HDMI TFT Module Specification

MODEL: HA-150GVEC0GA1-V

<◆> PRELIMINARY SPECIFICATION
<◇> APPROVAL SPECIFICATION

CUSTOMER
APPROVED BY
DATE:

DESIGNED	CHECKED	APPROVED
RD 2022.09.18 Norton	PM 2022.09.19 呂家祥	批准 2022.09.19 PM

DigiWise International Corporation
3F., No. 10, Ln 83, Sec 1, Guang Fu Rd., Sanchong Dist., 24158,
New Taipei City, Taiwan (ROC)

TEL : +886-2-29992866
FAX : +886-2-29990900

RECORD OF REVISION

Version	Revised Date	Page	Content
V1.0	2022/09/18	--	First Issued

TABLE OF CONTENTS

1. GENERAL DESCRIPTION

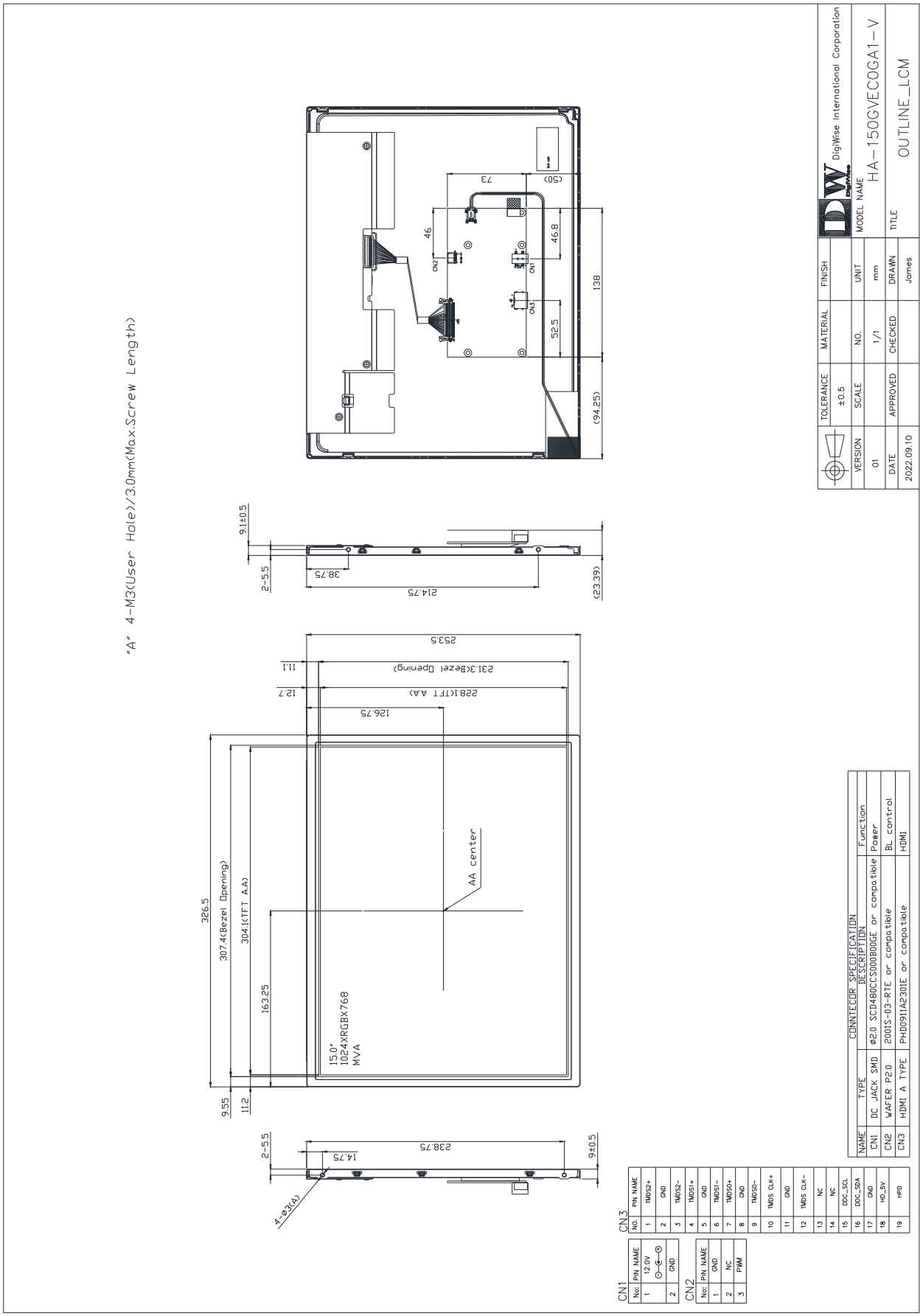
1.1 Description

HA-150GVEC0GA1-V-V is a 15.0 (4:3) inch diagonally measured active display with high resolution XGA 1024x768 display and high brightness. This model is composed of a TFT LCD panel, backlight system and HDMI . It is designed to make Raspberry Pi usage easy. You can simply use this TFT display with your Raspberry Pi, or also you can use this as computer display with any device which has HDMI output. This 15.0" TFT model comes in 1024x768 resolution that would be great for embedded computing usage too.

1.2 Features:

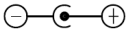
No.	Item	Specification	Unit
1	Panel Size	15”	Inch
2	Number of Pixels	1024 (H) x RGB x 768 (V)	Pixels
3	Active Area	304.1 (H) x 228.1 (V)	mm
4	Pixel Pitch	0.297 (H) x 0.297 (V)	mm
5	Outline Dimension	326.5 (H) × 253.5 (V) × 23.39 (T)	mm
6	Number of Colors	16.7M	- -
7	Display Mode	MVA / Normally Black / Transmissive	- -
