

SPECIFICATIONS

CUSTOMER : _____

MODEL NO. : **GFTM043HA480272-S**

VERSION : **A**

DATE : **2012.04.03**

CERTIFICATION : **ROHS**

Customer Sign	Sales Sign	Approved By	Prepared By

Revision Record

Data(y/m/d)	Ver.	Description	Note	page
2012.04.03	A	Specification released		

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1.General Specifications

No.	Item	Specification	Remark
1	LCD size	4.3 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	480 × 3(RGB) × 272	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.066(W) × 0.198(H) mm	
6	Active area	95.04 (W) × 53.856(H) mm	
7	Module size	105.5(W) × 67.2(H) × (7.3)(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	Backlight Power consumption	TBD(Typ.)	Note 2
12	Panel Power consumption	TBD(Typ.)	Note 3
13	Weight	TBD (Typ.)	

Note 1: Refer to Mechanical Drawing.

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 : 8Bit Low : 16Bit	
26	NC(Y1)	O	Bottom(TP) (GFTM043HA480272Y-S)	
27	NC(X1)	O	Right(TP) (GFTM043HA480272Y-S)	
28	NC(Y2)	O	Up(TP) (GFTM043HA480272Y-S)	
29	NC(X2)	O	Left(TP) (GFTM043HA480272Y-S)	
30	LEDK(NC)	I	LED Ground (GFTM043HA480272-SL)	
31	LEDK(NC)	I	LED Ground (GFTM043HA480272-SL)	

32	LEDA(NC)	I	LED Power 27.9V/20mA (GFTM043HA480272-SL)	
33	LEDA(NC)	I	LED Power 27.9V/20mA (GFTM043HA480272-SL)	

3. Operation Specifications

3.1. Absolute Maximum Ratings

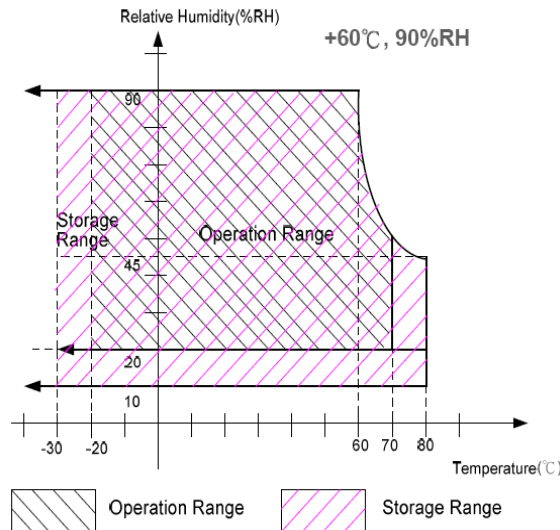
Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VCC	-0.5	5.0	V	
Input signal voltage	Logic input	-0.5	5.0	V	
Operation temperature	T _{OP}	-20	70	°C	Note 3,4
Storage temperature	T _{ST}	-30	80	°C	Note 3,4
LED Reverse Voltage	V _R	-	1.2	V	Each LED Note 2
LED Forward Current	I _F	-	25	mA	Each LED

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed.

Note 2: V_R Conditions: Zener Diode 20mA

Note 3: 90% RH Max. (Max wet temp. is 60°C)

Maximum wet-bulb temperature is at 60°C or less. And No condensation (no drops of dew)



Note 4: In case of temperature below 0°C, the response time of liquid crystal (LC) becomes slower and the color of panel darker than normal one.

3.2. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V _{DD}	3.1	3.3	3.5	V	
Current for Driver	I _{VDD}	-	17	25	mA	V _{DD} =3.2V
Input logic high voltage	V _{IH}	0.8V _{DD}	-	V _{DD}	V	Note1
Input logic low voltage	V _{IL}	GND	-	0.2V _{DD}	V	

Note1: CLK, DE, R0~ R7, G0~ G7, B0~ B7.

