Connect Tech Inc.

Embedded Computing Experts

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USERS GUIDE

Orbitty Carrier for NVIDIA® Jetson™ TX2/TX2i/TX1

Users Guide

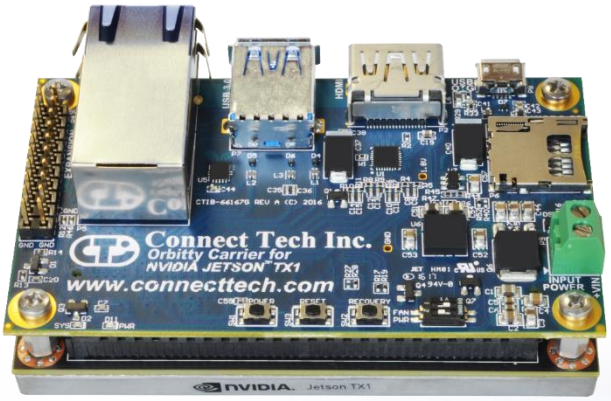

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Table of Contents

Preface

Disclaimer

The information contained within this user's guide, including but not limited to any product specification, is subject to change without notice.

Connect Tech assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user's guide.

Customer Support Overview

If you experience difficulties after reading the manual and/or using the product, contact the Connect Tech reseller from which you purchased the product. In most cases the reseller can help you with product installation and difficulties.

In the event that the reseller is unable to resolve your problem, our highly-qualified support staff can assist you. Our support section is available 24 hours a day, 7 days a week on our website at: http://connecttech.com/support/. See the contact information section below for more information on how to contact us directly. Our technical support is always free.

Contact Information

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www.connecttech.com

Note:
Please go to the **Connect Tech Resource Center** for product manuals, installation guides, device drivers, BSPs and technical tips. Submit your **technical support** questions to our support engineers.

Telephone/Facsimile
Technical Support representatives are ready to answer your call Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time. Our numbers for calls are:

Toll Free: 800-426-8979 (North America only)
Telephone: 519-836-1291 (Live assistance available 8:30 a.m. to 5:00 p.m. EST, Monday to Friday)
Facsimile: 519-836-4878 (on-line 24 hours)

Limited Product Warranty

Connect Tech Inc. provides a one year Warranty for the Orbitty Carrier. Should this product, in Connect Tech Inc.'s opinion, fail to be in good working order during the warranty period, Connect Tech Inc. will, at its option, repair or replace this product at no charge, provided that the product has not been subjected to abuse, misuse, accident, disaster or non-Connect Tech Inc. authorized modification or repair.

You may obtain warranty service by delivering this product to an authorized Connect Tech Inc. business partner or to Connect Tech Inc. along with proof of purchase. Product returned to Connect Tech Inc. must be pre-authorized by Connect Tech Inc. with an RMA (Return Material Authorization) number marked on the outside of the package and sent prepaid, insured and packaged for safe shipment. Connect Tech Inc. will return this product by prepaid ground shipment service.

The Connect Tech Inc. Limited Warranty is only valid over the serviceable life of the product. This is defined as the period during which all components are available. Should the product prove to be irreparable, Connect Tech Inc. reserves the right to substitute an equivalent product if available or to retract the Warranty if no replacement is available.

The above warranty is the only warranty authorized by Connect Tech Inc. Under no circumstances will Connect Tech Inc. be liable in any way for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, such product.

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ESD Warning

Electronic components and circuits are sensitive to ElectroStatic Discharge (ESD). When handling any circuit board assemblies including Connect Tech carrier assemblies, it is recommended that ESD safety precautions be observed. ESD safe best practices include, but are not limited to:

- Leaving circuit boards in their antistatic packaging until they are ready to be installed.
- Using a grounded wrist strap when handling circuit boards, at a minimum you should touch a grounded metal object to dissipate any static charge that may be present on you.
- Only handling circuit boards in ESD safe areas, which may include ESD floor and table mats, wrist strap stations and ESD safe lab coats.
- Avoiding handling circuit boards in carpeted areas.
- Try to handle the board by the edges, avoiding contact with components.

Revision History

Revision	Date	Changes
0.00	2016/04/28	Preliminary Release
0.01	2016/06/13	First Production Release
0.02	2016/08/10	Fixed BSP Download Link
0.03	2016/11/04	Updated images and assembly drawing
0.04	2016/11/24	Added note on power supply, MSG064
0.05	2016/12/01	Added Power Requirements and update maximum input voltage
0.06	2017/04/18	Updated Power Supply Cable Drawing
0.07	2017/05/26	Updated power supplies; added TX2 specs
0.08	2017/07/11	Added cable drawing link, removed drawings from doc
0.09	2018/03/08	Added GPIO KDB link
0.10	2018/06/15	Added ENC001 Enclosure info, Added BSP Information
0.11	2018/07/31	Edited TX2i Thermal Details
0.12	2019/02/15	Added TX2i Power Circuitry Note
0.13	2019-04-17	Added HDMI 2.0 support

Introduction

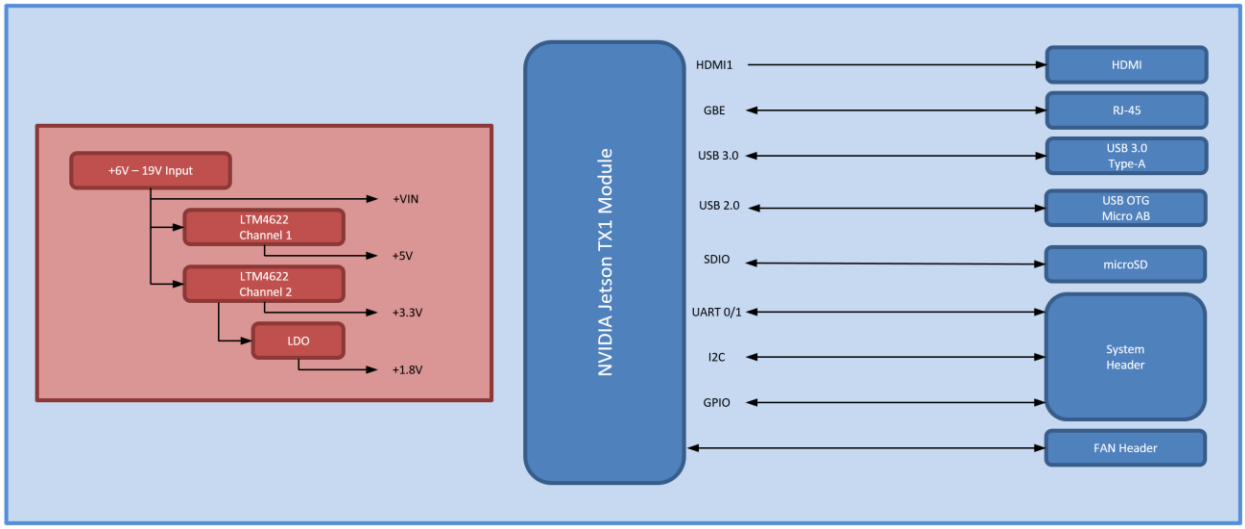
Connect Tech's Orbitty Carrier for NVIDIA® Jetson™ TX2/TX2i/TX1 brings a low cost deployable Jetson™ TX2/TX2i/TX1 Solution to the market. Designed to match the NVIDIA® Jetson™ TX2, TX2i, or TX1 module form factor, the Orbitty's design includes Gigabit Ethernet, HDMI Video, USB 3.0, USB 2.0 (w/ OTG functionality), 2 x UART ports and 4-bits of GPIO.

