LGE PDP 2K6

PDP42X3*

Service
Service
Service

Service Manual

Contents **Page**

1. Technical Specifications, Connections, and Chassis Overview 2
2. Safety Instructions, Warnings, and Notes 5
3. Directions for Use 6
4. Mechanical Instructions 7
5. Service Modes, Error Codes, and Fault Finding 12
6. Block Diagrams, Test Point Overviews, and Waveforms 25
7. Circuit Diagrams and PWB Layouts 25
8. Alignments 26
9. Circuit Descriptions, Abbreviation List, and IC Data Sheets 29
10. Spare Parts List 34
11. Revision List 34

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1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

1.1 Technical Specifications PDP42X3*
1.1.1 General Specification
1.1.2 Definitions
1.1.3 Chassis Overview

1.1 Technical Specifications PDP42X3*

The PDP Module is divided into a Panel part and a Drive part. The Panel part consists of Electrodes, Phosphor, various dielectrics, and gas, while the Drive part includes electronic circuitry and PWBs.

1.1.1 General Specification

Table 1-1 General Specifications

Model Name	PDP42X3*
Number Of Pixels (H x V)	1024 (*3) x 768
Pixel Pitch (H x V μm)	900 x 676
Cell Pitch (H x V μm)	300 x 676 (base: Green Cell)
Display Area (H x V mm)	921.6 x 519.2 ± 0.5
Outline Dimension (H x V x D mm)	1005 x 597 x 61.2 ± 1
Colour Arrangement	RGB closed type
Number Of Colours (R x G x B)	1024 x 1024 x 1024 (1,073,741,824)
Weight	15.3 ± 0.5 kg
Aspect Ratio	16 : 9
Peak Brightness	Typical 1200 cd/m^2 (1 % white window) Average 140 : 1 (Light room 100 Lx at centre)
Contrast Ratio	Typical 10000 : 1 (Dark room 1 % white window, white window pattern at centre)
Power Consumption	Max. 330 W (Full White)
Lifetime	Over 60,000 hours (initial brightness 1/2)

1.1.2 Definitions

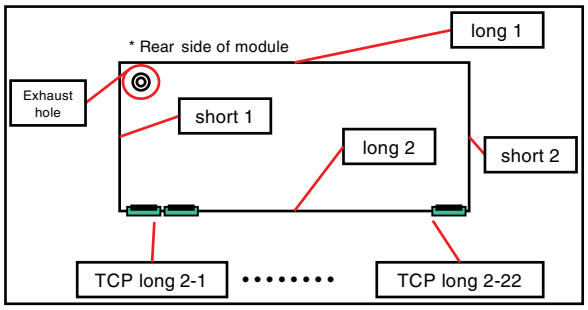

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Figure 1-1 Definition of module position

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Figure 1-2 Identification label

1. Model name.
2. Bar code (Code 128, contains the manufacture no.).
3. Manufacture no. (Module serial no.).
4. The trade name of LG Electronics.
5. Manufacture date (Year & Month).
6. The place of origin.
7. Model suffix.

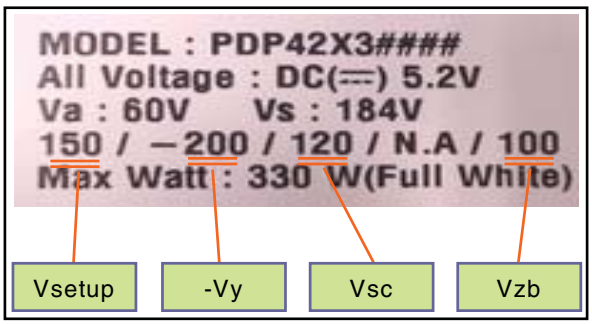

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Figure 1-3 Voltage label (on rear side of module)

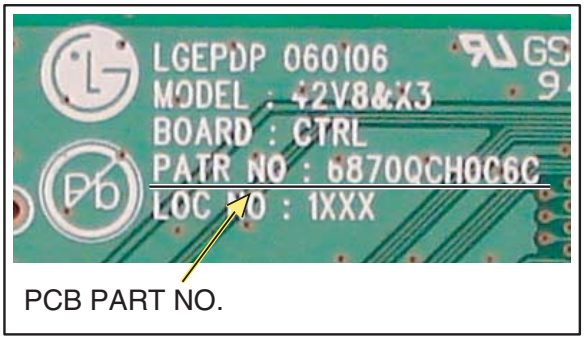

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Figure 1-4 Part number printing (on board)

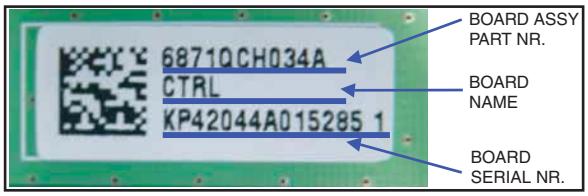

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Figure 1-5 Part number label (on board)

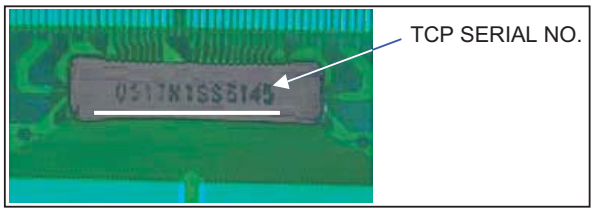

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Figure 1-6 TCP serial number (on TCP)

1.1.3 Chassis Overview

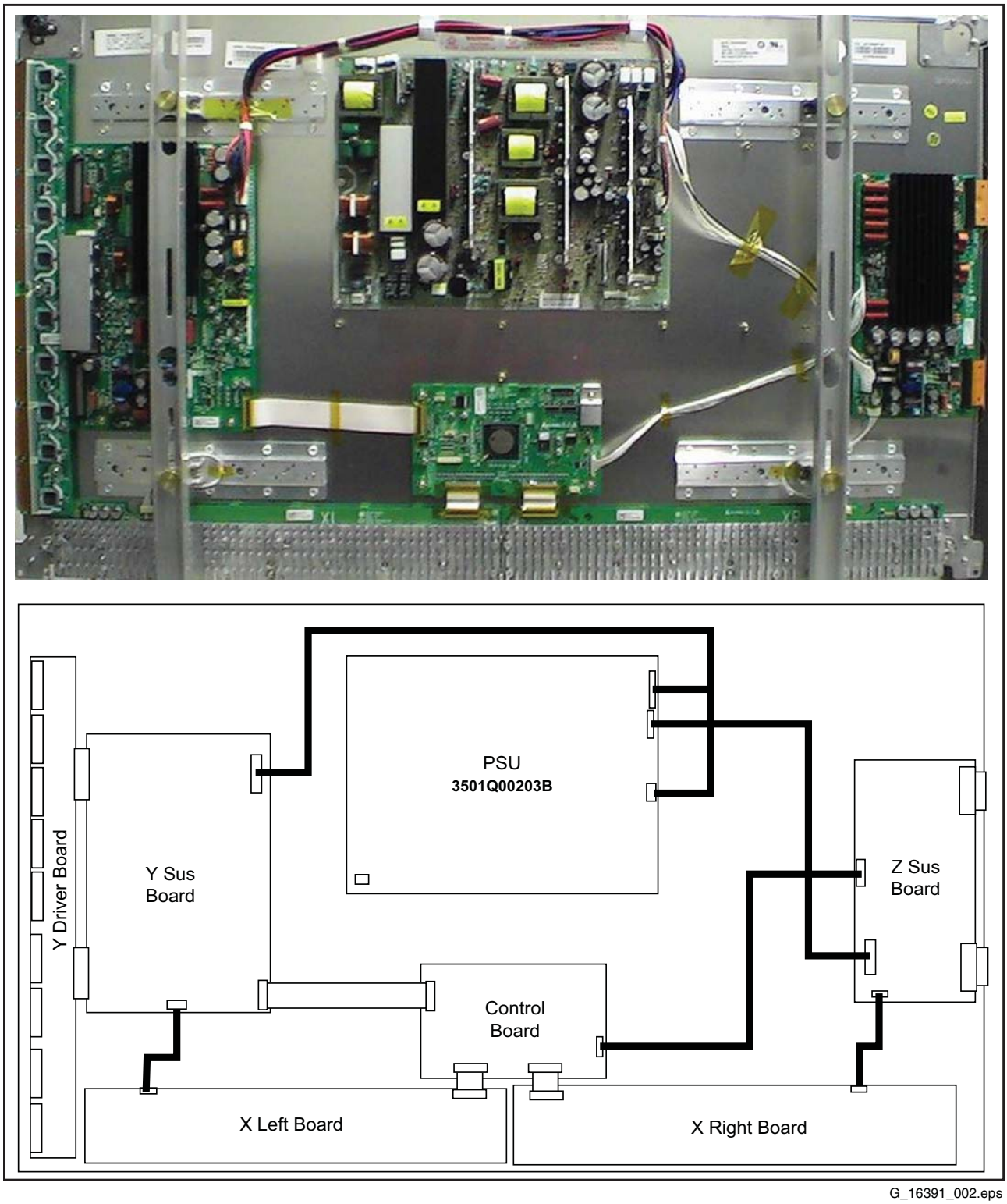

Figure 1-7 PWB location

2. Safety Instructions, Warnings, and Notes

Index of this chapter:

2.1 Warnings

Notes:

- Only authorised persons should perform servicing of this module.
- When using/handling this unit, pay special attention to the PDP Module: it should not be enforced into any other way then next rules, warnings, and/or cautions.
- **"Warning"** indicates a hazard that may lead to death or injury if the warning is ignored and the product is handled incorrectly.
- **"Caution"** indicates a hazard that can lead to injury or damage to property if the caution is ignored and the product is handled incorrectly.

2.1 Warnings

1. Do not touch the Signal and Power Connectors while this product operates. Do not touch EMI ground part and Heat Sink of Film Filter.
2. Do not supply a voltage higher than specified to this product. This may damage the product or can create hazardous situations.
3. Do not use this product in locations where the humidity is extremely high, where it may be splashed with water, or where flammable materials surround it. Do not install or use the product in a location that does no satisfy specified environmental conditions. This may damage the product or can create hazardous situations.
4. If a foreign substance (such as water, metal, or liquid) gets inside the product, immediately turn "OFF" the power. Continuing to use the product may cause electric shock or can create hazardous situations.
5. If the product emits smoke and abnormal smell, or makes an abnormal sound, immediately turn "OFF" the power. Continuing to use the product may cause electric shock or can create hazardous situations.
6. Do not (dis)connect the connector while power to the product is "ON". It takes some time for the voltage to drop to a sufficiently low level after the power has been turned "OFF". Confirm that the voltage has dropped to a safe level before (dis)connecting the connector.
7. Do not pull out or insert the power cable from/to an outlet with wet hands. It may cause electric shock.
8. Do not damage or modify the power cable. It may cause electric shock or can create hazardous situations.
9. If the power cable is damaged, or if the connector is loose, do not use the product, otherwise, this can lead to hazardous situations or may cause electric shock.
10. If the power connector, or the connector of the power cable, is dirty or dusty, wipe it with a dry cloth. Otherwise, this can lead to hazardous situations.
11. The PDP module uses a high voltage (max. 450 V_{DC}). Keep the cautions concerning electric shock and do not touch the device circuitry handling the PDP unit. And because the capacitors of the device circuitry may remain charged at the moment of Power "OFF", standing for 1 minute is required in order to touch the device circuitry.
12. Because the PDP module emits heat from the glass panel part and the drive circuitry, the environmental temperature must not be over 40 deg. C. The temperature of the glass panel part is especially high owing to heat from internal drive circuitry. And because the PDP module is driven by high voltage, it must avoid conductive materials.
13. If inserting components or circuit boards in order to repair, be sure to fix a lead line to the connector before soldering.
14. If inserting high-power resistors (metal-oxide film resistor or metal film resistor) in order to repair, insert it 10 mm away from a board.
15. During repairs, high voltage or high temperature components must be put away from a lead line.
16. This is a cold chassis but you better use an isolation transformer for safety during repairs. If repairing the electricity source part, you MUST use the isolation transformer.
17. Do not place an object on the glass surface of the display. The glass may break or be scratched.
18. This product may be damaged if it is subjected to excessive stresses (such as excessive voltage, current, or temperature). The absolute maximum ratings specify the limits of these stresses.
19. The recommended operating conditions are conditions in which the normal operation of this product is guaranteed. All the rated values of the electrical specifications are guaranteed within these conditions. Always use the product within the range of the recommended operating conditions. Otherwise, the reliability of the product may be degraded.
20. This product has a glass display surface. Design your system so that excessive shock and load are not applied to the glass. Exercise care that the vent at the corner of the glass panel is not damaged. If the glass panel or vent is damaged, the product is inoperable.
21. Do not cover or wrap the product with a cloth or other covering while power is supplied to the product.
22. Before turning on power to the product, check the wiring of the product and confirm that the supply voltage is within the rated voltage range. If the wiring is wrong or if a voltage outside the rated range is applied, the product may malfunction or be damaged.
23. Do not store this product in a location where temperature and humidity are high. This may cause the product to malfunction. Because this product uses a discharge phenomenon, it may take time to light (operation may be delayed) when the product is used after it has been stored for a long time. In this case, it is recommended to light all cells for about 2 hours (aging).
24. This product is made from various materials such as glass, metal, and plastic. When discarding it, be sure to contact a professional waste disposal operator.
25. If faults occur due to arbitrary modification or disassembly, LG Electronics is not responsible for function, quality or other items.
26. Use of the product with a combination of parameters, conditions, or logic not specified in the specifications of this product is not guaranteed. If intending to use the product in such a way, be sure to consult LGE in advance.
27. Within the warranty period, general faults that occur due to defects in components such as ICs will be rectified by LGE without charge. However, IMAGE STICKING due to misapplying the above provision (12), is not included in the warranty. Repairs due to the other faults may be charged for depending on responsibility for the faults.
28. While assembling the PDP module into a set, use the EMI ground part of the Film Filter for grounding, BEFORE removing the protective film, to prevent that static electricity can damage the TCPs or boards

3. Directions for Use

Not applicable.

4. Mechanical Instructions

Index of this chapter:

4.1 Mechanical Overviews
4.2 Panel/assy removal
4.2.1 Power Supply Unit
4.2.2 Control Board
4.2.3 Y Sustain Board
4.2.4 Y Driver Board
4.2.5 Z-Sustain board
4.2.6 X-board

4.1 Mechanical Overviews

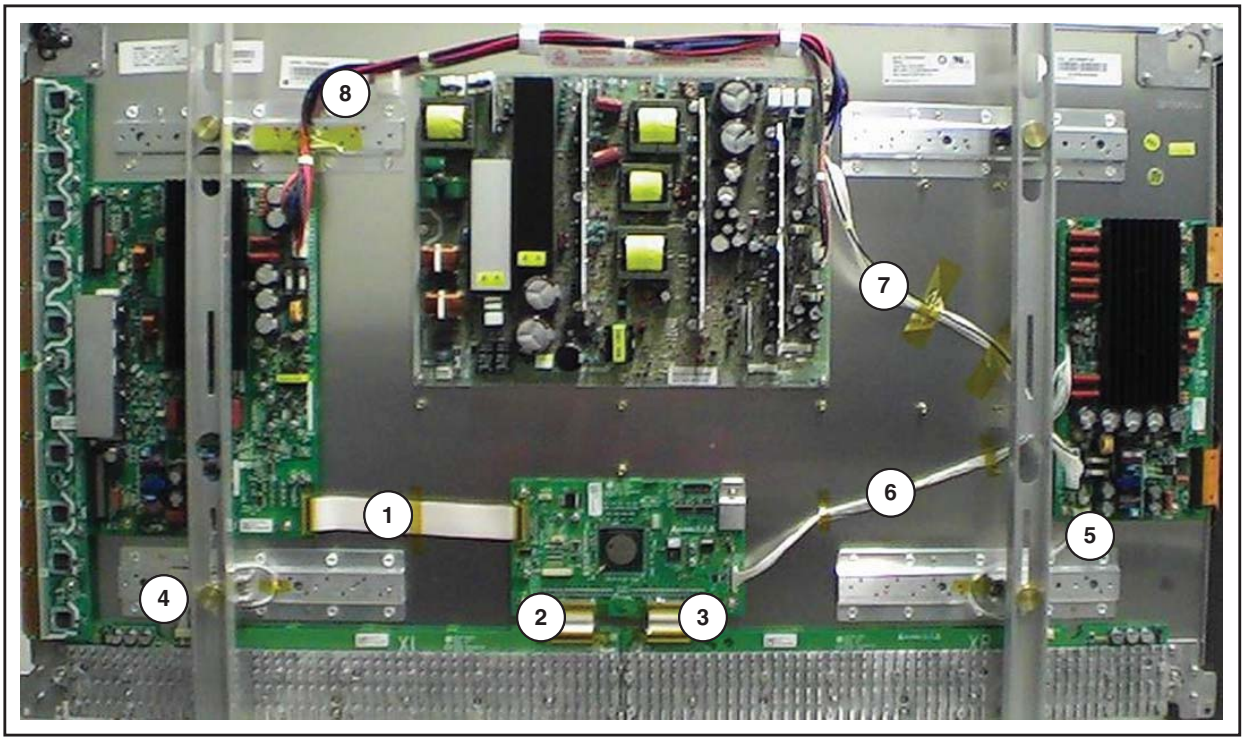

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Figure 4-1 Cable dressing

Table 4-1 Cable function

Cable No.	Function
1	Drive signal for Y waveform
2 & 3	RGB data to be transferred to panel
4 & 5	5V and Va supply for X-boards Left and Right
6	Drive signal for Z-waveform
7 & 8	Va, Vs and 5 V supply for PDP operation

