Product Description: P520HW01_V0 TFT-LCD PANEL with RoHS Guarantee			
AUO Model Name: P520HW01_V0			
Customer Part No/Project Name:			
Customer Signature	**Date**	AUO	**Date**
		Approved By: Debbie Chiu	
		Reviewed By: Kelvin Chou	
		Prepared By: KT Huang 2008/9/22	

Document Version: 0.1
Date: 2008/9/22

Product Specifications

52.0” Full HD Color TFT-LCD Module

Model Name: P520HW01 V0

(*) Preliminary Specifications

( ) Final Specifications

Note: This Specification is subject to change without notice.

Contents

Record of Revision

Version	Date	No	Description	Remark
0.0	Sep 22,'08		First Draft	

1. General Description

This specification applies to the 52.0 inch Color TFT-LCD Module P520HW01 V0. This LCD module has a TFT active matrix type liquid crystal panel 1920x1080 pixels, and diagonal size of 52.0 inch. This module supports 1920x1080 Full-HD modes.

Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 10-bit gray scale signal for each dot.

The P520HW01 V0 has been designed to apply the 10-bit 2 channel LVDS interface operation. It is intended to support displays where high brightness, wide viewing angle, high color saturation, and high color depth are very important.

The data on this specification sheet is applicable when LCD module is placed in landscape position.

* General Information

Items	Specification	Unit	Note
Display Mode	AMVA		
Active Screen Size	52	Inch	
Display Area	1152 (H) x 648(V)	mm	
Outline Dimension	1192(H) x 688(V) x 61.00(D)	mm	With inverter
Driver Element	a-Si TFT active matrix		
Display Colors	1.07B	Color	
Number of Pixels	1920x1080	Pixel	
Pixel Pitch	0.6	mm	
Pixel Arrangement	RGB vertical stripe		
Display Mode	Normally Black		
RoHS	Compliance		
Surface Treatment	Super Clear		

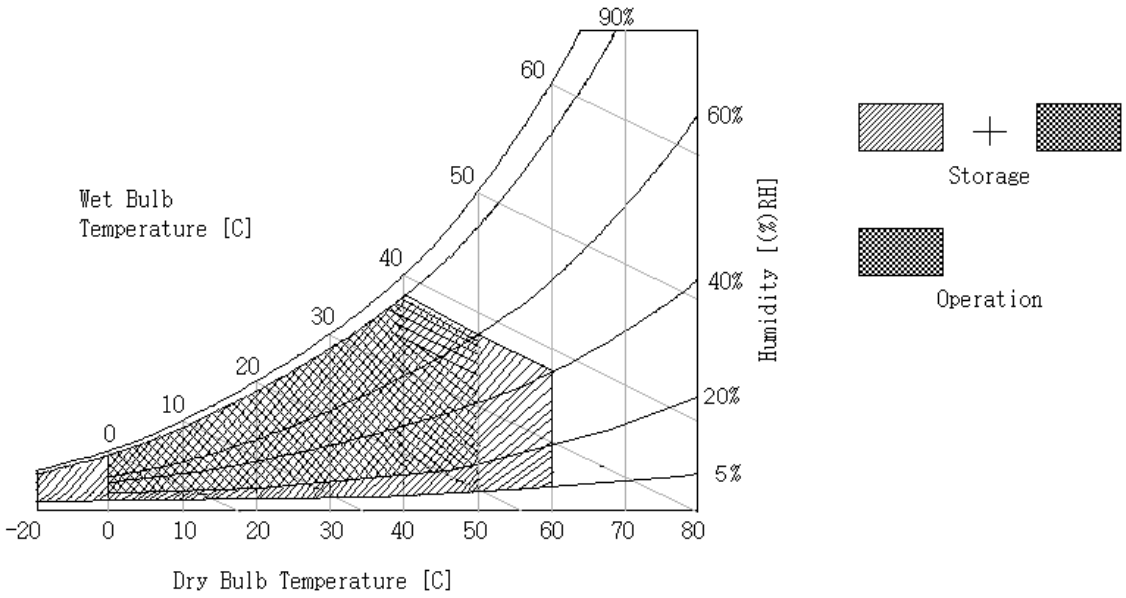
2. Absolute Maximum Ratings

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Parameter	Symbol	Min.	Max.	Unit	Note
Logic/LCD Driving Voltage	V_{dd}	**-0.3**	**14**	V	1
Input Voltage of Signal	Vin	**-0.3**	**3.6**	V	1
BLU Input Voltage	V_{DDB}	**-0.3**	**26**	V	1
BLU Control Voltage	V_{BLON}	**-0.3**	**5.5**	V	1
Operating Temperature	T_{OP}	**0**	**50**	℃	2
Storage Temperature	T_{ST}	**-20**	**60**	℃	2
Operating Ambient Humidity	H_{OP}	**10**	**90**	%RH	2
Storage Humidity	H_{ST}	**10**	**90**	%RH	2

Note 1: Duration = 50msec

Note 2: Maximum Wet-Bulb should be 39℃ and No condensation.



3. Electrical Specification

The P520HW01 V0 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input which powers the CCFL, is typically generated by an inverter.

3-1 Electrical Characteristics

3-1.1 LCD Characteristics

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Input Voltage		V_{dd}	11.4	12.0	12.6	V	
Power Supply Input Current		I_{dd}	--	1	--	A.	1
Power Consumption		P_C	--	12	--	W	1
Inrush Current		I_{RUSH}	--	--	(5)	A	5
LVDS Interface	Differential Input High Threshold Voltage	V_{TH}	--	--	+100	mV	4
	Differential Input Low Threshold Voltage	V_{TL}	-100	--	--	mV	4
	Common Input Voltage	V_{CIM}	0.6	1.2	1.8	V	
CMOS Interface	Input High Threshold Voltage	V_{IH} (High)	2.0	--	3.3	V	
	Input Low Threshold Voltage	V_{IH} (Low)	0	--	0.8	V	
Backlight Power Consumption			--	300	330	W	2
Lamp Life Time			50000	60,000	--	hr	3

3-1.2 Backlight Characteristics

No	Item	Symbol		Test Condition	Min	Typ	Max	Unit	Note
1	Input Voltage	V_{DDB}		--	22.8	24	25.2	V	
2	Input Current	I_{DDB}		V_{DDB}=24V 100%brightness	TBD	12.5	TBD	A	1
3	Input Power	P_{DDB}		V_{DDB}=24V 100%brightness	TBD	300	TBD	W	1
4	Input Inrush current	I_{RUSH}		V_{DDB}=24V 100%brightness	--	--	TBD	A	2
5	Output Frequency	F_{BL}		V_{DDB}=24V		58		KHz	
6	On/Off Control Voltage	V_{BLON}	On	V_{DDB}=24V	2.0	3.3	5	V	
			Off	V_{DDB}=24V	0.0	--	0.8	V	
7	On/Off Control Current	I_{BLON}		V_{DDB}=24V	0	--	2	mA	
8	External PWM Control Voltage	EV_{PWM}	Max	--	2.0	--	3.3	V	
			Min	--	0	--	0.8	V	
9	External PWM Control Current	EI_{PWM}	Max	PWM = 100%	0	--	2	mA	
			Min	PWM = 30%	0	--	2	mA	
10	External PWM Duty Ratio	ED_{PWM}		--	30	--	100	%	
11	External PWM Frequency	EF_{PWM}		--	120	--	300	Hz	
12	Analog Dimming Control Voltage	IV_{PWM}		V_{DDB}=24V	0	--	3.3	V	

Do not attach a conducting tape to lamp connecting wire. If the lamp wire attach to conducting tape, TFT-LCD Module have a low luminance and the inverter has abnormal action because leakage current occurs between lamp wire and conducting tape.

The relative humidity must not exceed 80% non-condensing at temperature of 40℃ or less. At temperature greater than 40℃, the wet bulb temperature must not exceed 39℃. When operate at low temperature, the brightness of CCFL will drop and the lifetime of CCFL will be redueced.

