

**CUSTOMER APPROVE**

**SPECIFICATION**  
**FOR**  
**DOUBLE LIN TFT-LCD MODULE**

**Edition : Preliminary spec 1.0**

**Date of issue : 2022-05-03**

**Product No. :G190ETN01.1**

<b>APPROVED</b>	<b>CHECKED</b>	<b>PREPARED</b>
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## Revision History

Date	Rev.	Page	Old Description	New Description	Remark
2022-05-03	1.0	All	The specification was first issued		

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# 1. General Description

G190ETN01.1 is a Color Active Matrix Liquid Crystal Display composed of a TFT-LCD panel, a driver circuit, and a backlight system. The screen format is intended to support the SXGA (1280(H) x 1024(V)) screen and 16.7M colors (RGB 6-bits + HiFRC data). All input signals are 2-channel LVDS interface.

## 1.1 Display Characteristics

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

ITEMS	Unit	SPECIFICATIONS
Screen Dingonal	[mm]	482.6(19")
Active Area	[mm]	376.32 (H) x 301.06 (V)
Pixels H x V	-	1280 x 3(RGB)×1024
Pixels Pitch	[um]	294 (per one triad) × 294
Pixels Arrangement	-	R.G.B. Vertical Stripe
Display Mode	-	TN Mode Normally White
White Luminance(Center)	[cd/m <sup>2</sup> ]	1000 (Typ.)
Contrast Ratio	-	1000 (Typ.)
Response Time	[msec]	5 (Typ.)(Tr/Td)
Viewing Angle	[degree]	85/85/80/80
Outline Dimension	[mm]	395.6(H) x 323.8(V) x 12.3(D) (Typ.)
Electrical Interface	-	Dual Channel LVDS
Support Color		16.7M colors
Surface Treatment		Anti - glare type, Hardness 3H
Temperature Range Operating Storage(Shipping)	[oC] [oC]	-30 to +85 -30 to +85

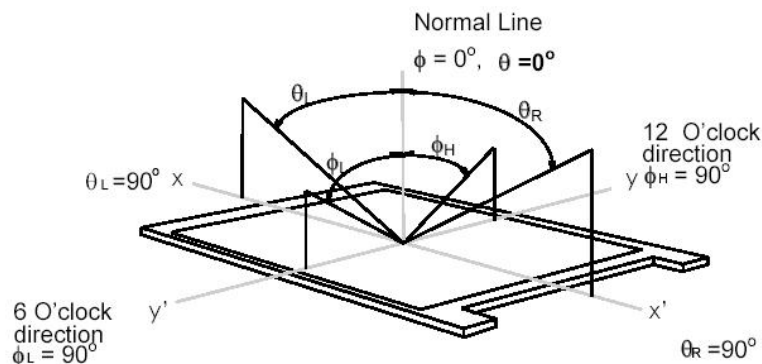
## 1.2 Optical Characteristics

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

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right)	75	85	-	1
		CR = 10 (Left)	75	85	-	
		Vertical (Up)	70	80	-	
		CR = 10 (Down)	70	80	-	
Contrast Ratio		Normal Direction	600	1000	-	
Optical Response Time	[msec]	Raising Time (TrR)	-	7	12	2
		Falling Time (TrF)	-	3	8	
		Rising + Falling	-	10	20	
Color / Chromaticity Coordinates (CIE)		Red x	0.590	0.640	0.690	
		Red y	0.294	0.344	0.394	
		Green x	0.277	0.327	0.377	
		Green y	0.574	0.624	0.674	
		Blue x	0.105	0.155	0.205	
		Blue y	0.004	0.054	0.104	
		White x	0.263	0.313	0.363	
		White y	0.279	0.329	0.379	
Central Luminance	[cd/m <sup>2</sup> ]		800	1000		3
Luminance Uniformity	[%]	9 Points	75	80		4,5
NTSC	[%]			72		

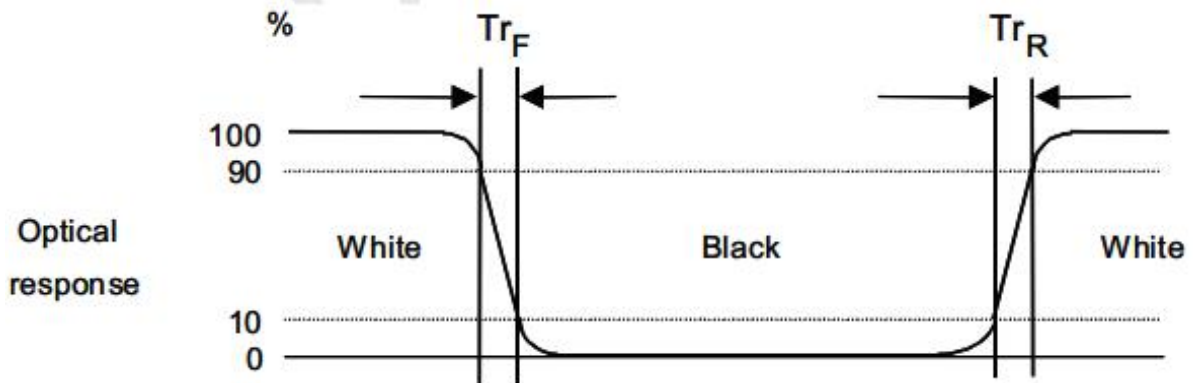
Optical Equipment: BM-5A, BM-7, PR880, or equivalent

Note 1: Definition of viewing angle Viewing angle is the measurement of contrast ratio  $\geq 10$ , or  $\geq 5$ , 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° ( $\theta$ ) horizontal left and right and 90° ( $\Phi$ ) 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.



