( ) Preliminary Specifications
(V) Final Specifications

Module	15 Inch Color TFT-LCD
Model Name	G150XAN03.0

Customer	Date
Checked & Approved by	
_____ _____	

Approved by	Date
Sean Lin	2019/12/17
Prepared by	
Ryan Chen	2018/12/17
General Display Business Unit / AU Optronics corporation	

Contents

Record of Revision

Version and Date	Page	Old description	New Description
0.0 2018/11/12	All	First Edition	
1.0 2019/12/17	All	Final Version	

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

G150XAN03.0 is a Color Active Matrix Liquid Crystal Display composed of a TFT-LCD display, a driver circuit, and a backlight system. The screen format is intended to support XGA (1024(H) x 768(V)) screen and 16.2M (RGB 6+2FRC) colors. All input signals are LVDS interface compatible.

G150XAN03.0 is designed for industrial display applications.

2.1 Display Characteristics

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

Items	Unit	Specifications
Screen Diagonal	[inch]	15
Active Area	[mm]	304.128(H) x 228.096(V)
Pixels H x V		1024x3(RGB) x 768
Pixel Pitch	[mm]	0.297 x 0.297
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		AHVA
Nominal Input Voltage VDD	[Volt]	3.3 typ.
Typical Power Consumption	[Watt]	7.1 W (All White Pattern)
Weight	[Grams]	920g (max.)
Physical Size	[mm]	314.13(H) x 245.30(V) x 6.8 (D, Max.)
Electrical Interface		eDP
Surface Treatment		Anti-glare, Hardness 3H
Support Color		16.2M colors

Temperature Range
    Operating
    Storage (Non-Operating)
	[ºC]
	[ºC]
		-20 to +70 (+70 ºC as panel surface temperature)
		-20 to +70

RoHS Compliance		RoHS Compliance
Light Bar Unit		LED, Non-Replaceable

2.2 Optical Characteristics

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

| Item	Unit	Conditions		Min.	Typ.	Max.	Note
White Luminance	[cd/m2]			320	400	-	1
Uniformity	%	9 Points		75	80	-	1, 2, 3
Contrast Ratio				800	1000	-	4
Cross talk	%			-	--	1.5	5
Response Time	[msec]	Rising		-			6
	[msec]	Falling		-			
	[msec]	Raising + Falling		-	25	30	
Viewing Angle	[degree]	Horizontal (Right) CR = 10 (Left)		80	89	-	7
	[degree]			80	89	-	
	[degree]	Vertical (Upper) CR = 10 (Lower)		80	89	-	
	[degree]			80	89	-	
Color / Chromaticity Coordinates (CIE 1931)		Red x		0.569	0.619	0.669	
		Red y		0.302	0.352	0.402	
		Green x		0.279	0.329	0.379	
		Green y		0.559	0.609	0.659	
		Blue x		0.100	0.150	0.200	
		Blue y		0.068	0.118	0.168	
		White x		0.263	0.313	0.363	
		White y		0.279	0.329	0.379	
Color Gamut	%				60	-	

Note 1: Measurement method

Equipment Pattern Generator, Power Supply, Digital Voltmeter, Luminance meter (SR_3 or equivalent)

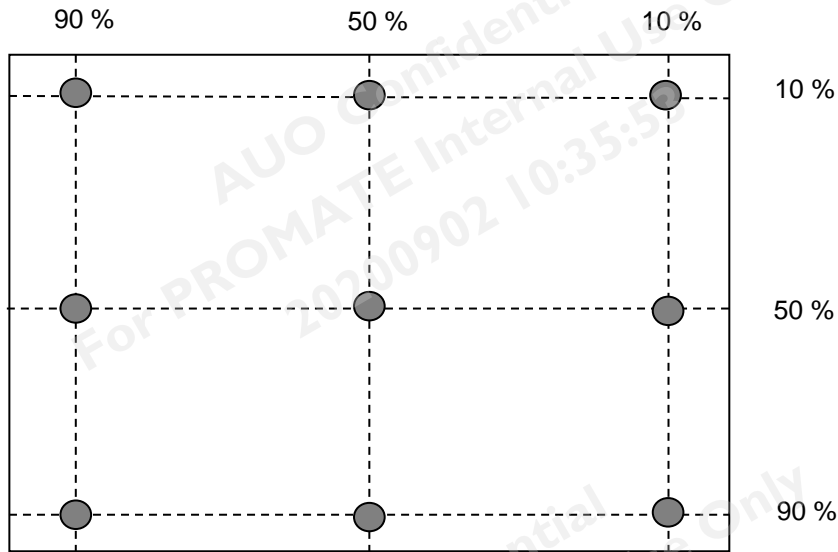   Aperture   1∘ with 50cm viewing distance

    Test Point   Center

    Environment   *< 1 lux*

LCD Module

SR_3 or equivalent

Measuring distance

Module Driving Equipment
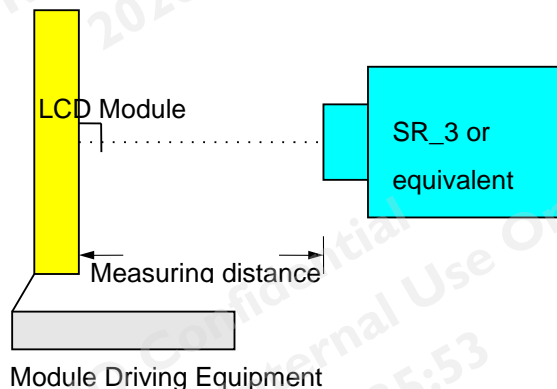
Note 2: Definition of 9 points position (Display active area: 304.128(H) x 228.096(V))

Note 3: The luminance uniformity of 9 points is defined by dividing the minimum luminance values by the maximum test point luminance

$$\delta_{W9} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

Note 4： Definition of contrast ratio (CR):

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$
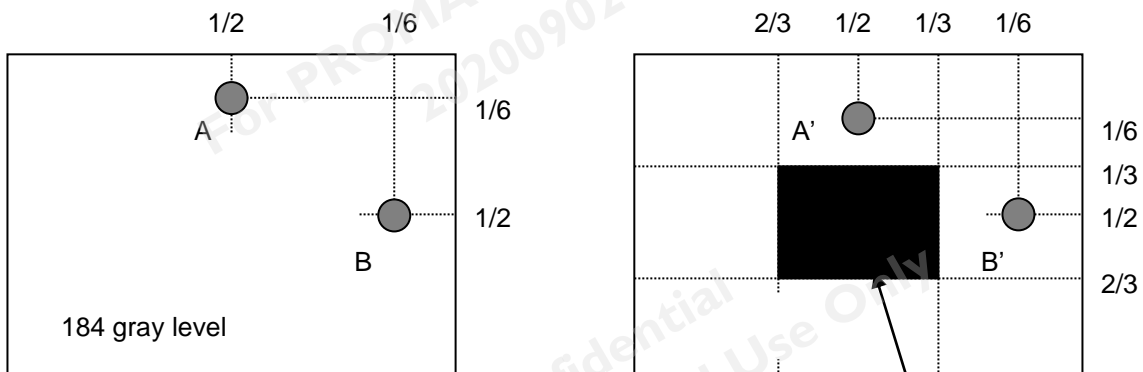
Note 5： Definition of cross talk (CT)

CT = | YB – YA | / YA × 100 (%)

Where

YA = Luminance of measured location without gray level 0 pattern (cd/m2)

YB = Luminance of measured location with gray level 0 pattern (cd/m2)

Note 6: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "White" to "Black" (falling time) and from "Black" to "White" (rising time), respectively. The response time interval is between 10% and 90% of amplitudes. Please refer to the figure as below.
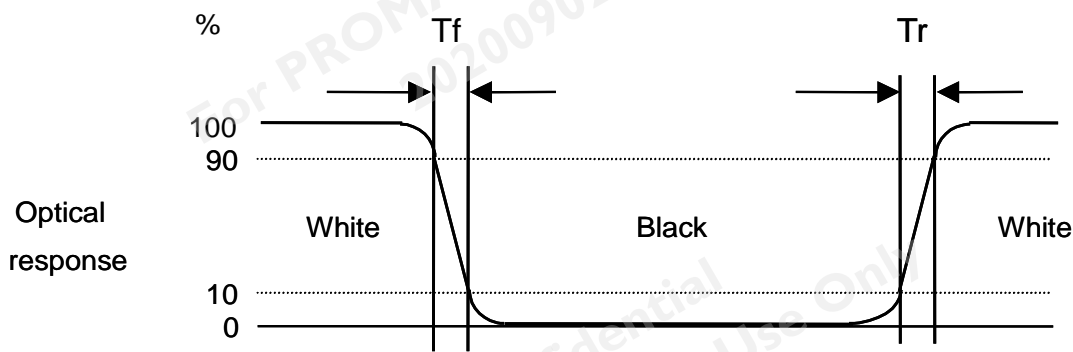

Note 7: Definition of viewing angle

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 below: 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 to its center to develop the desired measurement viewing angle.