3.2.1. Back-Light Unit

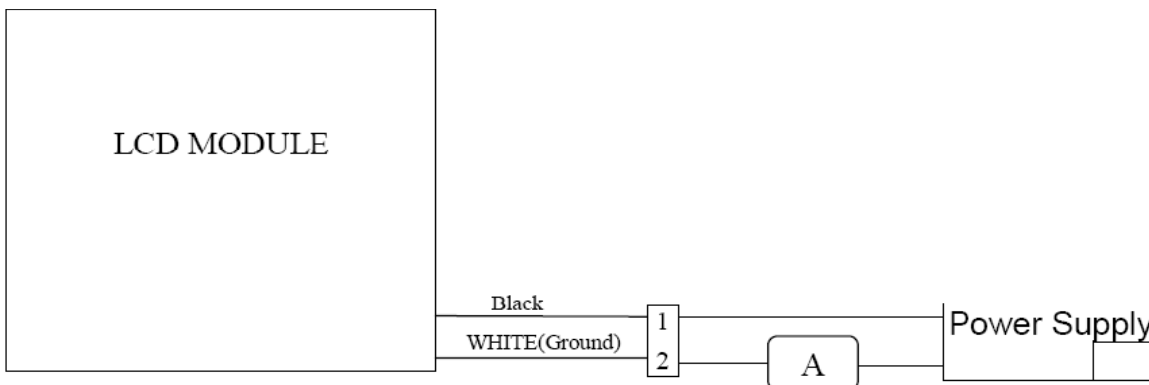
Item	Symbol	MIN.	TYP.	MAX.	Unit	Note
Forward voltage	Vf	25.2	27.9	31.5	V	(1)(2)
Forward current	If	18	20	22	mA	(1)(2) (3)
Operating LED life time	Hr	20000	-	-	Hour	(4)(5)

Note: (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2) $T_a = 25 \pm 2^\circ\text{C}$

(3) Test Condition: LED current 20 mA

(4) LED life time (Hr) can be defined as the time in which it continues to operate under the condition:
 $T_a = 25 \pm 3^\circ\text{C}$, typical $I_L = 40\text{mA}$ value indicated in the above table until the brightness becomes less than 50%.



