Great Company Great People

XCUITE 125

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Training Manual (PDP)

LG Electronics Display Div. SCR Gr.
1. Introduction
2. Precautions
3. Basic
4. Trouble Shooting
5. Configuration Diagram
6. Line SVC Mode
7. New Mount
PDP module

PDP 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.

The purpose of this manual

1. We want to communicate harmoniously by educating a defect phenomenons and terms
to send a message that include a defect articles to LGE exactly.

2. Let customers can distinguish module defect (lge defect) and their work defect by
educating an early analysis for SET maker. So customers can decide easily
whether he ask a c/s or not.

3. Prevent defects which is made during set assembly process previously by educating
Work precautions and conditions.
Composition of PDP Board

Introduction

42” V6 MODEL.

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**Definitions**

- **Definition of MODULE position**
  - *Back side of module*
  - Exhaust hole
  - COF
  - 42"
  - 50", 60", 71"

- **Identification label**
  - 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

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Label Display

- Voltage label
  (Attached on back side of module)

- Part No. label (Attached on board)

- COF serial No. label (attached on COF)
### Terms of defect

<table>
<thead>
<tr>
<th>Term</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add short (line on)</td>
<td><img src="image1" alt="Add short" /></td>
</tr>
<tr>
<td>Add open (line off)</td>
<td><img src="image2" alt="Add open" /></td>
</tr>
<tr>
<td>Sus short (line on)</td>
<td><img src="image3" alt="Sus short" /></td>
</tr>
<tr>
<td>Sus open (line off)</td>
<td><img src="image4" alt="Sus open" /></td>
</tr>
</tbody>
</table>
**Safety precautions**

Be sure to read this before service. 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. Do not impress a voltage that higher than represented on the product.
3. 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.
4. Drive circuits must be protected from static electricity.
5. The PDP module must be moved by two men.

**Before request service**

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.
   - 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.
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

Bending  Choping
receiving LOGIC signal from CONTROL B/D and make ADDRESS PULSE (generates Address discharge) by ON/OFF operation, and supplies this waveform to COF (data)

\[
\begin{align*}
\text{Lift up lock as shown in narrow.} \\
\text{Pull COF as shown in narrow.}
\end{align*}
\]
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)

**FPC Separating**

Separate the fixed Screw of Z-Board. Condition in Lock part is pulled. Pull out Lock as shown in arrow. Pull FPC Connector as shown in arrow.

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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” V6 use DRIVER IC IC 8 EA (TOP, BOTTOM: each 4EA)
Y sustain B/D

: generates SUSTAIN,RESET waveform, Vsc(SCAN)voltage.
   and supplies it Y DRIVER B/D.
* Composed with IPM, DIODE, electrolytic capacitor, FET.

Control Board

: creates signal processing (Contour noise, reduction SM,..)
   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.
Being impressed 5V, Va, Vs,
DC/DC converter makes
5V, Va, Vs, V_set_up, Vsc
which is essential for each B/D.
There is no DC/DC B/D in
model 40°/42° (1 POWER B/D).
° 50° 60° embedded DC/DC B/D
separately because of high power consumption.
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).

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.
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 can 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

* 42 V6 COF is the same as 42V5.
STV7620M Shape

Single Scan
42"

Dual Scan
40” 50” 60”

COF (Chip On Film) SERIAL NO.

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STV7620M Block Diagram

BLK  POC  STB  A6  A5  A4  A3  A2  A1

VSSP
OUT1
OUT96
VPP

VCC  VSSSUB  VSSLOG

COF Drive IC

COF (Chip On Film)

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Basic
**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.

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**Sustain Time**

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CTRL B/D (COF Type)

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.

![Diagram of ctrl b/d>](image)
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.
Fast check up

**defect**

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

**No display?**

- Check panel appearance
- Check PSU output (Va, Vs, 5v)
- Check Y, Z b/d input voltage
- Replace ctrl b/d
- Replace Y, Z b/d

**vertical defect?**

- Check panel appearance
- Replace X b/d
- Replace ctrl b/d

**Horizontal defect?**

- Check FPC
- Replace Y drv b/d
- Replace Y sus b/d
- Replace ctrl b/d

**Mis-discharge on screen?**

- Replace Y drv b/d
- Replace Y sus b/d
- Replace ctrl b/d
Trouble shooting.

Logical judgment

What kind of defect?

No display?

Please follow the no display trouble shooting.

vertical defect?

Bar defect appeared?

Please follow bar defect trouble shooting.

Horizontal defect?

Line defect

Please follow the line defect trouble shooting.

Mis-discharge on screen?

Please follow the mis discharge trouble shooting.
Check each section with following method if there is problem, replace or repair that part.
If not go to the next section.

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.

