



HTT101A/G-IPS-1024600A

For all variants of the HTT101A/G-IPS

Hardware Manual

Revision 1.0



PCB Revision: 1.0 or Higher

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1 Contact



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In-House Manufacturing

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Purchasing: www.matrixorbital.com

Support: www.matrixorbital.com

Free support forums

<https://www.lcdforums.com/forums>

Example Code on GitHub

<https://github.com/MatrixOrbital>

2 Customization

Need a custom solution? No problem! Since we manufacture our products in-house, we are highly flexible, have low MOQ's and provide you what you need. From custom headers to custom cables to entire custom displays, we can make what you need.



3 Introduction

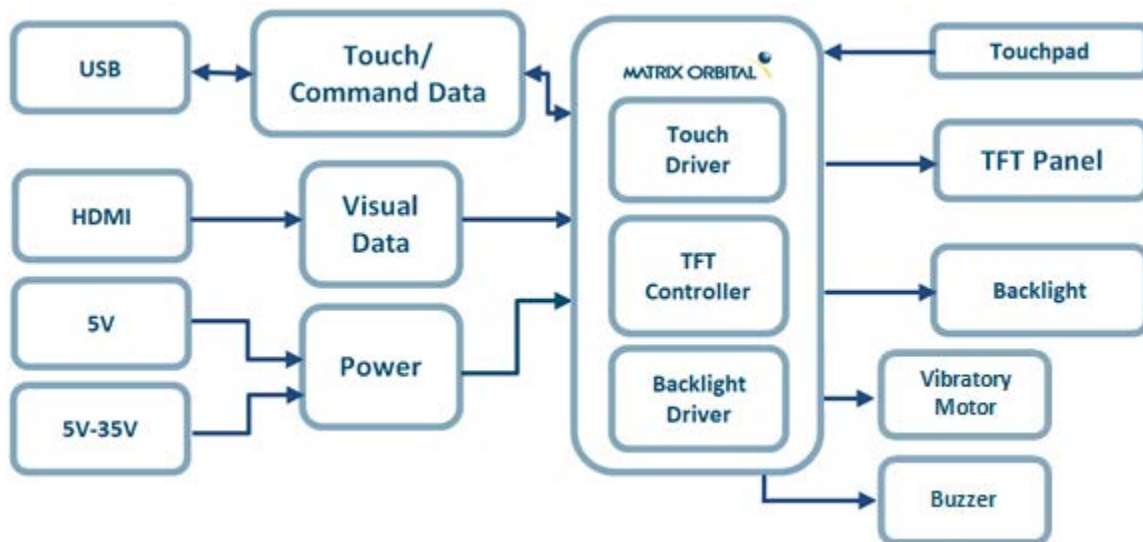
The HTT101 is an industrial 10.1" TFT display with an HDMI interface. Featuring a Sunlight readable 1000nit 1024x600 resolution IPS panel, and video feedback, with 24-bit Full colour capabilities. The HTT101 can be configured with a resistive, capacitive, or non-touch screen. Designed with industrial applications in mind, the HTT is perfect for panel mounted applications and HMI interfaces. Compatible with Windows and Linux hosts, including Raspberry Pi, BeagleBone, TinkerBoard

The HTT101G features an easy to mount oversized capacitive touch screen. Panel mounting of the display is seamless and smooth providing a crisp modern look. It easy to clean, sanitize, water and dust resistant.

