HM050WV111TV

5.0" Color TFT-LCD

FUNCTIONAL DRAFT SPECIFICATION

(This document is meant for customers' approval)

Release Date
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1. General Specifications

No.	Item	Specification	Remark
1	LCD size	5.0 inch	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800(W) RGB x480(H)	
4	Display mode	Normally Black, Transmissive	
5	Dot pitch	0.135(W) x 0.135(H)	
6	Active area	108(W) x 64.8(H) mm	
7	Module size	120.7(W)×75.85(H)×2.95(D) mm	Note 1
8	View direction	ALL	O clock
9	Surface treatment	Anti-Glare	
10	Color arrangement	RGB-stripe	
11	Interface	RGB	
12	Lcm power consumption	（1.2W）TYP.	
13	Driver IC	ST7262	
14	Weight	TBD	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

Pin No	Symbol	I/O	Function	Remark
1	GLED	P	LED Cathode	
2	VEDA	P	LED Anode	
3	GND	P	Ground	
4	VDD	P	Power for Digital Circuit	
5-12	R0-R7	I	Red data,B7 is MSB,B0 is LSB.	
13-20	G0-G7	I	Green data,B7 is MSB,B0 is LSB.	
21-28	B0-B7	I	Blue data,B7 is MSB,B0 is LSB.	
29	GND	P	Ground	
30	DCLK	I	Sample clock	
31	DISP	I	Display ON/OFF comtrol.Internally pulled high	
32	HS	I	Horizontal Sync Input	
33	VS	I	Vertical Sync Input	
34	DE	I	Data Input Enable	
35	NC	-	No connect	
36	GND	P	Ground	
37	XR	-	TP X-Right(No connection)	
38	YD	-	TP Y-Bottom(No connection)	
39	XL	-	TP X-Left(No connection)	
40	YU	-	TP Y-Up(No connection)	

Note I: input; O: output; P: Power or Ground(0V).

3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VDD	-0.3	5.0	V	TA=25℃
Operation Temperature	T_{OP}	-20	70	℃	
Storage Temperature	T_{ST}	-30	80	℃	
LED Reverse Voltage	V_R	-	5	V	Each LED
LED Forward Current	I_F	-	25	mA	Each LED

Note1 : The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

3.2. Typical Operation Conditions

Test condition: GND=0V, T_A=25 °C

Note1

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	3.0	3.3	3.6	V	Note 2
Input logic high voltage	V_{IH}	0.7 V_{DD}	-	V_{DD}	V	
Input logic low voltage	V_{IL}	0	-	0.3 V_{DD}	V	
Current for Drive	VDD	-	17	25	MA	

Note1: Be sure to apply VDD and VGL to the LCD first,and then apply VGH.
Note 2:VDD setting should match the signals output voltage (refer to Note 3)of customer's system board.

3.3. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L	17.4	18.6	19.8	V	Note 1
Crrent for LED Backlight	I_L	-	60	-	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note1: V_L=18.6V, I_L=60mA (Backlight circuit: 6series connection, 2 parallel connection), the ambient temperature is 25℃.

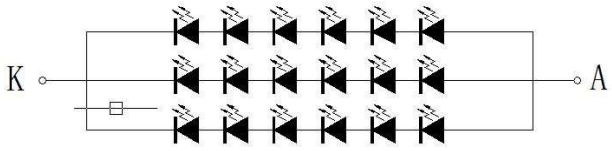
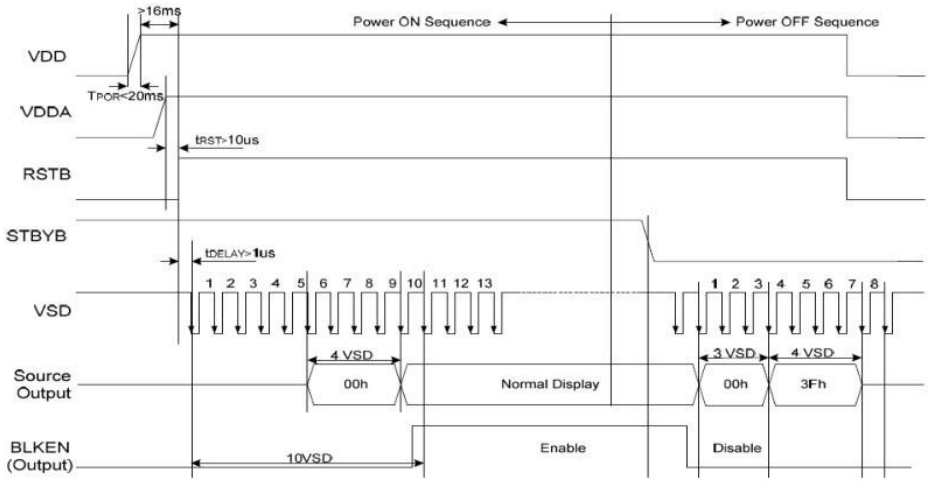


