

SPECIFICATIONS

CUSTOMER : _____

MODEL NO. : **GFTM056AB640480-S**

Version : **A**

DATE : **2012.06.25**

CERTIFICATION : **ROHS**

Customer Sign	Sales Sign	Approved By	Prepared By

Revision Record

Data(y/m/d)	Ver.	Description	Note	page
2012.06.25	A	Specification released		

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1.General Specifications

No.	Item	Specification	Remark
1	LCD size	5.6 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	640 × (RGB) × 480	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.0588(W) × 0.1764(H) mm	
6	Active area	112.896 (W) × 84.672(H) mm	
7	Module size	126.5(W) × 100(H) × (10.2)(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	MCU 8 Bit	
11	Backlight Power consumption	1.90W(Typ.)	Note 2
12	Panel Power consumption	0.66 W(Typ.)	Note 3
13	Weight	83.1g(Typ.)	

Note 1: Refer to Mechanical Drawing.

Note 2: Including LED Driver power consumption.

Note 3: Including T-con Board power consumption.

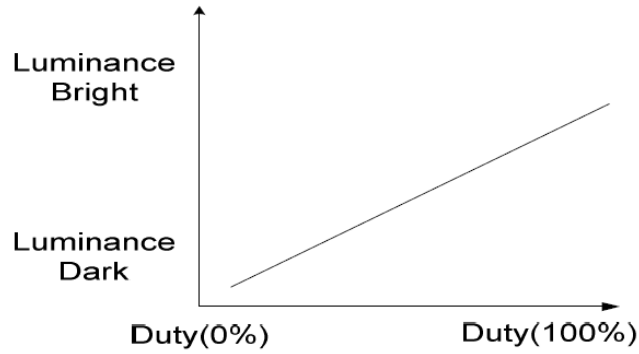
2.Pin Assignment

TFT LCD Panel Driving Section

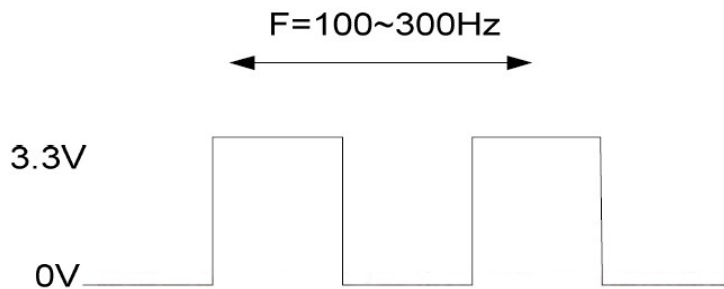
Pin No.	Symbol	I/O	Function	Remark
1	GND	P	Ground	
2	VDD	P	Power Voltage for digital circuit	
3	NC		Not Connection	
4	RS	P	Register Select H:Data L:Command	
5	/WR	I	Write Data	
6	/RD	I	Read Data	
7	DB0	P	Data Bus	
8	DB1	I		
9	DB2	I		
10	DB3	I		
11	DB4	I		
12	DB5	I		
13	DB6	I		
14	DB7	I		
15	/CS	I	Chip Select	
16	/RESET	I	Master synchronize reset	
17	VLED	I	Power for LED +5V	
18	RL	I	Select left to right scanning direction	Note3,4
19	UD	I	Select up or down scanning direction	Note3,4
20	ADJ	P	Adjust the LED brightness with PWM Pulse	Note1,2

Note: I: input, O: output t, P: Power

Note1: Pin5 is used to adjust brightness.



