



# Specification of Display Module

Customer Model Name	
Module Name	PV017401Y0840B
Version No.	V06 2021-10-28

Customer Approval:

- Approve Specification Only
- Approve Specification and Sample

APPROVED BY
DATA:

PREPARED BY	CHECKED BY	APPROVED BY
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# 1. Introduction

## 1.1 Scope of application

This specification applies to the LCD module that is supplied by Kingtech Group Co.,Ltd.This LCD module should be designed for mobile phone use.

LCD specification: Duty 1/180, Dots 240xRGBx180.

As to basic specification of the driver IC, refer to the IC (Himax:HX8347D) specification and data book.

All material & processing of the LCD module should be Free.

## 1.2 TFT features:

Structure: TFT PANNEL+IC+FPC+BL;

TN TFT Type LCD 240 dot-segment and 180 dot-common outputs;

262K Color can be selected by software;

White LED back light;

MCU/RGB interface

## 1.3 Applications:

Smart phone



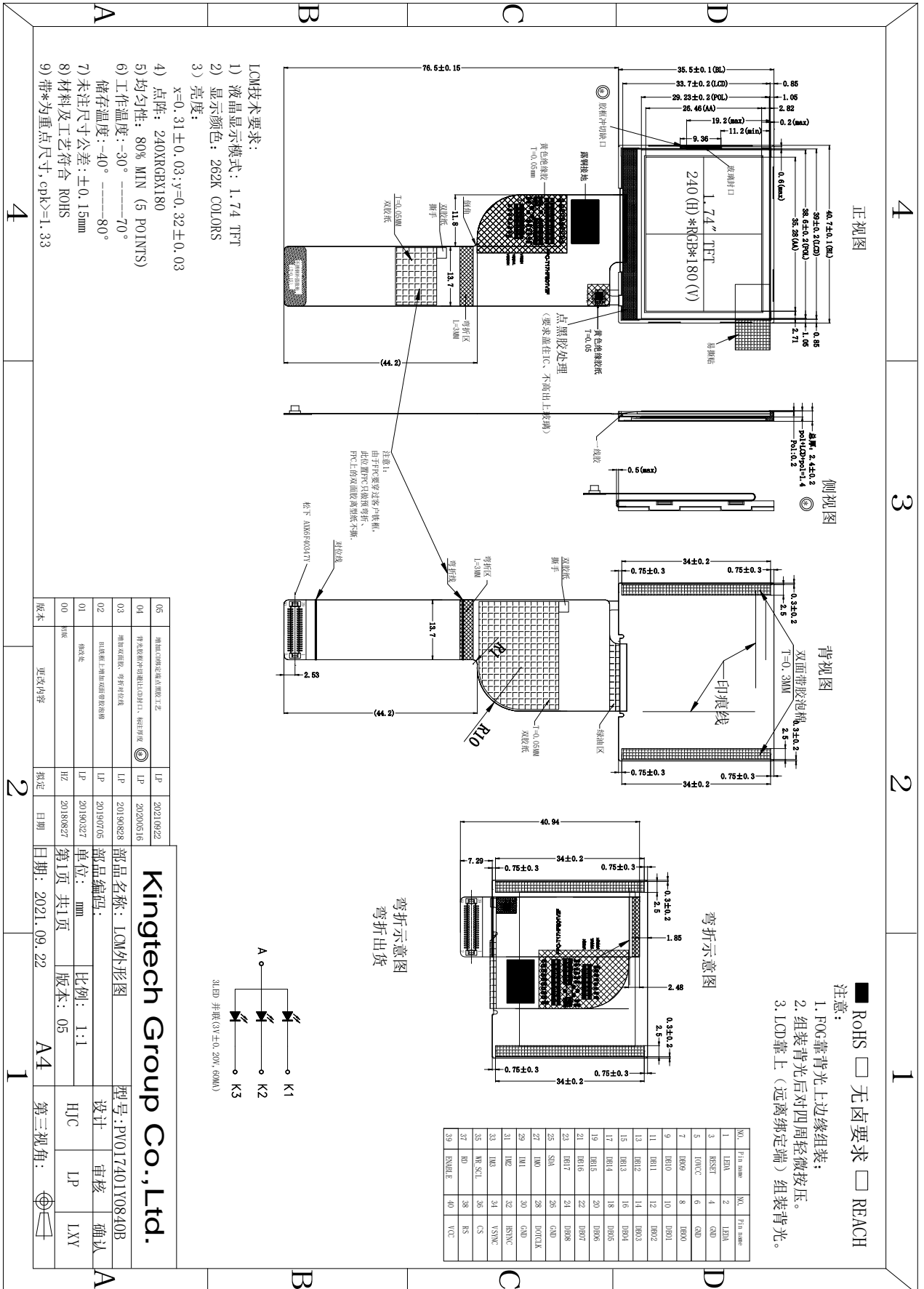
## 2. General specification

### 2.1 LCM General specification

ITEM	Standard value	UNIT
Display Type	Transflective	---
Driver Element	TFT Active matrix	
Number of Dots	240*(RGB)*180	Dots
Pixel Arrangement	RGB Vertical Stripe	
Pixel Pitch (W*H)	0.147*0.147	mm
Active Area	35.28*26.46	mm
Glass Area (W*H*T)	39.00 (H) * 33.70 (V) * 1.0 (T)	mm
LCD Duty	1/180	
NTSC	40 (Type)	%
Direction of gray scale reverse	ALL	
The best viewing direction	8:00	O' Clock
Control IC	HX8347D	
Module Size (W*H*T)	40.70*35.50*2.26	mm
Approx. Weight	8.5 (Type)	g
Module Power consumption (Vcc)	42.9	mW
Back Light	White 3 Parallel LED	



### 3. Mechanical drawing





## 4 LCM Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
I/O power supply	VDDIO	-0.3	3.3	V
