☐ **Preliminary Specification**
■ **Final Specification**

Module	18.5 Inch Color TFT-LCD with Touch
Model Name	G185HAT01.1

Company		**Approved by**	**Date**
		Elsie Kuo	2024/04/09
Checked & Approved by	**Date**	**Prepared by**	
		Athena Wu	2024/04/09
		General Display Business Unit / AUO Display Plus Corporation	

Contents

Record of Revision

Version and Date	Page	Old description	New Description
1.0 2024/03/12	All	Final specification	

1. Operating Precautions

1) Since front polarizer is easily damaged, please be cautious and 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 soft cloth.
5) Since the panel is made of glass, it may be broken or cracked 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 nor modify the module assembly.
8) Do not press the reflector sheet at the back of the module to any direction.
9) In case if a module has to be put back into the packing container slot after it was taken out from the container, do not press the center of the LED Reflector edge. Instead, press at the far ends of the LED Reflector edge softly. Otherwise the TFT Module may be damaged.
10) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
11) TFT-LCD Module is not allowed to be twisted & bent even force is added on module in a very short time. Please design your display product well to avoid external force applying to module by end-user directly.
12) Small amount of materials without flammability grade are used in the TFT-LCD module. The TFT-LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950-1 or UL60950-1), or be applied exemption.
13) Severe temperature condition may result in different luminance, response time.
14) Continuous operating TFT-LCD Module under high temperature environment may accelerate LED light bar exhaustion and reduce luminance dramatically.
15) The data on this specification sheet is applicable when TFT-LCD module is placed in landscape position.
16) Continuous displaying fixed pattern may induce image sticking. It’s recommended to use screen saver or moving content periodically if fixed pattern is displayed on the screen.

2. General Description

This specification applies to the 18.5 inch-wide Color TFT-LCD Module G185HAT01.1. The display supports the Full HD - 1920(H) x 1080(V) screen format and 16.7M colors. All input signals are LVDS interface comaptible.

2.1 Display Characteristics (G185HAT01.1)

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

Items	Unit	Specifications
Screen Diagonal	[mm]	(18.5")
Active Area	[mm]	408.96 (H) x 230.04 (V)
Pixels H x V		1920(x3) x 1080
Pixel Pitch	[um]	213 (per one triad) × 213
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		AHVA Mode, Normally Black
White Luminance (Center)	[cd/m^2]	300 cd/m^2 (Typ.)
Contrast Ratio		1000 (Typ.)
Optical Response Time	[msec]	20
Nominal Input Voltage	[Volt]	5 V(Typ)
Power Consumption (VDD line + LED line)	[Watt]	20.95W(max)
Weight (LCM)	[Grams]	2.5kg (typ.)
Physical Size (TTL)	[mm]	450.36 (H) x 271.44 (V) ×15.2(D)(typ.)
Electrical Interface		Dual LVDS
Support Color		True 8bit
Surface Treatment		AS coating
Temperature Range Operating Storage (Non-Operating)	 [°C] [°C]	 -30 to +80 -30 to +80
RoHS Compliance		RoHS Compliance

2.2 General Touch Characteristics

Item		Unit	Specifications
Type		Projected Capacitive Touch Panel	
Structure		Glass / Glass	
Mounting type		Direct Bonding	
Input Mode		Multi Finger	
Cover lens	O.D.	[mm]	450.36 X 271.44
	Thickness	[mm]	1.8
C/L Visual Area		[mm]	409.96 X 231.04
Sensor Glass	O.D.	[mm]	425 X 250.3
	Thickness	[mm]	0.7
TP Active Area		[mm]	412.8 X 234.06
Substrate Material		SDL CS Glass	
Touch points			10
Transmittance (%)		%	85% +/- 3%
Single Touch Point Life Time			1 Millions
Surface Hardness			7H
Interface			USB 2.0 full speed
Single / Multi-touch Accuracy		[mm]	Center:+/-1.5mm Edge: +/-2 mm
Linearity		[mm]	Center: +/-1.5mm Edge: +/-2mm
The smallest distance between 2 points (each point diameter is 7mm)		[mm]	13
Channel (X * Y)			80 * 47
Report Rate (points /sec)		[Hz]	>100
Power Consumption		[mW]	500 (typ.)
Response Time		[ms]	<35
Operating System			Support Win8 / Win10 ,Linux & Android

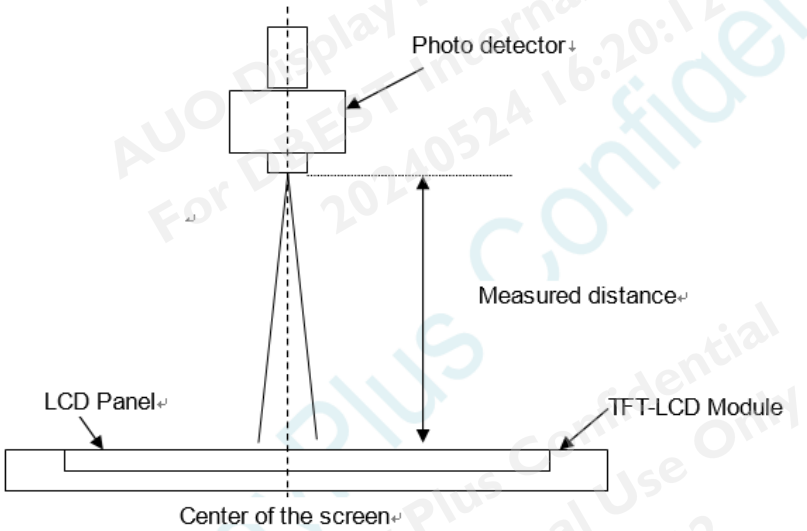
2.3 Optical Characteristics

The optical characteristics are measured under stable conditions at 25℃ (Room Temperature):

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right) CR = 10 (Left)		89 89	- -	*1, 2*
	[degree]	Vertical (Upper) CR = 10 (Lower)		89 89	- -	
Contrast ratio		Normal Direction	800	1000	-	*3*
Response Time	[msec]	Raising Time (T_{rR})	-	10	20	*4*
		Falling Time (T_{rF})	-	10	20	
		Raising + Falling	-	20	40	
Color / Chromaticity Coordinates (CIE)		Red x	0.594	0.644	0.694	*5*
		Red y	0.282	0.332	0.382	
		Green x	0.244	0.294	0.344	
		Green y	0.556	0.606	0.656	
		Blue x	0.096	0.146	0.196	
		Blue y	0.020	0.070	0.120	
Color Coordinates (CIE) White		White x	0.249	0.299	0.349	
		White y	0.265	0.315	0.365	
Central Luminance	[cd/m^2]		240	300	-	*6*
Luminance Uniformity	[%]		75	80	-	*7*

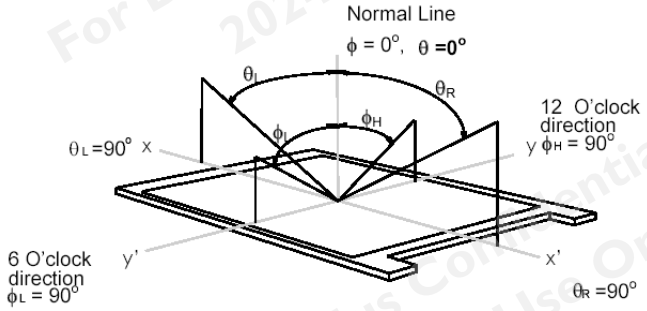
Note 1: Measurement method

Before measuring, the LCD module should be turn on 30 minutes at room temperature. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a stable, windless and dark room.



