( ) Preliminary Specification
(V) Final Specification

Module	**24" Color TFT-LCD**
Model Name	**M240HW01 V80A**

Customer	**Date**	**Approved by**	**Date**
			Oct 16, 2013
Approved by		**Prepared by**	**Date**
			Oct 16, 2013
Note: This Specification is subject to change without notice.		AU Optronics corporation	

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Record of Revision

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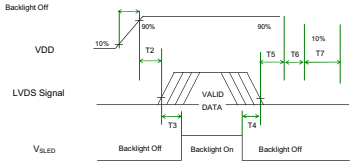
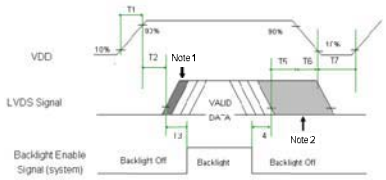
 
</td><td>Timming diagram:
- Insert a black/white pattem.
 
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1 Handling Precautions

1) Since front polarizer is easily damaged, pay attention not to scratch it.
2) Be sure to turn off power supply when inserting or disconnecting from input connector.
3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
7) Do not open or modify the Module Assembly.
8) Do not press the reflector sheet at the back of the module to any directions.
9) In case a TFT-LCD Module has to be put back into the packing container slot after once it was taken out from the container, do not press the center of the LED lightbar edge. Otherwise the TFT-LCD Module may be damaged.
10) Insert or pull out the interface connector, be sure not to rotate nor tilt it of the TFT-LCD Module.
11) Do not twist nor bend the TFT -LCD Module even momentary. It should be taken into consideration that no bending/twisting forces are applied to the TFT-LCD Module from outside. Otherwise the TFT-LCD Module may be damaged.
12) Please avoid touching COF position while you are doing mechanical design.
13) When storing modules as spares for a long time, the following precaution is necessary:
    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 General Description

This specification applies to the **24** inch wide Color a-Si TFT-LCD Module **M240HW01 V8**. The display supports the **Full HD - 1920(H) x 1080(V)** screen format and **16.7M** colors **(8-bits Data input)**. The light source of this TFT-LCD module is W-LED. The input interface is **4-channel LVDS** and this module doesn't contain an driver board for backlight.

2.1 Display Characteristics

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

ITEMS	Unit	SPECIFICATIONS
Screen Diagonal	[mm]	609.7(24.0")
Active Area	[mm]	531.36 (H) x 298.89 (V)
Pixels H x V	-	1920(x3) x 1080
Pixel Pitch	[um]	276.75 (per one triad) ×276.75
Pixel Arrangement	-	R.G.B. Vertical Stripe
Display Mode	-	TN Mode, Normally White
White Luminance (Center)	[cd/m^2]	350 (Typ.)
Contrast Ratio	-	1000 (Typ.)
Response Time	[msec]	5 (Typ., on/off)
Power Consumption (LCD Module + Backligh unit)	[Watt]	27.0 (Typ.) LCD module : PDD (Typ.)=7.3 @ Black pattern,Fv=120Hz Backlight unit : P_{BLU} (Typ.) =19.7 @Is=110mA
Weight	[Grams]	2010
Outline Dimension	[mm]	556.0(H)x323.2(V)x14.4(D) Typ.
Electrical Interface	-	4 channel LVDS
Support Color	-	16.7M colors (8-bits Data input)
Surface Treatment	-	Anti-Glare, 3H
Temperature Range Operating Storage (Shipping)	 [°C] [°C]	 0 to +50 -20 to +60
RoHS Compliance	-	RoHS Compliance
TCO Compliance	-	TCO 6.0 Compliance

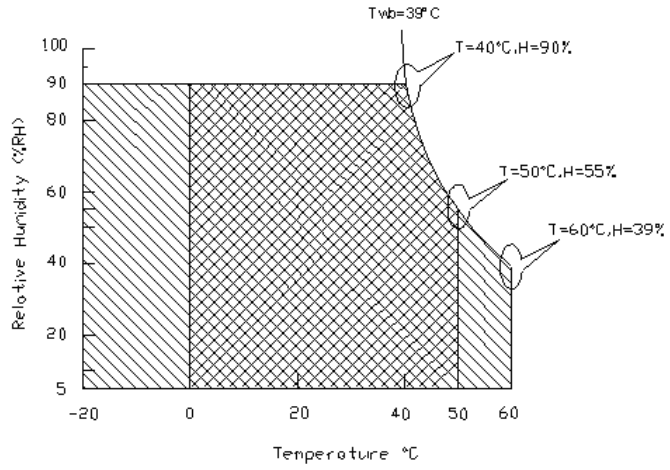
2.2 Absolute Maximum Rating of Environment

Permanent damage may occur if exceeding the following maximum rating.

Symbol	Description	Min.	Max.	Unit	Remark
TOP	Operating Temperature	0	+50	[°C]	***Note 2-1***
TGS	Glass surface temperature (operation)	0	+65	[°C]	***Note 2-1*** *Function judged only*
HOP	Operation Humidity	5	90	[%RH]	***Note 2-1***
TST	Storage Temperature	-20	+60	[°C]	
HST	Storage Humidity	5	90	[%RH]	

Note 2-1: Temperature and relative humidity range are shown as the below figure.

1. 90% RH Max (Ta ≦39℃)
2. Max wet-bulb temperature at 39℃ or less. (Ta ≦39℃)
3. No condensation



Operating Range Storage Range

2.3 Optical Characteristics

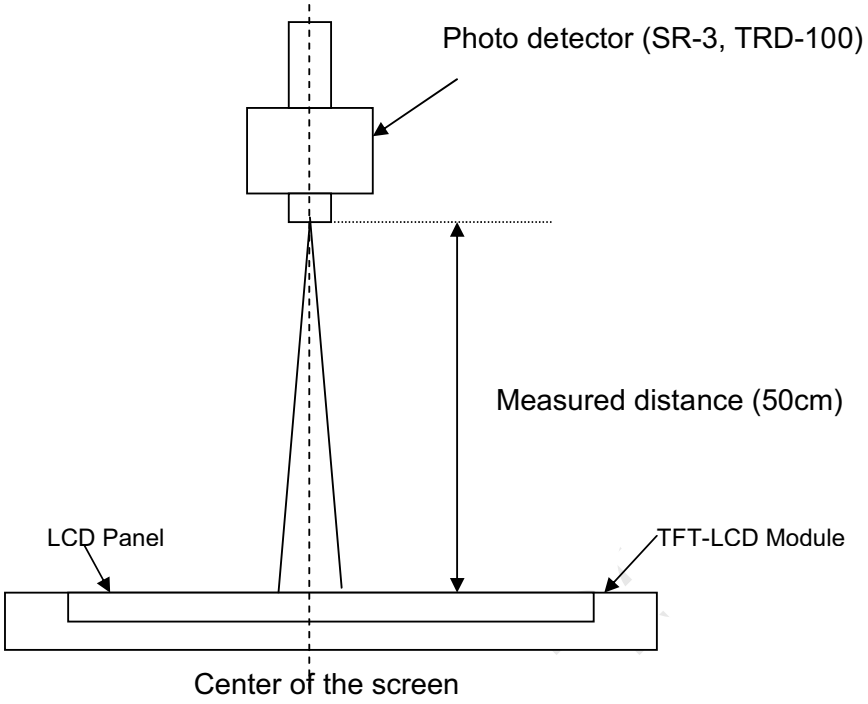
The optical characteristics are measured on the following test condition.

Test Condition:

1. Equipment setup: Please refer to ***Note 2-2***.
2. Panel Lighting time: 30 minutes
3. VDD=5.0V, Fv=120Hz,Is=110mA,Ta=25℃

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
L_w	White Luminance (Center of screen)		300	350	-	[cd/m2]	***Note 2-2*** *By SR-3*
L_{uni}	Luminance Uniformity (9 points)		75	80	-	[%]	***Note 2-3*** *By SR-3*
CR	Contrast Ratio (Center of screen)		600	1000	-	-	***Note 2-4*** *By SR-3*
θ_R	Horizontal Viewing Angle (CR=10)	Right	75	85	-	[degree]	***Note 2-5*** *By SR-3*
θ_L		Left	75	85	-		
Φ_H	Vertical Viewing Angle (CR=10)	Up	70	80	-		
Φ_L		Down	70	80	-		
θ_R	Horizontal Viewing Angle (CR=5)	Right	75	88			
θ_L		Left	75	88			
Φ_H	Vertical Viewing Angle (CR=5)	Up	70	85			
Φ_L		Down	70	85			
T_R	Response Time	Rising Time	-	3.5	7.4	[msec]	***Note 2-6*** *By TRD-100*
T_F		Falling Time	-	1.5	2.6		
-		Rising + Falling	-	5	10		
R_x	Color Coordinates (CIE 1931)	Red x	0.616	0.646	0.676	-	*By SR-3*
R_y		Red y	0.300	0.330	0.360		
G_x		Green x	0.280	0.310	0.340		
G_y		Green y	0.587	0.617	0.647		
B_x		Blue x	0.122	0.152	0.182		
B_y		Blue y	0.043	0.073	0.103		
W_x		White x	0.283	0.313	0.343		
W_y		White y	0.299	0.329	0.359		
CT	Crosstalk		-	-	1.5	[%]	***Note 2-7*** *By SR-3*
F_{dB}	Flicker (Center of screen)		-	-	-20	[dB]	***Note 2-8*** *By SR-3*

Note 2-2: Equipment setup :

