Technical Document

LCD Specification

LCD Group

LQ085Y3DG06 LCD Module

Product Specification
March 2008

Wide-VGA LCD module with
260 nits brightness and 250:1contrast.

Full Specifications Listing

SHARP

PREPARED BY : DATE	SHARP	SPEC No. LD-20228A
APPROVED BY : DATE		FILE No.
		ISSUE : Mar. 12. 2008
	MOBILE LIQUID CRYSTAL DISPLAY GROUP SHARP CORPORATION	PAGE : 18 pages
	SPECIFICATION	APPLICABLE GROUP MOBILE LIQUID CRYSTAL DISPLAY GROUP

DEVICE SPECIFICATION FOR

TFT-LCD Module

MODEL No.

LQ085Y3DG06

These parts have corresponded with the RoHS directive.

☐ CUSTOMER'S APPROVAL

BY _____

BY K. Shiono

K. Shiono
General manager
ENGINEERING DEPARTMENT
MOBILE LIQUID CRYSTAL DISPLAY DIVISION Ⅲ
MOBILE LIQUID CRYSTAL DISPLAY GROUP
SHARP CORPORATION

RECORDS OF REVISION

LQ085Y3DG06

SPEC No.	DATE	REVISED No.	PAGE	SUMMARY	NOTE
LD-20228A	Mar.13.2008	-	-	-	1 st Issue

NOTICE

The application circuit examples in this publication are provided to explain the representative applications of SHARP's devices and are not intended to guarantee any circuit design or permit any industrial property right or other rights to be executed. SHARP takes no responsibility for any problems related to any industrial property right or a third party resulting from the use of SHARP's devices, except for those resulting directly from device manufacturing processes.

In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that occur in equipment using any of SHARP's devices, shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP's device.

SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structures and other contents described herein at any time without notice in order to improve design or reliability. Contact SHARP in order to obtain the latest specification sheets before using any SHARP's device. Manufacturing locations are also subject to change without notice.

Observe the following points when using any device in this publication. SHARP takes no responsibility for damage caused by improper use of the devices.

The devices in this publication are designed for general electronic equipment use.

The appropriate design measures should be taken to ensure reliability and safety when SHARP's devices are used for equipment such as:

・Transportation control and safety equipment(i.e.,aircraft, trains, automobiles, etc.)

・Traffic signals・Gas leakage sensor breakers ・Alarm equipment・Various safety devices etc.

SHARP's devices shall not be used for equipment that requires extremely high level of reliability, such as:

・Military and space applications ・Nuclear power control equipment

・Medical equipment for life support

Contact a SHARP representative, in advance, when intending to use SHARP’s devices for any “specific” applications other than those recommended by SHARP.

Contact and consult with a SHARP representative if there are any questions about the contents of this publication.

1 Applicable TFT-LCD module

This technical literature applies to the color TFT-LCD module, LQ085Y3DG06.

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 circuits and power supply circuitry and a backlight unit. Graphics and texts can be displayed on a 800 x RGB x 480 dots panel with 262,144 colors by feeding 18 bit data signal (6bit/each of R,G,B), 4(four) timing signals, +3.3V DC power supply for TFT-LCD and AC power supply for backlight.

(Note: Backlight-driving DC/AC inverter is not 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. [best viewing angle: 12 o'clock direction]
- High contrast, thanks to active matrix drive system.
- AG (Anti Glare) polarizing filter.
- 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 RGB x 480(V)	dot
	(1 pixel=R+G+B dots)	-
Dot pitch	0.077[H] x 0.231[V]	mm
Pixel configuration	R,G,B vertical stripe	-
LCD mode	Normally white	-
Dimension*	212(W) x 134 (H) x 12.5(D)	mm
Mass	370(TYP)	g

*. Protrusion such as backlight harness and positioning boss are not included.

Fig.1 shows dimensions of the module.

4 Input Signal Assignment

4.1 TFT-LCD Panel driving section

CN1 Employed connector: FH12-40S-0.5SH(55) (HIROSE ELECTRIC CO.,LTD.) Terminal :Au plating 【Note 1】

Pin No.	Symbol	Function	Polarity
1	Test1	TEST1(Please be sure to connect 1pin with ground)	
2	GND	Ground	
3	CK	Clock signal for sampling each data signal	
4	GND	Ground	
5	Test2	TEST2(Please be sure to connect 5pin with ground)	
6	Test3	TEST3 (Please be sure to open 6pin)	
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	Hsync	Horizontal synchronous signal	Low active
32	GND	Ground	
33	Vsync	Vertical synchronous signal	Low active
34	FGND	Frame Ground	【Note 2】
35	ENAB	Data enable signal (signal to settle the horizontal display position)	【Note 3】
36	N.C.	No Connect	
37	Vcc	+3.3V power supply	
38	Vcc	+3.3V power supply	
39	N.C.	No Connect	
40	Vcc	+3.3V power supply	

【Note 1】Refer to the one that the size 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 specification.

【Note 2】A frame ground of the 34pin is connected to front and back bezel electrically,
but other grand terminals(2pin,4pin,・・・,32pin) are not connected to it.