8	View Direction	Wide viewing angle	- -
9	Display Format	RGB vertical stripe	- -
10	Surface Treatment	Anti-Glare (3H)	- -
11	Contrast Ratio	2500 (Typ.)	- -
12	Luminance (cd/m^2)	1500 (Typ.)	cd/m2
13	Video Input Interface	HDMI (Compliance HDMI V1.4)	- -
14	Backlight	White LED	- -
15	Operation Temperature	-30 ~ 80	°C
16	Storage Temperature	-40 ~ 80	°C
17	Weight	(TBD)	g

2. MECHANICAL SPECIFICATION



3. PIN DESCRIPTION

3.1 Power Input(CN1) [DC JACK:SCD480CCS000B00GE or compatible]

Pin No.	Symbol	I/O	Function	Note
1	12V	P	Power Supply +12V	12.0V 
2	GND	P	Ground	

3.2 Back-light Control(CN2) [WAFER P2.0mm:2001S-03-RTE or compatible]

Pin No.	Symbol	I/O	Function	Note
1	GND	P	Ground	
2	N.C.	-	N.C.	
3	PWM	I	Back-light Dimming control (internal pull up to 3.3V)	*1

*1: When PWM not connected, back-light default is typical brightness.

3.3 HDMI (CN3) [HDMI A TYPE:PHD0911A2301E or compatible]

Pin No.	Symbol	I/O	Function	Note
1	TMDS 2+	I	TMDS Data2+	
2	GND	P	TMDS Data2 Shield	
3	TMDS 2-	I	TMDS Data2-	
4	TMDS 1+	I	TMDS Data1+	
5	GND	P	TMDS Data1 Shield	
6	TMDS 1-	I	TMDS Data1-	
7	TMDS 0+	I	TMDS Data0+	
8	GND	P	TMDS Data0 Shield	
9	TMDS 0-	I	TMDS Data0-	
10	TMDS CLK+	I	TMDS Clock+	
11	GND	P	TMDS Clock Shield	
12	TMDS CLK-	I	TMDS Clock-	
13	N.C.	-	N.C.	
14	N.C.	-	N.C.	
15	DDC_SCL	I	IIC SCL to EDID ROM	
16	DDC_SDA	I/O	IIC SDA to EDID ROM	
17	GND	P	DDC/CEC Ground	
18	HD_5V	P	+5V Power	
19	HPD	O	Hot Plug Detect	

