

PREPARED BY: <u>Y. Maunishi</u> DATE <u>Aug. 23, 2006</u>	  MOBILE LIQUID CRYSTAL DISPLAY GROUP I SHARP CORPORATION SPECIFICATION	SPEC No. LCY-05045A
APPROVED BY: <u>T. Sato</u> DATE <u>Aug. 24, 2006</u>		FILE No.
		ISSUE: Aug. 22, 2006
		PAGE : 20 pages

DEVICE SPECIFICATION FOR

**TFT - LCD module**

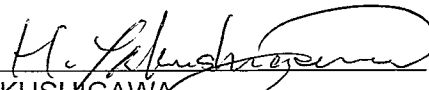
MODEL No. LQ070T5DR05

CUSTOMER'S APPROVAL

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SHARP CORPORATION

## RECORDS OF REVISION

MODEL No : LQ070T5DR05

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## (1) Application

This technical literature applies to color TFT-LCD module, LQ070T5DR05.

## (2) Summary and Features

- This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor).
- Graphics and texts can be displayed on a  $480 \times 3 \times 240$  dots panel with 262,144 colors by supplying 18 bit data signals(6 bit/color).
- Utilizes a panel with a 16:9 aspect ratio, which makes the module suitable for use in wide-screen systems.
- The 7.0 screen produces a high resolution image that is composed of 115,200 pixels elements in a stripe arrangement.
- Wide viewing field angle technology is employed. (The most suitable viewing angle is in the 6 o'clock direction.)
- By adopting an active matrix drive, a picture with high contrast is realized.
- Reduced reflection as a result of low reflection black matrix and an antiglare (AG) and anti-reflection(AR) polarizer being adopted.
- By COG method, realized a slim, lightweight, and compact module.
- An inverted video display in the vertical and horizontal directions is possible.
- Semi self-heating backlight that is excellent of brightness rising characteristics at low temperature in consideration of automotive application.

## (3) Construction and Outline

It is composed of a color TFT-LCD panel, driver ICs, control-PWB, FPC, frame, shielding front case, shielding back case and backlight unit. (It isn't composed DC/AC inverter.)

Outline dimensions : See Fig.1

Module construction : See Fig.2

## (4) Mechanical specifications

Table 4-1

Parameter	Specifications	Units	Remarks
Display format	115,200	pixels	
	$1,440(\text{W}) \times 240(\text{H})$	dots	
Active area	$154.1 (\text{W}) \times 87.0(\text{H})$	mm	
Screen size (Diagonal)	17.7[7.0" ]	cm	
Dot pitch	$0.107 (\text{W}) \times 0.363 (\text{H})$	mm	
Pixel configuration	R,G,B Stripe configuration		
Outline dimension	$170.1(\text{W}) \times 103.4 (\text{H}) \times 14.2 (\text{D})$	mm	【Note4-1】
Mass	280 (MAX)	g	

## 【Note 4-1】

Excluding protrusions. Typical values are given.

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

## (5) Input terminal

## 5-1) TFT-LCD panel driving part

Used connector : 36FLZ-RSM1-R-TB (JST Co., Ltd.)

Table 5-1  
CN1

Pin No.	Symbol	Description	Remarks
1	VGL	-10V power supply	
2	NC	Non connection (It should be opened electrically)	
3	GND	Ground	
4	CK	Clock signal for sampling each data signal	
5	GND	Ground	
6	Hsync	Horizontal synchronous signal	【Note5-1】
7	Vsync	Vertical synchronous signal	【Note5-1】
8	VGH	+10V power supply	
9	R0	RED data signal(LSB)	
10	R1	RED data signal	
11	R2	RED data signal	
12	R3	RED data signal	
13	R4	RED data signal	
14	R5	RED data signal(MSB)	
15	GND	Ground	
16	G0	GREEN data signal(LSB)	
17	G1	GREEN data signal	
18	G2	GREEN data signal	
19	G3	GREEN data signal	
20	G4	GREEN data signal	
21	G5	GREEN data signal(MSB)	
22	VSH	+5V power supply	
23	VSH	+5V power supply	
24	B0	BLUE data signal(LSB)	
25	B1	BLUE data signal	
26	B2	BLUE data signal	
27	B3	BLUE data signal	
28	B4	BLUE data signal	
29	B5	BLUE data signal(MSB)	
30	HVR	Selection for horizontal and vertical scanning direction	【Note5-2】
31	ENAB	Signal to settle the horizontal display position	【Note5-3】
32	VCOM	Monitor terminal for common electrode driving signal (It should be opened electrically)	
33	TEST	Terminal for test (It should be opened electrically)	
34	NC	Non connection (It should be opened electrically)	
35	PD-A	Photodiode sensor anode terminal	【Note5-4】
36	PD-C	Photodiode sensor cathode terminal	【Note5-4】

## 【Note 5-1】

Hsync	Positive
Vsync	Positive

## 【Note 5-2】

HVR = "High": Regular video

HVR = "Low" : Horizontally and Vertically inverted video

## 【Note 5-3】

The horizontal display start timing is settled in accordance with a rising timing of ENAB signal.  
(See Fig7-1)

In case ENAB is fixed “Low”, the horizontal start timing is determined as described in Fig7-2.  
(Don't keep ENAB “High” during operation..)

## 【Note 5-4】

OSRAM BPW34S

## 5-2) Backlight fluorescent tube driving part

Used connector :BHR-02(8.0)VS-1N (JST Co.,Ltd.)

Fit connector :SM02(8.0)B-BHS-1-TB (JST Co.,Ltd.)

Table 5-2

CN2

No.	Symbol	Function	Color of FL cable
1	VL1	Input terminal(Hi voltage side)	Red
2	VL2	Input terminal (Low voltage side)	Black

CN3

No.	Symbol	Function	Color of FL cable
1	VL1	Input terminal(Hi voltage side)	Red
2	VL2	Input terminal (Low voltage side)	Black

## (6)Absolute maximum ratings

Table 6-1

GND = 0 V

Parameter	Symbol	MIN	MAX	Unit	Remarks
Input signal voltage	$V_I$	-0.3	+3.6	V	【Note 6-1】 $T_a = -30 \sim 85^\circ\text{C}$
+5V power supply	VSH	0	+6.0	V	$T_a = -30 \sim 85^\circ\text{C}$
+10V power supply High	VGH	0	+12	V	$T_a = -30 \sim 85^\circ\text{C}$
-10V power supply Low	VGL	0	-12	V	$T_a = -30 \sim 85^\circ\text{C}$
Storage temperature	Tstg	-40	+85	$^\circ\text{C}$	【Note 6-2,3,6】
Operating temperature (panel surface)	Topr1	-30	+85	$^\circ\text{C}$	【Note 6-2,3,4】
Operating temperature ( Ambient temperature )	Topr2	-30	+70	$^\circ\text{C}$	【Note 6-4,5,6】

【Note 6-1】 CK,R0~R5,G0~G5,B0~B5,Hsync,Vsync,ENAB,HVR

【Note 6-2】 This rating applies to all parts of the module and should not be exceeded.

【Note 6-3】 Maximum wet-bulb temperature is less than  $49^\circ\text{C}$ . Condensation of dew must be avoided as electrical current leaks will occur, causing a degradation of performance specifications.

