Product Description: 23” WXGA Color TFT-LCD Module			
AUO Model Name: T230XW01 V0			
Customer Part No/Project Name:			
Customer Signature		AUO	2006/08/10
		Approved By: **Hong Jye Hong**	
		Reviewed By: **Ming Ku**	
		Prepared By: **Jerry Lee**	

Please return one copy with your signature and comments for our confirmation.

AU Optronics Corporation

Tel: +886-3-563-2899

Fax: +886-3-563-1590

Product Specifications

23” WXGA Color TFT-LCD Module
Model Name: T230XW01

(*) Preliminary Specifications
( ) Final Specifications

Contents

Record of Revision

Version	Date	Page	Old Description	New Description	Remark
0.1	06'/04/20	-	-	First Draft	
0.2	06'/05/05	8	TBD	Update Electrical Characteristics	
		12	TBD	Update Lamp specification	
			TBD	Update Inverter Pin Assignment and Connector Type	
0.3	06'/05/19	25	TBD	Update the packing information	
0.4	06'/06/19	6	TBD	Update power consumption and weight	
		7	TBD	Update input voltage of signal	
		8	TBD	Update electrical characteristics	
		9	TBD	Update the current of test pattern	
		12	TBD	Update backlight electrical specification	
		13	Clock Max. : 88 MHz	Clock Max. : 85 MHz	
		16	Power Sequence: T3 min.=700ms	T3 min. = 200ms	
		17	No Description	To add the power sequence of Inverter	
		21	TBD	To add the weight of panel = 3300g	
0.5	06'/06/28	18	TBD	To update the optical specification	
0.6	06'/07/27	13	Timing table	To update V-total lines to 930 as max. value	
0.7	06'/08/10	19	Optical Data	1. Adding CR and brightness min value	
				2. Adding response time max. value	
				3. Adding viewing angle min. value	

1. General Description

This specification applies to the 23.0 inch Color TFT-LCD Module T230XW01.

This module supports the WXGA (1366(H) x 768(V)) screen format and 16.7M colors (6-bits + FRC).

All input signals are 1 channel LVDS interface compatible.

This module includes inverter card for backlight.

Features

-WXGA 1366(H) x 768(V) resolution

-Fast response Time (8ms)

-50,000 hours lamp life

-8 CCFL Direct Type Backlight Design (Cold Cathode Fluorescent Lamp)

-High brightness, High contrast ratio

-Wide viewing angle

-Low power consumption

-Green Design (ROHS Compliance)

-HDTV Ready Module

Application

Personal TV

Bedroom TV or 2nd TV Application

Multi-function media

* General Information

The following items are characteristics summary on the table 25 ℃ condition:

Items	Specification	Unit	Note
Active Screen Size	22.95 inches		58.296cm diagonal
Display Area	508.152(H) x 285.696(V)	mm	
Outline Dimension	546.0(H) × 318.3(V) × 46.0(D) (Max.)	mm	
Resolution	1366(R,G,Bx3) x 768	Pixels	
Pixel Pitch	0.372 x 0.372	mm	
Pixel Arrangement	RGB vertical stripe		
Display mode	TN mode, Normally White		
Display Colors	16.7M (6-bit + FRC for R,G,B)	Colors	
Typical White Luminance	450 nit (typ.)	[cd/m^2]	
Contrast Ratio	700:1 (typ.)		
Color Gamut	72% (typ.) of NTSC		
Response Time	8ms(typ.) (Tr+Tf)	ms	
Viewing Angle (H/V)	160/140		CR>10
Power Consumption	54.03 (typ.)	W	
Electronic Interface	1ch LVDS		
Frame rate	60Hz (typ.), 75Hz (max.)	Hz	
Weight(g)	3300(typ.)	g	
Surface Treatment	Hard-Coating 3H, AG		
ROHS	ROHS compliance		

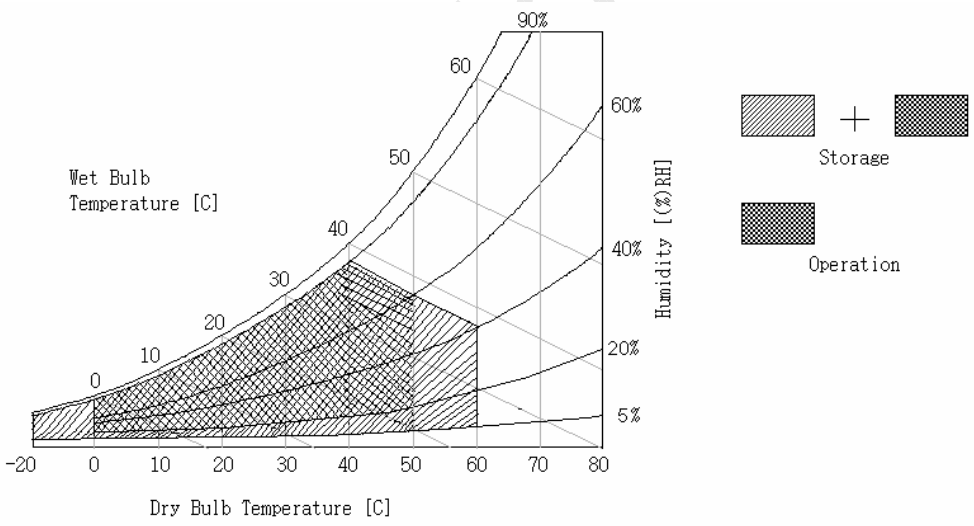
2. Absolute Maximum Ratings

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

Item	Symbol	Min	Max	Unit	Note
Logic/LCD Drive Voltage	Vdd	-0.3	14.0	[Volt]	1
Input Voltage of Signal	Vin	-0.3	3.6	[Volt]	1
Operating Temperature	TOP	0	+50	[°C]	2
Operating Humidity	HOP	10	90	[%RH]	2
Storage Temperature	TST	-20	+60	[°C]	2
Storage Humidity	HST	10	90	[%RH]	2

Note 1 : Duration = 50msec

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



3. Electrical Specification

The T230XW01 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. An inverter typically generates the second input, which powers the CCFL.