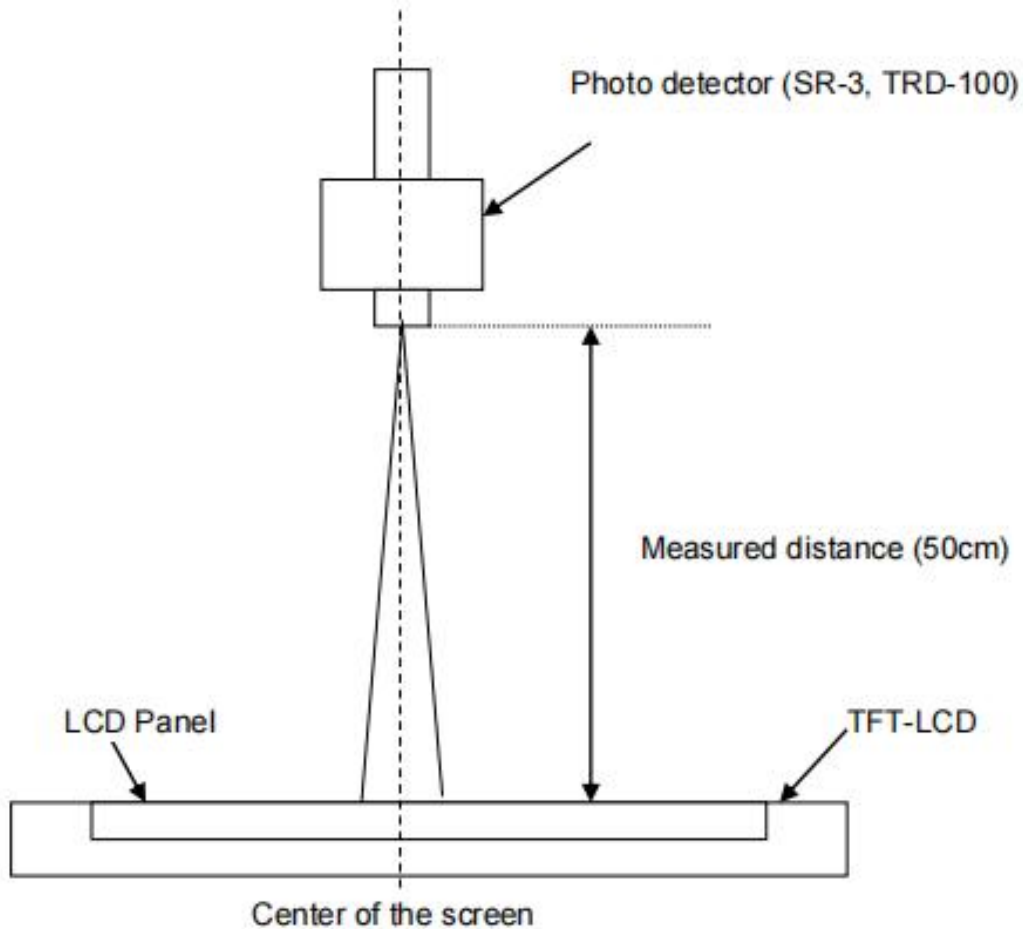
Note 2: Definition of response time:

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

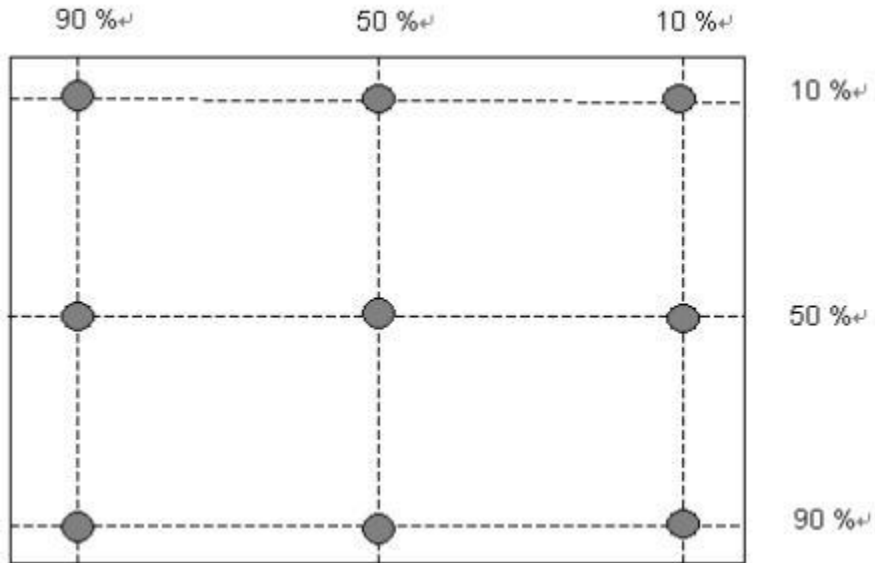


Note 3: Measurement method

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a stable, windless and dark room.



