






SPECIFICATIONS

CUSTOMER : _____
MODEL NO. : **GFT043HA480272**
VERSION : **E**
DATE : **2023.03.09**
CERTIFICATION : **ROHS**

Customer Sign	Approved By	Prepared By	Prepared By
			

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Contents

1. General Specifications	4
2. Pin Assignment	5
2.1. TFT LCD Panel Driving Section.....	5
3. Operation Specifications.....	7
3.1. Absolute Maximum Ratings	7
3.2. Typical operation conditions	8
3.3 Backlight Driving Conditions	8
3.4. Power Sequence	9
3.5. Timing Characteristics	10
4. Optical Specifications	12
5. Reliability Test Items	16
6. General Precautions	17
6.1. Safety	17
6.2. Handling	17
6.3. Static Electricity.....	17
6.4. Storage	17
6.5. Cleaning	17
7. Mechanical Drawing	18
8. Package Information	19
Appendix : Inspection Standard	



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 x 3(RGB) x 272	
4	Display mode	Normally White, Transmissive	
5	Dot pitch	0.066(W) x 0.198(H) mm	
6	Active area	95.04 (W) x 53.856(H) mm	
7	Module size	105.5(W) x 67.2(H) x 2.9(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	Digital	
11	Backlight Power consumption	0.558W(Typ.)	Note 2
12	Panel Power consumption	0.056W(Typ.)	Note 3
13	Weight	45 g (Typ.)	

Note 1: Refer to Mechanical Drawing.



2.Pin Assignment

2.1. TFT LCD Panel Driving Section

FPC Connector is used for the module electronics interface. The recommended model is “FH19SC-40S-0.5SH” manufactured by HIROSE.

Pin No.	Symbol	I/O	Function	Remark
1	VLED-	P	Power for LED backlight cathode	
2	VLED+	P	Power for LED backlight anode	
3	GND	P	Power ground	
4	VDD	P	Power voltage	
5	R0	I	Red data (LSB)	
6	R1	I	Red data	
7	R2	I	Red data	
8	R3	I	Red data	
9	R4	I	Red data	
10	R5	I	Red data	
11	R6	I	Red data	
12	R7	I	Red data (MSB)	
13	G0	I	Green data (LSB)	
14	G1	I	Green data	
15	G2	I	Green data	
16	G3	I	Green data	
17	G4	I	Green data	
18	G5	I	Green data	
19	G6	I	Green data	
20	G7	I	Green data (MSB)	
21	B0	I	Blue data (LSB)	



22	B1	I	Blue data	
23	B2	I	Blue data	
24	B3	I	Blue data	
25	B4	I	Blue data	
26	B5	I	Blue data	
27	B6	I	Blue data	
28	B7	I	Blue data (MSB)	
29	GND	P	Power ground	
30	CLK	I	Pixel clock	
31	DISP	I	Display on/off	
32	NC	-	No connection	
33	NC	-	No connection	
34	DE	I	Data Enable	
35	NC	-	No connection	
36	GND	P	Power ground	
37	NC	-	No connection	
38	NC	-	No connection	
39	NC	-	No connection	
40	NC	-	No connection	

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



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

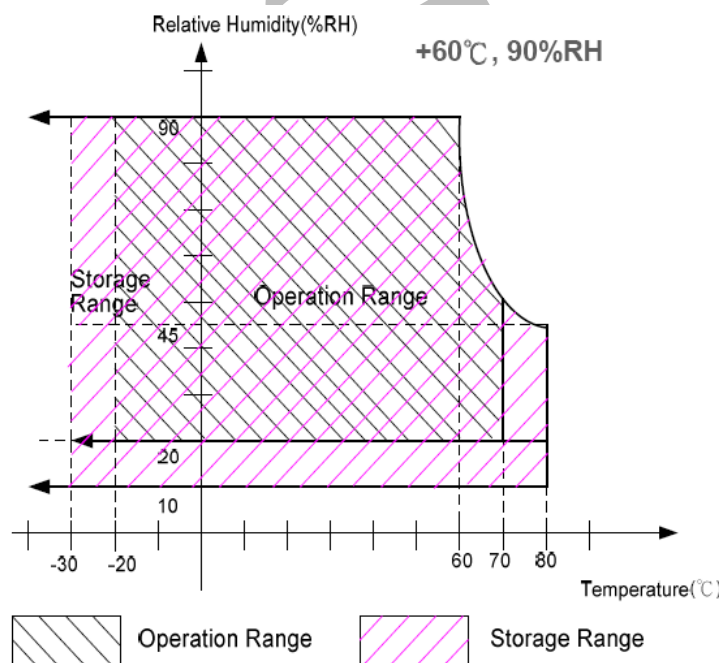
Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times.

