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PRODUCT SPECIFICATIONS

SHARP

AVC Liquid Crystal Displays Group

# LQ030B7DD01

## TFT-LCD Module

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DEVICE SPECIFICATION FOR

# TFT-LCD module

MODEL No. LQ030B7DD01

☐ CUSTOMER'S APPROVAL

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# RECORDS OF REVISION

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(1) Application

This specification applies to color TFT-LCD module, LQ030B7DD01.

(2) Overview

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor), named AD-TFT(Advanced TFT). It is practicable in both transmissive-type and reflection-type modes. It is composed of a color TFT-LCD panel, driver ICs, an FPC, a front sealed casing and a back-light and a back sealed casing. It isn't composed control circuit.

Graphics and texts can be displayed on a 320×3×320 dots panel with 262,144 colors by supplying. Optimum view angle is 1 o'clock.

(3) Mechanical specifications

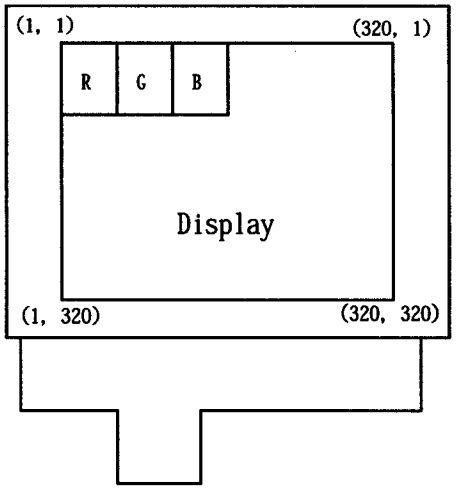
Table 1

| Parameter | Specifications | Units | Remarks |
|---|---|---|---|
| Screen size | 7.60 [2.99" ] Diagonal | cm | |
| Display active area | 53.76 (H) ×53.76 (V) | mm | |
| Pixel format | 320(H)×320(V)<br>(1 pixel = R+G+B dots) | pixels | |
| Pixel pitch | 0.056 (H) ×0.168 (V) | mm | |
| Pixel configuration | R,G,B vertical stripe | | |
| Display mode | Normally white | | |
| Unit outline dimension | 66.6(W)×68.5(H)×3.6(D) | mm | 【Note3-1】 |
| Mass | 37 | g | TYP. |
| Surface treatment | Clear Hard Coat | | |

【Note 3-1】

Excluding protrusion. For detailed measurements and tolerances, please refer to Fig. 1.

(4) Pixel configuration



(5) Input / Output terminal

Table 2

| Pin No. | Symbol | I/O | Description | Remarks |
|---|---|---|---|---|
| 1 | VDD | - | Power supply of gate driver (high level) | |
| 2 | NC | - | | |
| 3 | MOD | I | Control signal of gate driver | 【Note5-1】 |
| 4 | SPS | I | Start signal of gate driver | |
| 5 | CLS | I | Clock signal of gate driver | |
| 6 | NC | - | | |
| 7 | VEE | - | Power supply of gate driver (low level) | |
| 8 | VCOM | I | Common electrode driving signal | |
| 9 | SPL | I/O | Sampling start signal | |
| 10 | R0 | I | RED data signal (LSB) | |
| 11 | R1 | I | RED data signal | |
| 12 | R2 | I | RED data signal | |
| 13 | R3 | I | RED data signal | |
| 14 | R4 | I | RED data signal | |
| 15 | R5 | I | RED data signal (MSB) | |
| 16 | G0 | I | GREEN data signal (LSB) | |
| 17 | G1 | I | GREEN data signal | |
| 18 | G2 | I | GREEN data signal | |
| 19 | G3 | I | GREEN data signal | |
| 20 | G4 | I | GREEN data signal | |
| 21 | G5 | I | GREEN data signal (MSB) | |
| 22 | B0 | I | BLUE data signal (LSB) | |
| 23 | B1 | I | BLUE data signal | |
| 24 | B2 | I | BLUE data signal | |
| 25 | B3 | I | BLUE data signal | |
| 26 | B4 | I | BLUE data signal | |
| 27 | B5 | I | BLUE data signal (MSB) | |
| 28 | VSHD | - | Power supply of digital | |
| 29 | DGND | - | Ground (digital) | |
| 30 | PS | I | Power save signal | |
| 31 | LP | I | Data latch signal of source driver | |
| 32 | DCLK | I | Data sampling clock signal | |
| 33 | VSHA | - | Power supply (analog) | |
| 34 | V0 | I | Standard voltage to generate gray scale voltage | |
| 35 | V1 | I | Standard voltage to generate gray scale voltage | |
| 36 | V2 | I | Standard voltage to generate gray scale voltage | |
| 37 | V3 | I | Standard voltage to generate gray scale voltage | |
| 38 | V4 | I | Standard voltage to generate gray scale voltage | |
| 39 | AGND | - | Ground (Analog) | |

【Note5-1】 See section(7-1)-(A) "※Cautions when you turn on or off the power supply".

(6) Absolute Maximum Ratings

Table 3

| Parameter | | Symbol | Condition | Ratings | Unit | Remark |
|---|---|---|---|---|---|---|
| Power supply(S/Analog) | | VSHA | Ta=25℃ | -0.3～+6.0 | V | |
| Power supply(S,G/Digital) | | VSHD | Ta=25℃ | -0.3～+6.0 | V | |
| Power supply (G) | | VDD | Ta=25℃ | -0.3～+35.0 | V | |
| Power supply (G) | | VDD-VEE | Ta=25℃ | -0.3～+35.0 | V | |
| Input voltage (Analog) | | VIA | Ta=25℃ | -0.3～VSHA+0.3 | V | [Terminal①] |
| Input voltage (Digital) | | VID | Ta=25℃ | -0.3～VSHD+0.3 | V | [Terminal②] |
| Backlight LED | Forward current | IF | Ta=25℃ | 20 | mA | 【Note6-1】 |
| | Power dissipation | PD | Ta=25℃ | 80 | mW | 【Note6-1】 |
| | Reverse Voltage | VR | Ta=25℃ | 5 | V | 【Note6-1】 |
| Operating temperature (panel surface) | | T opp | — | -10～60 | ℃ | 【Note6-2】 |
| Storage temperature | | T stg | — | -20～70 | ℃ | 【Note6-2】 |
| | | | | | | |

[Terminal①] V0,V1,V2,V3,V4

[Terminal②] MOD,SPS,CLS,SPL,R0～R5,G0～G5,B0～B5,PS,LP,DCLK

【Note6-1】 This is specified for each LED.

