

# APPROVAL SPECIFICATION

- Tentative Specification  
 Preliminary Specification  
 Approval Specification

**MODEL NO.: V260B3**  
**SUFFIX: PE1**

<b>Customer:</b>	
<b>APPROVED BY</b>	<b>SIGNATURE</b>
Name / Title _____	_____
<b>Note</b>	
_____ Please return 1 copy for your confirmation with your signature and comments.	

Approved By	Checked By	Prepared By
Chao-Chun Chung	Vincent Chou	Delia Lin

## - CONTENTS -

REVISION HISTORY	-----	3
1. GENERAL DESCRIPTION	-----	4
1.1 OVERVIEW		
1.2 CHARACTERISTICS		
1.3 MECHANICAL SPECIFICATIONS		
2. ABSOLUTE MAXIMUM RATINGS	-----	5
2.1 ABSOLUTE RATINGS OF ENVIRONMENT (BASED ON CMO MODULE V260B3-LE1)		
2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)		
2.3 ELECTRICAL ABSOLUTE RATINGS (OPEN CELL)		
3. ELECTRICAL CHARACTERISTICS	-----	7
3.1 TFT LCD OPEN CELL		
4. BLOCK DIAGRAM	-----	9
4.1 TFT LCD MODULE		
5. INPUT TERMINAL PIN ASSIGNMENT	-----	10
5.1 TFT LCD MODULE		
5.2 LVDS INTERFACE		
5.3 COLOR DATA INPUT ASSIGNMENT		
6. INTERFACE TIMING	-----	14
6.1 INPUT SIGNAL TIMING SPECIFICATIONS		
6.2 POWER ON/OFF SEQUENCE		
7. OPTICAL CHARACTERISTICS	-----	18
7.1 TEST CONDITIONS		
7.2 OPTICAL SPECIFICATIONS		
8. DEFINITION OF LABELS	-----	22
8.1 OPEN CELL LABEL		
8.2 CARTON LABEL		
9. PACKAGING	-----	23
9.1 PACKING SPECIFICATIONS		
9.2 PACKING METHOD		
10. PRECAUTIONS	-----	25
10.1 ASSEMBLY AND HANDLING PRECAUTIONS		
10.2 SAFETY PRECAUTIONS		
11. MECHANICAL CHARACTERISTICS	-----	26

**REVISION HISTORY**

Version	Date	Page (New)	Section	Description
Ver 2.0	Oct.11,'10	All	All	Approval Specification was first issued.

## 1. GENERAL DESCRIPTION

### 1.1 OVERVIEW

V260B3- PE1 is a 26-inch TFT LCD cell with driver ICs and 1ch-LVDS interface. This module supports 1366 x 768 WXGA format and can display 16.7M colors (8-bit/color). The backlight unit is not built in

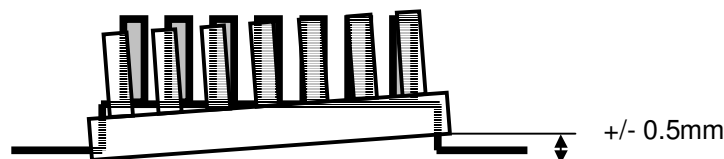
### 1.2 CHARACTERISTICS

CHARACTERISTICS ITEMS	SPECIFICATIONS
Screen Diagonal [in]	26.0
Pixels [lines]	1366×768
Active Area [mm]	575.769×323.712
Sub -Pixel Pitch [mm]	0.1405(H)×0.4215(V)
Pixel Arrangement	RGB vertical stripe
Weight [g]	TYP. 820
Physical Size [mm]	Refer to 2D Drawing
Display Mode	MVA, Normally Black
Contrast Ratio	(3000:1) Typ. (Typical value measured at CMO's module)
Glass thickness (Array/CF) [mm]	0.7 / 0.7
Viewing Angle (CR>20)	+88/-88(H), +88/-88(V) Typ. (Typical value measured at CMO's module)
Color Chromaticity	R=0.655, 0.328 G=0.269,0.598 B=0.131,0.120 W=0.299,0.355 *Please refer to "color chromaticity" on p.18
Cell Transparency [%]	5.0%Typ. (Typical value measured at CMO's module)
Polarizer (CF side)	Anti-Glare coating 587.4(H) x 335.2(w). Hardness: 3H
Polarizer (TFT side)	587.4(H) x 335.2(w).

### 1.3 MECHANICAL SPECIFICATIONS

Item	Min.	Typ.	Max.	Unit	Note
Weight		820		g	
I/F connector mounting position	The mounting inclination of the connector makes the screen center within $\pm 0.5\text{mm}$ as the horizontal.				(1)

Note (1) Connector mounting position



## 2. ABSOLUTE MAXIMUM RATINGS

### 2.1 ABSOLUTE RATINGS OF ENVIRONMENT (BASED ON CMO MODULE V260B3-LE1)

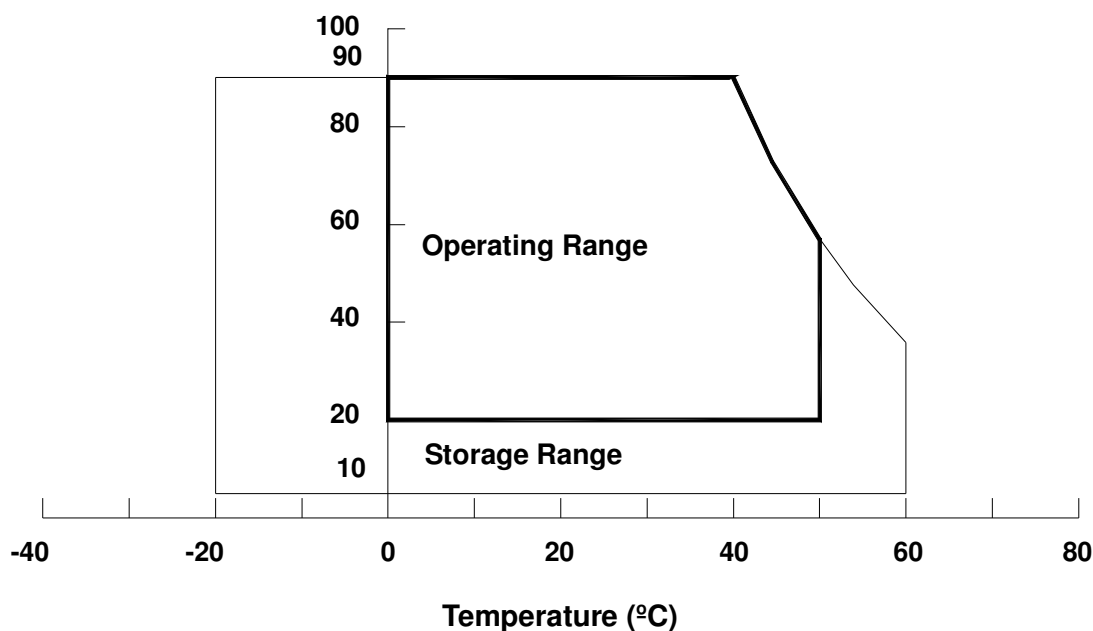
Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T <sub>ST</sub>	-20	+60	°C	(1)
Operating Ambient Temperature	T <sub>OP</sub>	0	+50	°C	(1), (2)

Note (1) Temperature and relative humidity range is shown in the figure below.

- (a) 90 %RH Max. ( $T_a \leq 40$  °C).
- (b) Wet-bulb temperature should be 39 °C Max. ( $T_a > 40$  °C).
- (c) No condensation.

