

PRODUCT SPECIFICATIONS

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SHARP

Liquid Crystal Displays Group

LQ315T3LZ49

TFT-LCD Module

Spec. Issue Date: Oct. 19, 2005

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DEVICE SPECIFICATION FOR

TFT - LCD module

MODEL No. LQ315T3LZ49

CUSTOMER'S APPROVAL

DATE _____

BY _____

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1. Application

This specification applies to the color 31.5" Wide XGA TFT-LCD module LQ315T3LZ49.

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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, inverter circuit and back light system etc. Graphics and texts can be displayed on a 1366 × RGB × 768 dots panel with 16,777,216 colors by using LVDS (Low Voltage Differential Signaling) to interface, +5V of DC supply voltages.

This module also includes the DC/AC inverter to drive the CCFT. (+24V of DC supply voltage)

And in order to improve the response time of LCD, this module applies the Over Shoot driving (O/S driving) technology for the control circuit. In the O/S driving technology, signals are being applied to the Liquid Crystal according to a pre-fixed process as an image signal of the present frame when a difference is found between image signal of the previous frame and that of the current frame after comparing them.

By using the captioned process, the image signals of this LCD module are being set so that image response can be completed within one frame, as a result, image blur can be improved and clear image performance can be realized.

3. Mechanical Specifications

| Parameter | Specifications | Unit |
|------------------------------|---|-------|
| Display size | 80.04 (Diagonal) | cm |
| | 31.5 (Diagonal) | inch |
| Active area | 697.69 (H) x 392.26 (V) | mm |
| Pixel Format | 1366 (H) x 768 (V) (1pixel = R + G + B dot) | pixel |
| Pixel pitch | 0.51075(H) x 0.51075 (V) | mm |
| Pixel configuration | R, G, B vertical stripe | |
| Display mode | Normally black | |
| Unit Outline Dimensions (*1) | 760.0(W) x 450.0(H) x 48.0(D) | mm |
| Mass | 7.5 ± 0.3 | kg |
| Surface treatment | Anti glare, low reflection coating Hard coating: 2H Haze: 23 +/- 5% | |

(*1) Outline dimensions are shown in Fig.1

Input Terminals

4-1. TFT panel driving

CN1 (Interface signals and +5V DC power supply) (Shown in Fig.1)

Using connector : FI-X30SSL-HF (Japan Aviation Electronics Ind. , Ltd.) or equivalent

Mating connector : FI-X30H/FI-X30HL, FI-X30C/FI-X30C2L

or FI-X30M (Japan Aviation Electronics Ind. , Ltd.)

Mating LVDS transmitter : THC63LVDM83A or equivalent device

| Pin No. | Symbol | Function | Remark |
|---------|----------|---|--|
| 1 | VCC | +5V Power Supply | |
| 2 | VCC | +5V Power Supply | |
| 3 | VCC | +5V Power Supply | |
| 4 | VCC | +5V Power Supply | |
| 5 | GND | GND | |
| 6 | GND | GND | |
| 7 | GND | GND | |
| 8 | GND | GND | |
| 9 | SELLVDS | Select LVDS data order 【Note 1】 | Pull up Default H:3.3V 【Note 3】 |
| 10 | NC | | |
| 11 | GND | Ground | |
| 12 | RIN0- | Negative (-) LVDS differential data input | LVDS |
| 13 | RIN0+ | Positive (+) LVDS differential data input | LVDS |
| 14 | GND | Ground | |
| 15 | RIN1- | Negative (-) LVDS differential data input | LVDS |
| 16 | RIN1+ | Positive (+) LVDS differential data input | LVDS |
| 17 | GND | Ground | |
| 18 | RIN2- | Negative (-) LVDS differential data input | LVDS |
| 19 | RIN2+ | Positive (+) LVDS differential data input | LVDS |
| 20 | GND | Ground | |
| 21 | CLKIN- | Clock Signal(-) | LVDS |
| 22 | CLKIN+ | Clock Signal(+) | LVDS |
| 23 | GND | Ground | |
| 24 | RIN3- | Negative (-) LVDS differential data input | LVDS |
| 25 | RIN3+ | Positive (+) LVDS differential data input | LVDS |
| 26 | GND | Ground | |
| 27 | R/L | Horizontal shift direction 【Note 2】 | Pull down Default L:GND 【Note 4】 |
| 28 | U/D | Vertical shift direction 【Note 2】 | Pull down Default L:GND 【Note 4】 |
| 29 | Reserved | Not Available | |
| 30 | Reserved | Not Available | |

【note】 GND of a liquid crystal panel drive part has connected with a module chassis.

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

NA: Not Available

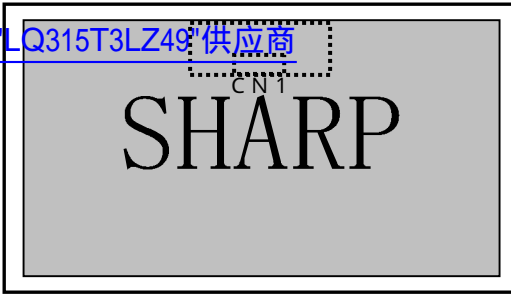
(*) Since the display position is prescribed by the rise of DE (Display Enable) signal, please do not fix DE signal during operation at "High."

【Note 2】 Display Reversal function

Normal (Default)

R / L : L (GND) U / D : L (GND)

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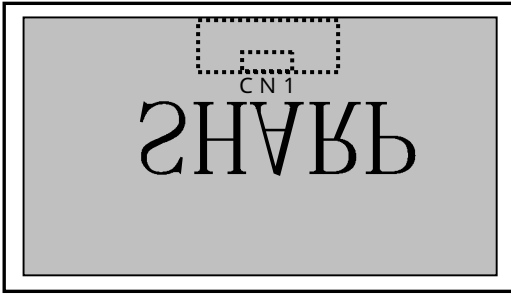
Horizontal reverse image

R / L : H (3 . 3 V) U / D : L (GND)



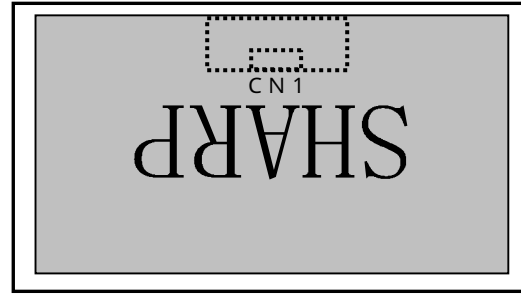
Vertical reverse image

R / L : L (GND) U / D : H (3 . 3 V)

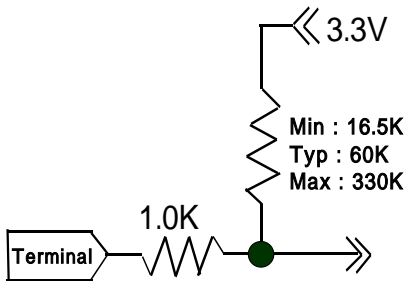


Horizontal and vertical reverse image

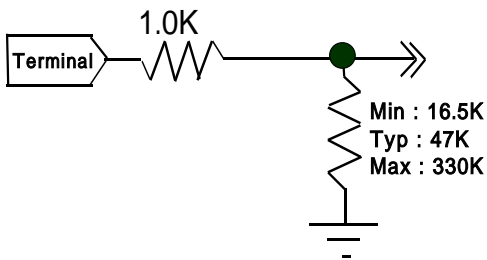
R / L : H (3 . 3 V) U / D : H (3 . 3 V)



