

**Display Elektronik GmbH**

# DATA SHEET

***TFT MODULE***

**DEM 1024600C VMH-PW-N**

**8,0" TFT**

**Product Specification**

**Ver.: 1**

**27.01.2016**

**Revision History**

<b>Revision</b>	<b>Date</b>	<b>Detail</b>	<b>Remarks</b>
0	09.12.2015	Initial Release	-
1	27.01.2016	Modify color coordinate	P6

**Table of Contents**

No.	Item	Page
1.	General Description .....	4
2.	Module Parameter .....	4
3.	Absolute Maximum Ratings .....	4
4.	DC Characteristics .....	5
5.	Backlight Characteristic .....	5
5.1.	Backlight Characteristic .....	5
5.2.	Backlighting Circuit .....	5
6.	Optical Characteristics .....	6
6.1.	Optical Characteristics .....	6
6.2.	Definition of Response Time .....	6
6.3.	Definition of Contrast Ratio .....	7
6.4.	Definition of Viewing Angles.....	7
6.5.	Definition of Color Appearance .....	8
6.6.	Definition of Surface Luminance, Uniformity and Transmittance.....	8
7.	Block Diagram and Power Supply .....	9
8.	Interface Pins Definition .....	10
9.	Input Signal Timing .....	12
9.1.	AC Electrical Characteristics.....	12
9.2.	Data Input Format .....	13
9.3.	Power On/Off Sequence .....	14
10.	Quality Assurance .....	15
10.1.	Purpose.....	15
10.2.	Standard for Quality Test.....	15
10.3.	Nonconforming Analysis & Disposition .....	15
10.4.	Agreement Items.....	15
10.5.	Standard of the Product Visual Inspection .....	16
10.6.	Inspection Specification .....	17
10.7.	Classification of Defects.....	20
10.8.	Identification/marketing criteria .....	20
10.9.	Packaging .....	20
11.	Reliability Specification .....	21
12.	Precautions and Warranty .....	22
12.1.	Safety .....	22
12.2.	Handling .....	22
12.3.	Storage.....	22
12.4.	Metal Pin (Apply to Products with Metal Pins) .....	22
12.5.	Operation .....	23
12.6.	Static Electricity .....	23
12.7.	Limited Warranty.....	23
13.	Outline Drawing .....	24

## 1. General Description

The specification is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT-LCD panel, driver ICs and a backlight unit.

## 2. Module Parameter

Features	Details	Unit
Display Size (Diagonal)	8.0 INCH	-
LCD Type	IPS TFT	-
Display Mode	Transmissive / Normally Black	-
Resolution	1024 x RGB x 600	Pixels
View Direction	FULL VIEW	Best Image
Module Outline	192.80 x 116.90 x 4.20 (Note1 )	mm
Active Area	176.64 x 99.36	mm
Pixel Pitch	0.1725 x 0.1656	mm
Pixel Arrangement	RGB Vertical stripe	-
Display Colors	16.7 Million	-
Interface	LVDS Interface	-
Driver IC	HX8282_A01+HX8696_A (Himax)	-
With or without the Touch Panel	Without	-
Operating Temperature	-20°C to +70°C	°C
Storage Temperature	-30°C to +80°C	°C
Weight	176	g

Note 1: Inclusive hooks, posts, FFC/FPC tail etc.

## 3. Absolute Maximum Ratings

$V_{SS}=0V$ ,  $T_a=25^{\circ}C$

Item	Symbol	Min.	Max.	Unit
Power Supply Voltage	VDD	-0.3	3.96	V
Storage Temperature	$T_{STG}$	-30	+80	°C
Operating Temperature	$T_{OP}$	-20	+70	°C

**Note 1:** If  $T_a$  below 50°C, the maximal humidity is 90%RH, if  $T_a$  over 50°C, absolute humidity should be less than 60%RH.

**Note 2:** The response time will be extremely slow when the operating temperature is around -10°C, and the back ground will become darker at high temperature operating.

4. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	
Supply Voltage	VDD	3.0	3.3	3.6	V	
Analog Voltage	AVDD	9.0	11.5	12	V	
TFT Common Electrode Voltage	VCOM	2.0	4.6	4.8	V	
TFT Gate ON Voltage	VGH	16	18	20	V	
TFT Gate OFF Voltage	VGL	-9.7	-10	-10.3	V	
Current Consumption All White	Logic Analog	I <sub>CC+</sub> I <sub>IN</sub>	-	TBD	-	mA

Note: Typical VCOM is only a reference value. It must be optimized according to each LCM.  
Please use VR.

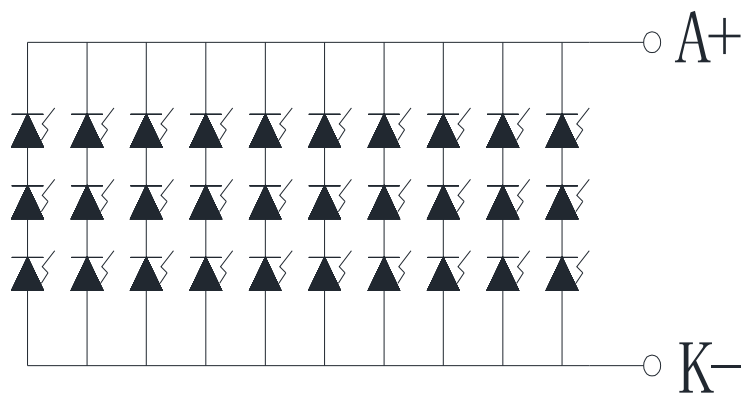
5. Backlight Characteristic

5.1. Backlight Characteristic

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V <sub>F</sub>	T <sub>a</sub> =25 °C, I <sub>F</sub> =286mA	8.4	9.6	10.2	V
Forward Current	I <sub>F</sub>	T <sub>a</sub> =25 °C, V <sub>F</sub> =3.2V/LED	-	286	-	mA
Power Dissipation	P <sub>D</sub>	-	-	2750	-	mW
Uniformity	Avg	-	70	80	-	%
LED Lifetime (25°C)	-	-	-	30000	-	Hrs
Drive Method	Constant Current					
LED Configuration	30 White LEDs ( 3 LEDs in one string and 10 groups in parallel)					

Note: LED lifetime defined as follows: The final brightness is at 50% of original brightness.  
The environmental conducted under ambient air flow, at T<sub>a</sub>=25±2 °C, 60%RH±5%.