Fig. 3-1 LED test circuit diagram

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and 1/2 rated current . The LED lifetime could be decreased if operating I_L is larger than 60 mA.

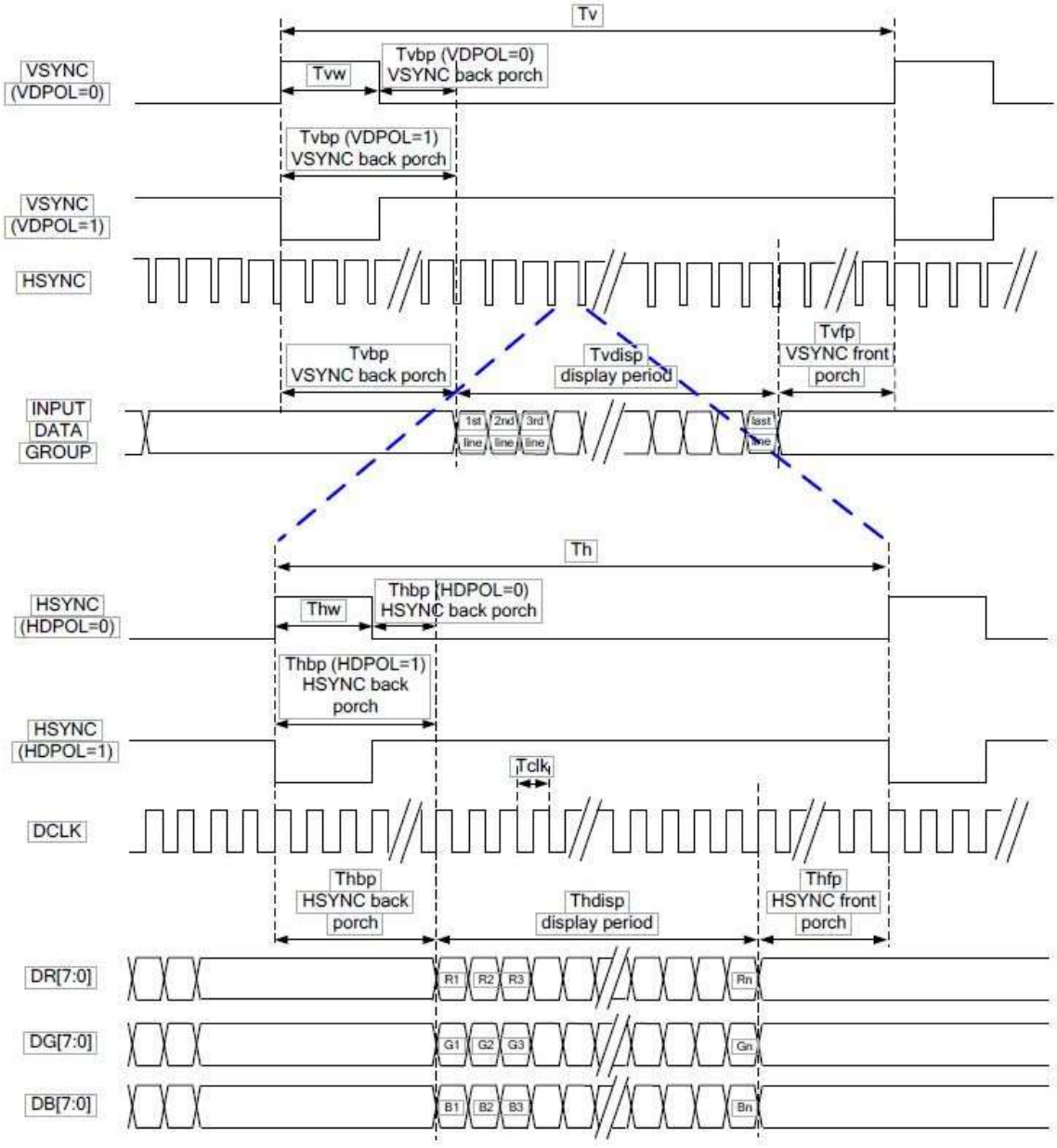
3.4. Power Sequence



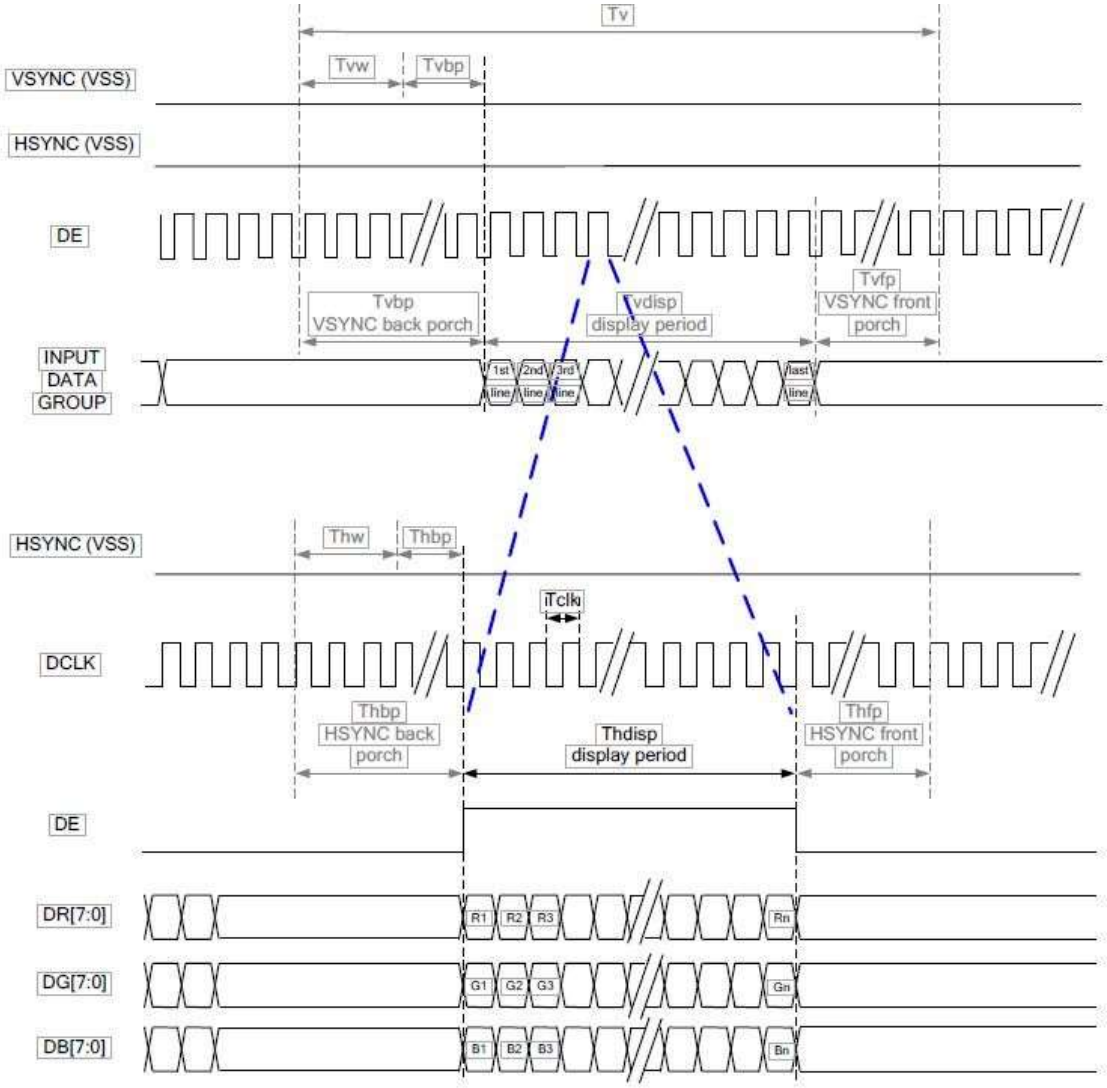
Note: For prevent anormal operation, t_{RST} must be longer than 10us during Power ON sequence.