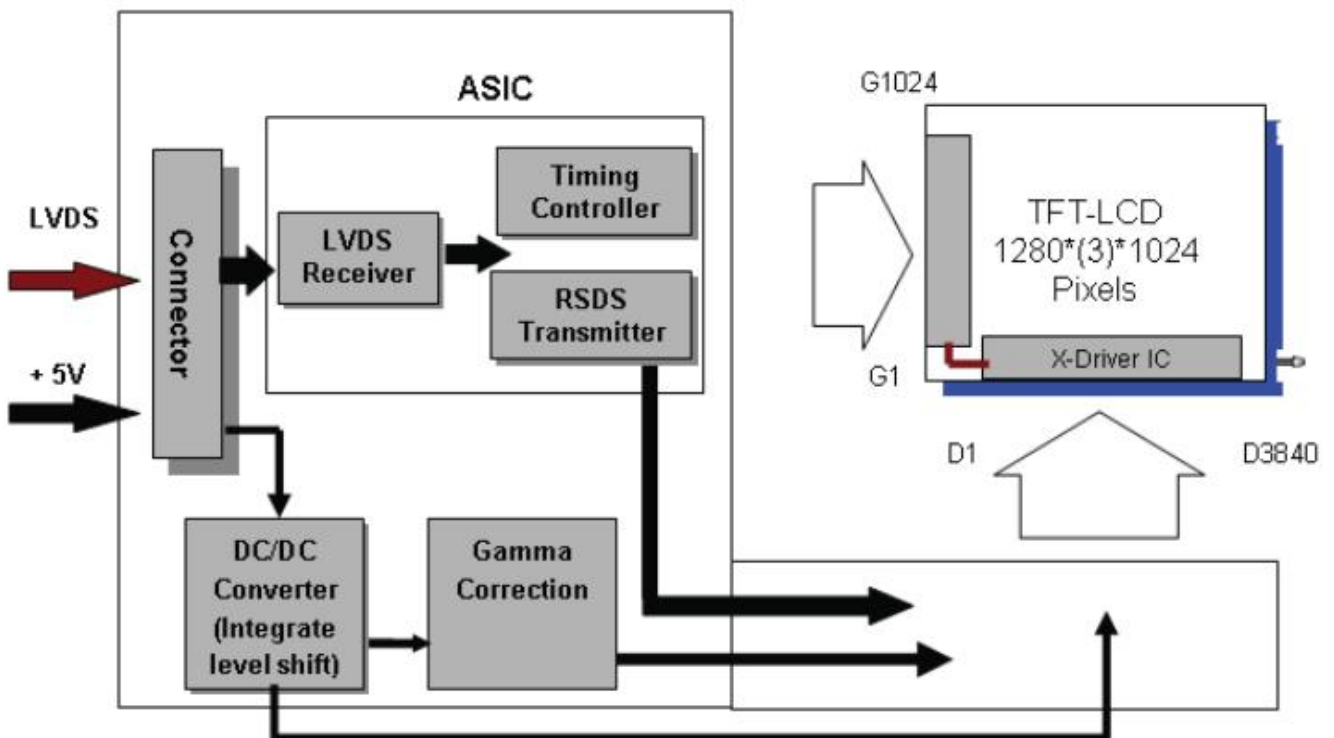
Note 4: 9 points position



Note 5: 
$$\text{Uniformity} = \frac{\text{Minimum Luminance of 9Points(P1~P9)}}{\text{Maximum Luminance of 9Points(P1~P9)}}$$

## 2. Functional Block Diagram

The following diagram shows the functional block of the 19.0 inches wide Color TFT-LCD Module:



### 3. Absolute Maximum Ratings

Absolute maximum ratings of the module are as following:

#### 3.1 TFT LCD Module

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	VDD	-0.3	+6.0	[Volt]	Note 1,2
Signal Voltage	RxOINi-/+ RxEINi-/+	-0.3	+6.0	[Volt]	Note 1,2, i=0,1,2,3
Signal Voltage	RxOCLKIN-/+ RxECLKIN-/+	-0.3	+6.0	[Volt]	Note 1,2

#### 3.2 Absolute Ratings of Environment

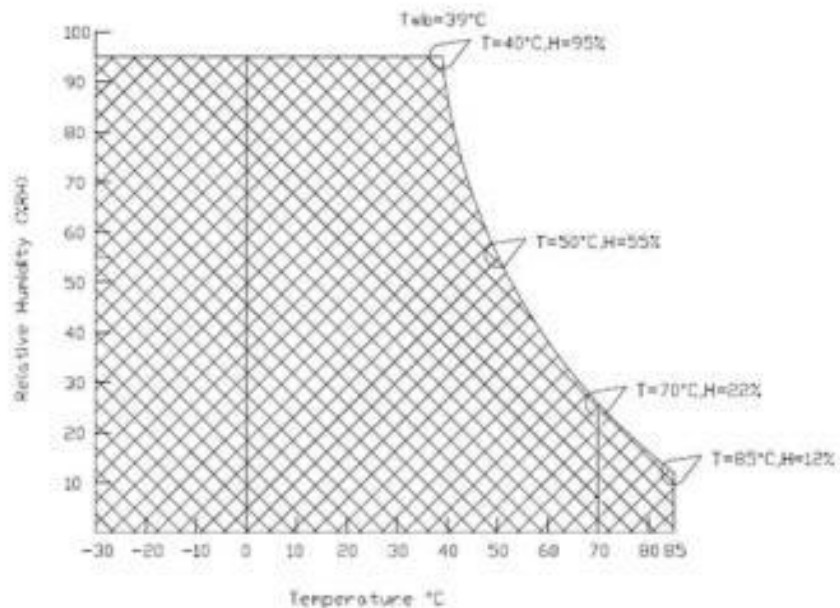
Item	Symbol	Min	Max	Unit	Conditions
Operating Temperature (Tgs)	TOP	-30	+85	[o C]	Note 3
Operation Humidity	HOP	5	95	[%RH]	Note 3
Storage Temperature (Ta)	TST	-30	+85	[o C]	
Storage Humidity	HST	5	95	[%RH]	

Note 1: With in Ta (25κ)

Note 2: Permanent damage to the device may occur if exceeding maximum values

Note 3: Temperature and relative humidity range are shown as the below figure.

1. 95% RH Max ( Ta ≤39°C)
2. Max wet-bulb temperature at 39°C or less.(Ta≤39°C)



## 4. Electrical Characteristics

### 4.1 TFT LCD Module

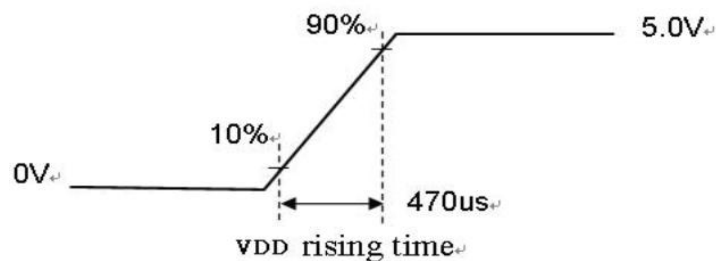
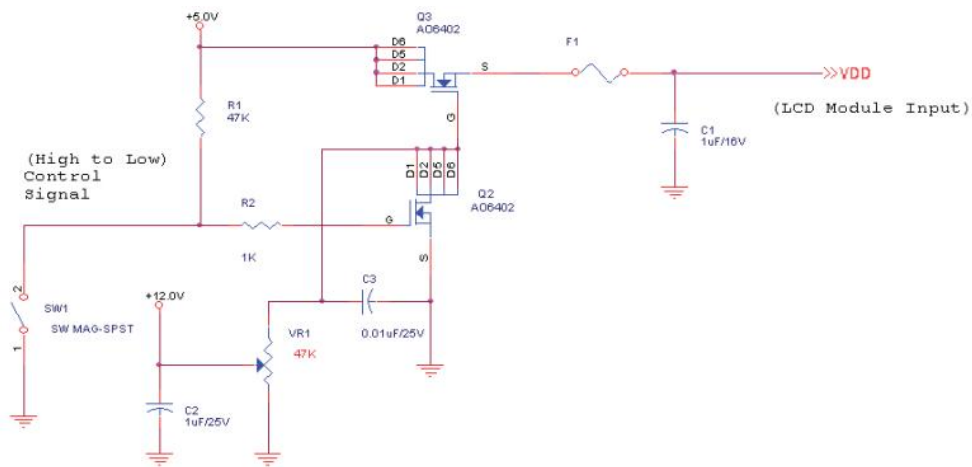
#### 4.1.1 Power Specification

