

**Display Elektronik GmbH**

**DATA SHEET**

**TFT MODULE**

**DEM 19201080B VM-PW-N**

**21,5" TFT**

**Product Specification**

**Ver.: 0**

**18.08.2020**

Revise Records

Rev.	Date	Contents	Written	Approved
0	18.08.2020	Preliminary Specification	J	MH

Special Notes

Note1.	
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## 1. General Description and Features

DEM 19201080B VM-PW-N is a transmissive type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module, a receiver circuit, and a back-light unit. Graphics and texts can be displayed on a FHD 1920 (H) x 3 x 1080 (V) dots (16:9 aspect ratio) with 16.7M colors by supplying 24 bits data signal (8 bits each color). The following table described the features of DEM 19201080B VM-PW-N.

### 1.1 Features

- Dual Channel LVDS Interface.

### 1.2 LCD Module

Item	Specification	Unit
Screen Size	21.5 Inches	Diagonal
Display Resolution	1920 x R.G.B. x 1080	Pixel
Active Area	476.64 x 268.11	mm
Outline Dimension	495.60 x 292.20 x 11.60	mm
Display Mode	Normally Black / VA Mode	--
Surface Treatment	Anti-Glare, 3H	--
Pixel Arrangement	R,G,B Vertical Stripe	--
Pixel Pitch	0.24825 x 0.24825	mm
Display Color	16.7 Million	--
Viewing Direction	Free	--
Input Interface	LVDS	--

## 2. Mechanical Information

Item	Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal	--	495.60	--	mm (1)
	Vertical	--	292.20	--	
	Thickness	--	11.60	--	
Weight	--	1670	--	g	--

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

3. Electrical Specifications

3.1 Absolute Max. Ratings

3.1.1 Absolute Ratings of Environment

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

Item	Symbol	Min.	Max.	Unit	Note
Storage Temperature	T <sub>STG</sub>	-20	+60	°C	(1)
Operating Temperature	T <sub>OPR</sub>	0	+50	°C	(1)

Note (1) :

1. 90% RH Max ( Ta ≤ 39°C )
2. Max wet-bulb temperature at 39°C or less. ( Ta ≤ 39°C )
3. No condensation

3.2 Electrical Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	VDD	GND-0.3	6	V	

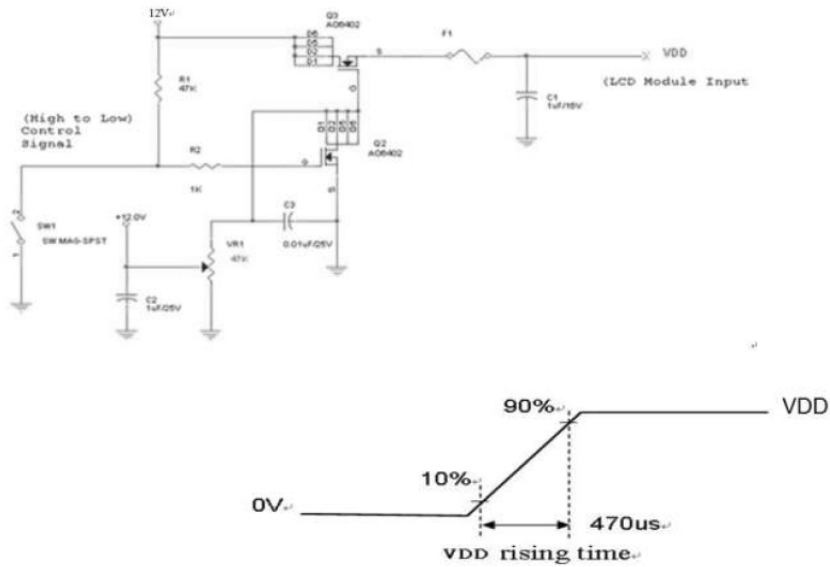
3.2.1 DC Electrical Characteristics of the TFT LCD

(Ta=25±2°C, GND=0)

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power Supply Voltage	VDD	4.5	5.0	5.5	V	-
Input Voltage for logic	Differential Input High Threshold VTH	-	-	+100	mV	-
	Differential Input Low Threshold VTL	-100	-	-	mV	-
Power Supply Current (RMS)	Black Pattern IDD	-	0.62	0.74	A	VDD=5V ,Fv=60HZ
		-	0.7	0.84	A	VDD=5V ,Fv=75HZ
Power Consumption	PDD	-	3.1	3.7	W	VDD=5V ,Fv=60HZ
		-	3.5	4.2	W	VDD=5V ,Fv=75HZ
Inrush Current	Inrush	-	-	3.0	A	Note(1)

