

SPECIFICATION

Customer : _____

Customer No.: _____

Product : _____ LCM

Product No.: _____ DBT-T7050-08

Date : _____ 2017-05-15

APPROVED	CHECKED	PREPARED
		HXY

Customer Approval	<input type="checkbox"/> Accept <input type="checkbox"/> Reject Comment: Approved by: _____
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Headquarters:

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1. General Specification

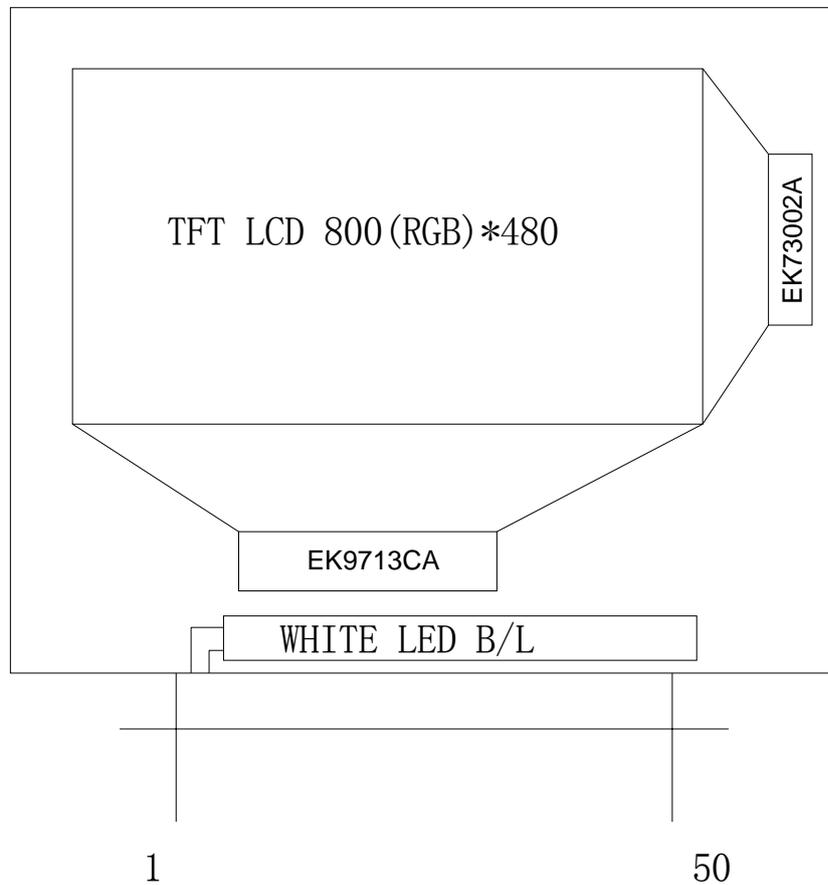
Item	CONTENTS	Unit
Module Size	164.9*100.0*5.22	mm
Display Format	800(RGB)*480	-
LCD type	TFT/ Transmissive	-
Active Area(W*L)	154.08*85.90	mm
View Angle	6 O'clock	-
Backlight Tpye & Color	Edge LED&White	-
Interface Type	RGB data bus	-
Operation Temperature	TOPL = -20, TOPH =70	°C
Storage Temperature	TSTL = -30, TSTH =80	°C

2. LCM Description

2.1 LCM Drawing

See appendix

2.2 LCD Logic Diagram



2.3 Interface PIN Assignment

Pin Assignments for the interface connector

1	VLED+	Power for led backlight(Anode)
2	VLED+	Power for led backlight(Anode)
3	VLED-	Power for led backlight(Cathode)
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 input enable
10	VSD	Vertical SYNC input
11	HSD	Horizontal SYNC input
12	B7	Blue data
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
20	G7	Green data
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
28	R7	Red data
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
36	GND	Power Ground
37	DCLK	Sample clock
38	GND	Power Ground
39	SHLR	Left/Right selection
40	UPDN	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	NC
46	VCOM	Common voltage
47	DITHB	Dithering function
48	GND	Power Ground
49	NC	NC
50	NC	NC

3. Absolute Maximum Ratings(Ta=25°C VSS=0V)

Item	Symbol	Min.	Type	Max.	Unit	Humidity	
Digital supply voltage	DVDD	-0.5	-	5	Volt	--	
Analog supply voltage	AVDD	-0.5	-	+15	Volt	--	
Power supply voltage	VGH	-0.3		40	Volt		
Power supply voltage	VGL	-20		0.3	Volt		
Operating temperature	Top	-20	--	+70	°C	Note1	
Storage temperature	Tst	-30	--	+80	°C	Note2	

Note1: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Ta ≤ 70°C : 75%RH max

Ta > 70°C : absolute humidity must be lower than the humidity of 75%RH at 70°C

Note2: Ta at -10°C will be <48hrs, at 80 °C will be <120hrs when humidity is higher than 75%RH.

