Shenzhen Leadtek Electronics Co.,Ltd

PRODUCT SPECIFICATION

TFT-LCD MODULE

Module No：LTK070WVBLM13-V1

☑ Preliminary Specification

☐ Approval Specification

Designed by	Checked by	Approved by
		

Final Approval by Customer

Approved by	Comment

※The specification of “TBD” should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.

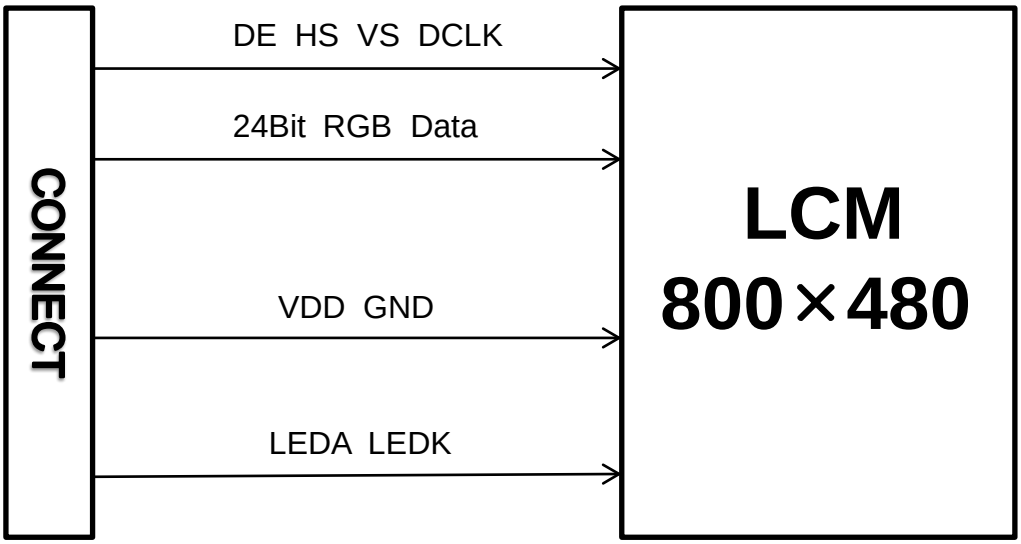
REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
V1	-	Preliminary Specification Release	2022-11-18	

Contents

1 GENERAL DESCRIPTION

1.1 Introduction

LTK070WVBLM13-V1_800480_IPS_H is a color active matrix TFT LCD module using amorphous silicon TFT‘s(Thin Film Transistors) as an active switching devices. It i s a transmissive type display operating in the normal black. The LCM has a 7 in ch diagonally measured active area with WV resolutions (800 horizontal by 480 ve rtical pixel arrays). Each pixel is divided into
RED,GREEN, BLUE dots which are arranged in vertical stripe and this panel can display 16.7M colors. This LCM is ad apted for a low reflection and higher Luminance type.



1.2 Features

☐ Wide viewing angle (U/D/L/R)：85/85/85/85
☐ 8 bit color depth, display 16.7M colors

1.3 Application

Vehicle-mounted Production

1.4 General Specification

Table 1-2 General Specifications

Parameter	Specification	Unit	Remarks
Dimensional outline	165.0(H) x 100.0(V) x5.56(D)	mm	
Active area	148.10 (H) × 88.86(V)	mm	
Number of pixels	800(H) ×RGB× 480(V)	pixels	
Pixel pitch	0. 06171(H) ×RGB×0.18513(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.7M	colors	
Color gamut	TYP：60%, Min：55%	%	
Display mode	Normally black		
Viewing Direction	typ 85/85/85/85		
IC	ST72658		

Notes :
1. Compatible ICs for this product include , ST72568;
2. The BOE reliability test is based on ST72568 IC;
3. Other ICs can only be used after the reliability test is passed.

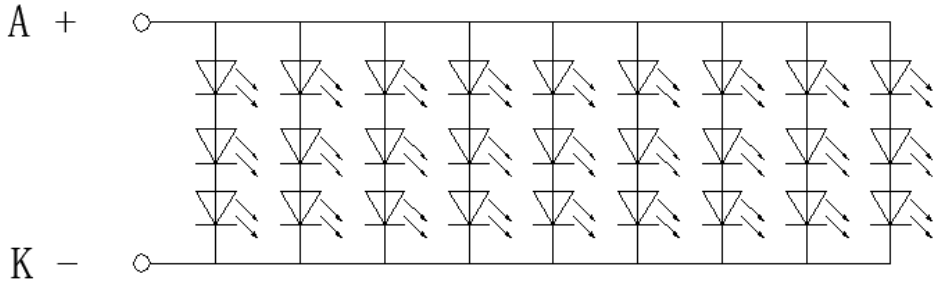
2 ELECTRICAL SPECIFICATIONS

2.1 Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Power Supply Voltage	VDD	-0.3 ~ +4.0	V
IO Supply Voltage	VDDI	-0.3 ~ +4.0	V
Charge Pump Supply Voltage	PVDD	-0.3 ~ +4.0	V
Logic Input Voltage Range	VIN	-0.3 ~ VDDI+0.3	V
Logic Output Voltage Range	VOUT	-0.3 ~ VDDI+0.3	V
Operating Temperature Range	TOPR	-30 ~ +80	℃
Storage Temperature Range	TSTG	-40 ~ +85	℃