5.2. Backlighting Circuit



Circuit Diagram

6. Optical Characteristics

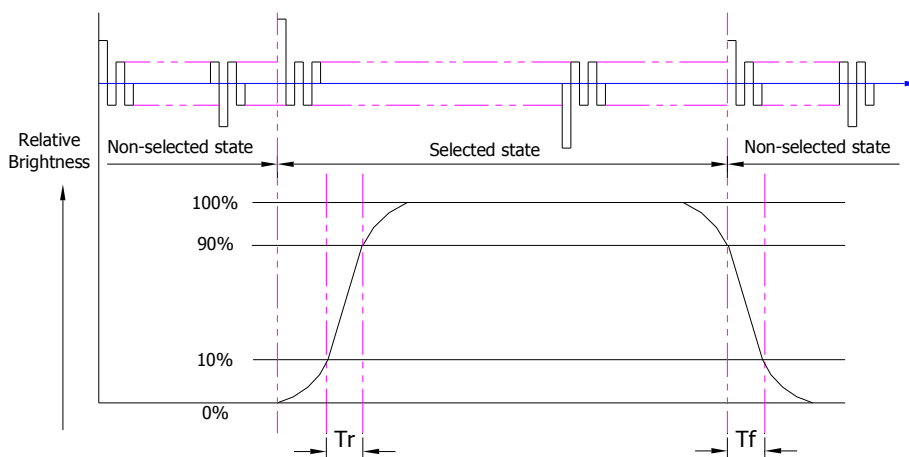
6.1. Optical Characteristics

Ta=25°C, V<sub>DD</sub>=3.3V, TN LC+ Polarizer

	Item	Symbol	Condition	Specification			Unit	
				Min.	Typ.	Max.		
Backlight On (Transmissive Mode)	Luminance on TFT(I <sub>f</sub> =286mA)	Lv		400	500	-	cd/m <sup>2</sup>	
	Contrast Ratio(See 6.3)	CR		600	800	-		
	Response Time (See 6.2)	T <sub>R+T<sub>F</sub></sub>		-	25	35	ms	
	Chromaticity Transmissive (See 6.5)	Red	X <sub>R</sub>	Center CR≥10	0.554	0.604	0.654	
			Y <sub>R</sub>		0.304	0.354	0.404	
		Green	X <sub>G</sub>		0.260	0.310	0.360	
			Y <sub>G</sub>		0.547	0.597	0.647	
		Blue	X <sub>B</sub>		0.096	0.146	0.196	
			Y <sub>B</sub>		0.078	0.128	0.178	
		White	X <sub>W</sub>		0.250	0.300	0.350	
			Y <sub>W</sub>		0.292	0.342	0.392	
	Viewing Angle (See 6.4)	Horizontal	θ <sub>X+</sub>	-	80	-	Deg.	
θ <sub>X-</sub>			-	80	-			
Vertical		φ <sub>Y+</sub>	-	80	-			
		φ <sub>Y-</sub>	-	80	-			

6.2. Definition of Response Time

6.2.1. Normally Black Type (Negative)

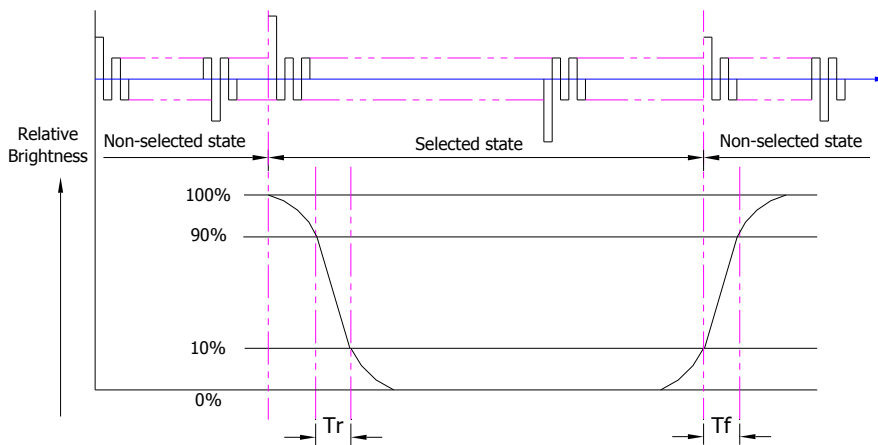


Tr is the time it takes to change from non-selected stage with relative luminance 10% to selected state with relative luminance 90%;

Tf is the time it takes to change from selected state with relative luminance 90% to non-selected state with relative luminance 10%.

Note: Measuring machine: LCD-5100

**6.2.2. Normally White Type (Positive)**



Tr is the time it takes to change from non-selected stage with relative luminance 90% to selected state with relative luminance 10%;

Tf is the time it takes to change from selected state with relative luminance 10% to non-selected state with relative luminance 90%;

Note: Measuring machine: LCD-5100 or EQUI

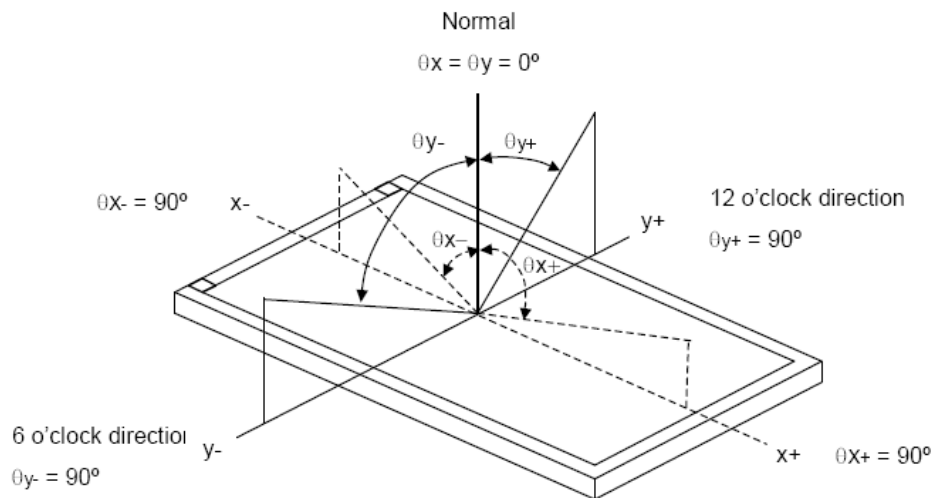
**6.3. Definition of Contrast Ratio**

Contrast is measured perpendicular to display surface in reflective and transmissive mode. The measurement condition is:

Measuring Equipment	Eldim or Equivalent
Measuring Point Diameter	3mm//1mm
Measuring Point Location	Active Area centre point
Test pattern	A: All Pixels white
	B: All Pixel black
Contrast setting	Maximum

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

**6.4. Definition of Viewing Angles**



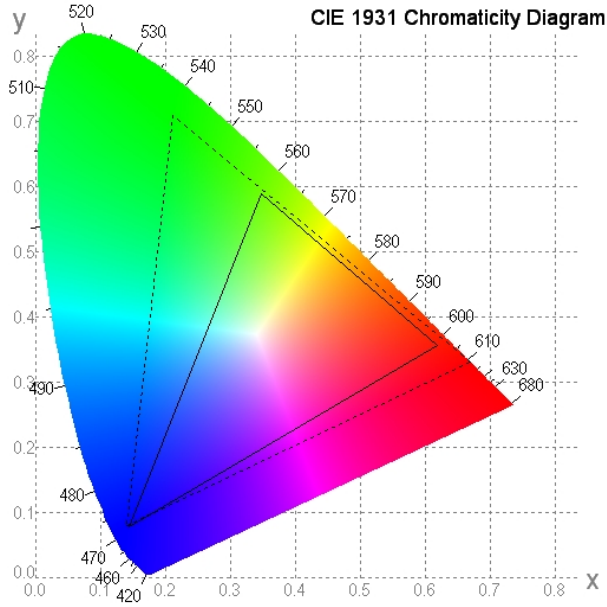
Measuring machine: LCD-5100 or EQUI

**6.5. Definition of Color Appearance**

R,G,B and W are defined by (x, y) on the IE chromaticity diagram

NTSC=area of RGB triangle/area of NTSC triangleX100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)



**6.6. Definition of Surface Luminance, Uniformity and Transmittance**

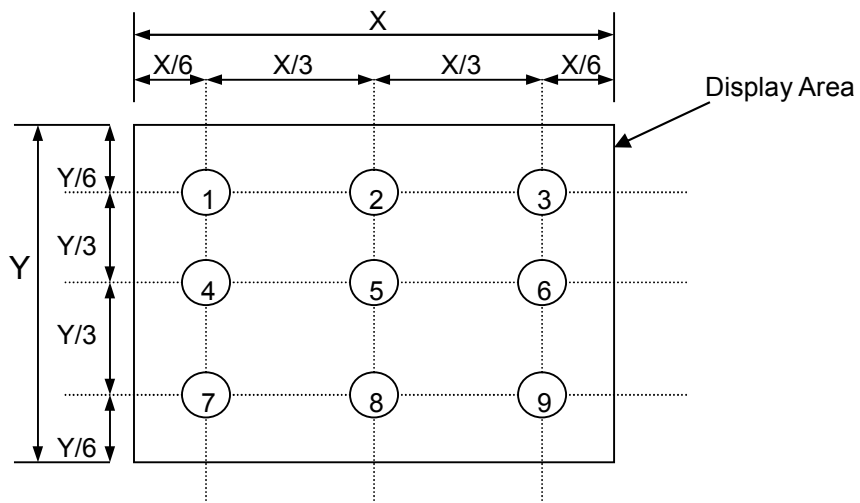
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