4. ABSOLUTE MAXIMUM RATINGS

4.1 Electrical Absolute Rating

4.1.1 HDMI TFT LCD Module

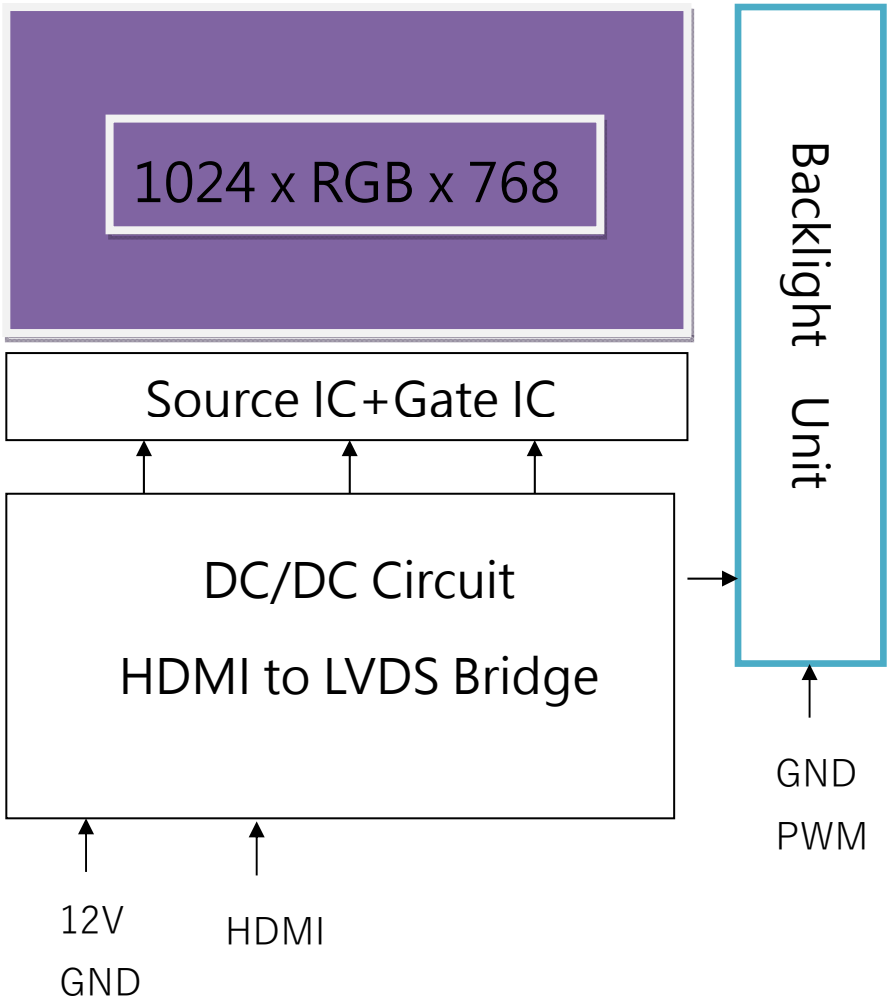
Item	Symbol	Values		Unit	Note
		Min	Max.		
Power supply voltage	12V	10	14	V	

4.1.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	-30	-	80	°C	Ambient temperature
Storage Temperature	Tst	-40	-	80	°C	

5. BLOCK DIAGRAM

5.1 TFT LCD Module



6. ELECTRICAL CHARACTERISTICS

6.1 HDMI TFT LCD Module

Item	Symbol	Values			Unit	Note
		Min	Typ.	Max.		
Supply Voltage	12V	11	12	13	V	
PWM frequency		100	-	10K	Hz	
PWM Duty		17	-	100	%	<17%=OFF
PWM Dimming Voltage	V_{PWM-IH}	3.3	-	8	V	
	V_{PWM-IL}	0	-	0.3	V	
Supply Current	ICC(12V)	-	TBD	-	mA	
LED life time		50000	-	-	Hr	(1)

