Tailorpixels

A Professional Manufacturer of Display

Manufacturer Certificated

9001 CERT. No.: 282Q19070712006

14001 CERT. No.: 282E19070712007

Product Specification

Model: TTX050QHI-02

5.0″TFT Display Module (800*480)

This module uses RoHS material

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Contents

1 Record of Revision

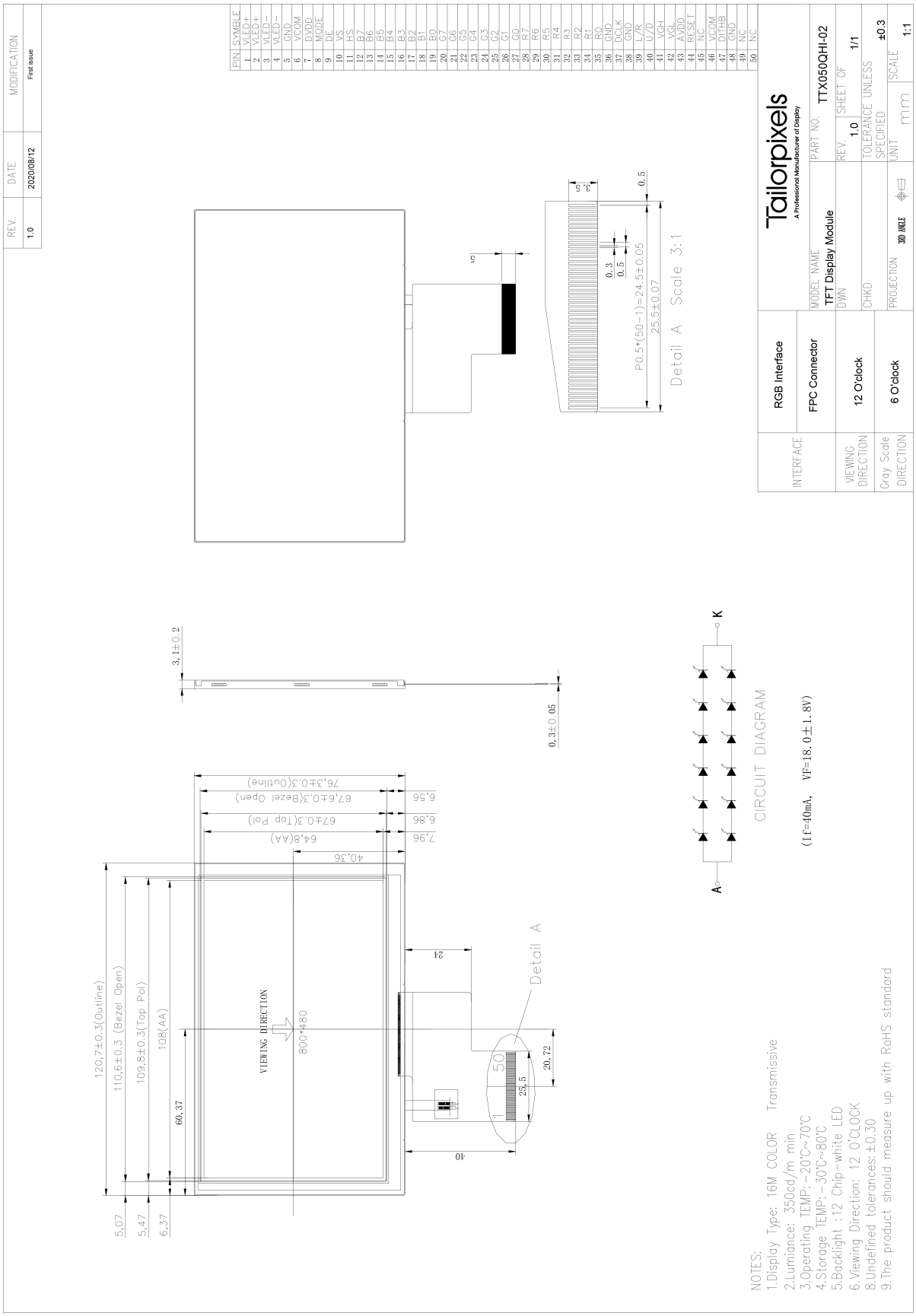
Version	Revise Date	Content	Remark
1.0	2021/01/04	First Release.	

