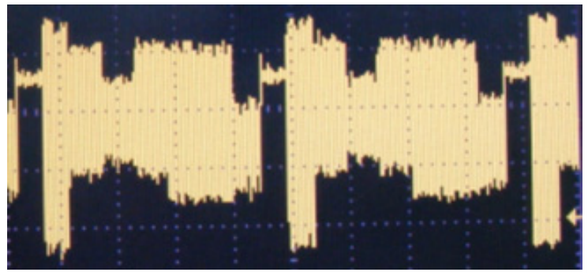
32LS3500 LVDS P705 WAVEFORMS

P705 Pin 6 Main or J2 Interface



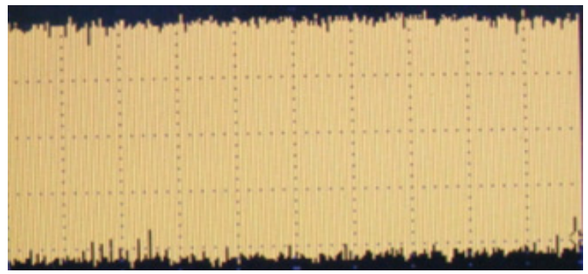
2uSec per/div 360mV p/p

P705 Pin 7 Main or J2 Interface



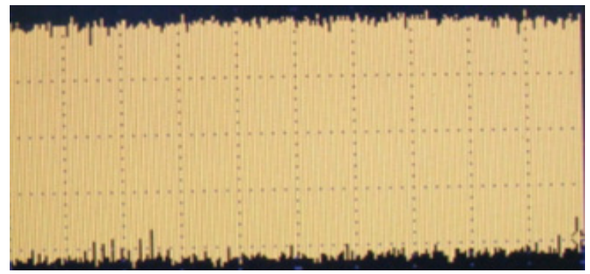
2uSec per/div 412mV p/p

P705 Pin 9 Main or J2 Interface



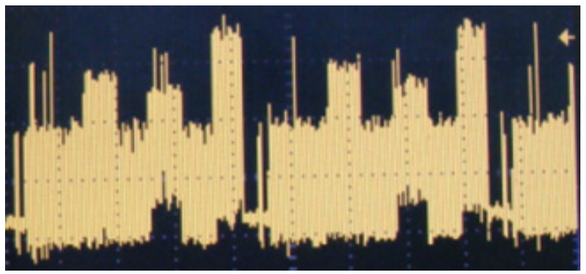
2uSec per/div 444mV p/p

P705 Pin 10 Main or J2 Interface



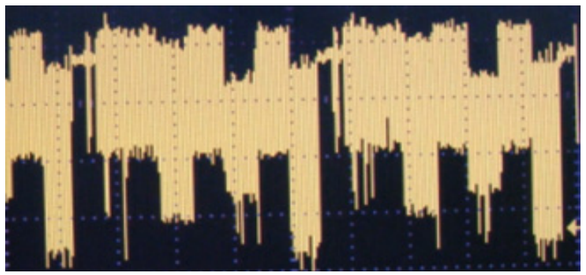
2uSec per/div 392mV p/p

P705 Pin 12 Main or J2 Interface



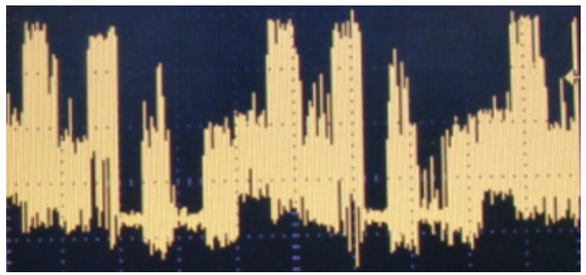
2uSec per/div 420mV p/p

P705 Pin 13 Main or J2 Interface



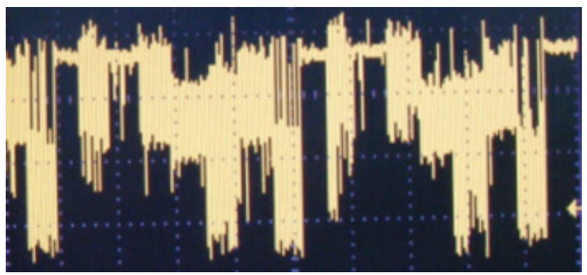
2uSec per/div 456mV p/p

P705 Pin 15 Main or J2 Interface



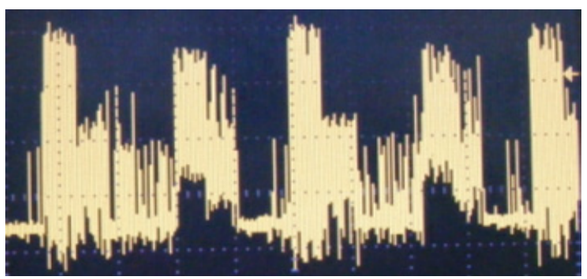
2uSec per/div 460mV p/p

P705 Pin 16 Main or J2 Interface



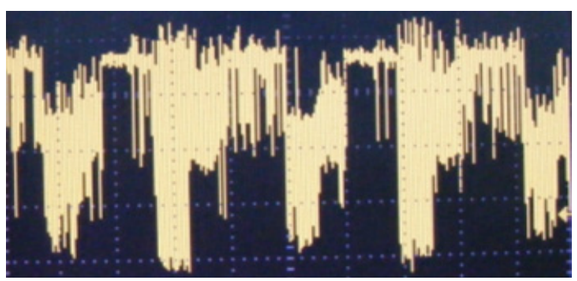
2uSec per/div 392mV p/p

P705 Pin 18 Main or J2 Interface



2uSec per/div 460mV p/p

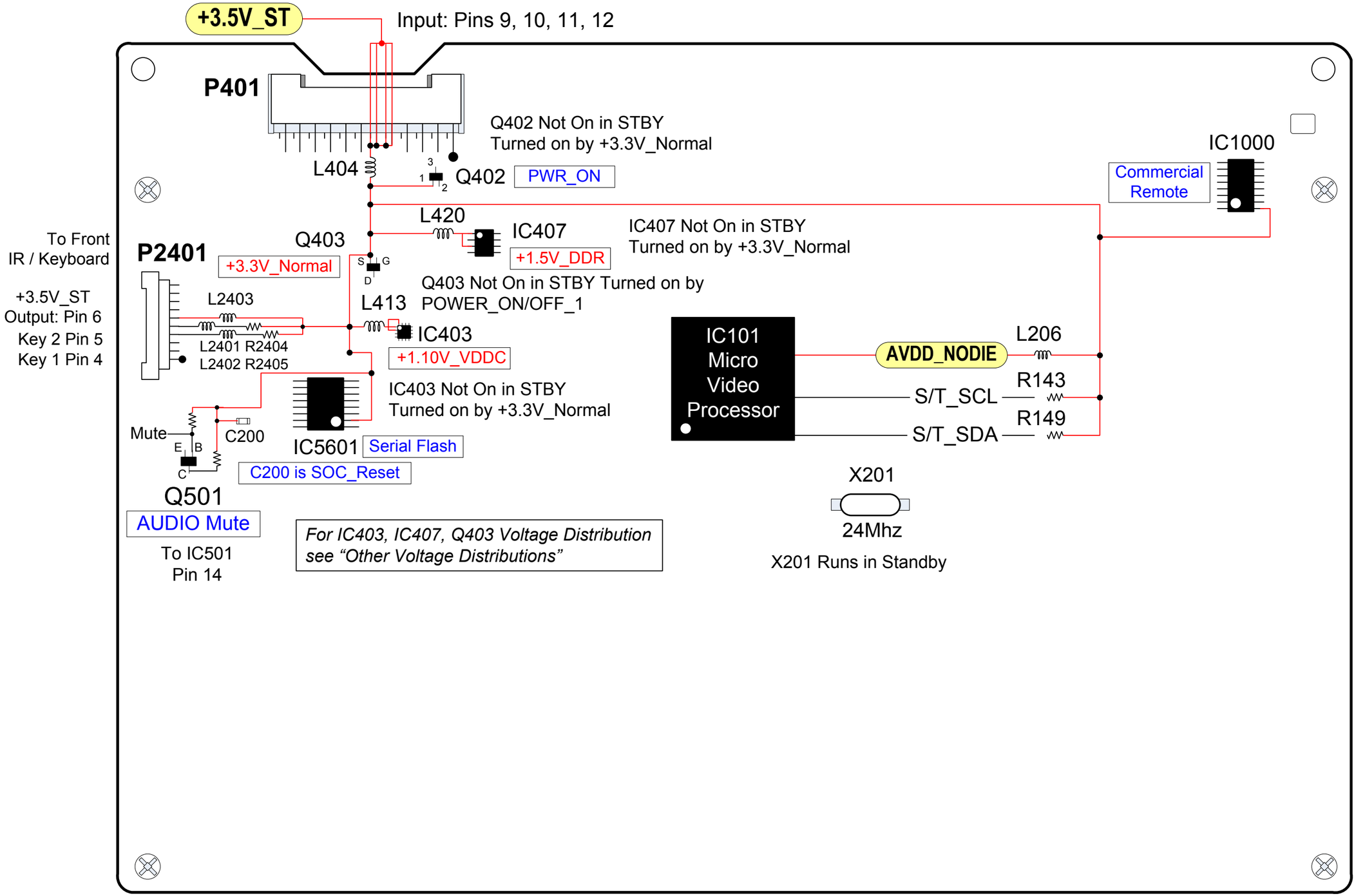
P705 Pin 19 Main or J2 Interface



2uSec per/div 460mV p/p

LVDS CABLE WAVEFORMS:
Waveforms taken using SMTP Color Bar input.
All readings give the Scale 100mV and 2uSec per division Time Base related to scope settings.

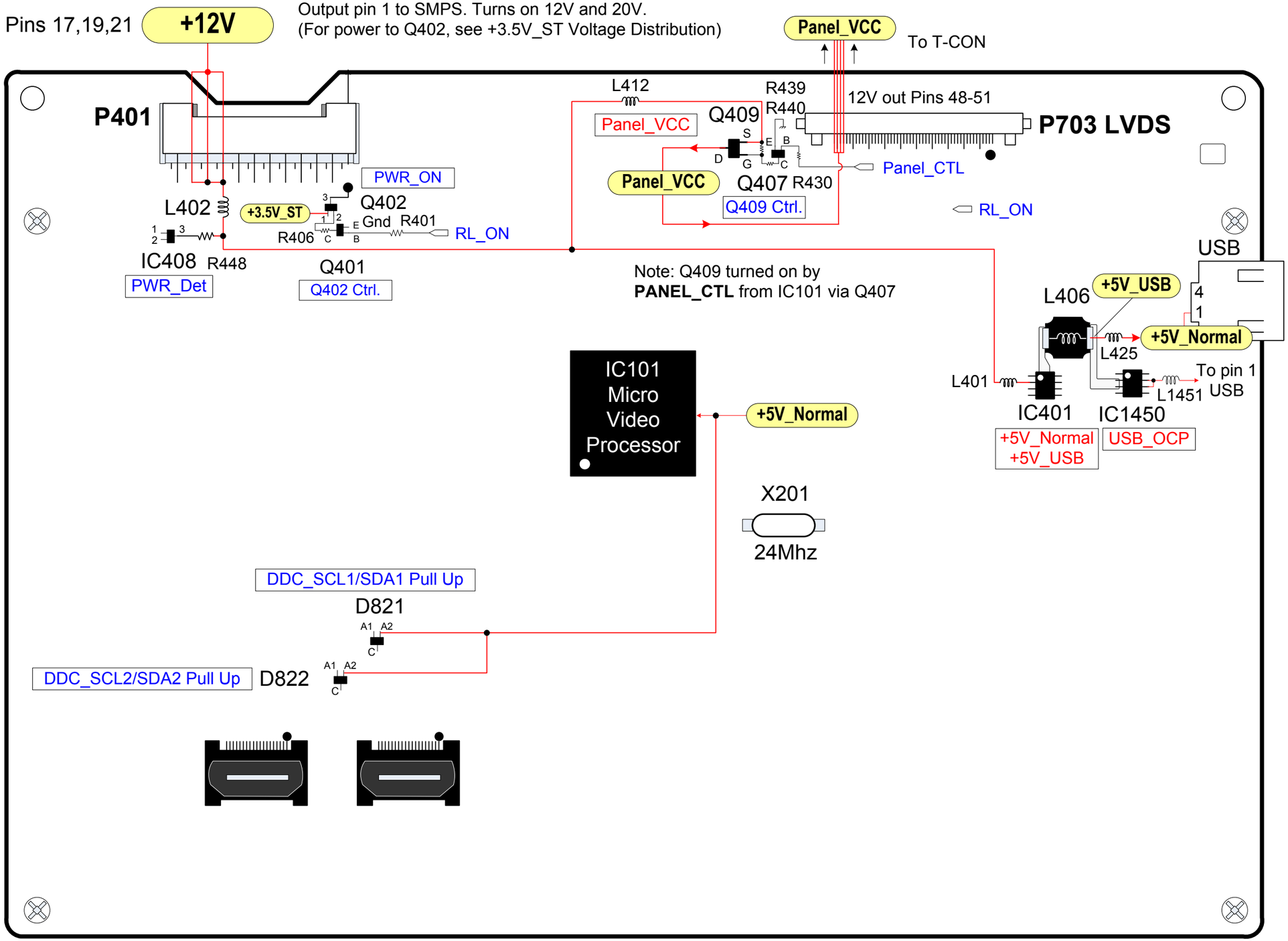
32LS3500 Main Board +3.5V_ST Distribution



32LS3500 Main Board +12V Distribution

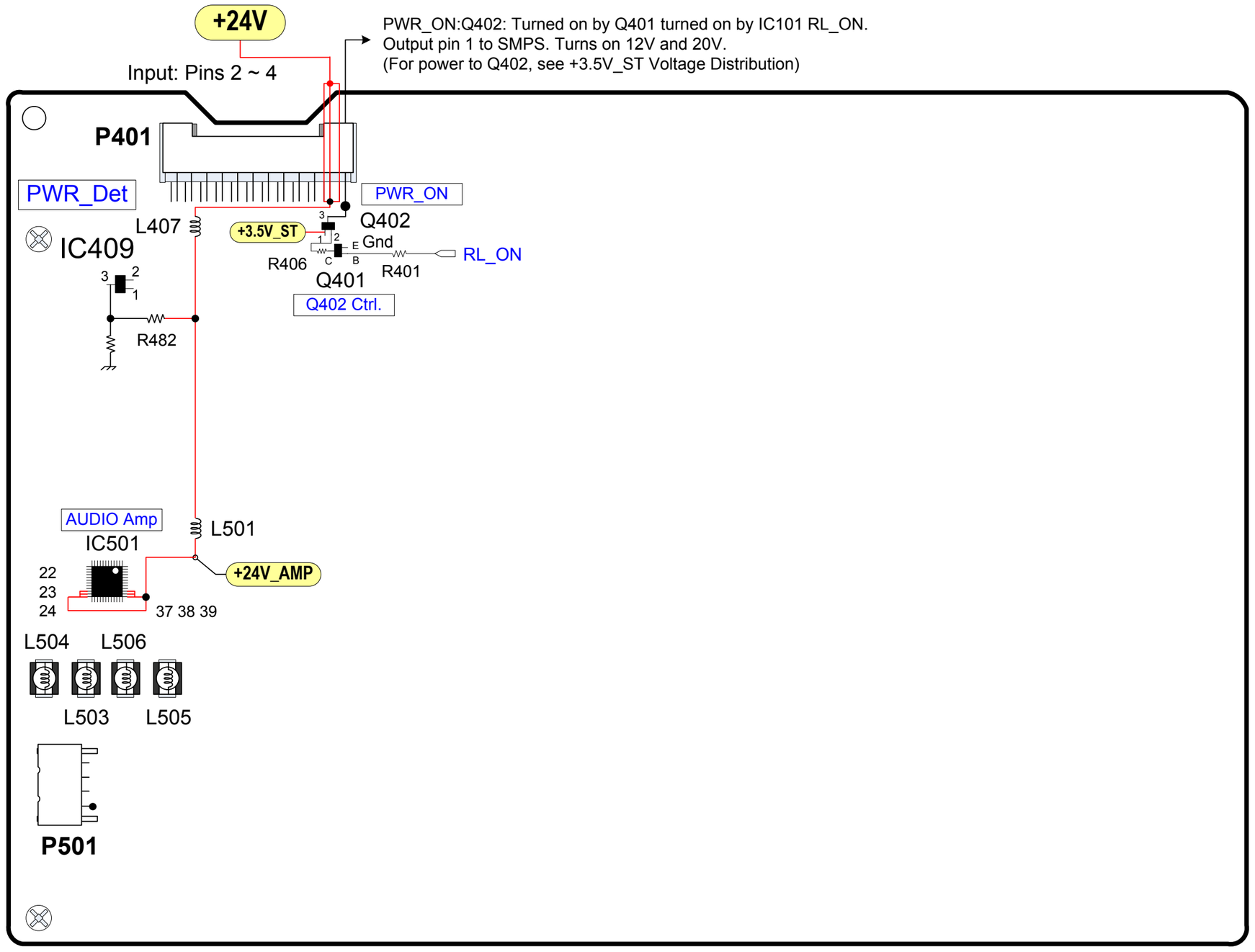
Input: Pins 17,19,21 **+12V**

PWR_ON Q402: Turned on by Q401 turned on by IC101 RL_ON.
Output pin 1 to SMPS. Turns on 12V and 20V.
(For power to Q402, see +3.5V_ST Voltage Distribution)



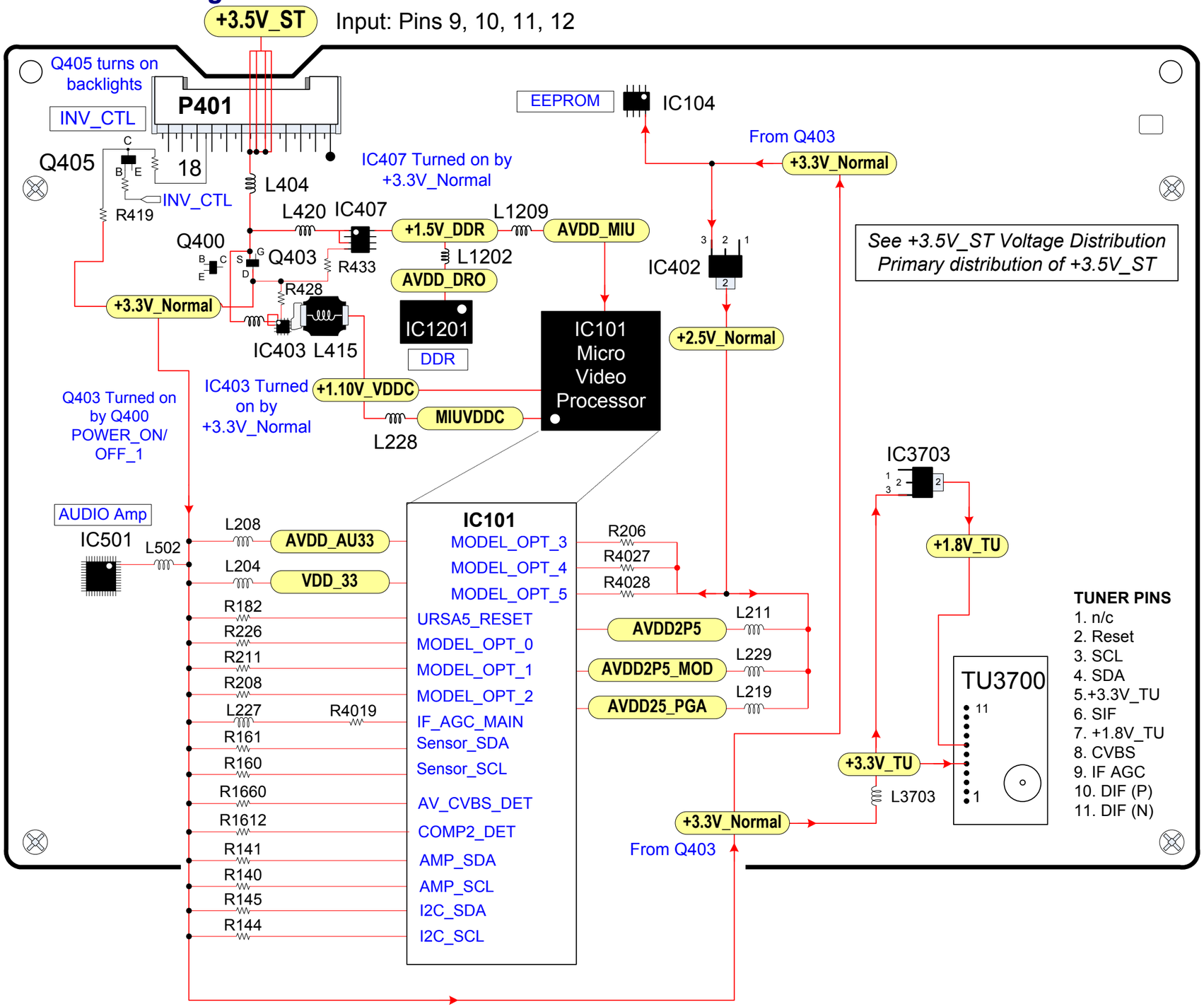
32LS3500 Main Board +24V Distribution

NOTE: 24V is the label, but the Voltage is actually 24.56V



32LS3500 Main Board Other Voltage Distributions

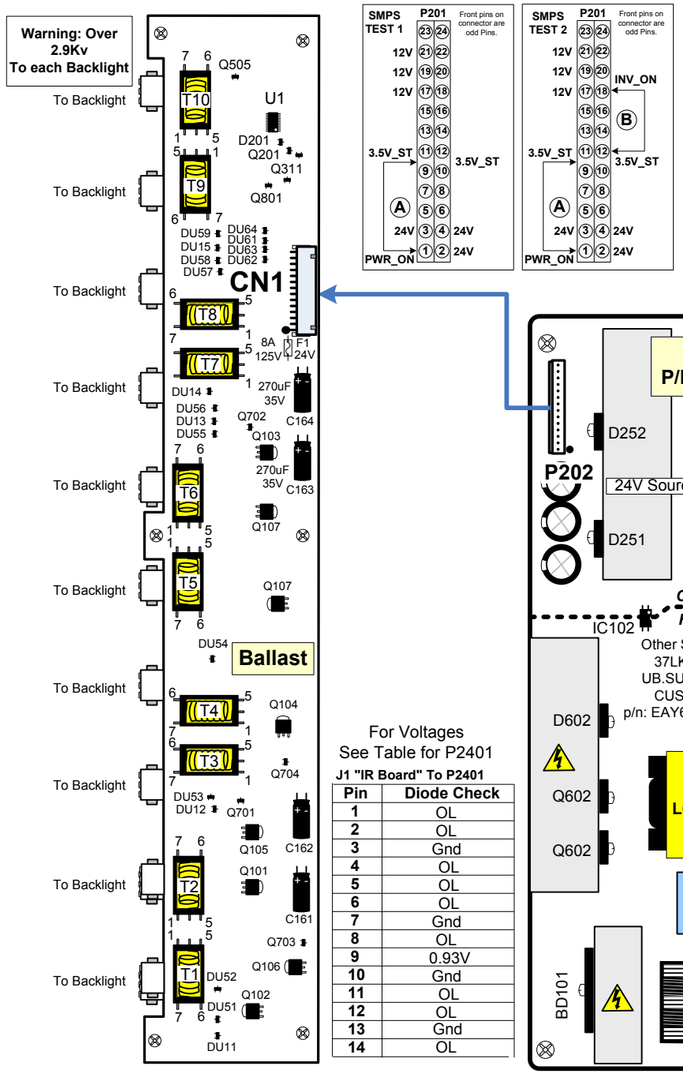
After all voltages are turned on on the Main board, Q405 is turned Off supplying INV_ON to the power supply (via pin 18) turning on the backlights. Collector pulled up by +3.3V_Normal through R419



37LK450 INTERCONNECT DIAGRAM

SMPS TEST 1 : Forcing SMPS On. Remove AC Power.
Disconnect **P401** on Main Board. Jump pin 1 (**PWR_ON**) to pin 9, 10, 11 or 12 .
Apply AC Power. This should force the SMPS to the on state. All Voltages should be produced. (24V and 12V to Main). Also 24V to the Ballast. However the Backlights are not on.
Disconnect AC Power.
SMPS TEST 2 : Forcing Backlights On.
Leave Jumper from Test 1 in place.
Jump pin 18 (**INV_ON**) to pin 9, 10, 11 or 12.
Apply AC Power. This should force the Backlights to come on.

Note: STBY 3.5V Must be present when AC applied.

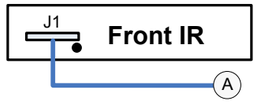


For Voltages See Table for P2401

J1 "IR Board" To P2401

Pin	Diode Check
1	OL
2	OL
3	Gnd
4	OL
5	OL
6	OL
7	Gnd
8	OL
9	0.93V
10	Gnd
11	OL
12	OL
13	Gnd
14	OL

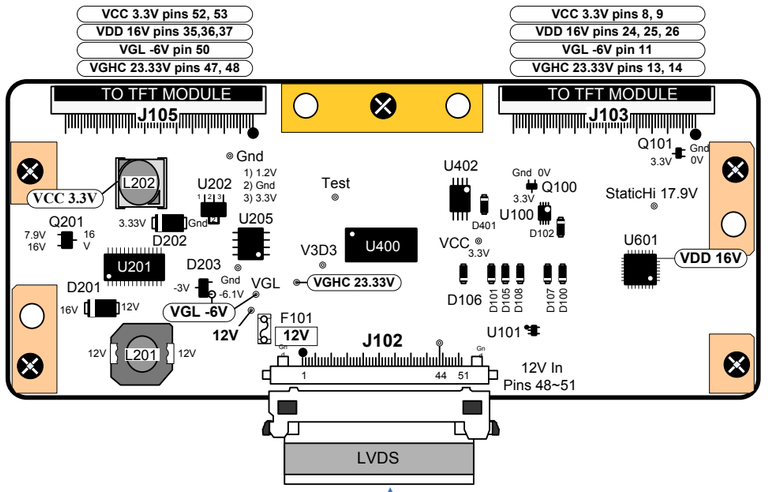
For Ballast Component Voltages and drive waveforms see Page 4 of Interconnect Diagram



Key 1 & Key 2 Voltage and Resistance Chart with buttons pressed.

Key 1 J1/P2401 Pin 3			Key 2 J1/P2401 Pin 4		
Resistance	Function	Voltage	Resistance	Function	Voltage
1.96MΩ	Vol +	1.69V	1.96MΩ	CH +	1.69V
1.24MΩ	Vol -	1.14V	1.24MΩ	CH -	1.14V
550KΩ	Menu	0.53V	550KΩ	Power	0.53V
11.5Ω	Enter	0.0V	11.5Ω	Input	0.0V

Voltage and Resistance taken with AC applied to the set.
No Button pressed Resistance is 16.7MΩ



12V Pins 48 ~ 51 and LVDS Video Signals

For LVDS Video Signals see Page 2 of Interconnect Diagram

Other U601 Voltages to the Panel

1) [15.44V] J103 41 & J105 20
2) [15.25V] J103 40 & J105 21
3) [13V] J103 39 & J105 22
4) [11.27V] J103 38 & J105 23
5) [10.22V] J103 37 & J105 24
6) [9.4V] J103 36 & J105 25
7) [7.47V] J103 35 & J105 26
8) [16V] J103 24,25,26 & J105 35,36,37
17) [VCC 3.3V] J103 8,9 & J105 52,53
18) [6.7V] J103 35 & J105 27
19) [6.34V] J103 36 & J105 28
20) [5.62V] J103 33 & J105 29
21) [1.23V] J103 38 & J105 30
22) [3V] J103 30 & J105 31
28) [7.18V] J103 16 & J105 45
29) [7.18V] J103 16 & J105 45

For best approach to jump 3.3V to pin 44. Use jumper with needles on each end. Attach 44 first, apply power, then touch left side of L202. Then observe screen.

P201 "SMPS Board" To P401 "MAIN Board"

Pin	Label	STBY	Run	No Load	Diode Check
24	ERROR	0V	0V	0V	OL
23	n/c	n/c	n/c	n/c	OL
22	P-DIM	0.02V	0.46V~3.2V	0V	OL
21	12V	0.06V	12.23V	12.18V	2.09V
20	A-DIM	0.02V	3.31V	0V	OL
19	12V	0.06V	12.23V	12.18V	2.09V
18	INV_On/Off	0.52V	3.09V	0V	OL
17	12V	0.06V	12.23V	12.18V	2.09V
13~16	Gnd	Gnd	Gnd	Gnd	Gnd
9~12	3.5V_STBY	3.53V	3.5V	3.53V	2.62V
5~8	Gnd	Gnd	Gnd	Gnd	Gnd
2~4	24V	0.05V	24.17V	24.36V	1.27V
1	PWER_ON	0V	3.38V	3.53V	1.16V

For Main Component Voltages see Page 3 of Interconnect Diagram

P401 to SMPS P201

Pin	Diode
1	2.9V
2-4	2.37V
5-8	Gnd
9-12	1.15V
13-16	Gnd
17	2.3V
18	OL
19	2.3V
20	OL
21	2.3V
22	OL
23	Gnd
24	OL

For Voltages See P201 SMPS

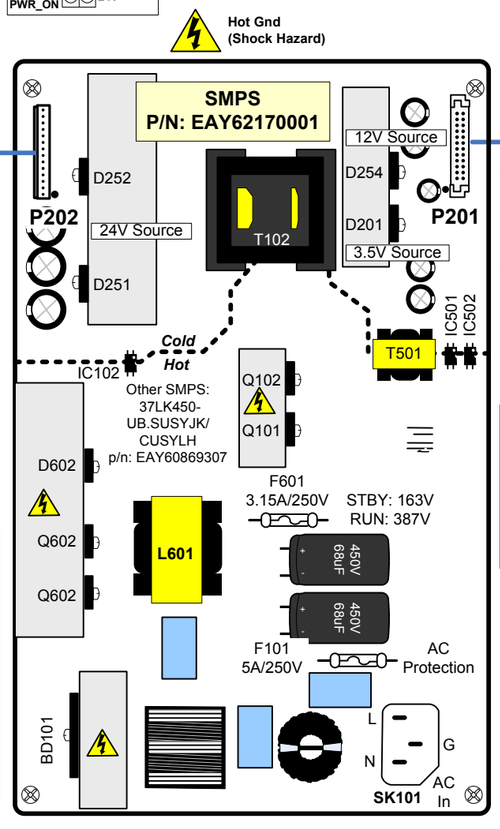
(1) PWR-On Pin 1: Turns on 12V, 24V to the Main and 24V to the Inverter. (Backlights not on).

(2) INV-On Pin 18: Turns on the Backlights

(3) Error_Out Pin 24: Goes high when the backlights are told to come on. Goes back low when they come on. If it goes high again on the 5th attempt to fire the backlights, the set shuts off.

(4) A-DIM Pin 20: Is not used. It is a fixed Voltage.

(5) P-DIM Pin 22 Will vary according to OSD Backlight setting, incoming video IRE level and Ambient room light conditions. It is output from the Video Processor. Range 0.46V to 3.2V.



PANEL TEST: To run the T-CON without the Main board. (Set up SMPS in Test 2 mode).
With no power applied to the SMPS, disconnect LVDS Cable J102.
Jump 12V from the SMPS (P201 pins 17 or 19) to F101 fuse on the T-CON.
Jump 3.3V from the VCC Test point (Left side of L202) to pin 44 of J102. Apply AC power to the SMPS.
The T-CON will product patters on the screen, Red, Green, Blue, etc.

P202 "SMPS Board" To CN1 "Ballast Board"

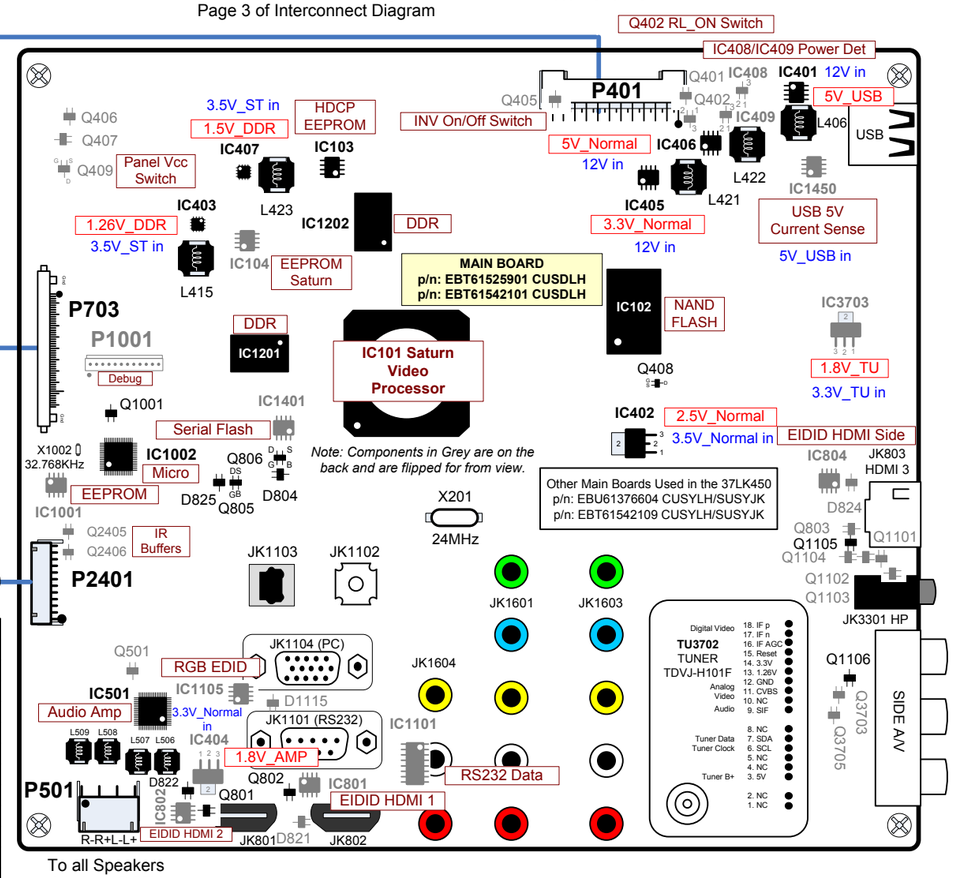
Pin	Label	STBY	Run	Diode Check
14	EPWM	0V	0.46V~3.2V	OL
13	IPWM	0.02V	3.31V	OL
12	INV_On/Off	0V	3.09V	OL
11	DET	0V	0V	OL
6~10	Gnd	Gnd	Gnd	Gnd
1~5	24V	0.05V	24.17V	1.27V

Pin 14 is P_DIM, Pin 13 is A_DIM, Pin 11 is Error.

