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PRODUCT SPECIFICATIONS

SHARP

Liquid Crystal Displays Group

# LQ150X1LGN2A

## TFT-LCD Module

Spec. Issue Date: Aug. 29, 2005

No: LD-16823

| PREPARED BY : DATE | SHARP | SPEC No. LD-16823 |
|---|---|---|
| | | FILE No. |
| | | ISSUE : Aug.29.2005 |
| APPROVED BY : DATE | | PAGE : 24 pages |
| | Mobile Liquid Crystal Display GROUP<br>SHARP CORPORATION | APPLICABLE GROUP<br>Mobile Liquid Crystal Display Group |
| | SPECIFICATION | |

DEVICE SPECIFICATION

# TFT-LCD Module

MODEL

# LQ150X1LGN2A

**These parts have corresponded with the RoHS directive.**

## CUSTOMER: SMA

☐ CUSTOMER'S APPROVAL

DATE _____

BY _____

PRESENTED

BY K. Shiono

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Engineering Department 7
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SHARP Corporation

SHARP

# RECORDS OF REVISION

LQ150X1LGN2A

| SPEC No. | DATE | REVISED No. | SUMMARY PAGE | SUMMARY | NOTE |
|---|---|---|---|---|---|
| LD-16823 | Aug.29.2005 | | | | 1st Issue |

## 1. Application

This specification applies to the color 15.0 XGA TFT-LCD module LQ150X1LGN2A.

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◎In case of using the device for applications such as control and safety equipment for transportation(aircraft, trains, automobiles, etc. ), rescue and security equipment and various safety related equipment which require higher reliability and safety, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.

◎Do not use the device for equipment that requires an extreme level of reliability, such as aerospace applications, telecommunication equipment(trunk lines), nuclear power control equipment and medical or other equipment for life support.

◎SHARP assumes no responsibility for any damage resulting from the use of the device which does not comply with the instructions and the precautions specified in these specification sheets.

◎Contact and consult with a SHARP sales representative for any questions about this device.

## 2. Overview

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, control circuit, power supply circuit and a back light unit. Graphics and texts can be displayed on a 1024×RGB×768 dots panel with about 16 million colors by using LVDS (Low Voltage Differential Signaling) and supplying +3.3V DC supply voltages for TFT-LCD panel driving and supply voltage for backlight.

**3. Mechanical Specifications**

| Parameter | Specifications | Unit |
|---|---|---|
| Display size | 38 (Diagonal) | cm |
| | 15.0 (Diagonal) | Inch |
| Active area | 304.1 (H)×228.1 (V) | mm |
| Pixel format | 1024 (H)×768 (V) | Pixel |
| | (1 pixel=R+G+B dots) | |
| Pixel pitch | 0.297 (H)×0.297 (V) | mm |
| Pixel configuration | R, G, B vertical stripe | |
| Display mode | Normally white | |
| Unit outline dimensions *1 | 326.0(W)×252.0(H)×11.5(D) | mm |
| Mass | 1100 (MAX) | g |
| Surface treatment | Anti-glare and hard-coating 2H<br>(Haze value = 28) | |

*1.Note: excluding back light cables, cover and pet sheet.

The thickness of module (D) doesn't contain the projection.

Outline dimensions are shown in Fig.1.

## 4. Input Terminals

4-1. TFT-LCD panel driving

CN1 (Interface signals and +3.3V DC power supply)

Using connectors : DF14H-20P-1.25H (Hirose Electric Co., Ltd.)

Corresponding connectors : DF14-20S-1.25C(Connector)
DF14-2628SCFA(Terminal)

Corresponding LVDS Transmitter : THC63LVDM83R(Thine) or compatible

| Pin No. | Symbol | Function | Remark |
|---|---|---|---|
| 1 | Vcc | +3.3V Power supply | |
| 2 | Vcc | +3.3V Power supply | |
| 3 | GND | | |
| 4 | GND | | |
| 5 | RXIN0- | Receiver signal (-) | LVDS |
| 6 | RXIN0+ | Receiver signal (+) | LVDS |
| 7 | GND | | |
| 8 | RXIN1- | Receiver signal (-) | LVDS |
| 9 | RXIN1+ | Receiver signal (+) | LVDS |
| 10 | GND | | |
| 11 | RXIN2- | Receiver signal (-) | LVDS |
| 12 | RXIN2+ | Receiver signal (+) | LVDS |
| 13 | GND | | |
| 14 | RXCKIN- | Clock signal (-) | LVDS |
| 15 | RXCKIN+ | Clock signal (+) | LVDS |
| 16 | GND | | |
| 17 | RXIN3- | Receiver signal (-) | LVDS |
| 18 | RXIN3+ | Receiver signal (+) | LVDS |
| 19 | GND | | |
| 20 | LVDS_SET | LVDS_SET | 【note1】 |

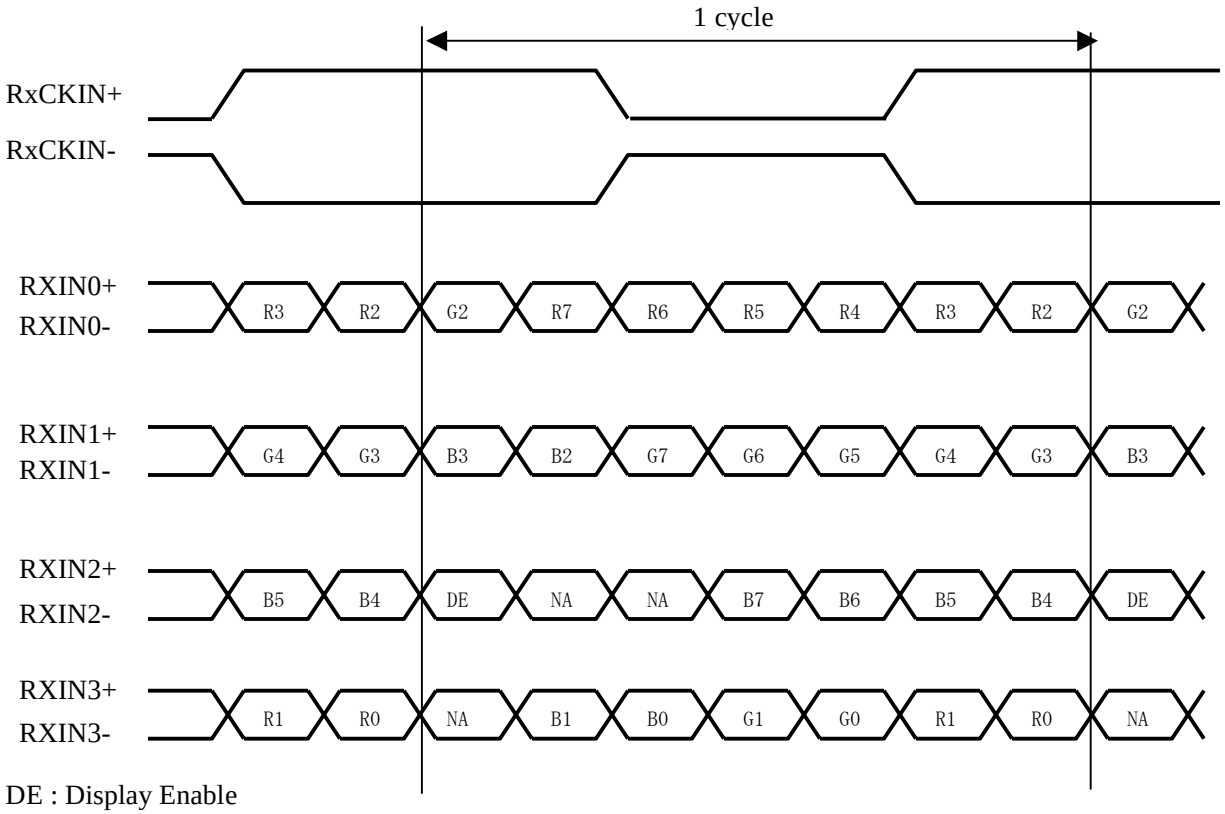
4-2 Data Mapping

1) 8 bit input

【note1】 pin assignment with LVDS_SET pin (Thine:THC63LVDM83R)

