

# NHD-10.1-1024600AF-ASXV#

## TFT (Thin-Film-Transistor) Color Liquid Crystal Display Module

NHD-	Newhaven Display
10.1-	10.1" Diagonal
1024600-	1024xRGBx600 Pixels
AF-	Model
A-	RGB Interface
S-	High Brightness, White LED Backlight
X-	TFT
V-	MVA, Transmissive, Standard Temperature
#-	<b>RoHS Compliant</b>

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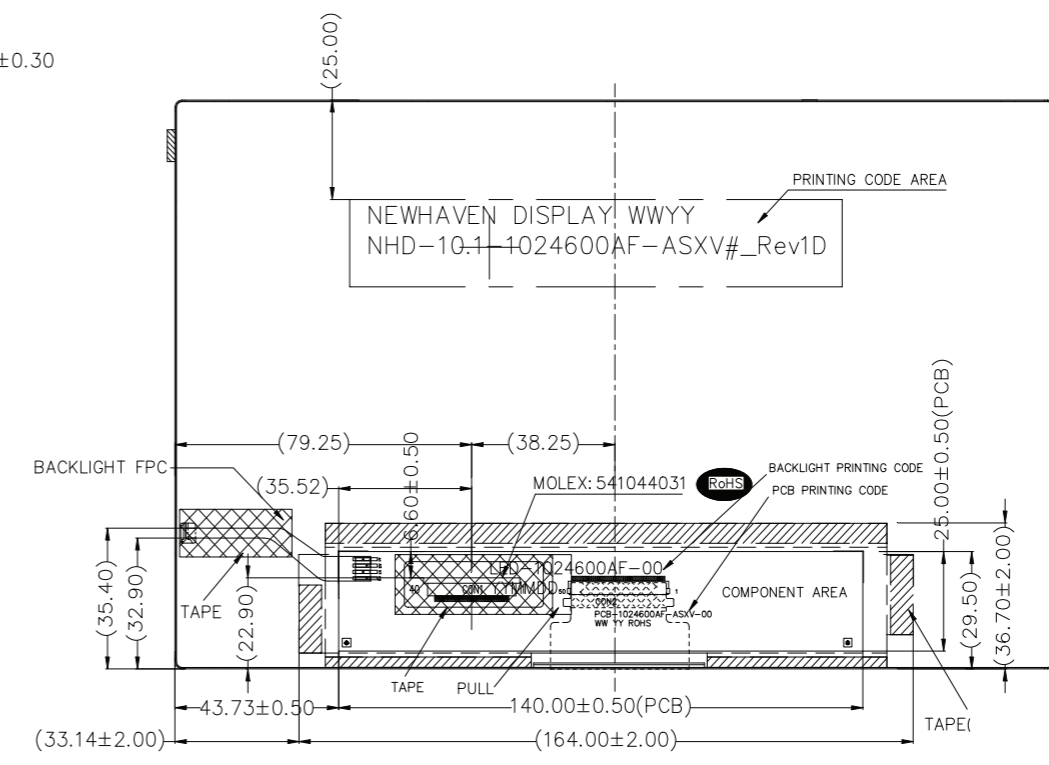
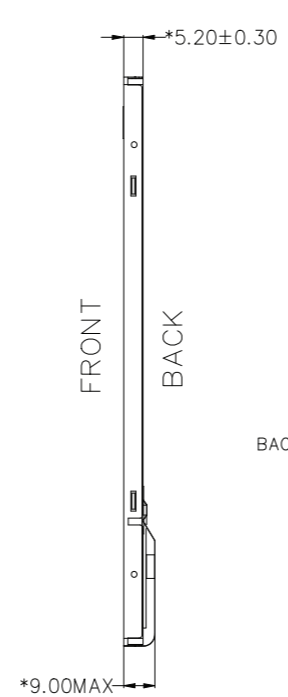
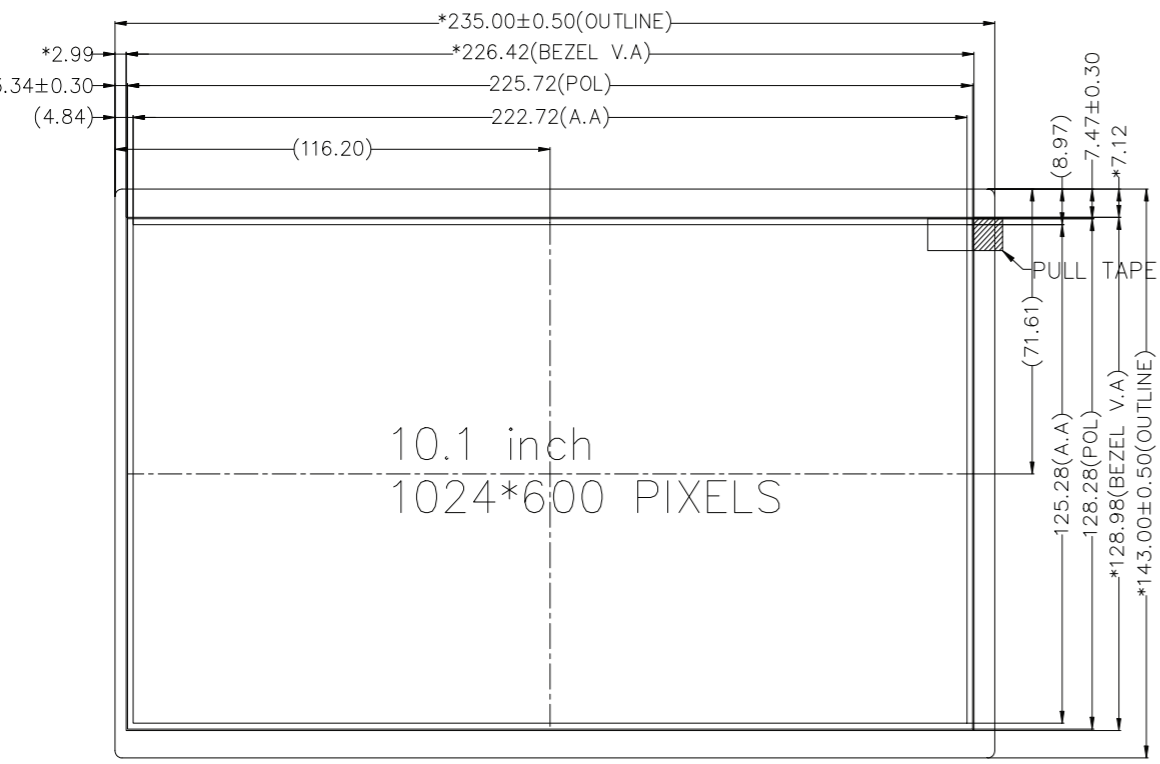
## Document Revision History

