

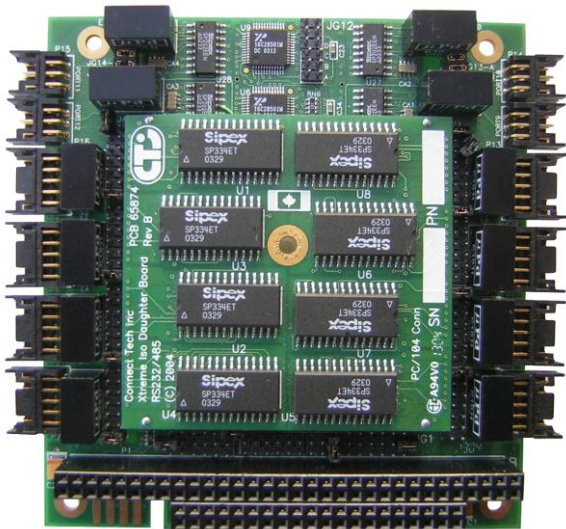


**Connect Tech Inc.**  
*Industrial Strength Communications*

# **USER MANUAL**

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## **Xtreme/104 Isolated**



**CTIM-00025 (1.08) – July 2011**

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## Revision History

Revision 1.08	July 2011
Add additional information regarding IRQ modes, IRQ selections and IRQ Status Port.	
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Corrected figures	
Revision 1.06	January 2011
Added Figures	
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Added Figures	
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Added Figures	
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Added Header to Serial Port Mapping Table	
Converted Revision 1.02 to new manual format	
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Release	

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## Introduction

Connect Tech's Xtreme/104 Isolated adapters are high density, high performance, 12 Port serial adapters that fully comply with PC/104 form factor specifications and offer 1.0 kV AC peak to peak electrical isolation on every signal of every Port.