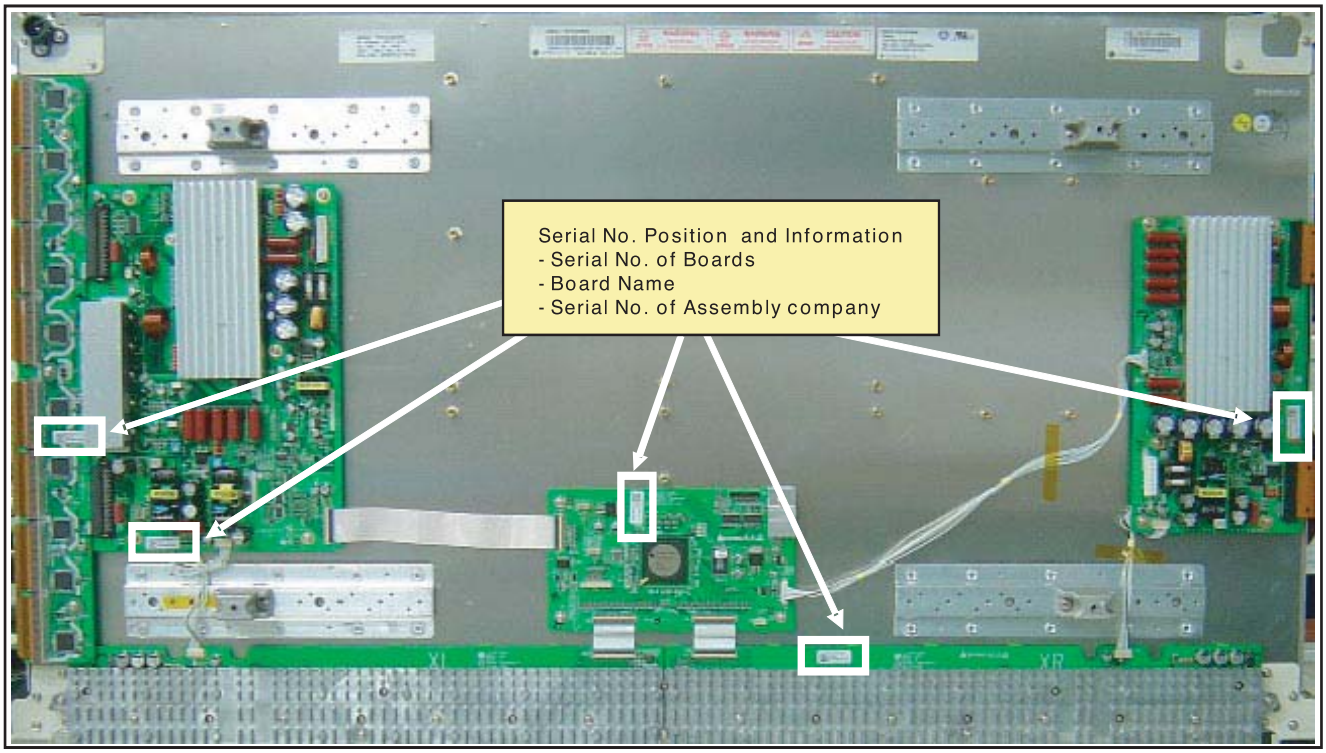

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Figure 4-2 Label location on PWB's

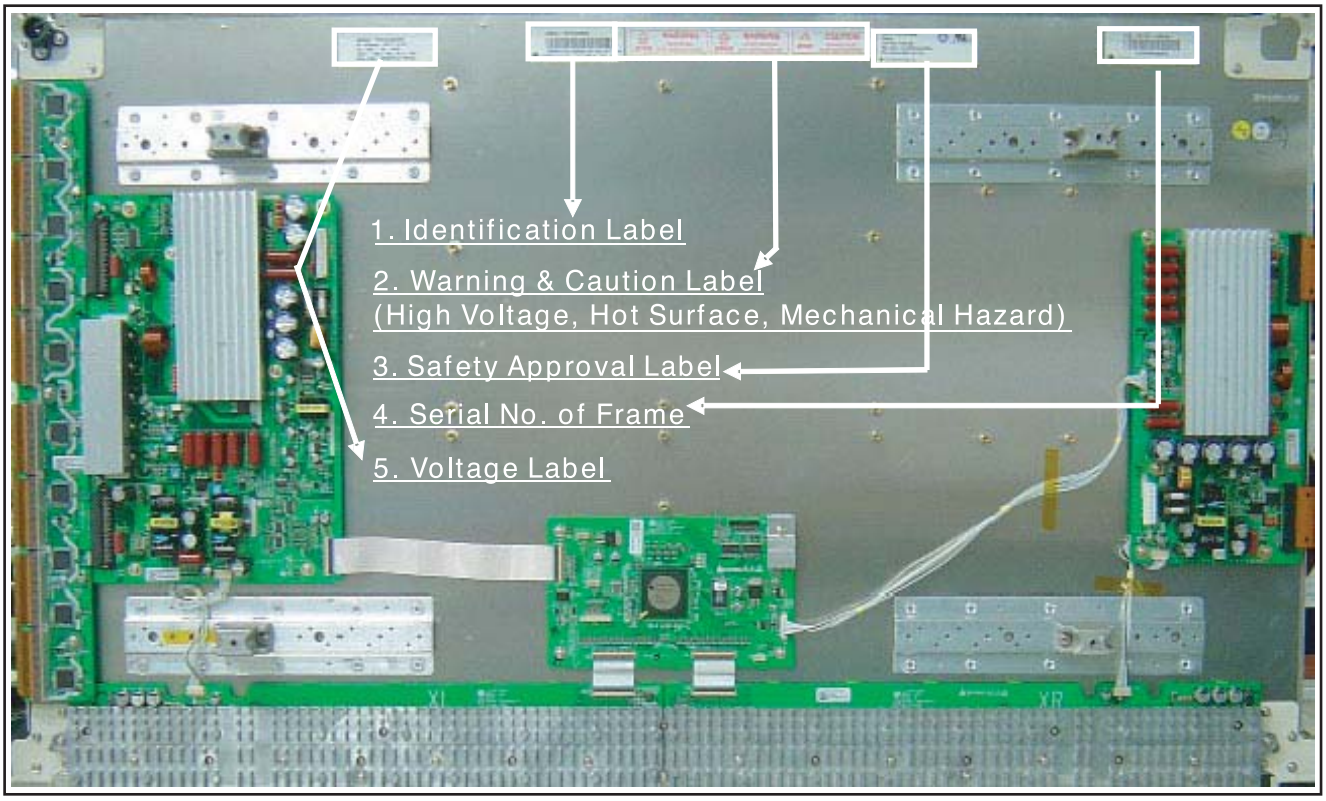

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Figure 4-3 Label indication

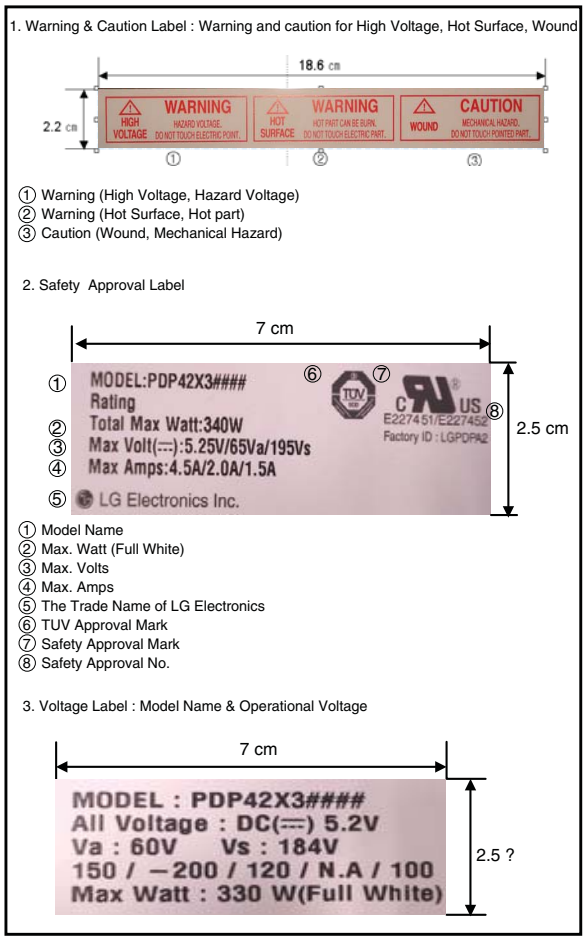

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Figure 4-4 Label information (1)

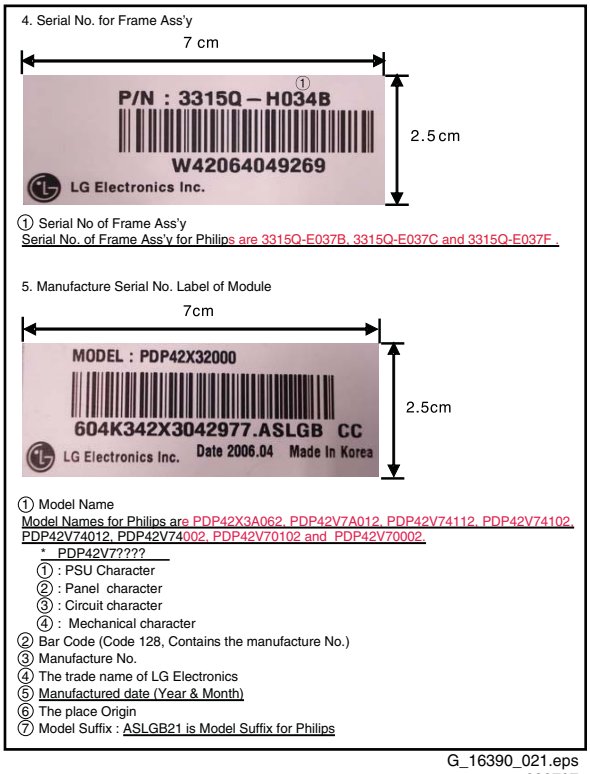

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Figure 4-5 Label information (2)

4.2 Panel/assy removal

4.2.1 Power Supply Unit

1. Unplug the connectors [1].
2. Remove the fixation screws [2].

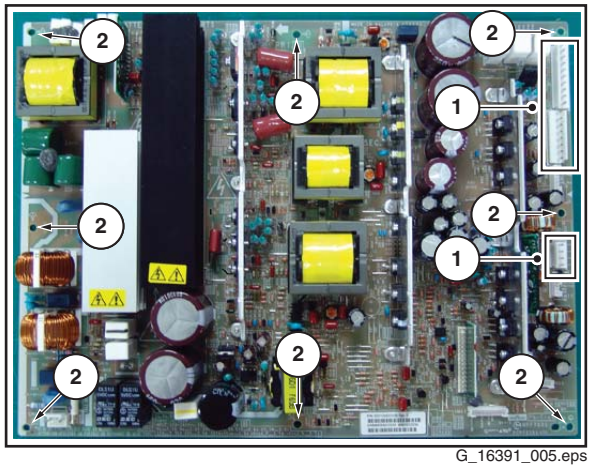

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Figure 4-6 PSU removal

4.2.2 Control Board

1. Unplug the connectors [1].
2. Remove the fixation screws [2].

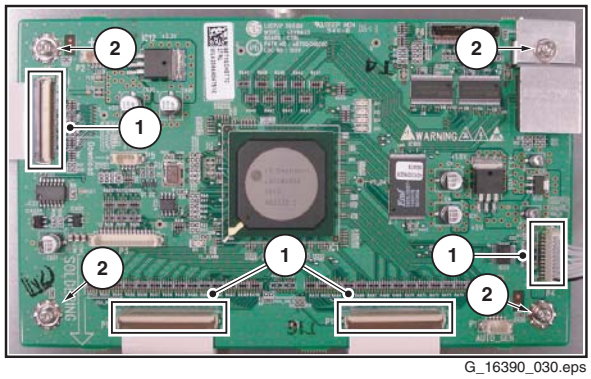

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Figure 4-7 Control board removal

4.2.3 Y Sustain Board

1. Unplug the connectors [1].
2. Remove the fixation screws [2].
3. Slide the board to the right, while unplugging connectors [3]. **Do not touch the heatsink!**

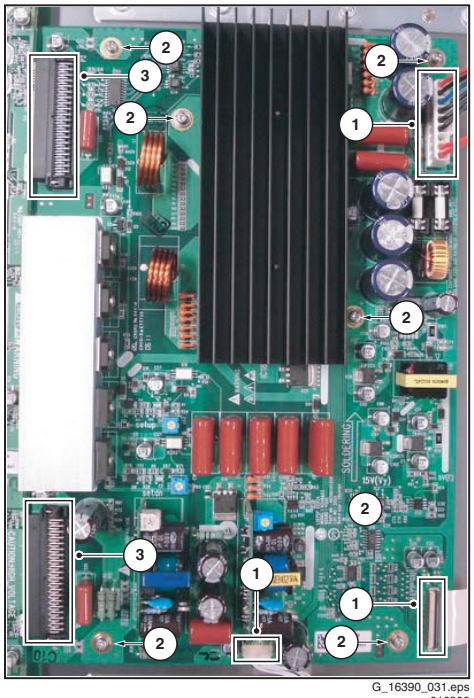

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Figure 4-8 Y-SUS board removal

4.2.4 Y Driver Board

1. Remove the Y-SUS board [1], as described previously.
2. Remove the fixation screws [2].
3. Separate the TCP's [3].

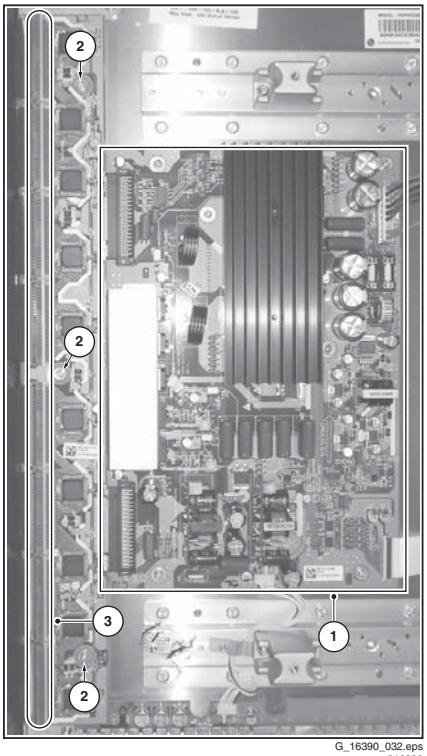

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Figure 4-9 Y driver board removal

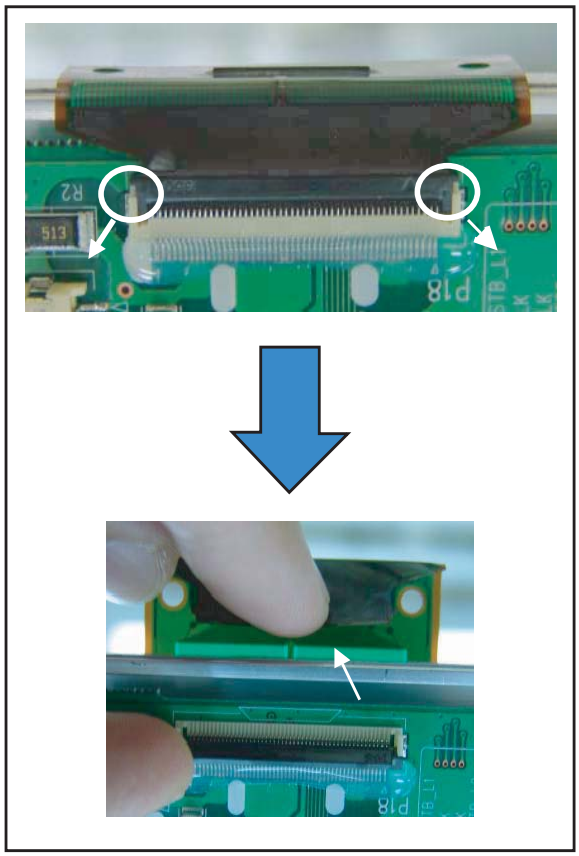

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Figure 4-10 TCP Separation

4.2.5 Z-Sustain board

1. Unplug the connectors [1].
2. Remove the fixation screws [2].
3. Slide the board to the right, while unplugging connectors [3]. **Do not touch the heatsink!**
4. Pull out the locks of the FPC's [3} as indicated by the arrows.
5. Condition in Lock part is pulled.
6. Pull FPC as shown by arrow.