3-1 Electrical Characteristics

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
LCD:						
Power Supply Input Voltage	Vdd	10.8	12.0	13.2	Vdc	
Power Supply Input Current	Idd	-	0.31	0.36	A	1
Power Consumption	Pc	-	3.63	4.32	Watt	1
Inrush Current	I_{RUSH}			1.2	A	1
Backlight Power Consumption		45.6	50.4	55.2	Watt	2
Total Power Consumption		-	54.03	59.52	Watt	2
Life Time		50,000		-	Hours	3

The performance of the Lamp in LCM, for example lifetime or brightness, is extremely influenced by the characteristics of the DC-AC Inverter. So all the parameters of an inverter should be carefully designed so as not to produce too much leakage current from high-voltage output of the inverter. When you design or order the inverter, please make sure unwanted lighting caused by the mismatch of the lamp and the inverter (no lighting, flicker, etc) never occurs. When you confirm it, the LCD Assembly should be operated in the same condition as installed in your instrument.

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.

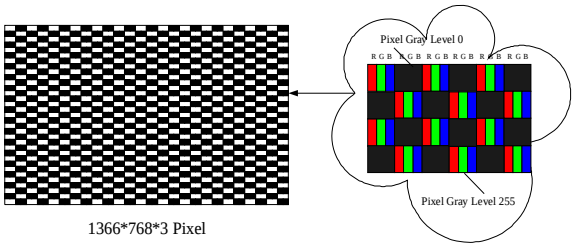
The relative humidity must not exceed 80% non-condensing at temperatures of 40℃ or less. At temperatures greater than 40℃, the wet bulb temperature must not exceed 39℃. When operate at low temperatures, the brightness of CCFL will drop and the lifetime of CCFL will be reduced.

Note :

1. Vdd=12.0V, Fv=62Hz, f_{CLK}= 88MHz , 25℃, Vdd Duration time= 470 μs

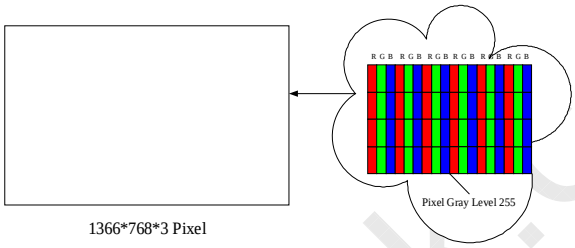
The Power supply input check pattern definition and dissipation reference as below :

Dot pattern：373mA (Max.)



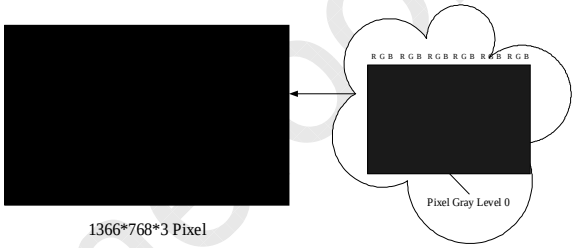
1366*768*3 Pixel
Dot pattern (Dot)

White pattern：290m A



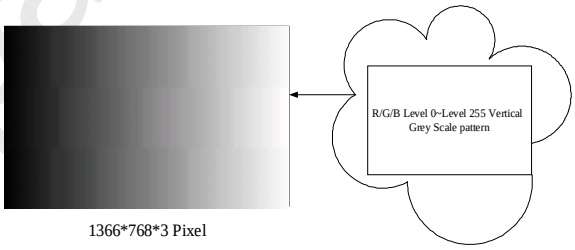
1366*768*3 Pixel
Gray Level 255 (White Screen)

Black pattern：345m A



1366*768*3 Pixel
Gray Level 0 (Black Screen)

Vertical gray scale pattern：311m A(Typ.)



1366*768*3 Pixel
Vertical Gray Scale

2. The lamp power consumption shown above does include loss of external inverter at 25 ℃..
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℃.

3-2 Interface Connections

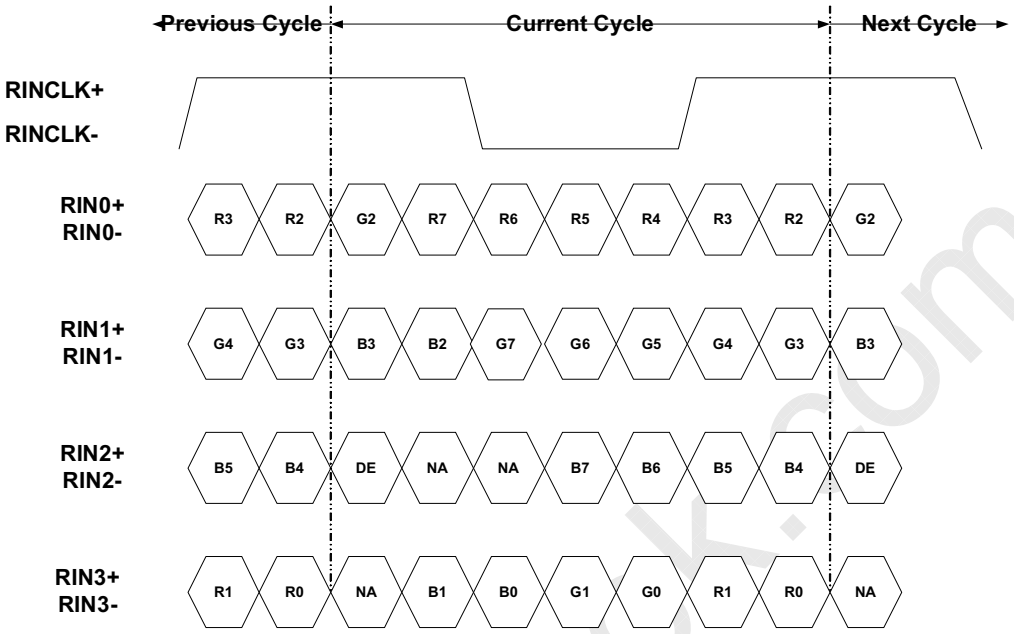
- LCD connector (CN1): JAE FI-X30SSL-HF or equivalent
- LVDS Transmitter: DS90C385 (NS) or equivalent

