1. Specification
2. Alignment & Adjustment
3. Block Diagram
4. Wiring Diagram
5. Operation Instruction & Installation
6. Trouble Shooting
Concept

Value Proposition

- Relaxation
- Pleasure
- Satisfaction
- Affordable

“beyond the space...”
1. Specification
## 1. Specification

### Product Features

<table>
<thead>
<tr>
<th>Features</th>
<th>Specification</th>
<th>Major IC</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RF</strong></td>
<td>Tuner</td>
<td>TCPS3001P032S(H)</td>
<td>SEMCO</td>
</tr>
<tr>
<td><strong>PDP Module</strong></td>
<td>Samsung SDI W2A</td>
<td></td>
<td>SAMSUNG SDI</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>Input Voltage: AC 100~240V, 50/60 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Video</strong></td>
<td>Scaler</td>
<td>MT8202FG</td>
<td>MTK</td>
</tr>
<tr>
<td></td>
<td>Video Decoder</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sound</strong></td>
<td>Sound AMP</td>
<td>NTP3003</td>
<td>Neo Fidelity</td>
</tr>
<tr>
<td></td>
<td>Audio CODEC</td>
<td>MT8291(1C8002)</td>
<td>MTK</td>
</tr>
<tr>
<td><strong>Cabinet</strong></td>
<td>C9 Design</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Model Specification

<table>
<thead>
<tr>
<th>Model</th>
<th>PS-42CS1H</th>
<th>PS-50CS1H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Screen Size</strong></td>
<td>42 inches (16.9)</td>
<td>50 inches (16.9)</td>
</tr>
<tr>
<td><strong>Dimensions (WxHxD)</strong></td>
<td>1055 x 775 x 341 mm (With stand)</td>
<td>1227.1 x 561.3 x 341 mm (With stand)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>40.4 kg (With stand)</td>
<td>49.7 kg (With stand)</td>
</tr>
<tr>
<td><strong>Voltage</strong></td>
<td>AC 100~240V, 50/60Hz</td>
<td></td>
</tr>
<tr>
<td><strong>Colour System</strong></td>
<td>PAL, SECAM, NTSC4.43, NTSC3.58</td>
<td></td>
</tr>
<tr>
<td><strong>Sound System</strong></td>
<td>EG, DK, I, M</td>
<td></td>
</tr>
<tr>
<td><strong>PC Resolution</strong></td>
<td>1024 x 768 @ 60 Hz</td>
<td>1360 x 768 @ 120 Hz</td>
</tr>
</tbody>
</table>

### Video Input

- SCART1, SCART2
- AV1, AV2
- S-VIDEO
- COMPONENT1 - 480i/480p/720p/1080i
- PC
- HDMI1/2 (DVI Compatible HDMI) (Option)

### Audio Input

- SCART1, SCART2
- AV1, AV2
- S-VIDEO
- COMPONENT1 - 480i/480p/720p/1080i
- PC
- DVI

### Audio Output

- AUDIO (L/R)

### Speaker Output

- 10W + 10W
1. Specification

## Key Features

<table>
<thead>
<tr>
<th>Model</th>
<th>PS-42C91H</th>
<th>PS-50C91H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen Size</td>
<td>42 inches (16:9)</td>
<td>50 inches (16:9)</td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>1055 x 775 x 341 mm (With stand)</td>
<td>1227.1 x 861.3 x 341 mm (With stand)</td>
</tr>
<tr>
<td>Weight</td>
<td>40.4 kg (With stand)</td>
<td>49.7 kg (With stand)</td>
</tr>
<tr>
<td>Voltage</td>
<td>AC 100~240V, 50/60Hz</td>
<td></td>
</tr>
<tr>
<td>Colour System</td>
<td>PAL, SECAM, NTSC4.43, NTSC 3.58</td>
<td></td>
</tr>
<tr>
<td>Sound System</td>
<td>BG, DK, I, M</td>
<td></td>
</tr>
<tr>
<td>PC Resolution</td>
<td>1024 x 768 @ 60/75Hz</td>
<td>1360 x 768 @ 120 Hz</td>
</tr>
<tr>
<td>ANTENNA input</td>
<td>AIR IN (75Ω unbalanced)</td>
<td></td>
</tr>
<tr>
<td><strong>VIDEO input</strong></td>
<td>SCART1, SCART2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AV1, AV2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-VIDEO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMPONENT1 - 480i/480p/720p/1080i</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HDMI1/2 (DVI Compatible HDMI) (Option)</td>
<td></td>
</tr>
<tr>
<td><strong>AUDIO input</strong></td>
<td>SCART1, SCART2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AV1, AV2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S-VIDEO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMPONENT1 - 480i/480p/720p/1080i</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DVI</td>
<td></td>
</tr>
<tr>
<td>Audio Output</td>
<td>AUDIO (L/R)</td>
<td></td>
</tr>
<tr>
<td>Speaker Output</td>
<td>10W + 10W</td>
<td></td>
</tr>
</tbody>
</table>
2. Alignment & Adjustment
2. Alignment & Adjustment

Factory Mode adjustments

1. How to enter factory mode

1. General Remote
   To Enter: POWER OFF → INFO → MENU → MUTE → POWER ON
   (Interval between key strokes: less than 3 sec)

2. Factory Remote
   To Enter: POWER ON → INFO → FACTORY Key
   (Interval between key strokes: less than 3 sec)

3. To Exit: POWER OFF → POWER ON

Press the Factory key twice with a key stroke interval of more than 1 second (Pressing once enters Aging Mode)

3. Settings when entering Factory mode
   - Sharp Screen (Dynamic), Color Tone (Cool1), Factory (Dynamic CE Off)

4. Adjustment Procedures
   - Channel ▲▼ Key: Select an item.
   - Volume ◄► Key: Adjust the value up or down.
   - MENU Key: Save the changes to the EEPROM and return to the higher-level mode.
   - Using the Numeric (0–9) keys, you can select a channel.
   - Using the SOURCE key, you can switch AV modes.

