SPECIFICATION
FOR
OLED+HDMI Module

MODULE No:	KD080WQOIN035-CP001A-HDMI
CUSTOMER:	

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

Revision History

Date	Rev. No.	Page	Summary
2025.08.29	V2.0	ALL	FIRST ISSUE

Contents

1. Basic Specifications

* Description

This is a color active matrix Flexible AMOLED module using Low Temperature Poly-silicon Thin Film Transistors as active switching devices. This module has a 8.01 inch diagonally measured active area with 2480 horizontal by 1860 vertical pixel arrays. Each pixel is divided into RED and GREEN dots, or BLUE and GREEN dots, and two pixels share RED or BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.

* Operating Instructions

This product supports the following operating systems:Windows 7/8/10,Android, Linux, Raspberry Pi.

1.Connect the DC-044 DC power.

2.Connect the HDMI cable to Windows 7/8/10 or Android or Linux or Raspberry Pi.

3.Connect the micro USB for touch panel, if this module supports it

1.1 AMOLED Features

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	162.688(H)*122.016(V) (8.01 inch)	mm	
Driver element	active matrix	-	
Display colors	16.7M	colors	
Number of pixels	2480(RGB)*1860	dots	
Pixel arrangement	RGB vertical stripe	-	
Pixel pitch	0.065(H)*0.065(V)	mm	
Viewing angle	ALL	o'clock	
Driving Frequency	30Hz		No display is displayed when the value exceeds 30hz
Display mode	Flexible AMOLED	-	
Degree of curvature	R=3.5mm		
Operating temperature	-20～+70	℃	
Storage temperature	-30～+80	℃	

