

Specification

COM121H9M18SSS

12,1" - 800 x 600 – LVDS

Spec Revision: 2.0
Revision Date: 06.12.2024

Note: This specification is subject to change without prior notice

Specifications for

Blanview TFT-LCD Monitor

(12.1"SVGA 800 x RGB x 600 Landscape)

△ Sunlight readable TFT-LCD Monitor

Version 2.0

(Please be sure to check the specifications latest version.)

MODEL COM121H9M18SSS

Customer's Approval

Signature :

Name :

Section :

Title :

Date :

ORTUSTECH

△ TOPPAN INC.
 Electronics Division
 Technological Development Department IV

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TOPPAN INC.

Version History

| Ver. | Date | Page | Description | |
|--------------|--|---------|--|-----------------|
| 0.0 | May.12,2022 | - | - | Tentative issue |
| 1.0 △ ×10 | Mar.19,2024 | - | - | First issue |
| | | All | All | All |
| | | Change | Company name font | |
| | | P.1 | Cover | |
| | | Change | Department name | |
| | | P.5 | 2.2 Display Method | |
| | | Correct | NTSC ratio | |
| | | P.19 | 7. Characteristics | |
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| | | Add | Remark | |
| | | P.21 | 8.1 Defective Display and Screen Quality | |
| | | Add | Signal condition/Foreign particle | |
| Correct | Dot defect | | | |
| P.23 | 9. Reliability Test | | | |
| Add | number of failures /number of examinations | | | |
| P.24 | 10. Packing Specifications | | | |
| Add | Packing Specifications | | | |
| P.27 | 11.4 Storage Condition for Shipping Cartons | | | |
| Add | Maximum piling up | | | |
| P.28 | 11.5 Precautions for Peeling off the Protective film | | | |
| Add | B)Work Method | | | |
| 2.0 △ ×6 | Dec.6,2024 | P.1 | Cover | |
| | | Add | Model specification | |
| | | Change | Department name | |
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| | | Change | Note | |
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| | | | | |



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1. Application

This Specification is applicable to 307.5 mm (12.1 inch) BlanviewTFT-LCD monitor for non-military use.

- ◎ TOPPAN makes no warranty or assume no liability that use of this Product and/or any information including drawings in this Specification by Purchaser is not infringing any patent or other intellectual property rights owned by third parties, and TOPPAN shall not grant to Purchaser any right to use any patent or other intellectual property rights owned by third parties. Since this Specification contains TOPPAN's confidential information and copy right, Purchaser shall use them with high degree of care to prevent any unauthorized use, disclosure, duplication, publication or dissemination of TOPPAN's confidential information and copy right.
- ◎ If Purchaser intends to use this Products for an application which requires higher level of reliability and/or safety in functionality and/or accuracy such as transport equipment (aircraft, train, automobile, etc.), disaster-prevention/security equipment or various safety equipment, Purchaser shall consult TOPPAN on such use in advance.
- ◎ This Product shall not be used for application which requires extremely higher level of reliability and/or safety such as aerospace equipment, telecommunication equipment for trunk lines, control equipment for nuclear facilities or life-support medical equipment.
- ◎ It must be noted as an mechanical design manner, especial attention in housing design to prevent arcuation/flexure caused by stress to the LCD module shall be considered.
- ◎ TOPPAN assumes no liability for any damage resulting from misuse, abuse, and/or miss-operation of the Product deviating from the operating conditions and precautions described in the Specification.
- ◎ It shall be mutually conferred if nonconforming defect which result from unspecified cause in this specification arises.
- ◎ If any issue arises as to information provided in this Specification or any other information, TOPPAN and Purchaser shall discuss them in good faith and seek solution.
- ◎ TOPPAN assumes no liability for defects such as electrostatic discharge failure occurred during peeling off the protective film or Purchaser's assembly process.
- ◎ This Product is compatible for RoHS(2.0) directive.

| Object substance | Maximum content [ppm] |
|--|-----------------------|
| Cadmium and its compound | 100 |
| Hexavalent Chromium Compound | 1000 |
| Lead & Lead compound | 1000 |
| Mercury & Mercury compound | 1000 |
| Polybrominated biphenyl series (PBB series) | 1000 |
| Polybrominated biphenyl ether series (PBDE series) | 1000 |
| Bis(2-ethylhexyl)phthalate series(DEHP series) | 1000 |
| Butyl benzyl phthalate series(BBP series) | 1000 |
| Dibutyl phthalate series(DBP series) | 1000 |
| Diisobutyl phthalate series(DIBP series) | 1000 |

2. Outline Specifications

B 2.1 Features of the Product

- 12.1 inch diagonal display, 800 x RGB [H] x 600 [V] dots.
- 16.7 Million colors / 262 thousand colors.
- Timing generator [TG], Counter-electrode driving circuitry, Built-in power supply circuit.
- High bright white LED back-light, Built-in backlight drive circuit.

| | Indoor | | Outdoor | |
|---------------|-------------|---------------------------------|-------------|---------------------------------|
| | Readability | Power Efficiency (Battery Life) | Readability | Power Efficiency (Battery Life) |
| Transmissive | Good | Good | Average | Poor |
| Transflective | Average | Poor | Good | Good |
| Blanview | Good | Good | Excellent | Excellent |

2.2 Display Method

| Items | Specifications | Remarks |
|---------------------|---|----------------------------|
| Display type | FFS 16.7 Million colors / 262 thousand colors. Normally black. | |
| Driving method | a-Si TFT Active matrix. Line-scanning, Non-interlace. | |
| Dot arrangement | RGB stripe arrangement. | Refer to "Dot arrangement" |
| Signal input method | VESA/JEIDA LVDS Interface. | |
| Backlight type | High bright white LED. | |
| NTSC ratio | 50% | |

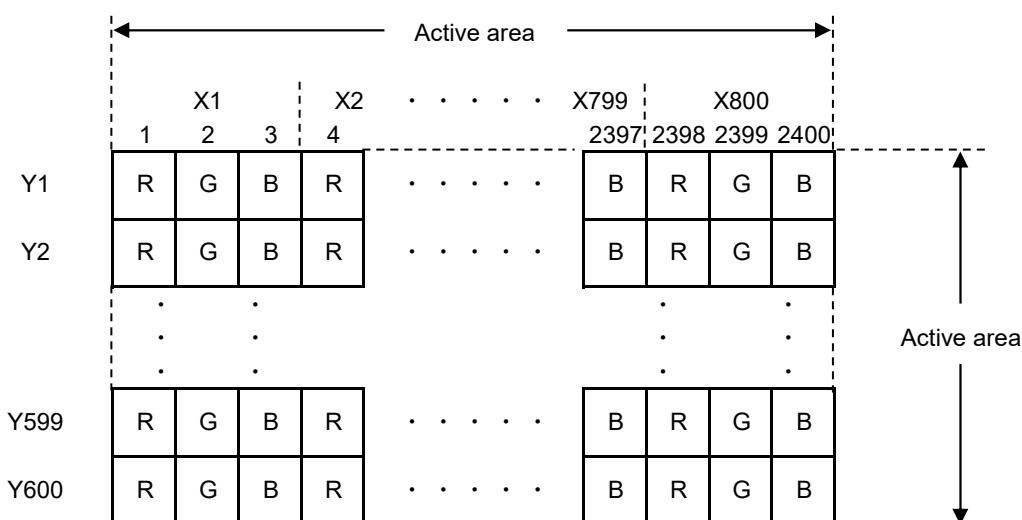


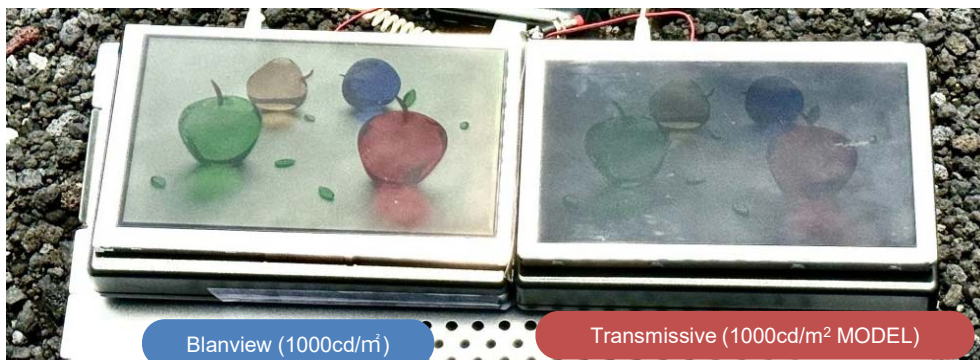
Fig.1 Dot arrangement



<Features of Blanview>

(A 7.0" WVGA display is shown as a typical sample)

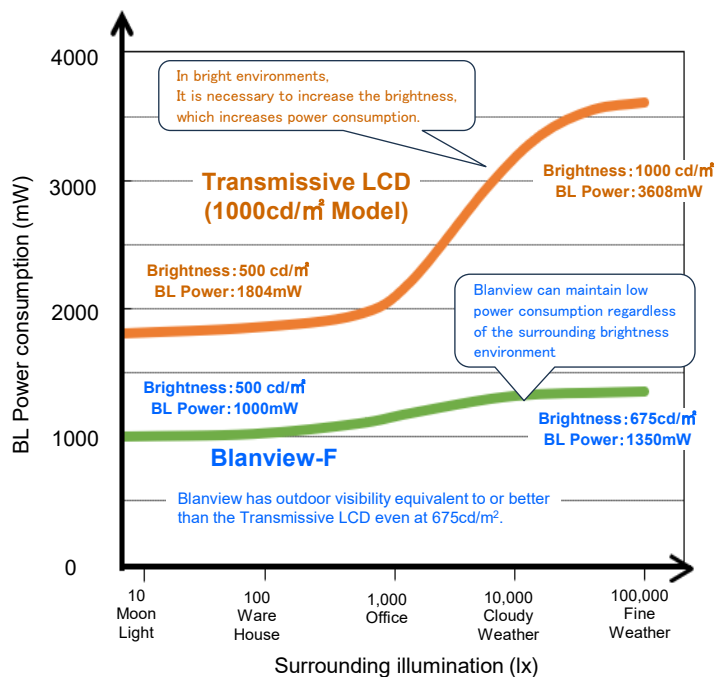
Blanview is a TFT-LCD monitor that achieves sunlight readability with low power consumption.