【Note6-2】 Humidity: 95%RH Max.(at Ta ≦ 40℃). Maximum wet-bulb temperature is less than 39℃ (at Ta > 40℃). Condensation of dew must be avoided.

(7) Electrical characteristics

7-1) Recommended operating conditions

A)TFT-LCD panel driving section

Table 4 GND=0V

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Remarks |
|---|---|---|---|---|---|---|---|
| Supply voltage for source driver (Analog) | | VSHA | +4.5 | +5.0 | +5.5 | V | |
| Supply voltage for source driver (Digital) | | VSHD | +2.7 | +3.3 | +3.6 | V | |
| Standard input voltage | | V0～V4 | 0 | - | VSHA | V | 【Note 7-1】 |
| Supply voltage for gate driver | High voltage | VDD | +14.3 | +15.0 | +15.7 | V | |
| | Low voltage | VEE | -10.5 | -10.0 | -9.5 | V | |
| Input voltage for Source driver (Low) | | VILS | GND | - | 0.2VSHD | V | 【Note 7-2】 |
| Input voltage for Source driver (High) | | VIHS | 0.8VSHD | - | VSHD | V | 【Note 7-2】 |
| Input current for Source driver (Low) | | IILS | - | - | 10 | μA | 【Note 7-2】 |
| Input current for Source driver (High) | | IIHS1 | - | - | 10 | μA | 【Note 7-3】 |
| | | IIHS2 | - | - | 400 | μA | 【Note 7-4】 |
| Input voltage for Gate driver (Low) | | VILG | GND | - | 0.2VSHD | V | 【Note 7-5】 |
| Input voltage for Gate driver (High) | | VIHG | 0.8VSHD | - | VSHD | V | 【Note 7-5】 |
| Input current for Gate driver (Low) | | IILG | - | - | 1.0 | μA | 【Note 7-5】 |
| Input current for Gate driver (High) | | IIHG | - | - | 1.0 | μA | 【Note 7-5】 |
| Common electrode driving signal | AC component | VCOMAC | - | ±2.4 | ±2.5 | Vp-p | 【Note 7-6】 |
| | DC component | VCOMDC | +0.1 | +1.1 | +2.1 | V | 【Note 7-6】 |

※Cautions when you turn on or off the power supply

① Turn on or off the power supply with simultaneously or the following sequence.

Turn on ··· VSHD → VSHA → VEE → VDD

Turn off ··· VDD → VEE → VSHA → VSHD

② The input signal of "MOD" Terminals (Pin No.3) must be low voltage when turning on the power supply, and it is held until more than double vertical periods after VSHD is turned on completely. After then, it must be held high voltage until turning off the power supply.

【Note 7-1】 These are standard input voltages for gray scale. When VCOM is alternated polarity, these voltage should be alternated polarity. V0 (black) is different polarity alternating signal of VCOM. V4 (white) is the same polarity alternating signal of VCOM. Center voltage of each standard input voltage shift positive way for LCD characteristics (V0→V1→V2→V3→V4). This sift amount is adjusted so as to no flicker of each standard input voltage after DC bias voltage of VCOM and V0 is adjusted.

【Note 7-2】 DCLK,SPL,LP,PS,R0～R5,G0～G5 and B0～B5 terminals are applied.

【Note 7-3】 DCLK,SPL,LP, R0～R5,G0～G5 and B0～B5 terminals are applied.

【Note 7-4】 PS terminal is applied.

【Note 7-5】 MOD,CLS and SPS terminals are applied.

【Note 7-6】 VCOMAC should be alternated on VCOMDC every 1 horizontal period and 1 vertical period. VCOMDC bias is adjusted so as to minimize flicker or maximum contrast every each module.

B)TFT-LCD panel driving section

| Parameter | Symbol | MIN | TYP | MAX | Units | Remarks terminal |
|---|---|---|---|---|---|---|
| LED voltage | $V_L$ | - | 18.5 | 20 | V | |
| LED current | $I_L$ | - | 18 | 20 | mA | |
| Power consumption | $W_L$ | - | 333 | 400 | mW | 【Note 7-7】 |

【Note 7-5】 Calculated reference value($I_L \times V_L$).

7-2) Timing Characteristics of input signals

Table 5 AC Characteristics (1) (VSHA=+5.0V, VSHD=+3.3V, Ta=25℃)

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|
| Source driver | Clock frequency | Fck | 6.29 | - | 8.22 | MHz | DCLK |
| | Rising time of clock | Tcr | - | - | 20 | ns | |
| | Falling time of clock | Tcf | - | - | 20 | ns | |
| | Pulse width (High level) | Tcwh | 40 | - | - | ns | |
| | Pulse width (Low level) | Tcwl | 40 | - | - | ns | |
| | Frequency of start pulse | Fsp | 17.5 | - | 22.8 | kHz | SPL 【Note 7-7】 |
| | Setup time of start pulse | Tsusp | 15 | - | - | ns | |
| | Hold time of start pulse | Thsp | 10 | - | - | ns | |
| | Pulse width of start pulse | Twsp | - | - | 1.5/FCK | ns | |
| | Setup time of latch pulse | Tsulp | 20 | - | - | ns | LP |
| | Hold time of latch pulse | Thlp | 20 | - | - | ns | |
| | Pulse width of latch pulse | Twlp | 60 | - | - | ns | |
| | Setup time of PS | Tsups | 0 | - | - | μs | PS |
| | Hold time of PS | Thps | 0 | - | - | μs | |
| Set up time of data | | Tsud | 15 | - | - | ns | R0～R5,G0～G5 , B0～B5 |
| Hold time of data | | Thd | 10 | - | - | ns | |
| Gate driver | Clock frequency | Fcls | 17.5 | - | 22.8 | kHz | CLS |
| | Pulse width of clock(Low) | Twlcls | 5 | - | (1/fcls)-37 | μs | |
| | Pulse width of clock(High) | Twhcls | 37 | - | - | μs | |
| | Rising time of clock | Trcls | - | - | 100 | ns | |
| | Falling time of clock | Tfcls | - | - | 100 | ns | |
| | Setup time of clock | Tsucls | 3 | - | - | μs | |
| | Hold time of clock | Thcls | 0 | - | - | μs | |
| | Frequency of start puls | Fsps | 52 | - | 68 | Hz | SPS |
| | Setup time of start pulse | Tsusps | 100 | - | - | ns | |
| | Hold time of start pulse | Thsps | 300 | - | - | ns | |
| | Rising time of start pulse | Trsps | - | - | 100 | ns | |
| | Falling time of start pulse | Tfsps | - | - | 100 | ns | |
| Vcom | Setup time of Vcom | Tsuvcom | 3 | - | - | μs | Vcom |
| | Hold time of Vcom | Thvcom | 1 | - | - | μs | |

【Note 7-7】 There must be only one up-edge of DCLK (includes Tsusp and Thsp time) in the period of SPL="Hi".

