SPECIFICATIONS

CUSTOMER : _____

MODEL NO. : _GFTM070DE800480_-S__

VERSION : _____A_____ __

DATE : ___2012.05.07___

CERTIFICATION : ____ROHS____

Customer Sign	Sales Sign	Approved By	Prepared By

Revision Record

Data(y/m/d)	Ver.	Description	Note	page
2012.05.07	A	Specification released		

Contents

1.General Specifications

No.	Item	Specification	Remark
1	LCD size	7.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	$800 \times (RGB) \times 480$	
4	Display mode	Normally White, Transmissive	
5	Pixel size	190.5 x 190.5 um	
6	Active area	152.4 (W) × 91.44(H) mm	
7	Module size	165(W) ×104.44(H)×(11.3)(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	MCU 8/16 Bit	
11	Backlight Power consumption	1.90W(Typ.)	
12	Panel Power consumption	0.66 W(Typ.)	Note 2
13	Weight	TBD (Typ.)	

Note 1: Refer to Mechanical Drawing.

Note 2: Including T-con Board power consumption.

2.Pin Assignment

Pin No.	Symbol	I/O	Function	Remark
1	GND	I	Ground	
2	VDD	I	Power Supply (+3.3 V)	
3	WR	I	Write signal	
4	RD	I	Read signal	
5	CS	I	Chip select	
6	NC	--	Not Connection	
7	Reset	I	Reset : active low	
8	RS	I	Register Select L:Command , H:Data	
9	DB15	I	Data Bus	
10	DB14	I	16Bit :DB0~DB15	
11	DB13	I	8Bit :DB0~DB7	
12	DB12	I		
13	DB11	I		
14	DB10	I		
15	DB9	I		
16	DB8	I		
17	DB7	I		
18	DB6	I		
19	DB5	I		
20	DB4	I		
21	DB3	I		
22	DB2	I		
23	DB1	I		
24	DB0	I		
25	IF	I	High : 6800 Low : 8080	
26	NC	O	Not Connection	
27	NC	O	Not Connection	
28	NC	O	Not Connection	
29	NC	O	Not Connection	
30	LEDK	--	Power Voltage for LED Ground	
31	LEDK	--	Power Voltage for LED Ground	

| 32 | LEDA | I | Power Voltage for LED Power 9.9V/180mA | |
| 33 | LEDA | I | Power Voltage for LED Power 9.9V/180mA | |

3.Operation Specifications

3.1. Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VCC	-0.3	6.5	V	
	VLED	-0.3	6.5	V	
Operation temperature	TOP	-20	70	°C	
Storage temperature	TST	-30	80	°C	

Note 1: The absolute maximum rating values of the module should not be exceeded.

　　　Once exceeded absolute maximum rating values, the characteristics of the odule may not be recovered.

　　　Even in an extreme condition, may result in odule permanently destroyed.

3.2. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VCC	3.0	3.3	3.6	V	Note1
	VLED	-	9.9	-	V	Note2
Current Consumption	ICC	--	70	120	mA	
	ILED	--	180	200	mA	Note3
Input logic high voltage	VIH	0.7VCC	-	1VCC	V	
Input logic low voltage	VIL	0	-	0.3VCC	V	
LED life time	-	10,000	20,000	-	Hr	Note4

Note 1: Vcc setting should match the signals output voltage (refer to Note 4) of customer's system board.

Note 2: LED driving voltage.

Note 3: LED driving current.

Note 4: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C

and VLED=5.0V. The LED lifetime could be decreased if operating VLED is larger than 5.0V.

