Crystal Clear Technology

Product Specification

T272480C07VR01 (without Touch Panel)
T272480C07VS01 (with Touch Panel)

Crystal Clear Technology sdn. bhd.
16Jalan TP5—Taman Perindustrian Sime UEP
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RECORDS OF REVISION

DATE	REVISED NO.	REVISED DESCRIPTIONS	PREPARED	CHECKED	APPROVED
23-02-2011	P1.0	Preliminary Specification			
01-04-2011	P1.1	Change the pin discription (pg.7)			
27-06-2011	P1.2	Change the pin function (pg.7)			

CONTENTS

1. GENERAL SPECIFICATIONS

1-1 SCOPE:

This specification covers the delivery requirements for the liquid crystal display delivered by **CRYSTAL CLEAR TECHNOLOGY (CCT)** to Customer。

1-2 PRODUCTS:

Liquid Crystal Display Module (LCM)

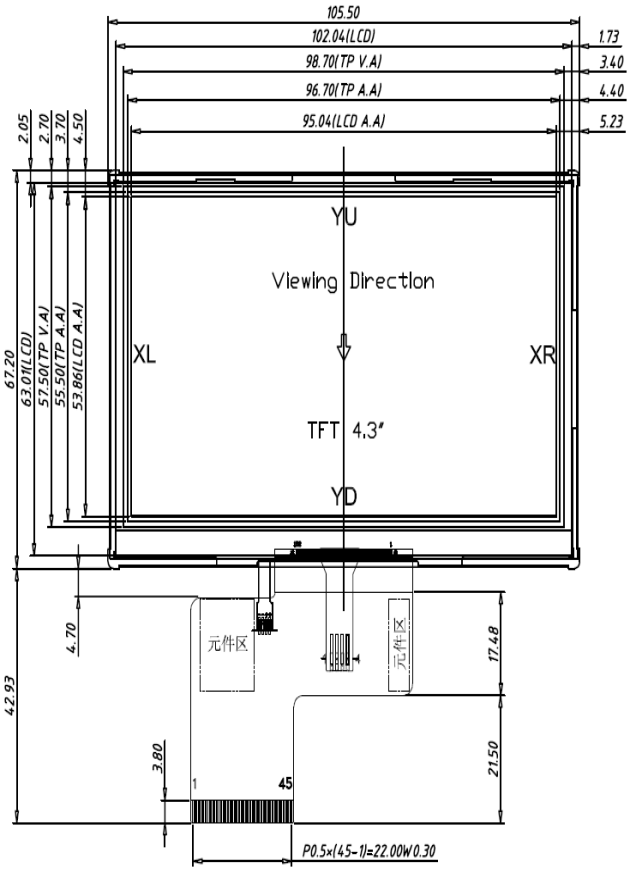
2. FEATURES

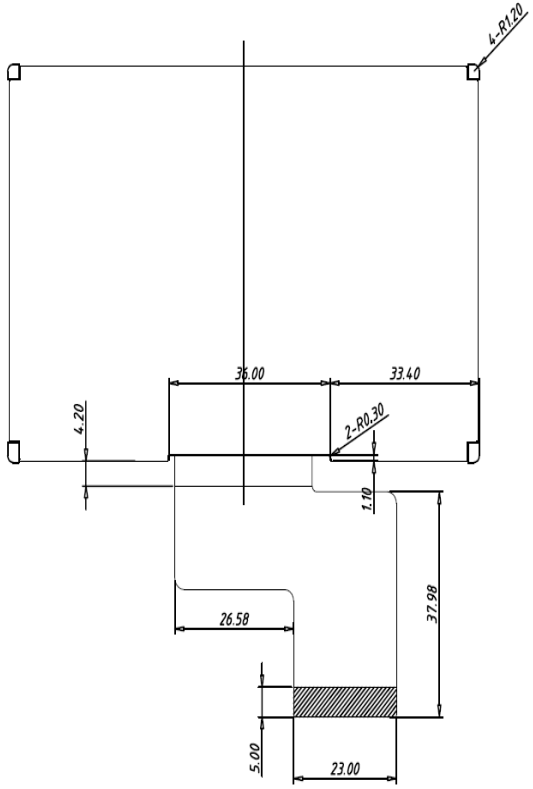
ITEM	SPECIFICATIONS
Part No.	T272480C07VX01
SIZE	4.3“TFT
Display Type	16.7M TFT, Tramsmissive
Viewing Direction	12 O’ clock
Driving IC	OTA5180A or Equivalent
Backlight	10-Chip WHITE LED
Operating Temperature	-20℃ ～+70℃
Storage Temperature	-30℃ ～+80℃

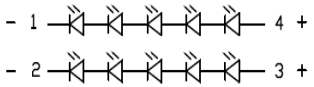
3. MECHANICAL SPECIFICATIONS

ITEM	SPECIFICATIONS	UNIT
OUTLINE DIMEMSIONS	105.5(W) x 67.2(H) x 3.95 (T)	mm
ACTIVE AREA	95.04*53.86	mm
NUMBER OF DOTS	480RGB x 272 Dots	---
ASSY.TYPE	COG+FPC+BL	---
WEIGHT	TBD	g

Preliminary Drawing







Pin Assignment

1	VSS	24	D23/B03
2	VSS	25	D24/B04
3	VDD	26	D25/B05
4	VDD	27	D26/B06
5	D00/R00	28	D27/B07
6	D01/R01	29	VSS
7	D02/R02	30	CLK
8	D03/R03	31	NC
9	D04/R04	32	HSYNC
10	D05/R05	33	VSYNC
11	D06/R06	34	DE
12	D07/R07	35	NC
13	D10/G00	36	VSS
14	D11/G01	37	NC
15	D12/G02	38	NC
16	D13/G03	39	NC
17	D14/G04	40	NC
18	D15/G05	41	VSS
19	D16/G06	42	BL_K
20	D17/G07	43	BL_A
21	D20/B00	44	NC
22	D21/B01	45	NC
23	D22/B02		

