NHD-7.0-HDMI-N-RSXN-CTU

7.0” HDMI TFT Module w/ USB-HID Capacitive Touch

NHD-	Newhaven Display
7.0-	7.0” Diagonal
HDMI-	HDMI (Type-A) Input
N-	Video Only, Fixed Input Resolution (800x480)
R-	On-board HDMI/DVI Receiver
S-	Sunlight Readable, White LED Backlight
X-	TFT
N-	12:00 Optimal View, Wide Temperature
CTU-	USB-HID Capacitive Touch Panel

Newhaven Display International, Inc.

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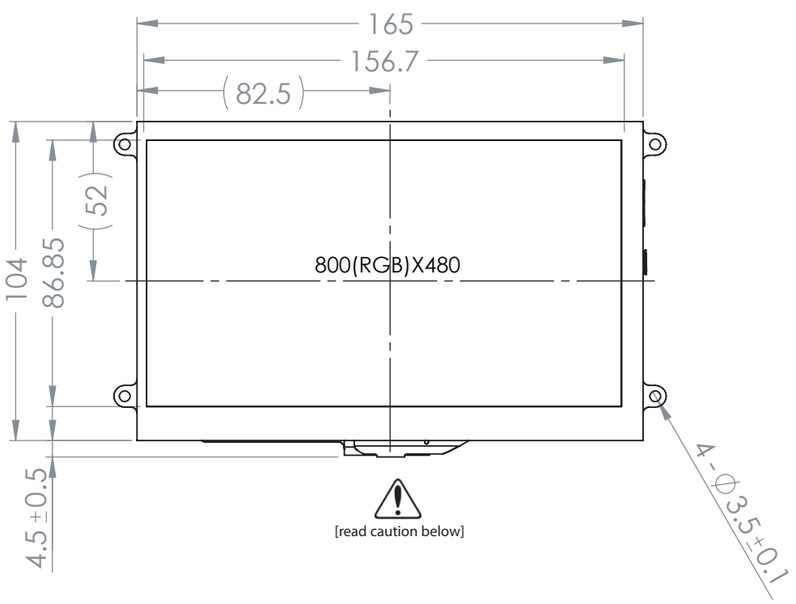
Document Revision History

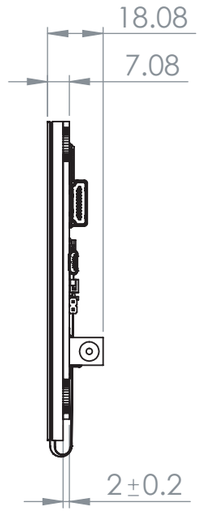
Revision	Date	Description	Changed by
-	10/13/17	Initial Release	PB, ML

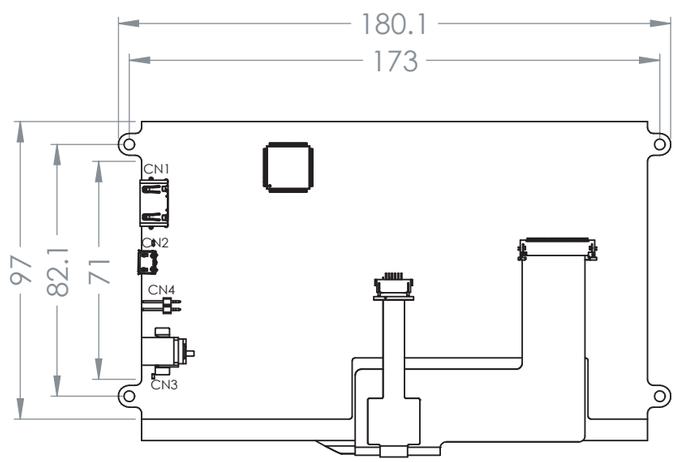
Functions and Features

- **7.0” Sunlight Readable HDMI TFT Module w/ USB-HID Capacitive Touch**
- **On-board Texas Instruments TFP401A HDMI/DVI Receiver**
- **5-7.5V DC Supply Voltage**
- **HDMI (Type-A) Input**
- **Compatible with PC (Windows/Linux)**
- **Compatible with Linux based SBCs such as Raspberry Pi, BeagleBone, etc.**
- **Sunlight Readable (830 cd/m²)**
- **24-bit True Color, 800x480 Resolution (WVGA)**
- **On-board Texas Instruments TPS61165 High Brightness LED Driver w/ PWM**
- **4 x 3.5mm Mounting Holes Enabling Standard M3 or #6-32 Screws**
- **Open-Source Hardware, Engineered in Elgin, IL (USA)**

