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Mechanical design



MODEL NO : ET035VG03-T

MODEL VERSION: 01

SPEC VERSION : 1.0

ISSUED DATE: 2021-08-27

☐ Preliminary Specification

☒ Final Product Specification

Customer : _____

Approved by	Notes

Youri Confirmation

Prepared by	Reviewed by	Approved by
John	Johnny	Wang

1. Introduction

1.1 Scope of application

LCD specification: Dots 640xRGBx480.

As to basic specification of the driver IC, refer to the IC (NV3052C) specification and data book.

All material & processing of the LCD module should be Lead Free.

1.2 TFT features:

Structure: TFT PANNEL+IC +FPC+BL;

IPS Type LCD

640dot-segment and 480 dot-common outputs;

16.7M Color can be selected by software;

White LED back light;

24 bit RGB interface

1.3 Applications:

2. LCM General specification

ITEM	Standard value	Unit
LCD Type	Normally black	--
Drive element	TFT active matrix	--
Number of pixels	640*3RGB(H)X480(V)	Dots
Pixel arrangement	RGB stripe	--
Pixel Pitch (W*H)	0.1095(W) × 0.1095 (H)	mm
Active area	70.08(W) × 52.56(H)	mm
Viewing direction	ALL O'CLOCK	--
TFT Driver IC	NV3052C	--
TFT interface	24 bit RGB Interface	--
Module Size(W*H*T)	76.84(W) × 63.84(H) × 3.27(T)	mm
Approx. Weight	TBD	g
Touch structure	--	--
Touch Driver IC	--	--
Touch Interface	--	--



3. Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit
LCM Operating Temperature	T _{OPR}	-20	+70	°C
LCM Storage Temperature	T _{STG}	-30	+80	°C
Humidity	RH	--	90	%

4. Electrical Characteristics

4.1 TFT DC Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage for I/O	VDDIO	--	--	--	V
Supply Voltage for(DC/DC)	VDD	2.5	3.3	3.6	V
Supply Voltage for(DC/DC)	AVDD	--	--	--	V
Supply Voltage for(DC/DC)	AVEE	--	--	--	V

4.2 Back-Light Unit Characteristics

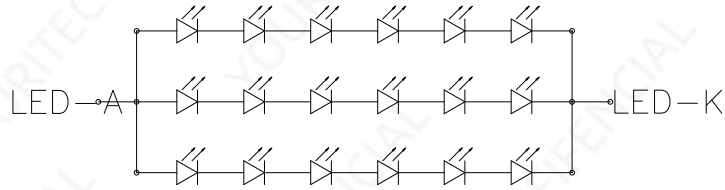
The back-light system is an edge-lighting type with 18 white LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V _F	16.8	--	19.2	V	--
Forward current	I _F	--	60	--	mA	--
Luminance(With LCD)	L _v	--	750	--	cd/m ²	--
LED life time	N/A	--	50,000	--	Hr	Note 1

Note:

- (1) The “LED life time” is defined as the module brightness decrease to 50% of original brightness at I_L=20mA/LED. The LED life time could be decreased if operating I_L is larger than 25mA/LED.

Backlight circuit diagram shown in below:



5. Module Function Description

Pin No.	Symbol	Description
1-2	LEDK	POWER SUPPLY- FOR BACKLIGHT CATHODE
3-4	LEDA	POWER SUPPLY+ FOR BACKLIGHT ANODE
5-6	NC	NC
7	SDO	SERIAL INTERFACE DATA OUTPUT
8	RESET	RESET
9	SEKB	3-WIRE COMMUNICATION ENABLE.
10	SPCK	3-WIRE COMMUNICATION CLOCK INPUT. RISING EDGE LATCH.
11	SPDA	3-WIRE COMMUNICATION DATA INPUT/OUTPUT.
12-35	DB0-DB23	24-BIT MODE: DB[0:7]=B[0:7] ; DB[8:15]=G[0:7] ; DB [16:23]=R[0:7] DATA.
36	HSYNC	Horizontal sync. Signal in RGB I/F
37	VSYNC	Vertical sync. Signal in RGB I/F
38	DCLK	Pixel clock signal in RGB I/F
39-40	NC	NC
41-42	VDD	POWER SUPPLY
43-47	NC	NC
48	XR	XR
48	YD	YD
50	XL	XL
51	YU	YU
52	DE	Data enable signal in RGB I/F mode 1
53	GND	GND
54	GND	GND