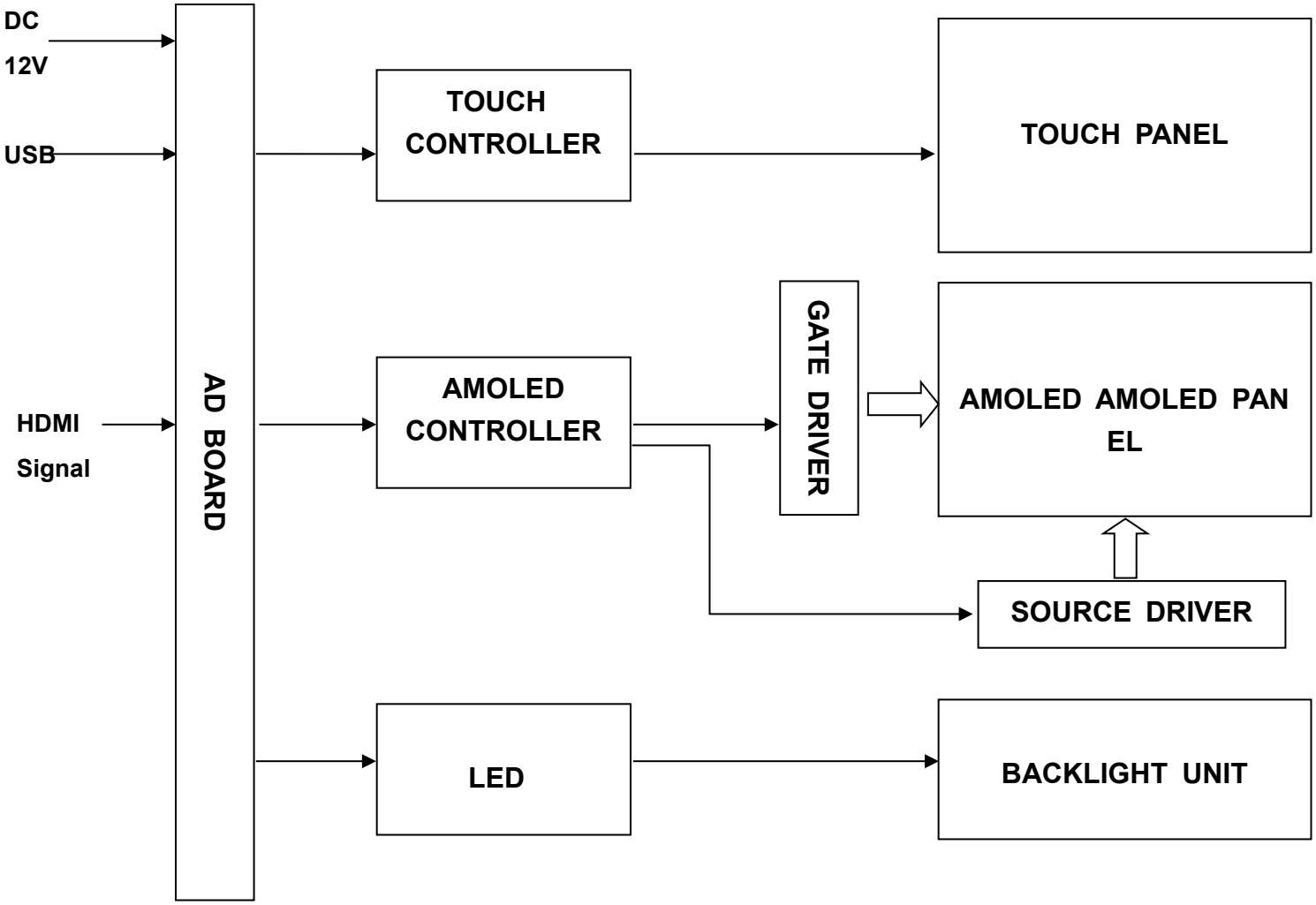
1.2 Module Features

General Information Items	Specification	Unit	Note
Display Interface	HDMI(Type A)	-	
Touch Interface	Micro USB	-	
Touch Mode	Multiple point	-	
Power supply	DC-12V(DC-005)	-	

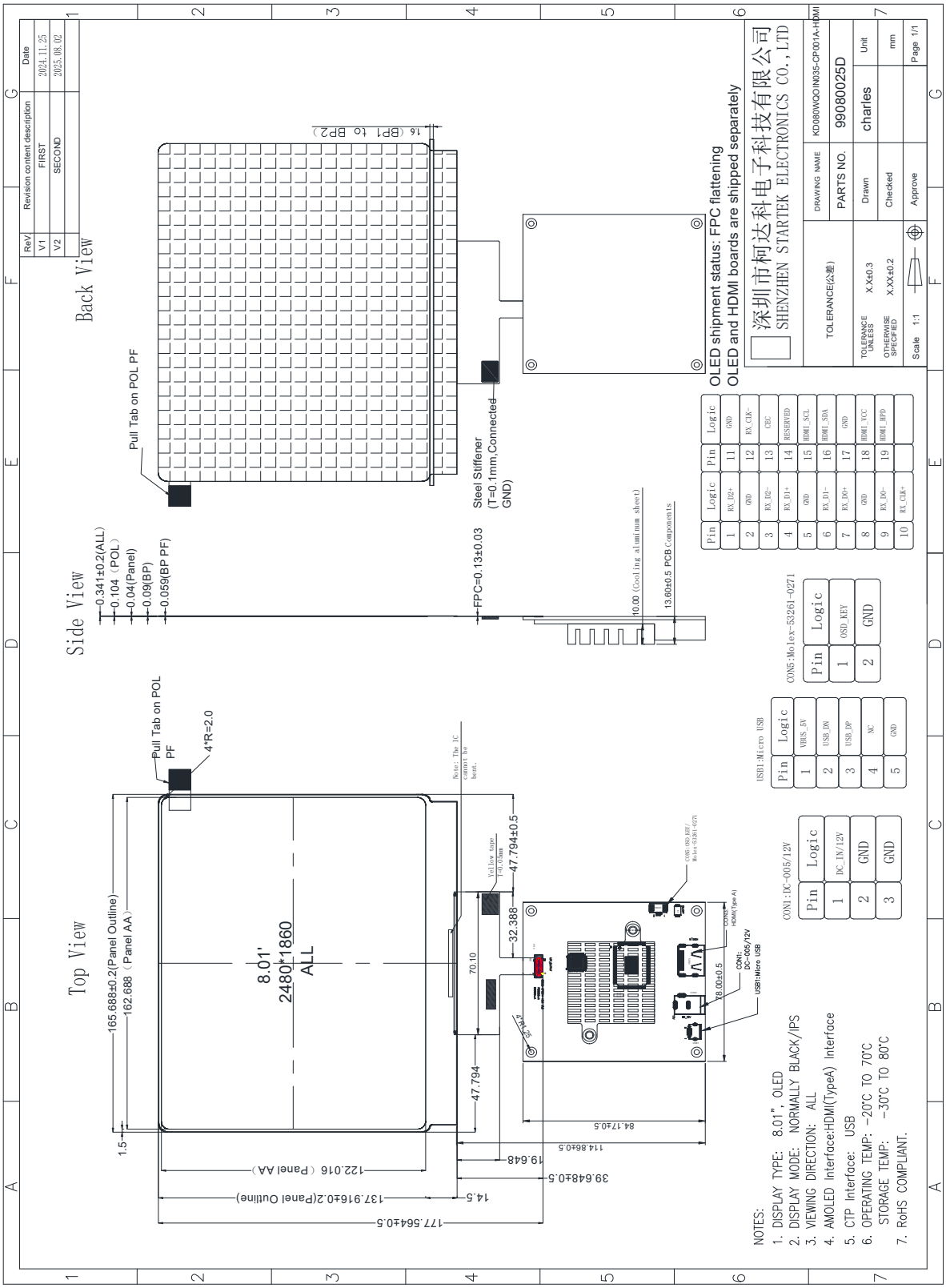
1.3 Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	165.688	-	mm	
	Vertical(V)	-	137.916	-	mm	Panel Outline
	Depth(D)	-	13.60	--	mm	PCB
Weight		-	TBD	-	g	