SYMBOL	REVISION	DATE







NOTES:
1. 7.0” Sunlight Readable HDMI TFT Module w/ USB-HID Capacitive Touch
2. On-board Texas Instruments TFP401A HDMI/DVI Receiver
3. Optimal Viewing Direction: 12:00
4. Display Mode: Transmissive / Normally White / Anti-Glare
5. Luminance: 830 cd/m²
6. 3M Brightness Enhancement Film
7. Touch Panel: Capacitive
8. On-board Texas Instruments TPS61165 High Brightness LED Driver w/ PWM

⚠ Improper handling of the FPC connections at the bottom edge of this module may cause damage resulting in display or touch failure. Take special care when handling this area of the display module to make sure these connections are never strained nor creased.

STANDARD TOLERANCES (UNLESS OTHERWISE SPECIFIED)

LINEAR: ± 0.3mm

UNLESS OTHERWISE SPECIFIED
- DIMENSIONS ARE IN MILLIMETERS
- THIRD ANGLE PROJECTION

NEWHAVEN DISPLAY INTERNATIONAL

DRAWING/PART NUMBER:			REVISION:
NHD-7.0-HDMI-N-RSXN-CTU			1.1
DRAWN BY: N. Patel	CHECKED BY: P. Bartek	APPROVED BY: M. LaVine	SIZE: A3
DRAWN DATE: 8/25/17	CHECKED DATE: 8/28/17	APPROVED DATE: 8/29/17	SCALE: 1:2
DO NOT SCALE DRAWING		SHEET 1 OF 1	

