



厦门炬圣森科技有限公司

Xiamen Toroson Technology Co., Ltd

TFT-LCD Module

SPECIFICATION

Customer: _____

Model Name: VI104DT420

SPEC NO.: _____

Date: 2019/08/19

Version: _____

☒ Preliminary Specification

☐ Final Specification

For Customer's Acceptance

Approved by	Comment

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Record of Revision

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1.General Specifications

No.	Item	Specification	Remark
1	LCD size	10.4 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	800X3(RGB)X600	
4	Dot pitch	0.088(W)x0.264(H) mm	
5	Pixel pitch	0.264(W)x0.264(H) mm	
6	Active area	211.2(W)x158.4(H) mm	
7	Panel size	228.4(W)x175.4(H)x5.9(D)mm	
8	Surface treatment	3H	Note 1
9	Color arrangement	RGB-stripe	
10	Interface	Digital 24 Bit RGB	
11	Backlight power consumption	2.304W (Typ.)	
12	Color Depth	16.2 M	
13	LCD type	TM TN	
14	View direction(Gray inversion)	6 o'clock	
15	Weight	0.26KG	

Note 1: Refer to Mechanical Drawing.

2.Pin Assignment

Pin No.	Symbol	I/O	Function	Remark
1	GND	G	Power Ground	
2	AVDD	P	Analog input voltage	
3	VCC	P	Digital input voltage	
4	R0	I	Red data input(LSB)	
5	R1	I	Red data input	
6	R2	I	Red data input	
7	R3	I	Red data input	
8	R4	I	Red data input	
9	R5	I	Red data input	
10	R6	I	Red data input	
11	R7	I	Red data input(MSB)	
12	G0	I	Green data input(LSB)	
13	G1	I	Green data input	
14	G2	I	Green data input	
15	G3	I	Green data input	
16	G4	I	Green data input	
17	G5	I	Green data input	
18	G6	I	Green data input	
19	G7	I	Green data input(MSB)	
20	B0	I	Blue data input(LSB)	
21	B1	I	Blue data input	
22	B2	I	Blue data input	
23	B3	I	Blue data input	
24	B4	I	Blue data input	
25	B5	I	Blue data input	
26	B6	I	Blue data input	
27	B7	I	Blue data input(MSB)	
28	CLKIN	I	Dot clock input	
29	DEN	I	Data enable signal	
30	HSD	I	HSYNC signal	

31	VSD	I	VSYNC signal	
32	MODE	I	H:DE Mode(Default) L:SYNC Mode	
33	NC	-	No connect(please leave it open)	
34	NC	-	No connect(please leave it open)	
35	NC	-	No connect(please leave it open)	
36	VCC	P	Digital input voltage	
37	NC	-	No connect(please leave it open)	
38	GND	G	Power Ground	
39	GND	G	Power Ground	
40	AVDD	P	Analog input voltage	
41	VCOM	P	VCOM DC input	
42	DITH	I	Dithering function setting H:Disable dithering function L:Enable dithering function	
43	NC	-	No connect(please leave it open)	
44	VCOM out	O	Connect a capacitor	
45	NC	-	No connect(please leave it open)	
46	NC	-	No connect(please leave it open)	
47	NC	-	No connect(please leave it open)	
48	NC	-	No connect(please leave it open)	
49	NC	-	No connect(please leave it open)	
50	NC	-	No connect(please leave it open)	
51	NC	-	No connect(please leave it open)	
52	NC	-	No connect(please leave it open)	
53	NC	-	No connect(please leave it open)	
54	NC	-	No connect(please leave it open)	
55	NC	-	No connect(please leave it open)	
56	VGH	P	TFT turn on voltage	
57	VCC	P	Digital input voltage	
58	VGL	P	TFT turn off voltage	
59	GND	G	Power Ground	
60	NC	-	No connect(please leave it open)	

Note 1:Suggested connector:MT-FP160N-2FR(UJU) or any equivalent.

