



# Product Specification

E170ETZ-801

☐ Preliminary Specifications

☒ Final Specifications

Module	17.0 Inch Color TFT-LCD
Model Name	<b>E170ETZ-801</b> (G170ETN02.1)
Document Version	Rev.01

Coutomer

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Approved by

Date

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Notice : This Specification is subject to change without notice.

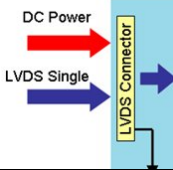
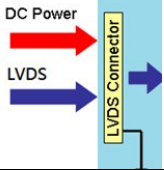
Approved By	Prepared By
	



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## Record of Revision

Version and Date	Page	Old description	New Description
1.0 2017/09/09	All	First Edition for Customer	
1.1 2017/10/03	9	Functional Block Diagram Modify 	Functional Block Diagram Modify 
1.2 2017/11/07	18	6.5 Power ON/OFF Sequence (w/ LED driver board)	Modify: 6.5 Power ON/OFF Sequence (w/o LED driver board)

## 1. Handling Precautions

- 1) Since front polarizer is easily damaged, pay attention not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnecting from input connector.
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- 5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
- 6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 7) Do not open or modify the Module Assembly.
- 8) Do not press the reflector sheet at the back of the module to any directions.
- 9) In case if a 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 light bar edge. Instead, press at the far ends of the LED light bar 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) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.
- 12) Small amount of materials having no flammability grade is used in the LCD module. The LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950-1 or UL60950-1), or be applied exemption.
- 13) Continuous operating TFT-LCD display under high temperature environment may accelerate LED exhaustion and reduce luminance dramatically.
- 14) Continuous displaying fixed pattern may induce image sticking. It's recommended to use screen saver or shuffle content periodically if fixed pattern is displayed on the screen.



## 2. General Description

This specification applies to the 17 inch Color TFT-LCD Module G170ETN02.1.

The display supports the SXGA (1280(H) x 1024(V)) screen format and 16.7M colors. All input signals are Dual Channel LVDS interface compatible.

### 2.1 Display Characteristics

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

Items	Unit	Specifications
Screen Diagonal	[mm]	432 (17.0")
Active Area	[mm]	337.920(H) × 270.336(V)
Pixels H x V		1280 × 3(RGB) × 1024
Pixel Pitch	[mm]	0.264(per one triad) × 0.264
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		Normally White
White Luminance	[cd/m2]	800 (Typ)
Contrast Ratio		700 : 1 (Typ)
Optical Response Time	[msec]	20
Nominal Input Voltage VDD	[Volt]	+5.0 (Typ)
Power Consumption	[Watt]	Logic 4.5W (max) @ All Black pattern (max.) BL 13.6W (max.) (w/o LED driver board)
Weight	[Grams]	1590 (Max.)
Physical Size (H x V x D)	[mm]	358.5(H) x 296.5(V) Typ. x 12.45(D) typ
Electrical Interface		Dual Channel LVDS
Surface Treatment		Anti-glare type, Hardness 3H
Support Color		16.7M colors (8-bits)
Temperature Range		
Operating	[°C]	-30 to +85
Storage (Non-Operating)	[°C]	-30 to +85
RoHS Compliance		RoHS Compliance



## 2.2 Optical Characteristics

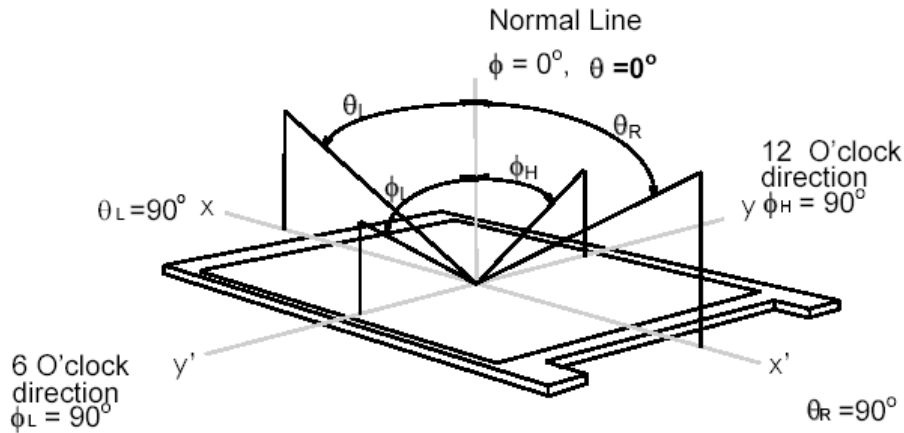
The optical characteristics are measured under stable conditions at 25°C (Room Temperature):

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right) CR = 10 (Left)	70 70	80 80	-	1
		Vertical (Up) CR = 10 (Down)	50 60	70 70	-	
Luminance Uniformity	[%]	9 Points	75	80	-	2, 3
Contrast Ratio			500	700	-	4
White Luminance	[cd/m <sup>2</sup> ]		640	800	-	4
Optical Response Time	[msec]	Rising	-	15	-	5
		Falling	-	5	-	
		Rising + Falling	-	20	-	
Color / Chromaticity Coordinates (CIE 1931)		Red x	0.590	0.640	0.690	
		Red y	0.293	0.343	0.393	
		Green x	0.274	0.324	0.374	
		Green y	0.577	0.627	0.677	
		Blue x	0.106	0.156	0.206	
		Blue y	0.016	0.066	0.116	
		White x	0.263	0.313	0.363	
		White y	0.279	0.329	0.379	
NTSC	[%]			72		

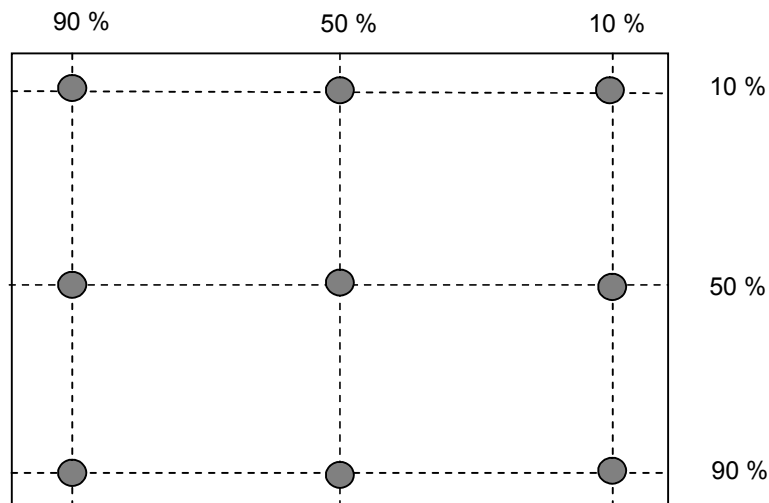
Optical Equipment: BM-5A, BM-7, PR880, or equivalent