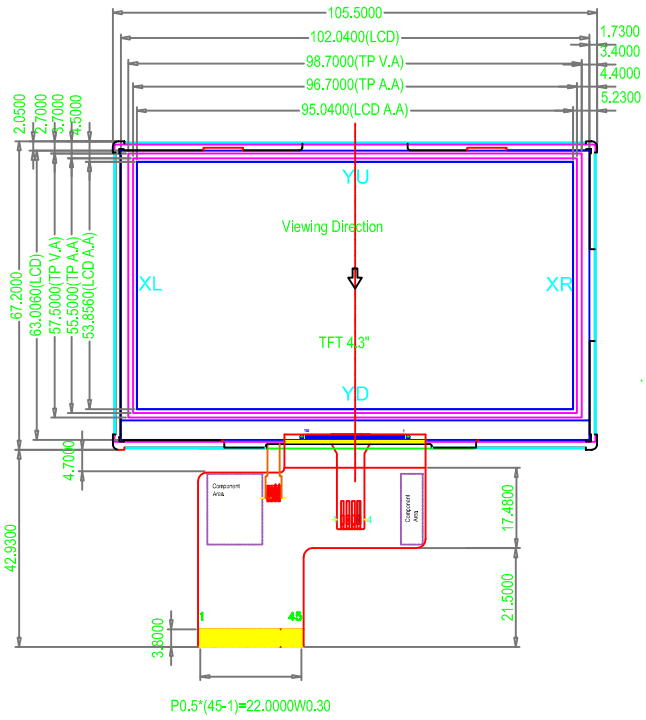
NOTES:
1. Display mode: a_si TFT/Transmissive/Normal White
2. Viewing angle: 12'CLOCK
3. OPERATING TEMP: -20° C~70° C
4. STORAGE TEMP: -30° C~80° C
5. IC: OTA5180A
6. All tha raw material are Rohs complicant
7. Unspecified Tolerance : ±0.20

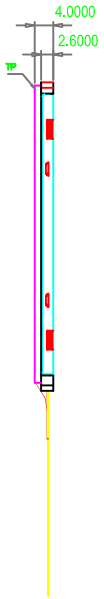
MODEL NAME	NO	MATERIAL	REMARKS
	1		

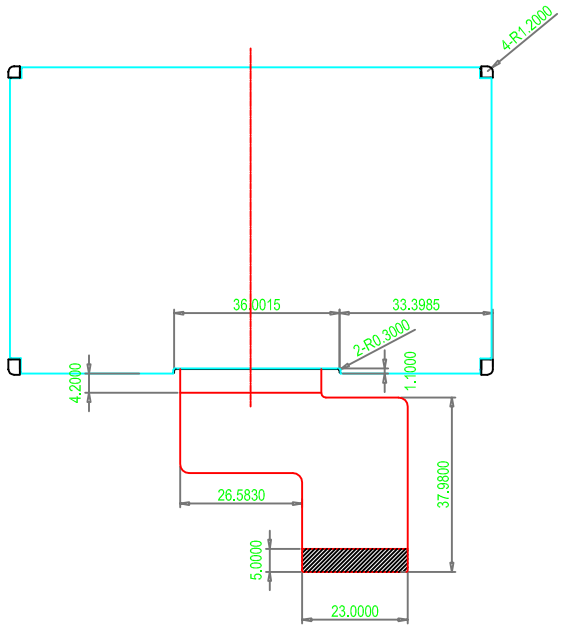
CRYSTAL CLEAR TECHNOLOGY SDN BHD
16, JLN TP5, TMN PERINDUSTRIAN SIME UEP,
47500 SUBANG JAYA, SELANGOR DARUL EHSAN.

PART NAME: T272480C07VR01

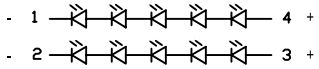
APPROVED	CHECKED	DRAWN	UNIT : MM / NTS	DRAWING NUMBER	SHEET	REV.
				T272480C07VR01		







1	VSS
2	VSS
3	VDD
4	VDD
5	D00
6	D01
7	D02
8	D03
9	D04
10	D05
11	D06
12	D07
13	D10
14	D11
15	D12
16	D13
17	D14
18	D15
19	D16
20	D17
21	D20
22	D21
23	D22
24	D23
25	D24
26	D25
27	D26
28	D27
29	VSS
30	CLK
31	NC
32	HSYNC
33	VSYNC
34	DE
35	NC
36	VSS
37	YU
38	XL
39	YD
40	XR
41	VSS
42	BLL
43	BLH
44	NC
45	NC



NOTES:
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7. Unspecified Tolerance : ±0.20

MODEL NAME	NO	MATERIAL	REMARKS

CRYSTAL CLEAR TECHNOLOGY SDN BHD
16, JLN TP5, TMN PERINDUSTRIAN SIME UEP,
47500 SUBANG JAYA, SELANGOR DARUL EHSAN.

