

# MicroComU

( MicroDXP Communications USB board)

## Technical Reference Manual

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# Safety

Please take a moment to review these safety precautions. They are provided both for your protection and to prevent damage to the MicroComU board and connected equipment. This safety information applies to all operators and service personnel.

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## Power Source

The MicroComU board requires a single DC voltage supply to operate. In such cases where the user will provide their own power supply, the supply must conform to the specifications contained in section 1.4.2.1 of this manual to avoid damaging the MicroComU and/or microDXP, and nullifying the product warranty.

We recommend that new users purchase the Rapid Development Kit. The kit includes a wall-mount power supply intended to operate from a mains supply voltage of 100VAC to 240VAC at 47Hz to 63Hz. Use of the evaluation kit with any other mains voltage or power supply could damage the unit and nullify the product warranty.

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## Servicing and Cleaning

To avoid personal injury, and/or damage to the MicroComU, microDXP, or connected equipment, do not attempt to repair or clean the unit. The MicroComU hardware is warranted against all defects for 1 year. Please contact the factory or your distributor before returning items for service.

# End Users Agreement

XIA LLC warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, XIA LLC, at its option, will either repair the defective products without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify XIA LLC of the defect before the expiration of the warranty period and make suitable arrangements for the performance of the service.

This warranty shall not apply to any defect, failure or damage caused by improper uses or inadequate care. XIA LLC shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than XIA LLC representatives to repair or service the product; or b) to repair damage resulting from improper use or connection to incompatible equipment.

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## Contact Information:

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31057 Genstar Rd.  
Hayward, CA 94544 USA  
[microDXP@xia.com](mailto:microDXP@xia.com) (for microDXP or microComU hardware support)