Revision	Date	Description	Changed by
-	08/01/18	Initial Release	NP
1	7/10/19	Backlight Voltage Updated	SB
2	3/11/20	Optical Characteristics Updated	SB
3	9/3/20	Updated 2D Drawing; Kapton Tape over Molex Connector	AS

## Functions and Features

- 1024xRGBx600 Resolution
- LED Backlight
  - Built In-LED Driver
  - PWM Brightness Control
- RGB Interface
- 262K Colors
- Wide Viewing Angles

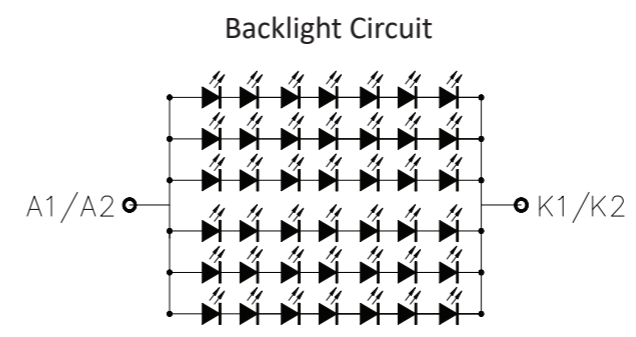
# Mechanical Drawing



### TFT Pinout:

Pin No.	Symbol
1	LED_GND
2-4	LED_VDD
5	LED_PWM
6	LED_EN
7	GND
8	VDD
9-16	[R0-R7]
17-24	[G0-G7]
25-32	[B0-B7]
33	GND
34	DCLK
35	HSD
36	VSD
37	DEN
38	MODE
39	RESET
40	STBYB

- Notes:**
- Display Size: 10.1" TFT
  - Display Resolution: 1024 x 600 Pixels
  - Display Mode: Transmissive / Normally White / Anti-Glare
  - Optimal View: Full View
  - Driver IC: HX8282 - RGB Interface
  - Power Supply Voltage: 3.3V
  - Backlight: White LED
  - Luminance: 800 cd/m<sup>2</sup> (Typ)



STANDARD TOLERANCE: (UNLESS OTHERWISE SPECIFIED)	NEWHAVEN DISPLAY INTERNATIONAL	
LINEAR: ±0.3mm	DRAWING/PART NUMBER: NHD-10.1-1024600AF-ASXV#	REVISION: 1D
UNLESS OTHERWISE SPECIFIED: - DIMENSIONS ARE IN MILLIMETERS - THIRD ANGLE PROJECTION	DRAWN BY: A. Shah	APPROVED BY: A. Shah
	DRAWN DATE: 9/3/20	APPROVED DATE: 9/3/20
	DO NOT SCALE DRAWING	
	SHEET 1 OF 1	
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## Pin Description

Pin No.	Symbol	Connection	Function Description
1	LED_GND	Power Supply	Ground for Backlight Driver
2-4	LED_VDD	Power Supply	Supply Voltage for Backlight Driver
5	LED_PWM	MPU	Backlight PWM Signal Input (See Table Below)
6	LED_EN	MPU	Backlight Enable H: Backlight On; L: Backlight Off
7	GND	Power Supply	Ground
8	VDD	Power Supply	Supply voltage for LCD (+3.3V)
9-16	[R0-R7]	MPU	Red Data Signals
17-24	[G0-G7]	MPU	Green Data Signals
25-32	[B0-B7]	MPU	Blue Data Signals
33	GND	Power Supply	Ground
34	DCLK	MPU	Dot data Clock
35	HSYNC	MPU	Horizontal sync input
36	VSYNC	MPU	Vertical sync input
37	DEN	MPU	Data Enable signal
38	MODE	MPU	DE/SYNC mode select MODE= H: DE mode MODE= L: SYNC mode
39	RESET	MPU	Active Low Reset Signal
40	STBYB	MPU	Active Low Standby Signal

**LCD connector:** 0.5mm pitch 40-Conductor FFC.

**Recommended cable:** 40 POS FFC      **Molex P/N:** 15020-0435

### LED\_PWM Signal Operating Frequency:

PWM Frequency (F)	Duty Cycle (Min.)	Duty Cycle (Max.)
100Hz < F < 500Hz	5%	100%
500Hz < F < 20KHz	10%	100%

## Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T <sub>OP</sub>	Absolute Max	0	-	+50	°C
Storage Temperature Range	T <sub>ST</sub>	Absolute Max	-20	-	+60	°C
Supply Voltage for LCD	V <sub>DD</sub>	-	3.0	3.3	3.6	V
Supply Current for LCD	I <sub>DD</sub>	V <sub>DD</sub> = 3.3V	50	120	180	mA
"H" Level Input	V <sub>IH</sub>	-	0.7 * V <sub>DD</sub>	-	V <sub>DD</sub>	V
"L" Level Input	V <sub>IL</sub>	-	GND	-	0.3 * V <sub>DD</sub>	V
"H" Level Output	V <sub>OH</sub>	-	V <sub>DD</sub> - 0.4	-	V <sub>DD</sub>	V
"L" Level Output	V <sub>OL</sub>	-	GND	-	GND + 0.4	V
Supply Voltage for Backlight Driver	LED_V <sub>DD</sub>	-	5.0	12.0	22.4	V
Supply Current for Backlight Driver <sup>1</sup>	LED_I <sub>DD</sub>	-	160	360	1200	mA
Backlight Enable Voltage	LED_EN	-	1.5	3.3	5.5	V
Backlight PWM Voltage	LED_PWM	I <sub>PWM</sub> ≤ 5 mA	1.5	3.3	5.5	V
Backlight Lifetime <sup>2</sup>	-	T <sub>OP</sub> = 25° C	20,000	50,000	-	Hrs.

<sup>1</sup>Minimum supply current occurs when supply voltage is at max; maximum supply current when supply voltage is at minimum.

<sup>2</sup>Backlight lifetime is rated as Hours until **half-brightness**, under normal operating conditions.

## Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Optimal Viewing Angles	Top	Cr ≥ 10	-	80	-	°	
	Bottom		-	80	-	°	
	Left		-	80	-	°	
	Right		-	80	-	°	
Contrast Ratio	CR	-	300	450	750	-	
Luminance	L <sub>V</sub>	-	600	800	1000	cd/m <sup>2</sup>	
Response Time	Rise + Fall	T <sub>R</sub> + T <sub>F</sub>	T <sub>OP</sub> = 25° C	-	8	-	ms
Chromaticity	Red	X <sub>R</sub>	-	0.565	0.605	0.635	-
		Y <sub>R</sub>	-	0.309	0.349	0.379	-
	Green	X <sub>G</sub>	-	0.286	0.326	0.356	-
		Y <sub>G</sub>	-	0.565	0.605	0.635	-
	Blue	X <sub>B</sub>	-	0.112	0.152	0.182	-
		Y <sub>B</sub>	-	0.075	0.115	0.145	-
White	X <sub>W</sub>	-	0.257	0.297	0.327	-	
	Y <sub>W</sub>	-	0.283	0.323	0.353	-	

## Driver Information

Built-in HX8282 Source Driver: <http://www.newhavendisplay.com/appnotes/datasheets/LCDs/HX8282-A01.pdf>

Built-in HX8696 Gate Driver: <http://www.newhavendisplay.com/appnotes/datasheets/LCDs/HX8696-A.pdf>