2 General Specifications

Feature		Spec
Characteristics	Size	5.0-inch
	Resolution	800(horizontal)*480(Vertical)
	Interface	RGB-24bit
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.045 x 0.135
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally White
	LCD Driver IC	
	Viewing Direction	12 O'clock
	Gray Scale Inversion Direction	6 O'clock
Mechanical	LCM (W x H x D) (mm)	120.2*75.9*3
	Active Area(mm)	108 x 64.80
	With /Without TSP	Without
	Weight (g)	TBD
	LED Numbers	12 LEDs

Note 1: Viewing direction is following the data measured by optics equipment.
Note 2: Requirements on Environmental Protection: RoHS
Note 3: LCM weight tolerance: +/- 5%

3 Mechanical Drawing


REV. 1.0
DATE 2020/08/12
MODIFICATION First issue
PIN SYMBLE
1 VLED+
2 VLED+
3 VLED-
4 VLED-
5 GND
6 VCOM
7 DVDD
8 MODE
9 DE
10 VS
11 HS
12 B7
13 B6
14 B5
15 B4
16 B3
17 B2
18 B1
19 B0
20 G7
21 G6
22 G5
23 G4
24 G3
25 G2
26 G1
27 G0
28 R7
29 R6
30 R5
31 R4
32 R3
33 R2
34 R1
35 R0
36 GND
37 DCLK
38 GND
39 L/R
40 U/D
41 VGH
42 VGL
43 AVDD
44 RESET
45 NC
46 VCOM
47 DITHB
48 GND
49 NC
50 NC
Tailorpixels
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INTERFACE RGB Interface
FPC Connector
VIEWING DIRECTION 12 O'clock
Gray Scale DIRECTION 6 O'clock
MODEL NAME TFT Display Module
DWN
CHKD
PROJECTION
PART NO. TTX050QHI-02
REV. 1.0
SHEET OF 1/1
TOLERANCE UNLESS SPECIFIED ±0.3
UNIT mm
SCALE 1:1
Detail A Scale 3:1
P0.5*(50-1)=24.5±0.05
25.5±0.07
0.3
0.5
0.5
3.1±0.2
0.3±0.05
CIRCUIT DIAGRAM
(If=40mA, Vf=18.0±1.8V)
A
K
120.7±0.3(Outline)
110.6±0.3 (Bezel Open)
109.8±0.3(Top Pol)
108(AA)
60.37
5.07
5.47
6.37
VIEWING DIRECTION
800*480
40.36
64.8(AA)
67±0.3(Top Pol)
67.6±0.3(Bezel Open)
76.3±0.3(Outline)
7.96
6.86
6.56
24
40
20.72
25.5
Detail A
NOTES:
1.Display Type: 16M COLOR Transmissive
2.Luminance: 350cd/m min
3.Operating TEMP: -20℃~70℃
4.Storage TEMP: -30℃~80℃
5.Backlight :12 Chip-white LED
6.Viewing Direction: 12 O'CLOCK
8.Undefined tolerances:±0.30
9.The product should measure up with RoHS standard

