SHARP

No.	LCP-1109025
DATE	Oct. 20. 2009

TECHNICAL LITERATURE

FOR

TFT - LCD module

MODEL No. LQ043Y1DX01

TENTATIVE

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MOBILE LIQUID CRYSTAL DISPLAY GROUP
SHARP CORPORATION

RECORD OF REVISIONS

MODEL No : LQ043Y1DX01

SPEC No.	Date	NO.	PAGE	SUMMARY	NOTE
LCP-1109025	2009.10.20	-	-	-	1st Issue

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instructions and the precautions specified in these specification sheets.

○Contact and consult with a SHARP sales representative for any questions about this device.

[For handling and system design]

(1) Do not scratch the surface of the polarizer film as it is easily damaged.

(2) If the cleaning of the surface of the LCD panel is necessary, wipe it swiftly with cotton or other soft cloth. Do not use organic solvent as it damages polarizer.

(3) Water droplets on polarizer must be wiped off immediately as they may cause color changes, or other defects if remained for a long time.

(4) Since this LCD panel is made of glass, dropping the module or banging it against hard objects may cause cracks or fragmentation.

(5) 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.

Check carefully that gas from materials used in system housing or packaging do not hart polarizer. Be sure to confirm the component of them.

(6) Liquid crystal material will freeze below specified storage temperature range and it will not get back to normal quality even after temperature comes back within specified temperature range. Liquid crystal material will become isotropic above specified temperature range and may not get back to normal quality. Keep the LCD module always within specified temperature range.

(7) Do not expose LCD module to the direct sunlight or to strong ultraviolet light for long time.

(8) If the LCD driver IC (COG) is exposed to light, normal operation may be impeded. It is necessary to design so that the light is shut off when the LCD module is mounted.

(9) Do not disassemble the LCD module as it may cause permanent damage.

(10) As this LCD module contains components sensitive to electrostatic discharge, be sure to follow the instructions in below.

① Operators

Operators must wear anti-static wears to prevent electrostatic charge up to and discharge from human body.

② Equipment and containers

Process equipment such as conveyer, soldering iron, working bench and containers may possibly generate electrostatic charge up and discharge. Equipment must be grounded through 100Mohms resistance. Use ion blower.

③ Floor

Floor is an important part to leak static electricity which is generated from human body or equipment. There is a possibility that the static electricity is charged to them without leakage in case of insulating floor, so the

countermeasure(electrostatic earth:$1\times10^{8}\Omega$) should be made.

④Humidity

Proper humidity of working room may reduce the risk of electrostatic charge up and discharge. Humidity should be kept over 50% all the time.

⑤Transportation/storage

Storage materials must be anti-static to prevent causing electrostatic discharge.

⑥Others

Protective film is attached on the surface of LCD panel to prevent scratches or other damages. When removing this protective film, remove it slowly under proper anti-ESD control such as ion blower.

(11) Hold LCD very carefully when placing LCD module into the system housing. Do not apply excessive stress or pressure to LCD module. Do not to use chloroprene rubber as it may affect on the reliability of the electrical interconnection.

(12) Do not hold or touch LCD panel to flex interconnection area as it may be damaged.

(13) As the binding material between LCD panel and flex connector mentioned in 12) contains an organic material, any type of organic solvents are not allowed to be used. Direct contact by fingers is also prohibited.

(14) When carrying the LCD module, place it on the tray to protect from mechanical damage. It is recommended to use the conductive trays to protect the CMOS components from electrostatic discharge. When holding the module, hold the Plastic Frame of LCD module so that the panel, COG and other electric parts are not damaged.

(15) Do not touch the COG‘s patterning area. Otherwise the circuit may be damaged.
(16) Do not touch LSI chips as it may cause a trouble in the inner lead connection.
(17) Place a protective cover on the LCD module to protect the glass panel from mechanical damages.
(18) LCD panel is susceptible to mechanical stress and even the slightest stress will cause a color change in background and pooling. So make sure the LCD panel is placed on flat plane without any continuous twisting, bending or pushing stress.
(19) Protective film is placed onto the surface of LCD panel when it is shipped from factory. Make sure to peel it off before assembling the LCD module into the system. Be very careful not to damage LCD module by electrostatic discharge when peeling off this protective film. Ion blower and ground strap are recommended.
(20) Make sure the mechanical design of the system in which the LCD module will be assembled matches specified viewing angle of this LCD module.
(21) This LCD module does not contain nor use any ODS (1,1,1-Trichloroethane, CCL4), CFCS, Carbon tetrachloride, Halon in all materials used, in all production processes.

[For operating LCD module]

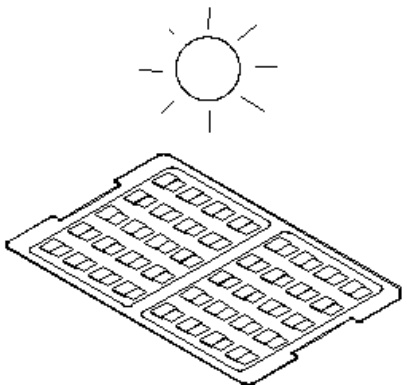
(1) Do not operate or store the LCD module under outside of specified environmental conditions.
(2) At the shipment, adjust the contrast of each LCD module with electric volume. LCD contrast may vary from panel to panel depending on variation of LCD power voltage from system.
(3) As opt-electrical characteristics of LCD will be changed, dependent on the temperature, the confirmation of display quality and characteristics has to be done after temperature is set at 25 °C and it becomes stable.

[Precautions for Storage]

(1) Do not expose the LCD module to direct sunlight or strong ultraviolet light for long periods. Store in a dark place.
(2) The liquid crystal material will solidify if stored below the rated storage temperature and will become an isotropic liquid if stored above the rated storage temperature, and may not retain its original properties. Only store the module at normal temperature and humidity (25±5°C,60±10%RH) in order to avoid exposing the front polarizer to chronic humidity.
(3) Keeping Method

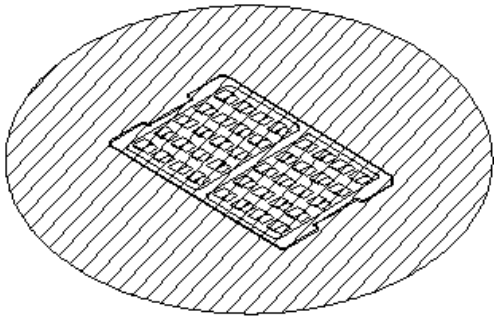
a. Don't keeping under the direct sunlight.

DON'T



b. Keeping in the tray under the dark place.

DO



(1) Do not operate or store the LCD module under outside of specified environmental conditions.

(2) Be sure to prevent light striking the chip surface.

[Other Notice]

(1) Do not operate or store the LCD module under outside of specified environmental conditions.

(2) As electrical impedance of power supply lines (VCI/VDDIO-GND) are low when LCD module is working, place the de-coupling capacitor near by LCD module as close as possible.

(3) Reset signal must be sent after power on to initialize LSI. LSI does not function properly until initialize it by reset signal.

