



MODEL NO. : TM050RDH05-00

ISSUED DATE: 20010-10-9

VERSION : Ver. 1.0

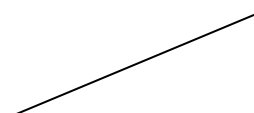
☒ Preliminary Specification

☐ Final Product Specification

Customer : _____

Approved by	Notes

SHANGHAI AVIC Confirmed :

Prepared by	Checked by	Approved by
Rong Qin 2010.10.14		Hyman Chen 2010.10.14

This technical specification is subjected to change without notice



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Record of Revision

[illegible]



1 General Specifications

Feature		Spec
Display Spec.	Size	5 inch
	Resolution	800(RGB) x 480
	Interface	RGB 24 bits with TCON
	Color Depth	16.7M
	Technology Type	a-Si
	Pixel Pitch (mm)	0.360×0.360
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	TM with Normally White
	Surface Treatment(Up Polarizer)	Anti Glare (3H)
	Viewing Direction	6 o'clock
	Gray Scale Inversion Direction	12 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	118.5x 77.55x 3.4
	Active Area(mm)	108.00 (W) x 64.80 (H)
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	14 LEDs

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%



2 Input/Output Terminals

2.1 CN1 of FPC

Pin No.	Symbol	I/O	Description	Remarks
1	V _{LED-}	P	Back light cathode	
2	V _{LED+}	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 falling 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	--	NC	
38	YD	--	NC	
39	XL	--	NC	
40	YU	--	NC	

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Note: I/O definition.

I---Input pin, O---Output pin, P--- Power/Ground, N--- No Connection

3 Absolute Maximum Ratings

AGND= GND=0V, Ta = 25°C

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VCC	-0.5	5.0	V	
Backlight Forward Current	I _{LED}	-	25	mA	For each LED
Operating Temperature	T _{OPR}	-20	70	°C	
Storage Temperature	T _{STG}	-30	80	°C	



4 Electrical Characteristics

4.1 Recommended Operating Condition

AGND=GND=0V, Ta = 25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
Digital Supply Voltage	VCC	3.0	3.3	3.6	V	
Analog Supply Voltage	AVDD	12.46	12.61	12.76	V	
Gate On Voltage	VGH	21	22	23	V	
Gate Off Voltage	VGL	-7.5	-7.0	-6.5	V	
Common Electrode Driving Signal	VCOM	3.5	3.7	4.5	V	

Note: The value is for design stage only.



4.2 Recommended Driving Condition for Backlight

The backlight system is an edge-lighting type with 14 LED.

The characteristics of the LED are shown in the following tables.

Ta=25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	I_F	-	20	-	mA	NOTE 1
Forward Voltage	V_F	-	21.7	-	V	
Backlight Power Consumption	W_{BL}	-	868	-	mW	
Operating Life Time	-	20,000	-	-	Hrs	NOTE 2

Note1: I_F is defined for one channel LED. There are total two LED channels in back light unit.

Note2: 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.

