TITLE : HV260WX1-100

Product Specification

Rev. O

BOE OPTOELECTRONICS TECHNOLOGY

REVISION HISTORY

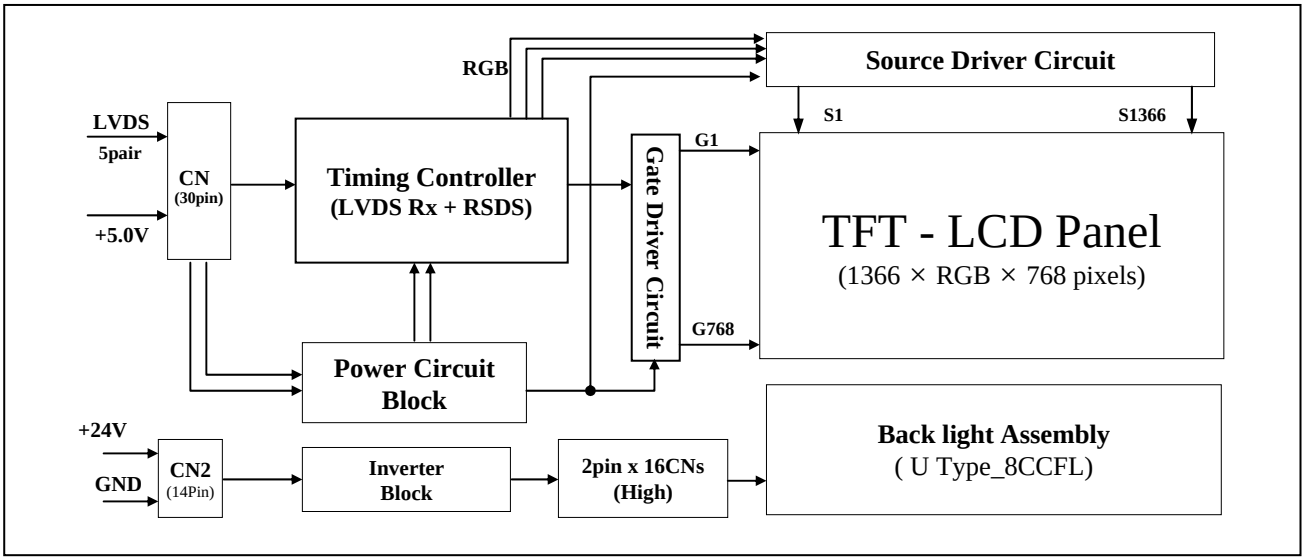
REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-	Initial Release	05.12.13	Y. J. Yoon
P1		1. Timing change. 1) On page7 ; Hsync, Vsync, main clock frequency 2) On page12 ; Clock period, clock frequency, horizontal signal, Horizontal active display term, Vertical active display term 2. Electrical characteristics 1) On page7 ; Inrush current 2) On page15 ; Power sequence 3) On page8 ; Inverter Spec. Add PWM dimming control 3.Color coordinate spec change ±0.3 → ±0.03	06.07.25	Y. J. Yoon
O	-	Initial Release	06.08.21	Y. J. Yoon

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

HV260WX1-100 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 26.0 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
- 8-bit color depth, display 16.7M colors
- Incorporated 8 U-type CCFL back-light
- High luminance and contrast ratio, low reflection and wide viewing angle
- DE (Data Enable) only mode
- RoHS Compliant

1.3 Application

- Home Alone Multimedia TFT-LCD TV
- Display Terminals for Control System
- High Definition TV
- AV application Products

1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remarks
Active area	575.77(H) * 323.71(V)	mm	
Number of pixels	1366(H) ×768(V)	pixels	
Pixel pitch	0.4215(H) ×0.4215(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.7M(8bits-true)	colors	
Display mode	Normally Black		
Outline Dimension	626.0(H) × 373.0(V) × 51.0(D) typ.	mm	
Weight	4300 (typ.)	gram	
Surface Treatment	Haze 25%, 3H		

2.0 ABSOLUTE MAXIMUM RATINGS

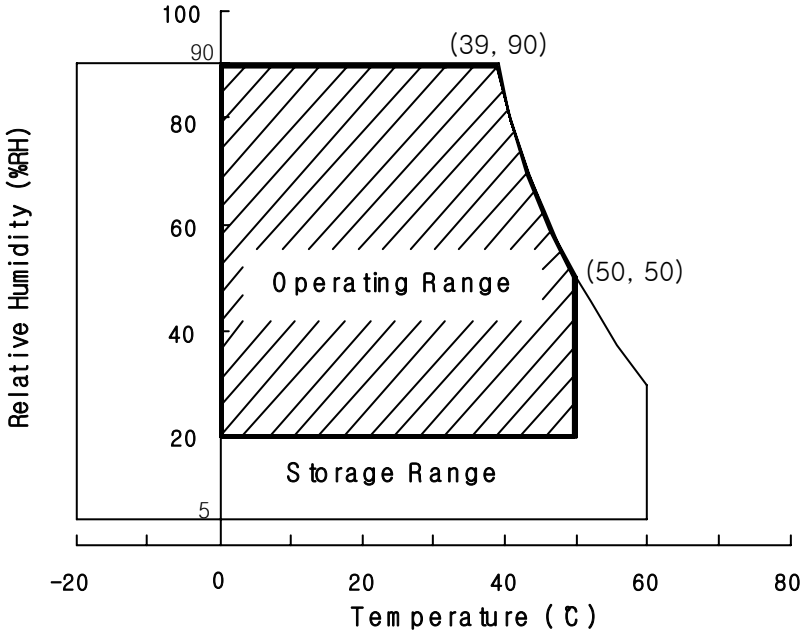
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. LCD Module Electrical Specifications >

