
**31.5 1500R C-shaped Surface
Module Specification M315HVR01.
5 V1.0**

客户/客户	由/核准公司批准	注释/备注

批准人 核准		
审核单位 会签	品质部	结构/电子

签人 审查	编制单位 编拟

主要内容	
序号	说明
	封面
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修订版历史记录					
版本。	第页码	修订后的说明	使用日期	修订版次	批准
修订版。 01	全部	首次发布了批准规范			

1. 一般说明

1.1 概述

315HVR01.5 是一种彩色有源矩阵 TFT 液晶开放单元，使用非晶硅 TFT（薄膜晶体管）作为有源开关器件。这个开放单元一个 31.5 英寸的对角测量的活动区域，具有 FHD 分辨率（1920 水平由 1080 垂直像素阵列）。每个像素被分为红色、绿色、蓝色的点，它们以垂直条纹排列，这个开放的单元可以显示 16.7M 的颜色。用于此开放单元的 TFT-LCD 面板适用于低反射和更高的颜色类型。

1.2 特征

- LVDS 接口，具有 2 个像素/时钟
- 高速响应
- 低色变换图像质量
- 8 位颜色深度，显示 16.7M 种颜色
- 亮度和对比度高，反射率低，视角广
- 仅限 DE（数据启用）的模式

1.3 应用程序

- 独立家用多媒体液晶显示器或电视
- 控制系统的显示端子
- 高清电视（FHD 电视）
- AV 应用程序产品

1.4、通用技术规范

各项目	技术规格书	工程单位	备注：注意
显示区域	698.4(横)×392.85(竖) mm	毫米	
驱动程序元素	a-SiTFT有源矩阵		
显示器的颜色	16.7M（8 位）	颜色	
像素数	1920 (H) × 1080 (V)	“像素”	
像素间距	363.75 (h) × rgb × 363.75 (v)	毫米	
像素布置图	RGB垂直条纹		
显示器操作模式	正常情况下，颜色为黑色		
表面处理	SAG 40%，3H		

1.5、机械技术规格

项目项目		最小值。	典型值	最大值。	工程单位	备注：注意
模块尺寸	水平水平 (H)		721.0/728.1		毫米	内/外
	垂直方向 (V)		423.5		毫米	(1)
	深度 (sD)		/		毫米	(1)

重量		3.8		千克	-
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2-1 背光灯单元：

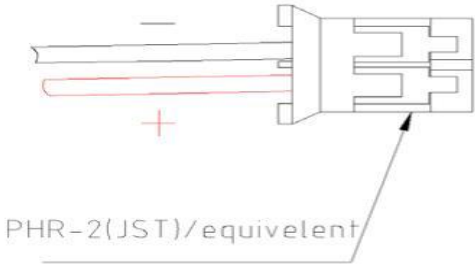
2.1.1 背光单元

项目项目	符号	价值			工 程 单 位	备注：注意
		最小值。	典型值	最大值。		
输入电流	单位	850	900		mA	
输入电压	vrp		54		V	
功耗量	P		38.6		W	
光条的使用寿命	1b1		30000		时 数： 10000 小 时	(1)

注（1），寿命定义为 LED 的亮度与初始值相比衰减到 50%的时间，工作条件：在 Ta=25±2℃，ILED=550mA 下连续工作

2.1.2 灯条线规格

灯条线 2P 插头红色为正极



接头类型：PHR-2Y 2.0mm		符号	功能
公司名称	料号		
P1	1	+	正极
	2	-	负极

3. 光学特性

3.1个试验条件

项目项目	符号	典型值	工程单位
环境温度		25±2	℃
环境湿度		50±10	%rh
电源电压			V

注（1）：有关前后外形尺寸的更多信息，请参见附图

LED 电流（一个通道）		900±5	mA
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3.2 光学技术规格书

光学特性的相对测量方法见6.2。以下项目应在6.1中所述的试验条件和注（6）中所示的稳定环境下进行测量。

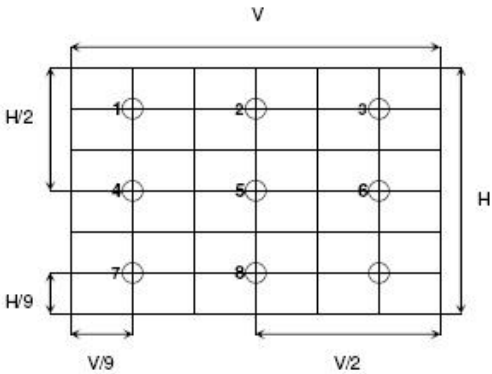
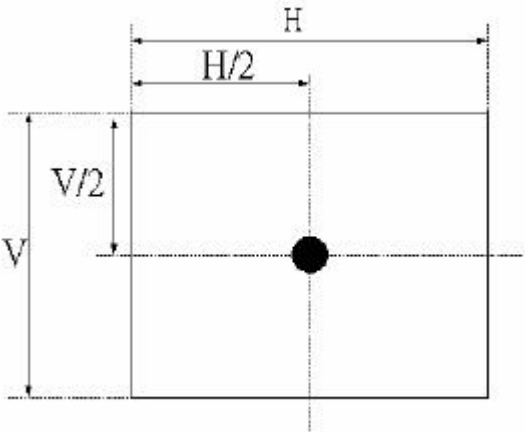
项目项目		符号	工作条件	最小值。	产品类型。	最大值。	工程单位	备注：注意
颜色色度 (1931 年中国公民学会)	红色的	R _x	$\theta_x=0$, $\theta_y=0$ 查看角度： 正 常 的 工 作 方 向	类型-0.03	0.656	类型+0.03	—	
		R _y			0.325			
	绿色的	G _x			0.272			
		G _y			0.585			
	蓝色	B _x			0.136			
		由			0.105			
	白色的	W _x			0.300			
		W _y			0.345			
白色中心发光度（屏幕中心）		L _c	375	500	—	cd/m²	(2)	
对比度		cr		75	—	%	(3)	
响应时间		从灰色到灰色的平均数		3000	—	—	(1)	
				—	20	—	毫秒钟	(4)
查看角度	水平的	θ+x	cr≥10	75	89	—	刻度。	(5)
		θ-x		75	89	—		
	垂直方向的	θ+Y		75	89	—		
		θ-Y		75	89	—		

1. 对比度(CR)的数学定义为:

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

2. 表面亮度是点 5 穿过 LCD 表面 50cm 处的亮度值，所有像素显示白色。有关更多信息，请参见图 2。LWH=Lon5，其中 Lon5 是亮度，所有像素在中心 5 位置显示白色。

FLG2 亮度



3. 表面亮度的变化， δ_{WHITE} （屏幕中心）定义为：

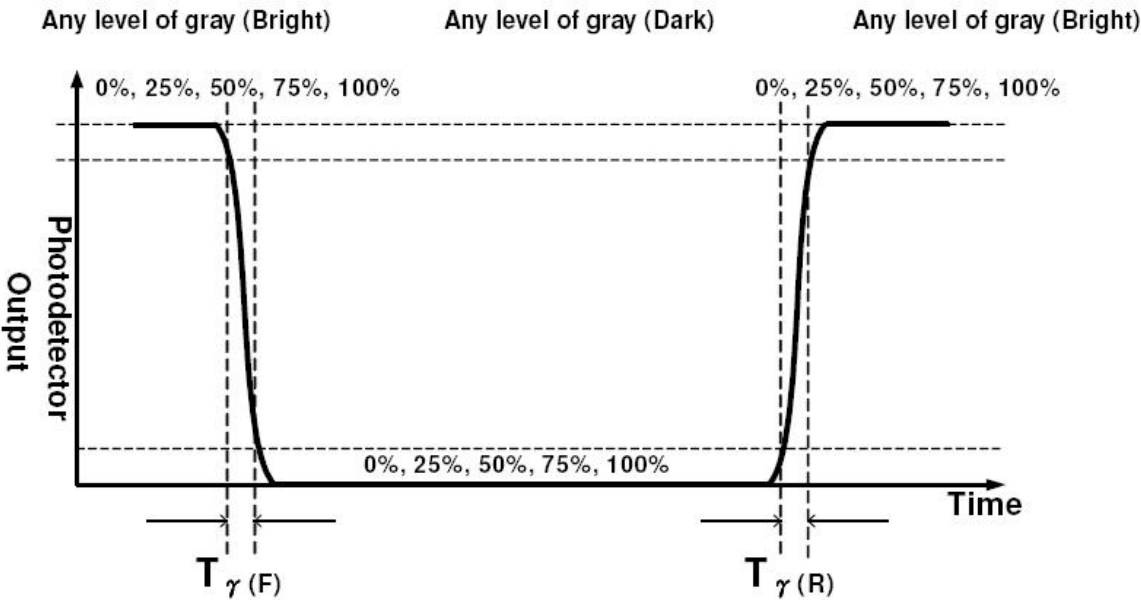
$$\delta_{\text{WHITE}}(9P) = \text{最小值}(\text{Lon1}, \text{Lon2}, \dots, \text{Lon9}) / \text{Lon5}$$