【Note 3】The horizontal display location is designated and controlled by rising timing of ENAB signal. However if ENAB signal is fixed to "Low", display location is designated by the default setting in the module. (Don't use the module by fixing ENAB to "High") …..See: Chapter 7-2

4.2 Backlight section

CN2 Employed connector: BHR-02(8.0)VS-1N (JST), Adapted connector: SM02(8.0)B-BHS-1N-TB (JST)

Pin no.	Symbol	Function	Collar of FL cable
1	V_{HIGH}	input terminal (Hi Voltage Side)	Pink
2	V_{LOW}	input terminal (Low Voltage Side)	White

【Note】

Please connect Low Voltage Side of a lamp input terminal (V_{LOW}) to input GND of a DC/AC inverter circuit, in the case of use in GND electrical potential.

5 Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings	Unit	Remark
Input voltage	V_I	Ta=25°C	-0.3 ~ + Vcc+0.3	V	【Note 1】
Supply voltage	Vcc	Ta=25°C	0 ~ +4.6	V	-
Storage temperature	Tstg	-	- 25 ~ +75	°C	【Note 2】
Operating temperature (Panel surface)	Topp	-	0 ~ +75	°C	

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

【Note 2】No condensation.

It may stop acting normally, when it operates it for a long time with having condensed.

6 Electrical characteristics

6.1 TFT-LCD Panel driving section

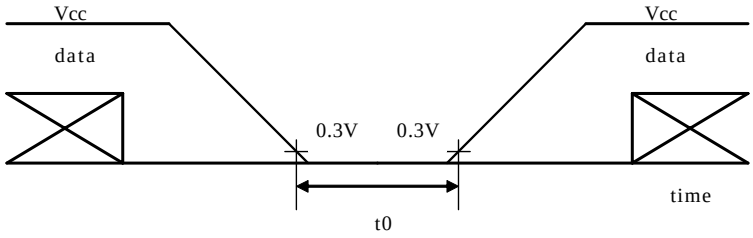
Ta=25℃

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Supply voltage	Vcc	+3.0	+3.3	+3.6	V	[Note1]
Current dissipation	Icc	-	300	400	mA	Vcc=3.3V [Note2]
Permission input ripple voltage	V_{RL}	-	-	100	mVp-p	
Input voltage (“Low” state)	V_{IL}	0	-	0.2*Vcc	V	[Note3]
Input voltage (“High” state)	V_{IH}	0.8*Vcc	-	Vcc	V	
Input leakage current(low)	$\|I_{OL1}\|$	-	-	4.0	μA	Vcc=0V [Note4]
Input leakage current(High)	$\|I_{OH1}\|$	-	-	4.0	μA	Vcc=3.3V [Note4]

[Note1]

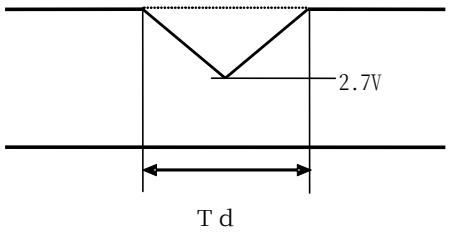
Vcc turn-on/off conditions

1s < t0



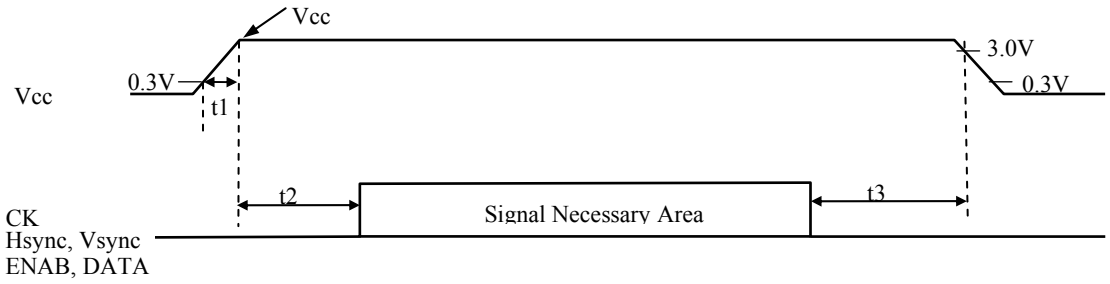
Vcc-dip conditions

1) 2.7V ≦ Vcc
   Td ≦ 10ms
2) Vcc < 2.7V
   Vcc-dip conditions should also follow the On-off conditions for supply voltage



[Note2] Current dissipation : When Black pattern is displayed.
[Note3] CK, R0~R5, G0~G5, B0~B5, Hsync, Vsync, ENAB
[Note4] R0~R5, G0~G5, B0~B5, Hsync, Vsync, ENAB

6.2 Vcc turn-on/off conditions



◎ Every Signal is CMOS Input, Hi-Z is prohibited when VCC is on level.
◎ Input CK, Hsync, Vsync, ENAB, and DATA after it becomes regular amplitude and a frequency.

	Min.	Typ.	Max.	Unit
t1	0	-	10	ms
t2	50	-	-	ms
t3	0	-	-	ms

6.3 Backlight driving Section Ta=25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Lamp voltage	VL	-	960	-	Vrms	IL=5.0mArms
Lamp current	IL	4.0	5.0	6.0	mArms	steady state [Note6-1]
Lamp frequency	fL	35	55	80	kHz	
Kick off voltage [Note6-2]	VS	-	-	1660	Vrms	Ta=25°C
		-	-	2325		Ta=0°C
Lamp life time Ta=25℃		25,000	-	-	hour	Continuation [Note6-3] [Note6-4]

(Inverter: HARISON TOSHIBA LIGHTING CORPORATION Type HIU-766(13.5pF, 52kHz) is used.)