Note (2) The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 65 °C with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 65 °C. The range of operating temperature may degrade in case of improper thermal management in final product design.

**Relative Humidity (%RH)**



## 2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)

Storage Condition : With shipping package.

Storage temperature range : 25±5 °C

Storage humidity range : 50±10%RH

Shelf life : a month

## 2.3 ELECTRICAL ABSOLUTE RATINGS

### 2.3.1 ELECTRICAL ABSOLUTE RATINGS (OPEN CELL)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V <sub>CC</sub>	-0.3	13.5	V	(1)
Input Signal Voltage	V <sub>IN</sub>	-0.3	3.6	V	

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

## 3. ELECTRICAL CHARACTERISTICS

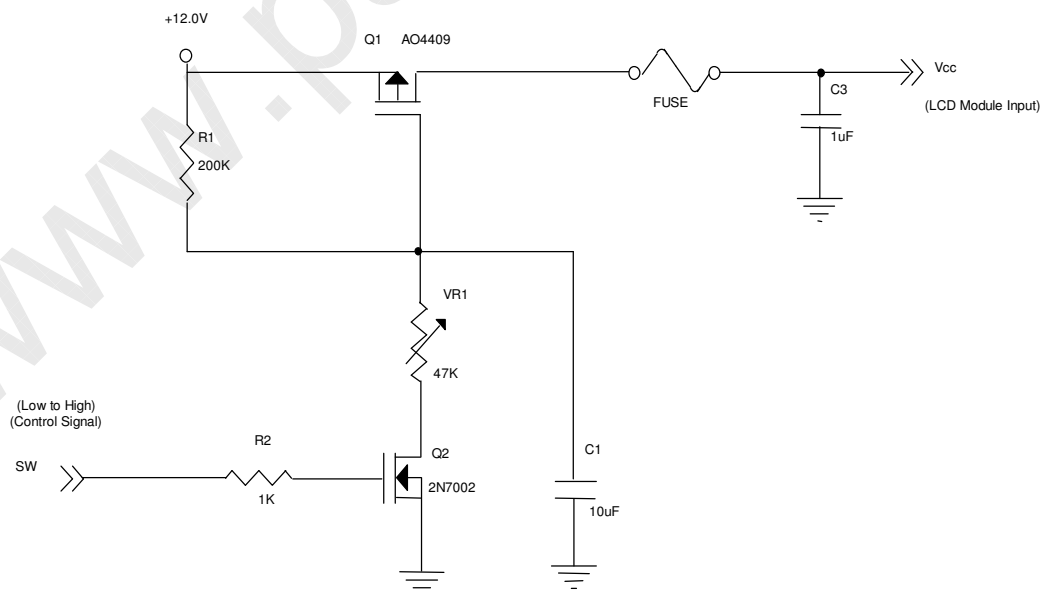
### 3.1 TFT LCD MODULE

 $T_a = 25 \pm 2 \text{ }^\circ\text{C}$ 

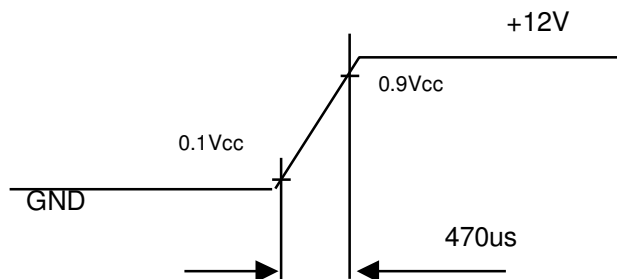
Parameter	Symbol	Value			Unit	Note	
		Min.	Typ.	Max.			
Power Supply Voltage	$V_{CC}$	10.8	12	13.2	V	(1)	
Rush Current	$I_{RUSH}$	—	—	2.8	A	(2)	
Power Supply Current	White Pattern	—	0.45	--	A	(3)	
	Horizontal Stripe	—	0.52	0.6	A		
	Black Pattern	—	0.35	--	A		
LVDS interface	Differential Input High Threshold Voltage	$V_{LVTH}$	+100	—	—	mV	(4)
	Differential Input Low Threshold Voltage	$V_{LVTL}$	—	—	-100	mV	
	Common Input Voltage	$V_{CM}$	1.0	1.2	1.4	V	
	Differential input voltage (Single-End)	$ V_{ID} $	200	—	600	mV	
	Terminating Resistor	$R_T$	—	100	—	ohm	
CMOS interface	Input High Threshold Voltage	$V_{IH}$	2.7	—	3.3	V	
	Input Low Threshold Voltage	$V_{IL}$	0	—	0.7	V	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Condition as below:

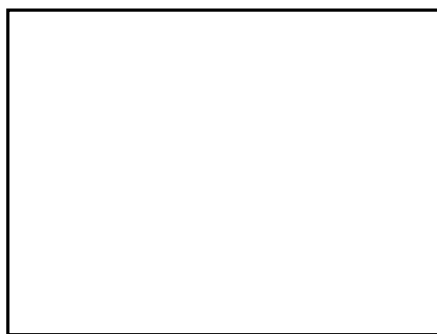


### Vcc rising time is 470us



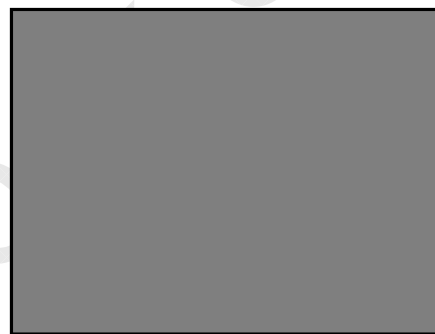
Note (3) The specified power supply current is under the conditions at  $V_{cc} = 12\text{ V}$ ,  $T_a = 25 \pm 2\text{ }^\circ\text{C}$ ,  $f_v = 60\text{ Hz}$ , whereas a power dissipation check pattern below is displayed.

a. White Pattern



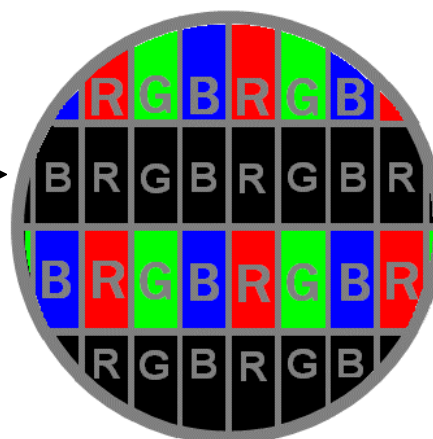
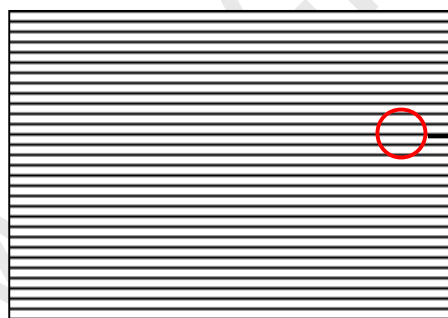
Active Area