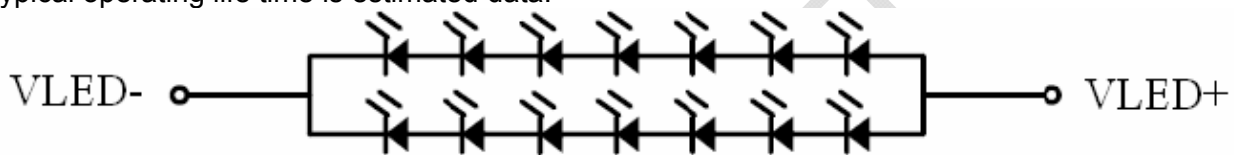
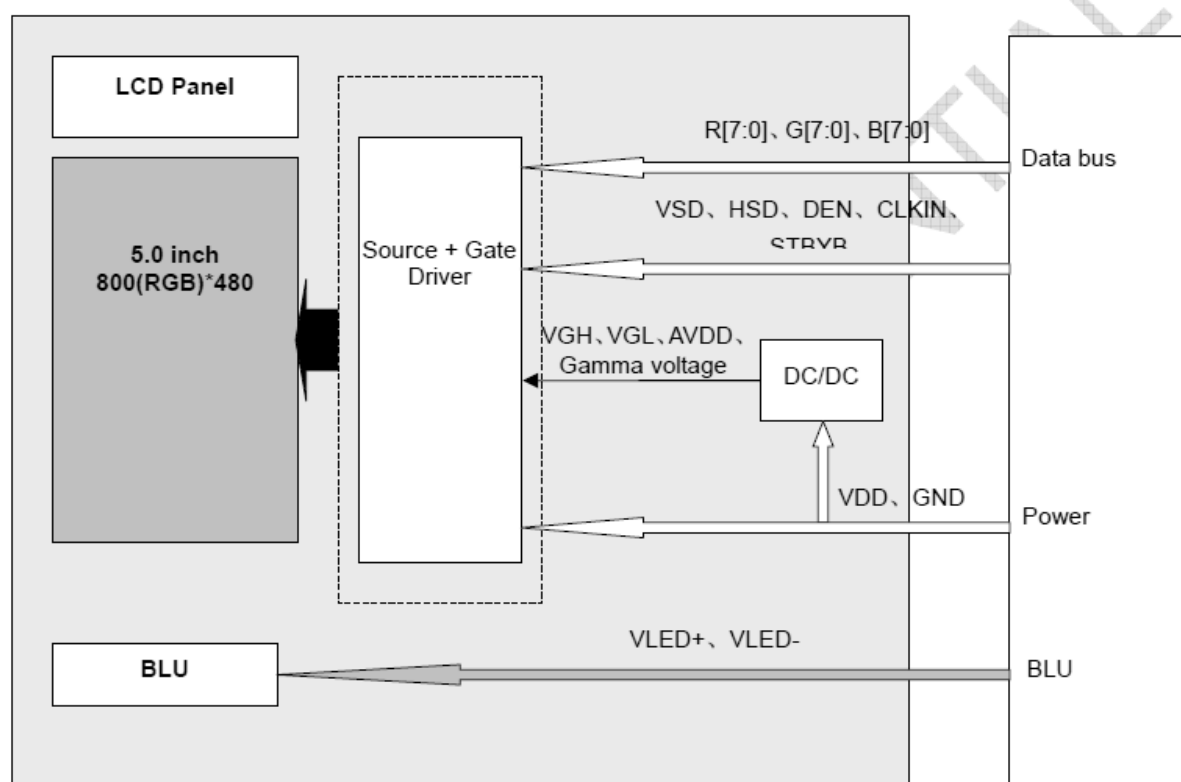


Figure 4.2 LED connection of backlight

**4.3 Power Consumption**

AGND=GND=0V, Ta = 25°C

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Digital Supply Current	I_{VCC}	VCC=3.3V	-	TBD	-	mA	
Analog Supply Current	I_{AVDD}	AVDD=12.61V	-	TBD	-	mA	
Gate On Current	I_{VGH}	VGH=22V	-	TBD	-	mA	
Gate Off Current	I_{VGL}	VGL=-7.0V	-	TBD	-	mA	
Power Consumption	Panel&Gamma		-	TBD	-	mW	
	Backlight		-	TBD	-	W	
	Total		-	TBD	-	W	

