



**Connect Tech Inc.**  
Embedded Computing Experts

[www.connecttech.com](http://www.connecttech.com)

# USERS GUIDE

## Spacely Carrier for NVIDIA® Jetson™ TX2/TX2i/TX1 Users Guide



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## 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

#### Mail/Courier

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42 Arrow Road  
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#### Email/Internet

[sales@connecttech.com](mailto:sales@connecttech.com)  
[support@connecttech.com](mailto:support@connecttech.com)  
[www.connecttech.com](http://www.connecttech.com)

#### Note:

Please go to the [Connect Tech Resource Center](#) for product manuals, installation guides, device driver software, 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 Spacely 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.

## Copyright Notice

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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	2017-03-10	Initial Release
0.01	2017-03-23	Updated Block Diagram
0.02	2017-07-11	Updated image, added cable drawing links
0.03	2017-08-09	Additional Info Added
0.04	2017-08-09	Mechanical Added
0.05	2017-08-10	Software/Switch info added
0.06	2017-08-29	Fan connector info added
0.07	2017-12-06	PSU info added
0.08	2017-12-06	USB and GPIO info edit
0.09	2018-01-11	Revised cable information
0.10	2018-03-08	Added GPIO KDB link
0.11	2018-03-26	Further GPIO info added
0.12	2018-05-16	SIM Info Added
0.13	2018-07-30	Added TX2i compatibility
0.14	2018-11-13	Updated Cables

## Introduction

Connect Tech's Spacely Carrier for NVIDIA® Jetson™ TX2/TX2i/TX1 is an ideal product for unmanned vehicle applications, or any application where situational awareness is critical. Spacely enables users to simultaneously connect up to 6 MIPI CSI-2 cameras as well as offering built-in expansion for a GPS/GNSS module.

This carrier includes a multi-I/O port specifically designed to allow easy connection to OEM Autopilots such as the Pixhawk. Other onboard interconnects include 2x GbE, 1x HDMI, USB 3.0, USB 2.0, USB CLIENT, as well as miniPCIe and mSATA expansion.

## Product Features and Specifications

Specifications	
<b>Module Compatibility</b>	NVIDIA® Jetson™ TX2, Jetson™ TX2i and Jetson™ TX1
<b>PCB Size / Overall Size</b>	125mm x 95mm (4.92" x 3.74")
<b>Display</b>	1x HDMI
<b>Camera Inputs</b>	6 x2 Lane MIPI CSI-2or 3 x4 Lane MIPI CSI-2
<b>Ethernet</b>	2x Gigabit Ethernet (10/100/1000)
<b>USB</b>	2x Micro USB 3.0 (Integrated USB 2.0) 2x USB 2.0 1x USB CLIENT 1x USB 2.0 to Mini-PCIe Slot
<b>SATA</b>	1x mSATA Full Size
<b>Audio</b>	HDMI Integrated
<b>Serial</b>	2x 3.3V from Jetson UART0 and UART1
<b>Mini-PCIe</b>	1x Mini-PCIe (PCIe & USB 2.0)
<b>SD Card</b>	1x microSD Card Slot
<b>CAN Bus</b>	1x CAN 2.b Port
<b>Optional Sensor</b>	1x GPS/GNSS Module (optional)
<b>Misc.</b>	1x I2C Link (+3.3V I/O) 1x SPI Channel (+3.3V I/O) 16x GPIO (3.3V level shifted) System Control
<b>Power Requirements</b>	+12V to +22V DC Input
<b>Operating Temperature</b>	-40°C to +85°C
<b>Weight</b>	90.7grams (0.2lbs)
<b>Accessories</b>	Cable Kit
<b>Warranty and Support</b>	1 Year Warranty and Free Support



