

Customer Specification

17.3 Inch Color LCD Display

Model: HL1706LT

Name	Department/Title	Date	Signature

Change History

Version	Date	Author	Modification
A0	2015-8-17	Xu Hongjie	Preliminary

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1. SCOPE

This document defines the performance requirements for a 17.3-inch FHD TFT LCD color monitor with touch screen for medical use. This product is controlled by model name; any change will be recorded in the list and confirmed by customer.

This high-resolution color display is specifically designed to meet the rigorous performance standards needed for medical monitoring system.

The surface of the monitor has an anti-glare coating to minimize reflection and a hard coating to reduce scratch.

The touch screen is projected capacitive touch screen, and is usable in Windows 7 environment.

2. ELECTRICAL PERFORMANCE

2.1 Power Supply

-Input Voltage	: DC24V $\pm$ 10%
- Current (max)	: 1.25A
- Power Consumption	: <30W

2.2 Power Management

The following table shows the power consumption feature:

VESA Mode	Horizontal Sync	Vertical Sync	Video	Power Indicator	Power Consumption
Normal operation	Active	Active	Active	Green	Less than 30 W

While there is no sync or active video supplied by the system, the Power indicator LED will be in green blinking status, and the monitor screen will display "No Signal".

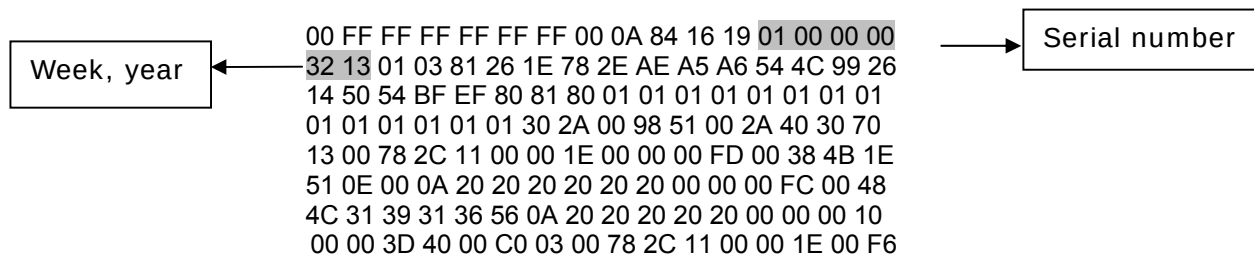
2.3 Interface



2.3.1 Signal Specifications

Item		Spec
DVI Digital	DVI-Digital Single link	TMDS: 600mV for each differential line Input Impedance: 50 ohm
	DVI EDID datum	EDID via DVI I ² C bus
Display Port	Display Port 1.1 Receiver 4 main Lanes	Display Port: 600mV for each differential line Impedance: 100 ohm per differential pair
	DP EDID datum	EDID via AUX channel

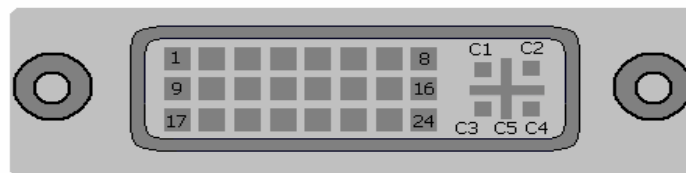
Digital (DVI-D/DP) EDID



Note: the datum above for reference only. Serial number, week and year will be changed according to manufacture order.

