

LQ035Q7DB06 LCD Module

Product Specification

December 2009

QVGA Portrait-mode Transflective module featuring touch panel, 130 nits brightness, 85:1 contrast (Transmissive mode) and 11% reflectivity, 8:1 contrast (Reflective mode).

Full specification listing.

PREPARED BY : DATE	<h1>SHARP</h1> <p>MOBILE LIQUID CRYSTAL DISPLAY GROUP SHARP CORPORATION</p> <h2>SPECIFICATION</h2>	SPEC No. LD-21Y08A
APPROVED BY : DATE		FILE No.
		ISSUE : Dec. 01. 2009
		PAGE : 23 pages
		APPLICABLE GROUP
		MOBILE LIQUID CRYSTAL DISPLAY GROUP

DEVICE SPECIFICATION FOR

TFT-LCD Module

MODEL No.

LQ035Q7DB06

These parts have corresponded with the RoHS directive.

CUSTOMER'S APPROVAL

DATE _____

BY _____

PRESENTED

BY J. Kawanishi

J. KAWANISHI

DEPARTMENT GENERAL MANAGER
ENGINEERING DEPARTMENT I
MOBILE LIQUID CRYSTAL DISPLAY DIVISION II
MOBILE LIQUID CRYSTAL DISPLAY GROUP
SHARP CORPORATION

NOTICE

This publication is the proprietary of SHARP and is copyrighted, with all rights reserved. Under the copyright laws, no part of this publication may be reproduced or transmitted 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. Express written permission is also required before any use of this publication may be made by a third party.

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 use in general electronic equipment designs, such as:

- Personal computers • Office automation • Telecommunication equipment
- Test and measurement equipment • Industrial control • Personal Digital Assistance
- Audio visual and multimedia equipment • Consumer electronics • Personal Navigation Device

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) Application

This specification applies to LQ035Q7DB06.

(2) Overview

This module is a color reflective and active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, FPCs, a back light, a front sealed casing and a back sealed casing. It isn't composed control circuit. Graphics and texts can be displayed on a 240 × 3 × 320 dots panel with 262,144 colors by supplying.

Optimum view angle is 6 o'clock. An inverted display mode is selective in the vertical or the horizontal direction.

This module is Lead-free design.

Confirm "(13) Handling Precautions "(page 18 and 19) item when you use the device.

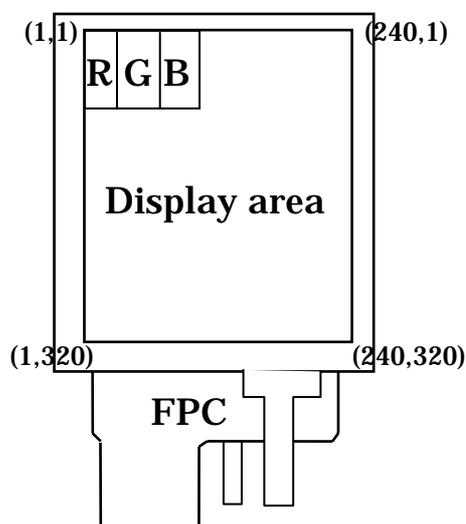
(3) Mechanical specifications

Table 1

Parameter	Specifications	Units	Remarks
Screen size (Diagonal)	8.9 [3.52 "] Diagonal	cm	
Display active area	53.64 (H) × 71.52 (V)	mm	
Pixel format	240(H) × 320(V) (1 pixel = R+G+B dots)	pixels	
Pixel pitch	0.2235 (H) × 0.2235 (V)	mm	
Pixel configuration	R,G,B vertical stripe		
Unit outline dimension	65.0(W) × 85.0(H) × 4.5(D)	mm	【Note3-1】
Mass	50	g	TYP.
Surface hardness	3H		

【Note 3-1】

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

(4)Pixel configuration

(5)Input/Output terminal

5-1)TFT-LCD panel driving section

Table2

Recommendation CN : FH12-50S-0.5SH(55) (HIROSE)

Pin No.	Symbol	I/O	Description	Remarks
1	VDD	-	Power supply of gate driver(high level)	
2	AGND	-		
3	MOD	I	Control signal of gate driver	【Note5-1】
4	MOD	I	Control signal of gate driver	【Note5-1】
5	U/L	I	Selection for vertical scanning direction	【Note5-2】
6	SPS	I	Start signal of gate driver	
7	CLS	I	Clock signal of gate driver	
8	AGND	-		
9	VEE	-	Power supply of gate driver(low level)	
10	VEE	-	Power supply of gate driver(low level)	
11	VCOM	I	Common electrode driving signal	
12	VCOM	I	Common electrode driving signal	
13	SPL	I/O	Sampling start signal	
14	R0	I	RED data signal(LSB)	
15	R1	I	RED data signal	
16	R2	I	RED data signal	
17	R3	I	RED data signal	
18	R4	I	RED data signal	
19	R5	I	RED data signal(MSB)	
20	G0	I	GREEN data signal(LSB)	
21	G1	I	GREEN data signal	
22	G2	I	GREEN data signal	
23	G3	I	GREEN data signal	
24	G4	I	GREEN data signal	
25	G5	I	GREEN data signal(MSB)	
26	B0	I	BLUE data signal(LSB)	
27	B1	I	BLUE data signal	
28	B2	I	BLUE data signal	
29	B3	I	BLUE data signal	
30	B4	I	BLUE data signal	
31	B5	I	BLUE data signal(MSB)	
32	VSHD	-	Power supply of digital	
33	DGND	-	Ground(digital)	
34	PS	I	Power save signal Please don't carry out use by "Low" fixation	
35	LP	I	Data latch signal of source driver	
36	DCLK	I	Data sampling clock signal	
37	LBR	I	Selection for horizontal scanning direction	【Note5-3】
38	SPR	I/O	Sampling start signal	
39	VSHA	-	Power supply(analog)	

Pin No.	Symbol	I/O	Description	Remarks
40	AGND	-		
41	AGND	-		
42	REV	I	reverse control signal	【Note5-4】
43	COM	O	Produce REV signal with the amplitude of AGND - VSHA	【Note5-4】
44	AGND	-		
45	AGND	-		
46	AGND	-		
47	AGND	-		
48	AGND	-		
49	AGND	-		
50	AGND	-	Ground(Analog)	

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

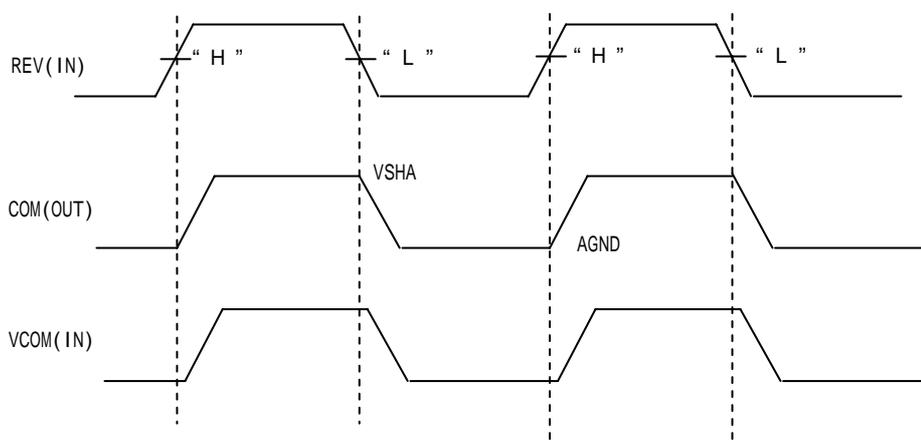
【Note5-2】 Selection for vertical scanning direction