PART NAME: MECHANICAL SPECIFICATION

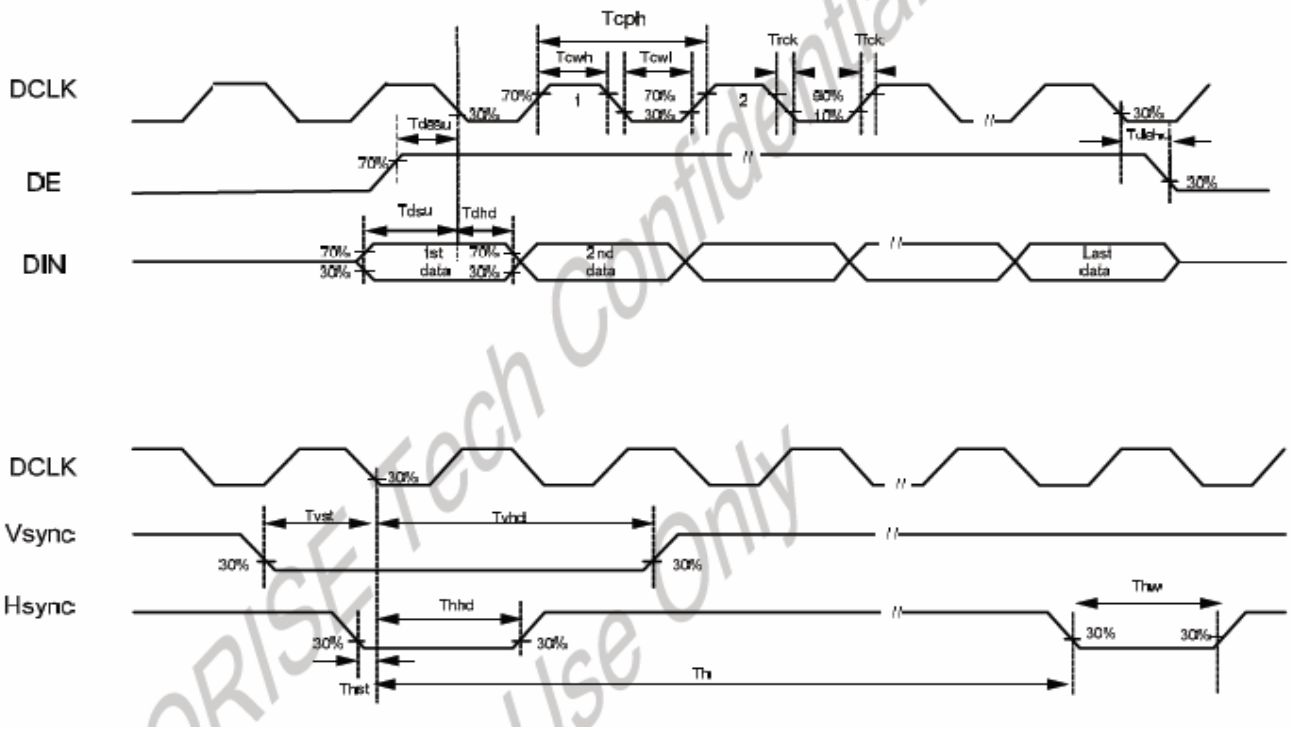
APPROVED	CHECKED	DRAWN	UNIT : MM	DRAWING NUMBER	SHEET	REV.
		KHAIRIAH 25-01-2011	NTS	T272480C07VS01	1/1	1

5. INTERFACE ASSIGNMENT

No.	Symbol	Description
1	GND	Ground
2	GND	Ground
3	VDD	Power Supply
4	VDD	Power Supply
5 ~ 12	R0 ~ R7	Data Bus (R0 ~ R7)
13 ~ 20	G0 ~ G7	Data Bus (G0 ~ G7)
21 ~ 28	B0 ~ B7	Data Bus (B0 ~ B7)
29	GND	Ground
30	PCLK	Dot-clock signal and oscillator source
31	NC	Not Connect
32	HSYNC	Line synchronization signal
33	VSYNC	Frame synchronization signal
34	DE	Display enable pin from controller
35	NC	Not Connect
36	GND	Ground
37	YU (NC)	Touch pad for y_up (Not connect for T272480C07VR01)
38	XL (NC)	Touch pad for x_left (Not connect for T272480C07VR01)
39	YD (NC)	Touch pad for y_down (Not connect for T272480C07VR01)
40	XR (NC)	Touch pad for x_right (Not connect for T272480C07VR01)
41	GND	Ground
42	LED -	Backlight LED Cathode
43	LED +	Backlight LED Anode
44	NC	Not Connect
45	NC	Not Connect

