

Version : 1.0

TECHNICAL SPECIFICATION
MODEL NO : ED060SC4

The content of this information is subject to be changed without notice.
Please contact PVI or its agent for further information.

Customer's Confirmation

Customer _____

Date _____

By _____

PVI's Confirmation

FOR MORE INFORMATION:
AZ DISPLAYS, INC.
75 COLUMBIA, ALISO VIEJO, CA, 92656
[Http://www.AZDISPLAYS.com](http://www.AZDISPLAYS.com)

Zenny Chang
Confirmed By _____

曾耀廷
Prepared By _____

Revision History

| Rev. | Issued Date | Revised | Contents |
|-------------|--------------------|----------------|-----------------|
| 1.0 | May, 13, 2008 | New | |

TECHNICAL SPECIFICATION

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1. Application

The display is a TFT active matrix electrophoretic display, with associated interface and control logic, and a reference system design.

The 6” active area contains 800x600 pixels, and has full 1~4 bit display capabilities.

An integrated circuit containing interface, timing and control logic is supplied with each panel.

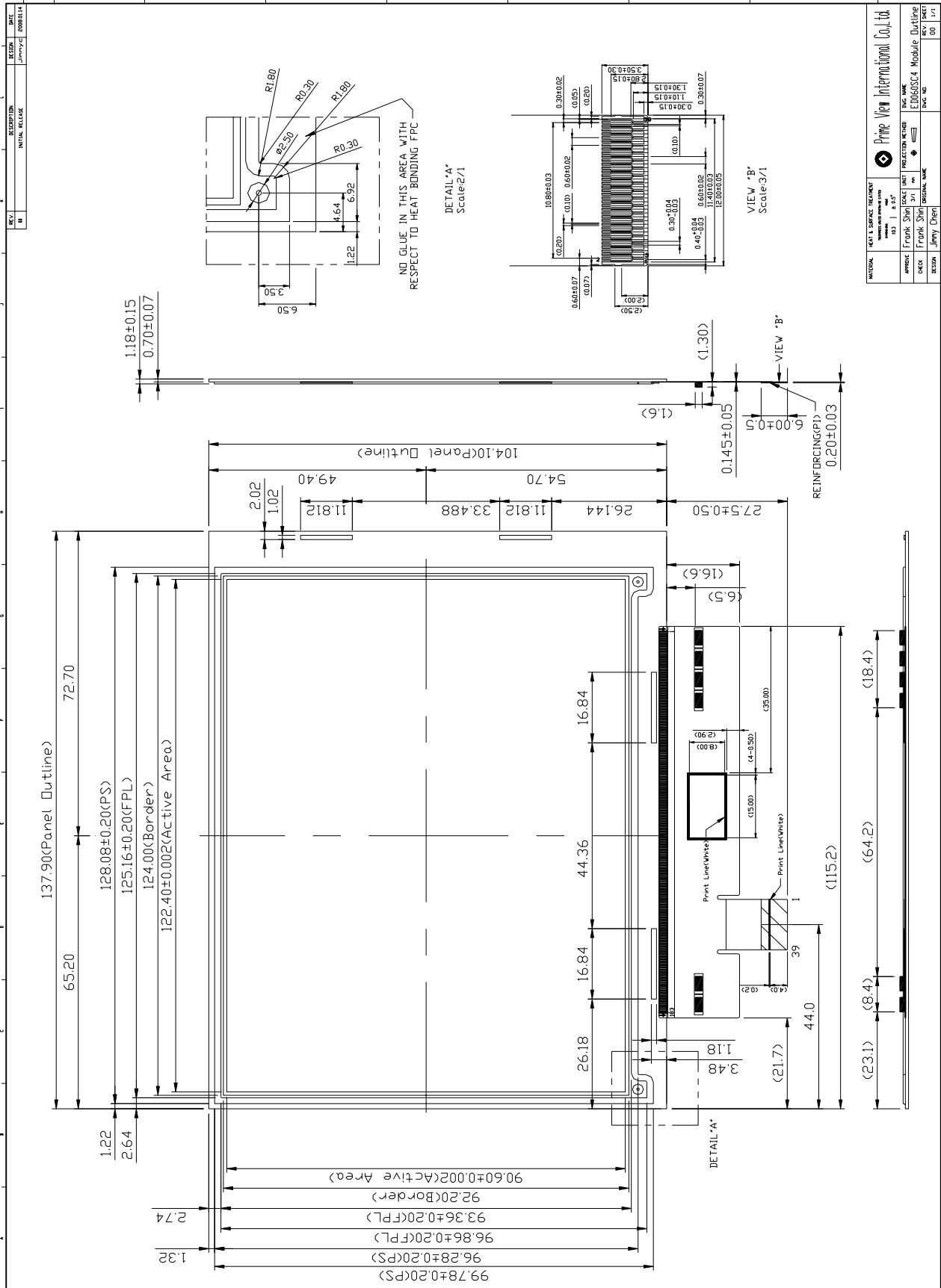
2. Features

- High contrast TFT electrophoretic
- 800x600 display
- High reflectance
- Ultra wide viewing angle
- Ultra low power consumption
- Pure reflective mode
- Bi-stable
- Commercial temperature range
- Landscape, portrait mode
- Antiglare hard-coated front-surface

3. Mechanical Specifications

| Parameter | Specifications | Unit | Remark |
|---------------------|---|------|--|
| Screen Size | 6.0 (4:3 diagonal) | Inch | |
| Display Resolution | 800 (H) ×600(V) | Dot | |
| Active Area | 122.4 (H)×90.6 (V) | mm | |
| Pixel Pitch | 0.153 (H)×0.151 (V) | mm | |
| Pixel Configuration | Rectangle | | |
| Outline Dimension | 137.90(W)×104.10(H)×1.18(D) (panel area height) 137.90(W)×104.10(H)×2.0 (D) (FPC area height with capacitor) | mm | Panel height is measured without released film |
| Module Weight | 35±5 | g | |

