Model Name: T370HW04 V3

Issue Date : 2009/12/3

( )Preliminary Specifications
(*)Final Specifications

Customer Signature	Date	AUO	Date
Approved By		Approval By PM Director Frank Hsu Frank Hsu.	
Note		Reviewed By RD Director Eugene CC Chen Eugene Chen Reviewed By Project Leader: Breeze Lin Breeze Lin	
		Prepared By PM: Shuzi Cheng Shuzi Cheng	

Contents

Record of Revision

Version	Date	Page	Description
0.0	2009/11/10		First release
0,1	2010/04/28	14	Modify T2 Max to 50

1. General Description

This specification applies to the 37.0 inch Color TFT-LCD SKD model, T370HW04 V3. This LCD Open Cell Unit 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 1.76(D)	mm	
Driver Element	a-Si TFT active matrix		
Display Colors	10 bit, 1.07G	Colors	
Number of Pixels	1920 x 1080	Pixel	
Pixel Pitch	0.42675(H) x 0.42675(W)	mm	
Pixel Arrangement	RGB vertical stripe		
Display Operation Mode	Normally Black		
Surface Treatment	Super Clear		

2. Absolute Maximum Ratings

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

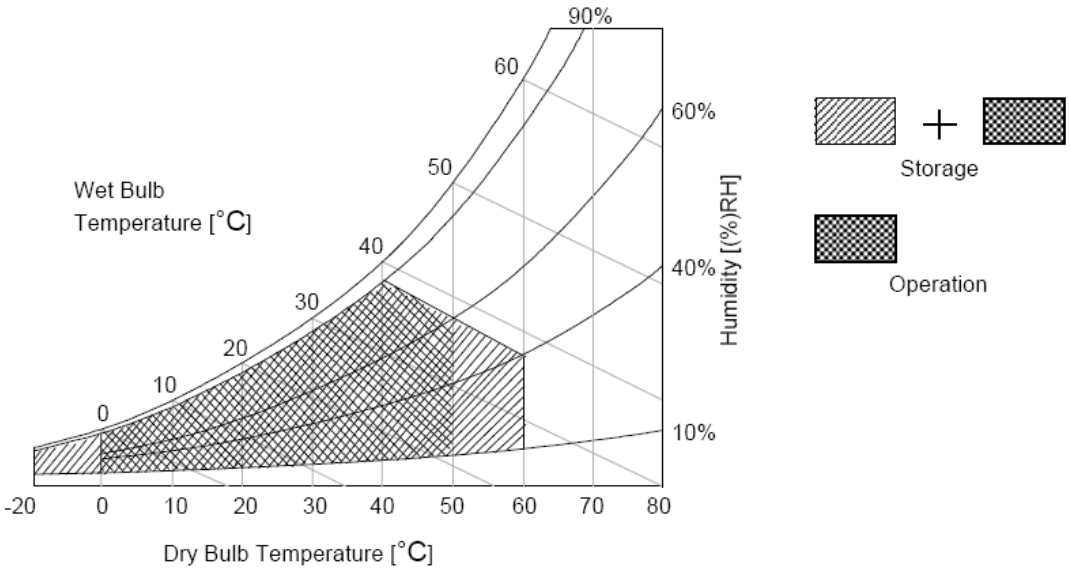
Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	Vcc	-0.3	14	[Volt]	Note 1
Input Voltage of Signal	Vin	-0.3	4	[Volt]	Note 1
Operating Temperature	TOP	0	+50	[°C]	Note 2
Operating Humidity	HOP	10	90	[%RH]	Note 2
Storage Temperature	TST	-20	+60	[°C]	Note 2
Storage Humidity	HST	10	90	[%RH]	Note 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

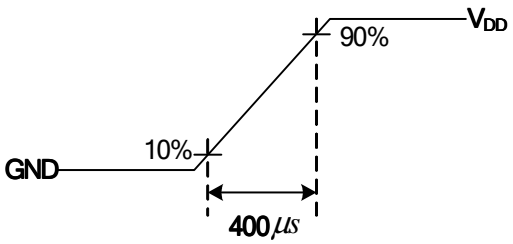
The T370HW04 V3 requires LVDS power inputs. One is employed to power the LCD electronics and to drive the TFT array and liquid crystal.

3.1 Electrical Characteristics

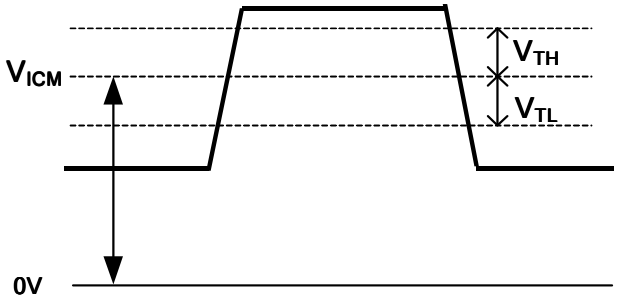
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max		
LCD							
Power Supply Input Voltage		V_{DD}		12		V_{DC}	1
Power Supply Input Current		I_{DD}	-	0.60	0.66	A	2
Power Consumption		P_C	-	7.20	7.92	Watt	2
Inrush Current		I_{RUSH}	-	-	4	A	3
LVDS Interface	Differential Input High Threshold Voltage	V_{TH}	--	--	+100	4	4
	Differential Input Low Threshold Voltage	V_{TL}	-100	--	--	4	4
	Input Common Mode Voltage	V_{ICM}	1.10	1.25	1.40	V_{DC}	4
CMOS Interface	Input High Threshold Voltage	V_{IH} (High)	2.7		3.3	V_{DC}	
	Input Low Threshold Voltage	V_{IL} (Low)	0		0.6	V_{DC}	

Note :

1. The ripple voltage should be controlled under 10% of V_{DD}
2. Test Condition:
   (1) V_{DD} = 12.0V
   (2) Fv = Type Timing, 120Hz
   (3) F_{CLK} = Max freq.
   (4) Temperature = 25 ℃
   (5) Test Pattern : White Pattern
3. Measurement condition : Rising time = 400us