2.2 Back-Light Unit

Item	Symbol	Min	Typ	Max	Unit	Note
LED current	IL	-	180	-	mA	
LED voltage	VL	8.4	9.0	9.6	V	
OperatingLED lifetime	Hr	-	20000	-	Hour	



3 ELECTRICAL SPECIFICATIONS

3.1 The LCD Module Electrical Interface Connection

Table 3-1 Pin Assignments for the LCD

Pin No	Definition	Description
1	LED+	Power for LED backlight(Anode)
2	LED+	Power for LED backlight(Anode)
3	LED-	Power for LED backlight(Cathode)
4	LED-	Power for LED backlight(Cathode)
5	GND	Powerground
6	NC	No connection
7	VDD	Power for DigitalCircuit
8	NC	NO PIN
9	DE	Data InputEnable
10	VS	Vertical SyncInput
11	HS	Horizontal SyncInput
12	B7	Bluedata(MSB)
13	B6	Bluedata
14	B5	Bluedata
15	B4	Bluedata
16	B3	Bluedata
17	B2	Bluedata
18	B1	Bluedata
19	B0	Bluedata(LSB)
20	G7	Greendata(MSB)
21	G6	Greendata
22	G5	Greendata
23	G4	Greendata
24	G3	Greendata
25	G2	Greendata
26	G1	Greendata
27	G0	Greendata(LSB)
28	R7	Reddata(MSB)
29	R6	Reddata
30	R5	Reddata
31	R4	Reddata

32	R3	Reddata
33	R2	Reddata
34	R1	Reddata
35	R0	Reddata(LSB)
36	GND	Power Ground
37	DCLK	Sample clock
38	GND	Power Ground
39	SHLR	Left / rightselection
40	NC	NO PIN
41	NC	No connection
42	NC	No connection
43	NC	No connection
44	RESET	Global resetpin.
45	NC	No connection
46	NC	No connection
47	DISP	Display On pin(High=Enable)
48	GND	PowerGround
49	NC	No connection
50	NC	No connection

3.2 DC Characteristics

DC Electrical Characteristics (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25□C, Bare Chip)

3.2.1 Recommended Operating Range

DC Electrical Characteristics (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply Voltage	VDD	3.1	3.3	3.6	V	
IO Supply Voltage	VDDI	3.1	3.3	3.6	V	
Charge Pump Supply Voltage	PVDD	3.1	3.3	3.6	V	

3.2.2 DC Characteristics for Digital Circuit

DC Electrical Characteristics (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Logic-High Input Voltage	Vih	0.7VDDI	-	VDDI	V	
Logic-Low Input Voltage	Vil	DGND	-	0.3VDDI	V	
Logic-High Output Voltage	Voh	VDDI-0.4	-	VDDI	V	
Logic-Low Output Voltage	Vol	DGND	-	DGND+0.4	V	

3.2.3 DC Characteristics for Analog Circuit

DC Electrical Characteristics (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Positive High-Voltage Power	VGHS	9	15	17	V	No Load@ FR=60Hz
Negative High-Voltage Power	VGL	-11.5	-10.5	-7	V	
Output Voltage Deviation	Vod	-	±40	±50	mV	
Standby Current	Isc	-	-	50	uA	
Operation Current	Ioc	-	40	-	mA	

