京东方 BOE

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TITLE : HM190WG3-700

Open Cell Product Specification

Rev. 0

BEIJING BOE OPTOELECTRONICS TECHNOLOGY

SPEC. NUMBER	PRODUCT GROUP	REV.	ISSUE DATE	PAGE
	TFT-LCD	0	2011.08.01	1 OF 28

京东方 BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	0	2011.08.01

REVISION HISTORY

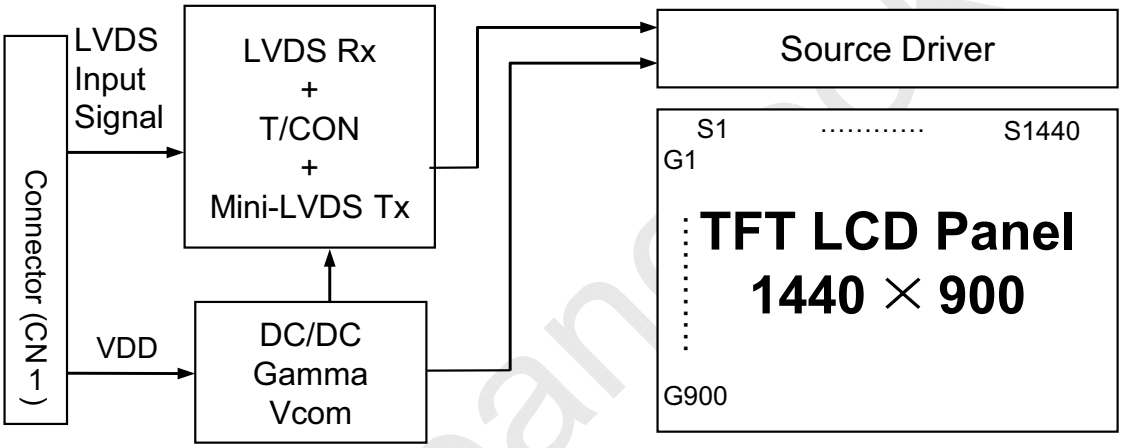
REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
0		Initial Release	2011.08.01	Wangkaixuan

Contents

1.0 General Description

1.1 Introduction

HM190WG3-700 is a color active matrix TFT LCD Open Cell using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This Open Cell has a 19.0 inch diagonally measured active area with WXGA+ resolutions (1440 horizontal by 900 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this Open Cell can display 16,7 M colors. The TFT-LCD panel used for this Open Cell is adapted for a low reflection and higher color type.



1.2 Features

- LVDS Interface with 2 pixel / clock
- High-speed response
- Low power consumption
- 6-bit (Hi-FRC) color depth, display 16,7 M colors
- High luminance and contrast ratio, low reflection and wide viewing angle
- DE (Data Enable) only
- RoHS Compliance
- TCO03 Compliance

1.3 Application

- Desktop Type of PC & Workstation Use
- Slim-Size Display for Stand-alone Monitor
- Display Terminals for Control System
- Monitors for Process Controller

1.4 General Specification

The followings are general specifications at the model HM190WG3-700.

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	408.24(H) × 255.15(V)	mm	
Number of pixels	1440(H) ×900(V)	pixels	
Pixel pitch	0.2835(H) ×0.2835(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.7M	colors	
Display mode	Normally White		
Weight	420 (max.)	g	
Surface Treatment	Haze 25%, 3H		

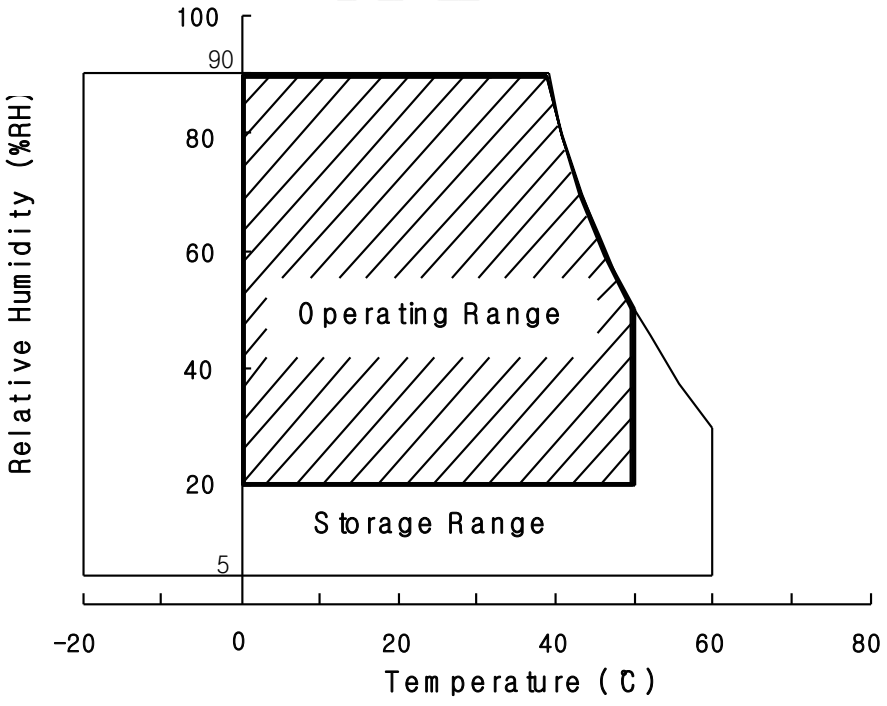
2.0 ABSOLUTE MAXIMUM RATINGS

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. Absolute Maximum Ratings> [VSS=GND=0V]

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	VSS-0.5	6.5	V	Ta = 25 ℃
Logic Supply Voltage	V_{IN}	VSS-0.3	V_{DD}+0.3	V	
Operating Temperature	T_{OP}	0	+50	℃	Note 1
Storage Temperature	T_{ST}	-20	+60	℃	Note 1

Note : 1) Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 ^{O}C max. and no condensation of water.



