

# **LQ104V1DC31**

## **TFT-LCD Module**

(Model No.: LQ104V1DC31)

Spec No.: LD-12604A

Issue Date: September 25, 2002

---

|                         |                                                                                                   |                                                         |
|-------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| PREPARED BY :      DATE | <b>SHARP</b><br><br>AVC LIQUID CRYSTAL DISPLAY GROUP<br>SHARP CORPORATION<br><b>SPECIFICATION</b> | SPEC No. LD-12604A                                      |
| APPROVED BY :      DATE |                                                                                                   | FILE No.                                                |
|                         |                                                                                                   | ISSUE : Jun. 15. 2000                                   |
|                         |                                                                                                   | PAGE : 17 pages                                         |
|                         |                                                                                                   | APPLICABLE GROUP<br>AVC LIQUID CRYSTAL DISPLAY<br>GROUP |

REVISION: Sep. 25 , 2002

DEVICE SPECIFICATION FOR

# TFT-LCD Module

MODEL No.

## LQ104V1DC31

☐ CUSTOMER' S APPROVAL

DATE \_\_\_\_\_

BY \_\_\_\_\_

PRESENTED

BY Makoto Takeda

M. TAKEDA  
 Department General Manager  
 Development Engineering Department II  
 AVC LIQUID CRYSTAL DISPLAY Division  
 AVC LIQUID CRYSTAL DISPLAY GROUP  
 SHARP CORPORATION

## 1. Application

This specification applies to color TFT-LCD module, LQ104V1DC31

(This specification is only applied for the module which has letter "A" at the end of the lot number of the module.)

These specification sheets are the proprietary product of SHARP CORPORATION("SHARP") and include materials protected under copyright of SHARP. Do not reproduce or cause any third party to reproduce them in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of SHARP .

The device listed in these specification sheets was designed and manufactured for use in general electronic equipment.

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 and power supply circuit. Graphics and texts can be displayed on a  $640 \times 3 \times 480$  dots panel with 262,144 colors by supplying 18 bit data signal(6bit/color), four timing signals, +3.3V/ +5V DC supply voltage for TFT-LCD panel driving .

The TFT-LCD panel used for this module is a low-reflection and higher-color-saturation type. Therefore, this module is also suitable for the multimedia use.

Optimum viewing direction is 6 o'clock.

## 3. Mechanical Specifications

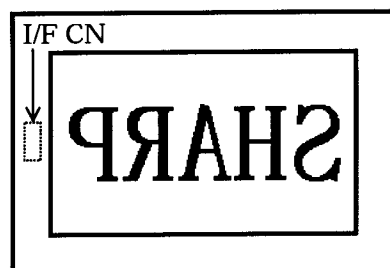
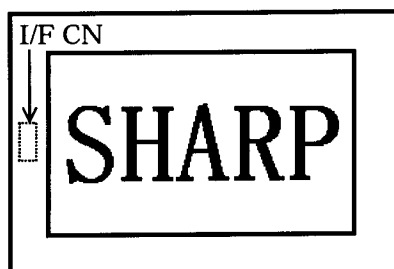
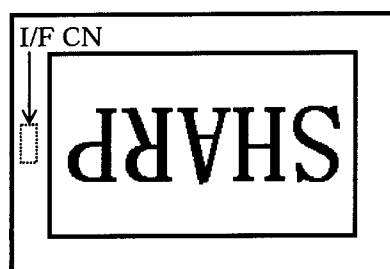
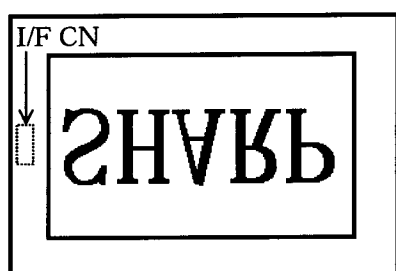
| Parameter                  | Specifications                 | Unit  |
|----------------------------|--------------------------------|-------|
| Display size               | 26 (10.4") Diagonal            | cm    |
| Active area                | 211.2(H)×158.4(V)              | mm    |
| Pixel format               | 640(H)×480(V)                  | pixel |
|                            | (1 pixel=R+G+B dots)           |       |
| Pixel pitch                | 0.330(H)×0.330(V)              | mm    |
| Pixel configuration        | R,G,B vertical stripe          |       |
| Display mode               | Normally white                 |       |
| Unit outline dimensions *1 | 265.0(W)×195.0(H)×11.2max(D)   | mm    |
| Mass                       | 310(max)                       | g     |
| Surface treatment          | Anti-glare and hard-coating 3H |       |

\*1.Note: excluding backlight cables.

Outline dimensions is shown in Fig.1



【Note3】 【Note4】


 $R/L = \text{High}, U/D = \text{Low}$        $R/L = \text{Low}, U/D = \text{Low}$ 

 $R/L = \text{High}, U/D = \text{High}$ 
 $R/L = \text{Low}, U/D = \text{High}$ 

## 5. Absolute Maximum Ratings

| Parameter                | Symbol      | Condition                | Ratings                  | Unit                   | Remark  |
|--------------------------|-------------|--------------------------|--------------------------|------------------------|---------|
| Input voltage            | $V_I$       | $T_a = 25^\circ\text{C}$ | $-0.3 \sim V_{CC} + 0.3$ | V                      | 【Note1】 |
| +5V supply voltage       | $V_{CC}$    | $T_a = 25^\circ\text{C}$ | $0 \sim +6$              | V                      |         |
| Storage temperature      | $T_{stg}$   | —                        | $-30 \sim +70$           | $^\circ\text{C}$       | 【Note2】 |
| Operating temperature ①  | $T_{opp}$   | —                        | $-10 \sim +70$           | $^\circ\text{C}$       | 【Note3】 |
| Operating temperature ②  | $T_{op}$    | —                        | $-10 \sim +65$           | $^\circ\text{C}$       | 【Note4】 |
| Light source wave length | $\lambda I$ | —                        | $\geq 400$               | nm                     | 【Note5】 |
| Light source luminance   | —           | —                        | $\leq 14000$             | $\text{cd}/\text{m}^2$ | 【Note5】 |

【Note1】 CK, R0~R5, G0~G5, B0~B5, Hsync, Vsync, ENAB, R/L, U/L

【Note2】 Humidity : 95%RH Max. at  $T_a \leq 40^\circ\text{C}$ .