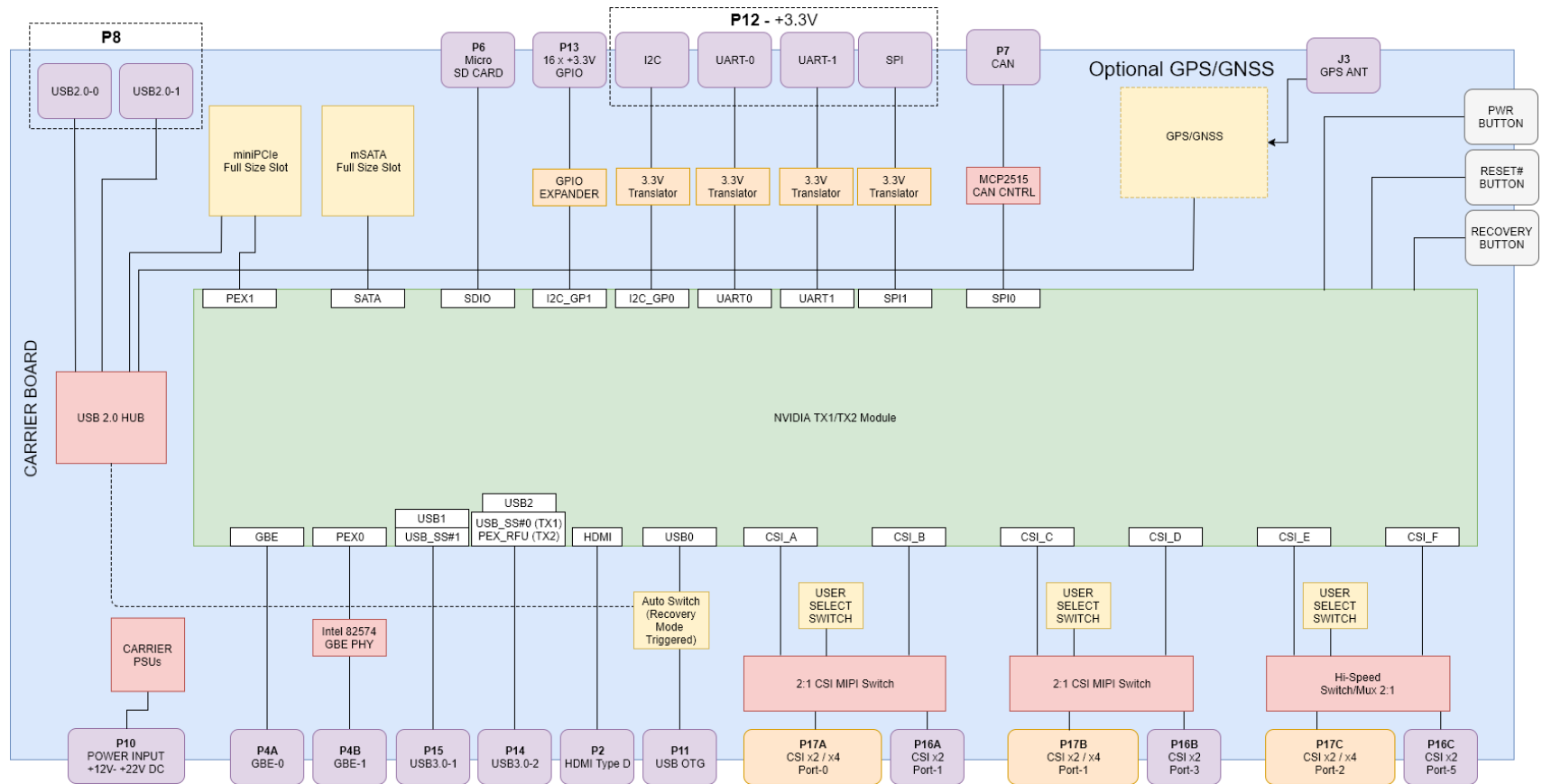
## Part Numbers / Ordering Information

Part Number	
ASG006	Spacely Carrier for NVIDIA® Jetson™ TX2/TX2i/TX1
ASG009	Spacely Carrier for NVIDIA® Jetson™ TX2/TX2i/TX1 with 3D Sensors and GNSS