Note:

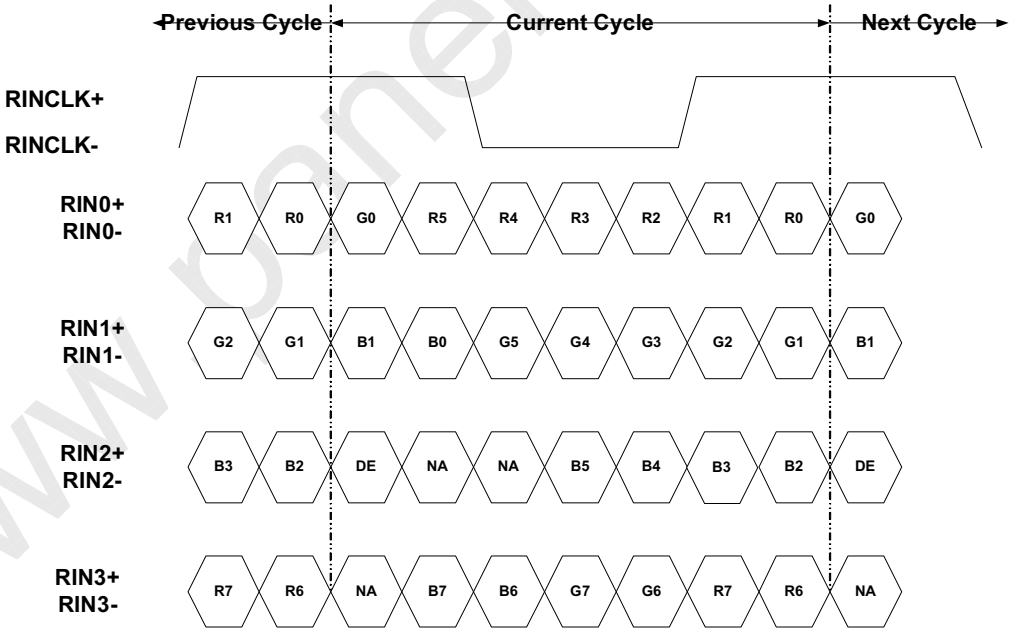
1. All GND (ground) pins should be connected together and should also be connected to the LCD's metal frame. All Vcc (power input) pins should be connected together.

Pin No	Symbol	Description	Note
1	Vdd	12V, DV, Regulated	
2	Vdd	12V, DV, Regulated	
3	Vdd	12V, DV, Regulated	
4	Vdd	12V, DV, Regulated	
5	GND	Ground	
6	GND	Ground	
7	GND	Ground	
8	GND	Ground	
9	LVDS	Low for JEIDA, High/Open for NS	
10	Reserved	N.C.	
11	GND	Ground	
12	RIN0-	LVDS Channel 0 [Polarity: Negative]	
13	RIN0+	LVDS Channel 0 [Polarity: Positive]	
14	GND	Ground	
15	RIN1-	LVDS Channel 1 [Polarity: Negative]	
16	RIN1+	LVDS Channel 1 [Polarity: Positive]	
17	GND	Ground	
18	RIN2-	LVDS Channel 2 [Polarity: Negative]	
19	RIN2+	LVDS Channel 2 [Polarity: Positive]	
20	GND	Ground	
21	RCLK-	LVDS Clock [Polarity: Negative]	
22	RCLK+	LVDS Clock [Polarity: Positive]	
23	GND	Ground	
24	RIN3-	LVDS Channel 3 [Polarity: Negative]	
25	RIN3+	LVDS Channel 3 [Polarity: Positive]	
26	GND	Ground	
27	Reserved	N.C.	
28	Reserved	N.C.	
29	GND	Ground	
30	GND	Ground	

◆ **LVDS Option = L (GND)**



◆ **LVDS Option = H (3.3V) / Open**



Backlight Connector Pin Configuration

1. Electrical specification

Item	Symb.		Condition	Spec			Units	Note.
				Min	Typ	Max		
Input Voltage	VDDB		-	21.6	24	26.4	VDC	
Input Current	IDDB		VDDB=24V	1.9	2.1	2.3	ADC	1
Input Power	PDDB		VDDB=24V	45.6	50.4	55.2	W	1
Inrush Current	IRUSH		VDDB=24V	-	-	3.15	ADC	1,2
On/Off Control Voltage	VBLON	ON	VDDB=24V	2	-	5	VDC	
		OFF	VDDB=24V	0	-	0.8		
On/Off Control Current	IBLON		VDDB=24V	0	-	1.5	mADC	
Dimming Control Voltage	VDIM	MAX	VDDB=24V	-	3.3	-	VDC	1
		MIN	VDDB=24V	-	0	-		
PWM Function	V_PWM	MAX	-	2	-	5	VDC	
		MIN	-	0	-	0.8		
Ext PWM Duty Ratio	D_EPWM		-	30	-	100	%	
Ext PWM Freq	F_EPWM		-	150	-	300	Hz	

Note1. VDIM = 3.3V (Ta = 25+-5℃, Turn on for 45 minutes)
Note2. Measurement condition rising time = 20ms (VDD: 10%~90%)

2. Inverter Pin Assignment

Connector (CN1)：JST_S14B-PH-SM3-TB or equivalent

Pin No.	Symbol	Description	Default
1	VDDB	Operation Voltage Supply, +24V DC regulated	24V
2	VDDB	Operation Voltage Supply, +24V DC regulated	24V
3	VDDB	Operation Voltage Supply, +24V DC regulated	24V
4	VDDB	Operation Voltage Supply, +24V DC regulated	24V
5	VDDB	Operation Voltage Supply, +24V DC regulated	24V
6	GND	Ground and Current Return	GND
7	GND	Ground and Current Return	GND
8	GND	Ground and Current Return	GND
9	GND	Ground and Current Return	GND
10	GND	Ground and Current Return	GND
11	VDIM (ADIM)	GND (0V) 80% / Open (1.6V) 100% / High (3.3V) 120%, Luminance	100%
12	VBLON	BL On-Off: Open/High (3.3V) for BL On as default	On
13	PDIM	External PWM/Analog Dimming Control input; Open/High (3.3V, 100% Duty) for 100%	100%
14	PDIM Selection	GND: External PWM dimming; Open/High: Analog dimming	PWM