Note :

1. Vdd=12.0V, fv=60Hz, fCLK=75 Mhz , 25℃, Vdd Duration time= 500 μs , Test pattern : white pattern
2. The Backlight power consumption shown above does include loss of external inverter at 25℃.

The used lamp current is the lamp typical current

3. The life is determined as the time at which luminance of the lamp is 50% compared to that of initial value at the typical lamp current on condition of continuous operating at 25±2℃.
4. VCIM = 1.25V

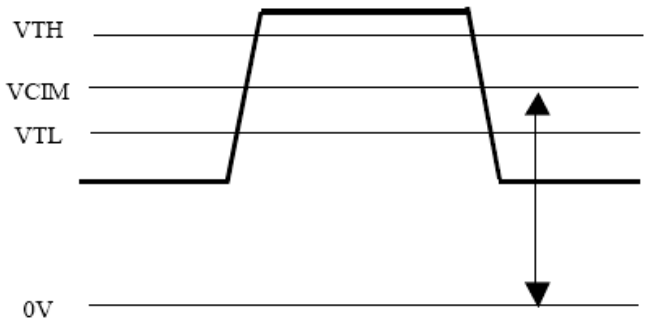
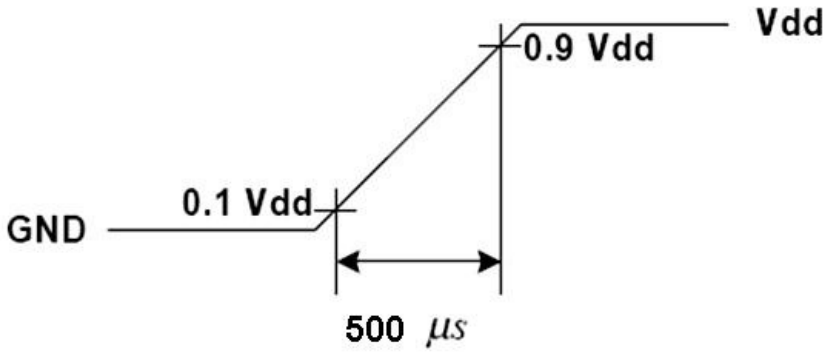


Figure : LVDS Differential Voltage

5. Measurement Condition: Rising time = 500μs



3-2 Interface Connections

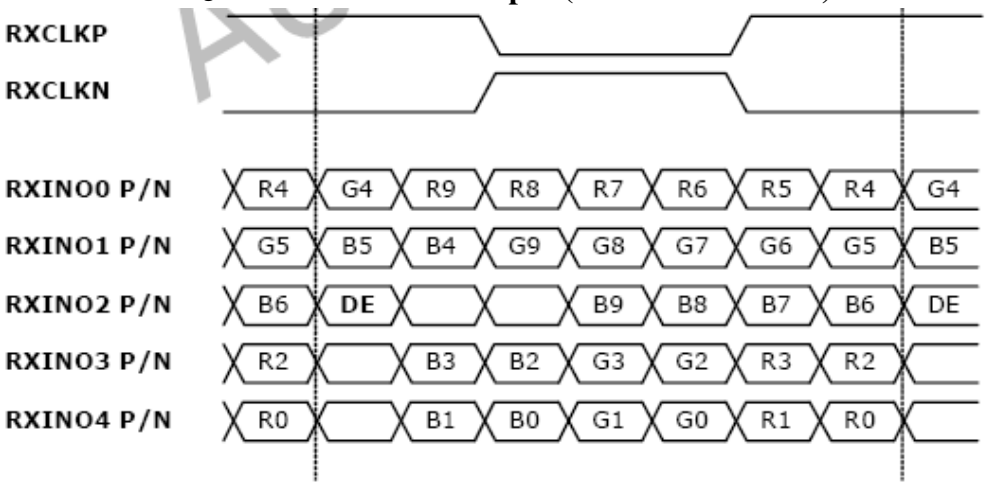
Connector Part number : FI-RE51S-HF(JAE)

Pin#	Signal Name	Description
1	VCC	12V Power Supply
2	VCC	12V Power Supply
3	VCC	12V Power Supply
4	VCC	12V Power Supply
5	VCC	12V Power Supply
6	GND	GND
7	GND	GND
8	GND	GND
9	GND	GND
10	RXON0	LVDS Odd pixel data input pair 0(-)
11	RXOP0	LVDS Odd pixel data input pair 0(+)
12	RXON1	LVDS Odd pixel data input pair 1(-)
13	RXOP1	LVDS Odd pixel data input pair 1(+)
14	RXON2	LVDS Odd pixel data input pair 2(-)
15	RXOP2	LVDS Odd pixel data input pair 2(+)
16	GND	GND
17	RXONCLK	LVDS Odd pixel clock input pair(-)
18	RXOPCLK	LVDS Odd pixel clock input pair(+)
19	GND	GND
20	RXON3	LVDS Odd pixel data input pair 3(-)
21	RXOP3	LVDS Odd pixel data input pair 3(+)
22	RXON4	LVDS Odd pixel data input pair 4(-)
23	RXOP4	LVDS Odd pixel data input pair 4(+)
24	GND	GND
25	RXEN0	LVDS Even pixel data input pair 0(-)
26	RXEP0	LVDS Even pixel data input pair 0(+)
27	RXEN1	LVDS Even pixel data input pair 1(-)
28	RXEP1	LVDS Even pixel data input pair 1(+)
29	RXEN2	LVDS Even pixel data input pair 2(-)
30	RXEP2	LVDS Even pixel data input pair 2(+)
31	GND	GND
32	RXENCLK	LVDS Even pixel data input pair(-)

33	RXEPCLK	LVDS Even pixel data input pair(+)
34	GND	GND
35	RXEN3	LVDS Even pixel data input pair 3(-)
36	RXEP3	LVDS Even pixel data input pair 3(+)
37	RXEN4	LVDS Even pixel data input pair 4(-)
38	RXEP4	LVDS Even pixel data input pair 4(+)
39	GND	GND
40	NC	No connected
41	NC	No connected
42	NC	No connected
43	NC	No connected
44	NC	No connected
45	LVDSORD	Select LVDS data order: ● High or NC → NS ● Low → JEIDA
46	NC	No connected
47	NC	No connected
48	NC	No connected
49	NC	No connected
50	NC	No connected
51	NA	No connected