Supply voltage for logic	VCI	-0.3	4.6	V
Input voltage for logic	Vt	-0.3	VDDIO+0.3	V
Supply current(LED)	I <sub>LED</sub>	0	25	mA
Operating temperature	Top	-30	+70	°C
Storage temperature	Tst	-40	+80	°C
Humidity	RH	10	90%(Max60 °C)	RH

## 5. Electrical Characteristics

### 5.1 LCD Electrical CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit	Applicable terminal
Supply voltage for logic	VCC/VCI	2.5	2.8	3.3	V	
I/O power supply	IOVCC	1.65	1.8	3.3	V	
Input voltage	V <sub>IL</sub>	-0.3	-	0.2IOVCC	V	
	V <sub>IH</sub>	0.8IOVCC	-	IOVCC	V	
Input leakage current	I <sub>LKG</sub>	-	10	15	μ A	
Output voltage level	V <sub>OL</sub>	-	-	0.2IOVCC	V	
	V <sub>OH</sub>	0.8IOVCC	-	-	V	

### 5.2 BACKLIGHT CHARACTERISTICS

Item	symbol	Min.	Typ.	Max	Unit	Condition
Forward voltage	Vf	2.8	3	3.2	V	If=20mA/LED
Number of LED	-	3			Piece	-
Connection mode	P	3 parallel			-	-



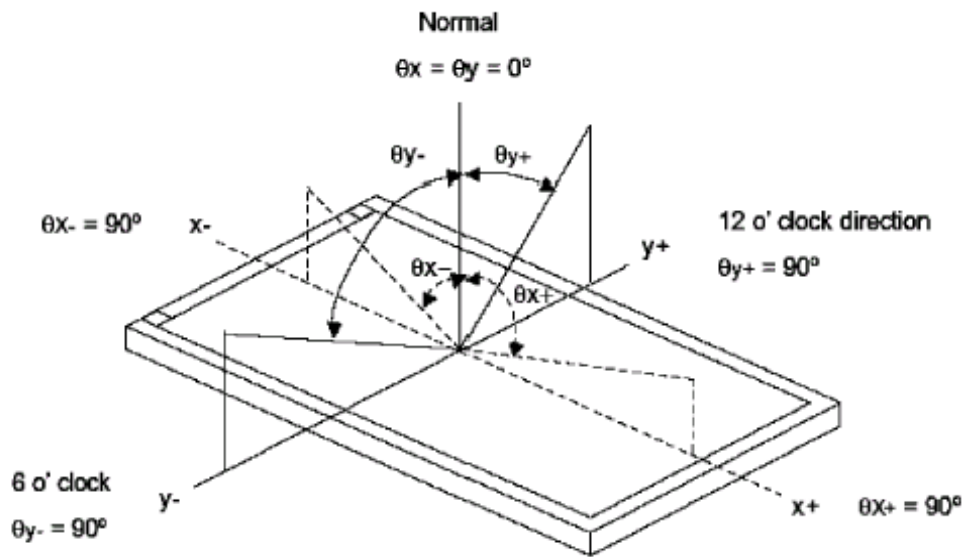
## 6. LCM Optical Characteristics

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE	
			MIN.	TYP.	MAX			
Brightness	Lv	Viewing normal angle	--	160	--	Cd/m <sup>2</sup>	All left side data are based on LEAD' s product reference only	
Contrast Ratio	CR		100	130	--	Note2		
Response Time	Tr+Tf		--	30	50	ms		
Luminance uniformity	δ WHITE		80	--	--	%		
CIE 1931 Color coordinate	Red		Xr	0.602±0.03				/
			Yr	0.320±0.03				/
	Green		Xg	0.288±0.03				/
			Yg	0.552±0.03				/
	Blue		Xb	0.159±0.03				/
			Yb	0.190±0.03				/
	White	Xw	0.299±0.03			/		
		Yw	0.341±0.03			/		
Viewing Angle	Hor.	$\theta_{x+}$	--	50	--	Deg. Note1		
		$\theta_{x-}$	--	40	--			
	Ver.	$\theta_{y+}$	--	40	--			
		$\theta_{y-}$	--	50	--			





