( ) Preliminary Specification
(V) Final Specification

Module	**27.0” Color TFT-LCD**
Model Name	**M270DAN02.0 (ES 7.0 from 00B)**

Customer	**Date**	**Approved by**	**Date**
			Jan.1, 2016
Approved by		**Prepared by**	**Date**
			Jan.1, 2016
Note: This Specification is subject to change without notice.		AU Optronics corporation	

Contents

Record of Revision

Version	Date	Page	Old description	New Description	Remark
0.1	2014/6/20	All	First version release	-	
1.1	2014/07/21	5	31.6W (Typ.) LCD module : PDD (Typ.)=5.5W @ white pattern,Fv=60Hz Backlight unit : P_{BLU} (Typ.) =26.1W @ I_{RLED} =120mA	28.7W (Typ.) LCD module : PDD (Typ.)=5.5W@ white pattern,Fv=60Hz Backlight unit : P_{BLU} (Typ.) =23.2W @ I_{RLED} =110mA	
		29	4.3.2 Recommended Operating Condition Symbol / Description / Min. / Typ. / Max. / Unit / Remark Is / LED String Current / - / 120 / 132 / [mA] / 100% duty ratio of LED chip Vs / LED String Voltage / 47.6 / 54.4 / 57.8 / [Volt] / Is=120mA @ 100% duty ratio; ***Note 4-1, Note 4-5*** ΔVs / Maximum Vs Voltage Deviation of light bar / - / - / 3.4 / [Volt] / Is=120mA @ 100% duty ratio; ***Note 4-2*** P_{BLU} / LED Light Bar Power Consumption / - / 26.1 / 27.7 / [Watt] / ***Note 4-3*** LT_{LED} / LED Life Time / 30,000 / - / - / [Hour] / ***Note 4-4*** OVP / Over Voltage Protection in system board / 110% Vsmax / - / - / [Volt] / ***Note 4-5***	4.3.2 Recommended Operating Condition Symbol / Description / Min. / Typ. / Max. / Unit / Remark Is / LED String Current / - / 110 / 120 / [mA] / 100% duty ratio of LED chip Vs / LED String Voltage / 47.6 / 52.7 / 57.8 / [Volt] / Is=110mA @ 100% duty ratio; ***Note 4-1, Note 4-5*** ΔVs / Maximum Vs Voltage Deviation of light bar / - / - / 3.4 / [Volt] / Is=110mA @ 100% duty ratio; ***Note 4-2*** P_{BLU} / LED Light Bar Power Consumption / - / 23.2 / 25.4 / [Watt] / ***Note 4-3*** LT_{LED} / LED Life Time / 30,000 / - / - / [Hour] / ***Note 4-4*** OVP / Over Voltage Protection in system board / 110% Vsmax / - / - / [Volt] / ***Note 4-5***	
1.2	2014/08/14	7	Color Coordinates Color Coordinates (CIE 1931) / Red x / 0.629 / 0.659 / 0.689 Red y / 0.302 / 0.332 / 0.362 Green x / 0.277 / 0.307 / 0.337 Green y / 0.603 / 0.633 / 0.663 Blue x / 0.121 / 0.151 / 0.181 Blue y / 0.021 / 0.051 / 0.081 White x / 0.283 / 0.313 / 0.343 White y / 0.299 / 0.329 / 0.359 - / *By SR-3*	Color Coordinates Color Coordinates (CIE 1931) / Red x / 0.630 / 0.660 / 0.690 Red y / 0.301 / 0.331 / 0.361 Green x / 0.270 / 0.300 / 0.330 Green y / 0.592 / 0.632 / 0.652 Blue x / 0.118 / 0.148 / 0.178 Blue y / 0.025 / 0.055 / 0.085 White x / 0.283 / 0.313 / 0.343 White y / 0.299 / 0.329 / 0.359 - / *By SR-3*	
1.3	2015/05/18	22	Before Symbol / Description / Min. / Typ. / Max. / Unit / Remark Tv / Vertical Section / Period / 1452 / 1481 / 2347 / Th / Tdisp (v) / Active / 1440 / 1440 / 1440 / Th / Tblk (v) / Blanking / 12 / 41 / 907 / Th / Fv / Frequency / 49 / 60 / 76 / Hz / Th / Horizontal Section / Period / 665 / 680 / 1023 / Tclk / Tdisp (h) / Active / 640 / 640 / 640 / Tclk / Tblk (h) / Blanking / 25 / 40 / 383 / Tclk / Fh / Frequency / 71.3 / 88.8 / 115.0 / KHz / ***Note 3-3*** Tclk / LVDS Clock / Period / 13.1 / 16.6 / 21.0 / ns / 1/Fclk Fclk / Frequency / 47.4 / 60.4 / 76.5 / MHz / ***Note 3-4***	After Symbol / Description / Min. / Typ. / Max. / Unit / Remark Tv / Vertical Section / Period / 1452 / 1481 / 2299 / Th / Tdisp (v) / Active / 1440 / 1440 / 1440 / Th / Tblk (v) / Blanking / 12 / 41 / 859 / Th / Fv / Frequency / 49 / 60 / 76 / Hz / Th / Horizontal Section / Period / 679 / 680 / 1023 / Tclk / Tdisp (h) / Active / 640 / 640 / 640 / Tclk / Tblk (h) / Blanking / 39 / 40 / 383 / Tclk / Fh / Frequency / 71.3 / 88.8 / 112.6 / KHz / ***Note 3-3*** Tclk / LVDS Clock / Period / 13.1 / 16.6 / 20.6 / ns / 1/Fclk Fclk / Frequency / 48.4 / 60.4 / 76.5 / MHz / ***Note 3-4***	
1.4	2015/11/13	25		Add note 3-7	
2.0	2015/12/08	all		ES 7.0	

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°C and 35°C at normal humidity.
14) Do not apply the same pattern for a long time, it will enhance relevant defect.

2 General Description

This specification applies to the 27.0 inch wide Color a-Si TFT-LCD Module M270DAN02.0. The display supports the WQHD - 2560(H) x 1440(V) screen format and 1.07B colors (10bits RGB data input). The input interface is 4 port 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]	684.7 (27.0")
Active Area	[mm]	596.74 (H) x 335.66 (V)
Pixels H x V	-	2560(x3) x 1440
Pixel Pitch	[um]	233.1 (per one triad) ×233.1
Pixel Arrangement	-	R.G.B. Vertical Stripe
Display Mode	-	Normally Black
White Luminance (Center)	[cd/m^2]	350 (Typ.)
Contrast Ratio	-	1000 (Typ.)
Response Time	[msec]	12ms (Typ., G/G)
Power Consumption (LCD Module + Backligh unit)	[Watt]	26.6W (Typ.) LCD module : PDD (Typ.)=5.5W@ white pattern,Fv=60Hz Backlight unit : P_{BLU} (Typ.) =21.1W @ I_{RLED} =100mA
Weight	[Grams]	2245g
Outline Dimension	[mm]	630(H) x 368.2(V) x 10.6(D) Typ.
Electrical Interface	-	4 channel LVDS (10bits RGB data input)
Support Color	-	1.07B colors
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 7.0 Compliance

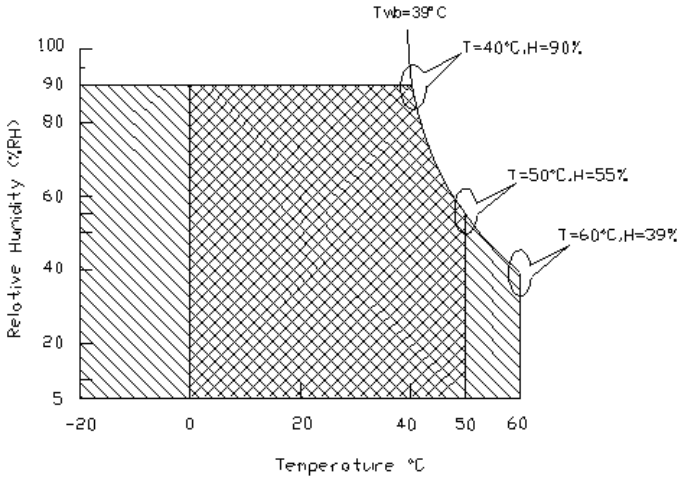
2.2 Absolute Maximum Rating of Environment

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°C)
2. Max wet-bulb temperature at 39°C or less. (Ta ≦39°C)
3. No condensation



Operating Range Storage Range +

2.3 Optical Characteristics

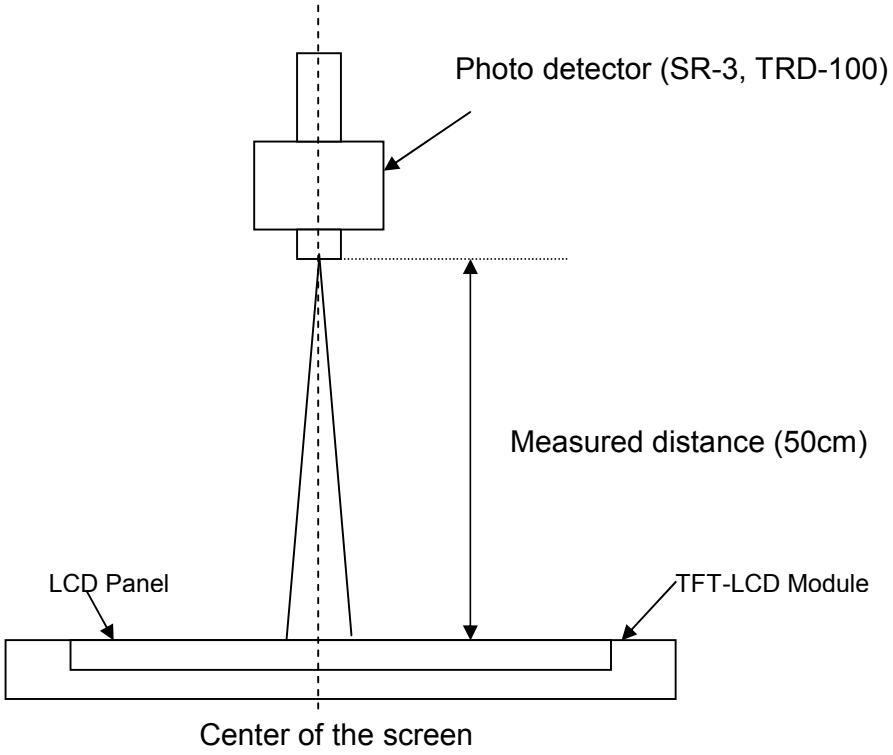
The optical characteristics are measured on the following test condition.