2.3.2 DVI-D connector

Comply with Digital Visual Interface DVI Revision 1.0

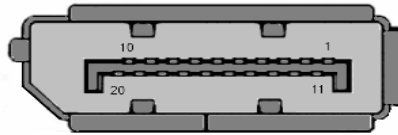


DVI-D connector

Pin - Assignment of 29-pin DVI-D/DVI-I Female Connector		
Pin 1 - TMDS Data 2-	Pin 12 - TMDS Data 3-	Pin 22 - TMDS Clock Shield
Pin 2 - TMDS Data 2+	Pin 13 - TMDS Data 3+	Pin 23 - TMDS Clock+
Pin 3 - TMDS Data 2/4 Shield	Pin 14 - +5 V Power	Pin 24 - TMDS Clock-
Pin 4 - TMDS Data 4-	Pin 15 – Ground	
Pin 5 - TMDS Data 4+	Pin 16 - Hot Plug Detect	
Pin 6 - DDC Clock	Pin 17 - TMDS Data 0-	
Pin 7 - DDC Data	Pin 18 - TMDS Data 0+	
Pin 8 – N.C	Pin 19 - TMDS Data 0/5 Shield	
Pin 9 - TMDS Data 1-	Pin 20 - TMDS Data 5-	
Pin 10 - TMDS Data 1+	Pin 21 - TMDS Data 5+	
Pin 11 - TMDS Data 1/3 Shield		

2.3.3 Display Port

Comply with VESA Display Port Standard Version 1.1

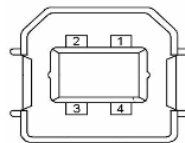


DP connector

Pin Number	20-pin Side of the Connected Signal Cable	Pin Number	20-pin Side of the Connected Signal Cable
1	ML0(p)	11	GND
2	GND	12	ML3(n)
3	ML0(n)	13	GND
4	ML1(p)	14	GND
5	GND	15	AUX(p)
6	ML1(n)	16	GND
7	ML2(p)	17	AUX(n)
8	GND	18	HPD
9	ML2(n)	19	Re-PWR
10	ML3(p)	20	PWR

2.3.4 USB 2.0 Interface

The monitor supports touch function, the touch screen only can be used in the Microsoft® Windows 7.



USB-B connector

Pin	Signal
1	VBUS
2	D-
3	D+
4	GND

USB is connected to host system, in order to enable Touch panel.

2.3.5 Power connector

Customer side: Molex Mini-Fit Jr. PN 39-01-2020

PIN1:GND; PIN2:24V DC

Monitor side: Mini-Fit® Jr. Header PN:39-29-9027

2.3.6 Signal switching

The default input port is Display Port, DVI signal only can be selected by OSD.

Note: Set Display Port as factory preset

2.4 Panel Features

Panel Module	G173HW01.0
Size	17.3"
Aspect Ratio	16:9 (W:H)
Active Display Area	381.888 (H) x 214.812 (V) mm
Resolution	1920 (H)x 1080 (V) pixels
Pixel Pitch	0.1989(H) x 0.1989(V) mm
Color Depth	16.7M
Lamp Type	LED (Replaceable module)
Surface	Hard-coating(3H),Glare treatment

2.5 Display Performance

2.5.1 Standard Testing Conditions

- Warm up time	> 30 minutes.
- DC supply voltage	24V DC
- Ambient temperature	25 ± 5°C
- Relative Humidity	30% --80%
- Video signal	1920x1080@ 60Hz; DVI-D/DP
- Ambient Environment	Dark
- LUT Setting	Native
- Luminance meter	Minolta CA-210/CA310 or equivalent

2.5.2 Brightness

The light output shall be set on 250cd/m² output during manufacturing

Note: White Luminance (L max) is defined as a Luminance of L255 Gray

Black Luminance (L min) is defined as a Luminance of L0 Gray

Test at the center point on LCD surface. (See Note 1 Note 4)

2.5.3 View angle

Left/Right: 80/80 degree (Typ.); 70/70 degree (Min.) (CR≥10) (Note 2)

Up/Down: 60/80 degree (Typ.); 50/70 degree (Min.) (CR≥10) (Note 2)

2.5.4 Luminance Uniformity

Typ. 80%, Min 75%

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2.5.5 Contrast ratio

600:1 (Typ.) (Note 3)

500:1 (Min.)