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} =3.3V
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.

3.3 Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V _L	25.2	27.9	31.5	V	Note2
Current for LED Backlight	I _L	18	20	22	mA	
LED life time	-	20,000	-	-	Hr	Note3

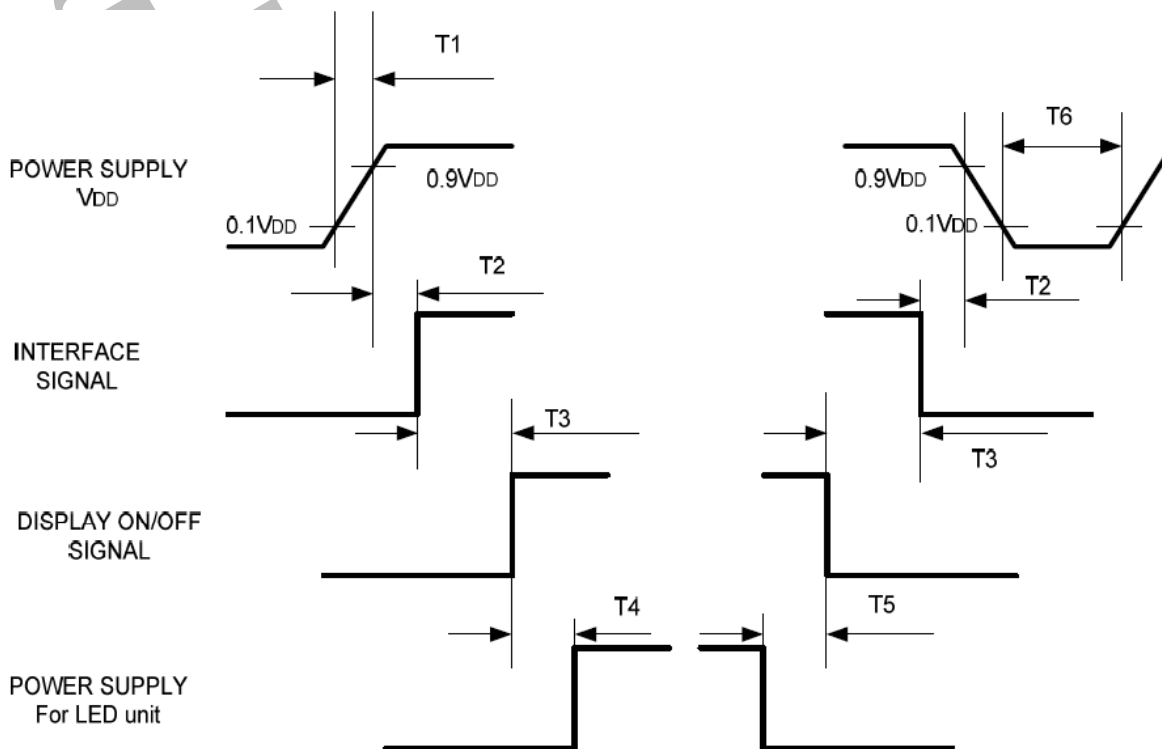
Note 1: The "LED life time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and I_L=20mA. The LED lifetime could be decreased if operating I_L is larger than 20 mA.

Note 2: The LED Supply Voltage is defined by the number of LED at Ta=25°C and I_L=20mA.



3.4. Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.