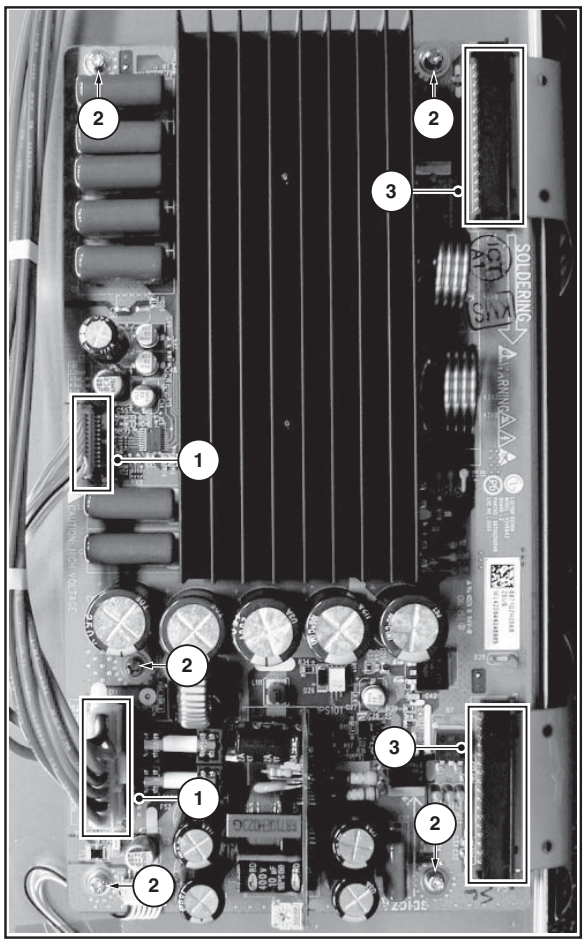

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Figure 4-11 Z-SUS board removal

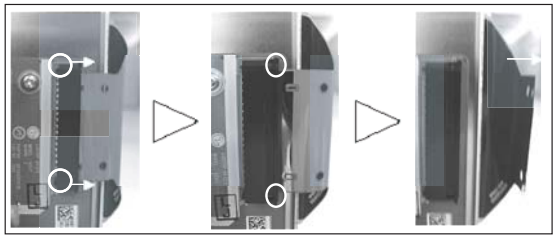

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Figure 4-12 FPC removal

4.2.6 X-board

1. Unplug the power cable.
2. Unplug the signal cable.
3. Remove the heatsink.
4. Separate the TCP's [1].
5. Remove the fixation screws [2].

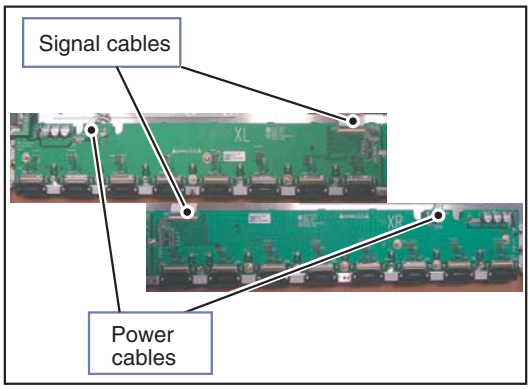

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Figure 4-13 X board removal 1/2

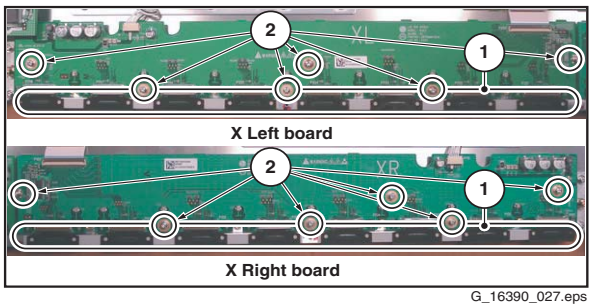

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Figure 4-14 X board removal 2/2

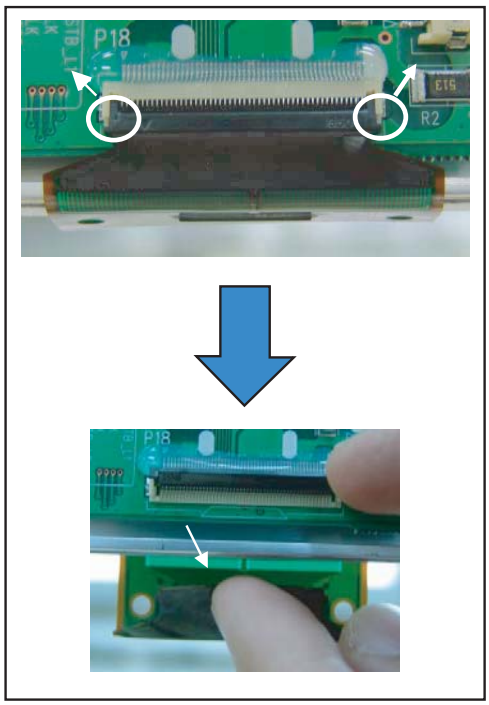

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Figure 4-15 TCP Separation

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

5.1 Quick Module Check
5.1.1 No Display
5.1.2 Bar Defect (Vertical)
5.1.3 Line Defect (Vertical)
5.1.4 Bar Defect (Horizontal)
5.1.5 Line Defect (Horizontal)
5.1.6 Mis-discharge Defect
5.2 Detailed Module Check
5.2.1 No Display
5.2.2 Display Defects
5.2.3 Checking for Component Damage
5.3 Defect Description Form

5.1 Quick Module Check

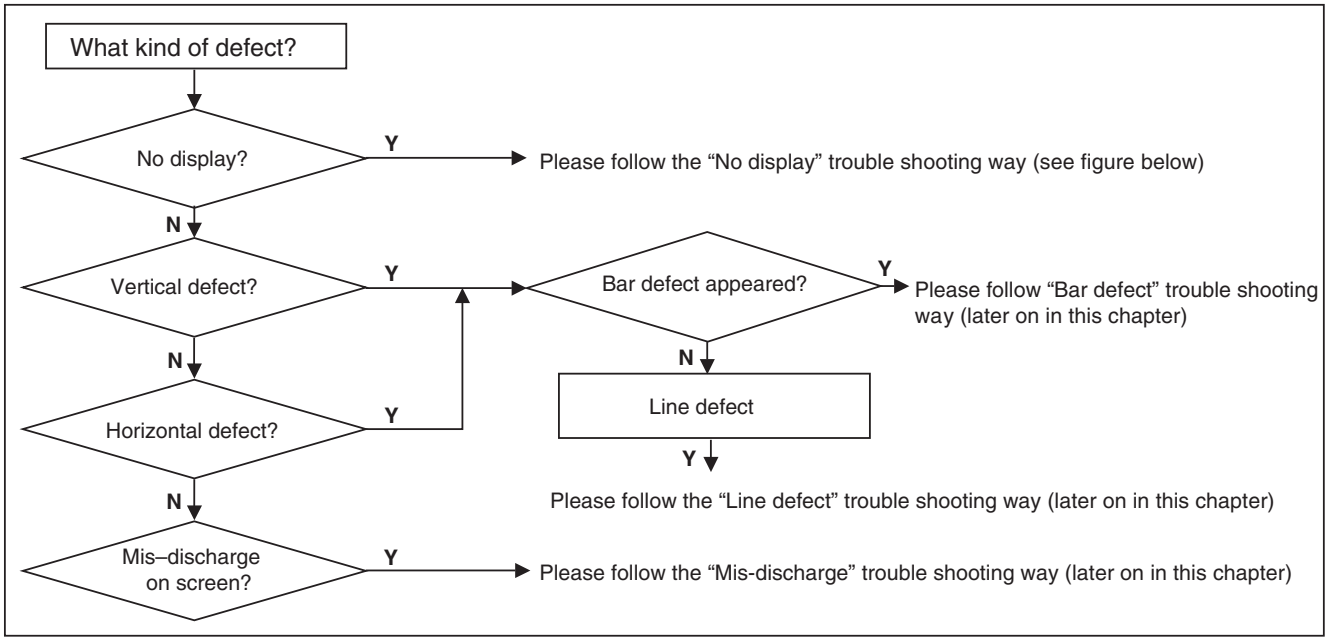

Figure 5-1 Logical judgement

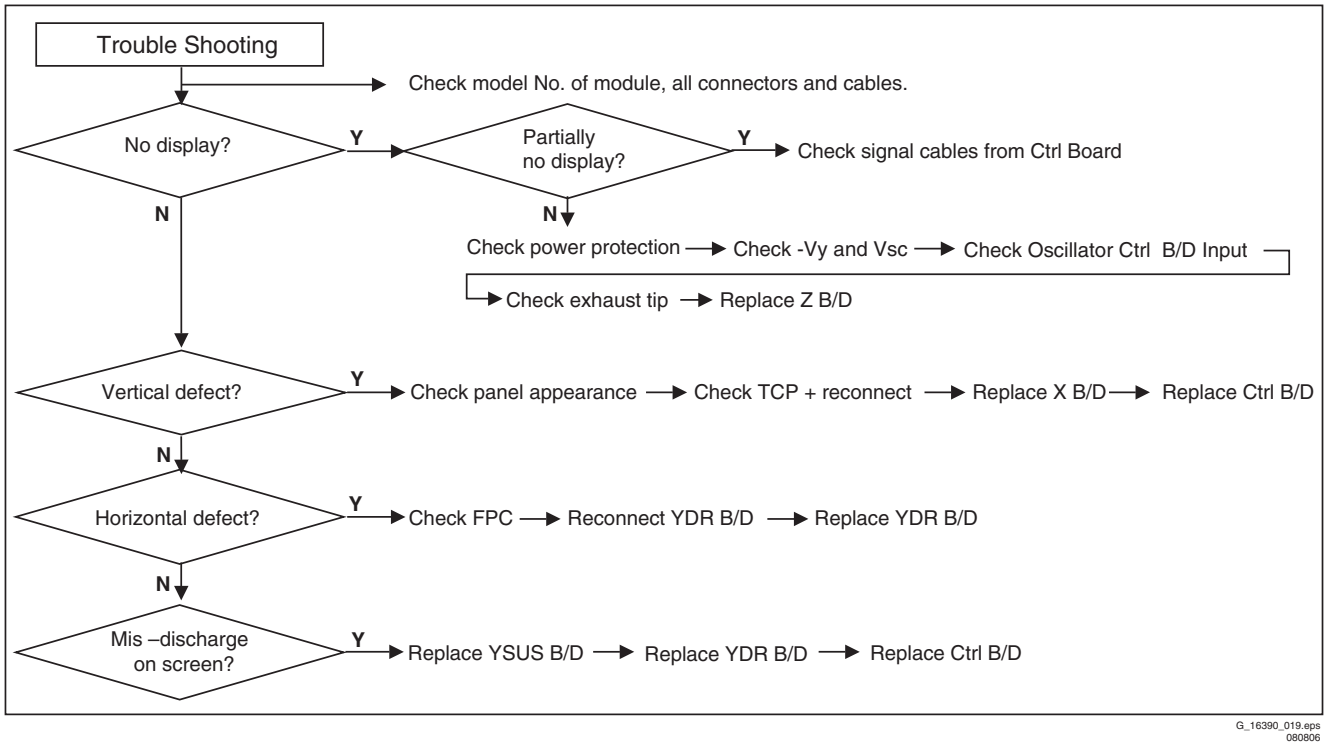

Figure 5-2 Quick check

5.1.1 No Display

Check each section with following method.
If there is a problem, replace or repair that part.
If it is not found, go to the next section.

Connectors
Check all connectors (PSU, Y-SUS, CTRL, Z-SUS). The module may not function normally by a misconnection (can not send signal and/or power). Also misconnection for a long period can cause a specific board to fail.

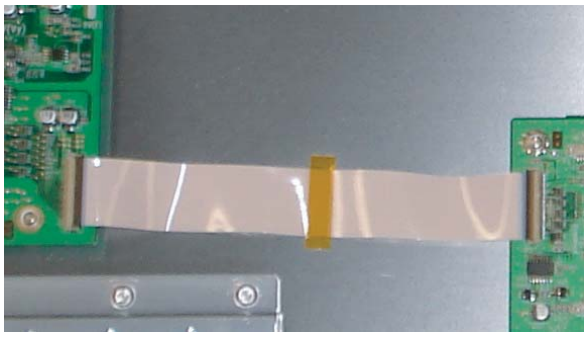

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Figure 5-3 Control + Y-SUS board

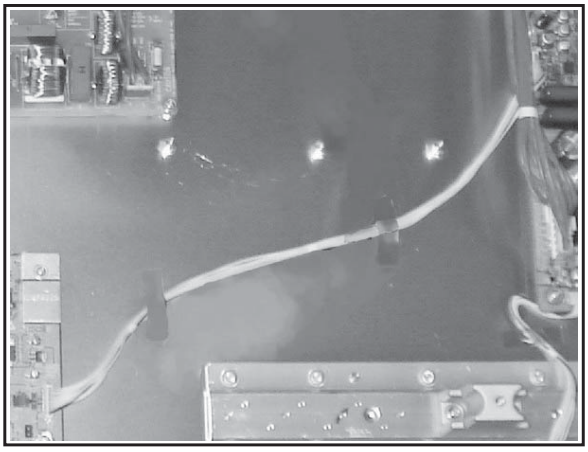

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Figure 5-4 Control + Z-SUS board

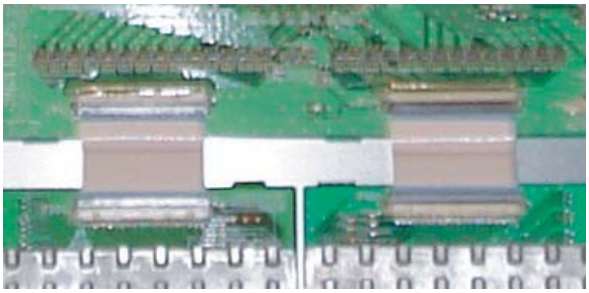

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Figure 5-5 Control + X board

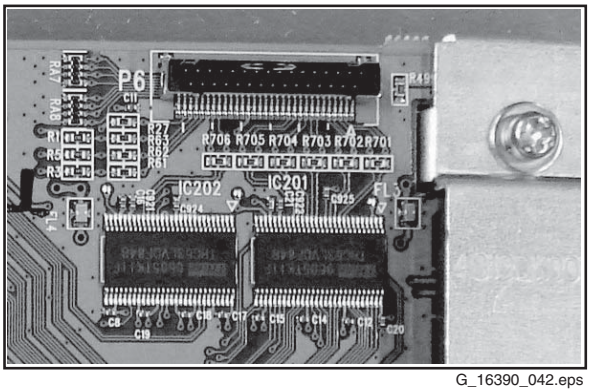

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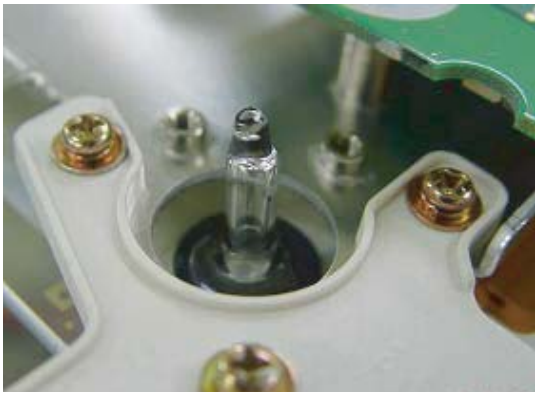
Figure 5-6 Signal input (LVDS)

Exhaust Tip
Check the Exhaust Tip for cracks with the naked eye to check the vacuum state.
If there is a problem, replace the PDP module by a new one.
In case of vacuum breakdown, the module makes a shaking noise because of inside gas ventilation.
There may be a small crack, which cannot be seen with the naked eye. This noise is different from capacitor noise.



NORMAL

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Figure 5-7 Exhaust tip "normal"

PSU (see figure "PSU trouble shooting")

1. Check each unit part of PSU inside with naked eye (capacitor, FET, IC, resistor).
2. Check fuse.
3. Check output voltage, which is converted from AC to DC.
4. Voltage Check (5V, Va, Vs).

When PSU protection occurred: check for a short circuit between the Y-SUS and the Z-SUS board.