4. Mechanical Drawing of EPD Module



5.Input/Ouput Interface

5-1)Pin Assignment

| Pin # | Signal | Description |
|-------|---------|-------------------------------------|
| 1 | VNEG | Negative power supply source driver |
| 2 | VPOS | Positive power supply source driver |
| 3 | VSS | Ground |
| 4 | VDD | Digital power supply drivers |
| 5 | CL | Clock source driver |
| 6 | LE | Latch enable source driver |
| 7 | OE | Output enable source driver |
| 8 | SHR | Shift direction source driver |
| 9 | NC | NO Connection |
| 10 | NC | NO Connection |
| 11 | SPH | Start pulse source driver |
| 12 | D0 | Data signal source driver |
| 13 | D1 | Data signal source driver |
| 14 | D2 | Data signal source driver |
| 15 | D3 | Data signal source driver |
| 16 | D4 | Data signal source driver |
| 17 | D5 | Data signal source driver |
| 18 | D6 | Data signal source driver |
| 19 | D7 | Data signal source driver |
| 20 | NC | NO Connection |
| 21 | NC | NO Connection |
| 22 | VCOM | Common connection |
| 23 | GVDD | Positive power supply gate driver |
| 24 | GVEE | Negative power supply gate driver |
| 25 | NC | NO Connection |
| 26 | NC | NO Connection |
| 27 | GMODE2 | Output mode selection gate driver |
| 28 | GMODE1 | Output mode selection gate driver |
| 29 | RL | Shift direction gate driver |
| 30 | U1CE2 | Cascade sequence 1st gate driver |
| 31 | U1CE1 | Cascade sequence 1st gate driver |
| 32 | U1SPV | Start pulse 1st gate driver |
| 33 | U1CKV | Clock 1st gate driver |
| 34 | VBORDER | Border connection |
| 35 | U2CE2 | Cascade sequence 2nd gate driver |
| 36 | U2CE1 | Cascade sequence 2nd gate driver |
| 37 | U2SPV | Start pulse 2nd gate driver |
| 38 | U2CKV | Clock 2nd gate driver |
| 39 | NC | NO Connection |

6. Electrical Characteristics

6-1) Panel interface description

This panel is driven by ASIC PVI-6001A or “Apollo” display controller ASIC. See control product specification for details.

6-2) Panel DC characteristics

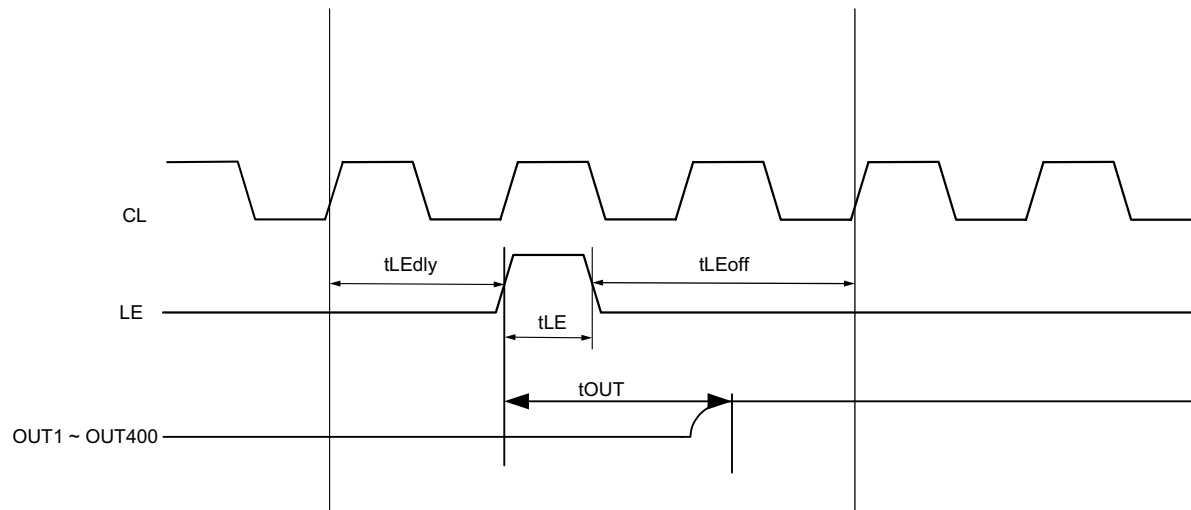
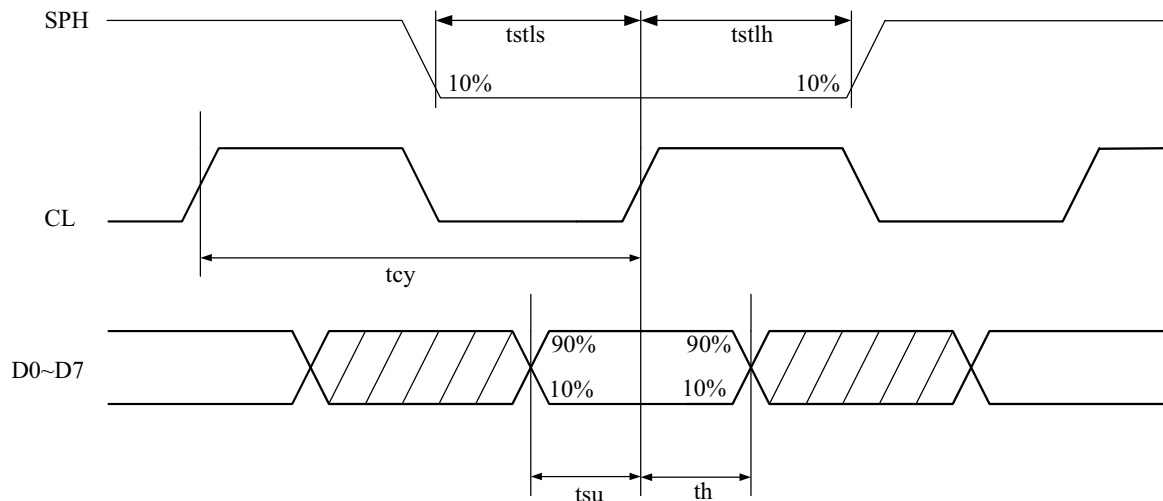
| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|-----------------------------------|-----------------------------|------------------------------------|-------|----------|-------|------|
| Signal ground | V _{SS} | | - | 0 | - | V |
| Logic Voltage supply | V _{DD} | | 3.0 | 3.3 | 3.6 | V |
| | I _{VDD} | V _{DD} =3.3V | - | 0.55 | 1.1 | mA |
| Gate Negative supply | G _{V_{EE}} | | -21 | -20 | -19 | V |
| | G _{I_{EE}} | G _{V_{EE}} = -20V | - | 1.3 | 3.9 | mA |
| Gate Positive supply | G _{V_{DD}} | | 21 | 22 | 23 | V |
| | G _{I_{DD}} | G _{V_{DD}} = 22V | - | 0.6 | 1.8 | mA |
| Source Negative supply | V _{NEG} | | -15.4 | -15 | -14.6 | V |
| | I _{NEG} | V _{NEG} = -15V | - | 18 | 36 | mA |
| Source Positive supply | V _{POS} | | 14.6 | 15 | 15.4 | V |
| | I _{POS} | V _{POS} = 15V | - | 18 | 36 | mA |
| Asymmetry source | V _{Asym} | V _{POS} +V _{NEG} | -80 | 0 | 80 | mV |
| Common voltage | V _{COM} | | -2.5 | Adjusted | -1.0 | V |
| | I _{COM} | | - | 0.2 | - | mA |
| Maximum power panel | P _{MAX} | | - | 1000 | 1100 | mW |
| Standby power panel | P _{STBY} | | - | - | 0.4 | mW |
| Typical power panel | P _{TYP} | | - | 400 | - | mW |
| Operating temperature | | | 0 | - | 50 | °C |
| Storage temperature | | | -25 | - | 70 | °C |
| Maximum image update time at 25°C | | | - | 1000 | - | ms |

