S H A R P

MOBILE LIQUID CRYSTAL DISPLAY GROUP
SHARP CORPORATION

S P E C I F I C A T I O N

DEVICE SPECIFICATION FOR

T F T — L C D   m o d u l e

MODEL No. LQ035Q7DB02R

☐ CUSTOMER'S APPROVAL

DATA _____

BY _____

PRESENTED

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ENGINEERING DEPT. V

MOBILE LCD DESIGN CENTER I

MOBILE LIQUID CRYSTAL DISPLAY GROUP

SHARP CORPORATION

RECORDS OF REVISION

	NO.	PAGE	SUMMARY	NOTE
2005.06 .15		-	-	1 st Issue

(1) Application

　　This specification applies to LQ035Q7DB02R.

(2) Overview

　　This module is a color reflective and active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor), named AD-TFT(Advanced TFT). It is composed of a color TFT-LCD panel, driver ICs, an FPC, a back light, a touch panel 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.

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		TYP.
Surface hardness	3H		

Note 3-1

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

(4)Pixel configuration
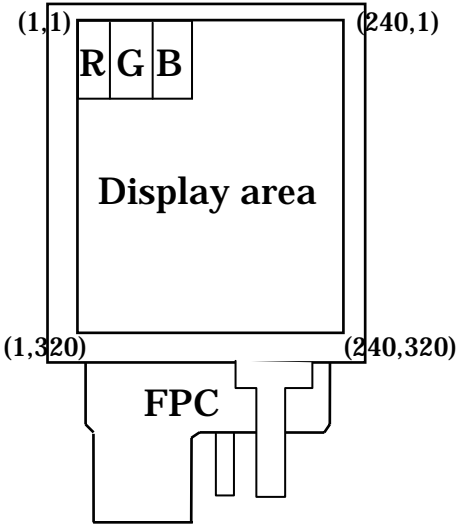
(5)Input/Output terminal

  5-1)TFT-LCD panel driving section

Table2   Recommendation CN   FH12A-50S-0.5SH(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
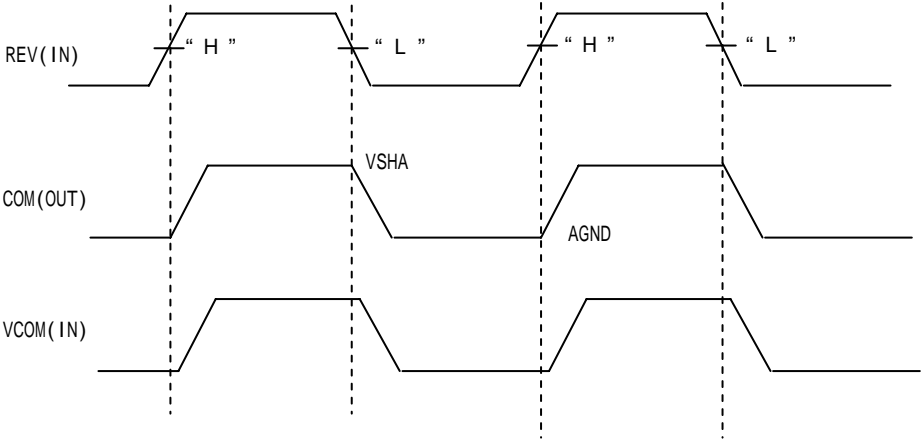
5-2)Back light driving section

Table3   Recommendation CN   CFP4605-0150F (SMK)

Pin No.	Symbol	I/O	Description	Remark
1	VL1	I	Power supply for LED (High voltage)	
	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   Recommendation CN   04(1.0)9FLH-SM1-TB (LF)

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	opp		-10 60		Note6
Storage temperature	stg		-25 70		Note6-2

[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.
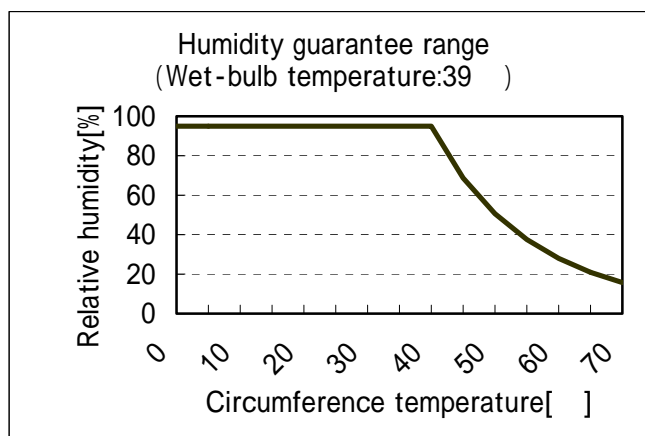
The maximum humidity in the temperature

