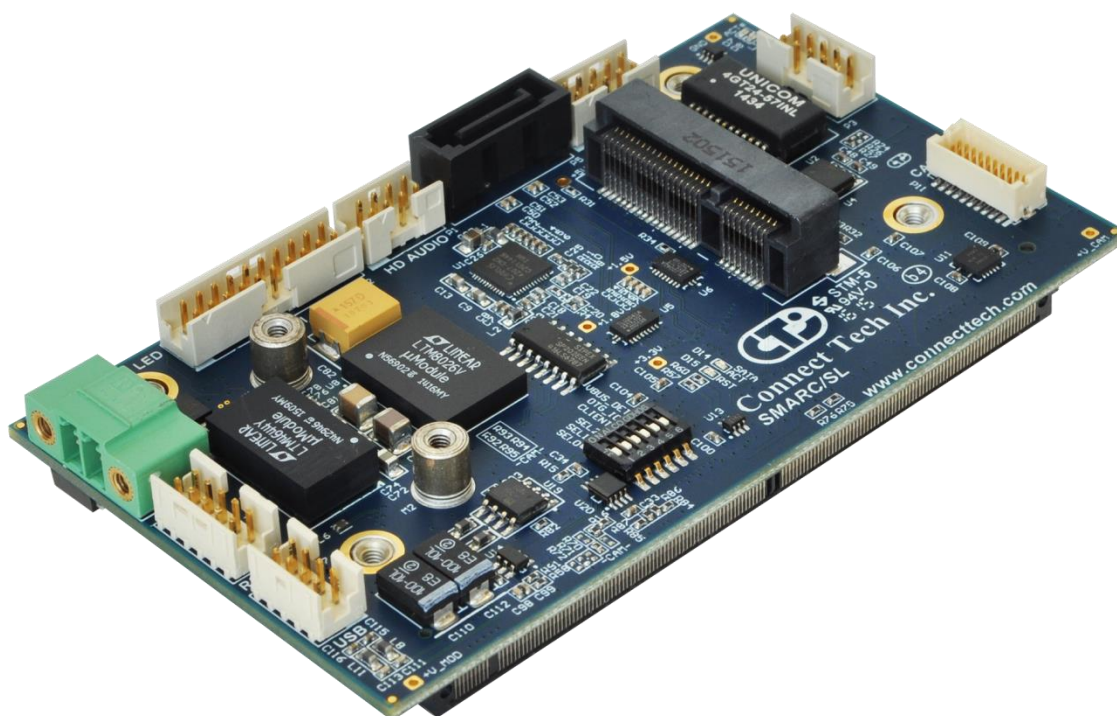




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SMARC/SL Users Guide



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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

Mail/Courier

Connect Tech Inc.
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42 Arrow Road
Guelph, Ontario
Canada N1K 1S6

Email/Internet

sales@connecttech.com
support@connecttech.com
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 Product Warranty

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

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

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

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

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ESD Warning



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

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

Revision History

Revision	Date	Changes
0.00	2015/05/25	Initial Release

Introduction

Connect Tech's SMARC/SL Carrier is a super small SMARC Carrier Board ideal for your low power application. The SMARC/SL Carrier has the ability to use both +3.3V and +1.8V SMARC Modules, a single Mini-PCIe/mSATA with External SATA switching, Gigabit Ethernet, HDMI Video, and MIPI CSI Camera interface.

The SMARC/SL Carrier supports an extended temperature range of -40°C to +85°C and offers a very small footprint; ideal for mobile or stationary applications.

Product Features and Specifications

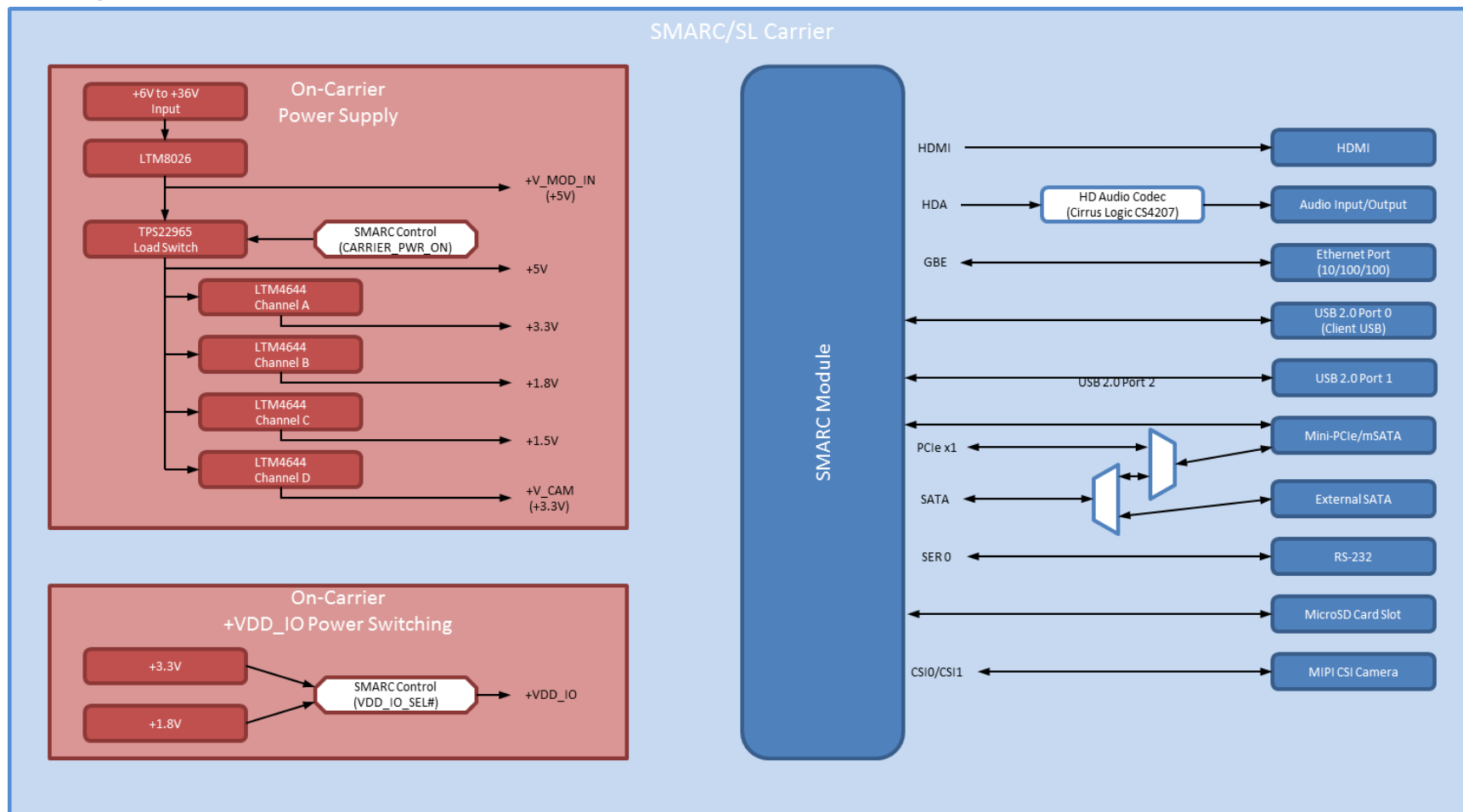
Feature	SMARC/SL
SMARC Compatibility	SMARC Hardware Specification V1.0 and V1.1
PCB Size / Overall Size	100 x 57.5mm (3.937" x 2.263") 3D STEP Model: download here
Display	1x HDMI
Ethernet	1x Gigabit Ethernet (10/100/1000)
USB	2x USB 2.0
SATA	1x External SATA Link (Switchable with Mini-PCIe/mSATA)
Audio	HD Audio: 1x Input, 1x Output
Serial	1x RS-232
Mini-PCIe/mSATA	1x Full Sized Mini-PCIe/mSATA (SATA Link Switchable with External SATA)
Storage	1x MicroSD Card Slot
Camera	1x MIPI 2-Lane Serial Camera Interface (CSI0 or CSI1)
Power Operation	SMARC V1.0 +VDD_IO Control Circuitry on Board +VDD_IO Operation at +3.3V and +1.8V Levels (SMARC V1.1 Ties +VDD_IO to +1.8V)
Power Requirements	+6V to +36V DC Input
Operating Temperature	-40°C to +85°C
Accessories	Cable Kit
Warranty and Support	2 Year Warranty and Free Support