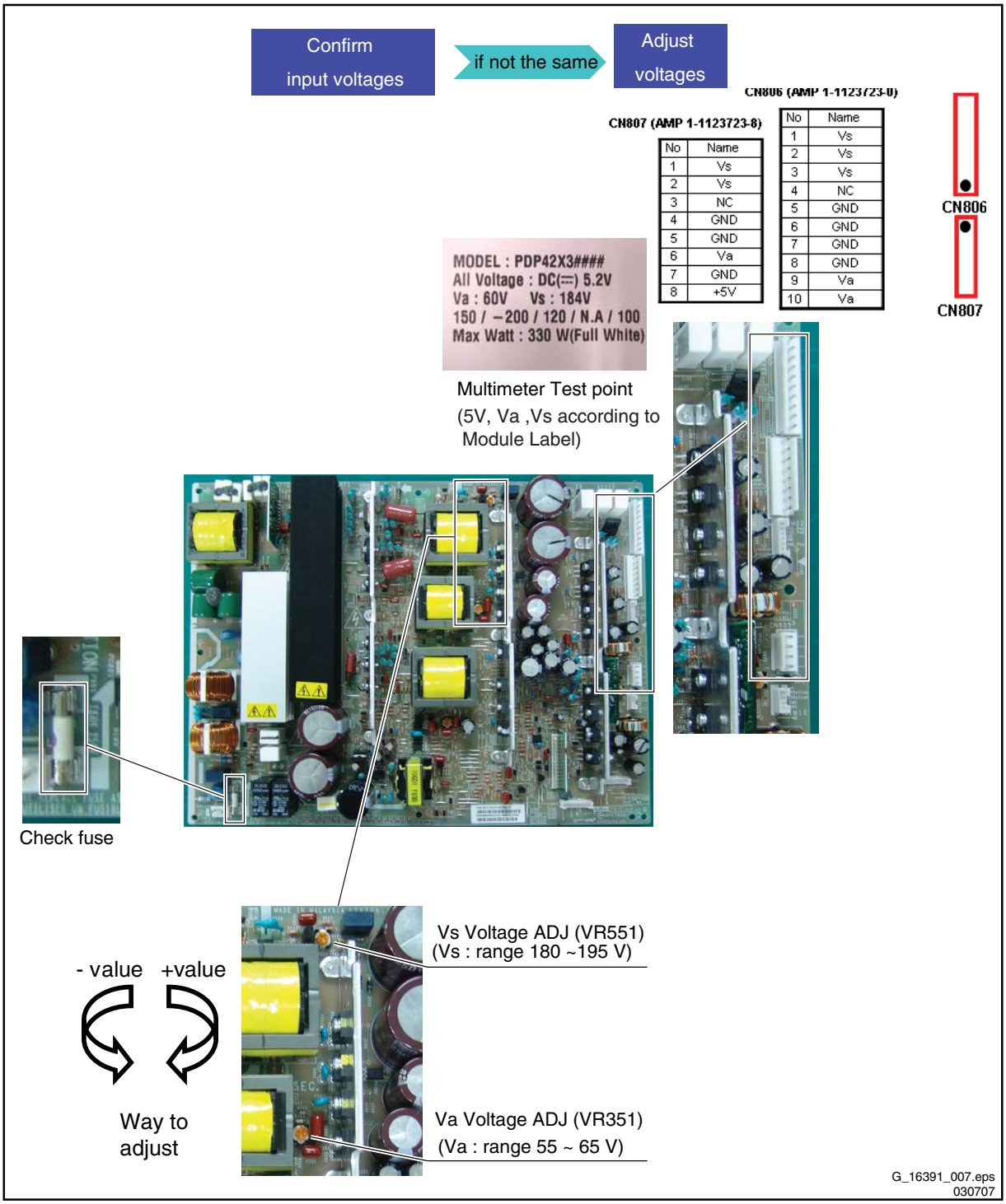

Figure 5-8 PSU trouble shooting

PSU Power Protection

When the power protection gets active, the power is switched "OFF" automatically within 2-3 min. from power "ON".
The power protection function protects the boards when a short occurs on circuits of the PDP module, or when a power problem occurs. If there is no power, even after replacing the PSU, find out where the short occurred.

In case of a PSU protection, the red LED will be "ON" and an error code will be displayed via the green blinking LED (see also paragraph "Detailed PSU Trouble Shooting", further on).
In case of a PSU protection, disconnect the power supply connectors to the boards, to find if the boards are defective or the PSU itself.

5.1.2 Bar Defect (Vertical)

Check each section with the following method. If there is a problem, replace or repair that part. If not go to the next section.

Connector
Check the TCP connector and cables. If not connected well, it will result in a bar defect and abnormal display behaviour.

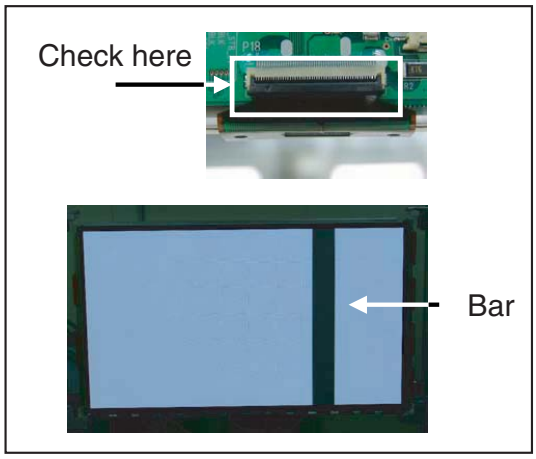

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Figure 5-9 Connector check (1)

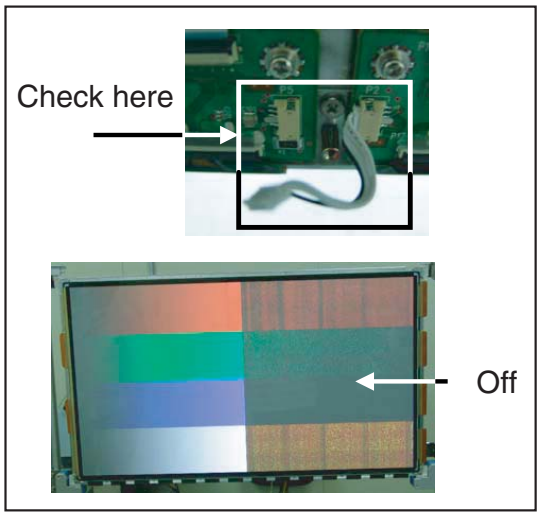

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Figure 5-10 Connector check (2)

Checking the TCP
Confirm whether the TCP was torn or chopped.

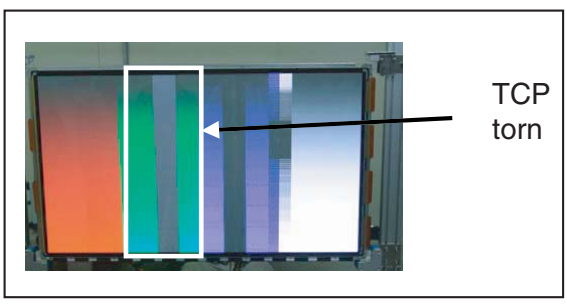

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Figure 5-11 TCP torn

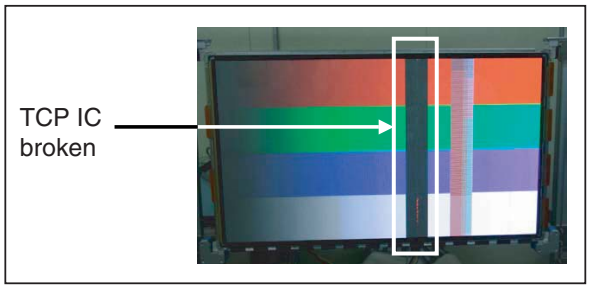

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Figure 5-12 TCP IC broken

Control Board
The Control board supplies the video signal to the TCP. So, if there is a bar defect on screen, it may be a Control board problem.

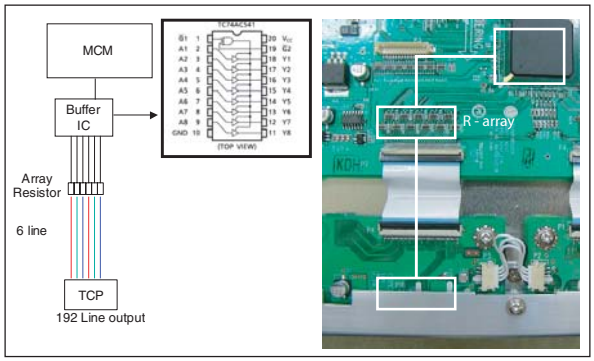

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Figure 5-13 Control board address flow

5.1.3 Line Defect (Vertical)

In case of one line open or shorted, check for dirt (foreign substances) in TCP connector. First, try to remove the dirt with compressed air. If, after this, the same line appears again, replace the panel.

Line Open or Short
This phenomenon is due to a TCP IC internal short or electrode problem. In this case, replace the panel.

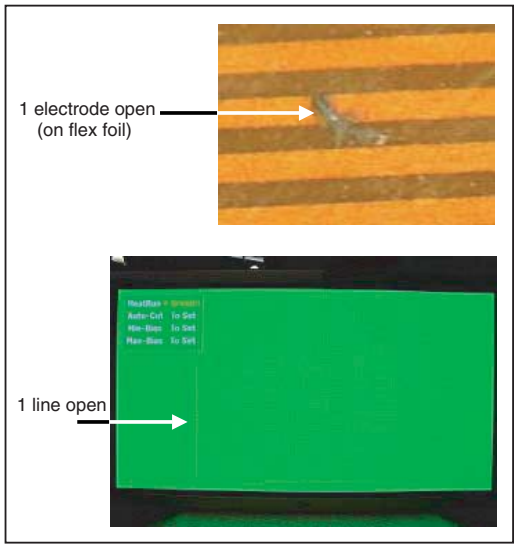

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Figure 5-14 Single line defect

Line Open or Short with the Same Distance
This is an MCM of Control board defect. The MCM cannot be replaced separately. So replace the Control board.

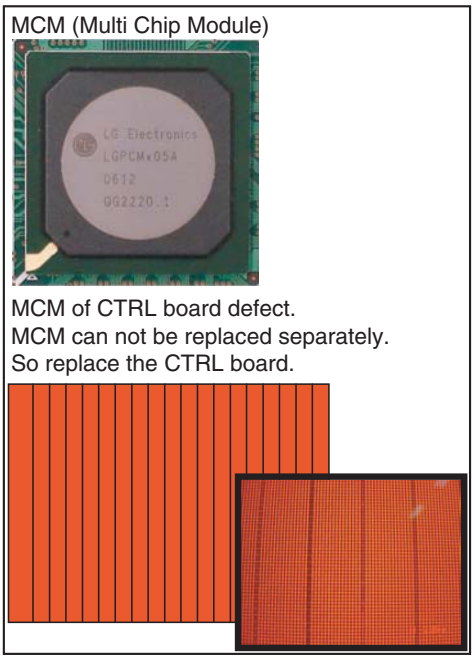


Figure 5-15 Evenly repeated lines

5.1.4 Bar Defect (Horizontal)

Most horizontal defects can be repaired. In case of adherence between a part of the film and the rear panel electrode, or a panel electrode open/short, replace the PDP panel.

Connector
If the connectors on the Y board and Z board are not plugged in well, it can result in a horizontal bar, because the sustain voltage cannot be supplied to the panel. So check the FPC connectors and YSUS<->YDRV first.
.

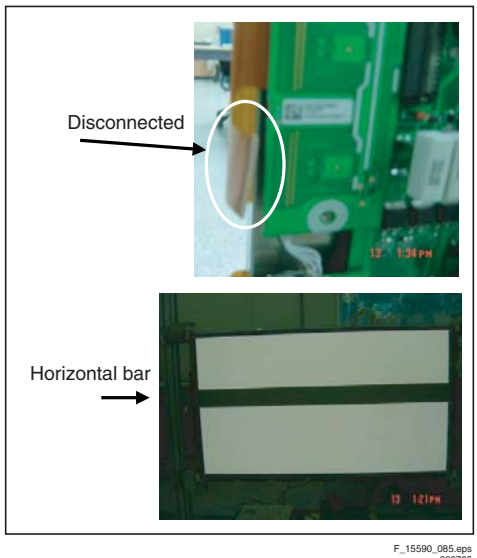


Figure 5-16 Check FPC connectors

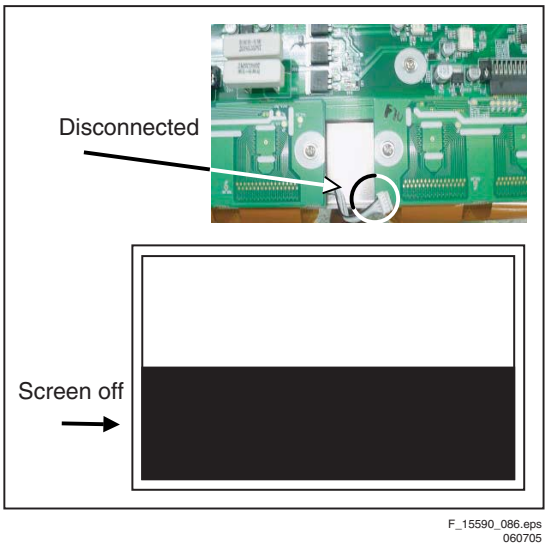


Figure 5-17 Check drive connectors

Scan IC Check
Check the diode value of the right side part of the output pin.

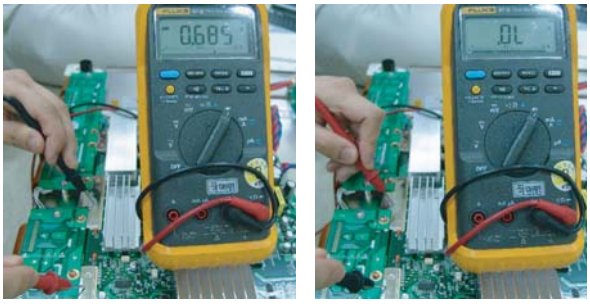


Figure 5-18 Scan IC output diode check

5.1.5 Line Defect (Horizontal)

FPC Check
In case of one or more horizontal lines, this is probably due to FPC or panel inside the Control board. Y board is just normal.

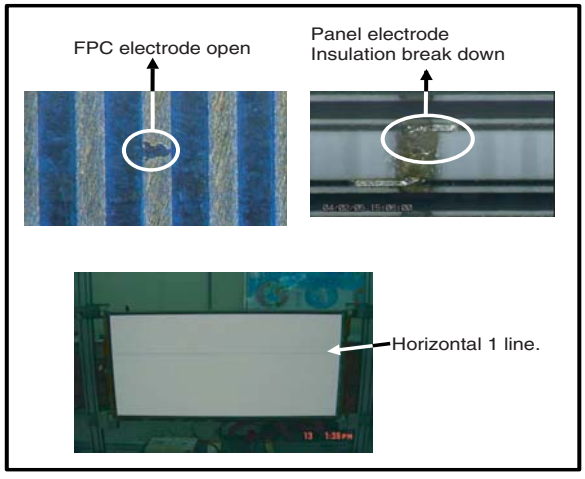
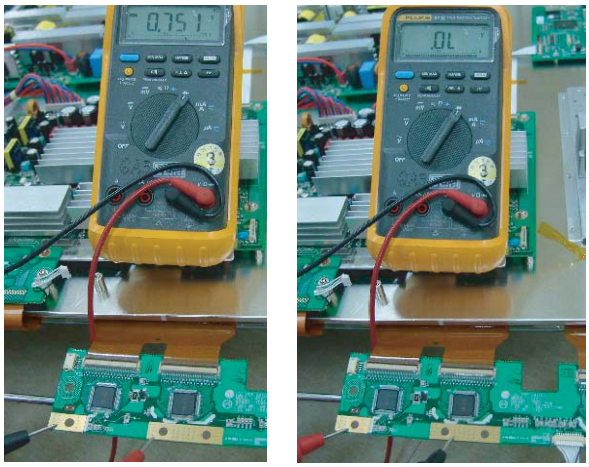


Figure 5-19 Open FPC electrode / Panel electrode breakdown

Scan IC Check

Check diode value of the right side part of the output pin.



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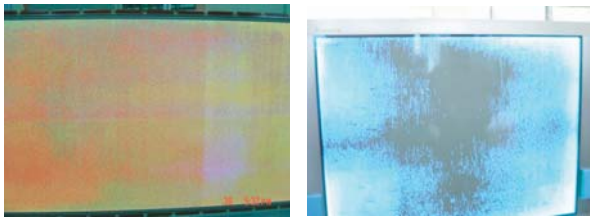
290605

Figure 5-20 Scan IC output diode check

5.1.6 Mis-discharge Defect

Most of mis-discharge appearance is a problem of the Y-DRV, Y-SUS, or Z board.
Check these boards when mis-discharge occurs.



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070705

Figure 5-21 Mis-discharge

Checking Order

1. Check the Y-SUS and Z-SUS signal cables.
2. Check if the Y-DRV IC is defective.
3. Check the Y-SUS board voltages (-Vy, Vscw).
4. Check if the Y-SUS and/or Z-SUS IPMs are defective (see paragraph "How to Check an IPM" below).
5. Replace the Control board.