【Note 6-4】 The operating temperature only guarantees operation of the circuit. For contrast, speed response, and other factors related to display quality, determine operating temperature using the formula  $T_a = +25^\circ\text{C}$

【Note 6-5】 Ambient temperature when the backlight is lit (reference value).

【Note 6-6】 Lamp current shall be reduced ,in case temperature on the panel surface exceeds  $85^\circ\text{C}$ .

## (7)Electrical characteristics

## 7-1)TFT-LCD panel driving section

Table 7-1

GND=0V, Ta=-30~85°C

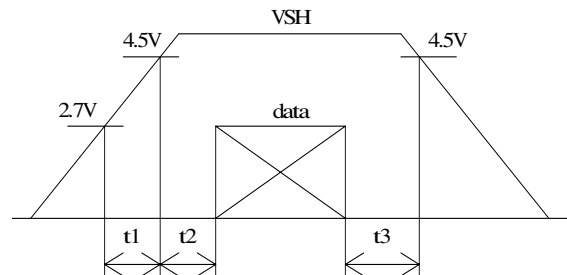
Parameter		Symbol	MIN	TYP	MAX	Unit	Remarks
+5V	Supply voltage	VSH	+4.5	+5.0	+5.5	V	【Note 7-1】
	Current dissipation	ISH	—	35	80	mA	【Note 7-2】
+10V	Supply voltage	VGH	+9.5	+10.0	+10.5	V	
	Current dissipation	IGH	—	25	35	mA	【Note 7-2】
-10V	Supply voltage	VGL	-9.5	-10.0	-10.5	V	
	Current dissipation	IGL	—	-22	-30	mA	【Note 7-2】
Permissive input ripple		V <sub>RF</sub>	—	—	100	mVpp	
Input Low voltage		V <sub>IL</sub>	—	0	0.9	V	【Note 7-3】
Input High voltage		V <sub>IH</sub>	2.3	3.3	—	V	
Input current (Low)		I <sub>IL</sub>	—	—	1.0	μA	V <sub>I</sub> =0V 【Note 7-3】
Input current (High)		I <sub>IH</sub>	—	—	1.0	μA	V <sub>I</sub> =3.3V 【Note 7-3】
Input current (Low)		I <sub>IL</sub>	2.0	—	36.0	μA	V <sub>I</sub> =0V 【Note 7-4】
Input current (High)		I <sub>IH</sub>	—	—	1.0	μA	V <sub>I</sub> =3.3V 【Note 7-4】
Input current (Low)		I <sub>IL</sub>	—	—	1.0	μA	V <sub>I</sub> =0V 【Note 7-5】
Input current (High)		I <sub>IH</sub>	2.0	—	36.0	μA	V <sub>I</sub> =3.3V 【Note 7-5】

◎Turn on :VGL→VSH→VGH or same time

◎Turn off :VGH→VSH→VGL or same time

## 【Note 7-1】

VSH-turn-on conditions

 $t_1 \leq 10\text{ms}$  $0 < t_2 \leq 10\text{ms}$  $0 < t_3 \leq 1\text{s}$ 

VSH-dip conditions

VSH-dip conditions should also follow the VSH-turn-on conditions.

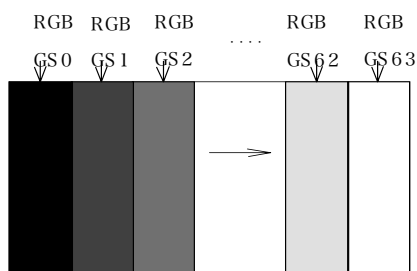
## 【Note 7-2】

Typical current situation:64-gray-bar pattern Timing ; CK=25MHz , HSY=15.73kHz , VSY=60Hz

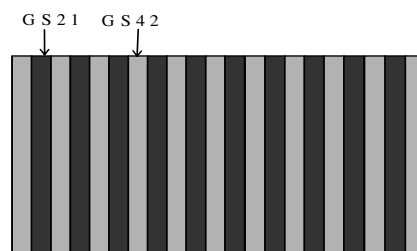
Max current situation: Vertical stripe pattern alternating 21 gray scale (GS21) with 42 gray scale (GS42) every 1 dot.

Timing ; CK=25MHz , HSY=15.73kHz , VSY=60Hz

VSH=+5.0V VGH=+10V VGL=-10V HVR= "High"



Typical current situation



Max current situation

【Note 7-3】 Applied to input pins (CK,R0~R5,G0~G5,B0~B5,Hsync,Vsync)

【Note 7-4】 Applied to input pins (HVR)

【Note 7-5】 Applied to input pins (ENAB)

## 7-2) Backlight driving section

The backlight system is an edge-lighting type with double CCFT (Cold Cathode Fluorescent Tube).  
The characteristics of Lamp are shown in the following table.

Table 7-2

Parameter	Symbol	M I N	T Y P	M A X	Unit	Remarks
lamp voltage	VL7	330	370	410	Vrms	I L = 6mArms
lamp current	IL	5.5	6.0	6.5	mArms	Per piece
	ILB	—	—	9	mArms	In case of the style light 【Note 7-6】
lamp frequency	fL	45	—	70	kHz	
Discharge pipe electric power(two)	WL	—	4.5	—	W	When the fixed case lights up
kick-off voltage	VS	—	—	1300	Vrms	Ta=+25°C 【Note 7-7】
		—	—	1350	Vrms	Ta=-30°C 【Note 7-7】

Inverter : HIU-359A-S [Harison Toshiba Lighting co. ,ltd]  
(Output capacitor : 18pF , frequency : 50kHz)

【Note 7-6】 within 5 minutes.  
at low temperature below 0°C

### 【Note 7-7】

The kick-off voltage is specified under the condition in just putting the backlight on the LCD module.  
(the backlight cable is not unbent)

The kick-off voltage depends on way to lead the cable between inverter and backlight.

### 【Caution】

Please use the inverter which has the one of the sine wave. With regards to the inverter, it should be negative / positive wave symmetry and the spike wave should not be occurred.



## 7-3) Timing Characteristics of input signals

Timing diagrams of input signal are shown in Fig7-1, Fig7-2

## a) Timing characteristics

Table 7-3

Parameter		Symbol	MIN	TYP	MAX	Unit	Remarks
Clock	frequency	1/Tc	—	—	25	MHz	
	High time	Tch	18	—	—	ns	
	Low time	Tcl	18	—	—	ns	
Data	Setup time	Tds	5	—	—	ns	
	Hold time	Tdh	10	—	—	ns	
Horizontal sync.Signal	Cycle	TH	59.1	—	80.32	$\mu s$	
			680	800	1675	clock	ENAB : active
			690				ENAB : Low
	Pulse width	THp	4	48	96	clock	
Vertical sync. Signal	Cycle	TV	14.7	16.67	26.50	ms	【Note 7-8】
			249	—	330	line	
	Pulse width	TVp	3	4	128	line	
Horizontal display period		THd	480	480	480	clock	
Vertical display period		TVd	240	240	240	line	
Hsync-Clock phase difference		THc	5	Tc/2	TH-5	ns	
Hsync-Vsync phase difference		TVh	-10	—	+10	clock	
Vertical display invalid line		TVe	7	7	7	line	

【Note7-8】 To be driven with more than 50Hz( $TV \leq 20ms$ ).