Note 2: ADJ signal=0~3.3V, operation frequency:100~300Hz

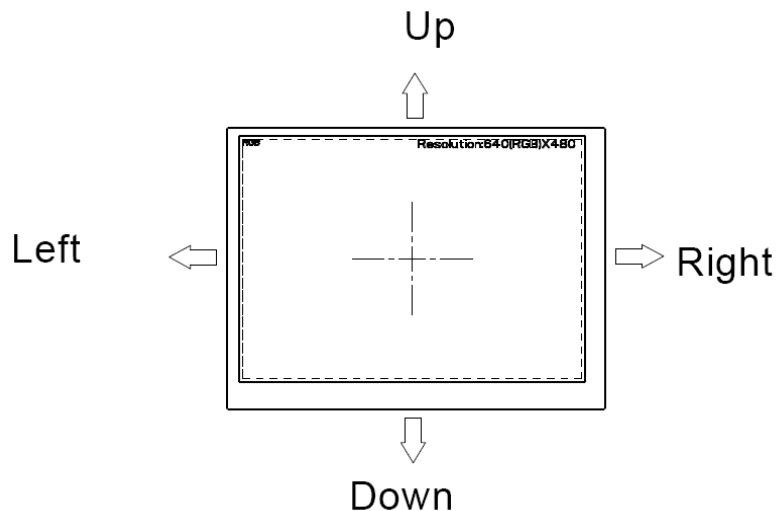


Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
UD	RL	
GND	VCC	Up to down, left to right
VCC	GND	Down to up, right to left
GND	GND	Up to down, right to left
VCC	VCC	Down to up, left to right

Note 4: Definition of scanning direction.

Refer to the figure as below:



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 module may not be recovered. Even in an extreme condition, may result in module permanently destroyed.

3.2. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VCC	3.1	3.3	3.5	V	Note1
	VLED	4.8	5.0	5.2	V	Note2
Current Consumption	ICC	-	200	250	mA	
	ILED	-	380	450	mA	Note3
Input logic high voltage	VIH	0.7VCC	-	1VCC	V	
Input logic low voltage	VIL	0	-	0.3VCC	V	
LED life time	-	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 Characteristics

