



## APPROVAL SHEET

MODEL NO: PV04300TYD40A-R

Approval option:  Specification

Sample

■ **Customer's Confirmation**

<b>Customer :</b>
<b>Approved by:</b>
<b>Date:</b>
<b>Note:</b>

■ **Center Confirmed:**

<b>Approved</b>	<b>Checked by</b>	<b>Made by</b>



## Records of Revision

DATE	REF. PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2014-5-14		01	First issue	



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## **1. Introduction**

### **1.1 Scope of application**

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

LCD specification: Dots 480x272.

As to basic specification of the driver IC, refer to the IC (HX8257A) specification and datasheet.

### **1.2 Structure:**

Double display structure:

TFT Module + FPC +BL+TP;

FULL 16.7M Color 4.3inch TFT LCD size for main LCD;

One bare chip with gold bump (COG) TECH;

24 BITS RGB interface;

### **1.3 TFT features:**

Structure: TFT PANNEL+IC+FPC+BL;

Transmissive Type LCD

480 dot-source and 272 dot-gate outputs;

White LED back light;

24 BITS RGB interface;

### **1.4 Applications:**

Mobile phone

PSP

PDA

GPS

Etc...



## 2. General specification

ITEM	Standard value	UNIT
LCD Type	TFT Transmissive	---
Driver element	a-Si TFT Active matrix	
Number of Dots	480*272	Dots
Pixel Arrangement	RGB Delta Stripe	
Active Area	95.04*53.856	mm
Viewing Direction	12 O'clock	
Driver IC	HX8257A	
Module Size(W*H*T)	105.5x67.2x4.15	mm
Approx. Weight	TBD	g
Back Light	White LED	
System interface	24 BITS RGB interface	



### 3. Mechanical drawing

Pin	Symbol	Description
1	LED+	Power for LED
2	LED-	Power for LED
3	ON	Power ground
4	VDD	Power supply
5	R0	Blue data (USB)
6	R1	Blue data
7	R2	Blue data
8	R3	Blue data
9	R4	Blue data
10	R5	Blue data
11	R6	Blue data
12	R7	Blue data (USB)
13	G0	Blue data (USB)
14	G1	Blue data
15	G2	Blue data
16	G3	Blue data
17	G4	Blue data
18	G5	Blue data
19	G6	Blue data
20	G7	Blue data (USB)
21	B0	Blue data (USB)
22	B1	Blue data
23	B2	Blue data
24	B3	Blue data
25	B4	Blue data
26	B5	Blue data
27	B6	Blue data
28	B7	Blue data (USB)
29	CLK	Blue data (USB)
30	PCLK	Panel clock
31	DISP	Display on/off
32	HSYNC	Horizontal sync
33	VSYNC	Vertical sync
34	DE	Data enable
35	NC	No connection
36	NC	No connection
37	TP CLEAR	TP CLEAR
38	V0	TP bottom side
39	X1	TP left side
40	V1	TP top side

Display Type	CMO 4.3 TFT
Viewing Angle	NORMALLY WHITE TRANSMISSIVE
LCD Driver IC	HX8257A
Logic Voltage	VDD=2.8-3.3V
Operation Temperature	-20°C TO 70°C
Storage Temperature	-30°C TO 80°C
Interface	24bit-RGB
Backlight	10-LED WHITE 40MA/15V
Surface luminance	280cd/m2
White X/Y	--

**NOTES:**  
 1. GENERAL TOLERANCE: ±0.2  
 2. REFERENCE DIMENSION  
 3. RECOMMENDED CUSHION ADHERENT AREA: TP V. A+1.6mm  
 4. REFERENCED DIMENSION: ( )  
 5. REQUIREMENTS ON ENVIRONMENTAL PROTECTION: RoHS

DRAWING NO.		PV04300TYD40A-R	
UNIT	mm	SCALE	1:1
3rd Angle	SHIBET 1 OF 1		
<b>MODULE SPEC.</b>			
<b>Kingtech Group Co., Ltd</b>			

DRAWN	ME.CHECKED	BIB.CHECKED	APPROVED	CUSTOMER'S APPROVAL
DATE	SIGN	DATE	SIGN	DATE
		2013.11.6		

P0.58(00-1)=19.5±0.05  
 P0.58(00-1)=19.5±0.05  
 P0.58(00-1)=19.5±0.05



## 4. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	V <sub>DD</sub>	-0.3	3.3	V
Input voltage for logic	V <sub>IN</sub>	-0.5	V <sub>cc</sub> +0.3	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

## 5. ELECTRICAL CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit	Applicable terminal
Supply voltage for logic	V <sub>DD</sub>	3.0	3.3	3.6	V	V <sub>DD</sub>
Input voltage	V <sub>IL</sub>	-0.3	-	0.2 V <sub>DD</sub>	V	
	V <sub>IH</sub>	0.8 V <sub>cc</sub>	-	V <sub>cc</sub>	V	
Input leakage current	I <sub>LKG</sub>	-1.0		1.0	μA	
LED Forward voltage	V <sub>f</sub>	-	3.2	-	V	--
Input backlight current	I <sub>LED</sub>	-	20	-	mA	With One LED

