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1. Alignment procedure (for function adjustment)

The list of necessary alignment for a LCD monitor

Items	Description	Remark
1	Geometry adjustment & checking	For Preset timing modes
2	ADC calibration (Auto color balance adjustment)	VGA 640x480@60Hz, 32 Gray
3	Color temperature adjustment	C1/Bluish, C2/sRGB & C3/Reddish
4	Writing EDID data into monitor	Analog/DVI-D

A. Preparation

1. Setup input timing to any preset modes or patterns.
2. Enter factory mode (press "EXIT" & "ENTER" & "Power" buttons at the same time to turn on monitor).
3. Move cursor into "BURN IN MODE" tag and select "YES" to enable burn-in mode.
4. Power off the monitor, remove the input source and then power on again.
5. Setup unit and keep it warm up for at least 30 minutes.

B. ADC calibration (Auto color balance adjustment)

~~Analog only, it is not required for DVI-D input source

1. Setup input timing VGA (640x480@60Hz), pattern 48(32 Gray pattern) with Analog signals from Chroma video pattern generator.
2. Enter factory mode (press "EXIT" & "ENTER" & "Power" buttons at the same time to turn on monitor).
3. Move cursor into "BURN IN MODE" tag and select "YES" to enable burn-in mode.
4. Move cursor into "Color" tag and select "User Preset".
5. Hide OSD and press "LEFT" key to run "White Balance" function. (This procedure will get optimal gain/offset(clamp) values)
6. Checking if the picture is ok, or reject this monitor and check its circuit board or wire/cable connection.

C. Geometry adjustment & checking (for preset timing modes)

1. Enter factory mode (press "EXIT" & "ENTER" & "Power" buttons at the same time to turn on monitor).
2. Select timing mode from figure-1 and input cross hatch screen display pattern to monitor.
3. Press "i-key" button to run "AUTO adjustment" function for geometry adjustment.
4. Check if the position, phase and clock of the image are correct to make sure controlled functions and performance are ok.
5. Turn off the monitor power.
6. Turn on the monitor power again to check if monitor's image settings are ok and with following settings.

   CONTRAST = 50

BRIGHTNESS = 90
COLOR = Reddish (default setting)
OSD time = 20
VOLUME = 30

Figure-1: Preset Timing modes list

Input Timing				Actual Output			
Resolution	**Horizontal Frequency (KHz)**	**Vertical Frequency (Hz)**	**Dot Clock Frequency (MHz)**	**Actual display Resolution**	**OK**	**N.A**	**Remark**
720x400	31.47(N)	70.08(P)	28.32	1280x1024	√		DOS
800x600	46.87(P)	75.00(P)	49.5	1280x1024	√		VESA
1024x768	48.36(N)	60.00(N)	65.00	1280x1024	√		VESA
1024x768	60.02(P)	75.00(P)	78.75	1280x1024	√		VESA
1152x870	68.68(N)	75.06(N)	100.00	1280x1024	√		Mac
1152x900	71.81(N)	76.14(N)	108.00	1280x1024	√		VESA
1280x1024	80.00(P)	75.00(P)	135.00	1280x1024	√		VESA
1280x1024	81.18(N)	76.16(N)	135.09	1280x1024	√		SUN

D. Color temperature adjustment

1. Setup input timing to any preset modes, pattern 41(full white color pattern) with Analog signals from Chroma video pattern generator.
2. Enter factory mode (press "EXIT" & "ENTER" & "Power" buttons at the same time to turn on monitor).
3. Move cursor into "BURN IN MODE" tag and select "YES" to enable burn-in mode.
4. Make sure ADC calibration(auto color balance adjustment) had already been done.
5. Measure color temperature by Minolta CA-110 (or equivalent equipment).
6. Adjust the color temperature ~~ Two methods can be used to adjust RED, GREEN, BLUE value of each color temperature, C1/Bluish, C2/sRGB & C3/Reddish to meet following spec requirement, the 1st method is by using external PC and IIC alignment protocol to do automatic adjustment, and the 2nd method is by manually and must be in factory mode.

Color temperature (C1/9300K/Bluish set on OSD)	X+-	0.283+(-) 0.03
	Y+-	0.297+(-) 0.03
Color temperature (C2/6500K/sRGB set on OSD)	X+-	0.313+(-) 0.03
	Y+-	0.329+(-) 0.03
Color temperature (C3/5800K/Reddish set on OSD)	X+-	0.326+(-) 0.03
	Y+-	0.342+(-) 0.03

7. Move cursor into "BURN IN MODE" tag and select "NO" to disable burn-in mode.
8. Turns off the monitor power.

E. Writing EDID data into monitor

1. Setup a PC with DDC card.
2. Connect PC to monitor with a D-sub signal cable.
3. Please refer to the C212 for the correct EDID file.
4. Runs the writing program to write the analog EDID data into EEPROM for analog input(ie. 15-pin D-sub).