4. V_{ICM} = 1.25V



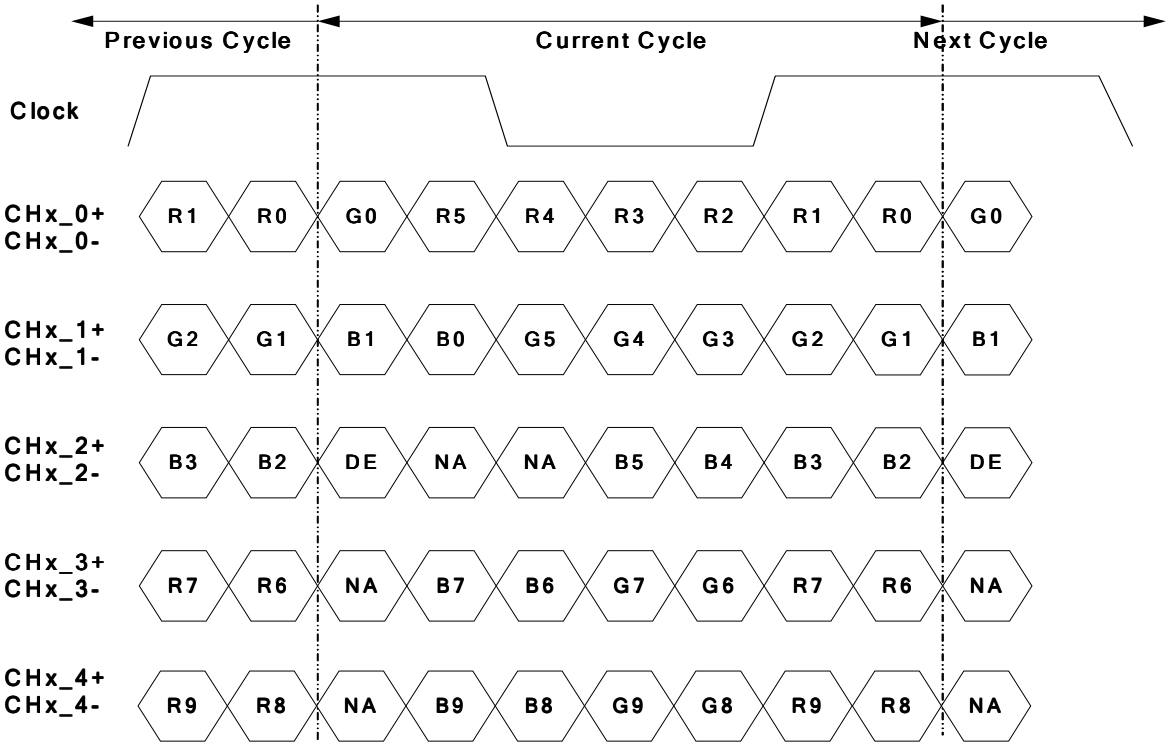
3.2 Interface Connections

- LCD connector: PF050-082B-C35/FF05001-82(UJU/FOOSUNG,LVDS)
- Mating connector:

PIN	Symbol	Description	PIN	Symbol	Description
1	V_{DD}	Power Supply, +12V DC Regulated	26	CH3_0+	LVDS Channel 3, Signal 0+
2	V_{DD}	Power Supply, +12V DC Regulated	27	CH3_1-	LVDS Channel 3, Signal 1-
3	V_{DD}	Power Supply, +12V DC Regulated	28	CH3_1+	LVDS Channel 3, Signal 1+
4	V_{DD}	Power Supply, +12V DC Regulated	29	CH3_2-	LVDS Channel 3, Signal 2-
5	V_{DD}	Power Supply, +12V DC Regulated	30	CH3_2+	LVDS Channel 3, Signal 2+
6	NC	No connection	31	GND	Ground
7	GND	Ground	32	CH3_CLK-	LVDS Channel 3, Clock -
8	GND	Ground	33	CH3_CLK+	LVDS Channel 3, Clock +
9	GND	Ground	34	GND	Ground
10	CH1_0-	LVDS Channel 1, Signal 0-	35	CH3_3-	LVDS Channel 3, Signal 3-
11	CH1_0+	LVDS Channel 1, Signal 0+	36	CH3_3+	LVDS Channel 3, Signal 3+
12	CH1_1-	LVDS Channel 1, Signal 1-	37	CH3_4-	LVDS Channel 3, Signal 4-
13	CH1_1+	LVDS Channel 1, Signal 1+	38	CH3_4+	LVDS Channel 3, Signal 4+
14	CH1_2-	LVDS Channel 1, Signal 2-	39	GND	Ground
15	CH1_2+	LVDS Channel 1, Signal 2+	40	SCL	EEPROM Serial Clock
16	GND	Ground	41	NC	No connection
17	CH1_CLK-	LVDS Channel 1, Clock -	42	NC	No connection
18	CH1_CLK+	LVDS Channel 1, Clock +	43	WP	EEPROM Write Protection High(3.3V) for Writable, Low(GND) for Protection
19	GND	Ground	44	SDA	EEPROM Serial Data
20	CH1_3-	LVDS Channel 1, Signal 3-	45	LVDS_SEL	Open/High(3.3V) for NS, Low(GND) for JEIDA
21	CH1_3+	LVDS Channel 1, Signal 3+	46	NC	No connection
22	CH1_4-	LVDS Channel 1, Signal 4-	47	NC	No connection
23	CH1_4+	LVDS Channel 1, Signal 4+	48	NC	No connection
24	GND	Ground	49	NC	No connection
25	CH3_0-	LVDS Channel 3, Signal 0-	50	NC	No connection