Maximum wet-bulb temperature at  $39^\circ\text{C}$  or less at  $T_a > 40^\circ\text{C}$ .

No condensation.

【Note3】 Panel surface temperature

【Note4】 Module ambient temperature

【Note5】 Measurement point : panel surface (Backlight mounting side)

The light source used fluorescence lamp with three wave length.

## 6. Electrical Characteristics

## 6-1. TFT-LCD panel driving

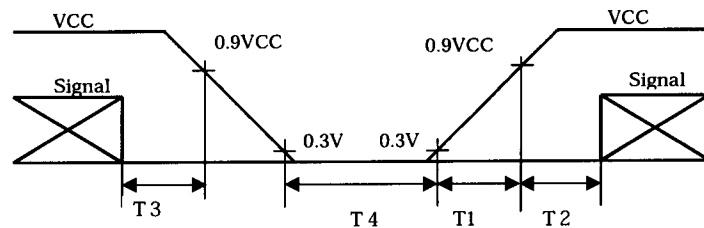
Ta = 25°C

| Parameter                       |                     | Symbol           | Min.               | Typ. |      | Max.               | Unit  | Remark                                  |
|---------------------------------|---------------------|------------------|--------------------|------|------|--------------------|-------|-----------------------------------------|
| Power                           | Supply voltage      | V <sub>cc</sub>  | +3.0               | +3.3 | +5.0 | +5.5               | V     | 【Note1】                                 |
| Supply                          | Current dissipation | I <sub>cc</sub>  | —                  | 180  |      | 270                | m A   | V <sub>cc</sub> =3.3V 【Note2】           |
|                                 |                     | I <sub>cc</sub>  | —                  | 150  |      | 230                | m A   | V <sub>cc</sub> =5.0V 【Note2】           |
| Permissive input ripple voltage |                     | V <sub>RF</sub>  | —                  | —    |      | 100                | mVp-p |                                         |
| Input voltage (Low)             |                     | V <sub>IL</sub>  | —                  | —    |      | 0.3V <sub>cc</sub> | V     | 【Note3】                                 |
| Input voltage (High)            |                     | V <sub>IH</sub>  | 0.7V <sub>cc</sub> | —    |      | —                  | V     |                                         |
| Input current (low)             |                     | I <sub>OL1</sub> | —                  | —    |      | 1.0                | μ A   | V <sub>I</sub> =0V 【Note4】              |
|                                 |                     | I <sub>OL2</sub> |                    |      |      | 10                 | μ A   | V <sub>I</sub> =0V 【Note5】              |
|                                 |                     | I <sub>OL3</sub> | —                  | —    |      | 800                | μ A   | V <sub>I</sub> =0V 【Note6】              |
| Input current (High)            |                     | I <sub>OH1</sub> | —                  | —    |      | 1.0                | μ A   | V <sub>I</sub> =V <sub>cc</sub> 【Note7】 |
|                                 |                     | I <sub>OH2</sub> |                    |      |      | 300                | μ A   | V <sub>I</sub> =V <sub>cc</sub> 【Note8】 |
|                                 |                     | I <sub>OH3</sub> | —                  | —    |      | 800                | μ A   | V <sub>I</sub> =V <sub>cc</sub> 【Note9】 |

## 【 NOTE 1 】

Vcc-turn-on conditions

$$\begin{aligned}
 T1 &\leq 15 \text{ ms} \\
 0 < T2 &\leq 100 \text{ ms} \\
 0 < T3 &\leq 1 \text{ s} \\
 T4 &> 200 \text{ ms}
 \end{aligned}$$



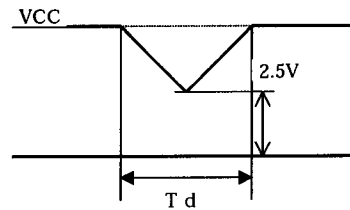
Vcc-dip conditions

$$1) 2.5 \text{ V} \leq V_{cc}$$

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

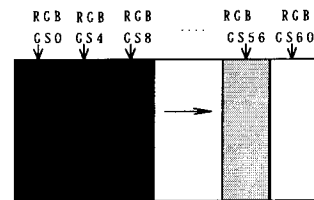
$$2) V_{cc} < 2.5 \text{ V}$$

Vcc-dip condition should also follow  
The Vcc-turn-on conditions



【Note2】 Typical current situation : 16-gray-bar pattern.

480 line mode/Vcc=+3.3V/+5.0V



【Note3】 CK,R0~R5,G0~G5,B0~B5,Hsync,Vsync,ENAB,  
R/L,U/D

【Note4】 CK,R0~R5,G0~G5,B0~B5,Hsync,Vsync,

【Note5】 U/D,ENAB

【Note6】 R/L

【Note7】 CK,R0~R5,G0~G5,B0~B5,Hsnc,Vsync,R/L

【Note8】 ENAB

【Note9】 U/D

## 7. Timing Characteristics of input signals

Timing diagrams of input signal are shown in Fig.2 - ①~③ .