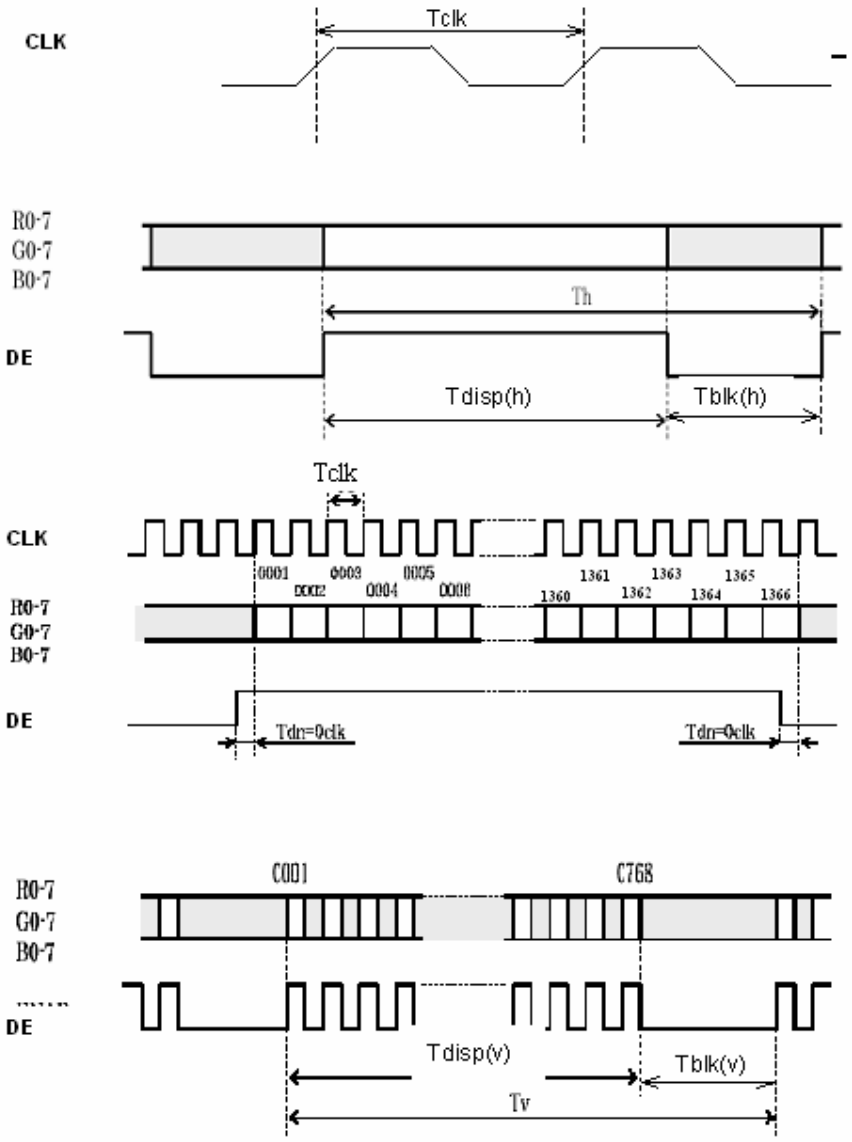
3-3 Signal Timing Specifications

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**

Signal	Item	Symbol	Min	Type	Max	Unit
Vertical Section	Period	Tv	789	806	**930**	Th
	Active	Tdisp (v)		768		Th
	Blanking	Tblk (v)	21	38	**162**	Th
Horizontal Section	Period	Th	1414	1560	1722	Tclk
	Active	Tdisp (h)		1366		Tclk
	Blanking	Tblk (h)	48	194	356	Tclk
Clock	Frequency	1/Tclk	65	76	**85**	MHz
Vertical Frequency	Frequency	**Fv**	**48**	60	**75**	Hz
Horizntal Frequency	Frequency	**Fh**	**39.45**		**61.65**	KHz

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 8 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
		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 Color	Black(L0)	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(L255)	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	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	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

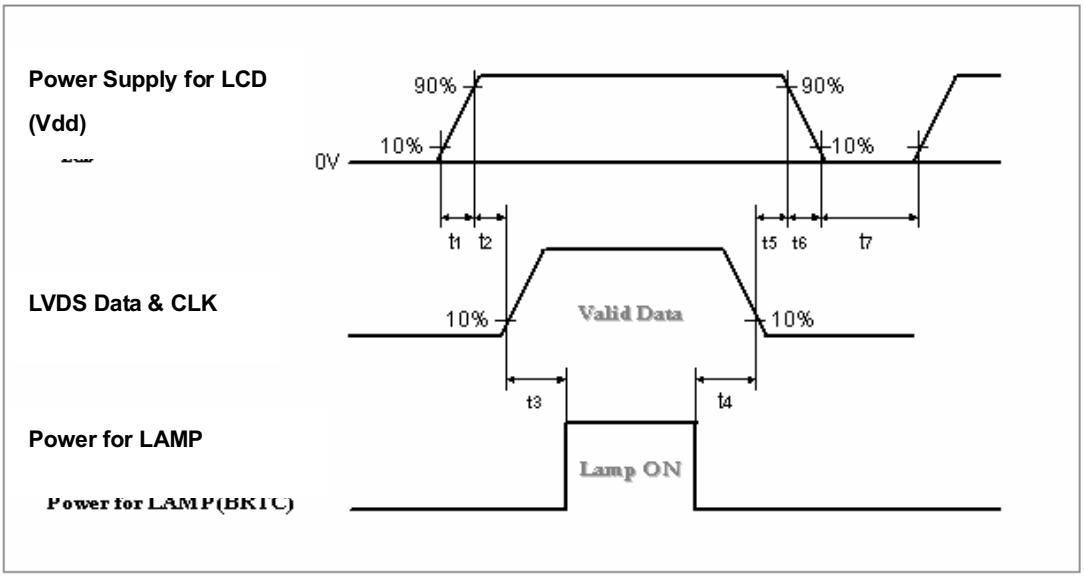
	RED	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