6. TIMING CHARACTERISTICS

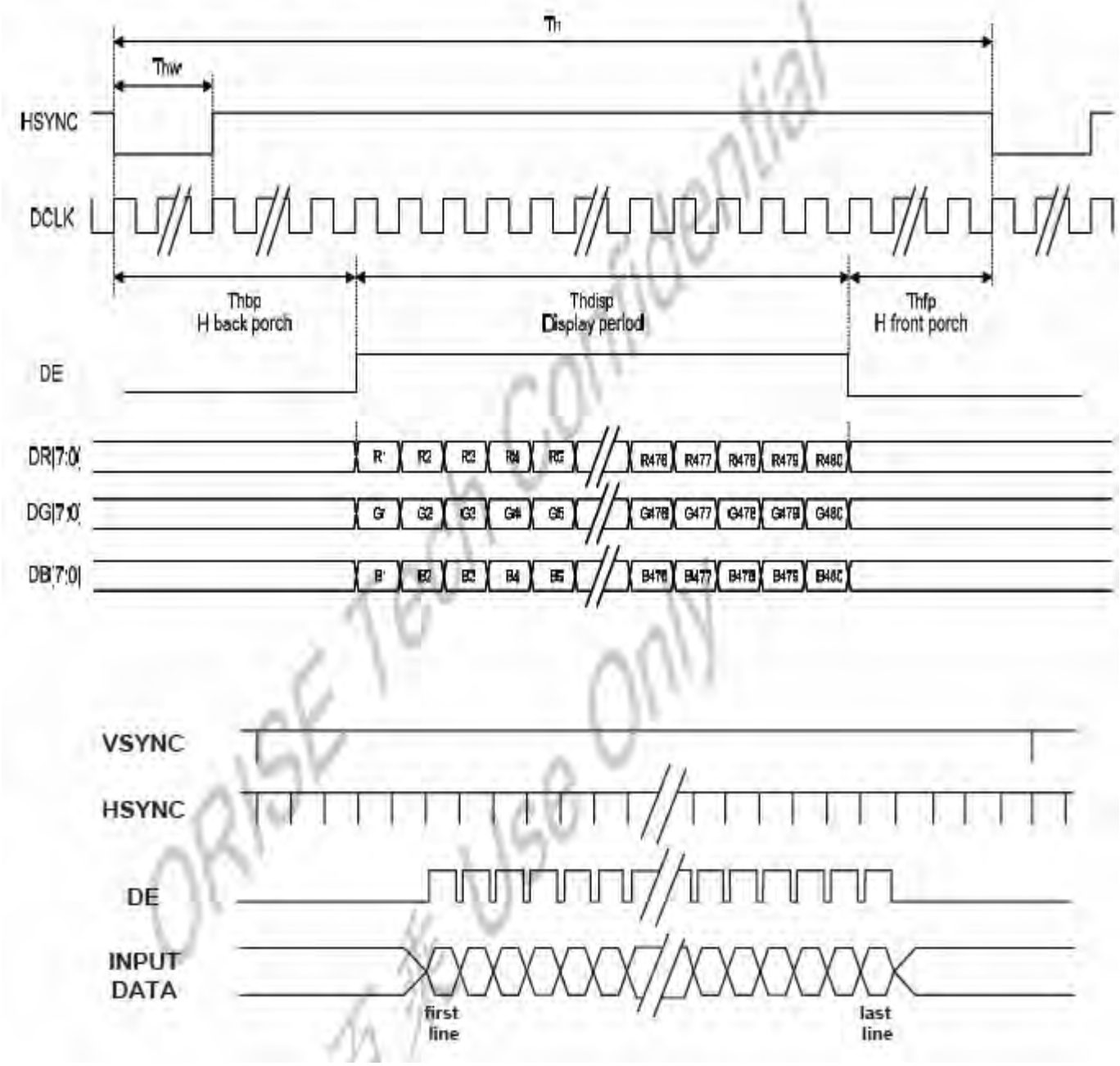
6.1 Clock and Data Input Timing Diagram



6.2 Parellel RGB Input Timing Table

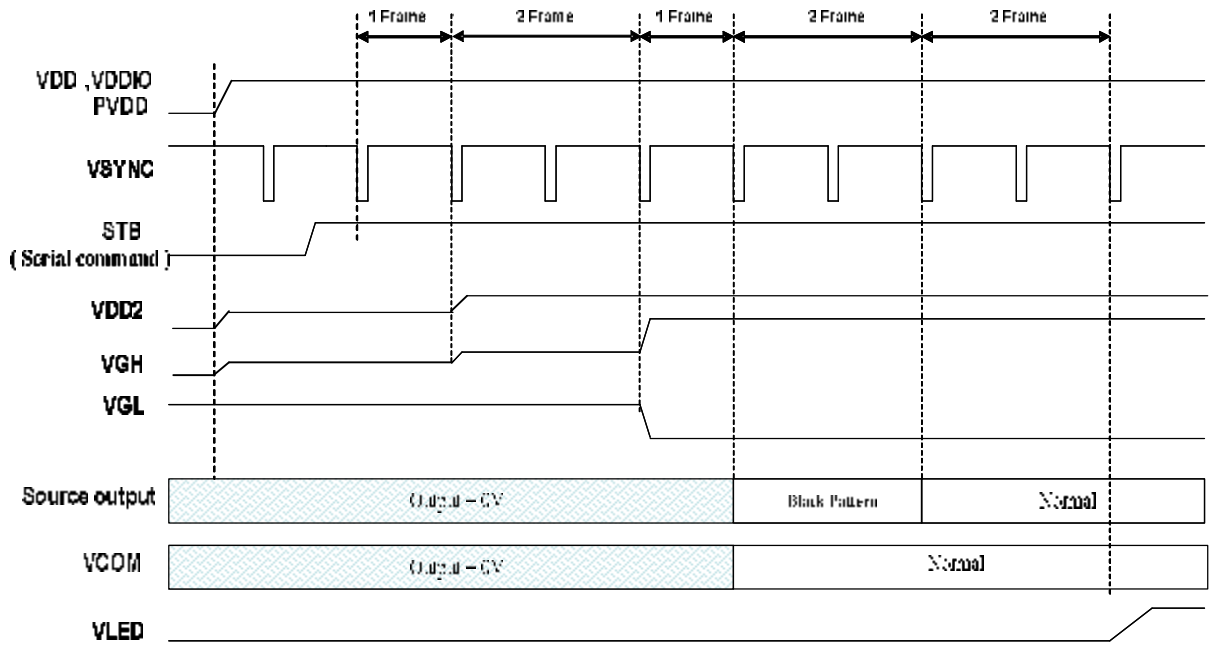
Item		Symbol	Min.	Typ.	Max.	Unit	
DCLK Frequency		Fclk	5	9	12	MHz	
DCLK Period		Tclk	83	110	200	ns	
Hsync	Period Time	Th	490	531	605	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	8	43		DCLK	By H_BLANKING setting
	Front Porch	Thfp	2	8		DCLK	
	Pulse Width	Thw	1			DCLK	
Vsync	Period Time	Tv	275	288	335	H	
	Display Period	Tvdisp		272		H	
	Back Porch	Tvbp	2	12		H	By V_BLANKING setting
	Front Porch	Tvfp	1	4		H	
	Pulse Width	Tvw	1	10		H	

