Connect Tech Inc.

COM Express Type 6
Rugged Ultra-Lite Carrier
CCG011 / CCG012
Users Guide

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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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www.connecttech.com

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 Lifetime Warranty

Connect Tech Inc. provides a Lifetime Warranty for all Connect Tech Inc. products. 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. Lifetime Warranty is defined as 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 Lifetime 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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Trademark Acknowledgment

Revision History

Revision	Date	Changes
0.00	09/11/2013	Preliminary Release
0.01	11/27/2013	Updated Cable Drawings and Listings
0.02	12/09/2013	Added CCG011 and CCG012 part info
0.03	12/20/2013	Further Cable Drawing Updates
0.04	02/03/2014	Added PCIe Allocations, Mech Drawings, and updated Cable PN info
0.05	02/18/2014	Correct GBE Cable Drawing (CBG117)

Introduction

Connect Tech's COM Express® Type 6 Rugged Ultra Lite Carrier Board is a compact carrier board which matches the dimensions of a COM Express® Basic module and offers the ultimate durability with locking, rugged pin headers.

COM Express® Type 6 Rugged Ultra Lite Carrier Board is ideal for space constrained applications, harsh environments, demanding conditions and supports extended temperature ranges of -40°C to +85°C.

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.

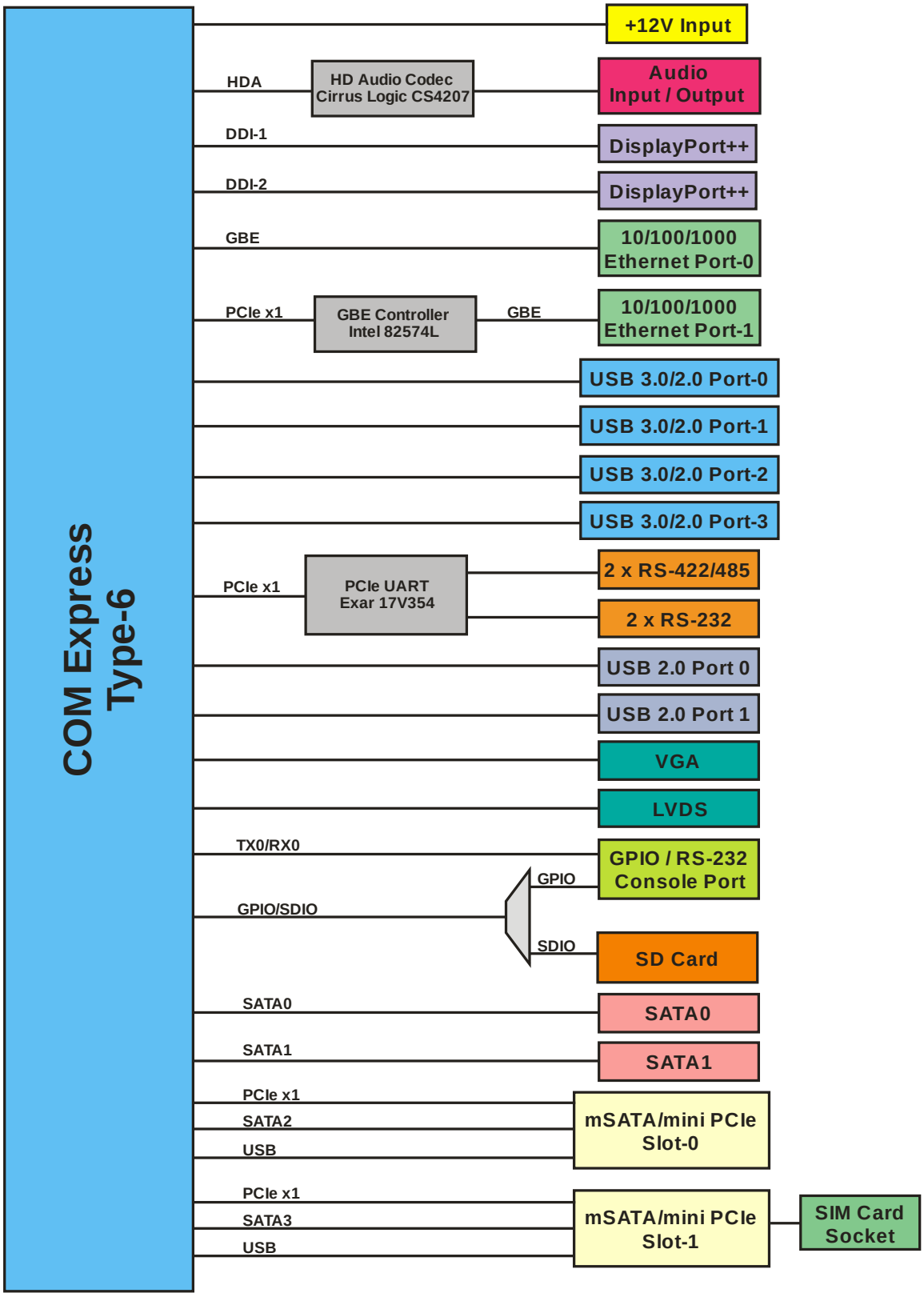
Product Features and Specifications

Specifications	
Compatibility	COM Express Type 6 Modules PICMG COM Express® COM.0 R2.0
Mini PCIe Expansion	2 x half or full length cards Both sockets have PCIe, USB and SATA signaling for mSATA operation 1 x SIM Card Expansion
Storage	4 x SATA ports: 2 x mSATA 2 x External Vertical Locking Connector
Network	2 x Gigabit Ethernet (10/10/1000) Ports 1 from COM Express 1 from on-board Intel 82574I PHY/Controller
GPIO	8-bit GPIO
USB	4 x USB 3.0 Ports (available only on the CCG012 model) 8 x USB 2.0 Ports (2 used for miniPCIe)
Display	2 x DisplayPort++ (DDI) interface Which can be used for DisplayPort, HDMI, DVI or VGA 1 x VGA (Analog/CRT) 1 x LVDS interface (single ch 24-bit, dual ch 48-bit)
Audio	HD Audio (Cirrus Logic CS4207 codec) 1 x stereo input 1 x stereo output
Serial	1 x Console RS-232 port (TX/RX) 2 x RS-232 (w/ full modem signals) 2 x RS-422/485
Misc External Interfaces	SMBus I2C Battery Low Indication PC speaker Interface System Status (S3 and Reset Outputs)
Power	Input: Single +12V input +/- 5% (5mm pitch terminal connector) On-board RTC Battery 3V 48mAh (with option to select from RTC external battery)
I/O Connectors	All low-profile shrouded **locking** ruggedized 2mm pitch headers. Can be mated to panel mountable cable set or MIL type connectors.
Detailed Mechanical Information	125mm x 95mm (x-y dims) Tallest top side component: 12mm **Download 3D model here**
Weight	96g
Operating Temperature	-40°C to +85°C
Warranty and Support	Lifetime Warranty and Free Technical Support

Part Numbers / Ordering Information

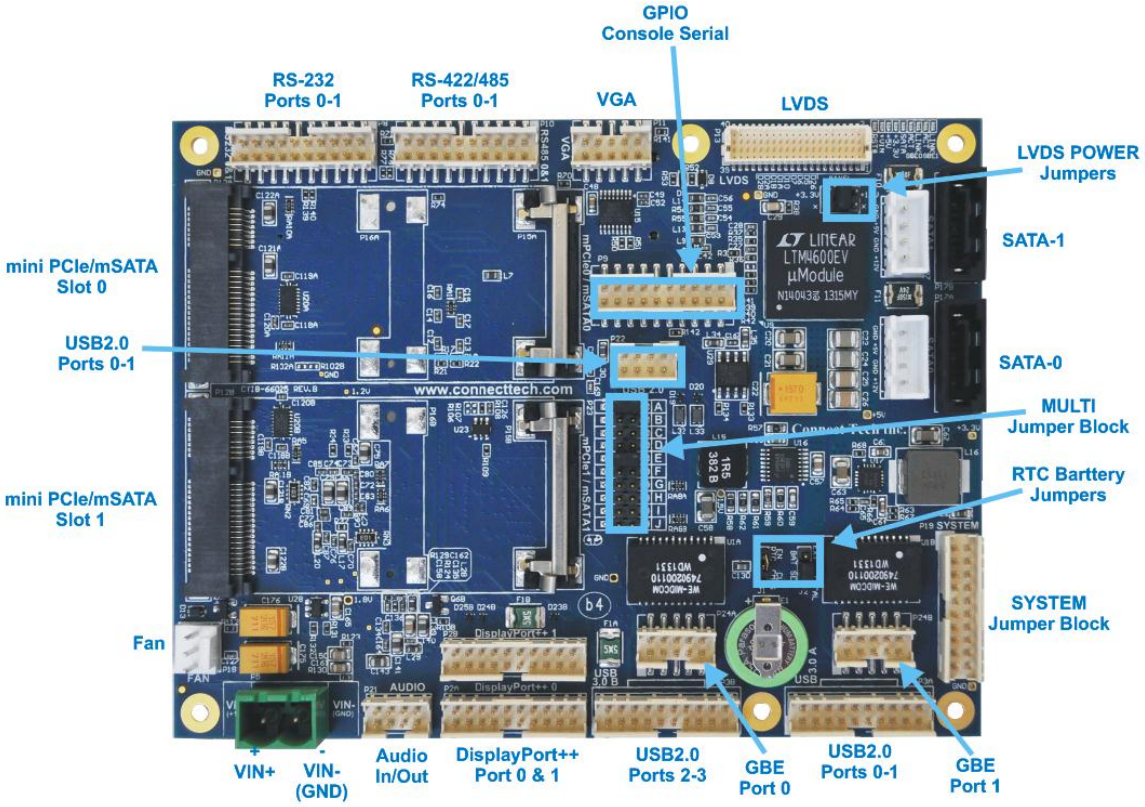
Part Number	
CCG011	USB 2.0 Only Model *(Lower overall mated cable assembly heights)*
CCG012	USB 3.0 Model

