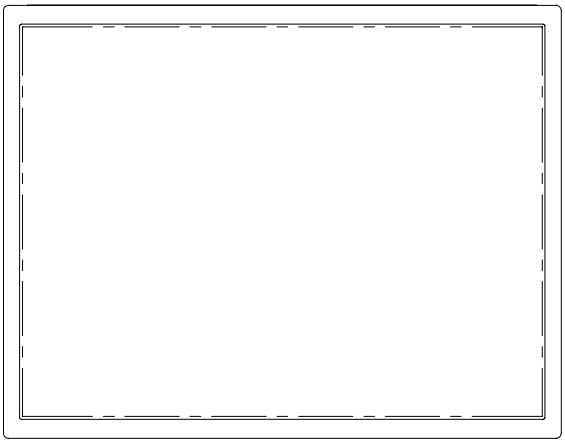
HANTRONIX

PRODUCT SPECIFICATION

HDA1500X-S

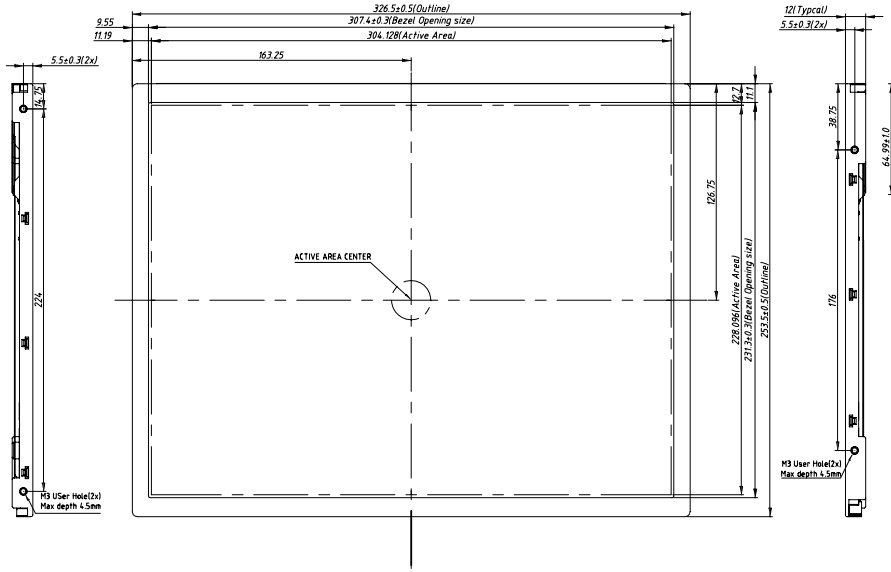
15”, TFT XGA (1024X768) COLOR LCD DISPLAY MODULE

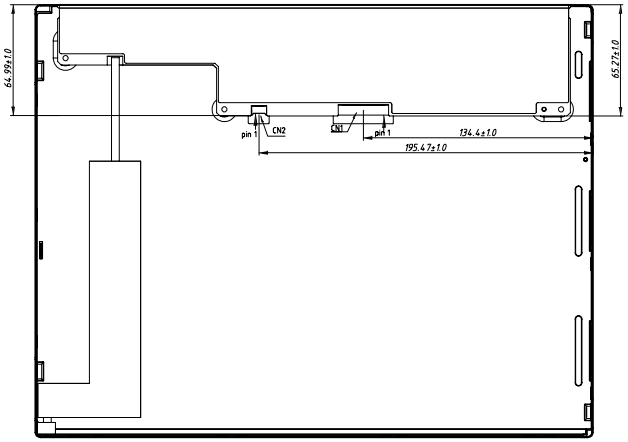


HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA1500X-S	SHEET 1 OF 15 DATE: 11/15/16

1. General Specifications

No	Item	Contents	Unit
1	Size	15.0	inch
2	Resolution	1024RGB*768	
3	Interface	LVDS	
4	Color Depth	16.2M	
5	Pixel Pitch	0.297*0.297	mm
6	Pixel Arrangement	R.G.B Vertical Stripe	
7	Surface Treatment	Anti-glare, Hard-Coating	
8	Viewing Direction	6:00	o'clock
9	LCM (W x H x D)	326.5*253.5*12.0	mm
10	Active Area (W x H)	304.128*228.096	mm
11	With/Without TSP	Without TSP	





CH1 PIN.