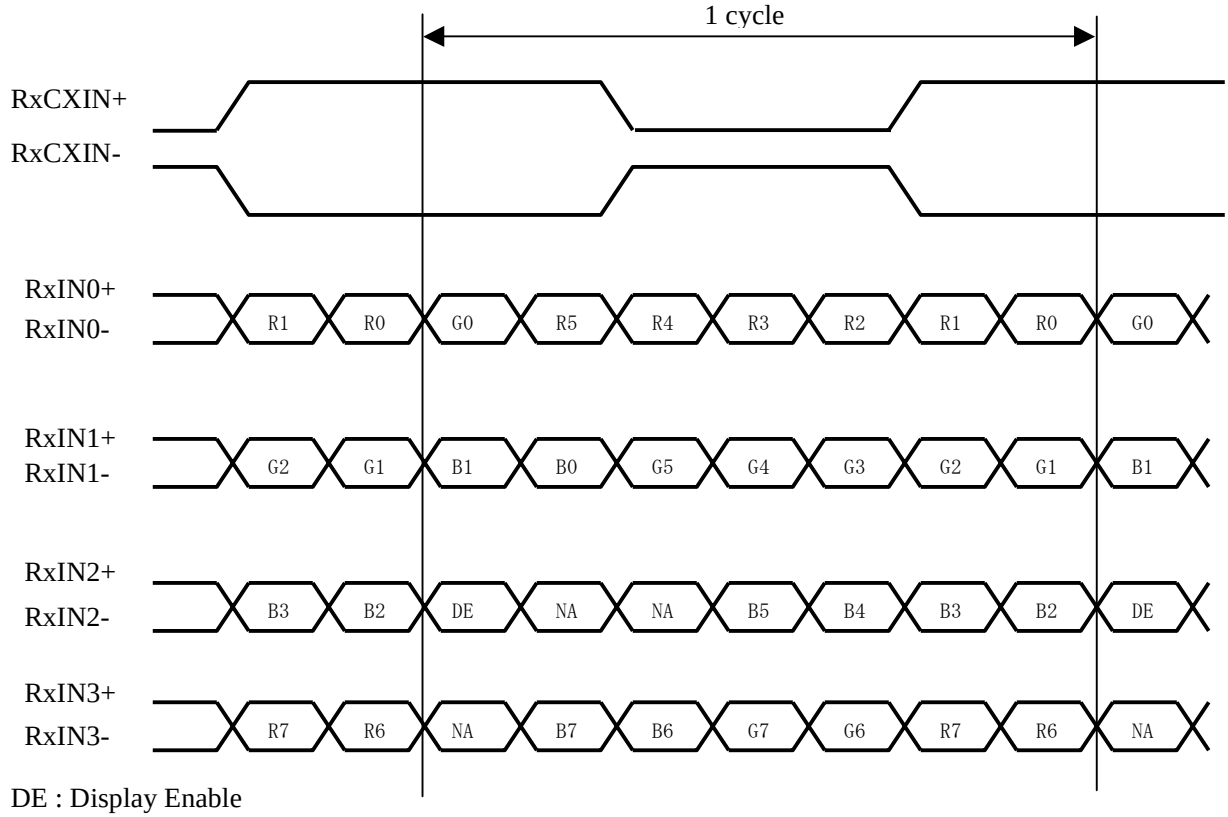
| Transmitter | | 20pin LVDS_SET | |
|---|---|---|---|
| Pin No | Data | =L (GND) or Open | =H (3.3V) |
| 51 | TA0 | R2 | R0 (LSB) |
| 52 | TA1 | R3 | R1 |
| 54 | TA2 | R4 | R2 |
| 55 | TA3 | R5 | R3 |
| 56 | TA4 | R6 | R4 |
| 3 | TA5 | R7 (MSB) | R5 |
| 4 | TA6 | G2 | G0 (LSB) |
| 6 | TB0 | G3 | G1 |
| 7 | TB1 | G4 | G2 |
| 11 | TB2 | G5 | G3 |
| 12 | TB3 | G6 | G4 |
| 14 | TB4 | G7 (MSB) | G5 |
| 15 | TB5 | B2 | B0 (LSB) |
| 19 | TB6 | B3 | B1 |
| 20 | TC0 | B4 | B2 |
| 22 | TC1 | B5 | B3 |
| 23 | TC2 | B6 | B4 |
| 24 | TC3 | B7 (MSB) | B5 |
| 27 | TC4 | (NA) | (NA) |
| 28 | TC5 | (NA) | (NA) |
| 30 | TC6 | DE | DE |
| 50 | TD0 | R0 (LSB) | R6 |
| 2 | TD1 | R1 | R7 (MSB) |
| 8 | TD2 | G0 (LSB) | G6 |
| 10 | TD3 | G1 | G7 (MSB) |
| 16 | TD4 | B0 (LSB) | B6 |
| 18 | TD5 | B1 | B7 (MSB) |
| 25 | TD6 | (NA) | (NA) |

<LVDS_SET=L or Open>




DE : Display Enable
NA : Not Available

<LVDS_SET =H>

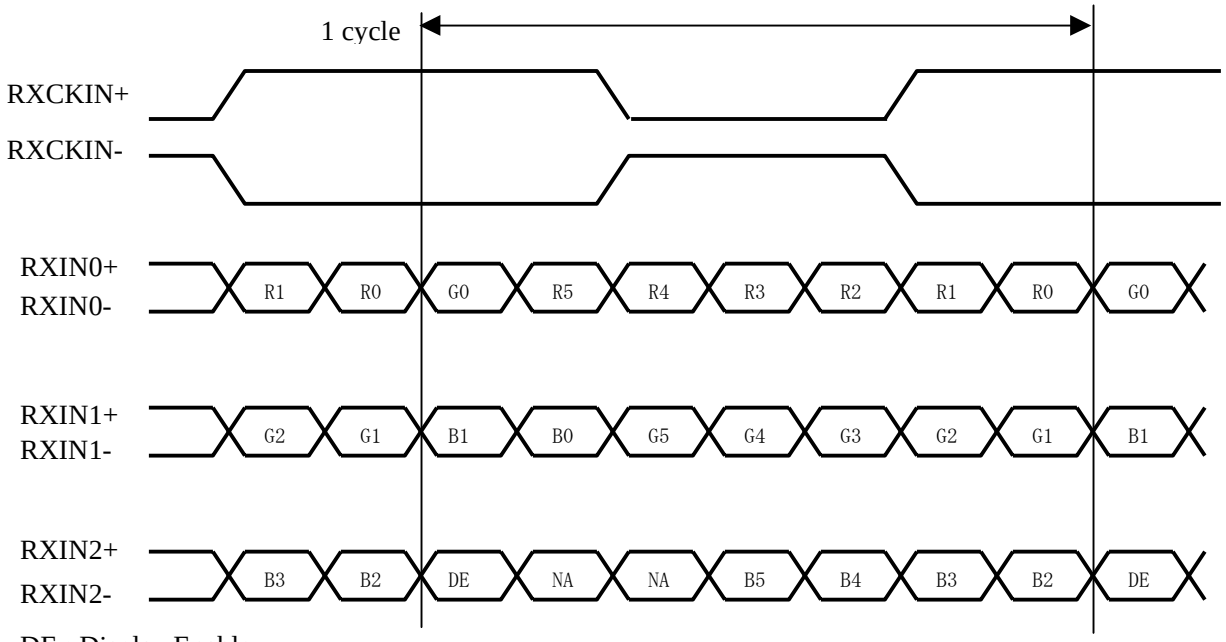



DE : Display Enable
NA : Not Available

2) 6 bit input

【note1】pin assignment with LVDS_SET pin (Thine:THC63LVDM83R)

| Transmitter | | 20pin LVDS_SET | |
|---|---|---|---|
| Pin No | Data | =L (GND) or Open | =H (3.3V) |
| 51 | TA0 | R0 (LSB) | — |
| 52 | TA1 | R1 | — |
| 54 | TA2 | R2 | — |
| 55 | TA3 | R3 | — |
| 56 | TA4 | R4 | — |
| 3 | TA5 | R5 (MSB) | — |
| 4 | TA6 | G0 (LSB) | — |
| 6 | TB0 | G1 | — |
| 7 | TB1 | G2 | — |
| 11 | TB2 | G3 | — |
| 12 | TB3 | G4 | — |
| 14 | TB4 | G5 (MSB) | — |
| 15 | TB5 | B0 (LSB) | — |
| 19 | TB6 | B1 | — |
| 20 | TC0 | B2 | — |
| 22 | TC1 | B3 | — |
| 23 | TC2 | B4 | — |
| 24 | TC3 | B5 (MSB) | — |
| 27 | TC4 | (NA) | — |
| 28 | TC5 | (NA) | — |
| 30 | TC6 | DE | — |
| 50 | TD0 | GND | — |
| 2 | TD1 | GND | — |
| 8 | TD2 | GND | — |
| 10 | TD3 | GND | — |
| 16 | TD4 | GND | — |
| 18 | TD5 | GND | — |
| 25 | TD6 | (NA) | — |