5. Initial SERVICE MODE DISPLAY State

1. Calibration

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>AV Calibration</td>
<td>Successes</td>
</tr>
<tr>
<td>Comp Calibration</td>
<td>Successes</td>
</tr>
<tr>
<td>DTV Calibration</td>
<td>Successes</td>
</tr>
<tr>
<td>HDMI Calibration</td>
<td>Successes</td>
</tr>
</tbody>
</table>

HDMI Write Successes.
T-UJ50PEA-XXXXX Month: Date, Year: 00:00:00 T-BDP/NSAS-XXXX Panel On Time(Hour): 0
TV: Air 3 0
2. Alignment & Adjustment

White Balance - Calibration

If picture color is wrong, do calibration first.

Execute calibration in Factory Mode
1. Source : VIDEO
2. Setting Mode : PAL Video (MODE : #2)
3. Pattern : Pattern #24 (Chess Pattern)
4. Use Equipment : MSPG945 Series or MSPG925 Series
5. Work order
   1) Enter by Factory Mode select "1.CALIBRATION".
   2) Select "AV CALIBRATION" again in CALIBRAION MENU.
   3) After Completing Calibration, come out "Av success". OSD on the screen (bottom-side) for about 3 seconds.

Source  AV : PAL composite, Component : 1280*720/60Hz(720P)
         PC : 42" - 1024*768/60Hz
              50" - 1360*768/60Hz

(Chess Pattern)
2. Alignment & Adjustment

Service adjustments

White Balance - Adjustment

If picture color is wrong, check White Balance condition.

Equipment: CA210, Patten: Toshiba
Adjust W/B in Factory Mode

Sub brightness and R/G/B Offset controls low light region
Sub contrast and R/G/B Gain controls high light region
Source AV: PAL composite, Component: 1280*720/60Hz,
HDMI[DVI]: 1280*720/60Hz

[ Test Pattern: MSPG-945 Series Pattern #16 ]

* Color temperature
1500K ± 500, -6 ~ -20 MPCS

* Color coordinate
H/L: 278/285 ± 2
L/L: 278/285 ± 3, 1.9ft ± 0.05ft
(This Data will be able to be changed according to Picture quality Setting,
Please refer to latest data from Factory.)

( SAMSUNG WHITE BALANCE Adjustment PATTERN with FPD )
2. Alignment & Adjustment

Software Upgrade (with RS-232C)

MTKtool

1. Install the MTKtool
   Connect Set (Service Jack) and Jig Cable to execute Program Update.

2. Turn on the Set (or on Stand by mode)
   - Run "MTKtool"

3. Turn off (= AC Power off) the Set (waiting a few seconds) and turn on again.

   - Click Reset
   - Choose MT8202
   - Select Com Port (Auto Detect)
   - Select Bin file, by browse
   - Click Upgrade button
2. Alignment & Adjustment

Software Upgrade (with UART JIG)

1. If some problems occur under this condition, update S/W by using UART JIG.

2. You can use UART JIG with USB Connection.

3. Install PL-2303 Driver Installer in your PC before using the JIG. Connect 4P Lead connector to Main Board (CN501)
2. Alignment & Adjustment

Voltage Adjustment

1. After replacing the SMPS or PDP panel, you must adjust the voltage referring to the voltage label printed on the panel. (If you do not adjust the voltage, an abnormal discharge symptom may appear.)

<table>
<thead>
<tr>
<th>Value</th>
<th>Value</th>
<th>Board Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vs</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>Va</td>
<td>63</td>
<td>SMPS</td>
</tr>
<tr>
<td>Vset</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Ve</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>Vscan</td>
<td>-190</td>
<td></td>
</tr>
</tbody>
</table>

2. A point of adjusting SMPS-MAIN voltage.
3. Block Diagram
3. Block Diagram

Overall Block Diagram

- Logic Board
- Input Data Processor
- Data Controller
- DRAM
- Driver Timing Controller
- Display Data
- Display Timing
- Scan Timing
- Row Driver
- Y-Pulse Generator
- PDP Panel
  - 42" - 1024x768 Pixels
  - 1024x768x3 Cells (R,G,B)
  - 50" - 1360x768 Pixels
  - 1360x768x3 Cells (R,G,B)
- Column Driver
- SMPS Board
- Main SMPS
- LVDS Trans
- Image Enhancer
- Deinterlacer
- Audio Processor
- Image Scaler
- CPU Decoder
- Video Decoder
- Speaker Out
- A/D Converter
- Video S/W
- Micom
- Tuner
- RF Splitter
- X Main Board
- Y-Pulse Generator
- AC Power Source
3. Block Diagram

Audio/Video Signal Block Diagram
3. Block Diagram

Logic Board Block Diagram
4. Wiring Diagram
4. Wiring Diagram

Overall Wiring (42")
4. Wiring Diagram

Overall Wiring (50"")
## Overall Wiring

<table>
<thead>
<tr>
<th>Use</th>
<th>Code</th>
<th>Photo</th>
</tr>
</thead>
</table>
| ① LVDS 31P-30P | 42" - BN39-00859A  
50" - BN39-03817A | ![Image] |
| ② POWER 24P   | BN39-00827A           | ![Image] |
| ③ SIDE        | -                     | ![Image] |
| ④ Y Drive     | -                     | ![Image] |
| ⑤ X Drive     | -                     | ![Image] |
| ⑥ Address     | -                     | ![Image] |
| ⑦ Logic       | -                     | ![Image] |
| ⑧ Front       | -                     | ![Image] |
| ⑨ SPEAKER     | -                     | ![Image] |
| ⑩ FUNCTION    | -                     | ![Image] |
| ⑪ AC_INPUT    | 42" - 2901-001378  
50" - 2901-001340 | ![Image] |
## 4. Wiring Diagram