PIN NO.	PIN NAME
1	VDD
2	VDD
3	VSS
4	REV
5	Rin1−
6	Rin1+
7	VSS
8	Rin2−
9	Rin2+
10	VSS
11	Rin3−
12	Rin3+
13	VSS
14	ClkIN−
15	ClkIN+
16	GND
17	Rin4−
18	Rin4+
19	VSS
20	NC

CH2 PIN.

PIN NO.	PIN NAME
1	Vcc
2	GND
3	Enable
4	Dimming
5	NC

1	*Operating Voltage:*	*Vdd=3.3V typ.*
2	*Resolution:*	*1024RGB*768*
3	*Color:*	*16.2M*
4	*Interface:*	*LVDS*
5	*Viewing Direction:*	*6:00*
6	*Operating Temp:*	*−20°C~70°C*
7	*Storage Temp:*	*−30°C~80°C*

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HDA1500X-S

REV.: 1.0

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3. PIN Assignment

CH1 PIN

Pin #	Signal Name	Description	Remarks
1	VDD	Power Supply, 3.3V (typical)	
2	VDD	Power Supply, 3.3V (typical)	
3	VSS	Ground	
4	REV	Reverse Scan selection	
5	Rin1-	-LVDS differential data input (R0-R5,G0)	
6	Rin1+	+LVDS differential data input (R0-R5,G0)	
7	VSS	Ground	
8	Rin2-	-LVDS differential data input	
9	Rin2+	+LVDS differential data input	
10	VSS	Ground	
11	Rin3-	-LVDS differential data input	
12	Rin3+	+LVDS differential data input	
13	VSS	Ground	
14	ClkIN-	-LVDS differential clock input	
15	ClkIN+	+LVDS differential clock input	
16	GND	Ground	
17	Rin4-	-LVDS differential data input	
18	Rin4+	+VDS differential data input	
19	VSS	Ground	
20	NC	Not connect	

CH2 PIN

Pin #	Symbol	Signal Name
1	Vcc	12V
2	GND	GND
3	Enable	5V-On / 0V-Off
4	Dimming	PWM Dimming or Analog Dimming
5	NC	NC

4. Absolute Maximum Rating

AGND = GND = 0V , Ta = 25° C

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VDD	-0.5	5	V	
Operating Temperature	T_{OPR}	-20	70	° C	
Storage Temperature	T_{STG}	-30	80	° C	

The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

5. Electrical Characteristics

5.1.Input power specifications are as follows

Symbol	Parameter	Min.	Typ.	Max.	Units	
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[V]	-
IDD	VDD Current	-	0.25	-	[A]	3.3V/Black pattern
PDD	VDD Power	-	-	1.3	[W]	Black Pattern, 60Hz
Irush	Rush Current	-	-	3	[A]	
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	200	[mV]p-p	

5.2. Parameter Guideline of LED Backlight

Symbol	Parameter		Min.	Typ.	Max.	Units	Condition
VLED	LED Input		10.8	12	12.6	[V]	
PLED	LED Power Consumption		-	-	7.5	W	
VLED_PWM	PWM Signal Voltage	High	4.5	5	5.5		Ta=25℃
		Low			0.8	V	
F_{PWM}	PWM dimming Frequency		200	-	20K	Hz	Ddim≥5%
VLED_EN	LED Enable Voltage	High	2.0	5	5.5	V	-
		Low			0.8	V	
LT	LED Life Time		30,000	-	-	Hours	Ta=25℃