[VSS=GND=0V]

Parameter		Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	LCD Module	V_{DD}	VSS-0.5	6.0	V	Ta = 25 ℃
	Inverter	V_{IN}	VSS-0.3	25.2	V	
Back-light Lamp Frequency		F_L	40	80	KHz	
Operating Temperature		T_{OP}	0	+50	℃	1)
		T_{SUR}	0	+50	℃	1)
Storage Temperature		T_{ST}	-20	+60	℃	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

3.1 TFT LCD Module

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

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
Power Supply Input Voltage	VDD	4.5	5.0	5.5	Vdc	
Power Supply Current	IDD	-	1.0	1.2	A	1
Power Consumption	PLCD		5.0	6.0	Watt	
Vertical Signal Frequency	f_V	47	60	63	Hz	
Horizontal Signal Frequency	f_H	39.4	47.4	53	KHz	
Main Clock Frequency	PLCD		80.4	85	MHz	
Rush current	IRUSH	-	-	3.0	A	2

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=60Hz and Clock frequency = 80MHz. Test Pattern of power supply current
a) Typ : Black Pattern
b) Max : Sub Dot Pattern
2. The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

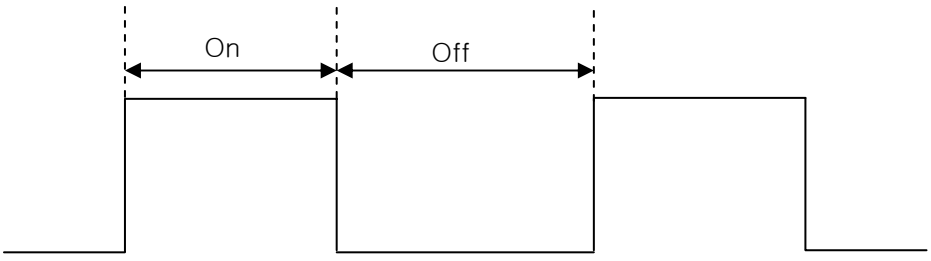
3.2 Inverter

< Table 4. Inverter Electrical Specifications >

Parameter	Symbol	Condition	Values			Unit	Notes
			Min.	Typ.	Max.		
Input Voltage	V_{IN}		21.6	24.0	26.4	V	
Input Current	I_{DDB}	A_{DIM}=3.3V	-	3.5	5.5	A	1
Power Consumption	P_B	Typ Luminance	-	84	100	Watt	
B/L on/off control	$V_{ON/OFF}$	Lamp ON = High	2.4	-	5.0	V	
		Lamp OFF =Low	0.0	-	0.8	V	
Analog Dimming	A_{DIM}	V_{IN} = 24V	0	-	3.3	V	
PWM signal duty	PWM_{DIM}		30	-	100	%	2
PWM frequency	F_{PWM}		120	-	240	Hz	
PWM amplitude	V_{PWM}	High (on)	2.4	-	5.5	V	
		Low (off)	-0.3	-	0.8		
Short circuit protection time	Tscp	V_{IN} = 24V A_{DIM} = 3.3V	0.5	-	2	Sec.	
Life Time			50,000	-	-	Hrs	3

Notes: 1.The specified current and power consumption are under the typical supply Input voltage, 24V.

2. High-duty = On/(On+Off) * 100



3. The life time of a Lamp, 50,000Hrs, is determined as the time at which luminance of the lamp is 50% value at the typical lamp current on condition of continuous operating at 25 ± 2°C.

4.0 INTERFACE CONNECTION

4.1 Module Input Signal & Power

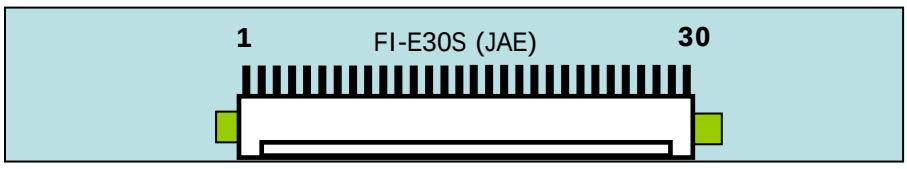
- Connector : FI-E30S (Manufactured by JAE) or Equivalent

< Table 5. LCM Module Input Connector Pin Configuration >

Pin No	Symbol	Description	Pin No	Symbol	Description
1	NC*	Not Connected	16	GND	Ground
2	NC*	Not Connected	17	RX3-	LVDS Receiver Signal(-)
3	NC*	Not Connected	18	RX3+	LVDS Receiver Signal(+)
4	GND	Ground	19	GND	Ground
5	RX0-	LVDS Receiver Signal(-)	20	NC*	Not Connected
6	RX0+	LVDS Receiver Signal(+)	21	OPT*	LVDS Option
7	GND	Ground	22	NC*	Not Connected
8	RX1-	LVDS Receiver Signal(-)	23	GND	Power Ground
9	RX1+	LVDS Receiver Signal(+)	24	GND	Power Ground
10	GND	Ground	25	GND	Power Ground
11	RX2-	LVDS Receiver Signal(-)	26	Vdd	Power supply + 5.0V dc
12	RX2+	LVDS Receiver Signal(+)	27	Vdd	Power supply + 5.0V dc
13	GND	Ground	28	Vdd	Power supply + 5.0V dc
14	RXCLK-	LVDS Receiver Clock Signal(-)	29	Vdd	Power supply + 5.0V dc
15	RXCLK+	LVDS Receiver Clock Signal(+)	30	Vdd	Power supply + 5.0V dc

