

Version : 1.0

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Http://www.lcdfriends.com

TECHNICAL SPECIFICATION

MODEL NO.: PD104SL1

Customer's Confirmation

Customer Name _____

Date _____

By _____

PVI's Confirmation

Confirmed By _____

Prepared By _____

PRIME VIEW INTERNATIONAL CO.,LTD.
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<http://www.pvi.com.tw>

Date: Aug.01, 2001

This technical specification is subject to change without notice.
Please contact with PVI for more detail information about this specification sheet.

TECHNICAL SPECIFICATION**CONTENTS**

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1. Application

This data sheet applies to a color TFT LCD module, PD104SL1.

PD104SL1 module applies to notebook PC, sub-note-book PC and other OA product, which require high quality flat panel display. **This module is not designed for aerospace, avionics, medical, F/A, transportation, car or any other products, which require extreme level of reliability.**

Prime View assume no responsibility for any damage resulting from the use of the device which dose not comply with the instructions and the precautions in these specification sheet.

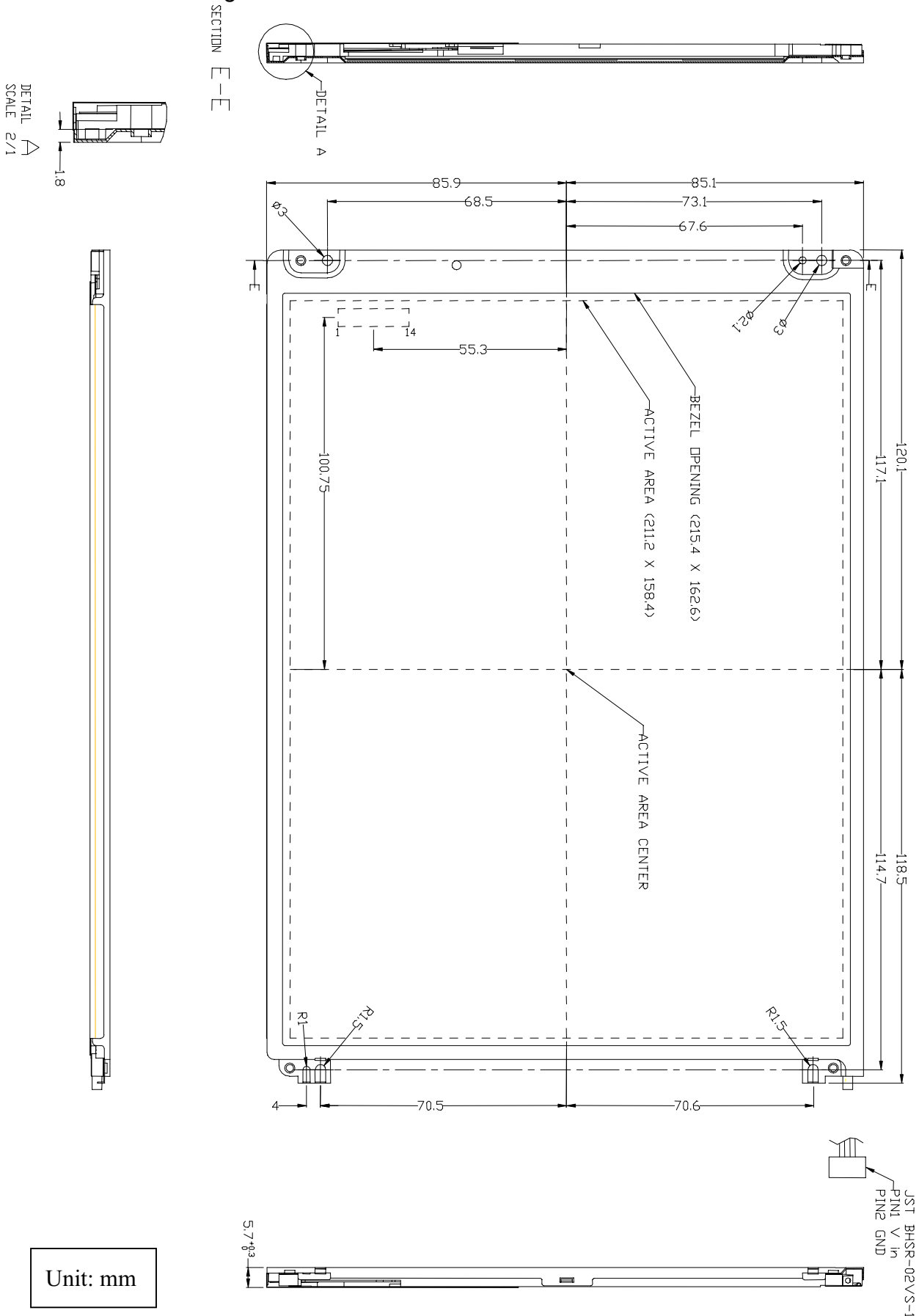
2. Features

- . Amorphous silicon TFT LCD panel with back-light unit
- . Pixel in stripe configuration
- . Slim and compact, designed for O/A application
- . Display Colors : 262,144 colors
- . Optimum Viewing Direction : 6 o'clock
- . 3.3V LVDS interface standard: DS90CF364 as receiver
- . +3.3V DC supply voltage for TFT LCD panel driving
- . Backlight driving DC/AC inverter not included in this module

3. Mechanical Specifications

| Parameter | Specifications | Unit |
|---------------------|------------------------------------|------|
| Screen Size | 26.4(diagonal) | cm |
| | 10.4 (diagonal) | inch |
| Display Format | 800× (R, G, B)× 600 | dot |
| Display Colors | 262,144 | |
| Active Area | 211.2(H)× 158.4 (V) | mm |
| Pixel Pitch | 0.264 (H)× 0.264 (V) | mm |
| Pixel Configuration | Stripe | |
| Outline Dimension | 238.6 (w)× 171.0(H)× 6.0(typ.) (D) | mm |
| Weight | 310(typ.),320(max.) | g |
| Back-light | Single CCFL, side-light type | |
| Surface treatment | Anti-glare and hard-coating | |
| Display mode | Normally white | |