(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	μ A	Note 7-1
Input current for Source driver (High)		IIHS1	-	-	30	μ A	Note 7-2
		IIHS2	-	-	1200	μ A	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	μ A	Note 7-4
Input current for Gate driver (High)		IIHG	-	-	4	μ A	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.3,4) must be low voltage when turning on the power supply, and it is held until more than double vertical periods after DATA is turned on completely. After then, it must be held high voltage until turning off the power supply.(Connect Pin No.3,4 terminals to the same signal.)
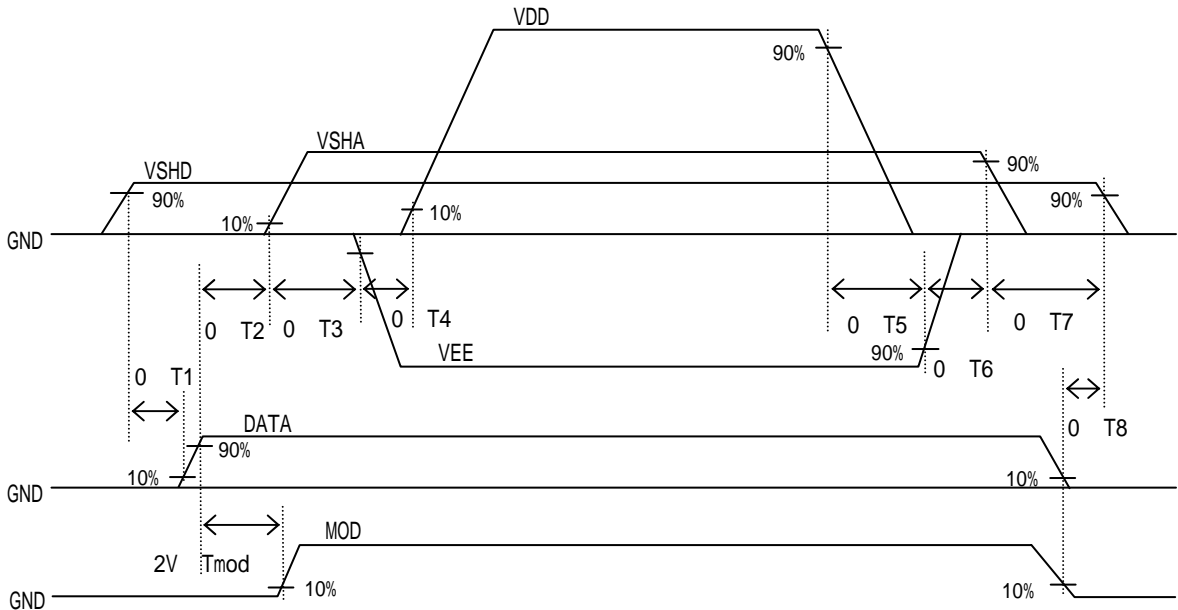
Note 7-1   DCLK,SPL,SPR,LBR,LP,PS,REV,R0   R5,G0   G5 and B0   B5 terminals are applied.