Features

- 1000 cd/m2 sunlight readable software-controlled backlight brightness
- Optically Bonded Capacitive touch panel
- IPS Panel
- Auto Dim Backlight, with multiple stages
- Touch Feedback with piezo, or haptic or both
- Industrial 9-35V power input (-VPT) option
- Plug & Play
- Industrial MATE-N-LOK locking headers
- HID touch panel with multi-touch Capacitive touch
- Upgradable touch driver firmware
- DVI/HDMI interface
- Automatic resolution detected provided by EDID
- Available with:
 - No touch panel (-TPN)
 - Resistive touch panel (-TPR)
 - Capacitive touch panel (-TPC)
 - Oversized Capacitive touch panel (G -TPC)

Functional Diagram



4 General Information

Item	Contents	Unit
Display Size (Diagonal)	10.1"	inch
Display type	IPS TFT	
Resolution	1024x600	Pixels
Display Mode	Transmissive, Normally Black	
Backlight	LED, 1000 cd/m2, 50,000 hours, PWM brightness	
View Direction	All (160°)	
Gray Scale Inversion Direction	None	
Module Outline	A: 235.0 (W) x 143.0 (H) G: 260.0 (W) x 170.0 (H)	mm
Active Area	222.7 (W) x 125.3 (H)	mm
Pixel Pitch	0.2175 (W) x 0.2088 (H)	mm
Polarizer Surface Treatment	Anti-glare	
Display Colors	16.7M 24-bit	
Interface	HDMI 1.0 Type-A or FFC	
Display Driver IC	TFP401A or Equivalent	
Touch	USB HID, Multi Touch (TPC)	
Operating Temperature	-20 to 70	°C
Storage Temperature	-30 to 80	°C

5 Part Numbering

The HTT101 is available with various voltage options and header orientations.