Test Condition:

1. Equipment setup: Please refer to ***Note 2-2***.
2. Panel Lighting time: 30 minutes
3. VDD=5.0V, Fv=60Hz, ,Is=110mA, Ta=25□

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
L_w	White Luminance (Center of screen)		280	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	89	-	[degree]	***Note 2-5*** *By SR-3*
θ_L		Left	75	89	-		
Φ_H	Vertical Viewing Angle (CR=10)	Up	75	89	-		
Φ_L		Down	75	89	-		
θ_R	Horizontal Viewing Angle (CR=5)	Right	75	89	-		
θ_L		Left	75	89	-		
Φ_H	Vertical Viewing Angle (CR=5)	Up	75	89	-		
Φ_L		Down	75	89	-		
-	Response Time	Gray to Gray	-	12	-	[msec]	***Note 2-6*** *By TRD-100*
R_x	Color Coordinates (CIE 1931)	Red x	0.630	0.660	0.690	-	*By SR-3*
R_y		Red y	0.301	0.331	0.361		
G_x		Green x	0.270	0.300	0.330		
G_y		Green y	0.602	0.632	0.662		
B_x		Blue x	0.118	0.148	0.178		
B_y		Blue y	0.025	0.055	0.085		
W_x		White x	0.283	0.313	0.343		
W_y		White y	0.299	0.329	0.359		
sRGB coverage ratio				100	-	[%]	*By SR-3*
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 :

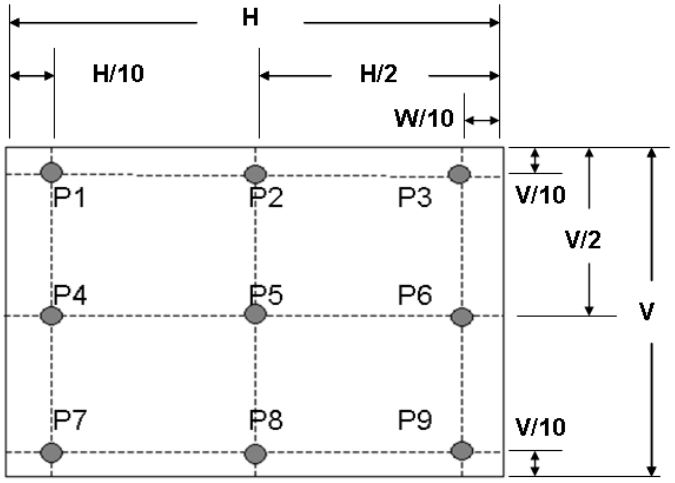


Note 2-3: Luminance Uniformity Measurement

Definition:

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

a.Test pattern: White Pattern



Note 2-4: Contrast Ratio Measurement

Definition:

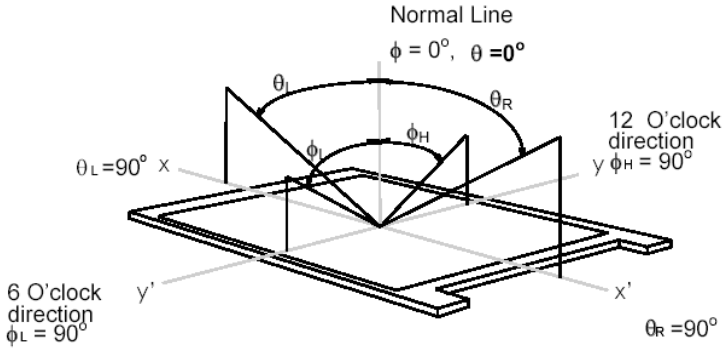
$$\text{Contrast Ratio} = \frac{\text{Luminance of White pattern}}{\text{Luminance of Black pattern}}$$

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

Note 2-5: Viewing angle measurement

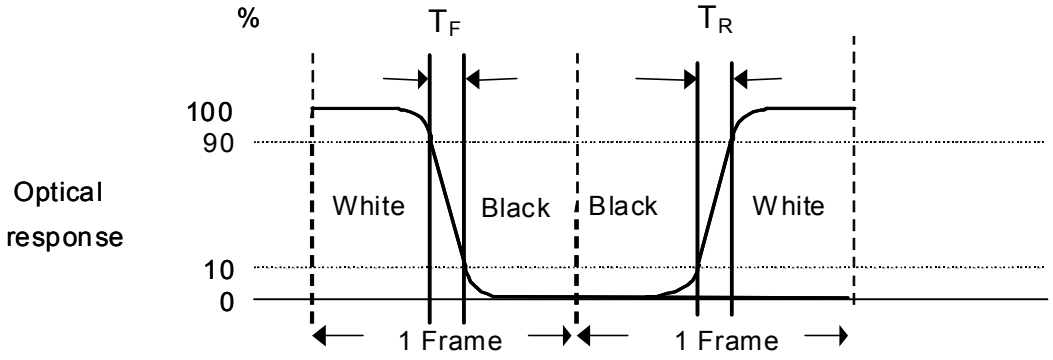
Definition: The angle at which the contrast ratio is greater than 10 & 5 .

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*



The gray to gray response time is defined as the following table. The algorithm is | Gray Level A – Gray Level B | ≧256.

Gray Level to Gray Level		Falling Time				
		G0	G255	G511	G767	G1023
Rising Time	G0					
	G255					
	G511					
	G767					
	G1023					

- T_{GTG_typ} is the total average time at rising time and falling time of gray to gray.
- T_{GTG_max} is the maximum time at rising time or falling time of gray to gray.

Note 2-7: Crosstalk measurement

Definition:

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

Where

a.Maximum Horizontal Crosstalk :

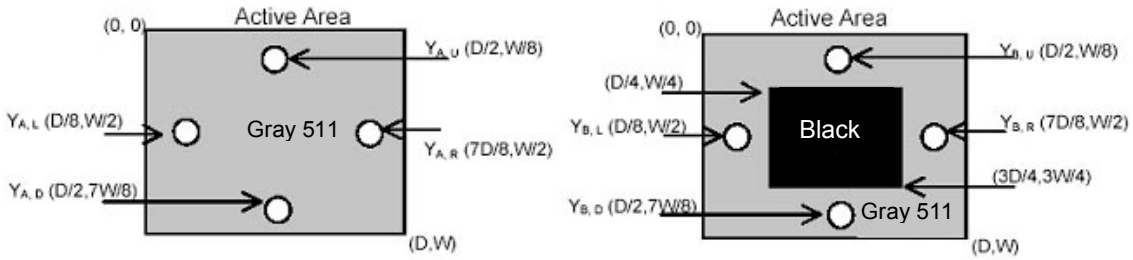
$CT_H = Max. (| Y_{BL} – Y_{AL} | / Y_{AL} \times 100\ \%, | Y_{BR} – Y_{AR} | / Y_{AR} \times 100\ \%)$;

Maximum Vertical Crosstalk:

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

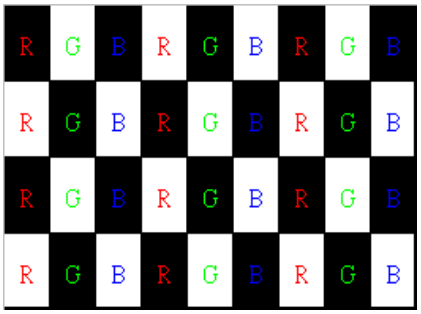
b. Y_{AU}, Y_{AD}, Y_{AL}, Y_{AR} = Luminance of measured location without Black pattern

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 = L511

R: Red, G: Green, B:Blue

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

2.4 Mechanical Characteristics

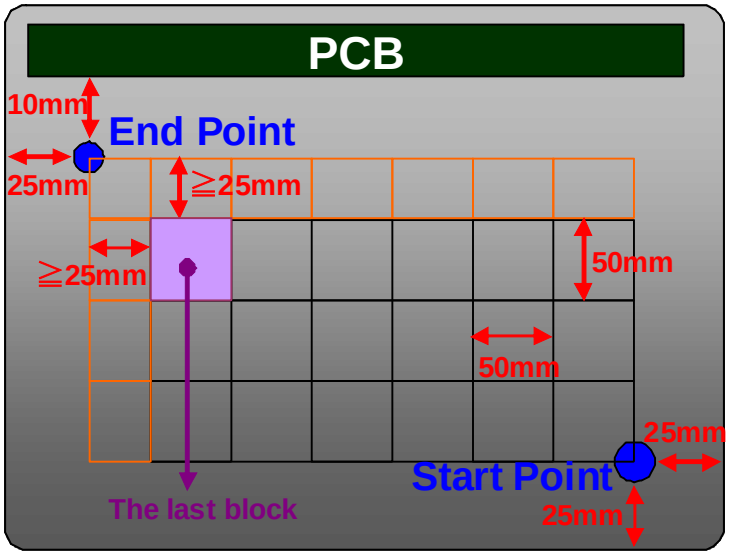
Symbol	Description	Min.	Max.	Unit	Remark
P_{bc}	Backside Compression	2.5	-	[Kgf]	***Note 2-9***

Note 2-9: Test Method:

The point is at a distance from right-downside 25mm x 25mm defined as the Start Point of Measure Points, and the point is at a distance 25mm from left-side & around 10mm from PCB defined as the End Point.