5. Repeat step 4 and write the digital EDID data into EEPROM for DVI-D input(ie. 24-pin DVI-D).
6. Read both EEPROM data and confirm it to match with the C212 definition.

(Note : The DVI-D input may not operation correctly if the digital EDID data do not exist.)

F. Command definition

PC Host will send 0x7C IIC slave address and then following 4 bytes command

I2C Send Command	Byte1	Byte 2	Byte3	Byte4	OK	N.A.	Remark
Write Contrast to MCU RAM	CA	55	Data	cksum	√		Write data to MCU RAM and update the related register to refresh the screen immediately. Don't store data to EEPROM.
Write Brightness to MCU RAM	CA	56	Data	cksum	√		
Write Red Gain to MCU RAM	CA	57	Data	cksum	√		
Write Green Gain to MCU RAM	CA	58	Data	cksum	√		
Write Blue Gain to MCU RAM	CA	59	Data	cksum	√		
Read Contrast from MCU RAM	C3	55	XX	cksum	√		
Read Brightness from MCU RAM	C3	56	XX	cksum	√		
Read Red Gain from MCU RAM by color index	C3	57	XX	cksum	√		Base on current color index to read back the right gain value.
Read Green Gain from MCU RAM by color index	C3	58	XX	cksum	√		
Read Blue Gain from MCU RAM by color index	C3	59	XX	cksum	√		
Write C1 (Bluish) R-Gain Data to EEPROM	AA	3C	Data	cksum	√		
Write C1 (Bluish) G-Gain Data to EEPROM	AA	3D	Data	cksum	√		
Write C1 (Bluish) B-Gain Data to EEPROM	AA	3E	Data	cksum	√		
Write C2 (sRGB) R-Gain Data to EEPROM	AA	4C	Data	cksum	√		
Write C2 (sRGB) G-Gain Data to EEPROM	AA	4D	Data	cksum	√		
Write C2 (sRGB) B-Gain Data to EEPROM	AA	4E	Data	cksum	√		
Write C3 (Reddish) R-Gain Data to EEPROM	AA	5C	Data	cksum	√		
Write C3 (Reddish) G-Gain Data to EEPROM	AA	5D	Data	cksum	√		
Write C3 (Reddish) B-Gain Data to EEPROM	AA	5E	Data	cksum	√		
Write User R-Gain Data to EEPROM	AA	6C	Data	cksum	√		

Write User G-Gain Data to EEPROM	AA	6D	Data	cksum	√		
Write User B-Gain Data to EEPROM	AA	6E	Data	cksum	√		
Write Cx R-Gain Data to EEPROM	AA	7C	Data	cksum		√	Reserved for some model have extra color temperature
Write Cx G-Gain Data to EEPROM	AA	7D	Data	cksum		√	
Write Cx B-Gain Data to EEPROM	AA	7E	Data	cksum		√	
Write Contrast to EEPROM	AA	92	Data	cksum	√		
Write Brightness to EEPROM	AA	93	Data	cksum	√		
Write C/T index to EEPROM	AA	94	0~4	cksum	√		1=C1/9300/Bluish, 2=C2/6500/normal 3=C3/5800/Reddish, 4=User, 5=Cx
Write OSD-Hpos to EEPROM	AA	95	Data	cksum	√		
Write OSD-Vpos to EEPROM	AA	96	Data	cksum	√		
Write Language to EEPROM	AA	97	0~7	cksum	√		0=DE, 1=EN, 2=ES, 3=FR, 4=IT, 5=JA, 6=繁中, 7=簡中 (Also Update MCU RAM)
Write EEPROM OSD Timer	AA	98	Data	cksum	√		
Write EEPROM Volume	AA	99	Data	cksum	√		
Write EEPROM Gamma index	AA	9A	Data	cksum		√	For model with Gamma curve selection function
Write OSD Transparency to EEPROM	AA	9E	Data	cksum		√	
Write OSD Rotation to EEPROM	AA	9F	Data	cksum		√	
Read C1 (Bluish) R-Gain data from EEPROM	A3	3C	XX	cksum	√		
Read C1 (Bluish) G-Gain data from EEPROM	A3	3D	XX	cksum	√		
Read C1 (Bluish) B-Gain data from EEPROM	A3	3E	XX	cksum	√		
Read C2 (sRGB) R-Gain data from EEPROM	A3	4C	XX	cksum	√		
Read C2 (sRGB) G-Gain data from EEPROM	A3	4D	XX	cksum	√		

