



LG

PDP MODULE

SERVICE MANUAL

MODEL : PDP42V5####

CAUTION

1. BEFORE SERVICING THE PDP MODULE,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.
2. WHEN REPLACEMENT PARTS ARE REQUIRED, BE SURE TO USE
REPLACEMENT PARTS SPECIFIED BY THE MANUFACTURER..

SAFETY PRECAUTIONS

PDP Module is a display device to be divided into a Panel part and a Drive part. The Panel part consists of Electrodes, Phosphor, various dielectrics and gas, and the Drive part includes electronic circuitry and PCB.

When using/handling this PDP Module, pay attention to the below warning and 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.

. **WARNING**

- (1) Do not supply a voltage higher than that specified to this product. This may damage the product and may cause a fire.
- (2) 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 not satisfy the specified environmental conditions. This may damage the product and may cause a fire.
- (3) If a foreign substance (such as water, metal, or liquid) gets inside the product, immediately turn off the power.
Continuing to use the product, it may cause fire or electric shock.
- (4) If the product emits smoke, and abnormal smell, or makes an abnormal sound, immediately turn off the power.
Continuing to use the product, it may cause fire or electric shock.
- (5) Do not disconnect or 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 disconnecting or connecting the connector.
- (6) Do not pull out or insert the power cable from/to an outlet with wet hands. It may cause electric shock.
- (7) Do not damage or modify the power cable. It may cause fire or electric shock.

- (8) If the power cable is damaged, or if the connector is loose, do not use the product: otherwise, this can lead to fire or electric shock.
- (9) If the power connector or the connector of the power cable becomes dirty or dusty, wipe it with a dry cloth. Otherwise, this can lead to fire.
- (10) PDP Module uses a high voltage (Max.450V dc). Keep the cautions concerning electric shock and do not touch the Device circuitry when handling the PDP Unit. And because the capacitor of the Device circuitry may remain charged at the moment of Power OFF, standing by for 1 minute is required in order to touch the Device circuitry.

- **CAUTIONS**

- (1) Do not place this product in a location that is subject to heavy vibration, or on an unstable surface such as an inclined surface. The product may fall off or fall over, causing injuries.
- (2) Before disconnecting cable from the product, be sure to turn off the power. Be sure to hold the connector when disconnecting cables. Pulling a cable with excessive force may cause the core of the cable to be exposed or break the cable, and this can lead to fire or electric shock.
- (3) This product should be moved by two or more persons. If one person attempts to carry this product alone, he/she may be injured.
- (4) This product contains glass. The glass may break, causing injuries, if shock, vibration, heat, or distortion is applied to the product.
- (5) The temperature of the glass of the display may rise to 80°C or more depending on the conditions of use.
If you touch the glass inadvertently, you may be burned.
- (6) If glass surface of the display breaks or is scratched, do not touch the broken pieces or the scratches with bare hands. You may be injured.
- (7) PDP Module requires to be handled with care not to be touched with metal or hard materials, and must not be stressed by heat or mechanical impact.
- (8) There are some exposed components on the rear panel of this product. Touching these components may cause an electric shock.
- (9) When moving the product, be sure to turn off the power and disconnect all the cables. While moving the product, watch your step. The product may be dropped or all, leading to injuries of electric shock.

- (10) In order to protect static electricity due to C-MOS circuitry of the Drive part, wear a wrist band to protect static electricity when handling.
- (11) If cleaning the Panel, wipe it with a soft cloth moistened with water or a neutral detergent and squeezed, being careful not to touch the connector part of the Panel. And don't use chemical materials like thinner or benzene.
- (12) If this product is used as a display board to display a static image, "image sticking" occurs. This means that the luminance of areas of the display that remain lit for a long time drops compared with luminance of areas that are lit for a shorter time, causing uneven luminance across the display. The degree to which this occurs is in proportion to the luminance at which the display is used. To prevent this phenomenon, therefore, avoid static images as much as possible and design your system so that it is used at a low luminance, by reducing signal level difference between bright area and less bright area through signal processing.
- (13) Because PDP Module emits heat from the Glass Panel part and the Drive circuitry, the environmental temperature must not be over 40°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.
- (14) If inserting components or circuit board in order to repair, be sure to fix a lead line to the connector before soldering.
- (15) If inserting high-power resistor(metal-oxide film resistor or metal film resistor) in order to repair, insert it as 10mm away as from a board.
- (16) During repairs, high voltage or high temperature components must be put away from a lead line.
- (17) This is a Cold Chassis but you had better use a cold transformer for safety during repairs. If repairing electricity source part, you must use the cold transformer.
- (18) Do not place an object on the glass surface of the display. The glass may break or be scratched.
- (19) This product may be damaged if it is subject to excessive stresses (such as excessive voltage, current, or temperature). The absolute maximum ratings specify the limits of these stresses.
- (20) 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.
- (21) 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.
- (22) Do not cover or wrap the product with a cloth or other covering while power is supplied to the product.
- (23) 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.
- (24) 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).
- (25) 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.
- (26) If faults occur due to arbitrary modification or disassembly, LG Electronics is not responsible for function, quality or other items.
- (27) 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.
- (28) 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 (12) provision is not included in the warranty. Repairs due to the other faults may be charged for depending on responsibility for the faults.

[PDP42V5#### Module]

CONTENTS

Ⅸ . Formation and Specification of Module

Ⅸ- . Adjustment

Ⅸ†. Trouble Shooting

1. Checking for No Picture

2. Hitch Diagnosis Following Display Condition

2-1. 4/7 or 3/7 of the screen doesn't be shown

2-2. Screen doesn't be shown as Data COF

2-3. It is generated unusual pattern of Data COF IC unit

2-4. Regular Stripe is generated about the quantity of one Data COF IC or more

2-5. Screen doesn't be shown at all as scan COF

2-6. Regular stripe is generated at regular interval on the whole screen

2-7. Data copy is generated to stripe direction

2-8. One or more stripe is generated on the screen

2-9. One or more horizontal line is generated on screen

2-10. Lightness of screen is wholly darken though there is input-signal-pattern

2-11. Different color is shown partially during full-white-screen or electric discharge is generated during full-black-screen

2-12. Full-white pattern it happened that the lightness of middle is darken while full-white pattern

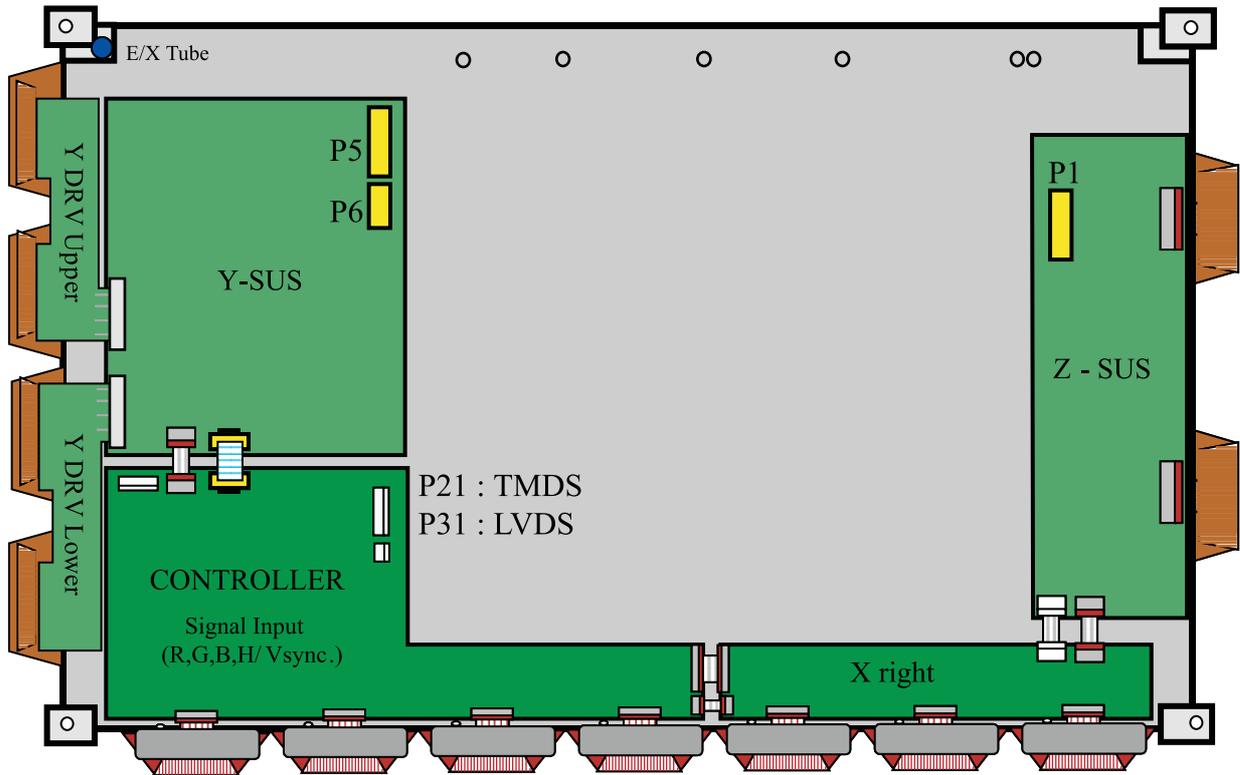
2-13. Some lightness of some color doesn't not generated well

Ⅸ‡. Block Diagram

Ⅸ·. Records of Revision for Board and EPROM

* Annexing : Schematic Diagram

ⅴ . Formation and Specification of Module



External Cable Connection

NO	Connector	Input Signal
1	P1[Z SUS B/D]	5V, Va, Vs
2	P5[Y SUS B/D]	5V, Vs
3	P6[Y SUS B/D]	5V
4	P21, P31[CTRL B/D]	Video Signal

NO	Part No.		Description
1	6871QCH025A	PWB(PCB) ASSY	TMDS CTRL B/D ASSY
2	6871QCH029A	PWB(PCB) ASSY	LVDS CTRL B/D ASSY
3	6871QDH051A	PWB(PCB) ASSY	Y DRV UPPER B/D ASSY
4	6871QDH052A	PWB(PCB) ASSY	Y DRV LOWER B/D ASSY
5	6871QRH034A	PWB(PCB) ASSY	X RIGHT B/D ASSY
6	6871QYH027A	PWB(PCB) ASSY	Y SUS B/D ASSY
7	6871QZH030A	PWB(PCB) ASSY	Z SUS B/D ASSY

ⅴ- Adjustment

1. Application Object

This standard is applied to the PDP42V5##### PDP Module which is manufactured by the manufacturing team of PDP promotion department or elsewhere.

2. Notes

- (1) Without any special specification, the Module should be at the condition of preliminaries more than 10minutes before adjusting.
 - Service signal : 100% Full White signal
 - Service DC voltage : Vcc:5V, Va:65V, Vs:190V
 - DC/DC Pack voltage : Vsetup:220V, Vscw:115V, -Ve:-35V, -Vy:-75V
 - Preliminaries environment : Temp (25±5°C), Relative humidity (65±10%)
- (2) Module should get the Aging for the equilibrium after finish the assembling. Aging condition is shown below.
 - Service signal: 100% Full White, Red, Green, Blue pattern signal(Service time of each pattern : within 5minutes/cycle)
 - Service DC voltage : Match the voltage with the set up voltage in the first adjustment.
 - Aging time : More than 4Hrs
 - Aging environment : Temp (60±2°C), Relative humidity-Less than 75%
- (3) Module adjustment should be followed by below sequence.
 - Setting up the initial voltage and adjusting the voltage wave form of Vsetup
 - Measuring the Margin of Vs voltage and deciding the voltage
 - Adjusting and checking the voltage of DC/DC pack (Vsetup, Vscw, -Ve, -Vy)
 - Adjusting the voltage wave form of Vset-down
 - Measuring the voltage margin of Vset-up and deciding the voltage
 - Adjusting the wave form of final voltageBut, these items above can be changed by the consideration of mass production. (When changing the sequence, there should be an agreement of the Module development 2Gr/ QA Gr/ Manufacturing Gr)
- (4) Without any special specification, you should adjust the Module in the environment of Temp (25±5°C) and Relative humidity (65±10%)

Caution) If you let the still image more than 10 minutes(especially The Digital pattern or Cross Hatch Pattern which has clear gradation), after image can be presented in the black level part of screen.

3. Adjustment items

3-1. Adjusting the Board Group

- (1) Adjusting the voltage wave form of Vset-up
- (2) Adjusting the voltage wave form of Vset-down
- (3) Adjusting the voltage wave form of Vramp

3-2 Adjustment after assembling

(PDP Module adjustment)

- (1) Setting up the initial voltage and adjusting the voltage wave form of Vsetup

- (2) Measuring the voltage Margin of Vs and deciding the voltage
- (3) Adjusting and checking the voltage of DC/DC pack (Vsetup, Vscw, -Ve, -Vy)
- (4) Adjusting the voltage wave form of Vset-down
- (5) Measuring the voltage Margin of Vset-up and deciding the voltage
- (6) Adjusting the wave form of final voltage

4. Adjusting the Board Group

(Applying the Jig Set)

4-1. Using Tools

- (1) Digital oscilloscope : More than 200MHz
- (2) DVM(Digital Multimeter) : Fluke 87 or similar one
- (3) Signal generator : VG-825 or similar one
- (4) DC power supply
 - DC power supply for Vs (1) : Should be changeable more than 0-200V/ more than 10A
 - DC power supply for Va (1) : Should be changeable more than 0-100V/ more than 5A
 - DC power supply for 5V (1) :Should be changeable more than 0-10V/ more than 10A
 - DC-DC Converter Jig (1) : The Jig which has voltage equivalent output of PDP42V5##### Module after taking the Vs, Va, 5V voltage
 - Voltage stability of power supply : Within ±1% for Vs/Va, within ±3% for 5V

4-2. Connection diagram of measuring instrument and setting up the initial voltage

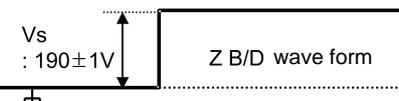
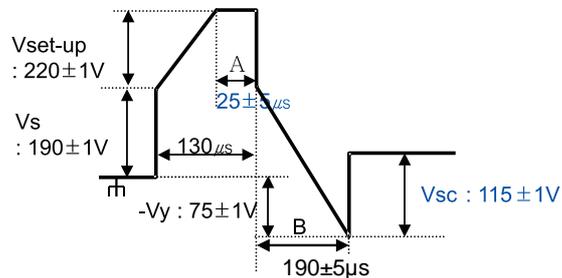
- (1) Connection diagram of measuring instrument
Refer to Fig. 1.(Connection diagram of measuring instrument that adjusting the voltage wave form)
- (2) Setting up the initial voltage
Initially setting up voltage : Vcc:5V, Va:65V, Vs:190V
But, Initially setting up voltage can be changed by the set up range according to the Module's characteristic.