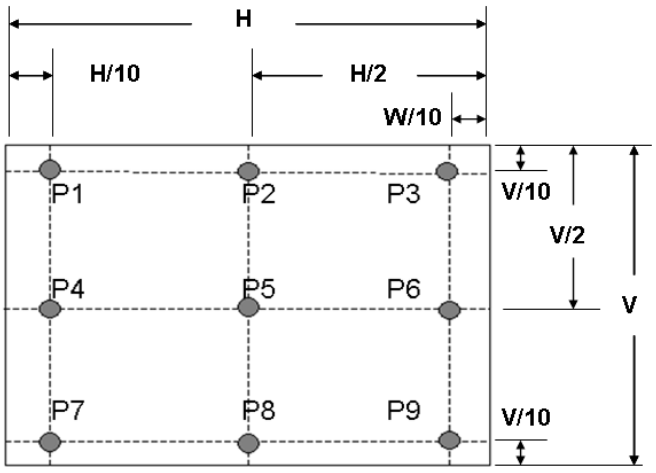


Note 2-3: Luminance Uniformity Measurement

Definition:

$$\text{Luminance Uniformity} = \frac{\text{Minimum Luminance of 9 Points (P1 ~ P9)}}{\text{Maximum Luminance of 9 Points (P1 ~ P9)}}$$

a.Test pattern: White Pattern



Note 2-4: Contrast Ratio Measurement

Definition:

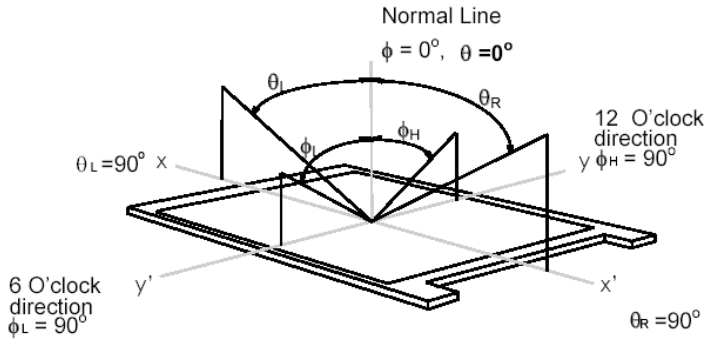
$$\text{Contrast Ratio} = \frac{\text{Luminance of White pattern}}{\text{Luminance of Black pattern}}$$

a. Measured position: Center of screen (P5) & perpendicular to the screen (θ=Φ=0°)

Note 2-5: Viewing angle measurement

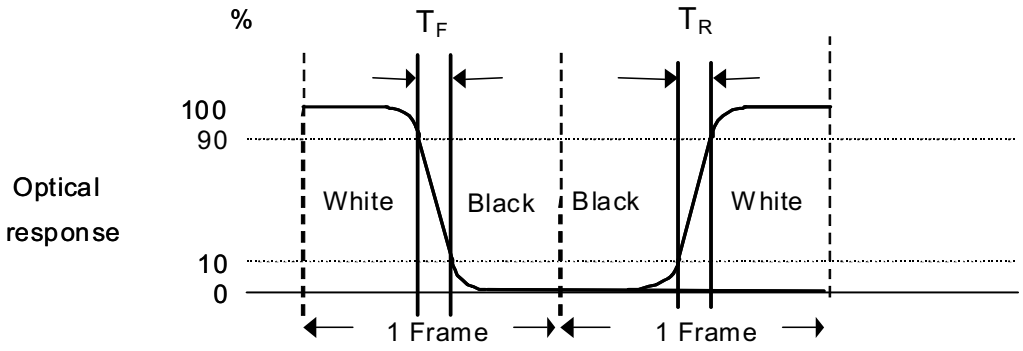
Definition: The angle at which the contrast ratio is greater than 10 & 5 .

a. Horizontal view angle: Divide to left & right (θ_L & θ_R)
Vertical view angle: Divide to up & down (Φ_H &Φ_L)



Note 2-6: Response time measurement

The output signals of photo detector are measured when the input signals are changed from "Black" to "White" (rising time, T_R), and from "White" to "Black" (falling time, T_F), respectively. The response time is interval between the 10% and 90% of optical response. (*Black & White color definition: Please refer section 3.4.3)*



Note 2-7: Crosstalk measurement

Definition:

$CT = Max. (CT_H, CT_V)$;

Where

a.Maximum Horizontal Crosstalk :

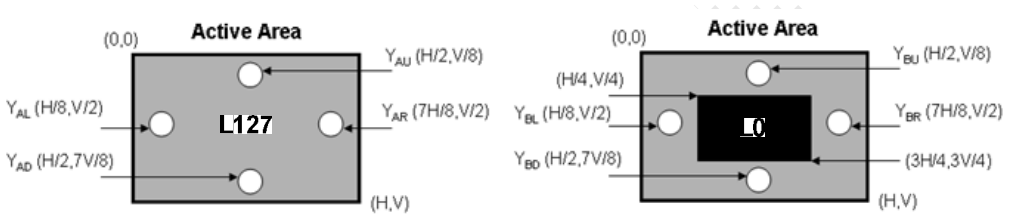
$CT_H = Max. (| Y_{BL} – Y_{AL} | / Y_{AL} \times 100\ \%, | Y_{BR} – Y_{AR} | / Y_{AR} \times 100\ \%)$;

Maximum Vertical Crosstalk:

$CT_V = Max. (| Y_{BU} – Y_{AU} | / Y_{AU} \times 100\ \%, | Y_{BD} – Y_{AD} | / Y_{AD} \times 100\ \%)$;

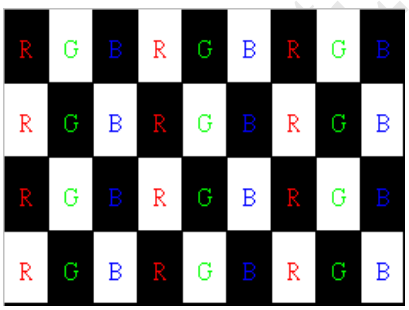
b. Y_{AU}, Y_{AD}, Y_{AL}, Y_{AR} = Luminance of measured location without Black pattern

Y_{BU}, Y_{BD}, Y_{BL}, Y_{BR} = Luminance of measured location with Black pattern



Note 2-8: Flicker measurement

a. Test pattern: It is listed as following.



Gray level = L0

Gray level = L127

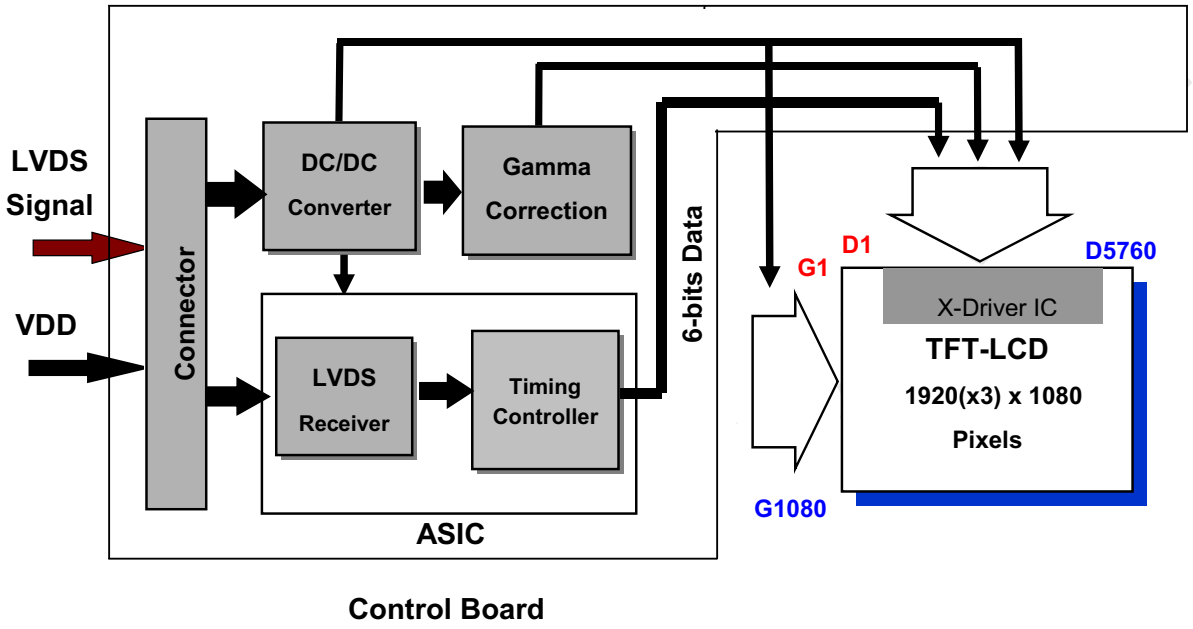
R: Red, G: Green, B:Blue

b. Measured position: Center of screen (P5) & perpendicular to the screen (θ=Φ=0°)

3 TFT-LCD Module

3.1 Block Diagram

The following shows the block diagram of the 24 inch Color TFT-LCD Module.