【Note 3】 The equivalent circuit figure of the terminal

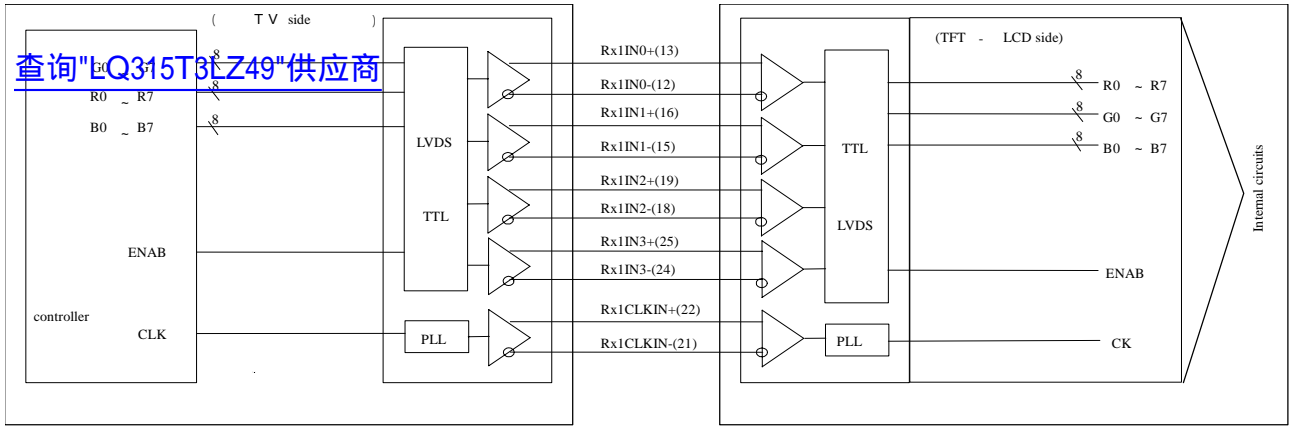


【Note 4】 The equivalent circuit figure of the terminal

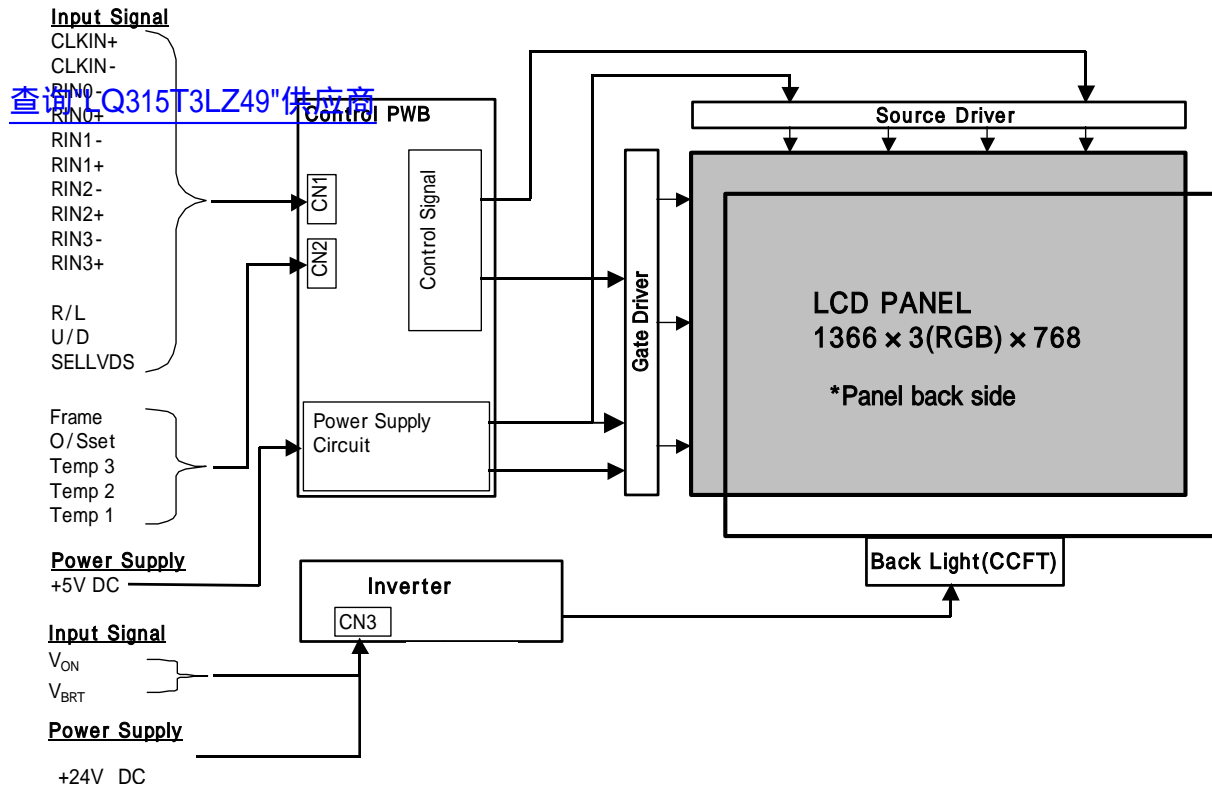


• Interface block diagram

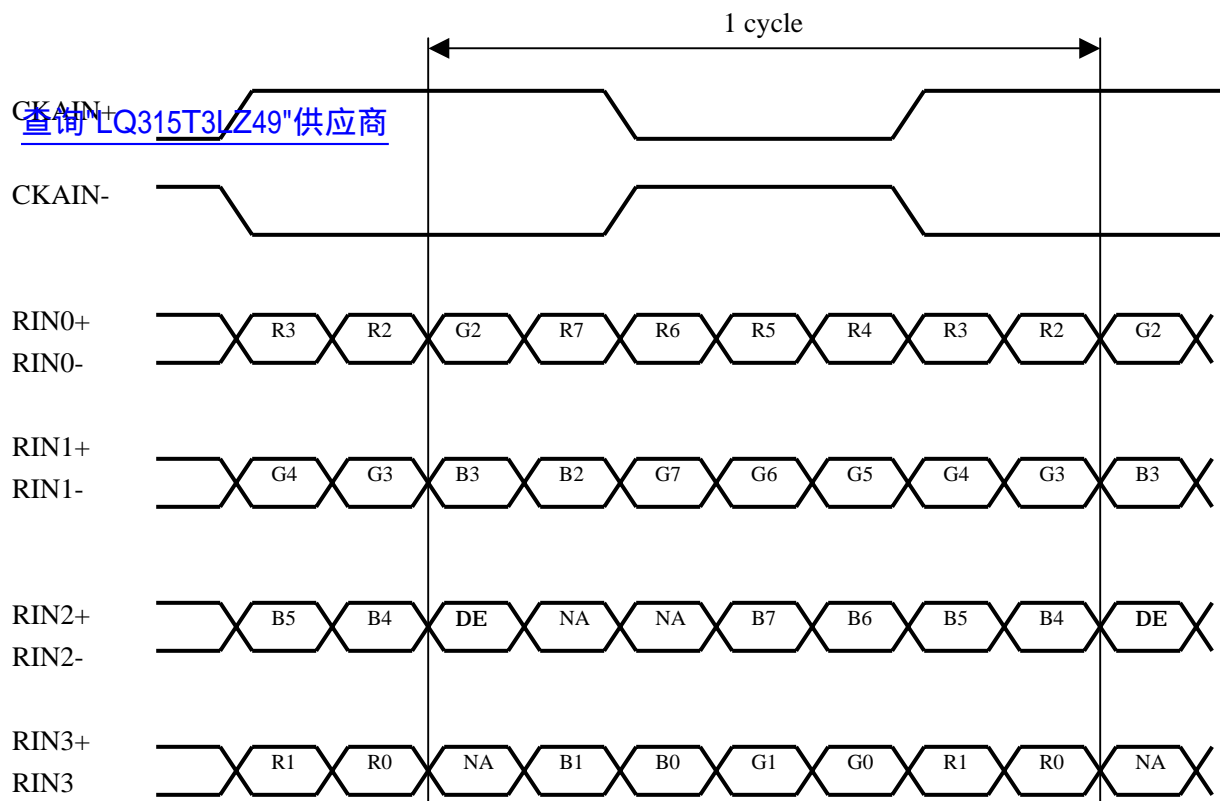
Corresponding Transmitter: THC63LVDM83R (THine) or equivalent device



