SHARP

MOBILE LIQUID CRYSTAL DISPLAY GROUP II
SHARP CORPORATION

CHECKED BY : DATE
T.Omori : Jul 20,2006

SPECIFICATION

DEVICE SPECIFICATION FOR

CG-Silicon TFT-LCD module

MODEL No. LS037V7DW03

CUSTOMER'S APPROVAL

DATA _____

BY _____

PRESENTED
BY 中辻 晴雄

H. NAKATSUJI
DIVISION DEPUTY GENERAL MANAGER &
DEPARTMENT GENERAL MANAGER
ENGINEERING DEPARTMENT VII
MOBILE LCD DESIGN CENTER
MOBILE LCD GROUP II
SHARP CORPORATION

RECORDS OF REVISION

MODEL No.: LS037V7DW03

SPEC No.: LCP-06014A

	NO.	PAGE	SUMMARY	NOTE
2006.07.20	LCP-06014A	-	-	1st Issue

(1) Application

This literature applies to LS037V7DW03.

(2) Overview

This module is a color transflective and active matrix LCD module incorporating CG-Silicon TFT (Continuous Grain-Silicon Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs (with control Function), an FPC(with DC-DC Converter), a back light and a back sealed casing.

It is composed control circuit. Graphics and texts can be displayed on a 480×3×640 dots panel with 262,144 colors by supplying.

This LCD module has multi resolution and multi colors functions. A resolution mode is selective in VGA (480H×640V) or QVGA (240H×320V). A Color mode is selective in 262,144 colors (18bit RGB) or 8 colors (3bit RGB).

It is a wide viewing-angle-mode (Vertical viewing angle:(±80°) Horizontal viewing angle: (±80°) ,CR ≧ 5).

(3) Mechanical specifications

Table 1

Parameter	Specifications	Units	Remarks
Screen size (Diagonal)	9.4 [3.7"] Diagonal	cm	
Display active area	56.16（H）×74.88（V）	mm	
Pixel format	480(H)×640(V) (1 pixel = R+G+B dots)	pixels	
Dot pitch	0.039（H）×0.117（V）	mm	
Pixel configuration	R,G,B vertical stripe		
Display mode	Normally Black		
Unit outline dimension	65.0(W)×89.2(H)×3.6(D)	mm	【Note3-1】
Mass	38	g	

【Note 3-1】Excluding protrusion. For detailed measurements and tolerances, please refer to Fig. 1.

(4) Pixel configuration

VGA mode ： m=480,n=640

QVGA mode： m=240,n=320
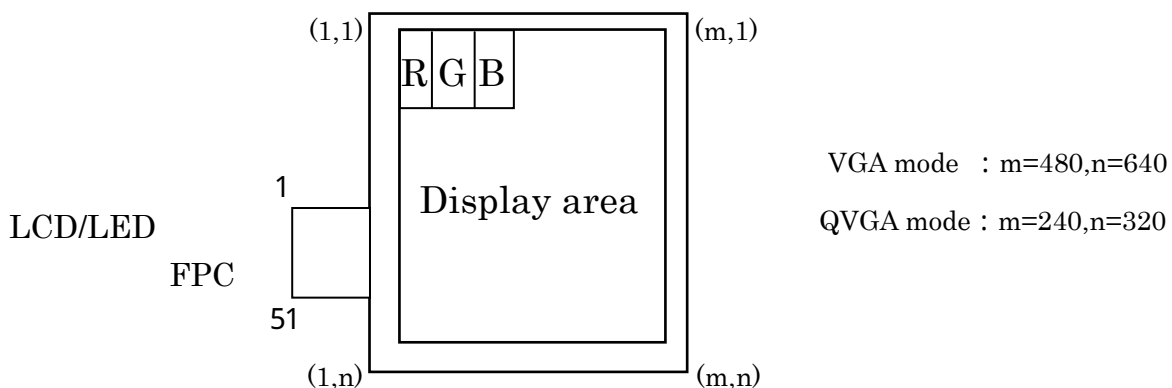
(5) Input/Output terminal

　5-1) TFT-LCD panel and Backlight driving section

　　Table2

Pin No.	Symbol	I/O	Description	Remarks
1	LED+	-	LED power supply(High Voltage)	【Note5-1】
2	NC	-		
3	LED-	-	LED power supply(Low Voltage)	
4	NC	-		
5	NC	-		
6	NC	-		
7	NC	-		
8	NC	-		
9	GND	-	Ground	
10	RESB	I	Reset signal	【Note5-2】
11	GND	-	Ground	
12	MO	I	Selection for resolution(VGA/QVGA)	【Note5-3】
13	UD	I	Selection for vertical scanning direction	【Note5-4】
14	LR	I	Selection for horizontal scanning direction	【Note5-5】
15	INI	I	Power on control	【Note5-2】
16	DEN	I	Data enable signal	【Note5-6】
17	GND	-	Ground	
18	VSYNC	I	Vertical synchronizing signal	
19	GND	-	Ground	
20	HSYNC	I	Horizontal synchronizing signal	
21	GND	-	Ground	
22	CLKIN	I	System clock signal	
23	GND	-	Ground	
24	VCC	-	Power supply(3.3V)	【Note5-2】
25	VCC	-	Power supply(3.3V)	【Note5-2】
26	VCC	-	Power supply(3.3V)	【Note5-2】
27	GND	-	Ground	
28	B5	I	Blue data signal(MSB)	
29	B4	I	Blue data signal	
30	B3	I	Blue data signal	
31	B2	I	Blue data signal	
32	B1	I	Blue data signal	
33	B0	I	Blue data signal(LSB)	
34	GND	-	Ground	
35	G5	I	Green data signal(MSB)	
36	G4	I	Green data signal	