b. Black Pattern



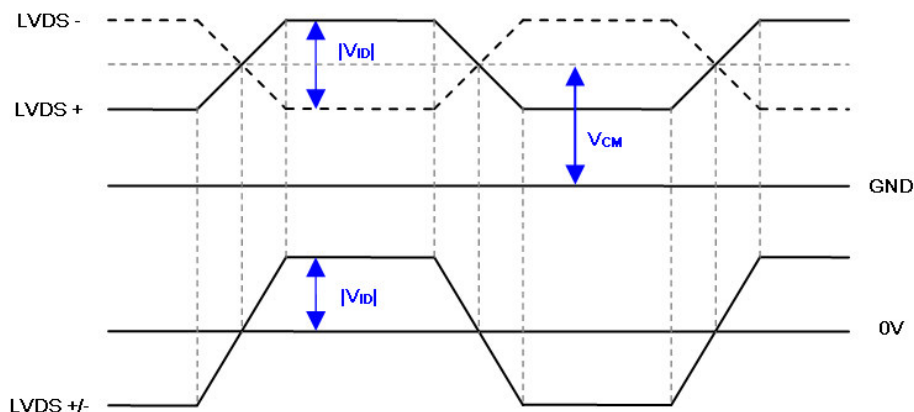
Active Area

c. Horizontal Pattern



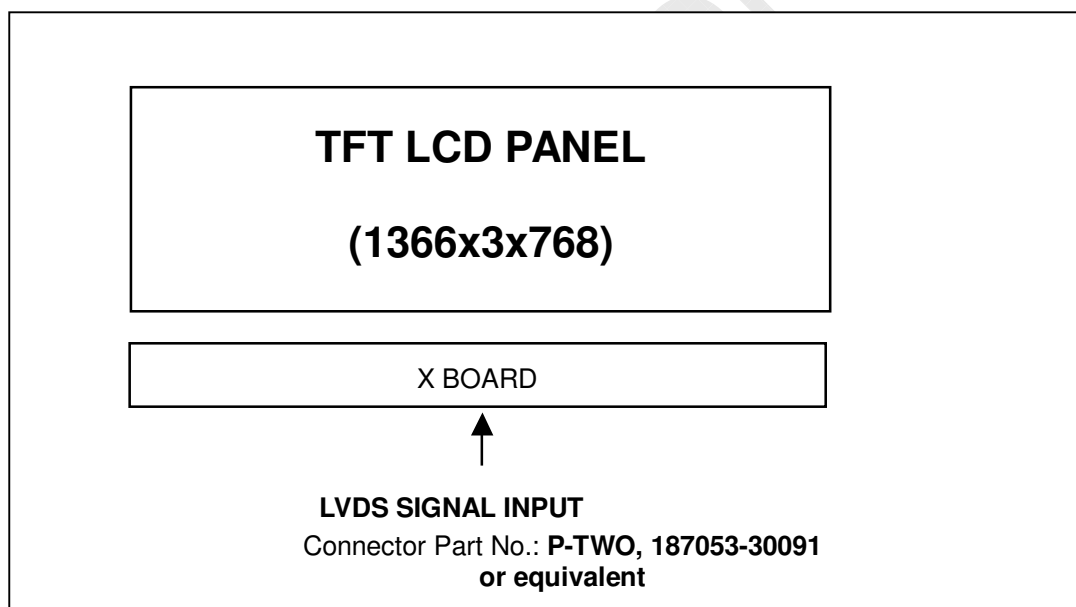


Note (4) The LVDS input characteristics are as follows:



## 4. BLOCK DIAGRAM

### 4.1 TFT LCD MODULE



## 5. INPUT TERMINAL PIN ASSIGNMENT

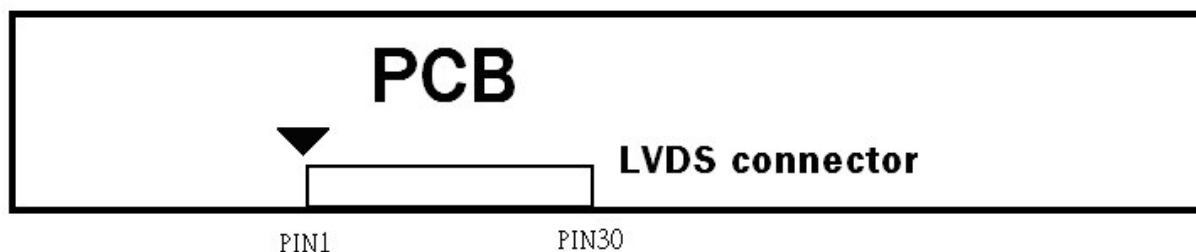
### 5.1 TFT LCD MODULE

#### CNF1 Connector Pin Assignment

Pin No.	Symbol	Description	Note
1	VCC	Power supply: +12V	
2	VCC	Power supply: +12V	
3	VCC	Power supply: +12V	
4	VCC	Power supply: +12V	
5	GND	Ground	
6	GND	Ground	
7	GND	Ground	
8	NC	No connection	(4)
9	SELLVDS	Select LVDS data format	(2),(5)
10	ODSEL	Overdrive Lookup Table Selection	(3),(5)
11	GND	Ground	
12	RX0-	Negative transmission data of pixel 0	
13	RX0+	Positive transmission data of pixel 0	
14	GND	Ground	
15	RX1-	Negative transmission data of pixel 1	
16	RX1+	Positive transmission data of pixel 1	
17	GND	Ground	
18	RX2-	Negative transmission data of pixel 2	
19	RX2+	Positive transmission data of pixel 2	
20	GND	Ground	
21	RXCLK-	Negative of clock	
22	RXCLK+	Positive of clock	
23	GND	Ground	
24	RX3-	Negative transmission data of pixel 3	
25	RX3+	Positive transmission data of pixel 3	
26	GND	Ground	
27	NC	No connection	(4)
28	NC	No connection	(4)
29	NC	No connection	(4)
30	GND	Ground	

Note (1) Connector Part No.: P-TWO, 187053-30091 or compatible

The pin order of LVDS connector is defined as follows



Note (2) Low = Open or connect to GND: VESA Format, High = Connect to +3.3V: JEIDA Format.

Please refer to 5.5 LVDS INTERFACE

Note (3) Overdrive lookup table selection. The Overdrive lookup table should be selected in accordance to the frame rate to optimize image quality.

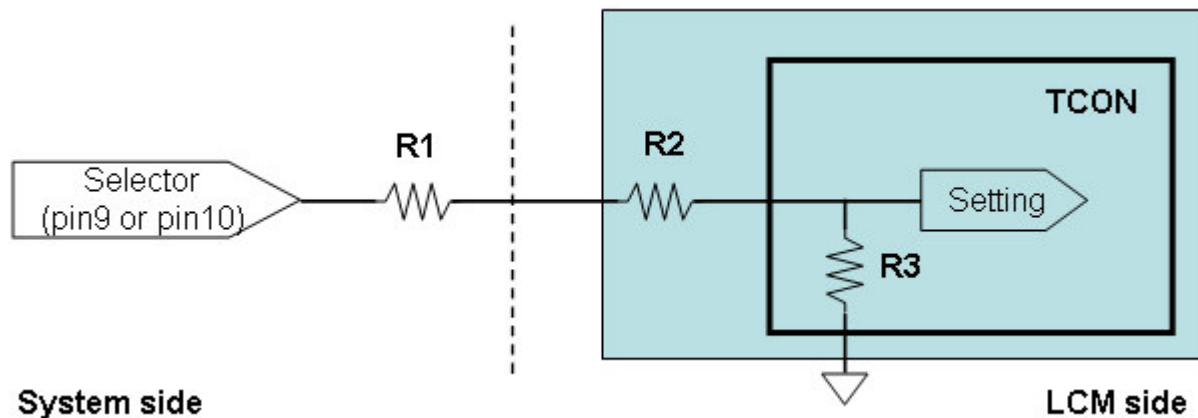
Low = Open or connect to GND, High = Connect to +3.3V

ODSEL	Note
L or Open	Lookup table was optimized for 60 Hz frame rate.
H	Lookup table was optimized for 50 Hz frame rate.

