ISOLATED MULTI-PORT RS232 PCI EXPRESS MINI CARD
HARDWARE MANUAL

MODELS mPCIE-ICM232-4 AND mPCIE-ICM232-2
CHAPTER 1: QUICK START

It is recommended that you install the software package before installing the PCI Express Mini Card (mPCIe) in your computer. You can install the software¹ using either a stand-alone installer downloaded from the website or an optional Software Master CD. Run the installer you downloaded (or autorun.exe on the Software Master CD) and follow the prompts to install the software for your device.

Please note: during the installation you may be prompted regarding the installation of non-WHQL-certified drivers; please carefully confirm the digitally signed source of the drivers and accept the installation.

Once the software has been installed, shut down your system and carefully install the mPCIe card.

Re-start your system. Once the computer finishes booting your new serial ports should already be installed and ready for use; you can confirm this by launching Device Manager and looking under the “Ports” section. If, for any reason, the mPCIe or its ports display a warning triangle, right-click and select “Update Driver”.

¹ In Linux or OSX please refer to the instructions in those directories.

CHAPTER 2: INTRODUCTION

PCI Express Mini Card (mPCIe), a low-profile small-footprint bus standard originally intended for adding peripherals to notebook computers, has become the de-facto standard for high-performance, small form-factor devices in many applications.

- 2- or 4-port RS232 serial interface on mPCIe
- Tru-Iso™ provides signal isolation to IPC-221B
- 500V port-to-port, 1500V port-to-PC isolation
- 1 Mbps / 921.6kbps, 9-bit mode, CTS and RTS
- RoHS and Industrial temperature standard

The mPCIe-ICM232 family of cards feature high performance 16C950-class UARTs. Each port is capable of communication speeds up to 921.6kbps and has 128-byte deep transmit and receive FIFOs which protect against data loss in multitasking operating systems, reduce CPU utilization, and improve data throughput. The advanced integrated circuit supports a wide variety of custom baud rates, and any rates not otherwise achievable can be supported via a factory-installed custom crystal oscillator.

CHAPTER 3: HARDWARE

This manual applies to the following models:
- mPCIe-ICM232-4 Four port RS232 Tru-Iso™ mPCIe device
- mPCIe-ICM232-2 Two port RS232 Tru-Iso™ mPCIe device

These models are full-length “F1” mPCIe devices (30 x 50.95 mm). All units are RoHS compliant and support Industrial temperature environments (-35°C to 85°C operating, -65°C to 150°C storage.)

INCLUDED IN YOUR PACKAGE

Four- or two-port mPCIe-ICM232 card
Printed QuickStart Guide

Available accessories include:
- CAB-mPCIe—ICM2 Two port DB-9 cable accessory kit
- CAB-mPCIe—ICM4 Four port DB-9 cable accessory kit
- ADAP9 DB-9 Screw Terminal Accessory
- mPCIe-HDW-KIT2 Mounting hardware for 2mm
- mPCIe-HDW-KIT2.5 Mounting hardware for 2.5mm

Contact the factory for information regarding additional accessories, options, and specials that may be available to best fit your specific application requirements.

CHAPTER 4: CONFIGURATION SETTINGS

This product has no user configurable hardware options. All possible configuration settings can be performed through the industry standard UART drivers in your operating system.
This product interfaces with a PC using a PCI Express Mini Card (mPCIe) connection; a small-form-factor, high-performance, rugged peripheral interconnect technology first introduced for use in laptops and other portable computers.

mPCIe’s small size and powerful performance, combined with perfect software compatibility with PCI and PCIe peripheral designs, have led to its recent adoption as a go-to standard for embedded Data Acquisition and Control, and many other applications.

Although mPCIe is a broadly-adopted industry standard, the actual connection to the computer shares a specification with mSATA: both mSATA and mPCIe use the same edge-connector. In fact, well-designed PCs can automatically detect and configure their onboard connectors to work with either mPCIe or mSATA devices – and, according to the standards for mPCIe and mSATA they are supposed to do so! However, some PC manufacturers ship computers that only support mSATA devices. Please confirm in your PC documentation that your edge-connector is actually PCI Express Mini Card compliant before installing this, or any, mPCIe card. Damage might occur if you install an mPCIe device into a computer that only supports mSATA.

mPCIe defines mounting holes for securing the otherwise loose end of the card, so it is impossible for these cards to wiggle or flap themselves loose (which was a recurring problem with the older PCI Mini devices). Eliminating this concern for PCI Express Mini Cards is a major reason this standard has seen rapid adoption by the Data Acquisition and Control industry.

The mPCIe standard, like its PCI Mini Card predecessor, was designed assuming use primarily in Laptop or Notebook and similar devices, where physical dimension is often the paramount design constraint. In Data Acquisition and Control applications low-weight combined with vibration tolerance tend to be of more concern.

Caution: Although the 2-Port card is fully compliant with all standard dimensions for a full-length mPCIe design, the 4-port card violates the component-height limit on the back of the card, by up to 1.3mm. This may result in mechanical incompatibility with some motherboard designs, if, and only if, they place other motherboard components inside the footprint of the full-length mPCIe card. See the Specification section of this document for dimension details.