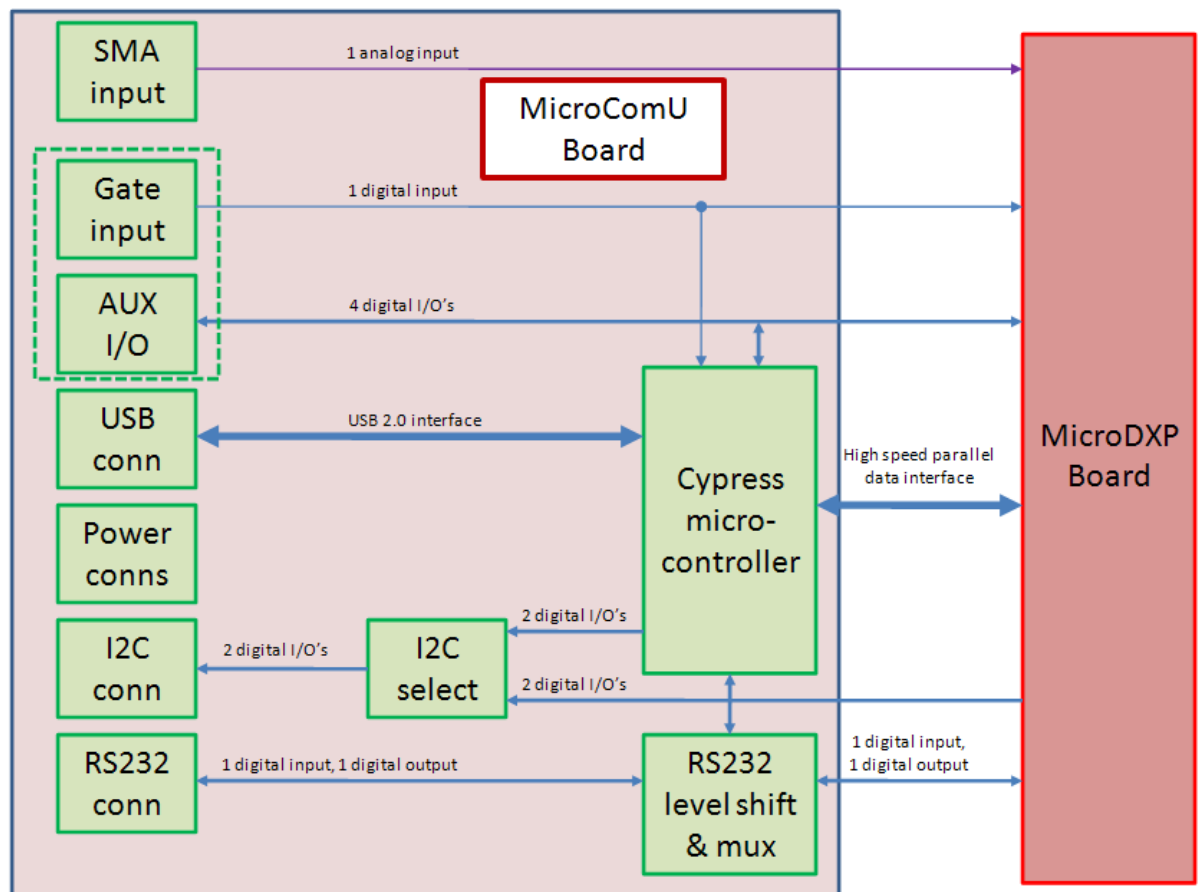
(510) 401-5760

# 1 Introduction

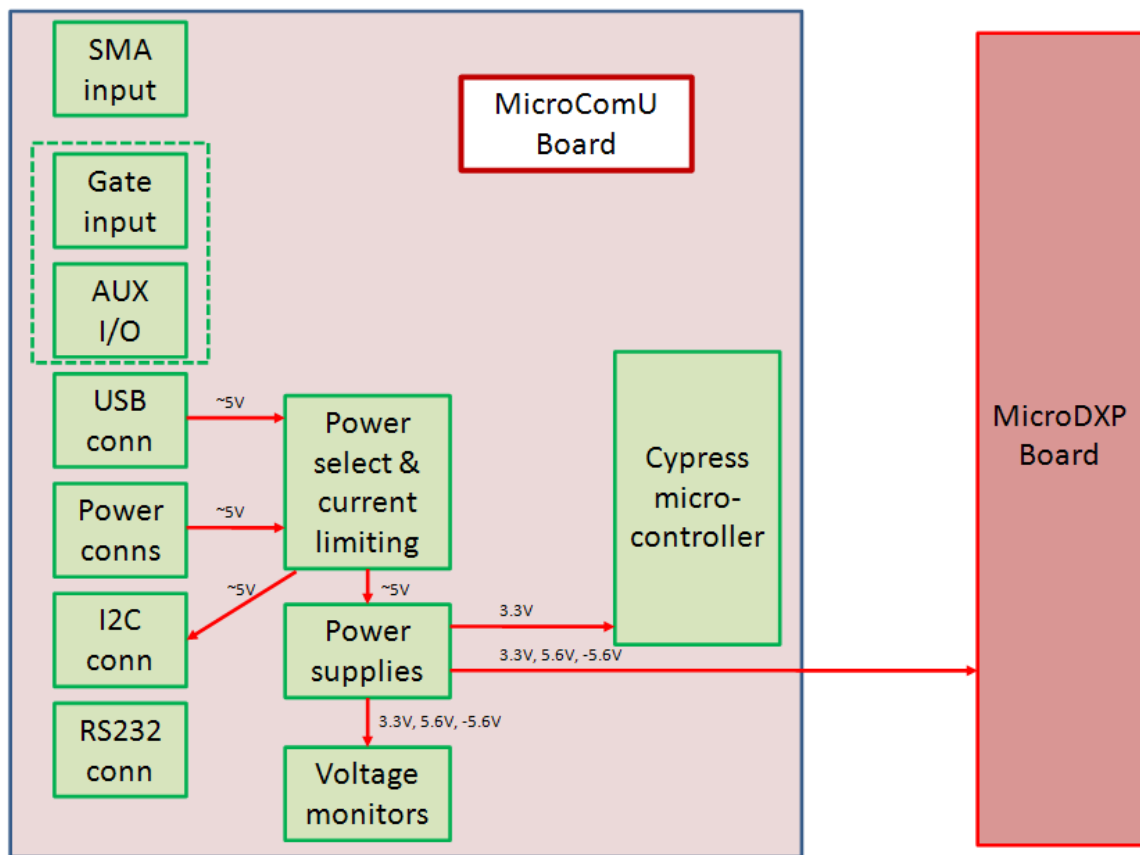
The MicroDXP Communications USB (MicroComU) board is designed to facilitate the adoption and use of XIA LLC's credit-card sized digital spectrometer (MicroDXP) board. To this end, the MicroComU includes various features to support and extend the functionality of the MicroDXP board. The MicroComU board is designed to mate to a MicroDXP board and be used as a set.

The MicroComU board may be used as part of a development kit to aid customers doing custom designs by providing an example of how to interface to the MicroDXP board. Alternatively, the MicroComU board may also be used as a companion board, where customers would simply order a MicroComU board for every MicroDXP board.

## 1.1 Control and Data Block Diagram



## 1.2 Power Flow Block Diagram



## 1.3 MicroComU Features

### 1.3.1 Power Supplies

The MicroComU generates the various voltages required by the MicroDXP board. Power may be supplied to the MicroComU/MicroDXP board set either (a) from a single external DC supply, using one of two available input power connectors, or (b) via USB, when directly connected to a PC or to a powered USB hub. Detailed specifications follow.

### 1.3.2 USB Communications

The MicroComU implements a USB 2.0 high-speed interface to a PC and a high-speed parallel interface to the MicroDXP board. This combination allows MCA spectrum to be read out at a sustained rate of 4MB/sec. This is considerably faster than using RS232 communications. Detailed specifications follow.

### 1.3.3 RS232 Communications

The MicroComU also implements the physical interface between a PC serial port (COM port) and the RS232 interface on the MicroDXP board. This feature is primarily intended to support customers who order lower cost versions of the MicroDXP that lack the high speed parallel interface between the MicroDXP and MicroComU boards. This feature also serves to allow the newer MicroComU board to start replacing the older MicroCom board. Detailed specifications follow.

### 1.3.4 SMA Connection to Detector

The MicroComU board implements a panel-mount-compatible SMA connector to accept input from detectors. This SMA connection supplements the existing options for BNC and Lemo connectors on the MicroDXP board. Customers wishing to use the SMA connector are requested to contact XIA to discuss compatible versions of the MicroDXP board.

### 1.3.5 I2C Communications

The MicroComU board implements an interface to external, customer supplied I2C peripherals. Examples could include temperature sensors, displays, etc. Customers wishing to use external I2C communications are requested to contact XIA to discuss requirements.

### 1.3.6 Gate Input & AUX I/O Communications

The MicroComU board implements a connector with 1 gate input pin and 4 I/O pins whose function is TBD. Customers wishing to implement gating or additional I/O capabilities are requested to contact XIA to discuss requirements.

### 1.3.7 Available board-to-board connection to customer equipment

Although the secondary power connector, RS232 connector, I2C connector, and AUX I/O connector are currently loaded with board-to-wire connectors, the MicroComU board was designed with the possibility of loading these with board-to-board connectors instead. Those interested in creating a 3-board stack consisting of (a) MicroDXP, (b) MicroComU, and (c) customer-designed custom board are requested to contact XIA to discuss requirements.