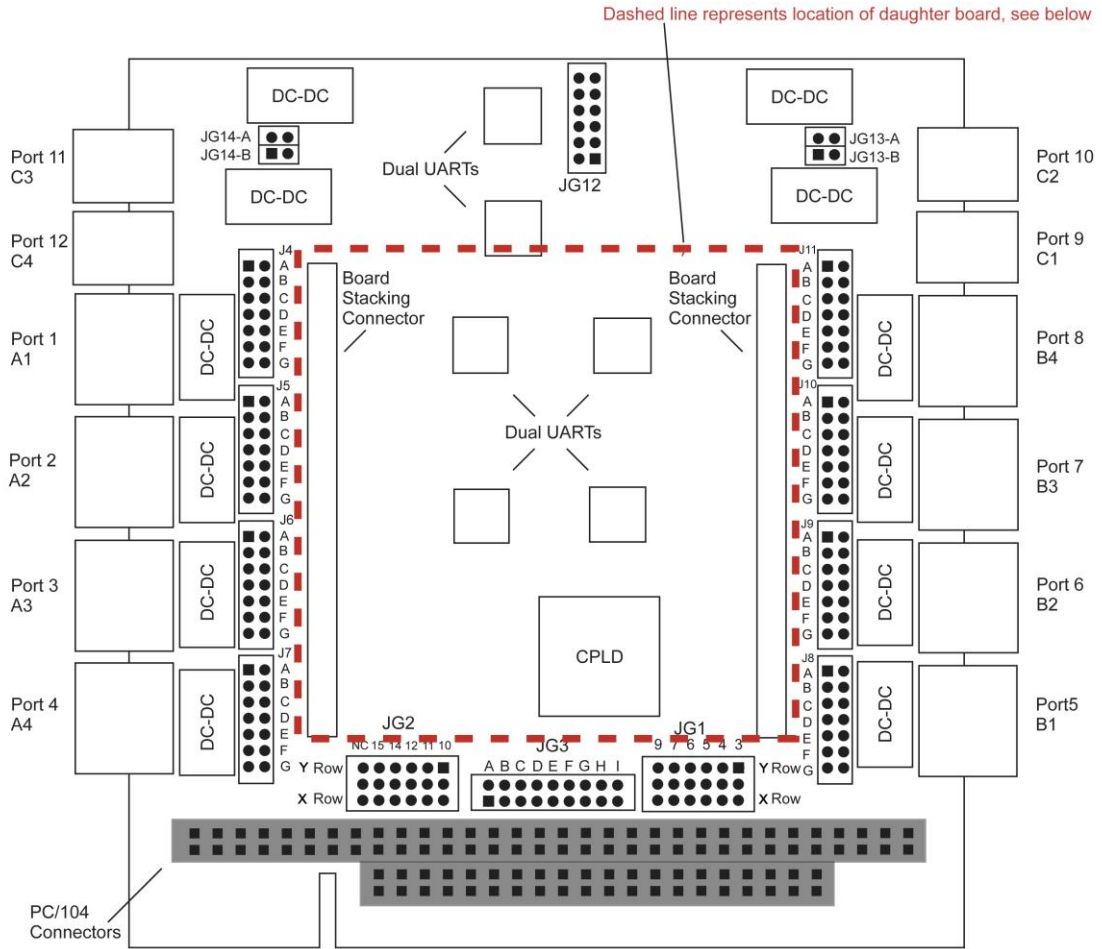
## Features

- ISA bus compatible with 16 bit PC/104 connector
- Twelve asynchronous I/O Ports
  - Eight selectable RS-232/422/485 Ports
  - Four dedicated RS-232 Ports
- Electrical isolation on each Port using Analog Device's iCoupler® technology, providing up to 1 kV AC peak to peak of protection
- Support for all three RS-422/485 modes
  - Full duplex (four wire)
  - Half duplex (two wire, with automatic data direction control)
  - Multi-drop (four wire)
- Data communication speeds up to 460.8 Kbps (RS-422/485) and 115.2 Kbps (RS-232). Custom baud rates available.
- 16C2850 dual UARTs control each Port providing 128 bytes of TxD/RxD FIFO buffers
- Eight jumper selectable I/O address ranges
- Operating temperature range of -40°C to 85°C
- Driver support for Linux, QNX, Solaris, SCO Unix, Windows 98/Me, Windows CE/CE .NET, Windows XP/XP Embedded and Windows NT/2000

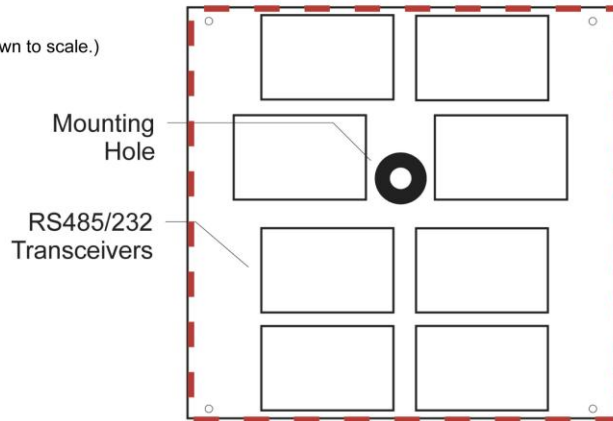
## Electrical Isolation

The Xtreme/104 Isolated uses electrical isolator technologies to provide 1.0 kV AC peak to peak isolation between each Port and also between each Port and your system. Please recognize that there are some considerations to note:

- Isolation can degrade if the board is subjected to high humidity, especially in conditions where condensation can occur.
- Isolation can degrade if airborne dust is allowed to accumulate on the surface of the board.
- An **electrical shock hazard could exist** depending on what equipment is connected to the Xtreme/104 Isolated. Under these circumstances the wiring and/or cabling leading to the Serial Port connections may have high voltages on them. You must use appropriately insulated cables in these situations.
- Please contact your Connect Tech Technical Support Specialist at [support@connecttech.com](mailto:support@connecttech.com) for any questions related to the application of optical isolation.



(Daughter board not shown to scale.)



**PLEASE NOTE:**  
If you are installing the daughter board, the mounting holes on the daughter board and the main board **MUST LINE UP** or you risk damaging the boards.

**Figure 1: Xtreme/104 Isolated Board Diagram**

## Hardware Installation

### Port Mapping

Serial Port numbers DO NOT sequentially map to the Xtreme/104 Isolated PCB header numbers. See [Table 1](#) below for Port mapping.

**Table 1: Serial Port to PCB Header Mapping**

Sorted by Serial Port

Serial Port	PCB Header
1	P4
2	P6
3	P5
4	P7
5	P9
6	P11
7	P10
8	P12
9	P13
10	P14
11	P15
12	P16

Sorted by PCB Header

PCB Header	Serial Port
P4	1
P5	3
P6	2
P7	4
P9	5
P10	7
P11	6
P12	8
P13	9
P14	10
P15	11
P16	12

### Port I/O Addresses

Port I/O address selections are configured with the jumper block JG3 on the Xtreme/104 Isolated adapter. Use jumpers A, B, and C to select a range of I/O port addresses for the Ports. Please refer to [Figure 5](#) for positions.

### Status Port I/O Addresses

Some operating system device drivers can utilize an Interrupt Status Port, for example Linux. This will improve the performance of Xtreme/104 Isolated. The Xtreme/104 Isolated offers a Status Port and this Port is enabled or disabled using jumper D on jumper block JG3. Please refer to [Table 2](#) for a list of supported Status Port addresses.

**NOTE:**

Please make certain that the Status Port Enable jumper is disabled if your application is not using the Status Port. This eliminates the possibility of an address conflict with another device in your system.