4-3. How to Adjust

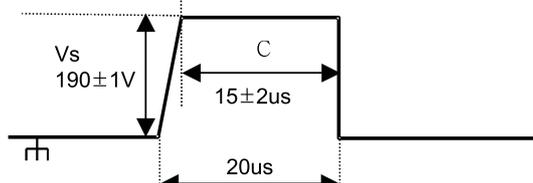
- (1) Adjusting the Voltage Wave form of Vsetup
 - Connect measuring instrument like the connection diagram Fig. 1.
 - Turn on the power of the measuring instrument like the <Caution> item Fig. 1.
 - Connect the oscilloscope probe to P4 connector(80 Pin) of Y-SUS PCB and GND.
 - Turn the VR1 of Y-SUS PCB and make the "A" wave form Fig. 2 to be 25±5µs.
- (2) Adjusting Vset-down Voltage Wave form
Turn the VR2 of Y-SUS PCB and make the "B" wave form Fig. 2 to be 190±5µs.
- (3) Adjusting Vramp Voltage Wave form
 - Connect oscilloscope Probe to the B37(Pin) of Z PCB and the GND of PCB

□ Turn the VR3 of Z PCB and make the “C” wave form Fig. 3 to be $15 \pm 2 \mu s$.

But, in case of not setting up the Test point, produce same output and adjust wave form connect to other pattern or parts which has no possibility of short.



(Fig. 2) Y Set-up Wave form



(Fig. 3) Z ramp Wave form

5. Adjustment after Assembling (PDP Module Adjustment)

5-1. Using Tools

- (1) Digital oscilloscope : More than 200MHz
- (2) DVM(Digital Multimeter): Fluke 87 or similar one
- (3) Signal generator: VG-825 or similar one
- (4) DC power supply
 - DC power supply for Vs (1) : Should be changeable more than 0-200V/ more than 10A
 - DC power supply for Va (1) : Should be changeable more than 0-100V/ more than 5A
 - DC power supply for 5V (1) : Should be changeable more than 0-10V/ more than 10A
 - DC-DC Converter Jig (1) : The Jig which has voltage equivalent output of PDP42V5#### Module after taking the Vs, Va, 5V voltage
 - Voltage stability of power supply : Within $\pm 1\%$ for Vs/Va, within $\pm 3\%$ for 5V

5-2. Connection diagram of measuring instrument and setting up the initial voltage

- (1) Connection diagram of measuring instrument
Refer to figure 1. (Connection diagram of measuring instrument that adjusting the voltage wave form)
- (2) Setting up the initial voltage
Initially setting up voltage : Vcc:5V, Va:65V, Vs:190V

But, Initially setting up voltage can be changed by the set up range according to the Module's characteristic.

5-3. How to Adjust

(1) Adjusting initial voltage wave form

Check the voltage wave form like the mentioned way on the 4-3(How to adjust) and readjust the wave form when it is wrong.

(2) Checking the DC/DC pack voltage

- Convert the signal of signal generator to the 100% Full White signal
- Connect the GND terminal of DVM to the GND of Y B/D and set the Plus terminal to the right up leg of R9 to check the -Ve voltage($-35 \pm 1V$). And when there is abnormality in voltage turn the variable resistor(VR7) of DC/DC Pack(-Ve) on Y B/D to adjust.
- Connect the GND terminal of DVM to the R60's right leg of the Y B/D and set the Plus terminal to the left leg of R60 to check the Vscw voltage($115 \pm 1V$) and when there is abnormality in voltage turn the variable resistor(VR5) of DC/DC Pack(Vscw) on Y B/D to adjust.
- Connect the GND terminal of DVM to the R8's right leg of the Y B/D and set the Plus terminal to the left leg of R8 to check the -Vy voltage($-80 \pm 1V$) and when there is abnormality in voltage turn the variable resistor(VR6) of DC/DC Pack(-Vy) on Y B/D to adjust.
- Connect the GND terminal of DVM to the R89's right leg of the Y B/D and set the Plus terminal to the left leg of R89 to check the Vsetup voltage($240 \pm 1V$) and when there is abnormality in voltage turn the variable resistor(VR4) of DC/DC Pack(Vsetup) on Y B/D to adjust.

(3) Measuring the Vs voltage Margin and deciding the voltage

- Convert the signal of signal generator to the 100% Full Red signal.
- Turn the voltage adjusting knob of Vs DC power supply to the voltage -down direction and make the cell of screen turned off.
- Turn the voltage adjusting knob of Vs DC power supply to the voltage -up direction until the cell of screen turned on. The first voltage, which make the cell of full screen turned on, is named as Vsmin1 and record it.
- Turn the voltage adjusting knob of Vs DC power supply to the voltage-up direction slowly until the cell of screen turned off or over electric discharge. The first voltage, which makes the cell of screen turned off or over electric discharge, is named as Vsmax1 and records it. (Only, Vs voltage variable passes over the maximum 195V)
- Convert the signal of signal generator to the 100% Full Green signal.
- Repeat the adjustment (2) item and name each voltage as Vsmin2/Vsmax2 and record them.
- Convert the signal of signal generator to 100% Full Blue signal.
- Repeat the adjustment (2) item and name each voltage as Vsmin3/Vsmax3 and record them.
- Convert the signal of signal generator to 100% Full White signal.
- Repeat the adjustment (2) item and name each voltage as Vsmin4/Vsmax4 and record them.

- æ Convert the signal of signal generator to 100% Full Black signal.
- Repeat the adjustment (2) item and name each voltage as V_{smin5}/V_{smax5} and record them.
- At this time decided V_s voltage ($V_{smin1}-V_{smin5}$) adds 6V to Max value and set up the voltage within the set-up range ($180V < V_s \leq 195V$) in consideration of other features.
- Turn the voltage adjusting knob of V_s DC power supply make deciding the V_s voltage.
- ₁ Adjust V_{set} down wave form using setting up V_s voltage like mentioned on the 4-3.

(4) Adjusting the final voltage wave form

Check the voltage wave form like the mentioned way on the 4-3 (How to adjust) and readjust the wave form when it is twisted.

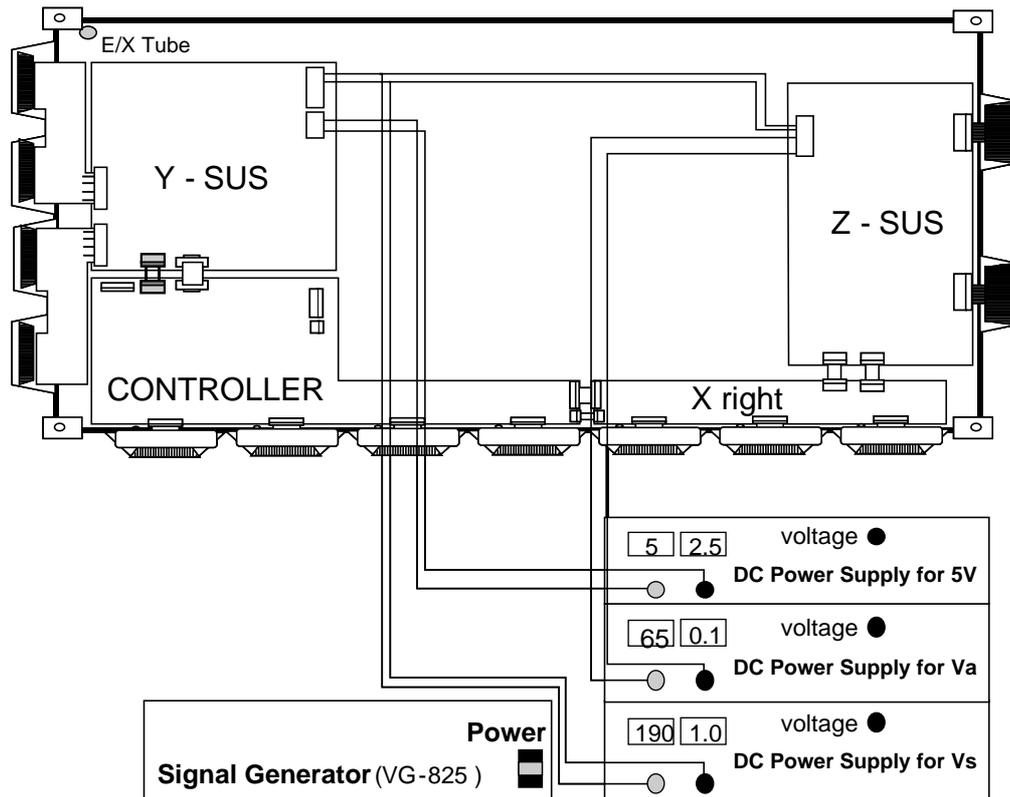
(5) DC-DC Pack Voltage Set up Range

V_{setup} : 210V ~ 240V

V_{sc} : 90V ~ 120V

$-V_y$: -60V ~ -80V

$-V_e$: -35V ~ -45V



- <Caution>**
- (1) The power of the signal generator should be turned on before turning on the power of DC power supply.
 - (2) The voltage of DC power supply , in standard of Module input voltage, should be preset as below.
Vcc: 5V, Va: 65V, Vs: 190V
 - (3) The power of power supply must turned on by this sequence. Reverse direction When turning off.
* Module on : 5V ⇒ Va ⇒ Vs, Module off: Vs ⇒ Va ⇒ 5V
 - (4) Signal generator should be selected with 852*480 mode(WVGA)

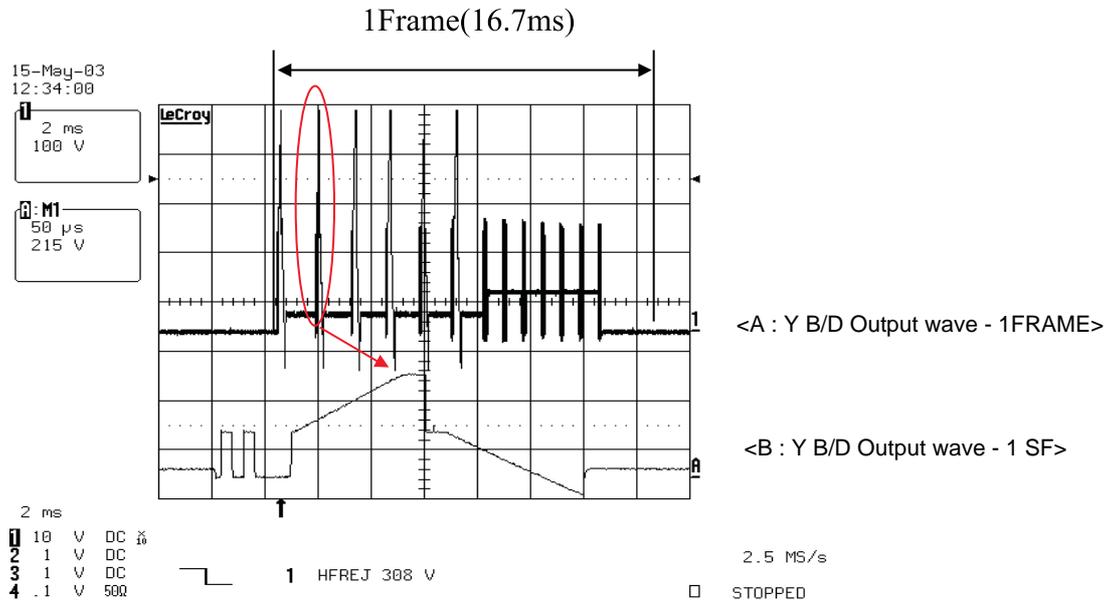
(Fig. 1) Connection diagram of measuring instrument

Ⅳ. Trouble Shooting

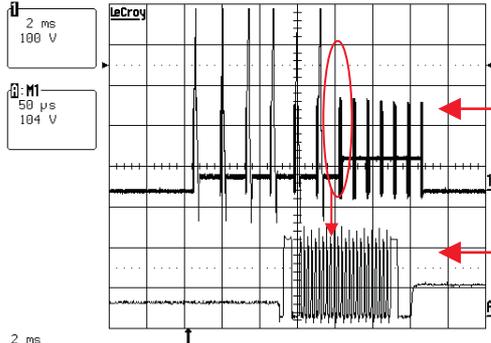
1. Checking for no Picture

A screen doesn't display at all and condition of black pattern or power off.

- (1) Check whether the CTRL B/D LED(D1~D4) is turned on or not.
- (2) Check the power and signal cable of CTRL B/D.
- (3) X B/D, Y B/D, Z B/D is well plugged in.
- (4) Check the connection of X B/D, Y B/D and Z B/D to CTRL B/D.
- (5) Measure the output wave of X, Y, Z B/D with oscilloscope(more than 200MHz) and find the trouble of B/D by comparing the output wave with below figure.
 - Measure Point fo Y B/D : TP (Connector P4 80 pin)
 - Measure Point fo Z B/D : Connection part of panel (SUS_OUT)
 - Measure Point fo X B/D : L1(RIGHT), L2(LEFT BOTTOM)
- (6) Check the SCAN(Y side) IC
- (7) Check the DATA(X side) COF IC
- (8) Replace the CTRL B/D.



15-May-03
12:36:00

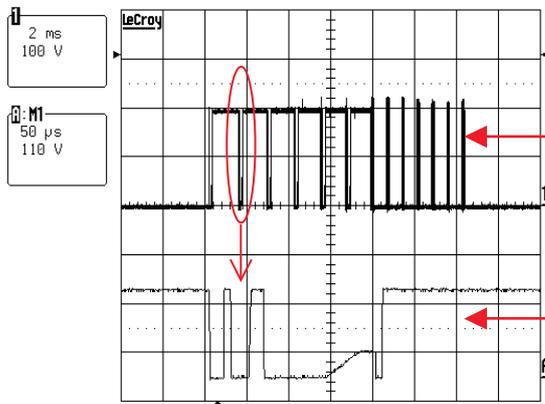


<A : Y B/D Output wave - 1Frame>

<B : Y B/D Output wave - 7~12 SF>

2 ms
 1 10 V DC 10
 2 1 V DC 10
 3 1 V DC 10
 4 .1 V 500
 1 HFREJ 308 V
 2.5 MS/s
 STOPPED

15-May-03
12:32:04

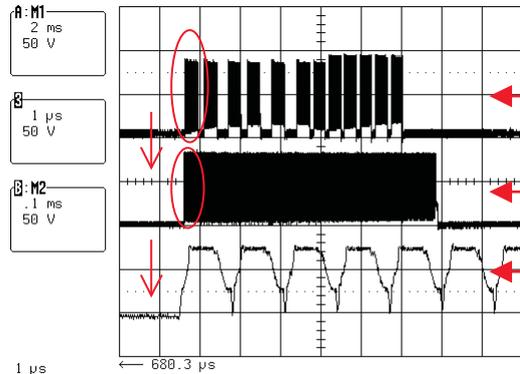


<A : Z B/D Output wave - 1Frame>

<B : Z B/D Output wave - 1SF>

2 ms
 1 10 V DC 10
 2 1 V DC 10
 3 1 V DC 10
 4 .1 V 500
 1 HFREJ 308 V
 2.5 MS/s
 STOPPED

17-Dec-01
16:43:14



RECALL W'FORM

From
 Memories
 HDD Flpy

<X B/D Output wave - 1 FRAME>

<X B/D Output wave - 1 SF>

<X B/D Output wave - Enlargement>

1 μs
 1 2 V DC 10
 2 .5 V DC 10
 3 .5 V DC 10
 4 .2 V DC 10
 2 DC 2.1 V
 500 MS/s
 STOPPED

2. Hitch Diagnosis Following Display Condition

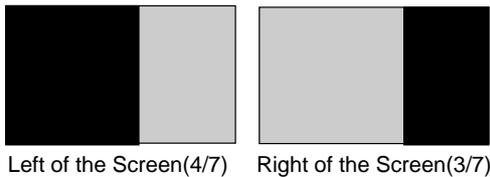
2-1. 4/7 or 3/7 of the screen doesn't be shown

- (1) Confirm the power connector of X B/D is well plugged in which is correspond to not showing screen.
- (2) Confirm the connector that is connected between CTRL B/D and X B/D correspond to not showing part.
- (3) Replace relevant X B/D.