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## 1.4 Hardware Requirements

### 1.4.1 Host Computer

The MicroComU board can communicate with a host Windows PC in two ways. The primary communication link is a USB 2.0 high-speed port. The secondary communication link is an RS232 (COM) port.



## 1.4.2 Power Requirements

The MicroComU board requires a single DC voltage supply to operate. In cases where the user will provide their own power supply to generate these voltages, such power supplies should conform to the specifications described below.

### 1.4.2.1 External DC Supply

The MicroComU/MicroDXP board set may be powered by an external DC power supply, such as the one included with the Development Kit. Specifications are:

<i>Voltage Range</i>	<i>Current</i>	<i>Description</i>
<b>+5.0V to +5.5V</b>	Capable of at least 500mA	Regulated DC power supply. This spec accommodates all MicroDXP board variants and the MicroComU board itself. In addition to the 500mA, external power supply must be capable of supplying any additional current that customer plans to draw from J3 for customer daughter board.

### 1.4.2.2 USB powered system

The MicroComU board is capable of using a high-power USB port to supply the power requirements for the MicroDXP/MicroComU board set. The USB port must accept a request to enter high power mode. Typically this requires a USB port on the PC or a powered USB hub.

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## 1.5 Operating Environment

- Temperature Range: 0° C - 50° C
- Maximum Relative Humidity: 75%, non-condensing.
- Maximum Altitude: 3,000 meters
- Pollution degree 2
- Not rated for use in high electromagnetic fields.
- Not rated for use in environments with measurable neutron flux. Neutron flux will cause permanent damage to silicon crystals and permanently degrade or impair the performance of this system.
- The components on the MicroComU and microCOM boards are not radiation hardened. Although there should not be a problem operating them in environments with modest gamma or X-ray flux, above a certain level this radiation will start to cause bit errors in the digital components. If necessary, please contact XIA LLC to discuss a proposed radiation environment.

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## 1.6 Regulatory Compliance

The MicroComU board is RoHS compliant.

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## 1.7 Support

A unique benefit of dealing with a small company like XIA is that the same people who designed them often provide the technical support for our sophisticated instruments. Our customers are thus able to get in-depth technical advice on how to fully utilize our products within the context of their particular applications. Please read through this brief chapter before contacting us.

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31057 Genstar Rd.  
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(510) 401-5760

Hardware Support:      microDXP@xia.com  
Software Support:      software\_support@xia.com

### 1.7.1 Firmware Updates

There is one firmware file associated with the MicroComU board, for the Cypress microcontroller. In the event that updates to this firmware are required, further instructions will be provided.

### 1.7.2 Related Documentation

As a first step in diagnosing a problem, it is sometimes helpful to consult the most recent data sheets and user manuals for a given product line, available in the Adobe Portable Document Format (PDF) from the XIA web site. Since these documents may have been updated since the MicroComU unit was purchased, they may contain information that could help solving a problem in question. All manuals, datasheets, and application notes, as well as software and firmware downloads can be found on at:

<http://www.xia.com/microDXP.html>

In order to request printed copies, please send an e-mail to software\_support@xia.com, or call the company directly. In particular, we recommend that you download the following documents:

- ✓ **Rapid Development Kit User Manual** – All users
- ✓ **MicroDXP Technical Reference Manual** – All users
- ✓ **MicroComU Technical Reference Manual (to check for updated versions of this document)** – All users

### 1.7.3 Email and Phone Support

The microDXP comes with one year of email and phone support. Support can be renewed for a nominal fee. Please call XIA if your support agreement has expired.

For general questions and MicroComU hardware issues please email:  
[microDXP@xia.com](mailto:microDXP@xia.com).

## 2 Using the MicroComU Board

*Note: Please refer to the 'Getting Started' section of the **Development Kit User Manual** for detailed setup instructions.*

This chapter provides an overview of the MicroComU board, including pointers to relevant connectors, switches, and indicators. It goes on to provide detailed descriptions of connector pin outs that may be required for customers wishing to incorporate the MicroComU/MicroDXP board set into a larger system.