### PDP - SMPS Wiring

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vg</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>Vs</td>
</tr>
<tr>
<td>6</td>
<td>Vs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vg</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
</tr>
<tr>
<td>4</td>
<td>Vs</td>
</tr>
<tr>
<td>5</td>
<td>Vs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Va</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>5.3V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STBY</td>
</tr>
<tr>
<td>2</td>
<td>VS_ON</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>PS_ON</td>
</tr>
<tr>
<td>5</td>
<td>RTN</td>
</tr>
<tr>
<td>6</td>
<td>5.3V</td>
</tr>
<tr>
<td>7</td>
<td>RTN</td>
</tr>
<tr>
<td>8</td>
<td>RTN</td>
</tr>
<tr>
<td>9</td>
<td>5.3V</td>
</tr>
<tr>
<td>10</td>
<td>5.3V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC Neutral</td>
</tr>
<tr>
<td>2</td>
<td>N/C</td>
</tr>
<tr>
<td>3</td>
<td>AC Live</td>
</tr>
</tbody>
</table>
4. Wiring Diagram

Main Board Wiring
### 4. Wiring Diagram

#### Main Board Wiring

<table>
<thead>
<tr>
<th>CN140[MAIN BD] ↔ CN2010(LOGIC BD)</th>
<th>CN101[MAIN BD] ↔ CN801(SMPS)</th>
<th>CN1804[MAIN BD] ↔ CN105(SIDE AV)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pin No.</strong></td>
<td><strong>Signal</strong></td>
<td><strong>Pin No.</strong></td>
</tr>
<tr>
<td>1</td>
<td>RxIN-</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>RxIN+</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>RxIN-</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>RxIN+</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>RxIN2-</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>RxIN+</td>
<td>21</td>
</tr>
<tr>
<td>7</td>
<td>RxINCLK-</td>
<td>22</td>
</tr>
<tr>
<td>8</td>
<td>RxINCLK+</td>
<td>23</td>
</tr>
<tr>
<td>9</td>
<td>RxIN3-</td>
<td>24</td>
</tr>
<tr>
<td>10</td>
<td>RxIN3+</td>
<td>25</td>
</tr>
<tr>
<td>11</td>
<td>NC</td>
<td>26</td>
</tr>
<tr>
<td>12</td>
<td>NC</td>
<td>27</td>
</tr>
</tbody>
</table>

#### CN1701[MAIN BD] ↔ POWER&IR

<table>
<thead>
<tr>
<th><strong>Pin No.</strong></th>
<th><strong>Signal</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IR</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>3.3V</td>
</tr>
<tr>
<td>4</td>
<td>LED_STB</td>
</tr>
<tr>
<td>5</td>
<td>BUZZER</td>
</tr>
<tr>
<td>6</td>
<td>KEY_INPUT1</td>
</tr>
<tr>
<td>7</td>
<td>KEY_INPUT2</td>
</tr>
<tr>
<td>8</td>
<td>GND</td>
</tr>
<tr>
<td>9</td>
<td>5V</td>
</tr>
<tr>
<td>10</td>
<td>LED_CTRL</td>
</tr>
</tbody>
</table>

#### CN1201[MAIN BD] ↔ SPEAKER

<table>
<thead>
<tr>
<th><strong>Pin No.</strong></th>
<th><strong>Signal</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R_-OUT</td>
</tr>
<tr>
<td>2</td>
<td>R_-OUT</td>
</tr>
<tr>
<td>3</td>
<td>L_-OUT</td>
</tr>
<tr>
<td>4</td>
<td>L_-OUT</td>
</tr>
</tbody>
</table>

#### CN1702[MAIN BD] ↔ FUNCTION

<table>
<thead>
<tr>
<th><strong>Pin No.</strong></th>
<th><strong>Signal</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KEY_INPUT1</td>
</tr>
<tr>
<td>2</td>
<td>KEY_INPUT2</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
</tr>
</tbody>
</table>

**Note:** The diagram includes pin numbers and signal descriptions for the main board wiring connections. The table details specific pin-related signals and their corresponding values. The notes mention additional components such as IR, 3.3V, LED_STB, BUZZER, KEY_INPUT1, KEY_INPUT2, GND, 5V, and LED_CTRL. The diagram provides a visual representation of these connections, aiding in understanding the wiring layout.
5. Operation Instruction & Installation
5. Operation Instruction & Installation

Rear Panel

PL-42C91H/50C91H

1. POWER IN
   Connect the supplied power cord.

2. AUDIO-R/L (AV IN 1)
   Audio inputs for external devices, such as a camcorder or VCR.

3. VIDEO (AV IN 1)
   Video input for external devices, such as a camcorder or VCR.

4. AUDIO OUT (AUDIO-R/L)
   Audio outputs for external devices.

5. DVI IN (AUDIO-R/L)
   Connect to the DVI audio output jack of an external device.
   In case of PL-42C91H/50C91H models, only the HDMI IN 2 jack is compatible with DVI.