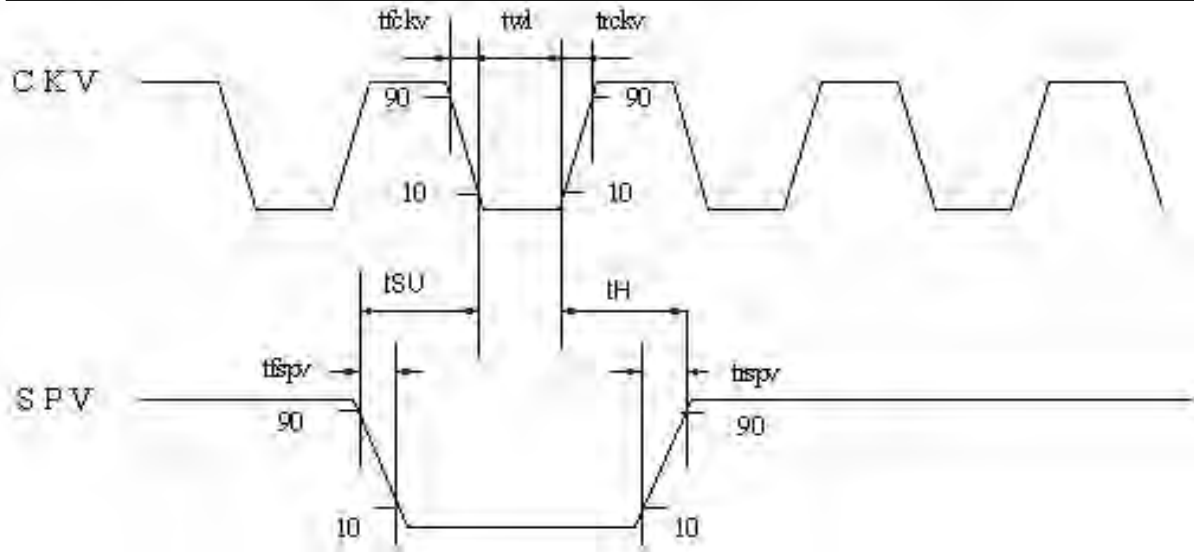
- The maximum power and maximum currents are specified for the worst case power consumption.
- The typical power is measured when “typical images” are displayed
- The standby power is the consumed power when the panel controller is in standby mode.
- The listed electrical/optical characteristics are only guaranteed under the controller & waveform provided by PVI.

6-3)Panel AC characteristics

VDD=3.0V to 3.6V, unless otherwise specified.

| Parameter | Symbol | Min. | Typ. | Max. | Unit | App Pin |
|-------------------------------|--------|------|------|------|------|----------------|
| Clock frequency | fckv | | | 200 | kHz | CKV |
| Minimum "L" clock pulse width | twL | 0.5 | | | us | |
| Clock rise time | trckv | | | 100 | ns | |
| Clock fall time | tfckv | | | 100 | ns | |
| Data setup time | tSU | 100 | | | ns | CKV, SPV |
| Data hold time | tH | 100 | | | ns | |
| Pulse rise time | trspv | | | 100 | ns | SPV |
| Pulse fall time | tfspv | | | 100 | ns | |
| Clock CL cycle time | tcy | 50 | | DC | ns | Below table |
| D0 .. D7, SPH setup time | tsu | 8 | | | ns | |
| D0 .. D7, SPH hold time | th | 1 | | | ns | |
| LE on delay time | tLEdly | 40 | | | ns | |
| LE high-level pulse width | tLEw | 40 | | | ns | |
| LE off delay time | tLEoff | 40 | | | Ns | |