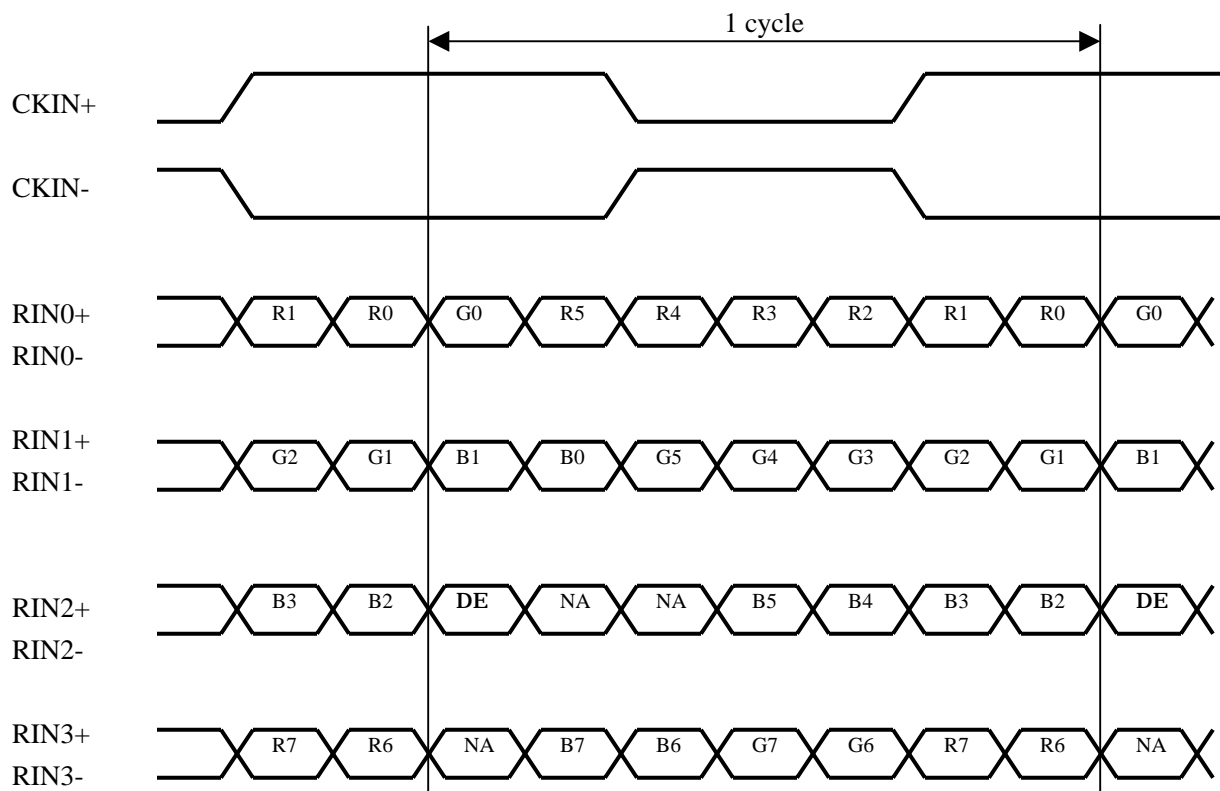
• Block Diagram (LCD Module)



SELLVDS= High (S.S.V) or Open



SELLVDS= Low(GND)



DE: Display Enable

NA: Not Available (Fixed Low)

O/S Driving Pin No and function

Using connector : SM07B-SRSS-TB-A (JST)

Mating connector : SHR-07V-S or SHR-07V-S-B (JST)

[查询LCS45T3LS49供应商](#)

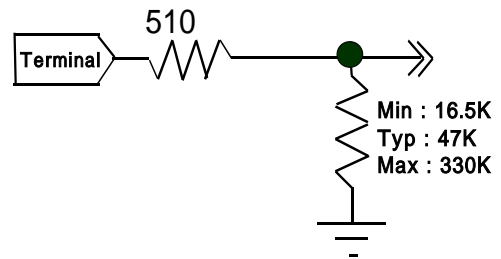
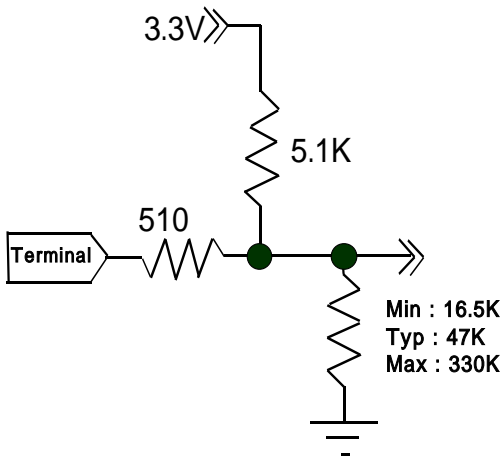
| Pin No | Function | Default | Remark |
|--------|----------|---|---------------------------------|
| 1 | Frame | Frame frequency setting H:60Hz, L:50Hz | Pull up H:3.3V 【Note 2】 |
| 2 | O/S set | O/S operation setting H:O/S_ON, L:O/S_OFF | Pull up H:3.3V 【Note 1】 |
| 3 | TEST | Fix to Low level usually. | Pull down L:GND 【Note 3】 |
| 4 | Temp3 | Data3 of panel surface temperature | Pull up H:3.3V 【Note 2】 |
| 5 | Temp2 | Data2 of panel surface temperature | Pull up H:3.3V 【Note 2】 |
| 6 | Temp1 | Data1 of panel surface temperature | Pull up H:3.3V 【Note 2】 |
| 7 | GND | GND | |

*L: Low level voltage (GND) H: High level voltage(3.3V)

【Note 1】 In case of O/S set setting "L"(O/S_OFF), it should be set the "Temp1~3" and "Frame" to "L".

【Note 2】The equivalent circuit figure of the terminal

【Note 3】The equivalent circuit figure of the terminal



According as the surface temperature of the panel, enter the optimum 3 bit signal into pin No.4,5,6.

Measuring the correlation between detected temperature by the sensor on PWB in users side and actual surface temperature of panel at center, convert the temperature detected by the sensor to the surface temperature of panel to enter the 3 bit temperature data.

| Pin no. | Surface temperature of panel | | | | | | | |
|---------|------------------------------|------|-------|-------|-------|-------|-------|--------------|
| | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 | 35 and above |
| 4 | L | L | L | L | H | H | H | H |
| 5 | L | L | H | H | L | L | H | H |
| 6 | L | H | L | H | L | H | L | H |

*L: Low level voltage (GND) H: High level voltage(3.3V)

*For overlapping temperatures (such as 5 ,10 ,15 ,20 ,25 , 30 ,35) select the optimum parameter, judging from the actual picture image.

4-2. Backlight driving

CN3 (Inverter control)

Using connector: B14B-PH-SM3-TB(JST)

Mating connector: PHR-14 (JST)

| Pin No. | Symbol | Function | Remark |
|---------|------------------|--------------------|----------|
| 1 | V _{INV} | +24V | |
| 2 | V _{INV} | +24V | |
| 3 | V _{INV} | +24V | |
| 4 | V _{INV} | +24V | |
| 5 | V _{INV} | +24V | |
| 6 | GND | GND | |
| 7 | GND | GND | |
| 8 | GND | GND | |
| 9 | GND | GND | |
| 10 | GND | GND | |
| 11 | Reserved | NC | |
| 12 | V _{ON} | Inverter ON/OFF | 【Note 1】 |
| 13 | V _{BRT} | Brightness Control | 【Note 2】 |
| 14 | Reserved | NC | |

【Note 1】 Inverter ON/OFF

| Input voltage | Function |
|---------------|---------------|
| 5V | Inverter: ON |
| 0V | Inverter: OFF |

【Note 2】 Brightness Control

PWM Brightness Control is regulated by analog input voltage (0V to 3.3V) .

| Input voltage | Function |
|---------------|-------------------------------|
| 0V | Brightness Control : (Dark) |
| 3.3V | Brightness Control : (Bright) |

4-3. The back light system characteristics

The back light system is direct type with 16 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.

| Item | Symbol | Min. | Typ. | Max. | Unit | Remarks |
|-----------|----------------|-------|------|------|------|---------|
| Life time | T _L | 60000 | - | - | Hour | 【Note】 |

【Note】• Lamp life time is defined as the time when brightness becomes 50% of the original value in the continuous operation under the condition of Ta=25 and brightness control(V_{BRT}=3.3V).