12V Pins 1 ~ 4 and LVDS Video Signals

P2401 "Main" to J1 "Ft. IR/SoftTouch Key Board"

Pin	Label	STBY	Run	Diode Check
15	SDA	3.53V	3.29V	1.97V
14	SCL	3.52V	3.29V	1.97V
13	Gnd	Gnd	Gnd	Gnd
12	LED_R	0V	0V	2.67V
11	+3.3V_NORMAL	0.56V	3.08V	0.56V
10	Gnd	Gnd	Gnd	Gnd
9	IR	1.96V	1.93V	OL
8	LED_B	0V	0V	2.67V
7	Gnd	Gnd	Gnd	Gnd
6	3.5V_ST	3.33V	3.49V	1.16V
5	KEY 2	3.3V	3.29V	1.83V
4	KEY 1	3.3V	3.29V	1.83V
3	Gnd	Gnd	Gnd	Gnd
2	NEC_EEPROM SDA	3.13V	3.48V	3.29V
1	NEC_EEPROM SCL	2.12V	3.48V	3.29V



To all Speakers
All pins 12.05V
Diode Test = OL

37LK450 MAIN (FRONT SIDE) SIMICONDUCTORS

IC103 HDCP EEPROM

Pin	
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	3.29V (B+)
[4]	0V (Gnd)
[5]	0V
[6]	3.29V
[7]	0V (Gnd)
[8]	3.29V (B+)

IC401 5V Regulator for USB

Pin	
[1]	0V (Gnd)
[2]	12.24V (In)
[3]	0V (Gnd)
[4]	0.8V
[5]	0.8V
[6]	3.3V (PWR On/Off2_1)
[7]	4.99V (Out)
[8]	4.99V (Out)

IC402 (+2.5V_Normal) Regulator

Pin	
[1]	3.29V (In)
[2]	0V (Gnd)
[3]	2.5V (Out)

IC403 (+1.26V_VDDC) Regulator

Pin	
[1]	3.28V (In)
[2]	3.28V (In)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	0V (Gnd)
[6]	0.8V
[7]	0.86V
[8]	0.54V
[9]	1.75V
[10]	1.33V (Out)
[11]	1.33V (Out)
[12]	1.33V (Out)
[13]	4.72V
[14]	n/c
[15]	3.29V
[16]	3.28V (In)

IC405 (+3.3V_NORMAL) Regulator

Pin	
[1]	0V (Gnd)
[2]	12.23V (In)
[3]	0V (Gnd)
[4]	0.8V
[5]	0.87V
[6]	3.32V (PWR On/Off1)
[7]	3.34V (Out)
[8]	3.34V (Out)

IC406 (+5V_Normal) Regulator

Pin	
[1]	0V (Gnd)
[2]	12.23V (In)
[3]	0V (Gnd)
[4]	0.8V
[5]	0.86V
[6]	3.32V (PWR On/Off1)
[7]	5V (Out)
[8]	5V (Out)

IC407 (+1.5V_DDR) Regulator

Pin	
[1]	3.32V (In)
[2]	3.32V (In)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	0V (Gnd)
[6]	0.83V
[7]	0.7V
[8]	0.51V
[9]	1.93V
[10]	1.52V (Out)
[11]	1.52V (Out)
[12]	1.52V (Out)
[13]	4.87V
[14]	n/c
[15]	3.31V
[16]	3.32V (In)

Q408 (+1.5V_FRC_DDR) Switch

Pin	
G	3.3V (PWR On/Off2_1)
S	1.51V (In)
D	1.52V (Out)

Q801 HDMI 2 Hot Swap

Pin	
B	0.63V
C	0V
E	Gnd

Q802 HDMI 1 Hot Swap

Pin	
B	0.63V
C	0V
E	Gnd

Q805 CEC Remote HDMI CEC

Pin	
[B]	3.17V
[G]	0V
[S]	0V
[D]	0.06VV

Q806 CEC Remote HDMI CEC

Pin	
[B]	3.17V
[G]	0V
[S]	3.28V
[D]	3.29V

Q1001 EDID Write Protect

Pin	
B	0V
C	4.7V
E	Gnd

Q1105 Head Phone MUTE

Pin	
B	2.82V
C	0V
E	3.34V

Q1106 Head Phone Mute Driver

Pin	
B	0V
C	2.82V
E	Gnd

D804 Source Bias Q806

Pin	
[A1]	0V
[A2]	3.27V
[C]	3.17V

D822 5V Routing for IC802

Pin	
[A1]	5V
[A2]	0V
[C]	4.7V

D825 Source Bias Q805

Pin	
[A1]	0V
[A2]	0.06V
[C]	3.17V

37LK450 MAIN (BACK SIDE) SIMICONDUCTORS

IC104 Microprocessor EEPROM

Pin	
[1]	0V (n/c)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	3.29V (SDA)
[6]	3.29V (SCL)
[7]	0V (Gnd)
[8]	3.29V (B+)

IC404 (+1.8V_Amp) Regulator

Pin	
[1]	Gnd
[2]	1.79V (Out)
[3]	3.29V (In)

IC408 Power_Det 12V

Pin	
[1]	0V (Gnd)
[2]	3.30V (Reset)
[3]	3.33V (In)

IC409 Power_Det 24V

Pin	
[1]	0V (Gnd)
[2]	3.30V (Reset)
[3]	3.33V (In)

IC801 EDID Data HDMI1

Pin	
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	4.7V (SDA)
[6]	4.7V (SCL)
[7]	4.7V (WP)
[8]	4.7V (Vcc)

IC802 EDID Data HDMI2

Pin	
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	4.7V (SDA)
[6]	4.7V (SCL)
[7]	4.7V (WP)
[8]	4.7V (Vcc)

IC804 EDID Data HDMI4

Pin	
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	4.7V (SDA)
[6]	4.7V (SCL)
[7]	4.7V (WP)
[8]	4.7V (Vcc)

IC1001 Micro EEPROM

Pin	
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	3.3V (B+)
[4]	0V (Gnd)
[5]	3.3V (SDA)
[6]	3.3V (SCL)
[7]	0V (Gnd)
[8]	3.3V (B+)

IC1101 RS232 Data Buffer

Pin	
[1]	3.3V
[2]	5.4V
[3]	0V
[4]	0V
[5]	(-5.4V)
[6]	0V
[7]	n/c (0V)
[8]	n/c (0V)
[9]	n/c (3.3V)
[10]	n/c (0V)
[11]	n/c (3.3V)
[12]	3.3V
[13]	0V
[14]	(-5.4V)
[15]	0V (Gnd)
[16]	3.3V

IC1105 EDID Data PC

Pin	
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	4.7V (SDA)
[6]	4.7V (SCL)
[7]	4.7V (WP)
[8]	4.7V (Vcc)

IC1401 Serial Flash Memory

Pin	
[1]	0.0V
[2]	3.3V
[3]	3.3V
[4]	0V (Gnd)
[5]	0V
[6]	0V
[7]	3.3V (B+)
[8]	3.3V (B+)

IC1450 5V Short Protection for USB

Pin	
[1]	0V (Gnd)
[2]	4.98V (In)
[3]	4.98V (In)
[4]	3.3V (USB-En)
[5]	4.96V
[6]	4.98V (Out)
[7]	4.98V (Out)
[8]	n/c (0V)

IC3703 (+1.2V_TU) Regulator

Pin	
[1]	0V (Gnd)
[2]	1.26V (Out)
[3]	3.3V (In)

Q401 Power On/Off Driver for Q402

Pin	
B	0.65V (RL_ON)
C	0V
E	Gnd

Q402 Power On/Off Switch

Pin	
1	3.3V (In)
2	0.8V (Ctl)
3	3.16V (Out)

Q405 Inverter On/Off Switch

Pin	
B	0.0V
C	3.0V (INV_On)
E	Gnd

Q406 PANEL_VCC Control 1st Driver

Pin	
B	0.0V
C	0.68V
E	Gnd

Q407 PANEL_VCC Control 2nd Driver

Pin	
B	0.68V
C	0V
E	Gnd

Q409 PANEL_VCC Switch

Pin	
S	12.2V (In)
G	1.84V (Enable)
D	12.2V (Out)

Q501 AMP_MUTE Pin 25 IC600

Pin	
B	0.0V
C	3.35V
E	Gnd

Q803 HDMI 4 Hot Swap

Pin	
B	0.65V
C	0V
E	Gnd

Q1101 Head Phone MUTE

Pin	
B	0V
C	0V
E	Gnd

Q1102 Head Phone MUTE

Pin	
B	0V
C	0V
E	Gnd

Q1103 Head Phone MUTE

Pin	
B	0V
C	0V
E	Gnd

Q1104 Head Phone MUTE

Pin	
B	0V
C	0V
E	Gnd

Q3703 Tuner CVSB (Video) Buffer

Pin	
B	3.4V
C	Gnd
E	4.1V

Q3705 Tuner SIF (Sound) Buffer

Pin	
B	0.2V
C	Gnd
E	0.9V

D821 5V Routing for IC801

Pin	
[A1]	0V
[A2]	5.0V
[C]	4.7V

D824 5V Routing for IC804

Pin	
[A1]	0V
[A2]	5V
[C]	4.7V

D1115 5V Routing for IC1105

Pin	
[A1]	0.0V
[A2]	5V
[C]	4.7V

Q2405 IR Buffer

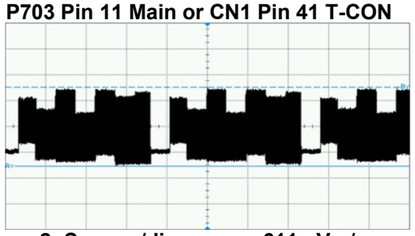
Pin	
B	0.0V
C	3.0V (INV_On)
E	Gnd

Q2406 IR Buffer

Pin	
B	0.0V
C	0.68V
E	Gnd

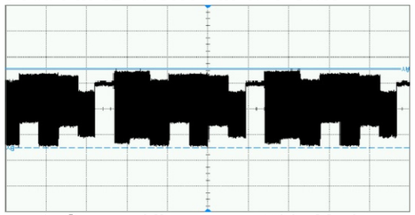
37LK450 LVDS P703 WAVEFORMS

P703 Pin 11 Main or CN1 Pin 41 T-CON



2uSec per/div 611mV p/p

P703 Pin 12 or CN1 Pin 40 T-CON

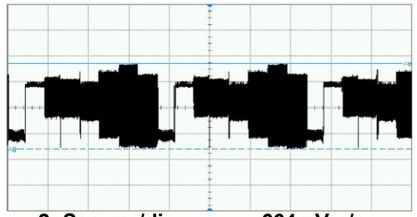


2uSec per/div 611mV p/p

P703 Pin 13 or CN1 Pin 39 T-CON

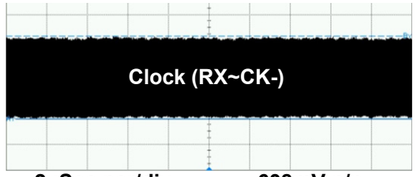
2uSec per/div 664mV p/p

P703 Pin 14 or CN1 Pin 38 T-CON



2uSec per/div 664mV p/p

P703 Pin 16 or CN1 Pin 36 and
P703 Pin 32 or CN1 20 T-CON

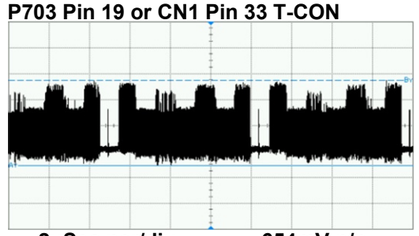


2uSec per/div 638mV p/p

P703 Pin 17 or CN1 Pin 33 and
P703 Pin 33 or CN1 19 T-CON

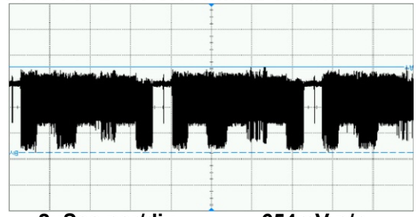
2uSec per/div 638mV p/p

P703 Pin 19 or CN1 Pin 33 T-CON



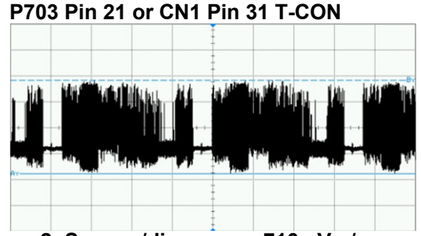
2uSec per/div 654mV p/p

P703 Pin 20 or CN1 Pin 32 T-CON



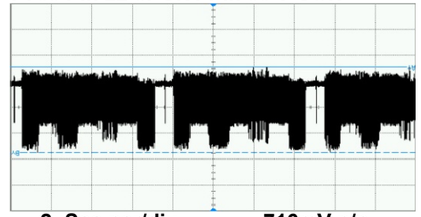
2uSec per/div 654mV p/p

P703 Pin 21 or CN1 Pin 31 T-CON



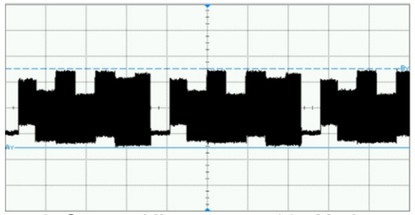
2uSec per/div 716mV p/p

P703 Pin 22 or CN1 Pin 30 T-CON



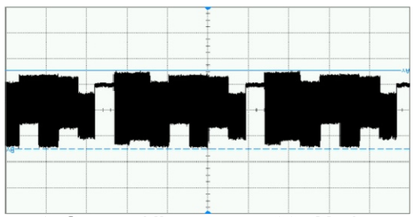
2uSec per/div 716mV p/p

P703 Pin 23 or CN1 Pin 29 T-CON



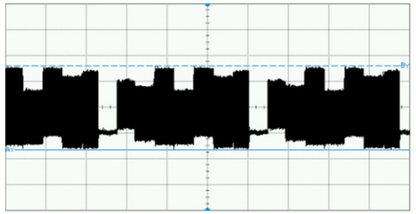
2uSec per/div 793mV p/p

P703 Pin 24 or CN1 Pin 28 T-CON



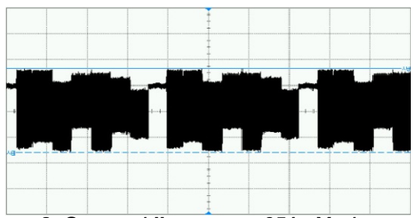
2uSec per/div 793mV p/p

P703 Pin 27 or CN1 Pin 24 T-CON



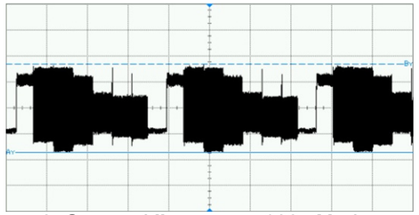
2uSec per/div 651mV p/p

P703 Pin 28 or CN1 Pin 23 T-CON



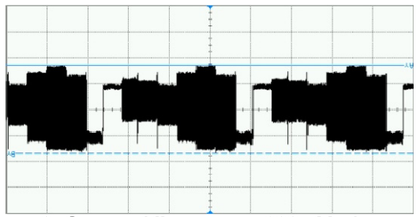
2uSec per/div 651mV p/p

P703 Pin 29 or CN1 Pin 22 T-CON



2uSec per/div 682mV p/p

P703 Pin 30 or CN1 Pin 21 T-CON

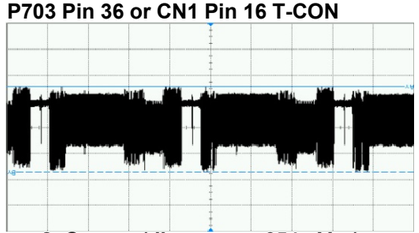


2uSec per/div 682mV p/p

P703 Pin 35 or CN1 Pin 17 T-CON

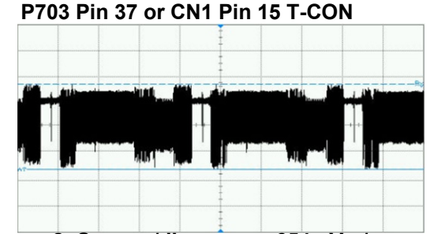
2uSec per/div 654mV p/p

P703 Pin 36 or CN1 Pin 16 T-CON



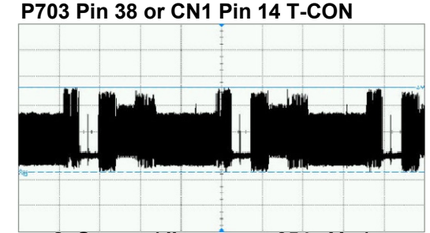
2uSec per/div 654mV p/p

P703 Pin 37 or CN1 Pin 15 T-CON



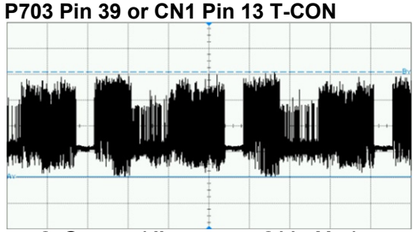
2uSec per/div 654mV p/p

P703 Pin 38 or CN1 Pin 14 T-CON



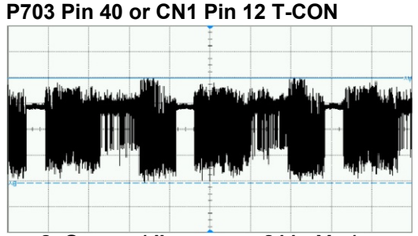
2uSec per/div 654mV p/p

P703 Pin 39 or CN1 Pin 13 T-CON



2uSec per/div 811mV p/p

P703 Pin 40 or CN1 Pin 12 T-CON



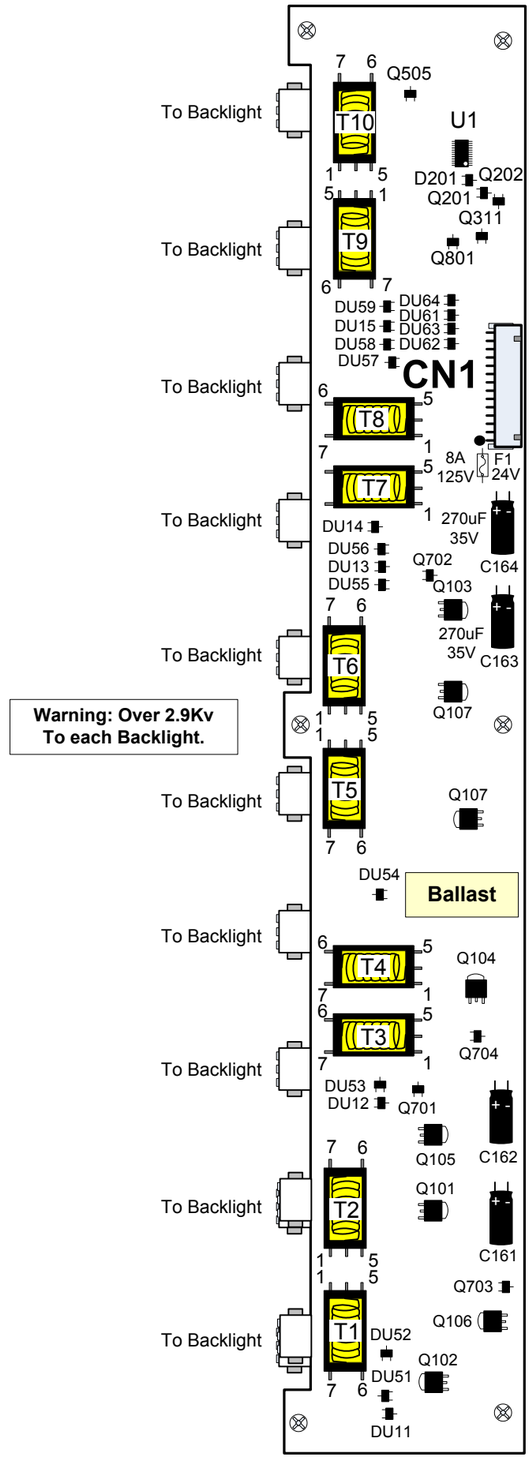
2uSec per/div 811mV p/p

LVDS CABLE WAVEFORMS:
Waveforms taken using SMTP Color Bar input.
All readings give the Scale 200mV and 2uSec per division Time Base related to scope settings.

37LK450 Ballast (Inverter) Drawing

BALLAST COMPONENT VOLTAGE TABLE

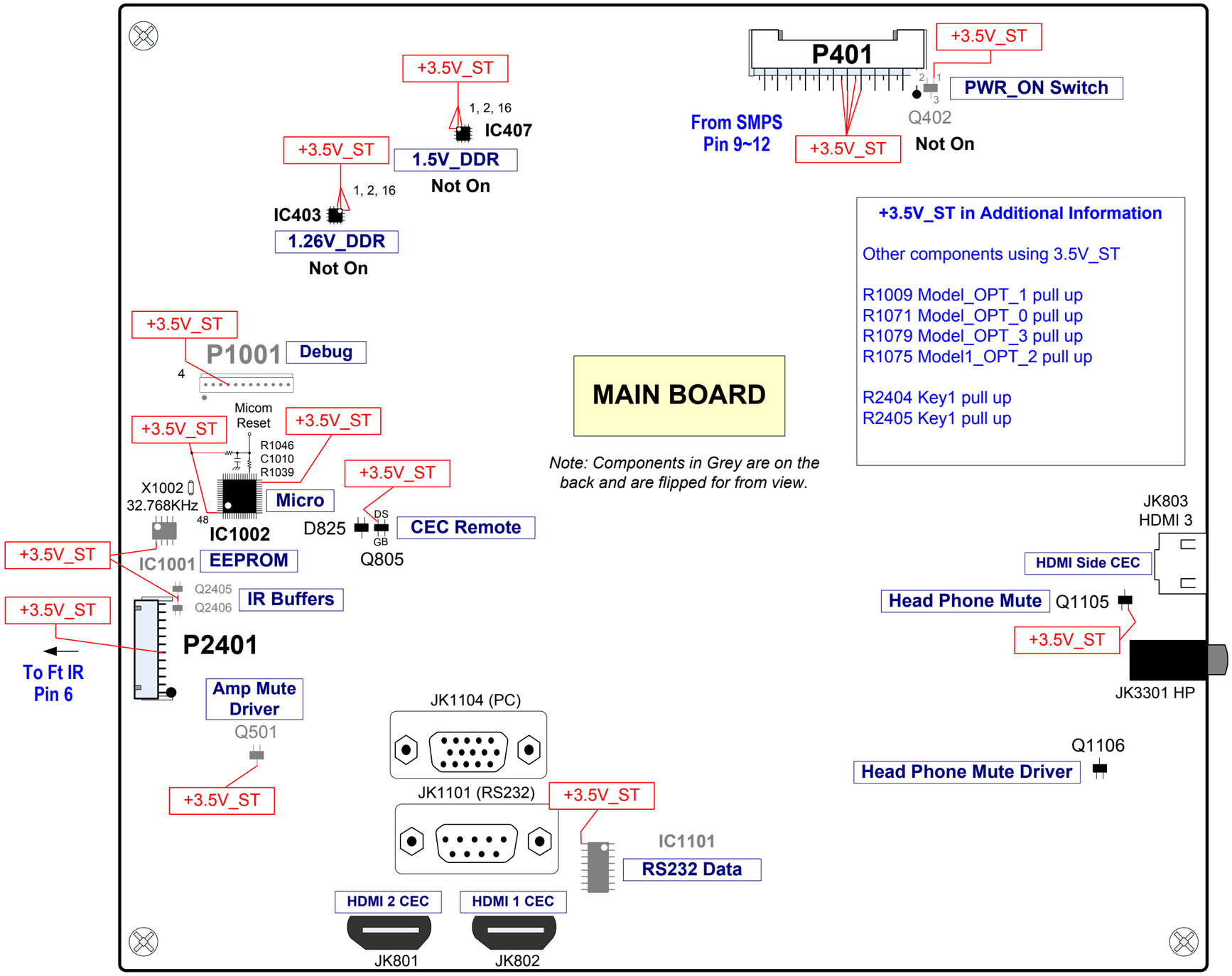
Q101 PIN Run 1) 10.86V 2) 24V 3) 8.96V	**Q202** PIN Run B) 2.9V C) 0V E) 0V	**DU11** PIN Run 1) 0V 2) 1.58V 3) 0V	**DU55** PIN Run 1) 0V 2) 1.6V 3) 2.61V
Q102 PIN Run 1) 3.17V 2) 8.9V 3) 0V	**Q311** PIN Run B) 0.58V C) 0.06V E) 0V	**DU12** PIN Run 1) 0V 2) 1.59V 3) 0V	**DU56** PIN Run 1) 0V 2) 1.26V 3) 2.61V
Q103 PIN Run 1) 11.23V 2) 24V 3) 9.07V	**Q505** PIN Run B) 0V C) 1.51V E) 0V	**DU13** PIN Run 1) 0V 2) 1.57V 3) 0V	**DU57** PIN Run 1) 0V 2) 0.91V 3) 2.65V
Q104 PIN Run 1) 3.14V 2) 9.08V 3) 0V	**Q701** PIN Run B) 11.03V C) 8.97V E) 10.87V	**DU14** PIN Run 1) 0V 2) 1.6V 3) 0V	**DU58** PIN Run 1) 0V 2) 1.23V 3) 2.66V
Q105 PIN Run 1) 10.86V 2) 24V 3) 10.86V	**Q702** PIN Run B) 11.43V C) 9.08V E) 11.26V	**DU15** PIN Run 1) 0V 2) 1.54V 3) 0V	**DU59** PIN Run 1) 0V 2) 1.41V 3) 2.66V
Q106 PIN Run 1) 0V 2) 8.9V 3) 0V	**Q703** PIN Run B) 3.29V C) 0V E) 3.16V	**DU51** PIN Run 1) 2.6V 2) 0.52V 3) 0V	**DU61** PIN Run 1) 0V 2) 0V 3) 24.12V
Q107 PIN Run 1) 11.27V 2) 24V 3) 9.08V	**Q704** PIN Run B) 3.27V C) 0V E) 3.14V	**DU52** PIN Run 1) 0V 2) 0.8V 3) 2.6V	**DU62** PIN Run 1) 0V 2) 3.09V 3) 24.12V
Q108 PIN Run 1) 3.15V 2) 9.06V 3) 0V	**Q801** PIN Run B) 5V C) 0V E) 0V	**DU53** PIN Run 1) 0V 2) 1.66V 3) 2.63V	**DU63** PIN Run 1) 0V 2) 3.32V 3) 24.12V
Q201 PIN Run B) 0V C) 1.49V E) 0V	**D201** PIN Run 1) 15.49V 2) 5.48V 3) 14.59V	**DU54** PIN Run 1) 2.6V 2) 0.9V 3) 2.66V	**DU64** PIN Run 1) 0V 2) 3.15V 3) 24.12V



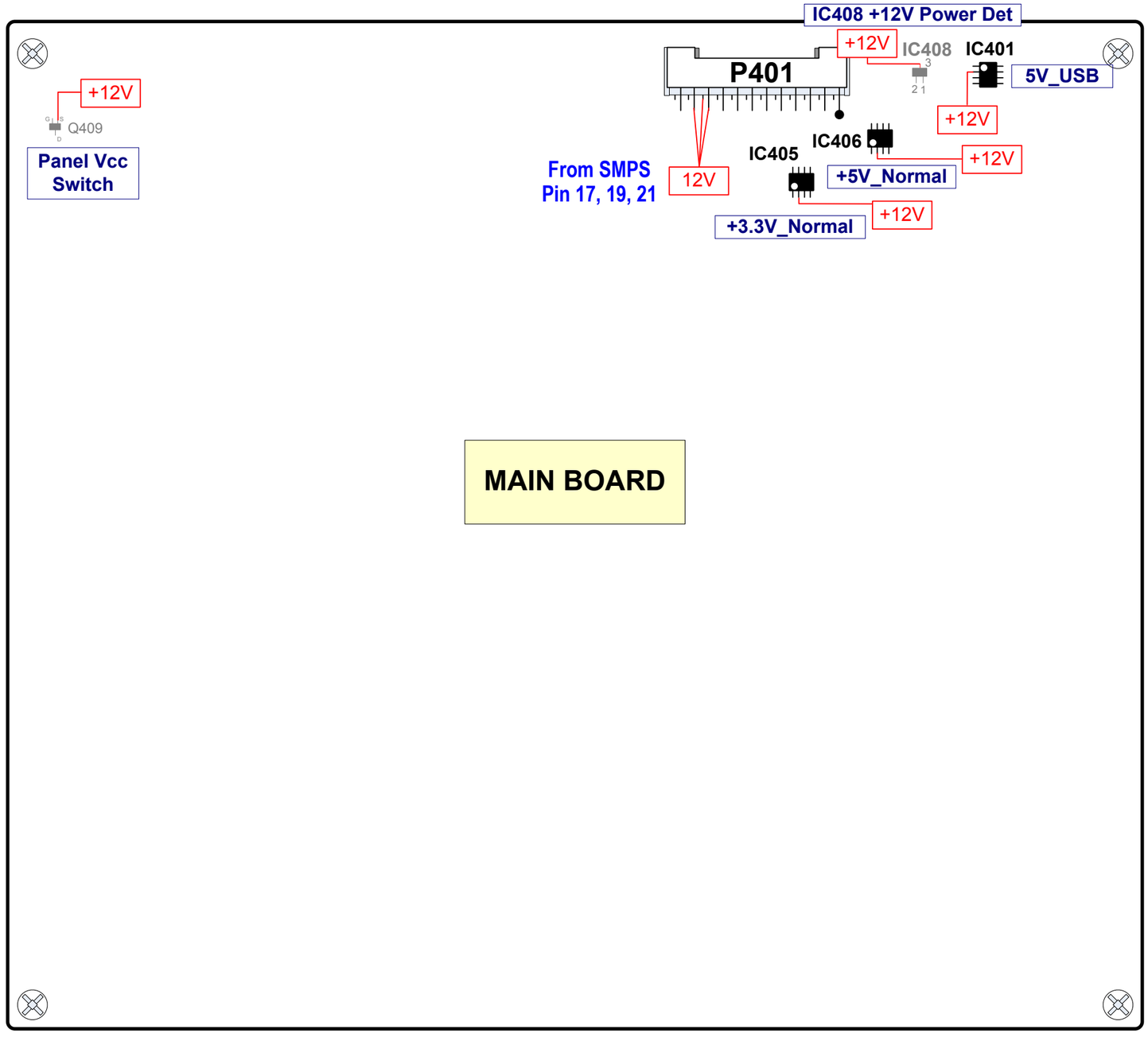
U1

1)	15.41V	13)	1.04V
2)	9.12V	14)	1.98V
3)	9.12V	15)	0.1V
4)	0V	16)	1.44V
5)	3.28V	17)	1.48V
6)	3.3V	18)	2.33V
7)	5.48V	19)	0V
8)	2.9V	20)	0V
9)	14.41V	21)	1.36V
10)	14.44V	22)	0V
11)	1.48V	23)	9.06V
12)	0V	24)	14.7V

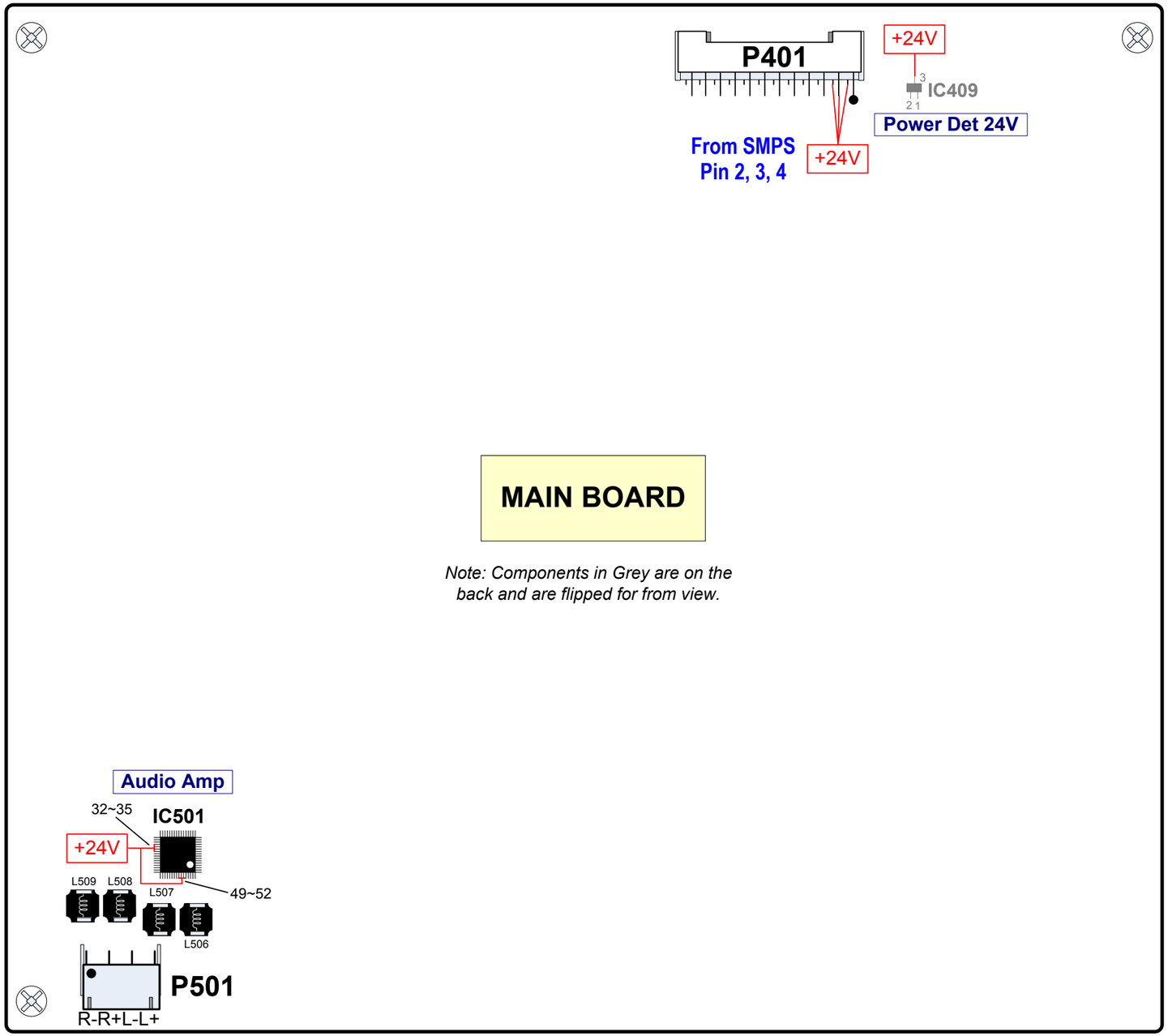
37LK450 +3.5V_ST Voltage Distribution Circuits



37LK450 +12V Voltage Distribution Circuits



37LK450 +24V Voltage Distribution Circuits



37LK450 Other Voltage Distribution Circuits

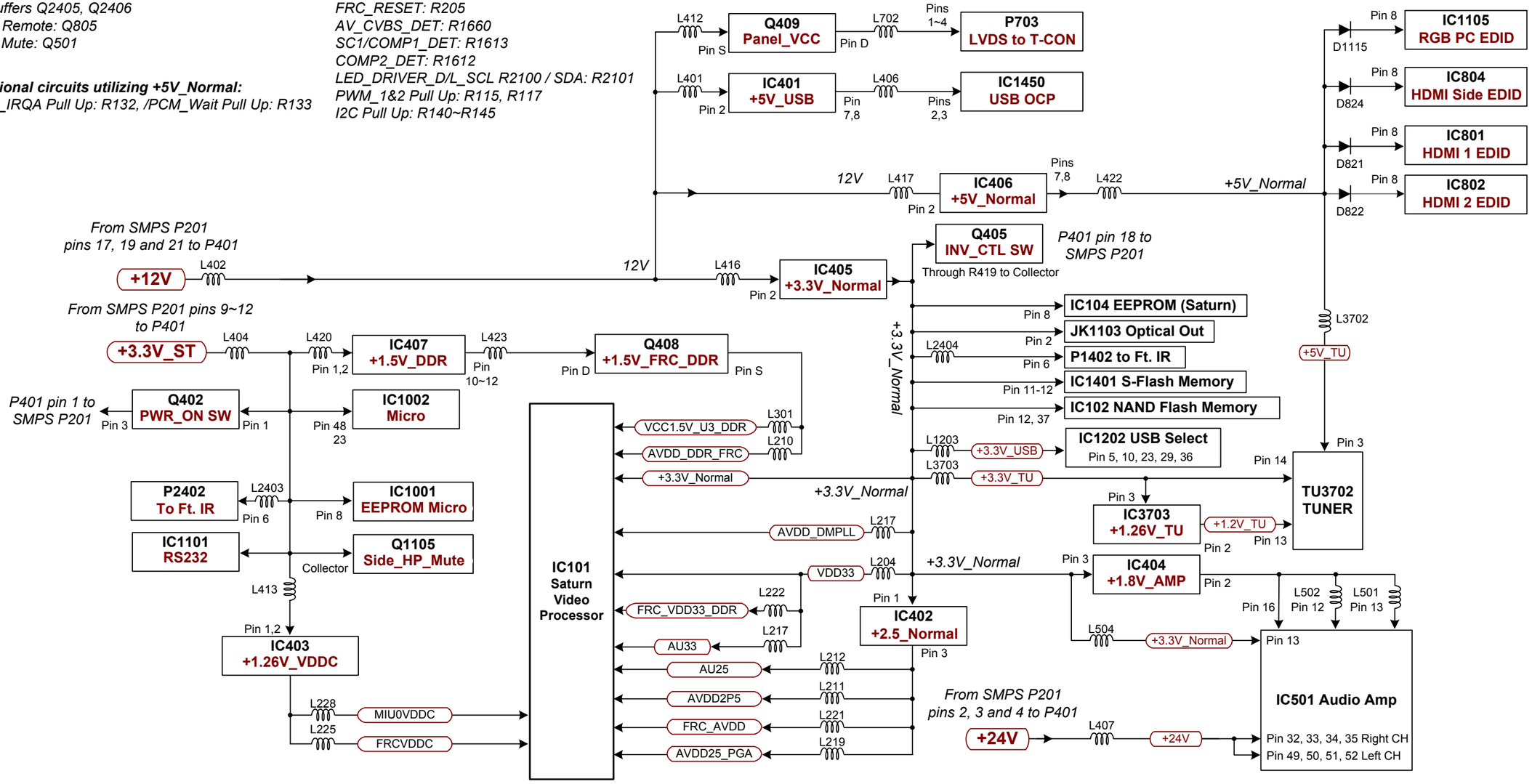
Additional circuits utilizing +3.5V_ST:
Reset for Microprocessor: C1010 and R1046
Key 1 and Key 2 pull up: R2401, R2405
S/T_SCL R4043, S/T_SDA R4035
Micom Model Option 0~3 pull up:
R1071, R1009, R1075, R1079
IR Buffers Q2405, Q2406
CEC Remote: Q805
Amp Mute: Q501

Additional circuits utilizing +5V_Normal:
/PCM_IRQA Pull Up: R132, /PCM_Wait Pull Up: R133

Additional circuits utilizing +3.3V_Normal:
CEC Remote: Q806
DSUB_Det: R1146
HP_DET: R1155
Write Protect (WP): IC1401 pin 3 R1403
IC_AGC_MAIN Pull Up: L227 R4019
FRC_RESET: R205
AV_CVBS_DET: R1660
SC1/COMP1_DET: R1613
COMP2_DET: R1612
LED_DRIVER_D/L_SCL R2100 / SDA: R2101
PWM_1&2 Pull Up: R115, R117
I2C Pull Up: R140~R145

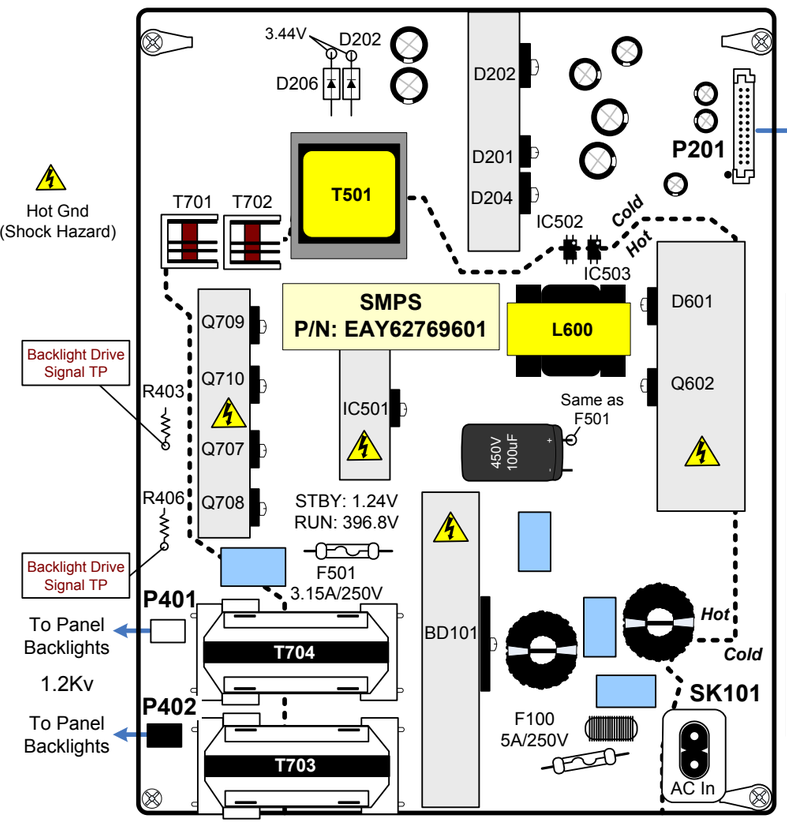
Additional circuits utilizing +12V:
IC408 Power_Det: R448
Panel Power Drivers: R431 to Q406, R439, R440 to Q407

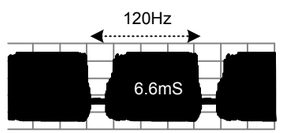
Additional circuits utilizing +24V:
IC409 Power_Det: R482



42CS560 INTERCONNECT DIAGRAM

(1) **PWR-On** Pin 1: Turns on 12V, 24V (21V) to the Main and 398V to the on board Ballast circuit.
(2) **INV-On** Pin 18: Turns on the Backlights
(3) **Error_Out** Pin 24: Goes high (3.3V) when the backlights are told to come on. Goes back low when they light. If it goes high again on the 5th attempt to fire the backlights, the Ballast shuts off.
(4) **A-DIM** Pin 20: Is not used (Fixed Voltage).
(5) **P-DIM** Pin 22 can vary according to incoming video IRE level and OSD Backlight setting Output from the Video Processor IC100. Range 0.95V to 2.64V.

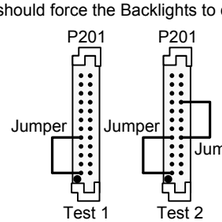




2Msec per/div
4.03V p/p 48KHz
80% P-DIM
R403 Bottom leg
R406 Bottom leg

SMPS TEST 1 : Forcing SMPS On.
Remove AC Power.
Disconnect P401 on Main Board.
Jump pin 1 (PWR_ON) to pin 9, 10, 11 or 12 .
Apply AC Power. This should force the SMPS to the on state. All Voltages should be produced.
(20V and 12V to Main). 397V Backlight Power.
Backlights are not on.
Disconnect AC Power.

SMPS TEST 2 : Forcing Backlights On.
Leave first connector in place.
Jump pin 18 (INV_ON) to pin 9, 10, 11 or 12.
Apply AC Power.
This should force the Backlights to come on.

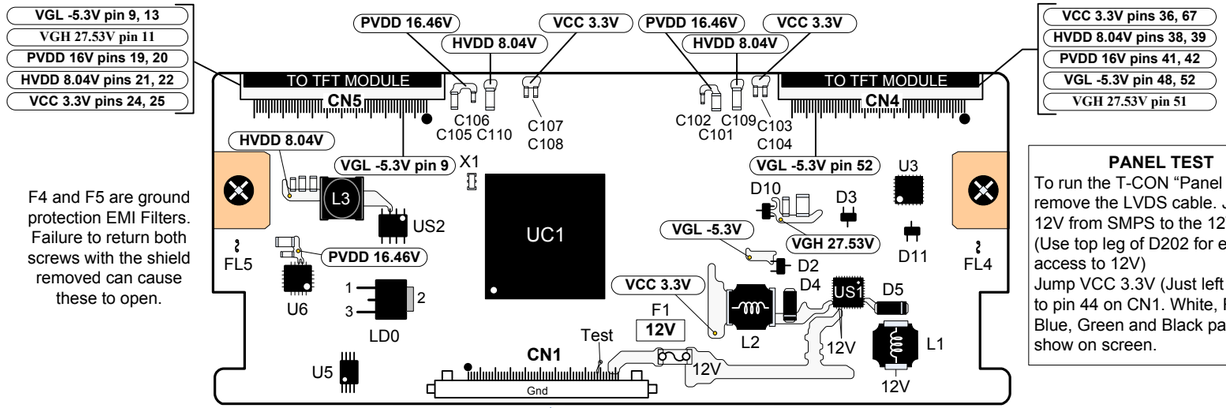


Note: STBY 3.5V Must be present when AC applied.

SMPS Test P201 Open

Pin	No Load
24	0.03V
23	n/c
22	3.25V
21	12.29V
20	1.64V
19	12.29V
18	3.41V
17	12.29V
13-16	Gnd
9-12	3.41V
5-8	Gnd
2-4	19.17V
1	3.41V

Front IR / Key Board Intelligent Sensor
J1
A



F4 and F5 are ground protection EMI Filters. Failure to return both screws with the shield removed can cause these to open.