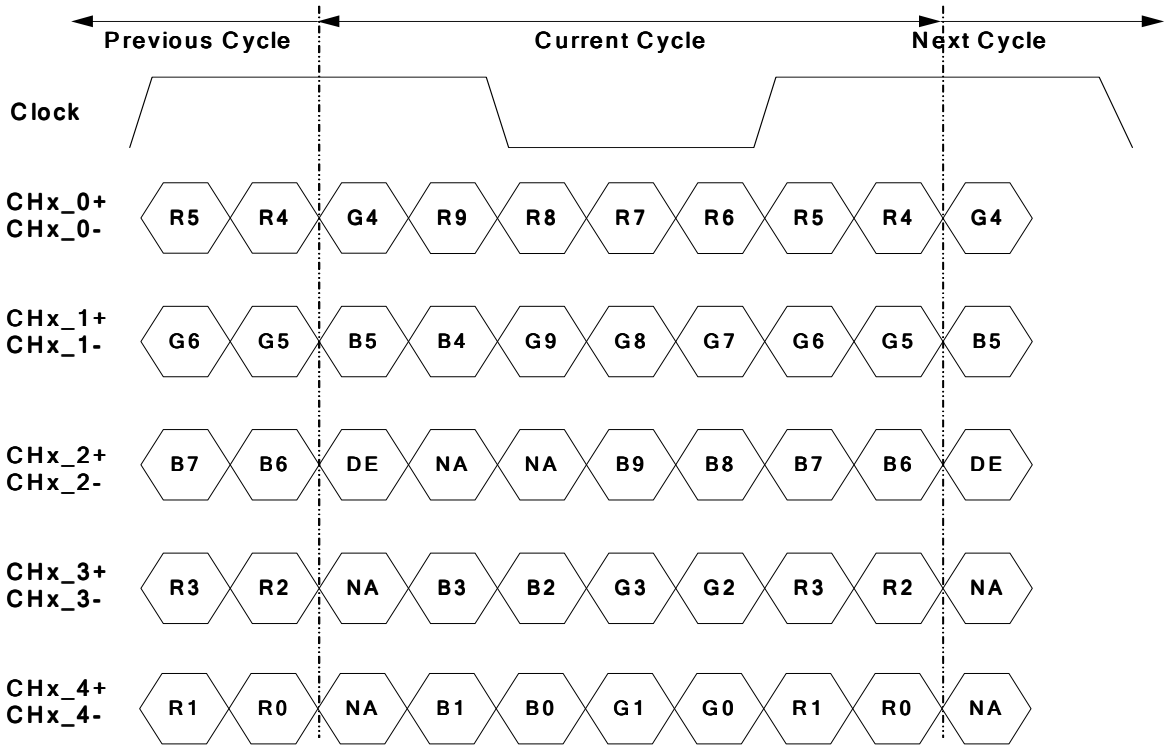
PIN	Symbol	Description	PIN	Symbol	Description
51	Reserved	AUO Internal Use Only	76	CH2_2+	LVDS Channel 2, Signal 2+
52	GND	Ground	77	CH2_2-	LVDS Channel 2, Signal 2-
53	CH4_4+	LVDS Channel 4, Signal 4+	78	CH2_1+	LVDS Channel 2, Signal 1+
54	CH4_4-	LVDS Channel 4, Signal 4-	79	CH2_1-	LVDS Channel 2, Signal 1-
55	CH4_3+	LVDS Channel 4, Signal 3+	80	CH2_0+	LVDS Channel 2, Signal 0+
56	CH4_3-	LVDS Channel 4, Signal 3-	81	CH2_0-	LVDS Channel 2, Signal 0-
57	GND	Ground	82	GND	Ground
58	CH4_CLK+	LVDS Channel 4, Clock +			
59	CH4_CLK-	LVDS Channel 4, Clock -			
60	GND	Ground			
61	CH4_2+	LVDS Channel 4, Signal 2+			
62	CH4_2-	LVDS Channel 4, Signal 2-			
63	CH4_1+	LVDS Channel 4, Signal 1+			
64	CH4_1-	LVDS Channel 4, Signal 1-			
65	CH4_0+	LVDS Channel 4, Signal 0+			
66	CH4_0-	LVDS Channel 4, Signal 0-			
67	GND	Ground			
68	CH2_4+	LVDS Channel 2, Signal 4+			
69	CH2_4-	LVDS Channel 2, Signal 4-			
70	CH2_3+	LVDS Channel 2, Signal 3+			
71	CH2_3-	LVDS Channel 2, Signal 3-			
72	GND	Ground			
73	CH2_CLK+	LVDS Channel 2, Clock +			
74	CH2_CLK-	LVDS Channel 2, Clock -			
75	GND	Ground			

■ LVDS Option = High/Open➔NS



Note: x = 1, 2, 3, 4…

■ LVDS Option = Low➔JEIDA



Note: x = 1, 2, 3, 4…

3.3 Signal Timing Specification

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 its proper operation.

Signal	Item	Symbol	Min.	Typ.	Max	Unit
Vertical Section	Period	Tv	1090	1130	1392	Th
	Active	Tdisp (v)		1080		Th
	Blanking	Tblk (v)	10	50	312	Th
Horizontal Section	Period	Th	540	570	580	Tclk
	Active	Tdisp (h)		480		Tclk
	Blanking	Tblk (h)	60	90	100	Tclk
Clock	Frequency	Fclk=1/Tclk	64.8	77.29	80.74	MHz
Vertical Frequency	Frequency	Fv	94	120	122	Hz
Horizontal Frequency	Frequency	Fh	120	135.6	139.2	KHz

Notes:

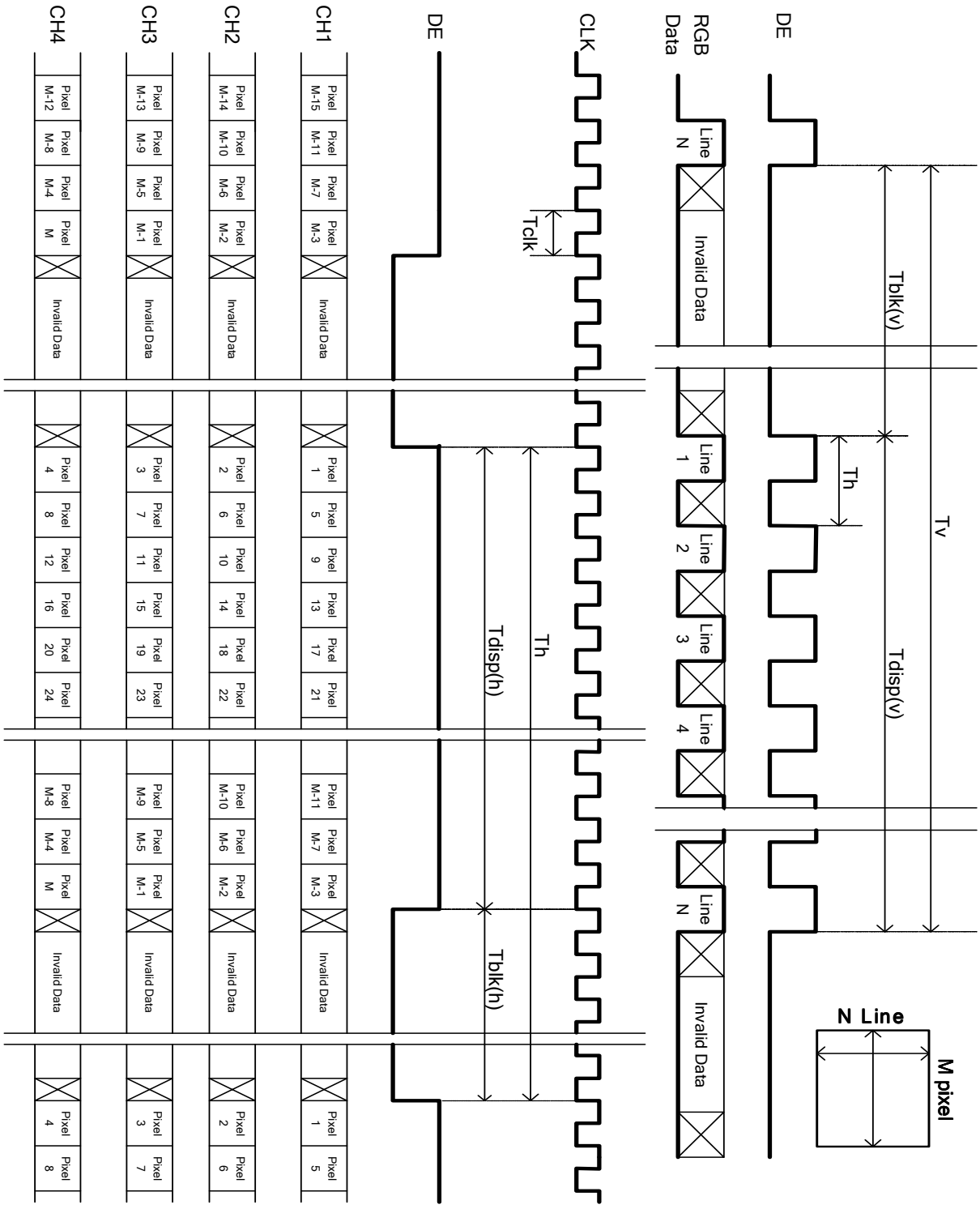
(1) Display position is specific by the rise of DE signal only.
Horizontal display position is specified by the rising edge of 1st DCLK after the rise of 1st DE, is displayed on the left edge of the screen.