## Note 1: Definition of viewing angle

Viewing angle is the measurement of contrast ratio  $\geq 10$ , at the screen center, over a  $180^\circ$  horizontal and  $180^\circ$  vertical range (off-normal viewing angles). The  $180^\circ$  viewing angle range is broken down as follows;  $90^\circ$  ( $\theta$ ) horizontal left and right and  $90^\circ$  ( $\Phi$ ) 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: 9 points position

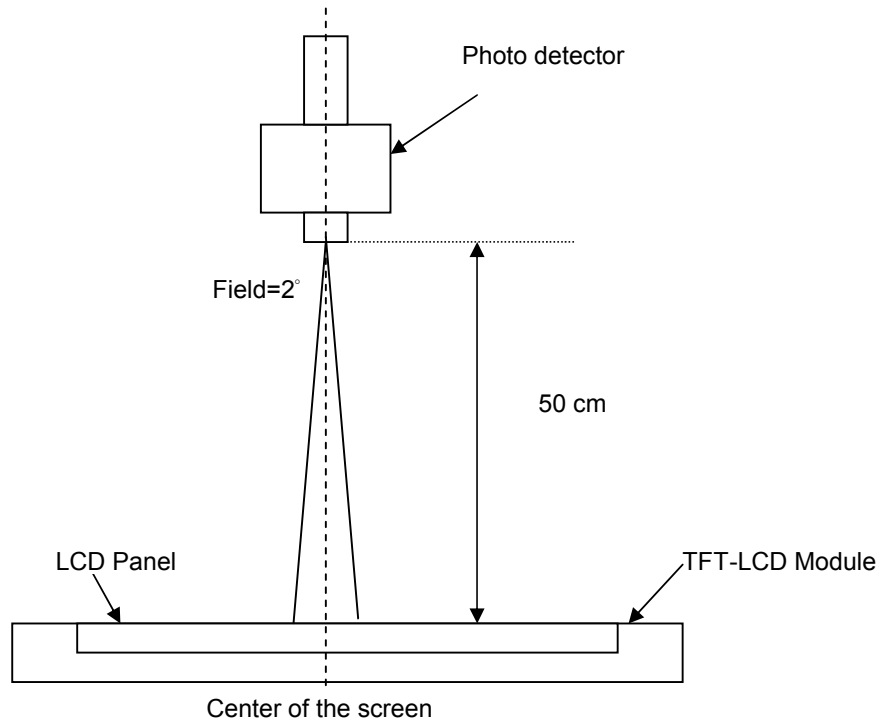


**Note 3:** The luminance uniformity of 9 points is defined by dividing the maximum luminance values by the minimum test point luminance

$$\delta_{w9} = \frac{\text{Minimum Luminance of 9 points}}{\text{Maximum Luminance of 9 points}}$$

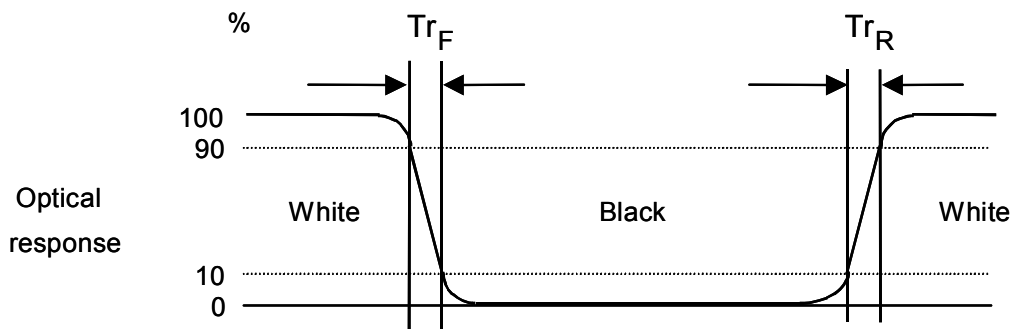
## Note 4: Measurement method

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 5: Definition of response time:

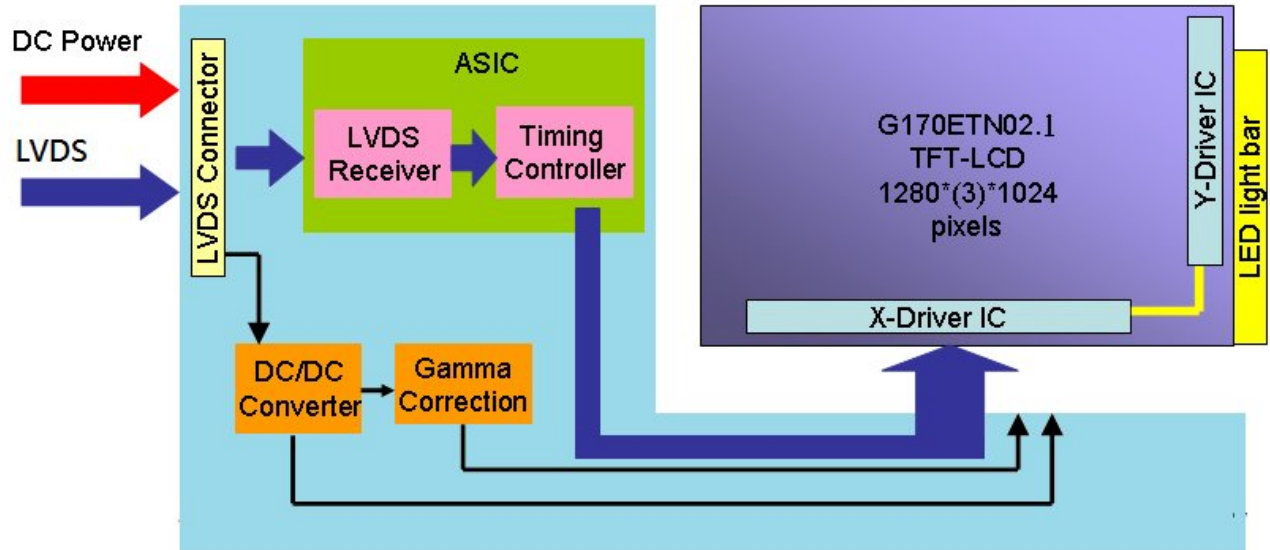
The output signals of photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time), and from "Full White" to "Full Black" (falling time), respectively. The response time is interval between the 10% and 90% of amplitudes. Please refer to the figure as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