Pin No.	Symbol	I/O	Description	Remarks
37	G3	I	Green data signal	
38	G2	I	Green data signal	
39	G1	I	Green data signal	
40	G0	I	Green data signal(LSB)	
41	GND	–	Ground	
42	R5	I	Red data signal(MSB)	
43	R4	I	Red data signal	
44	R3	I	Red data signal	
45	R2	I	Red data signal	
46	R1	I	Red data signal	
47	R0	I	Red data signal(LSB)	
48	GND	–	Ground	
49	SMPSYNC	I	Selection for Vertical/ Horizontal synchronizing signal timing(clock timing)	【Note5-7】
50	SMPDATA	I	Selection for Red, Green and Blue data signal timing (clock timing)	【Note5-7】
51	ID1	–	Ground	

【Note5-1】 When superfluous current flows, please intercept current with a fuse etc.

【Note5-2】 See section(7-1)-(A) "※ Cautions when you turn on or off the power supply".

【Note5-3】 Selection for resolution mode

MO	Resolution
Low	VGA(480RGB×640)
High	QVGA(240RGB×320)

【Note5-4】 Selection for vertical scanning direction

U/L	Scanning direction (Pixel configuration)
High	Conventional scanning (X , 1) ↓ (X , Y)
Low	Inverted scanning (X , 1) ↑ (X , Y)

VGA mode: Y=640, QVGA mode: Y=320

【Note5-5】 Selection for horizontal scanning direction

LBR	Scanning direction (Pixel configuration)
High	Conventional scanning (1,Y) → (X,Y)
Low	Inverted scanning (1,Y) ← (X,Y)

VGA mode: X=480, QVGA mode: X=240

【Note5-6】

   DEN makes it possible to take effective data timing.   Horizontal Data Sampling Timing is shown in 7-2) Timing Characteristics of input signals.

【Note5-7】 Selection for synchronizing signal and data signal timing(clock timing)

SMPSYNC	Selection for Vertical/ Horizontal synchronizing signal timing(clock timing)	SMPDATA	Selection for Red,Green and Blue data signal timing(clock timing)
High	Rise edge of clock(CLKIN)	High	Rise edge of clock(CLKIN)
Low	Fall edge of clock(CLKIN)	Low	Fall edge of clock(CLKIN)

(6)Absolute Maximum Ratings

Table 3

Parameter	Symbol	Condition	Ratings	Unit	Remark
Power supply (COG driver / Digital)	VSHD	Ta=25℃	-0.3 ~ +4.0	V	
Input voltage (Digital)	VID	Ta=25℃	-0.3 ~ VSHD+0.3	V	[Terminal]
Operating temperature(Panel surface)	Topp	–	-10 ~ 60	℃	【Note6-1】
Storage temperature	Tstg	–	-20 ~ 70	℃	【Note6-1】
LED current	I_L	Ta=25℃	30	mA	【Note6-2】

[Terminal] INI,VSYNC,HSYNC,MO,UD,LR,CLK,R0 ~ R5,G0 ~ G5,B0 ~ B5,DEN,RESB

【Note6-1】 Humidity: 95%RH Max.(at Ta ≦ 40℃). Maximum wet-bulb temperature is less than

39℃ (at Ta > 40℃). Condensation of dew must be avoided.

【Note6-2】 (Provisional plan) LED current should be as per below figure.
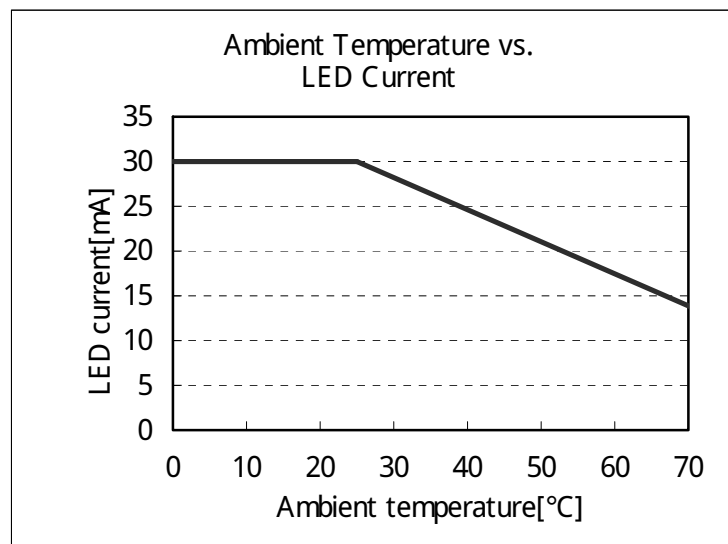
(7)Electrical characteristics

7-1) Recommended operating conditions

A) TFT-LCD panel driving section

Table4   GND=0V

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remarks
Supply voltage for COG driver	Digital	VSHD	+3.0	+3.3	+3.6	V	
Input voltage (Low)		VILS	GND	-	0.2VSHD	V	【Note 7-1】
Input voltage (High)		VIHS	0.8VSHD	-	VSHD	V	【Note 7-1】
Input current (Low)		IILS	-	-	10	µA	【Note 7-1】
Input current (High)		IIHS	-	-	10	µA	【Note 7-1】