Note (1) Inrush Current measurement

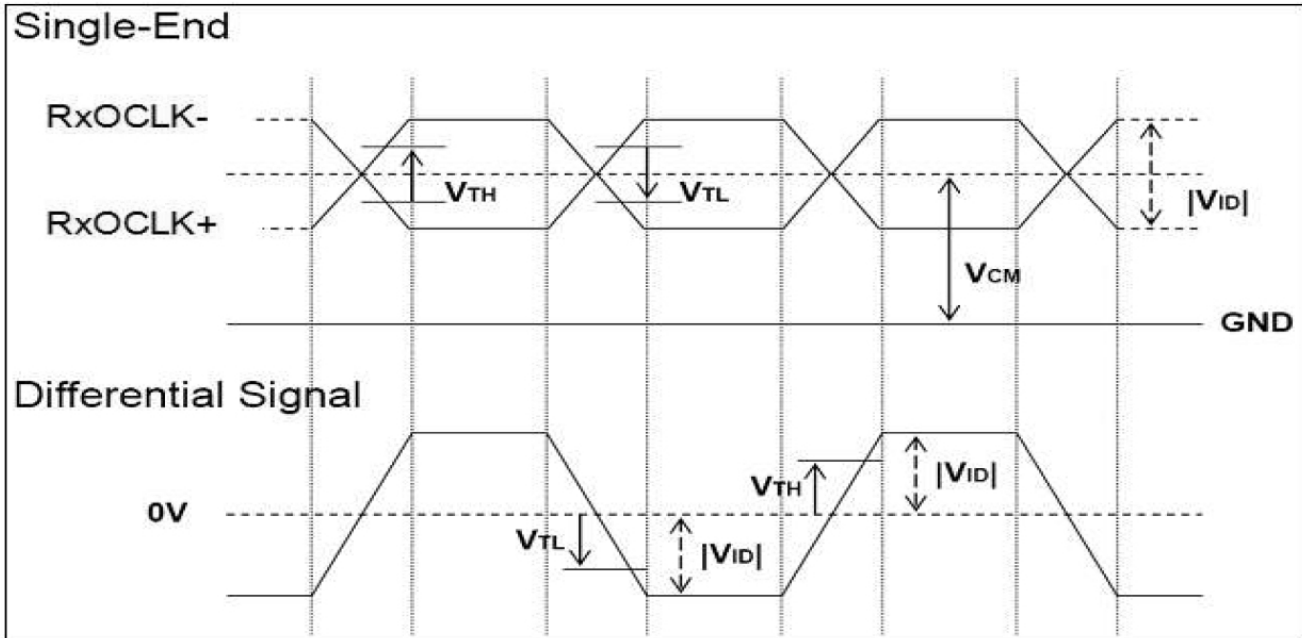
Test Circuit



The duration of VDD rising time: 470us.

LVDS Signal Waveform:

Use RxOCLK- & RxOCLK+ as example.



Parameter		Symbol	Values			Unit	notes		
			Min	Typ	Max				
LED Driver :									
Power Supply Input Voltage		VBL	10.8	12.0	13.2	Vdc	1		
Power Supply Input Current		IBL	-	3,17	-	A	1		
Power Supply Input Current (In-Rush)		In-rush	-	-	(TBD)	A	VBL = 12,0V ExtV <sub>BR-B</sub> = 100% 3		
Power Consumption		PBL	-	38	-	W	1		
Input Voltage for Control System Signals	On/Off	On	V on	2.5	-	5.5	Vdc	On Duty 5	
		Off	V off	-0.3	0.0	0.5	Vdc		
	Brightness Adjust	ExtV <sub>BR-B</sub>			30	-	100		%
					30	-	100		%
	ExtV <sub>BR-B</sub> Frequency	f <sub>PWM</sub>			500	-	1500		Hz
	Pulse Duty Level (PWM)	High Level			2.5	-	5.5		Vdc
Low Level				0.0	-	0.5	Vdc		
LED :									
Life Time				30,000	50,000	Hrs	2		

notes :

1. Electrical characteristics are determined after the unit has been 'ON' and stable for approximately 60 minutes at  $25 \pm 2^\circ\text{C}$ . The specified current and power consumption are under the typical supply Input voltage 24V and VBR (ExtV<sub>BR-B</sub> : 100%), it is total power consumption.
2. The life time (MTTF) is determined as the time which luminance of the LED is 50% compared to that of initial value at the typical LED current (ExtV<sub>BR-B</sub> : 100%) on condition of continuous operating in LCM state at  $25 \pm 2^\circ\text{C}$ .
3. The duration of rush current is about 200ms. This duration is applied to LED on time.
4. Even though inrush current is over the specified value, there is no problem if I<sup>2</sup>T spec of fuse is satisfied. ExtV<sub>BR-B</sub> signal have to input available duty range and sequence.
5. After Driver ON signal is applied, ExtV<sub>BR-B</sub> should be sustained from 30% to 100% more than 500ms. After that, ExtV<sub>BR-B</sub> 30% and 100% is possible

## 3.2.3 Input Timing Condition

It only support DE mode, and the input timing are shown as the following table.

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
Tv	Vertical Section	Period	1092	1130	1818	Th	
Tdisp (v)		Active	1080	1080	1080	Th	
Tblk (v)		Blanking	12	50	738	Th	
Fv		Frequency	50	60	76	Hz	
Th	Horizontal Section	Period	1034	1050	1100	Tclk	
Tdisp (h)		Active	960	960	960	Tclk	
Tblk (h)		Blanking	74	90	140	Tclk	
Fh		Frequency	55	68	91	KHz	<b>Note 3-3</b>
Tclk	LVDS Clock	Period	10.6	14.0	17.7	ns	1/Fclk
Fclk		Frequency	56.5	71.2	94.0	MHz	<b>Note 3-4</b>