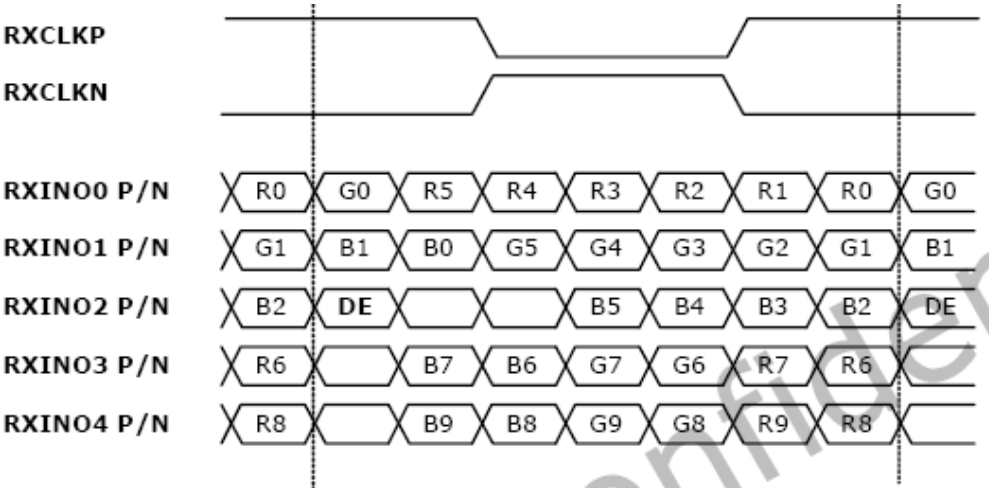
The 10 bits LVDS Input Data Mapping

- **JEIDA mode LVDS Input (LVDSORD = Low)**



10 BIT COLOR BIT ORDER	
MSB	R9
	R8
	R7
	R6
	R5
	R4
	R3
	R2
	R1
LSB	R0

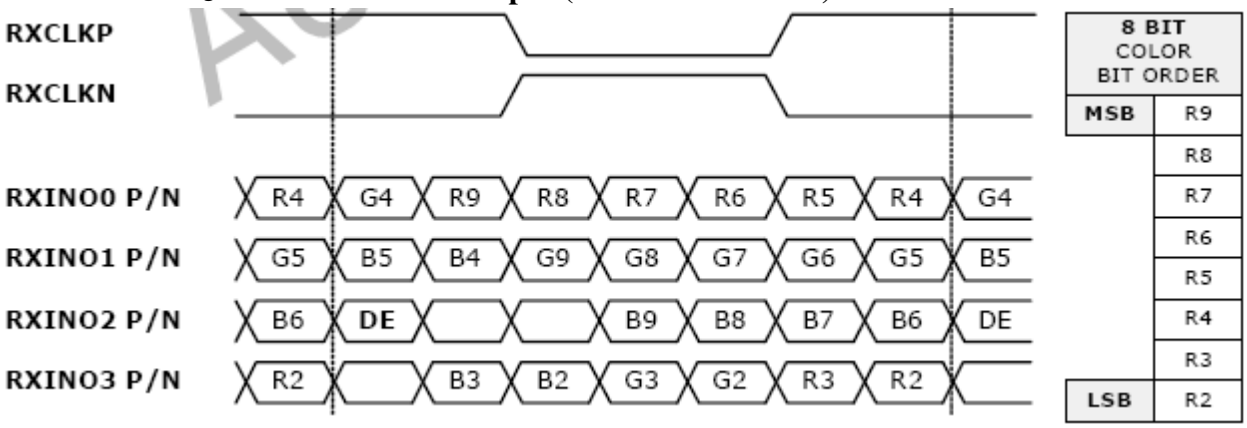
- **NS-like mode LVDS Input (LVDSORD = High or NC)**



10 BIT COLOR BIT ORDER	
MSB	R9
	R8
	R7
	R6
	R5
	R4
	R3
	R2
	R1
LSB	R0

The 8 bits LVDS Input Data Mapping

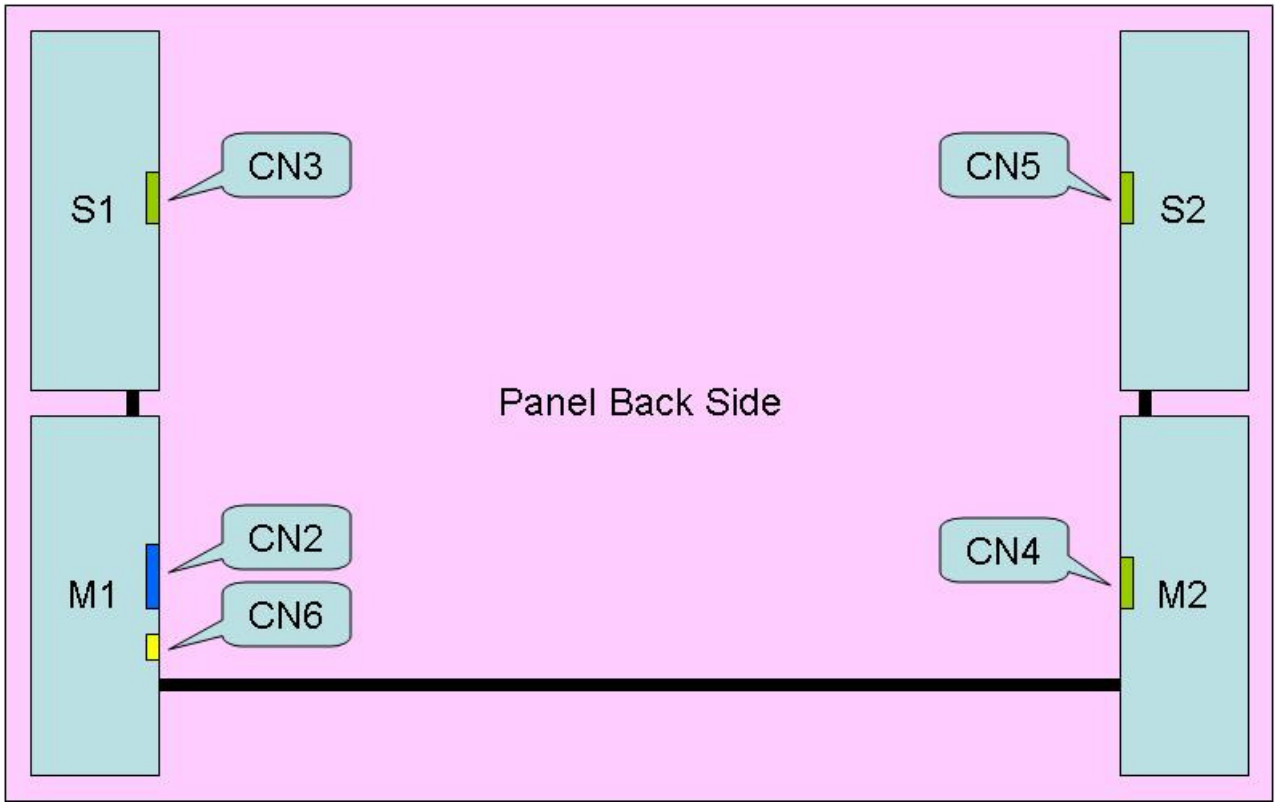
- **JEIDA mode LVDS Input (LVDSORD = Low)**



Note : For 8 bit LVDS input application, Panel only can be operated under JEIDA mode and the LVDS Data pair 4(RXINO4N, RXINO4P, RXINE4N, RXINE4N) input pin must be connected to Ground.

Backlight Connector Pin Configuration

1. Input specification



Connector 1: S14B-PH-SM4-TB (JST) or equivalent

Pin No	Symbol	Description
1	VDDB	Operating Voltage Supply, +24V DC regulated
2	VDDB	Operating Voltage Supply, +24V DC regulated
3	VDDB	Operating Voltage Supply, +24V DC regulated
4	VDDB	Operating Voltage Supply, +24V DC regulated
5	VDDB	Operating Voltage Supply, +24V DC regulated
6	BLGND	Ground and Current Return
7	BLGND	Ground and Current Return
8	BLGND	Ground and Current Return
9	BLGND	Ground and Current Return
10	BLGND	Ground and Current Return
11	VDIM	GND: 80%; Open/High (3.3V): 100%, Luminance
12	VBLON	Backlight On/Off: Open/High(+3.3V) for BL on, Low(GND) for BL off
13	PDIM(1)	External PWM Dimming Control input; Open/High (3.3V/100% Duty) for 100% Lum Analog dimming Control input: Open/High (3.3V) for 100% Lum; GND for 30% Lum

14	PDIM Selection[2,3]	Dimming mode Selection. GND: External PWM dimming; Open/High: Analog dimming.

Note 1: PDIM is PWM duty control input for +3.3V TTL level signal or DC voltage by Pin 14 input. This input signal is (a) continuous pulse signal with +3.3V, 100% duty (i.e. +3.3V, DC level), backlight should perform 100% luminance. Duty ratio of this input signal should be proportional relationship in certain range of control without any kind of inherent side effect like waterfall effect on screen. Guaranteed duty range and dimming ratio should be specified with supplementary measurement result.

Note 2: Pin 14 is the selection pin for dimming control method; if this pin is connected to High or open, PDIM (Pin 13) input should have DC level signal. Therefore the inverter should have SAW Tooth Wave Generator to generate internal PWM signal. If Pin 14 is connected to GND, PDIM (Pin 13) input should have external PWM signal.