	GREEN	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
BLUE	BLUE	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	0	0	0	0	0	0	0	1

	BLUE	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

3-6 Power Sequence

3.6.1 Power Sequence for LCD

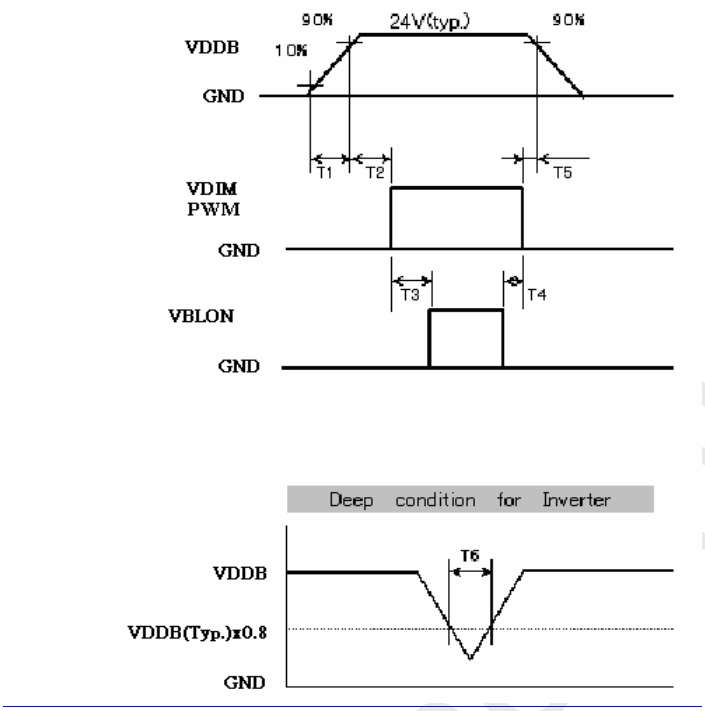


Parameter	Values			Units
	Min.	Typ.	Max.	
t1	0.47	-	20	ms
t2	20	-	50	ms
t3	200	-	-	ms
t4	10	-	-	ms
t5	1	-	50	ms
t6	-	-	300	ms
t7	1000	-	-	ms

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.

3.6.2 Power Sequence for Inverter



Parameter	Values			Units
	Min.	Typ.	Max.	
T1	20	-	-	ms
T2	50	-	-	ms
T3	50	-	-	ms
T4	50	-	-	ms
T5	0	-	-	ms
T6	-	-	10	ms

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 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°.

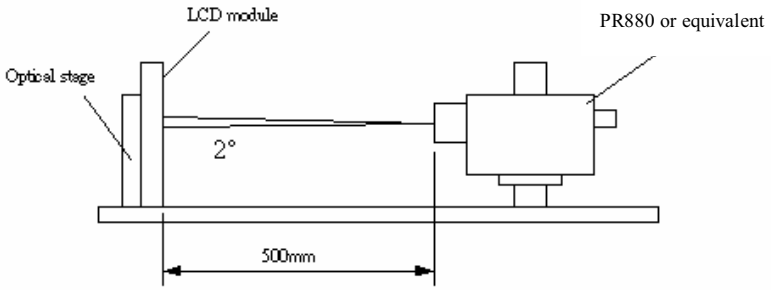


Fig.4-1 Optical measurement equipment and method

Parameter		Symbol	Values			Units	Notes
			Min.	Typ.	Max.		
Contrast Ratio		CR	550	700			1
Surface Luminance, white		LWH	360	450		cd/m²	2
Luminance Variation		δ_{WHITE} 9 p			1.25		3
Response Time		Tγ		8	16	ms	4,5 (Tr+Tf)
	Rise Time	Tr		7	13	ms	
	Decay Time	Tf		1	3	ms	
Color Coordinates							
	RED	R_X	Typ.-0.03	0.638	Typ.+0.03		
		R_Y		0.337			
	GREEN	G_X		0.299			
		G_Y		0.604			
	BLUE	B_X		0.145			
		B_Y		0.059			
	WHITE	W_X		0.280			
		W_Y		0.292			
Viewing Angle by ELDIM							Contrast Ratio>10
x axis, right(φ=0°)		θ_r	65	80		Degree	6
x axis, left(φ=180°)		θ_l	65	80			
y axis, up(φ=90°)		θ_u	65	80			
y axis, down (φ=0°)		θ_d	50	60			

Note:

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

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the white (L255) state}}{\text{Brightness on the black (L0) state}}$$

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 I_{BL} = 6.5mA, L_{WH}=450cd/㎡ (typ.) L_{WH}=Lon1, Where Lon1 is the luminance with all pixels displaying white at center 1 location.

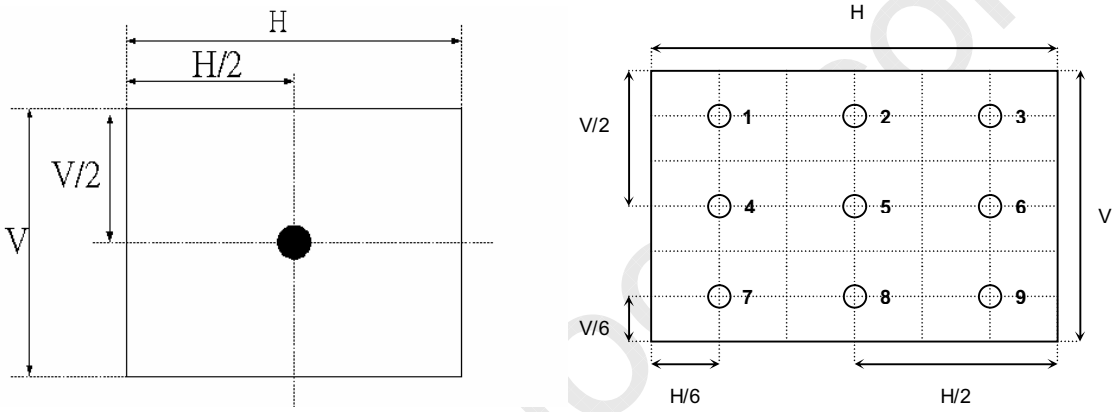


Fig.4-2 Optical measurement point

3. The variation in surface luminance, δ WHITE is defined (center of Screen) as:

$$\delta_{WHITE(9P)} = \text{Maximum}(L_{on1}, L_{on2}, \ldots, L_{on9}) / \text{Minimum}(L_{on1}, L_{on2}, \ldots L_{on9})$$

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). The response time interval is between the 10% and 90% of 1st frame amplitudes. For additional information see FIG 4-3.