U/L	Scanning direction (Pixel configuration)
Low	Normal scanning (X , 1) (X , 320)
High	Inverted scanning (X , 1) (X , 320)

【Note5-3】 Selection for horizontal scanning direction

LBR	SPL	SPR	Scanning direction (Pixel configuration)
High	Input	Output	Normal scanning (1,Y) (240,Y)
Low	Output	Input	Inverted scanning (1,Y) (240,Y)

【Note5-4】



5-2)Back light driving section

Table3

Recommendation CN : CFP4605-0150F (SMK)

Pin No.	Symbol	I/O	Description	Remark
1	VL1	I	Power supply for LED (High voltage)	
2	N.C	-	-	
3	N.C	-	-	
4	VL2	I	Power supply for LED (Low voltage)	
5	N.C	-	-	

5-3)Touch panel driving section

Table 4

Pin No.	Symbol	I/O	Description	Remark
T1	YU	-	Y (12 o'clock side)	
T2	XR	-	X (right side)	
T3	YD	-	Y (6 o'clock side)	
T4	XL	-	X (left side)	

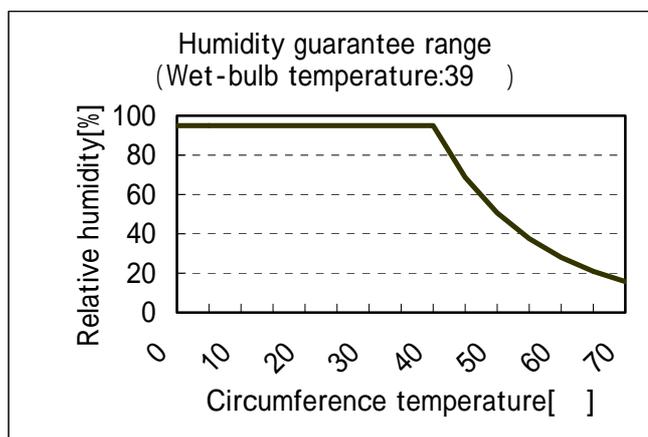
(6)Absolute Maximum Ratings

Table 5

Parameter	Symbol	Condition	Ratings	Unit	Remark
Power supply(source/Analog)	VSHA	Ta=25	-0.3 ~ +7.0	V	
Power supply(source/Digital)	VSHD	Ta=25	-0.3 ~ +7.0	V	
Power supply (gate)	VDD	Ta=25	-0.3 ~ +35.0	V	
Power supply (gate)	VDD-VEE	Ta=25	-0.3 ~ +35.0	V	
Input voltage (Digital)	VID	Ta=25	-0.3 ~ VSHD+0.3	V	[Terminal]
Operating temperature (panel surface)	T _{opp}	-	-10 ~ 60		【Note6】
Storage temperature	T _{stg}	-	-25 ~ 70		【Note6-2】
LED Current	I _{LED}	Ta=25	35	mA	

[Terminal] MOD,U/L,SPS,CLS,SPL,R0 ~ R5,G0 ~ G5,B0 ~ B5,LP,DCLK,LBR,SPR,PS,REV

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



The maximum humidity in the temperature

(7)Electrical characteristics

7-1)Recommended operating conditions

A) TFT-LCD panel driving section

Table 6

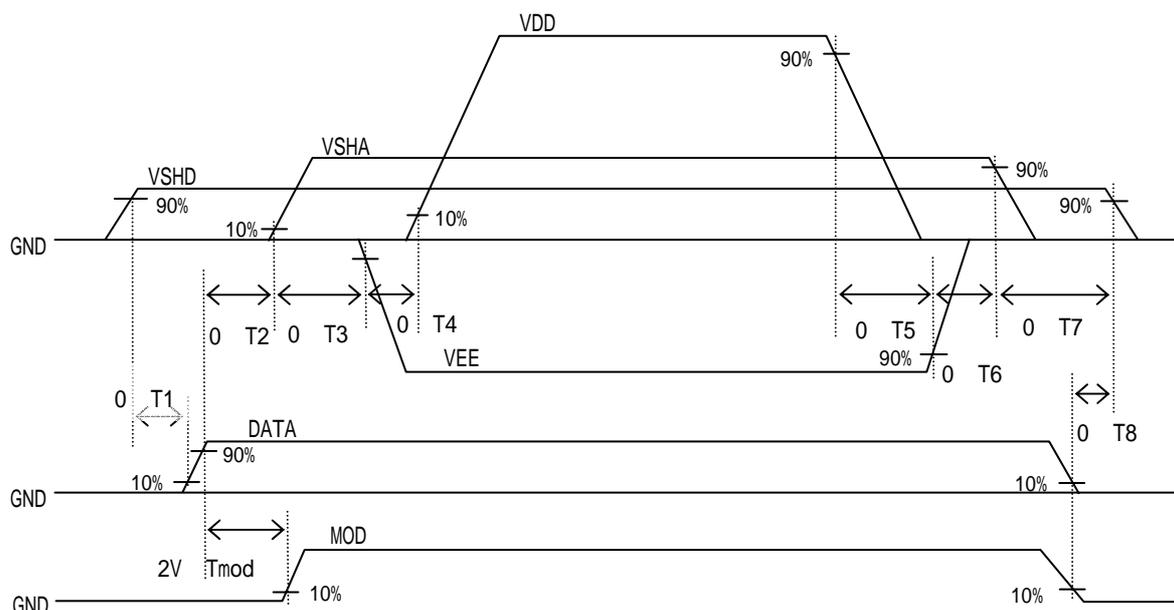
GND=0V

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks	
Supply voltage for source driver (Analog)	VSHA	+4.5	+5.0	+5.5	V		
Supply voltage for source driver (Digital)	VSHD	+3.0	+3.3	+3.6	V		
Supply voltage for gate driver	High voltage	VDD	+14.5	+15.0	+15.5	V	
	Low voltage	VEE	-10.5	-10.0	-9.5	V	
Input voltage for Source driver (Low)	VILS	GND	-	0.2VSHD	V	【Note 7-1】	
Input voltage for Source driver (High)	VIHS	0.8VSHD	-	VSHD	V	【Note 7-1】	
Input current for Source driver (Low)	IILS	-	-	30	μA	【Note 7-1】	
Input current for Source driver (High)	IHS1	-	-	30	μA	【Note 7-2】	
	IHS2	-	-	1200	μA	【Note 7-3】	
Input voltage for Gate driver (Low)	VILG	GND	-	0.2VSHD	V	【Note 7-4】	
Input voltage for Gate driver (High)	VIHG	0.8VSHD	-	VSHD	V	【Note 7-4】	
Input current for Gate driver (Low)	IILG	-	-	4	μA	【Note 7-4】	
Input current for Gate driver (High)	IIHG	-	-	4	μA	【Note 7-4】	
Common electrode driving signal	AC component	VCOMAC	-	± 2.5	± 2.6	Vp-p	【Note 7-5】
	DC component	VCOMDC	-0.4	+0.6	+1.6	V	【Note 7-5】

Cautions when you turn on or off the power supply

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

The input signal of "MOD" Terminals(Pin No.3 and No.4) must be low voltage when turning on the power supply, and it is held until more than double vertical periods after VSHD is turned on completely. After then, it must be held high voltage until turning off the power supply.(Connect Pin No.3 and No.4 terminals to the same signal.)