Note 3: Pin 14 selection vs Pin 13 control function table:

	Pin 13 (Default: Open/High 100%)
Pin 14 = GND	External PWM (AC signal control duty)
Pin 14 = Open/High	Analog dimming (DC power control duty)

Connector 2,3,4: S12B-PH-SM4-TB (JST) or equivalent

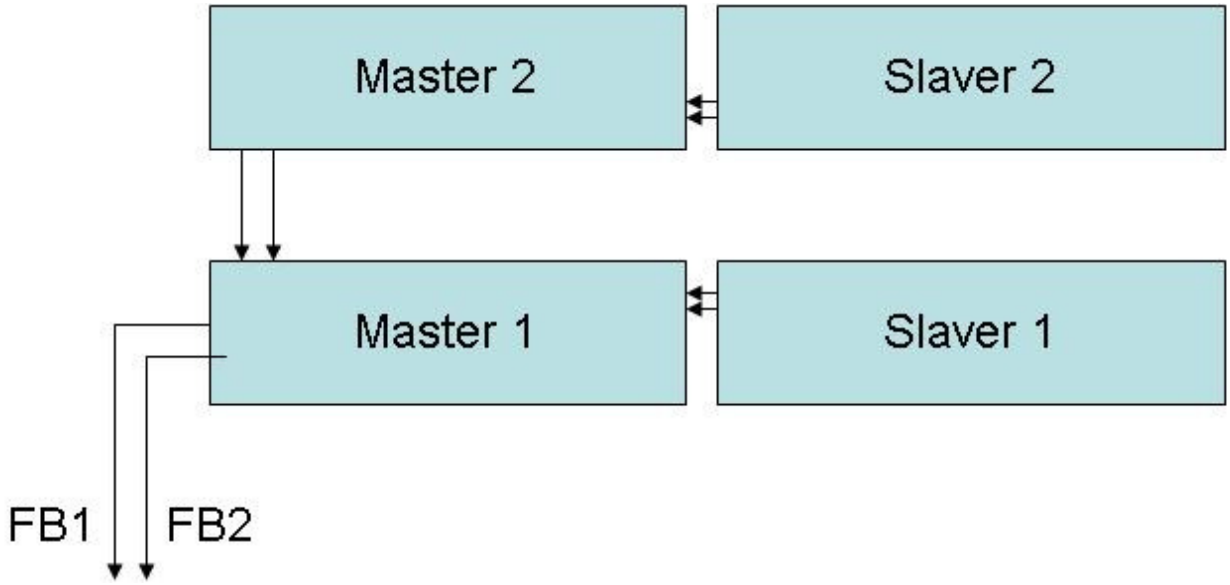
Pin No	Symbol	Description
1	VDDB	Operating Voltage Supply, +24V DC regulated
2	VDDB	Operating Voltage Supply, +24V DC regulated
3	VDDB	Operating Voltage Supply, +24V DC regulated
4	VDDB	Operating Voltage Supply, +24V DC regulated
5	VDDB	Operating Voltage Supply, +24V DC regulated
6	VDDB	Operating Voltage Supply, +24V DC regulated
7	BLGND	Ground and Current Return
8	BLGND	Ground and Current Return
9	BLGND	Ground and Current Return
10	BLGND	Ground and Current Return
11	BLGND	Ground and Current Return
12	BLGND	Ground and Current Return

Connector 6 : CI1504M1HR0-LF.(Cvilux)

Pin NO.	Signal name	Description
1	FB1	Feedback pin 1 (Sensor open lamp signal)
2	FB2	Feedback pin 2 (Sensor open lamp signal)
3	Disable	Disable Open Lamp Detection: 1. Open/High : Enable Open Lamp Detection. 2. Low : Disable Open Lamp Detection
4	GND	FB Ground

Note :

Open Lamp Detection Configuration:



Lamp status	(FB1, FB2)	Remark
Normal	(L,L)	No Open Lamp
1 lamp open	(L,H)	Inverter still work and send alarm signal continually.
2~3 lamps open	(H,L)	Inverter still work and send alarm signal continually.
≧4 lamps open	(H,H)	Inverter shut down.

3-3 Signal Timing Specifications

This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications for it's proper operation.

Timing Table (DE only Mode) Vertical Frequency Range A (60Hz)

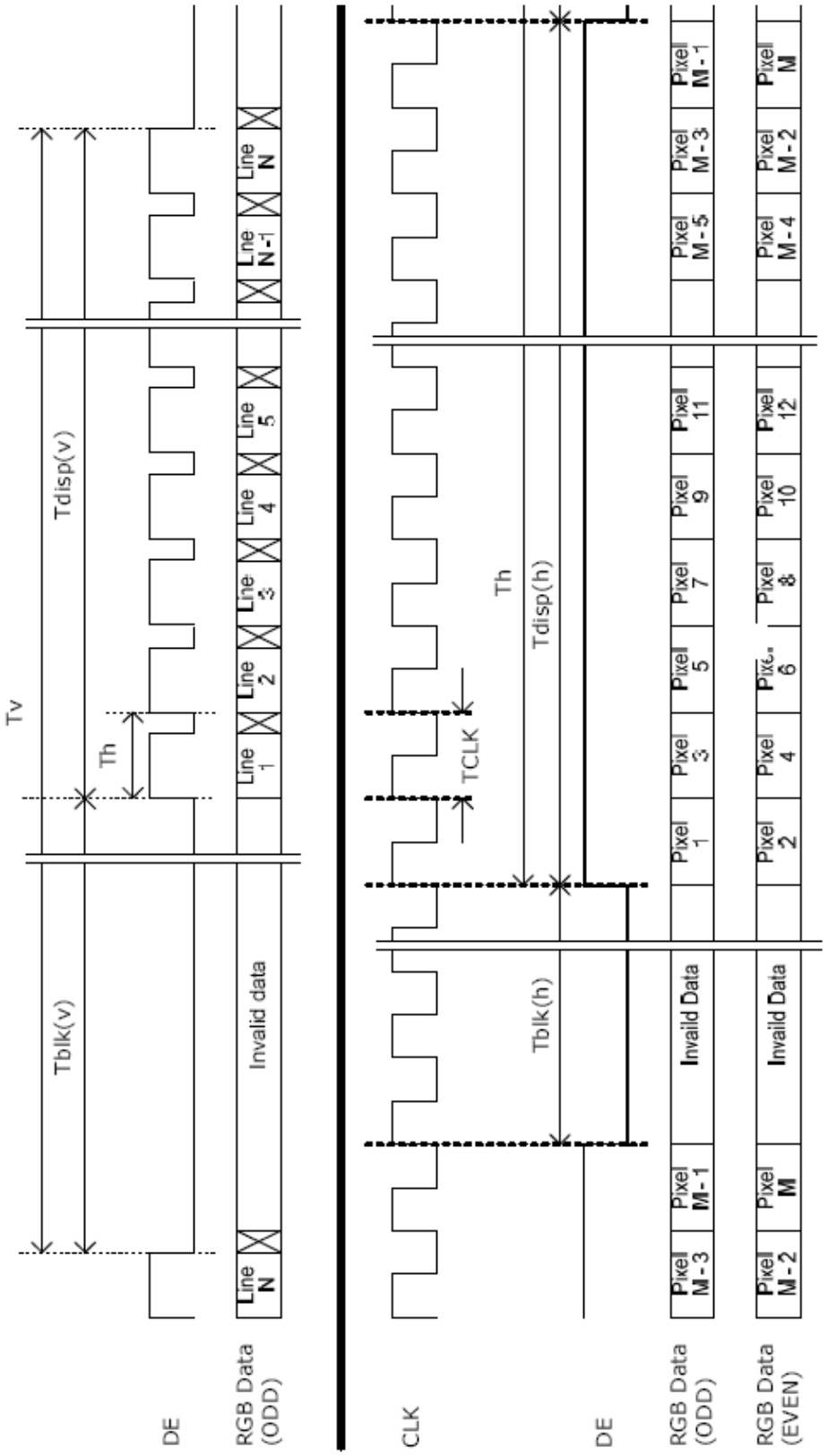
Signal	Item	Symbol	MIN	TYP	MAX	Unit
Vertical Section	Period	Tv	1090	1130	1200	Th
	Active	Tdisp(v)		1080		Th
	Blanking	Tblk(v)	10	50	120	Th
Horizontal Section	Period	Th	1030	1100	1180	Tclk
	Active	Tdisp(h)		960		Tclk
	Blanking	Tblk(h)	70	140	220	Tclk
Vertical Frequency	Frequency	FV	58	60	63	Hz
Horizontal Frequency	Frequency	FH	65.4	67.8	72	KHz
Clock	Period	CLK		13.41		Ns
	Frequency	FCLK	67.362	75.48	84.96	MHz