Align 50mm x 50mm block from Start Point on the Bezel Back, and the corners of each block are Measure Points.

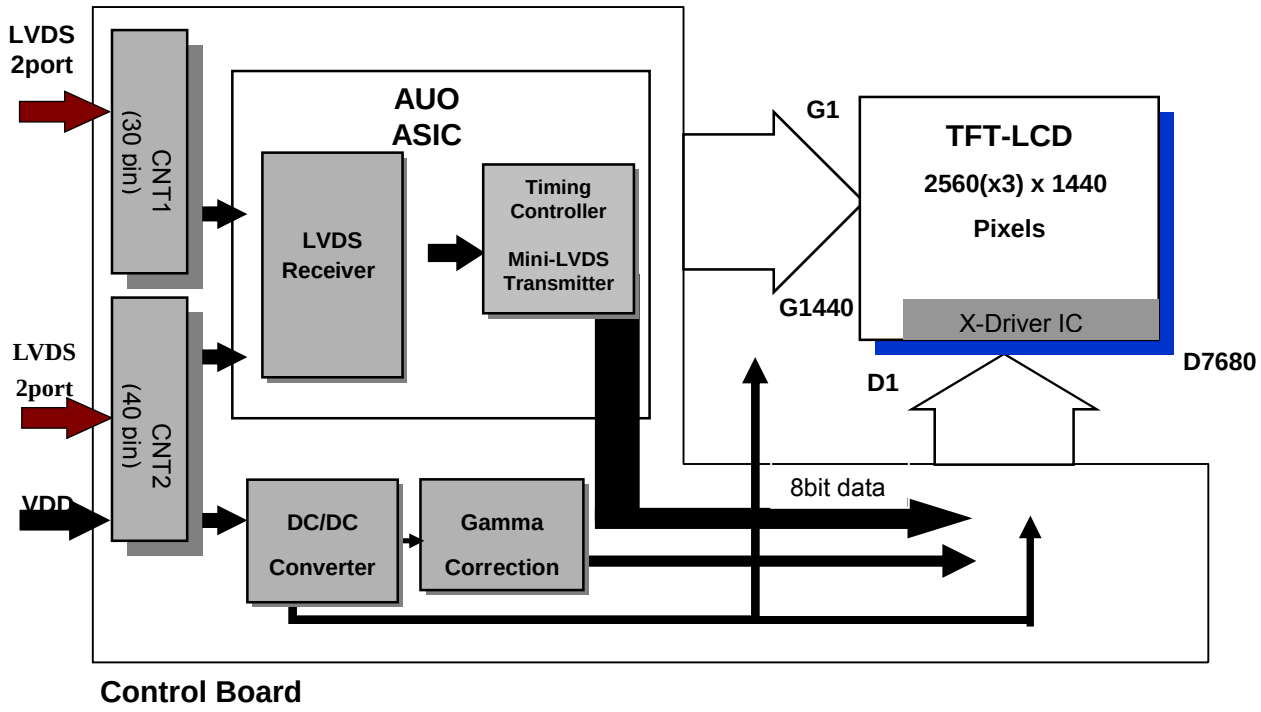
If the distance from the last block to each side of the End Point ≧ 25mm, add other blocks to make sure that most area of Bezel Back can be measured.



3 TFT-LCD Module

3.1 Block Diagram

The following shows the block diagram of the 27.0 inch Color TFT-LCD Module.



3.2 Interface Connection

3.2.1 Connector Type

TFT-LCD Connector (CNT1)	Manufacturer	Starconn	P-TWO
	Part Number	093G30-02001A-M4	AL230F-A0G1D-P
TFT-LCD Connector (CNT2)	Manufacturer	Starconn	
	Part Number	115F40-R000RA-M3	
Mating Connector (CNT1)	Manufacturer	JAE	STM
	Part Number	JAE_FI-X30HL	STM_PK2407P30V
Mating Connector (CNT2)	Manufacturer	JAE	
	Part Number	FI-NX40CL	

3.2.2 Connector Pin Assignment

LVDS CN1

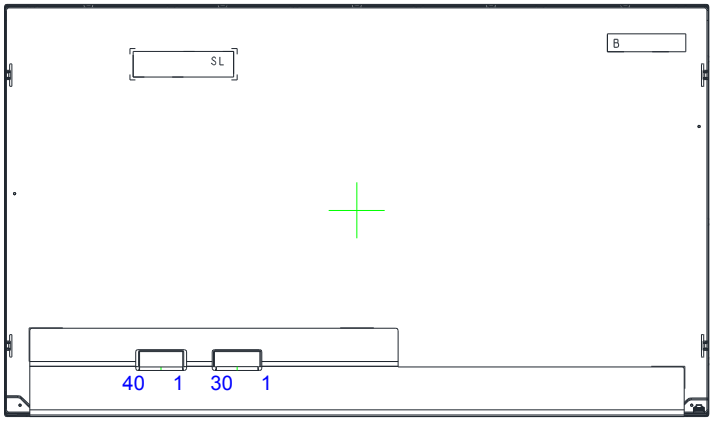
PIN #	Symbol	Description	Remark
1	R1_0N	FIRST_ Negative LVDS differential data input	
2	R1_0P	FIRST_ Positive LVDS differential data input	
3	R1_1N	FIRST_ Negative LVDS differential data input	
4	R1_1P	FIRST_ Positive LVDS differential data input	
5	R1_2N	FIRST_ Negative LVDS differential data input	
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	R1_4N	FIRST_ Negative LVDS differential data input	
14	R1_4P	FIRST_ Positive LVDS differential data input	
15	GND	Power Ground	
16	R2_0N	SECOND_ Negative LVDS differential data input	
17	R2_0P	SECOND_ Positive LVDS differential data input	
18	R2_1N	SECOND_ Negative LVDS differential data input	

19	R2_1P	SECOND_ Positive LVDS differential data input	
20	R2_2N	SECOND_ Negative LVDS differential data input	
21	R2_2P	SECOND_ Positive LVDS differential data input	
22	GND	Power Ground	
23	R2_CLKN	SECOND_ Negative LVDS differential clock input	
24	R2_CLKP	SECOND_ Positive LVDS differential clock input	
25	GND	Power Ground	
26	R2_3N	SECOND_ Negative LVDS differential data input	
27	R2_3P	SECOND_ Positive LVDS differential data input	
28	R2_4N	SECOND_ Negative LVDS differential data input	
29	R2_4P	SECOND_ Positive LVDS differential data input	
30	NC	No connection (for AUO test only. Do not connect)	

LVDS CN2

PIN #	Symbol	Description	Remark
1	R3_0N	THIRD_ Negative LVDS differential data input	
2	R3_0P	THIRD_ Positive LVDS differential data input	
3	R3_1N	THIRD_ Negative LVDS differential data input	
4	R3_1P	THIRD_ Positive LVDS differential data input	
5	R3_2N	THIRD_ Negative LVDS differential data input	
6	R3_2P	THIRD_ Positive LVDS differential data input	
7	GND	Power Ground	
8	R3_CLKN	THIRD_ Negative LVDS differential clock input	
9	R3_CLKP	THIRD_ Positive LVDS differential clock input	
10	GND	Power Ground	
11	R3_3N	THIRD_ Negative LVDS differential data input	
12	R3_3P	THIRD_ Positive LVDS differential data input	
13	R3_4N	THIRD_ Negative LVDS differential data input	
14	R3_4P	THIRD_ Positive LVDS differential data input	
15	GND	Power Ground	
16	R4_0N	FOURTH_ Negative LVDS differential data input	
17	R4_0P	FOURTH_ Positive LVDS differential data input	
18	R4_1N	FOURTH_ Negative LVDS differential data input	

19	R4_1P	FOURTH_ Positive LVDS differential data input	
20	R4_2N	FOURTH_ Negative LVDS differential data input	
21	R4_2P	FOURTH_ Positive LVDS differential data input	
22	GND	Power Ground	
23	R4_CLKN	FOURTH_ Negative LVDS differential clock input	
24	R4_CLKP	FOURTH_ Positive LVDS differential clock input	
25	GND	Power Ground	
26	R4_3N	FOURTH_ Negative LVDS differential data input	
27	R4_3P	FOURTH_ Positive LVDS differential data input	
28	R4_4N	FOURTH_ Negative LVDS differential data input	
29	R4_4P	FOURTH_ Positive LVDS differential data input	
30	NC	No connection (for AUO test only. Do not connect)	
31	NC	No connection (for AUO test only. Do not connect)	
32	NC	No connection (for AUO test only. Do not connect)	
33	GND	Power Ground	
34	GND	Power Ground	
35	GND	Power Ground	
36	VDD	Power +5V	
37	VDD	Power +5V	
38	VDD	Power +5V	
39	VDD	Power +5V	
40	VDD	Power +5V	



3.3 Electrical Characteristics

3.3.1 Absolute Maximum Rating

Permanent damage may occur if exceeding the following maximum rating.