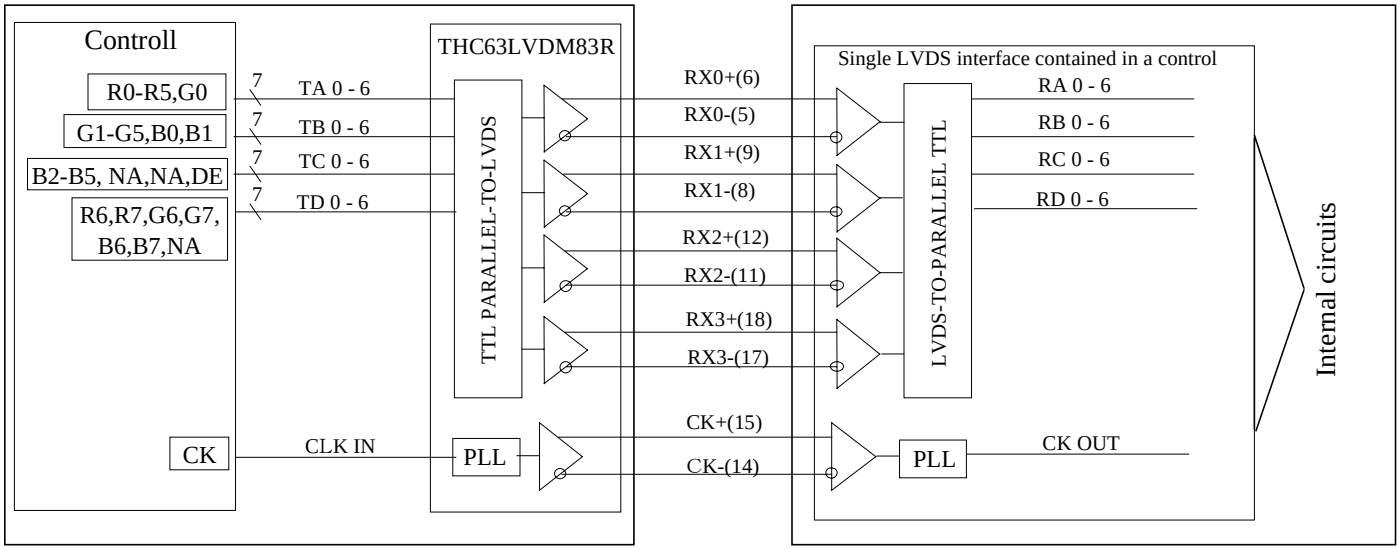

DE : Display Enable

NA : Not Available

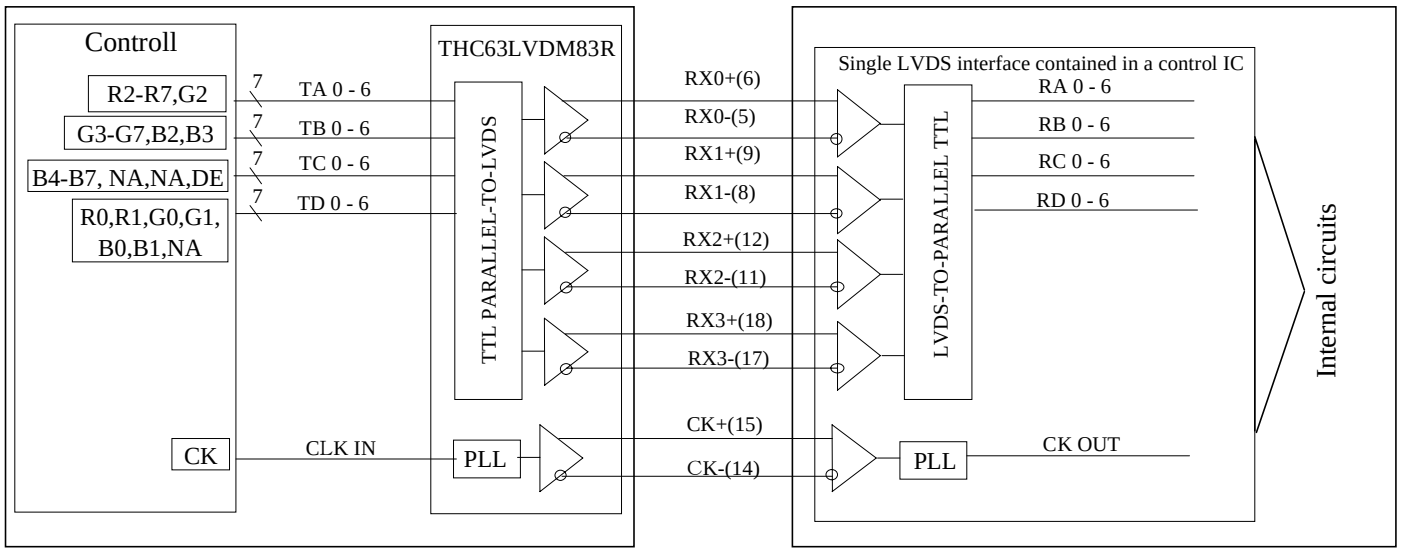
※In case of supplying 6 bit signal, it is recommended to connect pin No.17(Rx3-) with VCC(3.3V), and No.18(Rx3+) with GND(0V).

(Computer Side) (TFT-LCD side)

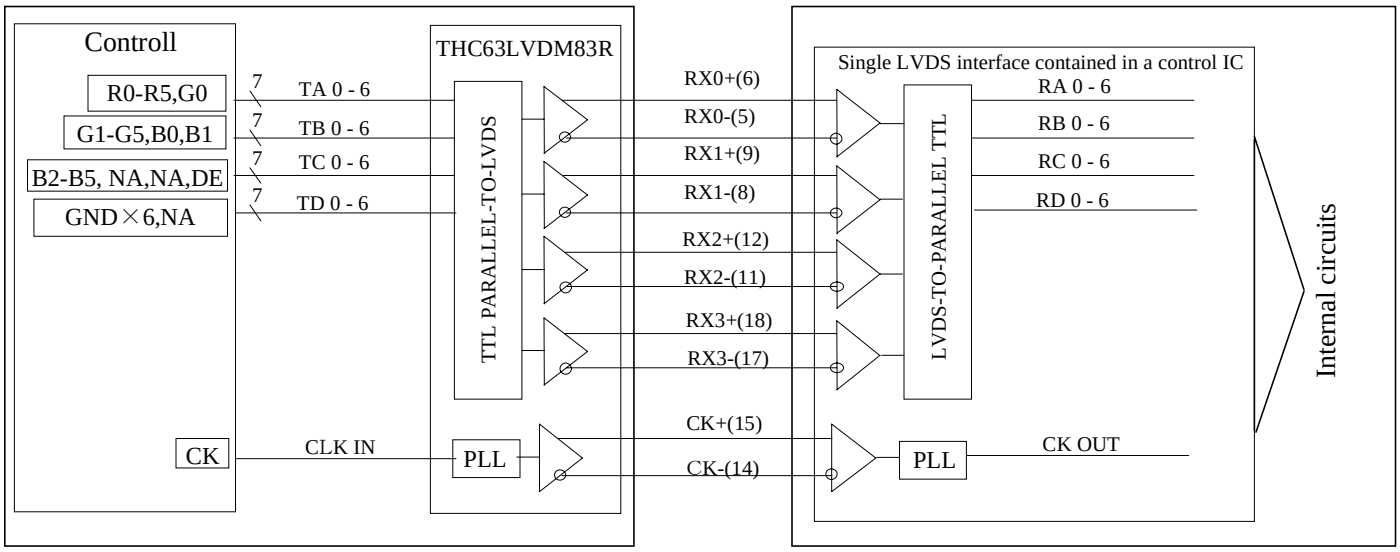
①8Bit Mode
LVDS_SET=H (20 pin=3.3[V])




②8Bit Mode
LVDS_SET=L (20 pin=GND or OPEN)




③6Bit Mode
LVDS_SET=L (20 pin=GND or OPEN)



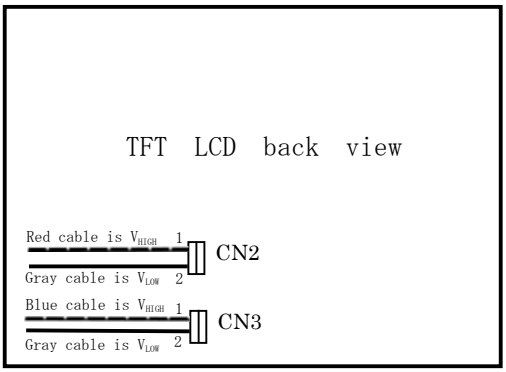
4-4 Backlight

CN 2, 3

The module-side connector : BHSR-02VS-1 (JST)

The user-side connector : SM02B-BHSS-1-TB (JST)

| Pin no. | symbol | I/O | Function |
|---|---|---|---|
| 1 | $V_{HIGH}$ | I | Power supply for lamp (High voltage side) |
| 2 | $V_{LOW}$ | I | Power supply for lamp (Low voltage side) |




## 5. Absolute Maximum Ratings

| Parameter | Symbol | Condition | Ratings | Unit | Remark |
|---|---|---|---|---|---|
| Supply voltage | Vcc | Ta=25℃ | 0 ～ + 4.0 | V | |
| Lamp Input voltage | $V_{HIGH}$ | － | 0 ～ + 2700 | Vrms | |
| Storage temperature | $T_{STG}$ | － | －25 ～ + 60 | ℃ | 【Note1】 |
| Operating temperature | $T_{OPA}$ | － | 0 ～ + 50 | ℃ | |

【Note1】Humidity：95%RH Max. ( Ta≦40℃ )

Maximum wet-bulb temperature at 39℃ or less. ( Ta>40℃ )

No condensation.