PANEL TEST
To run the T-CON "Panel Test", remove the LVDS cable. Jump 12V from SMPS to the 12V fuse. (Use top leg of D202 for easy access to 12V)
Jump VCC 3.3V (Just left of L2) to pin 44 on CN1. White, Red, Blue, Green and Black patterns show on screen.

12V Pins 48 ~ 51 and LVDS Video Signals

Warning: Return the Screws when the Shield is removed for Service if Power is going to be applied.

P401 to SMPS P201

Pin	Diode
1	OL
2-4	2.92V
5-8	Gnd
9-12	0.64V
13-16	Gnd
17	OL
18	1.57V
19	OL
20	OL
21	OL
22	2.57V
23	n/c
24	OL

For Voltages See P201 SMPS

P201 "SMPS Board" To P401 "MAIN Board"

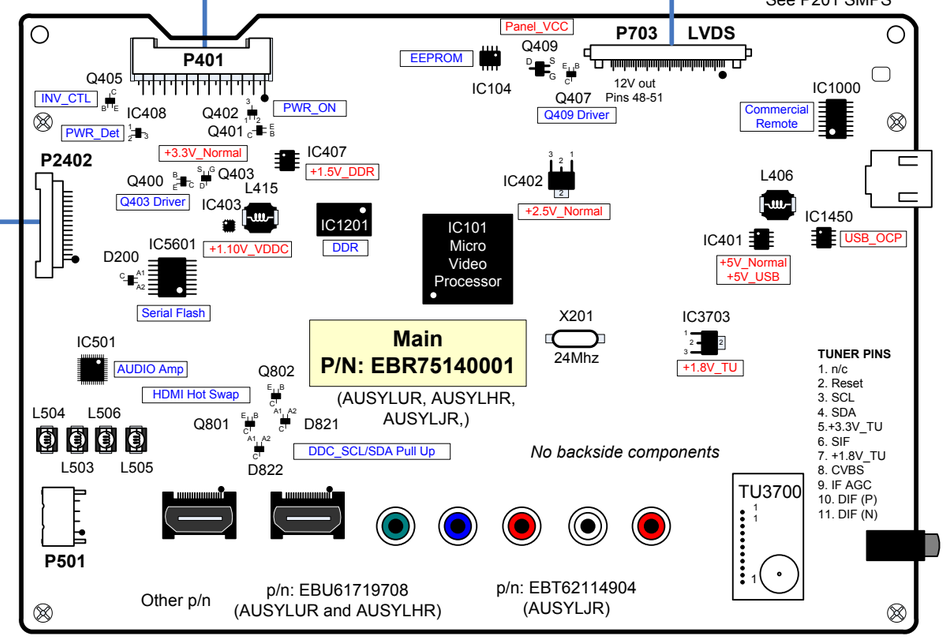
Pin	Label	STBY	Run	Diode Check
24	ERROR	0V	0V	Open
23	n/c	n/c	n/c	Open
22	P-DIM	0.02V	0.95V~2.64V	Open
21	12V	0V	12.27V	Open
20	A-DIM	n/c	1.53V	Open
19	12V	0V	12.27V	Open
18	INV-ON/OFF	0V	2.96V	Open
17	12V	0V	12.27V	Open
16	Gnd	Gnd	Gnd	Open
13-15	Gnd	Gnd	Gnd	Gnd
9-12	3.5V (Stby)	3.41V	3.39V	Open
5-8	Gnd	Gnd	Gnd	Gnd
2-4	20V	0V	21.56V	0.82V
1	PWR_ON	0V	3.24V	0.91V

3.43V on ERROR line indicate a Backlight firing fault.

P2402 "MAIN Board" To J1 "IR Board"

Pin	Label	STBY	Run	Diode Check
15	S/T_SDA	3.34V	3.34V	3.0V
14	S/T_SCL	3.34V	3.34V	3.1V
13	Gnd	Gnd	Gnd	Gnd
12	LED_R	0V	0V	OL
11	+3.3V_Normal	0.00V	3.26V	0.57V
10	Gnd	Gnd	Gnd	Gnd
9	IR	3.34V	3.34V	2.68V
8	LED_R	0V	0V	OL
7	Gnd	Gnd	Gnd	Gnd
6	3.5V_ST	3.41V	3.35V	0.65V
5	KEY 2	3.30V	3.31V	OL
4	KEY 1	3.30V	3.31V	OL
3	Gnd	Gnd	Gnd	Gnd
2	Sensor_SDA	0V	3.23V	0.79V
1	Sensor_SCL	0V	3.23V	1.14V

To Front IR A



See LVDS waveforms on Page 2 of Interconnect Diagram

To all Speakers
All pins 10.84V
Diode Test = OL

See DC Voltages for Main Board on Page 3 of Interconnect Diagram

Key 1 Line J1 or P2401 pin 4

Resistance		Voltage	
Volume (+)	1.96M Ω	Volume (+)	1.68V
Volume (-)	1.24M Ω	Volume (-)	1.13V
Settings	540K Ω	Menu	0.47V
OK	19.3 Ω	Enter	0.01V

Key 2 Line J1 or P2401 pin 5

Resistance		Voltage	
CH (Up)	1.96M Ω	CH (Up)	1.68V
CH (Dn)	1.24M Ω	CH (Dn)	1.13V
Power	540K Ω	Power	0.47V
Input	19.3 Ω	Input	0.01V

Key 1 or 2, No Key Pressed, resistance: 15.85M Voltage 3.3V

42CS560 Main Board Component Voltages

IC1001 — Micro EEPROM

Pin	
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	3.25V (SDA)
[6]	3.25V (SCL)
[7]	0V (Gnd)
[8]	3.25V (B+)

IC401 — +5V_Normal +5V_USB

Pin	
[1]	0V (Gnd)
[2]	12.23V (In)
[3]	0V (Gnd)
[4]	1.23V (FB)
[5]	3.26V (COMP)
[6]	12.22V (EN)
[7]	2.14V (SS)
[8]	0V (n/c)

For Output, use L406

IC402 — +2.5V_Normal Regulator

Pin	
[1]	0V (Gnd)
[2]	2.54V (Out)
[3]	3.25V (In)

Q400 — +3.3V_Normal Driver for Q403

Pin	
B	0.65V (POWER_ON/OFF_1)
C	0V (Ctrl)
E	0V (Gnd)

Q407 — PANEL_VCC Drives Q409

Pin	
B	0.0V
C	0.68V
E	Gnd

Q409 — PANEL_VCC Switch

Pin	
S	12.2V (In)
G	1.84V (Enable)

IC403 — +1.10V_VDDC Regulator

Pin	
[1]	3.33V (In) +3.3V_ST
[2]	3.33V (In) +3.3V_ST
[3]	Do not Measure
[4]	0V (Gnd)
[5]	0V (Gnd)
[6]	Do not Measure
[7]	Do not Measure
[8]	Do not Measure
[9]	2.16V
[10]	1.23V (Out)
[11]	1.23V (Out)
[12]	1.23V (Out)
[13]	4.61V (BOOT)
[14]	0V (n/c)
[15]	3.24V (EN) 3.3V_Normal
[16]	3.33V (In) +3.3V_ST

IC407 — (+1.5V_DDR) Regulator

Pin	
[1]	3.33V (In) +3.3V_ST
[2]	6V (n/c)
[3]	3.33V (In) +3.3V_ST
[4]	3.24V (EN) +3.3V_Normal
[5]	0V (Gnd)
[6]	2.09V (SS)
[7]	0.79V (FB)
[8]	1.53V (Out)

Q401 — Power On/Off Driver for Q402

Pin	
B	0.49V (RL_ON)
C	0.07V (Ctrl)
E	Gnd

D200 — SOC_Reset Speed Up

Pin	
[C]	0V
[A]	0V
[A-C]	0V (Gnd)

Q801 — HDMI 2 Hot Swap

Pin	
B	0.66V (HPD2)
C	0.04V (HDMI HS)
E	Gnd

IC408 — Power_Det 24V, 12V, 3.5V

Pin	
[1]	0V (Gnd)
[2]	3.25V (Reset)
[3]	3.35V (In) +12V

IC1000 — Commercial Remote

Pin	
[1]	3.34V (C1+)
[2]	8.8V (V+)
[3]	3.25V (C1-)
[4]	3.34V (C2+)
[5]	V (V+)
[6]	(-5.7V) (C2-)
[7]	0V (n/c)
[8]	3.34V (n/c)
[9]	3.36V (n/c)
[10]	5.79V (n/c)
[11]	0V (DN1)
[12]	0.04V (ROut1)
[13]	0V (RIn1)
[14]	(-5.73V) (DOut1)
[15]	0V (Gnd)
[16]	3.33V (In) +3.3V_ST

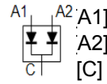
IC3703 — +1.8V_TU Regulator

Pin	
[1]	0V (Gnd)
[2]	3.30V (Reset)
[3]	3.33V (In)

Q402 — Power On/Off Switch

Pin	
1	3.33V (In) +3.3V_ST
2	3.35V (Ctl)
3	3.23V (Out) PWR_ON

D821 — DDC_SCL1/SDA1 Pull Up



Pin	
[A1]	V (5V_HDMI_1)
[A2]	5.32V (+5V_Normal)
[C]	5.14V (Pull_Up)

Q802 — HDMI 1 Hot Swap

Pin	
B	0.66V (HPD1)
C	0.04V (HDMI HS)
E	Gnd

IC1450 — 5V Short Protection for USB

Pin	
[1]	0V (Gnd)
[2]	4.98V (In)
[3]	4.98V (In)
[4]	3.3V (USB-En)
[5]	4.96V
[6]	4.98V (Out)
[7]	4.98V (Out)
[8]	n/c (0V)

IC5601 — Serial Flash Memory

Pin	
[1]	3.28V (In)
[2]	3.28V (In)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	0V (Gnd)
[6]	0.8V
[7]	0.86V
[8]	0.54V
[9]	1.75V
[10]	1.33V (Out)
[11]	1.33V (Out)
[12]	1.33V (Out)
[13]	4.72V
[14]	n/c
[15]	3.29V
[16]	3.28V (In)

Q403 — +3.3V_Normal Switch

Pin	
S	3.33V (In) +3.3V_ST
G	0.07V (Enable)
D	3.27V (Out) +3.3V_Normal

Q405 — Inverter On/Off Switch

Pin	
B	0.01V (INV_CTL)
C	2.98V (INV_On)
E	0V (Gnd)

D822 — DDC_SCL2/SDA2 Pull Up

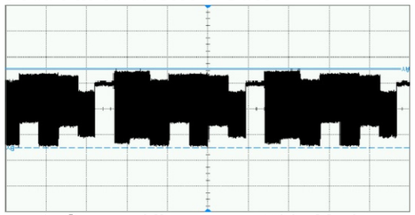
Pin	
[A1]	5.32V (5V_HDMI_1)
[A2]	5.32V (+5V_Normal)
[C]	5.14V (Pull_Up)

42CS560 LVDS P703 WAVEFORMS

P703 Pin 12 Main or CN1 T-CON

2uSec per/div 611mV p/p

P703 Pin 13 or CN1 T-CON

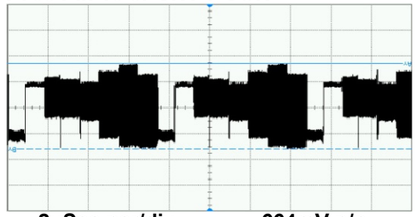


2uSec per/div 611mV p/p

P703 Pin 14 or CN1 T-CON

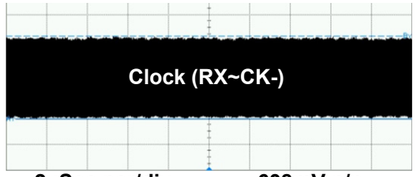
2uSec per/div 664mV p/p

P703 Pin 15 or CN1 T-CON



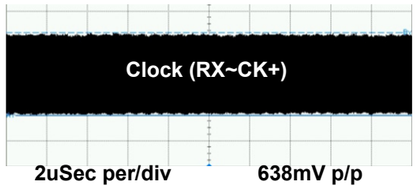
2uSec per/div 664mV p/p

P703 Pin 16 or CN1 T-CON and
P703 Pin 32 or CN1 T-CON



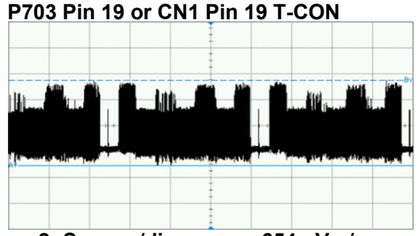
2uSec per/div 638mV p/p

P703 Pin 17 or CN1 and
P703 Pin 33 or CN1 T-CON



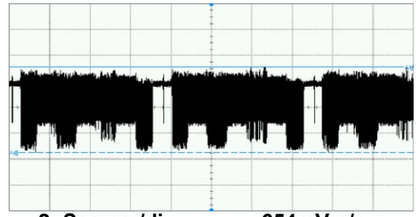
2uSec per/div 638mV p/p

P703 Pin 19 or CN1 Pin 19 T-CON



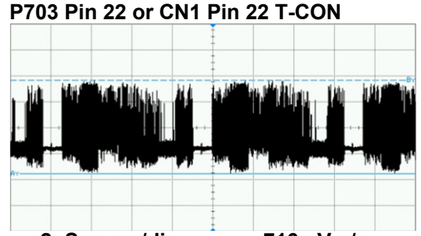
2uSec per/div 654mV p/p

P703 Pin 20 or CN1 Pin 20 T-CON



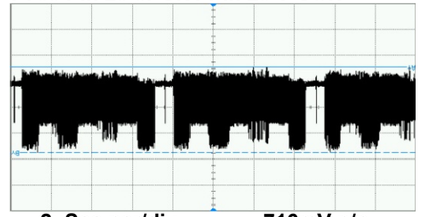
2uSec per/div 654mV p/p

P703 Pin 22 or CN1 Pin 22 T-CON



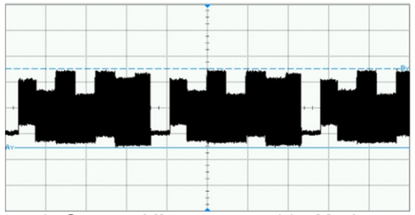
2uSec per/div 716mV p/p

P703 Pin 23 or CN1 Pin 23 T-CON



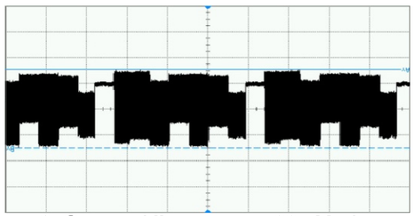
2uSec per/div 716mV p/p

P703 Pin 24 or CN1 T-CON



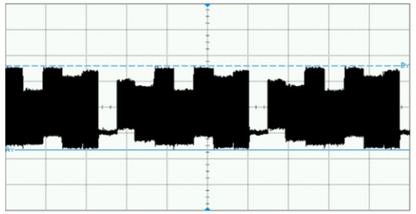
2uSec per/div 793mV p/p

P703 Pin 25 or CN1 T-CON



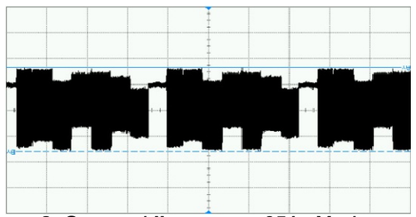
2uSec per/div 793mV p/p

P703 Pin 28 or CN1 T-CON



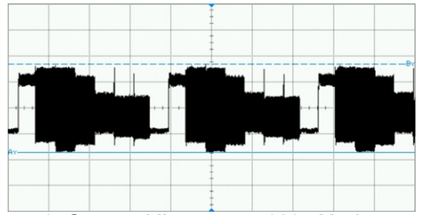
2uSec per/div 651mV p/p

P703 Pin 29 or CN1 T-CON



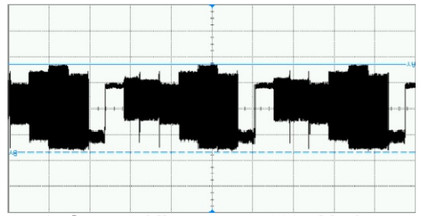
2uSec per/div 651mV p/p

P703 Pin 30 or CN1 T-CON



2uSec per/div 682mV p/p

P703 Pin 31 or CN1 T-CON



2uSec per/div 682mV p/p

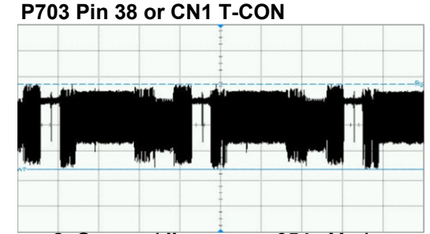
P703 Pin 35 or CN1 T-CON

2uSec per/div 654mV p/p

P703 Pin 36 or CN1 T-CON

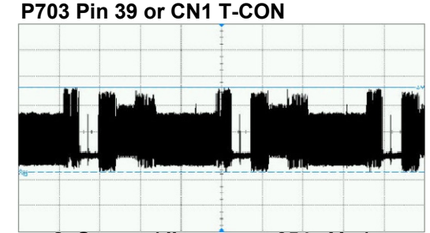
2uSec per/div 654mV p/p

P703 Pin 38 or CN1 T-CON



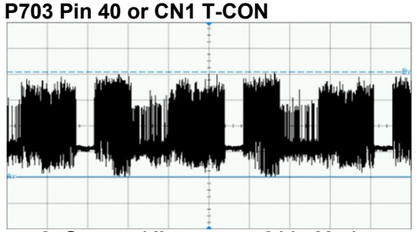
2uSec per/div 654mV p/p

P703 Pin 39 or CN1 T-CON



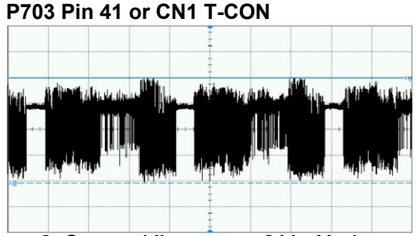
2uSec per/div 654mV p/p

P703 Pin 40 or CN1 T-CON



2uSec per/div 811mV p/p

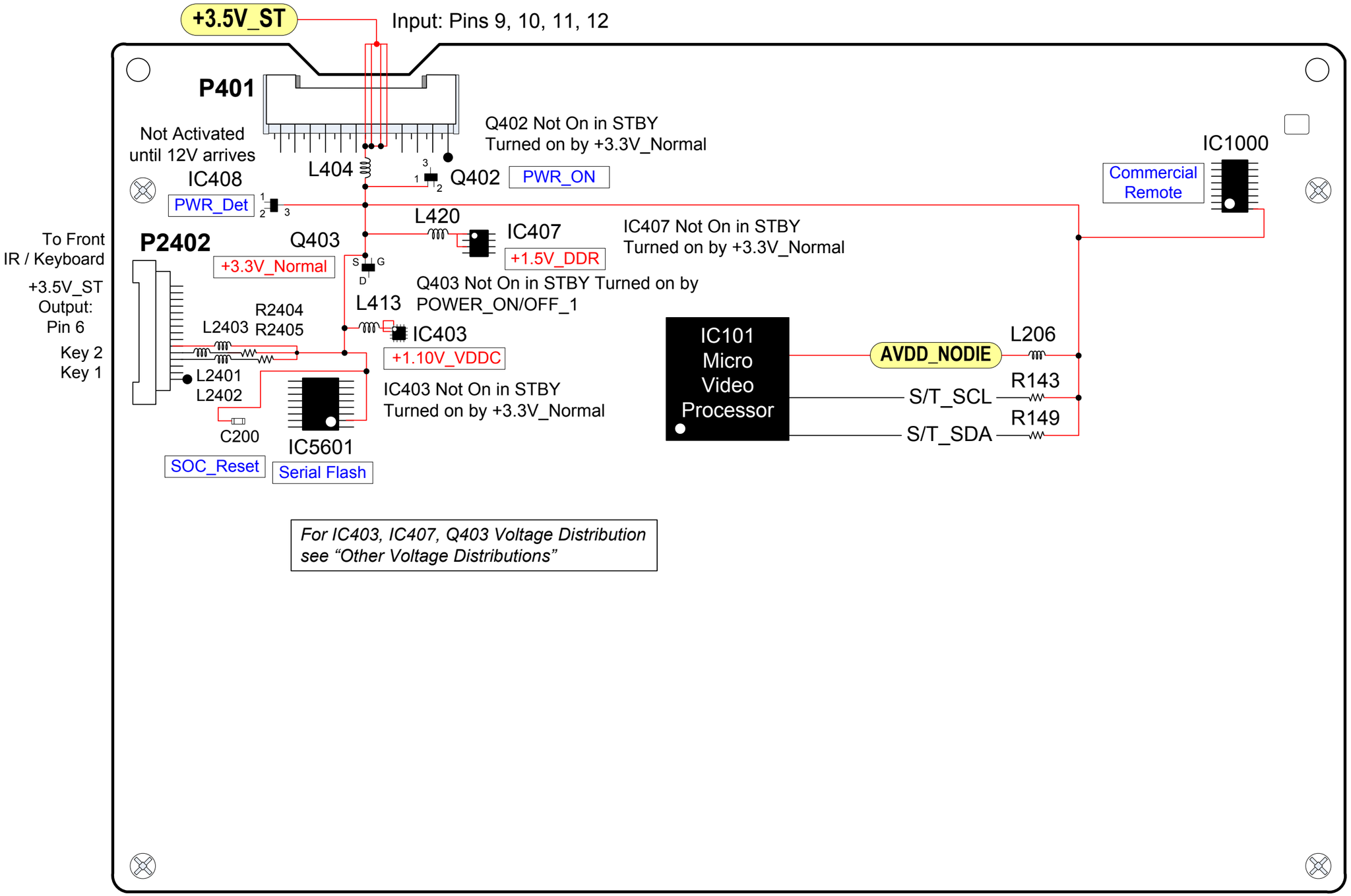
P703 Pin 41 or CN1 T-CON



2uSec per/div 811mV p/p

LVDS CABLE WAVEFORMS:
Waveforms taken using SMTP Color Bar input.
All readings give the Scale 200mV and 2uSec per division Time Base related to scope settings.

42CS560 Main Board +3.5V_ST Distribution



42CS560 Main Board +12V Distribution

PWR_ON Q402: Turned on by Q401 turned on by IC101 RL_ON.
Output pin 1 to SMPS. Turns on 12V and 20V.
(For power to Q402, see +3.5V_ST Voltage Distribution)

Input: Pins 17,19,21 **+12V**

P401

L402 +3.5V_ST

PWR_ON Q402 Gnd R401 RL_ON

R406

IC408 R448 PWR_Det

Q401 Q402 Ctrl.

Panel_VCC To T-CON

L412 Panel_VCC

Q409 R439 R440

12V out Pins 48-51 **P703 LVDS**

Panel_VCC Q407 R430 Panel_CTL

Q409 Ctrl. RL_ON

Note: Q409 turned on by
PANEL_CTL from IC101 via Q407

USB

L406 +5V_USB

+5V_Normal

L425

To pin 1 USB

L401 L1451

IC401 IC1450

+5V_Normal +5V_USB USB_OCP

IC101 Micro Video Processor

+5V_Normal

X201

24Mhz

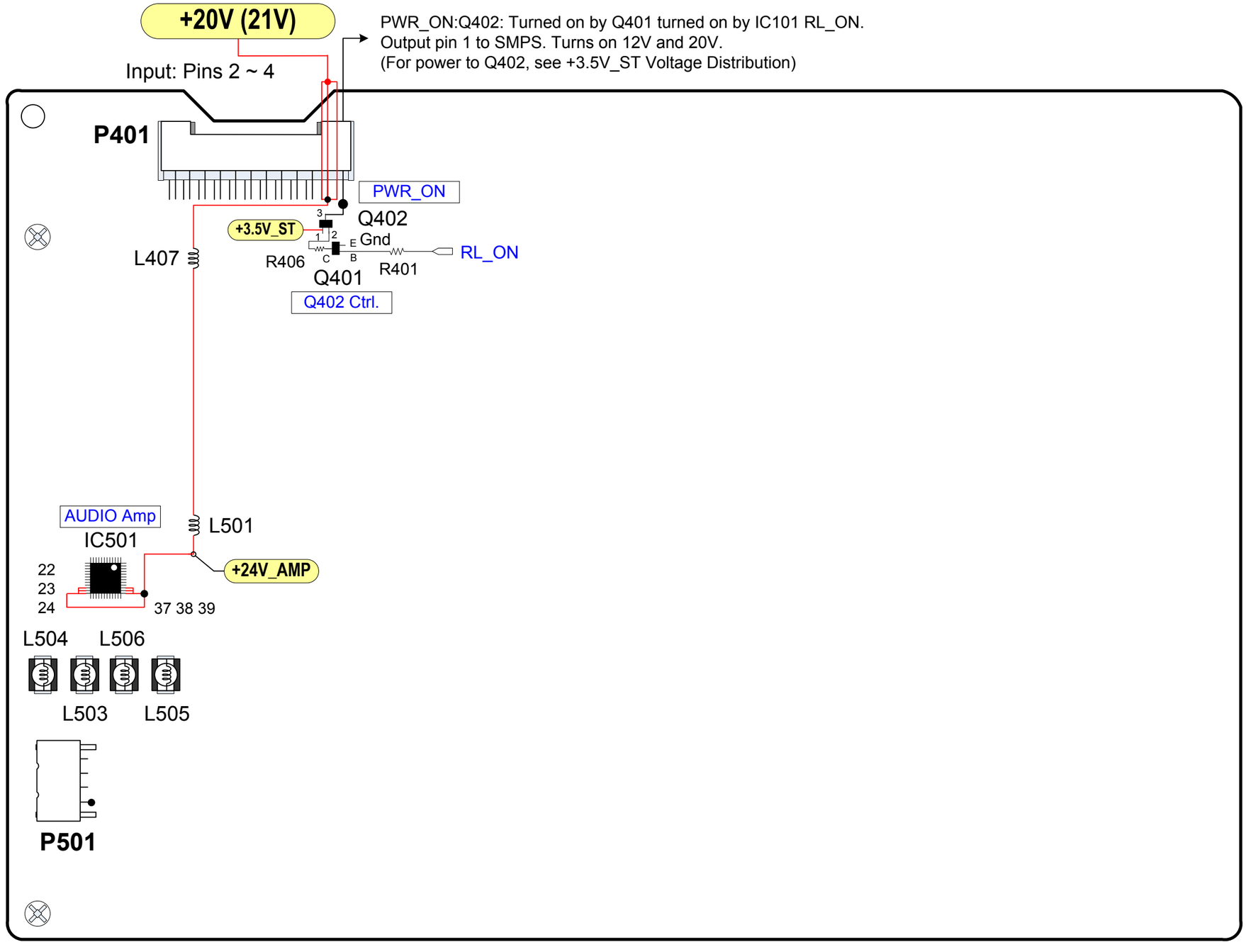
DDC_SCL1/SDA1 Pull Up

D821

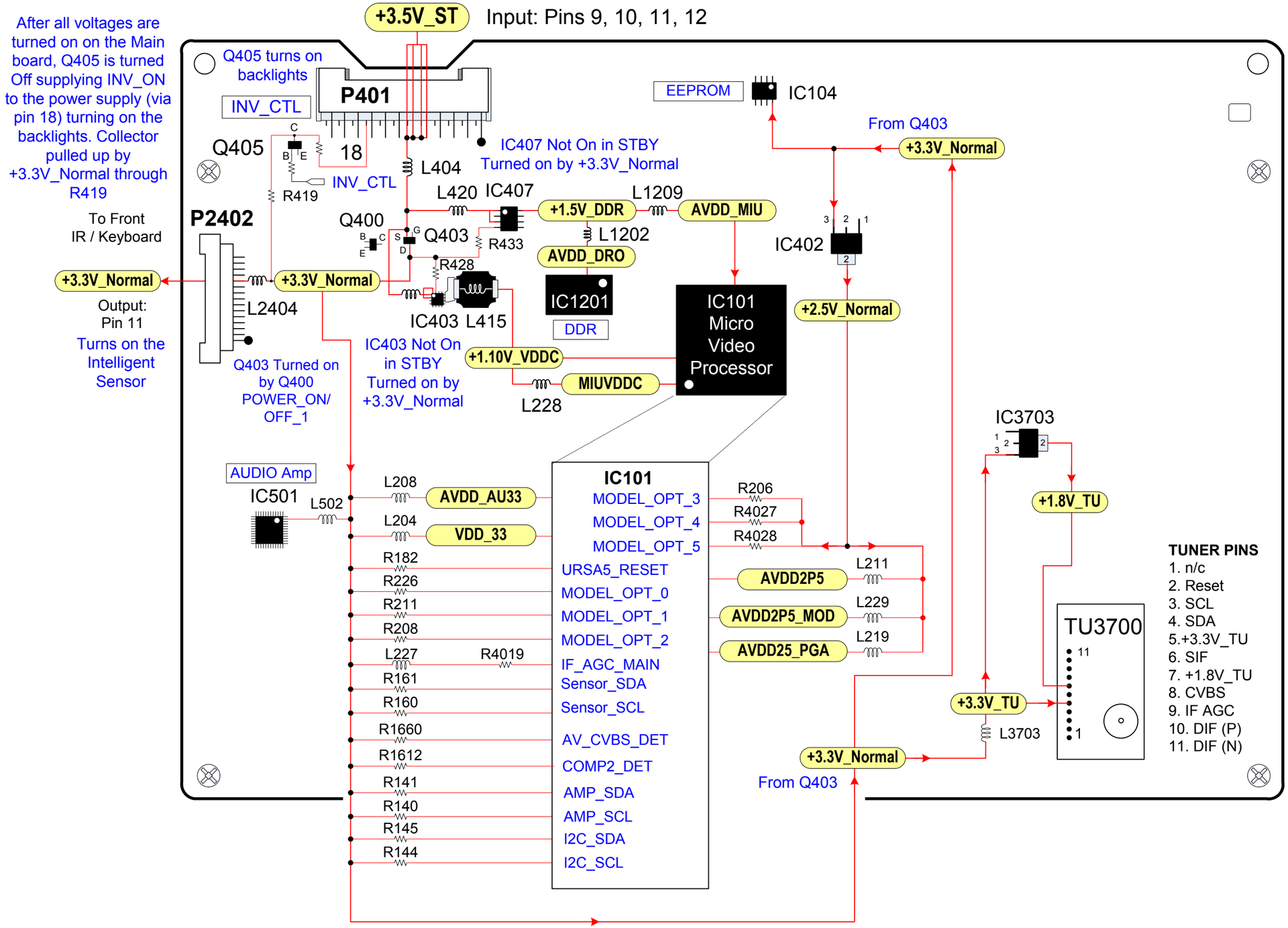
DDC_SCL2/SDA2 Pull Up D822

42CS560 Main Board +21V Distribution

NOTE: 20V is the label, but the Voltage is actually 21V



42CS560 Main Board Other Voltage Distributions



42LG60 CIRCUIT INTERCONNECT DIAGRAM

TFT PANEL

LD1 Blue LED TFT Drive PWB Check

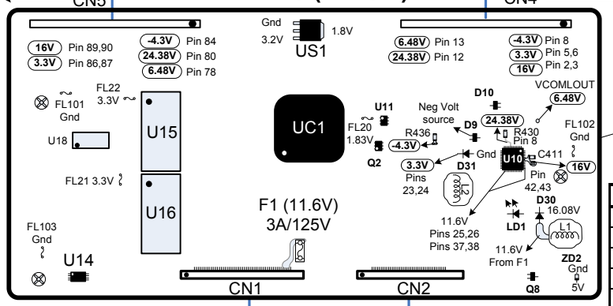
SET 0FF LED OFF	Lamp Assist LED ON	SET ON LED OFF
Anode 0V Cathode0V	Anode 11.6V Cathode0V	Anode 11.6V Cathode 9.5V

LD1 assist the backlights with firing in dimly lit rooms.
The appearance of LD1 when the set is on appears to be lit dimly.
However there is a small hole in the back panel frame and the
T-CON PWB that allows the backlight to make it appear lit.

16V Pin 89,90
3.3V Pin 86,87
-4.3V Pin 84
24.38V Pin 80
6.48V Pin 78

CN5

TFT-Drive (T-CON)



CN4

16V Pin 2,3
3.3V Pin 5,6
-4.3V Pin 8
24.38V Pin 12
6.48V Pin 13

D9

A	A (-6.05V)
Common	C (Gnd)
C	Common (-3.5V)

Q8

B	B (0V)
E	E (Gnd)
C	C (9.47V)

U11

1	1.8V	4	0V
2	Gnd	5	Gnd
3	1.55V	6	3.3V

U14

1	Gnd	5	3.3V
2	Gnd	6	2.9V
3	Gnd	7	3.3V
4	Gnd	8	3.3V

D10

C	A (26.7V)
A	A (14.5V)
A	C (19.6V)

Q2

1	3.3V	4	Gnd
2	0.6V	5	0V
3	Gnd	6	0V

P2 "SMPS" to P801 "Main PWB"

Odd Pins

Pin	Label	STBY	Run
1	16V	0V	16V
3	Gnd	Gnd	Gnd
5	12V	0V	11.8V
7	Gnd	Gnd	Gnd
9	5V	5V	5.15V
11	5V	5V	5.15V
13	Gnd	Gnd	Gnd
15	Gnd	Gnd	Gnd
17	ERR	3.19V	3.3V
19	PWR	0V	2.86V
21	ADIM	0.1V	1.68V
23	SEL	0V	3.2V

Pin	Label	STBY	Run
2	16V	0V	16V
4	Gnd	Gnd	Gnd
6	12V	0V	11.8V
8	Gnd	Gnd	Gnd
10	5V	5.15V	5.15V
12	5V	5.15V	5.15V
14	Gnd	Gnd	Gnd
16	Gnd	Gnd	Gnd
18	ACD	4V	4.57V
20	INV	0V	3.29V
22	*PDIM	0V	3.38V
24	SYNC	0V	0V

* PDIM Pin 22 can vary according to OSD Backlight setting. 0.9V 0% to 3.3V 100%

Pins 17, 23 and 24 Not Used

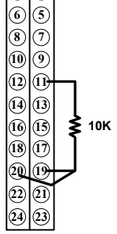
Pin 21 is a Fixed Voltage

12V In
Pins 47~50

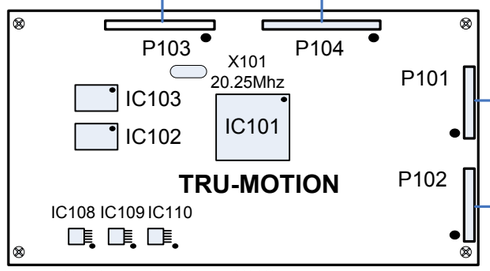
LVDS

FRONT SIDE OF MAIN PWB							BACK SIDE OF MAIN PWB					
IC800			**IC807**				**IC802 (On Back)**			**Q801 (On Back)**		
5V Switching Regulator			2.6V Switching Regulator A2.6V-BCM				3.3V Regulator			5V Switch		
Function	**Pin**	**Volts**	**Function**	**Pin**	**Volts**	**Name**	**Function**	**Pin**	**Volts**	**Function**	**Pin**	**Volts**
In from IC806	1	8.95V	In	6,7,8,10	5V		Gnd	1	0V	Source	C	ST-5V
On/Off	2	3.3V	Out	1,2,3,4,5	2.6V		Out	2	3.3V	Control	B	RL-ON (PWR)
Out (+5V-TU)	3	5.0V	On/Off	17		Power Control	In	3	5V	Gnd	E	0V
n/c	4	0.0V	Use L801 left side to test output				**IC805 (On Back)**			**IC405 uP Reset (On Back)**		
Gnd	5	0.0V	Use any top pin of IC807 to test input				3.3V Switching Regulator A3.3V-BCM			Reset by Charge of C431		
IC806			**IC820**				**Function**	**Pin**	**Volts**	**Function**	**Pin**	**Volts**
9V Regulator			1.2V Switching Regulator A1.2V-BCM				In	2	5V	In	1	3.3VST-MICOM
Function	**Pin**	**Volts**	**Function**	**Pin**	**Volts**	**Name**	Out	4	3.3V (A3.3V-BCM)	Gnd	2	0.0V
In (+12V)	1	11.6V	In	6,7,8,10	5V		On/Off	1	Power Control-3.3V	Out	3	Low to High to B Q400
Gnd	2	0.0V	Out	1,2,3,4,5	1.2V		**IC810 (On Back)**			**Q902 (On Back)**		
Out	3	9V	On/Off	17		Power Contro	1.8V Switching Regulator +1.8V-NTP			12V LVDS control to Q901		
IC404			Use L014 left side to test output				**Function**	**Pin**	**Volts**	**Function**	**Pin**	**Volts**
3.3V Regulator			Use any top pin of IC820 to test input				In	3	3.3V from IC802	Source	C	12V
Function	**Pin**	**Volts**	**IC404 uP 3.3V**				Out	2	1.8V (+1.8V-NTP)	Control	B	LVDS-Panel-Control
Gnd	1	0V	3.3VST-MICOM				Gnd	1	0V	Gnd	E	0V
Out	2	3.3V	**Function**	**Pin**	**Volts**	**Name**	**Q802 (On Back)**			**Q901 (On Back)**		
In	3	5V	In	3	5V	ST_+5V	5V Switch control to Q801			12V LVDS On control to P900 Pins 1~4		
			Out	2	3.3V	Reset	**Function**	**Pin**	**Volts**	**Function**	**Pin**	**Volts**
			Gnd	1	0V	Gnd	In	C	ST-5V	Source	1, 3	12V
							Control	B	RL-ON (PWR)	Control	2, 4	Low from Q902
							Gnd	E	0V	Output	5~8	12V

Left Backlight Plug



1st short either pin 9, 10, 11 or 12 (5V) to Pin 19 (PWR) using a 10K resistor.
This turns on the power supply.
2nd: To test the Backlights, jump Pin 20 (INV) to Pin 19 (PWR)
Observe the Backlights.
If normal, the backlights should turn on and off 4 times. Then they go off.
If only ½ the backlights light, (Right side or Left Side), confirm connectors are OK.
If yes, panel defective.
If no backlight activity, confirm the Fuse F700 has approx. 300V on both sides.
If on one side, check fuse for open.
If no 300V, replace Power Supply.
If 300V present, observe the center leg on the left hand side of ballast transformer T701. Look for 45Khz pulse at 8.7V p/p.
If yes, confirm connectors to backlight OK, if OK, then panel defective.
If no pulse, replace the Power Supply.

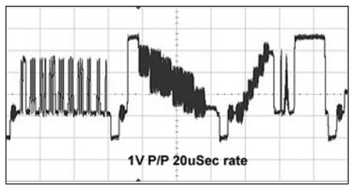


IC108	IC109	IC110
5 (1.2V)	5 (0V)	5 (2.5V)
4 (1.3V)	4 (1.79V)	4 (0V)
3 (0V)	3 (0V)	3 (0V)
2 (3.37V)	2 (3.36V)	2 (3.3V)
1 (3.29V)	1 (3.29V)	1 (3.37V)

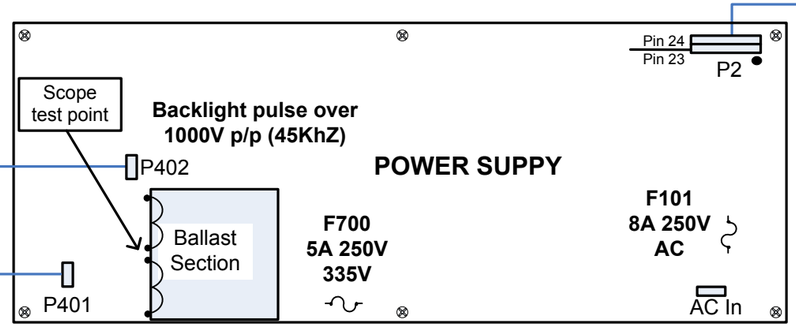
LVDS

PANEL TEST: To run the T-CON without the Main board.
With no power applied to the SMPS, disconnect both LVDS Cables CN1 and CN2.
Jump 12V from the SMPS (P201 pins 5 or 6) to F1 fuse on the T-CON.
Jump 3.3V from the VCC Test point (Bottom of L2) to pin 44 of CN1.
Apply AC power to the SMPS.
The T-CON will product patters on the screen, Red, Green, Blue, etc.