4. 响应时间 T 是五个亮度比（0%、25%、50%、75%、100%亮度矩阵）切换输入信号所需的平均时间，基于 $F_v=60\text{Hz}$ 进行优化。

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%	

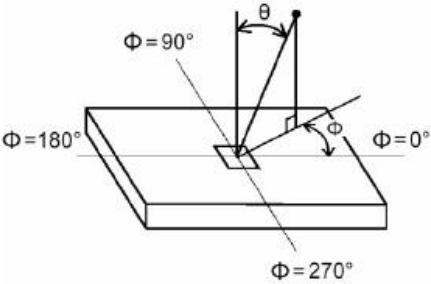
响应时间定义为下图，应通过切换“任何灰色（亮）”和“任何灰色（暗）”的输入信号进行测量。

图中示。3、响应时间



5. 视角是指对比度大于 10 的角度。确定水平或 X 轴以及垂直或 Y 轴相对于垂直于 LCD 表面的 z 轴的角度。有关更多信息，请参见图 4。

图中示。4个查看角度



4. 可靠性

环境试验条件

No	Test Item	Condition
1	High Temperature Storage Test	Ta=60℃ Determination: 240h
2	Low Temperature Storage Test	Ta=-20℃ Determination: 240h
3	High Temperature Operation Test	Ta=50℃ Determination: 240h
4	Low Temperature Operation Test	Ta=-5℃ Determination: 240h
5	Thermal Humidity Bias Test	Ta=50℃ 80%RH Determination: 240h
6	Thermal Shock Test	Ta=-20℃/1.0h~60℃/1.0h Determination: 50cycles
7	Vibration Test (non-operating)	Wave form: random Vibration level: 1.0grms Bandwidth: 10-500Hz Duration: X,Y,Z 20min, one time each direction
8	Shock Test (non-operating)	Shock level: 50G Wave form: half sine wave, 11ms Direction: ±X,±Y,±Z, one time each direction
9	Vibration Test (With Carton)	Wave form: random Vibration level: 1.5grms Bandwidth: 10-200Hz Duration: X,Y,Z 30min, one time each direction
10	Drop Test (With Carton)	Height: 46 cm 1 corner, 3 edges, 6 surfaces

5、注意注意事项

安装注意事项

- (1) 必须使用四角或四边的孔安装模块。
- (2) 你应该考虑安装结构，使力不均匀(例如。扭曲应力)不应用于模块。安装模块的情况应具有足够的强度，以使外力不会直接传递到模块。
- (3) 请将表面透明保护板安装到表面，以保护偏振器。透明保护板应具有足够的强度，以抵抗外力。
- (4) 您应采用辐射结构，以满足温度规范。
- (5) 盖箱无需乙酸型和氯型材料，因为前者产生高温下腐蚀极化器的腐蚀性气体，后者导致电化学反应破坏电路。
- (6) 不要用玻璃、镊子或任何比HB铅笔铅更硬的东西接触、推动或摩擦暴露的偏振器。请不要用化学处理。请勿接触徒手或油布的偏振器表面。(有些化妆品对偏振器有害。)
- (7) 表面灰尘时，请用吸水性棉或其他软材料如油苯轻轻擦拭。建议使用普通六烷清洁用于连接前后偏振器的粘合剂。
不要使用丙酮、甲苯和酒精，因为它们会对极化器造成化学损害。
- (8) 尽快擦拭唾液或水滴。它们与偏振器的长期接触会导致变形和褪色。
- (9) 不要打开外壳，因为内部电路没有足够的强度。

操作注意事项

-
- (1) 尖峰噪声会导致电路误操作。应低于以下电压： $V=\pm 200\text{mV}$ （过电压和拍摄电压）
 - (2) 的亮度取决于温度。（当温度较低时，该温度会变低。）在较低温度下，响应时间（开启后亮度稳定所需时间）变长。
 - (3) 在温度突然变化时应小心冷凝。冷凝水会损坏偏振器或电气接触的部件。凝结褪色后，会发生涂片或斑点。
 - (4) 当固定模式长期显示时，很可能会出现残余图像。
 - (5) 模块具有高频电路。系统制造商应对电磁干扰进行充分的抑制。接地和屏蔽方法对最小化接口可能很重要。

静电放电控制装置

由于模块由电路组成，静电放电不强。确保治疗人员通过腕带等与地面接地。而且不要直接触摸接口针。

强光照射的注意事项

强光曝光会导致偏振器和滤色器的退化。

存储器

当长期存储模块作为备件时，需要采取以下预防措施。

- (1) 把它们储存在一个黑暗的地方。请勿将模块暴露在太阳光下或荧光灯下。在正常湿度下，将温度保持在 5°C 至 35°C 之间。
- (2) 偏振器曲面不应与任何其他对象接触。建议储存在装它们的容器中。

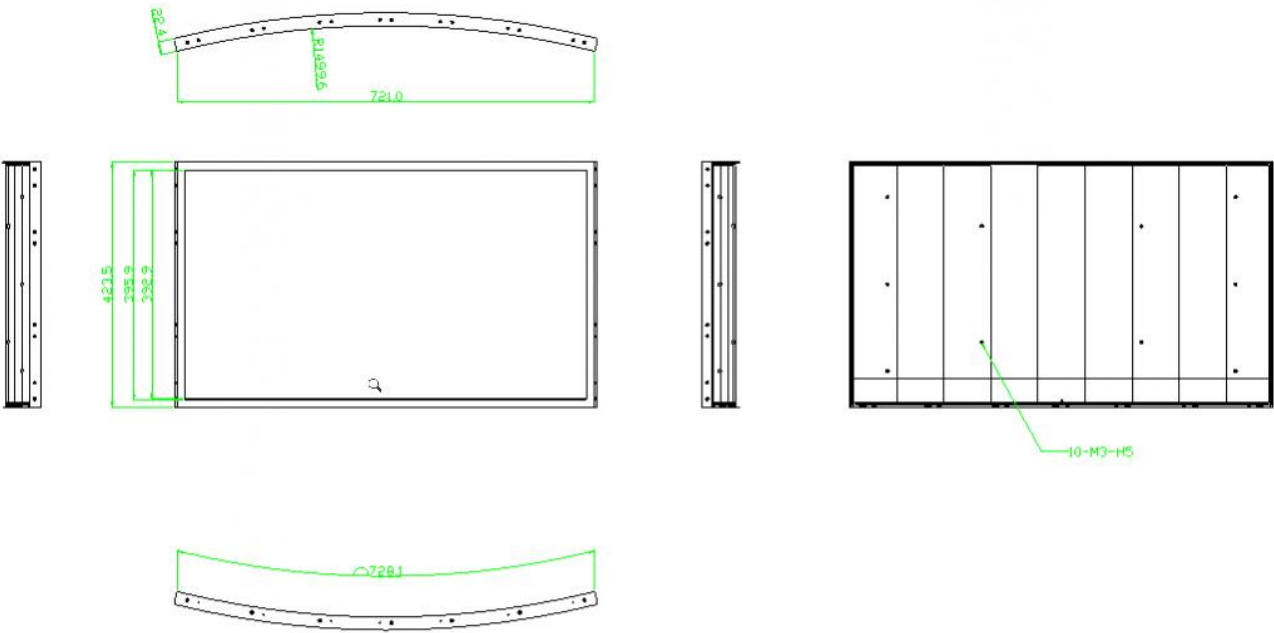
保护膜的处理注意事项

- (1) 保护膜与一个小屏蔽胶带连接在边框上。剥离保护膜后，薄膜与偏振器之间产生静电。电气接地、带有良好离子吹制设备的人员等应缓慢、小心地剥离。当连接有保护膜的模块长时间存放时，有时在保护膜脱落后，挡板上仍有非常少量的烟道。
- (2) 你可以很容易地去除胶水。当胶水留在边框上或其痕迹被识别时，请用吸收棉废料或其他软材料，如用普通己烷浸泡的变色羊擦干净。

6 模组标签

7. 模组光学及外形轮廓（模组外形结构及尺寸详见3D）

项目 Item			单位 unit	规格 Spection			备注 RemarkX
				MIN	TYP	MAX	Center point 450mA*2（NOTE 1）
1	灯条电流		mA	850	900	---	
	电压		V	50	54		（NOTE2）



(V) Preliminary Specification

() Final Specification

Module	31.5" Color TFT-LCD
Model Name	M315HVR01.100 Open Cell

Customer	Date
_____	_____
Approved by	
_____	_____
Note: This Specification is subject to change without notice.	