3.3 AC Characteristics

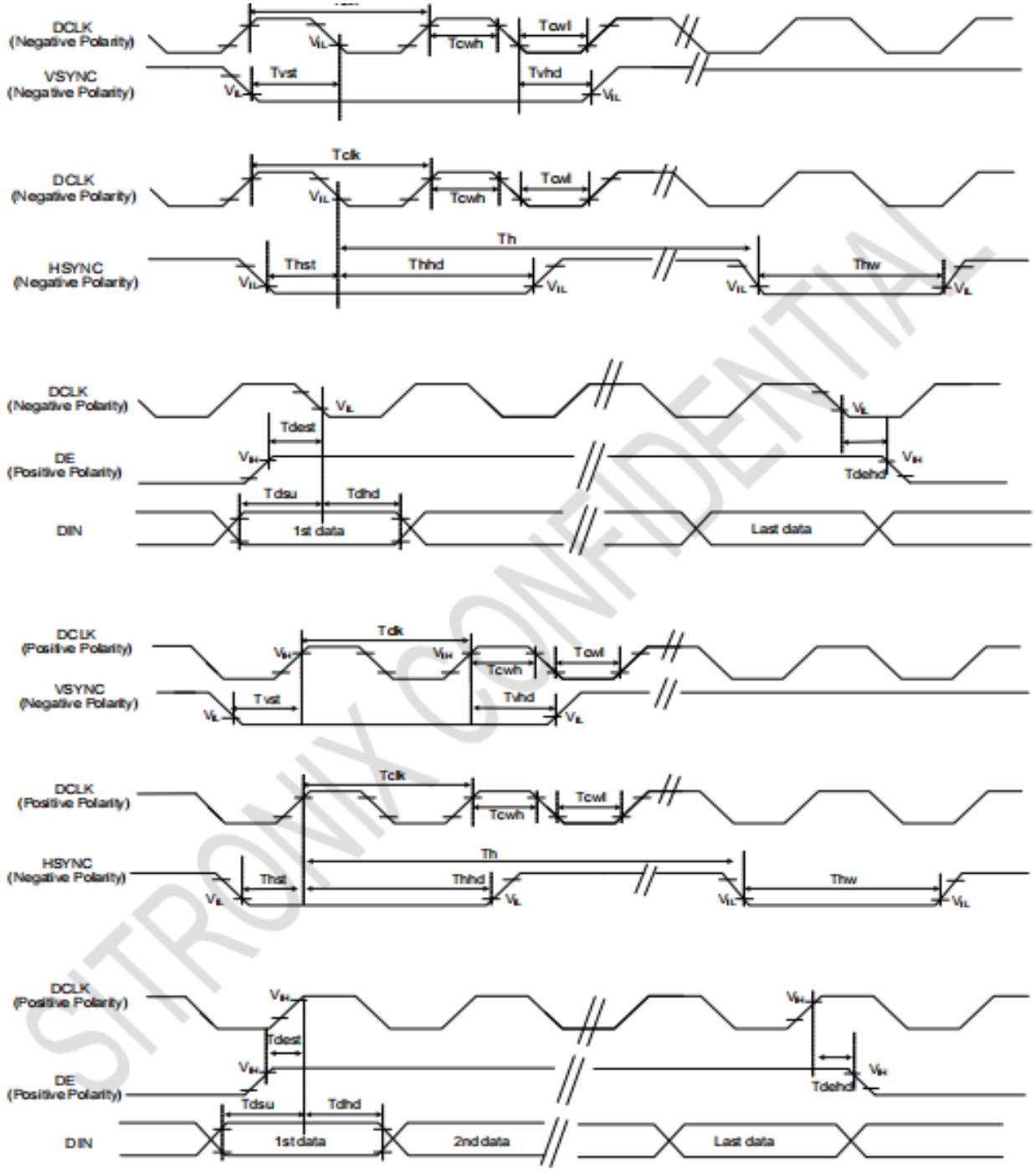
AC Electrical Characteristics (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25□C, Bare Chip)

3.3.1 System Operation AC Characteristics

DC Electrical Characteristics (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
VDD Power Source Slew Time	TPOR	-	-	20	ms	From 0V to 99% VDD
GRB Pulse Width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
SD Output Stable Time	Tst	-	-	12	us	Output settled within +20mV Loading = 6.8k+28.2pF.
GD Output Rise and Fall Time	Tgst	-	-	6	us	Output settled (5%~95%), Loading = 4.7k+29.8pF

3.3.2 System Bus Timing for RGB Interface



DC Electrical Characteristics (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	Tcw	40	50	60	%	
VSYNC Setup Time	Tvst	10	-	-	ns	
VSYNC Hold Time	Tvhd	10	-	-	ns	
HSYNC Setup Time	Thst	10	-	-	ns	
HSYNC Hold Time	Thhd	10	-	-	ns	
Data Setup Time	Tdsu	10	-	-	ns	
Data Hold Time	Tdhd	10	-	-	ns	
DE Setup Time	Tdest	10	-	-	ns	
DE Hold Time	Tdehd	10	-	-	ns	