For PROMATE internal use only - provided by jackctyang on 2020/09/02
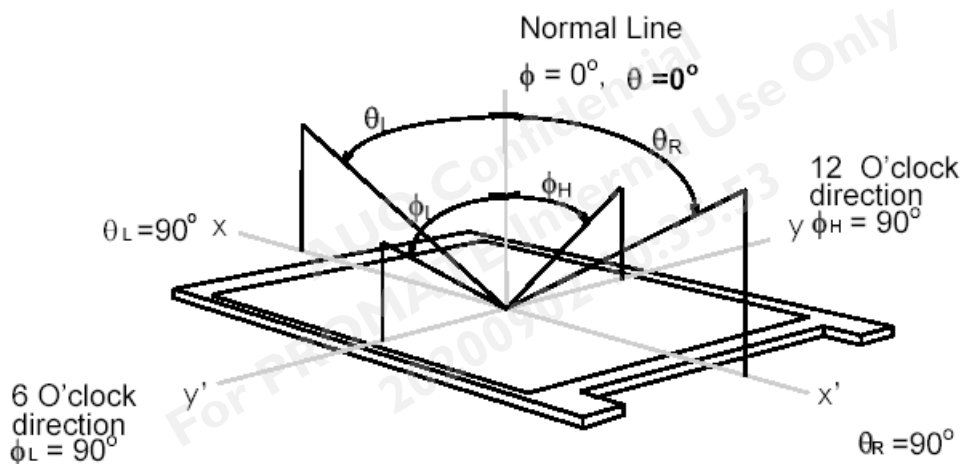
3. Functional Block Diagram

The following diagram shows the functional block of the 15 inch color TFT/LCD module:
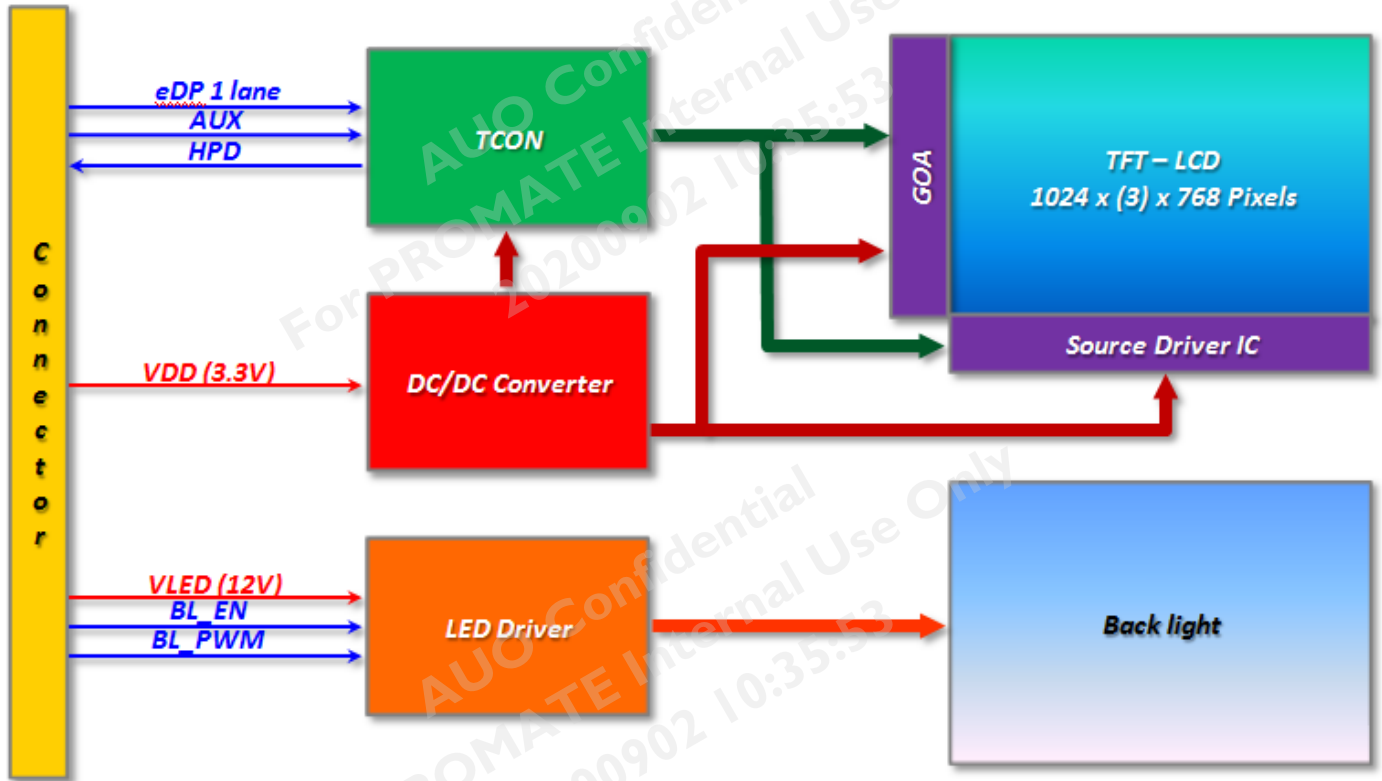
I-PEX, 20765-030E-11A   **Mating Type: I-PEX, 20453-030T-11 or Compatible**

# 4. Absolute Maximum Ratings

4.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min	Max	Unit
Logic/LCD Drive Voltage	Vin	-0.3	+3.6	[Volt]

4.2 Absolute Ratings of Environment

Item	Symbol	Min	Max	Unit
Operating Temperature	TOP	-20	+70*	[ºC]
Operation Humidity	HOP	8	90	[%RH]
Storage Temperature	TST	-20	+70	[ºC]
Storage Humidity	HST	8	90	[%RH]

Note: Maximum Wet-Bulb should be 39℃ and no condensation.