Block Diagram

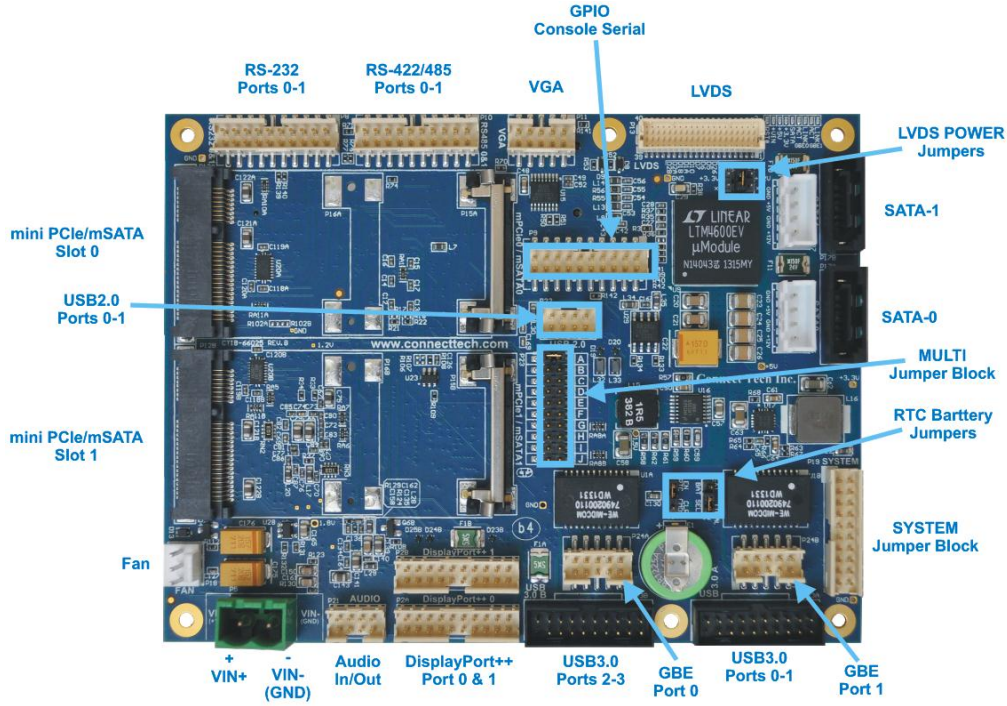


Connector Locations

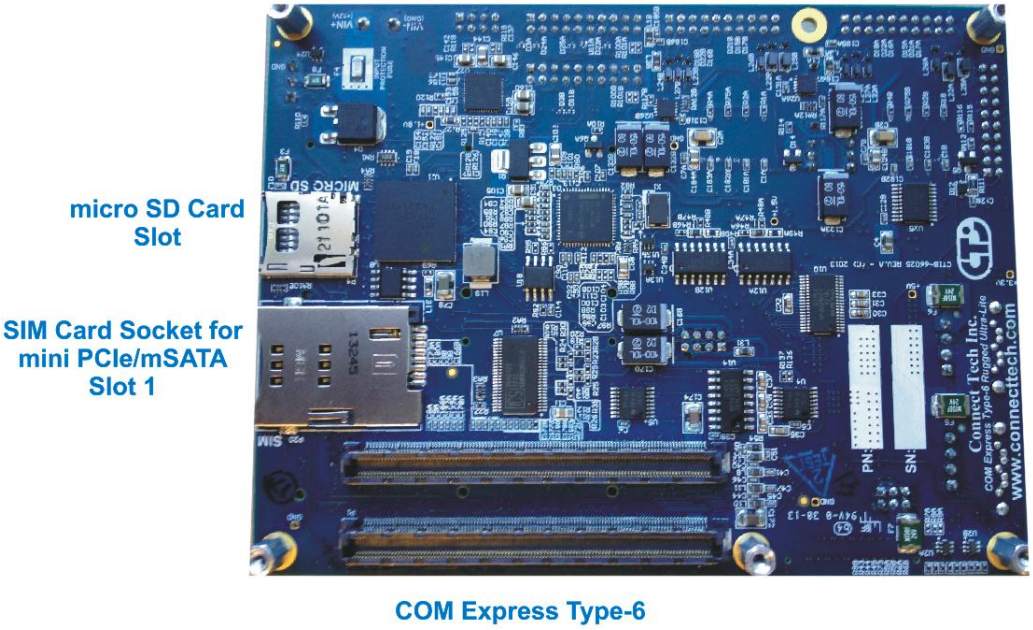
CCG011 - Top View



CCG012 - Top View



Bottom View



Jumper and Connector Summary

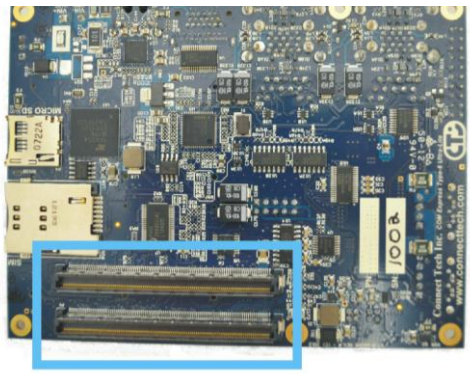
Designator	Description
P1	COM Express Connector,
P2A P2B	Display Port
P3A P3B	USB 3.0 Ports 0,1 USB 3.0 Ports 2,3
P4	Micro SD card.
P5	+12VDC Power In
P6, P7	SATA Power
P8	RS232 Ports 1&2
P9	GPIO and COM Express Type 6 simple serial
P10	RS485 Ports 3&4
P11	VGA
P12A, P12B	Dual mode MiniPCIe / mSATA
P13	LVDS
P14	-
P15,P16	Mini PCIe Retention Latches
P17A, P17B	SATA Signal Ports 1&2
P18	CPU FAN Power
P19	Reset, #S3, I2C, Power Button Misc
P20	Mini SIM card connector
P21	Stereo Audio In and Out
P22	2 x USB2.0 Internal Connector
P23	Misc Controls

Detailed Feature Pinouts and Descriptions

COM Express Module Connector [P1]

The processor and chipset are implemented on the COM Express Type 6 CPU module, which connects to the COM Express carrier via a Tyco fine pitch stacking connector.

Function	**COM Express interface**
Location	P1
Type	Tyco fine pitch stacking connector, part number: 3-5353652-6 8mm stack height.
Pinout	Refer to COM Express R2.0 specification, Type-6.



Note: 8mm standoffs are required to mount COM Express module.

DisplayPort ++ Video [P2A,P2B]

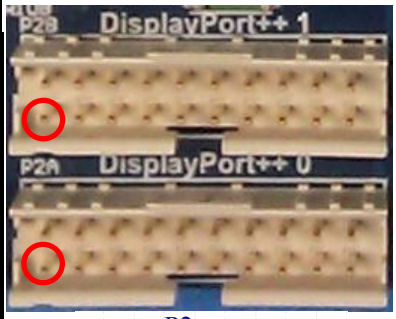
The *COM Express Type 6 Rugged Ultra-Lite Carrier* features two DisplayPort++ connectors. This can be configured to output DisplayPort, HDMI/DVI or even VGA through the use of a dongle.

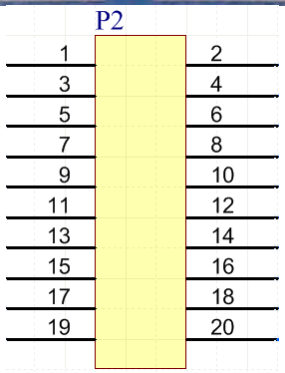
The configuration of each interface is setup via the COM Express module's BIOS settings. Refer to the COM Express module's documentation for more details.

Function	Main Input Power
Location	P2A, P2B
Type	FCI 98414-G06-20LF, 2x10 2mm
Cable	CBG124 (Rev A only)

Pinout

Pin	Description	Pin	Description
1	DP0+	2	DP3+
3	DP0-	4	DP3-
5	GND	6	GND
7	DP1+	8	DPAUX+ [2]
9	DP1-	10	DPAUX- [2]
11	GND	12	GND
13	DP2+	14	DP Hot Plug Detect
15	DP2-	16	GND
17	GND	18	GND
19	DP Power	20	DP AUX SEL [1]





*[1] – For **DP_AUX_SEL** – Cable assembly must tie high (+3.3V) for HDMI/DVI output and low (GND) for DisplayPort output.*
[2] DPAUX+/- will be swapped on future Revision to be compatible with CBG113

HDMI / DVI / VGA from DisplayPort++

The *COM Express Type 10 Mini Carrier*'s DisplayPort++ connector can be used for display outputs other than DisplayPort. The use of HDMI, DVI or VGA can be done through a simple dongle or cable assembly like the ones shown below. These can be purchased from any OEM vendor (such as www.startech.com) or directly through Connect Tech.

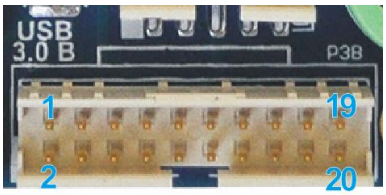
CCG011 - USB 2.0 Ports [P3A,P3B]

The CCG011 board houses 4 x USB 2.0 ports on 20-pin headers and 2 x USB 2.0 ports on 8-pin headers. Below is a description of the 20-pin USB 2.0 headers on the CCG011 carrier.

Function	**Dual, USB 2.0**
Locations	P3A, P3B
Type	FCI 98414-G06-20LF, 2x10 2mm
Cable	CBG130

Pinout

Pin	Description	Pin	Description
1	PORT A, VBUS	2	-
3	-	4	PORT B, VBUS
5	-	6	-
7	PORT A, GND	8	-
9	-	10	PORT B, GND
11	-	12	-
13	PORT A, GND	14	-
15	PORT A, D-	16	PORT B, GND
17	PORT A, D+	18	PORT B, D-
19	-	20	PORT B, D+



CCG012 - USB 3.0 Ports [P3A,P3B]

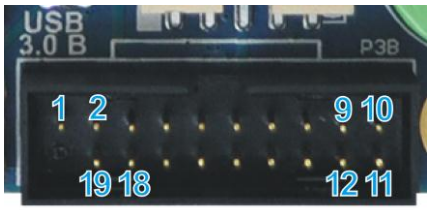
The CCG012 carrier implements four USB 3.0 connections via two 19-pin Locking Intel Motherboard style USB connectors. Over current protection, power supply filtering and ESD protection is provided.

Each USB 3.0 port is capable of bitrates of up to 5Gbps, as well as accepting USB2.0 and below connections.

Function	**Dual, USB 3.0**
Locations	P3A, P3B
Type	Intel Locking Motherboard Style 19-pin USB3.0 connector
Cable	CBG131 (Or any Standard USB 3.0 "Internal" 19-pin Motherboard Cable.) http://www.intel.com/content/www/us/en/io/universal-serial-bus/usb3-internal-connector-cable-specification.html

Pinout

Pin	Description	Pin	Description
-	-	1	P1-VBUS
19	P2-VBUS	2	P1-SSRX-
18	P2-SSRX-	3	P1-SSRX+
17	P2-SSRX+	4	GND
16	GND	5	P1-SSTX-
15	P2-SSTX-	6	P1-SSTX+
14	P2-SSTX+	7	GND
13	GND	8	P1-D-
12	P2-D-	9	P1-D+
11	P2-D+	10	-



MicroSD Card [P4]

The COM Express Ultra-Lite carrier provides a Micro SD Card Slot at P4. This Micro SD Card slot sources the SDIO interface from the COM Express modules GPIO pins.

** Note this SD card slot will ONLY operate if the COM Express module provides the SDIO interface over the GPIO pins. See below for the SDIO / GPIO mapping **

Also ensure **MULTI-JUMPER position "B"** is installed to select the SDIO interface.

Function	Micro SD Card Slot
Locations	P4
Type	Micro SD Card Socket Molex 502570-0893
Pinout	

Pin	SDIO Signal	COM Express GPIO Mapping
1	SD_D2	GPI2
2	SD_D3	GPI3
3	SD_CMD	GPO1
4	SD_VCC (+3.3V)	-
5	SD_CLK	GPO0
6	GND	-
7	SD_D0	GPI0
8	SD_D1	GPI1
9	GND	-
10	SD_CD#	GP03

micro SD Card Slot

Input Power [P5]

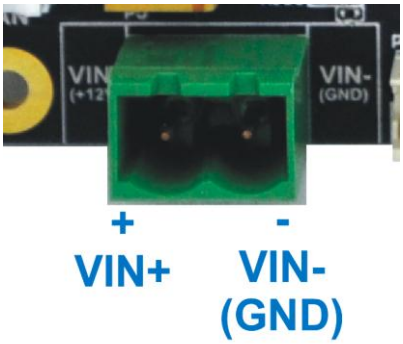
The COM Express carrier is designed to be powered from a regulated single +12V power supply. The carrier board features a 5mm screw terminal style connector. The COM Express carrier generates all of the necessary voltages on board from this single input.