Read C2 (sRGB) B-Gain data from EEPROM	A3	4E	XX	cksum	√		
Read C3 (Reddish) R-Gain data from EEPROM	A3	5C	XX	cksum	√		
Read C3 (Reddish) G-Gain data from EEPROM	A3	5D	XX	cksum	√		
Read C3 (Reddish) B-Gain data from EEPROM	A3	5E	XX	cksum	√		
Read User R-Gain data from EEPROM	A3	6C	XX	cksum	√		
Read User G-Gain data from EEPROM	A3	6D	XX	cksum	√		
Read User B-Gain data from EEPROM	A3	6E	XX	cksum	√		
Read Cx R-Gain data from EEPROM	A3	7C	XX	cksum		√	Reserved for some model have extra color temperature
Read Cx G-Gain data from EEPROM	A3	7D	XX	cksum		√	
Read Cx B-Gain data from EEPROM	A3	7E	XX	cksum		√	
Read Contrast from EEPROM	A3	92	XX	cksum	√		
Read Brightness from EEPROM	A3	93	XX	cksum	√		
Read C/T index from EEPROM	A3	94	XX	cksum	√		1=C1/9300/Bluish, 2=C2/6500/sRGB, 3=C3/5800/Reddish, 4=User, 5=Cx
Read OSD-Hpos EEPROM	A3	95	XX	cksum	√		
Read OSD-Vpos from EEPROM	A3	96	XX	cksum	√		
Read Language from EEPROM	A3	97	XX	cksum	√		0=DE, 1=EN, 2=ES, 3=FR, 4=IT, 5=JA, 6=繁中, 7=簡中
Read OSD Timer from EEPROM	A3	98	XX	cksum	√		
Read Volume from EEPROM	A3	99	XX	cksum	√		
Read Gamma index from EEPROM	A3	9A	XX	cksum		√	For model with Gamma curve selection function
Read OSD Transparency from EEPROM	A3	9E	XX	cksum		√	
Read OSD Rotation from EEPROM	A3	9F	XX	cksum		√	
Change Color Temp. to C1/9300K/Bluish	CC	01	XX	cksum	√		Change C/T immediately. And store C/T index to EEPROM.
Change Color Temp. to C2/6500K/sRGB	CC	02	XX	cksum	√		

Change Color Temp. to C3/5800K/Reddish	CC	03	XX	cksum	√		
Change Color Temp. to User	CC	04	XX	cksum	√		
Change Color Temp. to Cx	CC	05	XX	cksum		√	Reserved
Change Input Source to D-Sub	CD	01	XX	cksum		√	
Change Input Source to DVI	CD	02	XX	cksum		√	
On burn in mode	CE	01	XX	cksum	√		Store data to EEPROM
Off burn in mode	CE	XX*	XX	cksum	√		XX* = Non "1" value Store data to EEPROM
Monitor is forced power saving	CF	01	XX	cksum		√	
Monitor wake up from power saving	CF	XX*	XX	cksum		√	XX* = Non "1" value
User mode to factory mode	1A	5A	XX	cksum	√		
Auto Color (Offset1, Offset2, Gain)	1B	5A	XX	cksum		√	
Copy EDID Serial number to EEPROM	1C	5A	XX	cksum		√	For specified "Industry Customer" model.
Factory mode to User mode	1E	5A	XX	cksum	√		
Clear user mode and factory recall	1F	5A	XX	cksum	√		Store data to EEPROM
Write EDID data to MCU DDC RAM	55	NA	NA	NA	√		For MTV312 MCU type
Copy DDC RAM data to EEPROM	BB	NA	NA	NA	√		For MTV312 MCU type
Drive WP pin to low to enable write DDC IC	55	NA	NA	NA		√	For stand alone DDC IC
Drive WP pin to high to disenable write function	BB	NA	NA	NA		√	For stand alone DDC IC
EEPROM Bank R/W (For Debug using only, not for Production Line Write EEPROM directly)							
Read EEPROM Bank 0	B0	Address	XX	cksum	√		
Read EEPROM Bank 1	B1	Address	XX	cksum	√		
Read EEPROM Bank 2	B2	Address	XX	cksum		√	(For 24C08 type)
Read EEPROM Bank 3	B3	Address	XX	cksum		√	(For 24C08 type)
Write EEPROM Bank 0	B8	Address	Data	cksum	√		
Write EEPROM Bank 1	B9	Address	Data	cksum	√		
Write EEPROM Bank 2	BA	Address	Data	cksum		√	(For 24C08 type)

Write EEPROM Bank 3	BB	Address	Data	cksum		√	(For 24C08 type)

Note A: Byte4 (cksum) = Byte1 + Byte2 + Byte3

Note B: Data = The value write to MCU or EEPROM

Note C: XX = don't care, any value (<=0xFF).

When PC Host sends 0x7D command to MCU, MCU must return as following (2 bytes)

Return Code	R-Byte1	R-Byte2
Checksum error code	FC	AA
Normal return code	the above Byte3 (/data)	FC
If normal return code is exact FCh	FC	CF

