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Astro Carrier for Jetson™ 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: www.connecttech.com/sub/support/support.asp. 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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Note:

Please go to the [Download Zone](#) or the [Knowledge Database](#) in the [Support Center](#) on the Connect Tech website for product manuals, installation guides, device driver software and technical tips. Submit your technical support questions to our customer support engineers via the [Support Center](#) on the Connect Tech website.

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 Astro Carrier for Jetson™ TX1. 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 COM Express 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	2016/02/25	Initial Release

Introduction

Astro is specifically designed to work with the NVIDIA® Jetson™ TX1 supercomputer-on-module. The Astro Carrier provides access to features found on the Jetson™ TX1 module in an extremely small footprint (87mm x 57mm / 3.43" x 2.24").

The Astro Carrier for Jetson™ TX1 provides a high density board to board connector for use with either off-the-shelf or custom breakout boards, dramatically reducing the need for cabling.

With all of the complex circuitry already on the Astro carrier, such as Gigabit Ethernet, USB 3.0, Serial, and Display, the design of a unique breakout board can be done with minimal effort using Connect Tech's design services or by the user. Connect Tech already offers the XBG201 breakout board, as well as a single board carrier solution called the Elroy Carrier for Jetson™ TX1. For more information on these two products please contact sales@connecttech.com.

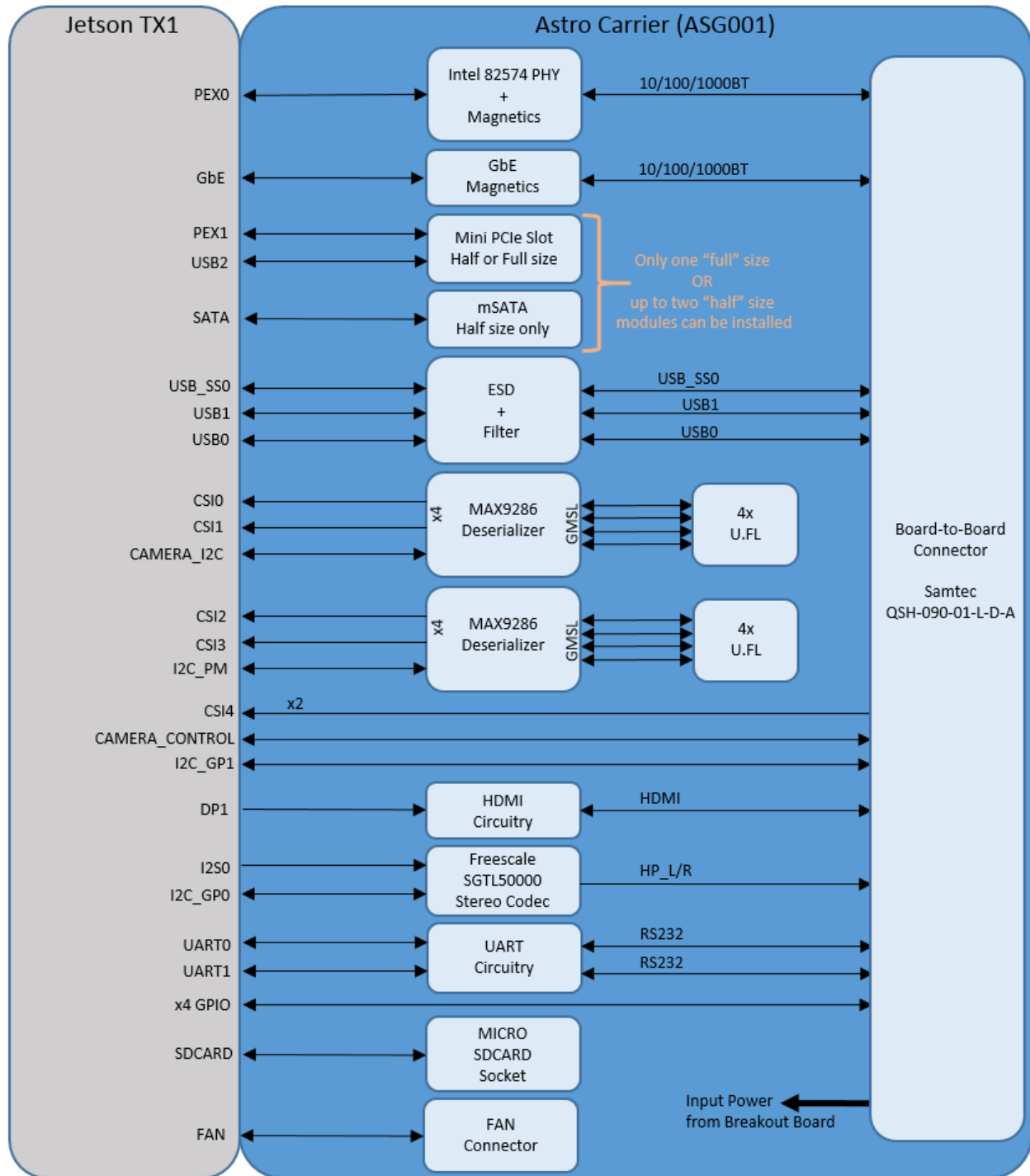
The Astro Carrier provides expansion via Mini PCI Express and mSATA, in addition to a micro SD Card slot.

Product Features and Specifications

Feature	Astro Carrier for Jetson™ TX1
PCB Size / Overall Size	87mm x 57mm (3.43" x 2.24") 3D STEP Model: download here
Display	1x HDMI Interface
Ethernet	2x Gigabit Ethernet (10/100/1000) Links
USB	1x USB 3.0 Links 2x USB 2.0 Links
SATA	1x SATA Link
Audio	HD Audio Link: 1x Output
Serial	2x RS-232/RS-485 Links
Mini-PCIe/mSATA	1x Mini-PCIe Half or Full Sized (Use of Full Size Removes mSATA Slot) 1x mSATA Half Size
SD Card	1x microSD Card Slot
GPIO	4x GPIO
Video Input	1x CSI-2 (x2) interface 2x CSI-2 (x4) interfaces via U.FL connector accepting GMSL signaling
Misc.	1x I2C Link 1x System Control (PWR and RST buttons, etc.) 1x RTC Battery Input
Power Requirements	+7.5V to +14.0V DC Input Range +12V DC Nominal Input
Operating Temperature	-40°C to +85°C
Weight	46 grams (with stand-offs attached)
Accessories	Breakout Boards Cable Kit
Warranty and Support	1 Year Warranty and Lifetime Free Support