Tuner Pin 16 SMTE Color bar In

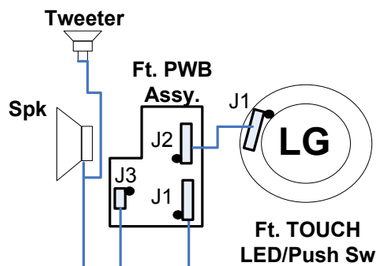


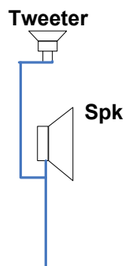
Right Backlight Plug



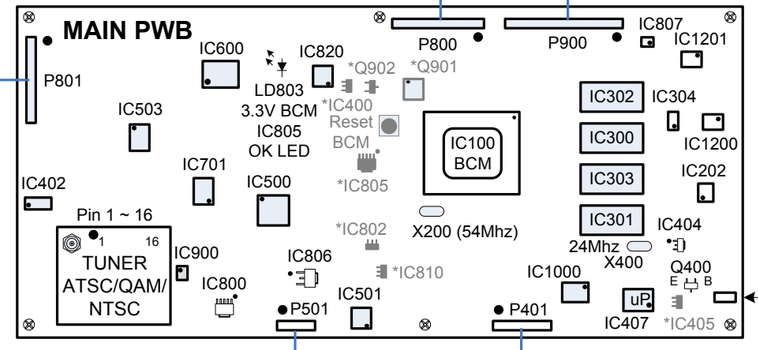
F700 90V in Stand-By

Side Control Keys
P100



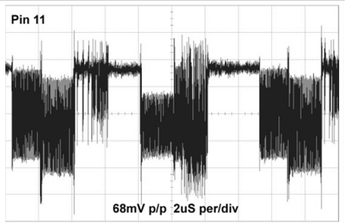


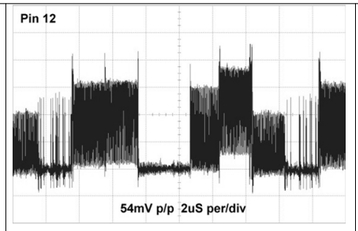
TUNER
5V Pin 3
Video Pin 16
Audio SIF Pin 14

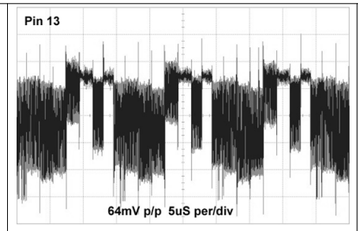


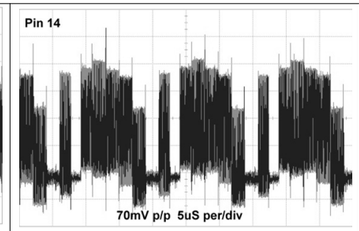
See next page for Waveforms for P900 using SMTE Color bar as the Input.

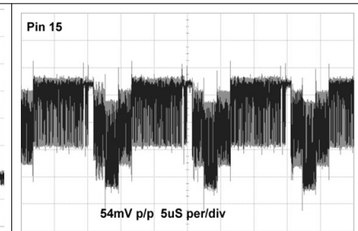
*Grayed out components on the back

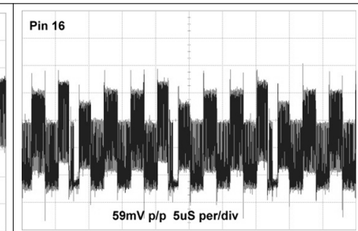


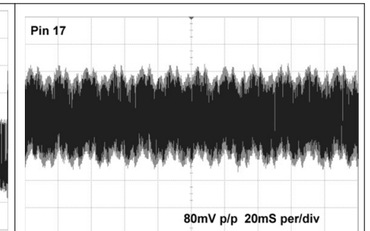


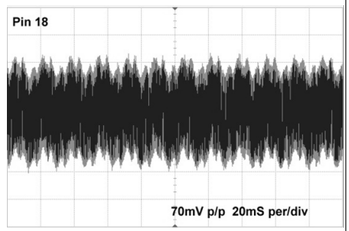


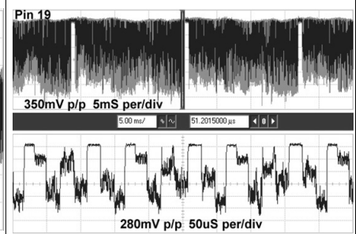


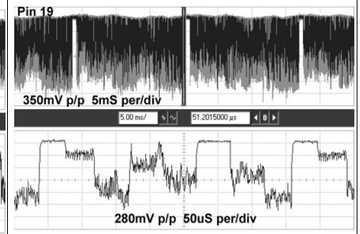


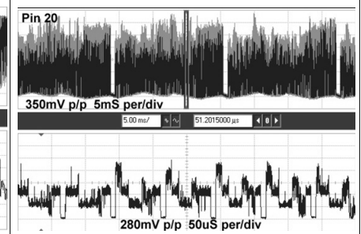


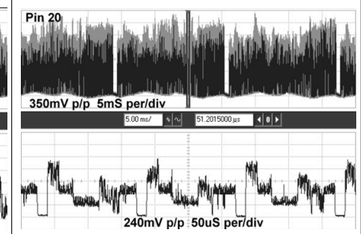


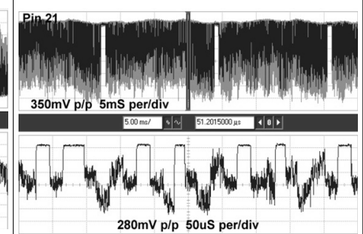


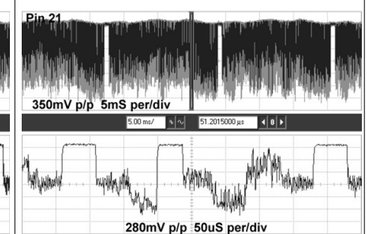


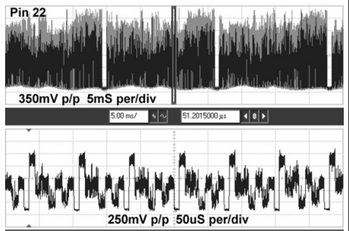


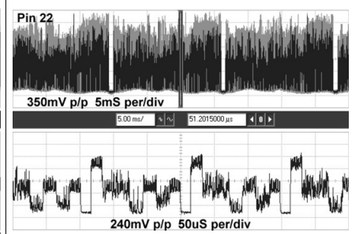


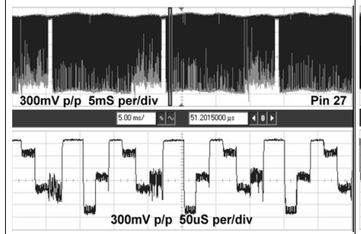


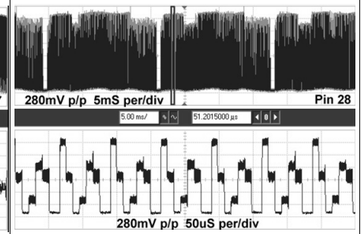


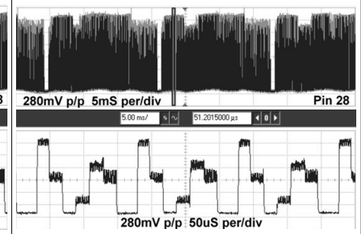


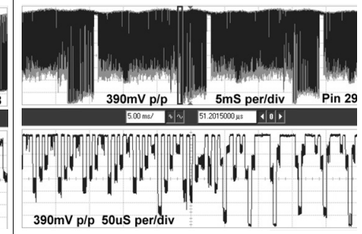


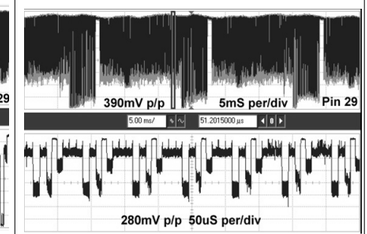


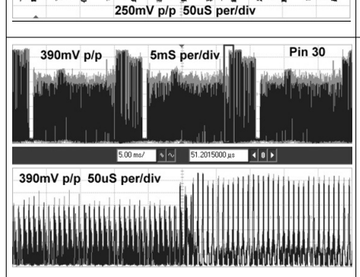


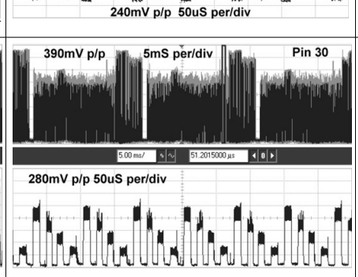


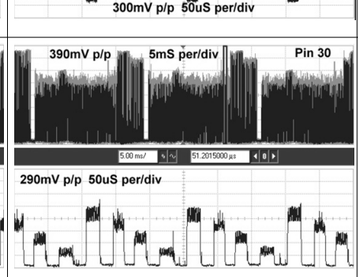


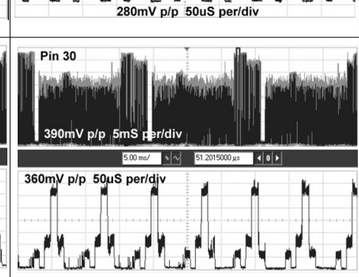


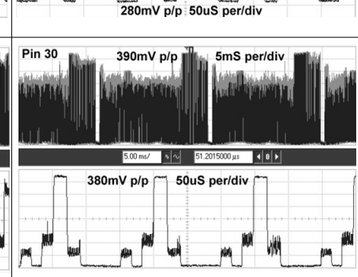


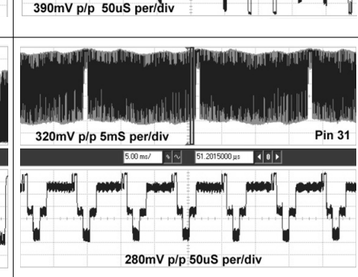


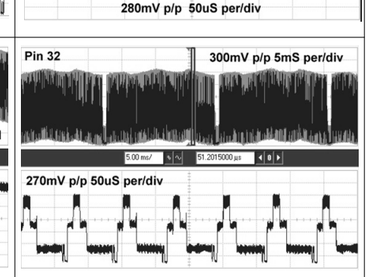


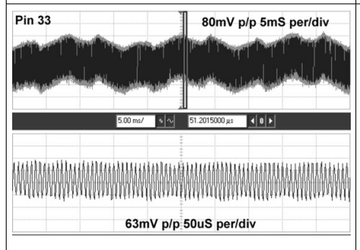


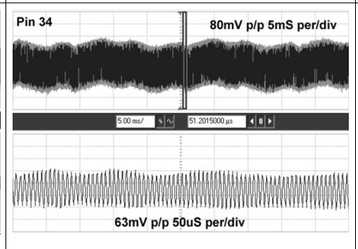


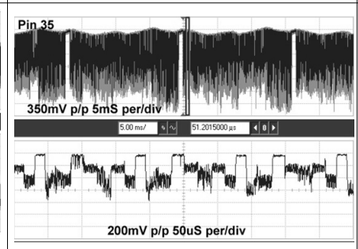


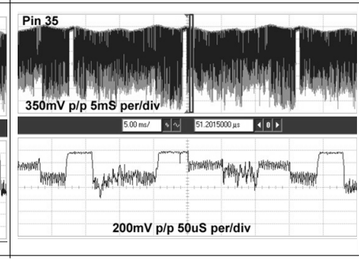


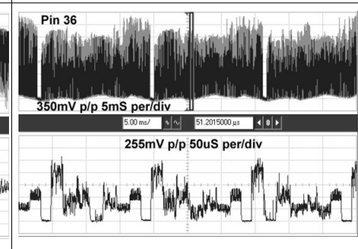


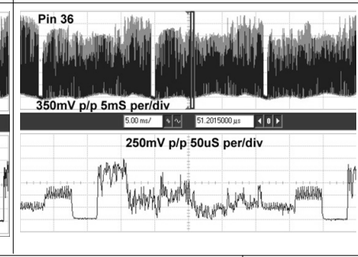


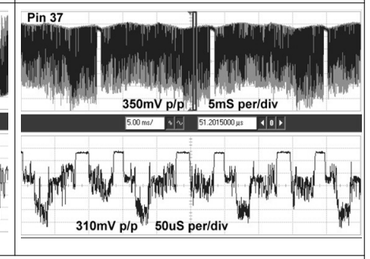


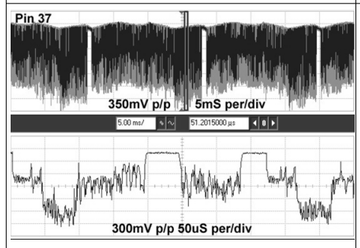


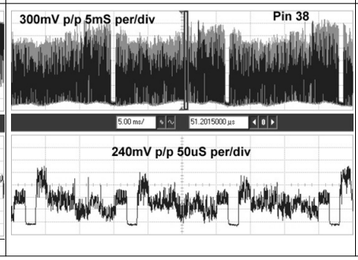








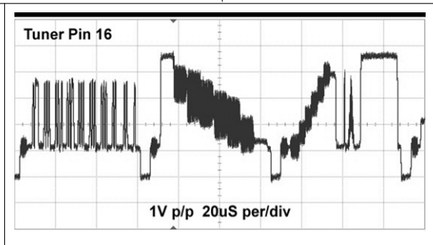


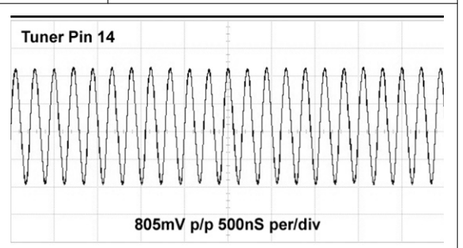


LVDS CABLE P900 FROM MAIN BOARD TO TRU-MOTION BOARD P101 USING SMTP COLOR BAR INPUT

Two Waveforms on the Right are Using the Tuner

Measurements +/- 5%



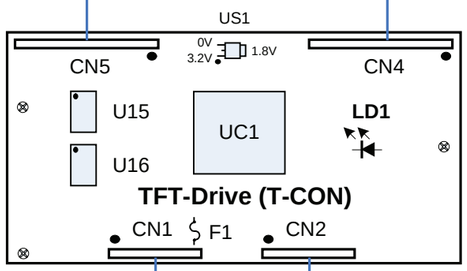


TFT PANEL

LD1 Blue LED TFT Drive PWB Check

SET 0FF LED OFF Anode 0V Cathode0V	BOOT OK LED ON Anode 11.6V Cathode0V	SET ON LED OFF Anode 11.6V Cathode 9.5V

The appearance of LD1 when the set is on appears to be lit dimly. However there is a small hole in the back panel frame and the T-CON PWB that allows the backlight to make it appear lit.



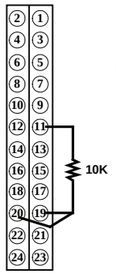
3A 125V
11.6V

LVDS

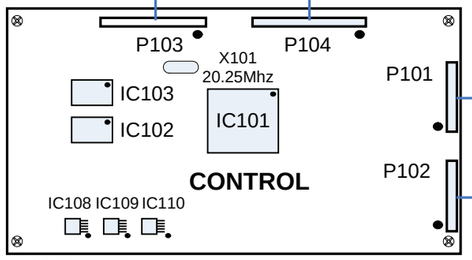
P2 "SMPS" to P801 "Main PWB"

Odd Pins				Even Pins			
Pin	Label	STBY	Run	Pin	Label	STBY	Run
1	16V	0V	16V	2	16V	0V	16V
3	Gnd	Gnd	Gnd	4	Gnd	Gnd	Gnd
5	12V	0V	11.8V	6	12V	0V	11.8V
7	Gnd	Gnd	Gnd	8	Gnd	Gnd	Gnd
9	5V	5V	5.15V	10	5V	5.15V	5.15V
11	5V	5V	5.15V	12	5V	5.15V	5.15V
13	Gnd	Gnd	Gnd	14	Gnd	Gnd	Gnd
15	Gnd	Gnd	Gnd	16	Gnd	Gnd	Gnd
17	ERR	3.19V	3.3V	18	ACD	4V	4.57V
19	PWR	0V	2.86V	20	INV	0V	3.29V
21	*ADIM	0.1V	1.68V	22	PDIM	0V	3.38V
23	SEL	0V	3.2V	24	SYNC	0V	0V

* ADIM Pin 21 can vary according to OSD Backlight setting. 0.9V 0% to 3.3V 100%



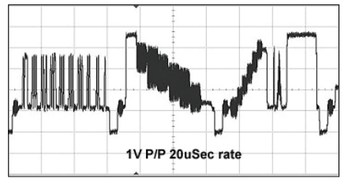
1st, short either pin 9, 10, 11 or 12 (5V) to Pin 19 (PWR) using a 10K resistor.
This turns on the power supply.
2nd: To test the Backlights, jump Pin 20 (INV) to Pin 19 (PWR)
Observe the Backlights.
If normal, the backlights should turn on and off 4 times. Then they go off.
If only ½ the backlights light, (Right side or Left Side), confirm connectors are OK.
If yes, panel defective.
If no backlight activity, confirm the Fuse F700 has approx. 300V on both sides.
If on one side, check fuse for open.
If no 300V, replace Power Supply.
If 300V present, observe the center leg on the left hand side of ballast transformer T701. Look for 58Khz pulse at 8.7V p/p.
If yes, confirm connectors to backlight OK, if OK, then panel defective.
If no pulse, replace the Power Supply.



IC108	IC109	IC110
5 (1.2V)	5 (0V)	5 (2.5V)
4 (1.3V)	4 (1.79V)	4 (0V)
3 (0V)	3 (0V)	3 (0V)
2 (3.37V)	2 (3.36V)	2 (3.3V)
1 (3.29V)	1 (3.29V)	1 (3.37V)

LVDS

Tuner Pin 16 SMTE Color bar In



See back side of page for Waveforms for P900 using SMTE Color bar as the Input.

FRONT SIDE OF MAIN PWB

IC800 — 5V Switching Regulator

Function	Pin	Volts
In from IC806	1	8.95V
On/Off	2	3.3V
Out (+5V-TU)	3	5.0V
n/c	4	0.0V
Gnd	5	0.0V

IC806 — 9V Regulator

Function	Pin	Volts
In (+12V)	1	11.6V
Gnd	2	0.0V
Out	3	9V

IC404 — 3.3V Regulator

Function	Pin	Volts
Gnd	1	0V
Out	2	3.3V
In	3	5V

IC807 — 2.6V Switching Regulator A2.6V-BCM

Function	Pin	Volts	Name
In	6,7,8,10	5V	
Out	1,2,3,4,5	2.6V	
On/Off	17		Power Control

Use L801 left side to test output

Use any top pin of IC807 to test input

IC820 — 1.2V Switching Regulator A1.2V-BCM

Function	Pin	Volts	Name
In	6,7,8,10	5V	
Out	1,2,3,4,5	1.2V	
On/Off	17		Power Contro

Use L014 left side to test output

Use any top pin of IC820 to test input

IC404 uP 3.3V — 3.3VST-MICOM

Function	Pin	Volts	Name
In	3	5V	ST_+5V
Out	2	3.3V	Reset
Gnd	1	0V	Gnd

BACK SIDE OF MAIN PWB

IC802 (On Back) — 3.3V Regulator

Function	Pin	Volts
Gnd	1	0V
Out	2	3.3V
In	3	5V

Q801 (On Back) — 5V Switch

Function	Pin	Volts
Source	C	ST-5V
Control	B	RL-ON (PWR)
Gnd	E	0V

IC805 (On Back) — 3.3V Switching Regulator A3.3V-BCM

Function	Pin	Volts
In	2	5V
Out	4	3.3V (A3.3V-BCM)
On/Off	1	Power Control-3.3V

IC405 uP Reset (On Back) — Reset by Charge of C431

Function	Pin	Volts
In	1	3.3VST-MICOM
Gnd	2	0.0V
Out	3	Low to High to B Q400

IC810 (On Back) — 1.8V Switching Regulator +1.8V-NTP

Function	Pin	Volts
In	3	3.3V from IC802
Out	2	1.8V (+1.8V-NTP)
Gnd	1	0V

Q902 (On Back) — 5V Switch control to Q801

Function	Pin	Volts
In	C	ST-5V
Control	B	RL-ON (PWR)
Gnd	E	0V

Q901 (On Back) — 12V LVDS control to Q901

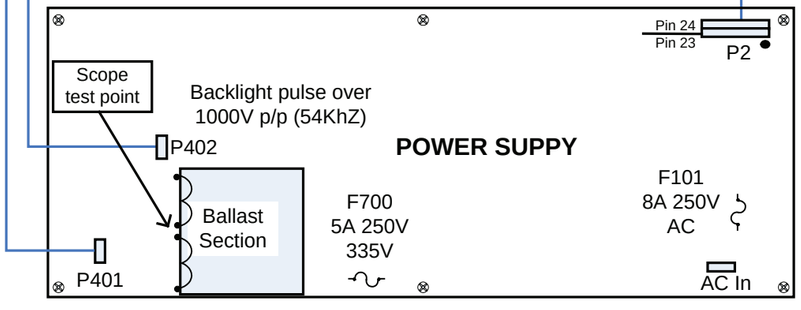
Function	Pin	Volts
Source	C	12V
Control	B	LVDS-Panel-Control
Gnd	E	0V

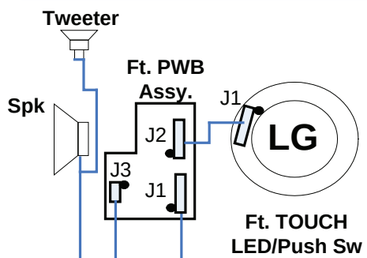
Q902 (On Back) — 12V LVDS On control to P900 Pins 1~4

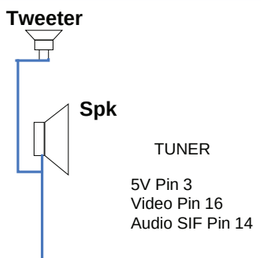
Function	Pin	Volts
Source	1, 3	12V
Control	2, 4	Low from Q902
Output	5~8	12V

Left Backlight Plug

Right Backlight Plug

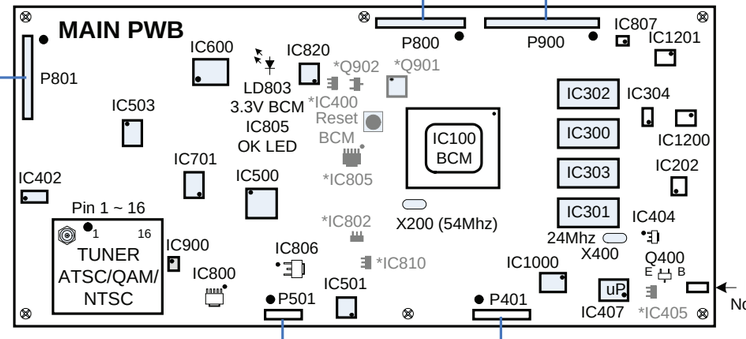






TUNER

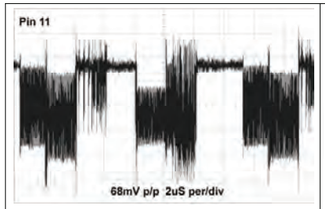
5V Pin 3
Video Pin 16
Audio SIF Pin 14

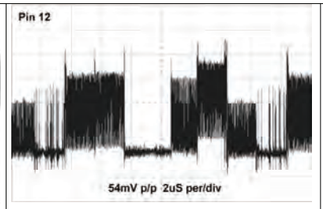


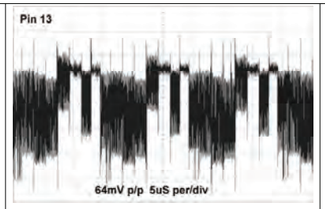
Side Control Keys

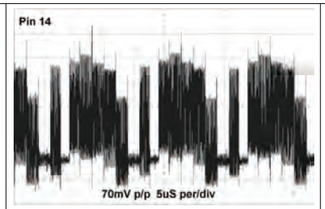
P100

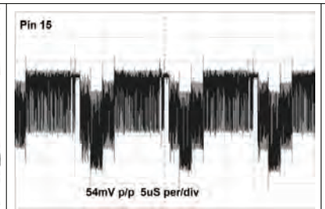
*Grayed out components on the back

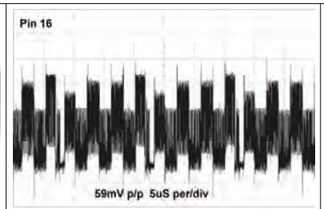


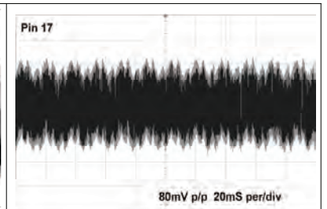


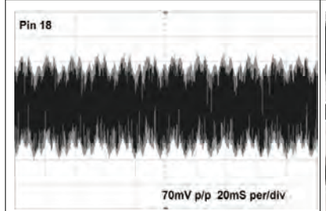


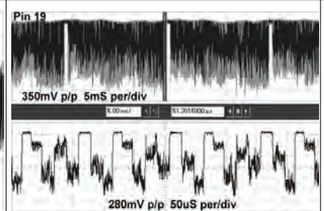


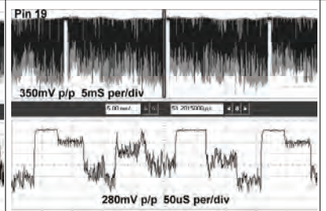


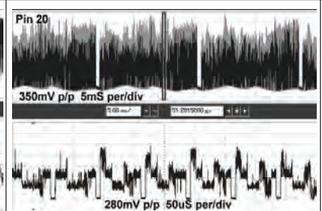


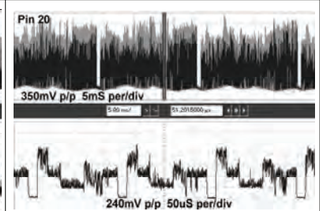


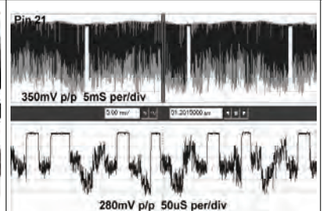


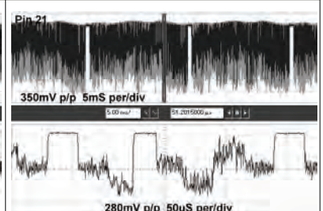


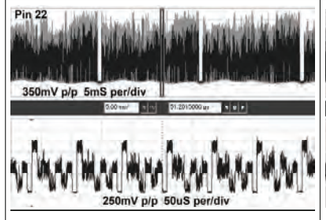


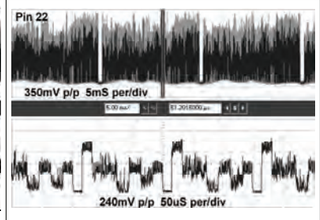


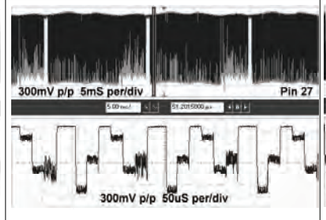


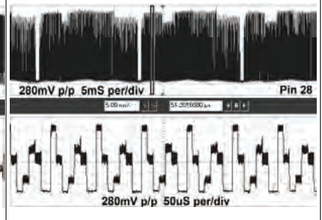


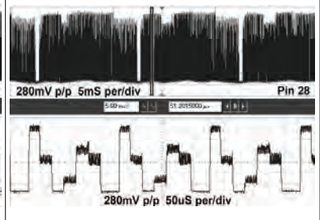


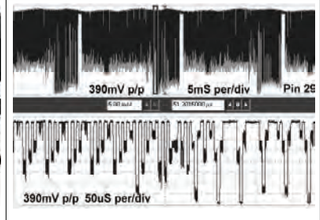


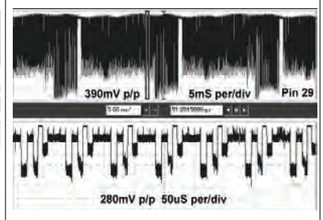


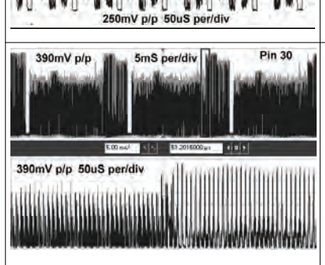


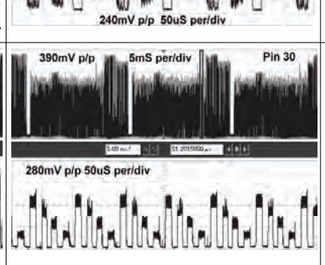


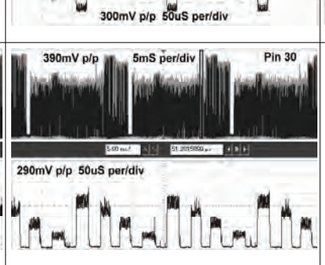


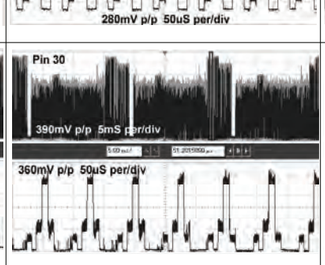


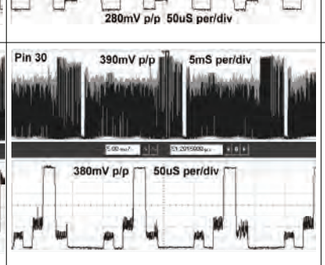


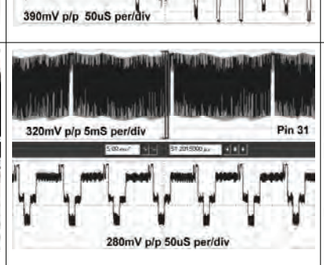


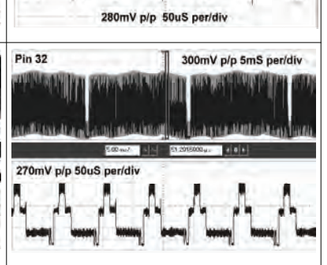


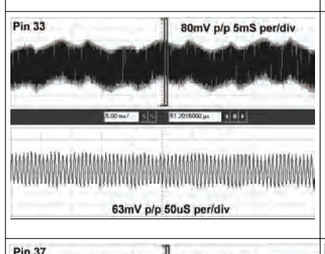


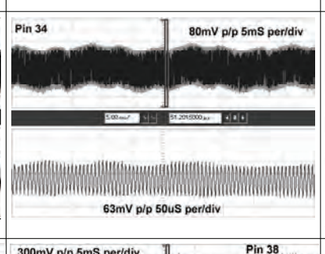


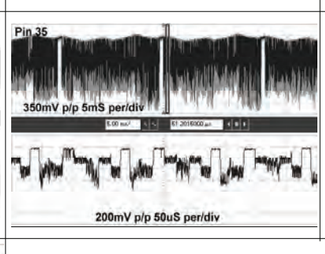


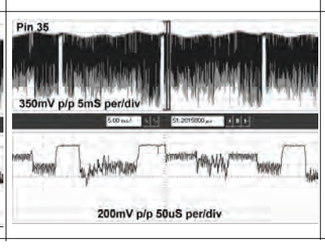


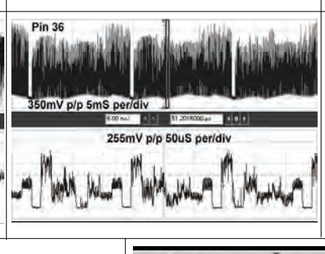


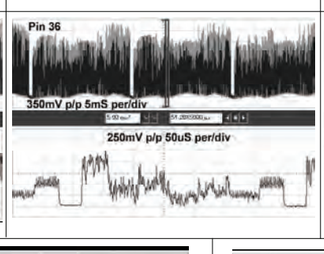


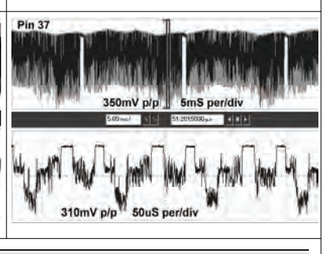


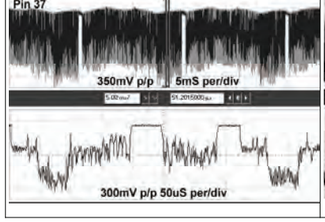


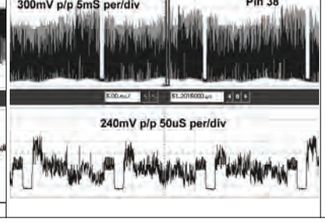








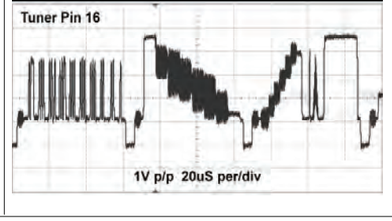


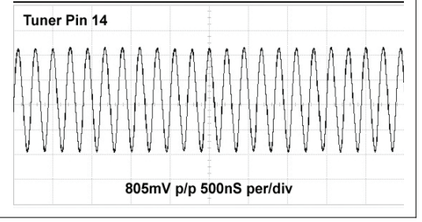


LVDS CABLE P900 FROM MAIN PWB TO CONTROL PWB P101 USING SMTP COLOR BAR INPUT

LAST TWO WAVEFORMS ARE FROM THE TUNER

Measurements +/- 5%





2017 Direct View TV Training

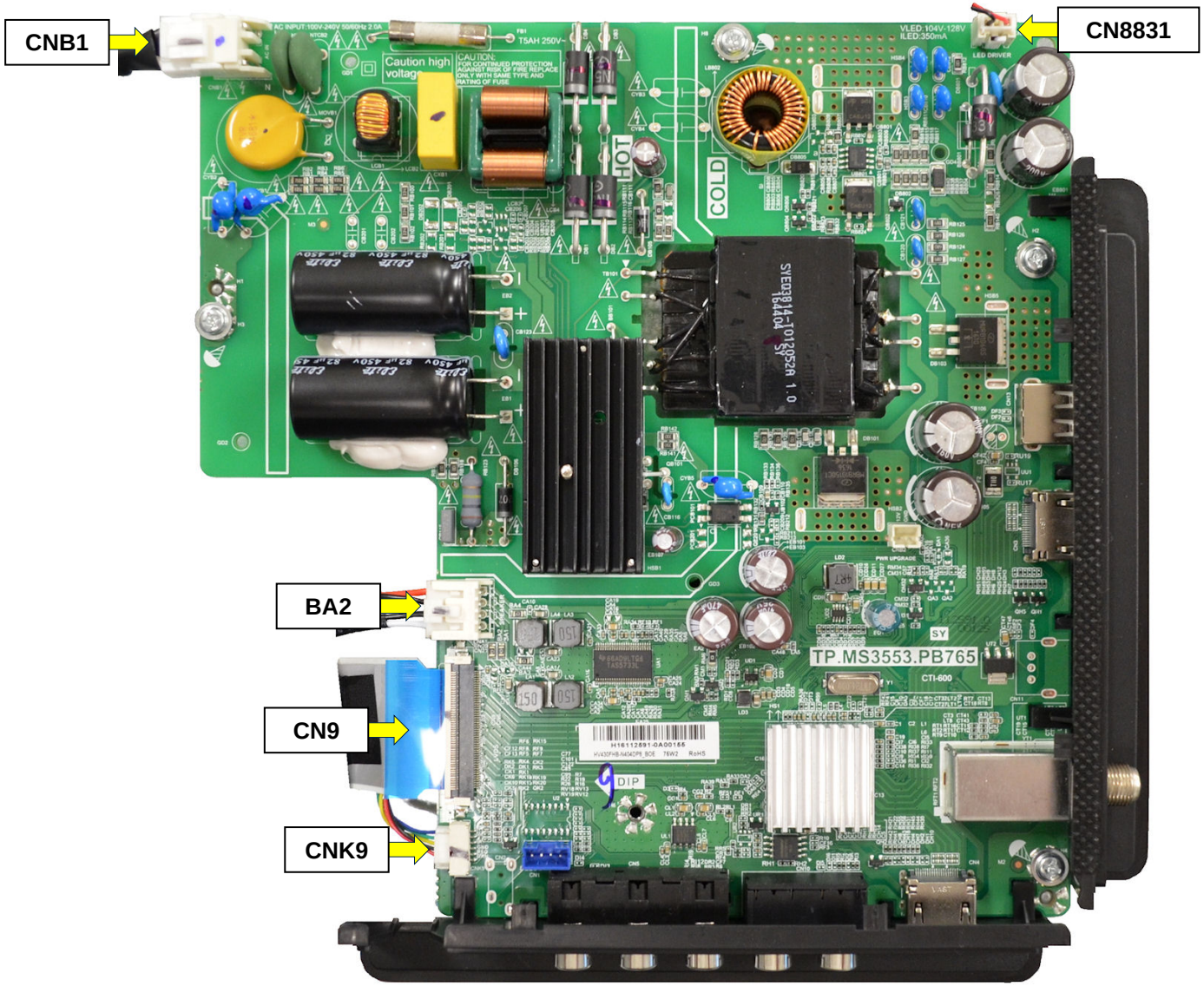
43LJ5000 WebOS 3.0 LED TV
MAIN BOARD LAYOUT

(Main Board and Component Voltages)

Published February 17th, 2017

Life's Good

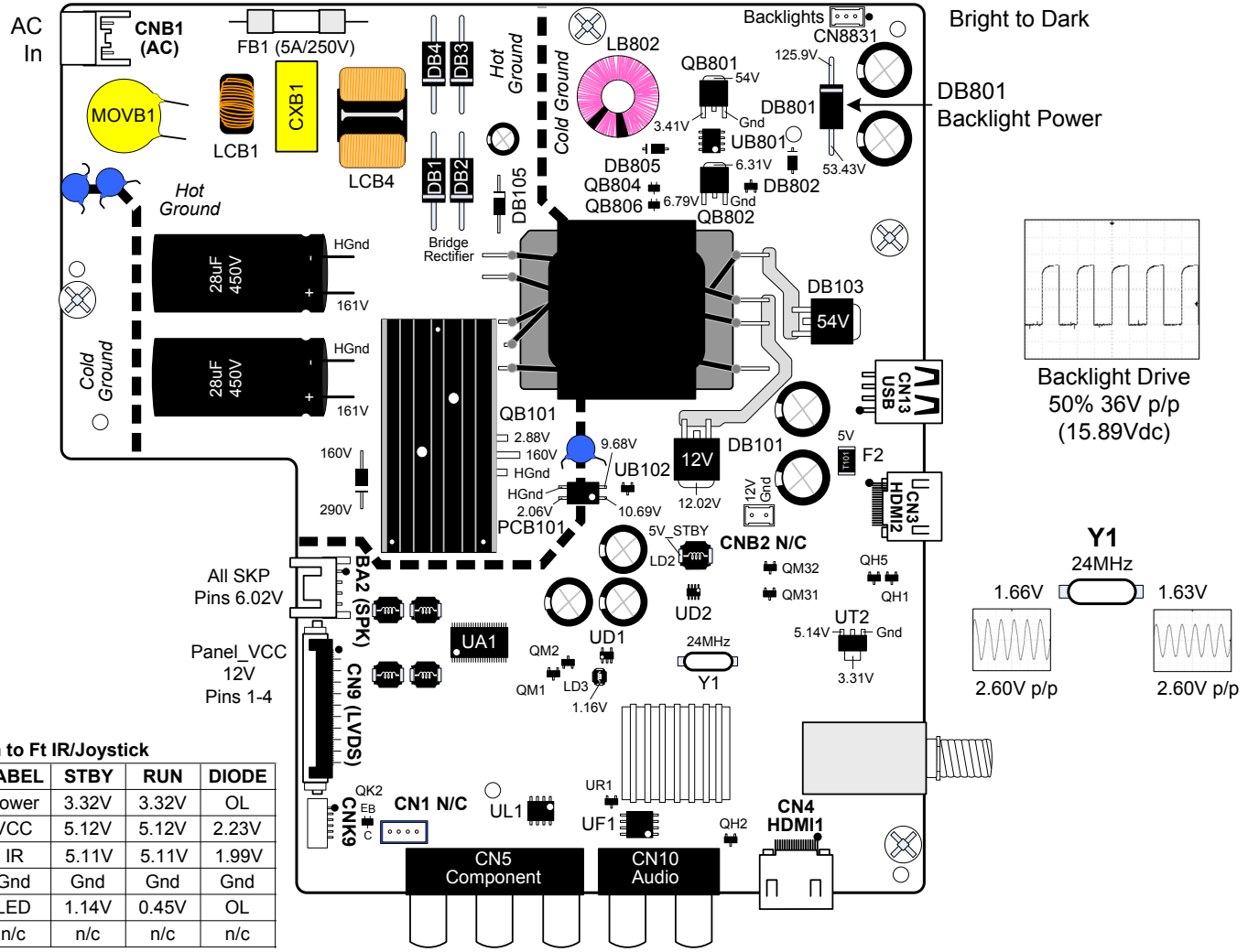
Main Board Picture



43LJ5000 Main Board Component Layout

With Backlights unplugged. BL Power DB801 cathode measures 64V Jumps to 150V then slowly bleeds down to 80V. Measures 56V (Even in Stand-by) with BL disconnected.