Note (4) Reserved for internal use. Left it open.

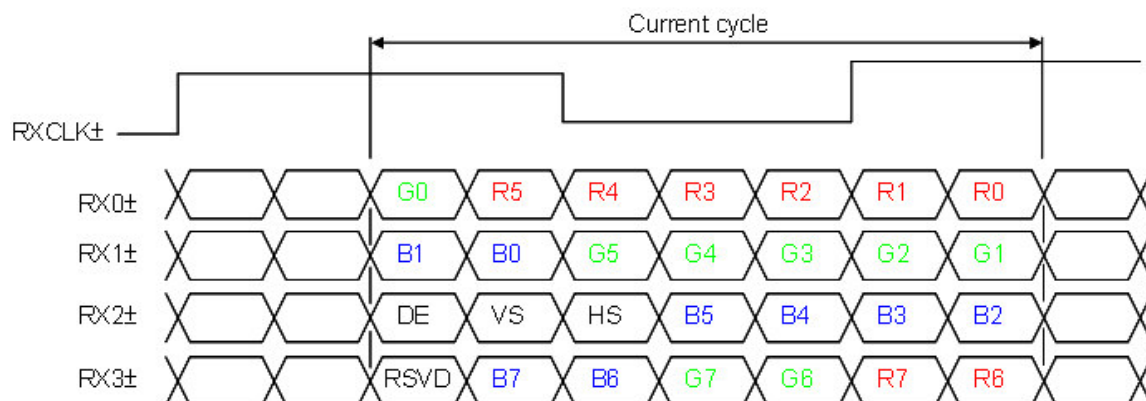
Note (5) LVDS signal pin connected to the LCM side has the following diagram.

R1 in the system side should be less than 1K Ohm. ( $R1 < 1K \text{ Ohm}$ )

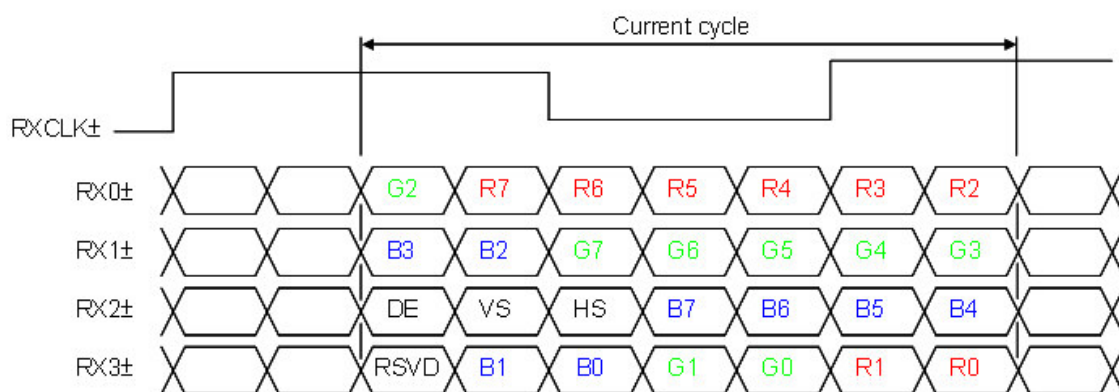


## 5.2 LVDS INTERFACE

VESA LVDS format : (SELLVDS pin=L or open)



JEDIA LVDS format : (SELLVDS pin=H)



R0~R7: Pixel R Data (7; MSB, 0; LSB)

G0~G7: Pixel G Data (7; MSB, 0; LSB)

B0~B7: Pixel B Data (7; MSB, 0; LSB)

DE: Data enable signal

Notes(1) RSVD(reserved)pins on the transmitter shall be "H" or( "L" or OPEN)

### 5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																						
		Red								Green								Blue						
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1
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
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	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
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	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
	White	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	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red(1)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Green(253)	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	
	Green(254)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
	Green(255)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
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	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	

Note (1) 0: Low Level Voltage, 1: High Level Voltage

## 6. INTERFACE TIMING

## 6.1 INPUT SIGNAL TIMING SPECIFICATIONS

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock	Frequency	$F_{clk_{in}}$ (=1/TC)	60	76	82	MHz	
	Input cycle to cycle jitter	$T_{rcl}$	—	—	200	ps	(3)
	Spread spectrum modulation range	$F_{clk_{in\_mod}}$	$F_{clk_{in}}-2\%$	—	$F_{clk_{in}}+2\%$	MHz	(4)
	Spread spectrum modulation frequency	$F_{SSM}$			200	KHz	
LVDS Receiver Data	Setup Time	$T_{lvsu}$	600	—	—	ps	(5)
	Hold Time	$T_{lvhd}$	600	—	—	ps	
Vertical Active Display Term	Frame Rate	$F_{r5}$	47	50	53	Hz	(6)
		$F_{r6}$	57	60	63	Hz	
	Total	$T_v$	778	806	888	Th	$T_v=T_{vd}+T_{vb}$
	Display	$T_{vd}$	768	768	768	Th	—
	Blank	$T_{vb}$	10	38	120	Th	—
Horizontal Active Display Term	Total	$T_h$	1442	1560	1936	Tc	$T_h=T_{hd}+T_{hb}$
	Display	$T_{hd}$	1366	1366	1366	Tc	—
	Blank	$T_{hb}$	76	194	570	Tc	—

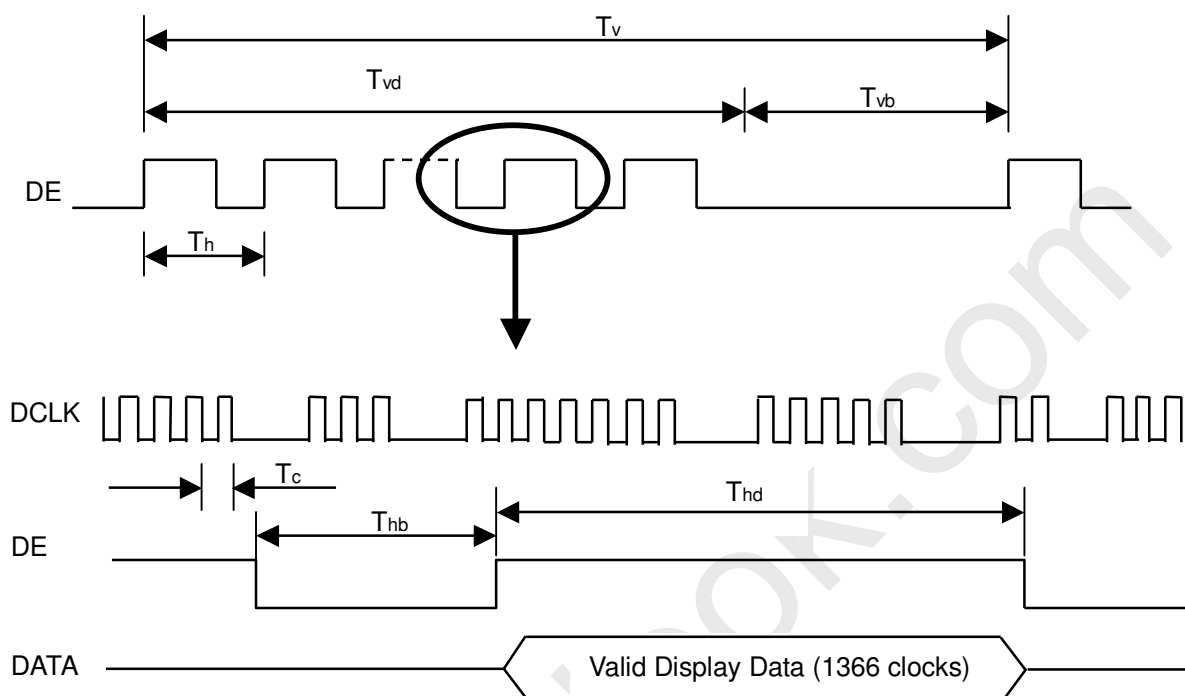
Note (1) Please make sure the range of pixel clock has follow the below equation :