A Panasonic BR1225A/FA Lithium battery provides the VBAT for the RTC Clock of the COM Express module.

Function	Main Input Power
Location	P5
Range	11.4 VDC to 12.6 VDC (+/-5%). Recommend no less than 12VDC at terminal block input.
Type	2 Position 5mm pitch terminal connector mating PN: **20020111-G021A01LF**
Fuse	+12V is protected with a one-time 10A fuse, at F4.
Pinout	

Pin	Signal	Description
1	+12V	Power In
2	GND	Power Return

***DO NOT REVERSE POLARITY!**



Asynchronous Serial Ports [P8, P10]

The COM Express Ultra-Lite carrier features four "external" serials ports. Port1 and Port2 are standard RS-232 and Port3 and Port4 can be configured as RS-422/485. These serial ports are generated from on-board PCIe 4-port UART the Exar 17V358 (Connect Tech's BlueStorm/Express Circuitry).

Software Support for the Exar 17V358

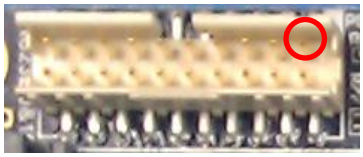
Additional drivers will be needed to properly operate the 4 additional serial ports on the COM Express carrier. Drivers for this functionality can be found on Connect Tech's download zone here: http://www.connecttech.com/asp/Support/DownloadZone_results.asp?Product=3&OperatingSystem=IS+NOT+NULL&x=16&y=13

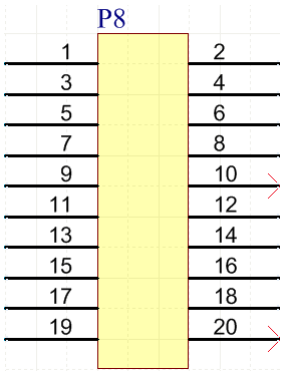
Serial Connector RS-232

Function	RS232 Serial
Location	P8
Type	FCI 98424-G52-20LF, 2x10 2mm
Cable	CBG121

Pinout

Pin	Description	Pin	Description
1	Port A, DCD	2	Port A, DSR
3	Port A, RXD	4	Port A, RTS
5	Port A, TXD	6	Port A, CTS
7	Port A, DTR	8	Port A, RI
9	GND	10	-
11	Port B, DCD	12	Port B,DSR
13	Port B,RXD	14	Port B,RTS
15	Port B,TXD	16	Port B,CTS
17	Port B,DTR	18	Port B,RI
19	GND	20	-

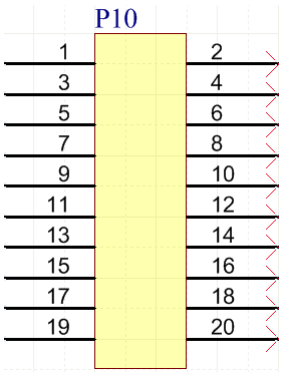




Serial Connector RS-422/485

Function	**RS485 Serial**
Location	**P10**
Type	FCI 98424-G52-20LF, 2x10 2mm
Pinout	

Pin	Description
1	Port A, RXD+
3	Port A, TXD+
5	Port A, TXD-
7	Port A, RXD-
9	GND
11	Port B,RXD+
13	Port B,TXD+
15	Port B,TXD-
17	Port B,RXD-
19	GND

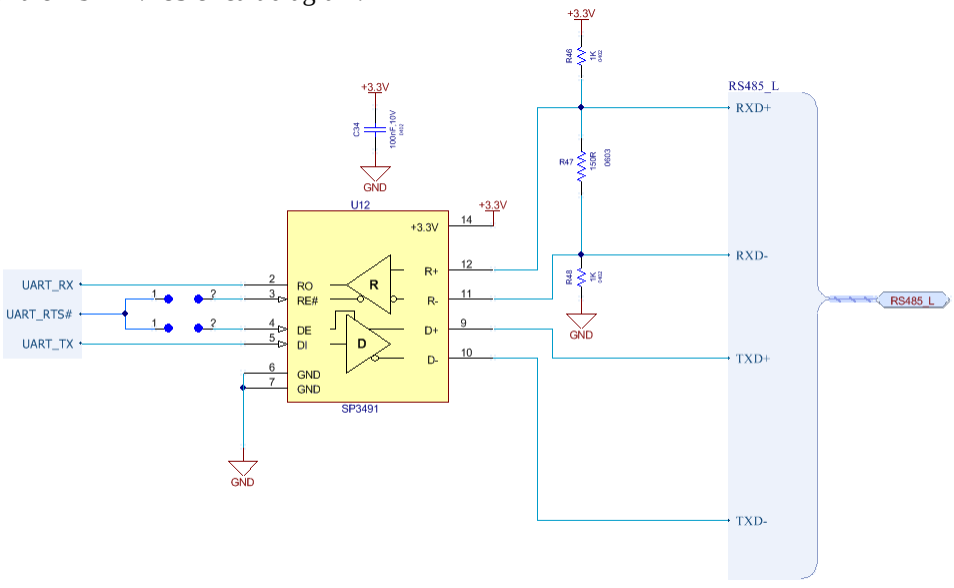


RS485 Control Jumpers

The RS485 Control Jumpers are used for implementing the following RS485 modes of operations:

- ½ Duplex Multidrop
- Full Duplex Multidrop

The UART RTS signals can used for TX/RX control and can be enable via the MULTI jumper block. See below for the RS-422/485 circuit diagram.



sample circuit shown (not exact circuit that is on-board)

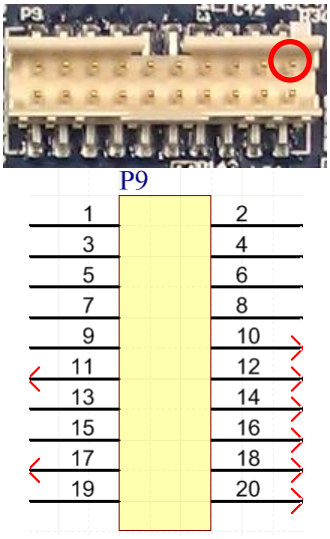
GPIO and Console Serial Port [P9]

The COM Express Ultra-Lite carrier provides additional functionality of COM Express Type-6 specification.

Function	**Console RS-232 / GPIO**
Locations	P9
Type	FCI 98424-G52-20LF
Cable	CBG121

Pinout

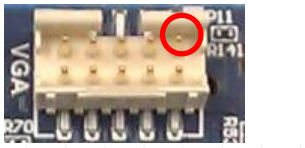
Pin	Description	Pin	Description
1	GPIO Input 0	2	GPIO Output 3
3	GPIO Input 1	4	GPIO Output 2
5	GPIO Input 2	6	GPIO Output 1
7	GPIO Input 3	8	GPIO Output 0
9	GND	10	-
11	-	12	-
13	RS-232 RX	14	-
15	RS-232 TX	16	-
17	-	18	-
19	GND	20	-

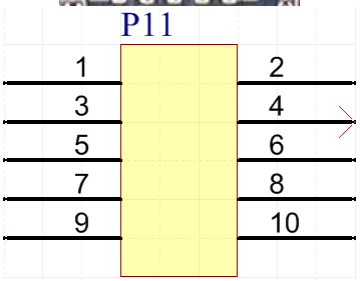


VGA Video [P11]

Function	Standard VGA
Location	P11
Type	FCI 98424-G52-10LF, 2x5 2mm header
Cable	CBG120
Pinout	

Pin	Description	Pin	Description
1	Red	2	GND
3	Green	4	-
5	Blue	6	SC DDC
7	HSYNC	8	SD DDC
9	VSYNC	10	GND



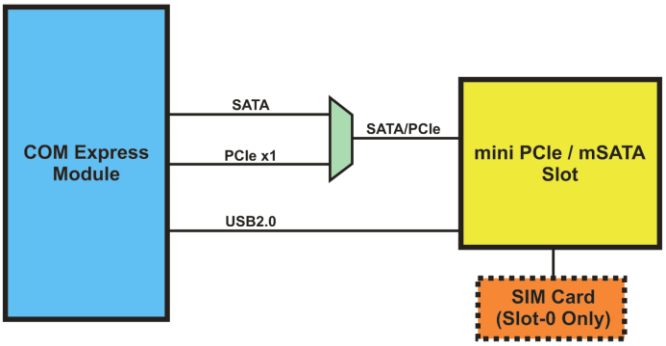


miniPCIe & mSATA Slots [P12A, P12B]

Dual Function miniPCIe mSATA Slots

The COM Express Ultra-Lite has two special dual purpose functionality mini PCIe / mSATA slots. Each of these slots can accept either a mini PCIe module or a mSATA SSD module. These slots have special circuitry that allows for the selection between connecting PCIe lanes or SATA lanes.

Each of these slots are also provided with a USB 2.0 in addition to the PCIe as per the mini PCIe specification, see below for a block diagram of the slots functionality.



PCIe / SATA Dual Functionality Diagram

Selection between mSATA and miniPCIe is done on the MULTI-JUMPER block (P23)

Position	Jumper ON	Jumper OFF
C	Slot-0 miniPCIe selected	Slot-0 mSATA selected
D	Slot-1 miniPCIe selected	Slot-1 mSATA selected

Half and Full Length mini PCIe / mSATA module Installation

The COM Express Ultra-Lite come populated by default with its latches in the full length position. If you wish install a half-length module you must use a half-to-full length bracket like shown below. If you would prefer to have a slot or both populated with half at the time of your production order please contact sales@connecttech.com for further details.

Function	**mini PCIe / mSATA Slots**	** photo here **
Locations	**P12A, P12B**	
Type		

Pinout

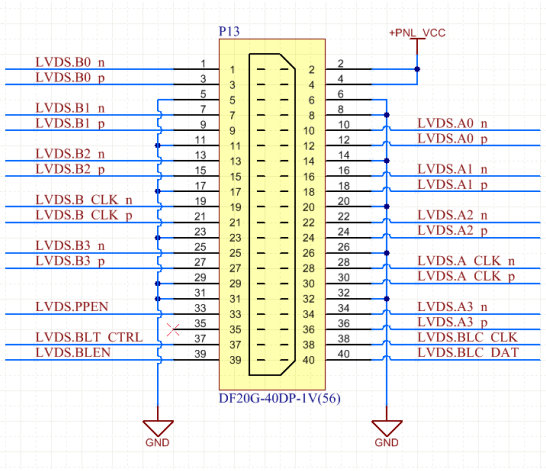
mSATA Pinout

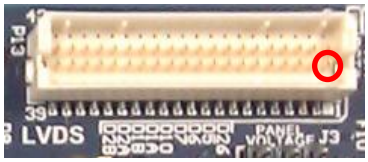
Pin Number	Description
1	NC
2	+3.3V
3	NC
4	GND
5	NC
6	+1.5V
7	NC
8	NC
9	GND
10	NC
11	NC
12	NC
13	NC
14	NC
15	GND
16	NC
17	NC
18	GND
19	NC
20	NC
21	RESV
22	NC
23	SATA TX+ To Host System
24	+3.3V
25	SATA TX- To Host System
26	GND
27	GND
28	+1.5V
29	GND
30	NC
31	SATA RX- From Host System
32	NC
33	SATA RX+ From Host System
34	GND
35	GND
36	NC
37	GND
38	NC
39	+3.3V
40	GND
41	+3.3V
42	NC
43	RESV
44	NC
45	NC
46	NC
47	NC
48	+1.5V
49	NC
50	GND
51	NC
52	+3.3V

miniPCIe Pinout

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

LVDS Video [P13]

Function	LVDS Video
Location	P11
Type	Hirose DF20G-40DP-1V(56)
Pinout	



External SATA Ports [P17A,P17B]

The COM Express carrier provides two SATA HDD connections as well as external power connectors for each drive.