Symbol	Specification	Symbol	Specification
T1	$0 \leq T1 \leq 10 \text{ msec}$	T4	$160 \text{ msec} \leq T4$
T2	$0 \leq T2 \leq 100 \text{ msec}$	T5	$160 \text{ msec} \leq T5$
T3	$0 \leq T3 \leq 200 \text{ msec}$	T6	$1 \text{ msec} \leq T6$



3.5. Timing Characteristics

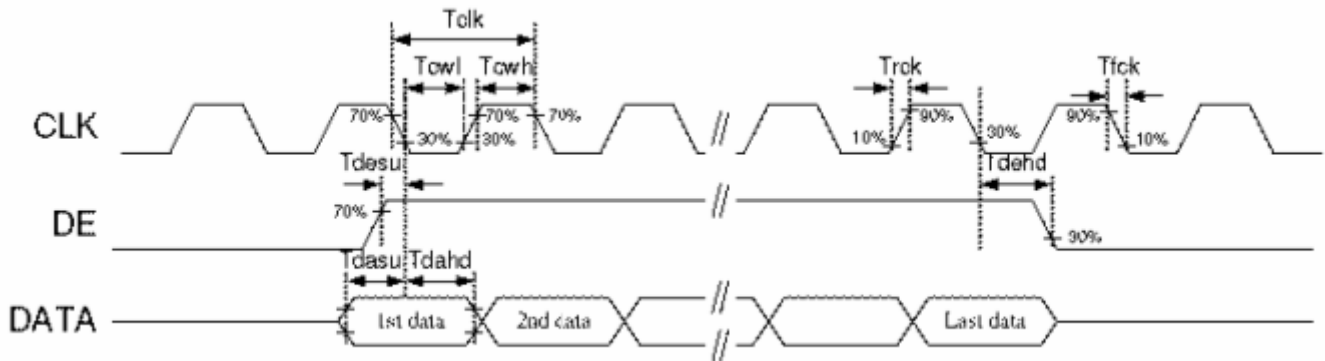
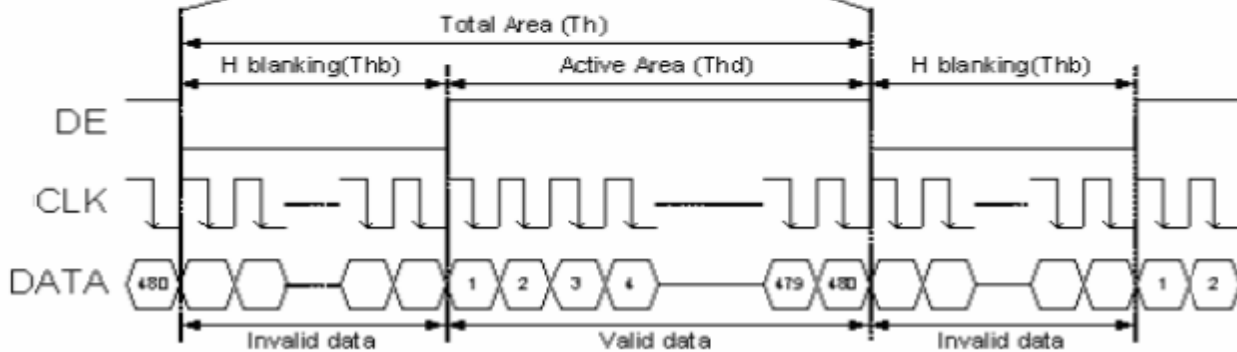
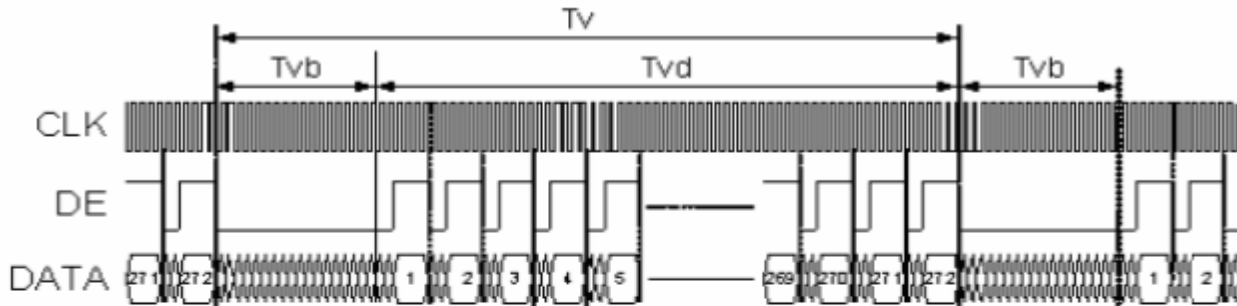
3.5.1. Timing Conditions