HTT	101	A	-IPS	1024600	-TPC	-BLH	-B0	-H5	-CH	-V5
1	2	3	4	5	6	7	8	9	10	11

Addon Options

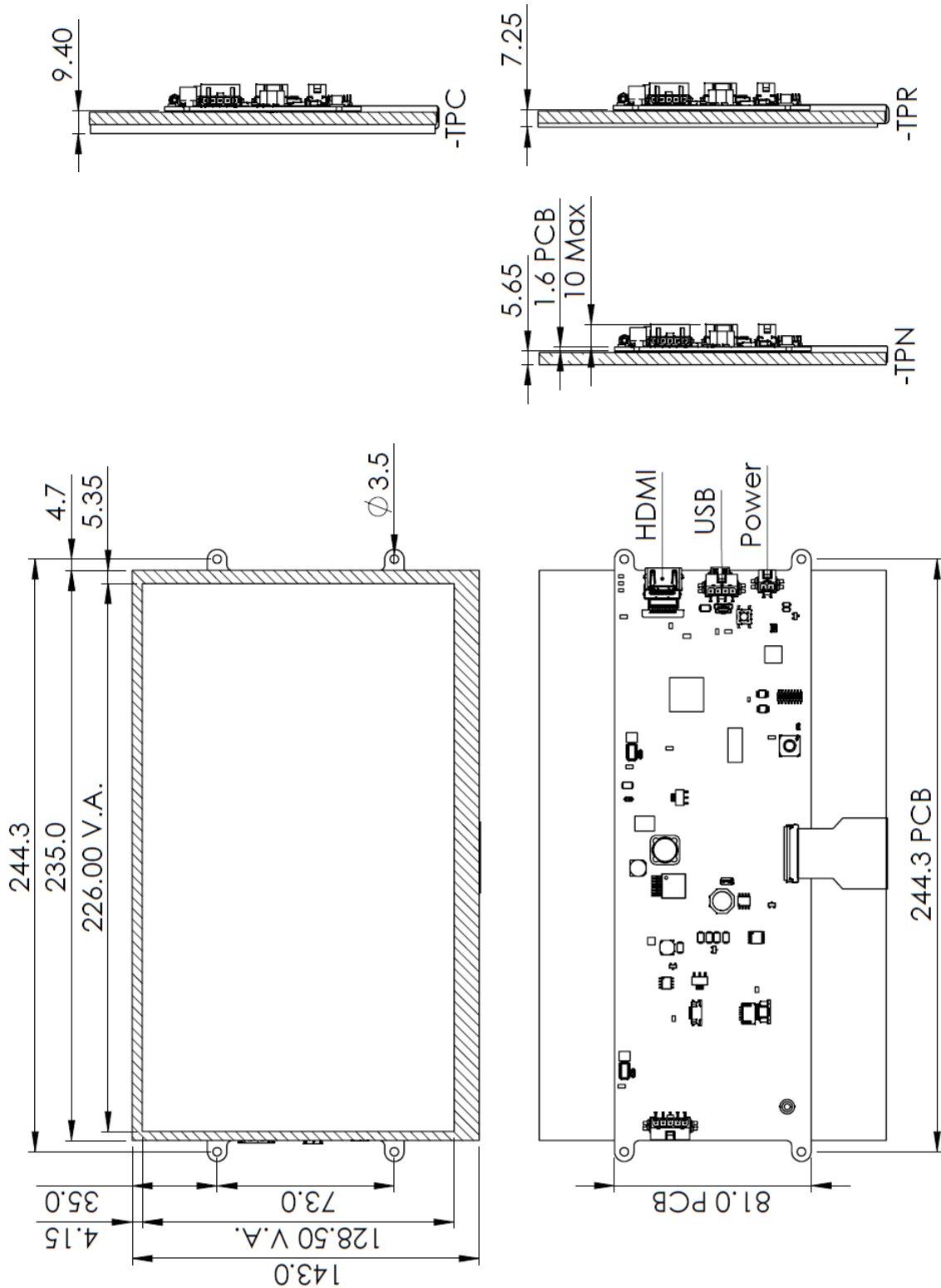
*-SPK	*-HAP	*-GG	*-WG	*-OPT

#	Designator	Options
1	Product Type	HTT: Graphic TFT Display
2	Display Size	101: 10.1"
3	Screen Type	A: A Type G: G Type
4	IPS Panel	-IPS
5	Resolution	1024x600
6	Touch	-TPN: No touch panel -TPR: Resistive touch panel -TPC: Capacitive touch panel -TPC-OPT: Optically Bonded Capacitive touch
7	Backlight	-BLM: 300 Nit < Brightness < 600 Nit -BLH: 600 Nit < Brightness < 1000 Nit -BLD: 1000 Nit < Brightness < 1500 Nit
8	Bezel	-B0: None -B1: Aluminum Bezel
9	Headers	-H5: Horizontal HDMI, Mini-B USB, Vertical Barrel Jack Power -H6: Vertical HDMI, Mini-B USB, Vertical Barrel Jack Power -H7: Horizontal HDMI, MATE-N-LOK USB & Power -H8: Vertical HDMI, MATE-N-LOK USB & Power
10	Protocol	-CH: HDMI interface
11	Voltage	-V5: 5.0V -VPT: 9V - 35V
	Designator	Addons
	Speaker	-SPK Piezo Speaker
	Haptic	-HAP Haptic Motor
	Gorilla Glass	-GG Gorilla Glass Gen 3
	Water/Glove	-WG Water/Glove Capable
	Optical Bonded	-OPT