3.3.1.Timing Conditions

Voltage referenced to VSS

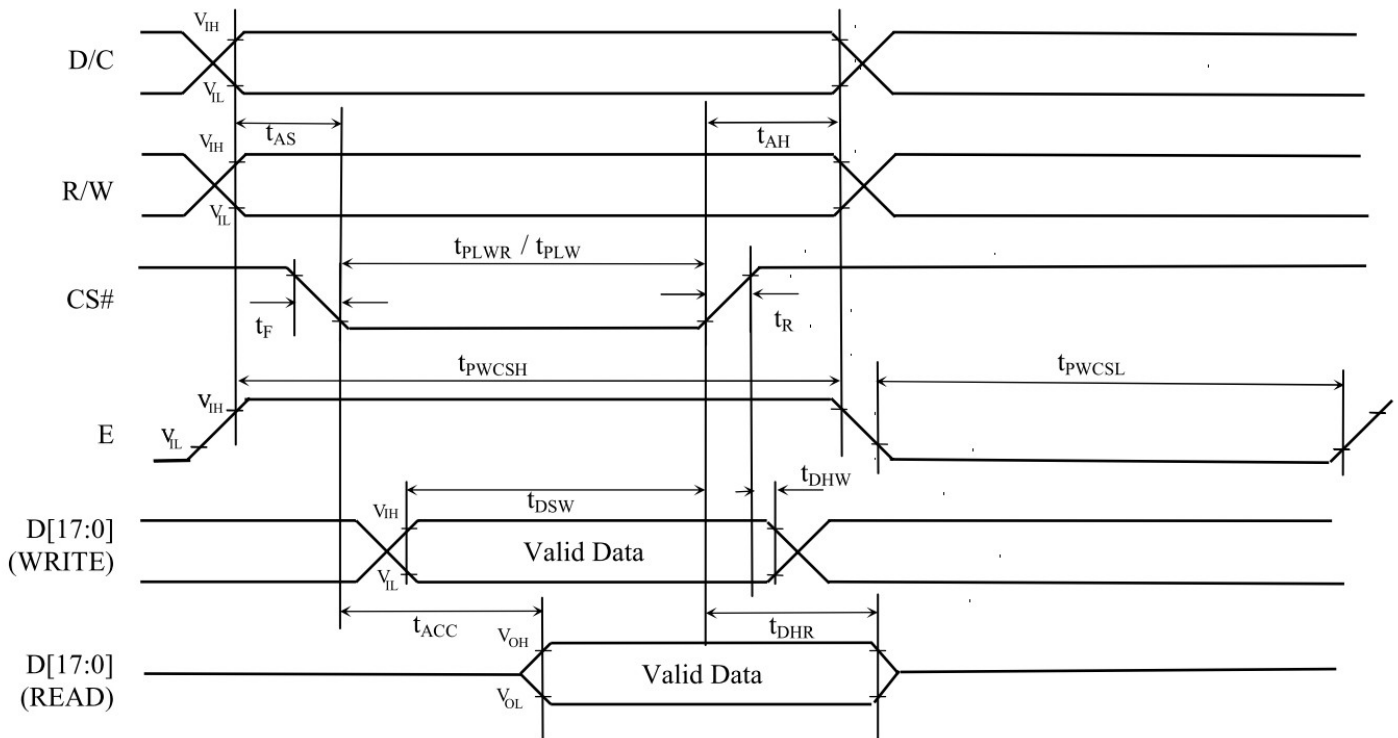
VDDIO = 3.3V±10%

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 Read	13 30	$1.5 * t_{MCLK}$ $3.5 * t_{MCLK}$	-	ns
t_{PWCSL}	Control Pulse Low Width Write (next write cycle) Write (next read cycle) Read	13 80 80	$1.5 * t_{MCLK}$ $9 * t_{MCLK}$ $9 * t_{MCLK}$	-	ns
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

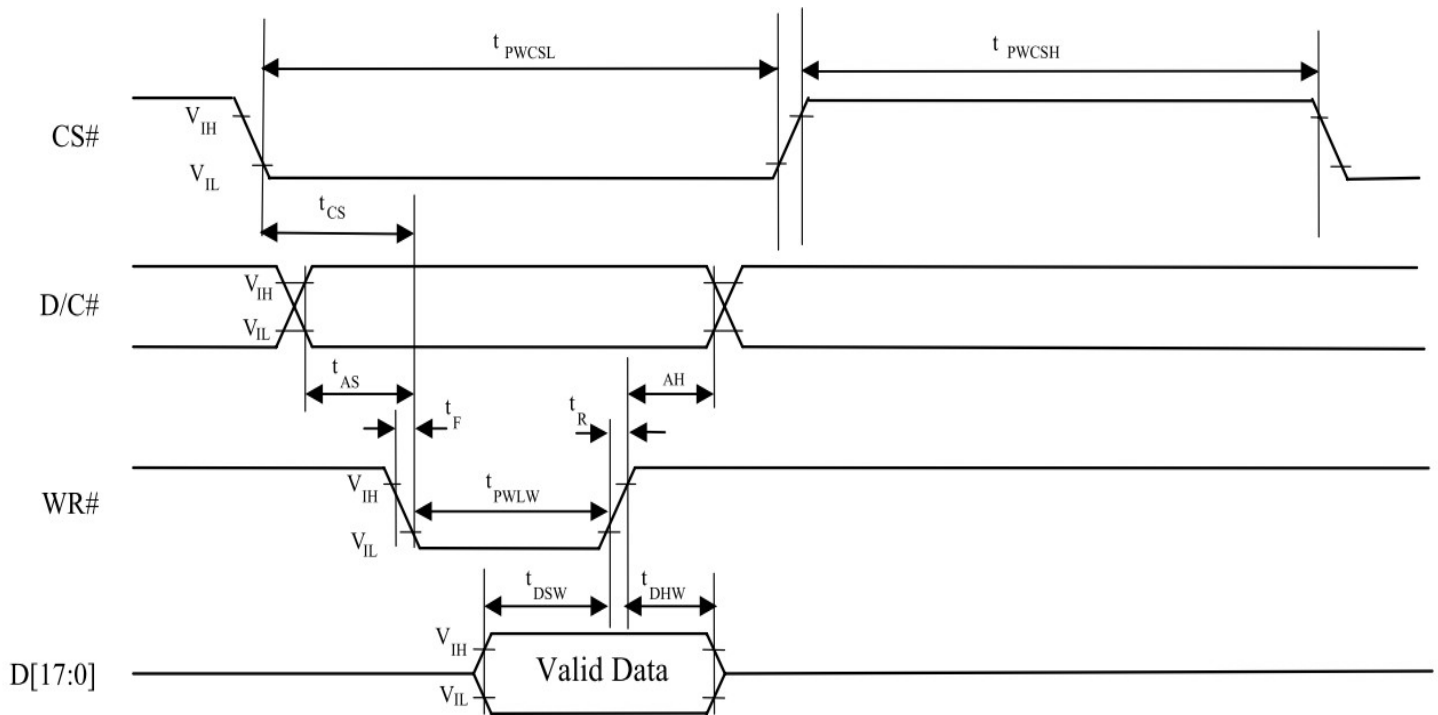
* System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)