Notes : 1. N*(Not Connected) : This pins are only used for BOE OT internal operations.
2. Input Level of LVDS signal is based on the IEA 664 Standard.
3. OPT* (LVDS Option) : This pin is used for selecting LVDS signal data format.
If this Pin : High (3.3V) → Normal NS LVDS format
Otherwise : Low (GND) or Open (NC) → JEIDA LVDS format
Sequence : On = Vdd ≥ LVDS Option ≥ Interface signal
Off = Interface signal ≥ LVDS Option ≥ Vdd

Rear view of LCM



4.2 LVDS Interface

- LVDS Receiver : Timing Controller (LVDS Rx merged)
- LVDS Data : Pixel Data

< Table 6. LCM Module Input Connector Pin Configuration >

	LVDS Pin	LVDS Data format	JEIDA Data format	Remark
TxOUT/RxIN0	TxIN/RxOUT0	Red0 [LSB]	R2	
	TxIN/RxOUT1	Red1	R3	
	TxIN/RxOUT2	Red2	R4	
	TxIN/RxOUT3	Red3	R5	
	TxIN/RxOUT4	Red4	R6	
	TxIN/RxOUT6	Red5	R7 [MSB]	
	TxIN/RxOUT7	Green0 [LSB]	G2	
TxOUT/RxIN1	TxIN/RxOUT8	Green1	G3	
	TxIN/RxOUT9	Green2	G4	
	TxIN/RxOUT12	Green3	G5	
	TxIN/RxOUT13	Green4	G6	
	TxIN/RxOUT14	Green5	G7 [MSB]	
	TxIN/RxOUT15	Blue0 [LSB]	B2	
	TxIN/RxOUT18	Blue1	B3	
TxOUT/RxIN2	TxIN/RxOUT19	Blue2	B4	
	TxIN/RxOUT20	Blue3	B5	
	TxIN/RxOUT21	Blue4	B6	
	TxIN/RxOUT22	Blue5	B7 [MSB]	
	TxIN/RxOUT24	HSYNC	HSYNC	
	TxIN/RxOUT25	VSYNC	VSYNC	
	TxIN/RxOUT26	DEN	DEN	
TxOUT/RxIN3	TxIN/RxOUT27	Red6	R0 [LSB]	
	TxIN/RxOUT5	Red7 [MSB]	R1	
	TxIN/RxOUT10	Green6	G0 [LSB]	
	TxIN/RxOUT11	Green7 [MSB]	G1	
	TxIN/RxOUT16	Blue6	B0 [LSB]	
	TxIN/RxOUT17	Blue7 [MSB]	B1	
	TxIN/RxOUT23	Reserved	Reserved	

4.3 Inverter Input Signal & Power

- Connector : S14B-PH-SM3 Side entry type (Manufactured by JST) or Equivalent

< Table 6. Inverter Input Connector Pin Configuration >

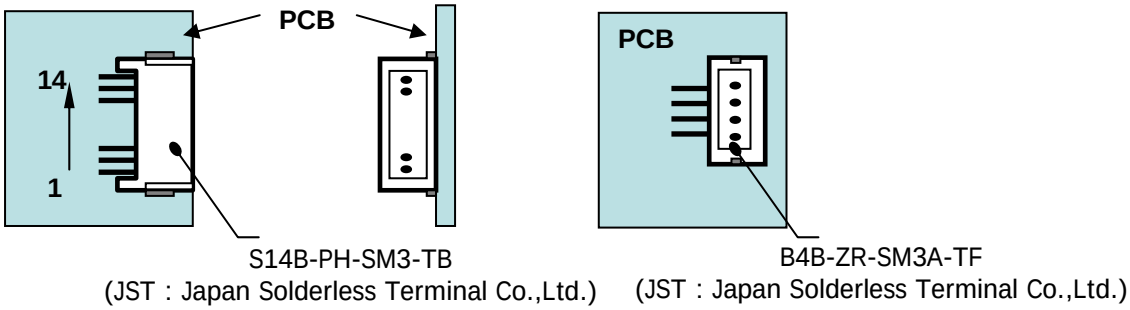
Pin No	Symbol	Description	Remarks
1	VBL	Power Supply +24V	
2	VBL	Power Supply +24V	
3	VBL	Power Supply +24V	
4	VBL	Power Supply +24V	
5	VBL	Power Supply +24V	
6	GND	Ground	
7	GND	Ground	
8	GND	Ground	
9	GND	Ground	
10	GND	Ground	
11	NC	Not Connected	
12	VON/OFF	Backlight On/off Signal	(On :2.4V~5.0V/Off :0.0~0.8V)
13	Analog Dimmer	Brightness Adjustable Voltage	(Max :3.3V / Min :0.0V)
14	PWM Dimmer	Brightness Adjustable Voltage	(Max :100% / Min :30%)

- Connector : B4B-ZR-SM3A-TF (Manufactured by JST) or Equivalent

< Table 7. Inverter Control Signal Connector Pin Configuration >

Pin No	Symbol	Description	Remarks
1	PWM dimmer	Brightness Adjustable Voltage	
2	Analog dimmer	Brightness Adjustable Voltage	
3	ON/OFF	Backlight On/off Signal	
4	GND	Backlight Ground	