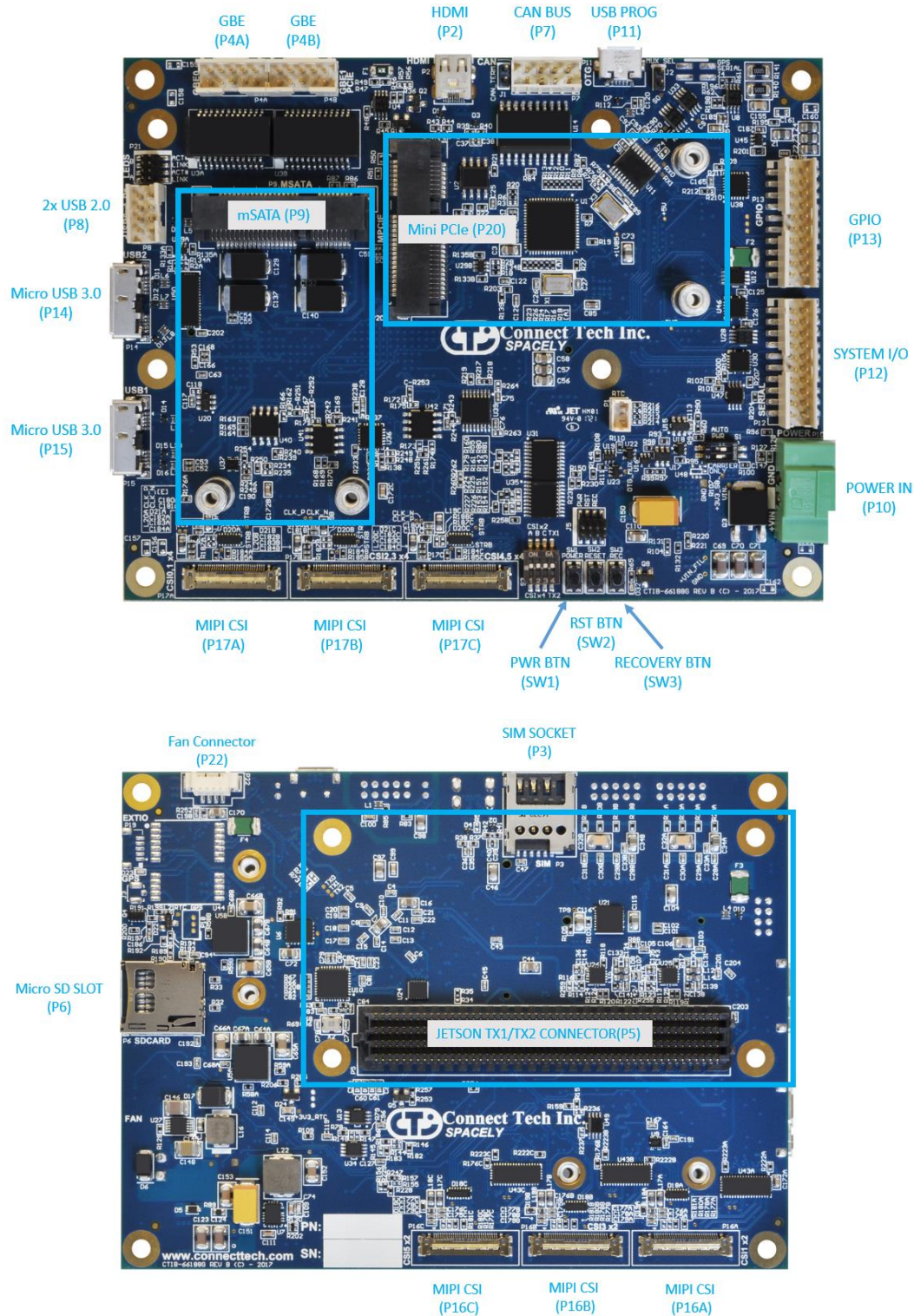


## Product Overview

### Block Diagram



## Connector Summary & Locations





Designator	Description
P2	HDMI Right Angle Type D (Micro) Connector
P3	Mini-PCIe SIM Card Slot
P4A/B	Ethernet Connector (10/100/1000)
P5	NVIDIA Jetson Module Connector
P6	MicroSD Card Slot
P7	1x CAN Port Connector
P8	2x USB 2.0 Ports
P9	mSATA Full Sized Slot
P10	+12V to +22V DC Power Input
P11	USB 2.0 Link 0 OTG Micro-AB Connector
P12	System I/O including UART and I2C signals
P13	GPIO Connector
P14	Micro USB 3.0 Link 1
P15	Micro USB 3.0 Link 0
P16A/B/C	2 Lane CSI Connector (PEX Micro Coax)
P17A/B/C	2/4 Lane CSI Connector (PEX Micro Coax)
P20	Mini-PCIe Full Sized Slot
P22	Fan Connector

## DIP Switch and Button Summary & Locations

Designator	Description
SW1	Push button to turn on system
SW2	Push button to reset system
SW3	Push button to place Jetson into force recovery
S1-A	When ON, removes the need to push the power button to turn on the system
S1-B	Used for Factory Test (Leave OFF)
S3-A	Selects 2 or 4 Lane CSI to P17A
S3-B	Selects 2 or 4 Lane CSI to P17B
S3-C	Selects 2 or 4 Lane CSI to P17C
S3-D	TX2/TX2i/TX1 Compatibility mode

## On-Board Indicator LED's

LED	Description
D32	All Power OK

## Typical Installation

1. Ensure all external system power supplies are off.
2. Install the Jetson Module onto the Samtec SEARAY Connector. Be sure to follow the manufacturer's directions for proper installation of mounting hardware, heatsink/heatspreader, and any other applicable requirements from the manufacturer.
3. Install the necessary cables for application. At a minimum these would include:
  - a) Power cable to the input power connector
  - b) HDMI video display cable
  - c) 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 Power Cable to the Power Supply
5. Switch ON the Power Supply. DO NOT power up your system by plugging in live power.

## Detailed Feature Description

### Jetson™ Board-to-Board Connector

With the NVIDIA® Jetson™ the processor and chipset are implemented on the Jetson™ Module. This connects to the Elroy Carrier via a Samtec SEARAY™ Board to Board Connector.

<b>Function</b>	<b>NVIDIA Jetson™ Interface</b>	
<b>Location</b>	P5	
<b>Type</b>	Samtec SEARAY™ Connector	
<b>Carrier Connector P/N</b>	SEAM-50-03.5-S-08-2-A-K-TR (8.0mm stacking height) Manufacturer: Samtec	
<b>Mating Connector P/N</b>	SEAF-50-05-S-08-02-A-K (installed on Jetson™) Manufacturer: Samtec	
<b>Pinout</b>	Refer to NVIDIA's Jetson™ TX2/TX2i/TX1 System-on-Module datasheet for pinout details	
<b>Standoffs</b>	8.0mm Standoffs Required between NVIDIA Jetson Module and Spacely (ASG006/ASG009) Carrier	

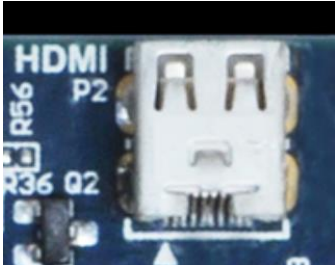
### Programming Micro USB 2.0 Connector

<b>Function</b>	<b>Micro USB Connector</b>				
<b>Location</b>	P2				
<b>Type</b>	Micro USB 2.0 Type AB				
<b>Cable</b>	OEM Micro USB cable				
<b>Pinout</b>	<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>	
	1	NC	2	USB_D--	
	3	USB_D+	4	OTG_ID	
	5	GND			
	<p><b>Note:</b> This port is client-only, and is only active when carrier is in recovery/programming mode</p>				




## HDMI Connector

<b>Function</b>	HDMI Connector			
<b>Location</b>	P2			
<b>Type</b>	HDMI Type D			
<b>Cable</b>	OEM HDMI Type D ('micro HDMI') cable			
<b>Pinout</b>	<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>
	1	Hot Plug Detect	11	TMDS0-
	2	NC	12	TMDS CLK+
	3	TMDS2+	13	GND
	4	GND	14	TMDS CLK-
	5	TMDS2	15	CEC
	6	TMDS1+	16	GND
	7	GND	17	DDC CLK
	8	TMDS1-	18	DDC DATA
	9	TMDS0+	19	+5V
	10	GND		



## USB 3.0 Connectors

<b>Function</b>	USB 3.0 Connectivity		
<b>Location</b>	P14, P15		
<b>Type</b>	USB MICRO AB		
<b>P/N</b>	20525-030E-02C		
<b>Pinout</b>	<b>Pin</b>	<b>Description</b>	<b>Type</b>
	1	VBUS	-
	2	USBD-	I/O
	3	USBD+	I/O
	4	NC	-
	5	GND	-
	6	SS0_RX-	Input
	7	SS0_RX+	Input
	8	GND	-
	9	SS0_TX-	Output
10	SS0_TX+	Output	



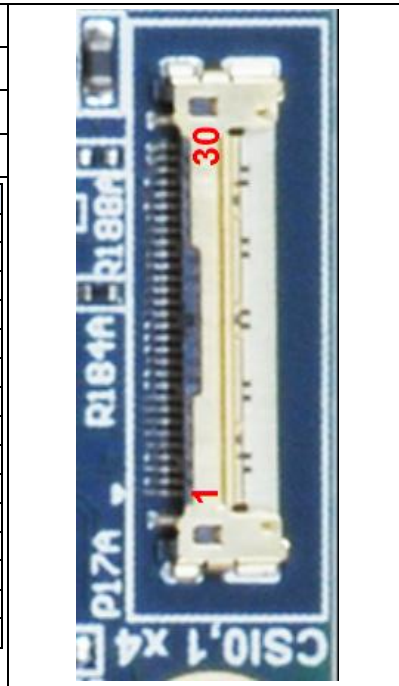
## Video Input

**NOTE:** Please note that MIPI configurations and sideband IO is NOT natively supported by the stock L4T builds. To enable full MIPI functionality users must deploy CTI-L4T BSP. Please see the software section of this document for more details.