3.2 Interface Connection

3.2.1 Connector Type

TFT-LCD Connector (CNT1)	Manufacturer	JAE	CHIEF LAND
	Part Number	FI-RE51S-HF	107C51-A000RAG4
TFT-LCD Connector (CNT2)	Manufacturer	P-TWO	SIN SHENG
	Part Number	185132-15021	MSAK2404P15B
Mating Connector (CNT1)	Manufacturer	JAE	CHIEF LAND
	Part Number	FI-RE51HL	107D51-000001-00
Mating Connector (CNT2)	Manufacturer		
	Part Number	12507HS-15L	

3.2.2 Connector Pin Assignment

LVDS

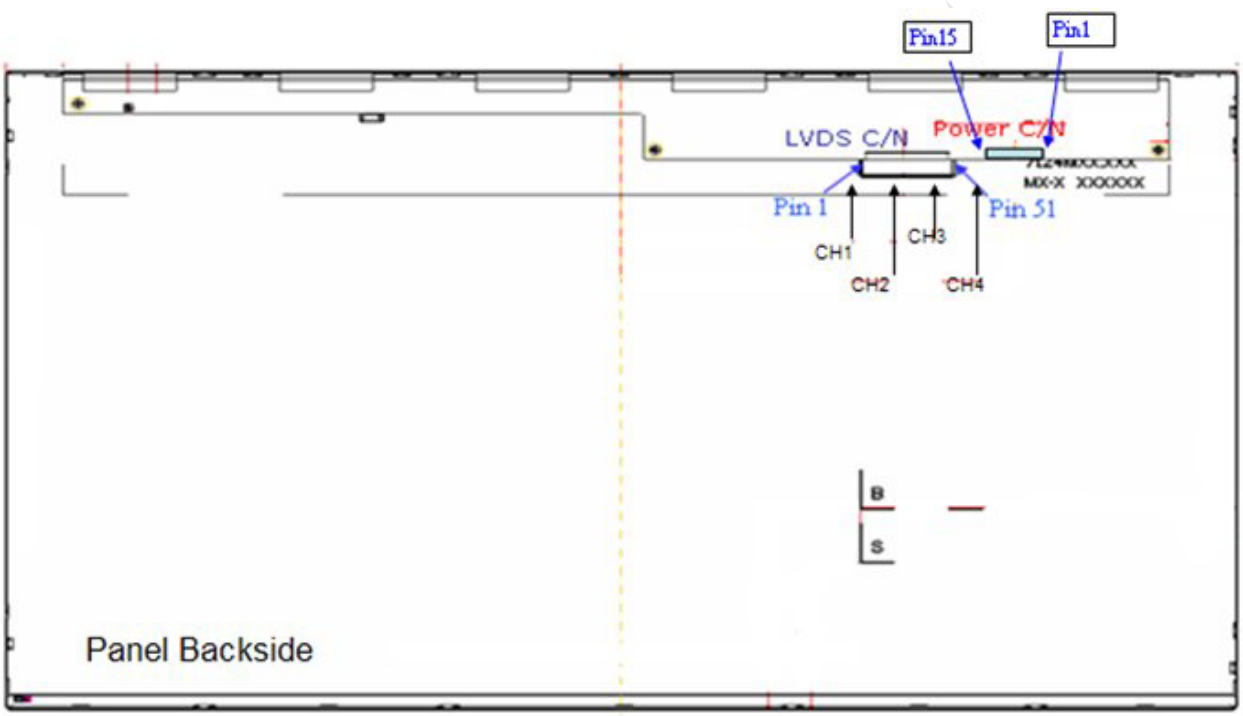
PIN #	Symbol	Description	Function
1	R1_0N	FIRST Negative LVDS differential data input	LVDS port 1
2	R1_0P	FIRST Positive LVDS differential data input	
3	R1_1N	FIRST Ne ative LVDS differential data input	
4	R1_1P	FIRST Positive LVDS differential data input	
5	R1_2N	FIRST Ne ative LVDS differential data input	
6	R1_2P	FIRST Positive LVDS differential data input	
7	GND	Power Ground	
8	R1_CLKN	FIRST Negative LVDS differential clock input	
9	R1_CLKP	FIRST Positive LVDS differential clock input	
10	GND	Power Ground	
11	R1_3N	FIRST Negative LVDS differential data input	
12	R1_3P	FIRST Positive LVDS differential data input	
13	GND	Power Ground	
14	R2_0N	SECOND Negative LVDS differential data input	LVDS port 2
15	R2_0P	SECOND Positive LVDS differential data input	
16	R2_1N	SECOND Negative LVDS differential data input	
17	R2_1P	SECOND Positive LVDS differential data input	
18	R2_2N	SECOND Negative LVDS differential data input	
19	R2_2P	SECOND Positive LVDS differential data input	
20	GND	Power Ground	
21	R2_CLKN	SECOND Negative LVDS differential clock input	

22	R2_CLKP	SECOND Positive LVDS differential clock input	
23	GND	Power Ground	
24	R2_3N	SECOND Negative LVDS differential data input	
25	R2_3P	SECOND Positive LVDS differential data input	
26	GND	Power Ground	
27	R3_0N	THIRD Negative LVDS differential data input	LVDS port 3
28	R3_0P	THIRD Positive LVDS differential data input	
29	R3_1N	THIRD Negative LVDS differential data input	
30	R3_1P	THIRD Positive LVDS differential data input	
31	R3_2N	THIRD Negative LVDS differential data input	
32	R3_2P	THIRD Positive LVDS differential data input	
33	GND	Power Ground	
34	R3_CLKN	THIRD Negative LVDS differential clock input	
35	R3_CLKP	THIRD Positive LVDS differential clock input	
36	GND	Power Ground	
37	R3_3N	THIRD Negative LVDS differential data input	
38	R3_3P	THIRD Positive LVDS differential data input	
39	GND	Power Ground	
40	R4_0N	FOURTH Negative LVDS differential data input	LVDS port 4
41	R4_0P	FOURTH Positive LVDS differential data input	
42	R4_1N	FOURTH Negative LVDS differential data input	
43	R4_1P	FOURTH Positive LVDS differential data input	
44	R4_2N	FOURTH Negative LVDS differential data input	
45	R4_2P	FOURTH Positive LVDS differential data input	
46	GND	Power Ground	
47	R4_CLKN	FOURTH Negative LVDS differential clock input	
48	R4_CLKP	FOURTH Positive LVDS differential clock input	
49	GND	Power Ground	
50	R4_3N	FOURTH Negative LVDS differential data input	
51	R4_3P	FOURTH Positive LVDS differential data input	

VDD

PIN #	Symbol	Description	Remark
1	NC	No connection (for AUO test only. Do not connect)	
2	NC	No connection (for AUO test only. Do not connect)	
3	NC	No connection (for AUO test only. Do not connect)	
4	GND	Power Ground	
5	GND	Power Ground	
6	GND	Power Ground	

7	GND	Power Ground	
8	NC	No connection (for AUO test only. Do not connect)	
9	NC	No connection (for AUO test only. Do not connect)	
10	GND	Power Ground	
11	VDD	Power +5V	
12	VDD	Power +5V	
13	VDD	Power +5V	
14	VDD	Power +5V	
15	VDD	Power +5V	



3.3 Electrical Characteristics

3.3.1 Absolute Maximum Rating

Permanent damage may occur if exceeding the following maximum rating.

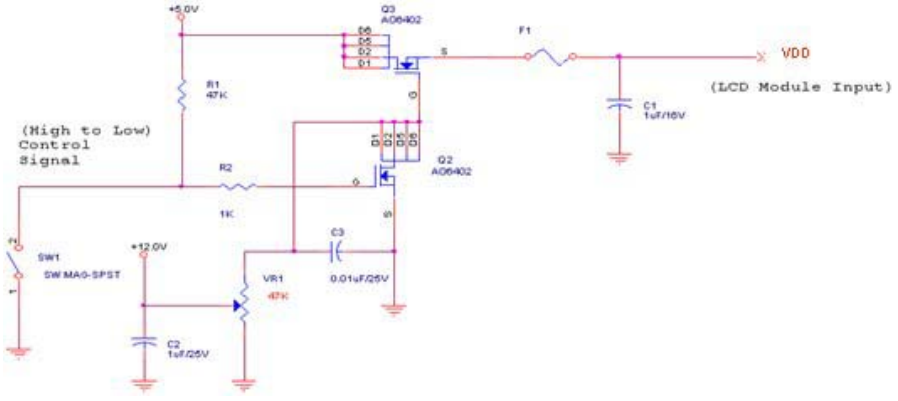
Symbol	Description	Min	Max	Unit	Remark
VDD	Power Supply Input Voltage	GND-0.3	6.0	[Volt]	Ta=25℃

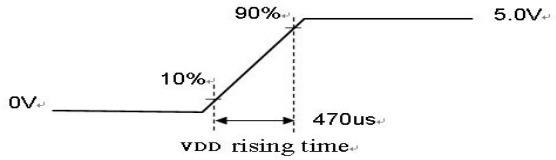
3.3.2 Recommended Operating Condition

Symbol	Description	Min	Typ	Max	Unit	Remark
VDD	Power supply Input voltage	4.5	5.0	5.5	[Volt]	
IDD	Power supply Input Current (RMS)	-	1.45	1.74	[A]	VDD= 5.0V, Black Pattern, Fv=120Hz
PDD	VDD Power Consumption	-	7.25	8.7	[Watt]	VDD= 5.0V, Black Pattern, Fv=120Hz
IRush	Inrush Current	-	-	3.0	[A]	***Note 3-1***
VDDrp	Allowable VDD Ripple Voltage	-	-	500	[mV]	VDD= 5.0V, Black Pattern, Fv=120Hz

Note 3-1: Inrush Current measurement:

Test circuit:

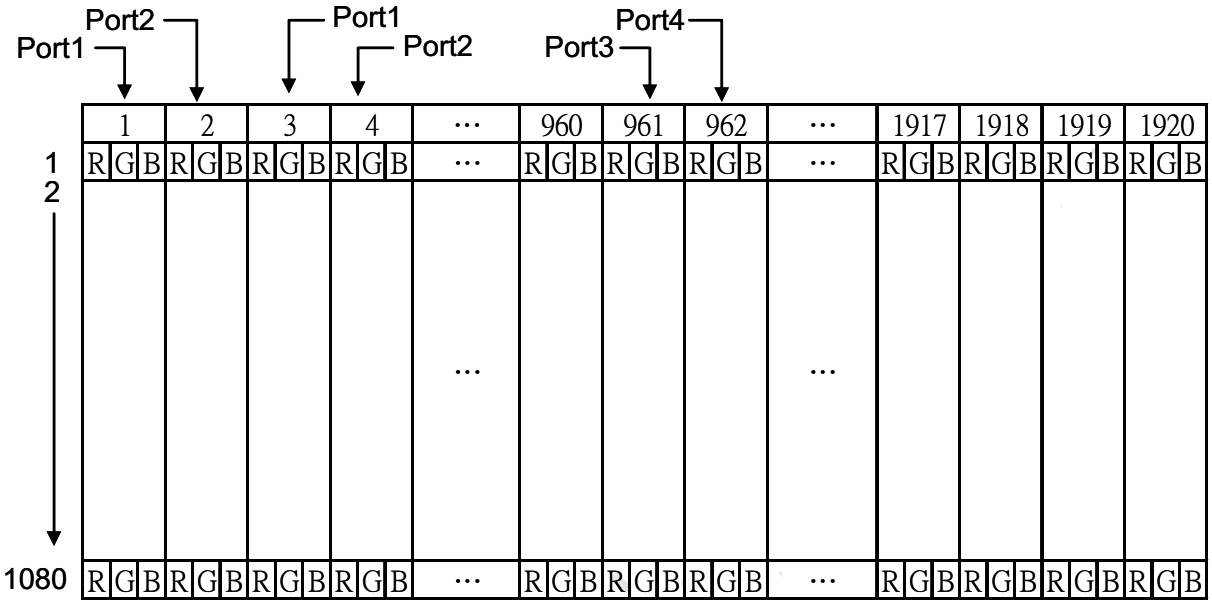




The duration of VDD rising time: 470us.

3.4 Signal Characteristics

3.4.1 LCD Pixel Format



Note 3-2: The module use 4port-LVDS interface.

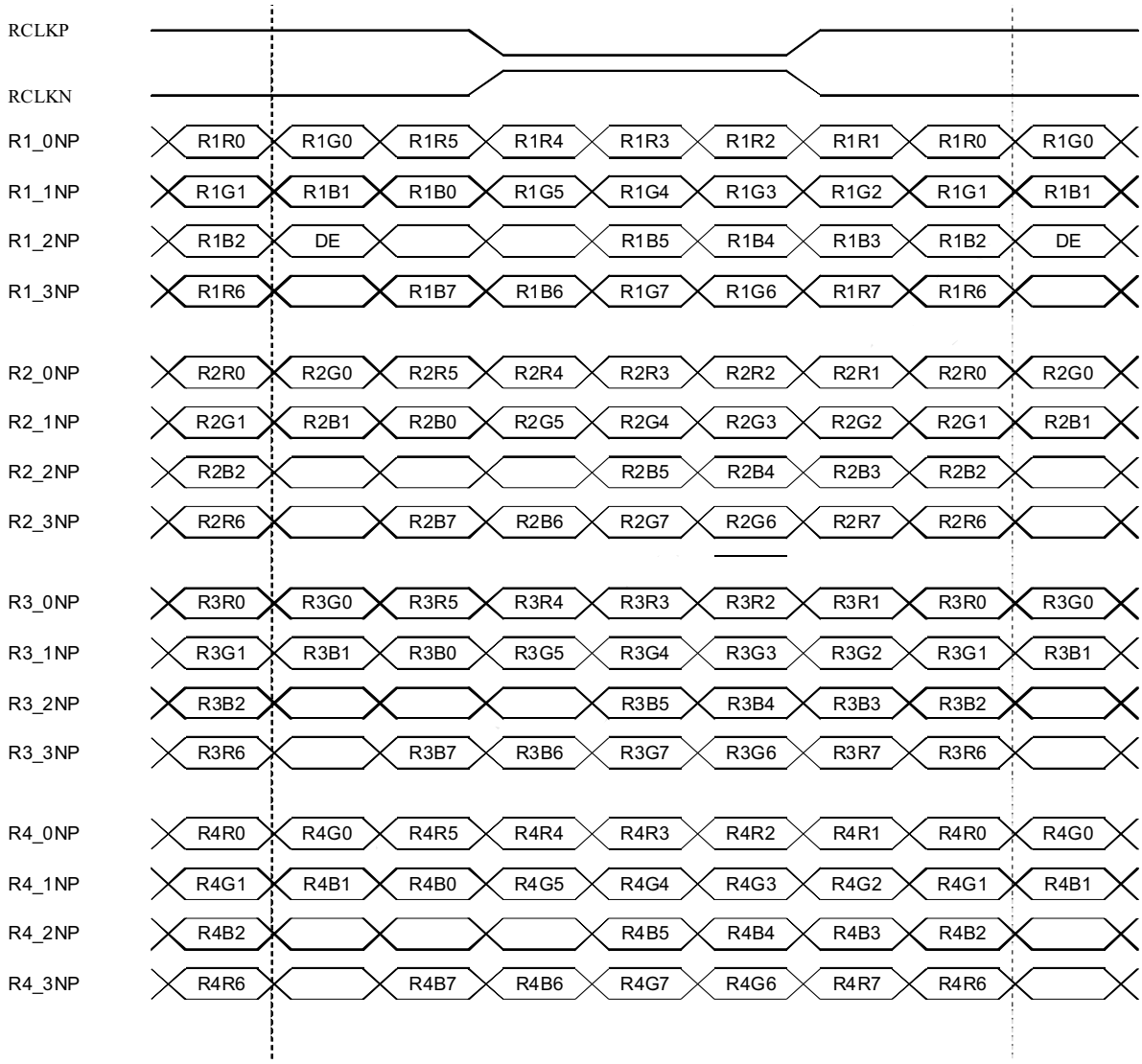
Port 1：1, 3…….....→ 959 pixel ➔2N+1 N=0,~ 479(1,3.. 959pixel)

Port 2：2, 4…….....→ 960 pixel ➔2N+2 N=0,~ 479 (2,4.. 960pixel)

Port 3：961, 963……..→1919 pixel ➔2N+961 N=0,~ 479 (961,963.. 1919pixel)

Port 4：962, 964……..→1920 pixel ➔2N+962 N=0,~ 479 (962,964.. 1920pixel)

3.4.2 LVDS Data Format



3.4.3 Color versus Input Data

The following table is for color versus input data (8bit). The higher the gray level, the brighter the color.

Color	Gray Level	Color Input Data																								Remark
		RED data (MSB:R7, LSB:R0)								GREEN data (MSB:G7, LSB:G0)								BLUE data (MSB:B7, LSB:B0)								
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0	
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	
White	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gray 127	-	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	
Red	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	Black
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L255	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	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	Black
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L255	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	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	Black
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L255	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	

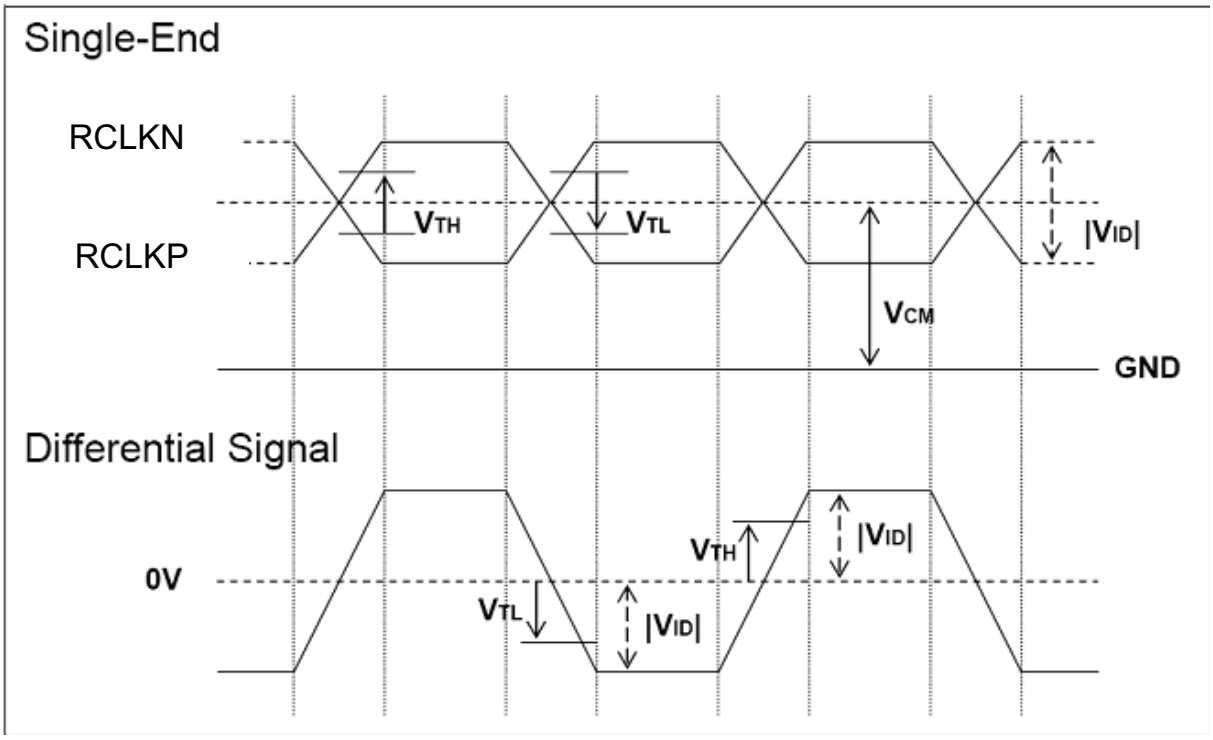
3.4.4 LVDS Specification

a. DC Characteristics:

Symbol	Description	Min	Typ	Max	Units	Condition
V_{TH}	LVDS Differential Input High Threshold	-	-	+100	[mV]	V_{CM} = 1.2V
V_{TL}	LVDS Differential Input Low Threshold	-100	-	-	[mV]	V_{CM} = 1.2V
$\lvert V_{ID} \rvert$	LVDS Differential Input Voltage	100	-	600	[mV]	
V_{CM}	LVDS Common Mode Voltage	+1.0	+1.2	+1.5	[V]	V_{TH}-V_{TL} = 200mV

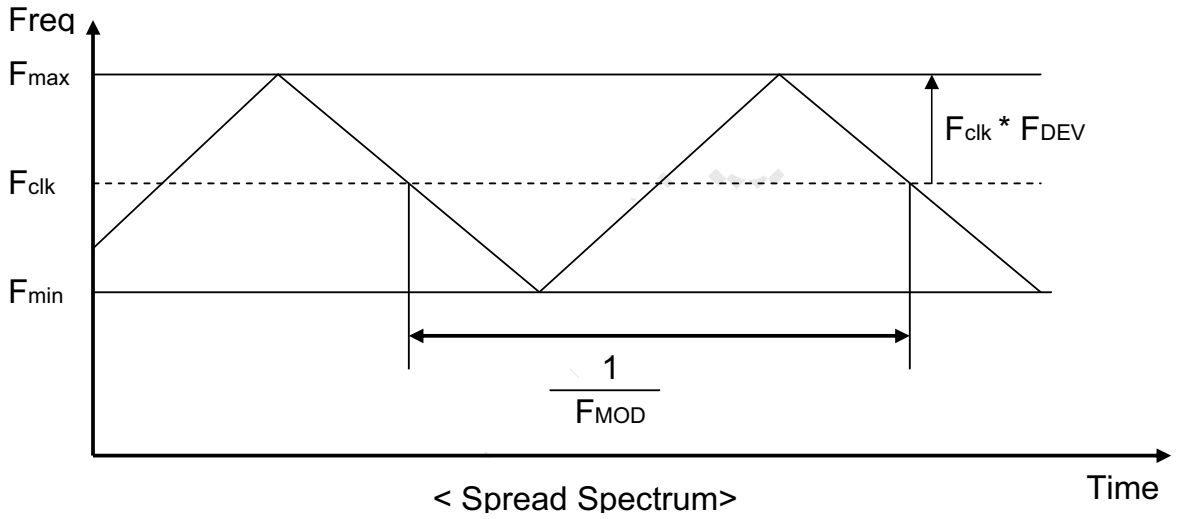
LVDS Signal Waveform:

Use RCLKN & RCLKP as example.



b. AC Characteristics:

Symbol	Description	Min	Max	Unit	Remark
F_{DEV}	Maximum deviation of input clock frequency during Spread Spectrum	-	± 3	%	
F_{MOD}	Maximum modulation frequency of input clock during Spread Spectrum	-	200	KHz	



< Spread Spectrum>

Fclk: LVDS Clock Frequency

3.4.5 Input Timing Specification

It only support DE mode, and the input timing are shown as the following table.

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
Tv	Vertical Section	Period	1088	1130	1715	Th	
Tdisp (v)		Active	1080	1080	1080	Th	
Tblk (v)		Blanking	8	50	635	Th	
Fv		Frequency	50	-	120	Hz	
Th	Horizontal Section	Period	510	560	600	Tclk	
Tdisp (h)		Active	480	480	480	Tclk	
Tblk (h)		Blanking	30	80	120	Tclk	
Fh		Frequency	55	-	149	KHz	*Note 3-3*
Tclk	LVDS Clock	Period	35.7	-	13.16	ns	1/Fclk
Fclk		Frequency	28	-	97.1	MHz	*Note 3-4*

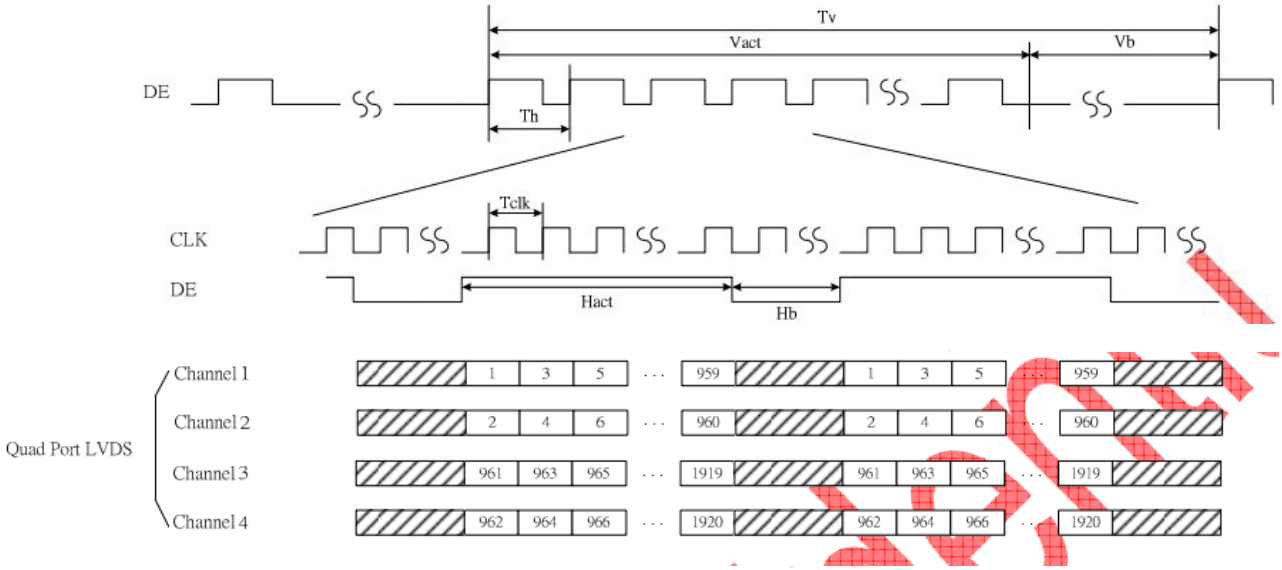
Note 3-3: The equation is listed as following. Please don't exceed the above recommended value.

Fh (Min.) = Fclk (Min.) / Th (Min.);
Fh (Typ.) = Fclk (Typ.) / Th (Typ.);
Fh (Max.)= Fclk (Max.) / Th (Min.);

Note 3-4: The equation is listed as following. Please don't exceed the above recommended value.

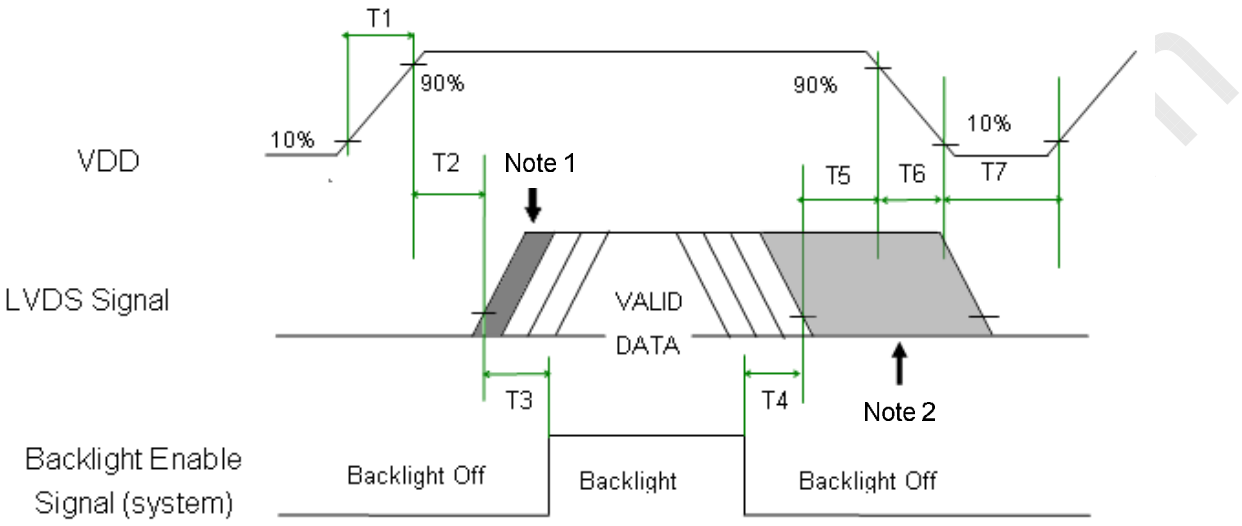
Fclk (Min.) = Fv (Min.) x Th (Min.) x Tv (Min.);
Fclk (Typ.) = Fv (Typ.) x Th (Typ.) x Tv (Typ.);
Fclk (Max.) = Fv (Max.) x Th (Typ.) x Tv (Typ.);

3.4.6 Input Timing Diagram



3.5 Power ON/OFF Sequence

VDD power,LVDS signal and backlight on/off sequence are as following. LVDS signals from any system shall be Hi-Z state when VDD is off.



Note 1: Insert a black pattern.