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

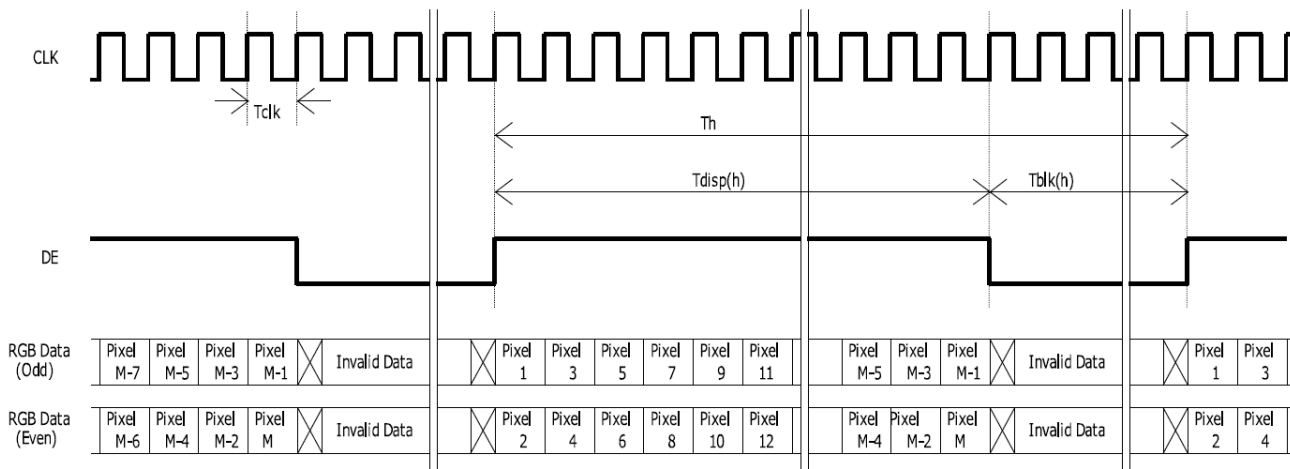
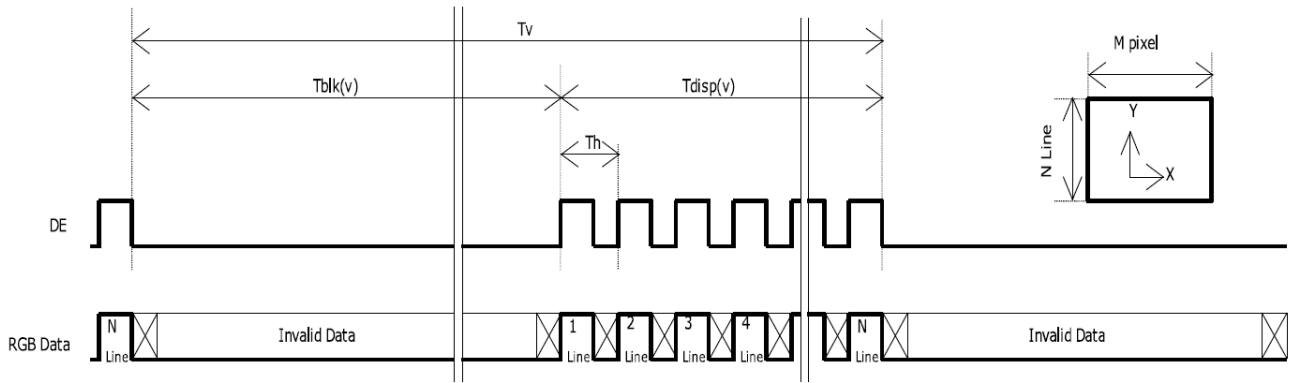
$$\begin{aligned} Fh (\text{Min.}) &= Fclk (\text{Min.}) / Th (\text{Min.}); \\ Fh (\text{Typ.}) &= Fclk (\text{Typ.}) / Th (\text{Typ.}); \\ Fh (\text{Max.}) &= Fclk (\text{Max.}) / Th (\text{Min.}); \end{aligned}$$

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

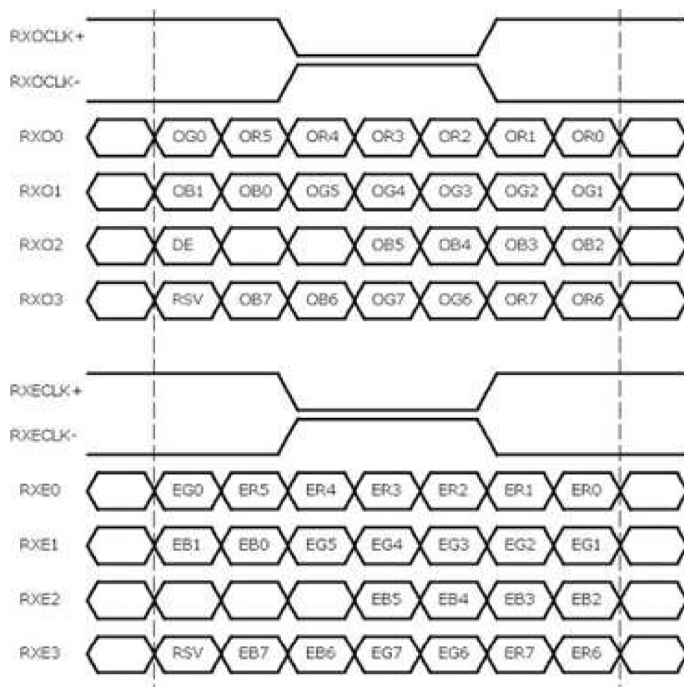
$$\begin{aligned} Fclk (\text{Min.}) &= Fv (\text{Min.}) \times Th (\text{Min.}) \times Tv (\text{Min.}); \\ Fclk (\text{Typ.}) &= Fv (\text{Typ.}) \times Th (\text{Typ.}) \times Tv (\text{Typ.}); \\ Fclk (\text{Max.}) &= Fv (\text{Max.}) \times Th (\text{Typ.}) \times Tv (\text{Typ.}); \end{aligned}$$