3.5. Timing Characteristics

3.5.1. AC Electrical Characteristics



SYNC Mode



RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

DE Mode

3.5.2. DC Electrical Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Low level input voltage	Vil	For the digital circuit	0	-	0.3×VDD	V
High level input voltage	Vih	For the digital circuit	0.7×VDD	-	VDD	V
Input leakage current	Ii	For the digital circuit	-	-	±1	μA
High level output voltage	Voh	Ioh= -400 μA	VDD-0.4	-	-	V
Low level output voltage	Vol	Iol= +400 μA	-	-	GND+0.4	V
Pull low/high resistor	Ri	For the digital input pin @ VDD=3.3V	150K	250K	350K	ohm
Digital Operation current	Idd	Fclk=40 MHz, FLD=37.88KHz, VDD=3.3V	-	8	10	mA
Digital Stand-by current	Ist1	Clock and all functions are stopped	-	10	50	μA
Analog Operating Current	Idda	No load, Fclk=40MHz, FLD=37.88KHz @ AVDD=10V,V1=8V, V14=0.4V	-	10	12	mA
Analog Stand-by current	Ist2	No load, Clock and all functions are stopped	-	10	50	μA
Input level of V1 ~ V7	Vref1	Gamma correction voltage input	0.4*AVDD	-	AVDD-0.1	V
Input level of V8 ~ V14	Vref2	Gamma correction voltage input	0.1	-	0.6*AVDD	V
Output Voltage deviation	Vod1	Vo = AVSS+0.1V ~ AVSS+0.5V and Vo = AVDD-0.5V ~ AVDD-0.1V	-	±20	±35	mV
Output Voltage deviation	Vod2	Vo = AVSS+0.5V ~ AVDD-0.5V	-	±15	±20	mV
Output Voltage Offset between Chips	Voc	Vo = AVSS+0.5V ~ AVDD-0.5V	-	-	±20	mV
Dynamic Range of Output	Vdr	SO1 ~ SO1200	0.1	-	AVDD-0.1	V
Sinking Current of Outputs	IOLy	SO1 ~ SO1200; Vo=0.1V v.s 1.0V , AVDD=13.5V	80	-	-	uA
Driving Current of Outputs	IOHy	SO1 ~ SO1200; Vo=13.4V v.s 12.5V , AVDD=13.5V	80	-	-	uA
Resistance of Gamma Table	Rg	Rn: Internal gamma resistor	0.7*Rn	1.0*Rn	1.3*Rn	ohm

