



FORMIKE ELECTRONIC CO.,LTD

PRODUCT SPECIFICATION

TFT LCD MODULE

MODEL : KWH050TG08-F02

【 ◆ 】 Preliminary Specification

【 】 Finally Specification

CUSTOMER'S APPROVAL	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWD	PD REVIEWD	PREPARED BY
Kam	/	Stephen	Roy

Prepared By :

FORMIKE ELECTRONIC CO.,LTD

Address :Room A818 New Energy Building, NanHai Road, NanShan District, ShenZhen, China. 518054

TEL:(86) 755 88306921,88306931 FAX:(86) 755 88304615

Http:// www.wandisplay.com

- This specification is subject to change without notice.Please contact FORMIKE or it's representative before designing your product based on this specification.



TABLE OF CONTENTS

N0	CONTENTS	PAGE
0	Table of Contents	2
1	Record of Revision	3
2	General Specifications	4
3	Mechanical Drawing	5
4	Pin Definition	6
5	Absolute Maximum Ratings	7
6	Electrical Characteristics	7
7	Data Input Timing	9
8	Optical Characteristics	13
9	Environmental / Reliability Test	16
10	Packing Information	17
11	Precautions For Use	18



2. GENERAL DESCRIPTION

2.1 Description

KWH050TG08-F02 is a Transmissive type color active matrix liquid crystal display (LCD), which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver ICs, FPC, and a backlight unit. The following table described the features of FORMIKE KWH050TG08-F02

2.2 Application

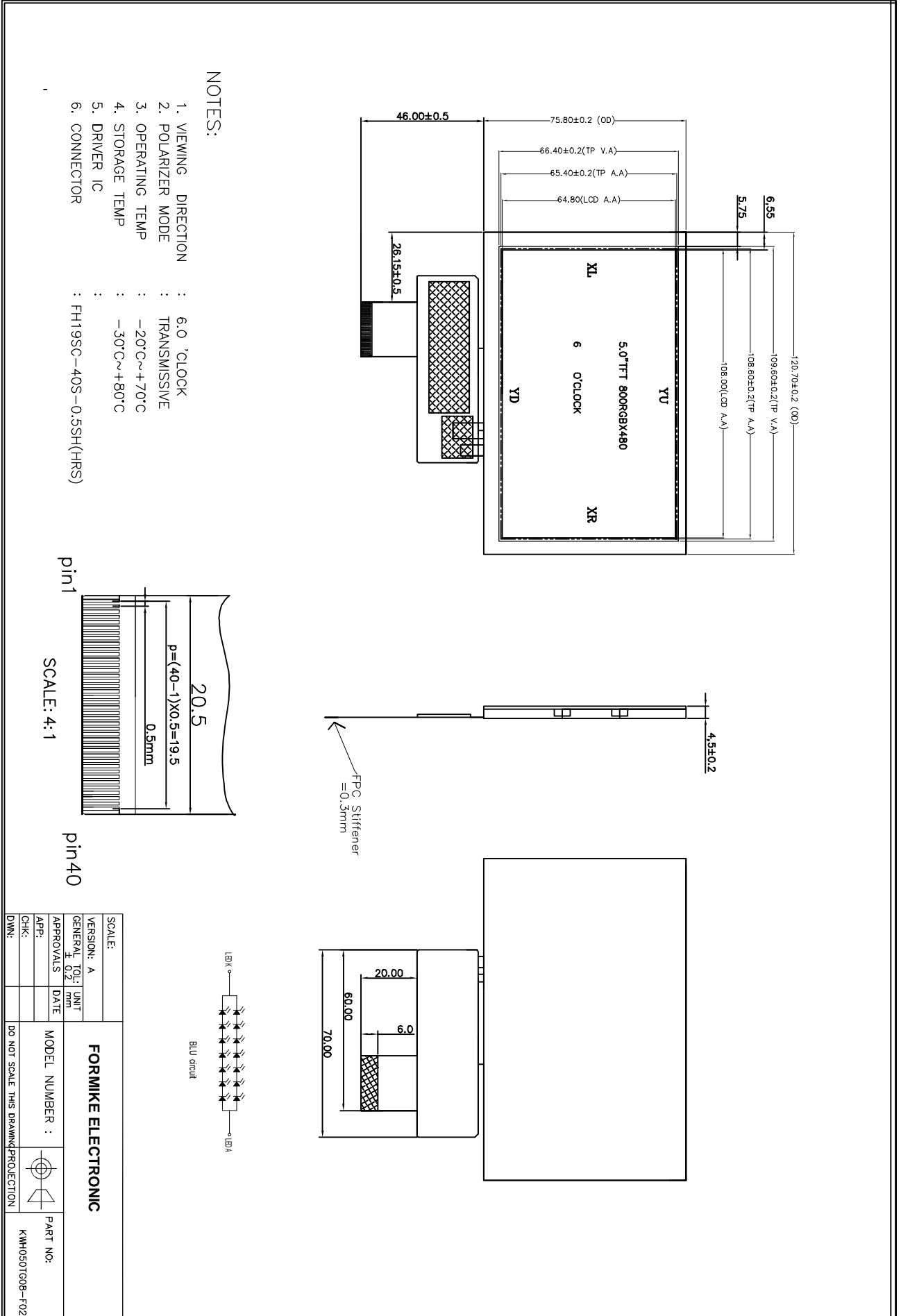
Medical equipments, mini notebook, GPS, MID.
Etc.

