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DEVICE SPECIFICATION FOR  
**TFT-LCD Module**  
 MODEL No.  
**LQ085Y3DG18**

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

CUSTOMER'S APPROVAL

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## 1 Applicable TFT-LCD module

This specification applies to the color TFT-LCD module, LQ085Y3DG18

## 2 Overview

This module is a color active matrix transmissive LCD module incorporating amorphous silicon TFT (Thin Film Transistor).

It is composed of a color TFT-LCD panel, driver ICs, control circuit PWB and a backlight unit. Graphics and texts can be displayed on a 800 x 480 x RGB dots panel with 262,144 colors by feeding 18 bit data signal (6bit/each of R,G,B), timing signals, +3.3V DC power supply for TFT-LCD and DC power supply for LED backlight.

(Note: Driving circuit for LED backlight is built in this module.)

- Fine images with stripe aligned 384,000 pixels on 8.5 inch diagonal screen.
- Color display capability of 262,144 colors with 18 bit data signal (6 bits for each RGB).
- Adapting a wide viewing angle technology.  
[Maximum contrast viewing angle: 12 o'clock direction]
- High contrast, thanks to active matrix drive system.
- AG (Anti Glare) polarizer are adopted for reducing reflection.
- Light and slim compact module achieved by (COG assemble technology.)
- Natural coloring reproducibility by employing normally-white-mode, which has good nature in coloring.
- These LCD modules have corresponded with the RoHS directive.

## 3 Mechanical Specifications

Items	Specifications	Unit
Display size (Diagonal)	21.6 (8.5")	cm
Active display area	184.8 (H) x 110.88 (V)	mm
Pixel format	800(H) x 480(V) x RGB	dot
	(1 pixel=R+G+B dots)	-
Pixel pitch	0.231[H] x 0.077[V]	mm
Pixel configuration	R,G,B horizontal stripe	-
LCD mode	Normally white	-
Dimension*	222.7(W) x 133.6(H) x 10.0(D)	mm
Mass	256 (TYP)	g

\* Protrusions are not included.

Fig.2 shows dimensions of the module.

## 4 Input Signal Assignment

### 4.1 TFT-LCD Panel driving section

CN1 Employed connector: FH52-50S-0.5SH (HIROSE ELECTRIC CO., LTD) 【Note 1】

Pin No.	Symbol	Function	Polarity
1	Test1	TEST terminal (Please be sure to connect this pin with ground)	
2	GND	Ground	
3	CK	Clock signal for sampling each data signal	
4	GND	Ground	
5	Test2	TEST terminal (Please be sure to connect this pin with ground)	
6	Test3	TEST terminal (Please be sure to open this pin )	
7	R0	RED data signal(LSB)	
8	R1	RED data signal	
9	R2	RED data signal	
10	GND	Ground	
11	R3	RED data signal	
12	R4	RED data signal	
13	R5	RED data signal(MSB)	
14	GND	Ground	
15	G0	GREEN data signal(LSB)	
16	G1	GREEN data signal	
17	G2	GREEN data signal	
18	GND	Ground	
19	G3	GREEN data signal	
20	G4	GREEN data signal	
21	G5	GREEN data signal(MSB)	
22	GND	Ground	
23	B0	BLUE data signal(LSB)	
24	B1	BLUE data signal	
25	B2	BLUE data signal	
26	GND	Ground	
27	B3	BLUE data signal	
28	B4	BLUE data signal	
29	B5	BLUE data signal(MSB)	
30	GND	Ground	
31	Test5	TEST terminal (Please be sure to open this pin)	
32	GND	Ground	
33	Test6	TEST terminal (Please be sure to open this pin)	
34	UD /LR	Selection signal for horizontal and vertical scanning direction	【Note 3】
35	ENAB	Data enable signal	【Note 2】
36	Test7	TEST terminal (Please be sure to open this pin )	
37	Vcc	+3.3V power supply	
38	Vcc	+3.3V power supply	
39	Test8	TEST terminal (Please be sure to connect this pin with Vcc)	
40	Vcc	+3.3V power supply	
41	GND	Ground for backlight	
42	GND	Ground for backlight	
43	GND	Ground for backlight	
44	GND	Ground for backlight	
45	V <sub>DD</sub>	Power supply for backlight	
46	V <sub>DD</sub>	Power supply for backlight	

4 7	V <sub>DD</sub>	Power supply for backlight	
4 8	V <sub>DD</sub>	Power supply for backlight	
4 9	XSTABY	ON/OFF control signal for backlight	
5 0	VBR	PWM signal for backlight dimming	

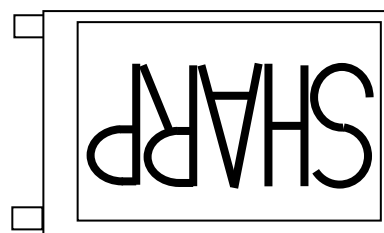
【Note 1】 Refer to the one that the dimension of FFC/FPC was recommended it of input connector.  
The terminal of FFC/FPC of input connector recommend gold or gold plating specification.  
Because point of contact with its is gold plating.