## 3. Functional Block Diagram

The following diagram shows the functional block of the 17.0 inches Color TFT-LCD Module:



## 4. Absolute Maximum Ratings

An absolute maximum ratings of the module is as following:

### 4.1 TFT LCD Module

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	VDD	-0.3	+6	[Volt]	<b>Note 1,2</b>
Signal Voltage	RxOINi-/+ , RxEINi-/+	-0.3	4	[Volt]	<b>Note 1,2, i=0,1,2,3</b>
Signal Voltage	RxOCLKON-/+ RxECLKIN-/+	-0.3	4	[Volt]	<b>Note 1,2</b>

### 4.2 Backlight Unit

Item	Symbol	Min	Typ	Unit	Conditions
LED Forward Current	I <sub>F</sub>	-	100	[mA]	<b>Note 1,2</b>

### 4.3 Absolute Ratings of Environment

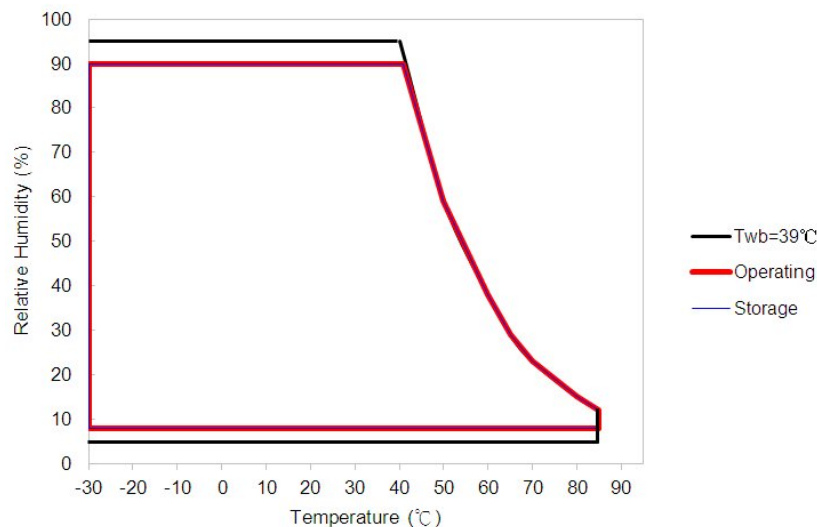
Item	Symbol	Min	Max	Unit	Conditions
Operating Temperature	TOP	-30	+85	[°C]	<b>Note 3</b>
Operation Humidity	HOP	8	90	[%RH]	
Storage Temperature	TST	-30	+85	[°C]	
Storage Humidity	HST	8	90	[%RH]	

**Note 1:** With in Ta (25°C)

**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

- 90% RH Max
- Max wet-bulb temperature at 39°C or less. ( Ta ≤ 39°C )
- No condensation



## 5. Electrical Characteristics

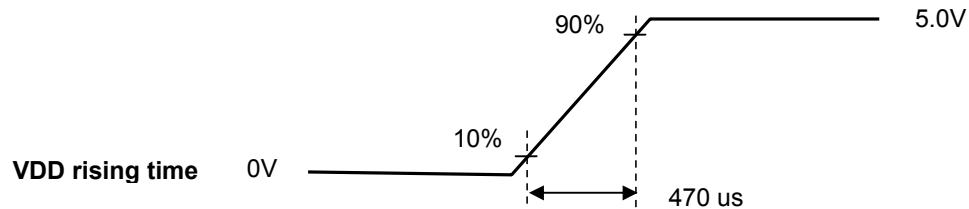
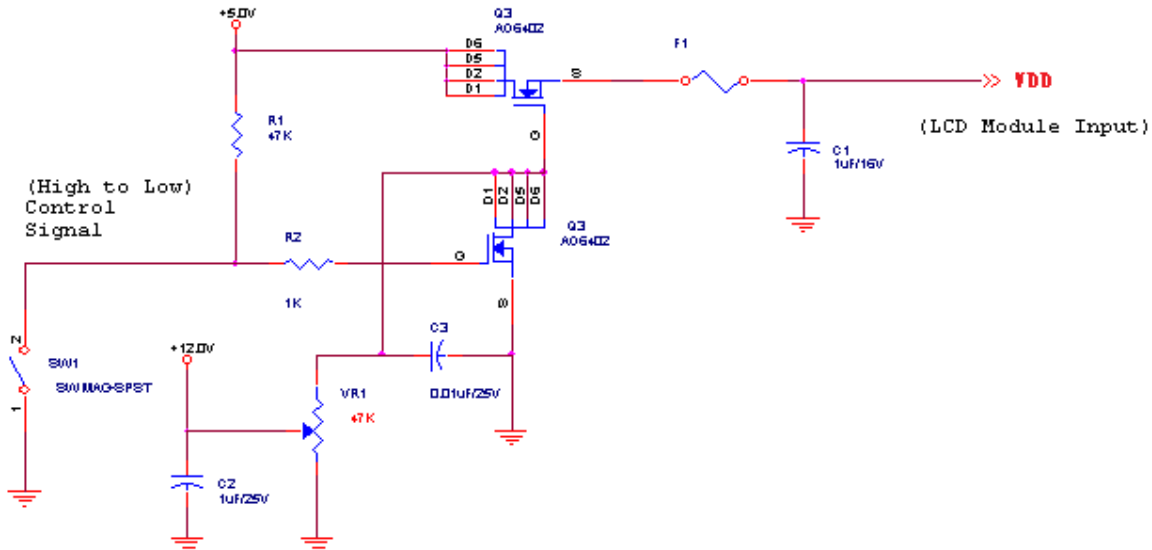
### 5.1 TFT LCD Module

#### 5.1.1 Power Specification

Input power specifications are as follows:

Symble	Parameter	Min.	Typ.	Max.	Unit	Condition
VDD	Logic/LCD Drive Voltage	4.5	5.0	5.5	[Volt]	±10%
IDD	Input Current	-	0.8	1.0	[A]	VDD=5V , All Black Pattern, at 60Hz
IRush	Inrush Current	-	-	2.5	[A]	Note
PDD	VDD Power	-	4	4.5	[Watt]	VDD=5V , All Black Pattern, at 60Hz
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	200	[mV] p-p	VDD=5V , All Black Pattern, at 60Hz

**Note:** Measurement conditions:



## 5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

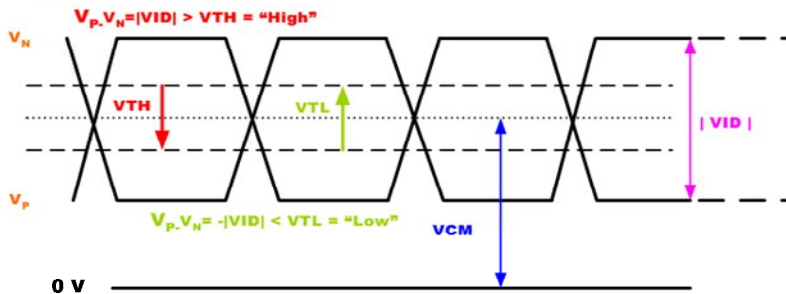
It is recommended to refer the specifications of SN75LVDS82DGG (Texas Instruments) in detail.