2. EEPROM mapping

~~ for common settings (24C16)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	x	x	ColorTemp	OSD Hstart	OSD Vstart	PowerOnFlag	OSD Time	x	x	x	x	x	x	x	UserRedColor	UserGreenColor
10	UserBlueColor	Language	x	x	x	x	x	x	x	x	x	x	x	x	x	x
20	x	SystemFlags	x	x	Volume	RedColor 5800K	GreenColor 5800K	BlueColor 5800K	RedColor 6500K	GreenColor 6500K	BlueColor 6500K	RedColor 9300K	GreenColor 9300K	BlueColor 9300K	x	x
30	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
40	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
50			BacklitHour1	BacklitHour2	BacklitHour3	BacklightMin	x	ColorModeIndex	x	SharpnessN	SharpnessC	SharpnessC1	SharpnessC2	BrightnessN	BrightnessC	BrightnessC1
60	BrightnessC2	ContrastN	ContrastC	ContrastC1	ContrastC2	SpreadSpectrumValue	Checksum1	Checksum2								
700	FWVersion	FWVersion1	FWVersion2	FWVersion3	FWVersion4	FWVersion5	FWVersion6	FWVersion7								FWVersion15
710	AdcRedOffset1	AdcGreenOffset1	AdcBlueOffset1	AdcRedOffset2	AdcGreenOffset2	AdcBlueOffset2	AdcRedGain	AdcGreenGain	AdcBlueGain							
720	BurninFlag	BurninFlag1	BurninFlag2	BurninFlag3												

<Note>The value definition of “ColorTemp”: **1**=User, **4**=6500K, **3**=5800K, **6**=9300K

3. USB Test Procedure (NA)

A. Introduction

The CATC UHT USB Hub Tester is a modular unit designed for use on the production line to test USB Hubs for proper functionality according to the USB specifications.

The UHT tester performs the following tests:

1. hub enumeration
2. hub reset, suspend, and resume operation
3. connection and enumeration of a low-speed device(on each downstream port)
4. data loop-back integrity test with a low-speed device(on each downstream port)
5. connection and enumeration of a full-speed device(on each downstream port)
6. data look-back integrity test with a full-speed device(on each downstream port)
7. individual port suspend and resume operations(on each downstream port)
8. remote wakeup detection and propagation from each of the downstream ports

9. hub-initiated remote wakeup on connect/disconnect events
10. hub over current detection and reporting to the host
11. over current protection(gang or per-port configuration)
12. downstream current restoration(over current removed)

B. System Setup

Position the CATC UHT box on the test bench, near the USB hub to be evaluated. Connect the DC plug of the AC to 5V DC@1000mA power converter to the +5V power receptacle of the CATC UHT box. To activate the unit, plug the AC to DC converter into an appropriate AC power outlet.

In the USB test system, connect the CATC UHT box as follow:

1. Connect a USB cable between the upstream port of the USB hub under test and the USB port of the host PC.
2. Connect a USB cable between the first downstream port to be tested and the USB connect to labeled “CH1”.
3. Repeat step B for the next ports to be tested, connecting to “CH2”, “CH3”, “CH4” in sequence.

C. Software Installation

Make a copy of the CATC diskette for backup, then copy its contents to the hard drive of the USB-capable PC to be used as the test system host. The UHT software program (usb_uht.exe) is a DOS application and must be run under the DOS operating system. It supports both UHCI and OHCI USB host controller implementations.

To run the program, at the DOS prompt, type USB_UHT and press “Enter” key. The program will clear the monitor screen and begin execution. During the test, the program displays the test results on the monitor screen. To terminate the program and get back to the DOS prompt, press any key.

4. Audio Test Procedure

A. Audio spec.

Amplifier	Spec.	Note
Input Sensitivity @ 1KHz (mV)	500Vrms	
Output Power	2W/Ch	
THD @1KHz 1W (%)	＜1%	
S/N Ratio (dB)	＞40dB	
R/L Channel Check	OK	
Pop Sound Check	OK	
Speaker		
Nominal Speaker Impedance @1KHz 1V	4 Ohm±15% at 1kHz	
Rated/Max Power	2W/3W	
Output SPL @1W 50cm	84±3dB	

B. Audio Test Procedures

1.) PC Playback

(a) Plug in the Audio input to a PC I/O ports.
(b) Playback a specified CD, listening to the playback music.

Reject criteria:
(a) Playback sound is not clear or distorted.
(b) Loss of high or low frequencies.
(c) Abnormal or no sound is heard.

2.) Left and right speaker functions and polarity check

(a) Playback music by switching off the right channel, listen to the music.
(b) Playback music by switching off the left channel, listen to the music.

Reject criteria:
(a) Both left and right channels sounded.
(b) The left and right channels playback are reversed.
(c) Abnormal or no sound is heard during right or left channels playback.

3.) Volume control check

(a) Playback and listen to the music.
(b) Turn the volume control from normal position to maximum then to minimum then back to normal position again.

Reject criteria:
(a) The sound output level is not decrease or increase smoothly.
(b) Abnormal sound is heard during the volume control is turning.
(c) Sound is heard when the volume control turn to minimum.
(d) No increase or decrease of sound level when turning the volume control.