### Backlight driving conditions

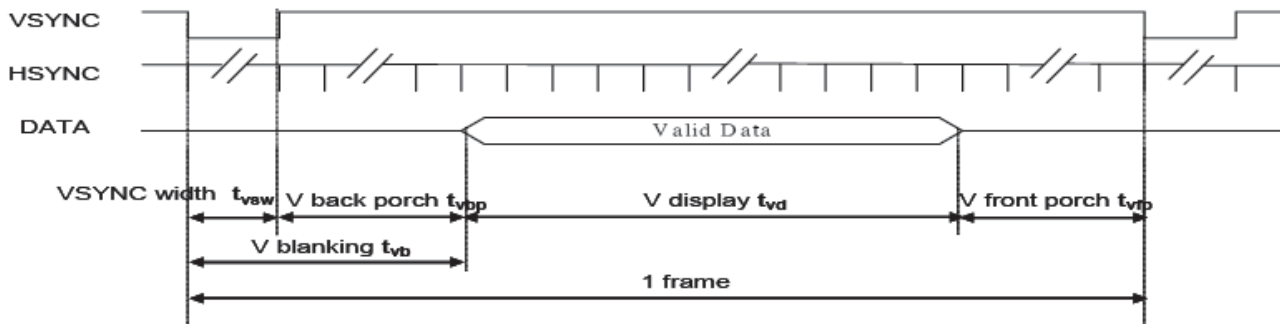
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V <sub>L</sub>	-	16	-	V	Note 1
Current for LED backlight	I <sub>L</sub>	-	40	-	mA	
LED life time	-	20,000	-	-	Hr	Note 2



## Timing characteristics

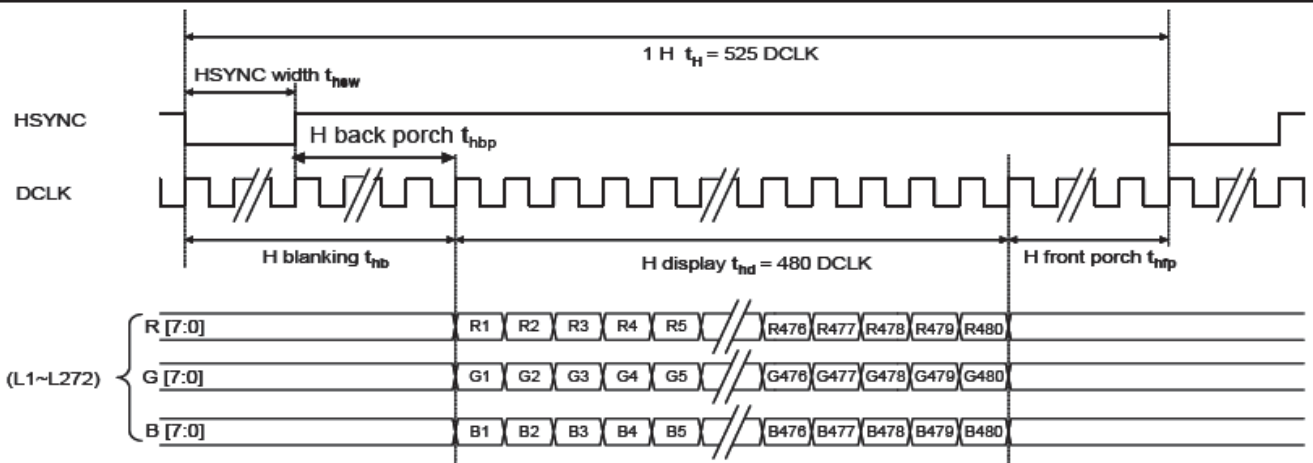
### 1. Vertical timing

Item	Min.	Typ.	Max.	Unit
V display $t_{VD}$		272		H
V blanking $t_{VB}$		12		
V front porch $t_{VFP}$		3		
VSYNC width $t_{VSW}$		10		
1 frame		287		



