Document Version : 2
Date : 2009/7/3

Product Specifications

37” FHD Color TFT-LCD SKD Panel
Model Name: T370HW03 V6

() Preliminary Specifications
(*) Final Specifications

Contents

Record of Revision

Version	Date	No	Old Description	New Description	Remark
0	2009/3		First issue		
1	2009/4			Update mechanical drawing	
2	2009/7			Modify packing part	

1. General Description

This specification applies to the 37.0 inch Color TFT-LCD SKD model, T370HW03 V6. This LCD module has a TFT active matrix type liquid crystal panel 1920*1080 pixels, and diagonal size of 37.0 inch. This module supports 1920*1080 HDTV mode (Non-interlace). 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.

* General Information

Items	Specification	Unit	Note
Active Screen Size	37.01	inch	
Display Area	819.36 (H) x 460.89(V)	mm	
Outline Dimension	842.6(H) x 485.8(V) x 1.82(D)	mm	
Driver Element	a-Si TFT active matrix		
Display Colors	8 bit, 16.7M	Colors	
Number of Pixels	1920 x 1080	Pixel	
Pixel Pitch	0.42675	mm	
Pixel Arrangement	RGB vertical stripe		
Display Operation Mode	Normally Black		
Contrast Ratio	5000:1		Base on AUO BLU
Brightness	500nits		Base on AUO BLU
Surface Treatment	SC		

2. Absolute Maximum Ratings

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

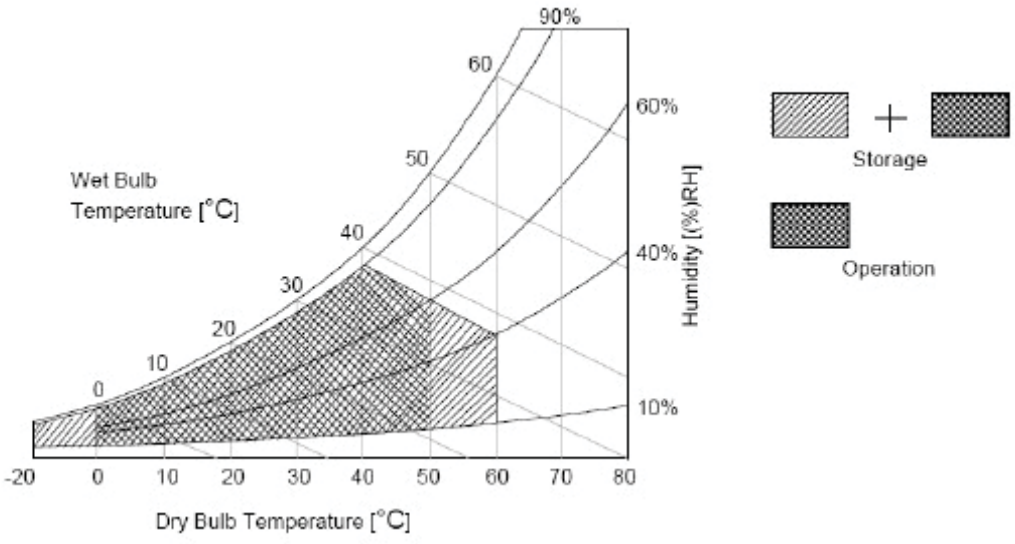
Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	Vcc	-0.3	14	[Volt]	Note 1
Input Voltage of Signal	Vin	-0.3	3.6	[Volt]	Note 1
Operating Temperature	TOP	0	+50	[°C]	Note 2
Operating Humidity	HOP	10	90	[%RH]	Note 2
Storage Temperature	TST	-20	+60	[°C]	Note 2
Storage Humidity	HST	10	90	[%RH]	Note 2
Panel Surface Temperature	PST		65	[°C]	Note 3

Note 1: Duration:50 msec.

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

The relative humidity must not exceed 90% non-condensing at temperatures of 40℃ or less. At temperatures greater than 40℃, the wet bulb temperature must not exceed 39℃.

Note 3: Surface temperature is measured at 50℃ Dry condition



3. Electrical Specification (open cell)

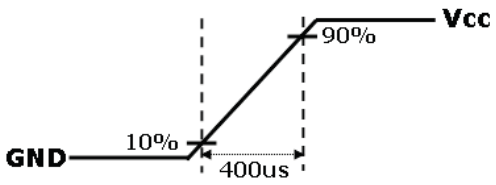
The T370HW03 V6 requires two power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second input power for the BLU, is to power inverter. (INV)

3-1 Electrical Characteristics

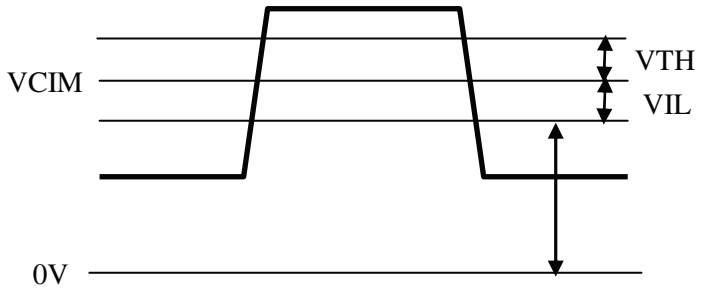
Parameter			Values			Unit	Notes
			Min	Typ	Max		
LCD:							
Power Supply Input Voltage		Vcc	10.8	12	13.2	Vdc	1
Power Supply Input Current		Icc	-	1	1.5	A	2
Power Consumption		Pc	-	12	18	Watt	2
Inrush Current		I_{RUSH}	-	-	2.5	Apeak	3
LVDS Interface	Differential Input High Threshold Voltage	VTH			100	mV	4
	Differential Input Low Threshold Voltage	VTL	-100			mV	4
	Common Input Voltage	VCIM	1.1	1.25	1.4	V	4
CMOS Interface	Input High Threshold Voltage	VIH (High)	2.4		3.3	Vdc	
	Input Low Threshold Voltage	VIL (Low)	0		0.9	Vdc	
Life Time			50,000			Hours	

Note :

1. The ripple voltage should be controlled under 10% of V_{CC}
2. Vcc=12.0V, f_v =60Hz, fCLK=81.5Mhz , 25℃, Test Pattern : White Pattern
3. Measurement condition :