3.5.3. Timing Controller

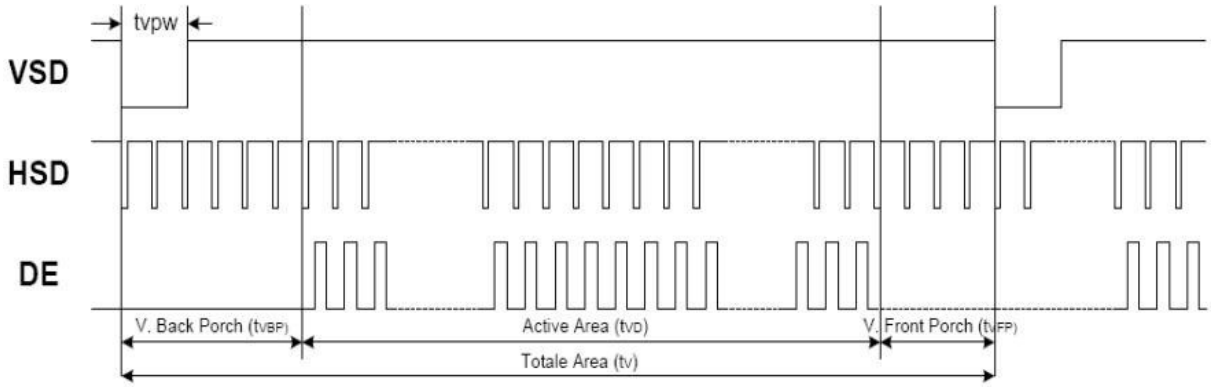
Horizontal input timing

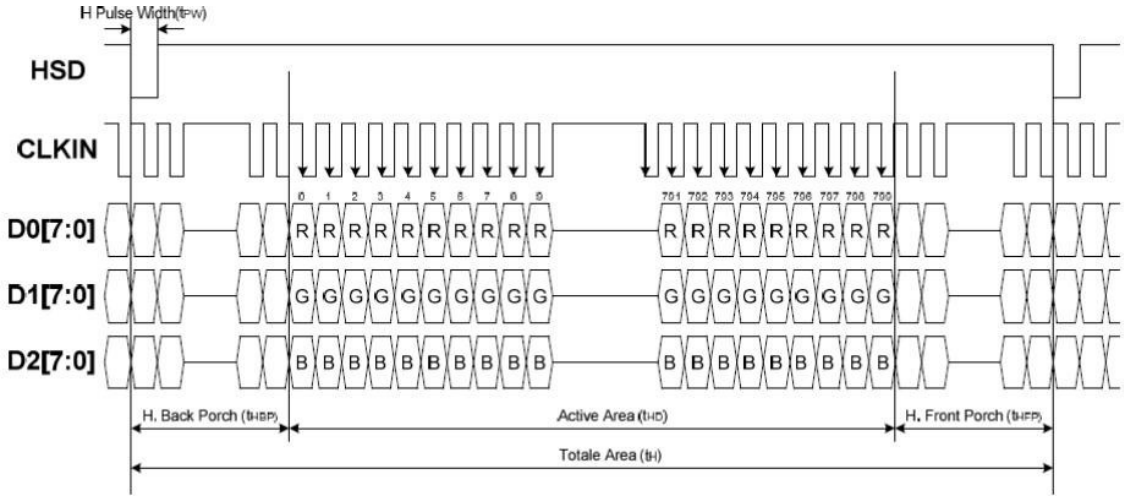
Parameter		Symbol	Value			Unit
Horizontal display area		thd	800			DCLK
DCLK frequency		fclk	Min.	Typ.	Max.	
			-	33.3	50	MHz
1 Horizontal Line		th	862	1056	1200	DCLK
HSD pulse width	Min.	thpw	1			
	Typ.		--			
	Max.		40			
HSD Blanking		thb	46	46	46	
HSD Front Porch		thfp	16	210	354	

Vertical input timing

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	480			H
VSD period time	tv	510	525	650	H
VSD pulse width	tvpw	1	-	20	H
VSD Blanking	tvb	23	23	23	H
VSD Front Porch	tvfp	7	22	147	H

3.5.4. Data Input Format





4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180° (9 o'clock)	70	80	-	degree	Note 1
	θ_R	Φ=0° (3 o'clock)	70	80	-		
	θ_T	Φ=90° (12 o'clock)	70	80	-		
	θ_B	Φ=270° (6 o'clock)	70	80	-		
Response time	T_{ON+} T_{OFF}	Normal θ=Φ=0°	-	30	40	msec	Note 3
Contrast ratio	CR		800	1000	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.28	0.33	0.38	-	
Luminance	L		420	500	-	cd/m²	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7

The test systems refer to Note 2.