### 2. Horizontal timing

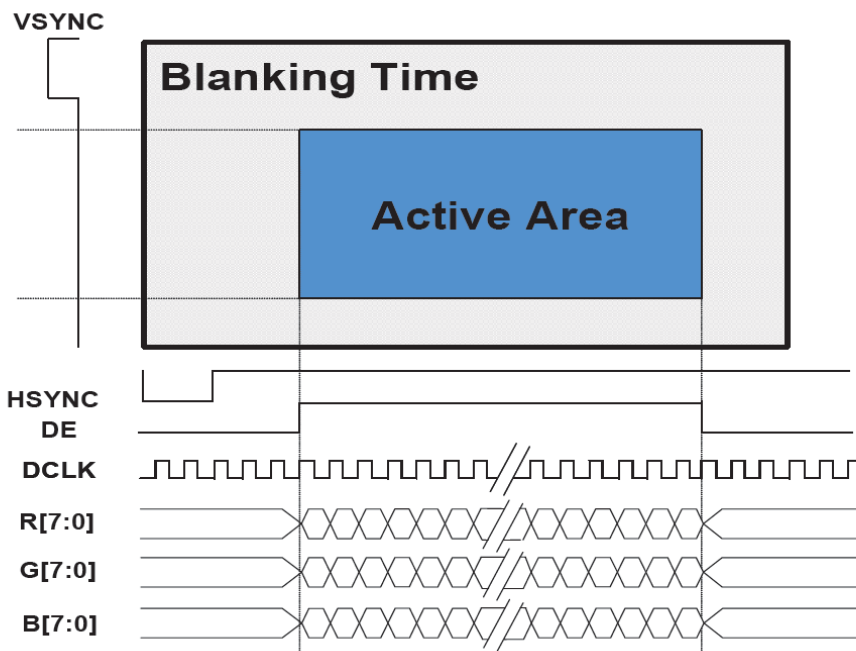
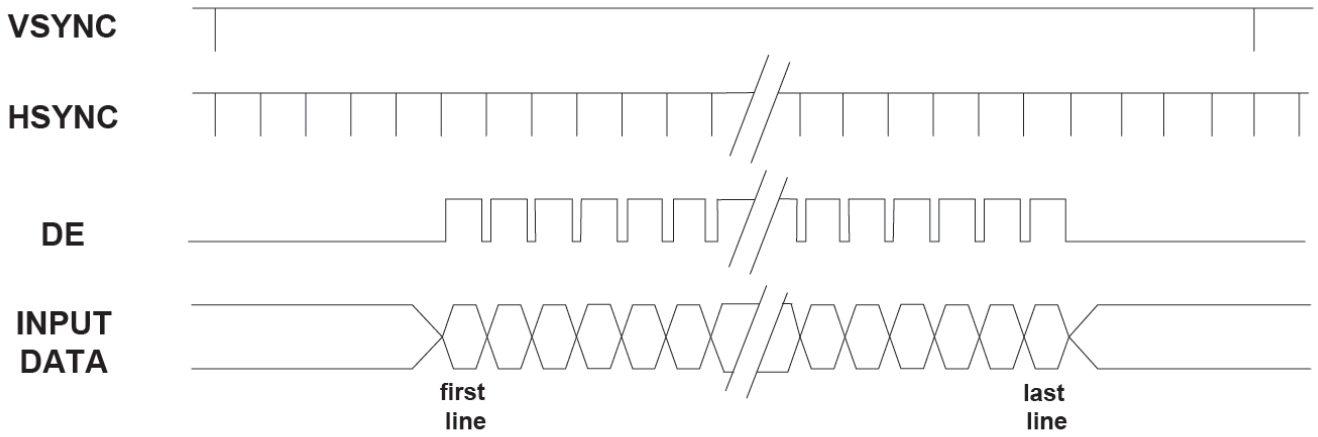
640x240 mode	Min	Min	Max	UNIT
H display $t_{HD}$		480		DCLK
1 H $t_H$		576		
H blanking $t_{HB}$ (*)		88		
H front porch $t_{HFP}$		8		
HSYNC width $t_{HSW}$		41		
Frequency		9.0		MHz