3.3.Timing Characteristicsk

### 3.3.1.Timing Conditions

　　Voltage referenced to VSS

　　VDDIO = 3.3V±10%

　　TA= -30°C to 85°C

Parallel 6800-series Interface Timing Characteristics(Use CS# as clock)

| Symbol	Parameter		Min	Typ	Max	Unit
f_{MCLK}	System Clock Frequency*		1	-	110	MHz
t_{MCLK}	System Clock Period*		$1/f_{MCLK}$	-	-	ns
t_{PWCSH}	Control Pulse High Width	Write	13	$1.5 * t_{MCLK}$	-	ns
		Read	30	$3.5 * t_{MCLK}$		
t_{PWCSL}	Control Pulse Low Width	Write (next write cycle)	13	$1.5 * t_{MCLK}$	-	ns
		Write (next read cycle)	80	$9 * t_{MCLK}$		
		Read	80	$9 * t_{MCLK}$		
t_{AS}	Address Setup Time		2	-	-	ns
t_{AH}	Address Hold Time		2	-	-	ns
t_{DSW}	Data Setup Time		4	-	-	ns
t_{DHW}	Data Hold Time		1	-	-	ns
t_{PLW}	Write Low Time		14	-	-	ns
t_{PHW}	Write High Time		14	-	-	ns
t_{PLWR}	Read Low Time		38	-	-	ns
t_{ACC}	Data Access Time		32	-	-	ns
t_{DHR}	Output Hold time		1	-	-	ns
t_R	Rise Time		-	-	0.5	ns
t_F	Fall Time		-	-	0.5	ns

* System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)
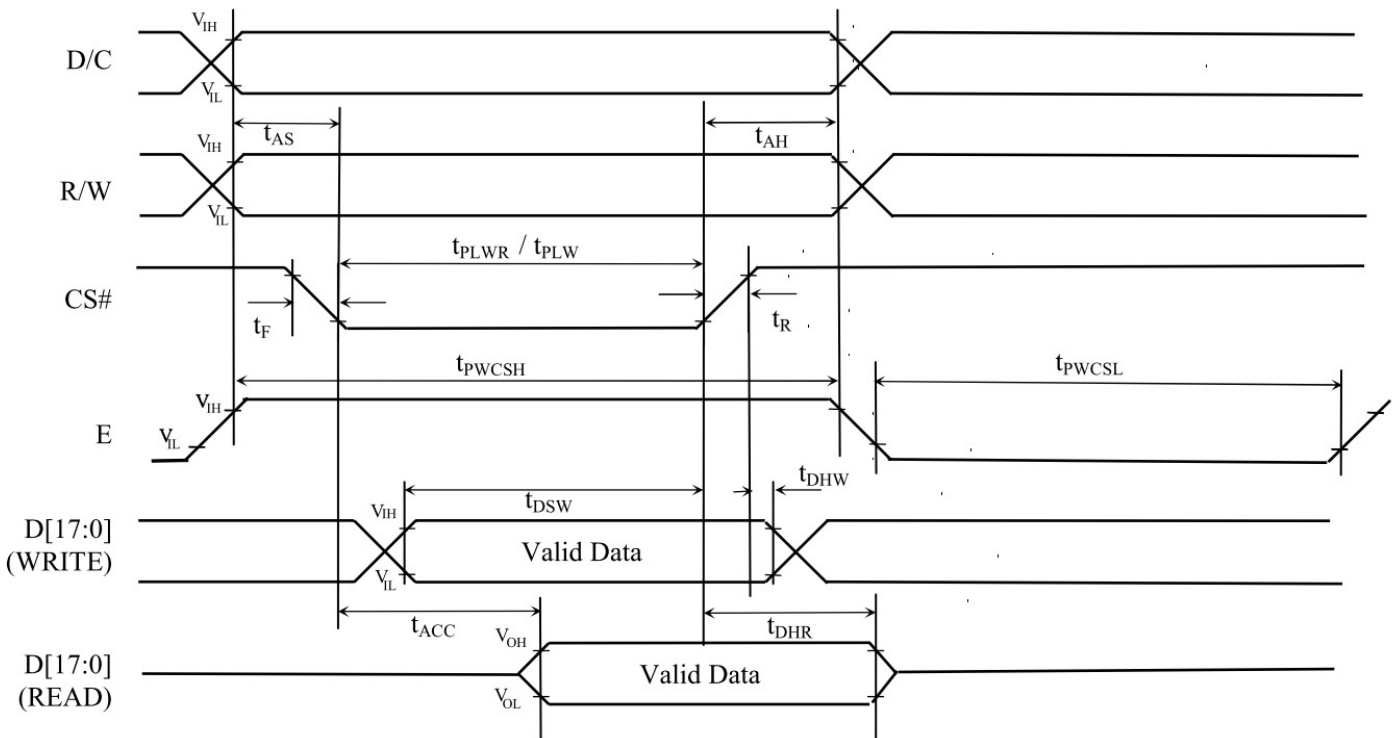
Parallel 8080-series Interface Timing Characteristics