- This definition is valid with the condition that the module is placed horizontally. (The wide side of the module should be parallel to the ground.)

5. Absolute Maximum Ratings

| Parameter | Symbol | Condition | Ratings | Unit | Remark |
|--------------------------------------|-------------------------------------|-----------|------------|------|----------|
| Input voltage (for Control) | V _I | Ta=25 | -0.3 ~ 5.0 | V | 【Note 1】 |
| 5V supply voltage (for Control) | VCC | Ta=25 | 0 ~ +6 | V | |
| Input voltage (for Inverter) | V _{BRT} V _{ON} | Ta=25 | 0 ~ +6 | V | |
| 24V supply voltage (for Inverter) | V _{INV} | Ta=25 | 0 ~ +29 | V | |
| Storage temperature | T _{stg} | - | -25 ~ +60 | | 【Note 2】 |
| Operation temperature (Ambient) | T _{opa} | - | 0 ~ +50 | | |

【Note 1】 SELLVDS, R/L, U/D, TEST, Frame, O/S set, Temp1, Temp2, Temp3

【Note 2】 Humidity 95%RH Max.(Ta < 40)

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

No condensation.

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Remark |
|--------------------------------------|---------------------|------------------|------|------|------|-------------------|-------------------------------------|
| +5V supply | Supply voltage | V _{CC} | +4.5 | +5.0 | +5.5 | V | 【Note 1】 |
| | Current dissipation | I _{CC} | - | 800 | 1800 | mA | 【Note 2】 |
| Permissible input ripple voltage | | V _{RP} | - | - | 100 | mV _{P-P} | V _{CC} = +5.0V |
| Differential input threshold voltage | High | V _{TH} | - | - | 100 | mV | V _{CM} = +1.2V 【Note 6】 |
| | Low | V _{TL} | -100 | - | - | mV | |
| Input Low voltage | | V _{IL} | - | - | 0.7 | V | 【Note 3】 |
| Input High voltage | | V _{IH} | 2.6 | 3.3 | 3.6 | V | |
| Input leak current (Low) | | I _{IL1} | - | - | 100 | μA | V _I = 0V 【Note 4】 |
| | | I _{IL2} | - | - | 400 | μA | V _I = 0V 【Note 5】 |
| Input leak current (High) | | I _{IH1} | - | - | 100 | μA | V _I = 3.3V 【Note 4】 |
| | | I _{IH2} | - | - | 400 | μA | V _I = 3.3V 【Note 5】 |
| Terminal resistor | | R _T | - | 100 | - | | Differential input |

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

【Note 1】

Input voltage sequences

$$0 < t_1 \quad 10\text{ms}$$

$$10\text{ms} \quad t_2-1 \quad 20\text{m}$$

$$t_2-2 \quad 10\text{ms}$$

$$0 < t_3 \quad 1\text{s}$$

$$t_4 \quad 1\text{s}$$

$$t_5 \quad 200\text{ms}$$

Dip conditions for supply voltage

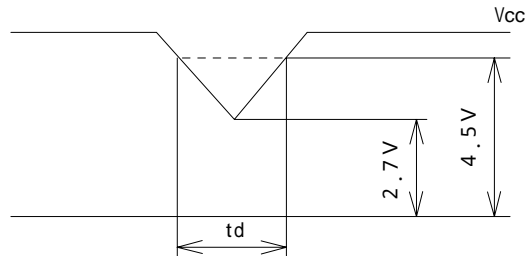
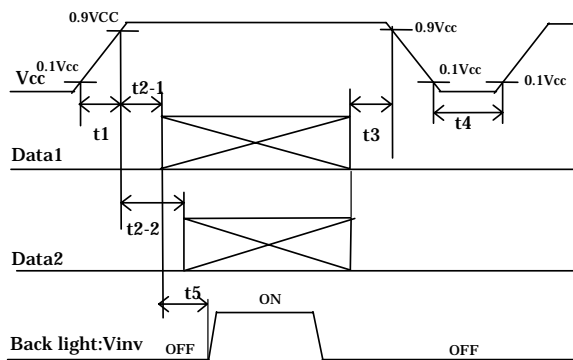
$$\text{a) } 2.7\text{V} \quad V_{CC} < 4.5\text{V}$$

$$t_d \quad 10\text{ms}$$

$$\text{b) } V_{CC} < 2.7\text{V}$$

Dip conditions for supply voltage is

based on input voltage sequence.



Data1: CLKIN ±, RIN0 ±, RIN1 ±, RIN2 ±, RIN3 ±

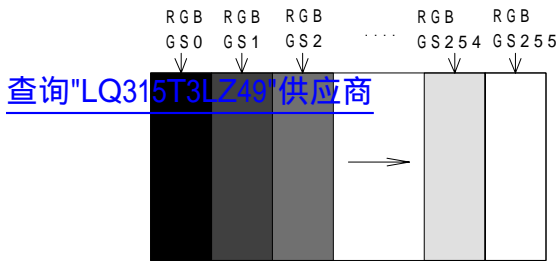
Data2: R/L, U/D, SELLVDS, Frame, O/Sset, Temp1, 2, 3

About the relation between data input and back light lighting, please base on the above-mentioned input sequence.

When back light is switched on before panel operation or after a panel operation stop, it may not display normally. But this phenomenon is not based on change of an incoming signal, and does not give damage to a liquid crystal display.

【Note 2】 Typical current situation: 256 gray-bar pattern (Vcc = +5.0V)

The explanation of RGB gray scale is seen in section 8.



Vcc = 5.0V
 CK = 82.0MHz
 Th = 20.67 μs

【Note 3】 R/L, U/D, SELLVDS, TEST, Frame, O/S set, Temp1, Temp2, Temp3

【Note 4】 R/L, U/D

【Note 5】 SELLVDS, TEST, Frame, O/S set, Temp1, Temp2, Temp3

【Note 6】 CLKIN+/CLKIN-, RIN0+/RIN0-, RIN1+/RIN1-, RIN2+/RIN2-, RIN3+/RIN3-,

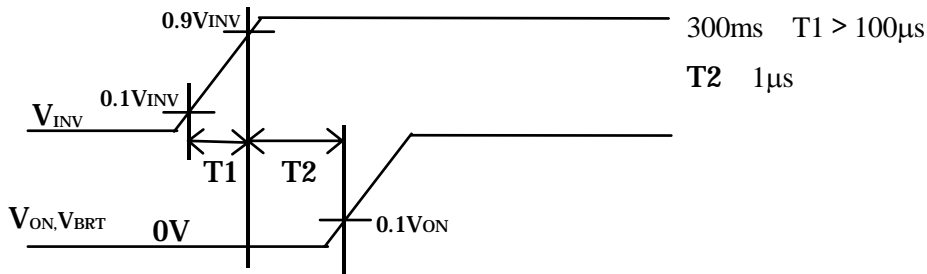
6-2. Inverter driving for back light

The back light system is direct type with 16 CCFTs (Cold Cathode Fluorescent Tube).