4. Mechanical Drawing of TFT-LCD Module



Unit: mm

5. Input Terminals

5-1) TFT-LCD Panel Driving

Connector type: Molex 55177-1491

| Pin No. | Symbol | Function | Remark |
|---------|--------|---|--------|
| 1 | VDD | Power supply : +3.3V | |
| 2 | VDD | Power supply : +3.3V | |
| 3 | GND | | |
| 4 | GND | | |
| 5 | IN0- | Pixel data Transmission pair 0 (negative -) | |
| 6 | IN0+ | Pixel data Transmission pair 0 (positive +) | |
| 7 | IN1- | Pixel data Transmission pair 1 (negative -) | |
| 8 | IN1+ | Pixel data Transmission pair 1 (positive +) | |
| 9 | IN2- | Pixel data Transmission pair 2 (negative -) | |
| 10 | IN2+ | Pixel data Transmission pair 2 (positive +) | |
| 11 | CLK- | Sampling Clock (negative -) | |
| 12 | CLK+ | Sampling Clock (positive +) | |
| 13 | GND | | |
| 14 | GND | | |

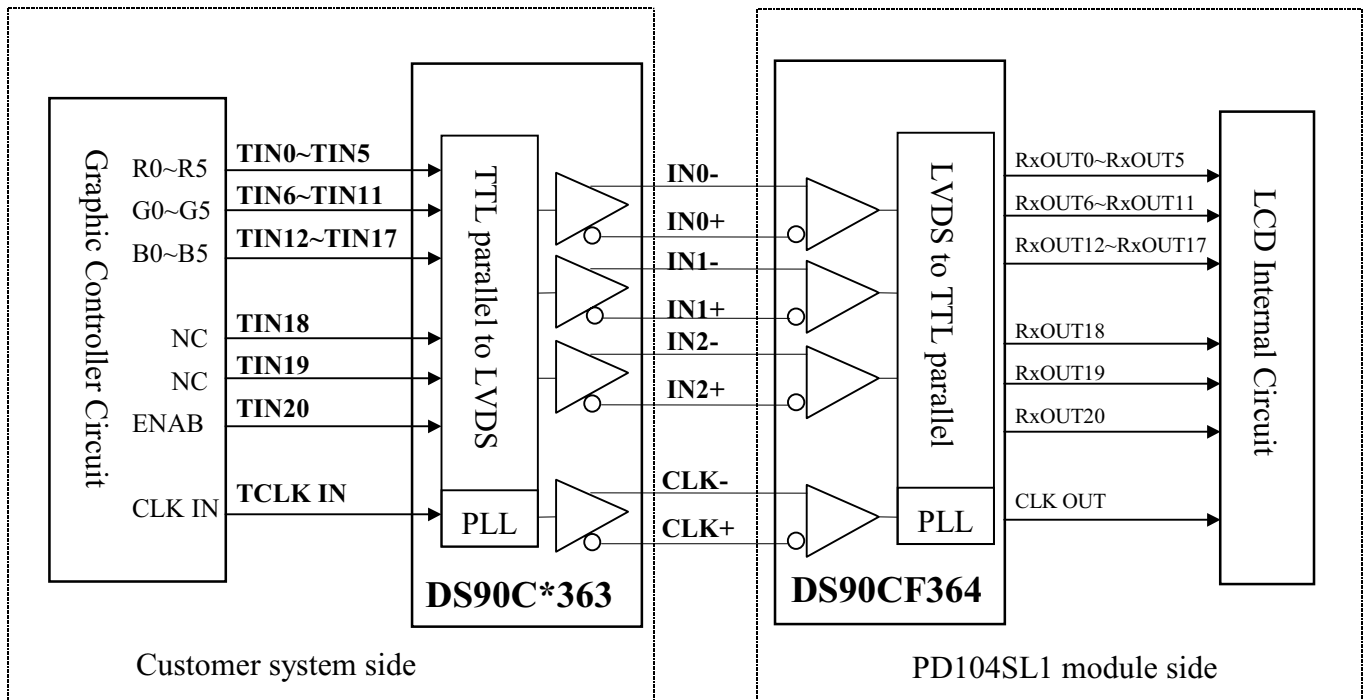
Recommended Transmitter (DS90C*363 of National Semiconductor) to PD104SL1 interface Assignment:

| Input terminal of DS 90C*363 | | Graphic controller output signal | | Output signal symbol | To PD104SL1 interface terminal(Symbol) |
|------------------------------|-----|----------------------------------|---------------------------------|------------------------|--|
| Symbol | No. | Symbol | Function | | |
| TIN0 | 44 | R0 | Red pixel data (LSB) | Tout0- Tout0+ | No.5 : IN0- No.6 : IN0+ |
| TIN1 | 45 | R1 | Red pixel data | | |
| TIN2 | 47 | R2 | Red pixel data | | |
| TIN3 | 48 | R3 | Red pixel data | | |
| TIN4 | 1 | R4 | Red pixel data | | |
| TIN5 | 3 | R5 | Red pixel data(MSB) | Tout1- Tout1+ | No.7 : IN1- No.8 : IN1+ |
| TIN6 | 4 | G0 | Green pixel data (LSB) | | |
| TIN7 | 6 | G1 | Green pixel data | | |
| TIN8 | 7 | G2 | Green pixel data | | |
| TIN9 | 9 | G3 | Green pixel data | | |
| TIN10 | 10 | G4 | Green pixel data | Tout2- Tout2+ | No.9 : IN2- No.10 : IN2+ |
| TIN11 | 12 | G5 | Green pixel data(MSB) | | |
| TIN12 | 13 | B0 | Blue pixel data(LSB) | | |
| TIN13 | 15 | B1 | Blue pixel data | | |
| TIN14 | 16 | B2 | Blue pixel data | | |
| TIN15 | 18 | B3 | Blue pixel data | TCLK out- TCLK out+ | No.11 : CLK IN- No.12 : CLK IN+ |
| TIN16 | 19 | B4 | Blue pixel data | | |
| TIN17 | 20 | B5 | Blue pixel data(MSB) | | |
| TIN18 | 22 | NC | No connection | | |
| TIN19 | 23 | NC | No connection | | |
| TIN20 | 25 | ENAB | Compound Synchronization signal | | |
| CLK in | 26 | NCLK | Data sampling clock | | |