* Relationship between screen and X B/D

Screen		X B/D
Left of the Screen	4/7 <-->	Right X B/D
Right of the Screen	3/7 <-->	Left X B/D

* Screen Display Form



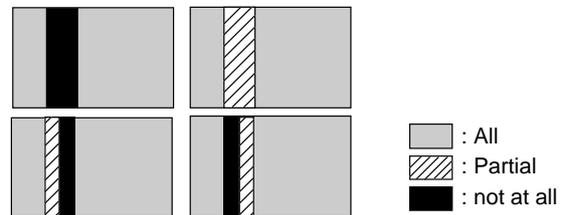
2-2. The screen doesn't be shown as Data COF

(Include not be shown part of Data COF quantity or a part)

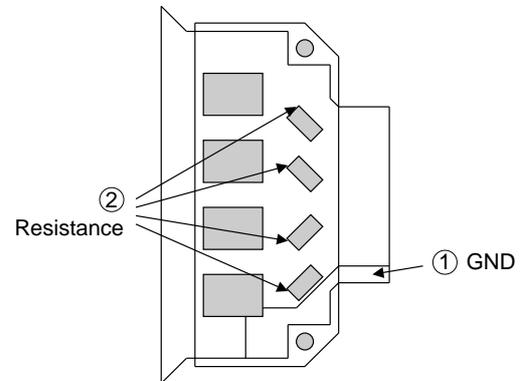
- (1) The problem between Data COF and X B/D is more possible that the screen is not be shown as data COF.
- (2) Confirm the connector of Data COF is well connected to X B/D. Correspond to the part that screen is not showing
- (3) Confirm whether the Data COF is failed and replace X B/D

* Example of the screen display form

(Anything of the 7 Data COF can be shown beside below pictures)



* How to examine Data COF IC



- ① ANODE Pattern (GND)
- ② CATHOD Pattern and examine the Diode to the pure or reverse direction.
- Measure the third resistance value

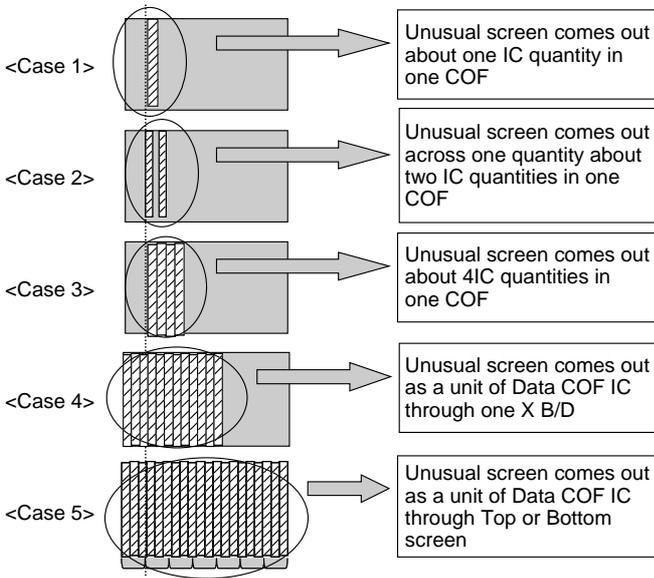
2-3. It Generates Unusual Pattern of Data COF IC unit

- (1) In case of generating unusual pattern of Data COF IC unit as below picture, there is problem in the check that is input into Data COF IC
- (2) In case of <case 1, 2, 3>
 - confirm the connection of Data COF connector
 - replace the relevant X B/D
- (3) In case of <case 4, 5>
 - confirm the connector that is connected from CTRL to X B/D
 - Replace relevant XB/D or CTRL B/D

2-4. Regular Stripe is Generated about the Quantity of one Data COF IC or more

- (1) In case of generating regular stripe about the quantity of one Data COF IC, there is problem at the output of output-flatworm of X B/D
 In case of generating regular stripe about the quantity of two Data COF IC, that means the data which is conveyed from CTRL B/D doesn't conveyed well.
- (2) Confirm the XB/D connection connector plugged in well.
 Correspond to unusual screen.
- (3) Replace relevant XB/D or CTRL B/D.

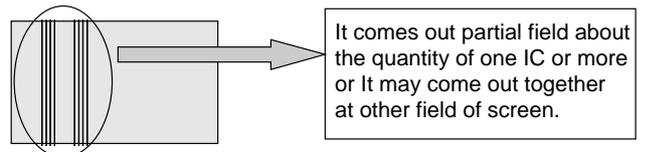
* Screen Display Form



* Relationship between screen and X B/D

Screen	X B/D
Left Bottom of the Screen 4/7 <-->	Right X B/D
Right Bottom of the Screen 3/7 <-->	Left X B/D

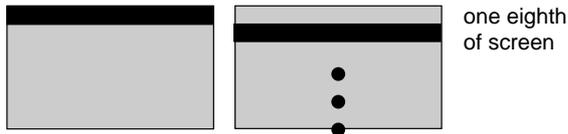
* Screen Display Form



2-5. The screen display has a problem for Scan FFC.

- (1) It's may be a problem between Scan FFC and Y B/D.
- (2) Check the connection of Y B/D and Scan COF.
- (3) If the Scan IC is failed, replace the Y DRV B/D.

* Screen Display Form



- The screen display is very good
- The screen display is a poor

* Check a method of SCAN IC

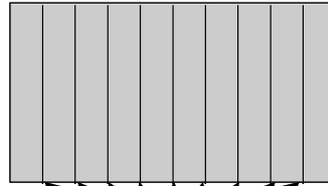


Change the Vpp Pin into ANODE and GND Pin into CATHOD and then test the Diode with forward or reverse direction.

2-6. The screen has a vertical line with regular gap. (A vertical stripe flash at especial color)

- (1) This is a problem about control B/D.
- (2) Replace Control B/D.

* Screen Display Form



The screen has a vertical line with regular gap

2-7. A data copy is happened into vertical direction

- (1) In this case, it's due to incorrect marking of scan wave.
- (2) Replace a Y DRV B/D or Y SUS B/D.

* Screen Display Form



<Display Pattern>



<Case 1 : Entire Copy>



<Case 2 : Top Copy>



<Case 3 : Bottom Copy>

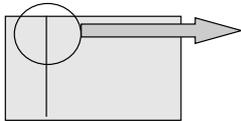


<Case 4 : Entire Copy>

2-8. The screen has one or several vertical line

- (1) In this case, It isn't a problem about controller B/D or X B/D.
- (2) It may cause followings.
 - It's out of order a panel
 - Open or short of DATA COF FPC attached panel
 - It's out of order a DATA COF attached panel
- (3) Replace Module.

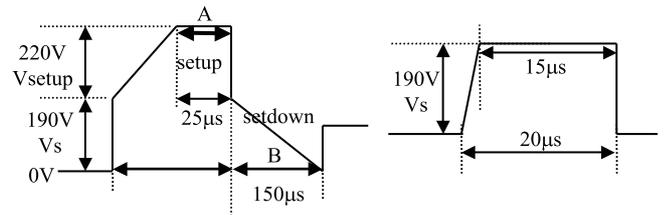
* Screen Display Form



It may show several vertical lines in a quarter or other division part of screen including left case.

2-11. The screen displays other color partially on full white screen or happens discharge partially on full black screen.

- (1) Check the declination of Y B/D set up, set down wave.
- (2) Check the declination of Z B/D ramp wave.
- (3) Measure each output wave with oscilloscope(more than 200MHz) and compare the data with below figure data. Adjust the Y B/D set up(Test-up:B/C[μ s/ μ s])/setdown(Test-down:D[μ s]) and Z B/D ramp(Tramp:F/G[μ s/ μ s]) declination by changing VR1/VR2/VR3.
 - Measuring Point of Y B/D : P4 (Connector P4 36 pin)
 - Measuring Point of Z B/D : B37 (SUS_OUT)



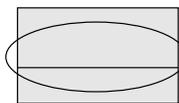
Y Output Voltage Waveform

Z RAMP Voltage Waveform

2- 9. The screen has one or several horizontal line

- (1) In this case, it isn't a problem about controller B/D or X B/D.
- (2) It may cause followings.
 - It's out of order a panel
 - Open or short of SCAN FPC attached panel
 - It's out of order a SCAN IC attached panel
- (3) Replace Y DRV B/D

* Screen Display Form



It may show several horizontal lines in a quarter or other division part of screen including left case.

2-12. A center of screen is darker than a edge of screen at full white pattern.

- (1) In this case, it's a problem about Z B/D ramp wave.
- (2) Check the connection cable of Z B/D and CTRL B/D.
- (3) Replace the Z B/D.

* Screen Display Form



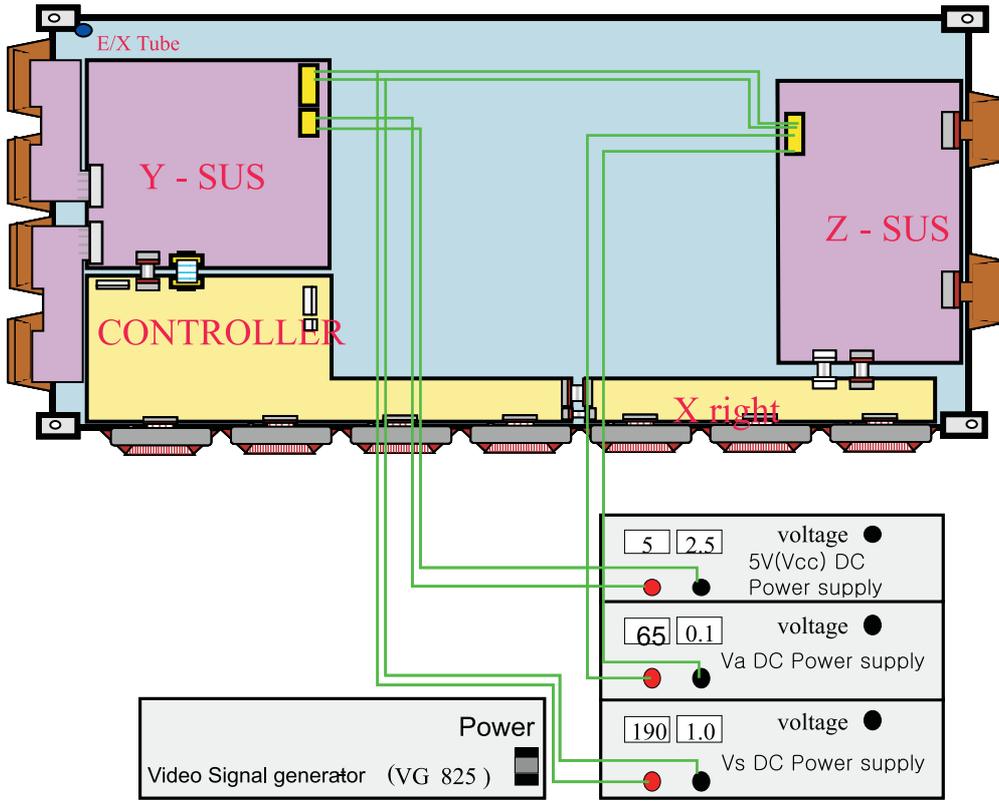
2-10. The screen displays input signal pattern but the brightness is dark

- (1) In this case, Z B/D operation isn't complete.
- (2) Check the power cord of Z B/D.
- (3) Check the connector of Z B/D and Controller B/D.
- (4) Replace the Controller B/D or Z B/D.

2-13. It doesn't display a specified brightness at specified color

- (1) Check the connector of CTRL B/D input signal.
- (2) Replace the CTRL B/D.

¥± Block Diagram





3828VD0143E

June, 2003
Printed in Korea



PDP Instruction Manual for customers

 **Model 42V5**



CONTENTS

- 1** INTRODUCTION
- 2** PRECAUTIONS
- 3** BASIC
- 4** TROUBLE SHOOTING

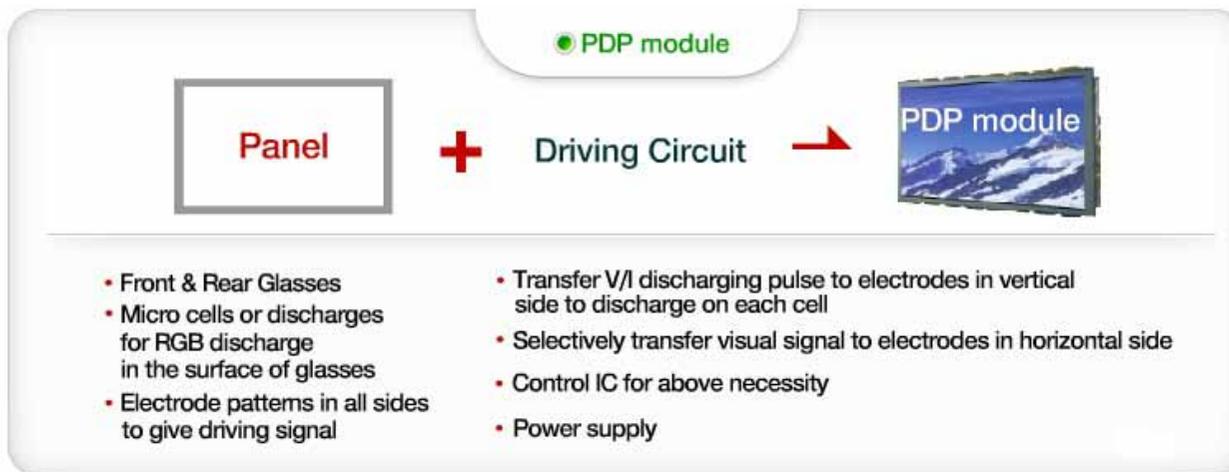
This manual is for the 42" V5 model.