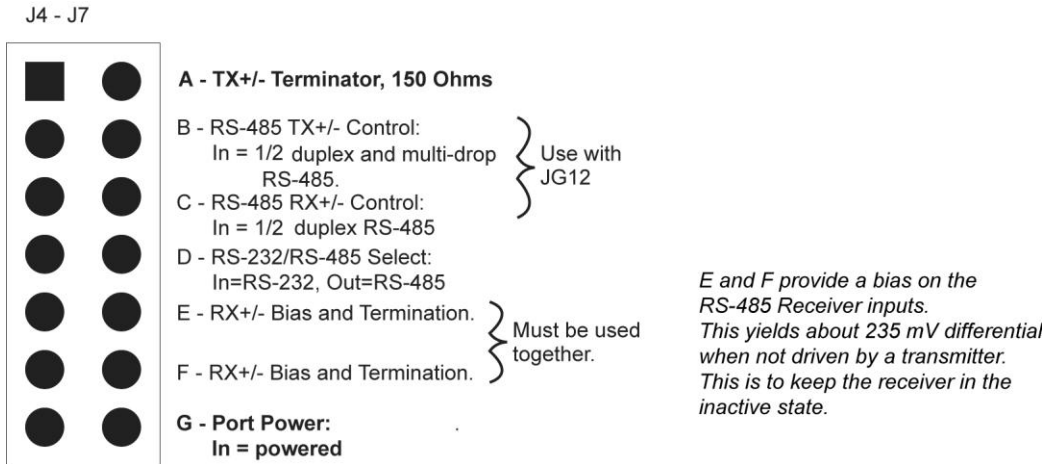
## Custom Port I/O Addresses

If you require specific Port addresses not listed in [Table 2](#) please contact Connect Tech Technical Support at [support@connecttech.com](mailto:support@connecttech.com) for further information. See Figure 5 for Jumper JG3 information.

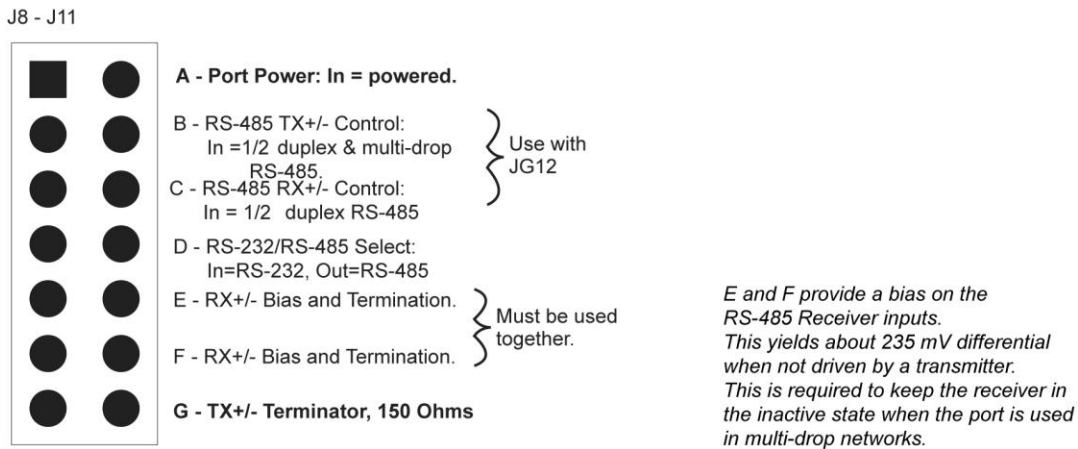
**Table 2: Port Address Settings**

Setting #	Jumper JG3			Port Group	Port addresses in hex				Status Port Address Enabled with JG3-D (In=enabled)
	A	B	C		1	2	3	4	
0	IN	IN	IN	A	150	158	160	168	190
				B	250	258	260	268	290
				C	1A0	1A8	1B0	1B8	1E0
1	OUT	IN	IN	A	250	258	260	268	290
				B	1A0	1A8	1B0	1B8	1E0
				C	2A0	2A8	2B0	2B8	2E0
2	IN	OUT	IN	A	1A0	1A8	1B0	1B8	1E0
				B	2A0	2A8	2B0	2B8	2E0
				C	100	108	110	118	140
3	OUT	OUT	IN	A	2A0	2A8	2B0	2B8	2E0
				B	100	108	110	118	140
				C	200	208	210	218	240
4	IN	IN	OUT	A	100	108	110	118	140
				B	200	208	210	218	240
				C	380	388	390	398	3C0
5	OUT	IN	OUT	A	200	208	210	218	240
				B	380	388	390	398	3C0
				C	300	308	310	318	340
6	IN	OUT	OUT	A	380	388	390	398	3C0
				B	300	308	310	318	340
				C	150	158	160	168	190
7	OUT	OUT	OUT	A	300	308	310	318	340
				B	150	158	160	168	190
				C	250	258	260	268	290

