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Revision History

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<thead>
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<th>Date</th>
<th>Author(s)</th>
<th>Change(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>2014-09-16</td>
<td>RC</td>
<td>Initial Manual Revision Created</td>
</tr>
</tbody>
</table>
Customer Support Overview

If you experience difficulties after reading the manual and/or using the product, contact the Connect Tech Inc. 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.

Limited Warranty

Connect Tech Inc. provides a 90 Day Warranty for this product. 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. 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.
Contact Information

We offer three ways for you to contact us:

Mail/Courier
You may contact us by letter at: Connect Tech Inc.
Technical Support
42 Arrow Road, Guelph, ON
Canada N1K 1S6

Email/Internet
You may contact us through the Internet. Our email and URL addresses on the Internet are:
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 Inc. 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 Inc. 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:

Telephone: 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 (online 24 hours)
Introduction

Connect Tech’s Xtreme/PSU-UC is a high efficiency, high powered PC/104 form factor power supply with extended temperature capabilities. Xtreme/PSU-UC is a highly reliable power supply which provides 154W of total output power with +5V, +3.3V, +12V, -12V and +5V-Standy output voltages. It can be used as a stand-alone power supply to power any other embedded system, or used directly to power any PCI-104 stack or single board computer (SBC). The Xtreme/PSU-UC has a wide input voltage range that accepts +9V to +36V DC and is specifically designed for use in a broad range of rugged applications including military, industrial, and air and ground vehicles. Xtreme/PSU-UC can be used in combination with Connect Tech’s stackable CPU and expansion boards for a total design solution.

In addition to the power supply capabilities, the Xtreme/PSU-UC also has the ability to charge, monitor and switch from main supply to a backup SMART battery, providing transparent backup power to all voltage outputs. The Xtreme/PSU-UC is a Level 2 SMART battery charger and works with all SMART batteries, supporting charge voltages up to +16V and charging current up to 4A.

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.
### Detailed Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
</table>
| **Dimensions** | 3.550” x 3.775” (90mm x 96) PC/104 Compliant  
* Fully meets the PC/104 component height requirements  
* Download 3D Model Files (Click Here) - .step model files |
| **Input Voltage Range** | +9V to +36V DC  
* Input Suppression Diode and Series Fuse and Reverse Polarity Input Protection  
* 15A fused maximum power draw protection |
| **+5V Output** | 10A (50W) maximum  
* 1% Output regulation accuracy  
* <50mV p-p ripple at full load  
* Output Current Limiting Protection  
* Output Overvoltage Protection  
* Remote ON/OFF control via SHUTDOWN# switch, USB UART and RS-232 |
| **+12V Output** | 5A (60W) maximum  
* 1% Output regulation accuracy  
* <40mV p-p ripple at full load  
* Output Current Limiting Protection  
* Output Overvoltage Protection  
* Remote ON/OFF control via SHUTDOWN# switch, USB UART and RS-232 |
| **+5V Standby Output** | 1A (5W) maximum  
* 1% Output regulation accuracy  
* <15mV p-p ripple at full load  
* Current limiting protected |
| **Ultra Capacitors** | 11x 10F Ultracapacitors in series – 0.909 farads  
* Energy Capacity - 262 joules  
* Expansion capabilities for the addition of external modules |
| **Operating Temperature** | -40 to +85 Degrees Celsius  
* See derating section for full details on current consumption vs. input voltage. |
| **Warranty and Support** | 90 Day Product Warranty  
* Free Technical Support |
Board Diagram

[Image of a board diagram with labeled connectors like RS-232 Serial Connector, Micro USB Connector (on bottom of board), External Output Power Connector, and Input Power Connector.]

Functional Block Diagram

[Diagram showing the flow of power from External DC Voltage Input Source through Charge Controller to Xtreme/PSU-UC, which feeds Ultracapacitors and External Capacitor Bank (Optional) to External Equipment Loads, etc.]