Basic rules are same with 42" V5 for other models.

1. Introduction

1.1 PDP module

PDP module is composed with PANEL part and DRIVE part. Panel is consist of electrode, phosphor, dielectric, gas. And drive part is made up of electronic circuit (X , Y-sus, Z sus, Y drv,PSU,CTRL B/D) and PCB.



1. Introduction

1.2 About 42V5 model



X means XGA resolution (1024 768) .
using dual scan method
V5 shows 1000:1 contrast ratio and 1000cd.
So V5 called as KK model.

1.3 The purpose of this manual

1. We want to communicate harmoniously by educating a defect phenomenons and terms to send LG Electronics a message that includes a detail articles of defect panel.
2. Let customers can distinguish module defect(LG Electronics defect) and a defect from their work by educating an early analysis for SET maker .So customers can decide easily whether it is LG defect or customer's.
3. Prevent defects which is made during set assembly process previously by educating Work precautions and conditions.

Since mixed terms may cause confusion. Please use the formal terms which in this manual.

1. Introduction

42 inch V5 MODEL.

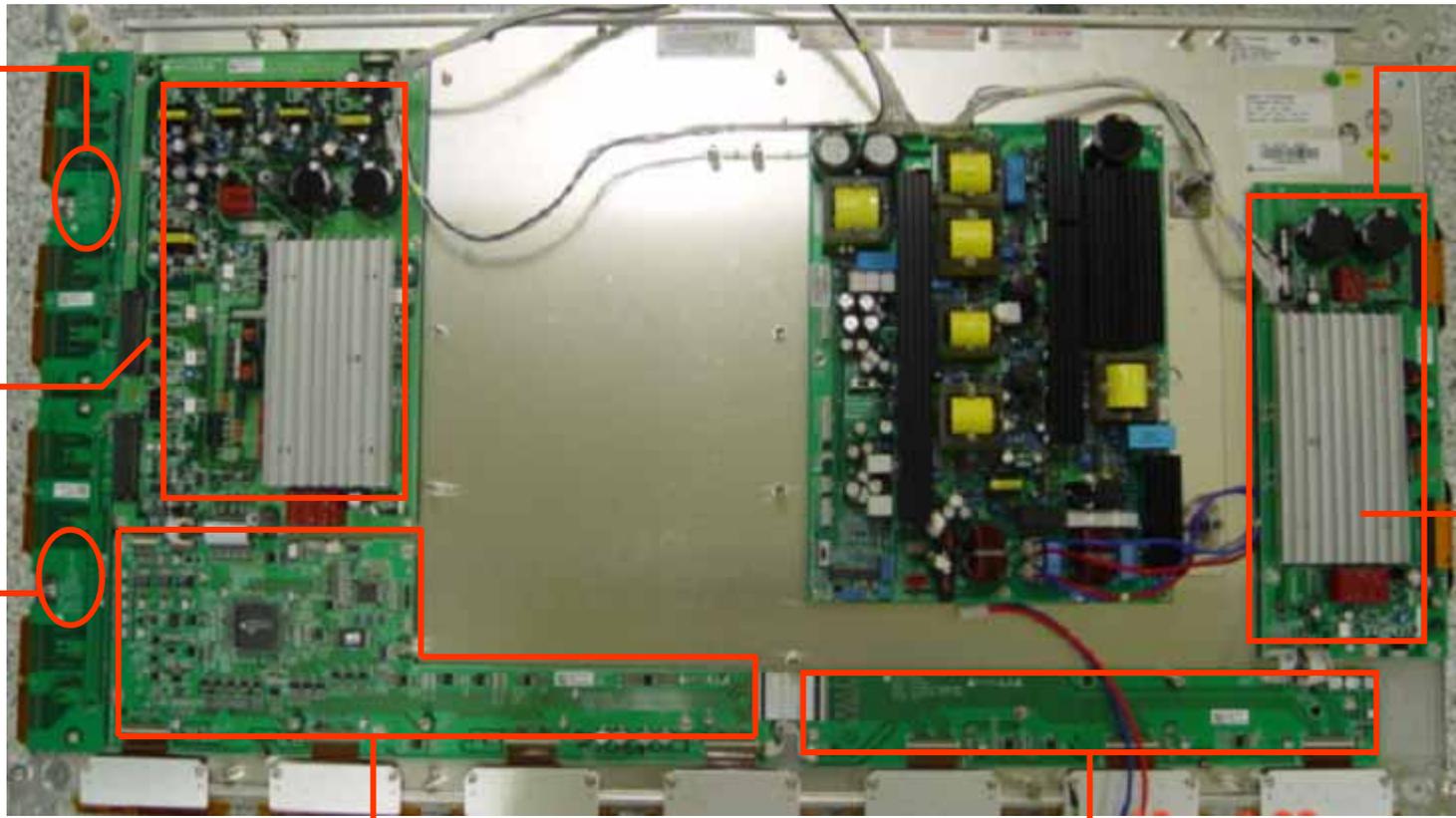
Y DRV TOP

Y-SUS B/D

Y-DRV BTM

Z-SUS B/D

IPM



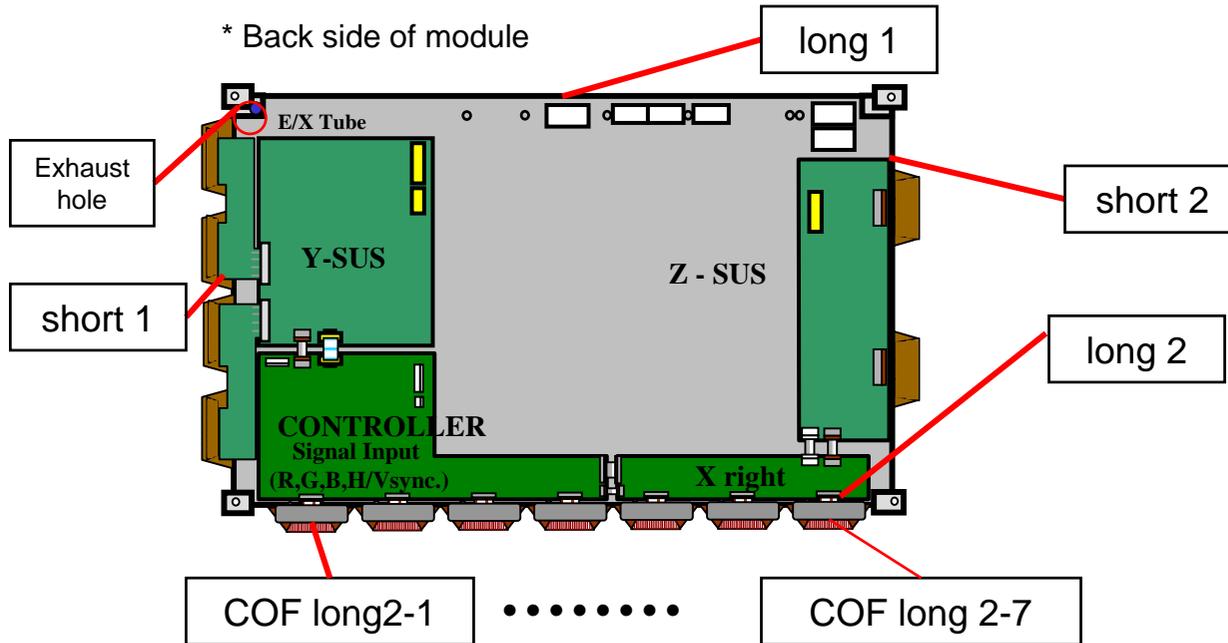
CONTROL B/D + X-LEFT B/D

X-RIGHT B/D

1. Introduction

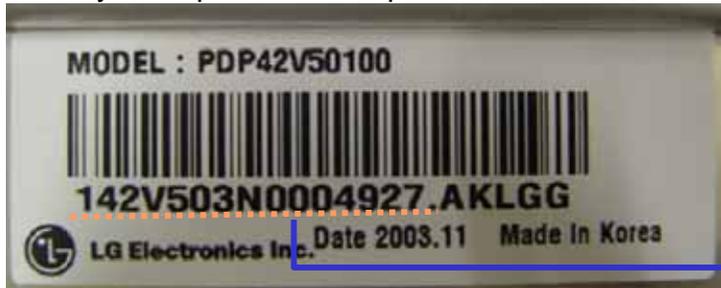
1.4 Definitions

Definition of MODULE position



PDP Module S/N

When you request LG to repair PDP module, Please inform LG the Module S/N for tracking the module's history by e-system



Module SERIAL NO.

Model Name

Bar Code (Code 128, Contains the manufacture No.)

Manufacture No.

The trade name of LG Electronics

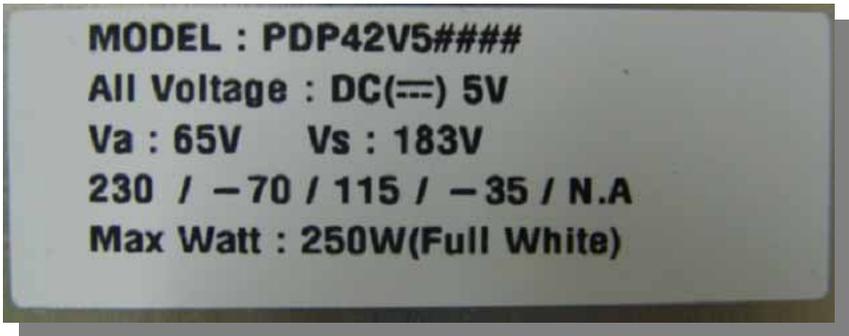
Manufactured date (Year & Month)

The place Origin

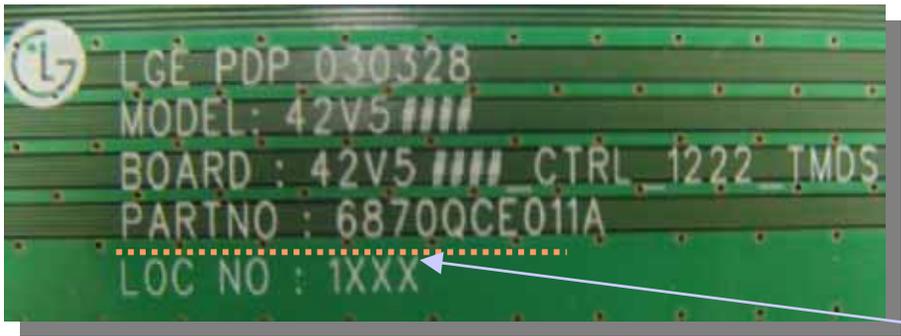
Model Suffix

1. Introduction

Voltage label (Attached on back side of module)



Part No. label (Attached on board)



BOARD ASS'Y PART NO.

BOARD NAME

BOARD SERIAL NO.

PCB PART NO.

COF serial No. label (attached on COF)



COF SERIAL NO.

1. Introduction

Terms of defect



Add short (light on)



Add open (light off)



Sus short (light on)



Sus open (light off)



Add bar (light off)



Mal discharge



Cell defect



Add short (light on)

2. Precaution

2.1 Safety precautions

Be sure to read this before repair. When using/ handling this PDP module, Please pay attention to the below warning and cautions.

1. Before repairing there must be a preparation for 10 min.
2. Be aware of metallic particles to prevent short circuit .
3. Do not impress a voltage that higher than represented on the product.
4. Since PDP module uses high voltages, Be careful a **electric shock** and after removing power some current remains in drive circuit.
so you can touch circuit after **1 min**.
5. Drive circuits must be protected from static electricity.
6. The PDP module must be Moved by two man.
7. Be careful with short circuit of PDP boards when measuring any voltages.

2.2 Before service request

1. Check panel surface and appearance of B/D.
 2. Check the model label. Whether it is boards of same model with label.
 3. Before requesting Service, please inform us a detail defect phenomenon and history of module document.
it can be helpful to us for a smooth service.
- Ex) COF long 2-1 fail ,address 1 line open, Y b/d problem , mis-discharge.

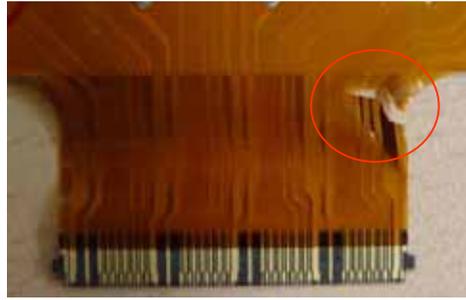
2. Precaution

2.3 Handle with care (COF)

COF is the most important component in the PDP module.
Even a little imperfection of COF can make a serious screen problem.



SCRATCHING

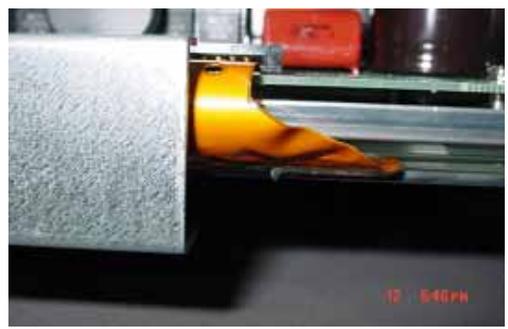


TEARING

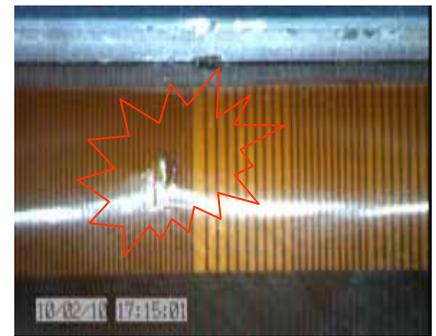


BEING PUSHED

These must not happen in assembly process



BENDING



CHOPING

1. X B/D

: X board have two kind of funtion one is an addressing and another is a path. It receives LOGIC signal from CONTROL B/D and make ADDRESS PULSE(generates Address discharge)by ON/OFF operation of FET , and supplies this waveform to COF(data) as a path.

X LEFT B/D



Signal part

X RIGHT B/D

Power part



2. Z sustain B/D

: make SUSTAIN PULSE and ERASE PULSE that generates SUSTAIN discharge in panel by receiving LOGIC signal from CONTROL B/D.

this waveform is supplied to panel through FPC(Z).

*composed with IPM,FET,DIODE, electrolytic capacitor ,E/R coil.