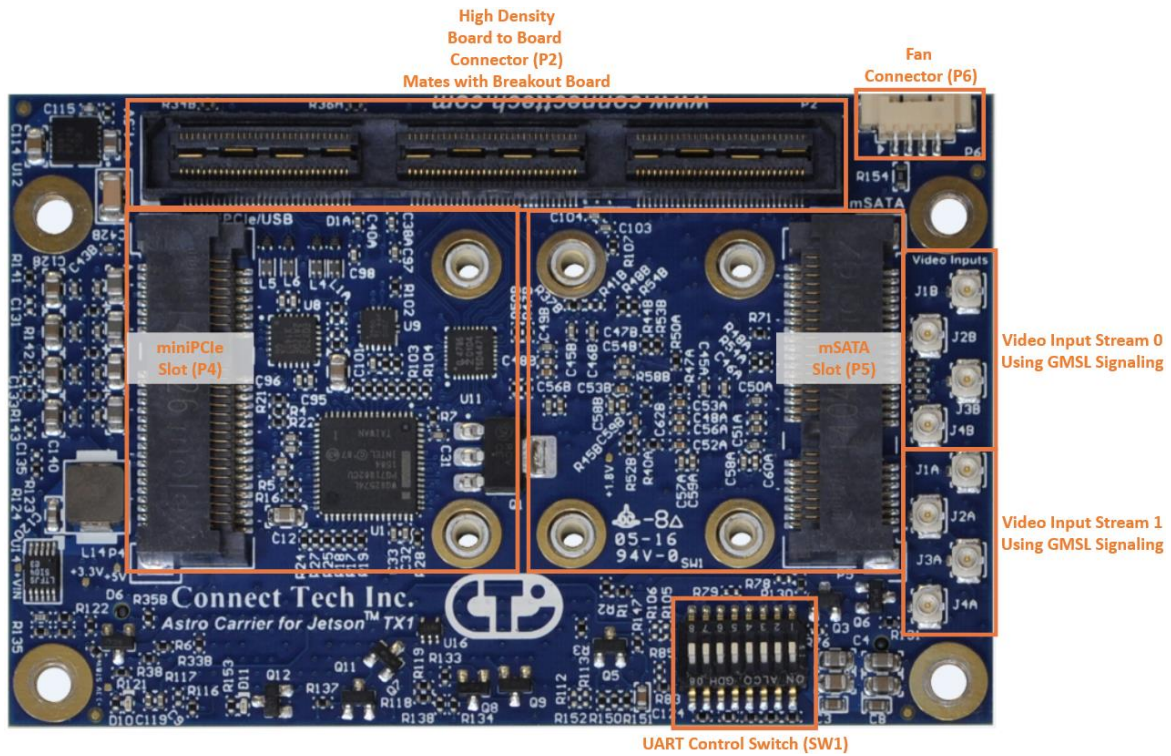
Product Overview

Block Diagram

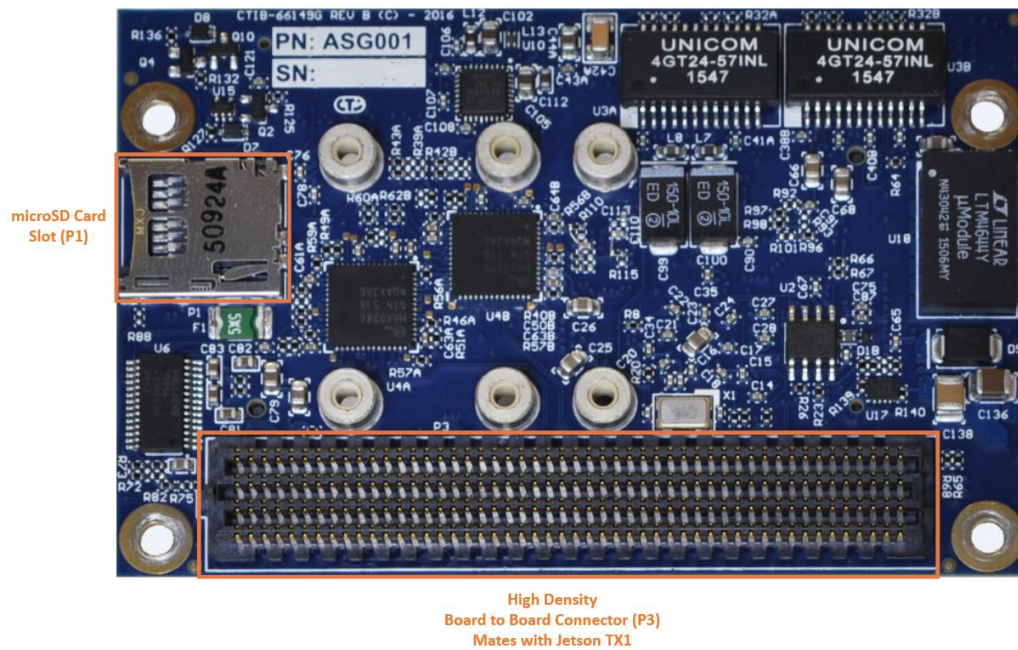


Connector Locations

Top Side



Secondary Side



Connector Summary

Designator	Connector	Description
P1	microSD Card Socket	microSD Card Socket
P2	High Density Board to Board Connector	Connect Tech High Density Board to Board Connector that mates with the breakout board
P3	High Density Board to Board Connector	High Density Board to Board Connector that mates with the Jetson™ TX1
P4	Mini-PCIe Slot	Mini-PCIe Half or Full Sized Card Slot
P5	mSATA Slot	mSATA Half Sized Card Slot
P6	Fan Connector	+5V Fan Connector
J1-4A	Video Input Connectors	U.FL video input connectors using GMSL signaling
J1-4B	Video Input Connectors	U.FL video input connectors using GMSL signaling

DIP Switch Summary

Designator	Function	Description
SW1A	Serial Selection	DIP Switches for Controlling Serial Format and Related Features
SW1B	Serial Selection	DIP Switches for Controlling Serial Format and Related Features
SW1C	Serial Selection	DIP Switches for Controlling Serial Format and Related Features
SW1D	Serial Selection	DIP Switches for Controlling Serial Format and Related Features
SW1E	Serial Selection	DIP Switches for Controlling Serial Format and Related Features
SW1F	Serial Selection	DIP Switches for Controlling Serial Format and Related Features
SW1G	N/A	Not used/unconnected
SW1H	RTC Voltage	Allows for shorting the RTC voltage to Ground

Detailed Feature Description

Jetson™ TX1 Board-to-Board Connector

The processor and chipset are implemented on the Jetson™ TX1 Module, which connects to the Astro Carrier Board via a Samtec SEARAY™ stacking connector.

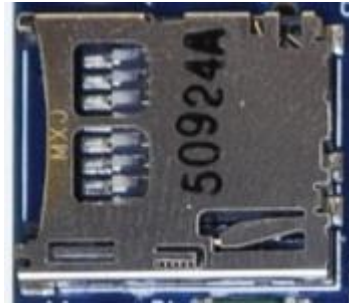
Function	Board-to-Board Mating Connector with Jetson™ TX1	
Location	P3	
Type	Samtec “SEARAY™” Connector	
Carrier Connector P/N	SEAM-50-03.5-S-08-2-A-K-TR (8.5mm stacking height) Manufacturer: Samtec	
Mating Connector P/N	SEAF-50-05-S-08-02-A-K (installed on Jetson™ TX1) Manufacturer: Samtec	
Pinout	Refer to NVIDIA’s Jetson™ TX1 System-on-Module datasheet for pinout details.	



microSD Card Slot

The Astro Carrier features a microSD Card Slot for system purposes. It is connected directly to the SDCARD interface on the Jetson™ TX1.

Function	microSD Card Slot	
Location	P1	
Type	Molex microSD Memory Card Connector	
P/N	5025700893	
Pinout	Pin	Description
	1	SD_D2
	2	SD_D3
	3	SD_CMD
	4	SD_VDD
	5	SD_CLK
	6	GND
	7	SD_D0
	8	SD_D1
	9	GND
	10	SD_CD#



U.FL Video Input Connectors

The Astro Carrier features eight U.FL connectors that accept video input streams using GMSL signaling. Four U.FL connectors translate into one 4-lane CSI interface (using CSI0 and CSI1 from the Jetson™ TX1 module) while the other four U.FL connectors translate into another 4-lane CSI interface (using CSI-2 and CSI3 from the Jetson™ TX1 module).

Function	U.FL Video Input	
Location	P1	
Type	U.FL, 50 ohm	
P/N	U.FL-R-SMT-1(01)	
Pinout	J1/2/3/4B correspond to CSI0 and CSI1 on the Jetson™ TX1 module.	
	J1/2/3/4A correspond to CSI-2 and CSI3 on the Jetson™ TX1 module.	

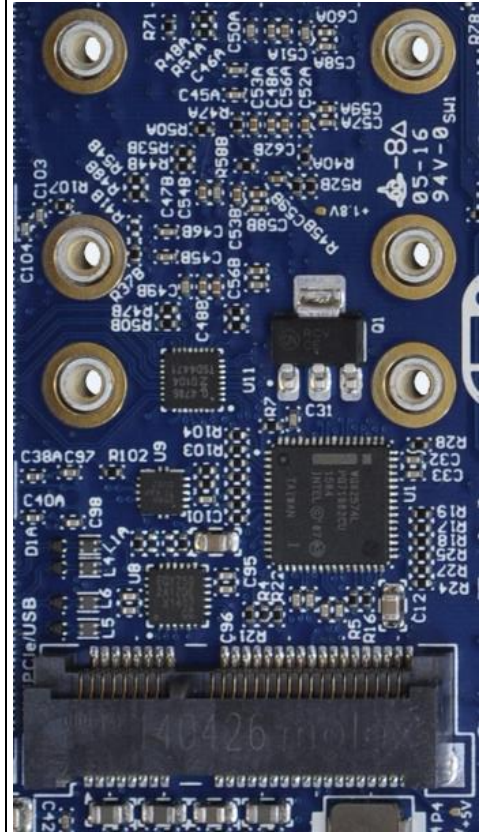


Mini-PCle

Half and Full Length Mini-PCle Module Installation

The Astro Carrier is designed with mounting holes to allow for the population of half-length or full length Mini-PCle modules. To install a half-length module simply shift the spacers to the appropriate location.

