TFT LCD Preliminary Specification

MODEL NO.: V260B2 – L04

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REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 1.0	Dec. 12,'08	All	All	Preliminary Specification was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

V260B2- L04 is a TFT Liquid Crystal Display module with 4U-CCFL Backlight unit and 1ch-LVDS interface. The display diagonal is 26". This module supports 1366 x 768 WXGA format and can display 16.7M colors (6-bit+Hi-FRC). The inverter module for backlight is built-in.

1.2 FEATURES

- Optimized Brightness 450nits
- Contrast Ratio (800:1)
- Fast Response Time (5ms)
- Color Saturation NTSC 72%
- WXGA (1366 x 768 pixels) Resolution
- DE (Data Enable) Only Mode
- LVDS (Low Voltage Differential Signaling) Interface
- Viewing Angle: 160(H)/150(V) (CR>10) TN Technology

-Color Reproduction (Nature Color)

1.3 APPLICATION

- TFT LCD TVs
- Optimized Brightness, Multi-Media Displays

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Active Area	575.769 (H) x 323.712 (V) (26" Diagonal)	mm	(1)
Bezel Opening Area	580.8 (H) x 328.8 (V)	mm	
Driver Element	a-si TFT Active Matrix	—	
Pixel Number	1366 x R.G.B. x 768	pixel	
Pixel Pitch (Sub Pixel)	0.1405 (H) x 0.4215 (V)	mm	
Pixel Arrangement	RGB Vertical Stripe	—	
Display Colors	16.7M	color	
Display Operation Mode	Transmissive Mode / Normally White	—	
Surface Treatment	Anti-Glare Coating (Haze 25%) Hard Coating (3H)	—	

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	625	626	627	mm	
	Vertical(V)	372	373	374	mm	
	Depth(D)	31	32	33	mm	To Rear
	Depth(D)	45.7	46.7	47.7	mm	To Inverter Cover
Weight		—	3900	—	g	

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	+50	ºC	(1), (2)
Shock (Non-Operating)	S_{NOP}	—	50	G	(3), (5)
Vibration (Non-Operating)	V_{NOP}	—	1.0	G	(4), (5)

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

(a) 90 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

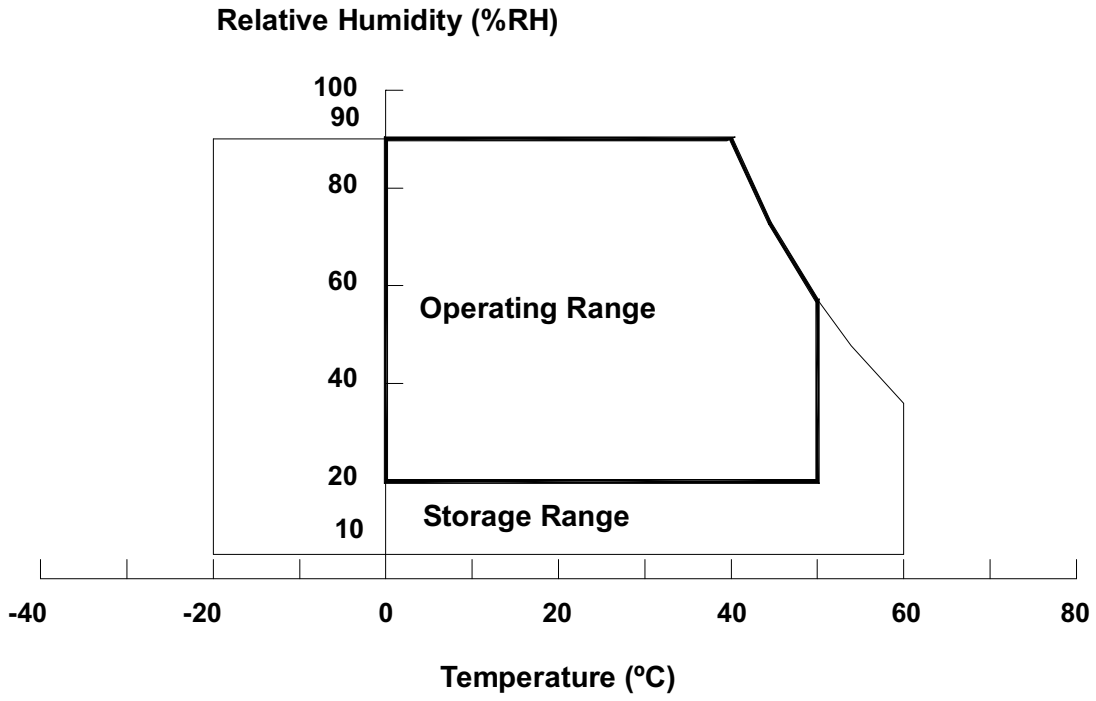
(c) No condensation.

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 ºC 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 ºC. The range of operating temperature may degrade in case of improper thermal management in final product design.

Note (3) 11 ms, half sine wave, 1 time for ± X, ± Y, ± Z.

Note (4) 10 ~ 500 Hz, 10 min, 1 time each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.



2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	Vcc	-0.3	13.0	V	(1)
Input Signal Voltage	V_{IN}	-0.3	3.6	V	

2.2.2 BACKLIGHT UNIT

Item	Symbol	Test Condition	Min.	Type	Max.	Unit	Note
Lamp Voltage	V_W	Ta = 25 ℃	—	—	3000	V_{RMS}	
Power Supply Voltage	V_{BL}	—	0	—	30	V	(1)
Control Signal Level	—	—	-0.3	—	7	V	(2), (3)

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Functional operation should be restricted to the conditions described under normal operating conditions.

Note (2) No moisture condensation or freezing.

Note (3) The control signals includes Backlight On/Off Control, Internal PWM Control and External PWM Control.

3. ELECTRICAL CHARACTERISTICS

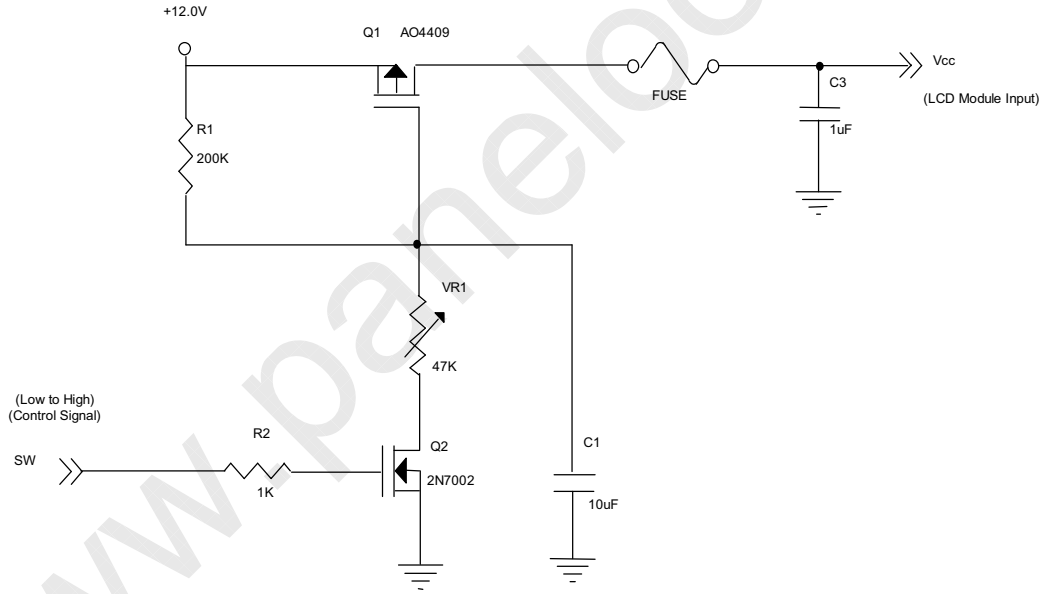
3.1 TFT LCD MODULE

Ta = 25 ± 2 ºC

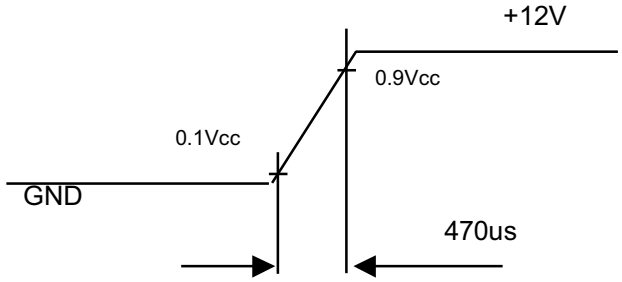
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V_{CC}	11.4	12.0	12.6	V	(1)
Power Supply Ripple Voltage		V_{RP}	—	—	300	mV	
Rush Current		I_{RUSH}	—	—	3.0	A	(2)
Power Supply Current	White	I_{CC}	—	0.2	0.25	A	(3)
	Black		—	0.5	0.55	A	
	Vertical Stripe		—	0.4	0.45	A	
LVDS Interface	Differential Input High Threshold Voltage	V_{LVTH}	+100	—	—	mV	
	Differential Input Low Threshold Voltage	V_{LVTL}	—	—	-100	mV	
	Common Input Voltage	V_{LVC}	1.125	1.25	1.375	V	
	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 Conditions:



Vcc rising time is 470us



Note (3) The specified power supply current is under the conditions at Vcc = 12 V, Ta = 25 ± 2 ºC, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

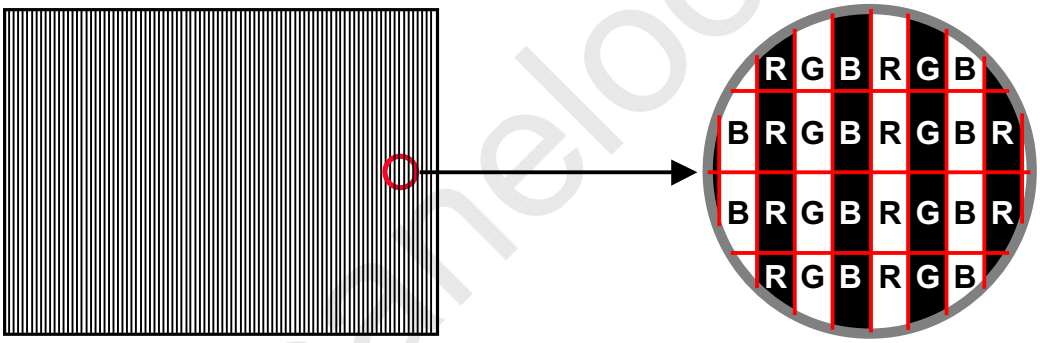
a. White Pattern

Active Area

b. Black Pattern

Active Area

c. Vertical Stripe Pattern



Active Area

3.2 BACKLIGHT UNIT

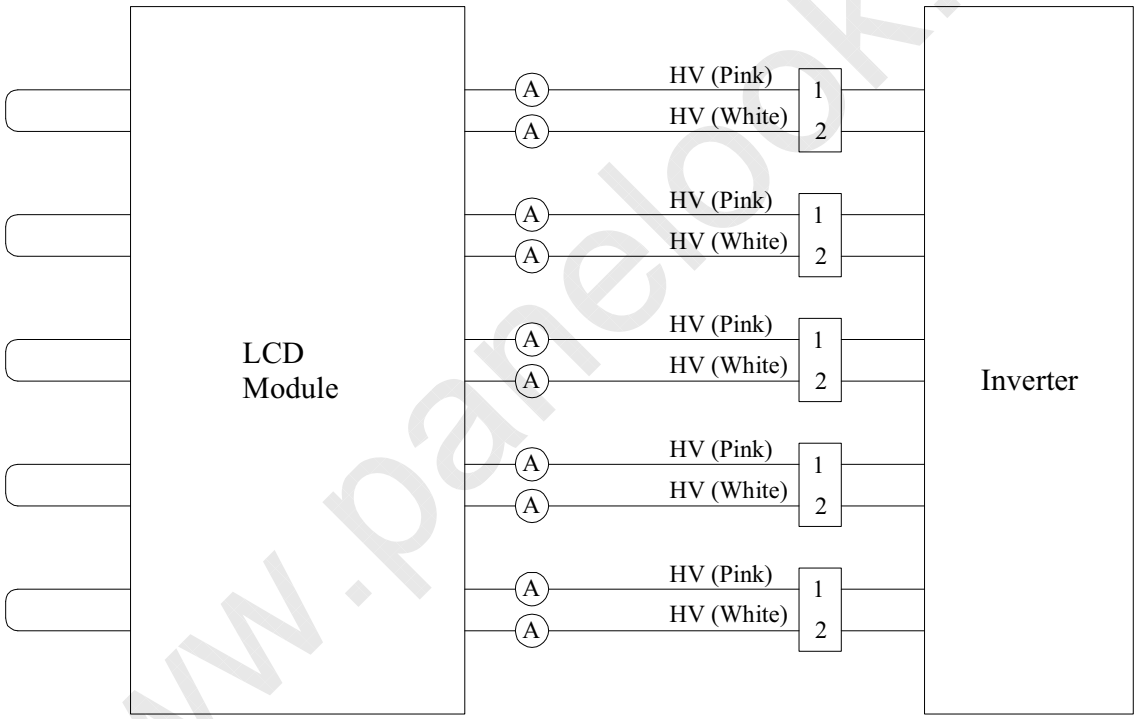
3.2.1 CCFL (Cold Cathode Fluorescent Lamp) CHARACTERISTICS (Ta = 25 ± 2 ºC)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Voltage	V_W	-	1380	-	V_{RMS}	I_L = 7.5mA
Lamp Current(HI-Side)	I_L	7.0	7.5	8.0	mA_{RMS}	-
Lamp Starting Voltage	V_S	-	-	1657	V_{RMS}	(1), Ta = 0 ºC
		-	-	1593	V_{RMS}	(1), Ta = 25 ºC
Operating Frequency	F_O	40	-	80	KHz	(2)
Lamp Life Time	L_{BL}	50,000		-	Hrs	(3)

3.2.2 INVERTER CHARACTERISTICS (Ta = 25 ± 2 ºC)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Consumption	P_{BL}	—	TBD	—	W	(5), I_L = 7.5mA
Input Voltage	V_{BL}	22.8	24	25.2	V_{DC}	
Input Current	I_{BL}	—	TBD	—	A	Non Dimming
Input Inrush Current	—	—	—	TBD	A_{peak}	V_{BL} =24.0V
Input Ripple Noise	—-	—	—	912	mV_{P-P}	V_{BL} =22.8V
Oscillating Frequency	F_W	63	66	69	kHz	
Dimming Frequency	F_B	150	160	170	Hz	
Minimum Duty Ratio	D_{MIN}	—	20	—	%	

Note (1) Lamp current is measured by utilizing high frequency current meters as shown below:



Note (2) The lamp starting voltage V_S should be applied to the lamp for more than 1 second under starting up duration. Otherwise the lamp could not be lighted on completed.

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency from the display, and this may cause line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) The life time of a lamp is defined as when the brightness is larger than 50% of its original value and the effective discharge length is longer than 80% of its original length (Effective discharge length is defined as an area that has equal to or more than 70% brightness compared to the brightness at the center point.) as the time in which it continues to operate under the condition Ta = 25 ±2℃ and I_L = 7.0~ 8.0mA_{RMS}.

Note (5) The measurement condition of Typ. value is based on 26" backlight unit under input voltage 24V, average lamp current 7.5 mA and lighting 30 minutes later.

Note (6) 10% minimum duty ratio is only valid for electrical operation.

3.2.3 INVERTER INTERTFACE CHARACTERISTICS

Item		Symbol	Test Condition	Min.	Typ.	Max.	Unit	Note
Error Signal		ERR	—	—	—	—	—	(Note 1)
On/Off Control Voltage	ON	V_{BLON}	—	2.0	—	5.0	V	
	OFF		—	0	—	0.8	V	
Internal PWM Control Voltage	MAX	V_{IPWM}	—	3.0	3.15	3.3	V	Maximum Duty Ratio
	MIN			—	0	—	V	Minimum Duty Ratio
External PWM Control Voltage	HI	V_{EPWM}	—	2.0	—	5.0	V	Duty On
	LO			0	—	0.8	V	Duty Off
VBL Rising Time		Tr1	—	30	—	—	ms	
VBL Falling Time		Tf1	—	30	—	—	ms	
Control Signal Rising Time		T_r	—	—	—	100	ms	
Control Signal Falling Time		T_f	—	—	—	100	ms	
PWM Signal Rising Time		T_{PWMR}	—	—	—	50	us	
PWM Signal Falling Time		T_{PWMF}	—	—	—	50	us	
Input Impedance		R_{IN}	—	1	—	—	MΩ	
PWM Delay Time		T_{PWM}		100		—	ms	
BLON Delay Time		T_{on}	—	300	—	—	ms	
		T_{on1}	—	300	—	—	ms	
BLON Off Time		T_{off}	—	300	—	—	ms	

