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TITLE : TV122WXM-NW0 Product Specification

Rev.1

HEFEI BOE OPTOELECTRONICS TECHNOLOGY

REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
0	-	Initial Release	2015.08.05	蒋盛超
1	-	Update the spec of circuit & packing information	2015.10.19	蒋盛超

Contents

1.0 General Description

Parameter	Specification	Unit	Remarks
LCD Size	12.2	inch	-
Active area	262.656(H) ×164.16(V)	mm	-
Number of pixels	1280(H) ×800 (V)	pixels	-
Pixel pitch	0.2052 (H) × 0.2052(V)	mm	-
Pixel arrangement	RGB	-	-
Display colors	16.7M	colors	-
Display mode	Normal black	-	-
LCM Outline Dimension	271.06±0.3(W)×176.42±0.3(V) × 2.66±0.2(D)	mm	
Transmittance	6.0%	-	W/O APF
NTSC	Typ. 50%	-	-
Inversion Type	1+2LINE	-	
Response Time	Typ. 30ms, Max. 35ms	ms	
CR	Typ. 900 Min:700		
Brightness	Typ:300 Min:270	nits	@center
Brightness Uniformity（9Point）	Typ.75%,70%Min	-	
Viewing angle (CR≧10)	Typ:80/80/80/80		
LCM Weight	290(Max.)	gram	No Digging Hole

Parameter	Specification	Unit	Remarks
Upper pol size	265.66×167.16	mm	HC
Lower pol size	265.66×167.16	mm	AG25
Interface	EDP1.2	-	-

2.0 ELECTRICAL SPECIFICATIONS

2.1 TFT LCD Module

< Table 1 . LCD Module Electrical Specifications > [Ta =25±2 ℃]

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	3.0	3.3	3.6	V	Note 1
Power Supply Current	I_{DD}	-	350	450	mA	Note 1
Positive-going Input Thresh old Voltage	V_{IT+}	-	-	100	mV	V_{cm} = 1.2V typ.
Negative-going Input Thresh old Voltage	V_{IT-}	-100	-	-	mV	
Differential Input Voltage	V_{ID}	380	-	1200	mV	
Power Consumption	P_D	-	1.0	1.4	W	white
	P_{BL}	-	2.8	3.1	W	W/I Driver
	P_{total}	-	3.8	4.5	W	

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25 ℃
Max value at White Pattern

2. Calculated value for reference (VLED X ILED)

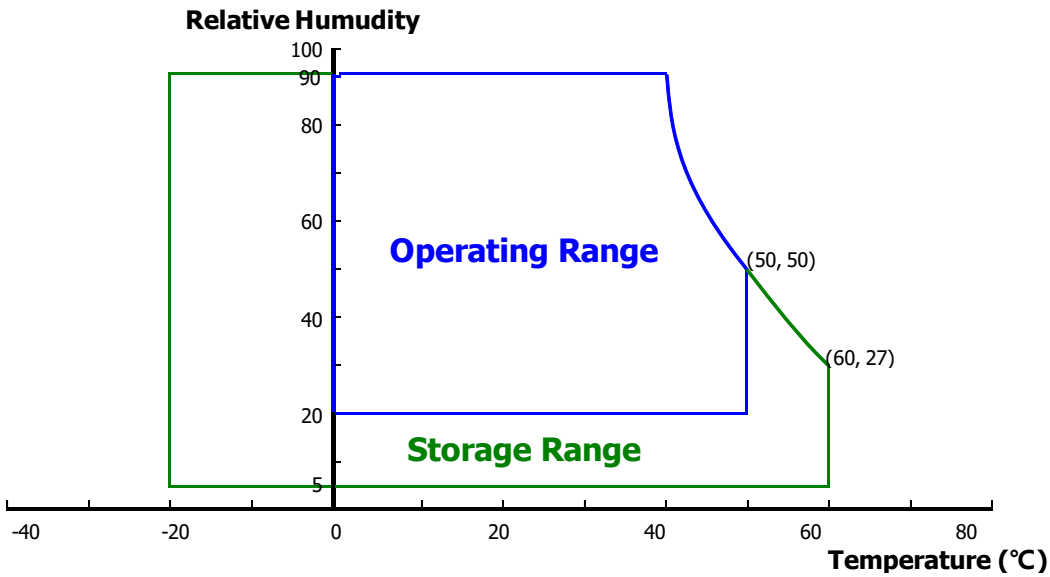
3.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2 . LCD Module Electrical Specifications > [Ta =25±2 ℃]

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	4.2	V	Note 1
Logic Supply Voltage	V_{IN}	V_{ss}-0.3	V_{DD}+0.3	V	
Operating Temperature	T_{OP}	0	+50	℃	Note 2
Storage Temperature	T_{ST}	-20	+60	℃	

Note : 1) Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 ℃ max. and no condensation of water.