### 7-1. Timing characteristics

| Parameter                    |             | Symbol | Mode | Min.  | Typ.  | Max.   | Unit  | Remark |
|------------------------------|-------------|--------|------|-------|-------|--------|-------|--------|
| Clock                        | Frequency   | 1/Tc   | all  | —     | 25.18 | 28.33  | MHz   |        |
|                              | High time   | Tch    | //   | 5     | —     | —      | ns    |        |
|                              | Low time    | Tcl    | //   | 10    | —     | —      | ns    |        |
| Data                         | Setup time  | Tds    | //   | 5     | —     | —      | ns    |        |
|                              | Hold time   | Tdh    | //   | 10    | —     | —      | ns    |        |
| Horizontal sync. signal      | Cycle       | TH     | //   | 30.00 | 31.78 | —      | μs    |        |
|                              |             |        | //   | 750   | 800   | 900    | clock |        |
|                              | Pulse width | THp    | //   | 2     | 96    | 200    | clock |        |
| Vertical sync. signal        | Cycle       | TV     | 480  | 515   | 525   | 560    | line  |        |
|                              |             |        | 400  | 446   | 449   | 480    | line  |        |
|                              |             |        | 350  | 447   | 449   | 510    | line  |        |
|                              | Pulsewidth  | TVp    | all  | 1     | —     | 34     | line  |        |
| Horizontal display period    |             | THd    | //   | 640   | 640   | 640    | clock |        |
| Hsync-Clock phase difference |             | THc    | //   | 10    | —     | Tc-10  | ns    |        |
| Hsync-Vsync phase difference |             | TVh    | //   | 0     | —     | TH-THp | clock |        |

Note) In case of lower frequency, the deterioration of display quality, flicker etc., may be occurred.

### 7-2. Horizontal display position

The horizontal display position is determined by ENAB signal and the input data corresponding to the rising edge of ENAB signal is displayed at the left end of the active area.

| Parameter                            |             | symbol | Min. | Typ. | Max.   | Unit  | Remark |
|--------------------------------------|-------------|--------|------|------|--------|-------|--------|
| Enable signal                        | Setup time  | Tes    | 5    | —    | Tc-10  | ns    |        |
|                                      | Pulse width | Tep    | 2    | 640  | 640    | clock |        |
| Hsync-Enable signal phase difference |             | THE    | 44   | —    | TH-664 | clock |        |

Note) When ENAB is fixed "Low", the display starts from the data of C104(clock) as shown

in Fig.2-①~③. Be careful that the module does not work when ENAB is fixed "High".

When the phase difference is below 104 clock, keep the "High level of ENAB is signal longer Than 104-The. If it will not be kept, the display starts from the data of C104(clock).

7-3. Vertical display position

The vertical display position is automatically centered in the active area at each mode of VGA ,480-,400-,and 350-line mode . Each mode is selected depending on the polarity of the synchronous signals described in 4-1(Note1).

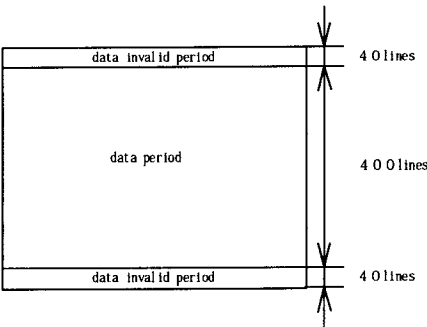
In each mode ,the data of TVn is displayed at the top line of the active area. And the display position will be centered on the screen like the following figure when the period of vertical synchronous signal,TV,is typical value.

In 400-,and 350-line mode,the data in the vertical data invalid period is also displayed,

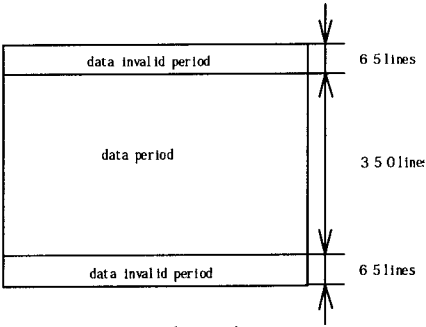
So ,inputting all data "0" is recommended during vertical data invalid period.

ENAB signal has no relation to the vertical display position.

| Mode | V-data start(TVs) | V-data period(TVd) | V-display start(TVn) | V-display period | Unit | Remark |
|------|-------------------|--------------------|----------------------|------------------|------|--------|
| 480  | 34                | 480                | 34                   | 480              | line |        |
| 400  | 34                | 400                | 443-TV               | 480              | line |        |
| 350  | 61                | 350                | 445-TV               | 480              | line |        |

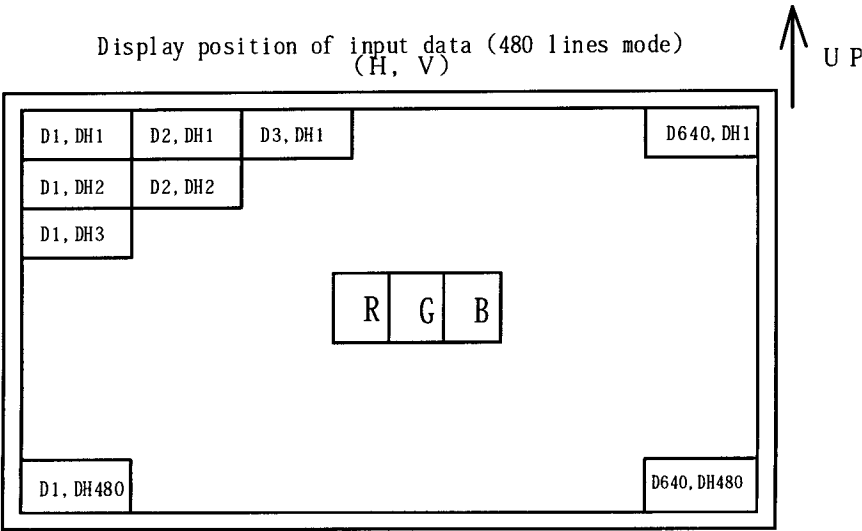


400 lines mode (TV=449)



350 lines mode (TV=449)