Product Features and Specifications

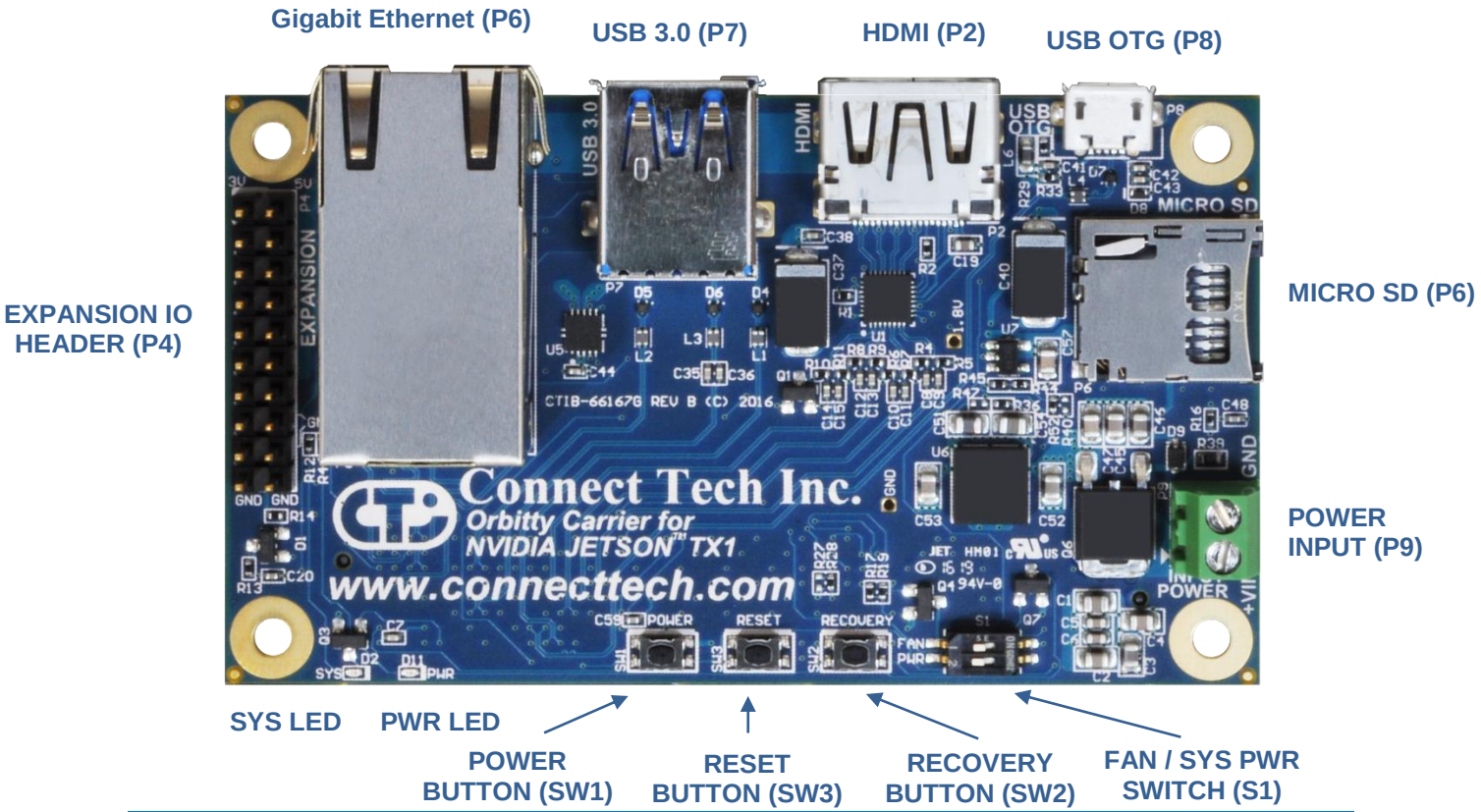
Feature	Orbitty Carrier for NVIDIA Jetson TX2/TX2i/TX1
Module Compatibility	NVIDIA Jetson TX2, TX2i or TX1 - Datasheet Downloads: **Module Datasheet** - **SoC Datasheet**
Mechanical Dimensions	X/Y Footprint: 87mm x 50mm - Tallest Component Height: 13.42mm *(From Top PCB Surface of Orbitty)* - Total Stack Height: 30.18mm *(Orbitty + TX2/TX2i/TX1 Module + TX2/TX1 Flat Heatplate)* - 3D STEP Model: **Download Here**
Video Output	1x HDMI 2.0 (Supports up to HDMI 2.0 UHD 4K [2160p] at 60Hz)
Ethernet	1x Gigabit Ethernet - 10/100/1000 BASE-T
USB	1x USB 3.0 (5Gbps, 1A Maximum Current Sourcing) 1x USB 2.0 (w/ OTG functionality)
Audio Output	HDMI Integrated
UART	2x 3.3V UART Ports - TX/RX lines only
GPIO	4-bits GPIO - 3.3V CMOS Level - Configurable as inputs or outputs
SD Card	1x microSD Card Slot - 4-bit Data - Support for SD 4.0 Specification without UHS-II
Video Inputs	Video Inputs can be accessed through any of the of the following interfaces: - USB 3.0 / 2.0 - Gigabit Ethernet
I2C	1x I2C (Master Controller) - Pullup Level: 1k ohm - Operation Speeds: 100kbit/s, 400kbit/s, 1Mbit/s, 3.4Mbit/s
Misc Interfaces	User Power Output Pins: +3.3V and +5V Fan Connection: 4-pin, +5V, PWM Capability On-board and External Button Interfaces: Reset, Power, Recovery External RTC Battery Connection
Power Requirements	Input Voltage Range: +9V to +14V DC TX2i Module Consumption: 20W; TX2/TX1 Module Consumption: 6.5W to 15W *(dependent on CPU/GPU utilization)* Orbitty Carrier Consumption: 2W to 6W *(dependent on draw of peripheral ports)*
Temperature	TX2/TX1 Module Operating Temperature Range: -25C to +80C TX2/TX1 SoC Junction Temperature Range: -25C to +105C TX2i Module & Orbitty Carrier Operating Temperature Range: -40C to +85C
Weight	41g
Warranty and Support	1 Year Warranty and Free Support

Product Overview

Block Diagram



Connector Locations (Top Side)