Rear view of LCM



5.0 SIGNAL TIMING SPECIFICATION

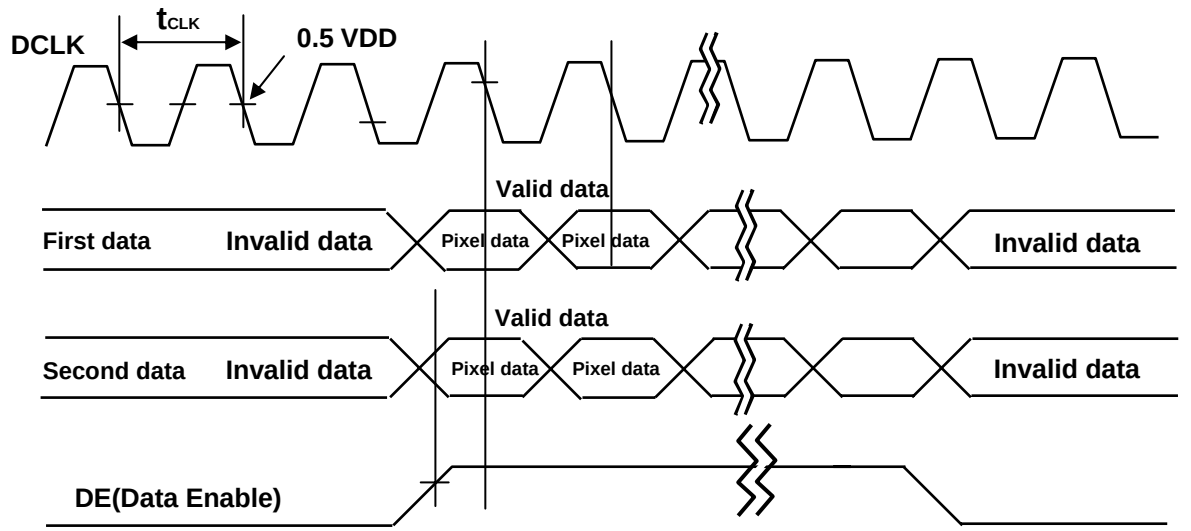
5.1 Timing Parameters (DE only mode)

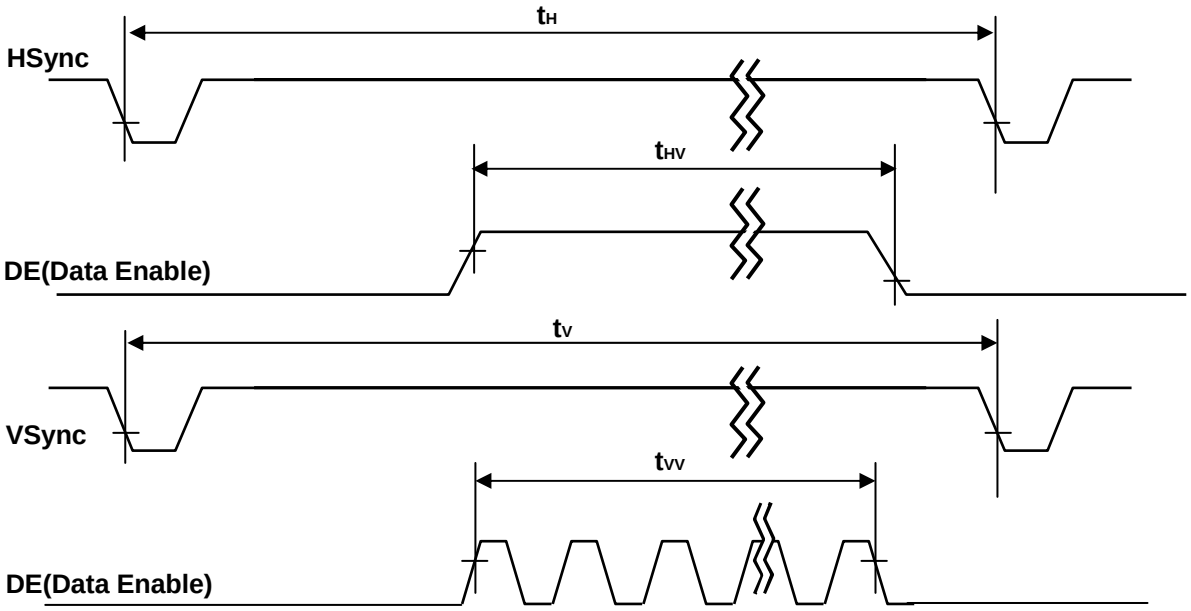
< Table 8. Timing Table >

ITEM	Symbol		Min	Typ	Max	Unit	Note
CLK	Period	t_{CLK}	11.8	12.4	15.9	ns	
	Frequency	-	63	80.4	85	MHz	
Horizontal signal Frequency		f_H	39.4	50.2	53	KHz	
Vertical Signal Frequency		f_V	47	60	63	Hz	
Horizontal Active Display Term	Valid	t_{HV}	-	1366	-	t_{CLK}	
	Total	t_H	1440	1600	2000	t_{CLK}	
Vertical Active Display Term	Valid	t_{VV}	-	768	-	t_{HP}	
	Total	t_V	773	838	1200	t_{HP}	

