TITLE : HT156WX1-100

Product Specification

Rev. 0

BEIJING BOE OPTOELECTRONICS TECHNOLOGY

REVISION HISTORY

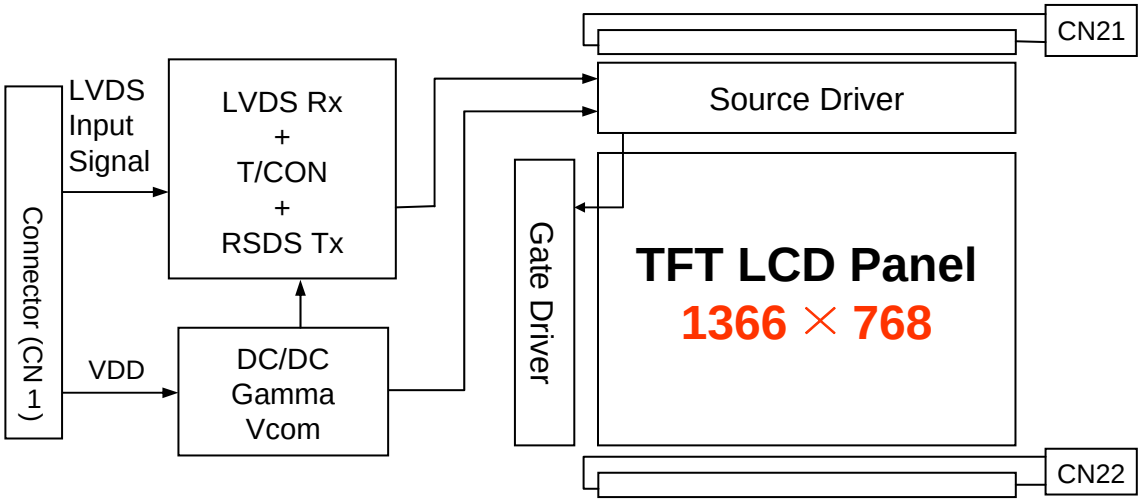
REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
0		Initial Release	May. 28. 08’	权宁万

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

HT156WX1-100 is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 15.6 inch diagonally measured active area with WXGA resolutions (1366 horizontal by 768 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. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.



1.2 Features

- LVDS Interface with 1 pixel / clock
- High-speed response
- Low power consumption
- 6-bit (Hi-FRC) color depth, display 16. 7M colors
- Incorporated edge type back-light (Two lamps)
- High luminance and contrast ratio, low reflection and wide viewing angle
- DE (Data Enable) only
- RoHS Compliant

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 HT156WX1-100.

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	344.232(H) × 193.536(V)	mm	
Number of pixels	1366(H) ×768(V)	pixels	
Pixel pitch	0.252(H) ×0.252(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.7M	colors	
Display mode	Normally White		
Dimensional outline	363.8(H) × 215.9(V) × 14.3(D) typ.	mm	
Weight	1300 (max.)	g	
Surface Treatment	Haze 25%, 3H		
Back-light	Top/Bottom edge side, 2-CCFL type		Note 1

Note : 1. CCFL (Cold Cathode Fluorescent Lamp)

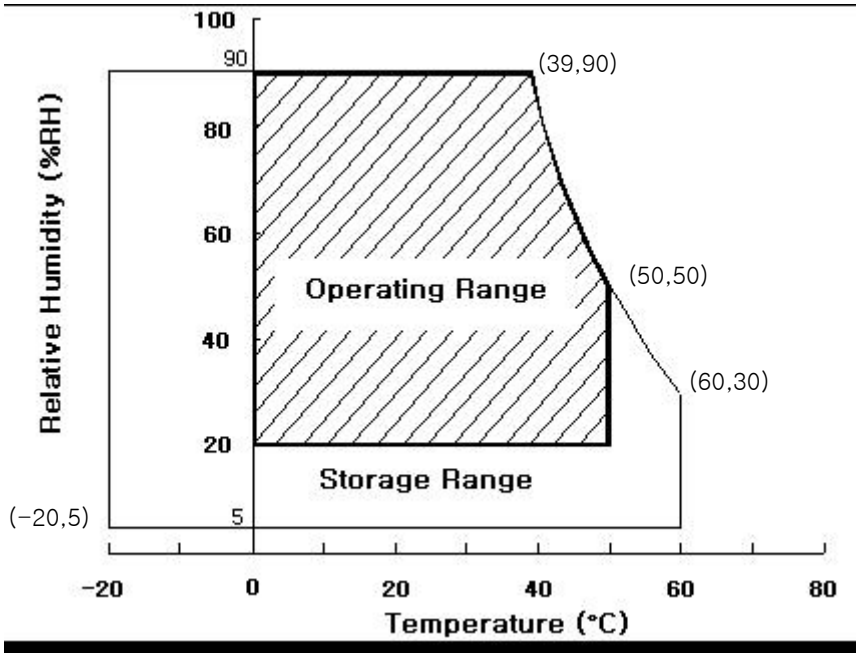
2.0 ABSOLUTE MAXIMUM RATINGS

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}	**-0.3**	**5.5**	V	Ta = 25 ℃
Logic Supply Voltage	V_{IN}	VSS-0.3	V_{DD}+0.3	V	
Back-light Lamp Current	I_{BL}	3	8	mA	
Back-light Lamp frequency	F_L	40	80	kHz	
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.