- External DC Voltage Input Source: +9V - +36V
- Charge Controller: 16V/24V, 16V/24V
- Xtreme/PSU-UC
- Ultracapacitors
- External Capacitor Bank (Optional)
- External Equipment Loads, Etc.
Part Number Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Features</th>
<th>Board Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSG013</td>
<td>+5V @ 10A, +12V @ 5A, +5VSB @ 1A</td>
<td></td>
</tr>
</tbody>
</table>

Other available ordering options:
- 5V or 12V output only build option available
- Aluminum caps removed/replaced for vacuum application

To order any of these part numbers or to inquire about the other available ordering options please contact sales@connecttech.com for further information.
Hardware Installation

The Xtreme/PSU-UC can be installed into a PC/104 stack to provide power to the stack through its external power connector. The Xtreme/PSU-UC can also be used as a stand-alone embedded power supply to provide power to any other piece of equipment or embedded SBC.

To install the Xtreme/PSU-UC in your system please follow these steps:

1. Ensure your DC input power is OFF (+9V to +36V)
2. Install standoffs into system
3. Insert Xtreme/PSU-UC onto stack (bottom, middle or top).
4. Ensure board is bolted/screwed into stack
5. Connect any external power connections to the Xtreme/PSU-UC’s External Power Connector
6. Connect input power connection to the Xtreme/PSU-UC’ Input Power Connector

*** WARNING: NEVER PLUG IN A LIVE CONNECTION TO THE INPUT POWER ***
7. Power on input power to power up the system.
Input Power

The Xtreme/PSU-UC is meant to use any DC input power source in the range of +9V to +36V DC, which is ideal for many vehicle or mobile application, but also many industrial power solutions as well.

Input Power Circuit Diagram

![Input Power Circuit Diagram](image)

Technical Specifications

- Input Voltage Range: +9V to +36V DC
- Input Fuse Rating: 65V Max, 15A Max
- Input Capacitor Max Voltage: 50V Max

Input Power Connector Pinout

- PIN2 -VIN (Negative Terminal)
- PIN1 +VIN (Positive Terminal)

The input power connector on the Xtreme/PSU-UC is a standard 2-pin 5mm pitch terminal block w/screw flange connector that mates to a 5mm screw terminal plug (with or without flange). With your purchase of the Xtreme/PSU-UC you will have received a mating plug connector, below is a list of plug part numbers that are compatible with the PSG.

Input Power Connector Plug Compatible Part Numbers

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>20020002-G031B01LF</td>
<td>FCI</td>
</tr>
<tr>
<td>796858-2</td>
<td>TE Connectivity</td>
</tr>
<tr>
<td>1835478</td>
<td>Phoenix Contact</td>
</tr>
<tr>
<td>OSTVM027552</td>
<td>On Shore Technology Inc</td>
</tr>
</tbody>
</table>
Output Power

Technical Specifications

The Xtreme/PSU-UC outputs 3 main voltage rails:

- +5V @ up to 10A
- +12V @ up to 5A
- +5V-SB @ up to 1A

All outputs provide:

- Current Limiting Protection
- Overvoltage Protection
- Remote ON/OFF control via SHUTDOWN# switch, USB or remote RS-232 connection (+5V standby power is always on and not controlled by SHUTDOWN#)

Output Power Connector Pinout

Output Power Connector Plug Compatible Part Numbers

With Screw Flange

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>284510-8</td>
<td>TE Connectivity</td>
</tr>
<tr>
<td>1606700000</td>
<td>Weidmuller</td>
</tr>
<tr>
<td>OSTTJ0811520</td>
<td>On Shore Technology Inc</td>
</tr>
<tr>
<td>39504-0008</td>
<td>Molex</td>
</tr>
<tr>
<td>1863369</td>
<td>Phoenix</td>
</tr>
</tbody>
</table>
Configuration Jumpers

**J1: Charge Voltage Control Jumper**

<table>
<thead>
<tr>
<th>Description</th>
<th>Installed</th>
<th>Uninstalled</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>Capacitor Voltage</td>
<td>Charge Voltage <strong>AND</strong> Ext. Connector voltage set to +24V</td>
</tr>
</tbody>
</table>

***WARNING: DO NOT INSTALL OR UNINSTALL THIS JUMPER WHILE MAIN INPUT POWER IS CONNECTED / POWERED ON.***

For applications using the on-board ultracapacitors, installing the jumper (setting the Charge Voltage to +24V) will maximize the hold-up time.