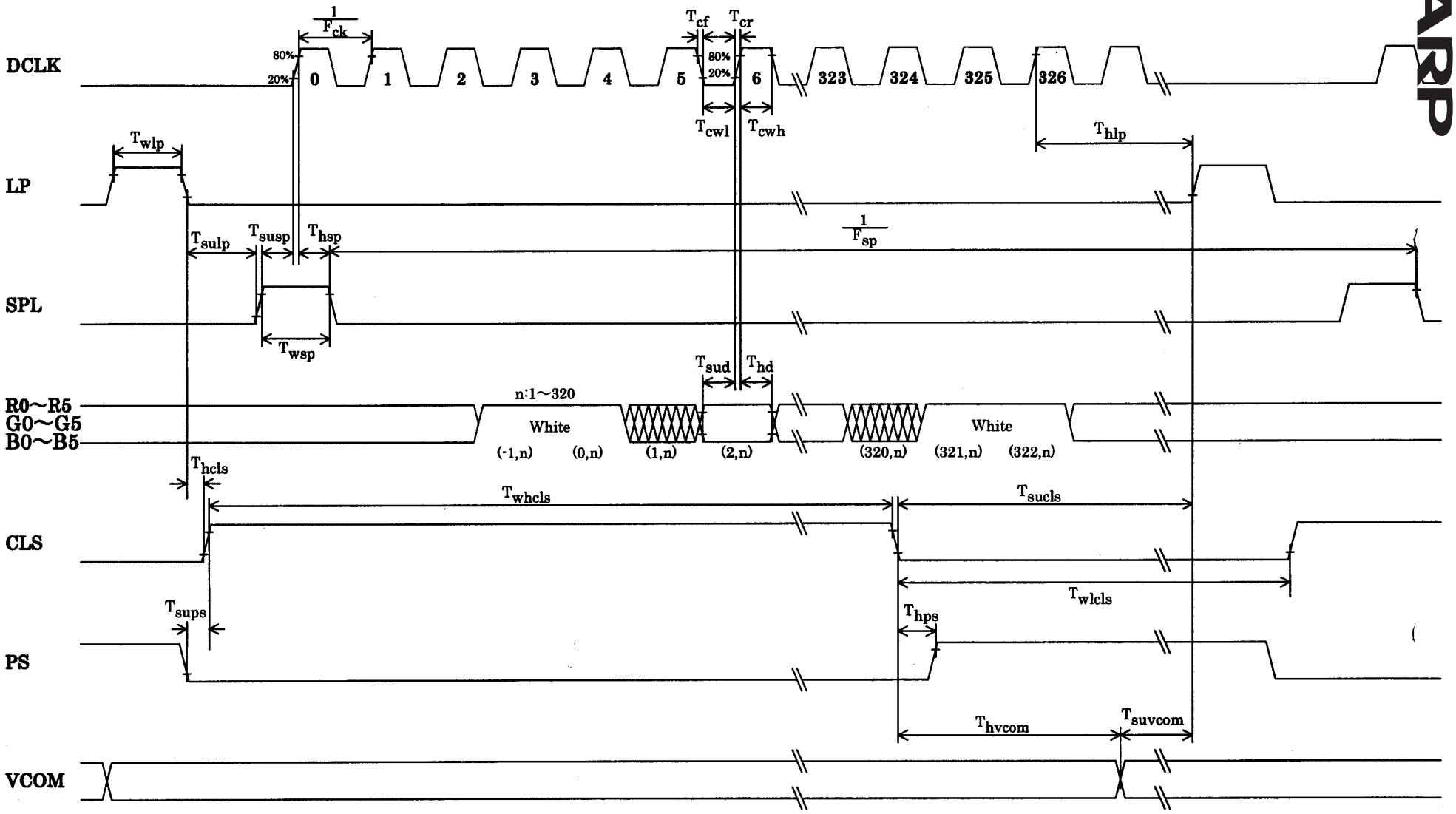



Fig.(a) Horizontal timing chart

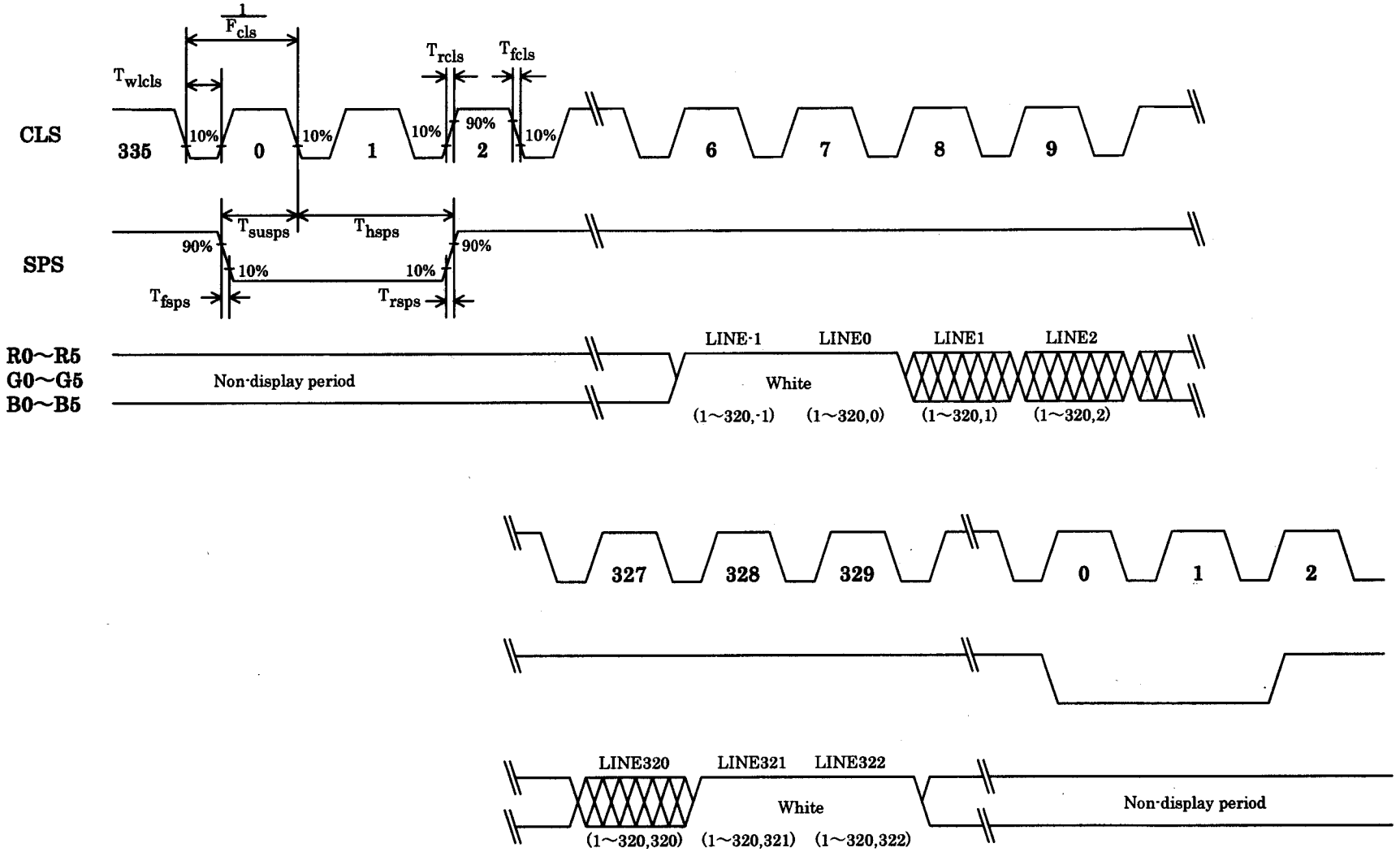



Fig.(b) Vertical timing chart

7-3) Power consumption

Measurement condition : SPS=60Hz, CLS=20.16kHz, SPL=20.16kHz, DCLK=7.26MHz
The term of PS="Lo" in one horizontal period ··· 30.1 μsec(322DCLK)
Ta=25℃

Table 6

| Parameter | | Symbol | Conditions | MIN | TYP | MAX | Unit | Remarks |
|---|---|---|---|---|---|---|---|---|
| Source current | Analog | ISHA | VSHA=+5.0V | - | 4.0 | 7.5 | mA | 【Note 7-11】 |
| | Digital | ISHD | VSHD=+3.3V | - | 1.8 | 3.3 | mA | 【Note 7-11】 |
| Gate current | High | IDD | VDD=+15.0V | - | 50 | 100 | μA | 【Note 7-12】 |
| | Low | IEE | VEE=-10.0V | - | -50 | -100 | μA | 【Note 7-12】 |

【Note 7-11】 Vertical stripe pattern alternating 21 gray scale (GS21) with 42 gray scale (GS42) every 1 dot.

【Note 7-12】 64-Gray-bar vertical pattern (GS0 ～ GS63 for horizontal way)

(8) Input Signals, Basic Display Color and Gray Scale of Each Color

Table 7

| | Colors & Gray scale | Data signal | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gray Scale | 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 bleu | 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 | 1 | 1 | 1 | 1 |
| | ⇩ | GS62 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| | Bleu | 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