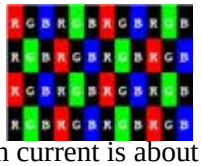
3.0 ELECTRICAL SPECIFICATIONS

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}	-	500	600	mA	
In-Rush Current	I_{RUSH}	-	-	3.0	A	Note 2
Permissible Input Ripple Voltage	V_{RF}	-	-	100	mV	V_{DD} = 5.0V
Positive-going Input Threshold Voltage	V_{IT+}	-	-	+100	mV	Vcm = 1.2V typ.
Negative-going input threshold voltage	V_{IT-}	-100	-	-	mV	
Differential input voltage	$\|V_{ID}\|$	200		600	mV	
Back-light Lamp Voltage	V_{BL}	620	640	700	V_{rms}	
Back-light Lamp Current	I_{BL}	4.0	7.0	8.0	mA_{rms}	
Back-light Lamp operating Frequency	F_L	40	60	(80)	KHz	Note 3
Lamp Start Voltage		-	-	1000	V_{rms}	25℃, Note 4
		-	-	1300	V_{rms}	0℃, Note 4
Lamp Life		50,000	-	-	Hrs	I_{BL}= 7 mA
Power Consumption	P_D	-	2.50	3.00	W	
	P_{BL}	-	8.96	9.92	W	I_{BL}=7 mA, Note 5
	P_{total}	-	11.46	12.92	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=63Hz and Clock frequency = 79.2MHz. Test Pattern of power supply current
a) Typ : Color Bar pattern
b) Max : Skip Sub Pixel Pattern



2. Duration of rush current is about 2 ms and rising time of VDD is 520 μs ± 20 %
3. The lamp frequency should be selected as different as possible from the horizontal synchronous frequency and its harmonics to avoid interference, which may cause line flow on the display
4. The voltage above this value should be applied to the lamps for more than 1 second to start-up. Otherwise the lamps may not be turned on.
5. Calculated value for reference (V_{BL} × I_{BL}) ×2 excluding inverter loss.

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

<Table 4. Optical Specifications>

[VDD = 5.0V, Frame rate = 60Hz, Clock = 75.4MHz, I_{BL} = 7.0mA, Ta =25±2 ℃]

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	40	45	-	Deg.	Note 1
		Θ_9		40	45	-	Deg.	
	Vertical	Θ_{12}		15	20	-	Deg.	
		Θ_6		40	45	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	**350**	500			Note 2
Luminance of White		Y_w		200	250		cd/m^2	Note 3
White luminance uniformity		Δ Y			75		%	Note 4
Reproduction of color	White	W_x		0.283	0.313	0.343		Note 5
		W_y		0.299	0.329	0.359		
	Red	R_x		-0.03	0.645	+0.03		
		R_y			0.346			
	Green	G_x			0.294			
		G_y			0.602			
	Blue	B_x			0.142			
		B_y			0.089			
Response Time	Rising	T_r			3	6	ms	Note 6
	Falling	T_f			5	10	ms	
Cross Talk		CT		-	-	2.0	%	Note 7

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 FIGURE 1)
2. 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.

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

3. 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.
4. 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).
5. The color chromaticity coordinates specified in Table 4. 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.
6. 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.
7. 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 Module Side Connector : UJU IS100-30O-C23(PB-FREE)or Equivalent
  User Side Connector : JAE FI-X30H or Equivalent

<Table 5. Pin Assignments for the Interface Connector>

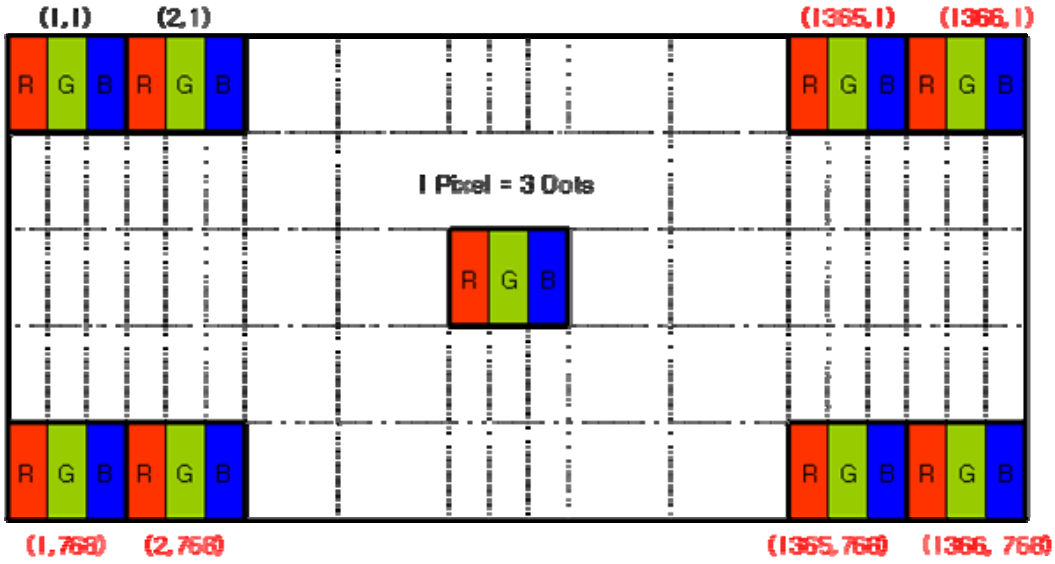
Pin No	Symbol	Function	Remark
1	NC	No connection	
2	NC (CE)	LCD internal use only	Internal Use
3	NC (CTL)		Internal Use
4	GND	GND Ground	
5	RX0-	Negative LVDS differential data input. Channel 0	
6	RX0+	Positive LVDS differential data input. Channel 0	
7	GND	Ground	
8	RX1-	Negative LVDS differential data input. Channel 1	
9	RX1+	Positive LVDS differential data input. Channel 1	
10	GND	Ground	
11	RX2-	Negative LVDS differential data input. Channel 2	
12	RX2+	Positive LVDS differential data input. Channel 2	
13	GND	Ground	
14	RXCLK-	Negative LVDS differential clock input.	
15	RXCLK+	Positive LVDS differential clock input.	
16	GND	Ground	
17	RX3-	Negative LVDS differential data input. Channel 3	
18	RX3+	Positive LVDS differential data input. Channel 3	
19	GND	Ground	
20	NC	Not connection, this pin should be open.	
21	NC	Not connection, this pin should be open.	
22	NC	Reserved. (For internal test used)	
23	GND	Ground	
24	GND	Ground	
25	GND	Ground	
26	VDD	5.0V power supply	
27	VDD	5.0V power supply	
28	VDD	5.0V power supply	
29	VDD	5.0V power supply	
30	VDD	5.0V power supply	