2.3 Features:

Feature	Description
Size	5.0 inch
Display Mode	Normally White, Transmissive
Surface Treatment	Anti-glare (3H)
Resolution	800 (RGB) x 480
Display Format	R.G.B. Stripe type
Pixel Pitch (mm)	0.135 x 0.135
Interface	R.G.B. 24 bit parallel data
Viewing Direction	6 o'clock
Outline Dimension (W x H x D) (mm)	120.7 x 75.80x 4.5 mm
Active Area(H x V mm)	108.0 X 64.80
With/Without TSP	With TSP
LED Numbers	14 LEDs
Weight (g)	TBD



3. Mechanical Drawing





4. Input/Output Terminals

4.1 CN1 pin assignment (Signal interface)

No	Symbol	I/O	Description	Comment
1	VLED-	P	Back light cathode	
2	VLED+	P	Back light anode	
3	GND	P	Ground	
4	VDD	P	Power supply	
5	R0	I	Data input	
6	R1	I	Data input	
7	R2	I	Data input	
8	R3	I	Data input	
9	R4	I	Data input	
10	R5	I	Data input	
11	R6	I	Data input	
12	R7	I	Data input	
13	G0	I	Data input	
14	G1	I	Data input	
15	G2	I	Data input	
16	G3	I	Data input	
17	G4	I	Data input	
18	G5	I	Data input	
19	G6	I	Data input	
20	G7	I	Data input	
21	B0	I	Data input	
22	B1	I	Data input	
23	B2	I	Data input	
24	B3	I	Data input	
25	B4	I	Data input	
26	B5	I	Data input	
27	B6	I	Data input	
28	B7	I	Data input	
29	GND	P	Ground	
30	CLKIN	I	Clock for input data. Data latched at rising edge of this signal.	
31	STBYB	I	Standby mode. STBYB="1": Normally operation. STBYB="0": Standby mode .Timing controller, source driver will turn off, all output are High-Z.	
32	HSD	I	Horizontal sync input.	
33	VSD	I	Vertical sync input	
34	DEN	I	Data input enable. Active high to enable the data input bus under "DE Mode ".	
35	NC	-	No connection	
36	GND	P	Ground	
37	XR	-	XR	
38	YD	-	YD	
39	XL	-	XL	
40	YU	-	YU	

Note1: I/O definition:

I---Input O---Output P---Power/Ground



5 Absolute Maximum Ratings

5.1 Driving TFT LCD Panel

GND=0V, Ta=25°C

Item	Symbol	Min	Max	Unit	Remark
Supply Voltage	VDD	-0.5	5.0	V	
Back Light Forward Current	I_{LED}		25	mA	For each LED
Operating Temperature	T_{OPR}	-20	70	°C	
Storage Temperature	T_{STG}	-30	80	°C	

Note1: The parameter is for driver IC (gate driver, source driver) only.

Note2: Signals include R0~R7, G0~G7, B0~B7, CLKIN, STBYB, HSD, VSD, DEN.

Table 3.1 absolute maximum rating

6 Electrical Characteristics

6.1 Driving TFT LCD Panel

GND=0V, Ta=25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
Supply Voltage	VDD	3.0	3.3	3.6	V	
Input Signal Voltage	Low Level	V_{IL}	0	-	0.3xVDD	V
	High Level	V_{IH}	0.7xVDD	-	VDD	V
Output Signal Voltage	Low Level	V_{OL}	-	-	GND+0.4	V
	High Level	V_{OH}	VDD-0.4	-	-	V
(Panel+LSI) Power Consumption	Black Mode (60Hz)		TBD		mW	
	Standby Mode		TBD		mW	

Note1: For different LCM, the value may have a bit of difference.

Note2: To test the current dissipation, use "all Black Pattern".

Table 4.1 LCD module electrical characteristics

6.2 Driving Backlight

Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	I_F	-	20	25	mA	Note 1
Forward Current Voltage	V_F	-	23.1	-	V	
Backlight Power Consumption	W_{BL}	-	924	-	mW	
Life Time	-	10,000	20,000		Hrs	Note 3

Note 1: I_F is defined for one channel LED. There are total three LED channels in back light unit

Note 2: Optical performance should be evaluated at Ta=25°C only.