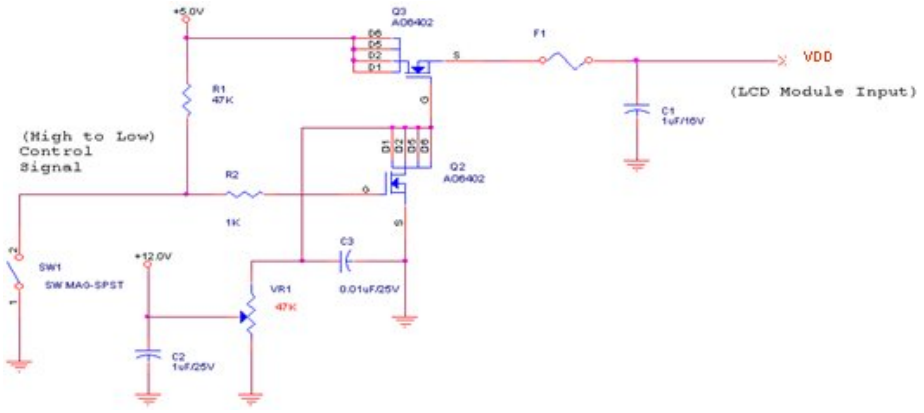
Symbol	Description	Min	Max	Unit	Remark
VDD	Power Supply Input Voltage	GND-0.3	6.0	[Volt]	Ta=25□

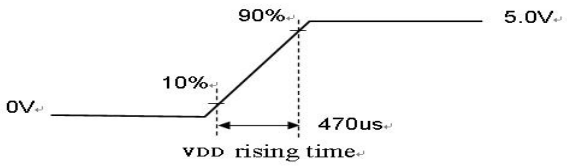
3.3.2 Recommended Operating Condition

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)	-	1.1	1.32	[A]	VDD= 5.0V,White Pattern, Fv=60Hz
			1.3	1.56	[A]	VDD= 5.0V, White Pattern, Fv=75Hz
PDD	VDD Power Consumption	-	5.5	6.6	[Watt]	VDD= 5.0V, White Pattern, Fv=60Hz
			6.5	7.8	[Watt]	VDD= 5.0V, White Pattern, Fv=75Hz
IRush	Inrush Current	-	-	5.0	[A]	***Note 3-1***
VDDrp	Allowable VDD Ripple Voltage	-	-	500	[mV]	VDD= 5.0V, White Pattern, Fv=75Hz

Note 3-1: Inrush Current measurement:

Test circuit:



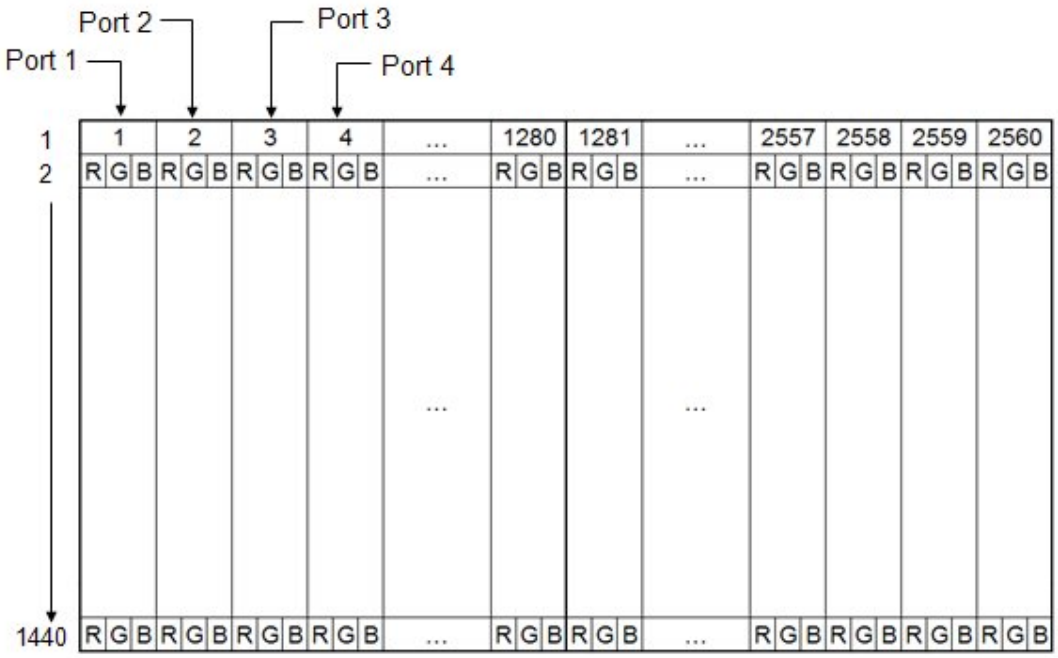


The duration of VDD rising time: 470us.

3.4 Signal Characteristics

3.4.1 LCD Pixel Format

Following figure shows the relationship between the input signals and LCD pixel format.



Note 1: The module use 4port-LVDS interface.

Port 1： 4N+1 (1, 5.. 2557 pixel)

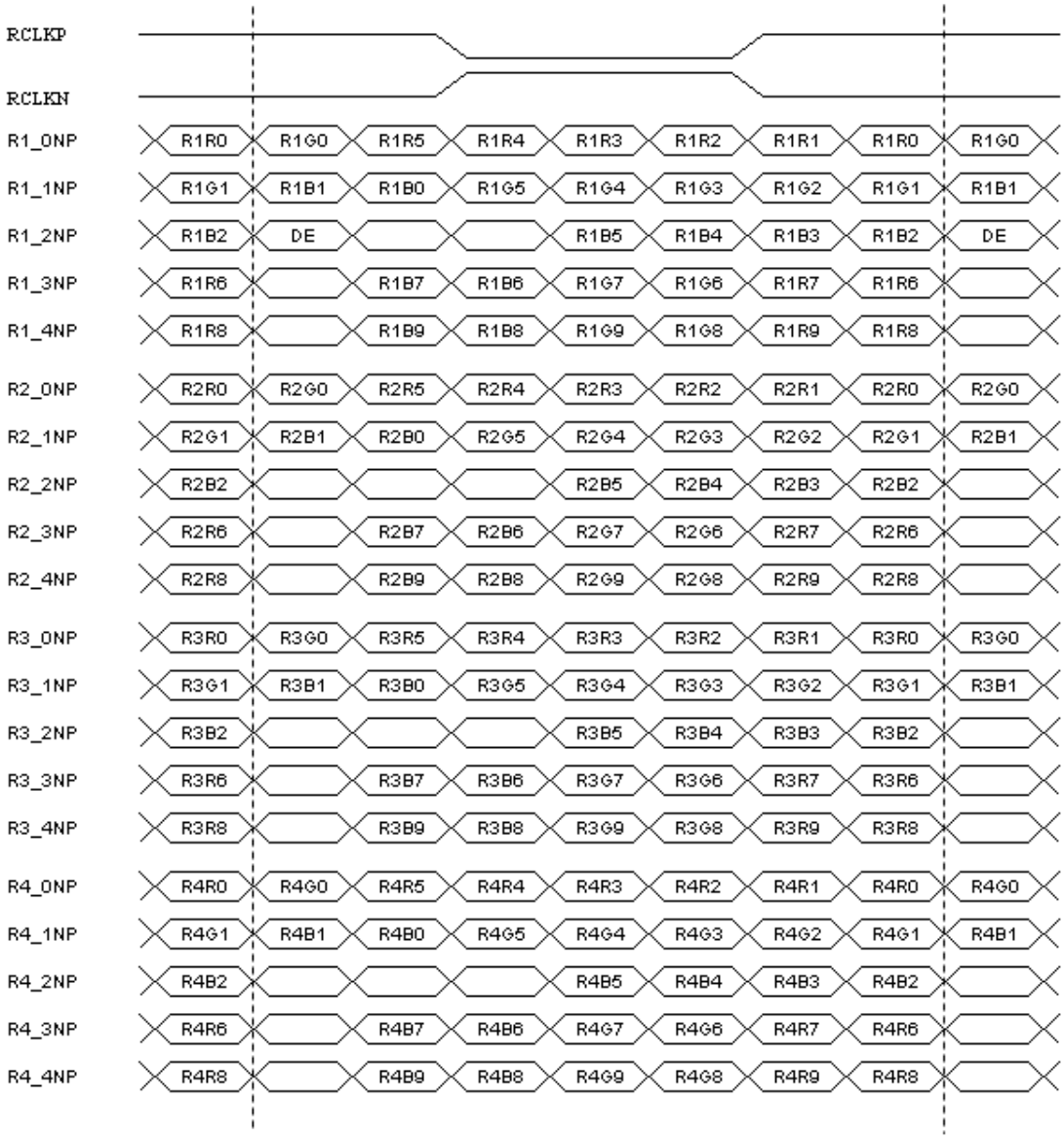
Port 2： 4N+2 (2, 6.. 2558 pixel)

Port 3： 4N+3 (3, 7.. 2559 pixel)

Port 4： 4N+4 (4, 8.. 2560 pixel)

N = 0, 1 ~639

3.4.2 LVDS Data Format



3.4.3 Color versus Input Data

The following table is for color versus input data (10bit). The higher the gray level, the brighter the color.