(4) Generally, at power on, in order not to apply DC charge directly to LCD panel, supply logic voltage first and initialize LSI logic function including polarity alternation. Then supply voltage for LCD bias. At power off, in order not to apply DC charge directly to LCD panel, execute Power OFF sequence and Discharge command.

(5) Don't touch to FPC surface, exposed IC chip, electric parts and other parts, to any electric, metallic materials.

(6) No bromide specific fire-retardant material is used in this module.

(7) Do not display still picture on the display over 2 hours as this will damage the liquid crystal.

(8)This product doesn't support active backlight function. Use active back light function with this product at your discretion and responsibility.

[Precautions for Discarding Liquid Crystal Modules]

COG: After removing the LSI from the liquid crystal panel, dispose of it in a similar way to circuit boards from electronic devices.

LCD panel: Dispose of as glass waste. This LCD module contains no harmful substances. The liquid crystal panel contains no dangerous or harmful substances. The liquid crystal panel only contains an extremely small amount of liquid crystal (approx.100mg) and therefore it will not leak even if the panel should break.

-Its median lethal dose (LD50) is greater than 2,000 mg/kg and a mutagenetic (Aims test: negative) material is employed.

FPC: Dispose of as similar way to circuit board from electric device.

1. Application

This data sheet is to introduce the specification of LQ043Y1DX01 active matrix 65,536colors LCD module. LCD module is controlled by Driver IC (HX8363A/RAMless).

If any problem occurs concerning the items not stated in this specification, it must be solved sincerely by both parties after deliberation.

As to basic specification of driver IC refer to the IC specification and handbook.

2. Construction and Outline

This module is a color transmissive, high contrast, wide viewing angle and active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor), named ASV LCD (Advanced Super View LCD).

Construction: LCD panel, Driver (COG), FPC with electric components, 8 white LEDs prism sheet, diffuser, light guide and reflector, plastic frame and metal frame to fix them mechanically.

Outline: See page ** (Fig.1 Outline Dimensions)

Connection: ZIF connector (HRS FH39-45S-0.3SHW(05))

There shall be no scratches, stains, chips, distortions and other external drawbacks that may affect the display function.

Rejection criteria shall be noted in Inspection Standard.

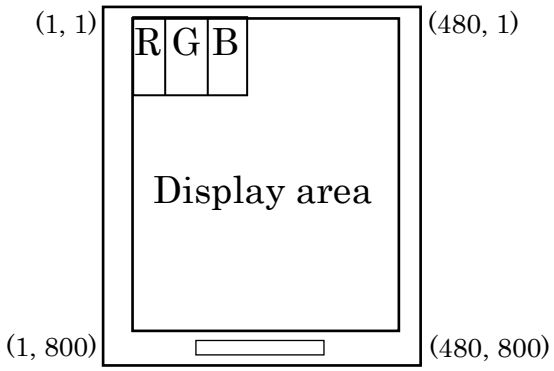
3. Mechanical (Physical) Specifications

Table1

Item	Specifications	Unit	Remarks
Screen size	10.9 (4.30” type) Diagonal	cm	
Active area	56.16(H)×93.60(V)	mm	
Pixel format	480(H)×800(V)	pixel	
	1 Pixel =R+G+B dots	-	
Pixel pitch	0.117(H)×0.117(V)	mm	
Pixel configuration	R,G,B vertical stripes	-	
Display mode	Normally black	-	
Unit outline dimensions	62.46(W)×105.9(H)×2.1(D)	mm	【Note3-1】
Mass	TBD	g	
Surface hardness	3H(Initial)	-	Pencil hardness

【Note3-1】The above-mentioned table indicates module sizes without some projections and FPC. For detailed measurements and tolerances, please refer to Fig.1 Outline Dimensions.

4. Pixel Configuration



5. Input Terminal Names and Functions

Table2

Pin No.	Symbol	I/O	Description	Remarks
1	GND-TP	-	By pass to TP connector	
2	CLK_TP	-	By pass to TP connector	
3	DAT_TP	-	By pass to TP connector	
4	IRQ_TP	-	By pass to TP connector	
5	VDD_TP	-	By pass to TP connector	
6	RES_TP	-	By pass to TP connector	
7	GND_TP	-	By pass to TP connector	
8	SDO	O	SPI I/F data out from LCM	
9	SDI	I	SPI I/F data In to LCM	
10	GND	-	Ground	
11	SCL	I	SPI I/F clock	
12	CSX	I	SPI I/F chip select	
13	RESX	I	Device reset signal	“L” Active
14	GND	-	Ground	
15	DR4	I	Red data signal (MSB)	
16	DR3	I	Red data signal	
17	DR2	I	Red data signal	
18	DR1	I	Red data signal	
19	DR0	I/O	Red data signal (LSB) (10kΩ±5% Pull-Down GND)	
20	GND	-	Ground	
21	DG5	I	Green data signal (MSB)	
22	DG4	I	Green data signal	
23	DG3	I	Green data signal	
24	DG2	I	Green data signal	
25	DG1	I	Green data signal	
26	DG0	I	Green data signal (LSB)	
27	GND	-	Ground	
28	DB4	I	Blue data signal (MSB)	
29	DB3	I	Blue data signal	
30	DB2	I	Blue data signal	
31	DB1	I	Blue data signal	
32	DB0	I	Blue data signal (LSB)	
33	DE	I	Data enable	
34	GND	-	Ground	

Pin No.	Symbol	I/O	Description	Remarks
35	PCLK	I	Pixel clock signal	
36	GND	-	Ground	
37	HS	I	Horizontal synchronous signal	
38	VS	I	Vertical synchronous signal	
39	VDDIO	-	Power supply for I/O	
40	VCI	I	Power supply for analog	
41	NC	-	No connection	
42	LEDK	-	Power Supply for LED(Cathode)	Connected to pin-43
43	LEDK	-	Power Supply for LED(Cathode)	Connected to pin-42
44	LEDA	-	Power Supply for LED(Anode)	
45	GND	-	Ground	

6. Absolute Maximum Ratings

Table 3 GND=0V

Parameter	Symbol	Conditions	Rated value	Unit	Remarks
Driver IC (Analog) Power Supply Voltage	VCI	Ta=+25℃	-0.3 ~ +4.6	V	【Note6-1】
Driver IC (Digital) Power Supply Voltage	VDDIO	Ta=+25℃	-0.3 ~ +4.6	V	【Note6-1】
Temperature for storage	T_{stg}	-	-30 ~ +70	°C	【Note6-2】
Temperature for operation	T_{opr}	-	-20 ~ +60	°C	【Note6-2】
LED Input electric current	I_{LED}	Ta=+25°C	35	mA	【Note6-3】

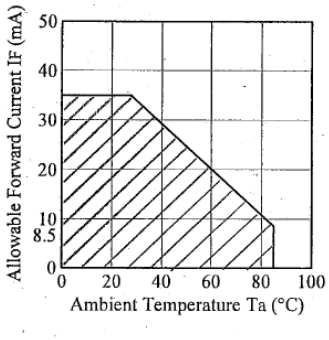
【Note6-1】Voltage applied to GND pins. GND pin conditions are based on all the same voltage (0V). Always connect all GND externally and use at the same voltage.