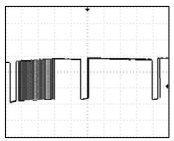
Color	Pin	RUN (Voltage)
Red	1	Backlight Voltage: 125.3V ~ 126.6V
n/a	2	N/C
Black	3	Backlight Ground Return: 6.32V ~ 32V



CNK9 Main to Ft IR/Joystick

	PIN	LABEL	STBY	RUN	DIODE
Drops to 0V when Power Button is pressed.	1	Power	3.32V	3.32V	OL
	2	VCC	5.12V	5.12V	2.23V
Drops to 4.7V when IR is received	3	IR	5.11V	5.11V	1.99V
	4	Gnd	Gnd	Gnd	Gnd
	5	LED	1.14V	0.45V	OL
	6	n/c	n/c	n/c	n/c

IR Pulses 5.68V p/p



43LJ5000 Main Board Component Voltages

PCB101

Pin	*Pins 3-4 Hot Gnd Reference
[1]	10.69V
[2]	9.68V
[3]	*HGnd
[4]	*2.06V

UB102

Pin	
[1]	9.62V
[2]	Gnd
[3]	2.49V

UB801

Pin	1.5V Regulator
[1]	11.22V
[2]	2.21V
[3]	Gnd
[4]	0.09V
[5]	0.15V
[6]	1.52V
[7]	1.56V
[8]	1.59V

UD1

Pin	1.16V Regulator
[1]	5.10V
[2]	Gnd
[3]	1.21V
[4]	5.14V
[5]	0.19V

UD2

Pin	5V_STBY Regulator
[1]	0.46V
[2]	12V
[3]	5.19V
[4]	Gnd
[5]	9.90V
[6]	6.32V
[7]	4.87V
[8]	0.81V

UF1

Pin	EEPROM Microprocessor
[1]	3.31V
[2]	0V
[3]	3.32V
[4]	Gnd
[5]	0V
[6]	0V
[7]	3.32V
[8]	3.32V

UR1

Pin	
[1]	Gnd
[2]	3.32V
[3]	0V

UL1

Pin	3.3V Regulator
[1]	0.27V
[2]	5.12V (In)
[3]	Gnd
[4]	5.12V
[5]	3.33V (Out)
[6]	3.33V (Out)
[7]	1.54V
[8]	1.54V

UT2

Pin	3.3V_Tuner Regulator
[1]	Gnd
[2]	3.31V (Out)
[3]	5.14V (In)

QB101

Pin	SMPS (Switch) Hot Gnd Reference
[1]	HGnd
[2]	160V (Out)
[3]	2.88V

QB801

Pin	Backlight Power Doubler
[1]	3.41V
[2]	54V (Out)
[3]	3.41V

QB802

Pin	Backlight Driver Power
[1]	6.79V
[2]	6.31V (Out)
[3]	Gnd

QB804

Pin	
[1]	0.31V
[2]	4.40V
[3]	Gnd

QB806

Pin	
[1]	0.31V
[2]	0.31V
[3]	Gnd

QH1

Pin	HDMI Hot Swap
[1]	0.39V
[2]	0V
[3]	5.13V

QH2

Pin	HDMI Hot Swap
[1]	0.61V
[2]	0.01V
[3]	Gnd

QH5

Pin	
[1]	0V
[2]	5.13V
[3]	0.39V

QK2

Pin	
[B]	0.68V
[E]	Gnd
[C]	0V

QM1

Pin	12V Panel VCC
[1]	0.10V
[2]	12V
[3]	12V

QM2

Pin	
[1]	0V
[2]	0V
[3]	Gnd

QM31

Pin	
[1]	0.62V
[2]	0.08V
[3]	Gnd

QM32

Pin	5V_Switched For USB
[1]	0.08V
[2]	5.14V (Out)
[3]	5.16V

DB101

Pin	12V Rectifier
[1]	T101 Pluse
[2]	12.02V (Out)
[3]	T101 Pluse

DB103

Pin	54V Backlight Doubler
[1]	T101 Pluse
[2]	54V (Out)
[3]	T101 Pluse

DB802

Pin	
[1]	11.98V
[2]	11.40V
[3]	11.98V

47LV4400 INTERCONNECT DIAGRAM

Note: If a particular area is exhibiting a dimmer backlight level than other areas or the overall brightness seems dim, be sure to first check the customer's Menu setting for Backlights. Raise the percentage and see if the overall brightness returns to normal. If not, Check the P-DIM level, it should rise with the percentage shown on screen.
100% = 3.3V. Follow the P-DIM signal all the way to the SMPS.

You can also test each of the 16 blocks functionality by grounding the return path signal (using 220Ω resistor).

LED SINGLE BLOCK TEST (DIM OR DARK PICTURE AREA):
Turn the Brightness, Contrast and Backlights all the way up.
Confirm 50V on C700 +.
Confirm P-DIM is approx. 3V. Using a 220Ω resistor, jump any of the blocks grounding pin on LCN1 or LCN2 while observing the picture and each block should turn on maximum.

LCN1 White Plug "SMPS Board" To "Panel LEDs"

Pin	Label	Run	Diode Check
1	VLED	50V	OL
2	n/c	n/c	OL
3	R8	*0.86V~11.67V	OL
4	R7	*0.86V~11.67V	OL
5	R6	*0.86V~11.67V	OL
6	R5	*0.86V~11.67V	OL
7	R4	*0.86V~11.67V	OL
8	R3	*0.86V~11.67V	OL
9	R2	*0.86V~11.67V	OL
10	R1	*0.86V~11.67V	OL
11	n/c	n/c	OL
12	VLED	50V	OL

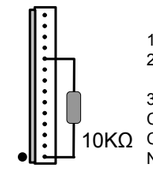
*White to Black screen

LCN2 Black Plug "SMPS Board" To "Panel LEDs"

Pin	Label	Run	Diode Check
1	VLED	50V	OL
2	n/c	n/c	OL
3	L1	*0.86V~11.67V	OL
4	L2	*0.86V~11.67V	OL
5	L3	*0.86V~11.67V	OL
6	L4	*0.86V~11.67V	OL
7	n/c	n/c	OL
8	L5	*0.86V~11.67V	OL
9	L6	*0.86V~11.67V	OL
10	L7	*0.86V~11.67V	OL
11	L8	*0.86V~11.67V	OL
12	n/c	n/c	OL
13	VLED	50V	OL

*White to Black screen

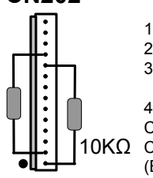
CN202



Test 1

1) Disconnect Main Board.
2) Using 10K resistor, jump 5V_ST (pin 1) to PWR_ON (pin 10).
3) Apply AC power.
Check 12V (pins 8-9).
Check BL power (40V).
No Backlights at this time.

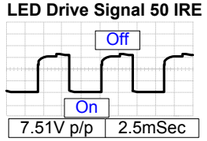
CN202



Test 2

1) Remove AC Power.
2) Leave pin 1 to pin 10 connected.
3) Using 10K resistor, jump 5V_ST (pin 2) to BL_On (pin 11).
4) Apply AC power.
Check BL power (50V).
Check BLs come on.
(Backlights On).

LED Drive Signal 50 IRE



(1) **PWM Pins 12~14** can vary according to incoming video IRE level, OSD Backlight setting and then Intelligent Sensor (room light condition).
Output from the Microprocessor.
Range 0.69V to 3.3V.

To the Panel Backlights

PWR-ON: Starts 12V and 40V LED Power. No Backlights.

BL-ON: Starts Backlights
LED Power goes to 50.

CN202 "SMPS Board" To CN4 "MAIN Board"

Pin	Label	STBY	Run	No Load	Diode Check
14	(1) P-DIM3	0V	0.69V~3.3V	3.36V	OL
13	(1) P-DIM2	0V	0.72V~3.3V	3.36V	OL
12	(1) P-DIM1	0V	0.69V~3.3V	3.36V	OL
11	BL-ON/OFF	0V	3.27V	0V (4.77V)	OL
10	PWR_ON	0V	3.27V	4.77V	OL
8-9	12V	0V	12.81V	12.87V	1.64V
4-7	Gnd	Gnd	Gnd	Gnd	Gnd
1-3	+5VSB	5.24V	5.22V	5.24V	OL

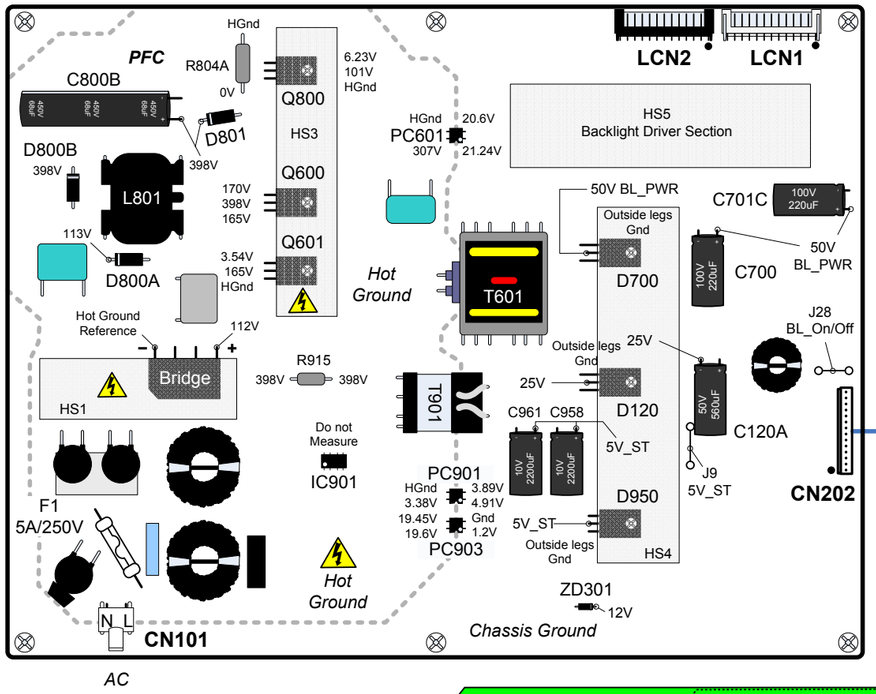
Test1 Test2

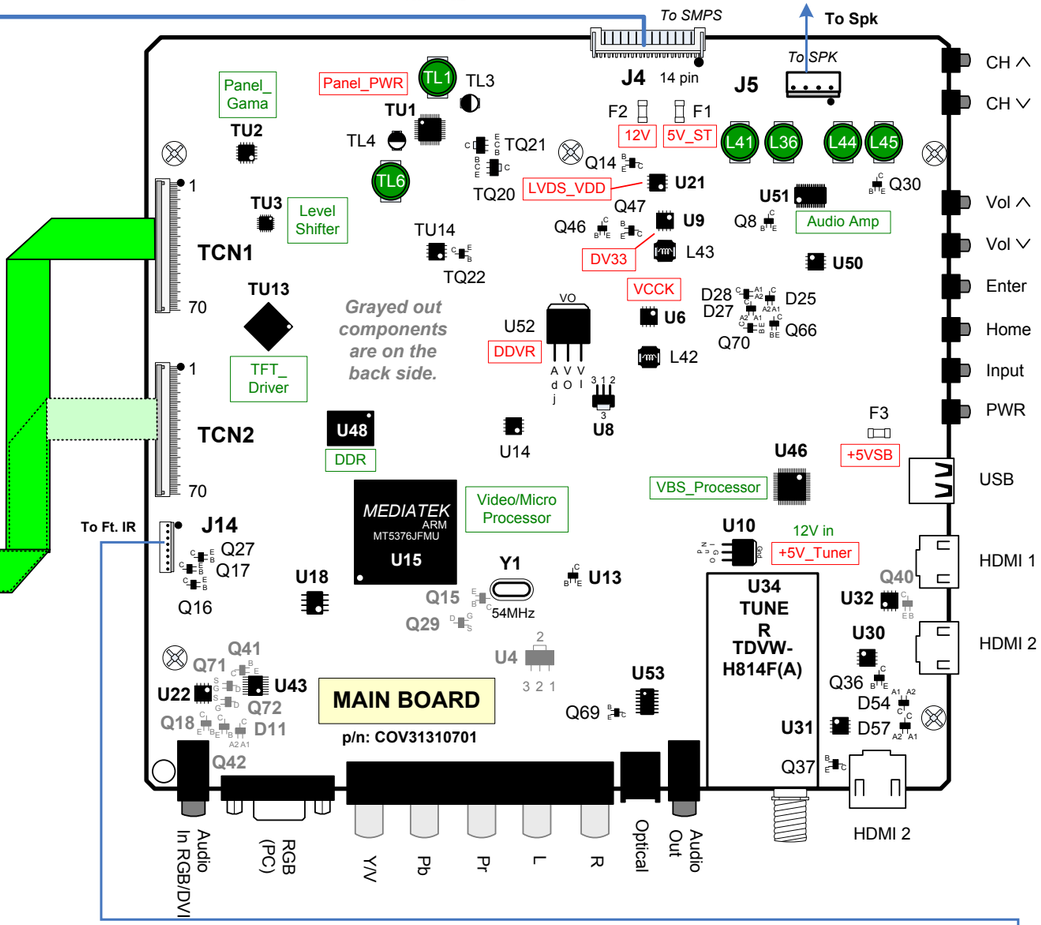
J4 "MAIN Board" To CN202 "SMPS Board"

Pin	Diode
14	OL
13	OL
12	OL
11	OL
10	OL
8-9	1.64V
4-7	Gnd
1-3	OL

For DC voltages for Main board components see pages 2, 3 and 4 of the Interconnect diagram.

For LVDS video signal waveforms see page 5 of the Interconnect diagram.





Note; If there is a problem with a load from the panel backlights, you can remove AC and Disconnect either LCN1 or LCN2. When AC is reapplied, the Backlight LEDs should turn on for about 2 seconds and then they turn off.

DC Voltages to the Panel developed by on the Main Board, Output from TCN1

VCC pins 35, 36 from TL1
Made by TU1 pins 35, 26 (3.3V)

H_VDD pins 38, 29 from TL4
Made by TU1 pin 8 (7.88V)

VDD pins 40, 41 from TP12
Made by TU1 pin 18 (16.47V)

VST pin 47 from TU3 pin 15
(-4.93V)

VGL_I pin 48 from TTP 14
Made by diode TD3 (-5V)

VGH_EVEN pin 49 from TU3 Pin 13
Made by TU3 pin 13 (-5V to 26V) Toggles every second

VGH_ODD pin 50 from TU3 Pin 12
Made by TU3 pin 12 (-5V to 26V) Toggles every second

VGH_R pin 52 from TU3 Pin 10
Made by TU3 pin 12 (-5V to 26V) Toggles every second

DC Voltages to the Panel developed by on the Main Board, Output from TCN2

VCC pins 25, 26 from TL1
Made by TU1 pins 35, 26 (3.3V)

H_VDD pins 22, 23 from TL4
Made by TU1 pin 8 (7.88V)

VDD pins 20, 21 from TP12
Made by TU1 pin 18 (16.47V)

VST pin 14 from TU3 pin 15
(-4.93V)

VGL_I pin 13 from TTP 14
Made by diode TD3 (-5V)

VGH_EVEN pin 12 from TU3 Pin 13
Made by TU3 pin 13 (-5V to 26V) Toggles every second

VGH_ODD pin 11 from TU3 Pin 12
Made by TU3 pin 12 (-5V to 26V) Toggles every second

VGH_R pin 52 from TU3 Pin 9
Made by TU3 pin 12 (-5V to 26V) Toggles every second

Video (LRLVRO-2+/-) pins 28-33
Video Clock (LMCLK+/-) 26, 27

To the Panel

Video (RMLVO-2+/-) pins 28-33
Video Clock (RMCLK+/-) 34, 35

Video Signal Levels: p/p: Approx: 740mV

PANEL p/n: COV31311201

J14 "MAIN Board" to "IR Board" to J1

Pin	Label	STBY	Run	Diode Check
1	IR	3.96V	3.95V	OL
2	IR_LED_POWER	5.24V	5.19V	0.99V
3	Gnd	Gnd	Gnd	Gnd
4	LS_SCL	3.42V	3.37V	OL
5	LS_SDA	3.42V	3.37V	OL
6	Light_Sensor_Det	3.56V	3.47V	OL
7	LED_R	3.62V	3.82V	OL
8	LED_B	3.03V	3.86V	OL

Ft. IR/Intelligent Sensor
Front IR J1

p/n: COV31147501

47LV4400 Main (Front Side) Flat Pack IC Voltages

U6

Pin	VCCK (Core PWR) Regulator
[1]	5.19V
[2]	0.8V
[3]	Gnd
[4]	0.8V
[5]	5.19V (Enable)
[6]	Gnd
[7]	1.14V (Out)
[8]	5.2V (In)

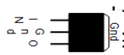
U8

Pin	AV125 (1.25V) Regulator (Analog)
[1]	1.25V (Adj)
[2]	1.25V (Out)
[3]	3.37V (In)

U9

Pin	DV33 (Core PWR) Regulator
[1]	5.19V
[2]	0.8V
[3]	Gnd
[4]	0.8V
[5]	5.19V (Enable)
[6]	Gnd
[7]	1.14V (Out)
[8]	5.2V (In)

U10



Pin	+5V_Tuner Regulator
In	12.78V (In)
Gnd	0V (Gnd)
Out	4.9V (Out)

U13

Pin	System Reset
1	Gnd
2	5.18V (Reset)
3	5.12V (In)

U14

Pin	System EEPROM
[1]	n/c
[2]	n/c
[3]	n/c
[4]	0V (Gnd)
[5]	3.37V (SDA)
[6]	3.37V (SCL)
[7]	3.37V (WP)
[8]	3.37V (VCC)

U18

Pin	Serial Flash
[1]	3.37V
[2]	3.06V
[3]	3.37V (WP)
[4]	0V (Gnd)
[5]	0V (Gnd)
[6]	0V (Gnd)
[7]	3.37V (VCC)
[8]	3.37V (VCC)

U21

Pin	LVDS Power Switch
[1]	12.78V (In)
[2]	0.05V (Ctrl)
[3]	12.78V (In)
[4]	0.07V (Ctrl)
[5]	12.77V (Out)
[6]	12.77V (Out)
[7]	12.77V (Out)
[8]	12.77V (Out)

U22

Pin	HDMI EDID
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	4.99V (SDA)
[6]	4.94V (SCL)
[7]	4.92V (WP)
[8]	4.94V (VCC)

U30

Pin	HDMI EDID
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	4.99V (SDA)
[6]	4.94V (SCL)
[7]	4.92V (WP)
[8]	4.94V (VCC)

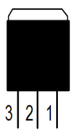
U31

Pin	HDMI EDID
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	4.99V (SDA)
[6]	4.94V (SCL)
[7]	4.92V (WP)
[8]	4.94V (VCC)

U32

Pin	HDMI EDID
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	4.99V (SDA)
[6]	4.94V (SCL)
[7]	4.92V (WP)
[8]	4.94V (VCC)

U52



Pin	DDVR Regulator
[1]	3.37V (In)
[2]	1.80V (Out)
[3]	0.55V (Adj)

U43

Pin	RGB (PC) Data Buffer
[1]	3.30V
[2]	3.85V
[3]	4.94V
[4]	4.99V
[5]	3.3V
[6]	0V (Gnd)
[7]	0V (Gnd)
[8]	0V (Gnd)
[9]	4.99V
[10]	4.98V
[11]	4.98V
[12]	3.3V
[13]	4.98V
[14]	3.3V
[15]	3.28V
[16]	4.99V (VCC)

U50

Pin	Audio Op Amp
[1]	6.06V (Left Out)
[2]	6.06V (Left In)
[3]	6V
[4]	0V (Gnd)
[5]	6V
[6]	6.02V (Right In)
[7]	6.02V (Right Out)
[8]	12.06V (VCC)

U53

Pin	Head Phone Audio Amplifyer
[1]	0V (Gnd)
[2]	0V (R In)
[3]	0V (R Out)
[4]	0V
[5]	3.23V (Mute)
[6]	-3.12V
[7]	-1.57V
[8]	-0.07V
[9]	3.25V
[10]	0V (Gnd)
[11]	3.25V
[12]	0V (L Out)
[13]	0V (L In)
[14]	0V

U51

Pin	Audio Amplifyer
[1]	12.64V (Mute)
[2]	12.64V
[3]	2.98V (L In)
[4]	2.98V
[5]	1.57V (n/c)
[6]	0V (n/c)
[7]	12.7V (AVCC)
[8]	0V (Gnd)
[9]	6.92V
[10]	3.56V
[11]	2.99V
[12]	2.99V (R In)
[13]	0V (n/c)
[14]	0V (Gnd)
[15]	12.79V (PVCC)
[16]	12.79V (PVCC)
[17]	12.9V
[18]	6.3V (R Out)
[19]	0V (Gnd)
[20]	6.3V (R Out)
[21]	12.93V
[22]	12.77V
[23]	6.12V (L Out)
[24]	0V (Gnd)
[25]	6.19V (L Out)
[26]	12.75V
[27]	12.79V (PVCC)
[28]	12.79V (PVCC)

TU14

Pin	T-CON EEPROM
[1]	0V (Gnd)
[2]	0V (Gnd)
[3]	0V (Gnd)
[4]	0V (Gnd)
[5]	4.99V (SDA)
[6]	4.94V (SCL)
[7]	4.92V (WP)
[8]	4.94V (VCC)

47LV4400 Main (Front Side) Transistor Voltages

TQ20

Pin	VGH Reg (Panel Power)
[B]	3.0V (CTRLP)
[C]	26.85V (Out)
[E]	30.68V (In)

TQ21

Pin	VGL SW (Panel Power)
[B]	0.6V (CTRLN)
[C]	4.0V (SW)
[E]	0V (Gnd)

TQ22

Pin	T-CON Write Protect
[B]	0V (TCON_WP)
[C]	3.3V (WP1)
[E]	0V (Gnd)

Q8

Pin	MUTE_AMP (Audio Mute)
[B]	0V (Mute_Amp)
[C]	12.63V (Mute)
[E]	0V (Gnd)

Q14

Pin	LVDS_PWR Driver
[B]	0.65V (LVDS_PWR_ON)
[C]	0.04V (U21 Control)
[E]	0V (Gnd)

Q16

Pin	BLUE_LED Control
[B]	0.08V (OPWM2)
[C]	2.56V (LED Control)
[E]	0V (Gnd)

Q17

Pin	RED_LED Driver
[B]	0.75V (OPC_CTRL)
[C]	0.02V (LED Control)
[E]	0V (Gnd)

Q27

Pin	RED_LED Control
[B]	0.02V (From Q17)
[C]	3.78V (LED Control)
[E]	0V (Gnd)

Q30

Pin	AMPVCC_OP Regulator
[B]	12.71V
[C]	12.78V (AMPVCC_AP)
[E]	12.06V (AMPVCC_OP)

Q36

Pin	HDMI3_Hot_Swap Switch
[1]	0V (Gnd)
[2]	0V (3_HOTPLUG)
[3]	0V

Q37

Pin	HDMI3_Hot_Swap Switch
[1]	0V (Gnd)
[2]	0V (2_HOTPLUG)
[3]	0V

Q46

Pin	3V3_Enable Driver
[1]	0V (Gnd)
[2]	0.67V (VCCK)
[3]	0V (To Q47)

Q47

Pin	3V3_Enable Switch
[1]	0V (Gnd)
[2]	0V (VCCK)
[3]	6.19V (3V3_EN)

Q66

Pin	Audio_Mute 12V Det
[1]	11.7V (Off_Mute)
[2]	11.7V (To Q70)
[3]	-0.03V (HW_Mute)

Q69

Pin	Line_Out Mute_Enable
[1]	0V (Gnd)
[2]	0.16V (Lineout_Mute)
[3]	-3.23V (Enable)

Q70

Pin	Audio_Mute 12V / 5V Det
[1]	11.7V (To Q66)
[2]	12.73V
[3]	-0.03V (Off_Mute)

D25

Pin	Mute_Amp Routing
[A1]	0.04V
[A2]	0.04V
[C]	0V (Mute_Amp)

D27

Pin	A_Mute Routing
[A1]	0.03V (Off_Mute)
[A2]	0.03V (HW_Mute)
[C]	0V (A_Mute)

D28

Pin	Lineout_Mute Routing
[A1]	0.06V (A_Mute)
[A2]	0.37V (Lineout_Mute)
[C]	0.19V (Mute_Lineout)

D54

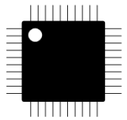
Pin	HDMI 5V Routing
[A1]	0.0V (HDMI_5V_In)
[A2]	5.12V ('+5VSB)
[C]	4.97V (HDMI_5V_Out)

D57

Pin	HDMI 5V Routing
[A1]	0.0V (HDMI_5V_3IN)
[A2]	0.0V (HDMI_5V_2IN)
[C]	4.97V (HDMI_5V_Out)

47LV4400 Main (Front Side) Panel Voltage IC Voltages

TU1 Panel DC-to-DC Converter

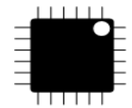


Pin		Pin	
[1]	4.98V (VL)	[21]	26.84V (VGH)
[2]	1.49V (TCOMP)	[22]	0.9V (VGL_FB)
[3]	4.98V (VL)	[23]	n/c
[4]	0V (Gnd)	[24]	0.6V (CTRLN)
[5]	12.75V (P_12V)	[25]	n/c
[6]	12.75V (P_12V)	[26]	3.3V (TCON_Reset)
[7]	n/c	[27]	0V (Gnd)
[8]	7.88V (HVDD_ SWB3)	[28]	3.3V (SCL_TPS)
[9]	7.81V (HVDD_FB)	[29]	3.3V (SDA_TPS)
[10]	0V (Gnd)	[30]	1.8V (Vcore_FB)
[11]	4.93V (SS)	[31]	0V (Gnd)
[12]	0.06V (COMP)	[32]	1.8V (Vcore_Out)
[13]	0V (Gnd)	[33]	3.3V (VCC_FB)
[14]	0V (Gnd)	[34]	n/c
[15]	12.73V (SW)	[35]	3.31V (VCC_SW_Out)
[16]	12.73V (SW)	[36]	3.31V (VCC_SW_Out)
[17]	16.52V (SW_In)	[37]	0V
[18]	16.47V (VDD)	[38]	12.75V (P_12V)
[19]	n/c	[39]	12.75V (P_12V)
[20]	30.06V (CTRLP)	[40]	n/c

TU2 Panel Gamma

Pin		Pin	
[1]	3.3V (SDA_TPS)	[11]	12.42V (GMA4)
[2]	0V (Gnd)	[12]	11.36V (GMA5)
[3]	3.3V (VCC)	[13]	9.86V (GMA7)
[4]	0V (Gnd)	[14]	6.03V (GMA12)
[5]	6.45V (VCOM_PG)	[15]	4.01V (GMA14)
[6]	6.43V (VCOM_FB)	[16]	7.88V (HVDD)
[7]	15.62V (VCOM_AVDD)	[17]	7.88V (HVDD)
[8]	15.62V (AVDD)	[18]	3.24V (GMA15)
[9]	0V (Gnd)	[19]	2.63V (GMA16)
[10]	13.05V (GMA3)	[20]	3.3V (SCL_TPS)

TU3 PaneL Level Shifter



Pin		Pin	
[1]	26.84V (VGH2)	[13]	*(-5V~26V) (VGH_EVEN)
[2]	-5V (VGL)	[14]	-5V (DISCHG)
[3]	26.84V (VGH1)	[15]	(-4.93V) (VST)
[4]	8.44V (CLK1)	[16]	(-5V) (GIP_RST)
[5]	8.44V (CLK2)	[17]	0V (Gnd)
[6]	8.44V (CLK3)	[18]	7.51V (RE)
[7]	8.44V (CLK4)	[19]	3.2V (VSENSE)
[8]	8.44V (CLK5)	[20]	0V (EO)
[9]	8.45V (CLK6)	[21]	0V (GST)
[10]	26.83V (VGH_R)	[22]	1.13V (MCLK)
[11]	-5V (VGH_F)	[23]	1.62V (GCLK)
[12]	*(-5V~26V) (VGH_ODD)	[24]	3.23V (REVERSE)

*Toggels every second

47LV4400 Main (Back Side) Component Voltages

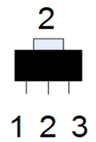
Q15

Pin	Controls Q29
[B]	0.68V (Ctrl)
[C]	0V (Out)
[E]	0V (Gnd)

Q41

Pin	VGA (PC) Sorce Select
[B]	0.0V (VGA_11)
[C]	5.0V (S1 U43 p9)
[E]	0.0V (Gnd)

U4



Pin	3V3SV Regulator
[1]	2.05V (Reg)
[2]	3.29V (Out)
[3]	5.21V (In)

Q18

Pin	HDMI Write Protect
[B]	0.0V (Ctrl GPIO0)
[C]	5V (WP)
[E]	0V (Gnd)

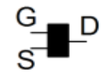
Q42

Pin	RGB (PC) SO Switch
[B]	0.0V (VGA_4 Mon ID)
[C]	5.0V (SO)
[E]	0.0V (Gnd)

D11

Pin	RGB (PC) PWR Routing
[A1]	0.58V (RGB p9)
[A2]	5.20V (+5VSB)
[C]	5V (VGA_PLUGPWR)

Q29



Pin	AV_3V3 Source Switch
[G]	0.09V (From Q15)
[S]	3.28V (+3V3SB)
[D]	2.27V (AV_3V3)

Q71

Pin	SDA Switch
[G]	3.38V (DV33)
[S]	3.38V (SDA_SW)
[D]	5.0V (VGASDA_SW)

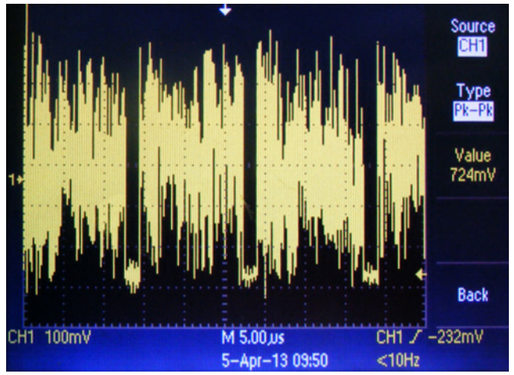
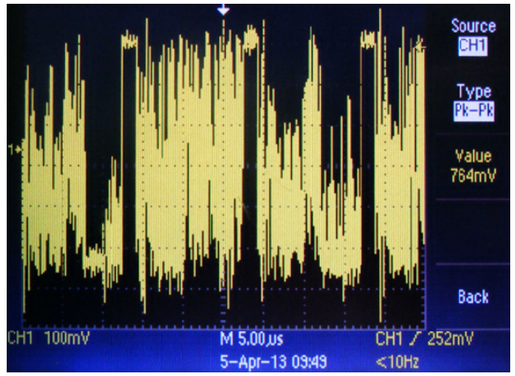
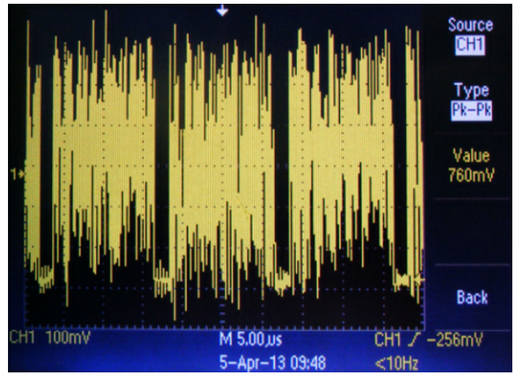
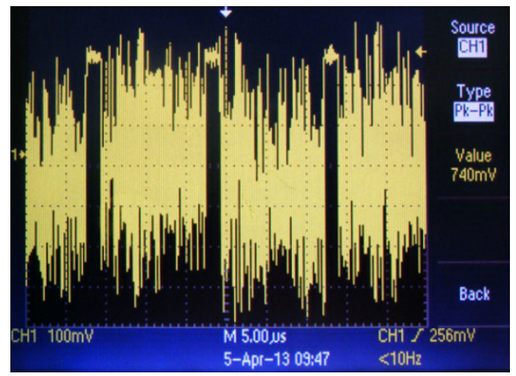
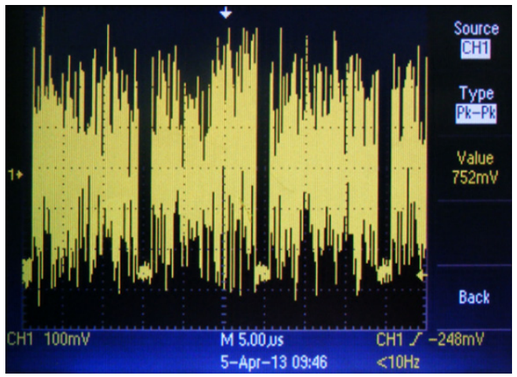
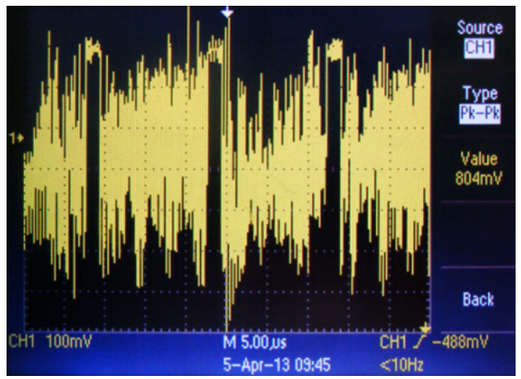
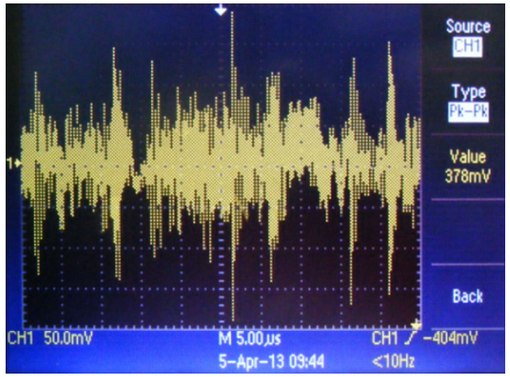
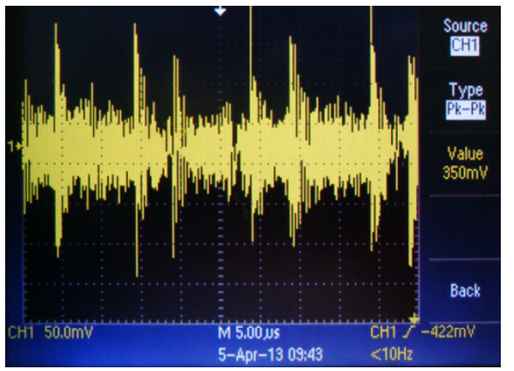
Q40

Pin	HDMI HOT SWAP
[B]	0.0V (1_HOTPLUG)
[C]	0.0V (HDMI p19)
[E]	0.0V (Gnd)

Q72

Pin	SCL Switch
[G]	3.38V (DV33)
[S]	3.38V (SCL_SW)
[D]	5.0V (VGASCL_SW)

47LV4400 LVDS Waveforms TCN1 and TCN2

TCN1 PIN 28 LRLVOP TCN2 PIN 28 RMLVOP	TCN1 PIN 29 LRLVOP TCN2 PIN 29 RMLVOP	TCN1 PIN 30 LRLVOP TCN2 PIN 30 RMLVOP	TCN1 PIN 31 LRLVOP TCN2 PIN 31 RMLVOP
			
724mV p/p	764mV p/p	760mV p/p	740mV p/p
TCN1 PIN 32 LRLVOP TCN2 PIN 32 RMLVOP	TCN1 PIN 33 LRLVOP TCN2 PIN 33 RMLVOP	TCN1 PIN 26 LRLVOP TCN2 PIN 34 RMLVOP	TCN1 PIN 27 LRLVOP TCN2 PIN 35 RMLVOP
			
752mV p/p	804mV p/p	378mV p/p	350mV p/p

49UH6100 INTERCONNECT DIAGRAM

P801 "SMPS Board" To "LED Backlights"

PIN	LABEL	RUN	Diode
1 ←	LED-	78.4V~55.78V	OL
3 →	LED+	Pins 3-5 shorted together on SMPS 123.7V~109.4V	OL
5 ←	LED-		
7 →	LED+	169.0V~163.6V	OL

In → Out ← Dim to Bright

No Stand-By Voltages Backlights *0% to 100%
Pins 2, 4, 6 are n/c.
Pins 3 and 5 are jumped together
Direct Lit Backlights (LED Array Strips)
36 Total LEDs. 4 Strips with 9 LEDs per/strip.

P201 "SMPS Board" To P2502 "MAIN Board"

PIN	LABEL	STBY	RUN	Diode
(3) 12	P_DIM1	0V	*0.18V-3.24V	OL
(2) 11	MS (Drv_On)	0V	2.03V	OL
9-10	Gnd	Gnd	Gnd	Gnd
4-8	13.2V	7.90V	13.11V	OL
3	Gnd	Gnd	Gnd	Gnd
(3) 2	N/C	n/c	n/c	n/c
(1) 1	PWR_ON	0V	3.29V	0.87V

*Dim to Bright

(1) **PWR-On Pin 1:** Turns on 13.2V to the Main. No backlights at this time. Backlight Power is 160.8V.

(2) **MS (DRV_On) Pin 11:** Turns on the Backlights. Backlight power goes to 169V.

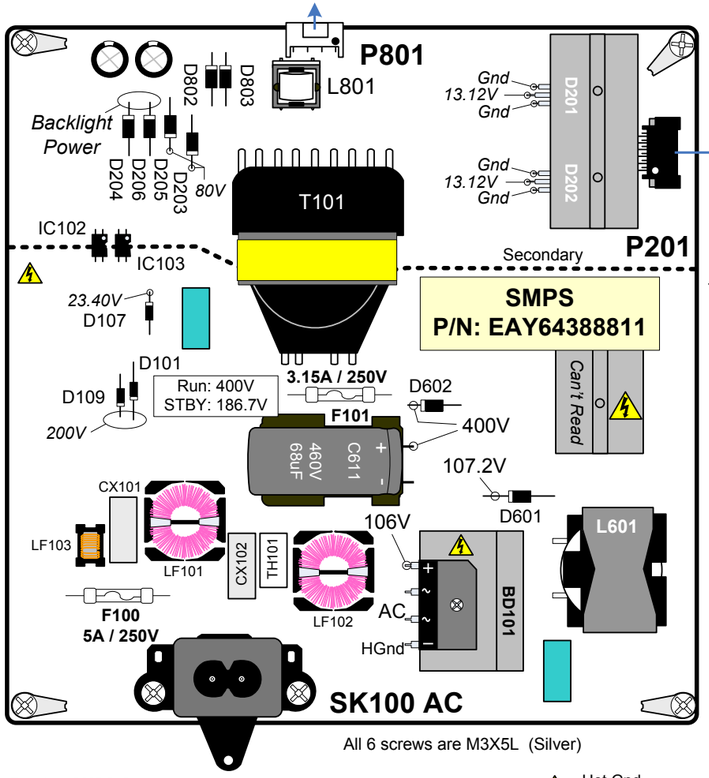
(3) **P_DIM#1 Pin 12 and P_DIM#2 Pin 2:** Will vary according to incoming video IRE level and OSD Backlight setting Output from the Video Processor. It is then routed out P2300 to P201 and sent to the LED Driver IC on the Back of the SMPS.
The Range is: 0.18V~3.24V.