※ Cautions when you turn on or off the power supply
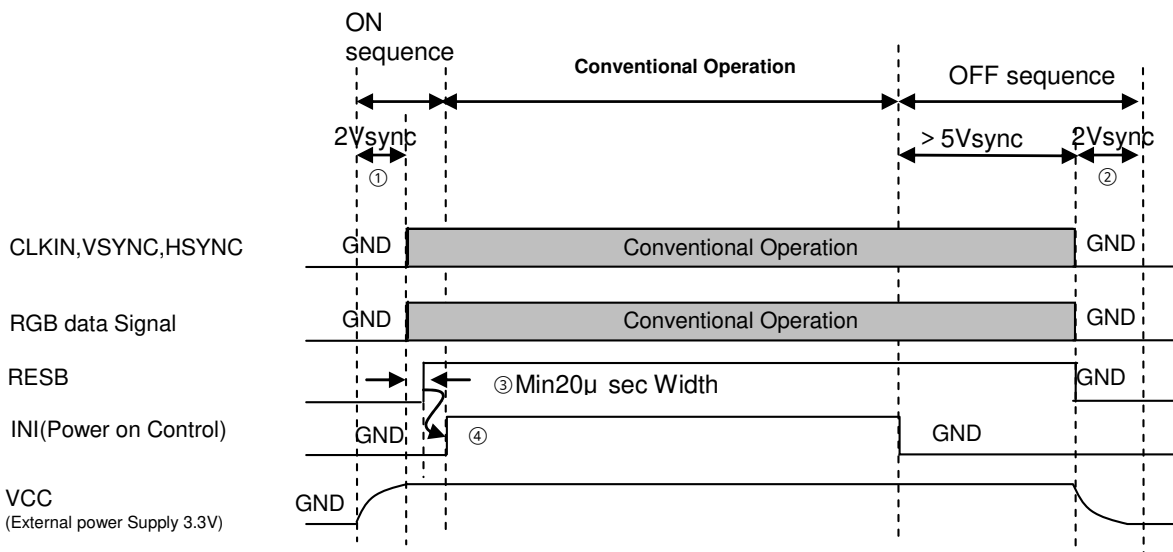
(1) After VCC is ON ,please make sure to start HVIF(CLK,HSYNC,VSYNC,RGB data signal) synchronized signal before INI(Power on control) becomes High.

(2) Please keep HVIF(CLK,HSYNC,VSYNC,RGB data signal) synchronized signal High for more than 5 vertical period after INI becomes Low to shut down VCC.

(3) Stabilize VCC(+ 3.3V) within double vertical periods.

(4) VCC is stabilized to GND within double vertical periods.

(5) When the power supply is on again after Power Supply Off sequence ,please put the RESB signal before Power Supply On sequence. RESB signal needs LOW level more than 20μsec after VCC(+3.3V) ON.

(6) Please Set RESB signal before INI Signal.

【Note 7-1】 INI,VSYNC,HSYNC,MO,UD,LR,CLK,R0 ~ R5,G0 ~ G5,B0 ~ B5,DEN,RESB terminals are applied.
　　　　　　　 Each voltage should be kept to satisfy absolute maximum ratings.
　　　　　　　 If the applied voltage goes beyond absolute maximum ratings, the LCD module may be broken eternally.

B)　Back light driving section

Table 5　　　Ta=25

Parameter	Symbol	MIN	TYP	MAX	Units	Remarks terminal
LED voltage(VL)	V_L	–	27.9	31.5	V	【Note 7-2】
LED current(IL)	I_L	–	16	20	mA	
Power consumption	W_L	–	446.4	630	mW	【Note 7-3】

【Note 7-2】 V_L(TYP) at I_L(16mA).　V_L (MAX) at I_L (20mA).

【Note 7-3】 Calculated reference value.　$W_L=(V_L \times I_L)$

7-2) Timing Characteristics of input signals

Table 6   AC Characteristics

Parameter	Symbol	MODE	Min.	Typ.	Max.	Unit	Note
CLK Period	t_{CLK}	VGA QVGA	38 152	39.7 158.8	41.7 167	ns	CLK
CLK Low Width	t_{CLKL}		15	-	-	ns	
CLK High Width	t_{CLKH}		15	-	-	ns	
Data setup time	t_{DS}		10	-	-	ns	R0 ~ R5, G0 ~ G5, B0 ~ B5
Data hold time	t_{DH}		10	-	-	ns	
Pulse width of DEN	t_{HHW}	VGA QVGA	-	480 240	-		
Period of HSYNC	t_{HS}	VGA QVGA	-	648 324	-	CLK	HSYNC
Pulse width of HSYNC	t_{hsw}		-	2	-	CLK	
HSYNC setup time	t_{HSYS}		10	-	-	ns	
HSYNC hold time	t_{HSYH}		10	-	-	ns	
Horizontal Back Porch	t_{HBP}	VGA QVGA	28 14	78 38	166 82	CLK	
Horizontal Front Porch	t_{HFP}	VGA QVGA	0 0	88 44	138 68	CLK	
Period of VSYNC	t_{VS}		57	59.94	63	Hz	VSYNC
Period of VSYNC	t_{VS}	VGA QVGA	- -	648 324	-	HCYC	
Pulse width of VSYNC	t_{vsw}		-	1	-	HCYC	
VSYNC setup time	t_{VSYS}		10	-	-	ns	
VSYNC hold time	t_{VSYH}		10	-	-	ns	
VSYNC-HSYNC phase difference	t_{VHD}		0		HCYC-2	CLK	【Note 7-4】
Input Signal 1 Rising Time	t_{RISE1}		-	-	5	ns	【Note 7-5】
Input Signal 1 Falling Time	t_{FALL1}		-	-	5	ns	【Note 7-5】
Input Signal 2 Rising Time	t_{RISE2}		-	-	5	μs	【Note 7-6】
Input Signal 2 Falling Time	t_{FALL2}		-	-	5	μs	【Note 7-6】
Reset Pulse Width	t_{RESW}		20	-	-	μs	【Note 7-7】