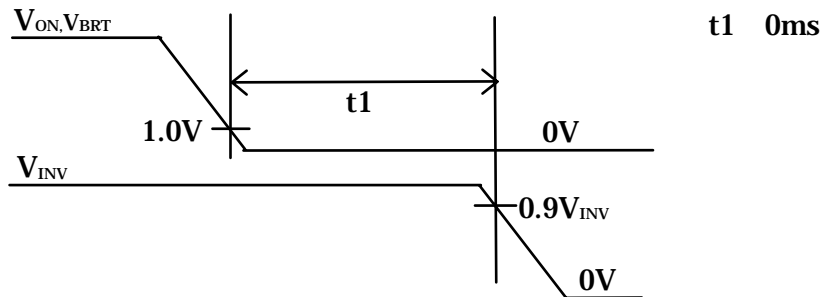
Ta=25

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|----------------------------------|---------------------|------------------|------|------|-------------------|--|
| + 24V | Current dissipation | I _{INV} | - | 4.2 | A | V _{INV} = 24V V _{BRT} = 3.3V, V _{ON} =5V 【Note 1】 |
| | Supply voltage | V _{INV} | 22.5 | 24.0 | 25.5 | |
| Permissible input ripple voltage | V _{RF} | - | - | 400 | mV _{P-P} | V _{INV} = 24V |
| Input voltage (Low) | V _{ONL} | 0 | - | 1.0 | V | Von impedance=1M |
| Input voltage (High) | V _{ONH} | 3.0 | - | 5.0 | V | |
| Brightness control voltage | V _{BRT} | 0 | | 3.3 | V | V _{BRT} impedance=10k |

【Note 1】 1)V_{INV}-turn-on condition



2) V_{INV}-turn-off condition



7. Timing characteristics of input signals

7-1. Timing characteristics

Timing diagrams of input signal are shown in Fig.2

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark | |
|------------------------|-------------------------------|------|-------|-------|------|---------|---------|
| Clock Frequency | 1/Tc | 65 | 82 | 85 | MHz | 【Note1】 | |
| Data enable signal | Horizontal period | TH | 1560 | 1696 | 1940 | clock | 【Note1】 |
| | Horizontal period (High) time | THt | 20.20 | 20.67 | - | μs | 【Note1】 |
| | Horizontal period (High) | THd | 1366 | 1366 | 1366 | clock | |
| | Vertical period | TV | 778 | 806 | 972 | line | |
| Vertical period (High) | TVd | 768 | 768 | 768 | line | | |

【Note】 When vertical period is very long, flicker and etc. may occur.

Please turn off the module after it shows the black screen.

Please make sure that length of vertical period should become of an integral multiple of horizontal length of period. Otherwise, the screen may not display properly.

【Note1】 Set up clock frequency and horizontal period to be less low than the min value of horizontal period time.

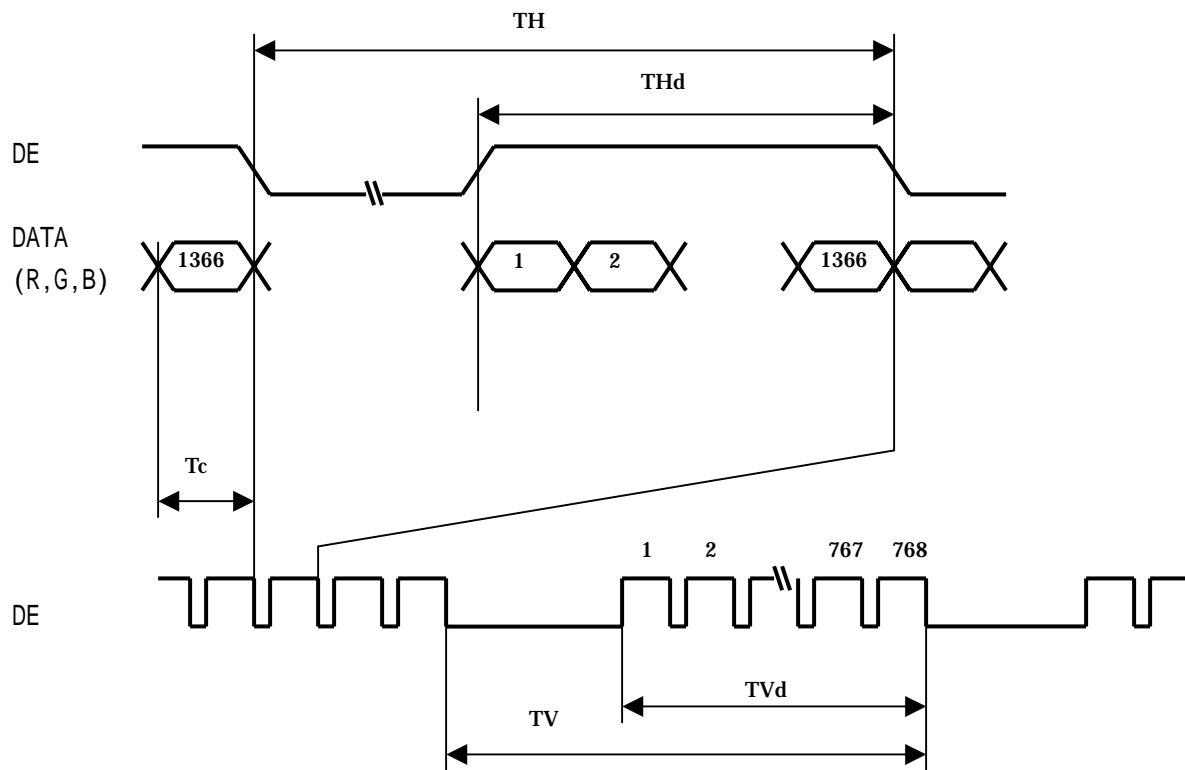
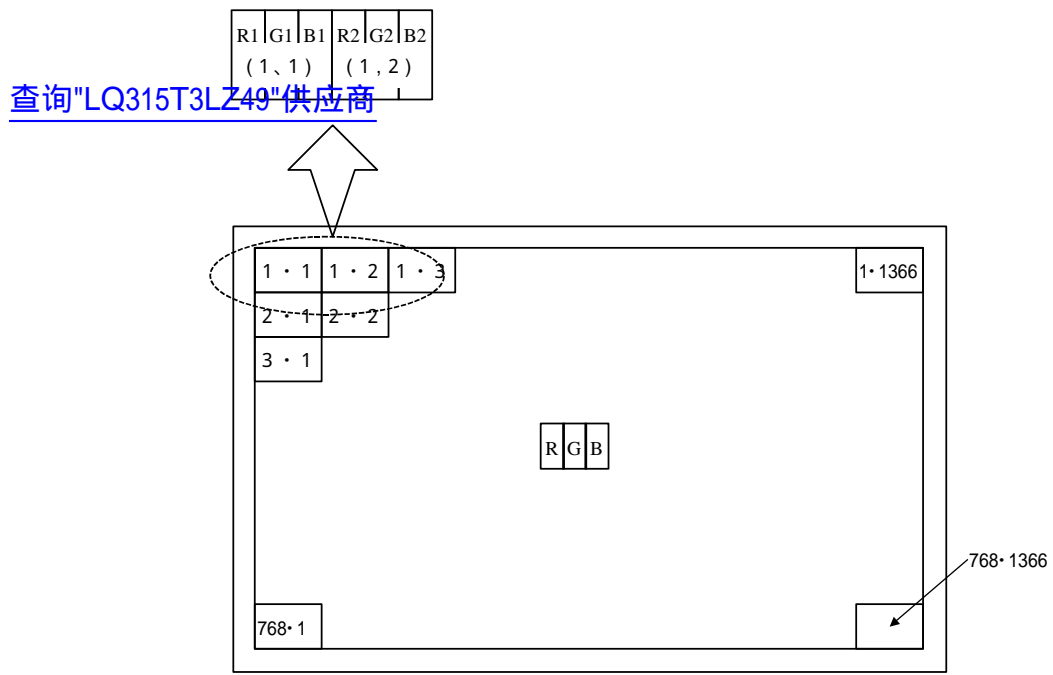


Fig.2 Timing characteristics of input signals



Display Position of Data (V,H)

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

| | Colors & Gray scale | Data signal | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|---------------------|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|--|
| | | Gray Scale | 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 | 0 | 0 | | |
| | Blue | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| | Green | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Cyan | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| | Red | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Magenta | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| | Yellow | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 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 | 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 | 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 | 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 | 0 | | |
| | ↑ | ↓ | | | | | ↓ | | | | | | | | | ↓ | | | | | ↓ | | | | | | | | |
| | ↓ | ↓ | | | | | ↓ | | | | | | | | | ↓ | | | | | ↓ | | | | | | | | |
| | Brighter | GS253 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | ↓ | GS254 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Red | GS255 | 1 | 1 | 1 | 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 | 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 | 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 | 0 | | |
| | ↑ | ↓ | | | | | ↓ | | | | | | | | | ↓ | | | | | ↓ | | | | | | | | |
| | ↓ | ↓ | | | | | ↓ | | | | | | | | | ↓ | | | | | ↓ | | | | | | | | |
| | Brighter | GS253 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | ↓ | GS254 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | Green | GS255 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 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 | 0 | | |
| | ↑ | GS1 | 0 | 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 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | ↑ | ↓ | | | | | ↓ | | | | | | | | | ↓ | | | | | ↓ | | | | | | | | |
| | ↓ | ↓ | | | | | ↓ | | | | | | | | | ↓ | | | | | ↓ | | | | | | | | |
| | Brighter | GS253 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| | ↓ | GS254 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| | Blue | GS255 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |

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

Each basic color can be displayed in 256 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.