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 Read	13 30	$1.5 * t_{MCLK}$ $3.5 * t_{MCLK}$	-	ns
t_{PWCSH}	Control Pulse Low Width Write (next write cycle) Write (next read cycle) Read	13 80 80	$1.5 * t_{MCLK}$ $9 * t_{MCLK}$ $9 * t_{MCLK}$	-	ns
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
$t_{PWL R}$	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	1 st							R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
16 bits (565 format)	1 st							R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0	
16 bits	1 st							R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0		
	2 nd							B7	B6	B5	B4	B3	B2	B1	B0	R7	R6	R5	R4	R3	R2	R1	R0		
	3 rd							G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0		
12 bits	1 st													R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4
	2 nd												G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0	
9 bits	1 st																R5	R4	R3	R2	R1	R0	G5	G4	G3
	2 nd															G2	G1	G0	B5	B4	B3	B2	B1	B0	
8 bits	1 st																	R7	R6	R5	R4	R3	R2	R1	R0
	2 nd																	G7	G6	G5	G4	G3	G2	G1	G0
	3 rd																	B7	B6	B5	B4	B3	B2	B1	B0

4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥10)	θL	Φ=180°(9 o'clock)	60	70	-	degree	Note 1
	θR	Φ=0°(3 o'clock)	60	70	-		
	θT	Φ=90°(12 o'clock)	40	50	-		
	θB	Φ=270°(6 o'clock)	60	70	-		
Response time	TON	Normal θ=Φ=0°	-	10	20	msec	Note 3
	TOFF		-	15	30	msec	Note 3
Contrast ratio	CR		400	500	-	-	Note 4
Color chromaticity	WX		0.26	0.31	0.36	-	Note 2 Note 5
	WY		0.28	0.33	0.38	-	Note 6
Luminance	L1		280	350	-	cd/m ²	Note 6

Luminance uniformity	YU		70	75	-	%	Note 6,7
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Test Conditions:

1. $V_{CC}=3.3V$, $V_{LED}=5.0V$, the ambient temperature is $25^{\circ}C$.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle

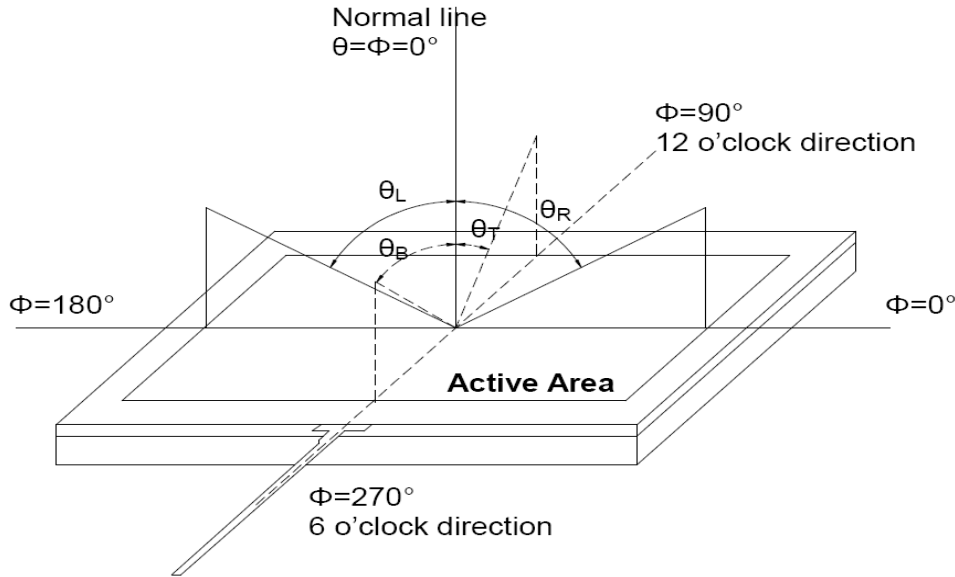


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

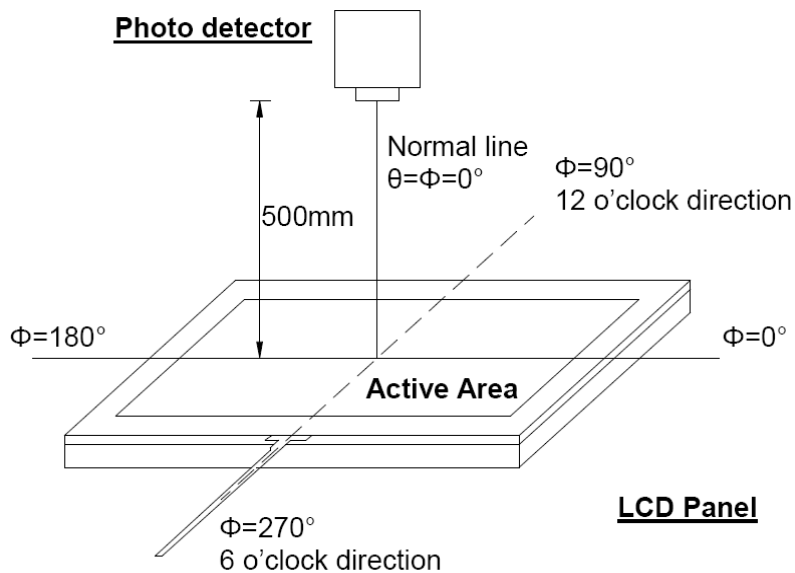


Fig. 4-2 Optical measurement system setup

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 (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF})

is the time between photo detector output intensity changed from 10% to 90%.