If less than 50 Hz( $TV \geq 20ms$ ), the flicker might occur gradually.

## b) Horizontal display position

The horizontal display position is determined by ENAB signal. The input data corresponding to the rising edge of ENAB signal is displayed at the left end of the active area. (See Fig7-1)

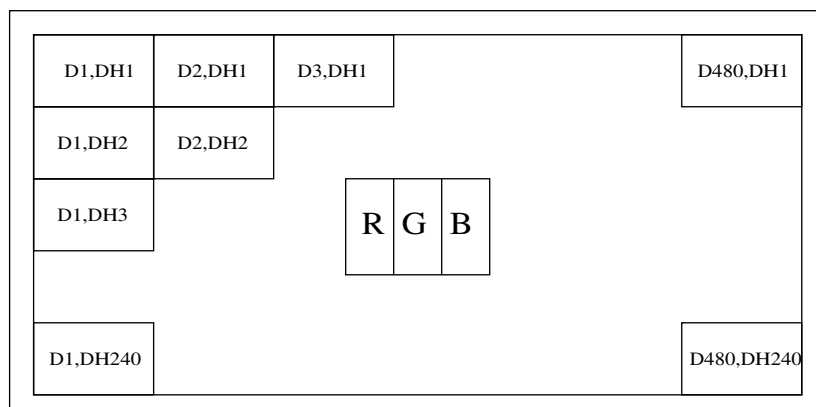
Parameter		symbol	Min.	Typ.	Max.	Unit	Remark
Enable signal	Setup time	Tes	5	Tc/2	Tc-5	ns	
	Pulse width	Tep	10	—	TH-10	clock	
Hsync-Enable signal phase Difference		THE	5	—	256	clock	【Note7-9】

Note) When ENAB is fixed "Low", the display starts from the data of 16 clock (C16) as shown in Fig7-2.

【Note7-9】  $THE \leq TH - 673\text{clock}$

【Note7-10】 Enable signal must be input into Vertical invalid data period as well as Vertical display period.

## c) Input Data Signals and Display Position on the screen



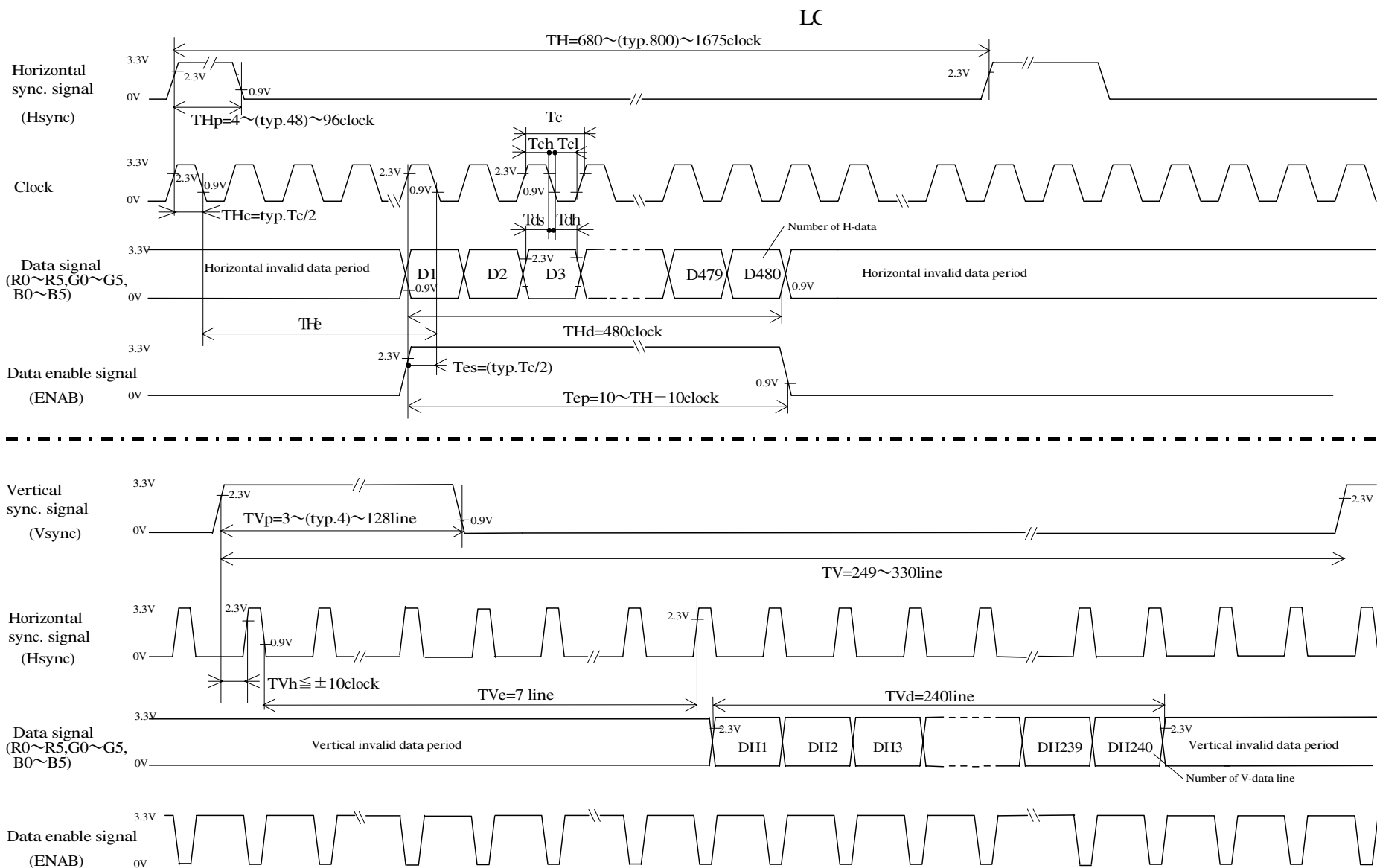


Fig7-1 Input signal waveform(ENAB : active)