Connector Summary

Designator	Connector	Description
P1	TX2/TX2i/TX1 Module Connector	NVIDIA Jetson TX2/TX2i/TX1 Module Board-to-Board Connector
P2	HDMI	HDMI 2.0 Maximum: 6Gbps, 24bpp, 4096x2160@60Hz
P4	Expansion IO Header	Expansion IO Header Interfacing to all Misc IO
P5	Gigabit Ethernet	Gigabit Ethernet 10/100/1000 BASE-T Connection
P6	Micro SD Card Slot	Micro SD Card Slot (4-bit Data, Support for SD 4.0)
P7	USB 3.0	USB 3.0 Type-A Host Connection
P8	USB OTG	USB OTG (Host Mode and Client Mode capable)
P9	Power Input	DC Power Input (+9V to +14V)

Switch Summary & Locations

Designator	Function	Description
S1	Fan / Power Control	Power Start-up Control, FAN PWM / Always ON Control
SW1	Power Button	Power Button, Press to Power ON or OFF
SW2	Reset Button	Reset Button, Press to initiate Reset Sequence
SW3	Recovery	Use to initiate a recovery mode, and flash new image via USB OTG

Detailed Feature Description

Jetson™ TX2/TX2i/TX1 Board-to-Board Connector

With the NVIDIA Jetson™ TX2, TX2i, or TX1, the processor and chipset are implemented on the Jetson™ TX2/TX2i/TX1 Module. This connects to the Orbitty Carrier via a Samtec SEARAY™ Board to Board Connector.

Function	**NVIDIA Jetson™ TX2/TX2i/TX1 Interface**
Location	P1
Type	Samtec SEARAY™ Connector
Carrier Connector	Part Number: SEAM-50-03.0-S-08-2-A-K-TR (8.0mm stacking height) Manufacturer: Samtec
Mating Connector	Part Number: SEAF-50-05-S-08-02-A-K (installed on Jetson™ TX2/TX2i/TX1) Manufacturer: Samtec
Pinout	Refer to NVIDIA's Jetson™ TX2/TX2i/TX1 System-on-Module datasheet for pinout details
Board-to-Board Standoff Height	8.0mm height M3 Standoffs Required between NVIDIA Jetson TX2/TX2i/TX1 Module and Orbitty (ASG003) Carrier

System Expansion IO Connector

The System Expansion header has numerous interfaces to connect external peripherals and IO. As well as the ability to provide external connection to the Recovery, Reset and Power Buttons. The System Expansion IO Connector also has 2 voltage output pins to allow powering of external devices.

Function	**System Connector**
Location	P4
Type	0.1” / 2.54mm Pitch IDC Header (DIL)
Carrier Connector	Part Number: TSW-110-07-L-D Manufacturer: Samtec
Mating Connector	Any IDC / DIC 0.1” Cable, Socket or Jumper Wire Assemblies

Pinout

Pin	Description	Pin	Description
1	+3.3V OUTPUT	2	+5V OUTPUT
3	UART0 TX	4	UART0 RX
5	UART1 TX	6	UART1 RX
7	GPIO-0	8	GPIO-1
9	GPIO-2	10	GPIO-3
11	I2C CLK	12	I2C SDA
13	RECOVERY	14	RTC BAT INPUT
15	RESET	16	GND
17	POWER BUTTON	18	GND
19	GND	20	GND

System Expansion IO Connector – Detailed Signal Descriptions

Signal Name	Description	Type	Pin Number(s)
+3.3V OUTPUT	**+3.3V Power Output Pin** - Max output should be limited to 1A - Please note there is no external fuse.	Output	1
+5V OUTPUT	**+5V Power Output Pin** - Max output should be limited to 1A - Please note there is no external fuse.	Output	2
UART0 TX	**UART 0 Transmit Pin** - This signal is the UART port 0 output from the TX2/TX2i/TX1 Module - This is level shifted on the Orbitty carrier to support 3.3V logic. - Under L4T this port will show up as **/dev/ttyS0**	Output 3.3V CMOS	3
UART0 RX	**UART 0 Receive Pin** - This signal is the UART channel 0 input on TX2/TX2i/TX1 Module - This is level shifted on the Orbitty carrier to support 3.3V logic. - Under L4T this port will show up as **/dev/ttyS0**	Input 3.3V CMOS	4
UART1 TX	**UART 1 Transmit Pin** - This signal is the UART channel 1 output from the TX2/TX2i/TX1 Module - This is level shifted on the Orbitty carrier to support 3.3V logic. - Under L4T this port will show up as **/dev/ttyTHS2**	Output 3.3V CMOS	5
UART1 RX	**UART 1 Receive Pin** - This signal is the UART channel 1 input on TX2/TX2i/TX1 Module - This is level shifted on the Orbitty carrier to support 3.3V logic. - Under L4T this port will show up as **/dev/ttyTHS2**	Input 3.3V CMOS	6
GPIO-[0:3]	**GPIO Bits 0 to 3** - This signal is the GPIO Bit 0 and can be configured as an Input or an Output - This is level shifted on the Orbitty carrier to support 3.3V logic. Please reference our **GPIO KDB** for TX2/TX2i/TX1 values.	Input/Output Configurable 3.3V CMOS	7,8,9,10
I2C CLK	**I2C Clock Signal** - This is clock signal on the I2C bus - This signal has a pull up on the TX2/TX2i/TX1 module to +3.3V - Under L4T this is I2C bus # 1	Output +3.3V Open Drain	11
I2C SDA	**I2C Data Signal** - This is data signal on the I2C bus - This signal has a pull up on the TX2/TX2i/TX1 module to +3.3V - Under L4T this is I2C bus # 1	Bidirectional +3.3V Open Drain	12

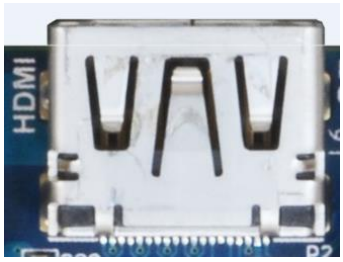
RECOVERY	**System Recovery Pin** - Shorting this signal to Ground will initialize a system recovery procedure	Input	13
RTC BAT INPUT	**RTC Battery Input** - Use this pin to connect a backup battery source (Coin Cell or other) to sustain the RTC clock on the TX2/TX2i/TX1 module. - The voltage should be provided from a 3V source	Input	14
RESET	**External Reset Button Source** - Pulse / Short this signal to GND to initiate a reset sequence	Input	15
POWER BUTTON	**External Power Button Source** - Pulse / Short this signal to GND to initiate a power sequence	Input	17
GND	**Ground / Reference Connection** - This pin is connected to the Orbitty Carrier's main digital ground connection - Use this pin as a reference/return for any externally connected peripherals to the Expansion IO Connector	Reference	16,18,19,20