【Note 7-1】 DCLK,SPL,SPR,LBR,LP,PS,REV,R0 ~ R5,G0 ~ G5 and B0 ~ B5 terminals are applied.

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

【Note 7-3】 PS terminal is applied.

【Note 7-4】 MOD,CLS,SPS and U/L terminals are applied.

【Note 7-5】 VCOMAC should be alternated on VCOMDC every 1 horizontal period and 1 vertical period.

VCOMDC bias is adjusted so as to minimize flicker or maximum contrast every each module.

B) Back light driving section

Table 7

Ta=25

Parameter	Symbol	MIN	TYP	MAX	Units	Remarks terminal
LED voltage	VL	-	21.6	24	V	
LED current	IL	-	15	20	mA	
Power consumption	WL	-	0.324	-	W	【Note 7-6】

【Note 7-6】 Calculated reference value($I_L \times V_L$)

7-2) Timing Characteristics of input signals

Table 8 AC Characteristics (1)

(VSHA=+5V, VSHD=+3.3V, Ta=25)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark	
Clock frequency of source driver	fCK	4.5	-	6.8	MHz		
Source driver	Rising time of clock	Tcr	-	-	20	ns	DCLK
	Falling time of clock	Tcf	-	-	20	ns	
	Pulse width (High level)	Tcwh	40	-	-	ns	
	Pulse width (Low level)	Tcwl	40	-	-	ns	
	Frequency of start pulse	fsp	16.5	-	28	kHz	SPL,SPR
	Setup time of start pulse	Tsusp	15	-	-	ns	
	Hold time of start pulse	Thsp	10	-	-	ns	
	Pulse width of start pulse	Twsp	-	-	1.5/fCK	ns	【Note 7-7】
	Setup time of latch pulse	Tsulp	20	-	-	ns	LP
	Hold time of latch pulse	Thlp	20	-	-	ns	
	Pulse width of latch pulse	Twlp	60	-	-	ns	
	Setup time of PS	Tsups	0	-	59	μs	PS
	Hold time of PS	Thps	0	-	1	μs	
Set up time of data	Tsud	15	-	-	ns	R0 ~ R5,G0 ~ G5	
Hold time of data	Thd	10	-	-	ns	,B0 ~ B5	
Gate driver	Clock frequency	fcls	16.5	-	28	kHz	CLS
	Pulse width of clock(Low)	Twlcls	5	-	(1/fcls)-30	μs	
	Pulse width of clock(High)	Twhcls	30	-	-	μs	
	Rising time of clock	Trcls	-	-	100	ns	
	Falling time of clock	Tfcls	-	-	100	ns	
	Setup time of clock	Tsucls	3	-	-	μs	
	Hold time of clock	Thcls	0	-	-	μs	SPS
	Frequency of start pulse	fsp	58	-	86	Hz	
	Setup time of start pulse	Tsusps	100	-	-	ns	
	Hold time of start pulse	Thsps	300	-	-	ns	
	Rising time of start pulse	Trsps	-	-	100	ns	
Falling time of start pulse	Tfsps	-	-	100	ns		
Vcom	Setup time of Vcom	Tsuvcom	0	-	-	μs	Vcom
	Hold time of Vcom	Thvcom	1	-	-	μs	