4 Interface

No.	Symbol	Description
1，2	VLED+	Power for LED backlight (Anode)
3，4	VLED-	Power for LED backlight (Cathode)
5	GND	Power Ground
6	VCOM	Common voltage
7	DVDD	Power for Digital Circuit
8	MODE	DE/SYNC mode select
9	DE	Data Enable
10	VS	Vertical sync signal
11	HS	Horizontal sync Signal
12	B7	Blue data (MSB)
13	B6	Blue data
14	B5	Blue data
15	B4	Blue data
16	B3	Blue data
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data (LSB)
20	G7	Green data (MSB)
21	G6	Green data
22	G5	Green data
23	G4	Green data
24	G3	Green data
25	G2	Green data
26	G1	Green data
27	G0	Green data (LSB)
28	R7	Red Data (MSB)
29	R6	Red Data
30	R5	Red Data
31	R4	Red Data
32	R3	Red Data
33	R2	Red Data
34	R1	Red Data
35	R0	Red Data (LSB)
36	GND	Power Ground
37	DCLK	Pixel clock

38	GND	Power Ground
39	L/R	Left/right selection
40	U/D	up/down selection
41	VGH	Gate ON Voltage
42	VGL	Gate OFF Voltage
43	AVDD	Power for Analog Circuit
44	RESET	Global reset pin
45	NC	NO connection
46	Vcom	Common Voltage
47	DITHB	Dithering function
48	GND	Power Ground
49	NC	NO connection
50	NC	NO connection

5 Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
	DV_{DD}	-0.3	5	V	
	AV_{DD}	-0.5	13.5	V	
	V_{GH}	-0.3	42	V	
	V_{GL}	-20	0.3	V	
Power voltage	V_{GH}-V_{GL}	-	40	V	
Operation Temperature	T_{OP}	-20	70	℃	
Storage Temperature	T_{ST}	-30	80	℃	
LED Reverse Voltage	V_R	-	3.3	V	Each LED Note 2
LED Forward Current	I_F	-	20	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

6 Electrical Characteristics

6.1 Operation Conditions

(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	DV_{DD}	3.0	3.3	3.6	V	Note 2
	AV_{DD}	10.2	10.4	10.6	V	
	V_{GH}	15.3	16.0	16.7	V	
	V_{GL}	-6.7	-6.0	-5.3	V	
Input signal voltage	V_{COM}	3.09	4.09	5.09	V	Note 4
Input logic high voltage	V_{IH}	0.7 DV_{DD}	-	DV_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	-	0.3 DV_{DD}	V	

Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.
Note 3: DCLK,HS,VS,RESET,U/D, L/R,DE,R0~R7,G0~G7,B0~B7,MODE,DITHB.
Note 4: Typical V_{COM} is only a reference value. It must be optimized according to each LCM. Please use VR and base on below application circuit.

6.2 Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	(0.50)	1	mA	V_{GH} =16.0V
	I_{GL}	-	(0.54)	1	mA	V_{GL} = -6.0V
	IDV_{DD}	-	(4.2)	10	mA	DV_{DD} =3.3V
	IAV_{DD}	-	(19)	50	mA	AV_{DD} =10.4V

6.3 Driving Backlight

Ta = 25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
LED current	I_F	-	40	-	mA	
LED Voltage	V_F	16.2	18.0	19.8	V	
LED Life Time	W_{BL}	20000	-		Hr	Note 1 Note 2