Each signal characteristics are as follows;

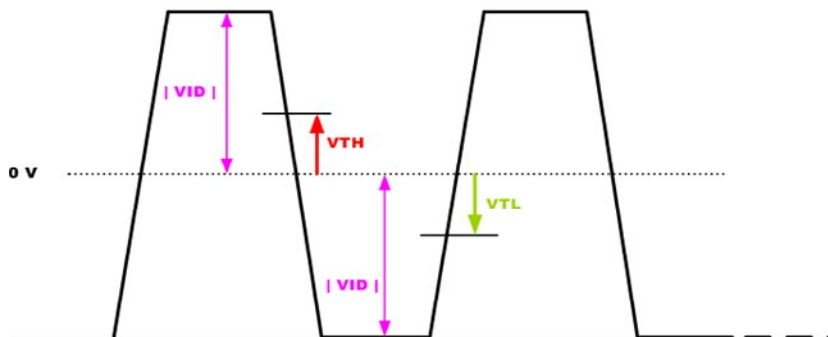
Symbol	Parameter	Min	Typ	Max	Units	Condition
$V_{TH}$	Differential Input High Threshold	-	-	+100	[mV]	$V_{CM} = 1.2V$ <b>Note</b>
$V_{TL}$	Differential Input Low Threshold	-100	-	-	[mV]	$V_{CM} = 1.2V$ <b>Note</b>
$ V_{ID} $	Input Differential Voltage	100	400	600	[mV]	<b>Note</b>
$V_{CM}$	Differential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

**Note:** LVDS Signal Waveform

### Single-end Signal



### Differential Signal





## 5.1.3 Backlight Unit

Parameter guideline for LED driving is under stable conditions at 25°C (Room Temperature)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Note
I <sub>RLED</sub>	LED Operation Current	-	100	-	[mA] Note 1	Operating with fixed driving current
V <sub>LB</sub>	Light Bar Operation Voltage (for reference)	-	31	34	[Volt] Note 2	
P <sub>BLU</sub>	BLU Power consumption (for reference)	-	12.4	13.6	[Watt]	
LT <sub>LED</sub>	LED life Time (Typical)	50,000	-	-	[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.

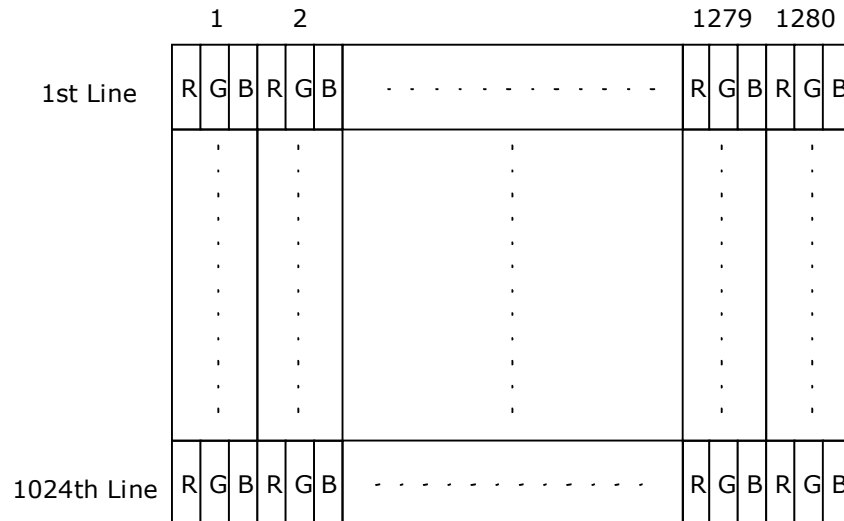
Note 3 : Definition of life time : brightness becomes 50% of its original value.

Note 4 : Each LED light bar consists of 40 pcs LED package ( 4 strings x 10 pcs / string ).

