



# SPECIFICATION

## PV03501TYD54C-R

Preliminary Specification

Final Specification

Kingtech Group Co.,Ltd

**CUSTOMER:**

**Made By:**

**Checked By:**

**Approved By:**

**Quality:**

**Date:**

**Note:**

**Approved By:**

**Date:**

**Note:**





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# 1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	76.90*63.90*4.35	MM
ACTIVE SIZE (W*H)	70.08*52.56	MM
PIXEL PITCH (W*H)	0.219*0.219	MM
NUMBER OF DOTS	320*240	
DIVER IC	HX8238D	
INTERFACE TYPE	24BIT RGB+SPI	
TOP POLARIZER TYPE	ANTI-GLARE	
RECOMMEND VIEWING DIRECTION	12	O'CLOCK
GRAY SCALE INVERSION DIRECTION	6	O'CLOCK
COLORS	16.7M	
BACKLIGHT TYPE	6-DIES WHITE LED	
TOUCH PANEL TYPE	Resistive TP	



# 2. Mechanical Drawing

PIN DESCRIPTION	
1	LEDK 29 R1
2	LEDK 30 R2
3	LEDA 31 R3
4	LEDA 32 R4
5	YU 33 R5
6	XR 34 R6
7	NC 35 R7
8	RESET 36 HSYNC
9	SPCLK 37 VSYNC
10	SPCLK 38 DCLK
11	SPDAT 39 NC
12	B0 40 NC
13	B1 41 VDD
14	B2 42 VDD
15	B3 43 YD
16	B4 44 XL
17	B5 45 NC
18	B6 46 NC
19	B7 47 NC
20	G0 48 SEL2
21	G1 49 SEL1
22	G2 50 SEL0
23	G3 51 NC
24	G4 52 DEN
25	G5 53 GND
26	G6 54 GND
27	G7
28	R0

Display Type	TFT
Optimum Viewing Direction	12 O'CLOCK
Top Polarizer Type	Anti-Glare
LCD Driver IC	HX8238D
Operating Voltage	VDD=3.3V
Operation Temperature	-20°C TO 70°C
Storage Temperature	-30°C TO 80°C
Interface	24BIT RGB+SPI
Backlight Driver Voltage	6-LED White
BL Surface luminance	2600/m2(9p)
White X/Y	TBD.

DRAWING NO.	
UNIT	PV03501TYD54C-R
mm	SCALE
3rd Angle	SHEET 1 OF 1

TITLE	
MODULE SPEC.	
<b>Kingtech Group Co.,Ltd</b>	

DRAWN	ME. CHECKED	EE. CHECKED	APPROVED	CUSTOMER'S APPROVAL
2016.01.23				
DATE	SIGN			

LEDK ← ← ← ← ← ← ← ← ← ← ← ← ← ← ← ← → LEDK  
LED CIRCUIT DIAGRAM  
15.206/04h

YU XR XL YD  
3.51" TFT  
320\*(RGB)P240  
VIEWING DIRECTION

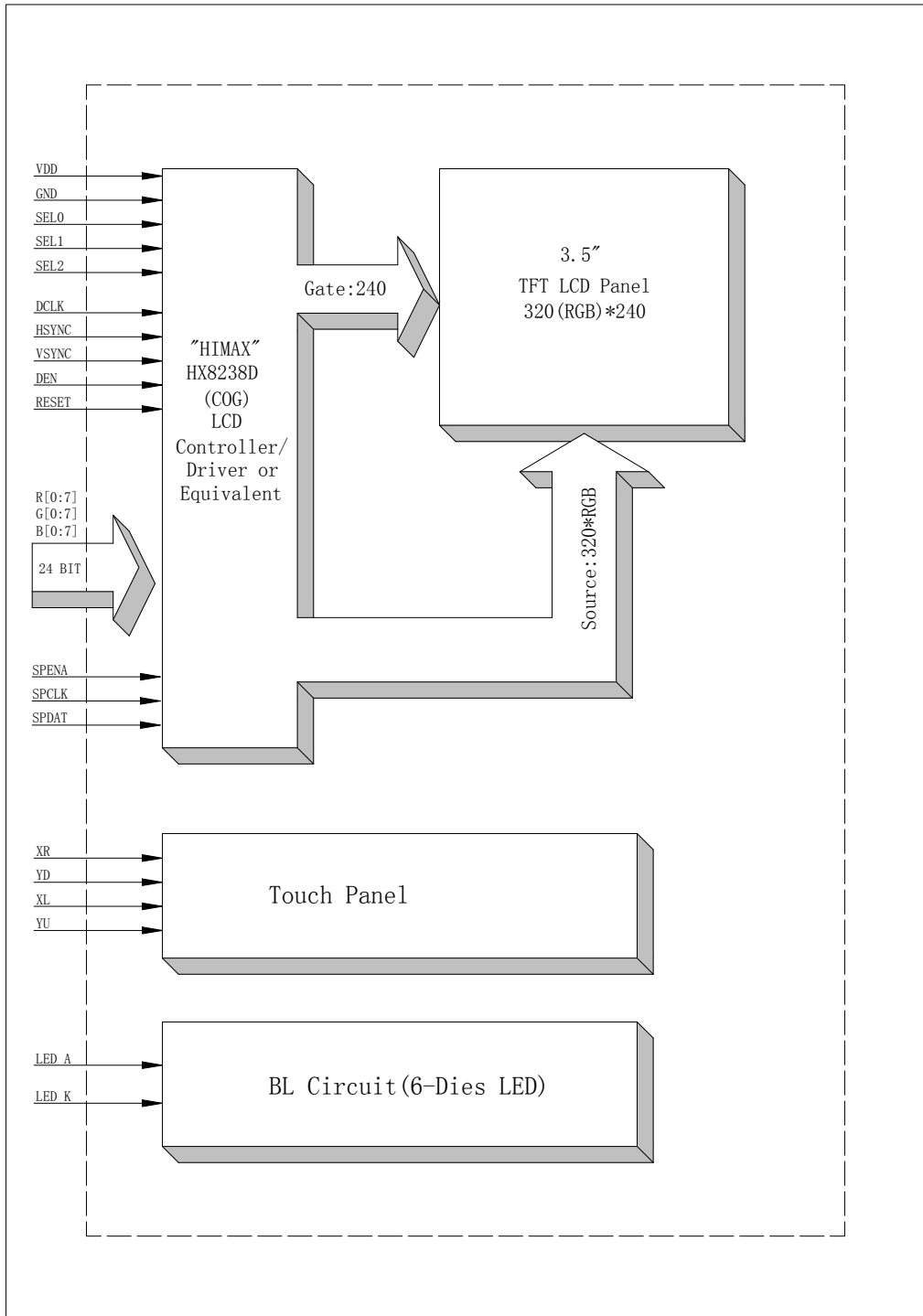
FRONT BACK

铁框压印

NOTES:  
1. General Tolerance±0.2  
2. ( ) reference dimension.  
3. Recommended case open area should be less than module V.A  
4. Recommended cushion adherent area: 1P V.A±1.6mm  
5. RoHS must be compliant.