5.2 LVDS Interface (Tx; THC63LVDF83A or Equivalent)

<Table 6. Pin connection in case of using Thine THC63LVDF83A>

Input Signal	Transmitter		Interface		DF14H-20P-1.25H	Remark
	Pin No.	Pin No.	System (Tx)	TFT-LCD (Rx)	Pin No.	
OR0	51	48 47	OUT0- OUT0+	IN0- IN0+	5 6	
OR1	52					
OR2	54					
OR3	55					
OR4	56					
OR5	3					
OG0	4					
OG1	6	46 45	OUT1- OUT1+	IN1- IN1+	8 9	
OG2	7					
OG3	11					
OG4	12					
OG5	14					
OB0	15					
OB1	19					
OB2	20	42 41	OUT2- OUT2+	IN2- IN2+	11 12	
OB3	22					
OB4	23					
OB5	24					
Hsync	27					
Vsync	28					
DE	30					
MCLK	31	40 39	CLK OUT- CLK OUT+	CLKIN- CLKIN+	14 15	
OR6	50	38 37	OUT3- OUT3+	IN3- IN3+	17 18	
OR7	2					
OG6	8					
OG7	10					
OB6	16					
OB7	18					
RSVD	25					

5.3 Data Input Format



Display Position of Input Data (V-H)

5.4 Back-light Interface Connection

<Table 7. Back-light Electrical Interface>

●CN 21,22, Module Side Connector :35001HS-02L (Yeon Ho) or Equivalent
User Side Connector :35001WR-02L(Yeon Ho) or Equivalent

PIN NO.	INPUT	COLOR	FUNCTION
1	HOT	Pink & Blue	High Voltage
2	COLD	Black & White	Ground

6.0 SIGNAL TIMING SPECIFICATION

6.1 The HT156WX1-100 is operated by the DE only.

<Table 8. Signal Timing Specification.>

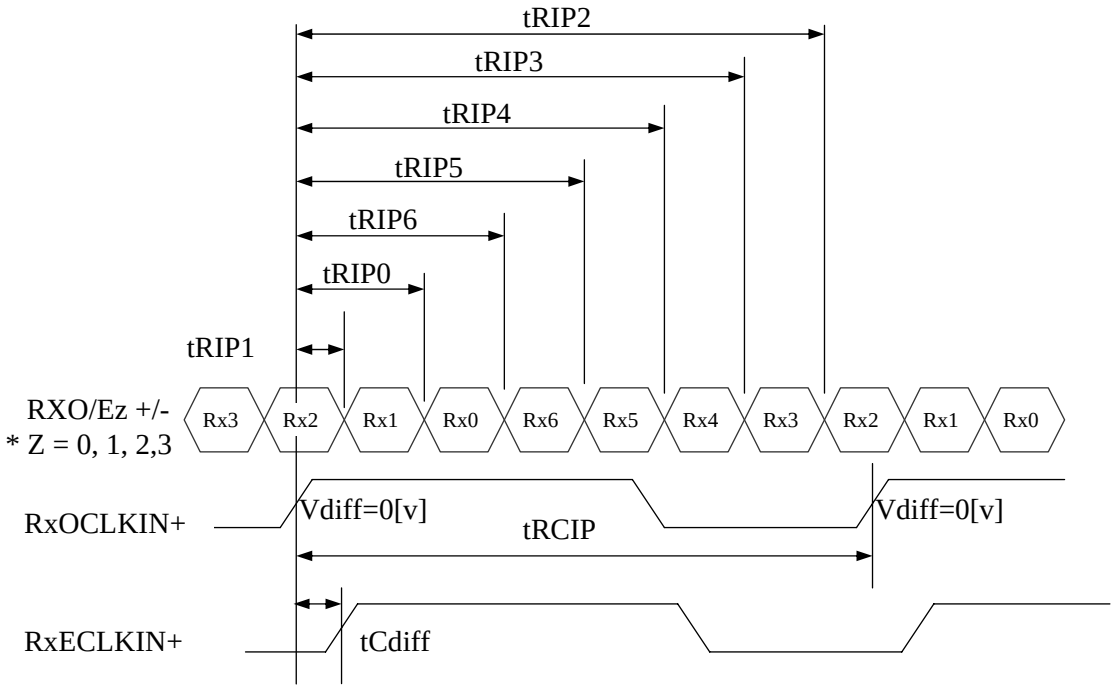
Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	50	75.4	79.2	MHz
	High Time	Tch	-	4/7	-	Tc
	Low Time	Tcl	-	3/7	-	Tc
Frame Period		Tv	778	806	888	lines
			40	60	63	Hz
			13.3	16.7	25	ms
Vertical Display Period		Tvd	768	768	768	lines
One line Scanning Period		Th	1446	1560	1936	clocks
Horizontal Display Period		Thd	1366	1366	1366	clocks

6.2 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter is shown in Table 9.