Notes: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

5.2 Signal Timing Waveform



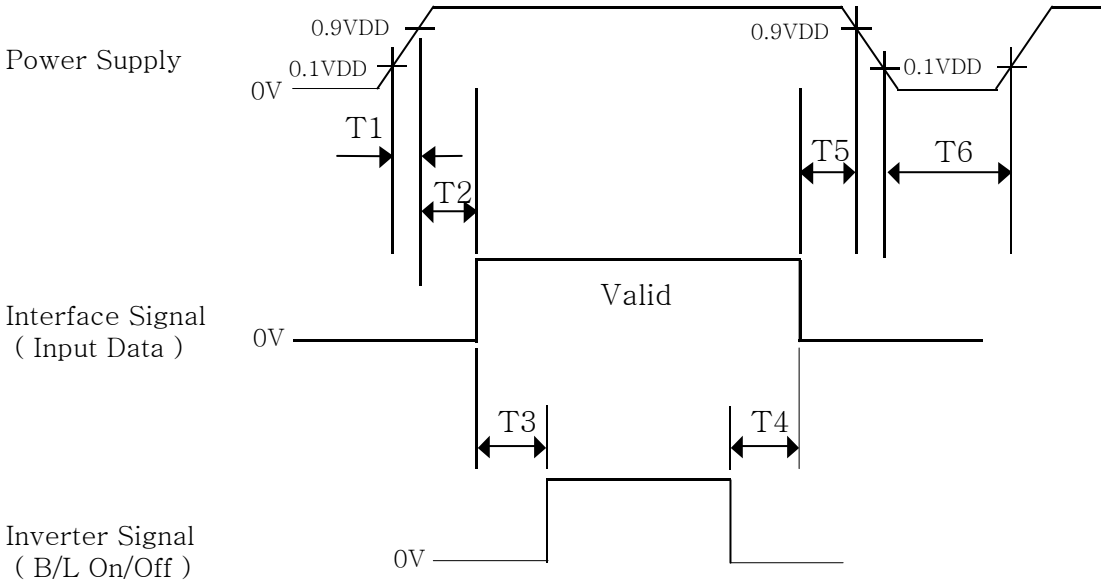


5.3 Input Signals, Basic Display Colors & Gray Scale Of Colors

Color & Gray Scale		Input Data Signal																							
		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

5.4 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



Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0.5	-	50	ms
T3	600	-	-	ms
T4	100	-	-	ms
T5	0.5	-	50	ms
T6	3.0	-	-	s

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.

6.0 OPTICAL SPECIFICATION

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 TOPCON 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.

[VDD = 5.0V, Frame rate = 60Hz, Ta =25±2 ℃]

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Θ_3	CR > 10		89		Deg.	Note 1
		Θ_9			89		Deg.	
	Vertical	Θ_{12}			89		Deg.	
		Θ_6			89		Deg.	
Color Temperature				-	12,000		K	TBD
Color Gamut				-	72		%	
Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	(600:1)	800:1	-		Note 2
Luminance of White		Y_w		(450)	500	-	cd/m²	Note 3
White luminance uniformity		Δ Y		75	-		%	Note 4
Reproduction of color	White	W_x		TYP. - 0.03	0.272	TYP. + 0.03		Note 5
		W_y			0.277			
	Red	R_x			0.640			
		R_y			0.330			
	Green	G_x			0.265			
		G_y			0.590			
	Blue	B_x			0.150			
		B_y			0.057			
Response Time	Rise	T_r		-	6	(7)	ms	Note 6
	Decay	T_d		-	6	(7)		
	G to G	T_g		-	-	8		
Gamma Scale				2.0	2.2	2.4		

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.
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.

7.0 MECHANICAL CHARACTERISTICS

7.1 Dimensional Requirements

FIGURE 6 (located in Appendix) shows mechanical outlines for the model HT170EX1-100. Other parameters are shown in Table 5.

<Table 5. Dimensional Parameters>

Parameter	Specification	Unit
Dimensional outline	626.0(H) ×373.0.3 (V) ×51.0 (D) ±1.0	mm
Weight	4300 (typ)	gram
Active area	575.77 (H) ×323.71(V)	mm
Pixel pitch	0.4215(H) ×0.4215(V)	mm
Number of pixels	1366(H) ×768(V) (1 pixel = R + G + B dots)	pixels
Back-light	Direct Light 8U CCFL type	

7.2 Mounting

See FIGURE 5. (shown in Appendix)

7.3 Anti-Glare and Polarizer Hardness.

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

7.4 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 350 [lux.]

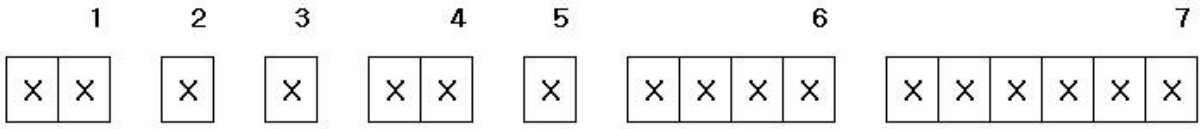
8.0 RELIABLITY TEST

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 10 min Gravity / AMP : 1.5 G Sine Period : ±X, ±Y, ±Z 30 min
8	Shock test (non-operating)	Gravity : 50G Pulse width : 11msec, Sine wave ±X, ±Y, ±Z Once for each direction
9	Electro-static discharge test	Air : ±15kV , 50pF/330Ω ,100Point ,1time/Point Contact : ±8kV , 150pF/330Ω ,100Point , 1time/Point

9.0 Product Serial Number



Type

No 1. Control

No 2. Rank

No 3. Line Classification(BOE HYDIS : H, LCM : L, BOE OT : A/B/C)

No 4. Year(2001 : 01, 2002 : 02,…)

No 5. Month(1, 2, 3, …,9 X, Y, Z)