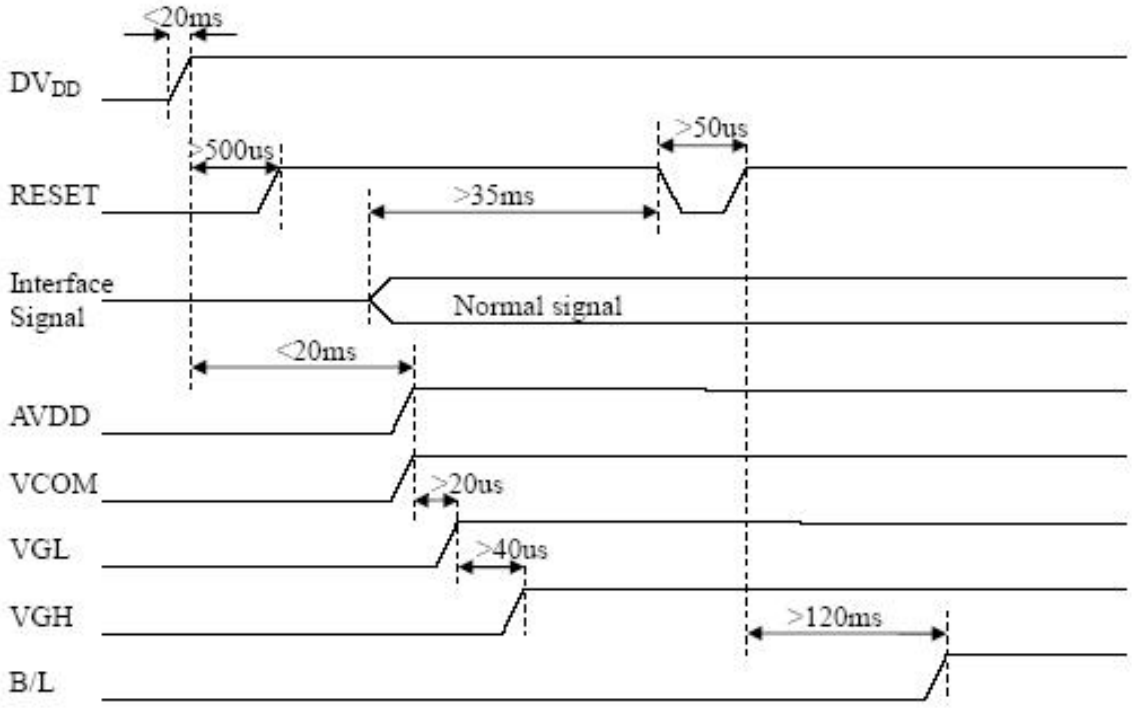
Note 1: There are 6 Groups LED
Note 2: Brightness to be decreased to 50% of the initial value

6.4 Interface Timing

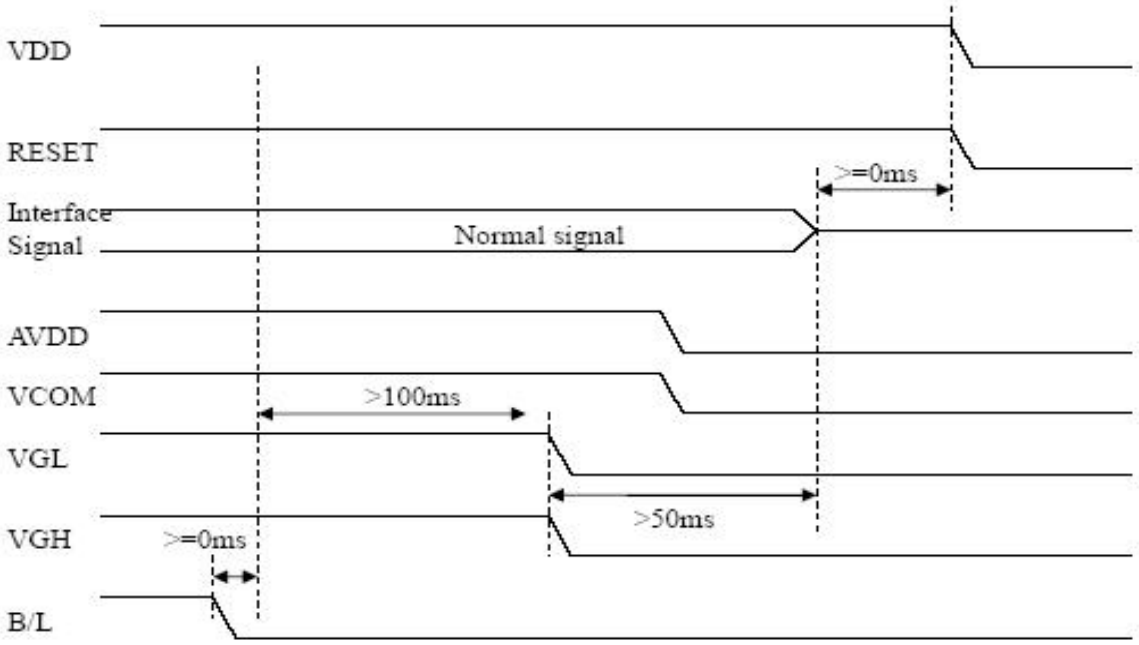
6.4.1 Power Sequence

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

a. Power on sequence:



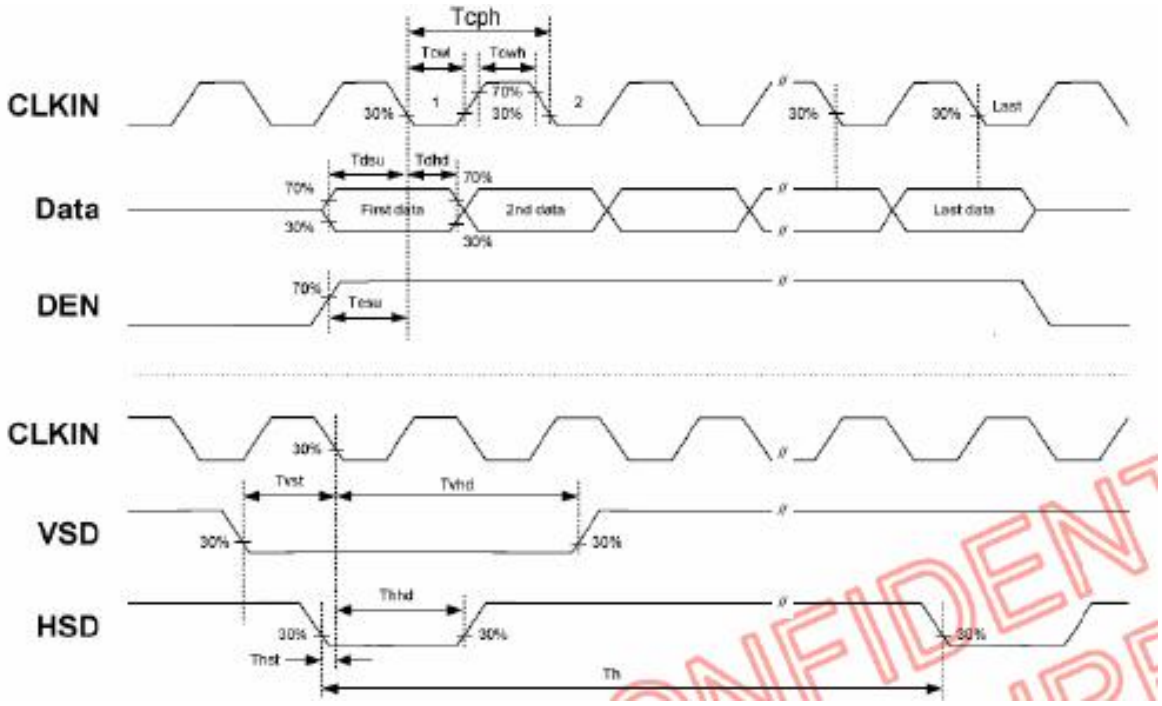
b. Power off sequence:



6.4.2 Timing Conditions

Item	Symbol	Values			Unit	Remark
		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 hole time	T_{dhd}	8	-	-	ns	
DE setup time	T_{esu}	8	-	-	ns	
DE hole time	T_{ehd}	8	-	-	ns	
DV_{DD} Power On Slew rate	T_{POR}	-	-	20	ms	From 0 to 90% DV_{DD}
RESET pulse width	T_{Rst}	1	-	-	ms	
DCLK cycle time	T_{coh}	20	-	-	ns	
DCLK pulse duty	T_{cwh}	40	50	60	%	