6.3 SYNC-DE Mode Timing Diagram

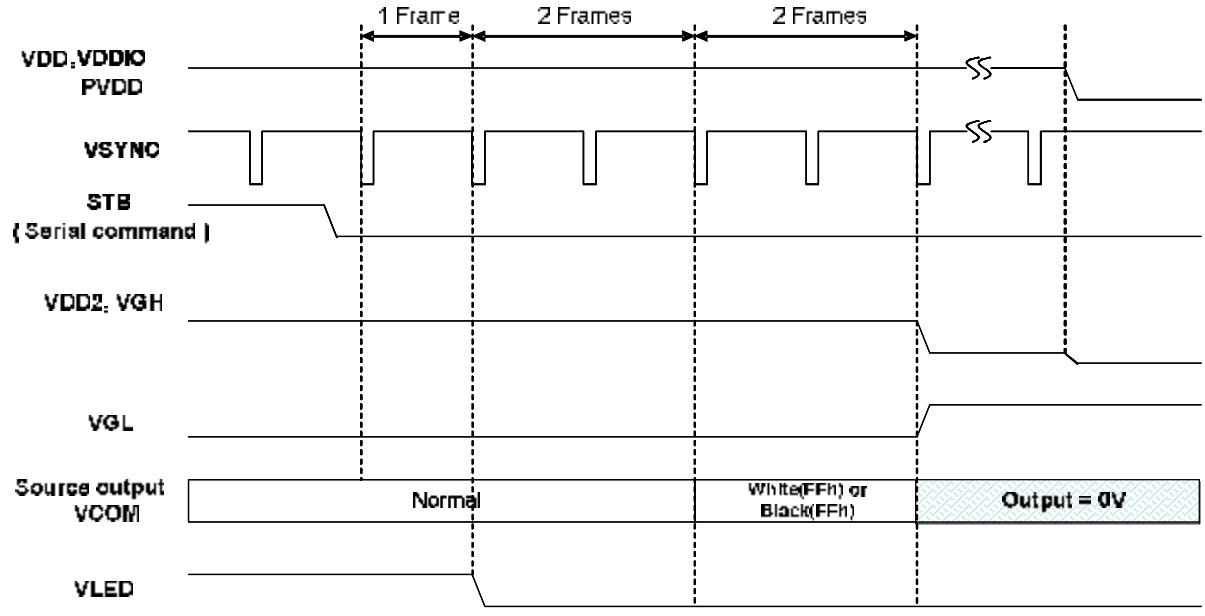


6.4. POWER ON/OFF SEQUENCE

6.4.1 Power On Sequence



6.4.2 Power Off Sequence



Note:

a. When normally-black LC is used, please send black pattern to discharge the panel.

b. When normally-white LC is applied, please send white pattern to discharge the panel.

7. ELECTRICAL SPECIFICATIONS

7.1 Absolute Maximum Ratings

Rating	Symbol	Value			Unit
Digital supply voltage	VDDIO	-0.3	to	+4.5	V
Power Supply for Pump	VDD	-0.3	to	+4.5	V
Analog supply voltage	VDD2	-0.3	to	+7.0	V
Storage temperature	T_{STG}	-55	to	100	℃
Operating temperature	T_A	-30	to	85	℃

Note: Stresses beyond those given in the Absolute Maximum Rating table may cause operational errors or damage to the device. For normal operational conditions see AC/DC Electrical Characteristics.

7.2 DC Characteristics

7.2.1 Recommended Operating Range

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Charge Pump Supply Voltage	PVDD	3	3.3	3.6	V	PWR_SEL=H
	PVDD	2.25	2.5	3	V	PWR_SEL=L
Digital Supply Voltage	VDD	3	3.3	3.6	V	PWR_SEL=H
	VDD	2.25	2.5	3	V	PWR_SEL=L
Digital Interface Supply Voltage	VDDIO	1.65	1.8	VDD	V	
Digital Input Voltage	Din	0	-	VDDIO	V	
OTP Supply Voltage	V_OTP	7.4	7.5	7.6	V	
VCOM AC Voltage	VCOMH-VCOML	3.46	-	6.2	V	

PARAMETER	SPECIFICATIONS	TYP
Logic supply voltage VDD	-0.5V TO +5V	3.3 V
Analog supply voltage VDDA	-0.5V TO +7.5V V	5.0 V
VGH	+9v to +16v	+15V
VGL	-9v to -11v	-10V

7.2.2 DC Characteristics for Digital Circuit

VDDIO=1.8V, VDD = 3.3V, AVDD = 6V, AGND = 0V, T_A = -20℃ to 80℃

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Low Level Input Voltage	Vil	GND	-	0.3xVDDIO	V	
High Level Input Voltage	Vih	0.7xVDDIO	-	VDDIO	uA	
High Level Output Voltage	Voh	VDDIO-0.4	-	VDDIO	ohm	
Low Level Output Voltage	Vol	GND	-	GND+0.4	uA	
Input Leakage Current	Iil			±1.0		
Pull High/Low Resistor	Rp	-	100K	-	ohm	
Digital Stand-by Current	Ist		5.0	20	uA	DCLK stopped, Output Hi-Z
Digital Operating Current	Icc	-	4	-	mA	DCLK = 9MHz

7.2.3 DC Characteristics for Analog Circuit

VDDIO=1.8V, VDD = 3.3V, AVDD = 6V, AGND = 0V, T_A = -20℃ to 80℃

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Analog Supply Voltage	VDD2		5		V	
Positive High-voltage power	VGH	9	15	16	V	No Load. By VGH_SEL setting.
Negative High-voltage power	VGL	-11	-10	-7	V	No Load. By VGL_SEL setting.
VCOMH Output Level	VCOMH	3.26		5.8	V	By VCOMH setting.
VCOML Output Level	VCOML	-2		-0.2	V	By VCOML setting
DRV Output Voltage	VDRV	0	-	VDD	V	
DCDC Feed Back Voltage	VFB	0.28	0.6	0.79	V	By LED_VFB setting
Base Drive Current	IDRV	-	20	25	mA	By LED_VFB setting
Output Voltage Deviation	Vod	-	±20	±35	mV	V_O = 0.15V ~ 0.5V, 3.45V~3.8V
		-	±15	±20		V_O = 0.5V ~ 3.45V
Output Dynamic Range	Vdr	0.2	-	5.3		MVA Mode
		0.15		4.8		TN Mode
VCOM Low Level Output Current	IOL_{FRP}		-10		mA	VCOM AC output = 0.5V
VCOM High Level Output Current	IOH_{FRP}		-10		mA	VCOM AC output = 5.7V
Analog Standby Current	Iast	-	-	20	uA	
Analog Operation Current	IDD	-	5.0	-	mA	Without panel loading