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

【Note6-3】Ambient temperature and the maximum input are fulfilling the following operating conditions.

※Please refer to specification of “Himax HX8363A” for detail.

■ Ambient Temperature vs. Allowable Forward Current



7. Electrical Characteristics

7-1. TFT-LCD Panel Driving Section

Table 4 GND=0V

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Driver IC(Analog) Power Supply Voltage	VCI	2.75	3.0	3.3	V	【Note7-1】
Driver IC(Digital) Power Supply Voltage	VDDIO	1.65	2.6	3.3	V	【Note7-1】
Input voltage (Low)	V_{IL}	0	-	0.3VDDIO	V	【Note7-2】
Input voltage (High)	V_{IH}	0.7VDDIO	-	VDDIO	V	【Note7-2】
Input current (Low)	I_{IL}	-1	-	-	μA	
Input current (High)	I_{IH}	-	-	1	μA	
Output voltage (Low)	V_{oL}	0	-	0.2VDDIO	V	I_{oL}=+0.1mA
Output voltage (High)	V_{oH}	0.8VDDIO	-	VDDIO	V	I_{oH}=-0.1mA
Power consumption	Pnorm	-	(88)	140	mW	【Note7-3】
		-	(76)	-	mW	【Note7-4】
		-	(37)	-	mW	【Note7-5】
		-	(57)	-	mW	【Note7-6】

【Note7-1】Include Ripple Noise

【Note7-2】Applied overshoot

【Note7-3】Measurement Conditions : Checker pattern (Worst case), PCLK=25MHz

【Note7-4】Measurement Conditions : White pattern, PCLK=25MHz

【Note7-5】Measurement Conditions : Black pattern, PCLK=25MHz

【Note7-6】Measurement Conditions : Color ber pattern (following pattern), PCLK=25MHz

※Please refer to specification of “Himax HX8363A” for detail.

7-2. Back Light Driving Section

Table 5 Ta=+25°C, GND=0V

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
LED Voltage	V_{LED}	-	+25.6	-	V	【Note7-8】
LED Current	I_{LED}	-	20	-	mA	
Power Consumption	W_{LED}	-	512	-	mW	【Note7-9】
LED Quantity			8		pcs	

【Note7-8】at I_{LED}=20mA

【Note7-9】$W_{LED}=V_L \times I_L$

8. Timing characteristics of input signals

Please refer to specification of “Himax HX8363A” for detail.

8-1.Reset Timing Characteristics

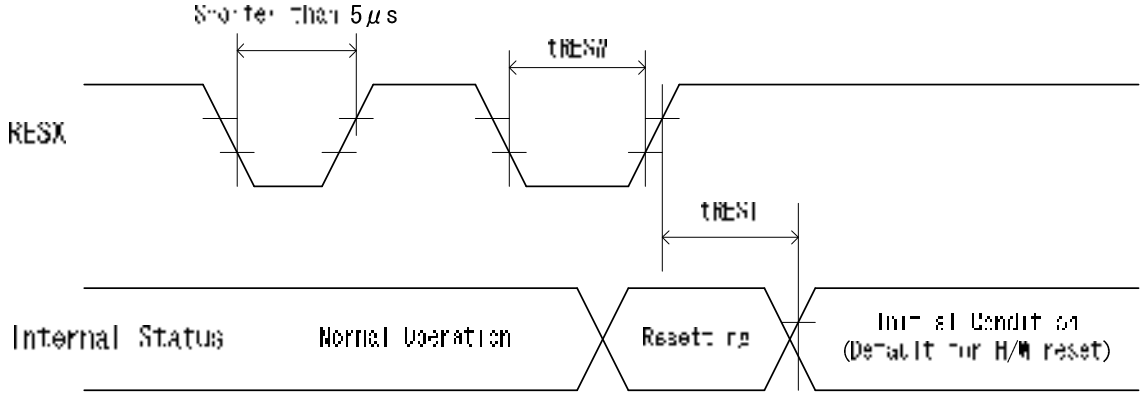


Table 6 Ta=+25°C, GND=0V, VCI=2.75V to 3.3V, VDDIO=1.65V to 3.3V

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
Reset “Low” pulse width	tRESW	10	-	-	μs	
Reset complete time	tREST	-	-	5	ms	【Note8-1】
		-	-	120	ms	【Note8-2】