2.5.6 White Color Coordinates

$x=0.30\pm0.01$ $y=0.31\pm0.01$

2.5.7 Response Time

Typ. (Tr+Td): 37+3ms (Note 6)

Max. (Tr+Td): 50+10ms (Note 6)

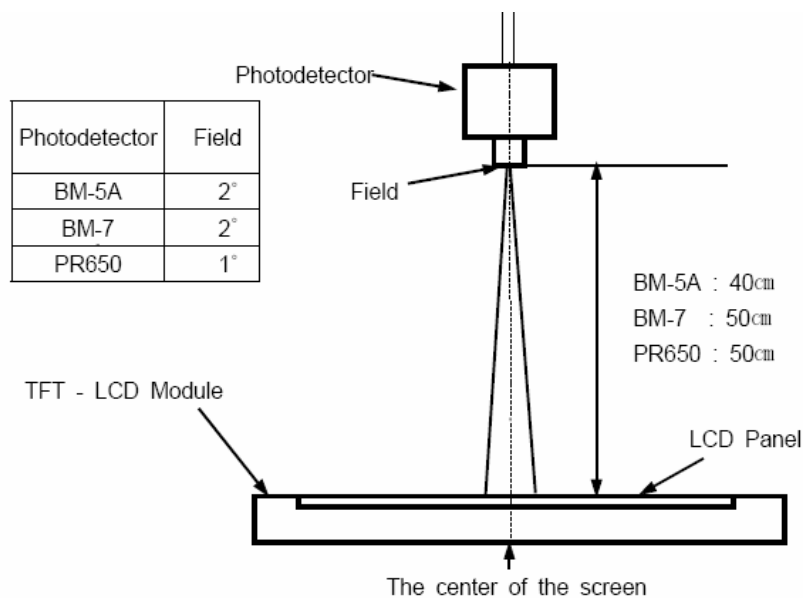
2.5.8 Color Gray

64 gray levels should be displayable

Note1: Test Equipment Setup

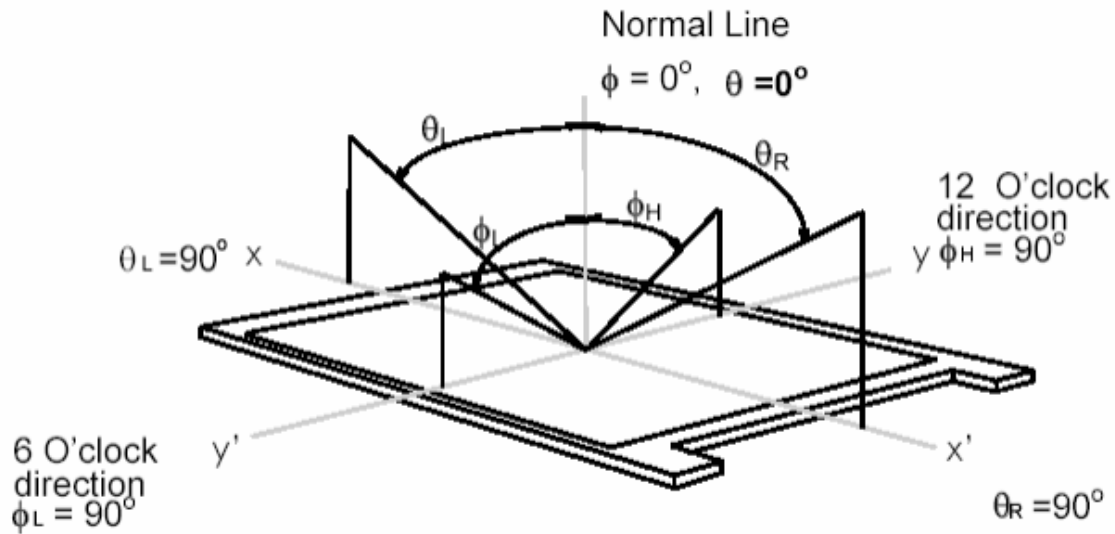
The measurement should be executed in a stable, windless and dark room between 20 minutes after the backlight at the given temperature for stabilization of the backlight. This should be measured in the center of screen. Test equipment should be equivalent with the following equipment.