3. Operation Specifications

3.1. Absolute Maximum Ratings

(GND=AAss=0V, Ta=25±2°C, Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	VCC	-0.3	5.0	V	
	AVDD	-0.5	15.0	V	
	V _{GH}	-0.3	42.0	V	
	V _{GL}	V _{GH} -12	0.3	V	
Operation Temperature	T _{OP}	-10	50	°C	
Storage Temperature	T _{ST}	-20	60	°C	

Note 1: 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.Electrical Characteristics

3.2.1. Operating Conditions

(Ta=25±2°C)

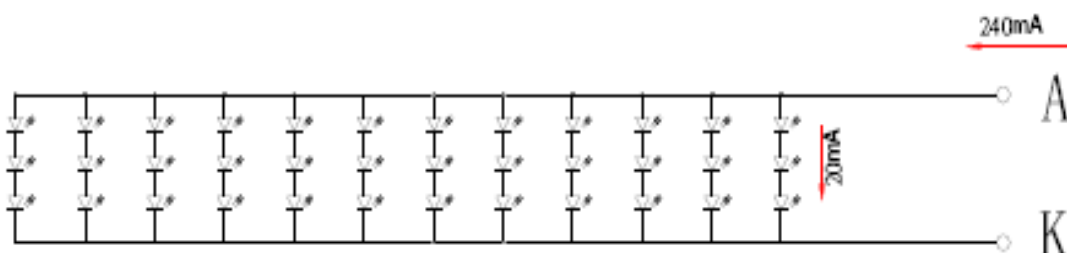
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Digital Power Supply Voltage	VCC	3.0	3.3	3.6	V	
Digital Supply Current	I _{CC}	24	30	45	mA	Black Pattern
Analog Power Supply Voltage	AVDD	10.3	10.5	10.7	V	
Analog Supply Current	I _{AVDD}	32	40	60	mA	Black Pattern
TFT Device on Voltage	V _{GH}	-	18	-	V	
TFT Device off Voltage	V _{GL}	-	-7	-	V	
Common Electrode Driving Voltage	V _{COM}	-	4.45	-	V	
LED Reverse Voltage	V _r	-	-	1.5	V	For single LED
LED Forward Current	I _f	-	20	30	mA	For single LED

3.2.2. Backlight Driving Conditions

(Ta=25±2°C)

Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Power Consumption	P _{BL}	-	2.304	2.52	W	-
LED Current	I _F	-	240	-	mA	-
Backlight Voltage	V _{BL}	8.1	9.6	10.8	V	-
Life Time	-	20000	-	-	hrs	Note 1

Note 1: Brightness to be decreased to 50% of the initial value.