【Note8-1】When reset is applied during sleep in mode

【Note8-2】When reset is applied during sleep out mode

8-2. Serial Interface Timing Characteristics

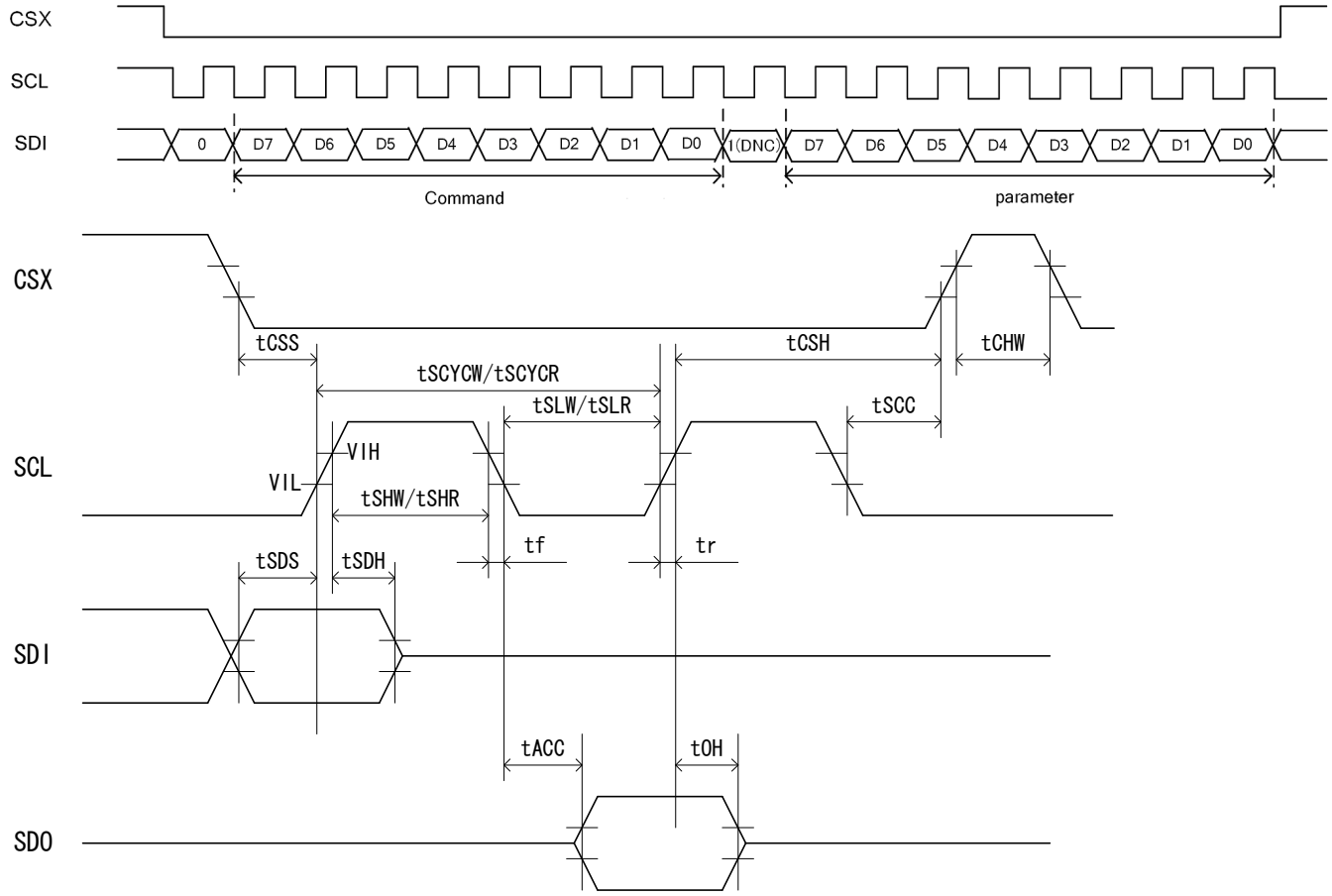


Table 7 Ta=+25°C, GND=0V, VCI=2.75V to 3.3V, VDDIO=1.65V to 3.3V

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
Serial clock cycle(Write)	tSCYCW	80	-	-	ns	
SCL “H” pulse width(Write)	tSHW	30	-	-	ns	
SCL “L” pulse width(Write)	tSLW	30	-	-	ns	
Data setup time(Write)	tSDS	10	-	-	ns	
Data hold time(Write)	tSDH	10	-	-	ns	
Serial clock cycle(Read)	tSCYCR	150	-	-	ns	
SCL “H” pulse width(Read)	tSHR	60	-	-	ns	
SCL “L” pulse width(Read)	tSLR	60	-	-	ns	
Access time	tACC	10	-	60	ns	【Note8-3】
Output disable time	tOH	15	-	100	ns	【Note8-3】
SCL to Chip select	tSCC	30	-	-	ns	
CSX “H” pulse width	tCHW	60	-	-	ns	
CSX-SCL time(Write)	tCSS	30	-	-	ns	
	tCSH	30	-	-	ns	
CSX-SCL time(Read)	tCSS	60	-	-	ns	
	tCSH	65	-	-	ns	

【Note8-3】SDO for maximum. CL=30pF. For maximum CL=8pF.

8-3. Vertical Timing Characteristics

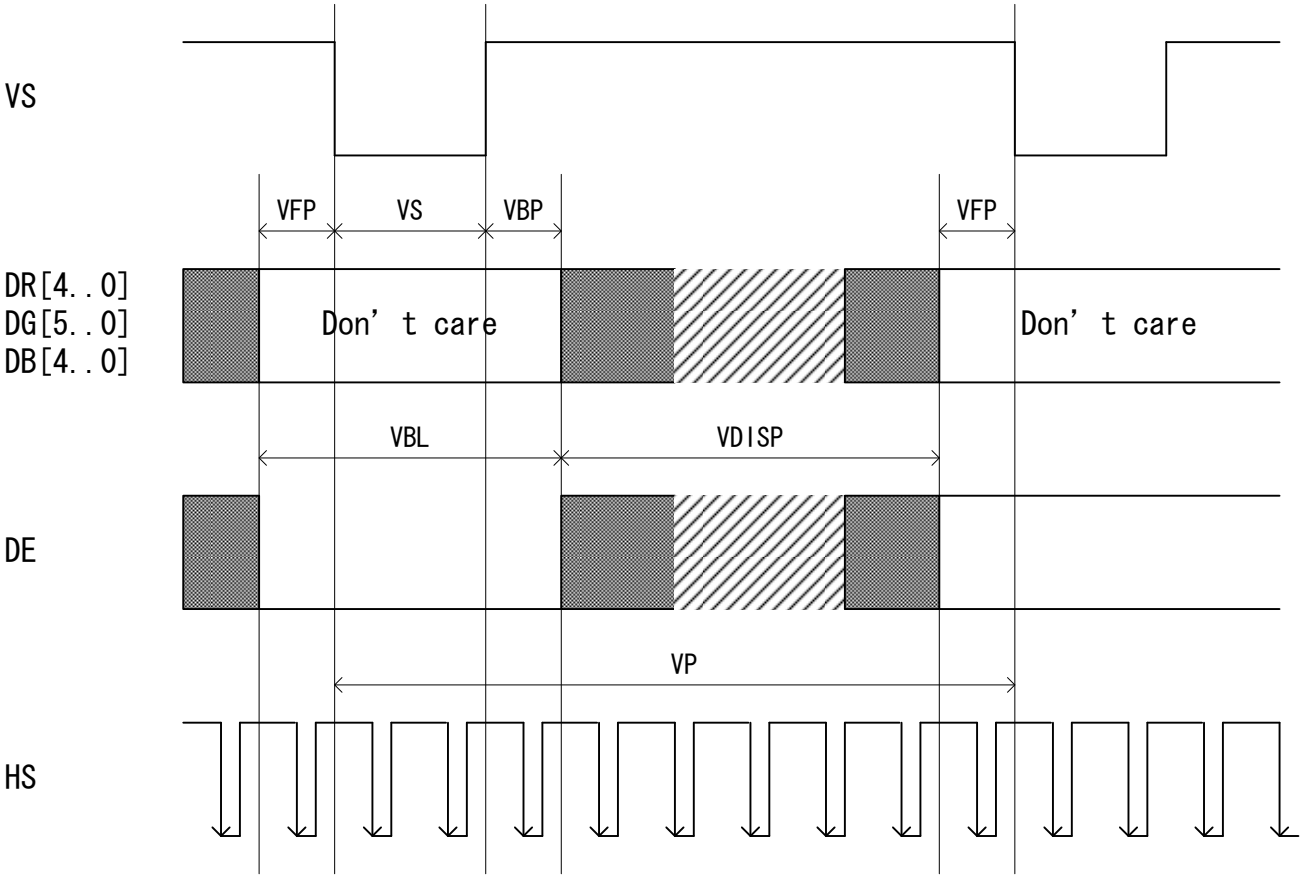


Table 8 Ta=+25°C, GND=0V, VCI=2.75V to 3.3V, VDDIO=1.65V to 3.3V

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
Vertical cycle	VP	806	809	810	Line	
Vertical low pulse width	VS	2	3	4	Line	
Vertical front porch	VFP	2	3	4	Line	
Vertical back porch	VBP	2	3	4	Line	
Vertical data start point	-	4	6	8	Line	【Note8-4】
Vertical blanking period	VBL	6	9	10	Line	【Note8-5】
Vertical active area	-	-	800	-	Line	【Note8-6】
Vertical refresh rate	VRR	55	60	65	Hz	