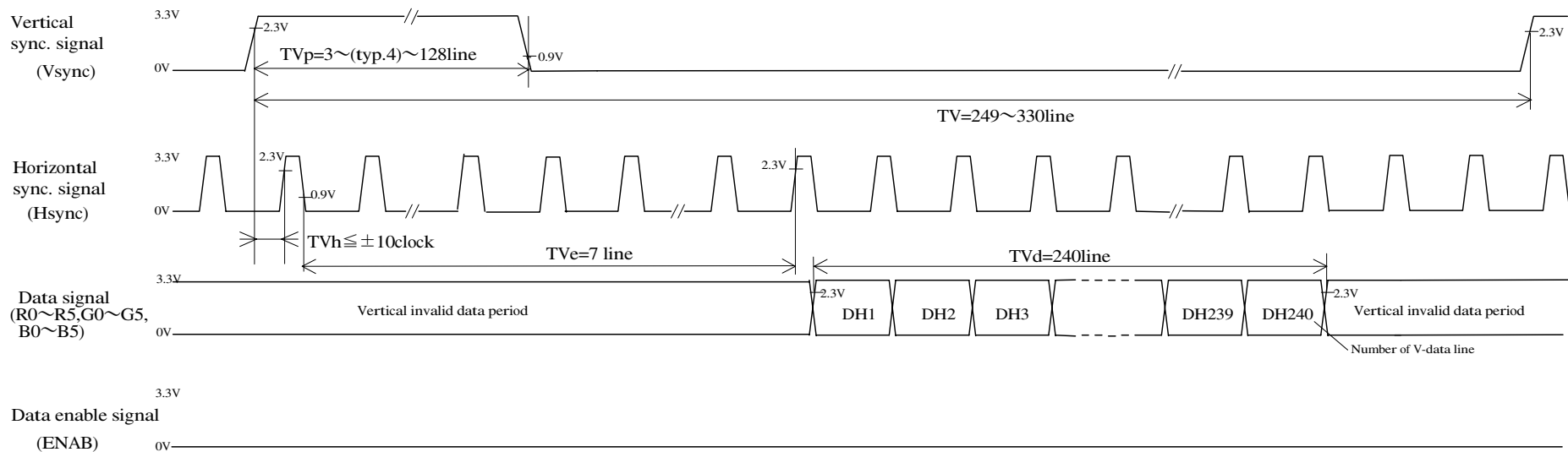
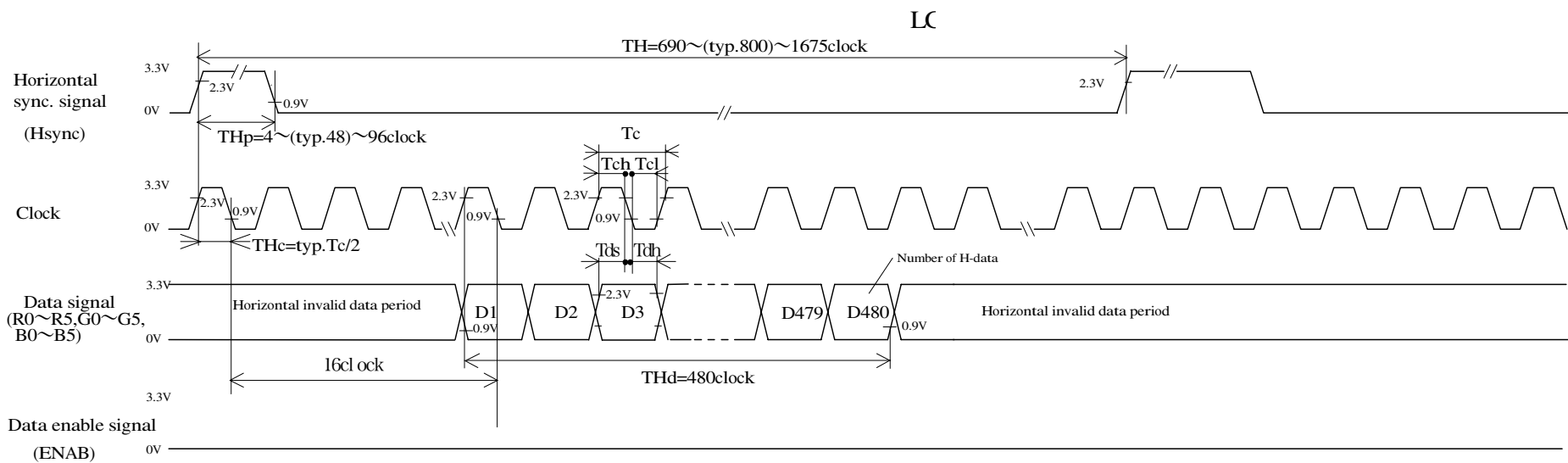


Fig7-2 Input signal waveform(ENAB : Low)

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

	Colors &	Data signal																		
	Gray scale	Gray Scale	0 :Low level voltage						1 :High level voltage											
			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

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

Table 9-1

Ta=25°C, VSH=+5V, VGH=+10V, VGL=-10V

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle range		$\theta_{11}$	$CR \geq 5$	60	65	—	° (degree)	【Note 9-1】
		$\theta_{12}$		35	40	—	° (degree)	
		$\theta_{21}, \theta_{22}$		60	65	—	° (degree)	
Contrast ratio		CRmax	Optimal viewing angle	100	—	—		【Note 9-2】
Response time	Rise	$\tau_r$	$\theta = 0^\circ$	—	30	60	ms	【Note 9-3】
	Fall	$\tau_d$		—	50	100	ms	
Luminance		Y	IL=6mArms	300	400	—	cd/m <sup>2</sup>	【Note 9-4】
	Rising-up[-20°C]	Y <sub>LOW</sub>	IL=9mArms	—	70	—	%	【Note 9-5】
Chromaticity	White	x	IL=6mArms	0.263	0.313	0.363		【Note 9-4】
		y		0.279	0.329	0.379		
	Red	x		0.530	—	—		
		y		0.290	—	—		
	Green	x		—	—	0.337		
		y		0.520	—	—		
	Blue	x		—	—	0.178		
		y		—	—	0.160		
Lamp life time	+25°C	-	continuation	10,000	—	—	hour	【Note 9-6】
	-30°C	-	intermission	2,000	—	—	time	【Note 9-7】

DC/AC inverter for external connection shown in following.

: HIU-359A-S [Harison Toshiba Lighting co., ltd] (Output capacitor : 18pF , frequency : 50kHz)

※ Measuring after 30minutes operation. It does the optical measurement of the characteristic in the condition which is equal to the darkroom or this using the way of measuring the following figure.