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	-	1	1.2	[A]	VDD= 5.0V, All Black Pattern At 75Hz
PDD	VDD Power	-	5	6	[Watt]	VDD= 5.0V, All Black Pattern At 75Hz
IRush	Inrush Current	-	-	3.0	[A]	Note 1
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	200	[mV] p-p	VDD= 5.0V, All Black Pattern At 75Hz

**Note 1:** Measurement conditions:

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



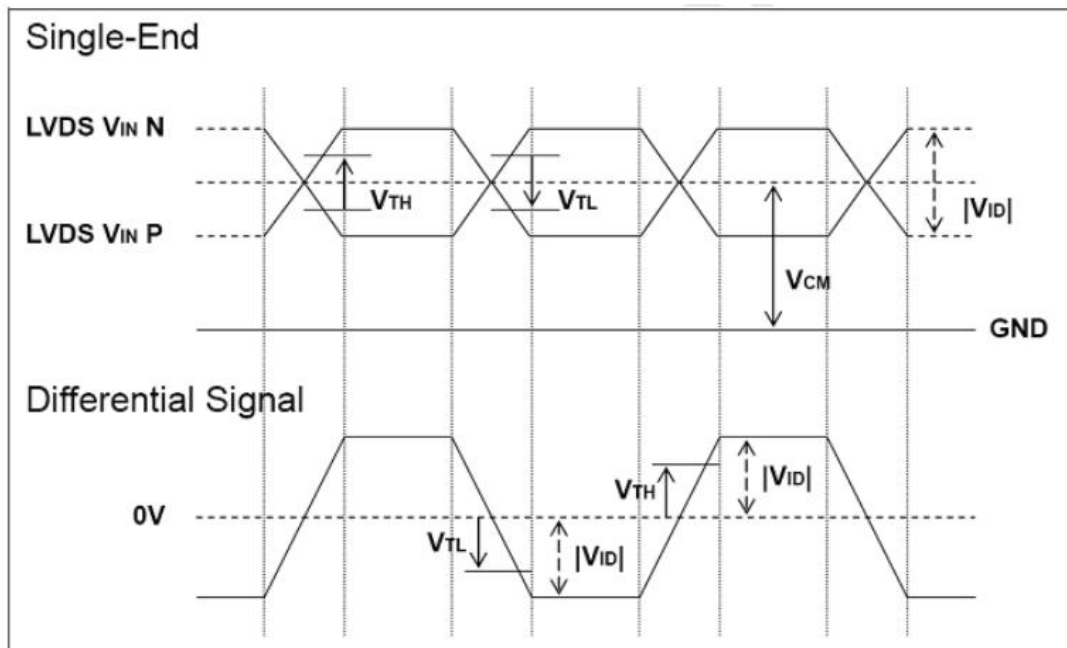
### 4.1.2 Signal Electrical Characteristics

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

Each signal characteristics are as follows;

Symbol	Parameter	Min	Typ	Max	Units	Condition
V <sub>TH</sub>	Differential Input High Threshold	-	-	+100	[mV]	V <sub>CM</sub> = 1.2V Note 1
V <sub>TL</sub>	Differential Input Low Threshold	-100	-	-	[mV]	V <sub>CM</sub> = 1.2V Note 1
V <sub>ID</sub>	Input Differential Voltage	100	400	600	[mV]	Note 1
V <sub>CM</sub>	Differential Input Common Mode Voltage	+1.0	+1.2	+1.5	[Volt]	V <sub>TH</sub> -V <sub>TL</sub> = 200mV (max) Note 1

**Note1:** LVDS Signal Waveform



### 4.1.3 Backlight Unit

Parameter guideline for LED driving is under stable conditions at 25κ (Room Temperature):

Symbol	Parameter	Min.	Typ.	Max.	Unit	Note
I <sub>RLED</sub>	LED Operation Current	-	480	-	[mA] Note 1	<b>Operating with fixed driving current</b>
V <sub>LB</sub>	Light Bar Operation Voltage (for reference)	47.6	-	56.1	[Volt] Note 2	
P <sub>BLU</sub>	BLU Power consumption (for reference)	22.84	-	26.92	[Watt]	
L <sub>TLED</sub>	LED life Time (Typical)	25,000	30,000	-	[Hour] Note 3	

Note 1 :The specified current is input LED chip 100% duty current.

Note 2 : The value showed in the table is one light bar's operation voltage.

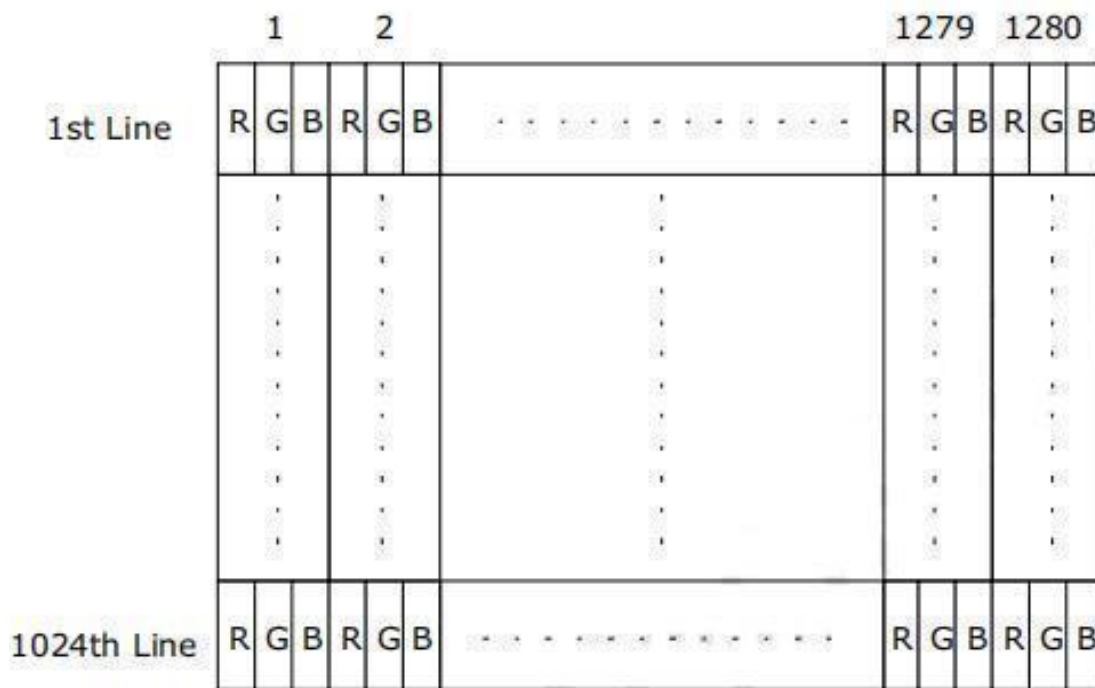
Note 3 : Definition of life time : brightness becomes 50% of its original value. The minimum life time of LED unit is on the condition of IRLLED = 60mA and 25±2κ (Room temperature).