6.6.1. Surface Luminance:  $L_v = \text{average} (L_{P1}:L_{P9})$

6.6.2. Uniformity =  $\text{Minimal} (L_{P1}:L_{P9}) / \text{Maximal} (L_{P1}:L_{P9}) * 100\%$

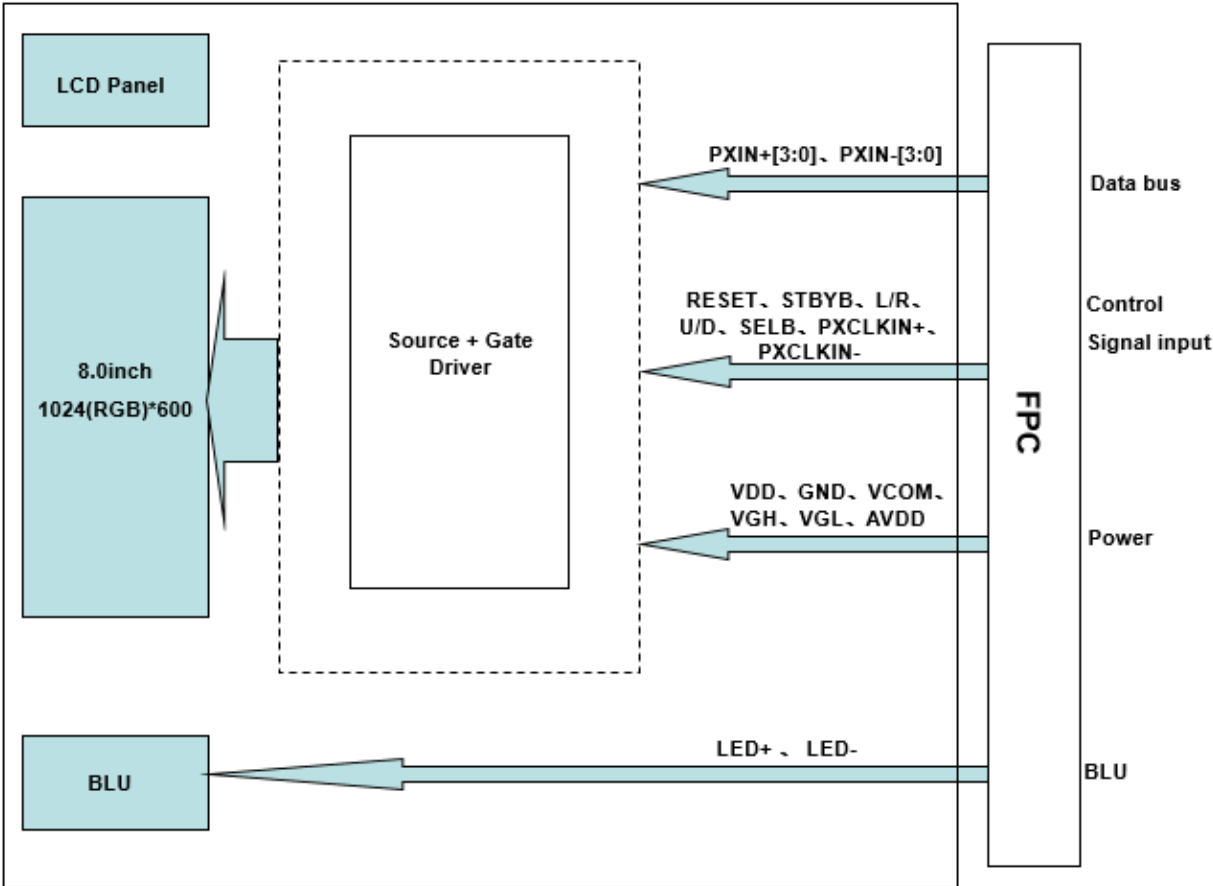
6.6.3. Transmittance =  $L_v \text{ on LCD} / L_v \text{ on Backlight} * 100\%$

Note: Measuring machine: BM-7





7. Block Diagram and Power Supply

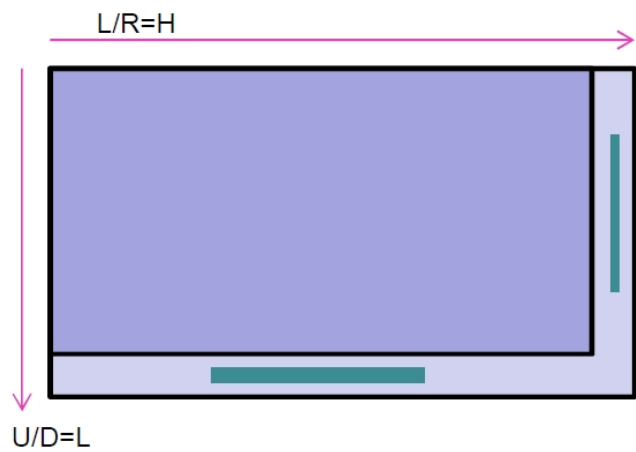


## 8. Interface Pins Definition

No.	Symbol	Function	Remark
1	VCOM	Common Voltage	
2	VDD	Digital power_3.3V	
3	VDD	Digital power_3.3V	
4	NC	No connect	
5	RESET	Global reset pin	
6	U/D	Vertical inversion	Note1
7	L/R	Horizontal inversion	Note1
8	STBYB	Standby mode	
9	GND	Ground	
10	PXCLKIN-	Negative LVDS differential clock input	
11	PXCLKIN+	Positive LVDS differential clock input	
12	GND	Ground	
13	PXIN0-	Negative LVDS differential data input	
14	PXIN0+	Positive LVDS differential data input	
15	GND	Ground	
16	PXIN1-	Negative LVDS differential data input	
17	PXIN1+	Positive LVDS differential data input	
18	GND	Ground	
19	PXIN2-	Negative LVDS differential data input	
20	PXIN2+	Positive LVDS differential data input	
21	GND	Ground	
22	PXIN3-	Negative LVDS differential data input	
23	PXIN3+	Positive LVDS differential data input	
24	GND	Ground	
25	SELB	6bit/8bit mode select	Note2
26	GND	Ground	
27	AVDD	Power for Analog Circuit	
28	GND	Ground	
29	VGH	Positive power for TFT	
30	NC	No connect	
31	NC	No connect	
32	VGL	Negative power for TFT	
33	GND	Ground	
34	NC	No connect	
35	LED-	LED cathode	
36	LED-	LED cathode	
37	NC	No connect	
38	NC	No connect	
39	LED+	LED Anode	
40	LED+	LED Anode	

Note1:

Scan Control Input		Scanning direction
L/R	U/D	
High	Low	Up to Down, Left to Right
Low	Low	Up to Down, Right to Left
High	High	Down to Up, Left to Right
Low	High	Down to Up, Right to Left



Note2:

-SELB= "H (3.3V)" : 6 bit ;