Note 2: Definition of viewing angle measured by ELDIM (EZContrast 88)

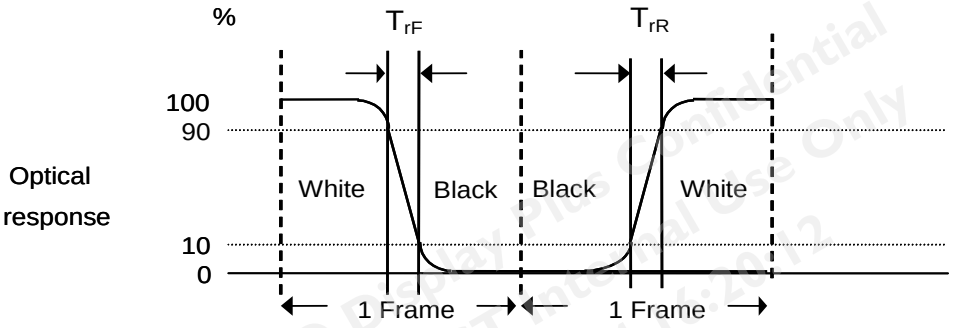
Viewing angle is the measurement of contrast ratio ≧10, at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as follows; 90° (θ) horizontal left and right and 90° (Φ) vertical, high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated about its center to develop the desired measurement viewing angle.



Note 3: Contrast ratio is measured by TOPCON SR-3

Note 4: Definition of Response time measured by Westar TRD-100A

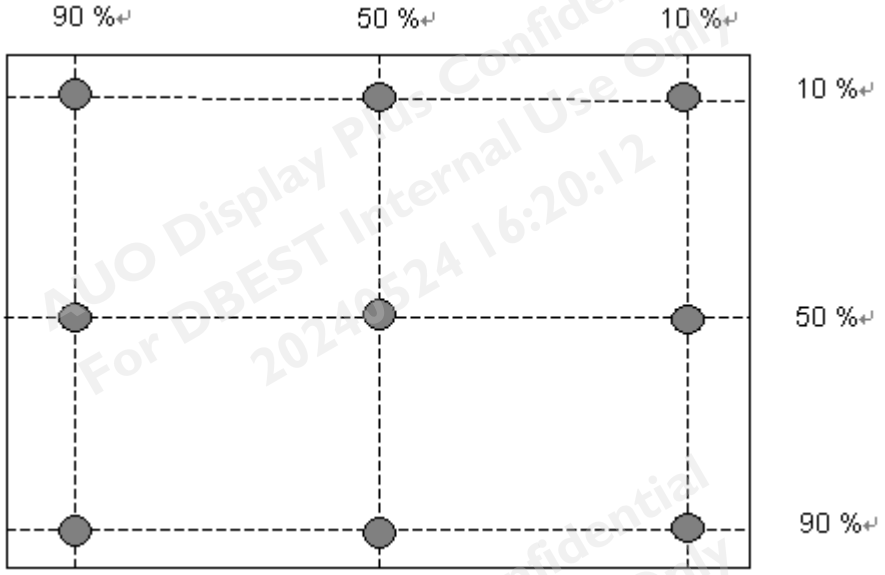
The output signals of photo detector are measured when the input signals are changed from “Full Black” to “Full White” (rising time, T_{rR}), and from “Full White” to “Full Black” (falling time, T_{rF}), respectively. The response time is interval between the 10% and 90% (1 frame at 60 Hz) of amplitudes.



Note 5: Color chromaticity and coordinates (CIE) is measured by TOPCON SR-3

Note 6: Central luminance is measured by TOPCON SR-3

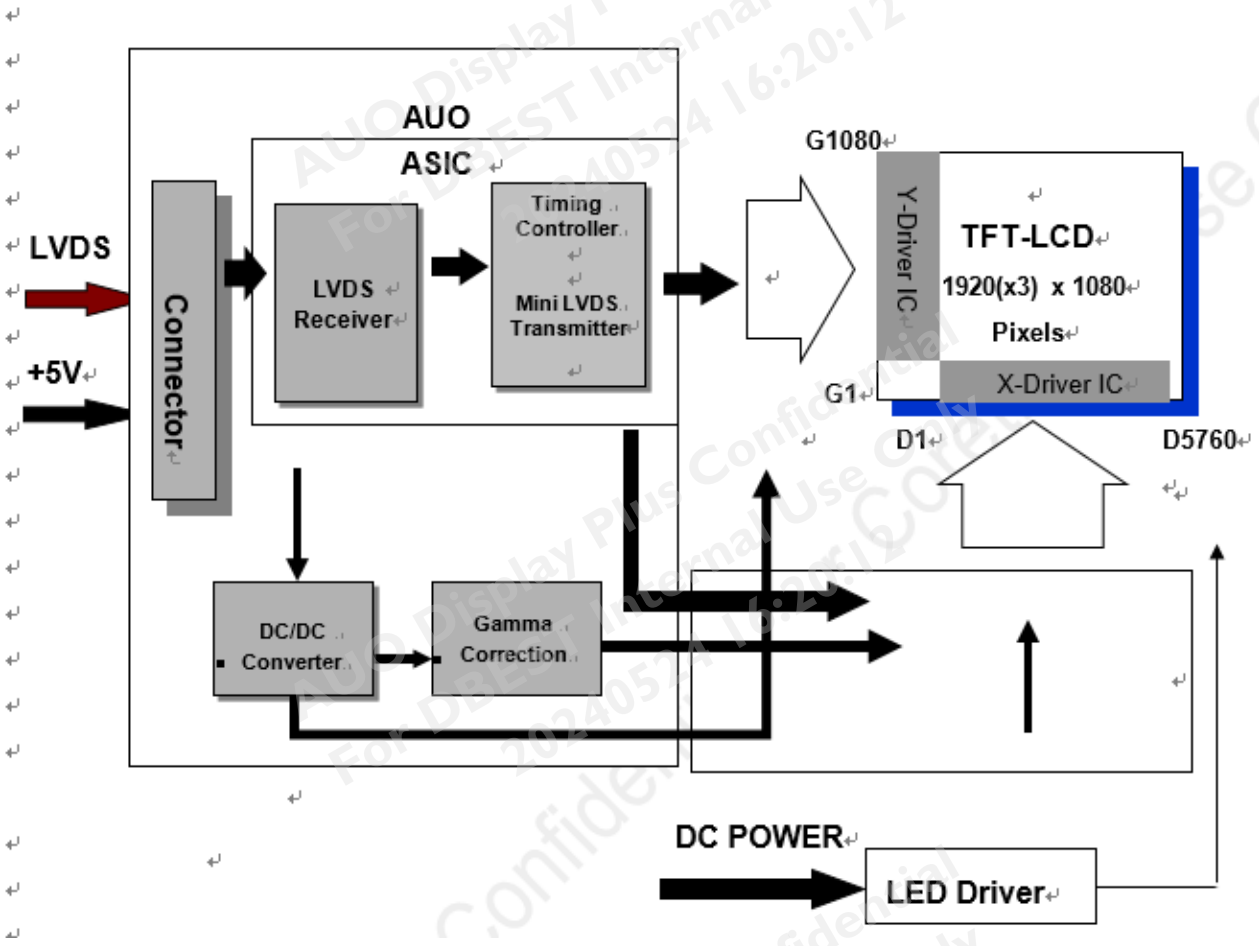
Note 7: Luminance uniformity of these 9 points is defined as below and measured by TOPCON SR-3



$$\text{Uniformity} = \frac{\text{Minimum Luminance in 9 points (1 - 9)}}{\text{Maximum Luminance in 9 Points (1 - 9)}}$$

3. Functional Block Diagram

The following diagram shows the functional block of this model.