3.3. DC Characterstics

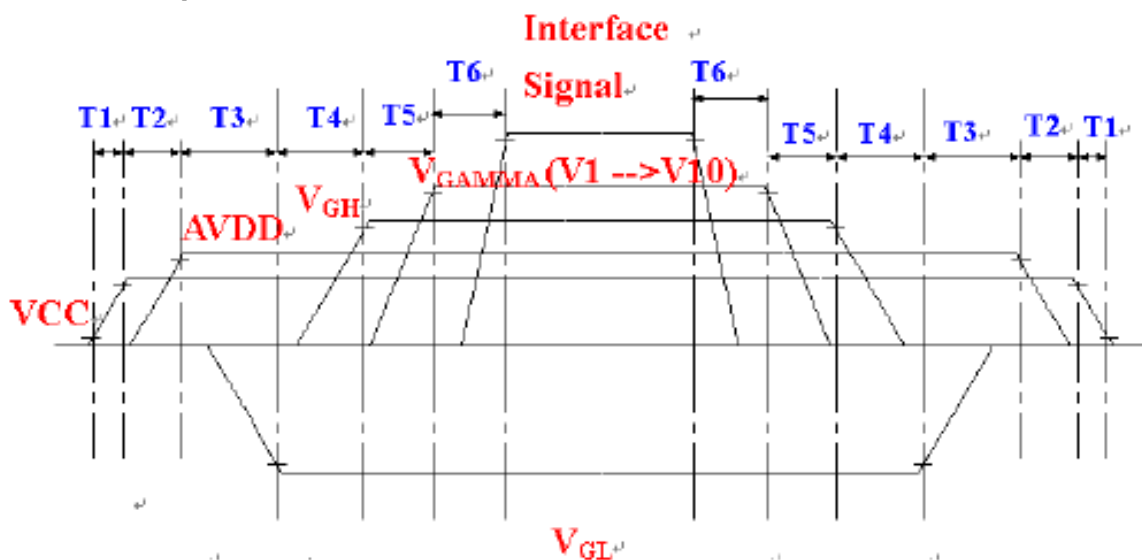
3.3.1. Operating Conditions

(Ta=25±2°C)

Item	Symbol	Values			Unit	Condition
		Min.	Typ.	Max.		
Low level input voltage	V _{IL}	0	-	0.3VCC	V	Note 1
Hight level input voltage	V _{IH}	0.7VCC	-	VCC	V	Note 1

Note 1:For Digital Circuit

3.3.2. Power Sequence



Item	Min.	Typ.	Max	Unit
T1	-	-	20	ms
T2	16	-	-	ms
T3		>0		ms
T4		>0		ms
T5		>0		ms
T6		>0		ms

3.4. AC Characteristics

3.4.1. Data Timing(Under frame rate is equal to 60HZ)

Horizontal Timing

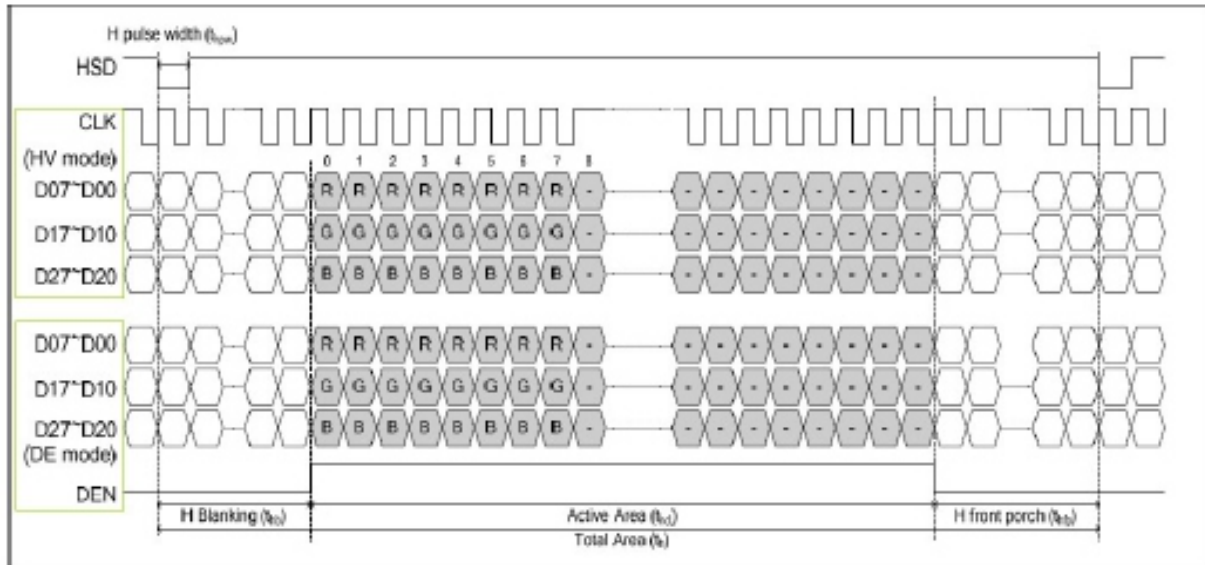
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	800			CLK	
CLK Frequency	fclk	-	40	50	MHZ	
One Horizontal Line	th	862	1056	1200	CLK	
HS pulse width	thpw	1	-	40	CLK	
HS Blanking Porch	thb	46			CLK	
HS Front Porch	thfp	16	210	354	CLK	