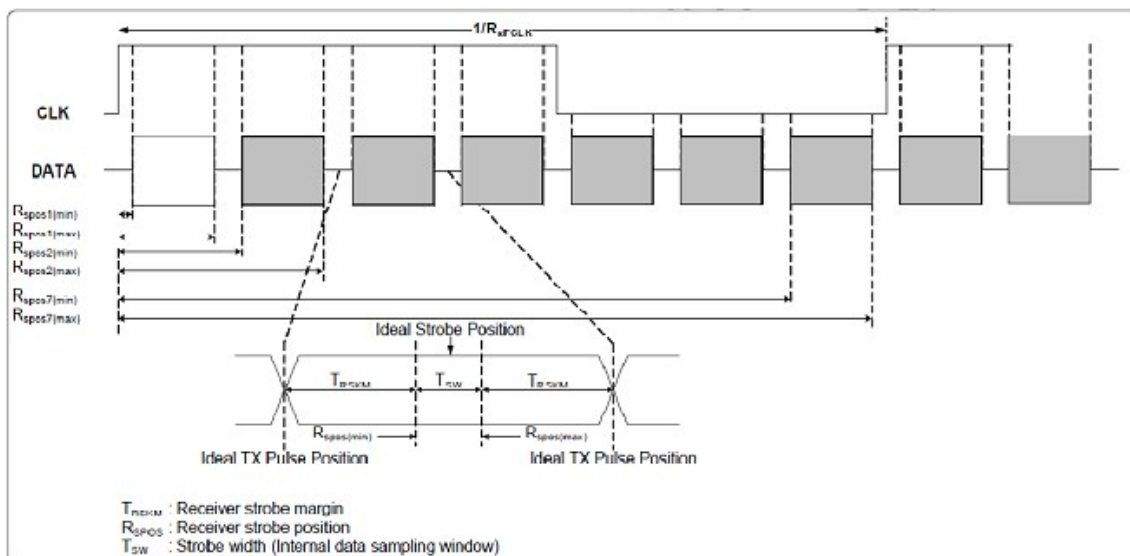
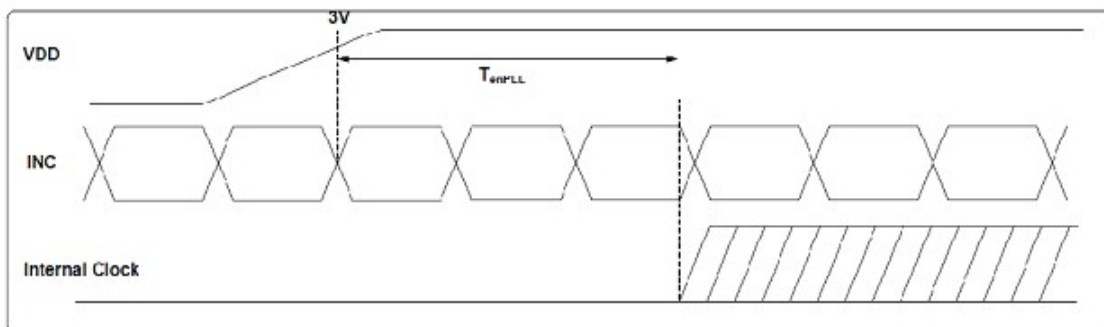
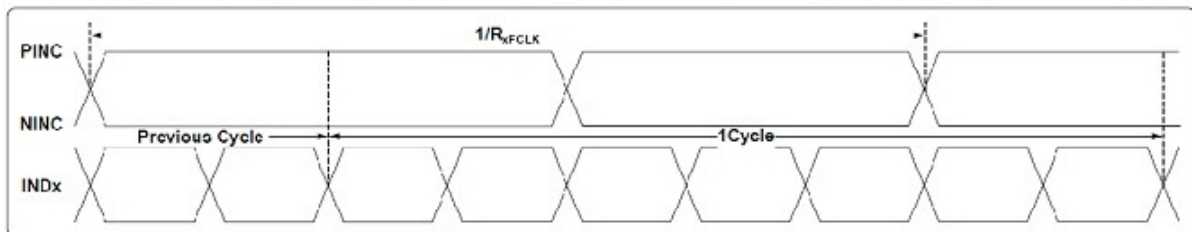
-SELB= "L (GND)" : 8 bit ;

9. Input Signal Timing

9.1. AC Electrical Characteristics

9.1.1. LVDS mode AC Electrical Characteristics

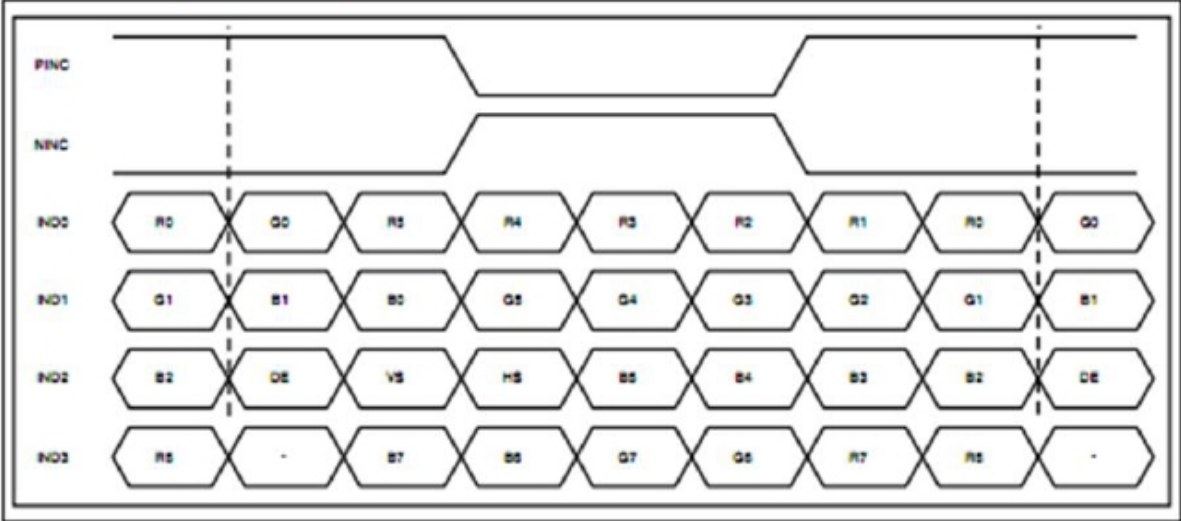
Parameter	Symbol	Min	Typ	Max	Unit	Condition
Clock frequency	RxFCLK	40.8	51.2	67.2	MHz	
Input data skew margin	TRSKM	500	-	-	ps	VID =400mV RxVCM=1.2V RxFCLK=71MHz
Clock high time	TLVCH	-	4/ (7*RxFCLK)		ns	
Clock low time	TLVCL		3/ (7*RxFCLK)		ns	
PLL wake-up time	TenPLL			150	us	