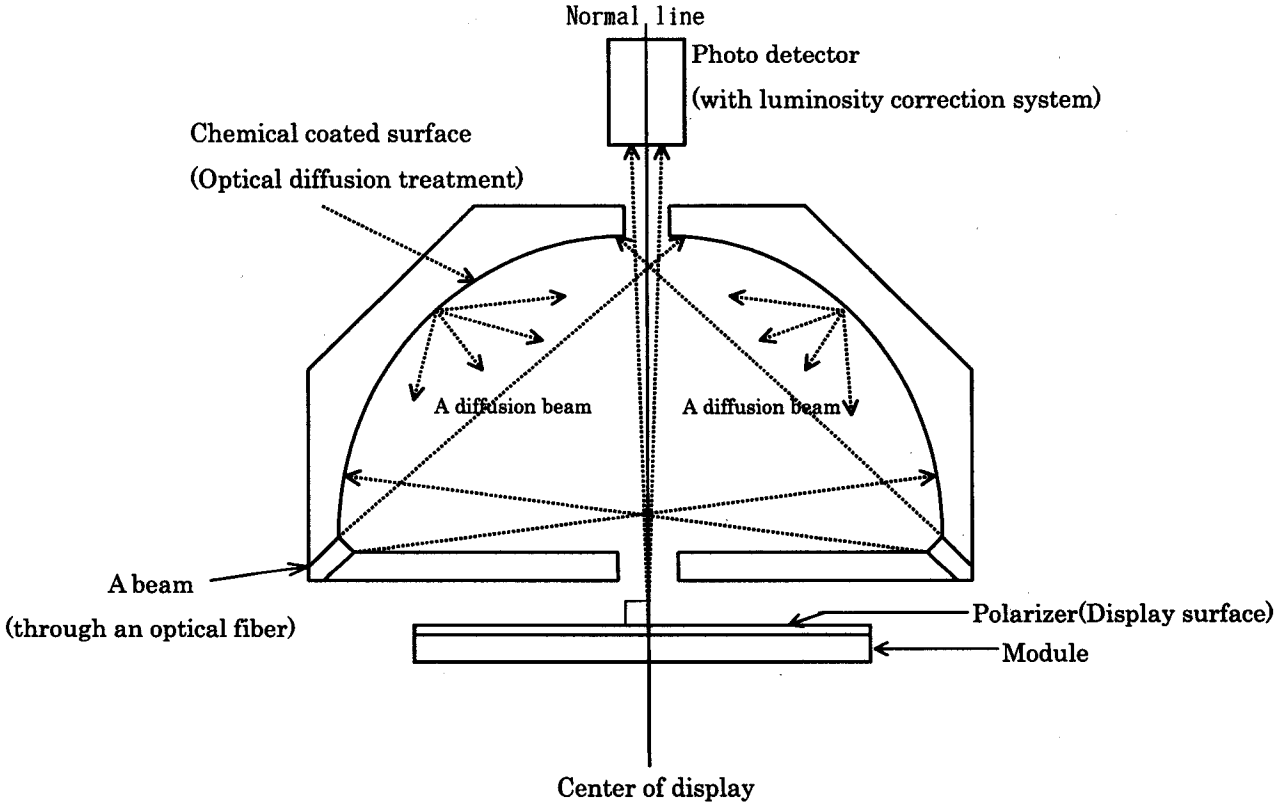
9-1) Reflective mode

Table 8 Ta=25℃

| Parameter | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remarks |
|---|---|---|---|---|---|---|---|---|
| Viewing angle range | | θ21 | CR≧2 | 50 | 60 | - | degree | 【Note 9-1,2】 |
| | | θ22 | | 30 | 40 | - | degree | |
| | | θ11 | | 40 | 50 | - | degree | |
| | | θ12 | | 30 | 40 | - | degree | |
| Contrast ratio | | CR | θ=0° | 3 | 5 | - | - | 【Note 9-2】 |
| Response time | Rise | τr | | - | 30 | 60 | ms | 【Note 9-3】 |
| | Fall | τd | | - | 50 | 100 | ms | |
| White chromaticity | | x | | 0.285 | 0.335 | 0.385 | - | 【Note 9-4】 |
| | | y | | 0.320 | 0.370 | 0.420 | - | |
| Reflection ratio | | R | | 4 | 6 | - | % | 【Note 9-5】 |

※The measuring method of the optical characteristics is shown by the following figure.

※A measurement device is Otsuka luminance meter LCD5200. (With the diffusion reflection unit.)