Note 2: Insert a white pattern after valid data and last until VDD falls to 10%

Power Sequence Timing

Symbol	Value			Unit	Remark
	Min.	Typ.	Max.		
T1	0.5	-	10	[ms]	
T2	0	-	50	[ms]	
T3	500	-	-	[ms]	
T4	100	-	-	[ms]	
T5	0		50	[ms]	*Note 3-5* *Note 3-6*
T6	0	-	150	[ms]	*Note 3-6*
T7	1000	-	-	[ms]	

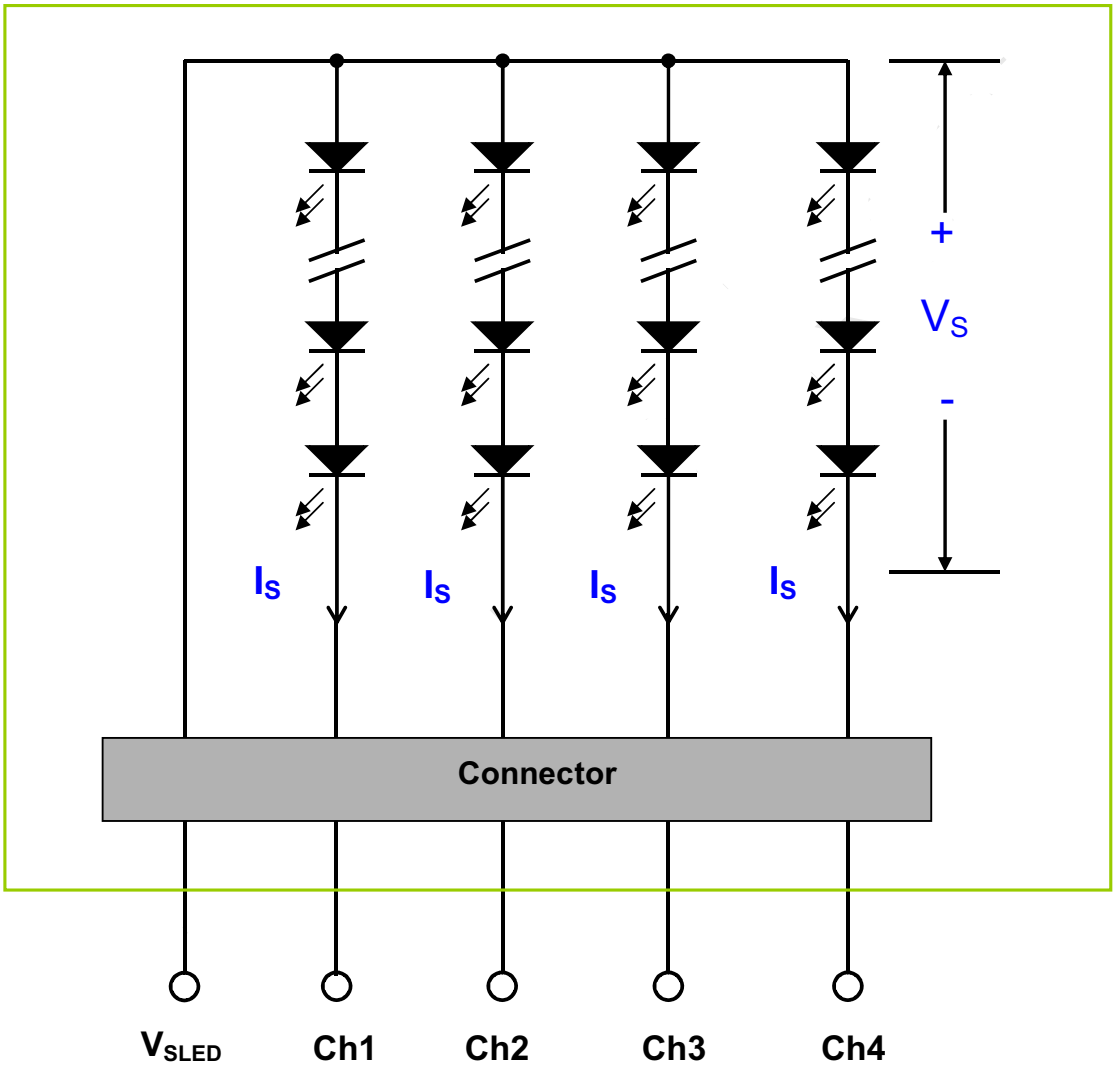
Note 3-5 : Recommend setting T5 = 0ms to avoid electronic noise when VDD is off.

Note 3-6 : During T5 and T6 period , please keep the level of input LVDS signals with Hi-Z state.

4 Backlight Unit

4.1 Block Diagram

The following shows the block diagram of the **24** inch Backlight Unit. And it includes **56** pcs LED in the LED light bar. (**4 strings and 14 pcs** LED of one string).



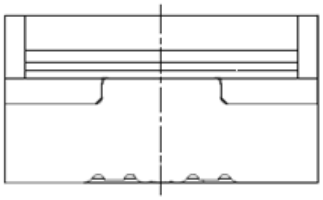
4.2 Interface Connection

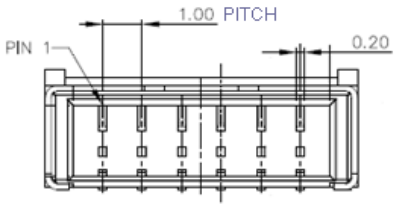
4.2.1 Connector Type

Backlight Connector	Manufacturer	**ENTERY**
	Part Number	**3707K-S06N-01R**
Mating Connector	Manufacturer	**ENTERY**
	Part Number	**H112K-P06N-00B (Non-Locking type)** **H112K-P06N-11B (Locking type)**

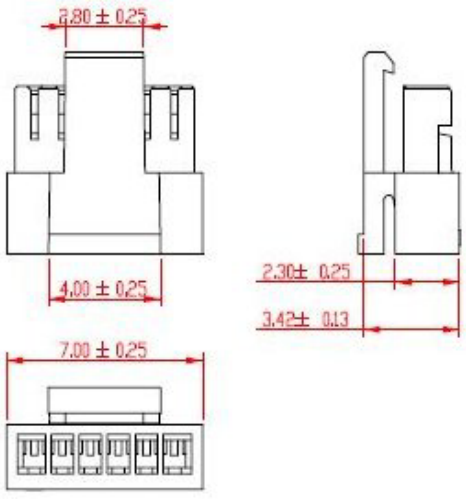
Backlight Connector dimension:

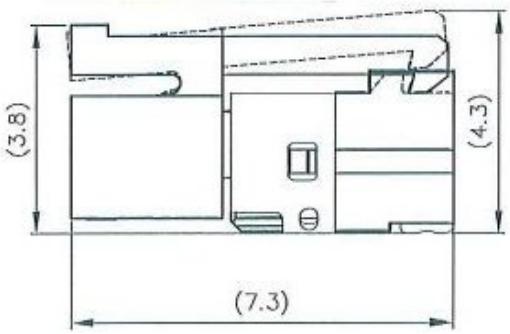
$H \times V \times D = 7.9 \times 3.00 \times 4.25, Pitch = 1.0(unit = mm)$





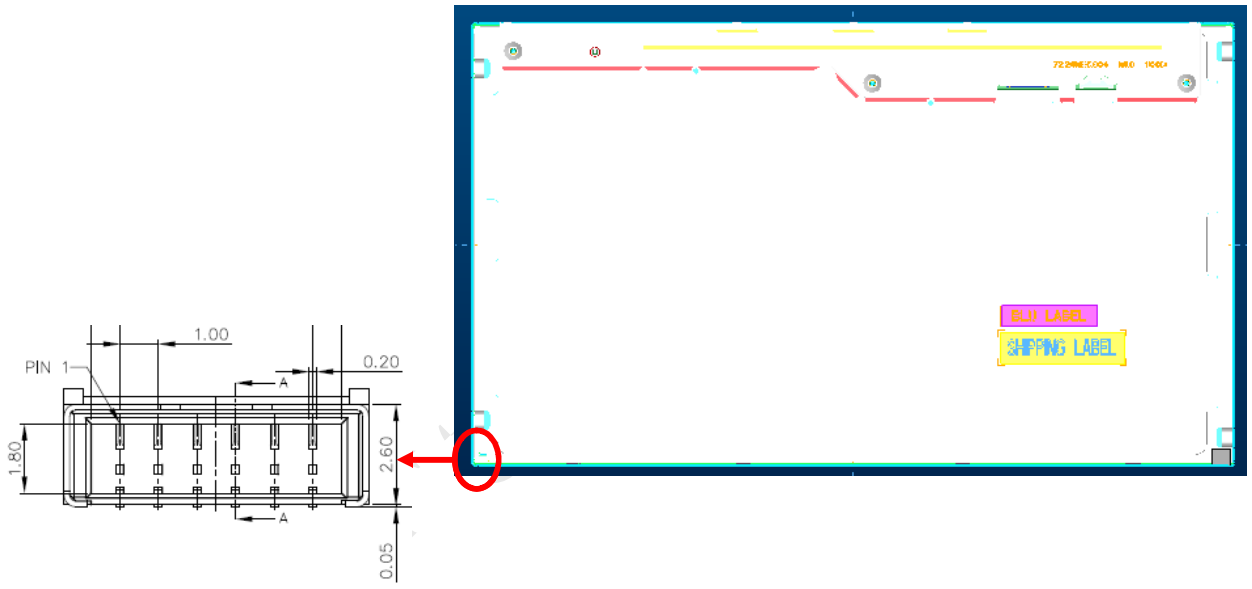
Mating Connector dimension:





4.2.2 Connector Pin Assignment

Pin#	Symbol	Description	Remark
1	Ch1	LED Current Feedback Terminal (Channel 1)	
2	Ch2	LED Current Feedback Terminal (Channel 2)	
3	V_{SLED}	LED Power Supply Voltage Input Terminal	
4	V_{SLED}	LED Power Supply Voltage Input Terminal	
5	Ch3	LED Current Feedback Terminal (Channel 3)	
6	Ch4	LED Current Feedback Terminal (Channel 4)	



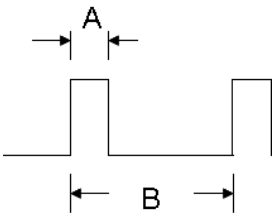
4.3 Electrical Characteristics

4.3.1 Absolute Maximum Rating

Permanent damage may occur if exceeding the following maximum rating.