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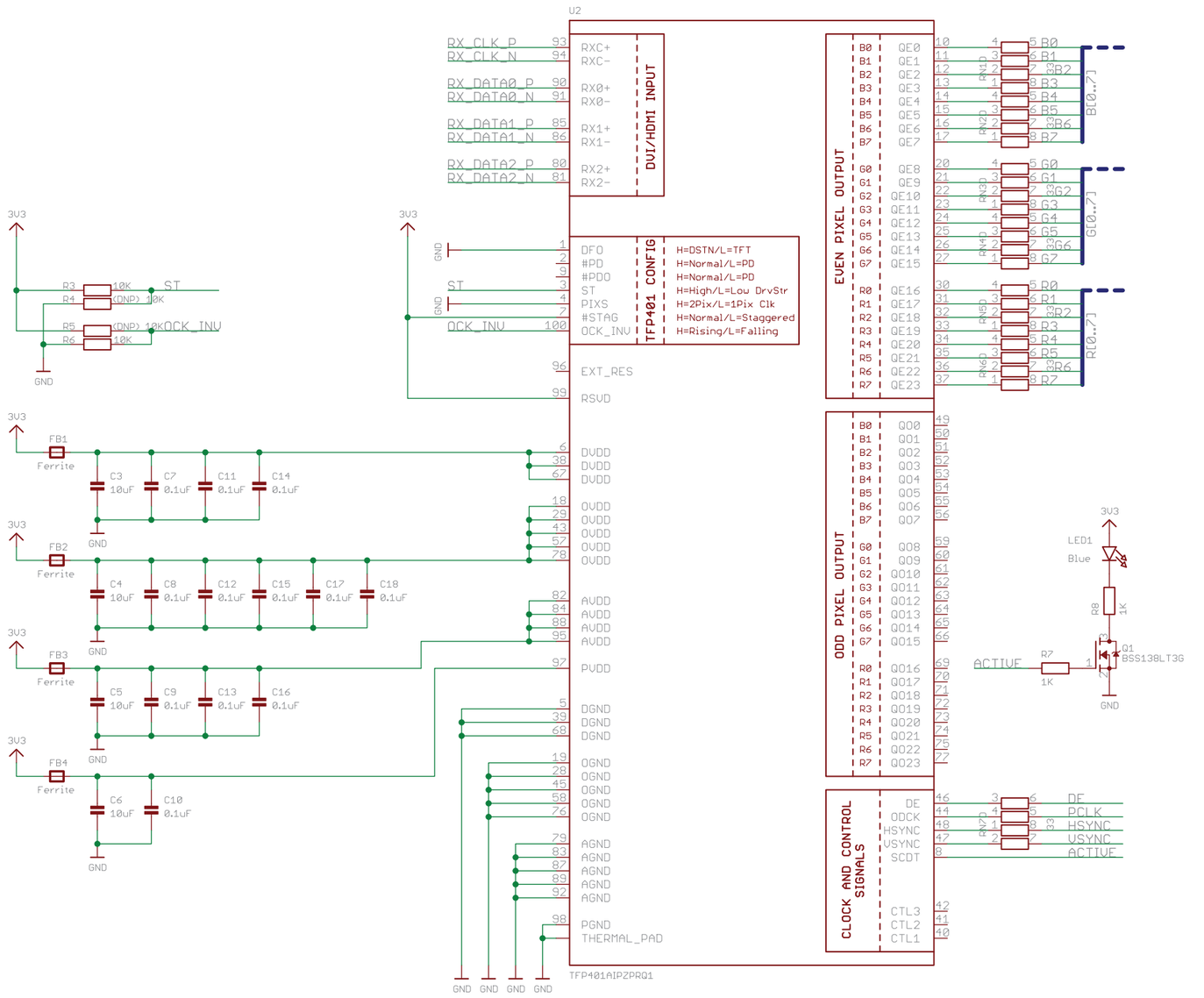
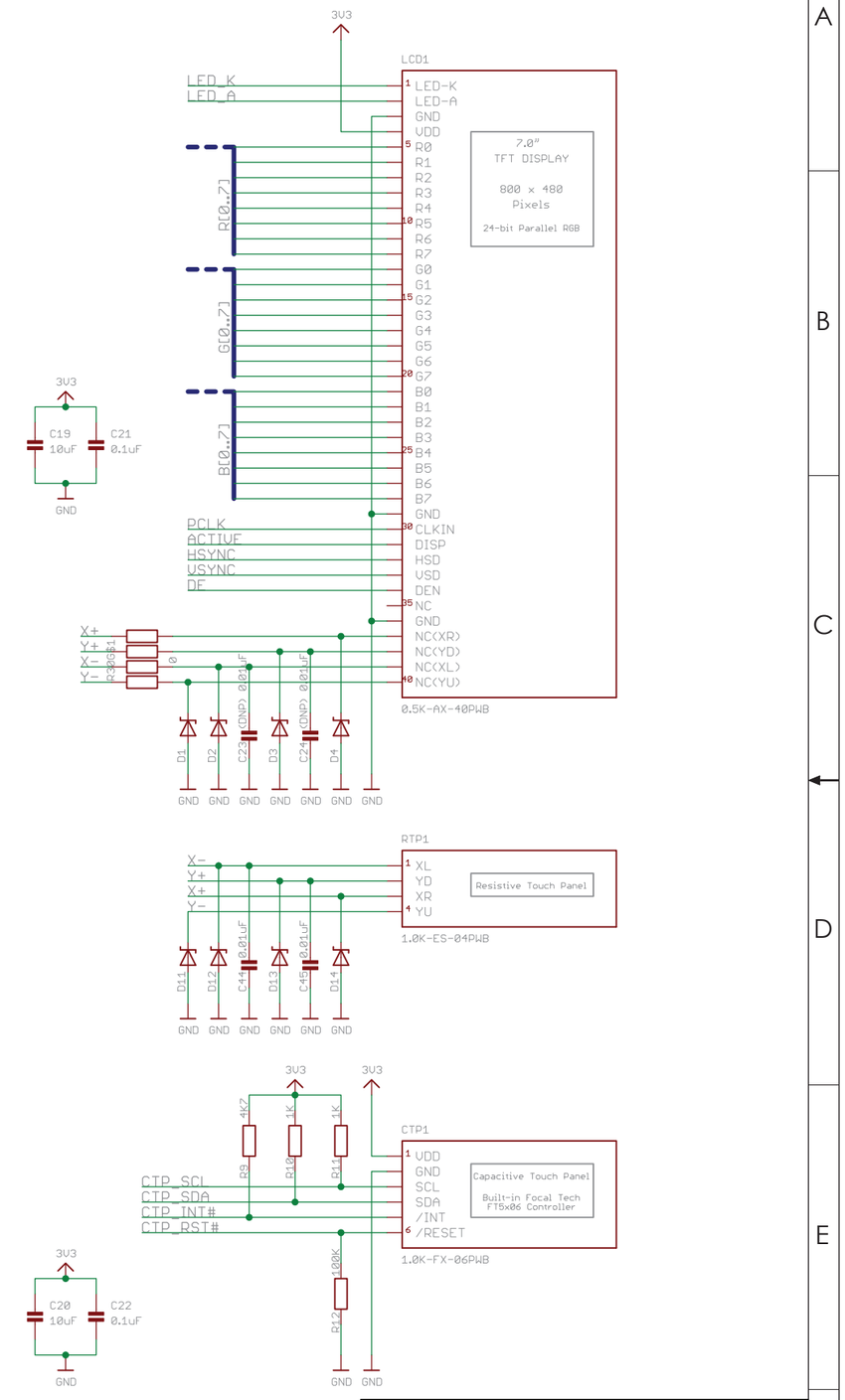
TFP401 (DVI/HDMI Decoder)