Part Numbers

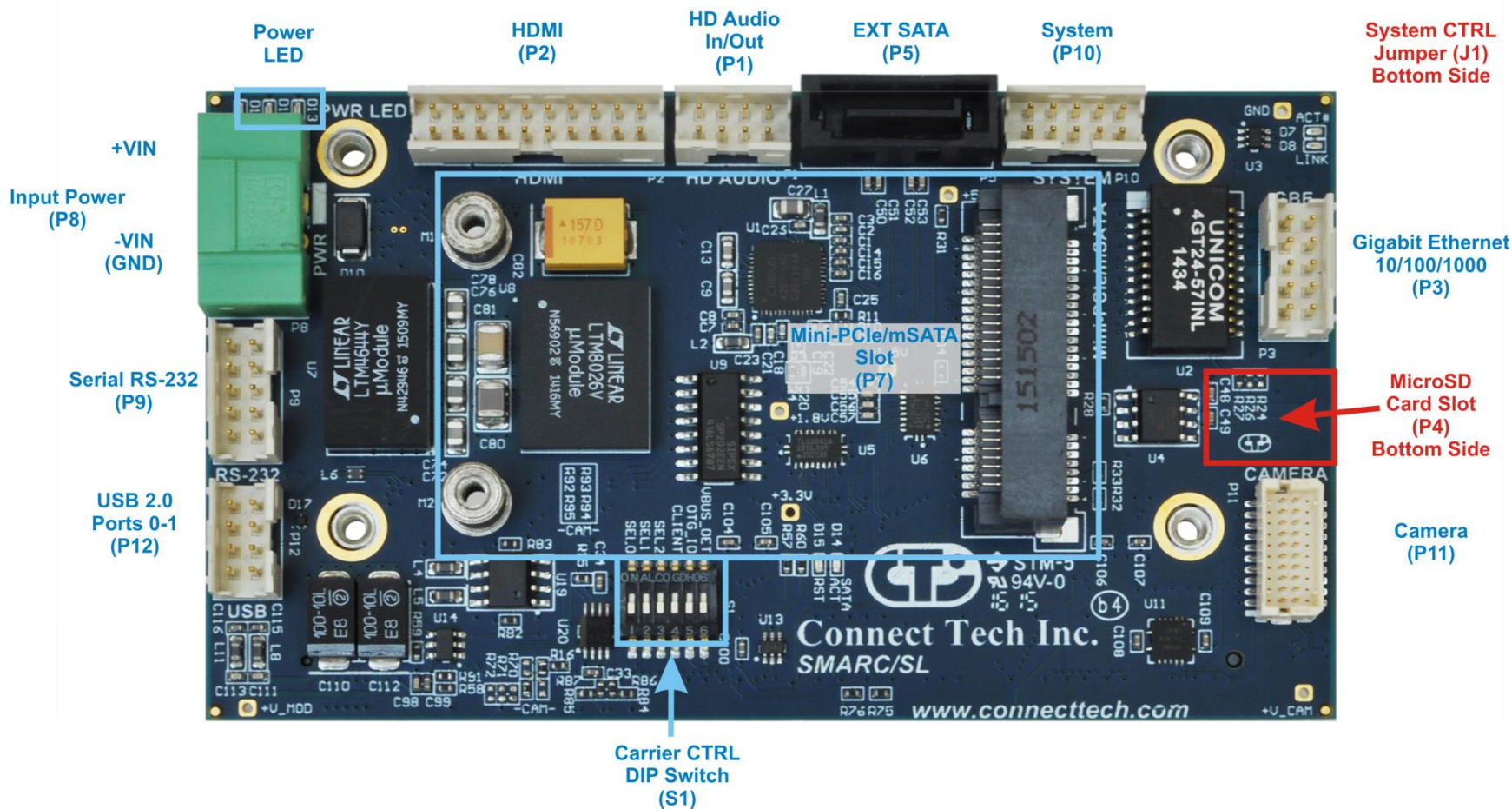
Feature	SMARC/SL
SRG001	SMARC/SL Carrier Board with MIPI CSI-0 Camera Interface
SRG002	SMARC/SL Carrier Board with MIPI CSI-1 Camera Interface

Product Overview

Block Diagram



Connector Locations



Connector Summary

Designator	Connector	Description
U10	SMARC	SMARC MXM 3.0 Module Connector
P1	HD Audio	HD Audio: 1x Input, 1x Output FCI MiniTek Connector
P2	HDMI	HDMI Display FCI MiniTek Connector
P3	Gigabit Ethernet	Gigabit Ethernet (10/100/1000) FCI MiniTek Connector
P4	microSD	microSD Card Slot
P5	External SATA	External SATA Molex Connector
P7	Mini-PCIe/mSATA	Mini-PCIe/mSATA Full Sized Card Slot
P8	Input Power	Input Power Phoenix Contact Terminal Connector
P9	Serial	RS-232 FCI MiniTek Connector
P10	SMARC System	SMARC System Port FCI MiniTek Connector
P11	Camera	MIPI 2-Lane Serial Camera Interface Hirose Connector
P12	USB 2.0 Ports 0-1	USB 2.0 Links 0 and 1 FCI MiniTek Connector

Jumper Summary & Locations

Designator	Function	Description
J1A	Reset	Jumper to hard reset the entire Carrier
J1B	Ext SATA/mSATA Selection	Jumper to select between External SATA with Mini-PCIe or mSATA

DIP Switch Summary & Locations

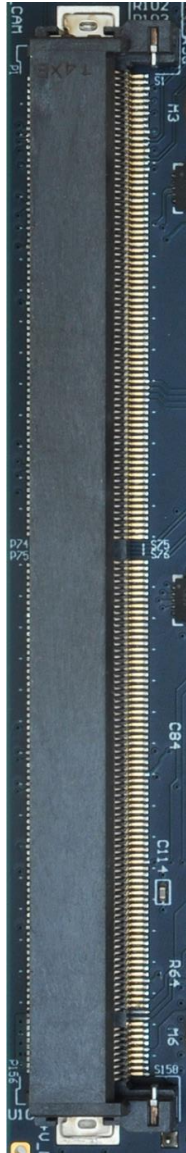
Designator	Function	Description
S1A	BOOT_SEL0#	Input straps determining the SMARC Modules boot device
S1B	BOOT_SEL1#	Input straps determining the SMARC Modules boot device
S1C	BOOT_SEL2#	Input straps determining the SMARC Modules boot device
S1D	Client USB VBUS Detection	USB host power detection
S1E	Client USB OTG ID	USB OTG ID input
S1F	Client USB Power	USB Client Power control to disable +5V at output

Detailed Feature Description

In SMARC Systems, the processor, chipset, and power control are all implemented on the SMARC Module. This connects to the SMARC Carrier via a MXM 3.0 Style Connector.