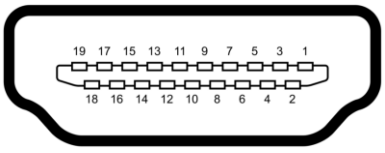
HDMI Connector

Function	**HDMI Connector**
Location	P2
Type	HDMI Type-A Connector (Female)
Carrier Connector	Part Number: A35071TR-ND Manufacturer: TE Connectivity
Mating Connector	Any HDMI Type-A Cable Assembly

Pinout

Pin	Description	Pin	Description
1	TMDS Data2+	2	TMDS Data2 GND
3	TMDS Data2-	4	TMDS Data1+
5	TMDS Data1 GND	6	TMDS Data1-
7	TMDS Data0+	8	TMDS Data0 GND
9	TMDS Data0-	10	TMDS Clock+
11	TMDS Clock GND	12	TMDS Clock-
13	CEC	14	No Connect
15	DDC clock	16	DDC data
17	DDC GND	18	+5V Power
19	Hot Plug Detect		





NVIDIA Jetson TX2/TX2i/TX1 Fan

Function	**NVIDIA Jetson TX2/TX2i/TX1 Fan Control**
Location	P4
Type	Molex PicoBlade Header
Carrier Connector	Part Number: 53261-0471 Manufacturer: Molex
Mating Connector	Part Number: 51021-0400 Manufacturer: Molex
Pinout	

Pin	Description
1	GND
2	+5V
3	TACH
4	PWM

NOTE: Please note that Fan PWM (speed control) is NOT natively supported by the stock L4T builds.

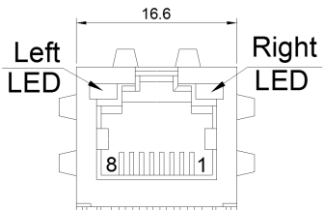
If users wish to use the native builds you must enable the S1 DIP Switch to put the Fan into the Always ON mode.

To enable PWM functionality (speed control) users must deploy CTI-L4T BSP and enable the S1 DIP Switch to put the Fan into the PWM Enabled mode.

10/100/1000 Ethernet (GBE)

Function	**Gigabit Ethernet Connector**
Location	P5
Type	RJ-45 8p8c
Carrier Connector	Part Number: 1RJMG14-220LNL Manufacturer: Unicom
Mating Connector	Any RJ-45 Plug with Cat5, Cat5e, Cat6 Type Cabling
Pinout	

Pin	Description	Pin	Description
1	TP0+	2	TP0-
3	TP1+	4	TP2+
5	TP2-	6	TP1-
7	TP3+	8	TP3-

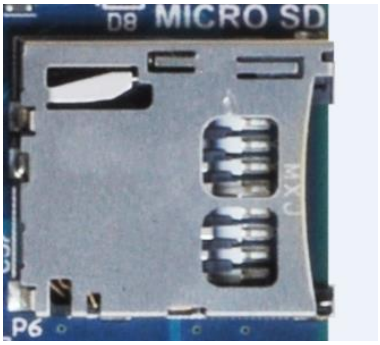


microSD Card Slot

Function	**microSD Card Slot**
Location	P7
Type	Molex microSD Memory Card Connector
Carrier Connector	502570-0893

Pinout

Pin	Description	Pin	Description
1	SDIO_DATA2	2	SDIO_DATA3
3	SDIO_CMD	4	SDIO_VCC
5	SDIO_CLK	6	GND
7	SDIO_DATA0	8	SDIO_DATA1
9	GND	10	SDIO_CD



USB 3.0

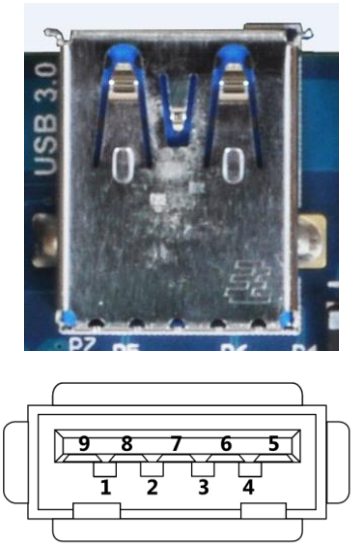
The Orbitty Carrier provides one external USB 3.0 Port with an integrated USB 2.0 Port. The USB 3.0 signals are sourced directly from the Jetson TX2/TX2i/TX1 Module. Over current protection, power supply filtering and ESD protection is provided on-board. The current limit on this port is set to 1A, if more current capacity is required please contact sales@connecttech.com

NOTE: Please note that USB3.0 support is NOT natively supported by the stock L4T builds. For USB3.0 support users must deploy CTI-L4T BSP

Function	**USB 3.0**
Location	P7
Type	USB 3.0 Type-A
Carrier Connector	Part Number: 1932258-1 Manufacturer: TE Connectivity
Mating Connector	Any USB 3.0 Type-A Cable

Pinout

Pin	Description	Pin	Description
1	VBUS	2	USB 2.0 D-
3	USB 2.0 D+	4	GND
5	SSRX-	6	SSRX+
7	GND	8	SSTX-
9	SSTX+		

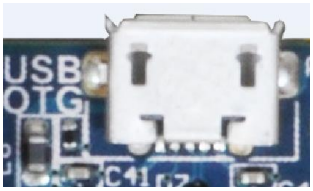


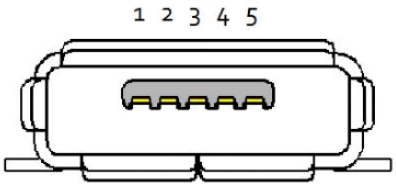
USB OTG

Function	**USB OTG**
Location	P8
Type	USB 2.0 Micro-AB
Carrier Connector	Part Number: 47589-0001 Manufacturer: Molex
Mating Connector	Any USB 2.0 Micro A or Micro B or Cable

Pinout

Pin	Description	Pin	Description
1	VBUS	2	USB 2.0 D-
3	USB 2.0 D+	4	USB ID
5	GND		





USB OTG – Host Mode

To put the USB OTG port into HOST mode, the USB ID pin needs to be left floating. Most USB Micro-A to Type-A (Female) cables will do this internally.

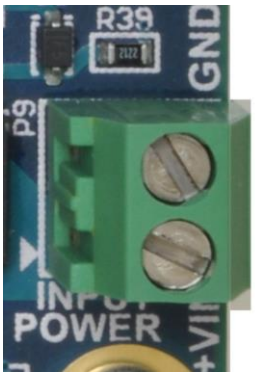
USB OTG – Client Mode (Used for Image Flashing)

To put the USB OTG port into CLIENT mode, the USB ID pin needs to be tied to GND. Most USB Micro-B cables will do this internally. Once in Client mode this port can then be connected to a Host PC. This is required for software image flashing. Please see the Software Section of this manual for more details.