*Display image comparison photo outdoors (at 100,000lx)

* When compared at the same power consumption, Blanview's contrast at 100,000lx is more than two times higher than that of a transmissive LCD (1000cd/m² model). Blanview's contrast is 17.5, while that of a transmissive LCD is 7.5. Sunlight readability is Good with a contrast of 8 or higher on the TOPPAN index. (Contrast at 100,000lx is reference data.)

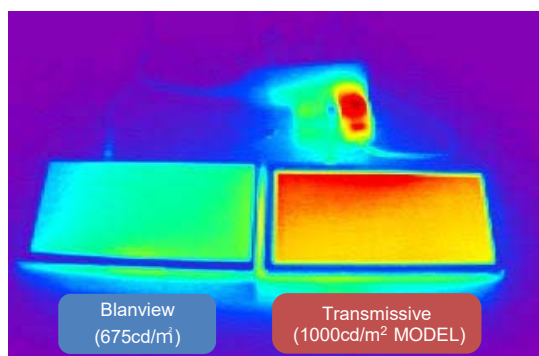
- Backlight power consumption required to assure visibility. (equivalent to 7.0"WVGA)



Sunlight Readable / BL Power comparison

| | Sunlight Readable | BL Power |
|--|-------------------|-----------|
| Transmissive LCD (1000cd/m ² Model) | Average | Poor |
| Blanview-F | Excellent | Excellent |

In bright environment, other companies' products require higher brightness, which increases power consumption, However TOPPAN' Blanview can maintain low power consumption without increasing brightness (visibility is not easily affected by the environment).



*Observation image with thermograph

Transmissive LCD (1000cd/m² MODEL) consume a lot of power, which places a large load on the customer's power circuit, causing problems such as heat generation. Blanview has low power consumption, so it places a low load on the customer's power supply circuit and does not cause any harmful effects such as heat generation.

3. Dimensions and Shape

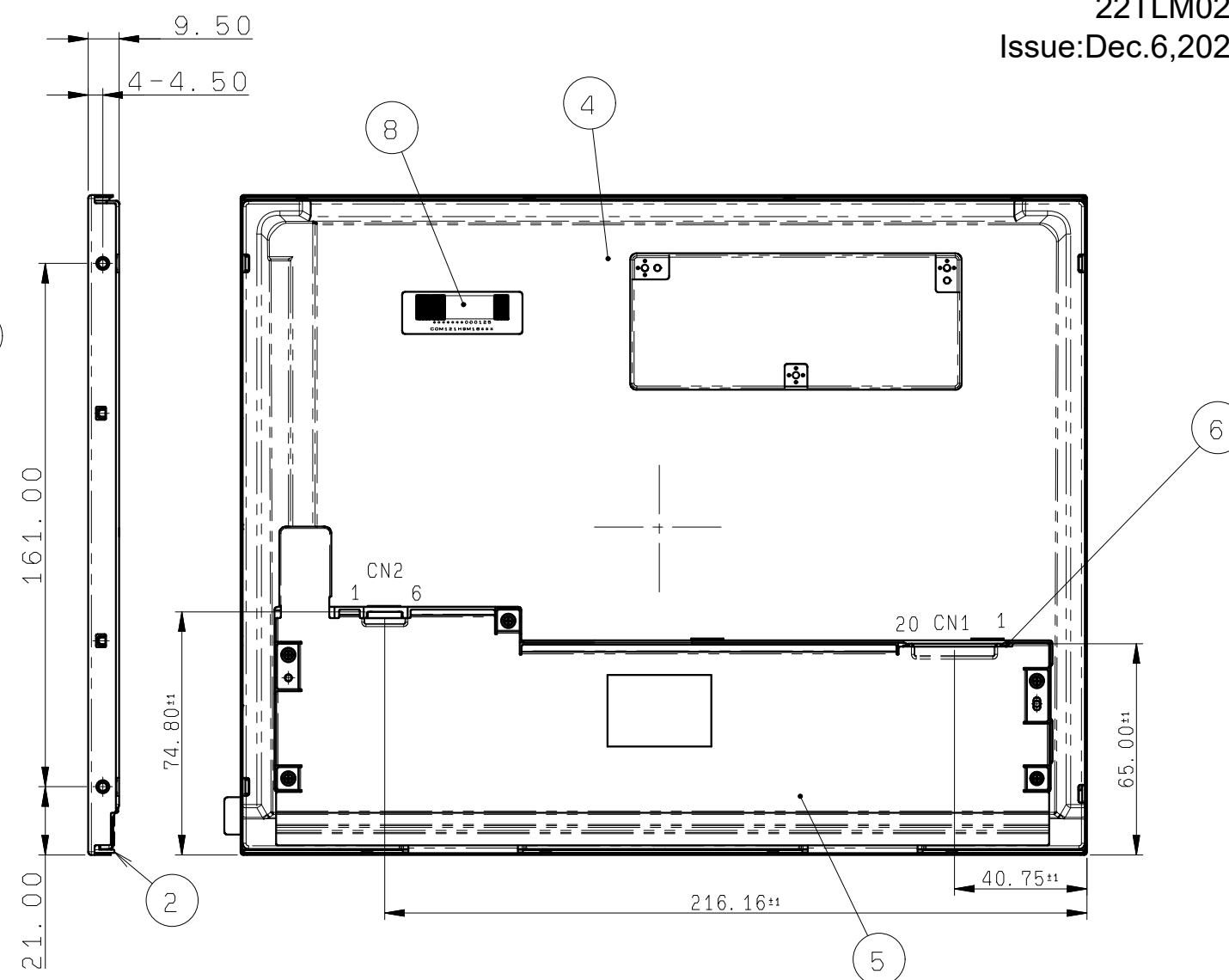
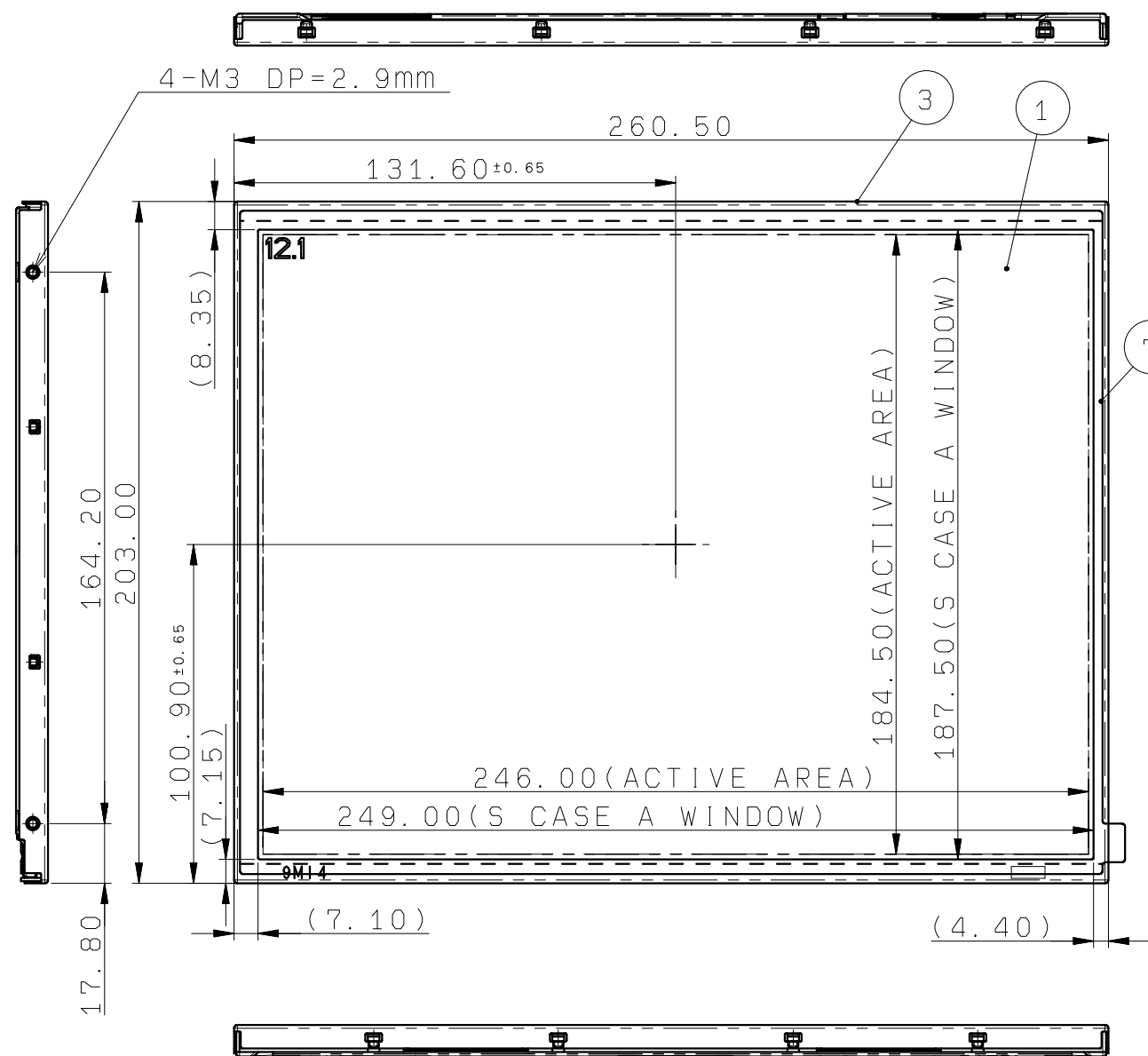
3.1 Dimensions

| Items | Specifications | Unit | Remarks |
|--------------------|---------------------------------|------|-------------------|
| Outline dimensions | 260.5 [H] × 203.0 [V] × 9.5 [D] | mm | |
| Active area | 246.0 [H] × 184.5 [V] | mm | Diagonal 307.5 mm |
| Number of dots | 2400 [H] × 600 [V] | dot | |
| Dot pitch | 102.5 [H] × 307.5 [V] | um | |
| Weight | 500 | g | |

3.2 Outward Form

| EC NO. | REV. NO. | REVISE | DATE (Y:M:D) | APPROVED | CHECKED | PREPARED |
|--------|----------|--------|--------------|----------|---------|----------|
| #### | | | ##:##:## | ## | ## | |

(8/30)
22TLM024
Issue:Dec.6,2024



Note: 1. Connector:
CN1:FI-SEB20P-HFE(JAE)
CN2:FI-S6P-HFE(JAE)
注 1. コネクタ:
CN1:FI-SEB20P-HFE(JAE)
CN2:FI-S6P-HFE(JAE)

Note: 2. Internal thread:
The internal thread part is 0.65 mm inside from the surface.
So the screw length of insert part is longer than 2.2mm
The tightening torque shall be 0.5 Nm or less.