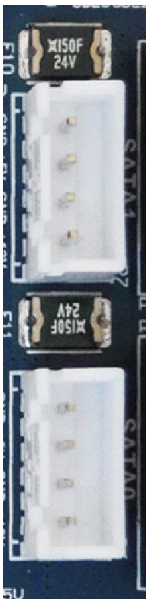
Function	**SATA host**
Locations	P17A – SATA – 0 P17B – SATA - 1
Type	Industry standard vertical entry SATA host connector with locking.
Cable	CBG090
Pinout	

Pin	Description
1	GND
2	SATA_TX_P
3	SATA_TX_N
4	GND
5	SATA_RX_N
6	SATA_RX_P
7	GND

Function	**SATA HDD Power**
Locations	P6, P7
Carrier Connector PN	B4B-XH-AM(LF)(SN)(P) Manufacturer: JST
Mating Connector PN	XHP-4 Manufacturer: JST
Mating CTI Cable PN	CBG090
Pinout	

Pin	Description
1	GND (Black)
2	+5V (Red)
3	GND (Black)
4	+12V (Yellow)

+12V and +5V are protected with 1200mA Raychem Poly fuses.

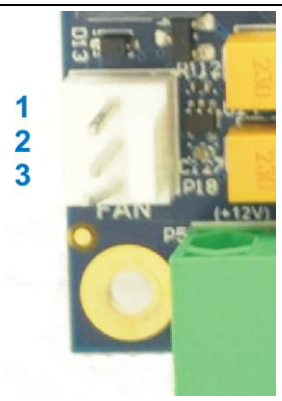


Note: The SATA power connectors are fused independently from the main +12V fuse that provides +12V power to the board, i.e. the SATA power connectors are not double fused.

CPU Fan [P18]

Function	Fan Power
Location	P18
Type	Molex 22-23-2031
Pinout	

Pin	Signal
1	Fan Tach
2	+V
3	GND

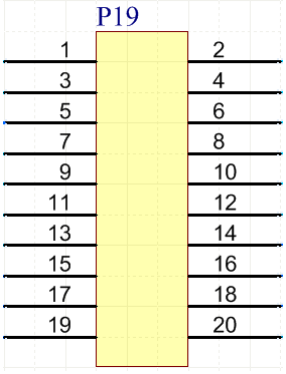


Miscellaneous Control [P19]

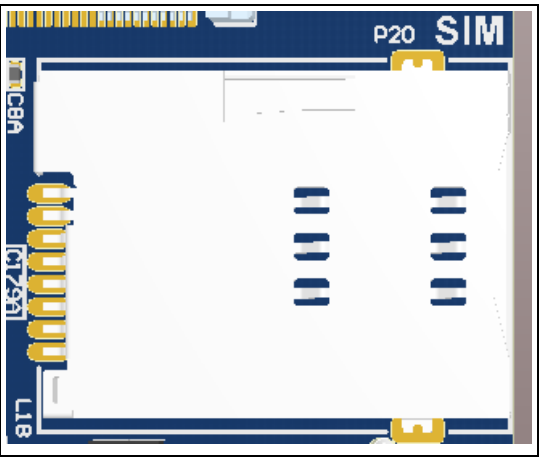
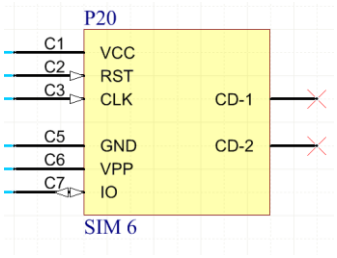
This misc header can be used to connect power button, reset button, PC speaker, I2C device and monitor other power rails. Aswell it provides the option of jumpering the +5V rail to the +5VSB rail which may be needed by some modules.

Function	Miscellaneous Control Header
Location	P19
Type	FCI 98414-G06-20LF, 2x10 2mm
Cable	CBG116
Pinout	

Pin	Description	Pin	Description
1	+5V	2	Speaker
3	+5V	4	+5VSB
5	Ext CMOS Bat	6	GND
7	System Reset	8	GND
9	Power Button	10	GND
11	Batlow#	12	GND
13	Sus_S3#	14	GND
15	I2C.CLK	16	GND
17	I2C.DAT	18	GND
19	+5V	20	GND



SIM Socket [P20]

Function	SIM Socket	
Location	P20	
Type	Molex 0475530001	
Pinout		

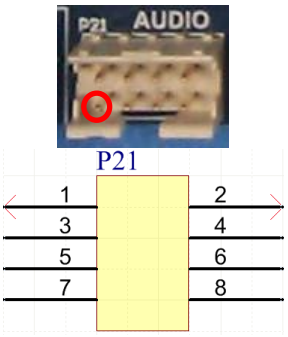
Audio Interface [P21]

The *COM Express Type 10 Mini Carrier* features HD Audio capabilities care of the Cirrus Logic CS4207 Codec device. From the codec 1 input (microphone) and 1 output (headphone) are available.

Function	**Audio Connector**
Locations	P21
Type	FCI 98424-G52-10LF
Cable	CBG118

Pinout

Pin	Description	Pin	Description
1	-	2	-
3	Mic R	4	Mic L
5	GND	6	GND
7	Head Phone R	8	Head Phone L



Software Support for the CS4207

The audio codec used on the carrier board is the CS4207 from Cirrus Logic.

Additional drivers will be needed to properly operate audio on the COM Express carrier. Some downloadable links can be found below.

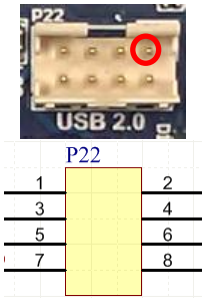
Windows XP Driver: http://www.cirrus.com/en/pubs/software/CS4207_WinXP_1-0-0-38.zip
Windows 7/Vista Driver: http://www.cirrus.com/en/pubs/software/CS4207_WinVista_Win7_32-64-bit_6-6001-1-30.zip
Linux Driver: Included in kernels 2.6.30 and up.

USB 2.0 Ports [P22]

The *COM Express Type 10 Mini Carrier* has 6 external USB 2.0 ports. Each of these are directly sourced from the COM Express Type 10 module and do not go through any external hubs or bridges.

Function	**USB 2.0**
Locations	P22
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



*[1] – **B-VBUS** – This voltage can be disable for USB Client mode on USB port 6, by un-installing jumper J23 position A.*

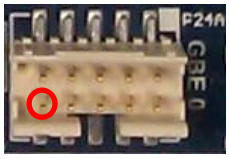
10/100/1000 Ethernet (GBE) [P24A, P24B]

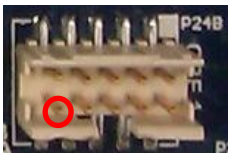
The COM Express carrier features dual 10/100/1000 Ethernet Ports.
GBE Port 0 is coming from an Intel 82574 PCIe PHY Controller located on the carrier.
GBE Port 1 is coming directly from the COM Express module.

Function	**LAN Connector**
Locations	P24A, P24B
Type	FCI 98424-G52-10LF
Cable	CBG128

Pinout

Pin	Description	Pin	Description
1	MX4+	2	MX4-
3	MX3+	4	MX3-
5	SHELL	6	SHELL
7	MX2+	8	MX2-
9	MX1+	10	MX1-





Ignore the silk screen pin 1 indicator

Software Support for the Intel 82574

Additional drivers will be needed to properly operate the GBE Port 0 on the COM Express 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&ProductProduct=Intel%C2%AE+82574+Gigabit+Ethernet+Controller

Multifunction Jumper Block

The COM Express Type-6 Ultra-Lite Carrier has a multi-function jumper that provides control for various interfaces and features. The "MULTI" jumper is located at P23.

Below are the full details of the MULTI jumper block functionality.

Position	Description	JUMPER IN	JUMPER OFF
A	USB Port-7 Client/Host	Port-7 USB Host enabled. Power connected	Port-7 USB Client enabled. Power Disconnected
B	SD Card / GPIO Mux	SD Card Functionality is enabled	GPIO Functionality is enabled
C	mSATA / miniPCIe Slot-0 Selection	miniPCIe enabled	mSATA enabled
D	mSATA / miniPCIe Slot-1 Selection	miniPCIe enabled	mSATA enabled
E	PCIe UART EEPROM	Enable PCIe UART EEPROM	Disable PCIe UART EEPROM
F	PCIe UART - TRI State Enable	Enable TRI-State control for PCIe UART	Disable TRI-State control for PCIe UART
G	PCIe UART - 485 Port 0 - RTS-TX Control	Enable RS-485 Port-0 RTS-TX Control	Disable RS-485 Port-0 RTS-TX Control
H	PCIe UART - 485 Port 0 - RTS-RX Control	Enable RS-485 Port-0 RTS-RX Control	Disable RS-485 Port-0 RTS-RX Control
I	PCIe UART - 485 Port 1 - RTS-TX Control	Enable RS-485 Port-1 RTS-TX Control	Disable RS-485 Port-1 RTS-TX Control
J	PCIe UART - 485 Port 1 - RTS-RX Control	Enable RS-485 Port-1 RTS-RX Control	Disable RS-485 Port-1 RTS-RX Control

Note: Highlighted cell are the recommended default settings

Typical Hardware Installation for +12V power input

1. Ensure all external system power supplies are off.

2. Install the COM Express module into P1. Be sure to follow the manufacturer's direction for proper heatsink/heatspreader installation and any other cooling instructions from the manufacturer.

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

   a) +12V Power cable to the input power connector.
   b) Connect a video display cable VGA, HDMI, DisplayPort or LVDS.
   c) Keyboard and mouse via USB
   d) SATA Power and Signal to SATA HDD

   For the relevant cables, see the Cables & Interconnect section of this manual

4. Connect the power cable to power supply

5. Switch on the power supply. DO NOT power up your COM Express system by plugging in live power.

Current Consumption Details

Below are the maximum ratings of the carrier.

Maximums	Amps	Watts
Theoretical absolute maximum total draw of all functionality on the carrier board (this value excludes current draw from module)	4.00 A	48 W
Safety Protected Maximum Current Draw Rating for Module and Carrier (from in-line fuse)	10.00 A	120 W

Below are some examples of actual measurements taken with the COM Express Ultra-Lite Carrier running in various test setups. Some values will change depending on what COM Express module is installed, please refer to the module manufactures manual for full details on the current consumption of the particular module you are using.