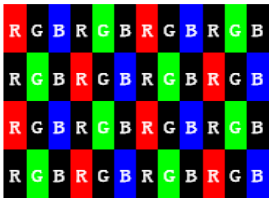
3.0 ELECTRICAL SPECIFICATIONS

3.1Electrical Specifications

< Table 3. Electrical specifications > [Ta =25±2 ℃]

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	4.5	5.0	5.5	V	Note1
Power Supply Current	I_{DD}	-	800	1100	mA	
In-Rush Current	I_{RUSH}	-	2.0	3.0	A	Note 2
Permissible Input Ripple Voltage	V_{RF}	-	-	100	mV	V_{DD} = 5.0V
High Level Differential Input Threshold Voltage	V_{IH}	-	-	+100	mV	Vcm = 1.2V typ.
Low Level Differential Input Threshold Voltage	V_{IL}	-100	-	-	mV	
Power Consumption	P_D	-	4.0		W	

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VDD=5.0V, Frame rate=76Hz and Clock frequency =56.3MHz. Test Pattern of power supply current
a) Typ : Color Bar pattern
b) Max : Dot pattern



2. Duration of rush current is about 2 ms and rising time of VDD is 520 μs ± 20 %

4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCONE BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to $\theta_{Ø=0}$ (=θ_3) as the 3 o'clock direction (the "right"), $\theta_{Ø=90}$ (= θ_{12}) as the 12 o'clock direction ("upward"), $\theta_{Ø=180}$ (= θ_9) as the 9 o'clock direction ("left") and $\theta_{Ø=270}$(= θ_6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VDD shall be 5.0V +/-10% at 25°C. Optimum viewing angle direction is 6 'clock.

4.2 Optical Specifications

[VDD = 5.0V, Frame rate = 60Hz, Clock = 54MHz, I_{BL} = 6.5mA, Ta =25 ± 2 ℃]

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	35	45	-	Deg.	Note 2
		Θ_9		35	45	-	Deg.	
	Vertical	Θ_{12}		10	20	-	Deg.	
		Θ_6		30	40	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle		600			Note 3
Cell Transmittance		Tr		-	6.0%	-		Note 4
Reproduction of color	White	W_x		0.283	0.313	0.343		Note 7
		W_y		0.299	0.329	0.359		
	Red	R_x		0.610	0.640	0.670		
		R_y		0.306	0.336	0.366		
	Green	G_x		0.249	0.279	0.309		
		G_y		0.573	0.603	0.633		
	Blue	B_x		0.110	0.140	0.171		
		B_y		0.038	0.068	0.098		
Response Time	Rising	T_r	Ta= 25° C Θ = 0°		1.5	2.5	ms	Note 8
	Falling	T_f			3.5	5.5	ms	
Cross Talk		CT		-	-	2.0	%	Note 9

Note :

1. The value in upper table are based on BLU provided by BOEOT
2. 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.
3. Contrast measurements shall be made at viewing angle of θ= 0° 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 FIGURE 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

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

4. Luminance of LCD module shall be made without signal input. Cell transmittance is defined mathematically, BLU provided by BOEOT.

$$\text{Transmittance} = \frac{\text{Luminance of LCD Module}}{\text{Luminance of BLU}}$$

5. Center Luminance of white is defined as the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.
6. The White luminance uniformity on LCD surface is then expressed as :
   ΔY = (Minimum Luminance of 9points / Maximum Luminance of 9points) * 100
   (See FIGURE 2 shown in Appendix).
7. The color chromaticity coordinates specified in above Table 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 panel with BLU provided by BOEOT.
8. The electro-optical response time measurements shall be made as FIGURE 3 shown in Appendix by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Td, and 90% to 10% is Tr.
9. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (Y_A) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (Y_B) of that same area when any adjacent area is driven dark. (See FIGURE 4 shown in Appendix).

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

- CN11 Open Cell Side Connector : UJU IS100-L30O-C23 or Equivalent
  User Side Connector : JAE FI-X30H or Equivalent

Pin No	Symbol	Function	Remark
1	RXO0-	Negative Transmission data of Pixel 0 (ODD)	
2	RXO0+	Positive Transmission data of Pixel 0 (ODD)	
3	RXO1-	Negative Transmission data of Pixel 1 (ODD)	
4	RXO1+	Positive Transmission data of Pixel 1 (ODD)	
5	RXO2-	Negative Transmission data of Pixel 2 (ODD)	
6	RXO2+	Positive Transmission data of Pixel 2 (ODD)	
7	GND	Power Ground	
8	RXOC-	Negative Transmission Clock (ODD)	
9	RXOC+	Positive Transmission Clock (ODD)	
10	RXO3-	Negative Transmission data of Pixel 3 (ODD)	
11	RXO3+	Positive Transmission data of Pixel 3 (ODD)	
12	RXE0-	Negative Transmission data of Pixel 0 (EVEN)	
13	RXE0+	Positive Transmission data of Pixel 0 (EVEN)	
14	GND	Power Ground	
15	RXE1-	Negative Transmission data of Pixel 1 (EVEN)	
16	RXE1+	Positive Transmission data of Pixel 1 (EVEN)	
17	GNG	Power Ground	
18	RXE2-	Negative Transmission data of Pixel 2 (EVEN)	
19	RXE2+	Positive Transmission data of Pixel 2 (EVEN)	
20	RXEC-	Negative Transmission Clock (EVEN)	
21	RXEC+	Positive Transmission Clock (EVEN)	
22	RXE3-	Negative Transmission data of Pixel 3 (EVEN)	
23	RXE3+	Positive Transmission data of Pixel 3 (EVEN)	
24	GND	Power Ground	Note 1
25	(CE)	LCD internal use only	Internal Use
26	(CTL)		Internal Use
27	NC	No. Connection	
28	VDD	Power Supply: +5V	
29	VDD		
30	VDD		

Note 1 : This pin should be connected with GND.