Data stream of IN0-/+, IN1-/+, and IN2-/+, for PD104SL1



LVDS Interface Block Diagram



5-2) Backlight driving

Connector type : "BHR-02VS-1" of Japan Solderless Terminal MFG Co. LTD

| PIN NO. | Symbol | Description | Remark |
|---------|--------|---------------------|--------|
| 1 | VL1 | Input Voltage(High) | |
| 2 | VL2 | Input Voltage(Low) | |

6. Absolute Maximum Ratings:

GND=0V, Ta=25°C

| Parameters | Symbol | MIN. | MAX. | Unit | Remark |
|-----------------------------|-----------------|------|---------|------|----------|
| Supply Voltage | VDD | -0.3 | +4.0 | V | |
| Input Signals Voltage | V _{IN} | -0.3 | VDD+0.3 | V | Note 6-1 |
| Backlight Driving Voltage | V _L | - | 2000 | V | |
| Backlight Driving Frequency | F _L | 0 | 100 | KHz | |
| Storage Temperature | T _{ST} | -20 | +60 | °C | Note 6-2 |
| Operating Temperature | T _{OP} | 0 | +50 | °C | |

Note 6-1: LVDS signal

Note 6-2: Humidity : 90% RH Max. at Ta ≤ 40°C.

Maximum wet-bulb temperature is at 39°C or less at Ta > 40°C and no condensation.

7. Electrical Characteristics

7-1) Recommended Operating Conditions:

GND = 0V , Ta = 25°C

| Item | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|------------------|------|------|------|------|---|
| Supply Voltage | VDD | 3.0 | 3.3 | 3.6 | V | |
| Current Dissipation | I _{DD} | - | 350 | 500 | mA | Note 7-1 |
| LVDS Differential input high threshold | V _{TH} | - | - | 100 | mV | Note 7-2 |
| LVDS Differential input low threshold | V _{TL} | -100 | - | - | | |
| Lamp Current | I _{FL} | 2.0 | 4.0 | 6.0 | mA | 4mA : 140 cd/m ² Note 7-3 Note 7-5 |
| Lamp Voltage | V _L | 500 | 550 | 600 | Vrms | I _{FL} =5mA Note 7-3 |
| Lamp Initial Voltage | V _{SFL} | - | 1200 | - | Vrms | at Ta=25°C 1000 at Ta=0°C |
| Lamp Driving Frequency | F _L | - | 45 | - | KHz | |
| Total power consumption (at I _{FL} =4mA) | | - | 3.42 | - | W | Note 7-4 |
| (at I _{FL} =6mA) | | - | 4.50 | - | | |

Note 7-1 : To test the current dissipation of VDD, using the “color bars” testing pattern shown as below

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|

1. White
2. Yellow
3. Cyan
4. Green
5. Magenta
6. Red
7. Blue
8. Black

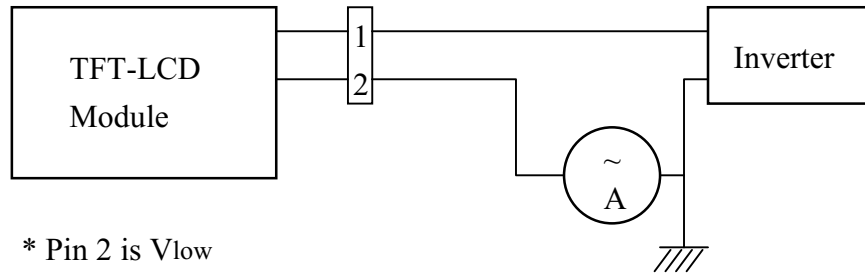
I_{DD} current dissipation testing pattern

Note 7-2 : Please refers to DS90CF364 specification by National Semiconductor Corporation.
This LCD module conforms to LVDS standard.

Note 7-3 : The back-light driving waveform should be as closed to sine-wave as possible

Note 7-4 : Not including the efficiency of backlight DC/AC inverter

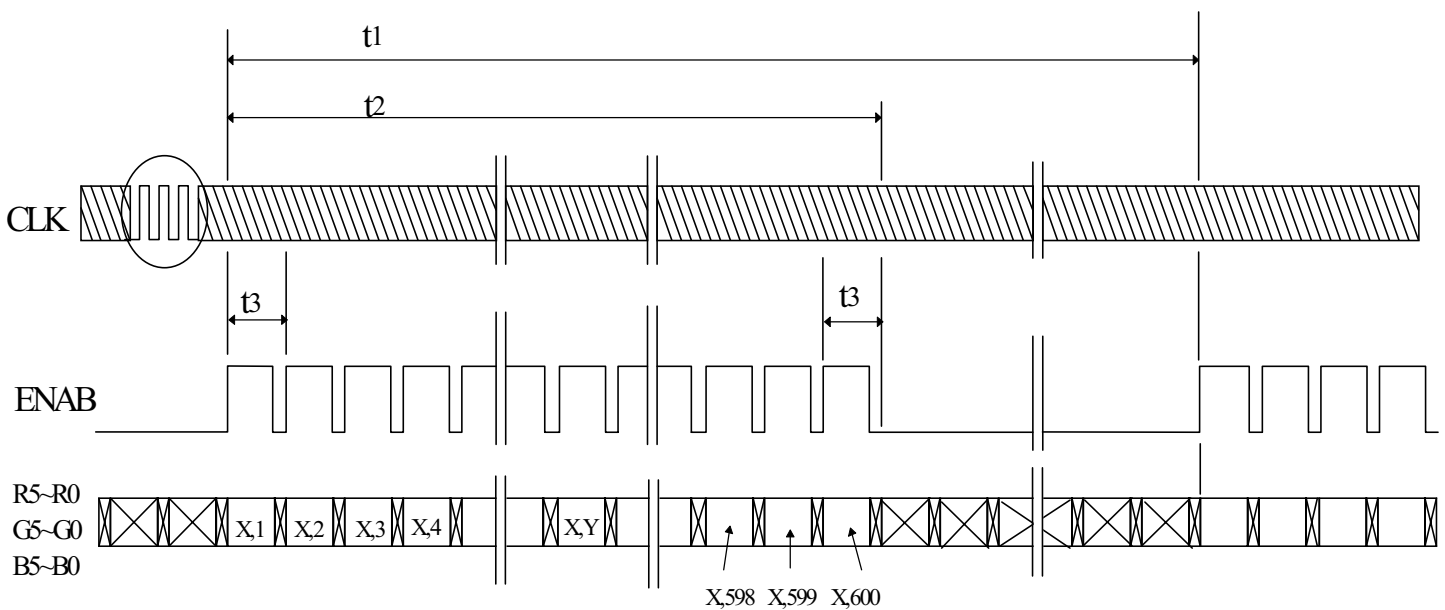
Note 7-5 : Lamp current is measured with current meter for high frequency as shown below