6. Timing Characteristics

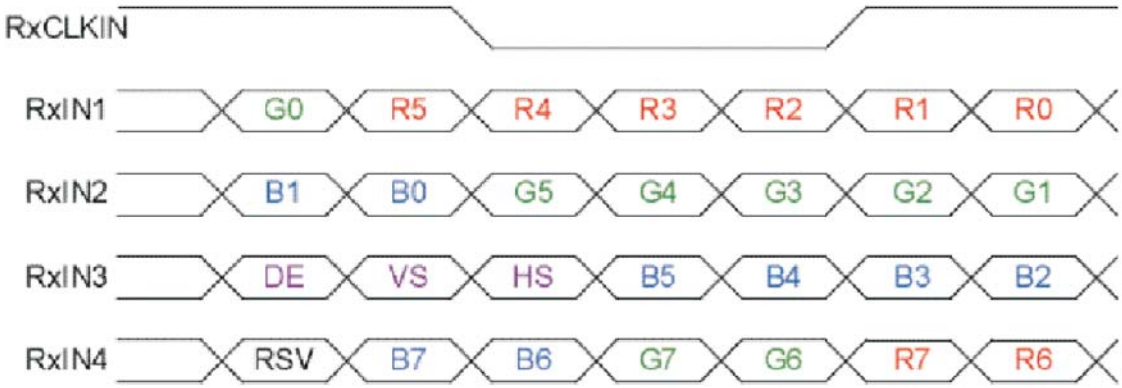
6.1. Timing Characteristics

Synchronization Method : DE only

Parameter	Symbol	Unit	Min.	Typ.	Max.
LVDS Clock Frequency <single >	fclk	MHz	50	65	80
H Total Time	Thp	clocks	1056	1344	1720
H Active Time	HA	clocks	1024	1024	1024
H Front Porch	Thfp	clocks	-	48	-
H Sync Pulse Width	HSPW	clocks	-	32	-
H Back Porch	Thbp	clocks	-	240	-
H Frequency	fh	kHz	46.32	48.36	59.40
V Total Time	Tvp	lines	772	806	990
V Active Time	VA	lines	768	768	768
V Front Porch	Tvfp	lines	-	3	-
V Sync Pulse Width	VSPW	lines	-	12	-
V Back Porch	Tvbp	lines	-	23	-
V Frequency	fv	Hz		60	

Note: H Blank area and V Blank area can not be changed at every frame

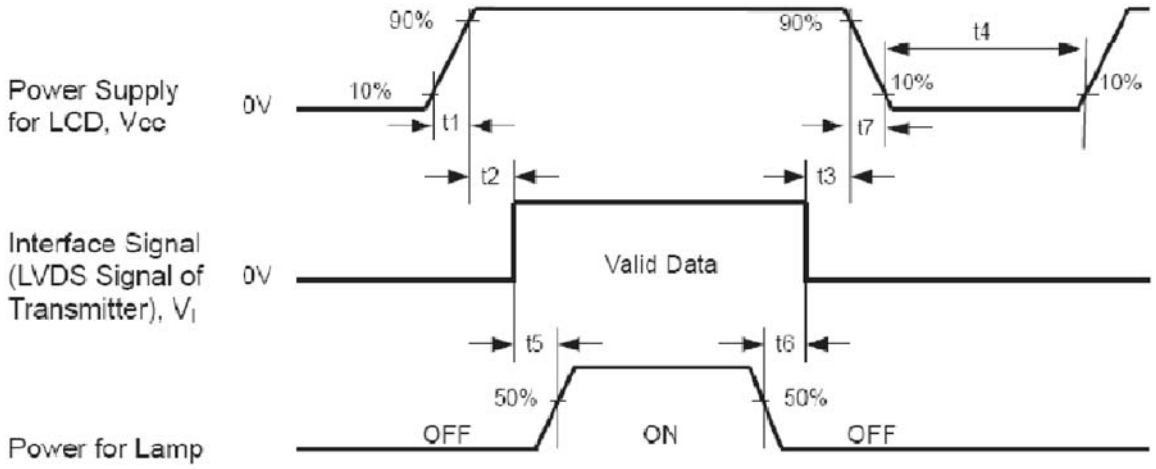
6. 2. Timing Diagram of Interface Signal



