

# RV338FBM-N00

## Product Specification

<b>ITEM</b>	<b>SIGNATURE</b>	<b>ITEM</b>	<b>SIGNATURE</b>		
Prepared		Checked			
Countersigned		Approved			

**Beijing BOE Special Display Technology CO.,LTD**

## CONTENT LIST

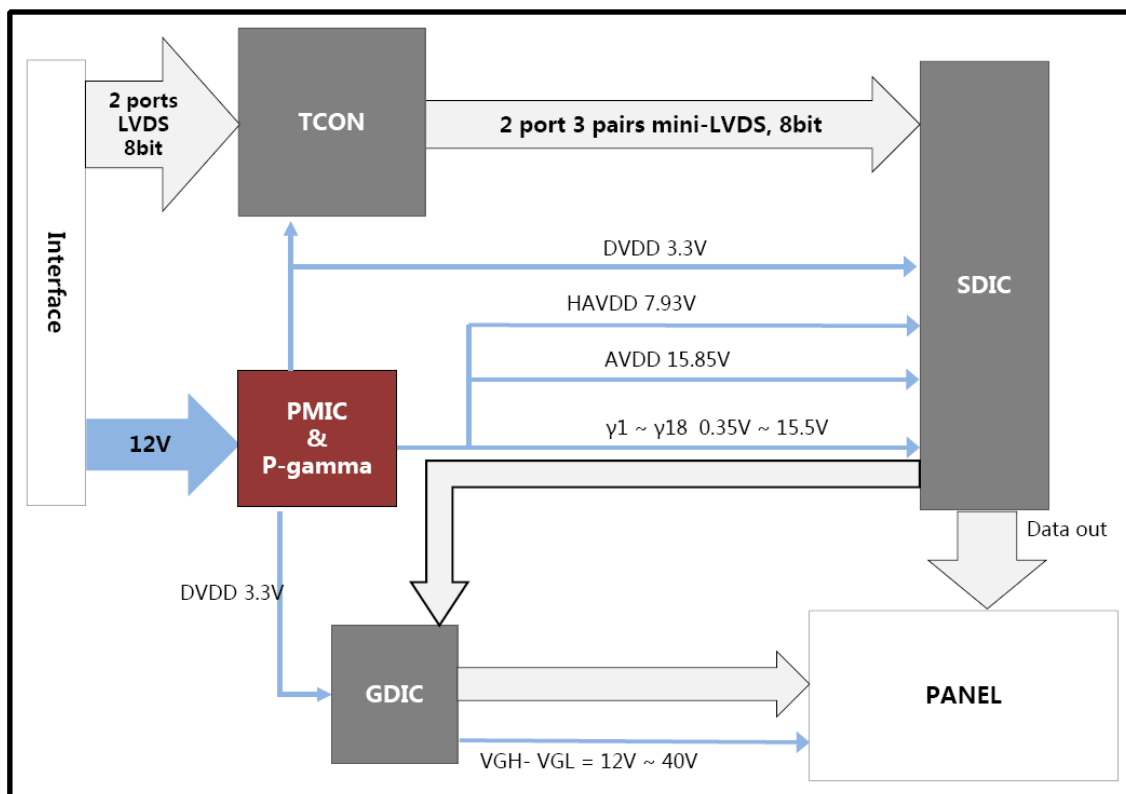
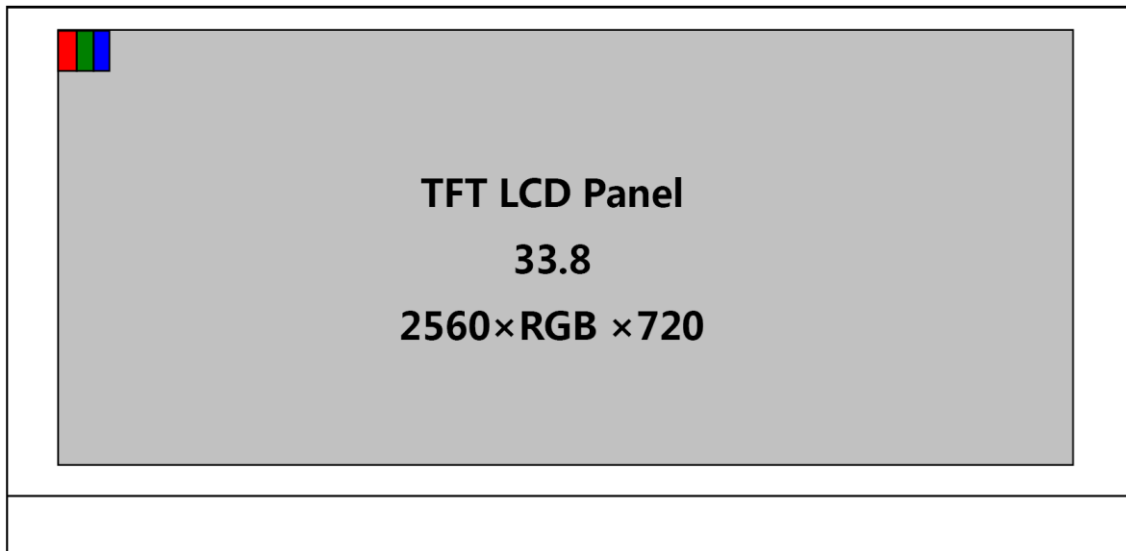
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## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

RV338FBB-N10 is a color active matrix TFT LCD open cell using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This OC has a 33.8 inch diagonally measured active area with FHD resolutions (2560 horizontal by 720 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors



## 1.2 Features

- Cell Thickness: 1.0t
- Thin and light weight
- RoHS Compliant
- LVDS Input Interface
- 8bit color-depth, display 16.7M color

## 1.3 Application

- Rail Transportation Display
- Public Transport Vehicle Display
- Display Terminals for Control System
- AV Application Products