3.1Power Consumption of Backlight

Test Condition : ILED=22mA LED 40PCS
Warning: LCM Brightness must match Optical Spec requirement when ILED=22mA
Backlight Unit Schematic:

Item	Symbol	Value			Unit	Remark
		Min	Typ	Max		
Forward current	IBL	100	110	120	mA	Note 5
Power Consumption	PBL	-	2800	3320	mW	
LED Quantity		40			pcs	
LED Rank		Luminous Flux: 2800			mcd	

Note : When ILED=22mA，the VBL must be in the range of above table specified.
The FPC wire resistance between LED+ and LED- must be less than 0.15ohm
PBL= ILEDX VBL

4.0 INTERFACE CONNECTION

4.1 Module Input Signal & Power

- FPC Signal interface : 30 Pin.(FH26W-39S-0.3SHW(60))

<Table 3. 1Display Interface>

Pin No.	Symbol	Description
1	LSB	Panel_ID
2	GND	High Speed Ground
3	Lane1_N	Complement Signal Link Lane 1
4	Lane1_P	True Signal Link Lane 1
5	GND	High Speed Ground
6	Lane0_N	Complement Signal Link Lane 0
7	Lane0_P	True Signal Link Lane 0
8	GND	High Speed Ground
9	AUX_CH_P	True Signal Auxiliary Ch.
10	AUX_CH_N	Complement Signal Auxiliary Ch.
11	GND	High Speed Ground
12	LCD_VCC	LCD logic power (3.3V)
13	LCD_VCC	LCD logic power (3.3V)
14	LCD_Self_Test	No Connection (Reserved for CMI)
15	GND	LCD Ground
16	GND	LCD Ground
17	HPD_IN	HPD signal pin
18	PWMI	System PWM signal input
19	PWMO	Panel PWM signal output to system
20	LED_FB1	LED Cathode
21	LED_FB2	LED Cathode
22	LED_FB3	LED Cathode
23	LED_FB4	LED Cathode
24	NC	No Connection
25	NC	No Connection

Pin No.	Symbol	Description
26	I2C_SCL	Reserved for ASUS I2C BUS
27	I2C_SDA	Reserved for ASUS I2C BUS
28	Anode	LED Anode
29	Anode	LED Anode
30	Panel_ID (MSB)	Panel_ID (MSB)

5.0 SIGNAL TIMING SPECIFICATION

5.1 Signal timing

ITEM	Symbol		Min	Typ	Max	Unit	Note
CLK	Period	t_{CLK}	4		4.44	ns	
	Frequency	-	64.8	67.2	70.4	MHZ	
Hsync	Period	t_{HP}	-	1380	-	t_{CLK}	
	Frequency	f_H	-	82.8	-	KHz	
Vsync	Period	t_{VP}	-	812	-	t_{HP}	
	Frequency	f_V	55	60	64	Hz	
Horizontal Active Display Term	Valid	t_{HV}	-	1280	-	t_{CLK}	
	Total	t_{HP}	-	1380	1560	t_{CLK}	
Vertical Active Display Term	Valid	t_{VV}	-	800	-	t_{HP}	
	Total	t_{VP}	804	812	830	t_{HP}	