Vertical Timing

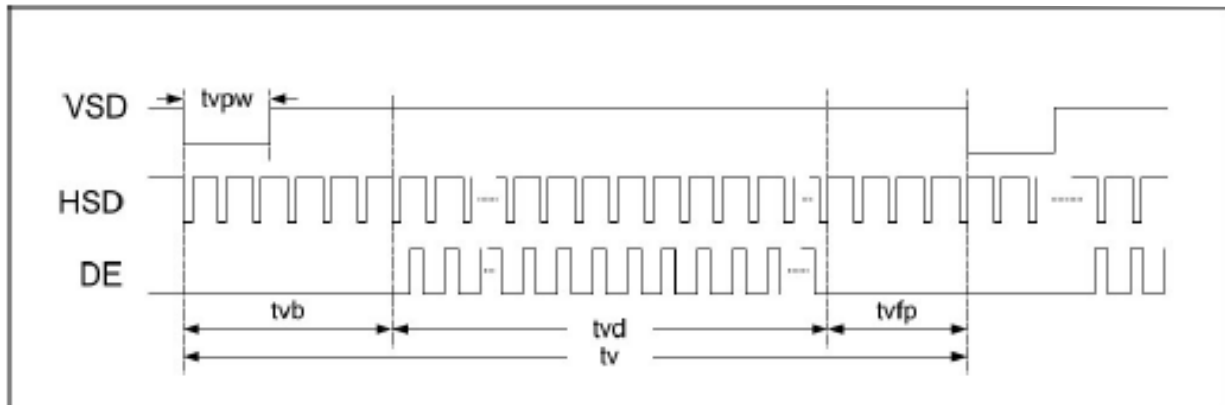
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	600			TH	
VS period time	tv	624	635	700	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking Porch	tvb	23	23	23	TH	
VS Front Porch	tvfp	1	12	77	TH	