【Note 7-4】 HCYC = HSYNC Period(VGA:Typ.648CLK,　QVGA:Typ.324CLK)

【Note 7-5】 VSYNC,HSYNC,CLK,R0～R5,G0～G5,B0～B5,DEN terminals are applied.

t_{RISE1}　t_{FALL1}

Input Signal　0.1VDD　0.9VDD　0.9VDD　0.1VDD
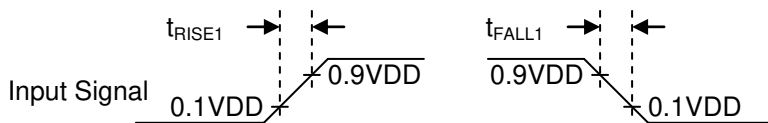
【Fig 7-1 Input Signal Rising/Falling Timing】

【Note 7-6】 INI,RESB　terminals are applied.

t_{RISE2}　t_{FALL2}

Input Signal　0.1VDD　0.9VDD　0.9VDD　0.1VDD
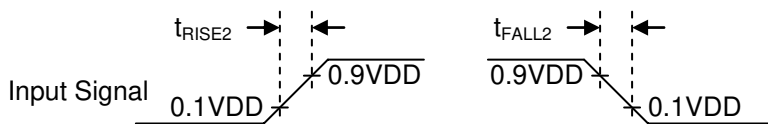
【Fig 7-2 Input Signal Rising/Falling Timing】

【Note 7-7】 Reset Signal Timing chart

t_{RESW}

RESB
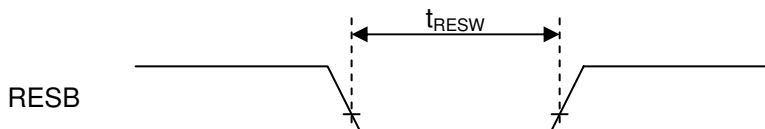
【Fig 7-3 Reset Timing Signal】

7-3)Power consumption

Measurement condition：Vsync=59.94Hz,Hsync=38.84kHz,CLK=25.17MHz,Ta=25℃ (VGA Mode)

Table 7　　　　　　　　　　　　　　　　　　　　　　　(when conventional scan mode)

Parameter	Sym	Conditions	MIN	TYP	MAX	Unit	Remarks
VSHD Total (Digital+Analog)	ISHD	VSHD=+3.3V	–	45	75	mA	【Note7-8】

【Note 7-8】 White Pattern

[Portrait VGA Mode Timing Chart]

[Vertical Timing]

【※ 1 】

t_{VS} (Typ. 648)

VSYNC

t_{VSW}

HSYNC

| 648 | 1 | 2 | 3 | 4 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 1 | 2 | 3 |

CLKIN

RIN[5:0]
GIN[5:0]
BIN[5:0]

1LINE 2LINE 639LINE 640LINE 1LINE

[Horizontal Timing]

t_{HS} (Typ.648CLK)

HSYNC

t_{HSW}

t_{HBP}

t_{HHW}

t_{HFP}

DEN

【※ 2 】

CLK

RIN[5:0]
GIN[5:0]
BIN[5:0]