Function	Mini-PCIe Slot	
Location	P4	
Type	Molex Card Edge Connector	
P/N	48338-0065	
Pinout	Pin	Mini-PCIe Description
	1	-
	2	+3.3V
	3	-
	4	-
	5	-
	6	+1.5V
	7	CLKREQ#
	8	-
	9	-
	10	-
	11	PCIe CLK+
	12	-
	13	PCIe CLK-
	14	-
	15	-
	16	-
	17	-
	18	-
	19	-
	20	W_DISABLE#
	21	RESV
	22	-
	23	PCIe RX+
	24	+3.3V
	25	PCIe RX-
	26	-
	27	-
	28	+1.5V
	29	-
	30	-
	31	PCIe TX-
	32	-
	33	PCIe TX+
	34	-
	35	-
	36	USB D-
	37	-
	38	USB D+
	39	+3.3V
	40	-
	41	+3.3V
	42	-
	43	RESV
	44	-
	45	-
	46	-
	47	-
	48	+1.5V
	49	-
	50	-
	51	-
	52	+3.3V



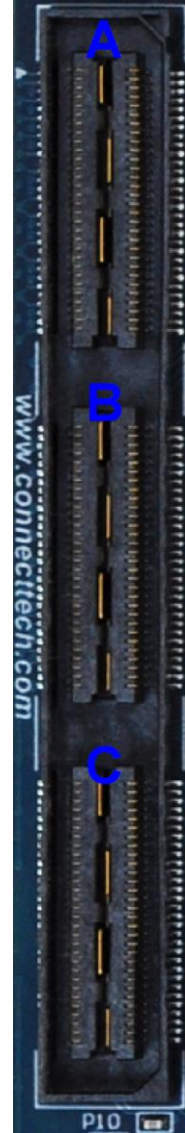
mSATA

Function	Mini-PCIE Slot	
Location	P5	
Type	Molex Card Edge Connector	
P/N	48338-0065	
Pinout	Pin	mSATA Description
	1	-
	2	+3.3V
	3	-
	4	-
	5	-
	6	+1.5V
	7	-
	8	-
	9	-
	10	-
	11	-
	12	-
	13	-
	14	-
	15	-
	16	-
	17	-
	18	-
	19	-
	20	-
	21	RESV
	22	RESET#
	23	SATA TX+
	24	+3.3V
	25	SATA TX-
	26	-
	27	-
	28	+1.5V
	29	-
	30	-
	31	SATA RX-
32	-	
33	SATA RX+	
34	-	
35	-	
36	-	
37	-	
38	-	
39	+3.3V	
40	-	
41	+3.3V	
42	-	
43	RESV	
44	-	
45	-	
46	-	
47	-	
48	+1.5V	
49	-	
50	-	
51	-	
52	+3.3V	

Connect Tech High Density Connector

The Astro Carrier main advantage is the High Density Connector (HDC) allowing for easy custom breakout boards.

Function	Connect Tech High Density Connector			
Location	P2			
Type	Samtec Qstrip High Speed Ground Plane Socket			
Carrier P/N	QSH-090-01-L-D-A			
Mating P/N	QTH-090-XX-L-D-A (On breakout board)			
Pinout Bank 1	Description	Pin	Pin	Description
	GND	1	2	RTC_BAT
	BATLOW#	3	4	RTC_BAT
	RESET_IN#	5	6	GND
	PWR_BUTTON#	7	8	GBE1_LINK1000#
	SLEEP#	9	10	GBE1_LINK100#
	RESET_OUT#	11	12	GBE1_LINK#
	GND	13	14	GBE1_ACT#
	-	15	16	-
	-	17	18	GBE1_MDI_3_P
	GND	19	20	GBE1_MDI_3_N
	USB2_1_VBUS	21	22	GBE1_MDI_2_N
	GND	23	24	GBE1_MDI_2_P
	USB3_0_SS_TX_N	25	26	GBE1_MDI_1_N
	USB3_0_SS_TX_P	27	28	GBE1_MDI_1_P
	GND	29	30	GBE1_MDI_0_N
	USB3_0_SS_RX_N	31	32	GBE1_MDI_0_P
	USB3_0_SS_RX_P	33	34	-
	GND	35	36	GBE1_GND
	USB2_1_DATA_N	37	38	GBE0_GND
	USB2_1_DATA_P	39	40	-
	-	41	42	GBE0_MDI_3_N
	GND	43	44	GBE0_MDI_3_P
	USB2_0_DATA_N	45	46	GBE0_MDI_2_N
	USB2_0_DATA_P	47	48	GBE0_MDI_2_P
	GND	49	50	GBE0_MDI_1_N
	USB2_VBUS_A	51	52	GBE0_MDI_1_P
	GND	53	54	GBE0_MDI_0_P
	FORCE_REC#	55	56	GBE0_MDI_0_N
	NC	57	58	-
	GND	59	60	GBE0_LINK1000#
	+3.3V	BLADE_A	+3.3V	





Pinout Bank 2	Description		Pin		Pin	Description
	HDMI_UTLY		61		62	GBE0_LINK100#
	HDMI_HPD		63		64	GBE0_LINK#
	HDMI_CEC		65		66	GBE0_ACT#
	GND		67		68	GND
	DDI_DAT		69		70	-
	DDI_CLK		71		72	-
	GND		73		74	GND
	TMDS_LANE2_P		75		76	-
	TMDS_LANE2_N		77		78	-
	GND		79		80	GND
	TMDS_LANE1_P		81		82	-
	TMDS_LANE1_N		83		84	GND
	GND		85		86	-
	TMDS_LANE0_P		87		88	-
	TMDS_LANE0_N		89		90	GND
	GND		91		92	-
	TMDS_CLK_P		93		94	-
	TMDS_CLK_N		95		96	GND
	GND		97		98	-
	-		99		100	-
	HDMI_5V_PWR		101		102	GND
	HDMI_5V_PWR		103		104	-
	HDMI_5V_PWR		105		106	-
	GND		107		108	GND
	-		109		110	+1.8V
	-		111		112	+1.8V
	GND		113		114	GND
	-		115		116	HD_AUDIO_HP_R
	-		117		118	HD_AUDIO_HP_L
	GND		119		120	GND
	GND		BLADE_B		GND	





Pinout Bank 3

Description	Pin	Pin	Description
GND	121	122	GPIO_EXP1_INT
UART1_RX_N	123	124	GPIO_EXP0_INT
UART1_RX_P	125	126	GPIO9
GND	127	128	GPIO8
UART1_TX_N	129	120	-
UART1_TX_P	131	132	GND
GND	133	134	CSI4_D1_N
UART0_RX_N	135	136	CSI4_D1_P
UART0_RX_P	137	138	GND
GND	139	140	CSI4_D0_N
UART0_TX_N	141	142	CSI4_D0_P
UART0_TX_P	143	144	GND
GND	145	146	CSI4_CLK_N
GND	147	148	CSI4_CLK_P
I2C_SDA (+3.3V)	149	150	GND
I2C_SCL (+3.3V)	151	152	-
GND	153	154	-
CAMERA1_RST	155	156	GND
CAMERA1_PWR	157	158	-
CAMERA1_MCLK	159	160	-
GND	161	162	GND
GND	163	164	-
CAMERA_VSYNC	165	166	-
CAMERA_FLASH_EN	167	168	GND
CAMERA_STROBE	169	170	-
GND	171	172	-
GND	173	174	GND
CAMERA0_RST	175	176	-
CAMERA0_PWR	177	178	-
CAMERA0_MCLK	179	180	GND
+VIN	BLADE_C		+VIN

HD AUDIO – HDC

The Astro Carrier features HD Audio capabilities with the assistance of the NXP (Freescale) SGTL5000 Audio codec. From the Codec, 1 Headphone Output is available on the HDC.