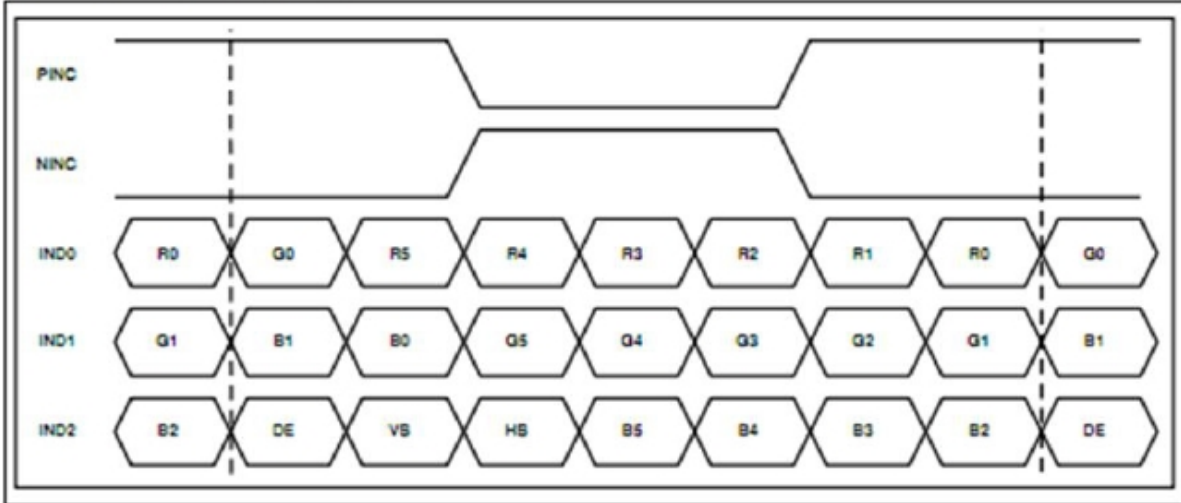
LVDS figure

9.2. Data Input Format

9.2.1. LVDS mode data input format



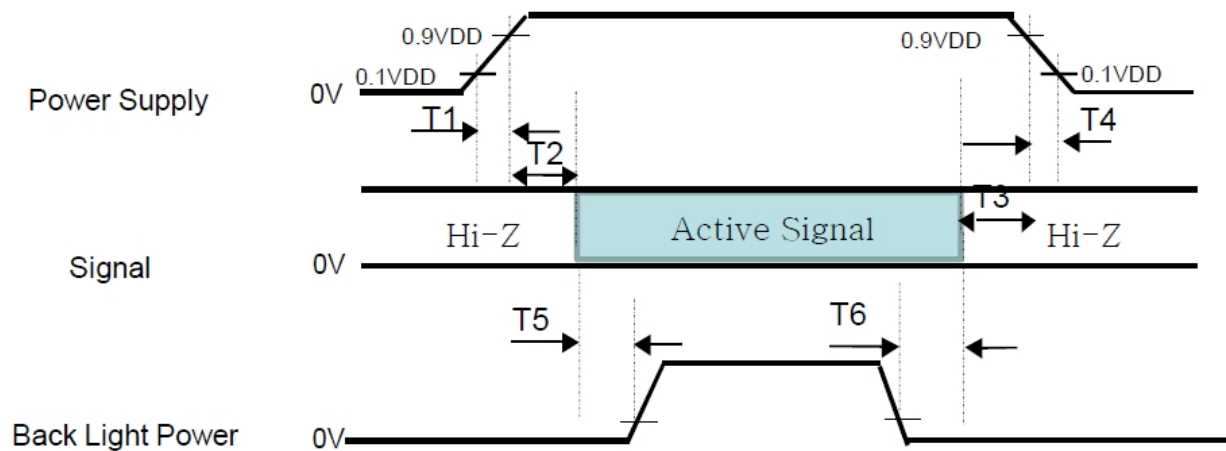
8bit LVDS Input



6bit LVDS Input

**9.3. Power On/Off Sequence**

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



- 0.5ms ≤ T1 ≤ 10 ms
- 0 ms ≤ T2
- 0 ms ≤ T3
- 0 ms ≤ T4 ≤ 10ms
- 100ms ≤ T5 ≤ 300ms
- 100 ms ≤ T6 ≤ 300ms

Notes:

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

## **10. Quality Assurance**

### **10.1. Purpose**

This standard for Quality Assurance assures the quality of LCD module products supplied to customer.

### **10.2. Standard for Quality Test**

#### 10.2.1 Sampling Plan:

GB2828.1-2012

Single sampling, normal inspection.

#### 10.2.2 Sampling Criteria:

Visual inspection: AQL 1.5%

Electrical functional: AQL 0.65%.

#### 10.2.3 Reliability Test:

Detailed requirement refer to Reliability Test Specification.

### **10.3. Nonconforming Analysis & Disposition**

#### 10.3.1 Nonconforming analysis:

10.3.1.1 Customer should provide overall information of non-conforming sample for their complaints.

10.3.1.2 After receipt of detailed information from customer, the analysis of nonconforming parts usually should be finished in one week.

10.3.1.3 If can not finish the analysis on time, customer will be notified with the progress status.

#### 10.3.2 Disposition of nonconforming:

10.3.2.1 Non-conforming product over PPM level will be replaced.

10.3.2.2 The cause of non-conformance will be analyzed. Corrective action will be discussed and implemented.

### **10.4. Agreement Items**

Shall negotiate with customer if the following situation occurs:

10.4.1 There is any discrepancy in standard of quality assurance.

10.4.2 Additional requirement to be added in product specification.

10.4.3 Any other special problem.

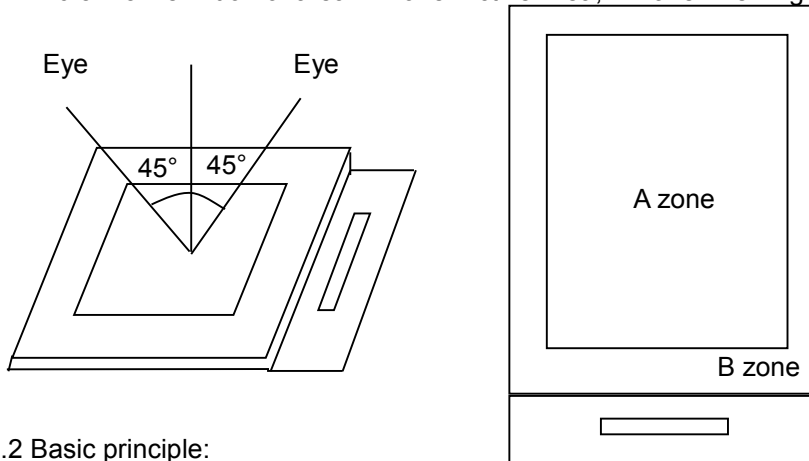
**10.5. Standard of the Product Visual Inspection**

10.5.1 Appearance inspection:

10.5.1.1 The inspection must be under illumination about 1000 – 1500 lx, and the distance of view must be at 30cm ± 2cm.

10.5.1.2 The viewing angle should be 45° from the vertical line without reflection light or follows customer's viewing angle specifications.

10.5.1.3 Definition of area: A Zone: Active Area, B Zone: Viewing Area,



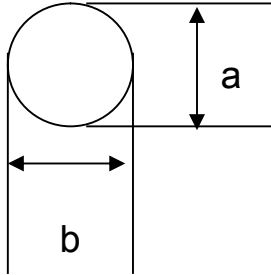
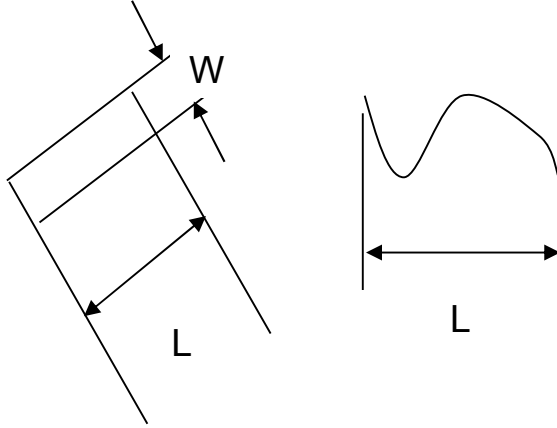
10.5.2 Basic principle:

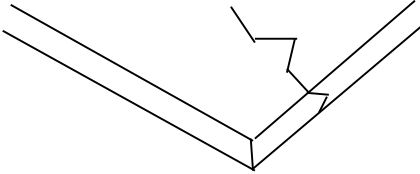
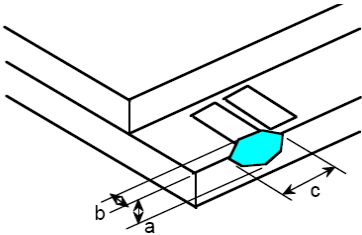
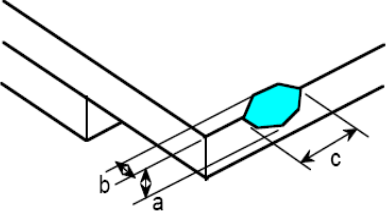
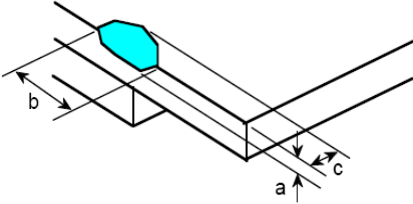
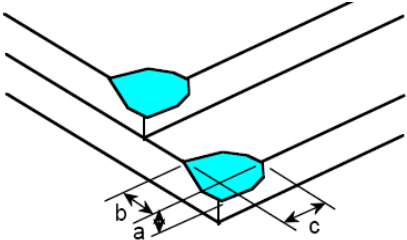
10.5.2.1 A set of sample to indicate the limit of acceptable quality level must be discussed by both us and customer when there is any dispute happened.