(Ta=25℃)

Symbol	Description	Min	Max	Unit	Remark
Is	LED String Current	0	150	[mA]	100% duty ratio
			200	[mA] Note1	Duty ratio= 33% Pulse Width=8~10 ms
			214	[mA] Note2	Duty ratio= 24% Pulse Width=8~10 ms



Duty ratio= (A / B) X 100% ; (A: Pulse time, B: Period)

Note 1: **Current @33% duty~I=200mA lifetime=30khrs (base on LGIT's measurement,it's vender's limit)**

Note 2: **Current@24% duty ~I=214mA, lifetime= 30khrs**

4.3.2 Recommended Operating Condition

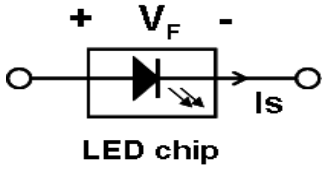
(Ta=25℃)

Symbol	Description	Min.	Typ.	Max.	Unit	Remark
Is	LED String Current	-	110	121	[mA]	100% duty ratio of LED chip
Vs	LED String Voltage	40.6	44.8	49	[Volt]	Is=110mA @ 100% duty ratio; *Note 4-1, Note 4-5*
ΔVs	Maximum Vs Voltage Deviation of light bar	-	-	2.8	[Volt]	Is=110mA @ 100% duty ratio; *Note 4-2*
P_{BLU}	LED Light Bar Power Consumption	-	19.7	21.6	[Watt]	Is=110mA @ 100% duty ratio; *Note 4-3*
LT_{LED}	LED Life Time	30,000	-	-	[Hour]	Is=110mA @ 100% duty ratio; *Note 4-4*
IFp	LED Pulse Forward Current	-	--	200	[mA]	Pulse Width=8~10ms Duty=33%;*Note 4-6*
IFp	LED Pulse Forward Current	-	--	214	[mA]	Pulse Width=8~10ms Duty=24%;*Note 4-7*

Note 4-1: Vs (Typ.) = V_F (Typ.) X LED No. (one string);

a. V_F: LED chip forward voltage, V_F (Min.)=2.9V, V_F(Typ.)=3.2V, V_F(Max.)=3.5V

b. The same euqation to calculate Vs(Min.) & Vs (Max.) for respective V_F (Min.) & V_F(Max.);



Note 4-2: ΔVs (Max.) = ΔV_F X LED No. (one string);

a. ΔV_F: LED chip forward voltage deviation; (0.2 V , each Bin of LED V_F)

Note 4-3: P_{BLU} (Typ.) = Vs (Typ.) X Is (Typ.) X 4 ; (4 is total String No. of LED Light bar)

P_{BLU} (Max.) = Vs (Max.) X Is (Typ.) X 4 ;

Note 4-4: Definition of life time:

a. Brightness of LED becomes to 50% of its original value

b. Test condition: Is = 110mA and 25℃ (Room Temperature)

Note 4-5: Recommendation for LED driver power design:

Due to there are electrical property deviation in LED & monitor set system component after long time operation. AUO strongly recommend the design value of LED driver board OVP (over voltage protection) should be 10% higher than max. value of LED string voltage (Vs) at least.

Note 4-6: Current @33% duty~I=200mA lifetime=30khrs (base on LGIT's measurement,it's vender's limit)

Note 4-7: Current@24% duty ~I=214mA, lifetime= 30khrs

Note 4-8: AUO strongly recommend "Analog Dimming" method for backlight brightness control for Wavy Noise Free. Otherwise, recommend that Dimming Control Signal (PWM Signal) should be synchronized with Frame Frequency.

5 Reliability Test

AUO reliability test items are listed as following table. (*Bare Panel only*)

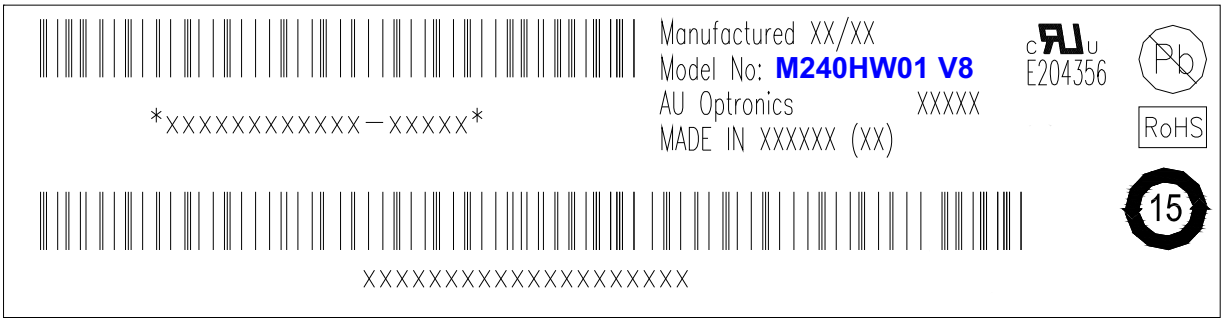
Items	Condition	Remark
Temperature Humidity Bias (THB)	Ta= 50℃, 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 50℃, 50%RH, 300hours	
Low Temperature Operation (LTO)	Ta= 0℃, 300hours	
High Temperature Storage (HTS)	Ta= 60℃, 300hours	
Low Temperature Storage (LTS)	Ta= -20℃, 300hours	
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Random Frequency: 10 - 200 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 20 ms Direction: ±X, ±Y, ±Z (one time for each Axis)	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 100 cycles	***Note 5-1***
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 15KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point.	***Note 5-2***
	Air Discharge: ± 15KV, 150pF(330Ω) 1sec 8 points, 25 times/ point.	
Altitude Test	Operation:18,000 ft Non-Operation:40,000 ft	

Note 5-1: a. A cycle of rapid temperature change consists of varying the temperature from -20℃ to 60℃, and back again. Power is not applied during the test.
b. After finish temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note 5-2: EN61000-4-2, ESD class B: Certain performance degradation allowed
No data lost
Self-recoverable
No hardware failures.

6 Shipping Label

The label is on the panel as shown below:



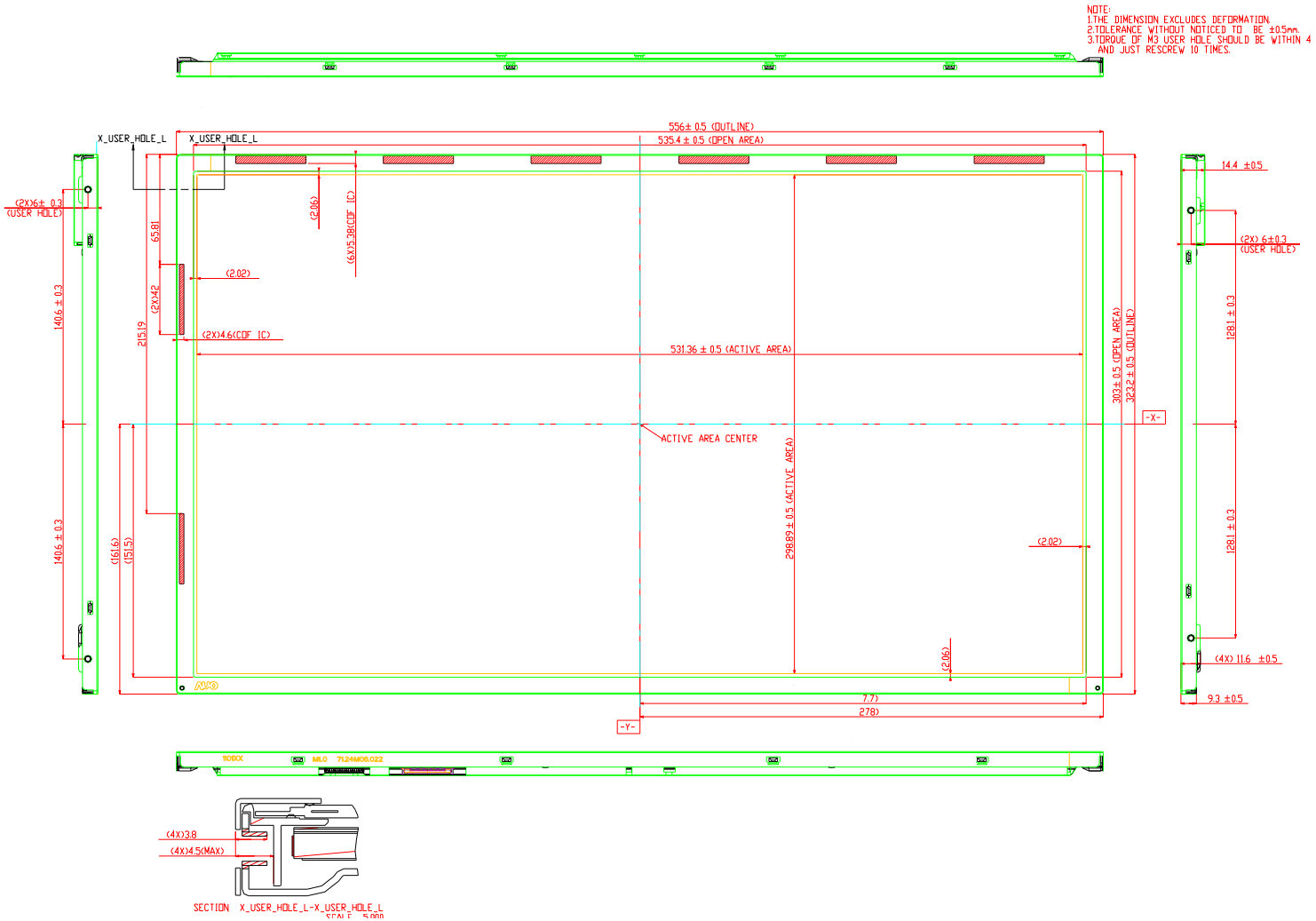
Note 6-1: For Pb Free products, AUO will add for identification.