CLOCK & DATA TIMING

OUTPUT LATCH CONTROL SIGNALS




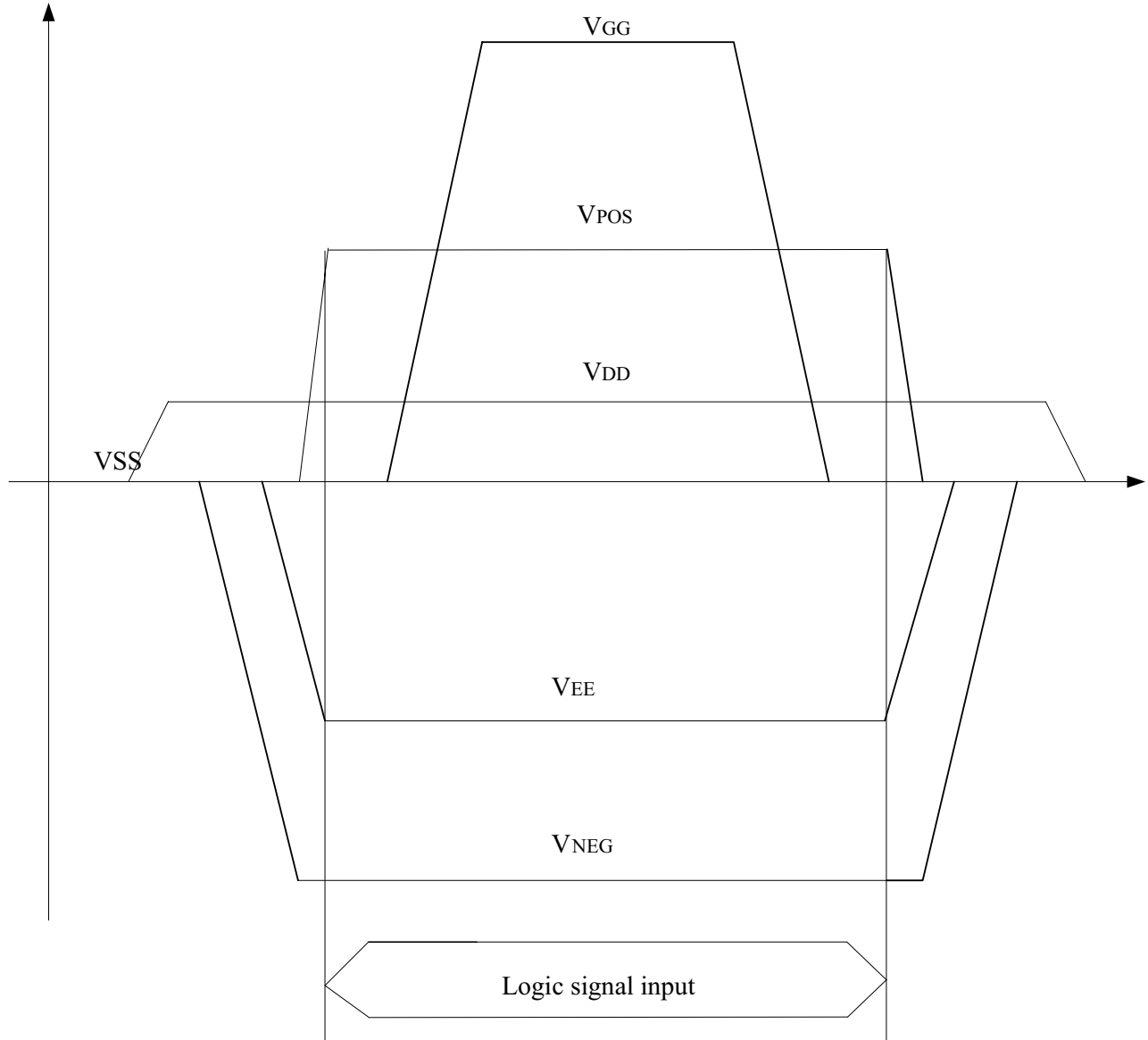
6-4) Power Consumption

| Parameter | Symbol | Conditions | TYP | Max | Unit | Remark |
|--|--------|------------|-----|------|------|--------|
| Maximum panel power consumption during update. | - | - | - | 1100 | mW | |
| Power consumption in standby mode | - | - | - | 0.4 | mW | |
| Typical panel power | - | - | 400 | - | mW | |