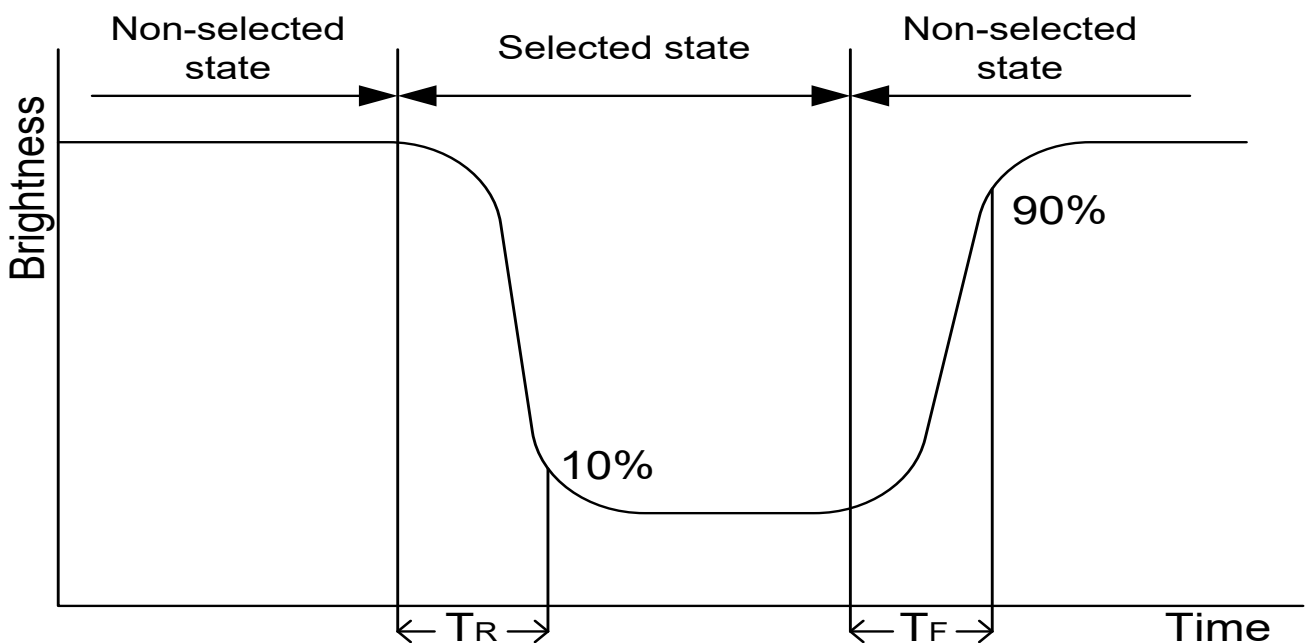
Note 1 : Definition of Viewing Angle  $\theta_x$  and  $\theta_y$  :



Note 2: Definition of contrast ratio CR:

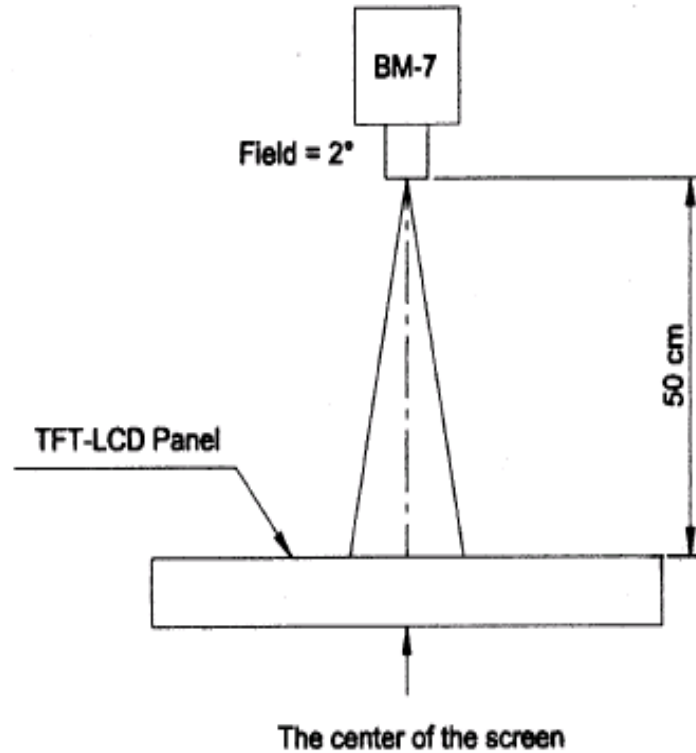
$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

Note 3: Definition of response time ( $T_R$ ,  $T_F$ )