Parallel DE mode RGB input timing table

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
CLK frequency	fclk	7	9	12	MHz
DEV period time	Tv	277	288	400	H
DEV display area	Tvd	272			H
DEV blanking	Tvb	5	16	128	H
DEH period time	Th	520	525	800	CLK
DEH display area	Thd	480			CLK
DEH blanking	Thb	40	45	320	CLK
CLK cycle time	Tclk	83	110	143	ns
Clock width of high level	Tcwh	40	50	60	%
Clock width of low level	Tcwl	40	50	60	%
Clock rising time	trck		-	9	ns
Clock falling time	tfck		-	9	ns
Data Setup Time	tdesu	10	-	-	ns
Data Hold Time	tdahd	10	-	-	ns
DE Setup Time	tdesu	10	-	-	ns
DE Hold Time	tdehd	10	-	-	ns



3.5.2. Timing Diagram





4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	60	70	-	degree	Note 1
	θ_R	$\Phi=0^\circ$ (3 o'clock)	60	70	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	40	50	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	60	70	-		
Response time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	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
Luminance	L		400	500	-	cd/m ²	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7

Test Conditions:

- $V_{DD}=3.3V$, $I_L=20mA$ (Backlight current), the ambient temperature is $25^\circ C$.
- The test systems refer to Note 2.



Note 1: Definition of viewing angle range

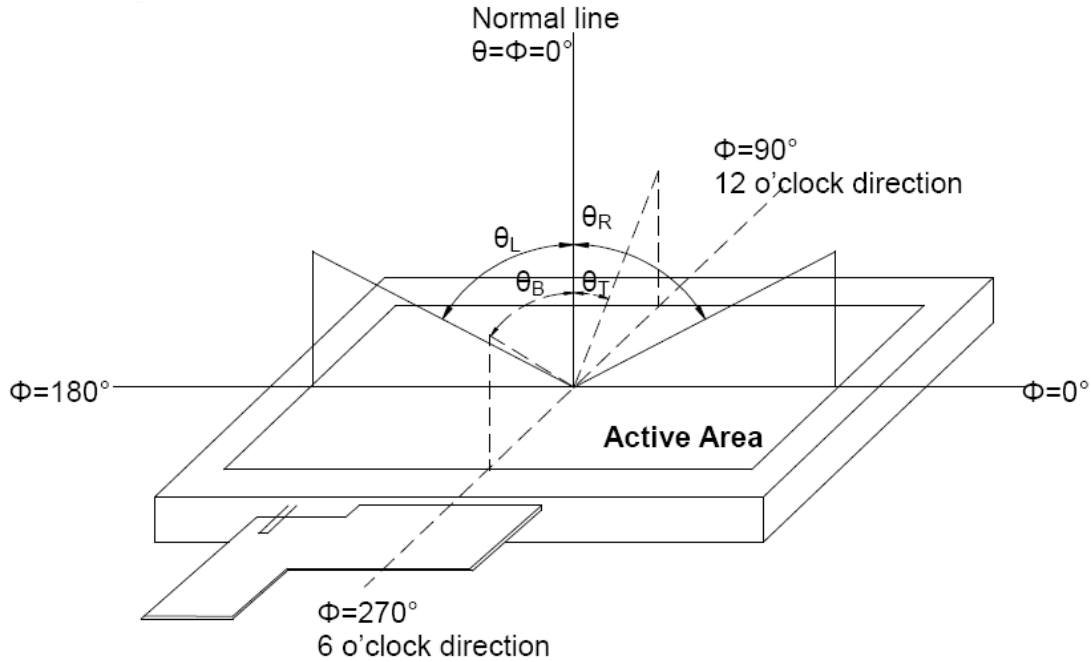


Fig. 4-1 Definition of viewing angle

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.)