## 1.4 General Specifications (H: horizontal length, V: vertical length)

< Table 1. General Specifications >

Model	Parameter	Items	Unit	Rema
LCD	Active area	825.6(H) ×232.2(V)	mm	
	Border(L/R/U/D)	19/19/15.7/15.7	mm	
	Number of pixels	2560(H)x720(V)	mm	
	Bezel Area	829.6(H)x236.2(V)	mm	
	Transmittance	4.7%(typ)		without
	Color Gamut	70%(typ)		C Light(CF)
	Display colors	16.7M		
	Display mode	Normally Black		
	Contrast Ratio	1200:1		
	Response Time	25	ms	
	Optima Viewing	Typ. 89(R)/89(L)/89(U)/89(D)	Deg.	CR ≥ 10
	Backlight	ELED		
	Brightness	700 (Typ.)	nits	
Power	Consumption	33W (Max.)	Watt	
Operation Conditions	Temperature	-20 ~ 70°C		
	Humidity	20% ~ 90%		
Dimensions	863.6±1(H) x 267.6±1(V)x20±0.5(D)		mm	
Weight	Net (Kg)	4.4±0.5		
	Gross (Kg)	20±1 (4pcs/box)		
Package	Height (mm)	956 (L) *217 (W) *360 (H)		

## 2.0 Absolute Maximum Ratings

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. LCD Module Electrical Specifications > [Ta =25±2 °C]

Item	Symbol	Min.	Max.	Unit	Note
LC operating Voltage	VOP		5.0	V	Ta=25+/-5° C
Operating Temperature (Humidity)	TOP	-20	+70	°C	[Note2]
	RH(60°)		90	%	
Storage Temperature (Humidity)	TST	-30	+80	°C	
	RH(60°)		90	%	

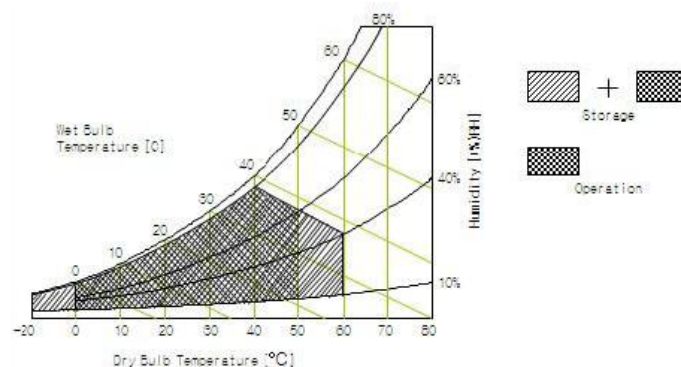
Note:

1. Liquid Crystal driving voltage

Due to the characteristics of LC Material, this voltage varies with environmental temperature.

2. Temperature and relative humidity range are shown in the figure below.

Wet bulb temperature should be 39 °C max. and no condensation of water.



## 3.0 ELECTRICAL SPECIFICATION

### 3.1 Electrical Specifications

< Table 3. LCD Module Electrical Specifications > [Ta =25±2 °C]

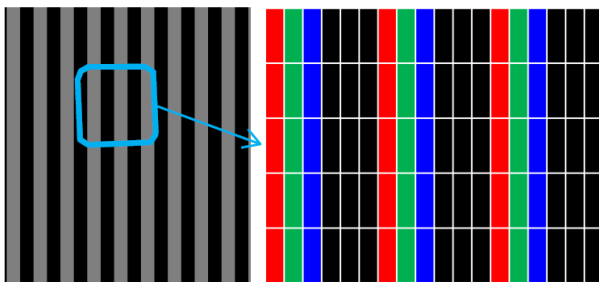
Parameter	Symbol	Value	Range	Unit	Remark
TFT Gate ON Voltage	VGH	27	10~15	V	Note1
TFT Gate OFF Voltage	VGL	-8	-14~-12	V	Note2
TFT Common Electrode Voltage	Vcom		-2~0	V	Note3
TFT Kick-Back Voltage Max	$\Delta V_p$ Max	0.755	-	V	
TFT Kick-Back Voltage Min	$\Delta V_p$ Min	0.723	-	V	

**Note:**

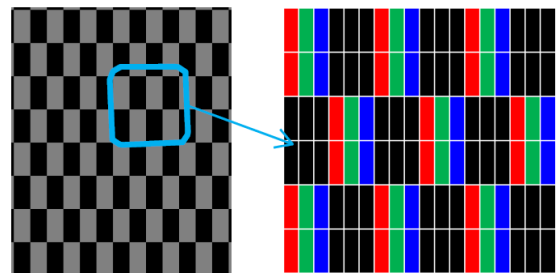
1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. Vcom must be adjusted to minimize flicker to optimize display quality, as Image Sticking, Crosstalk and Contrast Ratio etc.. (flicker patterns as below consist of 127 gray scale and 0 gray scale)

We just kindly recommend the setting-voltages the reference value.

In order to get the optimized display quality, the setting-voltage should be changed according to customer's developing condition. (The display quality could be changed by customer's setting -voltage.)



Flicker pattern for Column inversion



Flicker pattern for 2dot inversion

### 3.2 Back-light Unit

< Table 4. LED Driving guideline specifications >

Ta=25+/-2°C

Parameter		Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage	$V_F$	10.2	12	24	V	TBD
LED Forward Current	$I_F$		1.7	2.5	A	TBD
LED Driver Power Supply Voltage	$V_{LED}$	5.2		6.2	V	TBD
LED Driver Power Supply Current	$I_{LED}$		55		mA	TBD
Power Consumption for Back light	$P_{LED}$			33	W	Note 1
LED Life-Time	N/A	30000		50000	Hour	Note 2

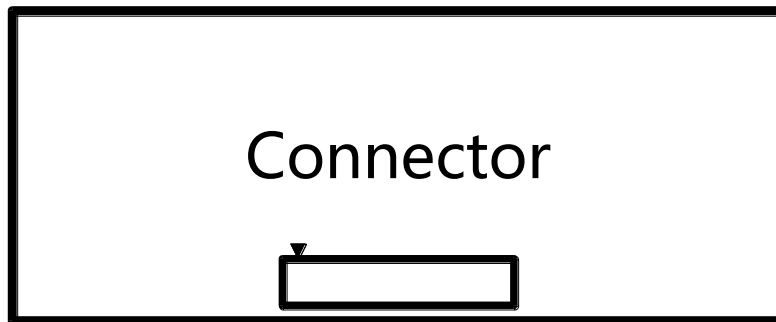
Notes : 1. Calculator Value for reference  $I_{LED} \times V_{LED} \div \eta = P_{LED}$

2. The estimated lifetime is specified as the time to reduce 50% brightness at 25°C。 The life time of he backlight depends on the ambient temperature. The life time will decrease under high temperature.