3.3. Timing Characteristics

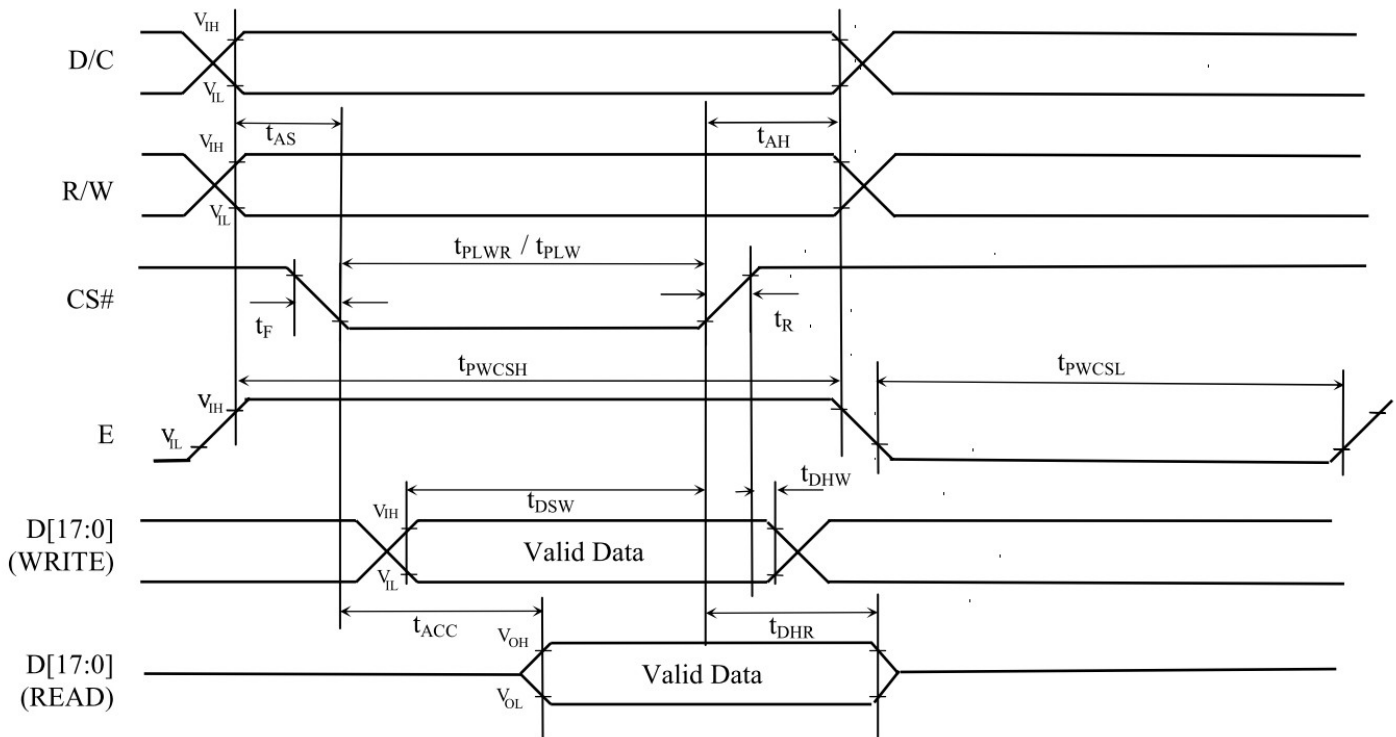
3.3.1. Timing Conditions

Voltage referenced to VSS $V_{DDIO} = 3.3\text{V} \pm 10\%$ $T_A = -30^\circ\text{C}$ 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

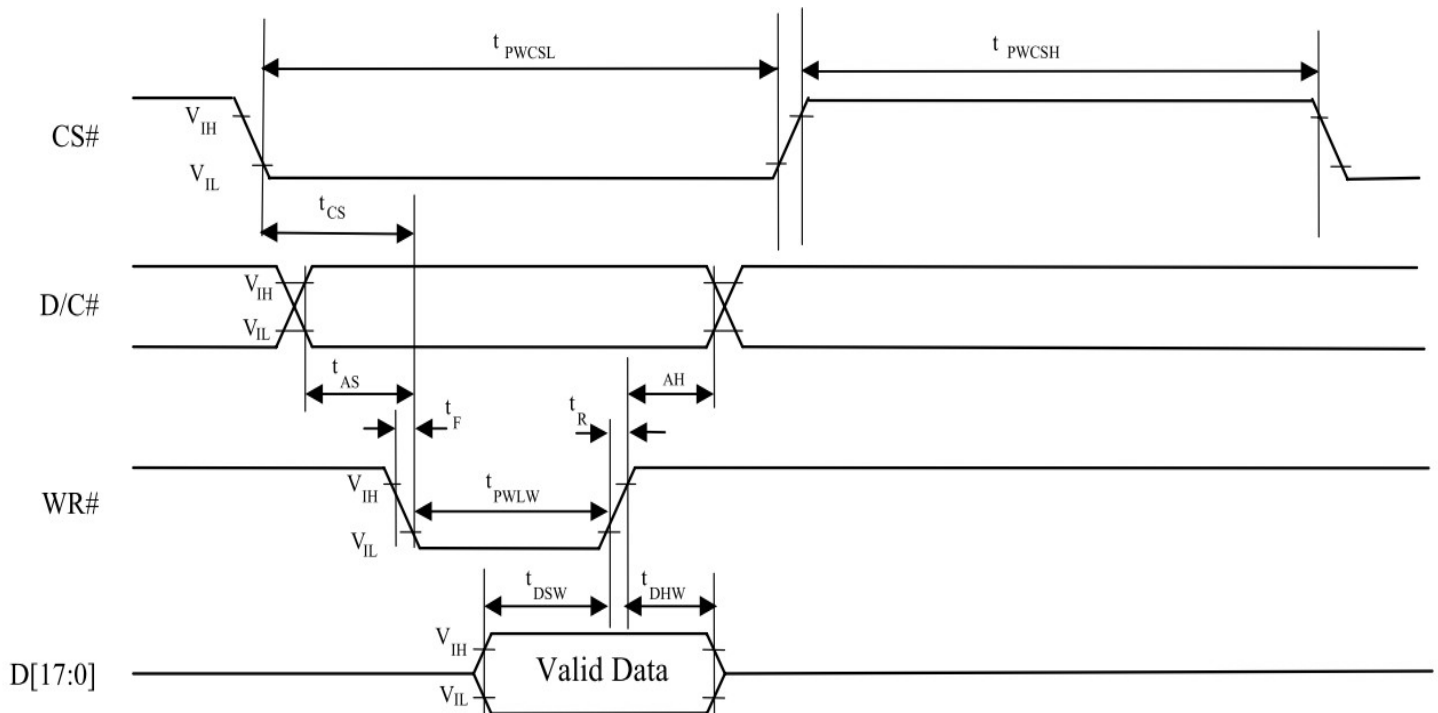
* System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)