Caution: 1) When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of the backlight and the inverter (miss-lighting, flicker, etc.) never occur. When you confirm it, the module should be operated in the same condition as it is installed in your instrument.

2) Use the inverter providing symmetrical sine-wave in positive/negative polarity with no spike.
The performance of the backlight, for example life time or brightness, is much influenced by the characteristics of the DC-AC inverter for the lamp. When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of the backlight and the inverter (miss-lighting, flicker, etc.) never occur. when you confirm it, the module should be operated in the same condition as it is installed in your instrument.
Be sure to use a back light power supply with the safety protection circuit such as the detection circuit for the excess voltage, excess current and or electric discharge waveform.

[Note6-1] Lamp current is a value at the time of stability after 30 minutes since backlight turns on.

[Note6-2] The data for lamp is for your reference, because lamp is consumable component.
When you design or order the inverter, please make sure that leak current and backlight turns on voltage of inverter circuit. When you confirm it, the module should be operated in the same condition as it is installed in your instrument.
Also, Method of voltage impress is slide up.
The open output voltage of the inverter shall be maintained for more than 1s.

[Note6-3] a) Lamp life time is defined by either ①or ② below.(Continuous turning on at Ta=25℃, IL=5mArms)
①When a brightness of lamp surface became 50% of the initial value under the standard condition.
②When it became the condition which a lamp impossible to illumination.
b) In case of operating under lower temp. Environment, the lamp exhaustion is accelerated and the brightness becomes lower.
(Continuous operating for around 1 month under lower temp. condition may reduce the brightness to half of the original brightness.)

[Note6-4] Please make sure that average lamp life time becomes short, although brightness goes up when lamp current is increased. When you confirm it, the module should be operated in the same condition as it is installed in your instrument.
(Recommendation lamp current 4.0～6.5 mArms)
This life is reference value when a module was put horizontally.
There is the case that luminance deteriorates in a shorter term than above specifications,
When a module was put in the state that put up a lamp (the state that made harness up or down).

[Note6-5] Lamp frequency of inverter may produce interference with horizontal synchronous frequency, and this may cause horizontal beat on the display. Therefore, adjust lamp frequency, and keep inverter as far as from module or use electronic shielding between inverter and module to avoid interference.

[Note6-6] Under the environment of 10 lx or less, lamp may not turn on or it may take some time to turn on.

7 Timing Characteristics of Input Signals

Timing diagrams of input signal are shown in Fig.2.

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	12	-	-	ns	
	"Low" time	Tcl	13	-	-	ns	
Data	Setup time	Tds	5	-	-	ns	
	Hold time	Tdh	5	-	-	ns	
Hsync	Period	TH	31.45	31.75	32.05	μs	
			1024	1056	1088	clock	
	Pulse width	THp	5	128	186	clock	
Vsync	Period	TV	520	525	530	line	60Hz
	Pulse width	TVp	2	-	TV-515	line	
Horizontal display period		THd	-	800	-	clock	
Phase difference between Hsync and clock		THc	8	-	Tc-10	ns	
Phase difference between Hsync and Vsync		TVh	0	-	50	clock	
Vertical back porch		TVs		35(fixed)	-	line	
Vertical front porch		TVf	3	-	-	line	
Vertical display period		TVd	-	480	-	line	

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

7.2 Display Position in horizontal direction

Display position in horizontal direction is designated by rising timing of ENAB signal.

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
ENAB signal	Setup time	Tes	5	-	Tc-10	ns	
	Pulse width	Tep	-	800	-	clock	
Phase difference between Hsync and ENAB signal		THe	88	-	216	clock	

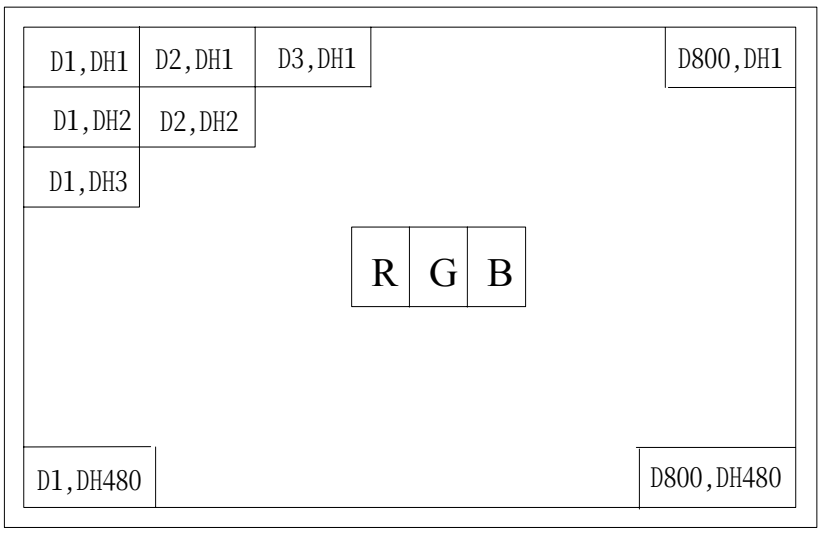
When ENAB is fixed to "Low", the horizontal display will starts from the clock C216 (clock) as shown in Fig.2.

[Note] In the case that ENAB signal is used with active, ENAB signal is fixed "LOW" or continuation input of the ENAB signal similar to the TVd period on Vertical invalid data period.