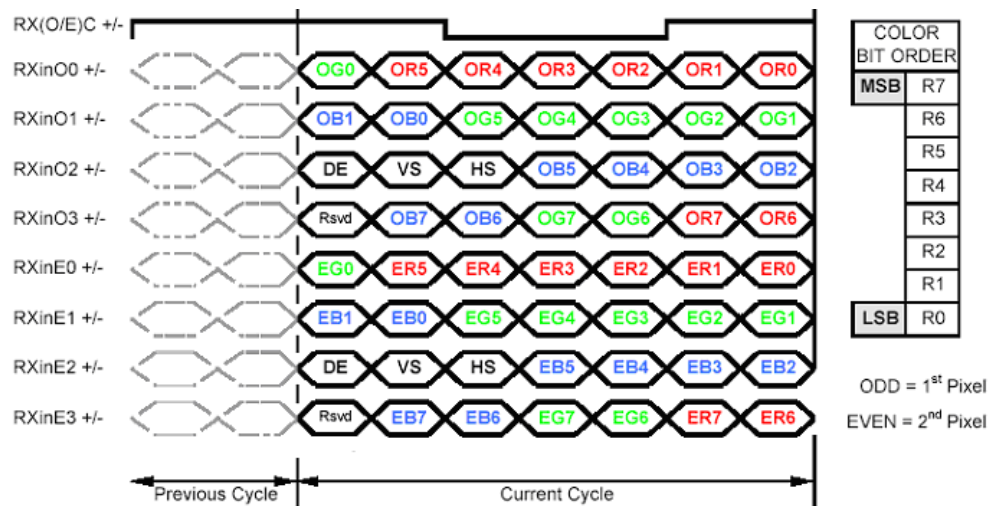
## 6. Signal Characteristic

### 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, VS, HS on EVEN channel are not used.

**Note2:** Please follow PSWG.

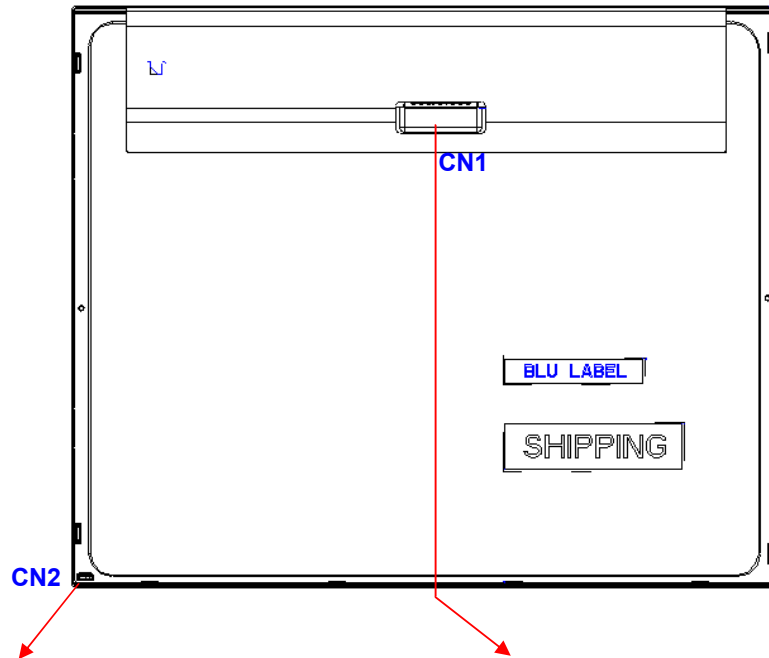
**Note3:** 8-bit in

## 6.3 Signal Description

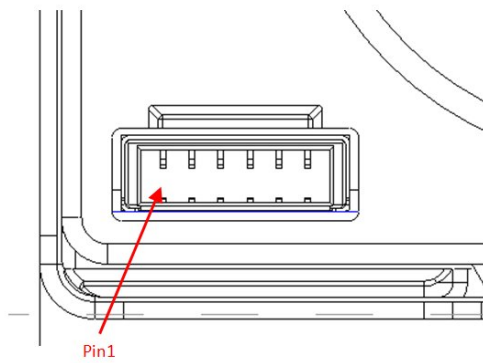
The module is using a pair of LVDS receiver SN75LVDS82DGG (Texas Instruments) or compatible. LVDS is a differential signal technology for LCD interface and high speed data transfer device. LVDS transmitter shall be SN75LVDS82DGG (negative edge sampling) or compatible. The first LVDS port (RxOxxx) transmits odd pixels while the second LVDS port (RxExxx) transmits even pixels.

### LVDS Connector Pin Assignment (CN1)

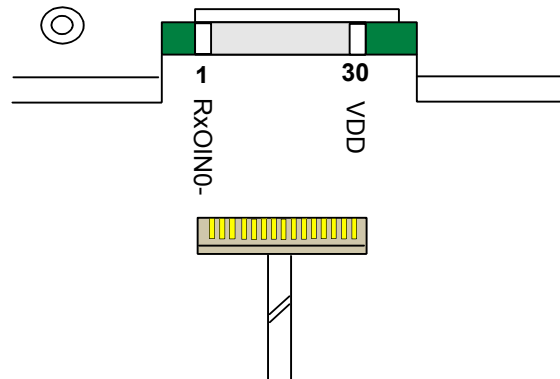
PIN #	SIGNAL NAME	DESCRIPTION
1	RxOIN0-	Negative LVDS differential data input (Odd data)
2	RxOIN0+	Positive LVDS differential data input (Odd data)
3	RxOIN1-	Negative LVDS differential data input (Odd data)
4	RxOIN1+	Positive LVDS differential data input (Odd data)
5	RxOIN2-	Negative LVDS differential 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 Ground
25	GND (AGMODE)	Power Ground (For AUO test Aging mode )
26	GND	Power Ground
27	GND	Power Ground
28	VDD	+5.0V Power Supply
29	VDD	+5.0V Power Supply
30	VDD	+5.0V Power Supply



**LED Driver Connector (CN2)**



**LVDS Connector (CN1)**





## 6.4 Timing Characteristics

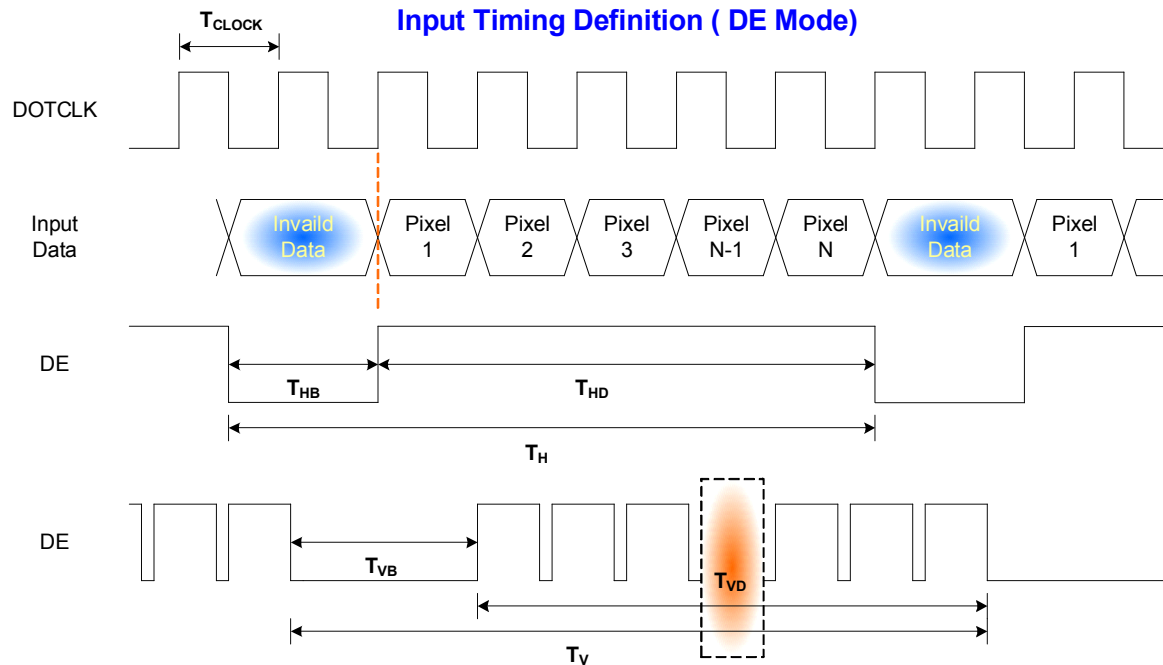
### 6.4.1 Timing Characteristics

Basically, interface timings described here is not actual input timing of LCD module but output timing of SN75LVDS82DGG (Texas Instruments) or equivalent.