* 70ºC is panel surface temperature

For PROMATE internal use only - provided by jackctyang on 2020/09/02
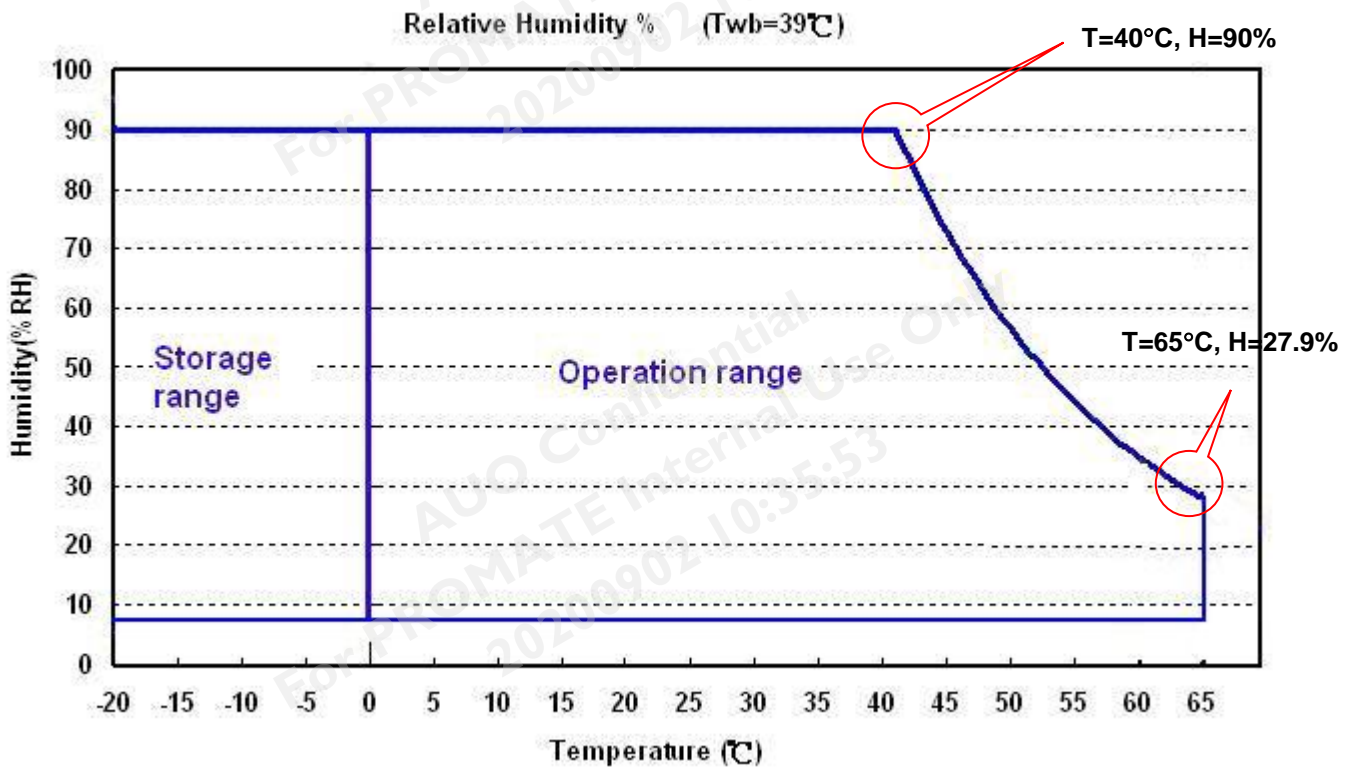
5. Electrical Characteristics

5.1 TFT LCD Module

5.1.1 Power Specification

Symbol	Parameter	Min	Typ	Max	Units	Remark
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[Volt]	±10%
IDD	VDD Current	-	0.43	0.52	[A]	All White Pattern (VDD=3.3V, at 60Hz)
Irush	LCD Inrush Current			3	[A]	Note 1
PDD	VDD Power	-	1.42	1.72	[Watt]	All White Pattern (VDD=3.3V, at 60Hz)

Note 1: Measurement condition:

VDD rising time

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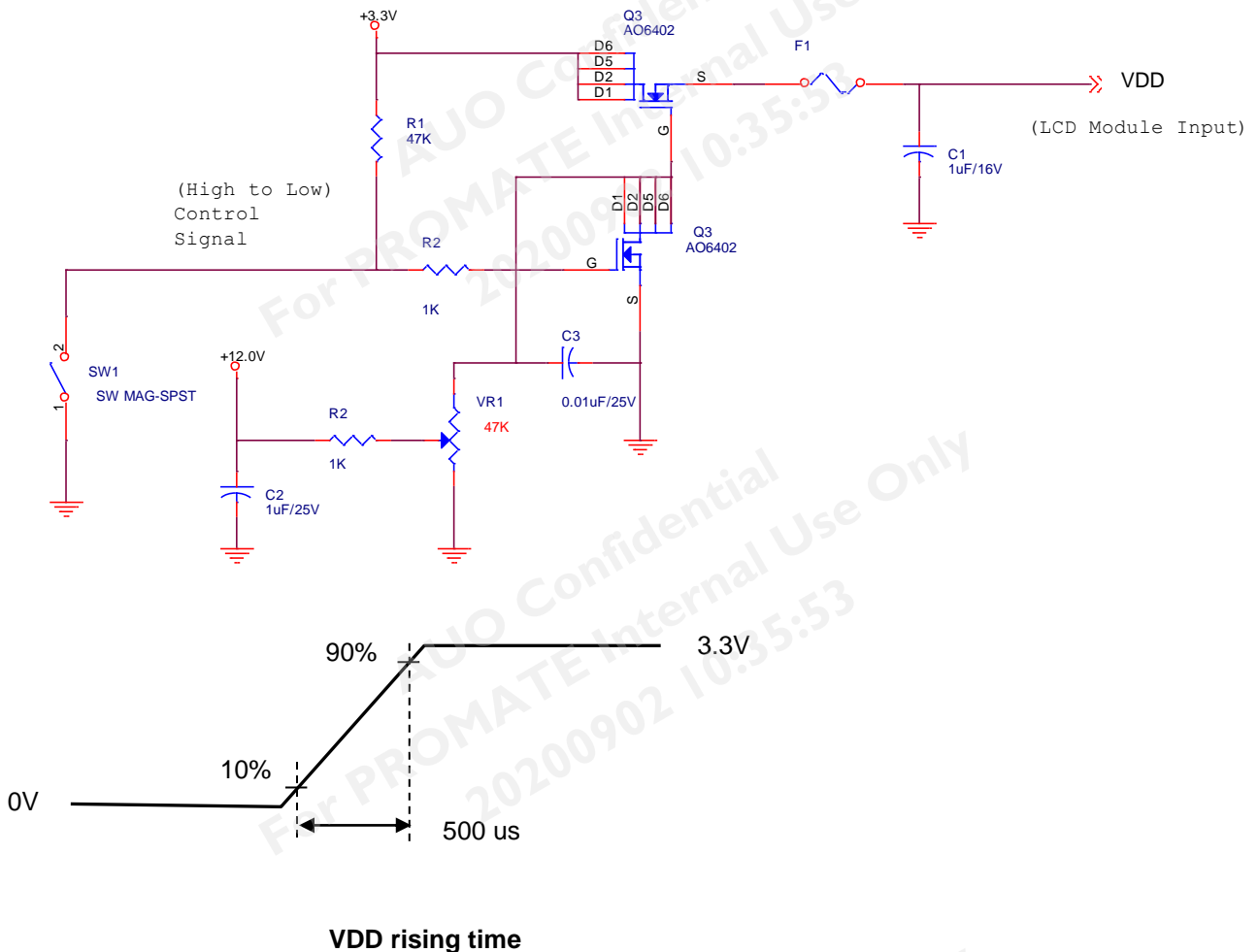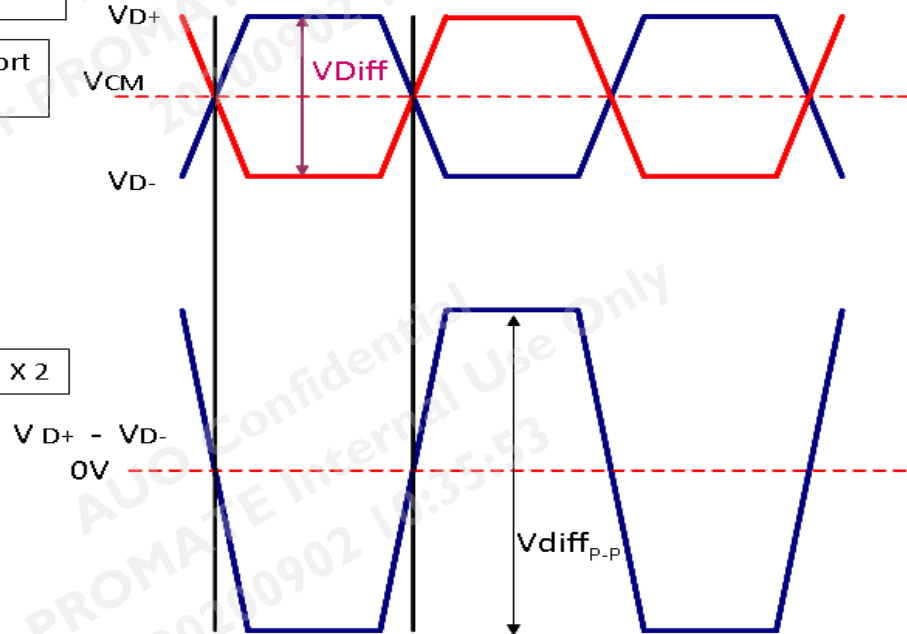
5.1.2 Signal Electrical Characteristics