4.4 Block Diagram



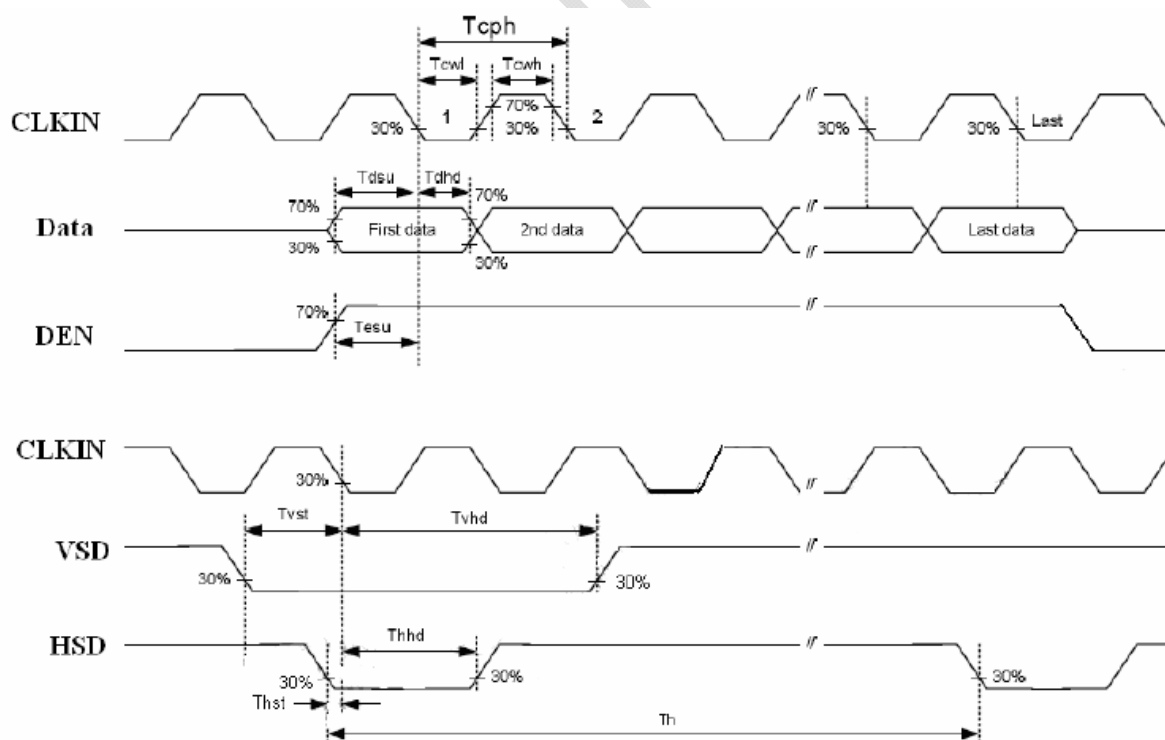
5 Timing Chart

5.1 TFT-LCD Input Timing

VCC=3.3V, AVDD=12.61V, AGND=GND=0V, Ta=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
DCLK Frequency	Fclk	-	30.0	50.0	MHz	
DCLK Cycle Time	Tcph	20	33.3	-	ns	
DCLK Pulse Width	Tcw	40%	50%	60%	Tcph	
VSD Setup Time	Tvst	8	-	-	ns	
VSD Hold Time	Tvhd	8	-	-	ns	
HSD Setup Time	Thst	8	-	-	ns	
HSD Hold Time	Thhd	8	-	-	ns	
Data Setup Time	Tdsu	8	-	-	ns	Data to DCLK
Data Hold Time	Tdhd	8	-	-	ns	Data to DCLK
DE Setup Time	Tesu	8	-	-	ns	
DE Hold Time	Tehd	8	-	-	ns	

Input Clock and Data timing Diagram:





5.2 Recommended Timing Setting Of TCON

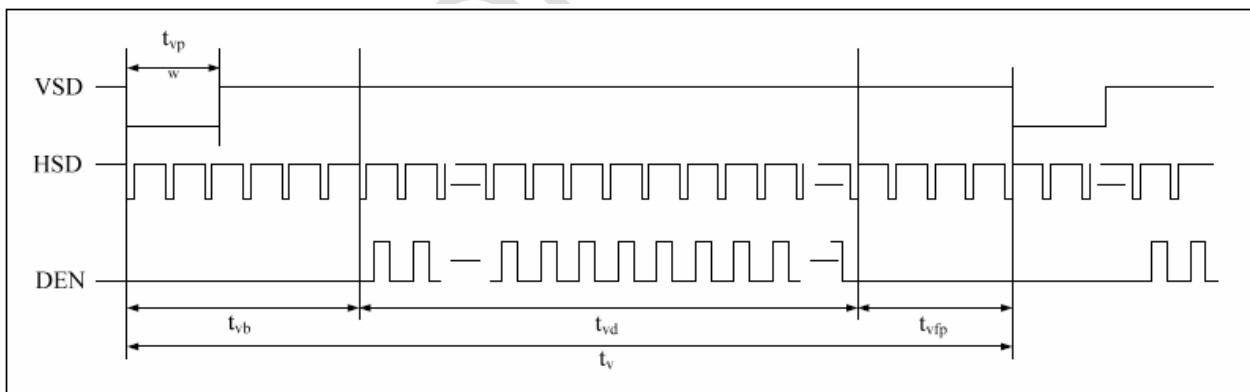
TCON (Embedded In Source IC) Input Timing (DCLK, HSD, VSD, DE)