7.3 Display position in vertical direction.

↑UP

Display position of input data (H,V)



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

Ta=25°C, Vcc=3.3V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle Range	Horizontal	θ21,θ22	CR≥10	50	55	-	° (Deg.)	[Note9-1,4]
	Vertical	θ11		30	40	-	° (Deg.)	
		θ12		50	60	-	° (Deg.)	
Contrast ratio		CR max	Best viewing angle	-	250	-	-	[Note9-2]
Response time	Rise	Tr	θ = 0°	-	8	-	ms	[Note9-3]
	Fall	Td		-	21	-	ms	
Chromaticity of white		x	θ = 0°	0.25	0.30	0.35	-	[Note9-4]
		y		0.27	0.32	0.37	-	
Luminance of white		L		200	260	-	cd/m^2	IL=5.0mArms
White Uniformity			θ = 0°	70	80	-	%	[Note9-5]

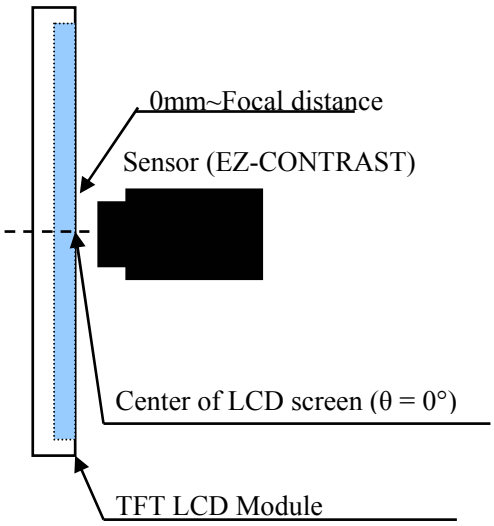


Fig.9-1 Measuring setup for Viewing angle and Contrast ratio

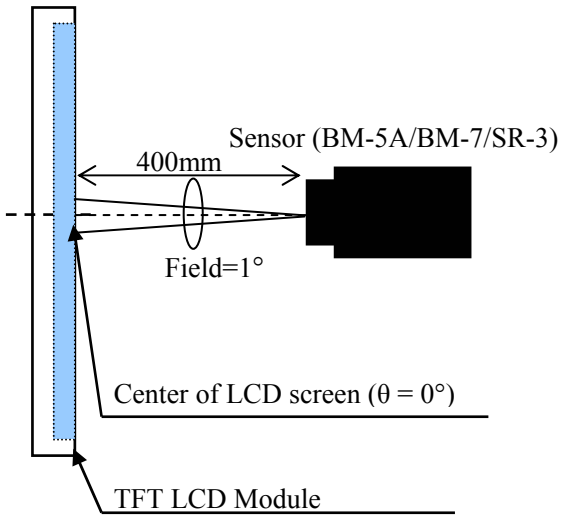
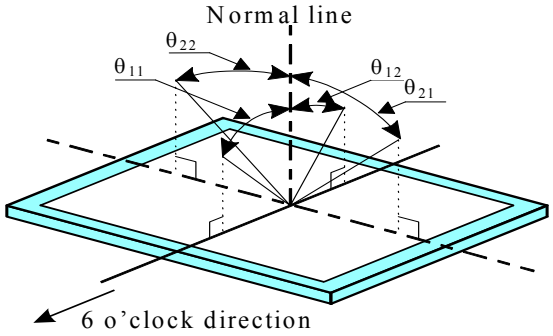


Fig.9-2 Measuring setup for Luminance, Chromaticity and Response time (BM-5A/7 is used for Luminance, SR-3 is for chromaticity)

[Note9-1] Definitions of viewing angle range:



The best viewing angle of this module (θmax) is slightly leaned to 12 o'clock from normal line.

Where $\theta_{12} > \theta_{max}$, gray scale is reversed partially.

Where $\theta_{12} < \theta_{max}$, or 6 o'clock direction , gray scale isn't reversed.

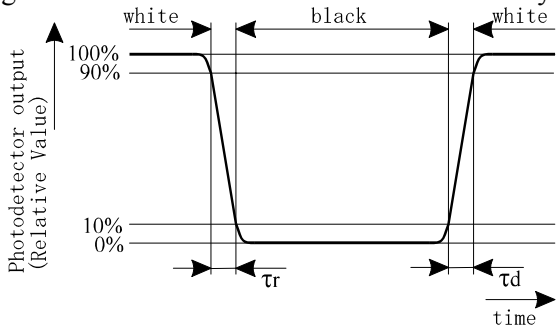
[Note9-2] Definition of contrast ratio:

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:

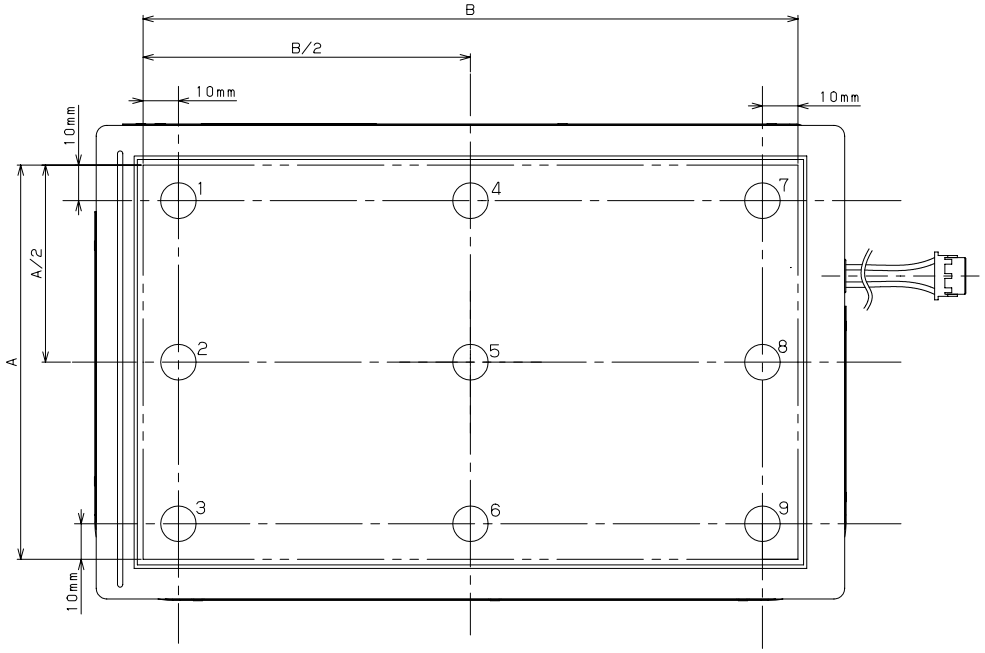
The response time is defined as the following figure and shall be measured by switching the input signal between "black" and "white" alternatively.



[Note9-4] This parameter should be measured at the center of the screen and 30 minutes after turn-on. The characteristics are measured when the driver circuit is not powered.

[Note9-5] Definition of white uniformity:

White uniformity is defined as the following with five measurements (1～9).



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) 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. Blow off 'dust' on the polarizer by using an ionized nitrogen.

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 mounting holes 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) There are high voltage portions on the backlight and very dangerous. Careless touch may lead to electrical shock. When exchange lamps or service, turn off the power without fail.

o) When handling LCD modules and assembling them into cabinets, please avoid that long-terms 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 modules.

p) Cold cathode fluorescent lamp in LCD panel contains a small amount of mercury, please follow local ordinances or regulations for disposal.

q) Be careful of a back light lead not to pull by force at the time of the wiring to an inverter, or line processing.

r) The inductive loss caused by routing of lamp lead wire, which is closed to conductive section, may require the kick-off voltage greater than specified kick-off voltage.

s) 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.

t) Notice : Never dismantle the module , because it will cause failure.
Please don't remove the fixed tape, insulateing tape etc that was pasted on the original module.
(except for protection film of the panel and the crepe tape(yellow tape) of fixing lamp cable temporarily.)

u) 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.)

v) 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. The module should be protected with cover to prevent salt content and/or water droplet.

w) Take enough shielding countermeasure not to interfere to peripheral electronic device.

x) The lamp 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.
It may decrease up to 50% of the initial luminance in about one month under the low temperature environment.
Please consult our company when it is used under the environment like the above mentioned.

12 Packing Form

12.1 Fig.3 shows packaging form.

12.2 Carton stock conditions

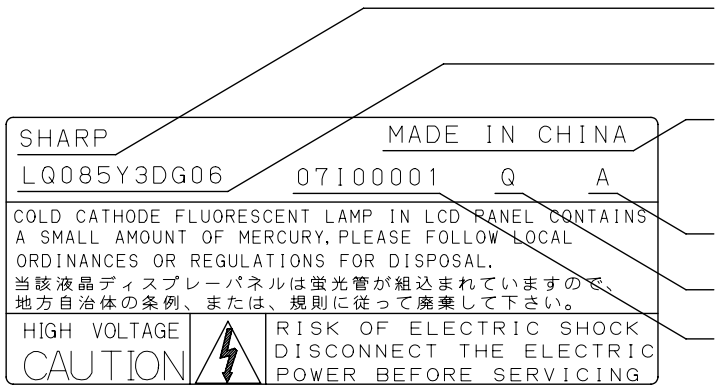
a) Maximum number of Carton being stuck: Max. 6 cartons
b) Maximum number of product contained: 20 Unit
c) Carton size: 571mm(W) × 241mm(H) × 356mm(D)
d) Total mass (for 20Unit): Approximately 10 kg
e) Carton stock environment:

1) Temperature:	0 ~ 40°C
2) Humidity:	Up to 60%RH
3) Ambiance:	No gases bite into electronic components and wiring materials
4) Period:	Approximately 3month
5) Unpacking:	To prevent LCD module from damaging by ESD, unpack the module with effective measure after controlling humidity 50%RH or more.

13 Marking of product name

13.1. Serial No. indication

Serial No. is indicated by labeling. The location is given in Fig.1 Outline dimension.



SHARP product

Model name

Country of origin

Revision marks (A, B, C, …)

Product factory (Q, L, etc.)

Serial No. contents

Production year (ex. 2007 → “07”)

Production month (1:A, 2:B,…, 12:L)

Serial number (00001 ~)

14 Reliability Test Items

[Note] Temperature condition is based on operating temperature condition of Absolute Maximum Ratings.