### 3.3 Backlight Unit

**Input connector: CN1 [Connector Type : PHR-6(JST)Pitch 2.0mm 6Pin.]**

Pin No.	Symbol	Description	Parameter
1~2	+12V	Supply voltage	10.8~26.4V
3	N/F	Standby/Operation	On =2--5.0V Off=0-0.5V
4	ADJ	PWM/100-1000Hz	100%=Brightness Max
5~6	GND	Ground	0V



Pin1

Pin6

## Input Connector

## 4.0 OPTICAL SPECIFICATIONS

### 4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance  $\leq 1$ lux and temperature =  $25 \pm 2^\circ\text{C}$ ) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of  $\theta$  and  $\phi$  equal to  $0^\circ$ . The center of the measuring spot on the Display surface shall stay fixed.

The backlight should be operating for 30 minutes prior to measurement.

### 4.2 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle	Horizontal	$\theta_3$	CR>10	85	89	-	°	Note 1
		$\theta_9$		85	89	-	°	
	Vertical	$\theta_{12}$		85	89	-	°	
		$\theta_6$		85	89	-	°	
Contrast Ratio		CR	$\theta = 0^\circ$	900	1200	-	-	Note 2
Luminance of White		9points max	$Y_w$	650	700		-	$\text{cd/m}^2$
White Luminance uniformity		9 Points	$\Delta Y_9$	70	75		-	%
Transmittance		T(%)	$\theta = 0^\circ$	4.2	4.7	-	-	Note 3
Color Gamut (CIE1976)		%	$\theta = 0^\circ$	65	70	-	-	
Reproduction Of color	Red	Rx	$\theta = 0^\circ$	0.661	0.662	0.663		Note 4 Color filter Glass (with OC By Backlight of BOE)
		Ry		0.323	0.323	0.324		
	Green	Gx		0.289	0.292	0.291		
		Gy		0.602	0.604	0.605		
	Blue	Bx		0.136	0.136	0.137		
		By		0.120	0.119	0.124		
White	Wx	$\theta = 0^\circ$	0.269	0.299	0.329			
	Wy		0.312	0.342	0.372			
Response Time		Tr+Tf	$\theta = 0^\circ$	-	25	30	ms	Note 5

#### Note:

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIG.1). Viewing angle measuring is based on WV Pol attached.

2. Contrast measurements shall be made at viewing angle of  $\Theta = 0^\circ$  and at the center of the LCD surface.

Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIG.1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Transmittance is the value with Polarizer.

4. The color chromaticity coordinates specified in Table1 shall be calculated from The spectral data measured with all pixels first in red, green, blue and white.

Measurements shall be made at the center of the C/F.

Measurement condition is C - light source & Halogen Lamp

5. The electro-optical response time measurements shall be made as FIG.2 by switching the "data" input signal ON and OFF.

The times needed for the luminance to change from 10% to 90% is  $T_f$ , and 90% to 10% is  $T_r$ .

**Figure 1. Measurement Set Up**

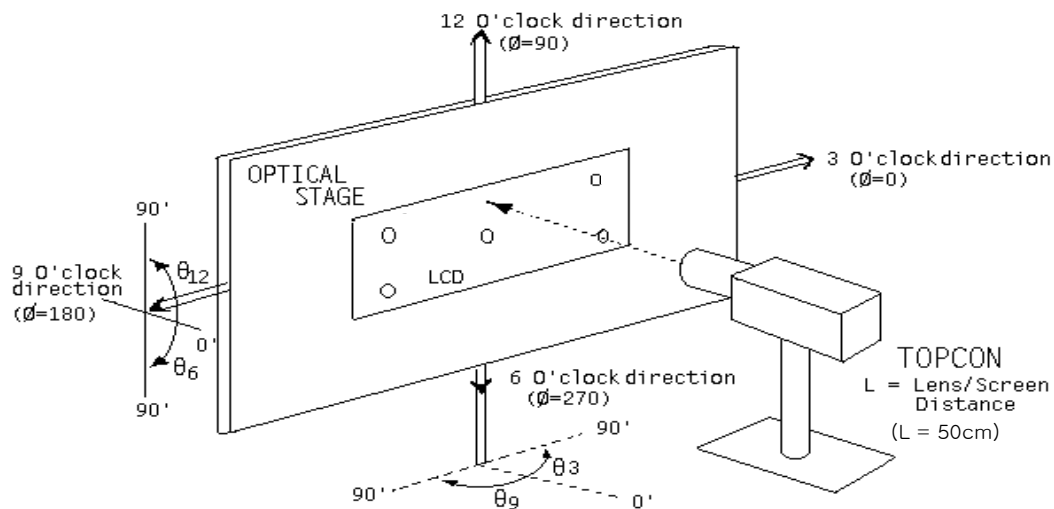
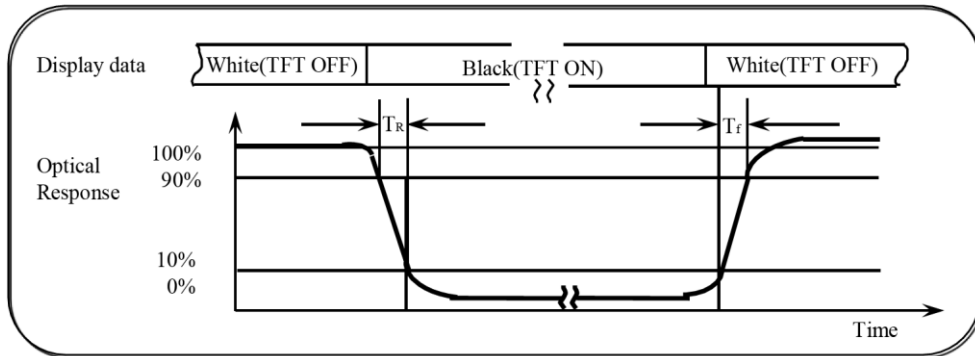


Figure 2. Response Time Testing



## 5.0 INTERFACE CONNECTION

### 5.1 Electrical Interface Connection

LVDS CONNECTOR: PM.FPC.LVS0508001 (巨铖)

No.	Symbol	Remark	No.	Symbol	Remark
1	GND	Ground	13	ERX0+	Even pixel Negative LVDS differential
2	SCL	I2C Clock	14	ERX1-	Even pixel Negative LVDS differential
3	SDA	I2C Data	15	ERX1+	Even pixel Negative LVDS differential
4	NC	No Connection	16	ERX2-	Even pixel Negative LVDS differential
5	NC	No Connection	17	ERX2+	Even pixel Negative LVDS differential
6	NC	No Connection	18	GND	Ground
7	SELLVDS	LVDS data format selection	19	ECLK-	Even pixel Negative LVDS differential
8	NC	No Connection	20	ECLK+	Even pixel Negative LVDS differential
9	NC	No Connection	21	GND	Ground
10	NC	No Connection	22	ERX3-	Even pixel Negative LVDS differential
11	GND	Ground	23	ERX3+	Even pixel Negative LVDS differential
12	ERX0-	Even pixel Negative LVDS differential data	24	NC	No Connection