6.4.3 Timing Diagram



6.4.4 Timing

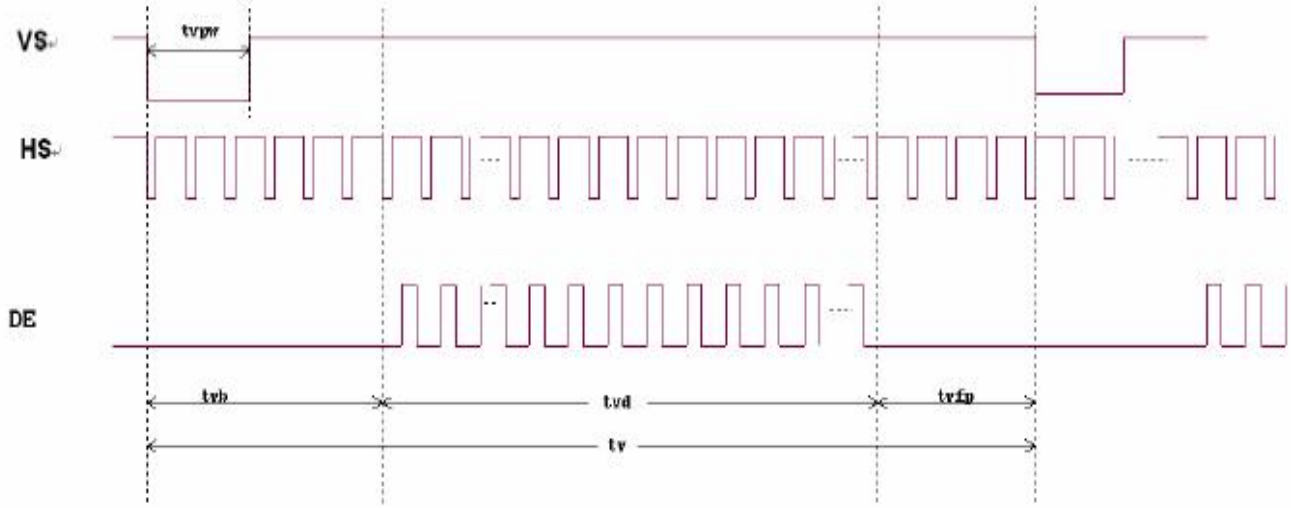
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

6.4.5 Data Input Format

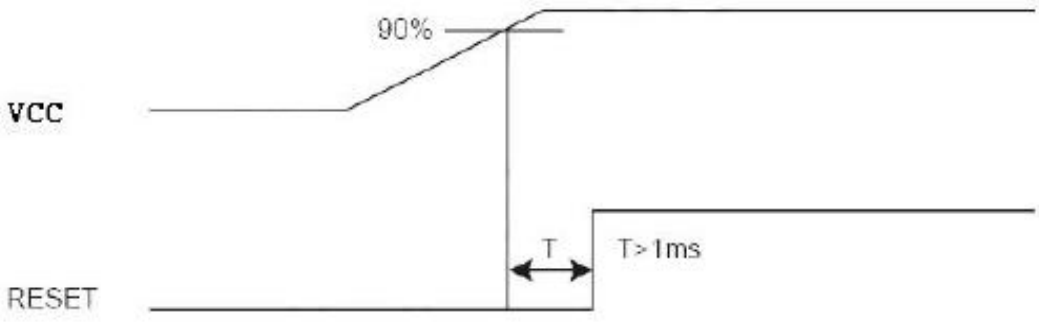
6.4.5.1 Figure: Horizontal Input Timing Diagram