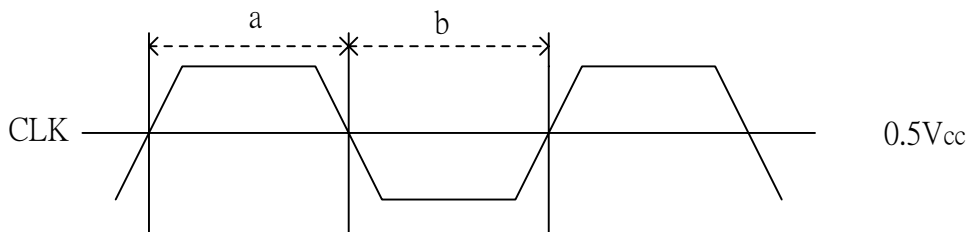
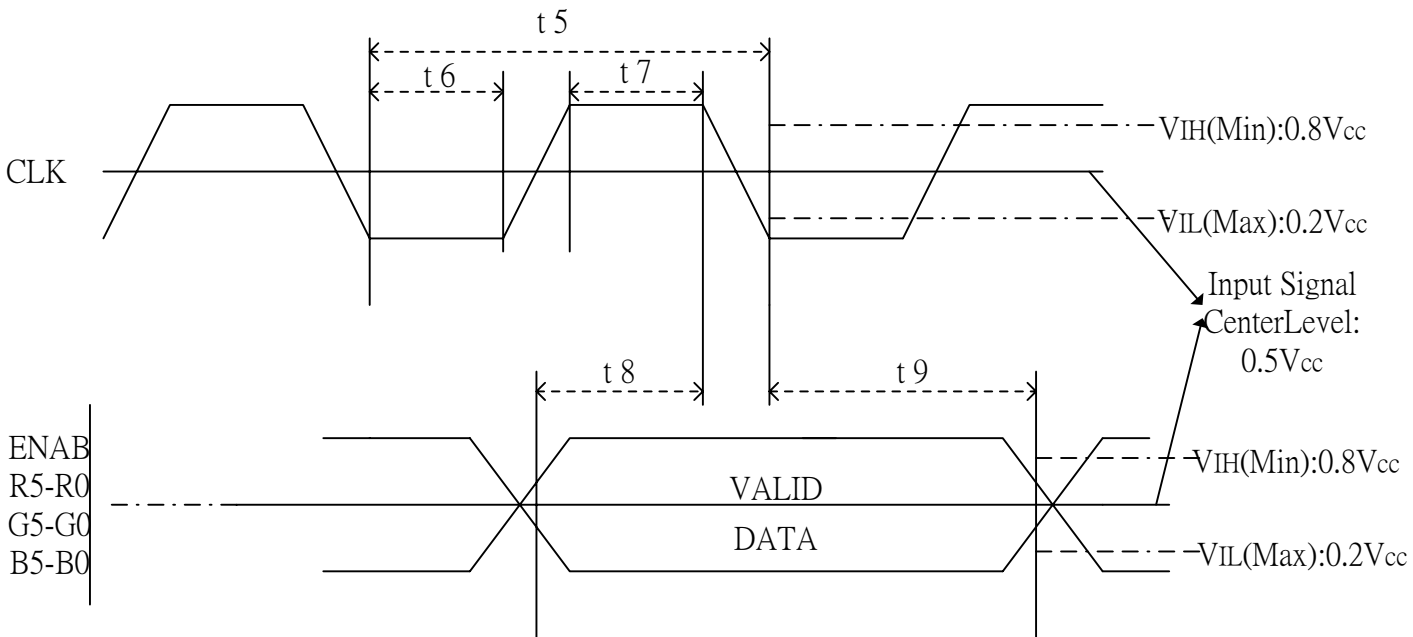
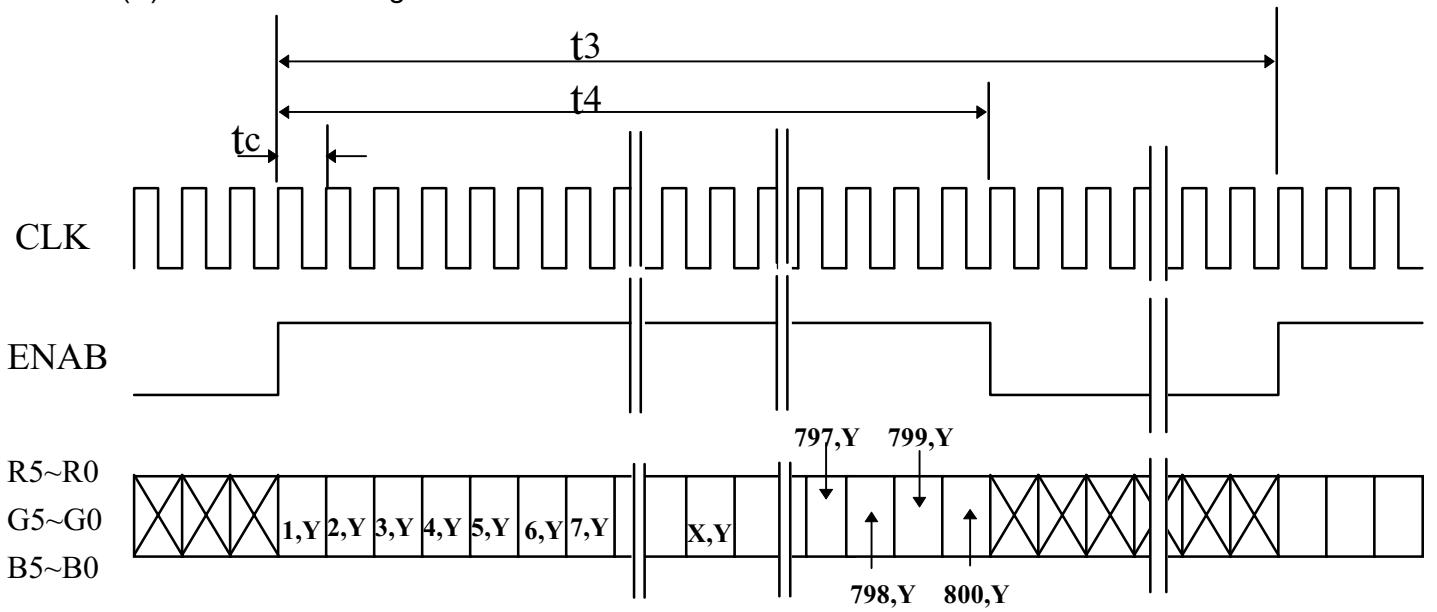
* Pin 2 is Vlow
** Current meter :
Yokogawa 2016-01