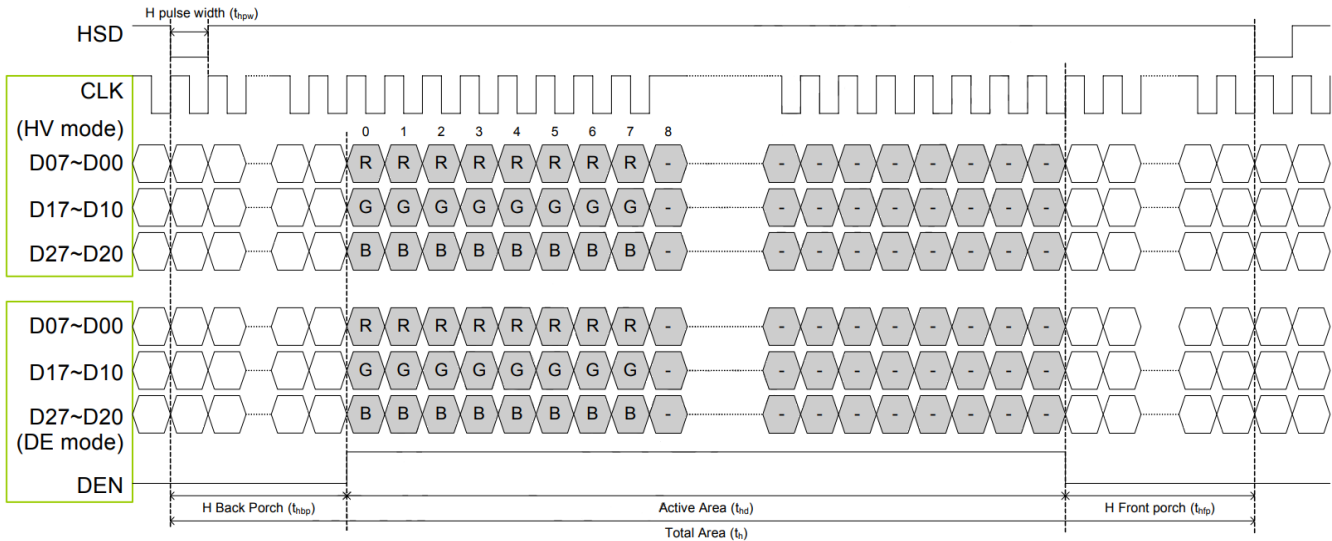
# Timing Characteristics

## DE Mode

Parameter	Symbol	Spec			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1114	1344	1600	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd	600			TH
VSD Period	tv	610	635	800	TH
VSD Blanking	tvbp+ tvfp	10	35	200	TH

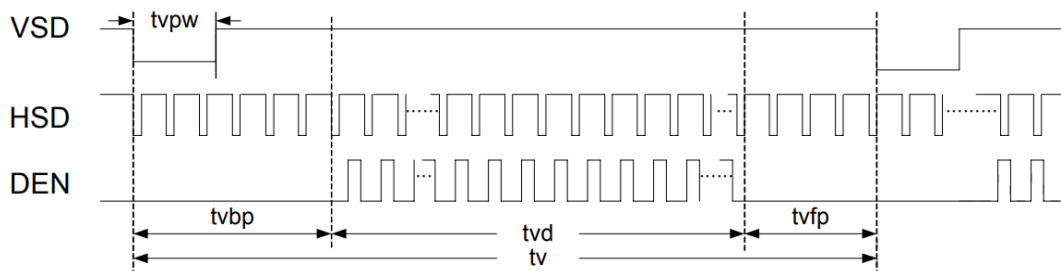
## Horizontal Timing

Parameter	Symbol	Spec			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp	160			DCLK
HSD Front Porch	thfp	16	160	216	DCLK



## Vertical Timing

Parameter	Symbol	Spec			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd	600			TH
VSD Period	tv	624	635	750	TH
VSD Pulse Width	tvpw	1	-	20	TH
VSD Back Porch	tvbp	23			TH
VSD Front Porch	tvfp	1	12	127	TH



## Quality Information

Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+60°C, 240 hrs.	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-20°C, 240 hrs.	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+50°C, 120 hrs.	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	0°C, 120 hrs.	1,2
High Temperature / Humidity Operation	Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time.	+50°C, 90% RH, 120 hrs.	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	0°C, 30min->25°C, 5min -> 50°C, 30min 10 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-55Hz, 1.5mm amplitude. 60 sec in each of 3 directions X, Y, Z For 15 minutes	3
Static electricity test	Endurance test applying electric static discharge.	Air: V <sub>s</sub> =8KV, Contact: V <sub>s</sub> =4KV 10 Times	

**Note 1:** No condensation to be observed.

**Note 2:** Conducted after 4 hours of storage at 25°C, 0%RH.

**Note 3:** Test performed on product itself, not inside a container.

## Precautions for using LCDs/LCMs

See Precautions at [www.newhavendisplay.com/specs/precautions.pdf](http://www.newhavendisplay.com/specs/precautions.pdf)

## Warranty Information and Terms & Conditions

[http://www.newhavendisplay.com/index.php?main\\_page=terms](http://www.newhavendisplay.com/index.php?main_page=terms)