【Note8-4】VS+VBP
【Note8-5】VS+VBP+VFP
【Note8-6】VDISP

8-4. Horizontal Timing Characteristics

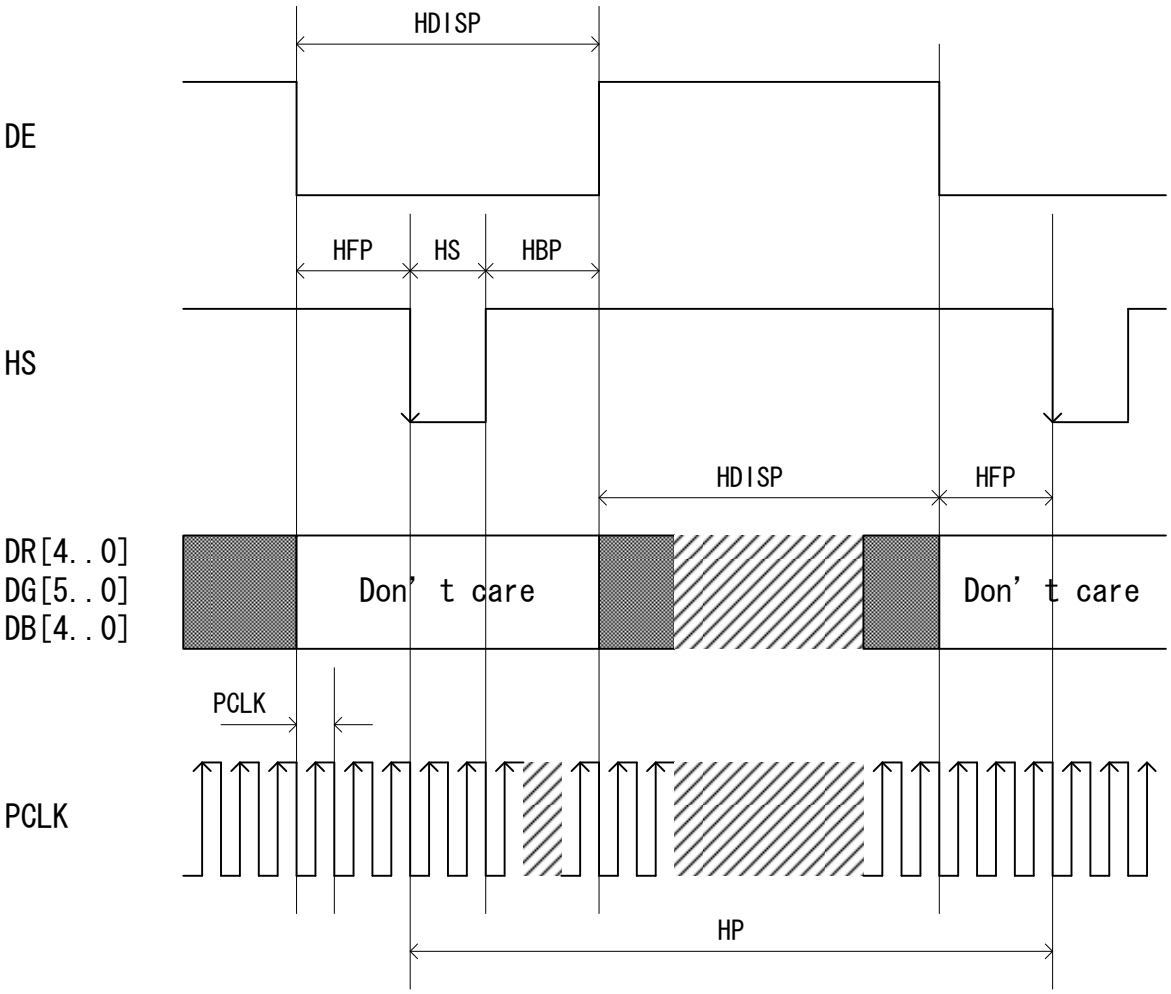


Table 9 Ta=+25°C, GND=0V, VCI=2.75V to 3.3V, VDDIO=1.65V to 3.3V

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
HS cycle	HP	504	507	568	DCK	
HS low pulse width	HS	5	6	256	DCK	
Horizontal back porch	HBP	5	15	256	DCK	
Horizontal front porch	HFP	5	6	256	DCK	
Horizontal data start point	-	19	21	83	DCK	【Note8-7】
Horizontal blanking period	HBLK	24	27	88	DCK	【Note8-8】
Horizontal active area	HDISP	-	480	-	DCK	
Pixel clock frequency When RGB I/F is running	DCK	20.3	24.58	32.2	MHz	【Note8-9】
		31	40.68	49.2	ns	