Vertical Frequency Range B (50Hz)

Signal	Item	Symbol	MIN	TYP	MAX	Unit
Vertical Section	Period	Tv	1316	1356	1436	Th
	Active	Tdisp(v)		1080		Th
	Blanking	Tblk(v)	236	276	356	Th
Horizontal Section	Period	Th	1030	1100	1180	Tclk
	Active	Tdisp(h)		960		Tclk
	Blanking	Tblk(h)	70	140	220	Tclk
Vertical Frequency	Frequency	FV	47	50	53	Hz
Horizontal Frequency	Frequency	FH	65.8	67.8	71.3	KHz
Clock	Period	CLK		13.41		ns
	Frequency	Freq	54	63	74	MHz

Note: Typical value refer to VESA STANDARD

3-4 Signal Timing Waveforms



3-5 Color Input Data Reference

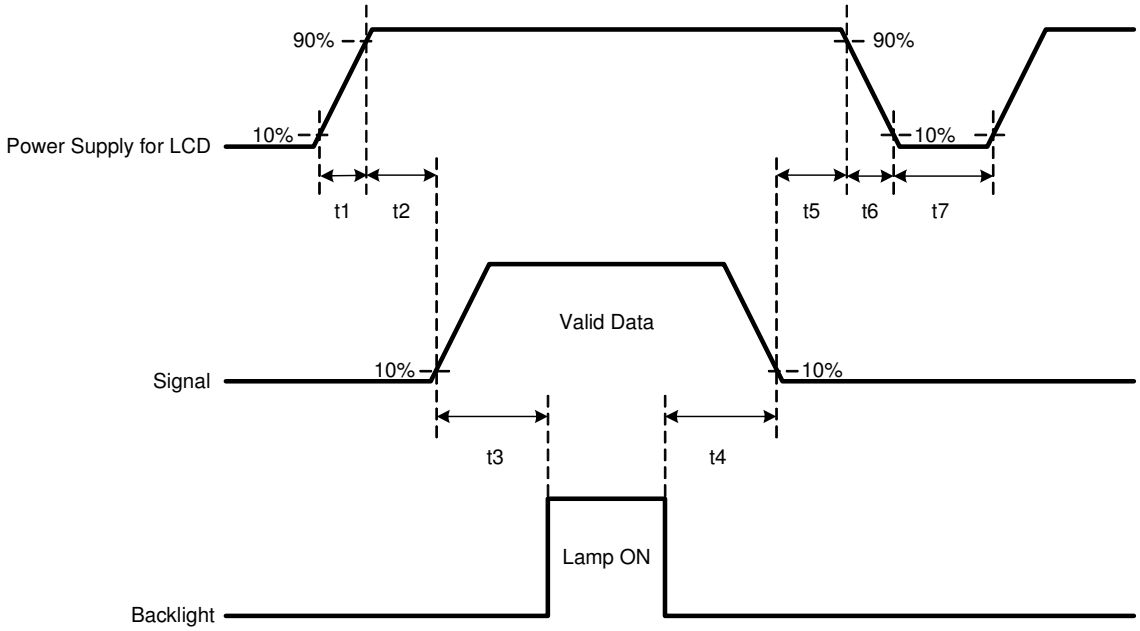
The brightness of each primary color (red, green and blue) is based on the 10 bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

COLOR DATA REFERENCE

COLOR		INPUT COLOR DATA																													
		RED										GREEN										BLUE									
		MSB									LSB	MSB									LSB	MSB									LSB
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	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
	Red(255)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	0	0	1	1	1	1	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	1	1	0	0	0	0	0	0	0	0	0	0	1	1	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	1	1	1	1	0	0	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	1	1	1	1	1	1
Red	Red(000)	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
	Red(001)	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	0	0	0	0
	:																														
	Red(254)	1	1	1	1	1	1	1	1	1	0	0	0	0	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	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green	Green(000)	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
	Green (001)	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
	:																														
	Green(254)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Blue	Blue(000)	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
	Blue(001)	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
	:																														
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	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	0	0	0	0	1	1	1	1	1	1	1	1	1	1

3-6 Power Sequence

1. Power sequence of panel



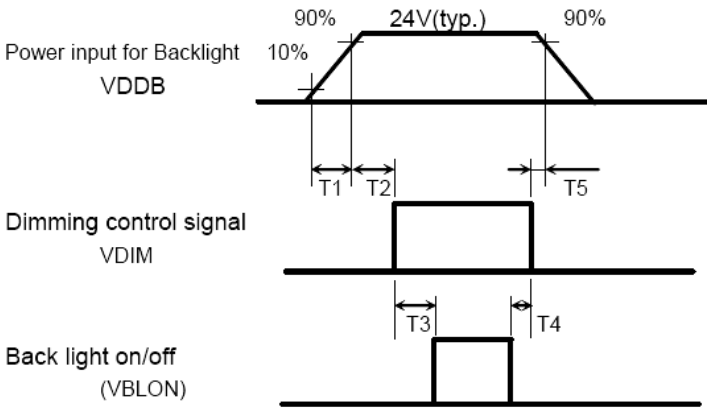
Parameter	Values			Units
	Min.	Typ.	Max.	
t1	0.5	-	20	**ms**
t2	20	-	50	**ms**
t3	800	-	-	**ms**
t4	200	-	-	**ms**
t5	50	-	-	**ms**
t6	0.5	-	30	**ms**
t7	1.0	-	-	**s**

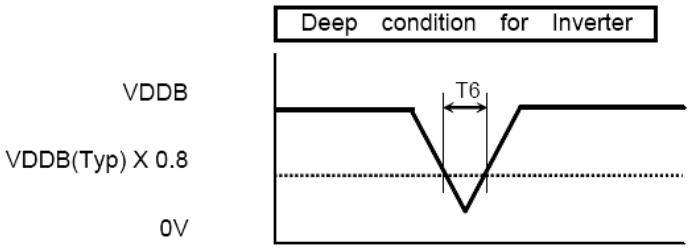
*: If t3=200ms, input black signal till 700ms from system is necessary. In case of t3<200ms, the abnormal display will be happened. But it will not damage timing controller.

Apply the lamp voltage within the LCD operating 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.

Caution: The above on/off sequence should be applied to avoid abnormal function in the display. In case of handling, make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

2 Power Sequence of Inverter





Parameter	Values			Units
	Min.	Typ.	Max.	
T1	20	-	-	ms
T2	0	-	-	ms
T3	500	-	-	ms
T4	0	-	-	ms
T5	1	-	-	ms
T6	-	-	10	ms

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 60 minutes in a dark environment at 25℃. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and θ equal to 0°.