I/F PCB Interface:
FI-XB30SSRLA-HF-16-R3500 (JAE)
Mating Type:
FI-X30HL or FI-X30C2L-NPB

4. Absolute Maximum Ratings

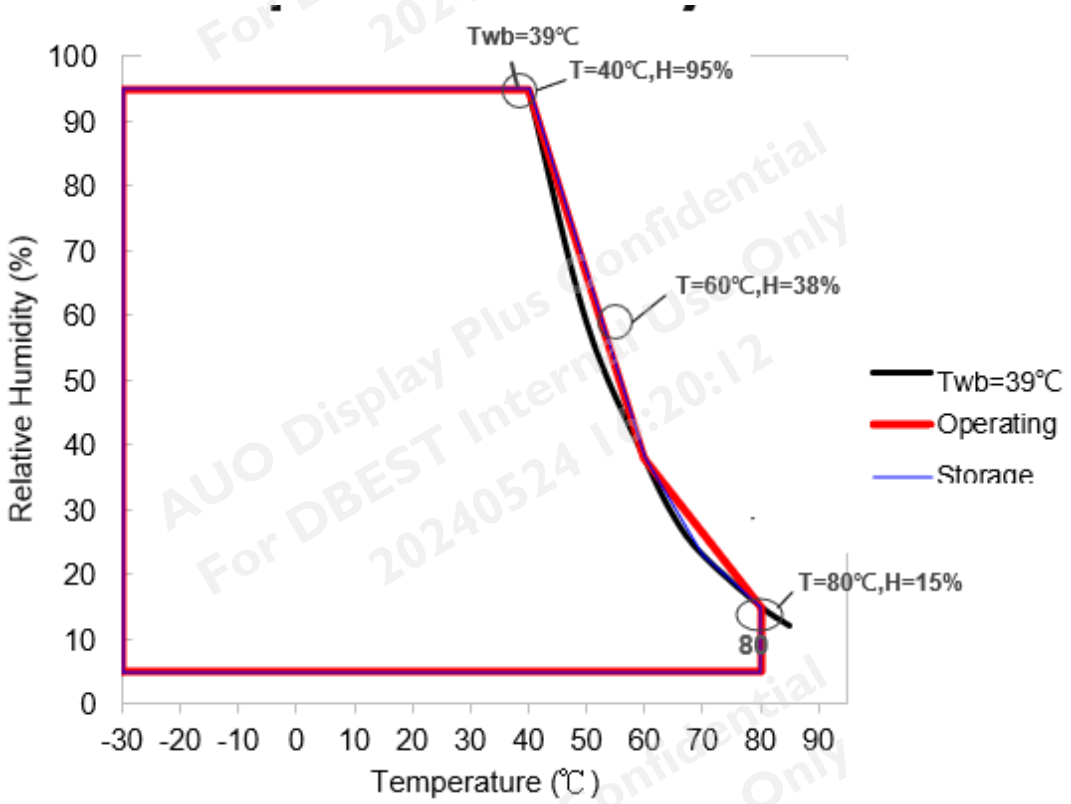
4.1 TFT LCD Module

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	VDD	-0.3	5.5	[Volt]	Note 1,2

4.2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	0	80	[°C]	Note 3 & 4
Operation Humidity	HOP	5	90	[%RH]	
Storage Temperature	TST	-30	80	[°C]	
Storage Humidity	HST	5	90	[%RH]	

Note 1: With in Ta (25°C)
Note 2: Permanent damage to the device may occur if exceeding maximum values
Note 3: For quality perfermance, please refer to AUO IIS(Incoming Inspection Standard).
Note 4: Panel surface termperature. Max 60C (Function judge only)



5. Electrical Characteristics

5.1 TFT LCD Module

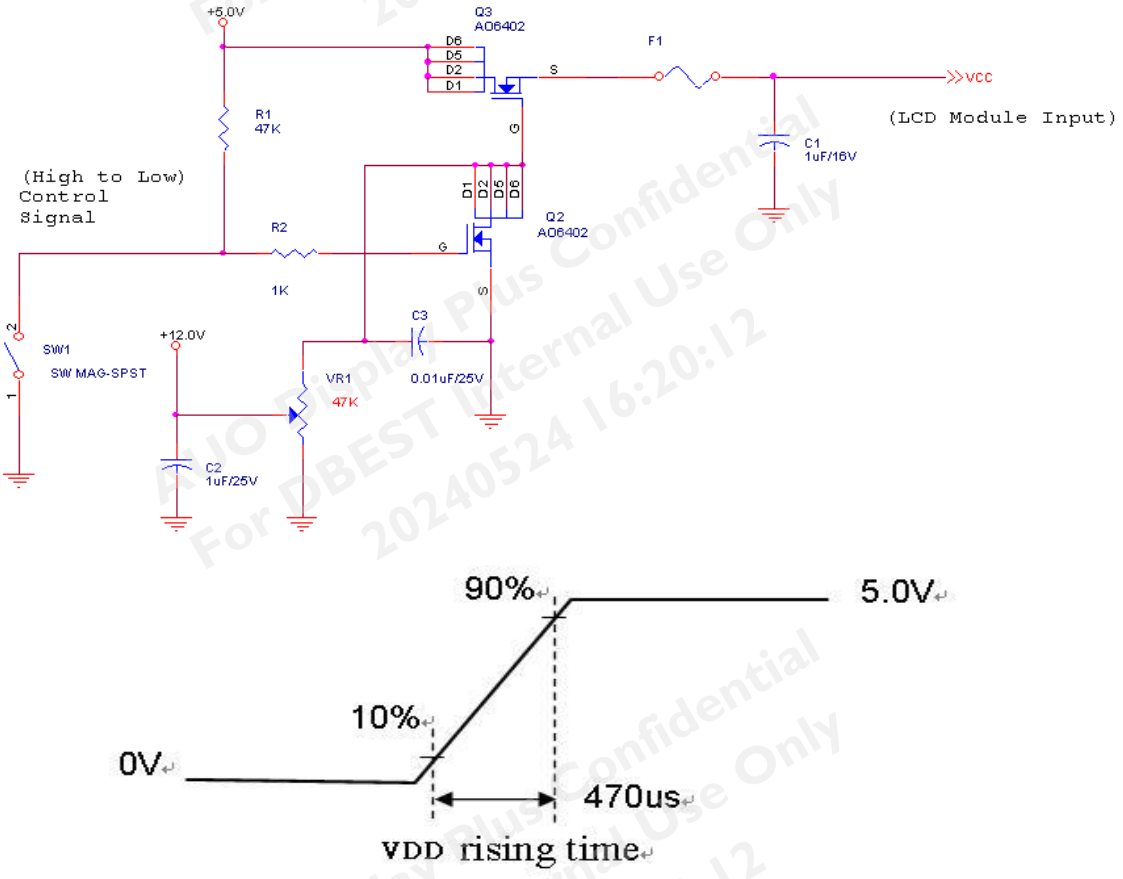
5.1.1 Power Specification

Input power specifications are as follows:

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
VDD	Logic/LCD Drive Voltage	4.5	5.0	5.5	[Volt]	+/-10%
IDD	Input Current		0.89	1.07	[A]	VDD= 5.0V, All White Pattern At 60Hz,
PDD	VDD Power		4.45	5.35	[Watt]	VDD= 5.0V, All White Pattern At 60Hz
IRush	Inrush Current		2	2.5	[A]	Note 1
VDDrp	Allowable Logic/LCD Drive Ripple Voltage			300	[mV] p-p	VDD= 5.0V, All White Pattern At 60Hz

Note 1: Measurement conditions:

The duration of rising time of power input is 470us.



