

XIA LLC

MicroComU v2.10 Rev 12231 Board Specification

August 4, 2009

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.

Power: 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 input power connectors, or (b) via USB, when directly connected to a PC or to a powered USB hub. Detailed specifications follow.

USB Communications: The MicroComU implements a USB 2.0 interface to a PC and a high-speed parallel interface to the MicroDXP board. This combination allows data to be read out from the MicroDXP board considerably faster than using RS232 communications. Detailed specifications follow.

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.

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.

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.

AUX I/O Communications: The MicroComU board implements a connector with 4 I/O pins whose function is TBD. Customers wishing to implement additional I/O capabilities are requested to contact XIA to discuss requirements.

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.

The MicroComU board is RoHS compliant. It is rated for use at temperatures ranging from 5C to 65C, non-condensing humidity. It is not rated for use in high electromagnetic fields. It is not rated for use in environments with high alpha, beta, gamma, neutron, X-ray, or cosmic-ray flux.

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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 gray 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.

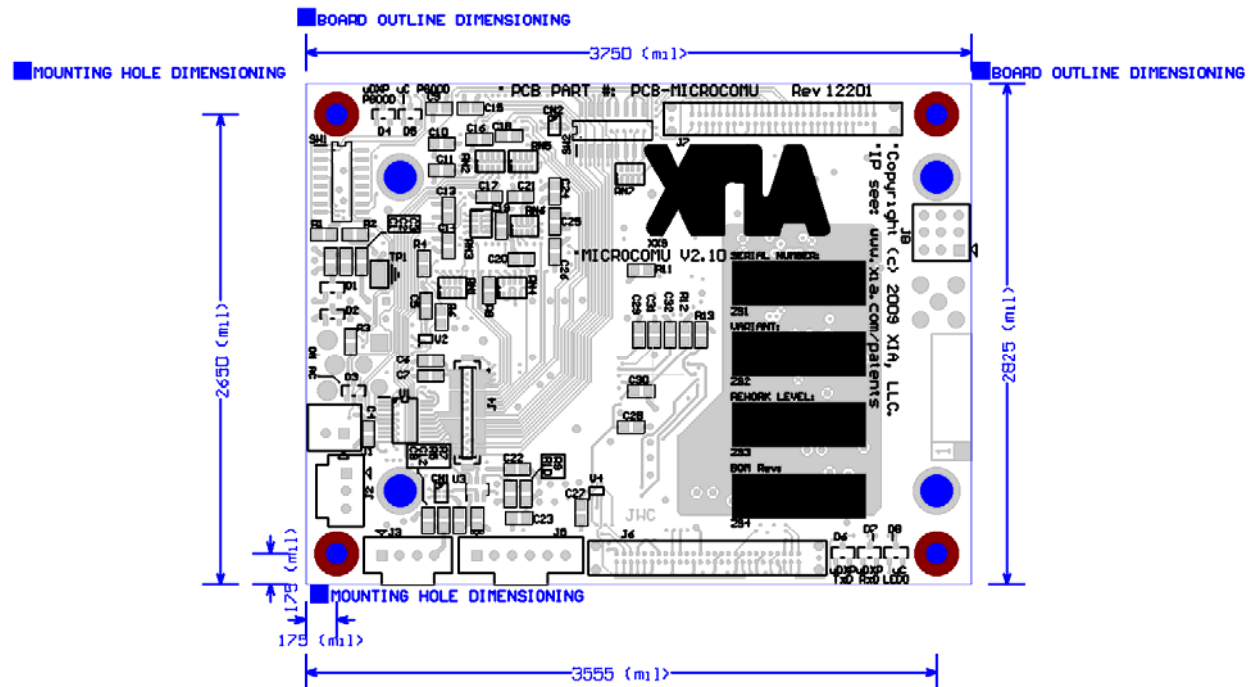


Figure 1: Board outline dimensions and locations of customer-accessible mounting holes (the 4 shown in red nearest the corners of the board). Dimensions and locations are given in mil, where 1 mil = 1/1000 inch, or 1 mil = 0.0254 mm. Note: The inner 4 mounting holes (in gray and blue) are reserved for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