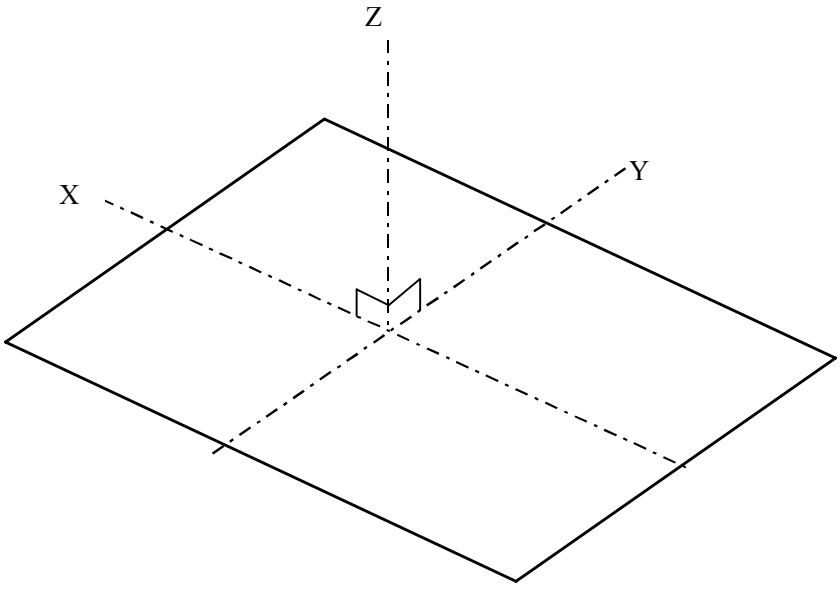
No.	Test parameter	Conditions
1	High temperature storage test	Leaves the module at Ta=75°C for 240h
2	Low temperature storage test	Leaves the module at Ta=-25°C for 240h
3	High temperature & high humidity operation test	Operates the module at Ta=40°C; 90~95%RH for 240h (No condensation)
4	High temperature operation test	Operates the module with +75°C at panel surface for 240h
5	Low temperature operation test	Operates the module at Ta=0°C for 240h (Exclude lamp life time)
6	Strength against ESD	±200V·200pF [0Ω] one time for each terminal
7	Shock test (non- operating)	Max. acceleration : 490m/s^2 Pulse width : 11ms, half sine wave Direction : ±X,±Y,±Z once for each direction.
8	Vibration test (non- operating)	Frequency : 10~57Hz/Vibration width (one side):0.075mm : 57~500Hz/ acceleration:9.8m/s^2 Sweep time : 11 minutes Test period :1 hour for each direction of X,Y,Z (total 3 hours)
9	Thermal shock test	-25°C ~ +75°C /50 cycle [0.5h] [0.5h]

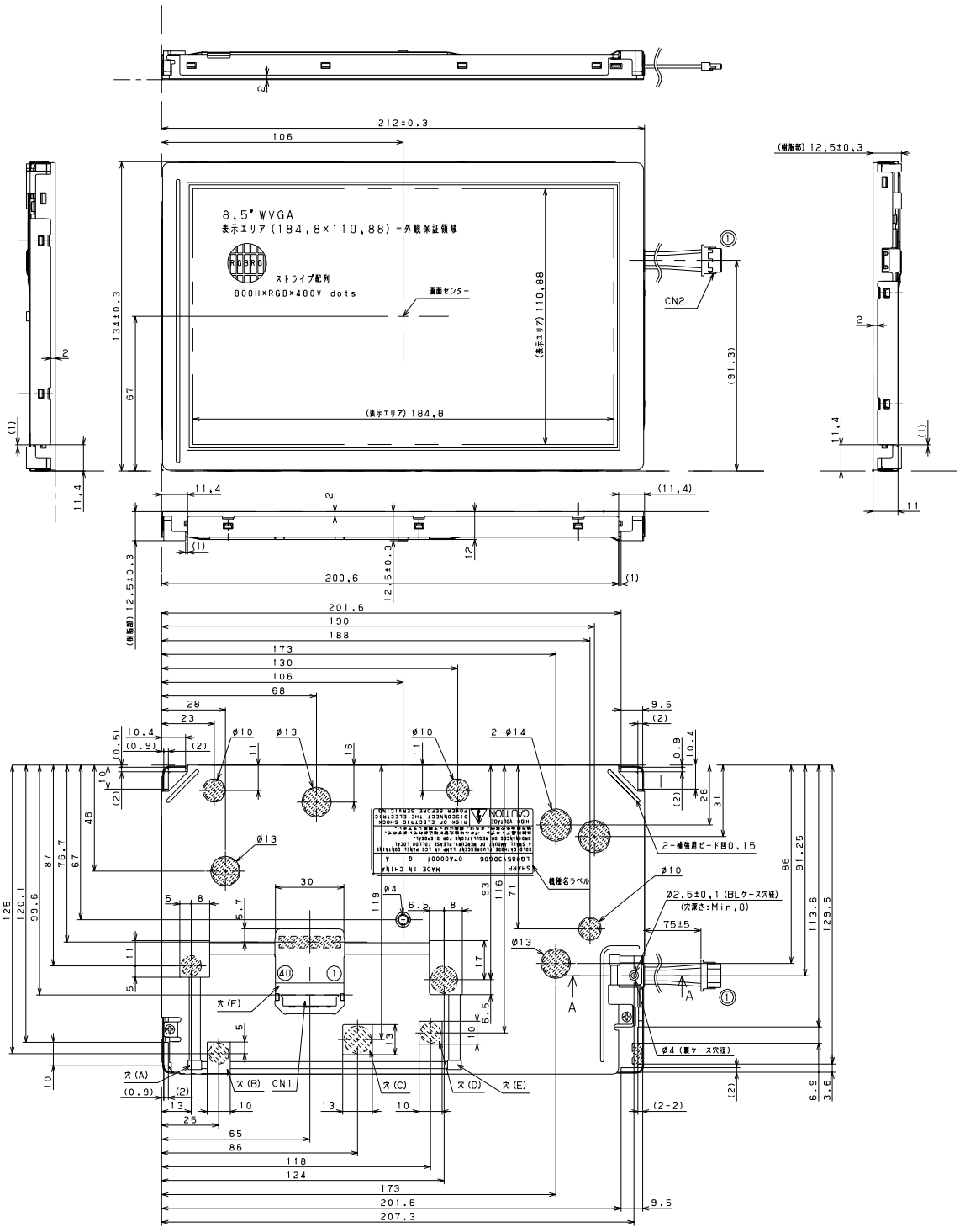
[Result Evaluation Criteria]

Under the display quality test conditions with normal operation state,

these shall be no change which may affect practical display function.

