Shenzhen Leadtek Electronics Co.,Ltd

PRODUCT SPECIFICATION

TFT-LCD MODULE

Module No：LTK116FHBCT01

☑ 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.

Contents

Document Revision History

Change No.	Date	Subject And Reason	Version No.	Responser
1	2022.07.19	New	V0	

1.0General Description

1.1 Introduction

LTK116FHBCT01 color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel and a driving circuit.This TFT LCD has a 11.6 (16:10) inch diagonally measured active display area with (1920 horizontal by 1080 vertical pixel) resolution.

1.2. Features

11.6(16:10 diagonal) inch configuration
Image Reversion: UP/DOWN and LEFT/RIGHT
ROHS design

1.3. General information

Item	Specification	Unit
Outline Dimension	303.12(H) x 191.00(V) x5.05 (D)	mm
Display area	256.32(H) x 144.18 (V)	mm
Number of Pixel	1920(H) x3(RGB)x 1080 (V)	pixels
Pixel pitch	0.1335(H) x3(RGB)x 0.1335 (V)	mm
Pixel arrangement	RGB Vertical stripe	
Display mode	IPS(Normal Black)	
Color Filter Array	RGB vertical stripes	
Luminous	300（TYP）	cd/㎡
Weight	TBD	g
Interface	EDP	

2.0 Absolute Maximum Ratings

2.1 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
LCD Power Supply	**VDD**	**-0.3**	**3.6**	**V**	
Operating Temperature	Topa	-10	50	℃	
Storage Temperature	Tstg	-20	60	℃	

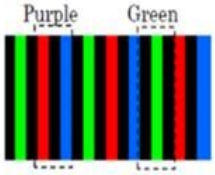
Power supply voltage for LED Driver		V_{LED}	5	12	21	V	
Maximum LED Current Setting		ICH_MAX	6	~	25	mA	LED 100% setting
Minimum LED Current Setting		ICH_Min	0.1	~	~	mA	Setting by Diming
Output Voltage		VLED	~	~	37	V	
EN Control Level	Backlight on		1.2		5.0	V	
	Backlight off		0		0.6	V	
PWM Control Level	PWM High Level		1.2		5.0	V	
	PWM Low Level		0		0.6	V	
PWM Control Frequency		F_{PWM}	200	-	20,000	Hz	
Duty Ratio		-	1	-	100	%	

2.2 TFT LCD FOB

< Table 3. LCD FOB Electrical Specifications > [Ta =25±2 ℃]