**Measuring method (a) for optical characteristics**

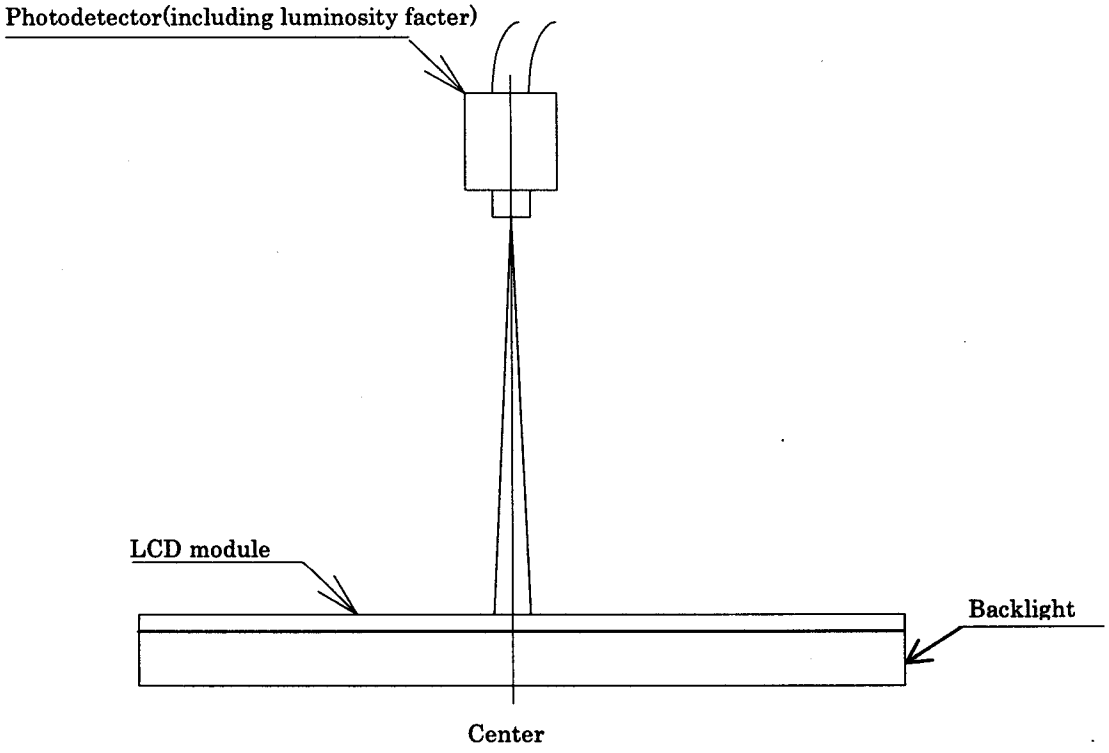
9-2) Transmisive mode

Table 9 Ta=25°C

| Parameter | | Symbol | Condition | Min. | Typ. | Max. | Unit | Remarks |
|---|---|---|---|---|---|---|---|---|
| Viewing angle range | | θ21 | CR≥2 | 50 | 60 | - | degree | 【Note 9-1,2】 |
| | | θ22 | | 30 | 40 | - | degree | |
| | | θ11 | | 40 | 50 | - | degree | |
| | | θ12 | | 30 | 40 | - | degree | |
| Contrast ratio | | CR | θ = 0° | 40 | 70 | - | - | 【Note 9-2】 |
| Response time | Rise | τr | | - | 30 | 60 | ms | 【Note 9-3】 |
| | Fall | τd | | - | 50 | 100 | ms | |
| White chromaticity | | x | | 0.260 | 0.310 | 0.360 | - | |
| | | y | | 0.290 | 0.340 | 0.390 | - | |
| Brightness | | L | | 90 | 110 | - | cd/m² | $I_{LED}$=18mA |

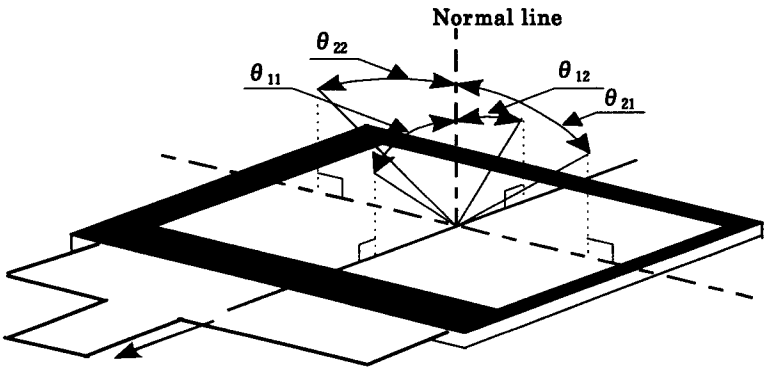
* The measuring method of the optical characteristics is shown by the following figure.