SMARC

The processor and chipset are implemented on the SMARC Module, which connects to the SMARC/SL Carrier Board via a MXM 3.0 fine pitch connector.

Function	SMARC Module Interface	
Location	U10	
Type	JAE Electronics MXM 3.0 Connector	
Carrier Connector P/N	MM70-314-310B1-2-R300 Manufacturer: JAE Electronics	
Pinout	Refer to SMARC Hardware Specification V1.1	

HD AUDIO

The SMARC Carrier features HD Audio capabilities with the assistance of the Cirrus Logic CS4207 Codec device. From the Codec, 1 Microphone Input and 1 Headphone Output are available.

Function	HD Audio			
Location	P1			
Type	FCI MiniTek Double Row 4 x 2			
P/N	98414-G06-08LF			
Mating	10073599-008LF			
Cable	CBG118			
Pinout	Pin	Description	Pin	Description
	1	-	2	-
	3	MIC IN R	4	MIC IN L
	5	GND	6	GND
	7	HP OUT R	8	HP OUT L



Software Support for the CS4207

The audio codec used on the SMARC Carrier is the [CS4207 from Cirrus Logic](#).

Additional drivers will be needed to properly operate audio on the SMARC 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 7/8 Driver:

http://www.cirrus.com/en/support/lic/lic3.html?uri=/en/pubs/software/CS4207_LogoedDriverPackage_6-6001-1-39.zip

Linux Driver: Included in kernels 2.6.30 and up.

HDMI Connector

Function	HDMI Connector			
Location	P2			
Type	FCI MiniTek Double Row 10 x 2			
P/N	98414-G06-20LF			
Mating	10073599-020LF			
Cable	CBG145			
Pinout	Pin	Description	Pin	Description
	1	TMDS2+	2	TMDS CLK+
	3	TMDS2-	4	TMDS CLK-
	5	GND	6	GND
	7	TMDS1+	8	DDC DATA
	9	TMDS1-	10	DDC CLK
	11	GND	12	GND
	13	TMDS0+	14	Hot Plug Detect
	15	TMDS0-	16	GND
	17	GND	18	GND
	19	+3.3V	20	DP/TMDS SEL



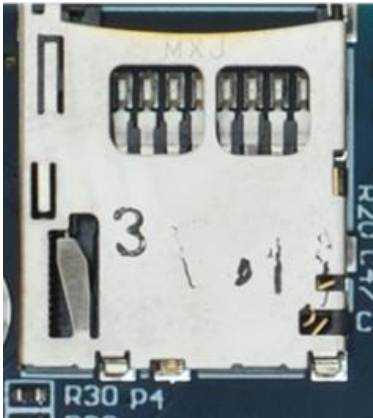
10/100/1000 Ethernet (GBE)

Function	Gigabit Ethernet Connector			
Location	P3			
Type	FCI MiniTek Double Row 5 x 2			
P/N	98414-G06-10LF			
Mating	10073599-010LF			
Cable	CBG117			
Pinout	Pin	Description	Pin	Description
	1	MX0-	2	MX0+
	3	MX1-	4	MX1+
	5	SHELL	6	SHELL
	7	MX2-	8	MX2+
	9	MX3-	10	MX3+



microSD Card

Function	microSD Card		
Location	P4		
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#	



External SATA

The SMARC/SL Carrier provides an External SATA connector that is SATA/mSATA switched. Please see Mini-PCIe/mSATA Slot description for additional details.

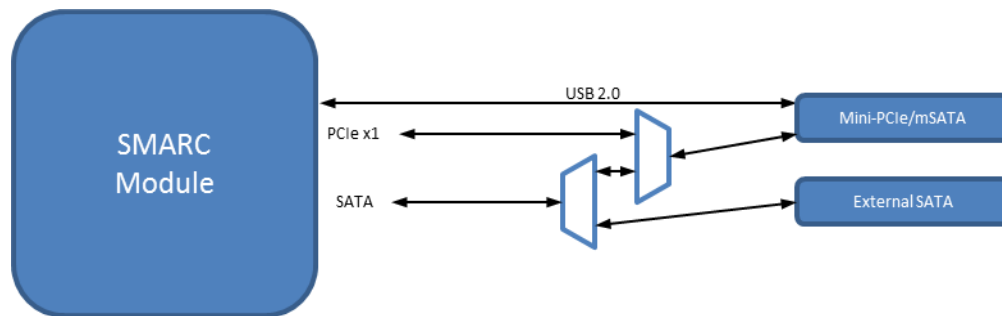
Function	External SATA		
Location	P5		
Type	Molex Vertical Serial ATA Plug		
P/N	0471554001		
Cable	CBG079		
Pinout	Pin	Description	
	1	GND	
	2	TX+	
	3	TX-	
	4	GND	
	5	RX-	
	6	RX+	
	7	GND	

Mini-PCIE/mSATA Slots

Dual Function Mini-PCIE/mSATA/External SATA Slot

The SMARC/SL Carrier has a special dual purpose functional Mini-PCIE/mSATA/External SATA slot. This slot can accept either a Mini-PCIE module or an mSATA SSD module. The slot has circuitry that allows for the selection between connecting PCIe lanes or SATA lanes to the Connector. In addition to having dual functionality Mini-PCIE/mSATA, the SMARC/SL Carrier has circuitry to allow for the unused SATA link to be routed out to a standard SATA plug. Finally, this slot also contains a USB 2.0 link as per the Mini-PCIE specification.

See the block diagram for the Mini-PCIE/mSATA/External SATA switching functionality.



Mini-PCIE/mSATA/External SATA Switching Functionality Diagram

If a Mini-PCIE Card is placed into the Mini-PCIE/mSATA, then the SATA Jumper (J1B) will select the SATA Link to be routed to the SATA plug, causing the SATA lanes routed to the Mini-PCIE/mSATA slot to be disconnected.

If however an mSATA Card is placed into the Mini-PCIE/mSATA slot, then the SATA Jumper (J1B) will select the SATA to be routed to the Mini-PCIE/mSATA slot, causing the SATA lanes routed to the SATA External Plug to be disconnected.

This allows for the following configurations:

- A. 1x Mini-PCIE Card, with 1x SATA External Plug connections
- B. 1x mSATA Card

Jumper Selection

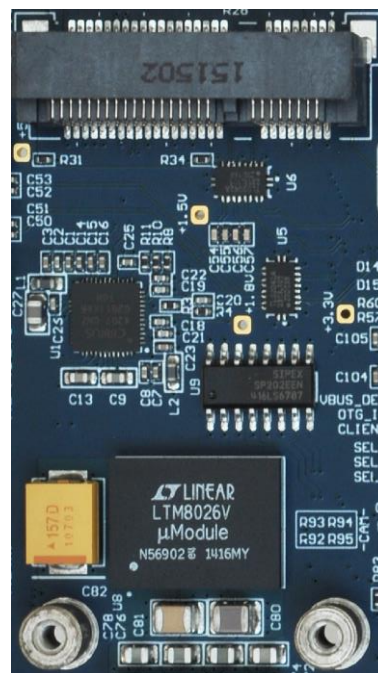
Jumper Location	Jumper ON	Jumper OFF
J1B	Mini-PCIE Slot, SATA External Plug	mSATA Slot

Half and Full Length Mini-PCIE/mSATA Module Installation

The SMARC/SL Carrier is designed with mounting holes to allow for the population a full length module. To install a half-length module you must use a Mini-PCIE Half to Full Size Extension Bracket.