Note 4: Each LED light bar consists of 2\*68 pcs LED package ( 4 strings x 17 pcs / string ).

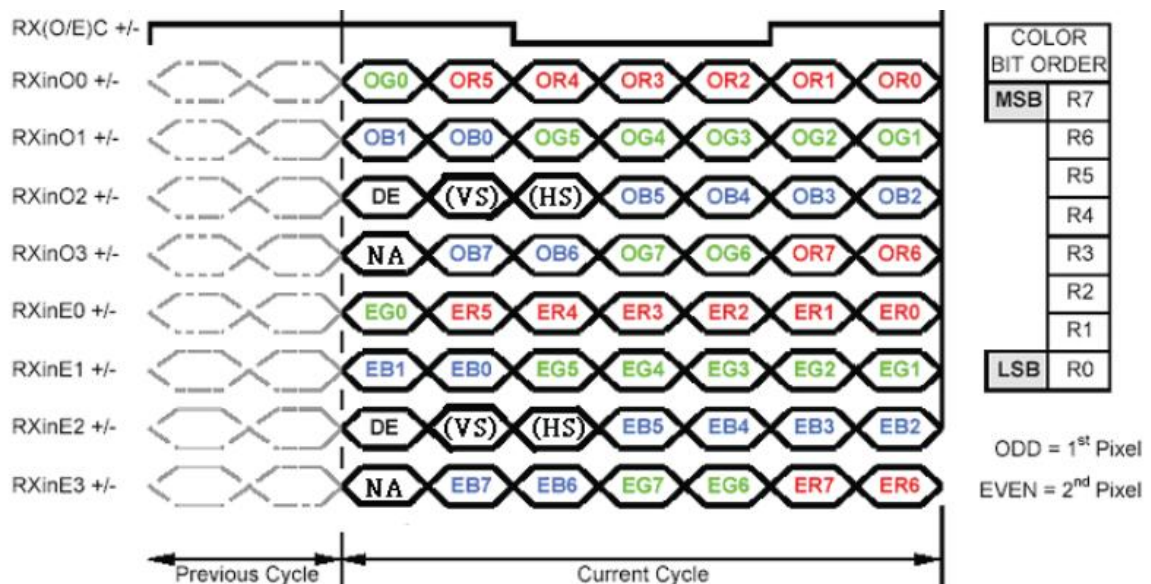
## 5. Signal Characteristic

### 5.1 Pixel Format Image

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



### 5.2 The Input Data Format



Note1: Please follow PSWG.

Note2: 8-bit in

Note3: DE: Data Enable, VS: Vsync, HS: Hsync, NA: No use

### 5.3 Signal Description

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

CN1		
PIN#	SIGNAL NAME	DESCRIPTION
1	RxOIN0-	Negative LDVS differential data input (Odd data)
2	RxOIN0+	Positive LDVS differential data input (Odd data)
3	RxOIN1-	Negative LDVS differential data input (Odd data)
4	RxOIN1+	Positive LDVS differential data input (Odd data)
5	RxOIN2-	Negative LDVS differential data input (Odd data)
6	RxOIN2+	Positive LDVS differential data input (Odd data)
7	GND	Power Ground
8	RxOCLKIN-	Negative LDVS differential data input (Odd clock)
9	RxOCLKIN+	Positive LDVS differential data input (Odd clock)
10	RxOIN3-	Negative LDVS differential data input (Odd data)
11	RxOIN3+	Positive LDVS differential data input (Odd data)
12	RxEIN0-	Negative LDVS differential data input (Even data)
13	RxEIN0+	Positive LDVS differential data input (Even data)
14	GND	Power Ground
15	RxEIN1-	Negative LDVS differential data input (Even data)
16	RxEIN1+	Positive LDVS differential data input (Even data)
17	GND	Power Ground
18	RxEIN2-	Negative LDVS differential data input (Even data)
19	RxEIN2+	Positive LDVS differential data input (Even data)
20	RXECLKIN-	Negative LDVS differential data input (Even clock)
21	RXECLKIN+	Positive LDVS differential data input (Even clock)
22	RxEIN3-	Negative LDVS differential data input (Even data)
23	RxEIN3+	Positive LDVS differential data input (Even data)
24	GND	Power Ground
25	GND	Power Ground
26	GND	Power Ground
27	GND	Power Ground
28	VDD	Power +5 V
29	VDD	Power +5 V
30	VDD	Power +5 V