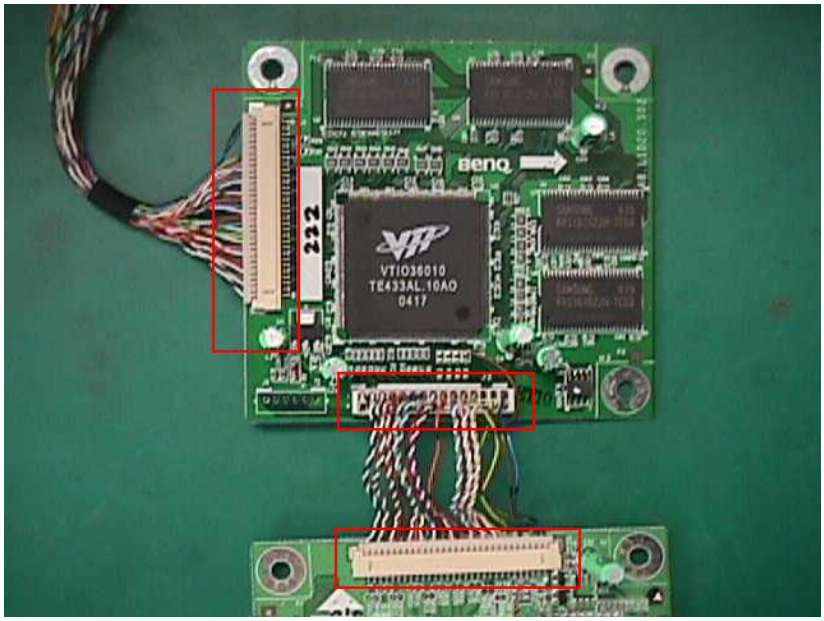
4.) Power saving

(a) Playback and listen to the music.
(b) Into power saving mode, the Left and Right speakers is muted.

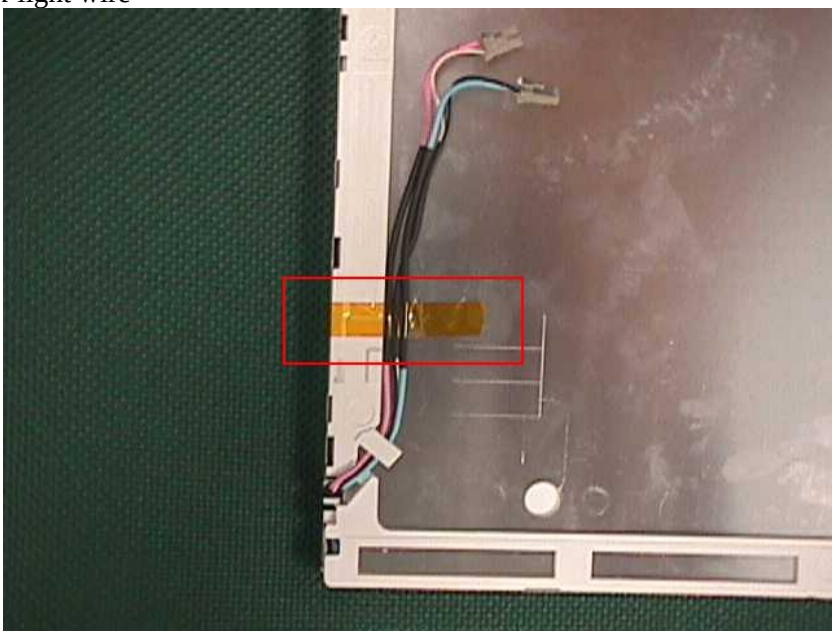
Reject criteria:
(a) The Left & Right speakers output are not muted.
(b) One of the Left or Right speaker is not muted.

5. Wire Dressing

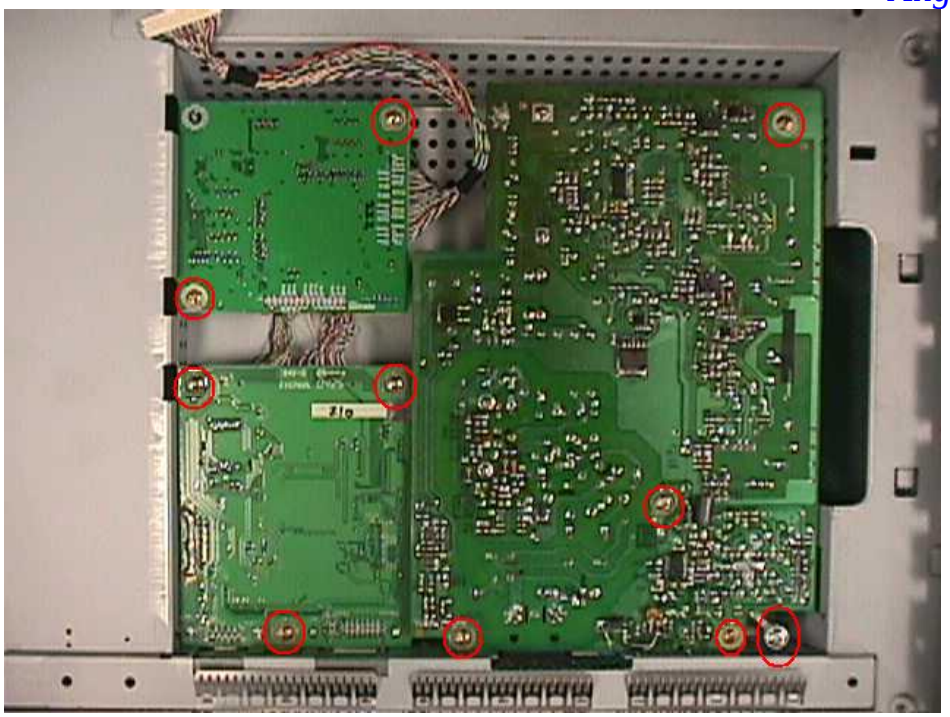
A. Connect these two wire on I/F BD and OD BD.