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)	θ _L	Φ=180°(9 o'clock)	60	70	-	degree	Note 1 Note 7
	θ _R	Φ=0°(3 o'clock)	60	70	-		
	θ _T	Φ=90°(12 o'clock)	40	50	-		
	θ _B	Φ=270°(6 o'clock)	60	70	-		
Response time	T _{ON}	Normal θ=Φ=0°	--	10	20	msec	Note 3
	T _{OFF}		--	15	30	msec	Note 3
Contrast ratio	CR		400	500	-	-	Note 4
Color chromaticity	W _X		0.26	0.31	0.36	-	Note 2
	W _Y		0.28	0.33	0.38	-	Note 5 Note 6 Note 7
Luminance	L		400	500	-	cd/m ²	Note 6
Luminance uniformity	YU		70	75	-	%	Note 8

Test Conditions:

- V_{DD}=3.3V, I_L=20mA (Backlight current), the ambient temperature is 25°C.

2. The test systems refer to Note 2.

Note 1: Definition of viewing angle

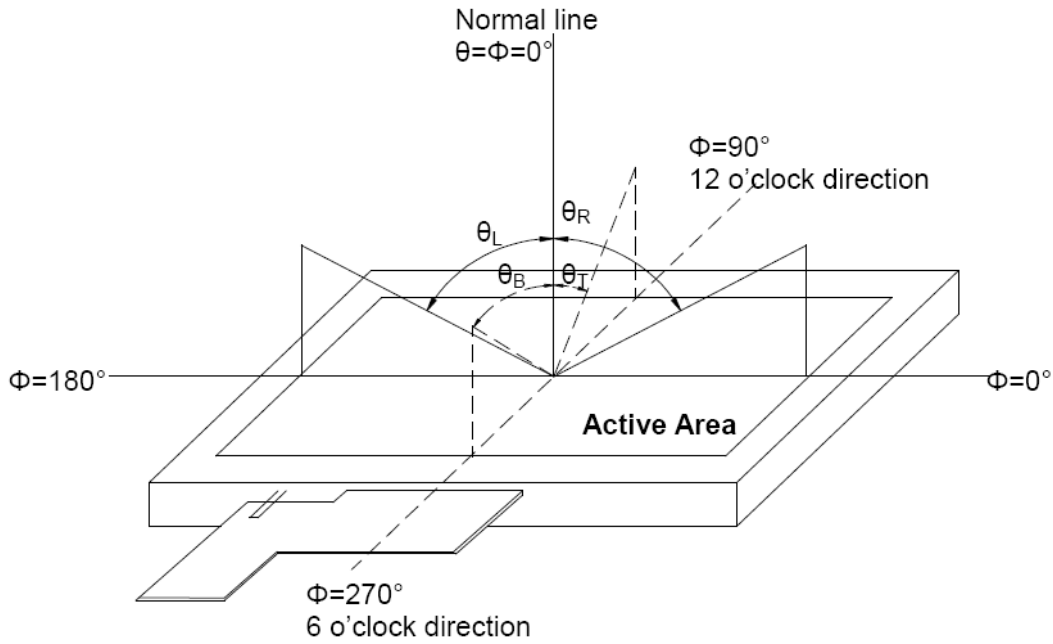


Fig. 4-1 Definition of viewing angle

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.)