6 Dimensional Drawings

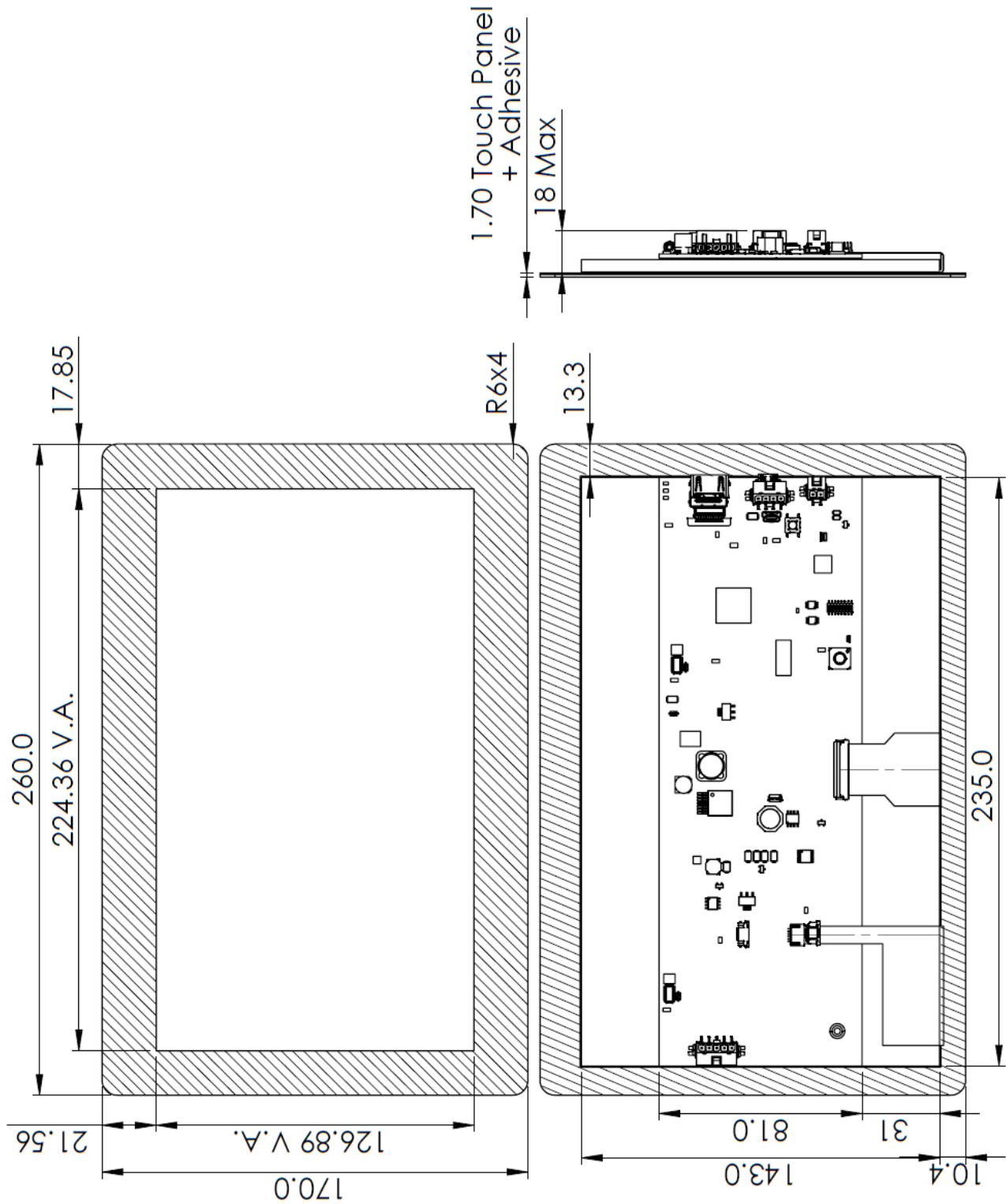
6.1 HTT101A

All dimensions are maximum +/- 0.3mm, typical is +/- 0.15mm maximum



6.2 HTT101G

All dimensions are maximum +/- 0.3mm, typical is +/- 0.15mm maximum



7 Characteristics & Specifications

7.1 Power

By default, the display must be powered by the 2 pin MATE-N-LOK header or barrel jack and cannot be powered over USB only. If you would like to power the display over USB only, please contact us.

Parameter	Min	Typ	Max	Unit	Remarks
Supply Voltage	4.75	5.0	5.25	V	Standard Voltage (V5)
	9.0	-	35.0	V	Wide Voltage (VPT)

5V	Min	Typ	Max	Unit
Logic	-	350	-	mA @ 5V
Backlight	0	550	1300	mA @ 5V
Haptic			400	mA @ 5V
Speaker			100	mA @ 5V

7.2 Backlight/Optical Characteristics

-OPT is optional bonding of the touch panel to the display, making it stronger and brighter.