* IPM (Intelligent Power Module)

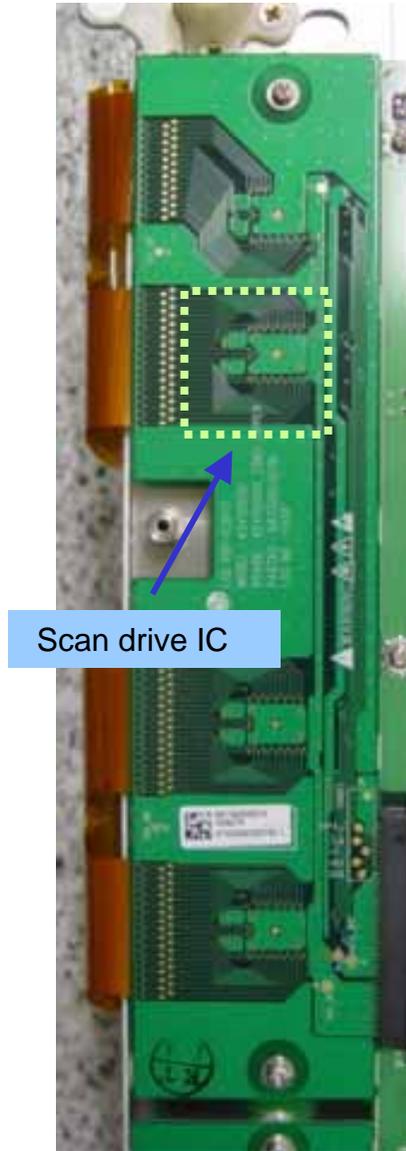
E/R(Energy recovery)



3. Y drive B/D

- 1) This is a path to supply SUSTAIN ,RESET waveform which made from Y SUSTAIN B/D to panel through SCAN DRIVER IC.
- 2) Supply a wave form that select Horizontal electrode (Y SUSTAIN electrode) sequentially.
 - potential difference is 0V between GND and Vpp of DRIVER IC in SUSTAIN period.
 - being generated potential difference between GND and Vpp only in SCAN period.

* In case of 42" X1 use DRIVER IC IC 12 EA (TOP, BOTTOM: each 6EA)



4. Y sustain B/D

: generates SUSTAIN,RESET waveform, V_{sc} (SCAN)voltage.
and supplies it Y DRIVER B/D.

* Composed with IPM,DIODE, electrolytic capacitor ,FET.

5. Control (logic) Board

: creates signal processing (Contour noise,reduction ISM,..)
and an order of many FET on/off of each DRIVER B/D with
R,G,B each 8bit input.

* Use 3.3V/5V 2 kinds of power .



MCM(Multi Chip Module)

6. FPC (Flexible Printed Circuit)

- : supply a driving waveform to PANEL by connecting a PAD electrode of PANEL with PCB(Y and Z).
- * there is two type of this for Y B/D. One is single-sided, another is double-side. These are having pattern on it
- * for Z B/D, there is no pattern , single-sided, and Beta type(all of copper surface).



7. FFC (Flat Flexible Cable)

- : for connecting a Logic signal between B/D and B/D.
- *There is 0.5mm pitch,50pin type
- 1mm pitch ,30pin type.



8. COF (Chip On Film)

: supply a waveform which made from X B/D to panel and select a output pin that is controlled by COF when be on or off.

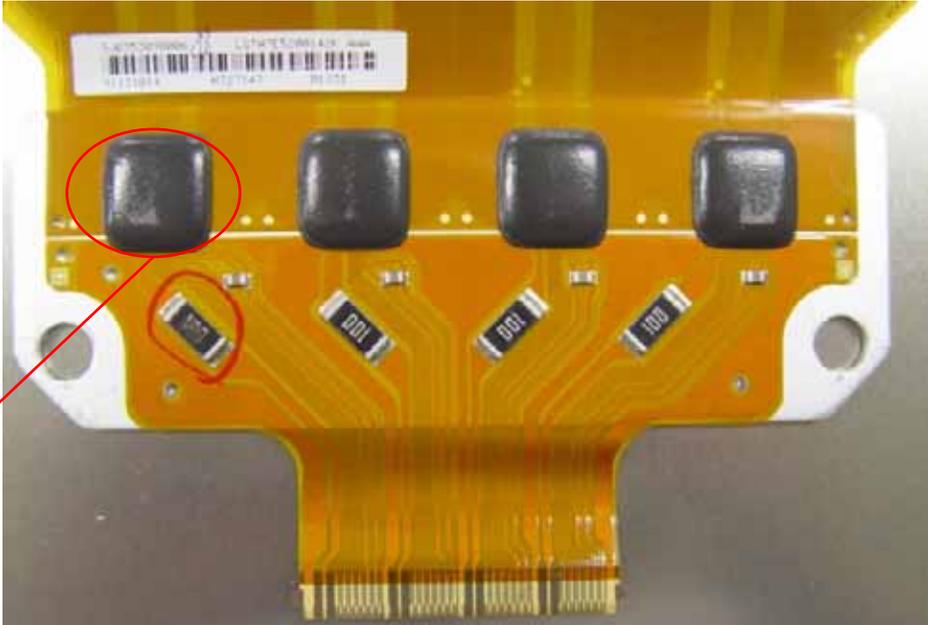
96 output pin per IC.

the more the resolution higher, the less spare space where can set IC on it in B/D. without using IC PACKAGE, we use a BARE IC , so we can get IC with LOW COST because we do not solder IC on PCB directly, a soldering defect rate decrease.

* composition

- 1) FPC + Heat /Sink
- ⇒ FPC for COF must have a Low Spec decline with getting damp
- 2) CHIP resistor + CHIP CAPACITOR
- 3) BARE IC (STV7610A/WAF) + GOLD WIRE/AL WIRE
- 4) EPOXY MOLDING

Bare IC



* 42 V6 COF is the same as 42V5.

9. IPM(Intelligent Power Module)

: composition

HEATSINK,CAPACITOR

DIODE

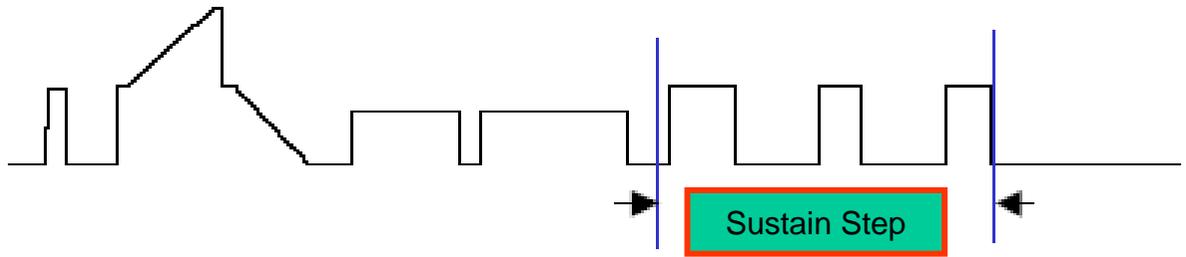
IC LINEAR

RESISTOR, TRANSISTOR, FETS.

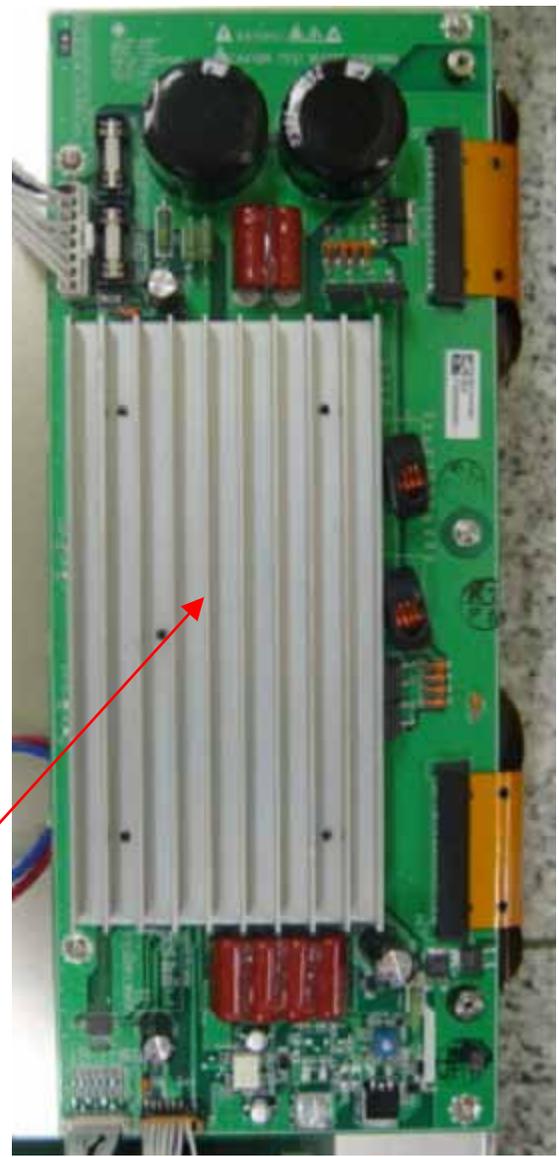
: description

Attached at Z B/D and Y B/D, make Sustain waveform.

Sustainer : supply a square wave to panel to make a video.



IPM



4. Trouble shooting.

Fast check up

defect

Check model No. of module , all connectors and cables.

No display?
Y → Check panel appearance (Include exhausting tip, GLASS crack) → Check all FUSE. → Check PSU output (Va,Vs,5v).
N ↓

Check Y, Z b/d input voltage → Replace ctrl b/d → Replace Y, Z b/d

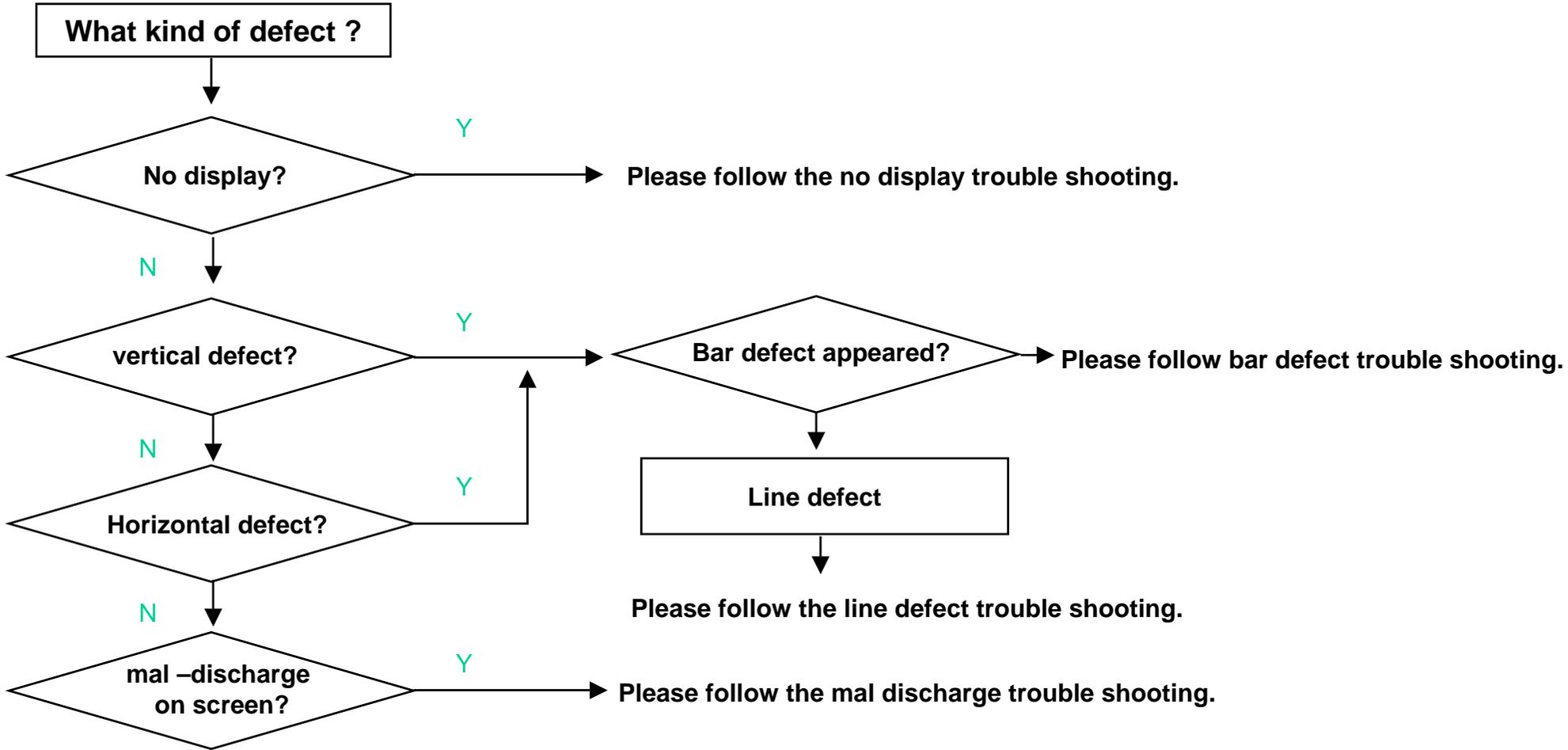
vertical defect?
Y → Check panel appearance → Check COF → Replace X b/d → Replace ctrl b/d
N ↓

Horizontal defect?
Y → Check FPC → Replace Y drv b/d → Replace Y sus b/d → Replace ctrl b/d
N ↓

Mal -discharge on screen?
Y → Replace Y drv b/d → Replace Y sus b/d → Replace ctrl b/d

4. Trouble shooting.

Logical judgment



4. Trouble shooting.

No display

Check each section with following method if there is problem, replace or repair that part.

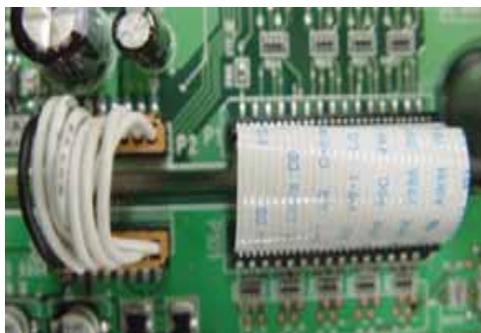
If not go to the next section.

1. Connector

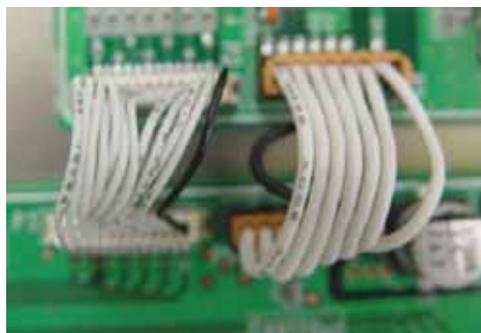
Confirm every Connector (PSU, Y-SUS, CTRL, Z-SUS)

module may not be normal by mis-connection which can not send signal and power.