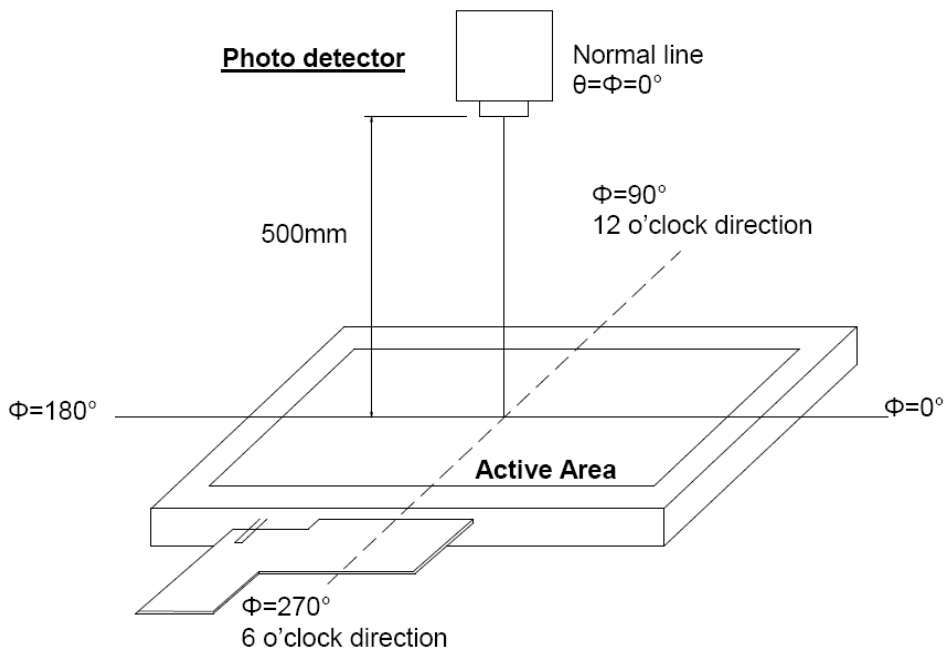


Fig. 4-2 Optical measurement system setup

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%.

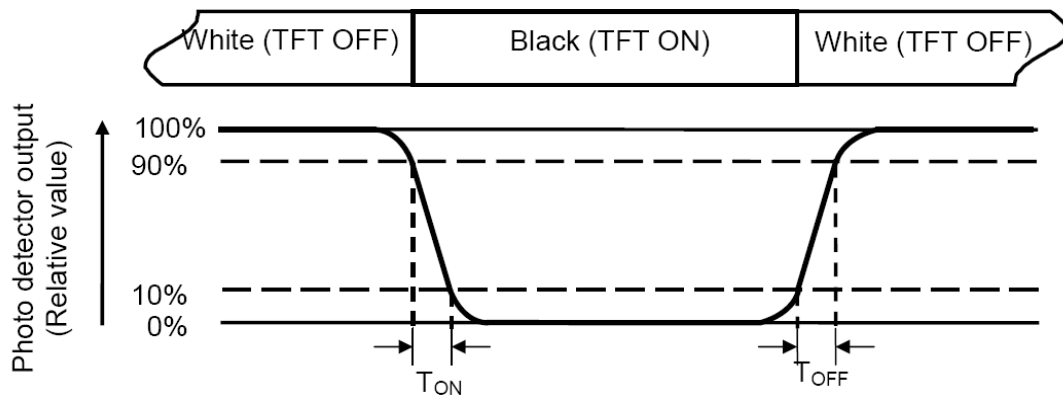


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

Luminance measured when LCD on the "White" state

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

Note 5: 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 $I_L=20\text{mA}$.