4. VCIM = 1.2V



3-2 Interface Connections

LCD connector (CN3): JAE FI-RE51S-HF

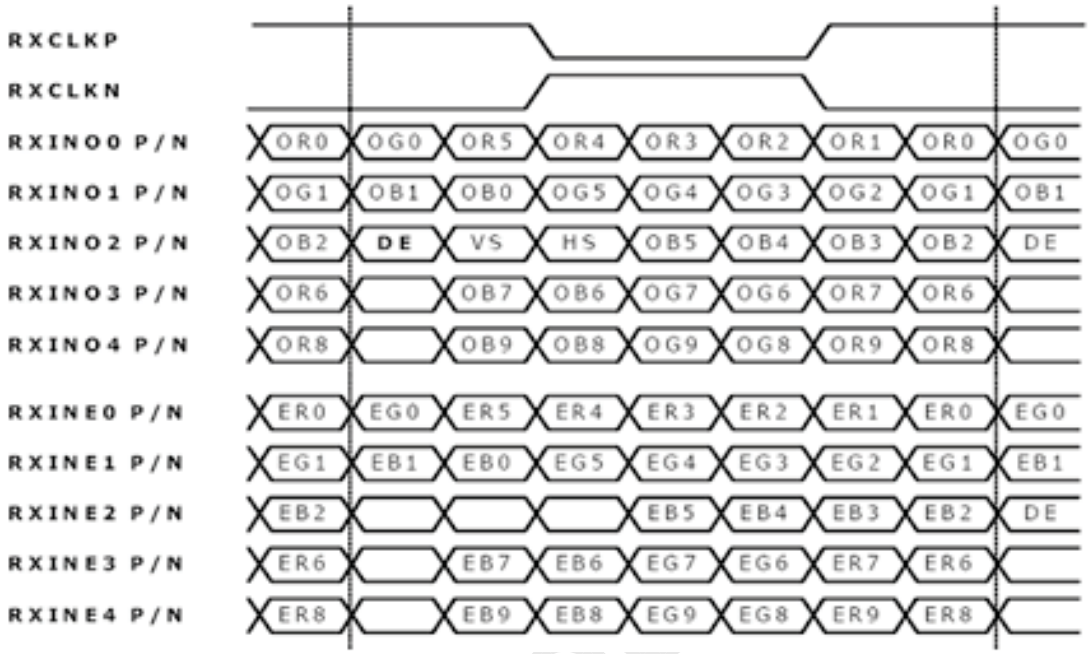
Pin No	Symbol	Description
1	V_{DD}	Operating Voltage Supply, +12 V DC Regulated
2	V_{DD}	Operating Voltage Supply, +12 V DC Regulated
3	V_{DD}	Operating Voltage Supply, +12 V DC Regulated
4	V_{DD}	Operating Voltage Supply, +12 V DC Regulated
5	V_{DD}	Operating Voltage Supply, +12 V DC Regulated
6	NC	NO CONNECTION
7	GND	Ground
8	GND	Ground
9	GND	Ground
10	RO_0-	LVDS Channel Odd, Signal 0-
11	RO_0+	LVDS Channel Odd, Signal 0+
12	RO_1-	LVDS Channel Odd, Signal 1-
13	RO_1+	LVDS Channel Odd, Signal 1+
14	RO_2-	LVDS Channel Odd, Signal 2-
15	RO_2+	LVDS Channel Odd, Signal 2+
16	GND	Ground
17	RO_CLK-	LVDS Channel Odd, Clock -
18	RO_CLK+	LVDS Channel Odd, Clock +
19	GND	Ground
20	RO_3-	LVDS Channel Odd, Signal 3-
21	RO_3+	LVDS Channel Odd, Signal 3+
22	RO_4-	LVDS Channel Odd, Signal 4-
23	RO_4+	LVDS Channel Odd, Signal 4+
24	GND	Ground

25	RE_0-	LVDS Channel Even, Signal 0-
26	RE_0+	LVDS Channel Even, Signal 0+
27	RE_1-	LVDS Channel Even, Signal 1-
28	RE_1+	LVDS Channel Even, Signal 1+
29	RE_2-	LVDS Channel Even, Signal 2-
30	RE_2+	LVDS Channel Even, Signal 2+
31	GND	Ground
32	RE_CLK-	LVDS Channel Even, Clock -
33	RE_CLK+	LVDS Channel Even, Clock +
34	GND	Ground
35	RE_3-	LVDS Channel Even, Signal 3-
36	RE_3+	LVDS Channel Even, Signal 3+
37	RE_4-	LVDS Channel Even, Signal 4-
38	RE_4+	LVDS Channel Even, Signal 4+
39	GND	Ground
40	SCL_I	SCL_I
41	SDA_I	SDA_I
42	NC	NO CONNECTION
43	WP	EEPROM Write Protection High(3.3V) for Writable, Low (GND) for Protection
44	Hsync_OUT	H-Sync Output for Inverter(PB(from FRC's B11 pin)
45	LVDS_SEL	Open/High(3.3V) for NS, Low(GND) for JEIDA
46	SCL	EEPROM Serial Clock
47	Reset_MEMC	Reset for MEMC Chip
48	SDA	EEPROM Serial Data
49	PVCC_SW	Panel VCC Sequence Control
50	Main_check	Main_check
51	AGING	Open/Low(GND) for Normal Mode, High(3.3V) for Aging Mode

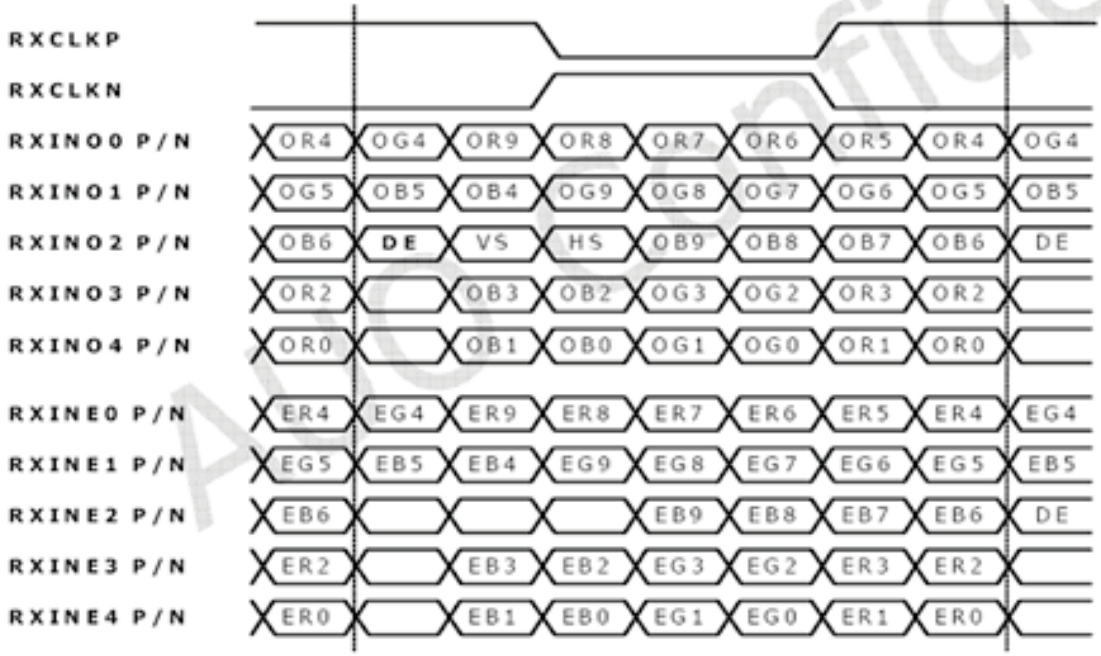
Note:

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.