Note 1: Definition of viewing angle range

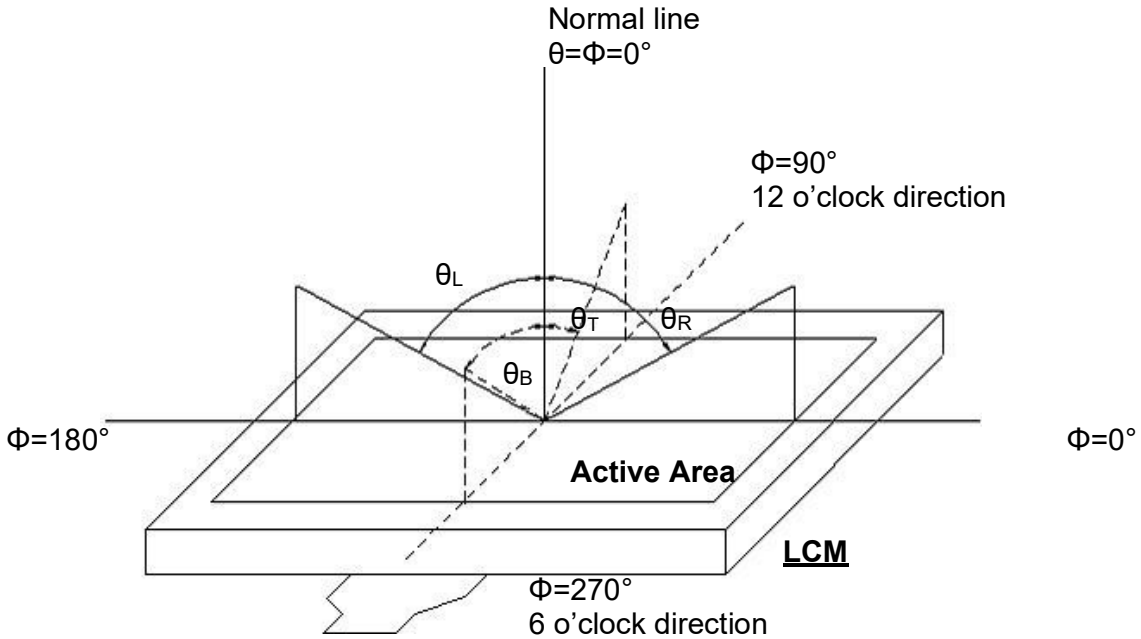


Fig. 4-1 Definition of viewing angle

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. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.) or CA-210.

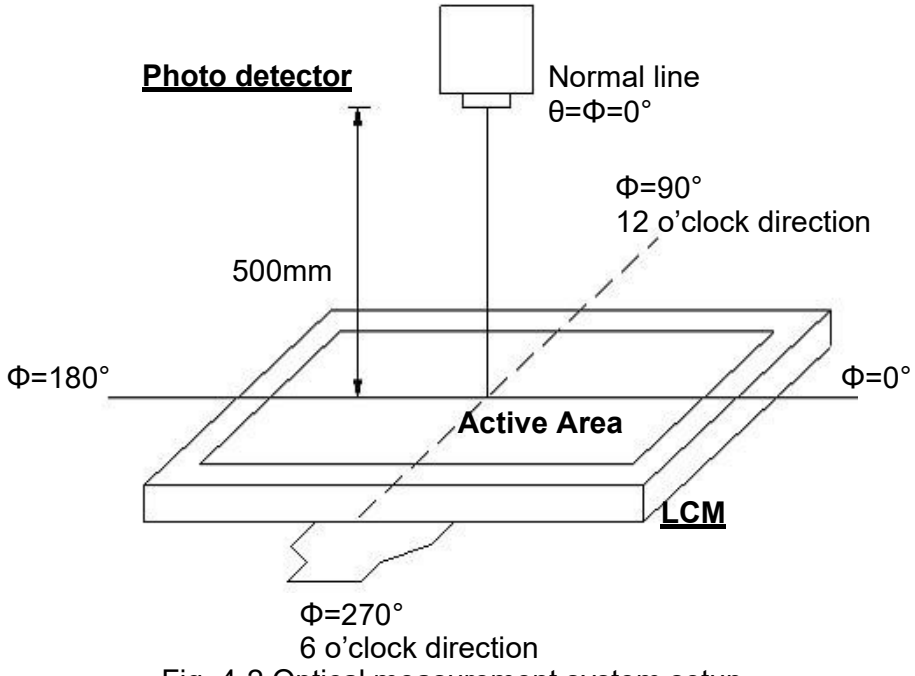


Fig. 4-2 Optical measurement system setup

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%.