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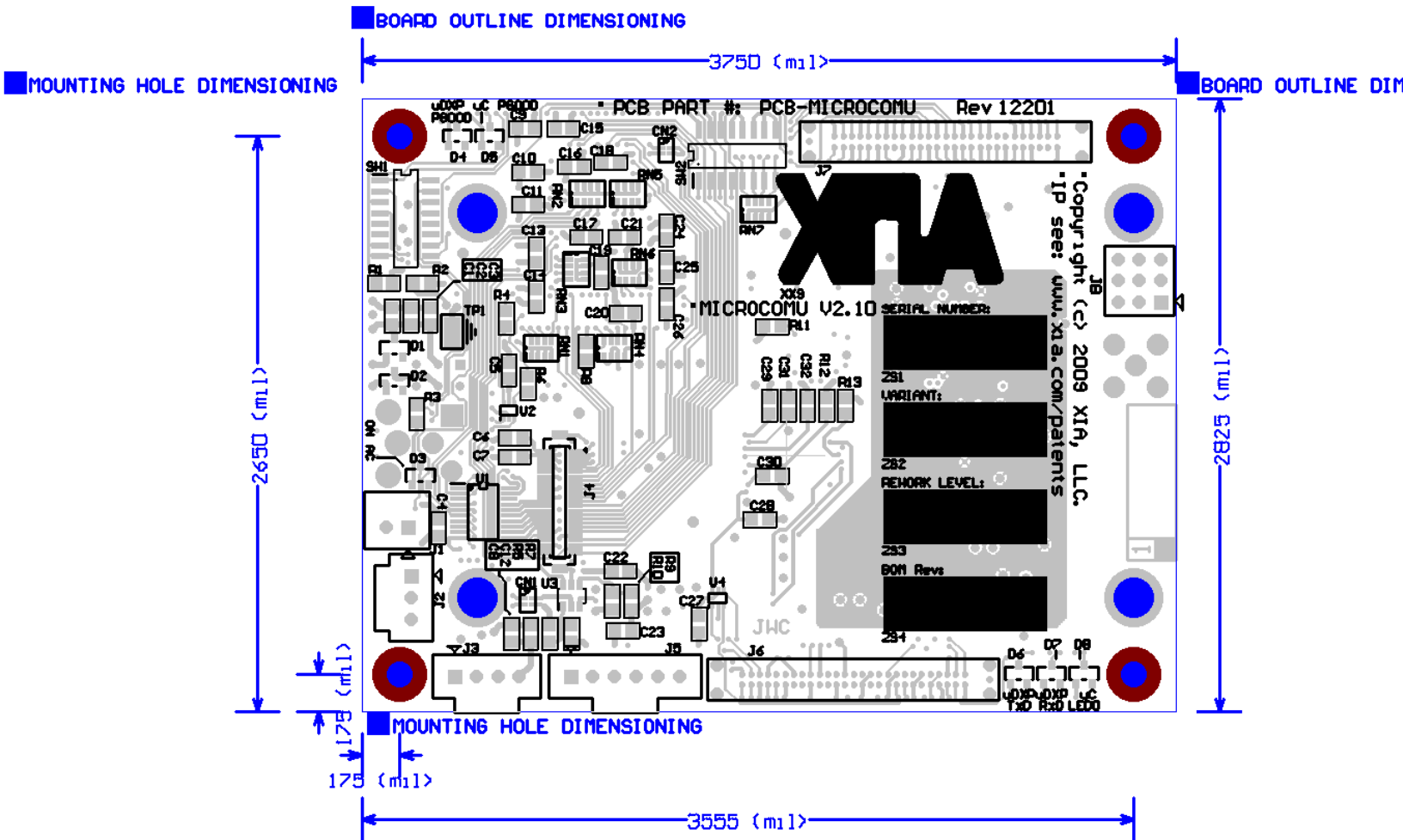
### 2.1 MicroComU Dimensions and Component Locations

The MicroComU board measures 3.750" (95.25mm) by 2.825" (71.755mm). It is slightly larger than the MicroDXP board on 3 sides. The MicroDXP board mates to J4 and secures itself to the MicroComU board using 4 supplied machine screws at the inner four mounting holes (shown in grey and blue).

The MicroComU board has four mounting holes available for use by customers (shown in dark red in Figure 1 below), at locations given below. It ships with 0.625" (15.875mm) tall nylon standoffs installed below and above the board at the mounting holes shown in dark red. These standoffs have 4-40 screw threads to accommodate machine screws.

The locations of notable connectors, LED indicators, switches, etc. on top and bottom sides of the MicroComU board are shown in Figures 2 and 3 below.

### 2.1.1 Board Dimensions and Mounting Hole Locations



**Figure 1:** Board outline dimensions and locations of customer-accessible mounting holes (the 4 shown in red nearest the corners of the board). Dimensions and locations are given in mil, where 1 mil = 1/1000 inch, or 1 mil = 0.0254 mm. Note: The inner 4 mounting holes (in gray and blue) are reserved for use by the mated MicroDXP board only. (There are 5 mm spacers installed in these mounting holes to support the mounted MicroDXP).