(2)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 of 1st DE is displayed at the top line of screen.

(3)If a period of DE “High” is less than 1920 DCLK or less than 1080 lines, the rest of the screen displays black.

(4)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 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

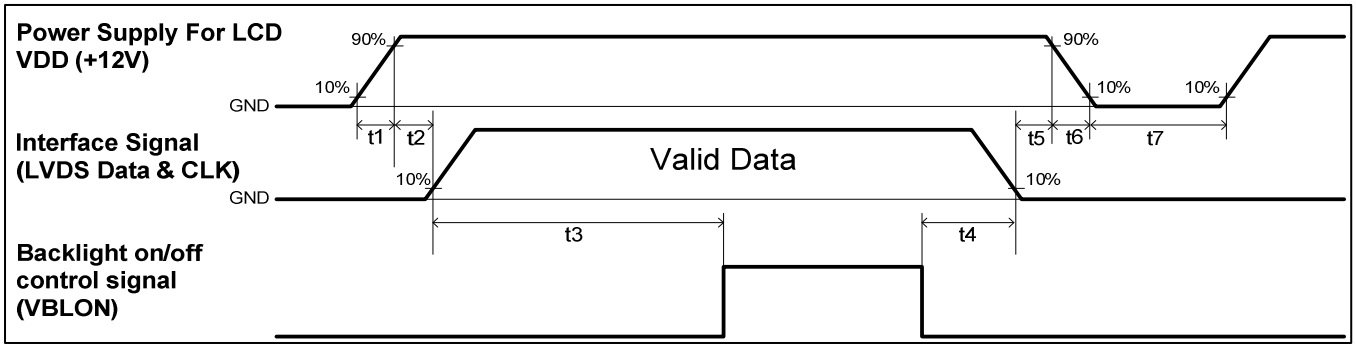
Color		Input Color Data																													
		RED										GREEN										BLUE									
		MSB									LSB	MSB									LSB	MSB									LSB
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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
R	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(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
G	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(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
B	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(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 for LCD



Parameter	Values			Unit
	Min.	Type.	Max.	
t1	0.4	---	30	ms
t2	0.1	---	50	ms
t3	300	---	---	ms
t4	0 *1	---	---	ms
t5	0	---	---	ms
t6	---	---	--- *2	ms
t7	500	---	---	ms

Note:

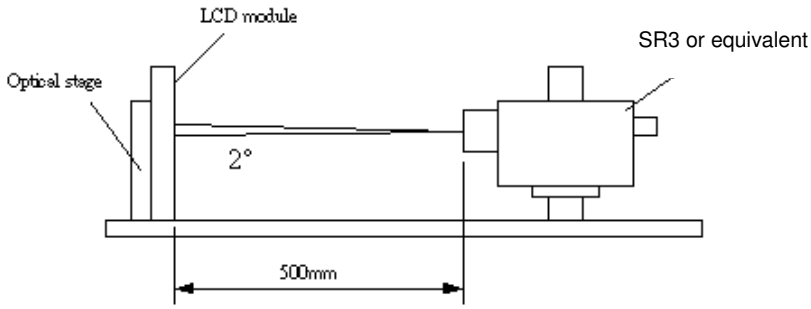
(1) T4=0 : concern for residual pattern before BLU turn off.

(2) T6 : voltage of VDD must decay smoothly after power-off. (customer system decide this value)

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 θ equal to 0°.

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



Parameter		Symbol	Values			Unit	Notes
			Min.	Typ.	Max		
Contrast Ratio		CR	5000	6000			1,2
Surface Luminance (White)		L_{WH}	425	500		cd/m^2	1,3
Luminance Variation		$\delta_{WHITE(9P)}$	--	--	1.3		1,4
Cell Transparency		Tr		4.2		%	1,7
Response Time (G to G)		Tγ	--	6.5	--	Ms	1,5
Color Gamut		NTSC		72		%	1
Color Coordinates							
	Red	R_X	Typ.-0.03	0.640	Typ.+0.03		1
		R_Y		0.330			1
	Green	G_X		0.29			1
		G_Y		0.6			1
	Blue	B_X		0.144			1
		B_Y		0.060			1
	White	W_X		0.280			1
		W_Y		0.290			1
Viewing Angle							
	x axis, right(φ=0°)	θ_r	--	89	--	degree	1,6
	x axis, left(φ=180°)	θ_l	--	89	--	degree	1,6
	y axis, up(φ=90°)	θ_u	--	89	--	degree	1,6
	y axis, down (φ=270°)	θ_d	--	89	--	degree	1,6

Note:

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

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

3. Surface luminance is luminance value at point 5 across the LCD surface 50cm from the surface with all pixels displaying white. From more information see FIG 2. When lamp current I_H = 11mA. L_{WH}=Lon5 where Lon5 is the luminance with all pixels displaying white at center 5 location.
4. The variation in surface luminance, δWHITE is defined (center of Screen) as:
   $\delta_{WHITE(9P)}$= Maximum(L_{on1}, L_{on2},…,L_{on9})/ Minimum(L_{on1}, L_{on2},…L_{on9})
5. Response time T_γ 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=120Hz to optimize.