Input Timing Diagram



LVDS Data Format

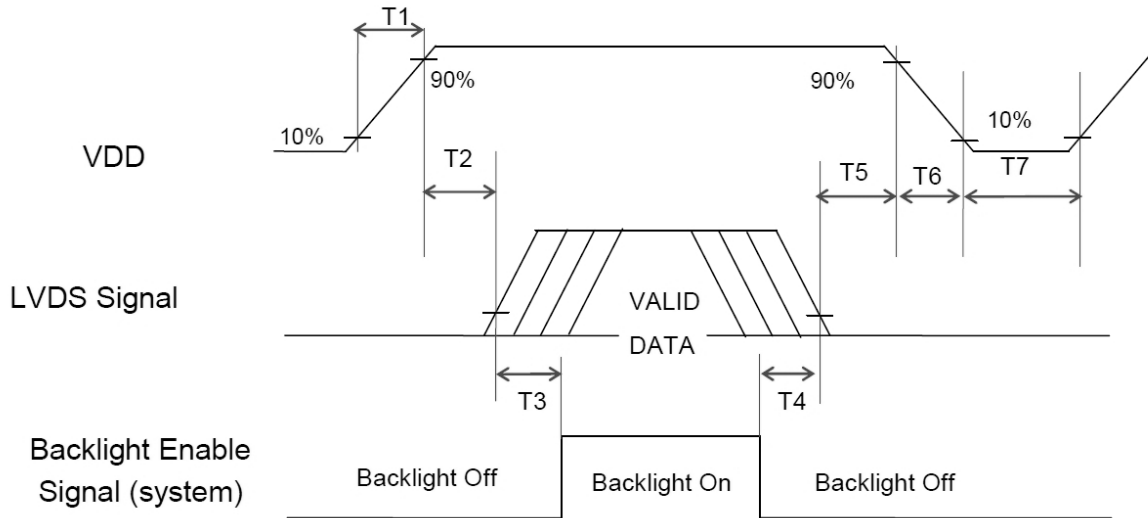


8 Bit Color Bit Order			
MSB	R7	G7	B7
	R6	G6	B6
	R5	G5	B5
	R4	G4	B4
	R3	G3	B3
	R2	G2	B2
	R1	G1	B1
LSB	R0	G0	B0

- a. O = "Odd Pixel Data" E = "Even Pixel Data"
- b. Refer to 3.4.1 LCD pixel format, the 1st data is 1 (Odd Pixel Data), the 2<sup>nd</sup> data is 2 (Even Pixel Data) and the last data is 1920 (Even Pixel Data).

3.2.4 Power On/OFF Sequence

VDD power, LVDS signal and backlight on/off sequence are as following. LVDS signals from any system shall be Hi-Z state when VDD is off.



Power Sequence Timing

Symbol	Value			Unit	Remark
	Min.	Typ.	Max.		
T1	0.5	-	10	[ms]	
T2	0	-	50	[ms]	
T3	500	-	-	[ms]	
T4	100	-	-	[ms]	
T5	0		50	[ms]	<b>Note 3-5</b> <b>Note 3-6</b>
T6	0	-	100	[ms]	<b>Note 3-6</b>
T7	1000	-	-	[ms]	

**Note 3-5 :** Recommend setting T5 = 0ms to avoid electronic noise when VDD is off.

**Note 3-6 :** During T5 and T6 period , please keep the level of input LVDS signals with Hi-Z state.

4. Optical Characteristics

4.1 Optical characteristic of the LCD

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods.

Measuring equipment: BM-7A

Ta=25°C ± 2°C; Ha=50%RH ± 10%RH

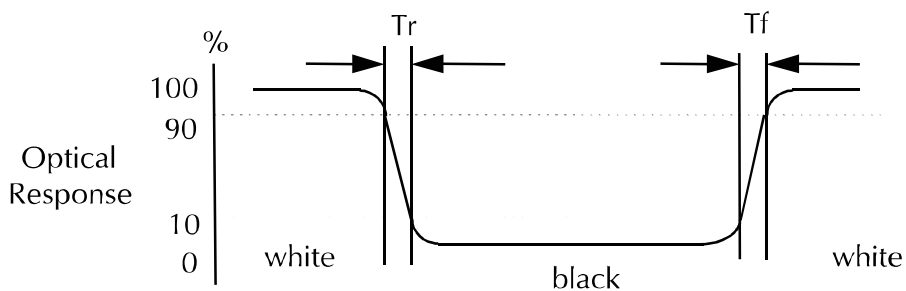
Item	Symbol	Condition	Min	Type	Max	Unit	Note	
Brightness	B		850	1000	--	cd/m <sup>2</sup>		
Response Time	Tr+Tf	θ=0°	--	18	36	ms		
Contrast Ratio	CR	At optimized viewing angle	2000	3000	--	--		
Luminance Uniformity	ΔL		75	80	--	%		
Color Chromaticity (CIE 1931)	Red	x	θ=0° Normal Viewing Angle	0.622	0.652	0.682	-	BM-7A
		y		0.305	0.335	0.365	-	
	Green	x		0.291	0.321	0.351	-	
		y		0.595	0.625	0.655	-	
	Blue	x		0.123	0.153	0.183	-	
		y		0.037	0.067	0.097	-	
	White	x		0.283	0.313	0.343	-	
		y		0.299	0.329	0.359	-	
Viewing Angle	Hor.	θ <sub>R</sub>	CR≥10	75	89	--	Degree	
		θ <sub>L</sub>		75	89	--		
	Ver.	θ <sub>U</sub>		75	89	--		
		θ <sub>D</sub>		75	89	--		

a. Test equipment setup

After stabilizing and leaving the panel alone shall be warmed up for the stable operation of LCM, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7A(fast) with a viewing angle of 2° at a distance of 50cm and normal direction.

b. Definition of response time: Tr and Tf

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

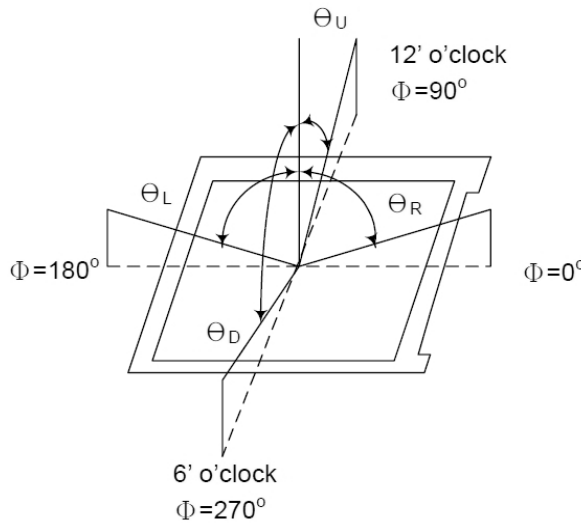


c. Definition of contrast ratio:

$$\text{Contrast Ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$

d. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

e. View Angle

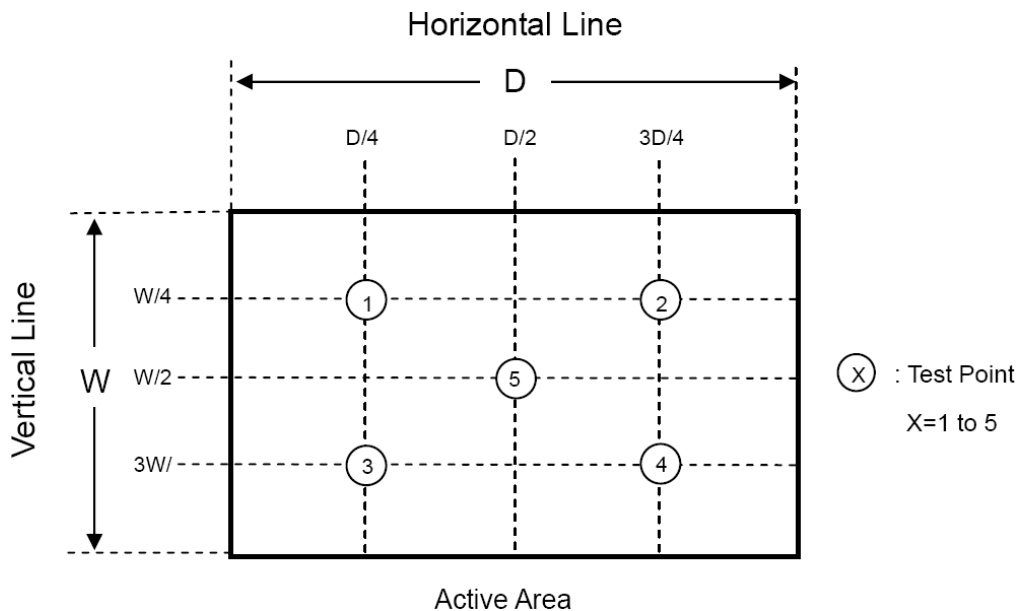


f. Definition of Luminance of White: Luminance of white at the center points

Light Source of Back-Light Unit	LED Type
---------------------------------	----------

g. Definition of White Uniformity

$$\text{White Uniformity} = \frac{\text{Min. luminance of white among 5-points}}{\text{Max. luminance of white among 5-points}} \times 100\%$$



## 5. I/O Terminal

### 5.1 Pin Assignment

(CN1 connector: STM MSAKT2407P30\_HB or equivalent.

Mating connector: JAE FI-X30HL or equivalent.)

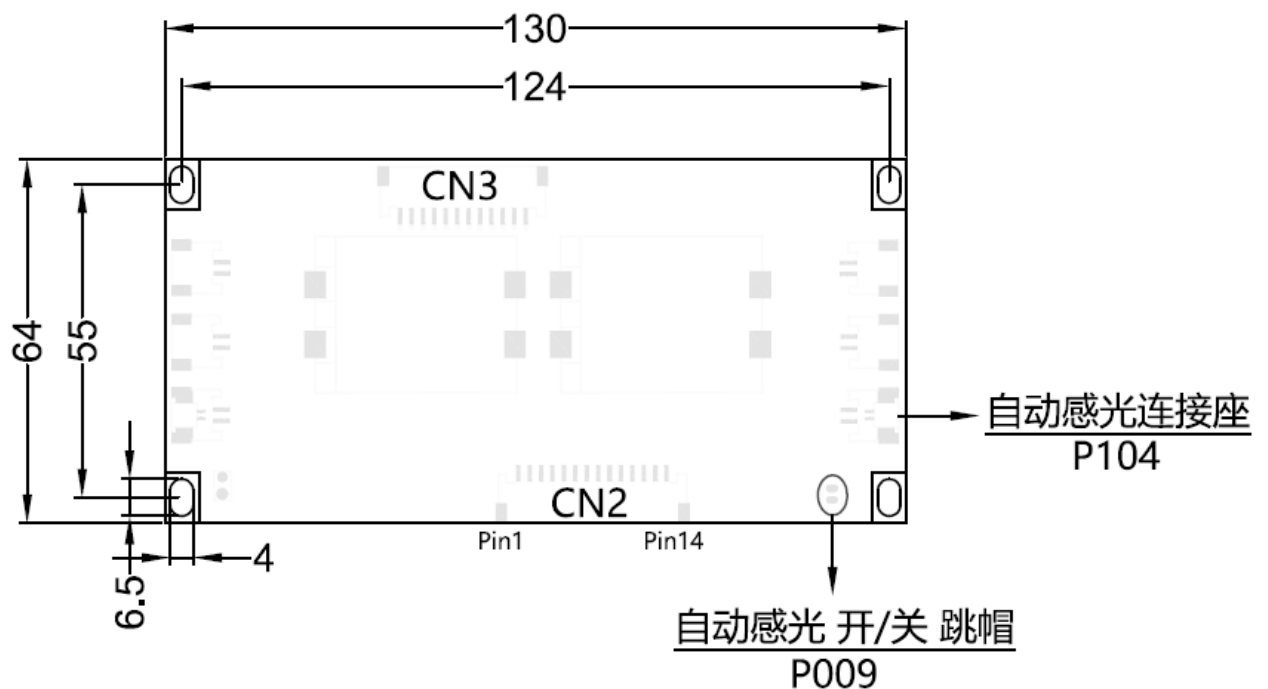
Pin No.	Symbol	I/O	Function	Remark
1	RxO0-	I	Negative LVDS differential data input (Odd Data)	
2	RxO0+	I	Positive LVDS differential data input (Odd Data)	
3	RxO1-	I	Negative LVDS differential data input (Odd Data)	
4	RxO1+	I	Positive LVDS differential data input (Odd Data)	
5	RxO2-	I	Negative LVDS differential data input (Odd Data)	
6	RxO2+	I	Positive LVDS differential data input (Odd Data)	
7	GND	P	Ground	
8	RxOCLK-	I	Negative LVDS differential clock input (Odd Data)	
9	RxOCLK+	I	Positive LVDS differential clock input (Odd Data)	
10	RxO3-	I	Negative LVDS differential data input (Odd Data)	
11	RxO3+	I	Positive LVDS differential data input (Odd Data)	
12	RxE0-	I	Negative LVDS differential data input (Even Data)	
13	RxE0+	I	Positive LVDS differential data input (Even Data)	
14	GND	P	Ground	
15	RxE1-	I	Negative LVDS differential data input (Even Data)	
16	RxE1+	I	Positive LVDS differential data input (Even Data)	
17	GND	P	Ground	
18	RxE2-	I	Negative LVDS differential data input (Even Data)	
19	RxE2+	I	Positive LVDS differential data input (Even Data)	
20	RxECLK-	I	Negative LVDS differential clock input (Even Data)	
21	RxECLK+	I	Positive LVDS differential clock input (Even Data)	
22	RxE3-	I	Negative LVDS differential data input (Even Data)	
23	RxE3+	I	Positive LVDS differential data input (Even Data)	
24	GND	P	Ground	
25	NC	-	No Connection	
26	NC	-	No Connection	
27	NC	-	No Connection	
28	VDD	P	Power for LCD	
29	VDD	P	Power for LCD	
30	VDD	P	Power for LCD	