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	V_L		21.6	24	V	
LED current	I_L		15	20	A	
Power consumption	W_L		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			μs	PS
	Setup time of PS	Tsulps	1			μs	
	Hold time of PS	Thps	0			μs	
	Hold time of PS	Thlps	30			ns	
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	
	Frequency of start pulse	fsps	58		86	Hz	SPS
	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".
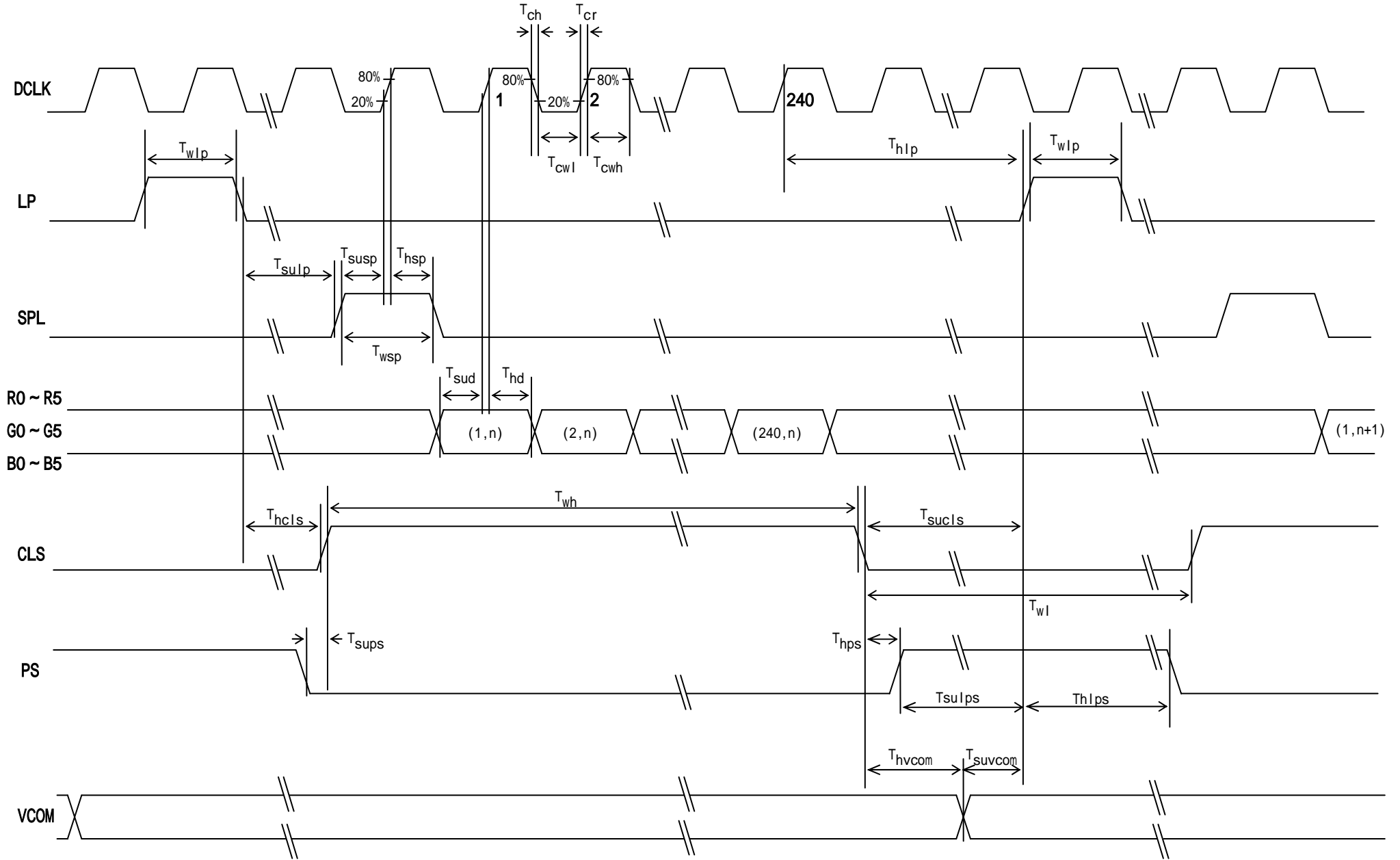
Fig.(a) Horizontal timing chart
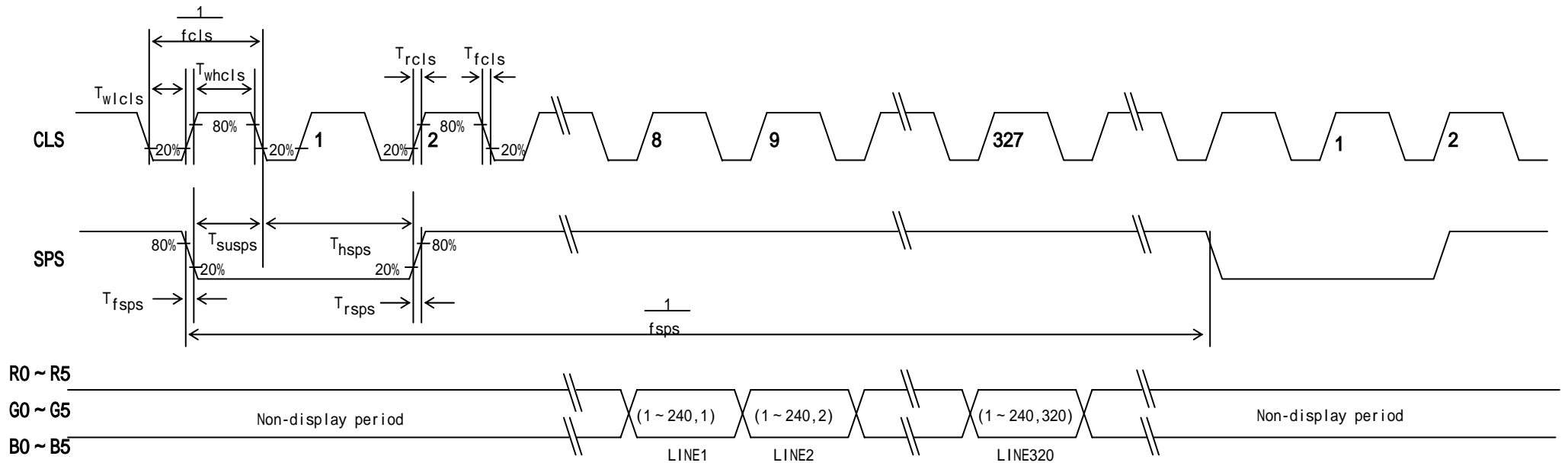
Fig.(b) Vertical timing chart