### 2.1.2 Notable components on top side of board

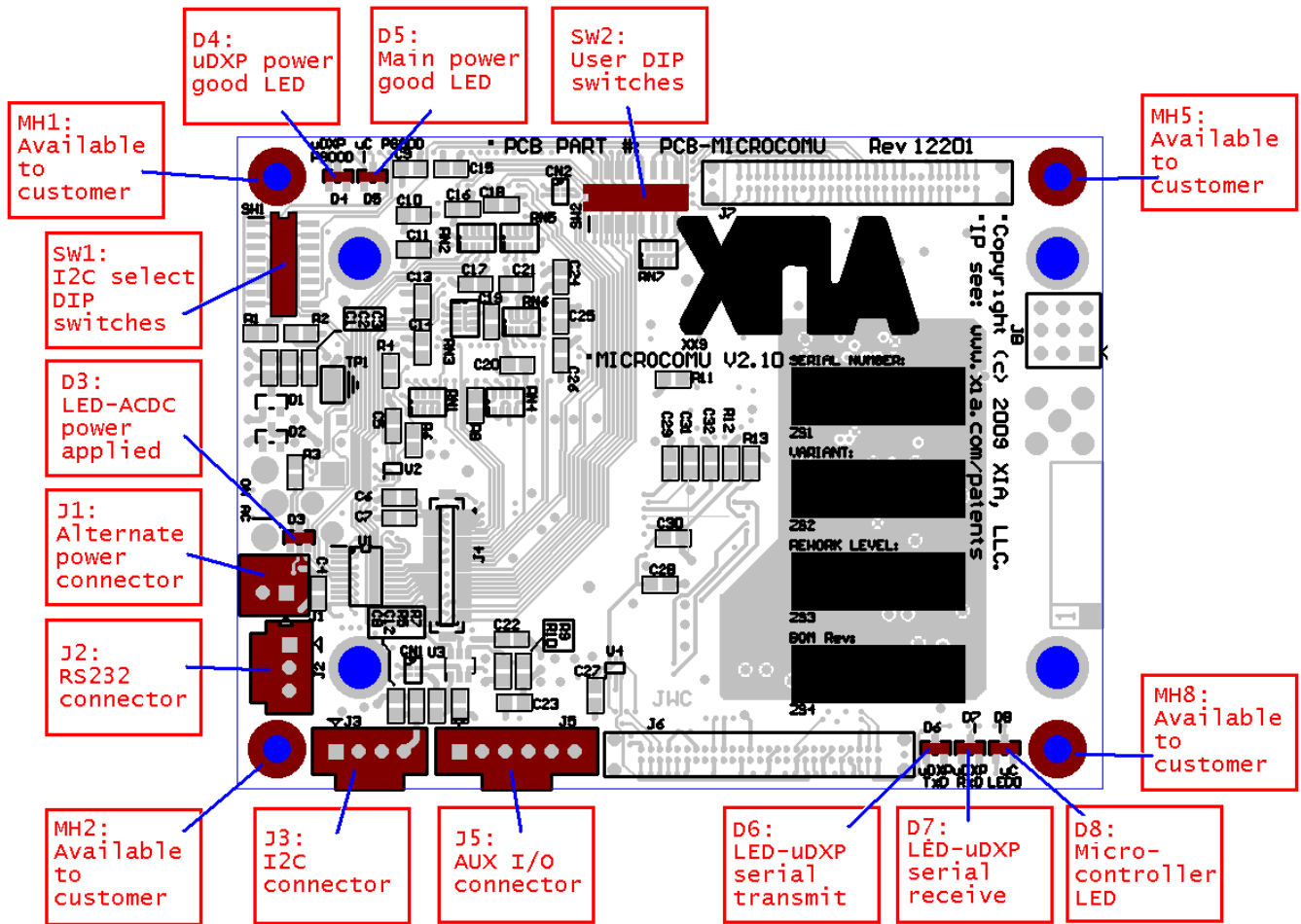


Figure 2: Locations of connectors, LEDs, and DIP switches on top side of board. Note that the MicroDXP is mounted to the top side of the board, using board-to-board connector J4.

### 2.1.3 Notable components on bottom side of board

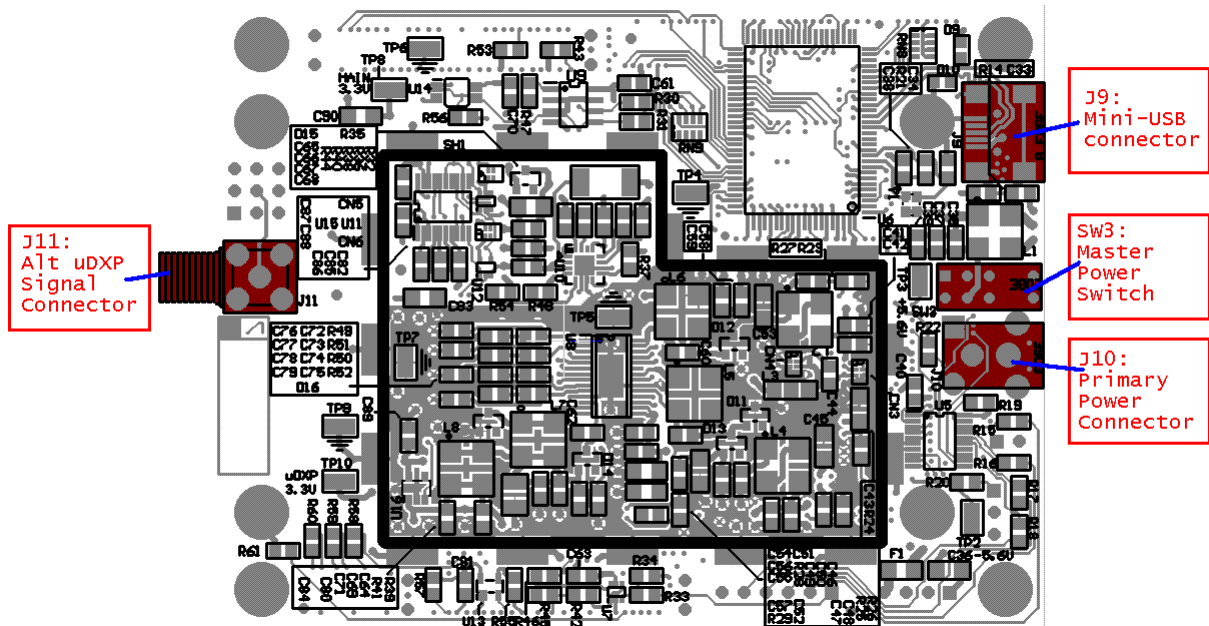


Figure 3: Locations of connectors and switches on bottom side of board. Note that an EMI shield covers much of the bottom side of the board. Customers are requested not to remove this shield.

## 2.2 Connector Descriptions and Pinouts

Please note that while all connectors and connections are described below, some board variants may omit one or more of these connectors, depending on the needs and specifications of the customer. In addition, while the AMP connectors specified for connectors J1, J2, J3 and J5 are meant for board-to-wire use, it would be possible to substitute other footprint-compatible connectors if board-to-board use is desired. Please consult with XIA to discuss your needs.

Also note that these connectors are listed in the order that they appear in Figures 2 & 3 above. They are not ordered by importance.