Input Power

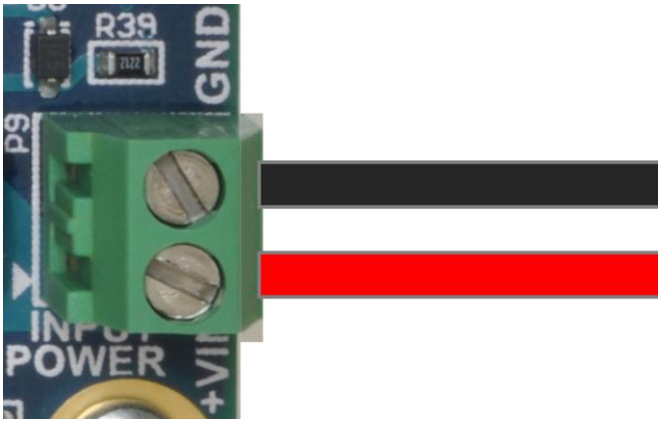
The Orbitty Carrier accepts a single power input to power all on-board devices.
A power input range of **+9V to +14V** is recommended.

Function	**Input Power**
Location	P9
Type	3.5mm Pitch Wire-to-Board Screw Terminal
P/N	Texas Instruments 1546551-2
Mating	Stripped and Tinned 8-22 AWG Wire
Cable	MSG064, MSG072
Pinout	**Pin** / **Description** 1 / +VIN 2 / GND



Input Power - Wiring

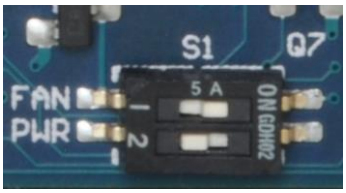
The positive wire should be connected to the +VIN terminal, and the negative wire should be connected to the GND terminal.



Switch Details

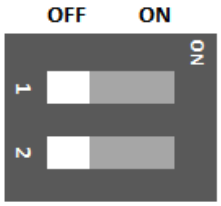
DIP Switch Details (S1)

The Orbitty Carrier has a 2 position DIP switch block which controls the PWM Fan Control and the main Power-up / Start-up Control.



Position No.	Position Description	Switch ON	Switch OFF
1	PWM Fan Control	FAN PWM Enabled (SW Controlled)	FAN Always ON
2	Power-Up / Start-up Control	"AT Mode" - Automatic Start-up Enabled	"ATX Mode" - Power Button Press Required

S1 Usage Examples



Fan Always ON

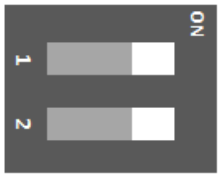
"ATX Mode" - Power Button Press Required

FAN PWM Enabled (SW Controlled)

"ATX Mode" - Power Button Press Required

Fan Always ON

"AT Mode" - Automatic Start-up Enabled

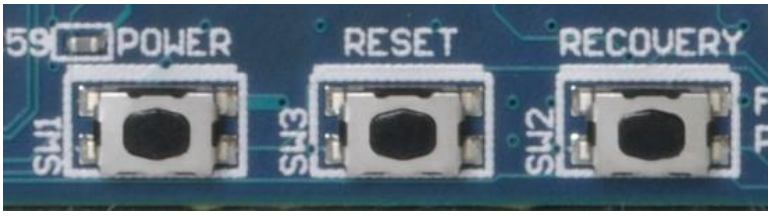


FAN PWM Enabled (SW Controlled)

"AT Mode" - Automatic Start-up Enabled

Push Button Details (SW1, SW2, SW3)

The Orbitty Carrier has a 3 tactile push buttons - Power (SW1), RESET (SW3) and RECOVERY (SW2).

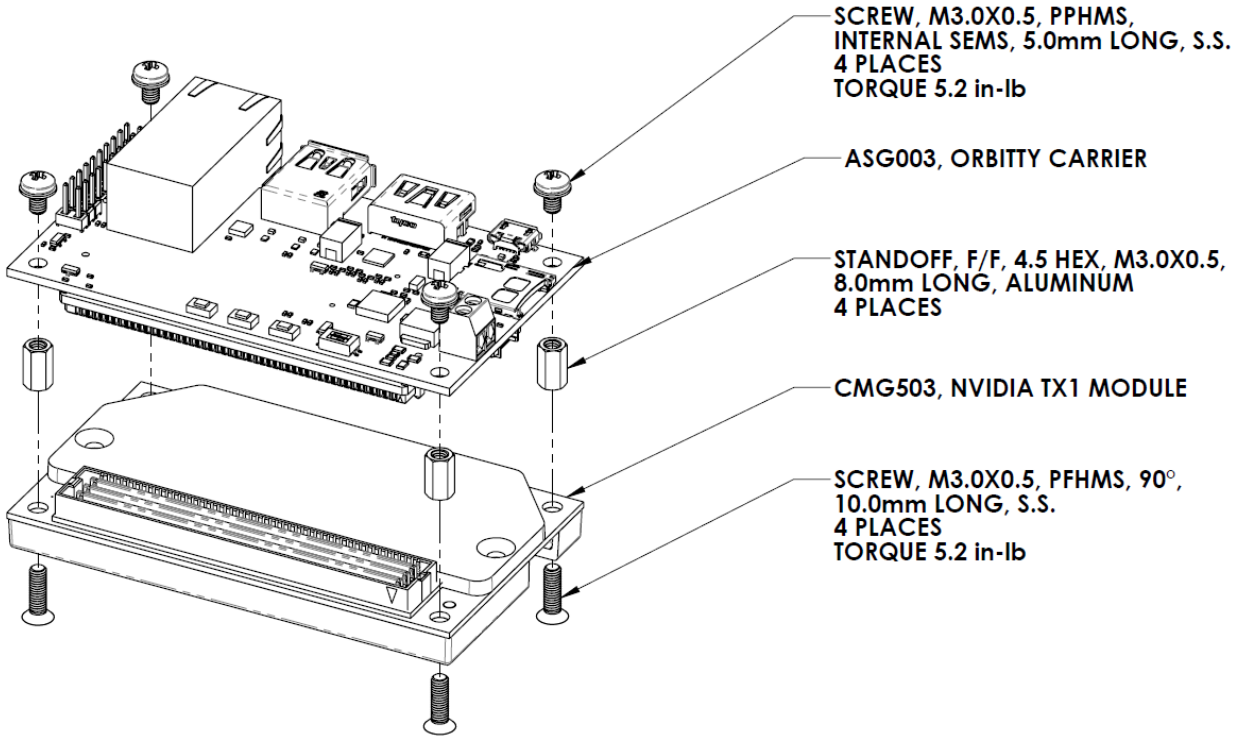


Switch Designator	Description
SW1	**Power Button** - When Orbitty is in "ATX Mode" a button press will initiate boot-up sequence - When Orbitty is ON, a button press will initiate a power down sequence in the Operating System - When Orbitty is ON and button is held for 5 seconds the system will do a hard power off (power down ungracefully) **Note:** Due to the changes done to the PMIC circuitry of the TX2i Jetson Module the Orbitty Carrier will always remain ON when in AT (Automatic Power ON) and ATX (Push Power button) modes. This will cause the Orbitty Carrier to automatically power ON when voltage is applied to the system. The system will in addition be unable to shut down in software (Soft Shutdown), due to the characteristics of the TX2i power circuitry as such the system will perform a Reset/Reboot function.
SW3	**Reset Button** - When button is pressed the system will initiate a Reset sequence
SW2	**Recovery Button** - Use this button to perform the Force Recovery Procedure detailed in the Software Section of this manual. - This is required when flashing a new image onto the TX2/TX2i/TX1 module via the USB OTB port.