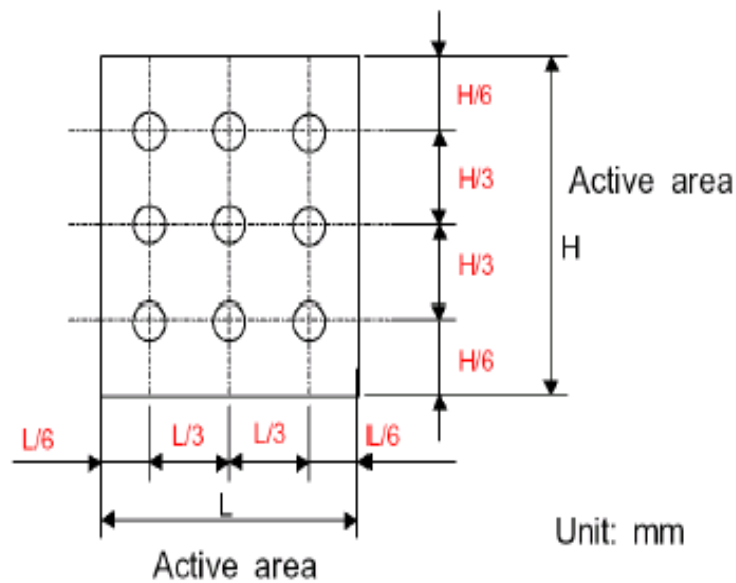




**The brightness test equipment setup**  
 20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)



Note 4 :





## 7. Interface Pin Function

### 7.1 LCM Interface Pin

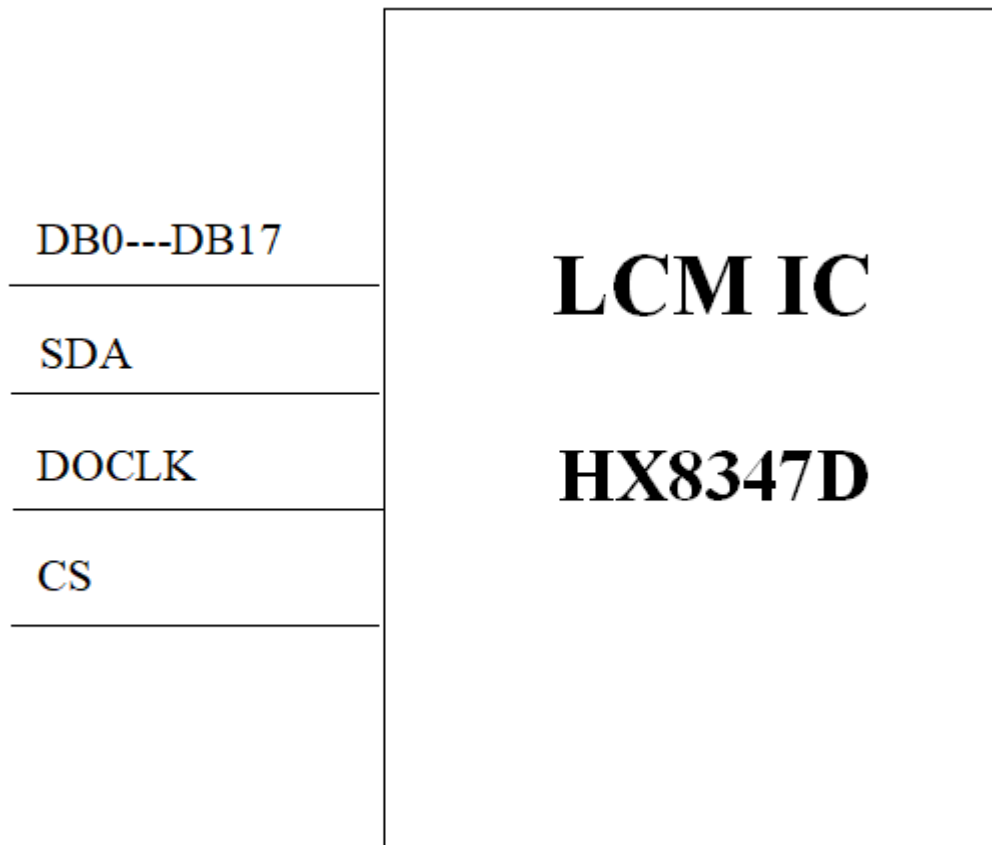
NO.	SYMBOL	Description	I/O
1	LEDA	LED backlight +	P
2	LEDA	LED backlight +	P
3	RESET	Reset signal. Setting either pin low initializes the LSI	I
4	GND	Ground	P
5	IOVCC	Logic IO power supply	P
6	GND	Ground	P
7	DB09	Data bus	I/O
8	DB00	Data bus	I/O
9	DB10	Data bus	I/O
10	DB01	Data bus	I/O
11	DB11	Data bus	I/O
12	DB02	Data bus	I/O
13	DB12	Data bus	I/O
14	DB03	Data bus	I/O
15	DB13	Data bus	I/O
16	DB04	Data bus	I/O
17	DB14	Data bus	I/O
18	DB05	Data bus	I/O
19	DB15	Data bus	I/O
20	DB06	Data bus	I/O
21	DB16	Data bus	I/O
22	DB07	Data bus	I/O
23	DB17	Data bus	I/O
24	DB08	Data bus	I/O
25	SDA	Serial data input pin and output pin in serial bus system interface.	I
26	GND	Ground	P
27	IM0	Interface select.	I
28	DOCLK	Dot clock signal in RGB interface.	I
29	IM1	Interface select.	I
30	GND	Ground	P
31	IM2	Interface select.	I
32	HSYNC	Horizontal synchronizing signal in RGB	I
33	IM3	Interface select.	I
34	VSYNC	Vertical synchronizing signal in RGB interface.	I
35	WR_SCL	Write enable pin I80 parallel bus system interface. (SCL) server as serial data clock in serial bus system interface	I
36	CS	Chip select signal.	I
37	RD	Read enable pin in 80 parallel bus system	I
38	RS	Command / parameter or display data selection	I
39	ENABLE	Data ENABLE signal in RGB mode	I
40	VCC	Power supply voltage (2.8v~3.3v)	P