Symbol	Parameter		Min	Typ	Max	Unit
f_{MCLK}	System Clock Frequency*		1	-	110	MHz
t_{MCLK}	System Clock Period*		$1/f_{MCLK}$	-	-	ns
t_{PWCSL}	Control Pulse High Width	Write	13	$1.5* t_{MCLK}$	-	ns
		Read	30	$3.5* t_{MCLK}$		
t_{PWCSH}	Control Pulse Low Width	Write (next write cycle)	13	$1.5* t_{MCLK}$	-	ns
		Write (next read cycle)	80	$9* t_{MCLK}$		
		Read	80	$9* t_{MCLK}$		
t_{AS}	Address Setup Time		1	-	-	ns
t_{AH}	Address Hold Time		2	-	-	ns
t_{DSW}	Write Data Setup Time		4	-	-	ns
t_{DHW}	Write Data Hold Time		1	-	-	ns
t_{PWLW}	Write Low Time		12	-	-	ns
t_{DHR}	Read Data Hold Time		1	-	-	ns
t_{ACC}	Access Time		32	-	-	ns
t_{PWLR}	Read Low Time		36	-	-	ns
t_R	Rise Time		-	-	0.5	ns
t_F	Fall Time		-	-	0.5	ns
t_{CS}	Chip select setup time		2	-	-	ns
t_{CSH}	Chip select hold time to read signal		3	-	-	ns

* System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)
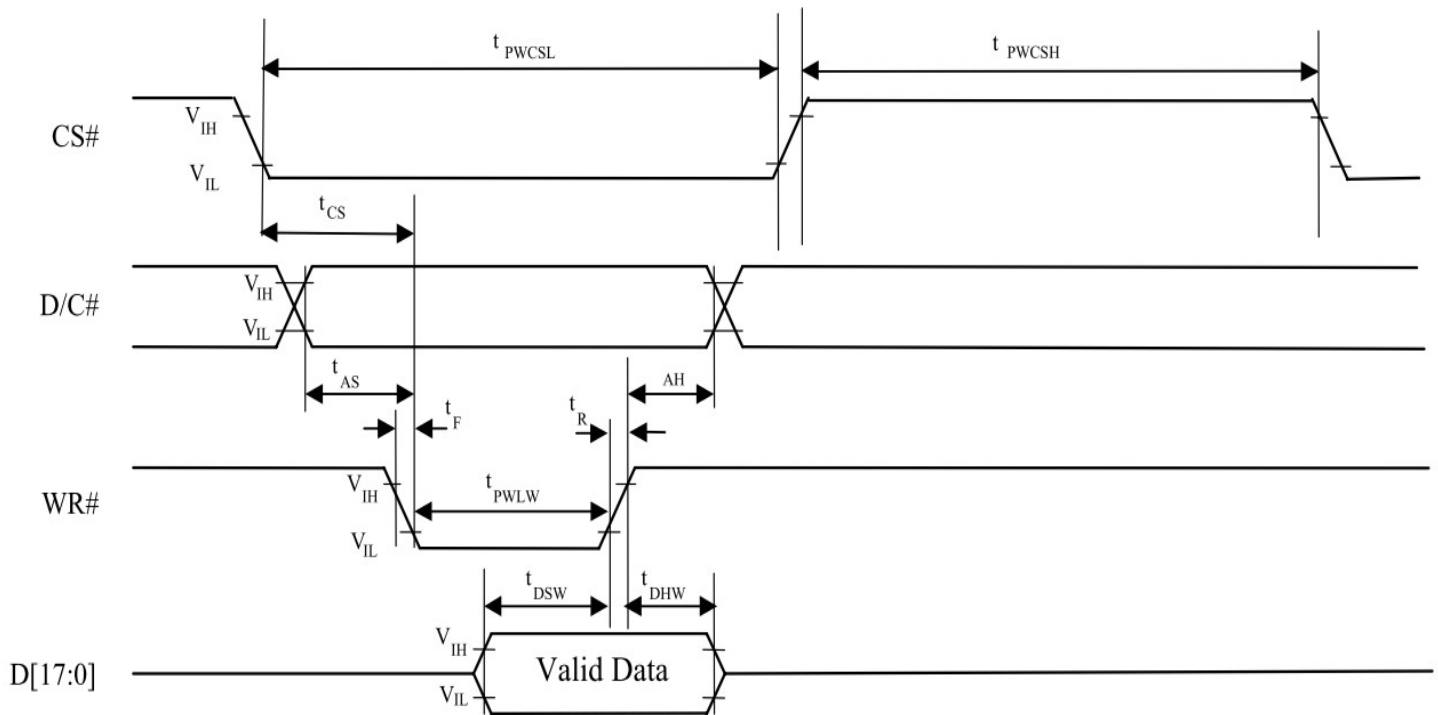
Pixel Data Format