【Note8-7】HS+HBP
【Note8-8】HS+HBP+HFP
【Note8-9】VRR=Min.55Hz. – Max.65Hz

8-5. General Timing Characteristics

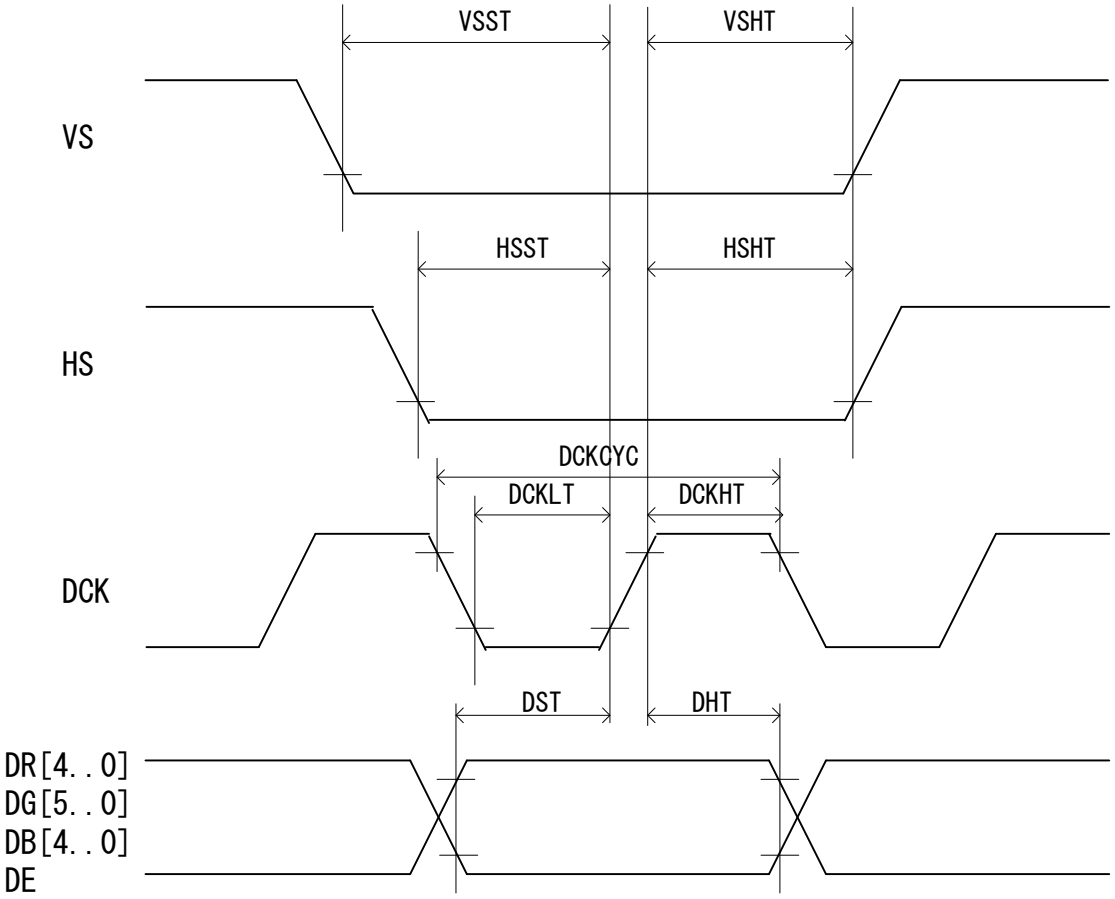
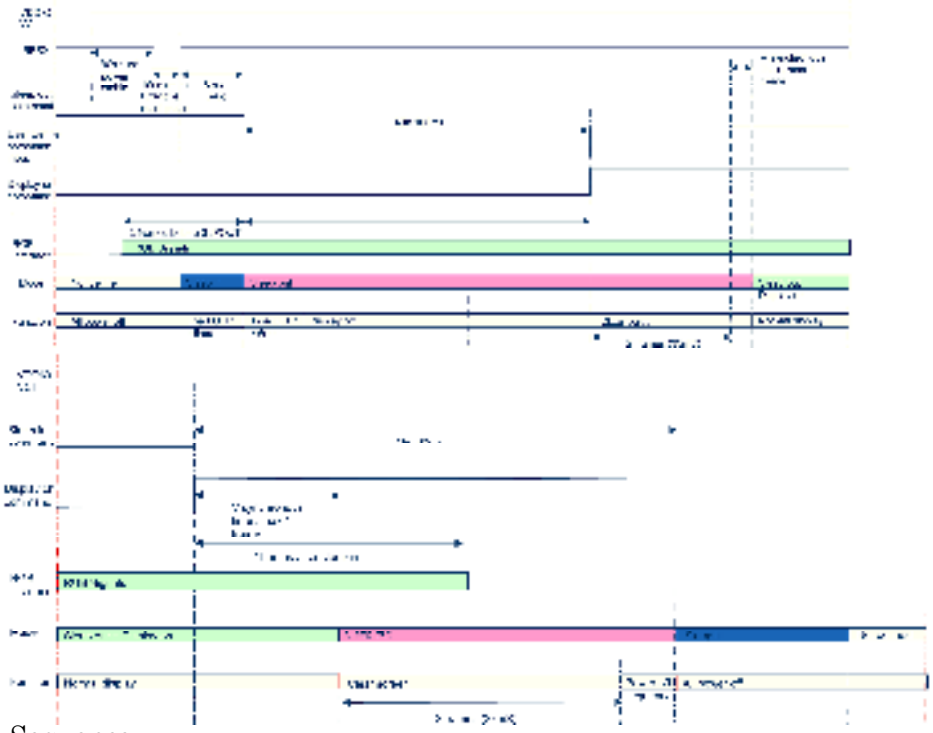


Table 10 Ta=+25°C, GND=0V, VCI=2.75V to 3.3V, VDDIO=1.65V to 3.3V

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
Vertical sync setup time	VSST	5	-	-	ns	
Vertical sync hold time	VSHT	5	-	-	ns	
Horizontal sync setup time	HSST	5	-	-	ns	
Horizontal sync hold time	HSHT	5	-	-	ns	
Pixel clock cycle When RGB I/F is running	DCKCYC	31 【Note8-10】	-	49.2 【Note8-11】	ns	【Note8-12】
Pixel clock low time	DCKLT	5	-	-	ns	
Pixel clock high time	DCKHT	5	-	-	ns	
Data setup time	DST	5	-	-	ns	
Data hold time	DHT	5	-	-	ns	

【Note8-10】32.2MHz
【Note8-11】20.3MHz
【Note8-12】VRR=Min.55Hz. – Max.65Hz

9. Power Sequence



9-1 Power On Sequence

Table 11

ITEM	Register Address	Register Data list	REMARK
VDDIO(2.6V),VCI(3.0V) ON (anytime VDDIO≦VCI),RESX=H			
WAIT until power stable			
RESX=L			
Wait min.10us(Effective reset pulse)			
RESX=H(Reset release)			
WAIT min. 6ms , RGB signals should be send for 2 frames before SLPOUT command.			
SLEEP OUT	11	**	SLPOUT
WAIT min. 100ms			
RGB Interface Format Setting	B9	FF 83 63	User Define Command RGB=565 Setting
	3A	50	
Display On	29	**	DISPON
WAIT 2frames(33ms) + max1frame			
Normal display			

9-2 Power Off Sequence

Table 12

ITEM	Register Address	Register Data list	REMARK
Normal display			
Display Off	28	**	DISPOFF
Sleep In	10	**	SLEEPIN
RGB signals should be send for 2 frames after SLPIN command.			
WAIT min. 60ms			
VDDIO(2.6V),VCI(3.0V) OFF (anytime VDDIO≦VCI)			

10. Input Signals, Basic Display Colors and Gray Scale of Each Color

Table 13

	Colors & Gray Scale	Gray Scale	Data signals															
			R0	R1	R2	R3	R4	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4
			LSB				MSB	LSB					MSB	LSB				MSB
Basic Color	Black	–	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
	Green	–	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0
	Cyan	–	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
	Red	–	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Magent	–	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	0	0	0	0	0
	White	–	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
	⇧	GS8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS16	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓			↓					↓						↓		
	⇩	↓			↓					↓						↓		
	Brighter	GS239	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS247	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Red	GS255	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
	⇧	GS4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Darker	GS8	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	⇧	↓			↓					↓						↓		
	⇩	↓			↓					↓						↓		
	Brighter	GS247	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0
	⇩	GS251	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
	Green	GS255	0	0	0	0	0	1	1	1	1	1	1	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
	⇧	GS8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	Darker	GS16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	⇧	↓			↓					↓						↓		
	⇩	↓			↓					↓						↓		
	Brighter	GS239	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
	⇩	GS247	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
	Blue	GS255	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

0: Low level voltage, 1: High level voltage

Red and blue color can be displayed in 32 gray scales from 5 bit data signals. Green color can be displayed in 64 gray scales from 6 bit data signals. According to the combination of total 16 bit data signals, the 65,536-color display can be achieved on the screen.