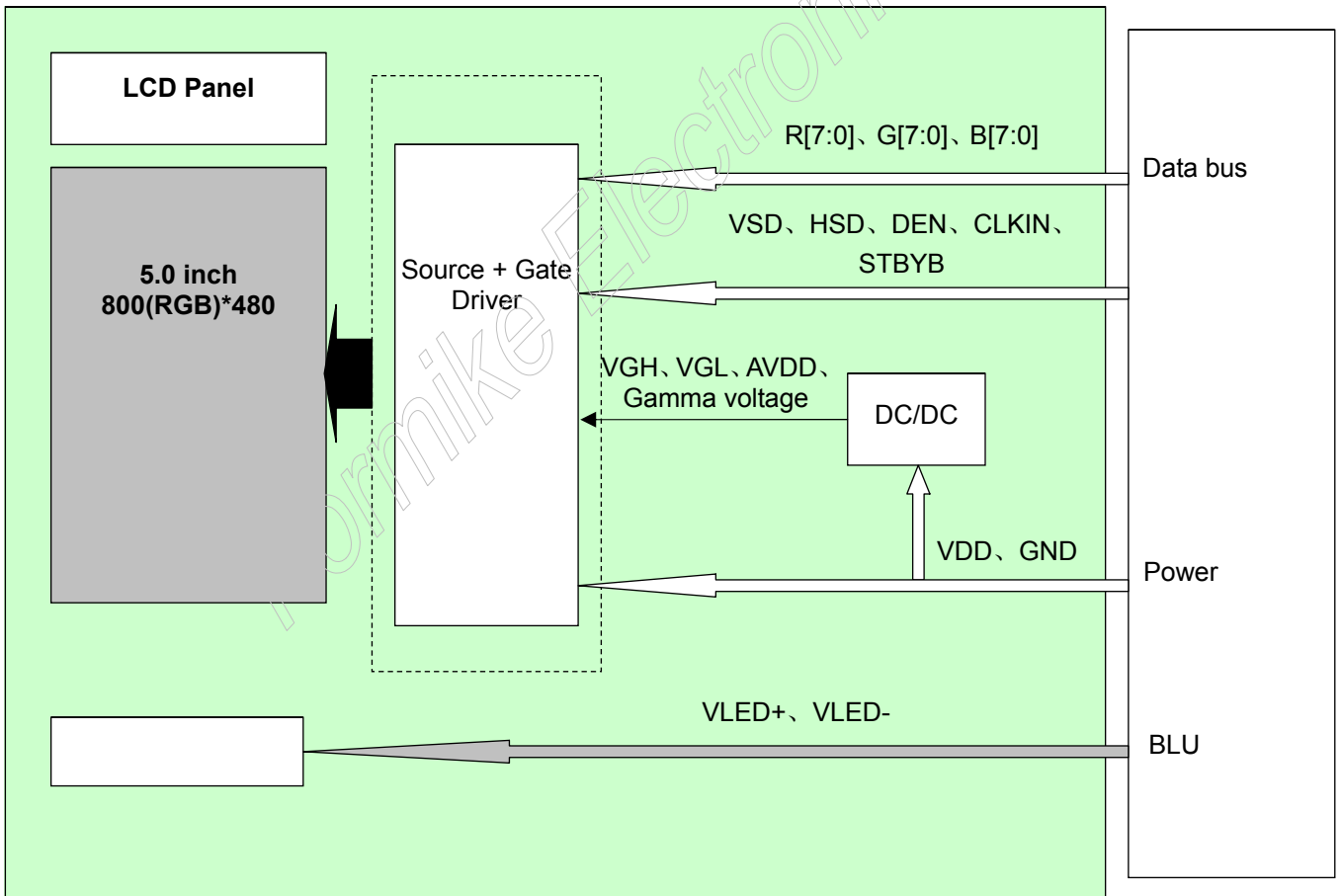
Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