5.2 LVDS Interface (Tx; THC63LVDF83A or Equivalent)

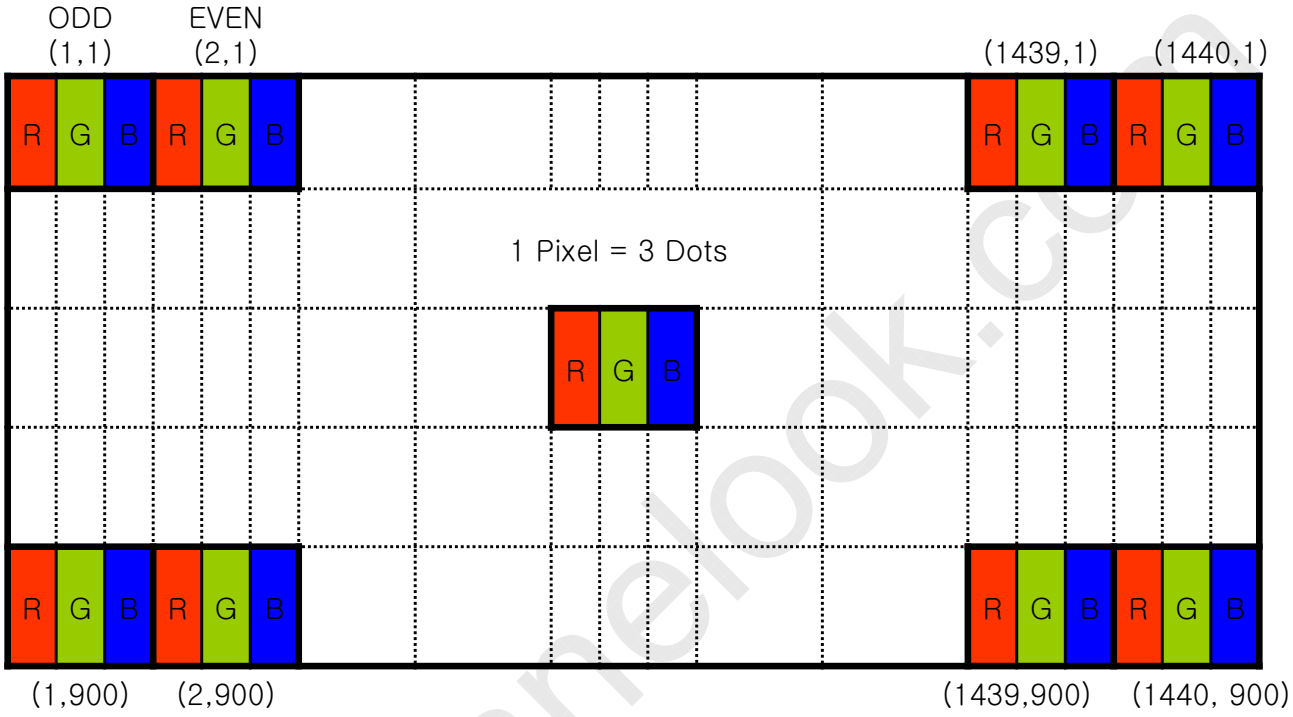
5.2.1 ODD LVDS Interface

	Input Signal	Transmitter		Interface		HM190WG3-700	Remark
		Pin No.	Pin No.	System (Tx)	TFT-LCD (Rx)	Pin No.	
ODD LVDS	OR0	51	48 47	OUT0- OUT0+	RXO0- RXO0+	1 2	
	OR1	52					
	OR2	54					
	OR3	55					
	OR4	56					
	OR5	3					
	OG0	4					
	OG1	6	46 45	OUT1- OUT1+	RXO1- RXO1+	3 4	
	OG2	7					
	OG3	11					
	OG4	12					
	OG5	14					
	OB0	15					
	OB1	19					
	OB2	20	42 41	OUT2- OUT2+	RXO2- RXO2+	5 6	
	OB3	22					
	OB4	23					
	OB5	24					
	Hsync	27					
	Vsync	28					
	DE	30					
	MCLK	31	40 39	CLK OUT- CLK OUT+	RXO CLK- RXO CLK+	8 9	
	OR6	50	38 37	OUT3- OUT3+	RXO3- RXO3+	10 11	
	OR7	2					
	OG6	8					
	OG7	10					
	OB6	16					
	OB7	18					
	RSVD	25					

5.2.2 EVEN LVDS Interface

	Input Signal	Transmitter		Interface		HM190WG3-700	Remark
		Pin No.	Pin No.	System (Tx)	TFT-LCD (Rx)	Pin No.	
EVEN LVDS	ER0	51	48 47	OUT0- OUT0+	RXO0- RXO0+	12 13	
	ER1	52					
	ER2	54					
	ER3	55					
	ER4	56					
	ER5	3					
	EG0	4					
	EG1	6	46 45	OUT1- OUT1+	RXO1- RXO1+	15 16	
	EG2	7					
	EG3	11					
	EG4	12					
	EG5	14					
	EB0	15					
	EB1	19					
	EB2	20	42 41	OUT2- OUT2+	RXO2- RXO2+	18 19	
	EB3	22					
	EB4	23					
	EB5	24					
	Hsync	27					
	Vsync	28					
	DE	30					
	MCLK	31	40 39	CLK OUT- CLK OUT+	RXO CLK- RXO CLK+	20 21	
	ER6	50	38 37	OUT3- OUT3+	RXO3- RXO3+	22 23	
	ER7	2					
	EG6	8					
	EG7	10					
	EB6	16					
	EB7	18					
	RSVD	25					

5.3 Data Input Format



Display Position of Input Data (V-H)

6.0 SIGNAL TIMING SPECIFICATION

6.1 The HM190WG3-700 is operated by the DE only..

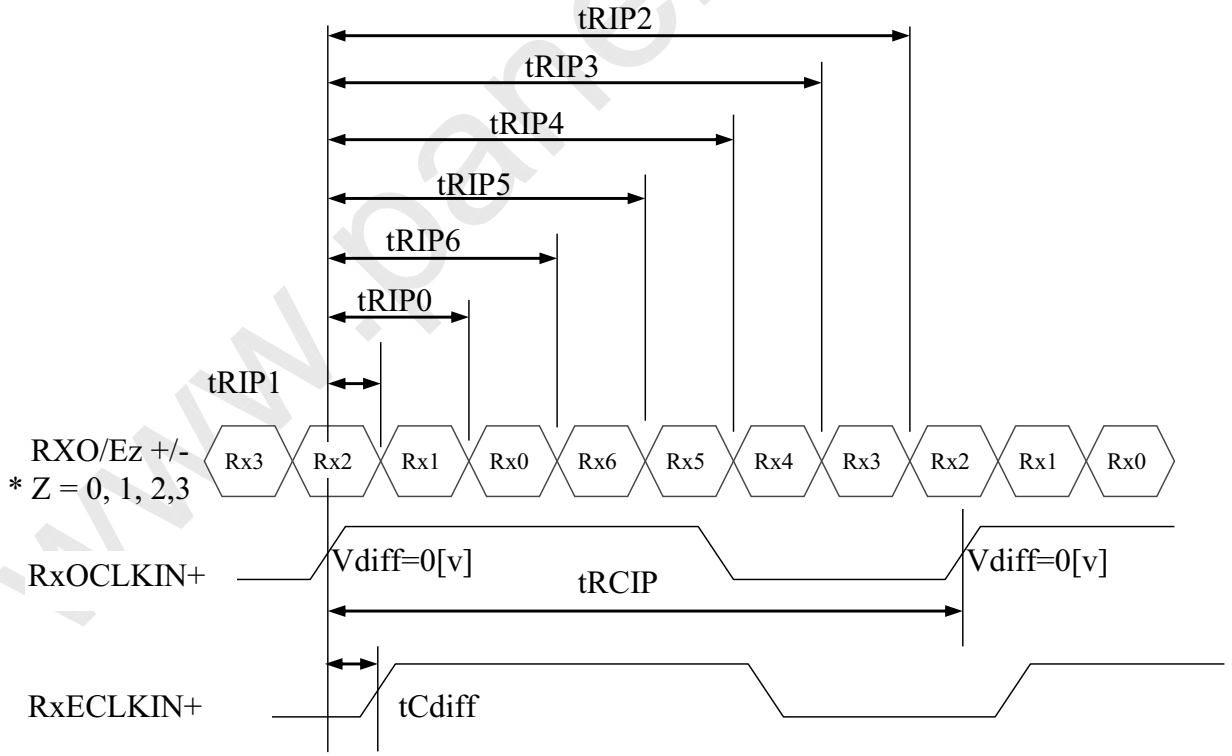
Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	41.5	44.5	65.7	MHz
	High Time	Tch	4	-	-	ns
	Low Time	Tcl	4	-	-	ns
Data	Setup time	Tds	4	-	-	ns
	Hold time	Tdh	4	-	-	ns
Data Enable Setup Time		Tes	4	-	-	ns
Frame Period		Tv	918	926	1050	lines
			56	60	76	Hz
			17.9	16.7	13.1	ms
Vertical Display Period		Tvd	-	900	-	lines
One line Scanning Period		Th	760	800	1400	clocks
Horizontal Display Period		Thd	720	720	720	clocks