No.	Symbol	Remark	No.	Symbol	Remark
25	NC	No Connection	39	ORX3+	Odd pixel Negative LVDS differential data input.
26	GND	Ground	40	NC	No Connection
27	GND	Ground	41	NC	No Connection
28	ORX0-	Odd pixel Negative LVDS differential data input.	42	GND	Ground
29	ORX0+	Odd pixel Negative LVDS differential data input.	43	GND	Ground
30	ORX1-	Odd pixel Negative LVDS differential data input.	44	GND	Ground
31	ORX1+	Odd pixel Negative LVDS differential data input.	45	GND	Ground
32	ORX2-	Odd pixel Negative LVDS differential data input.	46	GND	Ground
33	ORX2+	Odd pixel Negative LVDS differential data input.	47	NC	No Connection
34	GND	Ground	48	VCC	+12V
35	OCLK-	Odd pixel Negative LVDS differential data input.	49	VCC	+12V
36	OCLK+	Odd pixel Negative LVDS differential data input.	50	VCC	+12V
37	GND	Ground	51	VCC	+12V
38	ORX3-	Odd pixel Negative LVDS differential data input.			

## 6.0 SIGNAL TIMING SPECIFICATION

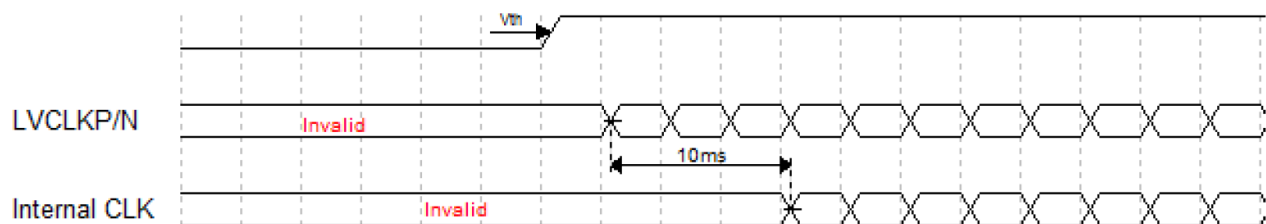
### 6.1 Timing Specification

Ite	Symbols	Spec			Unit	
		Min	Typ	Max		
Clock	Frequency	1/Tc	30	-	105	MHz
	High time	Tch	-	4/7Tc	-	
	Low time	Tcl	-	3/7Tc	-	
Frame period	Tv		792	860	936	lines
			50	60	75	Hz
			20	16.7	13.3	Ms
Vertical Display Period	Tvd	720	720	720	lines	
One Line Scanning Period	Th	2688	2760	3072	clocks	
Horizontal Display Period	Thd	2560	2560	2560	clocks	
Modulating frequency	F=105MHz	10	-	200	KHz	
Maximum deviation of	Vic = 1.2V	-3	-	+3	%	

## 6.2 Gate/Source control timing

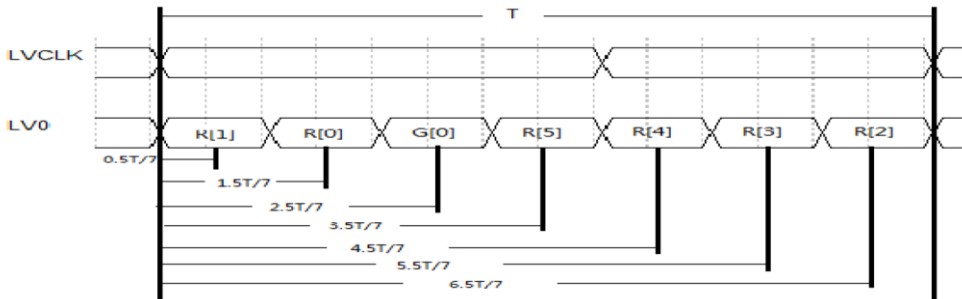
Parameter	Symbol	Condition	Spec			Unit
			Min	Typ	Max	
LVDS input frequency	F	3.3V power	30	-	105	MHz
LVDS channel to channel skew	TLVSK	F=95~105MHz	-600	-	+600	ps
		F=95~105MHz	-400	-	+400	ps
		F=95~105MHz	-300	-	+300	ps
		F=95~105MHz	-200	-	+200	ps
Modulating frequency of i	FLVMCO	F=105MHz Vic = 1.2V	10	-	200	KHz
Maximum deviation of i	FLVDEV		-3	-	+3	%
Cycle to cycle jitter	TCYCY		-	-	50	ms