3.4 Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

Parallel 24-bit RGB Interface Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	23	25	27	MHz	.
HSYNC	Period Time	Th	808	816	848	DCLK	
	Display Period	Thdisp		800		DCLK	
	Back Porch	Thbp	4	8	24	DCLK	
	Front Porch	Thfp	4	8	24	DCLK	
	Pulse Width	Thw	2	4	8	DCLK	
VSYNC	Period Time	Tv	496	512	528	HSYNC	
	Display Period	Tvdisp		480		HSYNC	
	Back Porch	Tvbp	8	16	24	HSYNC	
	Front Porch	Tvfp	8	16	24	HSYNC	
	Pulse Width	Tvw	2	4	8	HSYNC	

Note: 1. The minimum blanking time depends on the GIP timing of the panel specification

2. To ensure the compatibility of different panels, it is recommended to use the typical setting.

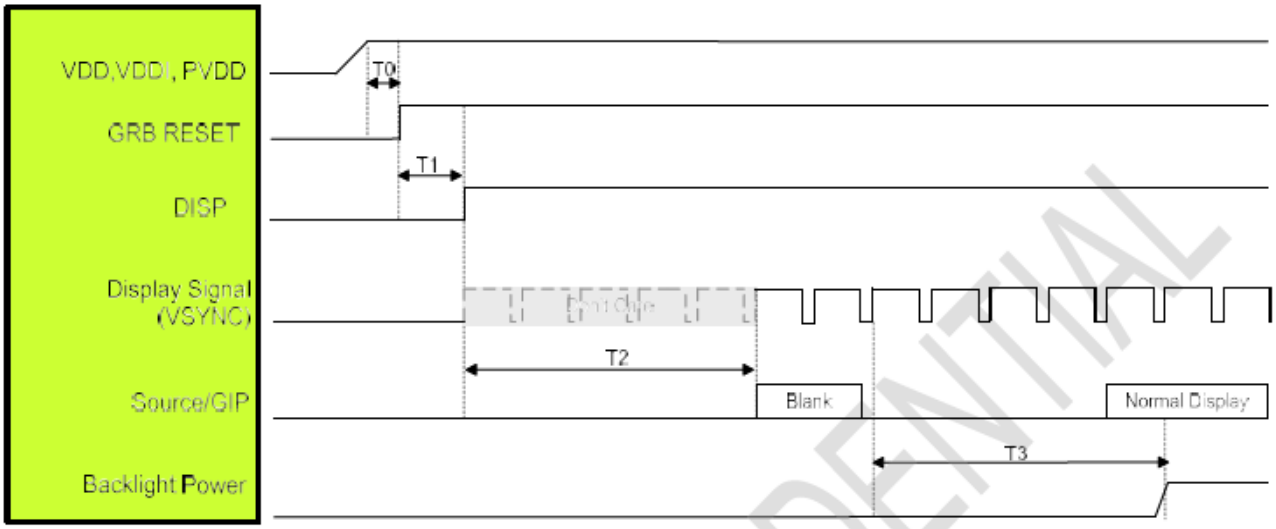
3. It is necessary to keep Tvbp =8 and Thbp =8 in sync mode. DE mode is unnecessary to keep it.

4. The maximum DCLK Frequency is 27MHz. If the case needs faster DCLK, please contact Sitronix .

3.5 Power on/off sequence

Power On Sequence

（Internal Power Mode）



Symbol	Description	Time	Unit
T0	System power stability to GRB RESET signal	≥1	ms
T1	GRB RESET= “High” to DISP=”High”	≥10	ms
T2	DISP=”High” to Source/GIP scan blank	85	ms
T3	Display Signal input to Backlight power on (base on Display Signal Frame Rate 60Hz)	≥100	ms

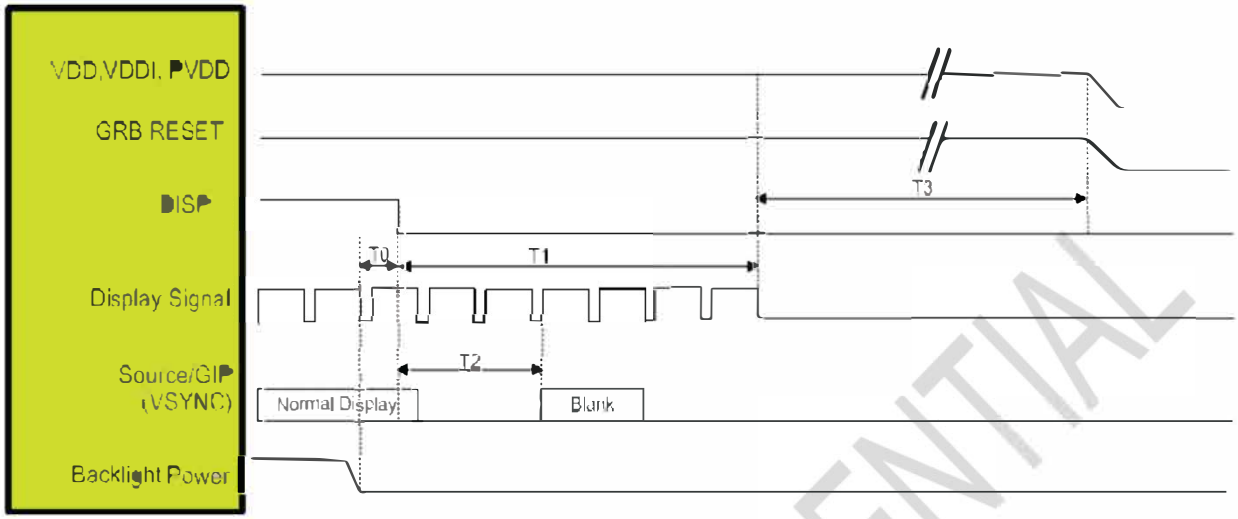
Note:

1. When DISP pull “H” or “L”, IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

3. LVDS interface Display signal: DCLK P/N; RX[3:0] P/N

Power Off Sequence
(Internal Power Mode)



Symbol	Description	Time	Unit
T0	Backlight Power off to DISP="Low"	≥1	ms
T1	DISP="Low" to IC internal voltage discharge complete	100	ms
T2	DISP="Low" to Source/GIP scan blank (base on Display Signal Frame Rate 60Hz)	≤50	ms
T3	IC internal voltage discharge is completed to VDD/VDDI/PVDD off	>0	ms

Note:

1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

3: LVDS interface Display signal: DCLK P/N; RX[3:0] P/N

4 OPTICAL SPECIFICATIONS

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-7) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. The center of the measuring spot on the Display surface shall stay fixed.

The backlight should be operating for 30 minutes prior to measurement.

Table 4-1 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	-	85	-	Deg.	Note 1
		Θ_9		-	85	-	Deg.	
	Vertical	Θ_{12}		-	85	-	Deg.	
		Θ_6		-	85	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	-	800	-		Note 2
Luminance uniformity		YU		-	450	-	cd/m2	Note 3
White luminance uniformity		ΔY		70	80	-	%	Note 4
NTSC		%		55%	60%			
White Chromaticity		x_w		Typ-0.02	0.320	Typ+0.02		Note 5
		y_w			0.340			
Reproduction of color	Red	x_R			TBD			
		y_R			TBD			
	Green	x_G			TBD			
		y_G			TBD			
	Blue	x_B			TBD			
		y_B			TBD			
Response Time (Rising / Falling)		T_{RT}	25℃	-	30	-	ms	Note 6

Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface.
2. Contrast measurements shall be made at viewing angle of $\theta = 0°$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIGURE 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Center trans of white is defined as the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 4 for a total of the measurements per display.
4. The White luminance uniformity on LCD surface is then expressed as :
   ΔY = (Minimum Luminance of 9points / Maximum Luminance of 9points) * 100
5. The color chromaticity coordinates specified in Table 4. shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurement condition is C- light source.
6. The electro-optical response time measurements shall be made as FIGURE 5 shown in Appendix by switching the "data" input signal ON and OFF. The times needed for the transmittance to change from 10% to 90% is Tr, and 90% to 10% is Tf.