Function	Mini-PCIe/mSATA Slot		
Location	P7		
Type	Molex Card Edge Connector		
P/N	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-	-
	37	GND	GND
	38	USB D+	-
	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



Power Input

The SMARC/SL Carrier accepts a single power input to power all on-board devices. A single +6V to +36V input is required for operation.

Function	Power	
Location	P8	
Type	Phoenix Contact Pluggable Terminal Block	
P/N	1843790	
Mating	1847055	
Pinout	Pin	Description
	1	+6V to +36V
	2	GND



Serial

Function	Serial RS-232			
Location	P9			
Type	FCI MiniTek Double Row 5 x 2			
P/N	98414-G06-10LF			
Mating	10073599-010LF			
Cable	CBG127			
Pinout	Pin	Description	Pin	Description
	1	-	2	RX
	3	TX	4	-
	5	GND	6	-
	7	RTS#	8	CTS#
	9	-	10	-



System

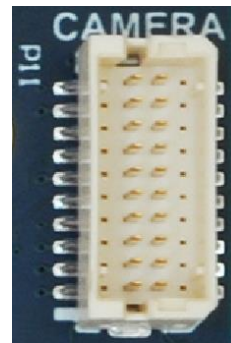
The System header can be used to connect the power button, reset button, and suspend state required to monitor the module performance or state.

Function	System Connector			
Location	P10			
Type	FCI MiniTek Double Row 5 x 2			
P/N	98414-G06-10LF			
Mating	10073599-010LF			
Cable	CBG134			
Pinout	Pin	Description	Pin	Description
	1	PWR_BTN#	2	GND
	3	RST_BTN#	4	GND
	5	BATLOW#	6	GND
	7	WAKE#	8	GND
	9	SUS_S3#	10	GND



Camera Connector

Function	MIPI 2-Lane Serial Camera Interface Connector			
Location	P11			
Type	Hirose Low Profile Board to Cable Connector			
P/N	DF20G-20DP-1V(56)			
Mating	DF20A-20DS			
Cable	CBG185			
Pinout	Pin	Description	Pin	Description
	1	+V_CAM ^[1]	2	GND
	3	+1.8V	4	CSI0_CLK_P
	5	+1.5V	6	CSI0_CLK_N
	7	CAM0_PWR#	8	GND
	9	CAM0_RST#	10	CSI0_D0_P
	11	GND	12	CSI0_D0_N
	13	CAM_I2C_CLK	14	GND
	15	CAM_I2C_DATA	16	CSI0_D1_P
	17	GND	18	CSI0_D1_N
	19	CAM_MSTR_CLK	20	GND

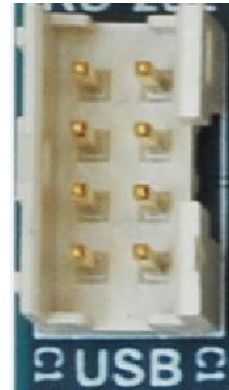


Note [1]: +V_CAM is a +3.3V Rail, However this can be modified upon request

USB 2.0

Over current protection, power supply filtering and ESD protection is provided.

Function	USB 2.0			
Location	P12			
Type	FCI MiniTek Double Row 4 x 2			
P/N	98414-G06-08LF			
Mating	10073599-008LF			
Cable	CBG104			
Pinout	Pin	Description	Pin	Description
	1	Port A - VBUS	2	Port B - VBUS
	3	Port A - D-	4	Port B - D-
	5	Port A - D+	6	Port B - D+
	7	Port A - GND	8	Port B - GND

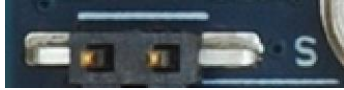


Jumper Description

The SMARC/SL Carrier has a single jumper blocks for Carrier Reset and SATA Control.

J1A Jumper – SMARC/SL Carrier Reset

Function	Carrier Reset	
Location	J1A	
Pinout	Position	Description
	ON	Place SMARC/SL Carrier into Reset
	OFF	Normal Operation



J1B Jumper – Ext SATA/mSATA Selection

Function	External SATA/mSATA Selection	
Location	J1B	
Pinout	Position	Description
	ON	Mini-PCIe Slot, SATA External Plug
	OFF	mSATA Slot



Switch Description

The SMARC/SL Carrier also has a single DIP Switch block for various on-board control.

S1 DIP Switch – Carrier Control

Function	Boot Selection and Client USB	
Location	S1	
Pinout	Switch	Description
	A	BOOT_SEL0#
	B	BOOT_SEL1#
	C	BOOT_SEL2#
	D	Client USB VBUS
	E	Client USB OTG ID
	F	Client USB Power



Typical Installation

1. Ensure all external system power supplies are off.
2. Install the SMARC Module onto the MXM 3.0 Connector U10. 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) Connect a video display cable
 - c) Keyboard and mouse via USB
 - d) SATA or mSATA hard drive

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.

On-Board Indicator LED's

The SMARC/SL Carrier has 7 on-board indicator LEDs.

LED	Description
D7	GBE ACT#
D8	GBE LINK#
D11	+V_MOD
D12	+5V
D13	+3.3V
D14	SATA ACT
D15	RST

Current Consumption Details

Below are the maximum ratings of the SMARC/SL Carrier.

Maximums	Amps	Watts
Theoretical Absolute Maximum Total Draw of All Functionality on the SMARC/SL Carrier Board	TBA	TBA

Below are measurements taken with the SMARC/SL Carrier running in various configurations. Some values will change depending on what SMARC Module is installed. Please refer to the module manufacturer's 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	TBA	TBA
Module Installed ^[4] , Single HDMI Video Output, USB Keyboard with System Sitting in BIOS	TBA	TBA
Module Installed ^[4] , Single HDMI Video Output, USB Keyboard, mSATA Linux Running CPU Stress Test	TBA	TBA
Module Installed ^[4] , Single HDMI Video Output, USB Keyboard, USB Mouse, Mini-PCIE Installed, Audio In/Out Running, GBE Connected, External SATA HDD Running Windows 7	TBA	TBA