Note 1:

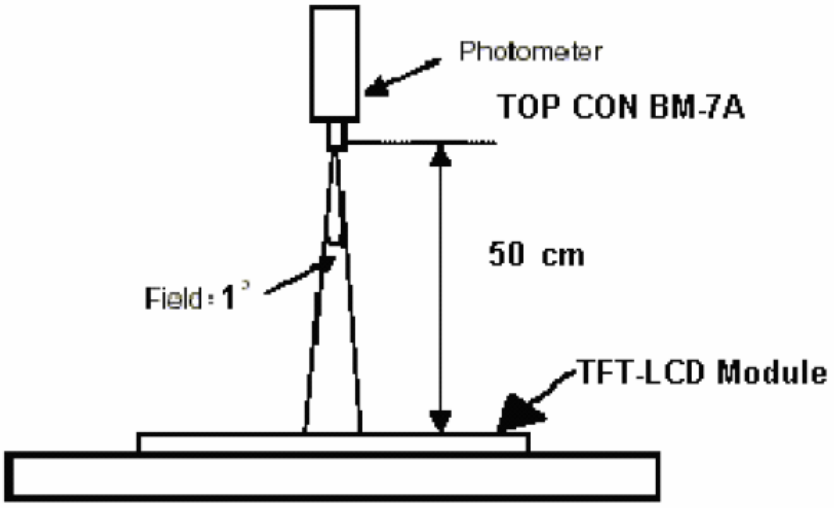
The “LED life time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃ 60% RH.

7. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Brightness		--	Note1, Note 3, ($\theta = 0^\circ$, Normal Viewing Angle)	1200	1500	--	cd/m2
Contrast Ratio		CR		1800	2500	--	--
Response Time		Tr		--	16	21	ms
		Tf		--	7	14	ms
Color Chromaticity	White	Wx		0.263	0.313	0.363	--
		Wy		0.279	0.329	0.379	--
	Red	Rx		0.597	0.647	0.697	
		Ry		0.288	0.338	0.388	
	Green	Gx		0.271	0.321	0.371	
		Gy		0.556	0.606	0.656	
	Blue	Bx		0.107	0.157	0.207	
		By		0.000	0.039	0.089	
View angle	Horizontal	θ x+	Center CR≥10	80	88	--	
		θ x-		80	88	--	
	Vertical	θ Y+		80	88	--	
		θ Y-		80	88	--	

Note：The following optical specifications shall be measured in a darkroom or equivalent state(ambient luminance ≤1 lux, and at room temperature). The operation temperature is 25°C±2°C. The measurement method is shown in Note1.

Note1: The method of optical measurement:

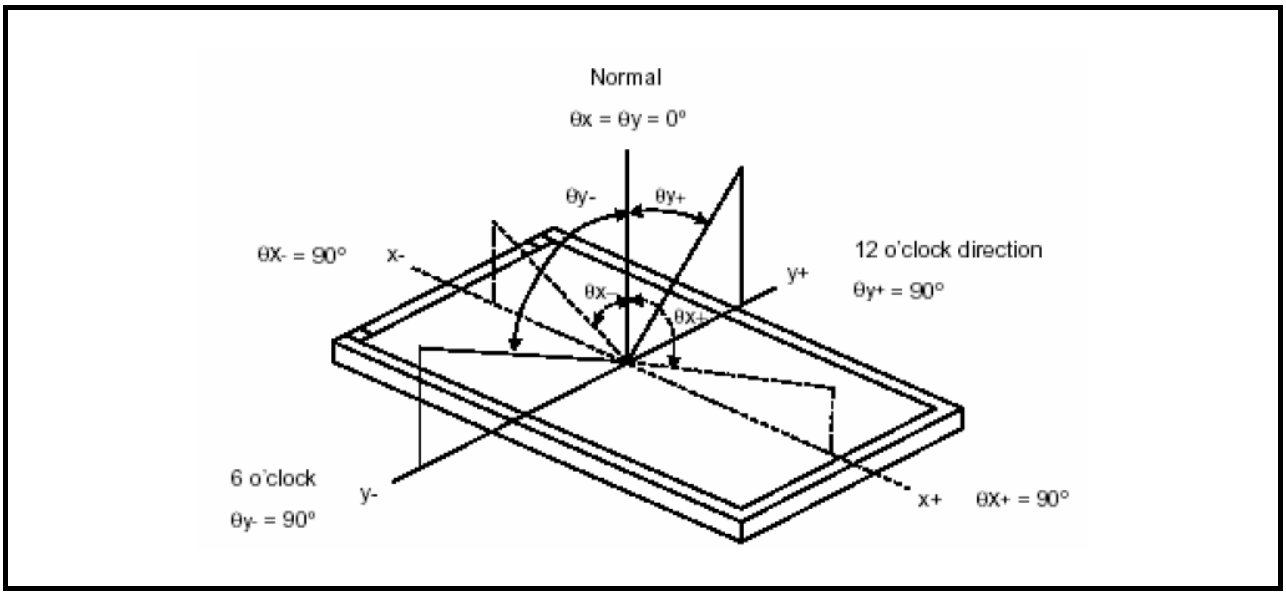


Note2: Measured at the center area of the panel and at the viewing angle of the θ x= θ y =0°

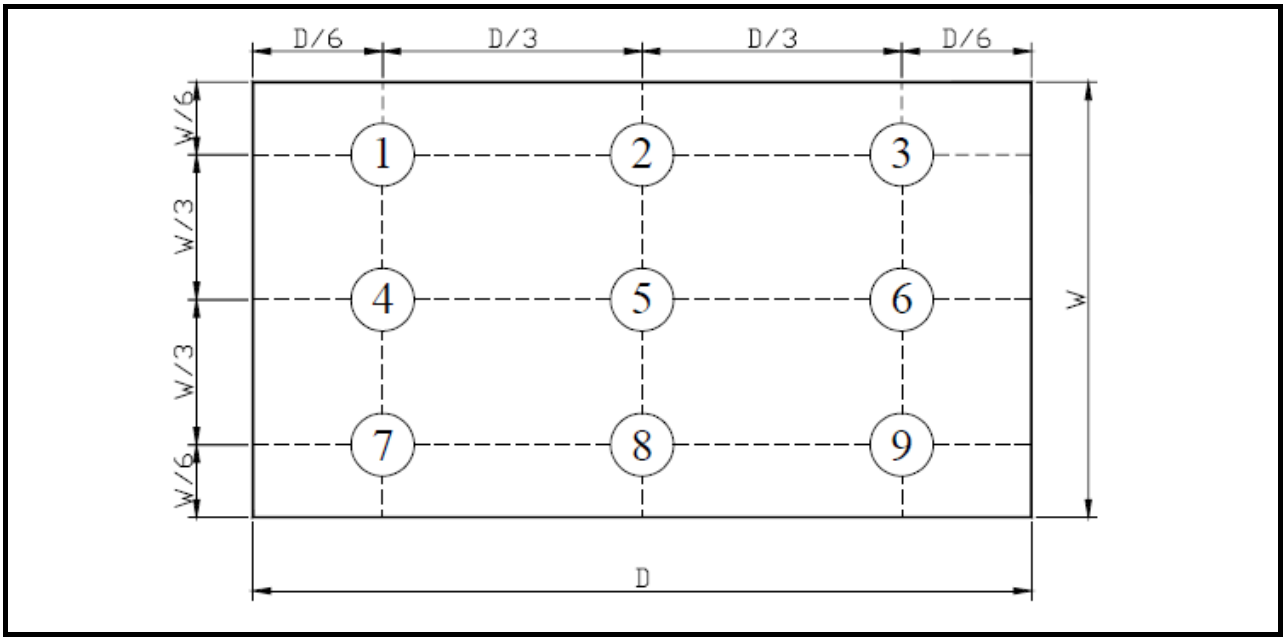
Note3: Definition of Contrast Ratio (CR):

CR = Luminance with all pixels in white state ÷ Luminance with all pixels in Black state