VCC=3.3V, AVDD=12.61V, AGND=GND=0V, Ta=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	Fclk	-	30	50	MHZ	
	tclk	-	33.3	-	ns	
HSD	th	889	928	1143	tclk	
	thd	-	800	-	tclk	
	thpw	1	48	255	tclk	
	thb	-	88	-	tclk	
	thfp	1	40	255	tclk	
VSD	tv	513	525	767	th	
	tvd	-	480	-	th	
	tvpw	3	3	255	th	
	tvb	-	32	-	th	
	tvfp	1	13	255	th	

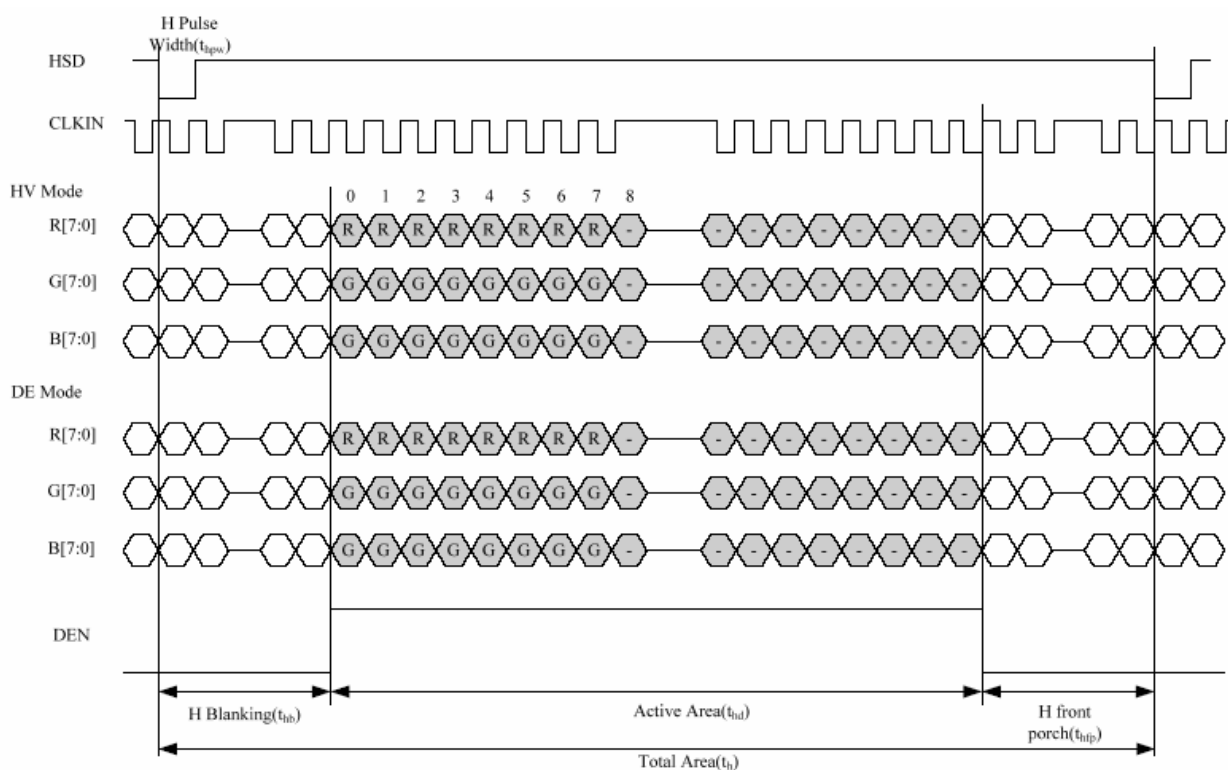
Note: DE timing refer to HSD, VSD input timing.

Vertical input timing Diagram:





Horizontal input timing Diagram:



5.3 POWER ON/OFF SEQUENCE

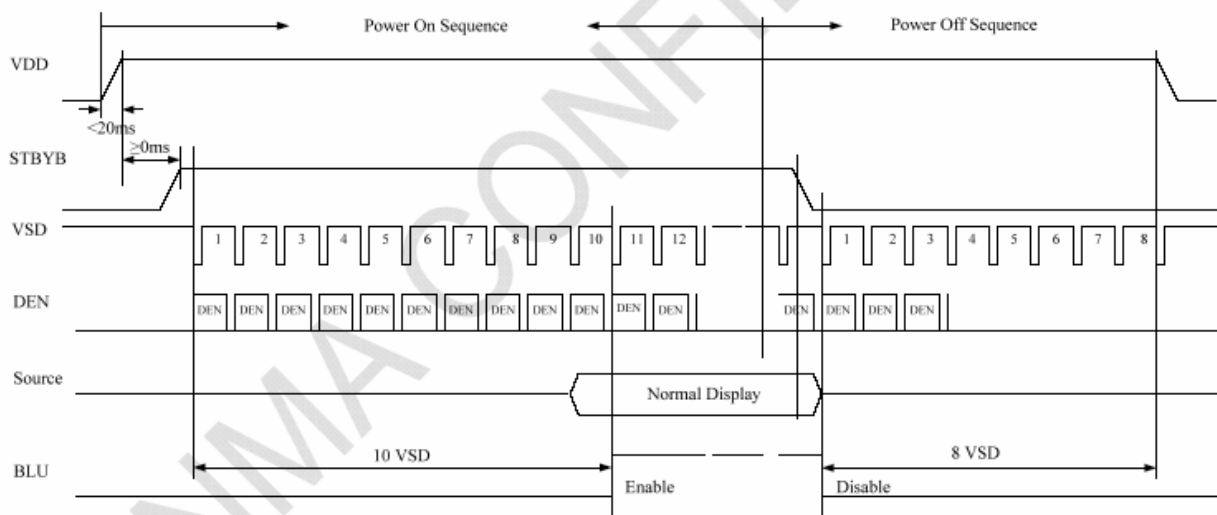


Figure 5.3 Power On/Off Sequence

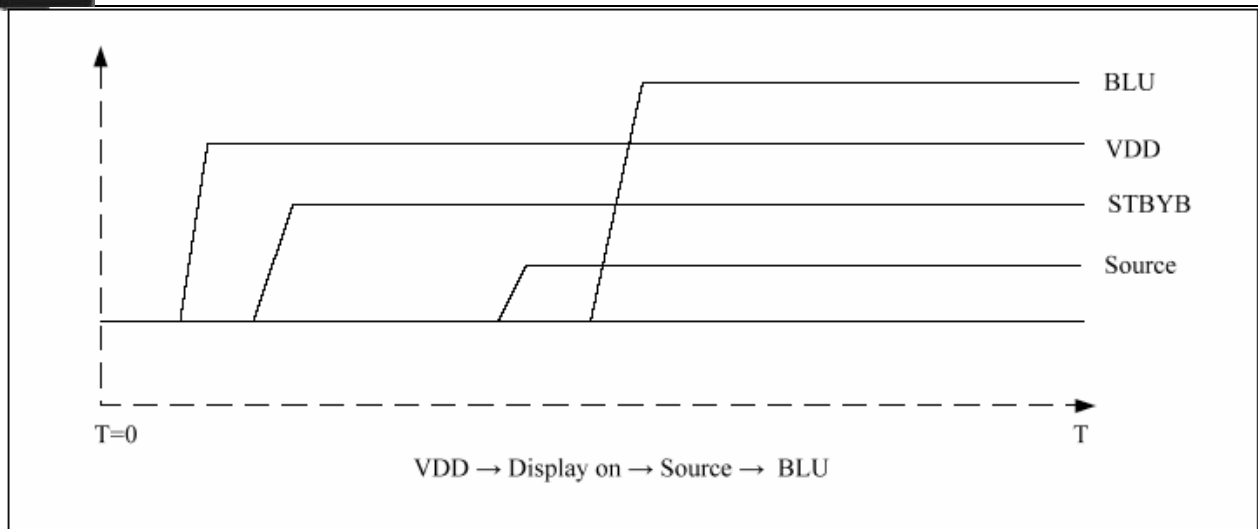


Figure 5.3 Power On Sequence

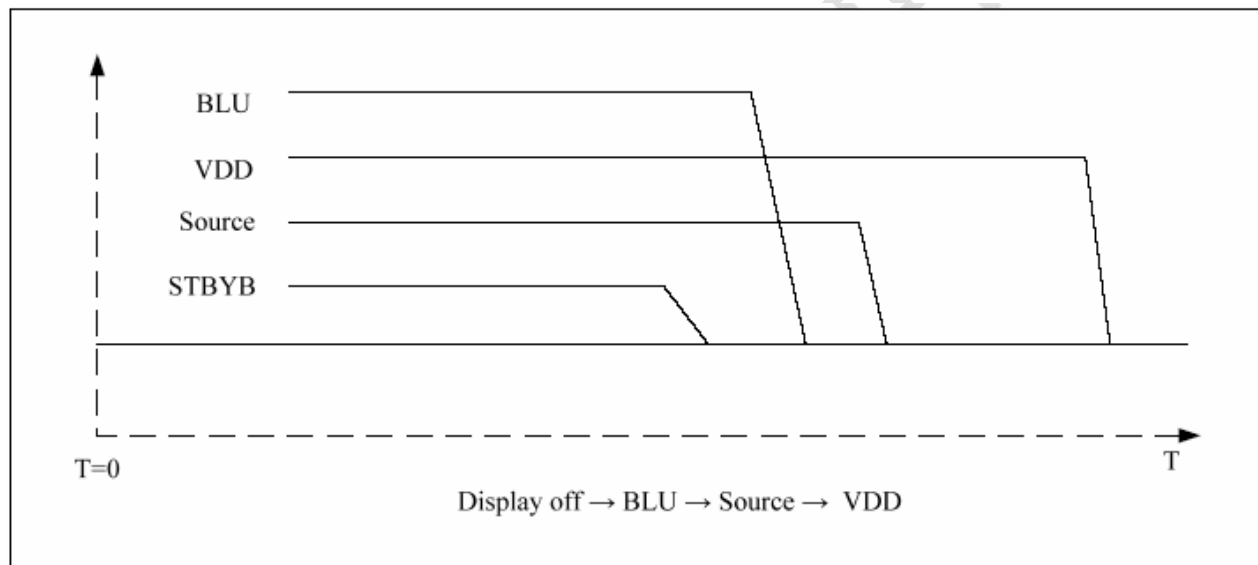


Figure 5.3 Power Off Sequence



6 Optical Characteristics

Ta=25°C

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≥10	40	50	-	Degree	Note 2
		θB		60	70	-		
		θL		60	70	-		
		θR		60	70	-		
Contrast Ratio		CR	θ=0°	500	600	-		Note1 Note3
Response Time		T _{ON}	25℃	-	20	30	ms	Note1