### CSI x4 / x2 Connectors

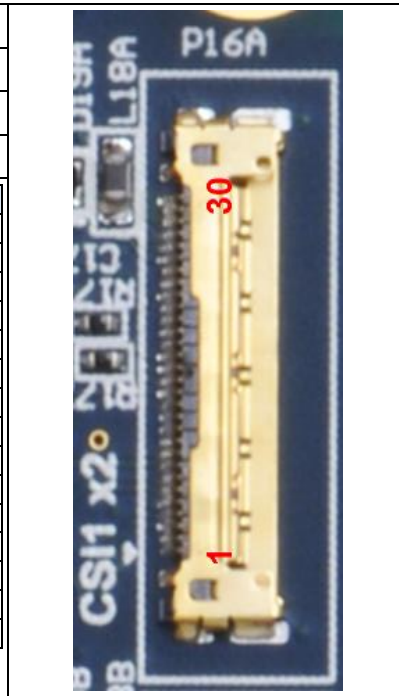
<b>Function</b>	Video Input/Camera			
<b>Location</b>	P17A, P17B, P17C			
<b>Type</b>	IPEX			
<b>P/N</b>	20525-030E-02C			
<b>Pinout</b>	<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>
	1	+3.3V	16	RST#
	2	+3.3V	17	SDA
	3	+3.3V	18	SCL
	4	+5V	19	NC
	5	NC	20	DATA2-*
	6	NC	21	DATA2+*
	7	NC	22	DATA0-
	8	NC	23	DATA0+
	9	PWR#	24	CLK-
	10	NC	25	CLK+
	11	NC	26	GND
	12	NC	27	DATA1-
	13	NC	28	DATA1+
	14	FLASH	29	DATA3-*
	15	MCLK	30	DATA3+*

\* Pins are NC in x2 mode




### CSI x2 Connectors

<b>Function</b>	Video Input/Camera			
<b>Location</b>	P16A, P16B, P16C			
<b>Type</b>	IPEX			
<b>P/N</b>	20525-030E-02C			
<b>Pinout</b>	<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>
	1	+3.3V	16	RST#
	2	+3.3V	17	SDA
	3	+3.3V	18	SCL
	4	+5V	19	NC
	5	NC	20	NC
	6	NC	21	NC
	7	NC	22	DATA0-
	8	NC	23	DATA0+
	9	PWR#	24	CLK-
	10	NC	25	CLK+
	11	NC	26	GND
	12	NC	27	DATA1-
	13	NC	28	DATA1+
	14	FLASH	29	NC
15	MCLK	30	NC	



## NVIDIA Jetson Fan

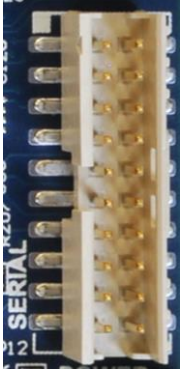
<b>Function</b>	NVIDIA Jetson Fan Control	
<b>Location</b>	P22	
<b>Type</b>	Molex PicoBlade Header	
<b>P/N</b>	53261-0471	
<b>Mating</b>	51021-0400	
<b>Pinout</b>	<b>Pin</b>	<b>Description</b>
	1	GND
	2	+5V
	3	TACH
	4	PWM



**NOTE:** Please note that FAN PWM (speed control) is NOT natively supported by the stock L4T builds. To enable PWM functionality (speed control) users must deploy CTI-L4T BSP. Please see the software section of this document for more details.

## Misc. IO Connector

<b>Function</b>	IO Connector			
<b>Location</b>	P12			
<b>Type</b>	FCI Minitek Double Row 10 x 2			
<b>P/N</b>	98424-G52-20LF			
<b>Mating</b>	10073599-020LF			
<b>Cable</b>				
<b>Pinout</b>	<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>
	1	SPI_CLK	2	UART0_TX
	3	SPI_MOSI	4	UART0_RX
	5	SPI_MISO	6	UART0_RTS#
	7	SPI_CS#	8	UART0_CTS#
	9	GND	10	GND
	11	I2C_GP0_CLK	12	UART1_TX
	13	I2C_GP0_DAT	14	UART1_RX
	15	GND	16	UART1_RTS#
	17	GPIO_IN	18	UART1_CTS#
	19	GND	20	GND





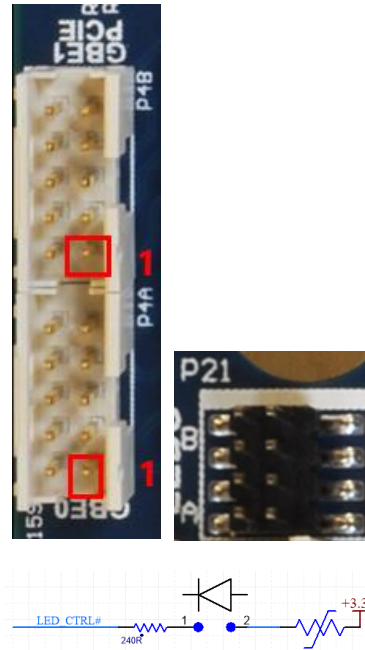
## GPIO Connector

<b>Function</b>	GPIO Connector				
<b>Location</b>	P13				
<b>Type</b>	FCI Minitek Double Row 10 x 2				
<b>P/N</b>	98424-G52-20LF				
<b>Mating</b>	10073599-020LF				
<b>Expander PN</b>	TCA9539				
<b>Pinout</b>	Pin	Description	Pin	Description	
	1	GPIO-14	2	GPIO-15	
	3	GPIO-12	4	GPIO-13	
	5	GPIO-10	6	GPIO-11	
	7	GPIO-8	8	GPIO-9	
	9	GPIO-6	10	GPIO-7	
	11	GPIO-4	12	GPIO-5	
	13	GPIO-2	14	GPIO-3	
	15	GPIO-0	16	GPIO-1	
	17	GND	18	GND	
	19	GND	20	GND	
	Please reference our <a href="#">GPIO KDB</a> for TX2/TX2i/TX1 values.				
	*Interrupts supported on Revision F and later				