6. Electrical Characteristics

6-1. TFT-LCD panel driving Ta＝25℃

| Parameter | | | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Vcc | Supply voltage | | Vcc | +3.0 | +3.3 | +3.6 | V | 【Note2】 |
| | Current dissipation | | Icc | － | 425 | 700 | mA | 【Note3】 |
| Permissive input ripple voltage | | | $V_{RF}$ | － | － | 100 | mVp-p | Vcc=+3.3V |
| Differential input threshold voltage | | High | $V_{TH}$ | － | － | +100 | mV | $V_{CM}$=+1.2V |
| | | Low | $V_{TL}$ | –100 | － | － | mV | 【Note1】 |
| Input current (High) | | | $I_{OH}$ | － | － | ±10 | μA | $V_I$=2.4V, Vcc=3.6V |
| Input current (Low) | | | $I_{OL}$ | － | － | ±10 | μA | $V_I$=0V, Vcc=3.6V |
| Terminal resistor | | | $R_T$ | － | 100 | － | Ω | Differential input |

【Note1】 $V_{CM}$ : Common mode voltage of LVDS driver.

【Note2】

1） On-off sequences of Vcc and data

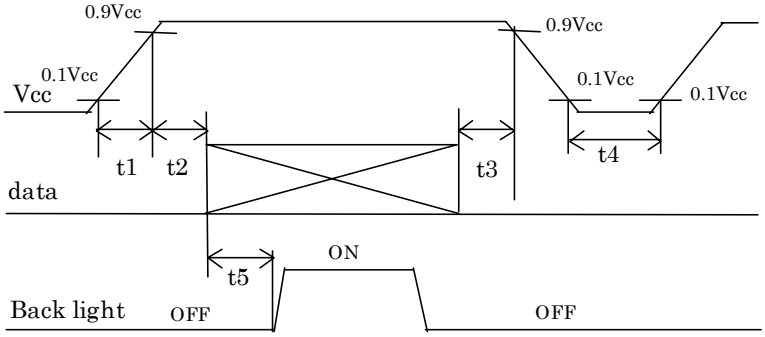
0＜t1≦10ms

0＜t2≦10ms

0＜t3≦1s

1s≦t4

200ms≦t5




Power sequence for Backlight is not especially specified, however it is recommended to consider some timing difference between LVDS input and Backlight input as shown above.

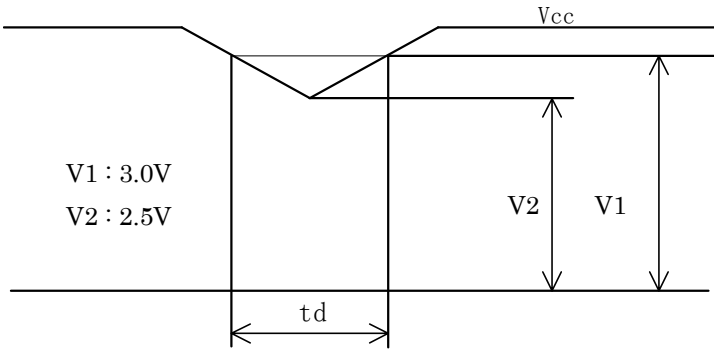
If the Backlight lights on before LCD starting, or if the Backlight is kept on after LCD stopping, the screen may look white for a moment or abnormal image may be displayed.

This is caused by variation in output signal from timing generator at LVDS input on or off. It does not cause the damage to the LCD module.

2） Dip conditions for supply voltage

1) V2 ≦Vcc＜ V1
td≦ 10ms

2) Vcc＜V2
Vcc-dip conditions should also follow the on-off conditions.



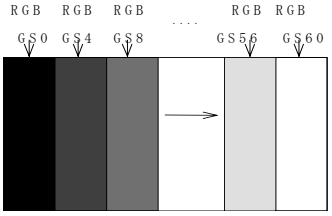

【Note3】 Typical current situation : 16-gray-bar pattern

Vcc=+3.3V, CK=65MHz

Horizontal period =20.7 us

Gray scale : GS(4n)

n=0～15



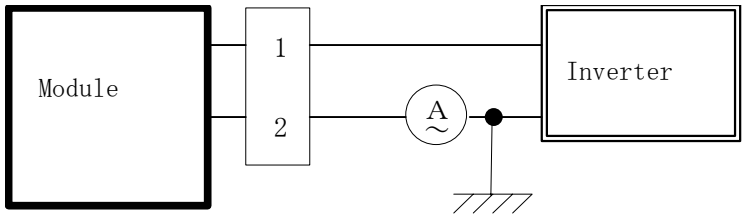

The explanation of each gray scale, GS(4n), is described below section 8-2.

6-2. Backlight

The back light system is an edge-lighting type with 2 CCFTs (Cold Cathode Fluorescent Tube).
The characteristics of the lamp are shown in the following table.
The value mentioned below is at the case of one CCFT.
CCFT Model Name : KTBE24MSTF-530.5KB270-Z-L (STANLEY ELECTRIC CO.,LTD)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| Lamp current range | $I_L$ | 3.0 | 4.5 | 5.0 | mArms | 【Note1】 |
| Lamp voltage | $V_L$ | — | 1000 | 1150 | Vrms | $I_L$=4.5 mArms Ta=25℃ 60kHz |
| Lamp power consumption | $P_L$ | — | 4.5 | 5.2 | W | 【Note2】<br>$I_L$=4.5 mArms Ta=25℃ 60kHz |
| Lamp frequency | $F_L$ | 40 | 60 | 70 | kHz | 【Note3】 |
| Kick-off voltage | Vs | — | — | 2200 | Vrms | Ta=0℃ 60kHz【Note4】 |
| Lamp life time | $T_L$ | 50,000 | — | — | hour | 【Note5】 |

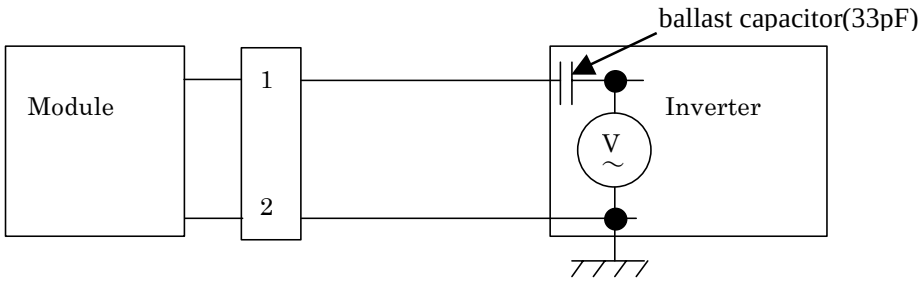
【Note1】 A lamp can be light in the range of lamp current shown above.
Maximum rating for current is measured by high frequency current measurement equipment connected to $V_{LOW}$ at circuit showed below.
(Note : To keep enough kick-off voltage and necessary steady voltage for CCFT.)
Lamp frequency : 40～70kHz
Ambient temperature : 0～50℃




【Note2】 Referential data per one CCFT by calculation ( $I_L$ × $V_L$ ).
The data don't include loss at inverter.

【Note3】 Lamp frequency of inverter may produce interference with horizontal synchronous frequency, and this may cause horizontal beat on the display. Therefore, adjust lamp frequency, and keep inverter as far as from module or use electronic shielding between inverter and module to avoid interference.

【Note4】 This is transformer output voltage at 33pF for the ballast capacitor of a DC-AC inverter.
The kick-off voltage may rise up in the user set, please decide the open output voltage by checking not to occur lighting failure under operating state.
The open output voltage should be applied to the lamp for more than 1 second to startup. Otherwise the lamp may not be turned on.




＊ 2pin $V_{LOW}$

【Note5】 Lamp life time is defined as the time when either ① or ② occurs in the continuous operation under the condition of Ta=25℃ and $I_L$=5.0 mA rms.

① Brightness becomes 50% of the original value under standard condition.

② Kick-off voltage at Ta=0℃ exceeds 2200 $V_{rms}$ value.

《Note》

The performance of the backlight, for example lifetime or brightness, is much influenced by the characteristics of the DC-AC inverter for the lamp. When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of the backlight and the inverter (miss-lighting, flicker, etc.) never occurs. When you confirm it, the module should be operated in the same condition as it is installed in your instrument.

Use the lamp inverter power source incorporating such safeguard as overvoltage / overcurrent protective circuit or lamp voltage waveform detection circuit, which should have individual control of each lamp.