Note: CMO suggest using frame rate 60HZ to have better performance

Horizontal Timing



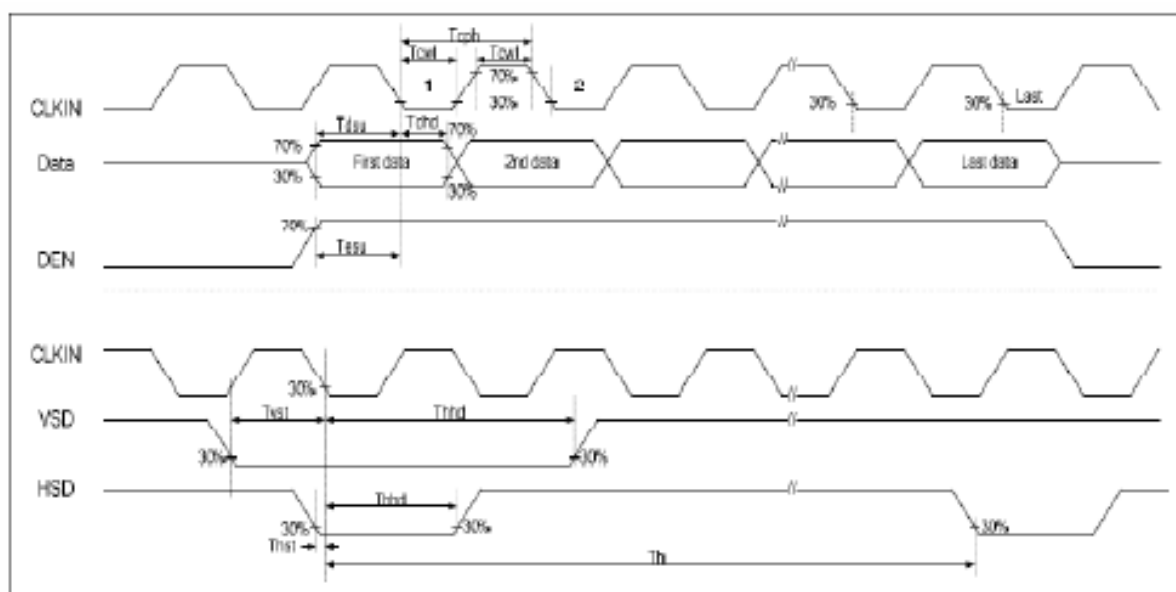
Vertical Timing



3.4.2. AC Electrical Characteristic

Item	Symbol	Values			Unit
		Min.	Typ.	Max.	
HS setup time	T_{hst}	8	-	-	ns
HS hold time	T_{hhd}	8	-	-	ns
VS setup time	T_{vst}	8	-	-	ns
VS hold time	T_{vhd}	8	-	-	ns
Data setup time	T_{dsu}	8	-	-	ns
Data hold time	T_{dhd}	8	-	-	ns
DE setup time	T_{esu}	8	-	-	ns
DE hold time	T_{ehd}	8	-	-	ns
VDD Power On Slew rate	T_{POR}	-	-	20	ms
RSTB pulse width	T_{rst}	10	-	-	us
CLKIN cycle time	T_{coh}	20	-	-	ns
CLKIN pulse duty	T_{cwh}	40	50	60	%
Output stable time	T_{sst}	-	-	6	ns
Repair OPA Output stable time	T_{Rsst}	-	-	6	ns

3.4.3. Input Clock and Data Timing Waveform



4. Optical Specifications

(Ta=25±2°C, If=20mA)

Item		Symbol	Condition	Specification			Unit	Note
				Min.	Typ.	Max.		
Contrast		CR	Θ=0° B/L On Normal viewing angle	300	500	-	-	(2)(4)(6)
Response time		Tr		-	5	10	msec	(3)
		Tf		-	15	20		
Brightness		B		320	400	-	cd/m ²	
Color chromaticity (CIE1931)	Red	R _x		0.523	0.573	0.623	-	(2)(5)(6)
		R _Y		0.30	0.350	0.40	-	
	Green	G _x		0.286	0.336	0.386	-	
		G _Y		0.547	0.597	0.647	-	
	Blue	B _x		0.102	0.152	0.202	-	
		B _Y		0.062	0.112	0.162	-	
	White	W	0.26	0.31	0.36	-		
		W	0.28	0.33	0.39	-		
Viewing angle	Hor.	Θ _L	CR>10 B/L On	60	70	-	deg.	(1)
		Θ _R		60	70	-		
	Ver.	Θ _U		40	50	-		
		Θ _D		50	60	-		
NTSC		-	-	-	50	-	%	
Uniformity		-	-	70	75	-	%	(7)