## 10/100/1000 Ethernet (GBE)

<b>Function</b>	Gigabit Ethernet Connector				
<b>Location</b>	P4A/P4B				
<b>Type</b>	FCI Minitek Double Row 5 x 2				
<b>P/N</b>	98414-G06-10LF				
<b>Mating</b>	10073599-010LF				
<b>Cable</b>	CBG117				
<b>Pinout</b>	Pin	Description	Pin	Description	
	1	MX0-	2	MX0+	
	3	MX1-	4	MX1+	
	5	SHELL	6	SHELL	
	7	MX2-	8	MX2+	
	9	MX3-	10	MX3+	
	ACT#/LINK# LED connection available via header P21:				
	Pin	Description	Pin	Description	
	1	GBE1-ACT#	2	+3.3V	
	3	GBE1-LINK	4	+3.3V	
5	GBE0-ACT#(TX1) GBE0-LINK(TX2)	6	+3.3V		
7	GBE0-LINK(TX1) GBE0-ACT#(TX2)	8	+3.3V		




## Isolated CAN

<b>Function</b>	CAN port			
<b>Location</b>	P7			
<b>Type</b>	FCI Minitek Double Row 5 x 2			
<b>P/N</b>	98414-G06-10LF			
<b>Mating</b>	10073599-010LF			
<b>Cable</b>	CBG190/CBG191			
<b>Converter</b>	MPC2515			
<b>Pinout</b>	<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>
	1	CAN-	2	CAN+
	3	NC	4	NC
	5	NC	6	NC
	7	CAN-GND	8	CAN-GND
	9	CAN-GND	10	CAN-GND



## microSD Card Slot

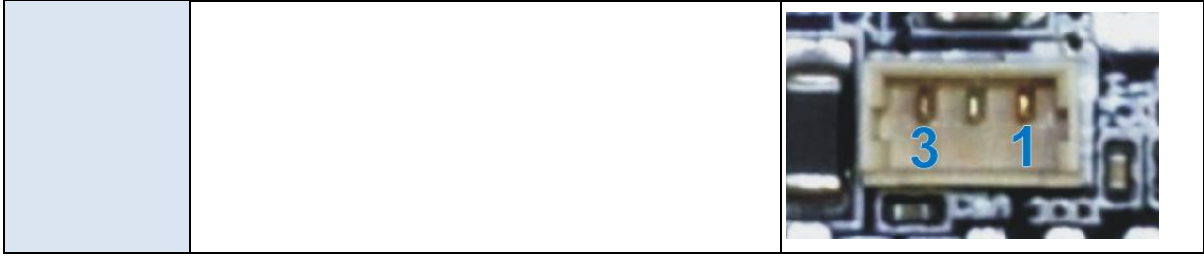
<b>Function</b>	microSD Card Slot			
<b>Location</b>	P6			
<b>Type</b>	Molex microSD Memory Card Connector			
<b>P/N</b>	502570-0893			
<b>Pinout</b>	<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>
	1	SDIO_DATA2	2	SDIO_DATA3
	3	SDIO_CMD	4	SDIO_VCC
	5	SDIO_CLK	6	GND
	7	SDIO_DATA0	8	SDIO_DATA1
	9	GND	10	SDIO_CD



## RTC Battery

The Spacely allows for an external RTC battery to be connected. This battery should be a 3V DC battery, and it will hold settings including date and time. For further information about RTC battery selection and life time estimation, see Application Note 00009: <http://connecttech.com/pdf/CTIN-00009.pdf>

<b>Function</b>	RTC Battery Connector		
<b>Location</b>	P1		
<b>Batt. Voltage</b>	+3V DC		
<b>Connector PN</b>	53047-0310 - Manufacturer: Molex		
<b>Mating PN</b>	51021-0300 - Manufacturer: Molex		
<b>Pinout</b>	<b>Pin</b>	<b>Signal</b>	<b>Description</b>
	1	+3V	RTC Battery Voltage Input
	2	NC	No Connect
	3	GND	Ground / Return



### Mini PCI Express / mSATA slots

<b>Function</b>	Mini-PCIe/mSATA Slots	
<b>Location</b>	P20, P9	
<b>Type</b>	Molex Card Edge Connector	
<b>P/N</b>	48338-0065	




Pinout	Pin	Mini-PCIe Description	mSATA Description
		1	-
	2	+3.3V	+3.3V
	3	-	-
	4	GND	GND
	5	-	-
	6	+1.5V	+1.5V
	7	CLKREQ#	-
	8	UIM_PWR*	-
	9	GND	GND
	10	UIM_DATA*	-
	11	PCIe CLK+	-
	12	UIM_CLK*	-
	13	PCIe CLK-	-
	14	UIM_RESET*	-
	15	GND	GND
	16	UIM_VPP*	-
	17	-	-
	18	GND	GND
	19	-	-
	20	W_DISABLE#	-
	21	RESV	RESV
	22	-	-
	23	PCIe RX+	SATA TX+
	24	+3.3V	+3.3V
	25	PCIe RX-	SATA TX-
	26	GND	GND
	27	GND	GND
	28	+1.5V	+1.5V
	29	GND	GND
	30	SMB_CLK	-
	31	PCIe TX-	SATA RX-
	32	SMB_DATA	-
	33	PCIe TX+	SATA RX+
	34	GND	GND
	35	GND	GND
	36	USB D- (P9 Only)	-
	37	GND	GND
	38	USB D+ (P9 Only)	-
	39	+3.3V	+3.3V
	40	GND	GND
	41	+3.3V	+3.3V
	42	-	-
	43	RESV	RESV
	44	-	-
	45	-	-
	46	-	-
	47	-	-
	48	+1.5V	+1.5V
	49	-	-
	50	GND	GND
	51	-	-
	52	+3.3V	+3.3V



\*These pins connected directly from Mini-PCIe connector to P3 SIM connector.