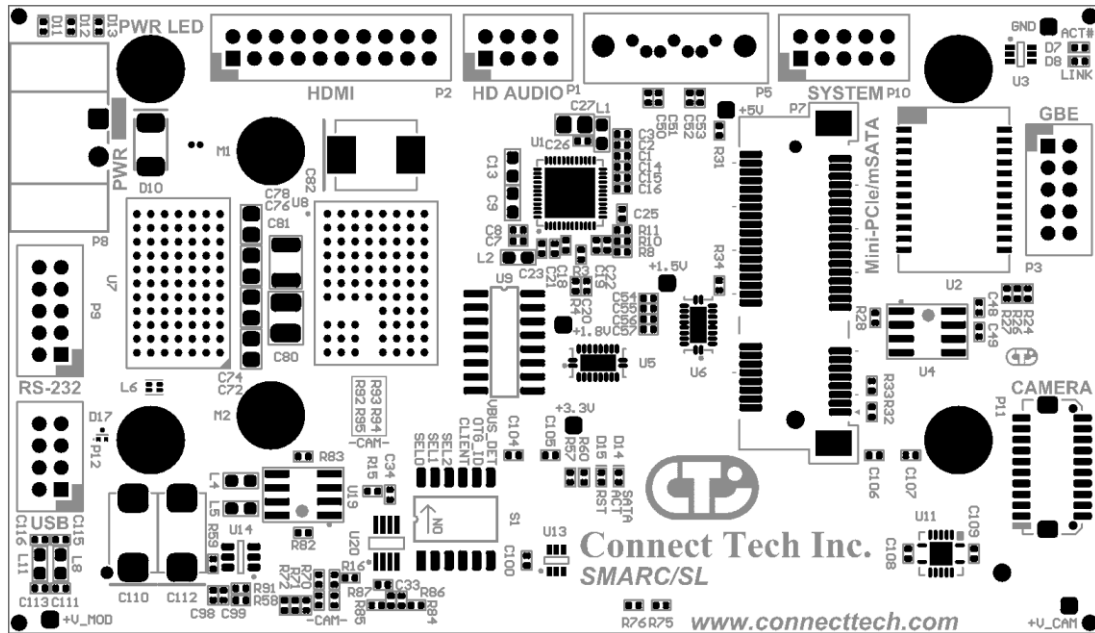
Note [4]: TBA

Mechanical Details

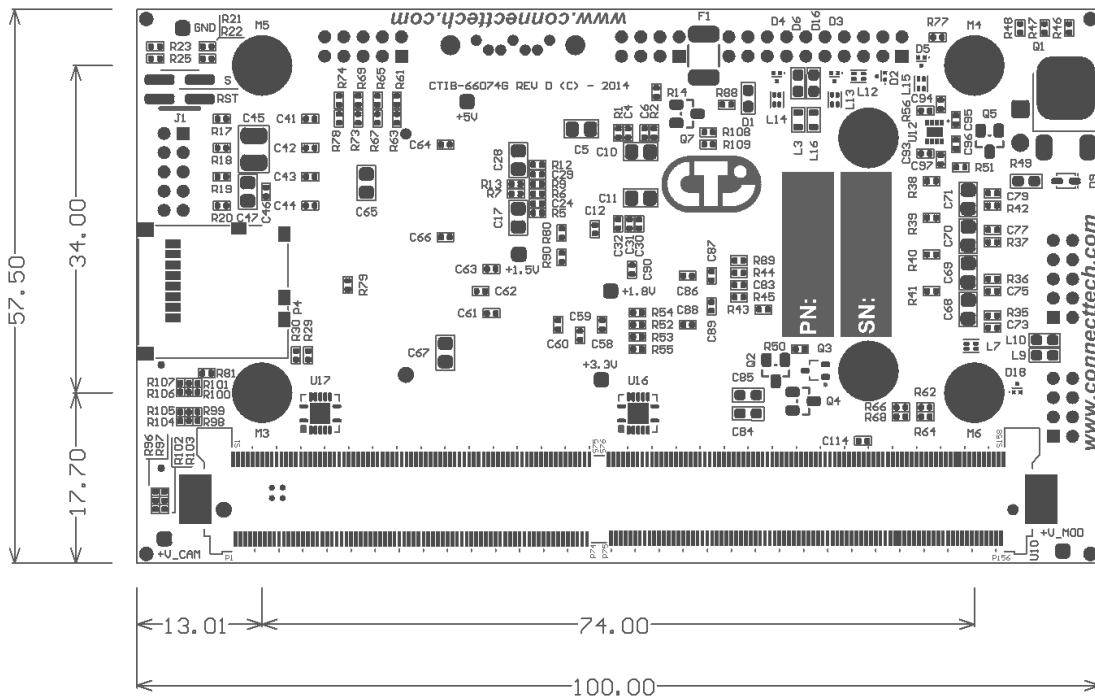
A complete 3D STEP Model file of SMARC/SL Carrier can be downloaded here:
http://www.connecttech.com/ftp/3d_models/SRG001_3D_MODEL.zip

2D Mechanical Dimensioned Drawing - PCB and Mounting Hole Dimension are in mm.

Top View



Bottom View



Cables

The following table summarizes the SMARC/SL Carrier cables available.

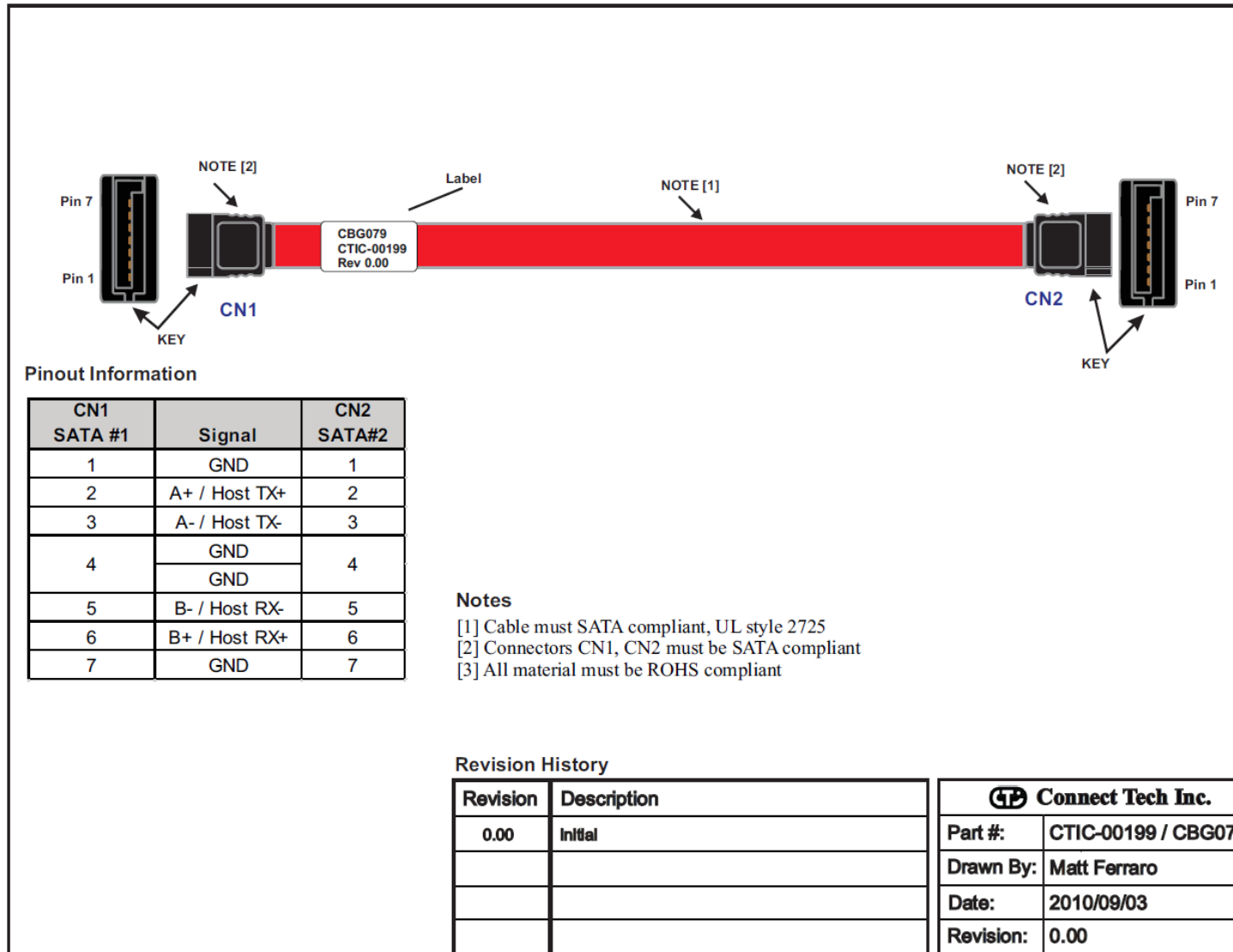
Cable Kits

Drawing No.	Part No.	Description	CKG034 Cable Kit
OEM	CBG079	SATA HDD Signal Cable	1
CTIC-00429	CBG104	Dual USB 2.0 to 8-Pin MiniTek Cable	1
CTIC-00433	CBG117	RJ-45 to 10-Pin MiniTek Cable	1
CTIC-00434	CBG118	Dual Audio to 8-Pin MiniTek Cable	1
CTIC-00388	CBG127	DB9 to 10-Pin MiniTek Cable	1
CTIC-00498	CBG134	10-Pin MiniTek System Cable	1
CTIC-00461	CBG145	HDMI Female to 20-Pin MiniTek Cable	1
OEM	CBG185	MIPI-CSI 2-Lane Camera 20-Pin Hirose to Flying Lead Cable	1