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





CN1:FHI2-40S-0.5SH(55) (HIROSE)
(CN1 Specification:Pitch0.5mm, 40Pin, Tin plating, Bottom side contact)
CN2:BHR-02(8.0)VS-1N(JST)

note1) General tolerance is ±0.5mm.
note2) Take care in set design to hide the scratches and bubbles appeared on the polarizer or other flame area whitch is located outside of active area.
note3) ① shows the HOT side of the lamp harness.
note4) Please fix the module on the same plane, taking care not to wrap or twist the module.
note5) ▨ : Maximum thickness is 9.5mm.
note6) Please avoid to have static electricity at hole (A~F) of back panel where PWB and FPC are not covered.
note7) Please avoid to press back panel by sharp edged item. And please confirm area pressed or contacted has no scratch/damage after vibration/shock test.
note8) The tube hasn't been contracted by heat, and the position is not fixed.

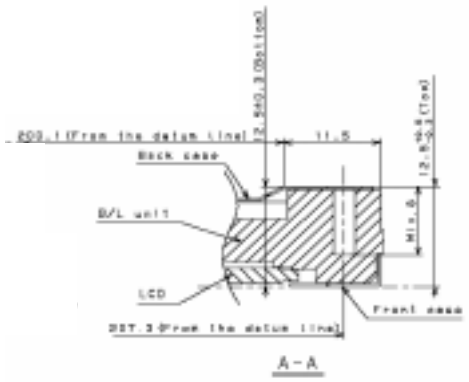
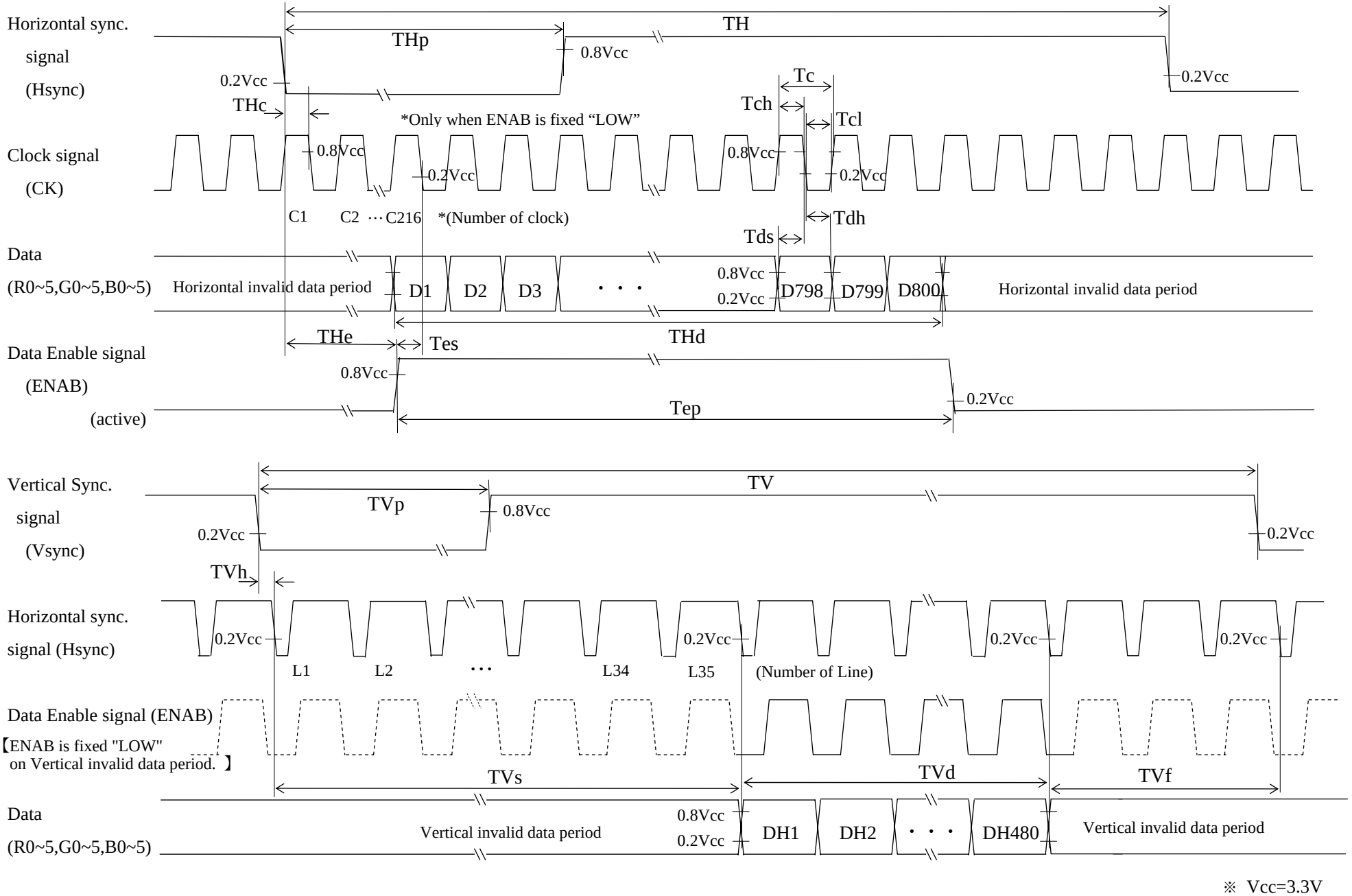