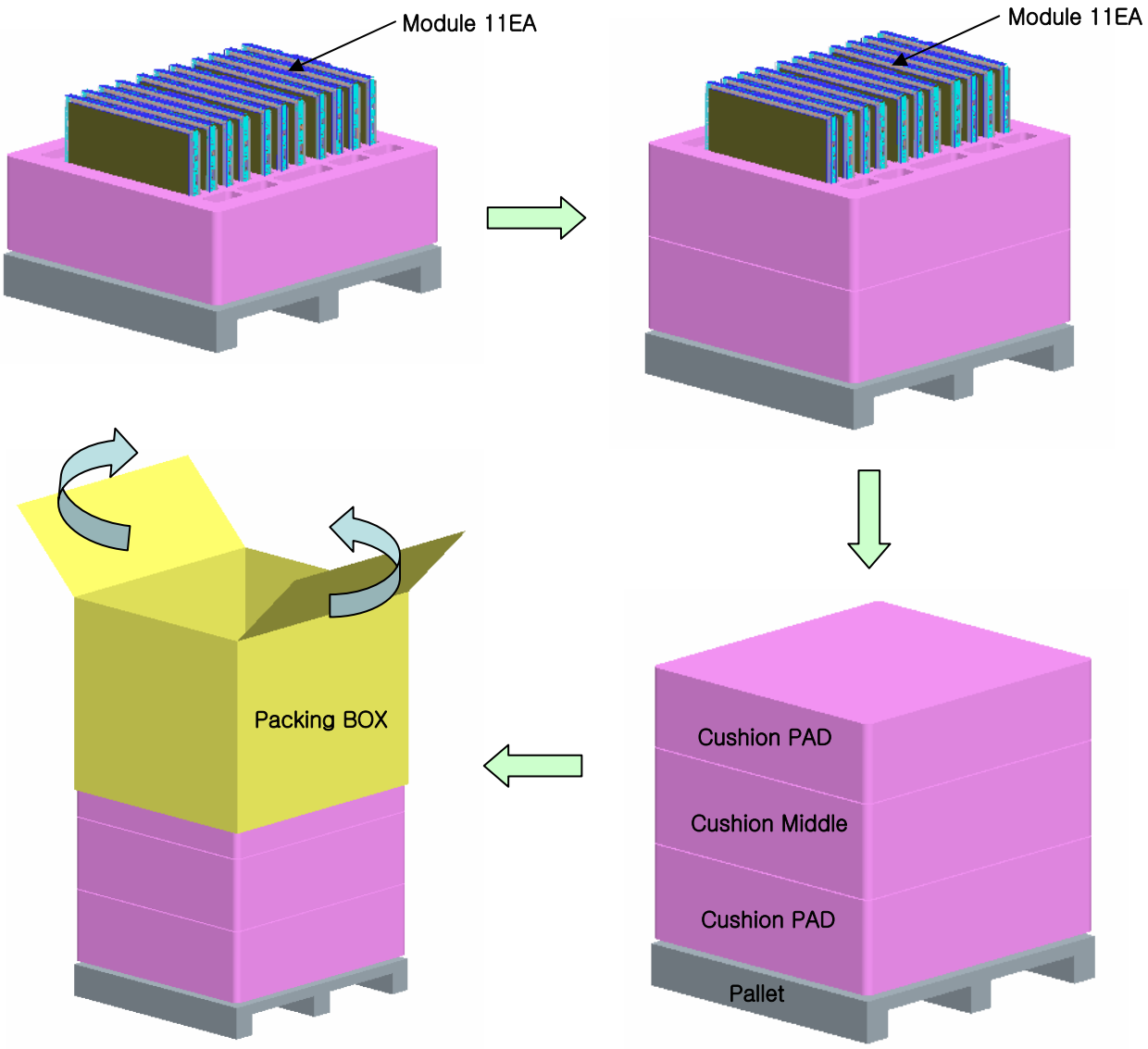
No 6. FG Code

No 7. Serial No.

10.0 PACKING INFORMATION

BOE provides the standard shipping container for customers, unless customer specifies their packing information. The standard packing method and Barcode information are shown in below.