* A measurement device is TOPCON luminance meter BM-5(A).(Viewing cone 1)




**Measuring method (b) for optical characteristics**

【Note 9-1】 Viewing angle range is defined as follows.




6 o'clock direction

**Definition for viewing angle**

【Note 9-2】 Definition of contrast ratio:

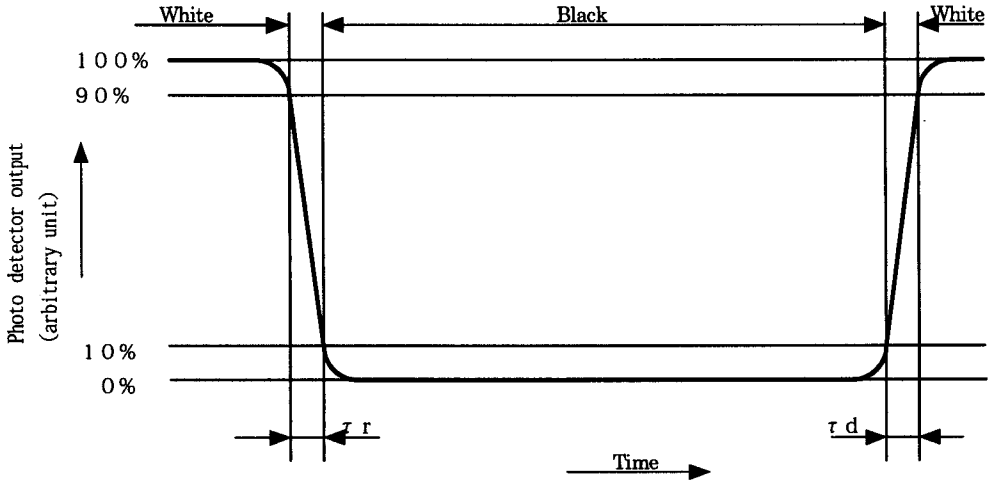
The contrast ratio is defined as follows:

$$\text{Contrast ratio(CR)} = \frac{\text{Photo detector output with all pixels white(GS63)}}{\text{Photo detector output with all pixels black(GS0)}}$$

$V_{COMAC}$=4.8Vp-p,V0=4.0Vp-p,V4=-4.0Vp-p

【Note 9-3】 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".




【Note 9-4】 A measurement device is Minolta CM-2002.

【Note 9-5】 Definition of reflection ratio

$$\text{Reflection ratio} = \frac{\text{Light detected level of the reflection by the LCD module}}{\text{Light detected level of the reflection by the standard white board}}$$

(10)Display quality

The display quality of the color TFT-LCD module shall be in compliance with the Incoming Inspection Standards for TFT-LCD.

(11) Mechanical characteristics

11-1) External appearance

See Fig. 1

11-2) FPC characteristics

①Specific connector

LCD FPC : FF0239SS1(JAE)

LED FPC : 59453-041120F(FCI) (Bottom contact)

LED FPC : 59453-042120F(FCI) (Top contact)

② Bending endurance of the bending slits portion(See Fig.1) :

Ⅰ.Bending slit ①

No line of the FPC is broken for the bending test (Bending radius=0.6mm and angle=90°) in 30 cycles.

Ⅱ.Bending slit ②

No line of the FPC is broken for the bending test by human hand (Bending radius=0mm and angle=180°) in 2 cycles.

(12) Handling Precautions

12-1) Insertion and taking out of FPC

Be sure insert and take out of the FPC into the connector of the set after turning off the power supply on the set side.

12-2) Handling of FPC

FPC shall be bent only slit portion. The bending slit ①shall be bent uniformly on the whole slit portion with bending radius larger than 0.6mm ,and only inner side (back side of the module).

Don't bend it outer side (display surface side).

Don't give the FPC too much force, for example, hanging the module with holding FPC.

12-3) Installation of the module

① On mounting the module, be sure to fix the module on the same plane. Take care not to warp or twist the module.

② In case that no protective plate is attached on the panel surface, pay attention to the following points. In order to avoid the electrostatic discharge, design the cabinet with grounded conductive sheet inside and cover the module include edge of the polarizer with it

12-4) Precaution when mounting

① The polarizer can be easily scratched. Handle it with sufficient care.

② If water droplets and oil attaches to it for a long time, discoloration and staining occurs. Wipe them off immediately.

③ Glass is used for the TFT-LCD panel. If it is dropped or bumped against a hard object, it may be broken. Handle it with sufficient care.

④ As the CMOS IC is used in this module, pay attention to static electricity when handling it. Take a measure for grounding on the human body.

12-5) Others

① The liquid-crystal is deteriorated by ultraviolet rays. Do not leave it in direct sunlight and strong ultraviolet rays for many hours.

② If it is kept at a temperature below the rated storage temperature, it becomes coagulated and the panel may be broken. Also, if it is kept at a temperature above the rated storage temperature, it becomes isotropic liquid and does not return to its original state. Therefore, it is desirable to keep it at room temperature as much as possible.

③ If the LCD breaks, don't put internal liquid crystal into the mouth. When the liquid crystal sticks to the hands, feet and clothes, wash it out immediately.

④ Wipe off water drop or finger grease immediately. Long contact with water may cause discoloration or spots.

⑤ Observe general precautions for all electronic components.

⑥ VCOM must be adjusted on condition of your final product. No adjustment causes the deterioration for display quality.

⑦ Static image should not be displayed more than 5 minutes in order to prevent from occurrence of residual image.

(13) Forwarding form

a) Piling number of cartons: MAX. 16

b) Package quantity in one cartons: 50pcs.

c) Carton size: 623mm(W) × 381mm(D) × 101mm(H)

d) Total mass of 1 carton filled with full modules: 3200g

Fig.2 shows packing form.