7-4. Input Data Signals and Display Position on the screen



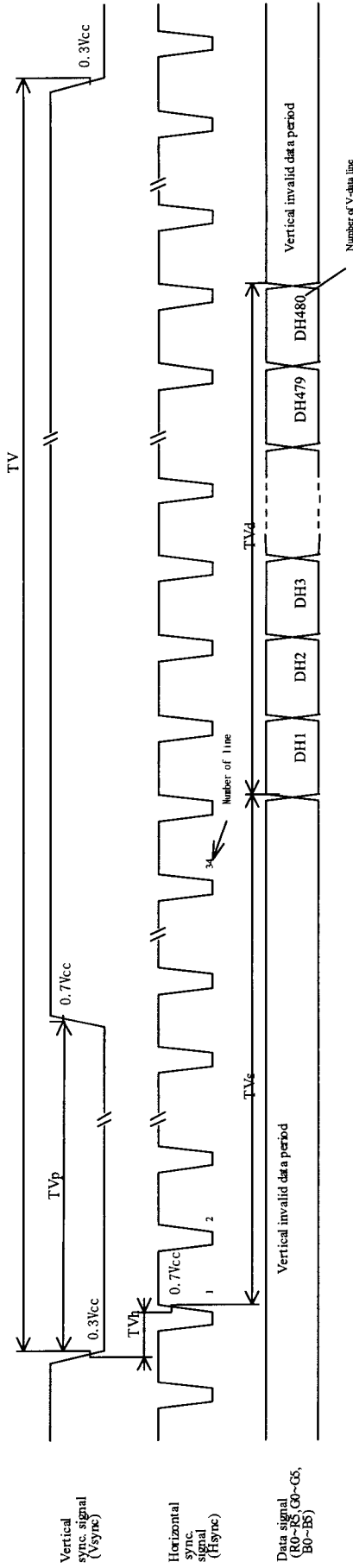
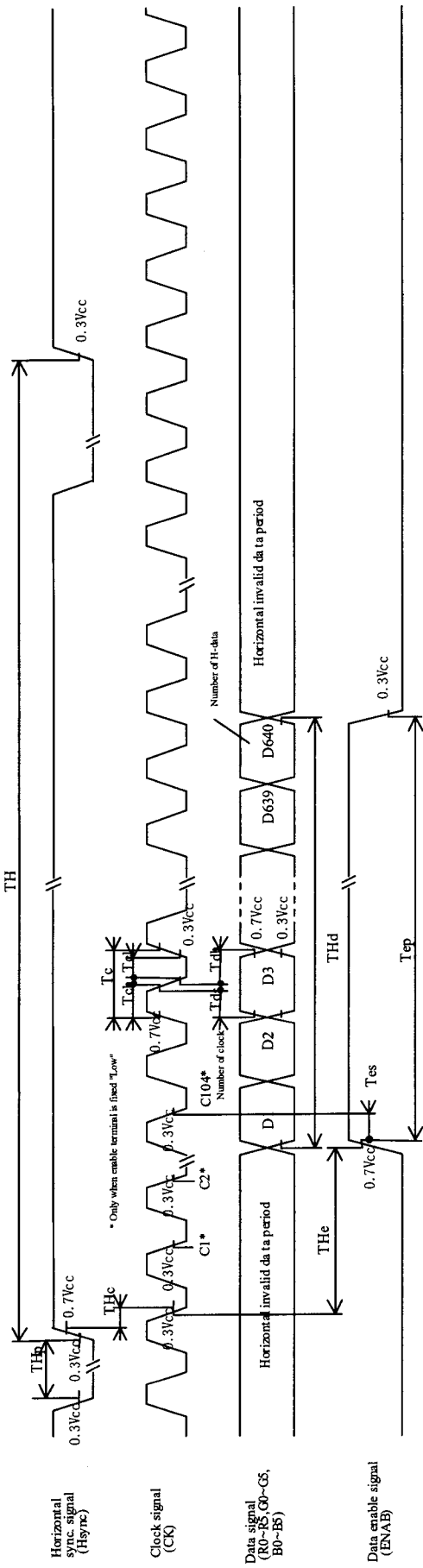


Fig 2-1 Input signal waveforms (480 line mode)

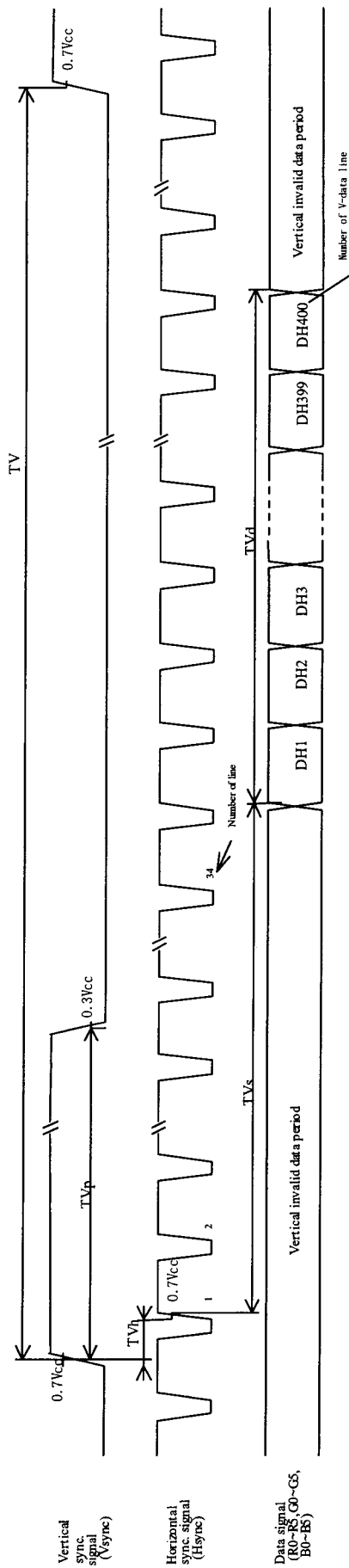


Fig.2-2 Input signal waveforms (400 line mode)