| 1 | 2 | 3 | 4 | 477 | 478 | 479 | 480 |

【 1 】

t_{VSYS} t_{VSYH}

VSYNC

t_{VHD} t_{HSYS} t_{HSYH}

HSYNC

CLKIN

【※ 2 】

t_{CLK}

t_{CLKL} t_{CLKH}

CLK

t_{DS} t_{DH}

RIN[5:0]
GIN[5:0]
BIN[5:0]
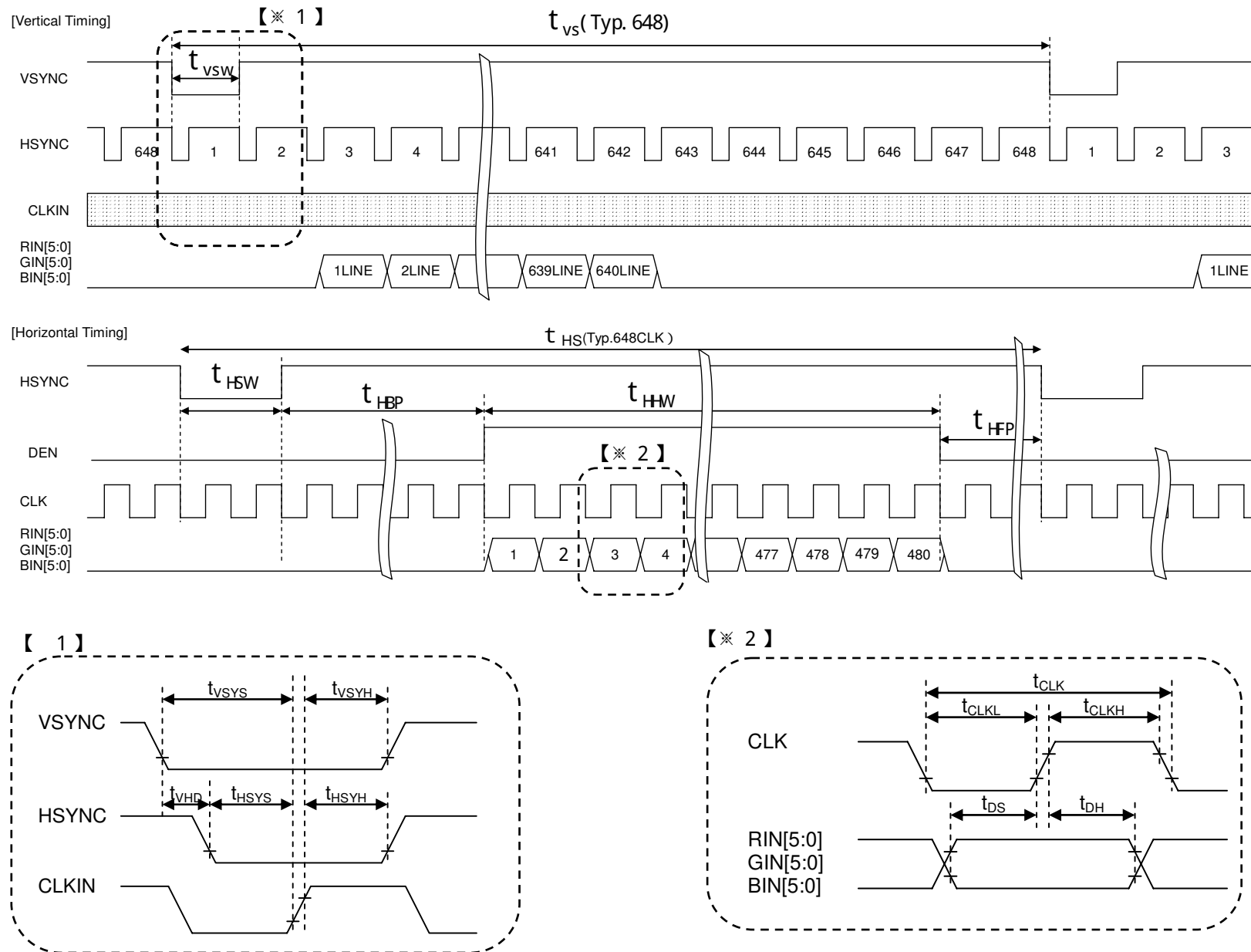
Fig 7-3 LCDIF signal timing in Portrait VGA mode

[Portrait QVGA Mode Timing Chart]

[Vertical Timing]

【※1】

t_{VS}(Typ.324)

VSYNC

t_{VSW}

HSYNC   324   1   2   3   4   321   322   323   324   1   2   3

CLKIN

RIN[5:0]
GIN[5:0]
BIN[5:0]   1LINE   2LINE   319LINE   320LINE   1LINE

[Horizontal Timing]

t_{HS} (Typ.324CLK)

HSYNC

t_{HBP} t_{HHW} t_{HFP}

DEN

t_{HSW} 【※2】

CLK

RIN[5:0]
GIN[5:0]
BIN[5:0]   1   2   3   4   237   238   239   240

【※1】

t_{VSYS} t_{VSYH}

VSYNC

t_{VHD} t_{HSYS} t_{HSYH}

HSYNC

CLKIN

【※2】

t_{CLK}

t_{CLKL} t_{CLKH}

CLK

t_{DS} t_{DH}

RIN[5:0]
GIN[5:0]
BIN[5:0]