## Port Control Setup

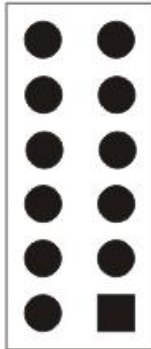


**Figure 2: Port Control, Group A (Ports 1 to 4)**



**Figure 3: Port Control, Group B (Ports 5 to 8)**

Auto RS485 Enable  
JG12



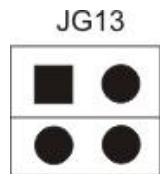
- D - Ports 7-8
- C - Ports 5-6
- B - Ports 3-4
- A - Ports 1-2

*In = Auto RS485 enable.*

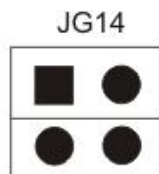
*Used for multidrop RS485 communications, including ½ duplex modes.*

*The setting of this jumper is only recognised at reset/powerup.*

*This jumper, in combination with JGx D/E, will perform the RS485 TX tristate and RX echo cancellation operations, automatically.*



- A - Power for Port 10
- B - Power for Port 9



- A - Power for Port 11
- B - Power for Port 12

**Figure 4: Jumpers JG12, JG13 and JG14**

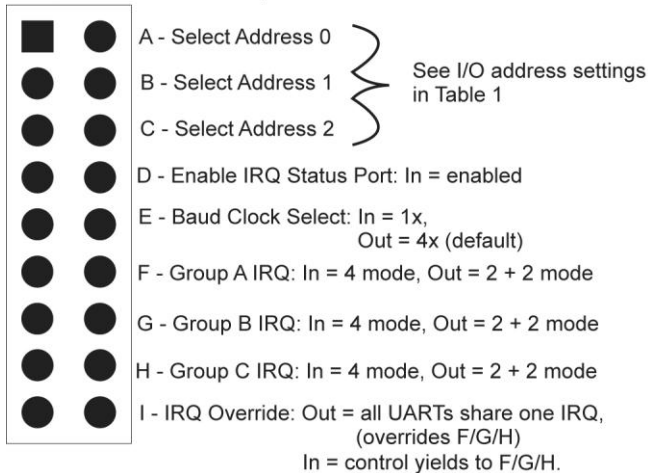
## Baud Rate Selection

The Xtreme/104 Isolated is capable of baud rates up to 460.8 Kbps (4X oscillator) or 115.2 Kbps (1X oscillator) depending on whether a jumper block is installed across position JG3-E. (Please refer to [Figure 5](#)).

## JG3 Selection Jumper Block

This Jumper block is used for a variety of setup functions.

JG3 Address and IRQ setup



**Figure 5: Address and IRQ Setup, JG3**

## Interrupt Setup

### Interrupt Mode

You can configure the board so that “All Ports share one IRQ” (the most common configuration), or you can setup the board to use three, four, five or six interrupts. Referring to Figure 5, there is 4 jumpers that setup the Interrupt Mode, Jumpers JG3 positions F, G, H and I.

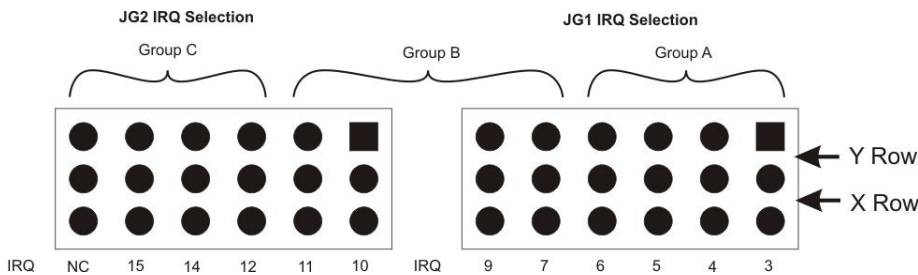
When **NOT** using the “All Ports share one IRQ” mode, there are restrictions on which IRQ’s are available to each Port Group.