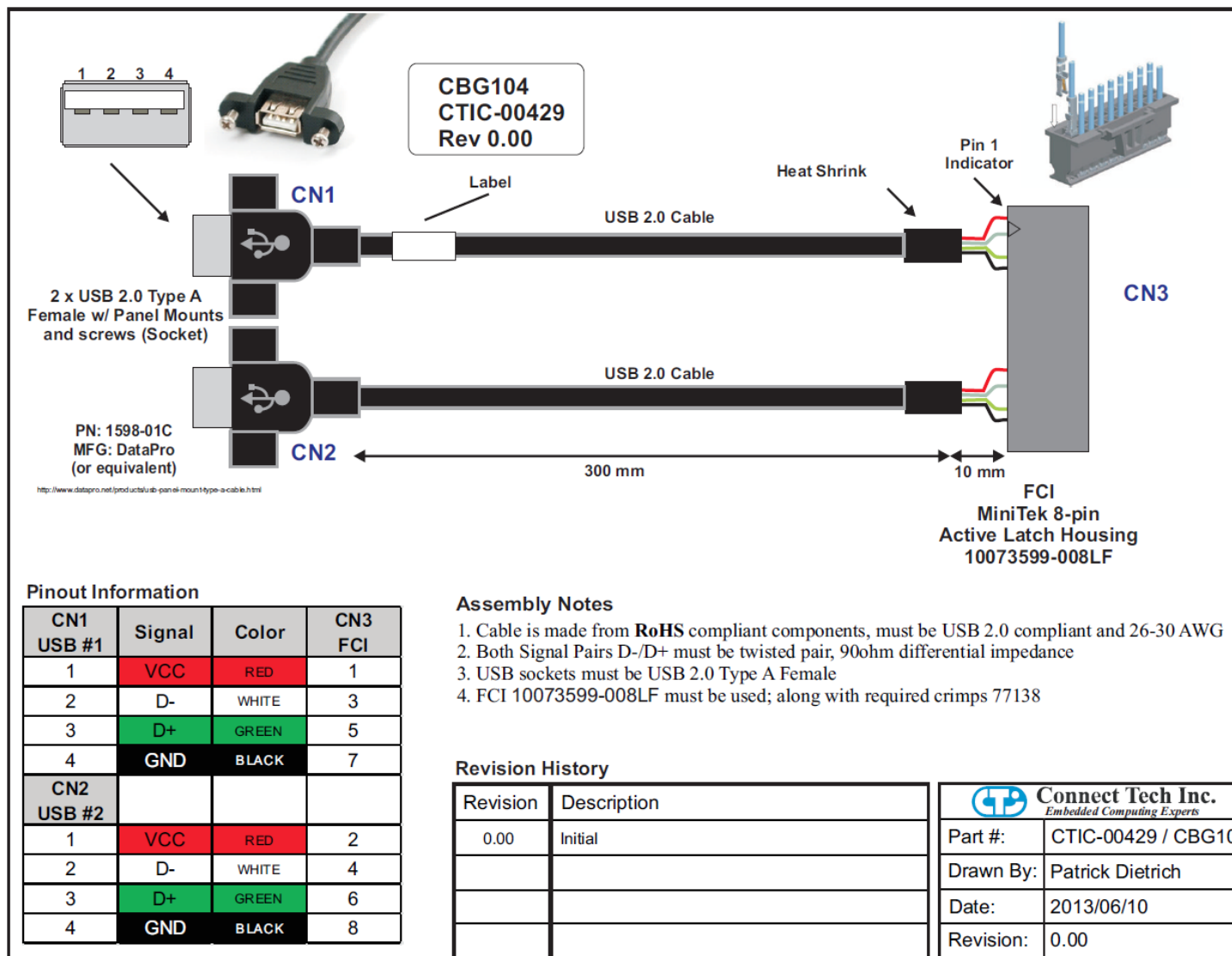


CBG079 - SATA HDD Signal Cable



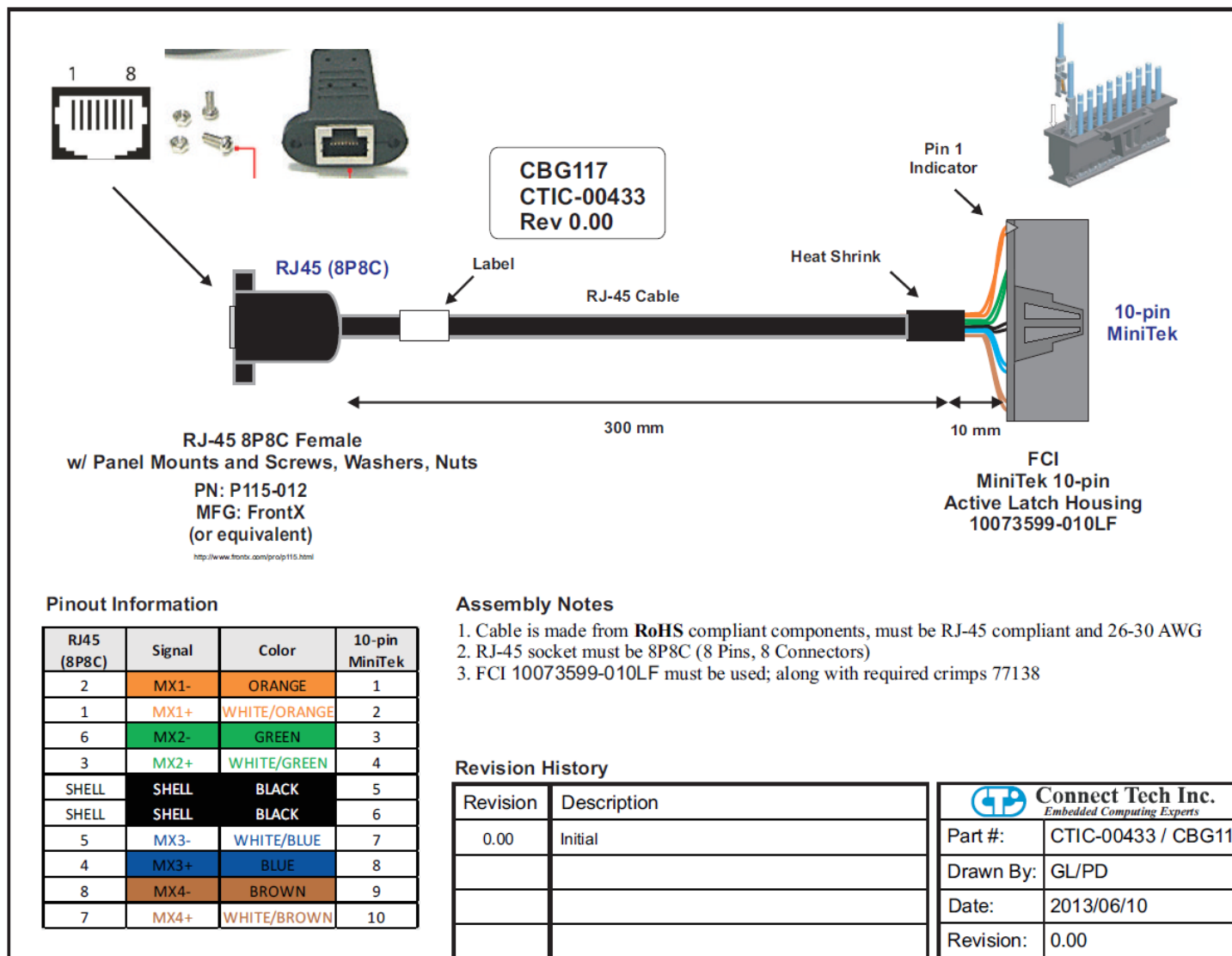


CBG104 - Dual USB 2.0 to 8-Pin MiniTek Cable

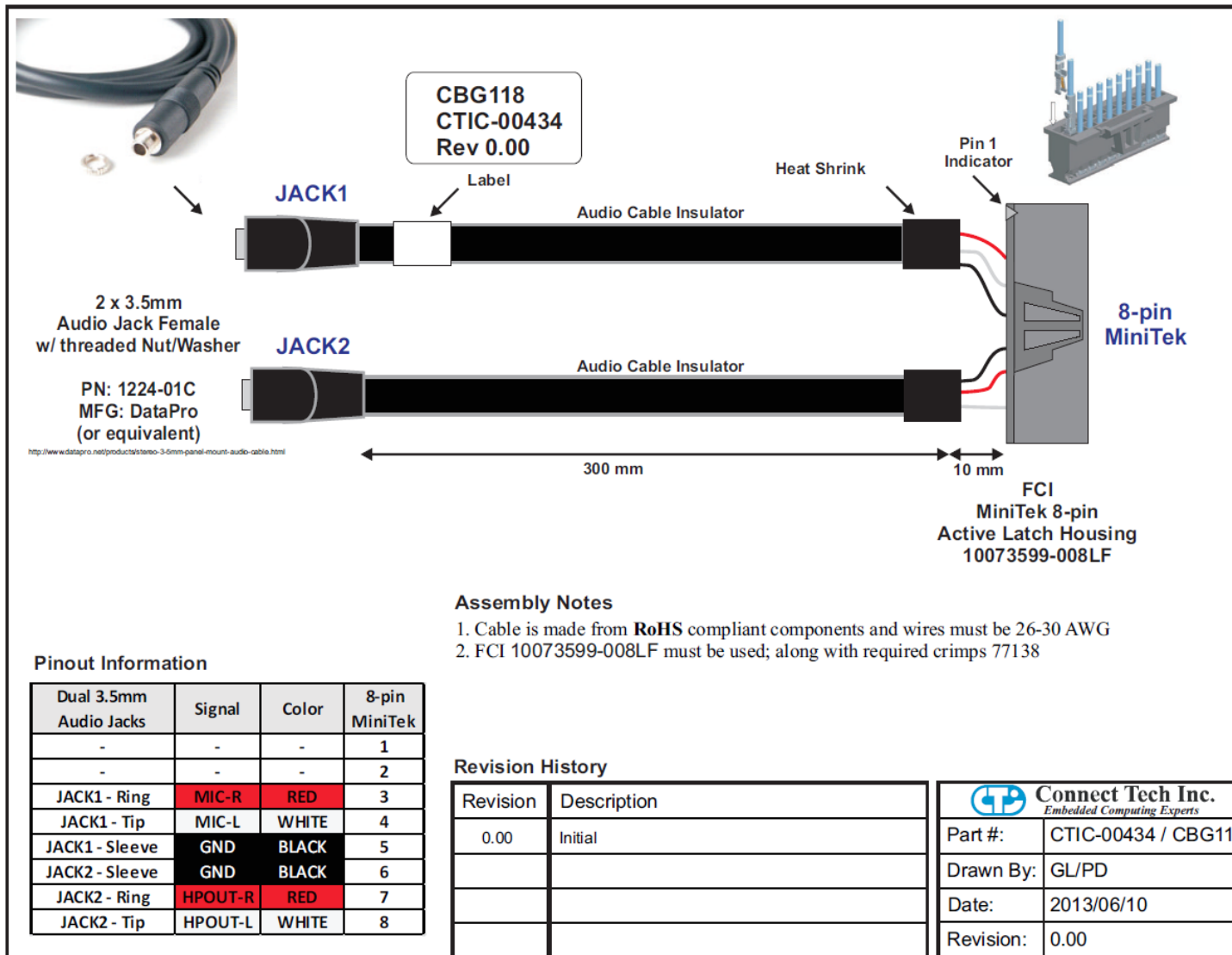




CBG117 - RJ-45 to 10-Pin MiniTek Cable



CBG118 - Dual Audio to 8-Pin MiniTek Cable





CBG127 - DB9 to 10-Pin MiniTek Cable

DB-9 Male

9 8 7 6
5 4 3 2 1

Label

CBG127
CTIC-00388
Rev 0.01

Ribbon Cable

300 mm

END A

END B

4-40 Hex Nut x4

Pin 1

Latch clip

Heat Shrink/Strain Relief

END C

10 mm

Attach Ribbon cable to QTY:10 crimps and install into FCI 10-pin housing

Pinout Table

END A DB-9	Signal	END B 2x5 IDC	New Connection	END C 2x5 Minitek
1	DCD	1	<---->	1
2	RXD	3	<---->	2
3	TXD	5	<---->	3
4	DTR	7	<---->	4
5	GND	9	<---->	5
6	DSR	2	<---->	6
7	RTS	4	<---->	7
8	CTS	6	<---->	8
9	RI	8	<---->	9
	-	10	<---->	10