Measured Response Time		Target				
		0%	25%	50%	75%	100%
Start	0%		0% to 25%	0% to 50%	0% to 75%	0% to 100%
	25%	25% to 0%		25% to 50%	25% to 75%	25% to 100%
	50%	50% to 0%	50% to 25%		50% to 75%	50% to 100%
	75%	75% to 0%	75% to 25%	75% to 50%		75% to 100%
	100%	100% to 0%	100% to 25%	100% to 50%	100% to 75%	

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 FIG3.
7. Cell Transparency (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. 2 Luminance

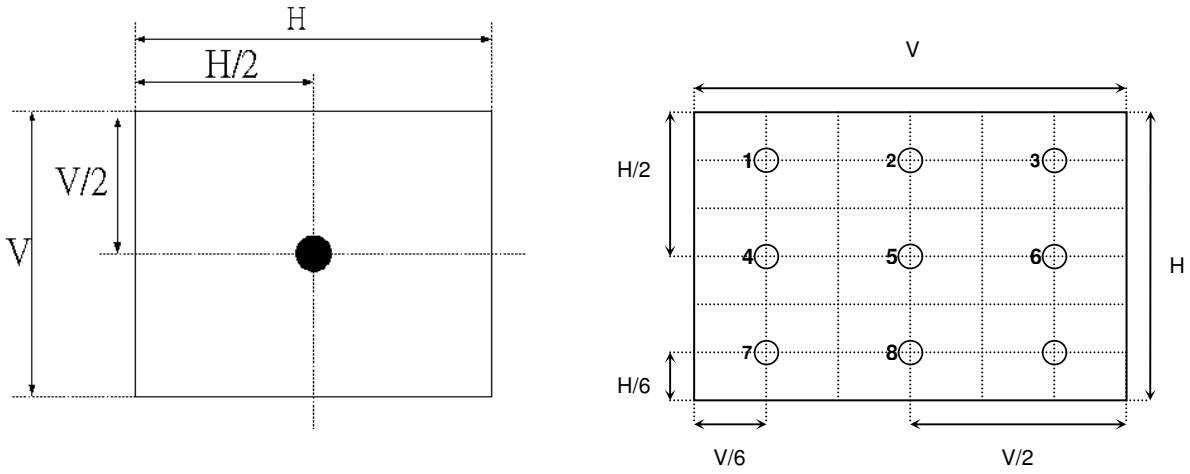
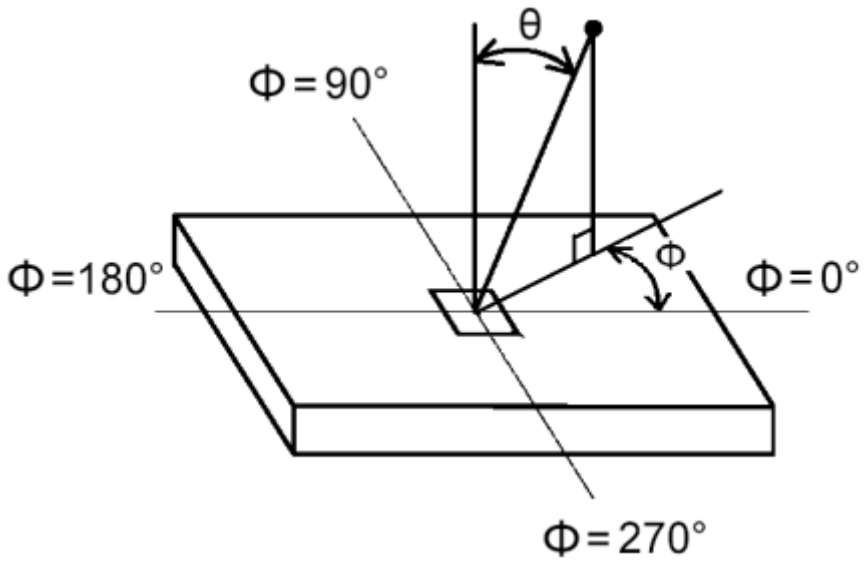
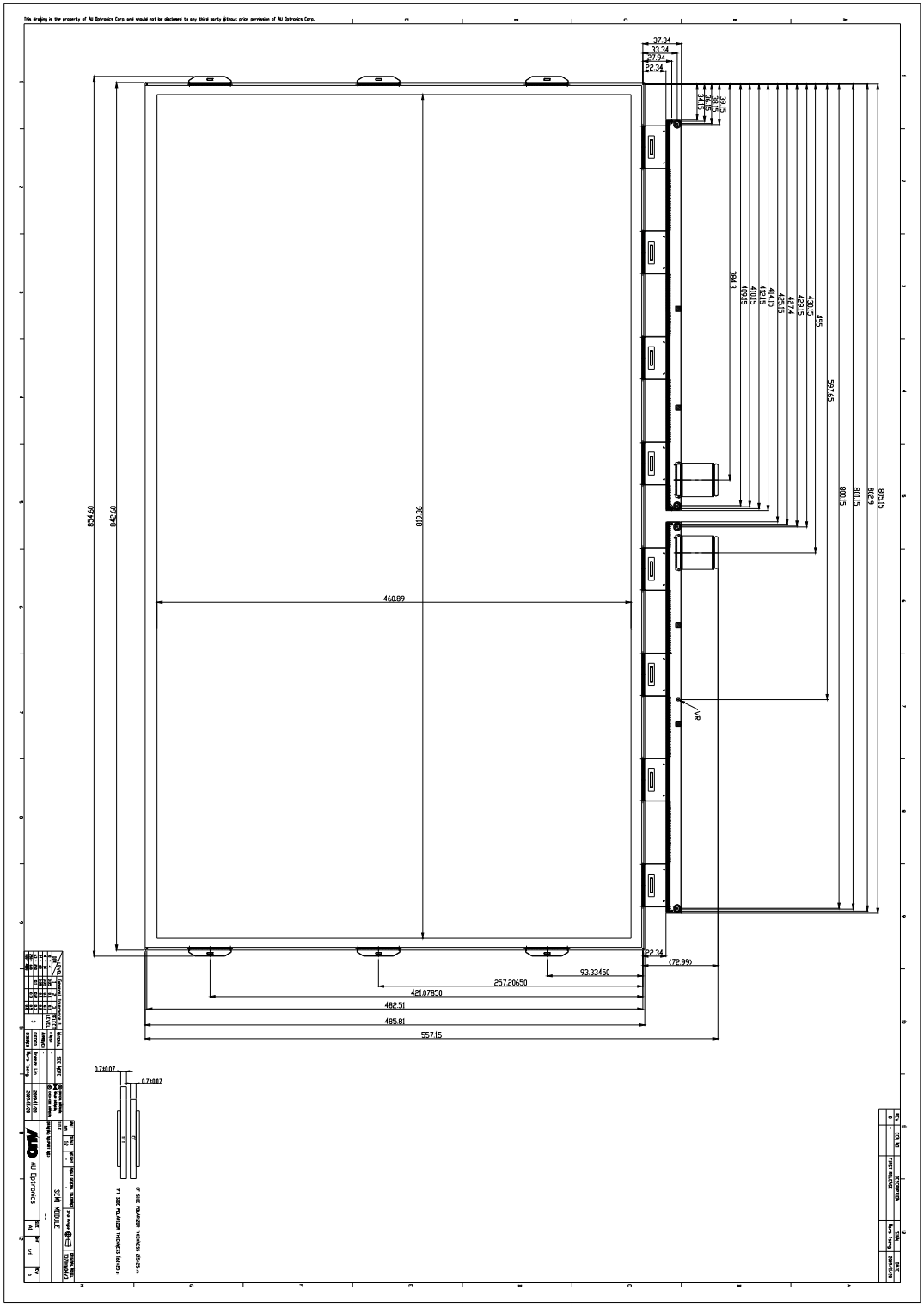