▪ LVDS Option = H (3.3V) or OPEN = NS



▪ LVDS Option = Low (GND) ➔ JEIDA



3-3 Signal Timing Specifications

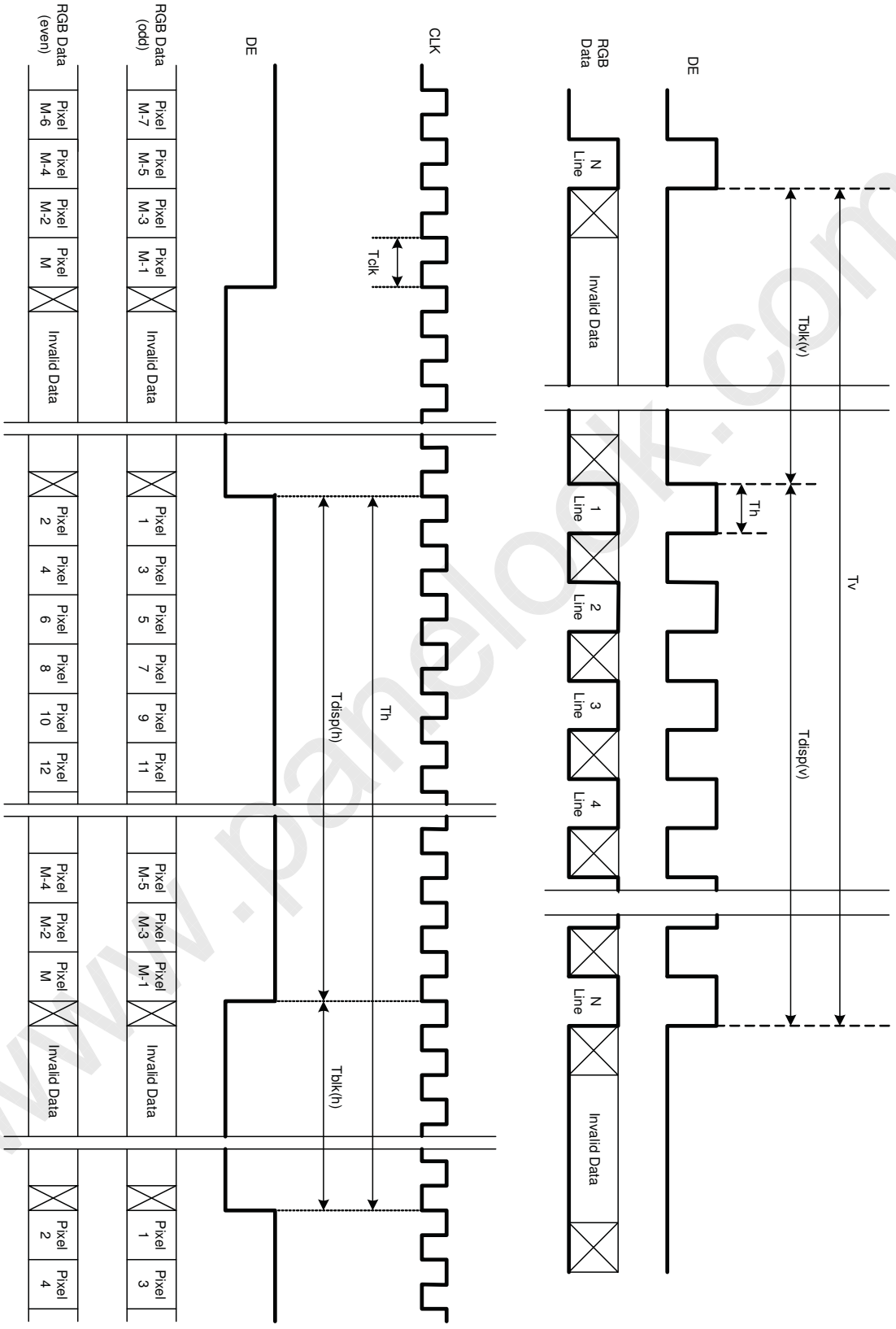
This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications for it's proper operation.

* Timing Table
DE only Mode

Parameters			Symbol	Min.	Typ.	Max.	Unit
Horizontal	Total		Th		2200		Tclk
	Active		Tact(h)		1920		Tclk
	Blank	Total blank	Tblk(h)		280		Tclk
		Front porch	Tfp(h)		49		Tclk
		Hsync	Tsync(h)		84		Tclk
		Back porch	Tbp(h)		147		Tclk
Vertical	Total		Tv		1125		Th
	Active		Tact(v)		1080		Th
	Blank	Total blank	Tblk(v)		45		Th
		Front porch	Tfp(v)		4		Th
		Vsync	Tsync(v)		9		Th
		Back porch	Tbp(v)		32		Th
Clock Frequency			1/Tclk		74.25		MHz
Frame Rate			F/R		60		Hz

Notes:
1.) Display position is specific by the rise of DE signal only.
Horizontal display position is specified by the rising edge of 1st DCLK after the rise of 1st DE, is displayed on the left edge of the screen.
Vertical display position is specified by the rise of DE after a "Low" level period equivalent to eight times of horizontal period. The 1st data corresponding to one horizontal line after the rise the of 1st DE is displayed at the top line of screen.
2.) If a period of DEB "High" is less than 1920 DCLK or less than 1080 lines, the rest of the screen displays black.
3.) The display position does not fit to the screen if a period of DE "High" and the effective data period do not synchronize with each other.