6. HDMI/DVI IN
   Connect to the HDMI jack of a device with HDMI output.
   This input can also be used as a DVI connection with separate analog audio inputs.
   (In case of PL-42C91H/50C91H models, only the HDMI IN 2 jack is compatible with DVI.)
   An optional HDMI/DVI cable will be necessary to make this connection.
   When using an optional HDMI/DVI adapter, the DVI analog audio inputs on your TV allow you to receive left and right audio from your DVI device. (Not compatible with PC)

7. ANT IN
   75Ω Coaxial connector for Air/Cable Network.

8. COMPONENT IN 1, 2
   Video (Y/Pb/Pr) and audio (R-AUDIO-L) component inputs.

9. SERVICE
   These jacks are for service purposes only.

10. PC AUDIO IN
    Connect to the audio output jack on your PC.

11. PC IN
    Connect to the video output jack on your PC.
6. Trouble shooting
6. Trouble shooting

No Power

1. Are the AC IN socket connector and the SMPS CN800 connected?
   - Yes
   - No

2. The AC IN socket connector and the SMPS CN800 connected
   - Yes
   - No

3. Is the Fuse (F801S) of the SMPS Power input part blown?
   - Yes
   - No

4. Replace Fuse (F801S)

5. SMPS CN801
   - Pin 3: STB 5V
   - Pin 2: PS-ON: Check to see if it is 0V
   - Yes
   - No

6. Replace the SMPS

7. Replace the Main Board
6. Trouble shooting

Turned on and off repeatedly

1. Does the symptom continue when connecting the power after removing CN510 from the SMPS?
   - Yes
   - No → Replace the Y Main Board

2. Does the symptom continue when connecting the power after removing CN509 from the SMPS?
   - Yes
   - No → Replace the X Main Board

3. Does the symptom continue when connecting the power after removing CN507 from the SMPS?
   - Yes
   - No → Replace the Logic Board
   - Yes → Replace the SMPS
6. Trouble shooting

No Picture (When audio is normal)

Are the Vs and Va voltages normal after removing all cables from the SMPS? (CN810, CN809, CN808, CN807)

- Yes
  - Replace the Y Main Board
    - Yes
      - Replace the X Main Board
        - Yes
          - Replace the Logic Board
            - Yes
              - Replace the Y Scan Board
  - No
    - Replace the SMPS
6. Trouble shooting

No Sound

1. Is the cable connection between the Main Board and the speaker properly connected?
   - Yes
   - No: Connect the cable properly or replace the cable, if necessary.

2. Is the output voltage of SMPS normal? (CN801 #13)
   - Yes
   - No: Replace the SMPS

3. Is the speaker output terminal of the Main Board normal?
   - Yes
   - No: Replace the Main Board

4. Replace the Speaker
ATTACHMENT
What is PDP?
1. Introduction to PDP
2. Panel Structure & Manufacturing
3. PDP Driving Characteristics
4. Characteristic of Board
1. Introduction to PDP

- PDP Concept

Power

Drive Circuit

Ultraviolet Fluorescent Radiation Substance

Visible Light

Generation

Converted into Energy

Visible Light Transfer

- PS

- Drive Circuit

- Visible Light

- R, G, B
1. Introduction to PDP

- **PDP Operating Efficiency**

  - **Power Input**
    - Loss in Drive Circuit: 70%
  
  - **Gas Discharge**
    - Heat and Infrared Radiation Ray Emission: 2%
  
  - **Visible Light Generation**
    - Ultraviolet Radiation Absorption by Fluorescent Substance: 60%
    - Absorption of Partitions of Cell Structure: 15%
    - Internal Loss due to Fluorescent Substance Efficiency: 60%

  - **Efficiency**
    - PDP Gun Operating Efficiency: 0.7×0.02×0.6×0.15×6 = 0.08%
1. Introduction to PDP

- **PDP Advantages and Disadvantages**
  - **< Advantages >**
    - Ultra-Slim: Wall-mounted TV
    - Easy Wide Screen Implementation: 80” or Higher
    - Lightweight (on the basis of a 42”):
      - 42” PDP: 30kg
      - 42” CRT: more than 100kg
      - 40” LCD: 32Kg
    - Wide View Angles (170°)
    - High Resolution
      - 0.1mm Cell Pitch
    - Not affected by magnetic fields
    - Full-color
    - Excellent Non-linearity
      - Does not require TFT (Thin Film Transistor) unlike LCD
  - **< Disadvantages >**
    - High Power Consumption
    - Low Brightness
    - High Price
    - Low Emissions Efficiency (Approximately 1.5 lm/W)
    - After Image
    - High Operating Temperature
    - Drive and Panel Noise
Panel Structure and Manufacturing
2. Panel Structure & Manufacturing

- Panel Cell Structure
2. Panel Structure & Manufacturing

- **PDP Cell Component Function**

  - **Driving Circuit**
    - Switches discharged cells
    - Processes the video signal

  - **MgO Thin Film**
    - Emits secondary electrons
    - Generates a wall charge

  - **Dielectric Layer**
    - Limits current flow
    - Transparent for visible light
    - Accumulates wall charge

  - **Phosphor Layer**
    - Converts Visible Light-Ultraviolet Rays

  - **Gas**
    - Causes and maintains the discharge
    - Generates ultraviolet rays

  - **Bus Electrode**
    - Provides a path for the discharge current
    - Prevents a voltage drop

  - **Transparent Electrode**
    - Sets a gap between electrodes
    - Transparent for visible light

  - **Address Electrode**
    - Inputs the Data Signal

  - **Transparent Electrode**
    - Prevents a voltage drop

  - **Bus Electrode**
    - Provides a path for the discharge current

  - **Address Electrode**
    - Inputs the Data Signal

  - **Driving Circuit**
    - Switches discharged cells
    - Processes the video signal
PDP Driving
Characteristics
3. PDP Driving Characteristics

- Block Diagram

[Wiring Diagram Schematic]
3. PDP Driving Characteristics

● Board Functions

■ SM PS (Switching Mode Power Supply)
  SM PS supplies the voltage for the parts installed on the boards and supplies the voltage and current for the panel.