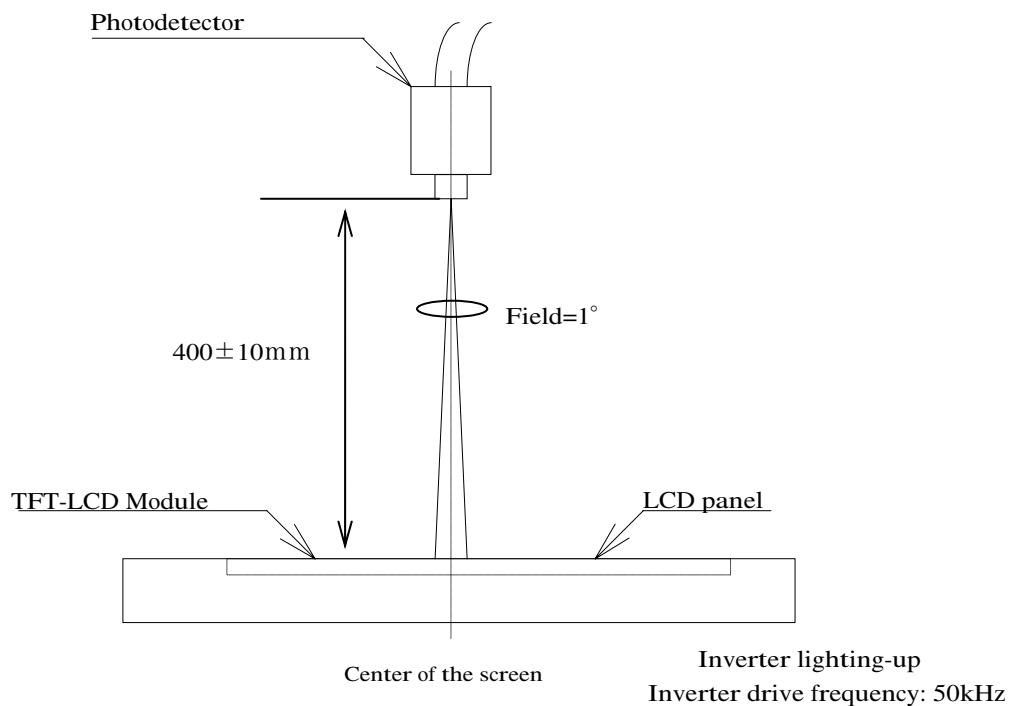
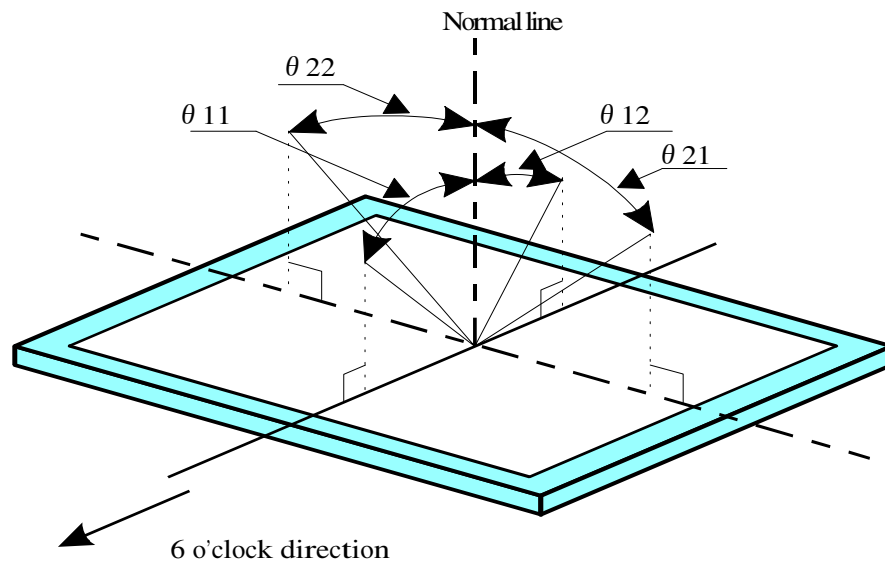


Fig.9-1 Optical characteristics measurement method

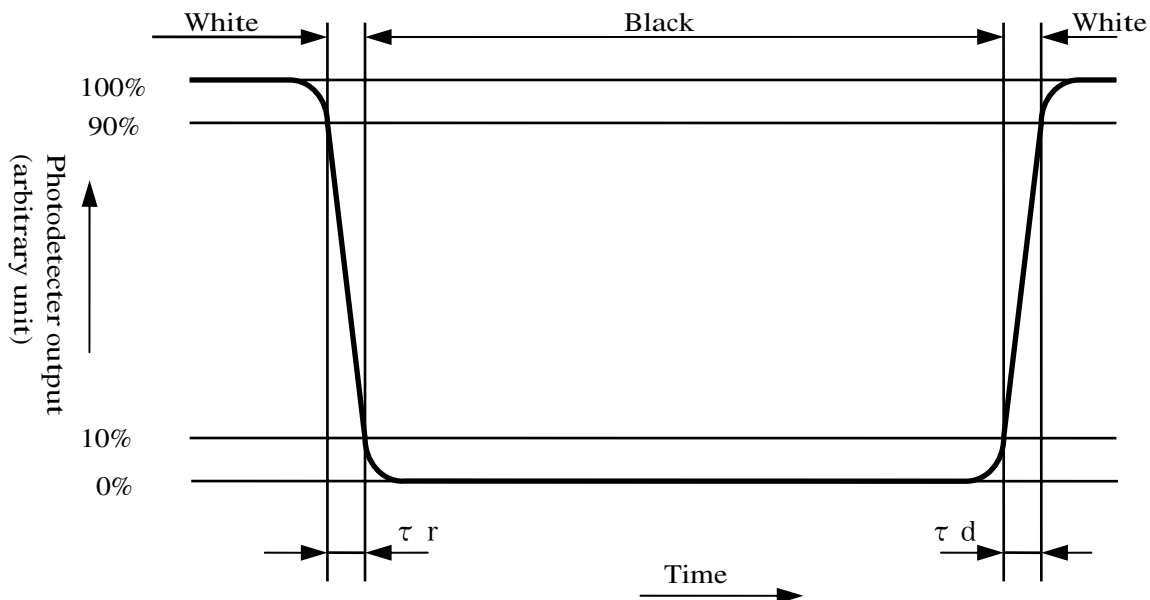
【Note 9-1】 Viewing angle range is defined as follows.



【Note 9-2】 Contrast ratio of transmission is defined as follows:

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output with LCD being "white"}}{\text{Photo detector output with LCD being "black"}}$$

【Note 9-3】 Response time is obtained by measuring the transition time of photo detector output, when input signals are applied so as to make the area "black" to and from "white".

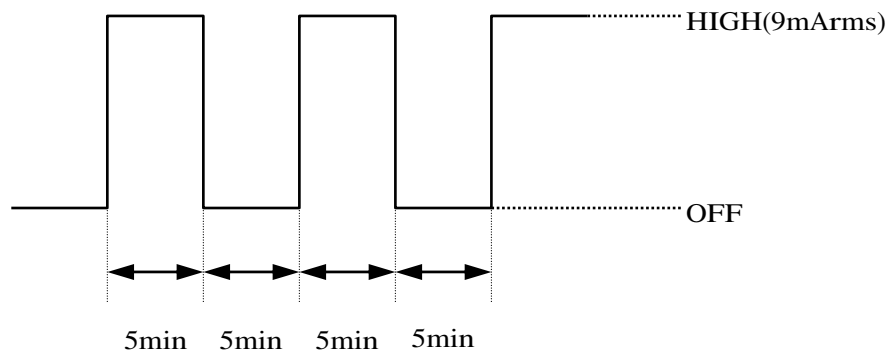


【Note 9-4】 Measured on the center area of the panel at a viewing cone  $1^\circ$  by TOPCON luminance meter BM-7. (After 30 minutes operation)  
DC/AC inverter driving frequency: 50kHz

【Note 9-5】 Relative luminance after 1 minute at  $-20^{\circ}\text{C}$  against the stable luminance regarding  $T_a=25^{\circ}\text{C}$  as 100%.

【Note 9-6】 Lamp life time is defined as the time when the brightness of the panel not to become less than 50% of the original value in the continuous operation under the condition of lamp current  $I_L=6.5\text{mA}_{\text{rms}}$  and PWM dimming 100%~5% ( $T_a=25^{\circ}\text{C}$ ).

【Note 9-7】 The intermittent cycles is defined as a time when brightness not to become under 50% of the original value under the condition of following cycle.  
Ambient temperature:  $-30^{\circ}\text{C}$



## (10) Mechanical characteristics

## 10-1) External appearance

Do not exist extreme defects. (See Fig. 1)

## 10-2) Panel toughness

The panel shall not be broken, when 19N is pressed on the center of the panel by a smooth sphere having 15 mm diameter.