Ta ≤ 80°C : 75%RH max

Ta > 80°C : absolute humidity must be lower than the humidity of 75%RH at 80°C

4. Electrical Characteristics (Ta=25°C)

Item	Symbol	Condition	Min.	Type	Max.	Unit
Power Supply	DVDD	--	3.0	3.3	3.6	Volt
Input Voltage	VIL	L level	0	--	0.3*DVDD	Volt
	VIH	H level	0.7 DVDD	--	DVDD	Volt
Power Supply	AVDD	--	10.2	10.4	10.6	Volt
Power Supply	VGH	--	15.3	16	16.7	Volt
Power Supply	VGL	--	-7.7	-7	-6.3	Volt
Power Supply	VCOM	--	2.8	3.8	4.8	Volt
Supply Current	IDD	DVDD= 3.3V	--	TBD	--	mA
Power supply for Backlight	VLED	IBL=180mA	8.0	9.1	9.8	Volt

5. Optical Characteristics

TFT LCD Panel

DVDD=3.3V, Ta=25°C

Item	Symbol	Condition	Min.	Typ.	Max.	unit	
Response time	Tr	Ta = 25°C	-	10	-	ms	Note2
	Tf						
Viewing angle (CR ≥ 10)	Top	Contrast Maximum direction	-	50	-	Deg.	Note4
	Bottom		-	70	-		
	Left			70			
	Right			70			
Contrast ratio		CR	350	500	-	-	Note3
Color of CIE Coordinate (With B/L)	White	X	-	TBD	-	-	Note1
		Y	-	TBD	-		
	Red	X	-	TBD	-		
		Y	-	TBD	-		
	Green	X	--	TBD	-		
		Y	-	TBD	-		
	Blue	X	-	TBD	-		
		Y	-	TBD	-		
Average Brightness Pattern=white display (With B/L)		IV	300	350	-	cd/m ²	Note1
Uniformity (With B/L)		△B	75	-	-	%	Note1

Note1:

*1 : $\Delta B = B(\min) / B(\max) * 100\%$

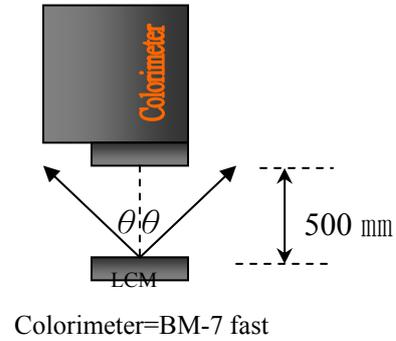
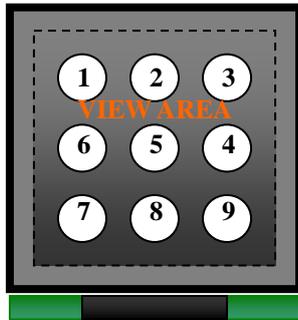
*2 : Measurement Condition for Optical Characteristics:

a : Environment: 25°C±5°C / 60±20%R.H , no wind , dark room below 10 Lux at typical lamp current and typical operating frequency.

b : Measurement Distance: 500 ± 50 mm , (θ= 0°)

c : Equipment: **TOPCON BM-5 fast** , (field 1°) , after **10** minutes operation.

d : The uncertainty of the C.I.E coordinate measurement ± 0.01 , Average Brightness $\pm 4\%$



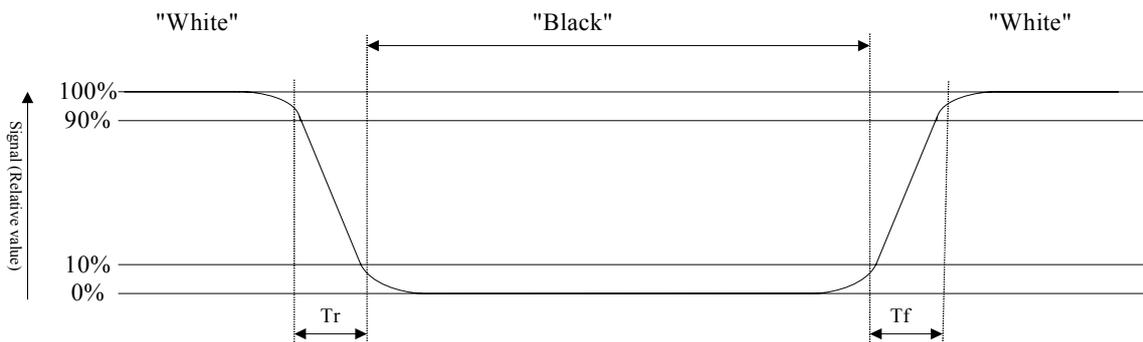
To be measured at the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-5, after 10 minutes operation (module)

Note2: Definition of response time:

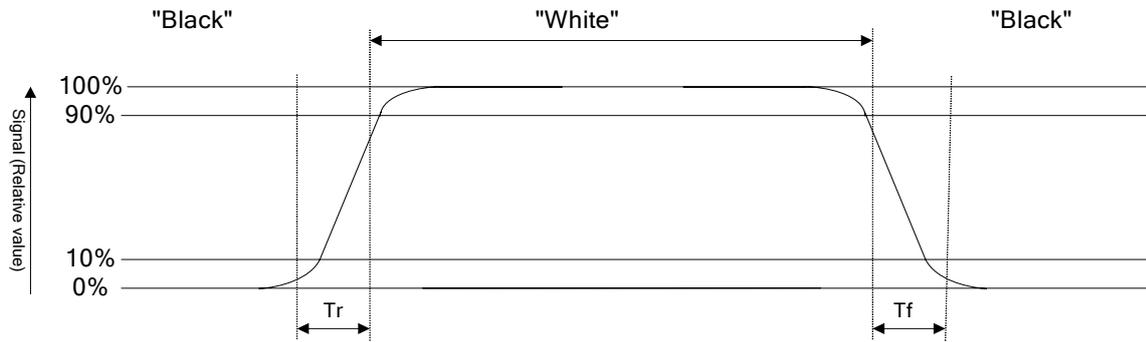
The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White



Normally Black



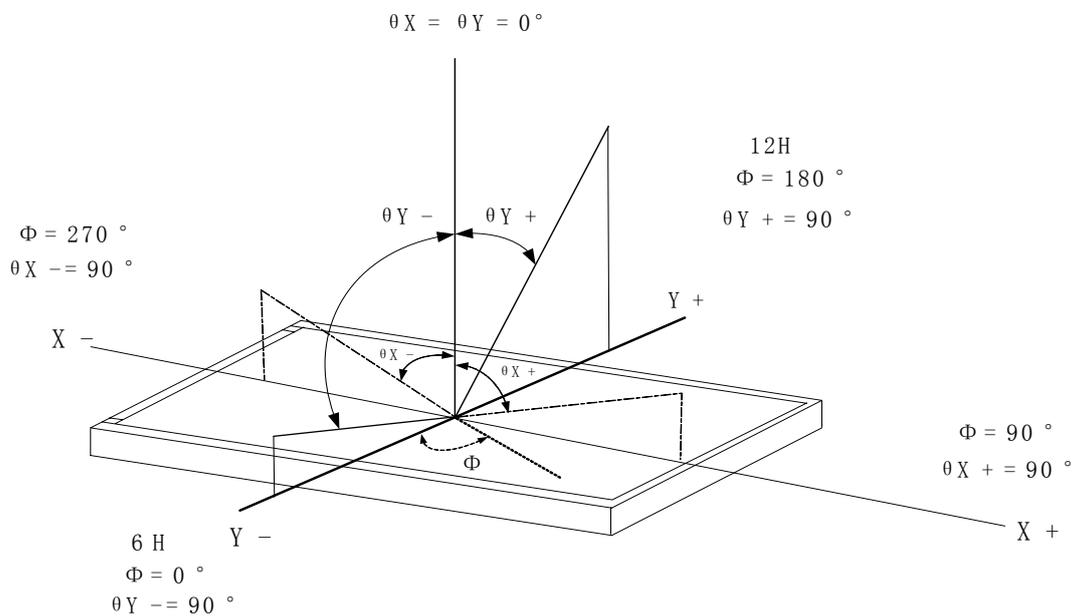
Note3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note4: Definition of viewing angle:

Refer to figure as below:



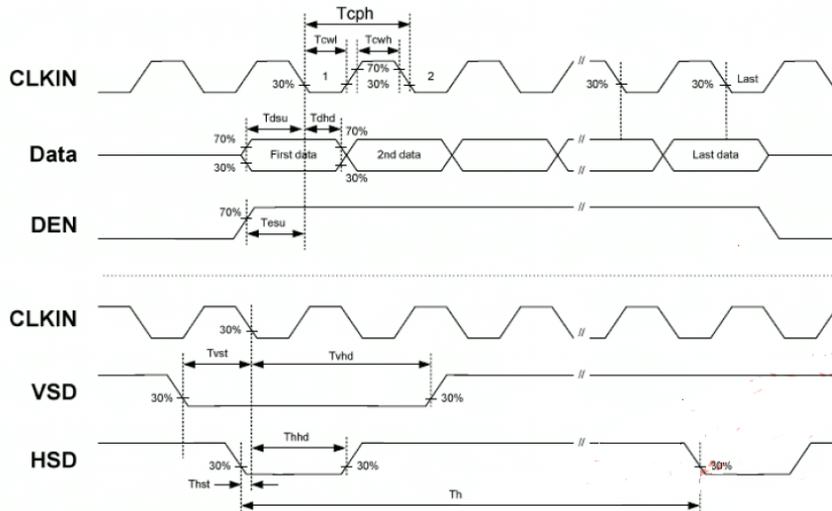
6. Read/Write operation sequence

Timing Characteristics

AC Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
DCLK cycle time	Tcph	20			ns
DCLK frequency	fclk		33.3	40	MHz
DCLK pulse duty	Tcwh	40	50	60	%
SD setup time	Tvs	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 hold time	Tdhd	8			ns
E setup time	Tesu	8			ns
DE hold time	Tehd	8			ns
Horizontal display area	thd		800		Tch
HS period time	th	862	1056	1200	Tc
HSD pulse width	thpw	1		40	Tcph
HSD back porch	thb	46	46	46	Tcph
HSD front porch	thfp	16	210	354	Tcph
Vertical display area	tvd		480		th
VSD period time	tv	510	525	650	th
VSD pulse width	tvpw	1		20	th
VSD back porch	vb	23	23	23	th
VSD front porch	tvfp	7	22	147	th

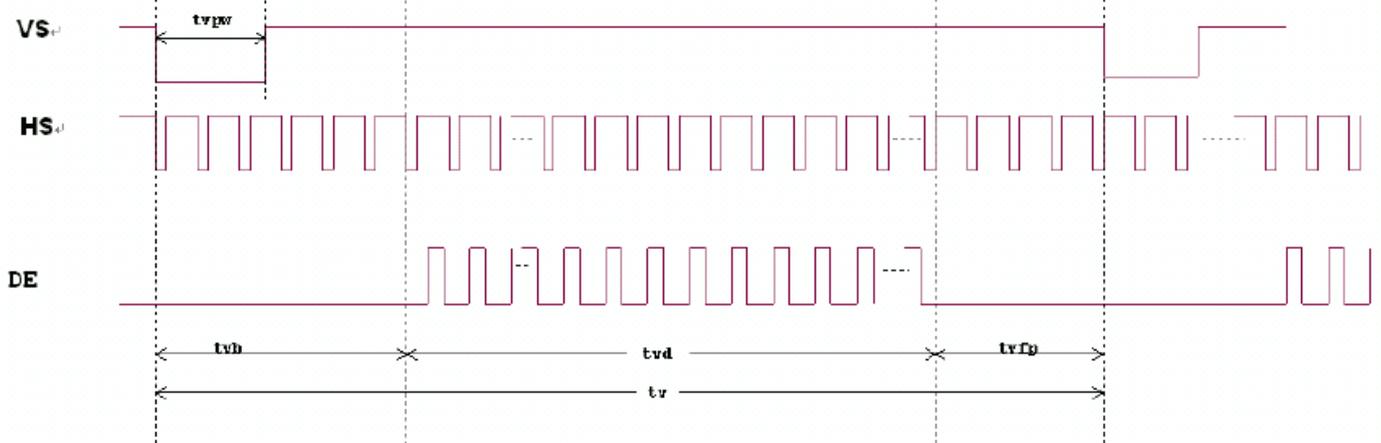
(4) Input Clock and Data Timing Diagram



(5) Data Input Format



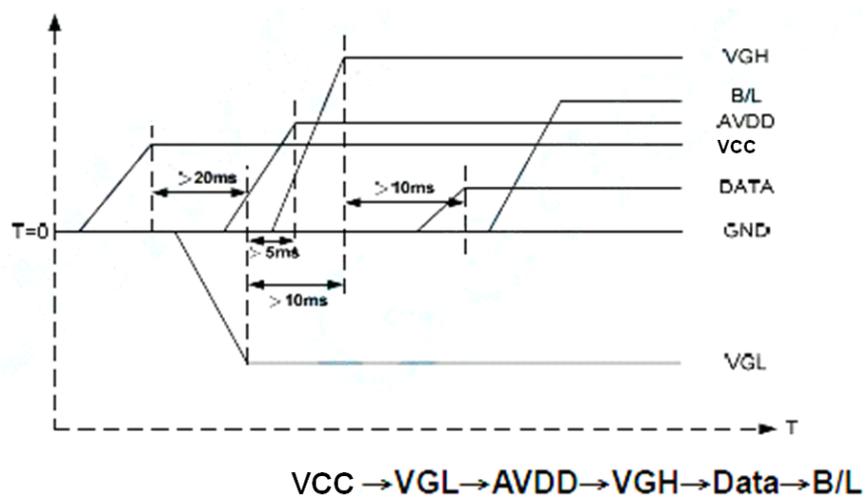
Horizontal input timing diagram.