■ X-MAIN Board
  Switches FETs according to the timing provided by the Logic Board, generates the Drive Waveform and supplies the Drive Waveform for the X electrode of the panel through the connector.

■ Y-MAIN Board
  Switches FETs according to the timing provided by the Logic Board, generates the Drive Waveform and supplies the Drive Waveform for the Y electrode of the panel through the Scan Driver IC of the Y-Buffer Board.

■ Logic Main Board
  Processes the video signal and generates and outputs the Address Drive Output and the XY Drive signals. It also buffers the Logic Main Board and the Address Drive Output signal and supplies the Output signal for the Address Driver IC (COF Module).
3. PDP Driving Characteristics

- **Board Functions**
  - **Logic Buffer (E, F, G)**: Outputs data and the control signal to the COF.
  
  - **Y-Buffer (Upper, Lower)**
    - A board supplies a Scan Waveform to the Y terminal. This board consists of Upper and Lower boards.
    - 8 Scan Driver ICs (ST’s STV7617: 64 or 65 Output) are installed.
  
  - **AC Noise Filter**
    - Removes low frequency noise and surge from the AC line.
    - It affects (EMC, EMI) the safety regulations depending on the AC filter.
  
  - **COF (Chip on Flexible)**
    - Applies a Va pulse to the Address electrode in the Address duration and causes an Address Discharge through the potential difference from the scan pulse applied to the Y electrode.
    - It is manufactured as a COF. A COF consists of 4 Data Drive ICs (STV7610A: 96 Output). A Single Scan consists of 7 COFs.
3. PDP Driving Characteristics

- **1 Sub-Field Structure (ADS – Address Data Separate)**

  - **Reset Duration**
    - Function: Removes the Sustain Components
    - Function: Initialize the Wall-Voltage
    - Issue: Operating Margin
    - Issue: Contrast
    - Issue: Short Reset Time

  - **Address Duration**
    - Function: Sets the Discharge Cell
    - Issue: High-Speed Switching
    - Issue: Low-Voltage

  - **Sustain Duration**
    - Function: Emission of visible rays through a Cell Discharge
    - Issue: High Efficiency
    - Issue: Low Voltage
    - Issue: ERC Operating Efficiency
### 3. PDP Driving Characteristics

#### Drive Waveform (P3 Alexander)

![Drive Waveform Diagram](image)

- **Y rising Ramp**: Increases from ground to Vset.
- **Vs**: Voltages used for control.
- **Y falling Ramp**: Decreases from Vset to ground.
- **Vscan**: Scan pulse for Y-axis.
- **Y sustain Pulse**: Sustain voltage for Y-axis.
- **X sustain Pulse**: Sustain voltage for X-axis.
- **Address Pulse**: Pulse for address (A1, 2, ...) electrodes.
- **Va**: Voltage for address pulses.

### Voltage Table

<table>
<thead>
<tr>
<th>Electrode Type</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1, 2, ... (Address)</td>
<td>85V</td>
</tr>
<tr>
<td>X (Common &amp; Sustain)</td>
<td>95V</td>
</tr>
<tr>
<td>Y1, 2, ... (Scan)</td>
<td>85V</td>
</tr>
</tbody>
</table>
3. PDP Driving Characteristics

- **Drive Waveform (P4 Mozart)**

<table>
<thead>
<tr>
<th>A1, 2 ....</th>
<th>Address (=Data) Electrode</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Common &amp; Sustain Electrode</td>
</tr>
<tr>
<td>Y1, 2 ...</td>
<td>Scan &amp; Sustain Electrode</td>
</tr>
</tbody>
</table>

- $V_{set} = 173V$
- $V_{sc\_h} = 35V$
- $V_{sc\_l} = -70V$
- $V_e = 165V$
- $V_s = 175V$
3. PDP Driving Characteristics

- Address Duration Operating Sequence

The preset cells to be turned on to display a picture.
3. PDP Driving Characteristics

- Sustain Duration

Turn the cells on by a strong Sustain Discharge
3. PDP Driving Characteristics

- Frame Structure (ADS)

---

- D
- X
- Y1
- Y2
- Yn

- SF1
- SF2
- SF3
- SF4
- SF5
- SF6
- SF7
- SF8

- Reset Period
- Address Period
- Sustain Period

- 1TV field (time)
- address
- sustain

- Scan line 1
- Scan line 2
- 480
3. PDP Driving Characteristics

- Image Display by 8 Sub-Fields
Operating Explanation per Board
4. Operating Explanation per Board

- Entire PDP Module Block Diagram

[Whole Block Diagram]
4. Operating Explanation per Board

- Drive Waveform Specifications

<table>
<thead>
<tr>
<th></th>
<th>Address (=Data) Electrode</th>
<th>X Common &amp; Sustain Electrode</th>
<th>Y1, 2... Scan &amp; Sustain Electrode</th>
<th>Vset</th>
<th>Ve</th>
<th>Va</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1, 2...</td>
<td>Address (=Data) Electrode</td>
<td>X Common &amp; Sustain Electrode</td>
<td>Y1, 2... Scan &amp; Sustain Electrode</td>
<td>Vset</td>
<td>Ve</td>
<td>Va</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Vset</th>
<th>Ve</th>
<th>Va</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vset</td>
<td>95V</td>
<td>95V</td>
<td>79V</td>
</tr>
<tr>
<td>Vscan</td>
<td>85V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vset</td>
<td>85V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Y rising Ramp
- Y falling Ramp
- Y scan Pulse
- Y sustain Pulse
- X sustain Pulse
- Address Pulse
- Va
What is PDP Filter?
PDP Filter Function
Plasma Panel Display Structure