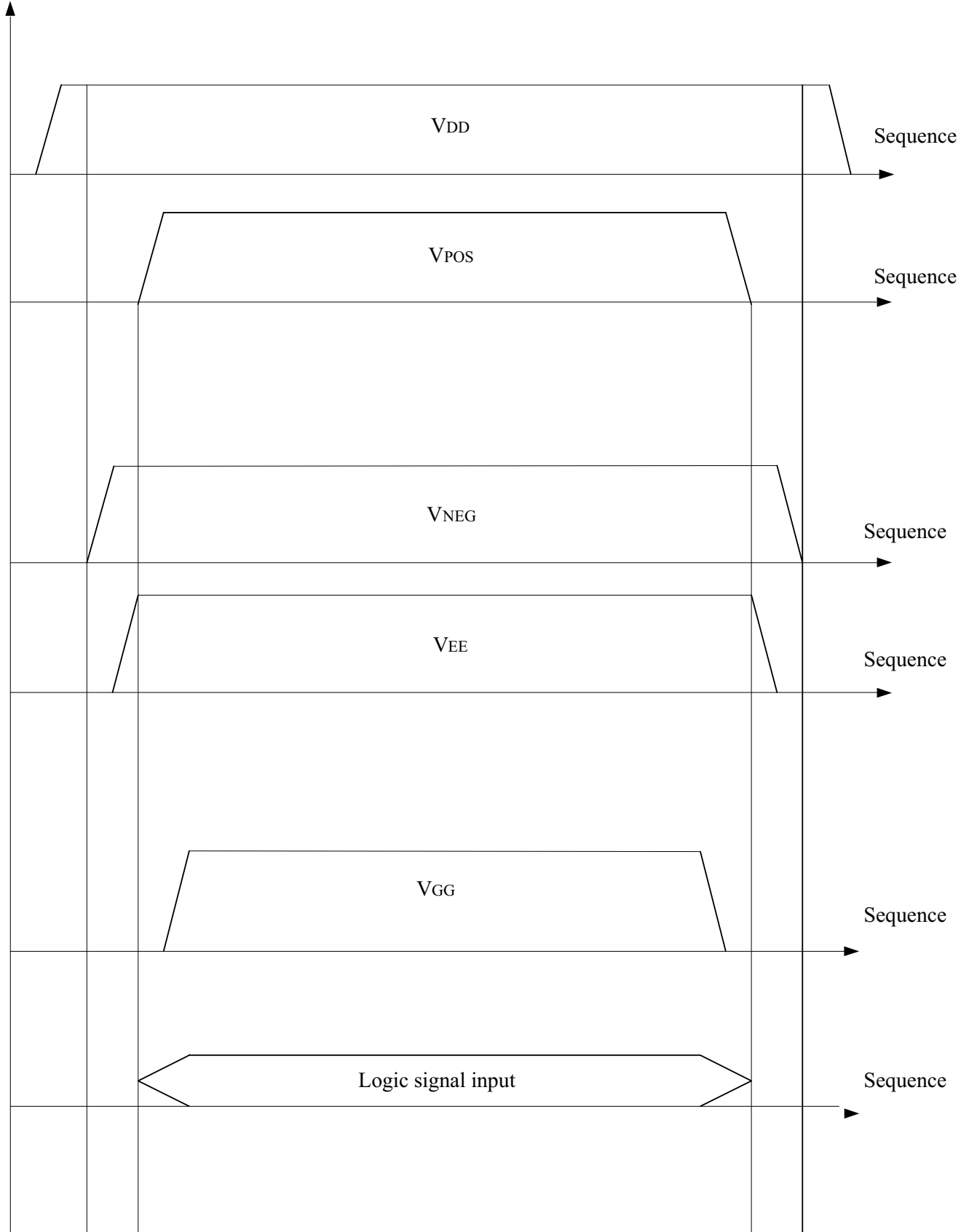
7. Power on Sequence

1. VSS → VDD → VNEG → VPOS (Source driver)
2. VEE → VGG(Gate driver)

* Power on sequence's timing chart as blew :



* It is expanded as blew.



8. Optical characteristics

8-1) Specifications

Measurements are made with that the illumination is under an angle of 30 degrees, the detection is perpendicular unless otherwise specified.

T = 25°C

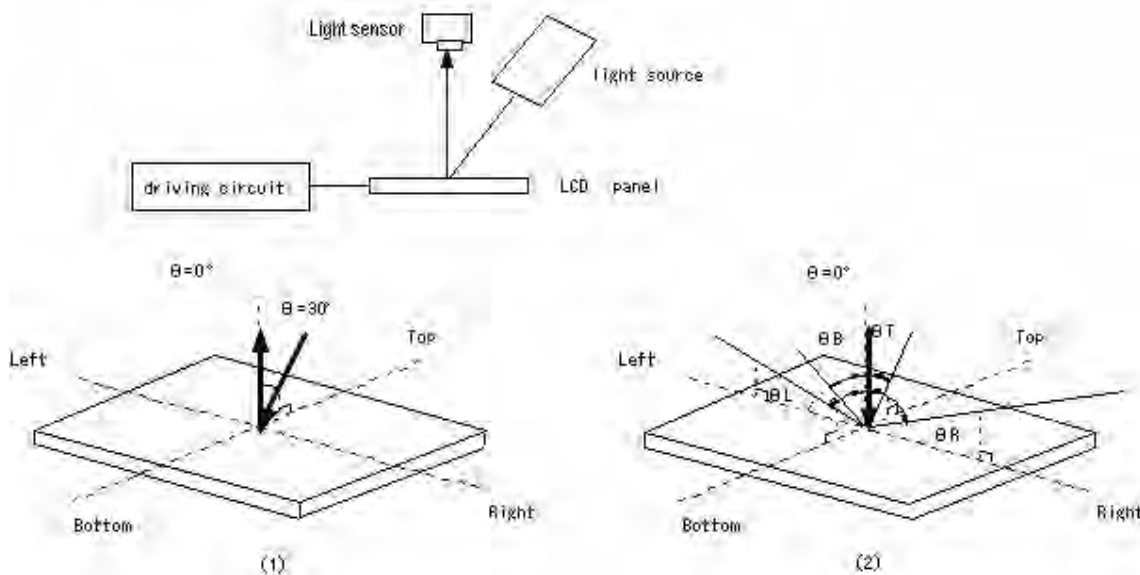
| SYMBOL | PARAMETER | CONDITIONS | MIN | TYP. | MAX | UNIT | Note |
|---------------------|----------------------------|----------------------------|-----|-------------------------------|-----|----------|------|
| R | Reflectance | White | 30 | 35 | - | % | 8-1 |
| G _n | N th Grey Level | - | - | $DS+(WS-DS) \times n / (m-1)$ | - | L* | - |
| CR | Contrast Ratio | - | 6 | - | - | | - |
| T _{update} | Update time | 2~4-bit mode 1-bit mode | | 1000 540 | - | ms ms | - |

WS: White state , DS: Dark state, Gray state from Dark to White :DS 、 G1 、 G2... 、 G_n... 、 G_{m-2} 、 WS
m:4 、 8 、 16 when 2 、 3 、 4 bits mode

8-2) Definition of contrast ratio

The contrast ratio (CR) is the ratio between the reflectance in a full white area (R_I) and the reflectance in a dark area (R_d):