Fig 7-4 LCDIF signal timing in Portrait QVGA mode

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

Table 8   18bit RGB color display mode

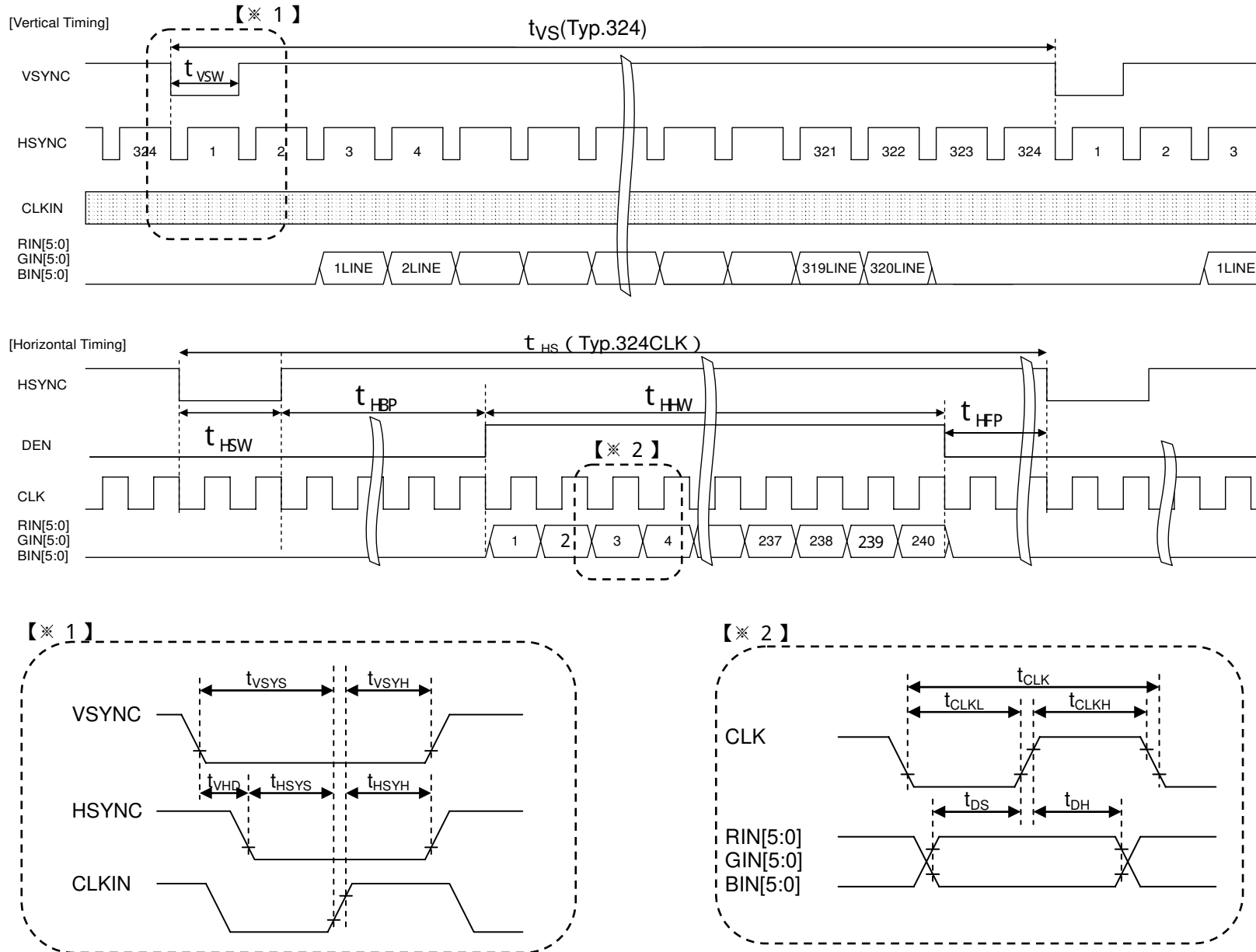| Colors & Gray scale		Gray Scale	R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic color	Black	–	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	–	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	–	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	–	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	–	1	1	1	1	1	1	0	0	0	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
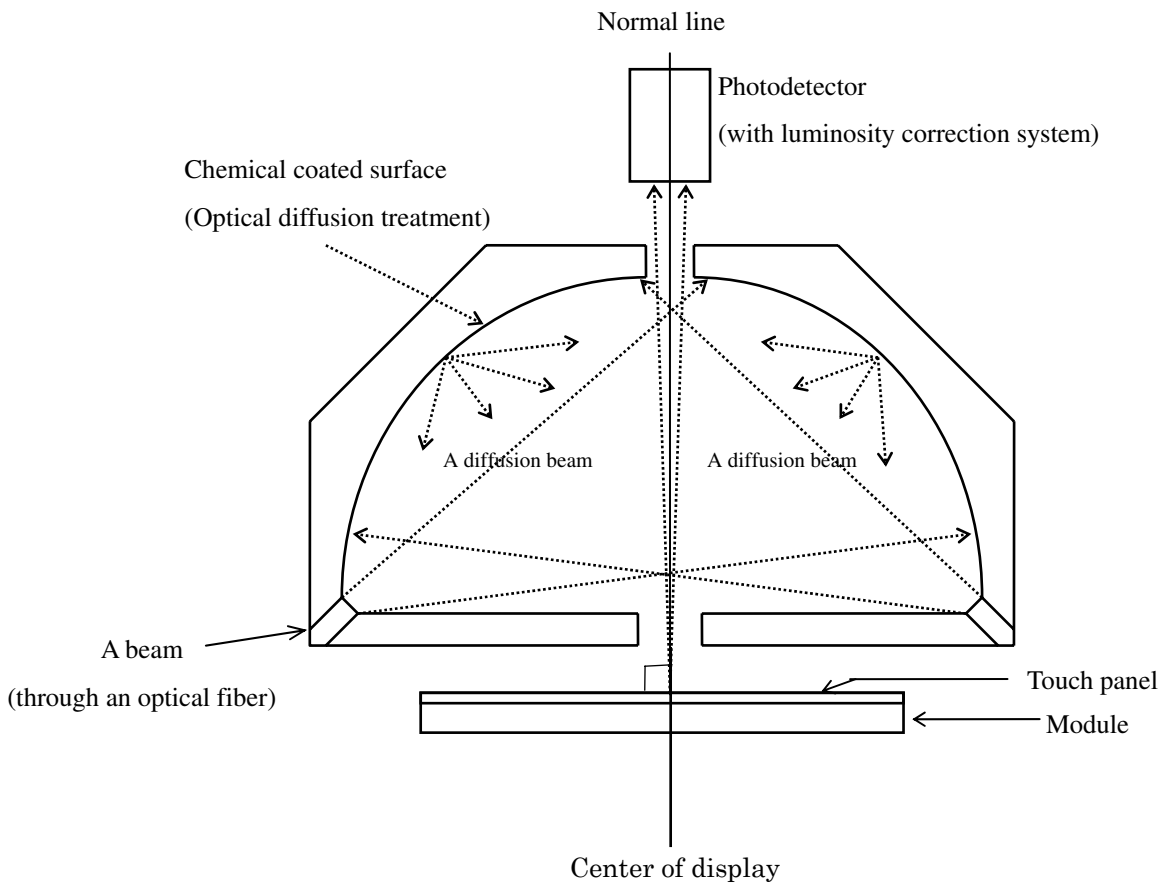
9-1) Not driving the Back light condition

Table 9   Ta=25°C

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle range		θ21,22		30	40	-	degree	[Note 9-1,2]
		θ11, 12	CR ≧ 1.2	30	40	-	degree	
Contrast ratio		CRmax	θ =0°	-	2	-		[Note 9-2,4]
Response time	Rise	τ r		-	10	20	ms	[Note 9-3]
	Fall	τ d	θ =0°	-	10	20	ms	
White chromaticity		x		0.25	0.30	0.35		[Note 9-4]
		y		0.30	0.35	0.40		
Reflection ratio		R	θ =0°	2	4	-	%	[Note 9-5]

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

* A measurement device is Otsuka luminance meter LCD5200.(With the diffusion reflection unit.)