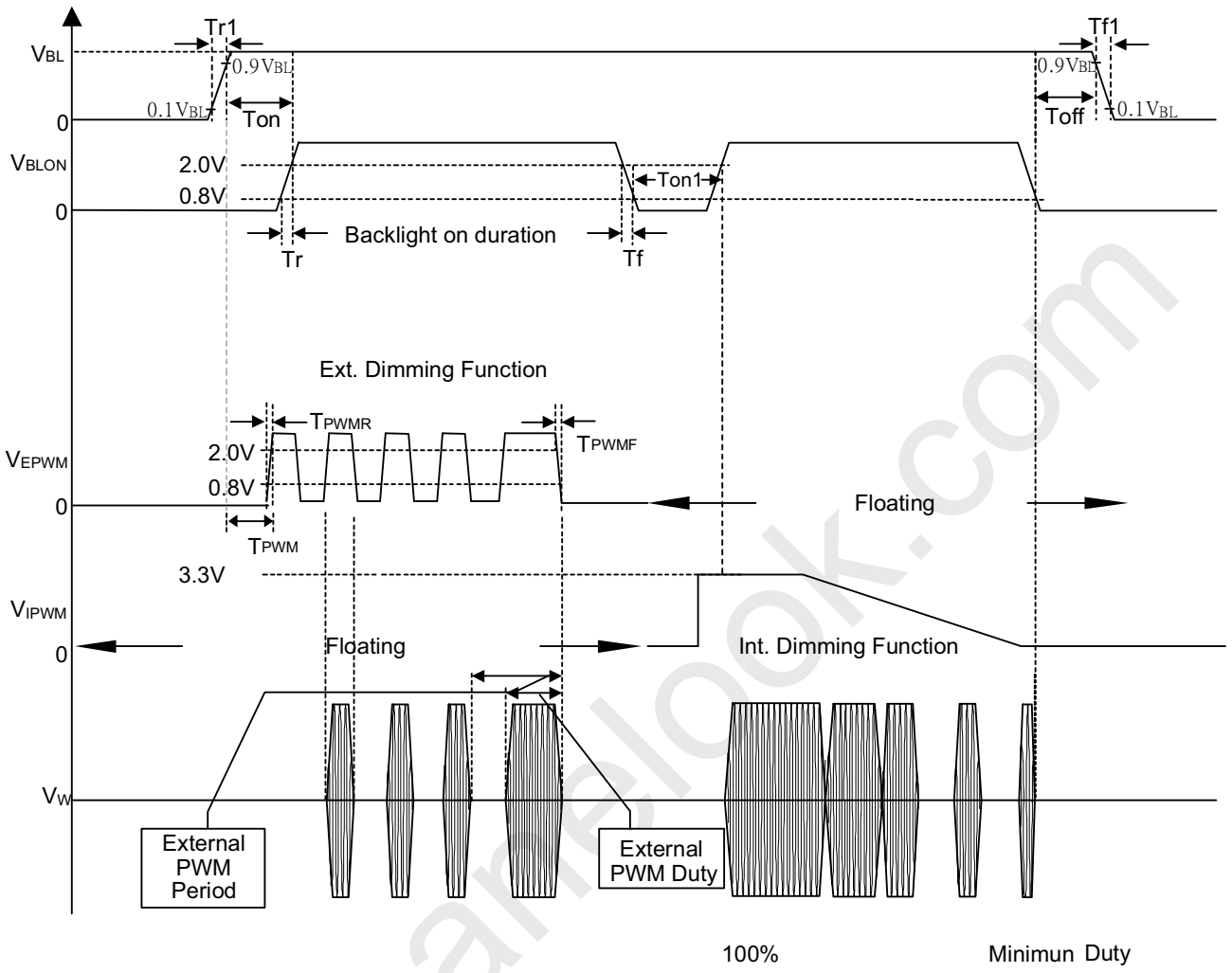
Note (1) When inverter protective function is triggered, ERR will output open collector status. In normal operation, the signal of ERR will output a low level voltage.

Note (2) The power sequence and control signal timing are shown in the following figure. For a certain reason, the inverter has a possibility to be damaged with wrong power sequence and control signal timing.

Note (3) While system is turned ON or OFF, the power sequences must follow as below descriptions:

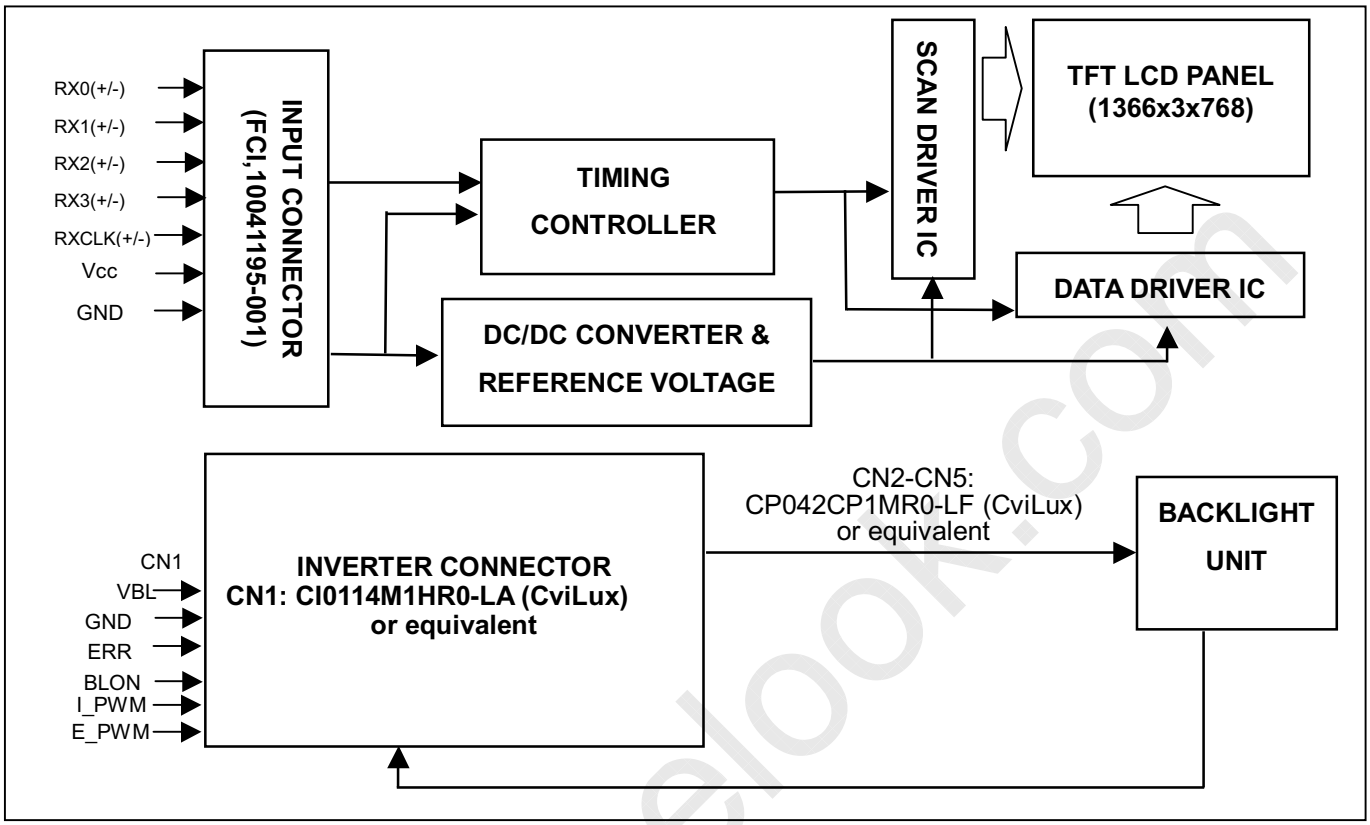
Turn ON sequence: VBL → PWM signal → BLON

Turn OFF sequence: BLOFF → PWM signal → VBL



4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



5. INTERFACE PIN CONNECTION

5.1 TFT LCD MODULE

CN1 Connector Pin Assignment

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

Note (1) Connector Part No.: FCI,10041195-001 or compatible

Note (2) Reserved for internal use. Please leave it open.

Note (3) High or OPEN: Normal, Ground: JEIDA LVDS format

Please refer to 5.5 LVDS INTERFACE (Page 18)

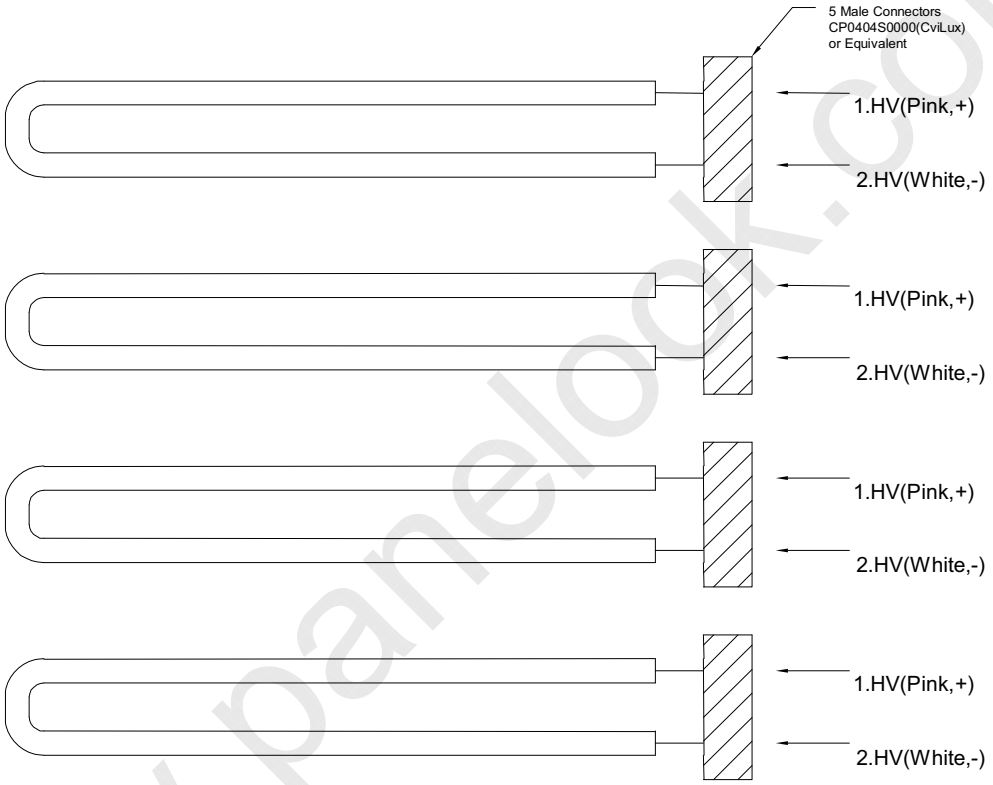
5.2 BACKLIGHT UNIT

The pin configuration for the housing and leader wire is shown in the table below.