P2502 "MAIN Board" to "SMPS Board" P201

PIN	LABEL	STBY	RUN	Diode
(2) 1	DRV_ON	0V	2.03V	OL
(3) 2	P_DIM#1	0V	*0.18V-3.24V	OL
3-4	Gnd	Gnd	Gnd	Gnd
5-8	13.2V	7.90V	13.11V	OL
9	Gnd	Gnd	Gnd	Gnd
10	13.2V	7.90V	13.11V	OL
(1) 11	PWR_ON	0V	3.29V	OL
12	N/C	n/c	n/c	n/c

*0% to 100%

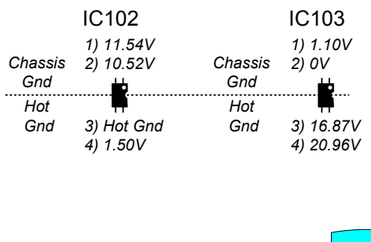
To Panel Backlights (Dim to Bright)
Backlight Power 169.0V~163.6V pin 7
Pin 1 goes to Backlight Driver Q801 (Back of SMPS)



All 6 screws are M3X5L (Silver)

Hot Gnd
(Shock Hazard)

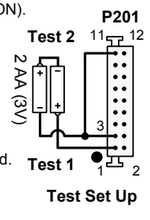
Can not use Smart Test Jig on this model for SMPS test mode.



SMPS TEST: Forcing SMPS On.
This test requires simple 3V jig. See below..

Remove AC Power.
Disconnect P2502 on Main Board.
Test 1: Using a 3V jig, Jump 3V to pin 1 (PWR_ON).
Apply AC Power. (No Backlights in Test 1)
(Pins 4-8) rises to 13.14V.
Backlight Power 160.8V.
Remove AC Power. P_DIM will be 10.12V

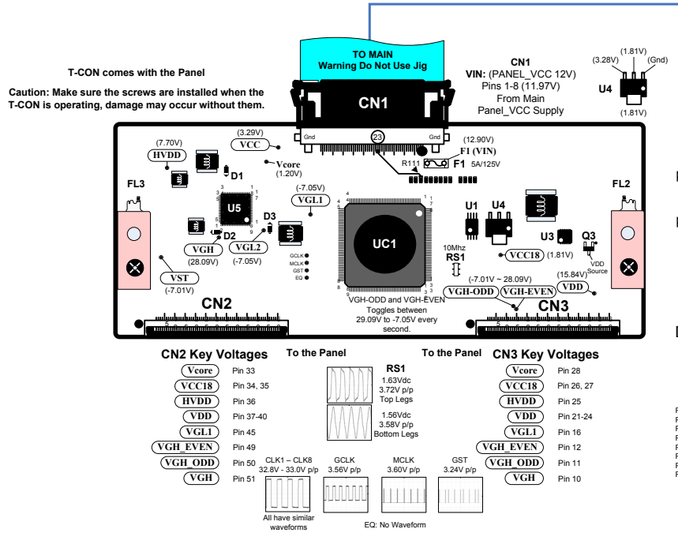
Test 2: Using a 3V jig, Jump 3V to pin 11 (DRV_ON).
Apply AC Power. All Voltages should be produced. (13.14V to Main and 149.7V to the Backlights).
This will also force the Backlights to come on.
P_DIM will be 10.12V



Test Set Up

Note:
P201 still inserted. P2502 removed.
Use P2502 side to insert resistors.
Note: 7.90V (Pins 4-8)
Must be present when AC is applied before beginning test indicating Standby is OK.

3V JIG: Made from 2 (AA) batteries.
Jump + to – on one side.
On the other side, solder two red wires (needle tipped) to the + and one black wire (needle tipped) to the – side.



LVDS Cable
p/n: EAD63787803

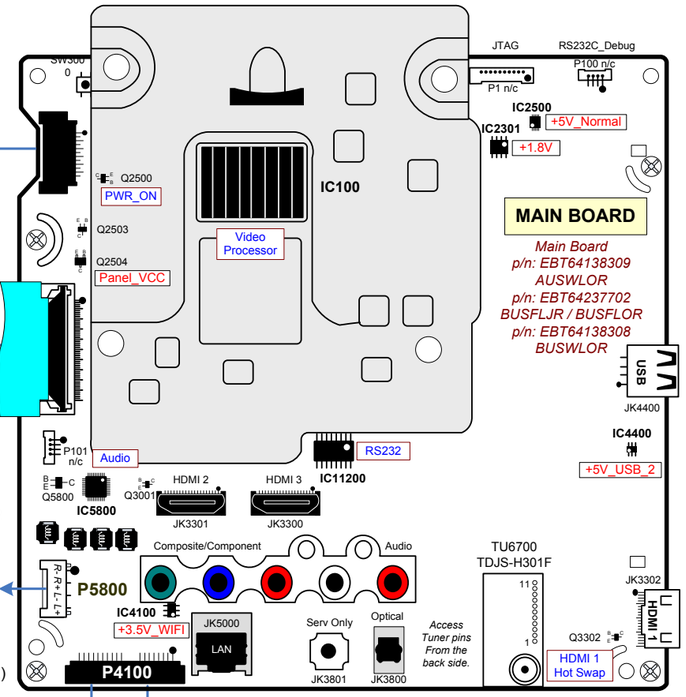
SPK Ft Right
p/n: EAB64048602

SPK Ft Left
p/n: EAB64048601

To Speakers

All Speaker plug pins
1.44V
Diode Check (OL)

U1
Pin 1 Gnd
Pin 2 Gnd
Pin 3 Gnd
Pin 4 Gnd
Pin 5 3.27V
Pin 6 3.26V
Pin 7 3.29V
Pin 8 3.30V



KEY VOLAGES
P4000 "MAIN" to "Joy Stick, WiFi"

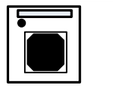
PIN	LABEL	STBY	RUN	Diode Check
1	3.5V_WiFi	0V	3.37V	OL
15	IR	3.39V	3.37V	1.83V
18	3.5V_ST	3.41V	3.40V	1.12V
19	Key 2	3.41V	3.40V	1.86V

Ground: Pins 4, 6, 8, 14, 17, 20, 21
No Connection (Not Used): Pins 9, 10, 11
Other Pin Functions: WiFi_DM 0.03V pin 2, WiFI_DP 0.03V pin 3, WOL_PWR_On 0V pin 5, M_Reset 0V pin 7
SDA 3.41V pin 12, SCL 3.41V pin 13

PANEL TEST: ROLLING TEST PATTERNS
1) With no Power, remove CN1 (Vx1 Cable)
2) Jump 12V from SMPS to Fuse F1.
For 12V from SMPS use D202 (center leg) Top right hand heat sink.
3) Jump VCC (3.3V) to pin 23 of CN1. For easier contact to pin 23, use top side of R111.

SMART JIG:
Can not run normal Panel Test by removing Vx1 cable on T-CON and supplying 12V to T-CON fuse. It will not work. Can not use Smart Test Jig on this model for T-CON test.

Front IR/Joy Stick



Bottom Center of Set
Front IR
p/n: EBR78925201

WiFi

Bottom Right (Rear View)
WiFi Module
p/n: EBR78925201

2015 Direct View UHD Training

55UF7600 WebOS 2.0 UHD LCD TV
MAIN BOARD INFORMATION

Main Board Layout and
Voltage Measurements

Life's Good

55UF7600 Main Board (Photo)

55UF7600 Main Board Component Layout

P2300 "MAIN Board" to "SMPS Board" P201

PIN	LABEL	STBY	RUN	Diode Check
23-24	GND	Gnd	Gnd	Gnd
18-22	24V	0V	25.46V	OL
16-17	GND	Gnd	Gnd	Gnd
11-15	12V	0V	11.88V	OL
9-10	GND	Gnd	Gnd	Gnd
7-8	3.5V	3.54V	3.52V	1.23V
6	GND	Gnd	Gnd	Gnd
5	3.5V	3.54V	3.52V	1.23V
4	P-DIM2	0V	0.92V	OL
3	P-DIM	0V	0.17V-2.55V	OL
2	DRV_ON	0V	3.46V	1.54V
1	PWR_ON	0V	3.51V	OL

Dim to Bright

(1) PWR_ON: turns on the 12V and 24V lines. Backlight power goes to 63.62V.
(2) INV_CTL: (DRV_ON on SMPS) turns on the Backlights. Backlight power goes to 80V.
(3) P-DIM: controls the backlight brightness. Controlled by Cust. Menu, Video, Backlights. Range 0% to 100% directly proportional to DC voltage to Backlight brightness. P-DIM is actually a PWM signal.
(4) P-DIM2: Fixed Voltage.

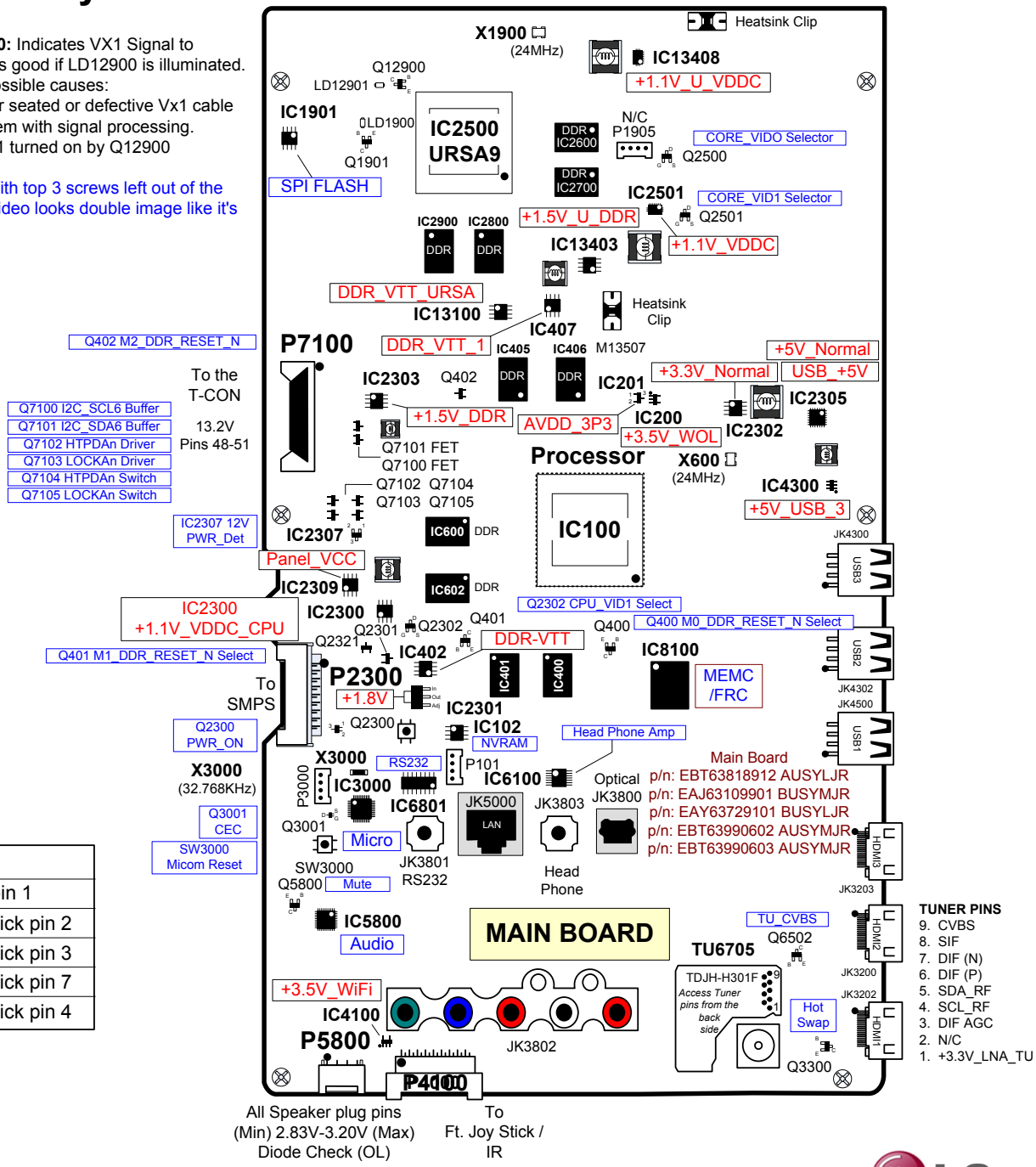
KEY VOLAGES
P4100 "MAIN" to "Joy Stick J1, M-Remote/WiFi"

PIN	LABEL	STBY	RUN	Diode Check	
2	3.5V_WOL	0V	3.49V	OL	WiFi pin 1
12	Key 1	3.55V	3.52V	1.98V	Joy Stick pin 2
14	Key 2	3.55V	3.52V	1.98V	Joy Stick pin 3
15	IR	3.54V	3.78V	1.89V	Joy Stick pin 7
16	3.5V_ST	3.56V	3.52V	1.25V	Joy Stick pin 4

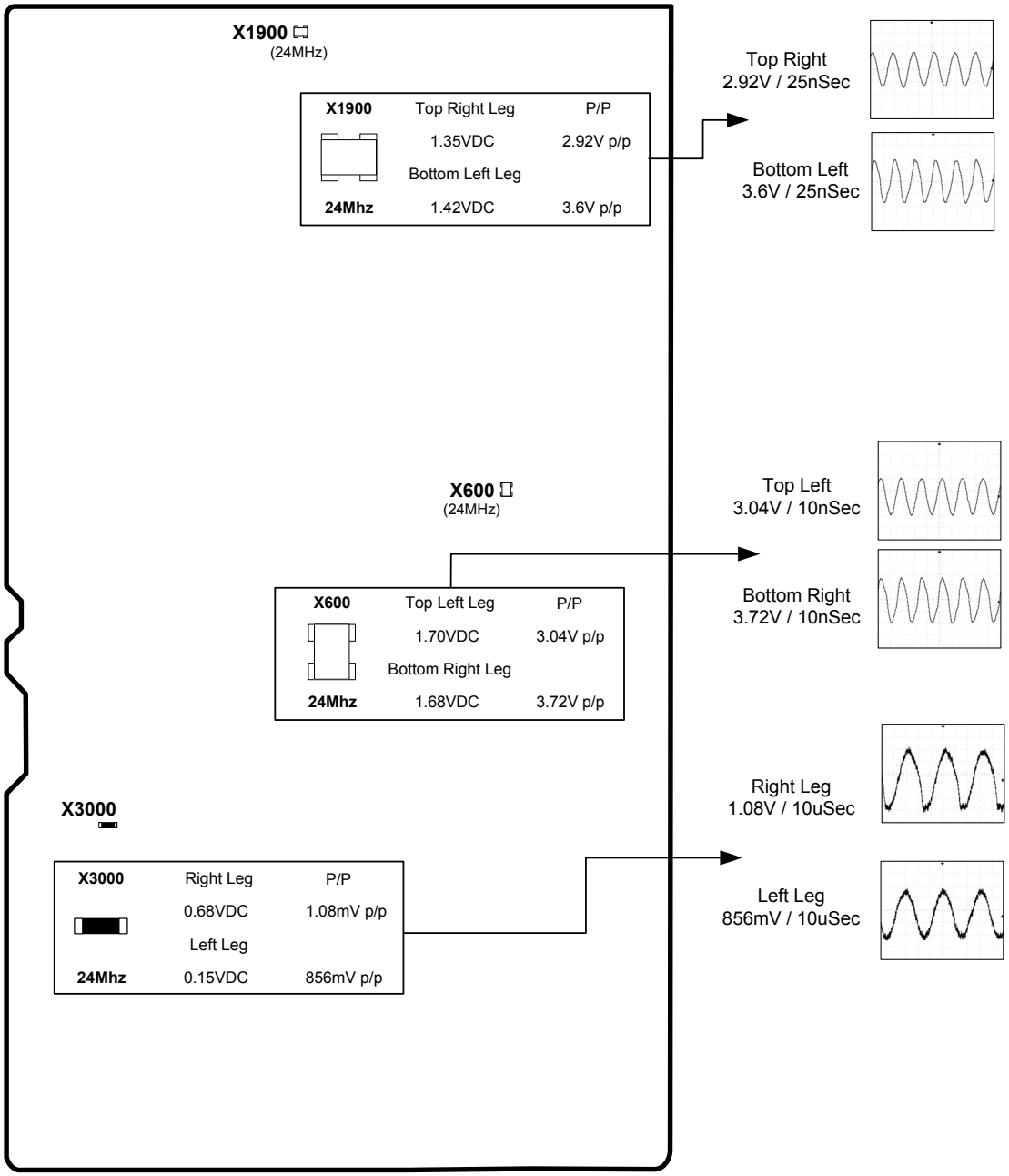
Pin 2 is power for the M-Remote / WiFi Board
Pin 16 is power for the IR/Joy Stick Board
IR peak/peak 3.80V

LD12900: Indicates VX1 Signal to T-CON is good if LD12900 is illuminated. If Off, possible causes: Improper seated or defective Vx1 cable or problem with signal processing. LD12901 turned on by Q12900

Note: With top 3 screws left out of the board, video looks double image like it's in 3D.



55UF7600 Main Board Crystals Measurements



55UF7600 Main Board (Small) Component Voltages

Pin	Memory
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	3.30V
[6]	3.30V
[7]	Gnd
[8]	3.30V

IC200

Pin	+3.5V_WOL Regulator
[1]	3.49V (Out)
[2]	Gnd
[3]	0.17V n/c
[4]	3.51V (WOL_CTL)
[5]	3.50V (Vcc In)

IC201

Pin	AVDD_3P3 Regulator
[1]	Gnd
[2]	3.31V (Out)
[3]	3.50V (In)

IC402

Pin	DDR_VTT Switch
[1]	1.51V (in)
[2]	Gnd
[3]	0.76V
[4]	0.76V (out)
[5]	n/c
[6]	3.29V (Enable)
[7]	n/c
[8]	n/c

IC407

Pin	DDR_VTT_1 Switch
[1]	1.52V (in)
[2]	Gnd
[3]	0.76V
[4]	0.76V (out)
[5]	n/c
[6]	3.29V (Enable)
[7]	n/c
[8]	n/c

IC1901

Pin	SPI FLASH Memory
[1]	3.29V (CS)
[2]	3.28V (SO)
[3]	0V (WP)
[4]	Gnd
[5]	3.29V (SPI_DI)
[6]	0V (SPI_CK)
[7]	3.29V (Hold)
[8]	3.29V (In)

Pin	Regulator
[1]	Gnd
[2]	11.85V (Vcc In)
[3]	Gnd
[4]	0.80V (FB)
[5]	1.36V (Comp)
[6]	3.47V (Enable)
[7]	1.07V (Out)
[8]	1.07V (Out)

IC2301

Pin	+1.8V_DDR Regulator
[In]	3.29V (In)
[Out]	1.79V (Out)
[Adj]	0.54V

IC2302

Pin	(+3.3V_NORMAL) Regulator
[1]	Gnd
[2]	11.82V (Vcc In)
[3]	Gnd
[4]	0.70V (FB)
[5]	1.97V (Comp)
[6]	3.47V (Enable)
[7]	3.31V (Out)
[8]	3.31V (Out)

IC2303

Pin	+1.5V_DDR Regulator
[1]	3.40V (Enable)
[2]	0.76V
[3]	5.23V
[4]	2.49V
[5]	Gnd
[6]	1.57V (Out)
[7]	6.60V
[8]	11.84V (Vcc In)

IC2307

Pin	PWR_Det 12V Sense
[1]	Gnd
[2]	3.61V (Out)
[3]	3.64V (In)

Q2309

Pin	Panel_VCC Switch
[1]	11.85V (Vcc In)
[2]	11.85V (Vcc In)
[3]	11.85V (Vcc In)
[4]	1.86V (CTL)
[5]	11.84V (Out)
[6]	11.84V (Out)
[7]	11.84V (Out)
[8]	11.84V (Out)

Pin	Regulator
[1]	3.49V (Out)
[2]	Gnd
[3]	0.43V (n/c)
[4]	3.51V (En)
[5]	3.51V (Vcc In)

IC4300

Pin	+5V_USB_1 Regulator
[1]	5.11V (In)
[2]	Gnd
[3]	3.28V (Enable)
[4]	3.30V (USB_OCD3)
[5]	0.40V
[6]	5.11V (Out)

IC13100

Pin	DDR_VTT_URSA Regulator
[1]	1.52V (In)
[2]	Gnd
[3]	0.76V
[4]	0.76V (Out)
[5]	n/c
[6]	3.29V (Enable)
[7]	n/c
[8]	n/c

IC13403

Pin	(+1.5V_U_DDR) Regulator
[1]	3.49V (Enable)
[2]	0.77V
[3]	5.23V
[4]	2.51V
[5]	Gnd
[6]	1.53V (Out)
[7]	6.47V
[8]	11.84V (In)

Q400

Pin	M0_DDR_RESET_N Select
[E]	Gnd
[B]	0.0V
[C]	Do Not Measure

Q401

Pin	M1_DDR_RESET_N Select
[E]	Gnd
[B]	0.64V
[C]	0.07V

Q402

Pin	M2_DDR_RESET_N Select
[E]	Gnd
[B]	0.0V
[C]	1.56V

Pin	LD1900
[E]	0.67V
[B]	0.52V
[C]	Gnd

Q2300

Pin	PWR_On Switch
[1]	3.50V
[2]	2.84V
[3]	3.49V

Q2301

Pin	CPU_VID0 Select
[G]	0.31V
[S]	Gnd
[D]	0.07V

Q2302

Pin	CPU_VID1 Select
[G]	3.29V
[S]	Gnd
[D]	0.07V

Q2321

Pin	Driver for IC2309
[B]	0.66V
[E]	Gnd
[C]	0.60V

Q2500

Pin	CORE_VIDO Select
[G]	3.31V
[S]	Gnd
[D]	0.07V

Q2501

Pin	CORE_VID1 Select
[G]	3.31V
[S]	Gnd
[D]	0.07V

Q3001

Pin	CEC Bi-Directional
[G]	3.51V
[S]	3.48V
[D]	3.43V

Q3300

Pin	HDMI Hot Swap
[B]	0V
[E]	Gnd
[C]	0.63V

Pin	Driver
[B]	0V
[C]	3.29V
[E]	Gnd

Q6502

Pin	TU_CVBS Buffer
[B]	1.52V
[C]	Gnd
[E]	2.23V

Q7100

Pin	I2C_SCL6 Switch
[G]	3.05V
[S]	3.27V
[D]	3.26V

Q7101

Pin	I2C_SDA6 Switch
[G]	3.05V
[S]	3.27V
[D]	3.26V

Q7102

Pin	HTPDAn Driver
[G]	0.18V
[S]	0.0V
[D]	1.96V

Q7103

Pin	LOCKAn Driver
[G]	0.18V
[S]	0.0V
[D]	1.97V

Q7104

Pin	HTPDAn Switch
[G]	0.63V
[S]	0.0V
[D]	0.04V

Q7105

Pin	LOCKAn Switch
[G]	0.0V
[S]	0.64V
[D]	0.05V

Q12900

Pin	Drives LD12901
[E]	0.63V
[B]	0.02V
[C]	Gnd

55UF7600 Main Board (Large) Component Voltages

IC2305
+5V_NORMAL / +5V_USB Regulator

Pin		Pin	
[1]	25.35V (In)	[15]	3.43V (OCP2)
[2]	25.35V (In)	[16]	5.11V
[3]	25.35V (In)	[17]	5.11V
[4]	Gnd	[18]	11.53V
[5]	Gnd	[19]	5.11V (Out)
[6]	Gnd	[20]	5.11V (Out)
[7]	6.30V	[21]	5.11V (Out)
[8]	6.30V	[22]	1.94V
[9]	3.51V (Enable)	[23]	0.60V
[10]	5.10V (Out USB2)	[24]	0.35V
[11]	5.10V (Out USB3)	[25]	1.24V
[12]	3.28V (USB2 Ctrl)	[26]	0.45V
[13]	3.28V (USB3 Ctrl)	[27]	0.45V
[14]	3.43V (OCP2)	[28]	Gnd

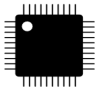
IC2501
+1.1V_VDDC Regulator

Pin		Pin	
[1]	3.51V (EN)	[9]	11.83V (In)
[2]	0.43V (Freq)	[10]	Gnd
[3]	0.63V (FB)	[11]	Gnd
[4]	4.84V (SS)	[12]	Gnd
[5]	Gnd	[13]	Gnd
[6]	4.83V (PG)	[14]	11.83V (In)
[7]	4.87V (VCC)	[15]	1.02V (Out)
[8]	5.79V (BST)	[16]	1.02V (Out)

IC6100
Head Phone Amp

Pin		Pin	
[1]	Gnd	[8]	1.66V
[2]	0V (R In)	[9]	3.31V (3.3V_Normal In)
[3]	0V (R Out)	[10]	Gnd
[4]	Gnd	[11]	n/c
[5]	3.49V (Mute)	[12]	0V (L Out)
[6]	(-3.18V)	[13]	0V (L In)
[7]	(-1.59V)	[14]	Gnd

IC3000
Micro Processor



Pin		Pin	
[1]	3.23V	[25]	0V
[2]	3.23V	[26]	3.51V
[3]	2.69V	[27]	3.51V
[4]	2.09V	[28]	0.03V
[5]	3.46V	[29]	0.1V
[6]	3.5V	[30]	0V
[7]	3.49V	[31]	3.34V
[8]	3.51V	[32]	3.51V
[9]	0V	[33]	3.51V
[10]	3.51V	[34]	3.75V
[11]	3.51V	[35]	0V
[12]	0V	[36]	0V
[13]	3.51V	[37]	0.02V
[14]	3.72V	[38]	0V
[15]	3.53V	[39]	3.51V
[16]	0V	[40]	3.51V
[17]	3.51V	[41]	0.65V
[18]	3.51V	[42]	0.13V
[19]	3.29V	[43]	0V
[20]	3.09V	[44]	0.14V
[21]	3.06V	[45]	0V
[22]	0V	[46]	2.09V
[23]	0V	[47]	Gnd
[24]	0.1V	[48]	3.51V

IC6801
RS232 Data

Pin		Pin	
[1]	3.52V	[9]	n/c
[2]	5.39V	[10]	n/c
[3]	0V	[11]	3.09V
[4]	0.02V	[12]	3.52V
[5]	(-5.33V)	[13]	0V
[6]	(-5.34V)	[14]	(-5.24V)
[7]	n/c	[15]	Gnd
[8]	n/c	[16]	3.52V (3.5V_ST In)

IC5800
Audio Amp

Pin		Pin	
[1]	n/c	[21]	2.16V (Out R+)
[2]	1.24V	[22]	Gnd
[3]	n/c	[23]	4.71V
[4]	Gnd	[24]	5.12V
[5]	n/c	[25]	5.14V
[6]	1.26V	[26]	n/c
[7]	0V	[27]	5.11V
[8]	1.62V	[28]	4.72V
[9]	n/c	[29]	Gnd
[10]	2.62V	[30]	2.16V (Out L-)
[11]	2.43V	[31-32]	18.67V (L B+)
[12]	3.30V (Mute)	[33]	2.16V (Out L+)
[13]	n/c	[34]	Gnd
[14]	0.0V	[35]	4.71V
[15]	n/c	[36]	3.03V (Reset)
[16]	4.71V	[37]	Gnd
[17]	Gnd	[38]	1.61V
[18]	2.16V (Out R-)	[39]	Gnd
[19-20]	18.67V (R B+)	[40]	3.31V (In)

IC13408
+1.1V_U_VDDC Regulator

Pin		Pin	
[1]	3.51V (EN)	[9]	11.83V (12V In)
[2]	0.43V (Freq)	[10]	Gnd
[3]	0.63V (FB)	[11]	Gnd
[4]	4.84V (SS)	[12]	Gnd
[5]	Gnd	[13]	Gnd
[6]	4.83V (PG)	[14]	11.83V (12V In)
[7]	4.87V (VCC)	[15]	1.18V (Out)
[8]	5.95V (BST)	[16]	1.18V (Out)

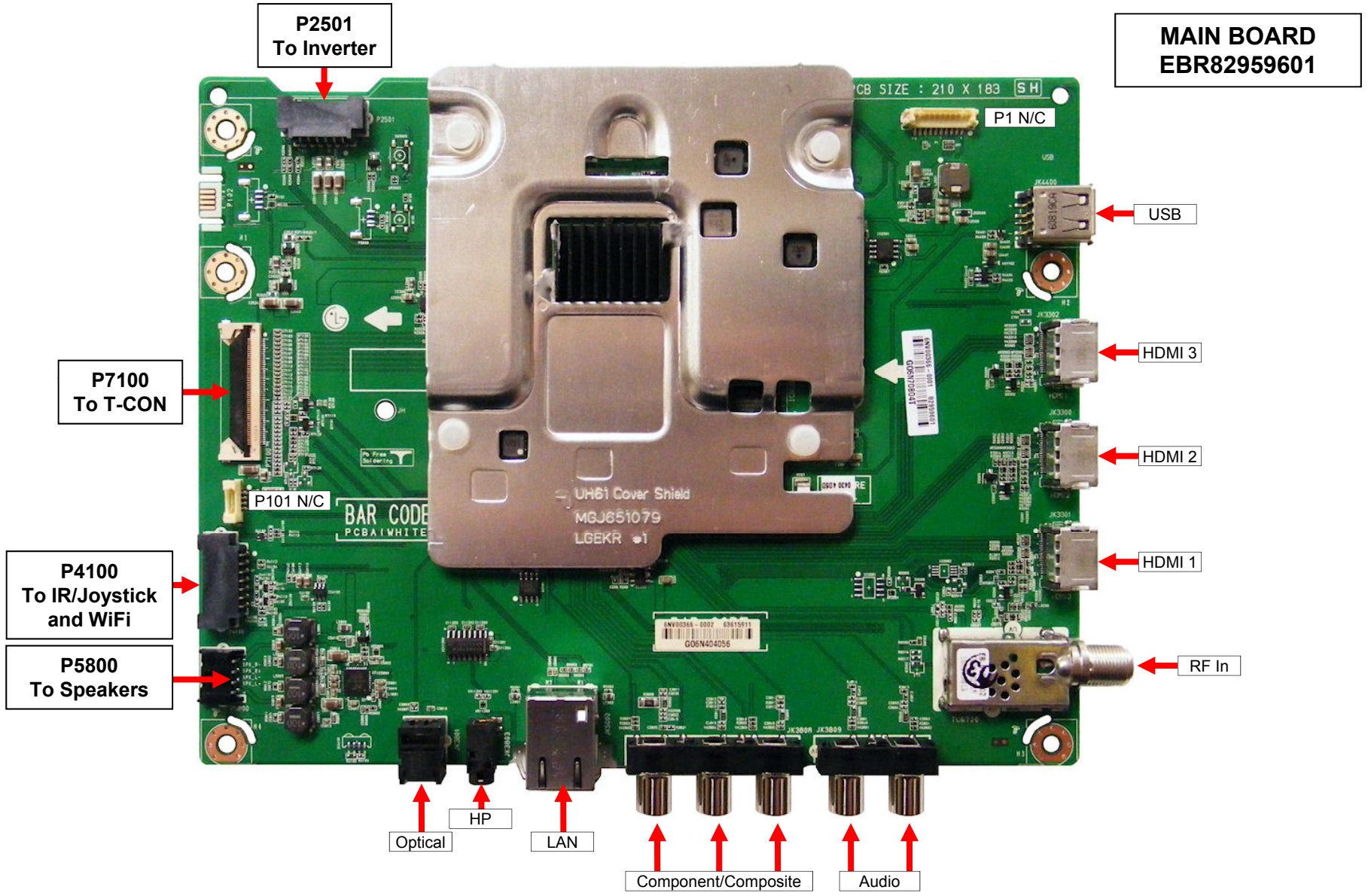
2016 4K UHD Training

65UH5500 WebOS 3.0 4K UHD TV
MAIN BOARD LAYOUT

(Main Circuit Board Layout)

Life's Good

65UH5500 Main Board Picture



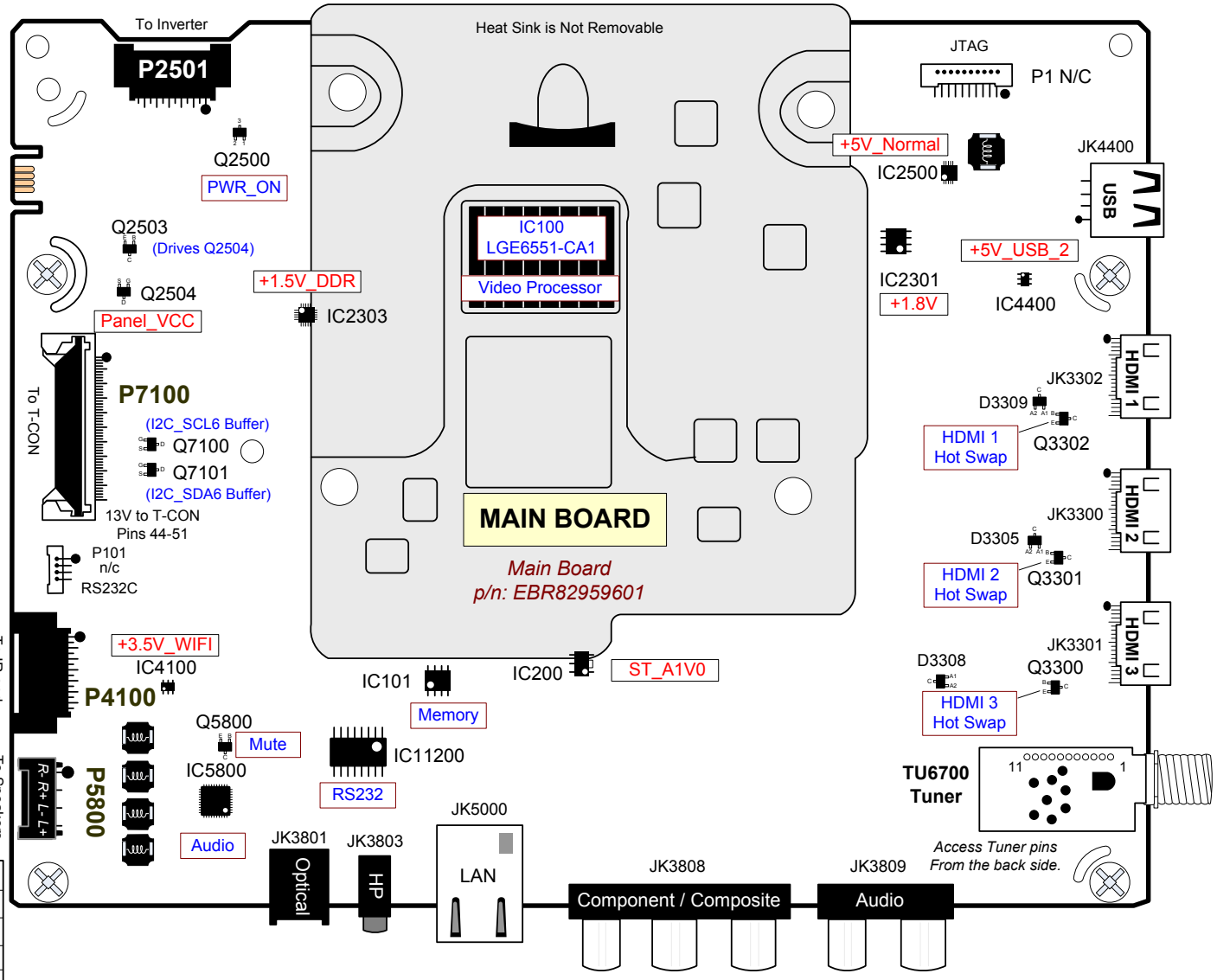
65UH5500 Main Board Component Layout

P5201 Main to Inverter CN402

Pin	Label	STBY	Run	Diode
1	PWR_ON	0.0V	3.20V	OL
2	N/C	n/c	n/c	n/c
3	Gnd	Gnd	Gnd	Gnd
4-8	13.2V	10.48V	13.34V	OL
9-10	Gnd	Gnd	Gnd	Gnd
11	DRV_ON	0V	3.36V	1.91V
12	P_DIM	0V	0.16V – 3.36V	OL

(Dim to Bright)

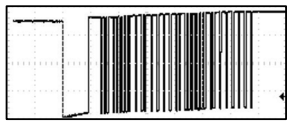
Note: Backlight Power is 64.4V in STBY.
(1) PWR_ON = (STB) Pin 1: Turns on the Power Supply. Backlight power goes to 84.6V. Backlights are not on at this time.
(2) DRV_ON (Pin 11): Turns on the Backlights. Backlight power goes to 78V. Note: P_DIM Must also be active. (3.3V) Max Brightness. (Pulse Width Modulation Dimming).
(3) P_DIM (Pin 12) = Controls the backlight brightness. Controlled by Cust.: Menu --> Video --> Backlights and by average brightness levels of the Video content.
Range 0% to 100% directly proportional to DC voltage to Backlight brightness. (0.16V~3.36V) P-DIM is actually a PWM 4.76V p/p signal.



KEY VOLAGES
P4100 "MAIN" to "Joy Stick, WiFi"

PIN	LABEL	STBY	RUN	Diode Check
2	3.5V_WiFi	0V	3.42V	OL
10	Key 2	3.44V	3.43V	1.86V
11	IR	3.42V	3.42V	1.73V
12	3.5V_ST	3.44V	3.44V	0.92V

Pins 1, 5, 14: Ground
Pins 7, 8, 9: No Connection (Not Used)
Pin 3: WOL_PWR_On 0.24V
Pin 10: Key2: 0.59V when Power Button Pressed
Pin 11: IR: 2.99V when IR Received
Pin 13: LED_R (0V) LED Off/TV On. (3V) LED On/TV Off.