Note: The voltage power of the interface logic pin depend on “IOVCC” and “GND”, Such as DB<sub>n</sub>, IM<sub>n</sub> and function pins 备注：逻辑接口 PIN 电压取决于 “IOVCC” 和 “GND”，如 DB<sub>n</sub>, IM<sub>n</sub> 和功能 PIN

IM3	IM2	IM1	IM0	Interface	DNC_SCL	NWR_SCL	Data Bus use	
							Register/Content	GRAM
0	0	0	0	8080 MCU 16-bit parallel type I	DNC	NWR	D7-D0	D15-D0: 16-bit data
0	0	0	1	8080 MCU 8-bit parallel type I	DNC	NWR	D7-D0	D7-D0: 8-bit data
0	0	1	0	8080 MCU 16-bit parallel type II	DNC	NWR	D8-D1	D17-10, D8-D1: 16-bit data
0	0	1	1	8080 MCU 8-bit parallel type II	DNC	NWR	D17-D10	D17-D10: 8-bit data
0	1	0	ID	3-wire serial interface	-	SCL		SDA
0	1	1	-	4-wire serial interface	DNC	SCL		SDA
1	0	0	0	8080 MCU 18-bit parallel type I	DNC	NWR	D7-D0	D17-D0: 18-bit data
1	0	0	1	8080 MCU 9-bit parallel type I	DNC	NWR	D7-D0	D8-D0: 9-bit data
1	0	1	0	8080 MCU 18-bit parallel type II	DNC	NWR	D8-D1	D17-D0: 18-bit data
1	0	1	1	8080 MCU 9-bit parallel type II	DNC	NWR	D17-D10	D17-D9: 9-bit data
Other Setting				Setting Invalid				

## 8.LCM Block Diagram





## 9. Caution

### 9.1 Handling of LCM

- . Be sure to ground the body when handling the LCM.
- . Don't give external shock
- . Don't apply excessive force on the surface.
- . Liquid in LCD is hazardous substance. Must not lick and swallow. When the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.
- . Don't operate it above the absolute maximum rating.
- . Don't disassemble the LCM

### 9.2 Storage

- .Store in an ambient temperature of 5°C to 45°C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or intensive ultraviolet rays.
- . Storage in a clean environment, free from dust, active gas, and solvent.
- . Store in anti-static electricity container.
- . Store without any physical load.



# 10.LCM Quality Criteria

## 10.1 VISUAL & FUNCTION INSPECTION STANDARD

### 10.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

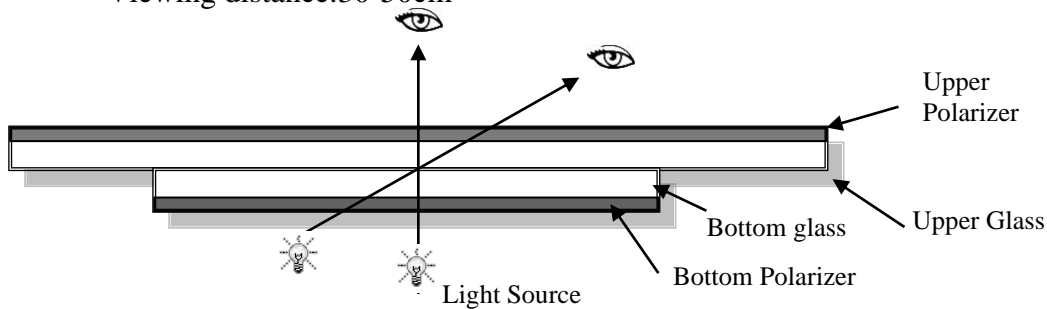
Temperature : 25±5°C

Humidity : 65%±10%RH

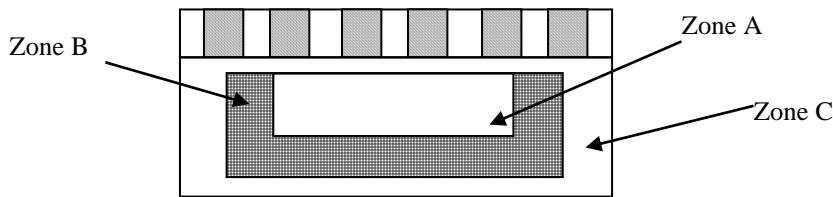
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



### 10.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Note:

As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer.