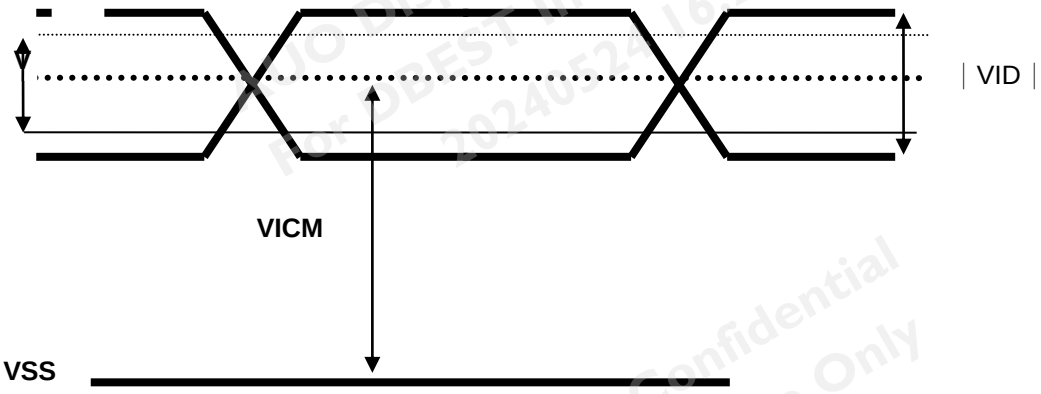
5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off. Please refer to specifications of SN75LVDS82DGG (Texas Instruments) in detail.

Characteristics of each signal are as follows:

Symbol	Parameter	Min	Typ	Max	Units	Condition
VTH	Differential Input High Threshold	-		100	[mV]	VICM = 1.2V Note 1
VTL	Differential Input Low Threshold	-100		-	[mV]	VICM = 1.2V Note 1
|VID|	Input Differential Voltage	100	400	600	[mV]	VICM = 1.2V Note 1
VICM	Differential Input Common Mode Voltage	1.125		1.375	[V]	VTH-VTL = 200MV (max) Note 1

Note 1: LVDS Signal Waveform



5.2 Backlight Unit

5.2.1 LED Driver

Following characteristics are measured under a stable condition at 25 ºC (Room Temperature):

Symbol	Parameter	Min.	Typ.	Max.	Unit	Remark
VCC	Input Voltage	10.8	12	13.2	[Volt]	
IVCC	Input Current		1.07	1.3	[A]	VCC=12V, 100% PWM Duty
PVCC	Power Consumption		12.84	15.6	[Watt]	VCC=12V,100% PWM Duty
Irush LED	Inrush Current	-		3	[A]	at rising time=470us
VLED on/off	On Control Voltage	3	5	5.5	Volt	
	Off Control Voltage			0.8	Volt	
FPWM	Dimming Frequency	200	-	20k	[Hz]	
	Swing Voltage	3	3.3	5	V	
	High Voltage	3	3.3	5	Volt	
	Low Voltage			0.8	Volt	
	Dimming Duty 200~5K	5	-	100	%	
	Dimming Duty 5K~20K	15	-	100	%	
IF	LED Forward Current		58		mA	Ta = 25 oC
VF	LED Forward Voltage	-	3.0	3.3	Volt	IF =58mA,Ta = 25oC
PLED	LED Power Consumption	-		10.72	Watt	IF =58mA, Ta = 25oC
LED Lifetime		50,000			Hrs	IF=58mA, Ta= 25oC

Note 1: Ta means ambient temperature of TFT-LCD module.

Note 2.: I_F, V_F , P_{LED} are defined for single LED.

Note 4: If G185HAT01.1 module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

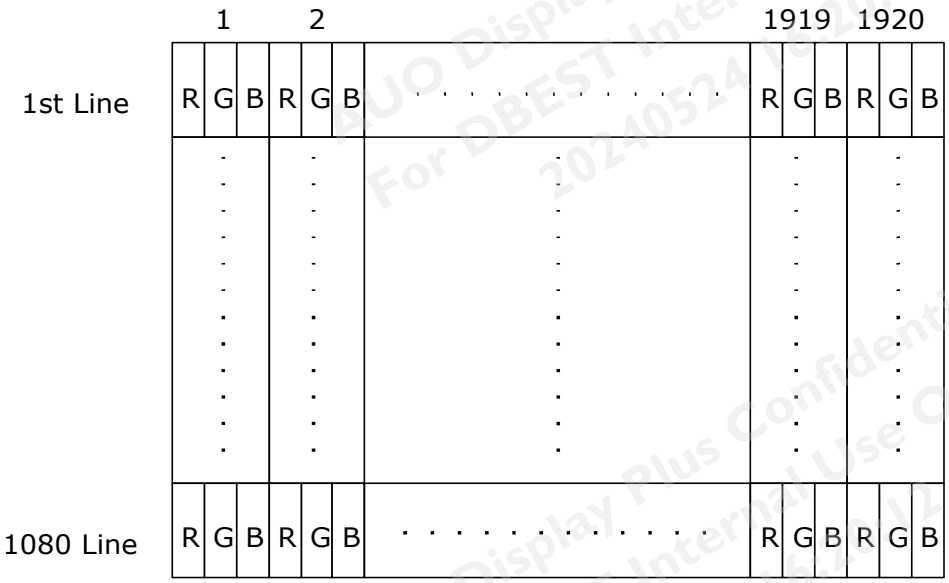
Note 5: Operation life means brightness goes down to 50% initial brightness. Minimum operating life time is estimated data.

Note 6: Each LED light bar consists of 56 pcs LED package (7 strings x 8 pcs / string)