Signal electrical characteristics are as follows:

Display Port main link signal:

Differential pair VD+ , VD-
Which is one Display port
Main link

VCM of Display port
Main link

VD+
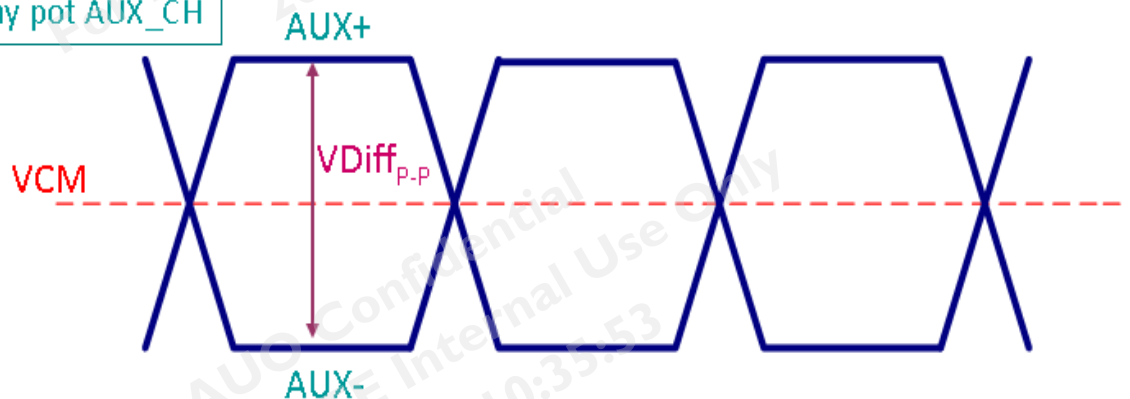
VCM

VDiff

VD-

$Vdiff_{P-P} = [(VD+) - (VD-)] \times 2$

V D+ - VD-

0V

$Vdiff_{P-P}$

Display port main link		Min	Typ	Max	unit
VCM	RX input DC Common Mode Voltage		0		V
VDiff$_{P-P}$	Peak-to-peak Voltage at a receiving Device	150		1320	mV

Follow as VESA display port standard V1.1a

Display Port AUX_CH signal:

Differential AUX+ , AUX-
Which is Display pot AUX_CH

AUX+

VCM

$VDiff_{P-P}$

AUX-

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Display port AUX_CH		Min	Typ	Max	unit
VCM	AUX DC Common Mode Voltage		0		V
VDiff~P-P~	AUX Peak-to-peak Voltage at a receiving Device	0.4	0.6-	0.8	V

Follow as VESA display port standard V1.1a.

Display Port VHPD signal:

Display port VHPD		Min	Typ	Max	unit
VHPD	HPD Voltage	2.25	2.5	2.75	V

Follow as VESA display port standard V1.1a.

5.2 Backlight Unit

Following characteristics are measured under stable condition using a LED driving board at 25℃ (Room

Temperature).

Symbol	Parameter	Min.	Typ.	Max.	Unit	Remark
Vcc	Input Voltage	10.8	12	13.2	Volt	
Ivcc	Input Current	-	0.45	0.50	A	100% Dimming
PLED	Power Consumption	-	5.42	5.94	Watt	100% Dimming
Irush	Inrush Current			2	A	
VLED on/off	On Control Voltage	2.5	3.3	5.5	Volt	
	Off Control Voltage			0.5	Volt	
FPWM	PWM Dimming Frequency	200		10k	Hz	
	High Voltage	2.5	3.3	5.5	Volt	
	Low Voltage			0.5	Volt	
	Dimming Duty Cycle	5	-	100	%	
IF	LED Forward Current		55		mA	Ta = 25ºC
Operating Life		50,000			Hrs	Ta = 25ºC

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

Note 2: If G150XAN03.0 module is driven at high ambient temperature & humidity condition. The operating life will be reduced.

Note 3: Definition of life time: LED brightness becomes 50% of its original value. The minimum life time of LED unit is defined at the condition of IR$_{LED}$ = 60 mA and 25±2℃ (Room temperature).
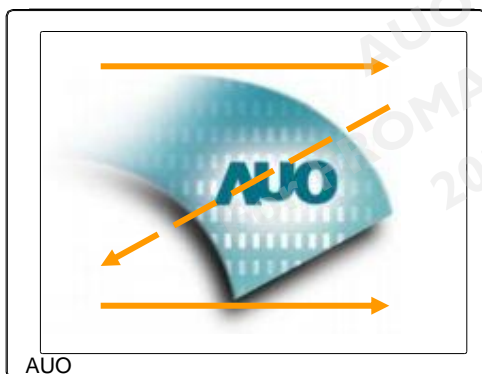
6. Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship between input signal and LCD pixel format.
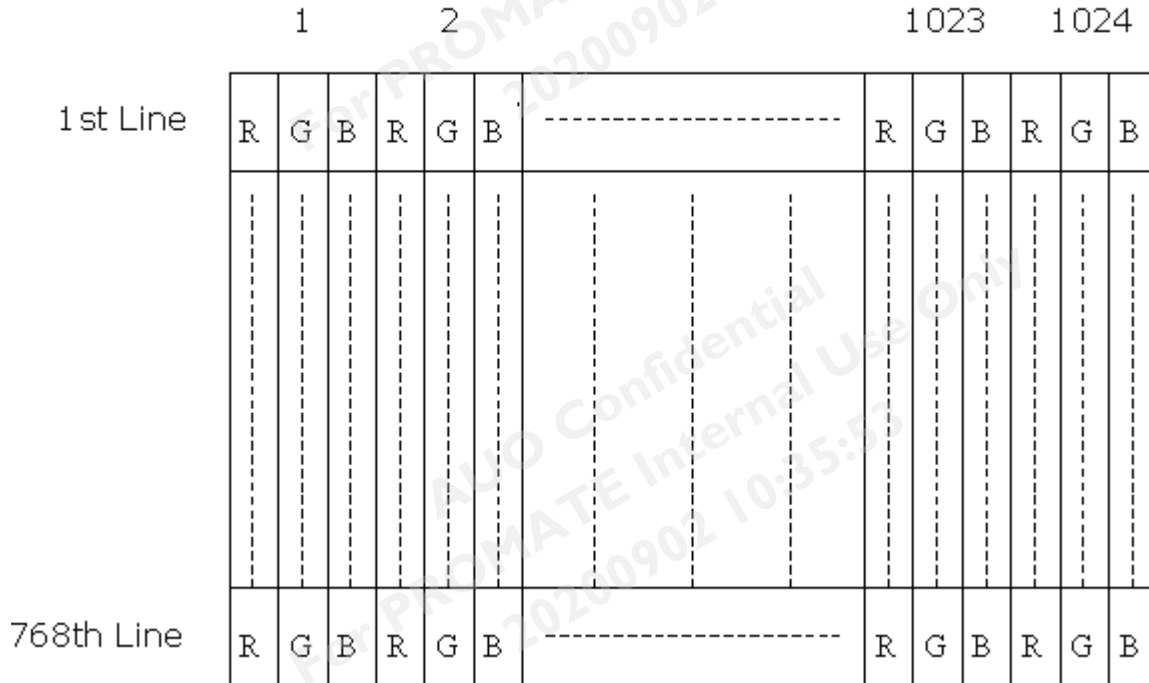
6.2 Scanning Direction

The following figures show the image seen from the front view. The arrow indicates the direction of scan.