### 10.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class II

AQL:

Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

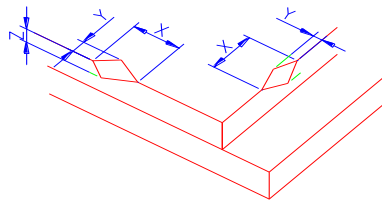
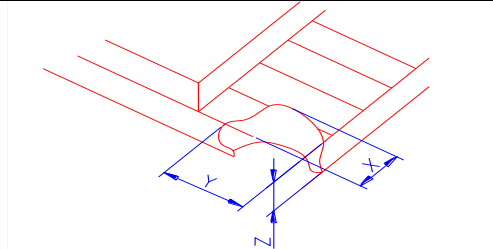
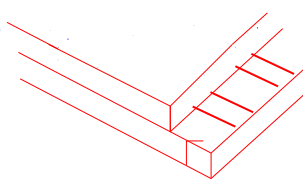
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	



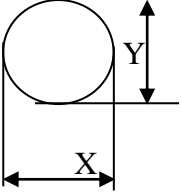


4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	
7	Linearity	No more than 1.5%	

### 10.1.4 Criteria (Visual)

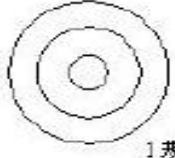

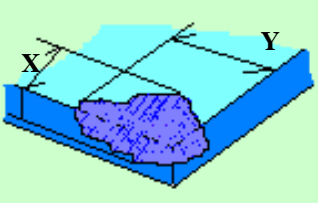
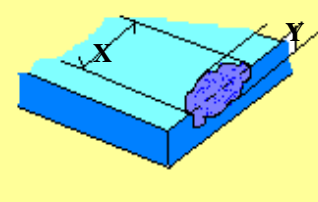
Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken  NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken	 <table border="1" style="margin-top: 10px;"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>≤3.0mm</td> <td>&lt;Inner border line of the seal</td> <td>≤T</td> </tr> </table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
	X	Y	Z					
	≤3.0mm	<Inner border line of the seal	≤T					
(2)LCD corner broken	 <table border="1" style="margin-top: 10px;"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>≤3.0mm</td> <td>≤L</td> <td>≤T</td> </tr> </table> <p>No effective function.</p>	X	Y	Z	≤3.0mm	≤L	≤T	
X	Y	Z						
≤3.0mm	≤L	≤T						
(3) LCD crack	 <p style="text-align: center;">Crack Not allowed</p>							



Number	Items	Criteria (mm)																								
2.0	Clear Spot defect    $\Phi = (X+Y)/2$	① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)  <table border="1"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.1</math></td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.1 &lt; \Phi \leq 0.2</math></td> <td colspan="2">2( distance <math>\geq 5</math>mm)</td> </tr> <tr> <td><math>\Phi &gt; 0.2</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.1 < \Phi \leq 0.2$	2( distance $\geq 5$ mm)		$\Phi > 0.2$	0								
		Zone Size (mm)		Acceptable Qty																						
			A	B	C																					
		$\Phi \leq 0.1$	Ignore		Ignore																					
		$0.1 < \Phi \leq 0.2$	2( distance $\geq 5$ mm)																							
		$\Phi > 0.2$	0																							
		② Dim spot (LCD/TP/Polarizer dim dot, light leakage、dark spot)  <table border="1"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.1</math></td> <td colspan="2">Ignore</td> <td rowspan="4">Ignore</td> </tr> <tr> <td><math>0.1 &lt; \Phi \leq 0.2</math></td> <td colspan="2">2( distance <math>\geq 5</math>mm)</td> </tr> <tr> <td><math>0.2 &lt; \Phi \leq 0.25</math></td> <td colspan="2">1</td> </tr> <tr> <td><math>\Phi &gt; 0.25</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.1 < \Phi \leq 0.2$	2( distance $\geq 5$ mm)		$0.2 < \Phi \leq 0.25$	1		$\Phi > 0.25$	0					
		Zone Size (mm)		Acceptable Qty																						
			A	B	C																					
		$\Phi \leq 0.1$	Ignore		Ignore																					
$0.1 < \Phi \leq 0.2$	2( distance $\geq 5$ mm)																									
$0.2 < \Phi \leq 0.25$	1																									
$\Phi > 0.25$	0																									
③ TP Dirt  <table border="1"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.1</math></td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.1 &lt; \Phi \leq 0.2</math></td> <td colspan="2">2( distance <math>\geq 5</math>mm)</td> </tr> <tr> <td><math>\Phi &gt; 0.2</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.1 < \Phi \leq 0.2$	2( distance $\geq 5$ mm)		$\Phi > 0.2$	0										
Zone Size (mm)		Acceptable Qty																								
	A	B	C																							
$\Phi \leq 0.1$	Ignore		Ignore																							
$0.1 < \Phi \leq 0.2$	2( distance $\geq 5$ mm)																									
$\Phi > 0.2$	0																									
Line defect (LCD/TP /Polarizer black/white line, foreign material on Polarizer scratch, stain)	<table border="1"> <thead> <tr> <th rowspan="2">Width(mm)</th> <th rowspan="2">Length(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.02</math></td> <td>Ignore</td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>0.02 &lt; W \leq 0.03</math></td> <td><math>L \leq 2.0</math></td> <td colspan="2"><math>N \leq 1</math></td> </tr> <tr> <td><math>0.03 &lt; W \leq 0.05</math></td> <td><math>L \leq 1.0</math></td> <td colspan="2"><math>N \leq 1</math></td> </tr> <tr> <td><math>W &gt; 0.05</math></td> <td colspan="3">Define as spot defect</td> </tr> </tbody> </table>	Width(mm)	Length(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.02$	Ignore	Ignore		Ignore	$0.02 < W \leq 0.03$	$L \leq 2.0$	$N \leq 1$		$0.03 < W \leq 0.05$	$L \leq 1.0$	$N \leq 1$		$W > 0.05$	Define as spot defect		
Width(mm)	Length(mm)			Acceptable Qty																						
		A	B	C																						
$\Phi \leq 0.02$	Ignore	Ignore		Ignore																						
$0.02 < W \leq 0.03$	$L \leq 2.0$	$N \leq 1$																								
$0.03 < W \leq 0.05$	$L \leq 1.0$	$N \leq 1$																								
$W > 0.05$	Define as spot defect																									