6. 3.Power ON/OFF Sequence

VDD power 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



7. Optical Characteristics

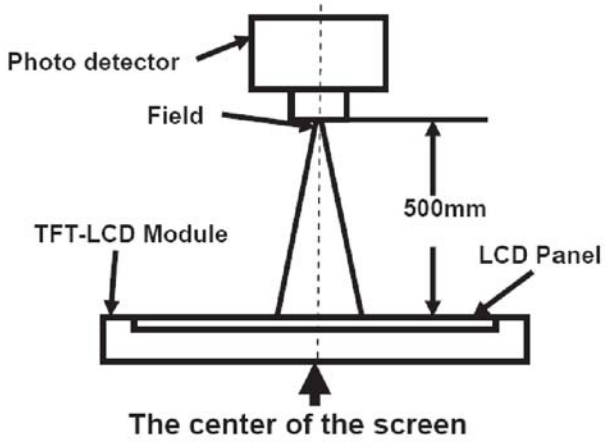
Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θ_L	70	80	-	degree	
		θ_R	70	80	-		
	Vertical	θ_T	70	80	-		
		θ_B	60	80	-		
Contrast Ratio	Center		450	800	-	-	
Response Time	Rising		-	5	-	ms	
	Falling		-	11	-	ms	
	Rising + Falling		-	16	-	ms	
Color Chromaticity (CIE1931)	NTSC		-	70	-	%	
	Red x		-0.03	0.625	Typ. +0.03	-	
	Red y			0.352		-	
	Green x			0.315		-	
	Green y			0.63		-	
	Blue x			0.149		-	
				0.067		-	
	White x		0.255	0.305	0.355	-	
	White y		0.275	0.325	0.375	-	
White Luminance	Center		350	420	-	cd/m^2	
Luminance Uniformity	9Points		75	80	-	%	

Test Conditions:

1. VDD =3.3V,the ambient temperature is 25° C.
2. The test systems refer to Note 2.

Note 1: Definition of optical measurement system.

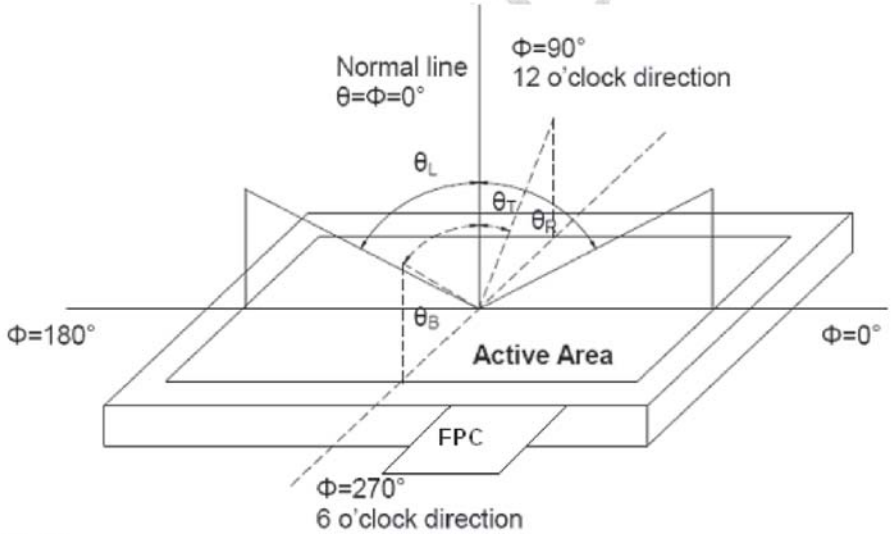
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	BM-5A	1°
Luminance		
Lum Uniformity		
Chromaticity	SR-3A	
Response Time	TRD100	-

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

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。



Note 3: Definition of contrast ratio

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

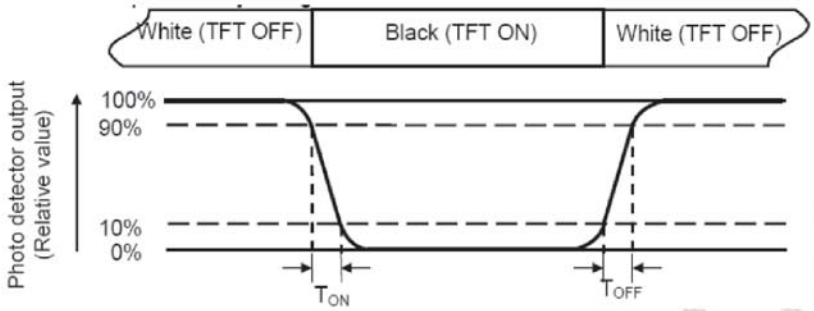
"White state ": The state is that the LCD should drive by Vwhite.

