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NEXT VISION DISPLAY

SPECIFICATION

CUSTOMER : _____

MODULE NO.: NT013RN001ML

Version	02
Engineer	
Date	2018/3/12

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Customer:
Approved by

NEXT VISION DISPLAY CO., LTD.

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Documents Revision History:

Rivision	Date	Description	Changed By
01	2017/12/2	New released	
02	2018/3/12	Update the backlight	

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General Description

- The NT013RN001ML is a Color TFT LCD supplied by Next Vision Display.
- This main Module has a 1.30 inch diagonally measured active display area with 240(RGB)X240 resolution. Each pixel is divided into Red, Green and Blue sub-pixels and dots, which are arranged in vertical stripes.
- The NT013RN001ML has been designed to enables high brightness, high speed, and high contrast.

Mechanical Specification

ITEM	Standard Value	Unit
LCD Size	1.30 inch(Diagonal)	
Display Mode	Normally White, Transmissive LCD	
Module Dimension	35.90(W)*39.70(H)*1.29(T)	mm
Resolution	240(RGB)X 240	Pixels
Active Display Area	32.40(W)×32.40(H)	mm
Pixel pitch	0.135(W) × 0.135(H)	mm
Input Data	MCU/RGB/SPI	
Display Colors	65K/262K	
Viewing Direction	All	--
LED Backlight Color	White LEDx2	--
Driver IC	ST7789V	

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Electrical Specification

- **Absolute Maximum Rating (Ta=25 VSS=0V)**

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Digital Supply Voltage	VCI	-0.3	4.6	V	
Interface Operation Voltage	IOVCC	-0.3	4.6	V	
Operating temperature	TOP	-20	70	℃	
Storage temperature	TST	-30	80	℃	

■ DC Electrical Characteristics

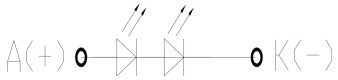
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Digital Supply Voltage	VCI	2.4	3.3	3.6	V	
Interface Operation Voltage	IOVCC	1.65	1.8	3.3	V	
Normal mode Current consumption	IDD	--	8.5	--	mA	
Level input voltage	VIH	0.7*IOVCC	--	IOVCC	V	
	VIL	GND	--	0.3*IOVCC	V	
Level output voltage	VOH	0.8 IOVCC	--	IOVCC	V	
	VOL	GND	--	0.2*IOVCC	V	

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■ Backlight Characteristics

The back-light system is edge-lighting type with 2 chips White LED

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Forward Voltage	VF	--	6.4	--	V	
Forward current	IF	15	20	--	mA	
LCM Luminance	Lv	--	500	--	Cd/m2	
LED life time	HR	50000	--	--	Hour	
Uniformity	AVG	80	--	--	%	



BLU CIRCUIT DIAGRAM

Optical Specification

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	75	80	-	degree	
	θ_R	Φ=0°(3 o'clock)	75	80	-		
	θ_T	Φ=90°(12 o'clock)	75	80	-		
	θ_B	Φ=270°(6 o'clock)	75	80	-		
Response time	T_{ON}	Normal θ=Φ=0°	-	10	20	msec	
	T_{OFF}		-	15	30	msec	
Contrast ratio	CR		400	600	-	-	
Color chromaticity	W_X		0.26	0.31	0.36	-	
	W_Y		0.28	0.33	0.38	-	
Luminance	L		400	500	-	cd/m²	
Luminance	Y_U		70	75	-	%	

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Note.1 These items are measured by C light.
Note.2 Definition of Viewing Angle(θ,ψ),refer to Fig.1 as below :