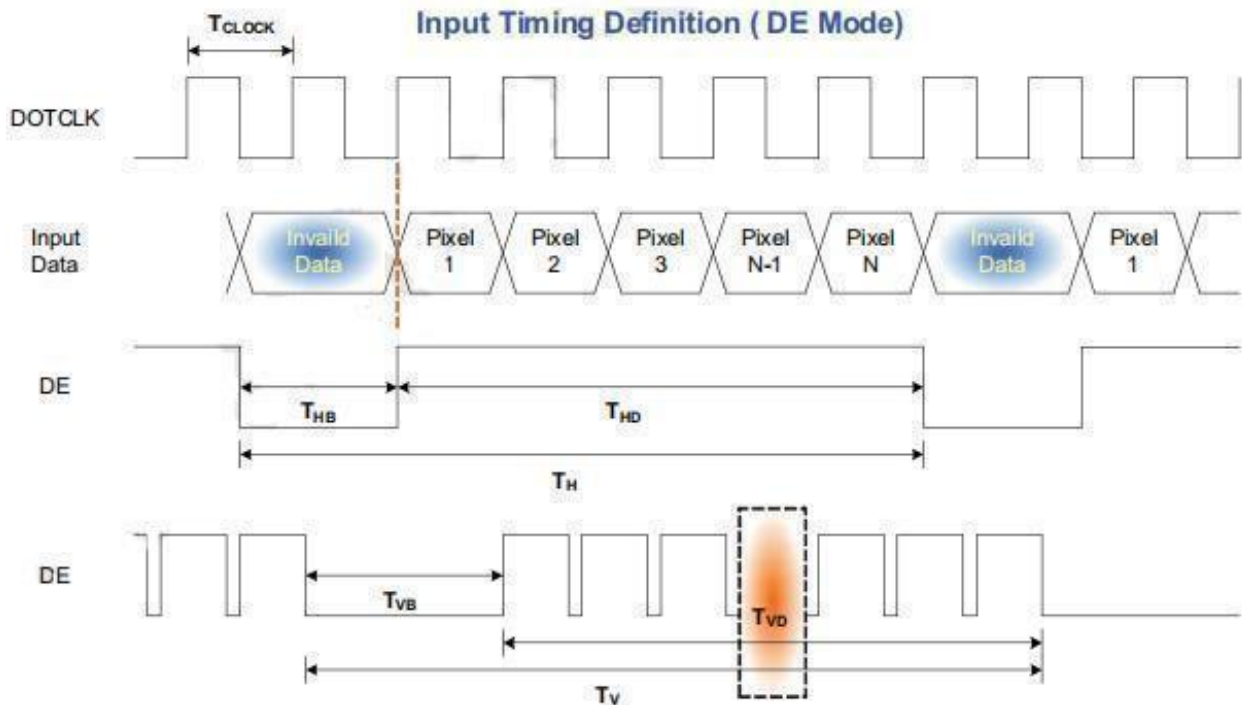
## 5.4 Interface Timing

### 5.4.1 Timing Characteristics

Signal	Item	Symbol	Min	Typ	Typ	Unit
Vertical Section	Period	$T_v$	1032	1066	1150	Th
	Active	$T_{disp(v)}$	1024	1024	1024	Th
	Blanking	$T_{bp(v)}+T_{fp(v)}+PW_{vs}$	8	42	126	Th
Horizontal Section	Period	$T_h$	780	844	2047	Tclk
	Active	$T_{disp(h)}$	640	640	640	Tclk
	Active	$T_{bp(h)}+T_{fp(h)}+PW_{hs}$	140	204	-	Tclk
Clock	Period	Tclk	22.2	18.52	14.81	ns
	Frequency	Freq.	44	54	67.5	MHz
Frame Rate	Frequency	$1/T_v$	49	60	75	Hz

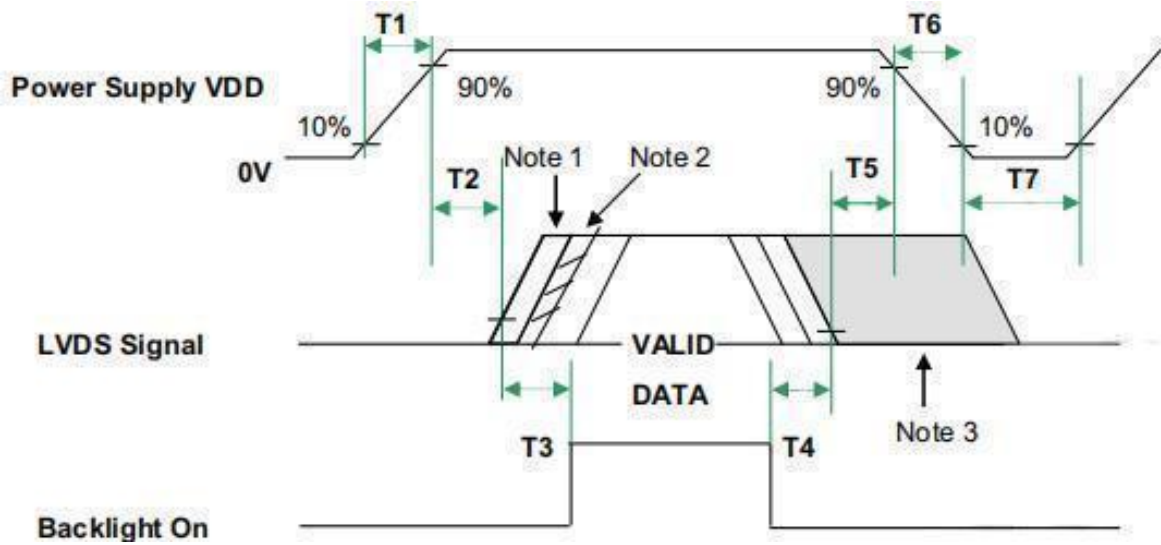
Note: DE mode only

### 5.4.2 Timing Diagram



## 5.5 Power ON/OFF Sequence

VDD power and backlight 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.



Note1: insert a white pattern 360ms

Note2: insert a black pattern

Note3: insert a white pattern after valid data and last until VDD falls to 10%.

Note4: when AC ON/OFF, timing rule of logo power ON/OFF is the same as above.

Power Sequence Timing				
Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	ms
T2	0	40	50	
T3	500	-	-	
T4	300	-	-	
T5	40	1500	-	
T6	-	-	-	
T7	1000	-	-	

## 6. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50κ , 80%RH, 240hours	
High Temperature Operation (HTO)	Ta= 85κ , 240hours	
Low Temperature Operation (LTO)	Ta= -30κ , 240hours	
High Temperature Storage (HTS)	Ta= 85κ , 240hours	
Low Temperature Storage (LTS)	Ta= -30κ , 240hours	
Vibration Test (Non-operation)	Acceleration: 1.5 G Wave: Random Frequency: 10 - 200 - 10 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) Axis)	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20κ /30min, 60κ /30min, 50 cycles	
ESD (Electro-Static Discharge)	Contact Discharge: ± 8KV, 150pF(330 ) 1sec, 9 points, 25 times/ point.	1
	Air Discharge:± 15KV,150pF(330Ω ) 1sec, 9 points,25 times/ point	

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

Note2:

- 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.