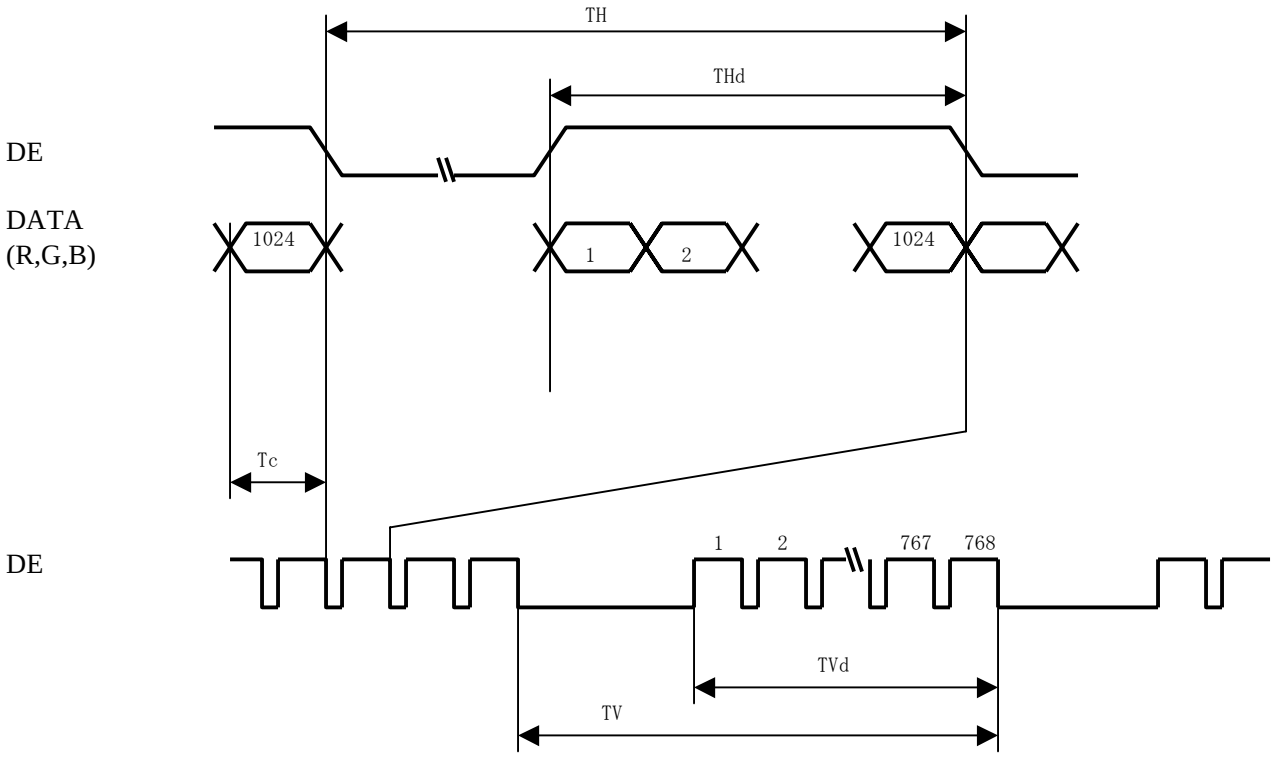
In case one circuit without such individual control is connected to more than two lamps, excessive current may flow into one lamp when the other one is not in operation.

7. Timing characteristics of input signals

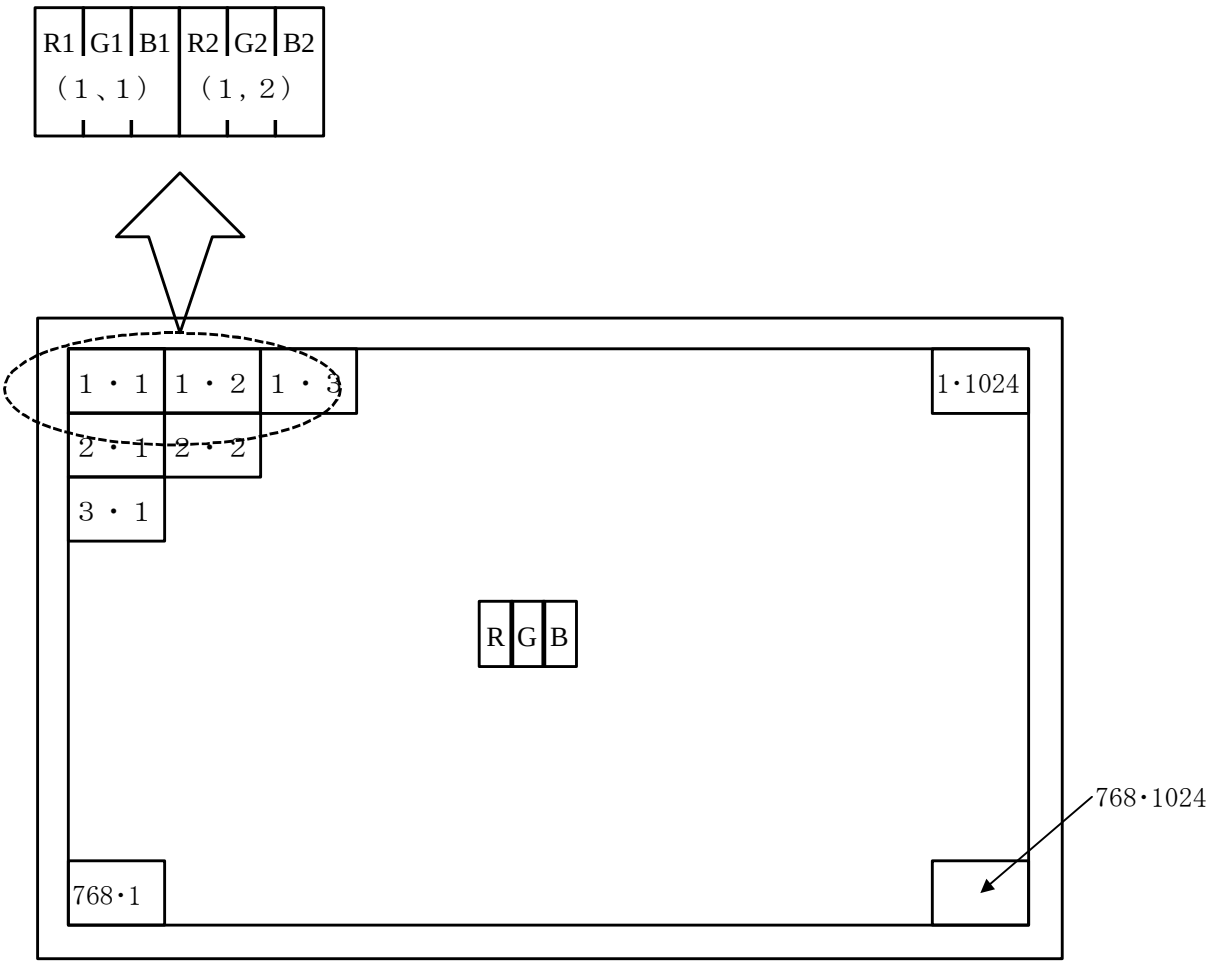
7-1. Timing characteristics

| Parameter | | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Clock signal | Frequency | 1/Tc | 50.0 | 65.0 | 80.0 | MHz |
| ENAB signal | Horizontal period | TH | 1056 | 1344 | 1720 | clock |
| | | | 16.0 | 20.7 | 23.4 | µs |
| | Horizontal period (High) | THd | 1024 | 1024 | 1024 | clock |
| | Vertical period | TV | 773 | 806 | 990 | line |
| | Vertical period (High) | TVd | 768 | 768 | 768 | line |

【Note】 In case of using the long vertical period, the deterioration of display quality, flicker etc. may occur.



7-2 Input Data Signals and Display Position on the screen




Display Position of Data (V,H)

8. Input Signals, Basic Display Colors and Gray Scale of Each Color

8-1 8bit input

| | Colors & Gray scale | Gray Scale | Data signal | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | R0 | R1 | R2 | R3 | R4 | R5 | R6 | R7 | G0 | G1 | G2 | G3 | G4 | G5 | G6 | G7 | B0 | B1 | B2 | B3 | B4 | B5 | B6 | B7 |
| Basic Color | Black | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | X | 1 | 1 | 1 | 1 | 1 | 1 |
| | Green | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | X | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Cyan | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | X | 1 | 1 | 1 | 1 | 1 | 1 | X | X | 1 | 1 | 1 | 1 | 1 | 1 |
| | Red | – | X | X | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Magenta | – | X | X | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | X | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | – | X | X | 1 | 1 | 1 | 1 | 1 | 1 | X | X | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | White | – | X | X | 1 | 1 | 1 | 1 | 1 | 1 | X | X | 1 | 1 | 1 | 1 | 1 | 1 | X | X | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale of Red | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | GS1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | GS2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | □ | | | | | □ | | | | | | | □ | | | | | | | | □ | | | | |
| | □ | □ | | | | | □ | | | | | | | □ | | | | | | | | □ | | | | |
| | Brighter | GS250 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | GS251 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red | GS252 | X | X | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale of Green | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | GS1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | GS2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | □ | | | | | □ | | | | | | | □ | | | | | | | | □ | | | | |
| | □ | □ | | | | | □ | | | | | | | □ | | | | | | | | □ | | | | |
| | Brighter | GS250 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | GS251 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | GS252 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | X | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale of Blue | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | GS1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | GS2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | □ | | | | | □ | | | | | | | □ | | | | | | | | □ | | | | |
| | □ | □ | | | | | □ | | | | | | | □ | | | | | | | | □ | | | | |
| | Brighter | GS250 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| | □ | GS251 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| | Blue | GS252 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | X | 1 | 1 | 1 | 1 | 1 | 1 |

0 : Low level voltage, 1 : High level voltage. X :Don't care.