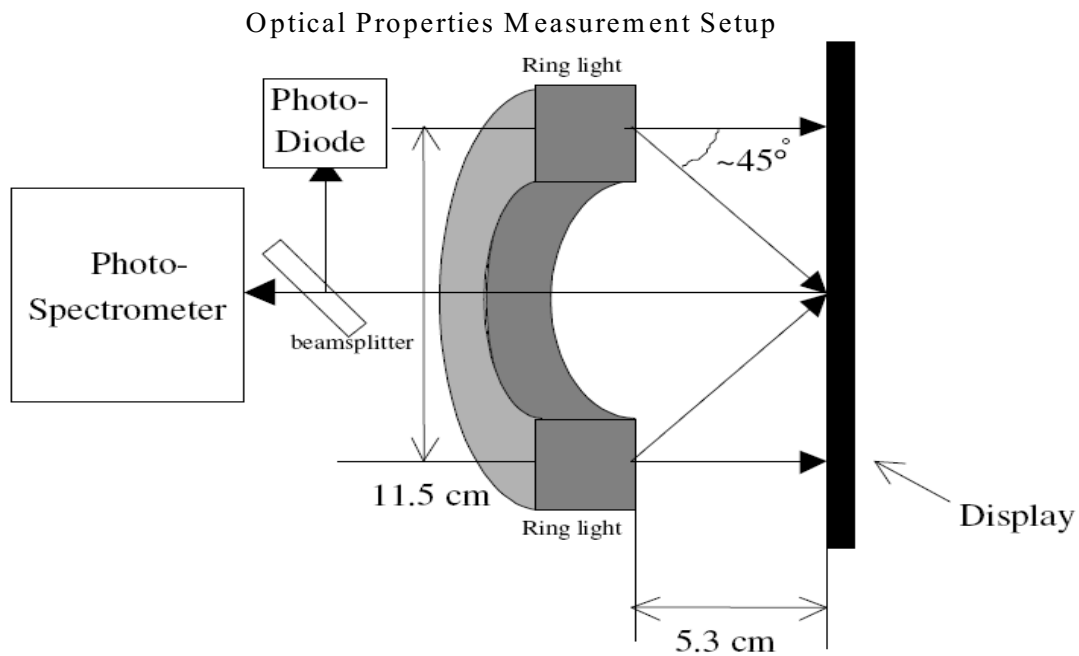
$$CR = R_I / R_d$$



Note 8-1

Luminance meter: Eye-One Pro Spectrophotometer

Only reflectivity effect is counted when using above optical measurement with Eye-One Pro Spectrophotometer .Some scattering effect will be counted in actual visual conditions and the measurement data will be higher. A second optical measurement method and related data by which scattering effect counted are listed for reference.



| Method | SYMBOL | PARAMETER | CONDITIONS | MIN. | Luminance meter | UNIT |
|---------------------------|--------|-------------|------------|------|-------------------------------|------|
| Reflectivity only | R | Reflectance | White | 30 | Eye-One Pro Spectrophotometer | % |
| Reflectivity & scattering | R | Reflectance | White | 35 | EOTS | |

8-3) Reflection Ratio

The reflection ratio is expressed as:

$$R = \text{Reflectance Factor}_{\text{white board}} \times (L_{\text{center}} / L_{\text{white board}})$$

L_{center} is the luminance measured at center in a white area ($R=G=B=1$). $L_{\text{white board}}$ is the luminance of a standard white board. Both are measured with equivalent illumination source (see figure 8.3). The viewing angle shall be no more than 2 degrees.

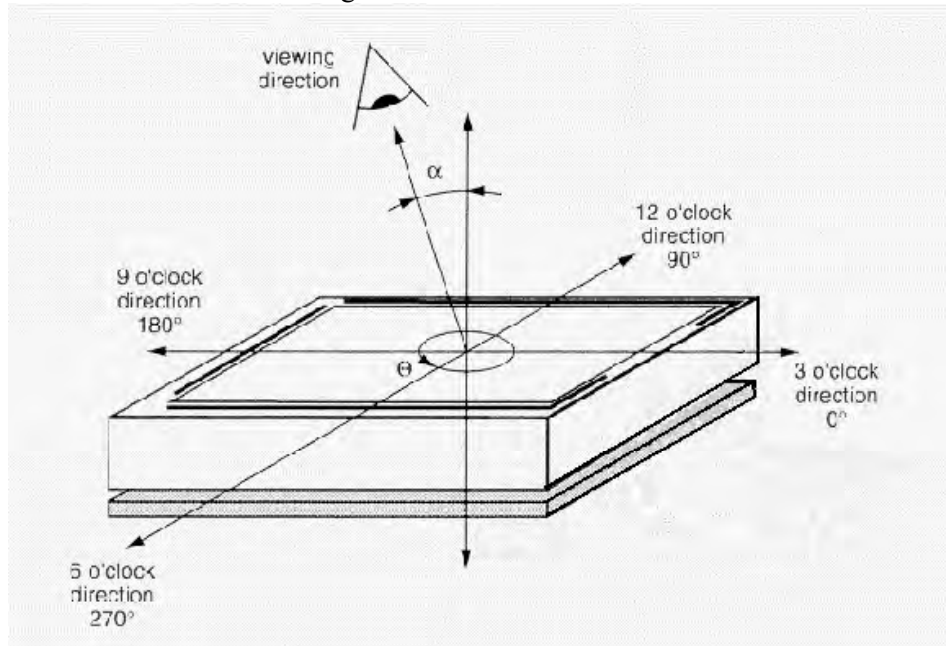


figure 8.3

α = declination / θ = azimuth

8-4) Waveform

- Wave Form file should be available before panel delivery to customer.
- Wave Form file size should be 64Kb
- Ghosting quality is measured by the reflectance difference between specific area and surface.
In MU and GU mode, within 3L*
In GC mode, within 2L*

9.HANDLING, SAFETY AND ENVIROMENTAL REQUIREMENTS

| WARNING |
|--|
| The display glass may break when it is dropped or bumped on a hard surface. Handle with care. Should the display break, do not touch the electrophoretic material. In case of contact with electrophoretic material, wash with water and soap. |

| CAUTION |
|---|
| The display module should not be exposed to harmful gases, such as acid and alkali gases, which corrode electronics components. |
| Disassembling the display module can cause permanent damage and invalidates the warranty agreements. |

Observe general precautions that are common to handling delicate electronic components. The glass can break and front surfaces can easily be damaged. Moreover the display is sensitive to static electricity and other rough environmental conditions.

| Data sheet status | |
|---|--|
| Product specification | This data sheet contains final product specifications. |
| Limiting values | |
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability. | |
| Application information | |
| Where application information is given, it is advisory and does not form part of the specification. | |