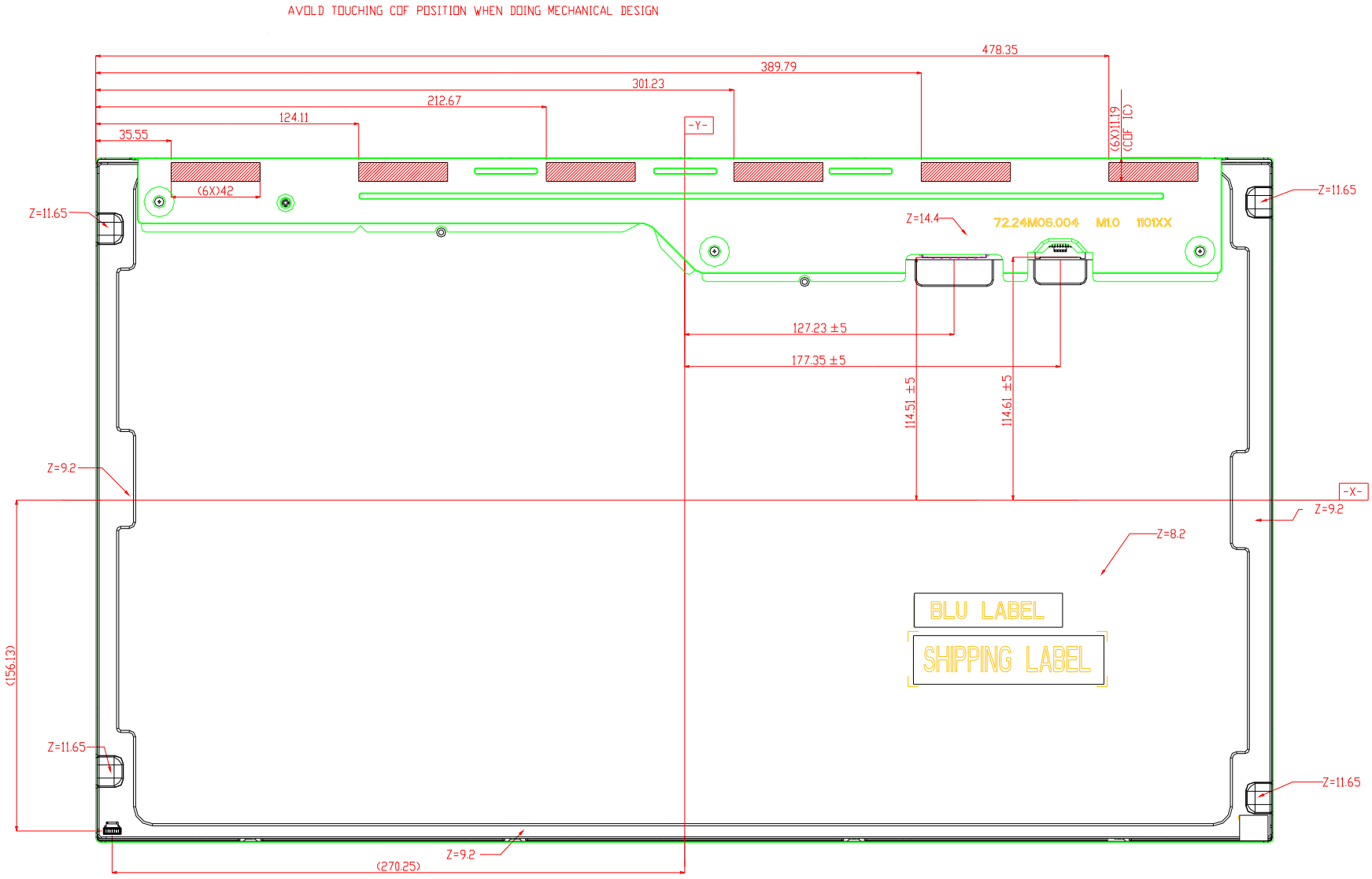
Note 6-2: For RoHS compatible products, AUO will add for identification.

Note 6-3: For China RoHS compatible products, AUO will add for identification.

Note 6-4: The Green Mark will be presented only when the green documents have been ready by AUO Internal Green Team.

7 Mechanical Characteristics

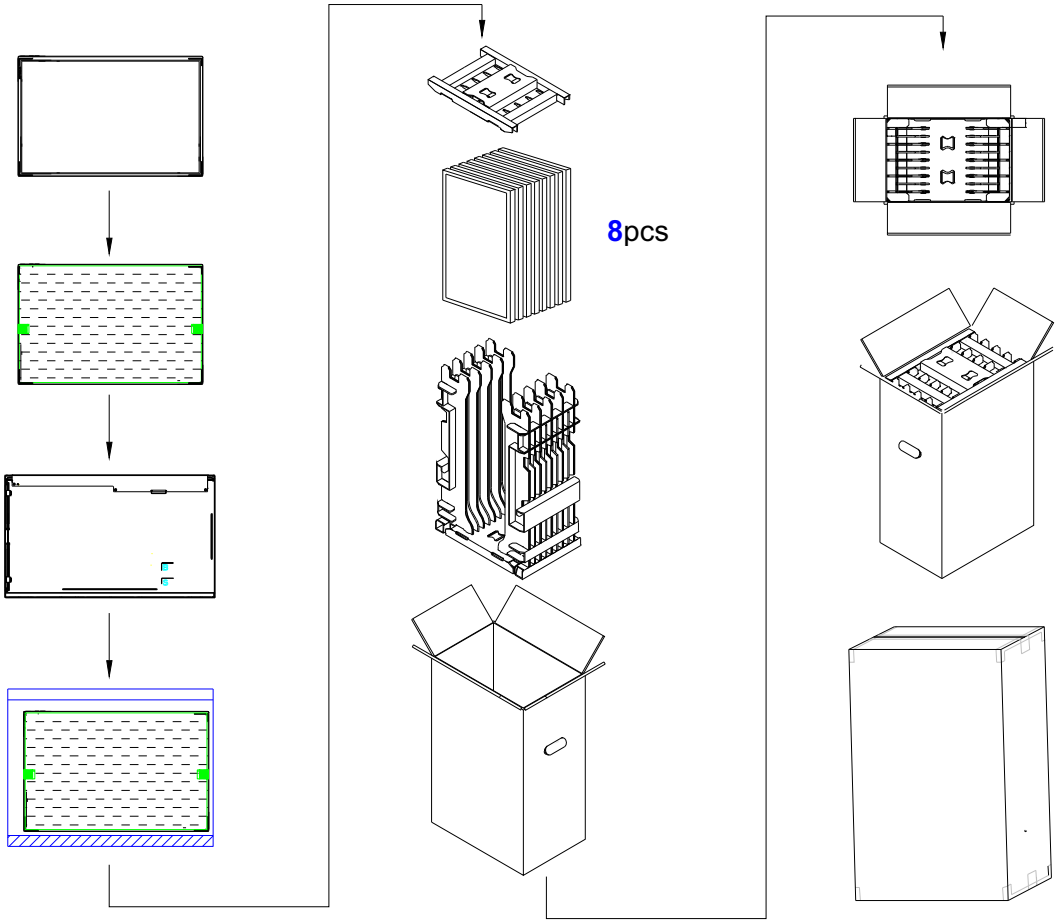


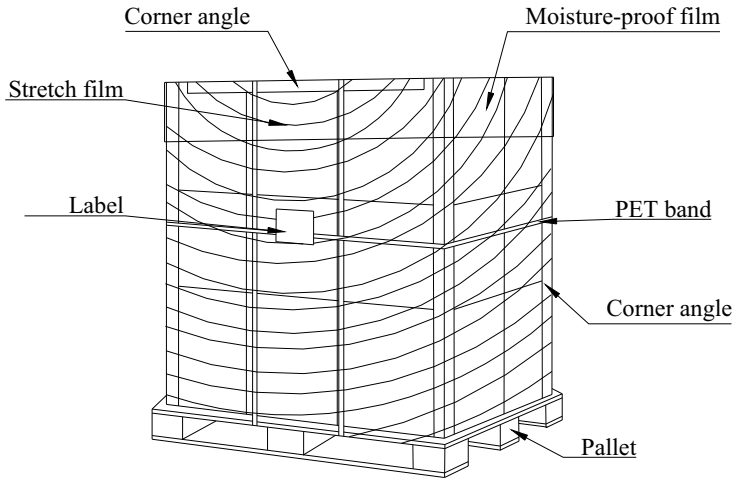


Ver 1.2

8 Packing Specification

8.1 Packing Flow





8.2 Pallet and shipment information

Item	Specification			Remark
	Q'ty	Dimension	Weight(kg)	
Panel	1	556(H)mm x 323.2(V)mm x 14.4(D)mm	2.01	± 0.08 kg
Cushion	1	-	1.51	
Box	1	406(L)mm* 281W)mm*651(H)mm,	1.185	without Panel & cushion
Packing Box	8pcs/Box	406(L)mm* 281(W)mm*651(H)mm	18.747	with panel & cushion
Pallet	1	1150(L)mm x 840(W)mm x 138(H)mm	12.00	
Pallet after Packing	16 boxes/pallet	1150(L)mm x 840(W)mm x 1440(H)mm	311.952	