6.2 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter is shown in Table 4.

<Table 4. LVDS Rx Interface Timing Specification>

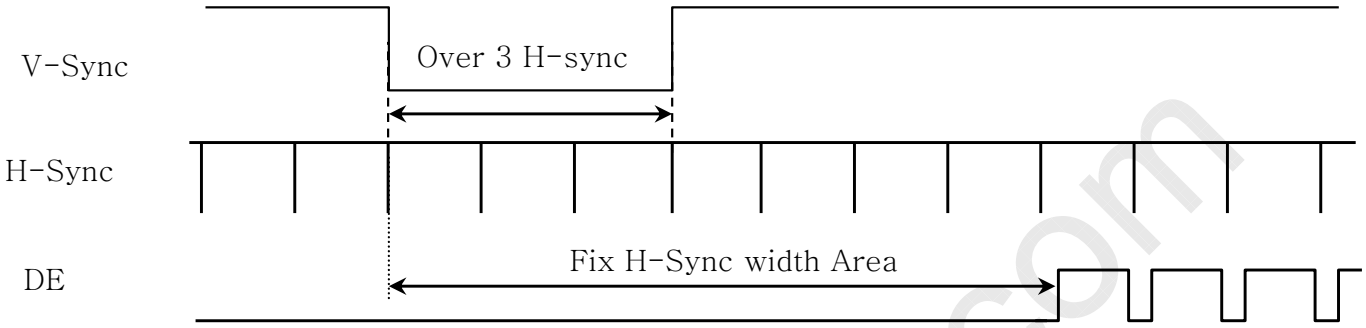
Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCIP	14.7	18.5	-	msec	
CLK Difference	tCdiff	-tRCIP*(3/7)	0	+tRCIP*(3/7)	nsec	
Input Data 0	tRIP1	-0.4	0.0	+0.4	nsec	
Input Data 1	tRIP0	tRCIP/7-0.4	tRCIP/7	tRCIP/7+0.4	nsec	
Input Data 2	tRIP6	2 ×tRCIP/7-0.4	2 ×tRCIP/7	2 ×tRCIP/7+0.4	nsec	
Input Data 3	tRIP5	3 ×tRCIP/7-0.4	3 ×tRCIP/7	3 ×tRCIP/7+0.4	nsec	
Input Data 4	tRIP4	4 ×tRCIP/7-0.4	4 ×tRCIP/7	4 ×tRCIP/7+0.4	nsec	
Input Data 5	tRIP3	5 ×tRCIP/7-0.4	5 ×tRCIP/7	5 ×tRCIP/7+0.4	nsec	
Input Data 6	tRIP2	6 ×tRCIP/7-0.4	6 ×tRCIP/7	6 ×tRCIP/7+0.4	nsec	



* Vdiff = (RXO/Ez+)-(RXO/Ez-),…. ,(RXO/ECLK+)-(RXO/ECLK-)

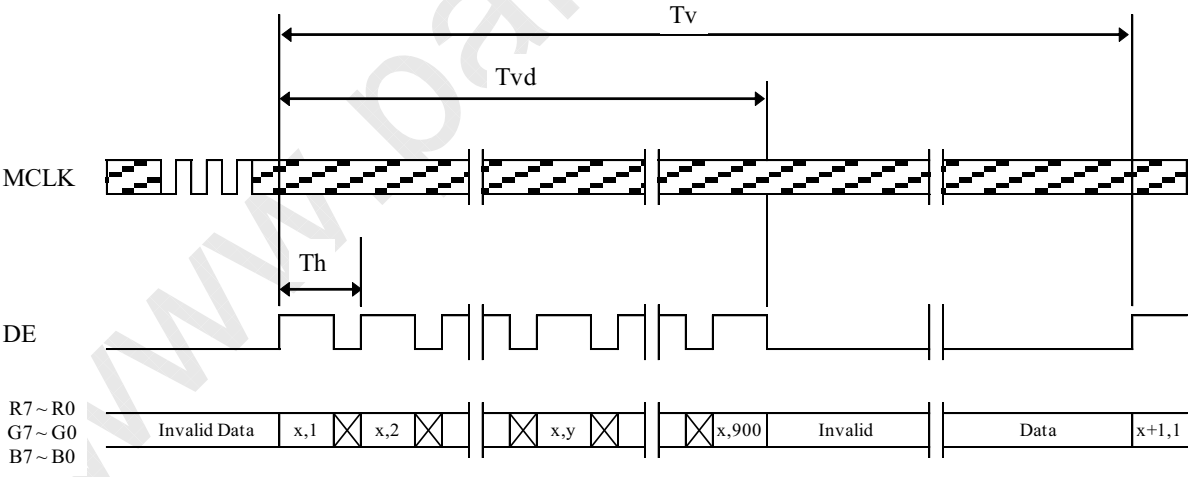
7.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