$$F_{clk_{in}}(\max) \geq F_{r6} \times T_v \times T_h$$

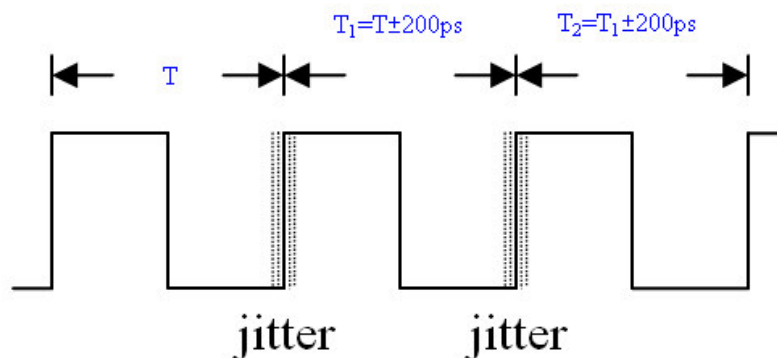
$$F_{r5} \times T_v \times T_h \geq F_{clk_{in}}(\min)$$

Note (2) This module is operated in DE only mode and please follow the input signal timing diagram below :

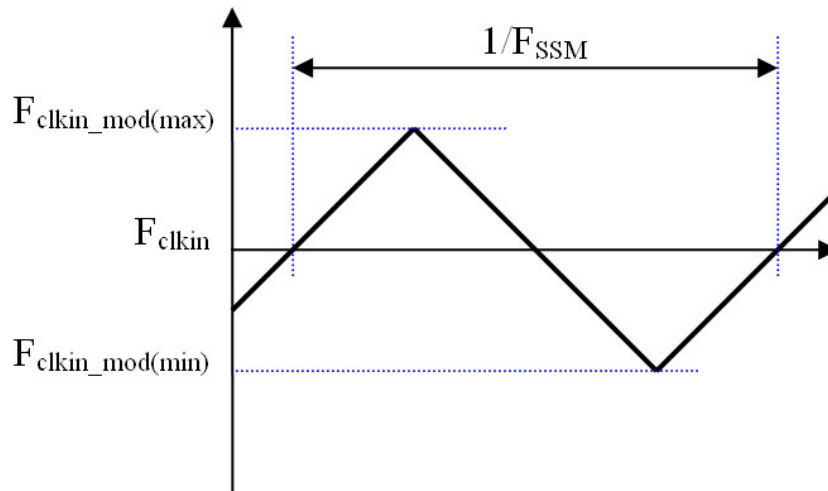
## INPUT SIGNAL TIMING DIAGRAM



Note (3) The input clock cycle-to-cycle jitter is defined as below figures.  $Trcl = |T_1 - T_1|$

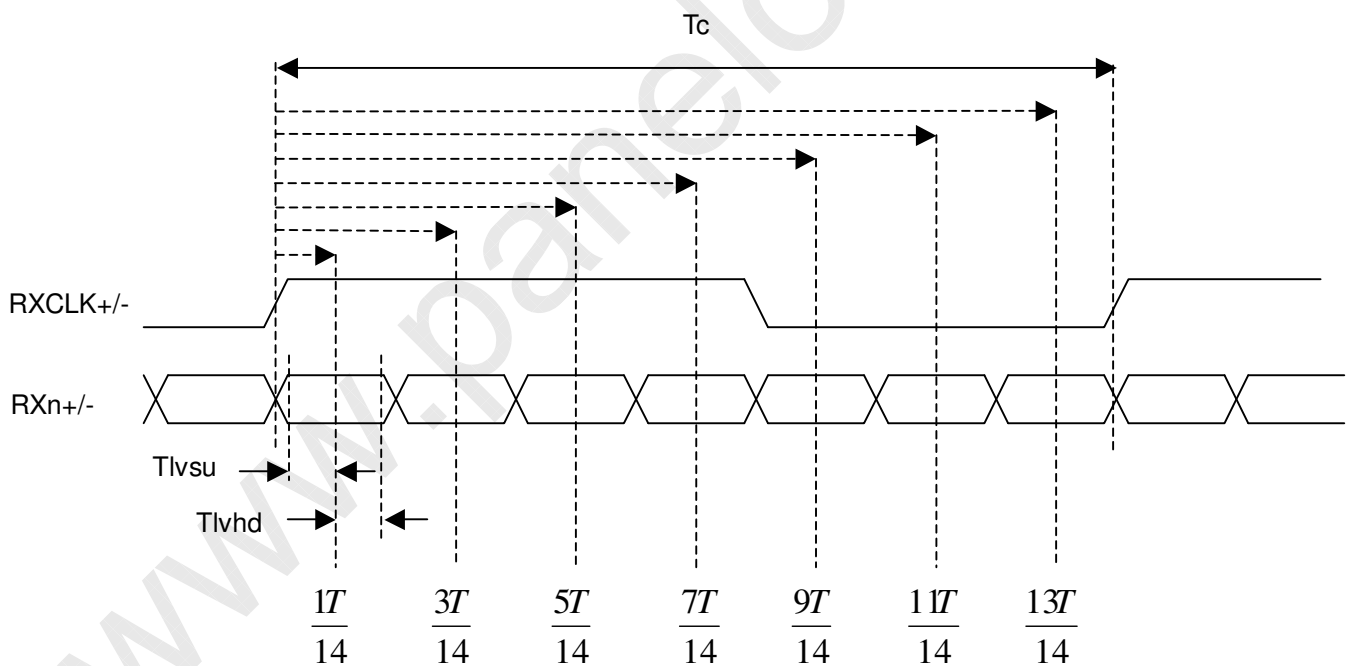


Note (4) The SSCG (Spread spectrum clock generator) is defined as below figures.



Note (5) The LVDS timing diagram and setup/hold time is defined and showing as the following figures.