Environment

| | |
|---|---|
| (1)Temperature | : 0~40℃ |
| (2)Humidity | : 60%RH or less (at 40℃)<br>No dew condensation at low temperature and high humidity. |
| (3)Atmosphere | : Harmful gas, such as acid or alkali which bites electronic components and/or wires, must not be detected. |
| (4)Period | : about 3 months |
| (5)Opening of the package | : In order to prevent the LCD module from breakdown by electrostatic charges, please control the room humidity over 50%RH and open the package taking sufficient countermeasures against electrostatic charges, such as earth, etc. |

(14)Reliability Test Conditions for TFT-LCD Module

Table 10

| No. | Test items | Test conditions |
|---|---|---|
| 1 | High temperature storage test | Ta=+70℃ 240h |
| 2 | Low temperature storage test | Ta=-30℃ 240h |
| 3 | High temperature and high humidity operating test | Tp=+40℃ , 95%RH 240h<br>(But no condensation of dew) |
| 4 | High temperature operating test | Tp=+60℃ 240h |
| 5 | Low temperature operating test | Tp=-10℃ 240h |
| 6 | Electro static discharge test | ±200V・200pF(0Ω) 1 time for each terminals |
| 7 | Shock test | 980 m/s$^2$, 6 ms<br>±X, ±Y, ±Z 3 times for each direction<br>(JIS C0041, A-7 Condition C) |
| 8 | Vibration test | Frequency range: 10Hz~55Hz<br>Stroke: 1.5 mm Sweep: 10Hz~55Hz<br>X,Y,Z 2 hours for each direction (total 6 hours)<br>(JIS C0040, A-10 Condition A) |
| 9 | Heat shock test | Ta=-30℃~+75℃ / 5 cycles<br>(1h) (1h) |

【Note】 Ta = Ambient temperature, Tp = Panel temperature

【Check items】 In the standard condition, there shall be no practical problems that may affect the display function.

(15) Others

15-1) Indication of lot number

The lot number is shown on a label. Attached location is shown in Fig.1 (Outline Dimensions).

Indicated contents of the label

| LQ030B7DD01 | ○○○○○○○○ |
|---|---|
| model No. | lot No. |

15-2) Used Regulation of Chemical Substances Breaking Ozone Stratum

Substances with the object of regulation : CFCS, Carbon tetrachloride, Halon
1,1,1-Trichloro ethane (Methyl chloroform)

(a) This LCD module, Constructed part and Parts don't contain the above substances.

(b) This LCD module, Constructed part and Parts don't contain the above substances in processes of manufacture.

15-3) If some problems arise about mentioned items in this document and other items, the user of the TFT-LCD module and Sharp will cooperate and make efforts to solve the problems with mutual respect and good will.

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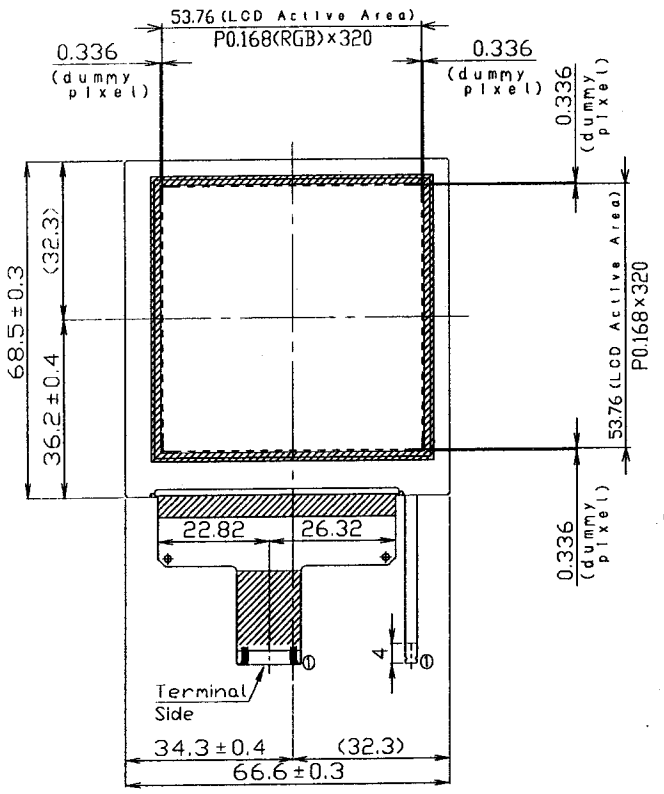
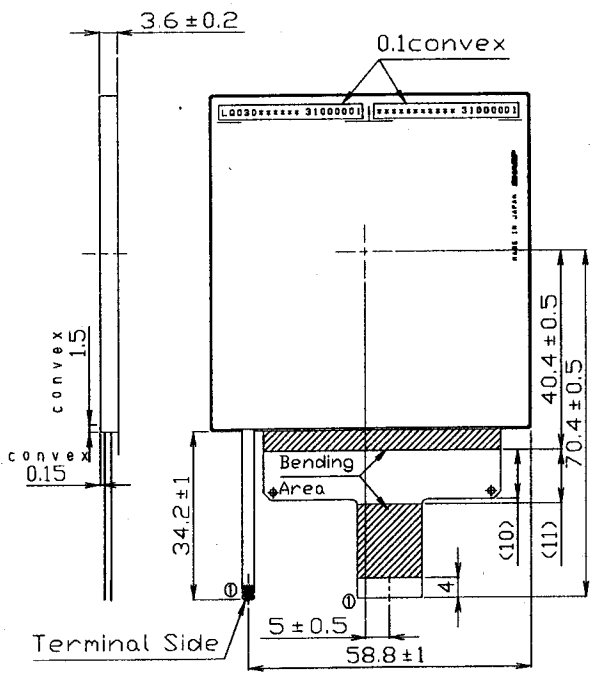
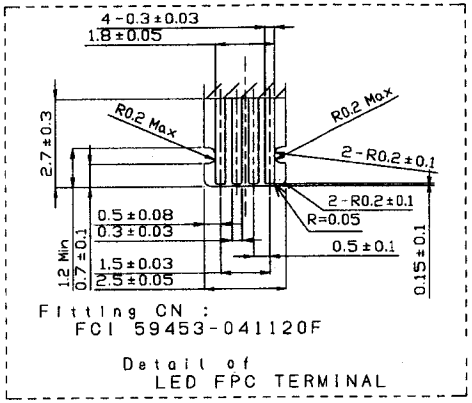
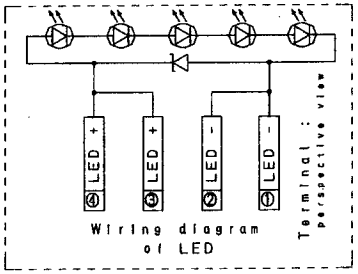
Fig.1 Outline dimensions