### 3. Block Diagram





## 4. Interface Pin Function

Pin No.	Symbol	Description
1	LEDK	Cathode of LED backlight
2	LEDK	Cathode of LED backlight
3	LEDA	Anode of LED backlight
4	LEDA	Anode of LED backlight
5	YU	Touch panel control PIN: YU
6	XR	Touch panel control PIN: XR
7	NC	No connect
8	RESET	RESET PIN
9	SPENA	Chip select of serial interface
10	SPCLK	Clock pin of serial interface
11	SPDAT	Data input pin of serial interface
12~19	B0~B7	Blue data bus
20~27	G0~G7	Green data bus
28~35	R0~R7	Red data bus
36	HSYNC	Horizontal sync signal; negative polarity
37	VSYNC	Vertical sync signal; negative polarity
38	DCLK	Clock signal; latching data at the falling edge
39	NC	Touch panel control PIN: XL
40	NC	Touch panel control PIN: YU
41	VCC	Power supply
42	VCC	Power supply
43	YD	Touch panel control PIN: YD
44	XL	Touch panel control PIN: XL
45	NC	No connect
46	NC	No connect
47	NC	No connect
48	SEL2	Interface mode select(note)
49	SEL1	
50	SEL0	
51	NC	No connect
52	DEN	Display enable pin from controller
53	GND	Power ground
54	GND	Power ground



## Note:

1. The mode control (SEL2) not use, it can't control CCIR601 interface, If not use CCIR601, it can floating.
2. For digital RGB input data format, both SYNC mode and DE+SYNC mode are supported. If DE signal is fixed low, SYNC mode is used. Otherwise, DE+SYNC mode is used. Suggest used SYNC mode!! Suggest the DE signal usually pull low.
3. IF select serial RGB or CCIR601/656 input mode is selected, only DX0-DX7 used, and the other short to GND, Only selected serial RGB、CCIR601/656 interface, DX BUS will enable, Digital input mode DX0 is LSB and DX7 is MSB.

## Interface select table

SEL2	SEL1	SEL0	Interface Mode
0	0	0	Parallel-RGB Data format interface (only support stripe type color filter)
0	0	1	Serial-RGB data format
0	1	0	CCIR 656 data format (640RGB)
0	1	1	CCIR 656 data format (720RGB)
1	0	0	YUV mode A data format(Cr-Y-Cb-Y)
1	0	1	YUV mode A data format(Cr-Y-Cb-Y)
1	1	0	YUV mode B data format(Cb-Y-Cr-Y)
1	1	1	YUV mode B data format(Cb-Y-Cr-Y)





## 5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for analog	VDD	-0.3	4.5	V
Supply voltage for logic	VDD	-0.3	4.5	V
Supply current (One LED)	I <sub>LED</sub>		30	mA
Operating temperature	T <sub>OP</sub>	-20	+70	°C
Storage temperature	T <sub>ST</sub>	-30	+80	°C

Note: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.



## 6. Electrical Characteristics

### 6.1 Input Power

Item	Symbol	Min	Typ.	Max	Unit	Applicable terminal
Supply Voltage for Analog	VDD	3.0	3.3	3.6	V	
Supply Voltage for Logic	VDD	3.0	3.3	3.6	V	
Input Voltage	V <sub>IL</sub>	GND	-	0.3VCC	V	
	V <sub>IH</sub>	0.7 VCC	-	VCC		
Input leakage Current	I <sub>LKG</sub>	-1		1	μA	

### 6.2 Backlight Driving Conditions

Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V <sub>F</sub>	-	19.2	-	V	I <sub>L</sub> =40mA
Current for LED Backlight	I <sub>L</sub>		20	30	mA	
Power Consumption	P		0.384		W	
LED Life Time		30,000	50,000		Hr	Note

**Note:** Brightness to be decreased to 50% of the initial value at ambient temperature TA=25°C



## 7. Touch Panel Specifications

### 7.1 Electrical Characteristics

ITEM	SPECIFICATIONS			UNIT	REMARK
	MIN.	TYP.	MAX		
Linearity	-1.5	-	1.5	%	After environment & life test
Terminal Resistance	400	-	900	ohm	X(Film side)
	200	-	600	ohm	Y(Glass side)
Insulation Resistance	20	-	-	Mohm	DC 25V 1min
Operating Voltage	-	5	-	V	DC

### 7.2 Optical Characteristics

ITEM	SPECIFICATIONS			UNIT	REMARK
	MIN.	TYP.	MAX		
Response Time	-	-	10	ms	100kohm pull-up
Light Transparency	78	-	-	%	

### 7.3 Mechanical Characteristics

ITEM	SPECIFICATIONS			UNIT	REMARK
	MIN.	TYP.	MAX		
Operation Force	-	-	100	gf	Note1
Surface Hardness	3	-	-	H	
Pen Sliding Durability			100,000	times	Note2
Hitting Durability	1,000,000			times	Note3

Note 1: Do not operate it with a thing except a polyacetal pen (tip R0.8mm or less) or a finger, especially those with hard or sharp tips such as a ball point pen or a mechanical pencil.

Depending on the pitch & the dimension of the spacer dots in between.

Note 2: Measurement for surface area.

-Scratch 100,000 times straight line on the film with a stylus change every 20,000 times.

-Force: 100gf.

-Speed: 60mm/sec.

-Stylus: R0.8 polyacetal tip.

Note 3: Hit 1,000,000 times on the film with an R12.5mm tip.

-Force: 250gf.

-Speed: 2 times/sec.