3. Optical characteristics
 $T_a=25$, $V_{CC} = +5V$, $V_{INV} = +24V$

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|----------------------|------------|-----------|-------|-------|-------|-----------------------------|-------------------------------|
| Viewing angle | Horizontal | 21 | CR 10 | 70 | 88 | - | 【Note1,4】 |
| | | 22 | | | | | |
| | Vertical | 11 | | 70 | 88 | - | |
| | | 12 | | | | | |
| Contrast ratio | CRn | =0 deg. | 900 | 1200 | - | 【Note2,4】 $V_{BRT}=3.3V$ | |
| Response time | τ_d | =0 deg. | - | 6 | - | ms | 【Note3,4,5】 $V_{BRT}=3.3V$ |
| | τ_r | | - | 6 | - | | |
| Luminance of white | X | | 0.248 | 0.278 | 0.308 | - | 【Note 4】 $V_{BRT}=3.3V$ |
| | Y | | 0.255 | 0.285 | 0.315 | - | |
| Luminance of red | X | | 0.610 | 0.640 | 0.670 | - | |
| | Y | | 0.300 | 0.330 | 0.360 | - | |
| Luminance of green | X | | 0.250 | 0.280 | 0.310 | - | |
| | Y | | 0.570 | 0.600 | 0.630 | - | |
| Luminance of blue | X | | 0.120 | 0.150 | 0.180 | - | |
| | Y | | 0.030 | 0.060 | 0.090 | - | |
| Luminance of white | Y_{L1} | | 400 | 500 | | cd/m^2 | 【Note 4】 $V_{BRT}=3.3V$ |
| Luminance uniformity | w | | - | - | 1.25 | | 【Note 6】 |

Measurement condition : Set the value of V_{BRT} to maximum luminance of white.

*The measurement shall be executed 60 minutes after lighting at rating.

【Note】 The optical characteristics are measured using the following equipment.

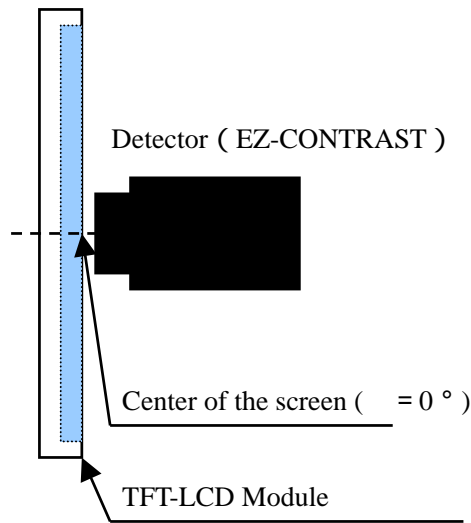


Fig.3-1 Measurement of viewing angle range.

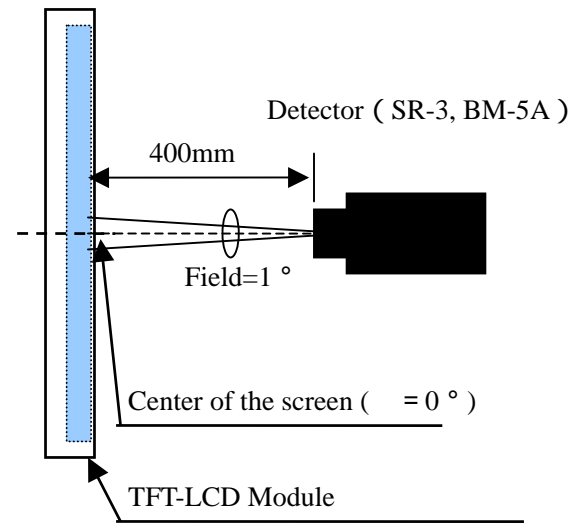
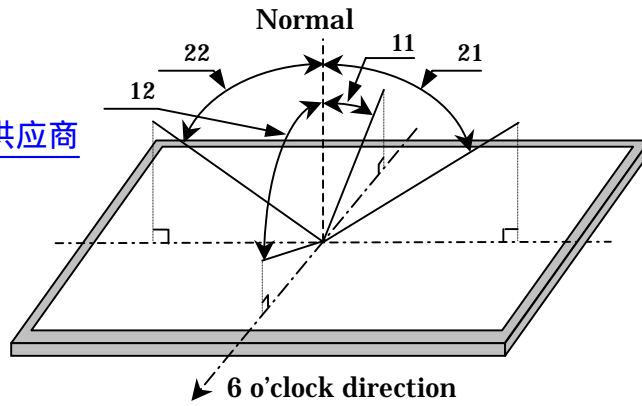


Fig.3-2 Measurement of Contrast, Luminance, Chromaticity and Response time.
 (Contrast, Luminance and Chromaticity: SR-3, Response time: Photo Diode).

【Note 1】 Definitions of viewing angle range :

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【Note 2】 Definition of contrast ratio :

The contrast ratio is defined as the following.

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

【Note 3】 Definition of response time

The response time (τd and τr) is defined as the following figure and shall be measured by switching the input signal for “any level of gray (0%, 25%, 50%, 75% and 100%)” and “any level of gray (0%, 25%, 50%, 75% and 100%)”.

| | 0% | 25% | 50% | 75% | 100% |
|------|-------------|--------------|--------------|-------------|--------------|
| 0% | | tr:0%-25% | tr:0%-50% | tr:0%-75% | tr:0%-100% |
| 25% | td: 25%-0% | | tr: 25%-50% | Tr25%-75% | tr: 25%-100% |
| 50% | td: 50%-0% | td: 50%-25% | | tr: 50%-75% | tr: 50%-100% |
| 75% | td: 75%-0% | td: 75%-25% | td: 75%-50% | | tr: 75%-100% |
| 100% | td: 100%-0% | td: 100%-25% | td: 100%-50% | td: 0%-75% | |

$t^*:x-y$...response time from level of gray(x) to level of gray(y)

$$\tau r = \Sigma(\text{tr}:x-y)/10, \tau d = \Sigma(\text{td}:x-y)/10$$

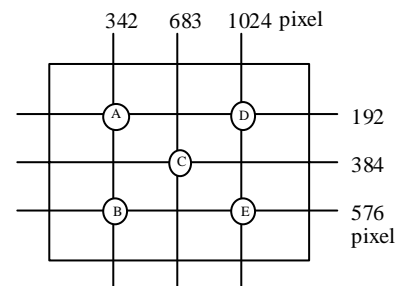
【Note 4】 This shall be measured at center of the screen.

【Note 5】 This value is valid when O/S driving is used at typical input time value .

【Note 6】 Definition of white uniformity ;

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

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



10. Handling Precautions of the module

- a) Be sure to turn off the power supply when inserting or disconnecting the cable.
- b) This product is using the parts (inverter, CCFT etc), which generate the high voltage.

Therefore, during operating, please don't touch these parts.

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Brightness control voltage is switched for "ON" and "OFF", as shown in Fig.4. Voltage difference generated by this switching, V_{INV} , may affect a sound output, etc. when the power supply is shared between the inverter and its surrounding circuit. So, separate the power supply of the inverter circuit with the one of its surrounding circuit.