8. AC Characteristics

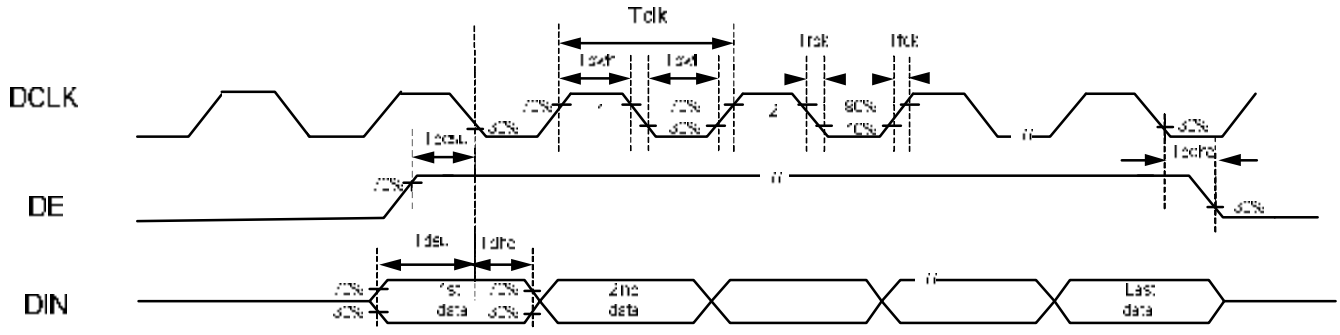
VDDIO=1.8V, VDD = 3.3V, AVDD = 6V, AGND = 0V, T_A = -20℃ to 80℃

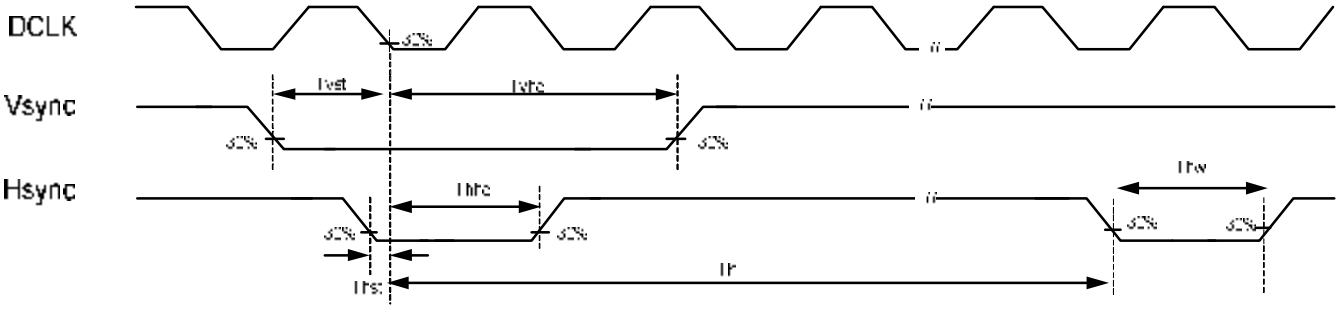
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK pulse duty	Tcw	40	50	60	%	
Hsync width	Thw	1.0	-	-	DCLK	
Hsync period	Th	55	60	65	us	
Vsync setup time	Tvst	12	-	-	ns	
Vsync hold time	Tvhd	12	-	-	ns	
Hsync setup time	Thst	12	-	-	ns	
Hsync hold time	Thhd	12	-	-	ns	
Data set-up time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	
DE set-up time	Tdesu	12	-	-	ns	
DE hold time	Tdehd	12	-	-	ns	
SD output stable time	Tst	-	10	12	us	
GD output rise and fall time	Tgst	-	500	1000	ns	
Serial communication						
Delay between CSB and Vsync	Tcv	1			us	
CS input setup time	Ts0	50			ns	
Serial data input setup time	Ts1	50			ns	
CS input hold time	Th0	50			ns	
Serial data input hold time	Th1	50			ns	
SCL pulse high width	Twh1	50			ns	