Table 4.2 LED backlight characteristics



Figure 4.2 LED connection of backlight

6.3 Block Diagram





7. Data input timing

7.1 Input Clock and Data Timing Diagram

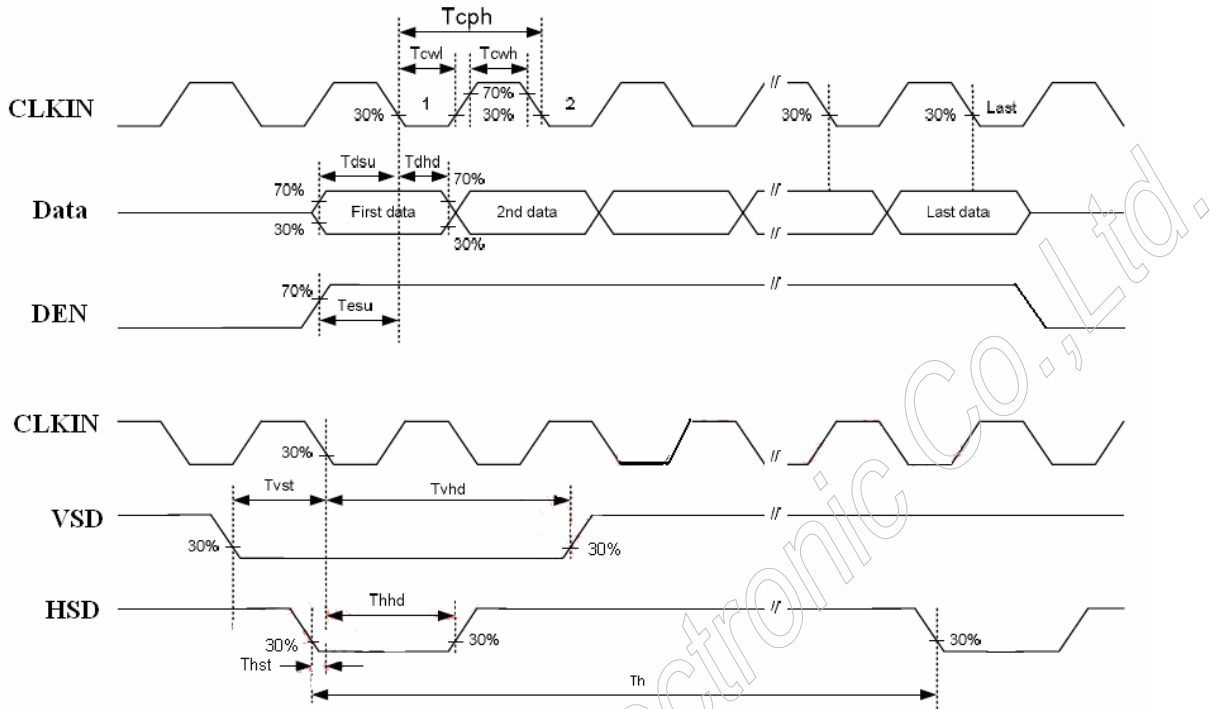


Table 5.1 Input Clock and Data Timing Diagram

7.2 Timing Parameters

Normal Write Mode

VDD=3.3V Ta=25°C

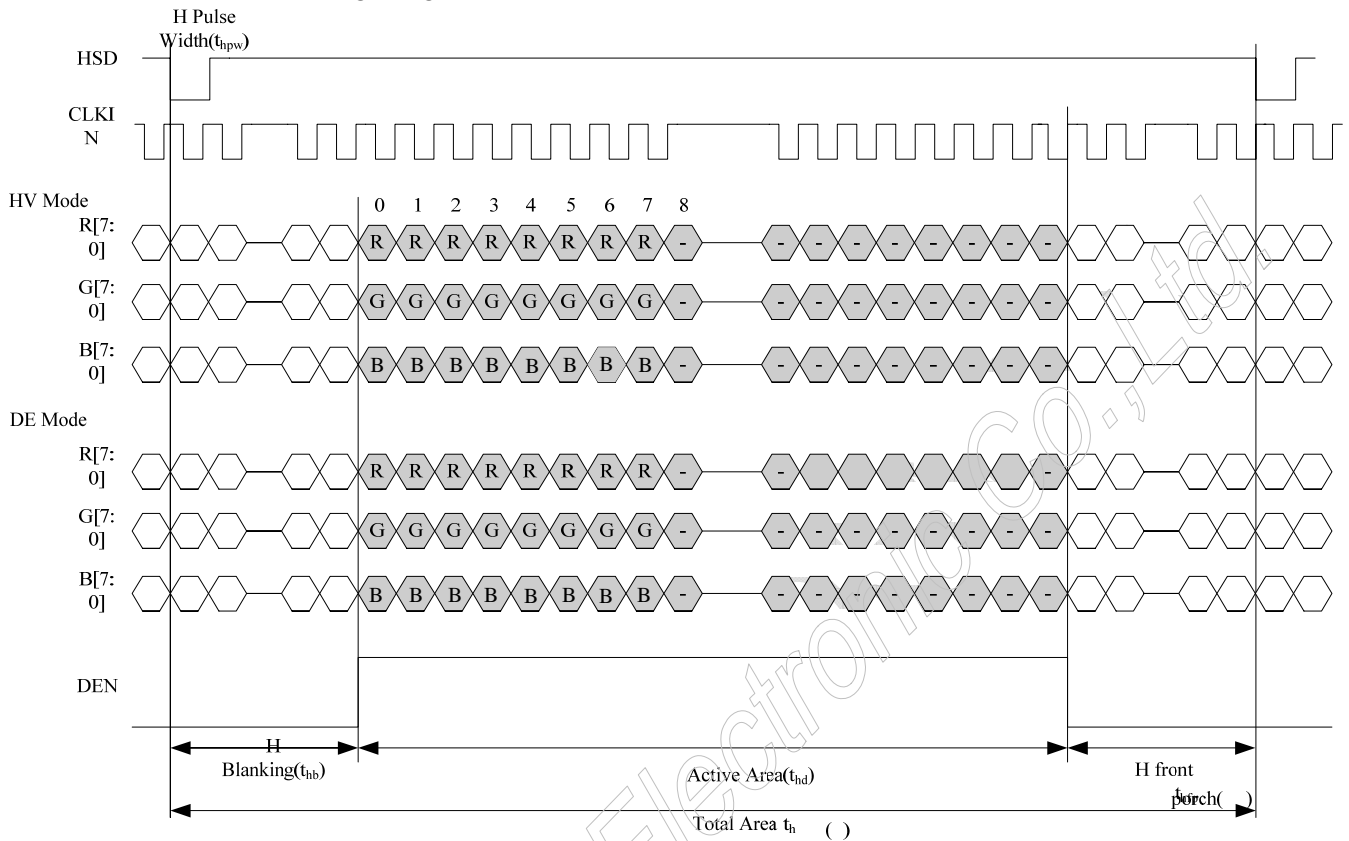
Parameter	Symbol	Min	Typ	Max	Unit	Remark
HSD Setup Time	T	8			ns	
HSD Hold Time	T	8	-	-	ns	
VSD Setup Time	T	8			ns	
VSD Hold Time	T_{vhhd}	8	-	-	ns	
Data Setup Time	T_{dsu}	8			ns	
Data Hold Time	T_{dhd}	8	-	-	ns	
DE Setup Time	T_{esu}	8			ns	
DE Hold Time	T_{ehd}	8	-	-	ns	
CLKIN Cycle Time	T_{cph}	20	-	-	ns	
CLKIN Pulse Width	T_{cwh}	40	50	60	%	
Output stable time	T_{sst}	-	-	6	us	
VDD Power ON Slew rate	T_{por}			20	ms	
RSTB pulse width	T_{Rst}	10	-	-	us	