Signal	Item	Symbol	Min	Typ	Max	Unit
Vertical Section	Period	$T_v$	1034	1066	1150	Th
	Active	$T_{disp(v)}$	1024	1024	1024	Th
	Blanking	$T_{bp(v)}+T_{fp(v)}+PW_{vs}$	10	42	126	Th
Horizontal Section	Period	$T_h$	750	844	2048	Tclk
	Active	$T_{disp(h)}$	640	640	640	Tclk
	Blanking	$T_{bp(h)}+T_{fp(h)}+PW_{hs}$	110	204	400	Tclk
Clock	Period	$T_{clk}$	25	18.52	11	ns
	Frequency	Freq	40	54	91	MHz
Frame rate	Frame rate	F	51	60	76	Hz

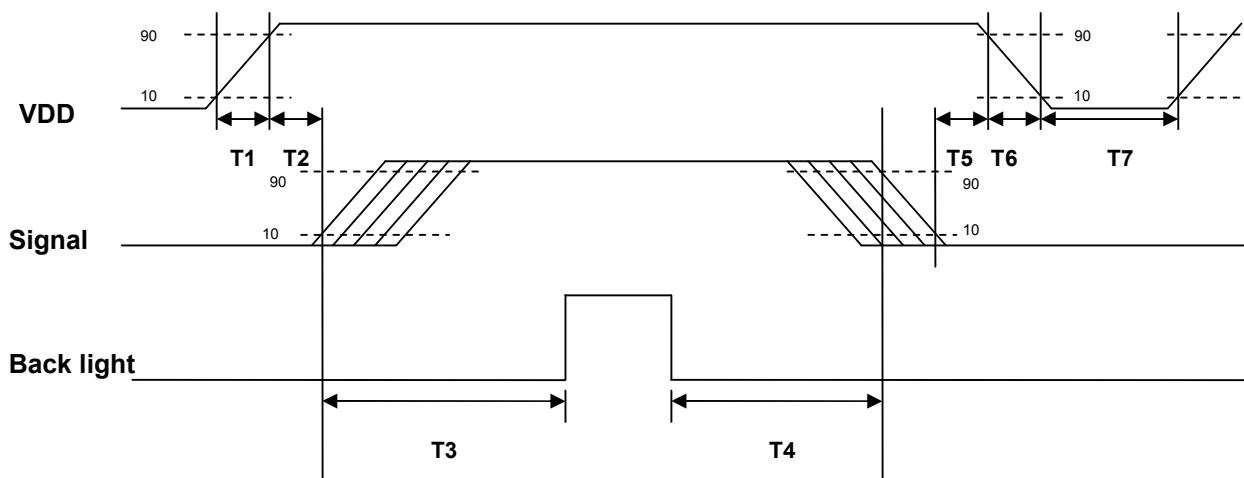
**Note** : DE mode only

### 6.4.2 Timing Diagram



## 6.5 Power ON/OFF Sequence

VDD power and LED on/off sequence is 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 Sequence Timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	110	-	-	[ms]
T5	0	16	50	[ms]
T6	-	-	10	[ms]
T7	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

#### 7.1.1 Connector

Connector Name / Designation	Interface Connector
Manufacturer	HRS
Type Part Number	MDF76URW-30S-1H(55)
Mating Housing Part Number	MDF76-30P-1C

#### 7.1.2 LVDS Pin Assignment (CN1)

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 (AGMODE)	26	GND
27	GND	28	VDD
29	VDD	30	VDD

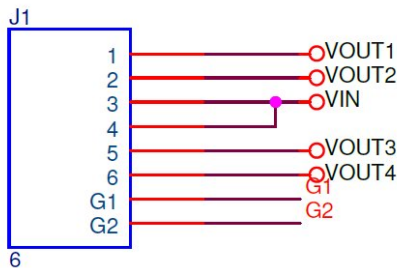
## 7.2 Backlight Unit

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

Connector Name / Designation	LED Connector
Manufacturer	E&T
Connector Model Number	3707K-S06N-00L

### 7.2.1 Pin Assignment (CN2)

Pin No.	Signal Name
1	VOUT1
2	VOUT2
3	VIN
4	VIN
5	VOUT3
6	VOUT4



## 8. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50□, 80%RH, 240hours	2
High Temperature Operation (HTO)	Ta= 85□, 240hours	2
Low Temperature Operation (LTO)	Ta= -30□, 240hours	2
High Temperature Storage (HTS)	Ta= 85□, 240hours	2
Low Temperature Storage (LTS)	Ta= -30□, 240hours	2
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Random Frequency: 10 – 200 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 20 ms Direction: ±X, ±Y, ±Z (one time for each Axis)	
Thermal Shock Test (TST)	-20□/30min, 60□/30min, 50 cycles	
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD	Contact Discharge: ± 8KV, 150pF(330Ω ) 1sec, 8 points, 25 times/ point.	1
	Air Discharge: ± 15KV, 150pF(330Ω ) 1sec 8 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.

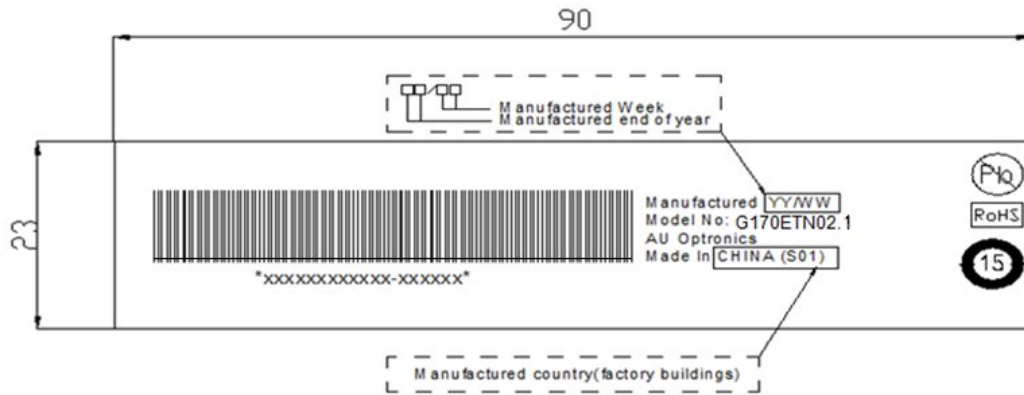
Note2:

- 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. Mura shall be ignored after high temperature reliability test.