### LVDS RECEIVER INTERFACE TIMING DIAGRAM



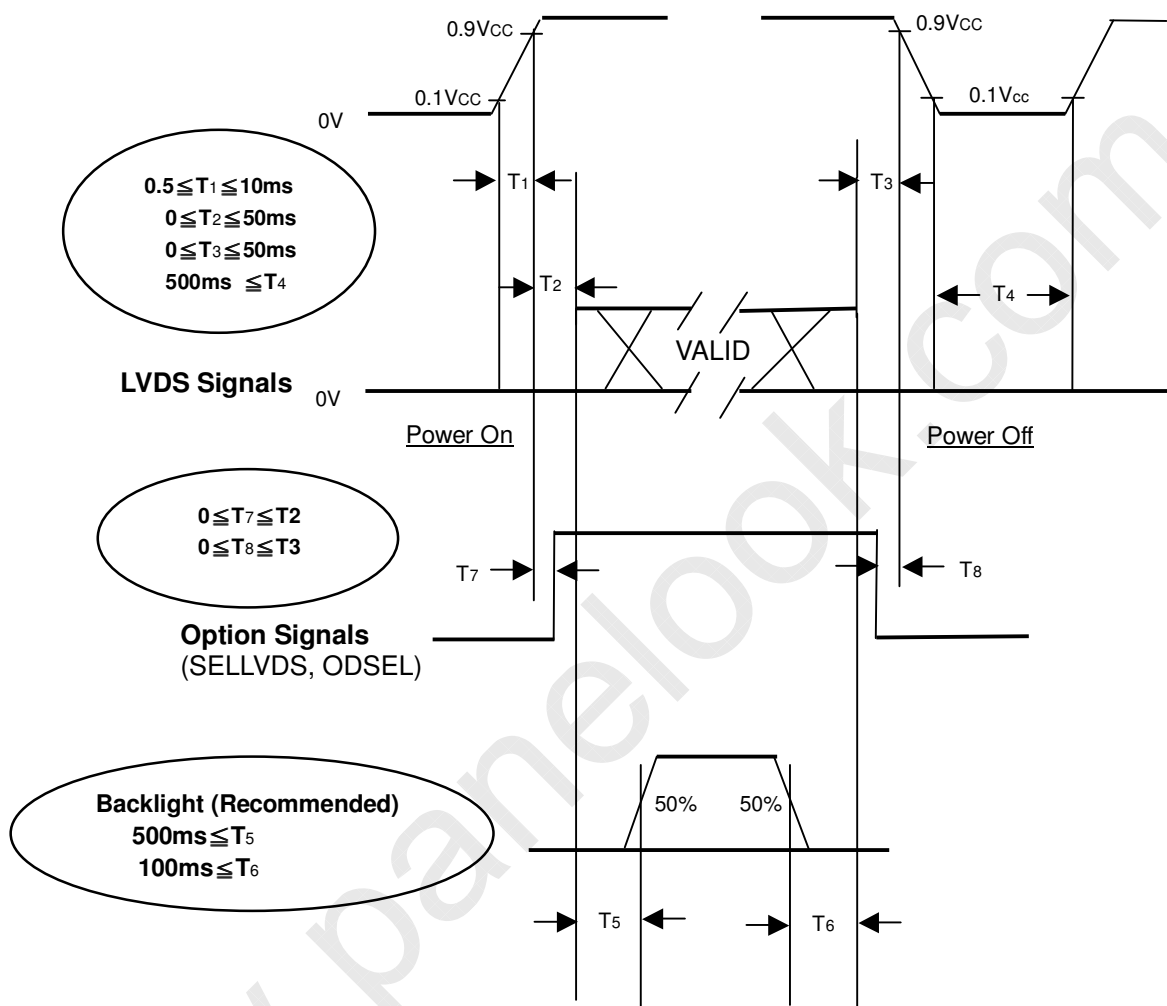
Note (6) : (ODSEL) = H/L or open for 50/60Hz frame rate. Please refer to 5.1 for detail information



## 6.2 POWER ON/OFF SEQUENCE

( $T_a = 25 \pm 2 \text{ }^\circ\text{C}$ )

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Power ON/OFF Sequence

## 7. OPTICAL CHARACTERISTICS

### 7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V <sub>CC</sub>	12.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Current	I <sub>L</sub>	80.0 ± 4.8	mA
Vertical Frame Rate	Fr	60	Hz

### 7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (5).

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Color Chromaticity	Red	Viewing Angle at Normal Direction Standard light source "C"	-	Rcx	0.655	-	-	(0),(5)
				Rcy	0.328		-	
	Green			Gcx	0.268		-	
				Gcy	0.598		-	
	Blue			Bcx	0.131		-	
				Bcy	0.120		-	
	White			Wcx	0.299		-	
				Wcy	0.355		-	
Center Transmittance	T%	$\theta_x=0^\circ, \theta_y=0^\circ$ with CMO module	-	5.0	-	%	(1),(7)	
Contrast Ratio	CR			3000	-		(1),(3)	
Response Time	Gray to gray	$\theta_x=0^\circ, \theta_y=0^\circ$ with CMO Module@60Hz	-	8.5		ms	(4)	
White Variation	$\delta W$	$\theta_x=0^\circ, \theta_y=0^\circ$ with CMO module	-	-	1.3	-	(1),(6)	
Viewing Angle	Horizontal	CR≥20 With CMO module		$\theta_{x+}$	88		Deg.	(1),(2)
				$\theta_{x-}$	88			
	Vertical			$\theta_{y+}$	88			
				$\theta_{y-}$	88			

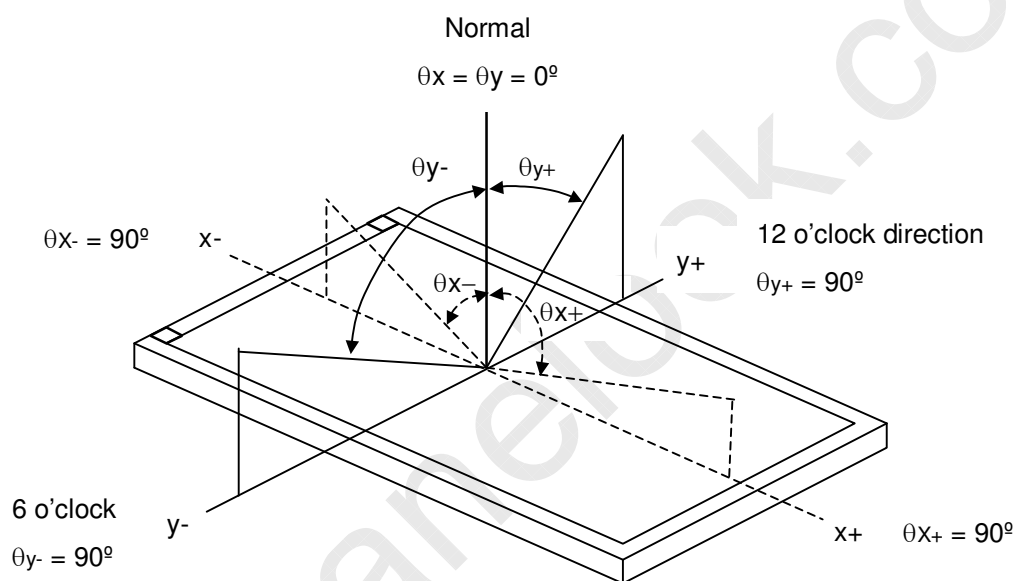
Note (0) Light source is the standard light source "C" which is defined by CIE and driving voltage are based on suitable gamma voltages. The calculating method is as following :

1. Measure Module's and BLU's spectrum. White is without signal input and R,G,B are with signal input. BLU (for V260B3-LE1) is supplied by CMO.
2. Calculate cell's spectrum.
3. Calculate cell's chromaticity by using the spectrum of standard light source "C".

Note (1) Light source is the BLU which is supplied by CMO and driving voltage are based on suitable gamma voltages.