7.1 Sync Timing Waveforms

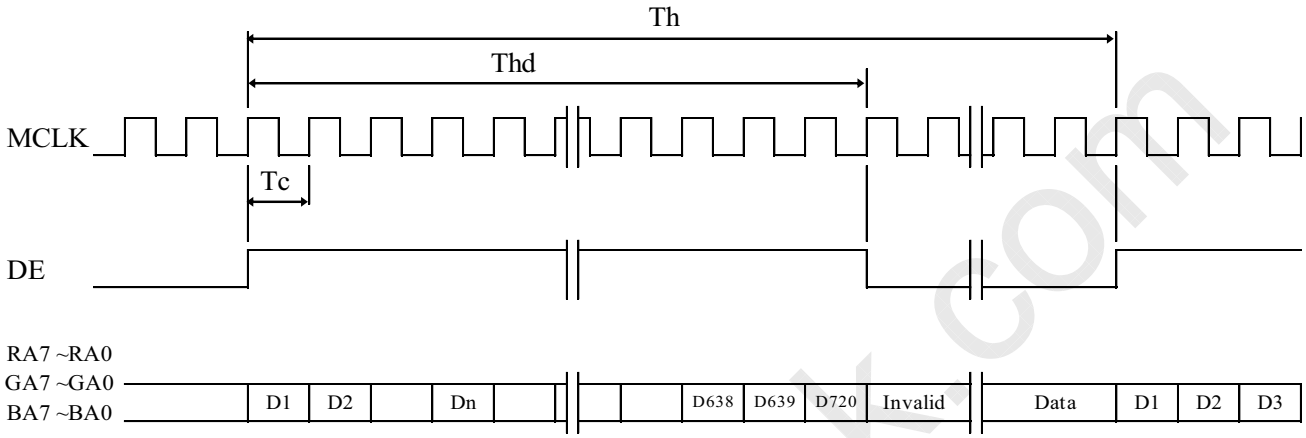


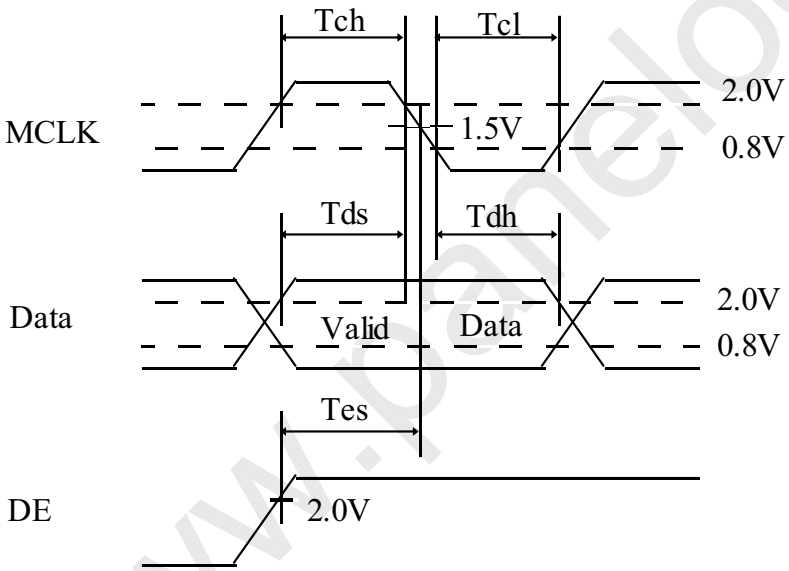
1) Need over 3 H-sync during V-Sync Low
2) Fix H-Sync width from V-Sync falling edge to first rising edge

7.2 Vertical Timing Waveforms



7.3 Horizontal Timing Waveforms



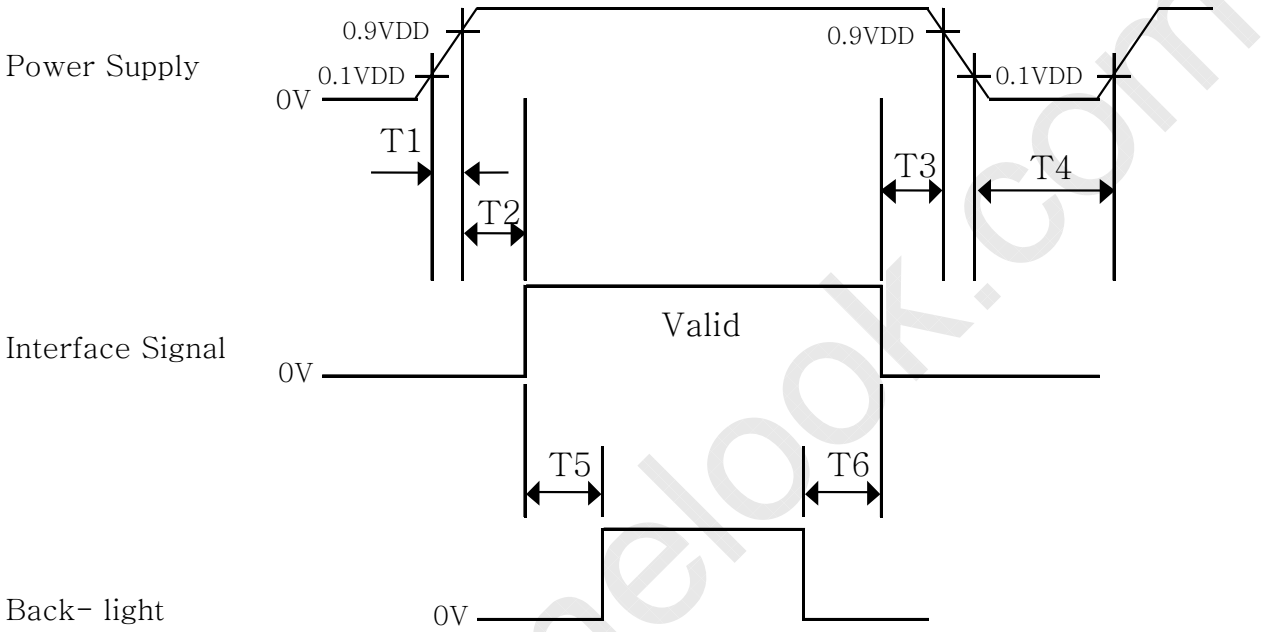


8.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

Color & Gray Scale		RED DATA								GREEN DATA								BLUE DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of RED	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of GREEN	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of BLUE	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of WHITE	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

9.0 POWER SEQUENCE

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



- 0.5 ms ≤ T1 ≤ 10 ms
- 0 ≤ T2 ≤ 50 ms
- 0 ≤ T3 ≤ 50 ms
- 1 sec ≤ T4
- 200 ms ≤ T5
- 200 ms ≤ T6

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.
3. Back Light must be turn on after power for logic and interface signal are valid.