## 9. Label and Packaging

### 9.1 Shipping Label

The shipping label format is shown as below.



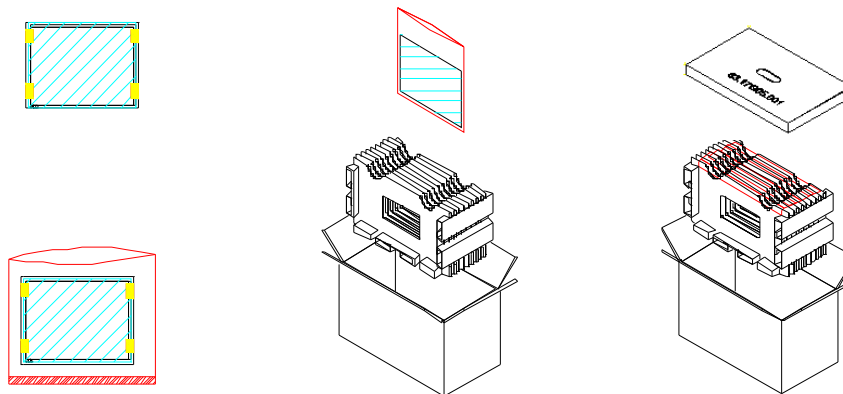
### 9.2 Carton Package

Max capacity : 8 TFT-LCD module per carton

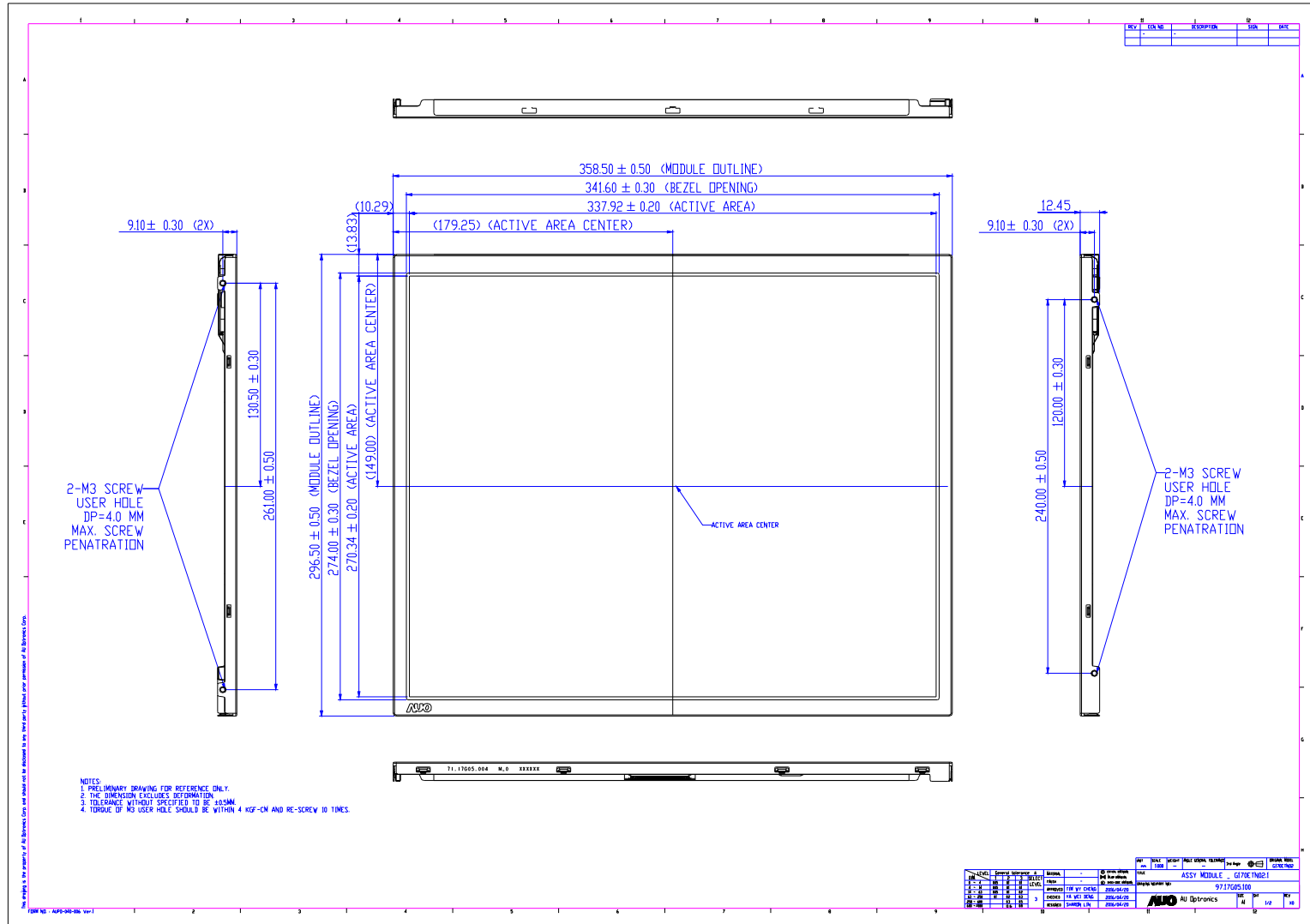
Max weight: 13.5 kg per carton

Outside dimension of carton:448(L)mm\*283(W)mm\*397(H)mm

Pallet size : 1150 mm \*910 mm \* 138mm



## 10. Mechanical Characteristics

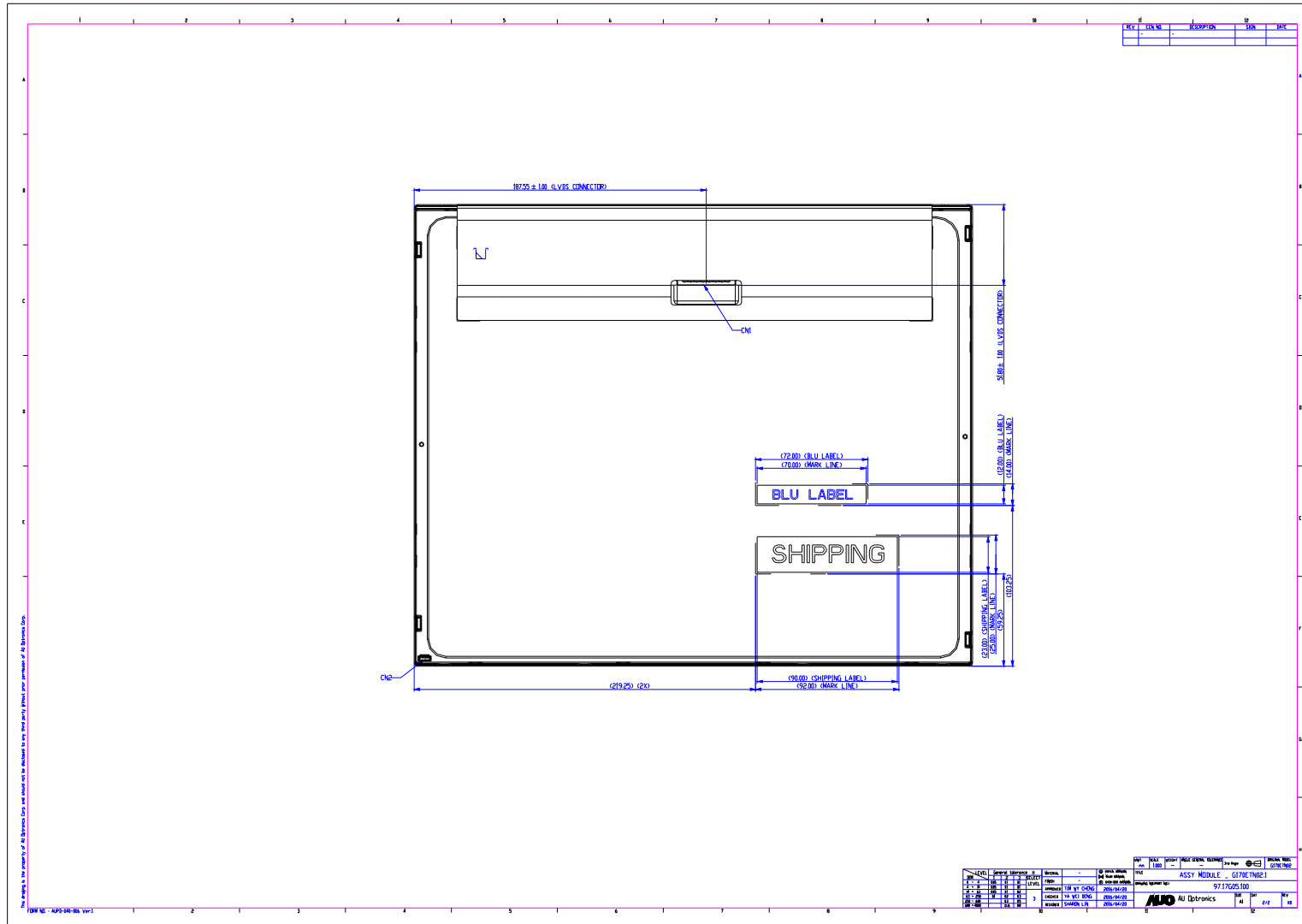




# Product Specification

AU OPTRONICS CORPORATION

G170ETN02.1







# Product Specification

DB-LB0B

☒ Preliminary Specifications

☐ Final Specifications

Product	LED Driver Board
Model Name	DB-LD0B
Document Version	Rev.0

Customer

\_\_\_\_\_


Approved by

Date

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Notice: This Specification is subject to change without notice.

Approved By	Prepared By
	Frank



# Product Specification

DB-LB0B

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# Product Specification

DB-LB0B

Revised Record				
Version	Date	Revised Content/Summary	Page	Remark
01	2018/03/29	First Edition	All	



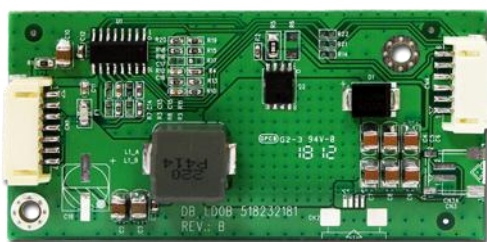
# Product Specification

DB-LB0B

## 1.General Description

This is a high efficiency LED backlight driver board which is capable to driving up to 4 channels of LED strings. This board provides the user with OVP/OTP and OCP features.