Actual Measurements	Amps	Watts
Carrier standalone no module installed, powered ON, with no loads	0.16 A	1.92 W
Module Installed[1], single DDI video output, USB keyboard with system sitting in BIOS	1.29 A	15.48 W
Module Installed[1], single DDI video output, USB keyboard, booted Linux running CPU stress test	2.60 A	31.20 W
Module Installed[1], dual DDI video output, 4 x USB 3.0 devices installed, 2 x USB2.0 devices installed, mSATA installed, miniPCIe installed, audio in/out running, dual GBE running and CPU stress test	3.10 A	37.2 W

Note [1] : COM Express Type-6 Module used for measurements - Intel Core i5 Ivy Bridge 2700MHz Quad- Core Processor with QM77 chipset.

PCI Express Allocation Details

Below is a listing of how the PCI Express Links are allocated on the carrier board.

COM Express PCI Express Link	Peripheral Connection
PCIe x1 - 0	PCIe UART (Exar 17V354)
PCIe x1 - 1	miniPCIe / mSATA Slot 0
PCIe x1 - 2	miniPCIe / mSATA Slot 1
PCIe x1 - 3	PCIe GBE PHY (Intel 82574)
PCIe x1 - 4	No Connect
PCIe x1 - 5	No Connect
PCIe x1 - 6	No Connect
PCIe x1 - 7	No Connect
PEG /PCIe x16	No Connect

USB Allocation Details

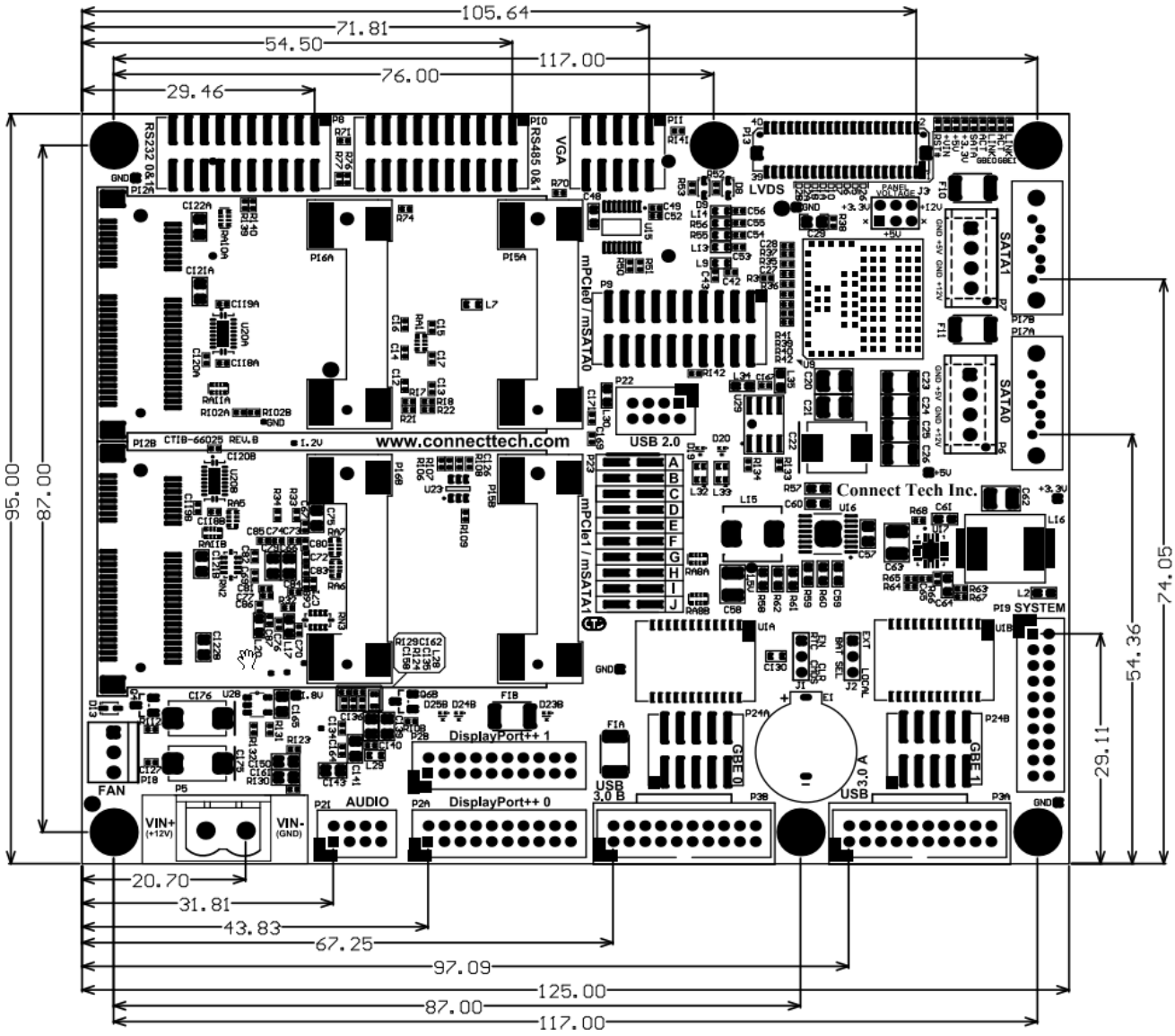
Below is a listing of how the USB Ports are allocated on the carrier board.

COM Express USB Port	Peripheral Connection
USB 3.0 Port 0	USB 3.0 A Connector (P3A)
USB 3.0 Port 1	USB 3.0 A Connector (P3A)
USB 3.0 Port 2	USB 3.0 B Connector (P3B)
USB 3.0 Port 3	USB 3.0 B Connector (P3B)
USB 2.0 Port 0	USB 3.0 A Connector (P3A)
USB 2.0 Port 1	USB 3.0 A Connector (P3A)
USB 2.0 Port 2	USB 3.0 B Connector (P3B)
USB 2.0 Port 3	USB 3.0 B Connector (P3B)
USB 2.0 Port 4	miniPCIe / mSATA Slot 0
USB 2.0 Port 5	miniPCIe / mSATA Slot 1
USB 2.0 Port 6	USB 2.0 Connector (P22)
USB 2.0 Port 7	USB 2.0 Connector (P22)

Mechanical Details

A complete **3D STEP Model** file of carrier board can be downloaded here:
http://www.connecttech.com/ftp/3d_models/CCG011_3D_MODEL.zip

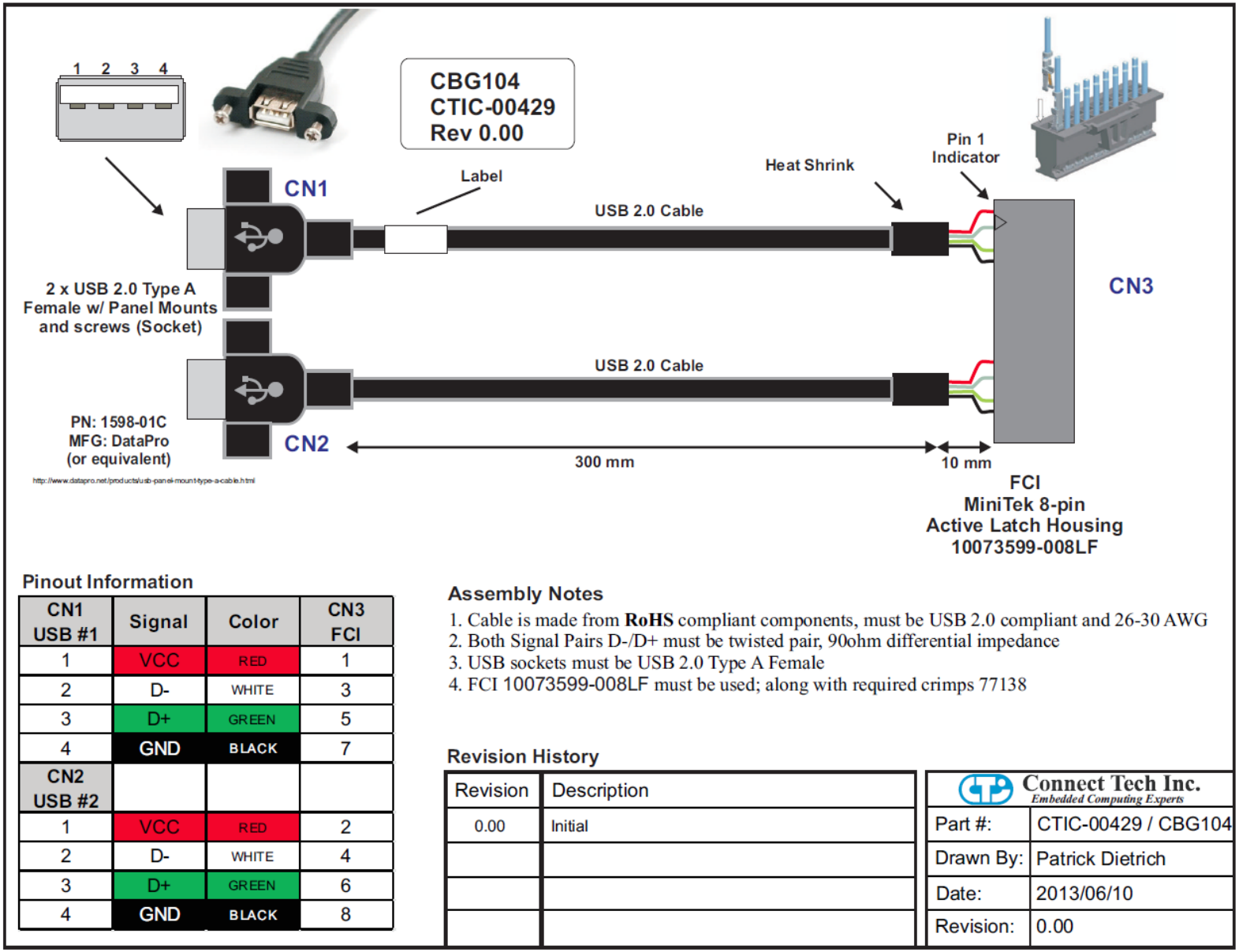
2D Mechanical Dimensioned Drawing (Top and Bottom Views) - All dimension are in (mm)



Cables and Cable Kit Information

Drawing No.	Part No.	Description	**CKG020** CCG011 **Full Kit**	**CKG022** CCG012 **Full Kit**	**CKG021** CCG011 / CCG012 **Starter Kit**
CTIC-00347 REV 0.00	CBG090	SATA HDD + Power cable	2	2	1
CTIC-00379 REV 0.00	CBG120	VGA to 10-pin Minitek Cable	1	1	1
CTIC-00380 REV 0.00	CBG121	Dual DB9 to 20-pin Minitek Cable	3	3	-
CTIC-00429 REV 0.00	CBG104	Dual USB 2.0 to 8-Pin Minitek Cable	1	1	1
CTIC-00432 REV 0.00	CBG113	DisplayPort to 20-pin Minitek Cable	2	2	-
CTIC-00433 REV 0.00	CBG117	RJ-45 to 10-pin Minitek Cable	2	2	1
CTIC-00434 REV 0.00	CBG118	Dual Audio to 8-Pin Minitek Cable	1	1	-
CTIC-00435 REV 0.00	CBG116	System-Misc to 20-pin Minitek Cable	1	1	-
CTIC-00488 REV 0.00	CBG130	Dual USB 2.0 to 20-pin Minitek Cable	2	-	-
OEM	CBG131	Dual USB 3.0 to 20-pin Locking Intel Style Header	-	2	-
OEM	CBG125	LVDS, DF20A-40DS to un-terminated wires	-	-	-