Caution: In spite of very soft toughness, if, in the long-term, add pressure on the active area, it is possible to occur the functional damage.

## (11) Display quality

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

## (12) Handling instructions

## 12-1) Mounting of module

The TFT-LCD module is designed to be mounted on equipment using the mounting tabs in the four corners of the module at the rear side.

On mounting the module, as the M2.6 tapping screw fastening torque is 0.3 through 0.5N·m is recommended, be sure to fix the module on the same plane, taking care not to wrap or twist the module.

Don't reach the pressure of touch-switches of the set side to a module directly, because images may be disturbed.

Please power off the module when you connect the input/output connector.

Please connect the metallic shielding cases of the module and the ground pattern of the inverter circuit surely. If that connection is not perfect, there may be a possibility that the following problems happen.

- a) The noise from the backlight unit will increase.
- b) The output from inverter circuit will be unstable. Then, there may be a possibility that some problems happen.
- c) In some cases, a part of module will heat.
- d) Don't pull a CCFT lead line with the power beyond 10N. It has the possibility of the breakage in the lamp, the connection part of the lead line, and so on.

## 12-2) Precautions in mounting

Polarizer which is made of soft material and susceptible to flaw must be handled carefully.

Protection sheet is applied on the surface to protect it against scratches and dirties.

It is recommended to remove the protection sheet immediately before the use, taking care of static electricity.

Precautions in removing the protection sheet

## A) Working environment

When the protection sheet is removed off, static electricity may cause dust to stick to the polarizer surface.

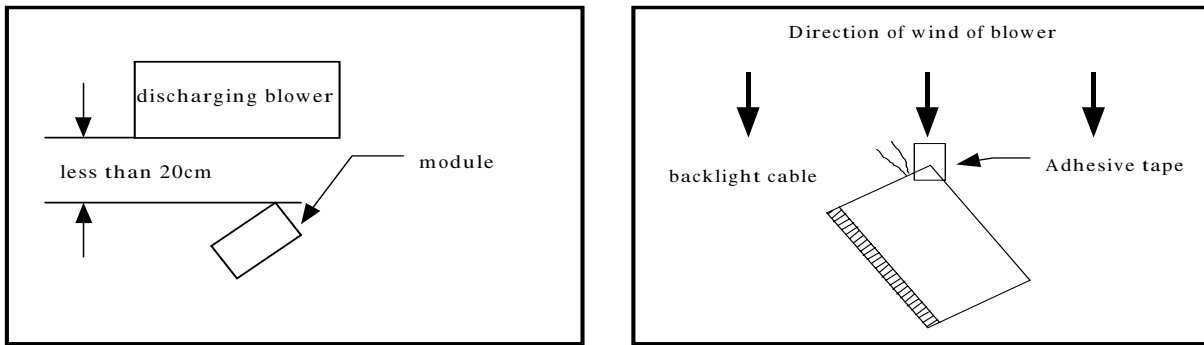
To avoid this, the following working environment is desirable.

- a) Floor: Conductive treatment of 1MΩ or more on the tile  
(conductive mat or conductive paint on the tile)
- b) Clean room free from dust and with an adhesive mat on the doorway
- c) Advisable humidity: 50%~70%      Advisable temperature: 15°C~27°C
- d) Workers shall wear conductive shoes, conductive work clothes, conductive gloves and an earth band.

## B) Working procedures

- a) Direct the wind of discharging blower somewhat downward to ensure that module is blown sufficiently. Keep the distance between module and discharging blower within 20 cm.
- b) Attach adhesive tape to the protection sheet part near discharging blower so as to protect polarizer against flaw.
- c) Remove the protection sheet, pulling adhesive tape slowly to your side.
- d) On removing the protection sheet, pass the module to the next work process to prevent the module to get dust.





e) Method of removing dust from polarizer

- Blow off dust with N2 blower for which static electricity preventive measure has been taken.
- Since polarizer is vulnerable, wiping should be avoided.  
But when the panel has stain or grease, we recommend to use adhesive tape to softly remove them from the panel.

When metal part of the TFT-LCD module (shielding lid and rear case) is soiled, wipe it with soft dry cloth. For stubborn dirties, wipe the part, breathing on it. Wipe off water drop or finger grease immediately. Long contact with water may cause discoloration or spots. TFT-LCD module uses glass which breaks or cracks easily if dropped or bumped on hard surface. Handle with care. Since CMOS LSI is used in this module, take care of static electricity and earth your body when handling.

12-3) Precautions in adjusting module

Adjusting volumes on the rear face of the module have been set optimally before shipment. Therefore, do not change any adjusted values. If adjusted values are changed, the specifications described here may not be satisfied.

12-4) Caution of product design

The LCD module shall be protected against water salt-water by the waterproof cover. Please take measures to interferential radiation from module, to do not interfere surrounding appliances.

Because driving voltage for backlight is high, it is dangerous to use LCD module under the conditions which are deviated from specification.

The equipment for which the LCD module is used shall have fail-safe design so that the safety can be ensured in case abnormality of inverter circuit, etc. should occur.

12-5) Others

Do not expose the module to direct sunlight or intensive ultraviolet rays for several hours; liquid crystal is deteriorated by ultraviolet rays. Store the module at a temperature near the room temperature. At lower than the rated storage temperature, liquid crystal solidifies, causing the panel to be damaged. At higher than the rated storage temperature, liquid crystal turns into isotropic liquid and may not recover. If LCD panel breaks, there may be a possibility that the liquid crystal escapes from the panel. Since the liquid crystal is injurious, do not put it into the eyes or mouth. When liquid crystal sticks to hands, feet or clothes, wash it out immediately with soap.

Observe all other precautionary requirements in handling general electronic components.

## (13) Packing form

Packing form : See Fig.3

- a) Piling number of cartons : MAX 10
- b) Package quantity in one carton 20 pcs
- c) Carton size: 475(W)×434(D)×167(H) mm
- d) Total mass of one carton filled with full modules: 7.0 kg
- e) Conditions for storage.

## Environment

- ①Temperature : 0~40°C
- ②Humidity : 60%RH or less (at 40°C)  
No dew condensation at low temperature and high humidity.
- ③Atmosphere :Harmful gas, such as acid or alkali which bites electronic components and/or wires, must not be detected.
- ④Period : about 3 months
- ⑤Opening 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.

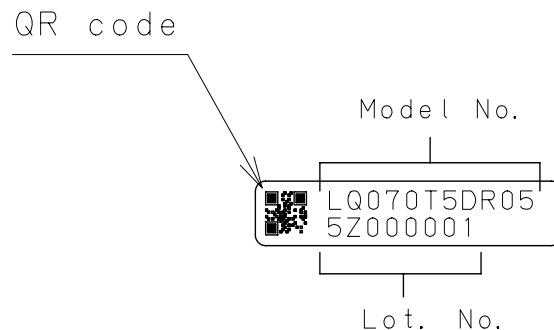
## (14) Others

- 14-1) Disassembling the module can cause permanent damage and should be strictly avoided.  
Please be careful since image retention may occur when a fixed pattern is displayed for a long time.