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

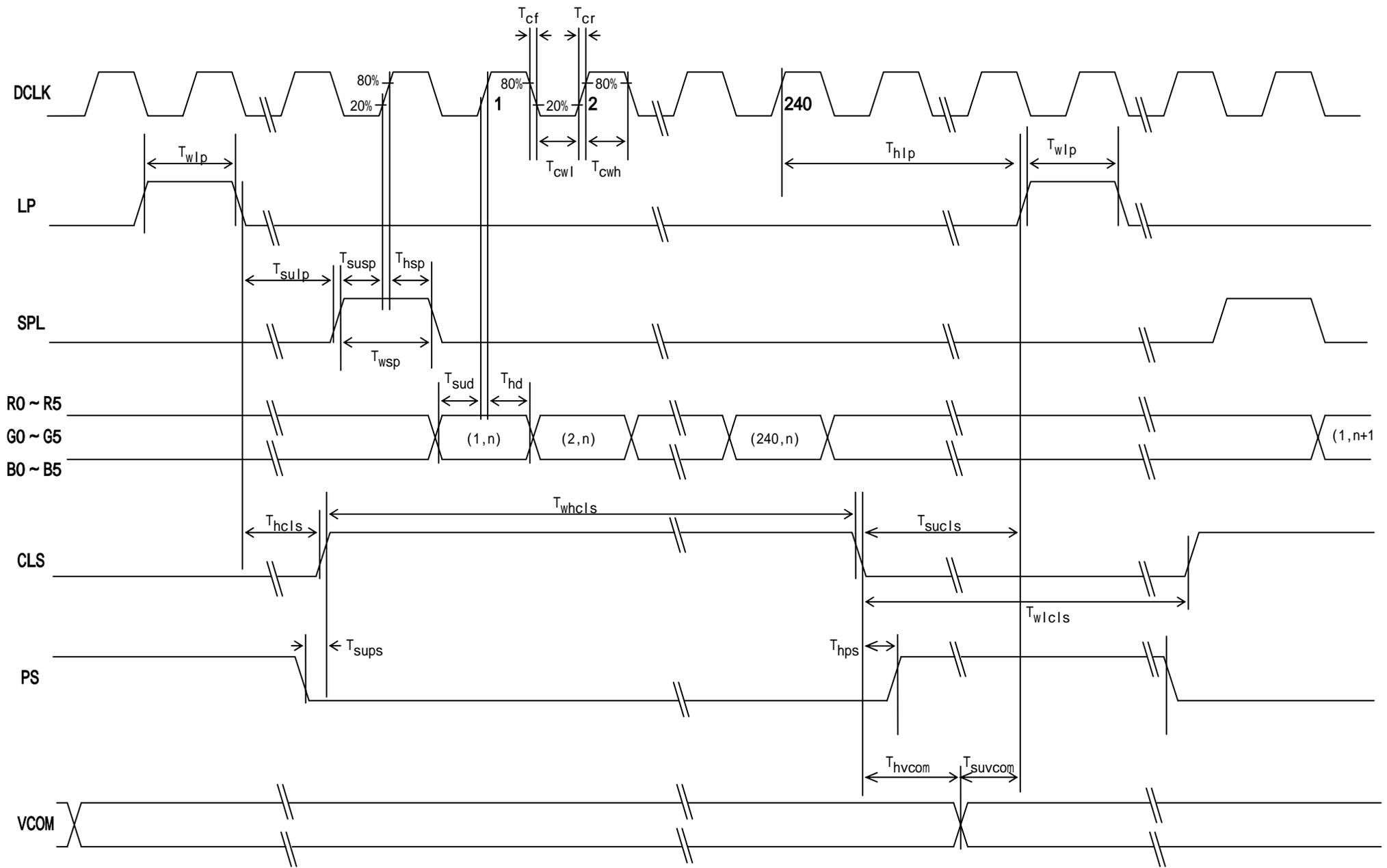


Fig.(a) Horizontal timing chart

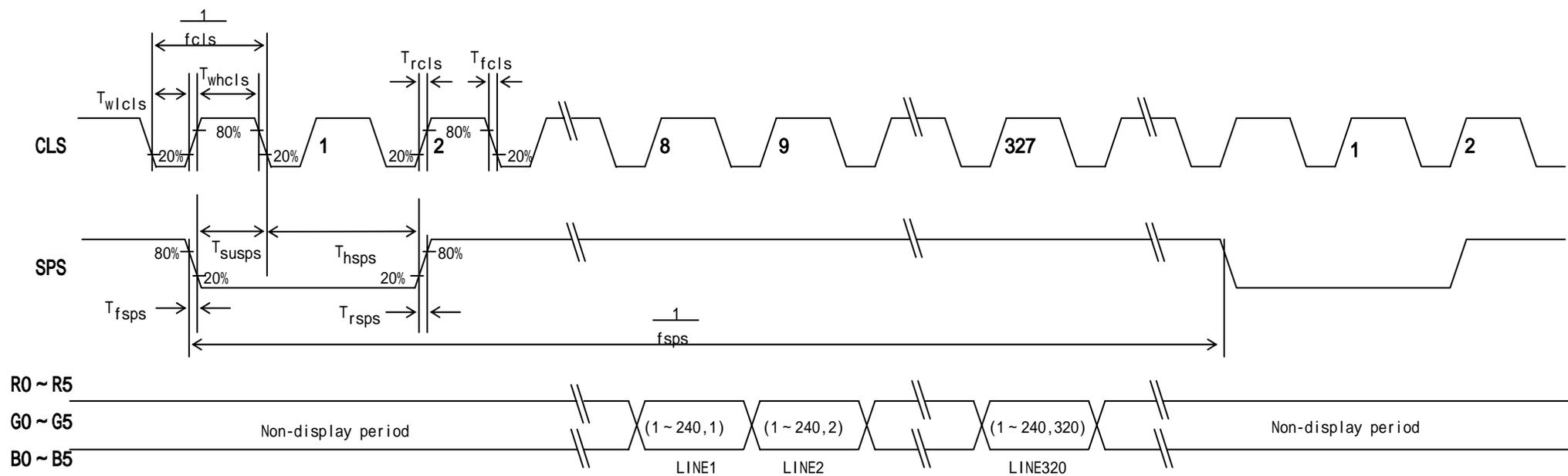


Fig.(b) Vertical timing chart

7-3)Power consumption

Measurement condition : SPS=60Hz,CLS=15.73kHz,SPL=15.73kHz,DCLK=6.3MHz

The term of PS="Lo" in one horizontal period ... 37 μ sec(234DCLK)

Ta=25

Table 9

when normal scan mode

Parameter		Sym	Conditions	MIN	TYP	MAX	Unit	Remarks
Source current	Analog	ISHA	VSHA=+5.0V	-	3.0	6.5	mA	【Note 7-8】
	Digital	ISHD	VSHD=+3.3V	-	2.0	3.5	mA	【Note 7-8】
Gate current	High	IDD	VDD=+15.0V	-	0.05	0.10	mA	【Note 7-9】
	Low	IEE	VEE=-10.0V	-	-0.05	-0.10	mA	【Note 7-9】

【Note 7-8】 Vertical stripe pattern alternating 21 gray scale (GS21) with 42 gray scale (GS42) every 1 dot.

【Note 7-9】 64-Gray-bar vertical pattern (GS0 ~ GS63 for horizontal way)

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

Table 10

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	
	Blue	-	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	
	Cyan	-	0	0	0	0	0	0	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	
	Magenta	-	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	
	Yellow	-	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	
	White	-	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	
	↑	GS1	1	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	
	↑	↓				↓					↓						↓			
	↓	↓				↓					↓						↓			
	Brighter	GS61	1	0	1	1	1	1	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	
	Red	GS63	1	1	1	1	1	1	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	
	↑	GS1	0	0	0	0	0	0	1	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	
	↑	↓				↓					↓						↓			
	↓	↓				↓					↓						↓			
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	
	↓	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	
Gray Scale of bleu	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	↑	GS1	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	1	0	0	0	0	
	↑	↓				↓					↓						↓			
	↓	↓				↓					↓						↓			
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	↓	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Bleu	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 :Low level voltage 1 :High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. According to the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

(9)Optical characteristics

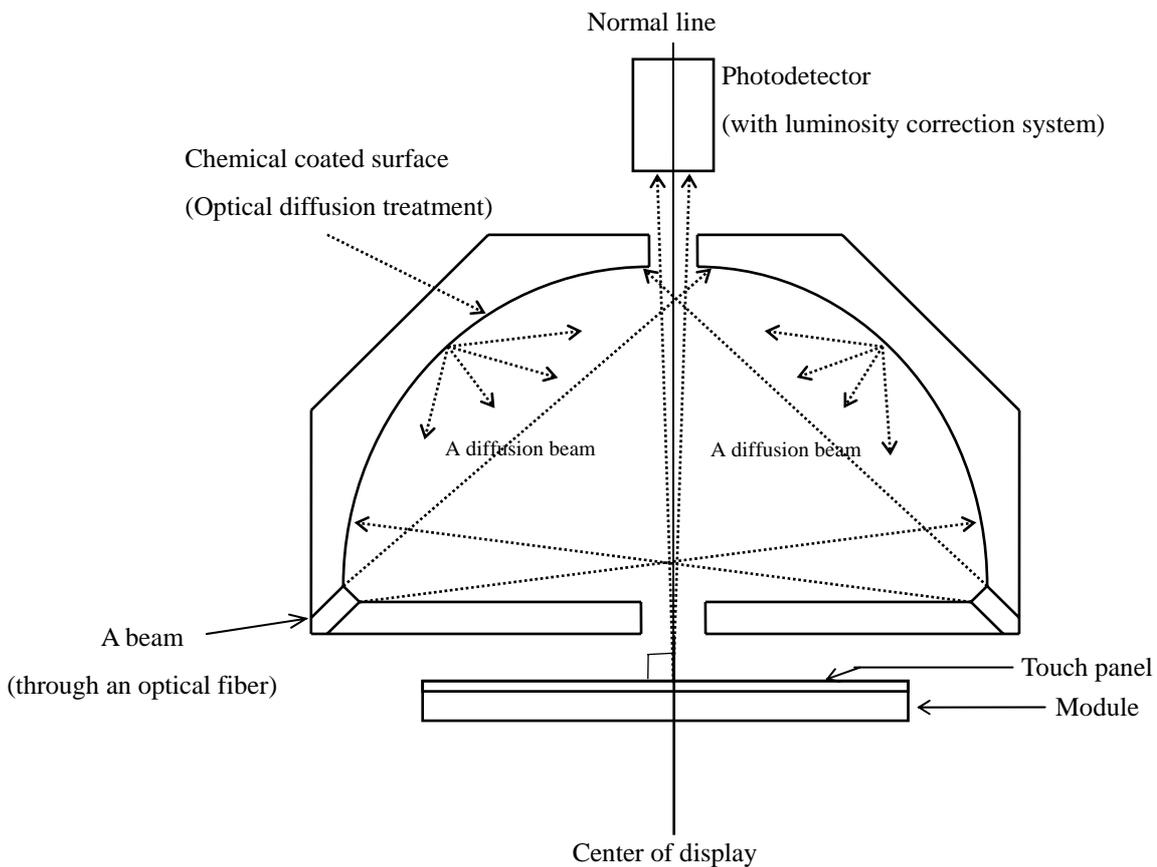
9-1)Not driving the Back light condition