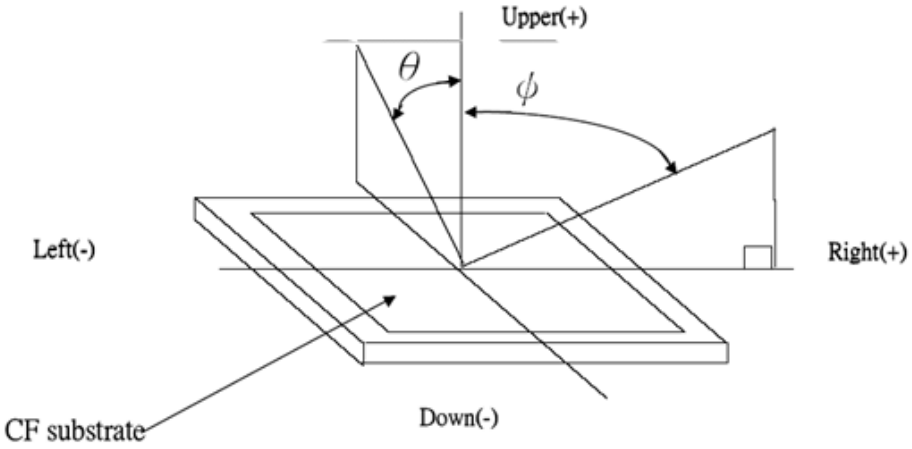
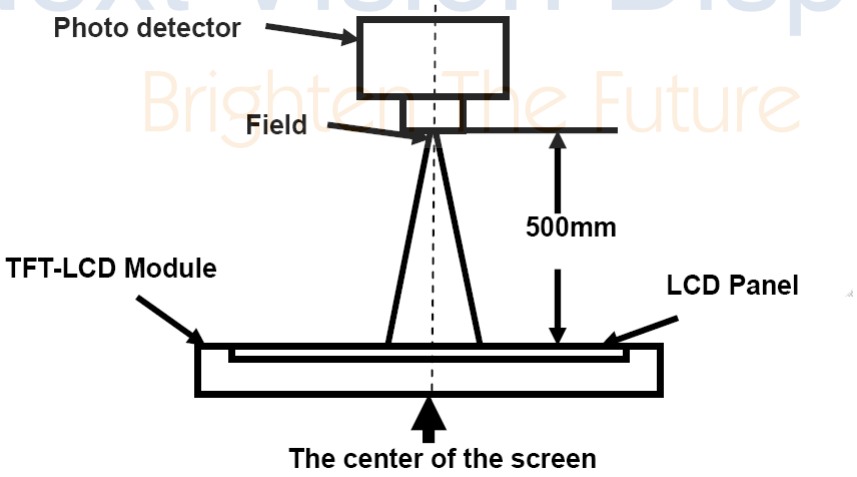


Fig.1 Definition of Viewing Angle

Note.3 Using LC+ EWV Polarizer+Corresponding Backlight, reference only, Measure device：BM-5A (TOPCON)，viewing cone= 1°，I_L=20mA。

Electro-optical characteristics test method:

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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 driven by Vwhite.

“Black state”: The state is that the LCD should driven by Vblack.

Vwhite: To be determined

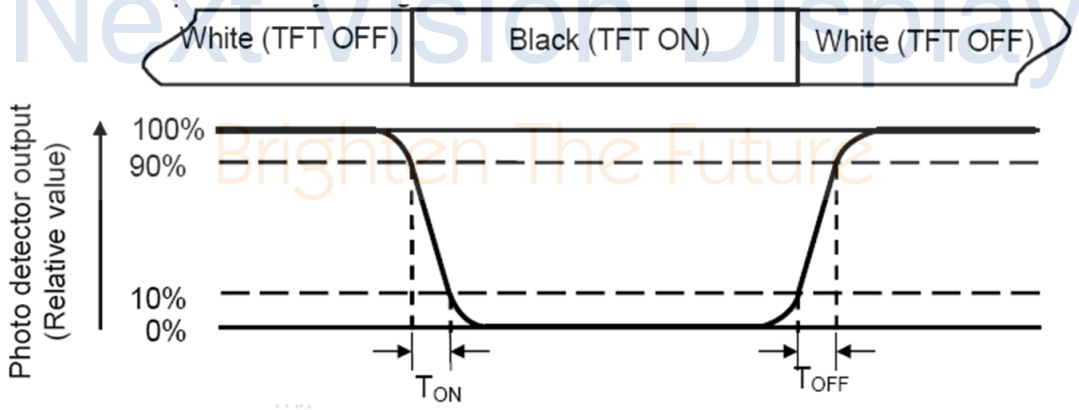
Vblack: To be determined.

Definition of Response Time:

The response time is defined as the LCD optical switching time interval between “White” state and

“Black” state. Rise time (TON) is the time between photo detector output intensity changed from

90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from10% to 90%.