Environment condition: $T_a=25 \pm 2^{\circ}\text{C}$



Optical Measuring Equipment Setup

Note2: Viewing angle is measured as follow:



Note 3: Definition of contrast Ratio (CR):

Ratio of gray max (Gmax) & gray min (Gmin) at the center point of the panel.

$$CR = \frac{G \max}{G \min}$$

Gmax: Luminance with all pixels white

Gmin: Luminance with all pixels black

Note 4: Definition of Luminance of White: Luminance of white at center point.

Note 5: Definition of luminance uniformity

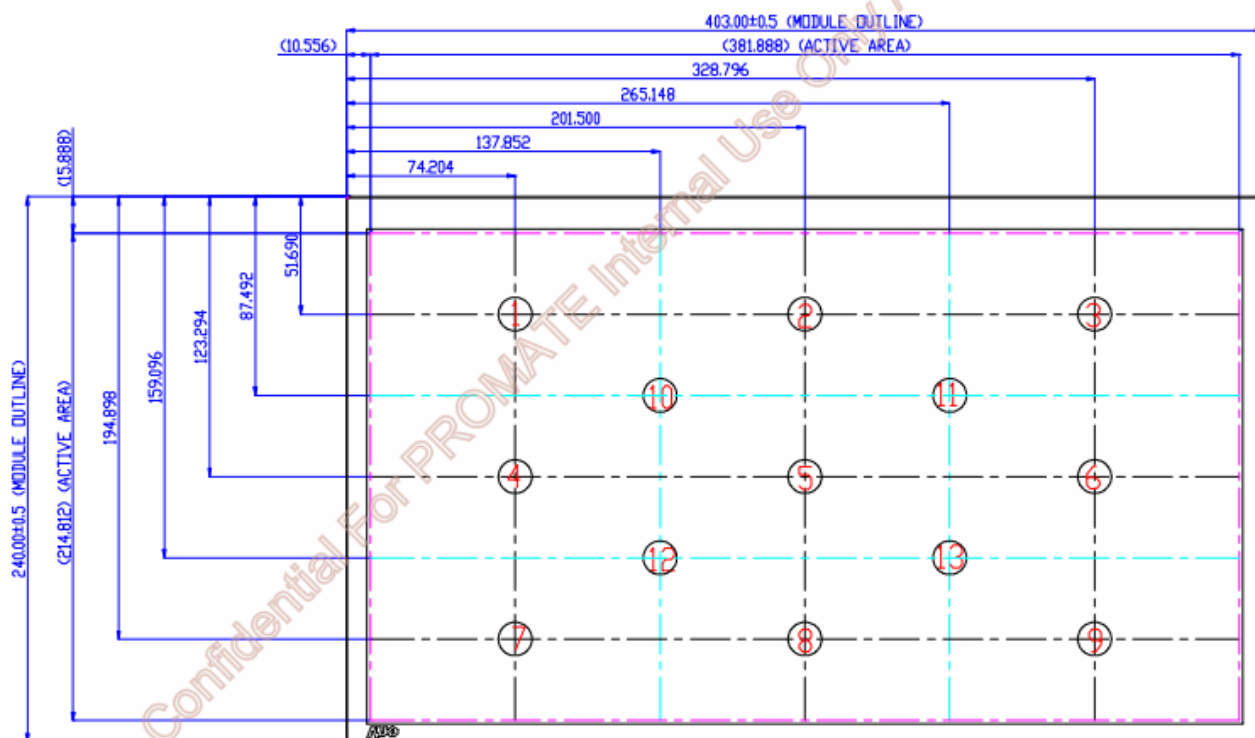
The luminance uniformity is calculated by using following formula.(Under White Screen Status)