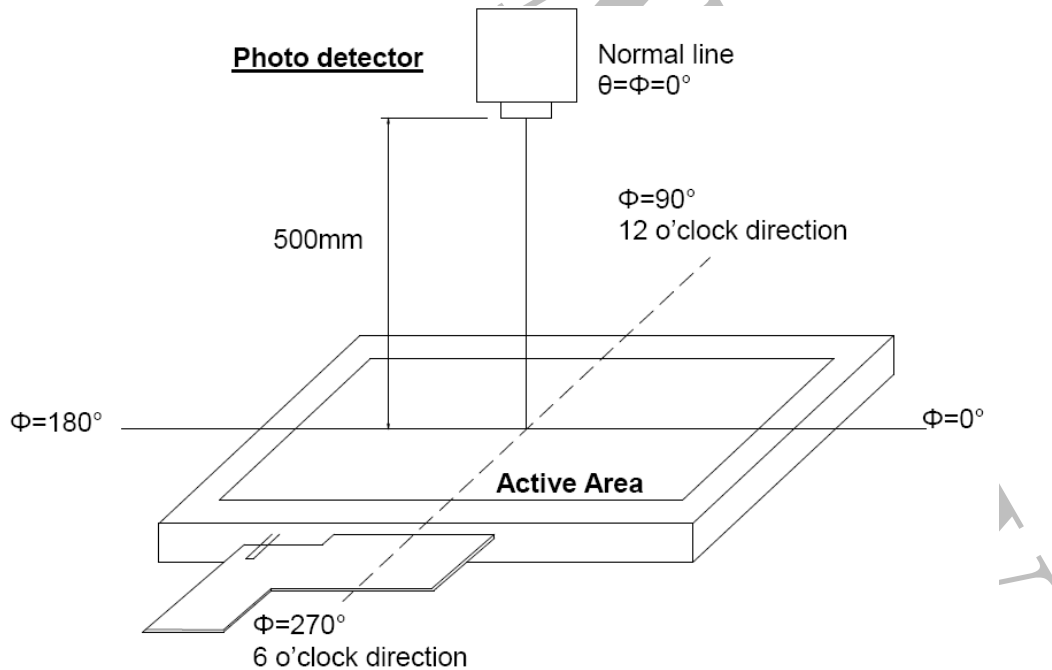


Fig. 4-2 Optical measurement system setup



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%.

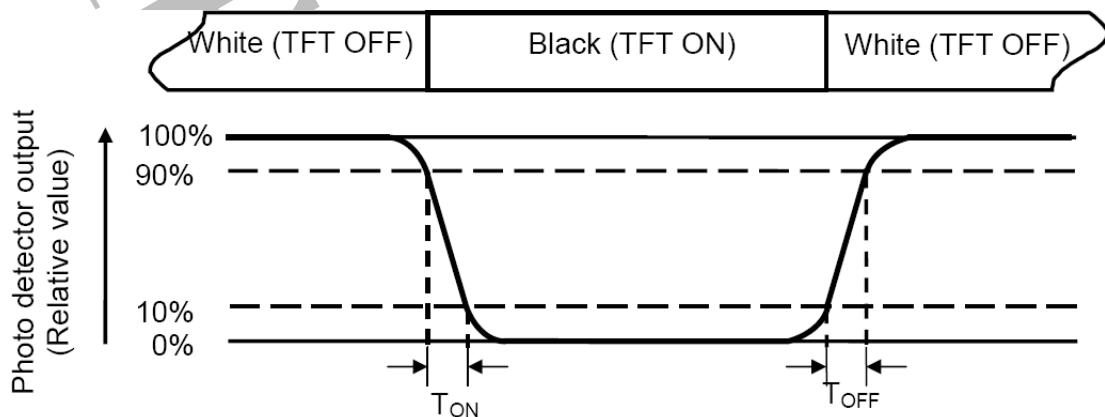


Fig. 4-3 Definition of response time

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 $I_L=20\text{mA}$.