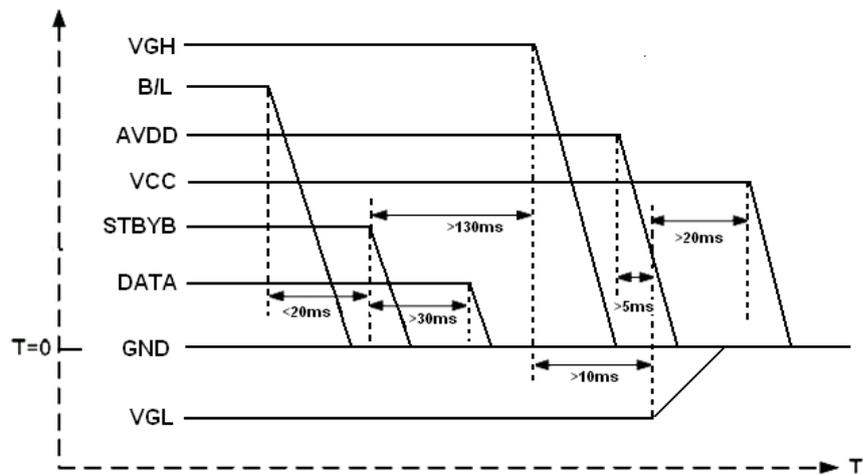
Vertical input timing diagram.

(6) POWER ON/OFF SEQUENCE

a. Power on:



b. Power off:



B/L → **STBYB** → **Data** → **VGH** → **AVDD** → **VGL** → **VCC**

Note 1: Data include R0~R7, B0~B7, GO~G7, U/D, L/R, DCLK, HS,VS,DE.

Note 2: Please do not plug the interface cable when system is on.

Note 3: Please avoid floating state of the interface signal during signal invalid period.

Note 4: It is recommended that the backlight power must be turned on after the power supply for LCD and the interface signal is valid.

7. Reliability

7.1 Environmental Test

NO	Test Item	Test Condition	
1	Low temperature storage	-30±2°C, 24H	
2	High temperature storage	80±2°C, 24H	
3	Low temperature operation	-20±2°C, 24H	
4	High temperature operation	70±2°C, 24H	
5	High temperature/ Humidity storage	70±2°C 90%±5%RH(Without dewing), 96H	
6	Thermal shock storage	$-30^{\circ}\text{C} \rightarrow 25^{\circ}\text{C} \rightarrow 80^{\circ}\text{C} \rightarrow 25^{\circ}\text{C}$ $\leftarrow (30\text{mins}) \quad (30\text{mins}) \quad (30\text{mins}) \quad (30\text{mins}) \rightarrow$ <p style="text-align: center;">10 Cycle</p>	
7	ESD Test	Air Discharge: Apply 2 KV with 5 times discharge for each polarity +/-	Contact Discharge: Apply 250V with 5 times discharge for each polarity +/-
		Testing location: Around the face of LCD	Testing location: 1.Apply to bezel. 2.Apply to Vdd, Vss.

*Suggest not to light the LCM all the time.

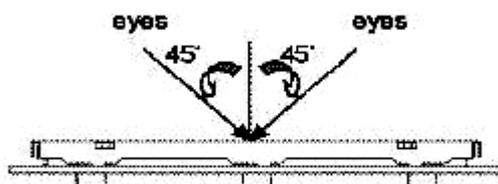
7.2 Mechanical Test

NO.	Test Item	Test Condition	Note
1	Vibration test	Sweep for 1 min at 10Hz , 55Hz , 10Hz , amplitude 1.5mm 15 minutes each in the X , Y and Z directions (Total 45 minutes)	Non operation state
2	Drop test	One angle , three edges and six sides. 75cm above the ground(no weight difference)	Non operation state

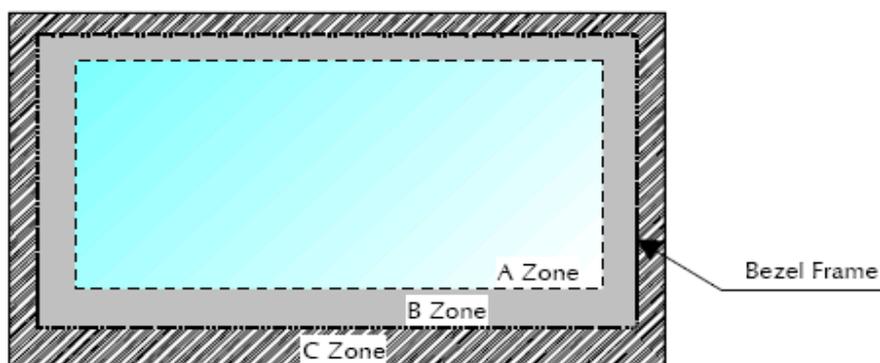
8. Appearance Standards

8.1 Inspection Conditions

The LCD shall be inspected under 40W white fluorescent light. The distance between the eyes and the sample shall be more than 30cm. All directions for inspecting the sample should be within 45° against perpendicular line.