The backlight brightness can be software controlled as well as Auto Dimmed.

Item	TPN	TPR	TPC	Unit
Brightness	1100	900	1000	nit or cd/m2
Contrast Ratio	800	800	800	

Item	Symbol	Min.	Typ.	Max.	Unit
Drive method		Constant current			
LED Configuration		32 White LEDs, 4 Serial x 8 Parallel			
Backlight life		Minimal 20,000 hours		Typical 50,000 hours	

Values at 25°C, 60% RH, at 30k hours backlight will be at 50% brightness

7.3 Touch Panel

-WG features is capable of detecting touches through latex gloves and is water capable.

-GG uses generation 3 Gorilla Glass for extra hardness.

Parameter	A Series			G Series	
	-TPR	-TPC	-TPC -WG	-TPC	-TPC -WG
IC Driver		ILI2511	ILI2511	ILI2511	ILI2511
Touch Points	1	5	5	5	10
Hardness	3H	6H	6H	6H	6H
Water/Glove Capable		Yes	Yes	Yes	Yes

IC Driver listed or equivalent

7.4 Touch Sensitivity

Touch Panel sensitivity can be set on the touch panel. Settings are Normal, High, Extra (thickness is dependent of display)

Material	A Series		G Series		A/G -WG	
	Acrylic	Glass	Acrylic	Glass	Acrylic	Glass
Normal	0.2	0.6	0.5	0.6	0.5	0.6
High	0.7	1.5	1.2	2.0	1.2	2.0
Extra High	1.2	2.5	2.0	5.0	2.0	5.0

*Note: The composition of the Cover Lens may affect the touch panel's operation. The values listed should be taken as reference only.

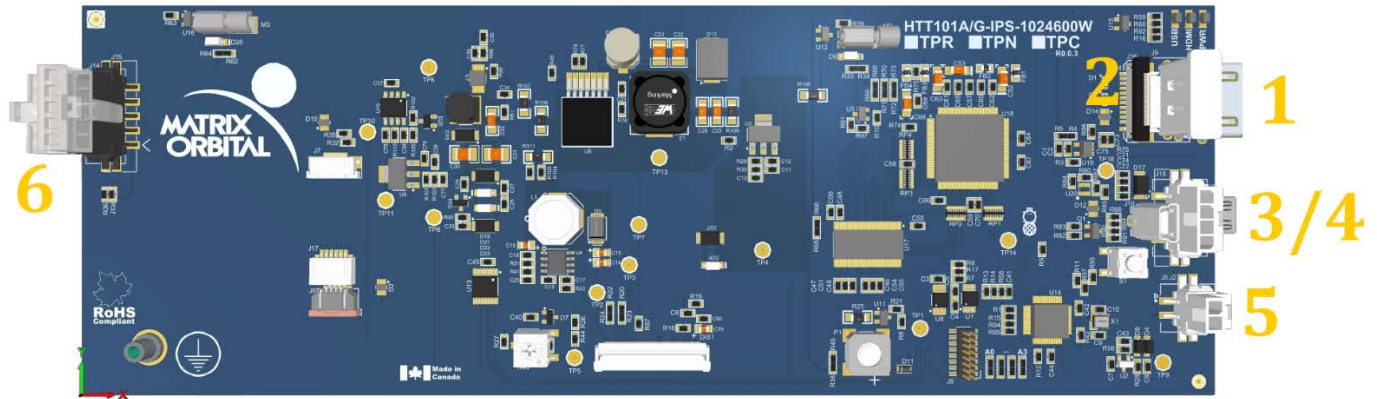
7.5 Environmental

Operating Temperature	-20°C to +70°C
Storage Temperature	-30°C to +80°C
Operating Relative Humidity*	90% (T < 60°C)

*Note: No condensation at any temperature

8 Headers

The HTT comes in many header configurations, if these do not meet your requirements, please contact us for a custom solution.