How to Check an IPM

Forward direction
Measure between:

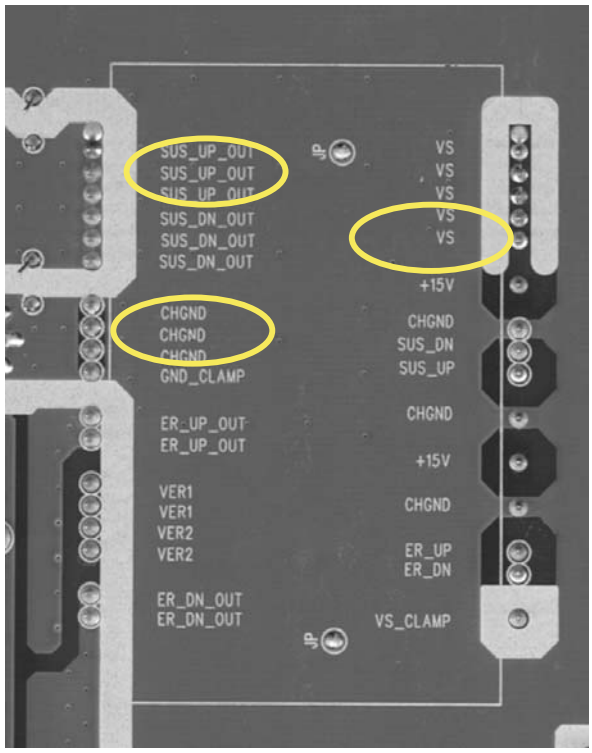
- GND (+) and Sus-out (-).
- Sus-out (+) and Vs (-).

When both test diode values are over 0.4 => OK.

Reverse direction
Measure between:

- GND (-) and Sus-out (+).
- Sus-out (-) and Vs (+).

When all test diode values are infinite => OK



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010906

Figure 5-22 IPM check

5.2 Detailed Module Check

5.2.1 No Display

The Screen Does Not Display a Picture

1. Check whether on the CTRL board LED (D12, D13, D14) is turned "ON" or not.
2. Check the power and signal cable of the CTRL board.
3. Check if the X, Y, and Z boards are plugged in correctly.
4. Check the connection of the X, Y, and Z boards to the CTRL board.
5. Measure the output wave of X, Y, and Z boards with an oscilloscope (> 200 MHz) and find the troubled board by comparing the output wave with the figures below.
   – Measuring point for the Y board: TP (“Waveform” on the Y-Driver board).
   – Measuring point for the Z board: TP (bead B28).
6. Check the SCAN (Y side) IC.
7. Check the DATA (X side) TCP IC.
8. Replace the CTRL board.

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300806

Figure 5-23 Output waveforms on X, Y, and Z-boards

5.2.2 Display Defects

Half of the Screen is Not Shown

- On the XR board:
  1. Check if the power connector of the XR board is plugged in correctly.
  2. Check if the 60-pin connection of the CTRL board to the XR board is plugged in correctly.
- On the XL board:
  1. Check if the power connector of the XL board is plugged in correctly.
  2. Check if the 60-pin connection of the CTRL board to the XL board is plugged in correctly.
- Replace relevant X board.

Notes:
Relationship between Screen and X board:

Screen	X-board
Left half of the screen	Right X-board
Right half of the screen	Left X-board

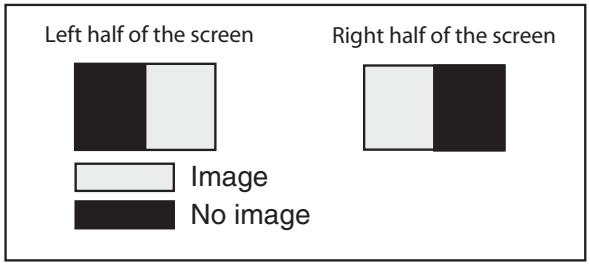

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Figure 5-24 Screen display "1/2 display"

Vertical Parts of the Screen are Missing

1. This can be related to a problem between the Data TCP and the X board.
2. Verify that the connector of the Data TCP is well connected to the X board (it corresponds to the part of the screen that does not display the image).
3. Confirm whether the Data TCP fails (examination with the naked eye of blown ICs or other parts included).
   – If an IC is damaged: replace the panel.
   – In case of an X board short circuit or an open PWB pattern: when the TCP IC is not defective, replace the X board.

Notes:

- Example of screen display (any of the Data TCPs can be shown).

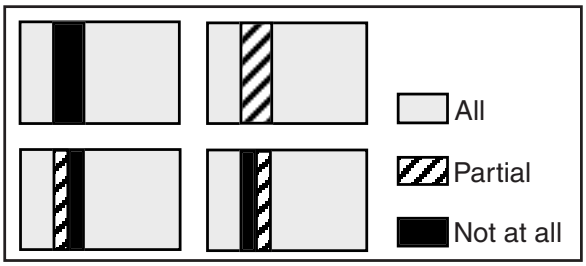

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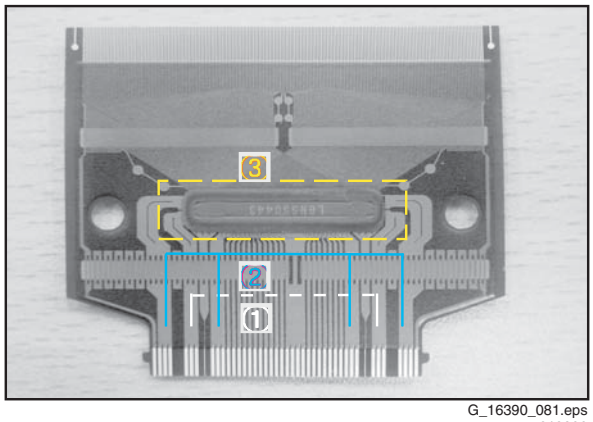
Figure 5-25 Screen display "Vertical parts missing"

- How to examine the Data TCP IC
  – Connect [1] "Va Power" to the minus and [2] "GND" to the plus of an ohmmeter, and then examine the diode in forward or reverse direction.
  – Examine with the naked eye traces of blown ICs [3] or other parts.



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010906

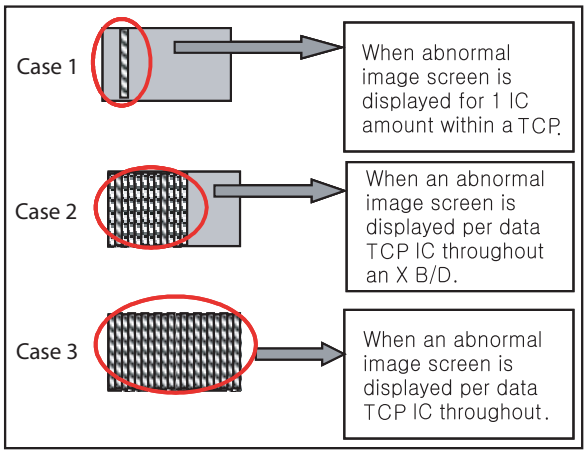
Figure 5-26 Data TCP IC examination

Unusual Pattern on Display

1. In case of generation of an unusual pattern of the Data TCP IC unit as shown in the picture below, check the fixation of the relevant X board. If that doesn't help, replace the X board.
2. In case of "Case 1":
   – Check the connection between the Data TCP connector and the IC.
   – Replace the relevant X board, or the Control board.
3. In case of "Case 2" or "Case 3":
   – Check the connection between the CTRL board and the relevant X board.
   – Replace the relevant X board or the CTRL board.

Note:

- If the silicon tape between the X board and the heatsink feels (partially) hard, it has to be replaced.



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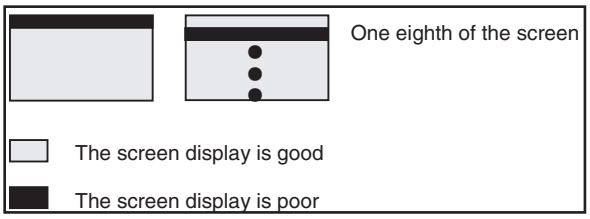
140806

Figure 5-27 Possible cases

Scan FPC Problem

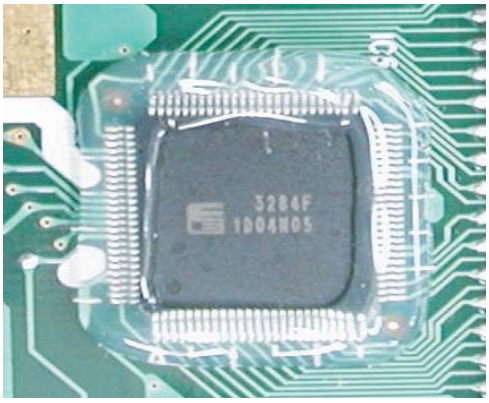
1. Check the connection between Y DRV board and Scan FPC.
2. If the Scan IC is defective, replace the Y DRV board.



G_16390_046.eps
140806

Figure 5-28 Screen display "Scan FPC problem"

- Check method of the SCAN IC
  – Connect the Vpp pin to the plus and "GND" to the minus of an ohmmeter, and then examine the diode in forward or reverse direction.

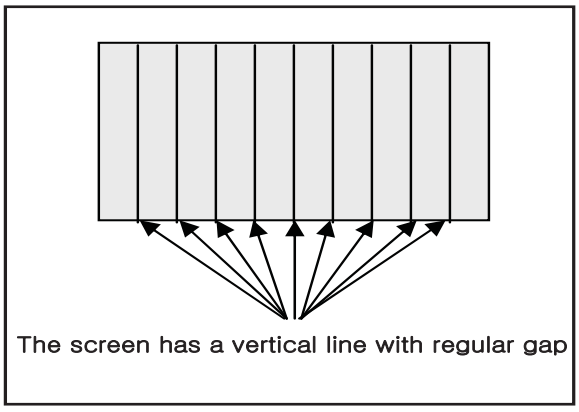


F_15590_018.eps
060605

Figure 5-29 Scan IC

Vertical Lines with Regular Gap (Vertical Stripe Flash at Special Colour)

- Replace the CTRL board.



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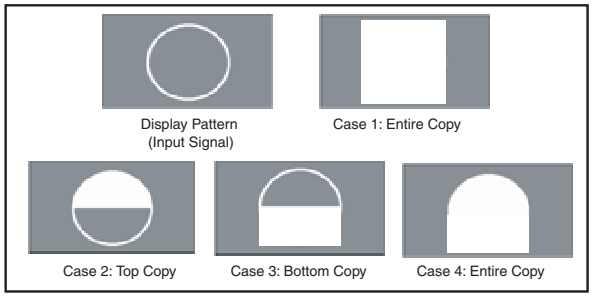
230407

Figure 5-30 Screen display "Vertical lines with regular gap"

Data Copy in Vertical Direction

- Replace the Y-DRV board or the YSUS board.

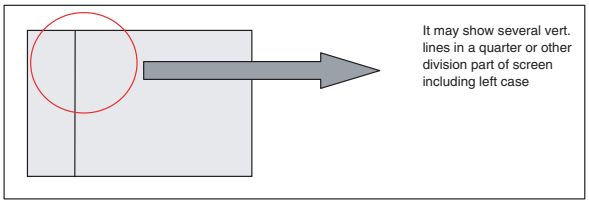


G_16390_047.eps
140806

Figure 5-31 Screen display "Data copy in vertical direction"

One or Several Vertical Line(s) on the Screen

1. It may be caused by:
   – Open or short circuit on DATA TCP FPC attached panel.
   – Defect on DATA TCP IC attached panel.
2. Replace the panel.

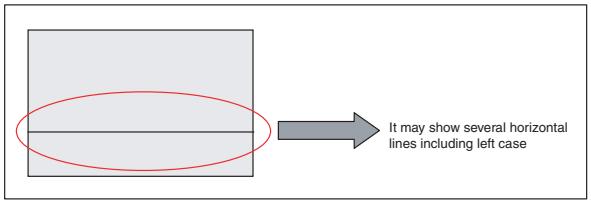


F_15590_021.eps
040705

Figure 5-32 Screen display "Vertical lines"

One or Several Horizontal Lines on the Screen

1. It may be caused by:
   – Open or short circuit on SCAN FPC attached panel.
   – Defect on SCAN IC attached panel.
2. Replace the panel.



F_15590_022.eps
040705

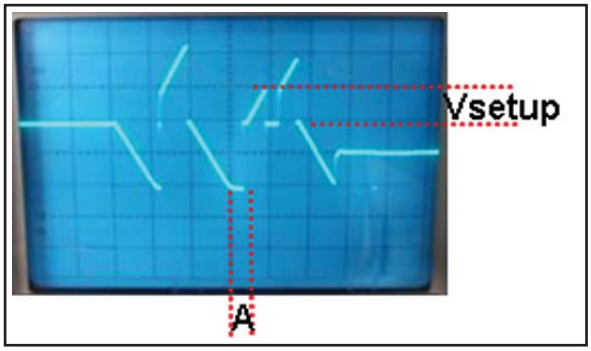
Figure 5-33 Screen display "Horizontal lines"

Low Brightness of Displayed Picture

1. In this case, Z board operation is not complete.
2. Check the power cord of Z board.
3. Check the connector of Z board and CTRL board.
4. Replace the CTRL board or Z board.

Partially Other Colour on Full White Screen or Partially Mis-Discharge on Full Black Screen.

1. Check the Y board waveform, see below.
2. Measure the output wave with an oscilloscope (> 200 MHz) and compare the waveform with the waveform in the figure below. Adjust the Y board Set_up voltage (Vsetup) and time-interval "A" by changing VR3 and VR2.
   Check if -Vy and Vscan have been set correctly with VRy and VRsc respectively, to the value indicated on the voltage label.
   – Measuring Point for "Vsetup" and time-interval "A": Test point "Waveform" on the Y-Driver board.
   – Measuring Points for "-Vy" and "Vscan": Test points "Vy" and "Vsc" on the Y-SUS board.



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020707

Figure 5-34 Y output voltage waveform

No Specified Brightness at Specified Colour

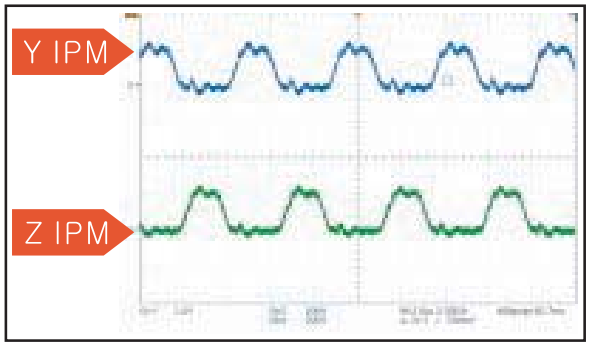
1. Check the connector of the CTRL board input signal (LVDS).
2. Replace the CTRL board.

5.2.3 Checking for Component Damage

Y IPM (IC 18) or Z IPM (IC 2)

When the internal Sustain FET or ER FET of the Y IPM (IC18) or Z IPM (IC2) is damaged, there will be no picture, or the screen is partially mis-discharged.

- Test Points: Waveform-GND (Y-DRV board), B28-GND (Z board).
- Wave format: Waveform (Y-DRV board) or B28 (Z board) has no output wave.



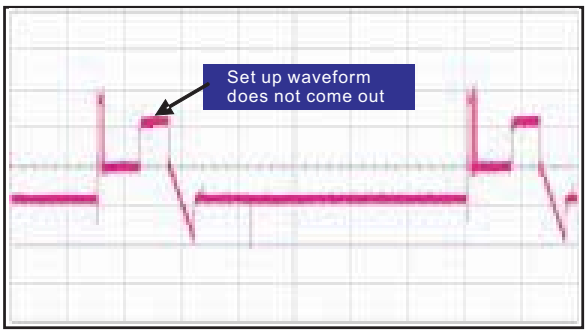
G_16390_049.eps
150806

Figure 5-35 IPM normal output

FET assy (Y board: HS2)

When the Set_up FET (2nd FFT of HS2) is damaged, there will be no picture.

- Test Point: GND-Waveform (Y-DRV board)
- Measuring condition: full white pattern.
- Wave format: as shown in the figure below.

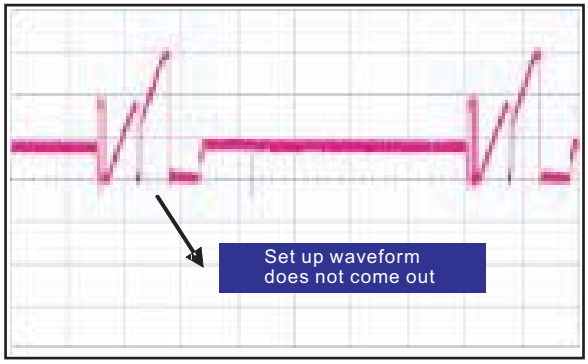


G_16390_050.eps
150806

Figure 5-36 Set_up FET defective

When the Set_down FET/Pass_Top FET(1st, 3rd, 4th, 5th FFT of HS2) is damaged, mis-discharge of the entire screen is generated.