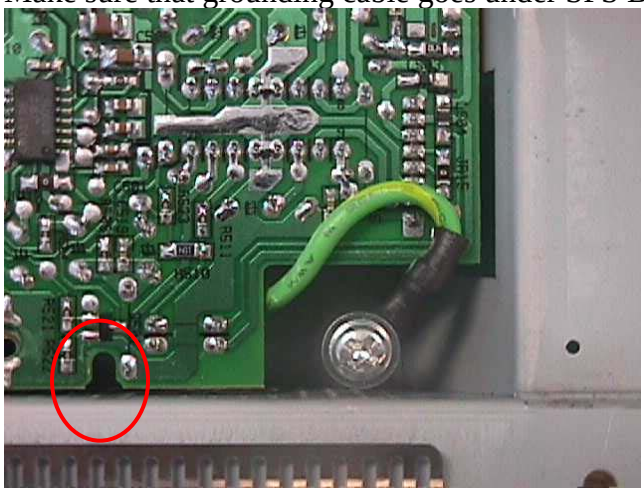
B. Paste tape on back-light wire



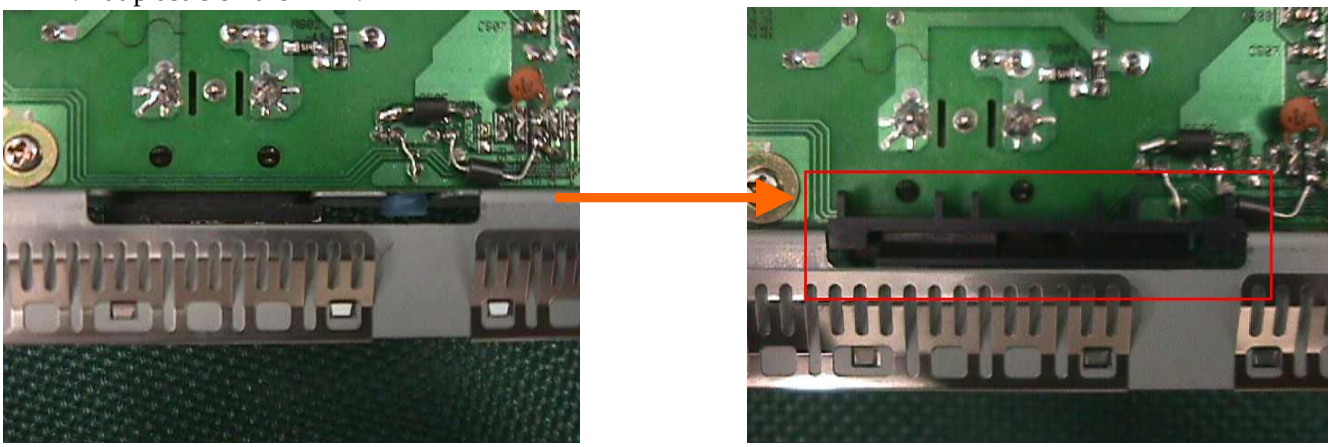
C. There are 10 screws fixed PCB on BKT.



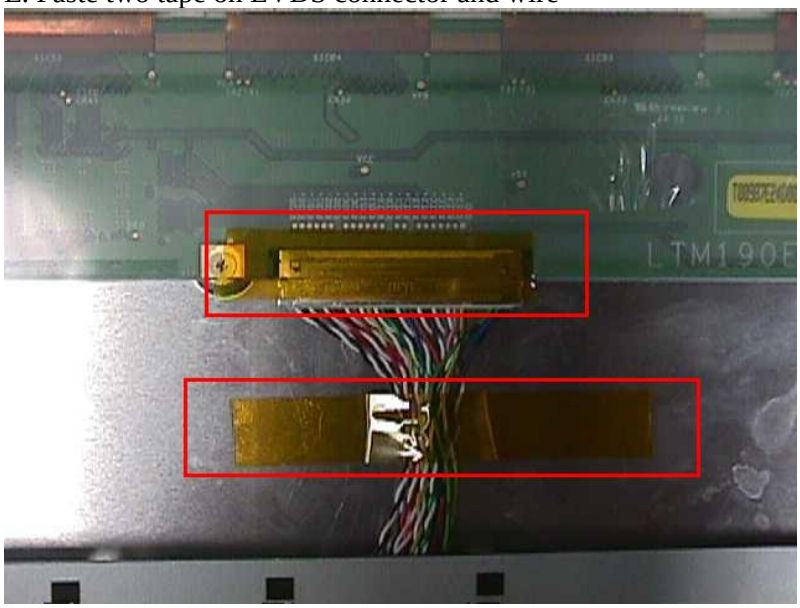
Make sure that grounding cable goes under SPS BD like this way, not through the red hole