6. Timing Characteristics

NV3052CGRB supports two kinds of RGB interface, DE mode and SYNC mode. The table shown below uses command 23h to select RGB interface mode.

sync_mode[1:0]	RGB Mode
00	SYNC+DE mode
01	SYNC mode
10	DE mode
11	SYNC+DE mode

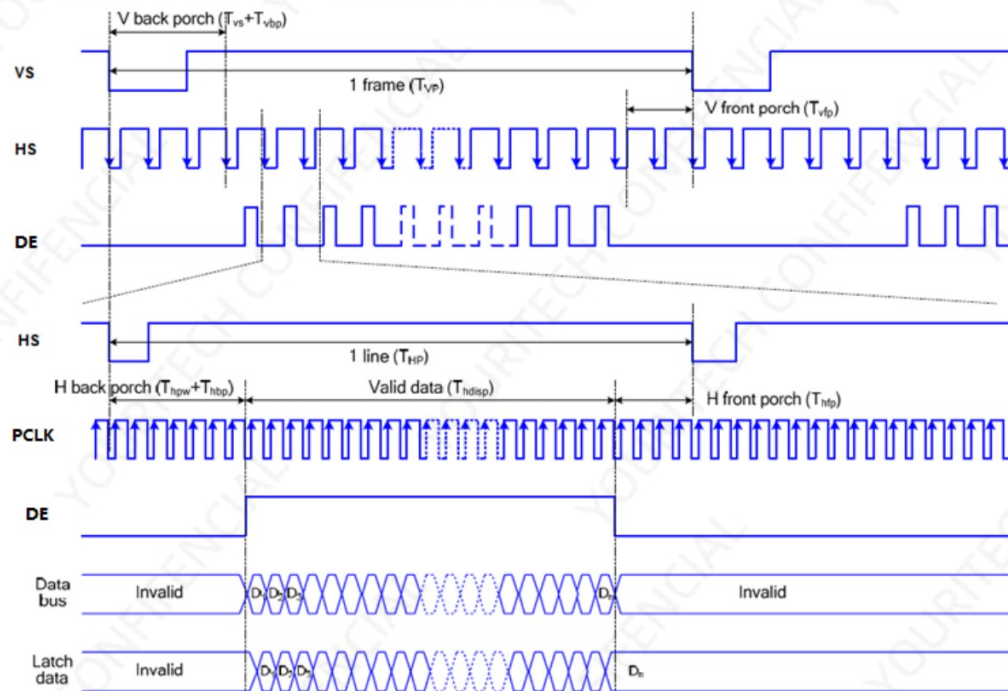
(Resolution for 720/640 horizontal x 1280 vertical display with Frame-Rate of 60Hz)

Parameters	Symbols	Min.	Typ	Max.	Unit
Horizontal Synchronization	hpw	-	2	-	PCLK
Horizontal Back Porch	hbp	-	20	-	PCLK
Horizontal Front Porch	hfp	-	20	-	PCLK
Hsync+ HBP+ HFP	-	-	88*Note1	-	PCLK
Horizontal Address (Display area)	hdisp	-	720	-	PCLK
Horizontal cycle	-	-	12.703	-	us
Vertical Synchronization	VS	-	2	-	Line
Vertical Back Porch	vbp	-	6	-	Line
Vertical Front Porch	vfp	-	12	-	Line
Vsync+ VBP+ VFP	-	-	32	-	Line
Vertical Address (Display area)	vdisp	-	1280	-	Line
Vertical cycle	-	-	16.66	16.181	ms
Frame-Rate	-	-	60	61.8	Hz

“-” means no limit.

Note : 1. If using Image Process Algorithm, Type value for H-blanking is minimum requirement.