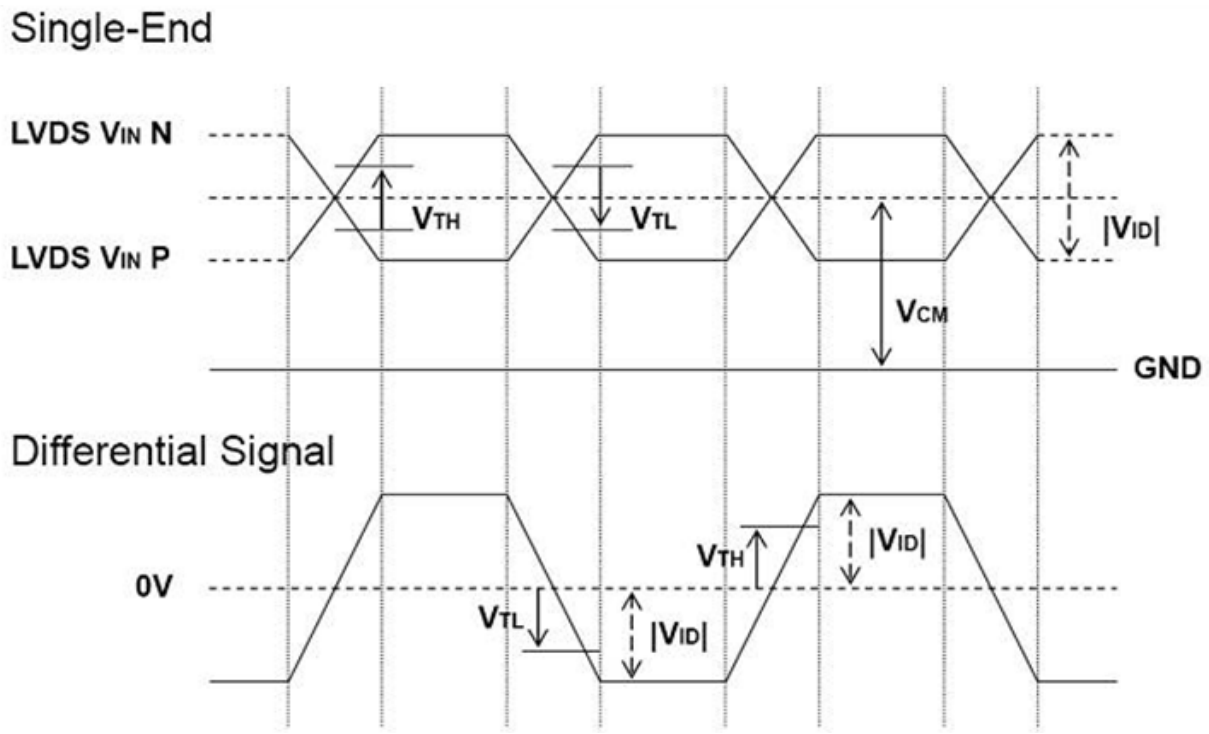
Color	Gary Level	Color Input Data																													Remark
		RED data (MSB:R9,LSB:R0)										GREEN data (MSB:G9,LSB:G0)										BLUE data (MSB:B9,LSB:B0)										
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0	
Black	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
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	
L511	-	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	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	0	0	0	0	0	0	Black
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L1023	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	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	0	0	0	0	0	0	Black
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L1023	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	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	0	0	0	0	0	0	Black
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L1023	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	

3.4.4 LVDS Specification

a. DC Characteristics:

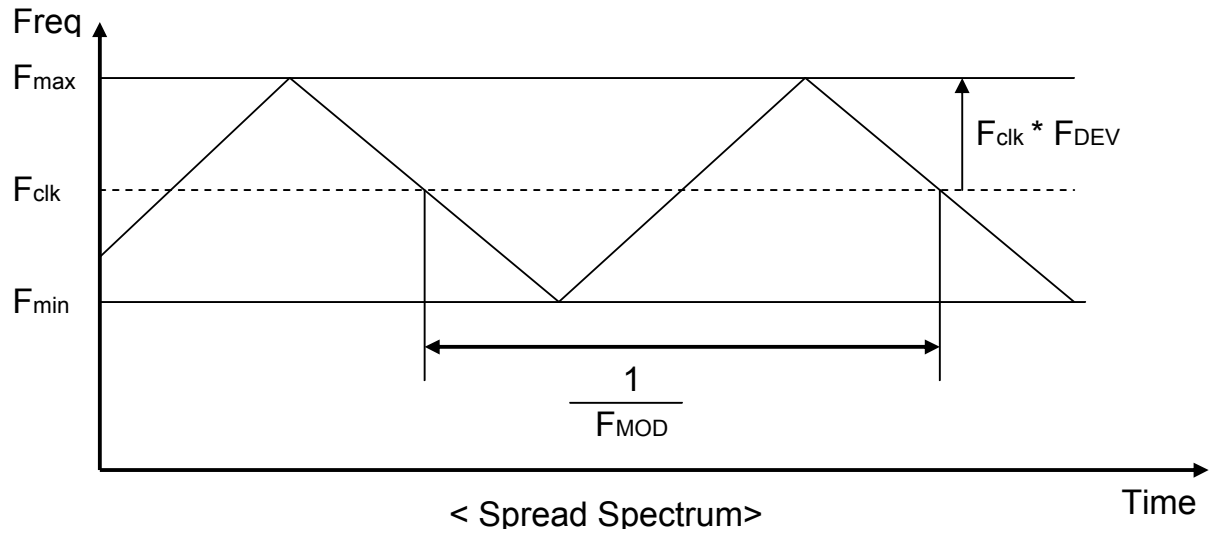
Symbol	Description	Min	Typ	Max	Units	Condition
V_{TH}	LVDS Differential Input High Threshold	-	-	+100	[mV]	V_{CM} = 1.2V
V_{TL}	LVDS Differential Input Low Threshold	-100	-	-	[mV]	V_{CM} = 1.2V
$\lvert V_{ID} \rvert$	LVDS Differential Input Voltage	100	-	600	[mV]	
V_{CM}	LVDS Common Mode Voltage	+1.0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

LVDS Signal Waveform:



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	



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	1452	1481	2299	Th	
Tdisp (v)		Active	1440	1440	1440	Th	
Tblk (v)		Blanking	12	41	859	Th	
Fv		Frequency	49	60	76	Hz	
Th	Horizontal Section	Period	679	680	1023	Tclk	
Tdisp (h)		Active	640	640	640	Tclk	
Tblk (h)		Blanking	39	40	383	Tclk	
Fh		Frequency	71.3	88.8	112.6	KHz	***Note 3-3***
Tclk	LVDS Clock	Period	13.1	16.6	20.6	ns	1/Fclk
Fclk		Frequency	48.4	60.4	76.5	MHz	***Note 3-4***

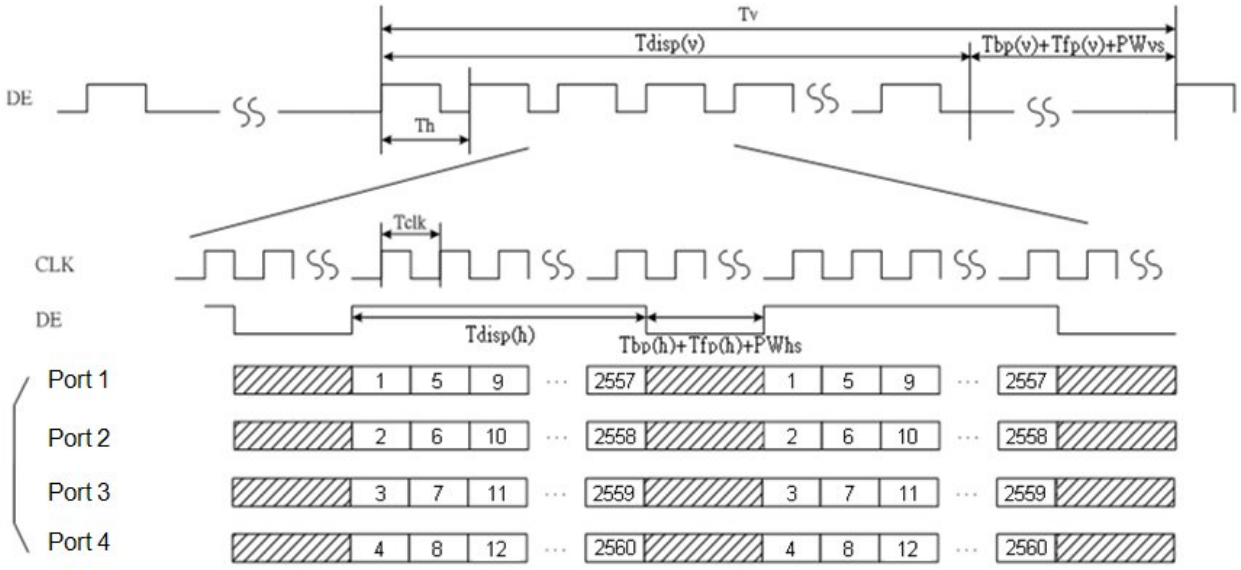
Note 3-3: The equation is listed as following. Please don't exceed the above recommended value.