11. Optical Characteristics

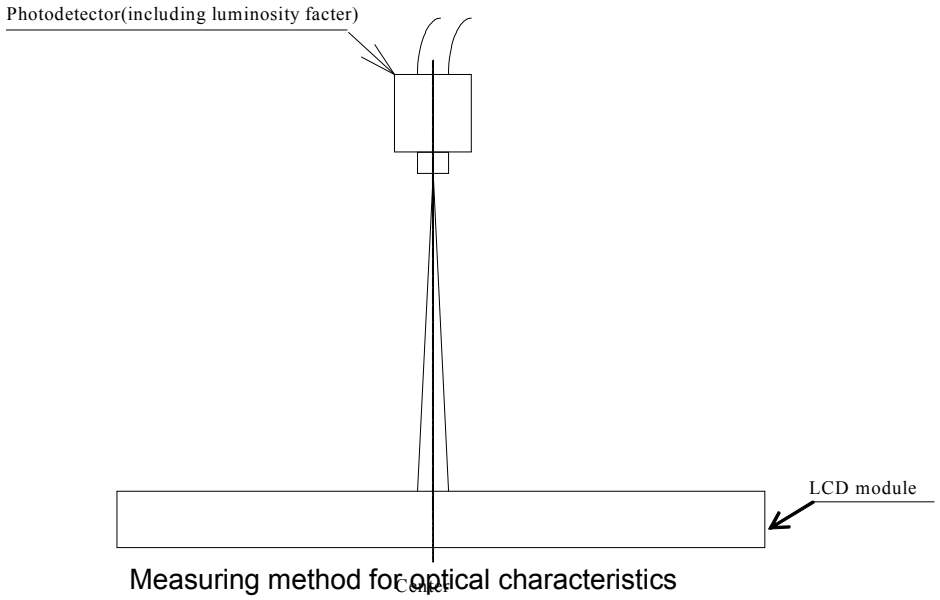
11-1 Driving the Back Light Condition

Table 14 Ta=+25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	θ21, θ22	CR>10	70	80	-	degree	【Note11-1, 14-2】
	θ11, θ12		70	80	-	degree	
Contrast Ratio	CR	θ=0°	720	900	-	-	【Note11-2】
Response Time	Tr +Td	θ=0°	-	-	35	ms	【Note11-3】
White Chromaticity	x	θ=0°	0.28	0.31	0.34	-	
	y		0.29	0.32	0.35	-	
Brightness	X_{L1}	θ=0°	(250)	350	-	cd/m²	I_{LED}=20mA
Uniformity	U	θ=0°	75	85	-	%	【Note11-6】
NTSC Ratio	S		60	72	-	%	

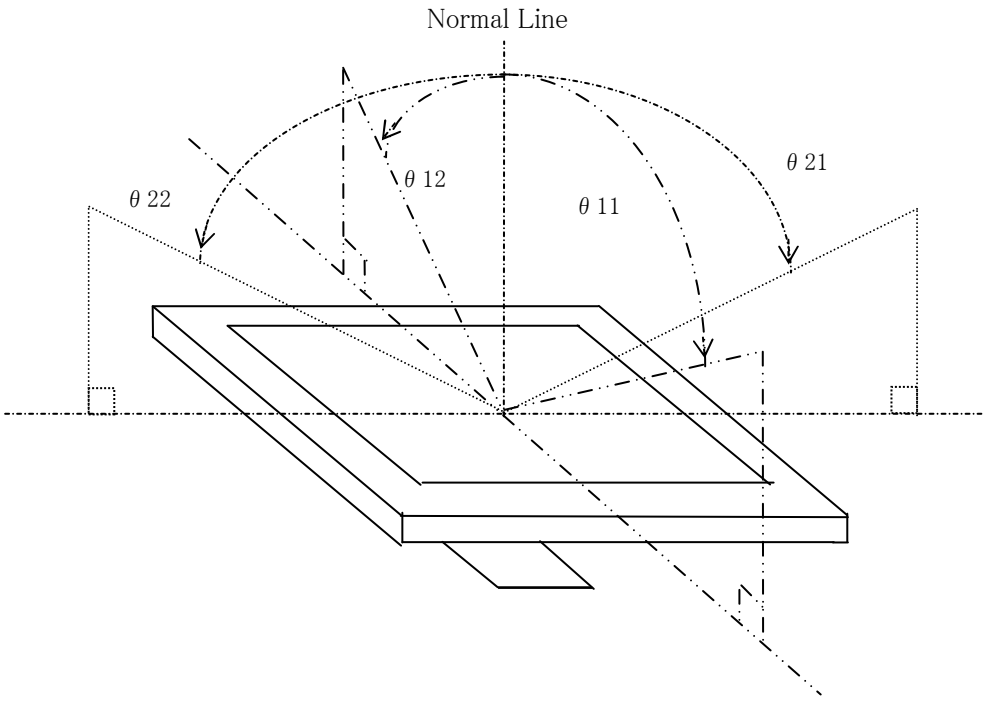
*The measuring method of the optical characteristics is shown by the following figure.

*A measurement device is TOPCON luminance meter SR-3.(Viewing cone1.)



Measuring method for optical characteristics

【Note 11-1】Viewing angle range is defined as follows.



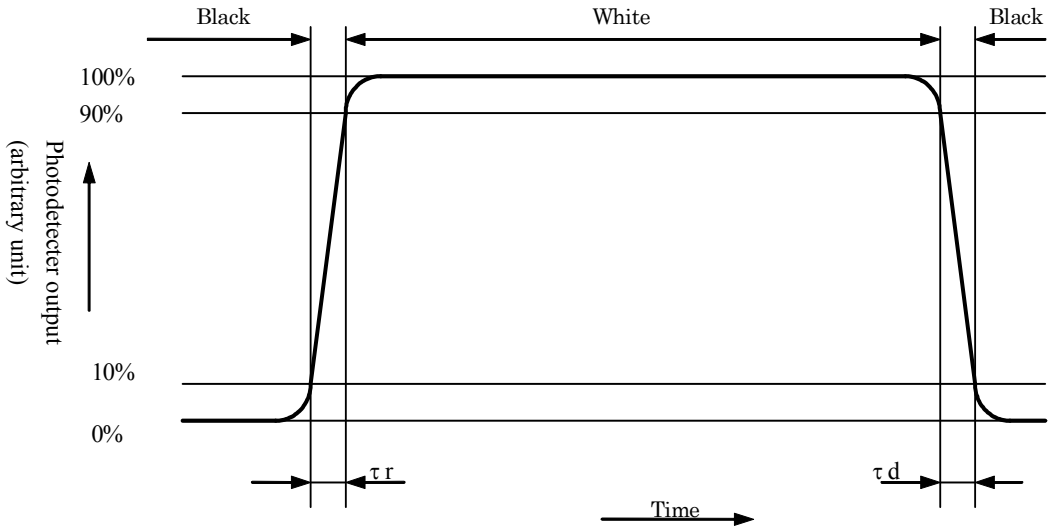
【Note 11-2】Definition of contrast ratio:

The contrast ratio is defined as the follows:

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$

【Note 11-3】Definition of response time:

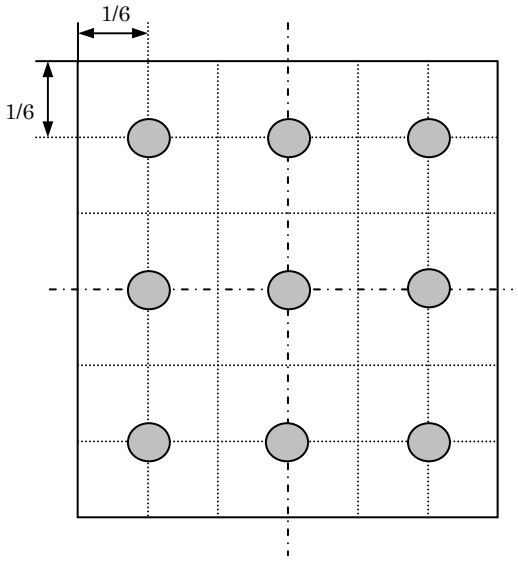
The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”



【Note 11-6】Definition of Uniformity.