10mSec / 1V

IR Signal
3.76V p/p

P4100 "Main" WiFi Board

Pin	Pin
1	6
2	1
3	5
4	2
5	4
6	3

P4100 "MAIN" IR Board

Pin	Pin
10	1
11	2
12	5
13	3
14	4

65UH5500 Main Board IC Voltages

IC101 — NVRAM Memory

Pin	
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	3.42V (SDA)
[6]	3.22V (SCL)
[7]	Gnd
[8]	3.40V (In +3.3V_Normal)

IC200 — ST_A1V0 Regulator

Pin	
[1]	3.44V (EN)
[2]	Gnd
[3]	0.79V (ADJ)
[4]	3.44V (In 3.5V_ST)
[5]	1.0V (Out)

IC2301 — +1.8V Regulator

Pin	
[1]	n/c
[2]	3.44V (EN Power_On/Off2_2)
[3]	3.39V (In +3.3V_Normal)
[4]	5.03V (Bias)
[5]	0.60V (SS)
[6]	1.80V (Out)
[7]	0.60V (FB)
[8]	Gnd

Q2500 — PWR_On Switch

Pin	
[1]	3.45V (In)
[2]	279V
[3]	3.43V (Out)

Q2503 — Drives (Controls) Q2504 (Panel_VCC)

Pin	
[B]	0.62V (PANEL_CTL)
[C]	0.05V
[E]	Gnd

Q2504 — Panel_VCC Switch

Pin	
[G]	10.57V
[S]	13.13V (+13V_In)
[D]	13.08V (Out)

IC2303 — +1.5V_DDR Regulator

Pin	
[1]	3.44V (In 3.5V_ST)
[2]	3.44V (In 3.5V_ST)
[3]	Gnd
[4]	Gnd
[5]	Gnd
[6]	0.83V (FB)
[7]	0.34V (ITH)
[8]	0.0V
[9]	2.26V (SS)
[10]	1.53V (Out)
[11]	1.53V (Out)
[12]	1.53V (Out)
[13]	5.06V (Boot)
[14]	n/c
[15]	3.49V (EN: POWER_ON/OFF2_3)
[16]	3.44V (In 3.5V_ST)

IC2500 — +5V_Normal Regulator

Pin	
[1]	3.44V (EN: POWER_ON/OFF1)
[2]	0.77V (FB)
[3]	5.07V (VREG5)
[4]	4.86V (SS)
[5]	n/c
[6]	+5.03V (Out)
[7]	+5.03V (Out)
[8]	9.72V (Boot)
[9]	13.2V (In +13V)
[10]	13.2V (In +13V)

Q7100
Q7101 — I2C_SCL6 Buffer / I2C_SDA6 Buffer

Pin	
[G]	3.42V (T_CON_EN)
[S]	3.14V (Out)
[D]	3.39V (In)

Q5800 — Audio Mute ("C" To pin 12 IC5800)

Pin	
[B]	0.0V (AMP_MUTE)
[C]	3.37V (Low Active)
[E]	Gnd

IC4100 — +3.5V_WiFI Regulator

Pin	
[1]	3.44V (In 3.5V_ST)
[2]	Gnd
[3]	3.44V (EN)
[4]	0.03V (OC)
[5]	0.19V
[6]	3.34V (Out)

IC4400 — +5V_USB_2 Regulator

Pin	
[1]	5.02V (In +5V_Normal)
[2]	Gnd
[3]	3.40V (EN)
[4]	3.39V (OC)
[5]	0.40V (ILIM)
[6]	5.03V (Out)

IC11200 — RS232 Data Buffer

Pin	
[1]	3.31V (C1+)
[2]	5.52V (V+)
[3]	0V (C1-)
[4]	0V (C2+)
[5]	(-5.43V) (C2-)
[6]	(-5.46V) (V2-)
[7]	(n/c)
[8]	(n/c)
[9]	(n/c)
[10]	(n/c)
[11]	3.27V (DIN2)
[12]	3.3V (ROut1)
[13]	0V (RIn1)
[14]	(-5.46V) (DOut1)
[15]	0V (Gnd)
[16]	0V (In) +3.3V_ST

Q3301
Q3302 — HDMI-2 Hot Swap (Pin 19 JK3300) / HDMI-1 Hot Swap (Pin 19 JK3302)

Pin	
[B]	0V (HDMI_HPD_CBUS_1)
[C]	0V (5V_DET_HDMI_1 and 2)
[E]	Gnd

IC5800 — Audio Amp

Pin		Pin	
[1]	n/c	[21]	1.81V (SPK_R+)
[2]	1.29V (VDD_PLL)	[22]	Gnd
[3]	n/c	[23]	6.38V
[4]	Gnd	[24]	5.11V
[5]	n/c	[25]	Gnd
[6]	1.24V (DVDD)	[26]	n/c
[7]	1.40V (SDATA)	[27]	5.09V
[8]	1.79V (WCK)	[28]	6.33V
[9]	n/c	[29]	Gnd
[10]	3.42V (SDA)	[30]	1.81V (SPK_L-)
[11]	3.42V (SCL)	[31]	13.2V (13V_AMP In)
[12]	3.37V (Mute)	[32]	13.2V (13V_AMP In)
[13]	n/c	[33]	1.81V (SPK_L+)
[14]	n/c	[34]	Gnd
[15]	n/c	[35]	6.40V
[16]	0V	[36]	3.33V (AMP_Reset)
[17]	Gnd	[37]	Gnd
[18]	1.81V (SPK_R-)	[38]	1.08V (AUD_SCK)
[19]	13.2V (13V_AMP In)	[39]	Gnd
[20]	13.2V (13V_AMP In)	[40]	3.3V (+3.3V_Normal)

NT71790-TCON

NN1B

NT71329

MAIN1V2

MAIN3V3

RESET

PI Resistor Must Close IC Pin

2D1G CPV Option

放在正面

EEPROM

NN6

NC/24LC64I/SN

By pass capacitor

<OrgName>	
Title	<Title>
Size C	Document Number <Doc>
Rev	?
Date:	Wednesday, February 06, 2013
Sheet	1 of 9

NT71790-MEMC

RX:NEAR CHIP SIDE

CO-LAYOUT DIP 8PIN

LVDS_RO0+	RN134	100R	LVDS_RO0-
LVDS_RO1+	RN108	100R	LVDS_RO1-
LVDS_RO2+	RN117	100R	LVDS_RO2-
LVDS_ROCLK+	RN130	100R	LVDS_ROCLK-
LVDS_RO3+	RN135	100R	LVDS_RO3-
LVDS_RO4+	RN148	100R	LVDS_RO4-
LVDS_RE0+	RN158	100R	LVDS_RE0-
LVDS_RE1+	RN107	100R	LVDS_RE1-
LVDS_RE2+	RN151	100R	LVDS_RE2-
LVDS_RECLK+	RN116	100R	LVDS_RECLK-
LVDS_RE3+	RN131	100R	LVDS_RE3-
LVDS_RE4+	RN142	100R	LVDS_RE4-

<OrgName>		
Title	<Title>	
Size C	Document Number <Doc>	Rev ?
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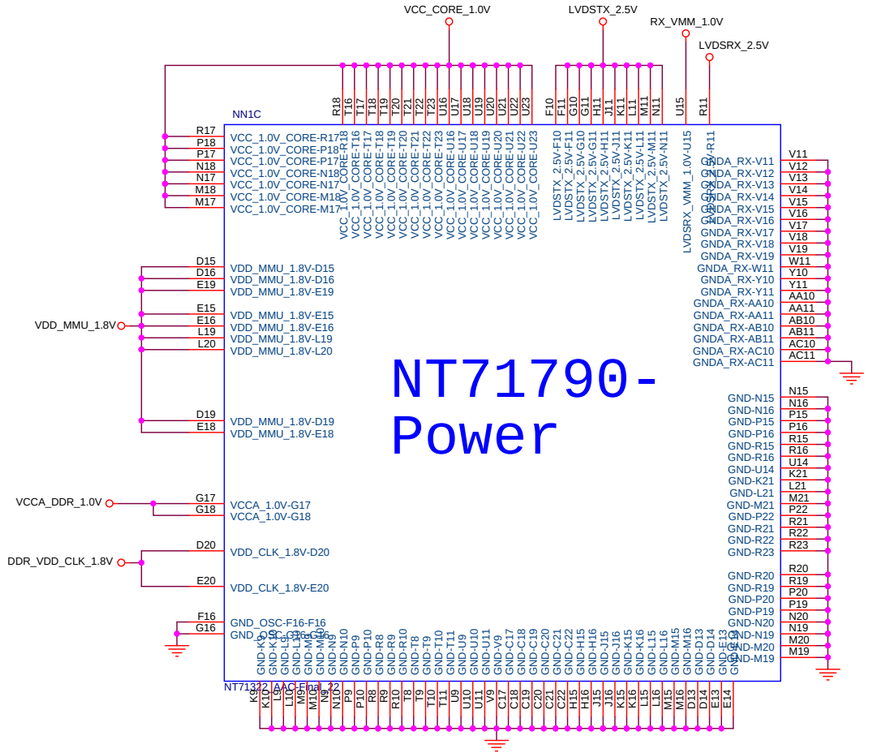

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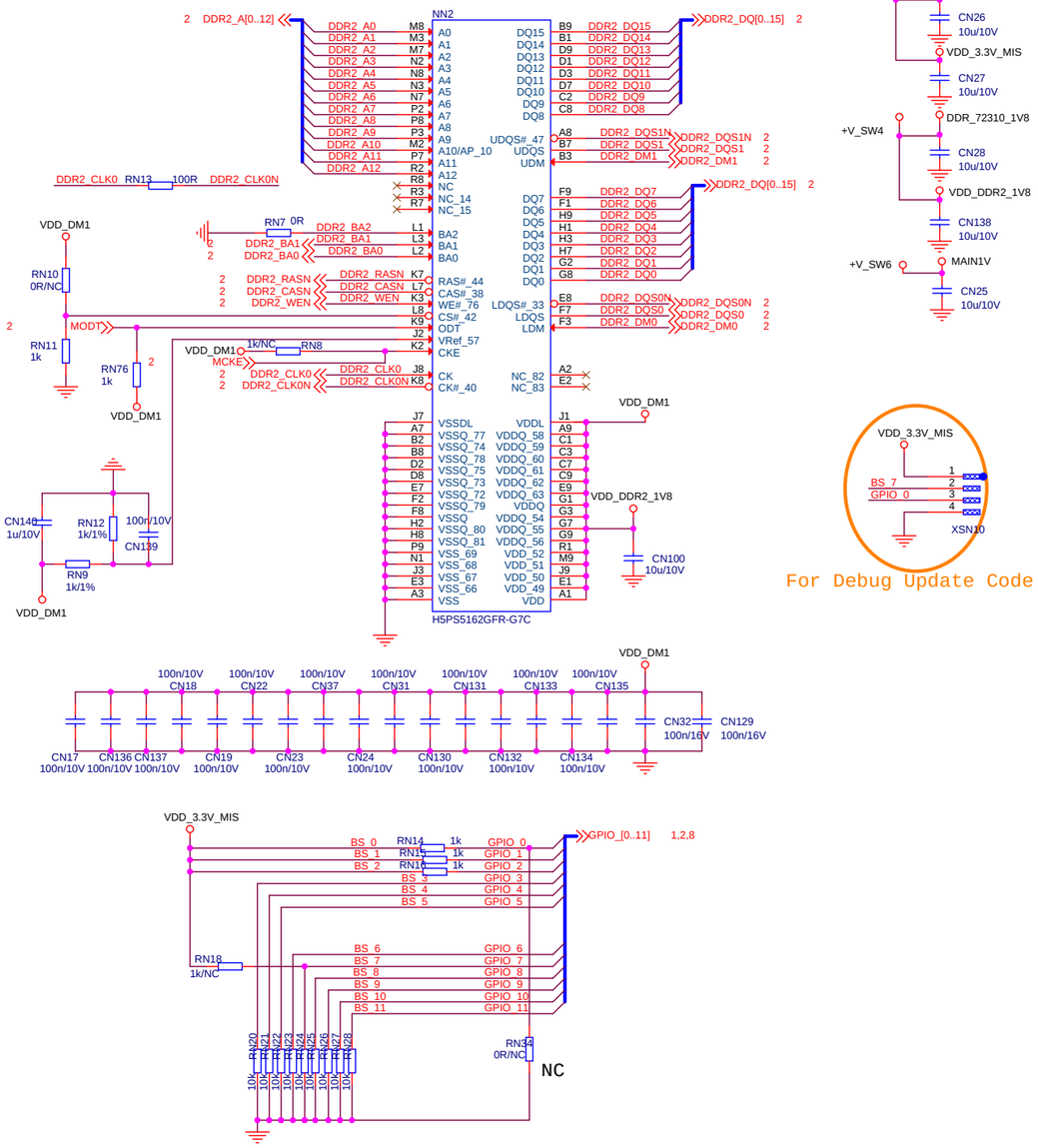
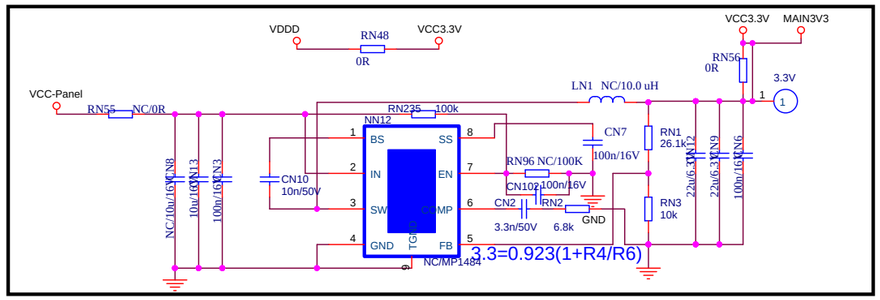
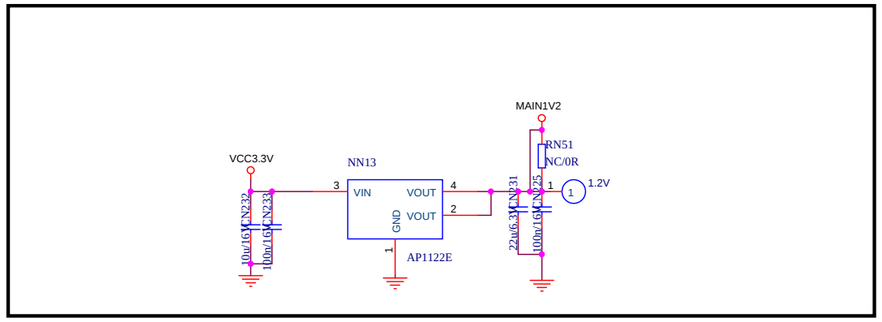
Title <Title>			
Size C	Document Number <Doc>		Rev ?
Date: Wednesday, February 06, 2013	Sheet 3 of 9		

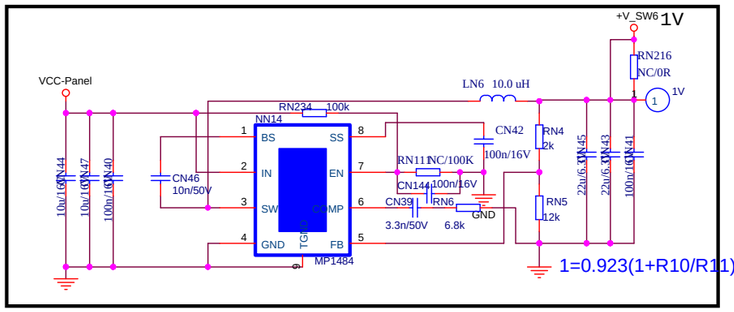
DDRII 512Mb/1Gb layout compatible
512Mb:BA2 NC, 1Gb:BA2 used

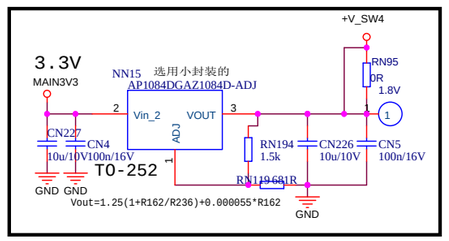


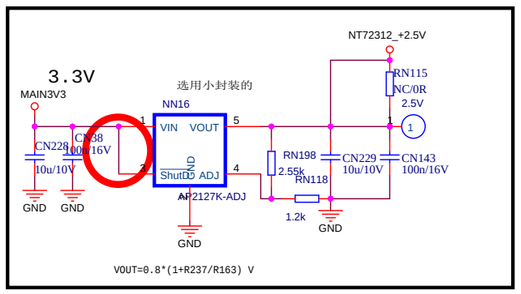
For Debug Update Code











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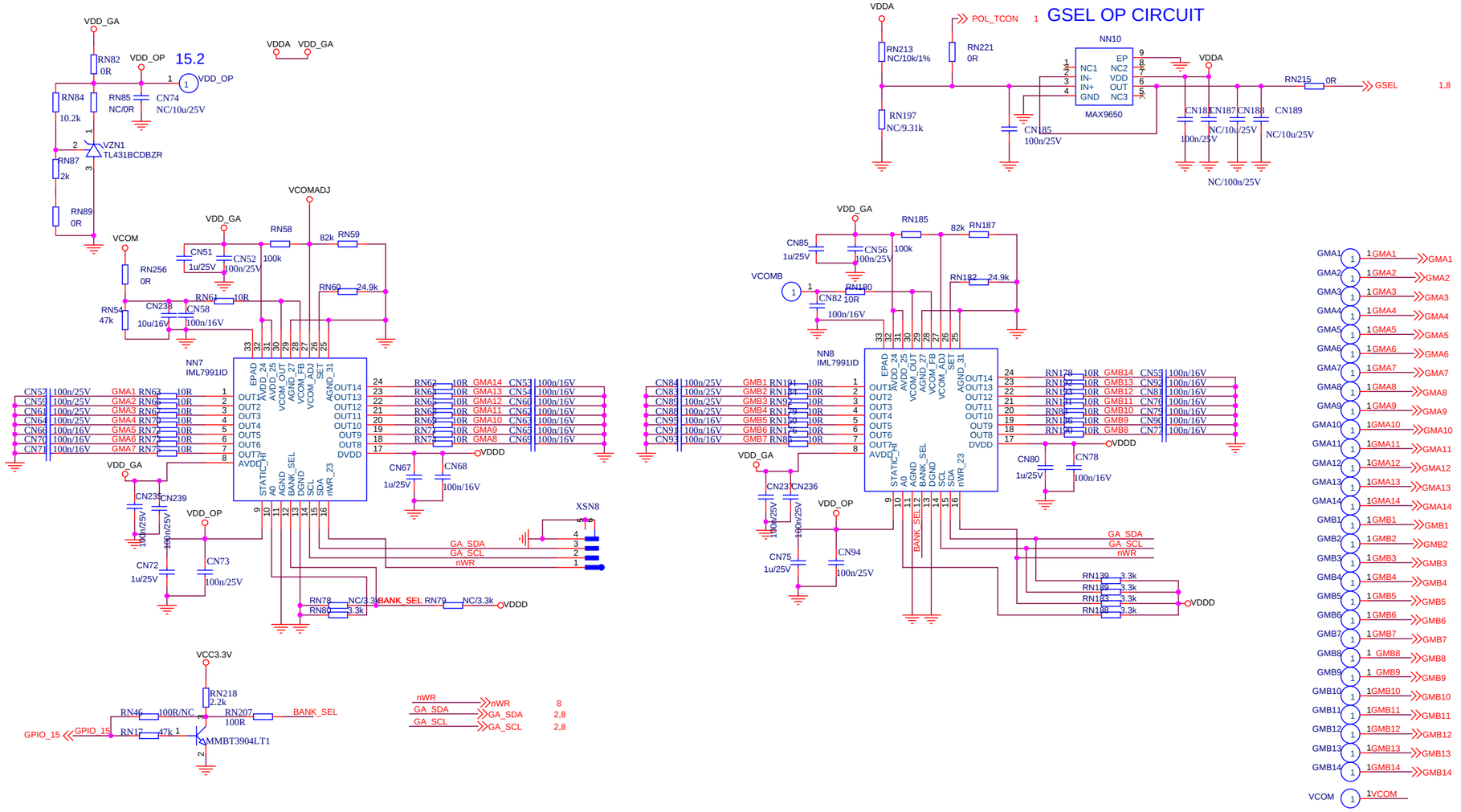
GSEL OP CIRCUIT



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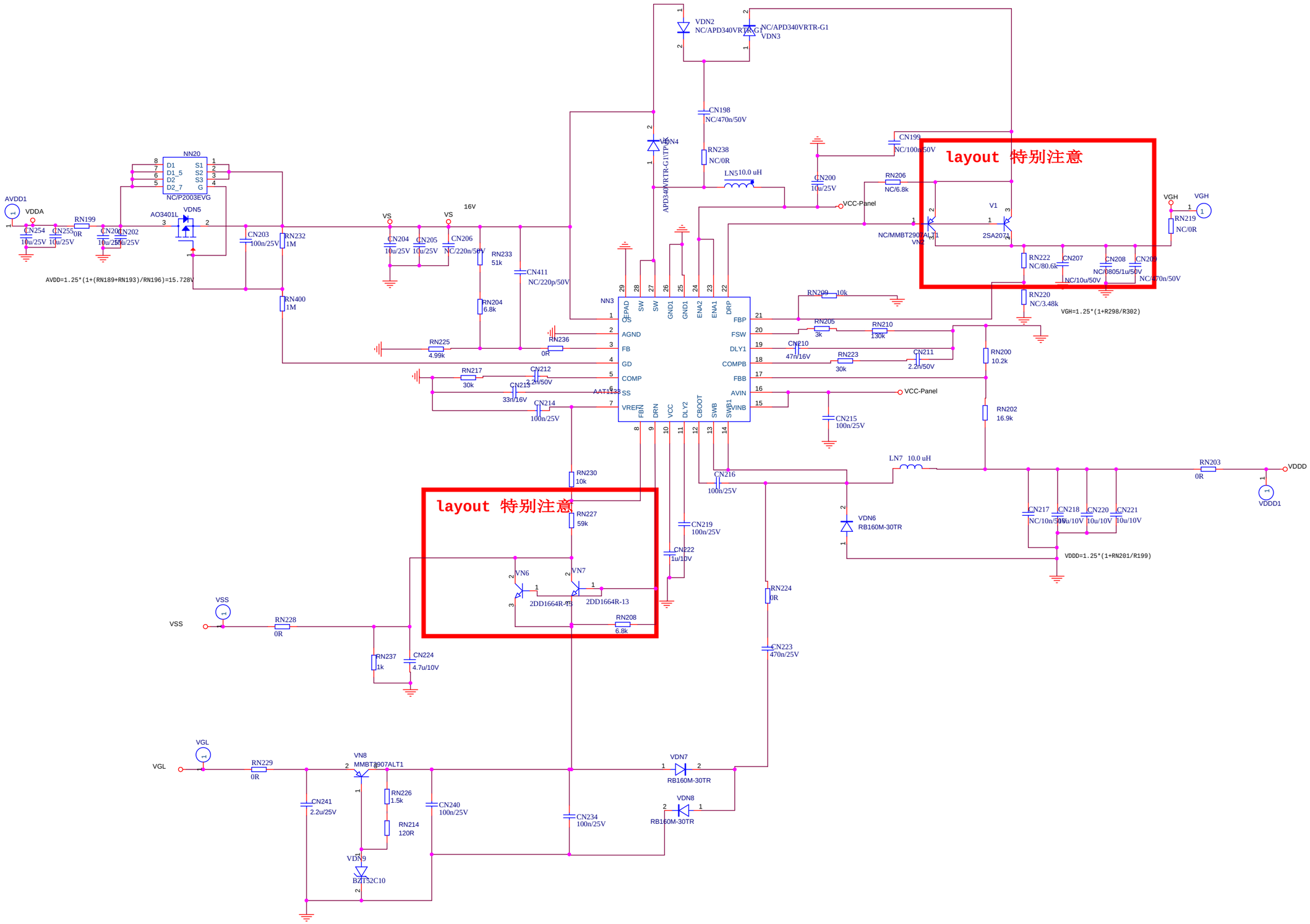
Date: Wednesday, February 06, 2013	Sheet 5 of 9		



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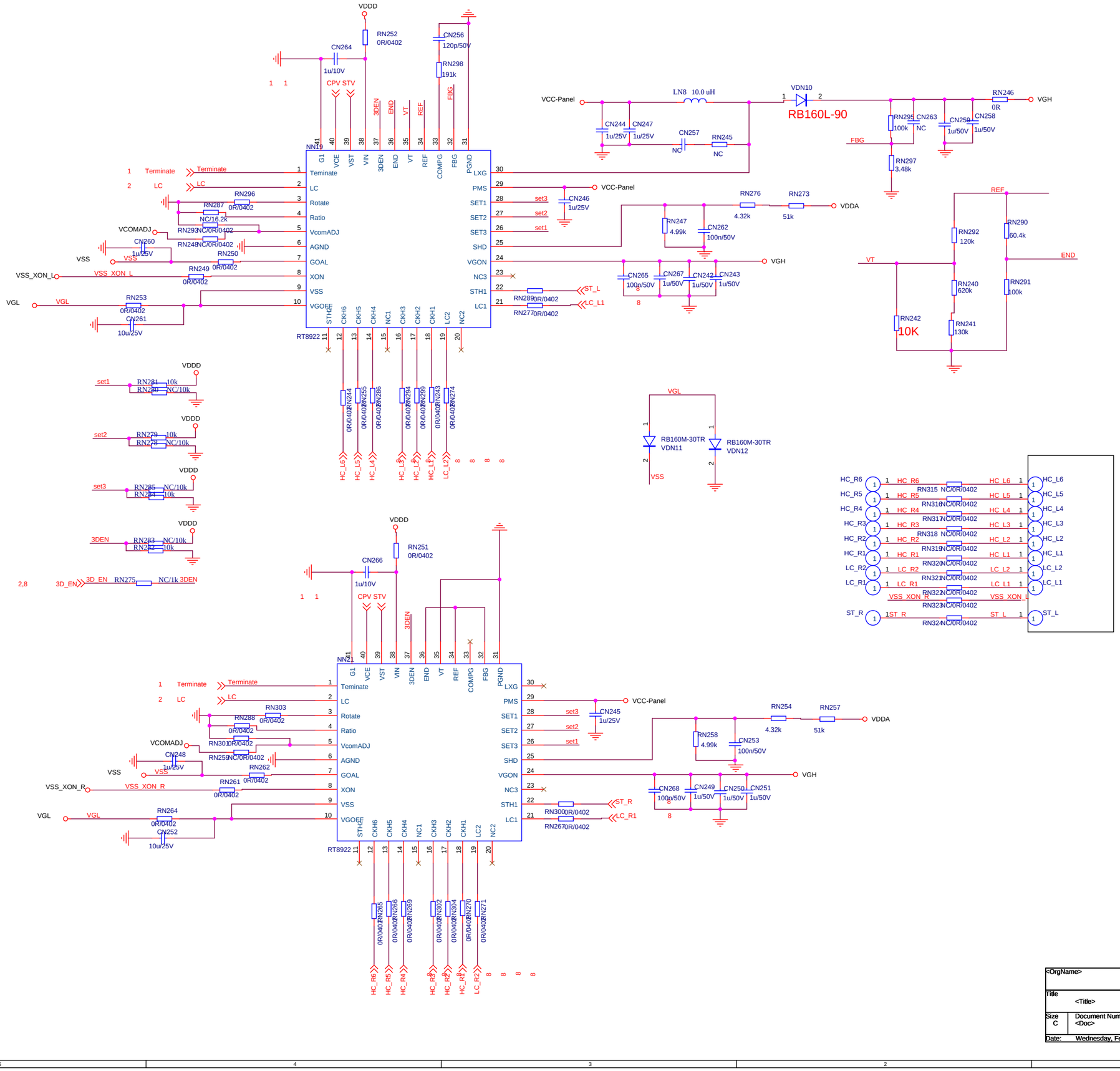
Size C	Document Number <Doc>	Rev ?
Date: Wednesday, February 06, 2013	Sheet 6 of 9	


VDDD
RN252 0R/0402
CN264 1u/10V
CN256 120p/50V
RN298 191k
CPV STV
3DEN END VT REF FBG
NN19
G1 VCE VST VIN 3DEN END VT REF COMPG FBG PGND
Teminate LC Rotate Ratio VcomADJ AGND GOAL XON VSS VGOFF
LXG PMS SET1 SET2 SET3 SHD VGON NC3 STH1 LC1
RT8922
STH6 CKH6 CKH5 CKH4 NC1 CKH3 CKH2 CKH1 LC2 NC2
Terminate
LC
RN296 0R/0402
RN287 NC/16.2k
RN293 NC/0R/0402
RN248 NC/0R/0402
RN250 0R/0402
RN249 0R/0402
RN253 0R/0402
CN261 10u/25V
CN260 1u/25V
CN248 1u/25V
VCOMADJ
VSS
VSS_XON_L
VGL
RN303 0R/0402
RN288 0R/0402
RN301 0R/0402
RN259 NC/0R/0402
RN262 0R/0402
RN261 0R/0402
RN264 0R/0402
CN252 10u/25V
VCC-Panel
CN246 1u/25V
CN245 1u/25V
set1 set2 set3
ST_L LC_L1
ST_R LC_R1
RN289 0R/0402
RN277 0R/0402
RN300 0R/0402
RN267 0R/0402
LN8 10.0 uH
VDN10
RB160L-90
RN246 0R
VGH
CN244 CN247 CN257 RN245
RN295 100k
CN263 NC
CN259 CN258 1u/50V
RN297 3.48k
FBG
RN276 4.32k
RN273 51k
VDDA
RN247 4.99k
CN262 100n/50V
CN265 100n/50V
CN267 CN242 CN243 1u/50V
CN268 100n/50V
CN249 CN250 CN251 1u/50V
REF
RN292 120k
RN290 60.4k
VT
END
RN240 620k
RN291 100k
RN242 10K
RN241 130k
RN254 4.32k
RN257 51k
RN258 4.99k
CN253 100n/50V
RN281 10k
RN280 NC/10k
RN279 10k
RN278 NC/10k
RN285 NC/10k
RN284 10k
RN283 NC/10k
RN282 10k
RN275 NC/1k
3D_EN
RB160M-30TR
VDN11
VDN12
RN244 RN255 RN286 RN254 RN299 RN243 RN274
RN265 RN266 RN269 RN302 RN304 RN270 RN271
HC_L6 HC_L5 HC_L4 HC_L3 HC_L2 HC_L1 LC_L2
HC_R6 HC_R5 HC_R4 HC_R3 HC_R2 HC_R1 LC_R2
RN315 NC/0R/0402
RN316 NC/0R/0402
RN317 NC/0R/0402
RN318 NC/0R/0402
RN319 NC/0R/0402
RN320 NC/0R/0402
RN321 NC/0R/0402
RN322 NC/0R/0402
RN323 NC/0R/0402
RN324 NC/0R/0402
VSS_XON_R
ST_R
ST_L
<OrgName>
Title
<Title>
Size C
Document Number <Doc>
Rev ?
Date: Wednesday, February 06, 2013
Sheet 7 of 9

Layout place Left

Layout place Right

Layout place L

Layout place Right

COF

Add:
From SOC to FRC(Function control option)

<OrgName>	
Title	<Title>
Size A2	Document Number <Doc> — Rev ?
Date: Wednesday, February 06, 2013	Sheet 8 of 9

Himax Solution

Panel Type: VA_IPS-alpha 315

Resolution: 1366*768

Scan direction:

Dummy Channel:

Tcon: HX6710 _Single in/Dual out_

SD: COF_HX8031-N42_684CH*6_

GD: COF_HX8651-FCU29 _256CH*3_

PWM: TPS65161

P-OP: HX5200

VIN: 12V

VDDD: 3.3V

VDDA: 12.5V

VDDD_TCON: 3.3V

VDDA_TCON: 3.3V

VDDP_TCON: 3.3V

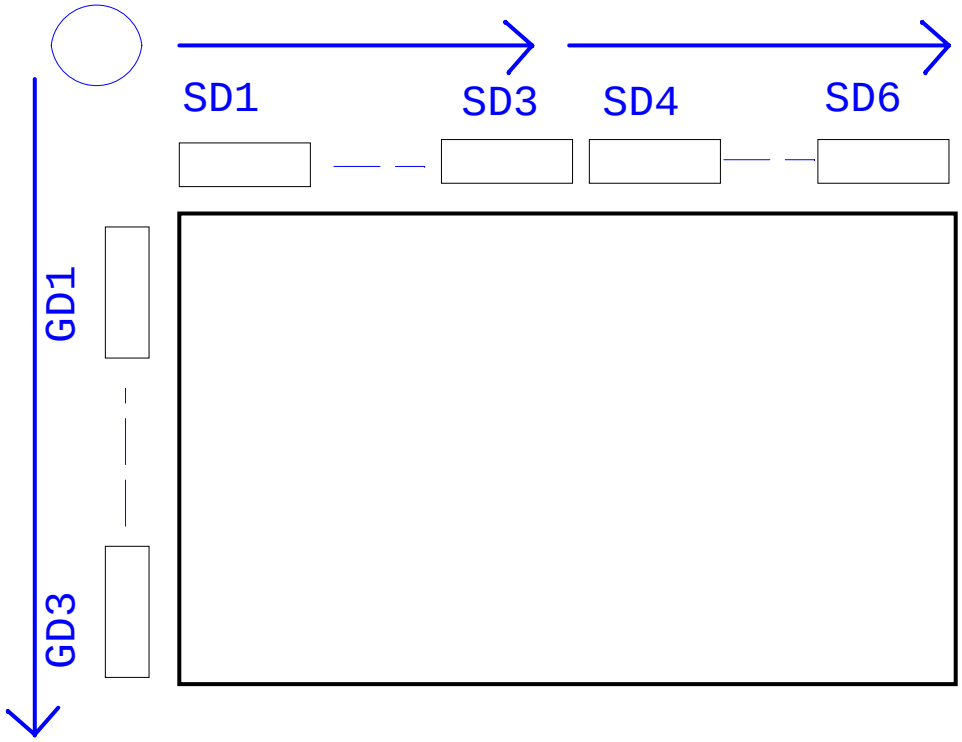
VDDM_TCON: 3.3V

VGH: 23V

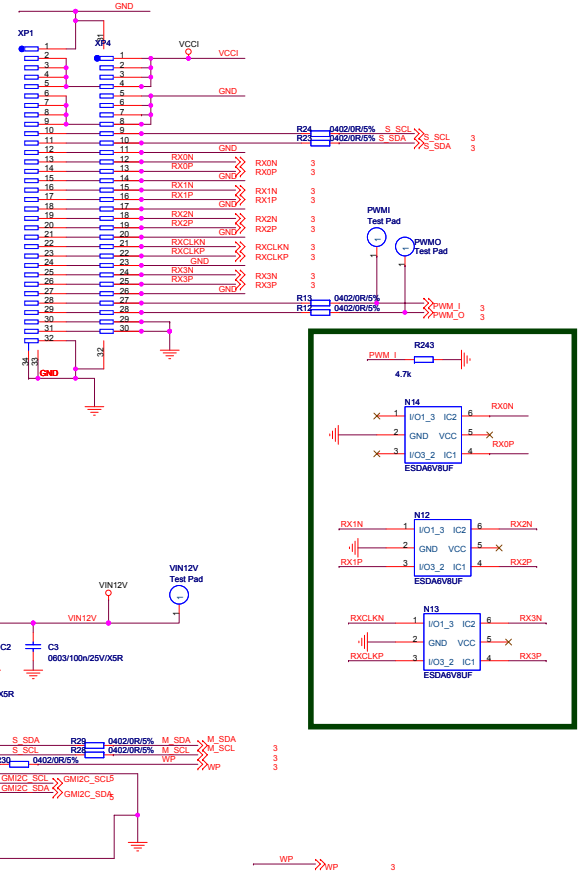
VGL: -8V

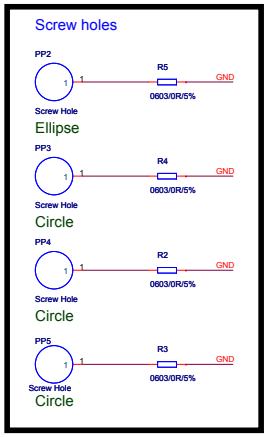
VCOM: 6V

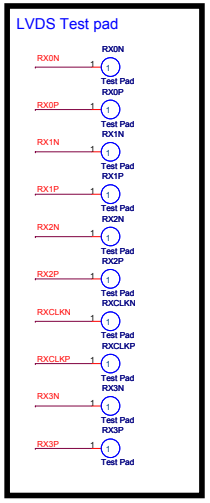
Vref: 12.4V

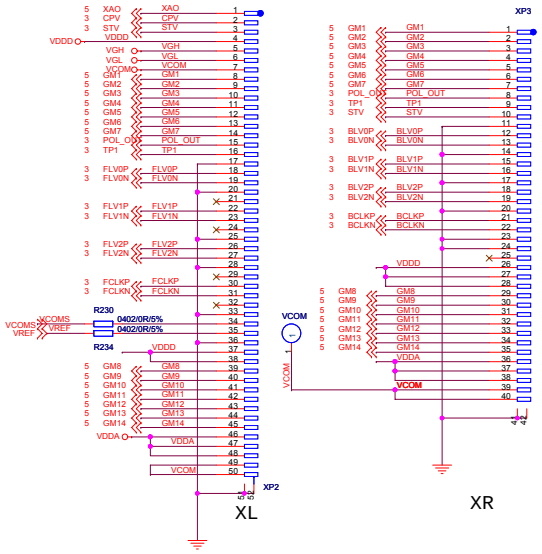


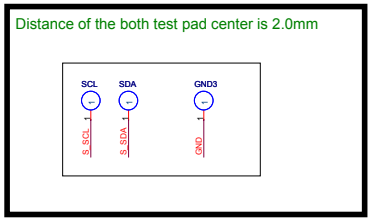
Distance of the both test pad center is 2.00mm











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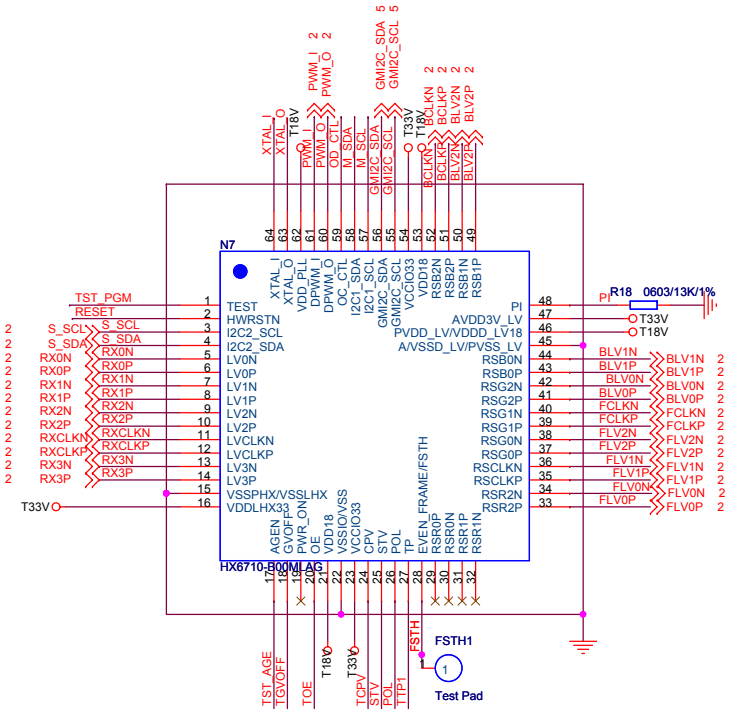
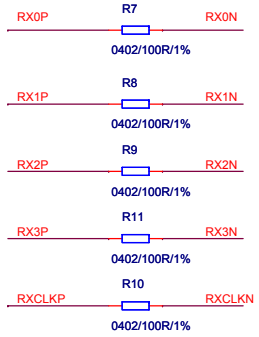
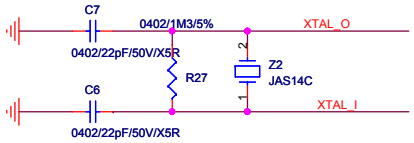
DWG NO <OrgName>			DATE 2016.9.13		
Size	Checked	Designer	Drawer	Rev	SHEET
A2				D	2 / 8