## 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

#### 7.1.1 Connector (CN1)

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	HRS
Type Part Number	DF14H-30P-1.25H (56)
Mating Housing Part Number	DF14-30S-1.25C

#### 7.1.2 Pin Assignment

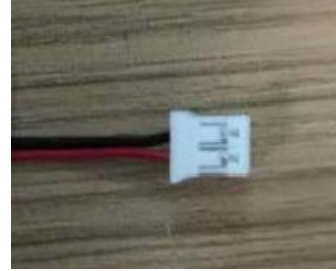
Pin#	Signal Name	Pin#	Signal Name
1	RxOIN0-	2	RxOIN0+
3	RxOIN1-	4	RxOIN1+
5	RxOIN2-	6	RxOIN2+
7	GND	8	RxOCLKIN-
9	RxOCLKIN+	10	RxOIN3-
11	RxOIN3+	12	RxEIN0-
13	RxEIN0+	14	GND
15	RxEIN1-	16	RxEIN1+
17	GND	18	RxEIN2-
19	RxEIN2+	20	RxECLKIN-
21	RxECLKIN+	22	RxEIN3-
23	RxEIN3+	24	GND
25	GND	26	GND
27	GND	28	VDD
29	VDD	30	VDD

## 7.2 Backlight Unit

### Backlight Electrical / Optical Characteristics

connector CN2 : PH- 2P \*2

Pin	Signal Name
1	VDD- (Black)
2	VDD+ (Red)



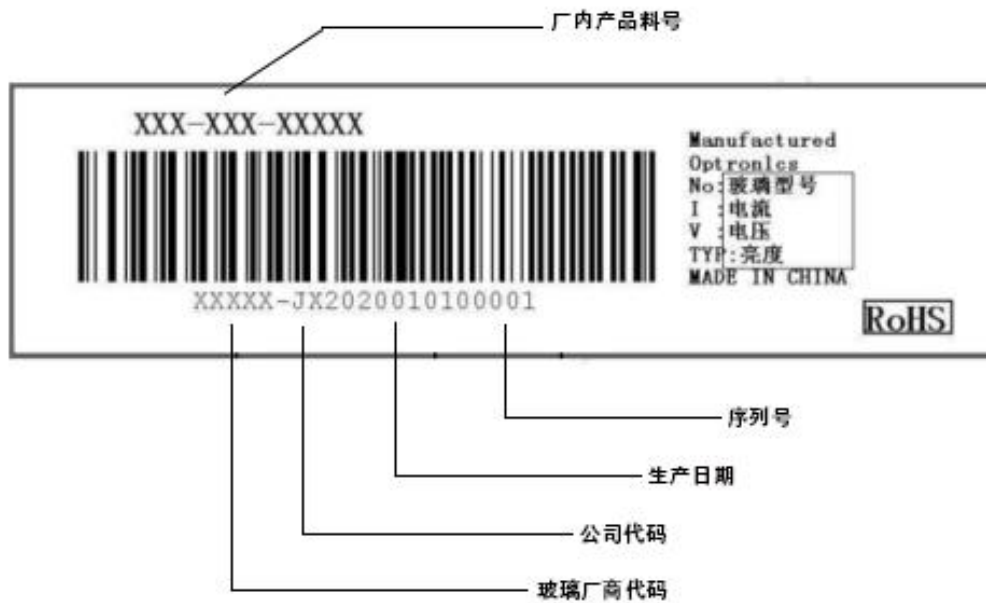
## 7.3 Recommended Operating Condition

The following shows the block diagram of the 19 inch Backlight Unit. And it includes 68 pcs LED in the LED light bar.(4 strings and 17 pcs LED of one string)

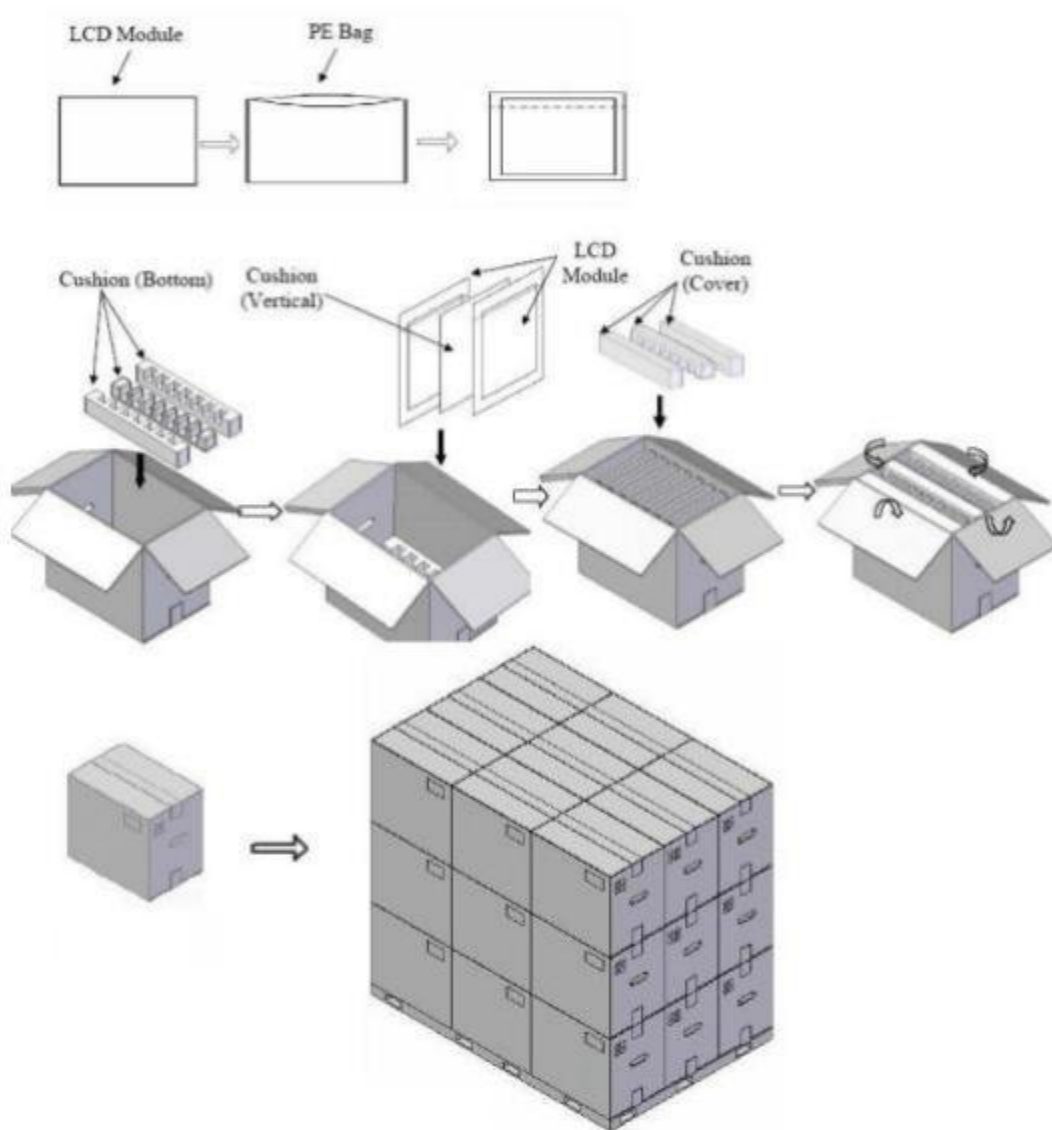
(Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit
LED operation Voltage	V led	47.6	-	56.1	V
LED operation Current	I led	-	480	-	mA
Backlight Power	PBL	22.84	-	26.92	W
Luminance	L	800	1000		nit
LED Life Time		30000			Hrs
Luminance uniformity	$\Delta L$	75	80		%