Lamp current dissipation testing configuration

7-2) Input / Output signal timing chart
(A) Vertical Timing



(B) Horizontal Timing



Duty (a , b) : $50 \pm 10\%$

D) Timing Specifications

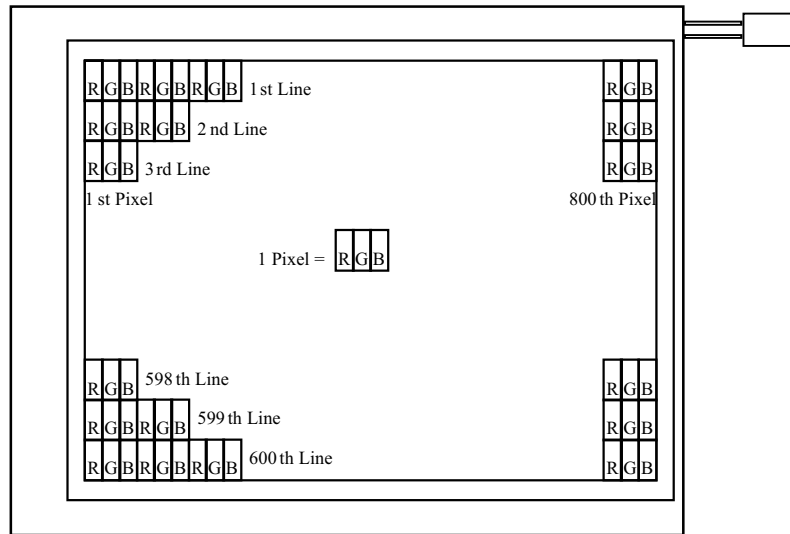
| Item | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---------------------------|--------|----------|-----------|-----------|---------|--------|
| Frame Cycling | t1 | 604 X t3 | 628X t3 | 660 X t3 | - | |
| | | - | 16.58 | 17.86 | ms | |
| Vertical Display Period | t2 | 600 X t3 | 600 X t3 | 600 X t3 | - | |
| Horizontal Scanning Time | t3 | 844 X t5 | 1056 X t5 | 1064 X t5 | - | |
| | | 26.3 | 26.4 | - | μ s | |
| Horizontal Display Period | t4 | - | 800 X t5 | - | - | |
| Clock Cycle | t5 | 24.0 | 25.0 | - | ns | |
| Clock High Level Time | t6 | 9.0 | - | - | ns | |
| Clock Low Level Time | t7 | 9.0 | - | - | ns | |
| Hold time | t8 | 4.0 | - | - | ns | |
| Set-up time | t9 | 5.0 | - | - | ns | |

7-3) Display Color and Gray Scale Reference

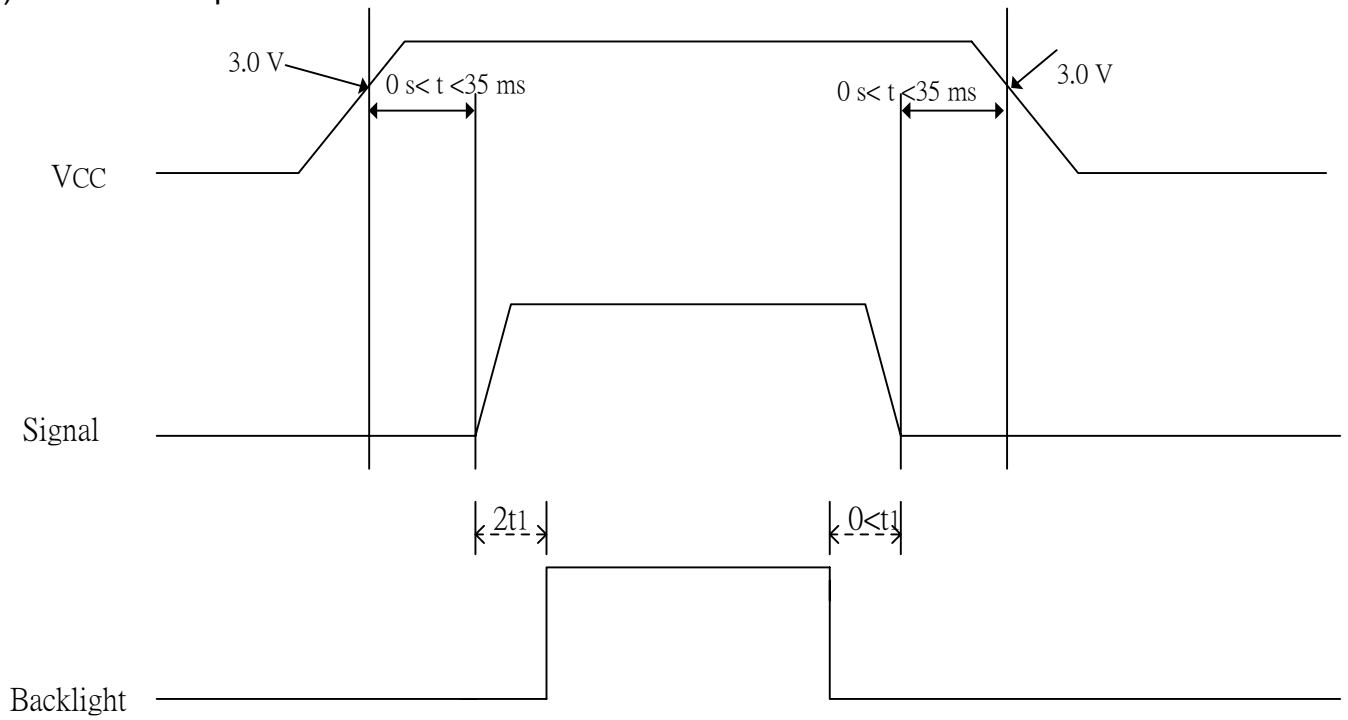
| Color | | Input Color Data | | | | | | | | | | | | | | | | | |
|--------------|------------|------------------|----|----|----|----|----|-------|----|----|----|----|----|------|----|----|----|----|----|
| | | Red | | | | | | Green | | | | | | Blue | | | | | |
| | | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red (63) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green (63) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue (63) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Red | Red (00) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red (01) | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red (02) | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | | | | | | | | | | | | | | | | | | |
| | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| | Brighter | | | | | | | | | | | | | | | | | | |
| | Red (61) | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red (62) | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Red (63) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Green | Green (00) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green (01) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green (02) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | | | | | | | | | | | | | | | | | | |
| | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| | Brighter | | | | | | | | | | | | | | | | | | |
| | Green (61) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green (62) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Green (63) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Blue | Blue (00) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue (01) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Blue (02) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | Darker | | | | | | | | | | | | | | | | | | |
| | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| | Brighter | | | | | | | | | | | | | | | | | | |
| | Blue (61) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| | Blue (62) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| Blue (63) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | |

7-4) Pixel Arrangement

The LCD module pixel arrangement is the stripe.



8.) Power On Sequence



1. The supply voltage for input signals should be same as V_{CC} .
2. When the power is off , please keep whole signals (Hsyno, Vsync, CLK, Data) low level or high impedance

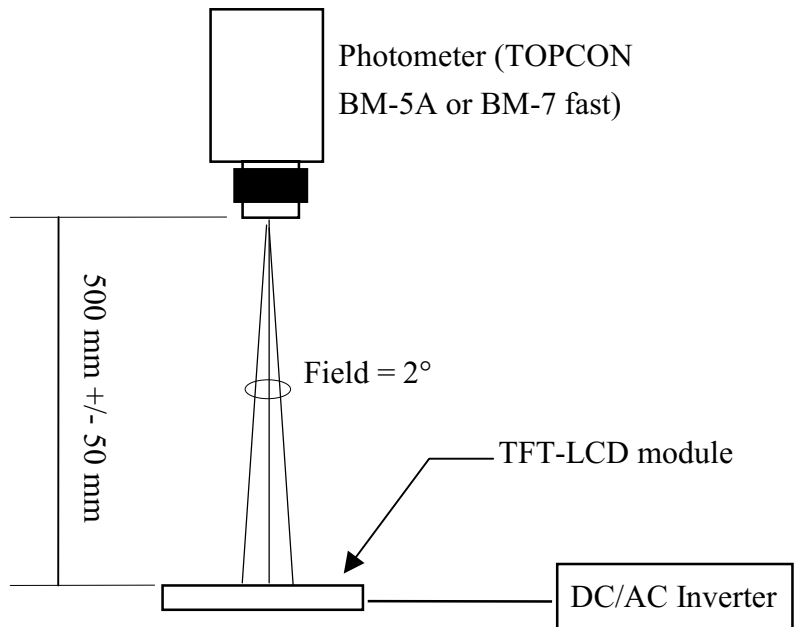
9.) Optical Characteristics

9-1) Specification:

Ta = 25°C

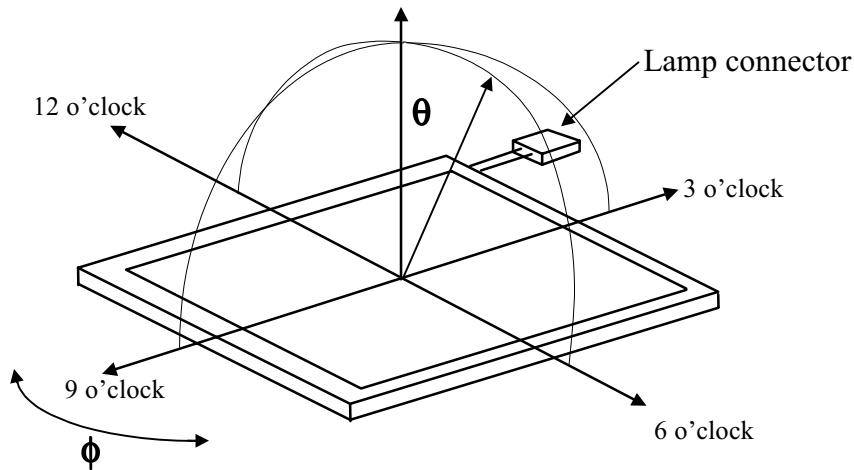
| Parameter | | Symbol | Condition | MIN. | TYP. | MAX. | Unit | Remarks |
|----------------------|------------|--------------------------|--|----------|----------|-------|-------------------|--------------------------------|
| Viewing Angle | Horizontal | θ | CR \geq 10 | ± 35 | ± 45 | - | deg | Note 9-1 |
| | Vertical | θ (to 12 o'clock) | | 10 | 15 | - | deg | |
| | | θ (to 6 o'clock) | | 25 | 40 | - | deg | |
| Contrast Ratio | | CR | Optimum direction | 100 | 180 | - | - | Note 9-2 |
| Response time | Rise | Tr | $\theta = 0^\circ$ | - | 15 | 50 | ms | Note 9-4 |
| | Fall | Tf | $\varphi = 0^\circ$ | - | 25 | 50 | ms | |
| Luminance | | L | $\theta = 0^\circ / \varphi = 0^\circ$ | 110 | 140 | - | cd/m ² | I _{FL} =4mA, Note 9-3 |
| Luminance Uniformity | | U | | 55 | 80 | - | % | Note 9-5 |
| White Chromaticity | | x | | 0.280 | 0.330 | 0.380 | - | |
| | | y | | 0.290 | 0.340 | 0.390 | - | |
| Lamp Life Time | | | | 10000 | - | - | hr | |
| Cross Talk Ratio | | CTK | | - | - | 3.5 | % | Note 9-6 |

All the optical measurement shall be executed 30 minutes after backlight being turn-on. The optical characteristics shall be measured in dark room (ambient illumination on panel surface less than 1 Lux). The measuring configuration shows as following figure.