【Note 2】 The horizontal and vertical display position is designated and controlled by rising timing of ENAB signal. However if ENAB signal is fixed to “Low”, display is not able to display correct image. See chapter 7-1,2

【Note 3】 “L” or Open : Normally, “H” : Up-and-Down /Right-and-Left reversal



UD/LR = L or Open



UD/LR = H

## 5 Absolute Maximum Ratings

Parameter	Symbol	Condition	MIN	MAX	Unit	Remark
Supply voltage	V <sub>CC</sub>	Ta=25°C	0	+4.0	V	
	V <sub>DD</sub>	Ta=25°C	0	+27.0		
Input voltage	V <sub>I1</sub>	Ta=25°C	-0.3	V <sub>CC</sub> +0.3	V	【Note 1】
	V <sub>I2</sub>	Ta=25°C	-0.3	V <sub>DD</sub>		【Note 2】
Storage temperature	Tstg	-	-25	+75	°C	【Note 3,4,5】
Operating temperature	Topp	-	0 (Ambient)	+60 (Panel surface)	°C	

【Note 1】 CK, R0 ~ R5, G0 ~ G5, B0 ~ B5, ENAB, UD/LR

【Note 2】 XSTABY,VBR

【Note 3】 Humidity: 95%RH Max. (at Ta=<40°C)

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

Dew condensation must be avoided as electrical current leaks will occur, causing a degradation of performance specifications.

【Note 4】 The operating temperature guarantees only operation of the circuit. For contrast, response time and other factors related to display quality, judgment is done using the ambient temperature Ta=+25°C.

【Note 5】 Take care not to overrun ratings above.

6 Electrical characteristics

6.1 TFT-LCD Panel driving section

Ta=25°C

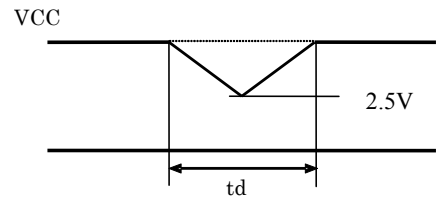
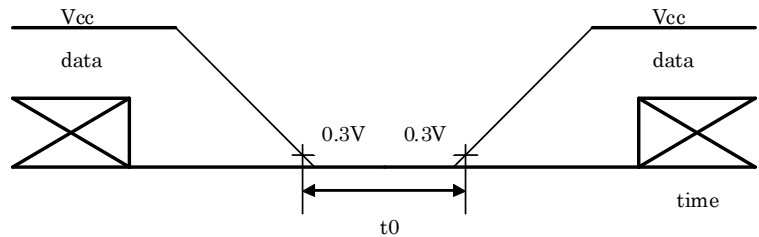
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Supply voltage	Vcc	+3.0	+3.3	+3.6	V	[Note1]
Current dissipation	Icc	-	77	130	mA	Vcc=3.3V [Note2]
Input voltage ("Low" state)	V <sub>IL</sub>	0	-	0.3 × Vcc	V	[Note3]
Input voltage ("High" state)	V <sub>IH</sub>	0.7 × Vcc	-	Vcc	V	
Input leakage current (low)	I <sub>OL1</sub>	-1	-	1	μA	Vcc=0V [Note4]
	I <sub>OL2</sub>	-1	-	1	μA	Vcc=0V [Note5]
Input leakage current (High)	I <sub>OH1</sub>	-1	-	1	μA	Vcc=3.3V [Note4]
	I <sub>OH2</sub>	-	-	400	μA	Vcc=3.3V [Note5]

[Note1] Vcc turn-on/off conditions  
1.0s < t<sub>0</sub>

Vcc-dip conditions

- 1) At 2.5V ≤ Vcc  
td ≤ 10 ms
- 2) At Vcc < 2.5V

Vcc dip conditions should also follow the Vcc turn-on/off conditions

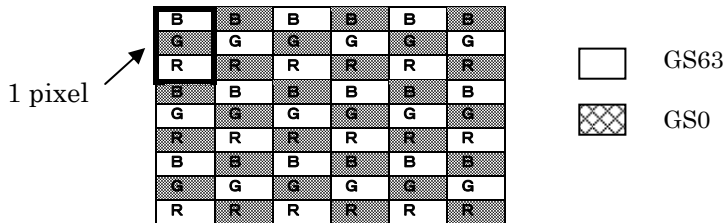


[Note2] Typical current situation:

Black screen (GS0)

Maximum current situation:

Checker screen which displays GS0, GS63 every 1dot.



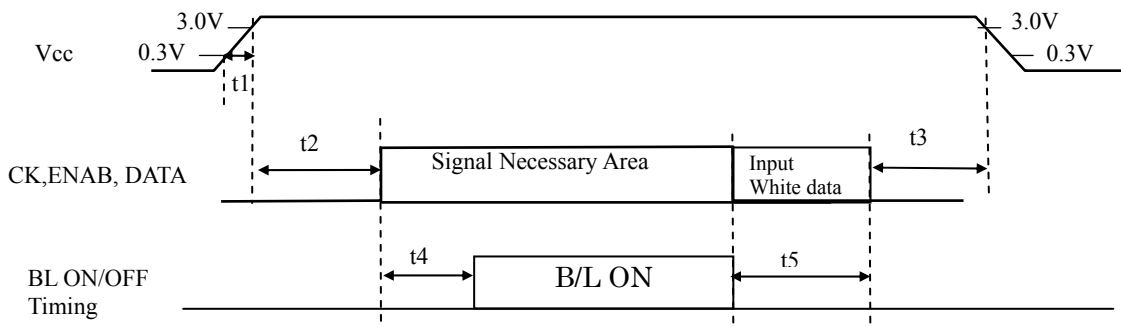
[Note3] CK, R0~R5, G0~G5, B0~B5, ENAB, UD/LR

[Note4] R0~R5, G0~G5, B0~B5, ENAB

[Note5] UD/LR

[Note6] When CK signal stops more than 1ms, VCC must be set to OFF and be reinputed by Vcc turn-on/off conditions .

6.2 Vcc turn-on/off conditions



- ⊙ Every signal is CMOS input, Hi-Z is prohibited when VCC is on level.
- ⊙ Input CK, ENAB, and DATA after it becomes regular amplitude and frequency.