I: Input, O: Output, P: Power

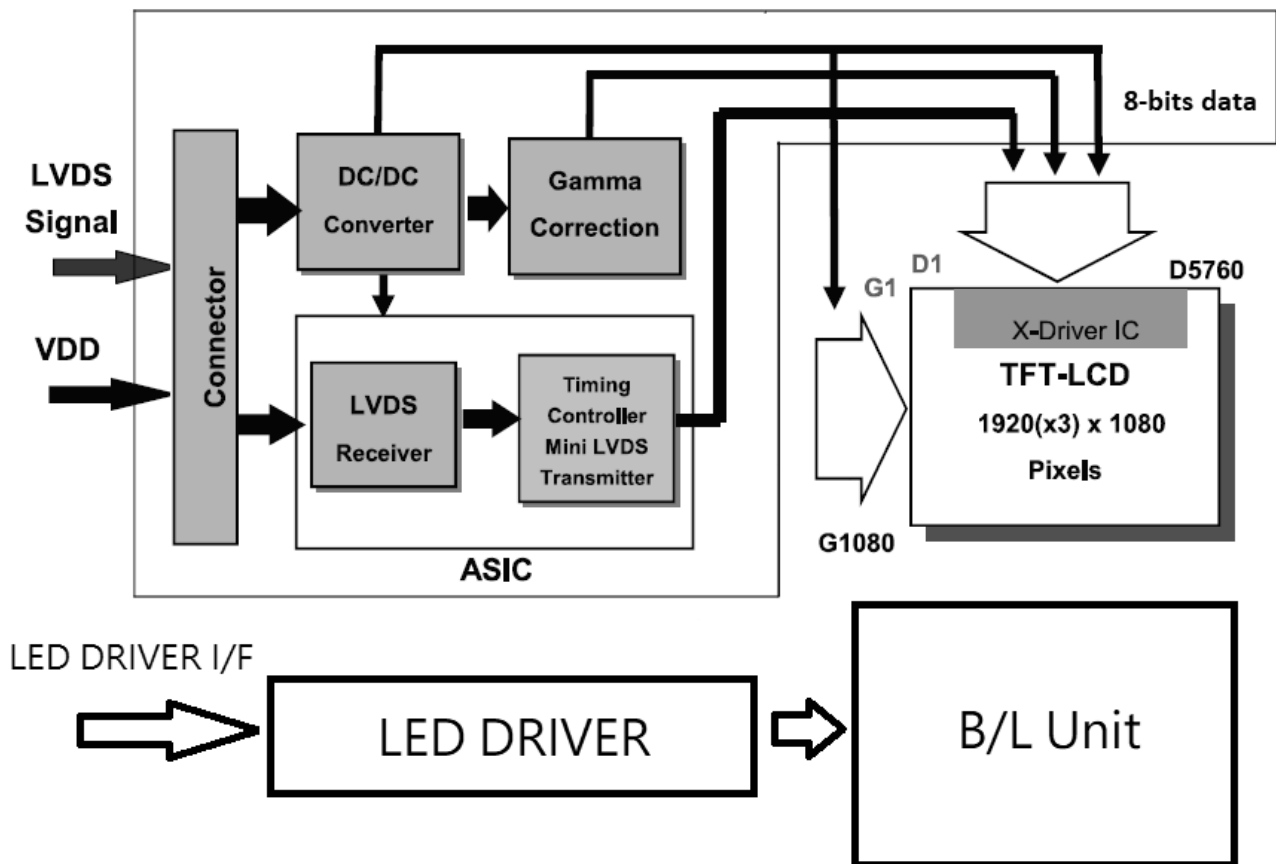
**5.2 Backlight:**

(CN2 connector: PH2.0-14 (2.0mmX14) or equivalent.)

Pin No.	Symbol	I/O	Function	Remark
1	VCC	P	Power Supply Voltage	
2	VCC	P	Power Supply Voltage	
3	VCC	P	Power Supply Voltage	
4	VCC	P	Power Supply Voltage	
5	VCC	P	Power Supply Voltage	
6	GND	P	Ground	
7	GND	P	Ground	
8	GND	P	Ground	
9	GND	P	Ground	
10	GND	P	Ground	
11	NC	-	No Connection	
12	ON/OFF	I	B/L ON-OFF	
13	DIM	I	PWM Dimming	
14	NC	-	No Connection	



5.3 Block Diagram



6. Displayed Color and Input Data

	Color & Gray Scale	Data Signal																							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	Red(127)	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0		
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	Green(127)	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0		
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0		
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	Blue(127)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1		
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1		

0 : Low level voltage, 1 :High level voltage

Each basic color can be displayed in 256 gray scales from 8 bit data signals. With the combination of total 24 bit data signals, the 16.7M color display can be achieved on the screen.



**Reliability Condition**

No change on display and in operation under the following test condition.

Condition: Unless otherwise specified, tests will be conducted under the following condition.

Temperature: 20°C ± 5°C.

Humidity: 50%RH ± 10%RH.