Typical Installation

1. Ensure all external system power supplies are off.

2. Install the Jetson TX2/TX2i/TX1 Module onto the Orbitty Carrier as shown below:

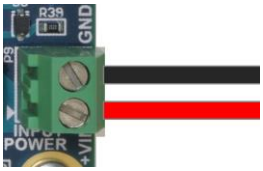


3. Install the necessary cables for application. At a minimum these would include:

   a) HDMI video display cable
   b) Keyboard and mouse via USB

For additional information on the relevant cables, please see the Cables and Interconnects section of this manual.

4. Connect the main power input to the Wire-to-Board Screw Terminal on board as shown below: +9V to +14V to the +VIN terminal and Ground to the GND terminal.



5. Switch ON the Power Supply. DO NOT power up your system by plugging in live power.

Power Supply

Connect Tech offers 12V 2A power supplies preconfigured for the ASG003. It is supplied by a standard AC line cord and has a cable length of approximately 1.5m. Contact our sales department about the **MSG064 or MSG072** for more details.

Please visit http://connecttech.com/cables for drawings.

On-Board Indicator LED's

The Orbitty Carrier has 2 on-board indicator LEDs.

LED Designator	Description
D11	**Power Good Indicator** - If this LED is ON, this indicates that all on-board power supplies are ON and at the proper level.
D2	**System Status Indicator** - If this LED is ON, it indicates the TX2/TX2i/TX1 module has powered ON.

Current Consumption Details

Below are the maximum ratings of the Orbitty Carrier.

Theoretical Maximum	Amps	Watts
Theoretical absolute maximum total draw of all functionality on the board	1.75	21

Below are measurements taken with the Orbitty Carrier running in various configurations. Some values will change depending on what operation or software is installed. Please refer to the module manufacturer's manual for full details on the current consumption of the particular module you are using.

All measurements below are used with +12V applied to the Input Power Connector.

Actual Measurements	Amps	Watts
Orbitty Carrier standalone no module installed, powered ON, with no loads	0.03	0.36
Module Installed, Ubuntu in headless mode, remote operation over serial console	0.12	1.44
Module Installed, single HDMI video output, Keyboard, Mouse and Ethernet connected. System sitting at Ubuntu Desktop (GUI) in idle operation	0.20	2.4
Module Installed, single HDMI video output, USB 3.0 Camera Connected, USB OTG connected with a Keyboard, and system running cpu stress test and glxgears GPU test	0.71	8.52

Software / BSP Details

All Connect Tech NVIDIA Jetson TX2/TX2i/TX1 based products are built upon a modified Linux for Tegra (L4T) Device Tree that is specific to each CTI product.

WARNING: The hardware configurations of CTI's products differ from that of the NVIDIA supplied evaluation kit. Please review the product documentation and install ONLY the appropriate CTI L4T BSPs. Failure to follow this process could result in non-functional hardware.

Connect Tech's Custom L4T BSP (CTI-L4T)

Connect Tech also offers a custom BSP to add in additional peripheral support on CTI's Jetson Carrier Boards. In the case of the Orbitty Carrier Board the CTI-L4T will expose software control of most of the carrier interfaces including USB3.0, and more.

The CTI-L4T can be downloaded directly from Connect Tech here:

http://www.connecttech.com/jetson

NVIDIA Jetpack for L4T

The Jetpack for L4T is an on-demand all-in-one package that bundles and installs all software tools required to develop for the NVIDIA's TX2/TX2i/TX1 Platform with Connect Tech's TX2/TX2i/TX1 Carrier Boards. Jetpack includes host and target development tools, APIs and packages (OS images, tools, APIs, middleware, samples, documentation including compiling samples) to enable developers to jump start their development environment for developing with the Jetson Embedded Platform. The latest release of Jetpack runs on an Ubuntu Linux 64-bit host system and supports both the latest Jetson TX2/TX2i/TX1 Development Kit and Jetson TK1 Development Kit.

NVIDIA's Jetpack can be downloaded directly from NVIDIA here:

https://developer.nvidia.com/embedded/jetpack

Force Recovery Mode

To update your system, you will need to be in Force USB Recovery Mode so you can transfer system software to the developer board. When in Force USB Recovery Mode, you are able to update system software and write the boot loader, boot configuration table (BCT), and partition configuration to the device.

See the Platform Software documentation for OS specific instructions when updating system software on your developer board.

CAUTION: ALWAYS CONNECT ALL EXTERNAL PERIPHERAL DEVICES BEFORE CONNECTING THE INPUT POWER SUPPLY

Connecting a device while powered on may damage the Orbitty Carrier or peripheral device.

Procedure to place system in Force USB Recovery Mode:

1) Power OFF the Orbitty. The Orbitty MUST be powered OFF, and not in a suspend or sleep state.

2) Use a USB Micro-B to USB Type-A Cable. Plug the Micro-B end into the Orbitty USB OTG port. Plug the USB Type-A end into a host PC.

3) Power ON the Orbitty.

4) (Press and release the POWER button, if necessary) Press and hold the RECOVERY button; while depressing the RECOVERY button, press and release the RESET button; wait two seconds and release the RECOVERY button.

Note: When in Force USB Recovery Mode, the development system will not boot up (nothing appears on display or serial port).

After successfully updating the system software and restarting your developer board, the system will continue through the boot up process.

Thermal Details

The Orbitty Carrier Board has an Operating Temperature Range of -40°C to +85°C.

However, it is important to note that the NVIDIA Jetson TX2 and TX1 Modules have its own properties separate to that of the Orbitty Carrier Board. The NVIDIA Jetson TX2i matches the Orbitty Operating Temperature Range of -40°C to +85°C.

Customer responsibility requires proper implementation of a thermal solution that maintains the TX2/TX2i/TX1 SoC and Thermal Transfer Plate (TTP) temperatures below the specified temperatures (shown in the tables below) under the maximum thermal load and system conditions for their use case.