注 2. ねじ部:
めねじ部のねじ山は表面より0.65mm内側にあります。表面から2.2mm以上挿入する設計を推奨します。
締め付けトルクは0.5Nm以下としてください。

| S LABEL | 8 | | | |
|-----------------|------|-----------|-------------------------------------|--------|
| Protective Film | 7 | | | |
| PCB A | 6 | | | |
| S CASE D | 5 | | t=0.3 | |
| S CASE C | 4 | | AL t=0.8 | |
| S CASE A | 3 | | t=0.5 | |
| FRAME | 2 | | PC | |
| TFT PANEL | 1 | | Glass substrate thickness 0.5t+0.5t | |
| PART NAME | ITEM | PART CODE | MODEL NUMBER | REMARK |

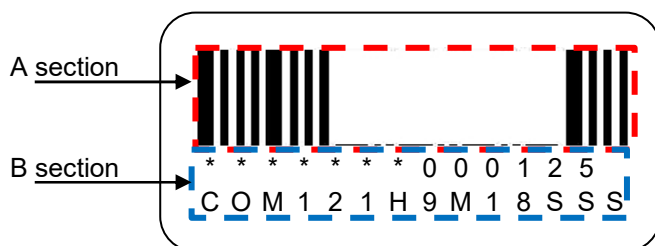
| | | | | |
|---------------|------------------------|----------------------|---------|---|
| APPROVED 木下大輔 | GENERAL TOLERANCE ±0.5 | SCALE 1/2 | UNIT mm | TOPPAN TOPPAN INC. DO NOT DUPLICATE, CONFIDENTIAL AND PROPRIETARY DRAWING No. REV. SHEET DIV. ASS'Y |
| CHECKED 木下大輔 | ISSUE (Y:M:D) 22:04:25 | MODEL CCM121H9M18S** | | |
| CHECKED | NAME | | | |
| DESIGN 木下大輔 | | | | |
| DRAW 木下大輔 | | OUTLINE-D9M18 | | RJD602910D301 # / |

3.3 Serial Label (S-label)

3.3.1 Display Items

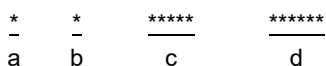
A section : Bar code

B section : Combination of a character



Details of B section

Upper column: It indicates The least significant digit of manufacture year (1 digit), manufacture month with below alphabet (1letter), model code (5characters), serial number (6digits).



| Contents of display | | | | | | | |
|---------------------|---|---|-------|-------|-------|-------|-------|
| a | The least significant digit of manufacture year | | | | | | |
| b | Manufacture month | Jan-A | Mar-C | May-E | Jul-G | Sep-I | Nov-K |
| | | Feb-B | Apr-D | Jun-F | Aug-H | Oct-J | Dec-L |
| c | Model code | 121ES (Made in Japan) 121FS (Made in Malaysia) | | | | | |
| d | Serial number | | | | | | |

* Example of indication of Serial label (S-label)

•Made in Japan

2L121ES000125

means "manufactured in December 2022, 12.1" E type, S specifications, serial number 000125"

•Made in Malaysia

2L121FS000125

means "manufactured in December 2022, 12.1" F type, S specifications, serial number 000125"

Lower column: Model (13characters)

3.3.2 Location of Serial Label (S-label)

Refer to 3.2 "Outward Form".

3.3.3 Others

Bar code readability is excluded from quality assurance coverage.

4. Pin Assignment

LCD_CN

| No. | Symbol | Details |
|-----|--------|---|
| 1 | VCC | Power supply (3.3V) |
| 2 | VCC | Power supply (3.3V) |
| 3 | GND | Ground |
| 4 | GND | Ground |
| 5 | Rx0- | LVDS DATA0(-) |
| 6 | Rx0+ | LVDS DATA0(+) |
| 7 | GND | Ground |
| 8 | Rx1- | LVDS DATA1(-) |
| 9 | Rx1+ | LVDS DATA1(+) |
| 10 | GND | Ground |
| 11 | Rx2- | LVDS DATA2(-) |
| 12 | Rx2+ | LVDS DATA2(+) |
| 13 | GND | Ground |
| 14 | CLK- | LVDS CLK(-) |
| 15 | CLK+ | LVDS CLK(+) |
| 16 | GND | Ground |
| 17 | Rx3- | LVDS DATA3(-) |
| 18 | Rx3+ | LVDS DATA3(+) |
| 19 | MODE | VESA/JEIDA switching terminal (Low: 8bit_JEIDA or 6bit_JEIDA / High: 8bit_VESA) *Note |
| 20 | SC | Display direction switching (Low: Normal display, High: Reverse display) |

- Used connector: FI-SEB20P-HFE (JAE)
- Corresponding connector: FI-S20S[for discrete Wire], FI-SE20ME[for FPC] (JAE)

Note) For 6-bits input, set MODE = 0 (JEIDA) and set pin numbers 17, 18 as the following recommended inputs.

- Enter the Low data of the LVDS transmitter in 17 and 18.
- or
- Connect pin 17 to VCC via 680Ω and pin 18 to GND via 620Ω.

BL_CN

| No. | Symbol | Details | Remark |
|-----|--------|----------------------------------|----------------------|
| 1 | VL | Power supply (12V) | |
| 2 | VL | Power supply (12V) | |
| 3 | GNDL | Ground | |
| 4 | GNDL | Ground | |
| 5 | BLEN | Backlight ON-OFF | High: ON Low: OFF |
| 6 | VPDIM | Light Dimmer Control (PWM) input | High active |

- Used connector: FI-S6P-HFE (JAE)
- Corresponding connector: FI-S6S (JAE)

- Please make sure to check a consistency between pin assignment in "3.2 Outward Form" and your connector pin assignment when designing your circuit.
Inconsistency in input signal assignment may cause a malfunction.

5. Absolute Maximum Rating

| Item | Symbol | Rating | | Unit |
|--|--------|--------|---------|------|
| | | MIN | MAX | |
| LCD Supply Voltage | VCC | -0.3 | 4.0 | V |
| Input Voltage for Logic | VI | -0.3 | VCC+0.3 | V |
| Backlight Power Supply Input Voltage | VL | -0.3 | 14.0 | V |
| Backlight ON-OFF | BLEN | -0.3 | VL | V |
| Light Dimmer Control (PWM) input Voltage | VPDIM | -0.3 | VL | V |
| Operational temperature range Note1 | Top | -30 | 70 | °C |
| Storage temperature range | Tstg | -30 | 80 | °C |

Note1: Panel surface temperature

6. Characteristics

6.1 DC Characteristics

6.1.1 LCD Display Module

(Unless otherwise noted, Ta=25 °C, VCC=3.3V, GND=0V)

| Item | Symbol | Condition | Rating | | | Unit | Applicable terminal |
|-------------------------|---------|------------|---------|-----|---------|------|---------------------|
| | | | MIN | TYP | MAX | | |
| LCD Supply Voltage | VCC | | 3.0 | 3.3 | 3.6 | V | VCC |
| LCD operating current | ICC | Color bars | - | 280 | 560 | mA | VCC |
| Input Voltage for Logic | LCD_VIH | | 0.8×VCC | - | VCC | V | MODE, SC |
| | LCD_VIL | | 0 | - | 0.2×VCC | V | MODE, SC |

6.1.2 Backlight

(Unless otherwise noted, Ta=25 °C, VL=12V, GNDL=0V)

| Item | Symbol | Condition | Rating | | | Unit | Applicable terminal |
|---|------------|-------------------|--------|--------|------|------|---------------------|
| | | | MIN | TYP | MAX | | |
| Supply Input Voltage | VL | | 10.8 | 12.0 | 13.2 | V | VL |
| Supply Input Current | IL | | -- | 450 | 900 | mA | VL |
| Backlight ON-OFF | High_BLEN | ON | 2.0 | -- | VL | V | BLEN |
| | Low_BLEN | OFF | 0 | -- | 0.8 | V | |
| Light Dimmer Control PWM Input Voltage | High_VPDIM | ON | 1.3 | -- | VL | V | VPDIM |
| | Low_VPDIM | OFF | 0 | -- | 0.8 | V | |
| Pull-down resistor | Rpd | | 100 | 300 | 500 | kΩ | BLEN, VPDIM |
| PWM frequency | f PDIM | | 100 | 500 | 1000 | Hz | VPDIM |
| Dimming Rate (PWM Duty) | DR | VL=12.0V | 5 | -- | 100 | % | VPDIM |
| Estimated Life of LED Note | LL | PWM duty =100% | -- | 70,000 | -- | hrs | |

- Note:
- The lifetime of the LED is defined as a period till the brightness of the LED decreases to the half of its initial value.
 - This figure is given as a reference purpose only, and not as a guarantee.
 - This figure is estimated for an LED operating alone. As the performance of an LED may differ when assembled as a monitor together with a TFT panel due to different environmental temperature.
 - Estimated lifetime could vary on a different temperature and usually higher temperature could reduce the life significantly.