### 3. SYNC-DE MODE

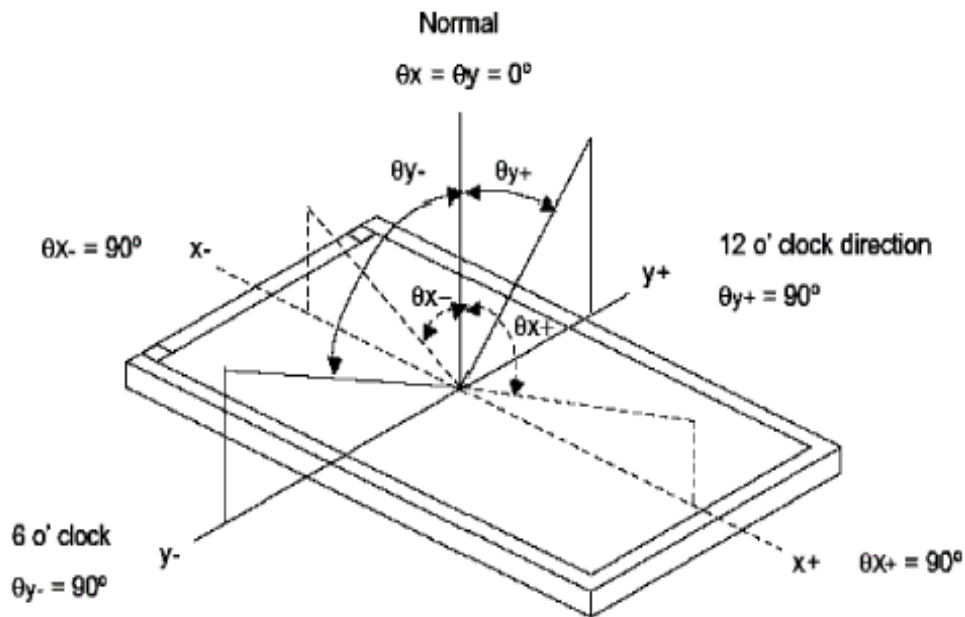




## 6. OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITIONS	SPECIFICATION			UNIT	NOTE	
			MIN	TYP.	MAX			
Brightness	B	Viewing normal angle	240	280	--	Cd/m <sup>2</sup>	All left side data are based on CMO's product reference only	
Contrast Ratio	CR		250	350	--	--		
Response Time	Tr+Tf		--	50	70	ms		
CIE Color coordinate	Red		X <sub>R</sub>	--				
			Y <sub>R</sub>					
	Green		X <sub>G</sub>	--				
			Y <sub>G</sub>					
	Blue		X <sub>B</sub>	--				
			Y <sub>B</sub>					
White	X <sub>W</sub>		--	0.29				
	Y <sub>W</sub>		0.34					
Viewing Angle	Hor.	$\theta_{x+}$	40	45	--	Deg.		
		$\theta_{x-}$	40	45	--			
	Ver.	$\theta_{y+}$	30	35	--			
		$\theta_{y-}$	10	15				
Uniformity	Un		80	85		%		