Jetson TX2i Thermal Specifications

Parameter	Value	Units
Maximum TTP operating temperature	85	°C
Recommended Tegra X2 operating temperature limit	T.cpu = 95.5	°C
	T.gpu = 95.5	°C
Tegra X2 maximum operating temperature limit	T.cpu = 101	°C
	T.gpu = 101	°C
	T.diode = 110	°C

Jetson TX2/TX1 Thermal Specifications

Parameter	Value	Units
Maximum TTP operating temperature	80	°C
Recommended Tegra X2 operating temperature limit	T.cpu = 95.5	°C
	T.gpu = 93.5	°C
Tegra X2 maximum operating temperature limit	T.cpu = 101	°C
	T.gpu = 101	°C

NVIDIA provides complete Thermal Design Guides, which include all of the information required to implement a complete thermal solution for the Jetson TX2, TX2i or TX1 Module. The Thermal Design Guides can be downloaded here:

Jetson TX2i:
http://developer.nvidia.com/embedded/dlc/jetson-tx2i-thermal-design-guide

Jetson TX2/TX1:
http://developer.nvidia.com/embedded/dlc/jetson-tx2-thermal-design-guide

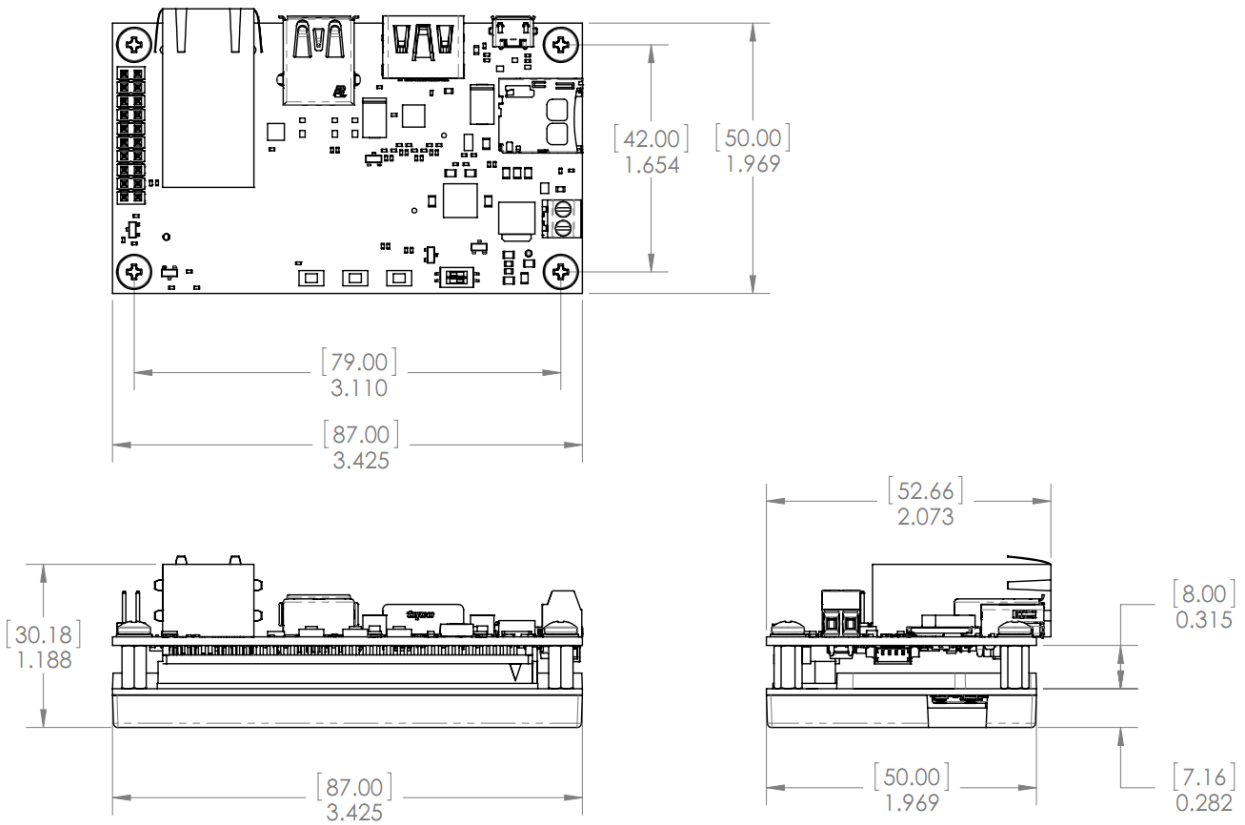
Mechanical Details

3D STEP Model

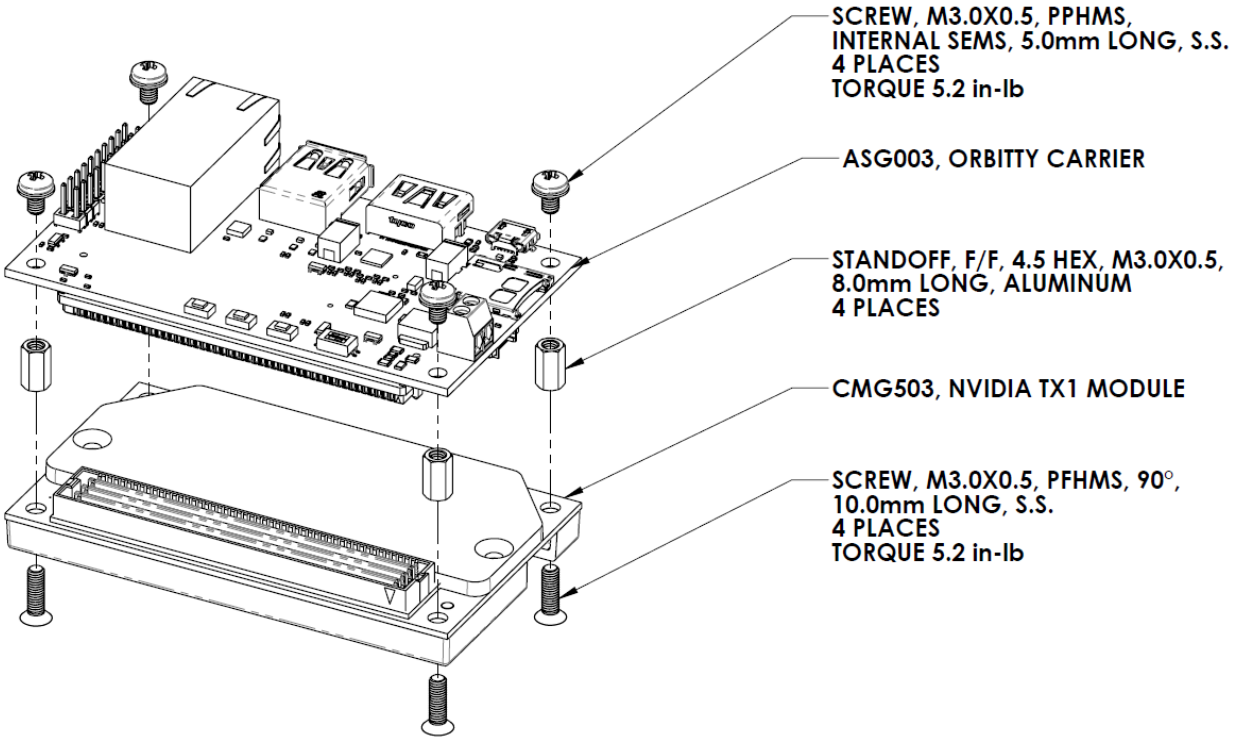
A complete **3D STEP Model** file of the Orbitty Carrier can be downloaded here:

http://www.connecttech.com/ftp/3d_models/ASG003_3D_MODEL.zip

2D Dimensions Drawing



Stack-up Drawing



Cables

The Orbitty Carrier does not require any special external I/O cables.
Standard USB, HDMI and Ethernet Cabling can be used.