This card provides one 5-pin latching Hirose DF57 connector per RS232 port. The mating connector is the Hirose DF57H-5S-1.2C.

Order the CAB-mPCIe-ICM4 or –ICM2 cable kit accessory to cable the DF57 connectors to industry standard DB9 Male connectors. Alternately, custom hardware interfaces can be produced to fit your specific application requirement.

The DF57 connector is a low profile latching device. In order to operate it correctly, please note: the front of the cable connector clicks down, into a locked position, after the rear has been mated by pushing it into the socket. To disconnect, pop the front of the cable connector upwards to disengage the latch before moving the connector away from the card.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Names</th>
<th>Signal Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>2</td>
<td>TX</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>3</td>
<td>RX</td>
<td>Receive Data</td>
</tr>
<tr>
<td>4</td>
<td>RTS</td>
<td>Request To Send</td>
</tr>
<tr>
<td>5</td>
<td>CTS</td>
<td>Clear To Send</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Male Pin</th>
<th>Signal Names</th>
<th>Signal Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>nc</td>
<td>no connect</td>
</tr>
<tr>
<td>2</td>
<td>RX</td>
<td>Receive Data</td>
</tr>
<tr>
<td>3</td>
<td>TX</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>4</td>
<td>RTS</td>
<td>Request To Send</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>nc</td>
<td>no connect</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
<td>Request To Send</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
<td>Clear To Send</td>
</tr>
<tr>
<td>9</td>
<td>nc</td>
<td>no connect</td>
</tr>
</tbody>
</table>

Although the UARTs provided by this card are fully 16550/16950 compatible, the advanced features are best enabled by using the provided software drivers.

<table>
<thead>
<tr>
<th>Mating</th>
<th>Un-Mating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position above and match alignment</td>
<td>Engage lever</td>
</tr>
<tr>
<td>Push down to insert the cable side</td>
<td>Pull up to release the simple lock</td>
</tr>
<tr>
<td>Push the contact-portion side into place</td>
<td>Continue lifting, the reinforced lock is released</td>
</tr>
</tbody>
</table>

The card installs ports into the OS as standard serial COM devices. Therefore, in each OS or programming environment, standard COM APIs are used to communicate. For example, in the .NET Common Language Runtime you would use the methods provided by the System.IO.Ports namespace. In Linux, the ttySn device controls port n. Other operating systems have similar, OS-specific, standard methods of communication with RS232 devices.

Various sample programs are provided to demonstrate application programming of the serial ports, in a variety of popular programming languages.

WinRISC is a serial port utility provided with this card. It is very useful when working with any serial device: it provides a very simple, very easy, interface.

The latest information can always be found on the product page on the website. Here are some useful links:

Links to useful downloads

- **Main web site**
  - [http://acces.io](http://acces.io)
- **Product web page**
  - [acces.io/mPCIe-ICM232-4](http://acces.io/mPCIe-ICM232-4)
- **This manual**
  - [acces.io/MANUALS/mPCIe-ICM232-4.pdf](http://acces.io/MANUALS/mPCIe-ICM232-4.pdf)
- **Windows Software Install Package**
  - [acces.io/files/packages/mPCIe-ICM232Install.exe](http://acces.io/files/packages/mPCIe-ICM232Install.exe)

**DF57 Pin Signal Names Signal Descriptions**

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<td>5</td>
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**DSub 9-pin Male**

DB-9 Male Signal Names Signal Descriptions

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CHAPTER 8: SPECIFICATIONS

**PC Interface**

**PCI Express Mini Card**
- Type F1 “Full Length”

**Communications Interface**

**I/O connector**
- Hirose DF57 5-pin latching

**I/O mating connector**
- Hirose DF57H-SS-1.2C

**Serial Ports**
- 4 (or 2) RS-232

**UART**
- Quad 16C950
- FIFO 128-byte transmit & receive

**Baud Rates**
- up to 921.6k baud (1Mbps)
- advanced-prescaler allows a wide variety of additional rates to be achieved

**Character length**
- 5, 6, 7, 8 bits (contact factory for assistance with 9-bit data)

**Parity**
- Even, Odd, None, Mark, Space

**Stop Interval**
- 1, 1½, 2 bits

**Flow Control**
- RTS/CTS, Xon/Xoff, None

**Environmental**

**Temperature**
- Operating: 35°C to 85°C
- Storage: -65°C to 150°C

**Humidity**
- 5% to 95%, non-condensing

**Power required**
- +3.3VDC @ 1.8W (typical)

**Physical**

**Size**
- length: 50.95mm (2.006”)
- width: 30.00mm (1.181”)

**Weight**
- 8 grams

**Isolation**

**ESD Protection**
- ±15kV on all signal pins (IEC 61000)

**Tru-Isol™**
- Port-to-port: 500 V peak (AC or DC)
- Port-to-PC: 1500 V peak (AC or DC)

**Careful attention has been paid to isolation design, including extensive keep-out zones and hand-routed circuit paths, as well as component and material selection.**

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CHAPTER 9: CERTIFICATIONS

**CE & FCC**

These devices are designed to meet all applicable EM interference and emission standards. However, as they are intended for use installed on motherboards, and inside the chassis of industrial PCs, important care in the selection of PC and chassis is important to achieve compliance for the computer as a whole.