Note (2) Definition of Viewing Angle ( $\theta_x, \theta_y$ ):

Viewing angles are measured by Conoscope Cono-80



Note (3) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

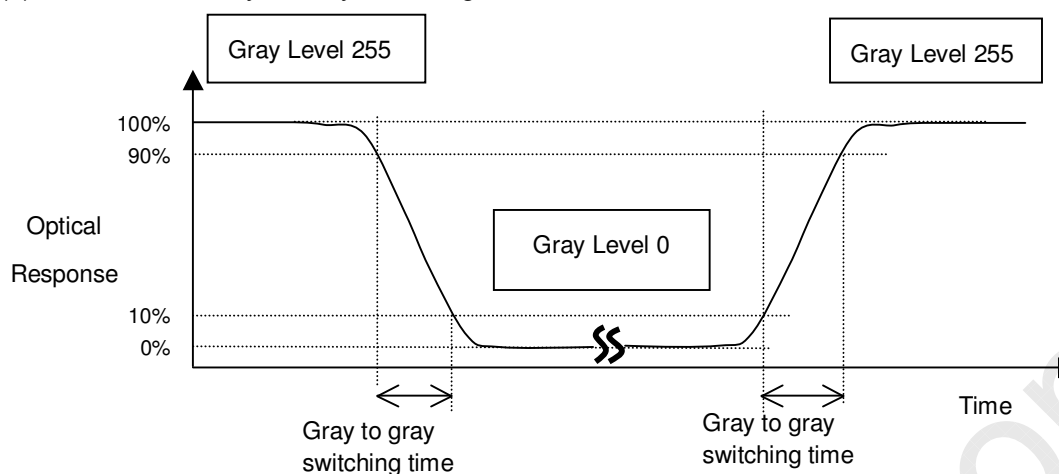
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in

Note (6).

Note (4) Definition of Gray to Gray Switching Time :

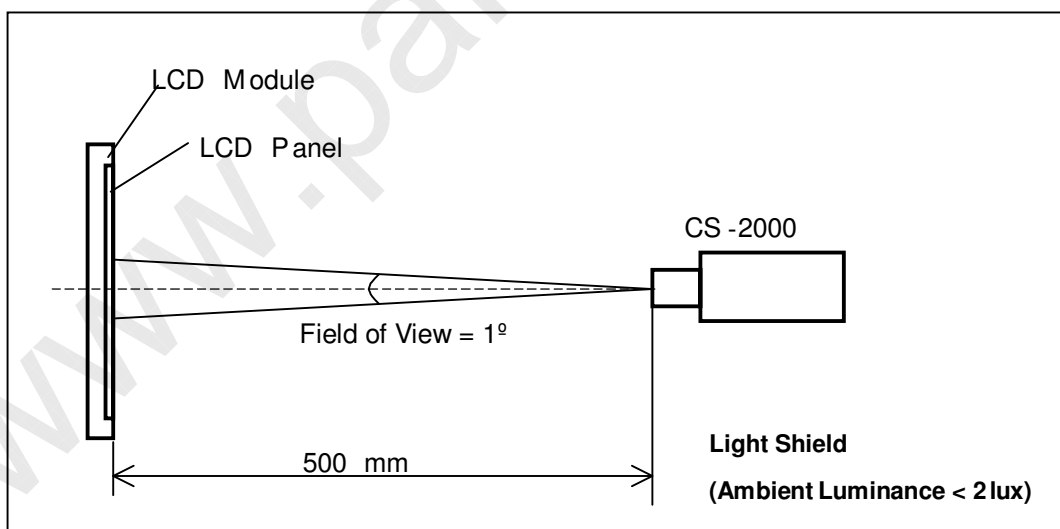


The driving signal means the signal of luminance 0%, 20%, 40%, 60%, 80%, 100%.

Gray to gray average time means the average switching time of luminance 0%, 20%, 40%, 60%, 80%, 100% to each other.

Note (5) Measurement Setup:

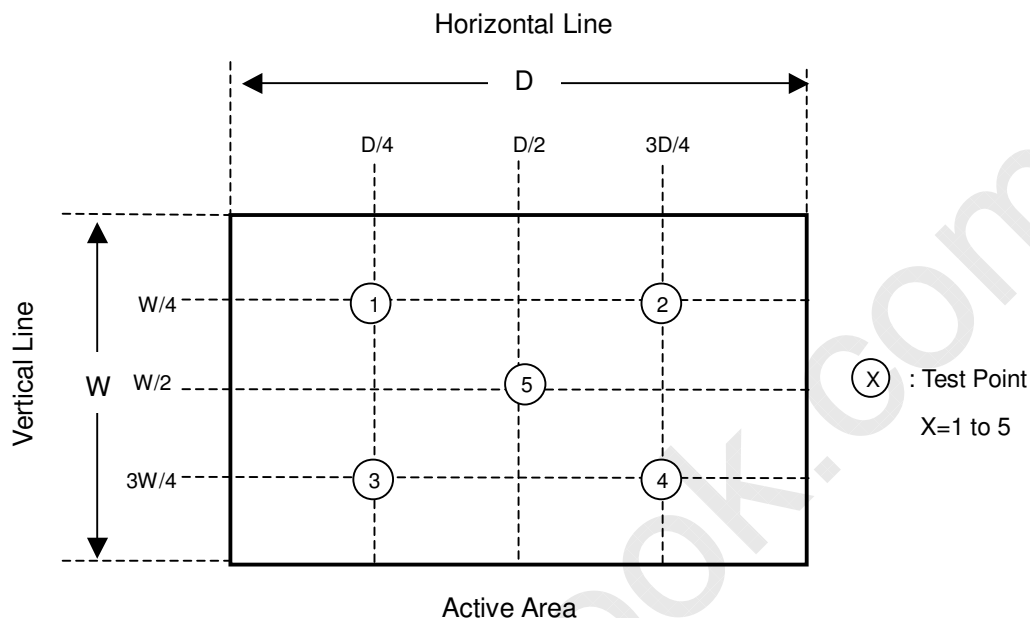
The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



Note (6) Definition of White Variation ( $\delta W$ ):

Measure the luminance of gray level 255 at 5 points

$$\delta W = \text{Maximum [L (1), L (2), L (3), L (4), L (5)]} / \text{Minimum [L (1), L (2), L (3), L (4), L (5)]}$$



Note (7) Definition of Transmittance (T%) :

Module is without signal input.

$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} * 100\%$$

## 8. DEFINITION OF LABELS

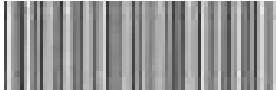
### 8.1 OPEN CELL LABEL

The barcode nameplate is pasted on each open cell as illustration for CMO internal control.



### 8.2 CARTON LABEL

The barcode nameplate is pasted on each box as illustration, and its definitions are as following explanation

P.O. NO.	_____
Parts ID.	_____
Carton ID.	 Quantities <u>  21  </u>
	XXXXXXXXXXXXXXXXXX
Made in Taiwan	

P.O. NO.	_____
Parts ID.	_____
Carton ID.	 Quantities <u>  21  </u>
	XXXXXXXXXXXXXXXXXX
Made in China	

- (a) Model Name: V260B3- PE1
- (b) Carton ID: CMO internal control
- (c) Quantities: 21

## 9. PACKAGING

### 9.1 PACKING SPECIFICATIONS

- (1) 21PCS LCD TV Panels / 1 Box
- (2) Box dimensions : 812 (L) X 572 (W) X 277 (H)
- (3) Weight : approximately 27.5 Kg