- PDP Filter (Corning)
- Module (SDI)
- SMPS (SEM)
- Cabinet – Front (SEC)
- Cabinet – Back (SEC)
- Display Board (SEC)
The Function of the PDP Filter

PDP Filter

Human hazard
Remote controller malfunction
Color purity up
☞ Breakage and scattering prevention

PDP Module

Visible Light
EMI
NIR
Neon Peak
Color adjust

(Source)
Panel & Module

Xenon gas
Red fluorescent & Neon gas

NIR: Near Infrared
EMI: Electro Magnetic Interference
The Function of the MRT PDP Filter

External Light absorption

Visual Image Light (High Transmittance)

High Contrast!
PDP Filter Structure
PDP Filter Mesh Type Structure

- AR Film
- Color adjusting+ NIR Cut Film
- Mesh Film
- Semi Tempered Glass
PDP Filter Sputter type Structure (Double AR)

AR Film
Color adjusting film
Semi Tempered Glass
Coating
AR Film
Color adjusting film
AR Film
Coating on Semi Tempered Glass
PDP Filter MRT (Sputter) type Structure

AR Film
Semi Tempered Glass
Coating
MAB Film
Color adjusting film

AR Film
MAB Film
Color adjusting
Coating on Semi Tempered Glass
PDP Filter Performance
## PDP Filter Performance

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Mesh Type</th>
<th>Sputter Coating Type</th>
<th>MRT Type (Coating)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmittance (%)</td>
<td>48 %</td>
<td>44 %</td>
<td>52 %</td>
</tr>
<tr>
<td>EMI Margin* @ Class B</td>
<td>17</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>NIR** Shielding (%)</td>
<td>9 %</td>
<td>5 %</td>
<td>5 %</td>
</tr>
<tr>
<td>850 nm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>950 nm</td>
<td>4 %</td>
<td>2 %</td>
<td>2 %</td>
</tr>
</tbody>
</table>

* SDI V3 Module & SEC 42” P4 set Test Result  
** Measure Data
## MRT PDP Filter Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>SDI V4 Module</th>
<th>M Filter Applied</th>
<th>Conducting Film Applied</th>
<th>Pioneer Direct-Attached</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bright Room (150Lux)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Brightness</td>
<td>1,077</td>
<td>561</td>
<td>476</td>
<td>212</td>
</tr>
<tr>
<td>Black Brightness</td>
<td>12.17</td>
<td>1.33</td>
<td>2.40</td>
<td>2.47</td>
</tr>
<tr>
<td>Contrast Ratio</td>
<td>88 : 1</td>
<td>423 : 1</td>
<td>181 : 1</td>
<td>86 : 1</td>
</tr>
<tr>
<td><strong>Dark Room</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Brightness</td>
<td>1,047</td>
<td>561</td>
<td>468</td>
<td>210</td>
</tr>
<tr>
<td>Black Brightness</td>
<td>0.15</td>
<td>0.08</td>
<td>0.07</td>
<td>0.65</td>
</tr>
<tr>
<td>Contrast Ratio</td>
<td>6,978 : 1</td>
<td>7,480 : 1</td>
<td>6,938 : 1</td>
<td>467 : 1</td>
</tr>
<tr>
<td><strong>PDP Filter Transmissivity</strong></td>
<td>-</td>
<td>52 %</td>
<td>44 %</td>
<td>30 %</td>
</tr>
</tbody>
</table>

- SDI V4 Module : V4 2.0x Version (Manufactured in November)
- Original Data : Refer to the SEC Measurement Data
NIR / IR Shielding

Transmittance (%) vs. Wavelength (nm)

SSC Mesh Type Filter
SSC Coating Type Filter
PDP Filter Manufacturing Process
PDP Filter Manufacturing Process
(Coating Type)

- Glass Cleaning
- Dry
- Inspection
- Dielectric Coating
- Blocker Coating
- Metal Coating
- FQA Inspection
PDP Filter Manufacturing Process (Coating Type)

Dry cleaning → Inspection → AR Laminating

Color Film Trimming → Color Film Laminating → Dry cleaning
PDP Filter Manufacturing Process (Coating Type)

1. Dry cleaning
2. Inspection
3. AR Film Laminating
4. AR Film Trimming
5. Packing & Shipping
6. FQA Inspection
7. Inspection
8. Auto Clave
### What is HDMI?

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DVI</th>
<th>HDMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA SPEED</td>
<td>1.78G BPS</td>
<td>2.2G BPS</td>
</tr>
<tr>
<td>AUDIO</td>
<td>NONE</td>
<td>CD OR HIGHER QUALITY DATA</td>
</tr>
<tr>
<td>REMOTE CONTROL</td>
<td>NONE</td>
<td>AV-LINK CAPABILITIES REPLACES INFRARED REPEATERS INTEGRATED REMOTE CONTROL SYSTEM</td>
</tr>
<tr>
<td>CONNECTOR</td>
<td><img src="image" alt="DVI Connector" /></td>
<td><img src="image" alt="HDMI Connector" /></td>
</tr>
<tr>
<td>FUTURE COMPATIBILITY</td>
<td>NONE</td>
<td>ACCOMMODATES ATSC DTV FORMATS SUPPORTS 8 CHANNEL AUDIO SPARE BANDWIDTH FOR FUTURE APP. (55% EXTRA AFTER HD TRANSMISSION)</td>
</tr>
</tbody>
</table>
What is HDMI?