10.1 Packing Order



10.2 Packing Note

- Box Dimension :
- Package Quantity in one Box : 3pcs

10.3 Box label

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

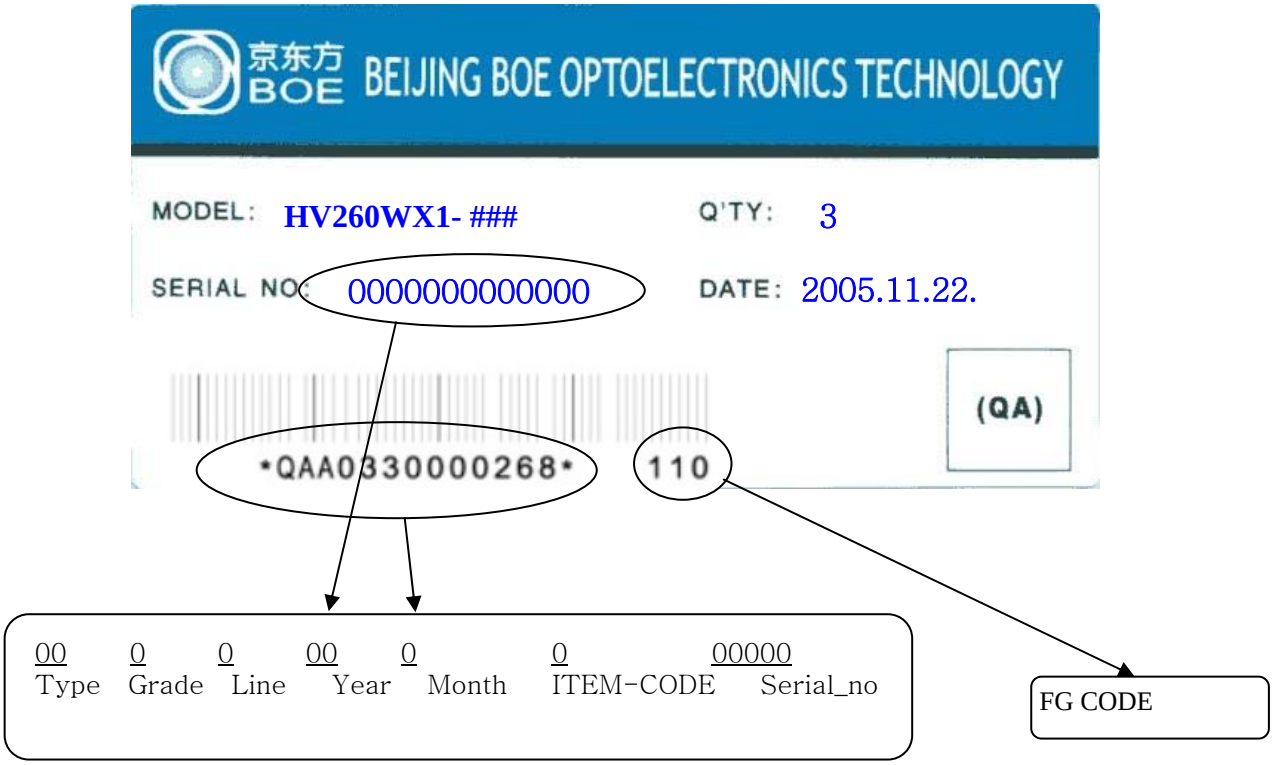
  Model : HV260WX1

  Q`ty : Module Q`ty in one box

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

  Date : Packing Date

  FG Code : FG Code of Product



11.0 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.