6.4.5.2 Figure: Vertical Input Timing Diagram



6.4.5.3 Figure: Reset Timing

The RESET input must be held at least 1ms after power is stable



7 Optical Characteristics

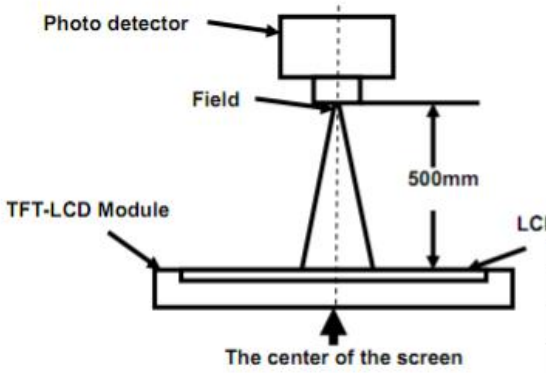
Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θ_T	Center CR≥10	50	60	-	Degree.	Note2
		θ_B		60	70	-		
		θ_L		60	70	-		
		θ_R		60	70	-		
Contrast Ratio		CR	Θ =0	350	500	-	-	Note1, Note3
Response Time		T_{ON}	25°C	-	25	35	ms	Note1, Note4
		T_{OFF}		-	25	35		
Chromaticity	White	X_W	Backlight is on	0.324	0.326	0.328	-	Note1, Note5
		Y_W		0.364	0.366	0.368	-	
	Red	X_R		0.611	0.613	0.615	-	
		Y_R		0.333	0.335	0.337	-	
	Green	X_G		0.305	0.307	0.309	-	
		Y_G		0.558	0.560	0.562	-	
	Blue	X_B		0.133	0.135	0.137	-	
		Y_B		0.158	0.160	0.162	-	
Uniformity		U		80	-	-	%	Note1, Note6
NTSC					50		%	Note5
Luminance		L			500			Note1, Note7

Test Conditions:

1. IF= 20mA(one channel),the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

The optical characteristics should be measured in the darkroom. After 5 minutes of operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	BM-7A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	SR-3A	2°

Note 2: Definition of viewing angle range and measurement system.
Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).