Port Group	Ports	IRQ Choices
A	1, 2, 3 and 4	3, 4, 5 and 6
B	5, 6, 7 and 8	7, 9, 10, 11
C	9, 10, 11 and 12	12, 14, 15

F	G	H	I	Interrupt Mode	Ports Interrupting on Row/Group					
					Y/A	X/A	Y/B	X/B	Y/C	X/C
X	X	X	Out	All Ports share one IRQ	1→12	---	1→12	---	1→12	---
Out	Out	Out	In	6 Interrupts (in Port pairs)	1,2	3,4	5,6	7,8	9,10	11,12
In	X	X	In	3 to 6 Interrupts (Group A selection)	1→4	---	Jumper G selection		Jumper H selection	
Out	X	X	In	3 to 6 Interrupts (Group A selection)	1,2	3,4	Jumper G selection		Jumper H selection	
X	In	X	In	3 to 6 Interrupts (Group B selection)	Jumper F selection		5→8	---	Jumper H selection	
X	Out	X	In	3 to 6 Interrupts (Group B selection)	Jumper F selection		5,6	7,8	Jumper H selection	
X	X	In	In	3 to 6 Interrupts (Group C selection)	Jumper F selection		Jumper G selection		9→12	---
X	X	Out	In	3 to 6 Interrupts (Group C selection)	Jumper F selection		Jumper G selection		9,10	11,12

### ISA Bus Interrupt Selection

You can configure the interrupt request lines (IRQ) with the jumper blocks JG1 and JG2 on the Xtreme/104 Isolated adapter. (Please refer to [Figure 6](#)).



**Figure 6: IRQ Selection JG1 and JG2**

### Interrupt Status Ports

The Interrupt Status Ports are ISA I/O locations that allow the software to quickly determine the Port (or Ports) that need service. See Table 2 for the I/O addresses of the Status Ports. The upper 4 bits of the value read will always be zero (0), the lower 4 bits are encoded (by port number) as follows.

Bit Number	Port Group A (Status Port A)	Port Group B (Status Port B)	Port Group C (Status Port C)
0	1	5	9
1	2	6	10
2	3	7	11
3	4	8	12

## Software Installation

Xtreme/104 Isolated adapters are standard multi-port serial adapters that utilize 16C2850 UARTs. In many cases, users have software that will interface directly to the Xtreme/104 Isolated adapters. Many operating systems come with a driver to control access to multiple 8250 style UARTs. Xtreme/104 Isolated adapters currently support device drivers for the following operating systems:

- Linux
- QNX
- SCO Unix/Openserver
- Windows 2000
- Windows 98/Me
- Windows CE
- Windows CE .NET
- Windows NT
- Windows XP
- Windows XP Embedded

The latest manuals, installation guides and drivers are located on the Connect Tech website. Please visit the download zone for more information: <http://www.connecttech.com/asp/Support/DownloadZone.asp>

If you have any questions, please contact Connect Tech Customer Support.

Email: [support@connecttech.com](mailto:support@connecttech.com)

Phone: 1-800-426-8979 (within North America)

Outside North America: 1-519-836-1291

Fax: 1-519-836-4878

## RS/232/422/485 Interfaces

### Electrical Interface Selection

The Xtreme/104 Isolated adapter provides jumper selectable RS-232 and RS-422/485 electrical interfaces on eight of its 12 Ports.

Position D on jumper blocks J1 through J11 determines the individual electrical interfaces for the Ports. Group "A" Ports are controlled by jumper blocks J4 through J7: J4 for Port 1, J5 for Port 2, J6 for Port 3 and J7 for Port 4. Jumper blocks J8 through J11 determine the electrical interfaces for the "B" group of Ports: J8 for Port 5, J9 for Port 6, J10 for Port 7 and J11 for Port 8. Jumpers installed across position D on any of these jumper blocks enable the RS-232 interface for that Port; otherwise the RS-422/485 interface will apply. (Please refer to [Figure 7](#) and [Figure 8](#) for examples of various electrical interface selections).

### Full Duplex Mode (four wire)

To make sure that there are no jumpers on positions B and C of jumper blocks J4 to J11, you can run the individual RS-422/485 Ports in full duplex mode. In this mode, TxD and RxD are active all the time. This mode is typically used in point-to-point situations much like RS-232. (Please refer to [Figure 2](#) and [Figure 3](#)).

### **Half Duplex RS-422/485 (two wire)**

By jumpering positions B and C of jumper blocks J4 to J11, along with the corresponding position on JG12, you can run the individual RS-422/485 Ports in half duplex mode. In this mode your Xtreme/104 Isolated adapter controls the transmitter and receiver circuits. RTS is turned on prior to and during transmission to enable the transmit driver and disable the receiver. RTS is turned off when not transmitting to disable the transmit driver (tri-stated) and enable the receiver. The Xtreme/104 Isolated adapter is responsible for timing the RTS toggle. (Please refer to [Figure 2](#) and [Figure 3](#)).

### **Multi-drop Mode (four wire)**

Placing a jumper on position B of jumper blocks J4 to J11 and on the corresponding Auto-enable on JG12, allows you to run the individual RS-422/485 Ports in multi-drop mode. In this mode the TxD line driver is enabled only when data is transmitted and RxD is enabled all the time. (Please refer to [Figure 2](#) and [Figure 3](#)).