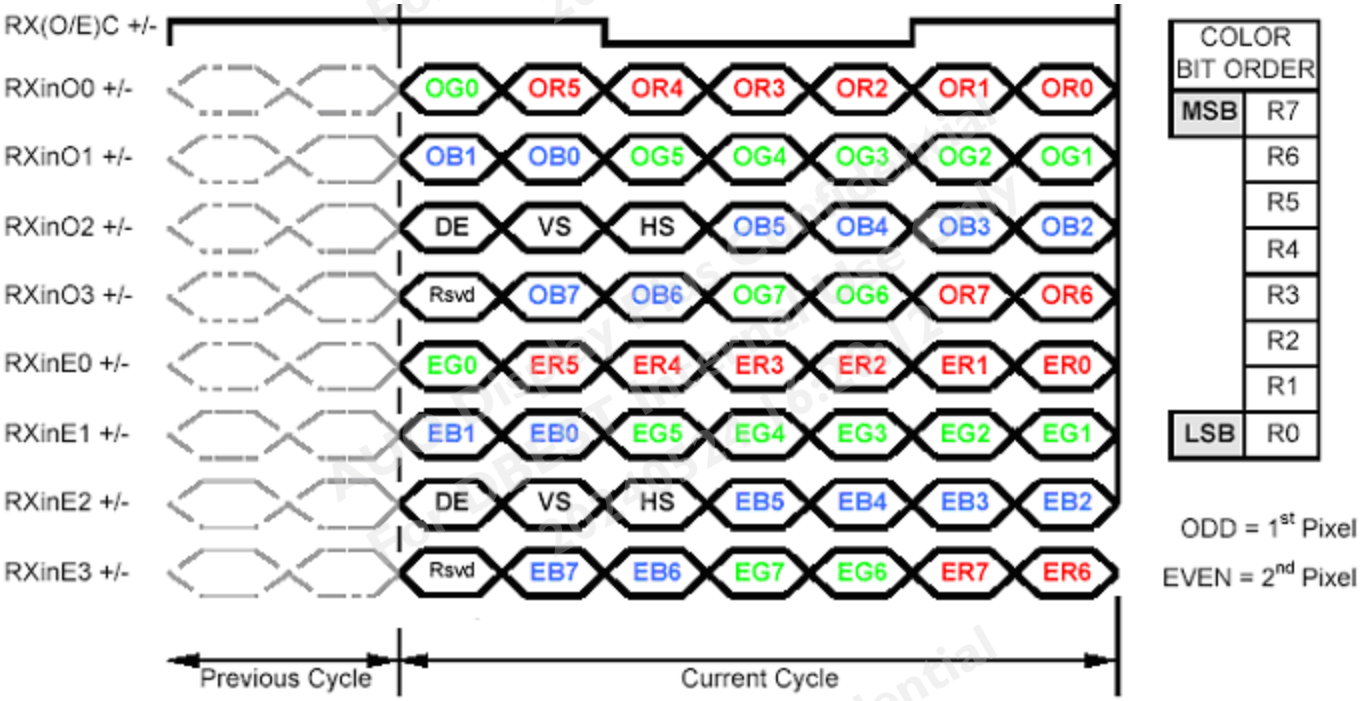
6. Signal Characteristic

6.1 Pixel Format Image

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



6.2 The input data format



Note1: Normally DE mode only. VS and HS on EVEN channel are not used.

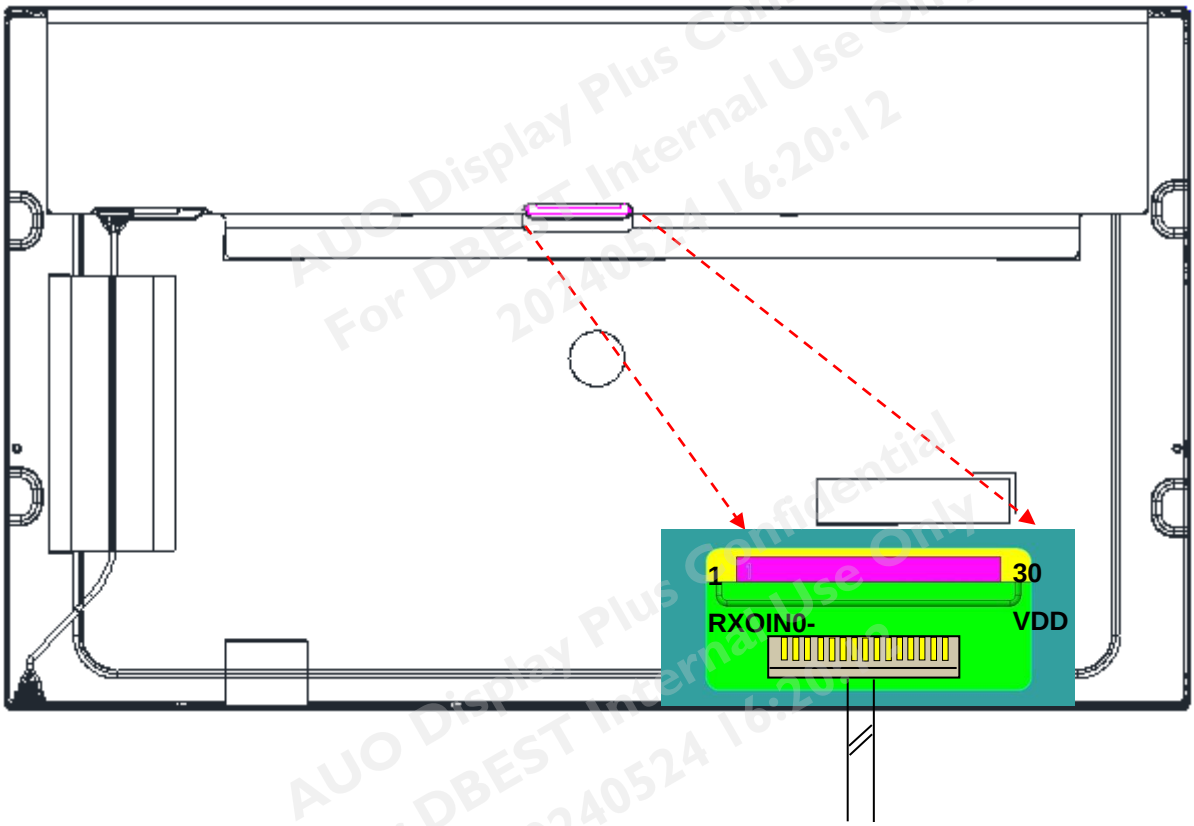
Note2: Please follow VESA.

6.3 Signal Description

The module using a pair of LVDS receiver **SN75LVDS82** / **SN75LVDS83** (Texas Instruments) or compatible. LVDS is a differential signal technology for LCD interface and high speed data transfer device. Transmitter shall be SN75LVDS83(negative edge sampling) or compatible**.** The first LVDS port(RxOxxx) transmits odd pixels while the second LVDS port(RxExxx) transmits even pixels.

PIN #	SIGNAL NAME	DESCRIPTION
1	RXOIN0-	Negative LVDS differential data input (Odd data)
2	RXOIN0+	Positive LVDS differential data input (Odd data)
3	RXOIN1-	Negative LVDS differential data input (Odd data)
4	RXOIN1+	Positive LVDS differential data input (Odd data)
5	RXOIN2-	Negative LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
6	RXOIN2+	Positive LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
7	GND	Power Ground
8	RXOCLKIN-	Negative LVDS differential clock input (Odd clock)
9	RXOCLKIN+	Positive LVDS differential clock input (Odd clock)
10	RXOIN3-	Negative LVDS differential data input (Odd data)
11	RXOIN3+	Positive LVDS differential data input (Odd data)
12	RXEIN0-	Negative LVDS differential data input (Even data)
13	RXEIN0+	Positive LVDS differential data input (Even data)
14	GND	Power Ground
15	RXEIN1-	Negative LVDS differential data input (Even data)
16	RXEIN1+	Positive LVDS differential data input (Even data)
17	GND	Power Ground
18	RXEIN2-	Negative LVDS differential data input (Even data)
19	RXEIN2+	Positive LVDS differential data input (Even data)
20	RXECLKIN-	Negative LVDS differential clock input (Even clock)
21	RXECLKIN+	Positive LVDS differential clock input (Even clock)
22	RXEIN3-	Negative LVDS differential data input (Even data)
23	RXEIN3+	Positive LVDS differential data input (Even data)
24	GND	Power GND
25	NC	NC
26	NC	NC
27	NC	NC
28	VDD	+5.0V Power Supply
29	VDD	+5.0V Power Supply
30	VDD	+5.0V Power Supply

Note1: Start from right side



Note2: Input signals of clock shall be the same timing.

Note3: Please follow TV VESA Pin Assignment

.