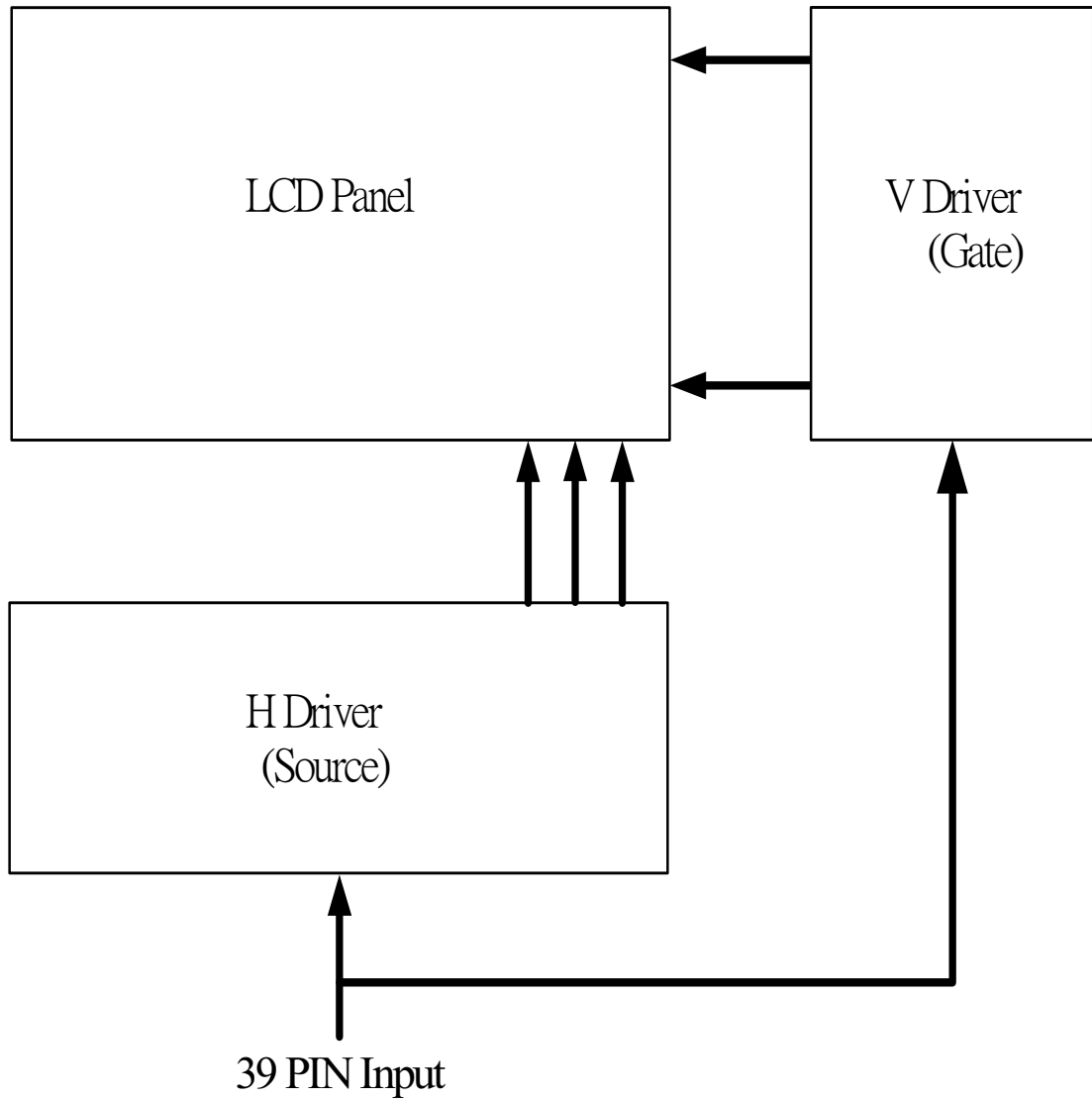
10. Reliability test

| | TEST | CONDITION | METHOD | REMARK |
|----|---|--|--------------------------|--|
| 1 | High-Temperature Operation | T = +50°C, RH = 30% for 240 hrs | IEC 60 068-2-2Bp | At the end of the test, electric, mechanical, and optical specifications shall be satisfied. |
| 2 | Low-Temperature Operation | T = 0°C for 240 hrs | IEC 60 068-2-2Ab | At the end of the test, electric, mechanical, and optical specifications shall be satisfied. |
| 3 | High-Temperature Functional | T = +60°C, RH=26% for 240 hrs | IEC 60 068-2-2Bp | At the end of the test, electric, mechanical, specifications shall be satisfied. |
| 4 | Low-Temperature Functional | T = -10°C for 240 hrs | IEC 60 068-2-2Ab | At the end of the test, electric, mechanical, specifications shall be satisfied. |
| 5 | High-Temperature Storage | T = +70°C, RH=23% for 240 hrs | IEC 60 068-2-2Bp | At the end of the test, electric, mechanical, and optical specifications shall be satisfied. |
| 6 | Low-Temperature Storage | T = -25°C for 240 hrs | IEC 60 068-2-1Ab | At the end of the test, electric, mechanical, and optical specifications shall be satisfied. |
| 7 | High-Temperature, High-Humidity Operation | T = +40°C, RH = 90% for 168 hrs | IEC 60 068-2-3CA | At the end of the test, electric, mechanical, specifications shall be satisfied. |
| 8 | High Temperature, High-Humidity Storage | T = +60°C, RH=80% for 240hrs | IEC 60 068-2-3CA | At the end of the test, electric, mechanical, specifications shall be satisfied. |
| 9 | Temperature Cycle | 1 cycle:[-25°C 30min]→[+70°C 30 min] : 100 cycles | IEC 60 068-2-14 | At the end of the test, electric, mechanical, specifications shall be satisfied. |
| 10 | UV exposure Resistance | 765 W/m ² for 168hrs,40°C | IEC60 068-2-5Sa | Optical characteristics shall be satisfied. |
| 11 | Package Vibration | 1.04G, Frequency: 10~500Hz Direction: X,Y,Z Duration: 1 hours in each direction | Full packed for shipment | At the end of the test, electric, mechanical, and optical specifications shall be satisfied. |
| 12 | Package Drop Impact | Drop from height of 122 cm on concrete surface. Drop sequence: 1 corner, 3 edges, 6 faces One drop for each. | full packed for shipment | At the end of the test, electric, mechanical, and optical specifications shall be satisfied. |
| 13 | Electrostatic Effect (non-operating) | Machine model +/- 250V, 0Ω, 200pF | IEC 62179, IEC 62180 | At the end of the test, electric, mechanical, specifications shall be satisfied. |
| 14 | Altitude test Operation | 700hPa (= 3000m) 48Hr | | At the end of the test, electric, mechanical, specifications shall be satisfied. |