Also Mis connection for a long time has a specific b/d failed.



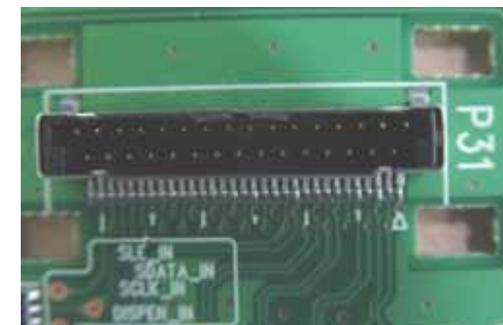
CTRL B/D + Y-SUS



CTRL B/D + Z-SUS



X-B/D + X-B/D



Signal input(LVDS)

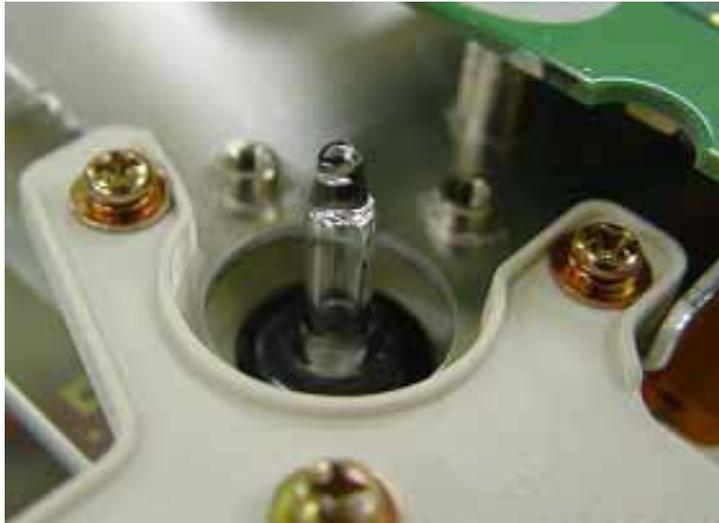
2. Exhaust tip Crack

Confirm exhausting Tip and find Crack with eyes to check the vacuum state of panel.

If there is problem replace the module .

in case of vacuum breakdown, module makes a shaking noise because of inside gas ventilation.

(there may be a small crack which could not see with naked eyes. And this noise is different from Capacitor noise.)



NORMAL

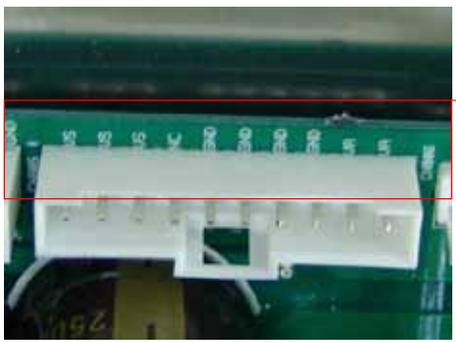
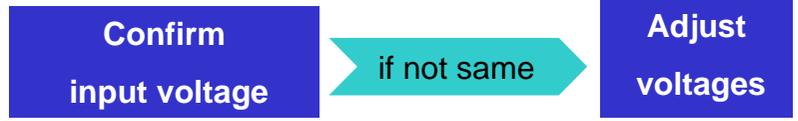


CRACKED

4. Trouble shooting.

3. PSU(Power Supply Unit)

- 1. Check each unit part of PSU inside with naked eyes. (capacitor, FET, a kind of IC, resistor)
 - 2. Check SW on Normal.
 - 3. Check Output voltage which is converted from AC V to DC V.
- voltage Check (5V, Va, Vs)
 When PSU Protection occurred. Check Short between Y-SUS, Z-SUS B/D .



MODEL : PDP42V6####
 All Voltage : DC(==) 5.2V
 Va : 65V Vs : 188V
 200 / - 75 / 115 / N.A / N.A
 Max Watt : 250W(Full White)

Multi-meter Touch point
 (5V, Va ,Vs must accord with Module Label)

SW Normal

Vs Voltage ADJ
 (Vs : About 180 ~195 V)

Va Voltage ADJ
 Va : About 55 ~65 V

4. Trouble shooting.

4. Ctrl B/D

- 1. Confirm LED D17(flashing) ,13 lighting
- 2. If not CHECK OSC X1 output.
- 3. Check CTRL input voltage.
- 4. CHECK 3.3V, 5V.
- 5. Check IC 404 3.3V
IC 54 2.5V

OSC(X2)

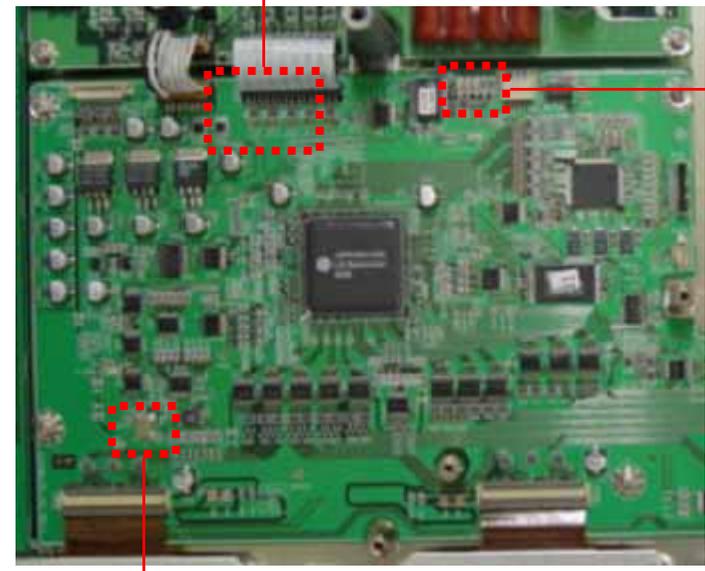
Probe
Touching
point



Check oscillating state.
(normal 100 MHZ)
Be careful with physical shock.

Input voltage P300

Diode



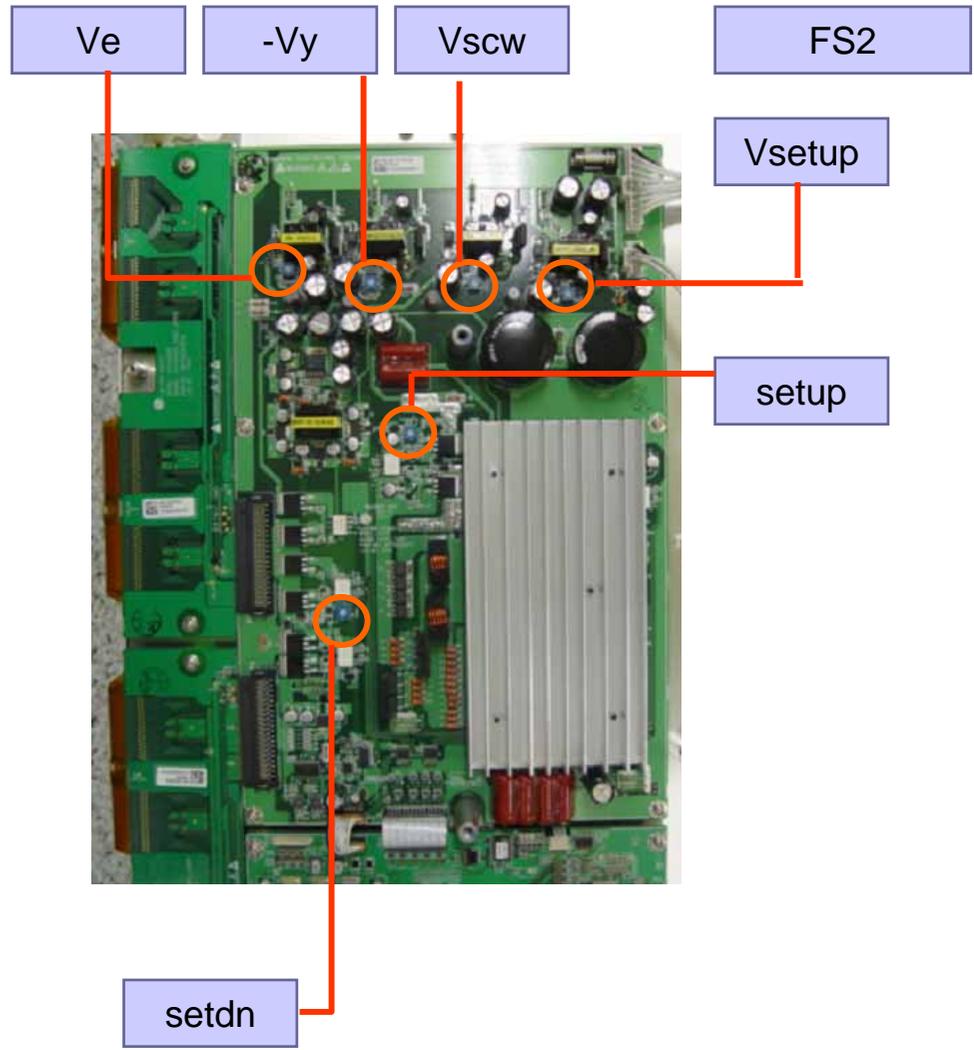
4. Trouble shooting.

5. Y-sus B/D

1. Check FUSE [FS2(Va) ,FS3(Vs)].
2. Check voltages(Vsetup,-Vy, Vscw)
3. Check DIODE between GND and Y SUS output. [SUSUP(OC2) SUSDN(OC1)].
forward=0.4 ,reverse=OVERLOAD.
4. Check whether output voltages agrees with voltage that represented in label.



F2(Vs) FUSE 6.3A



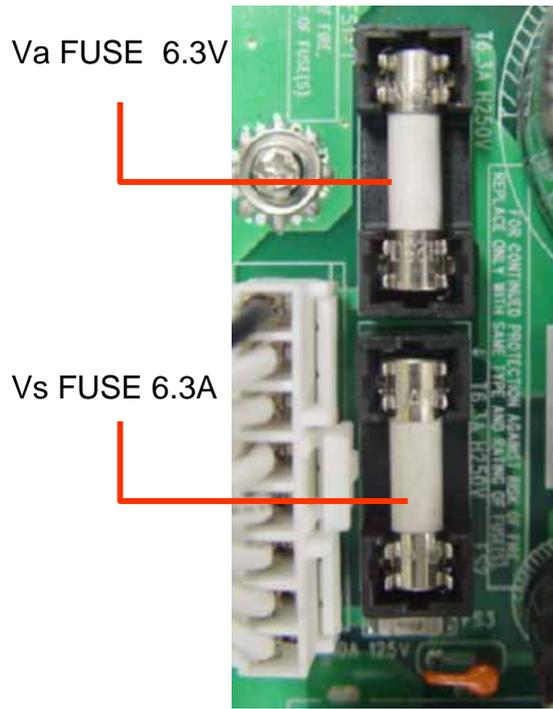
Check whether output voltages agrees with voltage that represented in label.

4. Trouble shooting.

6. Z-sus B/D

1. Check the FUSE.
2. Check input voltages.(Va, 5V,Vs)
3. Check FPC out put diode value.
4. Check ramp waveform.

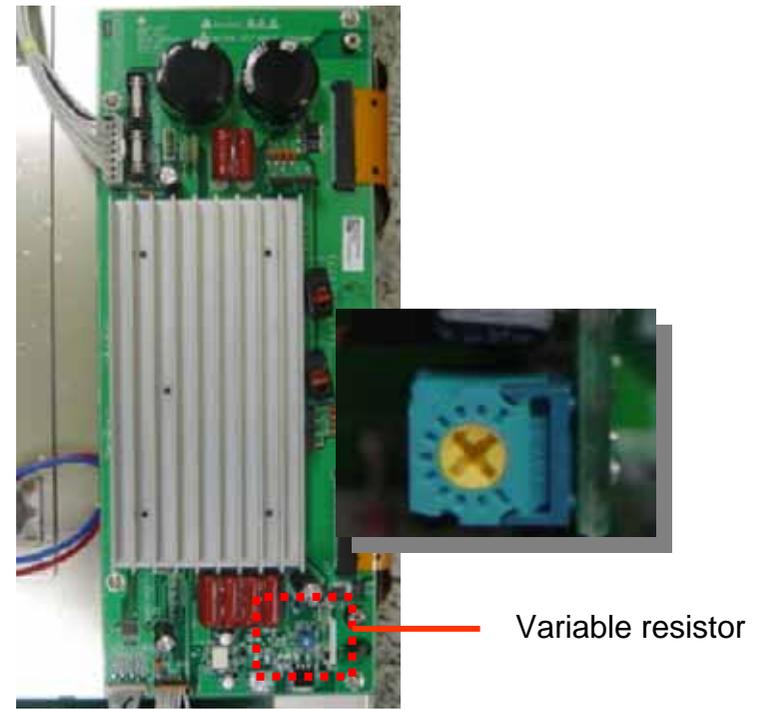
Check the FUSE



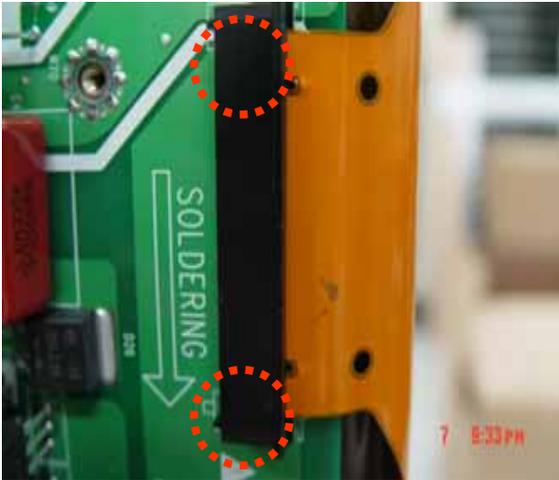
Check input voltages



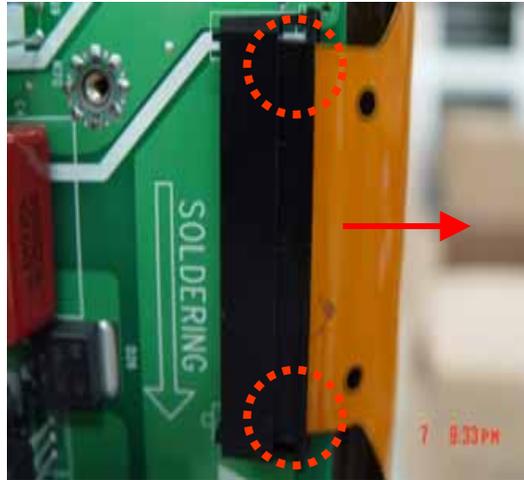
Variable resistor of Z RAMP waveform slope.