### 2.2.1 J1 – Alternate Power Connector

<b>J1 – Top side of board – Alternate Power Connector – 2 Pin</b>				
May be left unconnected if power is supplied via Primary Power Connector or if MicroComU is connected to a high-power USB port on a PC.				
<b>Connector on MicroComU board:</b>		<b>AMP part # 5-104363-1</b>		
<b>Mating connector (board-to-wires):</b>		<b>AMP part # 5-103957-1</b>		
<b>Mating connector (board-to-board):</b>		<b>TBD</b>		
<b>Pin(s)</b>	<b>Net</b>	<b>Logic level</b>	<b>Direction</b>	<b>Description</b>
<b>1</b>	<b>V_ACDC</b>	<b>N/A</b>	<b>Input power</b>	External +5.0V to +5.5V regulated DC power supply ( <i>Note 1</i> ). External supply must be capable of providing at least 500mA at 5.0VDC to 5.5VDC. This spec accommodates all MicroDXP board variants and the MicroComU board itself. In addition to the 500mA, external power supply must be capable of supplying any additional current that customer plans to draw from J3 for customer daughter board.
<b>2</b>	<b>GND</b>	<b>N/A</b>	<b>Ground return</b>	Ground return

*Note 1:* This is the specification for the typical MicroComU board. Customers wishing to power the MicroComU / MicroDXP board set with an external supply in the range +5.0V to +12.0V DC should contact XIA and inquire about MicroComU Variant B. In exchange for the increased input voltage range, MicroComU Variant B cannot draw power from the USB cable, and therefore must always be powered via the Alternate Power Connector or the Primary Power Connector.



### 2.2.2 J2 – RS232 Connector

<b>J2 – Top side of board – RS232 Connector – 3 Pin</b>				
If customer plans to use USB communication, <b>do not</b> mate to this connector. Use this connector only if customer wishes to communicate with MicroDXP board using lower bandwidth PC serial port (COM port).				
<b>Connector on MicroComU board:</b>		<b>AMP part # 5-104363-2</b>		
<b>Mating connector (board-to-wires):</b>		<b>AMP part # 5-103957-2</b>		
<b>Mating connector (board-to-board):</b>		<b>TBD</b>		
Pin(s)	Net	Logic level	Direction	Description
1	RS_EXT_TXD	RS232	<b>Input to MicroComU</b>	External PC serial transmit line.
2	RS_EXT_RXD	RS232	<b>Output from MicroComU</b>	External PC serial receive line.
3	GND	N/A	<b>Ground reference</b>	Ground reference.

### 2.2.3 J3 – I2C Connector

<b>J3 – Top side of board – I2C Connector – 4 Pin</b>				
This connector allows for the PIC microcontroller on the MicroDXP board or the Cypress microcontroller on the MicroComU board to communicate with external I2C devices. Examples of external I2C devices include additional temperature sensors, high voltage controls, additional display LEDs, etc. If planning to use this connector, call XIA to discuss customer requirements and possible NRE charges for XIA to enhance the PIC or Cypress microcontroller firmware.				
<b>Connector on MicroComU board:</b>		<b>AMP part # 5-104363-3</b>		
<b>Mating connector (board-to-wires):</b>		<b>AMP part # 5-103957-3</b>		
<b>Mating connector (board-to-board):</b>		<b>TBD</b>		
Pin(s)	Net	Logic level	Direction	Description
1	GND	N/A	<b>Ground reference</b>	Ground reference.
2	ED_EXTI2C_SDA	3.3V CMOS	<b>Bidirectional</b>	I2C Serial Data line.
3	ED_EXTI2C_SCL	3.3V CMOS	<b>Output from MicroComU</b>	I2C Serial Clock line.
3	V_5V_EXT_F	N/A	<b>Export power</b>	Power rail exported from MicroComU to power customer provided external I2C chips. (Voltage regulation on customer daughter board required.) Exports power delivered to the MicroComU via Alternate or Primary power connectors, switched by main power switch, and limited by 1A fuse. Does not export USB supplied power. Recommended current draw: Do not exceed 500mA.

### 2.2.4 J5 – AUX I/O Connector

<b>J5 – Top side of board – AUX I/O Connector – 6 Pin</b>				
This connector allows for additional control signals to communicate with the MicroDXP and/or MicroComU boards. These digital signals can be used as inputs, outputs or bidirectional signals for a custom application. If planning to use any signals on this connector, call XIA to discuss your requirements and possible NRE charges for XIA to enhance the firmware.				
<b>Connector on MicroComU board:</b>		<b>AMP part # 5-104363-5</b>		
<b>Mating connector (board-to-wires):</b>		<b>AMP part # 5-103957-5</b>		
<b>Mating connector (board-to-board):</b>		<b>TBD</b>		
<b>Pin(s)</b>	<b>Net</b>	<b>Logic level</b>	<b>Direction</b>	<b>Description</b>
<b>1</b>	<b>ED_GATE</b>	<b>3.3V CMOS, 5V tolerant</b>	<b>Input to MicroComU</b>	Gate input to limit data collection to times when gate input is high.
<b>2</b>	<b>ED_EXT_AUX_BB3</b>	<b>3.3V CMOS, 5V tolerant</b>	<b>TBD</b>	Function is TBD. Call XIA to discuss customer requirements.
<b>3</b>	<b>ED_EXT_AUX_BB2</b>	<b>3.3V CMOS, 5V tolerant</b>	<b>TBD</b>	Function is TBD. Call XIA to discuss customer requirements.
<b>4</b>	<b>ED_EXT_AUX_BB1</b>	<b>3.3V CMOS, 5V tolerant</b>	<b>TBD</b>	Function is TBD. Call XIA to discuss customer requirements.
<b>5</b>	<b>ED_EXT_AUX_BB0</b>	<b>3.3V CMOS, 5V tolerant</b>	<b>TBD</b>	Function is TBD. Call XIA to discuss customer requirements.
<b>6</b>	<b>GND</b>	<b>N/A</b>	<b>Ground reference</b>	Ground reference.