### **Line Bias and Termination**

The RS-422/485 Ports of the Xtreme/104 Isolated adapter feature jumper selectable line bias and termination resistors across RxD+/- and jumper selectable 150 Ohm termination resistors across TxD+/-.

**Termination resistors** are installed to improve the electrical performance of the RS-485 network. RS-485 networks are always wired in a daisy chain, from point-to-point-to-point and so on. Termination resistors are installed at the most extreme ends of that network; they can not be installed in the middle of the network. No more than two termination resistors can reside in the network. Termination resistors are useful in the following situations:

- Where long cabling 30m (100ft) or greater is used.
- Where the cable is of poor quality.
- When the application is using a high baud rate, 115.2 Kbps or greater.

For short point-to-point RS-485 networks, termination resistors are not usually required. While this may reduce power consumption of your adapter, be aware that you may risk poor or intermittent communications without the termination resistors.

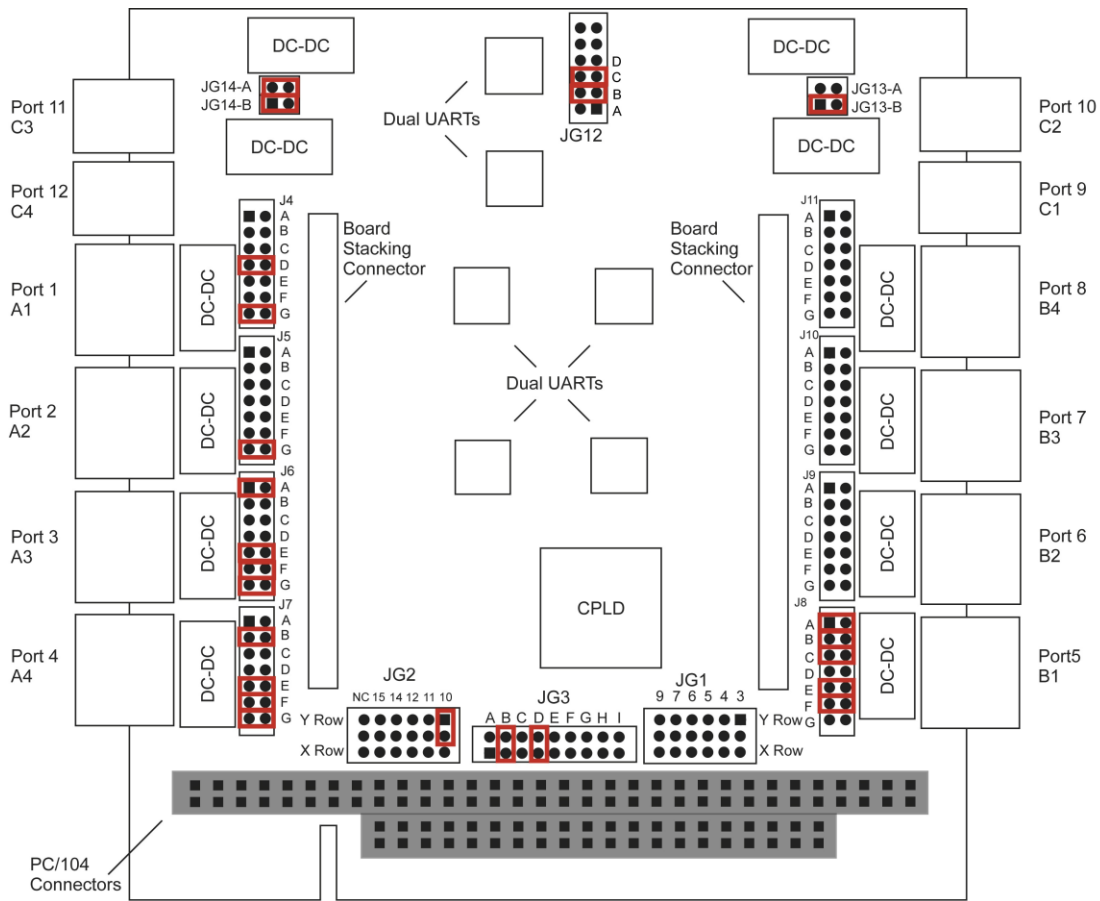
To install a termination resistor across TxD+/- on your Xtreme/104 Isolated adapter, install the appropriate jumper for a given Serial Port. (Please refer to [Figure 2](#) and [Figure 3](#)).

**Bias and Termination resistors** are applied across the RxD+/- pins. The bias resistors provide a valid differential voltage across the RxD+/- pins when there is no voltage applied across the RxD+/- input. The termination resistor has the same uses and the TxD+/- terminator as above.

The RxD+/- bias and termination resistors are used whenever your application requires the following:

- A terminator resistor across RxD+/-
- The Xtreme/104 Isolated Serial Port is configured as the master in a two wire (Half Duplex) multi-drop network.