It is recommended to consider some timing difference between CMOS input and Backlight input as shown above.

If the Backlight lights on before LCD starting, or if the Backlight is kept on after LCD stopping, the screen may look white for a moment or abnormal image may be displayed. This is caused by variation in output signal from timing generator at CMOS input on or off. It does not cause the damage to the LCD module.

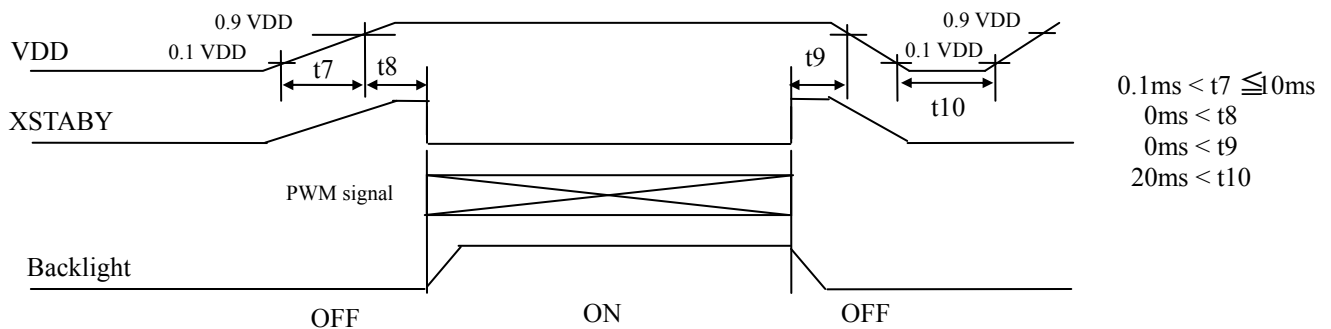
	Min.	Typ.	Max.	Unit
t1	0	-	10	ms
t2	2	-	100	ms
t3	0	-	100	ms
t4	11	-	-	flame
t5	3	-	-	flame

### 6.3 Backlight driving Section

Ta=25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Supply voltage	V <sub>DD</sub>	21.6	24.0	26.4	V	[Note1]
Current dissipation	I <sub>DD</sub>	-	160	240	mA	[Note2]
Permissive input ripple voltage	V <sub>RP_BL</sub>	-	-	200	mVp-p	
XSTABY voltage	OFF	V <sub>IH_XST</sub>	-	OPEN	-	[Note3]
	ON	V <sub>IL_XST</sub>	0	-	8.1	
VBR voltage	OFF	V <sub>IH_VBR</sub>	-	OPEN	-	[Note4]
	ON	V <sub>IL_VBR</sub>	0	-	11.6	
PWM frequency	f <sub>PWM</sub>	300	-	32,000	Hz	[Note5]
PWM duty ratio	D <sub>PWM</sub>	30	-	100	%	
Life time	L	-	25,000 (Module)	-	h	Reference value [Note6]

[Note1] ON-OFF conditions for BL supply voltage



[Note2] V<sub>DD</sub>= +24V, PWM duty ratio = 100%

[Note3] XSTABY terminal: Open collector input (See Fig.4) Low: ON, Open: OFF

[Note4] VBR terminal: Open collector input (See Fig.4) Low: ON, Open: OFF

[Note5] PWM Dimmer signal

$$f_{\text{PWM}} = 1/t_{14}, D_{\text{PWM}} = t_{13}/t_{14}$$

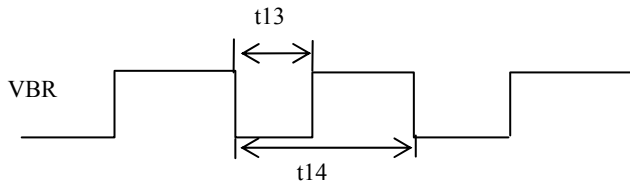
PWM duty 0% : Min. Luminance

PWM duty 100% : Max. Luminance

Luminance changes in proportion to the duty ratio. ( $t_{13} \geq 10\mu\text{s}$ )

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





[Note6] Luminance becomes 50% of an initial value. (Ta=25°C, PWM duty = 100%)

[Note7] When PWM signal is set "OPEN" more than 10ms, please turn off V<sub>DD</sub>(24V).

If PWM signal is input without reset of V<sub>DD</sub>, Softstart function of LED driving circuit is invalid and inrush current may occur.

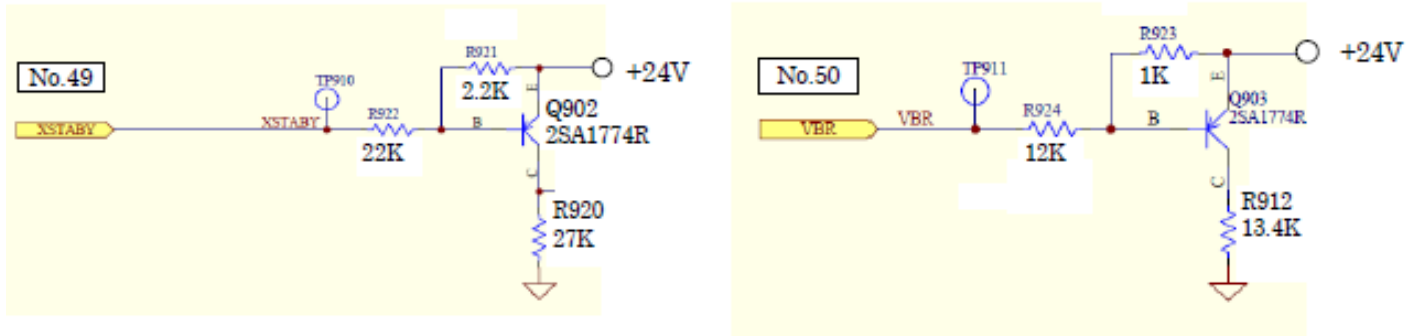


Fig.4 Input parts of control signal for LED backlight

## 7 Timing Characteristics of Input Signals

Timing diagrams of input signal are shown in Fig.1.