Note 4: Definition of Viewing Angle:



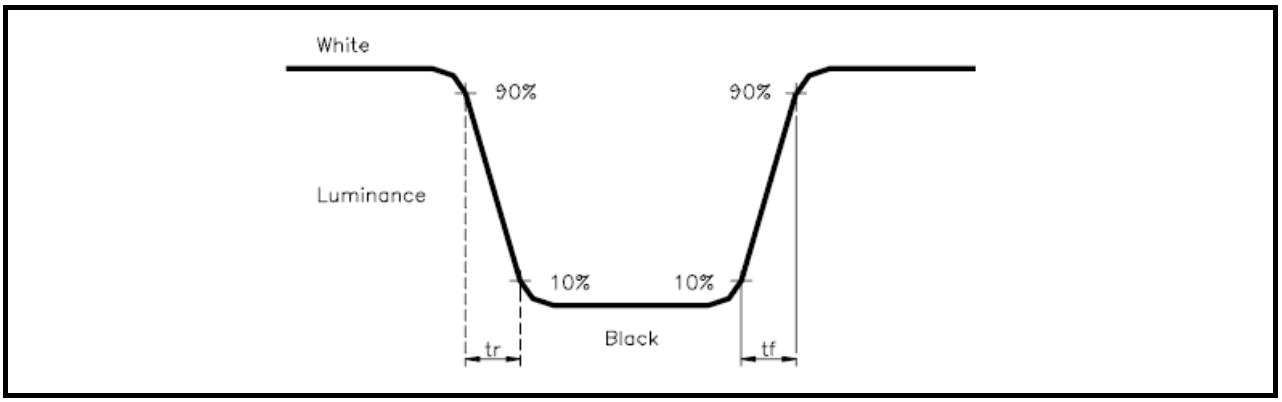
Note 5: Definition of Brightness Uniformity (B-uni):



B-uni ＝(Minimum luminance of 9 points÷Maximum luminance of 9points)X100%

Note 6: Definition of Response Time:

The Response Time is set initially by defining the “Rising Time (Tr)” and the “Falling Time (Tf)” respectively. Tr and Tf are defined as following figure



Note 7: Definition of Chromaticity:

The color coordinates (Wx,Wy),(Rx,Ry),(Gx,Gy),and (Bx,By) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

8. RELIABILITY

8.1 Test Condition

8.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : 25 ± 5°C

Humidity : 65 ± 5%

8.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

8.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

8.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

8.2 TESTS

No.	ITEM	CONDITION CRITERION
1	High Temperature Storage	80°C, 120 hrs
2	Low Temperature Storage	-40°C, 120 hrs
3	High Temperature Operating	80°C, 120 hrs
4	Low Temperature Operating	-30°C, 120 hrs
5	High Temperature/Humidity Non-Operating	40°C, 90%RH, 120 hrs
6	Temperature Shock Non-Operating	-30°C ←→ 70°C (1hr/cycle), 100 cycles
7	Vibration Test Non-Operating	Frequency:0 ~ 55 Hz Amplitude:1.5 mm Sweep Time:11min Test Period:6 Cycles for each Direction of X,Y,Z
8	Electro-static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω

Note1: The test sample have recovery time for 24 hours at room temperature before the function check. In the standard conditions, there is no any function NG issue occurred.

8.3 JUDGMENT STANDARD

The judgment of the above test should be made as follow:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.

8.4 INCOMING INSPECTION STANDARDS

(1) Display Inspection standards when power on.