Note 1: Definition of viewing angle range

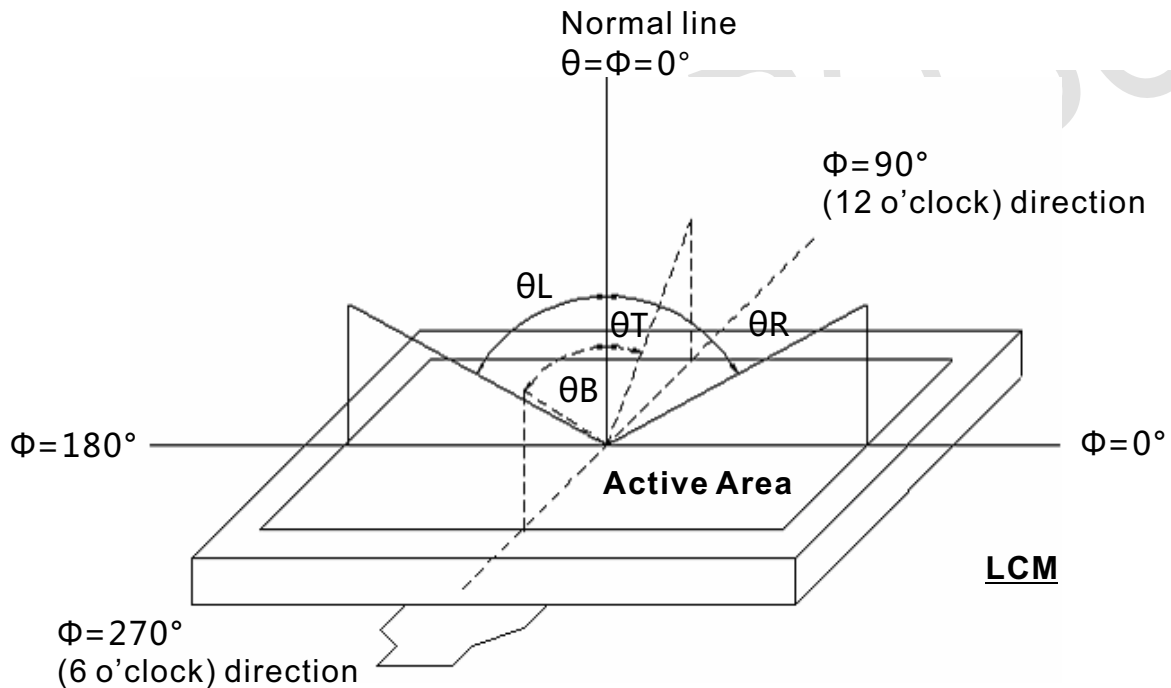


Fig. 4-1 Definition of viewing angle

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.)

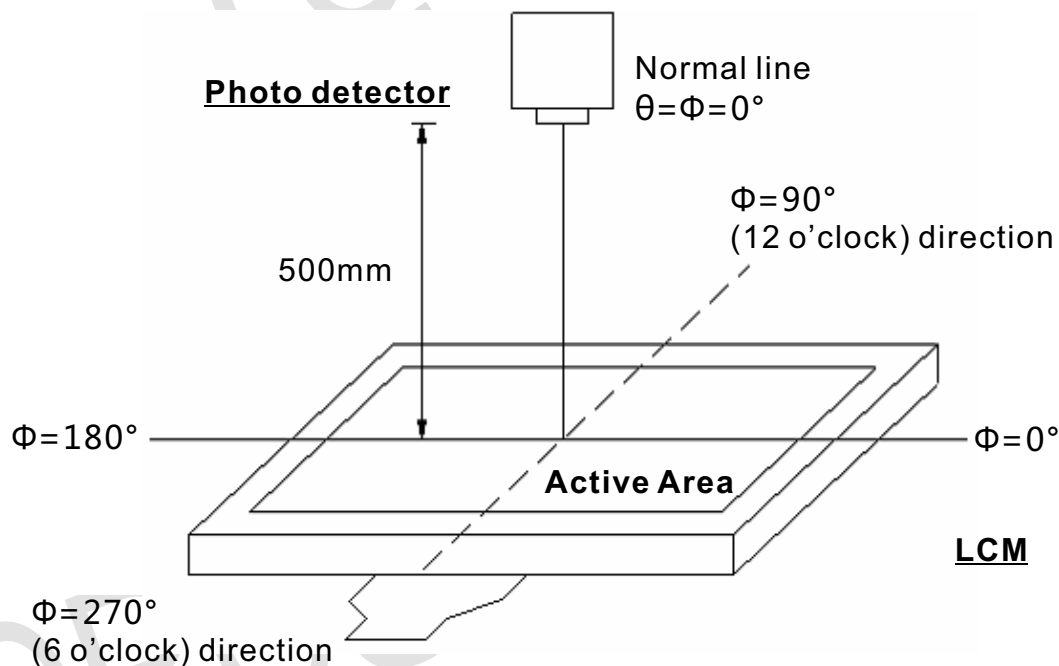


Fig. 4-2 Optical measurement system setup

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 (Ton) is the time between photo detector output intensity changed from 90% to 10%. And fall time (toff) is the time between photo detector output intensity changed from 10% to 90%.