### 7.1 Timing Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
Clock	Frequency	1/Tc	31.95	33.26	34.6	MHz	
	“High” time	Tch	8	-	-	ns	
	“Low” time	Tcl	8	-	-	ns	
Data	Setup time	Tds	6	-	-	ns	
	Hold time	Tdh	6	-	-	ns	
Horizontal sync. signal	Frequency	TH	31.45	31.75	32.05	$\mu$ s	
			1024	1056	1088	clock	
Vertical sync. signal	Frequency	TV	520	525	530	line	
Horizontal display period		THd	-	800	-	clock	
Vertical display period		TVd	-	480	-	line	

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

### 7.2 Horizontal Display Start Position

The horizontal display position is controlled by rising timing of ENAB signal.

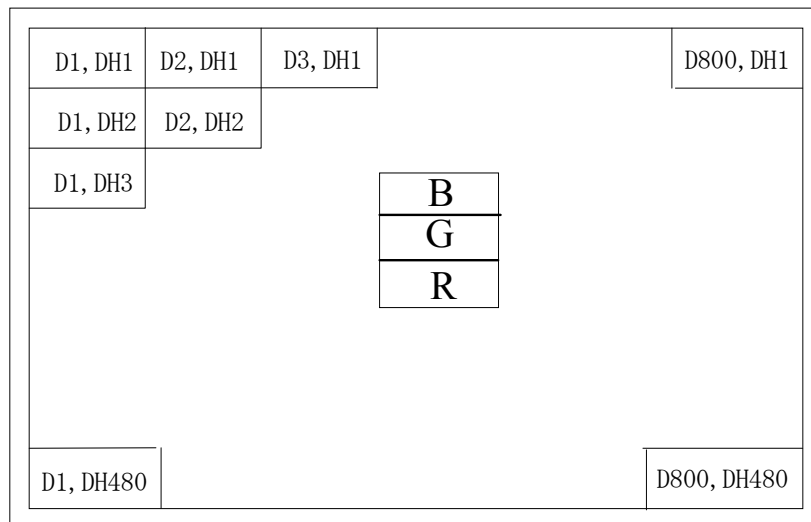
Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
ENAB signal	Setup time	Tes	5	-	Tc-8	ns	
	Pulse width	Tep	-	800	-	clock	

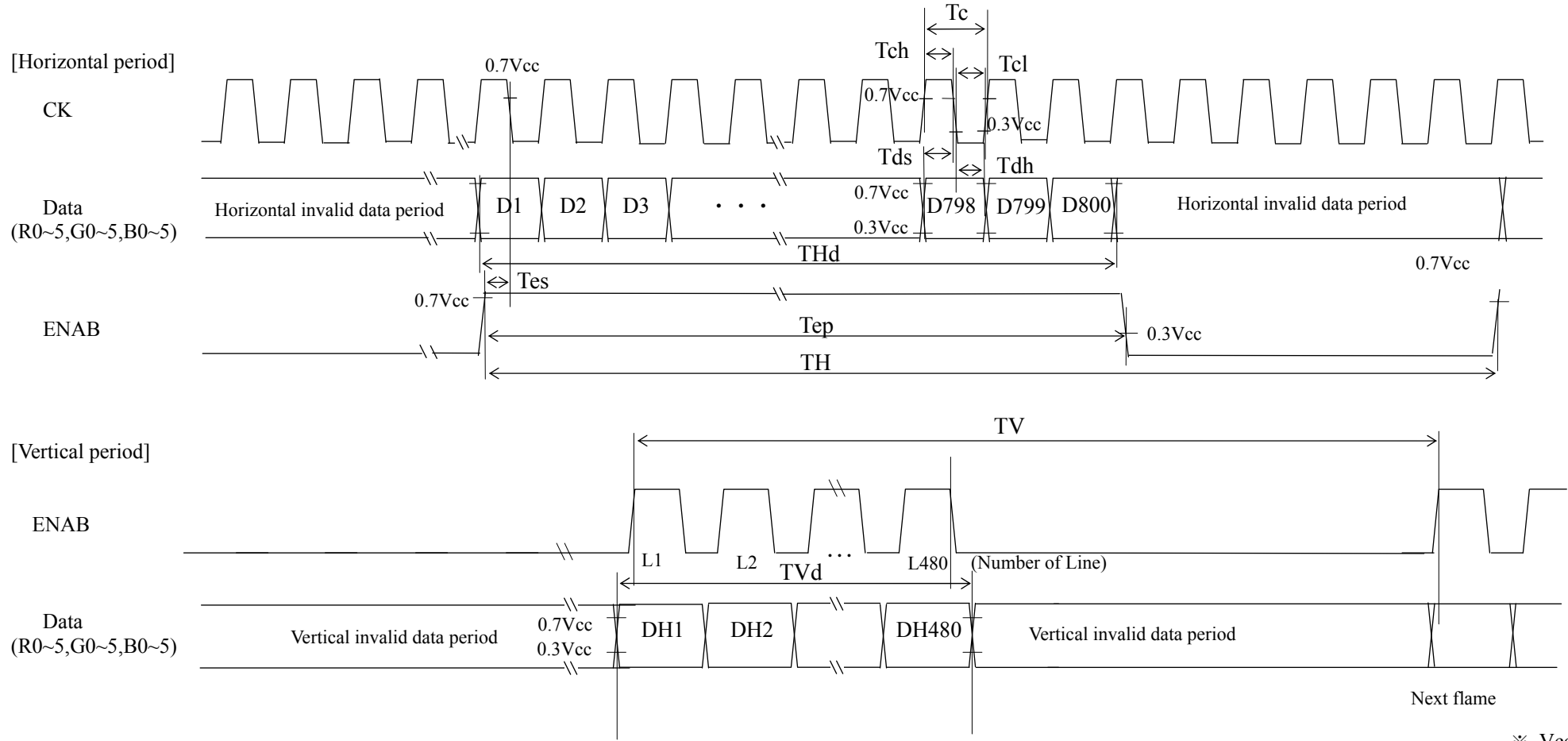
Note) ENAB signal must be kept to “low” level during the vertical invalid data period.