### Phase Lock Loop wake-up time

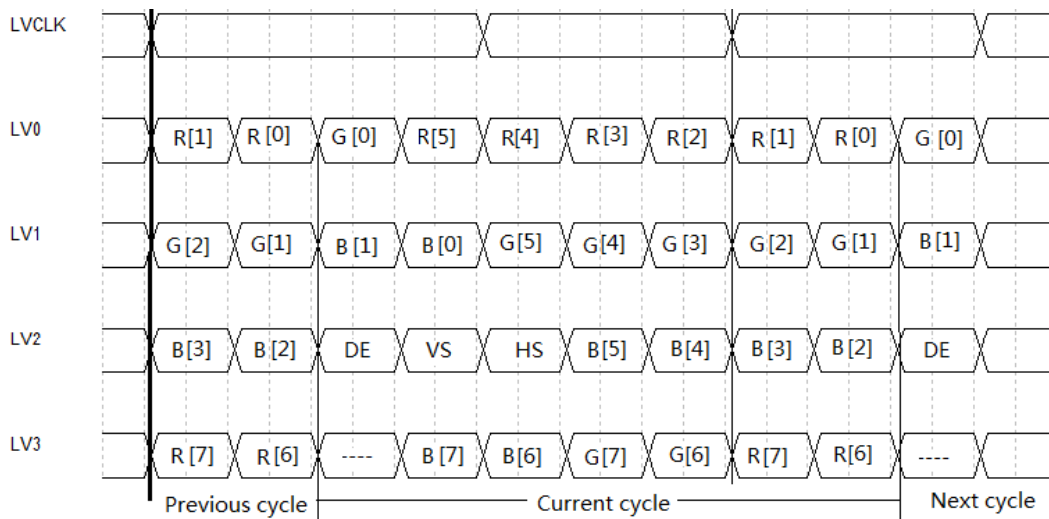


### 6.3 LVDS Receiver

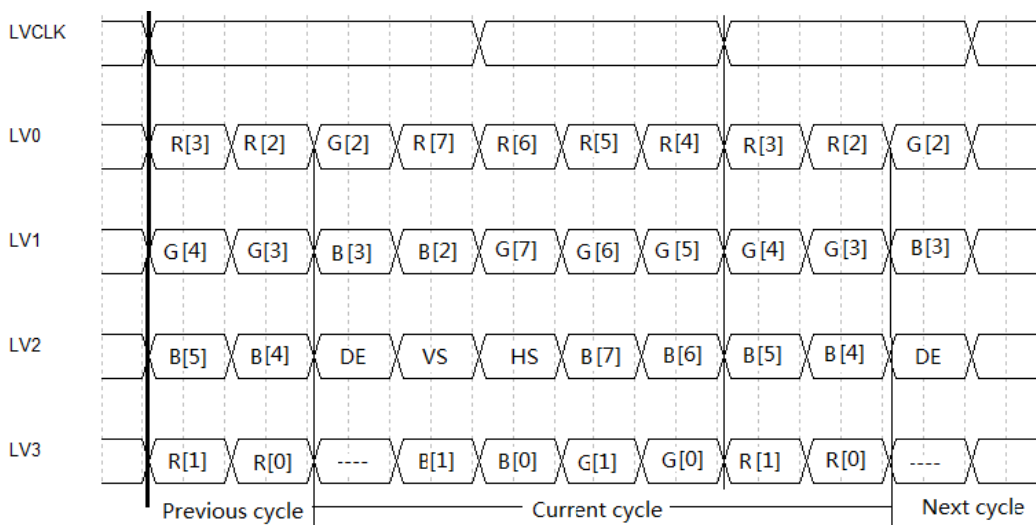
#### Ideal strobe position for LVDS input