Approved by	Date
<u>CH Lin</u>	<u>Dec 25, 2018</u>
Prepared by	Date
<u>Jiahau Jean</u>	<u>Dec 25, 2018</u>
AU Optronics corporation	

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Record of Revision

Version	Date	Page	Old description	New Description	Remark
1.0	2018/12/25	All			

I Handling Precautions

- 1) Since polarizer is easily damaged, do not touch or press the surface of polarizer with hand.
- 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.
- 15) If the product will be used under extreme conditions such as under high temperature, humidity, display patterns or the operation time etc., it is strongly recommended to contact AUO for the advice about the application of engineering. Otherwise, its reliability and the function may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, banks, stock markets, and controlling systems.
- 16) Module designer should apply adequate thermal solutions to keep the electrical components surface temperature under control limit (ex: Source Driver IC 100°C , Components on T-con PCB 85°C) Operations over the temperature can cause damages or decrease of lifetime.



2 General Description

This specification applies to the 31.5 inch wide Color a-Si TFT-LCD Module M315HVR01.I

The display supports the FHD - 1920(H) x 1080(V) screen format and 16.7M colors (RGB 8-bits). The input interface is LVDS .

2.1 Display Characteristics

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

ITEMS	Unit	SPECIFICATIONS
Screen Diagonal	[mm]	800.1 (31.50")
Active Area	[mm]	698.4 (H) x 392.85 (V)
Pixels H x V	-	1920(x3) x 1080
Pixel Pitch	[um]	363.75 (per one triad) x 363.75
Pixel Arrangement	-	R.G.B. Vertical Stripe. Source board at bottom
Display Mode	-	VA Mode, Normally Black
Response Time	[msec]	20 (Typical, G to G)
Power Consumption	[Watt]	5.52 (Typ.) @ White pattern, Fv=60Hz
Weight	[Grams]	765.8
Electrical Interface	-	2 Port LVDS
Support Color	-	16.7M colors (RGB 8-bits)
Surface Treatment	-	SAG 40% , 3H
Temperature Range		
Operating	[°C]	0 to +50
Storage (Shipping)	[°C]	-20 to +60
Cell transmittance	[%]	4.25% (Typ.)
		3.82% (Min.)
Cell thickness	[mm]	1.24 (Thickness of polarizer film: 0.22 mm each side)

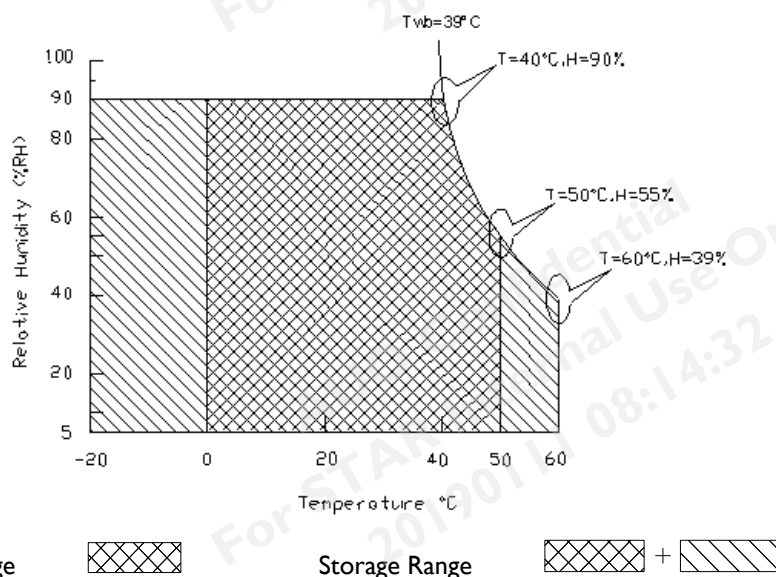
2.2 Absolute Maximum Rating of Environment

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 ($T_a \leq 39^\circ\text{C}$)
2. Max wet-bulb temperature at 39°C or less. ($T_a \leq 39^\circ\text{C}$)
3. No condensation



2.3 Optical Characteristics

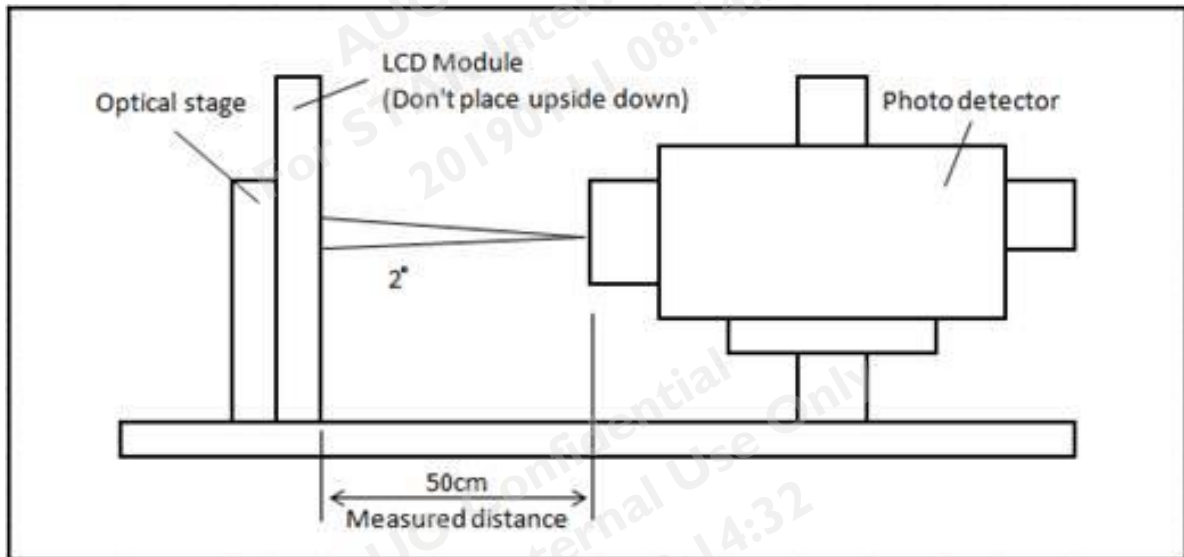
The optical characteristics are measured on the following test condition.

Test Condition:

1. Equipment setup: Please refer to **Note 2-2**.
2. Panel Lighting time: 30 minutes
3. VDD=12.0V, Fv=60Hz, Ta=25°C

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
CR	Contrast Ratio (Center of screen)		1800	3000	-	-	Note 2-4 By SR-3
θ_R	Horizontal Viewing Angle (CR=10)	Right	75	89	-	[degree]	Note 2-5 By EZ Contrasts
θ_L		Left	75	89	-		
Φ_H	Vertical Viewing Angle (CR=10)	Up	75	89	-		
Φ_L		Down	75	89	-		
TGTG	Response Time	Gray to Gray	-	20	-	[msec]	Note 2-6 By TRD-100
R _x	Color Coordinates (CIE 1931)	Red x	0.626	0.656	0.686	-	Base on C light
R _y		Red y	0.295	0.325	0.355		
G _x		Green x	0.242	0.272	0.302		
G _y		Green y	0.555	0.585	0.615		
B _x		Blue x	0.106	0.136	0.166		
B _y		Blue y	0.075	0.105	0.135		
W _x		White x	0.270	0.300	0.330		
W _y		White y	0.315	0.345	0.375		

Note 2-2: Equipment setup :

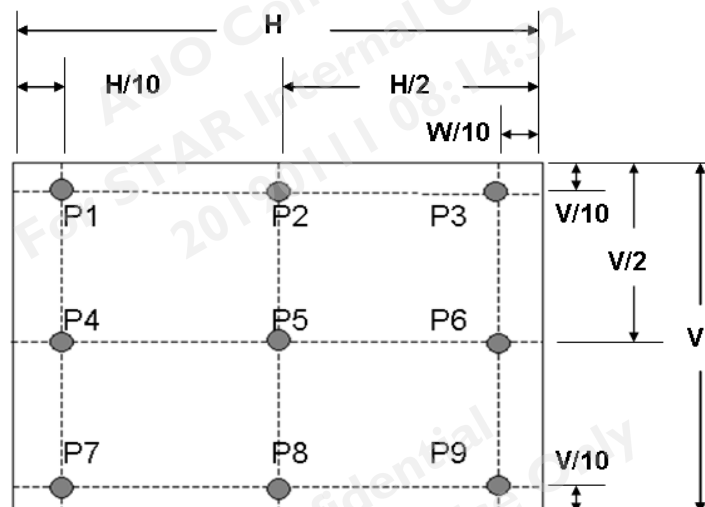


Note 2-3: Luminance Uniformity Measurement

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:

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

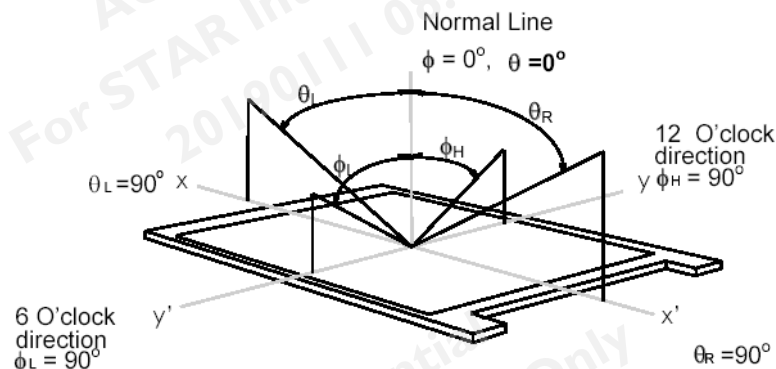
- Measured position: Center of screen (P5) & perpendicular to the screen ($\theta = \Phi = 0^\circ$)
- Base on AUO standard backlight

Note 2-5: Viewing angle measurement

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

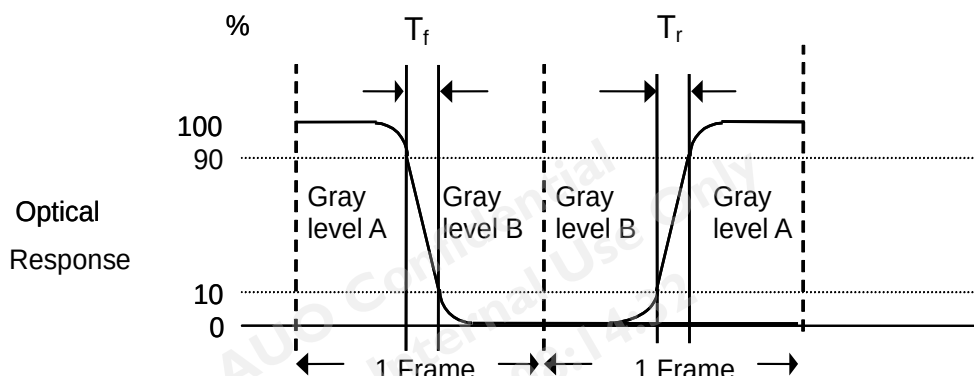
- Horizontal view angle: Divide to left & right (θ_L & θ_R)

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 “Gray level A” to “Gray level B” (falling time, T_f), and from “Gray level B” to “Gray level A” (rising time, T_r), respectively. The response time is interval between the 10% and 90% of optical response.





The gray to gray response time is defined as the following table.

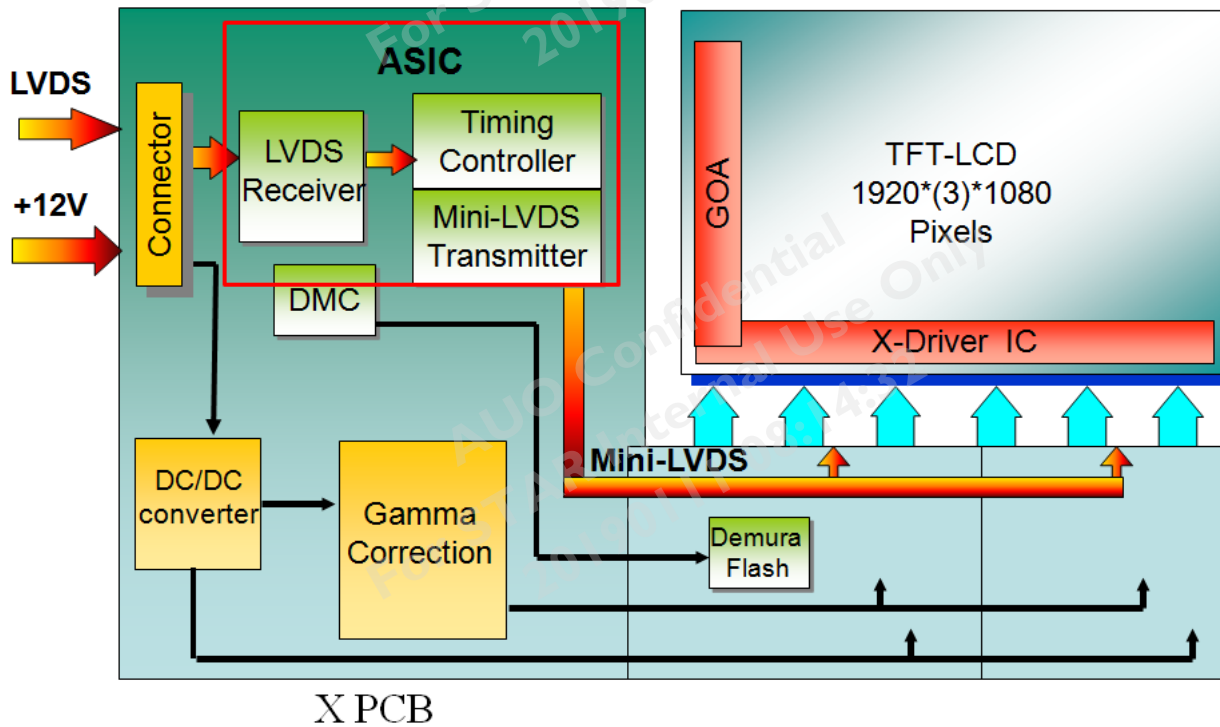
Gray Level to Gray Level		Target gray level				
		L0	L63	L127	L191	L255
Start gray level	L0					
	L63					
	L127					
	L191					
	L255					

■ T_{GTG_typ} is the total average time at rising time and falling time of gray to gray.

3 TFT-LCD Module

3.1 Block Diagram

The following shows the block diagram of the 31.5 inch Color TFT-LCD Module.



3.2 Interface Connection

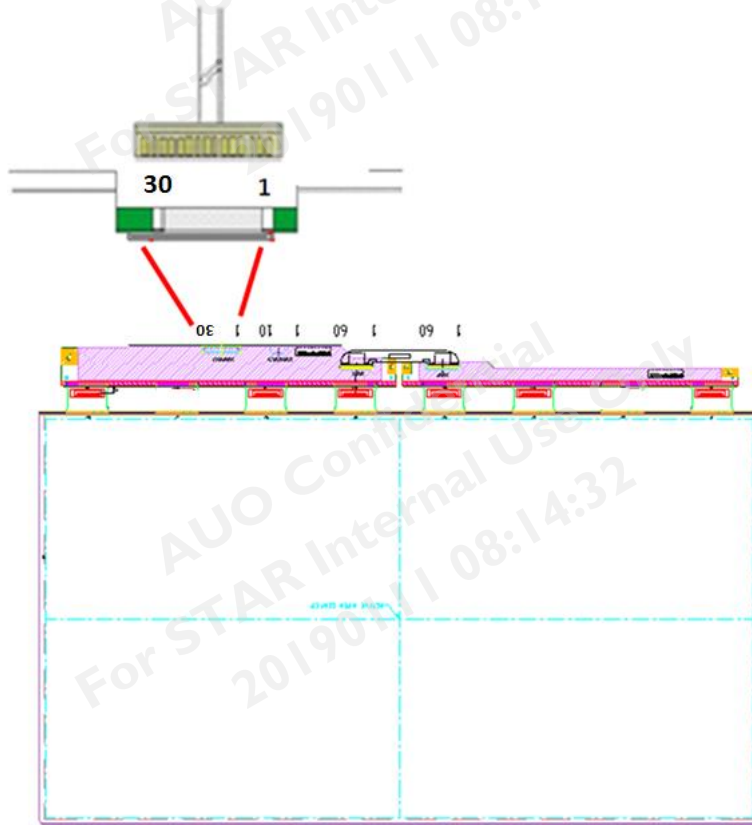
3.2.1 Connector Type

TFT-LCD Connector	Manufacturer	STARCOON	STM	P-TWO
	Part Number	093G30-00001A-M4	MSAKT2407P30_HB	187178-30091-3
Mating Connector	Manufacturer	JAE or Compatible		
	Part Number	FI-X30HL (Locked Type)		