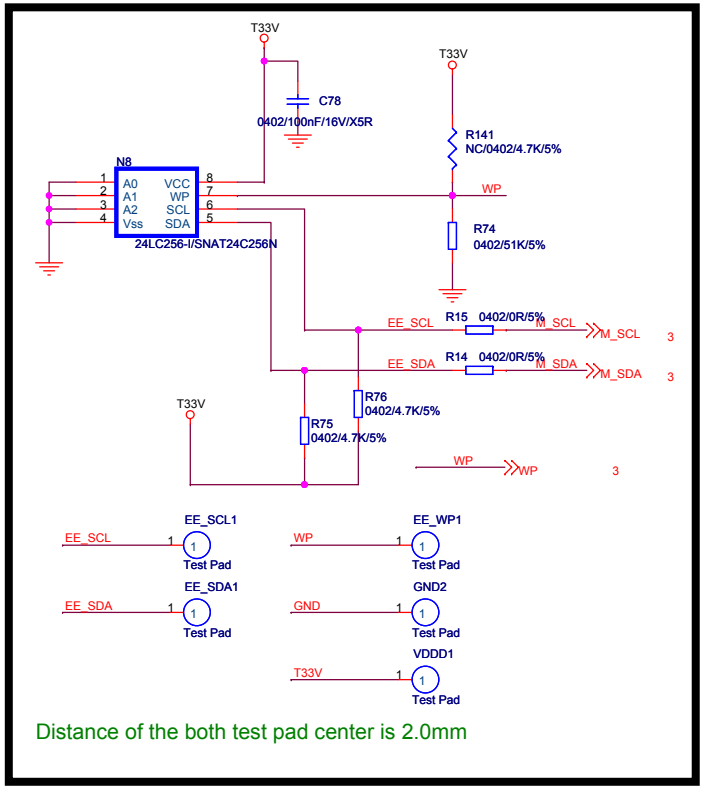


LVDS terminator, close to TCON

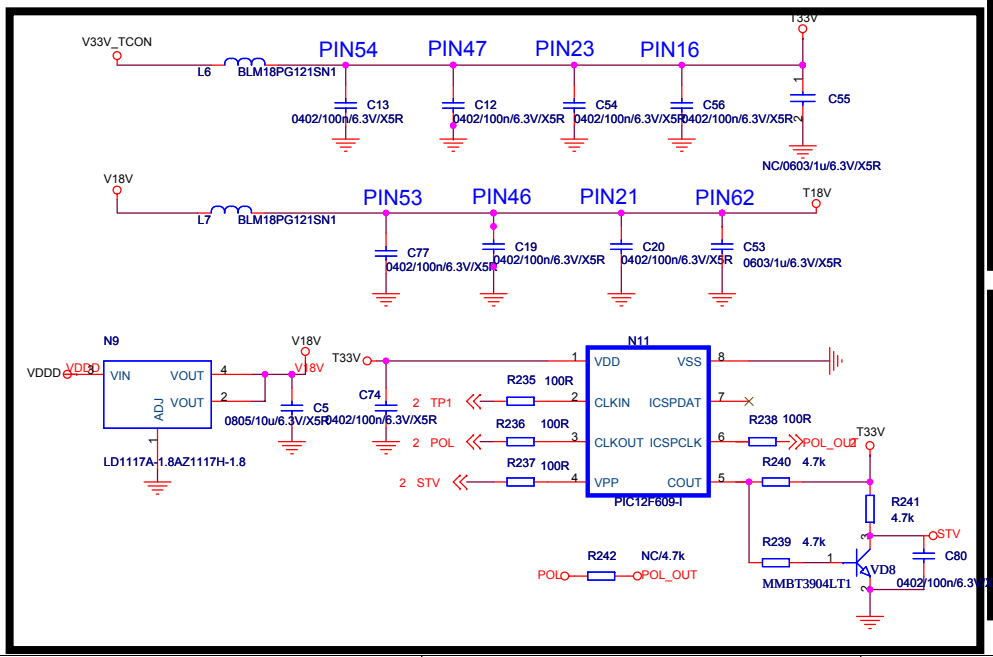


HX6710 Crystal



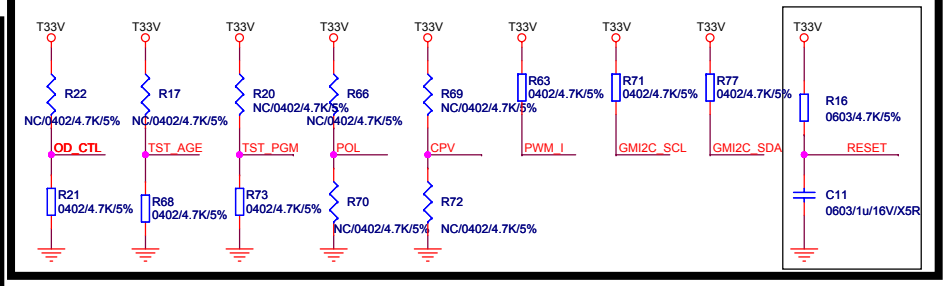


HX6710 Power & Decoupling _close to each pin_

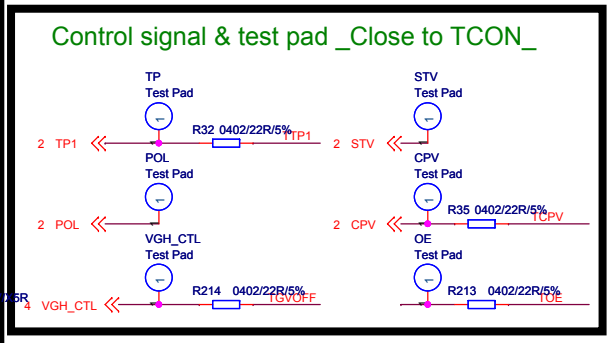


TCON option function

Close to TCON



Control signal & test pad _Close to TCON_



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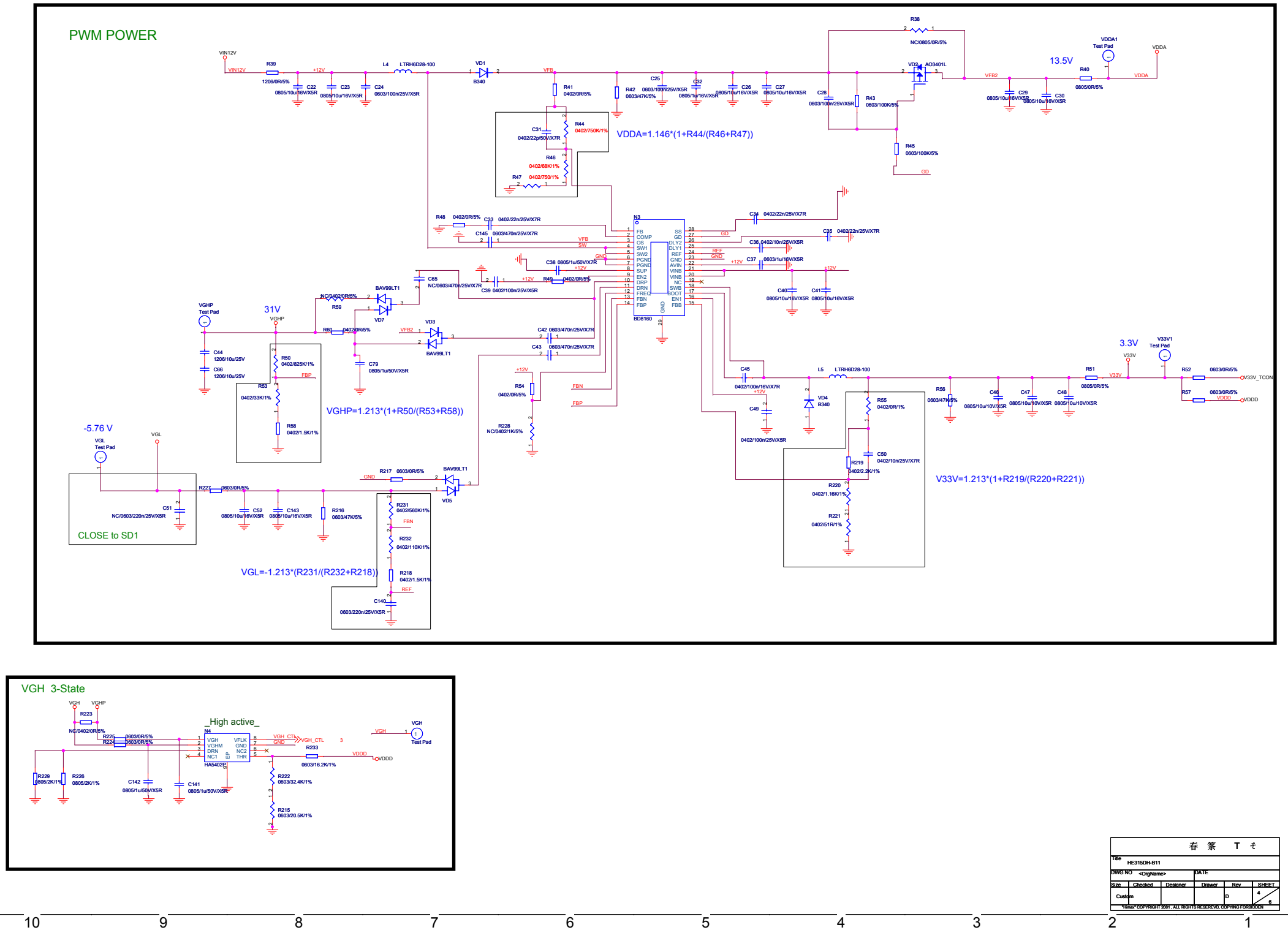
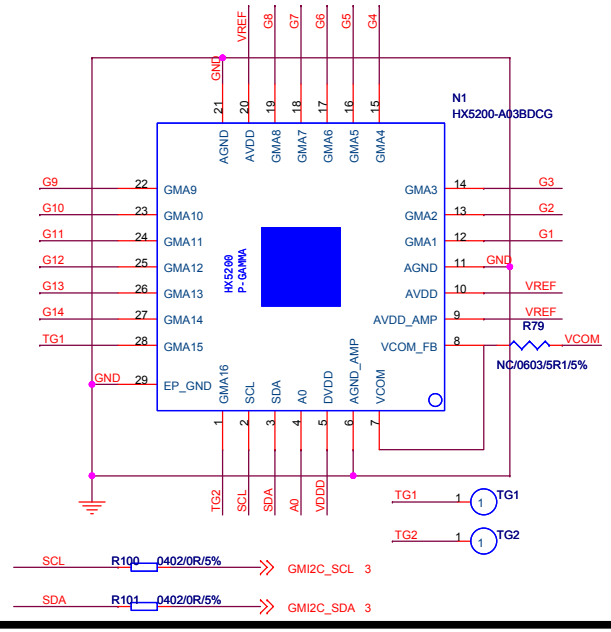
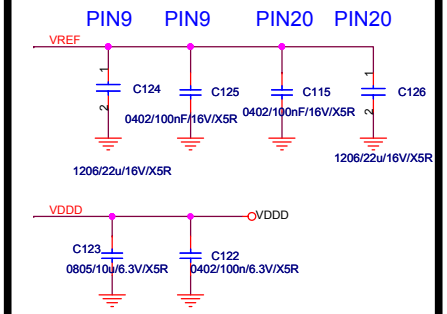

PWM POWER
VIN12V
R39
1206/0R/5%
+12V
L4
LTRH6D28-100
VD1
B340
VFB
R41
0402/0R/5%
R42
0603/47K/5%
C25
0603/100n/25V/X5R
C32
0805/1u/16V/X5R
C26
0805/10u/16V/X5R
C27
0805/10u/16V/X5R
C28
0603/100n/25V/X5R
R43
0603/100K/5%
R38
NC/0805/0R/5%
VD2
AO3401L
VFB2
13.5V
R40
0805/0R/5%
VDDA1
Test Pad
VDDA
C29
0805/10u/16V/X5R
C30
0805/10u/16V/X5R
R45
0603/100K/5%
GD
C31
0402/22p/50V/X7R
R44
0402/750K/1%
R46
0402/68K/1%
R47
0402/750/1%
VDDA=1.146*(1+R44/(R46+R47))
N3
BD8160
FB
COMP
OR
SW1
SW2
PGND
PGND
SUP
EN2
DRP
DRN
FREQ
FBN
FBP
SS
GD
DLY2
DLY1
REF
GND
AVIN
VINB
VINB
NC
SWB
BOOT
EN1
FBB
R48
0402/0R/5%
C33
0402/22n/25V/X7R
C145
0603/470n/25V/X7R
C34
0402/22n/25V/X7R
C35
0402/22n/25V/X7R
C36
0402/10n/25V/X5R
C37
0603/1u/16V/X5R
C38
0805/1u/50V/X7R
R49
0402/0R/5%
C39
0402/100n/25V/X5R
C85
NC/0603/470n/25V/X7R
C40
0805/10u/16V/X5R
C41
0805/10u/16V/X5R
VGHP
Test Pad
31V
VGHP
BAV99LT1
VD7
NC/0402/0R/5%
R59
R60
0402/0R/5%
VD3
BAV99LT1
C42
0603/470n/25V/X7R
C43
0603/470n/25V/X7R
C44
1206/10u/25V
C86
1206/10u/25V
R50
0402/825K/1%
R53
0402/33K/1%
R58
0402/1.5K/1%
C79
0805/1u/50V/X5R
VGHP=1.213*(1+R50/(R53+R58))
C45
0402/100n/16V/X7R
L5
LTRH6D28-100
VD4
B340
C49
0402/100n/25V/X5R
R54
0402/0R/5%
R228
NC/0402/1K/5%
R55
0402/0R/1%
C50
0402/10n/25V/X7R
R219
0402/2.2K/1%
R220
0402/1.16K/1%
R221
0402/51R/1%
V33V=1.213*(1+R219/(R220+R221))
3.3V
V33V
V33V1
Test Pad
R51
0805/0R/5%
R52
0603/0R/5%
R57
0603/0R/5%
V33V_TCON
VDDD
R56
0603/47K/5%
C46
0805/10u/10V/X5R
C47
0805/10u/10V/X5R
C48
0805/10u/10V/X5R
-5.76 V
VGL
Test Pad
VGL
R227
0603/0R/5%
C51
NC/0603/220n/25V/X5R
CLOSE to SD1
C52
0805/10u/16V/X5R
C143
0805/10u/16V/X5R
R216
0603/47K/5%
R217
0603/0R/5%
BAV99LT1
VD5
R231
0402/560K/1%
R232
0402/110K/1%
R218
0402/1.5K/1%
C140
0603/220n/25V/X5R
VGL=-1.213*(R231/(R232+R218))
VGH 3-State
VGH
VGHP
R223
NC/0402/0R/5%
High active
N4
HA5402P
VGH
VGHM
DRN
NC1
VFLK
GND
NC2
THR
VGH_CTL
R225
0603/0R/5%
R224
0603/0R/5%
R233
0603/16.2K/1%
R222
0603/32.4K/1%
R215
0603/20.5K/1%
R229
0805/2K/1%
R226
0805/2K/1%
C142
0805/1u/50V/X5R
C141
0805/1u/50V/X5R
VGH
Test Pad
春 篆 T そ
Title
HE315DH-B11
DWG NO
<OrgName>
DATE
Size
Checked
Designer
Drawer
Rev
SHEET
Custom
D
4
6
Name COPYRIGHT 2001 , ALL RIGHTS RESERVED, COPYING FORBIDDEN

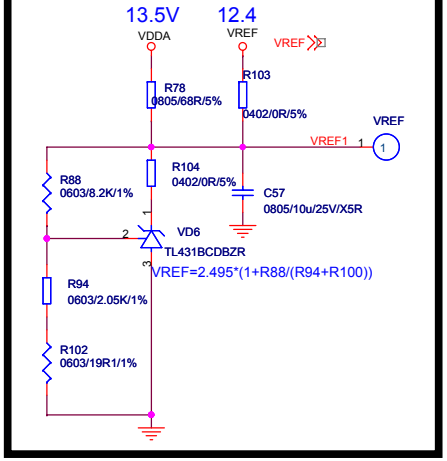
PROGRAMMING GAMMA



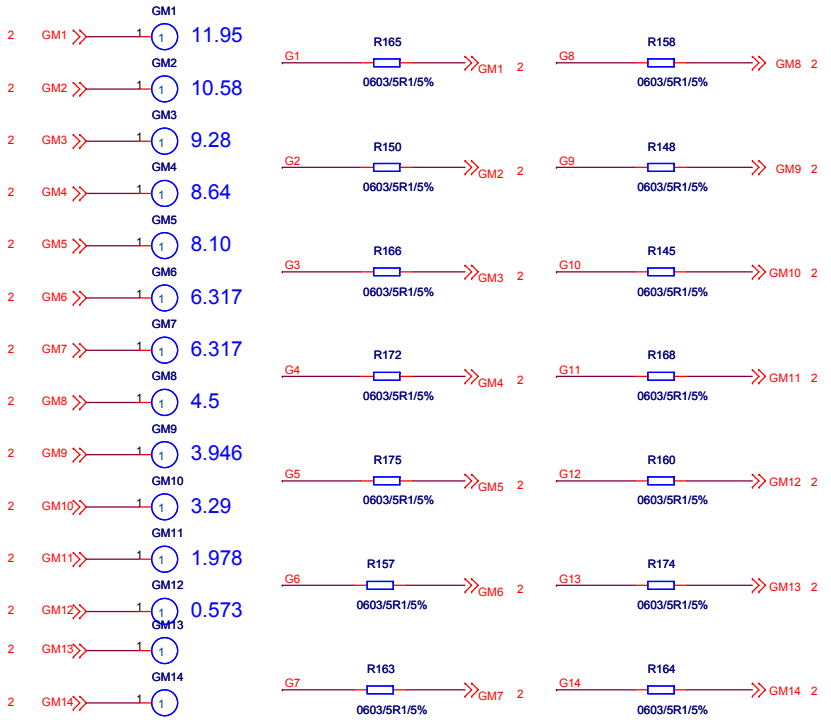
HX5200 Power



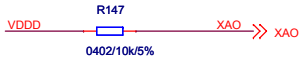
VREF



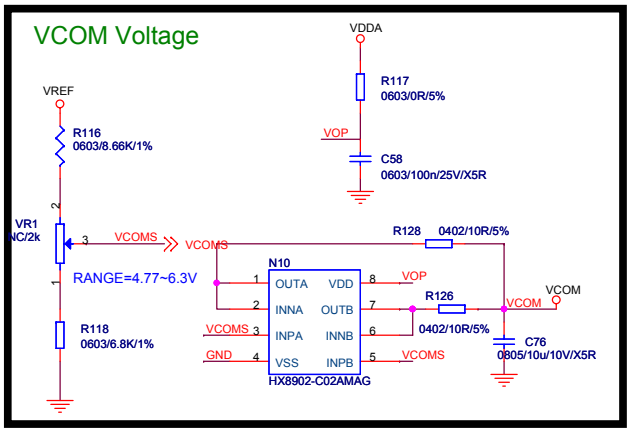
EXT-GAMMA VOLTAGE _ Gamma



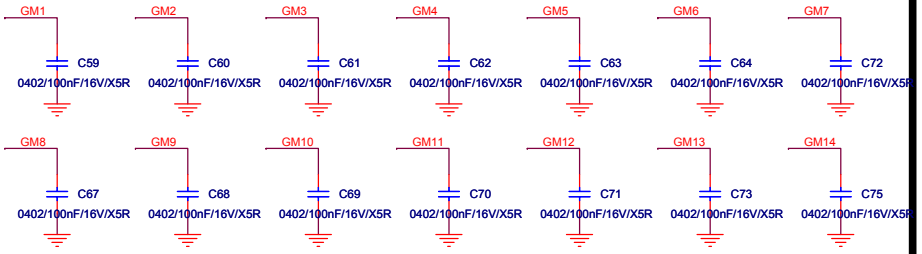
Reset IC for XAO function



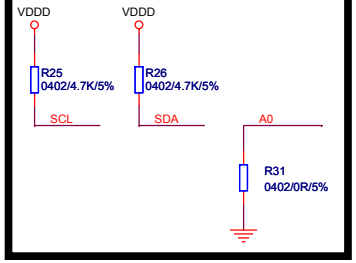
VCOM Voltage

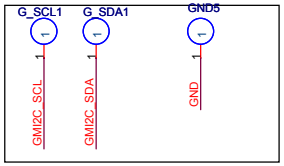


GAMMA Decoupling C



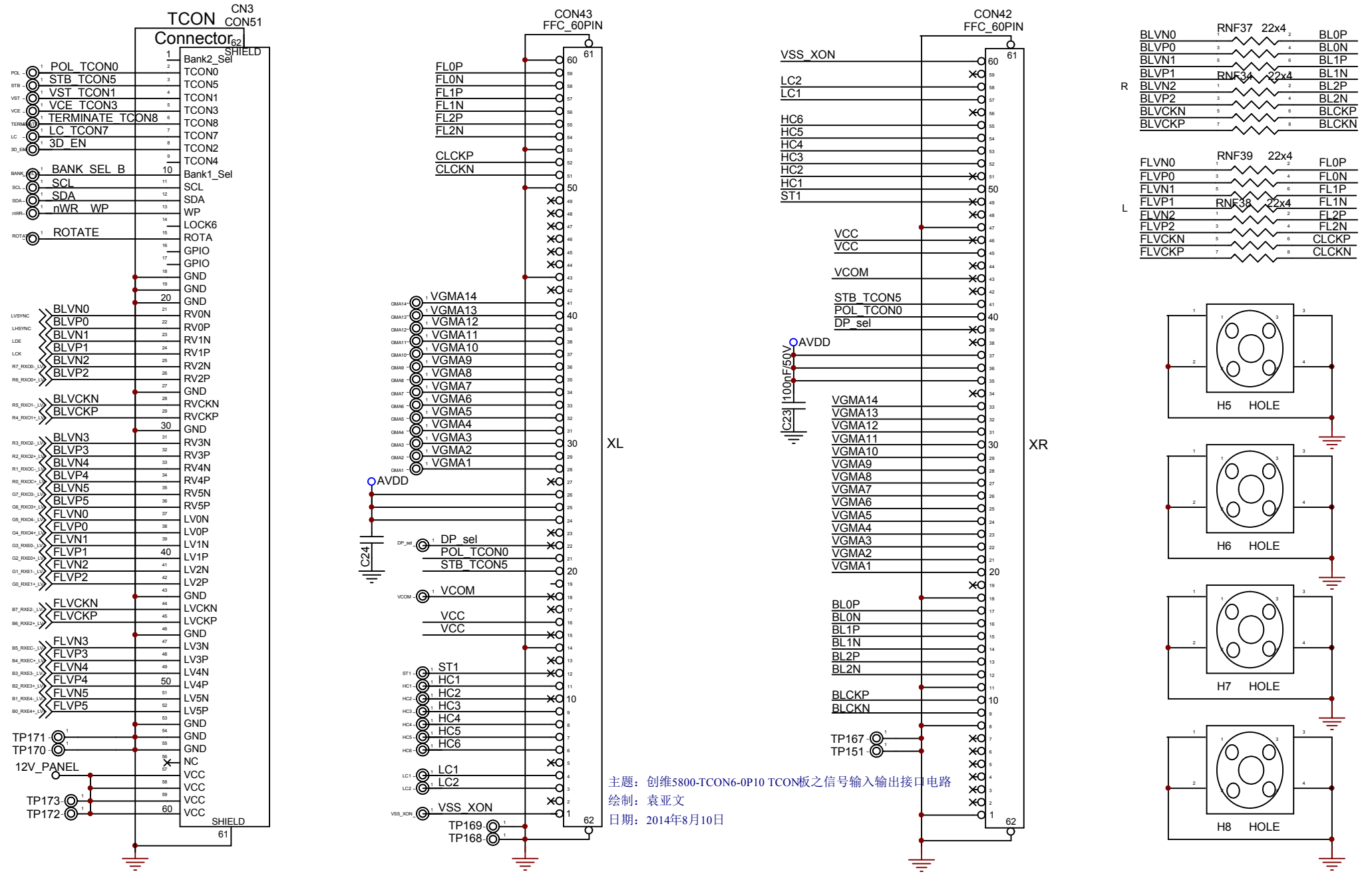
HX5200 Setting



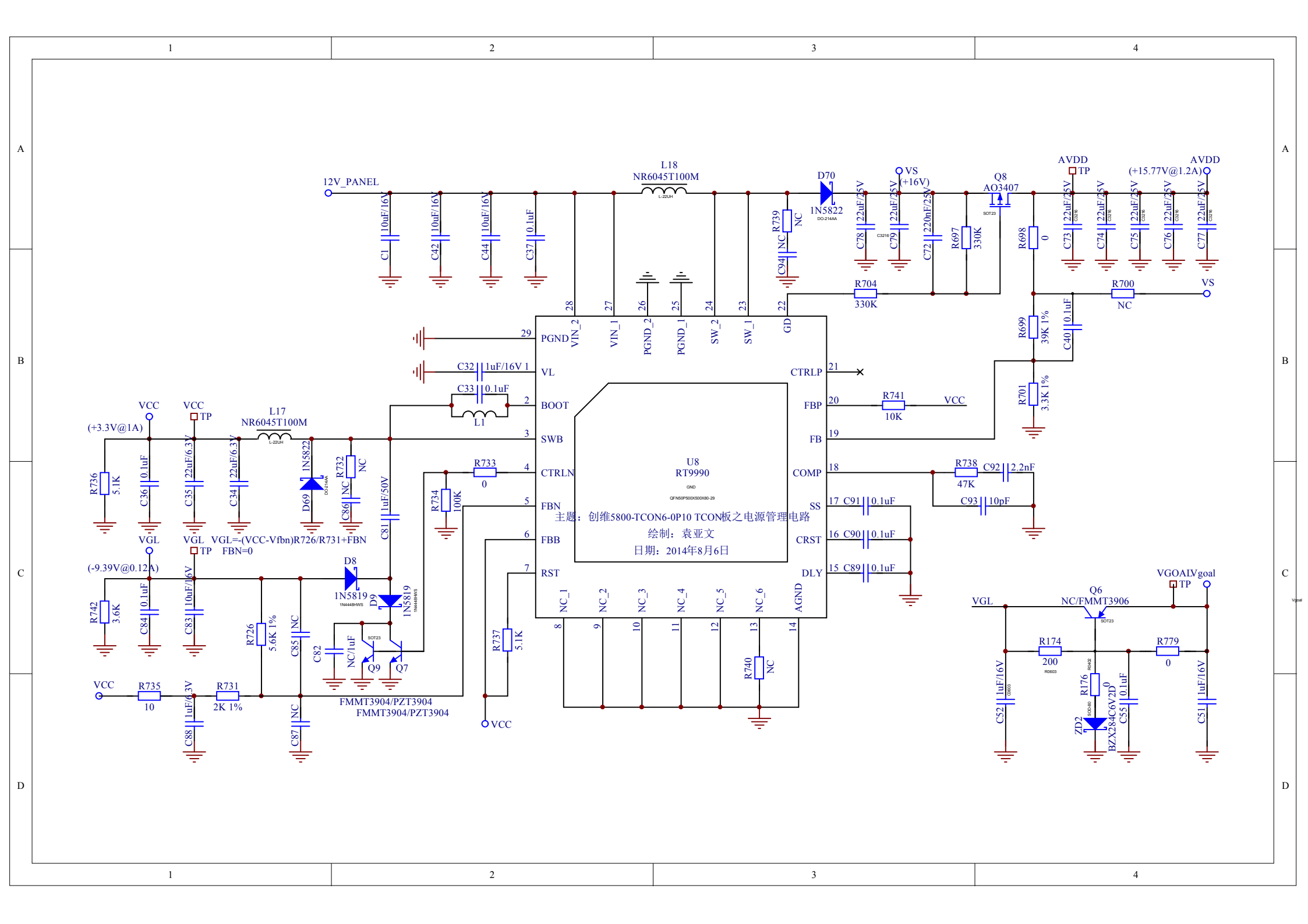


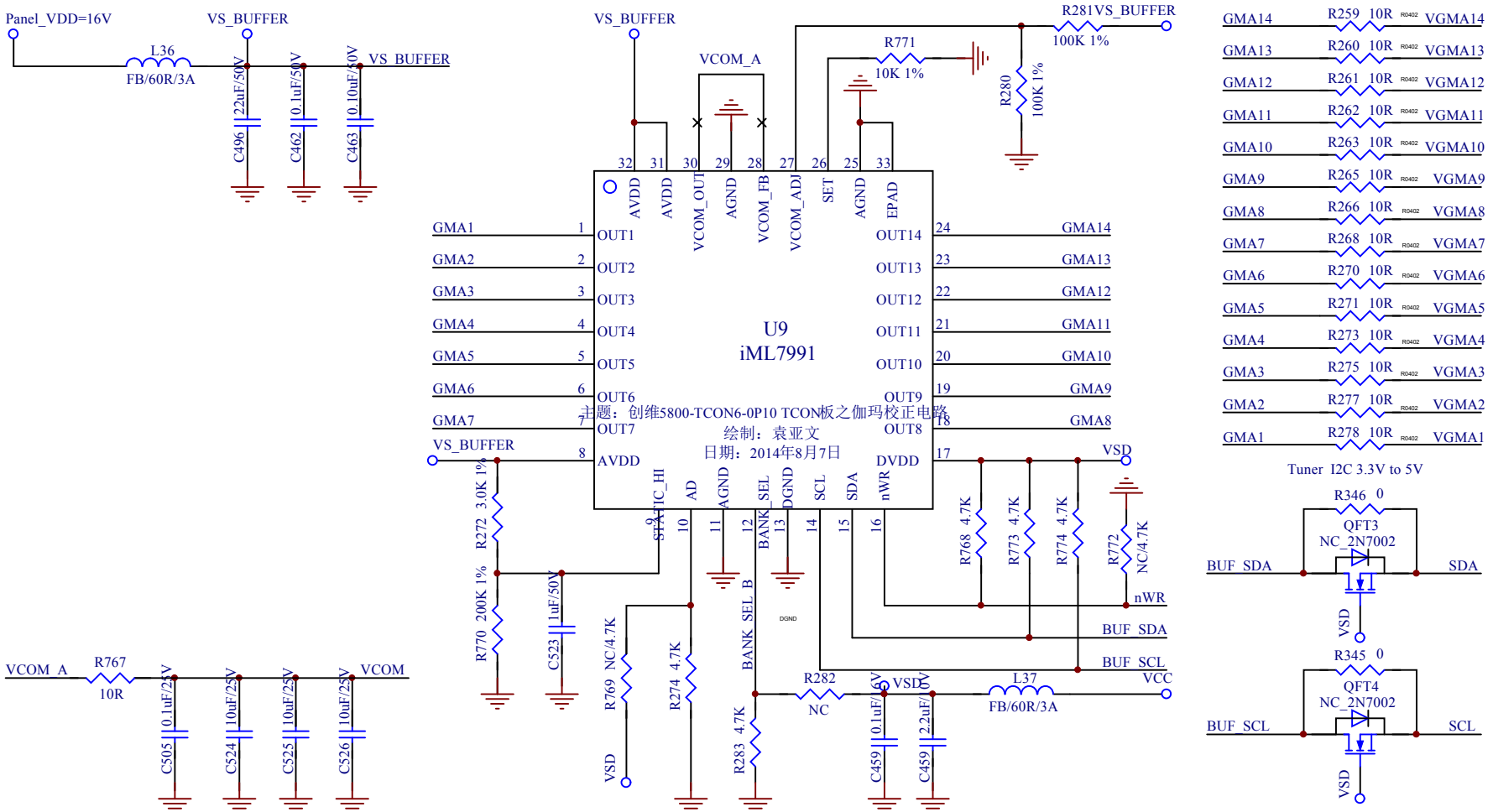
Distance of the both test pad center is 2.0mm

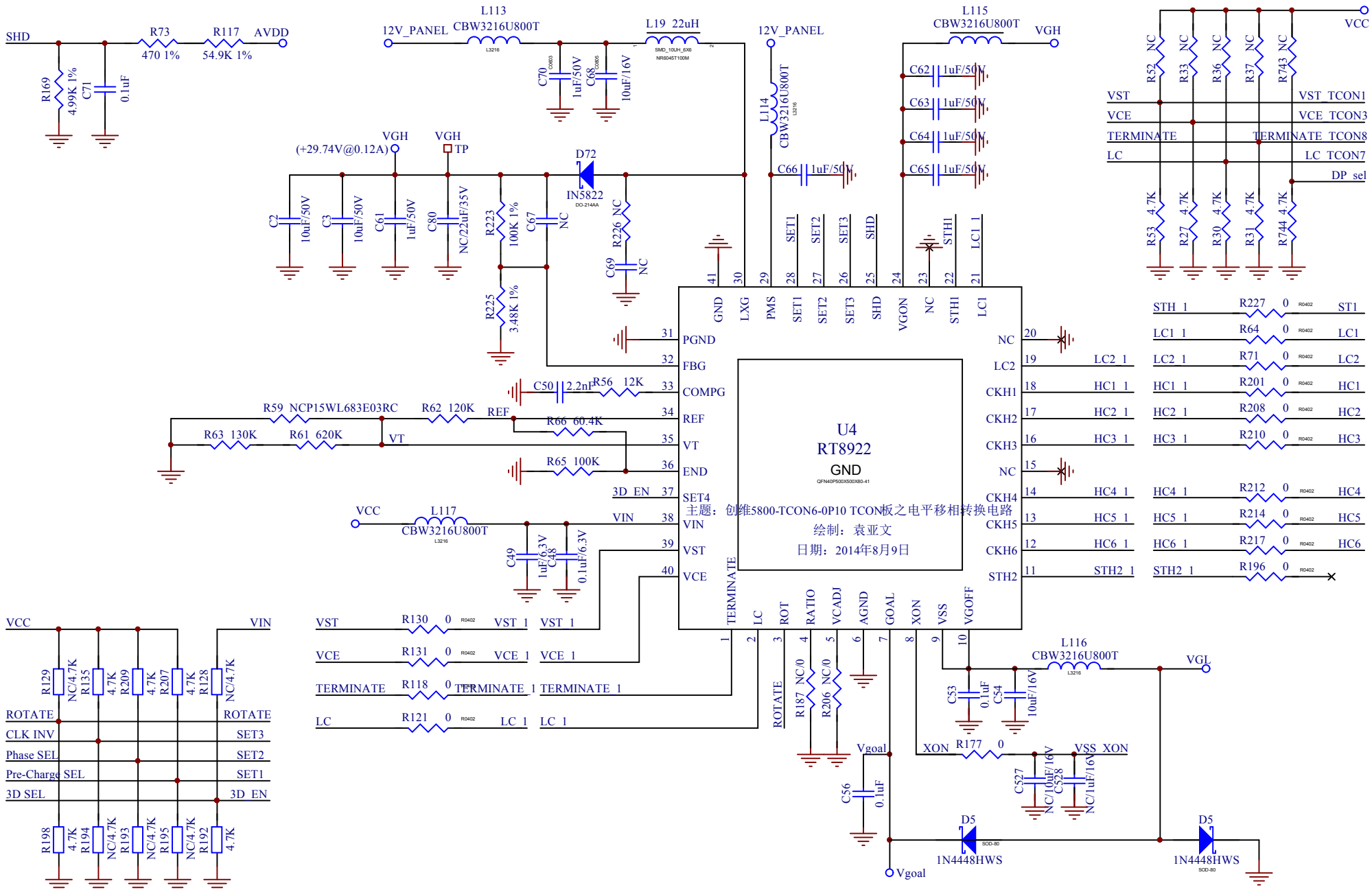
Title: HE315DH-B11					
DWG NO <OrgName>			DATE 2010.9.13		
Size	Checked	Designer	Drawer	Rev	SHEET
Custom				D	5/6



主题：创维5800-TCON6-0P10 TCON板之信号输入输出接口电路
绘制：袁亚文
日期：2014年8月10日


12V_PANEL
L18
NR6045T100M
D70
1N5822
VS
(+16V)
Q8
AO3407
AVDD
TP
(+15.77V@1.2A)
AVDD
U8
RT9990
主题：创维5800-TCON6-0P10 TCON板之电源管理电路
绘制：袁亚文
日期：2014年8月6日
PGND
VIN_2
VIN_1
PGND_2
PGND_1
SW_2
SW_1
GD
VL
BOOT
SWB
CTRLN
FBN
FBB
RST
CTRLP
FBP
FB
COMP
SS
CRST
DLY
AGND
NC_1
NC_2
NC_3
NC_4
NC_5
NC_6
L17
NR6045T100M
(+3.3V@1A)
VCC
VCC
TP
VGL
VGL
TP
VGL=-(VCC-Vfbn)R726/R731+FBN
FBN=0
(-9.39V@0.12A)
D8
1N5819
D9
1N5819
Q9
Q7
FMMT3904/PZT3904
FMMT3904/PZT3904
VCC
VGL
Q6
NC/FMMT3906
VGOALVgoal
TP
ZD2
BZX284C6V2D


Panel_VDD=16V
L36
FB/60R/3A
VS_BUFFER
22uF/50V
0.1uF/50V
0.10uF/50V
C496
C462
C463
VS_BUFFER
VCOM_A
R771
10K 1%
R281VS_BUFFER
100K 1%
R280
100K 1%
U9
iML7991
AVDD
AVDD
VCOM_OUT
AGND
VCOM_FB
VCOM_ADJ
SET
AGND
EPAD
OUT1
OUT2
OUT3
OUT4
OUT5
OUT6
OUT7
AVDD
OUT14
OUT13
OUT12
OUT11
OUT10
OUT9
OUT8
DVDD
GMA1
GMA2
GMA3
GMA4
GMA5
GMA6
GMA7
GMA14
GMA13
GMA12
GMA11
GMA10
GMA9
GMA8
VSD
STATIC_HI
AD
AGND
BANK_SEL
DGND
SCL
SDA
nWR
R272 3.0K 1%
R770 200K 1%
C523 1uF/50V
R769 NC/4.7K
R274 4.7K
R283 4.7K
BANK_SEL_B
R282
NC
C459 0.1uF/16V
C459 2.2uF/16V
L37
FB/60R/3A
VCC
R768 4.7K
R773 4.7K
R774 4.7K
R772 NC/4.7K
BUF_SDA
BUF_SCL
VCOM_A
R767
10R
C505 0.1uF/25V
C524 10uF/25V
C525 10uF/25V
C526 10uF/25V
VCOM
主题：创维5800-TCON6-0P10 TCON板之伽玛校正电路
绘制：袁亚文
日期：2014年8月7日
GMA14 R259 10R VGMA14
GMA13 R260 10R VGMA13
GMA12 R261 10R VGMA12
GMA11 R262 10R VGMA11
GMA10 R263 10R VGMA10
GMA9 R265 10R VGMA9
GMA8 R266 10R VGMA8
GMA7 R268 10R VGMA7
GMA6 R270 10R VGMA6
GMA5 R271 10R VGMA5
GMA4 R273 10R VGMA4
GMA3 R275 10R VGMA3
GMA2 R277 10R VGMA2
GMA1 R278 10R VGMA1
Tuner I2C 3.3V to 5V
R346 0
QFT3
NC_2N7002
BUF_SDA
SDA
VSD
R345 0
QFT4
NC_2N7002
BUF_SCL
SCL
VSD


U4
RT8922
GND
主题：创维5800-TCON6-0P10 TCON板之电平移相转换电路
绘制：袁亚文
日期：2014年8月9日
SHD
R73 470 1%
R117 54.9K 1%
AVDD
R169 4.99K 1%
C71 0.1uF
L113 CBW3216U800T
12V_PANEL
L19 22uH
C70 1uF/50V
C68 10uF/16V
L114 CBW3216U800T
L115 CBW3216U800T
VGH
C62 1uF/50V
C63 1uF/50V
C64 1uF/50V
C65 1uF/50V
C66 1uF/50V
(+29.74V@0.12A)
TP
D72 IN5822
C2 10uF/50V
C3 10uF/50V
C61 1uF/50V
C80 NC/22uF/35V
R223 100K 1%
C67 NC
R226 NC
C69 NC
R225 3.48K 1%
C50 2.2nF
R56 12K
R59 NCP15WL683E03RC
R62 120K
REF
R66 60.4K
R63 130K
R61 620K
VT
R65 100K
3D_EN
VCC
L117 CBW3216U800T
C49 1uF/6.3V
C48 0.1uF/6.3V
GND
LXG
PMS
SET1
SET2
SET3
SHD
VGON
NC
STH1
LC1
PGND
FBG
COMPG
REF
VT
END
SET4
VIN
VST
VCE
TERMINATE
LC
ROT
RATIO
VCADJ
AGND
GOAL
XON
VSS
VGOFF
NC
LC2
CKH1
CKH2
CKH3
NC
CKH4
CKH5
CKH6
STH2
L116 CBW3216U800T
VGL
C53 0.1uF
C54 10uF/16V
R187 NC/0
R206 NC/0
ROTATE
Vgoal
XON
R177 0
VSS_XON
C527 NC/10uF/16V
C528 NC/1uF/16V
C56 0.1uF
D5 1N4448HWS
VCC
R52 NC
R33 NC
R36 NC
R37 NC
R743 NC
VST
VCE
TERMINATE
LC
DP_sel
VST_TCON1
VCE_TCON3
TERMINATE_TCON8
LC_TCON7
R53 4.7K
R27 4.7K
R30 4.7K
R31 4.7K
R744 4.7K
STH_1
LC1_1
LC2_1
HC1_1
HC2_1
HC3_1
HC4_1
HC5_1
HC6_1
STH2_1
R227 0
R64 0
R71 0
R201 0
R208 0
R210 0
R212 0
R214 0
R217 0
R196 0
ST1
LC1
LC2
HC1
HC2
HC3
HC4
HC5
HC6
R130 0
R131 0
R118 0
R121 0
VST_1
VCE_1
TERMINATE_1
LC_1
VIN
R129 NC/4.7K
R135 4.7K
R209 4.7K
R207 4.7K
R128 NC/4.7K
ROTATE
CLK INV
Phase SEL
Pre-Charge SEL
3D SEL
SET3
SET2
SET1
3D_EN
R198 4.7K
R194 NC/4.7K
R193 NC/4.7K
R195 NC/4.7K
R192 4.7K