#### LVDS Input data mapping



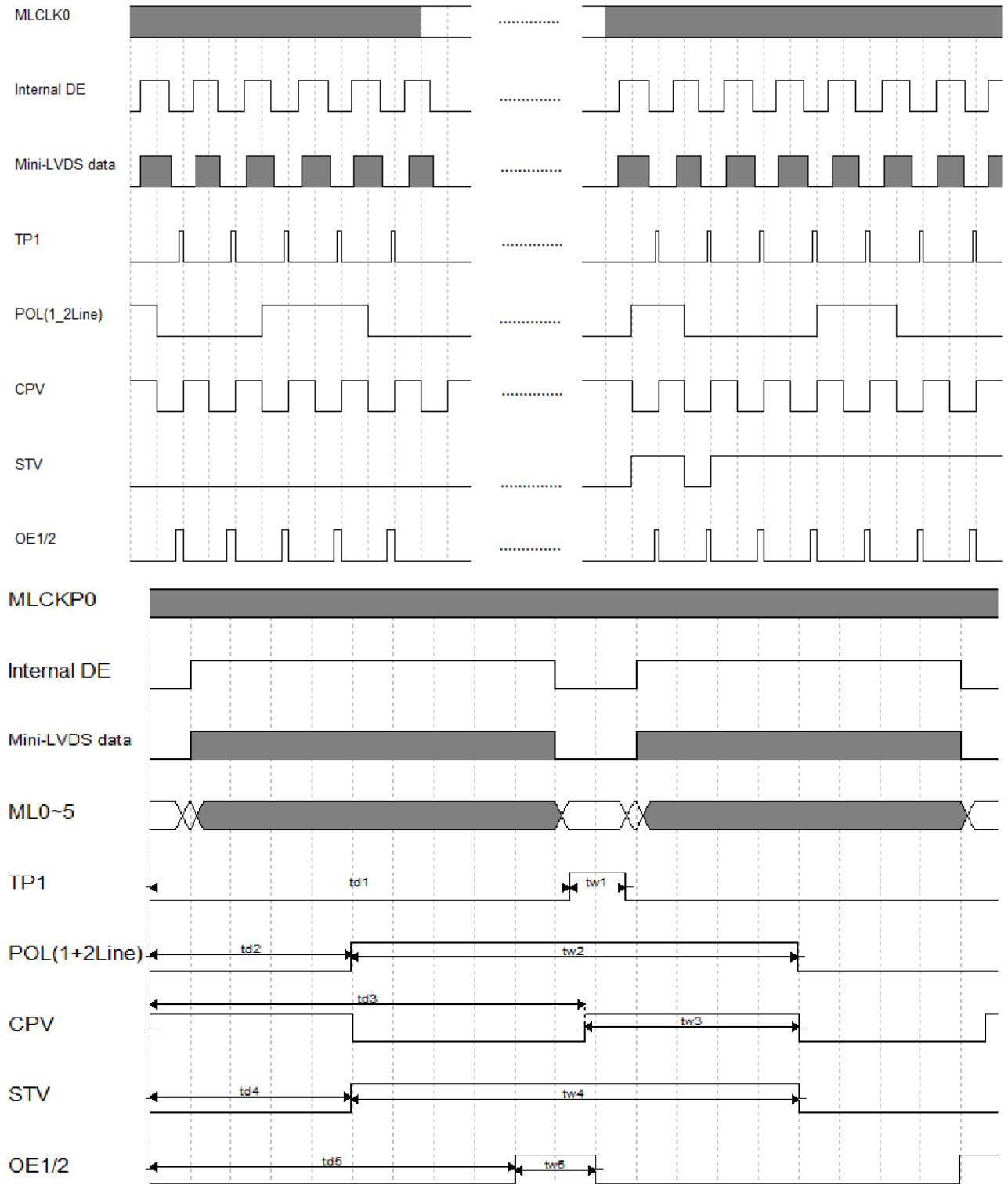
**VESA Format**



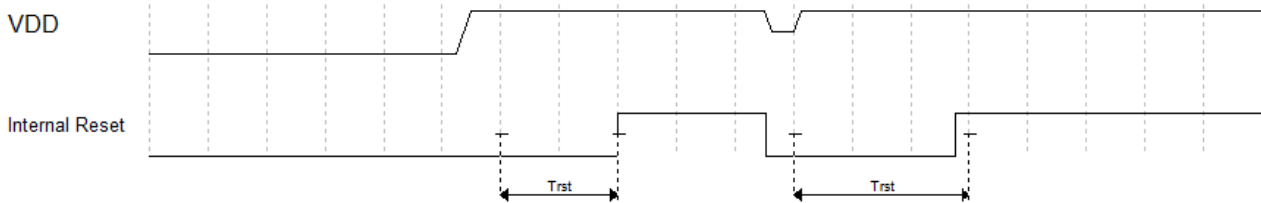
**JEIDA Format**

# 7.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

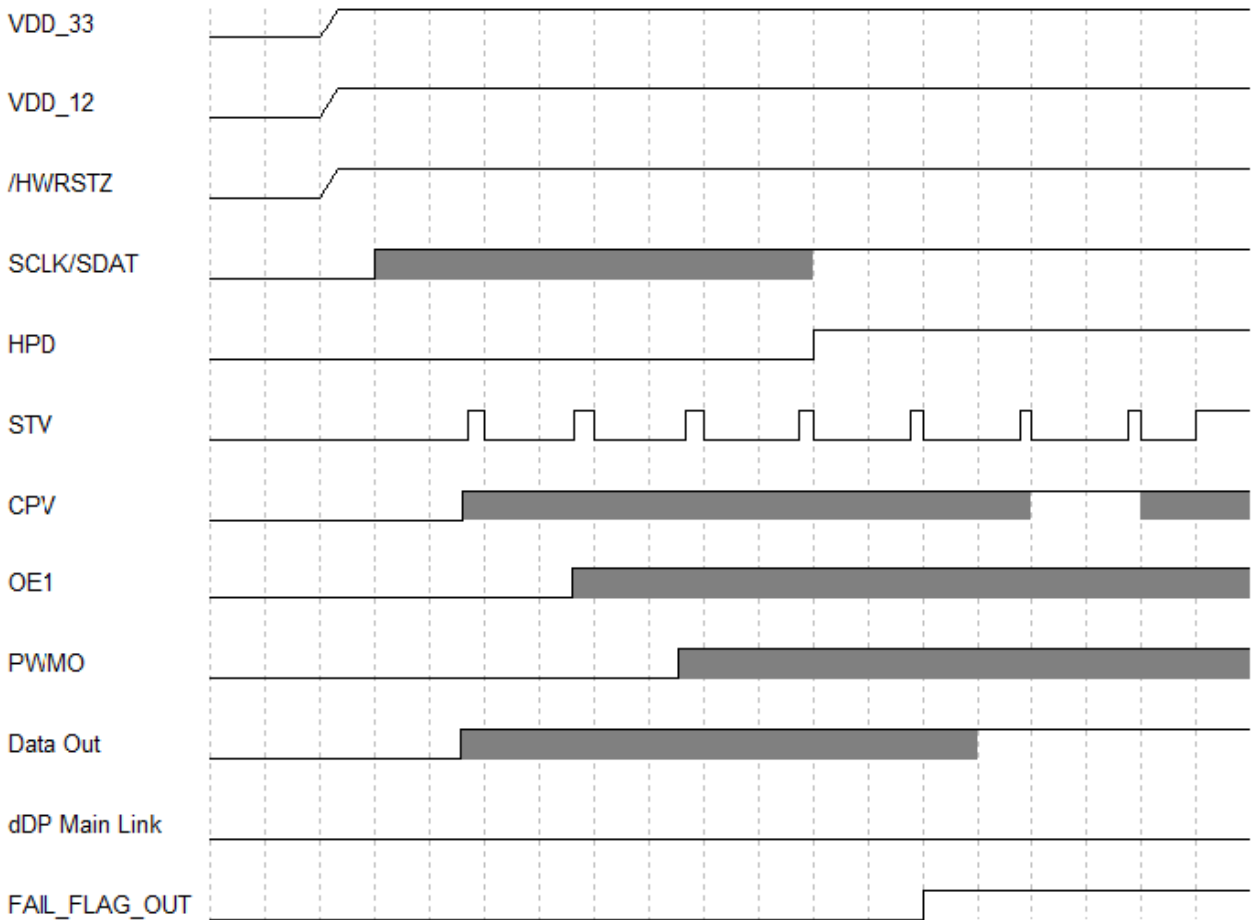
## 7.1 Control Signal output timing characteristic



## 8.0 Power Sequence



Parameter	Symbol	Condition	Spec			Unit
			Min	Typ	Max	
Reset threshold voltage	Vth	3.3V power	2.0	2.2	2.4	V
Hysteresis voltage	Vhys	3.3V power	200	-	-	mV
Time constant of RC	Trst	----	-	0.8RC	-	s
VDD rising time	Trst	For all power	0.1	-	10	ms