SCL pulse low width	Twl1	50			ns	
CS pulse high width	Tw2	400			ns	

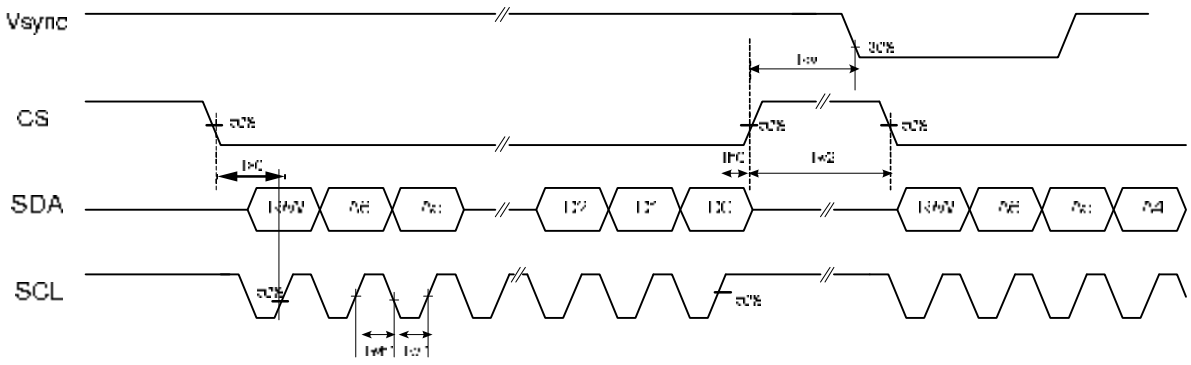
8.1 AC Timing Diagram

8.1.1 Clock and Data Input Timing Diagram



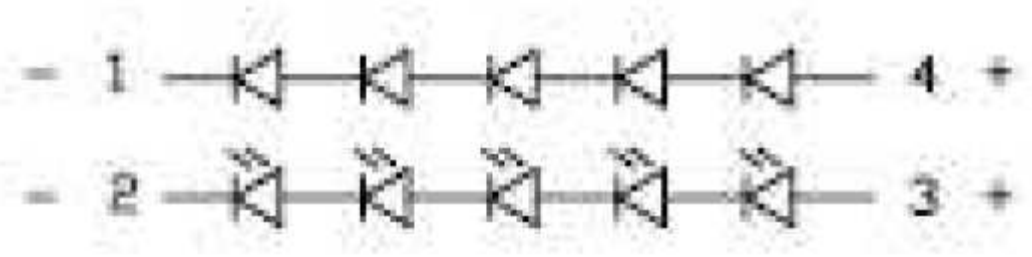


8.1.2 3-Wire Communication Timing Diagram



9. LED BACKLIGHT AND TOUCH PANEL CHARACTERISTICS

9.1 Power Supply For LED Backlight



9.2 LED Backlight Electrical Characteristics

PARAMETER	SYMBOL	lamp	REMARK	STANDARD VALUE		
				MIN	TYP	MAX
FORWARD VOLTAGE	Vf	WHITE		----	16V	----
LUMINOUSINTENSITY (complete module)	Iv	WHITE	If =40MA	270 cd/m²	280 cd/m²	290 cd/m²
LUMINOUS TOLERANCE	Iv-m	WHITE	(min/max)/100	80	----	----

9.2.1 Touch Panel Characteristics

9.2.1.1 Electrical Characteristics

Items	Min.	Typ.	Max.	Unit	Note
Linearity	-	-	±1.5	%	X (Flim side)
Resistance between terminals	100	-	640	Ω	Y (Glass side)
	260		1240	Ω	
Insulation resistance	20M	-		Ω	
Opration voltage	-	-	5	V	
Response time	-	-	10ms		
Transmittance	-	80	-	%	
Haze	-	8	-	%	

9.2.1.2 Mech. & Reliability Characteristics

Item	Min.	Typ.	Max.	Unit	Note
Activation force	-	-	80	g	Note 1
Surface hardness	3	-	-	H	JIS-K5400
Durability-surface Sliding	Write 100,000	-	-	Characters	Note 2
Durability-surface Hitting	1,000,000	-	-	Touch	Note 3

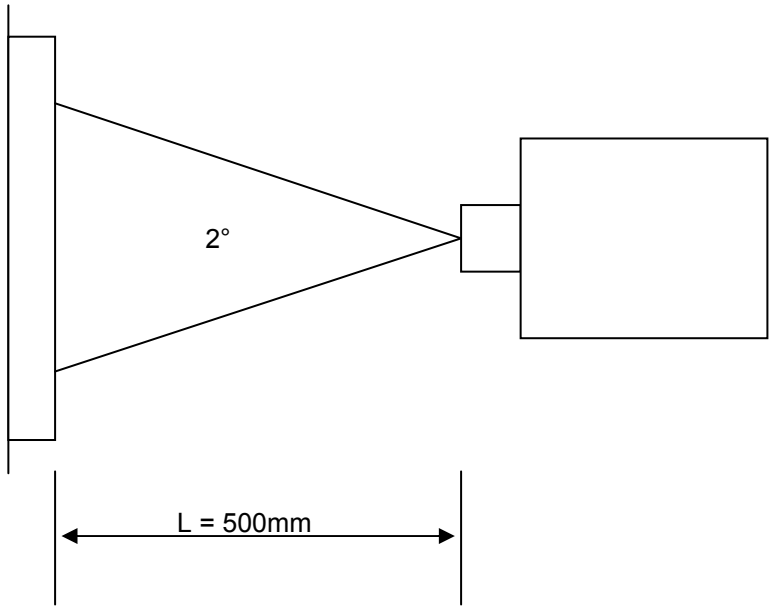
Note:
1. Stylus pen input: R 0.8mm polyacetal pen or finger.
2. Writing with R 0.8mm plastic styus pen, load 250gf in active area,. Speed is 60mm/sec, each sliding length 30mm.
3. Writing with R0.8mm plastic stylus pen; load 250gf in active area. Speed is 3 times.sec.

10. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Transmittance		T		6	6.4	-	%	Note 2
Contrast Ratio		CR	*1)	250	350	-	-	Note 3
Respone time		Tr + Tf	*3)	-	30	45	ms	Note 4
	Vertical	θ*2)	CR≥10	90	110	-		Note5
	Horizontal	Ψ*2)		110	130	-		
Color Filter Chromacicity with C light	White	X	θ = Φ = 0°	0.287	0.307	0.327		Note 6
		Y		0.325	0.345	0.365		
	RED	X	θ = Φ = 0°	0.589	0.609	0.629		
		Y		0.297	0.317	0.337		
	Green	X	θ = Φ = 0°	0.297	0.317	0.337		
		Y		0.523	0.543	0.563		
	Blue	X	θ = Φ = 0°	0.117	0.137	0.157		
		Y		0.141	0.161	0.181		
	NTSC			-	48.10%	-		