To install a bias and termination resistor across RxD+/- on your Xtreme/104 Isolated adapter install the appropriate jumpers, a total of two, for a given Serial Port. (Please refer to [Figure 2](#) and [Figure 3](#)).



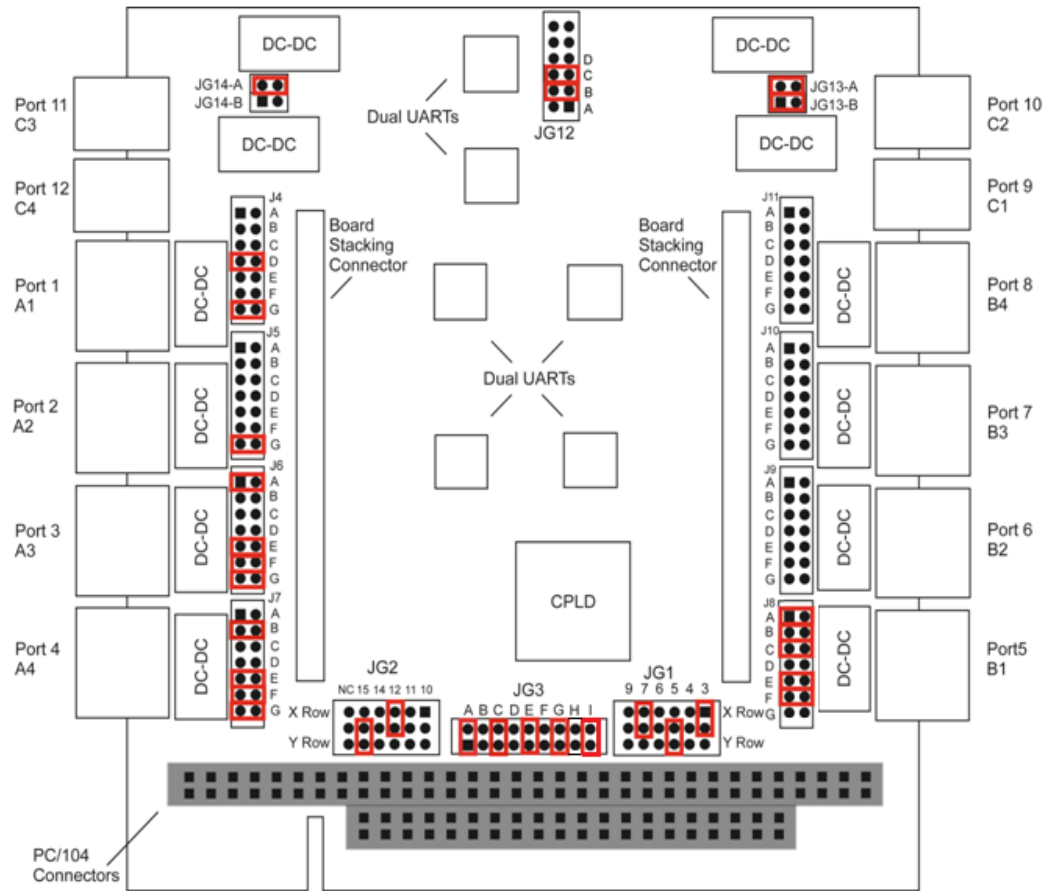
**Port Settings**

- Port 1 = RS-232
- Port 2 = RS-485 4-wire
- Port 3 = RS-485 4-wire TX terminator with RX Bias and Termination installed
- Port 4 = RS-485 4-wire multi-drop with RX Bias and Termination installed
- Port 5 = RS-485 2-wire multi-drop with RX Bias and Termination installed
- Port 6 = Not powered
- Port 7 = Not powered
- Port 8 = Not powered
- Port 9 = Fixed RS-232
- Port 10 = Not powered
- Port 11 = Fixed RS-232
- Port 12 = Fixed RS-232

**I/O Addresses and Interrupts settings**

- I/O Address Range = 5
- IRQ = 10, all ports share interrupt 10
- IRQ Status Ports enabled

**Figure 7: Common Jumper Configurations (Example 1)**



**Port Settings**

- Port 1 = RS-232
- Port 2 = RS-485 4-wire
- Port 3 = RS-485 4-wire TX terminator with RX Bias and Termination installed
- Port 4 = RS-485 4-wire multi-drop with RX Bias and Termination installed
- Port 5 = RS-485 2-wire multi-drop with RX Bias and Termination installed
- Port 6 = Not powered
- Port 7 = Not powered
- Port 8 = Not powered
- Port 9 = Fixed RS-232
- Port 10 = Fixed RS-232
- Port 11 = Fixed RS-232
- Port 12 = Not powered