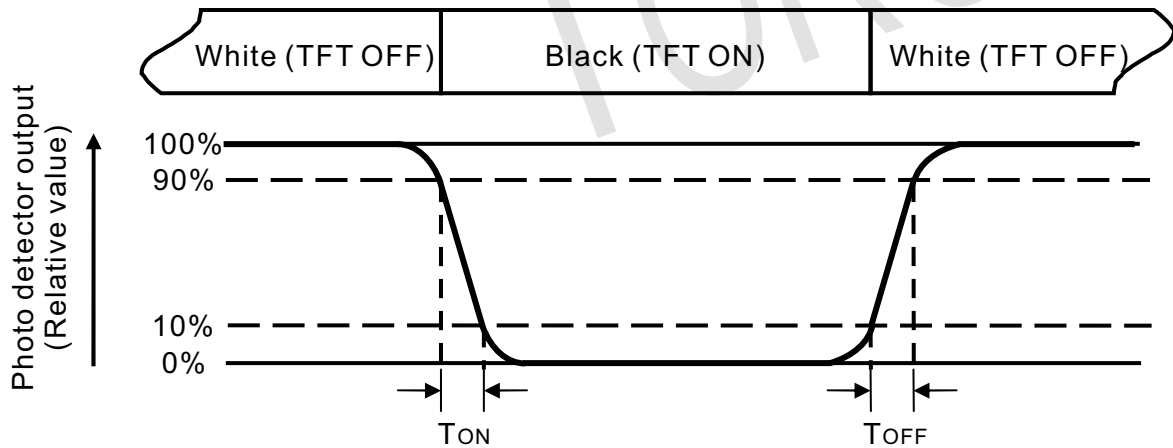


Fig. 4-3 Definition of response time

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

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.

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

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

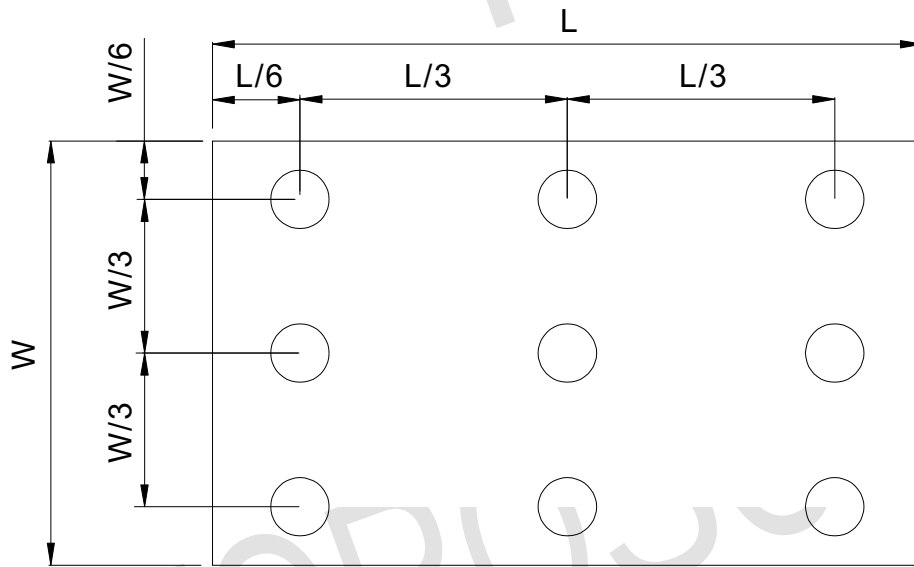


Fig. 4-4 Definition of measuring points

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

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

5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 60°C 240hrs	Note 1,Note 3
Low Temperature Storage	Ta = -20°C 240hrs	Note 1,Note 3
High Temperature Operation	Ta = 50°C 240hrs	Note 2,Note 3
Low Temperature Operation	Ta = -10°C 240hrs	Note 1,Note 3
Operate at High Temperature and Humidity	+50°C,80%RH 240hrs	Note 3
Thermal Shock	-30°C/30 min~ +80°C/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 don't guarantee all the cosmetic specification.

Note 4: Before cosmetic and function test, 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 lcs.