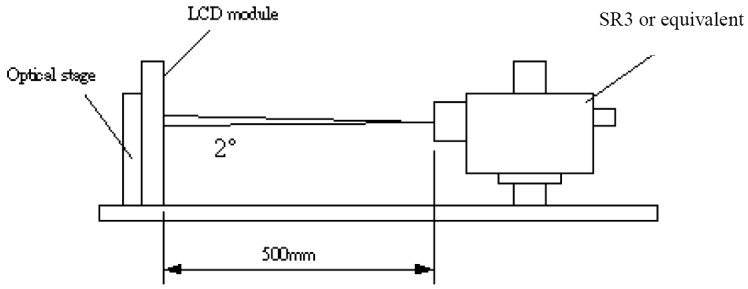


Fig.4-1 Optical measurement equipment and method

Parameter		Symbol	Values			Units	Notes
			Min.	Typ.	Max.		
Contrast Ratio		CR	3000	4000	-		1
Surface Luminance, white		LWH	550	700	-	cd/㎡	2
Luminance Variation		δ_{WHITE} 9 p	-	-	1.3		3
Response Time (Average)		T_γ		8		ms	5 (Gray to Gray)
	Rising Time	Tr	-	15	25	ms	4
	Falling Time	Tf	-	8	10	ms	4
Color Chromaticity	RED	R_X	Typ –0.03	TBD	Typ +0.03		
		R_Y		TBD			
	GREEN	G_X		TBD			
		G_Y		TBD			
	BLUE	B_X		TBD			
		B_Y		TBD			
	WHITE	W_X		0.280			
		W_Y		0.290			
Viewing Angle							CR>10
x axis, right(φ=0°)		θ_r	-	89	-	Degree	6
x axis, left(φ=180°)		θ_l	-	89	-		
y axis, up(φ=90°)		θ_u	-	89	-		
y axis, down (φ=0°)		θ_d	-	89	-		

Note:

1. Contrast Ratio (CR) is defined mathematically as:

$$\text{Contrast Ratio(CR)} = \frac{\text{Surface Luminance with all" white" pixels}}{\text{Surface Luminance with all "black" pixels}}$$

2. Surface luminance is luminance value at point 1 across the LCD surface 50cm from the surface with all pixels displaying white. From more information see Fig. 4-2. When V_{DDB} = 24V, I_{DDB} = 7.5 A. $L_{WH}=L_{on1}$, Where Lon1 is the luminance with all pixels displaying white at center 1 location.

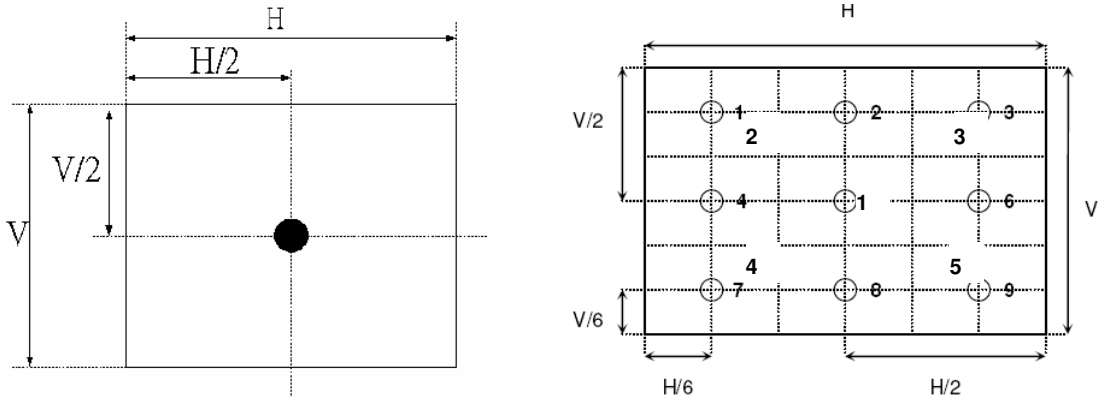


Fig.4-2 Optical measurement point

3. The variation in surface luminance, δ_{WHITE} is defined under 100% brightness as:

$$\delta_{WHITE(5P)}=\text{Maximum}(L_{on1}, L_{on2},\ldots,L_{on5})/\text{Minimum}(L_{on1}, L_{on2},\ldots L_{on5})$$

4. Response time is the time required for the display to transition from white(L255) to black(L0) (Decay Time, Tr_D=Tf) and from black(L0) to white(L255) (Rise Time, Tr_R=Tr). For additional information see Fig. 4-3.

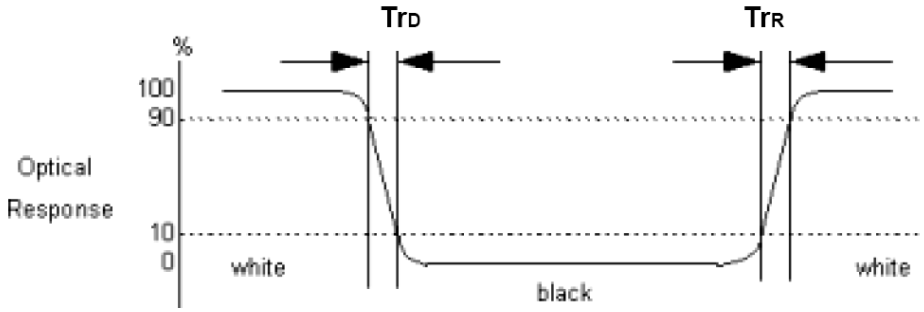


Fig.4-3 Response time

5. The response time is defined as the following figure and shall be measured by switching the input signal among 0%, 25%, 50%, 75%, 100% luminance. For additional information see Fig. 4-4.

	0%	25%	50%	75%	100%
0%		t: 0%-25%	t: 0%-50%	t: 0%-75%	t: 0%-100%
25%	t: 25%-0%		t: 25%-50%	t: 25%-75%	t: 25%-100%
50%	t: 50%-0%	t: 50%-25%		t: 50%-75%	t: 50%-100%
75%	t: 75%-0%	t: 75%-25%	t: 75%-50%		t: 75%-100%
100%	t: 100%-0%	t: 100%-25%	t: 100%-50%	t: 100%-75%	

Fig.4-4 Response time

6. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see Fig. 4-5. (Optical measurement by SR3)