<Table 9. LVDS Rx Interface Timing Specification>

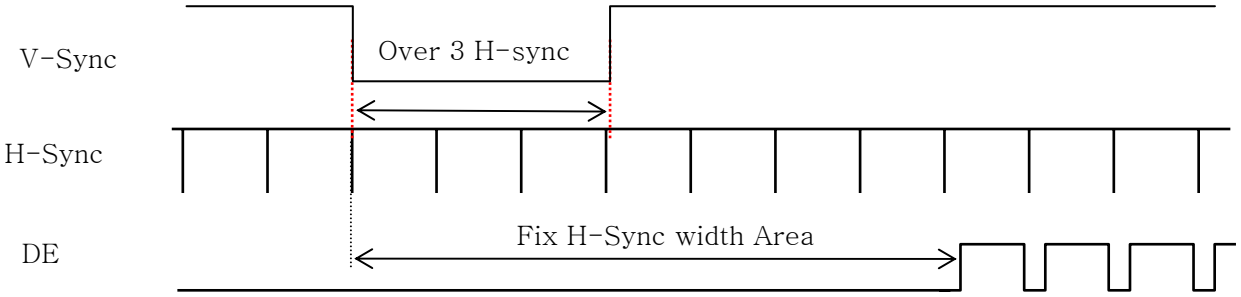
Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCIP	TBD	13.26	19.88	nsec	
CLK Difference	tCdiff	-tRCIP*(3/7)	0	+tRCIP*(3/7)	nsec	
Input Data 0	tRIP1	-0.4	0.0	+0.4	nsec	
Input Data 1	tRIP0	tRICP/7-0.4	tRICP/7	tRICP/7+0.4	nsec	
Input Data 2	tRIP6	2 ×tRICP/7-0.4	2 ×tRICP/7	2 ×tRICP/7+0.4	nsec	
Input Data 3	tRIP5	3 ×tRICP/7-0.4	3 ×tRICP/7	3 ×tRICP/7+0.4	nsec	
Input Data 4	tRIP4	4 ×tRICP/7-0.4	4 ×tRICP/7	4 ×tRICP/7+0.4	nsec	
Input Data 5	tRIP3	5 ×tRICP/7-0.4	5 ×tRICP/7	5 ×tRICP/7+0.4	nsec	
Input Data 6	tRIP2	6 ×tRICP/7-0.4	6 ×tRICP/7	6 ×tRICP/7+0.4	nsec	



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

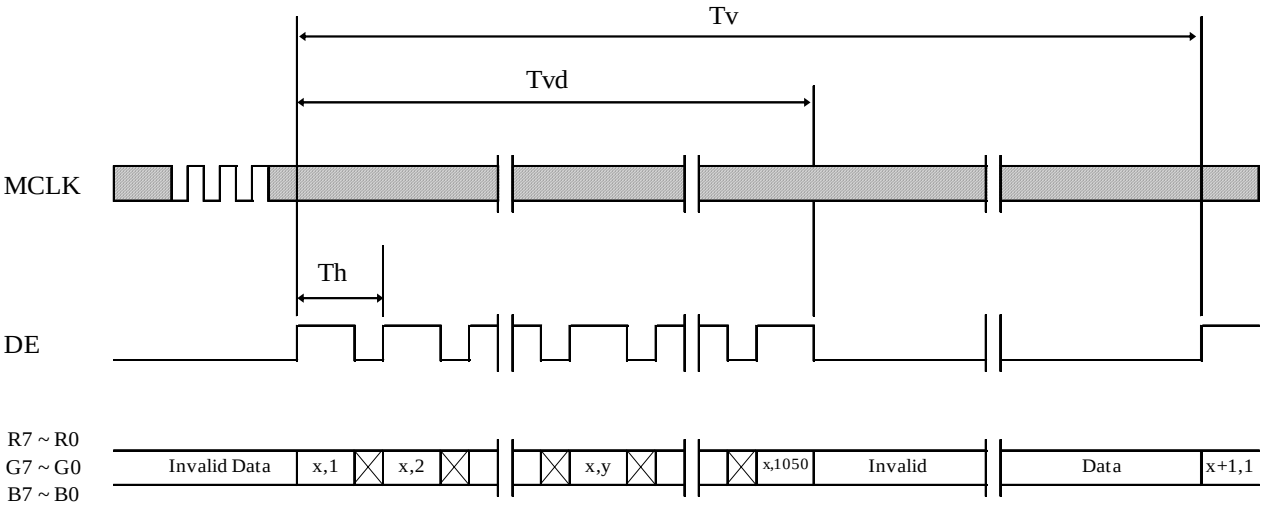
7.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