Optical characteristics measuring configuration

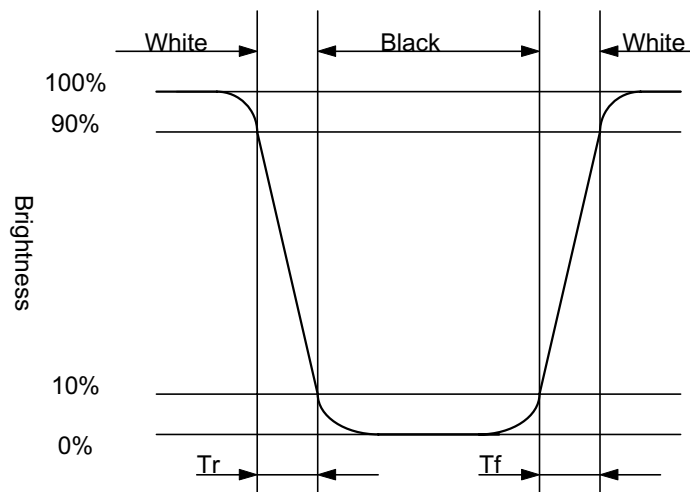
Note 9-1 : The definitions of viewing angles are as follows.



Note 9-2 : The definition of contrast ratio $CR = \frac{\text{Luminance at gray level 63}}{\text{Luminance at gray level 0}}$

Note 9-3 : Topcon BM-5A luminance meter 2° field of view is used in the testing (after 30 minutes' operation). The typical luminance value is measured at lamp current 3.0 mA. The max luminance value is measured at lamp current 6.0 mA.

Note 9-4: Definition of Response Time T_r and T_f :



Note 9-5: The uniformity of LCD is defined as

$$U = \frac{\text{The Minimum Brightness of the 9 testing Points}}{\text{The Maximum Brightness of the 9 testing Points}}$$

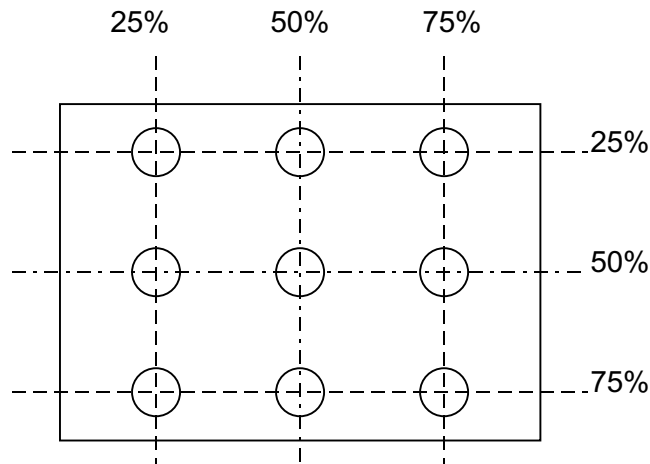
Luminance meter : BM-5A or BM-7 fast(TOPCON)

Measurement distance : 500 mm +/- 50 mm

Ambient illumination : < 1 Lux

Measuring direction : Perpendicular to the surface of module

The test pattern is white (Gray Level 63).



Note 8-6: Cross Talk (CTK) = $\frac{|YA-YB|}{YA} \times 100\%$

YA: Brightness of Pattern A

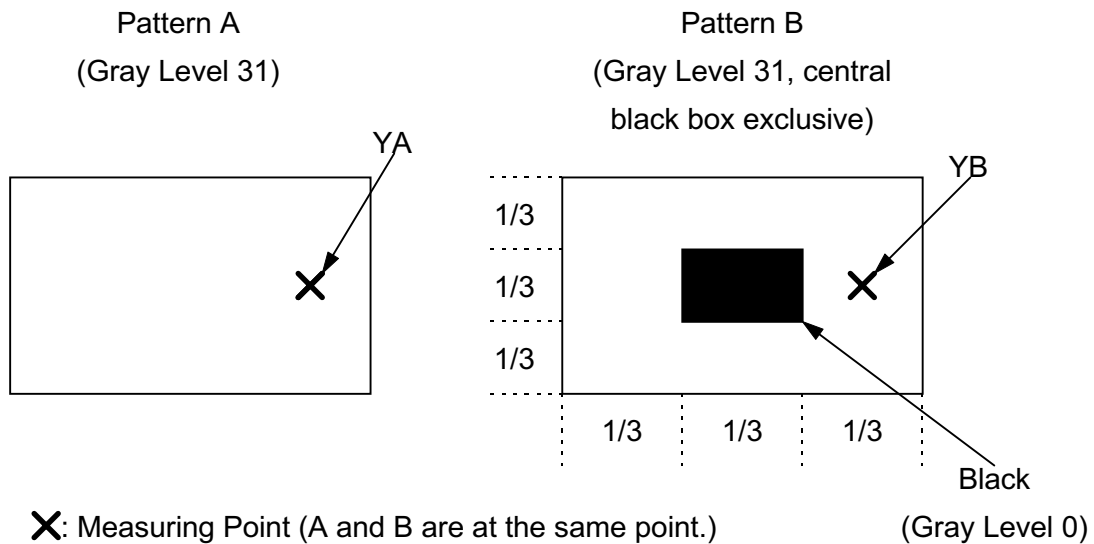
YB: Brightness of Pattern B

Luminance meter : BM 5A (TOPCON)