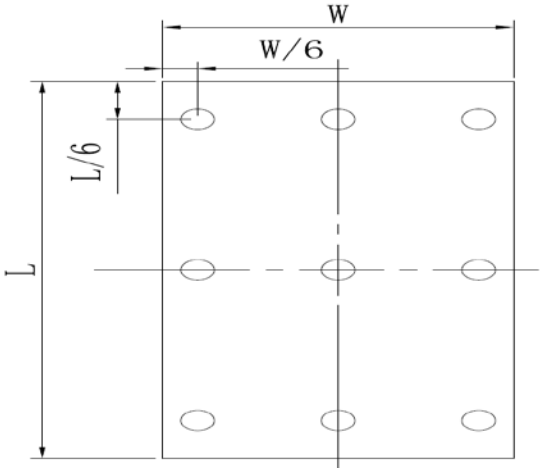


Figure 4-1 9 Points diagram

4.2 OPTICAL TEST APPENDIX

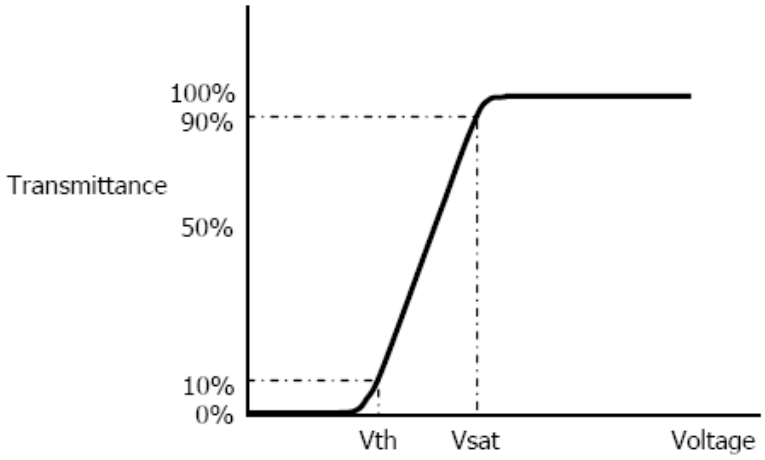


Figure 4-2 The Definition of Vth & Vsat

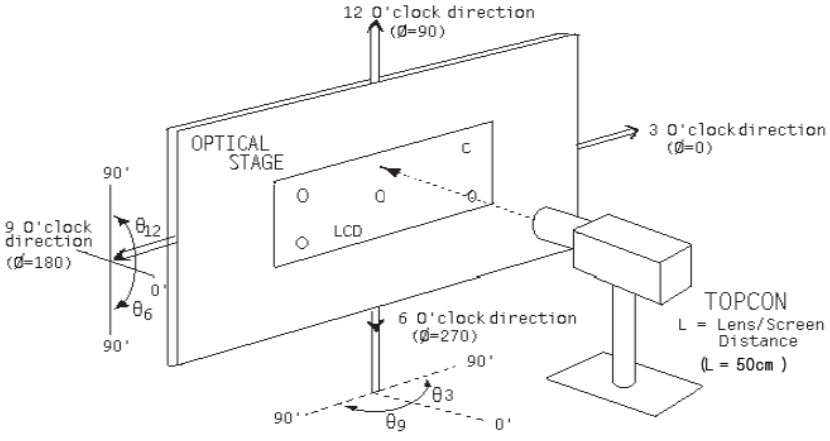


Figure 4-3 Measurement Set Up

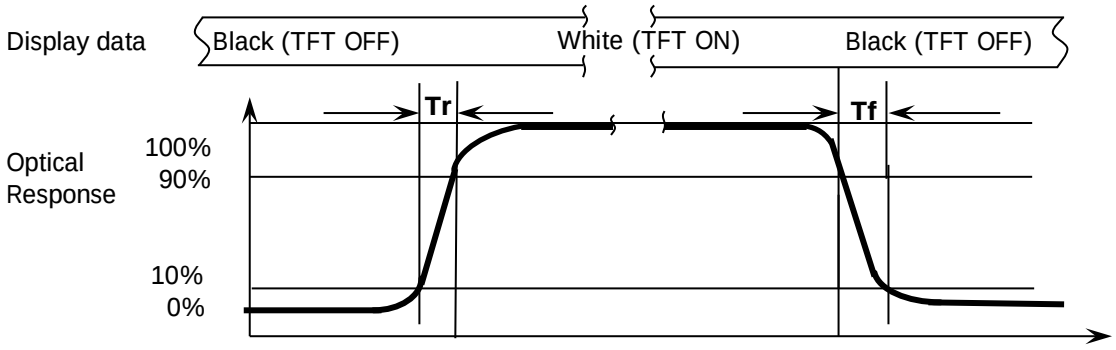
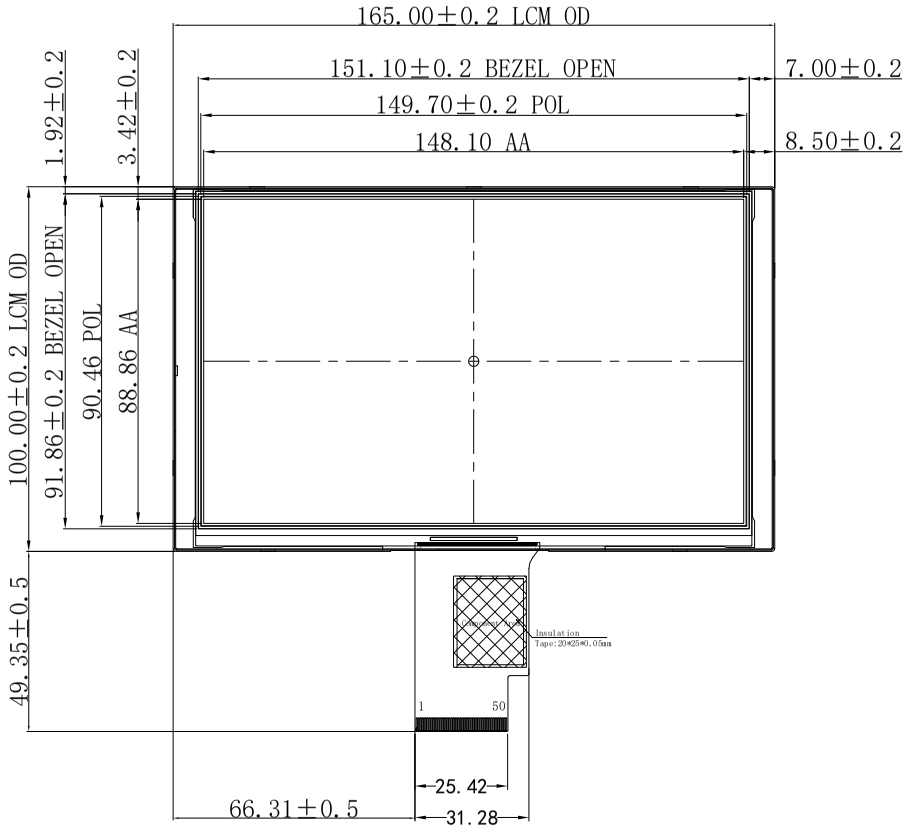