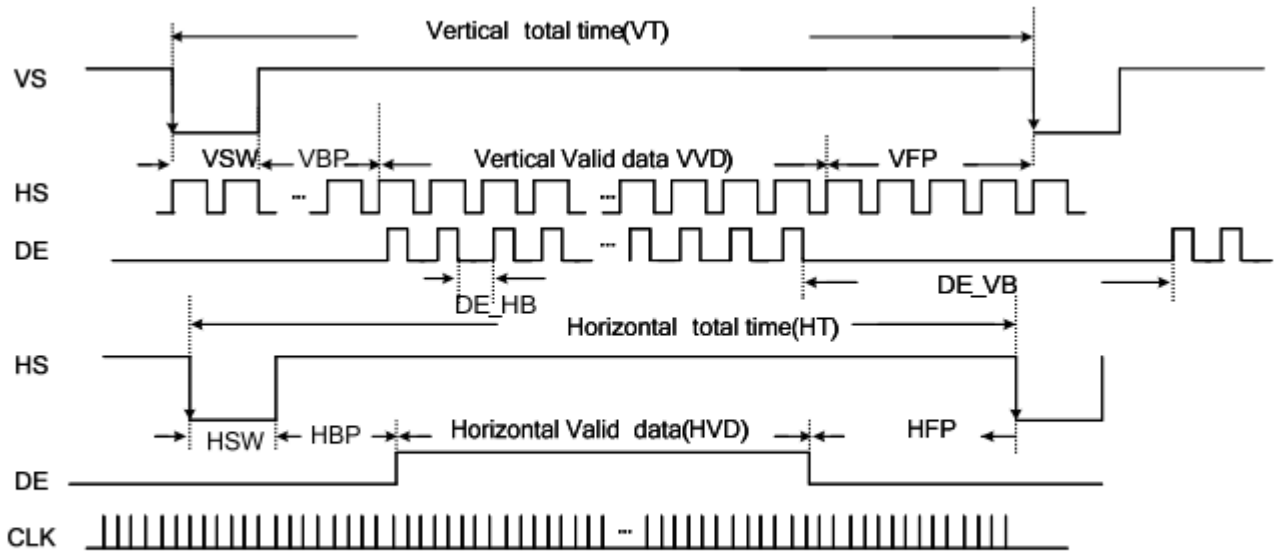


Figure 6.5: Input video signal format

5.2 EDP Interface Timing Parameter

The specification of the EDP interface timing parameter

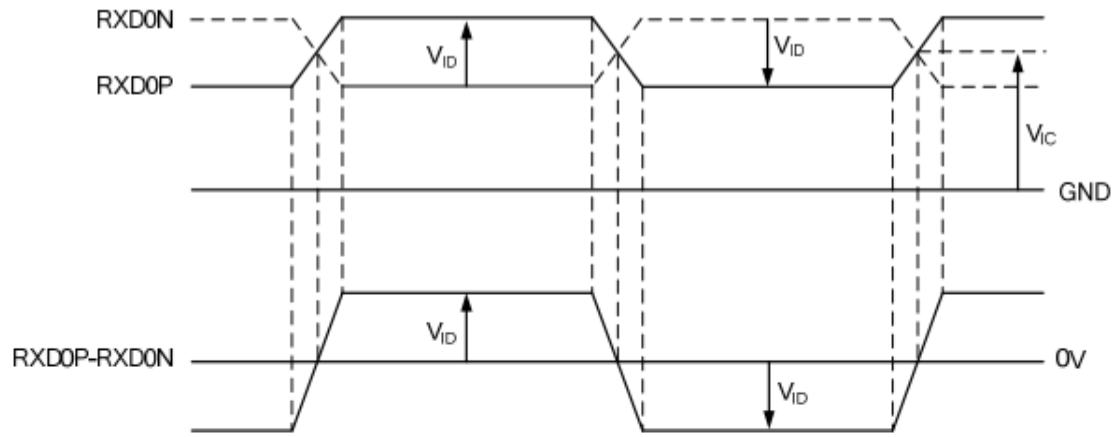
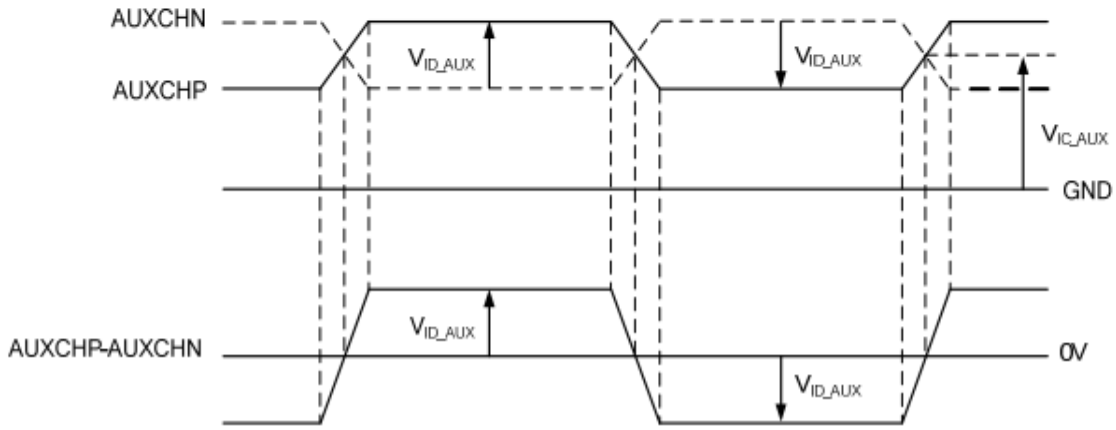