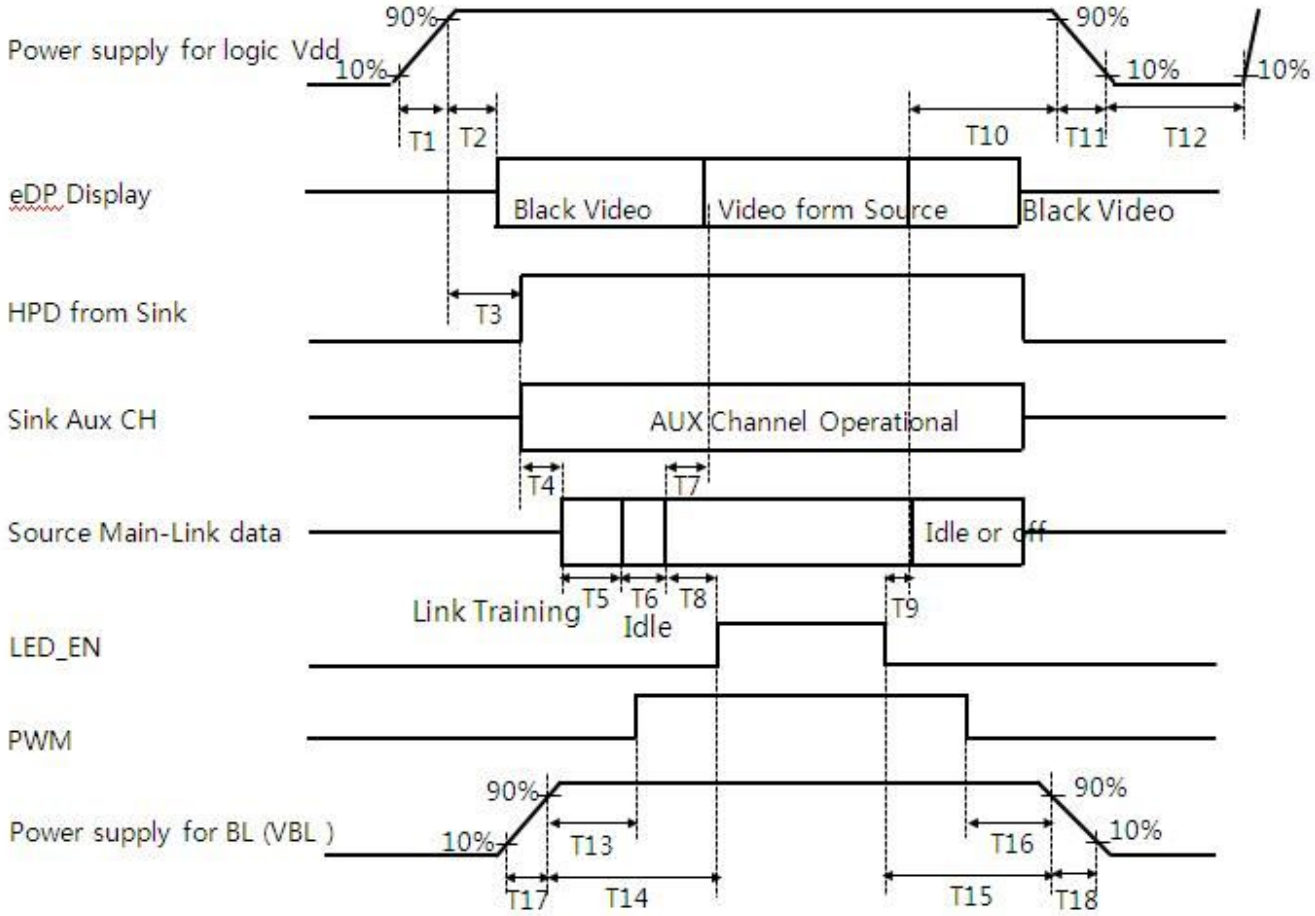
Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
Power Supply Input Voltage	V_{DD}	3.0	3.3	3.6	V	Note 1
Power Supply Current	I_{DD}	-	-	-	mA	
Positive-going Input Threshold Voltage	V_{IT+}	-		+100	mV	Vcom = 4.6V typ.
Negative-going Input Threshold Voltage	V_{IT-}	-100		-	mV	
Differential input common mode voltage	V_{com}		4.6		V	V_{IH}=100mV, V_{IL}=-100mV

Notes : 1. The supply voltage is measured and specified at the interface connector of FOB.
The current draw and power consumption specified is for 3.3V at 25 ℃
Max value at Sub V-line Pattern



2.3 Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off se quence shall be as shown in below



- 0.5ms ≤ T1 ≤ 10 ms
- 0ms ≤ T2 ≤ 200 ms
- 0ms ≤ T3 ≤ 200 ms
- 0ms ≤ T13
- 0ms ≤ T14
- 0ms ≤ T17
- 80ms ≤ T8
- 0ms ≤ T7 ≤ 50ms
- 0ms ≤ T10 ≤ 500 ms
- 0.5ms ≤ T11 ≤ 10 ms
- 500ms ≤ T12
- 0ms ≤ T15
- 0ms ≤ T16
- 0ms ≤ T18

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

3.1 Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Response Time	Tr+Tf		-	30	35	ms	Note 3
Contrast Ratio	CR	θ= 0°	800	1000	-		Note 2,4
Viewing Angle	Top(12 o'clock)	CR≧10	80	85	-	deg	Note 1
	Bottom(6 o'clock)		80	85	-		
	Left(9 o'clock)		80	85	-		
	Right(3 o'clock)		80	85	-		
Color Chromaticity	Wx	θ= 0°	0.277	0.31	0.337		Note 5
	Wy		0.303	0.33	0.363		
	Rx		-	-	-		
	Ry		-	-	-		
	Gx		-	-	-		
	Gy		-	-	-		
	Bx		-	-	-		
	By		-	-	-		
Luminance	L	θ= 0°	250	300	-	cd/㎡	
Luminance uniformity	YU		70	-	-	%	

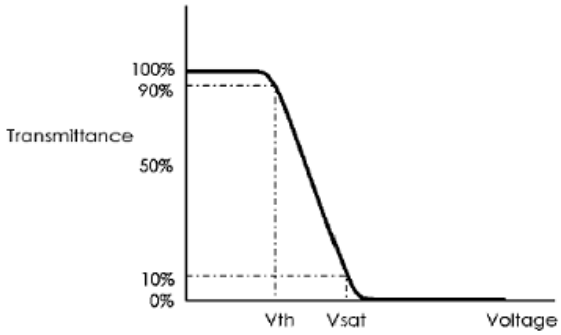
3.2 Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : 25±2℃
- 30min. warm-up time.