CN2-CN5 (Housing) : 1.CP0404S0000(CviLux)

Pin No.	Symbol	Description	Wire Color
1	HV	High Voltage	Pink
2	HV	High Voltage	White

Note (1) The backlight interface housing for high voltage side is a model 1. CP0404S0000(CviLux). The mating header on inverter part number is 1.CP042CP1MRO-LF(CviLux).



5.3 INVERTER UNIT

CN1 : CI0114M1HR0-LA (CviLux) or equivalent.

Pin No.	Symbol	Description
1	VBL	+24V Power input
2		
3		
4		
5		
6	GND	Ground
7		
8		
9		
10		
11	ERR	Normal (GND) Abnormal(Open collector)
12	BLON	BL ON/OFF
13	I_PWM	Internal PWM Control
14	E_PWM	External PWM Control

Note (1) PIN 13:Intermal PWM Control (Use Pin 13): Pin 14 must open.

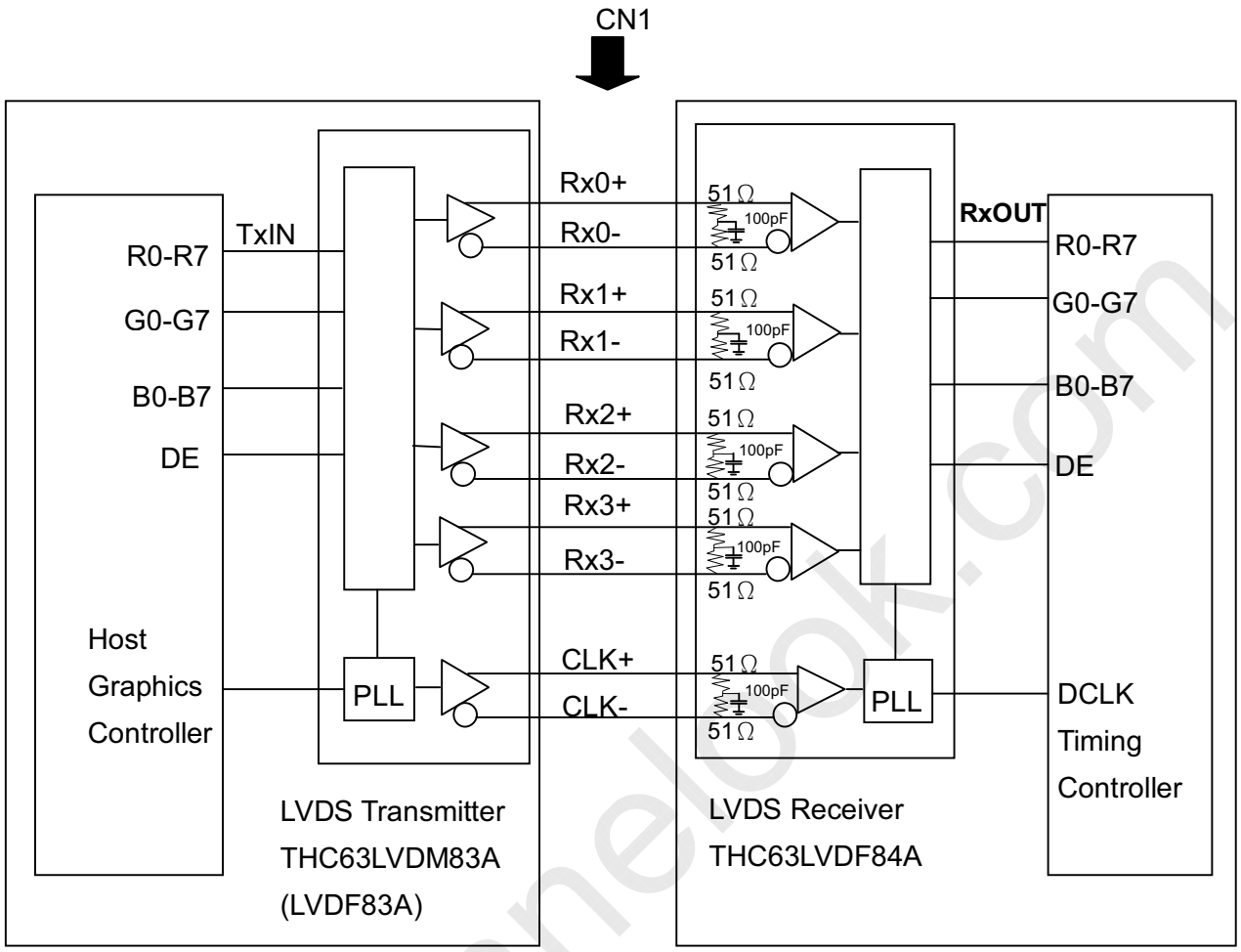
Note (2) PIN 14:External PWM Control (Use Pin 14): Pin 13 must open.

Note (3) Pin 13(I_PWM) and Pin 14(E_PWM) can't open in same period.

CN2-CN5 : CP042CP1MR0-LF (CviLux) or equivalent.

Pin	Name	Description
1	CCFL HOT	CCFL High Voltage
2	CCFL HOT	CCFL High Voltage

5.4 BLOCK DIAGRAM OF INTERFACE

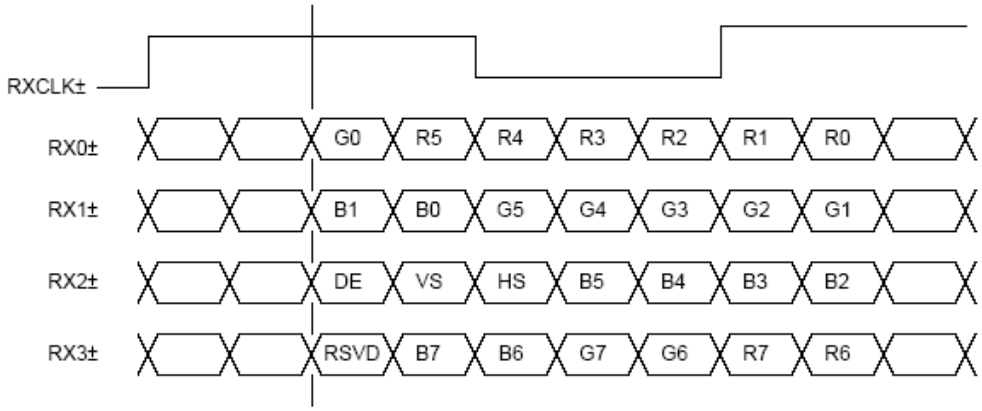


R0~R7 : Pixel R Data
G0~G7 : Pixel G Data
B0~B7 : Pixel B Data
DE : Data Enable Signal

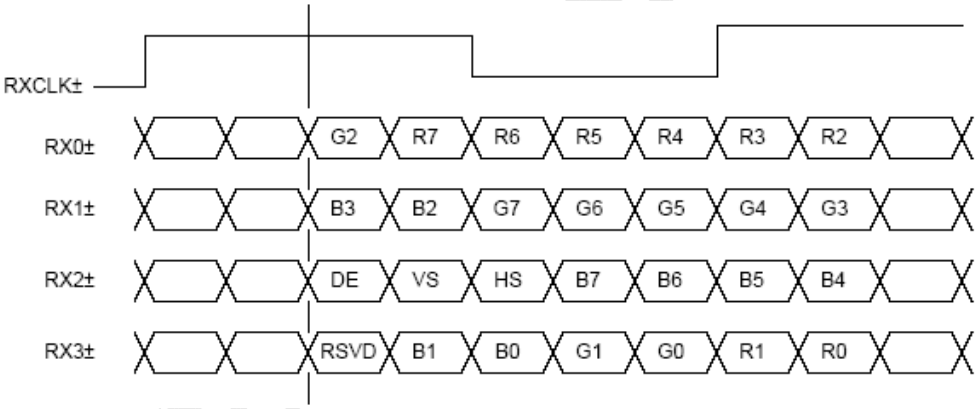
Note (1) The system must have the transmitter to drive the module.
Note (2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

5.5 LVDS INTERFACE

SELLVDS = H or Open (VESA)



SELLVDS = L (JEIDA)



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”.