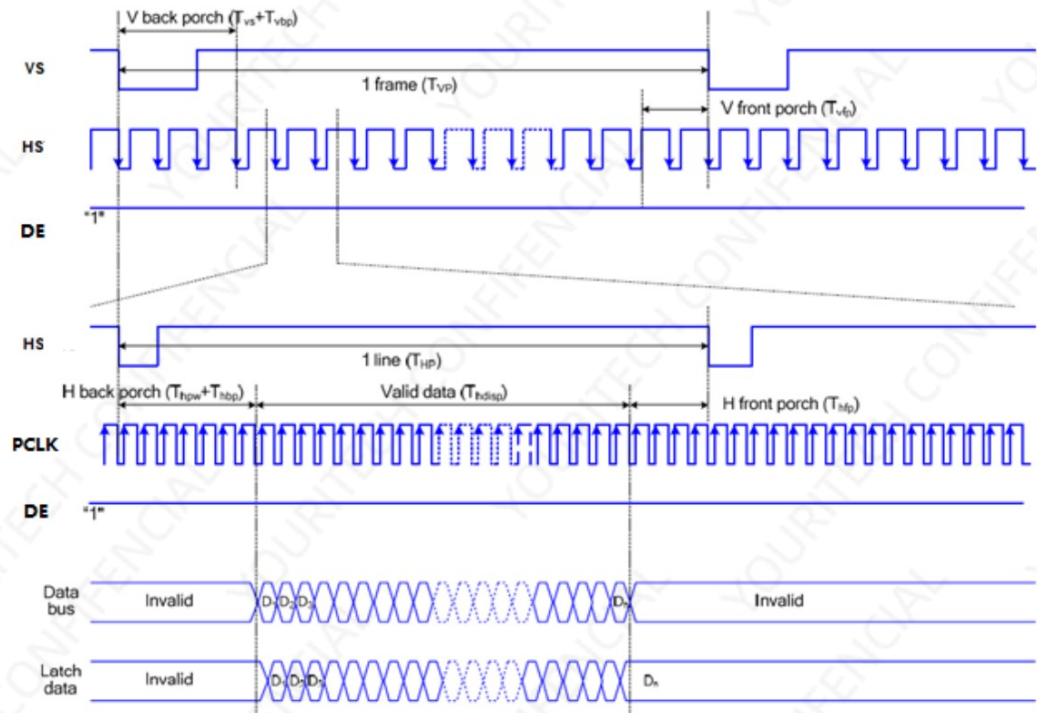
The timing chart of RGB interface DE mode is shown as follows.



Timing Chart of Signals in RGB Interface DE Mode

Note: The setting of front porch and back porch in host must match that in IC as this mode.

The timing chart of RGB interface SYNC mode is shown as follows.



Timing chart of RGB interface SYNC mode

Below Table provide the timing parameter by external Vertical-cycle

7.Optical Characteristics

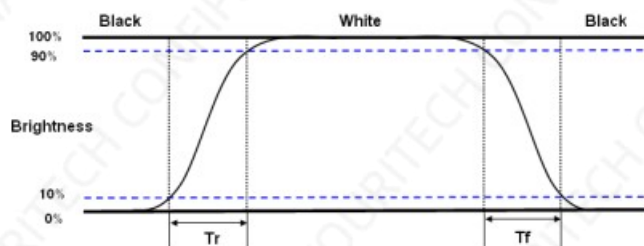
Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response time	Tr+Tf	$\theta = 0^\circ$	-	25	50	ms	Note 1,2
Contrast ratio	CR	$\theta = 0^\circ$	600	800	-		Note 1,3
Viewing angle	Top	CR ≥ 10	75	85	-	deg.	Note 1,4
	Bottom		75	85	-		
	Left		75	85	-		
	Right		75	85	-		
Color chromaticity (CF only with C light, CIE 1931)	Wx	$\theta = 0^\circ$	-0.015	0.297	+0.015		Note 1,5,6 CF glass
	Wy		-0.015	0.318	+0.015		
Color Gamut (CF only with C light, CIE 1931)	NTSC	CIE1931	45	50	-	%	Note 1,5,6 CF glass
Transmittance (with Polarizer)	Trans	$\theta = 0^\circ$	3.7	4.4	-	%	Note 7 Normal POL

Note 1: Measuring Conditions:

The optical characteristics are determined after the unit has been 'ON' and stable at the maximum brightness, in a dark environment at an ambient temperature at $25^\circ\text{C} \pm 2^\circ\text{C}$.