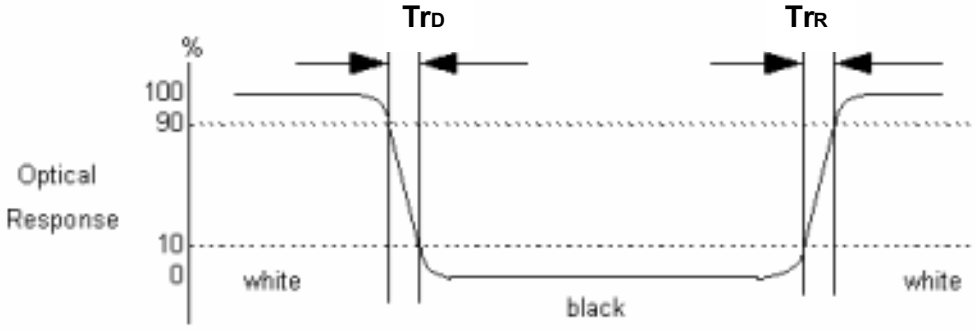


Fig.4-3 Response time

5. 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.

6. To be measured with a viewing cone of 1°by Topcon luminance meter ELDIM EZ Contrast 160D.

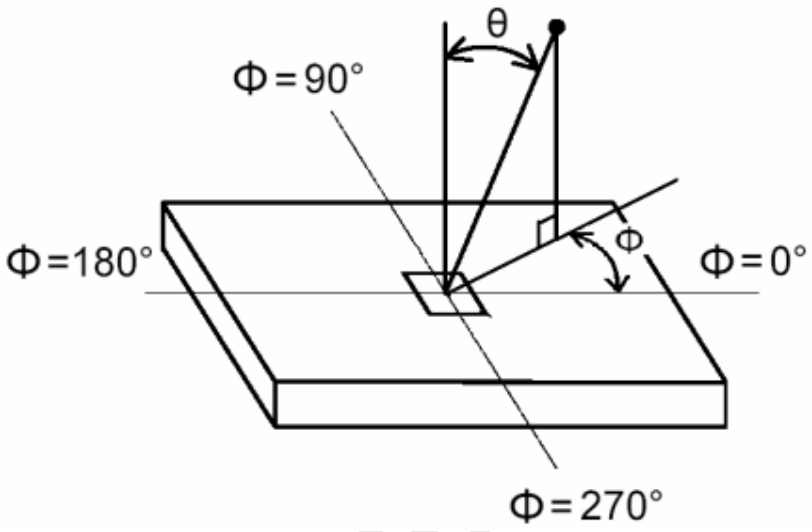


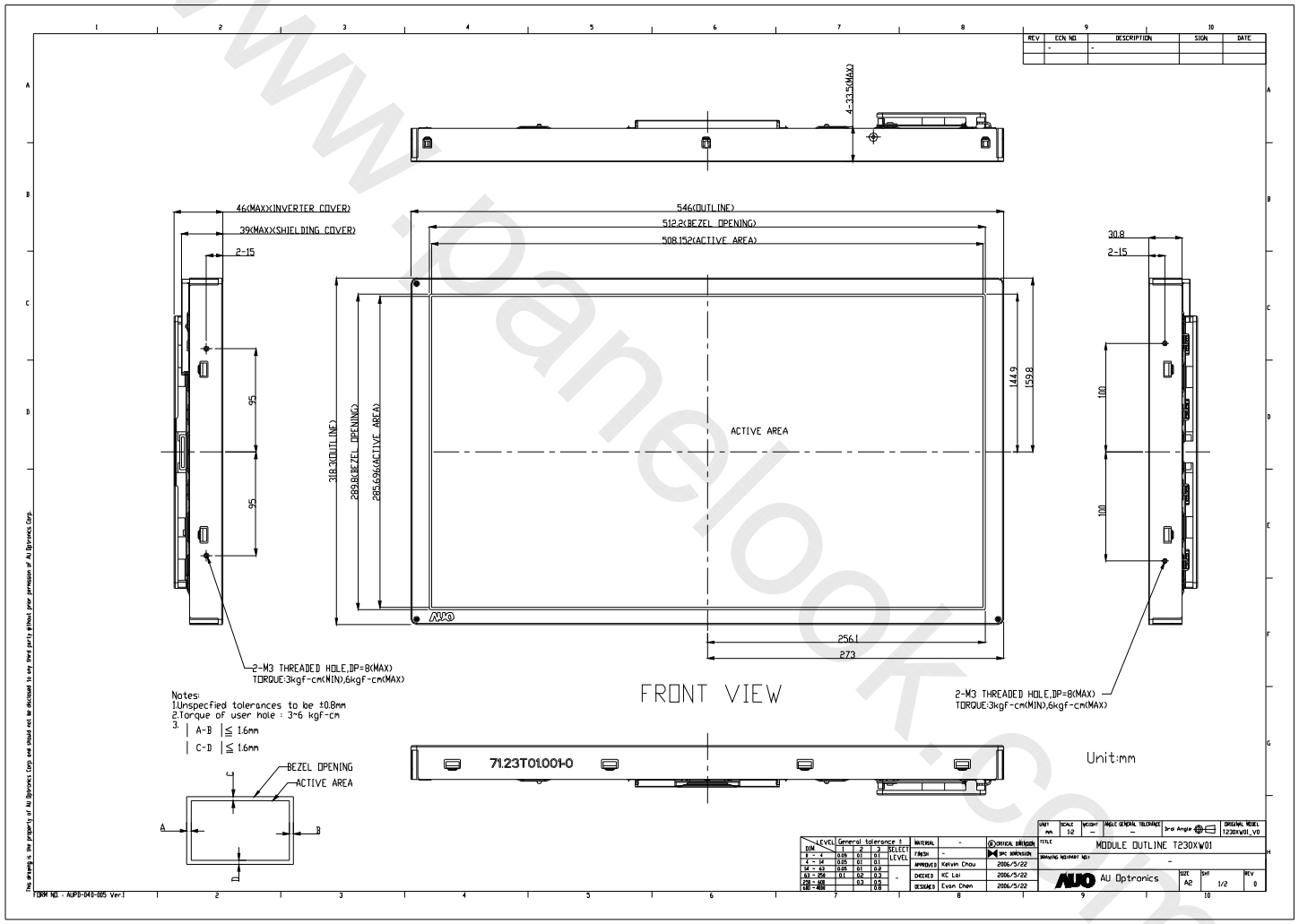
Fig.4-5 Viewing Angle Definition

5. Mechanical Characteristics

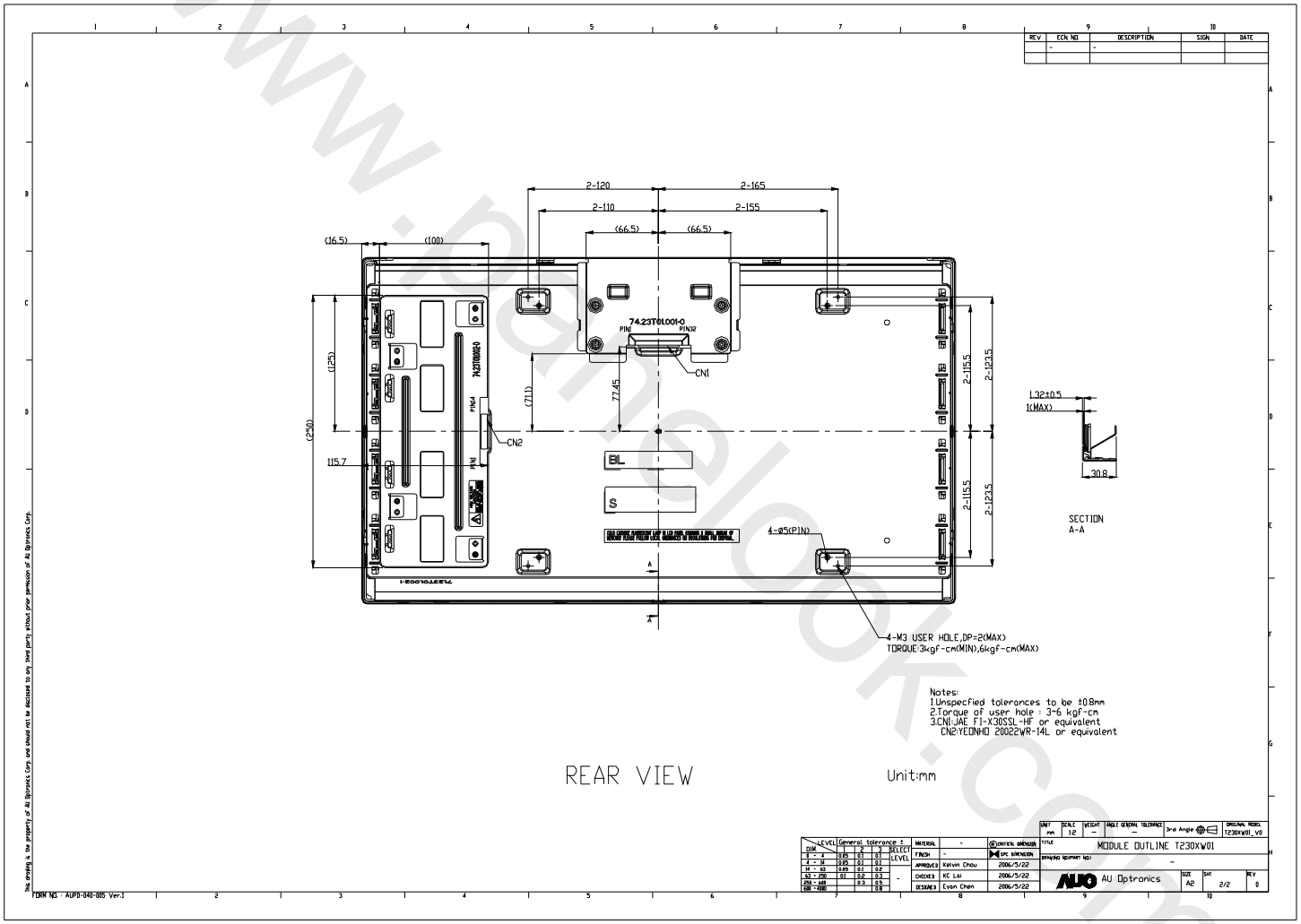
The contents provide general mechanical characteristics for the model T230XW01. In addition the figures in the next page are detailed mechanical drawing of the LCD.

Outline Dimension	Horizontal (typ.)	546.0mm
	Vertical (typ.)	318.3mm
	Depth (typ.)	46.0mm(Max.)
Bezel Area	Horizontal (typ.)	512.2mm
	Vertical (typ.)	289.8mm
Active Display Area	Horizontal	508.152mm
	Vertical	285.696mm
Weight	3300g (typ.)	
Surface Treatment	HC, 3H	

Front View:



Rear View:



6. International Standard

6-1. Safety

(1) UL6500, Underwriters Laboratories, Inc. (AUO file number : E204356)
Standard for Safety of Information Technology Equipment Including electrical Business Equipment.

(2) CAN/CSA C22.2 No. 950-95 Third Edition, Canadian Standards Association, Jan. 28, 1995
Standard for Safety of Information Technology Equipment Including Electrical Business Equipment.

(3) EN60950 : 1992+A2: 1993+A2: 1993+C3: 1995+A4: 1997+A11: 1997
IEC 950: 1991+A1: 1992+A2: 1993+C3: 1995+A4:1996
IEC 60065
European Committee for Electro technical Standardization (CENELEC)
EUROPEAN STANDARD for Safety of Information Technology Equipment Including Electrical Business Equipment.