Function	HD Audio
Location	P2
HDC Bank	B
Pins	116, 118
Design Instruction	No additional circuitry required Route direct to header/connector/device

USB 2.0/3.0 – HDC

The Astro Carrier has two USB 2.0 Ports and one USB 3.0 Port available at the HDC.

Function	USB 2.0
Location	P2
HDC Bank	A
Pins	21, 37, 39, 45, 47, 51
Design Instruction	Please note that the USB2_VBUS (Pins 21 and 51) supply +5V @ 0.9A No additional circuitry required USB magnetics (ESD/EMI) placed on Astro Carrier Route direct to header/connector/device

Function	USB 3.0
Location	P2
HDC Bank	A
Pins	25, 27, 31, 33
Design Instruction	No additional circuitry required USB magnetics (ESDS/EMI) placed on Astro Carrier Route direct to header/connector/device

System/I2C/GPIO – HDC

The System pins include a power button, two reset signals, sleep input, battery low input, optional RTC battery input, and a force recovery input signal for the Jetson™ TX1 module.

Function	System/I2C/GPIO
Location	P2
HDC Bank	A
Pins	System – 2, 3, 4, 5, 7, 9, 11, 55, 122, 124, 126, 128 I2C – 149, 151 (HDC Bank 3)
Design Instruction	For the power button, resets, force recovery, sleep, and battery low signals: these are pulled up on the Jetson™ TX1 module. A falling edge on these signals will trigger an event. The I2C interface is +3.3V. The four GPIO signals use +1.8V logic levels. Refer to the Jetson™ TX1 module datasheet for nominal RTC battery voltage and supply requirements. For all signals listed above: No additional circuitry required Route direct to header/connector/device

HDMI – HDC

The Astro Carrier features one display output interface using HDMI 2.0.

Function	HDMI
Location	P2
HDC Bank	B
Pins	61, 63, 65, 69, 71, 75, 77, 81, 83, 87, 89, 93, 95, 101, 103, 105
Design Instruction	The Astro Carrier fully supports the HDMI 2.0 interface from the Jetson TX1 module. All required circuitry is placed on the Astro Carrier. Route direct to header/connector/device

Serial – HDC

Function	Serial
Location	P2
HDC Bank	C
Pins	UART0 – 135, 137, 141, 143 UART1 – 123, 125, 129, 31
Design Instruction	No additional circuitry required Transceiver placed on the Astro Carrier Route direct to header/connector/device

Serial Configuration

Two Serial UART Links from the Jetson™ TX1 Module are routed into an Exar SP336E Transceiver. This enables the various selectable serial outputs (RS-232/RS-485). To configure the setting, the appropriate configuration of the Serial Selection DIP Switch (SW1) is required. Please refer to the Exar SP336E datasheet for additional details.

Locked/Hardwired Configuration

The Astro Carrier comes default populated with a Control DIP Switch (SW1).

Dual RS-232

Switch SW1	Position	Description
A	OFF	Mode 0 Selection - RS-232 Selection
B	OFF	Serial Link 0 - RX+ BIAS
C	OFF	Mode 1 Selection - RS-232 Selection
D	OFF	Serial Link 0 - RX- BIAS
E	OFF	Serial Link 1 - RX+ BIAS
F	OFF	Serial Link 1 – RX- BIAS

Serial 0 RS-232/Serial 1 RS-485

Switch SW1	Position	Description
A	OFF	Mode 0 Selection - RS-232 Selection
B	OFF	Serial Link 0 - RX+ BIAS
C	ON	Mode 1 Selection - RS-485 Selection
D	OFF	Serial Link 0 - RX- BIAS
E	USER	Serial Link 1 - RX+ BIAS
F	USER	Serial Link 1 – RX- BIAS

Dual RS-485

Switch SW1	Position	Description
A	ON	Mode 0 Selection - RS-485 Selection
B	USER	Serial Link 0 - RX+ BIAS
C	OFF	Mode 1 Selection - RS-485 Selection
D	USER	Serial Link 0 - RX- BIAS
E	USER	Serial Link 1 - RX+ BIAS
F	USER	Serial Link 1 – RX- BIAS



Dual Disable

Switch SW1	Position	Description
A	ON	Mode 0 Selection - Disable Selection
B	XX	Serial Link 0 - RX+ BIAS
C	ON	Mode 1 Selection - Disable Selection
D	XX	Serial Link 0 - RX- BIAS
E	XX	Serial Link 1 - RX+ BIAS
F	XX	Serial Link 1 – RX- BIAS

10/100/1000 Ethernet (GBE) – HDC

Function	Gigabit Ethernet
Location	P2
HDC Bank	A
Pins	GBE0 – 38, 42, 44, 46, 48, 50, 52, 54, 56, 60, 62, 64, 66 GBE1 – 8, 10, 12, 14, 18, 20, 22, 24, 26, 28, 30, 32, 36
Design Instruction	An in-line buffer (Recommended Part: NC7WZ04P6X) with Resistors for the GBE0 LED Pins (ACT#, LINK#, LINK100#, LINK1000#) is required An in-line buffer (Recommended Part: NC7WZ16P6X) with Resistors for the GBE1 LED Pins (ACT#, LINK#, LINK100#, LINK1000#) is required No additional circuitry required for MDI pins Route MDI connections direct to header/connector/device
Feature Note	GBE0_LINK1000# is not connected on the Astro Carrier. The CTI Default Programmed Intel 82574 does not provide LINK1000# LED capabilities.

Software Support for the Intel 82574

Additional drivers will be needed to properly operate the GBE Port 0 on the Astro Carrier.

These drivers can be downloaded directly from Intel website from the below link:

<http://downloadcenter.intel.com/SearchResult.aspx?lang=eng&ProductFamily=Ethernet+Components&ProductLine=Ethernet+Controllers&Product=Intel%C2%AE+82574+Gigabit+Ethernet+Controller>

Camera Serial Interface (CSI-2) – HDC

The Astro Carrier routes one CSI-2 (two lane) interface to the HDC. This is the CSI port 4 from the Jetson™ TX1 module.

Function	Camera Serial Interface
Location	P2
HDC Bank	C
Pins	134, 136, 140, 142, 146, 148
Design Instruction	Similar to the Jetson™ TX1 development kit, the CSI interface is directly connected between the Jetson™ TX1 module and the HDC on the Astro carrier. There is no EMI/ESD protection along the signal path. It is recommended to include this on the breakout board.

Power Input – HDC

The Astro Carrier accepts a single power input to power all on-board devices. While an input range of +7.5V to +14.0V is acceptable, a single +12.0V input is nominal for operation.

Function	Power Input
Location	P2
HDC Bank	C
Pins	BLADE_C
Design Instruction	Reverse Polarity protection recommended on Breakout Board Design LC Filter placed on Astro Carrier

+3.3V Power Output – HDC

The Astro Carrier generates a +3.3V rail that is available for use on Breakout Board Designs. A maximum of 500mA is available for use.

Function	+3.3V Power Output
Location	P2
HDC Bank	A
Pins	BLADE_A
Design Instruction	The provided +3.3V can be used for any circuitry, including LEDs, on the breakout board.

+1.8V Power Output – HDC

The Astro Carrier generates a +1.8V rail that is available for use on Breakout Board Designs. A maximum of 500mA is available for use.

Function	+1.8V Power Output
Location	P2
HDC Bank	B
Pins	110, 112
Design Instruction	The provided +1.8V is intended to provide power to any camera sensor that is connected to the CSI interface on a breakout board.

Typical Installation

1. Ensure all external system power supplies are off.
2. Install the Jetson™ TX1 module to the Astro carrier. Be sure to follow NVIDIA's directions for proper installation of mounting hardware, heatsink/heatspreader, and any other applicable requirements from the manufacturer.
3. Install any Mini-PCIe/mSATA Module(s) for the application.
4. Install a Breakout Board and any required cables. At a minimum this would include:
 - a. Power cable to the input power connector
 - b. Connect a video display cable
 - c. Keyboard and mouse via USB
5. Switch ON the Power Supply. DO NOT power up your system by plugging in live power.
 - A. The power button signal but have a falling edge in order to power on the system.