### 9.2 PACKING METHOD

Figures 9-1 and 9-2 are the packing method

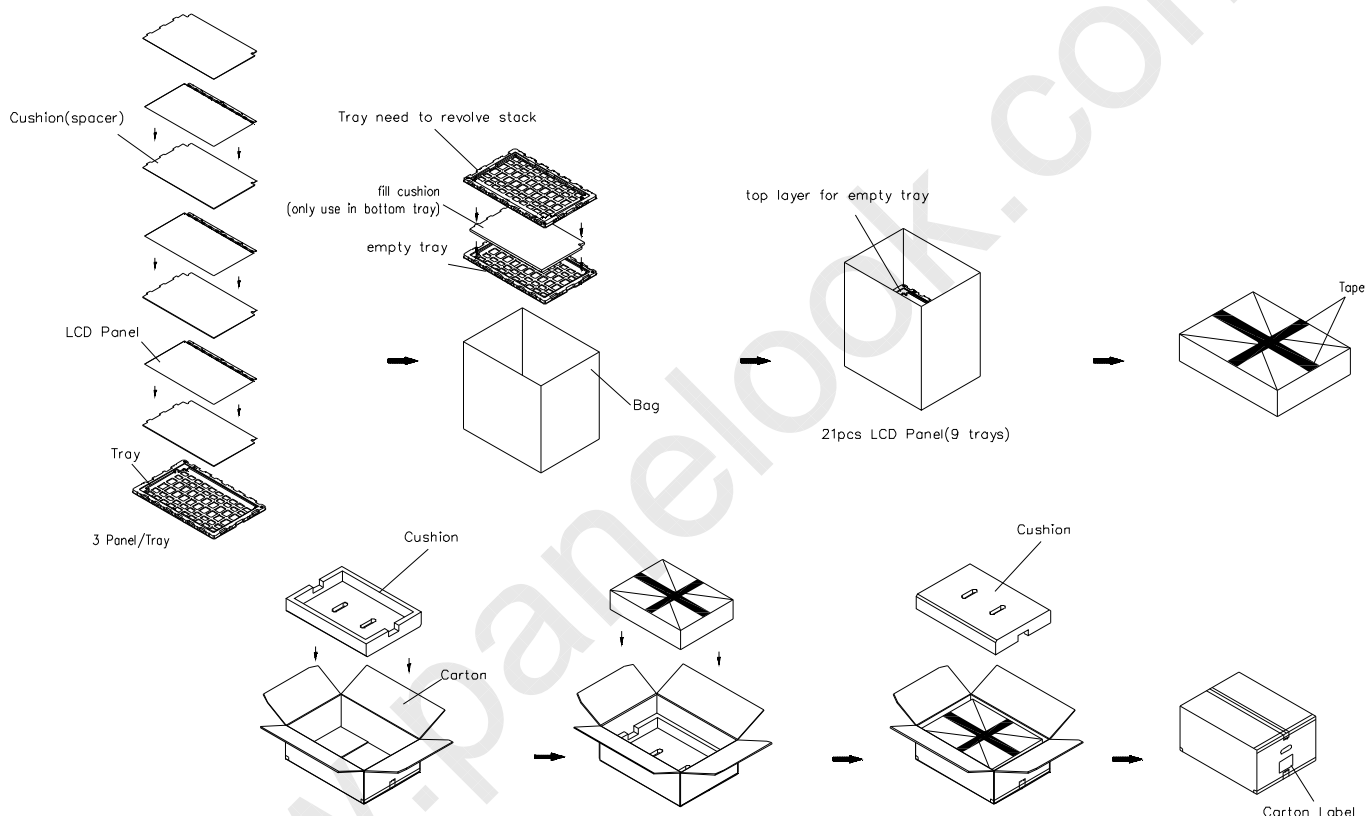
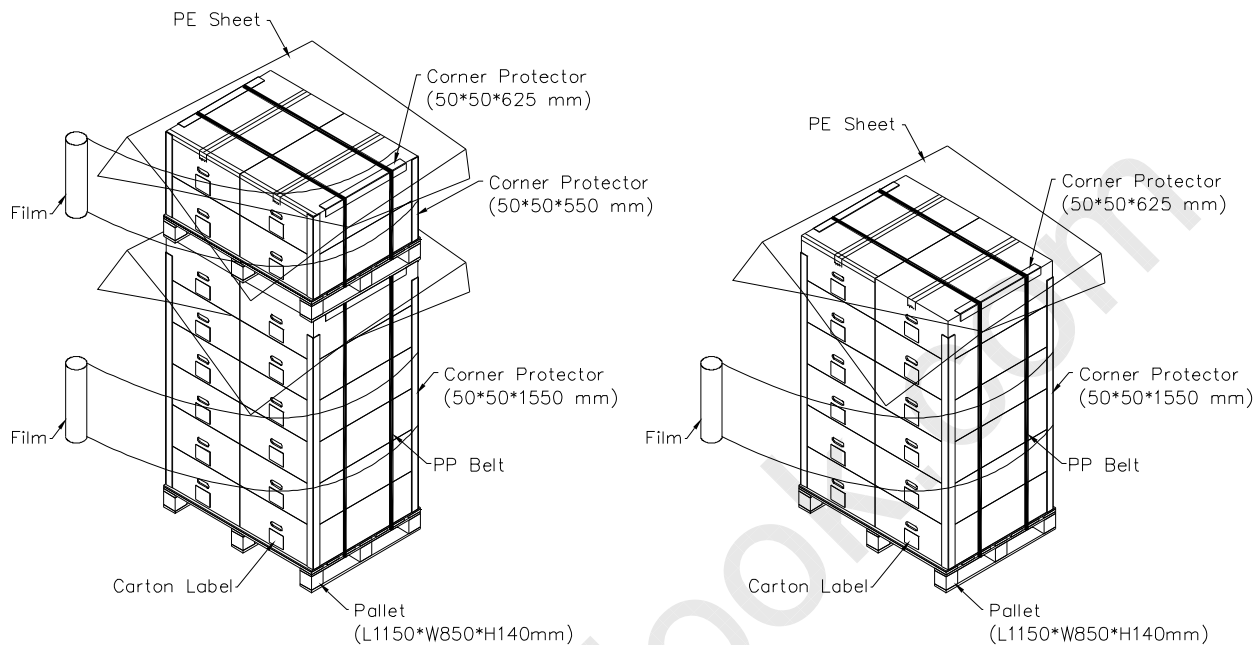


Figure.9-1 packing method

Sea / Land Transportation  
(40ft HQ Container)

Sea / Land Transportation  
(40ft Container)



Air Transportation

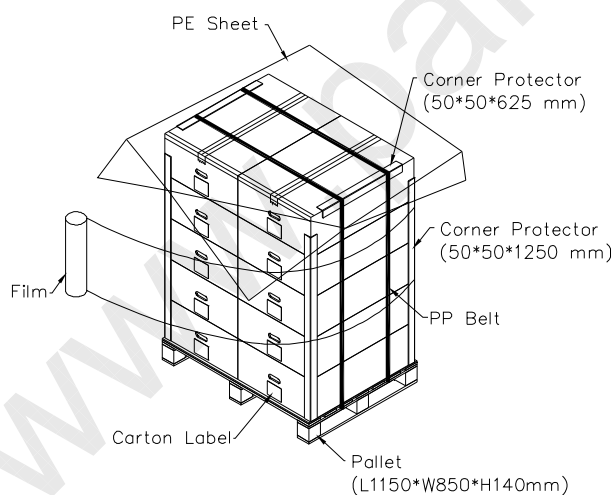


Figure.9-2 packing method



## 10. PRECAUTIONS

### 10.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the product during assembly.
- (2) To assemble backlight or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) It's not permitted to have pressure or impulse on the module because the LCD panel will be damaged.
- (4) Always follow the correct power sequence when the product is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- (5) Do not pull the I/F connector in or out while the module is operating.
- (6) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (7) It is dangerous that moisture come into or contacted the product, because moisture may damage the product when it is operating.
- (8) High temperature or humidity may reduce the performance of module. Please store this product within the specified storage conditions.
- (9) When ambient temperature is lower than 10°C may reduce the display quality. For example, the response time will become slowly.

### 10.2 SAFETY PRECAUTIONS

- (1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the product's end of life, it is not harmful in case of normal operation and storage.

11. MECHANICAL CHARACTERISTICS