## 2.2.5 J9 – Mini-USB Connector

<b>J9 – Bottom side of board – Mini-USB connector, 5 Pin</b>				
This connector is used for high speed communications with the MicroComU/MicroDXP board set using the USB 2.0 or USB 1.1 port on a PC or USB hub connected to a PC. USB connector pinout is standard and is given here only for completeness.				
<b>Connector on MicroComU board:</b>			<b>Samtec part # MUSB-05-S-B-SM-A-K</b>	
<b>Mating cable:</b>			<b>Any USB2.0 A-to-MiniB cable. Example: Molex part # 88732-8602</b>	
<b>Pin(s)</b>	<b>Net</b>	<b>Logic level</b>	<b>Direction</b>	<b>Description</b>
<b>1</b>	<b>V_USB_BUS</b>	<b>N/A</b>	<b>Input power</b>	USB power pin, range 4.35V to 5.4V DC. Can draw 100mA in low power mode, 500mA in high power mode. If the USB port agrees to high power mode, then the MicroComU/MicroDXP board set can run off USB power only. However, if the USB port declines high power mode (such as when connected to an unpowered USB hub), then the MicroComU/MicroDXP board set <b>MUST</b> be powered externally via the Alternate or Primary power connectors.
<b>2</b>	<b>DF_CYP_USBDN</b>	<b>Differential, 5V</b>	<b>Bidirectional</b>	USB data pin, negative polarity.
<b>3</b>	<b>DF_CYP_USBDP</b>	<b>Differential, 5V</b>	<b>Bidirectional</b>	USB data pin, positive polarity.
<b>4</b>	<b>N/C</b>	<b>N/A</b>	<b>N/A</b>	USB ID pin, not used.
<b>5</b>	<b>GND</b>	<b>N/A</b>	<b>Ground return</b>	Ground return.

### 2.2.6 J10 – Primary Power Connector

<b>J10 – Bottom side of board – Primary Power Connector, 2 Pin</b> May be left unconnected if power is supplied via Alternate Power Connector or if MicroComU is connected to a high-power USB port on a PC.				
<b>Connector on MicroComU board:</b>			<b>CUI part # PJ-047A</b>	
<b>Mating connector:</b>			<b>CUI part # PP3-002A</b>	
<b>Mating ACDC wall wart + cable + connector assembly:</b>			<b>CUI part # EMS050120-P5P-SZ (Note 2)</b>	
<b>Pin(s)</b>	<b>Net</b>	<b>Logic level</b>	<b>Direction</b>	<b>Description</b>
<b>Center pin</b>	V_ACDC	N/A	<b>Input power</b>	External +5.0V to +5.5V regulated DC power supply ( <i>See Note 1 at top of section</i> ). External supply must be capable of providing at least 500mA at 5.0VDC to 5.5VDC. This spec accommodates all MicroDXP board variants and the MicroComU board itself. In addition to the 500mA, external power supply must be capable of supplying any additional current that customer plans to draw from J3 for customer daughter board.
<b>Shell</b>	GND	N/A	<b>Ground return</b>	Ground return.

*Note 2:* This ACDC adapter is rated for 100 to 240VAC, 47 to 63Hz. It includes a selection of AC prongs which may be snapped in to support AC electrical standards in different regions of the world. This selection includes UL (North America/Japan), UK, VDE (Europe), and SAA (Australia) prongs. The adapter is RoHS compliant.

### 2.2.7 J11 – Alternate MicroDXP Signal Connector

<b>J11 – Bottom side of board – Alternate MicroDXP Signal Connector, 2 Pin</b> May be left unconnected in the typical case where pre-amp input signal is to be connected to LEMO connector on MicroDXP board or to 2-pin discrete wire connector on MicroDXP board. Use only if customer wishes to route pre-amp input signal to MicroDXP via this SMA connector on the MicroComU board. If planning to use this connector, call XIA to discuss obtaining the appropriate variant of the MicroDXP board to support use of the MicroComU SMA input connector. This connector will be omitted for applications which use one of the other input options.				
<b>Connector on MicroComU board:</b>			<b>Johnson Components part # 142-0701-551</b>	
<b>Mating cable:</b>			<b>Any 50 ohm impedance coax cable with SMA connector</b>	
<b>Pin(s)</b>	<b>Net</b>	<b>Signal range</b>	<b>Direction</b>	<b>Description</b>
<b>Center pin</b>	A_UDXP_INPUT	<b>Approx +/-6V. See MicroDXP documentation.</b>	<b>Input to MicroComU/ MicroDXP board set</b>	Preamp signal to be routed up to MicroDXP board.
<b>Shield</b>	GND	N/A	<b>Ground reference</b>	Ground reference.

## 2.3 Jumper Settings

The MicroComU board contains no jumpers.