6.3 Interface Timing

Basically, interface timings should match the 1024 x 768 /60Hz manufacturing guide line timing.

| Signal	Parameter		Symbol	Min.	Typ.	Max.	Unit
Clock Timing	Clock frequency		$1/T_{Clock}$	63	65	67	MHz
Vsync Timing	Vertical Section	Period	T_V	804	806	808	T_{Line}
		Active	T_{VD}	768	768	768	
		Blanking	T_{VB}	36	38	40	
Hsync Timing	Horizontal Section	Period	T_H	1328	1344	1360	T_{Clock}
		Active	T_{HD}	1024	1024	1024	
		Blanking	T_{HB}	304	320	336	
Frame Rate			F	59	60	61	Hz

Note: Support DE mode only.
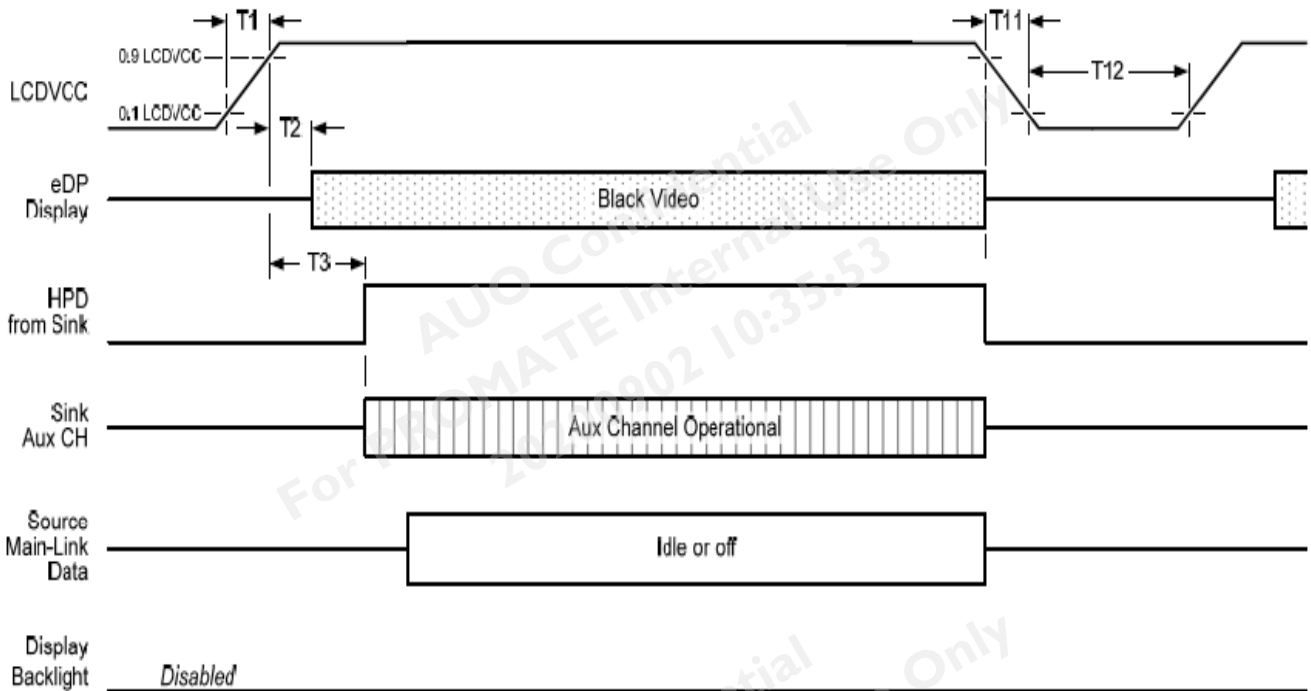Note: Typical value refer to VESA STANDARD

6.4 Power ON/OFF Sequence

Display Port panel power sequence:
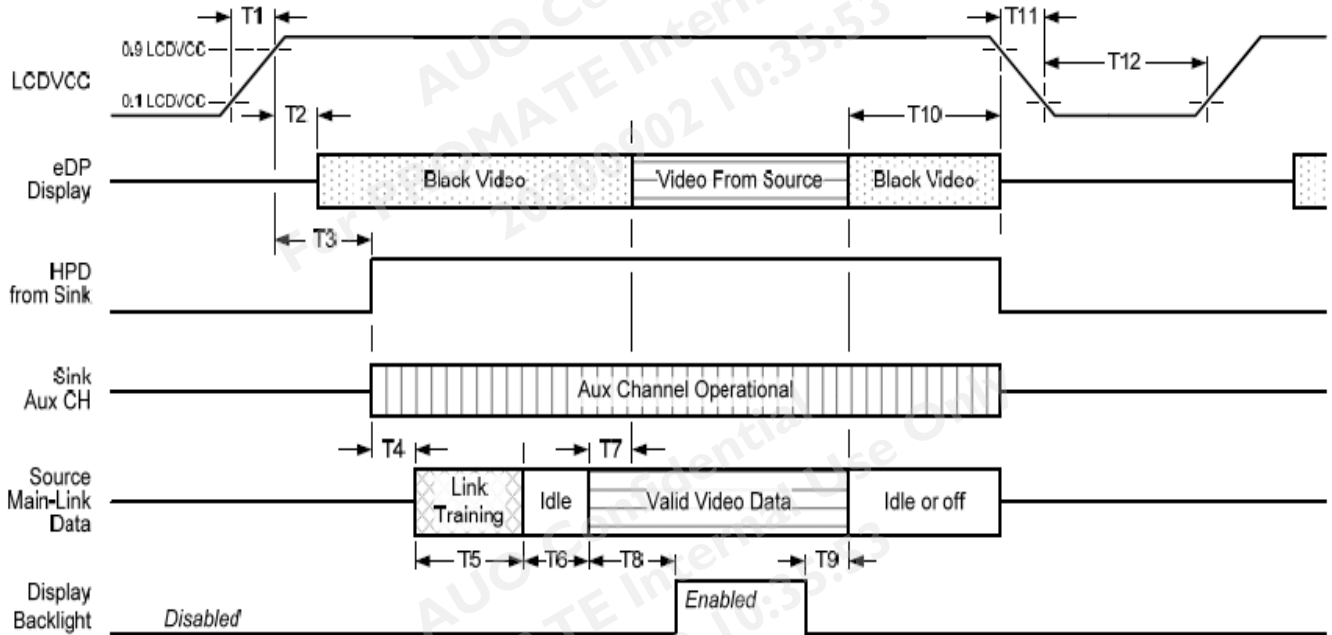
Display port interface power up/down sequence, normal system operation

Display Port AUX_CH transaction only:

Display port interface power up/down sequence, AUX_CH transaction only

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Display Port panel power sequence timing parameter:

Timing parameter	Description	Reqd. by	Limits			Notes
			Min.	Typ.	Max.	
T1	power rail rise time, 10% to 90%	source	0.5ms		10ms	
T2	delay from LCDVDD to black video generation	sink	0ms		200ms	prevents display noise until valid video data is received from the source
T3	delay from LCDVDD to HPD high	sink	0ms		200ms	sink AUX_CH must be operational upon HPD high.
T4	delay from HPD high to link training initialization	source				allows for source to read link capability and initialize.
T5	link training duration	source				dependant on source link to read training protocol.
T6	link idle	source				Min accounts for required BS-Idle pattern. Max allows for source frame synchronization.
T7	delay from valid video data from source to video on display	sink	0ms		50ms	max allows sink validate video data and timing.
T8	delay from valid video data from source to backlight enable	source				source must assure display video is stable.
T9	delay from backlight disable to end of valid video data	source				source must assure backlight is no longer illuminated.
T10	delay from end of valid video data from source to power off	source	0ms		500ms	
T11	power rail fall time, 905 to 10%	source			200ms	
T12	power off time	source	500ms			

Note1: The sink must include the ability to generate black video autonomously. The sink must automatically enable black video under the following conditions:
  -upon LCDVDD power on (with in T2 max)-when the "Novideostream_Flag" (VB-ID Bit 3) is received from the source (at the end of T9).
  -when no main link data, or invalid video data, is received from the source. Black video must be displayed within 64ms (typ) from the start of either condition. Video data can be deemed invalid based on MSA and timing information, for example.