On-Board Indicator LED's

The Astro Carrier has 2 on-board indicator LEDs.

LED	Description
D10	Carrier Stand-by Power Good: indicates the standby power is good.
D11	Carrier Power Good: indicates all onboard power supplies are properly regulated. It is only off in the event one of the onboard power supplies is malfunctioning while the carrier power is enabled.

Current Consumption Details

Below are the maximum ratings of the Astro Carrier.

Maximums	Watts
Theoretical absolute maximum total draw of all functionality on the Astro carrier board	10

Below are measurements taken with the Astro Carrier (ASG001) running in various configurations with the XBG201 Breakout Board. Values will change depending on what Astro Breakout Board is installed. Measurements also include the Jetson™ TX1 Module. No mSATA or miniPCIe modules were installed while taking these measurements. All measurements were taken in a lab environment with an ambient temperature of 25 degrees Celsius.

Actual Measurements	Watts
Module Installed, booted into Ubuntu, idle	7.2
Module Installed, booted into Ubuntu, running a Feature Tracker Demo	14.3
Module Installed, booted into Ubuntu, running a NVStreamer Demo with a USB camera and 1080p video.	14.6

Mechanical Details

3D Model Download

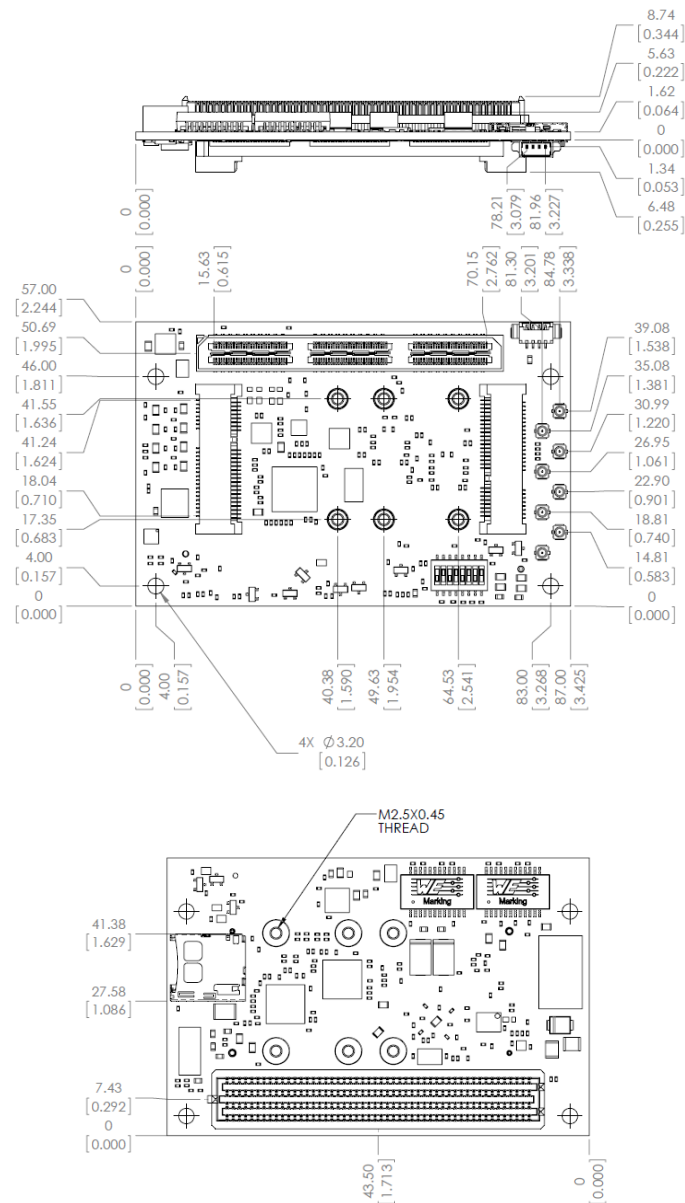
A complete **3D STEP Model** file of Astro Carrier can be downloaded here:

http://www.connecttech.com/ftp/3d_models/ASG001_3D_MODEL.zip

Weight

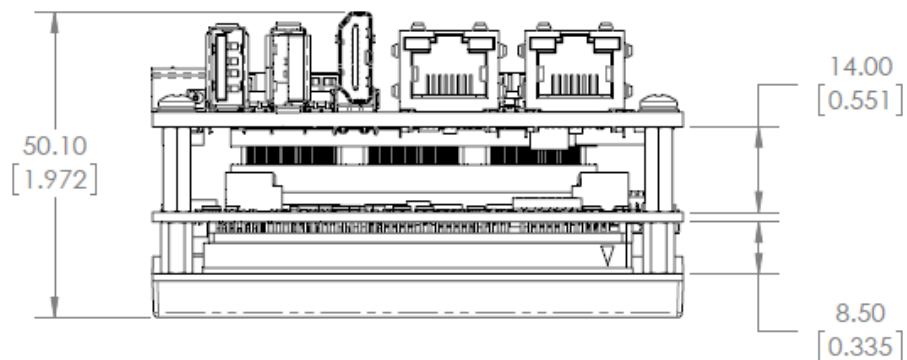
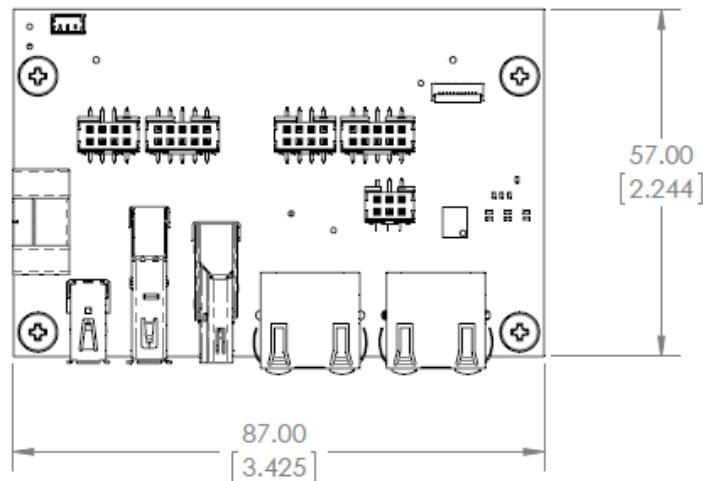
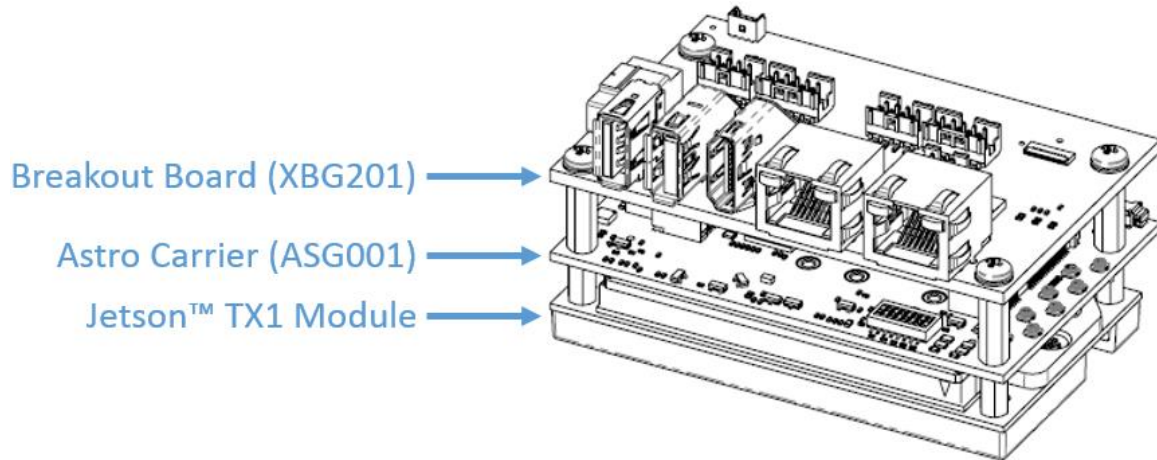
The ASG001 (Astro Carrier) has a weight of 46 grams with all stand-offs installed.