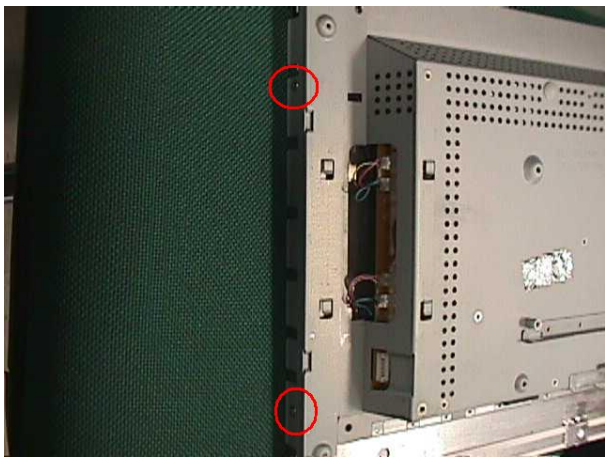
D. Put plastic on the BKT:

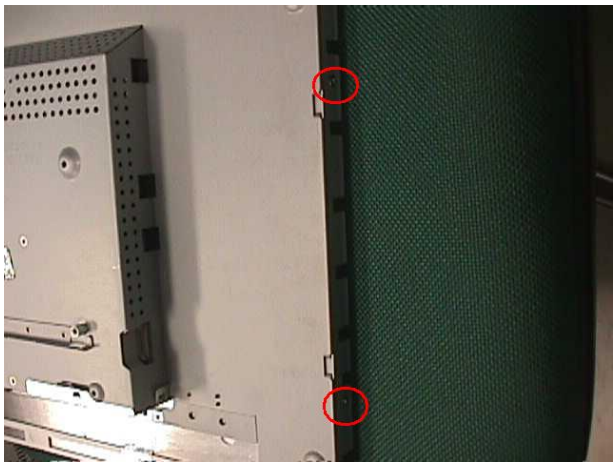


E. Paste two tape on LVDS connector and wire

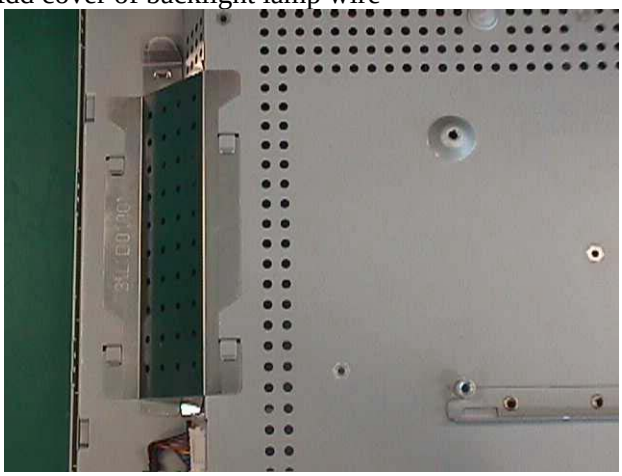


F. 4 screws on the side of BKT

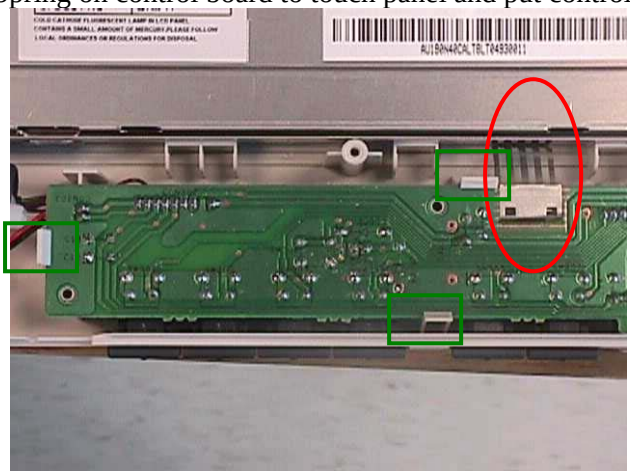




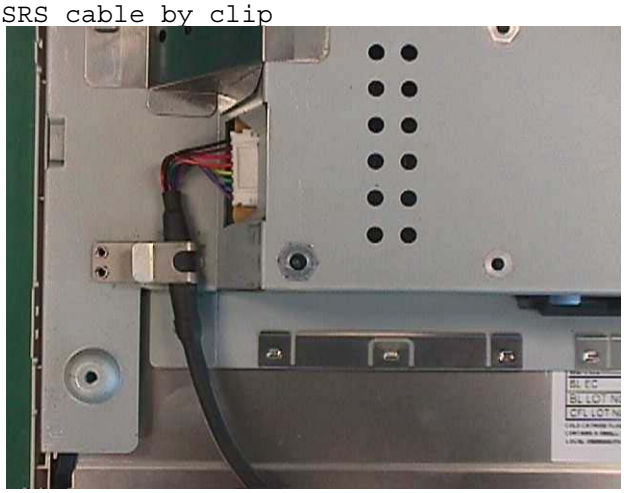
G. Add cover of backlight lamp wire



H. Spring on control board to touch panel and put control BD into hook(green) and boss(red)

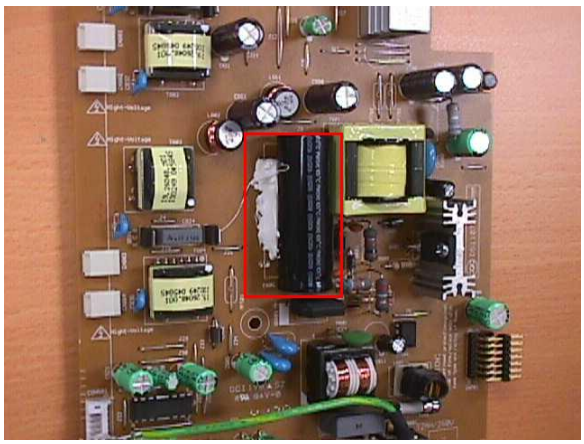