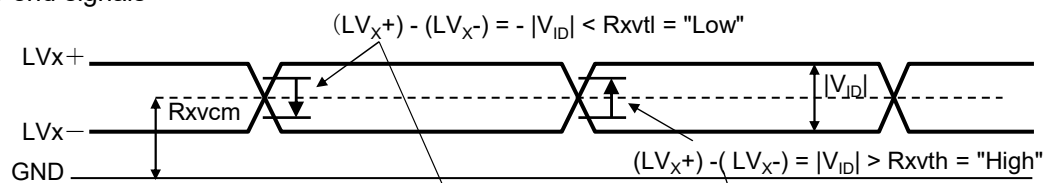
6.2 LVDS Interface

6.2.1 LVDS DC Characteristics

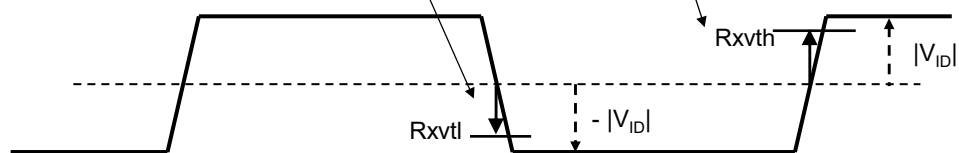
(Unless otherwise noted, $T_a=25\text{ }^\circ\text{C}$, $V_{CC}=3.3\text{V}$, $GND=0\text{V}$)

| Item | Symbol | Condition | Rating | | | Unit | Applicable terminal |
|--|------------|------------------------|--------|-----|------------------|---------------|--|
| | | | MIN | TYP | MAX | | |
| Differential input high threshold | Rxvth | $R_{xvcm}=1.2\text{V}$ | - | - | 0.1 | V | CLK+, CLK- Rx0+, Rx0-, Rx1+, Rx1- Rx2+, Rx2-, Rx3+, Rx3- |
| Differential input low threshold | Rxvtl | | -0.1 | - | - | V | |
| Differential input Common-mode voltage | Rxvcm | | 0.6 | 1.2 | $2.4- V_{ID} /2$ | V | |
| Differential input voltage | $ V_{ID} $ | | 0.2 | 0.4 | 0.6 | V | |
| Differential input leakage current | RvXliz | | -10 | - | +10 | μA | |

Single end signals



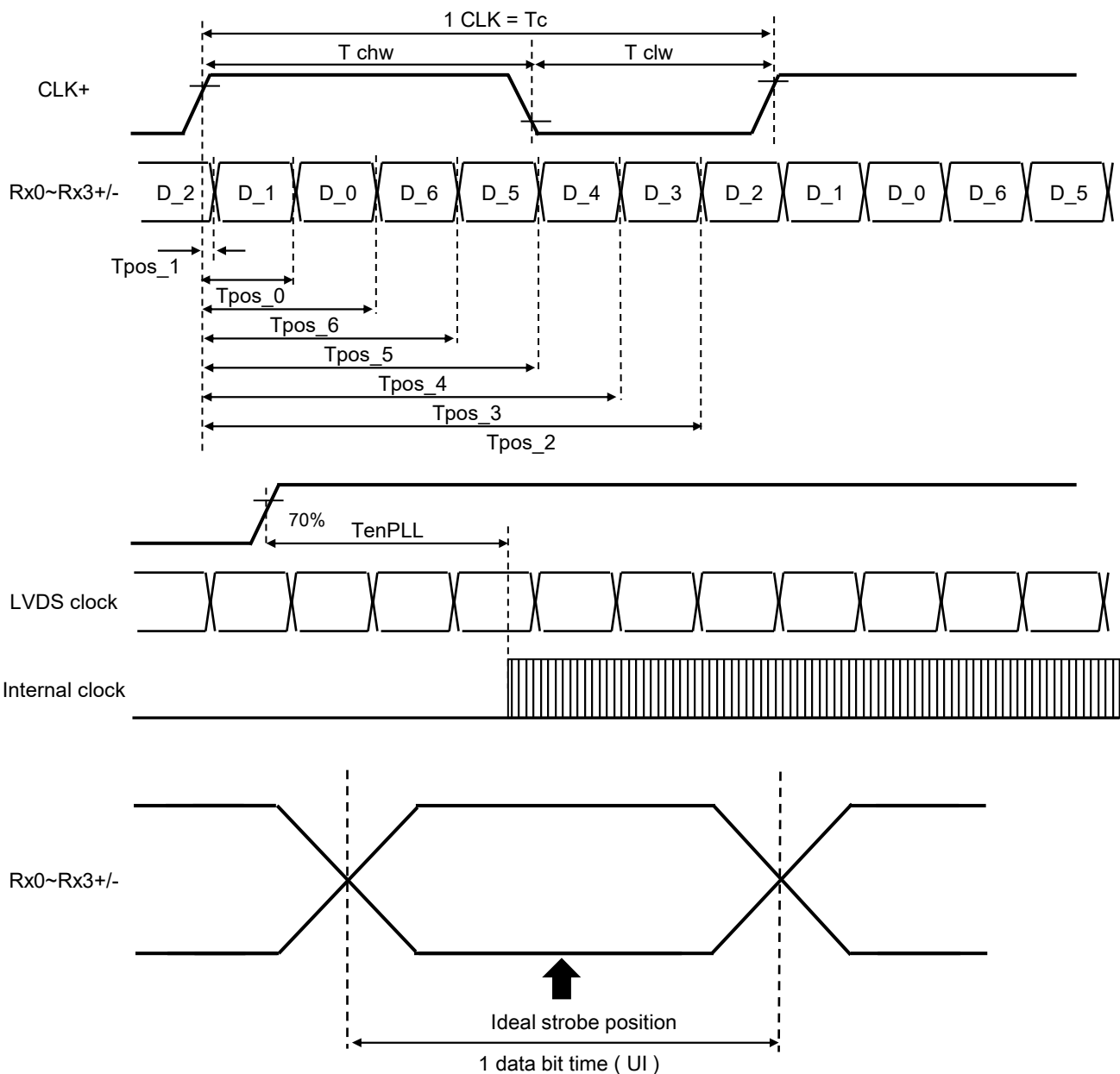
Differential signals



6.2.2 LVDS AC Characteristics

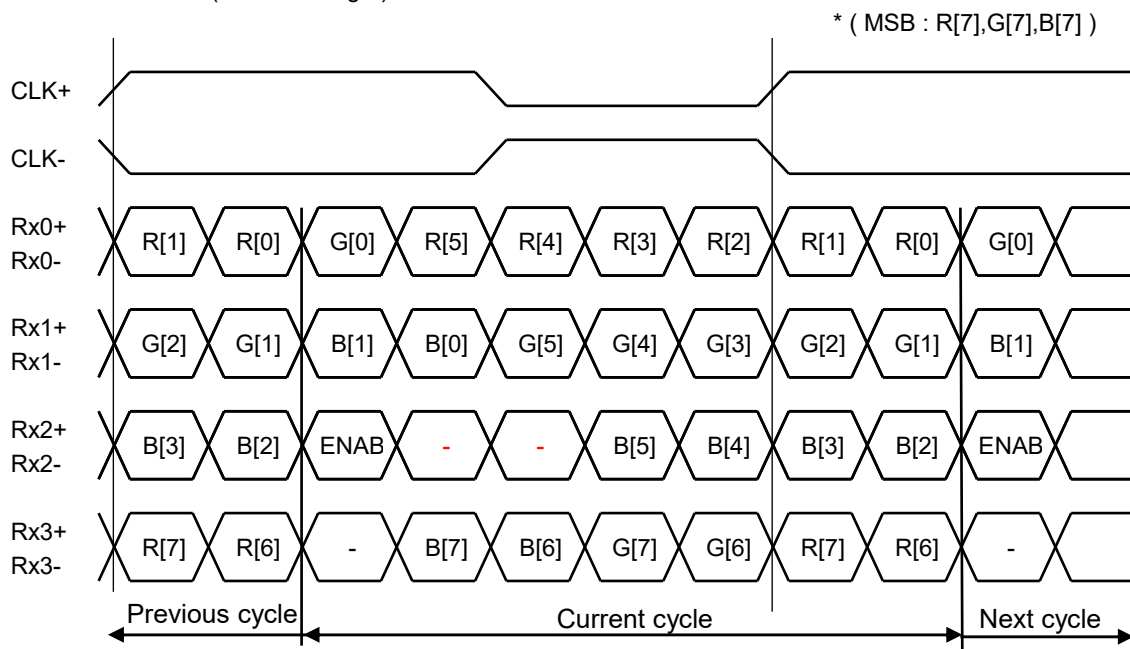
(Unless otherwise noted, Ta=25 °C,VCC=3.3V,GND=0V)

| Item | Symbol | Rating | | | Unit |
|----------------------|--------|--------|-----|------|------|
| | | MIN | TYP | MAX | |
| CLK Frequency | f clk | 35 | - | 42 | MHz |
| Clock period | Tc | 23.8 | - | 28.6 | ns |
| 1 data bit time | UI | - | 1/7 | - | Tc |
| CLK High level Width | T chw | - | 4 | - | UI |
| CLK Low level Width | T clw | - | 3 | - | UI |
| Position 1 | Tpos_1 | -0.25 | 0 | 0.25 | UI |
| Position 0 | Tpos_0 | 0.75 | 1 | 1.25 | UI |
| Position 6 | Tpos_6 | 1.75 | 2 | 2.25 | UI |
| Position 5 | Tpos_5 | 2.75 | 3 | 3.25 | UI |
| Position 4 | Tpos_4 | 3.75 | 4 | 4.25 | UI |
| Position 3 | Tpos_3 | 4.75 | 5 | 5.25 | UI |
| Position 2 | Tpos_2 | 5.75 | 6 | 6.25 | UI |
| PLL wake-up time | TenPLL | - | - | 150 | us |