Note 7: The values shall be measured without Touch Screen Panel.

Note 8: 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

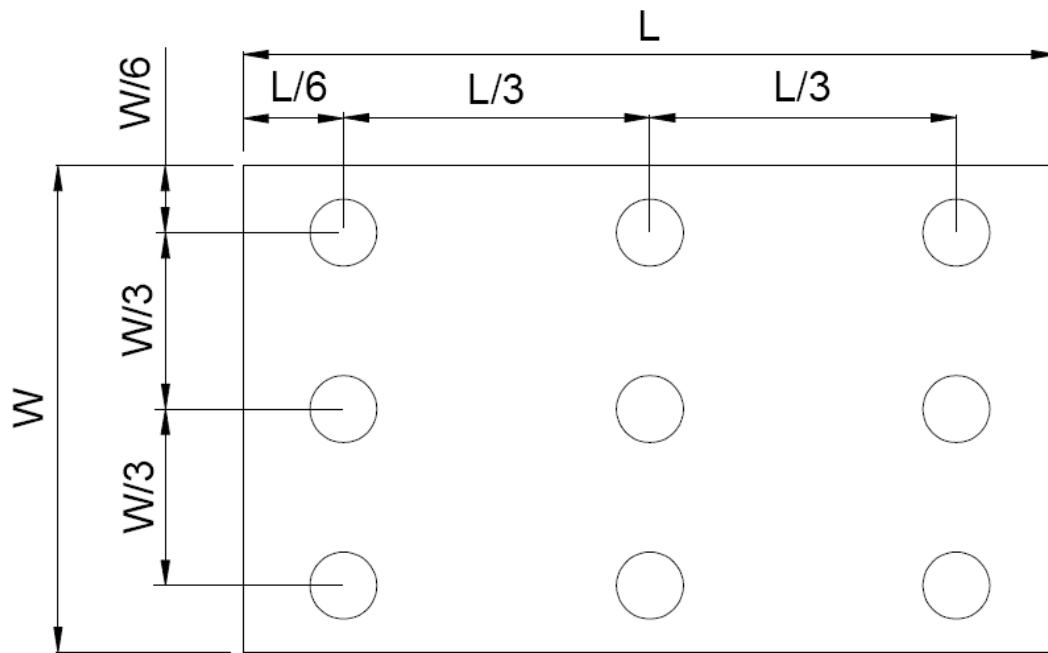


Fig. 4-4 Definition of measuring points

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, 3
Low Temperature Storage	$T_a = -30^{\circ}\text{C}$ 240hrs	Note 1, 3
High Temperature Operation	$T_s = 70^{\circ}\text{C}$ 240hrs	Note 2, 3
Low Temperature Operation	$T_a = -20^{\circ}\text{C}$ 240hrs	Note 1, 3
Operate at High Temperature and Humidity	$+40^{\circ}\text{C}$, 90%RH 240 hrs	Note 3
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 3
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)	
Electro Static Discharge	$\pm 2\text{KV}$, Human Body Mode, 100pF/1500 Ω	

Note 1: T_a is the ambient temperature of samples.

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

Note 3: 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 $+25\pm 10^{\circ}\text{C}$ 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.