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

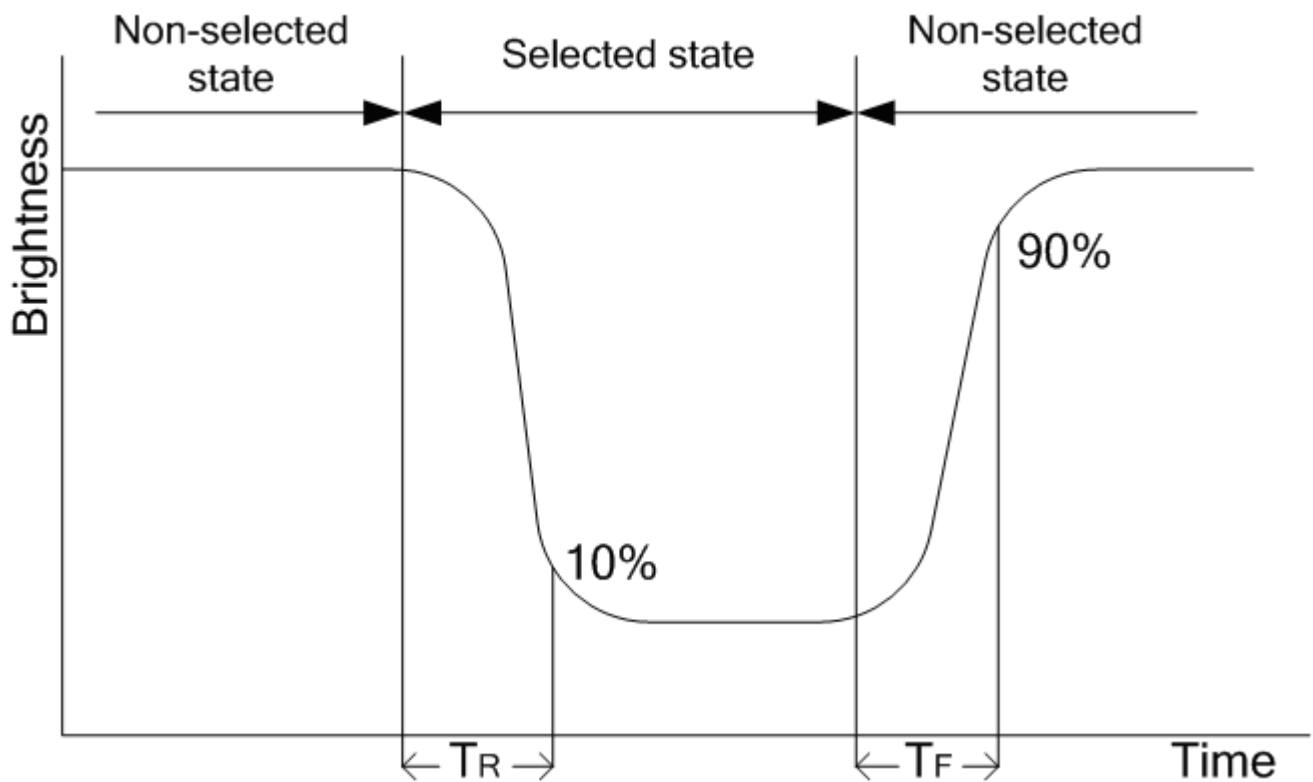




**Note 2: Definition of contrast ratio CR:**

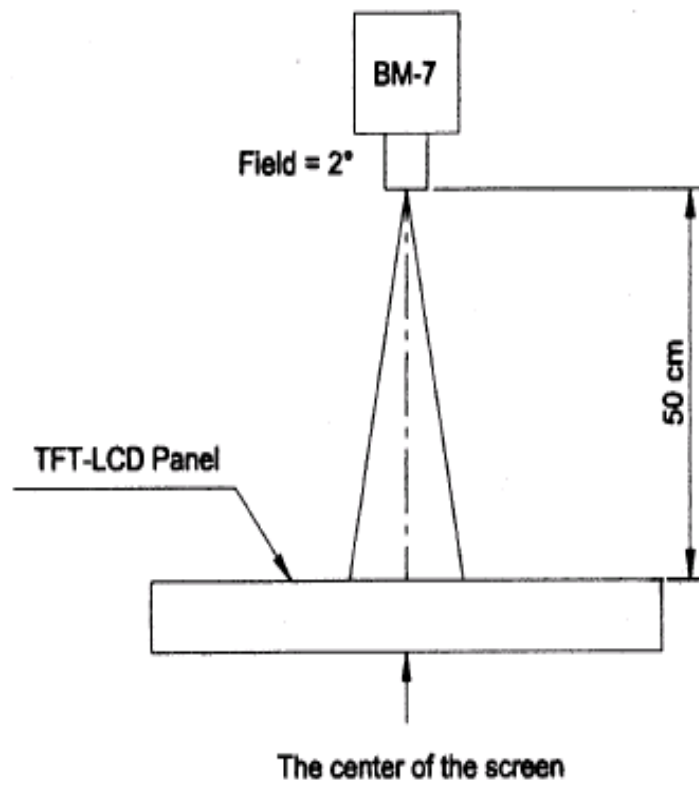
$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

**Note 3: Definition of response time (T<sub>R</sub>, T<sub>F</sub>)**

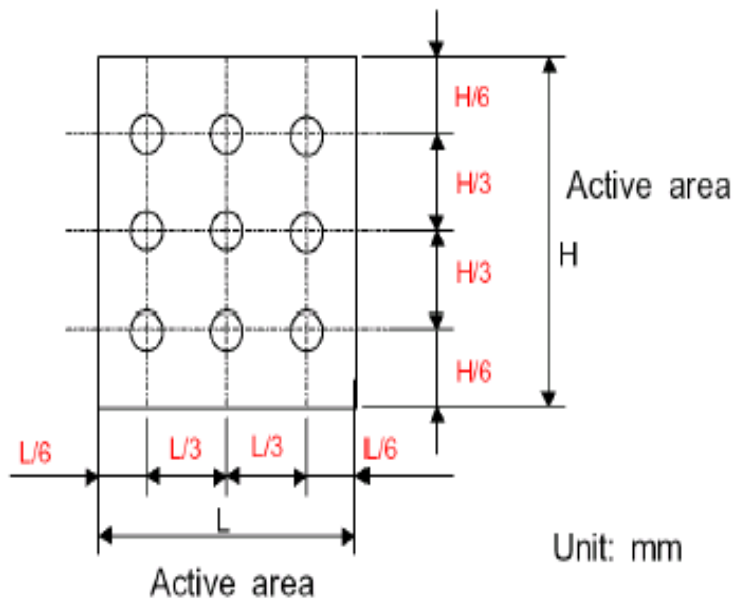




**The brightness test equipment setup**  
20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)



Note 4 :





## 7. MCU Interface Pin Function

NO.	SYMBOL	Description
1	VLED-	Power for LED backlight cathode
2	VLED+	Power for LED backlight anode
3	GND	Ground
4	VDD	Power supply
5	R0	Data bus
6	R1	Data bus
7	R2	Data bus
8	R3	Data bus
9	R4	Data bus
10	R5	Data bus
11	R6	Data bus
12	R7	Data bus
13	G0	Data bus
14	G1	Data bus
15	G2	Data bus
16	G3	Data bus
17	G4	Data bus
18	G5	Data bus
19	G6	Data bus
20	G7	Data bus
21	B0	Data bus
22	B1	Data bus
23	B2	Data bus
24	B3	Data bus
25	B4	Data bus
26	B5	Data bus
27	B6	Data bus
28	B7	Data bus



29	GND	Ground
30	DCLK	Pixel clock
31	DISP	Display on/off
32	HSYNC	Horizon YNC signal
33	VSYNC	Vertical YNC signal
34	DE	Data enable
35	NC	No connect
36	GND	Ground
37	XR	TP PIN
38	YD	TP PIN
39	XL	TP PIN
40	YU	TP PIN