Table 11 (VSHA=+5V, VSHD=+3.3V, VDD=+15V, VEE=-10V, Ta=25)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remarks	
Viewing angle range	θ21,22	CR≥2	35	50	-	degree	[Note 9-1,2]	
	θ11		35	50	-	degree		
	θ12		35	50	-	degree		
Contrast ratio	CRmax	θ =0°	6	8	-		[Note 9-2,4]	
Response time	Rise		τ r	-	30	60	ms	[Note 9-3]
	Fall		τ d	-	50	100	ms	
White chromaticity	x		0.26	0.31	0.36		[Note 9-4]	
	y		0.30	0.35	0.40			
Reflection ratio	R		7	11	-	%	[Note 9-5]	

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

* A measurement device is Otsuka luminance meter LCD5000.(With the diffusion reflection unit.)



Measuring method (a) for optical characteristics

9-2)Driving the Back light condition

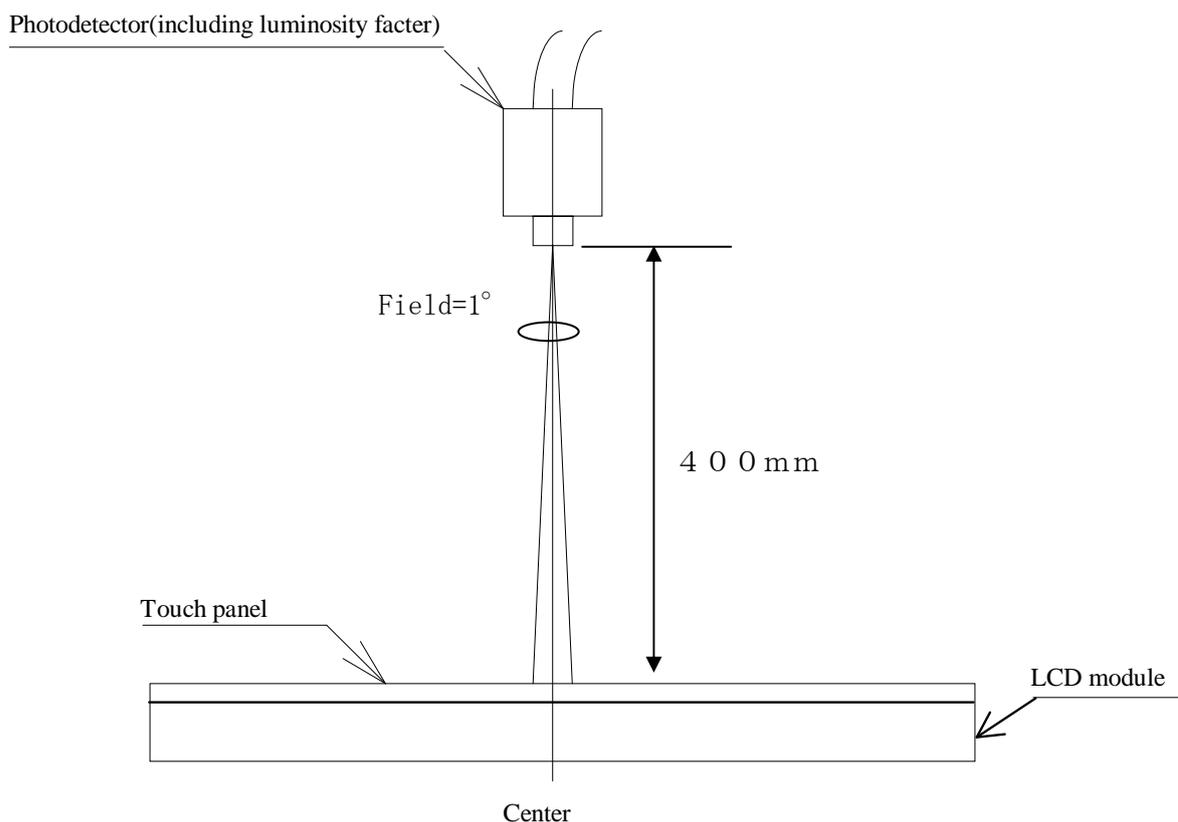
Table 12

(VSHA=+5V, VSHD=+3.3V, VDD=+15V, VEE=-10V, Ta=25°C)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle range	$\theta_{1,2}$	CR \geq 2	30	40	-	degree	[Note 9-1,2,6]
	θ_{11}		40	50	-	degree	
	θ_{12}		30	40	-	degree	
Contrast ratio	Crmax	$\theta = 0^\circ$	55	85	-		[Note 9-2]
Response time	Rise	τ_r	-	30	60	ms	[Note 9-3]
	Fall	τ_d	-	50	100	ms	
White chromaticity	x	$\theta = 0^\circ$	0.25	0.30	0.35		
	y		0.27	0.32	0.37		
Brightness	Y	$\theta = 0^\circ$	90	130	-	cd/m ²	IL=20mA
LED life time	LL	IL=15mA	-	10000	-		[Note 9-7]

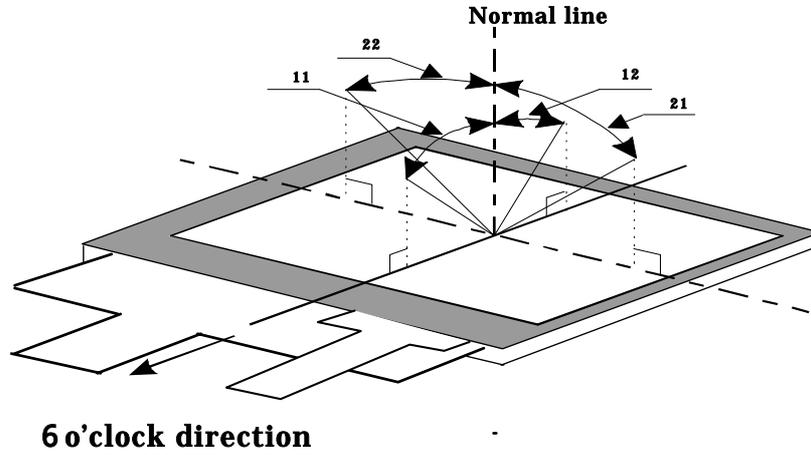
* The measuring method of the optical characteristics is shown by the following figure.