3.2.2 Connector Pin Assignment

1	RxO0-	Negative LVDS differential data input (Odd data)	
2	RxO0+	Positive LVDS differential data input (Odd data)	
3	RxO1-	Negative LVDS differential data input (Odd data)	
4	RxO1+	Positive LVDS differential data input (Odd data)	
5	RxO2-	Negative LVDS differential data input (Odd data)	
6	RxO2+	Positive LVDS differential data input (Odd data)	
7	GND	Ground	
8	RxOCLK-	Negative LVDS differential clock input (Odd clock)	
9	RxOCLK+	Positive LVDS differential clock input (Odd clock)	
10	RxO3-	Negative LVDS differential data input (Odd data)	
11	RxO3+	Positive LVDS differential data input (Odd data)	
12	RxE0-	Negative LVDS differential data input (Even data)	
13	RxE0+	Positive LVDS differential data input (Even data)	
14	GND	Ground	
15	RxE1-	Negative LVDS differential data input (Even data)	
16	RxE1+	Positive LVDS differential data input (Even data)	
17	GND	Ground	
18	RxE2-	Negative LVDS differential data input (Even data)	
19	RxE2+	Positive LVDS differential data input (Even data)	
20	RxECLK-	Negative LVDS differential clock input (Even clock)	
21	RxECLK+	Positive LVDS differential clock input (Even clock)	
22	RxE3-	Negative LVDS differential data input (Even data)	
23	RxE3+	Positive LVDS differential data input (Even data)	
24	WP	Digital-Vcom write protection	
25	NC	No connection (for AUO test only. Do not connect)	
26	SCL	I2C-Compatible Serial-Clock Input for Vcom adjust	
27	SDA	I2C-Compatible Serial-Data Input / Output for	
28	VDD	Power Supply Input Voltage	

29	VDD	Power Supply Input Voltage	
30	VDD	Power Supply Input Voltage	



3.3 Electrical Characteristics

3.3.1 Absolute Maximum Rating

Permanent damage may occur if exceeding the following maximum rating.

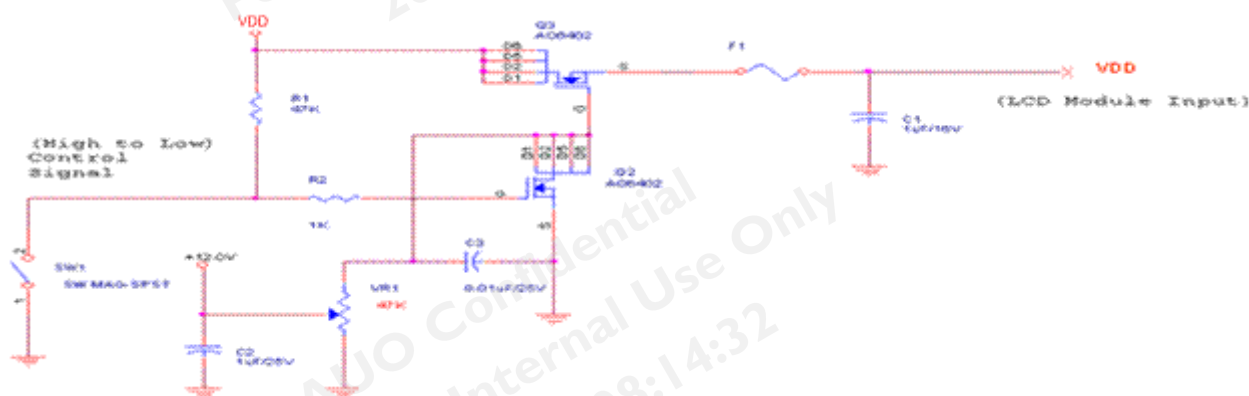
Symbol	Description	Min	Max	Unit	Remark
VDD	Power Supply Input Voltage	GND-0.3	14.0	[Volt]	Ta=25°C
SCL,SDA, WP	I2C input Voltage	GND-0.3	4.0	[Volt]	Ta=25°C

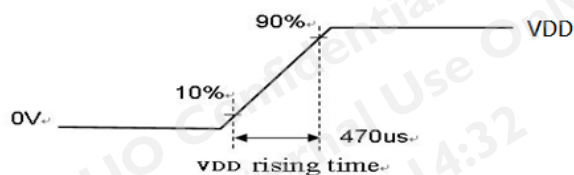
3.3.2 Recommended Operating Condition

Symbol	Description	Min	Typ	Max	Unit	Remark
VDD	Power supply Input voltage	10.8	12	13.2	[Volt]	
IDD	Power supply Input Current (RMS)	-	0.46	0.6	[A]	VDD= 12V, White Pattern, Fv=60Hz
		-	0.52	0.69	[A]	VDD= 12V, White Pattern, Fv=76Hz
PDD	VDD Power Consumption	-	5.52	7.2	[Watt]	VDD= 12V, White Pattern, Fv=60Hz
		-	6.24	8.28	[Watt]	VDD= 12V, White Pattern, Fv=76Hz
IRush	Inrush Current	-	-	3.0	[A]	Note 3-1
VDDrp	Allowable VDD Ripple Voltage	-	-	VDD*5%	[mV]	VDD= 12V, White Pattern, Fv=66Hz

Note 3-1: Inrush Current measurement:

Test circuit:





The duration of VDD rising time: 470us.

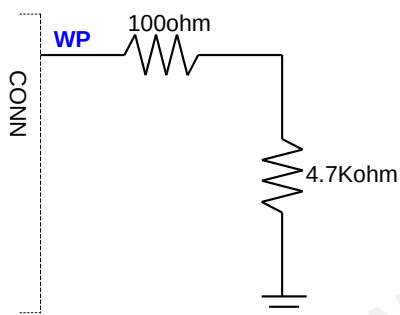
3.3.3 Input control signal threshold voltage definition

Item	Symbol	Min.	Typ.	Max.	Unit
Input High Threshold Voltage	VIH	2.7	-	3.6	V
Input Low Threshold Voltage	VIL	0	-	0.6	V