Note7: 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

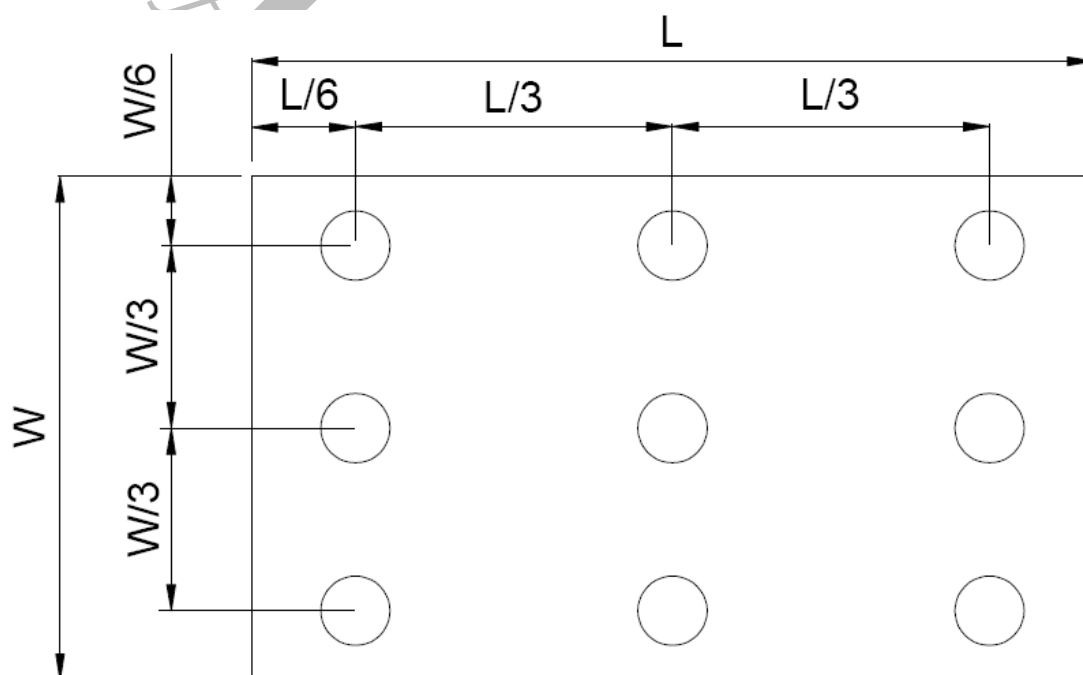


Fig. 4-4 Definition of measuring points

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

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



5. Reliability Test

NO.	ITEM	CONDITION		STANDARD	NOTE
1	High Temp. Storage	80°C	120 hrs	Appearance Without defect	
2	Low Temp. Storage	-30°C	120 hrs	Appearance Without defect	
3	High Temp. & High Humi. Storage	40°C 90% RH	120 hrs	Appearance Without defect	
4	High Temp. Operating Display	70°C	120 hrs	Appearance Without defect	
5	Low Temp. Operating Display	-20°C	120 hrs	Appearance Without defect	
6	Thermal Shock	-20°C, 30min. → 70°C, 30min. 		Appearance Without defect	10 cycles

** Dissipation current, contrast and display functions

** Polarizing filter deterioration, other appearance defects

** The function test shall be conducted after 4hours storage at the normal temperature and humidity after remove from the test chamber.