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 … 37μ 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	6.0	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)

( )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	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 bleu — 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
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   Ta=25°C

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle range		θ21,22		35	50	-	degree	[Note 9-1,2]
		θ11	CR≥2	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	θ =0°	-	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	θ =0°	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.)
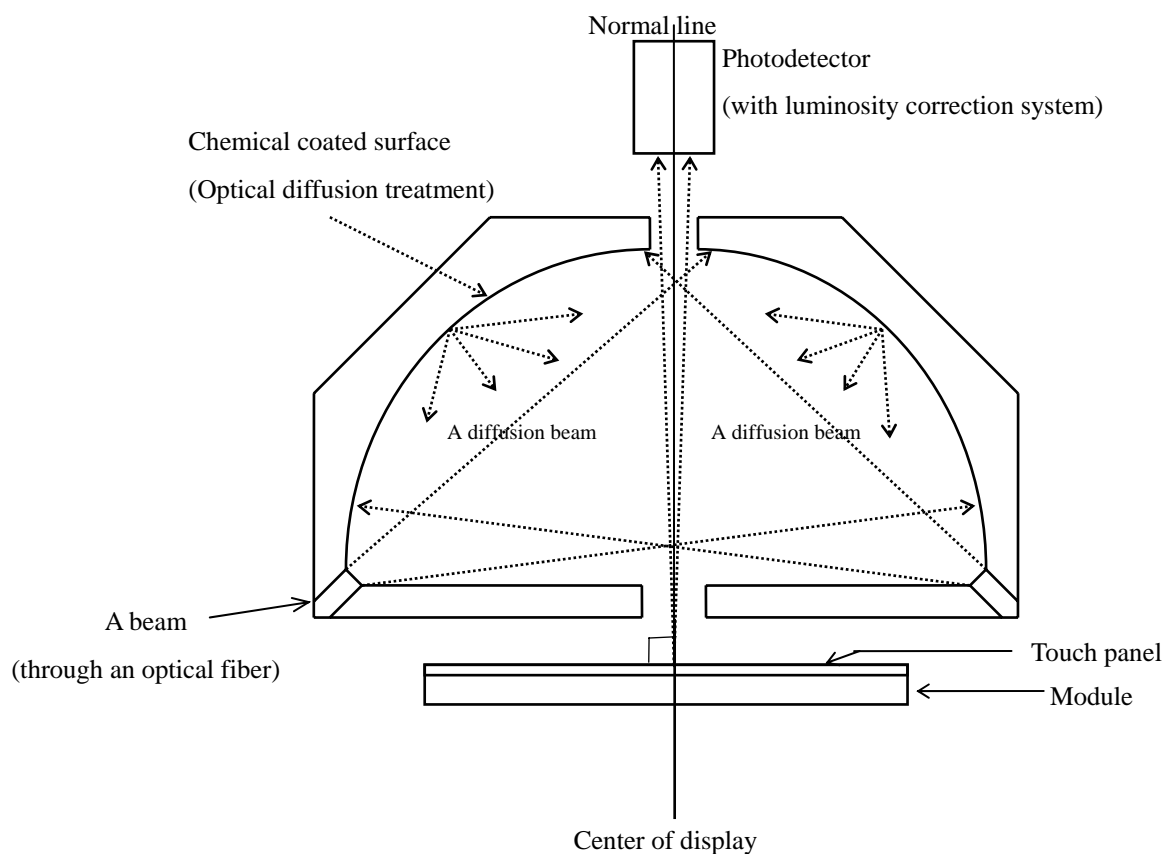
Measuring method (a) for optical characteristics

9-2)Driving the Back light condition

Table 12   Ta=25°C

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle range		θ21,22		30	40	-	degree	[Note 9-1,2,6]
		θ11	CR≥2	40	50	-	degree	
		θ12		30	40	-	degree	
Contrast ratio		Crmax	θ = 0°	40	70	-		[Note 9-2]
Response time	Rise	τ r		-	30	60	ms	[Note 9-3]
	Fall	τ d		-	50	100	ms	
White chromaticity		x		0.27	0.32	0.37		
		y		0.29	0.34	0.39		
Brightness		Y	θ = 0°	40	50	-	cd/m2	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 SR-3.(Viewing cone 1)

Photodetector(including luminosity facter)