LCD FPC
Fitting CN :
JAE FF0239SS1

LED FPC
Fitting CN :
FCI 59453-041120F (Bottom Contact)
FCI 59453-042120F (Top Contact)

General tolerance is ±0.5
Guarantee of appearance = LCD Active Area.
LCD-FPC should bended only bending area.
LCD/LED-FPC bend larger than 0.6 in radius.
Take care in set design to hide
the scratches and bubbles appeared on
the polarizer or other frame area
which is located outside of LCD Active Area.
The tolerance of module width are
exclude warp of case.

| | | | |
|---|---|---|---|
| ORIGINAL MODEL | LQ030B7DD01 (3.0") | | |
| 画面サイズ ACTIVE AREA SIZE | 76.0281 (2.99") | | |
| | 0.168mm 320 (RGB) ×320 | | |
| 尺度 SCALE 1/1 | 日付 DATE | 20/Jun/2003 | |
| 単位 Unit mm | 名称 NAME | 3.0" ADV Module Outline dimension | |
| | ユーザー USER | | |
| 原紙サイズ A3 | 図番 DRAWING NO | LDM-03014 | |

| 改訂日 | 改訂記事 REVISION | 担当 |
|---|---|---|
| 5 | | |
| 4 | | |
| 3 | | |
| 2 | | |
| 1 | | |

設計 DESIGNED 製図 DRAFTED 検図 DSN CK 検図 DSN CK 承認 ENG APPD

K. Yoshioka

シャープ株式会社
[MB液晶設計C] 第6開発部
SHARP CORPORATION

SHARP

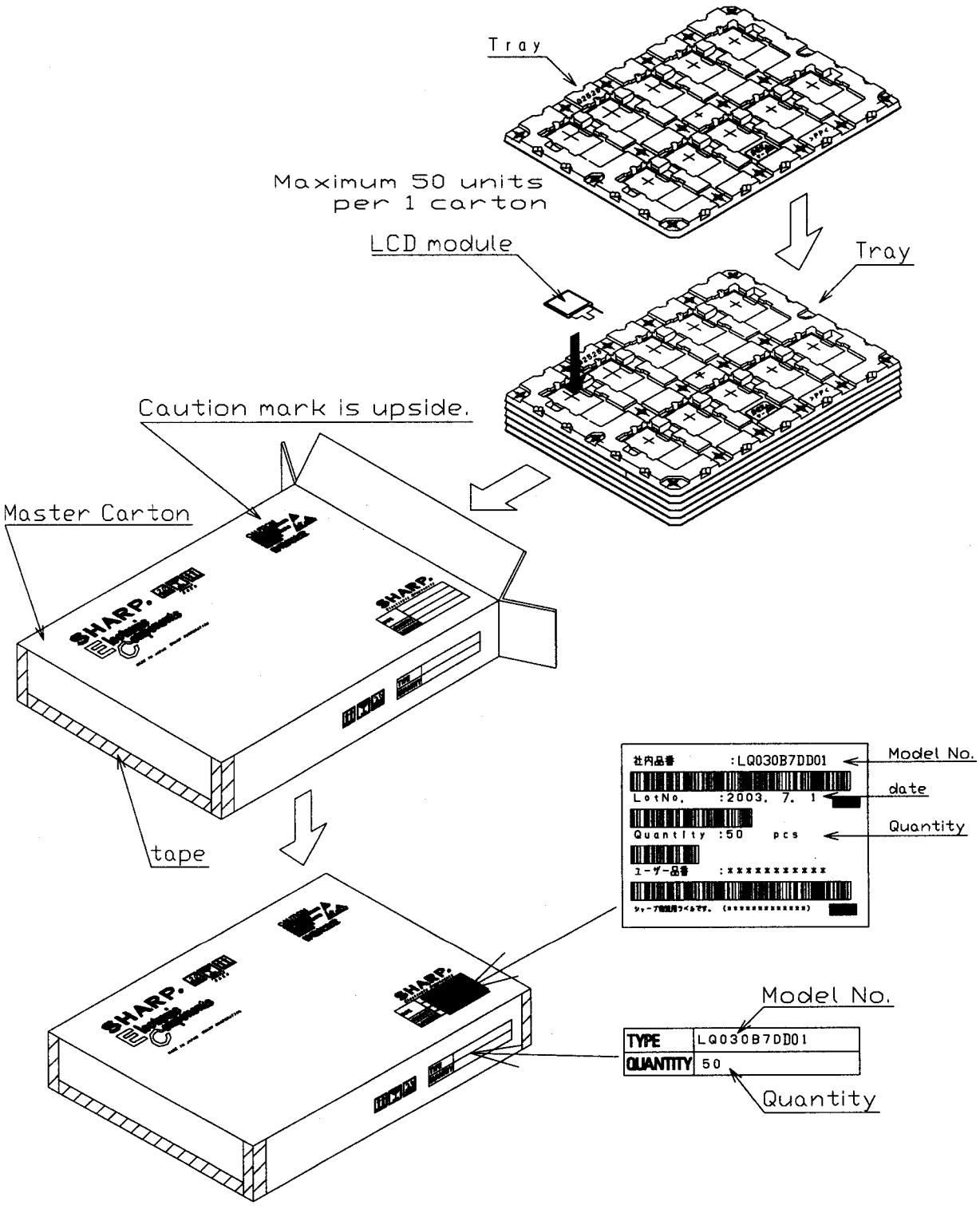

Tray
Maximum 50 units
per 1 carton
LCD module
Tray
Caution mark is upside.
Master Carton
tape
社内品番 :LQ030B7DD01
Model No.
LotNo. :2003. 7. 1
date
Quantity :50 pcs
Quantity
ユーザー品番 :xxxxxxxxxxx
Model No.
TYPE LQ030B7DD01
QUANTITY 50
Quantity

Fig.2

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