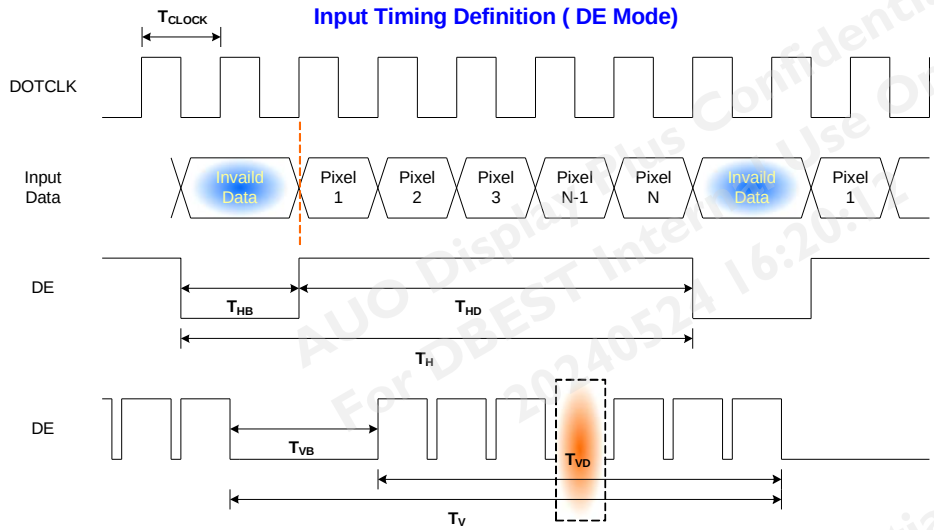
6.4 Interface Timing

6.4.1 Timing Characteristics

Signal	Item	Symbol	Min	Typ	Max	Unit
V-section	Period	Tv	1090	1100	1160	Th
	Active	Tdisp(v)	1080	1080	1080	Th
	Blanking	Tbp(v)+Tfp(v)+PWvs	10	20	80	Th
H-section	Period	Th	1000	1088	1120	Tclk
	Active	Tdisp(h)	960	960	960	Tclk
	Blanking	Tbp(h)+Tfp(h)+PWhs	40	128	160	Tclk
Clock	Period	Tclk	11.76	13.89	15.38	ns
	Frequency	Freq.	60	72	87.5	MHz
Frame Rate	Frame Rate	1/Tv	50	60	75	Hz

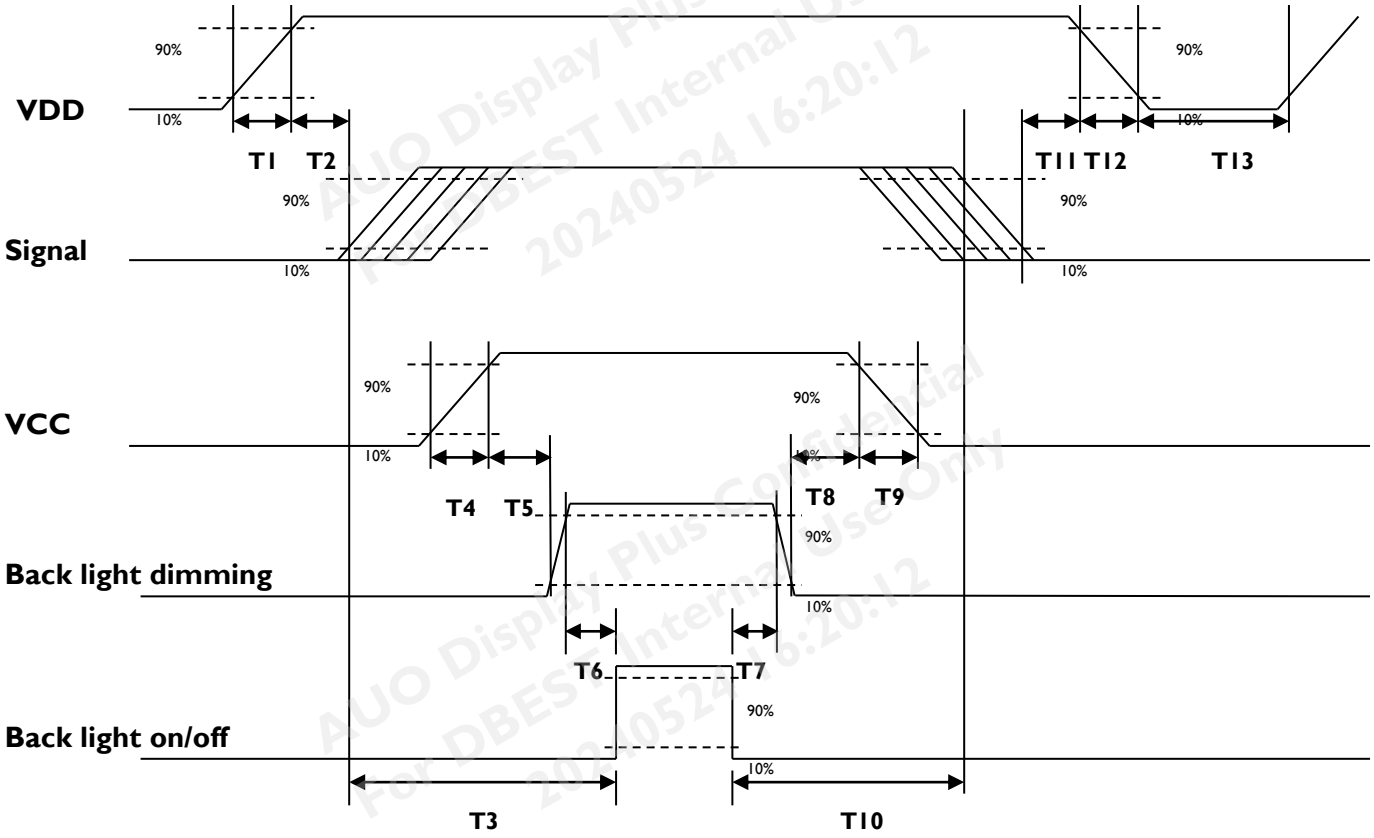
Note 1: Only DE mode operation.
The input of Hsync & Vsync signal does not have an effect upon the LCD normal operation.
Note 2: The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rates.
Note 3: Horizontal period should be even.

6.4.2 Input Timing Diagram



6.5 Power ON/OFF Sequence

VDD power and LED on/off sequence are as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power ON/OFF sequence timing

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	0	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0.5	16	50	[ms]
T12	-	-	100	[ms]
T13	1000	-	-	[ms]

7. Connector & Pin Assignment

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

7.1 TFT LCD Module

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	JAE or relevant
Type Part Number	FI-XB30SSRLA-HF-16-R3500 (JAE)
Mating Housing Part Number	FI-X30H or FI-X30C2-NPB or Compatible

7.1.1 Pin Assignment

PIN #	SIGNAL NAME	DESCRIPTION
1	RXOIN0-	Negative LVDS differential data input (Odd data)
2	RXOIN0+	Positive LVDS differential data input (Odd data)
3	RXOIN1-	Negative LVDS differential data input (Odd data)
4	RXOIN1+	Positive LVDS differential data input (Odd data)
5	RXOIN2-	Negative LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
6	RXOIN2+	Positive LVDS differential data input (Odd data, H-Sync,V-Sync,DSPTMG)
7	GND	Power Ground
8	RXOCLKIN-	Negative LVDS differential clock input (Odd clock)
9	RXOCLKIN+	Positive LVDS differential clock input (Odd clock)
10	RXOIN3-	Negative LVDS differential data input (Odd data)
11	RXOIN3+	Positive LVDS differential data input (Odd data)
12	RXEIN0-	Negative LVDS differential data input (Even data)
13	RXEIN0+	Positive LVDS differential data input (Even data)
14	GND	Power Ground
15	RXEIN1-	Negative LVDS differential data input (Even data)
16	RXEIN1+	Positive LVDS differential data input (Even data)
17	GND	Power Ground
18	RXEIN2-	Negative LVDS differential data input (Even data)
19	RXEIN2+	Positive LVDS differential data input (Even data)
20	RXECLKIN-	Negative LVDS differential clock input (Even clock)
21	RXECLKIN+	Positive LVDS differential clock input (Even clock)
22	RXEIN3-	Negative LVDS differential data input (Even data)
23	RXEIN3+	Positive LVDS differential data input (Even data)
24	GND	Power GND