## 8. Backlight Label



Parameter	Packing box	Unit
Size	450(L)x275(W)x375(H)(typ.)	mm
Weight	1.43(typ.)	kg
Total weight	14.32(typ.) (with 10 products)	kg



## 9. Precaution

### 9.1 Assembly and handling precautions

1. Do not apply rough force such as bending or twisting to the module during assembly.
2. To assemble or install module into user's system can be in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
3. It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
4. Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
5. Do not pull the I/F connector in or out while the module is operating.
6. Do not disassemble the module. Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
7. It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
8. High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

10. When ambient temperature is lower than 10 °C may reduce the display quality. For example, the response time will become slowly.

## **9.2 Safety precautions**

- 1 It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
- 2 If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth, in case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- 3 After the module's end of life, it is not harmful in case of normal operation and storage.

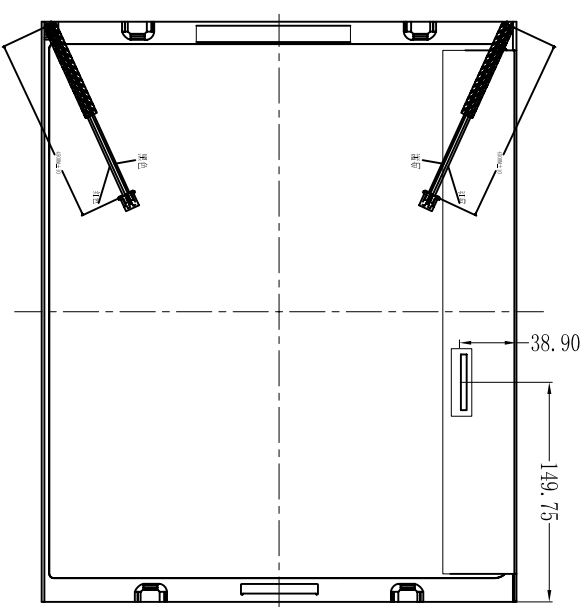
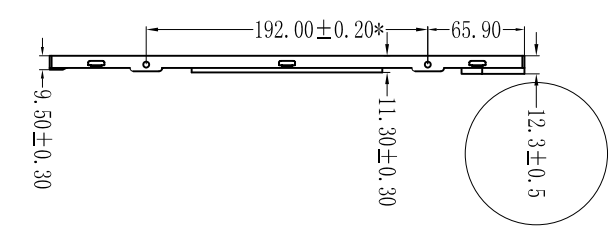
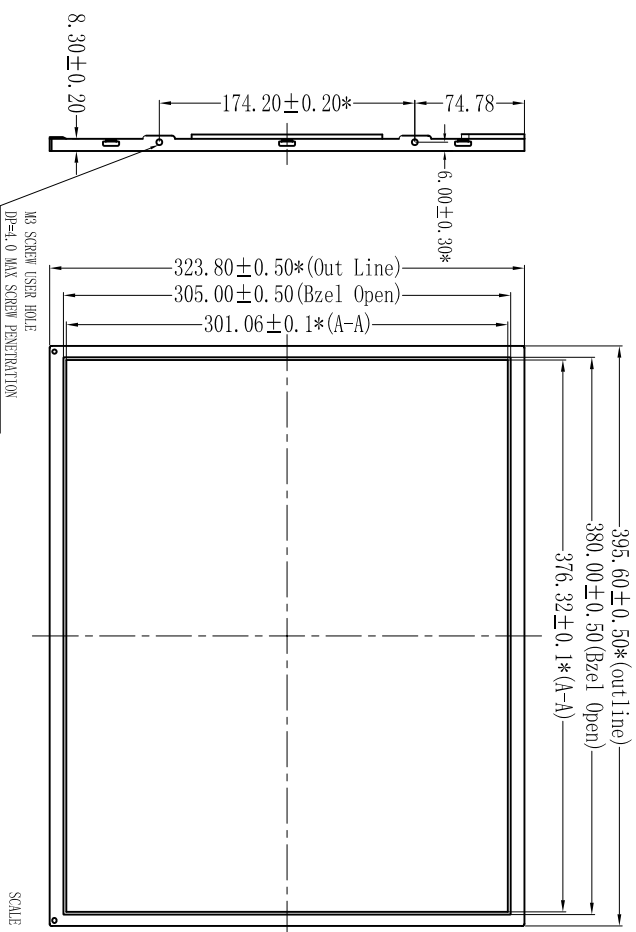
A

B 由 Autodesk 教育版产品制作

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D

REV	LOC'T	DESCRIPTION OF CHANGE	CH'G BY	DATE
A01		First release		



SCALE 0.700

Electrical/Optical Specifications:

	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Forward Voltage	V <sub>f</sub>	--	42	49	(V <sub>rms</sub> )	If=60mA/LED
Forward Current	I <sub>f</sub>	--	240*2	--	mA	
Power Dissipation	P <sub>d</sub>	--	9.8*2	--	W	
Luminous Intensity	I <sub>v</sub>	960	1200	--	cd/m <sup>2</sup>	If=2*240 mA
Luminous Uniformity		75%	--	--	%	
Chromatically coordinate	X	0.289±0.03				
	Y	0.288±0.03				

ITEM		RATINGS	
SYMBOL			
Operating Temperature	T <sub>opr</sub>	0°C to +50°C	
	T <sub>stg</sub>	0°C to +65°C	

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TITLE:

19(4:3) 组装高亮屏

MODEL NO.

19(4:3) 锦昕

MATERIAL:

UNLESS DRAWN OTHERWISE SPECIFIED

TOLERANCES UNLESS OTHERWISE SPECIFIED

LINEAR TOL. = ±0.05 (<20mm)

LINEAR TOL. = ±0.10 (>20mm)

ANGULAR TOL. = ±0.5°

FINISH:

PROJECTION:



DWG NO.

CAD FILE

APPROVE:

CHECK:

SCALE:

FTT

REV.

A01

SIZE

FTT

SHEET

1 OF 1