* A measurement device is TOPCON luminance meter BM-5(A) or SR-3.(Viewing cone 1)



Measuring method (c) for optical characteristics

[Note 9-1] Viewing angle range is defined as follows.



Definition for viewing angle

[Note 9-2] Definition of contrast ratio:

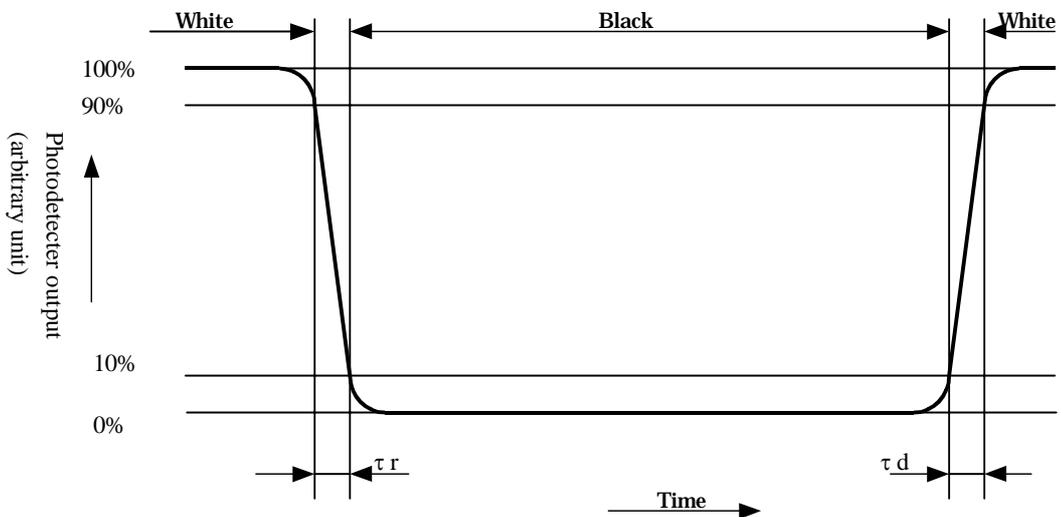
The contrast ratio is defined as follows:

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

VCOMAC=5.0Vp-p, Without Touch panel

[Note 9-3] Definition of response time:

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



[Note 9-4] A measurement device is Minolta CM-2002.

[Note 9-5] Definition of reflection ratio

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

[Note 9-6] A measurement device is ELDIM EZContrast

[Note 9-7] This is the reference value. The White-LED life time is defined as a time when brightness not to become under 50% of the original value(at Ta=25)

(10) Touch panel characteristics

Table 13

Parameter	Min.	Typ.	Max.	Unit	Remark
Input voltage	-	5.0	7.0	V	
Resistor between terminals(XL-XR)	140	-	675		Provisional specification
Resistor between terminals(YU-YD)	275	-	850		
Accuracy of detecting dimension	-	-	± 1.0	%	
Line linearity(X direction)	-	-	1.5	%	
Line linearity(Y direction)	-	-	1.5	%	
Insulation resistance	20	-	-	M	at DC25V
Minimum tension for detecting	-	-	0.79	N	

(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) Mechanical characteristics

12-1) External appearance

See Fig. 1

12-2) FPC (for LCD panel) characteristics

(1) Specific connector

FH12-50S-0.5SH(55) (HIROSE)

(2) Bending endurance of the bending slits portion

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

12-3) Design guidance for touchpanel(T/P)

12-3-1) Example of housing design

(1) If a consumer will put a palm on housing in normal usage, care should be taken as follows.

(2) Keep the gap, for example 0.3 to 0.7mm, between bezel edge and T/P surface.

The reason is to avoid the bezel edge from contacting T/P surface that may cause a "short" with bottom layer (See Fig.2)

(3) Insertion of a cushion material is recommended.

(4) The cushion material should be limited just on the busbar insulation paste area.

If it is over the transparent insulation paste area, a "short" may be occurred.

(5) There is one where a resistance film is left in the T/P part of the end of the pole.

Design to keep insulation from the perimeter to prevent from mis-operation and so on.

12-3-2) Mounting on display and housing bezel

- (1) In all cases, the T/P should be supported from the backside of the glass.
- (2) Do not use an adhesive-tape to bond it on the front of T/P and hang it to the housing bezel.
- (3) Never expand the T/P top layer (PET-film) like a balloon by internal air pressure.

The life of the T/P will be extremely short.

- (4) Top layer, PET, dimension is changing with environmental temperature and humidity.

Avoid a stress from housing bezel to top layer, because it may cause "waving".

- (5) The input to the Touchpanel sometimes distorts touch panel itself.