10.0 MECHANICAL CHARACTERISTICS

10.1 Dimensional Requirements

FIGURE 6 (located in Appendix) shows mechanical outlines for the Open Cell HM190WG3-700. Other parameters are shown in Table 5.

<Table 5. Dimensional Parameters>

Parameter	Specification	Unit	
Weight	420 (max.)	g	
Active area	408.24(H) × 255.15(V)	mm	
Pixel pitch	0.2835(H) ×0.2835(V)	mm	
Number of pixels	1440(H)×900(V) (1 pixel = R + G + B dots)	pixels	

10.2 Mounting

See FIGURE 5. (shown in Appendix)

11.0 RELIABLITY TEST

The Reliability test items and its conditions are shown in below.

<Table 6. Reliability Test Parameters >

No	Test Items	Conditions
1	High temperature storage test	Ta = 60 ℃, 240 hrs
2	Low temperature storage test	Ta = -20 ℃, 240 hrs
3	High temperature & high humidity operation test	Ta = 50 ℃, 80%RH, 240hrs
4	High temperature operation test	Ta = 50 ℃, 240hrs
5	Low temperature operation test	Ta = 0 ℃, 240hrs
6	Thermal shock	Ta = -20 ℃ ↔ 60 ℃ (0.5 hr), 100 cycle
7	Vibration test (non-operating)	Frequency 10 ~ 300 Hz, Sweep rate 60 min Gravity / AMP 1.5 G Period ±X, ±Y, ±Z 60 min
8	Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV

12.0 HANDLING & CAUTIONS

(1) Cautions when taking out the module
- Pick the pouch only, when taking out Open Cell from a shipping package.

(2) Cautions for handling the module
- As the electrostatic discharges may break the LCD Open Cell, handle the LCD Open Cell with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD Open Cell is made from fragile glass material, impulse and pressure to the LCD Open Cell should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD Open Cell is operating.
- Handle connectors and cables with care.

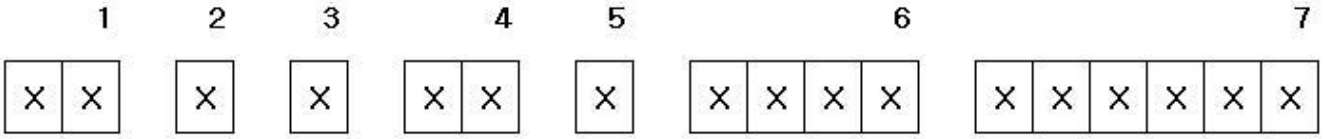
(3) Cautions for the operation
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

(4) Cautions for the atmosphere
- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD Open Cell in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(5) Cautions for the module characteristics
- Do not apply fixed pattern data signal to the LCD Open Cell at product aging.
- Applying fixed pattern for a long time may cause image sticking.

(6) Other cautions
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

13.0 PRODUCT SERIAL NUMBER



Type

No 1. Control

No 2. Rank

No 3. Line Classification

No 4. Year(2001 : 01, 2002 : 02,…)

No 5. Month(1, 2, 3, …,9 X, Y, Z)

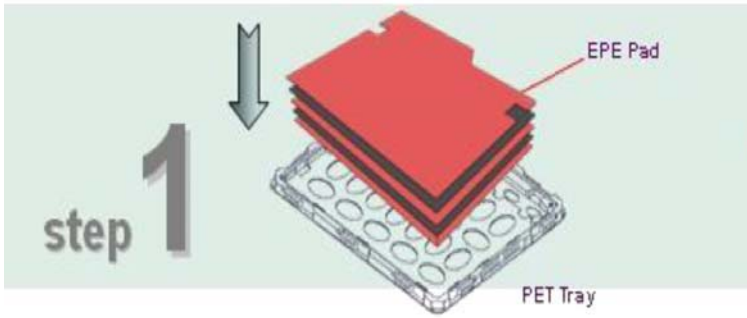
No 6 **Internal use**

No 7. Serial No.