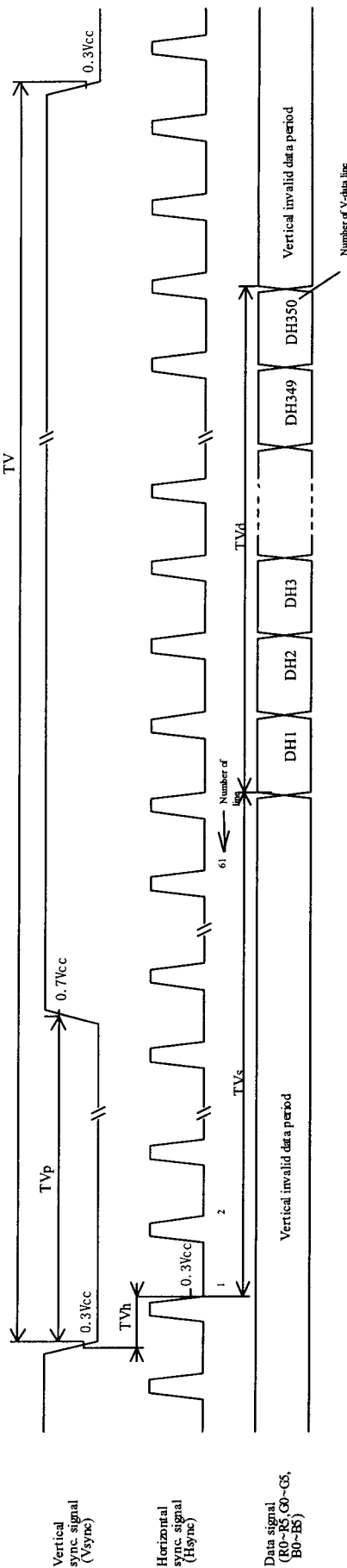
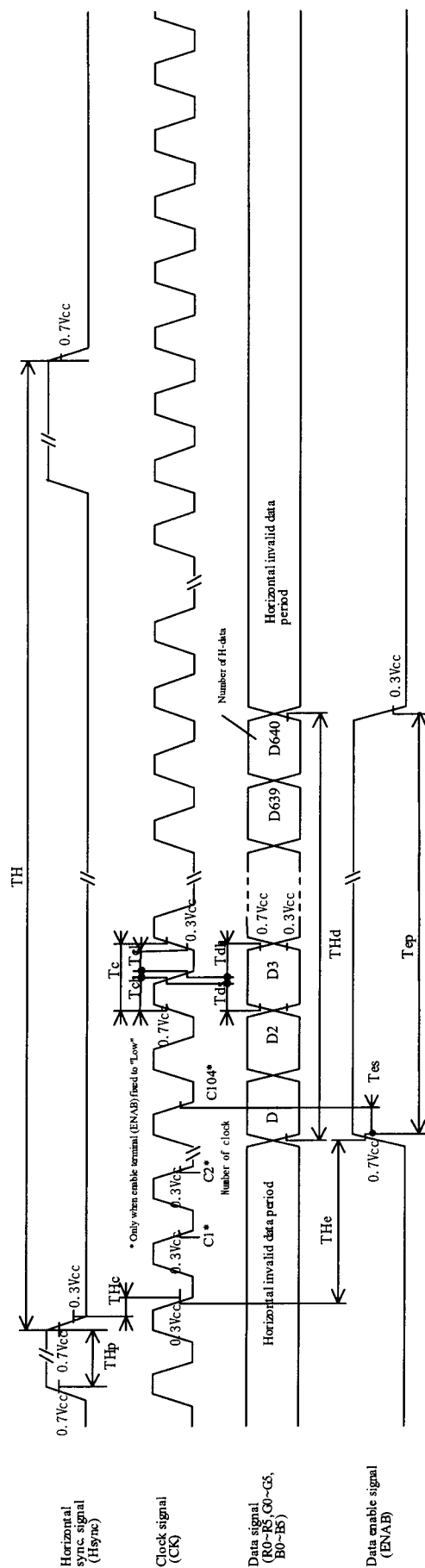


Fig.2-3 Input signal waveforms (350 line mode)

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

|                     | Colors &<br>Gray scale | Data signal   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|---------------------|------------------------|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|                     |                        | Gray<br>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 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  | 1  | 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°C, Vcc=+5V

| Parameter             |            | Symbol                 | Condition             | Min | Typ   | Max | Unit | Remark    |
|-----------------------|------------|------------------------|-----------------------|-----|-------|-----|------|-----------|
| Viewing Angle Range   | Horizontal | $\theta 21, \theta 22$ | C R > 10              | 60  | 70    | —   | Deg. | 【Note1,4】 |
|                       | Vertical   | $\theta 11$            |                       | 35  | 40    | —   | Deg. |           |
|                       |            | $\theta 12$            |                       | 55  | 70    | —   | Deg. |           |
| Contrast ratio        |            | C R                    | $\theta = 0^{\circ}$  | 150 | —     | —   | —    | 【Note2,4】 |
|                       |            |                        | Optimum Viewing Angle | —   | 300   | —   | —    |           |
| Response Time         | Rise       | $\tau r$               | $\theta = 0^{\circ}$  | —   | 20    | —   | ms   | 【Note3,4】 |
|                       | Decay      | $\tau d$               |                       | —   | 40    | —   | ms   |           |
| Chromaticity of White |            | x                      |                       | —   | 0.305 | —   |      | 【Note4】   |
|                       |            | y                      |                       | —   | 0.329 | —   |      |           |
| Transmissivity        |            | tr                     |                       | 6.1 | 7.7   | —   | %    | 【Note5】   |

[Use the backlight of LQ10D421 for measurement]

※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.3 below.