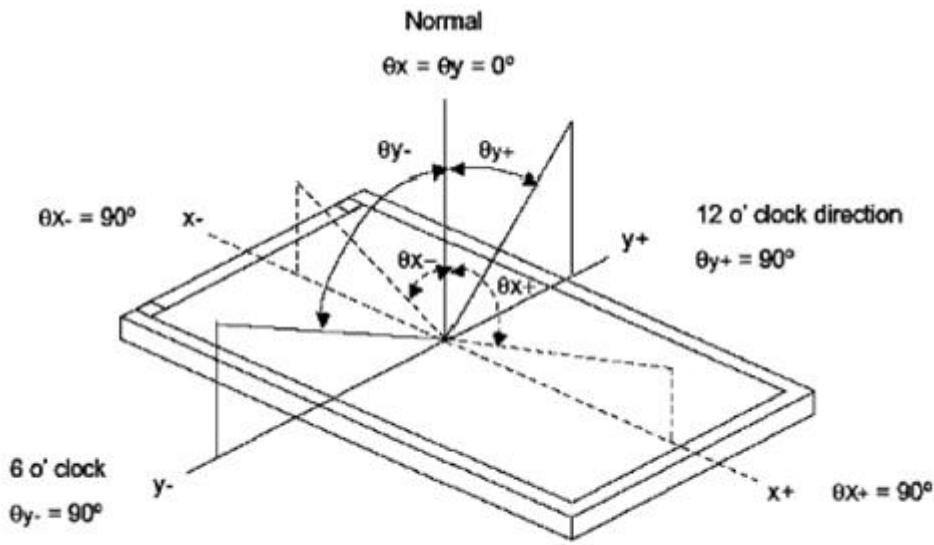


## 8. Optical Characteristics

ITEM	SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
			MIN	TYP.	MAX		
Luminance	L	$I_L = 20\text{mA}$	190	240	290	$\text{Cd/m}^2$	
Contrast Ratio	CR	$\theta = 0^\circ$	200	300			
Response Time	$T_{\text{ON}}$	$25^\circ\text{C}$		15	30	ms	
	$T_{\text{OFF}}$			35	50		
CIE Color Coordinate	Red	$X_R$	Viewing normal angle	0.581	0.601	0.621	
		$Y_R$		0.344	0.364	0.384	
	Green	$X_G$		0.317	0.337	0.357	
		$Y_G$		0.571	0.591	0.611	
	Blue	$X_B$		0.122	0.142	0.162	
		$Y_B$		0.071	0.091	0.111	
	White	$X_W$		0.270	0.290	0.310	
		$Y_W$		0.294	0.314	0.334	
Viewing Angle	Hor.	$\theta_{X+}$	$\text{CR} \geq 10$		60	Degree	
		$\theta_{X-}$			60		
	Ver.	$\theta_{Y+}$			50		
		$\theta_{Y-}$			60		
Uniformity	Un			80		%	



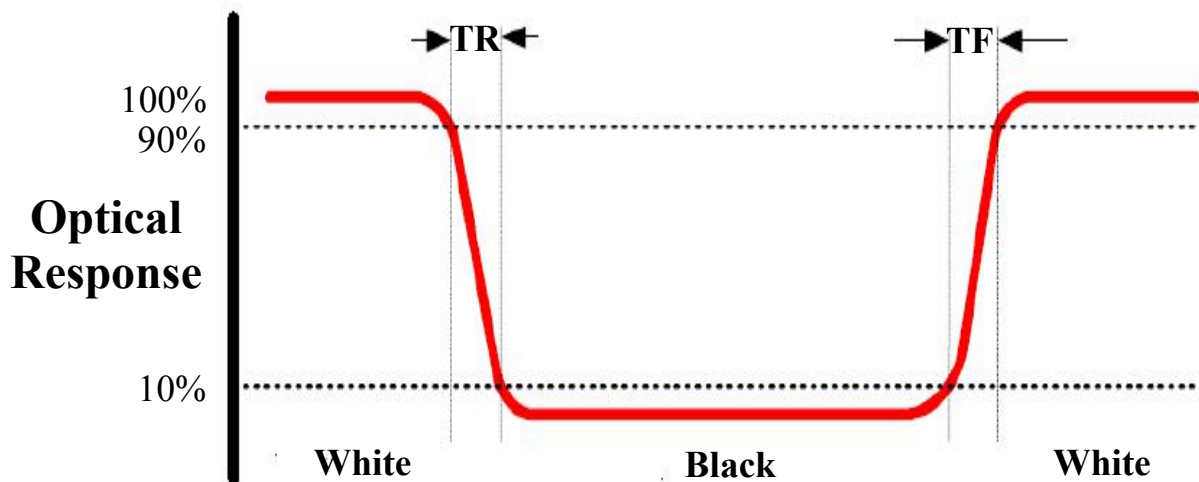
**Note 1: Definition of Viewing Angle  $\theta_x$  and  $\theta_y$ :**