- Test Point: GND-Waveform (Y-DRV board)
- Wave format: as shown in the figure below.

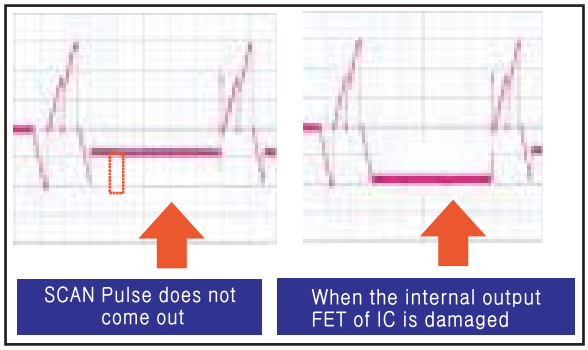


G_16390_051.eps
150806

Figure 5-37 Set_down FET defective

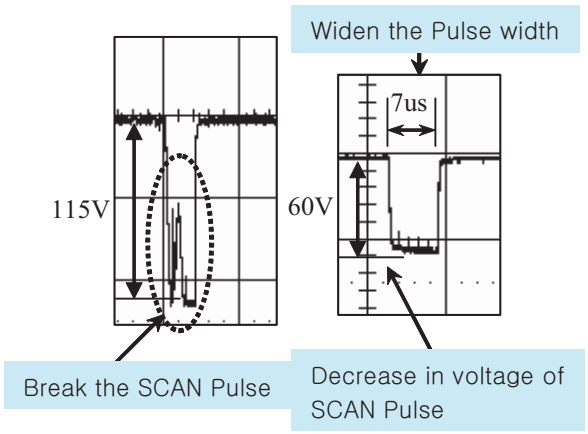
SCAN IC (Y-DRV board: IC1-10)

1. In case of the SCAN IC is damaged, one horizontal line may be open on the screen.
   - Test Point: ICT output - GND on the Y DRV board.
   - Wave format: As shown below figure.
2. When the SCAN IC is damaged (poor, external electricity, or spark), there might be no picture.
   - Test Point: ICT output - GND on the Y DRV board.
   - Wave format: Output wave format is not generated (you can see if which SCAN IC is damaged).
3. Overlap of two horizontal lines on the screen in case of shorted SCAN IC output.
   - Test Point: ICT output - GND on the Y DRV board.
   - Wave format: As shown in figures "SCAN IC shorted output" and "SCAN IC normal output".



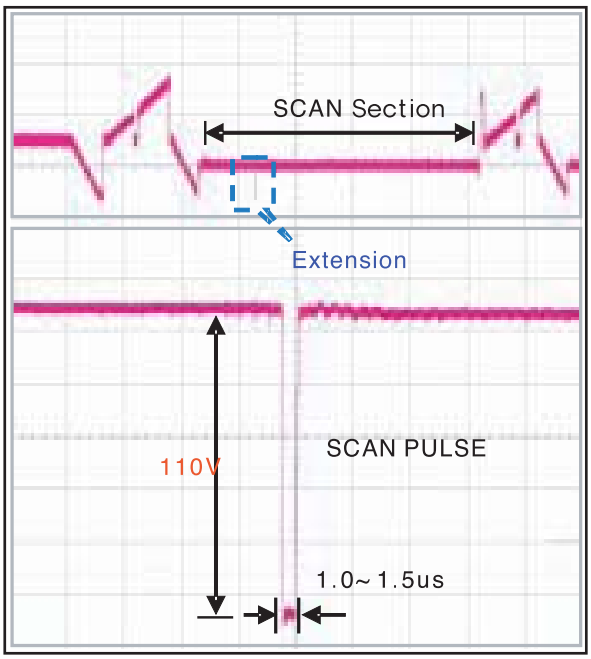
G_16390_052.eps
150806

Figure 5-38 SCAN IC defective



F_15590_031.eps
040705

Figure 5-39 SCAN IC shorted output

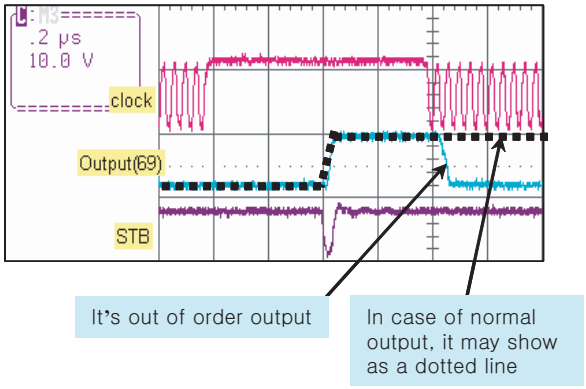


G_16390_053.eps
150806

Figure 5-40 SCAN IC normal output wave

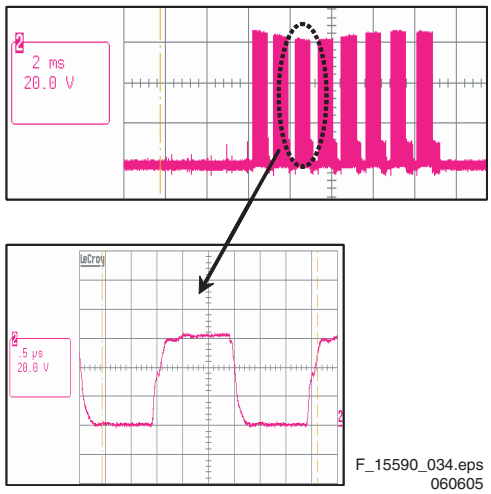
TCPs

1. In case of shorting or opening of TCP IC output, the screen may show one or several vertical lines.
   – Test Point: Output TP of GND-TCP
   – Wave format: As shown in figure below. In case of normal wave output, when STB signal is generated, the output must maintain "HIGH". When STB signal is generated again, the output must fall to "LOW". But when the TCP IC is damaged, the STB signal is not generated, and the output falls to "LOW".
2. In case of IC damage, the screen may show no image on the corresponding part, or mis-discharge. In most cases you can see a burn mark on the IC.
   – Test Point: Output TP of GND-TCP
   – Wave format: No output wave.



F_15590_033.eps
060605

Figure 5-41 COF IC output defective

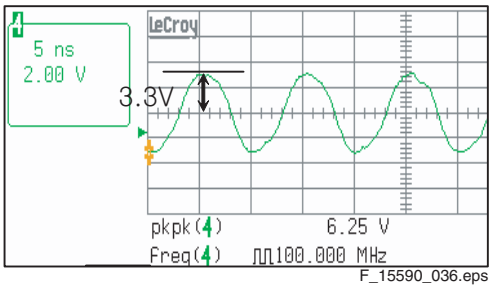


F_15590_034.eps
060605

Figure 5-42 TCP normal output

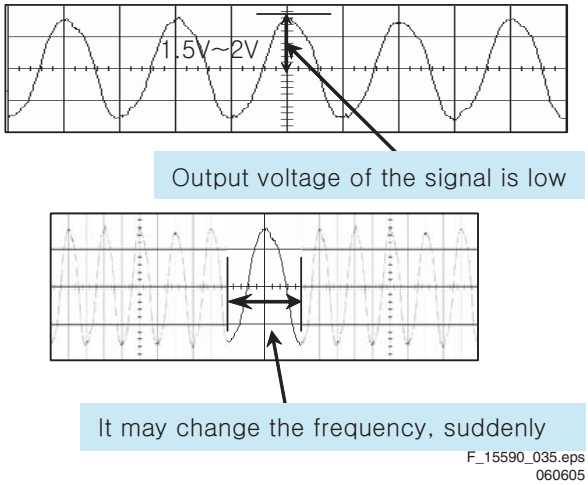
Crystal (CTRL board: X1)

1. When a crystal is damaged, the screen is not shown.
   – Test Point: 3-pin of GND-Crystal (CTRL board: X1).
   – Wave format: Output wave is not generated.
2. In case of unusual start-up of the crystal, the screen may blink.
   – Wave format: As shown in figure below.
   – Measurement position: Measuring output 3-pin of crystal (CTRL board: X1).



F_15590_036.eps
040705

Figure 5-43 Crystal normal output



F_15590_035.eps
060605

Figure 5-44 Crystal defective output

5.3 Defect Description Form

This form must be used by the workshops for warranty claims:

Defect Description Form LCD PLASMA v4.0 final — Date last modified: 28/03/2006

To be filled in by WORKSHOP / WORK CENTER

Country:	PHILIPS LCD & Plasma DEFECT DESCRIPTION FORM	Type nr./Model nr. set	
Customer Account nr.:		Serial nr. set	
Job sheet nr.:		Type nr. display	
		Serial nr. display	
		Part nr display (12nc)	
		Return number	

GENERAL REPAIR DATA

Condition	☐ Constantly ☐ Intermittently ☐ After a while ☐ In hot environment ☐ In cold environment	Other:
Symptom(s)	☐ No backlight ☐ No picture ☐ Picture too bright ☐ Scratches (LCD only acc. Pixel criteria sheet V4.0) ☐ Only partial picture ☐ Unstable picture ☐ Flickering / flashing picture ☐ Lines across/down image ☐ Inactive row(s) ☐ Inactive column(s) ☐ Missing colour(s) ☐ Light leakage	Other:

PANEL REPAIR

Pixel Defect(s):	Dark dots Bright dots	Qty of dots:	Mark Defect(s):	
Symptoms Out of warranty	Following defect symptoms are out of warranty: - Broken glass / Broken polarizer - Scratch(es) on display / polarizer - Number of dark/bright pixels within spec. - Burn in (Plasma TV) / Sticking image (LCD TV) - MURA			These symptoms are not claimable.

BOARD REPAIR

	Defect Board		New Board	
	Spare Part Nr.	Serial Nr.	Spare Part Nr.	Serial Nr.
1.				
2.				
3.				
4.				

Note 1: The defective LCD-panel / PDP needs to be returned in the same packaging as the new part was send. If not the warranty claim will be rejected.

DE10WEG

Owner: PHILIPS CE EUROSERVICE

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Figure 5-45 Defect Description Form (DDF)

6. Block Diagrams, Test Point Overviews, and Waveforms

6.1 Block Diagram PDP Module

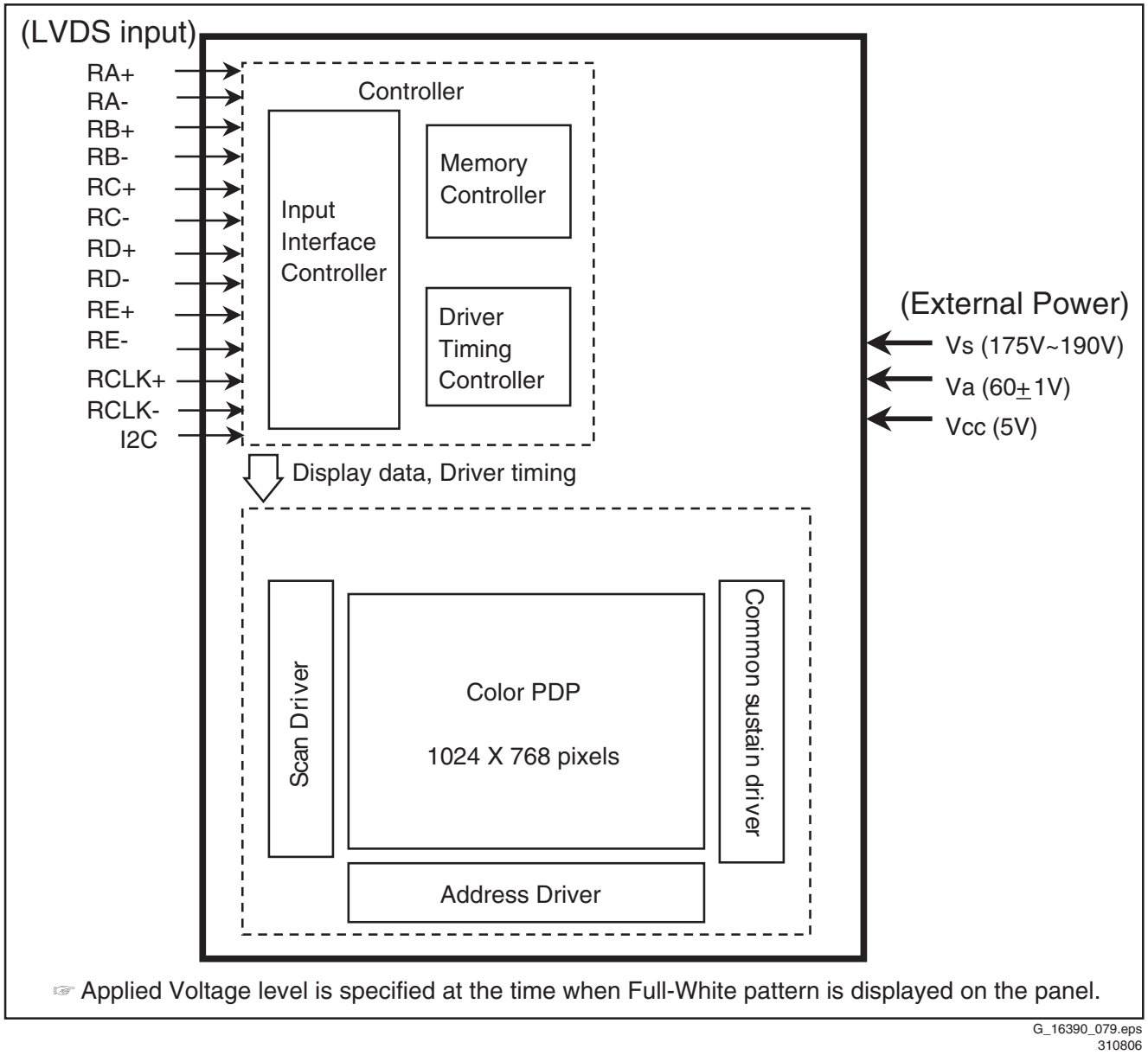

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Figure 6-1 Block Diagram

7. Circuit Diagrams and PWB Layouts

Not applicable

8. Alignments

Index of this chapter:

8.1 General
8.2 Alignments
8.2.1 Tools
8.2.2 Connection Diagram and Set-Up
8.2.4 Y-SUS Alignment

8.1 General

Notes:

- **Important**: if the PSU board, the Y-SUS board or the Z-SUS board is replaced, the technician should check if the voltages delivered by these boards are correct. If not, the boards should be realigned in order to avoid bad performance of the PDP.
- Allow the set to warm up according conditions below for at least 10 minutes before adjusting.
  - Service signal: 100% Full White.
  - Service DC voltage: Vcc= 5 V, Va= 60 V, Vs= 180 V.
  - DC/DC Pack voltage: Vsc= 120 V, Vzb = 100 V, -Vy= -200 V
  - Preliminaries environment: Temp (25 ± 5 deg. C), Relative Humidity (65 ± 10%).
- Module adjustment should follow below sequence.
  1. First, set up the Vsc / -Vy voltage (Vsc= 120 V, -Vy= -200 V).
  2. Then, adjust the voltage waveform (refer to adjustment).

Caution: Do not leave a still image for more than 10 minutes (especially The Digital pattern or Cross Hatch Pattern which has clear gradation) on the display, because this will cause burn-in effects.

8.2 Alignments

8.2.1 Tools

- Digital oscilloscope: > 200 MHz.
- DVM (Digital Multimeter): Fluke 187 or similar.
- Signal generator: VG-828 or similar.
- DC power supply or PSU:
  - 1 DC power supply for Vs: 0 - 200 V, > 10 A.
  - 1 DC power supply for Va: 0 - 100 V, > 5 A.
  - 1 DC power supply for 5V: 0 - 10 V, > 10 A.
  - A set of wires and appropriate connectors to hook up the power supplies to the display.
  - Required voltage stability of the power supplies: within ± 1% for Vs and Va, within ± 3% for 5V.

8.2.2 Connection Diagram and Set-Up

1. For the connection diagram of the measuring instrument, refer to Fig. "Measuring equipment connection diagram".
2. Set-up the initial voltage Vcc= 5 V, Va= 60 V, Vs= 180 V. Note that the initial set-up voltage can be changed according to the module's characteristics (= the values on the voltage label).
3. Environmental conditions: temperature 25 ± 5 °C, relative humidity 65 ± 10 %.