### 7.3 Input Data Signals and Display Position on the screen

↑ UP

Display position of input data (H,V)





※  $V_{cc}=3.3V$

Fig 1. Input signal waveforms

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

	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 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 specification [Initial characteristics]

Ta=25°C, Vcc=3.3V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle Range	Horizontal	θ21,θ22	CR≥10	70	80	-	° (deg.)	[Note9-1,4]
	Vertical	θ11		50	60	-	° (deg.)	
		θ12		60	70	-	° (deg.)	
Contrast ratio		CR max	Maximum viewing angle	300	450	-		[Note9-2,4]
Response time	Rise	Tr	θ = 0°	-	8	20	ms	[Note9-3,4]
	Fall	Td		-	21	45	ms	
Chromaticity of white		x	θ = 0°	0.260	0.310	0.360		[Note9-4]
		y		0.280	0.330	0.380		
Luminance of white		L		150	250	-	cd/m <sup>2</sup>	[Note9-4]

※ The measurement shall be executed 30 minutes after lighting at rating. Condition: PWM=100%  
The optical characteristics shall be measured in a dark room or equivalent.

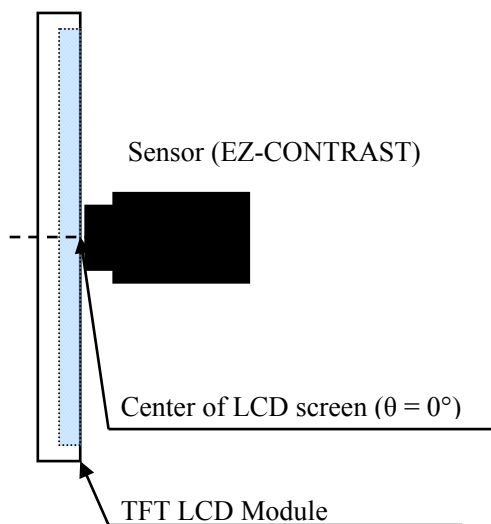


Fig.9-1 Measuring setup for Viewing angle

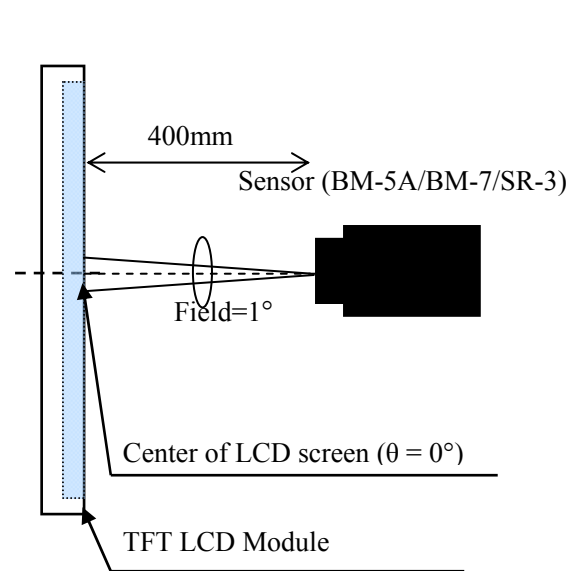
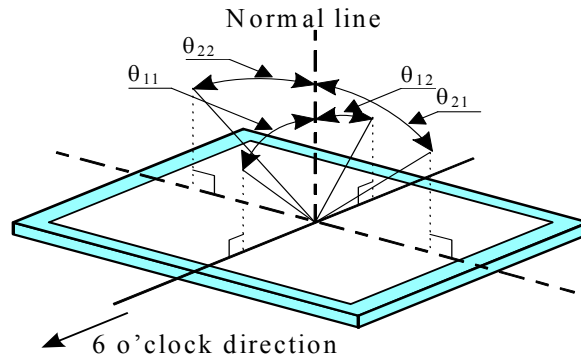


Fig.9-2 Measuring setup for Luminance, Chromaticity and Response time  
(BM-5A/7 is used for Response time, SR-3 is for Luminance, Contrast and Chromaticity)

[Note9-1] Definitions of viewing angle range:



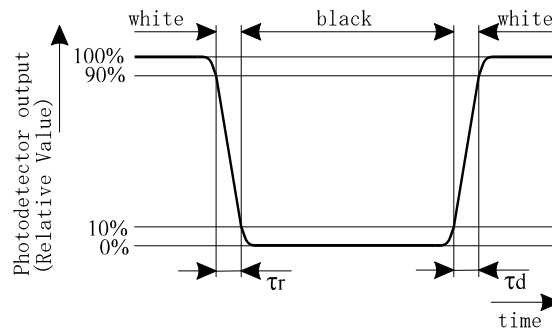
[Note9-2] Definition of contrast ratio:

The contrast ratio is defined as the following.