Astro Carrier Outline and Dimensions



Astro System Stacking Height

The images below include the Jetson™ TX1, Astro Carrier (ASG001), and Astro Breakout Board (XBG201).



CTI Breakout Boards

The following table summarizes the Astro Breakout Boards that are currently available from Connect Tech Inc.

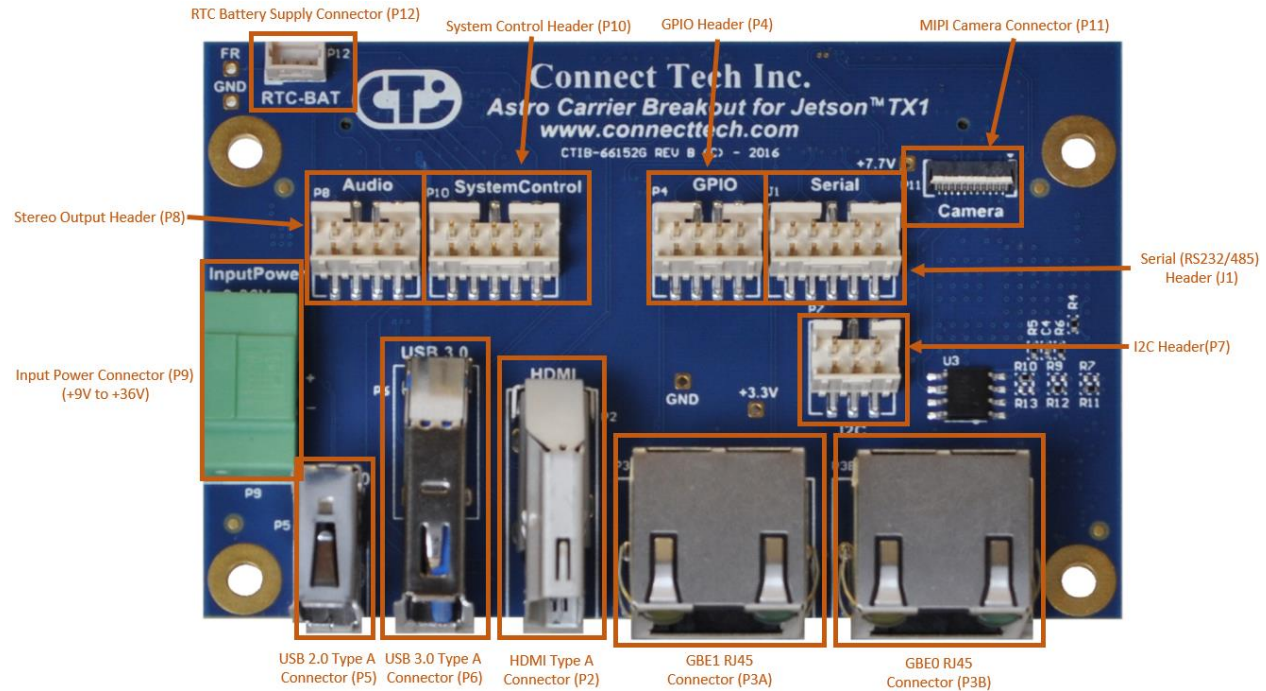
Available Breakout Boards

Breakout Board	Astro Breakout Board (XBG201)
Compatibility	ASG001
Dimensions	87mm x 57mm (3.43" x 2.24")
Mini-PCIe/mSATA	1x Mini-PCIe Full or Half 1x mSATA Half Size
Display	1x HDMI
Serial	2x RS-232/RS-485 Header
USB	1x USB 3.0 1x USB 2.0
Ethernet	2x RJ-45 Gigabit Ethernet
Audio	Stereo Output Header
GPIO	4x GPIO Header
Power Requirements	+9V to +36V Input
Operating Temperature	-40°C to +85°C
Weight	51 grams
Image	

Breakout Board XBG201 Technical Details

The following section provides technical details of the XBG201 breakout board.

XBG201 Connector Locations



Stereo Output Header

Function	Stereo Output Audio Header			
Location	P8			
Type	FCI Minithek Double Row 4 x 2			
P/N	98424-G52-08LF			
Mating	10073599-008LF – Manufacturer: FCI			
Cable	CBG118			
Pinout	Pin	Description	Pin	Description
	1	-	2	-
	3	-	4	-
	5	GND	6	GND
	7	HP OUT R	8	HP OUT L



RTC Battery Header

Function	RTC Battery Header		
Location	P12		
Type	PicoBlade		
P/N	53047-0310		
Mating	51021-0300 - Manufacturer: Molex		
Cable	N/A		
Pinout		Pin	Description
		1	GND
		2	-
		3	+3V





Input Power Connector

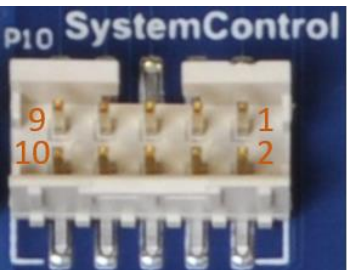
Function	Input Power Connector							
Location	P9							
Type	Pluggable Terminal Contact							
P/N	1843790							
Mating	2002011-G021A011F (included with the breakout board)							
Cable	N/A							
Pinout	<table><tr><th>Pin</th><th>Description</th></tr><tr><td>1</td><td>+</td></tr><tr><td>2</td><td>GND (-)</td></tr></table>		Pin	Description	1	+	2	GND (-)
	Pin	Description						
	1	+						
	2	GND (-)						
	Input Voltage Range: +9V to +36V							
The positive and negative terminals are clearly labelled on the PCB silkscreen.								





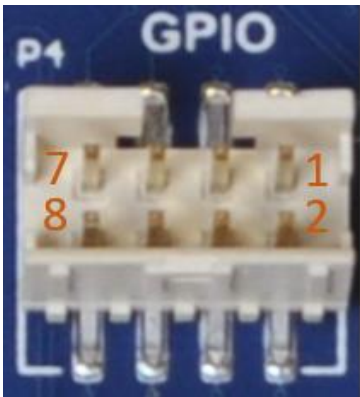
System Control Header

Function	System Control Header			
Location	P10			
Type	FCI Minitex Double Row 5 x 2			
P/N	98424-G52-10LF			
Mating	10073599-010LF – Manufacturer: FCI			
Cable	CBG190			
Pinout	Pin	Description	Pin	Description
	1	Power Button#	2	GND
	3	Main Reset#	4	GND
	5	Secondary Reset#	6	GND
	7	SLEEP#	8	GND
	9	BATLOW#	10	GND



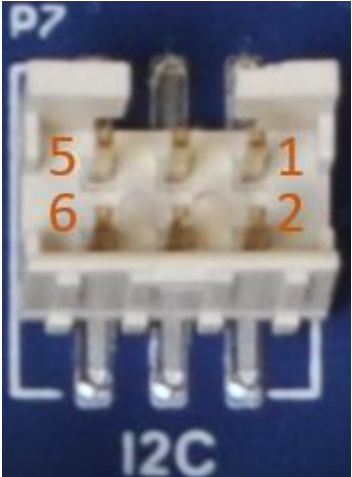
GPIO Header

Function	Stereo Output Audio Header			
Location	P4			
Type	FCI Minitex Double Row 4 x 2			
P/N	98424-G52-08LF			
Mating	10073599-008LF – Manufacturer: FCI			
Cable	N/A			
Pinout	Pin	Description	Pin	Description
	1	GPIO8	2	GND
	3	GPIO9	4	GND
	5	GPIO_EXP0_INT	6	GND
	7	GPIO_EXP1_INT	8	GND



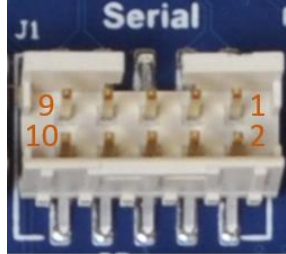
I2C Header

Function	I2C Header			
Location	P7			
Type	FCI Minitex Double Row 3 x 2			
P/N	98424-G52-06LF			
Mating	10073599-006LF – Manufacturer: FCI			
Cable	CBG112			
Pinout	Pin	Description	Pin	Description
	1	I2C_GP1_SCL	2	GND
	3	I2C_GP1_SDA	4	-
	5	-	6	-