Header Description

#	Header	Standard Mate
1	HDMI, Horizontal or Vertical, Type A	Type A HDMI Cable
2	HDMI, FFC	
3	Mini USB, Horizontal or Vertical: Touch	Mini-B USB Cable
4	USB, Horizontal or Vertical, 2-1445057-4	Micro MATE-N-LOK 1445022-4
5	Power, Horizontal or Vertical, 2-1445057-2	Micro MATE-N-LOK 1445022-2
6	Expansion Port	Micro MATE-N-LOK 1445022-5

Header Options

H	Header
5	Horizontal HDMI, Mini-B USB, Vertical Barrel Jack Power
6	Vertical HDMI, Mini-B USB, Vertical Barrel Jack Power
7	Horizontal HDMI, MATE-N-LOK USB & Power
8	Vertical HDMI, MATE-N-LOK USB & Power

8.1 Standard Type A HDMI

Available in horizontal or vertical.

8.2 HDMI over FFC

Special order, Available in horizontal or vertical configuration. 20 pin, 0.5mm, bottom contact.

8.3 Micro MATE-N-LOK Power Header

Low profile power header available in vertical or horizontal configuration. By default, the display must be powered by the 2 pin MATE-N-LOK header or barrel jack.

Display Header	Standard Mate
Micro MATE-N-LOK 2-1445057-2	Micro MATE-N-LOK 1445022-2

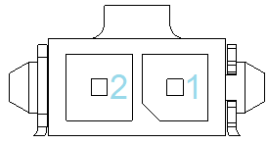


Table 1: Power Adaptor Pinout

Pin	Function
1	Vcc
2	Gnd

Optional Mate-n-Lok to 2.1mm barrel jack cable adapter.



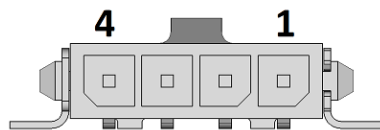
Part Number:
CBL-MNL2B21

Description:
2 pin Mate-n-Lok to 2.1mm barrel jack

8.4 Micro MATE-N-LOK USB Header

Low profile power header available in vertical or horizontal configuration. Custom cables are available. By default, the display cannot be powered over USB through pin 1, but requires to be present for the display to detect USB. If you would like to power the display over USB only, please contact us.

Display Header	Standard Mate
Micro MATE-N-LOK 2-1445057-4	Micro MATE-N-LOK 1445022-4



Pin	Function
1	USB 5V
2	D-
3	D+
4	Gnd

9 Additional Features

The HTT has a number of advanced optional features that are software configured by direct commands to the display or by the HTT Utility. Haptic motor and piezo speaker can be used individually or together for the maximum user experience.

<https://github.com/MatrixOrbital/HTT-Utility>

Settings:	
Screen Rotation	0, 90, 180, 2101
Touch Panel sensitivity	Normal, High, Extra (thickness is dependent of display)
Backlight Brightness	0-255
Haptic Feedback	Duration, ms
Piezo	Duration, ms
Touch Feedback	0 none, 1 Haptic, 2 Piezo, 3 Haptic & Piezo
Backlight Auto Dim	Dim from last touch, seconds

9.1 Screen Rotation

The display can be rotated 0, 90, 180, 2101 degrees, this allows the display to be in landscape or portrait mode.

9.2 Touch Panel Sensitivity

Touch Panel sensitivity can be set on Capacitive touch panels. Settings are Normal, High, Extra (thickness is dependent on display)

9.3 Backlight Brightness

The displays backlight brightness can be software controlled by command.

9.4 Haptic

Optional haptic motor is available, this will allow users to “feel” when they press the. Duration in ms is configurable.

9.5 Piezo Speaker

Optional piezo speaker is available, this will allow the user to hear a beep when they press the. Duration in ms is configurable.

9.6 Backlight Auto Dim

The HTT has the ability to setup several brightness levels, this is triggered from last touch. When touch, the display will go back to the original backlight brightness.