6-2. EMC

a) 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

b) C.I.S.P.R “Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment.” International Special committee on Radio Interference.

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

7. Packing

Label Sample

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

AU Optronics **QTY: 5**

MODEL NO: T230XW01 VX

PART NO: 97.23T01.XXX

CUSTOMER NO:

CARTON NO:

Made in Taiwan *PM100-01A1600001*

Packing size:

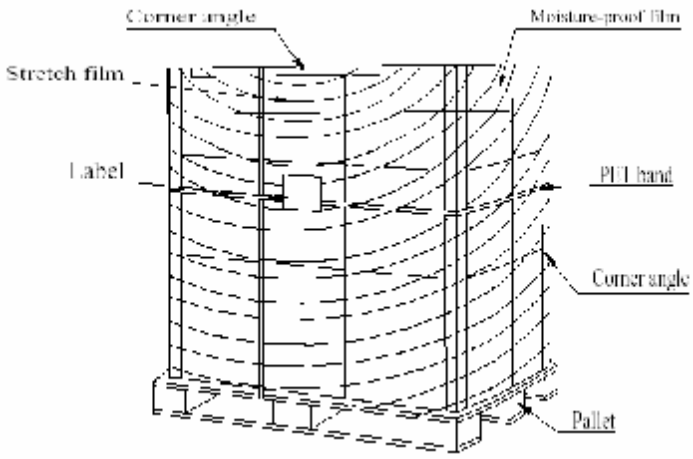
Carton Box: 370mm(W)x400mm(L)x655mm(H)

Pallet Size: 1140mm(W)*820mm(L)*123mm(H)

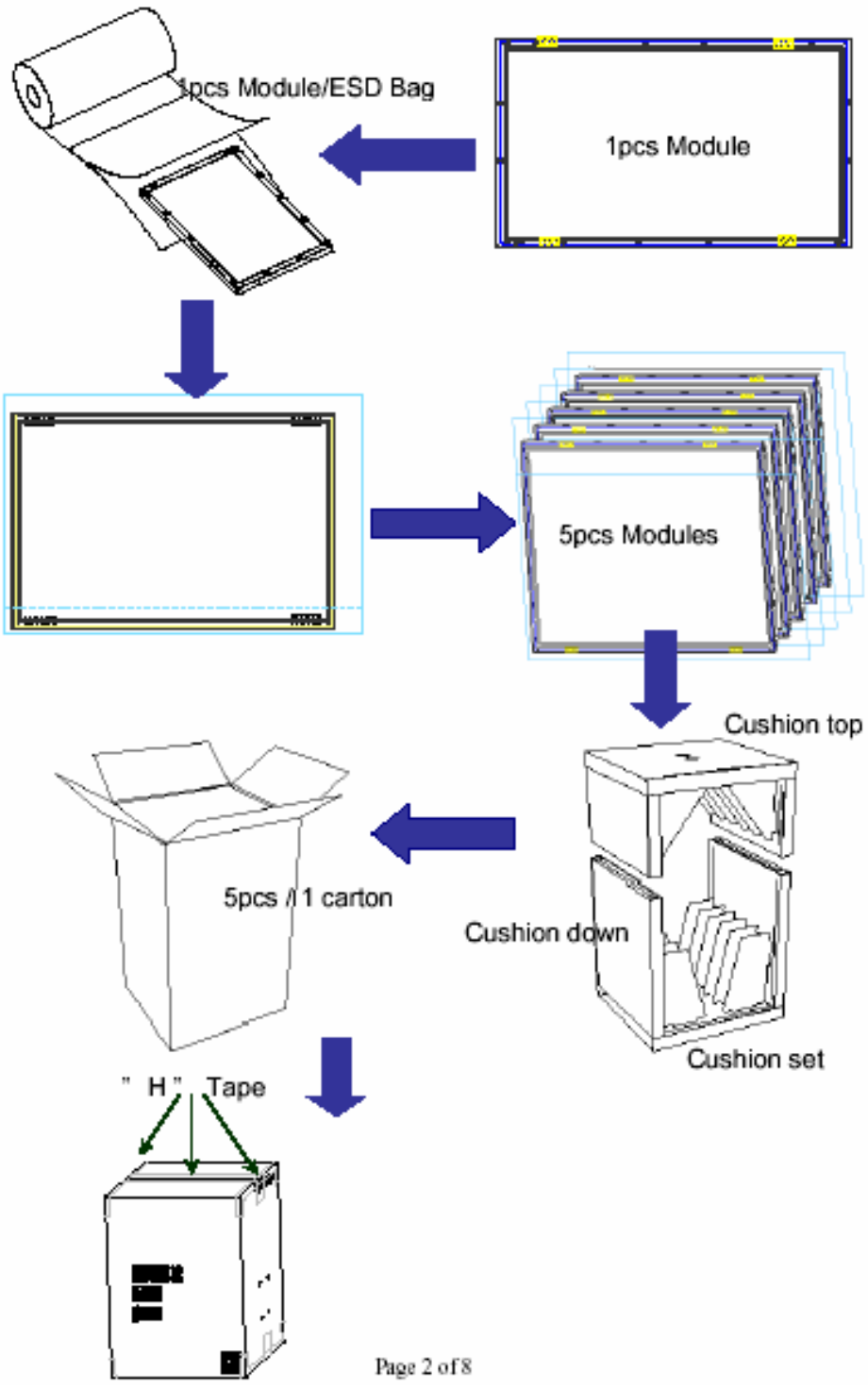
Shipping volume per pallet:

By Air: (3*2)*2 layers,
one pallet put 12 boxes,
total 60ps module.

By Sea: (3*2)*3 layers,
one pallet put 18 boxes,
total 90ps module.



Packing process



8. PRECAUTIONS

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

8-1 MOUNTING PRECAUTIONS

(1) You must mount a module using holes arranged in four corners or four sides.

(2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.

(3) 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.

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

(5) 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.

(6) 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.)

(7) 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.

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

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

8-2 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. (In lower temperature, it becomes lower.) 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.

8-3 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.

8-4 PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

8-5 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.

8-6 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.