Note 2: The sink may implement the ability to disable the black video function, as described in Note 1, above, for system development and debugging purpose.

Note 3: The sink must support AUX_CH polling by the source immediately following LCDVDD power on without causing damage to the sink device (the source can re-try if the sink is not ready). The sink must be able to respond to an AUX_CH transaction with the time specified within T3 max.

Display Port panel B/L power sequence timing parameter:
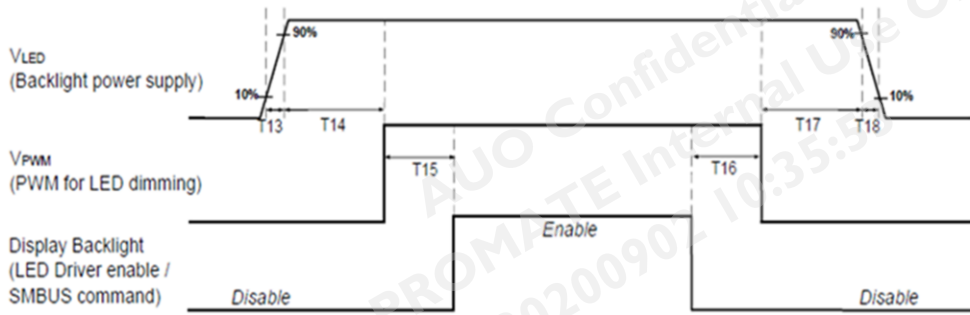
	Min (ms)	Max (ms)
T13	0.5	10
T14	10	-
T15	10	-
T16	10	-
T17	–	-
T18	–	200
T19	1*	-
T20	1*	-

Note : When the adapter is hot plugged, the backlight power supply sequence is shown as below.
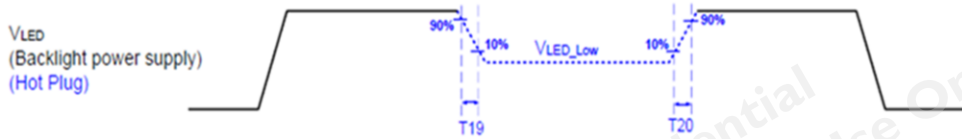
Seamless change: T19/T20 = 5xT_{PWM}*

*T_{PWM}= 1/PWM Frequency

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.
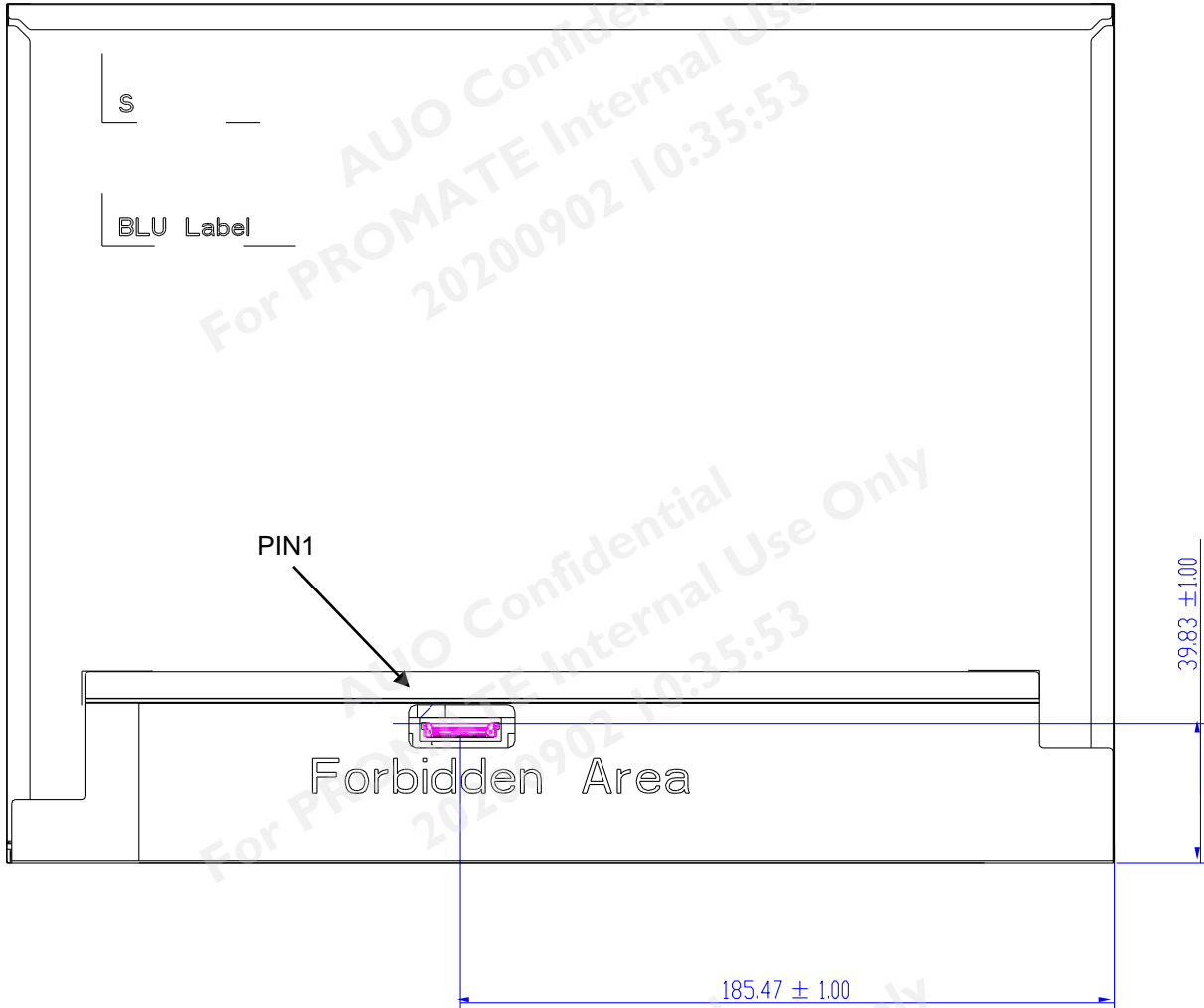
7.1 Connector Description

Connector Name / Designation	Signal Connector
Manufacturer	I-PEX or Compatible
Connector Model Number	20765-030E-11A or compatible
Adaptable Plug	20453-030T-11 or compatible

7.2 Pin Assignment

PIN NO	Symbol	Function
1	NC	No Connect
2	H_GND	High Speed Ground
3	Lane 1_N	NC
4	Lane 1_P	NC
5	H_GND	High Speed Ground
6	Lane0_N	Comp Signal Link Lane 0
7	Lane0_P	True Signal Link Lane 0
8	H_GND	High Speed Ground
9	AUX_CH_P	True Signal Auxiliary Ch.
10	AUX_CH_N	Comp Signal Auxiliary Ch.
11	H_GND	High Speed Ground
12	LCD_VCC	LCD logic and driver power
13	LCD_VCC	LCD logic and driver power
14	NC	No connect
15	LCD GND	LCD logic and driver ground
16	LCD GND	LCD logic and driver ground
17	HPD	HPD signale pin
18	BL_GND	Backlight_ground
19	BL_GND	Backlight_ground
20	BL_GND	Backlight_ground
21	BL_GND	Backlight_ground
22	BL_Enable	Backlight On / Off
23	BL PWM DIM	System PWM signal Input
24	NC	No connect
25	NC	No connect
26	BL_PWR	Backlight power (10.8V~13.2V)
27	BL_PWR	Backlight power (10.8V~13.2V)
28	BL_PWR	Backlight power (10.8V~13.2V)
29	BL_PWR	Backlight power (10.8V~13.2V)
30	NC	No Connect