7.1 Sync Timing Waveforms

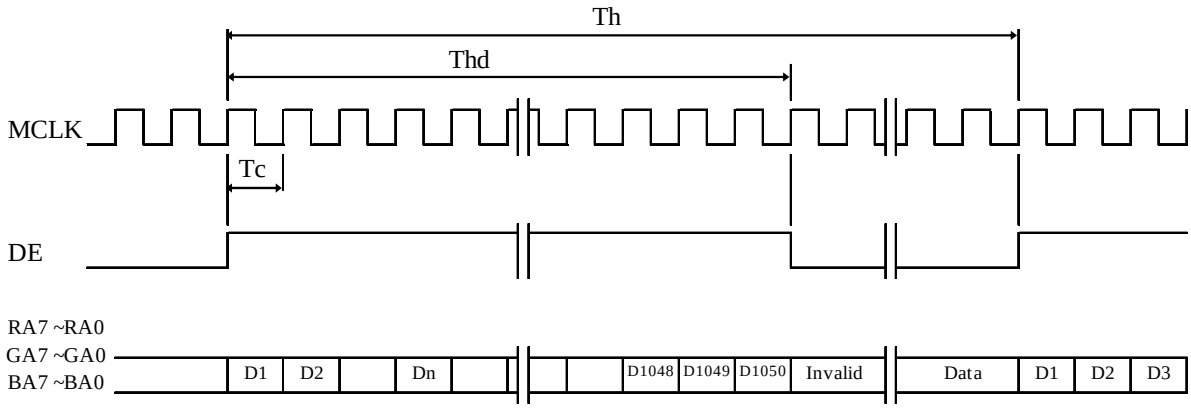


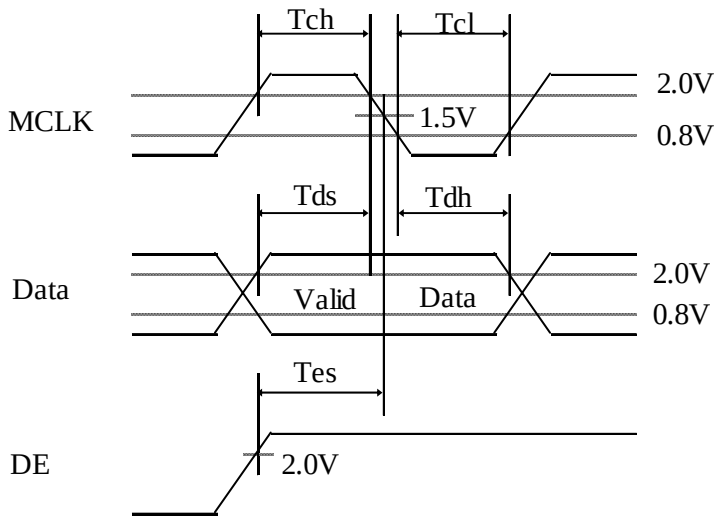
1) Need over 3 H-sync during V-Sync Low
2) Fix H-Sync width from V-Sync falling edge to first rising edge

7.2 Vertical Timing Waveforms



7.3 Horizontal Timing Waveforms





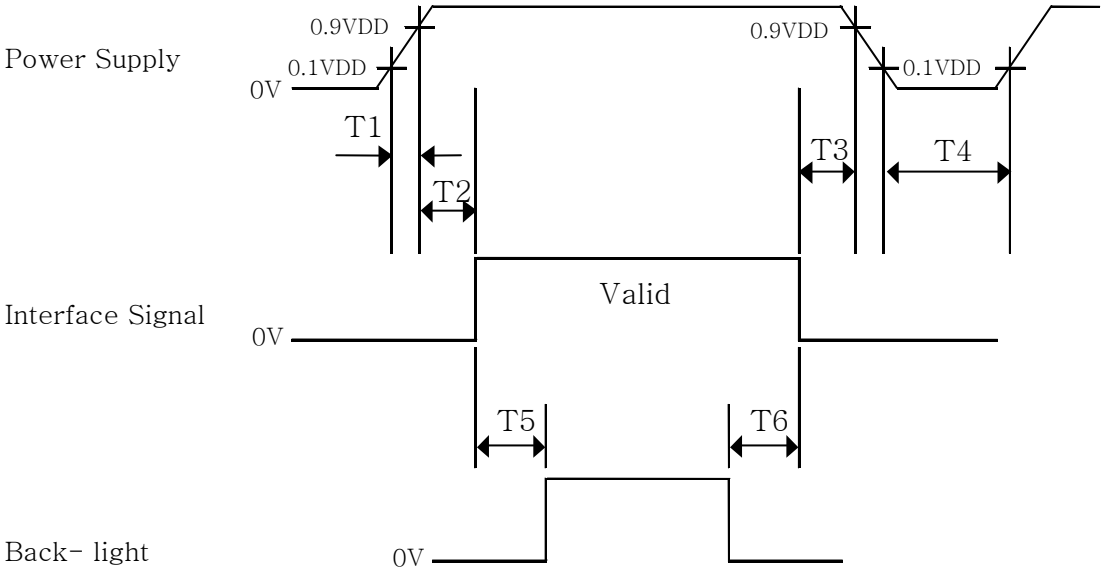
8.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

<Table 10. Input signals, Basic display colors and Gray scale for each color.>

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 module, 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. 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 model HT156WX1-100. Other parameters are shown in Table 11.

<Table 11. Dimensional Parameters>

Parameter	Specification	Unit
Dimensional outline	363.8 ×215.9×14.3 (typ.)	mm
Weight	1300 (max.)	gram
Active area	344.232(H) ×193.536(V)	mm
Pixel pitch	0.252(H) ×0.252(V)	mm
Number of pixels	1366(H) ×768(V) (1 pixel = R + G + B dots)	pixels
Back-light	Top / Bottom edge side 2-CCFL type	

10.2 Mounting

See FIGURE 5. (shown in Appendix)

10.3 Anti-Glare and Polarizer Hardness.

The surface of the LCD has an anti-glare coating to minimize reflection and a coating to reduce scratching.

10.4 Light Leakage

There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50cm from the screen with an overhead light level of 350lux.

11.0 RELIABLITY TEST

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

<Table 12. 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 Gravity / AMP Period	10 ~ 300 Hz, Sweep rate 30 min 1.5 G ±X, ±Y, ±Z 30 min
8	Shock test (non-operating)	Gravity	50G
		Pulse width	11msec, sine wave
		Direction	±X, ±Y, ±Z Once for each
9	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 module from a shipping package.

(2) Cautions for handling the module
- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module 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 module is operating.
- Put the module display side down on a flat horizontal plane.
- 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 module 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 module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

(6) Other cautions
- Do not disassemble and/or re-assemble LCD module.
- 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.