Measuring method (a) for optical characteristics

9-2) Driving the Back light condition

Table 10   Ta=25°C

| Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing angle range		θ21,22	CR ≧ 5	40	80	-	degree	[Note 9-1,2,6]
		θ11,12		40	80	-	degree	
Contrast ratio		Crmax		100	200	-		[Note 9-2]
Response time	Rise	τr	θ = 0°	-	15	20	ms	[Note 9-3]
	Fall	τd		-	20	30	ms	
White chromaticity		X		0.26	0.31	0.36		
		Y		0.28	0.33	0.38		
NTSC ratio		S		-	35	-	%	
Brightness		Y	θ = 0°	130	200	-	cd/m^2	I_L=16mA
Uniformity		U	θ = 0°	60	-	-	%	[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)

Touch panel

LCD module

Center
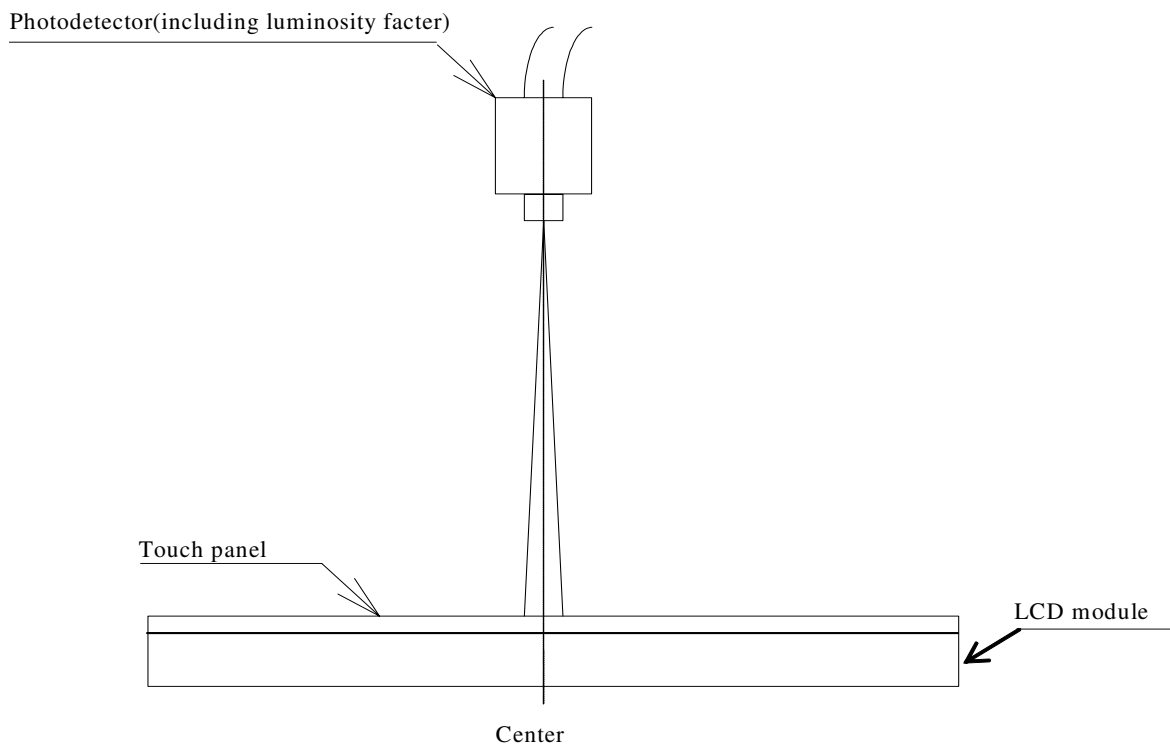
【Measuring method　for optical characteristics】

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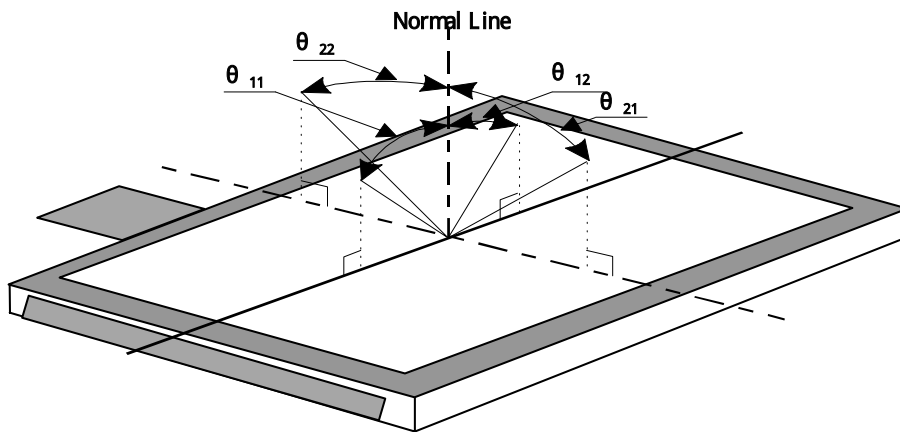
【Definition for viewing angle】

【Note 9-2】Definition of contrast ratio:

The contrast ratio is defined as follows:

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

V_{COMAC}=5.0Vp-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".
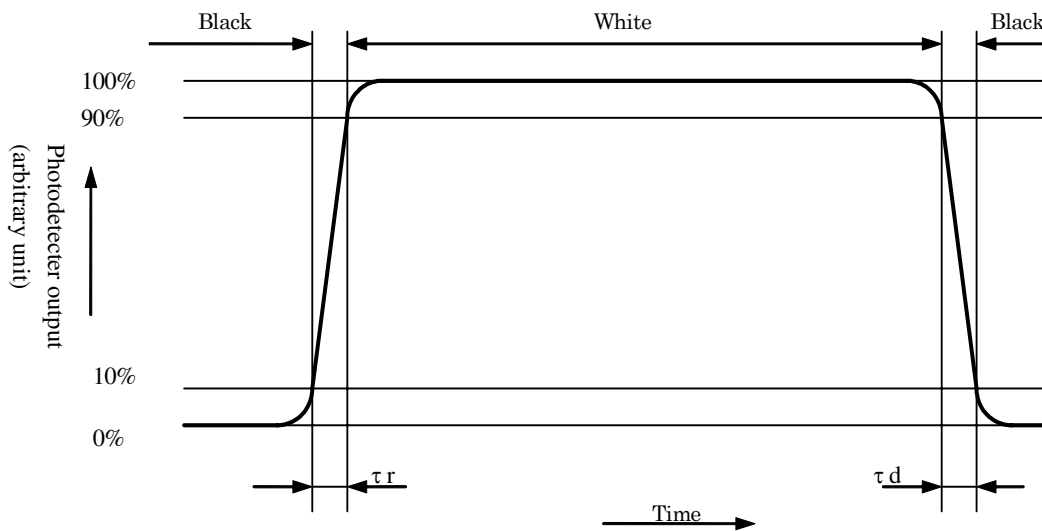
【Note 9-4】A measurement device is Minolta CM-2002.

【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】Definition of Uniformity

$$\text{Uniformity} = \frac{\text{Minimum Brightness}}{\text{Maximum Brightness}} \times 100(\%)$$

The brightness should be measured on the
9-point as shown in the right figure.
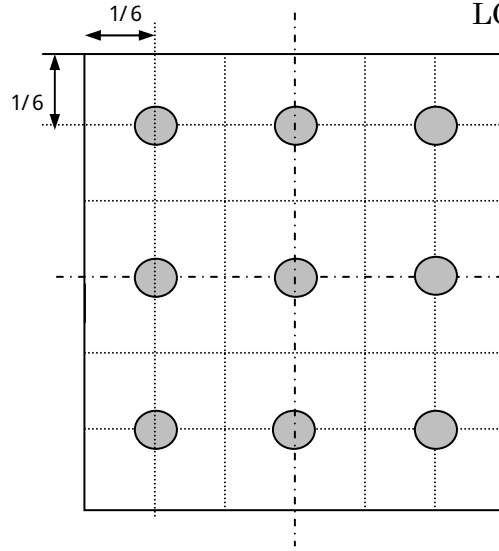
(10)Display quality

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

(11)Mechanical characteristics
 11-1) External appearance
     See Fig. 1 Outline Dimension
 11-2) FPC (for LCD panel) characteristics
      Specific connector
           LCD-FPC: HIROSE FH23-51S-0.3SHAW(05) (Bottom contact only)

(12)Handling Precautions

12-1) Insertion and taking out of FPCs

(1) 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.

12-2) Handling of FPCs

(1) 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 1.0mm ,and only inner side (back side of the
module). Don't bend it outer side (display surface side).

(2) Don't give the FPCs too large force, for example, hanging the module with holding FPC. Moreover,
Do not put stress on the components mounted on FPC to avoid failure of the components.

12-3) Installation of the module

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

12-4)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.

12-5)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) Static image should not be displayed more than 5 minutes in order to prevent from occurrence of
residual image.

(13)Reliability Test Conditions for TFT-LCD Module

Table 11

No.	Test items	Test conditions
1	High temperature storage test	Ta=+70℃ 240h
2	Low temperature storage test	Ta=-20℃ 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(0Ω) to Terminals(Contact) (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~55~10Hz 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=-20℃~+70℃ / 5 cycles (1h) (1h)

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

【Check items】

・Test No.1~9

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

(14) Others

14-1)Indication of lot number

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

14-2) 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.

14-3) 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.

(15)Forwarding form (fig2)

a) Piling number of cartons : 8

b) Package quality in one cartons : 100 pcs

c) Carton size : 575 mm × 360 mm × 225 mm

d) Total mass of 1 carton filled with full modules : TBD

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.

Fig.1 Outline dimensions

LCP-06014A-19

ORIGINAL	LS037V7DW03		
MODEL 面面サイズ	93.6(3.69')		
ACTIVE AREA SIZE	0.117mm 480RGBx640		
日付 DATE	2006.6.28		
尺度 SCALE 1/1	名称 NAME 3.7 Module Outline dimension		
単位 Unit mm			
	用紙サイズ A3	図番 DRAWING NO LDM-O3237A	

SHARP CORPORATION

・LCD-FPC bend radius: Min. 0.6mm
・Guarantee of appearance = LCD Active Area
・General tolerance is ±0.5mm
・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 tolerance of module width are
 exclude warp of case and FPC.

Fitting CN : HIROSE
FH23-51S-0.3SHAW(05)

5Trays + 1Tray

Out Sleeve

MAX50units/1Sleeve

MAX200units/1Master carton

Master carton

Inner Sleeve

Inner Sleeve

OPP Tape

LCD module
(LS037V7DW03)

Display

X

Tray

Label

対外応相 :   (4S)LS037V7DW03

LotNO.   (1T)2006.xx.xx

Quantity: (Q)100   PCS

コード名称 : LS037V7DW03

シャープ製品用デンベルです。

SHARP CODE

Date

Quantity

Model No.

Fig. 2 Forwarding form