5.6 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	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
	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
	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
	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
	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
	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	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	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	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	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	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	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	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	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	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(255)	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	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	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	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	0	1	0
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	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(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

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

6. INTERFACE TIMING

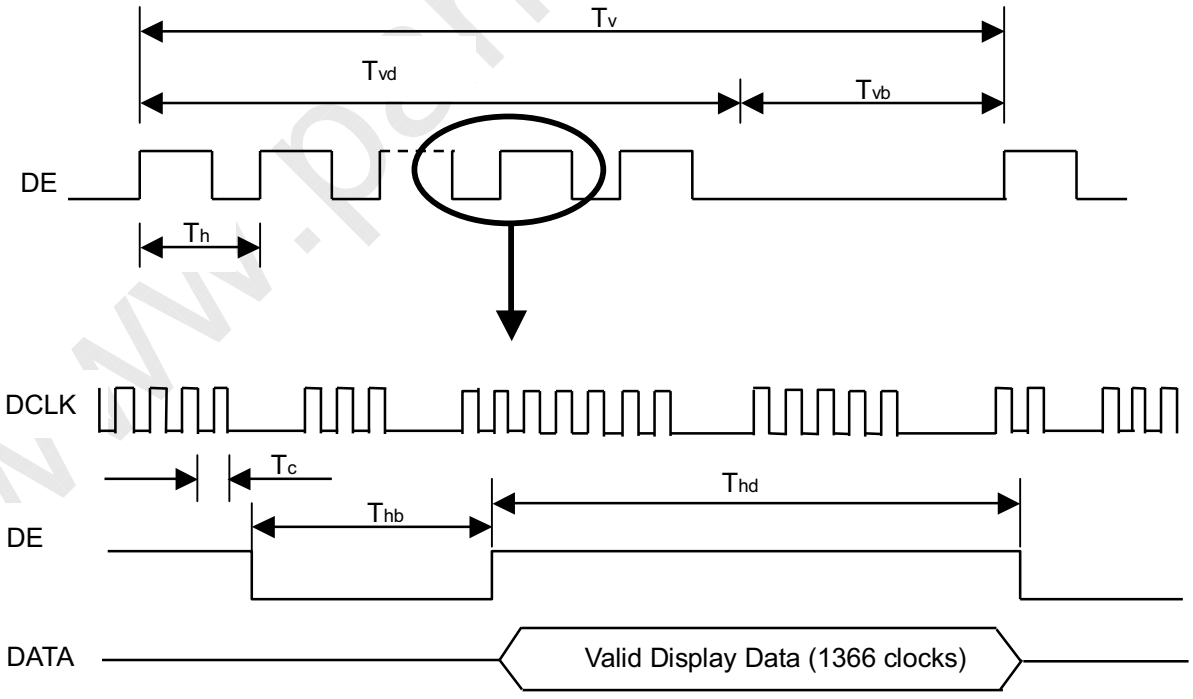
6.1 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

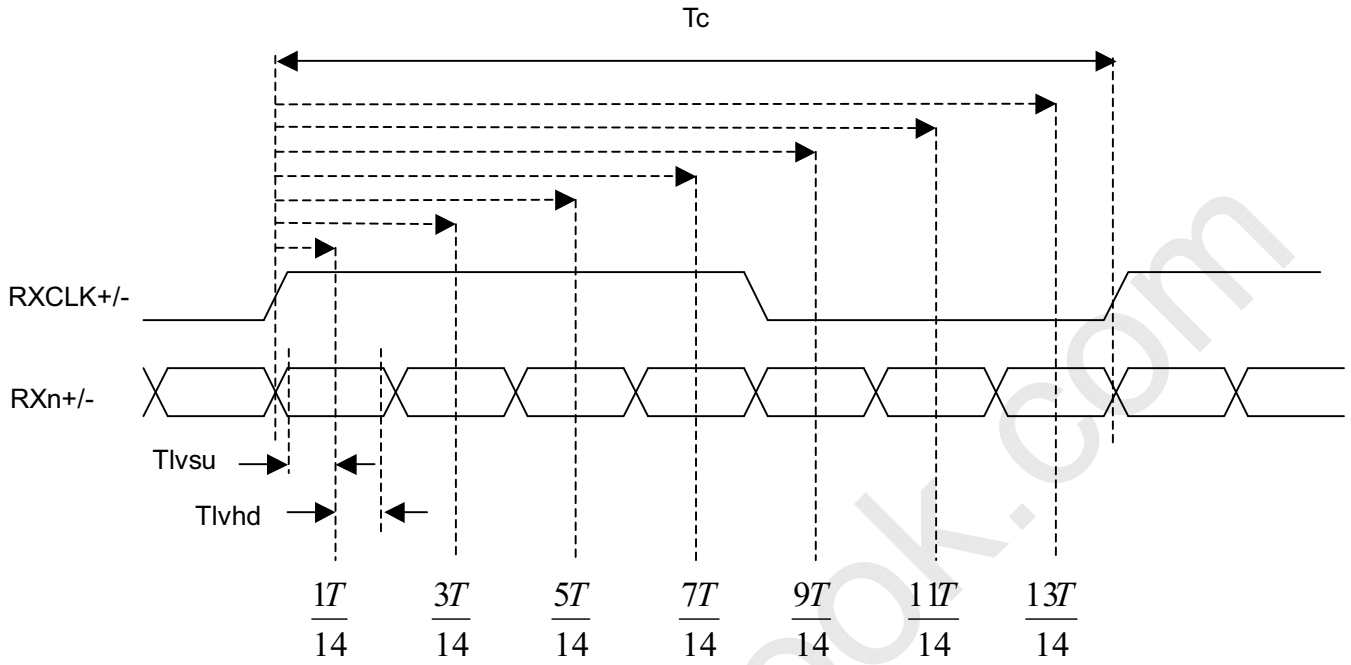
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock	Frequency	1/Tc	60	76	82	MHz	
	Input cycle to cycle jitter	Trcl	—	—	200	ps	
LVDS Receiver Data	Setup Time	Tlvsu	600	—	—	ps	
	Hold Time	Tlvhd	600	—	—	ps	
Vertical Active Display Term	Frame Rate	Fr_5	47	50	53	Hz	
		Fr_6	57	60	63	Hz	
	Total	Tv	778	806	888	Th	Tv=Tvd+Tvb
	Display	Tvd	768	768	768	Th	-
	Blank	Tvb	10	38	120	Th	-
Horizontal Active Display Term	Total	Th	1442	1560	1936	Tc	Th=Thd+Thb
	Display	Thd	1366	1366	1366	Tc	-
	Blank	Thb	76	194	570	Tc	-

Note (1) Since this module is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM

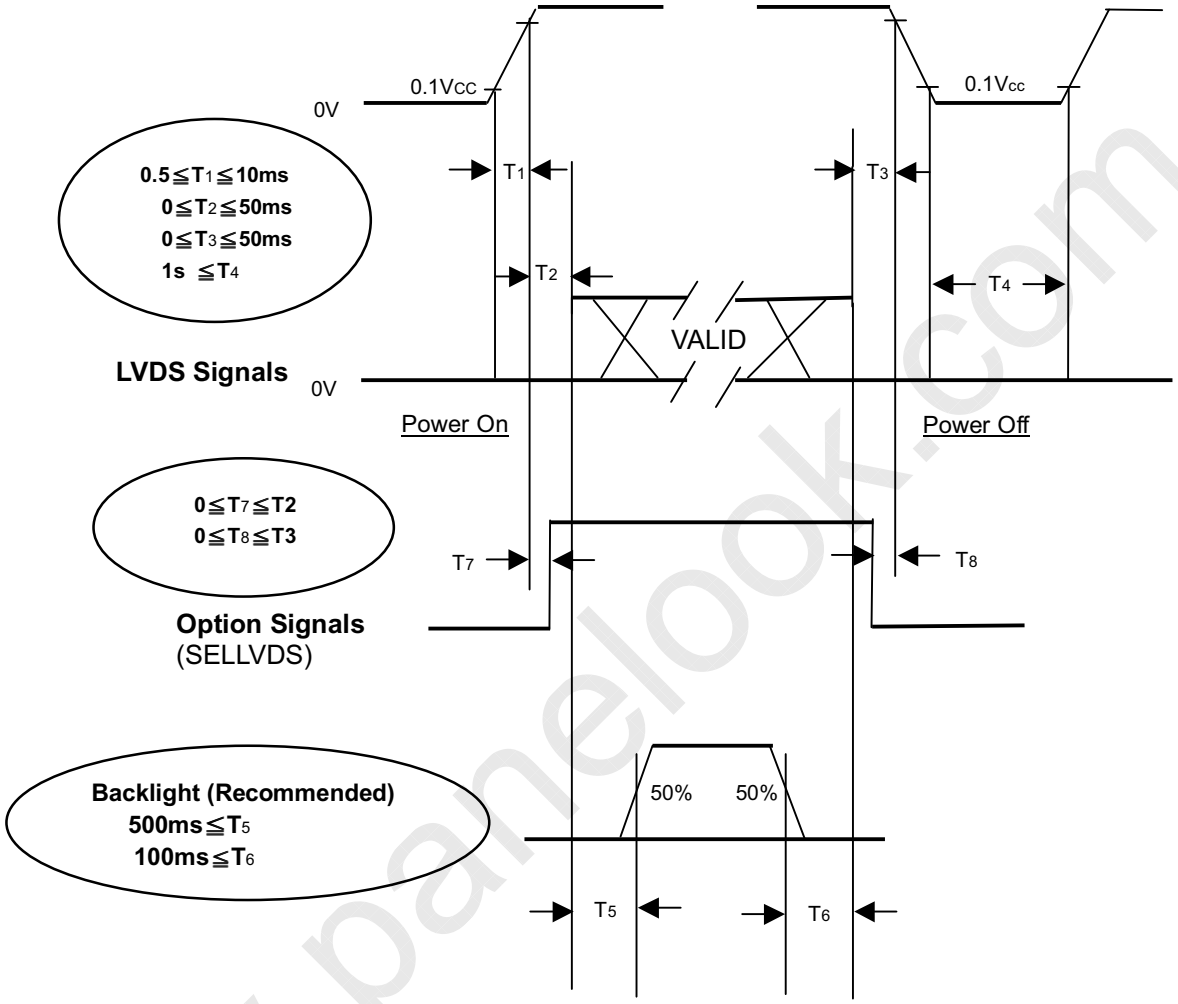


LVDS RECEIVER INTERFACE TIMING DIAGRAM



6.2 POWER ON/OFF SEQUENCE

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

Note (1) The supply voltage of the external system for the module input should follow the definition of Vcc.

Note (2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.

Note (3) In case of Vcc is in off level, please keep the level of input signals on the low or high impedance. If T2<0,that maybe cause electrical overstress failure.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

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_{CC}	12.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Lamp Current	I_L	7.5 ± 0.5	mA
Oscillating Frequency (Inverter)	F_W	66 ± 3	KHz
Vertical Frame Rate	Fr	60	Hz

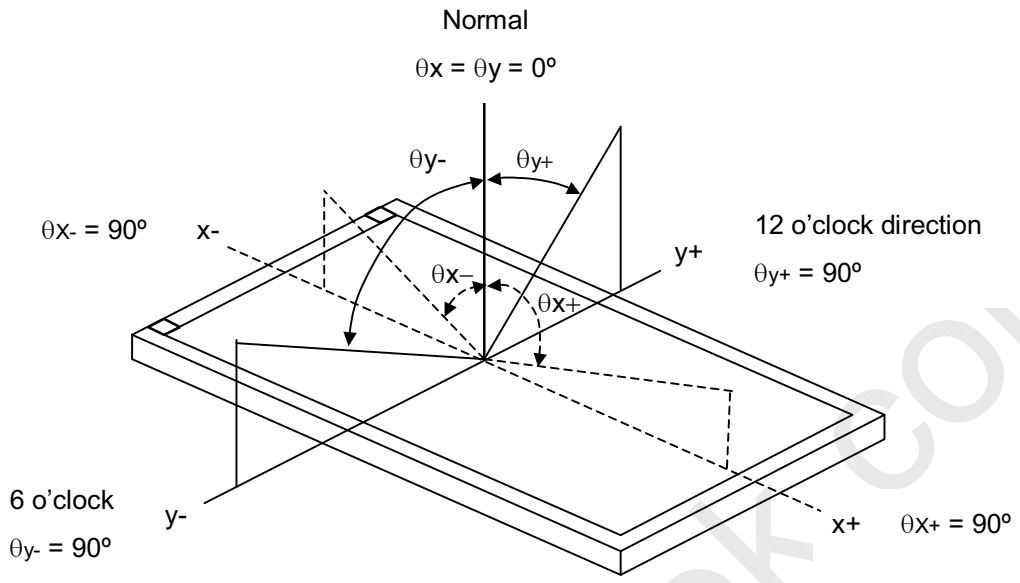
7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing Normal Angle	(600)	(800)		-	(2)
Response Time		T_R			(1.3)	(2.2)	ms	(3)
		T_F			(3.7)	(5.8)		
Center Luminance of White		L_C		(350)	(450)			(4)
White Variation		δW				(1.3)	-	(7)
Cross Talk		CT				(4)	%	(5)
Color Chromaticity	Red	Rx		Typ. (-0.03)	(0.643)	Typ. (+0.03)	-	(6)
		Ry			(0.332)		-	
	Green	Gx			(0.271)		-	
		Gy			(0.591)		-	
	Blue	Bx			(0.150)		-	
		By			(0.061)		-	
	White	Wx			(0.280)		Target	
		Wy			(0.290)			
	Color Gamut	CG		(68)	(72)		%	NTSC
Viewing Angle	Horizontal	θ_x+	CR≥10	(70)	(80)		Deg.	(1)
		θ_x-		(70)	(80)			
	Vertical	θ_Y+		(70)	(80)			
		θ_Y-		(60)	(70)			

Note (1) Definition of Viewing Angle (θx, θy):

Viewing angles are measured by EZ-Contrast 160R (Eldim)



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

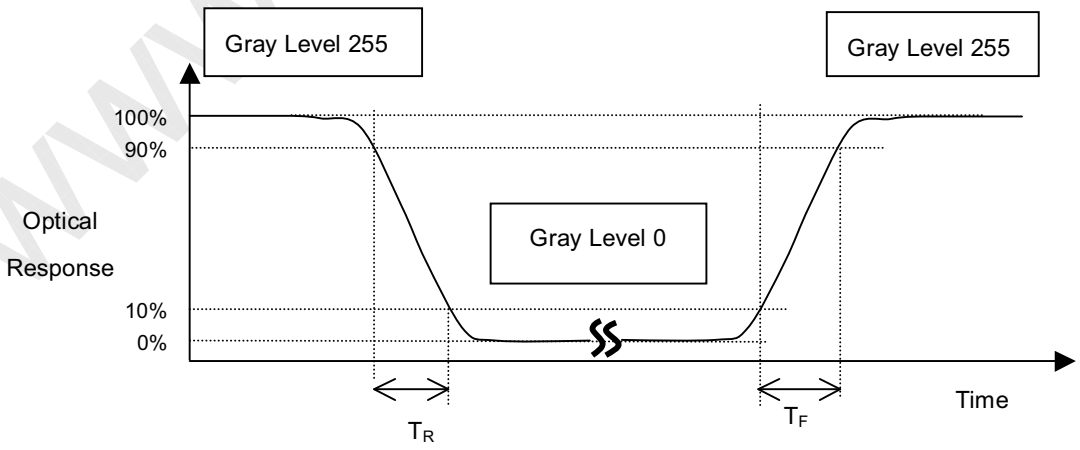
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5),

CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (7).

Note (3) Definition of Response Time (T_R, T_F):



Note (4) Definition of Luminance of White (L_C):

Measure the luminance of gray level 255 at center point and 5 points

$L_C = L(5)$

L (X) is corresponding to the luminance of the point X at the figure in Note (7).

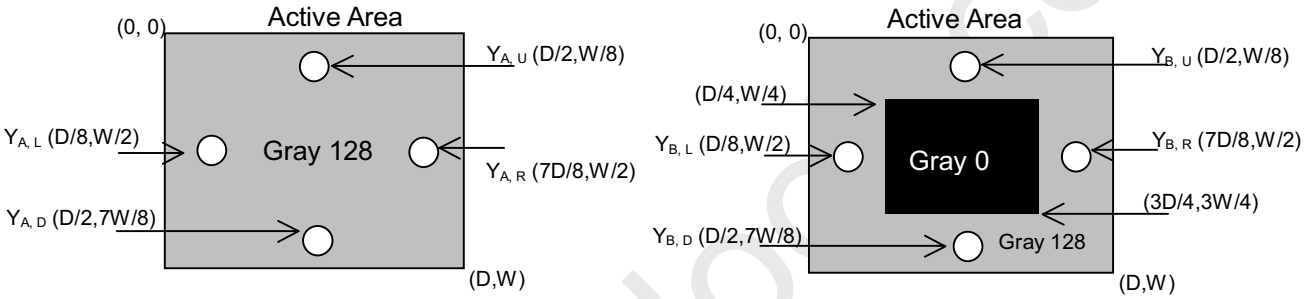
Note (5) Definition of Cross Talk (CT):

$CT = | Y_B - Y_A | / Y_A \times 100\ (\%)$

Where:

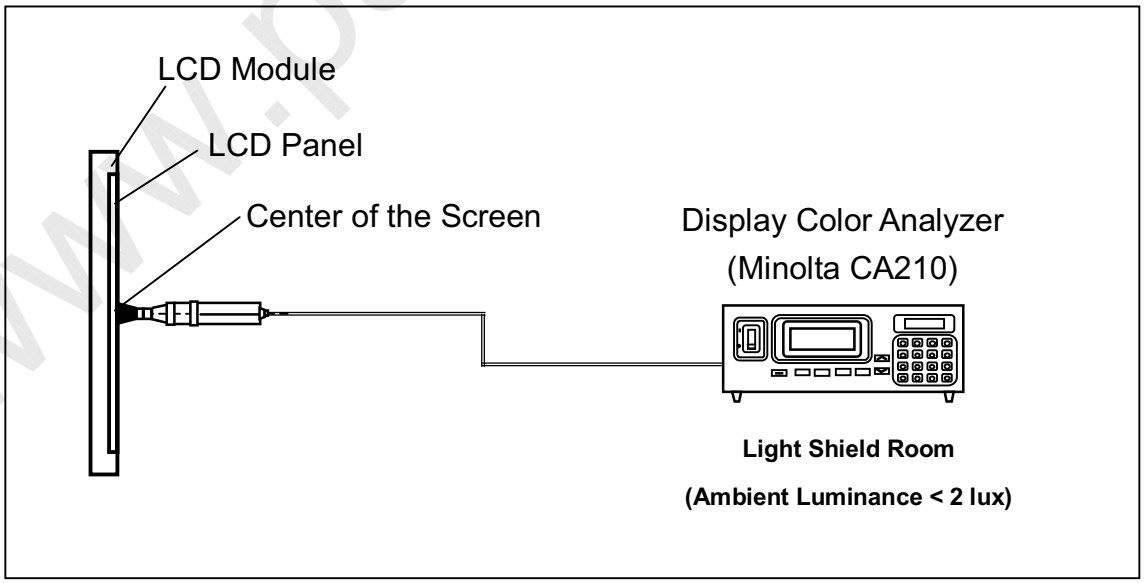
Y_A = Luminance of measured location without gray level 0 pattern (cd/m^2)

Y_B = Luminance of measured location with gray level 0 pattern (cd/m^2)



Note (6) Measurement Setup:

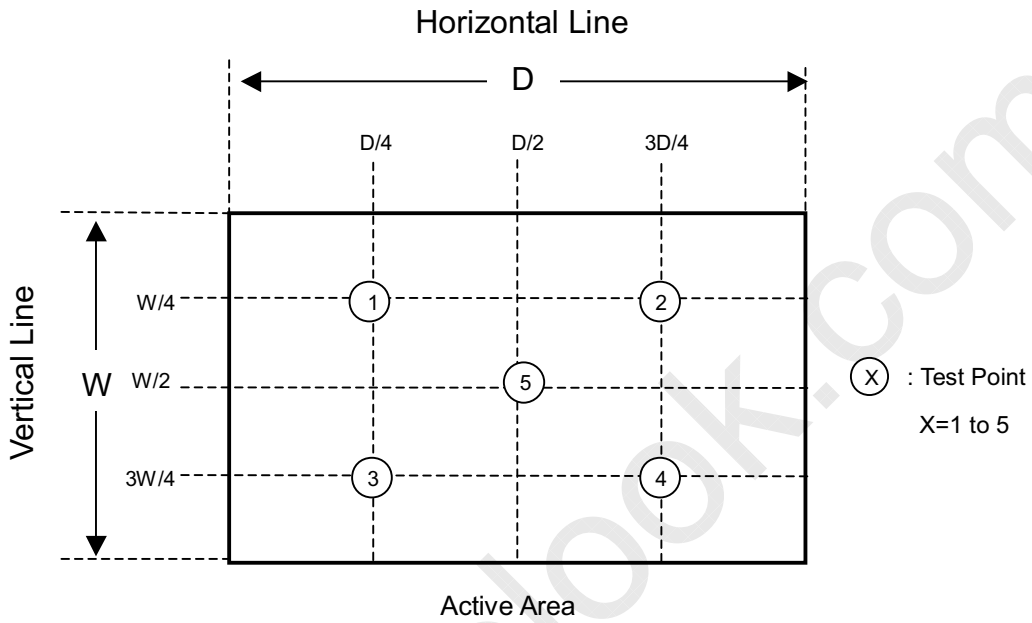
The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



Note (7) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

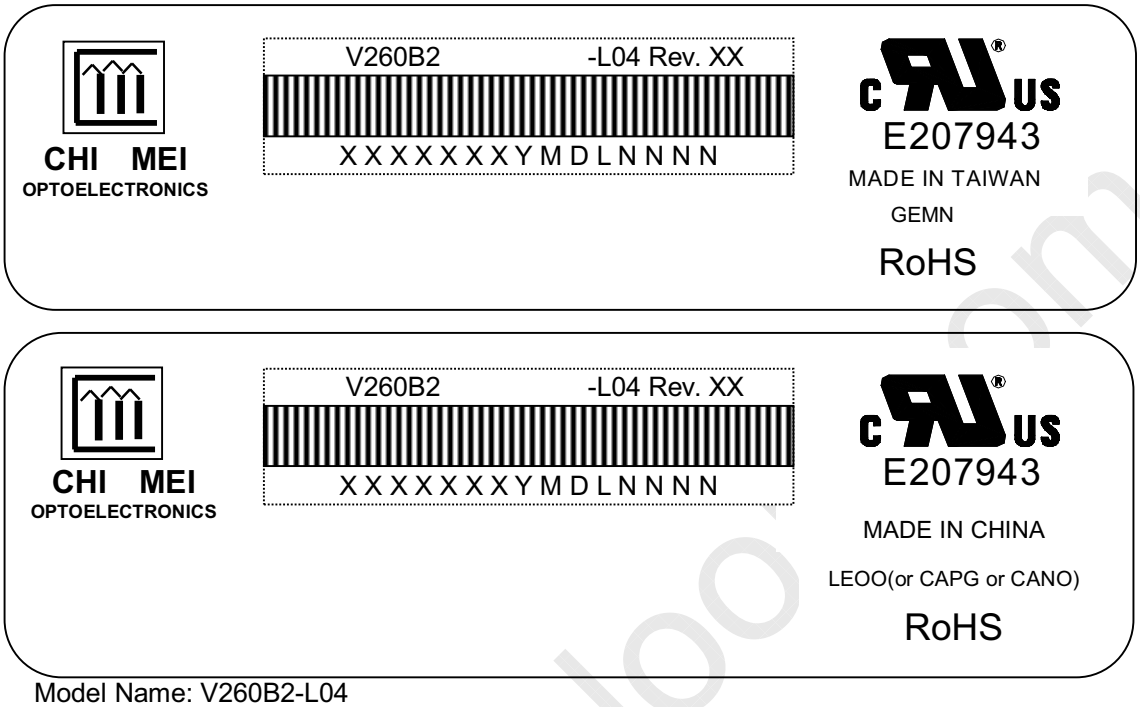
δW = Maximum [L (1), L (2), L (3), L (4), L (5)] / Minimum [L (1), L (2), L (3), L (4), L (5)]



8. DEFINITION OF LABELS

8.1 CMO MODULE LABEL

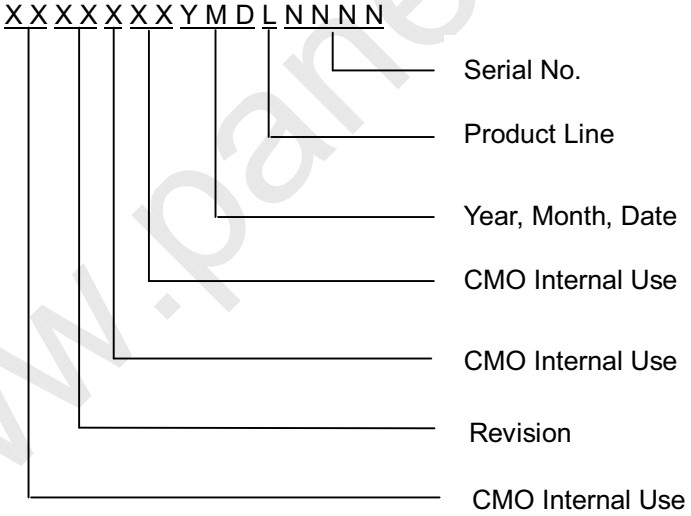
The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



(a) Model Name: V260B2-L04

(b) Revision: Rev. XX, for example: A0, A1… B1, B2… or C1, C2…etc.

(c) Serial ID: X X X X X X X Y M D L N N N N



Serial ID includes the information as below:

(a) Manufactured Date: Year: 1~9, for 2001~2009
Month: 1~9, A~C, for Jan. ~ Dec.
Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.