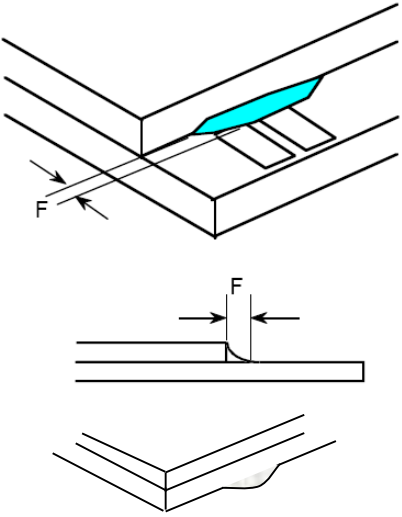
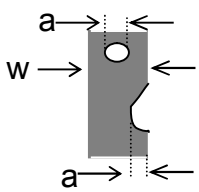
10.5.2.2 New item must be added on time when it is necessary.



10.6. Inspection Specification

No.	Item	Criteria (Unit: mm)																		
01	Black / White spot Foreign material (Round type) Pinholes Stain Particles inside cell. (Minor defect)	 <table border="1" data-bbox="970 344 1476 562"> <thead> <tr> <th>Size</th> <th>Area</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.20</math></td> <td></td> <td>Ignore</td> </tr> <tr> <td><math>0.20 &lt; \phi \leq 0.50</math></td> <td></td> <td><math>N \leq 3</math></td> </tr> <tr> <td><math>0.50 &lt; \phi</math></td> <td></td> <td>0</td> </tr> </tbody> </table> <p><math>\phi = (a + b) / 2</math>                      Distance between 2 defects should more than 5mm apart.</p>	Size	Area	Acc. Qty	$\phi \leq 0.20$		Ignore	$0.20 < \phi \leq 0.50$		$N \leq 3$	$0.50 < \phi$		0						
Size	Area	Acc. Qty																		
$\phi \leq 0.20$		Ignore																		
$0.20 < \phi \leq 0.50$		$N \leq 3$																		
$0.50 < \phi$		0																		
02	Electrical Defect (Minor defect)	<table border="1" data-bbox="517 741 1394 999"> <thead> <tr> <th>Bright dot</th> <th>Display Area</th> <th>Total</th> <th rowspan="3">Note1</th> </tr> </thead> <tbody> <tr> <td></td> <td><math>N \leq 2</math></td> <td><math>N \leq 2</math></td> </tr> <tr> <th>Dark dot</th> <td><math>N \leq 4</math></td> <td><math>N \leq 4</math></td> </tr> <tr> <th>Total dot</th> <td><math>N \leq 4</math></td> <td><math>N \leq 4</math></td> <td></td> </tr> <tr> <th>Mura</th> <td colspan="2">Not visible through 5% ND filter.</td> <th>Note 2</th> </tr> </tbody> </table> <p>Remark:                      1. Bright dot caused by scratch and foreign object accords to item 1.</p>	Bright dot	Display Area	Total	Note1		$N \leq 2$	$N \leq 2$	Dark dot	$N \leq 4$	$N \leq 4$	Total dot	$N \leq 4$	$N \leq 4$		Mura	Not visible through 5% ND filter.		Note 2
Bright dot	Display Area	Total	Note1																	
	$N \leq 2$	$N \leq 2$																		
Dark dot	$N \leq 4$	$N \leq 4$																		
Total dot	$N \leq 4$	$N \leq 4$																		
Mura	Not visible through 5% ND filter.		Note 2																	
03	Black and White line Scratch Foreign material (Line type) (Minor defect)	 <table border="1" data-bbox="576 1608 1203 1868"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td>/</td> <td><math>W \leq 0.1</math></td> <td>Ignore</td> </tr> <tr> <td><math>L \leq 2.5</math></td> <td><math>0.1 &lt; W \leq 0.2</math></td> <td>3</td> </tr> <tr> <td><math>L &gt; 2.5</math></td> <td><math>0.2 &lt; W</math></td> <td>0</td> </tr> <tr> <td colspan="2">Total</td> <td>3</td> </tr> </tbody> </table> <p>Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable.</p>	Length	Width	Acc. Qty	/	$W \leq 0.1$	Ignore	$L \leq 2.5$	$0.1 < W \leq 0.2$	3	$L > 2.5$	$0.2 < W$	0	Total		3			
Length	Width	Acc. Qty																		
/	$W \leq 0.1$	Ignore																		
$L \leq 2.5$	$0.1 < W \leq 0.2$	3																		
$L > 2.5$	$0.2 < W$	0																		
Total		3																		

<p>04</p>	<p>Glass Crack (Minor defect)</p>	 <p>Crack is potential to enlarge, any type is not allowed.</p>										
<p>05</p>	<p>Glass Chipping Pad Area: (Minor defect)</p> 	<table border="1"> <thead> <tr> <th>Length and Width</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td><math>c &gt; 3.0, b &lt; 1.0</math></td> <td>1</td> </tr> <tr> <td><math>c &lt; 3.0, b &lt; 1.0</math></td> <td>3</td> </tr> <tr> <td colspan="2"><math>a &lt; \text{Glass Thickness}</math></td> </tr> </tbody> </table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	3	$a < \text{Glass Thickness}$			
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	3											
$a < \text{Glass Thickness}$												
<p>06</p>	<p>Glass Chipping Rear of Pad Area: (Minor defect)</p> 	<table border="1"> <thead> <tr> <th>Length and Width</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td><math>c &gt; 3.0, b &lt; 1.0</math></td> <td>1</td> </tr> <tr> <td><math>c &lt; 3.0, b &lt; 1.0</math></td> <td>2</td> </tr> <tr> <td><math>c &lt; 3.0, b &lt; 0.5</math></td> <td>4</td> </tr> <tr> <td colspan="2"><math>a &lt; \text{Glass Thickness}</math></td> </tr> </tbody> </table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
<p>07</p>	<p>Glass Chipping Except Pad Area: (Minor defect)</p> 	<table border="1"> <thead> <tr> <th>Length and Width</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td><math>c &gt; 3.0, b &lt; 1.0</math></td> <td>1</td> </tr> <tr> <td><math>c &lt; 3.0, b &lt; 1.0</math></td> <td>2</td> </tr> <tr> <td><math>c &lt; 3.0, b &lt; 0.5</math></td> <td>4</td> </tr> <tr> <td colspan="2"><math>a &lt; \text{Glass Thickness}</math></td> </tr> </tbody> </table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
<p>08</p>	<p>Glass Corner Chipping: (Minor defect)</p> 	<table border="1"> <thead> <tr> <th>Length and Width</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td><math>c &lt; 3.0, b &lt; 3.0</math></td> <td>Ignore</td> </tr> <tr> <td colspan="2"><math>a &lt; \text{Glass Thickness}</math></td> </tr> </tbody> </table>	Length and Width	Acc. Qty	$c < 3.0, b < 3.0$	Ignore	$a < \text{Glass Thickness}$					
Length and Width	Acc. Qty											
$c < 3.0, b < 3.0$	Ignore											
$a < \text{Glass Thickness}$												