Each basic color can be displayed in 253 gray scales from 8 bit data signals. According to the combination of total 24 bit data signals, the 16-million-color display can be achieved on the screen.

8-2 6bit input

| | Colors & Gray scale | Gray Scale | Data signal | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | R0 | R1 | R2 | R3 | R4 | R5 | G0 | G1 | G2 | G3 | G4 | G5 | B0 | B1 | B2 | B3 | B4 | B5 |
| Basic Color | Black | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Green | – | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Cyan | – | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Red | – | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 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 |
| Gray Scale of Red | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | GS1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | GS2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | □ | | | | □ | | | | | | □ | | | | | | □ | | |
| | □ | □ | | | | □ | | | | | | □ | | | | | | □ | | |
| | Brighter | GS61 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | GS62 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red | GS63 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale of Green | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | GS1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | GS2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | □ | | | | □ | | | | | | □ | | | | | | □ | | |
| | □ | □ | | | | □ | | | | | | □ | | | | | | □ | | |
| | Brighter | GS61 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | GS62 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | GS63 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale of Blue | Black | GS0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | □ | GS1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | Darker | GS2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | □ | □ | | | | □ | | | | | | □ | | | | | | □ | | |
| | □ | □ | | | | □ | | | | | | □ | | | | | | □ | | |
| | Brighter | GS61 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| | □ | GS62 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| | Blue | GS63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

0 : Low level voltage, 1 : High level voltage.

Each basic color can be displayed in 64 gray scales from 6 bit data signals. According to the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

9. Optical Characteristics

Ta=25℃, Vcc =+3.3V

| Parameter | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Viewing angle range | Vertical | θ 11 | CR≧5 | 40 | 55 | — | Deg. | 【Note1,4】 |
| | | θ 12 | | 70 | 80 | — | Deg. | |
| | Horizontal | θ 21, θ 22 | | 70 | 80 | — | Deg. | |
| | Vertical | θ 11 | CR≧10 | 30 | 45 | — | Deg. | |
| | | θ 12 | | 45 | 55 | — | Deg. | |
| | Horizontal | θ 21, θ 22 | | 50 | 60 | — | Deg. | |
| Contrast ratio | | C R | θ =0° | 250 | 350 | — | | 【Note2,4】 |
| Response Time | Rise | γ r | θ =0° | — | 5 | 20 | ms | 【Note3,4】 |
| | Fall | γ d | | — | 20 | 40 | ms | |
| Chromaticity of White | | x | | 0.283 | 0.313 | 0.343 | | 【Note4】 |
| | | y | | 0.299 | 0.329 | 0.359 | | |
| Chromaticity of Red | | x | | 0.551 | 0.581 | 0.611 | | |
| | | y | | 0.292 | 0.322 | 0.352 | | |
| Chromaticity of Green | | x | | 0.277 | 0.307 | 0.337 | | |
| | | y | | 0.516 | 0.546 | 0.576 | | |
| Chromaticity of Blue | | x | | 0.121 | 0.151 | 0.181 | | |
| | | y | | 0.097 | 0.127 | 0.157 | | |
| Luminance of white | | YL | | 200 | 260 | — | cd/m$^2$ | IL=4.5mA rms fL=60kHz 【Note4】 |
| White Uniformity | | δ w | | — | — | 1.25 | — | 【Note5】 |

※The measurement shall be executed 30 minutes after lighting at rating.

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in Fig.2 below.

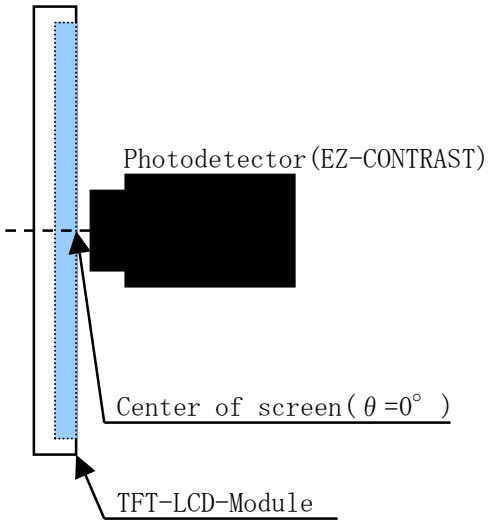



Fig2-1 Viewing angle measurement method

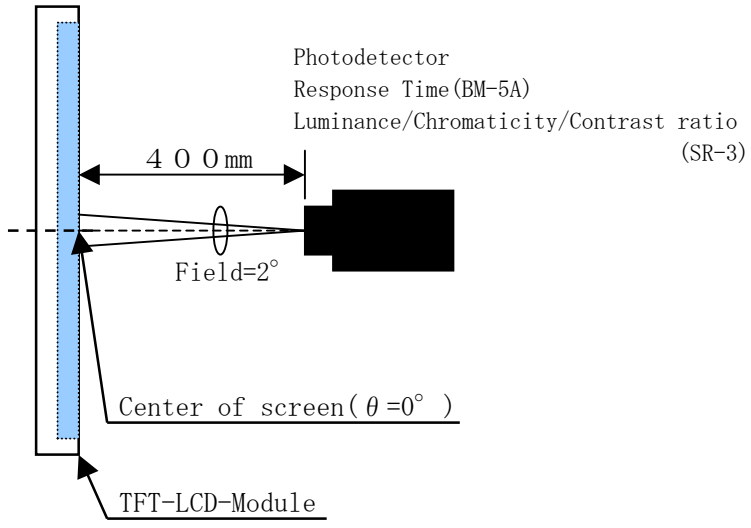
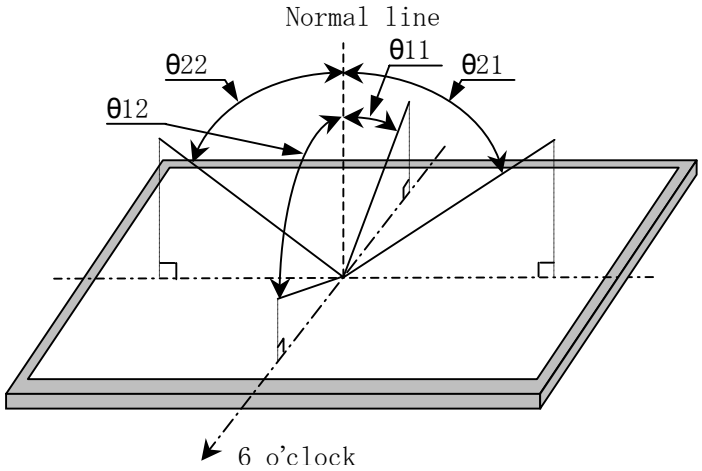



Fig2-2 Luminance/Contrast ratio/Response time/Chromaticity measurement method

【Note1】Definitions of viewing angle range:



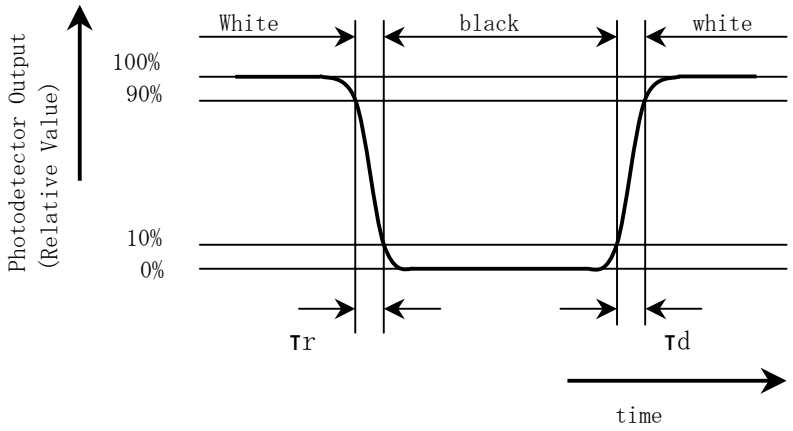

【Note2】Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$

【Note3】Definition of response time:

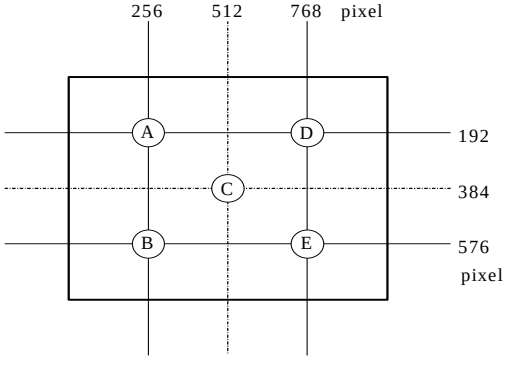
The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".