## 8. Touch panel specification

### 8.1 Electrical Characteristics

ITEM	SPECIFICATIONS			UNIT	REMARK
	MIN.	TYP.	MAX		
Linearity	-1.5	-	1.5	%	After environment & life test
Terminal Resistance	350	-	1050	ohm	X(Film side)
	100	-	450	ohm	Y(Glass side)
Insulation Resistance	10	-	-	Mohm	DC 25V 1min
Operating Voltage	10	-	-	V	DC

### 8.2 Optical Characteristics

ITEM	SPECIFICATIONS			UNIT	REMARK
	MIN.	TYP.	MAX		
Response Time	-	-	15	ms	100kohm pull-up
Light Transparency	80	-	-	%	

### 8.3 Mechanical Characteristics

ITEM	SPECIFICATIONS			UNIT	REMARK
	MIN.	TYP.	MAX		
Operation Force	30	-	120	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.

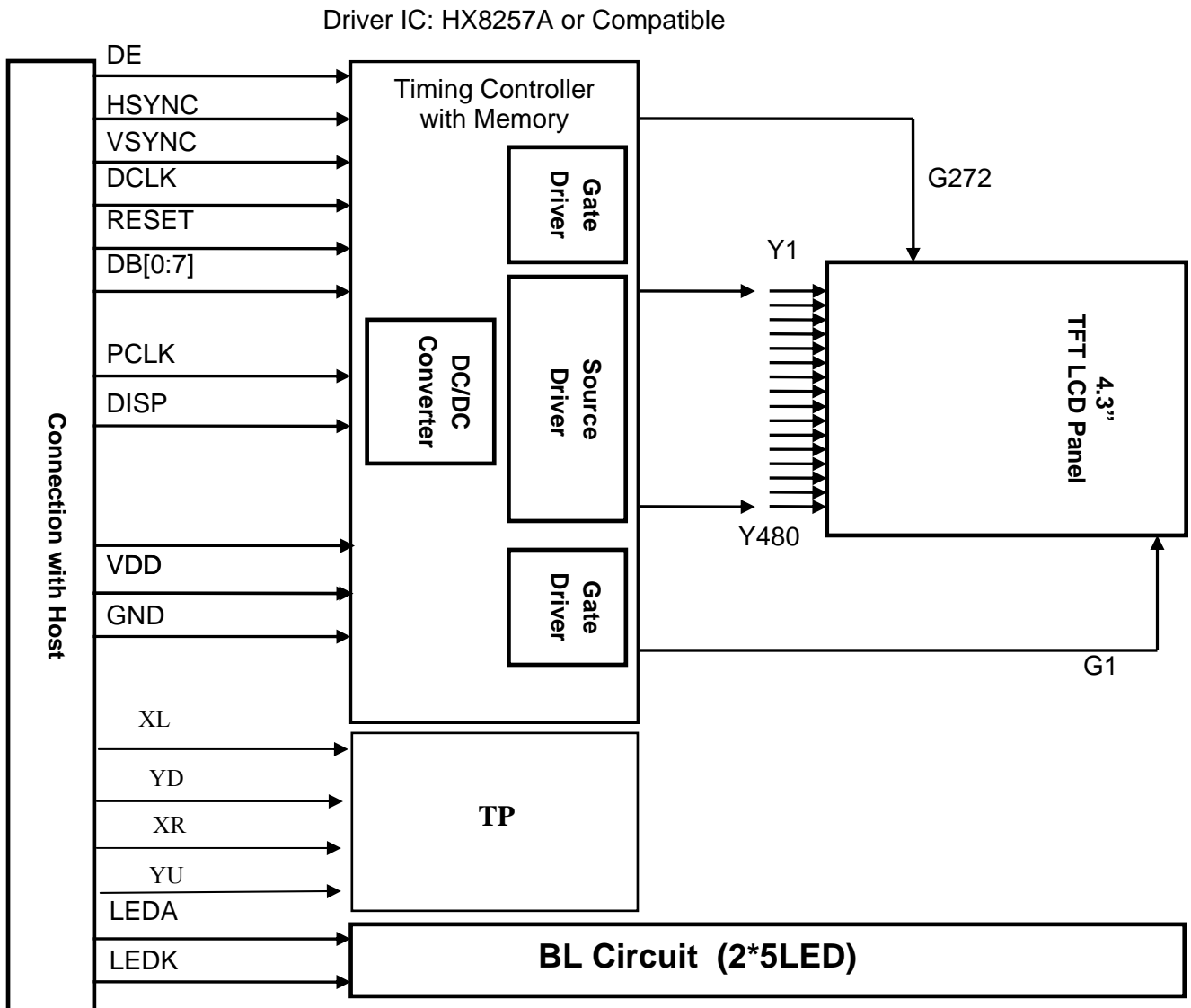
Note 3: Hit 1,000,000 times on the film with an R12.5mm tip.

-Force: 250gf.

-Speed: 2 times/sec.