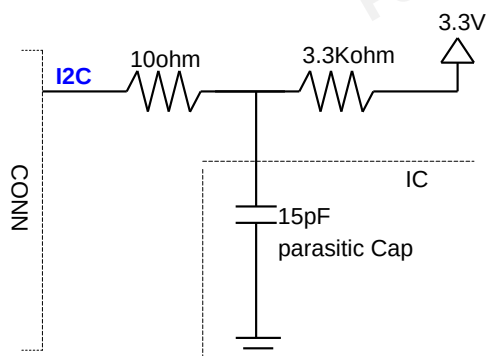
3.3.4 Write Protection mode selection

WP	Note
L or OPEN	Protection
H	Writable

3.3.5 Input equivalent impedance of WP pin

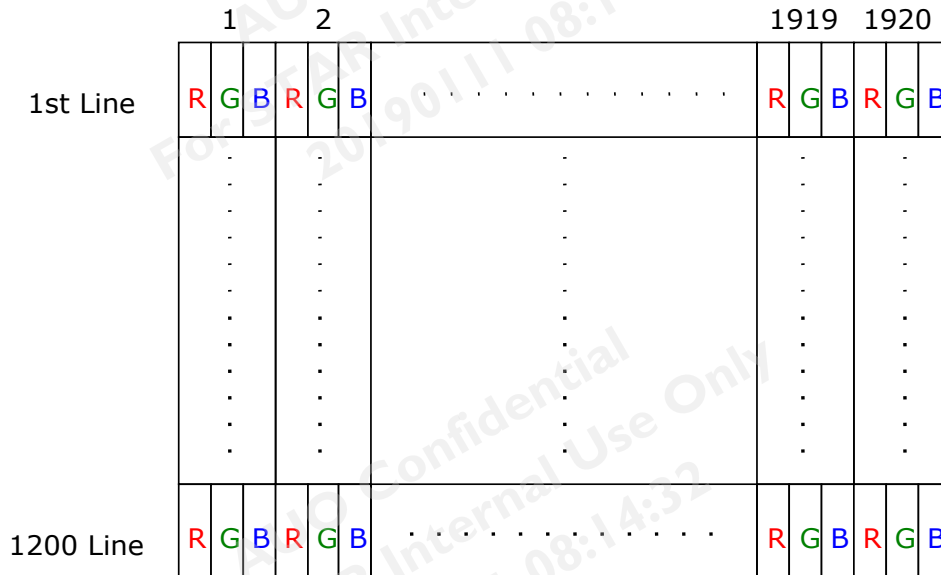


3.3.6 Input equivalent impedance of SDA/SCL pin



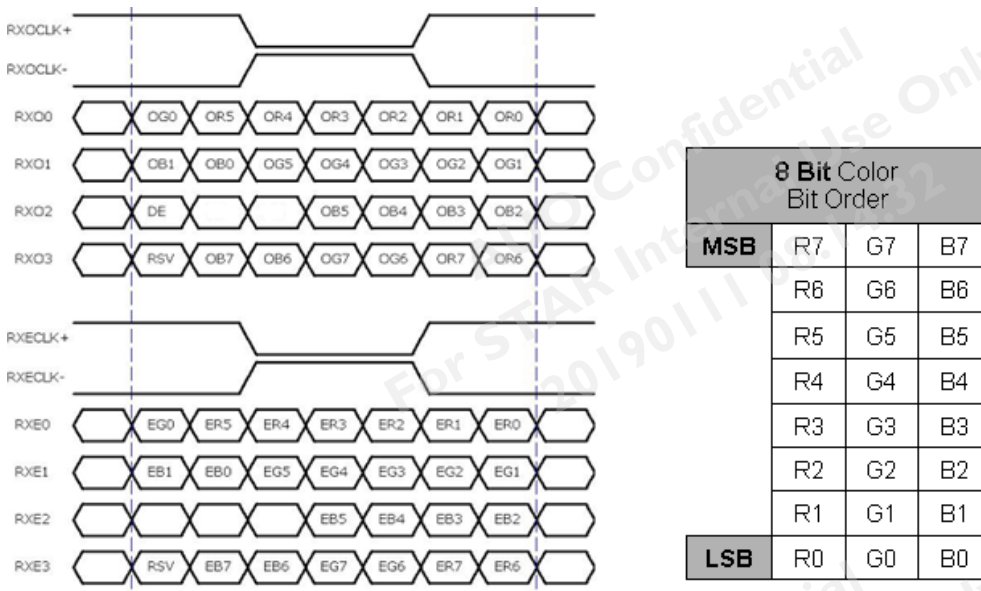
3.4 Signal Characteristics

3.4.1 LCD Pixel Format



3.4.2 Color versus Input Data

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



a. O = "Odd Pixel Data" E = "Even Pixel Data"

b. Refer to 3.4.1 LCD pixel format, the 1st data is 1 (Odd Pixel Data), the 2nd data is 2 (Even Pixel Data) and the last data is 1920 (Even Pixel Data).

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		
White	-	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		
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	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		
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	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		
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	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		

3.4.3 Input Timing Specification

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
Tv	Vertical Section	Period	1092	1130	1818	Th	
Tdisp (v)		Active	1080	1080	1080	Th	
Tblk (v)		Blanking	12	50	738	Th	
Fv		Frequency	48	60	76	Hz	Note 3-3
Th	Horizontal Section	Period	1034	1050	1100	Tclk	
Tdisp (h)		Active	960	960	960	Tclk	
Tblk (h)		Blanking	74	90	140	Tclk	
Fh		Frequency	52.0	68.0	91.0	KHz	Note 3-4
Tclk	LVDS Clock	Period	10.6	14.0	18.5	ns	I/Fclk
Fclk		Frequency	54.2	71.2	94.0	MHz	Note 3-5

Note 3-3:

75Hz model: Frame rate 48~76Hz / The optimal Vertical Frequency is 50~76 Hz for best picture quality

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

$$F_h (\text{Min.}) = F_{clk} (\text{Min.}) / T_h (\text{Min.});$$

$$F_h (\text{Typ.}) = F_{clk} (\text{Typ.}) / T_h (\text{Typ.});$$

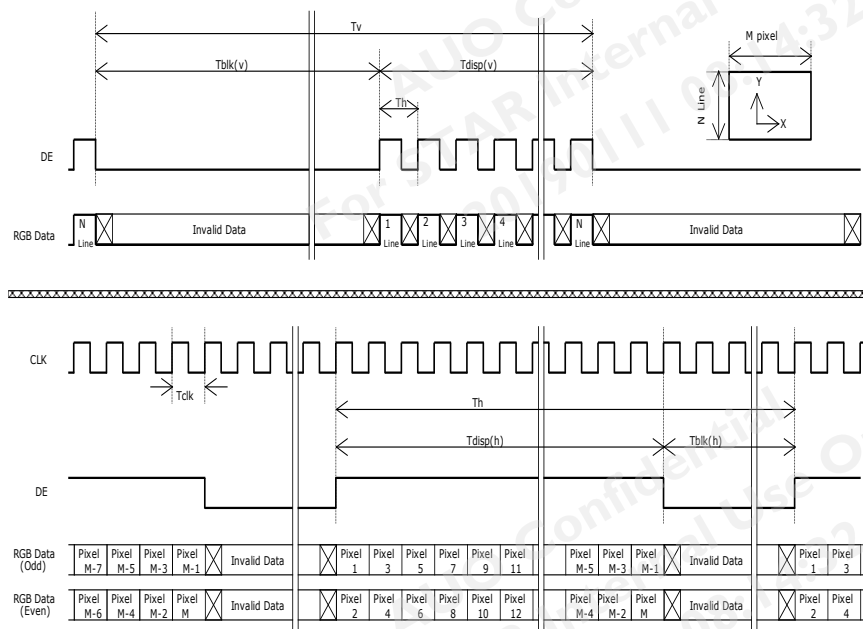
$$F_h (\text{Max.}) = F_{clk} (\text{Max.}) / T_h (\text{Min.});$$

Note 3-5: The equation is listed as following. Please don't exceed the above recommended value.

$$F_{clk} (\text{Min.}) = F_v (\text{Min.}) \times T_h (\text{Min.}) \times T_v (\text{Min.});$$

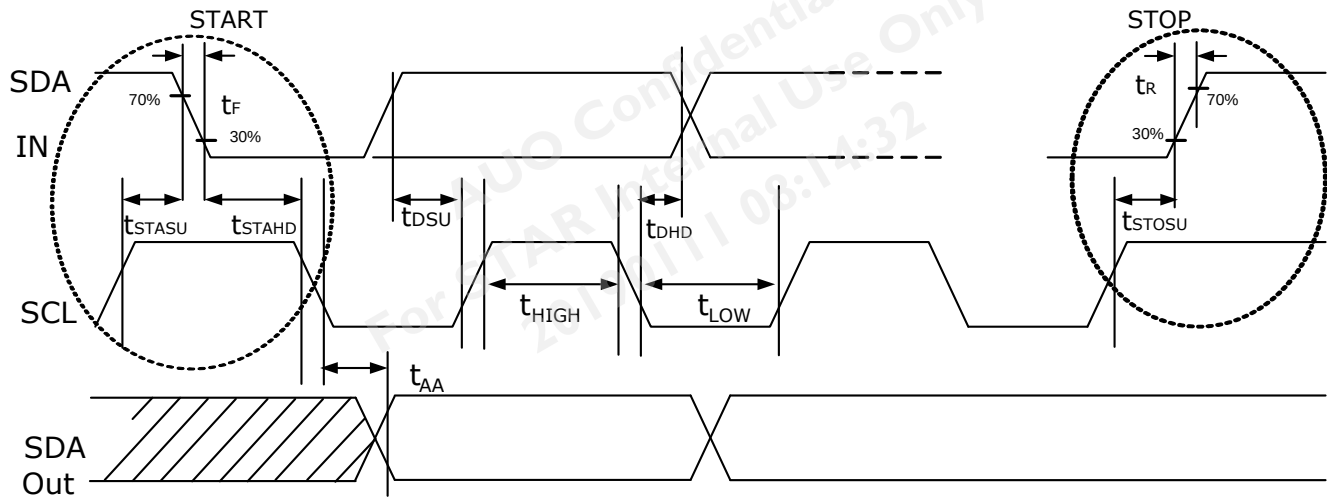
$$F_{clk} (\text{Typ.}) = F_v (\text{Typ.}) \times T_h (\text{Typ.}) \times T_v (\text{Typ.});$$

3.4.4 Input Timing Diagram



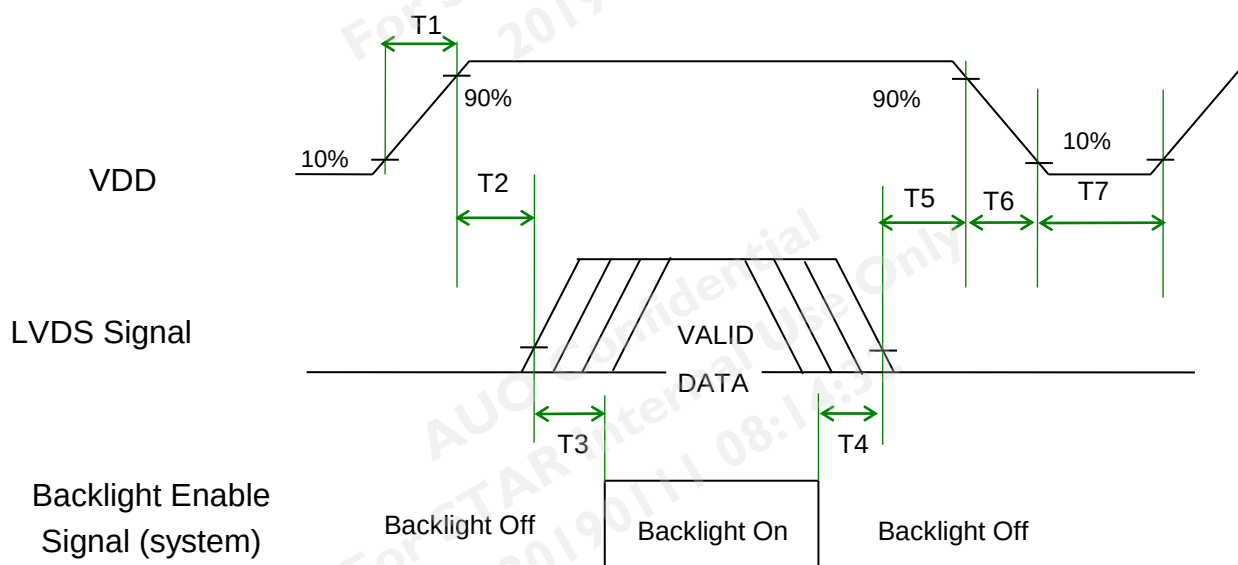
3.4.5 I2C Electrical Characteristics (VDD=12V, VSDA/VSCL=3.3V, TA=25°C)