Table 7.2 Timing Parameters



7.3 Data Input format

7.3.1: Horizontal Input Timing Diagram



7.3.2: Vertical Input Timing Diagram

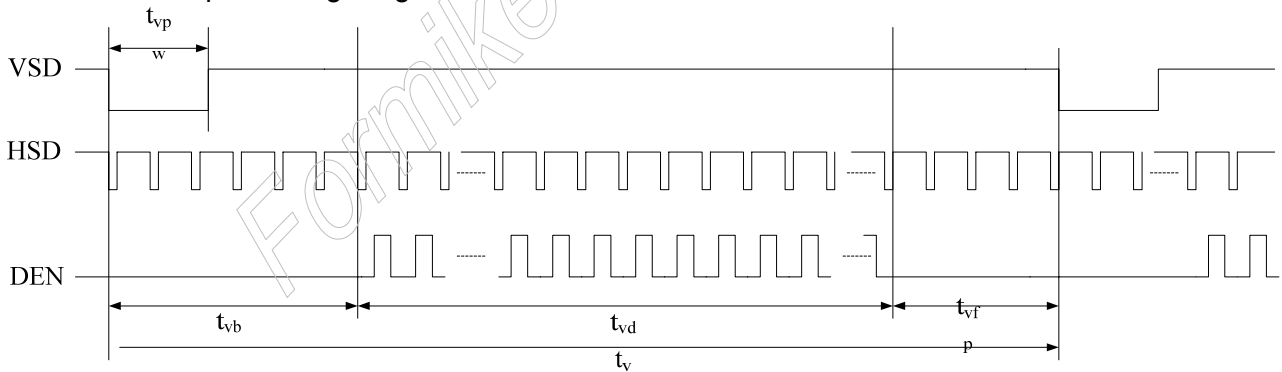


Figure 5.3.2 Vertical Input Timing Diagram

7.3.3 Parameter Setting Of Timing

Parameter	Symbol	Spec			Unit
		Min	Typ	Max	
Horizontal display area	t_{hd}		800		CLKIN
CLKIN frequency (60Hz)	f_{clk}	-	30	50	MHZ
One Horizontal Line	t_h	889	928	1143	CLKIN
HSD pulse width	t_{hpw}	1	48	255	CLKIN



HSD blanking	t_{hb}	88			CLKIN
HSD front porch	t_{hfp}	1	40	255	CLKIN
Vertical display area	t_{vd}	480			T_H
VSD period time	t_v	513	525	767	T_H
VSD pulse width	t_{vpw}	3	3	255	T_H
VSD Blanking(t_{vb})	t_{vb}	32			T_H
VSD Front porch (t_{vfp})	t_{vfp}	1	13	255	T_H

Table 7.3 Parameter Setting Of Timing

Formike Electronic Co., Ltd.