## 9. BLOCK DIAGRAM



## 10.LCM Quality Criteria

### 10.1 VISUAL & FUNCTION INSPECTION STANDARD

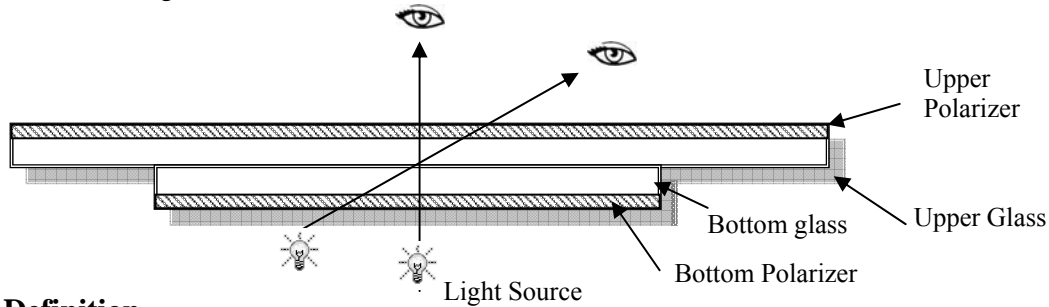




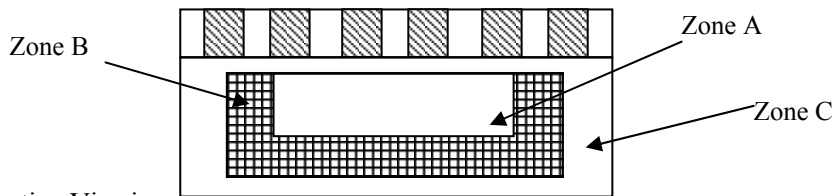
### 10.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

- Temperature : 25±5℃
- 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

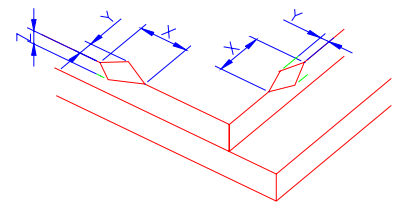
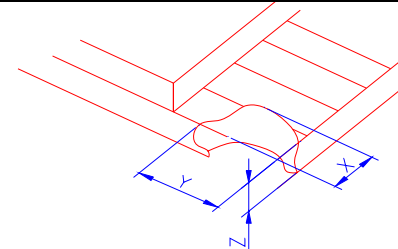
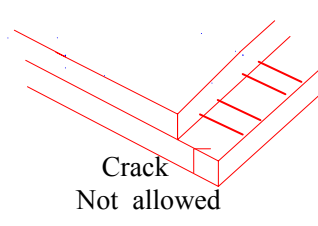
LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

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.	

### 10.1.4 Criteria (Visual)

Number	Items	Criteria(mm)
--------	-------	--------------



<p>1.0 LCD Crack/Broken</p> <p>NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD</p>	<p>(1) The edge of LCD broken</p>  <table border="1" data-bbox="845 492 1388 649"> <tr> <th>X</th> <th>Y</th> <th>Z</th> </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				
<p>(2)LCD corner broken</p>  <table border="1" data-bbox="893 918 1324 1008"> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> <tr> <td>≤3.0mm</td> <td>≤L</td> <td>≤T</td> </tr> </table>	X	Y	Z	≤3.0mm	≤L	≤T	
X	Y	Z					
≤3.0mm	≤L	≤T					
<p>(3) LCD crack</p>  <p>Crack Not allowed</p>							