Measurement distance : 500 mm +/- 50 mm

Ambient illumination : < 1 Lux

Measuring direction : Perpendicular to the surface of module



10. Reliability Test

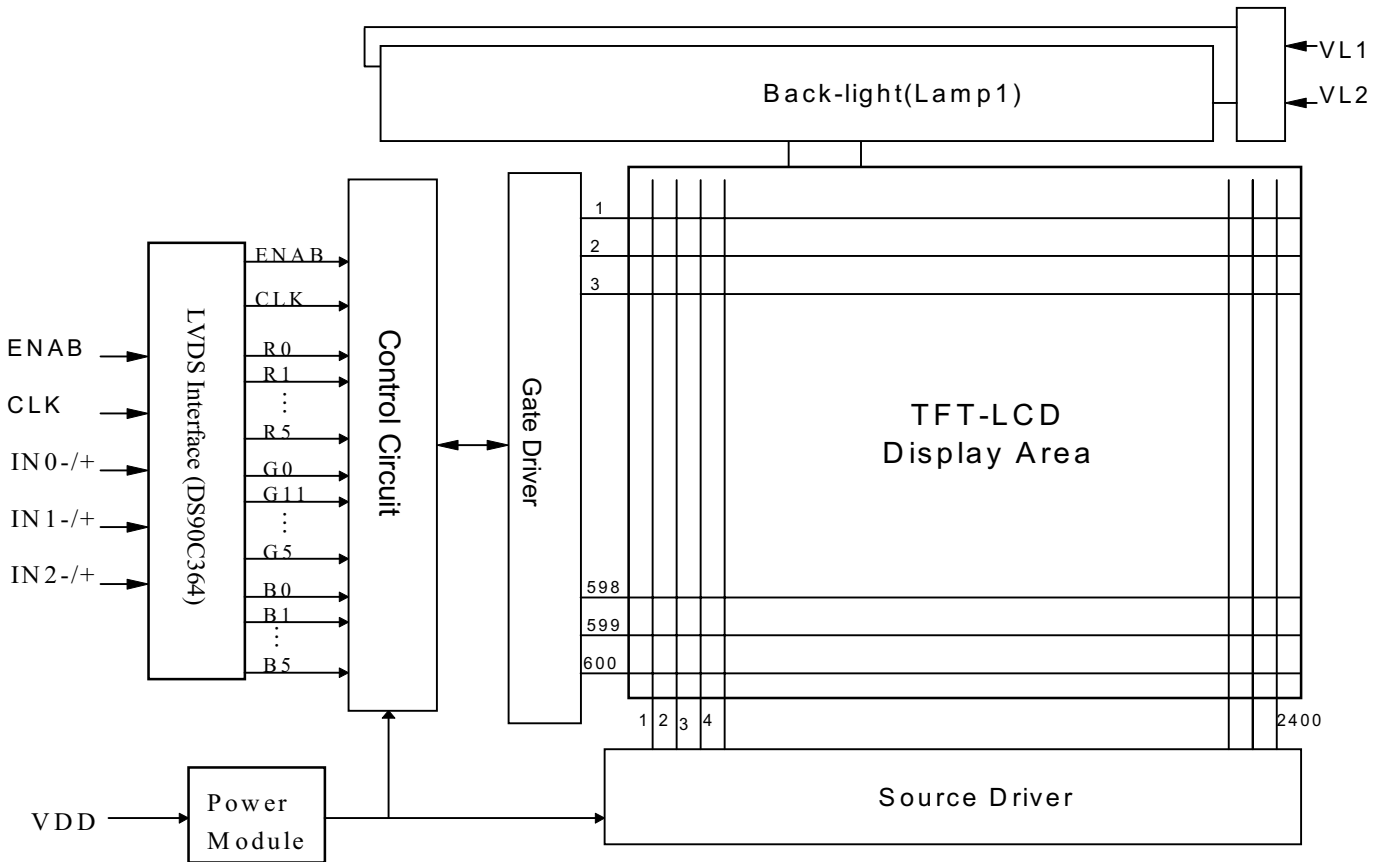
| No | Test Item | Test Condition | Remark |
|----|---|---|--------|
| 1 | High Temperature Storage Test | Ta = +60°C, 240 hrs | |
| 2 | Low Temperature Storage Test | Ta = -20°C, 240 hrs | |
| 3 | Low Temperature Operation Test | Ta = 0°C, 240 hrs | |
| 4 | High Temperature & High Humidity Operation Test | Ta = +50°C, 80%RH, 240 hrs (No Condensation) | |
| 5 | Thermal Cycling Test (non-operating) | 0°C ←→ +25°C ←→ +60°C, 50 Cycles 1Hr 0.5Hr 1Hr | |
| 6 | Vibration Test (non-operating) | Frequency : 10 ~ 57 Hz, Amplitude : 0.15 mm 58~500Hz, 1G Sweep time: 11 min Test Period: 3 hrs (1 hr for each direction of X, Y, Z) | |
| 7 | Shock Test (non-operating) | 80G, 6ms, X,Y, Z 1 times for each direction | |

Ta: ambient temperature

[Judgement Criteria]

Under the display quality test conditions with normal operation state , there should be no change which may affect practical display function.

11.)Block Diagram



12.)Packing

1. 先將成品電源線朝外套入防靜電袋中, 再將防靜電袋向後折並用膠帶貼合。
 2. 再以槍管電源線朝下的方向插入下緩衝材的溝槽裡。
 3. 插入10pcs 成品後, 再套上上緩衝材。
 4. 最後將carton封箱貼附膠帶即可。

| | | | | |
|------|------------|--------------------|-----|--------|
| 5 | 50-0500061 | 防靜電袋 PINK 180*340 | 10 | |
| 4 | V26C8060AA | 10.4" Module | 10 | |
| 3 | 50-0300291 | PP 緩衝材 底座 104 | 1 | |
| 2 | 50-0300301 | PP 緩衝材 上蓋 104 | 1 | |
| 1 | 50-0100151 | CARTON 320*285*335 | 1 | |
| ITEM | PART NO. | DESCRIPTION | QTY | REMARK |

| | | | | | |
|-----------|-----|-------------------|-----------|----------|-----------------|
| MTL.SPEC. | | UNSPECIFIED TOL'S | | REMARK | |
| | | ANGLE | | | |
| | | ROUGHNESS | | | |
| APPROVE | | SCALE | UNIT | SHEET OF | DWG.TITLE |
| CHECK | | | | | 10.4" PACKING |
| DESIGN | 莊孟儒 | MTL.NO. | 04.02.00' | DWG.NO. | REV. 01 A4 SIZE |

元太科技工業股份有限公司
 Prime View International Co.,Ltd.

Revision History

| Rev. | Issued Date | Revised Content |
|------|--------------|-----------------|
| 1.0 | Aug 01, 2001 | New |