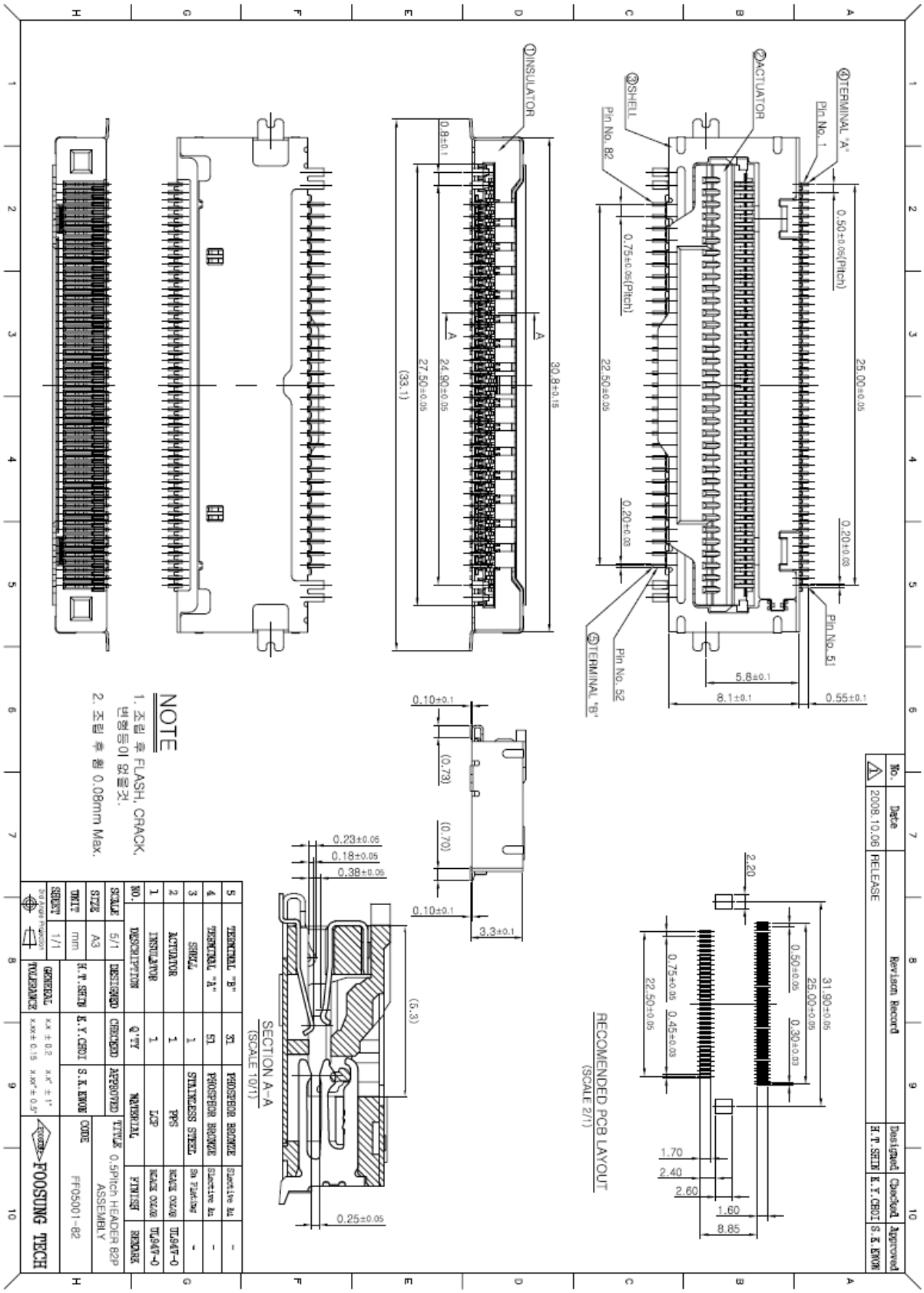
FIG.3 Viewing Angle



5. Open Cell Drawing



LVDS connector drawing



6. AUO's Basic BLU Optical Performance

The center Luminance & Chromaticity of AUO's BLU

Item		Typ.	Unit	Note
Luminance		11900	nit	100% Dimming
Central Chromaticity	x	0.253	-	CIE 1931
	y	0.242	-	