LCD Interface



NEWHAVEN DISPLAY INTERNATIONAL			
SCHEMATIC/PART NUMBER: NHD-7.0-HDMI-N			REVISION: 1.1
			SIZE: A3
DRAWN BY: P. Bartek	CHECKED BY: M. LaVine		SHEET: 1 of 3
DRAWN DATE: 08/15/17	CHECKED DATE: 08/15/17		

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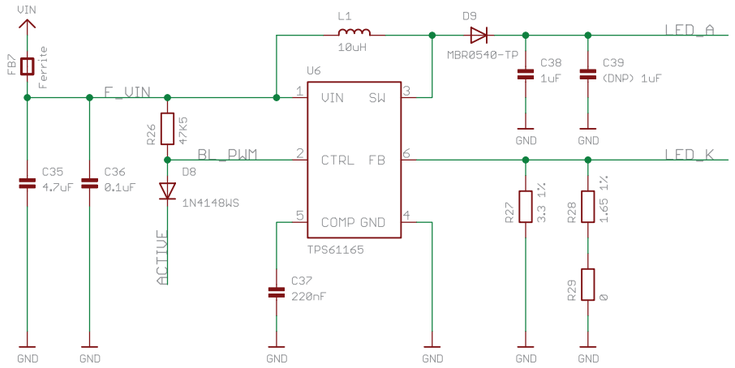
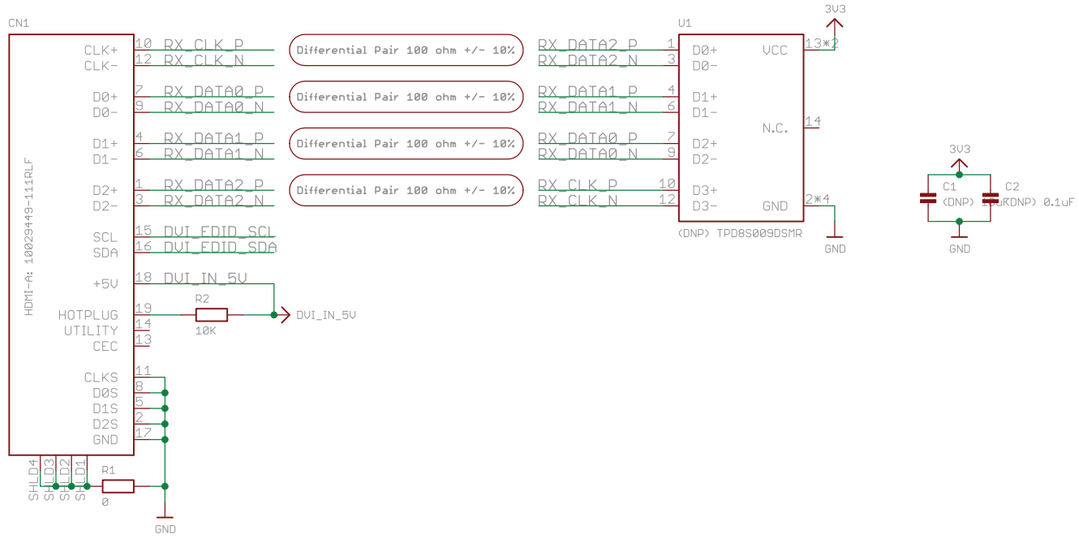
Backlight