## USB 2.0 Ports

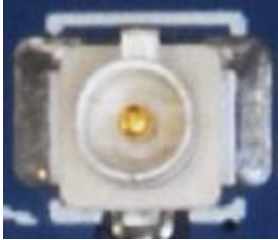
Function	USB 2.0			
Locations	P8			
Type	FCI 98414-G06-08LF, 2x4 2mm			
Cable	CBG104			
Pinout	Pin	Description	Pin	Description
	1	Port A-VBUS	2	Port B-VBUS [1]
	3	Port A-D-	4	Port B-D-
	5	Port A-D+	6	Port B-D+
	7	Port A-GND	8	Port B-GND



## GNSS / GPS Info (ASG009 ONLY)

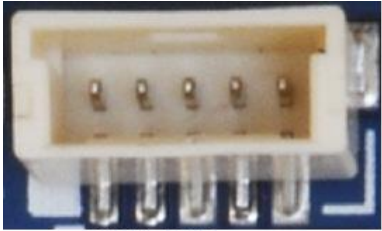
### Active Antenna Connector

Function	Active Antenna Connector
Location	J3
Connector PN	U.FL-R-SMT-1(01) - Manufacturer: Hirose
Mating Connector PN	R.FL Socket Standard CTI Cable #: CBG163

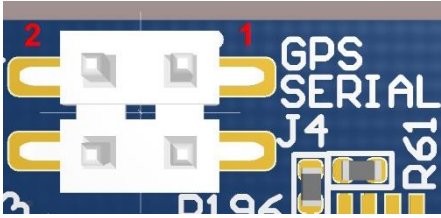


U.FL Jack

## GNSS Misc. IO Connector

<b>Function</b>	IO Connector			 <p>501331-0507</p>																	
<b>Location</b>	P19																				
<b>Type</b>	Molex Pico-Clasp																				
<b>P/N</b>	501331-0507																				
<b>Mating</b>	501330-0500																				
<b>Cable</b>	CBG162																				
<b>Pinout</b>	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>EXT_INT / WHEELTICK</td> <td>External Interrupt Input or Speed pulse input</td> </tr> <tr> <td>2</td> <td>TIMEPULSE</td> <td>Time pulse Output</td> </tr> <tr> <td>3</td> <td>FWD</td> <td>Forward/Reverse indicator</td> </tr> <tr> <td>4</td> <td>GND</td> <td>Digital Ground</td> </tr> <tr> <td>5</td> <td>EXT_BAT</td> <td>External Battery Input</td> </tr> </tbody> </table>	Pin	Signal		Description	1	EXT_INT / WHEELTICK	External Interrupt Input or Speed pulse input	2	TIMEPULSE	Time pulse Output	3	FWD	Forward/Reverse indicator	4	GND	Digital Ground	5	EXT_BAT	External Battery Input	
Pin	Signal	Description																			
1	EXT_INT / WHEELTICK	External Interrupt Input or Speed pulse input																			
2	TIMEPULSE	Time pulse Output																			
3	FWD	Forward/Reverse indicator																			
4	GND	Digital Ground																			
5	EXT_BAT	External Battery Input																			

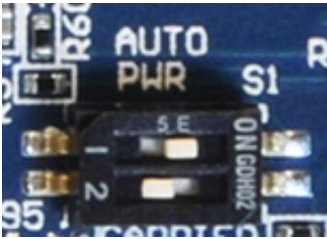
## UART Connector

<b>Function</b>	GPS_UART																		
<b>Location</b>	J4																		
<b>Connector PN</b>	TMM-102-01-L-D-SM																		
<b>Pinout</b>	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GND</td> <td>Ground</td> </tr> <tr> <td>2</td> <td>GPS_TXD</td> <td>Transmit</td> </tr> <tr> <td>3</td> <td>GND</td> <td>Ground</td> </tr> <tr> <td>4</td> <td>GPS_RX</td> <td>Receive</td> </tr> </tbody> </table>	Pin	Signal		Description	1	GND	Ground	2	GPS_TXD	Transmit	3	GND	Ground	4	GPS_RX	Receive		
Pin	Signal	Description																	
1	GND	Ground																	
2	GPS_TXD	Transmit																	
3	GND	Ground																	
4	GPS_RX	Receive																	

## Jumper/Switch Descriptions

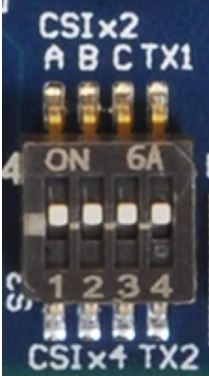
### S1 DIP Switch – Carrier Power-On

<b>Function</b>	Auto-On Feature control			
<b>Location</b>	S1			
<b>Pinout</b>	<b>Switch</b>	<b>Description</b>	<b>ON</b>	<b>OFF</b>
	S1-1	AUTO PWR	Carrier automatically powers on when VIN is applied	Carrier waits for power button press before turning ON
	S1-2	Internal Testing	Leave OFF	





### S3 DIP Switch – MIPI Control

<b>Function</b>	MIPI x2/x4 Selection, Jetson USB3.0 compatibility			
<b>Location</b>	S3			
<b>Pinout</b>	<b>Switch</b>	<b>Description</b>	<b>ON</b>	<b>OFF</b>
	S3-1	CSI 0/1 Switching	CSI-0 x2 CSI-1 x2	CSI-0 x4 CSI-1 NC
	S3-2	CSI 2/3 Switching	CSI-2 x2 CSI-3 x2	CSI-2 x4 CSI-3 NC
	S3-3	CSI 4/5 Switching	CSI-4 x2 CSI-5 x2	CSI-4 x4 CSI-5 NC
	S3-4	P15 USB3.0 MODE	TX1 Compatibility*	TX2 Compatibility*
**Must be used in conjunction with the CTI-L4T release for Spacely.				