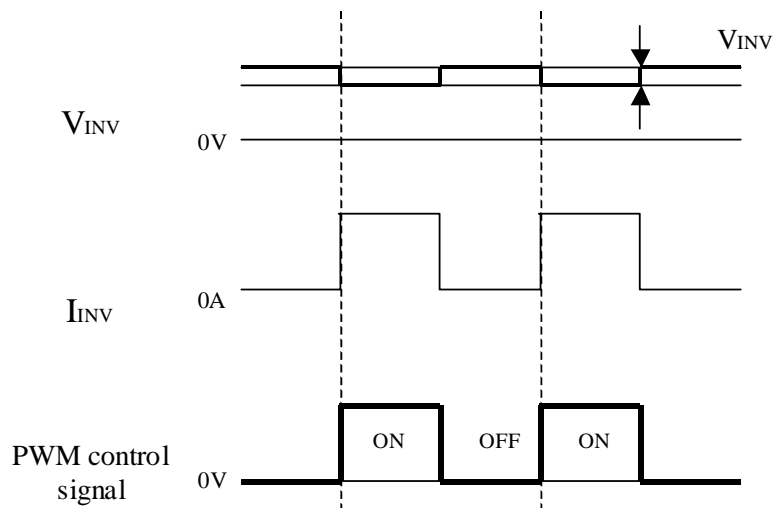


Fig.4 Brightness control voltage.

- d) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.
- e) Since the front polarizer is easily damaged, pay attention not to scratch it.
- f) Since long contact with water may cause discoloration or spots, wipe off water drop immediately.
- g) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- h) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.
- i) Since CMOS LSI is used in this module, take care of static electricity and take the human earth into consideration when handling.
- j) 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.
- k) Observe all other precautionary requirements in handling components.
- l) 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.
- m) When giving a touch to the panel at power on supply, it may cause some kinds of degradation. In that case, once turn off the power supply, and turn on after several seconds again, and that is disappear.
- n) 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) Piling number of cartons: 3 maximum
- b) Packing quantity in one carton: 8 pcs.
- c) Carton size: 845 (W) × 555 (D) × 660 (H)

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Total mass of one carton filled with full modules: 70 kg(Max)

12. Reliability test item

| No. | Test item | Condition |
|-----|---|---|
| 1 | High temperature storage test | Ta=60 240h |
| 2 | Low temperature storage test | Ta=-25 240h |
| 3 | High temperature and high humidity operation test | Ta=40 ; 95%RH 240h (No condensation) |
| 4 | High temperature operation test | Ta=50 240h |
| 5 | Low temperature operation test | Ta=0 240h |
| 6 | Vibration test (non-operation) | Frequency: 10~57Hz/Vibration width (one side): 0.075mm : 58~500Hz/Acceleration: 9.8 m/s ² Sweep time: 11 minutes Test period: 3 hours (1h for each direction of X, Y, Z) |
| 7 | Shock test (non-operation) | Maximum acceleration: 490m/s ² Pulse width: 11ms, sinusoidal half wave Direction: +/-X, +/-Y, +/-Z, once for each direction. |
| 8 | ESD | * At the following conditions, it is a thing without incorrect operation and destruction. (1)Non-operation: Contact electric discharge ± 10kV Non-contact electric discharge ± 20kV (2)Operation Contact electric discharge ± 8kV Non-contact electric discharge ± 15kV Conditions: 150pF、330ohm |

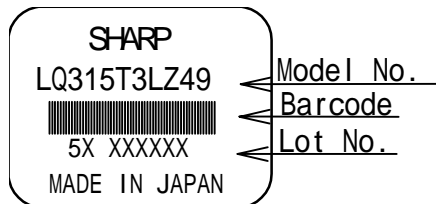
【Result evaluation criteria】

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

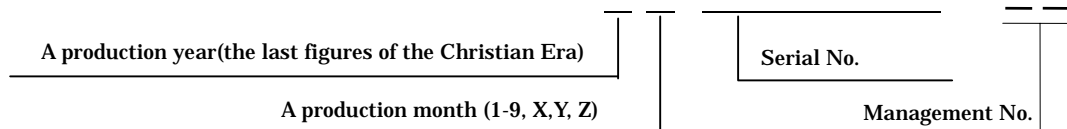
13. Others

1) Lot No. Label ;

The label that displays SHARP, product model (LQ315T3LZ49), a product number and “MADE IN JAPAN” is stuck on the back of the module.



How to express Lot No.



2) Packing Label

| |
|---------------------------------------|
| 社内品番 (4 S) LQ315T3LZ49 () |
| 查询"LQ315T3LZ49"供应商 |
| Lot NO. (1 T) 2 0 0 5 . * . * * () |
| Bar code |
| Quantity (O) 8 p c s () |
| Bar code |
| ユーザ品番 . |
| シャープ物流用ラベルです。 |

Management No. (LQ315T3LZ49)

Lot No. (Date)

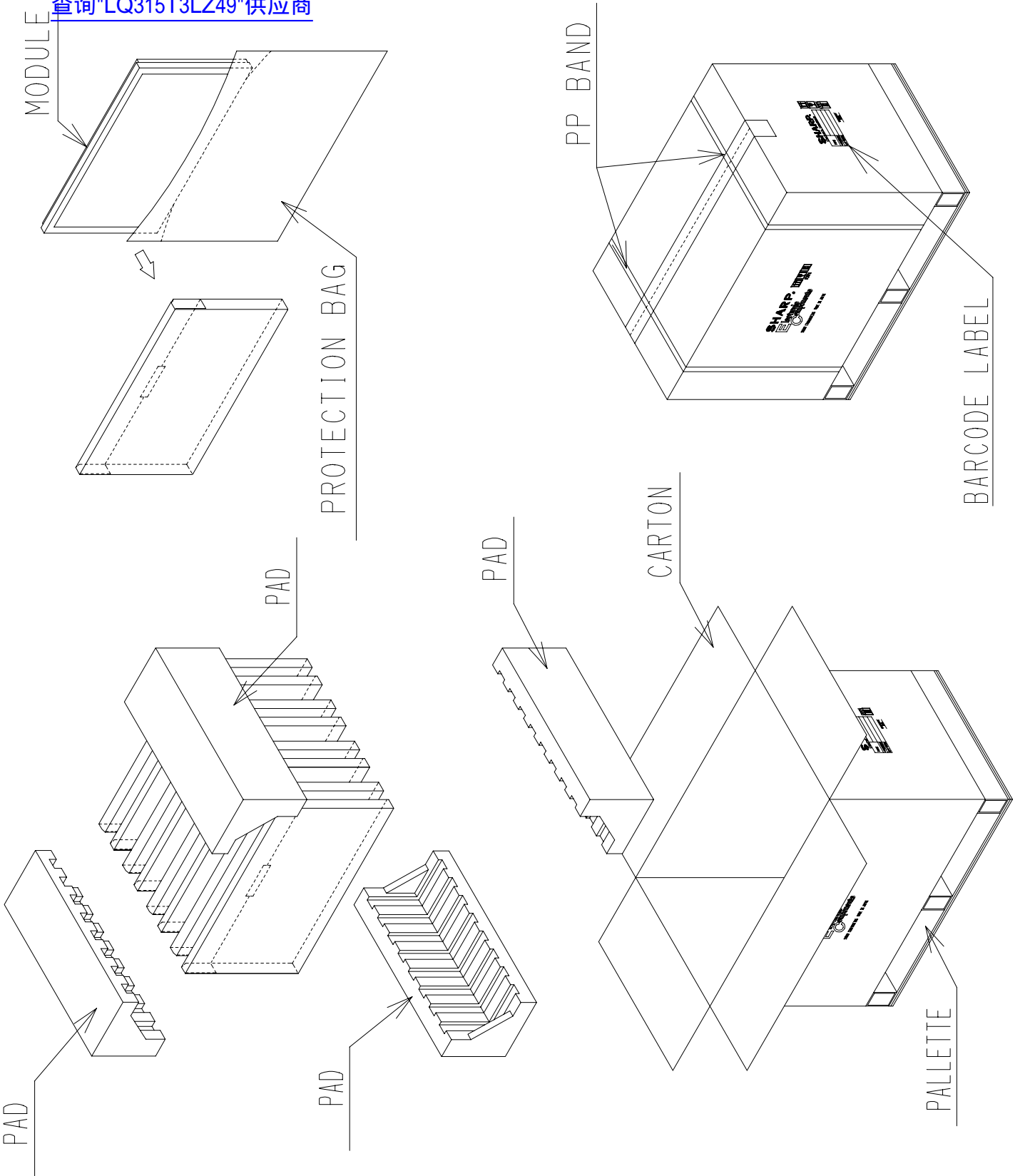
Quantity

- 3) Disassembling the module can cause permanent damage and should be strictly avoided.
- 4) Please be careful since image retention may occur when a fixed pattern is displayed for a long time.
- 5) The chemical compound, which causes the destruction of ozone layer, is not being used.