Interface	Cycle	D[23]	D[22]	D[21]	D[20]	D[19]	D[18]	D[17]	D[16]	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
18 bits	1st							R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
16 bits (565 format)	1st									R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1
16 bits	1st									R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0
	2nd									B7	B6	B5	B4	B3	B2	B1	B0	R7	R6	R5	R4	R3	R2	R1	R0
	3rd									G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
12 bits	1st													R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4
	2nd													G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
9 bits	1st																R5	R4	R3	R2	R1	R0	G5	G4	G3
	2nd																G2	G1	G0	B5	B4	B3	B2	B1	B0
8 bits	1st																	R7	R6	R5	R4	R3	R2	R1	R0
	2nd																	G7	G6	G5	G4	G3	G2	G1	G0
	3rd																	B7	B6	B5	B4	B3	B2	B1	B0

4. Optical Specifications

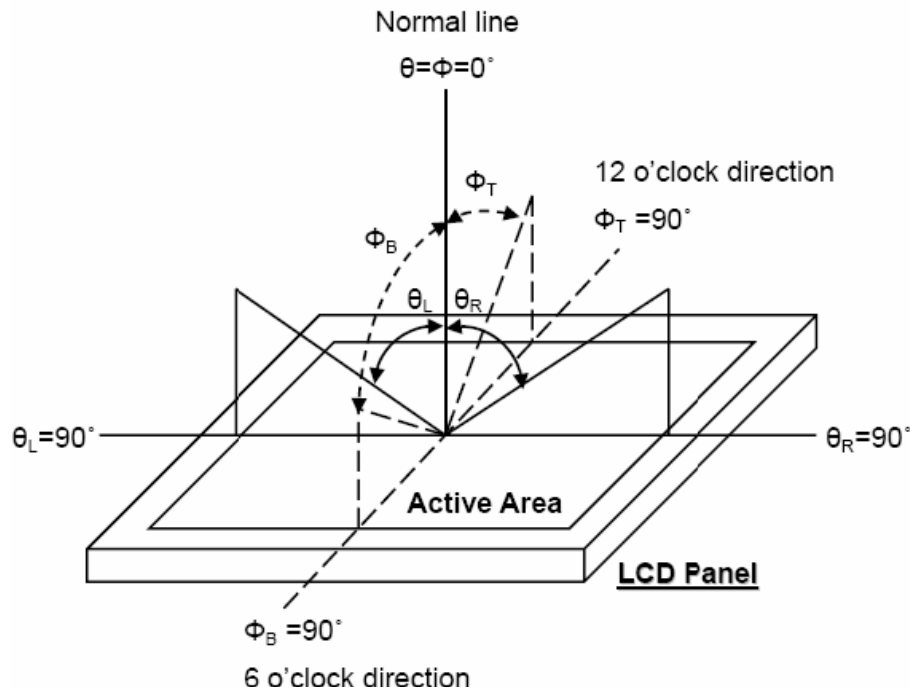| Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Brightness		-	Viewing normal angle $\theta = \phi = 0$	250	300	-	cd/m²	Center of display
Response time		Tr		-	5	10	.ms	Note 3,5
		Tf		-	11	16	.ms	
Contrast ratio		CR		250	400	-	-	Note 4,5
Color Chromaticity	White	Wx		0.249	0.299	0.349	-	Note 2,6,7
		Wy		0.278	0.328	0.378		
Viewing angle	Hor.	θR	CR ≥ 10	60	70	-	Deg.	Note 1
		θL		60	70	-		
	Ver.	ϕT		50	60	-		
		ϕB		60	70	-		