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.

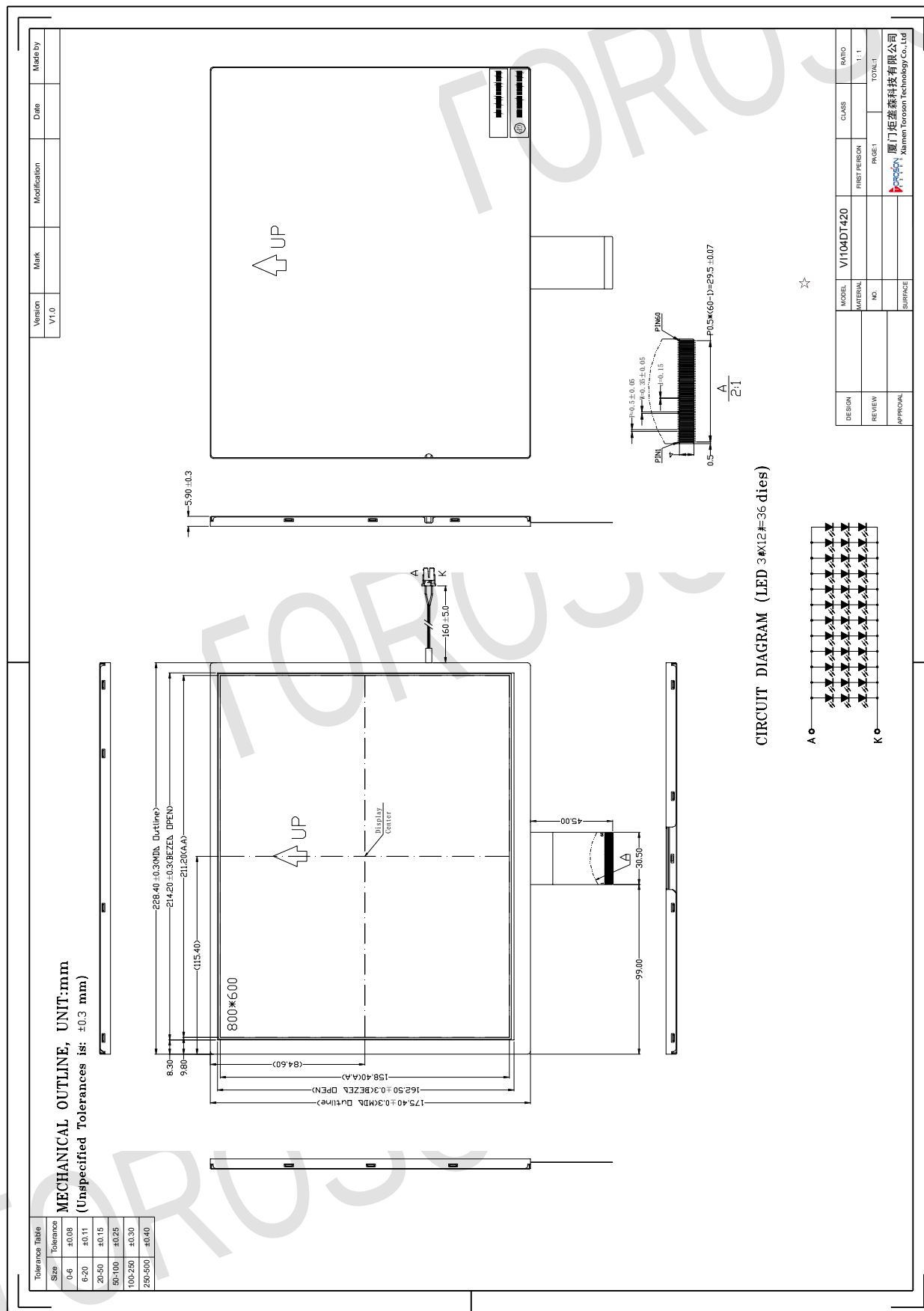
6.4. Storage

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



8. Package Drawing