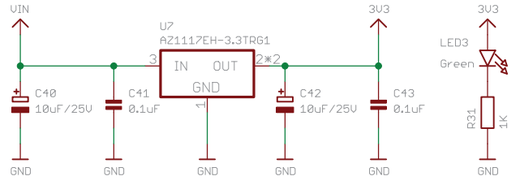


Backlight Configuration		
Current	R29	Display
~60mA	Open	ATXL#
(Default) ~180mA	Close	ASXV#, ASXN#

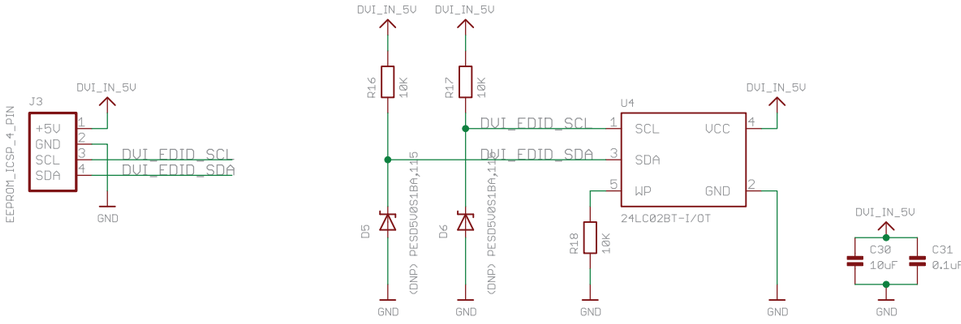
HDMI-A



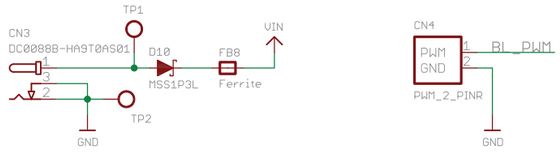
3.3V Regulator 800mA



EEPROM



VIN / PWM



NEWHAVEN DISPLAY INTERNATIONAL

SCHEMATIC/PART NUMBER: NHD-7.0-HDMI-N		REVISION: 1.1
		SIZE: A3
DRAWN BY: P. Bartek	CHECKED BY: M. LaVine	SHEET: 2 of 3
DRAWN DATE: 08/15/17	CHECKED DATE: 08/15/17	

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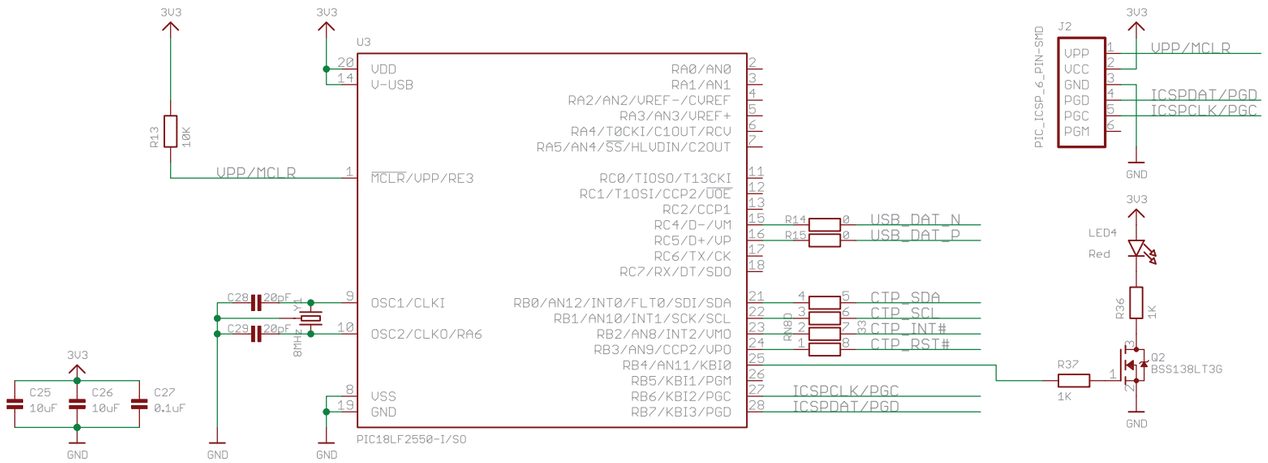
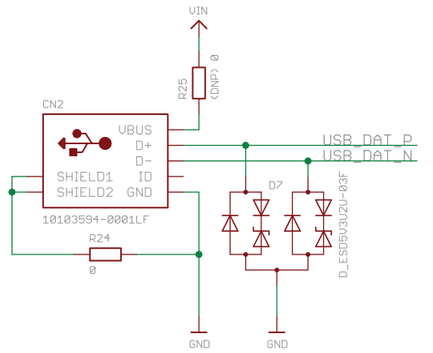
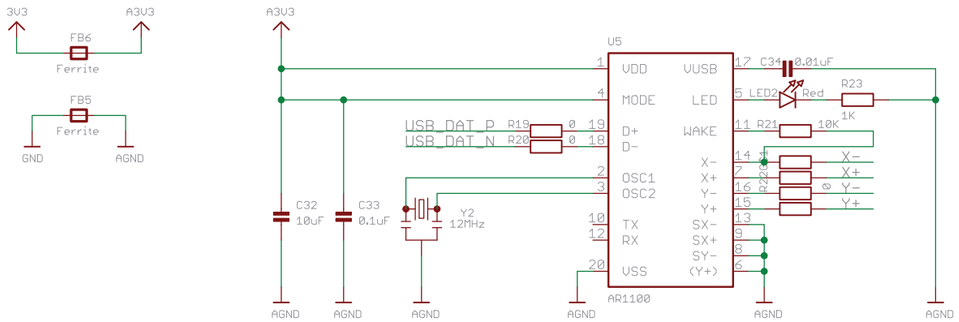
PIC18LF2550 / Capacitive Touch Screen Controller