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

[Note9-3] Definition of response time:

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



[Note9-4] This parameter is measured at the center of the screen.

## 10 Display Qualities

Please refer to the Outgoing Inspection Standard.

## 11 Handling Instruction

- a) Be sure to turn off the power supply when inserting or disconnecting the cable.
- b) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.
- c) Since the front 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 requirements in handling components.
- h) Since there is a circuit board in the module back, stress is not added at the time of a design assembly. Please make it like. If stress is added, there is a possibility that circuit parts may be damaged.
- i) Laminate film is attached to the module surface to prevent it from being scratched. Peel the sheet off slowly just before the use with strict attention to electrostatic charges. Ionized air shall be blown over during the action. Blow off the 'dust' on the polarizer by using an ionized nitrogen gun, etc. Working under the following environments is desirable.
  - All workers wear conductive shoes, conductive clothes, conductive fingerstalls and grounding belts without fail.
  - Use Ionized blower for electrostatic removal, and peel of the protect sheet with a constant speed.  
(Peeling of it at over 2 seconds)
- j) 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.
- k) Do not expose the LCD panel to direct sunlight. Lightproof shade etc. should be attached when LCD panel is used under such environment
- l) Connect GND to frame of module to stabilize against EMI and external noise.
- m) If stored at the temperatures lower than the rated storage temperature, the LC may freeze and it may cause LCD panel damage. If storage temperature exceeds the specified rating, the molecular orientation of the LC may change to that of a liquid, and they may not revert to their original state. Store the module in normal room temperature.
- n) When handling LCD modules and assembling them into cabinets, please be avoid 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.
- o) Liquid crystal contained in the panel may leak if the LCD is broken. Rinse it as soon as possible if it gets inside your eye or mouth by mistake.
- p) Never dismantle the module, because it will cause failure.
- q) Be careful when using it for long time with fixed pattern display as it may cause afterimage.  
(Please use a screen saver etc., in order to avoid an afterimage.)
- r) If a minute particle enters in the module and adheres to an optical material, it may cause display non-uniformity issue, etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.
- s) An abnormal display by changing in quality of the polarizer might occur regardless of contact or no contact to the polarizer, because of epoxy resin (amine system curing agent) that comes out from the material and the packaging material used for the set side, the silicon adhesive (dealcoholization system and oxime system), and the tray blowing agents (azo-compound), etc. Please confirm adaptability with your employed material.
- t) Take enough shielding countermeasure not to interfere to peripheral electronic device.
- u) The LED used for this product is very sensitive to the temperature.  
Luminance decreases rapidly when it is used for a long time or repeatedly under the environment of the low temperature or the module is being cooled.  
Please avoid the continuous or repeating use of it under such an environment.  
Please consult our company when it is used under the environment like the above mentioned.
- v) Do not put a laminate film on LCD module, after peeling of the original one. If you put on it, it may cause discoloration or spots because of the occurrence of air gaps between the polarizer and the film.

## 12 Packing Form

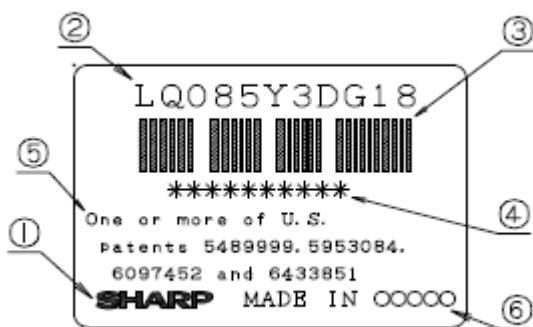
12.1 Fig.3 shows packaging form.

12.2 Carton stock conditions

- a) Maximum number of Carton being stuck: Max. 6 cartons  
 b) Maximum number of product contained: 20 Unit  
 c) Carton size: 516mm(W) × 240mm(H) × 354mm(D)  
 d) Total mass (for 20Unit): Approximately 9 kg  
 e) Carton stock environment:
- 1) Temperature: 0 ~ 40°C
  - 2) Relative humidity: below 95%  
 Please refer below as a mean value of the environmental conditions.  
 Summer time 20 ~ 35°C, below 85%RH  
 Winter time 5 ~ 15°C, below 85%RH  
 Please maintain within 240 hours of accumulated length of storage time, with conditions of 40°C, 95%RH.
  - 3) Direct sun light:  
 Please keep the product in a dark room or cover the product to protect from direct sun light.
  - 4) Atmospheric condition:  
 Please refrain from keeping the product with possible corrosive gas or volatile flux.
  - 5) Prevention of dew:  
 \* Please store the product carton either on a wooden pallet or a stand / rack to prevent dew.  
 Do not place directly on the floor. In addition, to obtain moderate ventilation in between the pallet's top and bottom surfaces, pile the cartons up in a single direction and in order.  
 \* Please place the product cartons away from the strage wall.  
 \* Please maintain the storage area with an appropriate ventilation. It is recommendable to furnish the storage area with equipments such as ventilation systems.  
 \* Please maintain the ambient temperature within the range of natural environmental fluctuation
  - 6) Period: Less than 1 year in the above condition.

## 13 Marking of product name

13.1. Module label indication



- ① SHARP Logo
- ② SHARP model number
- ③ Lot number bar-code
- ④ Lot number
- ⑤ Patent
- ⑥ Product country

④ Lot number



- Serial No.
- Assembly site code
- SHARP handling code
- Production month
- Production year



## 14 Reliability Test Items

[Note] Temperature condition is based on operating temperature condition of absolute maximum ratings.