Serial (RS-232/485) Header

Function	System Control Header		
Location	J1		
Type	FCI Minitex Double Row 5 x 2		
P/N	98424-G52-10LF		
Mating	10073599-010LF – Manufacturer: FCI		
Cable	CBG111		
Pinout	Pin	Signal	Description
	1	232TX0/485TX0+	RS-232 0 Transmit / RS-485 0 Transmit +
	2	232RX0/485RX0+	RS-232 0 Receive / RS-485 0 Receive +
	3	485TX0-	RS-485 0 Transmit -
	4	485RX0-	RS-485 0 Receive -
	5	232/485-GND0	Port 0 Ground
	6	232/485-GND1	Port 1 Ground
	7	232TX1/485TX1+	RS-232 1 Transmit / RS-485 1 Transmit +
	8	232RX1/485RX+	RS-232 1 Receive / RS-485 1 Receive +
	9	485TX1-	RS-485 1 Transmit -
	10	485RX1+	RS-485 1 Receive -

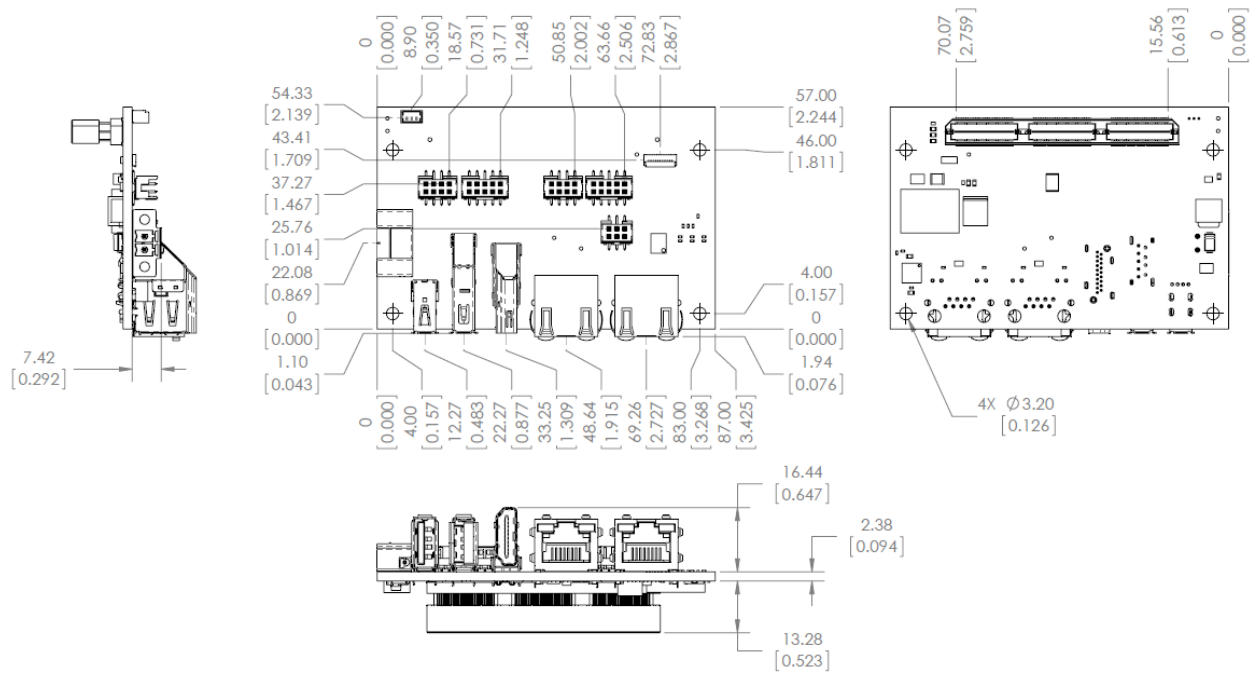


MIPI Camera Connector

Function	MIPI Camera Connector			
Location	P11			
Type	FPC Type Connector 0.3mm Pitch			
P/N	AYF332335			
Mating	CSI-2 Camera Sensor			
Pinout	Pin	Description	Pin	Description
	1	+1.8V	2	+1.8V
	3	GND	4	CSI4_D0_P
	5	CSI4_D0_N	6	GND
	7	CSI4_CLK_P	8	CSI4_CLK_N
	9	GND	10	CSI4_D1_P
	11	CSI4_D1_N	12	GND
	13	CAM0_MCLK	14	CAM0_PWRDN
	15	GND	16	CAM_I2C_SDA
	17	CAM_I2C_SCL	18	CAM0_RST
	19	-	20	GND
	21	+2.8V	22	-
	23	GND	-	-



Astro Breakout Board XBG201 Outline and Dimensions



Custom Breakout Board

If a user wishes to create their own breakout board to connect to the Astro Carrier, Connect Tech Inc. has prepared a reference design package. In addition, Connect Tech Inc. also offers a quick turn, low cost design service to create your custom breakout board. Please contact sales for more information at sales@connecttech.com.

Reference Design Package – OEM Astro Breakout Board

TBD – Please contact sales@connecttech.com for more information.

Cables

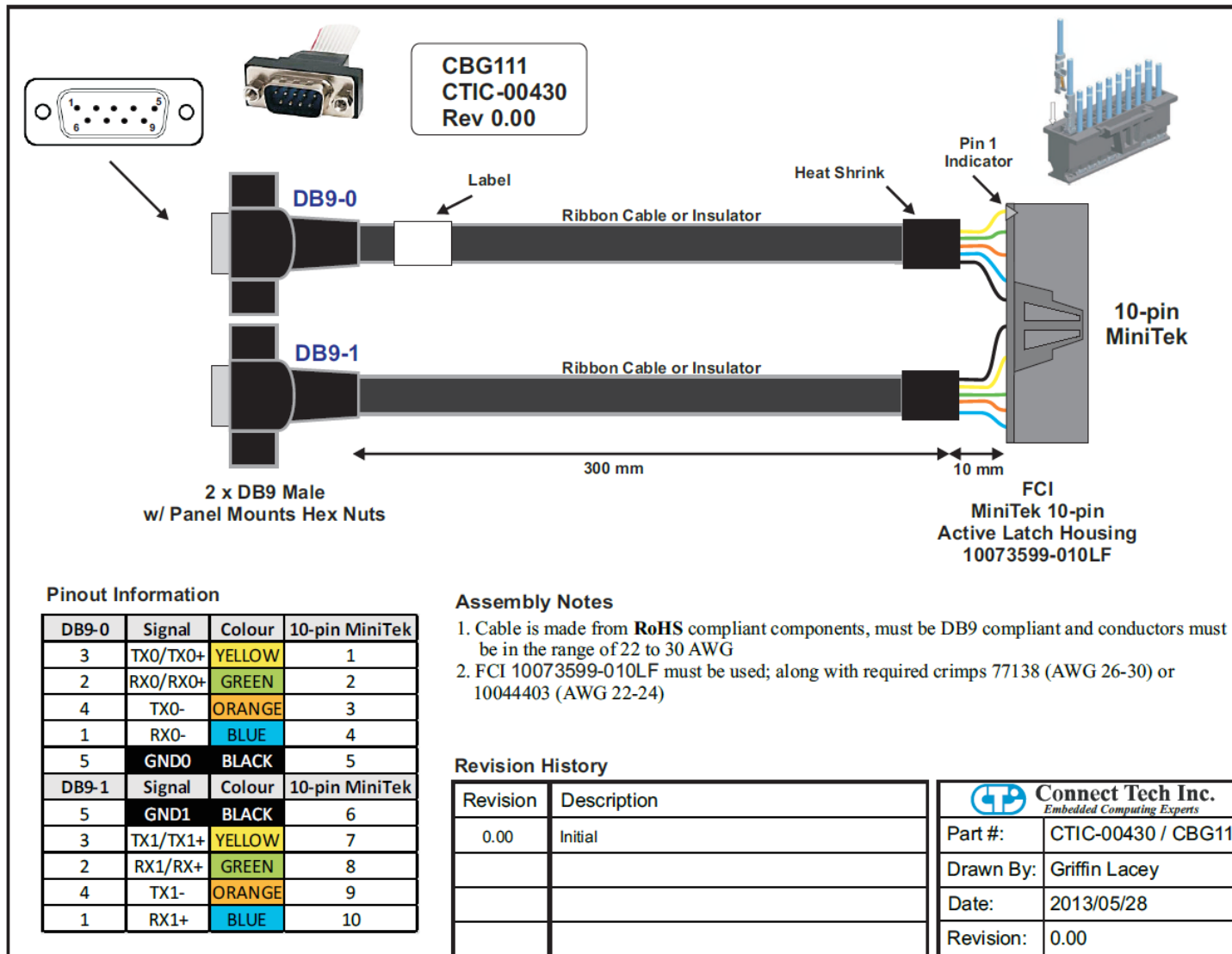
The following table summarizes the Astro Breakout Board (XBG201) cables available.