"Black state": The state is that the LCD should drive by Vblack.

Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of Response time

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



Note 5: Definition of color chromaticity (CIE1931)

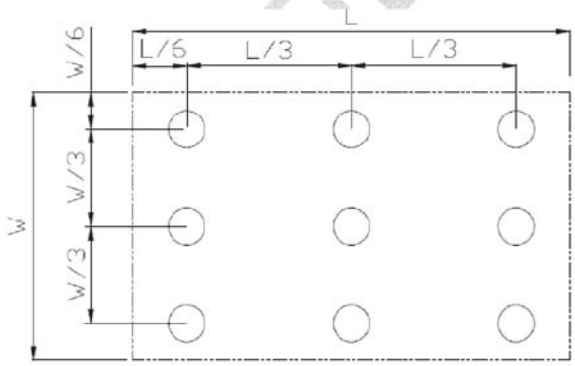
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). 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



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.

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8. Environmental/Reliability Test

No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	80±2℃/300 hours	Inspection after 2~4hours storage at room temperature,the sample shall be free from defects: 1.Air bubble in the LCD; 2.Sealleak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value.
2	Low Temperature Storage	-30±2℃/300 hours	
3	High Temperature Operating	70±2℃/300 hours	
4	Low Temperature Operating	-20±2℃/300 hours	
5	Temperature Cycle	-20℃~25℃~60℃ × 10cycles (30min.) (5min.) (30min.)	
6	Damp Proof Test	50℃±5℃×85%RH/300 hours	
7	Vibration Test	1.5G , 10~200 Hz , x、y、z each axis/30min	
8	Dropping test	Drop to the ground from 1m height, one time, every side of carton. (Packing condition)	
9	ESD test	Contact Discharge: ±8KV,150pF(330T) ; Air discharge: ±15KV,150pF(330Ω)	

Remark:
1.The test samples should be applied to only one test item.
2.Sample size for each test item is 5~10pcs.
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 judge as a good part.
5.EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.
7.Please use automatic switch menu(or roll menu) testing mode when test operating mode.

10. Standard Specifications For Product Quality

10.1. Manner of test:

10.1.1 The test must be under 40W fluorescent light, and the distance of view must be at 30±10cm.

10.1.2 Room temperature 25±5℃ Humidity: (60±10)%RH.

10.2. Quality specification

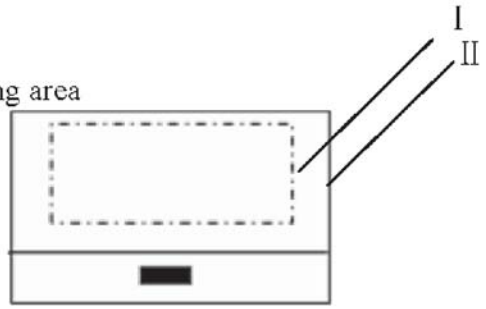
It shall be based on GB2828-87, inspection level II .

	IETM	CHECK LEVEL	AQL
MAJOR (MA)	1.Liquid crystal leakage 2.Wrong polarizer 3.Outside dimension 4. Bright dot、Dark dot 5. Display abnormal 6. Class crack	II	0.25
MINOR (MI)	1. Spot Defect (Including black spot、white spot、pinhole、foreign particle、bubbles、hurt) 2. fragment 3. Line Defect (Including black line、white line、cratch) 4. Incision defect 5. Newton's ring 6. Other visual defects	II	1.0

10.3. Definition of area:

10.3.1 Ⅰ area: viewing area

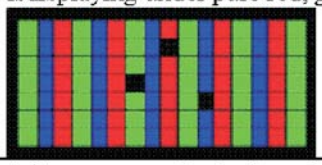
Ⅱ area: outside viewing area



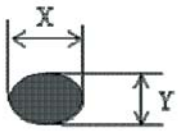
10.4.Standard of appearance test for Ⅰ area: (unit: mm)