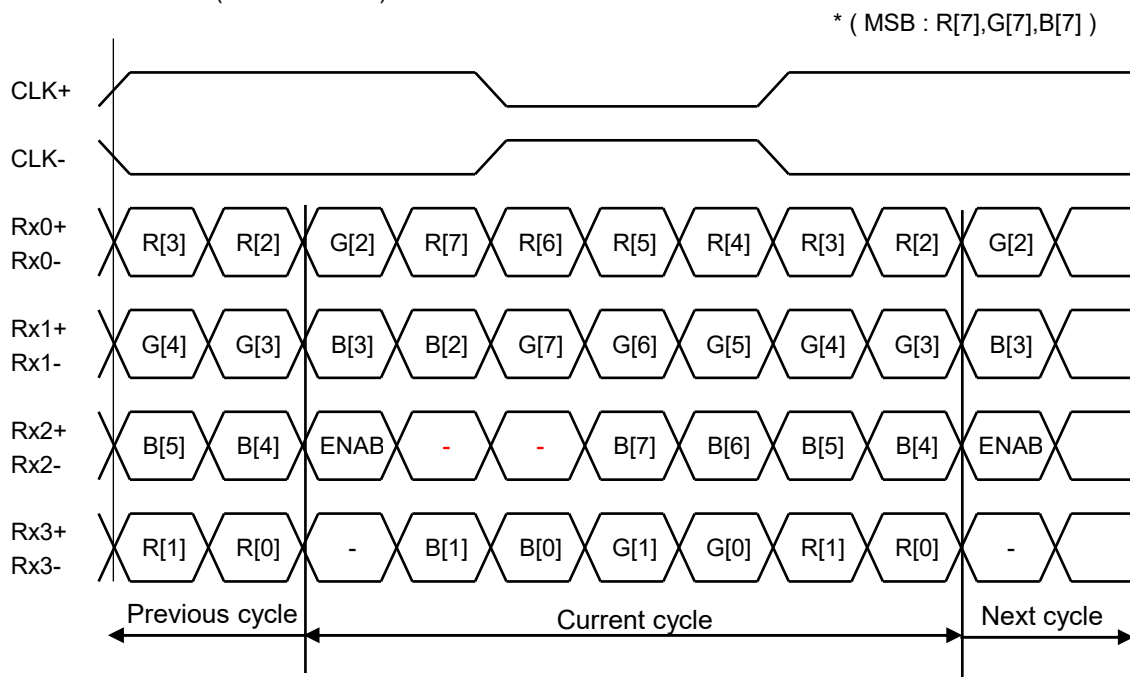


6.2.3 Input Data Format

VESA Format 8bit (MODE = High)



JEIDA Format 8bit (MODE = Low)



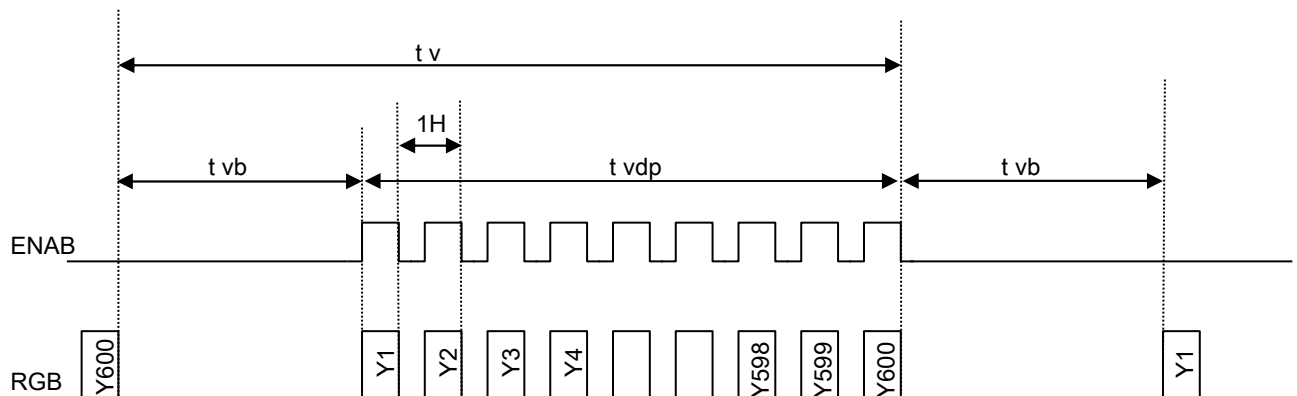
Note) For 6-bits input, MSB : R[7],G[7],B[7] and LSB : R[2],G[2],B[2].

6.3 Input Timing Specifications

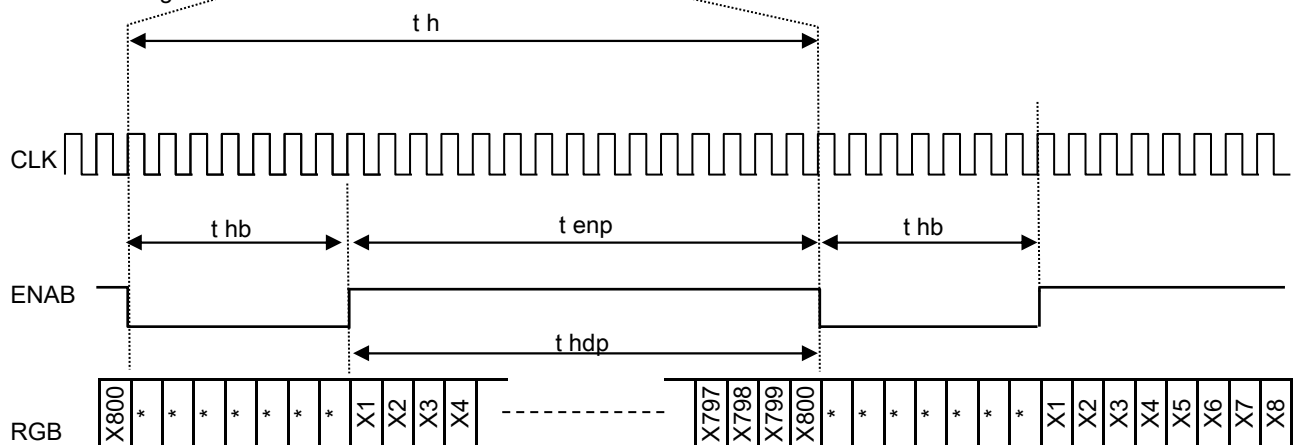
| Item | Symbol | Rating | | | Unit | Signal (*) | |
|---------------|------------------|------------------|------|------|------|--------------|----------------------------------|
| | | MIN | TYP | MAX | | | |
| CLK frequency | fCLK | 35 | 40 | 42 | MHz | CLK | |
| Vertical | Frequency | fVD | 55 | 60 | 64.2 | Hz | ENAB R[7:0],G[7:0],B[7:0] |
| | Period | t _v | 613 | 628 | - | H | |
| | Blanking Time | t _{vb} | 13 | 28 | - | H | |
| | Active Time | t _{vdp} | 600 | | | H | |
| Horizontal | Frequency | fHD | 35.2 | 37.9 | 39.2 | kHz | CLK,ENAB R[7:0],G[7:0],B[7:0] |
| | Period | t _h | 826 | 1056 | - | CLK | |
| | Blanking Time | t _{hb} | 26 | 256 | - | CLK | |
| | ENAB pulse width | t _{enp} | 800 | | | CLK | |
| | Active Time | t _{hdp} | 800 | | | CLK | |

(*) Input terminals are (Rx0 +/-, Rx1 +/-, Rx2 +/-, Rx3 +/-, CLK +/-).

<Vertical timing>

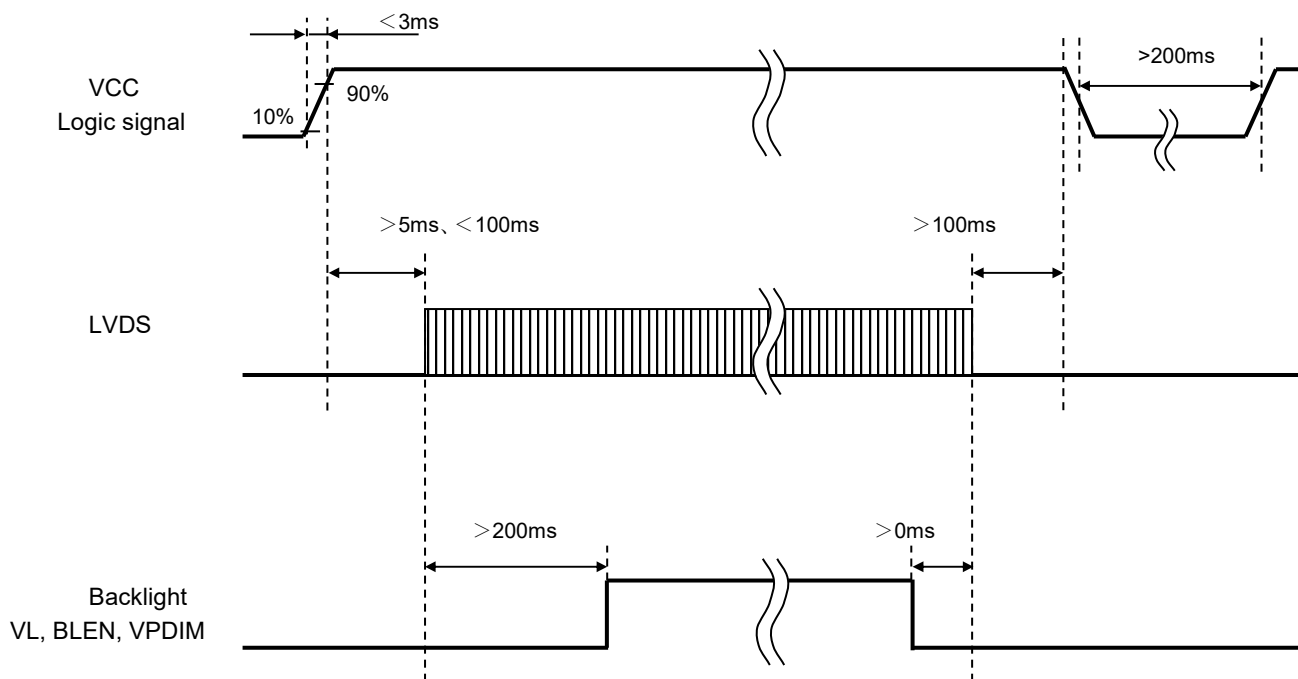


<Horizontal timing>



6.4 Power ON/OFF Sequence

【LCD】



7. Characteristics

7.1 Optical Characteristics

(Measurement Condition)