7.5 Power ON/OFF Sequence

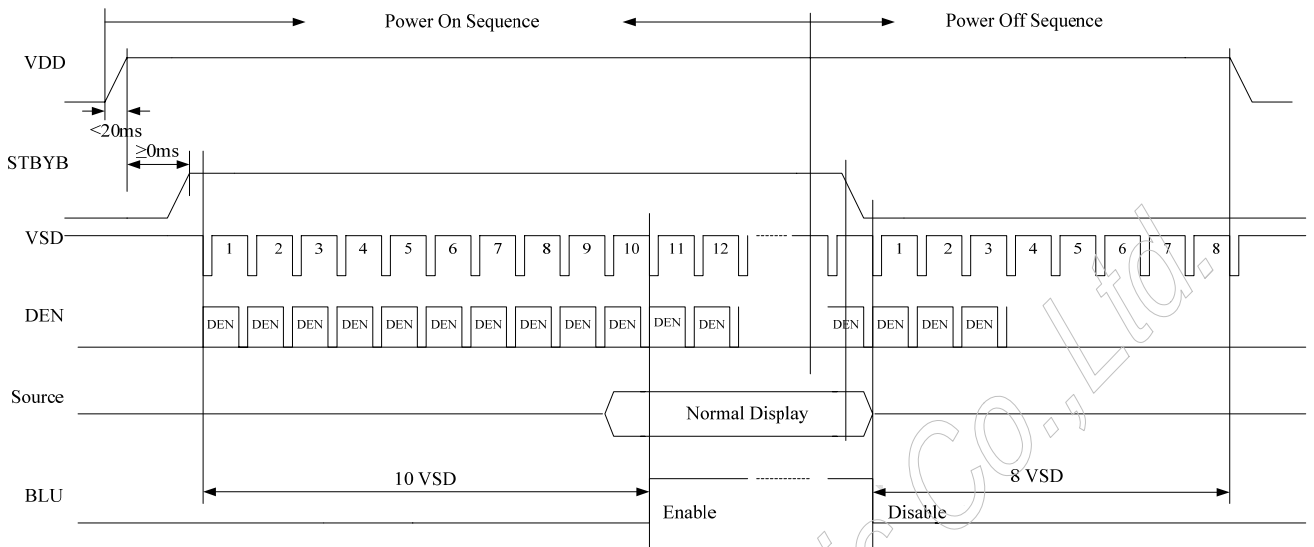


Table 7.5.1 Power on/off sequence

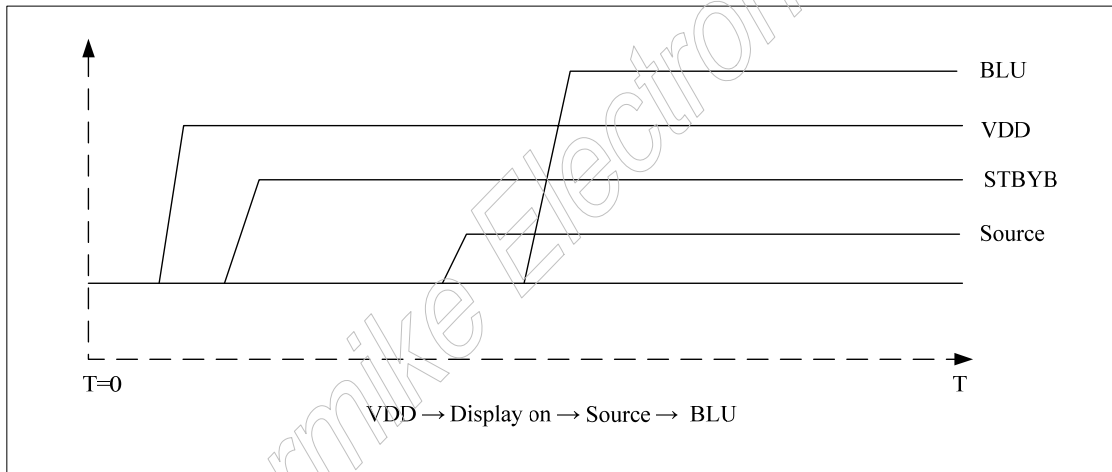


Table 7.5.2 Power on sequence

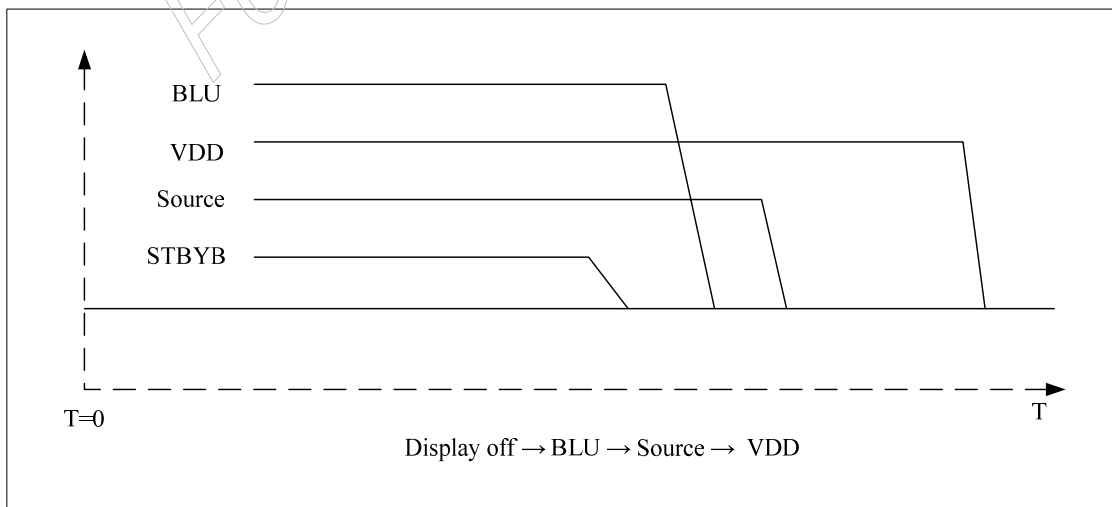


Table 7.5.3 Power off sequence



8. Optical Characteristics

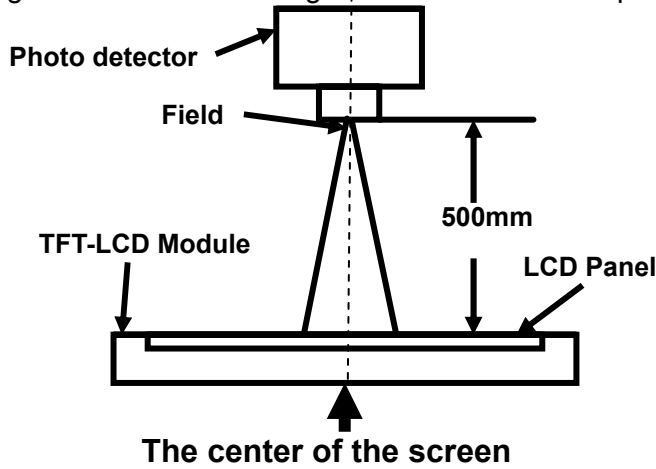
Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	$CR \geq 10$	40	50	--	Degree	Note 2
	θB		60	70	--		
	θL		60	70	--		
	θR		60	70	--		
Contrast Ratio	CR	$\theta=0^\circ$	500	600	--		Note1、Note3
Response Time	T_{ON}	25°C	--	20	30	ms	Note1
	T_{OFF}						Note4
Chromaticity	White	Backlight is on	x	0.260	0.310	0.360	Note5 Note1
			y	0.280	0.330	0.380	
	Red		x	0.540	0.590	0.640	
			y	0.300	0.350	0.400	
	Green		x	0.298	0.348	0.398	
			y	0.520	0.570	0.620	
	Blue		x	0.095	0.145	0.195	
			y	0.06	0.110	0.160	