【Note4】This shall be measured at center of the screen.

【Note5】Definition of white uniformity:

White uniformity is defined as the following with five measurements (A～E).




$$\delta w = \frac{\text{Maximum Luminance of five points (brightness)}}{\text{Minimum Luminance of five points (brightness)}}$$

10. Handling Precautions

a) Be sure to turn off the power supply when inserting or disconnecting the cable.

b) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.

c) Since the front polarize is easily damaged, pay attention not to scratch it.

d) Since long contact with water may cause discoloration or spots, wipe off water drop immediately.

e) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

f) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

g) Since CMOS LSI is used in this module, take care of static electricity and take the human earth into consideration when handling.

h) Make sure the four mounting holes of the module are grounded sufficiently. Take electro-magnetic interference (EMI) into consideration.

i) The module has some printed circuit boards (PCBs) on the back side. Take care to keep them form any stress or pressure when handling or installing the module; otherwise some of electronic parts on the PCBs may be damaged.

j) Observe all other precautionary requirements in handling components.

k) When some pressure is added onto the module from rear side constantly, it causes display non-uniformity issue, functional defect, etc. So, please avoid such design.

l) When handling LCD modules and assembling them into cabinets, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the LCD modules.

11. Packing form

a) Production country : JAPAN , TAIWAN, CHINA

b) Piling number of cartons : maximum 6 cartons

c) Packing quantity in one carton : 10 modules

d) Carton size : 408mm(W)×340mm(H)×398mm(D)

e) total mass of one carton filled with full modules : 12.0kg(typ.)

f) Packing form is shown in Fig.3

12. Reliability test items

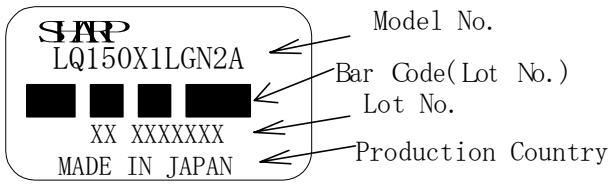
| No | Test item | Conditions |
|---|---|---|
| 1 | High temperature storage test | Ta = 60℃ 240h |
| 2 | Low temperature storage test | Ta = -25℃ 240h |
| 3 | High temperature<br>& high humidity operation test | Ta = 40℃ ; 95%RH 240h<br>(No condensation) |
| 4 | High temperature operation test | Ta = 60℃ 240h<br>(The temperature of panel surface) |
| 5 | Low temperature operation test | Ta = 0℃ 240H |
| 6 | Vibration test<br>(non- operating) | Waveform : Sine wave<br>Frequency : 10～57Hz/Vibration width (one side) : 0.075mm<br>: 58～500Hz/Gravity : 9.8m/s$^2$<br>Sweep time : 11minutes<br>Test period : 3 hours<br>(1 hour for each direction of X,Y,Z) |
| 7 | Shock test<br>(non- operating) | Max. gravity : 490m/s$^2$<br>Pulse width : 11ms, sine wave<br>Direction : ±X, ±Y, ±Z,<br>once for each direction. |
| 8 | Thermal shock test<br>(Storage) | Ta=-25℃～60℃ ; 5 cycles<br>Test period : 10 hours (1 hour for each temperature) |
| 9 | Altitude | Ta=50℃,70kPa,3,048m(10,000ft), t=24h (Operating)<br>Ta=70℃,12kPa,15,240m(50,000ft), t=24h (Storage) |

【Result Evaluation Criteria】

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

13. Others

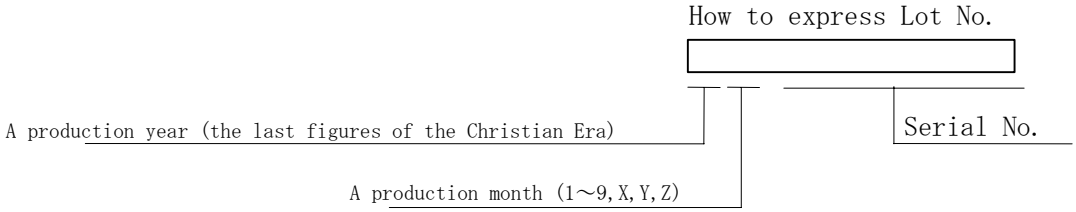
1) Lot No. and indication Bar Code Label:




Production country

| | |
|---|---|
| Japan | MADE IN JAPAN |
| Taiwan | MADE IN TAIWAN |
| China | MADE IN CHINA |

How to express Lot No.




2) Packing Label

社内品番：（４Ｓ）LQ150X1LGN2A
Bar code（①）
ＬｏｔＮＯ.　：（１Ｔ）２００４．Ｘ．ＸＸ
Bar code（②）
Ｑｕａｎｔｉｔｙ：(Q)　１０　ｐｃｓ
Bar code（③）
ユーザ品番　：
シャープ物流用ラベルです。

Made in JAPAN / CHINA

| | | |
|---|---|---|
| TYPE | ＬＱ１５０Ｘ１ＬＧＮ２Ａ | ① |
| QUANTITY | １０ | ③ |
| LOT(DATA) | ０４．０９．２４ | ② |

Made in TAIWAN

① Model No. (LQ150X1LGN2A)
② Lot No. (Date)
③ Quantity

3) Adjusting volume have been set optimally before shipment, so do not change any adjusted value. If adjusted value is changed, the specification may not be satisfied.

4) Disassembling the module can cause permanent damage and should be strictly avoided.

5) Please be careful since image retention may occur when a fixed pattern is displayed for a long time.

6) The chemical compound which causes the destruction of ozone layer is not being used.

7) Warning of mercury and material information of LPG (Light Pipe Guide) are printed on the back of the module.

**MATERIAL INFORMATION**
**>PLASTIC LIGHT GUIDE:PMMA<**

8)Cold cathode fluorescent lamp in LCD PANEL contains a small amount of mercury, Please follow local ordinances or regulations for disposal.

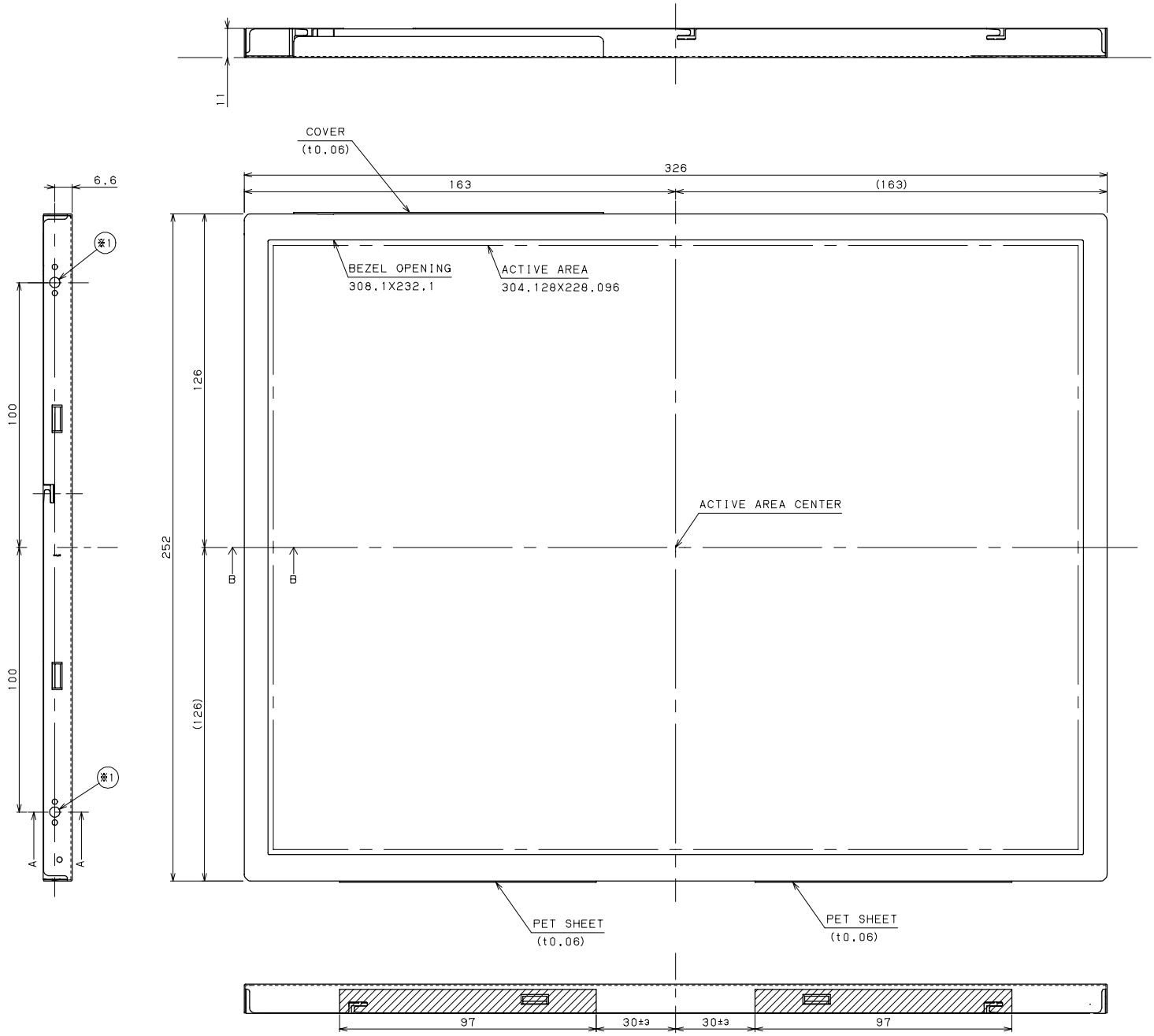
COLD CATHODE FLUORESCENT LAMP IN LCD PANEL
CONTAINS A SMALL AMOUNT OF MERCURY, PLEASE FOLLOW
LOCAL ORDINANCES OR REGULATION FOR DISPOSAL
当該液晶ディスプレイパネルは蛍光管が組み込まれていますので、地方自治体の条例、または、規則に従って廃棄ください。