<p>9</p>	<p>Glass Burr: (Minor defect)</p> 	<table border="1" data-bbox="901 264 1369 353"> <thead> <tr> <th>Length</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td><math>F &lt; 1.0</math></td> <td>Ignore</td> </tr> </tbody> </table> <p>Glass burr don't affect assemble and module dimension.</p>	Length	Acc. Qty	$F < 1.0$	Ignore				
Length	Acc. Qty									
$F < 1.0$	Ignore									
<p>10</p>	<p>FPC Defect: (Minor defect)</p> 	<p>11.1 Dent, pinhole width <math>a &lt; w/3</math>. (w: circuitry width.) 11.2 Open circuit is unacceptable. 11.3 No oxidation, contamination and distortion.</p>								
<p>11</p>	<p>Bubble on Polarizer (Minor defect)</p>	<table border="1" data-bbox="774 1299 1244 1473"> <thead> <tr> <th>Diameter</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td><math>\varphi \leq 0.30</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.30 &lt; \varphi \leq 0.50</math></td> <td><math>N \leq 2</math></td> </tr> <tr> <td><math>0.50 &lt; \varphi</math></td> <td><math>N = 0</math></td> </tr> </tbody> </table>	Diameter	Acc. Qty	$\varphi \leq 0.30$	Ignore	$0.30 < \varphi \leq 0.50$	$N \leq 2$	$0.50 < \varphi$	$N = 0$
Diameter	Acc. Qty									
$\varphi \leq 0.30$	Ignore									
$0.30 < \varphi \leq 0.50$	$N \leq 2$									
$0.50 < \varphi$	$N = 0$									
<p>12</p>	<p>Dent on Polarizer (Minor defect)</p>	<table border="1" data-bbox="774 1518 1244 1693"> <thead> <tr> <th>Diameter</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td><math>\varphi \leq 0.25</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.25 &lt; \varphi \leq 0.50</math></td> <td><math>N \leq 4</math></td> </tr> <tr> <td><math>0.50 &lt; \varphi</math></td> <td>None</td> </tr> </tbody> </table>	Diameter	Acc. Qty	$\varphi \leq 0.25$	Ignore	$0.25 < \varphi \leq 0.50$	$N \leq 4$	$0.50 < \varphi$	None
Diameter	Acc. Qty									
$\varphi \leq 0.25$	Ignore									
$0.25 < \varphi \leq 0.50$	$N \leq 4$									
$0.50 < \varphi$	None									
<p>13</p>	<p>Bezel</p>	<p>14.1 No rust, distortion on the Bezel. 14.2 No visible fingerprints, stains or other contamination.</p>								

<b>14</b>	Touch Panel	<p>D: Diameter W: width L: length</p> <p>15.1 Spot: <math>D &lt; 0.25</math> is acceptable  <math>0.25 \leq D \leq 0.4</math></p> <p>2dots are acceptable and the distance between defects should more than 10 mm.</p> <p><math>D &gt; 0.4</math> is unacceptable</p> <p>15.2 Dent: <math>D &gt; 0.40</math> is unacceptable</p> <p>15.3 Scratch: <math>W \leq 0.03</math>, <math>L \leq 10</math> is acceptable,  <math>0.03 &lt; W \leq 0.10</math>, <math>L \leq 10</math> is acceptable</p> <p>Distance between 2 defects should more than 10 mm.  <math>W &gt; 0.10</math> is unacceptable.</p>
<b>15</b>	PCB	<p>16.1 No distortion or contamination on PCB terminals.</p> <p>16.2 All components on PCB must same as documented on the BOM/component layout.</p> <p>16.3 Follow IPC-A-600F.</p>
<b>16</b>	Soldering	Follow IPC-A-610C standard
<b>17</b>	Electrical Defect (Major defect)	<p>The below defects must be rejected.</p> <p>18.1 Missing vertical / horizontal segment,</p> <p>18.2 Abnormal Display.</p> <p>18.3 No function or no display.</p> <p>18.4 Current exceeds product specifications.</p> <p>18.5 LCD viewing angle defect.</p> <p>18.6 No Backlight.</p> <p>18.7 Dark Backlight.</p> <p>18.8 Touch Panel no function.</p>

Remark: LCD Panel Broken shall be rejected. Defect out of LCD viewing area is acceptable.

**10.7. Classification of Defects**

10.7.1 Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.

10.7.2 Two minor defects are equal to one major in lot sampling inspection.

**10.8. Identification/marketing criteria**

Any unit with illegible / wrong /double or no marking/ label shall be rejected.

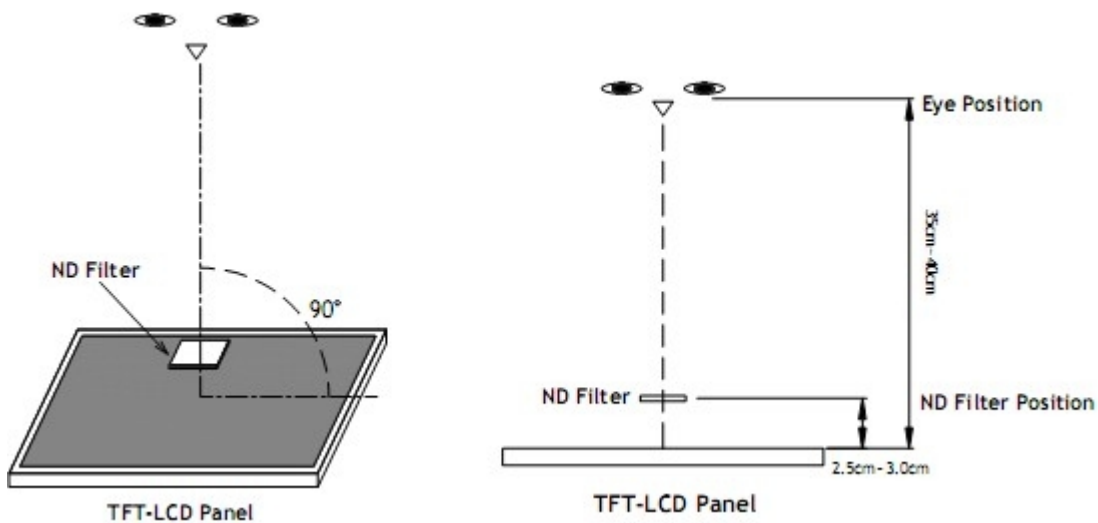
**10.9. Packaging**

10.9.1 There should be no damage of the outside carton box, each packaging box should have one identical label.

10.9.2 Modules inside package box should have compliant mark.

10.9.3 All direct package materials shall offer ESD protection

**Note1:** Bright dot is defined as the defective area of the dot is larger than 50% of one sub-pixel area.



Bright dot: The bright dot size defect at black display pattern. It can be recognized by 2% transparency of filter when the distance between eyes and panel is 350mm ± 50mm.

Dark dot: Cyan, Magenta or Yellow dot size defect at white display pattern. It can be recognized by 5% transparency of filter when the distance between eyes and panel is 350mm ± 50mm.

**Note2:** Mura on display which appears darker / brighter against background brightness on parts of display area.

**11. Reliability Specification**

No	Item	Condition	Quantity	Criteria
1	High Temperature Operating	70°C, 96Hrs	2	GB/T2423.2-2008
2	Low Temperature Operating	-20°C, 96Hrs	2	GB/T2423.1-2008
3	High Humidity	50°C, 90%RH, 96Hrs	2	GB/T2423.3-2006
4	High Temperature Storage	80°C, 96Hrs	2	GB/T2423.2-2008
5	Low Temperature Storage	-30°C, 96Hrs	2	GB/T2423.1-2008
6	Thermal Cycling Test	-20°C, 60min~70°C, 60min, 20 cycles.	2	GB/T2423.22-2012
7	Packing vibration	Frequency range:10Hz~50Hz Acceleration of gravity:5G X,Y,Z 30 min for each direction.	2	GB/T5170.14-2009
8	Electrical Static Discharge	Air: ±4KV 150pF/330Ω 5 times Contact: ±2KV 150pF/330Ω 5 times	2	GB/T17626.2-2006
9	Drop Test (Packaged)	Height:80 cm,1 corner, 3 edges, 6 surfaces.	2	GB/T2423.8-1995

Note1. No deflection cosmetic and operational function allowable.

Note2. Total current Consumption should be below double of initial value

**12. Precautions and Warranty**

**12.1. Safety**

12.1.1 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.

12.1.2 Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

**12.2. Handling**

12.2.1 Reverse and use within ratings in order to keep performance and prevent damage.

12.2.2 Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.