Note 1: Definition of viewing angle range

Fig. 4-1 Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 luminance meter 1.0° field of view at a distance of 50cm and normal direction.
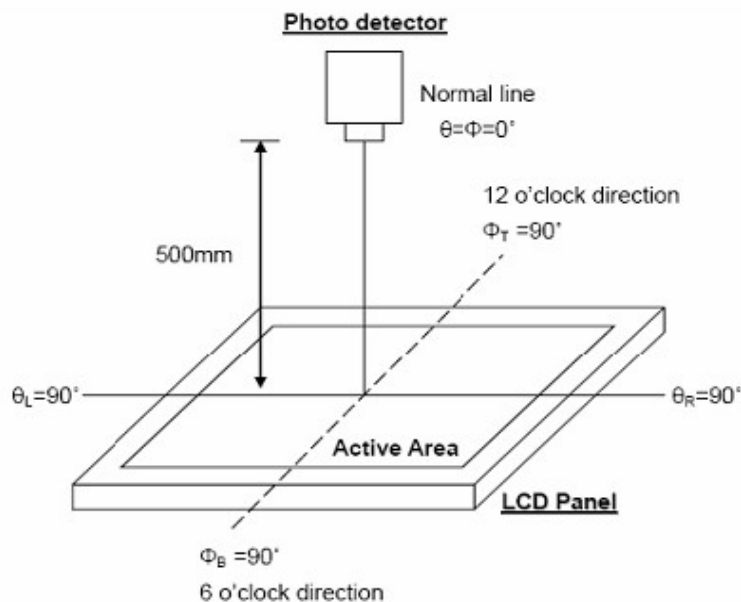

Fig.4-2 Optical measurement system setup

Note 3: Definition of Response time:

The response time is defined as the LCD optical switching time interval between "White state and "Black" state. Rise time, Tr, is the time between photo detector output intensity changed from 90% to 10% . And fall time, Tf, is the time between photo detector output Intensity changed from10% to 90% .
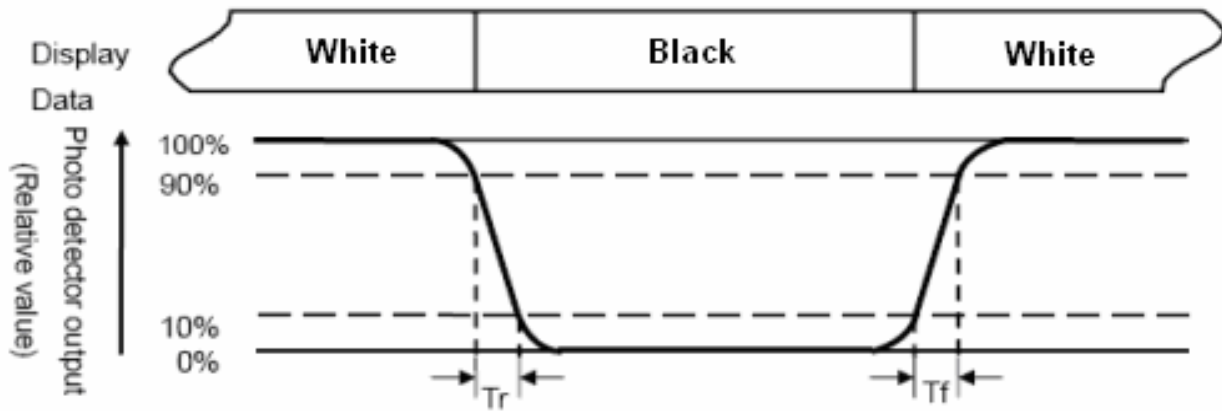
Fig. 4-3 Definition of Response time:

Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the ``White'' state}}{\text{Luminance measured when LCD on the ``Black'' state}}$$

Note 5: White Vi = $V_{i50} \pm 1.5V$

Black Vi = $V_{i50} \pm 2.0V$

"±" means that the analog input signal swings in phase with VCOM signal.

"±" means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

$$\text{Note 8: Uniformity (U)} = \frac{\text{Brightness (min)}}{\text{Brightness (max)}} \times 100\%$$

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5. Reliability Test

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80℃ 240 hrs	Note 1, 4
Low Temperature Storage	Ta = -30℃ 240hrs	Note 1, 4
High Temperature Operation	Ts = 70℃ 240hrs	Note 2, 4
Low Temperature Operation	Ta = -20℃ 240hrs	Note 1, 4
Operate at High Temperature and Humidity	+40℃, 90%RH 240 hrs	Note 4
Thermal Shock	-30℃/30 min ~ +80℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature	Note 4
Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60 cm	

	1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but doesn't guarantee all the cosmetic specification.

Note 4: Before cosmetic and function tests , the product must have enough recovery time, at least 2 hours at room temperature.

6.General Precautions

6.1.Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2.Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.

2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.

3. To avoid contamination on the display surface, do not touch the module surface with bare hands.

4. Keep a space so that the LCD panels do not touch other components.

5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.

6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.