Figure 7.1: Main Link V_{ID} and V_{IC} definition



DC electrical character

Symbol	Parameter	Condition	Spec. Min.	Spec. Typ.	Spec. Max.	Unit
CMOS/TTL DC specifications						
V_{IH}	High level input voltage	-	0.7VDDIO	-	VDDIO	V
V_{IL}	Low level input voltage	-	VSSIO	-	0.3VDDIO	V
V_{OH}	High level output voltage	-	0.8VDDIO	-	VDDIO	V
V_{OL}	Low level output voltage	-	VSSIO	-	0.2VDDIO	V
I_{IN}	Input current	-	-10	-	10	μA
R_{PD}	Pull low resistance	CABC_EN **(Pin 5)** COLOR_EN **(Pin 6)** AGMODE **(Pin 17)** PWMI **(Pin 18)** TEST **(Pin 22)**	75	150	225	KΩ
DP DC specifications						
V_{IC}	Main link common mode voltage	-	0	-	2.0	V
V_{ID}	Main link swing voltage	2.7 Gbps	±60	-	±600	mV
		1.62 Gbps	±20	-	±600	mV
V_{IC_AUX}	AUX common mode voltage	-	0	-	2.0	V
V_{ID_AUX}	AUX swing voltage	transmitting	±0.195	-	±0.69	V
		receiving	±0.16	-	±0.68	V
mini-LVDS DC specifications						
V_{OD}	Output differential voltage range	RL=100Ω (T_A=25℃)	100	-	600	mV
	Output differential voltage deviation		V_{OD_CODE} *0.85 (1)	-	V_{OD_CODE} *1.15 (1)	mV
V_{OS}	Output offset voltage range		0.6	-	1.3	V
	Output offset voltage deviation		V_{OS_CODE} -0.2 (1)	-	V_{OS_CODE} +0.2 (1)	V
PWM DC specifications						
V_{LX}	LX pin spike voltage	-	-2	-	3.6	V

Note: (1) The V_{OD_CODE} and V_{OS_CODE} can be programmable by different panel characteristics through ROM code.

AC electrical character

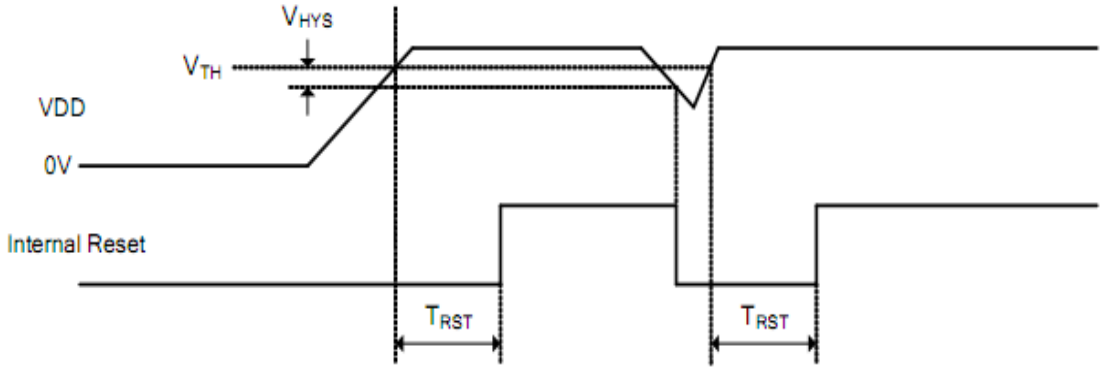


Figure : Power on reset

Symbol	Parameter	Condition	Spec.			Unit
			Min.	Typ.	Max.	
V_{TH}	Reset threshold voltage	-	1.7	1.9	2.1	V
V_{HYS}	Hysteresis voltage	-	200	-	-	mV
T_{RST}	Time constant of RC	-	-	0.8RC	-	s