CBG104 – Dual USB 2.0 (8-pin version)



Pinout Information

CN1 USB #1	Signal	Color	CN3 FCI
1	VCC	RED	1
2	D-	WHITE	3
3	D+	GREEN	5
4	GND	BLACK	7
CN2 USB #2			
1	VCC	RED	2
2	D-	WHITE	4
3	D+	GREEN	6
4	GND	BLACK	8

Assembly Notes

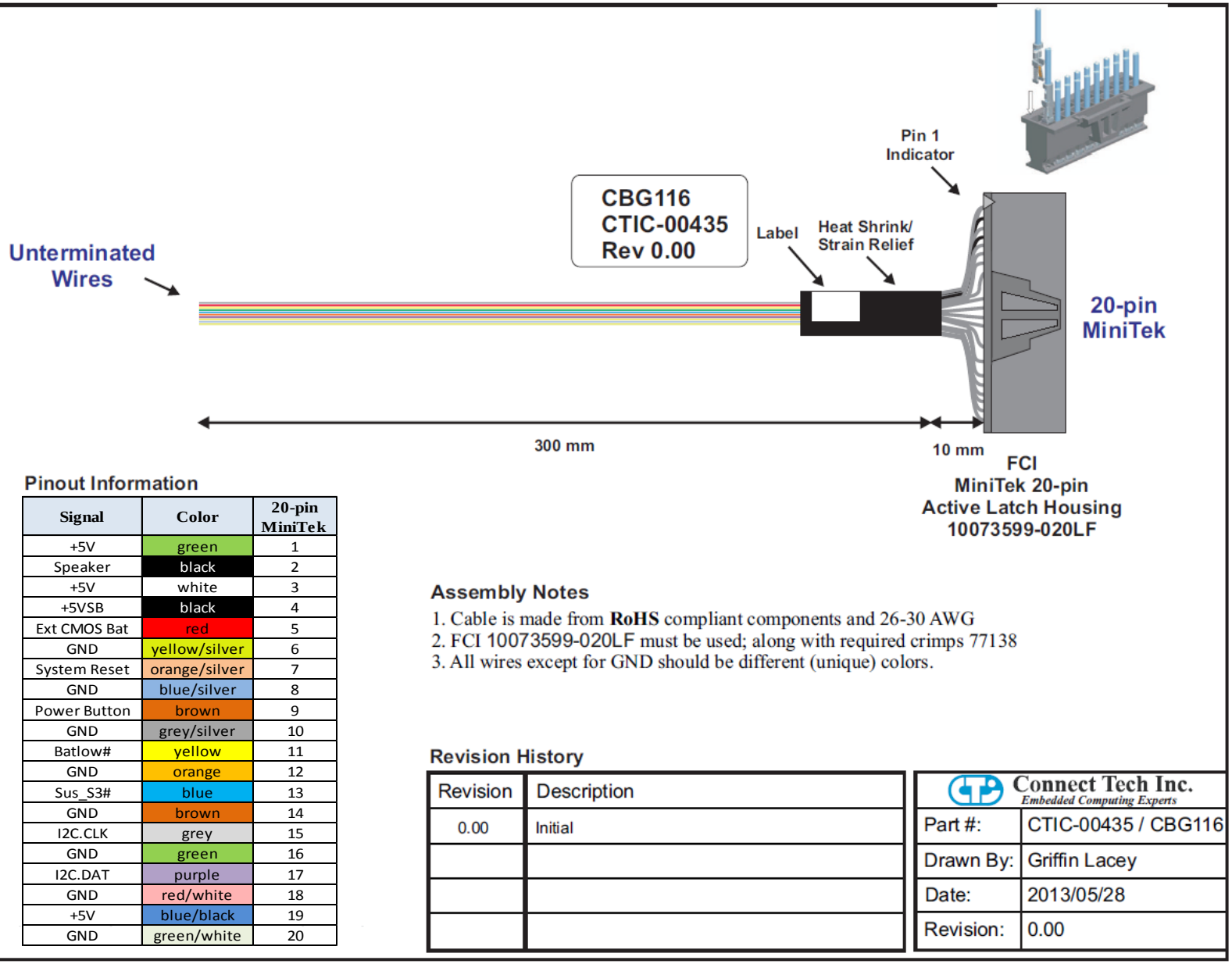
1. Cable is made from **RoHS** compliant components, must be USB 2.0 compliant and 26-30 AWG
2. Both Signal Pairs D-/D+ must be twisted pair, 90ohm differential impedance
3. USB sockets must be USB 2.0 Type A Female
4. FCI 10073599-008LF must be used; along with required crimps 77138

Revision History

Revision	Description
0.00	Initial

Connect Tech Inc. *Embedded Computing Experts*	
Part #:	CTIC-00429 / CBG104
Drawn By:	Patrick Dietrich
Date:	2013/06/10
Revision:	0.00

CBG116 – System Misc , Un-terminated



Pinout Information

Signal	Color	20-pin MiniTek
+5V	green	1
Speaker	black	2
+5V	white	3
+5VSB	black	4
Ext CMOS Bat	red	5
GND	yellow/silver	6
System Reset	orange/silver	7
GND	blue/silver	8
Power Button	brown	9
GND	grey/silver	10
Batlow#	yellow	11
GND	orange	12
Sus_S3#	blue	13
GND	brown	14
I2C.CLK	grey	15
GND	green	16
I2C.DAT	purple	17
GND	red/white	18
+5V	blue/black	19
GND	green/white	20

Assembly Notes

1. Cable is made from **RoHS** compliant components and 26-30 AWG
2. FCI 10073599-020LF must be used; along with required crimps 77138
3. All wires except for GND should be different (unique) colors.

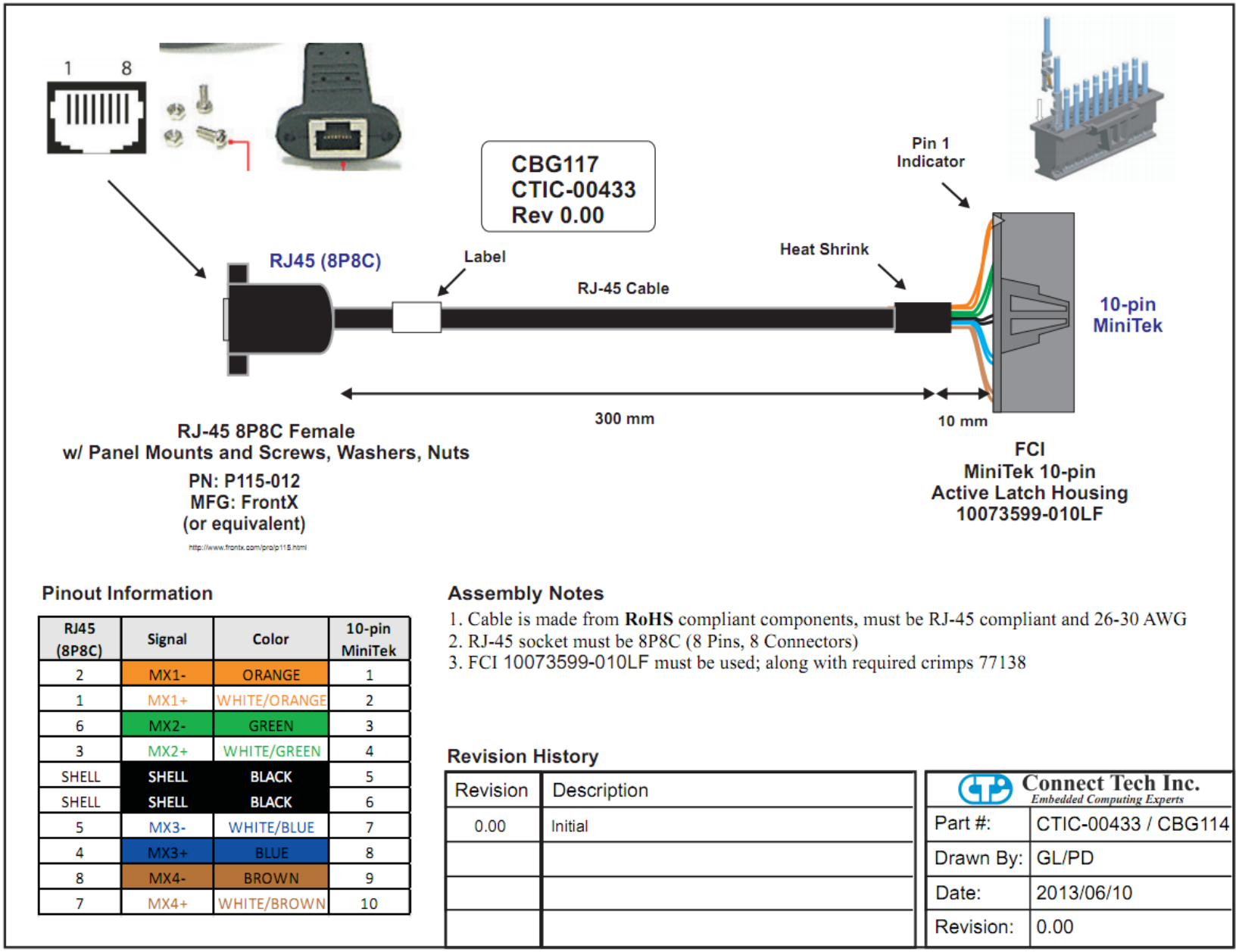
Revision History

Revision	Description
0.00	Initial

Connect Tech Inc.
Embedded Computing Experts

Part #:	CTIC-00435 / CBG116
Drawn By:	Griffin Lacey
Date:	2013/05/28
Revision:	0.00

CBG117 – RJ45 Ethernet



Pinout Information

RJ45 (8P8C)	Signal	Color	10-pin MiniTek
2	MX1-	ORANGE	1
1	MX1+	WHITE/ORANGE	2
6	MX2-	GREEN	3
3	MX2+	WHITE/GREEN	4
SHELL	SHELL	BLACK	5
SHELL	SHELL	BLACK	6
5	MX3-	WHITE/BLUE	7
4	MX3+	BLUE	8
8	MX4-	BROWN	9
7	MX4+	WHITE/BROWN	10

Assembly Notes

1. Cable is made from **RoHS** compliant components, must be RJ-45 compliant and 26-30 AWG
2. RJ-45 socket must be 8P8C (8 Pins, 8 Connectors)
3. FCI 10073599-010LF must be used; along with required crimps 77138

Revision History

Revision	Description
0.00	Initial

Connect Tech Inc. Embedded Computing Experts	
Part #:	CTIC-00433 / CBG114
Drawn By:	GL/PD
Date:	2013/06/10
Revision:	0.00