HDMI block diagram
HDMI system architecture is defined to consist of Sources and Sinks. A given device may have one or more HDMI inputs and one or more HDMI outputs. Each HDMI input on these devices shall follow all of the rules for an HDMI Sink and each HDMI output shall follow all of the rules for an HDMI Source.

As shown HDMI block diagram the HDMI cable and connectors carry four differential pairs that make up the TMDS data and clock channels. These channels are used to carry video, audio and auxiliary data. In addition, HDMI carries a VESA DDC channel. The DDC is used for configuration and status exchange between a single Source and a single Sink. The optional CEC protocol provides high-level control functions between all of the various audiovisual products in a user’s environment.

Audio, video and auxiliary data is transmitted across the three TMDS data channels. The video pixel clock is transmitted on the TMDS clock channel and is used by the receiver as a frequency reference for data recovery on the three TMDS data channels. Video data is carried as a series of 24-bit pixels on the three TMDS data channels. TMDS encoding converts the 8 bits per channel into the 10 bit DC-balanced, transition minimized sequence which is then transmitted serially across the pair at a rate of 10 bits per pixel clock period.
What is HDMI?

Connector Drawings
All dimensions in millimeters

Type A Receptacle

Type A Plug

Dimensions:
- No. 1: 10.6 MAX.
- No. 2: 4.45
- No. 18: 4.55
- No. 19: 0.5 (PITCH)
- No. 14: 9
- No. 13.9: 21 MAX.
- No. 9: 8

SAMSUNG Electronics
<table>
<thead>
<tr>
<th>NO</th>
<th>Function</th>
<th>NO</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D2_RX2+</td>
<td>11</td>
<td>D2_RXCLK GND</td>
</tr>
<tr>
<td>2</td>
<td>D2_RX2 GND</td>
<td>12</td>
<td>D2_RXCLK</td>
</tr>
<tr>
<td>3</td>
<td>D2_RX2-</td>
<td>13</td>
<td>No connection</td>
</tr>
<tr>
<td>4</td>
<td>D2_RX1+</td>
<td>14</td>
<td>No connection</td>
</tr>
<tr>
<td>5</td>
<td>D2_RX1 GND</td>
<td>15</td>
<td>HDMI_DDC_SCL</td>
</tr>
<tr>
<td>6</td>
<td>D2_RX1-</td>
<td>16</td>
<td>HDMI_DDC_SDA</td>
</tr>
<tr>
<td>7</td>
<td>D2_RX0+</td>
<td>17</td>
<td>HDMI_DDC_GND</td>
</tr>
<tr>
<td>8</td>
<td>D2_RX0 GND</td>
<td>18</td>
<td>HDMI VCC (5V)</td>
</tr>
<tr>
<td>9</td>
<td>D2_RX0-</td>
<td>19</td>
<td>Ident_HDMI</td>
</tr>
<tr>
<td>10</td>
<td>D2_RXCLK+</td>
<td>20</td>
<td>Common GND</td>
</tr>
</tbody>
</table>

**HDMI Connector pin configuration**

What is HDMI?
What is HDMI?

**HDMI Encoder/Decoder Overview**

**Input Streams**
- Pixel component (e.g. B)
- H, VSYNC
- Auxiliary Data (e.g. Packet Header)
- Pixel component (e.g. G)
- CTL0, CTL1
- Auxiliary Data (e.g. Audio Sample)
- Pixel component (e.g. R)
- CTL2, CTL3
- Auxiliary Data (e.g. Audio Sample)
- Pixel Clock

**HDMI TMDS Link**
- Channel 0
  - Source
    - D[7:0]
    - D[1:0]
    - D[3:0]
  - Sink
    - Recovery/Decoder
      - D[7:0]
      - D[1:0]
      - D[3:0]
- Channel 1
  - Source
    - D[7:0]
    - D[1:0]
    - D[3:0]
  - Sink
    - Recovery/Decoder
      - D[7:0]
      - D[1:0]
      - D[3:0]
- Channel 2
  - Source
    - D[7:0]
    - D[1:0]
    - D[3:0]
  - Sink
    - Recovery/Decoder
      - D[7:0]
      - D[1:0]
      - D[3:0]

**Output Streams**
- Pixel component (e.g. B)
- H, VSYNC
- Auxiliary Data (e.g. Packet Header)
- Pixel component (e.g. G)
- CTL0, CTL1
- Auxiliary Data (e.g. Audio Sample)
- Pixel component (e.g. R)
- CTL2, CTL3
- Auxiliary Data (e.g. Audio Sample)
- Pixel Clock
**Link Architecture**

As shown in an HDMI link includes three TMDS Data channels and a single TMDS Clock channel. The TMDS Clock channel constantly runs at the pixel rate of the transmitted video. During every cycle of the TMDS Clock channel, each of the three TMDS data channels transmits a 10-bit character. This 10-bit word is encoded using one of several different coding techniques.

The input stream to the Source’s encoding logic will contain video pixel, packet and control data. The packet data consists of audio and auxiliary data and associated error correction codes.

These data items are processed in a variety of ways and are presented to the TMDS encoder as either 2 bits of control data, 4 bits of packet data or 8 bits of video data per TMDS channel. The Source encodes one of these data types or encodes a Guard Band character on any given clock cycle.
Example: TMDS periods in 720x480p video frame
Operating Modes Overview

The HDMI link operates in one of three modes: Video Data Period, Data Island period, and Control period. During the Video Data Period, the active pixels of an active video line are transmitted. During the Data Island period, audio and auxiliary data are transmitted using a series of packets. The Control period is used when no video, audio, or auxiliary data needs to be transmitted. A Control Period is required between any other two periods.