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

The brightness should be measured on the 9-points as shown in the following figure.



12. Reliability Test Items

Table 15

No.	Test item	Conditions
1	High temperature storage test	Ta = +70°C, 240h
2	Low temperature storage test	Ta = -30°C, 240h
3	High temperature and high humidity operation test	Ta = +40°C95%RH, 240h (No condensation)
4	High temperature operation test	Ta = +60°C, 240h
5	Low temperature operation test	Ta = -20°C, 240h
6	Electro static discharge test	±200V, 200pF(0Ω) to Terminals(Contact) (1 time for each terminals)
7	Shock test	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=-30℃～+70℃ / 5 cycles (1h) (1h)

*Ta = Ambient temperature

*Check items

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

13. Indication of lot number

Attached location is shown in Fig.1 (Outline Dimensions).

14. Forwarding form

TBD

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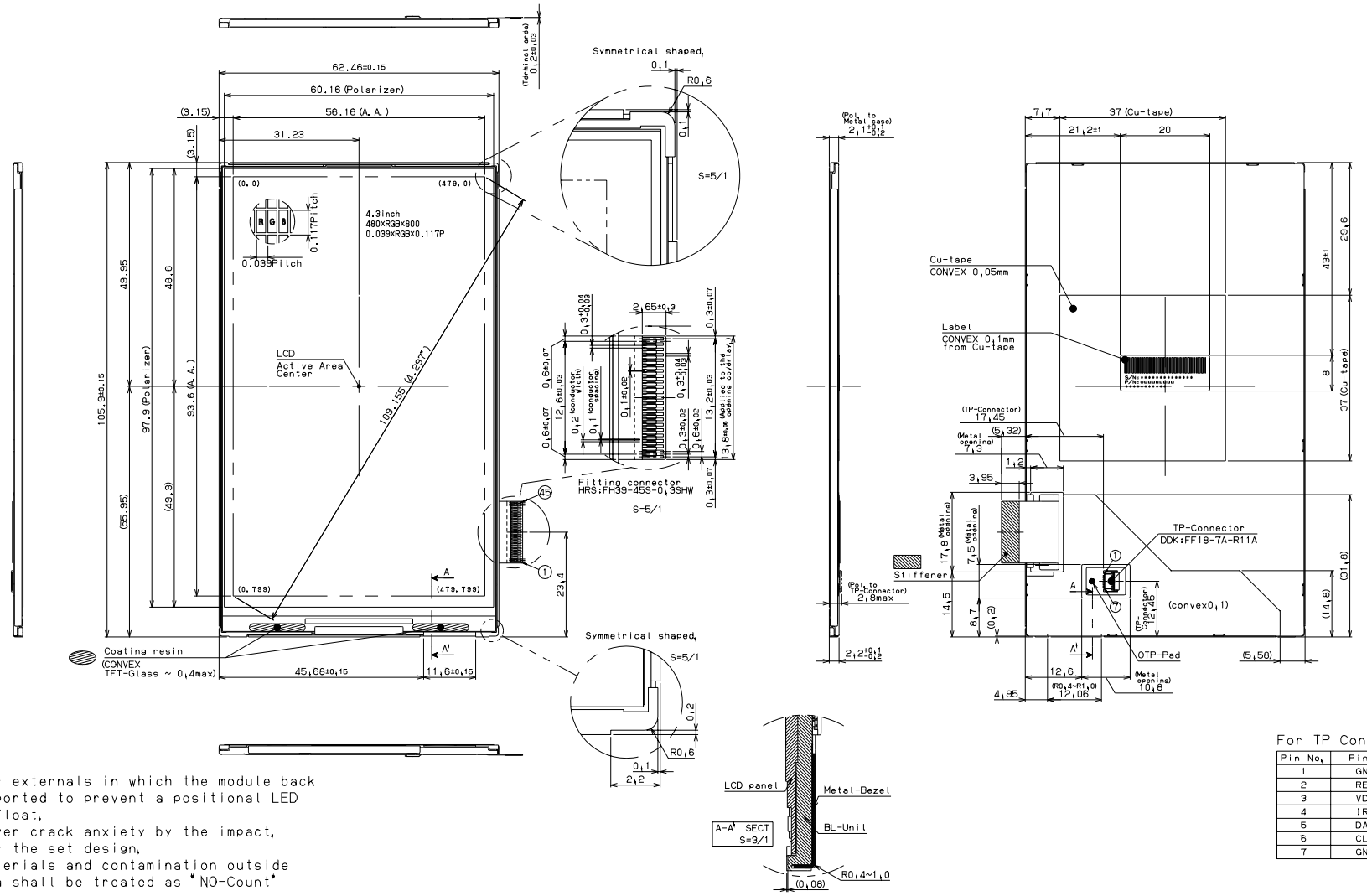

For TP Connector

Pin No.	Pin Name
1	GND_TP
2	RES_TP
3	VDD_TP
4	IRQ_TP
5	DAT_TP
6	CLK_TP
7	GND_TP

Please consider externals in which the module back surface is supported to prevent a positional LED and the panel float.
There is a driver crack anxiety by the impact, please consider the set design.
Any foreign materials and contamination outside the active area shall be treated as "NO-Count" at our inspections.
Guarantee of appearance=LCD Active Area.
General tolerance is ±0.5.
LCD warp is less than 0.3.
LCD-FPC bend larger than 0.6 in radius.
Please design carefully to hide the polarizer and other frame areas, which are outside of the guaranteed area.
When the set is not properly designed, it is possible that backlight light may leak from the gap at outside of black-mask area which is located at outside of active area, so, please pay attentions to try not to cause such leakage when designing the set.
The tolerances of the module thickness do not include warp of the Metal-case.

改訂日	改訂記事 REVISION	担当
10	,	
9	,	
8	,	
7	,	,
6	,	,

設計 DESIGNER	製図 DRAFTER	検図 DSN CK	検図 DSN CK	承認 ENG APPD
T.Tobi	T.Tobi			

シャープ株式会社
ENGINEERING DEPT. I
MOBILE LIQUID CRYSTAL DISPLAY DIVISION I
MOBILE LIQUID CRYSTAL DISPLAY GROUP
SHARP CORPORATION

ORIGINAL MODEL	LQ043Y1DX01
画面サイズ ACTIVE AREA SIZE	(4.3") 480×RGB×800
尺度 SCALE	1/1
日付 DATE <First edition>	20/Oct/2009
単位 Unit	mm
名称 NAME	4.3" WVGA Outline dimensions
ユーザー USER	**********
原紙サイズ	A3
図番 DRAWING NO	LDM-03402A