3.0	Polarizer Bubble	<table border="1"> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> <tr> <td><math>\Phi \leq 0.1</math></td> <td colspan="3">Ignore</td> </tr> <tr> <td><math>0.1 &lt; \Phi \leq 0.25</math></td> <td colspan="3">2 (distance <math>\geq 5</math>mm)</td> </tr> <tr> <td><math>\Phi &gt; 0.25</math></td> <td colspan="3">0</td> </tr> </table>		Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore			$0.1 < \Phi \leq 0.25$	2 (distance $\geq 5$ mm)			$\Phi > 0.25$	0		
		Zone Size (mm)	Acceptable Qty																			
			A	B	C																	
		$\Phi \leq 0.1$	Ignore																			
$0.1 < \Phi \leq 0.25$	2 (distance $\geq 5$ mm)																					
$\Phi > 0.25$	0																					
4.0	SMT	According to IPC-A-610C class II standard . Function defect and missing part are major defect ,the others are minor defect.																				
		Assembly deflection	beyond the edge of backlight $\leq 0.15$ mm																			
		Newton Ring	<p>Newton Ring area <math>&gt; 1/6</math> TP area NG</p> <p>Newton Ring area <math>\leq 1/6</math> TP area OK</p>	 <p>1 规律性</p>																		
Newton Ring	<p>Rule-less Newton Ring area <math>&gt; 1/4</math> TP area NG</p> <p>Rule-less Newton Ring area <math>\leq 1/4</math> TP area OK</p>	 <p>2 非规律性</p>																				
	TP corner broken	<table border="1"> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> <tr> <td><math>X \leq 2.0</math>mm</td> <td><math>Y \leq 2.0</math>mm</td> <td><math>Z &lt; \text{Lens thickness}</math></td> </tr> </table> <p>* Circuitry broken is not allowed.</p>	X	Y	Z	$X \leq 2.0$ mm	$Y \leq 2.0$ mm	$Z < \text{Lens thickness}$														
X	Y	Z																				
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X	Y	Z																				
$X \leq 2.0$ mm	$Y \leq 0.15$ mm	$Z < \text{lens thickness}$																				



		TP Dirt	Zone		Acceptable Qty			
			Size (mm)		A	B	C	
			$\Phi \leq 0.1$		Ignore		Ignore	
			$0.1 < \Phi \leq 0.2$		2( distance $\geq 5$ mm)			
			$\Phi > 0.2$		0			
		Foreign material on TP film	The line can be seen after mobile phone in the operating condition					
			Width(mm)	Length(mm)	Acceptable Qty			
					A	B	C	
			$\Phi \leq 0.03$	Ignore	Ignore		Ignore	
		$0.03 < W \leq 0.05$	$L \leq 3.0$	$N \leq 2$				
			$W > 0.05$	$L > 3$ Define as spot defect				
		Dim line defect Tpfilm scratch	If the scratch can be seen after mobile phone cover assembling or in the operating condition judge by the standards of foreign material on TP film, if the scratch can be seen only in non-operating operation or some special angle,judge by the following					
			Width(mm)	Length(mm)	Acceptable Qty			
					A	B	C	
			$\Phi \leq 0.03$	Ignore	Ignore		Ignore	
		$0.03 < W \leq 0.05$	$L \leq 3.0$	$N \leq 2$				
			$W > 0.05$	Define as spot defect				
		Pattern font	Pattern fonts are clear and symmetrical, Pattern fontsfilter lightly are allowed; the fort line is not allow to thinner or thicker than 1/3 of normal size,and swing is not more than 0.1mm,the line is smooth and not broken					