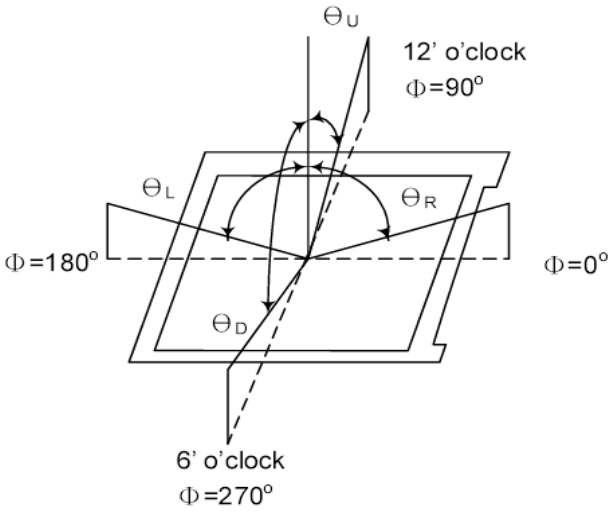
3.3 Measuring Equipment

- TOPCON BM-7
- Measuring spot size : field 2°

Note (1) Definition of Vsat and Vth (at 20℃)



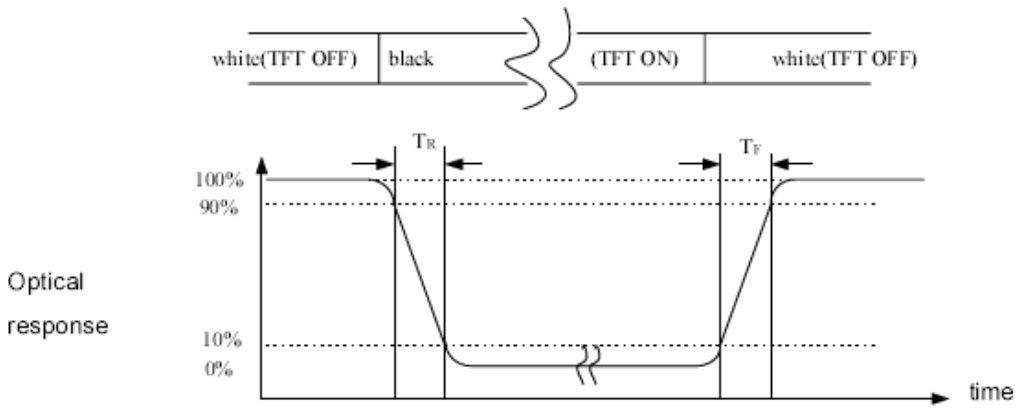
Note (2) Definition of Viewing Angle :



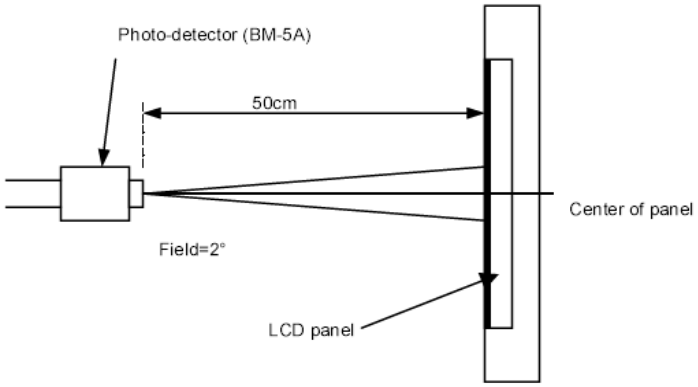
Note (3) Definition of Contrast Ratio(CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