Measuring instruments: CS2000 (KONICA MINOLTA), LCD7200 (OTSUKA ELECTRONICS), EZcontrastXL88 (ELDIM)

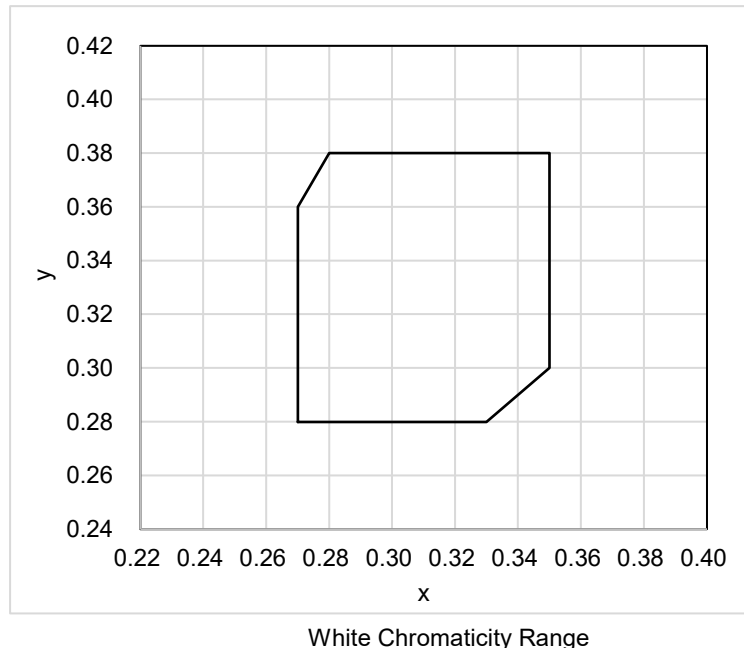
Driving condition: VCC=3.3V, GND=0V, Optimized VCOMDC

Backlight: PWM Duty=100% (VL=12.0V, GNDL=0)

Measured temperature: Ta = 25°C

| Item | | Symbol | Condition | MIN | TYP | MAX | Unit | Note № | Remark |
|-------------------------|----------------|--------|-----------------------|--------------------------|------|-----|-------------------|--------|--------|
| Response time | Rise time | TON | [Data]= 00h← → FFh | - | - | 40 | ms | 1 | |
| | + Fall time | TOFF | | | | | | | |
| Contrast ratio | Backlight ON | CR | [Data]= FFh / 00h | 700 | 1000 | - | | 2 | |
| Viewing angle | Left | θL | [Data]= FFh / 00h | - | 88 | - | deg | 3 | |
| | Right | θR | | - | 88 | - | deg | | |
| | Up | φU | | - | 88 | - | deg | | |
| | Down | φD | | - | 88 | - | deg | | |
| White Chromaticity | | x y | [Data]= FFh | White chromaticity range | | | | 4 | |
| Center Brightness | | | [Data]= FFh | 560 | 800 | - | cd/m ² | 5 | |
| Brightness distribution | | | [Data]= FFh | 70 | - | - | % | 6 | |

* Note number 1 to 6: Refer to the APPENDIX of "Reference Method for Measuring Optical Characteristics and Performance".



(White Chromaticity Range)

| x | y |
|------|------|
| 0.27 | 0.28 |
| 0.33 | 0.28 |
| 0.35 | 0.30 |
| 0.35 | 0.38 |
| 0.28 | 0.38 |
| 0.27 | 0.36 |



7.2 About Sunlight readable

| Item | Illuminance | Display visibility | Remarks |
|-------------------|-------------|--------------------|---------------------------------|
| Sunlight readable | 100,000 lx | Possible | Refer to <Features of Blanview> |

7.3 Temperature Characteristics

(Measurement Condition)

Measuring instruments: CS2000 (KONICA MINOLTA), LCD7200 (OTSUKA ELECTRONICS)

Driving condition: VCC=3.3V, GND=0V, Optimized VCOMDC

Backlight: PWM Duty=100% (VL=12.0V, GNDL=0)

| Item | | Symbol | Specification | | Remark |
|-----------------|-----------------------------|------------------|--|-----------------|--------------|
| | | | Ta = -30 °C | Ta = 70 °C | |
| Response time | Rise time + Fall time | TON + TOFF | 700 msec or less | 30 msec or less | |
| Contrast ratio | | CR | 200 or more | 200 or more | Backlight ON |
| Display Quality | | | No noticeable display defect or ununiformity should be observed. | | |

8. Criteria of Judgment

8.1 Defective Display and Screen Quality

Test Condition: Observed TFT-LCD monitor from front during operation with the following conditions

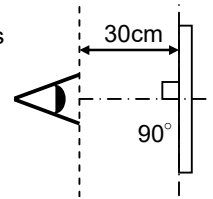
Driving Signal: Raster Patter (RGB, white, black)

Signal condition: [Data]:00h, A8h, FFh (3steps)

Observation distance: 30 cm

Illuminance: 200 to 350 lx

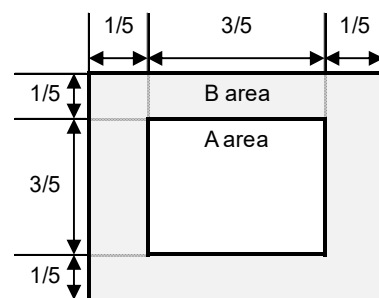
Backlight: PWM Duty=100% (VL=12.0V, GNDL=0)



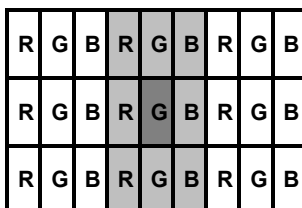
| Defect item | Defect content | | Criteria | | |
|-----------------|---|---|--|---------------------------|---|
| Display Quality | Line defect | Black, white or color line, 3 or more neighboring defective dots | Not exists | | |
| | Dot defect | Uneven brightness on dot-by-dot base due to defective TFT or CF, or dust is counted as dot defect (brighter dot, darker dot) Bright dot: Visible through 1% ND filter at [Data]=00h Dark dot: Appear dark through white display at [Data]=A8h Invisible through 5% ND filter at [Data]=00h | Refer to table 1 Note1) 1dot : 1R / 1G / 1B Note2) Point defect area $\geq 1/2$ dot. Acceptable | | |
| | Stain | Uneven brightness (white stain, black stain etc) | Invisible through 5% ND filter at Black screen. Invisible through 1% ND filter at other screen. | | |
| Screen Quality | Foreign particle | Point-like | Spec | Permissible Q'ty | $\phi = (L + W) / 2$ L: Length W: Width |
| | | | $\phi \leq 0.15\text{mm}$ | Disregard | |
| | | | $0.15\text{mm} < \phi \leq 0.50\text{mm}$ | 4 | |
| | | $0.50\text{mm} < \phi$ | 0 | | |
| | Liner | Spec | Permissible Q'ty | L: Length W: Width | |
| | | $L \leq 5.0\text{mm}$ and $W \leq 0.05\text{mm}$ | Disregard | | |
| | | $L \leq 5.0\text{mm}$ and $0.05\text{mm} < W \leq 0.10\text{mm}$ | 4 | | |
| | $5.0\text{mm} < L$ or $0.10\text{mm} < W$ | 0 | | | |
| Others | | | Use boundary sample for judgment when necessary | | |

Table1

| Item | Zone | | Total |
|-----------------------|----------------|---|-------|
| | A | B | |
| Bright dot | 1 | 2 | 3 |
| Dark dot | 2 | 3 | 3 |
| Bright dot + Dark dot | 3 | 4 | 5 |
| Two adjacent dot | ≤ 2 pairs | | - |



* Adjacent dot defect : When the dots adjacent to the defect dot are defects



: Defect dot
 : Adjacent dot

Division of A and B areas

B area: Active area

Dimensional ratio between A and B areas: 1: 3: 1
(Refer to the left figure)

8.2 Screen and Other Appearance

Testing conditions

Observation distance: 30 cm

Illuminance: 1200 ~ 2000 lx

| Item | | Criteria | Remark |
|-----------|--------|---|--|
| Polarizer | Flaw | Ignore invisible defect when the backlight is on. | Applicable area: Active area only (Refer to the section 3.2 Outward Form) |
| | Stain | | |
| | Dirt | | |
| | Bubble | | |
| | Dust | | |
| | Dent | | |
| S case | | No functional defect occurs | |

9. Reliability Test

| Test item | | Test condition | | number of failures / number of examinations |
|----------------------------------|---|---|-----------|--|
| Durability test | High temperature storage | Ta = 80°C | 240hrs | 0 / 3 |
| | Low temperature storage | Ta = -30°C | 240hrs | 0 / 3 |
| | High temperature & high humidity storage | Ta = 60°C, RH = 90%, non condensing | 240hrs | 0 / 3 |
| | High temperature operation | Tp = 70°C | 240hrs | 0 / 3 |
| | Low temperature operation | Tp = -30°C | 240hrs | 0 / 3 |
| | High temperature & high humidity operation | Tp = 40°C, RH = 90%, non condensing | 240hrs | 0 / 3 |
| | Thermal shock storage | -30°C ↔ 80°C (30min / 30min) | 100cycles | 0 / 3 |
| Mechanical environmental test | Electrostatic discharge test (Non operation) | C=200pF,R=0Ω,V=±200V Each 10 times of discharge on and power supply and other terminals. | | 0 / 3 |
| | Surface discharge test (Non operation) | C=150pF, R=330Ω, V=±8kV Each 10 times of discharge in both polarities on the center of screen with the case grounded. | | 0 / 3 |

Note:Ta=ambient temperature Tp=Panel temperature

※ The profile of high temperature/humidity storage and High Temperature/humidity operation
(Pure water of over 10MΩ·cm shall be used.)