Connect Tech offers 12V 2A power supplies preconfigured for the ASG003. It is supplied by a standard AC line cord and has a cable length of approximately 1.5m. Contact our sales department about the **MSG064 or MSG072** for more details.

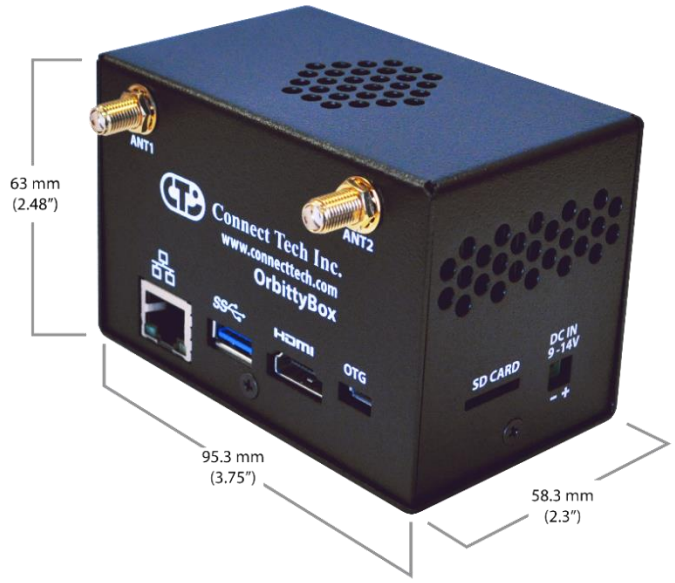
MSG064 Drawing

OrbittyBox Enclosure – ENC001

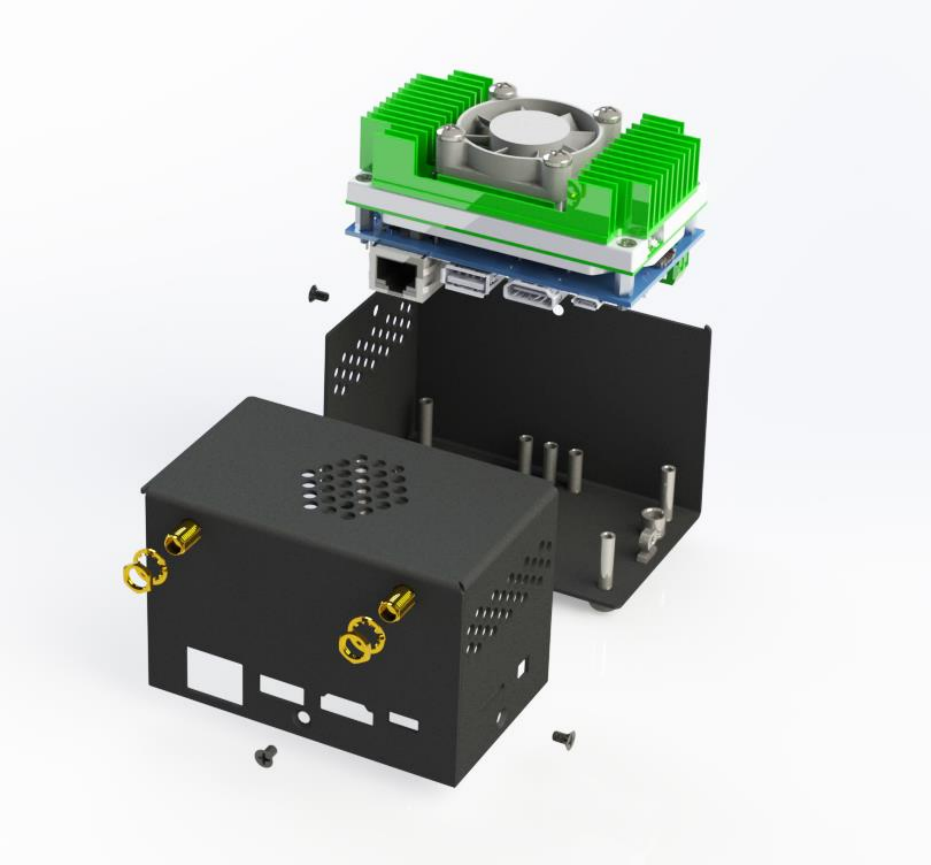
Connect Tech's OrbittyBox easily turns the Orbitty carrier into a complete packaged NVIDIA® Jetson™ TX2/Jetson TX1 system. This two-piece metal enclosure is designed to house an Orbitty Carrier, NVIDIA® Jetson™ TX2 or Jetson TX1 module, and Connect Tech's active heat sink. The enclosure is sold as an accessory, allowing it to be integrated with existing customer product. Two-piece construction for ease of installation and assembly.

Specifications

Feature	OrbittyBox
Compatibility	NVIDIA Jetson TX2 or TX1
Enclosure	2-Piece Metal Enclosure
Dimensions	95.3mm x 63mm x 58.3mm (3.75" x 2.48" x 2.30") (WxHxD)
Weight	Enclosure + Fasteners – 113g (0.25lb) (Orbitty, Module, Heat Sink – 204g [0.45lb])
Antenna	Optional 2x SMA Antenna Connectors

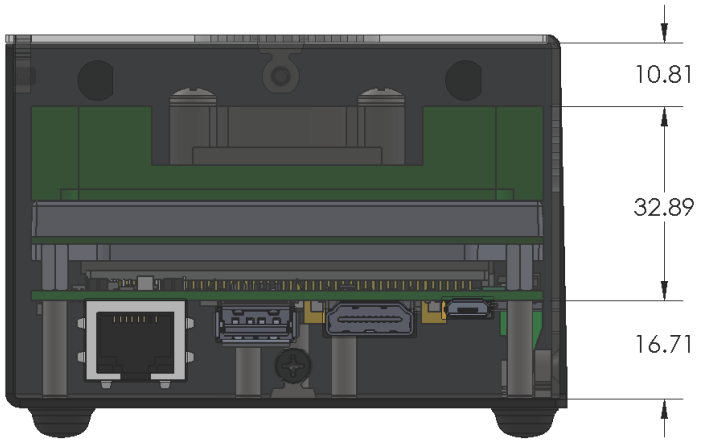


OrbittyBox Enclosure - Assembly Instructions



Assembly Instructions: Follow **this link** for assembly instructions for the OrbittyBox.

Internal Heights Drawing



Related Part Numbers

Product Name	Part Number
OrbittyBox	ENC001
Orbitty Carrier Board	ASG003
NVIDIA® Jetson™ TX2	CMG503-21
NVIDIA® Jetson™ TX1	CMG503
Active Heat Sink	XHG302
Passive Heat Sink	XHG301
SMA Cable – Female, U.FL	CBG225
MSG066	Dual Band Antenna

* All products sold separately