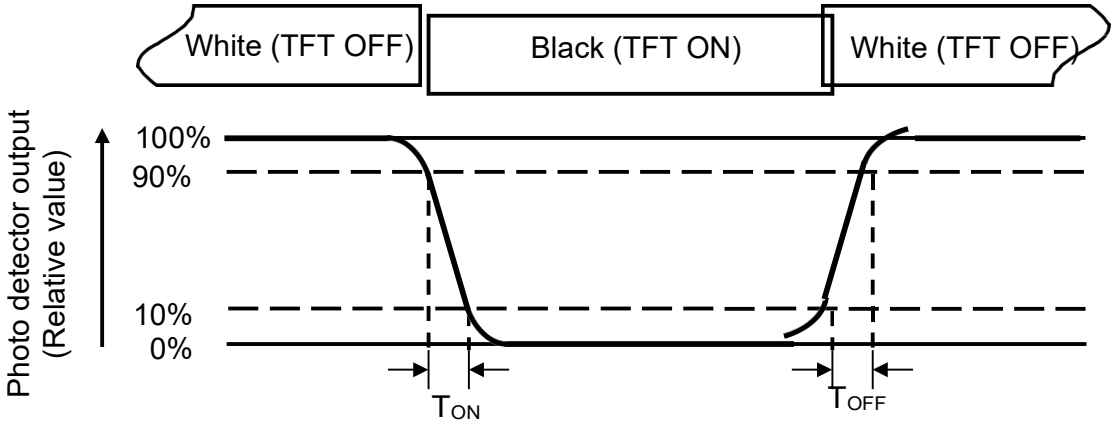


Fig. 4- 3 Definition of response time

Note 4: Definition of contrast ratio

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

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=60mA .

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.