		T _{OFF}						Note4
Chromaticity	White	x	Backlight is on	0.260	0.310	0.360		Note1 Note5
		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		0.060	0.110	0.160		
Uniformity		U		75	80	-	%	Note1 Note6
NTSC				-	50	-	%	Note 5
Luminance		L		200	250	-	cd/m ²	Note1 Note7

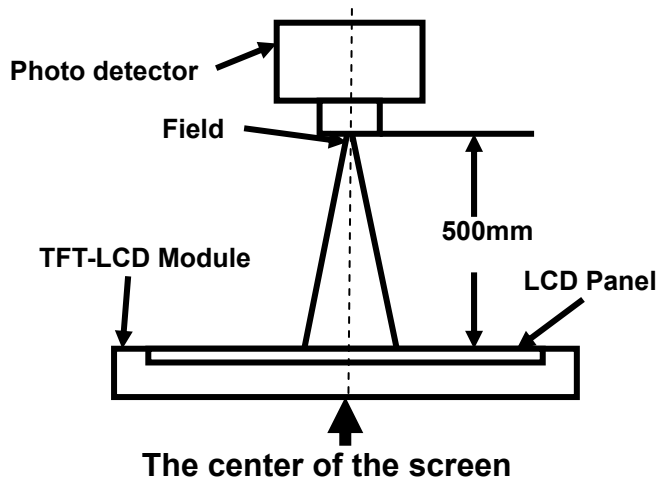
Test Conditions:

1. $I_F = 20 \text{ mA}$, $V_F = 23.1 \text{ V}$ and the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.



Note 1: Definition of optical measurement system.