Note 1. Ambient condition: 25°C ±2°C, 60 ±10% RH, under 10 Lunx in the darkroom

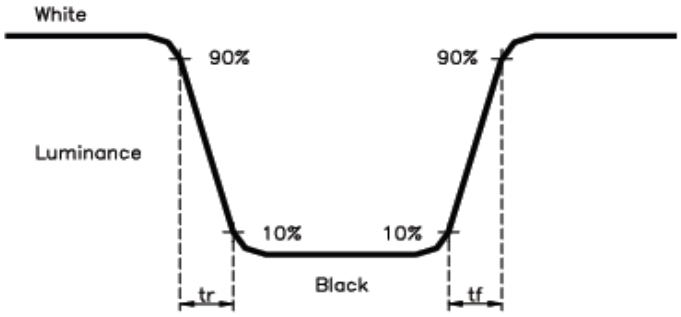
Note 2. Measure device: BM-5A (TOPCPN), viewing cone =1°, I_L = 20mA



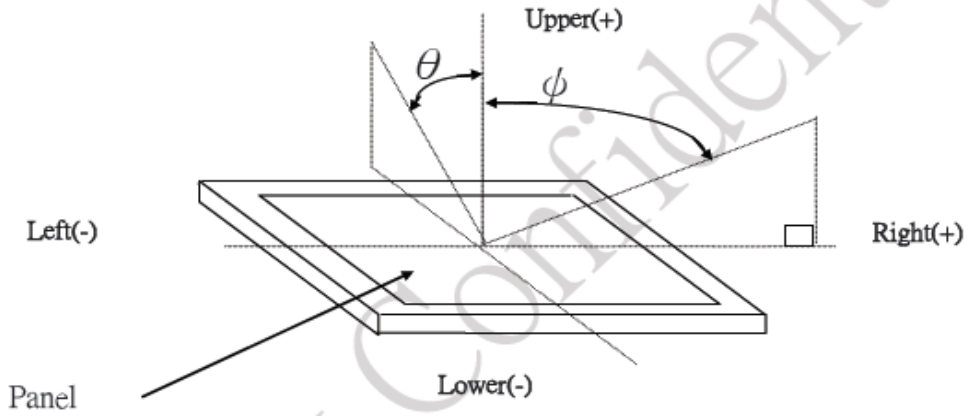
Note 3: Definition of Contrast Ratio:

CR = White Luminance (ON) / Black Luminance (OFF)

Note 4. Definition of response time：The response time is defined as the time interval between the 10% and 90% amplitudes.



Note 5. Definition of view angle(θ，ψ)：



Note 6. Light source: C light.

11. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBO	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-20℃ ～+70℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-30℃ ～+80℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
HUMIDITY	—	See Note	WITHOUT CONDENSATION

NOTE： TEST CONDITION

（1） Temperure and humidity:If no specification,temp .set at 25±2℃.humidity

（2） Operating state:Samples subject to the test shall bein “operating”condition

12. RELIABILITY TEST

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERTURE +50℃ 72HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE -10℃ 72HRS	
STORAGE TEMPERATURE	HIGH TEMPERTURE +70℃ 120HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE - 20℃ 120HRS	
HUMIDITY	40℃ 90%RH 72HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	• Operating Time: thirty minutes exposure for	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	• each direction (X,Y,Z)	
	• Sweep Frequency: 10～55Hz (1 min)	
	• Amplitude: 1.5mm	
THERMAL SHOCK	-10℃(30mins) ←5℃(5mins)→+50℃ (30mins) 10 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

NOTE: The samples must be free from defect before test, must be restore at room condition at least for 2 hour after reliability test before any inspection.

13. USING LCD MODULES

13-1 LIQUID CRYSTAL DISPLAY MODULES

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

(1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

(2) Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.).

(3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances which will be damaged by chemicals such as acetone, toluene, ethanol and isopropylalcohol.

(4) Environmental conditions :

- Do not leave them for more than 160hrs. at 70°C.
- Should not be left for more than 48hrs. at -20°C.

13-6 SAFETY

(1) It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

(2) If any liquid leakes out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

13-7 LIMITED WARRANTY

Unless agreed between CCT and customer, CCT will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with CCT LCD acceptance standards (copies available upon request) for a period of one year from date of shipments. Cosmetic/visual defects must be returned to CCT within 90 days of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of CCT limited to repair and/or replacement on the terms set forth above. CCT will not be responsible for any subsequent or consequential events.

13-8 RETURN LCM UNDER WARRANTY

No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

- Broken LCD glass.
- Circuit modified in any way, including addition of components.

Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB's eyelet, conductors and terminals.

electric potential.

(3) When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.

(4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

(5) As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

(6) To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended.

13-4 PRECAUTIONS FOR OPERATION

(1) Viewing angle varies with the change of liquid crystal driving voltage (VO). Adjust VO to show the best contrast.

(2) Driving the LCD in the voltage above the limit shortens its life.

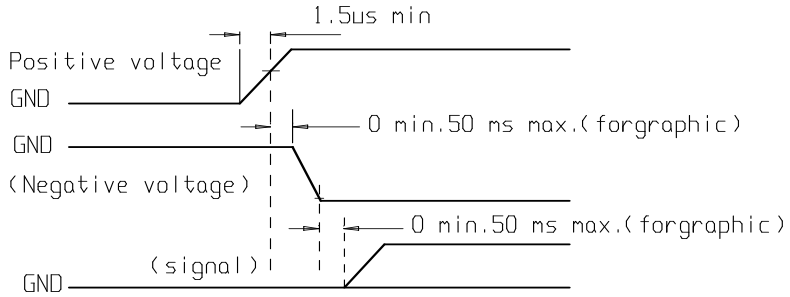
(3) If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

(4) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.

(5) If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.

(6) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of 40°C , 50% RH.

(7) When turning the power on, input each signal after the positive/negative voltage becomes stable.



13-5 STORAGE

When storing LCDs as spares for some years, the following precaution are necessary.

(1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for dessicant.

(2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.

3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped.)

(4) Environmental conditions :

- Do not leave them for more than 160hrs. at 70°C.
- Should not be left for more than 48hrs. at -20°C.

13-6 SAFETY

(1) It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

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