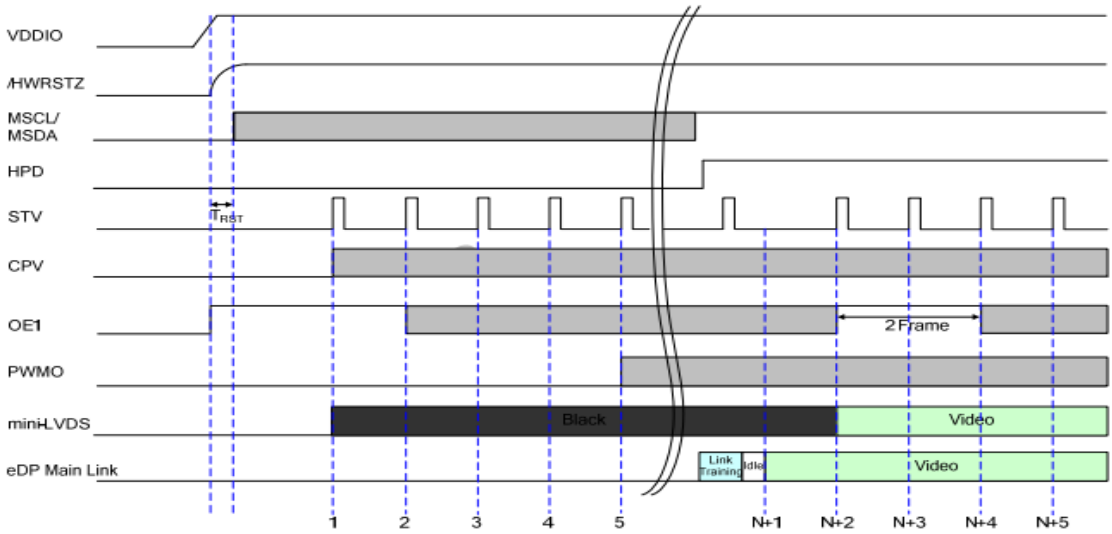


Figure : Power up sequence

6.0 Optical Specifications

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (CA-310、BM-5A) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to $\theta_{Ø=0}$ (=θ_3) as the 3 o'clock direction (the "right"), $\theta_{Ø=90}$ (= θ_{12}) as the 12 o'clock direction ("upward"), $\theta_{Ø=180}$ (= θ_9) as the 9 o'clock direction ("left") and $\theta_{Ø=270}$(= θ_6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VDD shall be 3.3V +/-10% at 25°C. Optimum viewing angle direction is 6 'clock.

Item		Symbol	Condition	Value			Unit	Note
				Min	Typ	Max		
luminance		Bp	θ=0 Φ=0	270	300	--	cd/m2	Note 3
Maximum Brightness of Black Pattern		Bblk		---	---	0.65	cd/m2	
Uniformity		△Bp		70	75	--	%	Note 4
Color Uniformity		△u'△ v'-A				TBD		
		△u'△ v'-B				TBD		
		△E*ab				TBD		
Viewing Angle	Left	θ_L	Cr≥10	75	80	--	deg	Note 1
	Right	θ_R		75	80	--		
	Top	ψ_T		75	80	--		
	Bottom	ψ_B		75	80	--		
Contrast Ratio		Cr	θ=0 Φ=0	700	900	--	-	Note 2
Response Time		Tr+Tf		--	30	35	ms	Note 6
		Tgray		-	45	55	ms	
Color Coordinate of CIE1931	Red	**x**	θ=0 Φ=0	—	—	—	-	Note 5
		y		—	—	—		
	Green	**x**		—	—	—		
		y		—	—	—		
	Blue	**x**		—	—	—		
		y		—	—	—		
	White	**x**		0.273	0.303	0.333		
		y		0.303	0.333	0.363		

6.0 Optical Specifications

NTSC Ratio	NTSC	CIE1931	-	50	-	%	Note 13
Flicker	amount	-	-	-	-30	dB	Note 14
Gamma	-		2.0	2.2	2.4		Note 15
Crosstalk	△CT	-	-	1.10	1.20		Note 16
Transmittance @w/o APF	Tm		TBD		--	%	
Reflectance	Rf	@550nm	--		TBD	%	Note 17
Polarization Direction of Front Polarizer	PdF			TBD		deg	Note 18
Polarization Direction of Rear Polarizer	PdR			TBD		deg	
Luminance decrease ratio		θL=30°	---	---	70	%	Note 19
		θR=30°	---	---	70	%	
		ψT=30°	---	---	70	%	
		ψB=30°	---	---	70	%	
Contrast decrease ratio		θL=30°	---	---	70	%	Note 20
		θR=30°	---	---	70	%	
		ψT=30°	---	---	70	%	
		ψB=30°	---	---	70	%	
Color shift		θL=30°	---	---	3	JNCD	Note 21
		θR=30°	---	---	3	JNCD	
		ψT=30°	---	---	3	JNCD	
		ψB=30°	---	---	3	JNCD	
Gray inversion angle		ψ=0°		NA		deg	Note 22
Sunglass Readability			NA				
Afterimage			3			Minute	Note 23
CABC Test							Note 24
Hot spot	△Bp	θ=0° Φ=0°	75	80		%	Note25
		θ=0° Φ=0°	80	85		%	Every near 9 points Note25

Note :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Center Luminance of white is defined as luminance values of 1point average across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display. The luminance is measured by CA310 when the LED current is set at 16.8mA.

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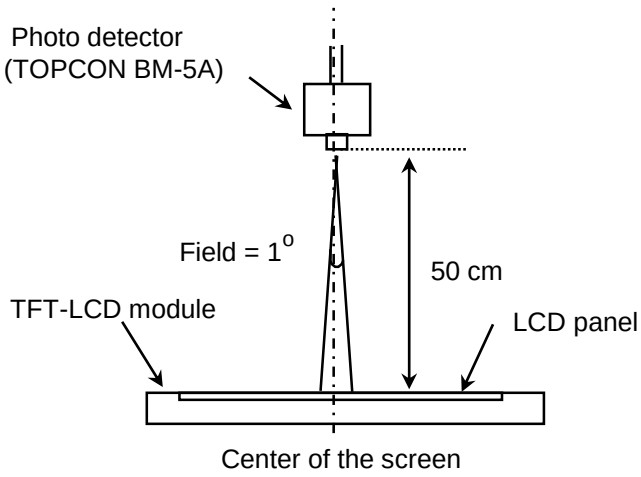
4. The White luminance uniformity on LCD surface is then expressed as : ΔY = Minimum Luminance of 9points / Maximum Luminance of 9points (see FIGURE 2).