This Product Specification is made to be the standard of Taiwan Screen manufactured LED Driving Board such a standard will be followed in Taiwan Screen production, shipment, and quality inspection.



## 2.Electrical Characteristics

Parameter		Min.	Typ.	Max.	Unit
<b>Input Voltage</b>	<b>Vin</b>	<b>10.8</b>	<b>12.0</b>	<b>15</b>	<b>V</b>
Input Current	Iin	-----	3	-----	A
Output Voltage	Vout	-----	-----	61	V
Efficiency	Eff.	-----	80	-----	%
Output Current	Io	-----	800	-----	mA
LED ON/OFF	Von	2.5	-----	5.0	V
	Voff	0	-----	0.5	
Dimming	PWM Level	2.5	-----	5.0	V
	Duty Ratio	0	-----	100	%
	Frequency	0.1	-----	20	KHz

“ \* “

“ \* “

“ \* “ Depend on panel type.



# Product Specification

DB-LB0B

## 3.Interface Characteristics

### 3.1 Input Connector :

Location CN1 – 7 pin wafer, PH=2.0mm R/A, STM MS24017R or equiv.

Pin Assign and Definition

Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
1	+12 V	4	GND	7	ADJ
2	+12 V	5	ON/OFF		
3	GND	6	NC		

### 3.2 Output Connector

Location CN4 –6 pin wafer, PH=2.0mm R/A, STM MS24016R or equiv

Pin Assign and Definition

Pin No.	Symbol	Pin No.	Symbol
1	IRLED	4	VLED+
2	IRLED	5	IRLED
3	VLED+	6	IRLED

Location CN3 –2 pin wafer, PH=2.0mm R/A, STM MS24012R or CP0502P1ML0 or equiv

Pin Assign and Definition

Pin No.	Symbol
1	VLED+
2	IRLED

Location CN2 –4 pin FPC wafer or equiv

Pin Assign and Definition

Pin No.	Symbol	Pin No.	Symbol
1	VLED+	3	IRLED
2	VLED+	4	IRLED

## 4. Mechanical Characteristics

Dimension: 84(L) \*40.8(W) \*8.5(H) mm

Weight: MAX. 20g