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

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

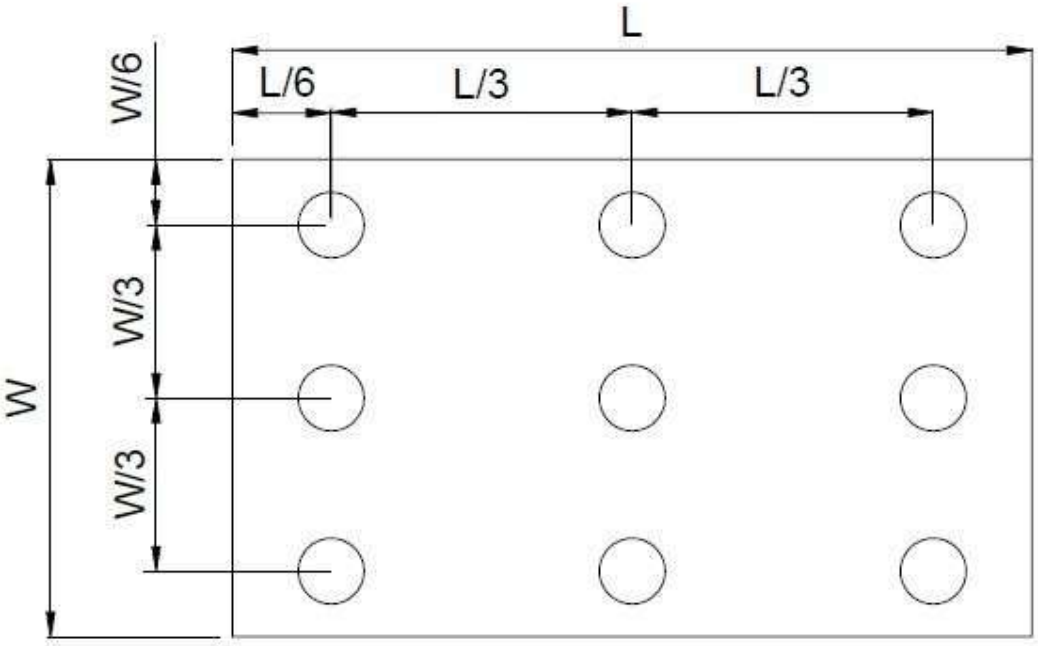


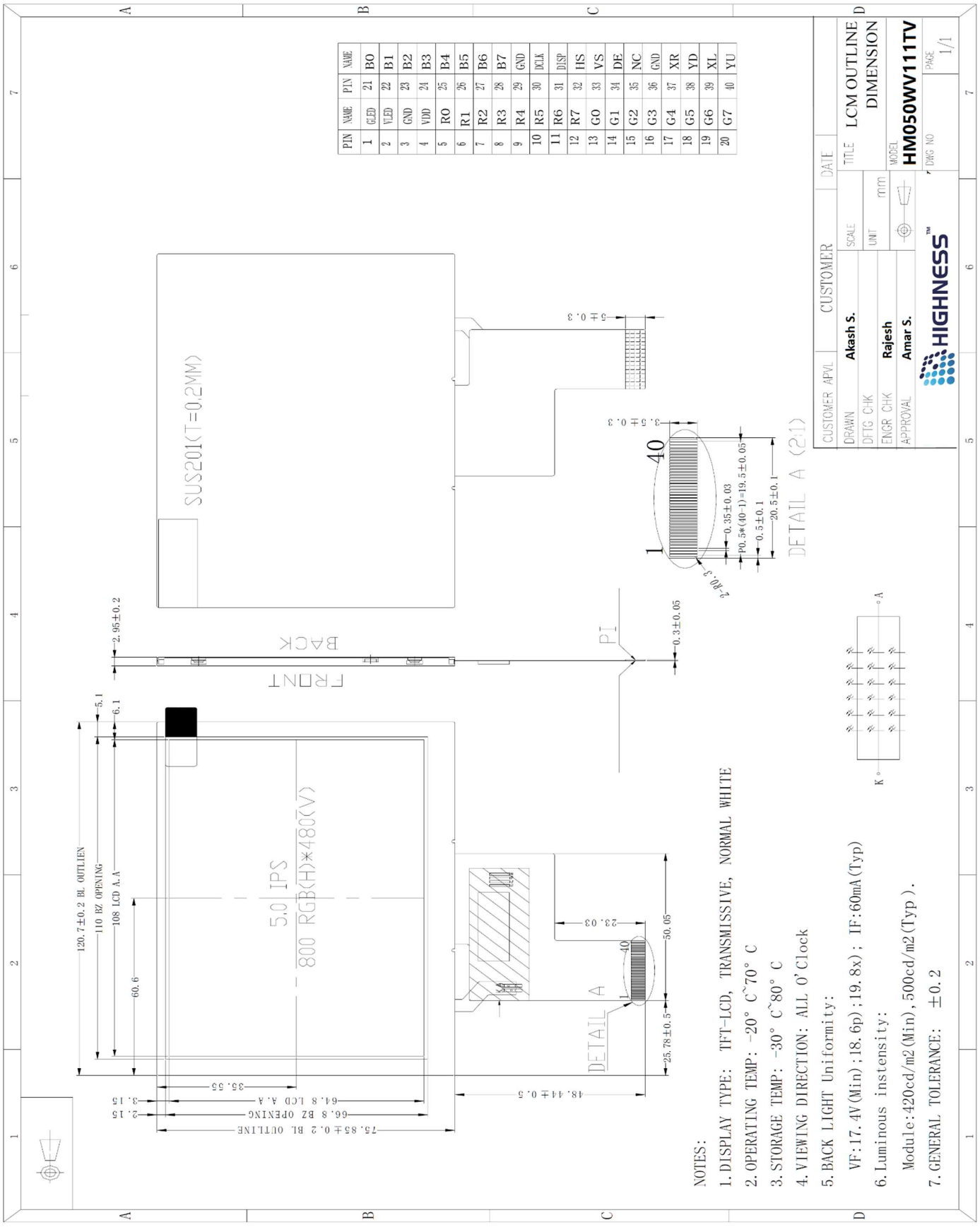
Fig. 4-4 Definition of measuring points

B_{MAX}: The measured maximum luminance of all measurement position.
B_{MIN}: The measured minimum luminance of all measurement position.

5. Reliability Test

High Temperature Storage	Ta = 80℃ 240hrs	A,B,C,D,E
Low Temperature Storage	Ta = -30℃ 240hrs	A,B,C,D,E
High Temperature Operation	Ts = 70℃ 240hrs	A,B,C,D,E
Low Temperature Operation	Ta =-20℃ 240hrs	A,B,C,D,E
Operate at High Temperature and Humidity	+60℃, 90%RH 240hrs	A,B,C,D,E
Thermal Shock (No operation)	-20℃/30 min ~ +70℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	A,B,C,D,E
Vibration Test	Sweep:10Hz~55Hz~10Hz 2G 2 hours for each direction of X. Y. Z. (6 hours for total)	A,B,C,D,E
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)	A,B,C,D,E
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	A,B,C,D,E
Electro Static Discharge	Contact=+/-2KV, Air=+/-4KV,(R=330R,C=150pF), 1 sec,9point,10times/point;	A,B,C,D,E

6. Mechanical Drawing



7. General Precautions

7.1. 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.

7.2. 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.

7.3. 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.

7.4. Storage

1. Store the module in a dark room where must keep at 25±10℃ 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.

7.5. 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.