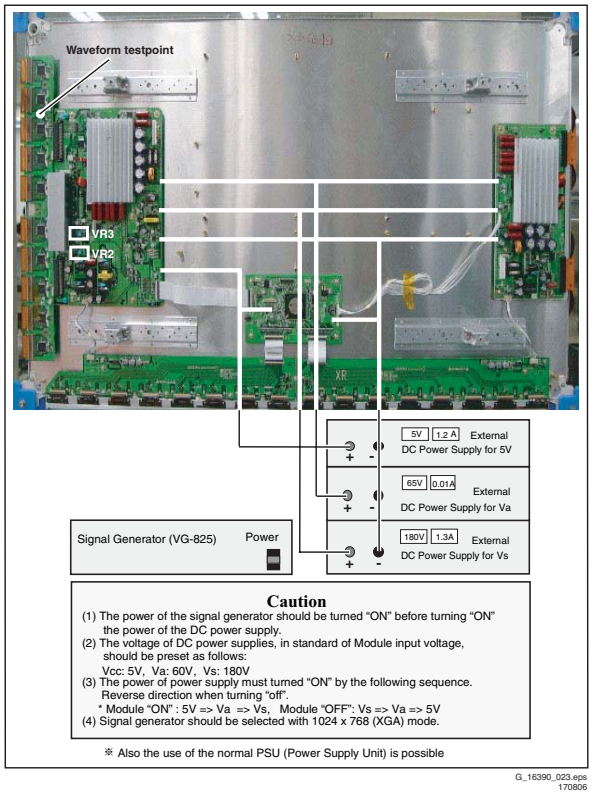

Figure 8-1 Measuring equipment connection diagram

8.2.3 PSU Alignment

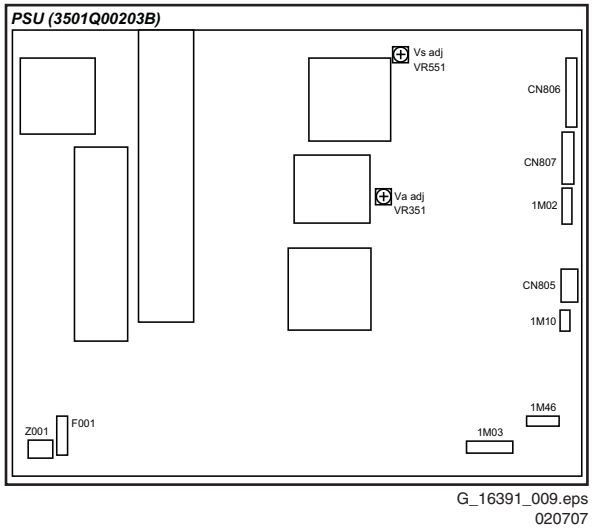

Figure 8-2 PSU Alignment

Vs Voltage Adjustment

1. Measure the Vs voltage (180...195 VDC) on pin 10 of CN806 on the PSU board (see Figure "PSU Alignment"). The voltage should have the same value as indicated on the label on the PSU.
2. If necessary, adjust Vs to its correct value with potentiometer VR551 on the PSU board.

Va Voltage Adjustment

1. Measure the Va voltage (55...65 VDC) on pin 1 of CN806 on the PSU board (see Figure “PSU Alignment”). The voltage should have the same value as indicated on the label on the PSU.
2. If necessary, adjust Va to its correct value with potentiometer VR351 on the PSU board.

8.2.4 Y-SUS Alignment

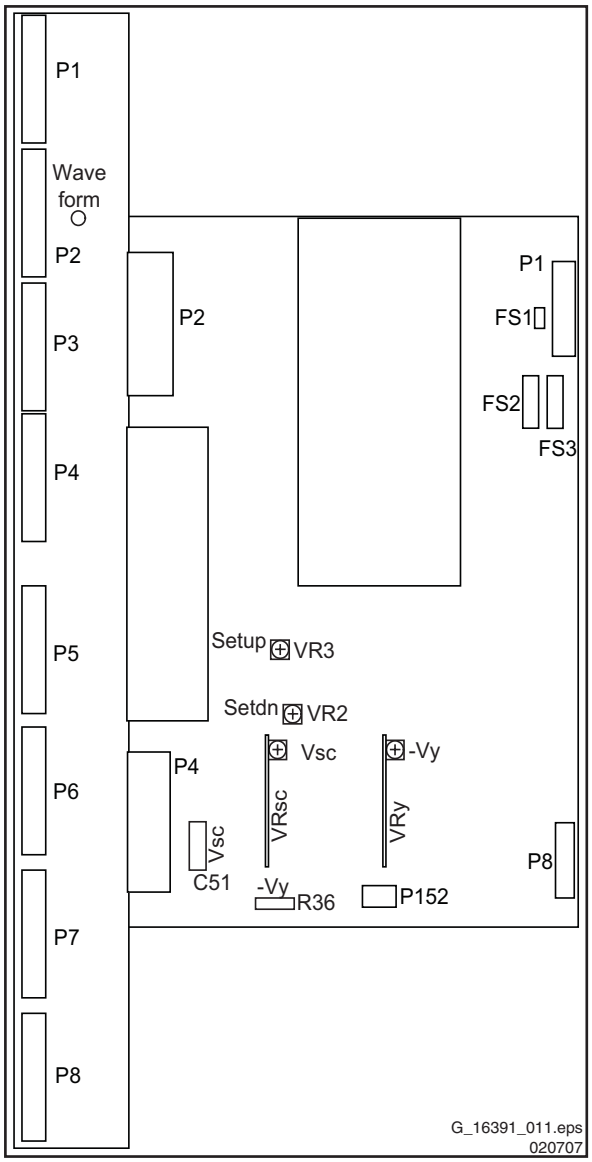

Figure 8-3 Y-SUS alignment

Condition

- Set up a situation as shown in “Measuring equipment connection diagram”.
- Check if the voltages Vs and Va of the PSU are correct (see PSU label and PSU Alignment 8.2.3).

Vscan Voltage Adjustment

1. Measure the Vscan voltage across C51 (or on the “Vsc” test point on the right of connector P4) on the Y-SUS board (see Figure “Y-SUS Alignment”).
2. Adjust Vsc to the value indicated on the voltage sticker with potentiometer VRsc on the Y-SUS board.

-Vy Voltage Adjustment

1. Measure the Vy voltage across R36 (or on the “Vy” test point on the DC converter) on the Y-SUS board (see Figure “Y-SUS Alignment”).
2. Adjust -Vy to the value indicated on the voltage sticker with potentiometer VRy on the Y-SUS board.

Y -SUS Set-up Voltage Waveform Adjustment

Now connect the oscilloscope between the Waveform test point on the Y-Driver board and GND (see Figure ““Y-SUS Alignment”). Trigger with Vs-DA on the Control board (see Figure “Trigger point Vs-DA”).

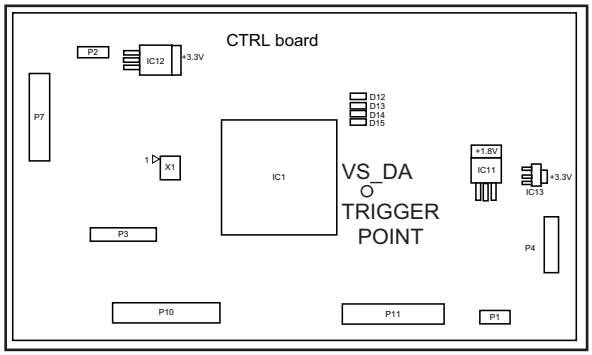

Figure 8-4 Trigger point Vs-DA

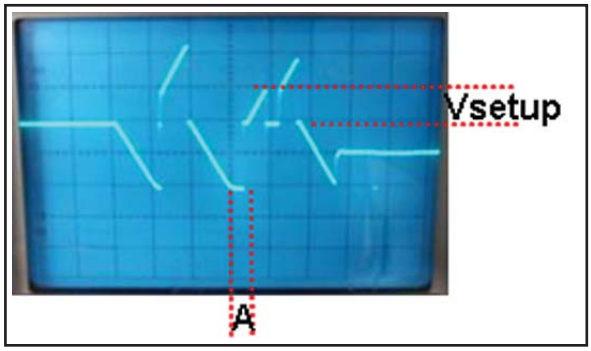

Figure 8-5 V set-up waveform

1. Refer to Figure “V set-up waveform”.
2. Adjust Vsetup to 150 ± 1 V with potentiometer VR3/Setup on the Y-SUS board (see Figure “Y-SUS Alignment”).
3. Adjust the duration of time-interval “A” to 10 ± 5 µsec with potentiometer VR2/Setdown on the Y-SUS board.

8.2.5 Z-SUS Alignment

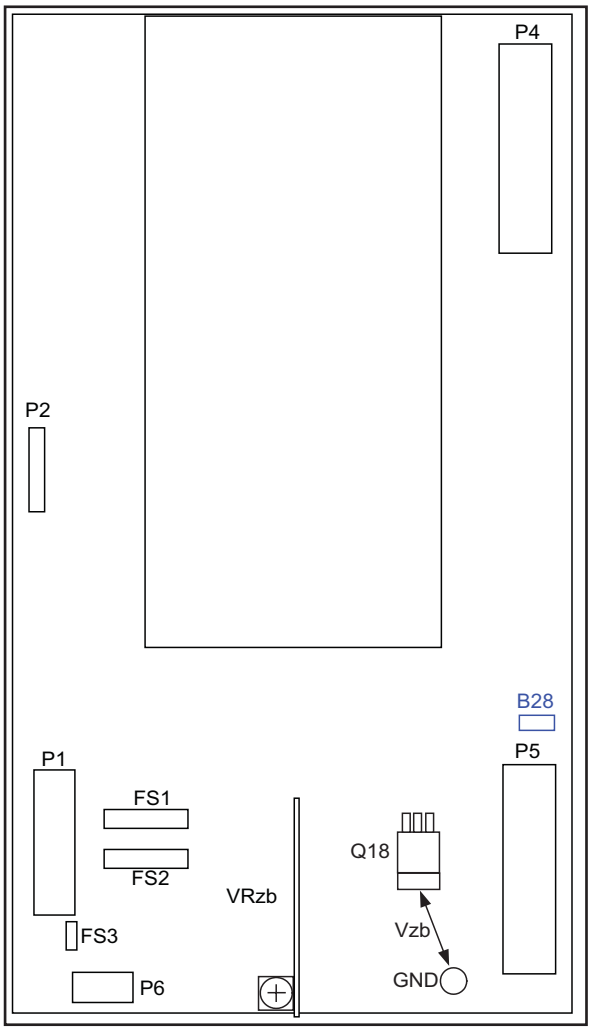

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Figure 8-6 Z-SUS alignment

Condition

- Set up a situation as shown in “Measuring equipment connection diagram”.
- Check if the voltages Vs and Va of the PSU are correct (see PSU label and PSU Alignment 8.2.3).

Vzb (Z bias) Voltage Adjustment

1. Measure the voltage between the Vzb test point (the drain of Q18) and GND on the Z-SUS board (see Figure “Z-SUS Alignment”).
2. Adjust Vzb to 100 ± 0.5 V with potentiometerVRzb on the Z-SUS board.

8.2.6 Internal Test Patterns

The CTRL board is capable of generating its own video test patterns. To generate the test patterns, do as follows:

- Disconnect the mains cord.
- Disconnect the SSB of the TV set, by removing the cables of connectors 1M03 and 1M46 on the PSU.
- Reconnect the mains cord.
- Connect pins 1 & 2 or pins 3 & 4 of Connector P1 on the Control Board (see Figure below) to each other.
- Now the internal test patterns are automatically shown in a loop.

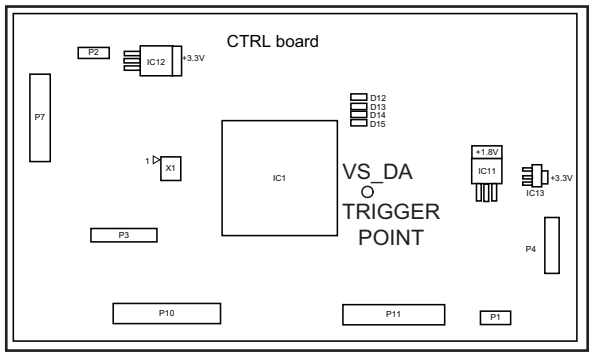

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Figure 8-7 P1: Connector for Internal Test Patterns

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter:

9.1 Introduction
9.2 Power Supply Unit (PSU)
9.3 Control Board
9.4 X Board
9.5 Y Sustain Board
9.6 Y Drive Board
9.7 Z Sustain Board
9.8 DC/DC Converter Part
9.9 FPC (Flexible Printed Circuit)
9.10 FFC (Flat Flexible Cable)
9.11 TCP (Tape Carrier Package)
9.12 IPM (Intelligent Power Modules)
9.13 Abbreviation List
9.14 IC Data Sheets

9.1 Introduction

The 42X3* panel is LGE's HD successor for the year 2007 of the 42V7* panel.

9.2 Power Supply Unit (PSU)

9.2.1 Purpose

- To convert an input voltage of 100 ~ 240 Volt AC to voltages that the different boards and the panel need.
- Output voltages: Vcc (5 V), Vs (180 ~ 200 V), and Va (60 ~ 65 V), all DC.
- The PSU switches "OFF" automatically, when it detects errors like short circuits.

Warning: Voltages on the PSU reach 390 Volt maximum, so be very careful when handling it!

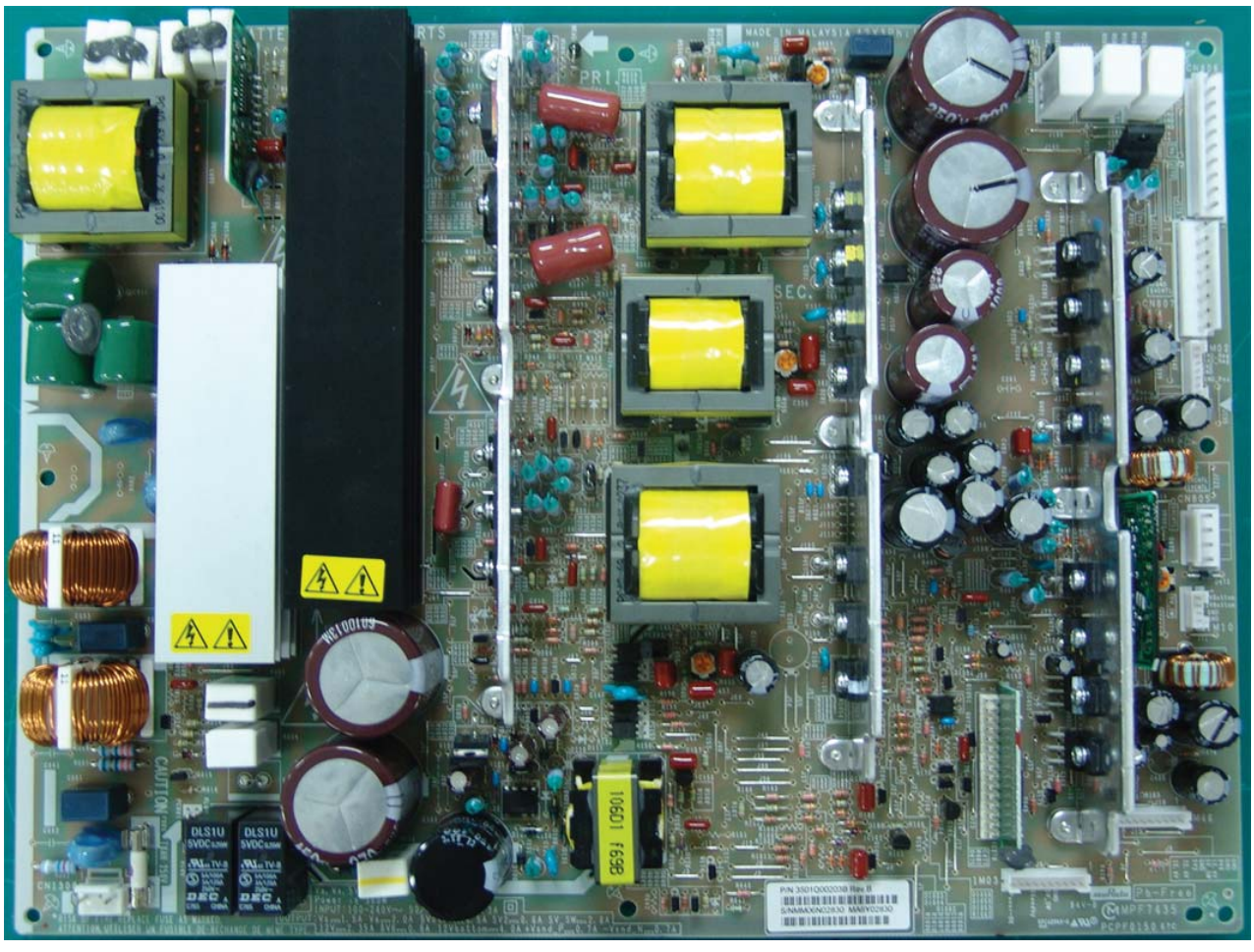

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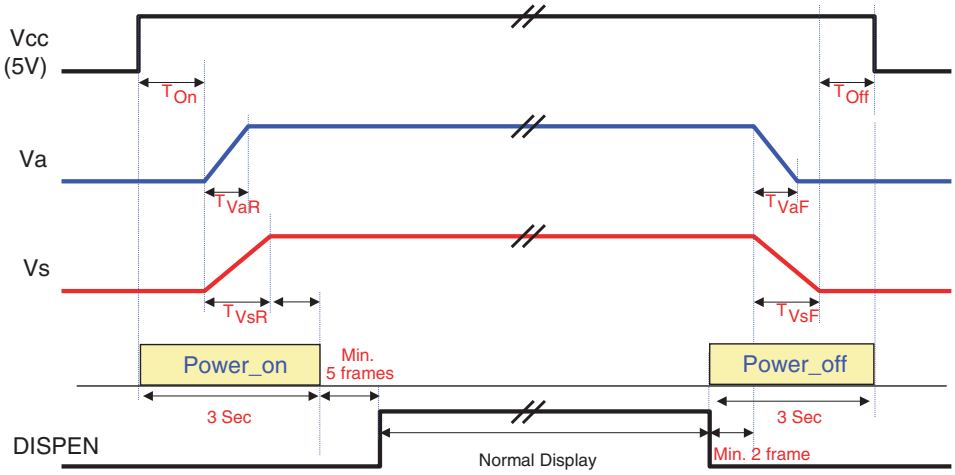
Figure 9-1 Power supply

9.2.2 Power ON and Power OFF Sequence

- For a correct functioning of the display, the different supply voltages have to be powered up and down according to a certain sequence. This sequence is shown in the following figure.