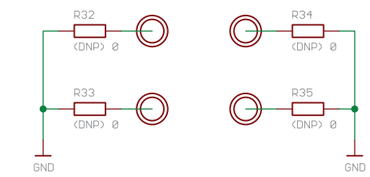
Micro-B USB



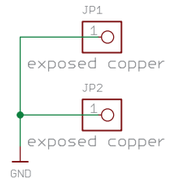
Resistive Touch Screen Controller



Mounting Holes 3.5mm Plated



Exposed Pads to Ground TFT Bezel



BOARD VERSIONS

RTU Version: (DNP) - C1, C20, C25, C26, C2, C22, C27, C23, C24, C28, C29, C39, CTP1, D1, D2, D3, D4, D5, D6, D11, D12, D13, D14, LED4, Q2, R4, R5, R13, R9, R10, R11, R36, R37, R12, R14, R15, R25, R32, R33, R34, R35, RN8, U1, U3, Y1

CTU Version: (DNP) - C1, C32, C2, C33, C23, C24, C34, C44, C45, C39, D1, D2, D3, D4, D5, D6, D11, D12, D13, D14, FB5, FB6, LED2, R4, R5, R21, R19, R20, R25, R32, R33, R34, R35, R22, R30, R23, RTP1, U1, U5, Y2

Non-Touch Version: (DNP) - C1, C20, C25, C26, C32, C2, C22, C27, C33, C23, C24, C34, C44, C45, C28, C29, C39, CN2, CTP1, D1, D2, D3, D4, D5, D6, D11, D12, D13, D14, D7, FB5, FB6, LED2, LED4, Q2, R4, R5, R13, R21, R9, R10, R11, R23, R36, R37, R12, R14, R15, R19, R20, R24, R25, R32, R33, R34, R35, R22, R30, RN8, RTP1, U1, U3, U5, Y1, Y2

NEWHAVEN DISPLAY INTERNATIONAL

SCHEMATIC/PART NUMBER: NHD-7.0-HDMI-N	REVISION: 1.1
DRAWN BY: P. Bartek	CHECKED BY: M. LaVine
DRAWN DATE: 08/15/17	CHECKED DATE: 08/15/17
	SIZE: A3
	SHEET: 3 of 3