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.

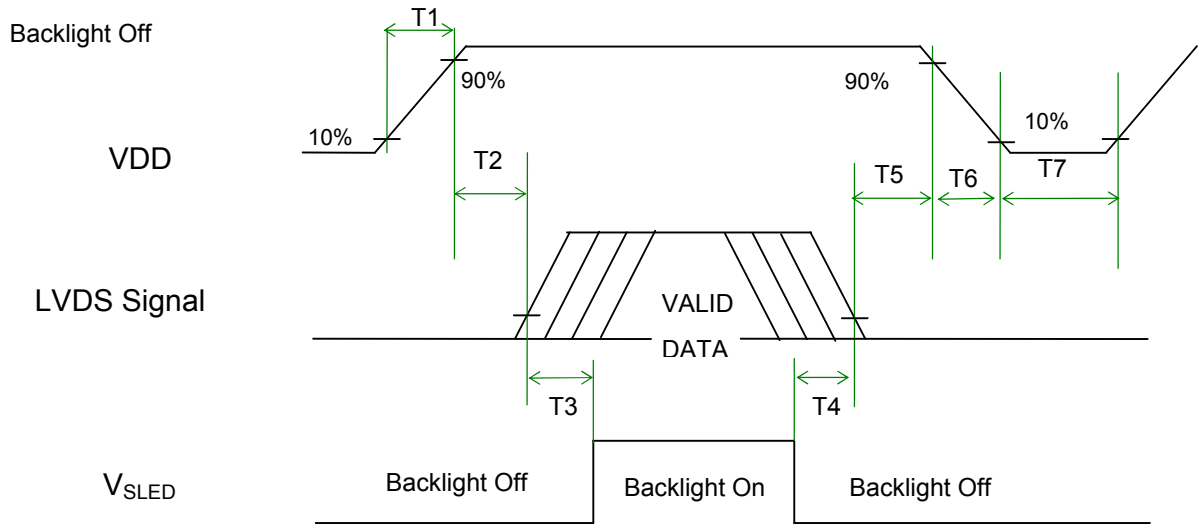
Fclk (Min.) = Fv (Min.) x Th (Min.) x Tv (Min.);
Fclk (Typ.) = Fv (Typ.) x Th (Typ.) x Tv (Typ.);
Fclk (Max.) = Fv (Max.) x Th (Typ.) x Tv (Typ.);

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.



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* *Note 3-7*
T7	1000	-	-	[ms]	

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

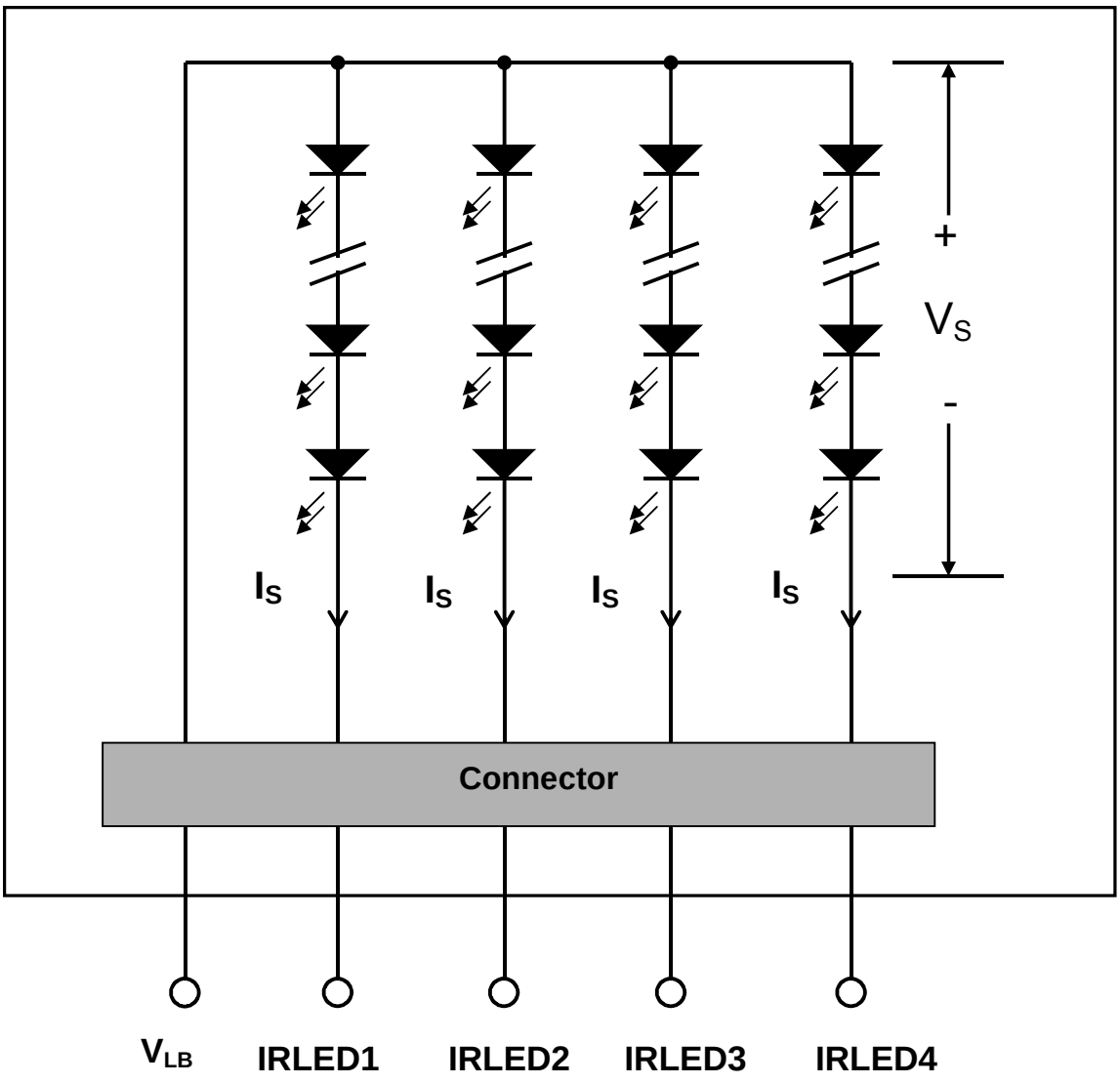
Note 3-6 : During T5 , please keep the level of input LVDS signals with Hi-Z state.

Note 3-7 *:* Voltage of VDO must decay smoothly after power-off. (customer system decide this value)

4 Backlight Unit

4.1 Block Diagram

The following shows the block diagram of 27 inch Backlight Unit. And it includes 68 LED in the LED light bar. (4 strings and 17 pcs LED of one string).



4.2 Interface Connection

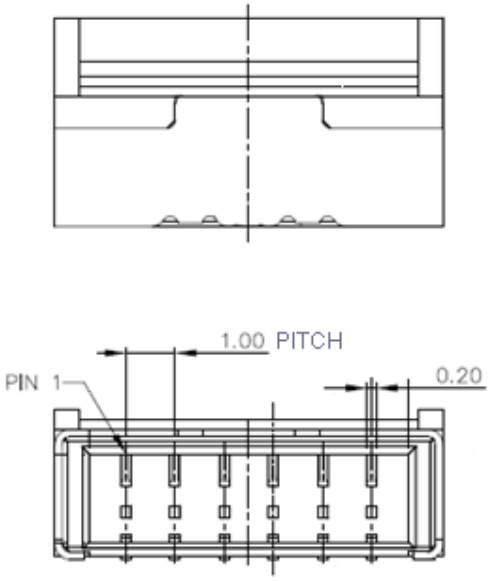
4.2.1 Connector Type

Backlight Connector	Manufacturer	ENTERY
	Part Number	3707K-S06N-21R
Mating Connector	Manufacturer	ENTERY
	Part Number	H112K-P06N-13B (Locked Type)

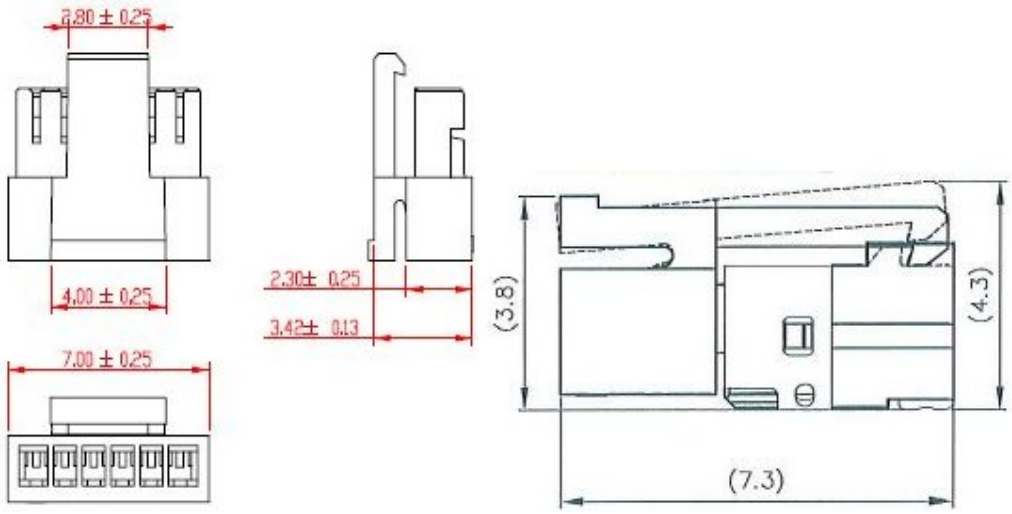
Backlight Connector dimension:

H × V × D = 7.9 × 3.0 × 4.25; Pitch = 1.0 (unit:mm)

3707K-S06N-21R

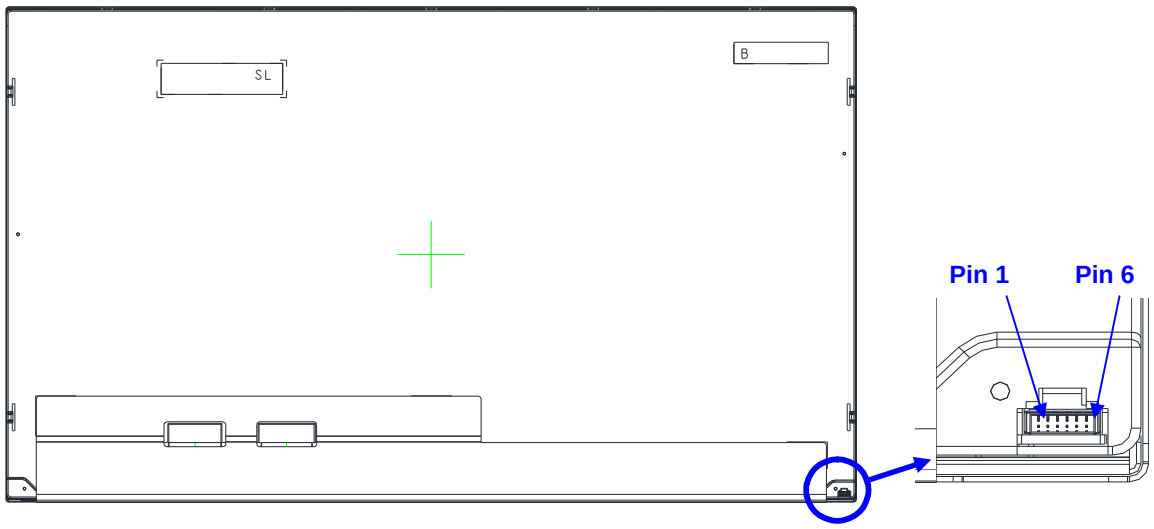


Mating Connector dimension:



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)	



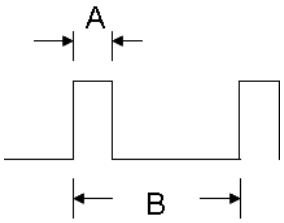
4.3 Electrical Characteristics

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
			300	[mA]	*Duty ratio≦ 10%* *Pulse time=10 ms*



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

4.3.2 Recommended Operating Condition

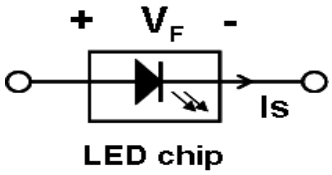
(Ta=25°C)

Symbol	Description	Min.	Typ.	Max.	Unit	Remark
Is	LED String Current	-	**100**	**110**	[mA]	100% duty ratio of LED chip
Vs	LED String Voltage	47.6	52.7	57.8	[Volt]	Is=**100**mA @ 100% duty ratio; ***Note 4-1, Note 4-5***
ΔVs	Maximum Vs Voltage Deviation of light bar	-	-	3.4	[Volt]	Is=100mA @ 100% duty ratio; ***Note 4-2***
P_{BLU}	LED Light Bar Power Consumption	-	**21.1**	**23.1**	[Watt]	***Note 4-3***
LT_{LED}	LED Life Time	30,000	-	-	[Hour]	***Note 4-4***
OVP	Over Voltage Protection in system board	110% Vsmax	-	-	[Volt]	***Note 4-5***

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

a. V_F: LED chip forward voltage, V_F (Min.)=2.8 V, V_F(Typ.)=3.1V, V_F(Max.)=3.4V;

b. The same equation 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

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

("4" is total LED Light bar string of single Backlight Unit.)

Note 4-4: Definition of life time:

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

b. Test condition: Is = **100mA** 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: 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*)

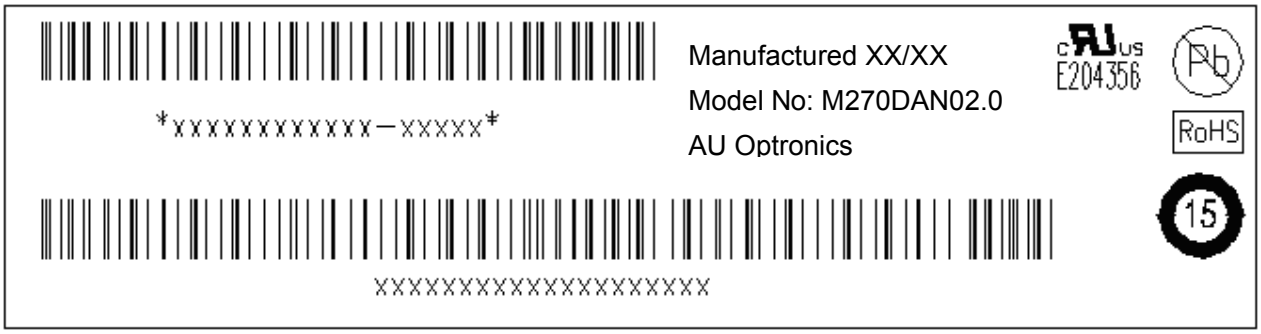
Items	Condition	Remark
Temperature Humidity Bias (THB)	Ta= 50□, 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 50□, 50%RH, 300hours	
Low Temperature Operation (LTO)	Ta= 0□, 300hours	
High Temperature Storage (HTS)	Ta= 60□, 300hours	
Low Temperature Storage (LTS)	Ta= -20□, 300hours	
Vibration Test (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:



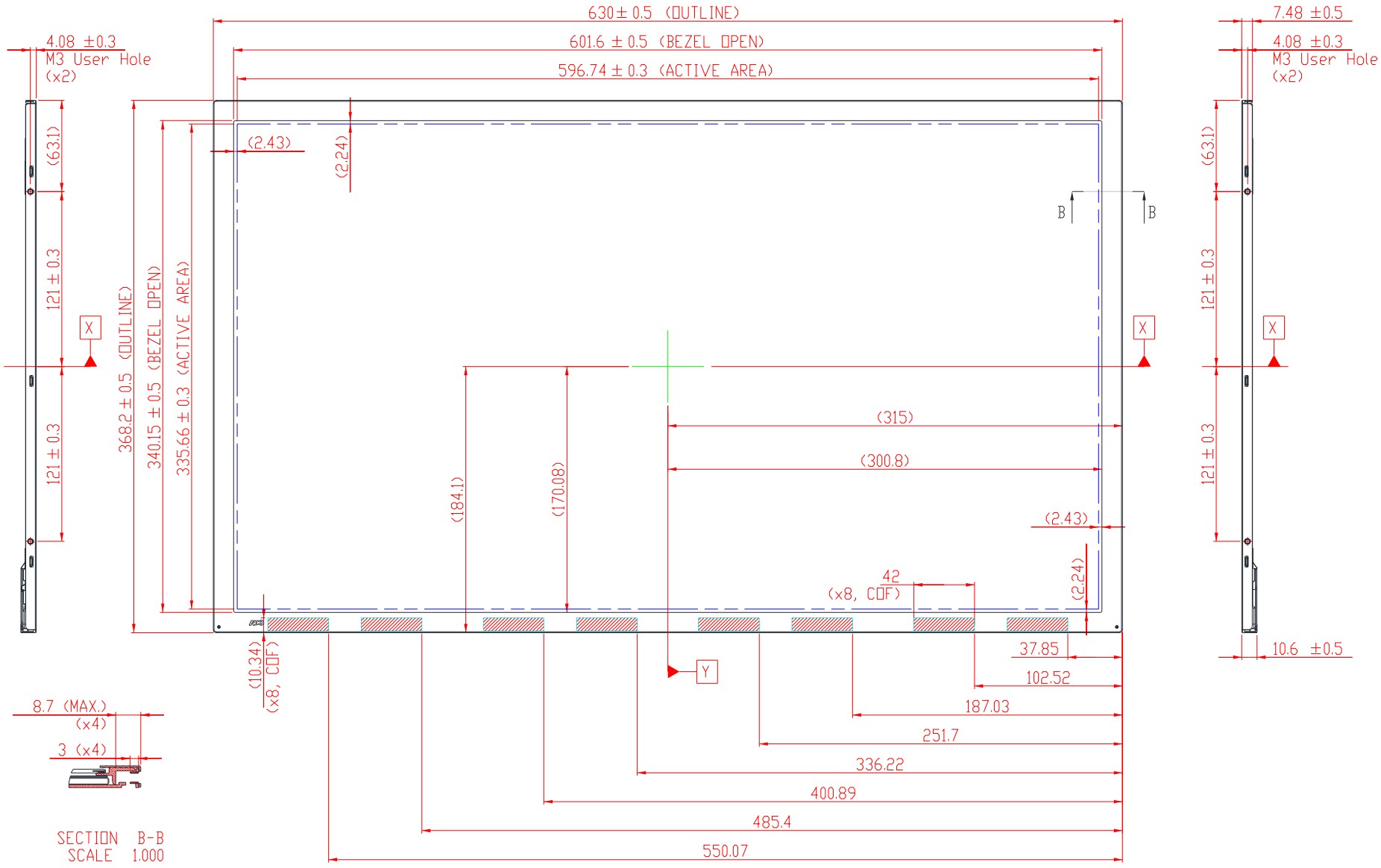
Note 6-1: For Pb Free products, AUO will add for identification.