8.2 Definition of Applicable Zones



A Zone : Active display area

B Zone : Area from outside of "A Zone" to validity viewing area

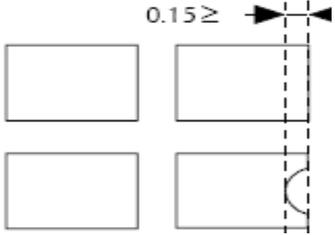
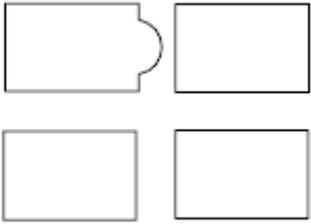
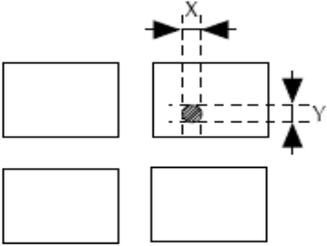
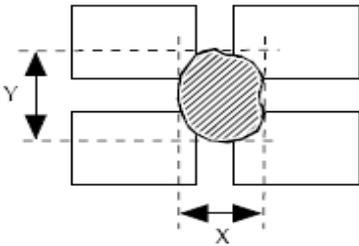
C Zone : Rest parts

A Zone + B Zone = Validity viewing area

8.3 Standards

No.	Parameter	Criteria																																										
1.	Black and White Spots, Foreign Substances	(1) Round Shape																																										
		<table border="1"> <thead> <tr> <th colspan="4">Zone</th> <th colspan="3">Acceptable Number</th> </tr> <tr> <th colspan="4">Dimension (mm)</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>D</td> <td>≤ 0.2</td> <td>*</td> <td>*</td> <td>*</td> </tr> <tr> <td>0.2</td> <td><</td> <td>D</td> <td>≤ 0.3</td> <td>5</td> <td>6</td> <td>*</td> </tr> <tr> <td>0.3</td> <td><</td> <td>D</td> <td>≤ 0.5</td> <td>3</td> <td>4</td> <td>*</td> </tr> <tr> <td>0.5</td> <td><</td> <td>D</td> <td></td> <td>0</td> <td>1</td> <td>*</td> </tr> </tbody> </table>	Zone				Acceptable Number			Dimension (mm)				A	B	C			D	≤ 0.2	*	*	*	0.2	<	D	≤ 0.3	5	6	*	0.3	<	D	≤ 0.5	3	4	*	0.5	<	D		0	1	*
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		(2) Line Shape																																										
		<table border="1"> <thead> <tr> <th colspan="2">Zone</th> <th colspan="3">Acceptable Number</th> </tr> <tr> <th>X (mm)</th> <th>Y (mm)</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>W ≤ 0.03</td> <td>*</td> <td>*</td> <td>*</td> </tr> <tr> <td>L ≤ 2.0</td> <td rowspan="3">0.03 < W ≤ 0.1</td> <td>*</td> <td>*</td> <td>*</td> </tr> <tr> <td>2.0 ≤ L ≤ 4.0</td> <td>3</td> <td>*</td> <td>*</td> </tr> <tr> <td>4.0 < L</td> <td>0</td> <td>2</td> <td>*</td> </tr> <tr> <td>-</td> <td>0.1 < W</td> <td colspan="3">In the same way (1)</td> </tr> </tbody> </table>							Zone		Acceptable Number			X (mm)	Y (mm)	A	B	C	-	W ≤ 0.03	*	*	*	L ≤ 2.0	0.03 < W ≤ 0.1	*	*	*	2.0 ≤ L ≤ 4.0	3	*	*	4.0 < L	0	2	*	-	0.1 < W	In the same way (1)					
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2.	Air Bubbles (between glass & polarizer)	(1) Round Shape																																										
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*: Disregard																																												

To be continued.....

No.	Parameter	Criteria
3.	The Shape of Dot	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="margin-bottom: 20px;">  <p>(1) Dot Shape (with Dent)</p> <p>As per the sketch of left hand.</p> </div> <div style="margin-bottom: 20px;">  <p>(2) Dot Shape (with Projection)</p> <p>Should not be connected to next dot.</p> </div> <div style="margin-bottom: 20px;">  <p>(3) Pin Hole</p> <p>$(X+Y)/2 \leq 0.2\text{mm}$ (Less than 0.1mm is no counted.)</p> </div> <div style="margin-bottom: 20px;">  <p>(4) Deformation</p> <p>$(X+Y)/2 \leq 0.2\text{mm}$</p> </div> <p>Total acceptable number: 1/dot, 5/cell (Defect number of (4): 1pc.)</p> </div>
4.	Polarizer Scratches	Not to be conspicuous defects.
5.	Polarizer Dirts	If the stains are removed easily from LCDP surface, the module is not defective.
6.	Complex Foreign Substance Defects	Black spots, line shaped foreign substance or air bubbles between glass & polarizer should be 5pcs maximum in total.
7.	Distance between different Foreign	$D \leq 0.2$: 20mm or more $0.2 > D$: 40mm or more

9. Precautions

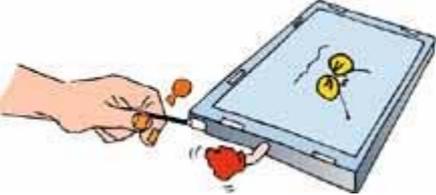
9.1 Operation

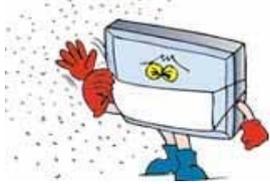
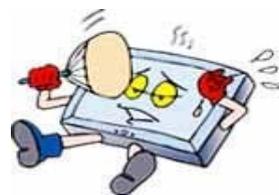
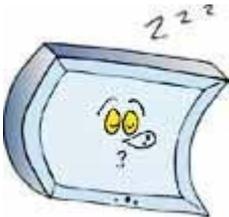
Burn-in sometimes happens when the same character was displayed at along time. Therefore, to prevent Burn-in, it is recommended to set up a Screen-saver function.