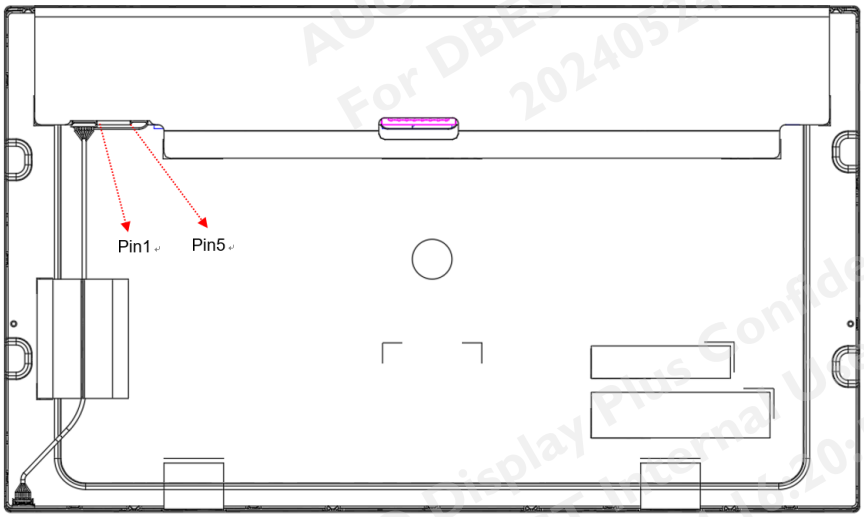
25	NC	NC
26	NC	NC
27	NC	NC
28	VDD	+5.0V Power Supply
29	VDD	+5.0V Power Supply
30	VDD	+5.0V Power Supply

7.2 Backlight Unit: LED Connector

Connector Name / Designation	LED Connector
Manufacturer	STM or compatible
Connector Model Number	MSB24038P5D or compatible
Mating Connector Model Number	P24038P5 or compatible

7.3 LED Driver Connector Pin Assignment

Pin#	Symbol	Signal Name
1	VCC	12V
2	GND	GND
3	Enable	5V-On / 0V-Off
4	Dimming	PWM Dimming
5	NC	NC



7.4 Touch Driver Connector

7.4.1 Touch Driver Connector

Name / Designation	TP controller
Manufacturer	EETI
Type / Part Number	EXC81H84

7.4.2 Connect & Pin Assignment

Manufacturer	ACSE or Compatible

Connector Model Number	wire to board / (50224-00501-001) or Compatible

PIN NO	Symbol	Function
1	TP_VDD	Touch panel power supply
2	D-	USB Data- for Touch
3	D+	USB Data+ for Touch
4	GND	Ground–Shield
5	GND	Ground–Shield

8. Reliability Test Criteria

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃, 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 70℃, 300hours	
Low Temperature Operation (LTO)	Ta= 0℃, 300hours	
High Temperature Storage (HTS)	Ta= 70℃, 300hours	
Low Temperature Storage (LTS)	Ta= -20℃, 300hours	
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Random Frequency: 10 - 200 Hz Duration: 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)	
Drop Test	Height: 46 cm, package test	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 100 cycles	***1***
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point.	***2***
	Air Discharge: ± 15KV, 150pF(330Ω) 1sec 8 points, 25 times/ point.	

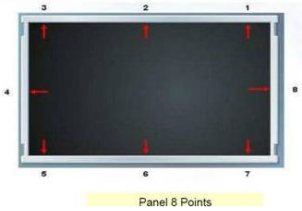
Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -20℃ to 60℃, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note2: According to EN61000-4-2, ESD class B: Some performance degradation allowed. No data lost Self-recoverable.

No hardware failures.

Note3:Mura shall be ignored after high temperature reliability test.

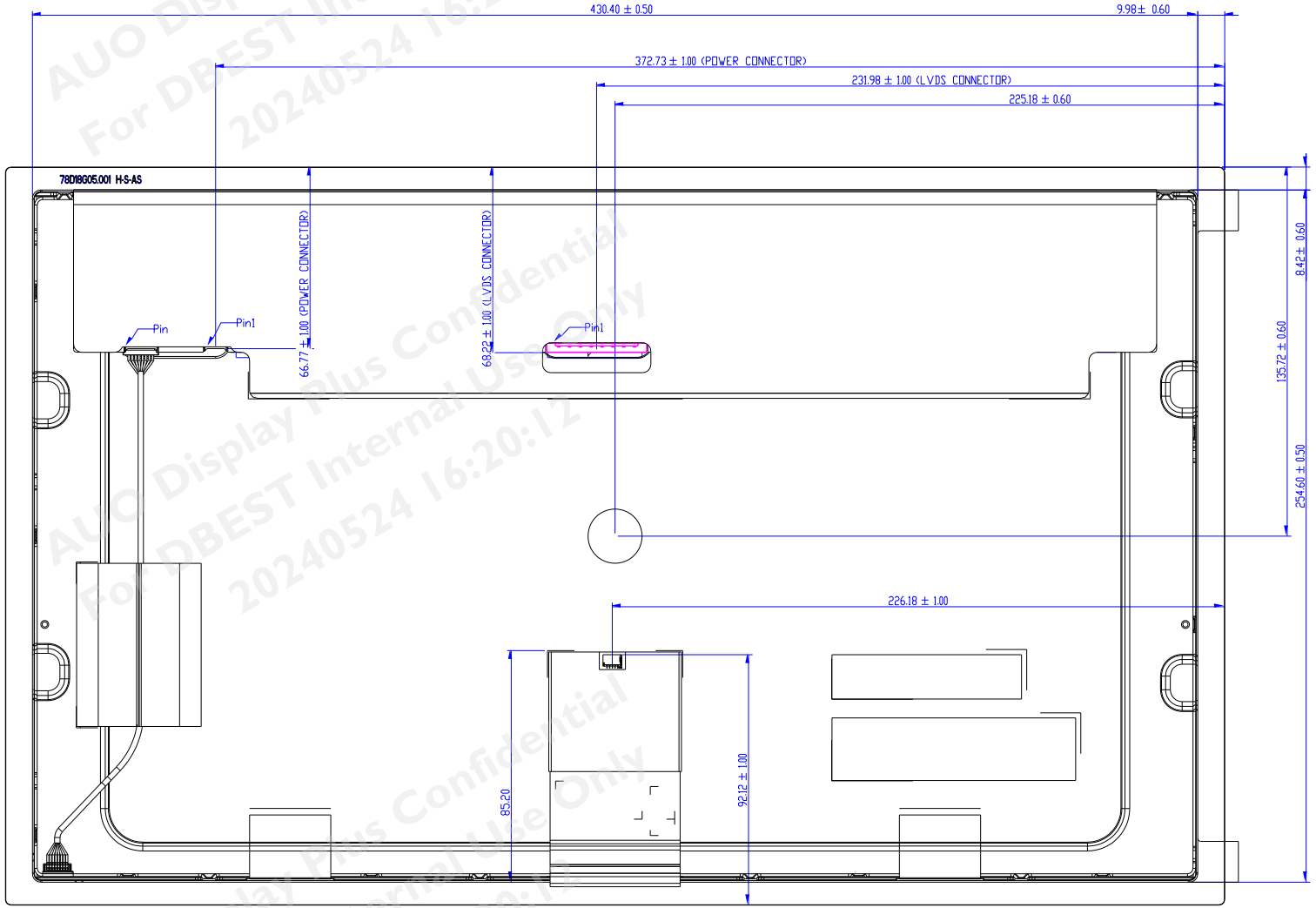
Note4: The DUT (Device Under Test) include panel and touch, and power would turn on during ESD test. The DUT would be checked OK or not after ESD test.