$$Buni = 100 * \frac{(B \max - B \min)}{B \max}$$

Bmax: Maximum brightness

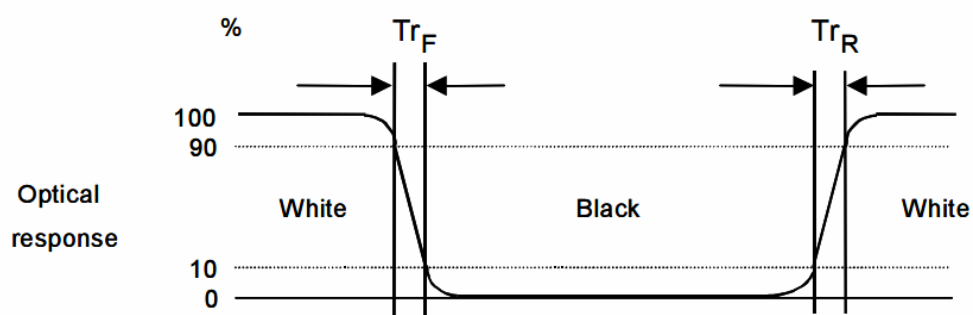
Bmin: minimum brightness

13 points position



Note 6: Definition of response time is as follows:

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.



2.6 Touch screen Performance

2.6.1 Features

Item	Specification
Type	P-CAP
Input Mode	Finger
Cable	FPC
Interface Type	USB-B 2.0 interface (Voltage & connection provide by host system)

2.6.2 General Specification

Item	Specification
Frame Size	414mm X247 mm
Tolerance	-0.3,+0.3mm
Active Area	382 X215mm
Black Silkscreen	16mm perimeter outside viewable area
Surface Treatment	Chemically hardened glass, no anti-reflective treatment
Total Thickness	2.3±0.20 mm

2.6.3 Environmental Characteristics

Item	Specification	
	Temperature	Humidity (Non Condensing)
Operation	-20°C ~ +70°C	10%RH ~ 90%RH (Max 50°C)
Storage	-20°C ~ +70°C	10%RH ~ 90%RH (Max 50°C)