Ex:

100% → 1m → 90% → 5m → 50% → 20m → 0% TOUCH → 100%

10 Mounting

For custom mounting options, such a custom touch panel or mounting ears, please contact us.

10.1 HTT101G Series

Our G series extended capacitive touch with a double-sided adhesive already applied on the exposed back side of the over-sized cover glass. This provides an extraordinarily strong double-sided foam tape that adheres to a broad range of surfaces such as aluminum, stainless steel, galvanized steel, composites, plastics, acrylic, polycarbonate, ABS and painted or sealed wood and concrete.

Adhesive: 3M VHB 0.6mm (3M 5925) or similar.

The tape can maintain its bond in environments of 100% relative humidity at 38°C, and can withstand temperatures up to 149°C.

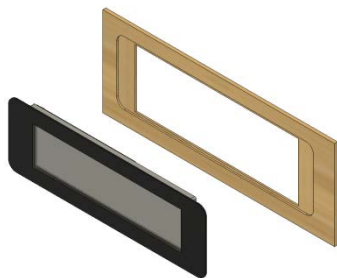


Figure 1: Installation

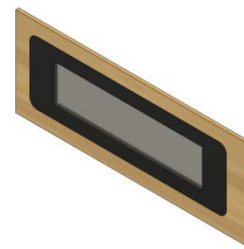


Figure 2: Completed Assembly

Application Best Practices:

- Prepared by cleaning the surface with a 50:50 mixture of isopropyl alcohol
- Ideal application temperature 21C/70F to 38C/100F. At room temperature 50% bond strength in 20 minutes, 90% 24 hours, 100% after 72 hours.
- Firm application pressure develops better adhesive contact and helps improve bond strength. We recommend applying approximately several kilograms evenly across the entire glass area. The adhesive ideally requires 100 kPa/15psi of pressure for good surface contact.

10.2 HTT101A Series

The A series uses 4 mounting points with a 3.5mm diameter. M4 screws can be used. Chassis grounding is optionally provided, please contact us for more information.

11 Getting Started

When connecting your HTT display, power must first be applied through the Micro MATE-N-LOK. Once powered, connect the HTT to your source HDMI cable.

When properly connected...

Windows

When connected to Windows, the HTT's resolution will be automatically detected and set through the on-board EDID. The HTT display should immediately appear in display settings. No additional software setup will be required.

Raspberry Pi

Some setup will be required before the display can be used with a Raspberry Pi unit. The HDMI resolution will have to be configured through the config.txt file (located in /boot/config.txt).

The following modifications can be made to the Raspberry Pi's config.txt file, forcing the HTT's resolution settings:

```
#Set the Monitor mode to DMT.  
hdmi_group=2  
#Use a custom resolution.  
hdmi_mode=87  
#Use an 1024 x 600 resolution @ 60Hz  
hdmi_cvt= 1024 600 60 6 0 0 0  
#Deliver max current through USB  
Max_usb_current=1
```

The configuration lines listed above will configure the Raspberry Pi to drive an 800 x 480 display at 60Hz.

TinkerBoard & BeagleBone

The HTT will be compatible with TinkerOS-Debian. Once connected, the Tinkerboard will autodetect the HTT's display settings. No further software configuration is required.

The HTT is not fully compatible with TinkerOS-Android Marshmallow.