9. Mechanical Characteristics

9.1 Total solution Outline Dimension (Front View)

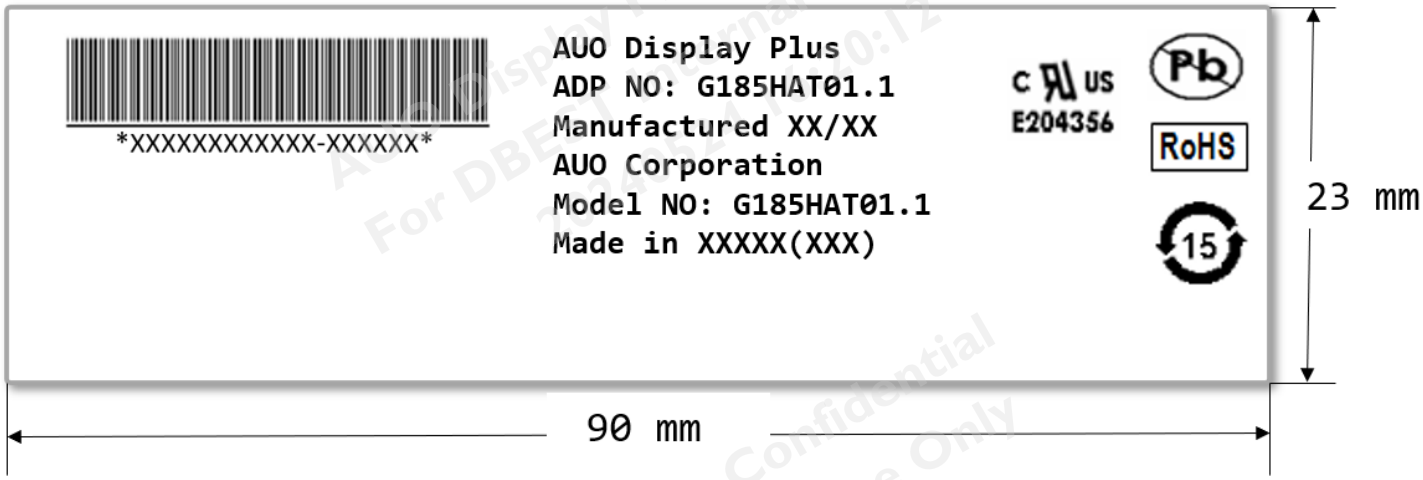
9.2 Total solution Outline Dimension (Back View)



10. Label and Packaging

10.1 Shipping Label

The label is on the panel as shown below:



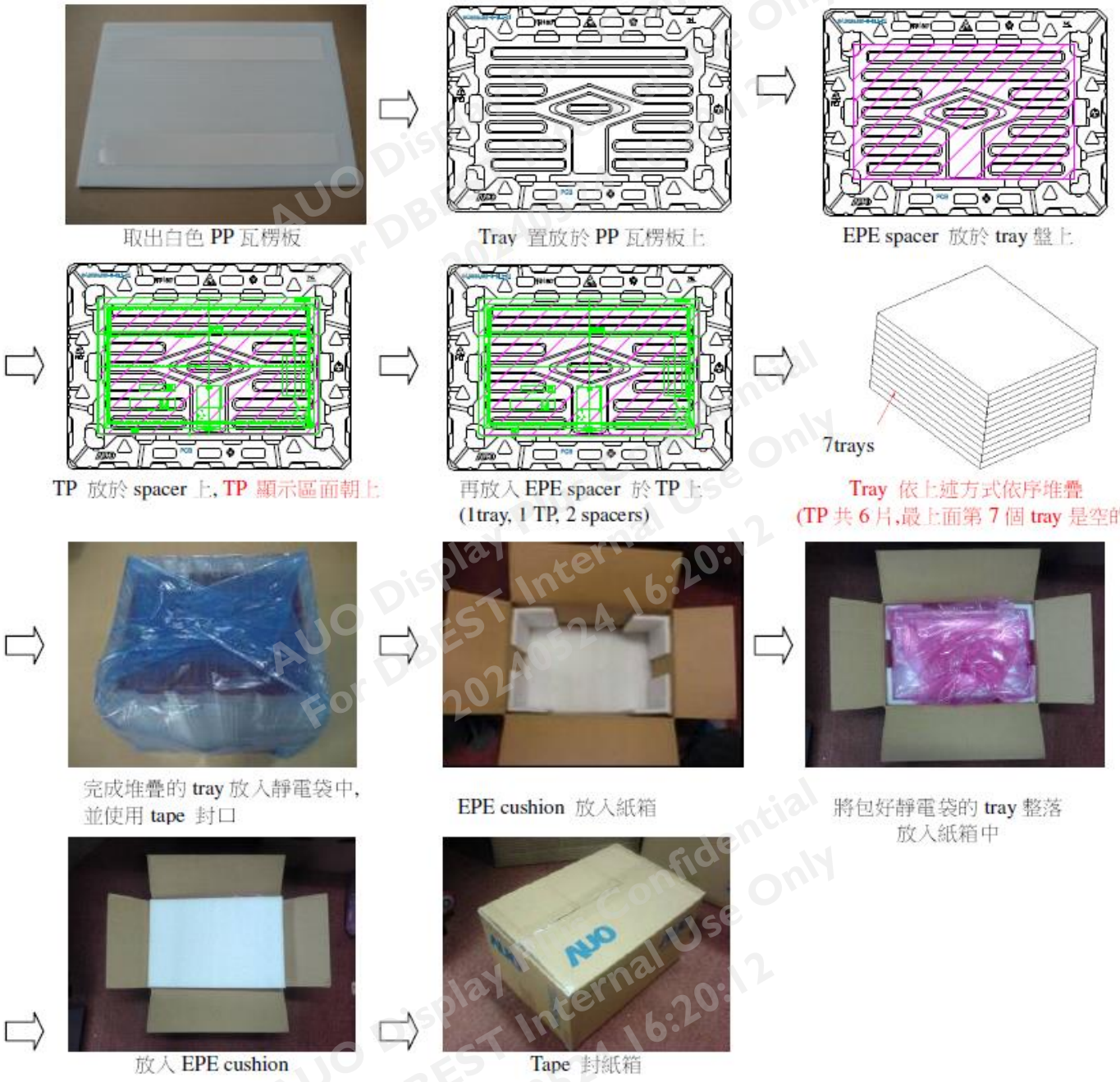
Note 1: For Pb Free products, AUO will add for identification.

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

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

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

10.2 Carton Package



Max capacity：6 TFT-LCD module per carton

Max weight: 19.5 Kg

Outside dimension of carton: 635 x 475 x 280 mm

Pallet size：980 x 740 x 132 mm

11. Safety

11.1 Keen Edge Requirements

There will be no sharp edges or comers on the display assembly that could cause injury.

11.2 Materials

11.2.1 Toxicity

There will be no carcinogenic materials used anywhere in the display module. If toxic materials are used, they will be reviewed and approved by the responsible AUO toxicologist.

11.2.2 Flammability

The printed circuit board will be made from material rated 94-V1 or better. The actual UL flammability rating will be printed on the printed circuit board.

11.3 Capacitors

If any polarized capacitors are used in the display assembly, provisions will be made to keep them from being inserted backwards.

11.4 International Safety Standard Compliance

The TFT-LCD module will satisfy all requirements for compliance to:IEC/UL 62368-1