9.2 Safety

The liquid crystal in the LCD is poisonous, DO NOT put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

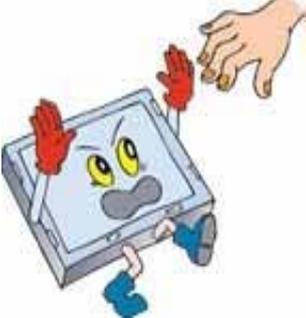
9.3 Handling

	<ul style="list-style-type: none">a. The LCD module shall be installed flat , without twisting or bending.b. COF or FPC has narrow pattern width, so easily become open circuit by external force. DO NOT apply pressure to COF or FPC especially in bending area.
	<ul style="list-style-type: none">c. To avoid damage in appearance or malfunction, DO NOT subject the module to mechanical shock or to excessive force on its surface.
	<ul style="list-style-type: none">d. The polarizer attached to the display is very easy to damage, handle it with care to avoid scratching
	<ul style="list-style-type: none">e. To avoid contamination on the display surface, DO NOT touch the display surface with bare hands.f. Provide a space so that the LCD module does not come into contact with other components components.
	<ul style="list-style-type: none">g. To protect the LCD panel from external pressure, put covering glass (acrylic board or similar board) to keep appropriate space between them.

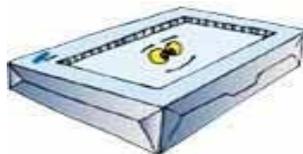
	<p>h. Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.</p>
	<p>i. Property of semiconductor devices may be affected when they are exposed to light possibly resulting in malfunctioning of the ICs. To prevent such malfunctioning of the ICs, your design and mounting layout done are so that the IC is not exposed to light in actual use.</p>
	<p>j. Strong light exposure causes degradation of color filter. It may not recover</p>
	<p>k. DO NOT contact with water to avoid Metal corrosion. l. When it is not in use, the screen must be turned off or the pattern must be frequently changed by a screen saver. If it displays the same pattern for a long period of time, brightness down/image sticking may develop due to the LCD structure.</p>
	<p>m. Never disassemble LCD product under any circumstances. If unqualified operators or users assemble the product after disassembling it, it may not function or its operation may be seriously affected.</p>

9.4 Static electricity

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge.

	<ol style="list-style-type: none"> The LCD module shall be installed flat, without twisting or bending. Ground they operate.soldering iron tips, tools and testers when they operat. Ground your body when handling the products. DO NOT apply voltage to the input terminal without applying power supply. DO NOT apply voltage that exceeds the absolute maximum rating. Peel off protect tape, attached to polarizer, slowly to minimize ESD damage Store the products in an anti-electrostatic container.
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9.5 Storage



Store the products in a dark place at +5 ~+25°C, low humidity (50%RH or less).
DO NOT store the products in an atmosphere containing organic solvents or corrosive gases.

9.6 Cleaning



DO NOT wipe the polarizer with dry cloth, as it might cause scratch.
Wipe the polarizer with a soft cloth soaked with petroleum IPA, other chemicals might damage.

9.7 Waste



When dispose of LCD module, manage it at the production waste according to the relevant laws and regulations.

10. Warranty

This product has been manufactured to your company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

(1) We cannot accept responsibility for any defect, which may arise from additional manufacturing of the product (including disassembly and reassembly), after product delivery

We cannot accept responsibility for any defect, which may arise after the application of strong