Fi el d=1°

Touch panel

LCD module

Center
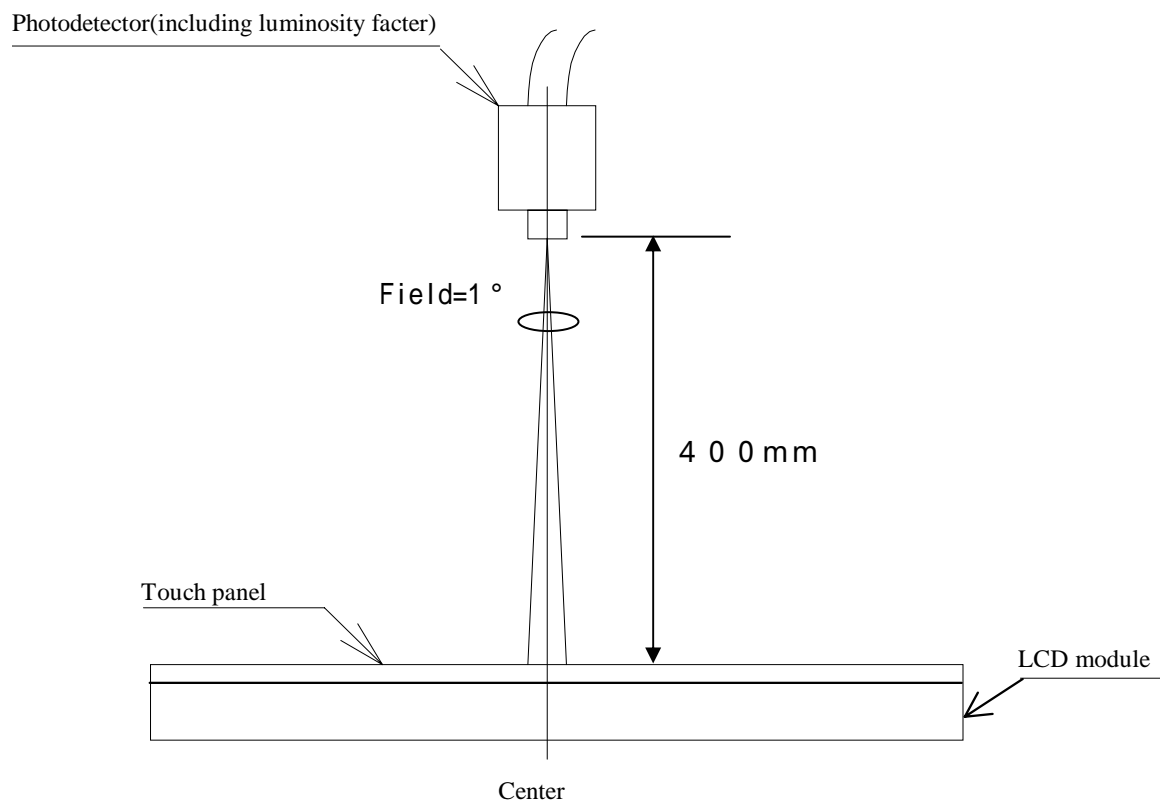
Measuring method (c) for optical characteristics

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

o'clock direction
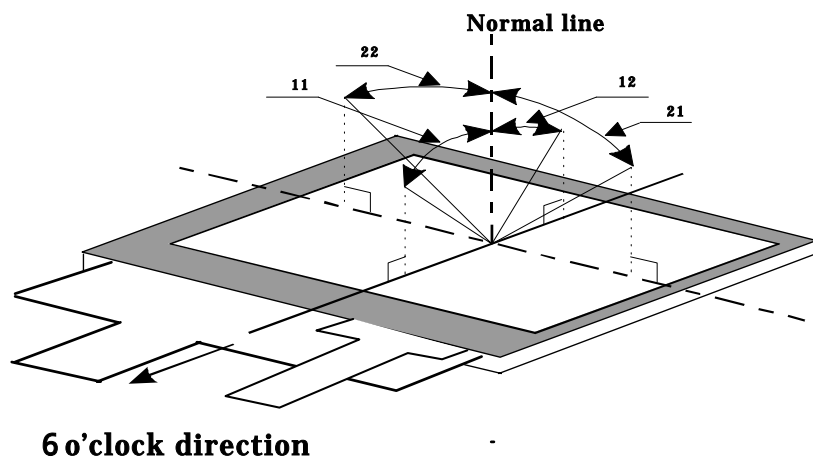
Definition for viewing angle

[Note 9-2]　Definition of contrast ratio:

The contrast ratio is defined as follows:

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

$V_{COMAC}=5.0Vp\text{-}p$

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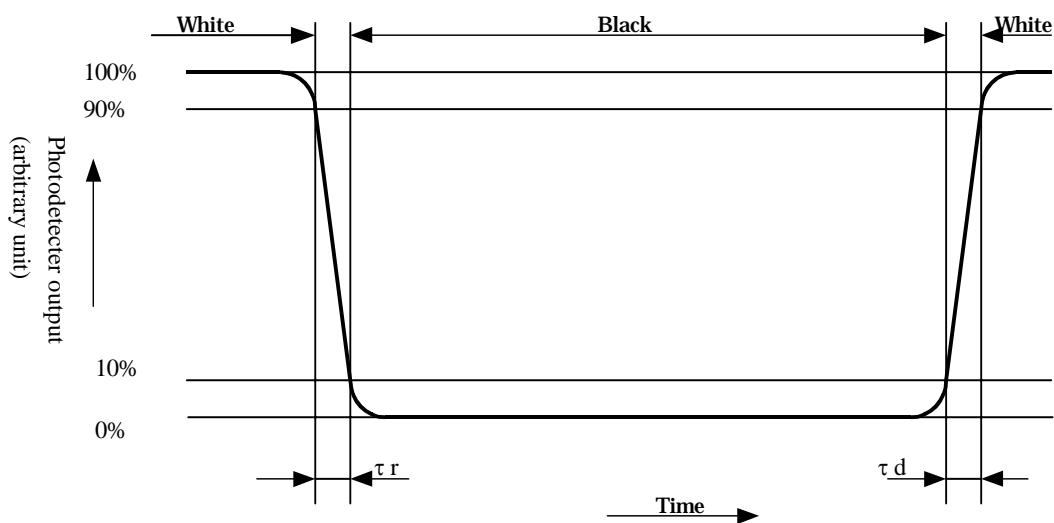
[Note 9-4] A measurement device is Minolta CM-2002.

[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 defind 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
Resistor between terminals(YU-YD)	275		850		specification
Accuracy of detecting dimension			± 1.0	%	
Line linearity(X direction)			1.5	%	
Line linearity(Y direction)			1.5	%	
Insuration 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

FH12A-50S-0.5SH(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 an 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 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 to use an adhensive-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".

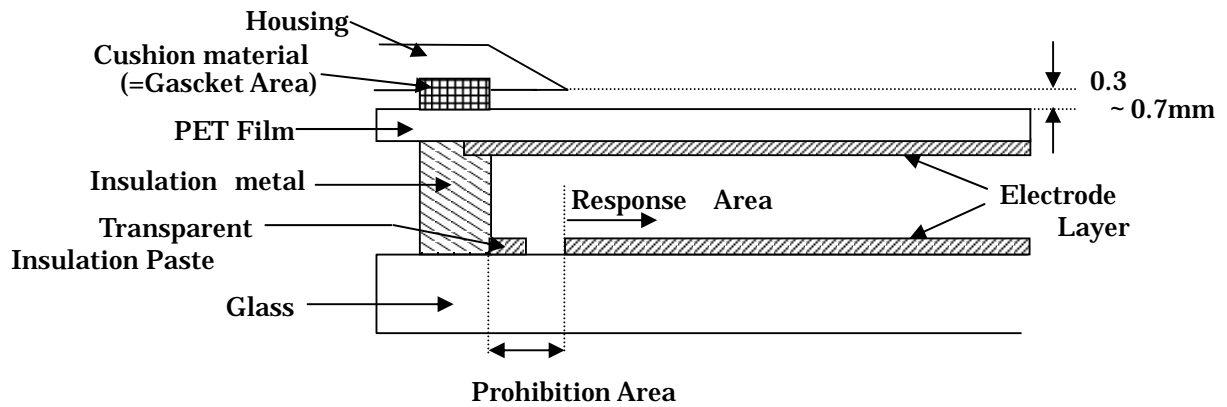 (5)The input to the Touchpanel sometimes distorts touch panel itself.

Fig.2

(13)Handling Precautions

13-1) Insertion and taking out of FPCs

Be sure insert and take out of the FPC into the connector of the set after turning off the power supply on the set side.

13-2) Handling of FPCs

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).

Don't give the FPCs too large force, for example, hanging the module with holding FPC.

13-3) Installation of the module

On mounting the module, be sure to fix the module on the same plane. Taking care not to warp or twist the module.

13-4)Precaution when mounting

(1) If water droplets and oil attaches to it for a long time, discoloration and staining occurs. Wipe them off immediately.

(2) Glass is used for the TFT-LCD panel. If it is dropped or bumped against a hard object, it may be broken. Handle it with sufficient care.

(3)As the CMOS IC is used in this module, pay attention to static electricity when handling it. Take a measure for grounding on the human body.

13-5)Others

(1) The liquid-crystal is deteriorated by ultraviolet rays. Do not leave it in direct sunlight and strong ultraviolet rays for many hours.

(2) 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.

(3) If the LCD breaks, don't put internal liquid crystal into the mouth. When the liquid crystal sticks to the hands, feet and clothes, wash it out immediately.