**RS-232 Connector Pinout (P4)**

**View facing 10 pin header**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td>N/A</td>
</tr>
<tr>
<td>3</td>
<td>RX – RS-232 Receive</td>
<td>Input</td>
</tr>
<tr>
<td>4</td>
<td>RTS – RS-232 RTS</td>
<td>Output</td>
</tr>
<tr>
<td>5</td>
<td>TX – RS-232 Transmit</td>
<td>Output</td>
</tr>
<tr>
<td>6</td>
<td>CTS – RS-232 CTS</td>
<td>Input</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td>N/A</td>
</tr>
<tr>
<td>8</td>
<td>NC</td>
<td>N/A</td>
</tr>
<tr>
<td>9</td>
<td>GND – Signal Ground</td>
<td>N/A</td>
</tr>
<tr>
<td>10</td>
<td>GND – Signal Ground</td>
<td>N/A</td>
</tr>
</tbody>
</table>
External Module Charging

The Xtreme/PSU-UC includes an external connector that can be used to charge additional Ultracap modules. In order to conform with many +16V rated modules, the removal of jumper J1 will set this external Charge voltage to +15.5V. Depending on the properties of the module that you wish to use there may be requirements for custom firmware to optimize charging for your target module. If you wish to increase holdup with the use of an external ultracapacitor module please email support@connecttech.com and a custom board and/or custom firmware can be designed to exactly fit your needs.

Remote ON/OFF Functionality

The Xtreme/PSU-UC incorporates remote ON/OFF functionality, in order to necessitate remotely turning the Xtreme PSU ON or OFF from a mechanical switch or digital I/O. It also supports supply shutoff and start up in software via the USB or RS-232 serial interfaces.

+5V-Standby Functionality
The +5V-Standby power will continue to remain turned ON at all times whenever the input power is present, this will be independent of the SHUTDOWN# pin

Turn Supply ON

When the SHUTDOWN# pin is left floating, unconnected or is driven externally to a voltage above +1.5V (min) and +5V (max), the Xtreme/PSU-UC’ +5V, +3.3V, -12V and +12V rails will turn ON.

Connection Example A - Mechanical Switch Method

Connection Example B - External I/O Control Method
**Turn Supply OFF**

Connecting the SHUTDOWN# pin to ground the Xtreme/PSU-UC' +5V and +12V will turn OFF. Alternatively the Xtreme/PSU-UC can be turned OFF by driving the SHUTDOWN# pin to a voltage below +1.3V.

**Connection Example A - Mechanical Switch Method**

**Connection Example B - External I/O Control Method**
Software Interface

The *Xtreme/PSU-UC* includes multiple interfaces for monitoring and control of the power outputs and board temperature.

**RS-232**

The *Xtreme/PSU-UC* includes an on-board RS-232 port for monitoring and control of the power outputs. The port runs at 57600 baud and a summary of the available commands are below.

<table>
<thead>
<tr>
<th>Serial Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VER?</td>
<td>Display firmware version</td>
</tr>
<tr>
<td>HELP?</td>
<td>Display a list of available functions (from this table)</td>
</tr>
<tr>
<td>STARTUP=X</td>
<td>Startup power supply in specified number of seconds [X] (+12V, +5V)</td>
</tr>
<tr>
<td>SHUTDOWN=X</td>
<td>Shutdown power supply in specified number of seconds [X] (+12V, +5V)</td>
</tr>
<tr>
<td>TEMP0?</td>
<td>Display the temperature of Temp. Sensor 0 (°C)</td>
</tr>
<tr>
<td>TEMP1?</td>
<td>Display the temperature of Temp. Sensor 1 (°C)</td>
</tr>
</tbody>
</table>

**USB**

The *Xtreme/PSU-UC* includes an on-board USB port for monitoring and control of the power outputs and board temperature. The USB port is an UART device, running at 57600 baud. Once connected, the RS-232 commands listed above also apply to this serial port connection. Drivers for the port can be found from our website: [www.connecttech.com/](http://www.connecttech.com/)
Power Sequencing Details

Below are some oscilloscope captures of the Xtreme/PSU-UC’ power sequencing during initial power up. The default sequencing is of the following order: +5V-SB → +5V → +12V. If your system requires a different sequence, adjusted parameters, or default startup/shutdown delay please contact support@connecttech.com and a custom board can be ordered to exactly fit your needs.

VIN = +24V

VIN = +10V
Detailed Specifications and Derating Graphs

*All temperature deratings based on test results in a 125CFM test chamber.*