2.6.4 Optical Characteristics

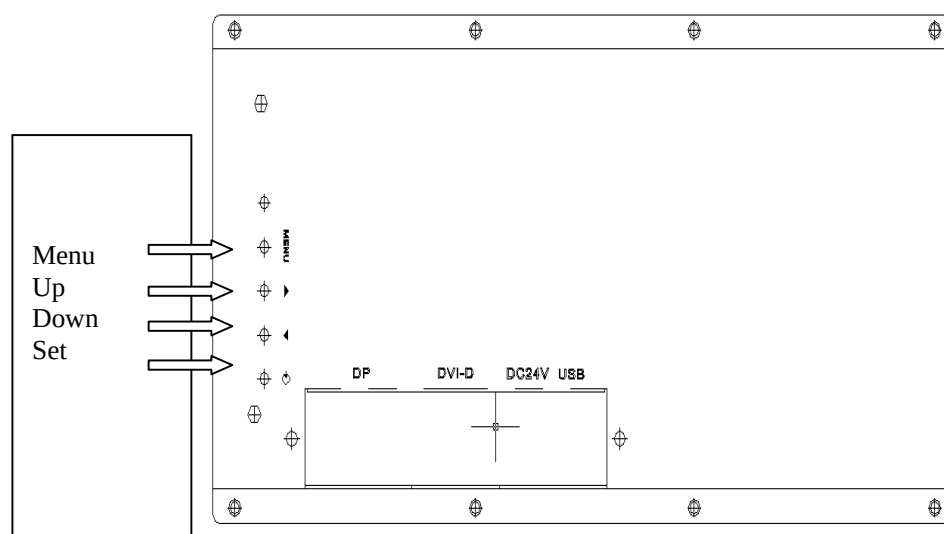
Item	Specification
Transmissivity	87±2%

3. OPERATING GUIDE

添加整机加按键的图片，做按键标注

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3.1 Keys assignment

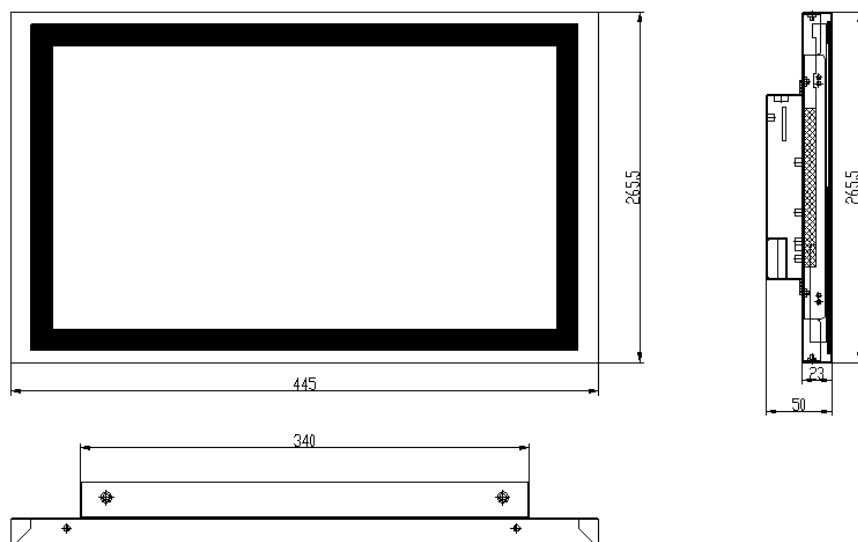


3.2 Key Functions in the OSD Menu

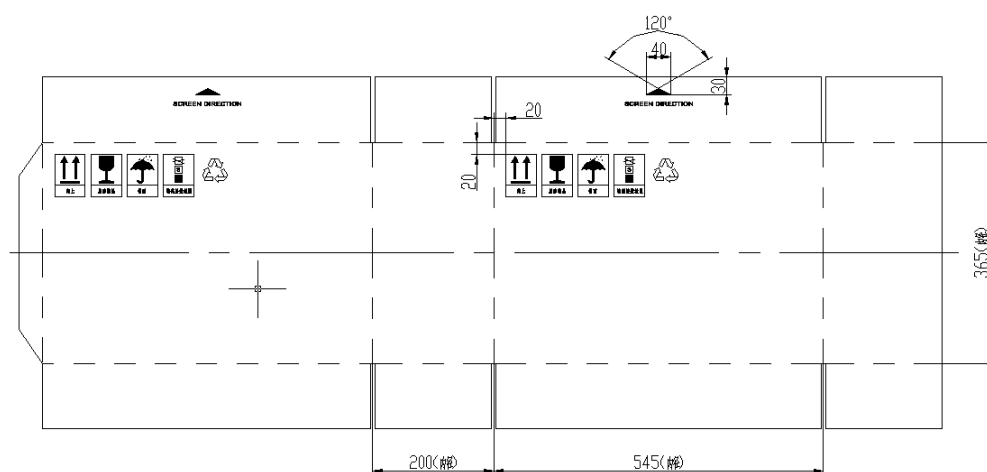
Keys	Action
Menu	Switch signal input
Up	Adjust Backlight
Down	Adjust Brightness
Set	Adjust Contrast

4. MECHANICAL SPECIFICATIONS

4.1 Outline Dimensions & Weight



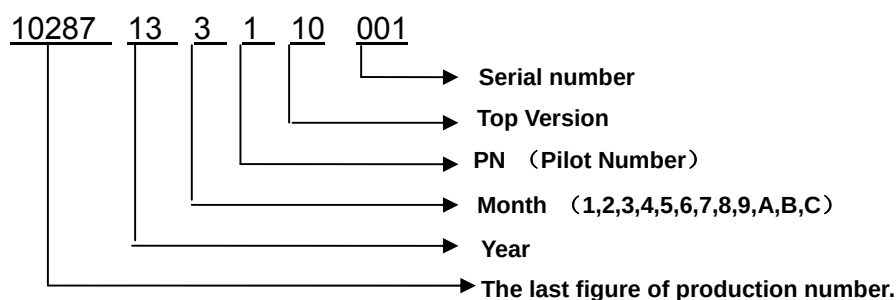
4.2 Packaging



	Carton Box	
Dimension	Width (mm)	TBD
	Depth (mm)	TBD
	Height (mm)	TBD
Gross weight	TBD	