I. Fix SRS cable by clip



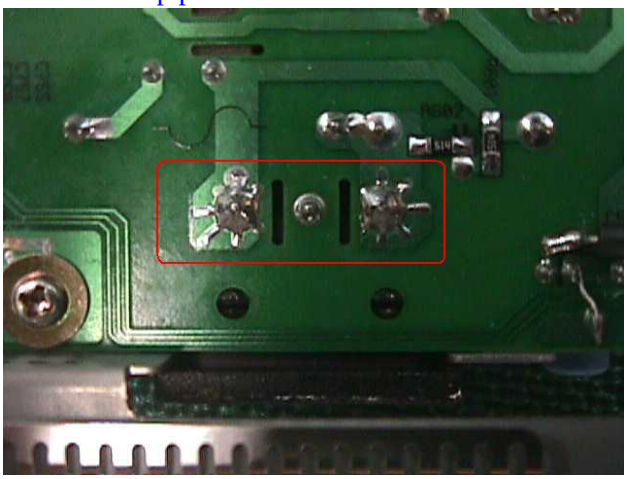
6. Add Glue

A. C605: (on power board)

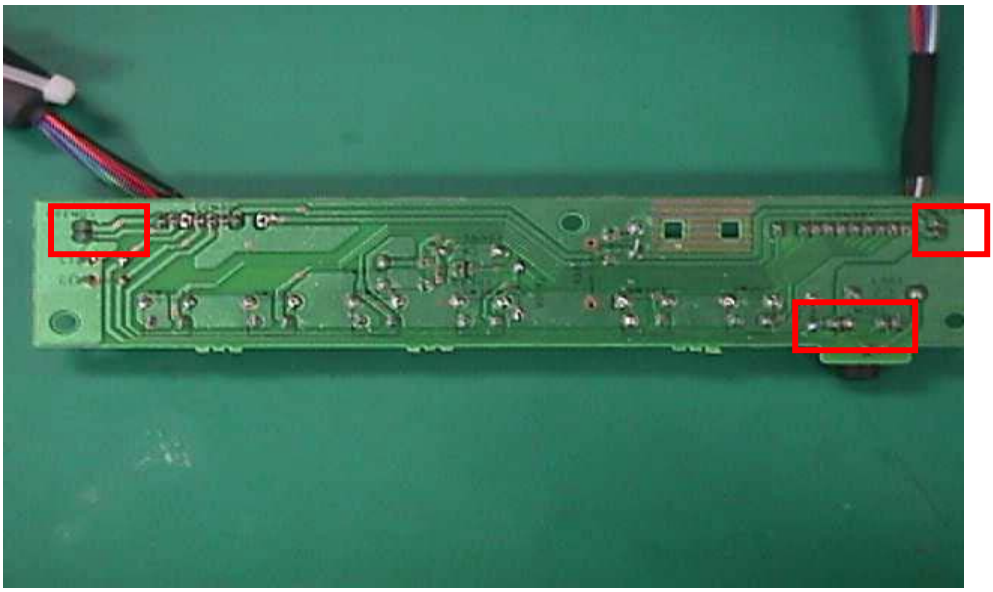


7. Touch-up

The manufacturing site should base on their experience and pass the necessary testing to add or reduce some touchup points.



CN601's holders may need to be added more solder to enhance its fixed strength.



CN303, CN304, M301' s holders may need to be added more solder to enhance its fixed strength.