No display

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Confirm exhausting Tip and find Crack with naked eyes to check vacuum state.
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.)
PSU (Power Supply Unit)

1. Check each unit part of PSU inside with naked eyes.
   (capacitor, FET, a kind of IC, resistor)
2. Check FUSE and SW1 (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.

Confirm input voltage
Adjust voltages if not same

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

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1. Confirm LED D17 (flashing), 13 lighting
2. If not CHECK OSC X1 output.
3. Check CTRL input voltage
   (CONNECTOR P300)
4. CHECK 3.3V, 5V, 15V.
5. Check IC 11 3.3V
   IC 3 2.5V

Check oscillating state.
(normal 100 MHZ)
Be careful with physical shock.
1. Check FUSE (FS1(5v), FS2(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 agree with voltage that represented in label.
- Check whether output voltages agrees with voltage that represented in label.

- Check diode value GND between Y-SUS output.

Normal diode value = 0.4 (forward)

Normal diode value = OL (reverse)
Trouble shooting.

1. Check the FUSE.
2. Check input voltages. (Va, 5V, 15V)
3. Check FPC output diode value.
4. Check ramp waveform.
■ Variable resistance of Z RAMP waveform slope.

■ Check FPC output diode value.

caution: check certainly after removing FPC.

Normal diode value=0.375(forward)

Normal diode value=OVER LOAD(reverse)
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

ORIGIN PSU
Vertical defect (bar)

Trouble shooting.

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

**Connector**

Check COF connector. If not connected well, it will make a bar defect.
Checking COF

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

COF 6 is torn partly

Tearing
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 Ω
But if not, the value will be 0 or infinity and replace the resistor.
© 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 0.66 (fig.1)

2. contact DMM - terminal to Output terminal of resistor, and DMM + terminal to a right terminal of IC, normal value 0.73 (fig.2)
**Vertical defect (line)**

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

**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.

**Trouble shooting.**

- **MCM (Multi Chip Module)**

1 line open

1 electrode open

**Line open or short with same distance.**

This is MCM of Ctrl b/d defect. MCM can not be replaced separately. So replace the ctrl b/d.
Case 1: Buffer IC fail

COF IC 1,2 ⇒ 192 line (96+96) open.
COF IC 3,4 ⇒ 64 line open
(with fixed interval there is on, off …… Repetition)

case 2: Array resistor fail

COF IC 1 ⇒ 16 line, COF IC 2 ⇒ 16 line open

Case 3: COF IC fail

96 line open.
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.

**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.
Scan IC check

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

Normal diode value. (in case of Panasonic IC=1.035)
* It can be different from each IC Maker. (in case of TI IC= 0.6~0.7)

Defect diode value= 0.018

Check here with DMM (either forward or reverse is ok)
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.

![FPC electrode open](image1)

![Horizontal 1 line.](image2)

Check scan IC
Check with same method that presented in Horizontal (bar).

![Panel electrode Insulation break down](image3)
Most of mis-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

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* Mis-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 must aware to know after 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,
LINE SVC Mode

White-Pattern
1. Test Pattern  Off

White-Pattern
1. Test Pattern  W

White-Pattern
1. Test Pattern  R

White-Pattern
1. Test Pattern  G

White-Pattern
1. Test Pattern  B
### Display Message

<table>
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<tr>
<th>PowerOffStatus</th>
<th>Explain</th>
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</thead>
<tbody>
<tr>
<td>1. POWOFFMOD_CPUCMD</td>
<td>From CPU Power Off</td>
</tr>
<tr>
<td>2. POWOFFMOD_ABN</td>
<td>Abnormal Off</td>
</tr>
<tr>
<td>3. POWOFFMOD_KEYTIMEOUT</td>
<td>Power Off Key 에 대한 CPU 응답이 없음</td>
</tr>
<tr>
<td>4. POWOFFMOD_ACDET</td>
<td>AC Detect Error</td>
</tr>
<tr>
<td>5. POWOFFMOD_RESET</td>
<td>Main Power Off</td>
</tr>
<tr>
<td>6. POWOFFMOD_5VMNT</td>
<td>5V Error</td>
</tr>
<tr>
<td>7. POWOFFMOD_KEY</td>
<td>Power Key Input</td>
</tr>
<tr>
<td>8. POWOFFMOD_OFFTIMER</td>
<td>Off time Off Mode</td>
</tr>
<tr>
<td>9. POWOFFMOD_SLEEPTIMER</td>
<td>Sleep Time Off Mode</td>
</tr>
<tr>
<td>10. POWOFFMOD_NOSIG</td>
<td>After 10min No signal Off Mode</td>
</tr>
<tr>
<td>11. POWOFFMOD_FANSTSTOP</td>
<td>Fan Movement Error</td>
</tr>
<tr>
<td>12. POWOFFMOD_INSTOP</td>
<td>In-Stop Key Input</td>
</tr>
</tbody>
</table>