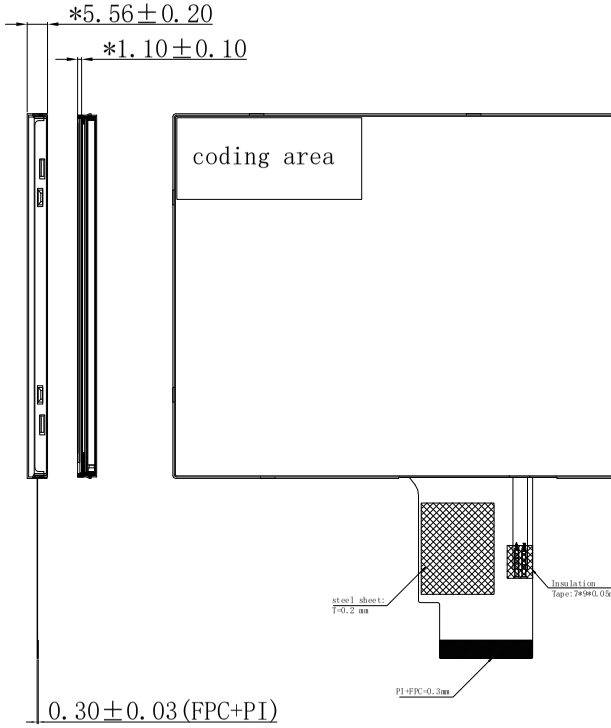
Figure 4-4 Response Time Testing

5. Mechanical Drawing

Front View



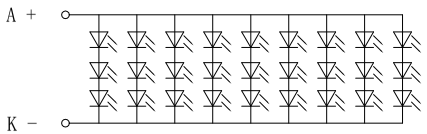
Side View



Back View

PIN DESCRIPTION

1	LED+
2	LED+
3	LED−
4	LED−
5	GND
6	NC
7	VDD3.3V
8	NC
9	DE
10	VSYNC
11	HSYNC
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	DOTCLK
38	GND
39	L/R
40	NC
41	NC
42	NC
43	NC
44	NRESET
45	NC
46	NC
47	DISP
48	GND
49	NC
50	NC



If=180mA
Vf=9.0V(Reference)

Notes:
1. Display : 6.8″, TFT
2. Resolution: 800xRGBx480
3. LCD Viewing Direction: ALL,
4. Display Mode: Normally Black
5. LCM Bringhtness: 450cd/㎡(TYP)
6. unmark Tolerance:±0.2
7. OPERATING TEMP: -30° C~ +80° C
8. STORAGE TEMP: -40° C~ +85° C
9. Requirements on Environmental Protection: ROHS

REV	DESCRIPTION	DATE	NAME
3			
2			
1	Change PIN definition	2022.10.17	IAN
0	NEW	2022.10.11	IAN

LEADTEK COMPANY LIMITED

LEADTEK DISPLAY

SCALE:1/1	UNIT:mm	PAGE:1/1		Approve	Check	Drawn
Part No:	LTK070WVBLM13		VER:V1		TOM	IAN
Customer No:						

6 RELIABILITY

Table 6-1 Reliability test

No	Test Items	Conditions	Remark
1	High temperature storage test	Ta = 85 ℃, 240 hrs	
2	Low temperature storage test	Ta = -40 ℃, 240 hrs	
3	High temperature operation test	Ta = 80℃, 240 hrs	
4	Low temperature operation test	Ta = -20 ℃, 240 hrs	
5	High temperature & high humidity operation test	Ta = 60 ℃, 90%RH, 240 hrs	
6	Thermal shock	Ta = -20 ℃(0.5 hr) ↔ 80 ℃(0.5 hr), 100 cycle	Non-operation
7	ESD	330Ω/150PF, Contact:±4K Air:±8K, class B	
8	Image sticking	5*5 Chess,1h@25C Inspection Pattern:50% grey, Perpendicular view, after 5min,the mura mus t disappear	

Note：After the reliability test, the product only guarantee function normally without any fatal defect (non-display, line defect, abormal display etc). All the cosmetic specification is judged before the reliablity test.