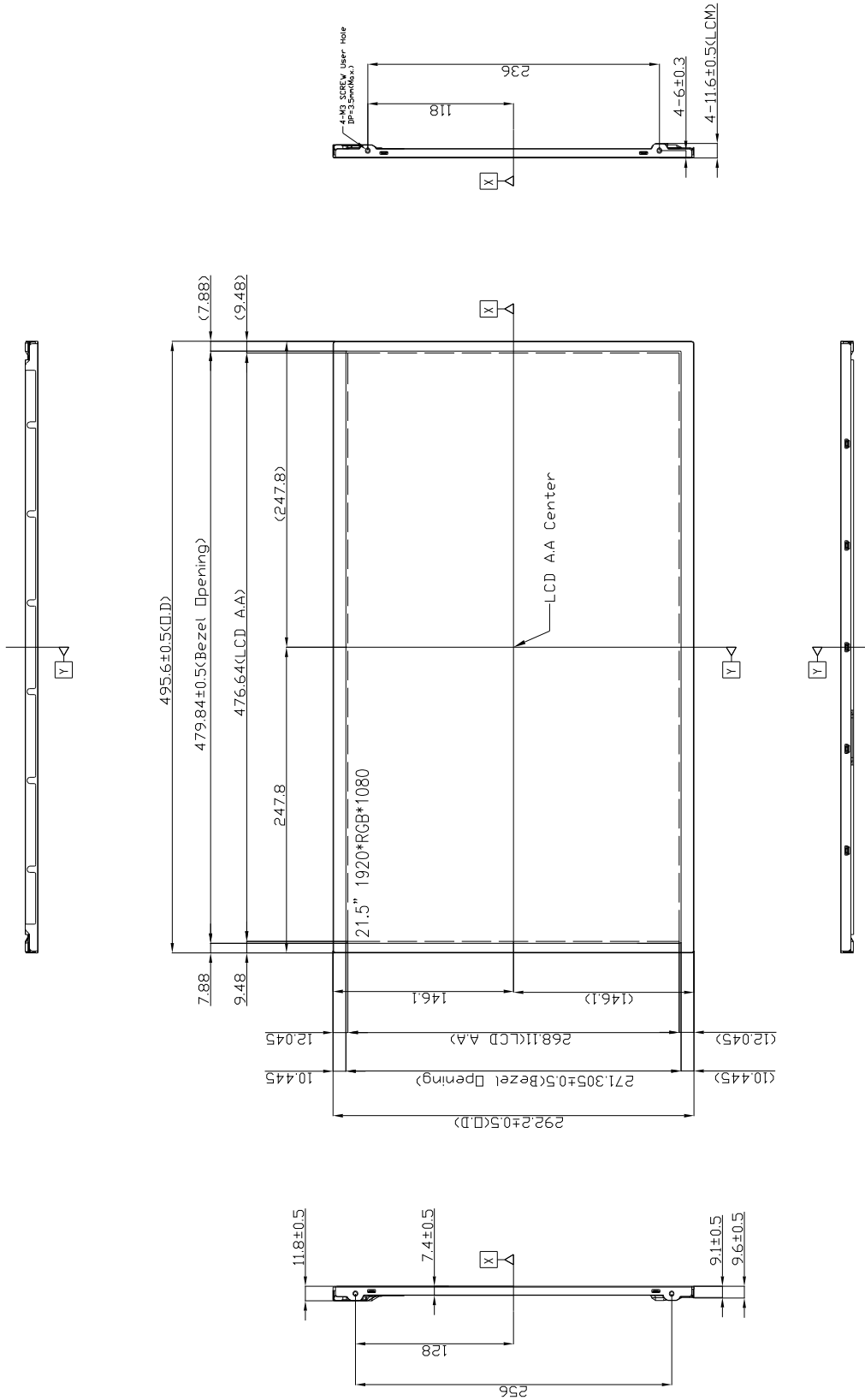
Tests will be not conducted under functioning state.

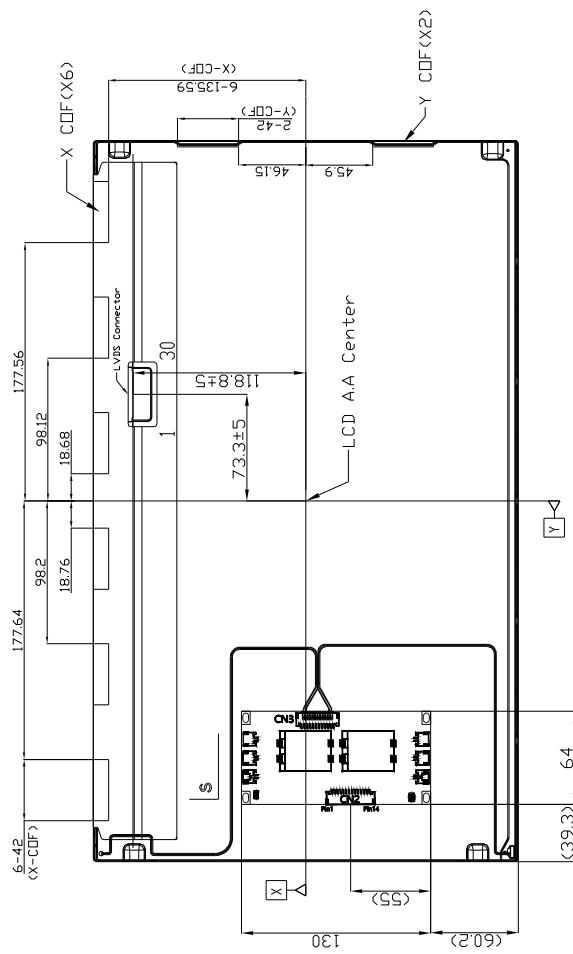
No.	Parameter	Condition	Notes
1	High Temperature Operating	+70°C, 240hrs (Operation state).	-
2	Low Temperature Operating	-20°C, 240hrs (Operation state).	1
3	High Temperature Storage	+70°C, 240hrs.	2
4	Low Temperature Storage	-20°C, 240hrs.	1,2
5	High Temperature and High Humidity Operation Test	+50°C, 50%RH, 240hrs.	1,2
6	Thermal Shock	-20°C/30 min ~ +70°C/30 min for a total 20 cycles, Start with cold temperature and end with high temperature.	1,2

Notes: 1. No dew condensation to be observed.