**I/O Addresses and Interrupts settings**

- I/O Address Range = 2
- Clock select (JG3-E) set to divide by 4
- IRQs
  - Ports A1 and A2 on IRQ3
  - Ports A3 and A4 on IRQ5
  - Ports B1 - B4 on IRQ7
  - Ports C1 and C2 on IRQ12
  - Ports C3 and C4 on IRQ15

**Figure 8: Common Jumper Configurations (Example 2)**

## Appendix

### Xtreme/104 Isolated Specifications

#### Operating Environment

Storage: 40°C to 150°C (40°F to 302°F)  
Operating: -40°C to 70°C (-40°F to 158°F)  
Humidity: 90% relative humidity, non-condensing

#### PC Bus Interface

Base address for UARTs is jumper selectable. Each UART requires eight I/O addresses (96 I/O addresses required).

Custom baud rates are also available. Please contact [sales@connecttech.com](mailto:sales@connecttech.com) for more information.

#### Communications

##### UARTs

XR16C2850 dual UART communication controllers  
On chip 128 byte TxD and RxD FIFO buffers per Port  
Automatic RTS/CTS (Hardware) flow control  
Automatic XON/XOFF (Software) flow control  
Compatible with 16550 style software drivers  
RS-232  
Programmable baud rate generator - up to 115.2 Kbps on all dedicated RS-232 Ports  
230.4 Kbps on all switchable Ports  
RS-422/485  
Programmable baud rate generator - up to 460.8 Kbps on all RS-422/485 Ports  
Full duplex (four wire)  
Half duplex (two wire)  
Multi-drop (four wire)  
Jumper selectable Automatic direction control for two-wire half duplex  
Jumper selectable RxD/TxD line/bias termination resistors

##### Control Signals

RS-232: TxD; RxD; RTS; CTS, ISO GND  
RS-422/485: TxD $\pm$ ; RTS $\pm$ ; CTS $\pm$ ; RxD $\pm$ , ISO GND

#### Electrical Isolation

1.0 kV AC peak to peak on every signal of every Port

#### Power

+5V DC @ 500mA (typical)  
+5V DC @ 1A (maximum)

#### Connectors/Interface

One PC/104 16-bit expansion connector  
RS-232/422/485: Ten pin right angle 2mm connectors  
RS-232: Six pin right angle 2mm connectors (Please refer to [Figure 9](#) for pinouts)

**Dimensions**

Xtreme/104 Isolated Main PCB: 10.10cm /3.55” including connectors (W), 9.60cm/3.78” (L)  
Daughter Board: 5.80cm/2.27” (W), 5.50cm/2.18” (L)

Height is fully compliant with PC/104 specification 2.3.

**Cable Options**

304 mm DB-9 male cables

**Connectors/Pinouts**

Connect Tech recommends using the following mating connectors for your Xtreme/104 Isolated product:

10 pin: Hirose part number - DF11-10DS-2C, DigiKey part number - H2023-ND

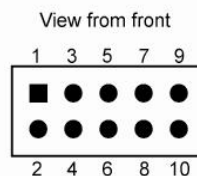
6 pin: Hirose part number - DF11-6DS-2C, DigiKey part number - H2021-ND

Crimping sockets: Hirose part number - DF11-2428SCA

Individual wire assemblies for the DF11 series can be found in DigiKey’s online catalogue at [www.digikey.com](http://www.digikey.com).

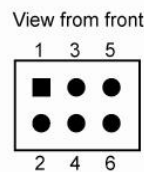
**10 Contact Socket RS-232/422/485**

- 1 - TX/TXD+
- 2 - NC/TXD-
- 3 - NC/RXD+
- 4 - RXD/RXD-
- 5 - CTS/CTS+
- 6 - NC/CTS-
- 7 - RTS/RTS+
- 8 - NC/RTS-
- 9 - GND
- 10 - NC



**6 Contact Socket RS-232**

- 1 - TX
- 2 - RX
- 3 - RTS
- 4 - CTS
- 5 - GND
- 6 - NC



**Figure 9: Pinouts**

## 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 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.

## 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 online Support Center is available 24 hours a day, seven days a week on our website at: [www.connecttech.com/sub/support/support.asp](http://www.connecttech.com/sub/support/support.asp). Please go to the [Download Zone](#) or the [Knowledge Database](#) for product manuals, installation guides, device driver software and technical tips. Submit your questions to our technical support engineers at [support@connecttech.com](mailto:support@connecttech.com). Our technical support is always free.

## Contact Information

### 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: 800-426-8979 (North America only) | Tel: 519-836-1291 | Fax: 519-836-4878 (online 24 hours)

### Email/Internet

You may contact us through the Internet. Our email and URL addresses are:

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

### Mail/Courier

Connect Tech Inc.

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