## 2.4 Switch Settings

### 2.4.1 SW1 – I2C Selection DIP Switches

<b>SW1 – Top side of board – I2C Selection DIP Switches</b>	
Used to select whether the Cypress microcontroller on the MicroComU board or the PIC microcontroller on the MicroDXP board are connected to external I2C devices via J3 I2C connector.	
<i>To connect Cypress microcontroller on the MicroComU board to external I2C devices (default), set:</i>	
<b>SW1 position 1</b>	<b>ON</b>
<b>SW1 position 2</b>	<b>OFF</b>
<b>SW1 position 3</b>	<b>ON</b>
<b>SW1 position 4</b>	<b>OFF</b>
<i>To connect PIC microcontroller on the MicroDXP board to external I2C devices, set:</i>	
<b>SW1 position 1</b>	<b>OFF</b>
<b>SW1 position 2</b>	<b>ON</b>
<b>SW1 position 3</b>	<b>OFF</b>
<b>SW1 position 4</b>	<b>ON</b>
<i>SW1 positions 5 &amp; 6 are reserved for future use. Leave them at their default setting of:</i>	
<b>SW1 position 5</b>	<b>ON</b>
<b>SW1 position 6</b>	<b>ON</b>
<i>SW1 positions 7 &amp; 8 are reserved for factory testing. Leave them at their default setting of:</i>	
<b>SW1 position 7</b>	<b>ON</b>
<b>SW1 position 8</b>	<b>ON</b>

### 2.4.2 SW2 – User DIP Switches

<b>SW2 – Top side of board – User DIP Switches</b>	
These DIP switches may be used to provide customer configuration information to the Cypress microcontroller on the MicroComU board. For example, a customer may wish to incorporate the MicroDXP/MicroComU board set into two products, the SpiffyWidget 10000 with a basic display connected to the J3 I2C connector, and the SpiffyWidget 20000 with a more advanced display connected to J3. XIA could produce Cypress microcontroller firmware which would read the SW2 DIP switches on boot up, determine which customer product to support, and enable the appropriate display drivers. If planning to use these DIP switches, call XIA to discuss customer requirements and NRE charges for XIA to enhance Cypress firmware.	
<i>All SW2 positions are reserved for customer use and are set by default to be:</i>	
<b>SW2 position 1</b>	<b>ON</b>
<b>SW2 position 2</b>	<b>ON</b>
<b>SW2 position 3</b>	<b>ON</b>
<b>SW2 position 4</b>	<b>ON</b>
<b>SW2 position 5</b>	<b>ON</b>
<b>SW2 position 6</b>	<b>ON</b>
<b>SW2 position 7</b>	<b>ON</b>
<b>SW2 position 8</b>	<b>ON</b>

### 2.4.3 SW3 – Master Power Switch

#### **SW3 – Bottom side of board – Master Power Switch**

This switch is used to power on or power off the MicroComU/MicroDXP board set.

When switched on, the MicroComU will draw power from the external power supply if available (via Primary or Alternate power connectors). If external power is not available, MicroComU will draw power from the USB interface. If external power supply is not available and USB port does not allow high power mode (as will be the case with an unpowered USB hub), MicroComU will be unable to power up the MicroDXP board, and will be unable to collect data.

When switched off, the MicroComU/MicroDXP board set will not draw any power and will not respond over USB interface.

If customer has an application for which a master power switch is not desired, call XIA to discuss a variant of the MicroComU board that would omit the master power switch.

<b>SW3 lever down (away from PCB)</b>	<b>Power on the MicroComU/MicroDXP board set.</b>
<b>SW3 lever up (toward PCB)</b>	<b>Power off the MicroComU/MicroDXP board set.</b>

## 2.5 LED Indicators

The MicroComU board has a number of LED indicators to show the health and status of the system. Their operation is described below.

### 2.5.1 D3 – ACDC (external) Power Applied LED

<b>D3 – Top side of board – ACDC (external) Power Applied LED</b>	
<b>D3 illuminated (green)</b>	MicroComU/MicroDXP board set is drawing power from external power supply via Primary or Alternate power connectors.
<b>D3 not illuminated</b>	MicroComU/MicroDXP board set is either (a) off or (b) drawing power from USB port.

### 2.5.2 D4 – MicroDXP Power Good LED

<b>D4 – Top side of board – MicroDXP Power Good LED</b>	
<b>D4 illuminated (green)</b>	MicroComU/MicroDXP board has sufficient power available (from external power supply or USB port high power mode) and has successfully powered up the MicroDXP board. Furthermore, MicroDXP board's 3 power rails are within specifications.
<b>D4 not illuminated</b>	MicroComU/MicroDXP board set is (a) switched off, (b) has insufficient power available in order to power up the MicroDXP board, or (c) there is a fault in one of the MicroDXP board's 3 power rails.

### 2.5.3 D5 – Main Power Good LED

<b>D5 – Top side of board – Main Power Good LED</b>	
<b>D5 illuminated (green)</b>	MicroComU has some power available (from external power supply or USB port low or high power mode) and MicroComU board's 1 power rail is within specifications.
<b>D5 not illuminated</b>	MicroComU/MicroDXP board set is (a) switched off, or (b) there is a fault in the MicroComU board's 1 power rail.

### 2.5.4 D6 – MicroDXP Serial Transmit LED

<b>D6 – Top side of board – MicroDXP Serial Transmit LED</b>	
<b>D6 blinking (orange)</b>	MicroDXP board is currently sending command acks to MicroComU board.
<b>D6 not blinking</b>	MicroDXP is not currently responding to MicroComU board.

### 2.5.5 D7 – MicroDXP Serial Receive LED

<b>D7 – Top side of board – MicroDXP Serial Receive LED</b>	
<b>D7 blinking (orange)</b>	<b>MicroComU board is currently sending commands to MicroDXP board.</b>
<b>D7 not blinking</b>	<b>MicroComU is not currently sending commands to MicroDXP board.</b>

### 2.5.6 D8 – Microcontroller LED

<b>D8 – Top side of board – Microcontroller LED</b>	
<b>D8 illuminated or blinking (orange)</b>	<b>Cypress microcontroller on the MicroComU is currently reading the MCA spectrum from the MicroDXP.</b>
<b>D8 not blinking</b>	<b>Cypress microcontroller on the MicroComU is not currently reading the MCA spectrum from the the MicroDXP.</b>