2. The function test shall be conducted after 24 hours storage at the normal temperature and humidity after removed from the test chamber.

7. Dimensional Outlines





Note:

1. General tolerance : +/- 0.5mm.
2. LVDS connector : P-TW AL230F-A0G1D-P or equivalent.  
Mating connector : JAE FI-X30HL(Locked Type) or equivalent.
3. LED backlight connector (CN2) : PH2.0-14(2.0mmX14) or equivalent.
4. Torque of M3 user hole should be within 4 kgf-cm and re-screw 10 times

**8. Incoming Inspection Standards**

**8.1 Inspection environment conditions:**

1. Room temperature: 20°C ~ 25°C.
2. Humidity: 65%RH ± 5%RH.
3. Illumination: Fluorescent light (Day-Light Type) display surface illumination to be 300~ 700 Lux. (standard 500Lux.)
4. To be a distance about 35cm ± 5 cm in front of LCD unit, viewing line should be perpendicular to the surface of the module judge the visual appearance with human's eyes (+-30° viewing edge will allowed).
5. Take off the protector of polarizer while judging the display area.
6. If there is any question while judging, check the panel again while operating.

**8.2 Inspection sampling method:**

Unless otherwise agree in writing, the method of incoming inspection shall be based on MIL-STD-105E.

1. Lot size: Quantity per shipment lot per model.
2. Sampling type: Normal inspection, single sampling.
3. Sampling level: Level II.
4. Acceptable quality level (AQL):
  - Major defect: AQL=1.0%
  - Minor defect: AQL=2.5%

**8.3 Electrical inspection specification**

	Inspection Item	Specification	
1	Line / Block defect	Can't be seen.	
2	Bright dots	≤ 2 dots (Note1, 4)	
3	Dark dots	≤ 5 dots	
4	Total dots defect	≤ 5 dots	
5	Adjacent dot defect (Note 1, 2, 3)	Two continuous bright dots (vertical, horizontal, oblique):	≤ 1 pair
		Three or more continuous bright dots (vertical, horizontal, oblique):	Not allow
		Two continuous dark dots (vertical, horizontal, oblique):	≤ 2 pair
		Three or more continuous dark dots (vertical, horizontal, oblique):	≤ 1 pair
		Distance between 2 Bright dots:	Not allow
		Distance between 2 Dark dots:	≥ 15 mm
6	Display Non-uniformity (Mura)	Distance between Bright and Dark dot:	Not allow
		Use 2%ND Filter or equivalent samples if necessary(Note 5 & 6)	

Note 1: For bright dot defect, bright area should be larger than 1/2 area of a sub-pixel to be count as 1 dot defect. A dot defect that is smaller than the defined dot defect will be treated as small bright dot.

The drawing of 1/2 area sub-pixel definition: The 1/2 area sub-pixel can be defined as below one or more of specific shapes (Fig.1).



Fig.1



Fig.2

All bright dot defects should not be noticeable by observer under specified inspection environment (Please refer to item 5).

Note 2: (Fig.2) Adjacent-dot defect (refer to picture, dot 1,2,...,8 around A are all A's adjacent dots) should be inspected under the same display pattern in any one of White /Black /Red /Green /Blue /Monotone Gray pattern.

Note 3: Adjacent-dot defect should be observed under any one of White /Black /Red /Green /Blue pattern. 1 pair of bright dots equals 2 dots. Inspection patterns: Standard inspection patterns of dot defect are listed below. AUO uses these patterns as standard criteria for judging dot defect. Please inform AUO if any other pattern is to be used to examine dot defect.

Test Pattern	
Full Black	For bright dot(s)
Full White	For dark dot(s)
Monotone Red /Green /Blue	For bright and dark dot(s)

Note 4: The judgment criteria of particle occurred bright dot is the same as bright dot judgment criteria.

Note 5: The display uniformity (general mura) symptoms will use 2% ND Filter. That is, the definition of Not Noticeable means the symptom can be covered by 2% ND Filter. Movable mura should be ignored if the mura disappear after lightly patting on the mura area. And the weak line defect can be counted as mura which can be invisible while 2% ND filter applied.

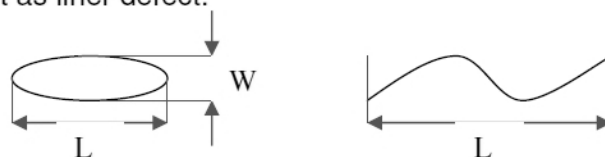
Note 6: The inspection method of ND Filter - holding ND filter in front of the panel around 1 cm and examine the panel from 35±5 cm in the front view for 3 seconds.

8.4 Appearance inspection specification

Judge area	Judge item		Inspection specification		Judge criterion	
					Major	Minor
Active Area (Note 4)	Particles, scratch and bubbles in display area (include bright & dark spot, Note 1, 2, 3)	Round	Average diameter (D) :(mm)			○
			Numbers (N)			
			0.5<D ≤ 1.0		N ≤ 10	
	Linear	Width: W (mm)	Length: L (mm)	Numbers		
0.15<W ≤ 0.2, 1<L ≤ 20		N ≤ 10				
Bezel	Scratch		No harm			○
	Dirt					○
	Wrap		No dangerous		○	
	Sunken		No harm		○	
Label (S/N, B/L, Week code)	No label				○	
	Invert label		No		○	
	Broken				○	
	Dirt					○
	Not clear		Word can be read.			○
	Word out of shape					○
	Mistake		No			○
Position		Be attached on right position			○	
Solder	Appearance		Can't see the abnormal color, shape, hurt, dirt (fused goods, etc.). If it is necessary, please prepare sample.		○	
Screw	Not enough		No		○	
	Limp		No		○	
Connector	Connection status		Need correct connection.		○	
FPC/FFC	Broken				○	

Note 1: When  $L \geq 2W$ , defect count as liner defect.

Note 2:  $D = 1/2(W+L)$



Note 3: To verify the responsibility of following defects was caused by supplier, the IQC checks as requested on above items before mass production such as the Polarizer Scratch, Gap Mura, TFT Glass broken...etc.