7 PRECAUTIONS

7.1 Handing

(1) Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
(2) You must mount a module using specified mounting holes (Details refer to the drawings).
(3) Please make sure to avoid external forces applied to the Source PCB or FPC and D-IC during the process of handling or assembling. If not, It causes panel damage or malfunction.
(4) Note that polarizers are very fragile and could be easily damaged. Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
(5) Do not pull or fold the source D-IC which connect the source PCB or FPC and the panel. Do not pull or fold the LED wire.
(6) After removing the protective film, when the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with alcohol or purified water. Do not strong polar solvent because they cause chemical damage to the polarizer
(7) Wipe off saliva or water drops as soon as possible. Their long time contact with . polarizer causes deformations and color fading.
(8) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
(9) Since the LCD is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the product. If it falls from a high place or receives a strong shock, the glass may be broken.
(10) Do not disassemble the module.
(11) To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
(12) If the customer's set presses the main parts of the LCD, the LCD may show the abnormal display. But this phenomenon does not mean the malfunction of the LCD and should be pressed by the way of mutual agreement.
(13)Do not drop water or any chemicals onto the LCD’s surface.
(14)The ITO pad area needs special careful caution because it could be easily corroded. Do not contact the ITO pad area with HCFC, Soldering flux, Chlorine, Sulfur, saliva or fingerprint. To prevent the ITO corrosion, customers are recommended that the ITO area would be covered by UV or silicon.

7.2 Operating Precautions

(1) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
(2) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
(3) The electrochemical reaction caused by DC voltage will lead to LCD degradation, so DC drive should be avoided.
(4) The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.
(5) Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
(6) Design the length of cable to connect between the connector for back-light and the converter as short as possible and the shorter cable shall be connected directly. The longer cable between that of back-light and that of converter may cause the luminance of LED to lower and need a higher startup voltage(Vs).
(7) Connectors are precise devices for connecting PCB and transmitting electrical signals. Operators should insert and unplug MDL in parallel when assembling MDL.
(8) Do not connect or disconnect the cable to/ from the module at the "Power On" condition.
(9) When the module is operating, do not lose CLK, HS,VS signals. If any one these signals is lost, the LCD panel would be damaged.
(10) Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
(11) Do not re-adjust variable resistor or switch etc.

7.3 Electrostatic Discharge Control

(1) Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly. Keep products as far away from static electricity as possible.
(2) Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

7.4 Precautions for Strong Light Exposure

Strong light exposure causes degradation of polarizer and color filter. It is not allowed to store or run directly in strong light or in high temperature and humidity for a long time.

7.5 Storage Precautions

(1) When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
(2) The LCD modules should be stored under the storage temperature range. the recommend condition is: Temperature : 0℃~ 40℃, Relatively humidity: ≤80%, and no more than 1 year.
(3) The LCD modules should be stored in the room without acid, alkali and harmful gas.

7.6 Handling Precautions for Protection Film

(1) Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
(2) In handling the LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

7.7 Operation Condition Guide

(1) Lifetime in this spec. is guaranteed only when Commercial Display is used according to operating usages.
(2) Module used in unnormal orientation mode, need to confirm with the manufacturer.
(3) Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.

(4) Dew drop atmosphere should be avoided.
(5) The storage room should be equipped with a good ventilation facility, which has a temperature controlling system.
(6) When expose to drastic fluctuation of temperature (hot to cold or cold to hot） ,the LCD may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD's surface which may affect the operation of the polarizer and the LCD.
(7) Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD may turn black at temperature above its operational range. However those phenomena do not mean malfunction or out of order with the LCD. The LCD will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.

7.8 Others

(1)When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.
(2) In order to prevent potential problems, flicker should be adjusted by optimizing the Vcom value in customer LCM.
(3) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.
(4) For the crash damaged or unnecessary LCD, it is recommended to wash off liquid crystalby either of solvents such as acetone and ethanol an should be burned up later.
(5) If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.
(6) If the liquid crystal should get in your eyes, flush your eyes with running water for at least fifteen minutes.
(7) Client needs to add heat dissipation design , such as fan, water cooling , etc.
(8) After assembling into modules, guarantee that the temperature rise of panel surface does not exceed 20 C at room temperature.
(9) Customers need to drive current down according to derating curve.

8 Package Drawing

TBD