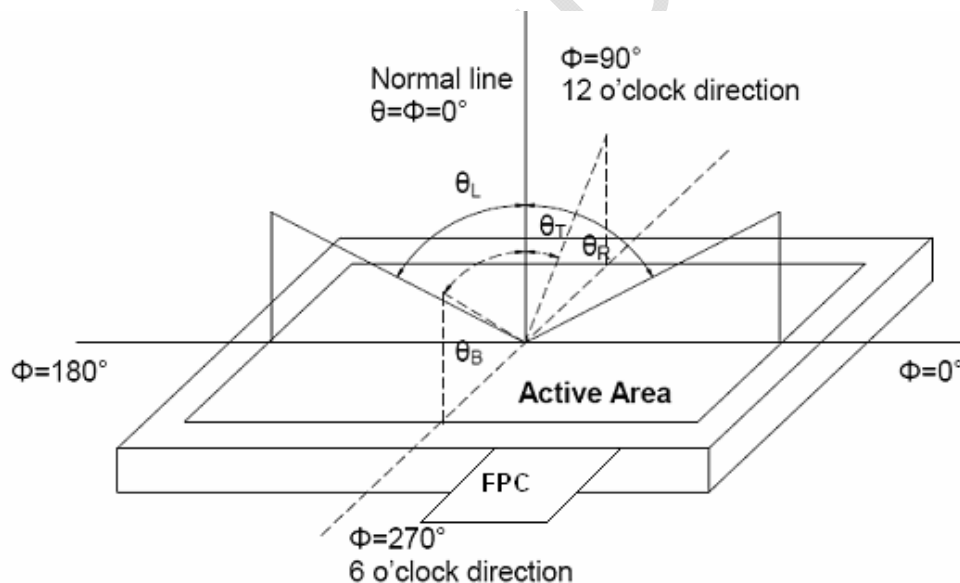
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	BM-5A	1°
Luminance		
Lum Uniformity		
Chromaticity	SR-3A	-
Response Time	TRD100	

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.

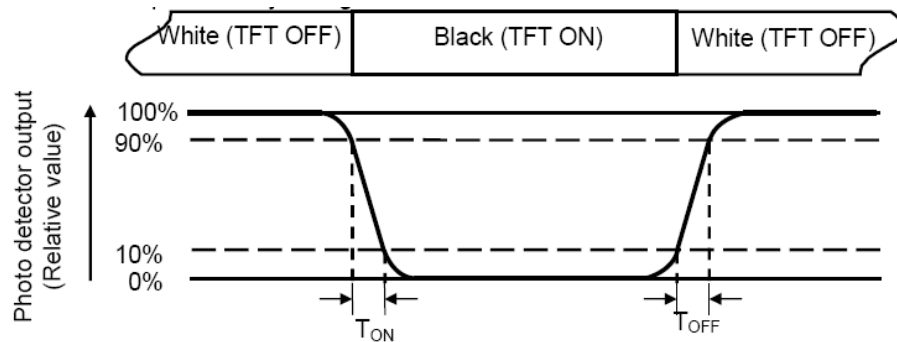
Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and

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"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)

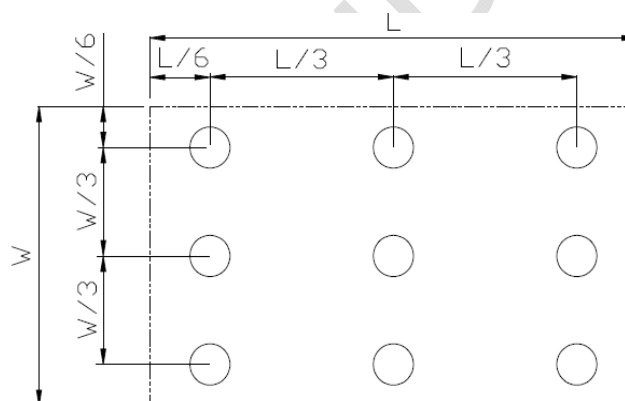
Color coordinates measured at center point of LCD.

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.

$$\text{Luminance Uniformity (U)} = L_{\min} / L_{\max}$$

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



L_{\max} : The measured Maximum luminance of all measurement position.

L_{\min} : The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.