2. Block Diagram



3. Outline dimension



4. Pin Assignment

4.1 Power Input

CON1(DC-005 Socket)

NO.	SYMBOL	DISCRIPTION	I/O
1	DC_IN	Power supply (DC 12V).	P
2	GND	Ground	P
3	GND	Ground	P

4.2 Touch Input

USB1(Micro USB)

NO.	SYMBOL	DISCRIPTION	I/O
1	VBUS_5V	Supply voltage(5V).	P
2	USB_DN	USB- signal.	I/O
3	USB_DP	USB+ signal.	I/O
4	NC	No connection.	
5	GND	Ground.	P

4.3 HDMI Input

The type of HDMI connector is a type A.

NO.	SYMBOL	DISCRIPTION	I/O
1	RX_D2+	HDMI Receiver channel 2 positive analog input.	I/0
2	GND	Ground.	P
3	RX_D2-	HDMI Receiver channel 2 negative analog input.	I/0
4	RX_D1+	HDMI Receiver channel 1 positive analog input.	I/0
5	GND	Ground.	P
6	RX_D1-	HDMI Receiver channel 1 negative analog inpsut.	I/0
7	RX_D0+	HDMI Receiver channel 0 positive analog input.	I/0

8	GND	Ground.	P
9	RX_D0-	HDMI Receiver channel 0 negative analog input.	I/0
10	RX_CLK+	HDMI Receiver clock positive analog input.	I
11	GND	Ground.	P
12	RX_CLK-	HDMI Receiver clock negative analog input.	I
13	CEC/DET_HDMI	No connection.	
14	NC	No connection.	
15	HDMI_SCL	HDMI Receiver DDC data channel.	I
16	HDMI_SDA	HDMI Receiver DDC clock channel.	I/0
17	GND	Ground.	P
18	HDMI_5V	HDMI Supply voltage (5.0V).	P
19	HPD	HDMI Receiver hot plug detect output	O

4.4 ADC Key ON/OFF

CON5(Molex：53261-0271)

NO.	SYMBOL	DISCRIPTION	I/O
1	ADC_KEY	Trun off or turn on backlight.	I
2	GND	Ground.	I

5. LCM Optical Characteristics

5.1 Optical specification

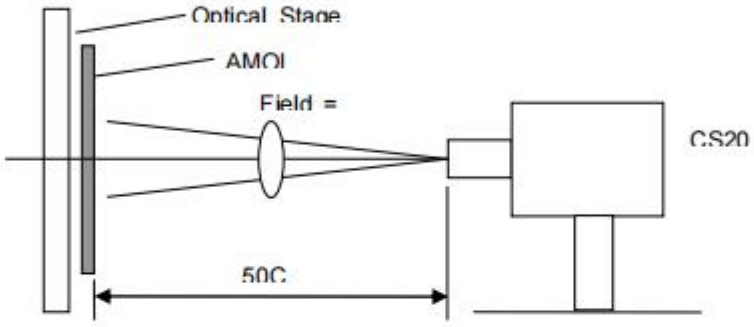
Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	Θ=0 Normal	400,000	--	--		(1)(3)
LCM Luminance		LV	White Mode	480	600		cd/m2	(1)(7)
Color gamut		S(%)	vs. NTSC	--	99	--	%	(5)
Color Filter Chromacicity	White	W_X		-0.04	0.300	+0.04		(1)(4)
		W_Y			0.315			
	Red	R_X			0.683			
		R_Y			0.317			
	Green	G_X			0.255			
		G_Y			0.713			
	Blue	B_X			0.134			
		B_Y			0.056			
Uniformity		U		80	/	/	%	(1)(6)
OLED Life Time				--	30000	--	Hrs	
Option View		ALL						

Test Conditions:

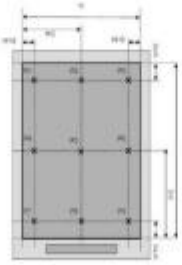
1. the ambient temperature is 25℃.
2. The test systems refer to Note1 and Note2.

Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. The optical properties are measured at the center point of the AMOLED screen. All input terminals AMOLED panel must be ground when measuring the center area of the panel.

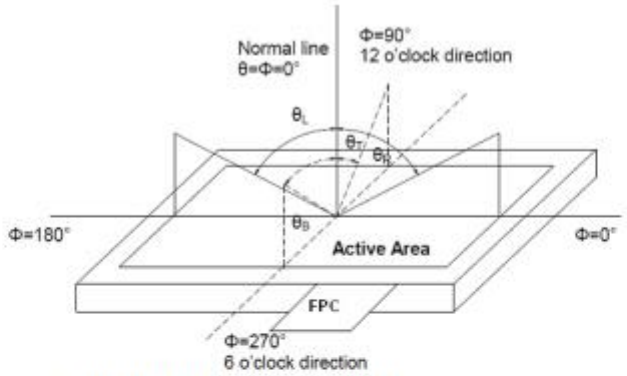


Optical Characteristic Measurement Equipment and Method



Measuring point for surface luminance

Note 2: Definition of viewing angle range and measurement system.



Definition of viewing angle

Note 3: Definition of contrast ratio

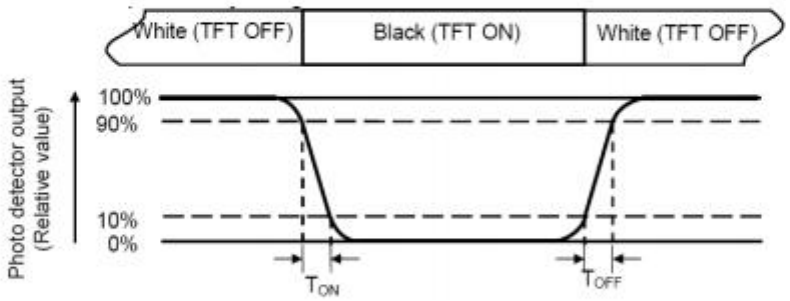
$$\text{Contrast ratio(CR)} = \frac{Luminance\ measured\ when\ AMOLED\ \text{is on the "white" state}}{Luminance\ measured\ when\ AMOLED\ is\ on\ the\ "Black"\ state}$$

"White state ": A state where the AMOLED should be driven by V_{white}.

"Black state": A state where the AMOLED should be driven by V_{black}.

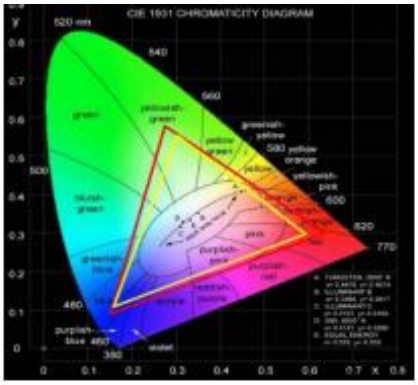
Note 4: Definition of response time

The response time is defined as the AMOLED optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changing from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changing from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of AMOLED.

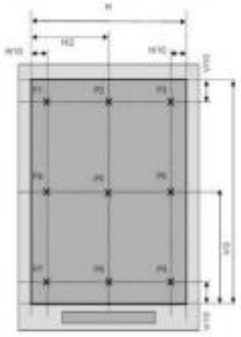


Note 6: Definition of luminance uniformity

Active area is divided into 9 measuring areas. Every measuring point is placed at the center of each measuring area.

Luminance Uniformity(U) = Lmin/ Lmax

L--------Active area length W----- Active area width



Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of luminance:

Measure the luminance of white state at center point.

Note 8: Cross Talk

There should be no visible cross-talk in normal direction of the display when the two "Cross-talk Test Patterns " below are loaded.

Measurement equipment: CS2000 or similar equipments

The point should be marked is, the background of Cross-talk Test Pattern-"gray " are defined as middle gray scale . For example, RGB 24bit "gray" defined as below:

R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

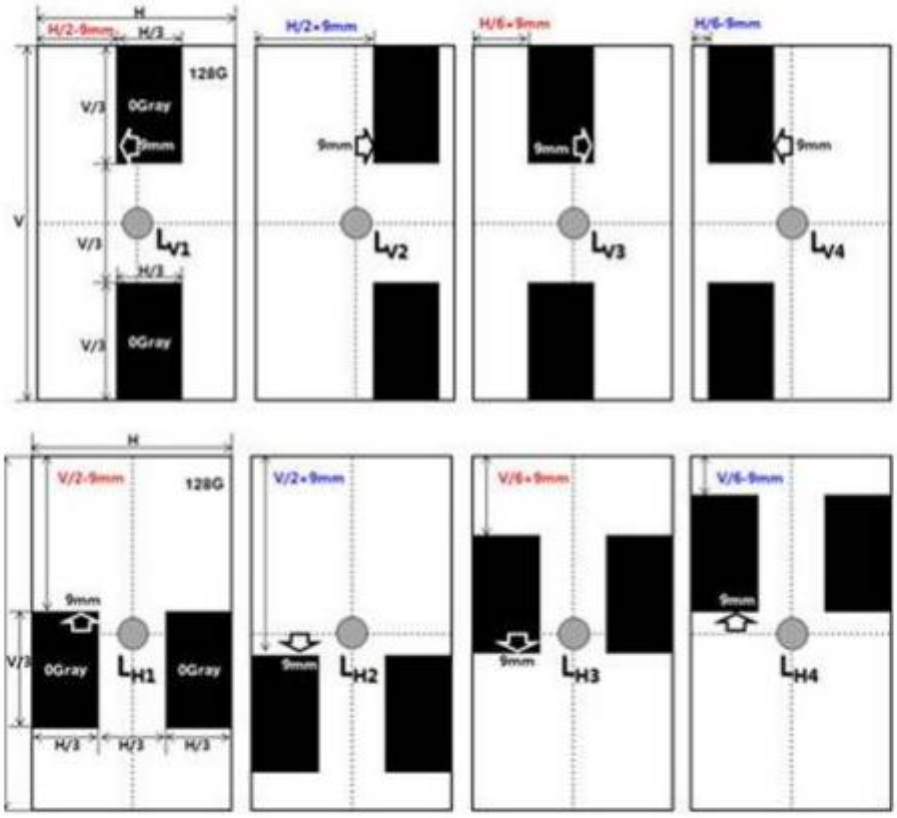
Test pattern follow below picture, the background is middle gray and with two black rectangle parts, each one is 1/9 of the AA size.

Calculate the crosstalk(V) and crosstalk(H) with the test formula below:

$$Crosstalk\,(V) = \max\left(\left|\frac{L_{V1}-L_{V2}}{L_{V2}}\right|\times 100, \left|\frac{L_{V3}-L_{V4}}{L_{V4}}\right|\times 100\right)$$

$$Crosstalk\,(H) = \max\left(\left|\frac{L_{H1}-L_{H2}}{L_{H2}}\right|\times 100, \left|\frac{L_{H3}-L_{H4}}{L_{H4}}\right|\times 100\right)$$

Then use the max value between Crosstalk(V) and Crosstalk(H) as the final crosstalk.



Note 9: Image stacking

Test conditions:

Test instruments: Fast imaging photometer

Figure 7.9-1 gray scale 48 picture

figure 7.9-2 black and white pattern

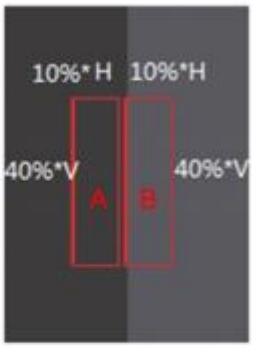


figure 7.9-3 calculation area

The test procedure for short time image sticking is as follows:

1) Display the 48 gray scale pattern in full screen, measure the brightness, and calculate the X value.

2) Switch to the black and white pattern and keep it for 10s.

3) Switch to the 48 gray scale pattern. Use the CCD to measure the luminance of the red frame. The exposure time of the CCD is 0.3s. The test is performed 60 times at an interval of 1s. The captured luminance values are as follows:

4) Calculate the X value.

$$IS(ST) = \left| \frac{I(t)_A - I(t)_B}{I(t)_A + I(t)_B} - \frac{I(0)_A - I(0)_B}{I(0)_A + I(0)_B} \right|$$

JND=IS(ST)/0.004

The test procedure for medium-term image sticking is as follows:

1) Display the 127 gray scale pattern in full screen, measure the brightness, and calculate the X value.

2) Switch to the black and white pattern and keep it for 10min.

3) Switch to the 127 gray scale pattern. Use the CCD to measure the luminance of the red frame. The exposure time of the CCD is 0.3s. The test is performed 3600 times at an interval of 1s. The captured luminance values are as follows:

4) Calculate the X value.

$$IS(ST) = \left| \frac{I(t)_A - I(t)_B}{I(t)_A + I(t)_B} - \frac{I(0)_A - I(0)_B}{I(0)_A + I(0)_B} \right|$$

JND=IS(ST)/0.004

Note 10: Flicker

1）Measurement equipment: CA-310 or similar equipment.

2）Measuring temperature: Ta=25℃.