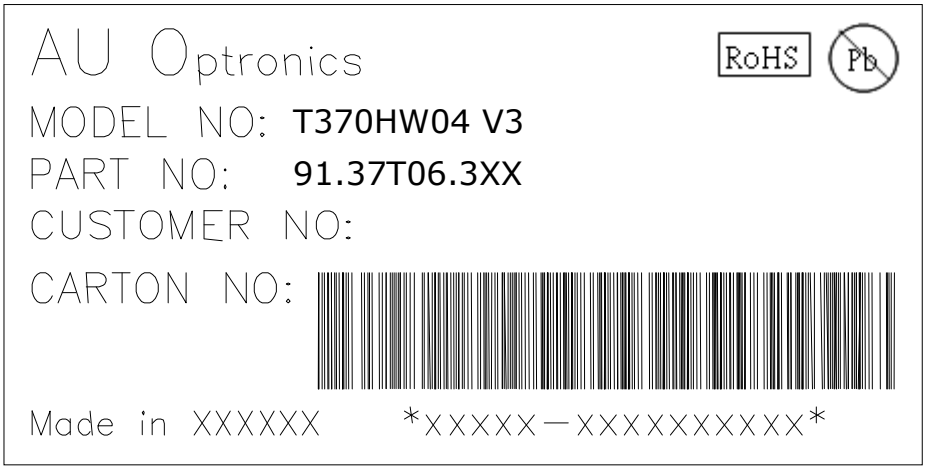
7. Reliability Test Items

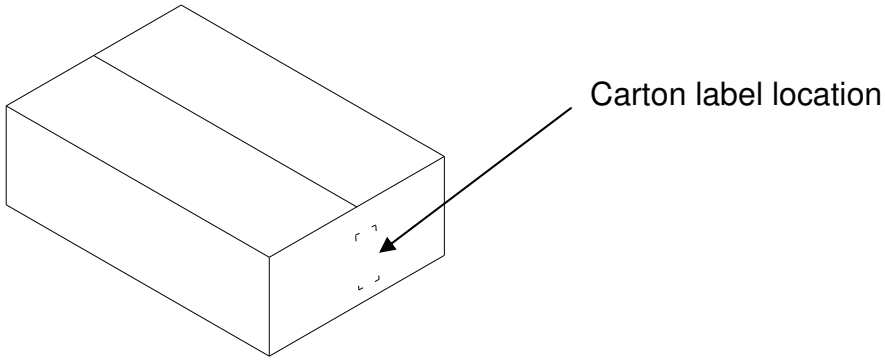
	Test Item	Q'ty	Condition
1	High temperature storage test	3pcs	60℃, 300hrs
2	Low temperature storage test	3pcs	-20℃, 300hrs
3	High temperature operation test	3pcs	50℃, 300hrs
4	Low temperature operation test	3pcs	-5℃, 300hrs
5	Vibration test (With carton)	18pcs (1Box)	Random wave (1.5G RMS, 10-200Hz) 30mins/ Per each X,Y,Z axes
6	Drop test (With carton)	18pcs (1Box)	Height: 30.5m 1 corner, 3 edges, 6 surfaces (ASTMD4169-I)

Note: Test item 1~4 RA tests are done on AUO 97.37T05.H00 panels.