7.3 Connector Illustration

S

BLU Label

PIN1

Forbidden Area

39.83 ± 1.00

185.47 ± 1.00

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8. Reliability Test Criteria

Items	Required Condition	Note
Temperature Humidity Bias	50℃/80%,300 hours	
High Temperature Operation	70℃,300 hours	
Low Temperature Operation	-20℃,300 hours	
Hot Storage	70℃,300 hours	
Cold Storage	-20℃,300 hours	
Thermal Shock Test	-20℃/30 min ,60℃/30 min ,100cycles	
Shock Test (Non-Operating)	50G,20ms,Half-sine wave,(±X, ±Y, ±Z)	
Vibration Test (Non-Operating)	1.5G, (10~200Hz, P-P) 30 mins/axis (X, Y, Z)	
On/off test	On/10 sec, Off/10 sec, 30,000 cycles	
ESD	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point Air Discharge: ± 15KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point	Note 1

Note1: According to EN61000-4-2, ESD class B: Some performance degradation allowed. No data lost

Self-recoverable. No hardware failures.

Note 2:

● Water condensation is not allowed for each test items.

● Each test is done by new TFT-LCD module. Don't use the same TFT-LCD module repeatedly for reliability test.

● The reliability test is performed only to examine the TFT-LCD module capability.

● To inspect TFT-LCD module after reliability test, please store it at room temperature and room humidity for 24 hours at least in advance.

● No function failure occurs. Mura shall be ignored after high temperature reliability test.
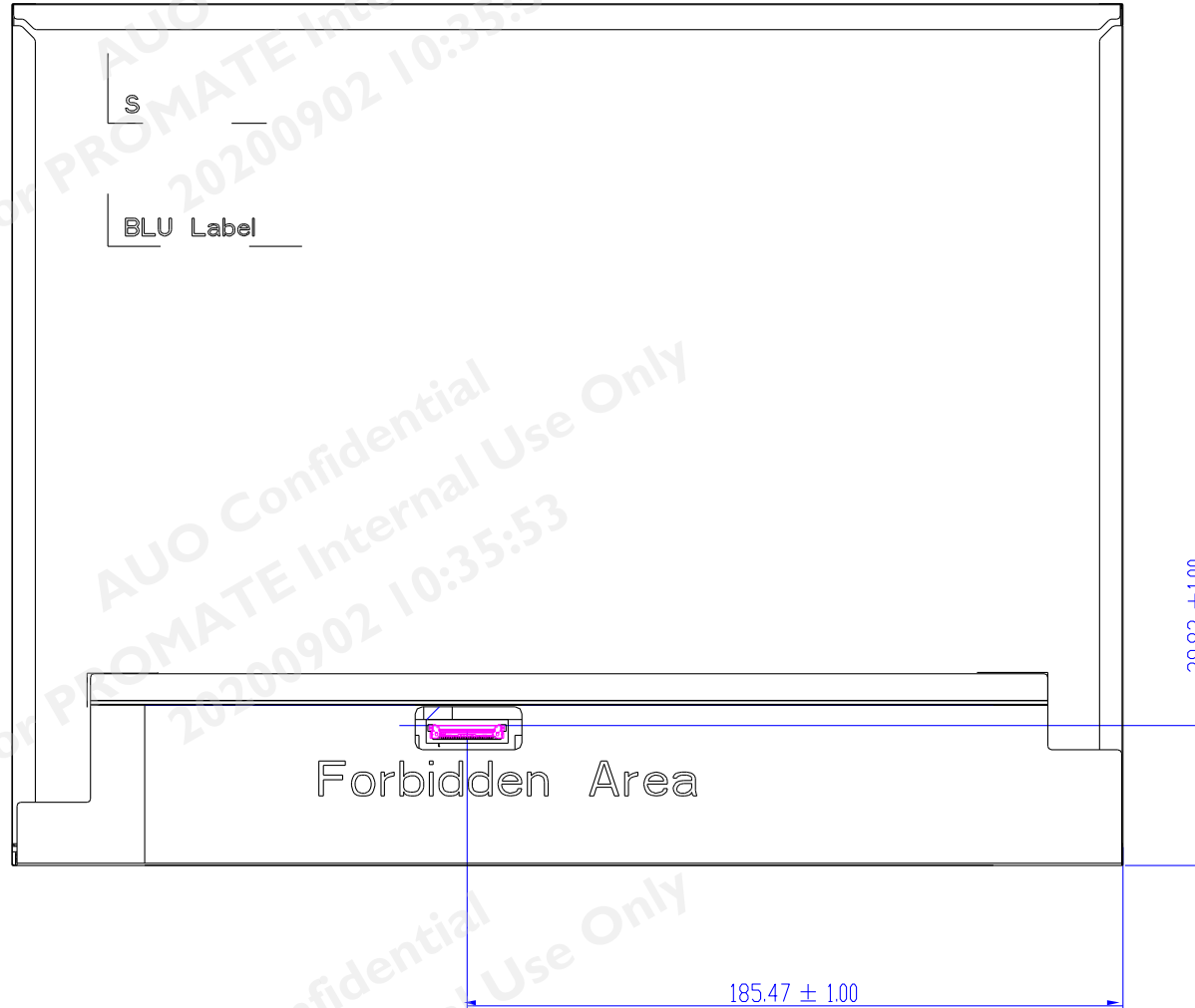
9. Mechanical Characteristics