**Note 2: Definition of contrast ratio CR:**

$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$

**Note 3: Definition of Response Time ( $T_r, T_f$ )**

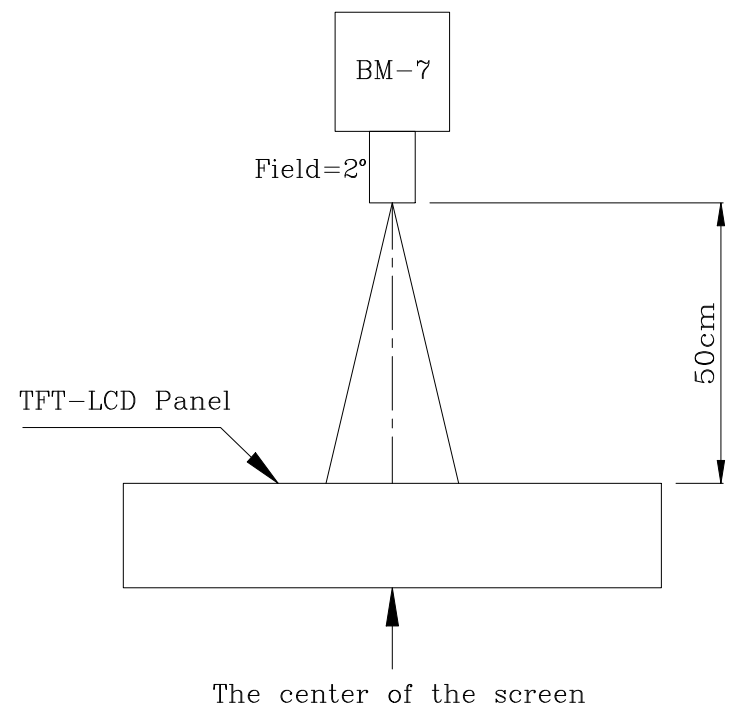




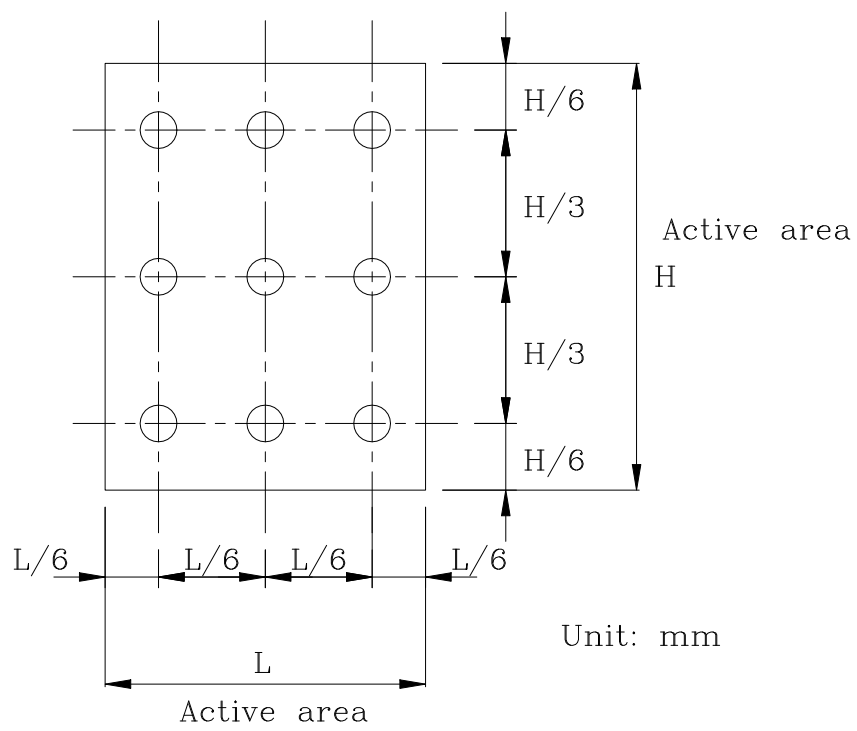
### Note 4: Definition of Luminance

#### ①The Brightness Test Equipment Setup

Field=2° (As measuring “black” image, field=2° is the best testing condition)



#### ②The Brightness Test Point Setup

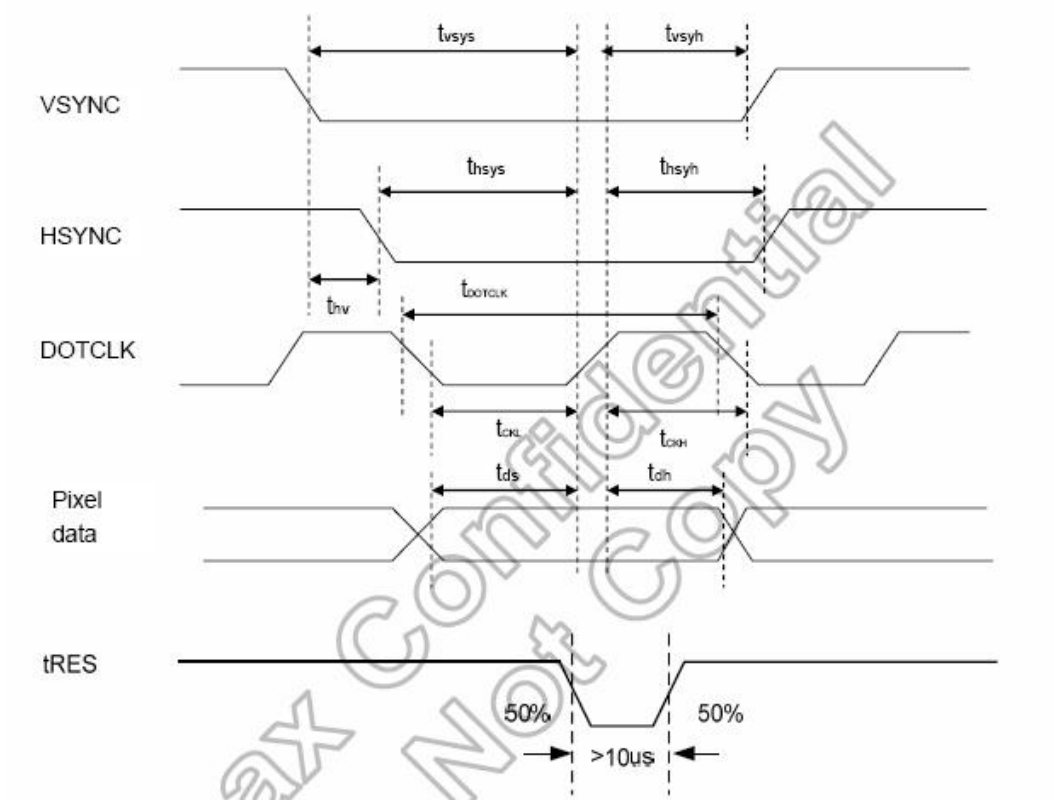






# 9. Timing Characteristics

## 9.1 Pixel Timing Diagram

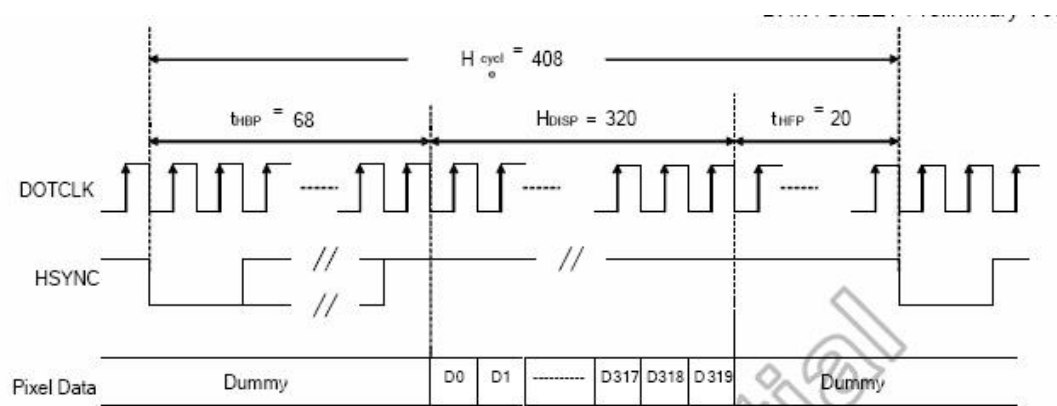


Characteristics	Symbol	Min.		Typ.		Max.		Unit
		24 bit	8 bit	24 bit	8 bit	24 bit	8 bit	
DOTCLK Frequency	fDOTCLK	-	-	6.5	19.5	10	30	MHz
DOTCLK Period	tDOTCLK	100	33.3	154	51.3	-	-	ns
Vertical Sync Setup Time	tvsys	20	10	-	-	-	-	ns
Vertical Sync Hold Time	tvsyh	20	10	-	-	-	-	ns
Horizontal Sync Setup Time	thsys	20	10	-	-	-	-	ns
Horizontal Sync Hold Time	thsyh	20	10	-	-	-	-	ns
Phase difference of Sync Signal Falling Edge	thv	1		-		240		tDOTCLK
DOTCLK Low Period	tCKL	50	15	-	-	-	-	ns
DOTCLK High Period	tCKH	50	15	-	-	-	-	ns
Data Setup Time	tds	12	10	-	-	-	-	ns
Data hold Time	tdh	12	10	-	-	-	-	ns
Reset pulse width	tRES	10		-		-		µs