Video Data Periods use transition minimized coding to encode 8 bits per channel, or 24 bits total per pixel. Data Island Periods are encoded using a similar transition minimized coding, TMDS Error Reduction Coding (TERC4), which transmits 4 bits per channel, or 12 bits total per pixel clock period. During Control Periods, 2 bits per channel, or 6 bits total are encoded per pixel clock using a transition maximized encoding. These 6 bits are HSYNC, VSYNC, CTL0, CTL1, CTL2 and CTL3. Near the end of every Control Period, a Preamble, using the CTLx bits, indicates whether the next Data Period is a Video Data Period or a Data Island Period.
Video Format Support

In order to provide maximum compatibility between video Sources and Sinks, specific minimum requirements have been specified for Sources and Sinks.

Primary Video Format Timings

- 640x480p @ 59.94/60Hz
- 1280x720p @ 59.94/60Hz
- 1920x1080i @ 59.94/60Hz
- 720x480p @ 59.94/60Hz
- 720(1440)x480i @ 59.94/60Hz
- 1280x720p @ 50Hz
- 1920x1080i @ 50Hz
- 720x576p @ 50Hz
- 720(1440)x576i @ 50Hz
Audio Sample Rates and Support Requirements

If an HDMI Source supports audio transmission across any output, then it shall support HDMI audio transmission. If an HDMI Source supports any HDMI audio transmission, then it shall support 2 channel L-PCM using an IEC 60958 Subpacket structure, with either 32kHz, 44.1kHz or 48kHz sampling rate and a sample size of 16 bits or more.

An HDMI Source is permitted to transmit L-PCM or encoded audio data at sample rates of 32kHz, 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz and 192kHz using either IEC 60958 format or IEC 61937 format. If an HDMI Sink supports audio reception across any input, then it shall support audio reception from all HDMI inputs.

Basic Audio is defined as two channel L-PCM audio at sample rates of 32kHz, 44.1kHz, or 48kHz, with a sample size of at least 16 bits. For EIA/CEA-861B references to DTV devices, Basic Audio is defined as two channel L-PCM audio at sample rates of 32kHz, 44.1kHz, and 48kHz.

There is no sample size usage restriction for DTV devices. An HDMI Sink may optionally accept audio at sample rates of 88.2kHz, 96kHz, 176.4kHz and/or 192kHz using either IEC 60958 format or IEC 61937 format, and should indicate these capabilities in the E-EDID data structure.
Compatibility With DVI

All HDMI Sources shall be compatible with DVI 1.0 compliant sink devices (i.e. “monitors” or “displays”) through the use of a passive cable converter. Likewise, all HDMI Sinks shall be compatible with DVI 1.0 compliant sources (i.e. “systems” or “hosts”) through the use of a similar cable converter.

When communicating with a DVI device, an HDMI device shall operate according to the DVI 1.0 specification, with the following exception - these devices are not required to comply with DVI 1.0 rules regarding:
- Monitor scaling requirements
- Physical Interconnect specifications
- System Low Pixel Format Support Requirements

Furthermore, for HDMI devices which do not have a “BIOS” or “operating system”, there are the following additional exceptions:
- “BIOS” requirements
- “Operating system” requirements
- “System level event” requirements
- Power management requirements
TruSurround XT for Virtual Surround Sound

DVD players have transformed the household into an entertainment center. While DVD owners can now enjoy 5.1 multichannel soundtracks for movies and music in the comfort of their living room or at their computer, most televisions and computer playback systems have only two speakers.

TruSurround XT bridges this gap. It processes any multichannel audio source, as is usually found on DVDs, and transforms the material into breathtaking virtual surround sound from just two speakers or headphones.

Based upon the patented TruSurround technology from SRS Labs, which is the established standard for virtual surround sound, TruSurround XT also includes the unique features of SRS Dialog Clarity and TruBass and creates a stunning 3D sound image from standard stereo material.
TruSurround XT features

**TruSurround**: TruSurround is a patented SRS technology that solves the problem of playing 5.1 multichannel content over two speakers. TruSurround delivers a compelling, virtual surround sound experience through any two-speaker playback system, including internal television speakers and headphones. It is fully compatible with all multichannel formats up to 6.1 channels.

**SRS Dialog Clarity Enhancement**: Playback of dialog often suffers due to competing signals from other speakers. In addition, feature film soundtracks are mixed specifically for cinema playback and are loaded with the latest advancements in special audio effects. When translated over home theatre or computers systems, dialog may become unintelligible. This patented SRS algorithm enhances signal clarity to address these problems, thus improving dialog intelligibility from all such source material.
TruSurround XT features

TruBass: TruBass is a patented SRS technology that enhances bass performance utilizing proprietary psychoacoustic techniques. These techniques restore the perception of fundamental low frequency tones by dynamically augmenting harmonics, which are more easily reproduced by contemporary loudspeakers.

Using TruBass, TruSurround XT takes the bass information contained within the original audio track and helps the speakers or headphones re-create it – even if it is below the speaker’s low frequency limitations.

WOW: WOW™ is an award winning stereo enhancement technology that significantly improves the performance of stereo (non-surround sound encoded material) signals through any two-speaker system, including headphones. It extends the sound image in both the horizontal and vertical planes well beyond the speakers themselves. In addition, WOW incorporates TruBass and SRS Dialog Clarity Enhancement.

When TruSurround XT accepts a stereo signal, WOW is enabled for a better listening experience. Wow is also used by Microsoft in their new Media Player for Windows XP and Windows Media Player 7.