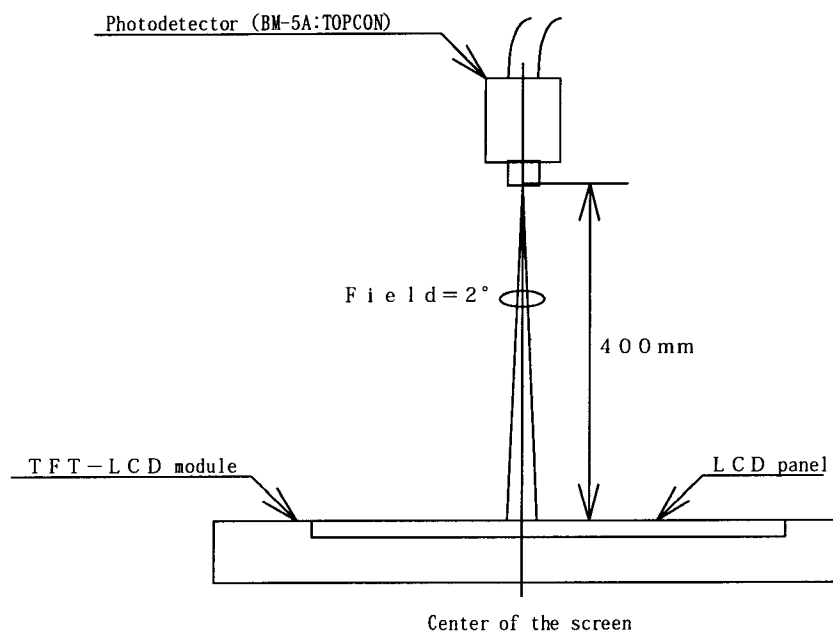
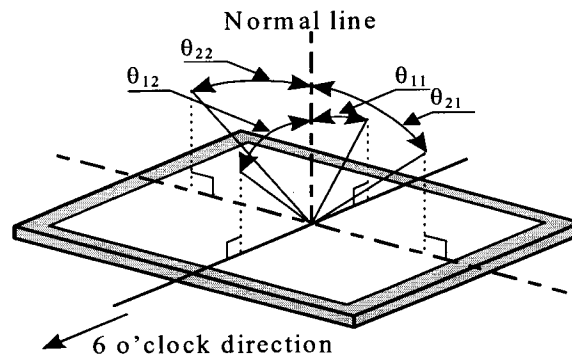


Fig.3 Optical characteristics measurement method

【Note1】 Definitions of viewing angle range:



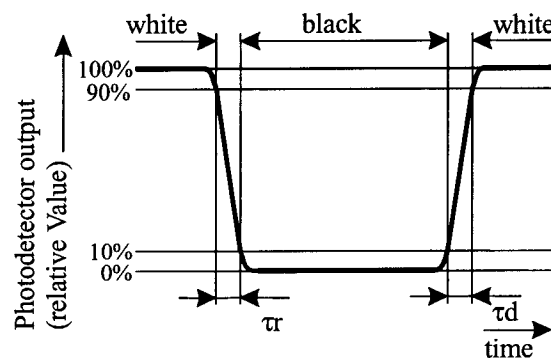
【Note2】 Definition of contrast ratio:

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:

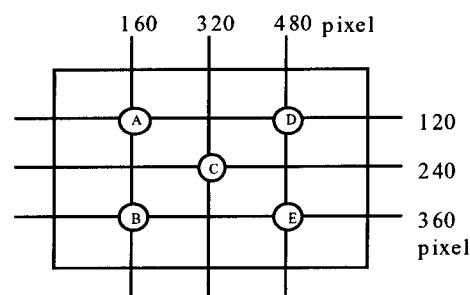
The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".



【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. Display Quality

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

## 11. 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 polarizer is easily damaged, pay attention not to scratch it.
- d) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 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 injure the human earth when handling. Observe all other precautionary requirement in handling electric components.
- h) Protection film is attached to the module surface to prevent it from being scratched .  
Peel the film off slowly , just before the use, with strict attention to electrostatic charges. Ionized air shall be blown over during the action. Blow off 'dust' on the polarizer by using an ionized nitrogen.
- i) The polarizer surface on the panel is treated with Anti-Glare for low reflection. In case of attaching protective board over the LCD, be careful about the optical interface fringe etc. which degrades display quality.
- j) Do not expose the LCD panel to direct sunlight. Lightproof shade etc. should be attached when LCD panel is used under such environment.
- k) When you use the module , please apply enough EMI countermeasure by using optimum backlight system etc..
- 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.

## 12. Packing form

|                                                   |                       |
|---------------------------------------------------|-----------------------|
| Product country                                   | JAPAN                 |
| Piling number of cartons                          | 7 (Max)               |
| Packing quantity in one carton                    | 20                    |
| Carton size [mm]                                  | 525 (W)×309(D)×377(H) |
| Total mass of one carton filled with full modules | 12.5kg                |
| Packing form is shown                             | Fig.4                 |

## 13. Reliability test items

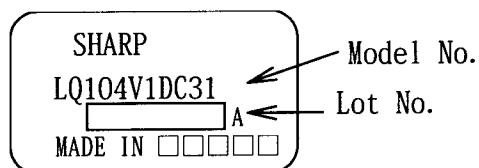
| No. | Test item                                          | Conditions                                                                                                                                                                                      |
|-----|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | High temperature storage test                      | Ta=70℃ 240h                                                                                                                                                                                     |
| 2   | Low temperature storage test                       | Ta= -30℃ 240h                                                                                                                                                                                   |
| 3   | High temperature<br>& high humidity operation test | Ta=40℃ ; 95%RH 240h<br>(No condensation)                                                                                                                                                        |
| 4   | High temperature operation test                    | Topp=70℃ 240h(Panel surface temperature)                                                                                                                                                        |
| 5   | Low temperature operation test                     | Ta= -10℃ 240h                                                                                                                                                                                   |
| 6   | Vibration test<br>(non- operating)                 | Frequency: 10~57Hz/Vibration width (one side):0.075mm<br>: 58~500Hz/Gravity:9.8m/s <sup>2</sup><br><br>Sweep time : 11 minutes<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 <sup>2</sup><br>Pulse width : 11ms, half sine wave<br>Direction : ±X,±Y,±Z<br>once for each direction.                                                                    |

## 【Result Evaluation Criteria】

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

## 14. Others

## 1) Label: Module



## Packing box

## ①Model.No ②Shipment Date ③Quantity

|                           |                    |
|---------------------------|--------------------|
| 社内品番: (4 S) LQ104V1DC31 ① |                    |
| ①                         |                    |
| Lot NO. :                 | (1 T) 2002. 9. 1 ② |
| ②                         |                    |
| Quantity : (Q)            | 20 pcs ③           |
| ③                         |                    |
| ユーザ品番 :                   |                    |
| シャープ物流用ラベルです。             |                    |

2) 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.