CBG118 – Audio

Assembly Notes

1. Cable is made from **RoHS** compliant components and wires must be 26-30 AWG
2. FCI 10073599-008LF must be used; along with required crimps 77138

Pinout Information

Dual 3.5mm Audio Jacks	Signal	Color	8-pin MiniTek
-	-	-	1
-	-	-	2
JACK1 - Ring	MIC-R	RED	3
JACK1 - Tip	MIC-L	WHITE	4
JACK1 - Sleeve	GND	BLACK	5
JACK2 - Sleeve	GND	BLACK	6
JACK2 - Ring	HPOUT-R	RED	7
JACK2 - Tip	HPOUT-L	WHITE	8

Revision History

Revision	Description
0.00	Initial

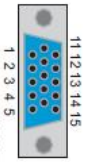
Connect Tech Inc. Embedded Computing Experts	
Part #:	CTIC-00434 / CBG118
Drawn By:	GL/PD
Date:	2013/06/10
Revision:	0.00

CBG120 - VGA

VGA - HD-15 Female Panel Mount Connector with moulding/cover and hex nut screws

Any of the below or equivalents can be used

Manufacturer	Part Number
Assman	A-HDF15LL-TL-B-R
Sullins	SDS104-PRW2-F15-SN00-1
FCI	10090770-S154ALF
Norcomp	180-015-202L001



CBG120
CTIC-00379
Rev 0.00

Label

CN1

VGA Cable (Any color can be used)
Ribbon type or Insulated Wire Assembly

Pin 1 Indicator

CN2

Heat Shrink

300 mm (+/- 25%)

10 mm

FCI
MiniTek 10-pin
Active Latch Housing
10073599-010LF
crimps: 77138

Pinout Information

CN1 VGA (HD-15)	Signal	CN2 10 Pin Header
1	RED	1
2	GREEN	3
3	BLUE	5
4	NC	-
5	GND	10
6	GND	2
7	GND	2
8	GND	2
9	NC	-
10	GND	10
11	NC	-
12	DDC DATA	8
13	HSync	7
14	VSync	9
15	DDC CLK	6

Assembly Notes

- Cable must be made from **RoHS** compliant components
- Wires must be 26-30 AWG
- Hex nut screws on CN1 must be installed

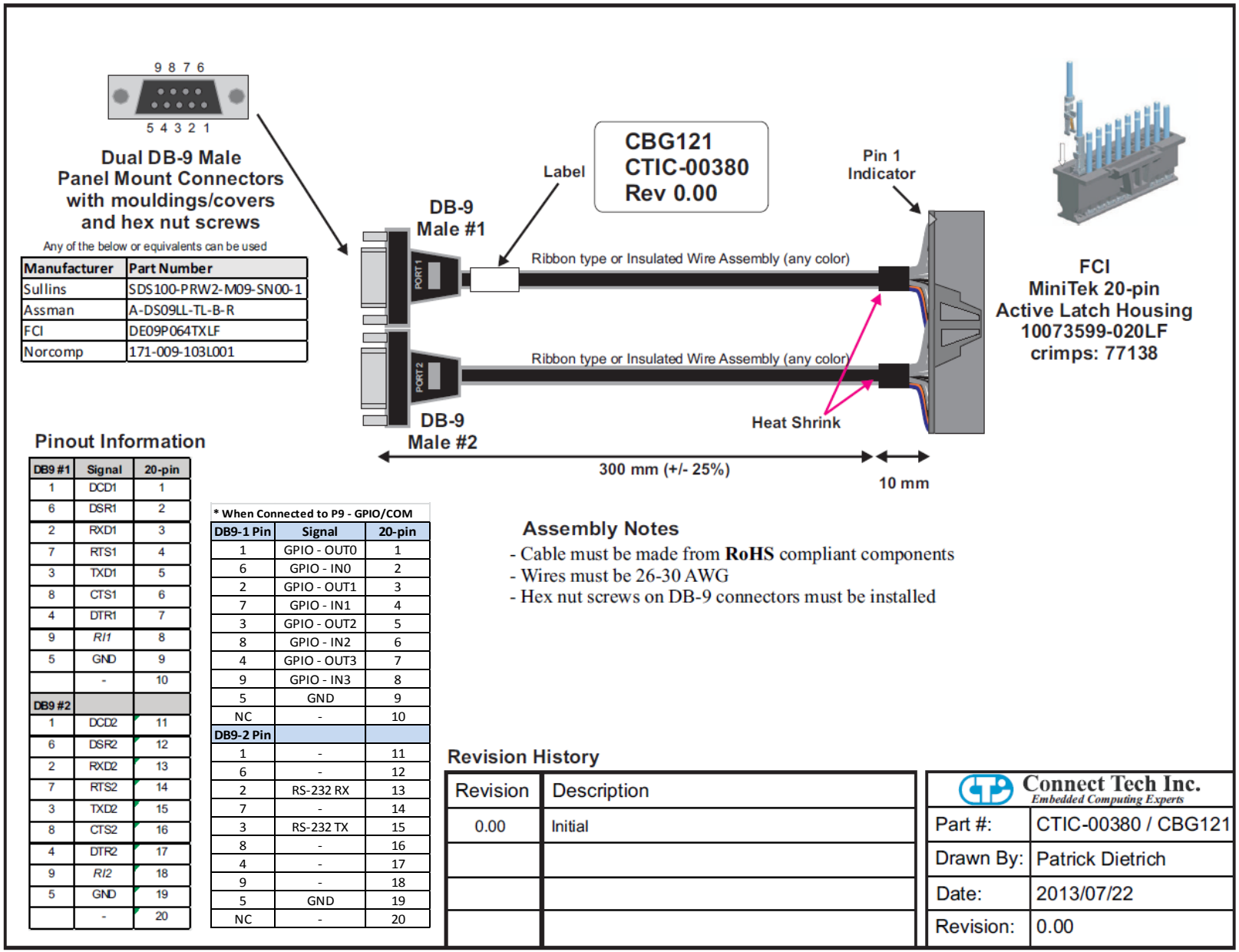
Revision History

Revision	Description
0.00	Initial

Connect Tech Inc.
Embedded Computing Experts

Part #:	CTIC-00379 / CBG120
Drawn By:	Patrick Dietrich
Date:	2013/07/22
Revision:	0.00

CBG121 – Dual DB-9 Serial



Any of the below or equivalents can be used

Manufacturer	Part Number
Sullins	SDS100-PRW2-M09-SN00-1
Assman	A-DS09LL-TL-B-R
FCI	DE09P064TXLF
Norcomp	171-009-103L001

Pinout Information

DB9 #1	Signal	20-pin
1	DCD1	1
6	DSR1	2
2	RXD1	3
7	RTS1	4
3	TXD1	5
8	CTS1	6
4	DTR1	7
9	*RI1*	8
5	GND	9
	-	10
DB9 #2		
1	DCD2	11
6	DSR2	12
2	RXD2	13
7	RTS2	14
3	TXD2	15
8	CTS2	16
4	DTR2	17
9	*RI2*	18
5	GND	19
	-	20

*** When Connected to P9 - GPIO/COM**

DB9-1 Pin	Signal	20-pin
1	GPIO - OUT0	1
6	GPIO - IN0	2
2	GPIO - OUT1	3
7	GPIO - IN1	4
3	GPIO - OUT2	5
8	GPIO - IN2	6
4	GPIO - OUT3	7
9	GPIO - IN3	8
5	GND	9
NC	-	10
DB9-2 Pin		
1	-	11
6	-	12
2	RS-232 RX	13
7	-	14
3	RS-232 TX	15
8	-	16
4	-	17
9	-	18
5	GND	19
NC	-	20

Assembly Notes

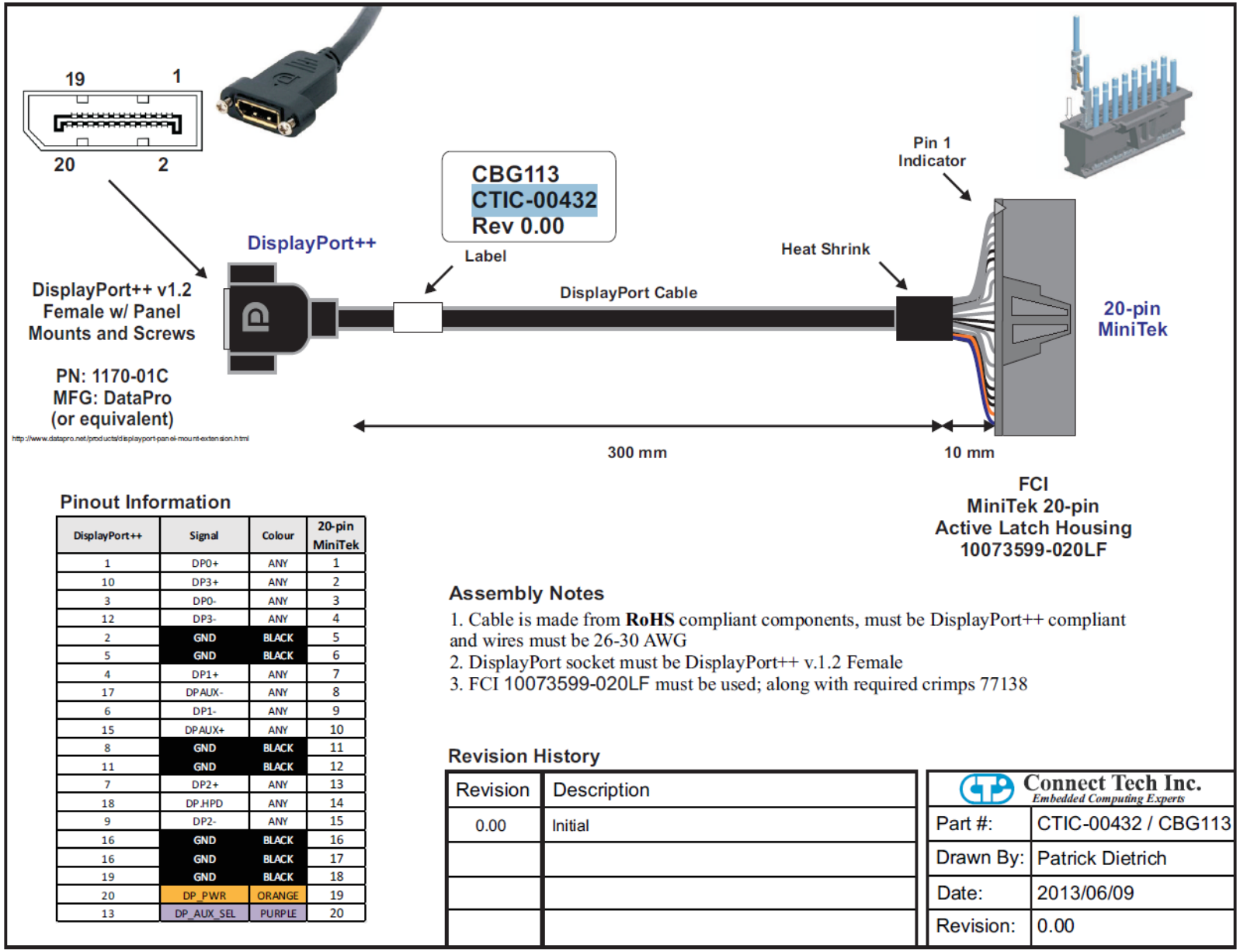
- Cable must be made from **RoHS** compliant components
- Wires must be 26-30 AWG
- Hex nut screws on DB-9 connectors must be installed