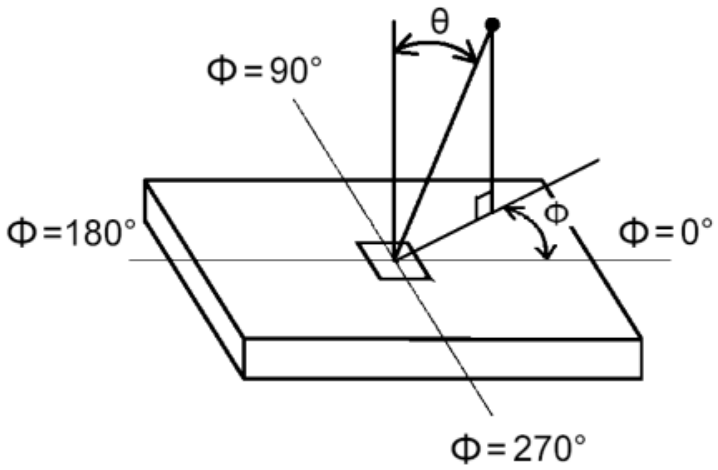


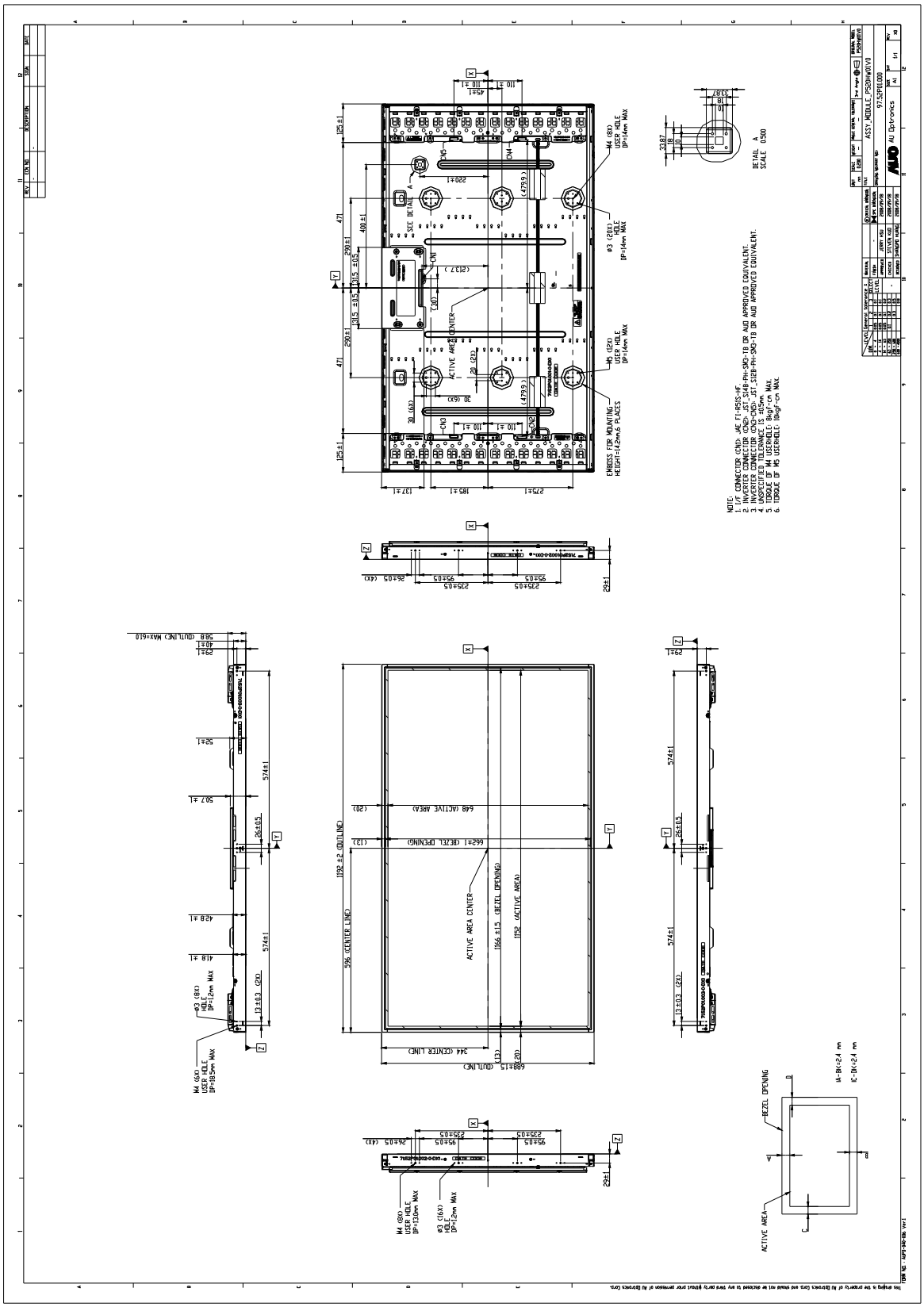
Fig.4-5 Viewing Angle Definition

5. Mechanical Characteristics

The contents provide general mechanical characteristics for the model P520HW01 V0. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal (typ.)	1192 mm
	Vertical (typ.)	688 mm
	Depth (max.)	61.00 mm(with inverter)
Bezel Opening Area	Horizontal (typ.)	1166 mm
	Vertical (typ.)	662 mm
Display Active Area	Horizontal (typ.)	1152 mm
	Vertical (typ.)	648 mm
Weight	20000 g (Max.)	
Surface Treatment	Super clear	

2-D Drawing



6. Reliability

No	Test Item	Condition
1	High temperature storage test	Ta=60℃, 300hr judge
2	Low temperature storage test	Ta=-20℃, 300hr judge
3	High temperature/High humidity operation test	Ta=50℃, 80%RH, 300hr judge
4	High temperature operation test	Ta=50℃, 300hr judge
5	Low temperature operation test	Ta=-5℃, 300hr judge
6	Thermal shock	-20℃/0.5hr ~ 60℃/0.5hr, 100cycle
7	Vibration test (non-operating)	Wave form: Random Vibration level: 1.5G RMS, Bandwidth: 10-500Hz Duration: X, Y, Z (30min one time each direction)
8	Shock test (non-operating)	Shock level: 30G Waveform: half since wave, 11ms Direction: ±X, ±Y, ±Z (One time each direction)
9	Vibration test (with carton)	Wave form: Random Vibration level: 2.19G RMS, Bandwidth: 1~500Hz Duration: X, Y, Z (30min each direction)
10	Drop test (with carton)	Height: 30.5cm 1 corner, 3 edges, 6 surfaces (ASTMD4169-I)

7. International Standard

7-1. Safety

(1) UL60065, Underwriters Laboratories, Inc. (AUO file number : E204356)
Audio, video and similar electronic apparatus, safety requirement .

(2) CSA E60065, Canadian Standards Association
Audio, video and similar electronic apparatus, safety requirement .

(3) IEC 60065 ver. 7th, European Committee for Electro technical Standardization (CENELEC)
Audio, video and similar electronic apparatus, safety requirement .

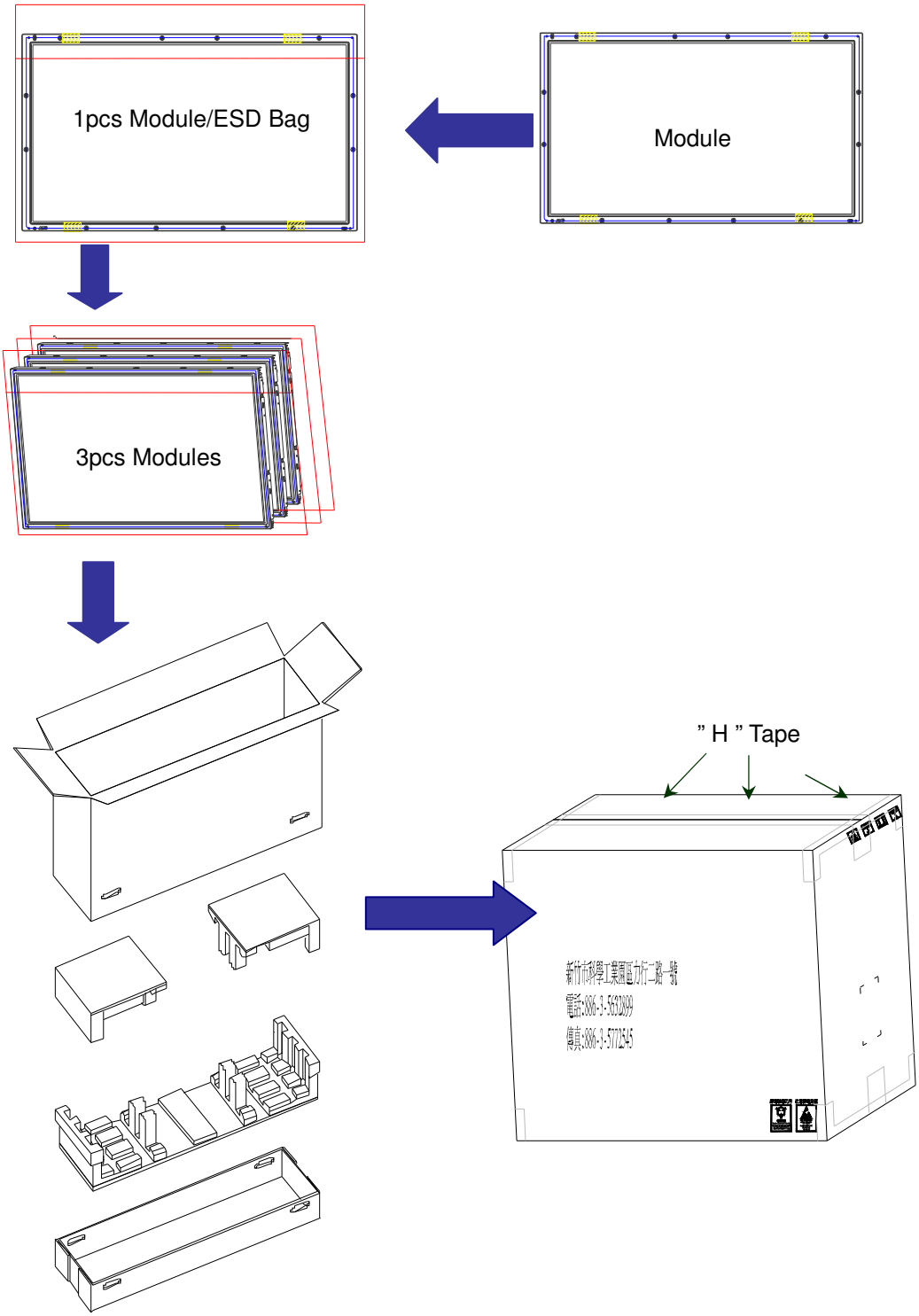
7-2. EMC

(1) ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electrical Equipment in the Range of 9kHz to 40GHz. “American National standards Institute (ANSI), 1992

(2) CISPR 20 “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment. ” International Special committee on Radio Interference.