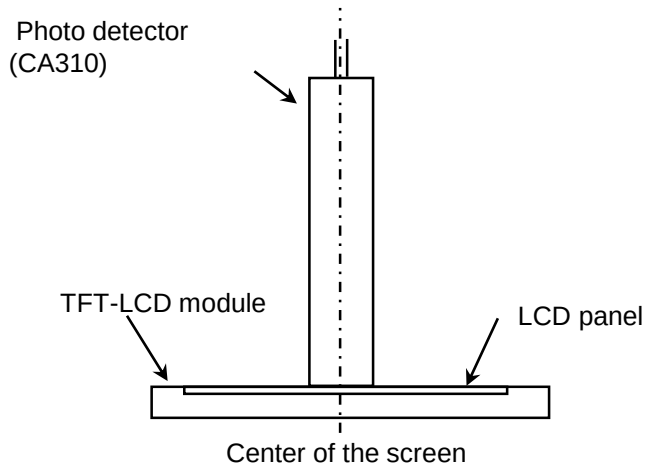
5. The color chromaticity coordinates specified shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

6. The color chromaticity coordinates specified shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

7. The electro-optical response time measurements shall be made as FIGURE 4 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

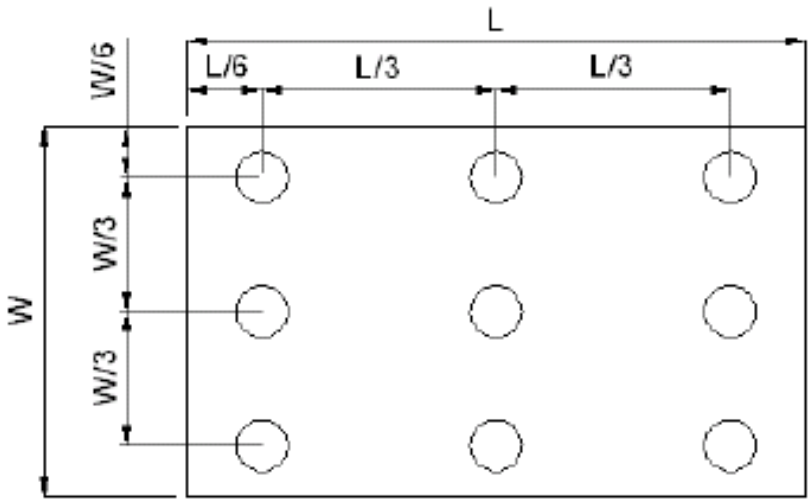
Figure 1. Measurement Set Up





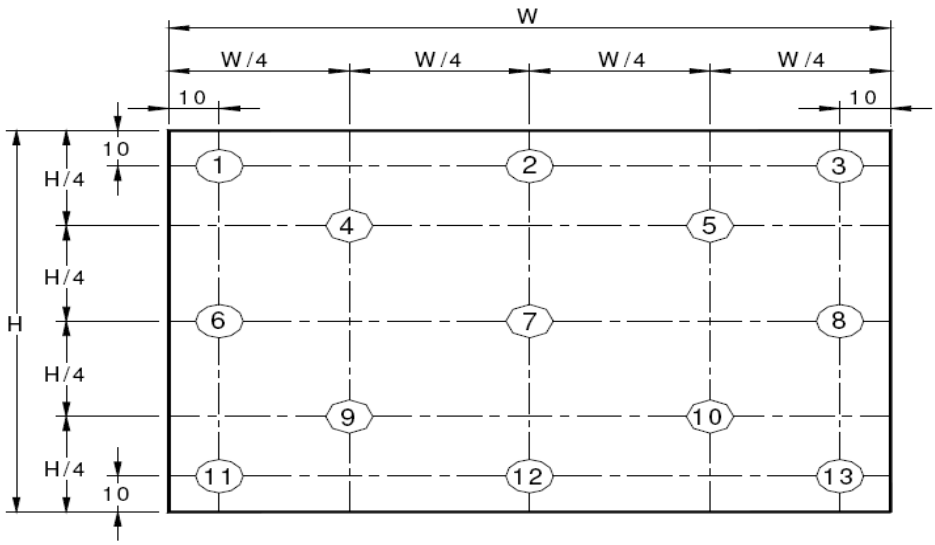
View angel range measurement setup Luminance , uniformity and color measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (9 points)