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.

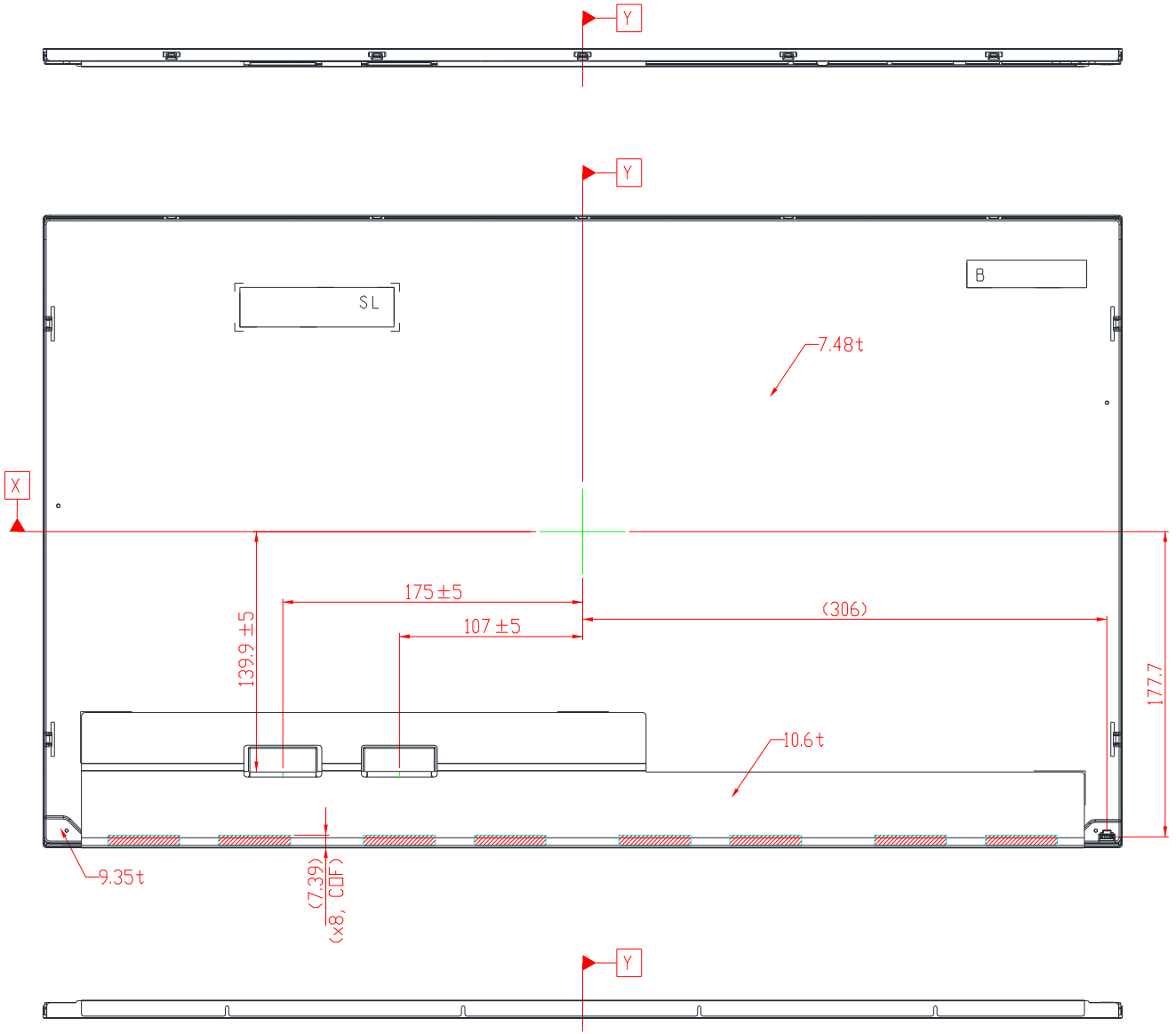
Note 6-4: The Green Mark will be presented only when the green documents have been ready by AUO Internal Green Team.

7 Mechanical Characteristics



Avoid stressing front bezel position when doing mechanical design

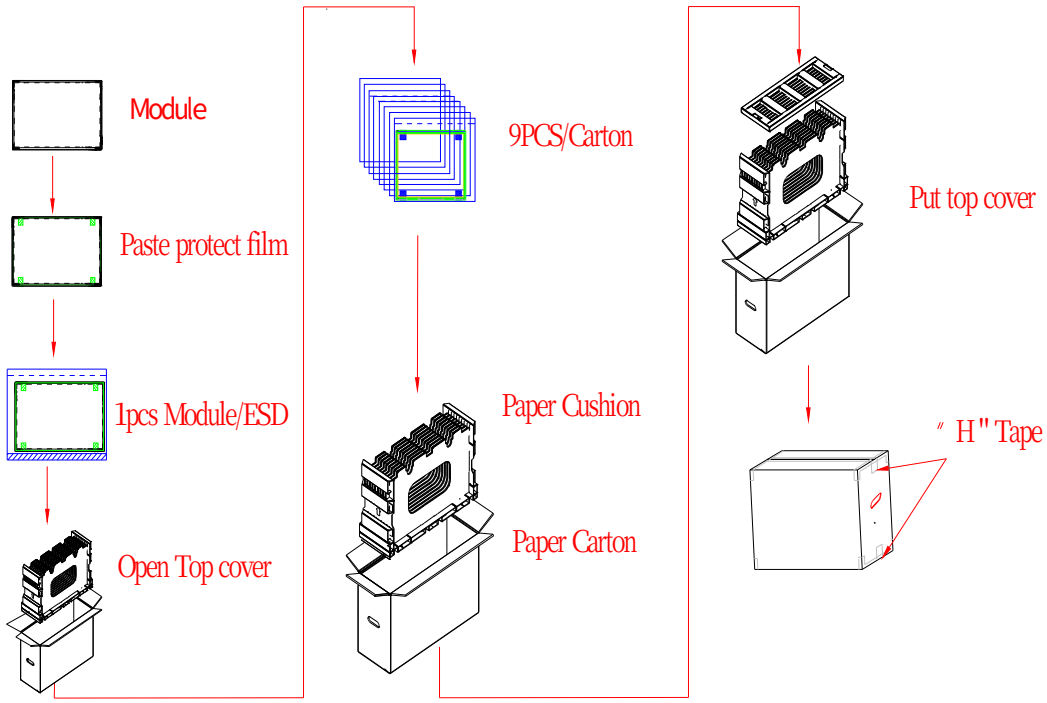
Ver 0.1

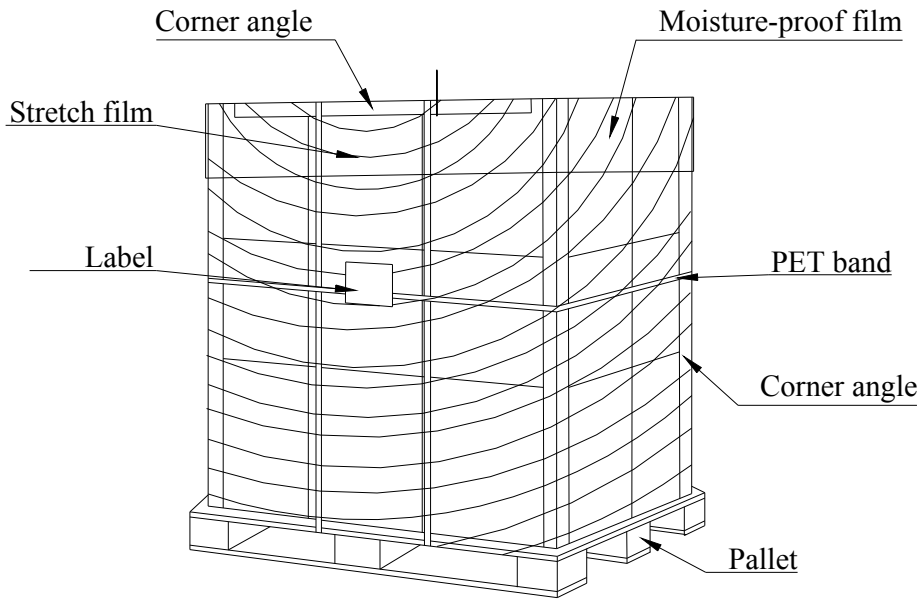


Ver 0.1

8 Packing Specification

8.1 Packing Flow





8.2 Pallet and shipment information

Item	Specification			Remark
	Q'ty	Dimension	Weight (kg)	
Panel	1	630(H) x 368.2(V) x 10.6(D)	2.245	
Cushion	1	-	3.7	
Box	1	720(L)mm x 264(W)mm x 460(H)mm	1.35	without Panel & cushion
Packing Box	9 pcs/Box	720(L)mm x 264(W)mm x 460(H)mm	25.26	with panel & cushion
Pallet	1	1070(L)mm x 740(W)mm x 138(H)mm	13.85	
Pallet after Packing	8 boxes/pallet	1070(L)mm x 740(W)mm x 1060(H)mm	215.97	