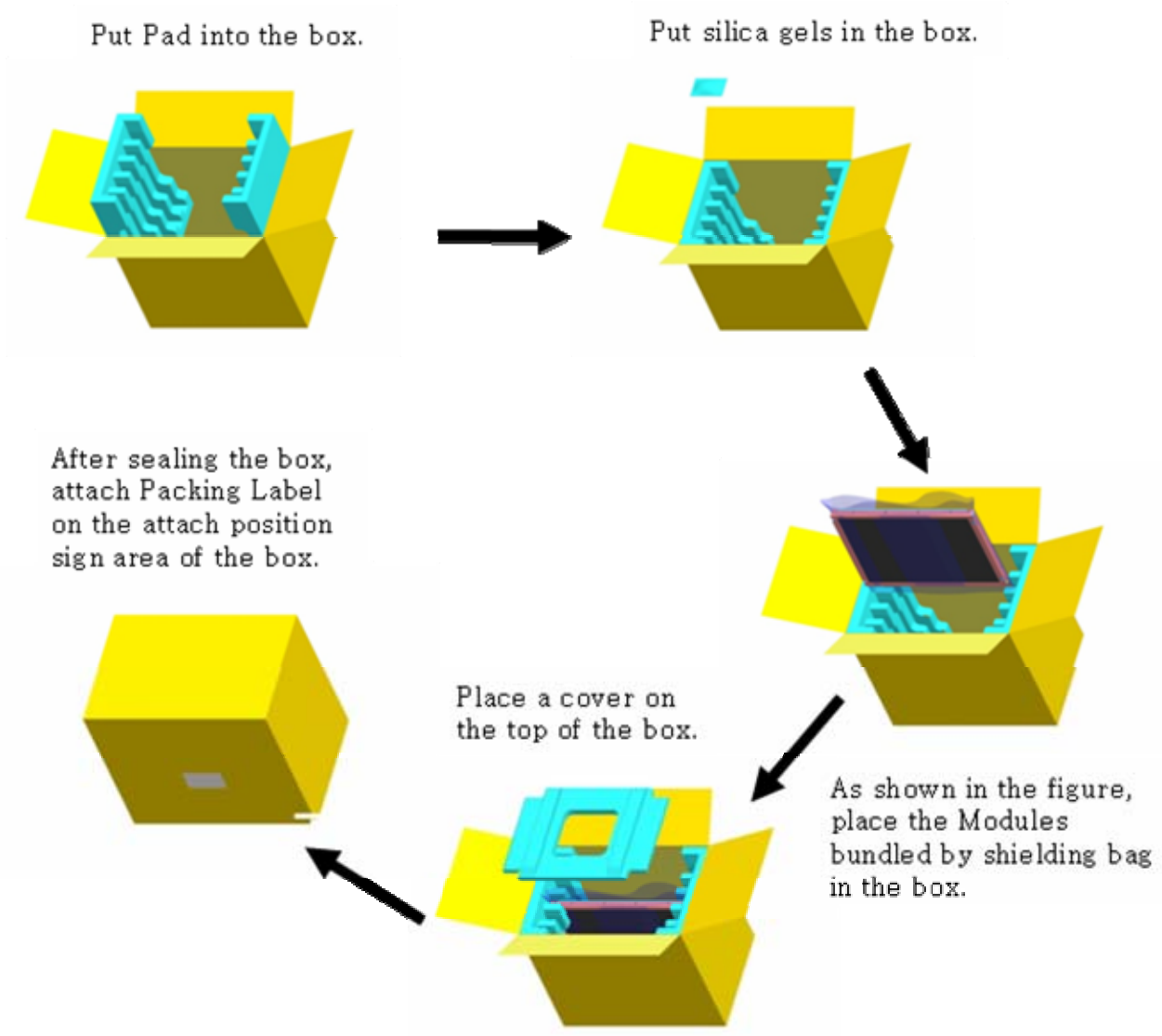
13.0 PRODUCT SERIAL NUMBER

1	2	3	4	5	6	7
X X	X	X	X X	X	X X X X	X X X X X X

1. Control Number
2. Rank / Grade
3. Line Classification
   (BOE OT : A/B/C)
4. Year (2001 : 01, 2002 : 02, ...)
5. Month (1,2,3, ... , 9, X, Y, Z)
6. BOE OT internal use
7. Serial Number

14.0 Packing

14.1 Packing Order



14.2 Packing Note

- Box Dimension : 333mm(W) × 365mm(D) × 455mm(H)
- Package Quantity in one Box : 8pcs
- Box Quantity in one Pallet : 18boxes

14.3 Box label

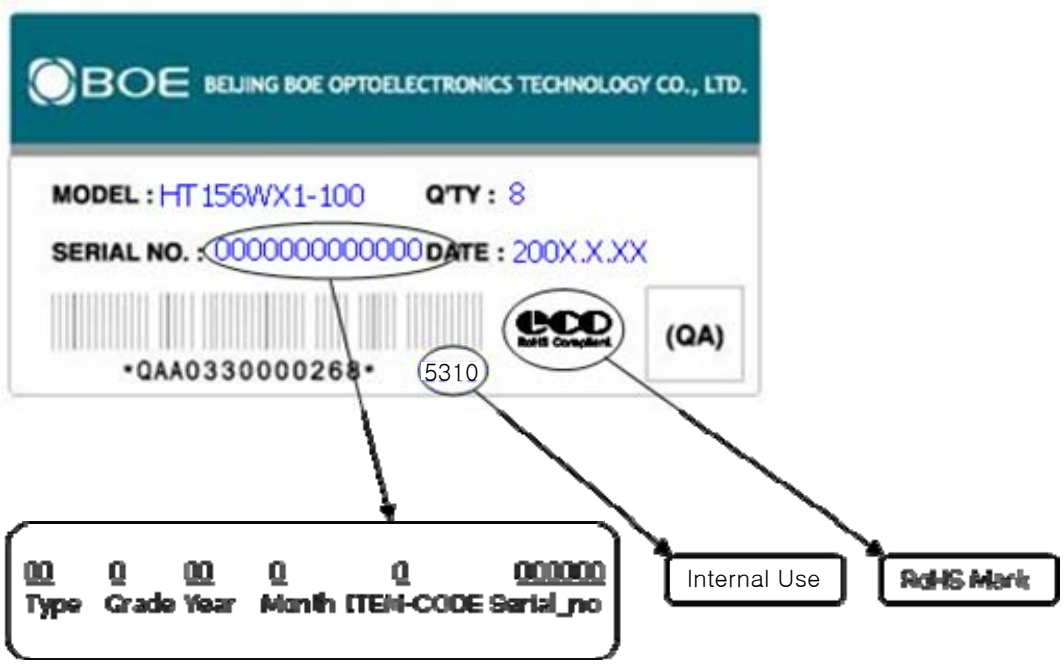
- Label Size : 108 mm (L) × 56 mm (W)
- Contents