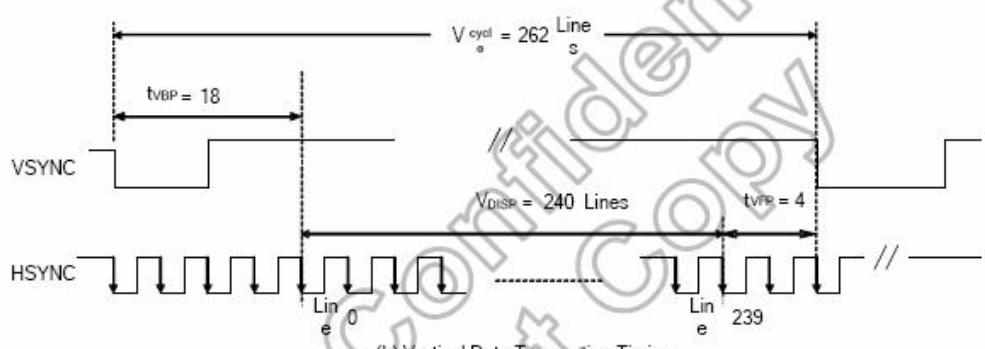
**Note:** External clock source must be provided to DOTCLK pin of HX8238-D. The driver will not operate if absent of the clocking signal.



## 9.2 SYNC mode Timing Diagram



(a) Horizontal Data Transaction Timing



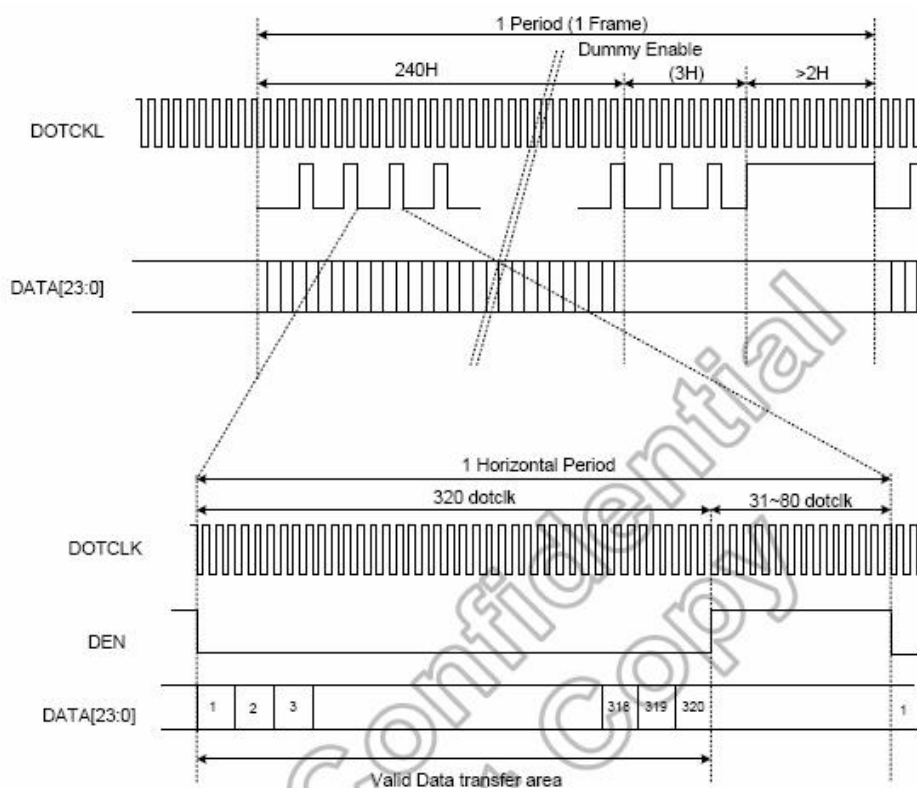
(b) Vertical Data Transaction Timing

Characteristics	Symbol	Min.		Typ.		Max.		Unit
		24 bit	8 bit	24 bit	8 bit	24 bit	8 bit	
DOTCLK Frequency	fDOTCLK	-	-	6.5	19.5	10	30	MHz
DOTCLK Period	tDOTCLK	100	33.3	154	51.3	-	-	ns
Horizontal Frequency (Line)	fH	-	-	14.9		22.35		KHz
Vertical Frequency (Refresh)	fV	-	-	60		90		Hz
Horizontal Back Porch	tHBP	-	-	68	204	-	-	tDOTCLK
Horizontal Front Porch	tHFP	-	-	20	60	-	-	tDOTCLK
Horizontal Data Start Point	tHBP	-	-	68	204	-	-	tDOTCLK
Horizontal Blanking Period	tHBP + tHFP	-	-	88	264	-	-	tDOTCLK
Horizontal Display Area	HDISP	-	-	320	960	-	-	tDOTCLK
Horizontal Cycle	Hcycle	-	-	408	1224	450	1350	tDOTCLK
Vertical Back Porch	tVBP	-	-	18		-	-	Lines
Vertical Front Porch	tVFP	-	-	4		-	-	Lines
Vertical Data Start Point	tVBP	-	-	18		-	-	Lines
Vertical Blanking Period	tVBP + tVFP	-	-	22		-	-	Lines
Vertical Display Area	NTSC	VDISP	-	240		-	-	Lines
	PAL			280(PALM=0)				
	PAL			288(PALM=1)				
Vertical Cycle	NTSC	Vcycle	-	262		350	-	Lines
	PAL			313				





### 9.3 DE mode Timing Diagram



Characteristics	Symbol	Min.		Typ.		Max.		Unit
		24-bit	8-bit	24-bit	8-bit	24-bit	8-bit	
DOTCLK Frequency	fDOTCLK	-	-	6.5	19.5	10	30	MHz
DOTCLK Period	tDOTCLK	100	33.3	154	51.3	-	-	ns
Horizontal Blanking Period	tHBP + tHFP	52	146	88	264	180	960	tDOTCLK
Horizontal Display Area	HDISP	-	-	320	960	-	-	tDOTCLK
Horizontal Cycle	Hcycle	372	1106	408	1224	500	1920	tDOTCLK
Vertical Blanking Period	tVBP + tVFP	2	-	-	-	47	-	Lines
Vertical Display Area	VDISP	-	-	240	-	-	-	Lines
Vertical Cycle	Vcycle	242	-	-	-	287	-	Lines

Note: The above parallel RGB interface timing sequence is for reference only. For the other interface timing sequence, please refer to the driver IC(HX8238D) data sheet.