## 9.0 Mechanical Characteristics

### 9.1 OC Dimensional Requirements

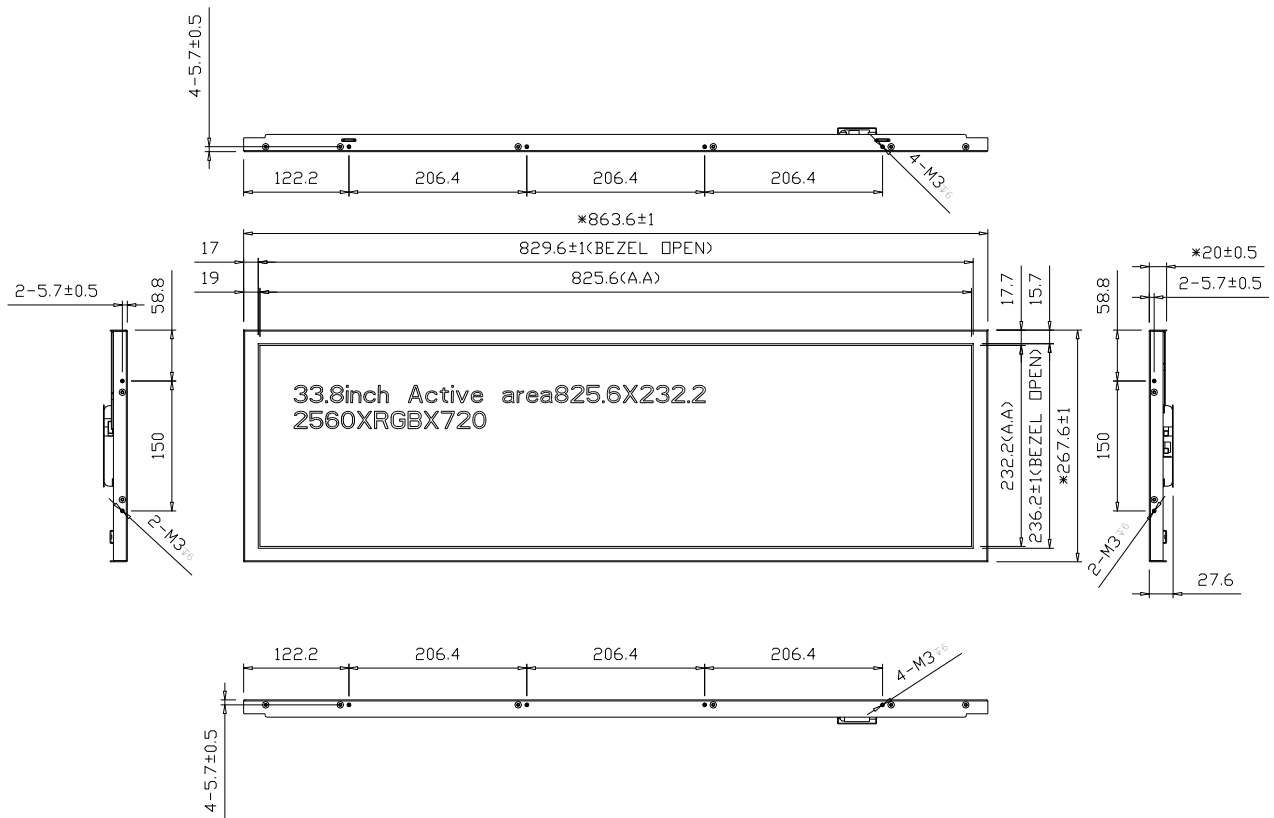
Parameter	Specification	Unit	Remark
Active area	825.6(H) × 232.2(V)	mm	± 0.15mm
Number of pixels	2560(H)RGB × 720(V)	pixels	-
	(1 pixel = R + G + B dots)		
Pixel pitch	190.5(H) × 190.5(V)	um	-
Pixel arrangement	RGB 2 domain stripe	-	-
Dimensional Outline	863.6(H) × 267.6(V) × 20(D) typ.	mm	

### 9.2 Mounting

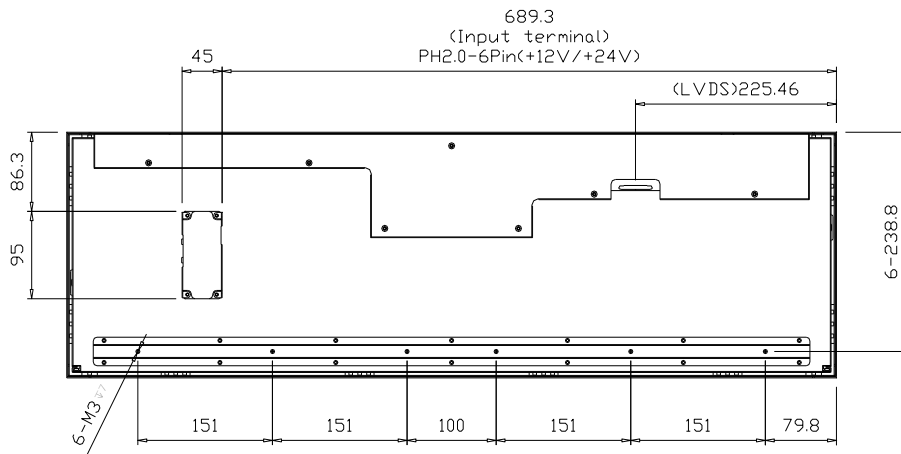
See FIG.5.

**Figure 5. Outline Dimensions** ( unit: mm if unspecified)

Drawing Attachment: Landscape Front View



Drawing Attachment: Landscape Back View



**10.0 RELIABILITY TEST**

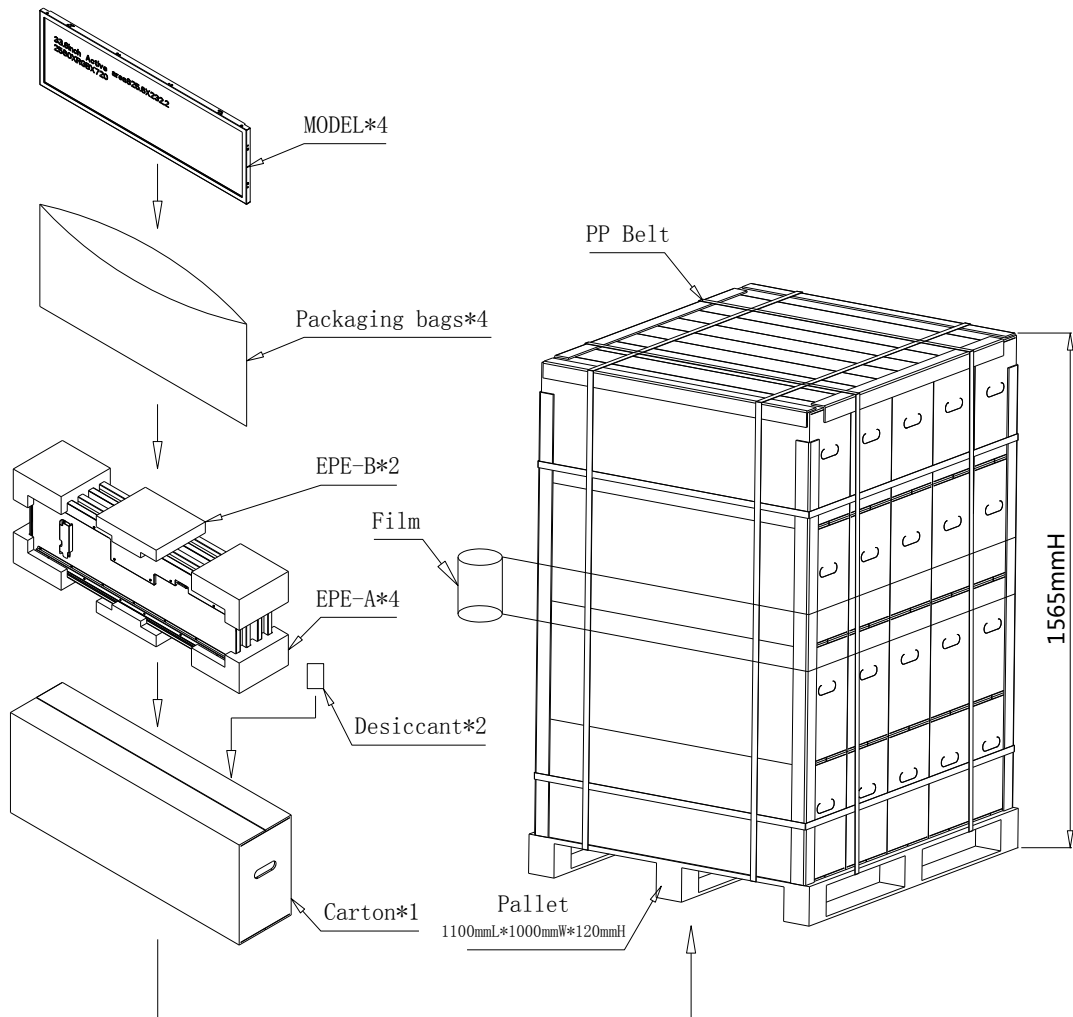
No	Test Items	Conditions
1	High temperature storage test	Ta = 60 °C, 240 hrs
2	Low temperature storage test	Ta = -20 °C, 240 hrs
3	High temperature & high Humidity operation test	Ta = 50 °C, 80%RH, 240hrs
4	High temperature operation test	Ta = 50 °C, 240hrs
5	Low temperature operation test	Ta = 0 °C, 240hrs
6	Thermal shock	Ta = -20 °C ↔ 60 °C (0.5 hr), 100 cycle
7	Vibration test (non-operating)	Frequency : 10 ~ 300 Hz, Gravity / AMP : 1.5 Grams Period : ±X, ±Y, ±Z 30 min/axis
8	Shock test (non-operating)	Gravity : 50G Pulse width : 11msec, sine wave Direction: ±X, ±Y, ±Z Once for each
9	Electro-static discharge test	Air : ±15kV, 150pF/330Ω Contact : ±8kV, 150pF/330Ω