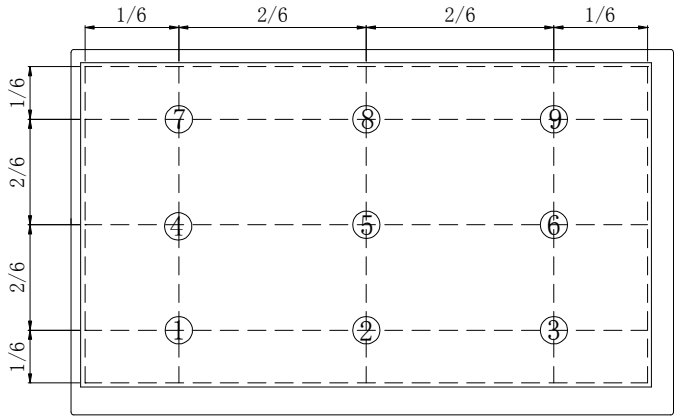
Note (4) Definition of Response Time : Sum of T_R and T_F



Note (5) Definition of optical measurement setup



Note (6) Definition of brightness uniformity



Note (7) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

3.4 Block Diagram

3.4.1 TFT-LCD Module

Display position of input data(V·H)

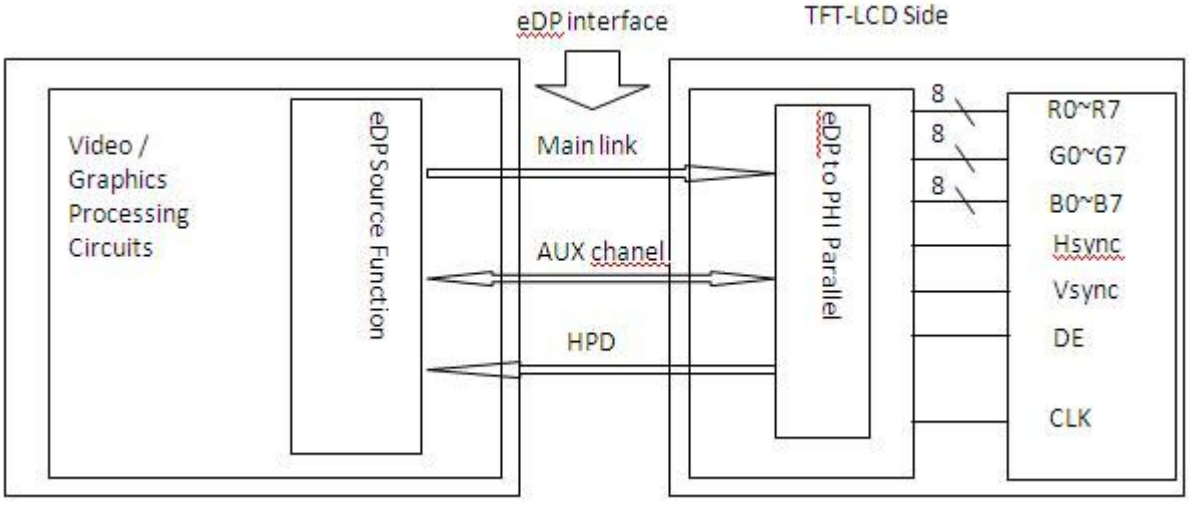
4. Electrical Characteristic

The electronics interface connector is S050-L30B-C10(30P)

The connector interface pin assignments are listed in Table 6

<Table 6. Pin Assignments for the Interface Connector>

PIN #	Symbol	Description Remark	PIN #	Symbol	Description Remark
1	CABC-EN	CABC-EN	16	GND	Power Ground
2	GND	Power Ground	17	HPD	Hot plug detect output
3	LANE1-N	eDP RX channel 1 negative	18	BL-GND	Power Ground
4	LANE1-P	eDP RX channel 1 positive	19	BL-GND	Power Ground
5	GND	Power Ground	20	BL-GND	Power Ground
6	LANE0-N	eDP RX channel 0 negative	21	BL-GND	Power Ground
7	LANE0-P	eDP RX channel 0 positive	22	BL-ENABLE	BL-ENABLE
8	GND	Power Ground	23	BL-PWM	Reset low active
9	AUX-CH-P	eDP AUX CH positive	24	MSCL	FOR DEBUG
10	AUX-CH-N	eDP AUX CH negative	25	MSDA	FOR DEBUG
11	GND	Power Ground	26	BL-POWER	BL-POWER
12	LDC-VCC	3.3V	27	BL-POWER	BL-POWER
13	LCD-VCC	3.3V	28	BL-POWER	BL-POWER
14	LCD-TEST	Panel self test enable	29	BL-POWER	BL-POWER
15	GND	Power Ground	30	NC	NC