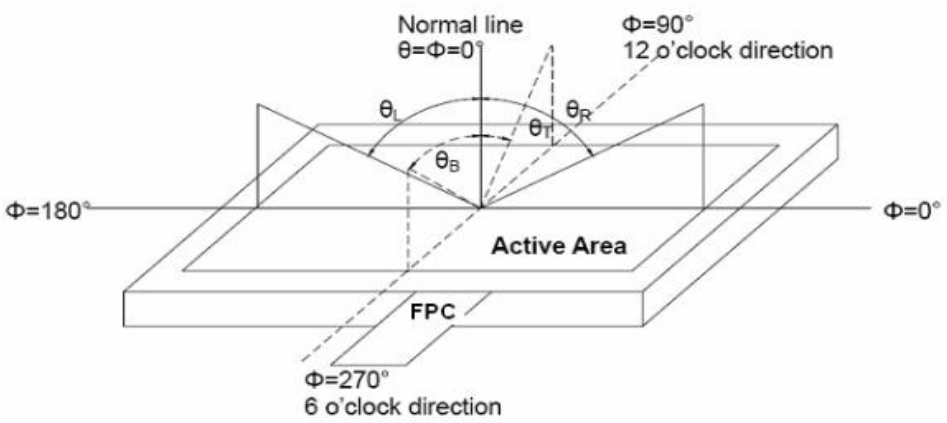


Fig. 1 Definition of viewing angle

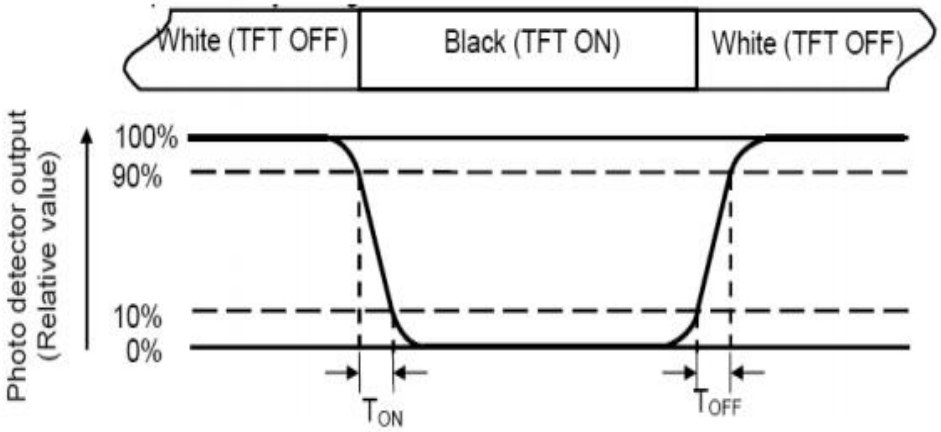
Note 3: Definition of contrast ratio

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

Note 4: 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%



Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the Center of each measuring area
Luminance Uniformity (U) = Lmin/ Lmax X100%
L-------Active area length W----- Active area width

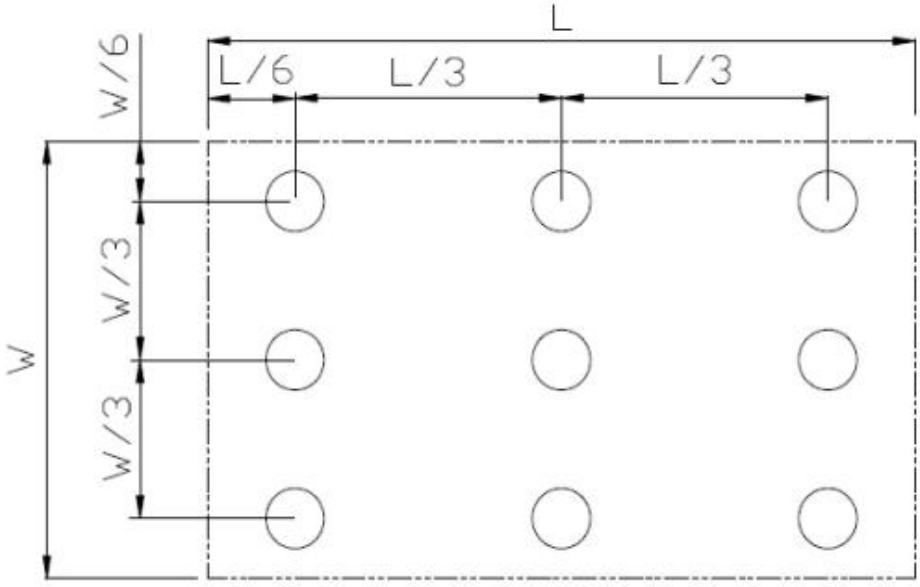


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.
Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance:
Measure the luminance of white state at center point.

8 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20℃, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃, 240hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60℃, 90% RH max, 160 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30℃ 30 min ~ +80℃ 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Operation)	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X.Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y, ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note: 1. T_S is the temperature of panel's surface.
2. Ta is the ambient temperature of sample.

9 Precautions For Use of LCD modules

9.1 Handling Precautions

9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

9.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

9.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

9.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten the cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following: Water; Ketene; Aromatic solvents

9.1.6 Do not attempt to disassemble the LCD Module.

9.1.7 If the logic circuit power is off, do not apply the input signals.

9.1.8 To prevent the destruction of the elements by static electricity, be careful to maintain an optimum work environment.

9.1.8.1 Be sure to ground the body when handling the LCD Modules.

9.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

9.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

9.1.8.4 The LCD Module is coated with a film to protect the display surface. Be careful when peeling off this protective film since static electricity may be generated.

9.2 Storage Precautions

9.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

9.2.2 The LCD modules should be stored under the storage temperature range If the LCD modules will be stored for a long time, the recommended condition is:
Temperature: 0℃ ～ 40℃, Relatively humidity: ≤80%

9.2.3 The LCD modules should be stored in the room without acid, alkali, and harmful gas.

9.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, dampness, and sunshine.