Items		Acceptable count
Full Bright dot	Random	N≦2
	2 dots adjacent	N≦1
	3 dots adjacent or more	N≦0
Full Dark dot	Random	N≦3
	2 dots adjacent	N≦1
	3 dots adjacent or more	N≦0
Total full bright and full dark dot		N≦5
Foreign Black/White/Bright Spot		D≦0.15mm, Ignore 0.15＜D≦0.5 mm, N≦4
Foreign Black/White/Bright Line		W≦0.05mm, Ignore 0.05＜W≦0.1 mm,0.3＜L≦2.0 mm,N≦4
Polarizer	Scratches	W≦0.05mm, Ignore 0.05＜W≦0.1 mm,0.3＜L≦2.0 mm,N≦4
	Dent /Bubble	Avg. 0.15<D≦0.5 mm, N≦4
Distance	Minimum Distance Between Full Bright dots	L≧10mm
	Minimum Distance Between Full Dark dots	L≧10mm
Display failure (V-line/H-line/Cross line etc.)		Not allowable
Mura	Not visible through 6% ND filter in 50% gray or judge by limit sample if necessary	

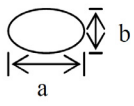
(2) External Appearance Inspection Criteria(Power off)

Item	Contents	
Screw	Parts mounting, incomplete assembly, deformation, oxidized, crooked or rusty is not permitted.	
CCFL cable (For CCFL Model)	Cable not continuous、Break-off 、Connector Burn-off /Break-off	
Metal frame (Bezel)	Scratch	*Noticeable scratch and exfoliation coating are not permitted. *The oxidized metal is not permitted.
	Incomplete assembly is not permitted.	
Backlight	Scratch	The scratch which may causes a problem in practical use is not permitted.
	Break-off	Breaking off is not permitted.
	Crack	The crack is not permitted.
Polarizer	Scratches	W≦0.05mm, Ignore 0.05＜W≦0.1 mm, 0.3＜L≦10.0 mm, N≦4
	Dent/Bubble	Avg. 0.15<D≦0.5 mm, N≦4
	Stain	The stain on polarizer, which can't be wiped off, is not permitted.
Tape/Label	Incorrect position, missed label is not permitted.	
Connector	Oxidized/rusty connector is not permitted.	
Outline size	Spec. out is not permitted.	

*Note: If any specific defect is not included in the above defect table, this defect should be judged by INX/ODM/Brand customer discussion.

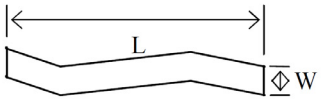
Note.1

D=(a+b)/2



Note.2

W: width, L：length



(1) Definition of dot defect induced from the panel inside

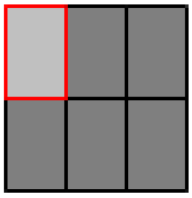
a) Bright dot：Dots appear bright and unchanged in size in which module is displaying under black pattern.

b) Dark dot：Dots appear dark and unchanged in size in which module is displaying under pure red, green, blue, white picture.

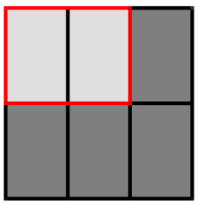
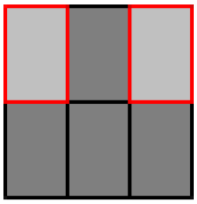
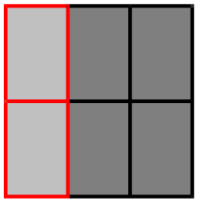
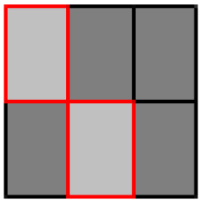
c) 2 Full dot adjacent = 1pair.

d) Picture：

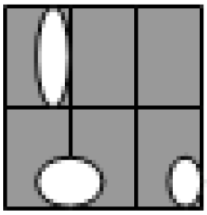
(a) Full dot



(b) 2 Full dot adjacent

(c) Spot defect



(3) Classification of defects

Inspection Item	Criteria and Description	Defect type
Vertical line	Signal input, vertical line off or irregular V-line appears	major
Horizontal line	Signal input, horizontal line off or irregular H-line appears	major
Cross line	Pattern signal input, a correct display is not obtained	major
No display	Signal input, display is dead	major
Irregular display	Pattern signal input, a correct display is not obtained	major
Dots defect	Exceed specified standards	minor
Scratch and Dent on polarizer	Exceed specified standards	minor
Foreign material	Exceed specified standards	minor
Mura	Non-uniformity is appeared in display	minor
Polarizer bubble	Exceed specified standards	minor

Defects are classified two types, major defect and minor defect according to the defect. And, the definition of defects is classified as below.