Revision History

Revision	Description
0.00	Initial

Connect Tech Inc. Embedded Computing Experts	
Part #:	CTIC-00380 / CBG121
Drawn By:	Patrick Dietrich
Date:	2013/07/22
Revision:	0.00

CBG113 – Display Port



Pinout Information

DisplayPort++	Signal	Colour	20-pin MiniTek
1	DP0+	ANY	1
10	DP3+	ANY	2
3	DP0-	ANY	3
12	DP3-	ANY	4
2	GND	BLACK	5
5	GND	BLACK	6
4	DP1+	ANY	7
17	DPAUX-	ANY	8
6	DP1-	ANY	9
15	DPAUX+	ANY	10
8	GND	BLACK	11
11	GND	BLACK	12
7	DP2+	ANY	13
18	DP.HPD	ANY	14
9	DP2-	ANY	15
16	GND	BLACK	16
16	GND	BLACK	17
19	GND	BLACK	18
20	DP_PWR	ORANGE	19
13	DP_AUX_SEL	PURPLE	20

Assembly Notes

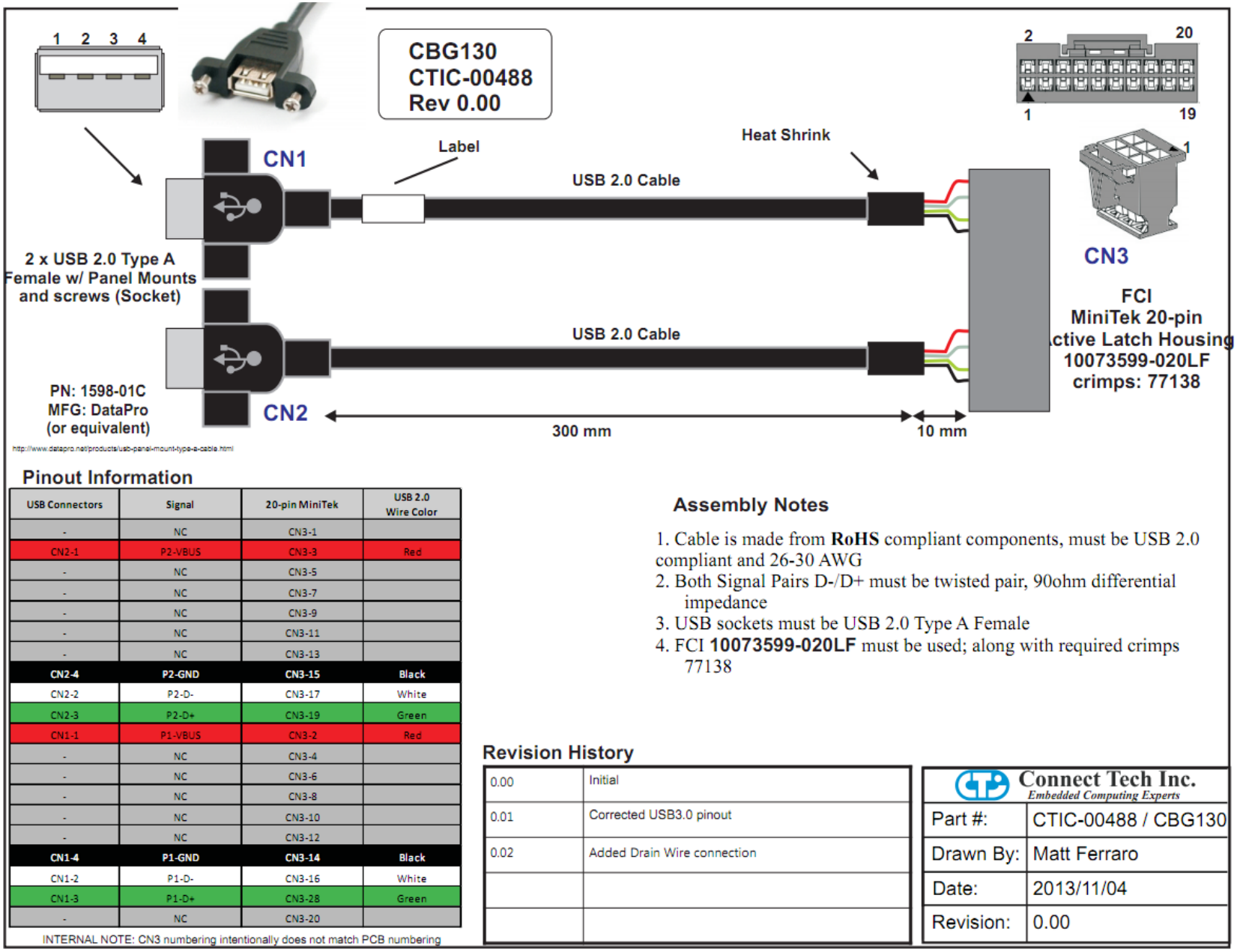
1. Cable is made from **RoHS** compliant components, must be DisplayPort++ compliant and wires must be 26-30 AWG
2. DisplayPort socket must be DisplayPort++ v.1.2 Female
3. FCI 10073599-020LF must be used; along with required crimps 77138

Revision History

Revision	Description
0.00	Initial

Connect Tech Inc. *Embedded Computing Experts*	
Part #:	CTIC-00432 / CBG113
Drawn By:	Patrick Dietrich
Date:	2013/06/09
Revision:	0.00

CBG130 – Dual USB 2.0 (20-pin version)



Pinout Information

USB Connectors	Signal	20-pin MiniTek	USB 2.0 Wire Color
-	NC	CN3-1	
CN2-1	P2-VBUS	CN3-3	Red
-	NC	CN3-5	
-	NC	CN3-7	
-	NC	CN3-9	
-	NC	CN3-11	
-	NC	CN3-13	
CN2-4	**P2-GND**	**CN3-15**	**Black**
CN2-2	P2-D-	CN3-17	White
CN2-3	P2-D+	CN3-19	Green
CN1-1	P1-VBUS	CN3-2	Red
-	NC	CN3-4	
-	NC	CN3-6	
-	NC	CN3-8	
-	NC	CN3-10	
-	NC	CN3-12	
CN1-4	**P1-GND**	**CN3-14**	**Black**
CN1-2	P1-D-	CN3-16	White
CN1-3	P1-D+	CN3-28	Green
-	NC	CN3-20	

INTERNAL NOTE: CN3 numbering intentionally does not match PCB numbering

Assembly Notes

1. Cable is made from **RoHS** compliant components, must be USB 2.0 compliant and 26-30 AWG
2. Both Signal Pairs D-/D+ must be twisted pair, 90ohm differential impedance
3. USB sockets must be USB 2.0 Type A Female
4. FCI **10073599-020LF** must be used; along with required crimps 77138

Revision History

0.00	Initial
0.01	Corrected USB3.0 pinout
0.02	Added Drain Wire connection

Connect Tech Inc.
Embedded Computing Experts

Part #:	CTIC-00488 / CBG130
Drawn By:	Matt Ferraro
Date:	2013/11/04
Revision:	0.00

CBG131 – Internal USB.30 19-Pin Cable

The CBG131 cable is an OEM 19-pin internal type cable, to panel mountable USB 3.0 Type-A Connector(s).

Hardware	
Cable Jacket Type	PVC - Polyvinyl Chloride
Cable Shield Type	Aluminum-Mylar Foil with Braid
Connector(s)	
Connector A	2 - USB 3.0 A (9 pin; SuperSpeed) Female
Connector B	1 - IDC (20 pin; USB 3.0; Motherboard Header) Female
Physical Characteristics	
Color	Blue
Wire Gauge	28 AWG
Cable Length	1.6 ft [0.5 m]
Product Length	19.7 in [500 mm]
Product Width	1.4 in [36.5 mm]
Product Height	0.5 in [12 mm]
Product Weight	2.5 oz [70 g]

Note: Cable will not ship with bracket

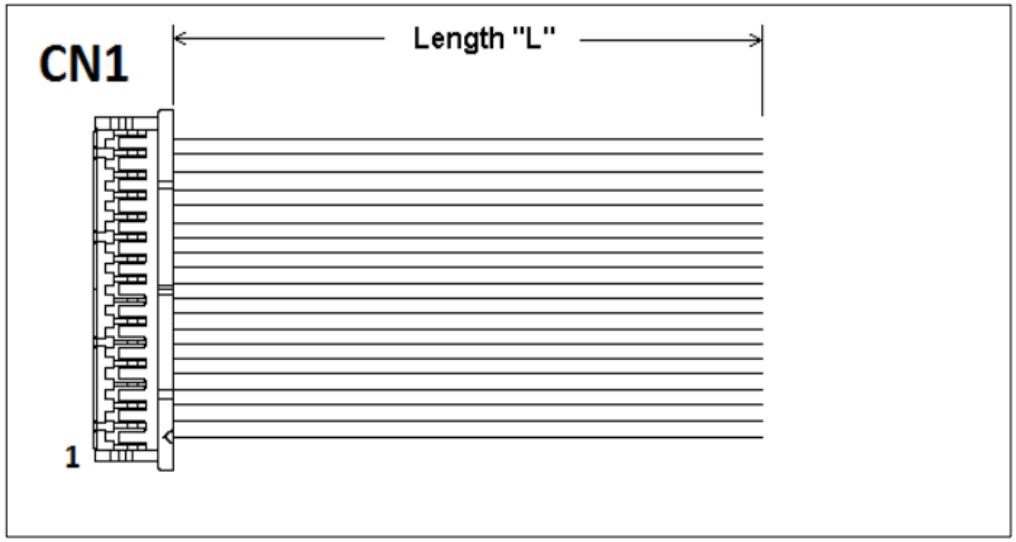
CBG125 – LVDS Unterminated Cable

COLOR	CN1	CN2
Black	1	Flying Lead
White	2	Flying Lead
White	3	Flying Lead
White	4	Flying Lead
White	5	Flying Lead
White	6	Flying Lead
White	7	Flying Lead
White	8	Flying Lead
White	9	Flying Lead
White	10	Flying Lead
White	11	Flying Lead
White	12	Flying Lead
White	13	Flying Lead
White	14	Flying Lead
White	15	Flying Lead
White	16	Flying Lead
White	17	Flying Lead
White	18	Flying Lead
White	19	Flying Lead
White	20	Flying Lead
White	21	Flying Lead
White	22	Flying Lead
White	23	Flying Lead
White	24	Flying Lead
White	25	Flying Lead
White	26	Flying Lead
White	27	Flying Lead
White	28	Flying Lead
White	29	Flying Lead
White	30	Flying Lead
White	31	Flying Lead
White	32	Flying Lead
White	33	Flying Lead
White	34	Flying Lead
White	35	Flying Lead
White	36	Flying Lead
White	37	Flying Lead
White	38	Flying Lead
White	39	Flying Lead
White	40	Flying Lead

CN1 = HIR DF20A-40DS-1C

WIRE = UL1571 AWG 28(7)

LENGTH = "L" = 18.00" +/- 0.25"



CBG90 – SATA + JST Power Cable