(4) Wipe off water drop or finger grease immediately. Long contact with water may cause discoloration or spots.

(5) Observe general precautions for all electronic components.

(6) VCOM must be adjusted on condition of your final product. No adjustment causes the deterioration for display quality.

(7) Static image should not be displayed more than 5 minutes in order to prevent from occurrence of residual image.

(14)Reliability Test Conditions for TFT-LCD Module

Table 14

No.	Test items	Test conditions
1	High temperature storage test	Ta=+70 240h
2	Low temperature storage test	Ta=-25 240h
3	High temperature and high humidity operating test	Tp=+40 , 95%RH 240h (But no condensation of dew)
4	High temperature operating test	Tp=+60 240h
5	Low temperature operating test	Tp=-10 240h
6	Electro static discharge test	± 200V 200pF(0) 1 time for each terminals
7	Shock tset	980 m/s^2, 6 ms ± X,± Y,± Z 3 times for each direction (JIS C0041, A-7 Condition C)
8	Vibration test	Frequency range: 10Hz 55Hz Stroke: 1.5 mm Sweep: 10Hz 55Hz X,Y,Z 2 hours for each direction (total 6 hours) (JIS C0040,A-10 Condition A)
9	Heat shock test	Ta=-25 +70 / 5 cycles (1h) (1h)
10	Point activation test (Touch panel)	Hit it 1,000,000 times with a silicon rubber of R8 HS 60. Hitting force :2.4N Hitting speed : 3 times per second
11	Writing friction resistance test (Touch panel)	Write according to the right illustration in the under –mentioned conditions: Pen : 0.8R Polyacetal stylus Load : 2.4N Speed : 3 strokes per second Stroke : 30mm Frequency : 50000 times Testing apparatus : shown in Fig (I)

Fig.(I)

Note   Ta = Ambient temperature, Tp = Panel temperature
Check items
    (a)Test No.1   9
      In the standard condition, there shall be no practical problems that may
      affect the display function.
    (b)Test No.10   No.11
      The measurements after the tests are satisfied (10)-Table 13 (Touch panel
      characteristics)

(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

LQ035Q7DB02R

      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
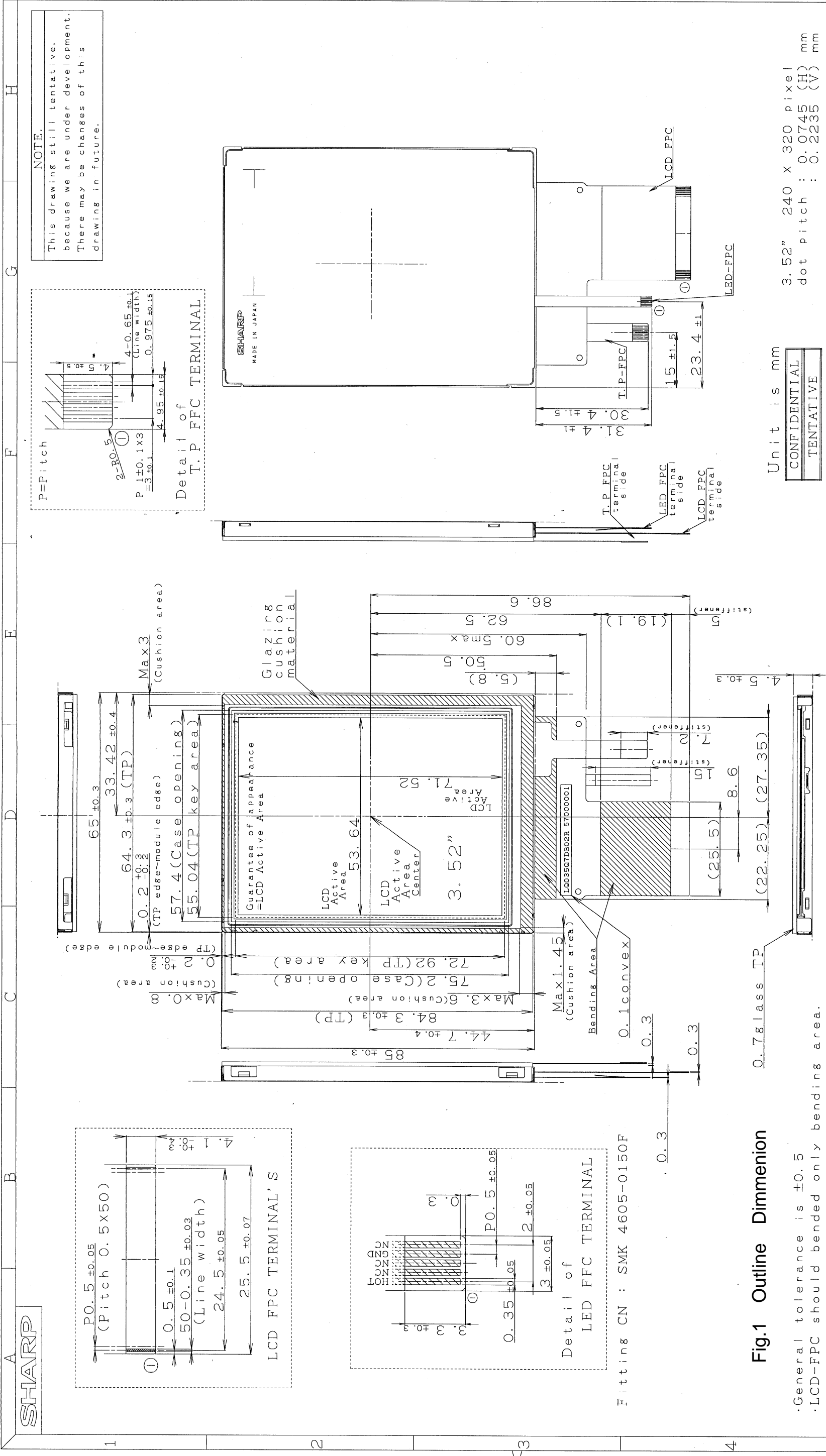   respect and good will.