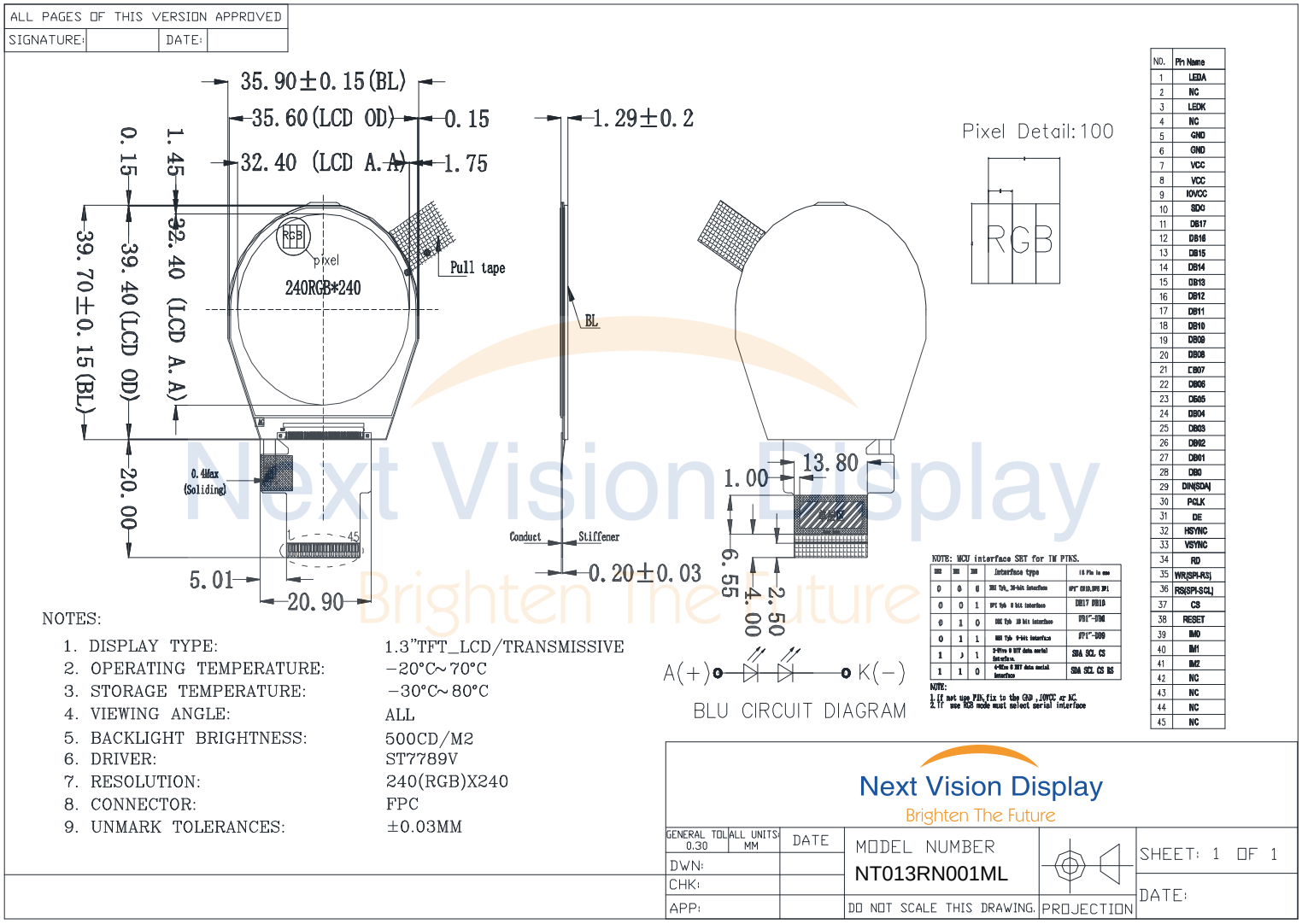


Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD

Definition of Luminance Uniformity

Mechanical Diagram



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Interface Pin Connections

Pin No.	Symbol	Function
1	LEDA	Anode pin of backlight
2	NC	No Connect
3	LEDK	Cathode pin OF backlight
4	NC	No Connect
5	GND	Ground
6	GND	Ground
7	VCC/VCI	Supply voltage(3.3V)
8	VCC/VCI	Supply voltage(3.3V)
9	IOVCC	Supply voltage(1.65-3.3V)
10	SDO	SPI interface output pin. The data is output on the falling edge of the SCL signal. If not used, let this pin open.
11-28	DB17-DB0	18-bit parallel bi-directional data bus for MCU system and RGB interface mode . Fix to GND level when not in use
29	DIN(SDA)	When IM3: Low, SPI interface input/output pin. When IM3: High, SPI interface input pin. The data is latched on the rising edge of the SCL signal. If not used, please fix this pin at IOVCC or DGND level
30	PCLK	Dot clock signal for RGB interface operation. Fix this pin at IOVCC or GND when not in use. (2.5V-3.3V)
31	DE	Data enable signal for RGB interface operation. fix this pin at IOVCC or GND when not in use. (2.5V-3.3V)
32	HSYNC	Line synchronizing signal for RGB interface operation. fix this pin at IOVCC or GND when not in use
33	VSYNC	Frame synchronizing signal for RGB interface operation. fix this pin at IOVCC or GND when not in use

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34	RD	Serves as a read signal and MCU read data at the rising edge. fix this pin at IOVCC or GND when not in use
35	WR(SPI-RS)	Write enable in MCU parallel interface. Display data/command selection pin in 4-line serial interface. Second Data lane in 2 data lane serial interface. If not used, please fix this pin at IOVCC or DGND
36	RS(SPI-SCL)	Display data/command selection pin in parallel interface. This pin is used to be serial interface clock. RS='1': display data or parameter. RS='0': command data.
37	CS	Chip select input pin ("Low" enable). fix this pin at IOVCC or GND when not in use
38	RESET	This signal will reset the device and must be applied to properly initialize the chip
39	IM0	MPU Parallel interface bus and serial interface select If use RGB Interface must select serial interface. Fix this pin at IOVCC and GND
40	IM1	
41	IM2	
42	NC	No Connect
43	NC	No Connect
44	NC	No Connect
45	NC	No Connect

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