Criteria ( functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed



## 11 RELIABILITY TEST

NO	ITEM	CONDTTION	STANDARD
1	High Temp. Storage	80°C, 120 hours	1. Functional test is OK. Missing Segment, short, unclear segment, non-display, display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-40°C, 120 hours	
3	High Temp. Operation	70°C, 120 hours	
4	Low Temp. Operation	-30°C, 120 hours	
5	High temperature and high Humidity storage	60°C,93%RH ,48 hours	
6	Thermal and cold shock	Static state, -40°C (30 Min) ~80°C (30 Min) ~ -40°C (30Min) , packaging, 10 cycles	1. Function test is OK. 2. No glass crack, chipped glass, end seal loose and fall, epoxy frame crack and so on. 3. No structure loose and fall.
7	Vibration test	Packaging, Frequency : 10-55Hz Amplitude : 1.5mm, Each direction on X,Y axe 1hour, circle 3 hours	
8	Dropping test	Pack products into the carton box. Drop it from 100cm height to ground. Once for each side of the carton	

### NOTE:

11.1.1 The reliability items will be fully performed in new sample qualification,

11.1.2 The reliability status will be tested as monitor during mass production. Individual reliability test shall be performed by lot , Moreover, the individual reliability item shall be decided according to reliability plan.

11.1.3 All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.

11.1.4 Vibration test: It is not necessary to test for those products without assembly frame , back light ,PCB and so on.

11.1.5 Dropping test : It is necessary for affirming new package.

11.1.6 For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.

11.1.7 Each test item applies for test LCM only once .Then tested LCM cannot be used again in any other test item.

11.1.8 The quantity of LCM examination for each test item is 5pcs to 10pcs.



## 12 PRECAUTIONS FOR USING LCM MODULES

### 12.1 Safety instructions

12.1.1 If the LCD panel breaks, be careful not to get any liquid crystal substance in your mouth.

12.1.2 If the liquid crystal substance touches your skin or clothes, please wash it off immediately by using soap and water.

### 12.2 Handling Precautions

12.2.1 Avoid static electricity damaging the LSI.

12.2.2 Do not remove the panel or frame from the module .

12.2.3 The polarizing plate of the display is very fragile . So, please handle it very carefully.

12.2.4 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.

12.2.5 The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.

12.2.6 Pay attention to the working environment, as the element may be destroyed by static electricity.

--Be sure to ground human body and electric appliance during work.

--Avoid working in a dry environment to minimize the generations of static electricity.

--Static electricity may be generated when the protective film is fast peeled off.

12.2.7 When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.

12.2.8 If the display surface becomes contaminated ,breathe on the surface and gently wipe it with a soft-dry- clean cloth .If it is heavily contaminated ,moisten cloth with the following solvent(ex:Ethyl alcohol).Solvents other than those above-mentioned may damage the polarizer(Especially ,do not use them .ex: Warter / Ketone)

### 12.3 Operation instructions

12.3.1 It is recommended to drive the LCD within the specified voltage limits, try to adjust the operating voltage for the optimal contrast, the color and contrast of LCD panel will varies at different temperature.

12.3.2 Response time is greatly delayed at low 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.

12.3.3 If the display area is pushed hard during operation, the display will become abnormal.

12.3.4 Do not operate the LCD at the environments over the specified conditions, this may cause damage on the LCD and shorten the lifetime.

### 12.4 Storage instructions:

12.4.1 Store LCDs in a sealed polyethylene bag.

12.4.2 Store LCDs in a dark place, Do not expose to sunlight or fluorescent light. Keep the temperature between 0°C and 35°C.

12.4.3 Avoid the polarizer touch any other object, ( It is recommended to store them in the container in which they were shipped.)

### 12.5 Limited Warranty

12.5.1 Kingtech Group Co.,Ltd will replace or repair any of its LCD modules, which are found to be defective, when inspected in accordance with Kingtech Group Co.,Ltd LCM acceptance standards ( copies available upon request ) for a period of 12 months from ink- print date on product

12.5.2 Any defects must be returned to Kingtech Group Co.,Ltd within 60 days since ship-out. Confirmation of such date shall be based on freight documents. The warranty liability of Kingtech Group Co.,Ltd limited to repair and/or replacement on defects above (7.1,7.2)



12.5.3 No warranty can be granted if the precautions stated above have been disregarded. The typical samples are as below:

- LCD glass crack/break
- PCB outlet is damaged or modified.
- PCB conductors damaged.
- Circuit modified with by grinding, engraving or painting varnish.
- FPC crack

12.5.4 Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB outlet, conductors and terminals. Modules must be packed with the container in which they were shipped.





## 13. Packing method -TBD-