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

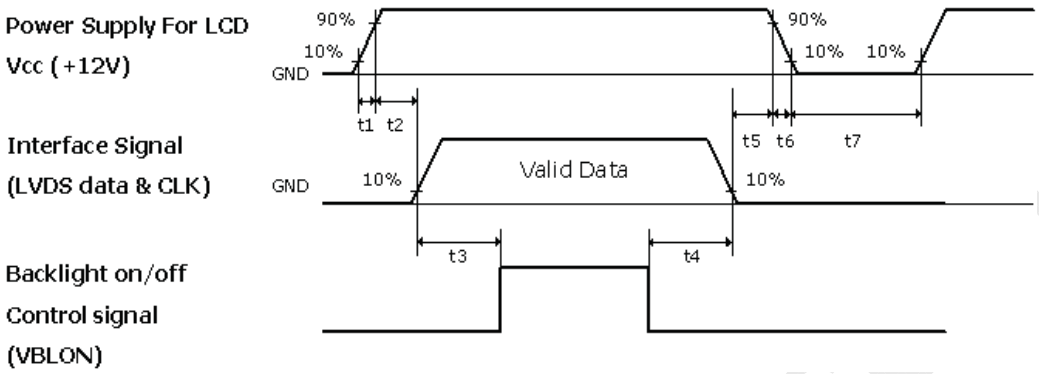
Color		Input Color Data																															
		RED										GREEN										BLUE											
		MSB								LSB		MSB								LSB		MSB								LSB			
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1023)	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(1023)	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(1023)	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(0000)	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(0001)	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(1022)	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(1023)	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(0000)	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(0001)	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(1022)	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(1023)	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(0000)	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(0001)	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(1022)	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(1023)	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



Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.4	---	30	ms
T2	0.1	---	50	ms
T3	300	---	---	ms
T4	10	---	---	ms
T5	0.1	---	50	ms
T6	---	---	300	ms
T7	500	---	---	ms

Note:

The timing controller will not be damaged in case of TV set AC input power suddenly shut down.

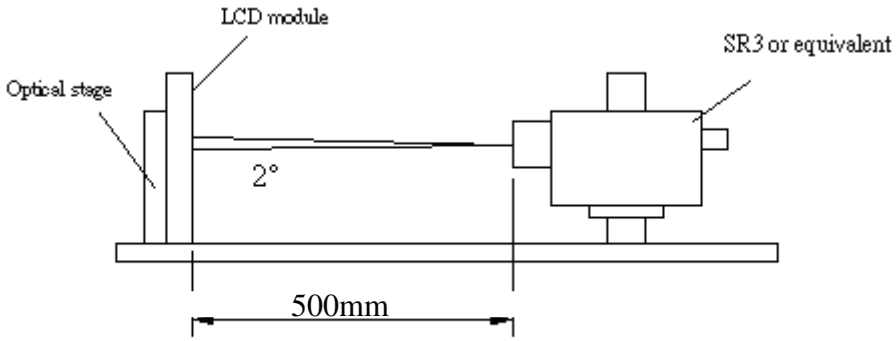
Once power reset, it should follow power sequence as spec. definition.

(1) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become abnormal screen.

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 45 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 θequal to 0°.

Fig.1 presents additional information concerning the measurement equipment and method.



Parameter		Symbol	Values			Units	Notes
			Min.	Typ.	Max.		
Contrast Ratio		CR	4000	5000			1,2
Surface Luminance, white		LWH	425	500		cd/㎡	1.3
Luminance Variation		δ_{WHITE} 9 p			1.30		1,4
Response time	G to G	Tγ		5.5	8	ms	5
Cell Transmittance		Tr		4.15		%	1.
Color Gamut		NTSC		72		%	1
Color Coordinates							
	RED	R_X	Typ.-0.03	0.64	Typ.+0.03		1
		R_Y		0.33			1
	GREEN	G_X		0.29			1
		G_Y		0.60			1
	BLUE	B_X		0.15			1
		B_Y		0.06			1
	WHITE	W_X		0.28			1
		W_Y		0.29			1
Viewing Angle							
x axis, right(φ=0°)		θ_r		89		degree	1.6
x axis, left(φ=180°)		θ_l		89			1.6
y axis, up(φ=90°)		θ_u		89			1.6
y axis, down (φ=0°)		θ_d		89			1.6

Note:

1. Above measured optical data are based on AUO BLU unit.
   (T370HW03 V1 backlight)
2. Contrast Ratio (CR) is defined mathematically as:

$$\textbf{Contrast Ratio} = \frac{\textbf{Surface Luminance of } L_{on5}}{\textbf{Surface Luminance of } L_{off5}}$$

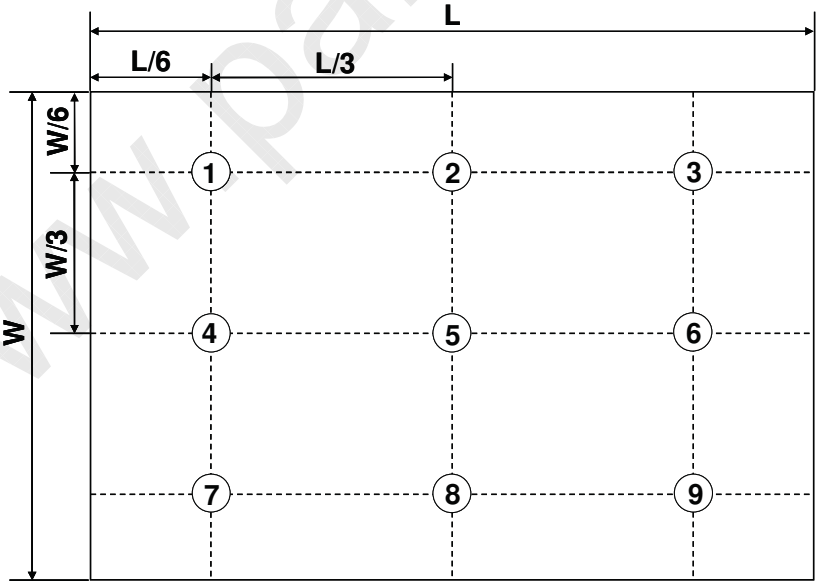
3. Surface luminance is luminance value at point 5 across the LCD surface 50cm from the surface with all pixels displaying white.
4. The variation in surface luminance, δWHITE is defined (center of Screen) as:

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

   The measurement data is base on AUO jig board test.
5. Response time Tγ is the average time required for display transition by switching the input signal for five luminance ratio (0%,25%,50%,75%,100% brightness matrix) and is based on f_v=60Hz to optimize.

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

FIG.2 Measured points define



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 FIG4.
7. Cell Transmittance (Tr) is the ratio of module luminance at center point of active area to backlight luminance at center point. Tr is defined as, Tr (%) = (Module luminance / Backlight luminance) x 100. Where the film structure of backlight should not include any reflective type of prism such as DBEFD, and Measurement of module or backlight luminance should be under the same condition of BLU power and no any lamp mura is found.

FIG.3 Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for "any level of gray(bright) " and "any level of gray(dark)".