## 11.0 PACKING

### 11.1 Packing Specifications

- (1) 4 LCD modules / 1 Box
- (2) Package quantity in one Pallet : 80 pcs
- (3) Box dimensions (mm): 956 ( L ) \* 217 ( W ) \* 360 ( H )
- (4) Weight : 420KG

### 11.2 Packing Method



## 12.0 Handling & Cautions

### 12.1 Mounting Method

- The panel of the LCD consists of two thin glasses with polarizers which easily get damaged. So extreme care should be taken when handling the LCD.
- Excessive stress or pressure on the glass of the LCD should be avoided. Care must be taken to insure that no torsional or compressive forces are applied to the LCD unit when it is mounted.
- If the customer's set presses the main parts of the LCD, the LCD may show the abnormal display. But this phenomenon does not mean the malfunction of the LCD and should be pressed by the way of mutual agreement.
- To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Mount a LCD module with the specified mounting parts.

### 12.2 Caution of LCD Handling and Cleaning

- Since the LCD is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the product. If it falls from a high place or receives a strong shock, the glass maybe broken.
- The polarizers on the surface of panel are made from organic substances. Be very careful for chemicals not to touch the polarizer or it leads the polarizer to be deteriorated.
- If the use of a chemical is unavoidable, use soft cloth with solvent (recommended below) to clean the LCD's surface with wipe lightly.  
-IPA (Isopropyl Alcohol), Ethyl Alcohol, Tri-chloro, tri-florothane.  
Do not wipe the LCD's surface with dry or hard materials that will damage the polarizer, And others, Do not use the following solvent.  
-Water, acetone, Aromatics.
- It is recommended that the LCD be handled with soft gloves during assembly, etc. The polarizer on the LCD's surface are vulnerable to scratch and thus to be damaged by shape particles.
- Do not drop water or any chemicals onto the LCD's surface.
- A protective film is supplied on the LCD and should be left in place until the LCD is required for operation.
- The ITO pad area needs special careful caution because it could be easily corroded. Do not contact the ITO pad area with HCFC, Soldering flux, Chlorine, Sulfur, saliva or fingerprint. To prevent from the ITO corrosion, customers are recommended that the ITO area would be covered by UV or silicon.
- Please clean the LCD without ultrasonic to avoid line open

### 12.3 Caution Against Static Charge

- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.
- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, if possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- In handling the LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

### 12.4 Caution For operation

- It is indispensable to drive the LCD within the specified voltage limit since the higher voltage than the limit causes the shorter LCD's life. An electro-chemical reaction due to DC causes undesirable deterioration of the LCD so that the use of DC drive should avoid.
- Do not connect or disconnect the LCD to or from the system when power is on.
- Never use the LCD under abnormal conditions of high temperature and high humidity.
- When expose to drastic fluctuation of temperature(hot to cold or cold to hot) ,the LCD may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCD's surface which may affect the operation of the polarizer and the LCD.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD may turn black at temperature above its operational range. However those phenomena do not mean malfunction or out of order with the LCD. The LCD will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.
- Do not display the fixed pattern for a long time because it may develop image sticking due to the LCD structure. If the screen is displayed with fixed pattern, use a screen saver.

### 12.5 Packaging

- Modules use LCD element, and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity for long periods.

## 12.6 Storage

- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Relative humidity of the environment should therefore be kept below 60%RH.
- Original protective film should be used on LCD's surface (polarizer). Adhesive type protective film should be avoided, because it may change color and/or properties of the polarizer.
- Do not store the LCD near organic solvents or corrosive gasses.
- Keep the LCD safe from vibration, shock and pressure.
- Black or white air-bubbles may be produced if the LCD is stored for long time in the lower temperature or mechanical shocks are applied onto the LCD.
- In the case of storing for a long period of time for the purpose or replacement use, the following ways are recommended.
  - Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.
  - Store in a dark place where neither exposure to direct sunlight nor light is.
  - Keep temperature in the specified storage temperature range.
  - Store with no touch on polarizer surface by the anything else. If possible, store the LCD in the packaging situation LCD when it was delivered.

## 12.7 Safety

- For the crash damaged or unnecessary LCD, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol and should be burned up later.
- In the case the LCD is broken, watch out whether liquid crystal leaks out or not. If your hands touch the liquid crystal, wash your hands cleanly with water and soap as soon as possible.
- If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.
- If the liquid crystal gets in your eyes, flush your eyes with running water for at least fifteen minutes.
- If the liquid crystal touches your skin or clothes, remove it and wash the affected part of your skin or clothes with soap and running water.