Parameter		Symbol	Min.	Typ.	Max	Unit
I2C	SCL clock frequency	fSCL	-	-	350	kHz
	Clock Pulse Width Low	tLOW	1.85	-	-	us
	Clock Pulse Width High	tHIGH	0.4	-	-	us
	Clock Low to Data Output Valid	tAA	1.76	-	-	us
	Start Setup Time	tSTASU	0.6	-	-	us
	Start Hold Time	tSTAHD	0.6	-	-	us
	Stop Setup Time	tSTOSU	0.6	-	-	us
	Data In Setup Time	tDSU	0.1	-	-	us
	Data In Hold Time	tDHD	0	-	-	us
	SCL/SDA Rise Time	tR	-	-	0.3	us
	SCL/SDA Fall Time	tF	-	-	0.3	us



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	-	200	[ms]	
T3	500	-	-	[ms]	
T4	100	-	-	[ms]	
T5	0		50	[ms]	Note 3-5 Note 3-6
T6	0	-	200	[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 and T6 period , please keep the level of input LVDS signals with Hi-Z state.

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

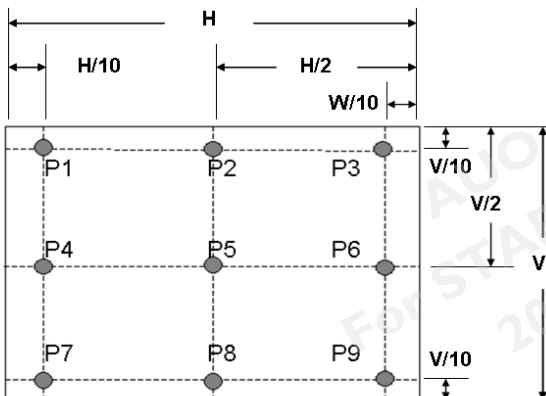
3.6 Vcom Adjustment Flow

A. Flicker Pattern

2L+1 (1V) L127

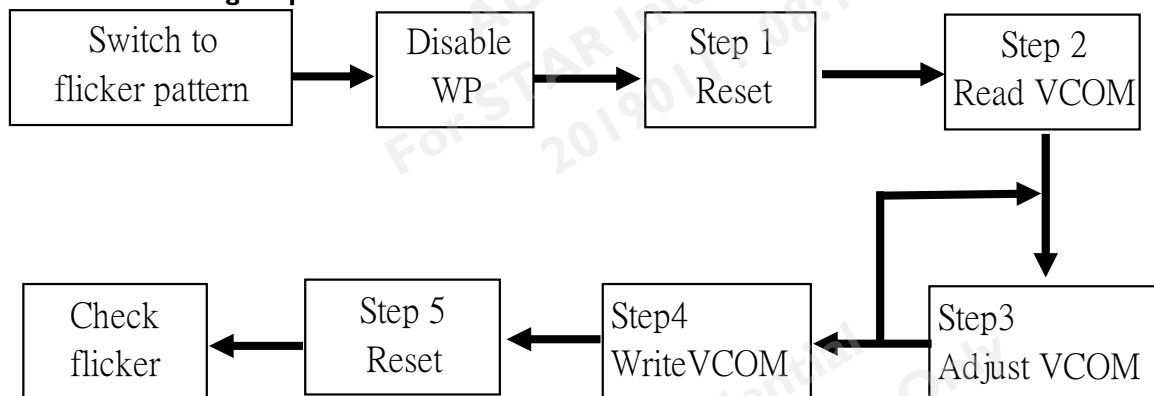


3.6.2 Vcom is optimization when minimized flicker phenomenon of location P5 (as below figure)



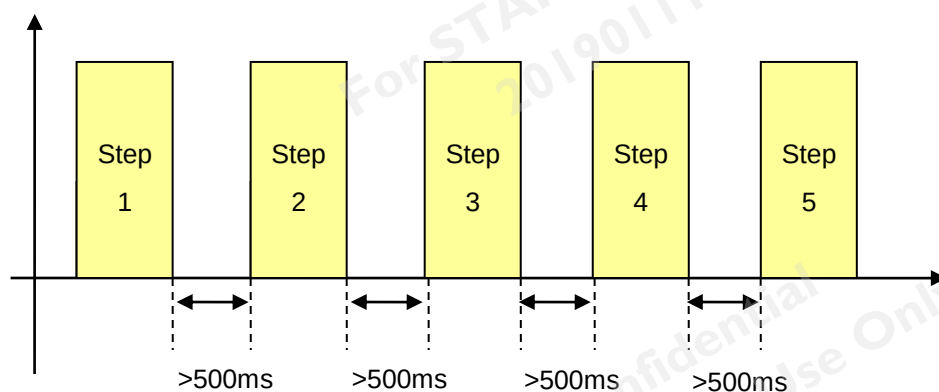
3.6.3 Tuning Step

VCOM I2C Tuning Step



3.6.4 Interval of Step to Step

VCOM I2C Tuning Step



3.6.5 I2C Protocol Define

DVCOM IC address (slave) : 1110100 (0x74)

Step1 Reset Command

Start	Slave Address								W R	ACK	Index Address 0								ACK	Control Byte								ACK	Stop
	1	1	1	0	1	0	0	0			0	0	0	0	0	0	0	0		0	0	0	1	0	0	1	0		
	0xE8										0x00									0x12									
	Device Address + W										Control Address									Reset + OUT_EN									

Step2 Read Vcom Command

Start	Slave Address							W R	ACK	Index Address 0							ACK	Start	Slave Address							W R	ACK	VCOM data							ACK	Stop				
	1	1	1	0	1	0	0	0		0	0	0	0	0	1	1			1	1	0	1	0	0	1	X		X	X	X	X	X	X							
	0xE8									0x01									0xE9									0~127												
	Device Address + W									VCOM Address									Device Address + R									DATA												

Step3 Adjust Vcom Command

	Slave Address							W R		Index Address 1								VCOM data										
Start	1	1	1	0	1	0	0	0	ACK	0	0	0	0	0	0	0	1	ACK	X	X	X	X	X	X	X	N	ACK	Stop
	0xE8							0x01							0~127							A						
	Device Address + W							VCOM Address							VCOM Value													

Step4 Write Vcom Command

Start	Slave Address							W R	ACK	Index Address 0							ACK	Control Byte							ACK	Stop	
	1	1	1	0	1	0	0	0		0	0	0	0	0	0	0		0	0	0	0	1	0	1			0
	0xE8							0x00							0x0A												
	Device Address + W							Control Address							Write DAC to NVM												

Step5 Reset Command

Start	Slave Address							W R	ACK	Index Address 0							ACK	Control Byte							ACK	Stop		
	1	1	1	0	1	0	0	0		0	0	0	0	0	0	0		0	0	0	0	1	0	0			1	0
	0xE8							0x00							0x12													
	Device Address + W							Control Address							Reset + OUT EN													

4 Reliability Test

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

Items	Condition	Remark
Temperature Humidity Bias (THB)	Ta= 50°C, 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 50°C, 50%RH, 300hours	
Low Temperature Operation (LTO)	Ta= 0°C, 300hours	
High Temperature Storage (HTS)	Ta= 60°C, 300hours	
Low Temperature Storage (LTS)	Ta= -20°C, 300hours	
Thermal Shock Test (TST)	-20°C/30min, 60°C/30min, 100 cycles	Note 4-1

- Note 4-1:** a. A cycle of rapid temperature change consists of varying the temperature from -20°C to 60°C 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 4-2 : Result Evaluation Criteria:

TFT-LCD panels test should take place after gradually cooling enough at room temperature

In the normal application, there should be no particular problems that may affect the display function.