Fig.1 Outline Dimensions



※ Vcc=3.3V

Fig 2. Input signal waveforms

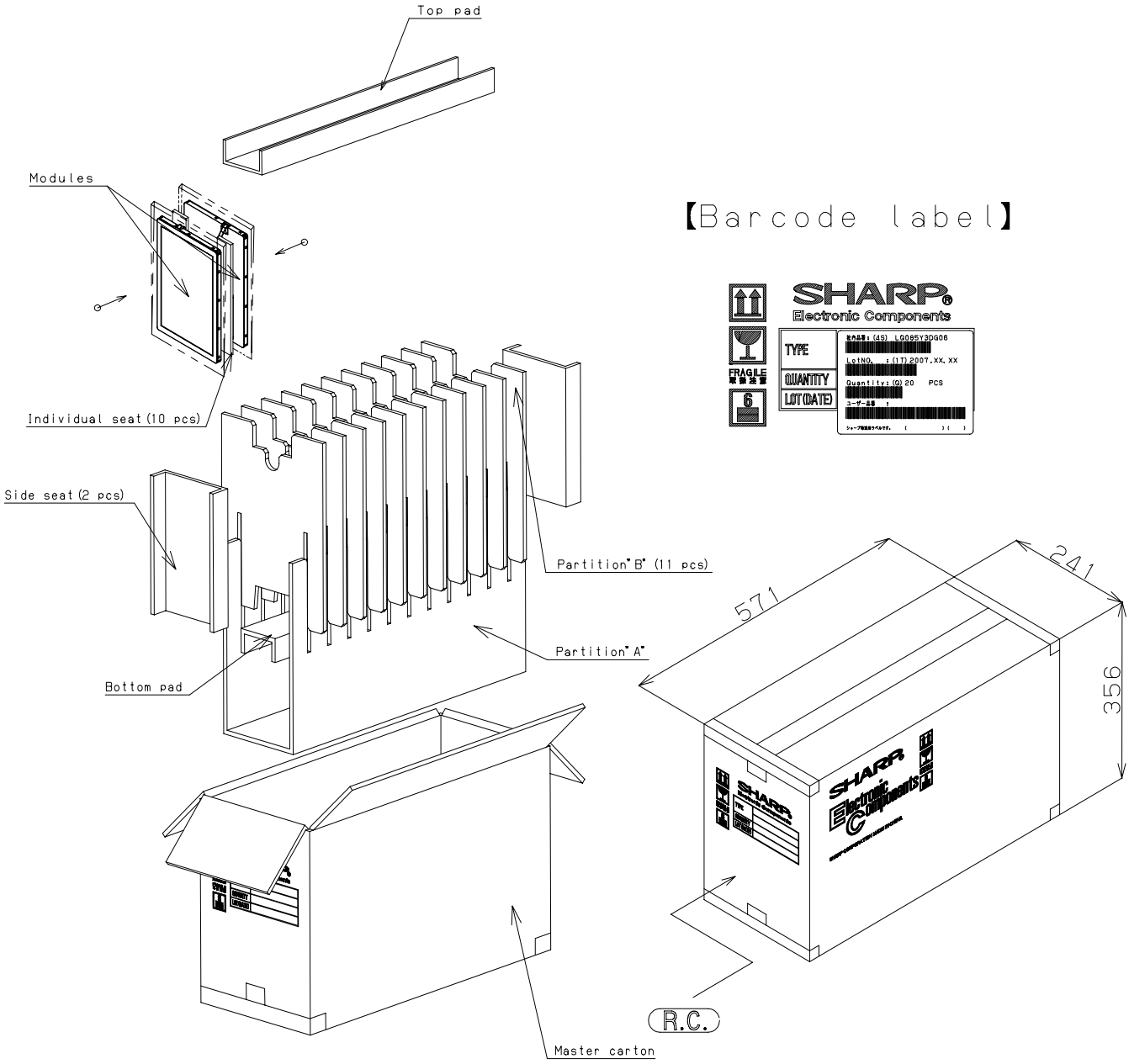


Fig.3 Packing form chart

Technical Document

LCD Specification

LCD Group

SHARP

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
www.sharpsma.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

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

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

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

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

HONG KONG
Sharp-Roxy (Hong Kong) Ltd.
Level 26, Tower 1, Kowloon Commerce Centre,
No. 51, Kwai Cheong Road, Kwai Chung,
New Territories, Hong Kong
Phone: (852) 28229311
Fax: (852) 28660779
www.sharp.com.hk
Shenzhen Representative Office:
Room 602-603, 6/F.,
International Chamber of Commerce Tower,
168 Fuhua Rd. 3, CBD,
Futian District, Shenzhen 518048,
Guangdong, P.R. China
Phone: (86) 755-88313505
Fax: (86) 755-88313515

LC-20228A