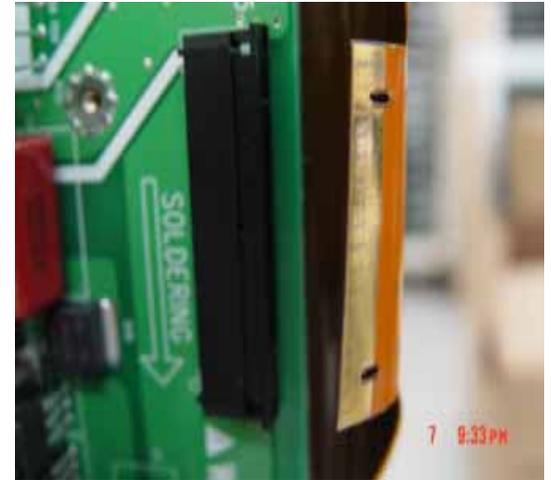
<FPC Separating>



Separate the fixed Screw of Z-Board.
Pull out Lock as shown in arrow.



Condition in Lock part is pulled



Pull FPC Connector
as shown in arrow.

4. Trouble shooting.

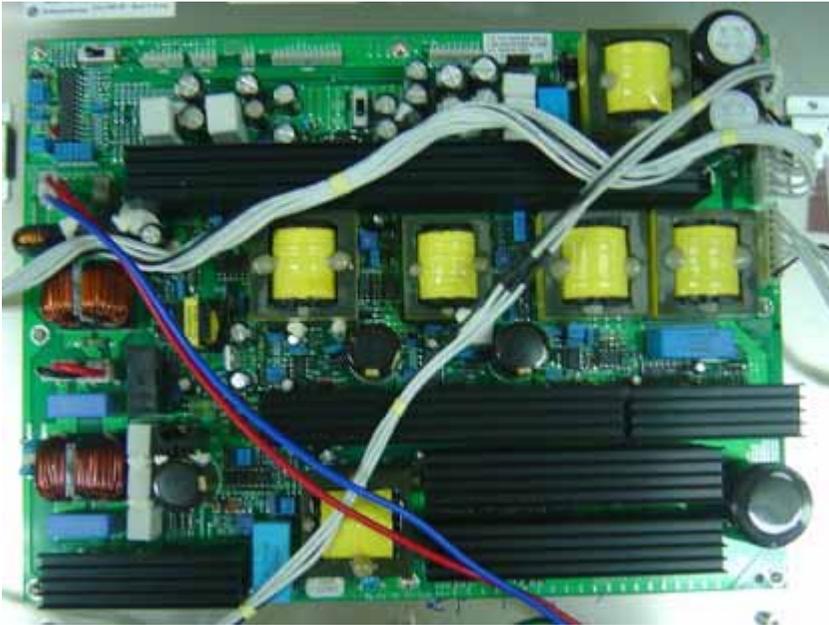
Power protection

It is power protection when power is off automatically within 2~3 min. from power on.

Power protection function protect the boards when occurred short on circuits of PDP module or power problem.

If can not impress power even after replacing PSU, find out where the short occurred.

*** PSU makers.**



DAEGIL PSU
(diode on board)



ORIGIN PSU
(No diode)

4. Trouble shooting.

Vertical defect (bar)

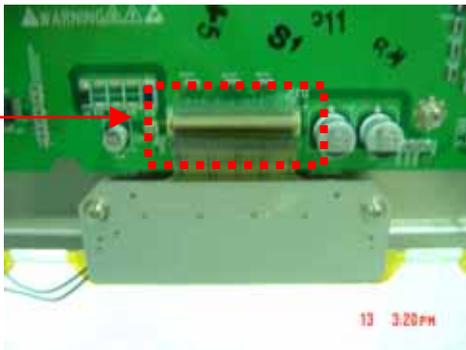
Check each section with following method if there is problem, replace or repair that part.
If not go to the next section.

1. Connector

Check COF connector.

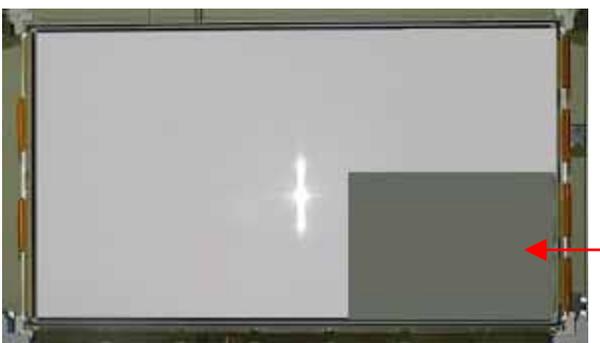
If not connected well, it will make a bar defect.

Check here



Bar

Check here

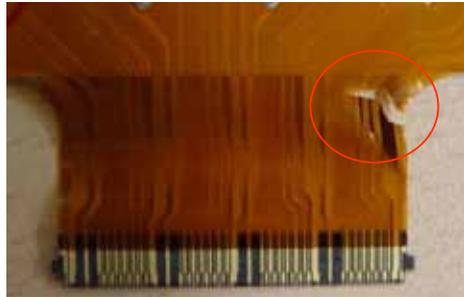


Off

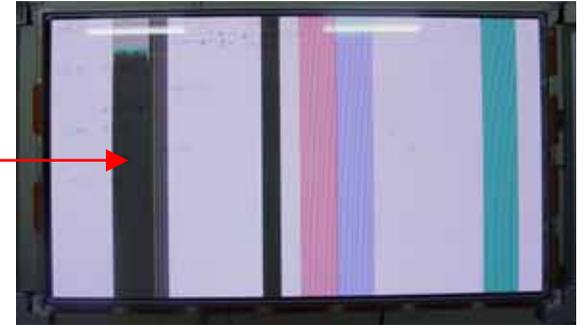
2. Checking COF

Confirm whether COF was torn. And then check input of COF resistor and IC.

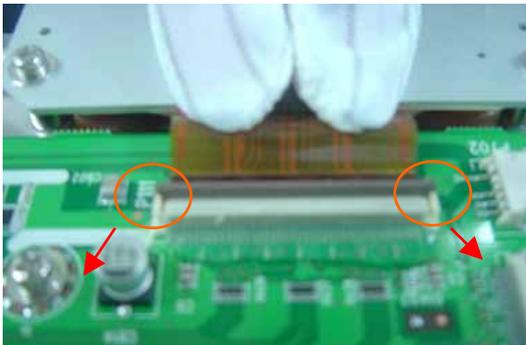
Tearing →



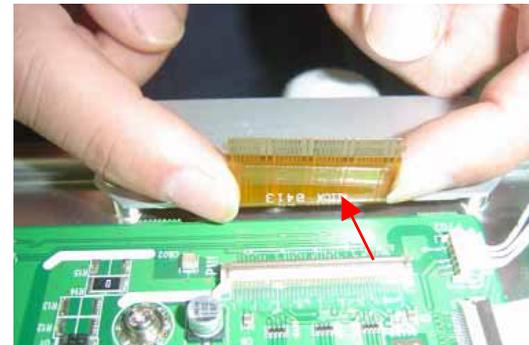
COF 6 is torn partly



<COF Separating>



Lift up lock as shown in narrow.



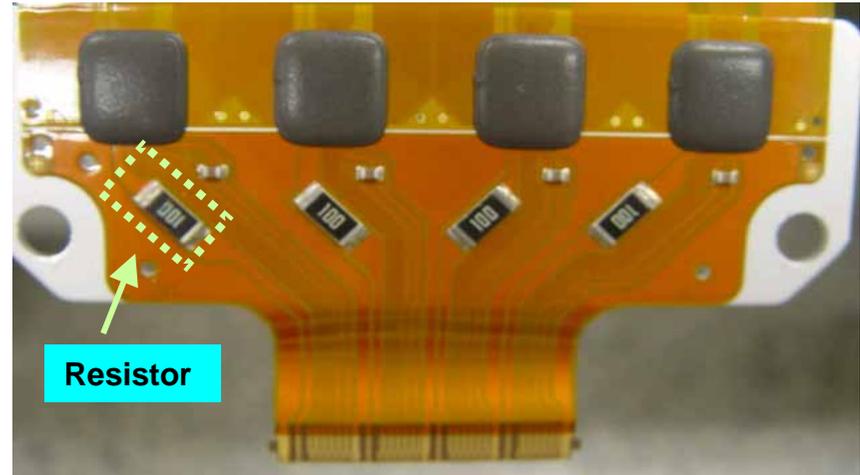
Pull COF as shown in narrow.

4. Trouble shooting.

Checking address COF input of resistor and IC

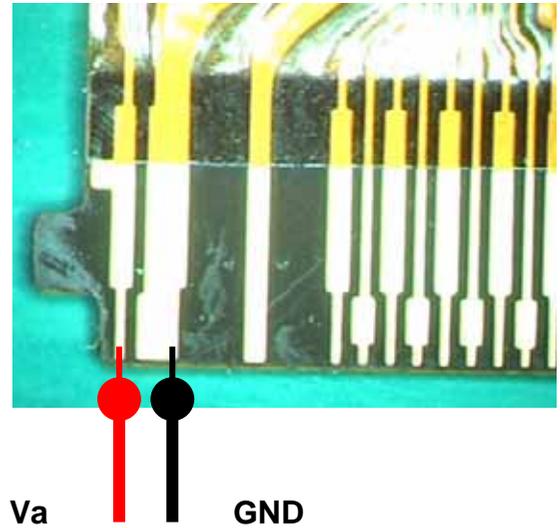
COF resistor checking

Check the both side of resistor With Digital multi meter(DMM) .
If the resistor is normal, the resistor value will be 10.2 ~ 10.8
But if not, the value will be 0 or infinity and replace the resistor.



COF short circuit check

Check the short circuit between Va and GND short.
If it is short, cof is failed.



Checking address COF input of resistor and IC

IC input checking

Inside of IC , there is 4 ea diodes which separated in 2 series .

(input 2, output 2)

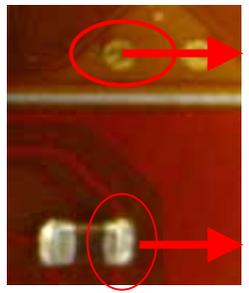
how to check

- 1.contact DMM + terminal to a right terminal of condenser(GND) and DMM - terminal to a right terminal of IC, normal value is **0.68** (fig.1)
- 2.contact DMM - terminal to Output terminal of resistor, and DMM + terminal to a right terminal of IC , normal value is **0.745** (fig.2)



Confirm this position.

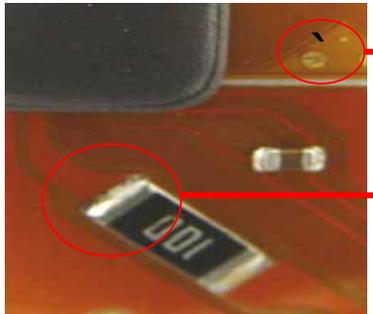
Fig. 1



DMM(- terminal)

DMM(+ terminal)

Fig. 2



DMM (+ terminal)

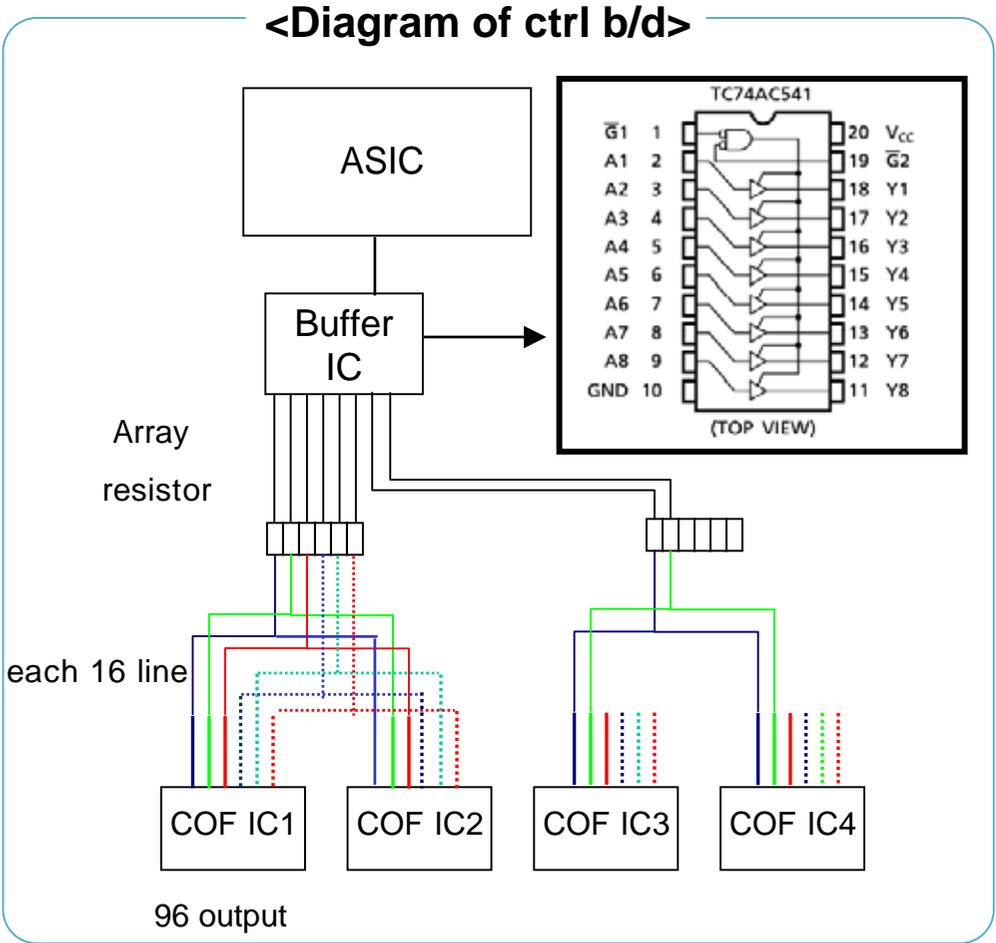
DMM (- terminal)

3. Ctrl B/D

CTRL B/D supplies video signal to COF. So if there is a bar defect on screen, It may be the ctrl b/d problem.

A flow of address signal

In this figure, we can easily suppose what will be appeared on screen when a specific part failed.



4. Trouble shooting.

Vertical defect (line)

In case of 1 line open or short , check foreign substances in COF connector.
First blow up the connector with your mouth to remove foreign substances which may be on it. And then if the same line appears, replace the panel.