**UL & TUV**

No DC voltages above 5V, and no AC voltages of any kind, are consumed or produced during normal operation of this device. This product is therefore exempt from any related safety standards. Use it with confidence!

**TRU-ISO™ STATEMENT**

Our Tru-Isol™ products are designed under IPC-221B. The circuit is isolated with a ≥ 300mil gap between all signal and plane layers between the ports and the PC, and a ≥ 100mil gap port to port. These gaps are rated under IPC-221B at 1500V (Port to PC) and 500V (Port to Port). Our circuit uses a chip-level high-frequency DC-DC isolator which is rated at 2500VRMS for 1 minute under UL 1577. This isolation component has an over 50 year isolation lifespan even if the isolation voltage potential is in excess of 350 volts AC. TRU-ISO™, for true signal isolation.

**ROHS / LEAD-FREE STATEMENT**

All models are produced in compliance with RoHS and various other lead-free initiatives.

**WARNING**

A SINGLE STATIC DISCHARGE CAN DAMAGE YOUR CARD AND CAUSE PREMATURE FAILURE! PLEASE FOLLOW ALL REASONABLE PRECAUTIONS TO PREVENT A STATIC DISCHARGE SUCH AS GROUNDING YOURSELF BY TOUCHING ANY GROUNDED SURFACE PRIOR TO TOUCHING THE CARD.

ALWAYS CONNECT AND DISCONNECT YOUR FIELD CABLELING WITH THE COMPUTER POWER OFF. ALWAYS TURN COMPUTER POWER OFF BEFORE INSTALLING A CARD. CONNECTING AND DISCONNECTING CABLES, OR INSTALLING CARDS, INTO A SYSTEM WITH THE COMPUTER OR FIELD POWER ON MAY CAUSE DAMAGE TO THE I/O CARD AND WILL VOID ALL WARRANTIES, IMPLIED OR EXPRESSED.

**WARRANTY**

Prior to shipment, ACCES equipment is thoroughly inspected and tested to applicable specifications. However, should equipment failure occur, ACCES assures its customers that prompt service and support will be available. All equipment originally

ACCES I/O Products, Inc.
Made in the USA

mPCIe-ICM232-4
manual revision B2g
manufactured by ACCES which is found to be defective will be repaired or replaced subject to the following considerations:

GENERAL
Under this Warranty, liability of ACCES is limited to replacing, repairing or issuing credit (at ACCES discretion) for any products which are proved to be defective during the warranty period. In no case is ACCES liable for consequential or special damage arriving from use or misuse of our product. The customer is responsible for all charges caused by modifications or additions to ACCES equipment not approved in writing by ACCES or, if in ACCES opinion the equipment has been subjected to abnormal use. "Abnormal use" for purposes of this warranty is defined as any use to which the equipment is exposed other than that use specified or intended as evidenced by purchase or sales representation. Other than the above, no other warranty, expressed or implied, shall apply to any and all such equipment furnished or sold by ACCES.

TERMS AND CONDITIONS
If a unit is suspected of failure, contact ACCES' Customer Service department. Be prepared to give the unit model number, serial number, and a description of the failure symptom(s). We may suggest some simple tests to confirm the failure. We will assign a Return Material Authorization (RMA) number which must appear on the outer label of the return package. All units/components should be properly packed for handling and returned with freight prepaid to the ACCES designated Service Center, and will be returned to the customer's/user's site freight prepaid and invoiced.

COVERAGE
FIRST THREE YEARS: Returned unit/part will be repaired and/or replaced at ACCES option with no charge for labor or parts not excluded by warranty. Warranty commences with equipment shipment.
FOLLOWING YEARS: Throughout your equipment's lifetime, ACCES stands ready to provide on-site or in-plant service at reasonable rates similar to those of other manufacturers in the industry.

EQUIPMENT NOT MANUFACTURED BY ACCES
Equipment provided but not manufactured by ACCES is warranted and will be repaired according to the terms and conditions of the respective equipment manufacturer's warranty.

TRADEMARKS
Tru-Iso™ is a trademark of ACCES I/O Products, Inc., San Diego CA 92121-1506

DISCLAIMER
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PCI EXPRESS MINI CARD STANDARD NOTICE AND EXCEPTION
The mPCI-ICM232-2 (two-port) device is fully compliant with PCI Express Mini Card v1.2.
NOTICE: The mPCIe-ICM232-4 (four-port) device exceeds the component height limit on the bottom of the card. Depending on the specific device, the components on the bottom of the card may protrude between 1.0 and 1.3 millimeters further “down” than the standard allows.
Please verify your intended host PC motherboard / adapter has not located components within the 51x30mm footprint of the mPCIe card.