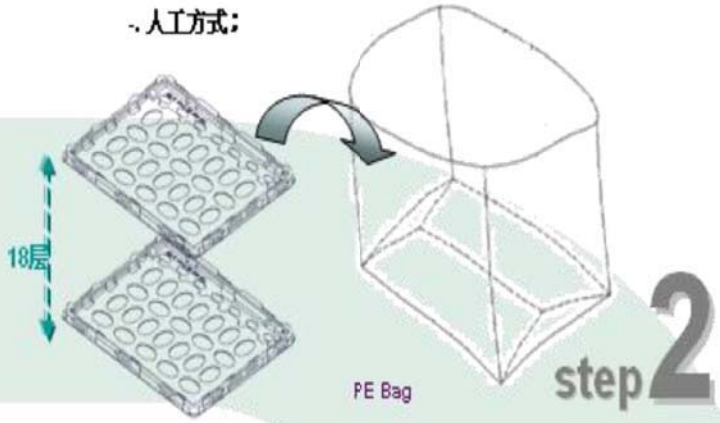
14.0 Packing

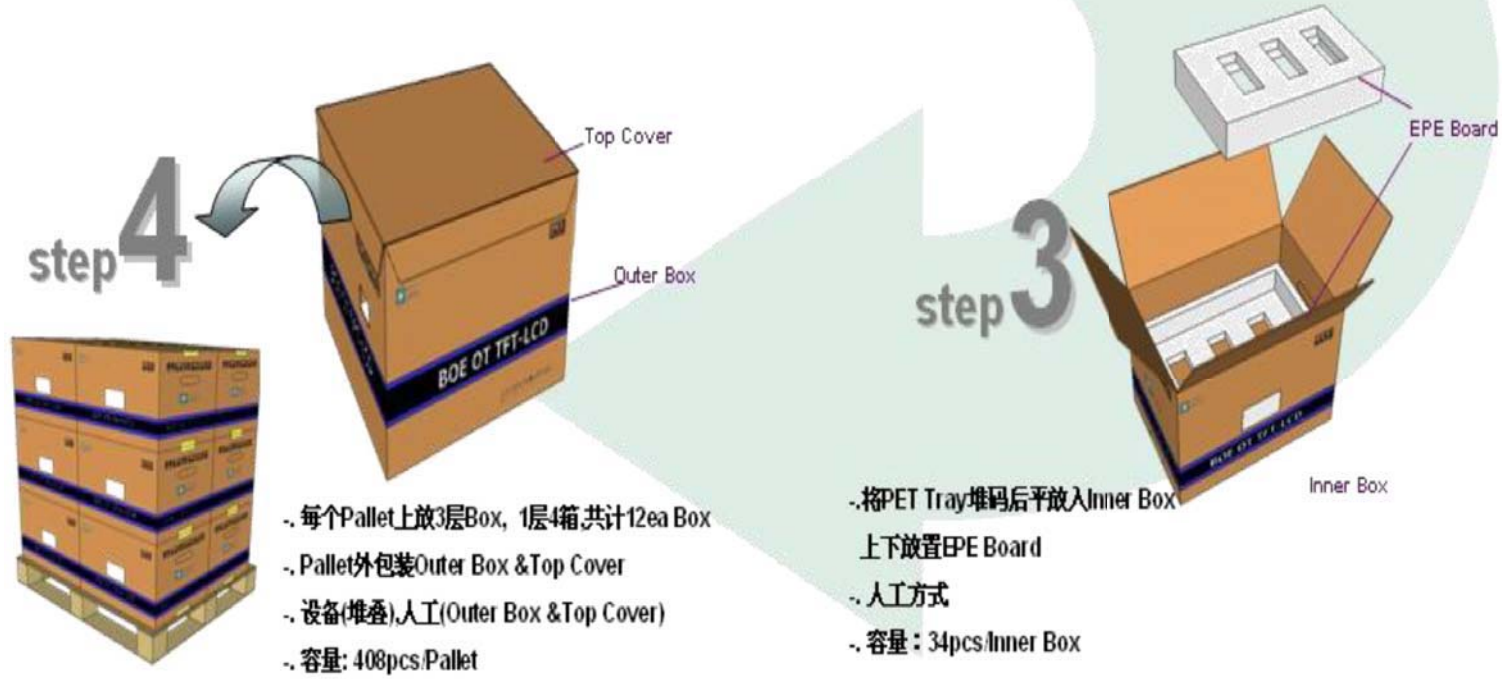
14.1 Packing Order

-. 将EPE Pad&产品依次水平放入PET Tray, 每个卡槽内2pcs产品&3pcsEPE Pad
-. 人工方式:
-. 容量: 2pcs/PET Tray



-. 将18pcs PET Tray 互旋180度后平放入PE Bag
-. 人工方式:





-.将PET Tray堆码后平放入Inner Box
上下放置EPE Board
-. 人工方式
-. 容量: 34pcs/Inner Box

-. 每个Pallet上放3层Box, 1层4箱,共计12ea Box
-. Pallet外包装Outer Box &Top Cover
-. 设备(堆叠),人工(Outer Box &Top Cover)
-. 容量: 408pcs/Pallet

14.2 Packing Note

- Box Dimension : 520mm(L) ×510mm(W)×260mm(H)
- Package Quantity in one Box : 34pcs

14.3 Box label

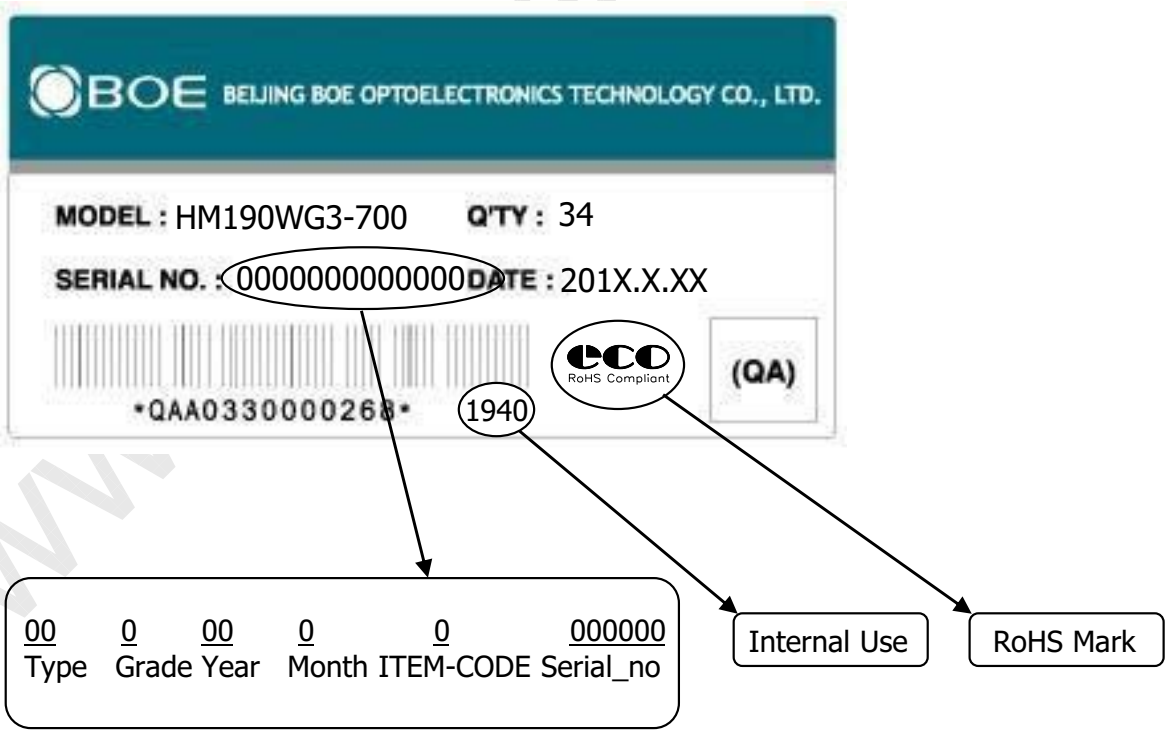
- Label Size : 108 mm (L) × 56 mm (W)
- Contents

  Open Cell : HM190WG3-700

  Q`ty : 34

  Serial No. : Box Serial No. See next page for detail description.