## 14-2)Indication of lot number

- ①Attached location of the label : See Fig.1 (Outline Dimensions).

- ②Indicated contents of the label



contents of lot No. the 1st figure ∴ production year (ex. 2005 : 5)  
 the 2nd figure ∴ production month 1,2,3,·····,9,X,Y,Z  
 the 3rd~7th figure ∴ serial No. 00001~  
 the 8th figure ∴ revision marks A,B,C··

## (15) Reliability Test Conditions for TFT-LCD Module

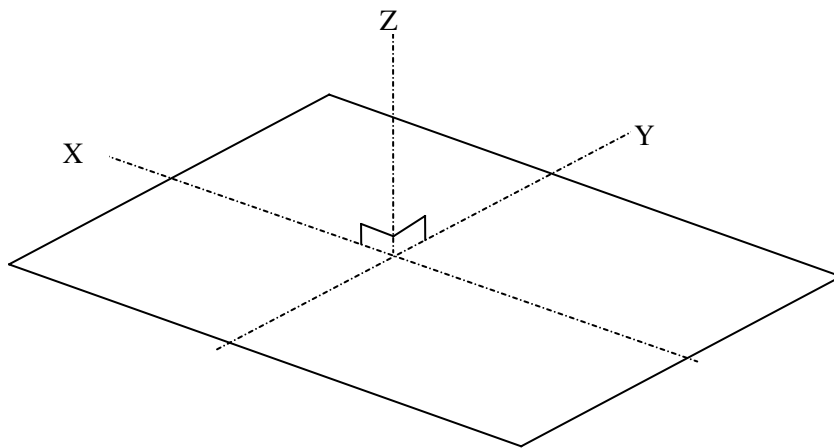
Table 15-1

No.	Test items	Test conditions
1	High temperature storage test	Ta= +85°C 240h
2	Low temperature storage test	Ta= -40°C 240h
3	High temperature and high humidity operating test	Tp=+50°C 90%RH 240h
4	High temperature operating test	Tp= +85°C 240h
5	Low temperature operating test	Ta= -30°C 240h
6	Electro static discharge test	$\pm 200V \cdot 200pF(0\Omega)$ 1 time for each terminals
7	Shock test	980m/s <sup>2</sup> · 6ms, $\pm X; \pm Y; \pm Z$ 3 times for each direction (JIS C0041, A-7 Condition C)
8	Vibration test	Frequency : 8~33.3Hz, Stroke : 1.3mm Frequency : 33.3Hz~400Hz, Acceleration : 28.4m/s <sup>2</sup> Sweep cycle : 15 minutes X,Z 2 hours for each directions, 4 hours for Y direction (total 8 hours) (JIS D1601)
9	Heat shock test	Ta= -30°C ~ +85°C / 200 cycles (0.5h) (0.5h)

【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.

X,Y,Z directions are shown as follows:



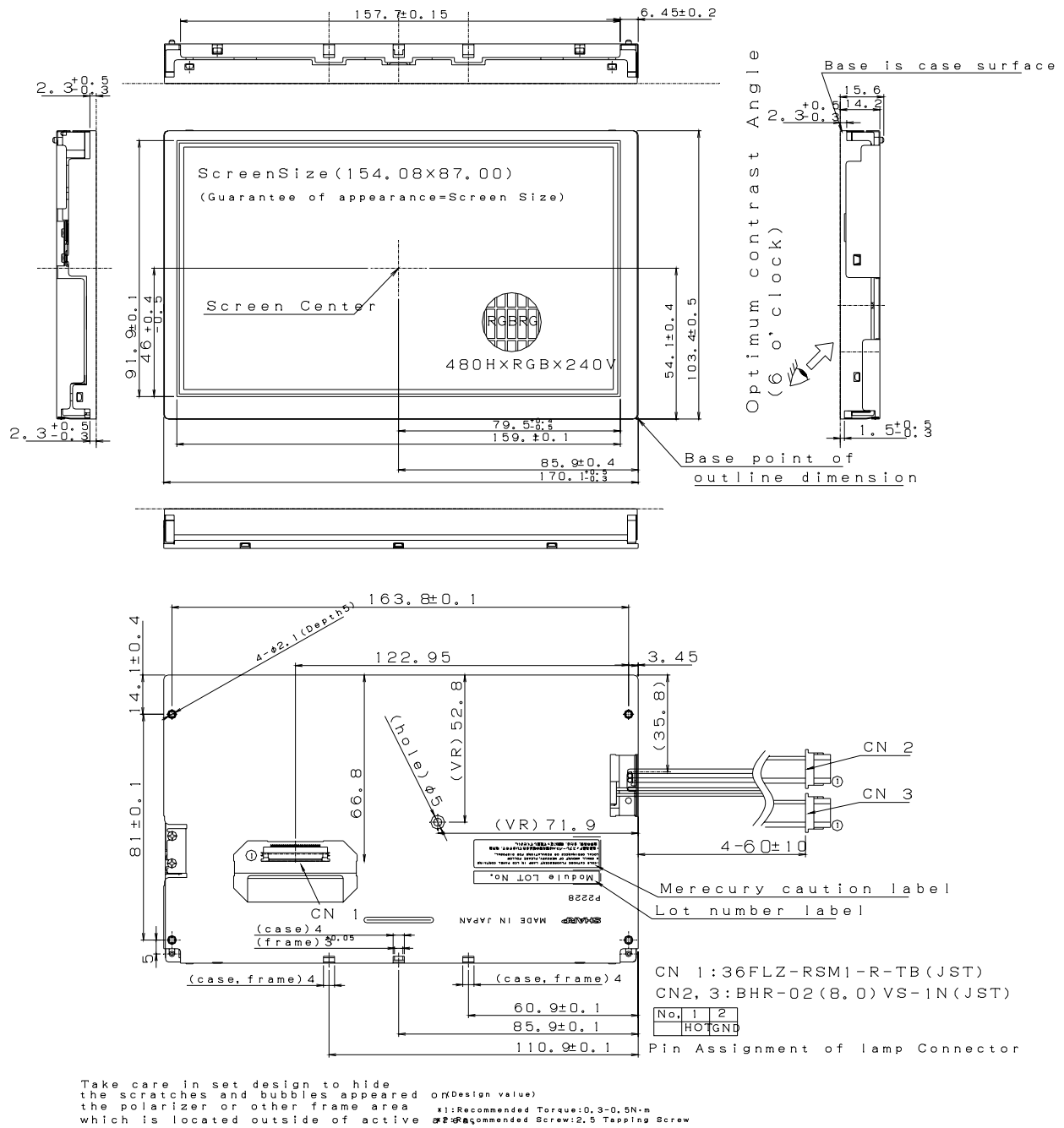


Fig.1 Module Construction

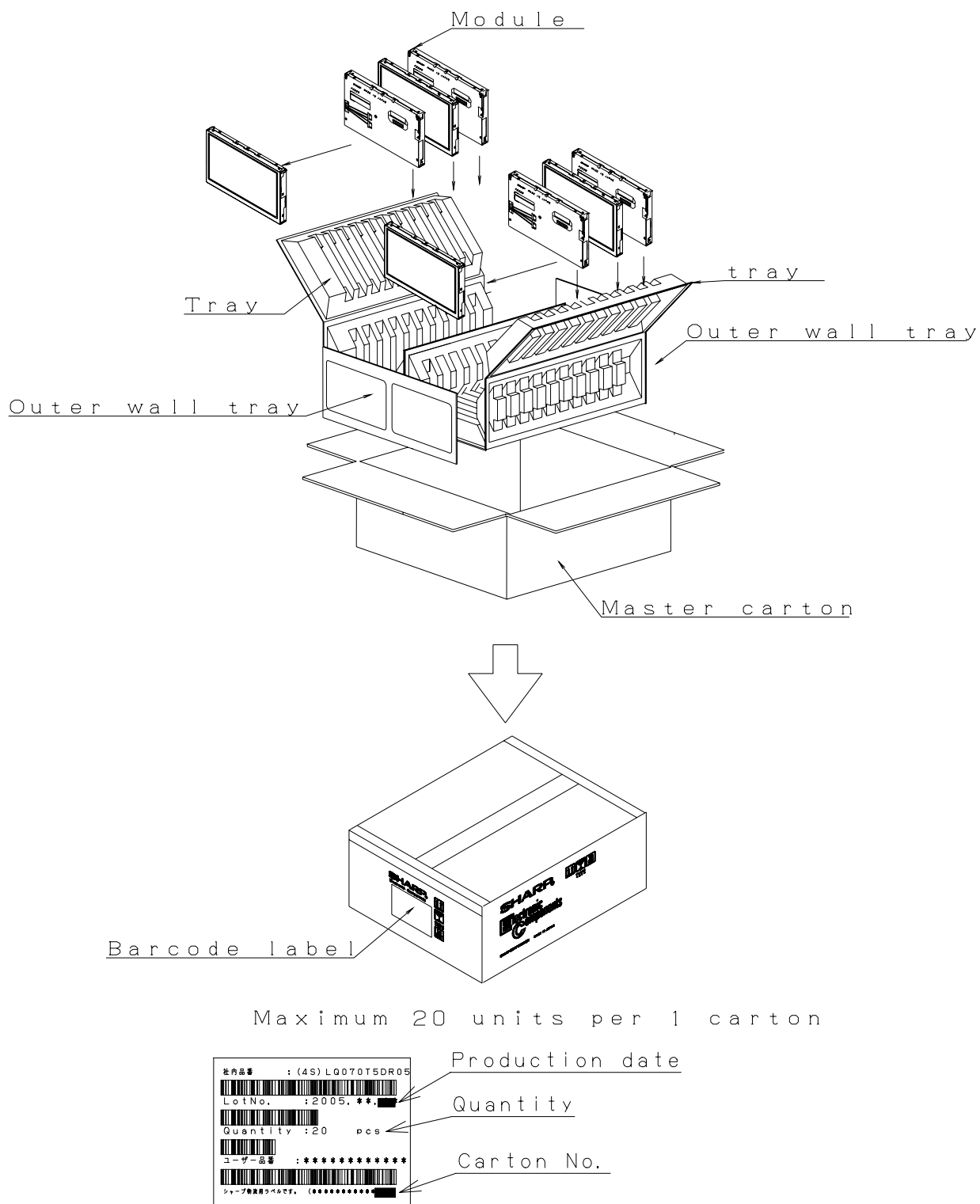


Fig.2 Packing Form

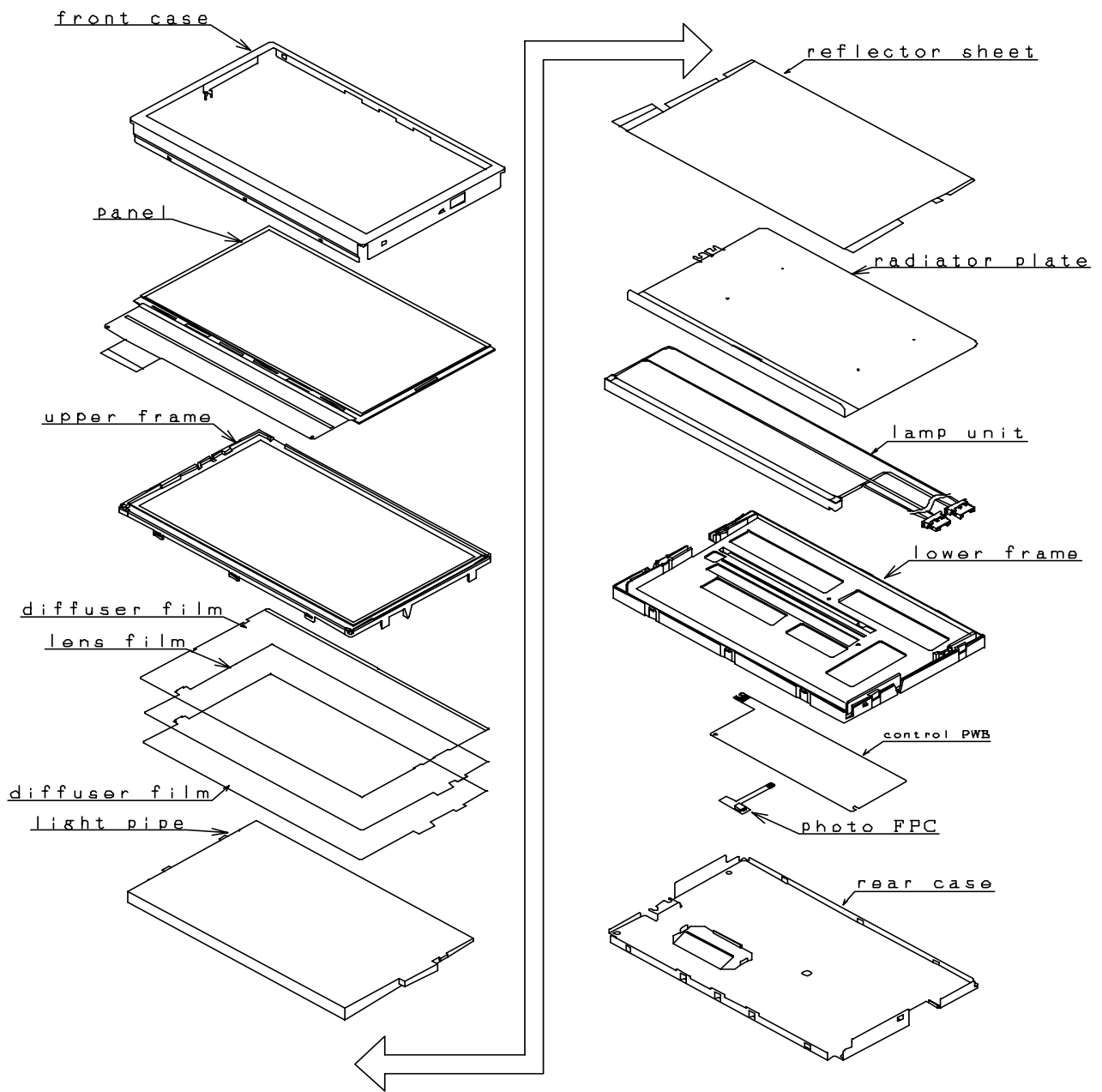


Fig.3 STRUCTURE OF THE MODULE