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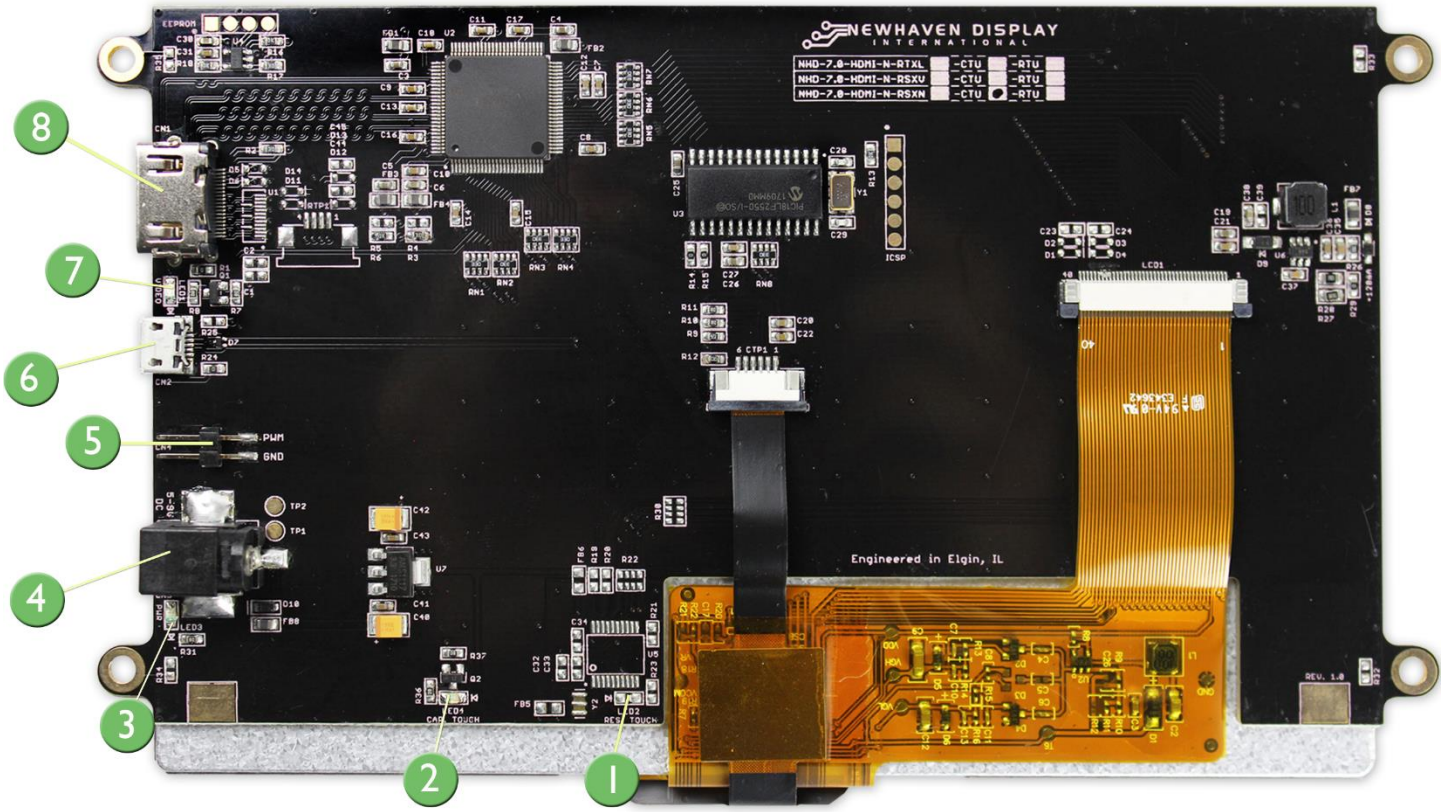
Interface Description



(Capacitive Touch model shown above as reference)

Num.	Description
1)	(LED2) **LED Indicator for Touch** – *Resistive Touch model only.* This is a Red LED that will blink slowly (once per second) if the RTP controller is powered ON, awake, and no touch is detected. This LED will blink rapidly (5 times per second) if the RTP controller detects a touch.
2)	(LED4) **LED Indicator for Touch** – *Capacitive Touch model only.* This is a Red LED that will illuminate when there is a touch sensed on the CTP.
3)	(LED3) **LED Indicator for Power**. This is a Green LED that will illuminate when DC power is supplied to the module.
4)	(CN3) **DC Jack (Center-Positive)**. This is used to supply power to the display module. A DC power supply in the range of 5-7.5V should be used. The output current rating of the DC power supply should be at least the maximum Supply Current (I_{DD}) listed in the Electrical Characteristics section on page 8.
5)	(CN4) **Surface Mount Pin Header, 2.54mm pitch, for Backlight PWM**. The pin labelled 'PWM' is connected directly to the LED driver's CTRL pin (T.I. TPS61165). This is a multifunctional pin which can be used for enable control, PWM, and digital dimming. The PWM signal's frequency and duty cycle should operate within the specified ranges listed in the Electrical Characteristics section on page 8.
6)	(CN2) **Micro-USB (Type-B) Connector for Touch** – *Touch Panel models only.* This is to connect the Touch Panel of this module to a USB input to act as a USB-HID device.
7)	(LED1) **LED Indicator for Video**. This is a Blue LED that will illuminate when there is an active video signal detected.
8)	(CN1) **HDMI (Type-A) Connector for Video**. This is a full-size HDMI connector meant to connect the HDMI source signal (Video only) to this module. The on-board T.I. TFP401A HDMI/DVI Receiver does not scale video resolutions. Therefore, the output resolution of the source must be 800x480 (WVGA).

Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T_{OP}	Absolute Max	-20	-	+70	°C
Storage Temperature Range	T_{ST}	Absolute Max	-30	-	+80	°C
Supply Voltage	V_{DD}	-	5.0	-	7.5	V
Supply Current	I_{DD}	V_{DD} = 5V	-	750	790	mA
		V_{DD} = 7.5V	-	560	590	mA
PWM Frequency	f_{PWM}	-	5	-	100	kHz

Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal Viewing Angles	Top	φY+	CR ≥ 10	-	60	-	º
	Bottom	φY-		-	50	-	º
	Left	θX-		-	60	-	º
	Right	θX+		-	60	-	º
Contrast Ratio		CR	-	-	400	-	-
Luminance		L_V	-	660	830	-	cd/m²
Response Time	Rise + Fall	$T_R + T_F$	T_{OP} = 25°C	-	25	35	ms

Capacitive Touch Panel Material Characteristics

Property	Requirement	Unit
IC	FT5406	-
ITO Glass Thickness	0.55	mm
Cover Lens Thickness	0.70	mm
Surface Hardness	≥6	H
Transparency	≥83%	-
Operating Humidity	20~90	RH
Storage Humidity	20~90	RH

Digital Receiver Information

On-board Texas Instruments TFP401A Receiver.
To view the full TFP401A specification, please download it by accessing the link below:
http://www.ti.com/lit/ds/slds190a/slds190a.pdf

Display Information

Part Number	Display Type	Luminance Rating	Viewing Angle	Interface
NHD-7.0-800480EF-ASXN#-CTP	Sunlight Readable	830 cd/m²	12:00	24-Bit RGB

This product consists of the above TFT display assembled with a PCB which supports all the features of this module.
For more details on the TFT display itself, please download the specification at:
http://www.newhavendisplay.com/specs/NHD-7.0-800480EF-ASXN-CTP.pdf

Raspberry Pi Application

On the Raspberry Pi, we recommend forcing the HDMI resolution by using the following config.txt file (in /boot/config.txt) - you can edit it by inserting the Pi's SD card into your computer.

```
# uncomment if you get no picture on HDMI for a default "safe" mode
#hdmi_safe=1

# uncomment this if your display has a black border of unused pixels visible
# and your display can output without overscan
#disable_overscan=1

# uncomment the following to adjust overscan. Use positive numbers if console
# goes off screen, and negative if there is too much border
#overscan_left=16
#overscan_right=16
#overscan_top=16
#overscan_bottom=16

# uncomment to force a console size. By default it will be display's size minus
# overscan.
#framebuffer_width=1280
#framebuffer_height=720

# uncomment if hdmi display is not detected and composite is being output
hdmi_force_hotplug=1

# uncomment to force a specific HDMI mode
hdmi_group=2
hdmi_mode=1
hdmi_mode=87
hdmi_timings=800 0 40 48 44 480 0 13 3 30 0 0 0 60 0 32000000 6

# uncomment to force a HDMI mode rather than DVI. This can make audio work in
# DMT (computer monitor) modes
#hdmi_drive=2

# uncomment to increase signal to HDMI, if you have interference, blanking, or
# no display
#config_hdmi_boost=4

# uncomment for composite PAL
#sdtv_mode=2

#uncomment to overclock the arm. 700 MHz is the default.
#arm_freq=800
```

Quality Information

Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+80°C , 96hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C , 96hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C , 96hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C , 96hrs	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.	+60°C , 90% RH , 96hrs	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-20°C,30min -> 25°C,5min - >70°C,30min = 1 cycle 10 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-55Hz , 15mm amplitude. 60 sec in each of 3 directions X,Y,Z For 15 minutes	3
Static electricity test	Endurance test applying electric static discharge.	VS=800V, RS=1.5kΩ, CS=100pF One time	

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

Warranty Information

See Terms & Conditions at http://www.newhavendisplay.com/index.php?main_page=terms