  Model : HT156WX1-100

  Q`ty : Module Q`ty in one box

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

  Date : Packing Date



15.0 APPENDIX

Figure 1. Measurement Set Up

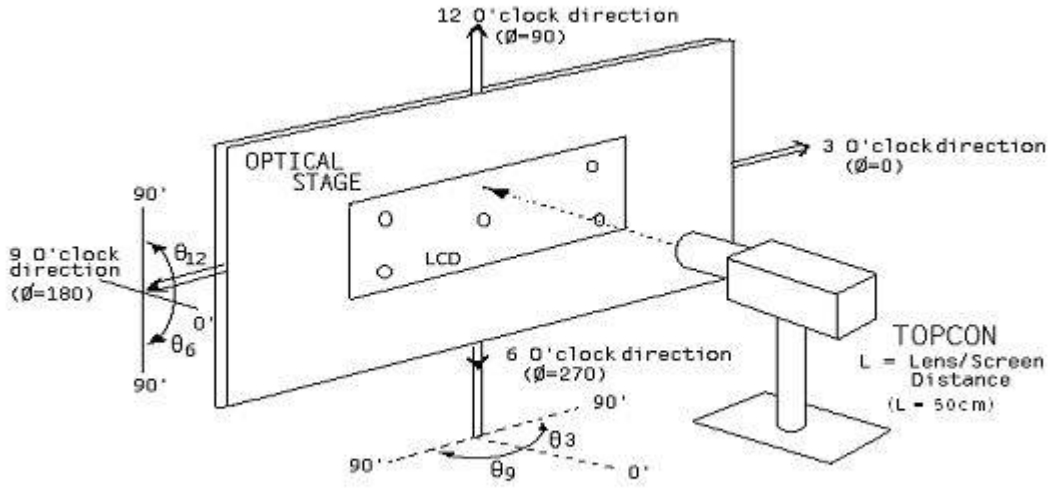


Figure 2. White Luminance and Uniformity Measurement Locations (9 points)