4.3 Label

The manufacture serial number consists of 14 characters (majuscule and numbers), format as below:



Notes: Month using hexadecimal, A, B, C substitute for October, November, December.

Example: HL1706LT products machine Part Number 301010312, TOP version 1.0, in January 2014, the first batch, the serial number of the first production is 10312141110001.

5. ENVIRONMENT CONDITONS

5.1 Operation Environment

Ambient temperature range	+5 -- +35℃
Ambient humidity	15%-85%
Temperature gradient	Max. 7℃/h , no condensation
Atmospheric pressure range	70 – 106 kPa
Altitude	≤ 5000m

5.2 Transport and Storage (Packed)

Ambient temperature range	-20 -- +60℃
Ambient humidity	5%-90%
Temperature gradient	Max. 10℃/h, no condensation
Atmospheric pressure range	70 – 106 kPa
	≤ 5000m

5.3 Mechanical Load

Operation

Vibration	According to EN60068-2-6 10--58 Hz within ± 0.075 mm deflection 58—500 Hz at 10 m/s ²
Shock	According to EN 60068-2-27 (single shock) 150m/s ² , 6ms No permanent shock allowed in operating conditions

Packed unit

According to 2M2 EN60721-3-2

6.REGULATION

6.1 Safety Specifications

Safety standards	EN60601-1, EN60601-1-2, ANSI/AAMI ES6060-1: 2005 + A2(R2012) + A1 & CAN/CSA-C22.2 NO. 60601-1:14, FCC PART15B
Approvals	cTUVus、CB (NCB Lab.)
Protection class	Protection class III
Degree of protection to DIN 40050	IP 20
Conformity	CE

6.2 Electromagnetic Compatibility

IEC60601-1-2 Class B
FCC Part15 class B

6.3 RoHS Compliance

Comply with RoHS Directive 2011/65/EU

7. MTBF & Warranty

The monitor life time: $\geq 50,000$ hours (Brightness reduction to 50%)

Warranty items refer to related service contract.

8. DEFECT, SCRATCH and DUST

8.1 Inspection instruments

8.1.1 Pattern generator: LD-2000 or equivalent model.

8.1.2 Video board: AU video board or equivalent. The output of the signal should comply with the specification provided by AU.

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8.1.3 Luminance colorimeter: Topcon BM-7 or equivalent model

8.2 Environment condition

8.2.1 Room temperature: 20 ~ 25 C.

8.2.2 Humidity: 65±5% RH.

8.2.3 Illumination: Fluorescent light (Day-Light Type) display surface illumination to be 300 ~ 700 lux. (standard 500lux.)

8.2.4 To be a distance about 35 ± 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.

8.2.5 Take off the protector of polarizer while judging the display area.

8.2.6 If there is any question while judging, check the panel again while operating.

8.2 Dot Defect

Defects are classified as major defects and minor defects according to the degree of defectiveness defined herein.

Major defects:

A major defect is a defect that is likely to result in failure, or to reduce materially the usability of the product for its intended purpose.

Minor defects:

A minor defect is either a defect that is not likely to reduce materially the usability of the product for its intended purpose, or a departure from an intended purpose with little bearing on the effective use or operation of the product.

1 2	Inspection Item	Specification	
	Line defect	Can't be seen.	
	Bright dots	• 2 dot	
	Dark dots	• 8 dots	
	Total dots defect	• 5 dots	

Note 1) For dot defect, one sub pixel is defined as one dot. Defect area (of dot defect) should be larger than 1/2 area of one sub-pixel to be count as 1 dot defect.