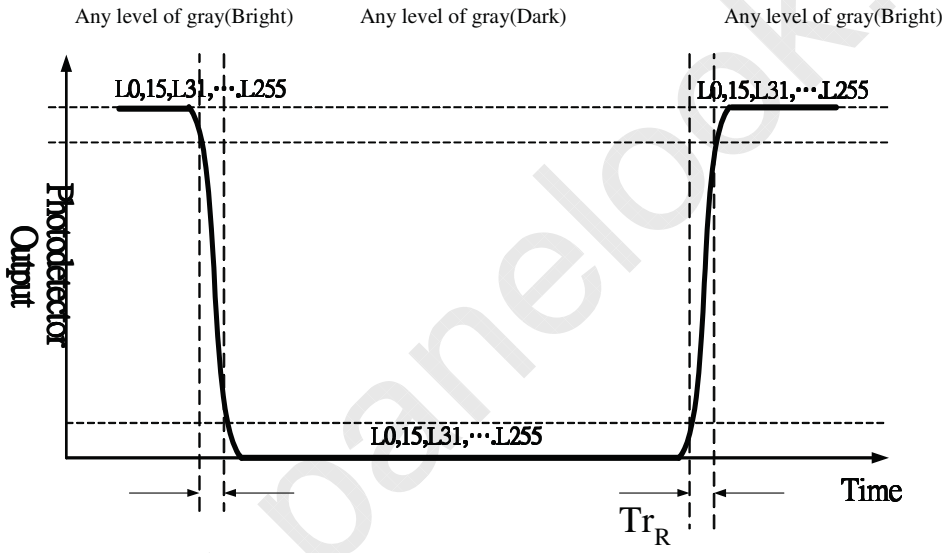
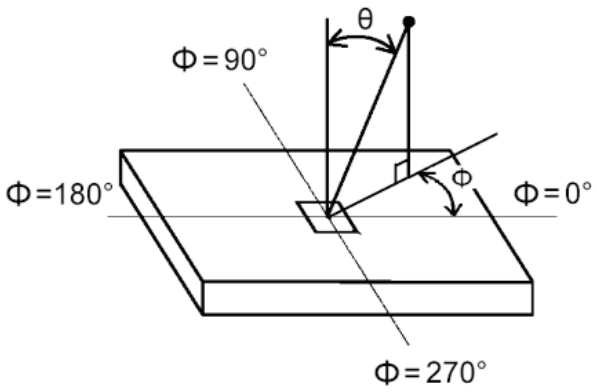
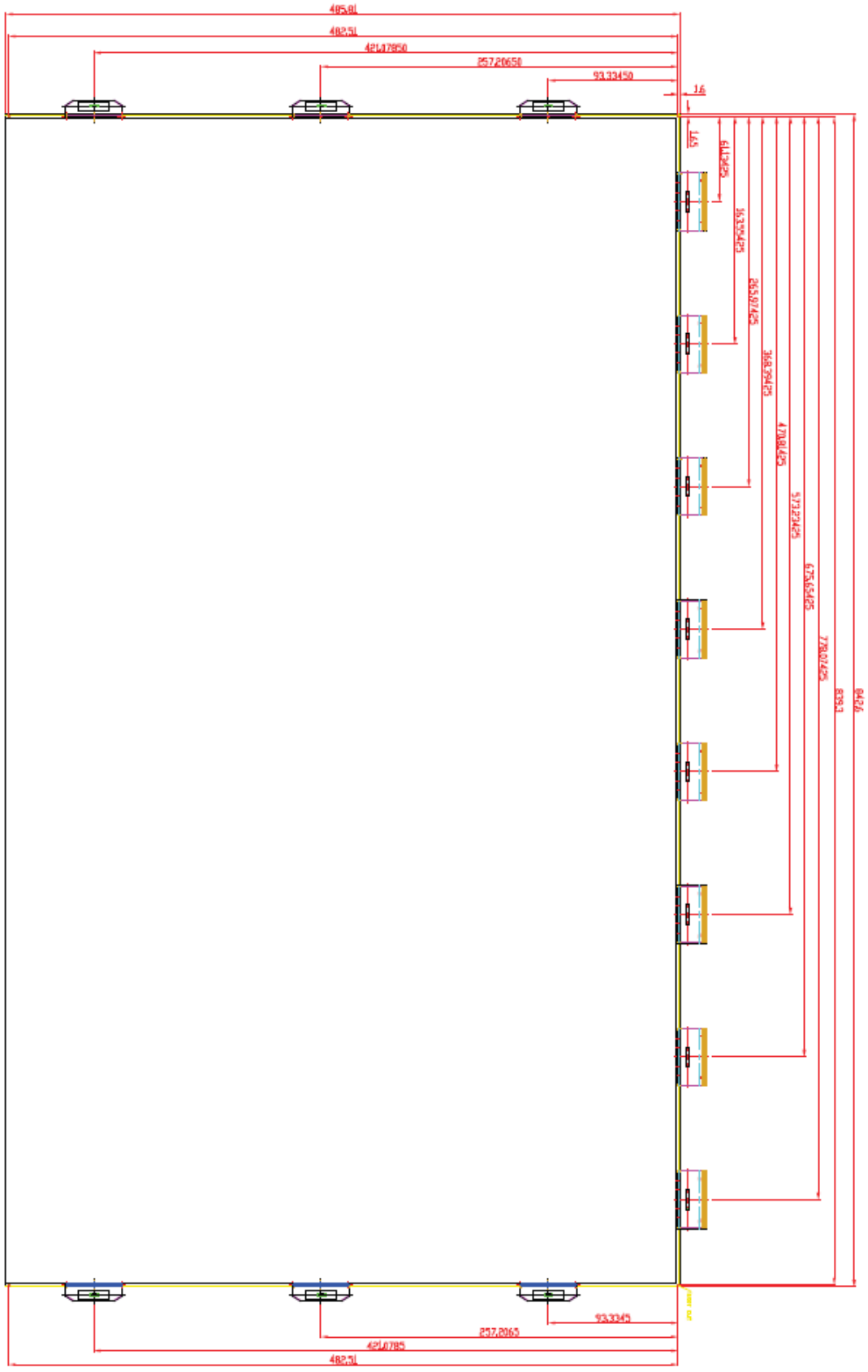
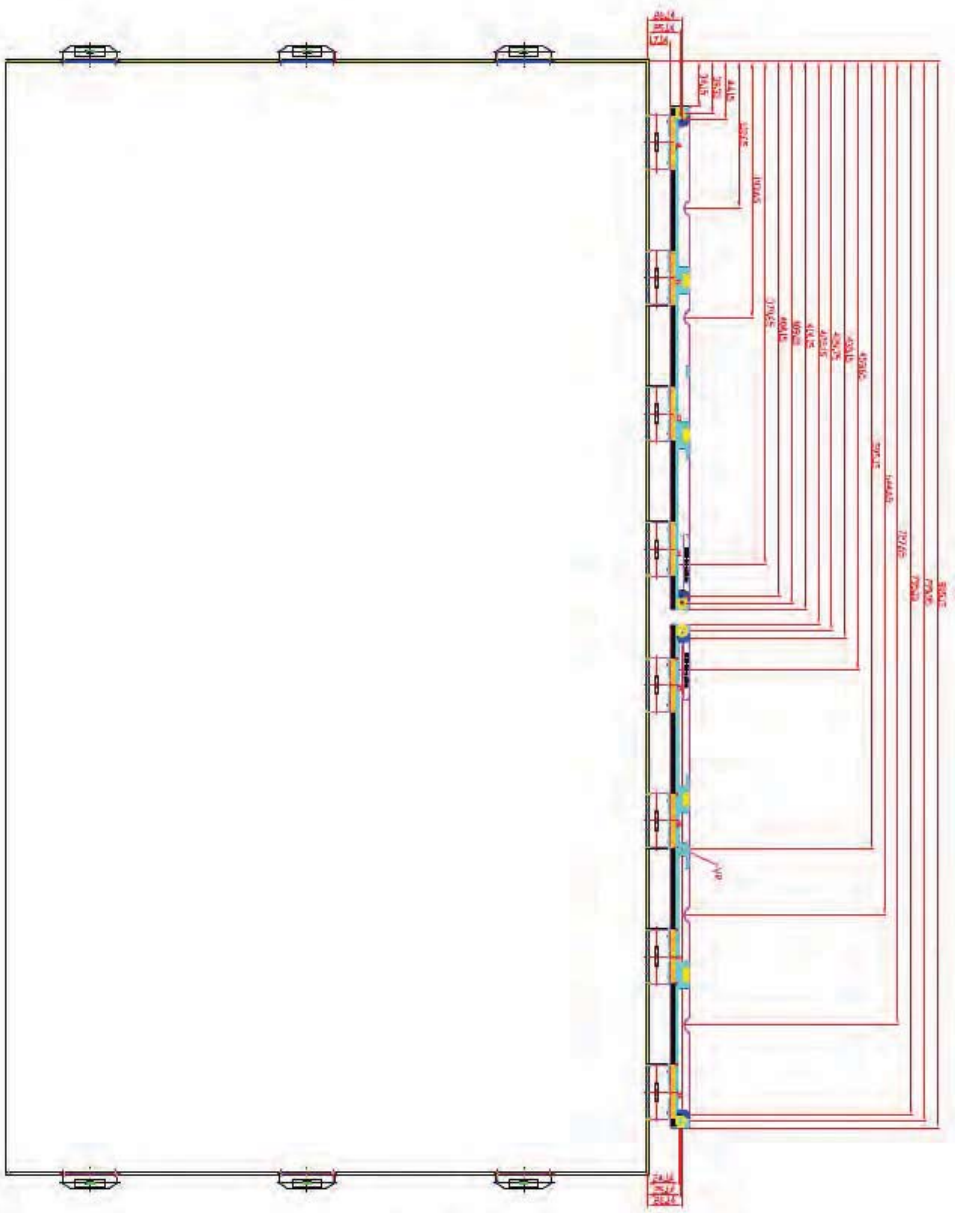