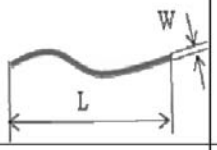
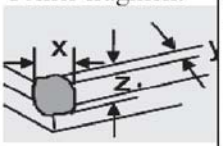
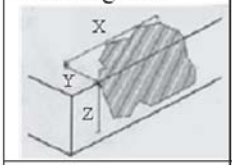
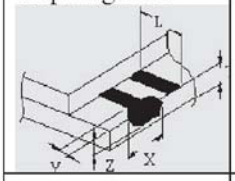
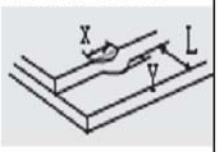
NOTE: Defect ignore for Ⅱ area .

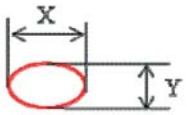
10.4.1 Bright/Dark Dots explain

Name	Explain	Definition
Bright dot	Dots appear bright and unchanged in size in which LCD panel isdisplaying under black pattern	The definition of dot: The size of a defective dot over 1/2 of single pixel dot is regarded as one defective dot . NOTE: One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)
Dark dot	Dots appear dark and unchanged in size in which LCD panel isdisplaying under pure red, green, blue pattern. 	
ADJACENT DOT	Adjacent two sub-pixel are defect（define two dot defect）	

10.4.2 Inspection standard

№	Items	Criterion		Checking Manner	Defect Classes
1	Bright/dark dot	Under 6” (contain 6”)	Bright dot：no Dark dot：N≤3 **Note:** be more than 5mm apart	Checking with eyes	MAJ
		6”-12”	Bright dot：N≤4 Dark dot：N≤5 Total Bright and Dark Dots：N≤8 **Note ：** 1.Two bright dot defects (red, green, blue, and white) should be larger than 15mm； 2.The distance between black dot defects or black and bright dot defects should be more than 5mm apart.		
2	Spot Defect (Including black spot.white spot. Pinhole.foreign particle.bubbles.hurt）  D=(X+Y)/2	Under 6” （contain 6”）	D≤0.1 Ignore 0.1＜D≤0.35 N≤3 0.35＜D N=0	Checking with eyes	MIN
		6”-12”	D≤0.3 Ignore 0.3＜D≤0.6 N≤4 0.6＜D N=0		

№	Items	Criterion		Checking manner	Defect classes
3	Line Defect (Including black Line.white line. scratch) 	Under 6" (contain 6")	W≤0.02 Ignore 0.02＜W≤0.04 L≤5 N≤2 0.04＜W≤0.06 L≤5 N≤1 W＞0.06 N=0	Checking with eyes	MIN
		6"-12"	W≤0.07 Ignore 0.07＜W≤0.1 L≤10 N≤4 W＞0.1 N=0		
4	Display abnormal	Not allowed		Checking with eyes	MAJ
5	Outside dimension	Accord with drawing		Callipers	MAJ
6	Class crack	Not allowed		Checking with eyes	MAJ
7	Leak	Not allowed		Checking with eyes	MAJ
8	Comer fragment 	X≤3 Y≤3 Z≤T Ignore Note ： 1.No hurt identifying .wire.seal 2.T：Glass thickness X: Length Y: Width Z: thickness		Checking with eyes	MIN
9	Side fragment 	Y≤1 Z≤T Ignore Note ： 1.No hurt identifying .wire.seal 2.T：Glass thickness X: Length Y: Width Z: thickness		Checking with eyes	MIN
	Step fragment 	Y≤1 and Y≤1/4 L		Checking with eyes	MIN
	Incision defect 	Y≤1 and accord with outside dimension		Checking with eyes	MIN

№	Items	Criterion		Checking manner	Defect classes
10	Newton's ring (CTP or Cover board)  D=(X+Y)/2	Under 6" (contain 6")	D≤25 N≤3 D＞25 N=0	Checking with eyes	MIN
		6"-12"	D≤70 N≤5 D＞70 N=0		