9.1 LCM Outline Dimension (Front View)
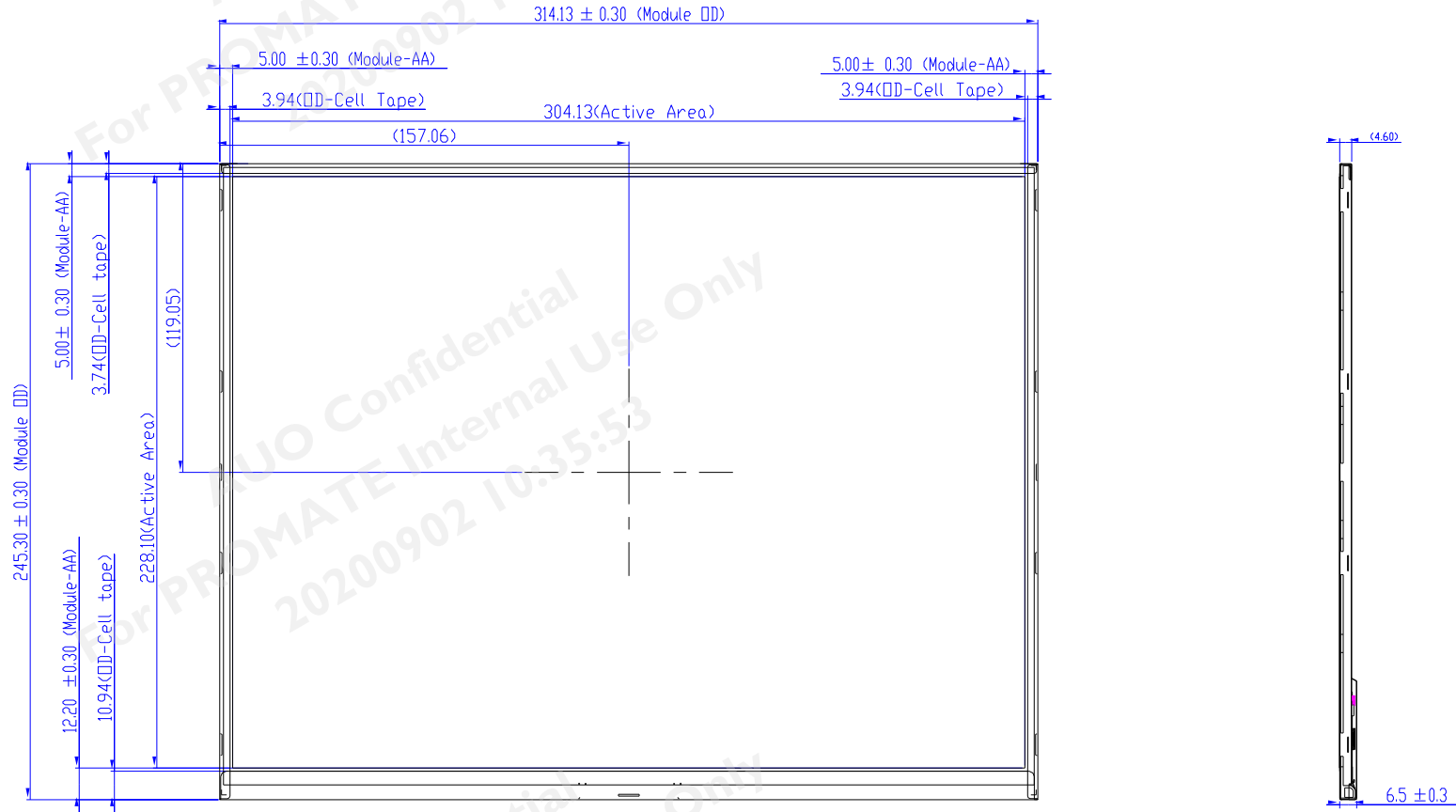
NOTE:
1.TOLERANCE IS ±0.5mm IF NOT SPECIFIED.

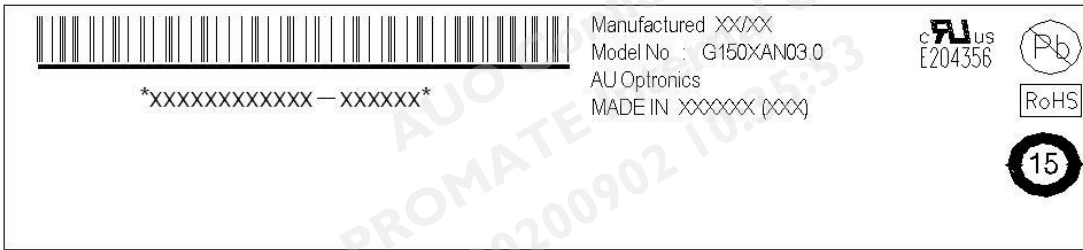**For PROMATE internal use only - provided by jackctyang on 2020/09/02**

9.2 LCM Outline Dimension (Rear View)

S

BLU Label

Forbidden Area

39.83 ± 1.00

185.47 ± 1.00

10. Label and Packaging

10.1 Shipping Label (on the rear side of TFT-LCD display)

Manufactured XX/XX
Model No ： G150XAN03.0
AU Optronics
MADE IN XXXXX (XXX)

XXXXXXXXXXXX－XXXXXX

E204356

RoHS

15

10.2 Carton Package

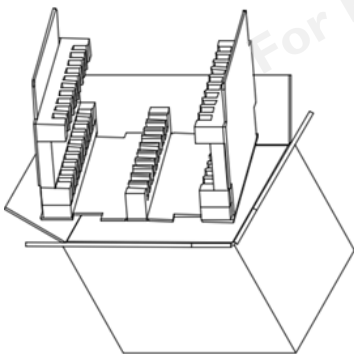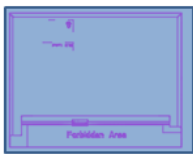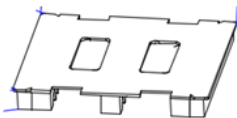Max capacity：20 PCS TFT-LCD module per carton
Max weight: 16.5 kg per carton
Outside dimension of carton: 395mm(L)* 330mm(W)*331mm(H)
Pallet size： 1000 mm * 820 mm * 132mm
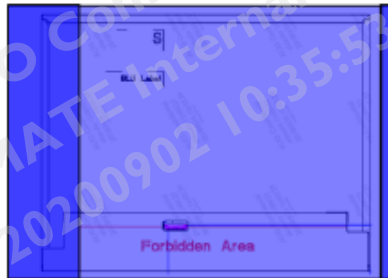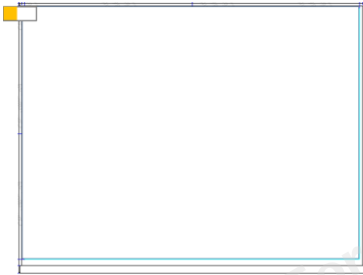
the upper left hand corner of panel
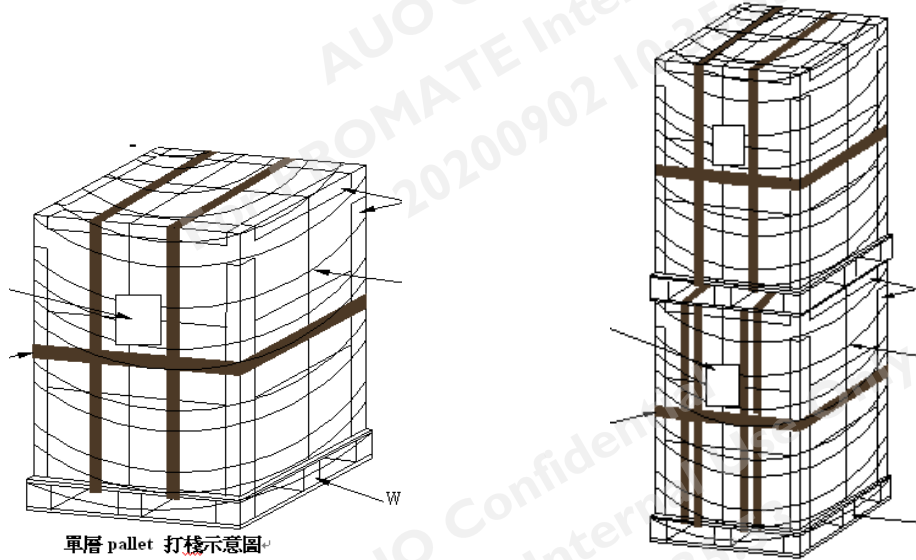
be tape with remove film label

Panel put into ESD bag
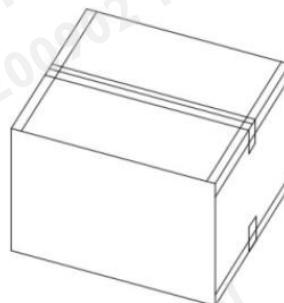
Put 20 pcs panel into EPE Cushion

10.3 Palletizing

Module by air_Max: (2 *3) *4 layers，one pallet put 24 boxes，total 480 pcs module
Module by sea_Max: (2 *3) *4 layers + (2 *3) *1 layers , two pallet put 40 boxes，total 600 pcs module
Module by sea_HQ_Max: (2 *3) *4 layers+(2 *3) *2 layers, two pallet put 48 boxes, total 720pcs module

單層 pallet 打棧示意圖

By air：one pallet

By sea：two pallet

For PROMATE internal use only - provided by jackctyang on 2020/09/02

11 Safety

11.1 Sharp 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

All components including electrical components that do not meet the flammability grade UL94-V1 in the module will complete the flammability rating exception approval process.

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 National Test Lab Requirement

The display module will satisfy all requirements for compliance to:

UL 60950-1, Second Edition　　　　　　　U.S.A. Information Technology Equipment