### SW1-3 Power Control Buttons

<b>Function</b>	Power/Programing Control			
<b>Location</b>	SW1, SW2, SW3			
<b>Pinout</b>	<b>Switch</b>	<b>Description</b>		
	SW1	POWER BUTTON		
	SW2	RESET		
	SW3	RECOVERY		
Controls Also available via header J5:				
<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>	
1	GND	2	PWR_BUTTON#	
3	GND	4	RESET#	
5	GND	6	RECOVERY#	
7	NC	8	NC	



## Input Power Connector

<b>Function</b>	Input Power Connector							
<b>Location</b>	P10							
<b>Type</b>	Pluggable Terminal Contact							
<b>P/N</b>	1843790							
<b>Mating</b>	1847055 (Or equivalent) - included							
<b>Cable</b>	N/A							
<b>Pinout</b>	<table border="1"> <thead> <tr> <th>Pin</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+</td> </tr> <tr> <td>2</td> <td>GND (-)</td> </tr> </tbody> </table>		Pin	Description	1	+	2	GND (-)
	Pin	Description						
	1	+						
2	GND (-)							
Input Voltage Range: +12V to +22V DC								
								



## Thermal Details

**The Spacely 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 Spacely Carrier Board. The NVIDIA Jetson TX2i matches the Spacely 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>**

## 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 Spacely Carrier Board the CTI-L4T will expose software control of most of the carrier interfaces including GPIO, MIPI CSI-2, CAN, 2x USB3.0, Mini-PCIE and more.

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

<http://www.connecttech.com/jetson>

### NVIDIA Jetpack for L4T

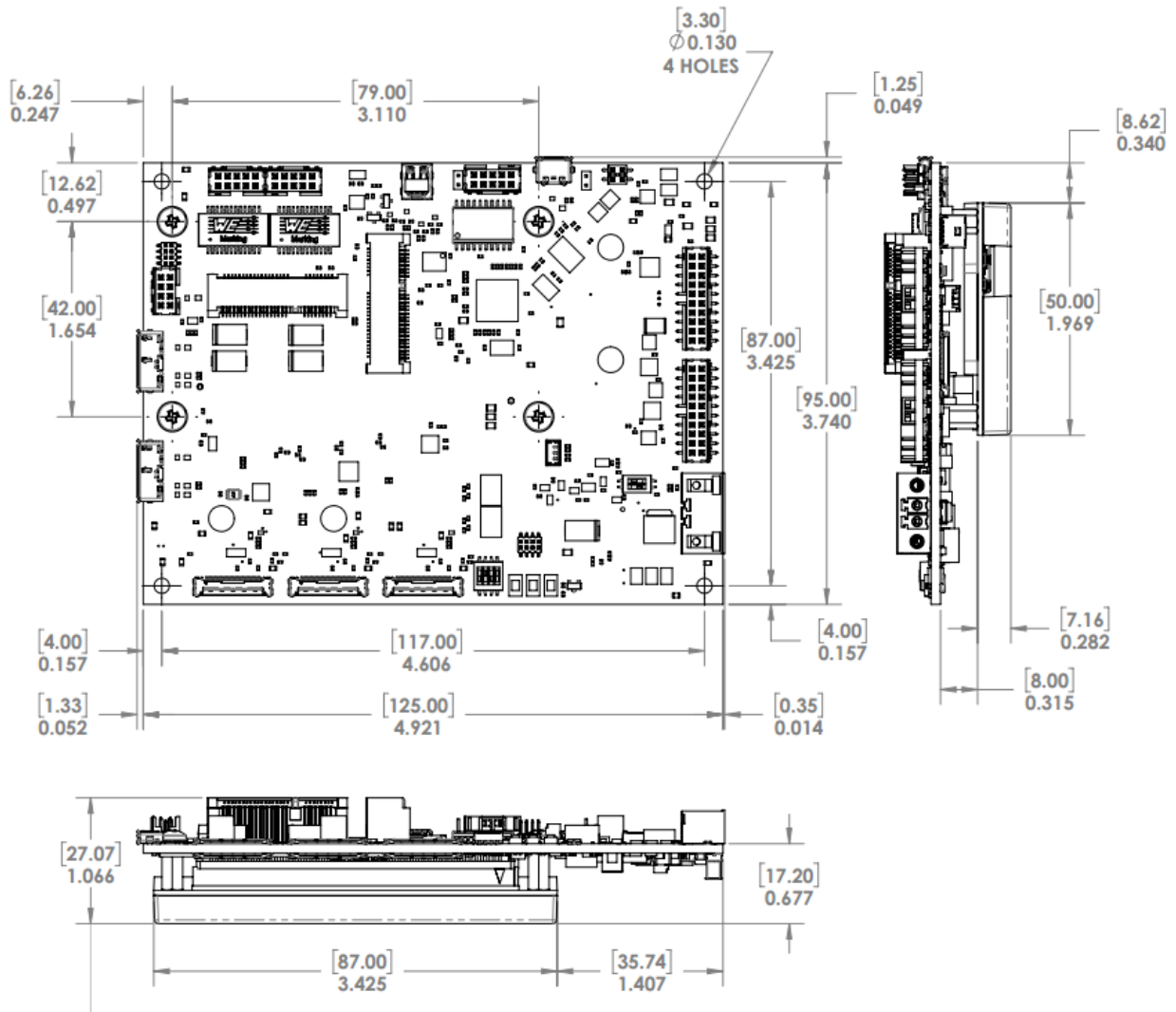
The JetPack for L4T is an on-demand all-in-one package that bundles and installs all software tools required to develop for the NVIDIA's TX2i/TX2i/TX1 Platform with Connect Tech's Carrier Boards. JetPack includes host and target development tools, APIs and packages (OS images, tools, APIs, middleware, 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 14.04 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>