Note 2: Definition of response time:

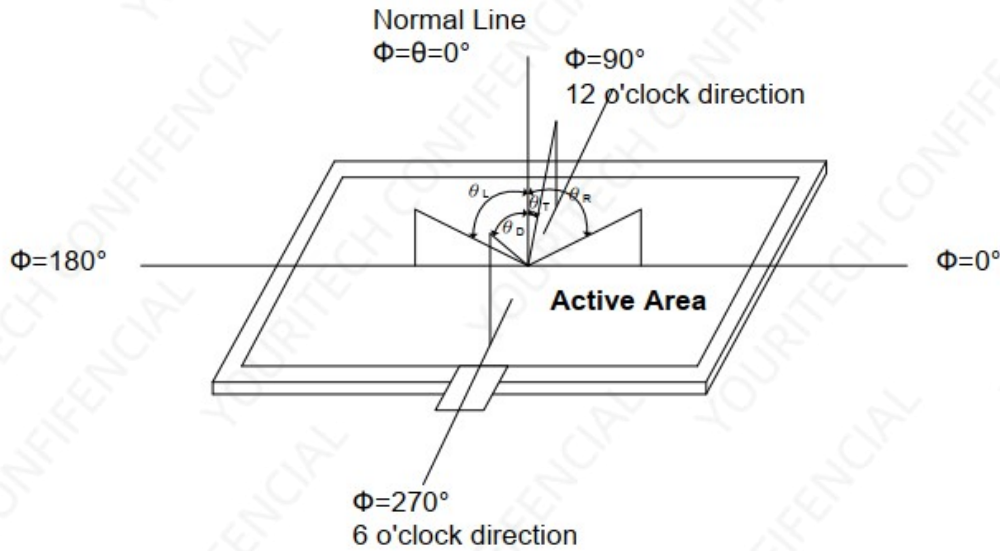
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time is the time between photo detector output intensity changed from 10% to 90%. And fall time is the time between photo detector output intensity changed from 90% to 10%.



Note 3: Definition of contrast ratio:

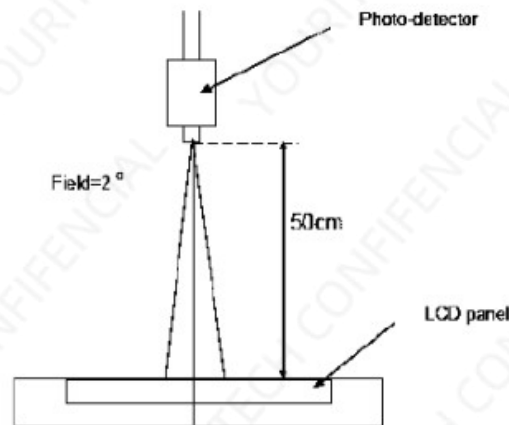
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 4: Definition of viewing angle



Note 5: Optical characteristic measurement setup.

The LCD module should be stabilized at given temperature for 10 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 10 minutes in a windless room.

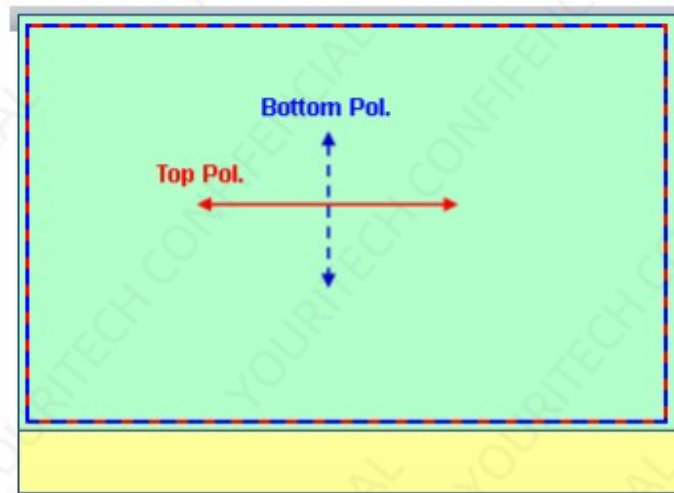


Note 6: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 7: Direction of POL absorption axis

The red and blue arrow directions are meant to be absorption axis.



8. Reliability Test Item

No.	Test Item	Test Condition	Notes
1	High Temp. Storage	+80°C / 96H	1. Functional test is OK. Missing Segment, short, unclear segment non-display, display abnormally and liquid crystal leakage un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-30°C / 96H	
3	High Tempe. Operating	+70°C / 96H	
4	Low Tempe. Operating	-20°C / 96H	
5	High Temperature / Humidity storage	60°C x 90%RH / 96H	
6	Thermal and cold shock	Static state, -30°C (30min) ~80°C (30min), 50 cycles	

9. Packing Method----TBD

- END -