7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3.Static Electricity

1. Be sure to ground module before turning on power or operating module.

2. Do not apply voltage which exceeds the absolute maximum rating value.
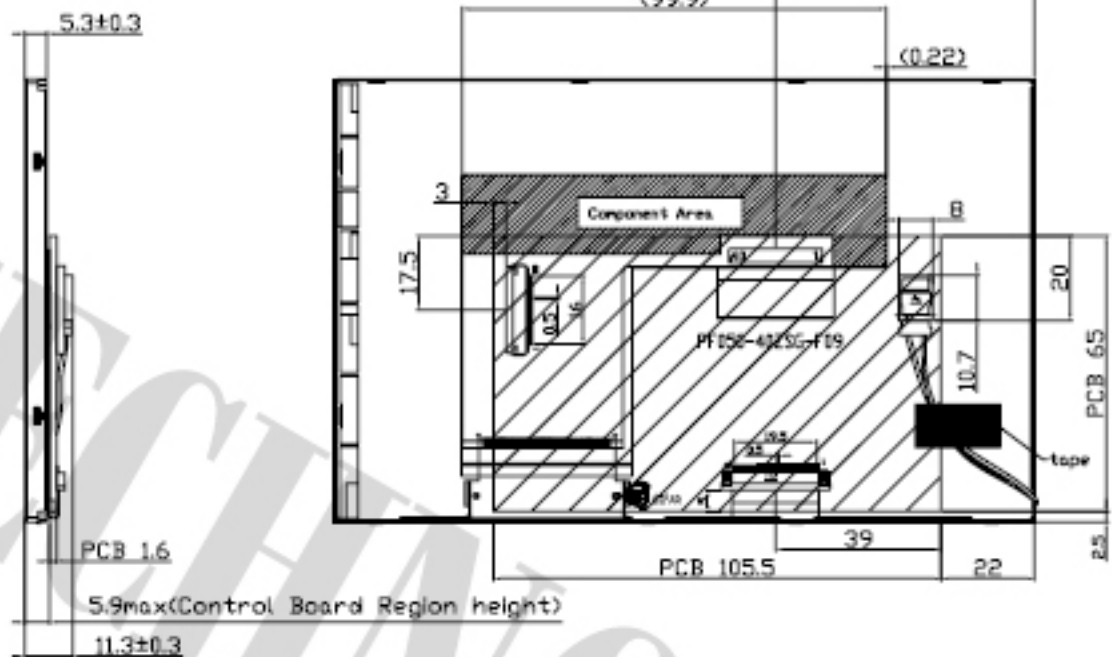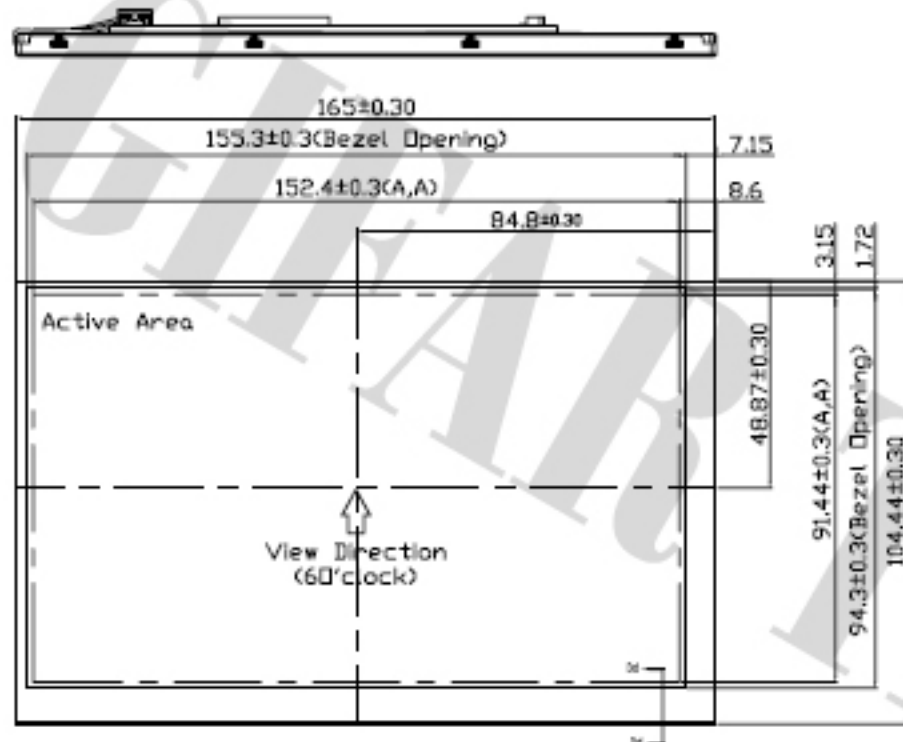
6.4.Storage

1. Store the module in a dark room where must keep at +25±10°C and 65%RH or less.

2. Do not store the module in surroundings containing organic solvent or corrosive gas.

3. Store the module in an anti-electrostatic container or bag.

6.5.Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.

2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

7.Mechanical Drawing

 See next page..

Active Area

View Direction
(6 O'clock)

165±0.30
155.3±0.3(Bezel Opening)
152.4±0.3(A.A)
84.8±0.30
7.15
8.6
3.15
1.72
48.87±0.30
91.44±0.3(A.A)
94.3±0.3(Bezel Opening)
104.44±0.30

5.3±0.3
PCB 1.6
5.9max(Control Board Region height)
11.3±0.3

61±0.5
(99.9)
(0.22)
Component Area
17.5
PT035-41ZSG-F09
3
B
20
PCB 65
10.7
39
22
2.5
PCB 105.5

20.5
19.5
0.54
0.3
(0.3±0.02)
0.35±0.1

PIN DESCRIPTION

NO.	NAME
1	GND
2	VDD
3	WR
4	RD
5	CS
6	NC
7	/RESET
8	RS
9	DB15
10	DB14
11	DB13
12	DB12
13	DB11
14	DB10
15	DB9
16	DB8
17	DB7
18	DB6
19	DB5
20	DB4
21	DB3
22	DB2
23	DB1
24	DB0
25	IF
26	NC
27	NC