16)Forwarding   form(see Fig.   Package Form)
    a)   Piling number of cartons : Max 20
    b)   Package quality in one cartons : 50pcs
    c)   Carton size : 503mm x 373mm x 88mm
    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)Period   : about 3 months
        (5)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.

NOTE.
This drawing still tentative.
because we are under development.
There may be changes of this
drawing in future.

Detail of
T.P. FFC TERMINAL

P=Pitch
4-0.65 ±0.1 (Line width)
0.975 ±0.15
4.5 ±0.5
4.95 ±0.15
2-R0.5
P 1±0.1 x3
=3 ±0.1

LCD FPC
LED-FPC
T.P-FPC

15 ±1.5
23.4 ±1
31.4 ±1
30.4 ±1.5

SHARP
MADE IN JAPAN

Unit is mm

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

T.P FPC terminal side
LED FPC terminal side
LCD FPC terminal side

Fig.1 Outline Dimmension

Max×3 (Cushion area)
Glazing cushion material
Guarantee of appearance = LCD Active Area
LCD Active Area
LCD Active Area Center
Active Area
3.52"

65 ±0.3
33.42 ±0.4
64.3 ±0.3 (TP)
57.4 (Case opening)
55.04 (TP key area)
0.2 ±0.2 (TP edge-module edge)
53.64
71.52

86.6
62.5
60.5max
50.5
(5.8)
(19.1) (stiffener)
(stiffener)
7.2
15
8.6
(25.5)
(22.25) (27.35)
4.5 ±0.3

84.3 ±0.3 (TP)
44.7 ±0.5
85 ±0.3
75.2 (Case opening)
72.92 (TP key area)
0.2 ±0.2 (TP edge-module edge)
Max0.8 (Cushion area)
Max×3.6 (Cushion area)
Max×1.45 (Cushion area)
Bending Area
0.1convex
0.3
0.3
0.3
0.7glass TP

LCD FPC
LED-FPC
T.P-FPC

T.P Top View
yU xR yL xL

Detail of
LCD FPC TERMINAL'S

P0.5 ±0.05 (Pitch 0.5×50)
0.5 ±0.1
50-0.35 ±0.03 (Line width)
24.5 ±0.05
25.5 ±0.07
4.1 ±0.3

Detail of
LED FFC TERMINAL

P0.5 ±0.05
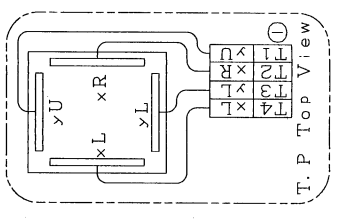2 ±0.05
3 ±0.05
3 ±0.05
0.35 ±0.05
3 ±0.3
NC NC GND NC NC HOT

Fitting CN : SMK 4605-0150F

·General tolerance is ±0.5
·LCD-FPC should bended only bending area.
·LCD/LED-FPC bend larger than 0.6 in radius.
·T.P-FFC 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 shuould be limited
 just on the busbar insuration paste area.

Tray

Maximum 50 units
per 1 carton

LCD module

Tray

Master Carton
Caution mark is upside.

tape

社内品番	:LQ035Q7DB02R	Model No.
LotNo.	:2005. 7. 1	date
Quantity	:50 pcs	Quantity
ユーザー品番	:**********	User Model Name

シャープ物流用ラベルです。（**************）

Model No.

| TYPE | LQ035Q7DB02R |
| QUANTITY | 50 |

Quantity

Fig.3 Forwarding Form