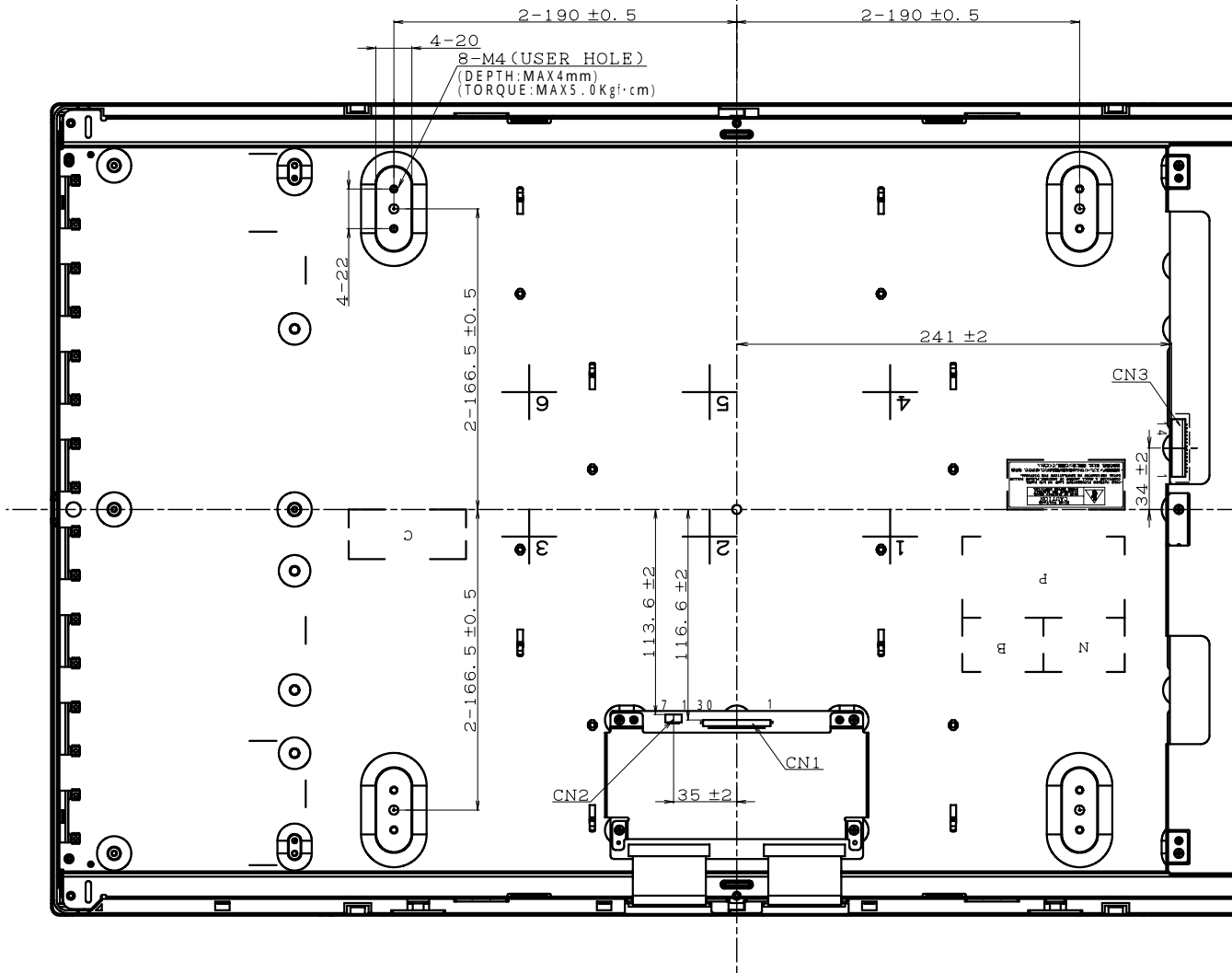
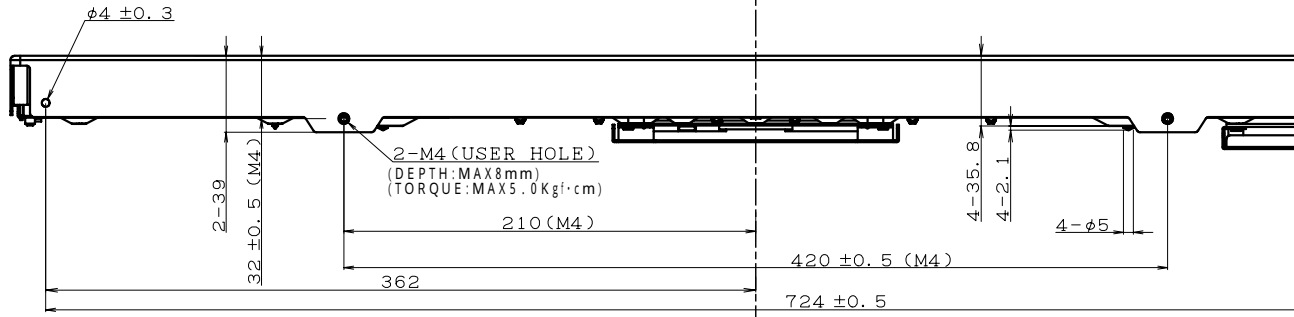
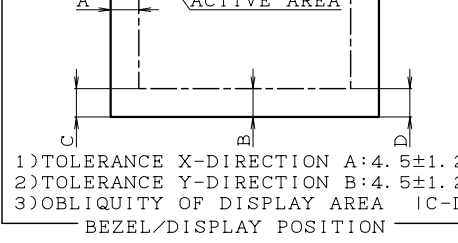
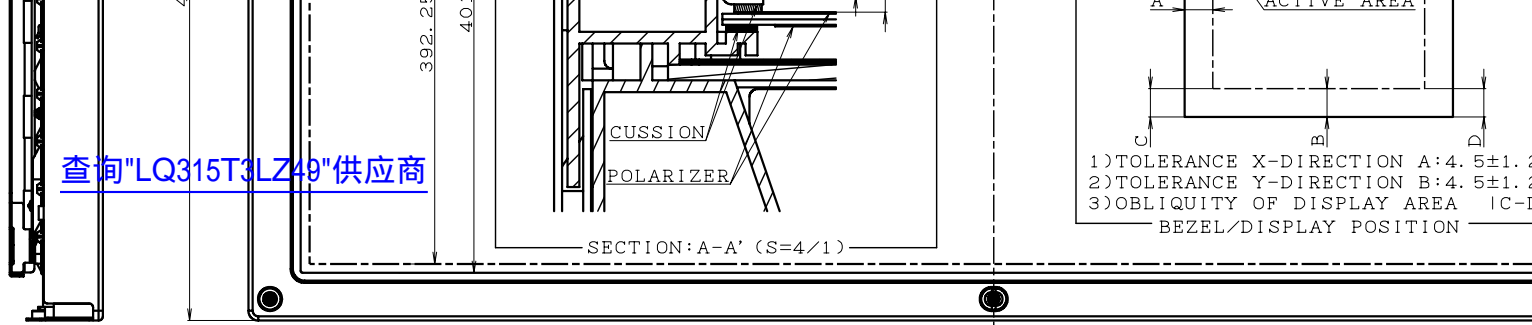
14. Carton storage condition

| | |
|---------------------|--|
| 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 Please take care of ventilation in storehouse and around cartons, and control changing temperature is within limits of natural environment |
| Storage life | 1 year |

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NOTE)
1. UNSPECIFIED TOLERANCE
DATE:

Fig 1. LQ315T3LZ4* TFT-LCD MODULE
INV:14Pin R OUTLINE DIMENSION

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