# 10. Standard Specification for Reliability

## 10.1 Standard Specification for Reliability of LCD Module

No.	Item	Description
01	High temperature operation	The sample should be allowed to stand at 70°C for 120 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
02	Low temperature operation	The sample should be allowed to stand at -20°C for 120 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
03	High temperature storage	The sample should be allowed to stand at 80°C for 240 hours under no-load condition, and then returning it to normal temperature condition and allowing it stand for 2 hours.
04	Low temperature storage	The sample should be allowed to stand at -30°C for 240 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.
05	Moisture storage	The sample should be allowed to stand at 60°C, 90%RH MAX for 240 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.
06	Thermal shock storage	The sample should be allowed to stand the following 10 cycles : -30°C for 30 minutes → normal temperature for 5 minutes → +80°C for 30 minutes → normal temperature for 5 minutes, as one cycle.
07	Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm    Sweep time: 12 min X, Y, Z 2 hours for each direction.
08	Packing drop test	According to ASTM-D-5327.
09	Electrical Static Discharge	Air: ±4KV 150pF/330Ω 5 times
		Contact: ±2KV 150pF/330Ω 5 time

\*Sample size for each test item is 3~5pcs



## 10.2 Testing Conditions and Inspection Criteria

For the final test, the testing sample must be stored at room temperature for 24 hours. After the tests listed in Table 9.2, standard specifications for reliability will be executed in order to ensure stability.

No.	Item	Test Model	In section Criteria
01	Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
02	Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
03	Appearance	Visual inspection	Defect free.

## 10.3 MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±5°C), normal humidity (50±10% RH), and in area not exposed to direct sun light.
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## 11. Specification of Quality Assurance

This standard of Quality Assurance confirms to the quality of LCD module products supplied by Kingtech

### 11.1 Quality Test

Before delivering, the supplier should conduct the following tests to confirm the quality of products.

- Electrical-Optical Characteristics: According to the individual specification to test the product.
- Appearance Characteristics: According to the individual specification to test the product.
- Reliability Characteristics: According to the definition of reliability on the specification for testing products.

### 11.2 Delivery Test

Before delivering, the supplier should conduct the delivery test.

- Test method: According to MIL-STD105E.General Inspection Level II take a single time.
- The defects classify of AQL as following:  
Major defect: AQL = 0.65  
Minor defect: AQL = 2.5  
Total defects: AQL = 2.5

### 11.3 Non-conforming Analysis & Deal with Manners

#### 11.3.1 Non-conforming Analysis

- Purchaser should provide the data detail of non-conforming sample and the non-conforming.
- After receiving the data detail from purchaser, the analysis of non-conforming should be finished within two weeks.
- If the analysis can't be finished on time, supplier must notice purchaser 3 days in advance.

#### 11.3.2 Disposition of non-conforming

- If any product defect be found during assembling, supplier must change the good for every defect after confirmation.
- Both supplier and customer should analyze the reason and discuss the disposition of non-conforming when the reason of nonconforming is not sure.



## 11.4 Agreement items

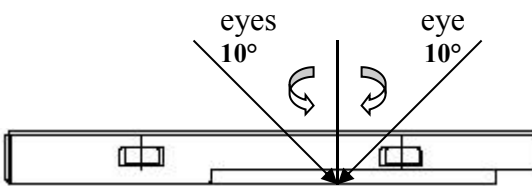
Both parties should negotiate together when the following problems happen.

- There is any problem of standard of quality assurance, and both sides should agree that it must be modified.
- There is any argument item which does not record in the standard of quality assurance.
- Any other special problem.

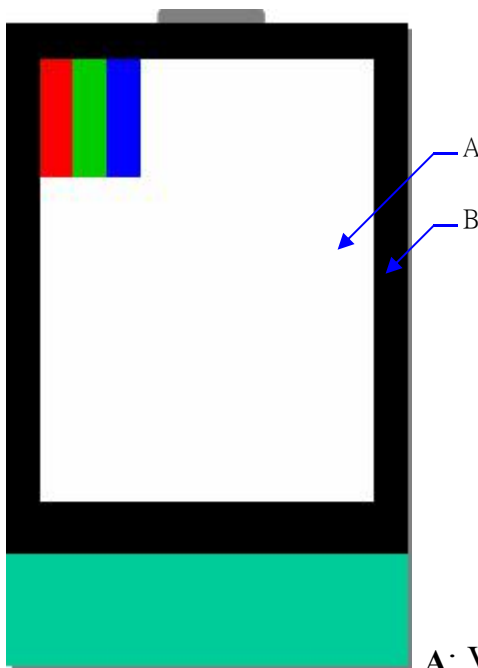
## 11.5 Standard of the Product Appearance Test

### 11.5.1 Manner of appearance test

- The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must be at 30±5cm.
- When test the model of transmissive product must add the reflective plate.
- The test direction is base on around 10° of vertical line.
- Temperature: 25±5°C Humidity: 60±10%RH



- Definition of area:



A: Viewing area B: Outside viewing area



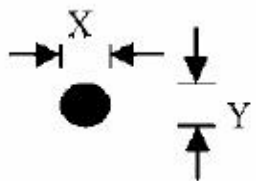
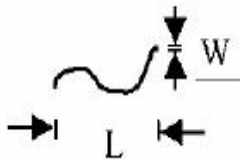
## 11.5.2 Basic principle

- When the standard cannot be described, AQL will be applied.
- The sample of the lowest acceptable quality level must be negotiated by both supplier and customer when any dispute happened.
- New item must be added on time when it is necessary.