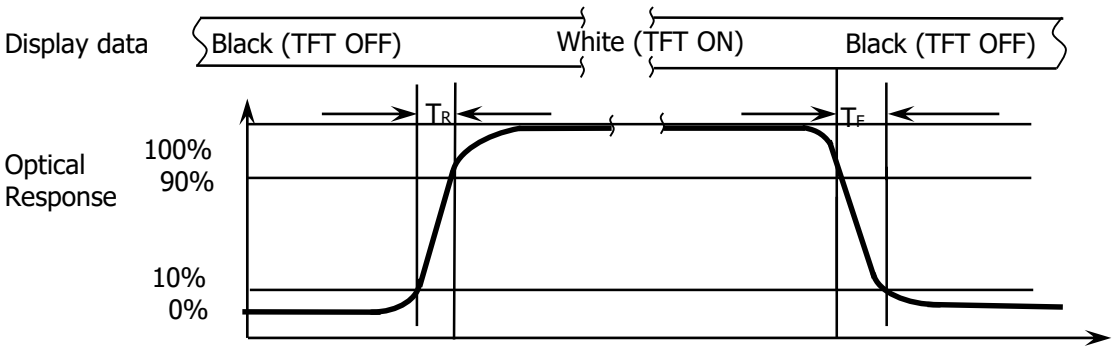
Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.
The White luminance uniformity on LCD surface is then expressed as : ΔY9 = Minimum Luminance of 9points / Maximum Luminance of 9points (see FIGURE 2).

Figure 3. Uniformity Measurement Locations (13 points)



The White luminance uniformity on LCD surface is then expressed as : ΔY13 = Minimum Luminance of 13 points /Maximum Luminance of 13 points (see FIGURE 3).
The White luminance uniformity of 5 point is the same test method as 13 point u sing FIGURE 3.

Figure 4. Response Time Testing



The electro-optical response time measurements shall be made as shown in FIGURE 3 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr and 90% to 10% is Td.

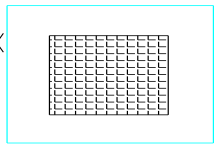
7.0 Reliability Test

No	Test Item	Test Condition	Remark
1	High temperature storage	60C/96h	-
2	Low temperature storage	-20C/96h	
3	High temperature/High humidity operating	50C/90%RH/96h	
4	High temperature operating	50C/96h	
5	Low temperature operating	-10℃/96h	
6	Thermal Shock Storage	-20℃ (30 min)~ +60 ℃(30 min) , 10 cycles	
7	ESD test (Component-LCD MDL)	Air +/-8KV ,contact +/-4KV , Criteria B	

8.0 LABEL

(1) Product label

TV122WXM-NW0 XXXXXXXXXXXXXXXXX 8SSD18C033650JHFYMDXXXX



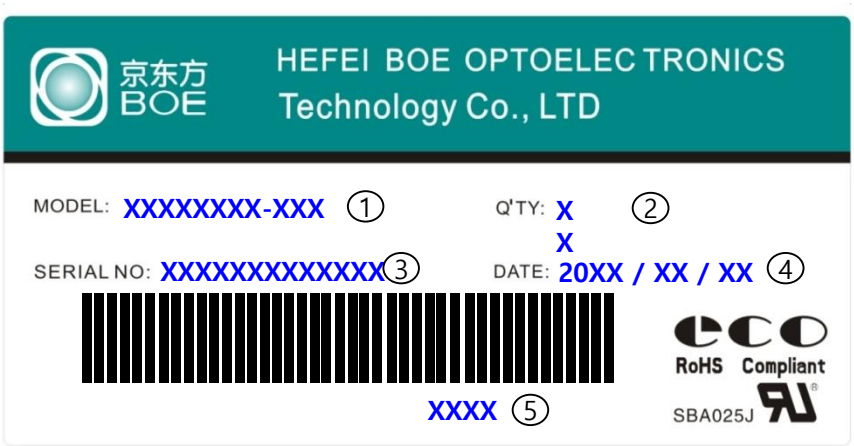
序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	4	F	P	3	1	2	7	3	8	0	0	0	0	1	E	E	J
描述	GBN代码		等级	B3	年份		月	FG Code后四位				序列号					

Code	Description
L	LCM
H	HYDIS
A	BOEOT
B	BOEOT
C	BOEOT
3	BOEHF

Code	Description
1	1月
2	2月
...	...
X	10月
Y	11月
Z	12月

(2) Box label

Label Size: 110 mm (L) × 56 mm (W)
Contents
Model: TV122WXB-NW0
Q`ty: Module Q`ty in one box
Serial No.: Box Serial No. See next figure for detail description.
Date: Packing Date
Internal use of Product



1. FG-CODE
2. Box 产品数量
3. Box ID, 编码规则如下
4. Box Packing 日期
5. FG-CODE 后四位

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13
代码	4	J	P	3	1	2	7	0	0	0	1	H	D
描述	GBN代码		等级	B3	年份		月	Rev	序列号				

9.0 PACKING INFORMATION(TBD)

10.0 Handing & Cautions

(1) Cautions when taking out the module
- Pick the pouch only, when taking out module from a shipping package.