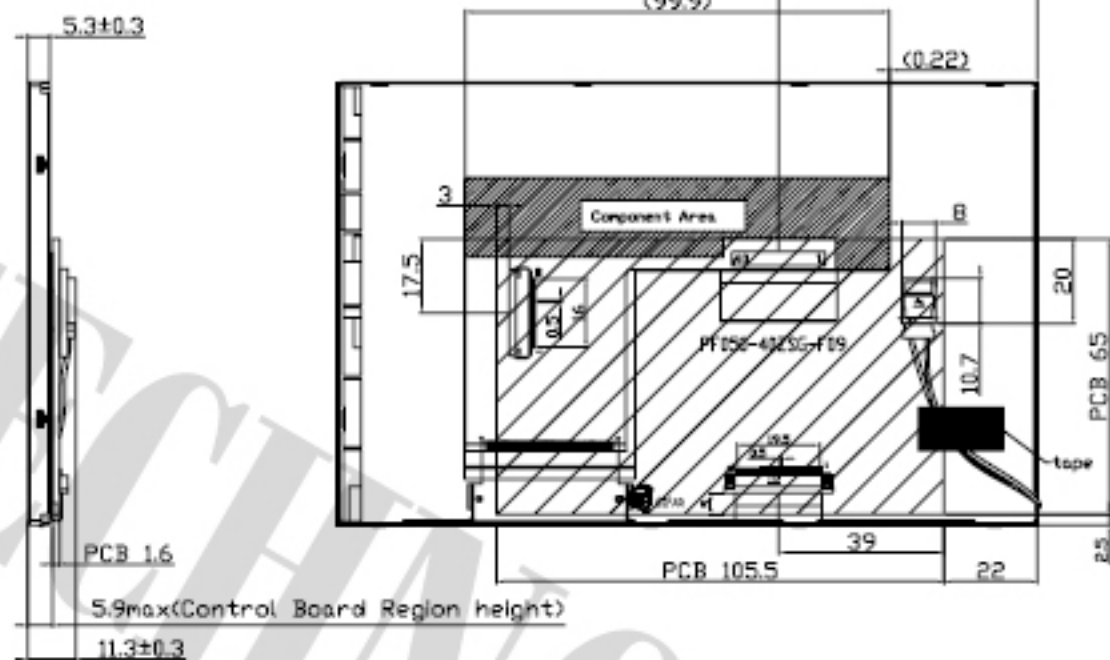
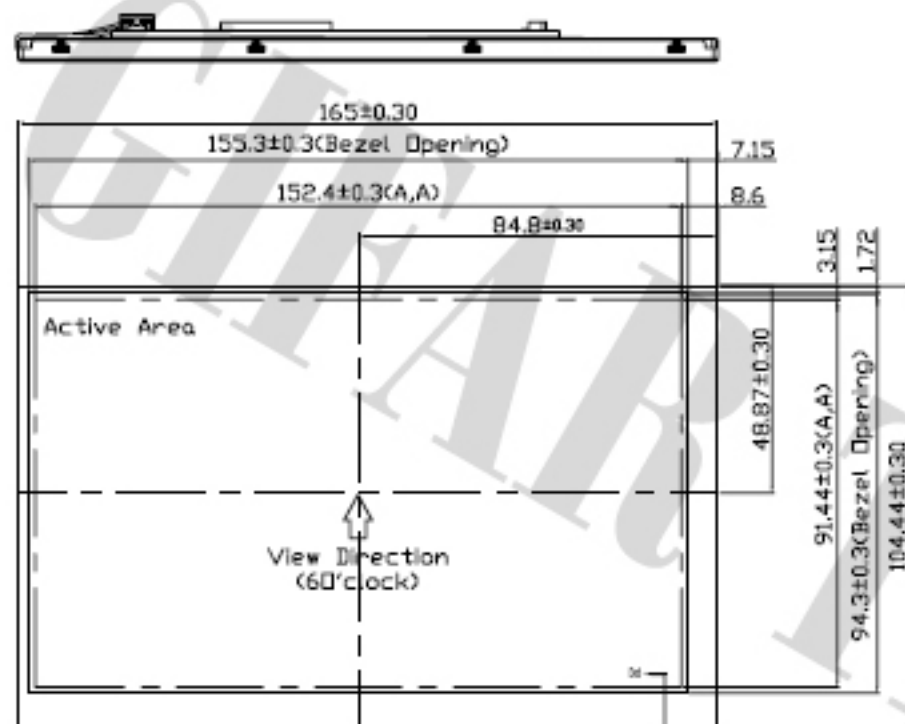
6.5. Cleaning

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