## Mechanical Details

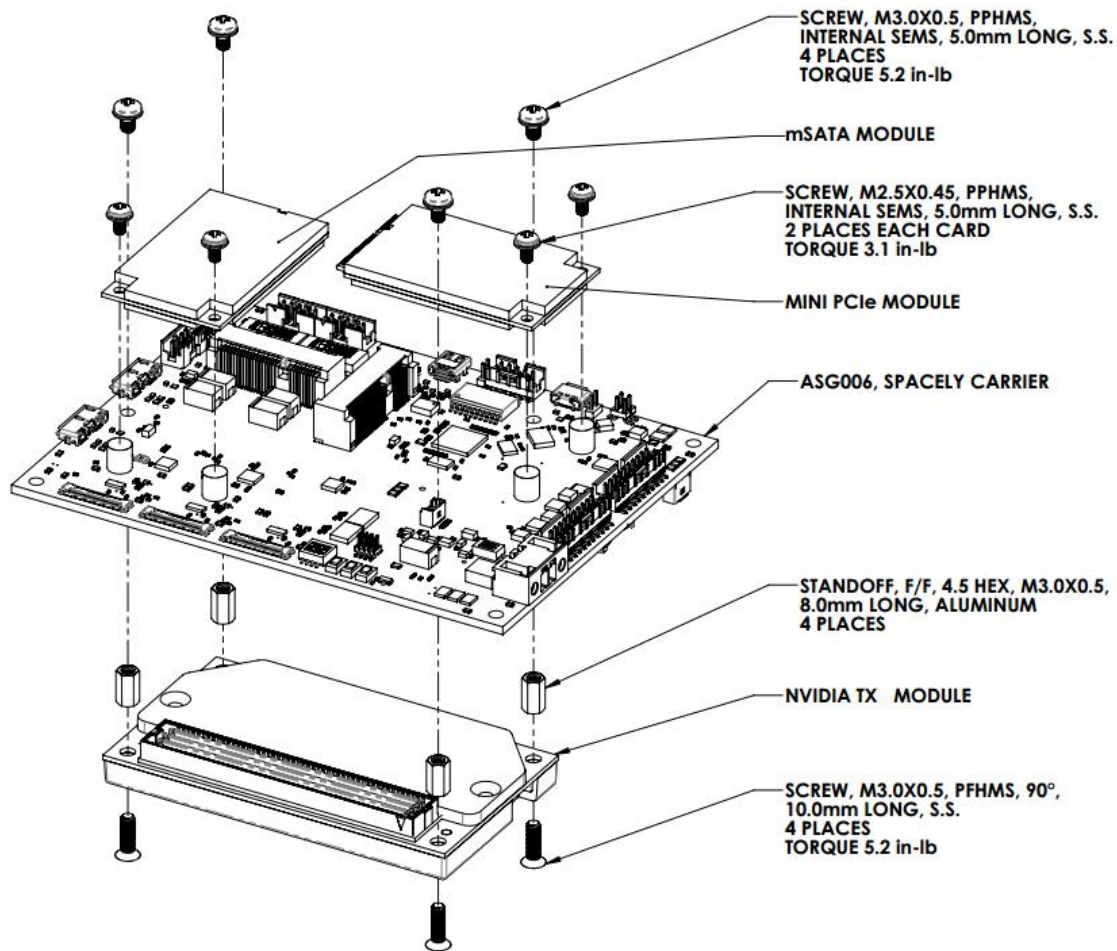
### Mechanical Dimensions



**THIS DIMENSION DOES NOT TAKE INTO ACCOUNT THE HEIGHT OF THE MINI PCIe CARD**



## Module / Mini-PCIe / mSATA Installation



## Cables

The following table summarizes the Spacely Carrier cables available.

Drawing No.	Part No.	Description
--	<u>CKG045</u>	ASG006 Cable Kit: 2 x CBG116 System Cable - Unterminated wires to 20-pin MiniTek w/Latch, 2 x CBG117 RJ-45 to Minitek Cable, 1 x CBG104 Dual USB 2.0 panel mount to 8-pin MiniTek w/Latch, 1 x CBG191 DB9 to 10-pin Header 2mm.
<u>CTIC-00435</u>	CBG116	System/GPIO (Unterminated) to 20-Pin MiniTek (P12, P13)
<u>CTIC-00433</u>	CBG117	RJ-45 Panel Mount to 10-Pin MiniTek (P4A, P4B)
<u>CTIC-00429</u>	CBG104	Dual USB 2.0 to 8-Pin MiniTek (P8)
<u>CTIC-00539</u>	CBG191	CAN Bus (DB-9 Male) to 10-Pin MiniTek (P7)
--	MSG080	Power Supply for ASG006 / ASG009
<u>CTIC-00538</u>	CBG190	10-pin Minitek to flying Lead Cable optional CANbus cable
<u>CTIC-00477</u>	CBG136	CR2032 RTC Battery w/ 3-pin Connector Cable Assembly
--	CBG247	USB Type A to Micro USB Type B



<u>CTIC-00510</u>	CBG162	External I/O cable for ASG009
--	CBG163	R.FL to SMA Female Cable for ASG009
--	GPS-06T	GPS Active antenna with RF protection circuit, low profile +3VDC to +6VDC input +28dB gain, SMA connector

For latest cable specifications please contact [support@connecttech.com](mailto:support@connecttech.com)