(1) Major defect

Any defect may result in functional failure, or reduce the usability of product for its purpose. For example, electrical failure, deformation and etc..

(2) Minor defect

A defect that is not to reduce the usability of product for its intended purpose and un-uniformity,dot defect and etc..

The criteria on major or minor judgment will be according with the classification of defects, and any defects out of active area, are not considered as a defect or counted.

8.5 The environmental condition of inspection

The environmental condition and visual inspection shall be conducted as below.

(1) Ambient temperature：15~25℃

(2) Humidity：25~75 %RH

(3) External appearance inspection shall be conducted by using a single 20W fluorescent lamp or equivalent illumination.

(4) Panel visual inspection on the operation condition for cosmetic shall be conducted at the distance 35cm or more between the LCD module and eyes of inspector.

Ambient Illumination：300 ~ 500 Lux for external appearance inspection

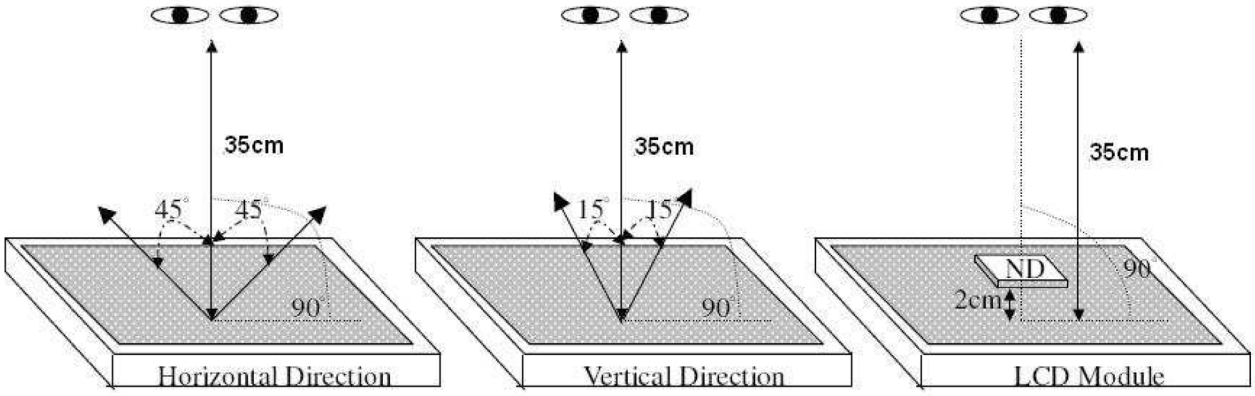
Ambient Illumination：100 ~ 200 Lux for light on inspection

(5) The viewing angle：

a) 15 degree to the front surface of display panel in vertical direction.

b) 45 degree to the front surface of display panel in horizontal direction.

(6) ND filter shall be conducted at the distance 2 cm to front surface of display panel and shall be conducted at the distance 35 cm between the LCD module and eyes of inspector by view angle 90 degree within 3 seconds.



9. PRECAUTION RELATING PRODUCT HANDLING

9.1 SAFETY

9.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.

9.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

9.2 HANDLING

9.2.1 Avoid any strong mechanical shock which can break the glass.

9.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module, be sure to ground your body and any electrical equipment you may be using.

9.2.3 Do not remove the panel or frame from the module.

9.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully, Do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)

9.2.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.

9.2.6 Do not touch the display area with bare hands , this will stain the display area.

9.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.

9.2.8 To control temperature and time of soldering is 280 ± 10˚C and 3-5 sec.

9.2.9 To avoid liquid (include organic solvent) stained on LCM.

9.3 STORAGE

9.3.1 Store the panel or module in a dark place where the temperature is 25˚C ± 5˚C and the humidity is below 65% RH.

9.3.2 Do not place the module near organics solvents or corrosive gases.

9.3.3 Do not crush, shake, or jolt the module.