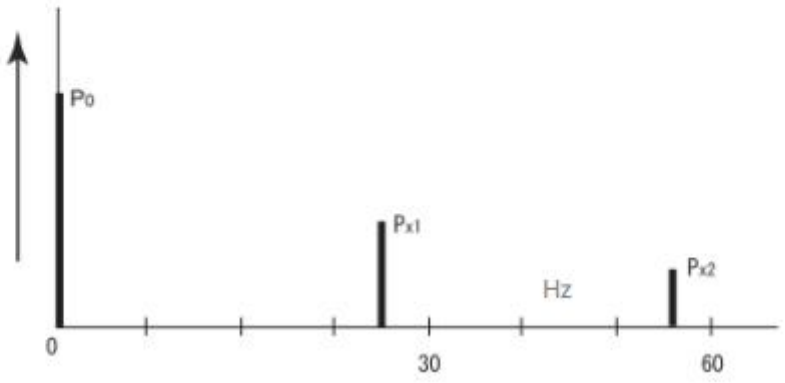
3）JEITA method can be used to supply software for CA310.

4）Test pattern: W255&W128&W32.

5）Frame Frequency Requirement：AOD\60Hz\90Hz\120Hz, etc. (The flicker at all frequency mode need to be tested)

6）Calculation formula Flicker = 10 × log （Px/P0）[dB]

Data processed by FFT analyzer



6. Electrical Characteristics

6.1 Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	DC_IN	-0.5	16	V	Note1
Operating temperature	T_{OP}	-20	+70	℃	
Storage temperature	T_{ST}	-30	+80	℃	

NOTE1: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

6.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	DC_IN	9	12	16	V	
Normal mode Current consumption	I_{DC_IN}	--	600	--	mA	DC_IN=12V

7. LCM Module Out-Going Quality Level

7.1 VISUAL & FUNCTION INSPECTION STANDARD

7.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

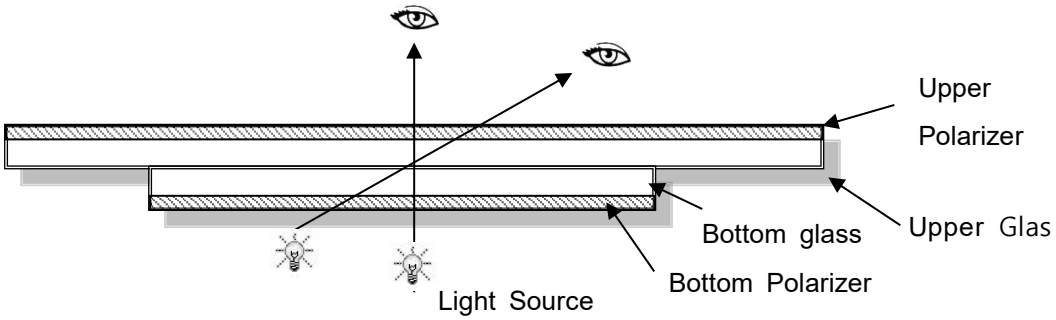
Temperature : 25±5℃

Humidity : 65%±10%RH

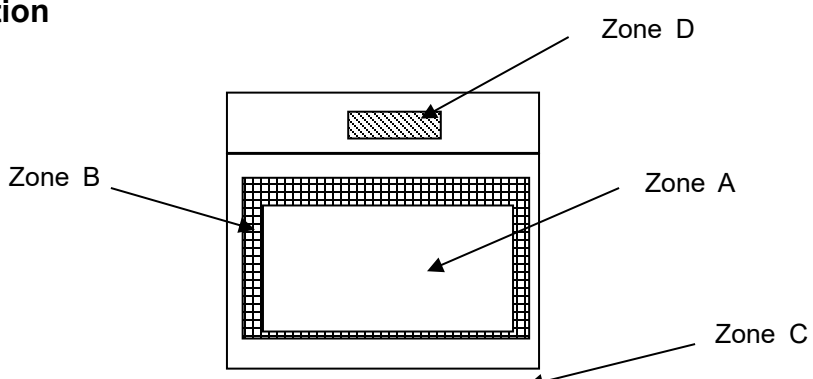
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



7.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Zone D : IC Bonding Area

Note:

As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or ap pearance after assembly by customer

7.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class Ⅱ

AQL:

Major defect	Minor defect
0.65	1.5

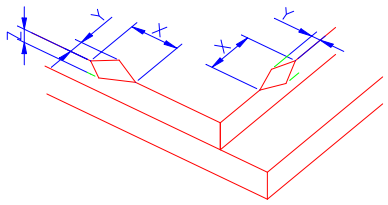
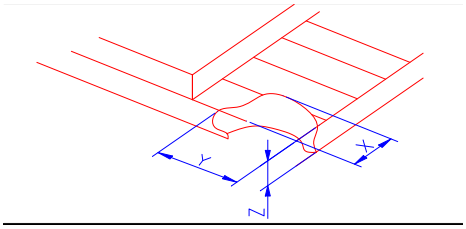
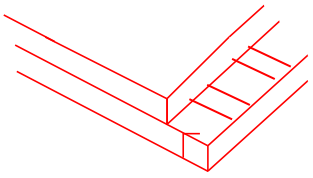
AMOLED: Liquid Crystal Display , LCM: Liquid Crystal Module, CTP: Capacitive Touch Panel

No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. etc	Major
2	Missing	Missing components and etc	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed,deformation and etc	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot/Line defect	Light dot,Dim spot,(Note1) Polarizer Air Bubble, Polarizer accidented spot and etc	
6	Soldering appearance	Good soldering , Peeling off is not allowed and etc	
7	AMOLED/Polarizer/CTP	Black/White spot/line, scratch, crack, etc.	

Note1: a) Light dot：Dots appear bright and unchanged in size in which AMOLED panel is displaying under black pattern.

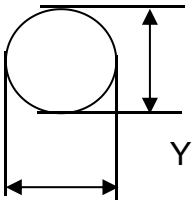
b) Dim dot: Dots appear dark and unchanged in size in which AMOLED panel is displaying under pure red, green, blue picture.

7.1.4 Criteria (Visual)

<table>
<tr><th>Number</th><th>Items</th><th>Criteria(mm)</th></tr>
<tr><td rowspan="3">1.0 AMOLED Crack/Broken
NOTE:
X: Length
Y: Width
Z: Height
L: Length of ITO,
T: Height of AMOLED</td><td>(1) The edge of AMOLED broken</td><td> 
<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table></td></tr>
<tr><td>(2)AMOLED corner broken</td><td> 
<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table></td></tr>
<tr><td>(3) AMOLED crack</td><td> 
Crack
Not allowed</td></tr>
</table>

2.0

Spot defect



Φ=(X+Y)/2

① light dot (black/white spot , pinhole, stain，etc.)

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore	Ignore	
0.15<Φ≤0.25	3(distance≧10mm)		
0.25<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

② Dim spot (light leakage、dent、dark spot，etc)

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore	Ignore	
0.15<Φ≤0.25	3(distance≧10mm)		
0.25<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

③ Polarizer accidented spot

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.5	2(distance≧10mm)		
Φ>0.5	0		

④Polarizer Bubble

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

3.0 AMOLED Pixel defect

Pixel bad points

Item	Zone A	Acceptable Qt
Bright dot	Random	N≤2
	2 dots adjacent	N≤0
	3 dots adjacent	N≤0
Dark dot	Random	N≤3
	2 dots adjacent	N≤0
	3 dots adjacent	N≤0
Distance	1. Minimum Distance Between Bright dots. 2. Minimum Distance Between dark dots 3. Minimum Distance Between dark and bright dot.	5mm
Total bright and dark dot		N≤4

Note:

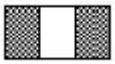
A) Bright dot：Dots appear bright and unchanged in size in which AMOLED panel is displaying under black pattern.

B) Dark dot: Dots appear dark and unchanged in size in which AMOLED panel is displaying under pure red, green, blue picture.

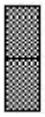
C) 2 dot adjacent = 1 pair = 2 dots

Picture:

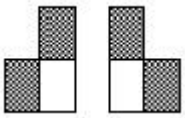
2 dot adjacent



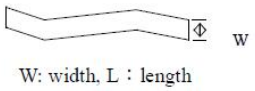
2 dot adjacent



2 dot adjacent (vertical)



2 dot adjacent (slant)

<table>
<tr>
<td>4.0</td>
<td>Line defect (AMOLED /Polarizer backlight black/white line, scratch, stain)
 