Number	Items	Criteria (mm)
--------	-------	---------------



2.0	Spot defect	① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)					
				Acceptable Qty			
				A	B	C	
		Φ≤0.10		Ignore			
		0.10<Φ≤0.15		3( distance ≥ 10mm)			
		0.15<Φ≤0.2		1			
		0.2<Φ		0			
		②Dim spot (LCD/TP/Polarizer dim dot, light leakage、dark spot)					
				Acceptable Qty			
				A	B	C	
Φ≤0.1		Ignore					
0.1<Φ≤0.2		2( distance ≥ 10mm)					
0.2<Φ≤0.3		1					
Φ>0.3		0					
③ Polarizer accidented spot							
		Acceptable Qty					
		A	B	C			
Φ≤0.2		Ignore					
0.2<Φ≤0.5		2( distance ≥ 10mm)					
Φ>0.5		0					
Line defect (LCD/TP /Polarizer black/white line, scratch, stain)	Width(mm)		Length(mm)		Acceptable Qty		
					A	B	C
	Φ≤0.03		Ignore		Ignore		Ignore
	0.03<W≤0.05		L≤3.0		N≤2		
	0.05<W≤0.08		L≤2.0		N≤2		
0.08<W		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 0.2</math></td> <td colspan="3">Ignore</td> </tr> <tr> <td><math>0.2 &lt; \Phi \leq 0.4</math></td> <td colspan="3">2 (distance <math>\geq 10\text{mm}</math>)</td> </tr> <tr> <td><math>0.4 &lt; \Phi \leq 0.6</math></td> <td colspan="3">1</td> </tr> <tr> <td><math>0.6 &lt; \Phi</math></td> <td colspan="3">0</td> </tr> </table>			Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore			$0.2 < \Phi \leq 0.4$	2 (distance $\geq 10\text{mm}$ )			$0.4 < \Phi \leq 0.6$	1			$0.6 < \Phi$	0			
		Zone Size (mm)	Acceptable Qty																									
			A	B	C																							
		$\Phi \leq 0.2$	Ignore																									
		$0.2 < \Phi \leq 0.4$	2 (distance $\geq 10\text{mm}$ )																									
$0.4 < \Phi \leq 0.6$	1																											
$0.6 < \Phi$	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.																										
5.0	TP Related	TP bubble/ accidented spot	<table border="1"> <tr> <th rowspan="2">Size <math>\Phi</math>(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 0.2</math></td> <td colspan="3">2</td> </tr> <tr> <td><math>0.2 &lt; \Phi \leq 0.3</math></td> <td colspan="3">1</td> </tr> <tr> <td><math>0.3 &lt; \Phi</math></td> <td colspan="3">0</td> </tr> </table>			Size $\Phi$ (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore			$0.1 < \Phi \leq 0.2$	2			$0.2 < \Phi \leq 0.3$	1			$0.3 < \Phi$	0		
			Size $\Phi$ (mm)	Acceptable Qty																								
				A	B	C																						
			$\Phi \leq 0.1$	Ignore																								
$0.1 < \Phi \leq 0.2$	2																											
$0.2 < \Phi \leq 0.3$	1																											
$0.3 < \Phi$	0																											
Assembly deflection	beyond the edge of backlight $\leq 0.15\text{mm}$																											
Newton Ring	Newton Ring area $> 1/3$ TP area NG Newton Ring area $\leq 1/3$ TP area OK	  																										



		TP corner broken X: length Y: width Z: height	<table border="1"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td><math>X \leq 3.0\text{mm}</math></td> <td><math>Y \leq 3.0\text{mm}</math></td> <td><math>Z &lt; \text{LCD thickness}</math></td> </tr> </table> <p>Circuitry broken is not allowed.</p>	X	Y	Z	$X \leq 3.0\text{mm}$	$Y \leq 3.0\text{mm}$	$Z < \text{LCD thickness}$	
		X	Y	Z						
$X \leq 3.0\text{mm}$	$Y \leq 3.0\text{mm}$	$Z < \text{LCD thickness}$								
		TP edge broken X: length Y: width Z: height	<table border="1"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td><math>X \leq 6.0\text{mm}</math></td> <td><math>Y \leq 2.0\text{mm}</math></td> <td><math>Z &lt; \text{LCD thickness}</math></td> </tr> </table> <p>* Circuitry broken is not allowed.</p>	X	Y	Z	$X \leq 6.0\text{mm}$	$Y \leq 2.0\text{mm}$	$Z < \text{LCD thickness}$	
X	Y	Z								
$X \leq 6.0\text{mm}$	$Y \leq 2.0\text{mm}$	$Z < \text{LCD thickness}$								

**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

## 10.2 RELIABILITY TEST

NO	ITEM	CONDITION	STANDARD
1	High Temp. Storage	70°C, 12 hours	1. Functional test is OK. Missing Segment, short, unclear segment, non-display, display abnormally and liquid crystal leak are un-allowed.
2	Low Temp. Storage	-20°C, 12 hours	
3	High Temp. Operation	60°C, 12 hours	
4	Low Temp. Operation	-10°C, 12 hours	
5	High temperature and high Humidity storage	40°C,90%RH ,12 hours	2. No low temperature bubbles, end seal loose and fall, frame rainbow.
6	Thermal and cold shock	Static state, -20°C (30 Min) ~70°C (30 Min) ~ -20°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 : 1.0mm, Each direction on X,Y axe 0.5 heure, circle 2 hours	
8	Dropping test	Pack products into the carton box. Drop it from 80cm height to ground. Once for each side of the carton	

**NOTE:**

- 10.2.1 The reliability items will be fully performed in new sample qualification,
- 10.2.2 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.



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

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

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

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

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

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

### 10.3 Safety instructions

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

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

### 10.4 Handling Precautions

10.4.1 Avoid static electricity damaging the LSI.

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

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

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

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

10.4.6 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.

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

10.4.8 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)

### 10.5 Operation instructions

10.5.1 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.

10.5.2 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.

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

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

### 10.6 Storage instructions:

10.6.1 Store LCDs in a sealed polyethylene bag.

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

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

### 9.7 Limited Warranty

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

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

10.7.3 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

10.7.4 Modules must be returned with sufficient description of the failures of 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.



## 11. Packing method

-----TBD