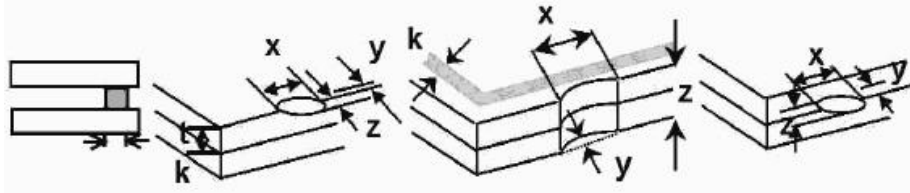
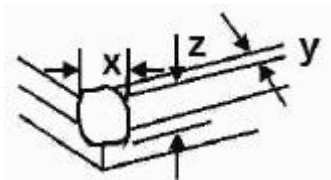




## 11.6 Inspection Specification

NO.	Item	Criterion	AQL												
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product types. 1.8 Flicker	0.65												
02	Black or White spots or Bright spots or Color spots on LCD (Display only)	2.1 White and black or color spots on display $\leq 0.25\text{mm}$ , no more than Five spots. 2.2 Densely spaced: No more than three spots within 3mm.	2.5												
03	LCD and Touch Panel black spots, white spots, contamination (non – display)	3.1 Round type: As following drawing $\Phi = (X+Y) / 2$  <table border="1" data-bbox="821 1120 1356 1377"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.10</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.10 &lt; \Phi \leq 0.20</math></td> <td>2</td> </tr> <tr> <td><math>0.20 &lt; \Phi \leq 0.25</math></td> <td>2</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.30</math></td> <td>1</td> </tr> <tr> <td><math>0.30 &lt; \Phi</math></td> <td>0</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two spots within 3mm.</p>	Size(mm)	Acceptable Q'ty	$\Phi \leq 0.10$	Accept no dense	$0.10 < \Phi \leq 0.20$	2	$0.20 < \Phi \leq 0.25$	2	$0.25 < \Phi \leq 0.30$	1	$0.30 < \Phi$	0	2.5
		Size(mm)	Acceptable Q'ty												
$\Phi \leq 0.10$	Accept no dense														
$0.10 < \Phi \leq 0.20$	2														
$0.20 < \Phi \leq 0.25$	2														
$0.25 < \Phi \leq 0.30$	1														
$0.30 < \Phi$	0														
3.2 Line type: (As following drawing)  <table border="1" data-bbox="726 1523 1356 1803"> <thead> <tr> <th>Length(mm)</th> <th>Width(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>---</td> <td><math>W \leq 0.02</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>L \leq 3.0</math></td> <td><math>0.02 &lt; W \leq 0.05</math></td> <td rowspan="2">2</td> </tr> <tr> <td><math>L \leq 2.5</math></td> <td><math>0.03 &lt; W \leq 0.08</math></td> </tr> <tr> <td>---</td> <td><math>0.08 &lt; W</math></td> <td>Rejection</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two lines within 3mm.</p>	Length(mm)	Width(mm)	Acceptable Q'ty	---	$W \leq 0.02$	Accept no dense	$L \leq 3.0$	$0.02 < W \leq 0.05$	2	$L \leq 2.5$	$0.03 < W \leq 0.08$	---	$0.08 < W$	Rejection	2.5
Length(mm)	Width(mm)	Acceptable Q'ty													
---	$W \leq 0.02$	Accept no dense													
$L \leq 3.0$	$0.02 < W \leq 0.05$	2													
$L \leq 2.5$	$0.03 < W \leq 0.08$														
---	$0.08 < W$	Rejection													



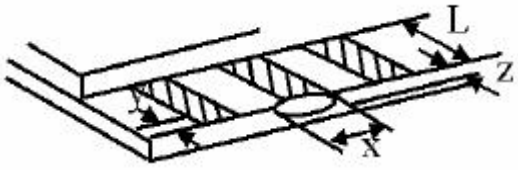
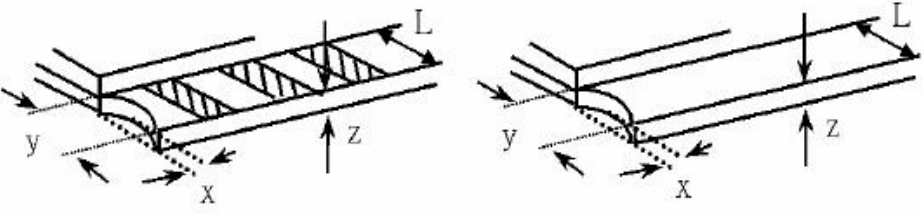
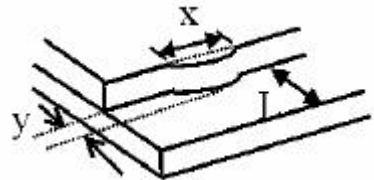
NO.	Item	Criterion	AQL																		
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction	Size $\Phi$ (mm)	Acceptable Q'ty																	
			$\Phi \leq 0.20$	Accept no dense																	
			$0.20 < \Phi \leq 0.50$	3																	
			$0.50 < \Phi \leq 1.00$	2																	
			$1.00 < \Phi$	0																	
		Total Q'ty	3																		
05	Scratches	Follow NO.3 -2 Line Type.																			
06	Chipped glass	<p>Symbols:                      x: Chip length    y: Chip width    z: Chip thickness                      k: Seal width    t: Glass thickness    a: LCD side length                      L: Electrode pad length</p> <p>6.1 General glass chip:                      6.1.1 Chip on panel surface and crack between panels:</p>  <table border="1"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td><math>Z \leq 1/2t</math></td> <td>Not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> <tr> <td><math>1/2t &lt; z \leq 2t</math></td> <td>Not exceed 1/3k</td> <td><math>x \leq 1/8a</math></td> </tr> </tbody> </table> <p>⊙ Unit: mm                      ⊙ If there are 2 or more chips, x is the total length of each chip</p> <p>6.1.2 Corner crack:</p>  <table border="1"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td><math>Z \leq 1/2t</math></td> <td>Not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> <tr> <td><math>1/2t &lt; z \leq 2t</math></td> <td>Not exceed 1/3k</td> <td><math>x \leq 1/8a</math></td> </tr> </tbody> </table> <p>⊙ Unit: mm                      ⊙ If there are 2 or more chips, x is the total length of each chip</p>	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	2.5
		z: Chip thickness	y: Chip width	x: Chip length																	
		$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																	
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$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																			
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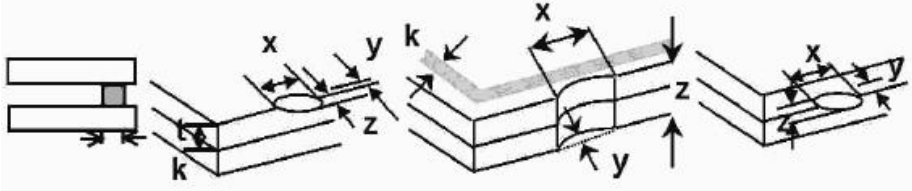
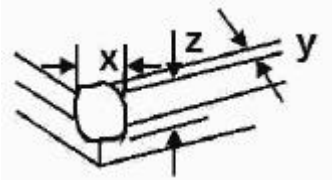