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) If any problem occurs in relation to the description of this specification , it shall be resolved through discussion with spirit of cooperation.

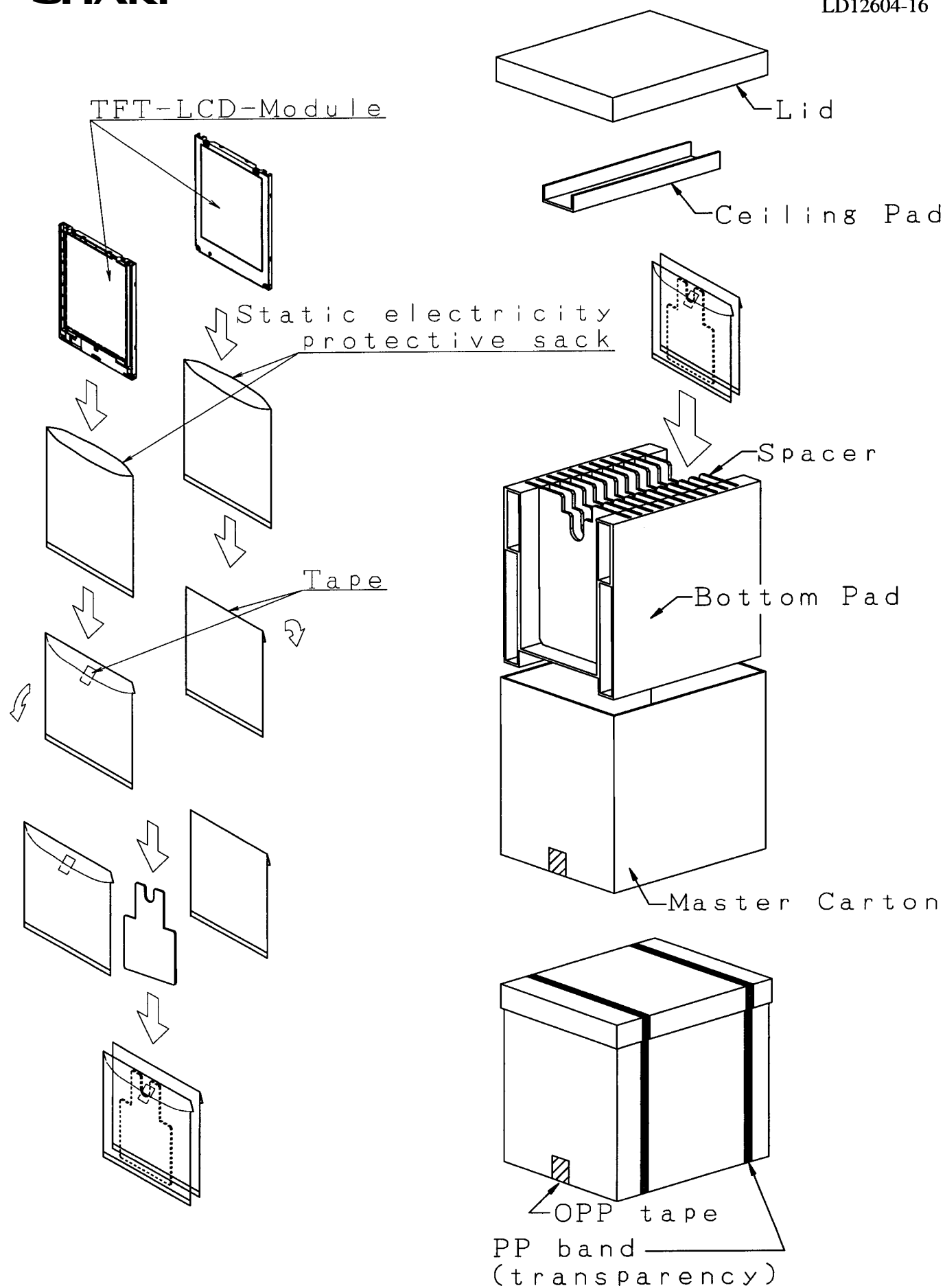


Fig.4 Packing Form

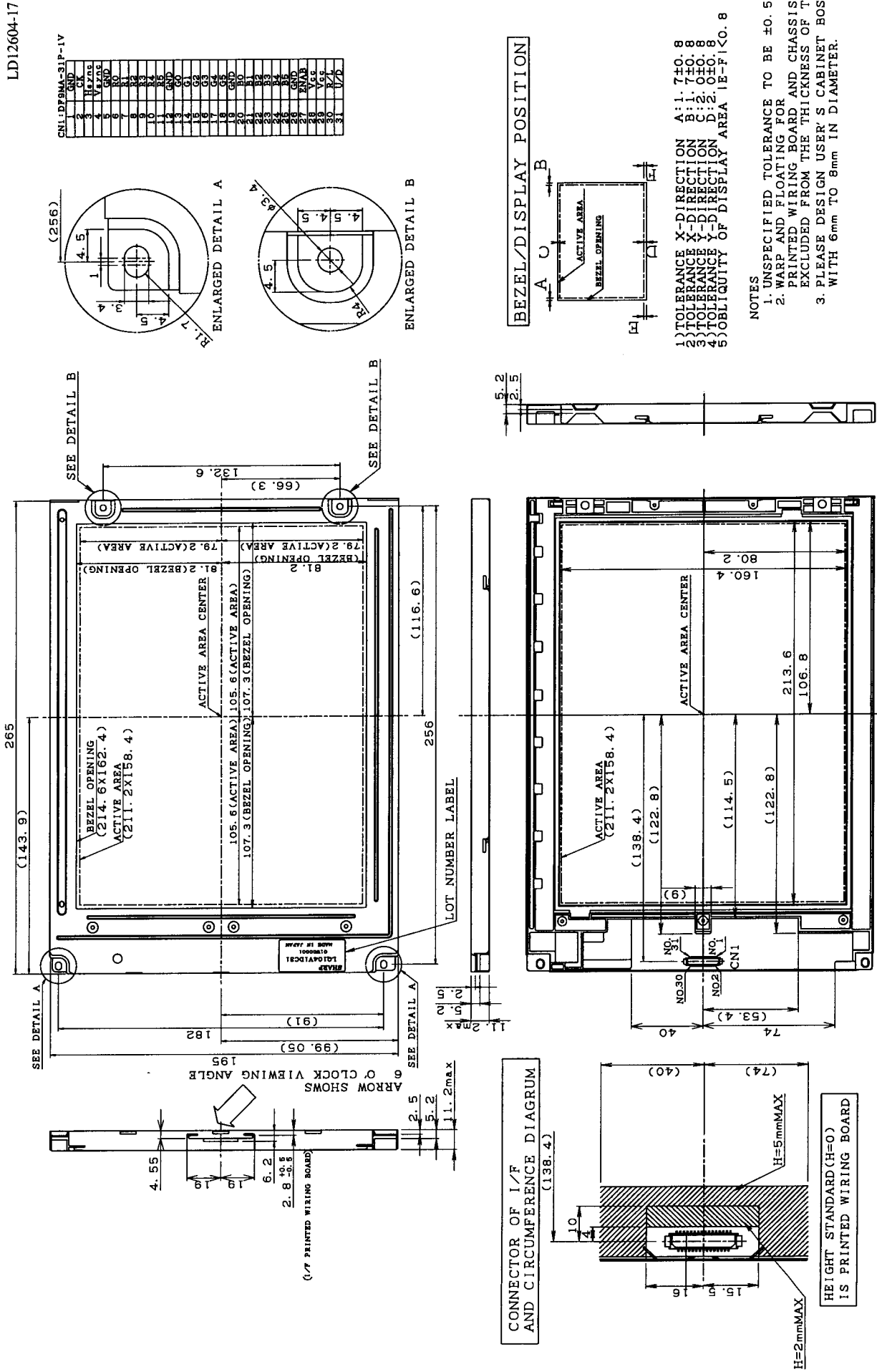


Fig.1 LQ104VDC31 Outline Dimensions

**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.

---

**NORTH AMERICA**

---

SHARP Microelectronics of the Americas  
5700 NW Pacific Rim Blvd.  
Camas, WA 98607, U.S.A.  
Phone: (1) 360-834-2500  
Fax: (1) 360-834-8903  
Fast Info: (1) 800-833-9437  
[www.sharpsma.com](http://www.sharpsma.com)

**EUROPE**

---

SHARP Microelectronics Europe  
Division of Sharp Electronics (Europe) GmbH  
Sonninstrasse 3  
20097 Hamburg, Germany  
Phone: (49) 40-2376-2286  
Fax: (49) 40-2376-2232  
[www.sharpsme.com](http://www.sharpsme.com)

**JAPAN**

---

SHARP Corporation  
Electronic Components & Devices  
22-22 Nagaike-cho, Abeno-Ku  
Osaka 545-8522, Japan  
Phone: (81) 6-6621-1221  
Fax: (81) 6117-725300/6117-725301  
[www.sharp-world.com](http://www.sharp-world.com)

**TAIWAN**

---

SHARP Electronic Components  
(Taiwan) Corporation  
8F-A, No. 16, Sec. 4, Nanking E. Rd.  
Taipei, Taiwan, Republic of China  