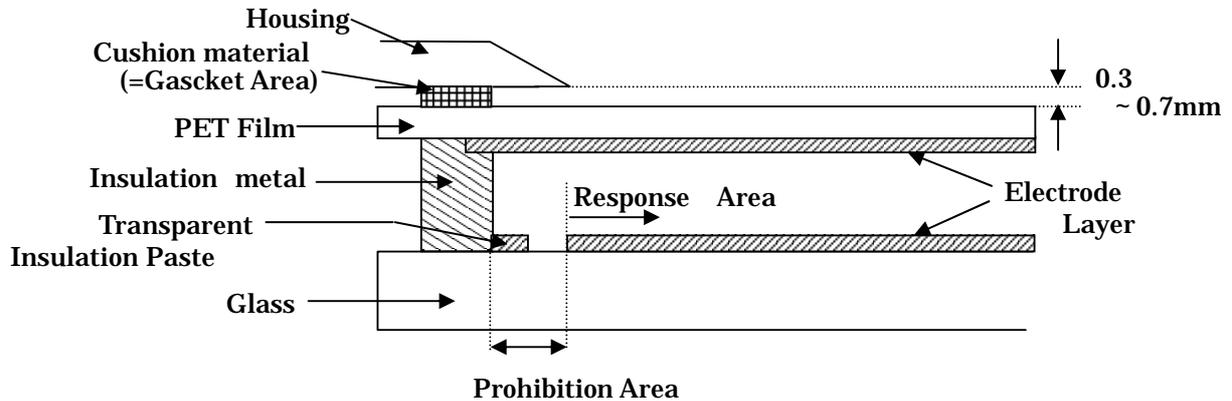


Fig.2

(13) Handling Precautions

- a) Be sure to turn off the power supply when inserting or disconnecting the FPC.
- b) Please insert FPC in the connector carefully so that the tension should not hang.
- c) The FPC for LCD panel shall be bent only slit portion. The bending slit shall be bent uniformly on the whole slit portion with bending radius larger than 0.6mm ,and only inner side (back side of the module). Don't bend it outer side (display surface side). Do not give the FPCs too large force, for example, hanging the module with holding FPC.
- d) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.
- e) Since the front polarizer is easily damaged, pay attention not to scratch it. Blow away dust on the polarizer with antistatic N₂ blow. It is undesirable to wipe off because a polarizer is sensitive. It is recommended to peel off softly using the adhesive tape when soil or finger oil is stuck to the polarizer. When unavoidable, wipe off carefully with a cloth for wiping lenses.
- f) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- g) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- h) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.
- i) 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.
- j) 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.
- k) In case of attaching protective board over the LCD, be careful about the optical interface fringe etc. which degrades display quality.
- l) Do not expose the LCD panel to direct sunlight. Lightproof shade etc. should be attached when LCD panel is used under such environment. The panel characteristic might be deteriorated and the display fineness decrease when strong light is irradiated to the liquid crystal panel.
- m) When handling LCD modules and assembling them into cabinets, 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, causes corrosion and discoloration of the modules. Therefore, please avoid these use. Epoxy resin (amine series curing agent), silicone adhesive material (dealcoholization series and oxime series), tray forming agent (azo compound) etc, in the cabinet or the packing materials may induce abnormal display with polarizer film deterioration regardless of contact or noncontact to polarizer film. Be sure to confirm the component of them.
- n) If it is kept at a temperature below the rated storage temperature, it becomes coagulated and the panel may be broken. Also, if it is kept at a temperature above the rated storage temperature, it becomes isotropic liquid and does not return to its original state. Therefore, it is desirable to keep it at room temperature as much as possible.
- o) The LED used for this product is very sensitive to the temperature. Luminance decreases rapidly when it issued for a long time under the environment of the high temperature. Please consult our company when it is used under the environment like the above mentioned.
- p) 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.)
- q) Notice:Never dismantle the module , because it will cause failure. Moreover, please do not peel off the tapes other than the creped paper tape (yellow tape) of a protection film pasted to the product.

- 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) Observe general precautions for all electronic components.
- t) VCOM must be adjusted on condition of your final product. No adjustment causes the deterioration for display quality.

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

【Check items】

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

(15) Others

15-1) Indication of lot number

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

Indicated contents of the label

LQ035Q7DB06	M
-------------	---

model No.

lot No.

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

Substances with the object of regulating : CFCS, Carbon tetrachloride, Halon

1,1,1-Trichloro ethane (Methyl chloroform)

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

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

16) Forwarding form (see Fig.3 Package Form)

- a) Piling number of cartons : Max 20
- b) Package quantity in one cartons : 50pcs
- c) Carton size : 503mm x 373mm x 85mm
- d) Total mass of 1 carton filled with full modules : 4100g

Conditions for storage.

Environment

(1) Temperature : 0 ~ 40

(2) Humidity : 60%RH or less (at 40)

No dew condensation at low temperature and high humidity.

(3) Atmosphere : Harmful gas, such as acid or alkali which bites electronic components and/or wires, must not be detected.

(4) Direct sunshine : Please keep it in the state of wrapping or the darkroom so that direct sunshine should not strike directly into the product.

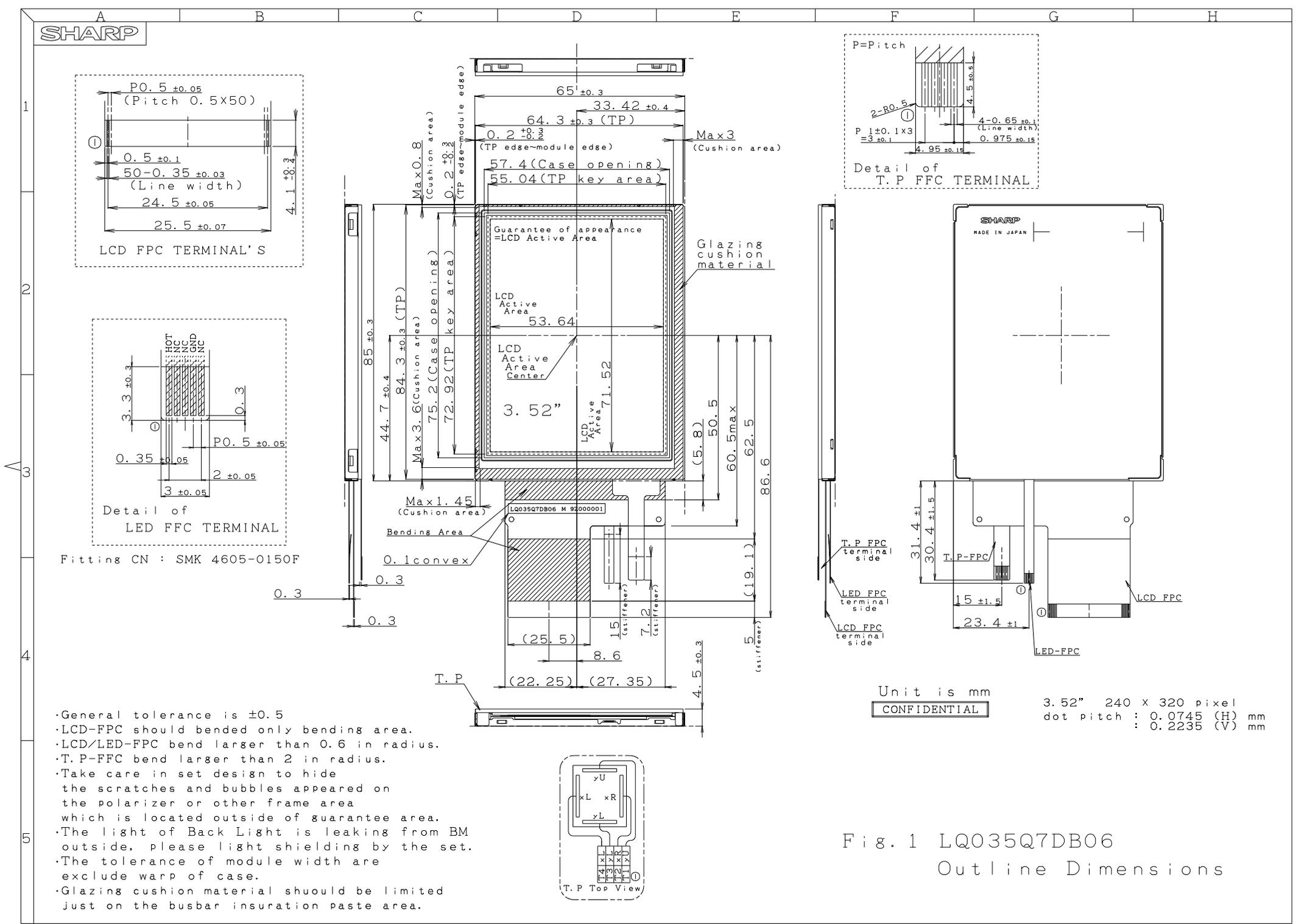
(5) Asking for be dewy prevention

- Please do not put directly on the floor, and keep the wrapping box on the palette or the stand to avoid the be dewy. Moreover, please arrange it in a constant direction correctly to improve ventilation under the palette.
- Please separate from the wall in the storage warehouse and keep it.
- Please note that ventilation is improved and consider the installation such as ventilators in the warehouse.
- Please manage so that there is no rapid temperature change more than natural environment.