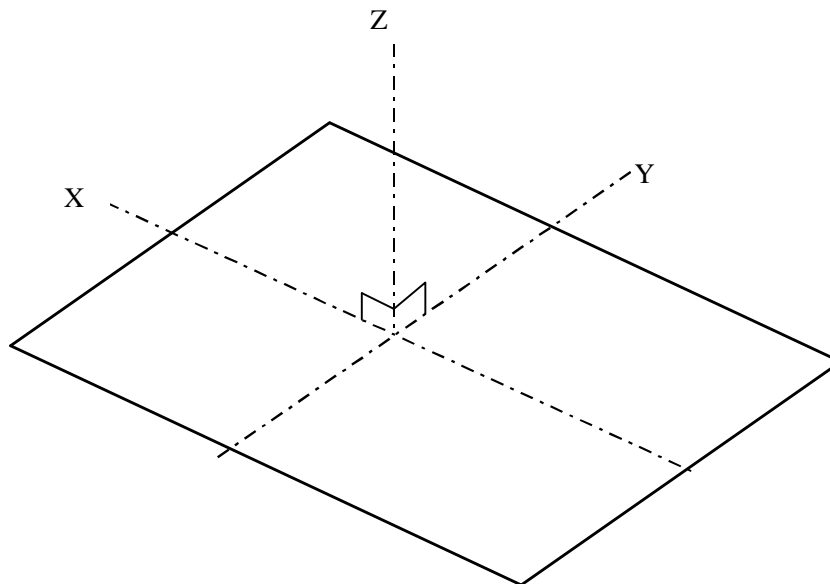
No.	Test parameter	Conditions
1	High temperature storage test	Leaves the module at $T_a=+75^{\circ}\text{C}$ for 240h
2	Low temperature storage test	Leaves the module at $T_a=-25^{\circ}\text{C}$ for 240h
3	High temperature & high humidity operation test	Operates the module at $T_p=+40^{\circ}\text{C}$ ; 90~95%RH for 240h (No condensation)
4	High temperature operation test	Operates the module with $+60^{\circ}\text{C}$ at panel surface for 240h
5	Low temperature operation test	Operates the module at $T_a=0^{\circ}\text{C}$ for 240h
6	Strength against ESD	$\pm 200\text{V} \cdot 200\text{pF}$ [ $0\ \Omega$ ] one time for each terminal
7	Shock test (non- operating)	Max. acceleration : $490\text{m/s}^2$ Pulse width : 11ms, half sine wave Direction : $\pm X, \pm Y, \pm Z$ once for each direction.
8	Vibration test (non- operating)	Frequency : 10~57Hz/Vibration width (one side):0.076mm : 57~500Hz/ acceleration: $9.8\text{m/s}^2$ Sweep time : 11 minutes Test period :1 hour for each direction of X,Y,Z (total 3 hours)
9	Thermal shock test (non- operating)	$-25^{\circ}\text{C} \sim +75^{\circ}\text{C}$ , 50 cycle [0.5h] [0.5h]

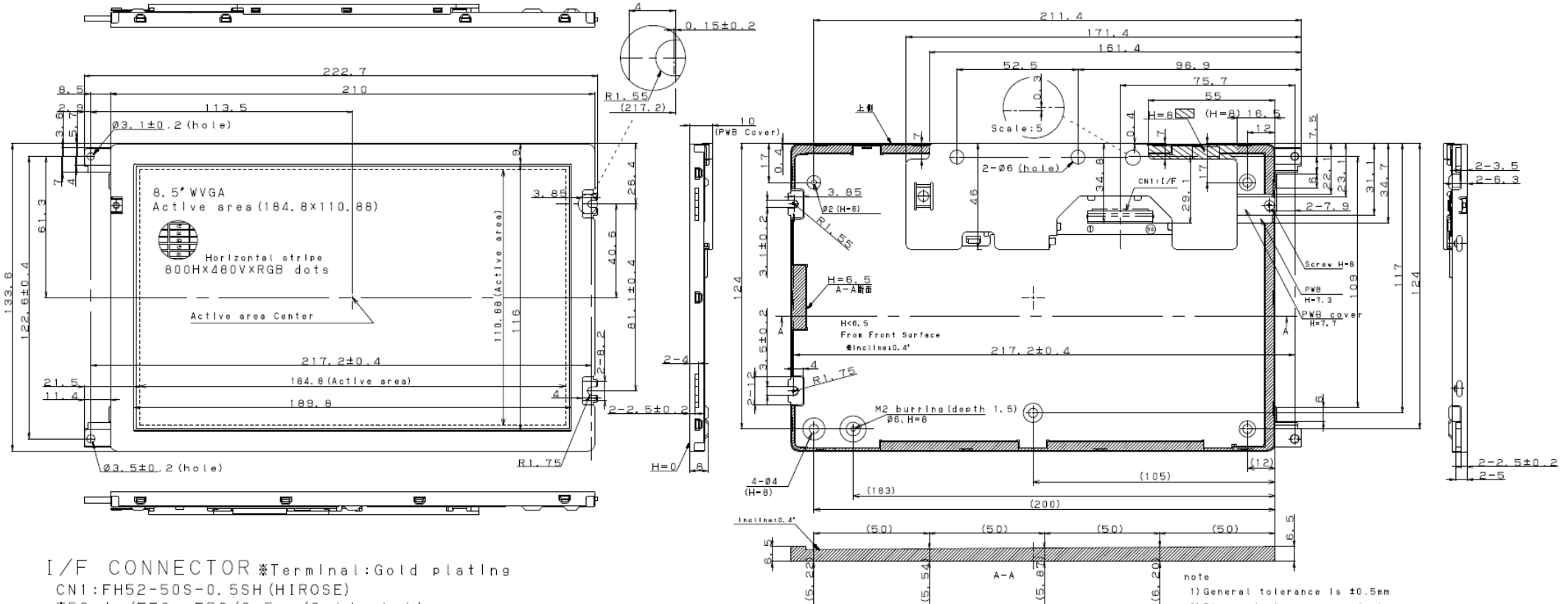
$T_a$ : Ambient temperature ,  $T_p$ : panel surface temperature