Uniformity	U		75	80	--	%	Note1、Note6
NTSC			--	50	--	%	Note 5
Luminance	L		200	250	--	cd/m ²	Note1、Note7

Test Conditions:

1. $I_F=20mA$ (one channel), $V_F=23.1V$, the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

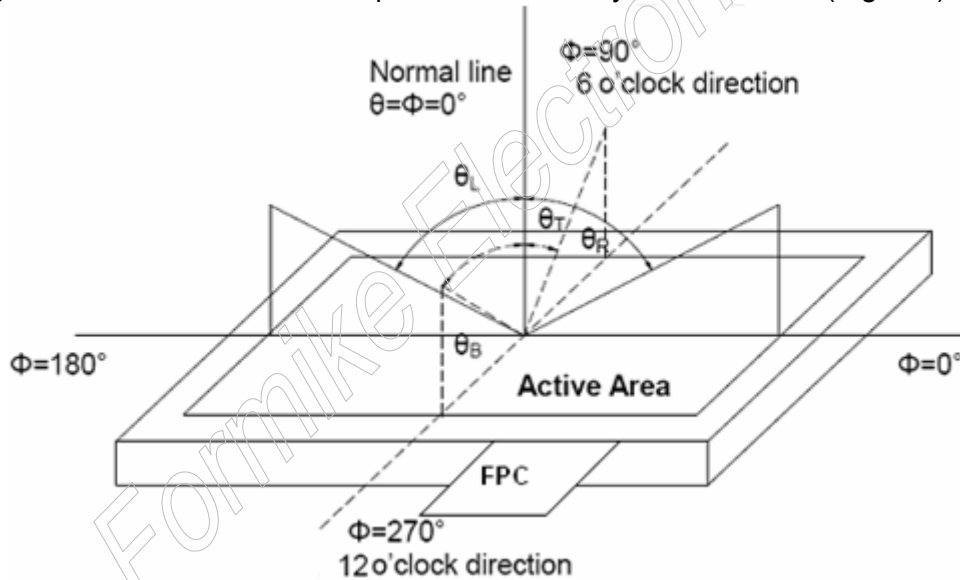
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



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



Note 3: Definition of contrast ratio

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

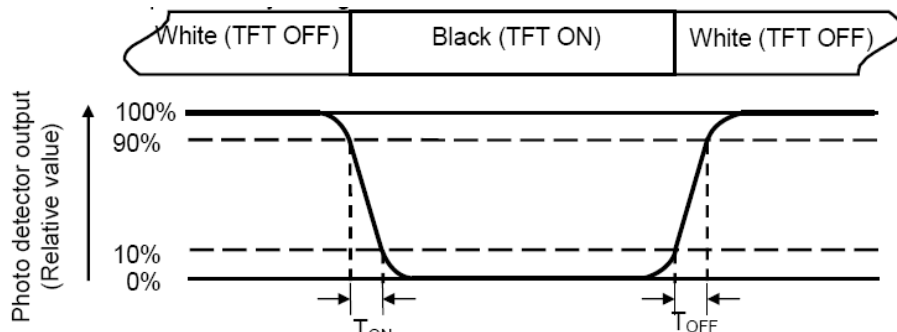
“White state “: The state is that the LCD should drive by V_{white} .

“Black state”: The state is that the LCD should drive by V_{black} .

V_{white} : To be determined V_{black} : To be determined.

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 (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%.