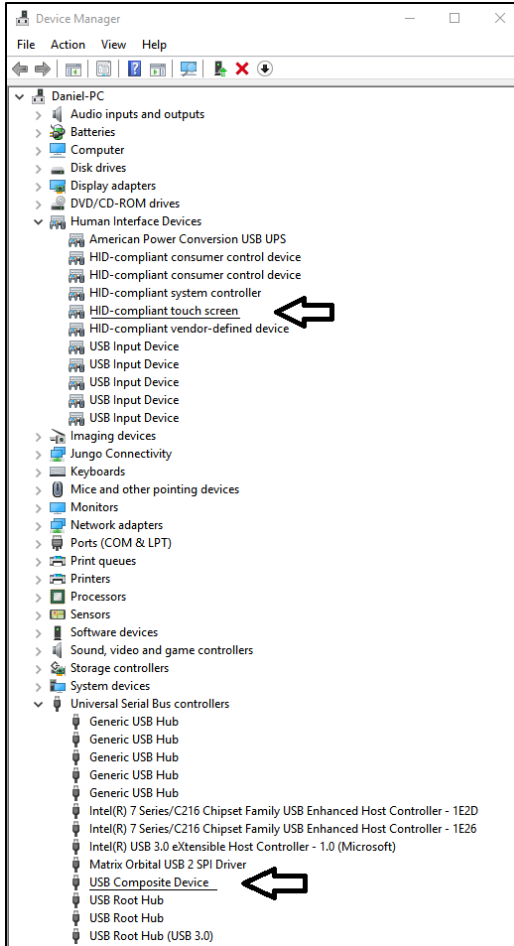
The BeagleBone board will autodetect the HTT's EDID display settings automatically. No further software configuration is required.

12 USB Drivers

The touch panel is configured as a HID-Compliant Touch Screen. The touch panel will respond to finger gestures differently depending on the host features.

Once the HTT is properly installed on Windows, 2 new devices will be present in Device manager.

USB Composite Device



13 TFT & Extended Display Information Data

EDID

The HTT's on-board EDID comes preconfigured, so users won't have to worry about setting up their screen resolution or display timings. Once plugged in, the EDID settings will be read automatically, setting the HTT's display resolution. For modifications or custom EDID please contact us.

TFT Display Used

For more detailed information for the TFT's Electro-Optical Characteristics, Reliability Test Conditions, Inspection Criteria, and Handling Precautions. Please consult the Parallel TFT Datasheet

HTT Display	Parallel TFT Datasheet
HTT101A-IPS-1024600W	MOP-TFT1024600W-101A-IPS
HTT101G-IPS-1024600W	MOP-TFT1024600W-101G-IPS

14 Troubleshooting

Power

To function correctly, the HTT must be supplied with the appropriate power. If the power LED near the top right corner of the board is not illuminated, power is not applied correctly. Try the tips below.

- HTT devices have specific power requirements. Ensure the correct voltage and sufficient current are available to your device by consulting the Power table.
- Check the power cable that you are using for continuity. If you don't have an ohm meter, try using a different power cable; if this does not help try a different power supply.
- Check the power connector in use on your display. If the connector has become loose or you are unable to resolve the issue, please contact a friendly Matrix Orbital support representative.

Display

If your display is powered successfully and connected to an HDMI source, the video feed should appear on screen immediately. The video signal should be clean, and the picture should fit the viewing area of the display. If this is not the case, check out these tips.

- If you are connected to a single board computer, such as a Raspberry Pi, and your screen displays a white screen on start-up, or slowly fade to white, please check the Config.txt file to ensure that the display is properly configured.
- If the display is flickering, or if the display's backlight is not consistent, try supplying additional power through the display's barrel jack.
- If your display shows picture but there are white lines along the edge(s) of the display, your display may be receiving the incorrect number of pixels. The HTT does not have a resolution scaler, and therefore the appropriate 800 x 480 resolution must be specified for all the pixels to be used.

Touch

The HTT101 can be ordered with a touch panel. When the touch panel is properly configured the touch cursor will accurately follow your finger as it moves across the screen. If the cursor is not responding to your touches, or if the cursor is offset from your finger, try the following:

- If you are using a resistive touch display, try downloading the HTT Calibration Software, available on our website here: <https://www.matrixorbital.com/software/htt-calibration>
Once downloaded, run the calibration program and follow the instructions that appear on screen.
- If you are using a capacitive touch display, make sure the screen is clear of debris or droplets.

15 Revision History

Revision	Date	Description	Author
1.0	November 1 2024	First Release	Henry