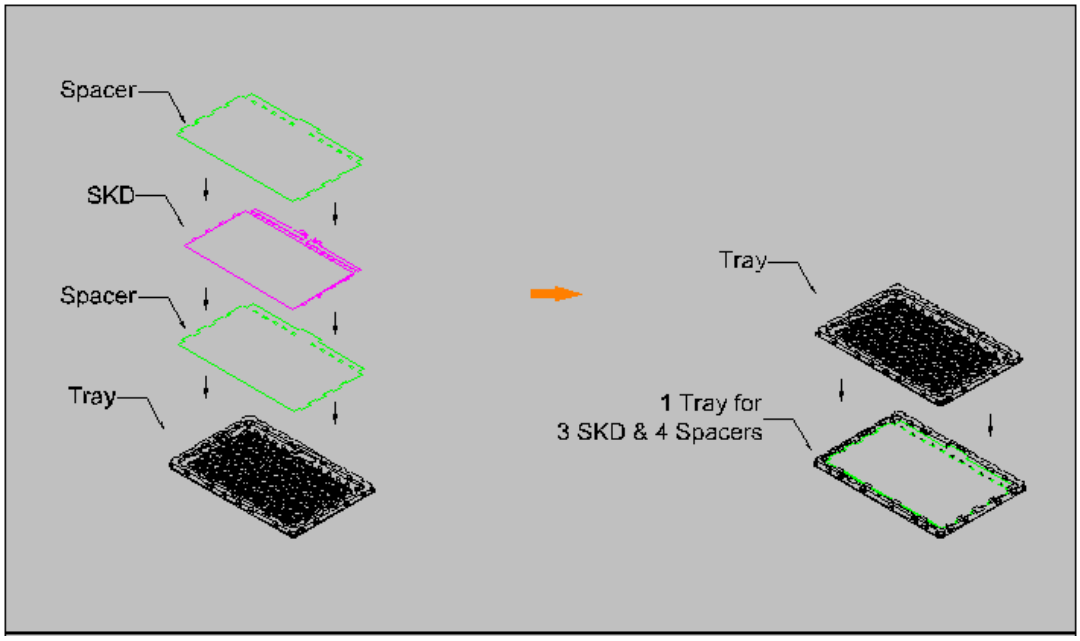
8. Packing

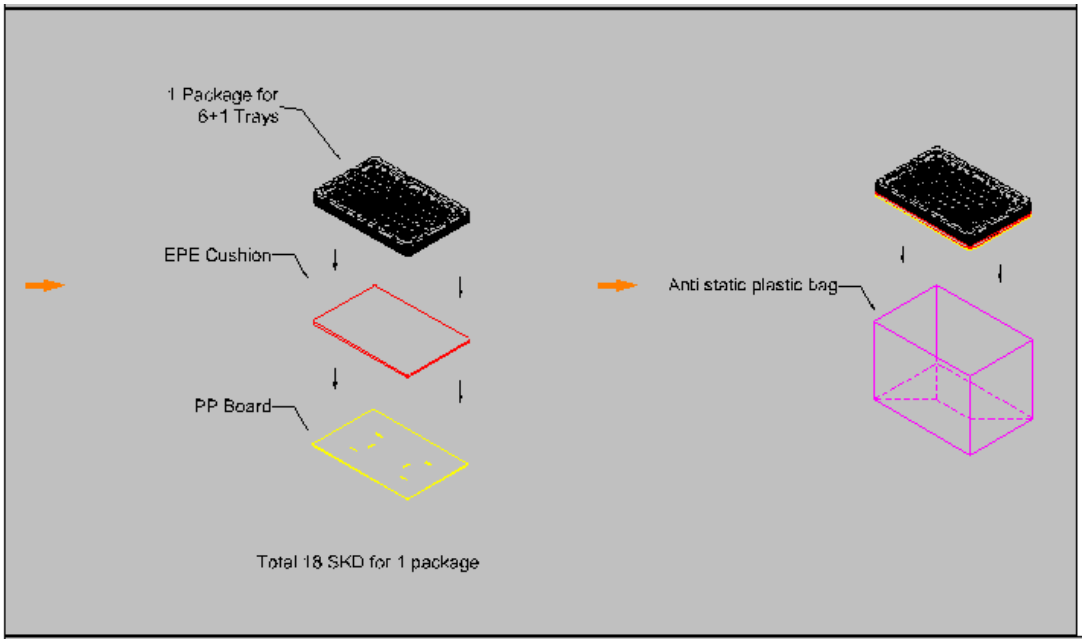
Carton Label:

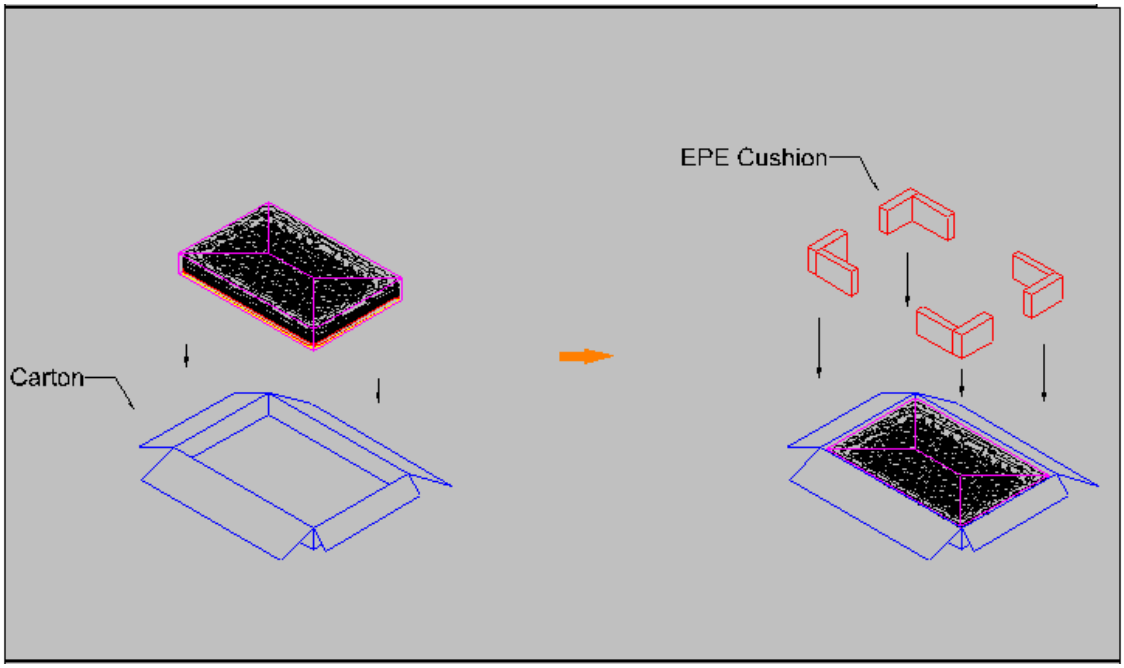


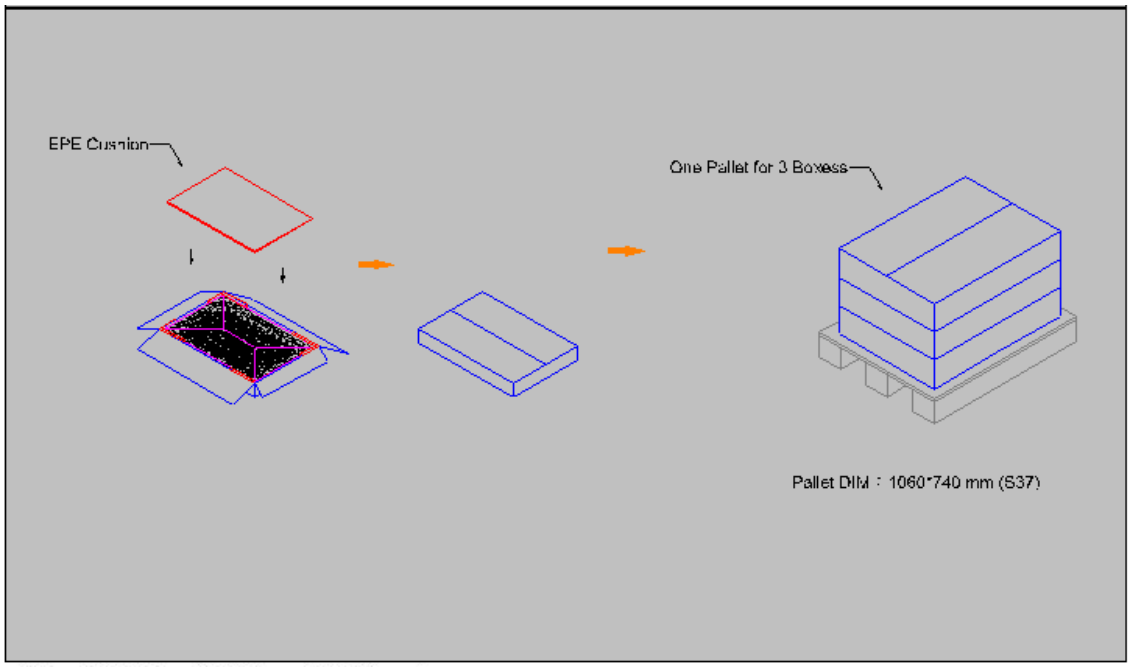


Packing Process:









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

9. PRECAUTIONS

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

9-1 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.

(3) 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.
(4) 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.)
(5) 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.
(6) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(7) Do not open the case because inside circuits do not have sufficient strength.

9-2 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.

9-3 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.

9-4 PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

9-5 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.

9-6 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.