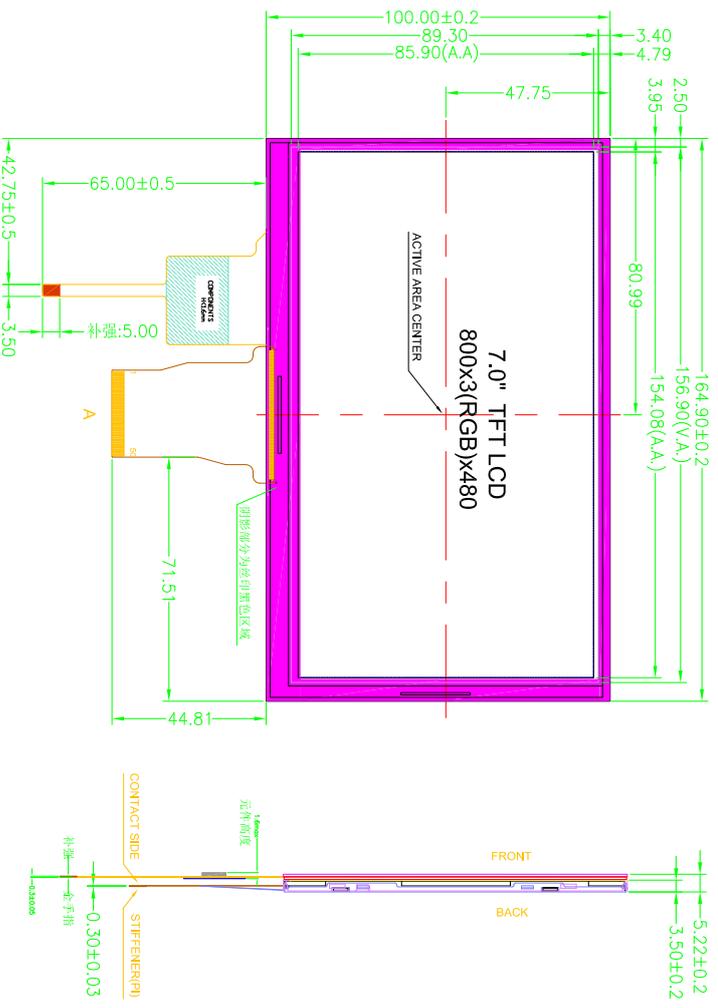
(2) external force to the product

(3) We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed your company's acceptance inspection procedures

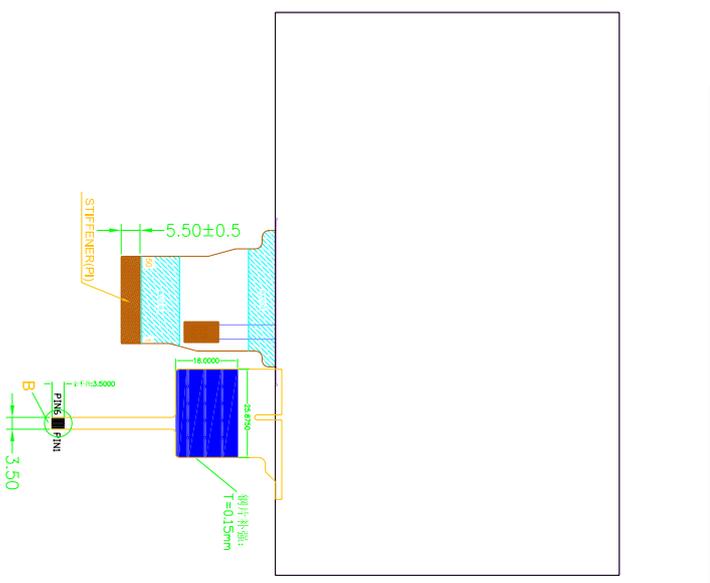
(4) We cannot accept responsibility for industrial property, which may arise through the use of your product, with exception to those issues relating directly to the structure or method of manufacturing of our product. Microtips-origin longer than one year from Microtips production.

Thank you!

REV	DESCRIPTION:	DATE
00	First issue	2017-05-15



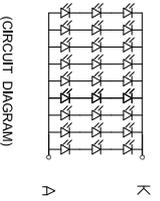
- TFT SPECIFICATION:**
- 1: DISPLAY MODE: TFT TRANSMISSIVE/NORMAL WHITE
 - 2: VIEWING DIRECTION: 6 O'CLOCK
 - 3: OPERATING TEMP: -20°C ~ +70°C ≤90%RH
 - 4: STORAGE TEMP: -30°C ~ +80°C ≤90%RH
 - 5: BACKLIGHT: 27 CHIP WHITE LED, 3 CHIPS IN SERIAL, IF=180mA
 - 6: UNSPECIFIED TOLERANCE: ±0.2



CPT. DRIVE IC: GT9111

FPC #A*	PIN #	TEST SYMBOL
1	RESET	
2	VCC	
3	GND	
4	INT	
5	SDA	
6	SCL	

PIN	SYMBOL
1	LED+
2	LED+
3	LED+
4	LED-
5	LED-
6	VCCM
7	LED-
8	LED-
9	LED-
10	VSD
11	HSD
12	B7
13	B6
14	B5
15	B4
16	B3
17	B2
18	B1
19	B1
20	E7
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	ENR
40	DEPN
41	VGH
42	VGL
43	AVDD
44	RESET
45	NC
46	VCCM
47	DITHB
48	GND
49	GND
50	NC



DESCRIPTION:

SCALE: FIT	UNIT: mm	SHEET: 1 OF 1	NO.: HXY20170515
VERSION	WEB:	DWN:	Huang Xinyi
V00	TEL:	QQ:	