5 Shipping Label

5.1 Small Shipping Label

The label is on the PCBA as shown below :



5.2 Run Card Label

The label is on the panel as shown below :

M315HVR01-x/xx
xx:xxxxxxxxxx
Remark : X

0



SKD

S/N
xxxxxxxxxxxxxx (xxxxx)
Z
P
N
V

XXXXX	XXXXX	XXXXX		
XXXXX	XXXXX	XXXXX		
XXXXX	XXXXX	XXXXX		
XXXXX	XXXXX	XXXXX		



Product Specification

AU OPTRONICS CORPORATION

M315HVR01.1

AUO Confidential
For STAR Internal Use Only
20190111 08:14:32

AUO Confidential
For STAR Internal Use Only
20190111 08:14:32

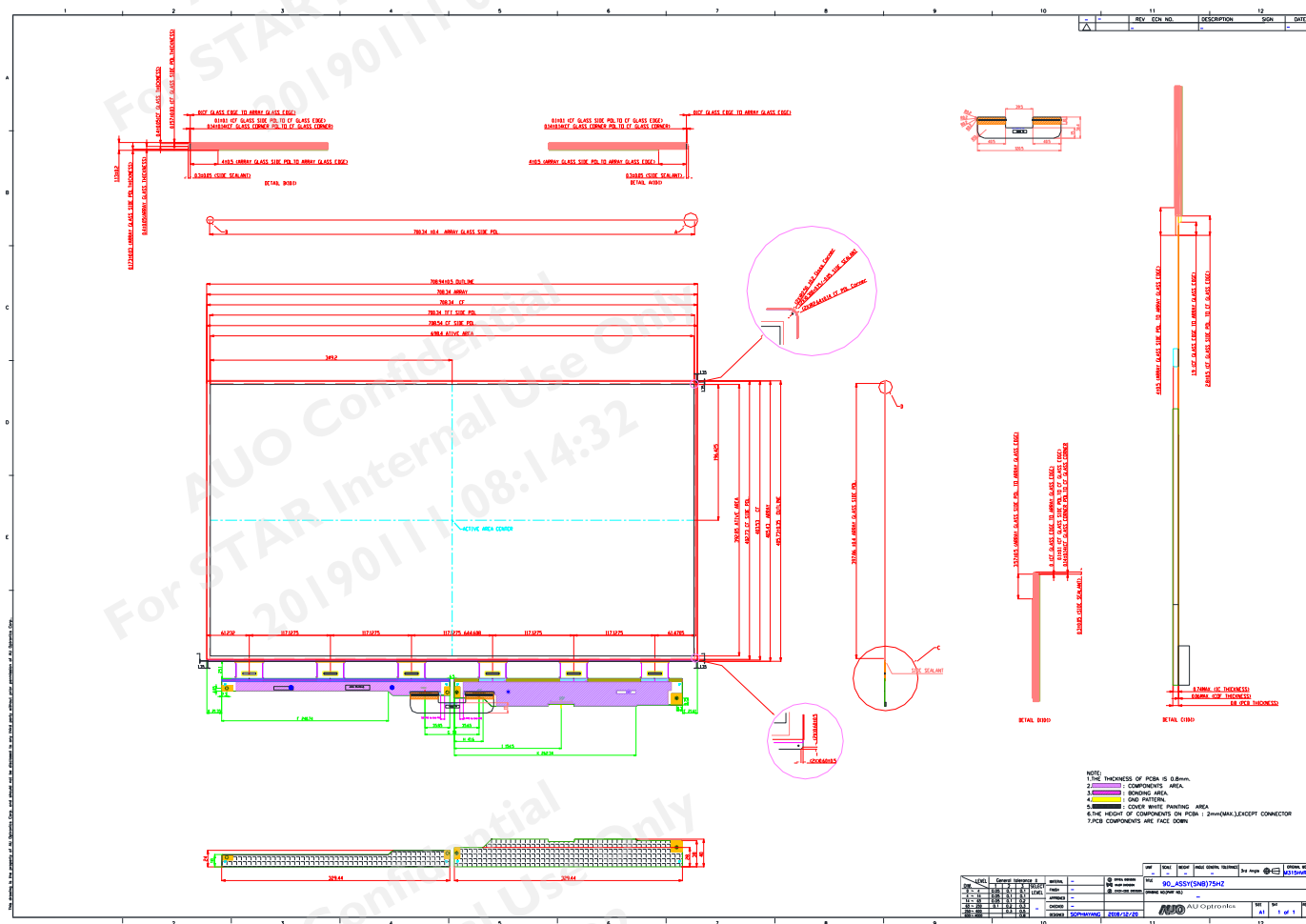
AUO Confidential
For STAR Internal Use Only
20190111 08:14:32

AUO Confidential
For STAR Internal Use Only
20190111 08:14:32



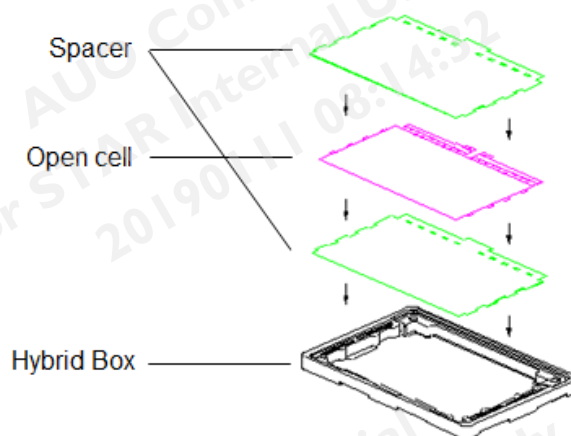
6 Mechanical Characteristic

Avoid touching COF position when doing mechanical design



7 Packing Specification

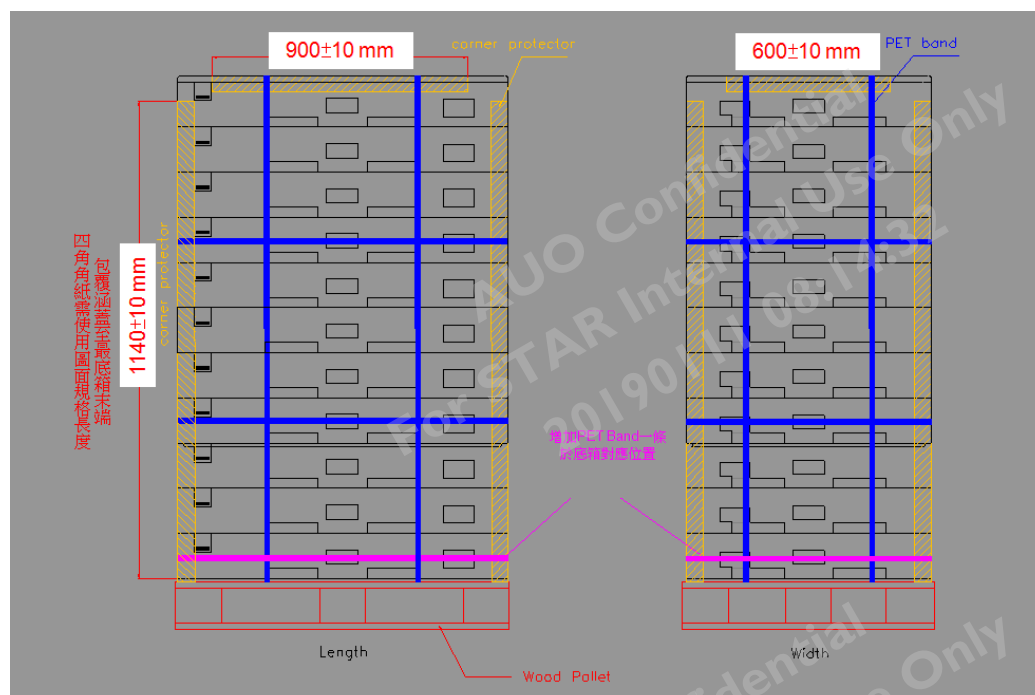
7.1 Packing Flow



- Open cell : 10(pcs/Box)
- Spacer : 11(pcs/Box)

Single pallet packing Illustration

- 1 (Box/Layer)
- 10 (Layer/Pallet)



單層pallet打棧示意圖

SingleOne pallet packaging illustration



7.2 Pallet and Shipment information

Item	Specification			Remark
	Q'ty	Dimension	Weight(kg)	
Box	1	950.6(L)mm x 675(W)mm x 120(H)mm	1.93	without cell & spacer
Packing Box	10 pcs/Box	950.6(L)mm x 675(W)mm x 120(H)mm	10.5	with cell & cushion & spacer
Pallet	1	980(L)mm x 740(W)mm x 132(H)mm	12.0	M25 棧板
Pallet after Packing	10 boxes/pallet	980(L)mm x 740(W)mm x 1332(H)mm	117	