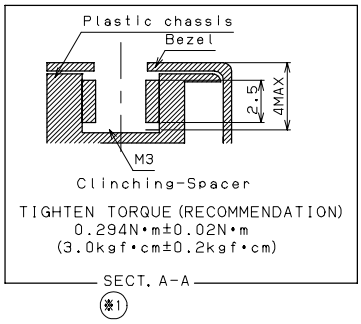
9) When any question or issue occurs, it shall be solved by mutual discussion.

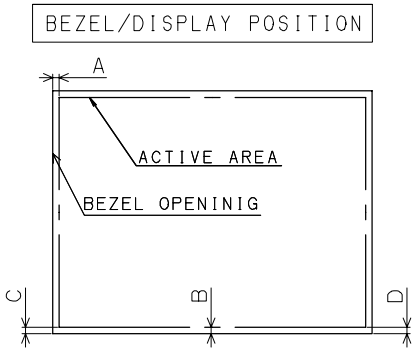
14. Carton storage condition

| | |
|---|---|
| Temperature | 0℃ to 40℃ |
| Humidity | 95%RH or less |
| Reference condition : | 20℃ to 35℃ , 85%RH or less (summer) |
| | : 5℃ to 15℃ , 85%RH or less (winter) |
| | ・the total storage time (40℃,95%RH) : 240H or less |
| Sunlight | Be sure to shelter a product from the direct sunlight. |
| Atmosphere | Harmful gas, such as acid and alkali which bites electronic components and/or wires must not be detected. |
| Notes | Be sure to put cartons on palette or base, don't put it on floor, and store them with removing from wall<br>Please take care of ventilation in storehouse and around cartons, and control changing temperature is within limits of natural environment |
| Storage period | 1 year |

SHARP




1) TOLERANCE X-DIRECTION A:2.0±0.8
2) TOLERANCE Y-DIRECTION B:2.0±0.8
3) OBLIQUITY OF DISPLAY AREA |C-D|<0.8

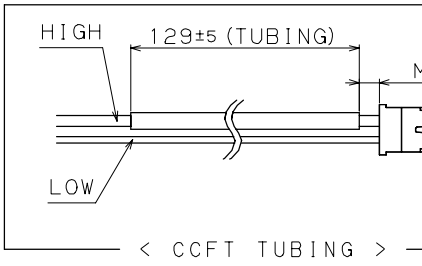
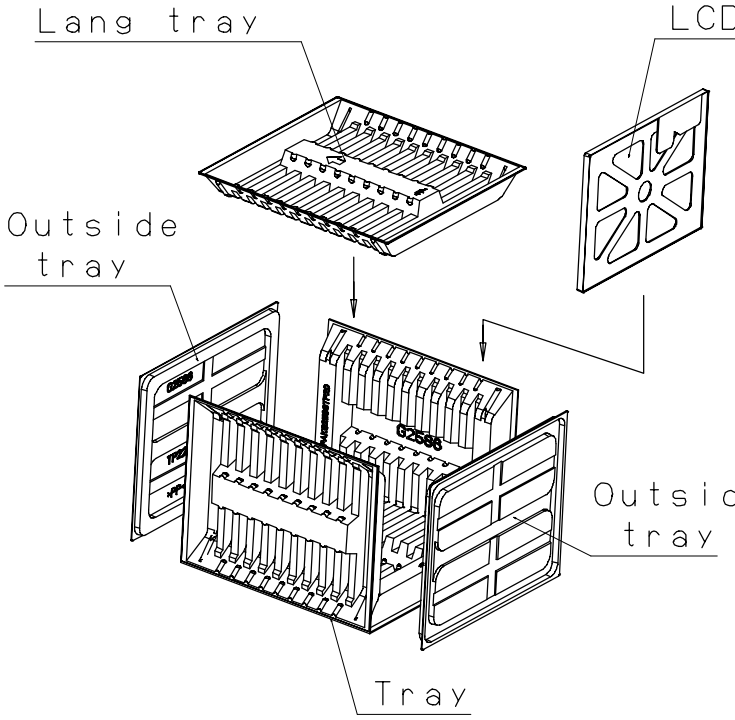


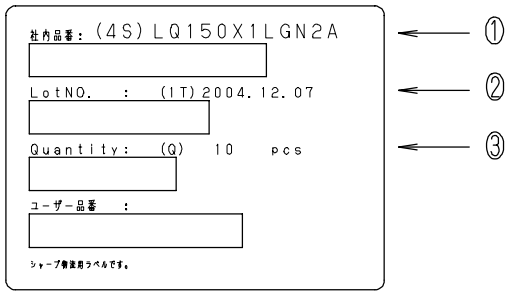

Fig. 1 LC

SHARP

LD-17823-22



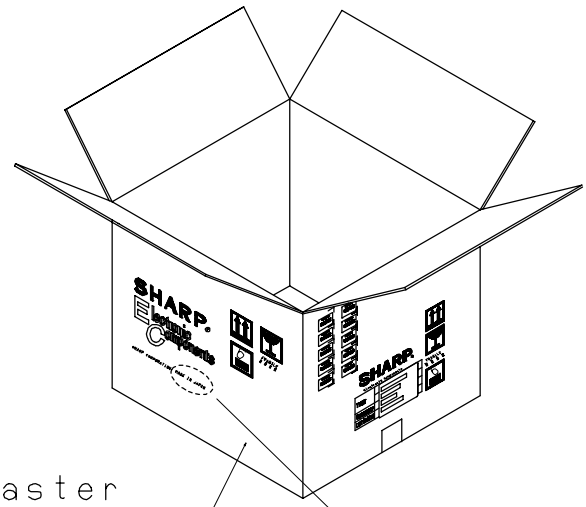

※Made in JAPAN/CHINA

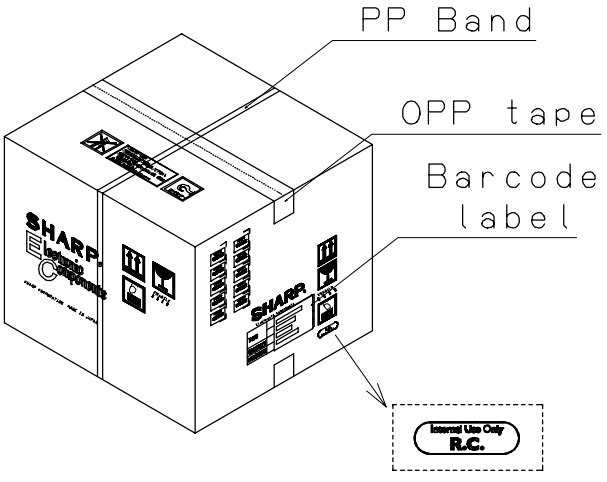



※Made in TAIWAN

| | | |
|---|---|---|
| TYPE | LQ150X1LGN2A | ←① |
| | | |
| QUANTITY | 10 | ←③ |
| LOT(DATE) | 04.12.07 | ←② |

①Model No.
②Lot No. (Date)
③Quantity




「R.C.mark for RoHS」

※A production country is JAPAN : "MADE IN JAPAN"
A production country is CHINA : "MADE IN CHINA"
A production country is TAIWAN : "MADE IN TAIWAN"

Fig.3 Packing Form(LQ150X1LGN2A)

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Suggested applications (if any) are for standard use; See Important Restrictions for limitations on special applications. See Limited Warranty for SHARP's product warranty. The Limited Warranty is in lieu, and exclusive of, all other warranties, express or implied. ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR USE AND FITNESS FOR A PARTICULAR PURPOSE, ARE SPECIFICALLY EXCLUDED. In no event will SHARP be liable, or in any way responsible, for any incidental or consequential economic or property damage.

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www.sharp-world.com

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