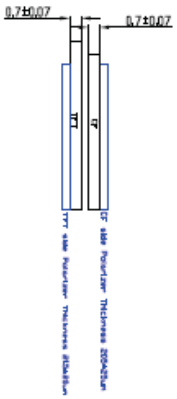
FIG.4 Viewing angle



Mechanical Figure:







5. Reliability:

Environment test condition

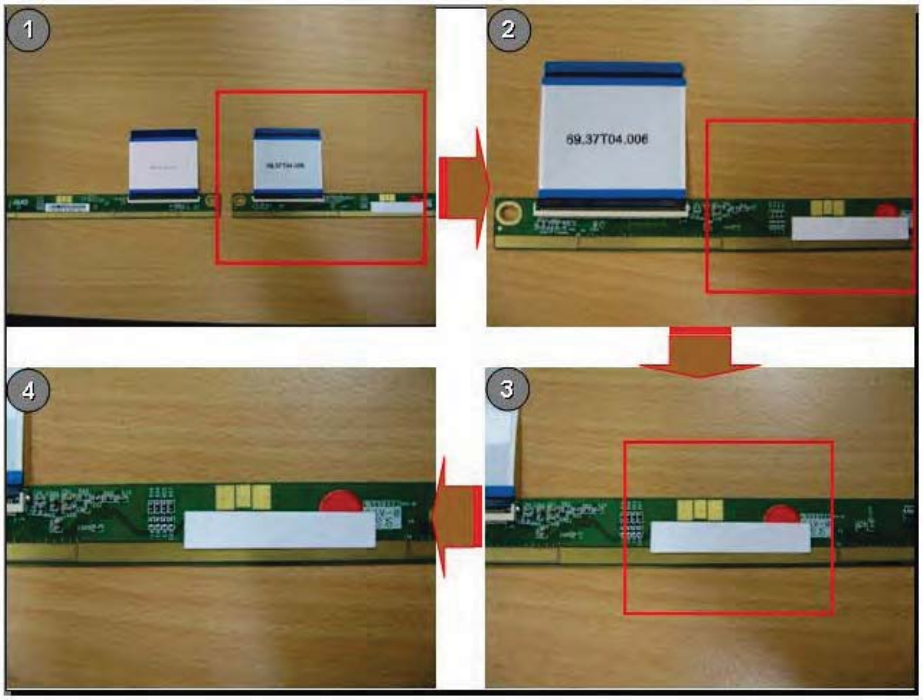
No	Test Items	Q'ty	Condotions
1	High Temperature Storage test	3	60℃ 300hrs
2	Low Temperature Storage test	3	-20℃ 300hrs
3	High Temperature Operation test	3	50℃ 300hrs
4	Low Temperature Operation test	3	-5℃ 300hrs
5	Vibration (With carton)	18	Random wave (1.5 Grms 10~200Hz) 30mins/Per each XYZ axes
6	Drop (With carton)	18	Height:30.5cm 1 corner,3 edges,6 surfaces (ASTMD4169-1)

Note: Test item 1~4 RA tests are done on AUO 97.37T05.000 panels.