7 Environmental / Reliability Test

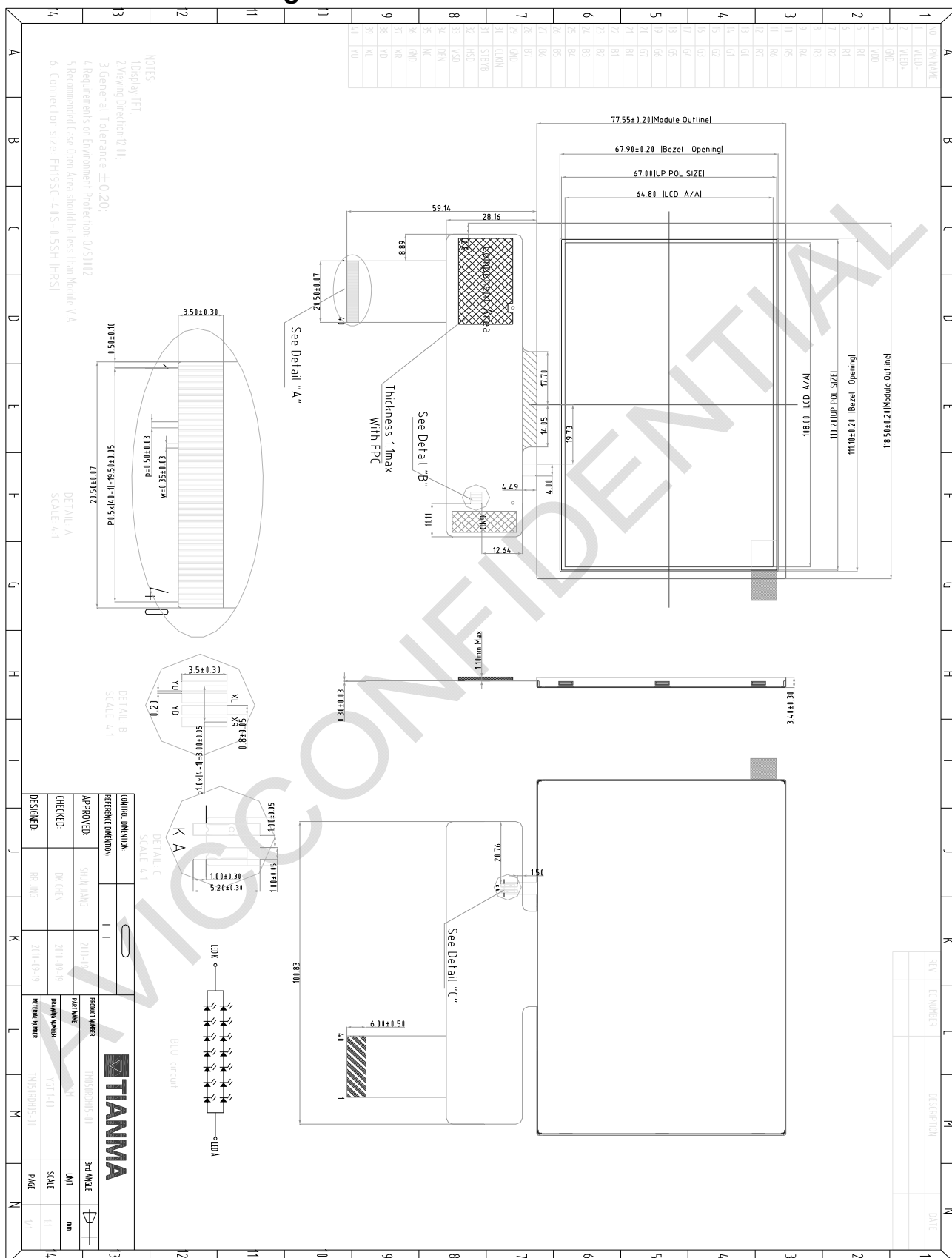
No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max, 240 hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time: 5min, 20 Cycle	Start with cold temperature, End with high temperature, IEC60068-2-14:1984, G B2423.22-2002
7	ESD	C=150pF, R=330Ω, 5 point/panel Air: ±8Kv, 5 times; Contact: ±4Kv, 5 times (Environment: 15℃~35℃, 30%~60% .86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	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)	IEC60068-2-6:1982 GB/T2423.10—1995
9	Mechanical Shock (Non Op)	Half Sine Wave 60G 6ms, ±X, ±Y, ±Z 3 times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Drop Test	Height: 60cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

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

Note2: Ta is the ambient temperature of samples.



8 Mechanical Drawing



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9 Packing drawing

TBD

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10 Precautions for Use of LCD Modules

10.1 Handling Precautions

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

10.1.2 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.

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

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

10.1.5 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 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
- Ketone
- Aromatic solvents

10.1.6 Do not attempt to disassemble the LCD Module.

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

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

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

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

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

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

10.2 Storage precautions

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

10.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ~ 40℃ Relatively humidity: ≤80%

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

10.3 Transportation Precautions

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