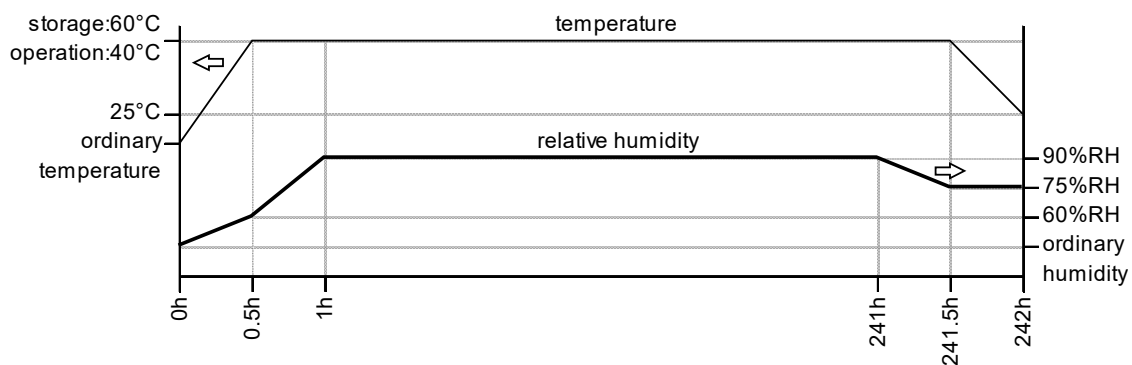
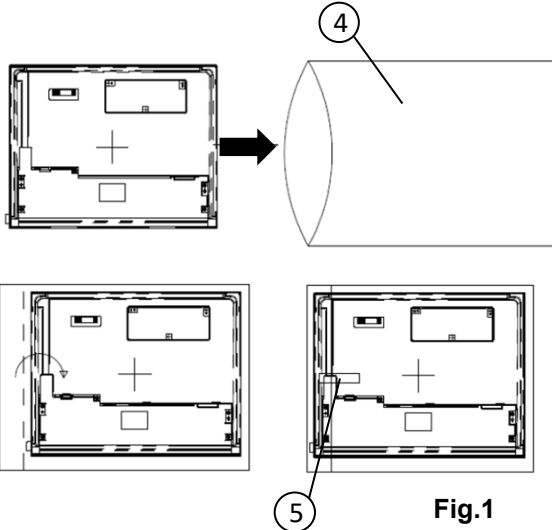


Table2. Reliability Criteria

The parameters should be measured after leaving the monitor at the ordinary temperature for 24 hours or more after the test completion.

| Item | Standard | Remark |
|-----------------|--|--------------|
| Display quality | No visible abnormality shall be seen. (Except for unevenness by Pol deterioration.) | |
| Contrast ratio | 200 or more | Backlight ON |

10. Packing Specifications



【Step1】 ·Each product is to be inserted into the bag.
(Fig.1)

【Step2】 ·Two cushions are to be insert into outer carton.
(Fig.2)

【Step3】 ·Each product is to be inserted into slit of the cushion.
·20pcs
(Fig.3)

【Step4】 ·Cushion T is to be inserted into outer carton.
(Fig.4)

【Step5】 ·The outer carton is to be sealed in H-shape with packing tape.
(Fig.5)

【Step6】 ·The model number, quantity of products,
and shipping date are to be printed on the outer carton.
·If necessary, shipping labels or impression markings
are to be put on the outer carton.

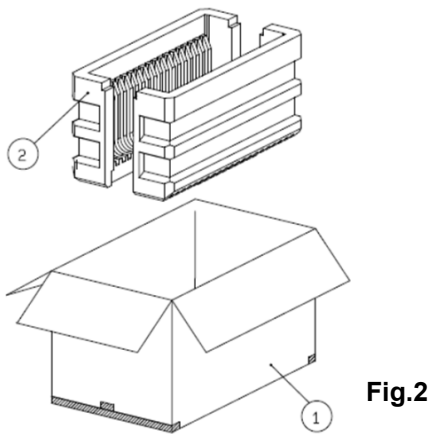


Fig.2

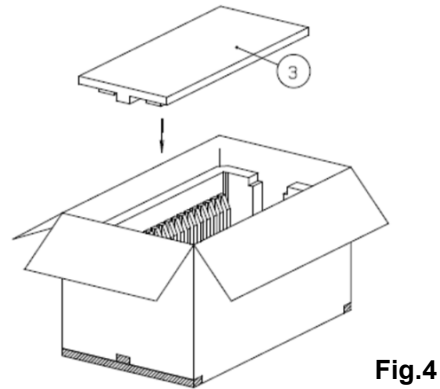


Fig.4

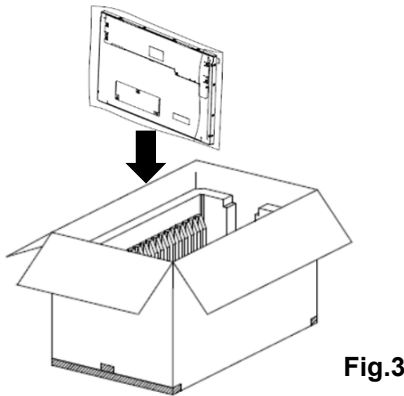


Fig.3

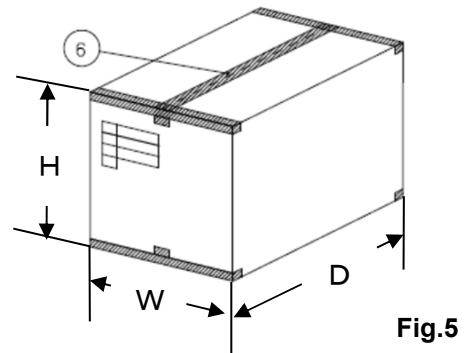


Fig.5

Remark: The return of packing materials is not required.

| | Packing item name | Specs, Material |
|---|-------------------|----------------------|
| ① | Outer carton | Corrugated cardboard |
| ② | Cushion S | Polypropylene |
| ③ | Cushion T | Polypropylene |
| ④ | Product's bag | |
| ⑤ | Tape | |
| ⑥ | Tape | |

| Dimension of outer carton | |
|---|------------|
| D : Approx. | (645 mm) |
| W : Approx. | (358 mm) |
| H : Approx. | (344 mm) |
| Quality of products packed in one carton : | 20 pcs |
| Gross weight : Approx. | 12.5 kg |

11. Handling Instruction

11.1 Cautions for Handling LCD panels



Caution

- (1) Do not make an impact on the LCD panel glass because it may break and you may get injured from it.
- (2) If the glass breaks, do not touch it with bare hands.
(Fragment of broken glass may stick you or you cut yourself on it.)
- (3) If you get injured, receive adequate first aid and consult a medial doctor.
- (4) Do not let liquid crystal get into your mouth.
(If the LCD panel glass breaks, try not let liquid crystal get into your mouth even toxic property of liquid crystal has not been confirmed.)
- (5) If liquid crystal adheres, rinse it out thoroughly.
(If liquid crystal adheres to your cloth or skin, wipe it off with rubbing alcohol or wash it thoroughly with soap. If liquid crystal gets into eyes, rinse it with clean water for at least 15 minutes and consult an eye doctor.)
- (6) If you scrap this products, follow a disposal standard of industrial waste that is legally valid in the community, country or territory where you reside.
- (7) Do not connect or disconnect this product while its application products is powered on.
- (8) Do not attempt to disassemble or modify this product as it is precision component.
- (9) If a part of soldering part has been exposed, and avoid contact (short-circuit) with a metallic part of the case etc. about Circuit board of this model, please.
Please insulate it with the insulating tape etc. if necessary.
The defective operation is caused, and there is a possibility to generation of heat and the ignition.
- (10) For protection your circuit, we recommend you to add excess current protection circuit to power supply.



Caution

This mark is used to indicate a precaution or an instruction which, if not correctly observed, may result in bodily injury, or material damages alone.

11.2 Precautions for Handling

- 1) Wear finger tips at incoming inspection and for handling the TFT monitors to keep display quality and keep the working area clean.
Do not touch the surface of the monitor as it is easily scratched.
- 2) Wear grounded wrist-straps and use electrostatic neutralization blowers to prevent static charge and discharge when handling the TFT monitors as the LED in this TFT monitors is damageable to electrostatic discharge.
Designate an appropriate operating area, and set equipment, tools, and machines properly when handling this product.
- 3) Avoid strong mechanical shock including knocking, hitting or dropping to the TFT monitors for protecting their glass parts.
Do not use the TFT monitors that have been experienced dropping or strong mechanical shock.
- 4) Do not use or storage the TFT monitors at high temperature and high humidity environment.
Particularly, never use or storage the TFT monitors at a location where condensation builds up.
- 5) Avoid using and storing TFT monitors at a location where they are exposed to direct sunlight or ultraviolet rays to prevent the LCD panels from deterioration by ultraviolet rays.
- 6) Do not stain or damage the contacts of the Connector
FPC cable needs to be inserted until it can reach to the end of connector slot.
During insertion, make sure to keep the cable in a horizontal position to avoid an oblique insertion.
Otherwise, it may cause poor contact or deteriorate reliability of the Connector.
- 7) Peel off the protective film on the TFT monitors during mounting process.
Refer to the section 11.5 on how to peel off the protective film.
We are not responsible for electrostatic discharge failures or other defects occur when peeling off the protective film.