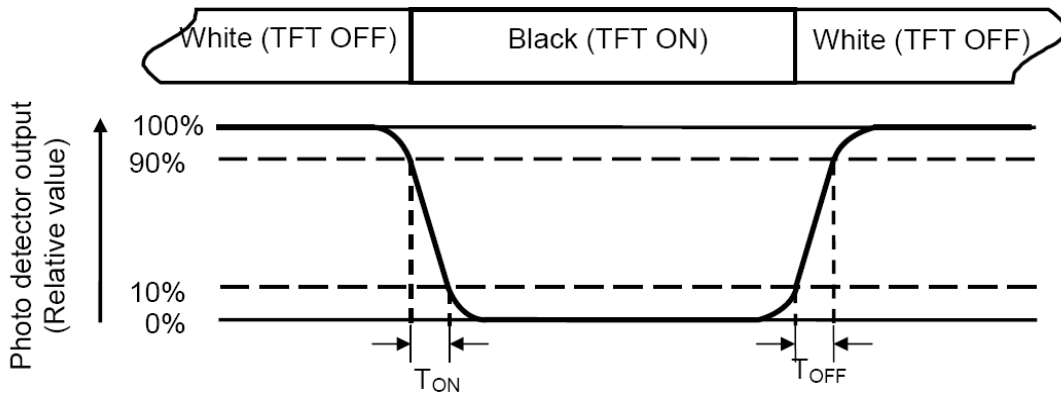


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

Luminance measured when LCD is on the "Black" state

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

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is $V_{LED}=5.0V$

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{\min}}{B_{\max}}$$

L-----Active area length W----- Active area width

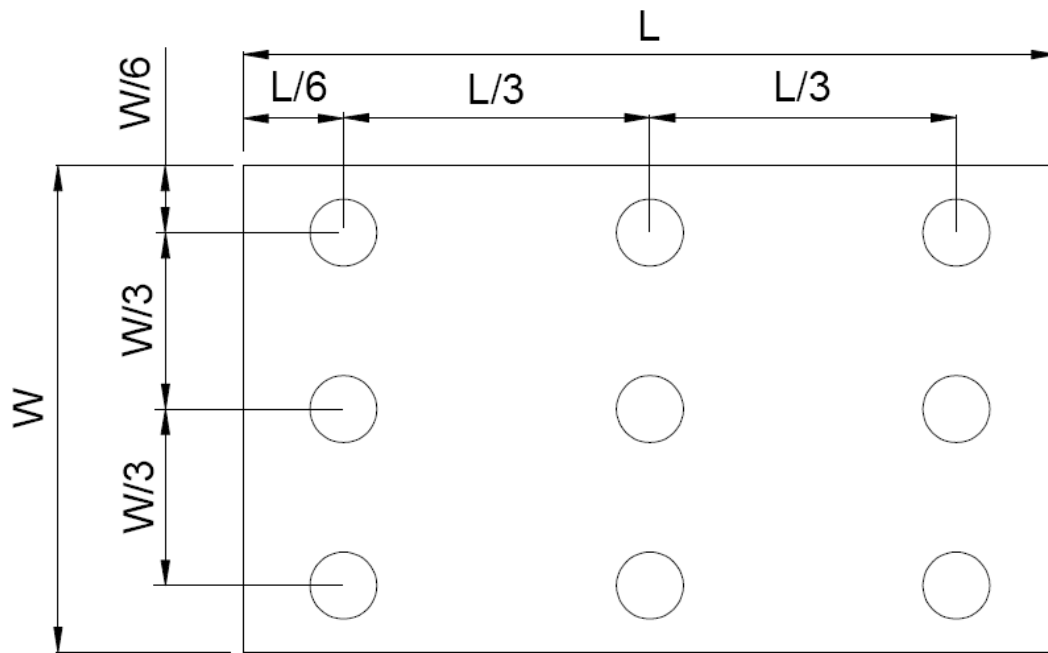


Fig. 4-4 Definition of measuring points

B_{max} : The measured maximum luminance of all measurement position.

B_{min} : The measured minimum luminance of all measurement position.

5. Reliability Test

Item	Test Conditions	Remark
High Temperature Storage	$T_a = 80^{\circ}\text{C}$ 240 hrs	Note 1, 4
Low Temperature Storage	$T_a = -30^{\circ}\text{C}$ 240hrs	Note 1, 4
High Temperature Operation	$T_s = 70^{\circ}\text{C}$ 240hrs	Note 2, 4
Low Temperature Operation	$T_a = -20^{\circ}\text{C}$ 240hrs	Note 1, 4
Operate at High Temperature and Humidity	$+40^{\circ}\text{C}$, 90%RH 240 hrs	Note 4
Thermal Shock	$-30^{\circ}\text{C}/30 \text{ min} \sim +80^{\circ}\text{C}/30 \text{ min}$ 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, $\pm X$, $\pm Y$, $\pm Z$ 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.