**12.3. Storage**

12.3.1 Do not store the LCD module beyond the specified temperature ranges.

**12.4. Metal Pin (Apply to Products with Metal Pins)**

12.4.1 Pins of LCD and Backlight

12.4.1.1 Solder tip can touch and press on the tip of Pin LEAD during the soldering

12.4.1.2 Recommended Soldering Conditions

Solder Type: Sn96.3~94-Ag3.3~4.3-Cu0.4~1.1

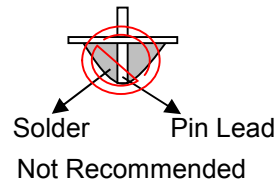
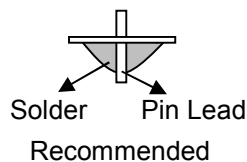
Maximum Solder Temperature: 370℃

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20℃

Typical Soldering Time: ≤3s

12.4.1.3 Solder Wetting



12.4.2 Pins of EL

12.4.2.1 Solder tip can touch and press on the tip of EL leads during soldering.

12.4.2.2 No Solder Paste on the soldering pad on the motherboard is recommended.

12.4.2.3 Recommended Soldering Conditions

Solder type: Nippon Alimit Leadfree SR-34, size 0.5mm

Recommended Solder Temperature: 270~290℃

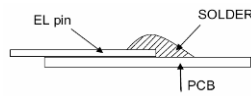
Typical Soldering Time: ≤2s

Minimum solder distance from EL lamp (body):2.0mm

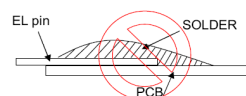
12.4.2.4 No horizontal press on the EL leads during soldering.

12.4.2.5 180° bend EL leads three times is not allowed.

12.4.2.6 Solder Wetting

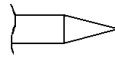


Recommended

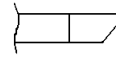


Not Recommended

12.4.2.7 The type of the solder iron:

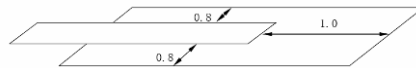


Recommended



Not Recommended

12.4.2.8 Solder Pad



**12.5. Operation**

- 12.5.1 Do not drive LCD with DC voltage
- 12.5.2 Response time will increase below lower temperature
- 12.5.3 Display may change color with different temperature
- 12.5.4 Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear “fractured”.

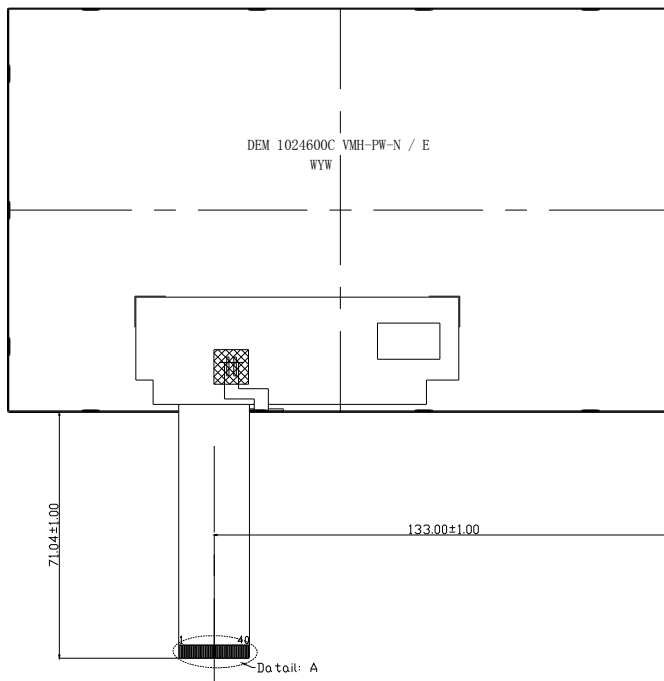
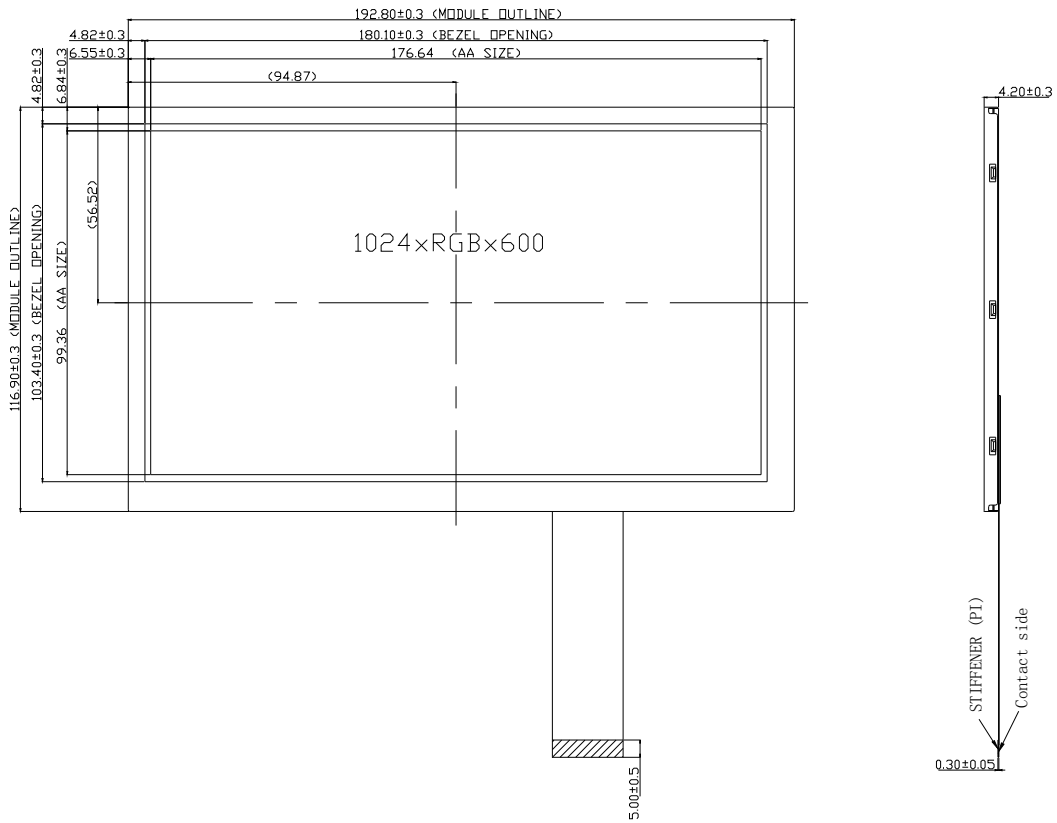
**12.6. Static Electricity**

- 12.6.1. CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.
- 12.6.2. The normal static prevention measures should be observed for work clothes and benches.
- 12.6.3. The module should be kept into anti-static bags or other containers resistant to static for storage.

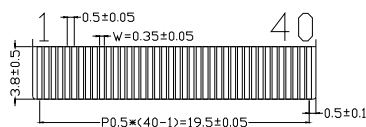
**12.7. Limited Warranty**

- 12.7.1 Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.
- 12.7.2 If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.
- 12.7.3 After the product shipped, any product quality issues must be feedback within three months, otherwise, we will not be responsible for the subsequent or consequential events.

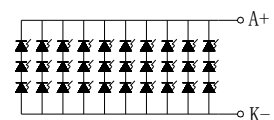
13. Outline Drawing



PIN	SYMBOL
1	VCOM
2	VDD
3	VDD
4	NC
5	RESET
6	U/D
7	L/R
8	STBYB
9	GND
10	RXCLKIN-
11	RXCLKIN+
12	GND
13	RXIN0-
14	RXIN0+
15	GND
16	RXIN1-
17	RXIN1+
18	GND
19	RXIN2-
20	RXIN2+
21	GND
22	RXIN3-
23	RXIN3+
24	GND
25	SELB
26	GND
27	AVDD
28	GND
29	VGH
30	NC
31	NC
32	VGL
33	GND
34	NC
35	LED-
36	LED-
37	NC
38	NC
39	LED+
40	LED+



Detail A:4/1



Circuit Diagram