Note 2) 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). The small bright dots is less than or equal to 10 dots.



Fig.1

Note 3) Judgment criteria (For Bright dot and Small Bright dot) : Using ND Filter 5% (distance : 30 cm). If it could be observed, dot defines as one bright dot. If not, dot defines as one small bright dot.

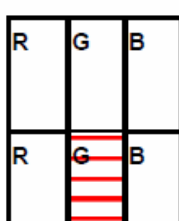
Note 4) All bright dot defects should not be noticeable by observer under specified inspection environment (Please refer to item 5).

Note 5) Adjacent-dot defect should be observed under the same display pattern in any one of Black/Green/Blue/Red pattern.

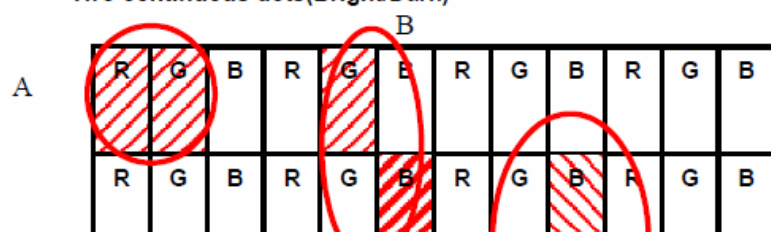
● Dot defect diagram

L
2

One dot (Bright /Dark)



Two continuous dots(Bright/Dark)

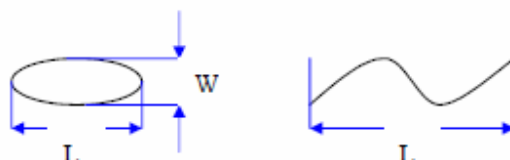


8.3 Inspection Specification

	Label overlapping	Allowed	• •	
Screw	Not enough (Q'ty)	No	• •	
	Loose	No	• •	
Connector	Appearance	No broken, rising, deformation	• •	

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

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



Note 3 : Extraneous substances which can be wiped out, such as fingerprint and particles are not considered as a defect.

Note 4 : Defects on the Black Matrix (outside Active Area 0.3mm) are not considered as a defect.

Note 5 : ND filter use method The inspection method of ND Filter - holding ND filter in front of the panel around 10 mm and examine the panel from 35±5 cm in the front view for 1 seconds.

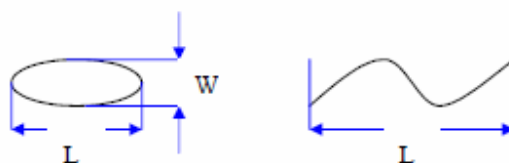
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2014-5

Judge area	Judge item		Inspection specification			Judge criterion		
						Major	Minor	
Active area	Particles,	Circular	Average diameter: D (mm)		Numbers			• •
			D<0.4		Disregarded			
			0.4• D<0.6		n• 10			
			0.6<D		n=0			
		Linear	Width: W (mm) Length: L (mm)		Numbers			• •
			W• 0.15		L• 80			
	0.15<W		L>30					
Scratch/Defect	Circular	Average diameter: D (mm)		Numbers			• •	
		D<0.4		Disregarded				

	Label overlapping	Allowed	• •	
Screw	Not enough (Q'ty)	No	• •	
	Loose	No	• •	
Connector	Appearance	No broken, rising, deformation	• •	

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

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Note:5 :ND filter use method The inspection method of ND Filter - holding ND filter in front of the panel around 10 mm and examine the panel from 35 ± 5 cm in the front view for 1 seconds.

Appendix: Preset Timings

640 x 480	60Hz
800 x 600	60Hz
1024 x 768	60Hz
1280 x 1024	60Hz
1366 x 768	60Hz
1440 x 900	60Hz
1920 x 1080	60Hz