5. Data Input Format

Figure 5. Pixel Format

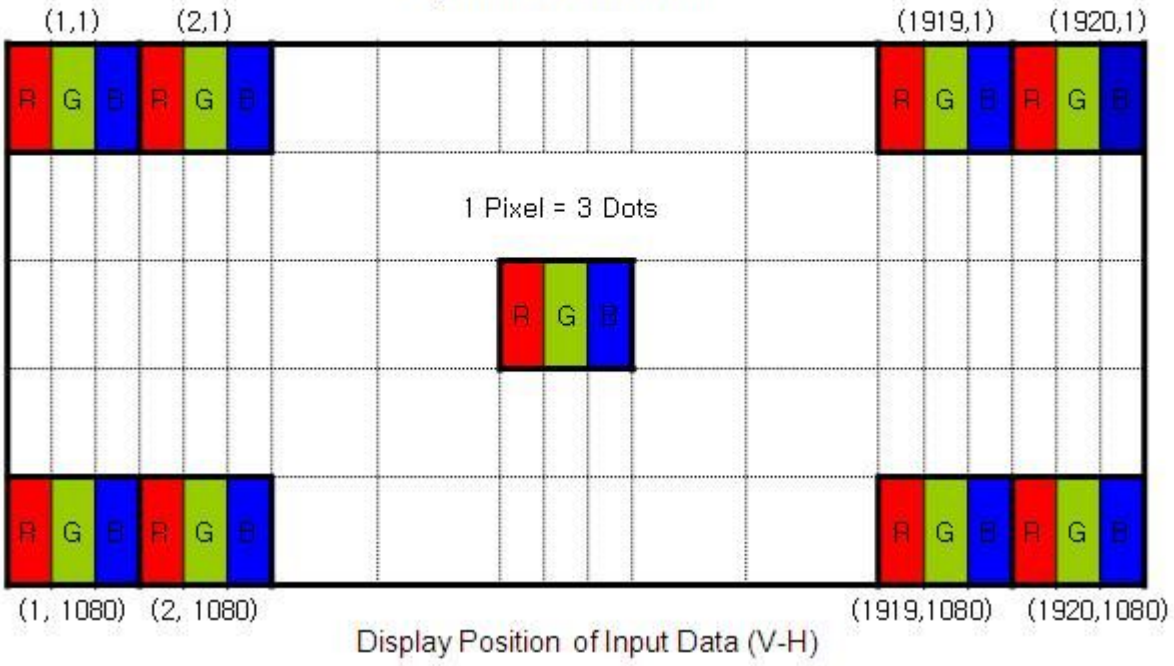
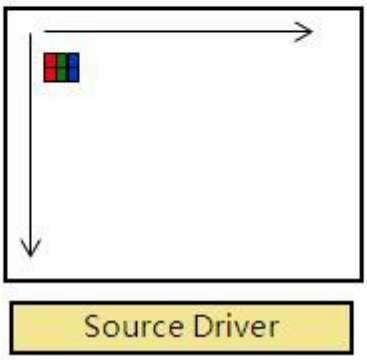


Figure 6. Scan direction



6.0 SIGNAL TIMING SPECIFICATION

6.0.1 The QV116FHB-N81 is operated by the DE only.

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	-	477	-	MHz
Horizontal display area	thd		1920		pixel
HSYNC period time	th	-	2142	-	pixel
HSYNC blanking	thb+ thfp	-	222	-	pixel
Vertical display area	Tvd		1080		H
Frequency	fV	48	60	65	Hz
VSYNC period time	Tv	-	1100	-	H
VSYNC blanking	Tvb+ Tvfp	-	20	-	H

7.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

Color & Gray Scale		Input Data Signal																							
		Red Data								Green Data								Blue Data							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Δ	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Δ	↑								↑								↑							
	∇	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	∇	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Δ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	Δ	↑								↑								↑							
	∇	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	∇	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Δ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Δ	↑								↑								↑							
	∇	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	∇	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of White	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Δ	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Δ	↑								↑								↑							
	∇	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	∇	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