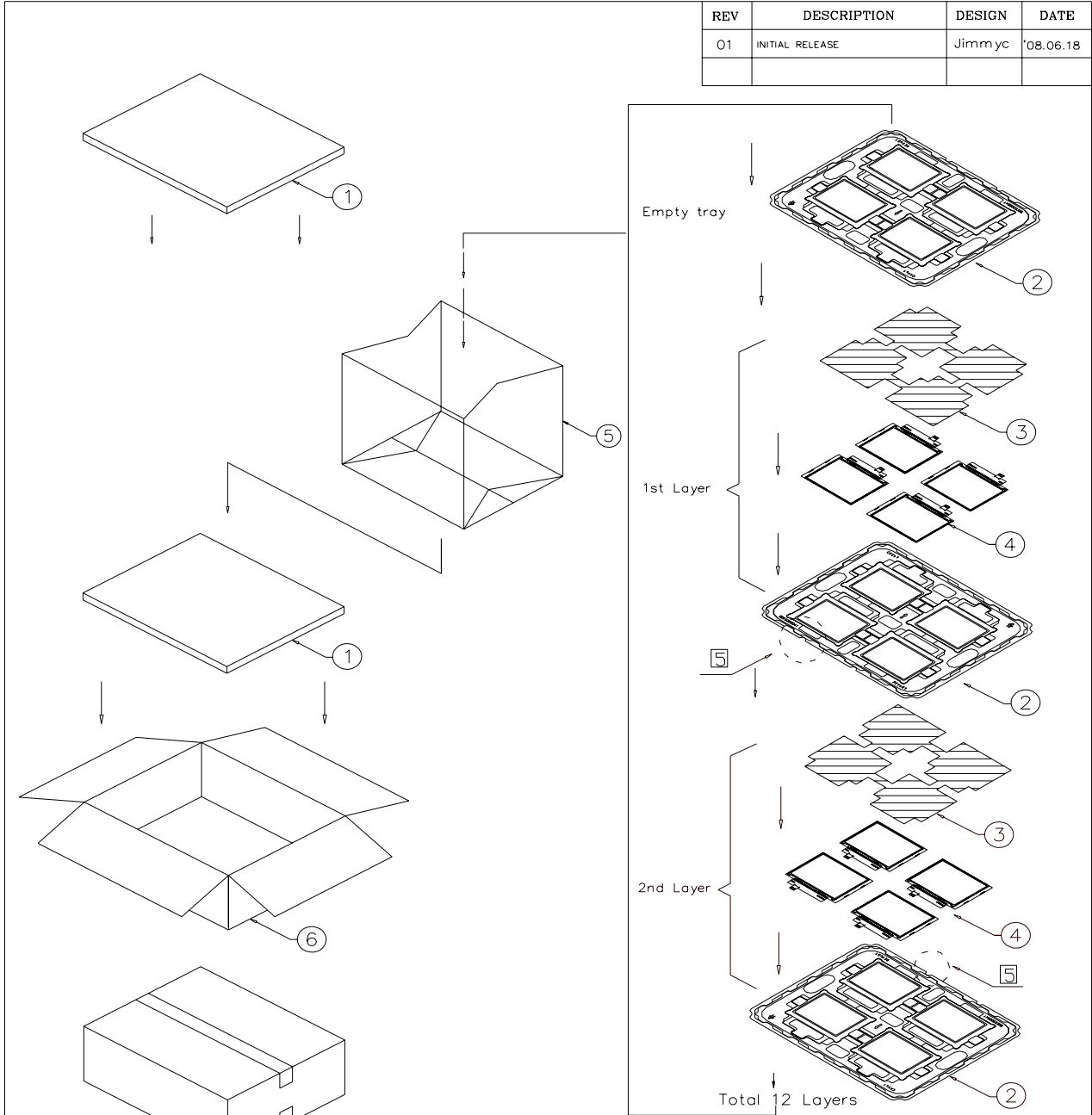
| | | | | |
|----|--------------------------|---|--|--|
| 15 | Altitude test Storage | 260hPa (= 10000m) 48Hr | | At the end of the test, electric, mechanical, specifications shall be satisfied. |
| 16 | Stylus Tapping | POLYACETAL Pen: Top R0.4mm Load: 300gf Speed: 5times/sec Total 13,500times, | | Pass criteria – no glass breakage or damage to microcapsules. |

Actual EMC level to be measured on customer application

11. Block Diagram



12.Packing



| REV | DESCRIPTION | DESIGN | DATE |
|-----|-----------------|--------|-----------|
| 01 | INITIAL RELEASE | Jimmyc | '08.06.18 |

NOTE:
 1. One layer include: 1 piece of cushion sheet, 4pcs panel & 1 piece of tray.
 2. QTY: 48 pcs panel/carton.
 3. Dimension: 455*375*190mm
 4. Weight: 4.7 KG
 5. tray 需180°交叉堆疊，疊堆後可從側邊檢視圓弧防呆方向是否正確

| | | | | |
|------|------------|-------------------|-----|--------|
| 6 | 50-0100091 | CARTON INTERNAL | 1 | |
| 5 | 50-0500041 | 摺口袋450*380*700mm | 1 | 抗靜電 |
| 4 | | ED060SC4 Panel | 48 | |
| 3 | 50E0200021 | EPE CUSHION SHEET | 12 | 抗靜電 |
| 2 | 50E0300041 | PS TRAY | 13 | 抗靜電 |
| 1 | 50-0300491 | EPE FOAM | 2 | |
| ITEM | PART NO. | DESCRIPTION | QTY | REMARK |

| | | | | | | | |
|-----------|------------|-------------------|-----|---------|----|---|--------|
| MTL.SPEC. | | UNSPECIFIED TOL'S | | REMARK | | 元太科技股份有限公司 Prime View International Co.,Ltd. | |
| | | ANGLE | | | | | |
| | | ROUGHNESS | | | | DWG.TITLE ED060SC4 PACKING DRAW | |
| APPROVE | Frank Shin | SCALE | 1:1 | UNIT | mm | SHEET | 1 OF 1 |
| CHECK | Frank Shin | MTL.NO. | | DWG.NO. | | REV. | 01 |
| DESIGN | Jimmyc | | | | | SIZE | A4 |