12.0 APPENDIX

Figure 1. Measurement Set Up

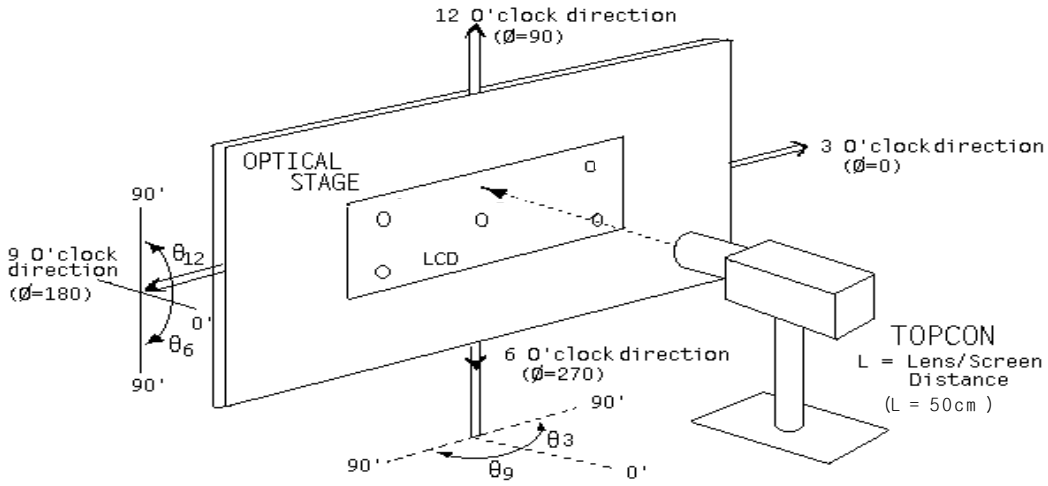


Figure 2. White Luminance and Uniformity Measurement Locations

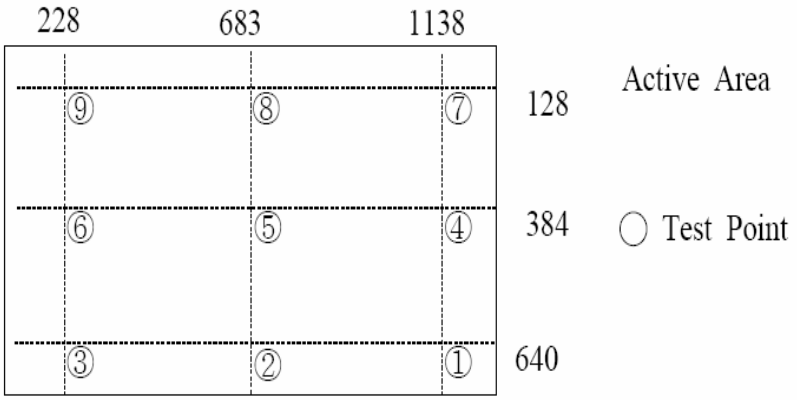


Figure 3. Response Time Testing

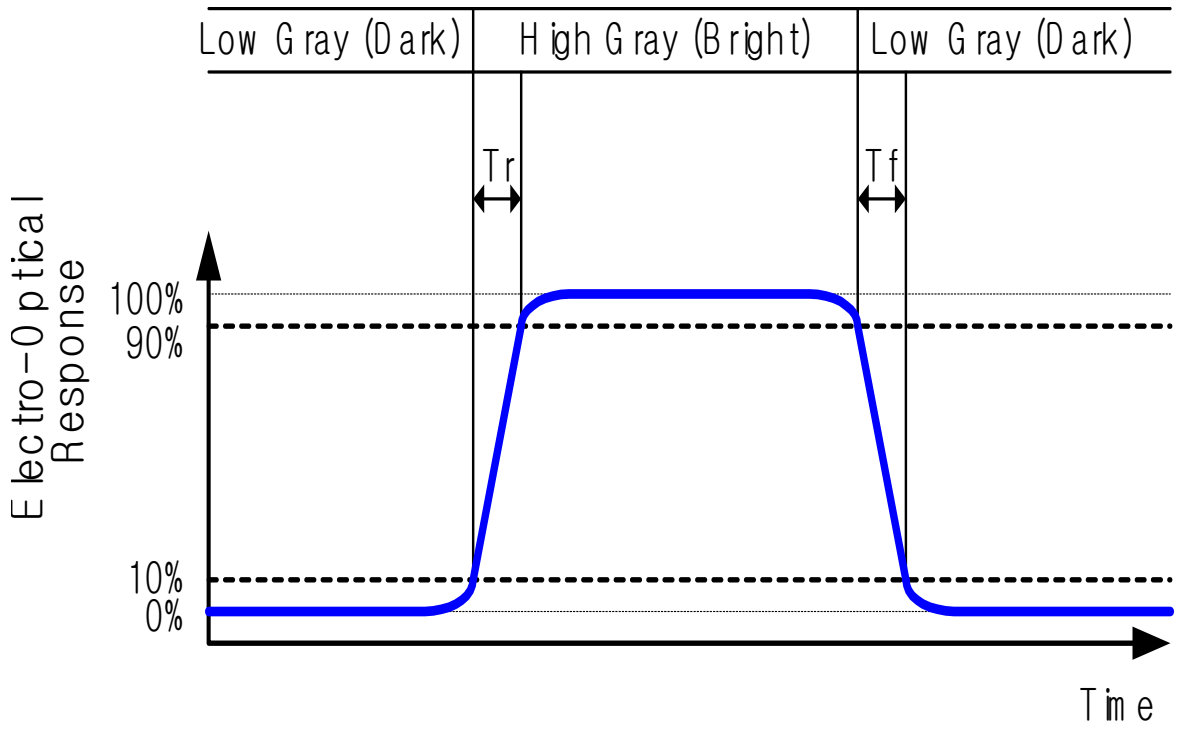


Figure 5. TFT-LCD Module Outline Dimensions (Front view)

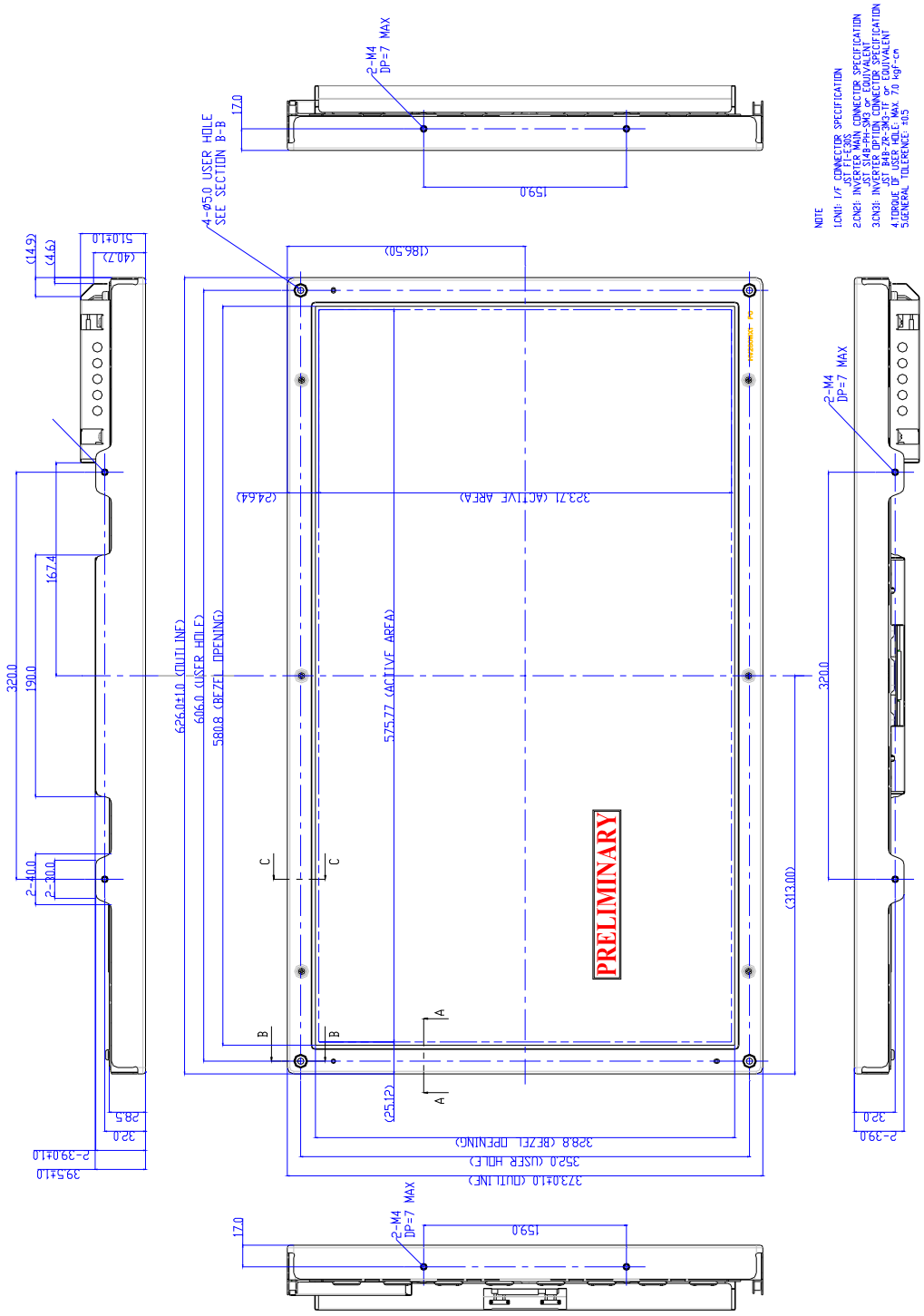


Figure 6. TFT-LCD Module Outline Dimensions (Rear view)