Available Cables

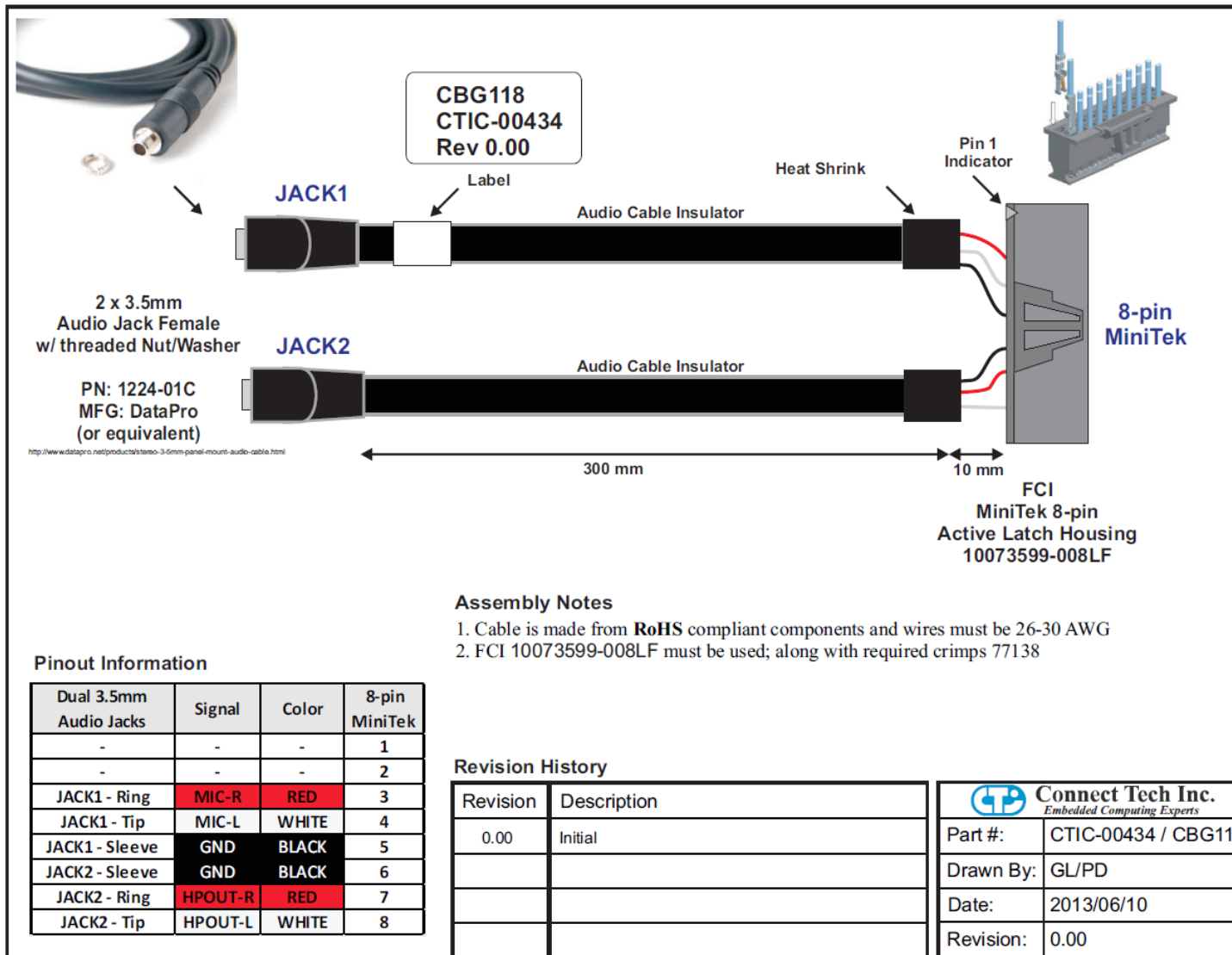
Drawing No.	Part No.	Description
CTIC-00538	CBG190	10-pin Minitex to flying Lead Cable (for System Control Header)
CTIC-00430	CBG111	Dual DB-9 Panel Mount to 10-Pin Minitex Cable
CTIC-00431	CBG112	6-Pin Minitex to Flying Lead Cable (for I2C Header)
OEM	See Description	U.FL to SMA – Samtec PN: MH113-MH1RP-01SB1-0150
CTIC-00434	CBG118	Dual Audio (uses HP out only) to 8-Pin Minitex Cable
OEM	CBG136	CR2032 RTC Battery w/ 3-pin Connector Cable Assembly - 6032101013

Cable drawings are available upon request. Send an email request to: support@connecttech.com

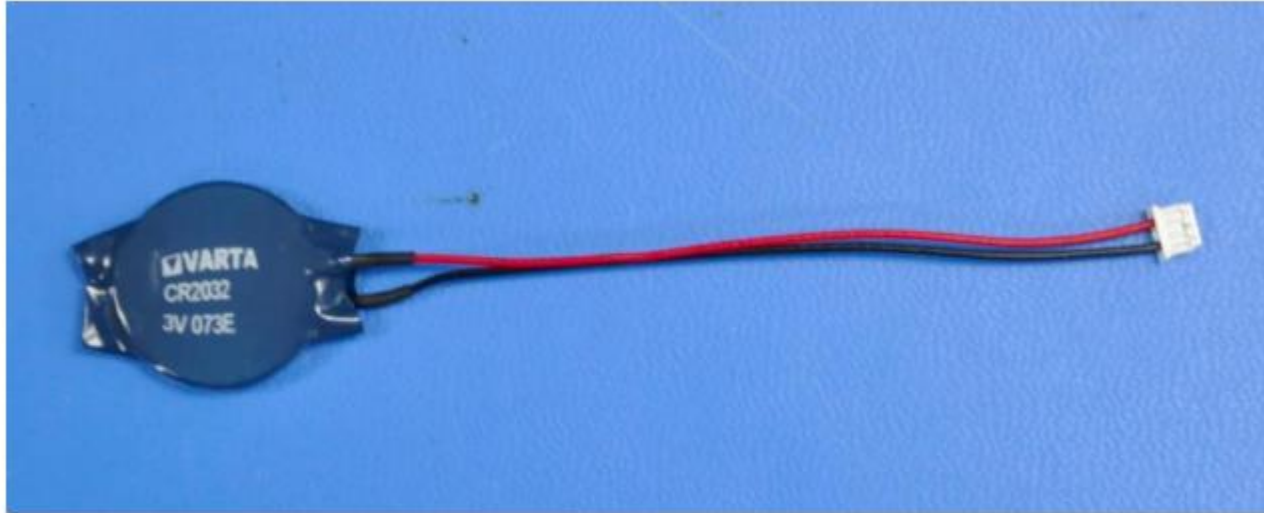
CBG111 - Dual DB-9 to 10-pin MiniTek Cable



CBG118 - Dual Audio to 8-Pin Minithek Cable



CBG136 - CR2032 RTC Battery w/ 3-pin Connector Cable Assembly - 6032101013



CR2032 Battery	Signal	3-pin MiniTek
Positive Terminal	+3V	1
-	NC	2
Negative Terminal	GND	3