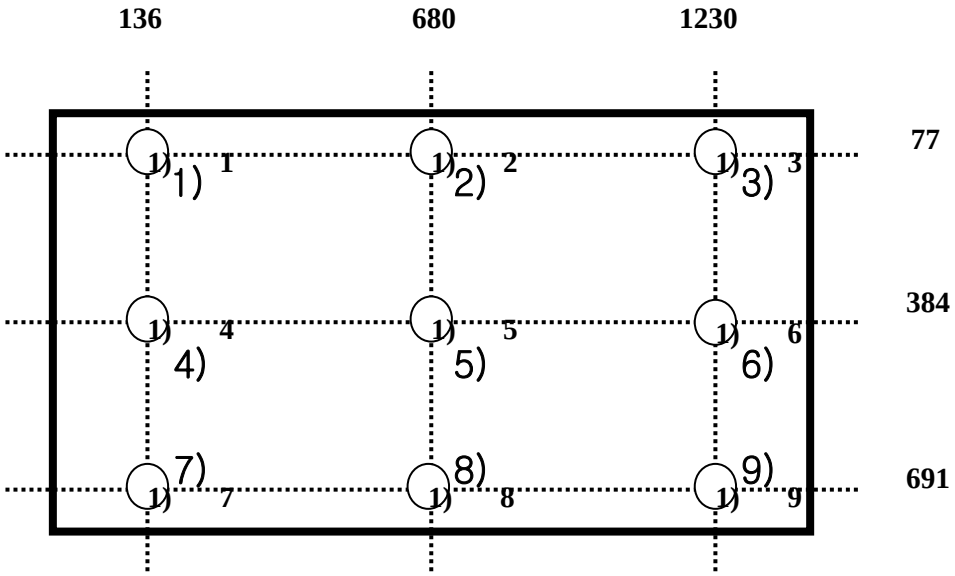


Figure 3. Response Time Testing

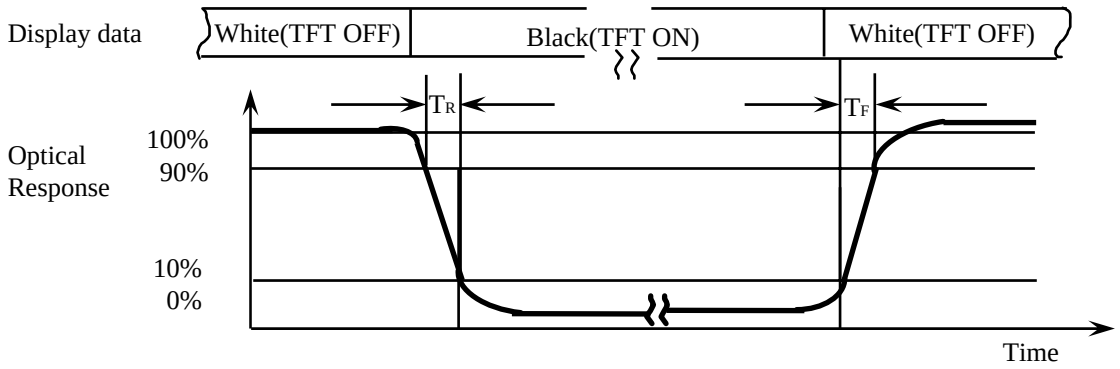
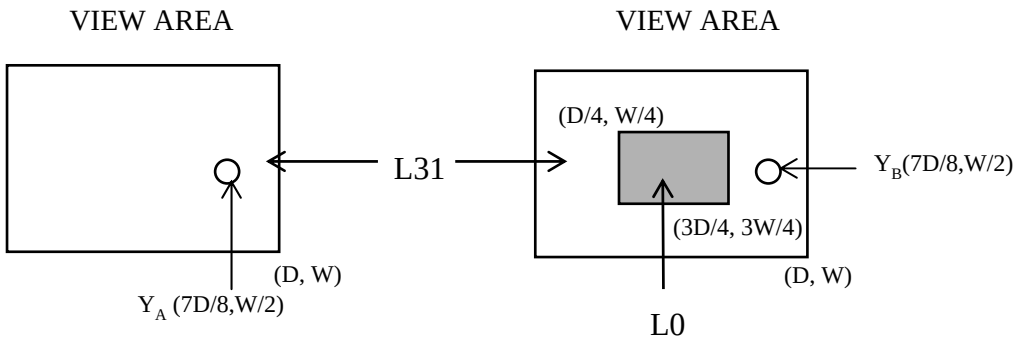


Figure 4. Cross Modulation Test Description



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

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. TFT-LCD Module Outline Dimensions (Front view)

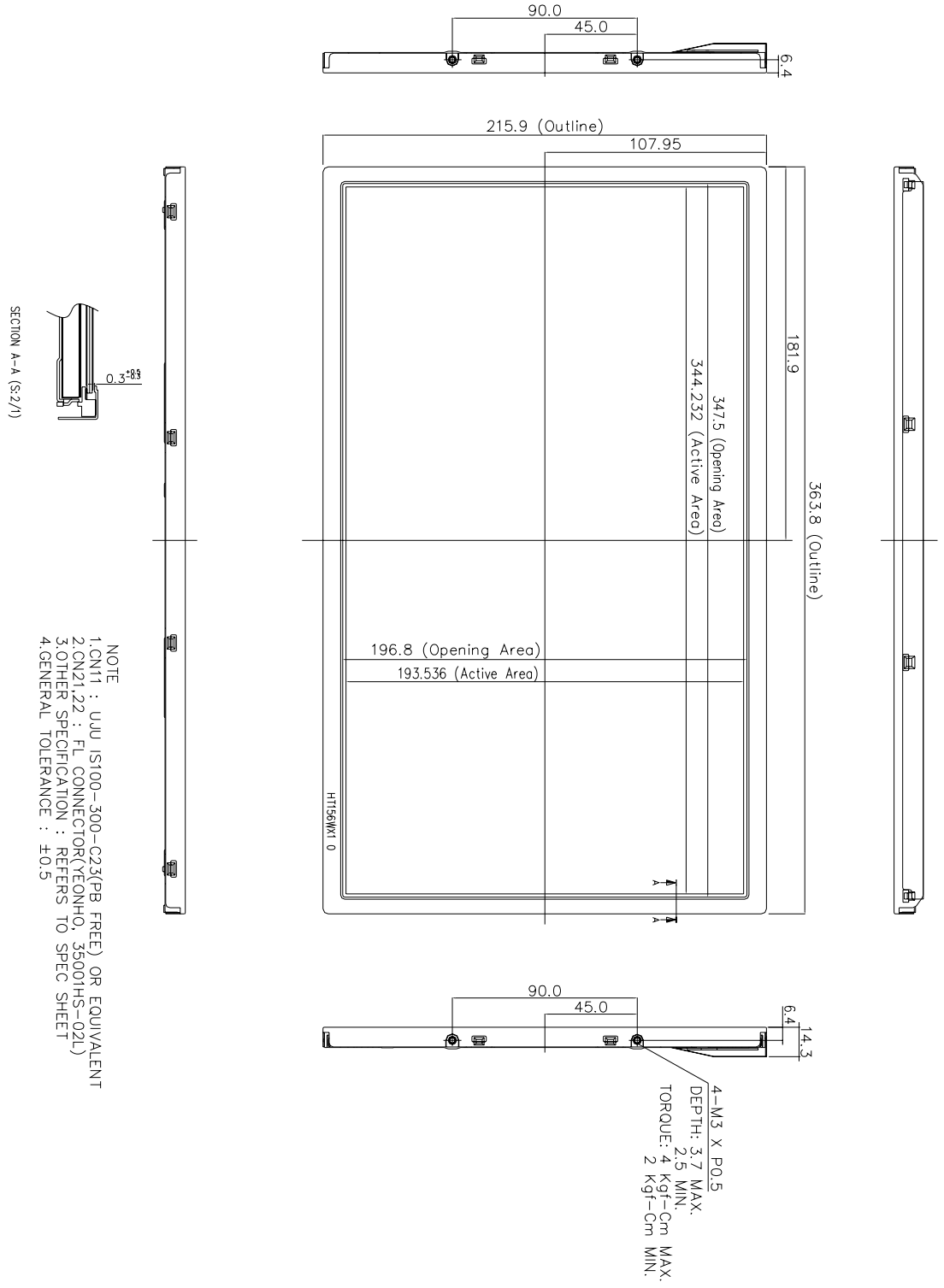


Figure 6. TFT-LCD Module Outline Dimensions (Rear view)