N : Count</td>
<td>
<table>
<tr><td rowspan="2">Width(mm)</td><td rowspan="2">Length(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.05</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.05<W≤0.06</td><td>L≤5.0</td><td colspan="2">N≤3</td></tr>
<tr><td>0.06<W≤0.08</td><td>L≤4.0</td><td colspan="2">N≤2</td></tr>
<tr><td>W>0.08</td><td colspan="4">Define as spot defect</td></tr>
</table>
</td>
</tr>
<tr>
<td>5.0</td>
<td>Electronic Components SMT.</td>
<td>Not allow missing parts，solderless connection，cold solder joint，mismatch，The positive and negative polarity opposite</td>
</tr>
<tr>
<td>6.0</td>
<td>Display color& Brightness.</td>
<td>1. Color：Measuring the color coordinates, The measurement standard according to the datasheet or samples.
2. Brightness：Measuring the brightness of White screen, The measurement standard according to the datasheet or Samples.</td>
</tr>
<tr>
<td>7.0</td>
<td>AMOLED Mura/Wavi ng/
Hot spot</td>
<td>Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary.</td>
</tr>
<tr>
<td>8.0</td>
<td>CTP Related</td>
<td>CTP Cover sensor accidented black/white spot</td>
<td>
<table>
<tr><td rowspan="2">Size Φ(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.15</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.15<Φ≤0.25</td><td colspan="2">4（distance≧10mm）</td></tr>
<tr><td>0.25<Φ≤0.35</td><td colspan="2">3（distance≧10mm）</td></tr>
<tr><td>Φ>0.35</td><td colspan="2">0</td><td></td></tr>
</table>
</td>
</tr>
</table>

CTP Cover scratch

Width(mm)	Ignore (mm)	Acceptable Qty		
		A	B	C
Φ≤0.05	Ignore	Ignore		
0.05<W≤0.06	L≤4.0	N≤3		
0.06<W≤0.08	L≤3.0	N≤2		
0.08<W	Define as spot defect			

CTP Cover Pinhole/ Lack of ink

Zone / Size (mm)	Acceptable Qty
	C
Φ≤0.2	Ignore
0.2<Φ≤0.3	4(distance≧10mm)
0.3<Φ≤0.4	2(distance≧10mm)
Φ>0.4	0

CTP Bonding bubble/ accidented spot

Size Φ(mm)	Acceptable Qty	
	A	B
Φ≤0.1	Ignore	
0.1<Φ≤0.2	3(distance≧10mm)	
0.2<Φ≤0.3	2(distance≧10mm)	
Φ>0.3	0	

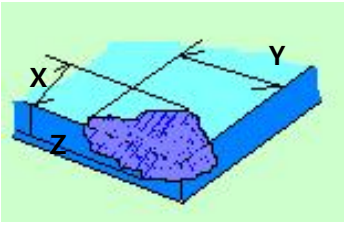
Assembly deflection

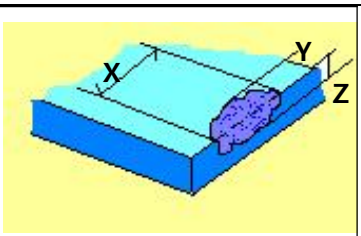
beyond the edge of backlight ≤0.2mm

CTP cover broken
X : length
Y : width
Z : height

X	Y	Z
X≤0.5mm	Y≤0.5mm	Z<cover thickness

*
Circuitry broken is not allowed.



		CTP cover broken X : length Y : width Z : height	X: X≤0.3mm; Y: Y≤0.3mm; Z: Z<cover thickness * Circuitry broken is not allowed.	

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	CTP no function	Not allowed

8. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	70℃,96HR	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the AMOLED; 2.Non-display; 3.Missing segments/line; 4.Glass crack; 5.Current IDD is twice higher than initial value.
Low Temperature Operating	-20℃, 96HR	
High Temperature Storage	80℃, 96HR	
Low Temperature Storage	-30℃, 96HR	
High Temperature & High Humidity Operating	+60℃, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-20℃,30 min ↔ 70℃,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±8KV, 5times; Contact:±6KV, 5 times; (Environment: 15℃~35℃, 30%~60%).	
Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces,80㎝(MEDIUM BOX)	

Remark:

1.The test samples should be applied to only one test item.

2.Sample size for each test item is 3~10pcs.

3.For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.

4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

5.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

9. Cautions and Handling Precautions

9.1 Handling and Operating the Module

(1) When the module is assembled, it should be attached to the system firmly.
Do not warp or twist the module during assembly work.
(2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
(3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
(4) Do not allow drops of water or chemicals to remain on the display surface.
If you have the droplets for a long time, staining and discoloration may occur.
(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
(6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.
Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
(7) 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, legs, or clothes, it must be washed away thoroughly with soap.
(8) Protect the module from static; it may cause damage to the CMOS ICs.
(9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
(10) Do not disassemble the module.
(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
(12) Pins of I/F connector shall not be touched directly with bare hands.
(13) Do not connect, disconnect the module in the “Power ON” condition.

9.2 Storage and Transportation.

(1) Do not leave the panel in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35 ℃ and relative humidity of less than 70%
(2) Do not store the AMOLED-AMOLED module in direct sunlight.
(3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
(4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.
In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.

(5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

10. Packing

----TBD----