(2) Cautions for handling the module
- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

(3) Cautions for the operation
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

(4) Cautions for the atmosphere
- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(5) Cautions for the module characteristics
- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

(6) Other cautions
- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

11.0 MECHANICAL OUTLINE DIMENSION

Figure 1. LCM Module Outline Dimension (Front View)

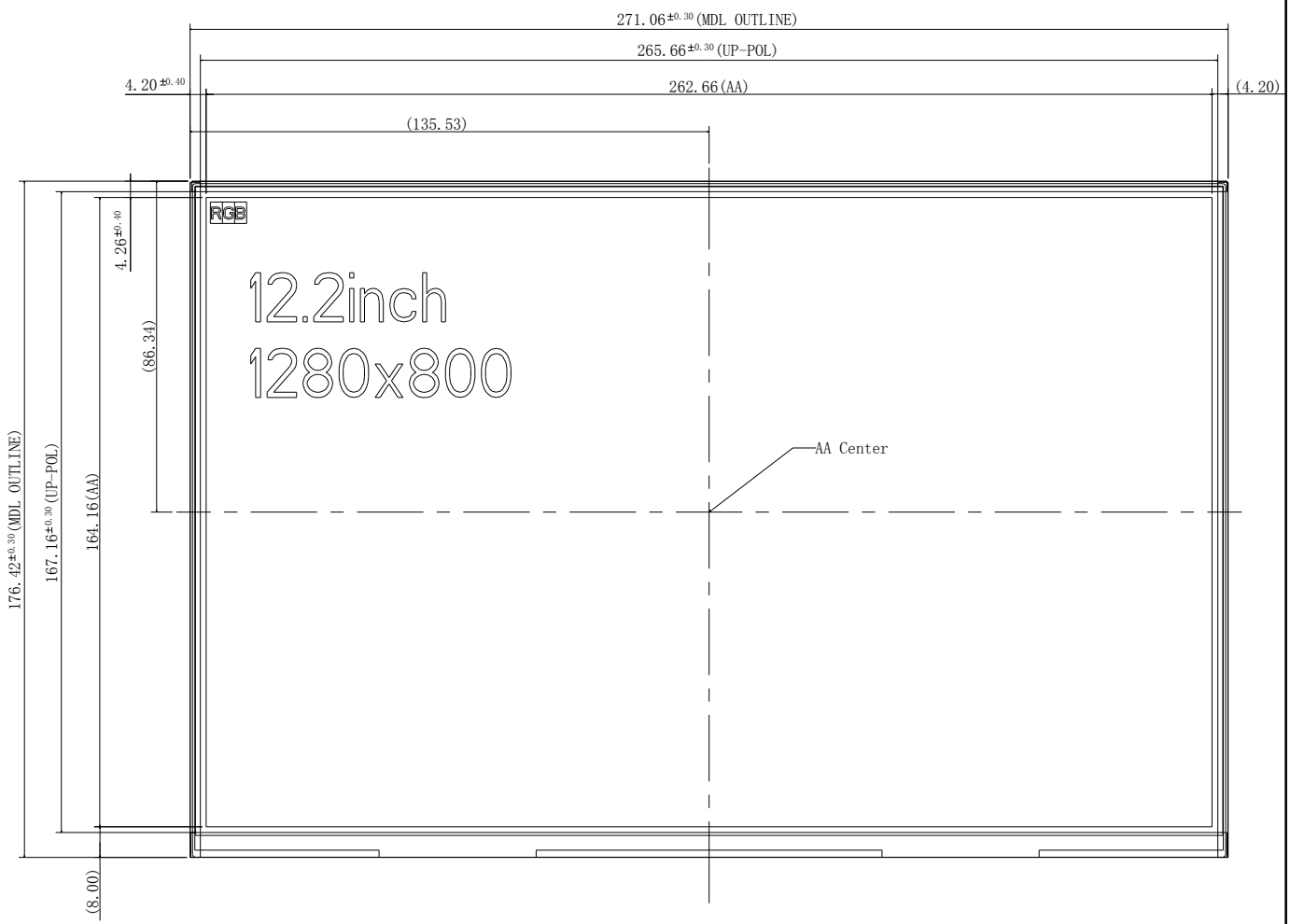


Figure 2. TFT-LCD Module Outline Dimensions (Rear view)