NO.	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	2.5 2.5 0.65
10	Bezel	Bezel must comply with product specifications.	2.5
11	PCB、COB	11.1 COB seal may not have pinholes larger than 0.2mm or contamination. 11.2 COB seal surface may not have pinholes through to the IC. 11.3 The height of the COB should not exceed the height indicated in the assembly diagram. 11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places. 11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts. 11.6 The jumper on the PCB should conform to the product characteristic chart.	2.5 2.5 2.5 2.5 0.65 0.65
12	FPC	12.1 FPC terminal damage $\cong$ 1/2 FPC terminal width and can not affect the function, we judge accept. 12.2 FPC alignment hole damage $\cong$ 1/2 alignment area and can not affect the function, we judge accept.	2.5 2.5
13	Soldering	13.1 No cold solder joints, missing solder connections, oxidation or icicle. 13.2 No short circuits in components on PCB or FPC.	2.5 0.65

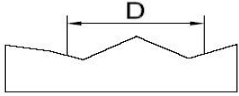
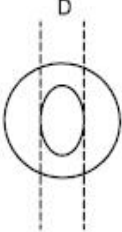


NO.	Item	Criterion	AQL																
07	Glass crack	<p>Symbols:                      x: Chip length    y: Chip width    z: Chip thickness                      k: Seal width    t: Glass thickness    a: LCD side length                      L: Electrode pad length</p> <p>7.2 Protrusion over terminal:                      7.2.1 Chip on electrode pad:</p>  <table border="1" data-bbox="558 761 1236 907"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq 0.5\text{mm}</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> <p>7.2.2                      Non-conductive portion:</p>  <table border="1" data-bbox="558 1276 1236 1422"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq L</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> <p>⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.                      ⊙ If the product will be heat sealed by the customer, the alignment mark must not be damaged.</p> <p>7.2.3 Substrate protuberance and internal crack</p>  <table border="1" data-bbox="885 1747 1324 1892"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td><math>y \leq 1/3L</math></td> <td><math>X \leq a</math></td> </tr> </table>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$	y: width	x: length	$y \leq 1/3L$	$X \leq a$	2.5
y: Chip width	x: Chip length	z: Chip thickness																	
$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$																	
y: Chip width	x: Chip length	z: Chip thickness																	
$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$																	
y: width	x: length																		
$y \leq 1/3L$	$X \leq a$																		



NO.	Item	Criterion	AQL												
14	Touch Panel Chipped glass	<p>Symbols:                      x: Chip length      y: Chip width      z: Chip thickness                      k: Seal width      t: Touch Panel Total thickness      a: LCD side length                      L: Electrode pad length</p> <p>14.1 General glass chip:                      14.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="451 772 1270 987"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td><math>Z \leq t</math></td> <td><math>\leq 1/2 k</math> and not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> </table> <p>⊙ Unit: mm                      ⊙ If there are 2 or more chips, x is the total length of each chip</p> <p>14.1.2 Corner crack:</p>  <table border="1" data-bbox="451 1366 1270 1581"> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td><math>z \leq t</math></td> <td><math>\leq 1/2 k</math> and not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> </table> <p>⊙ Unit: mm                      ⊙ If there are 2 or more chips, x is the total length of each chip</p>	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$	2.5
z: Chip thickness	y: Chip width	x: Chip length													
$Z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$													
z: Chip thickness	y: Chip width	x: Chip length													
$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$													



NO.	Item	Criterion	AQL										
15	Touch Panel(Fish eye、dent and bubble on film)	<table border="1"> <thead> <tr> <th>SIZE(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.2</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.2 &lt; D \leq 0.4</math></td> <td>5</td> </tr> <tr> <td><math>0.4 &lt; D \leq 0.5</math></td> <td>2</td> </tr> <tr> <td><math>0.5 &lt; D</math></td> <td>0</td> </tr> </tbody> </table>  	SIZE(mm)	Acceptable Q'ty	$\Phi \leq 0.2$	Accept no dense	$0.2 < D \leq 0.4$	5	$0.4 < D \leq 0.5$	2	$0.5 < D$	0	2.5
SIZE(mm)	Acceptable Q'ty												
$\Phi \leq 0.2$	Accept no dense												
$0.2 < D \leq 0.4$	5												
$0.4 < D \leq 0.5$	2												
$0.5 < D$	0												
16	Touch Panel Newton ring	Newton ring dimension $\leq 1/2$ touch panel area and not affect font and line distortion ( $\leq 2.5\%$ ), it is acceptable.	2.5										
17	Touch Panel Linearity	Less than 2.5% is acceptable.	2.5										
18	LCD Ripple	Touch the touch panel, cannot see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 80g	2.5										
19	General appearance	19.1 Pin type must match type in specification sheet. 19.2 LCD pin loose or missing pins. 19.3 Product packaging must the same as specified on packaging specification sheet. 19.4 Product dimension and structure must conform to product specification sheet.	0.65 0.65 0.65 0.65										



## 12. Handling Precaution

### 12.1 Handling of LCM

- Avoid external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance, do not lick or swallow. When the liquid is attaching to your hand, skin, cloth, etc., wash it thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.
- The operators should wear protections whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
- The modules should be kept in antistatic bags or other containers resistant to static for storage.
- The module is coated with a film to protect the display surface, be careful when peeling off this protective film since static electricity may be generated.

### 12.2 Storage

- Store it in an ambient temperature of  $25\pm 10^{\circ}\text{C}$ , and in a relative humidity of  $50\pm 10\%\text{RH}$ . Don't expose to sunlight or fluorescent light.
- Store it in a clean environment, free from dust, active gas, and solvent.
- Store it in anti-static electricity container.
- Store it without any physical load.

### 12.3 Soldering

- Use only soldering irons with proper grounding and no leakage.
- Iron: no higher than  $280\pm 10^{\circ}\text{C}$  and less than 3 sec during hand soldering.
- Rewiring: no more than 2 times.

## 13. Packing Method

----TBD