11.3 Precautions for Operation

- 1) Since this TFT monitors are not equipped with light shielding for the driver IC,
do not expose the driver IC to strong lights during operation as it may cause functional failures.
- 2) In case of powering up or powering off this LCD module,
be sure to comply the sequence as instructed in this specification.
- 3) Do not plug in or out the FPC cable while power supply is switch on.
Plug the FPC cable in and out while power supply is switched off.
- 4) Do not operate the TFT monitors in the strong magnetic field. It may break the TFT monitors.
- 5) Do not display a fixed image on the screen for a long time.
Use a screen-saver or other measures to avoid a fixed image displayed on the screen for a long time.
Otherwise, it may cause burn-in image on the screen due the characteristics of liquid crystal.

11.4 Storage Condition for Shipping Cartons

(Storage environment)

- Temperature 0 to 40° C
- Humidity 60%RH or less
No-condensing occurs under low temperature with high humidity condition.
- Atmosphere No poisonous gas that can erode electronic components and/or wiring materials should be detected.
- Time period 1 year
- Unpacking To prevent damages caused by static electricity, anti-static precautionary measures (e.g. earthing, anti-static mat) should be implemented.
After unpack, keep product in the appropriate condition, otherwise bubble seal of Protective film may be printed on Polarizer.
- Maximum piling up 4 cartons(excluding the bottom)

*Conditions to storage after unpacking

(Storage environment)

- Temperature 0 to 40° C
- Humidity 60%RH or less
No-condensing occurs under low temperature with high humidity condition.
- Atmosphere No poisonous gas that can erode electronic components and/or wiring materials should be detected.
- Time period 1 year (Shelf life)
- Others Keep/ store away from direct sunlight
Storage goods on original tray made by TOPPAN.

11.5 Precautions for Peeling off the Protective film

The followings work environment and work method are recommended to prevent the TFT monitors from static damage or adhesion of dust when peeling off the protective films.

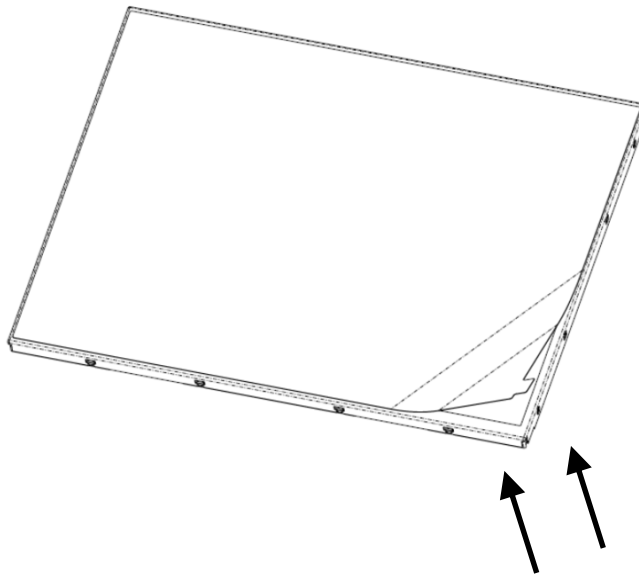
A) Work Environment

- a) Humidity: 50 to 70 %RH, Temperature 15 to 27° C
- b) Operators should wear conductive shoes, conductive clothes, conductive finger tips and grounded wrist-straps.
Use an electrostatic neutralization blower.
- c) Anti-static treatment should be implemented to work area's floor.
Use a room shielded against outside dust with sticky floor mat laid at the entrance to eliminate dirt.

B) Work Method

The following procedures should taken to prevent the driver ICs from charging and discharging.

- a) Use an electrostatic neutralization blower to blow air on the TFT monitors to its lower right when Tab of Protection Film is placed at the lower right.
Optimize direction of the blowing air and the distance between the TFT monitors and the electrostatic neutralization blower.
- b) Peel off the Tab slowly (spending more than 2 secs to complete)
by pulling it to opposite direction.



Blower wind direction
(Set an ion blower with its adequate conditions.)

11.6 Warranty

TOPPAN is only liable to defective goods which is stored and used under the condition complying with this specifications and returned within 1 (one) year.

Warranty caused by manufacturing defect shall be conducted by replacement of goods or refundment at unit price.

APPENDIX

Reference Method for Measuring Optical Characteristics and Performance

1. Measurement Condition

Measuring instruments: CS2000(KONICA MINOLTA), LCD7200(OTSUKA ELECTRONICS),EZcontrastXL88(ELDIM)

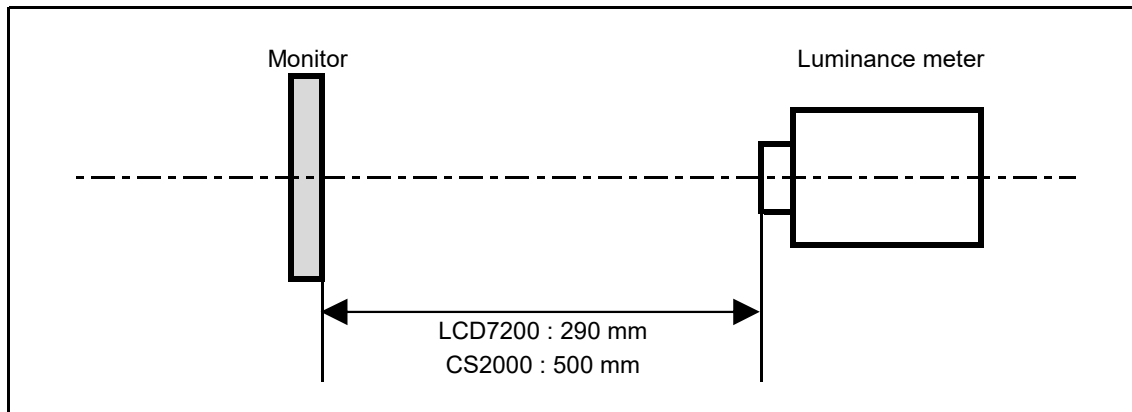
Driving condition: Refer to the section "Optical Characteristics"

Measured temperature: 25° C unless specified

Measurement system: See the chart below. The luminance meter is placed on the normal line of measurement system.

Measurement point: At the center of the screen unless otherwise specified

Dark box at constant temperature

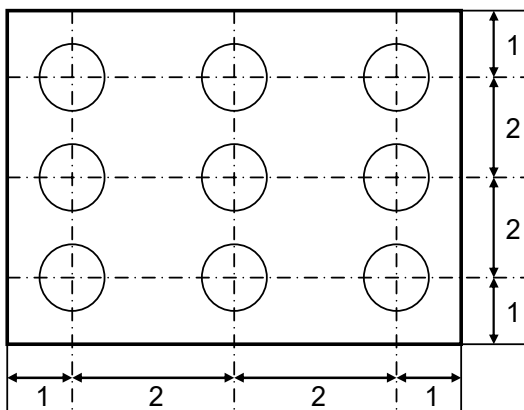


*Measurement is made after 30 minutes of lighting of the backlight.

Measurement point: At the center point of the screen

Brightness distribution: 9 points shown in the following drawing.

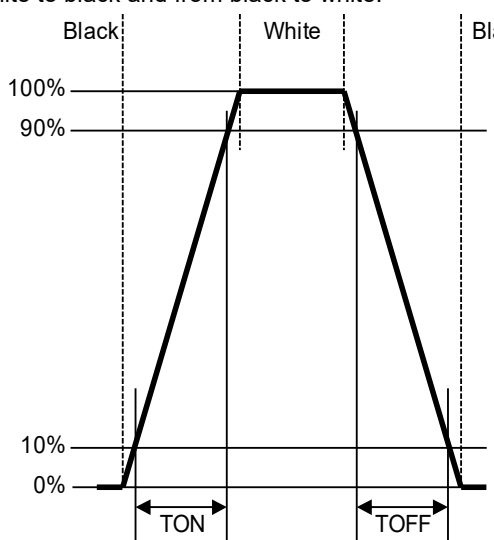
<Landscape model>



Dimensional ratio of active area

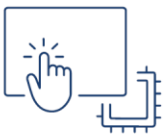
Backlight PWM Duty=100% (VL=12.0V, GNDL=0)

2. Test Method

| Notice | Item | Test method | Measuring instrument | Remark |
|--------|---|--|----------------------|---|
| 1 | Response time | <p>Measure output signal waveform by the luminance meter when raster of window pattern is changed from white to black and from black to white.</p>  | LCD7200 | <p>Black display [Data]=00h White display [Data]=FFh TON Rise time TOFF Fall time</p> |
| 2 | Contrast ratio | <p>Measure maximum luminance Y1([Data]=FFh) and minimum luminance Y2([Data]=00h) at the center of the screen by displaying raster or window pattern. Then calculate the ratio between these two values.</p> <p>Contrast ratio = $Y1/Y2$ Diameter of measuring point: 7.8mmφ(CS2000)</p> | CS2000 | |
| 3 | Viewing angle Horizontalθ Verticalφ | Move the luminance meter from right to left and up and down and determine the angles where contrast ratio is 10. | EZcontrastXL88 | |
| 4 | White chromaticity | <p>Measure chromaticity coordinates x and y of CIE1931 colorimetric system at [Data] = FFh Color matching function: 2°view measurement angle: 1°</p> | CS2000 | |
| 5 | Center brightness | Measure the brightness at the center of the screen. | CS2000 | |
| 6 | Brightness distribution | <p>(Brightness distribution) = $100 \times B/A \%$ A : max. brightness of the 9 points B : min. brightness of the 9 points</p> | CS2000 | |

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