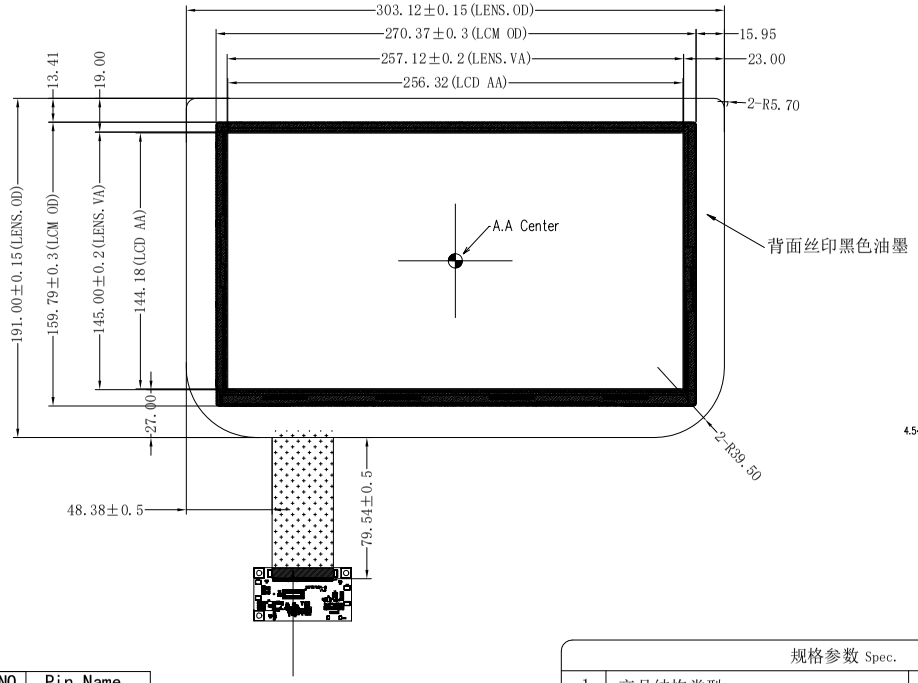
7.1 Reliability Test

NO	Item	Conditions	Remark
1	High Temperature Storage	Ta=+60℃,48hrs	
2	Low Temperature Storage	Ta=-20℃,48hrs	
3	High Temperature Operation	Ta=+50℃,48hrs	
4	Low Temperature Operation	Ta=-10℃,48hrs	
5	High Temperature and High Humidity (operation)	Ta=+40℃,90%RH,48hrs	

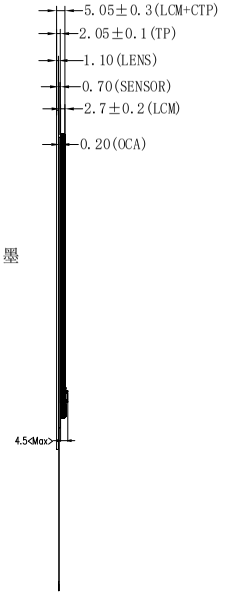
Note: All tests above are practiced at module type.

There is no display function NG issue occurred, All the cosmetic specification is judged before the reliability stress.