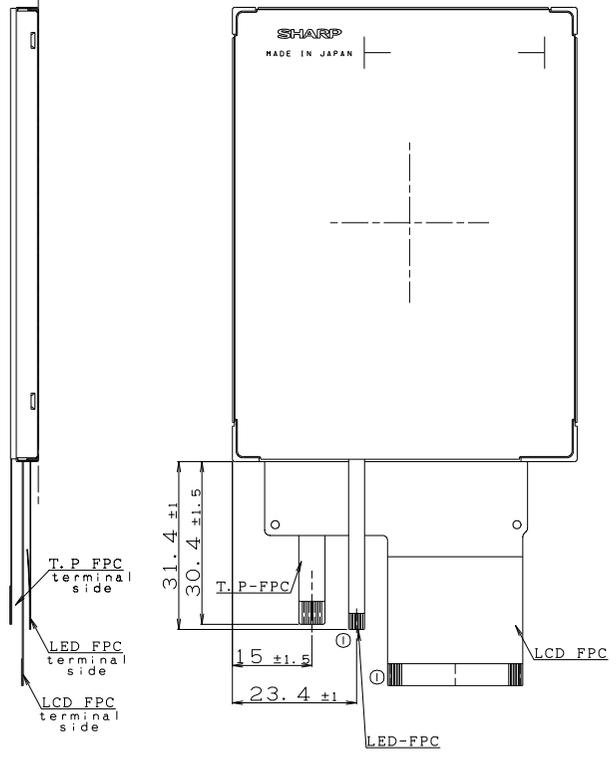
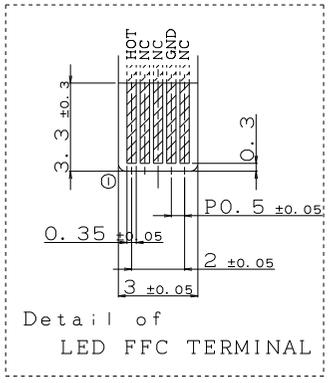
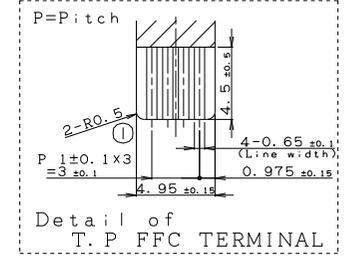
(6) Period : about 3 months

(7) Opening of the package : In order to prevent the LCD module from breakdown by electrostatic charges, please control the room humidity over 50%RH and open the package taking sufficient countermeasures against electrostatic charges, such as earth, etc.

SHARP



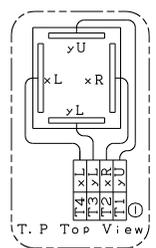
- General tolerance is ± 0.5
- LCD-FPC should be bended only bending area.
- LCD/LED-FPC bend larger than 0.6 in radius.
- T.P-FPC bend larger than 2 in radius.
- Take care in set design to hide the scratches and bubbles appeared on the polarizer or other frame area which is located outside of guarantee area.
- The light of Back Light is leaking from BM outside, please light shielding by the set.
- The tolerance of module width are exclude warp of case.
- Glazing cushion material should be limited just on the busbar insulation paste area.



Unit is mm
CONFIDENTIAL

3.52" 240 x 320 pixel
dot pitch : 0.0745 (H) mm
 : 0.2235 (V) mm

Fig. 1 LQ035Q7DB06
Outline Dimensions



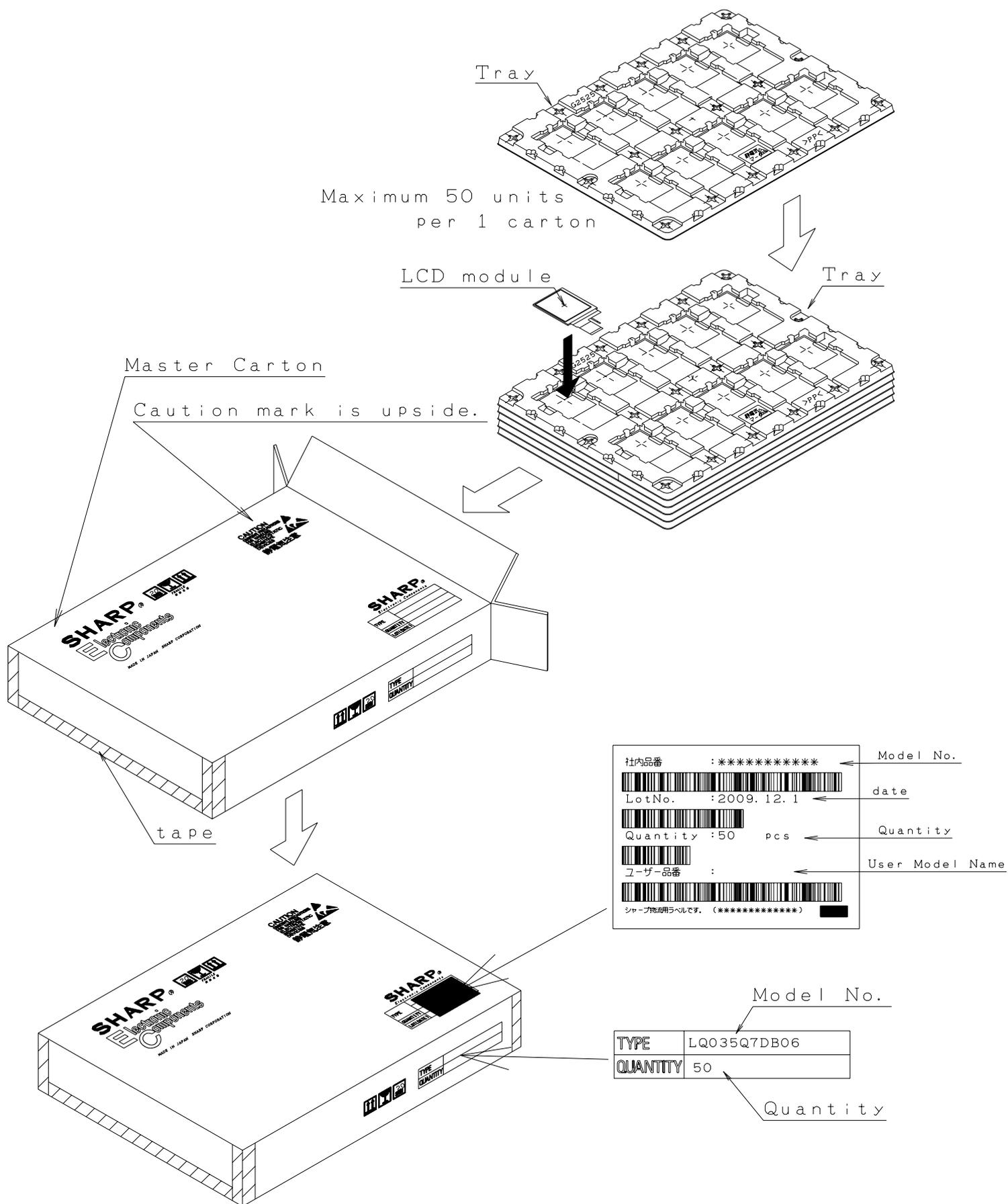


Fig. 3 Package form

LCD Specification

LCD Group



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 Nagaïke-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

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 responsible in any way, for any incidental or consequential economic or property damage.