(3) EN 55022 “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment. ” European Committee for Electrotechnical Standardization. (CENELEC), 1998

8. Packing



Package Information:

Carton outside dimension: 1270(L)mm× 370(W)mm× 820(H)mm

Carton/Package weight:3.7 kg

EPE Cushion：4.4 Kg

Gross weight (per Box): 65 kg

Shipping Label (on the rear side of TFT-LCD display)

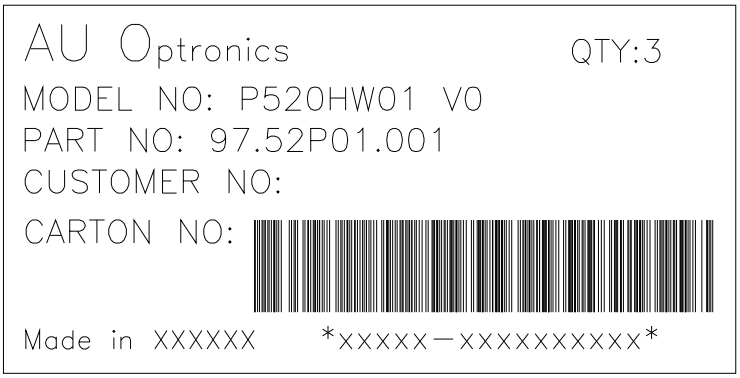
Green Mark Description:

For Pb Free products, AUO will add for identification.

For RoHS compatible products, AUO will add for identification.

Note: The Green Mark will be present only when the green documents have been ready by AUO Internal Green Team. (The definition of green design follows the AUO green design checklist.)

Carton label



Pallet Information

By air cargo: : (3x1) x1 layers, one pallet put 3 boxes, total 9 pcs module.

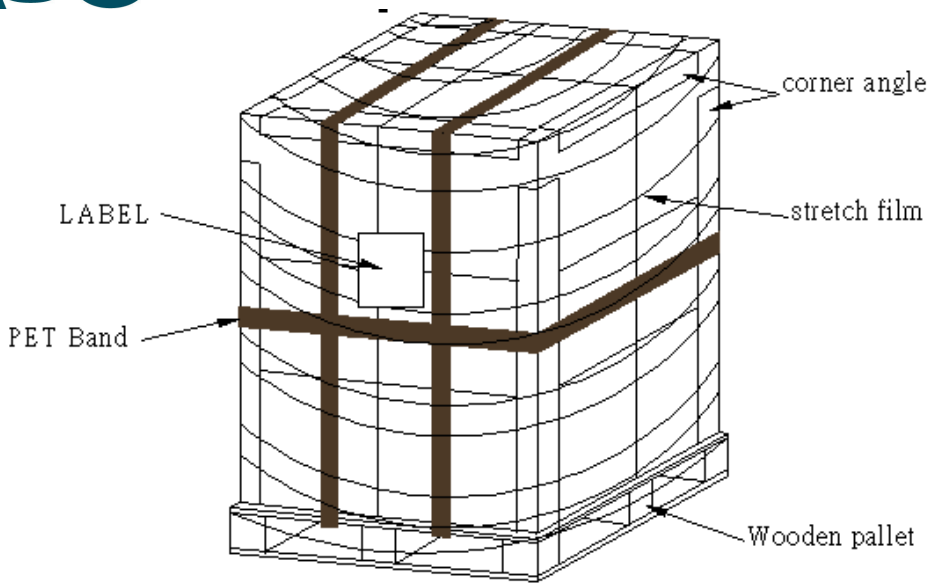
By sea: (3x1) x2 layers, one pallet put 6 boxes, total 18 pcs module.

Pallet dimension : 114 m m× 1320 m m *138 m m

Pallet weight: 15.5kg

By air total weight: 65 kg/box X 3 boxes=195 kg (with pallet weight 210.5 kg)

By sea total weight: 65 kg/box X 6 boxes=390 kg (with pallet weight 421 kg)



9. Precautions

Please pay attention to the followings when you use this TFT LCD module.

9-1 Mounting Precautions

(1) You must mount a module using holes arranged on back side of panel.

(2) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.

(3) You should adopt radiation structure to satisfy the temperature specification.

(4) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.

(5) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are detrimental to the polarizer.)

(6) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front/ rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.

(7) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.

(8) Do not open the case because inside circuits do not have sufficient strength.

9-2 Operating Precautions

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage: V=±200mV(Over and under shoot voltage)

(2) Response time depends on the temperature. (In lower temperature, it becomes longer..)

(3) Brightness depends on the temperature. And in lower temperature, response time (required time that brightness is stable after turned on) becomes longer.

(4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.

(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.

(6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interface.

(7) Since front polarizer is easily damaged, please be cautious and not to scratch it.

(8) Be sure to turn off power supply when inserting or disconnecting from input connector.

(9) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

(10) When the panel surface is soiled, wipe it with absorbent cotton or soft cloth.

(11) Since the panel is made of glass, it may be broken or cracked if dropped or bumped on hard surface.

(12) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.

(13) Do not open nor modify the module assembly.

(14) Do not press the reflector sheet at the back of the module to any direction.

(15) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.

(16) After installation of the TFT Module into an enclosure (Notebook PC Bezel, for example), do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

(17) Cold cathode fluorescent lamp in LCD contains a small amount of mercury. Please follow local ordinances or regulations for disposal.

(18) Small amount of materials having no flammability grade is used in the LCD module. The LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950 or UL1950), or be applied exemption.

(19) The LCD module is designed so that the CCFL in it is supplied by Limited Current Circuit (IEC60950 or UL1950). Do not connect the CCFL in Hazardous Voltage Circuit.

(20) Severe temperature condition may result in different luminance, response time and lamp ignition voltage.

(21) Continuous operating TFT-LCD display under low temperature environment may accelerate lamp exhaustion and reduce luminance dramatically.

(22) The data on this specification sheet is applicable when LCD module is placed in portrait position.

(23) Continuous displaying fixed pattern may induce image sticking. It's recommended to use screen saver or shuffle content periodically if fixed pattern is displayed on the screen.

9-3 Electrostatic Discharge Control

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

9-4 Precautions for Strong Light Exposure

Strong light exposure causes degradation of polarizer and color filter.

9-5 Storage

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.

(2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

9-6 Handling Precautions for Protection Film

(1) The protection film is attached to the bezel with a small masking tape. When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.

(2) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of flue still on the Bezel after the protection film is peeled off.

(3) You can remove the glue easily. When the glue remains on the Bezel or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

9-7 Operating Condition in PID Application

(1) If the continuous static display is required, periodically inserting a motion picture is strongly recommended.

(2) Recommend to periodically change the background color and background image.

(3) Recommend not to continuously operate over 18 hours a day.

(4) Recommend to adopt one of the following actions after long time display.

i. Running the screen saver (motion picture or black pattern)

ii. Power off the system for a while