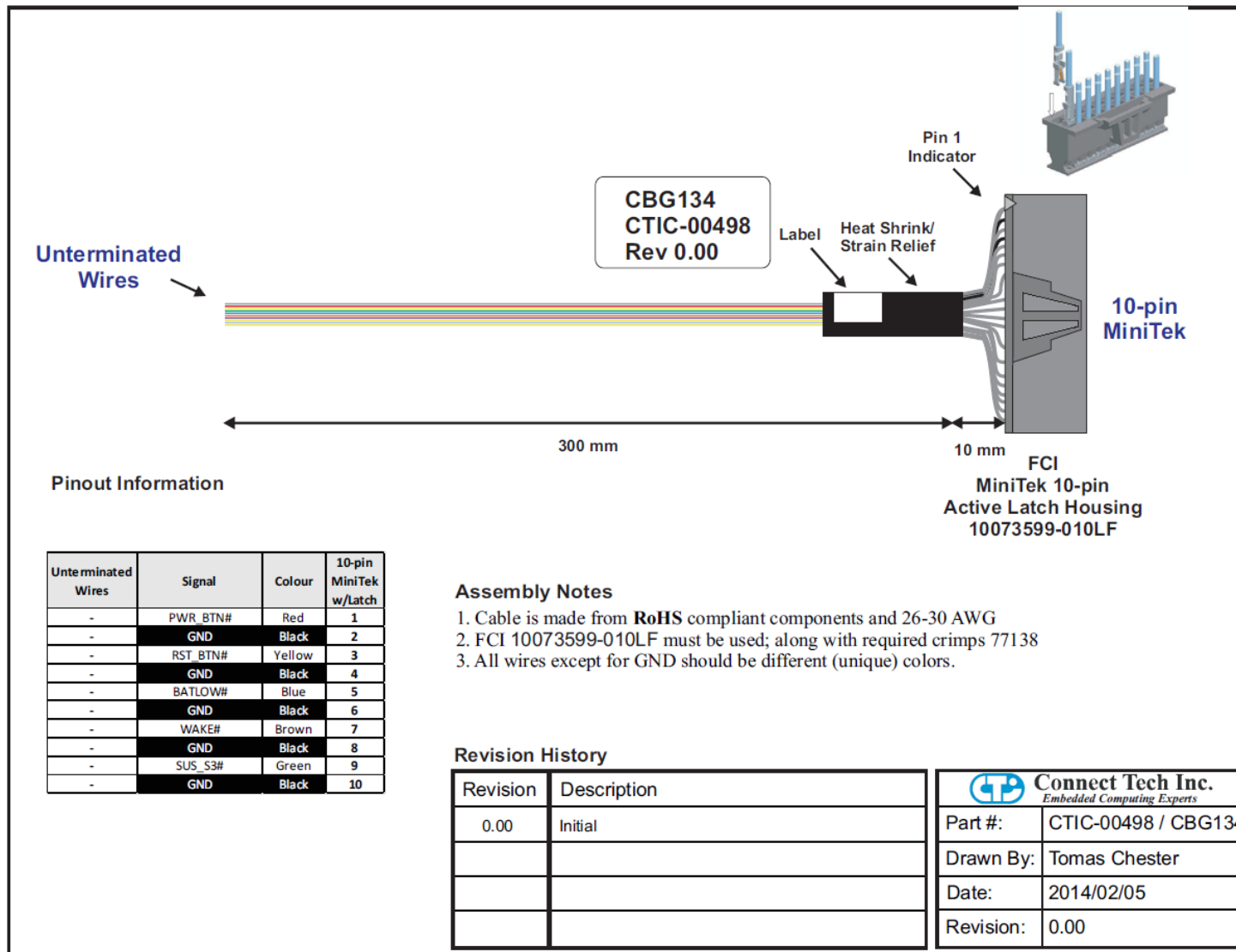
Assembly Notes

1. Take QTY:1 CTIC-00048 REV 0.01 (CAG104) cable and CUT off END B
2. Install small piece of heat shrink on END B
3. Attach END B to END C using the proper pinouts from the **Pinout Table**
3. Use QTY:1 FCI 10073599-010LF housing and QTY:10 FCI 77138 crimps
4. Replace CTIC-00048 label with new CTIC-00388 label
6. Finished cable should be 300mm long

CT Connect Tech Inc.	
Part #:	CTIC-00388/CBG127
Drawn By:	Patrick Dietrich
Date:	02/13/2014
Revision:	0.01

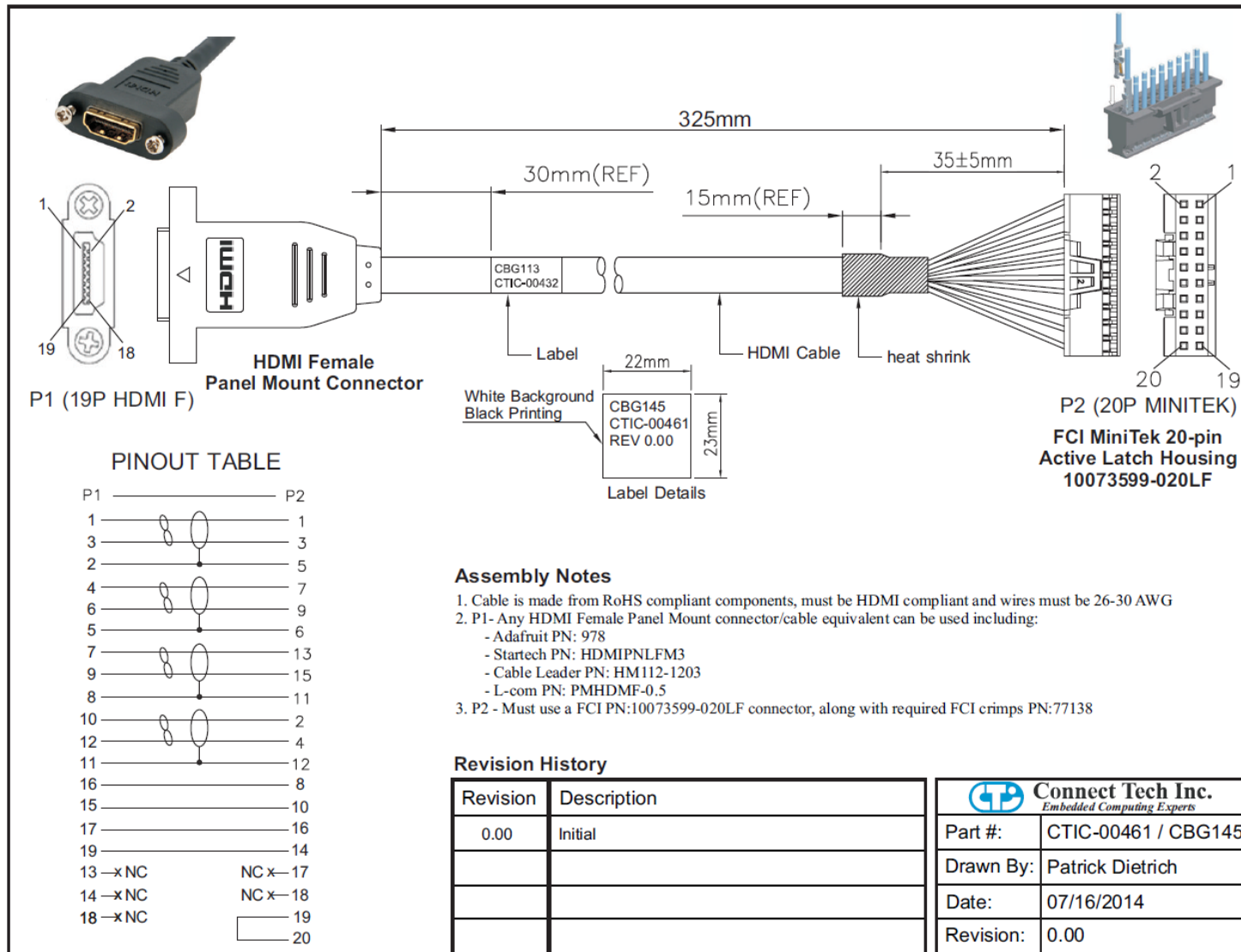


CBG134 - 10-Pin MiniTek System Cable





CBG145 - HDMI Female to 20-Pin MiniTek Cable





CBG185 - MIPI-CSI 2-Lane Camera 20-Pin Hirose to Flying Lead Cable

P/N: QD18835

<u>COLOR</u>	<u>CN1</u>	
Black	1	Flying Lead
Brown	2	Flying Lead
Red	3	Flying Lead
Orange	4	Flying Lead
Yellow	5	Flying Lead
Green	6	Flying Lead
Blue	7	Flying Lead
Violet	8	Flying Lead
Gray	9	Flying Lead
White	10	Flying Lead
Black	11	Flying Lead
Brown	12	Flying Lead
Red	13	Flying Lead
Orange	14	Flying Lead
Yellow	15	Flying Lead
Green	16	Flying Lead
Blue	17	Flying Lead
Violet	18	Flying Lead
Gray	19	Flying Lead
White	20	Flying Lead

CN1 = HIR DF20A-20DS-1C

WIRE = UL1571 AWG 28(7)

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