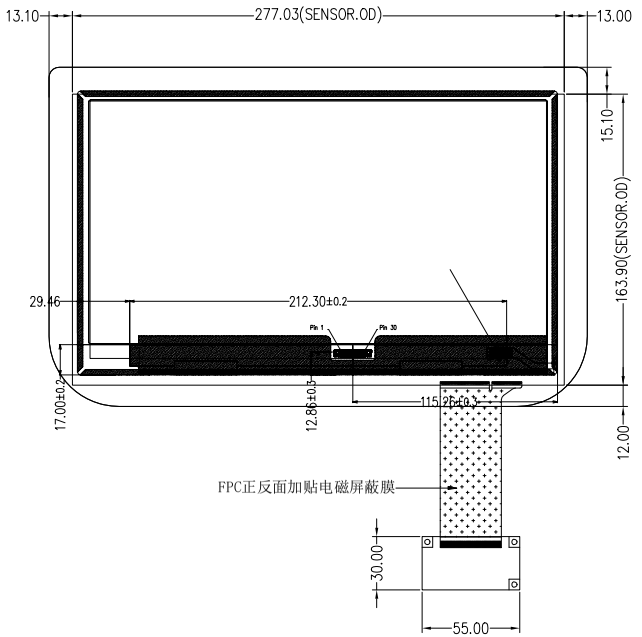
Front View



Side View



Back View

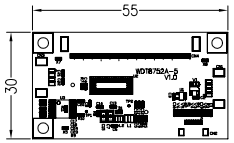


CN1

Pin NO.	Pin Name
1	VCC
2	DN
3	DP
4	GND

规格参数 Spec.		
1	产品结构类型 Structure	Glass+Glass
2	COVER LENS钢化类型 Strengthening	化学钢化 Chemically
3	COVER LENS表面硬度 Surface Hardness	>6H
4	无油墨处透光率 Transmission	>=86%
5	工作温度 Operation temperature	-10℃~60℃
6	储存温度 Storage temperature	-20℃~70℃
所有产品物料满足ROHS和无卤素要求 *All materials comply with RoHS & Halogen free requirement*		

触控IC型号 Touch IC	WDT8752A	通道数 Channels	41*23
供电电压 VDD	5V	接口类型 Interface	USB



SCAL 3:1

CURRENT IF=20*5=100mA
8C*5B=40LED

Notes:
1. Display : 11.6″, TFT
2. Resolution: 1920xRGBx1080
3. LCD Viewing Direction: ALL,
4. Display Mode: Normally Black
5. LCM Bringhtness: 300cd/㎡(TYP),uniformity≥80%
6. unmark Tolerance:±0.2
7. OPERATING TEMP: -10° C~ +50° C
8. STORAGE TEMP: -20° C~ +60° C
9. Requirements on Environmental Protection: ROHS

REV	DESCRIPTION	DATE	NAME
3			
2			
1			
0	NEW	2022.06.25	Ian

LEADTEK COMPANY LIMITED

SCALE:1/1	UNIT:mm	PAGE:1/1		Approve	Check	Drawn
Part No:	LTK116FHBCT01		VER:V0		JK	Ian
Customer No:						

9.0 Packing Form

TBD

10.0 General Precaution

10.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

10.2 Asembly Precaytton

10.2.1 Please use the mounting hole on the module side in installing and do not bending or wrenching LCD in assembling. And please do not drop, bend or twist LCD module in handling.
10.2.2 Please design display housing in accordance with the following guide lines.
10.2.2.1 Housing case must be destined carefully so as not to put stresses on LCD all sides and not to wrench module. The stresses may cause non-uniformity even if there is no non-uniformity statically.
10.2.2.2 Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. The clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.
10.2.3 Please do not push or scratch LCD panel surface with any-thing hard. And do not soil LCD panel surface by touching with bare hands. (Polarizer film, surface of LCD panel is easy to be flawed.)
10.2.4 Please do not press any parts on the rear side such as source IC, gate IC, and FPC during handling LCD module. If pressing rear part is unavoidable, handle the LCD module with care not to damage them.
10.2.5 Please wipe out LCD panel surface with absorbent cotton or soft cloth in case of it being soiled.
10.2.6 Please wipe out drops of adhesives like saliva and water on LCD panel surface immediately. They might damage to cause panel surface variation and color change.
10.2.7 Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.

10.3 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. HannStar does not warrant the module, if customers disassemble or modify the module.

10.4 Breakage of LCD Panel

10.4.1 If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.
10.4.2 If liquid crystal contacts mouth or eyes, rinse out with water immediately.
10.4.3 If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
10.4.4 Handle carefully with chips of glass that may cause injury, when the glass is broken.

10.5 Absolute Maximum Ratings and Power Protection Circuit

10.5.1 Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.
10.5.2 Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
10.5.3 It's recommended employing protection circuit for power supply.

10.6 Operation

10.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
10.6.2 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.
10.6.3 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.
10.6.4 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

10.7 Static Electricity

10.7.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
10.7.2 Because LCD module uses CMOS-IC on TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge.
10.7.3 Persons who handle the module should be grounded through adequate methods.

10.8 Disposal

When disposing LCD module, obey the local environmental regulations.

10.9 OTHERS

10.9.1 A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight land strong UV rays.
10.9.2 Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.
10.9.3 For the packaging box, please pay attention to the followings:
10.9.3.1 Packaging box and inner case for LCD are designed to protect the LCDs from the damage or scratching during transportation. Please do not open except picking LCDs up from the box.
10.9.3.2 Please do not pile them up more than 6 boxes. (They are not designed so.) And please do not turn over.
10.9.3.3 Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
10.9.3.4 Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)