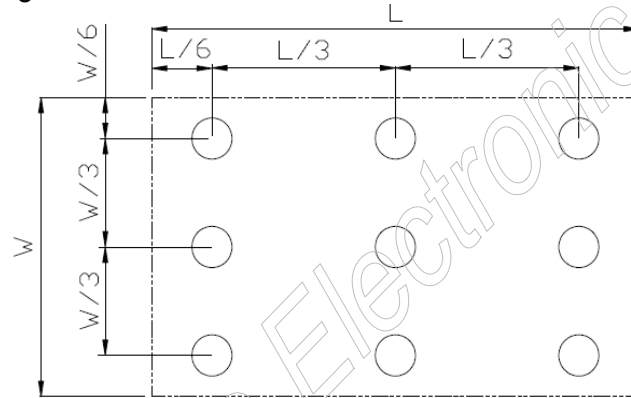
Note 5: Definition of color chromaticity (CIE1931)
 Color coordinates measured at center point of LCD.

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.

$$\text{Luminance Uniformity (U)} = \text{Lmin} / \text{Lmax}$$

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



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.

**9. Environmental / Reliability Test**

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70°C, 240 hours	
2	Low Temperature Operation	Ta = -20°C, 240 hours	
3	High Temperature Storage	Ta = +80°C, 240 hours	
4	Low Temperature Storage	Ta = -30°C, 240 hours	
5	Storage at High Temperature and Humidity	Ta = +60°C, 90% RH max,240hours	
6	Thermal Shock (non-operation)	-20°C 30 min~+60°C 30 min, Change time:5min, 100 Cycle	
7	ESD	C=150pF,R=330Ω,5point/panel Air:±8Kv,5times; Contact:±4Kv,5times (Environment:15°C~35°C, 30%~60%.86Kpa~106Kpa)	
8	Vibration Test	Frequency range:10~55Hz,Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z.(package condition)	
9	Mechanical Shock (Non Op)	60G 6ms, ± X,± Y,± Z 3times for each direction	
10	Package Drop Test	Height:60cm, 1corner,3edges,6surfaces	

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of samples.



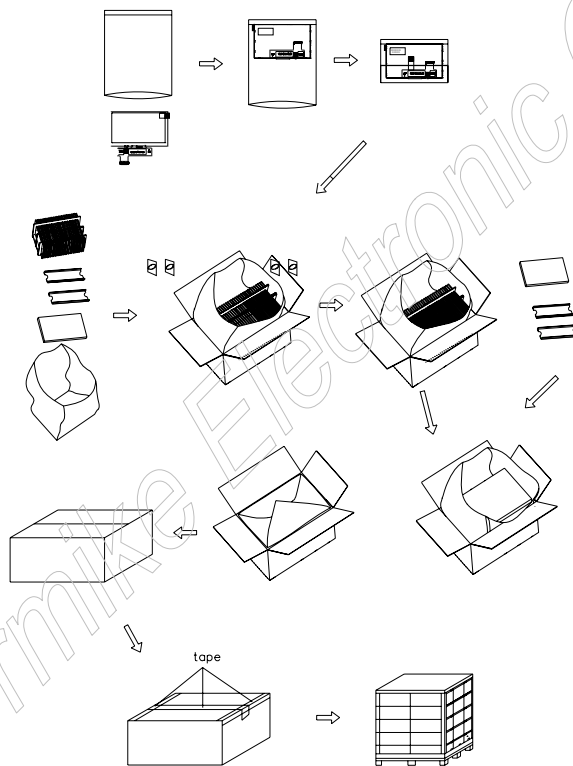
10. Packing information

10.1 Carton Size: 530x350x250mm

Total Gross Weight: 15KG+/-5%

Total Qunatity: 112pcs (4 Rows x 28pcs)

10.2 Packing Instruction





11.PRECAUTIONS FOR USE

11.1.Safety

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

11.2.Storage Conditions

- (1) Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $50\pm 20\%\text{RH}$.
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.
- (6) Do not exposed to direct sun light of fluorescent lamps.

11.3.Installing LCD Module

Attend to the following items when installing the LCD Module.

- (1) Cover the surface with a transparent protective plate or touch panel to protect the polarizer and LC cell.
- (2) When assembling the LCD Module into other equipment, the spacer to the bit between the LCD Module and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be $\pm 0.1\text{mm}$.

11.4.Precautions For Operation

- (1) Viewing angle varies with the change of liquid crystal driving voltage (V_0). Adjust V_0 to show the best contrast.
- (2) Driving the LCD in the voltage above the limit will shorten its lifetime.
- (3) Response time is greatly delayed at temperature below the operating



temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.

- (4) When turning the power on, input each signal after the positive/negative voltage becomes stable.
- (5) Do not apply water or any liquid on product which composed of T/P.

11.5.Handling Precautions

- (1) Avoid static electricity which can damage the CMOS LSI; please wear the wrist strap when handling.
- (2) The polarizing plate of the display is very fragile. so, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface; it may cause display abnormal .
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) Do not apply water or any liquid on product, which composed of T/P.

11.6.Warranty

- (1) The period is within 12 months since the date of shipping out under normal using and storage conditions.
- (2) The warranty will be avoided in case of defect induced by customer.