## [Result Evaluation Criteria]

Under the display quality test conditions with normal operation state, these shall be no change which may affect practical display function. (normal operation state : Temperature: $15 \sim 35^{\circ}\text{C}$ , Humidity: $45 \sim 75\%$ , Atmospheric pressure: $86 \sim 106\text{kpa}$ )

[Note] The directions of X, Y, Z are defined as below:





I/F CONNECTOR \*Terminal: Gold plating  
 CN1: FH52-50S-0.5SH (HIROSE)  
 \*50 pin/FFC or FPC/0.5mm/Gold plating

pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Test1	GND	GND	CK	GND	Test2	Test3	R0	R1	R2	GND	R3	R4	R5	GND	G0	G1	G2
pin	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
	GND	G3	G4	G5	GND	B0	B1	B2	GND	B3	B4	B5	GND	(Test5)	GND	(Test6)	UD/LR
pin	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	
	ENAB	(Test7)	VCC	VCC	(Test8)	VCC	GND	GND	GND	GND	VDD	VDD	VDD	VDD	XSTABY	VBR	

Fig.2 Outline Dimensions

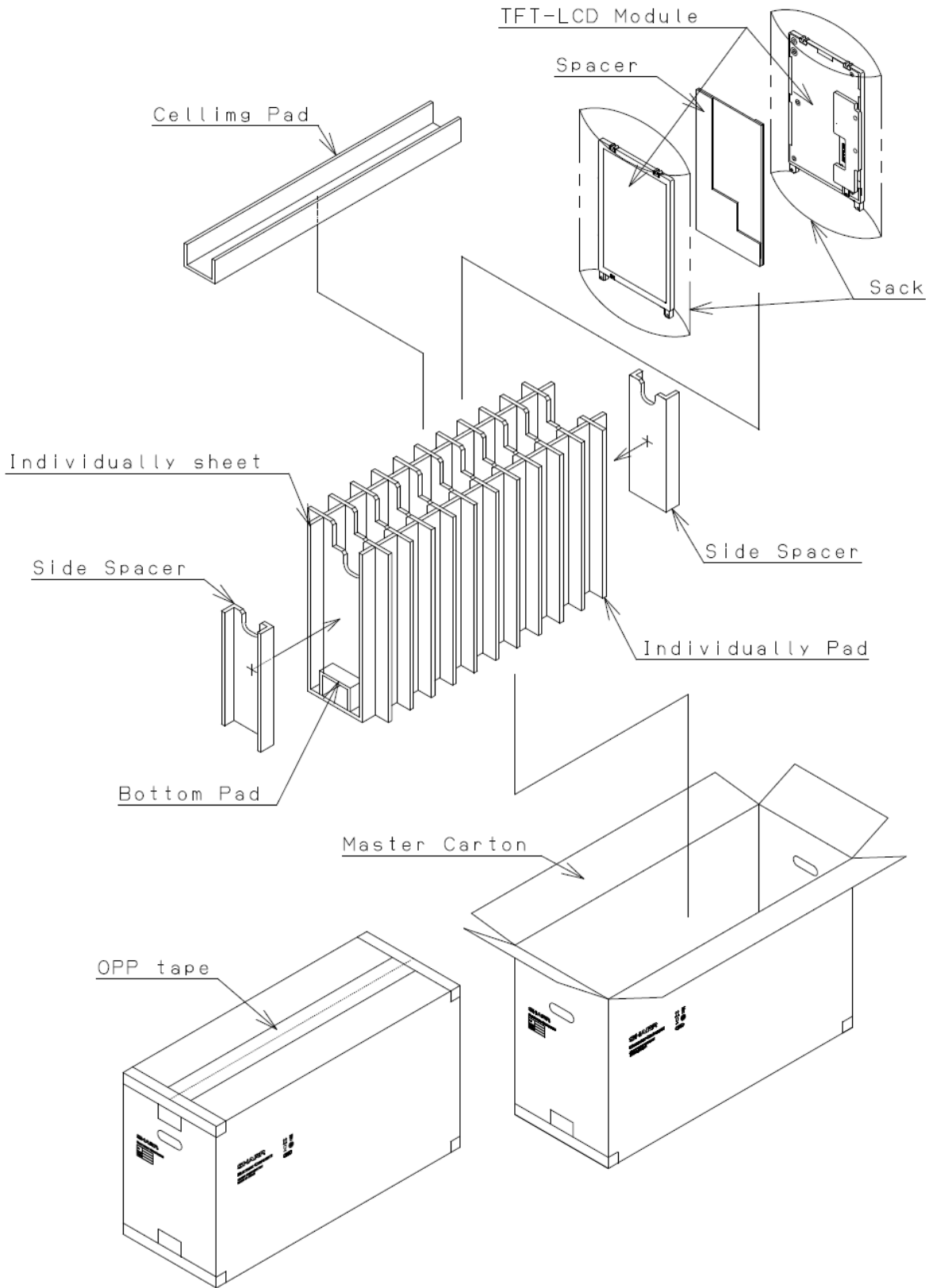


Fig.3 Packing form chart