Symbol	Description	Min.	Max.	unit
T_{On}	Time interval between 90% of Vcc and 10% of Vs when Power On	0.2	-	sec
T_{Off}	Time interval between 10% of Vs and 90% of Vcc when Power Off	20	-	ms
T_{VaR}	Rising Time of Va (10% to 90%)	10	400	ms
T_{VaF}	Falling Time of Va (90% to 10%)	100	300	ms
T_{VsR}	Rising Time of Vs (10% to 90%)	100	800	ms
T_{VsF}	Falling Time of Vs (90% to 10%)	90	500	ms

☞ If power sequence does not meet to above sequence diagram, PDP drivers may be damaged permanently.
☞ Even when AC input power supply is switched ON/OFF, above sequence should be observed strictly.
☞ Transition section: Transition section is needed to drive PDP as a initial and set-up period. At this period, Brightness is low and there is no gray.
☞ If DISPEN is low, picture is changed to BLACK pattern. Signal is operated by synchronized vertical signal.
☞ The panel will not malfunction, if DISPEN is high at start up.

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Figure 9-2 Power supply sequence

9.3 Control Board

9.3.1 Purpose

Creates signal processing, and controls many FETs on each DRIVER board with R, G, and B signals.

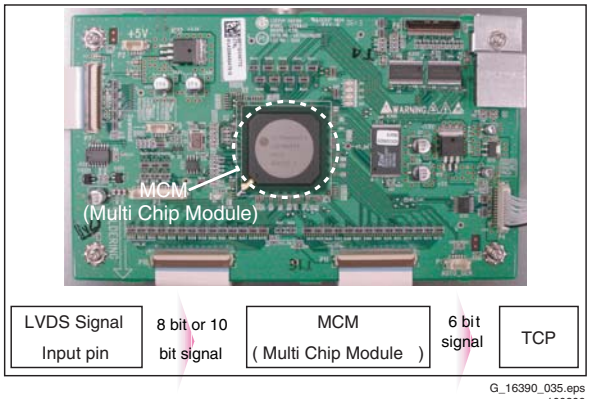

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Figure 9-3 Control board

9.4 X Board

9.4.1 Purpose

Receives LOGIC signal from the CONTROL board and makes the ADDRESS PULSE (generates Address discharge) by ON/OFF operation, and then supplies this waveform to TCP (data).

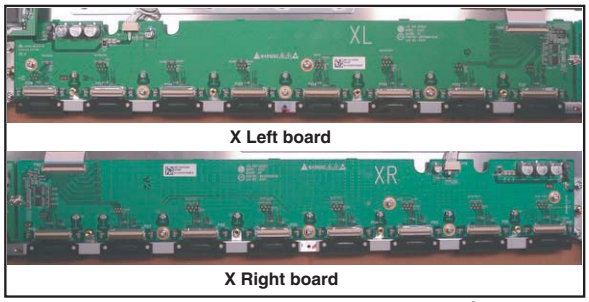

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Figure 9-4 X boards

9.5 Y Sustain Board

9.5.1 Purpose

Generates Sustain waveform, Reset, Vsc (Scan) and -Vy voltages, and supplies them to the Y DRIVE board.

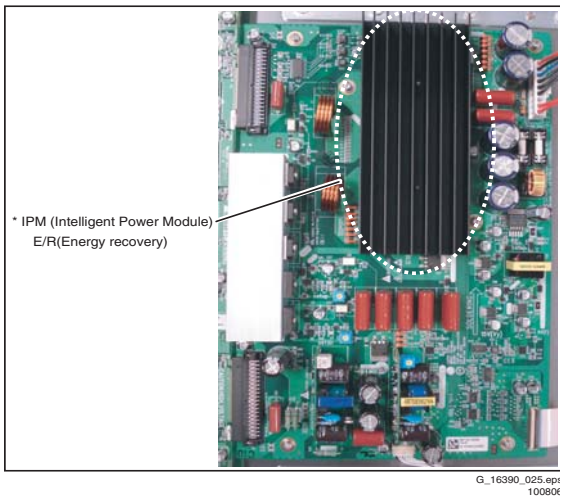

Figure 9-5 Y Sustain board

9.5.2 Main Components

IPM, diodes, electrolytic capacitors, and FETs.

9.6 Y Drive Board

9.6.1 Purpose

- To supply Sustain, Reset waveform, made by the Y-SUS board, to the PDP through the SCAN DRIVER IC.
- To supply a waveform that selects the horizontal electrodes (Y SUSTAIN electrodes) sequentially.
  - Potential difference is 0 V between GND and Vpp of the DRIVER IC during the SUSTAIN period.
  - Generates a potential difference between GND and Vpp only during the SCAN period.

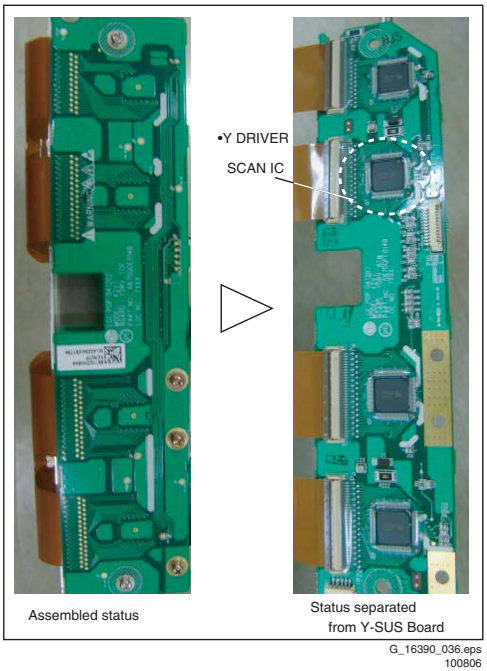

Figure 9-6 Y Drive board

9.7 Z Sustain Board

9.7.1 Purpose

To make the SUSTAIN and ERASE pulses that generate SUSTAIN discharge in the panel by receiving LOGIC signal from CONTROL board. This waveform is then supplied to the panel through FPC (Z).

9.7.2 Main Components

IPM, FET, DIODE, electrolytic capacitor, and E/R coil.

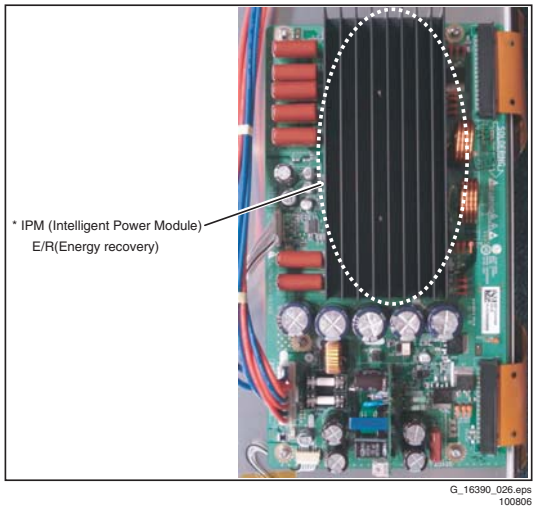

Figure 9-7 Z Sustain Board

9.8 DC/DC Converter Part

9.8.1 Purpose

From 5V, Vs, and Va (from the PSU), the DC/DC converter makes 5V, 15V, Vy, Vsc, 5Vf, and Va, which are essential for each board.

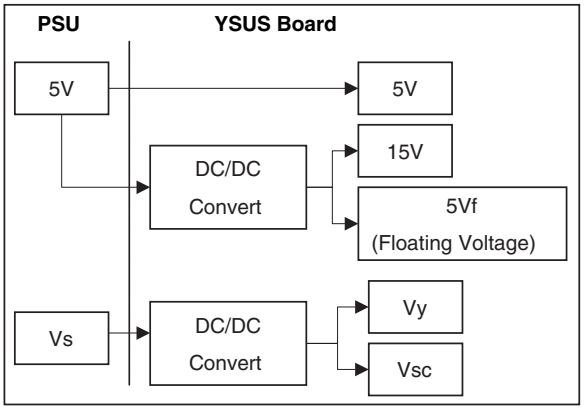

Figure 9-8 DC/DC Converter block diagram

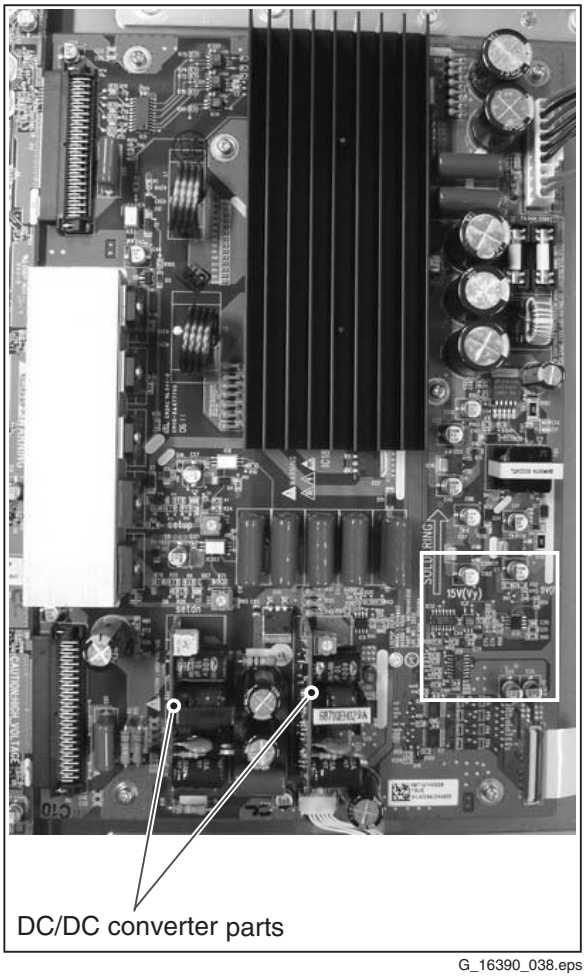

Figure 9-9 DC/DC Converter part

9.9 FPC (Flexible Printed Circuit)

9.9.1 Purpose

To supply a driving waveform to the PDP by connecting a PAD electrode of the PDP with a PWB (Y and Z boards).

- There are two types of this for the Y board: One is single-sided, the other double-sided (these have a pattern on it).
- For Z board there is no pattern, single-sided, and Beta type (all of copper surface).

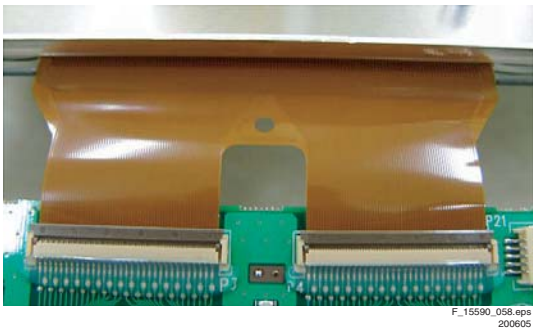

Figure 9-10 Flexible Printed Circuit

9.10 FFC (Flat Flexible Cable)

9.10.1 Purpose

For connecting LOGIC signals between boards. There are two types

- 0.5 mm pitch, 50-pin type.
- 1.0 mm pitch, 30-pin type.

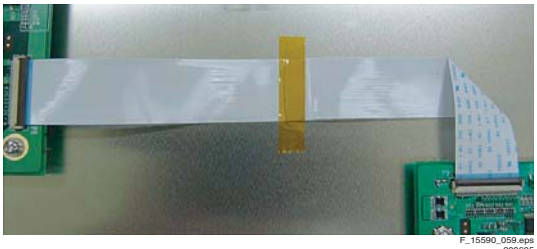

Figure 9-11 Flat Flexible Cable

9.11 TCP (Tape Carrier Package)

9.11.1 Purpose

To supply a 6-bit RGB signal to the panel, by connecting a PAD electrode of the panel with the X board.

Figure 9-12 Tape Carrier Package

9.12 IPM (Intelligent Power Modules)

9.12.1 Purpose

Attached to Y board (SUS IPM) and Z board (ER IPM):

- SUS IPM generates the Sustain waveform
- ER IPM performs an Energy Recovery function

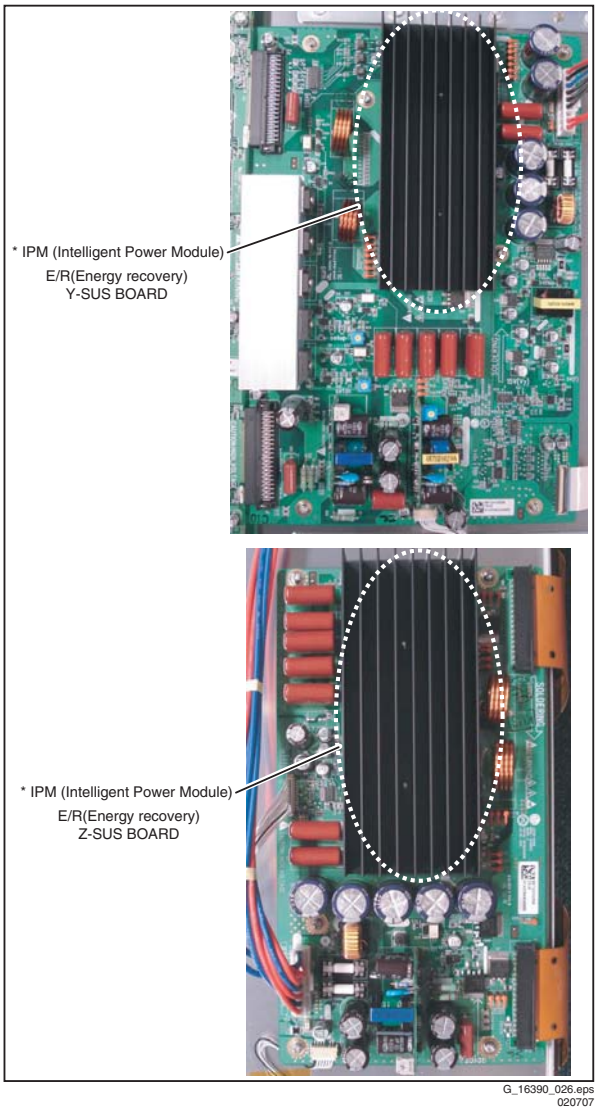

Figure 9-13 Intelligent Power Modules

9.12.2 Main Components

Heatsink, capacitor, diode, IC, resistor, transistor, and FET.

9.13 Abbreviation List

AC	Alternating Current
B/D	Board
CLK	Clock signal
COF	Chip On Flex / Foil / Film
CTRL	Control (board)
DC	Direct Current
FET	Field Effect Transistor
FPC	Flexible Printed Circuit
I/O	Input/Output
IC	Integrated Circuit
IPM	Intelligent Power Module
LED	Light Emitting Diode
LGE	Lucky Goldstar Electronics (supplier)
MCM	Multi Chip Module
PCB	Printed Circuit Board (same as PWB)
PDP	Plasma Display Panel
PFC	Power Factor Corrector circuit
PSU	Power Supply Unit
PWB	Printed Wiring Board (same as PCB)
RGB	Red, Green, Blue colour space
STB	Stand-by signal
TCP	Tape Carrier Package

9.14 IC Data Sheets

Not applicable

10. Spare Parts List

Please refer to the Philips Service website, for an actual overview (monthly updated).

11. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- References in text and graphics to PSU model 3501Q00201A (not used in this PDP model) changed to references to PSU model 3501Q00203B.
- Corrections in texts referring to the PSU, Y-SUS and Z-SUS boards.

Manual xxxx xxx xxxx.2

- Text on how to generate Internal Test Patterns added to Chapter 8, Alignments.
- Minor text corrections added.