Phone: (886) 2-2577-7341  
Fax: (886) 2-2577-7326/2-2577-7328

**SINGAPORE**

---

SHARP Electronics (Singapore) PTE., Ltd.  
438A, Alexandra Road, #05-01/02  
Alexandra Technopark,  
Singapore 119967  
Phone: (65) 271-3566  
Fax: (65) 271-3855

**KOREA**

---

SHARP Electronic Components  
(Korea) Corporation  
RM 501 Geosung B/D, 541  
Dohwa-dong, Mapo-ku  
Seoul 121-701, Korea  
Phone: (82) 2-711-5813 ~ 8  
Fax: (82) 2-711-5819

**CHINA**

---

SHARP Microelectronics of China  
(Shanghai) Co., Ltd.  
28 Xin Jin Qiao Road King Tower 16F  
Pudong Shanghai, 201206 P.R. China  
Phone: (86) 21-5854-7710/21-5834-6056  
Fax: (86) 21-5854-4340/21-5834-6057

**Head Office:**

No. 360, Bashen Road,  
Xin Development Bldg. 22  
Waigaoqiao Free Trade Zone Shanghai  
200131 P.R. China  
Email: [smc@china.global.sharp.co.jp](mailto:smc@china.global.sharp.co.jp)

**HONG KONG**

---

SHARP-ROXY (Hong Kong) Ltd.  
3rd Business Division,  
17/F, Admiralty Centre, Tower 1  
18 Harcourt Road, Hong Kong  
Phone: (852) 28229311  
Fax: (852) 28660779  
[www.sharp.com.hk](http://www.sharp.com.hk)

**Shenzhen Representative Office:**

Room 13B1, Tower C,  
Electronics Science & Technology Building  
Shen Nan Zhong Road  
Shenzhen, P.R. China  
Phone: (86) 755-3273731  
Fax: (86) 755-3273735