(b) Revision Code: Cover all the change

(c) Serial No.: Manufacturing sequence of product

(d) Product Line: 1 -> Line1, 2 -> Line 2, …etc.

9. PACKAGING

9.1 PACKING SPECIFICATIONS

(1) 7 LCD TV modules / 1 Box

(2) Box dimensions : 713(L)x429(W)x453(H)mm

(3) Weight : approximately 30.48 Kg (7 modules per box)

9.2 PACKING METHOD

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

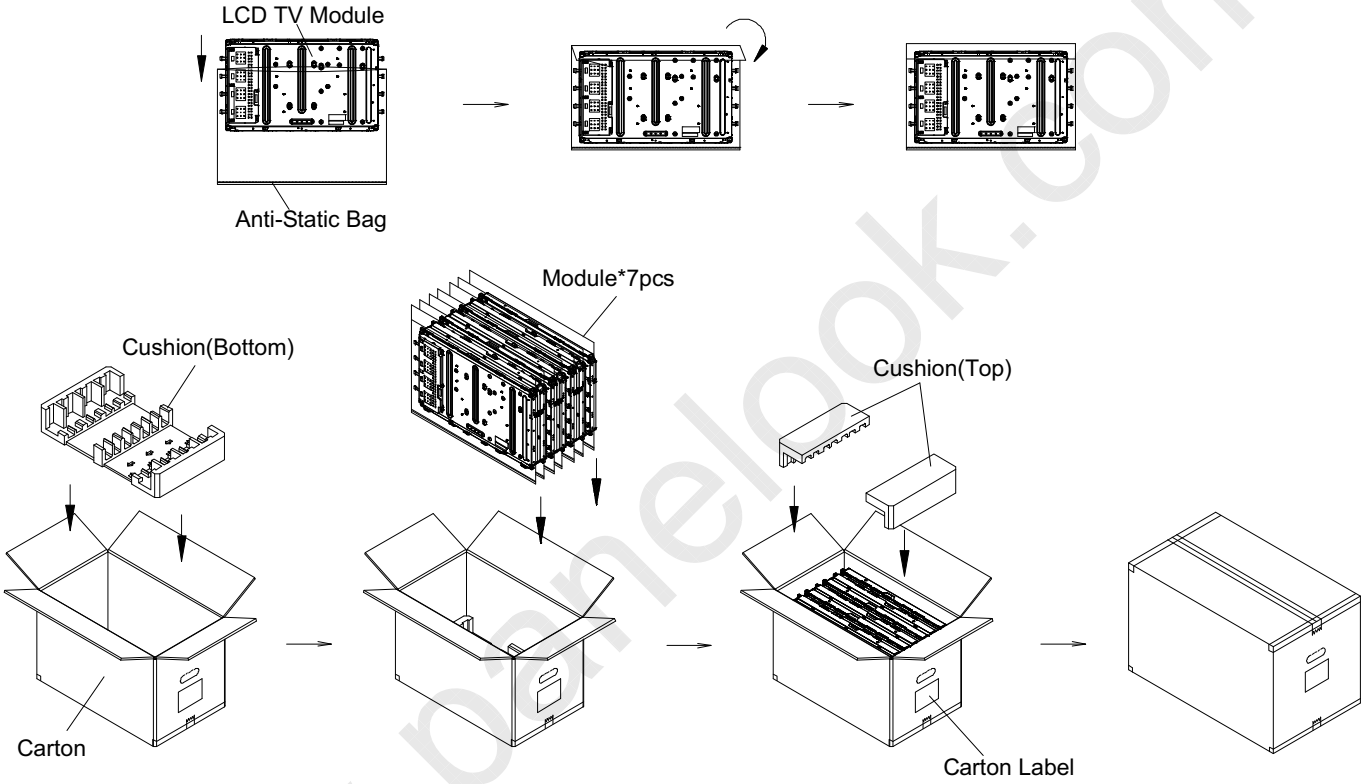
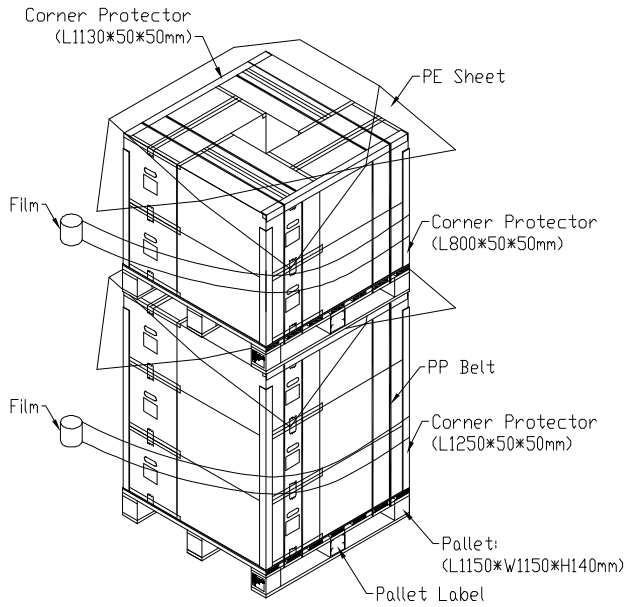
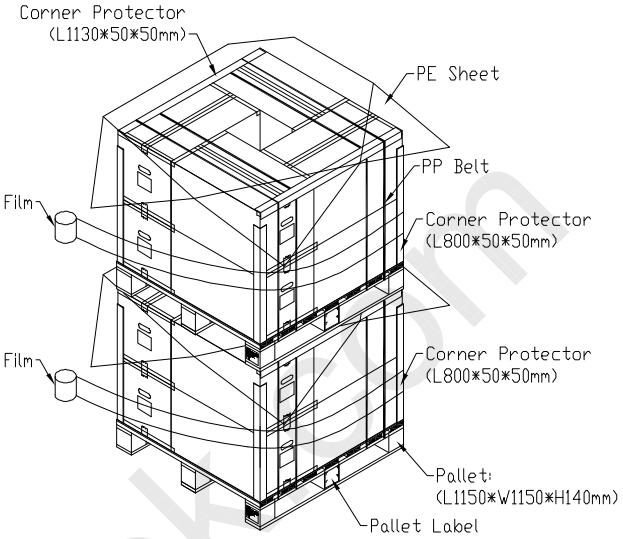


Figure.9-1 packing method

Sea / Land Transportation
(40ft HQ Container)



Sea / Land Transportation
(40ft Container)



Air Transportation

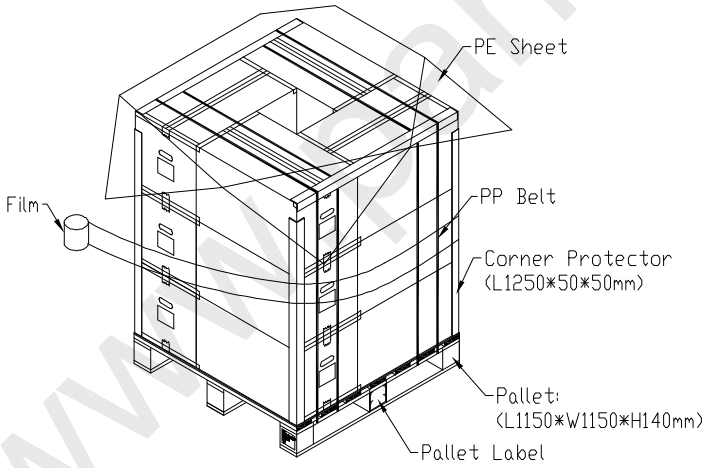


Figure.9-2 Packing method

10. PRECAUTIONS

10.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the module during assembly.

(2) It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) Do not apply pressure or impulse to the module to prevent the damage of LCD panel and backlight.

(4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.

(5) Do not plug in or pull out the I/F connector while the module is in operation.

(6) Do not disassemble the module.

(7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

(8) Moisture can easily penetrate into LCD module and may cause the damage during operation.

(9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD modules in the specified storage conditions.

(10) When ambient temperature is lower than 10ºC, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of CCFL will be higher than that of room temperature.

10.2 SAFETY PRECAUTIONS

(1) The startup voltage of a backlight is over 1000 Volts. It may cause an electrical shock while assembling with the inverter. Do not disassemble the module or insert anything into the backlight unit.

(2) 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.

(3) After the module's end of life, it is not harmful in case of normal operation and storage.

10.3 STORAGE PRECAUTIONS

When storing modules as spares for a long time, the following precaution is necessary.

(1) Do not leave the module in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35℃at normal humidity without condensation.

(2) The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

11. REGULATORY STANDARDS

11.1 SAFETY

Regulatory	Item	Standard
Information Technology equipment	UL	UL 60950-1: 2003
	cUL	CAN/CSA C22.2 No.60950-1-03
	CB	IEC 60950-1:2001
Audio/Video Apparatus	UL	UL 60065: 2003
	cUL	CAN/CSA C22.2 No.60065-03
	CB	IEC 60065:2001

12. MECHANICAL CHARACTERISTICS