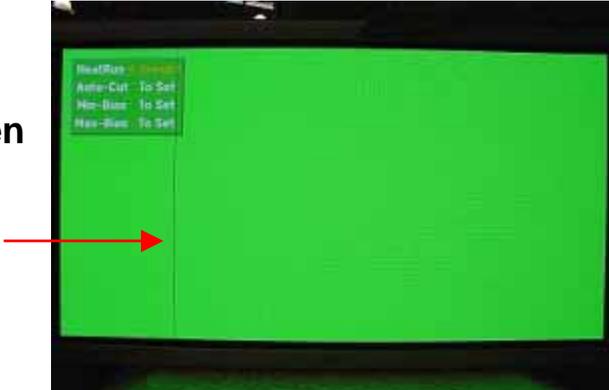
1 line open or short

This phenomenon is due to COF IC inside short or adherence part of the Film and rear panel electrode problem.
In this case, replace the panel.

1 electrode open



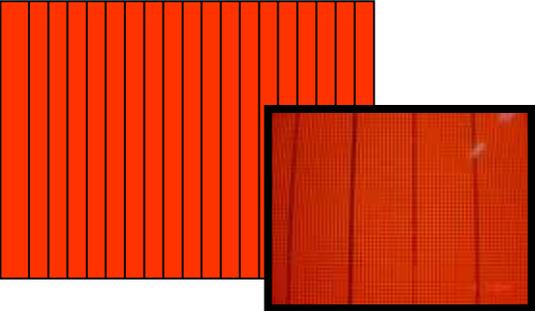
1 line open



Line open or short with same distance.

This is an MCM of Ctrl b/d defect. MCM can not be replaced separately. So replace the ctrl b/d.

MCM (Multi Chip Module)



4. Trouble shooting.

line defect from each parts

- **Case 1: Buffer IC fail**

COF IC 1,2 192 line(96+96) open.

COF IC 3,4 64 (16 4)line open

(with fixed interval there is on,off Repetition)

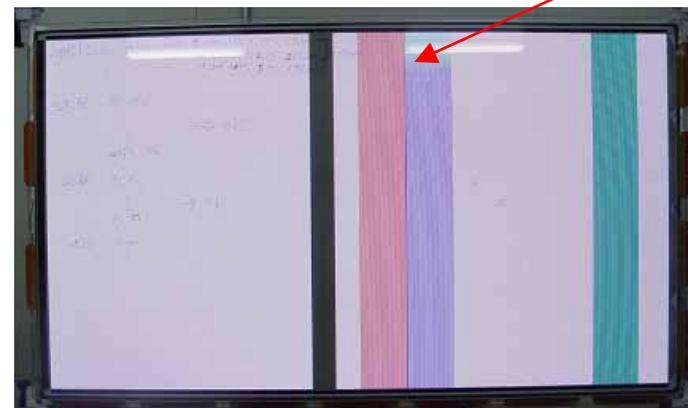
- **case 2 : Array resistor fail**

COF IC1 16 line , COF IC2 16 line open

- **case3 : COF IC fail**

96 line open.

16 line open



96 line open



4. Trouble shooting.

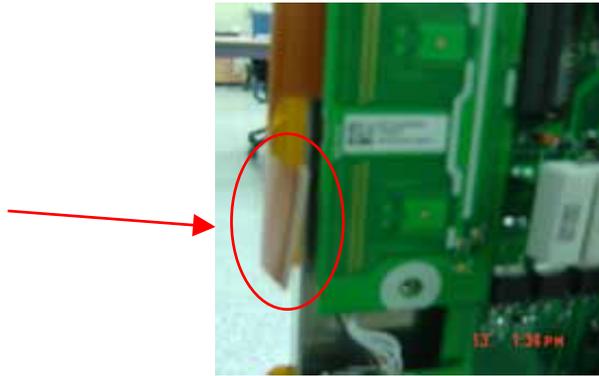
Horizontal (bar)

Most horizontal defects can be repaired. In case of adherence part of the Film and rear panel electrode defect or panel electrode open,short , replace the panel.

1. Connector

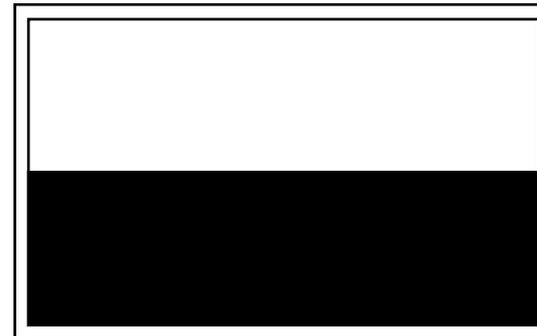
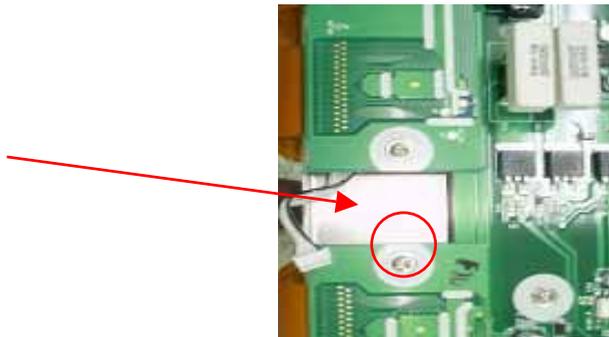
It can make a horizontal bar that connector on Y b/d and Z b/d did not plugged well. Because sustain voltage can not be supplied to panel. So check connectors (FPC, Y drv –Y drv) first.

Disconnected



Horizontal bar

Disconnected



Screen off

4. Trouble shooting.

2. Scan IC check

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

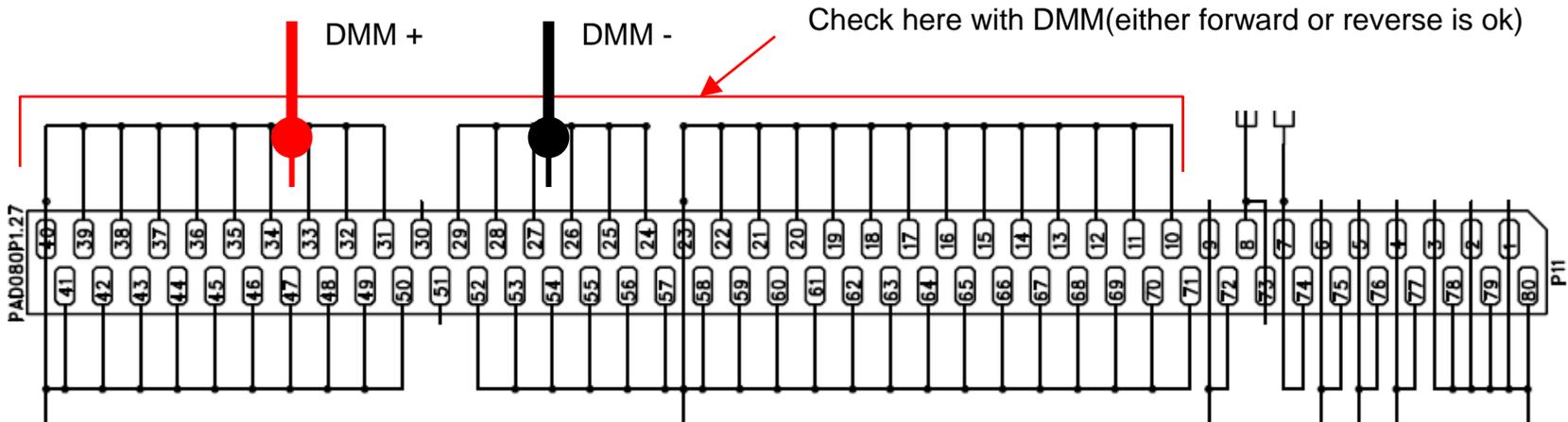


Normal diode value. (in case of TI IC =0.6 ~ 0.7)

* It can be different from each IC Maker.



Defect diode value= 0.018



4. Trouble shooting.

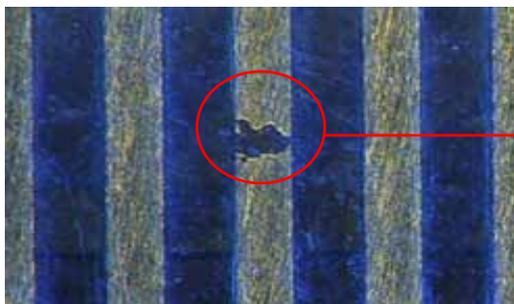
Horizontal (line)

1. Check FPC

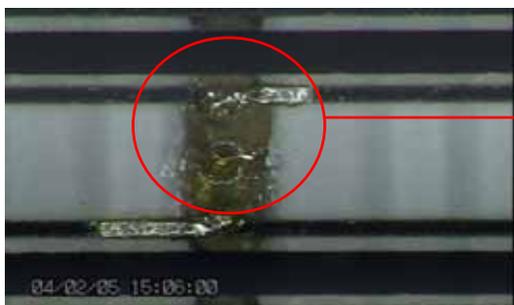
In case of horizontal 1 or more line, it is due to FPC or panel inside .ctrl b/d, Y b/d is just normal.

First , sweep the FPC electrode with a clean cloth or blow up the electrode to remove particles.

And then check the FPC and panel with your eyes.



FPC electrode open



Panel electrode
Insulation break down



Horizontal 1 line.

2. Check scan IC

Check with a same way that presented in Horizontal (bar).

4. Trouble shooting.

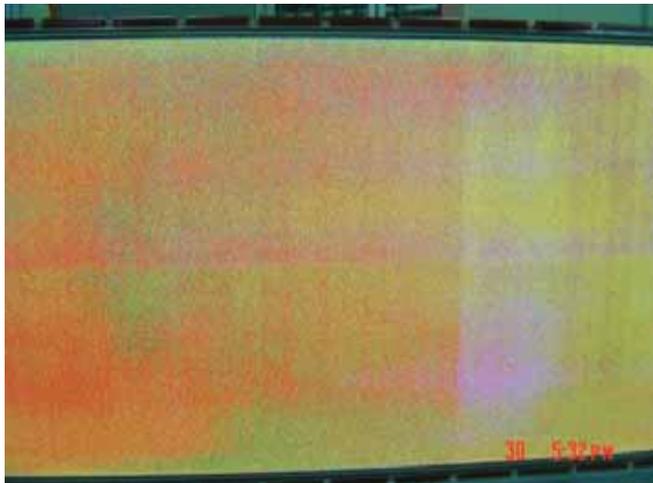
Mal-discharge

Most of mal-discharge appearance is problem of y drv ,y ,z b/d.check these boards when occurred.

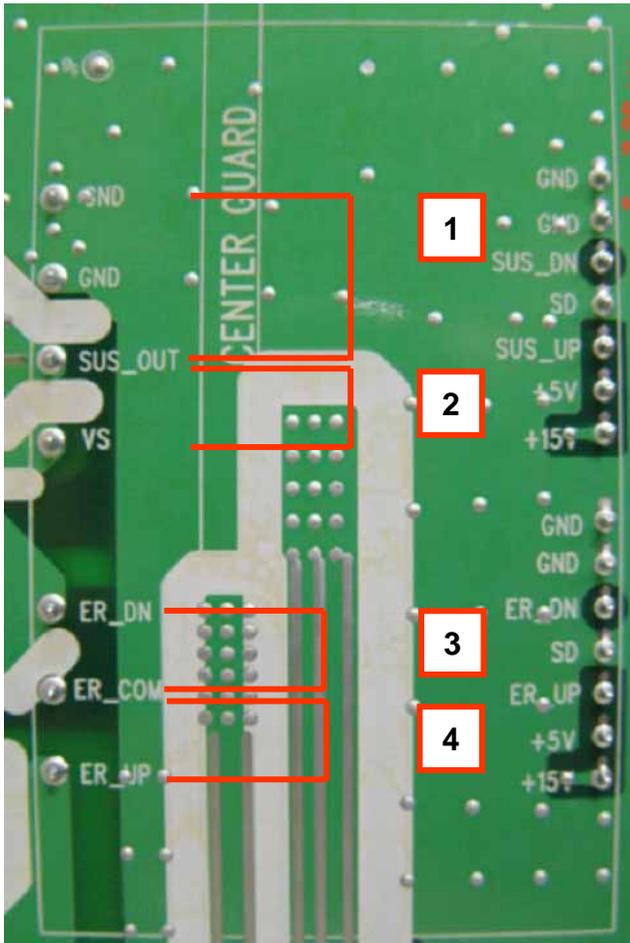
Checking order

1. Confirm Y, Z SUS signal cable.
2. Check Y DRV IC FAIL
3. Check Y sus b/d voltages(-Vy.Vscw)
4. Check Y ,Z-SUS IPM fail
5. Replace CTRL b/d

***Mal-discharge**



How to check IPM



Forward : **test 1** : GND(+) , Sus-out(-)
2 : Sus-out(+),Vs(-)
3 : ER-DN(-),ER-COM(+)
4 : ER-COM(-),ER-UP(+)

when each 4 TEST Diode value is over 0.4V => **OK**

Reverse : **test 1** : GND(-) , Sus-out(+)
2 : Sus-out(-),Vs(+)
3 : ER-DN(+),ER-COM(-)
4 : ER-COM(+),ER-UP(-)

when each 4 nodes TEST Diode value is infinity => **OK**

Specially, the value of ER-UP,COM,DN in the Y/Z board, should be checked all of them. but, the terminal of Vs,Sus-out,GND, we just check one of IPM because it is parallel.

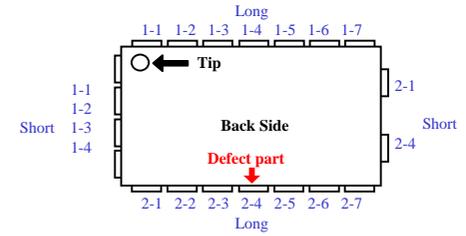
→ if no problems, check 15V(Y,Z B/D) with GND, → Forward value 0.3V, Reverse value infinite. If no problems,

Attached #1.

Global Quality Information (GQI)

#SAMPLE

Set Model	MP-DP4220LV	Quantity	1	No. : TT-2004-DP4220LV-001		
Set Serial No.	PT420200099	Symptom	Vertical Line (R , G , B Pattern)		Vertical Bar (R , G , B) ✓	
Module Model	PDP42V51330		Horizontal Line (R , G , B)		Horizontal Bar (R , G , B)	
Module Serial No.	312K142V5009368		No Raster Cell Defect		External Defect etc	
Country	Netherlands	PCB B/D defect only Serial No.	Detail :			
Customer purchase date	2004 / 04 / 05		X-L-TOP(UP)	X-C-TOP	X-R-TOP ✓	PSU
Issued date	2004 / 04 / 30		X-L-BTM(LOW)	X-C-BTM	X-R-BTM	DC-DC
Issued place	Office or living room		Y-SUS	Y-DRV-TOP	Y-DRV-BTM	CTRL
Condition in use	Use as monitor	COF defect only Serial No.	Z-SUS	etc		
Detailed repair records and the result including date	Replace Control Board (2004 / 04 / 06) : Not improved		No.: the last line number of white label on B/D			
Pictures of Symptom						



White label