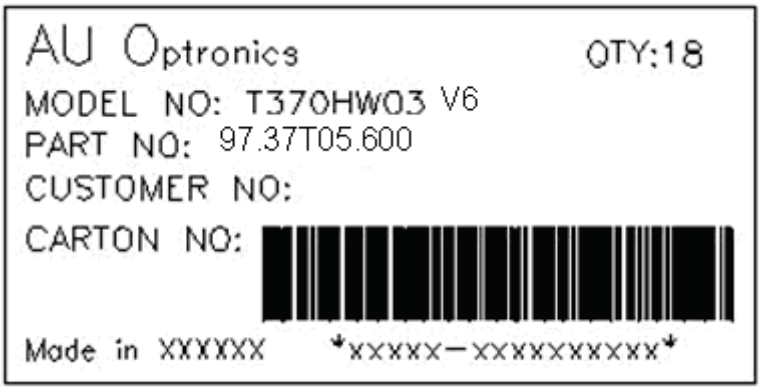
6. Packing

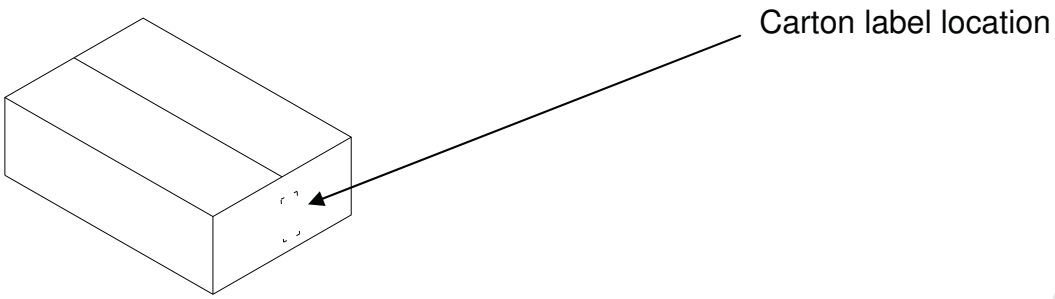
Open cell shipping label (35mm * 7mm):

1. MW6660500026- NM101
   MW66605: Production Lot
   00026: Panel serial number
   NM101:AUO internal code
2. Manufactured 06/22: 2006 week 22

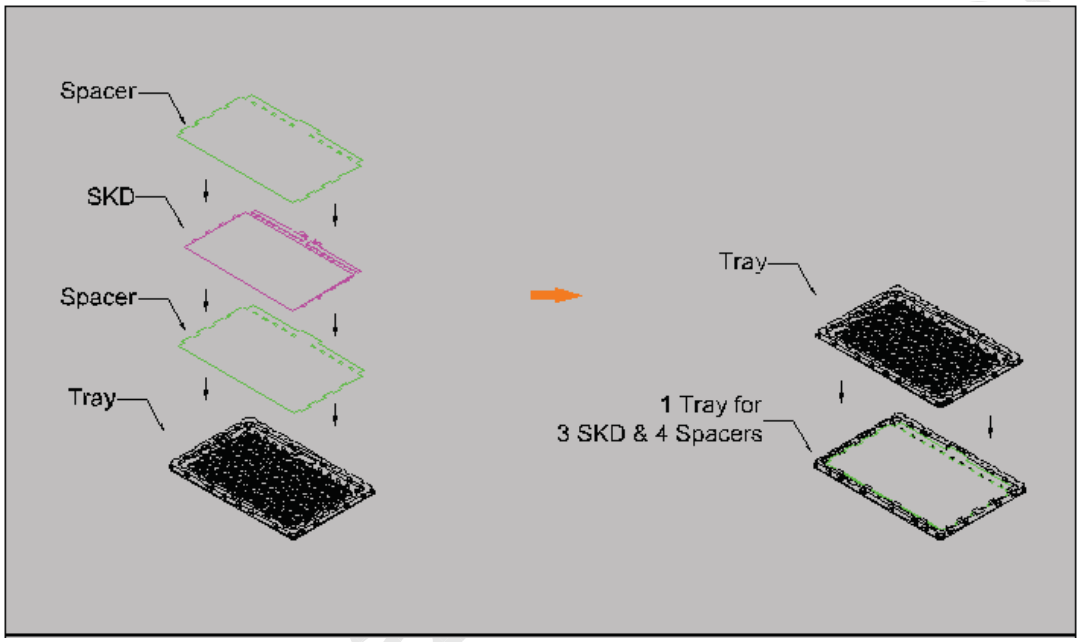


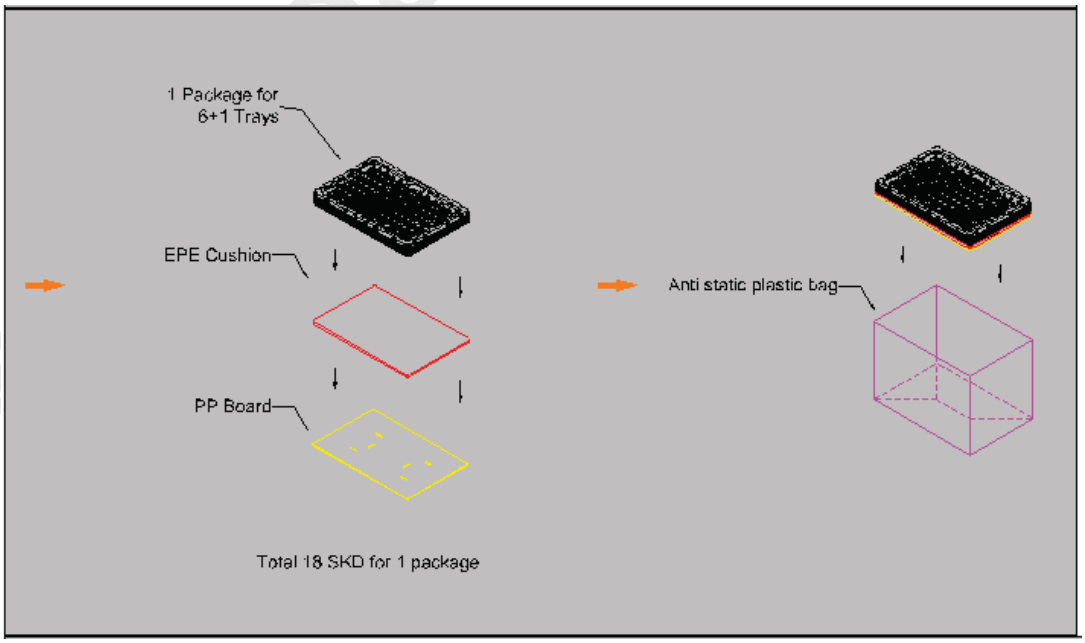
Carton Label (80mm * 40mm) :