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

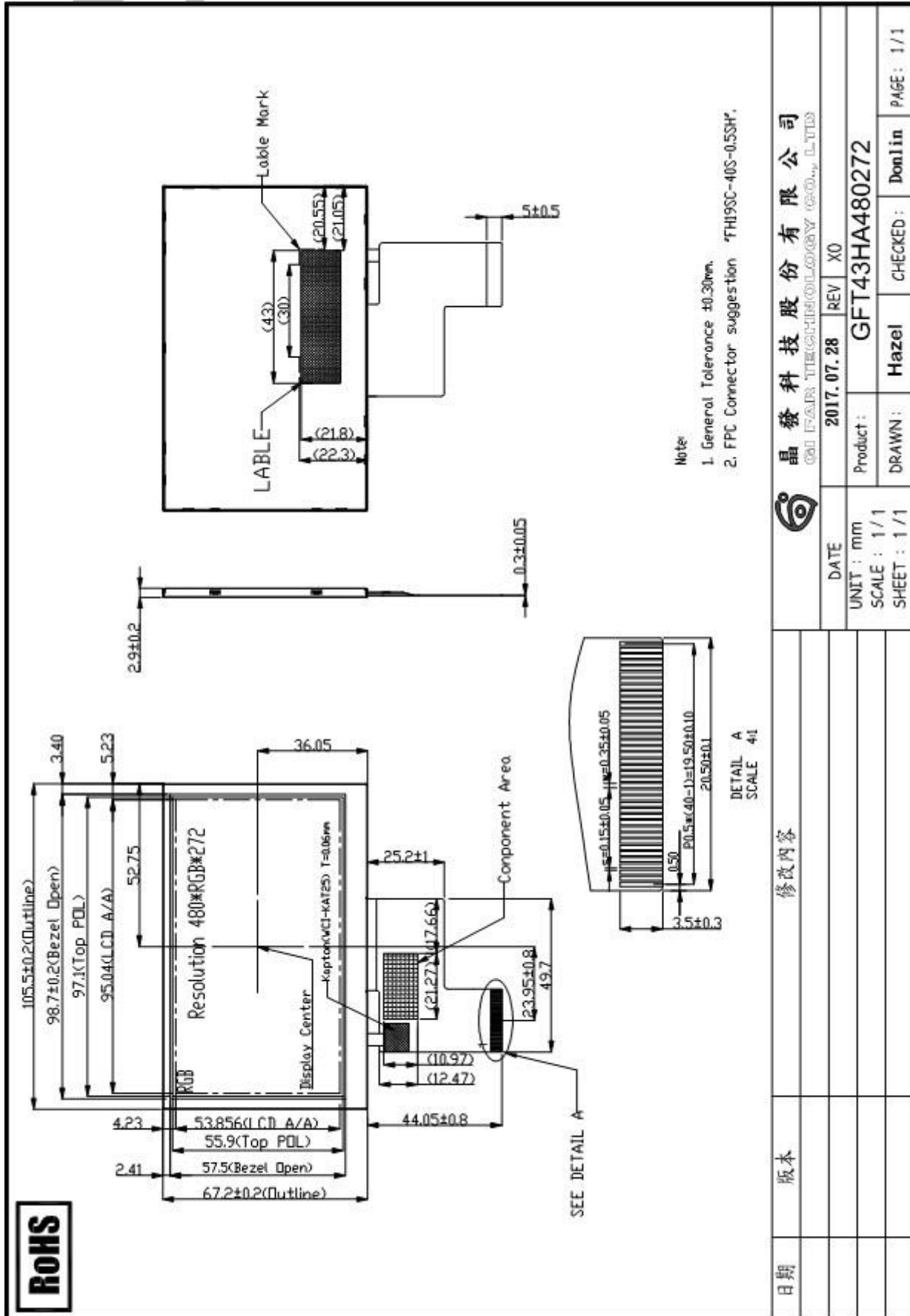
1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

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





9. PACKAGE INFORMATION

1	1 Tray	:	6 pcs (modules)
2	1 stack	:	10 tray +1 Cover tray
3	1 Carton	:	(1 Cover tray + 10 tray) 3 stack
4	Total pcs	:	1 Carton (6pcs * 10tray * 3 stack) = 18 pcs
5	Carton size = NO. 17	:	495*315*435mm
6	Net weight	:	TBD KG
7	Gross weight	:	TBD KG

** Packaging information **

- 1 Tray = 6 pcs



- 1 stack=10 tray+1 Cover tray



**Each layer of tray should be staggered stacked



WW

- 1 Carton = 3 stack, Total pcs = 180 pcs