  Date : Packing Date



15.0 Appendix

Figure 1. Measurement Set Up

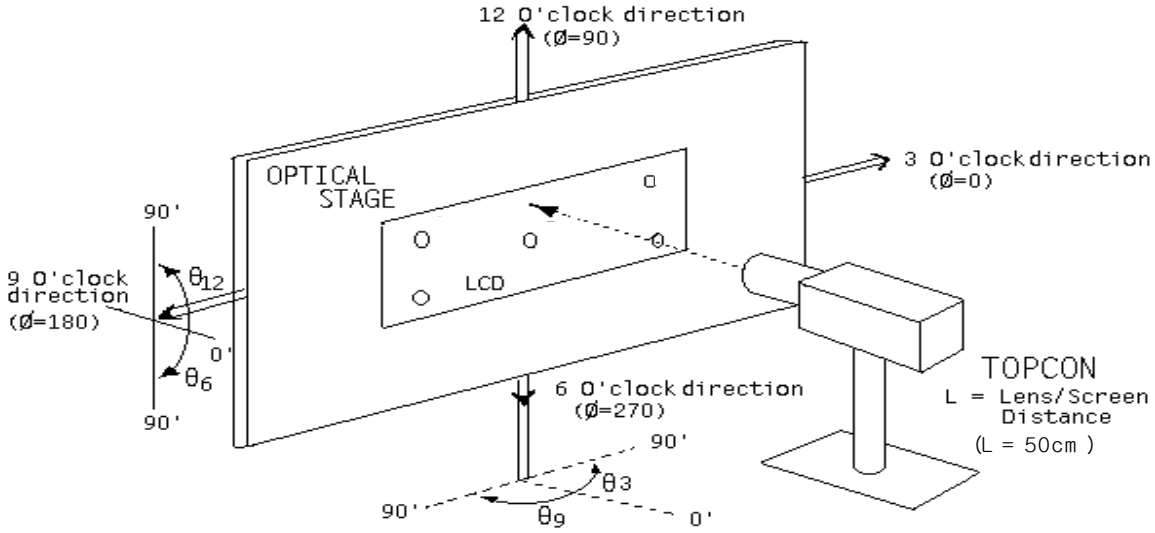


Figure 2. White Luminance and Uniformity Measurement Locations (9 points)

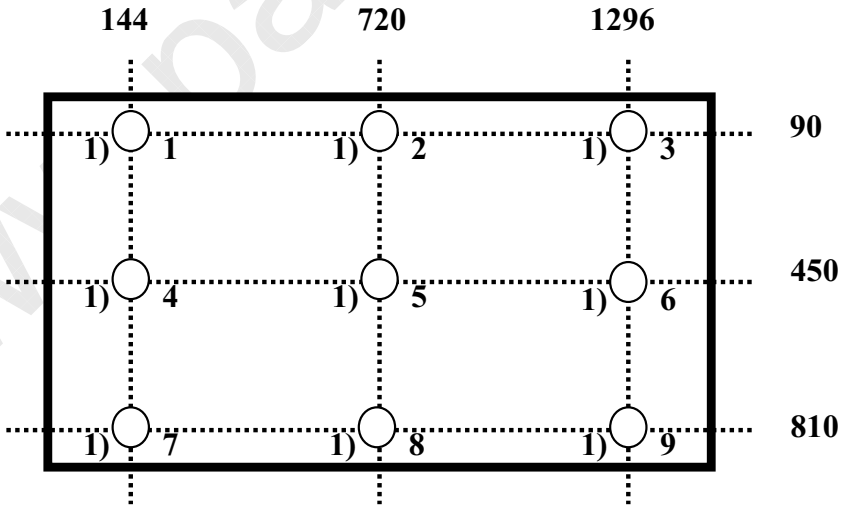


Figure 3. Response Time Testing

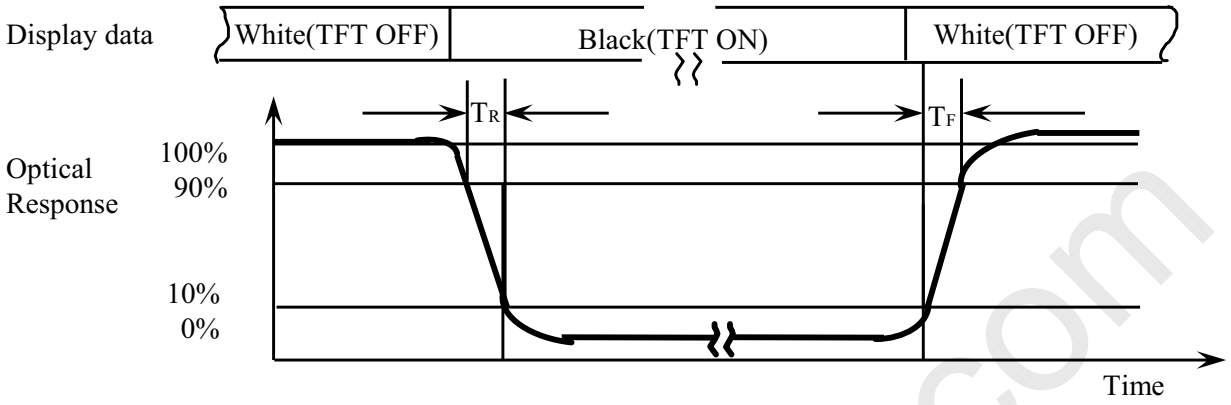
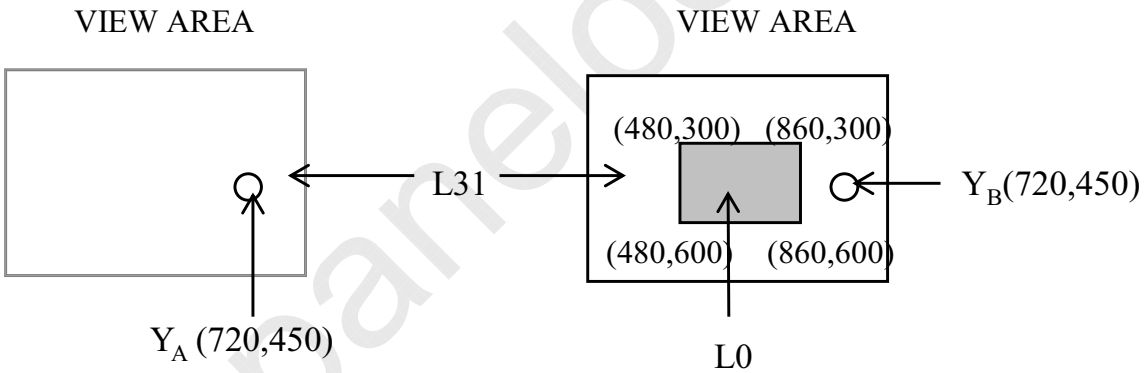


Figure 4. Cross Modulation Test Description



$$\text{Cross-Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_A} \right| \times 100$$

Where: Y_A = Initial luminance of measured area (cd/m^2)
Y_B = Subsequent luminance of measured area (cd/m^2)
The location measured will be exactly the same in both patterns

Figure 5. Open Cell Outline Dimensions