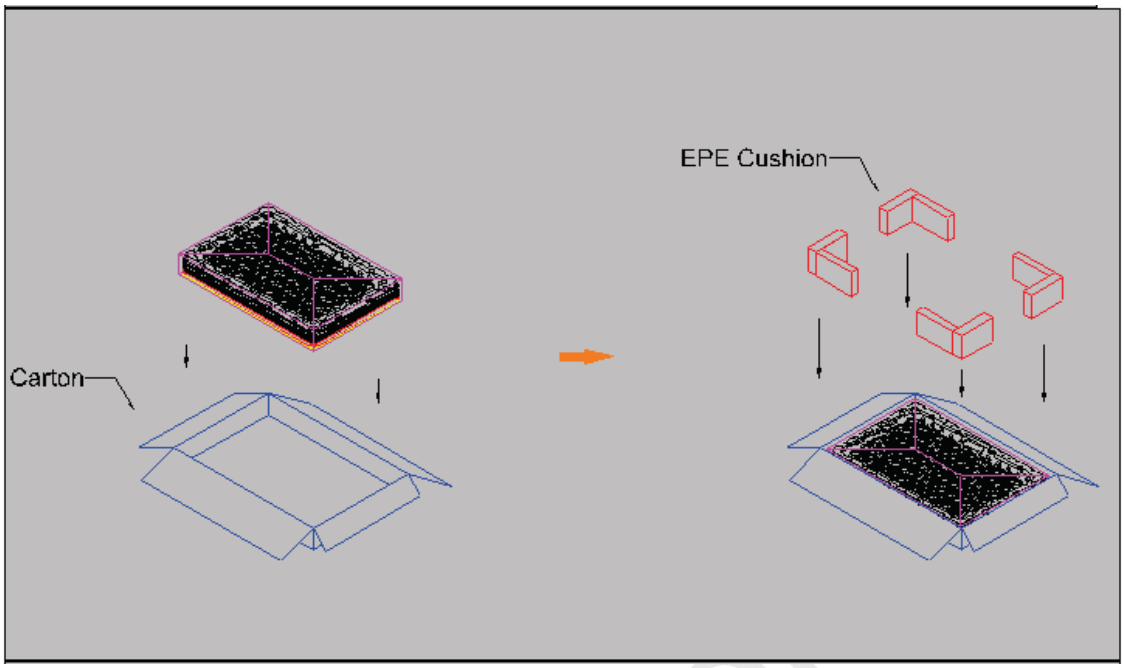


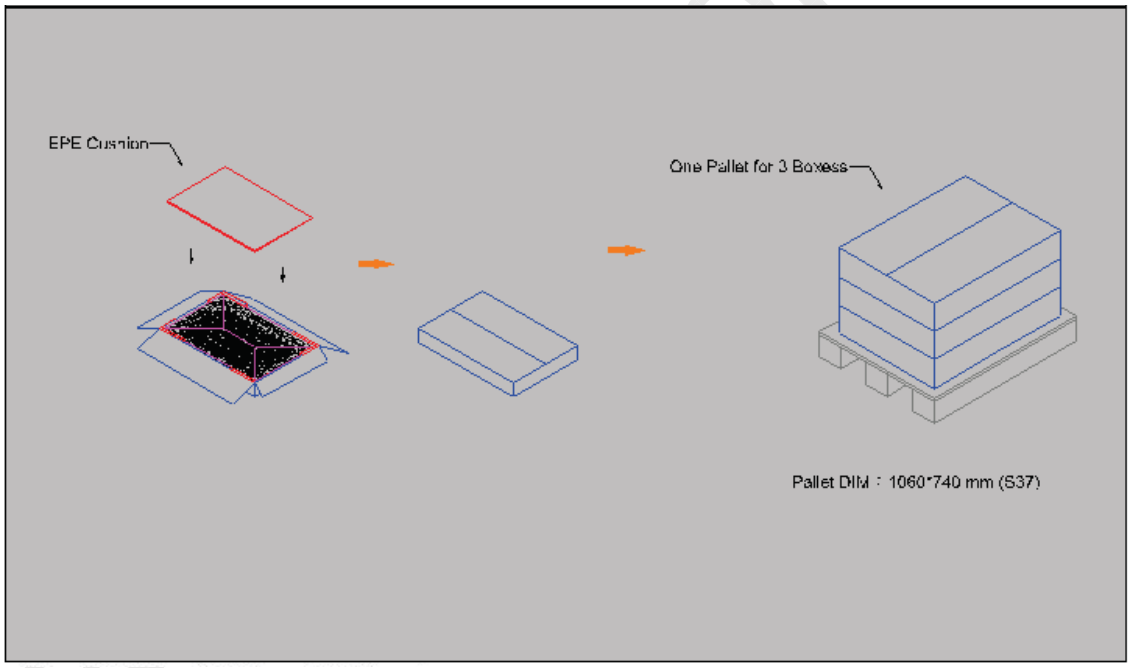


Packing Process:









Carton 1050(L)mm*720(W)mm*290(H)mm

Pallet : 1060mm*740mm*138mm

(1) By Air : (1 *1) *3 layers,3package per pallet, total 54 pcs open cell

(2) By Sea : (1 *1) *3layers, 3package per pallet, Double Pallet, total 108 pcs open cell

7. PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD Open Cell unit.

7-1 MOUNTING PRECAUTIONS

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

7-2 OPERATING PRECAUTIONS

(1) The open cell unit listed in the product specification sheets was designed and manufactured for TV application
(2) The spike noise causes the mis-operation of circuits. It should be lower than following voltage: V=±200mV(Over and under shoot voltage)
(3) Response time depends on the temperature. (In lower temperature, it becomes longer.)
(4) 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.
(5) 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.
(6) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(7) 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.

7-3 ELECTROSTATIC DISCHARGE CONTROL

Since a open cell unit 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.

7-4 PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

7-5 STORAGE

When storing open cell units as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the open cell unit 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.

7-6 HANDLING PRECAUTIONS FOR PROTECTION FILM OF POLARIZER

The protection film of polarizer is still attached on the surface as you receive open cell units. When the protection film is peeled off, static electricity is easily generated on the polarizer surface. 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.

APPENDIX

1. AUO T370HW03 V6 T-CON LVDS timing(120Hz)

Signal	Item	Symbol	Min	Type	Max	Unit
Vertical Section	Period	Tv	1096	1130	1160	Th
	Active	Tdisp (v)		1080		Th
	Blanking	Tblk (v)	16	50	80	Th
Horizontal Section	Period	Th	560	570	580	Tclk
	Active	Tdisp (h)		480		Tclk
	Blanking	Tblk (h)	80	90	100	Tclk
Clock	Frequency	1/Tclk	73.65	77.29	80.74	MHz
Vertical Frequency	Frequency	Freq	118	120	122	Hz
Horizontal Frequency	Frequency	Freq	131.52	135.6	139.2	KHz