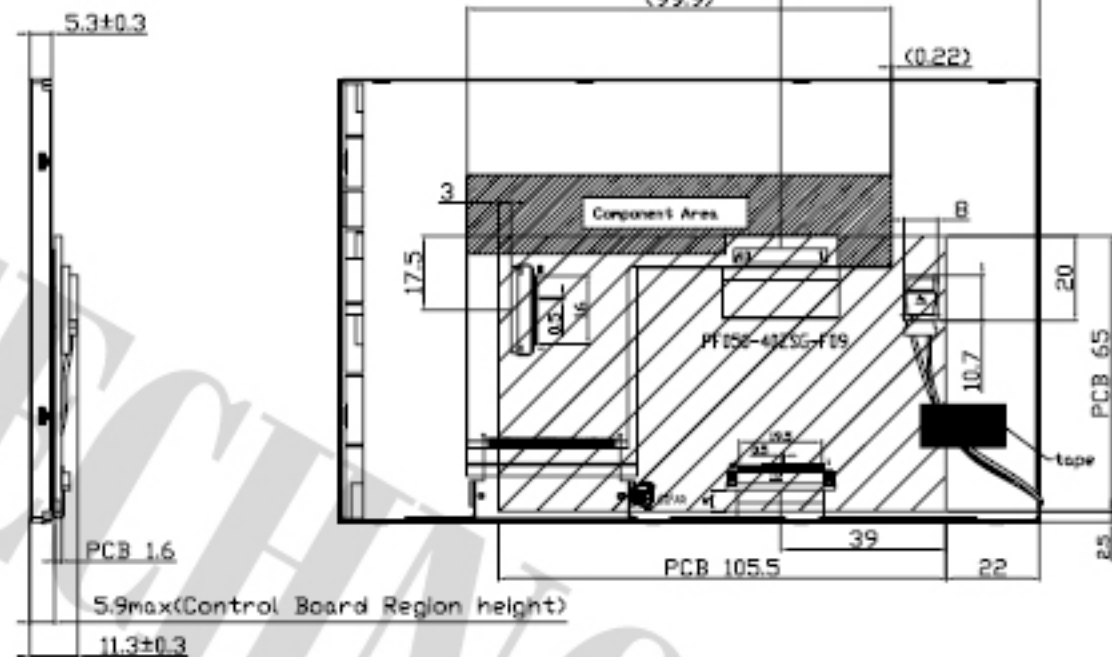
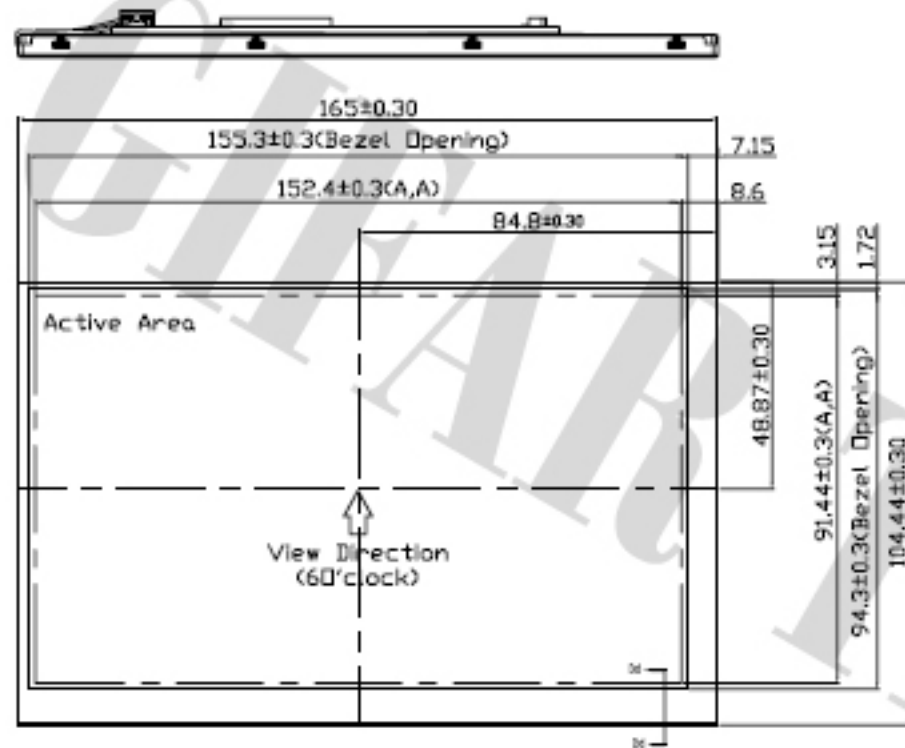
6.5.Cleaning

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...

RoHS



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
28	NC