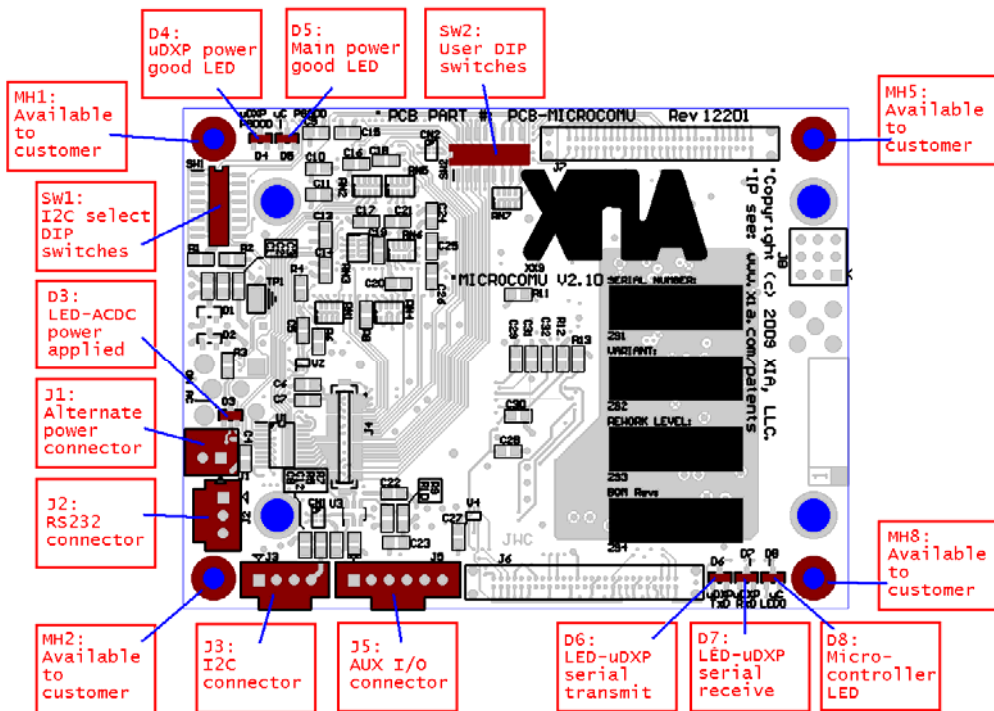


Figure 2: Locations of connectors, LEDs, and DIP switches on top side of board. Note that the MicroDXP is mounted to the top side of the board, using board-to-board connector J4.

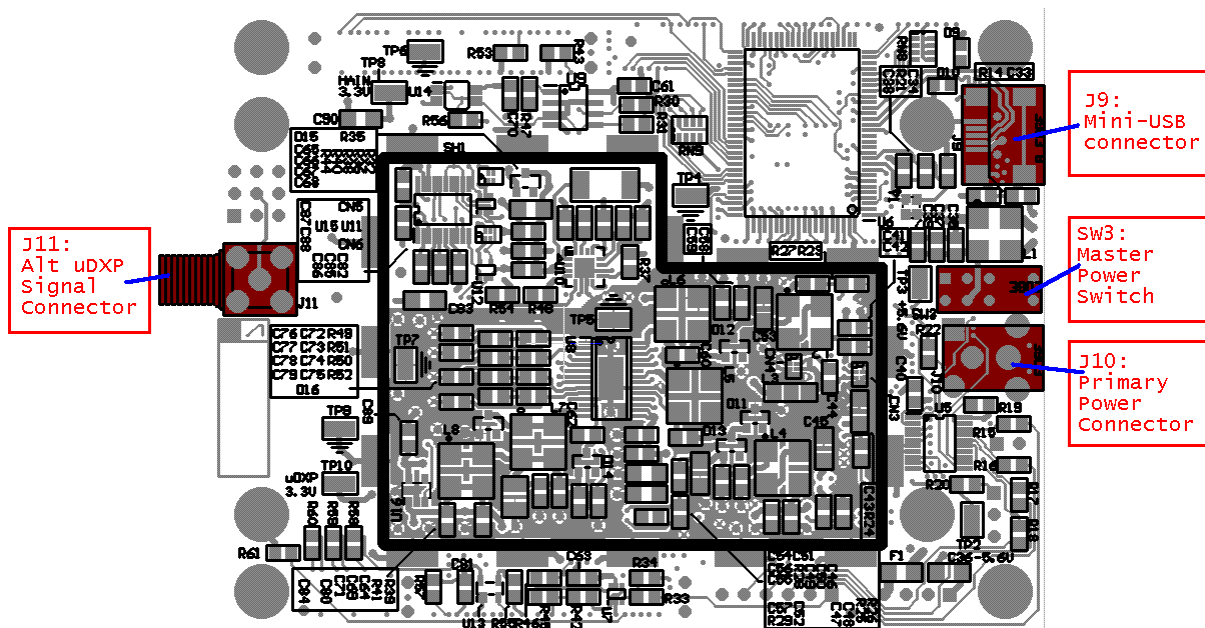


Figure 3: Locations of connectors and switches on bottom side of board. Note that an EMI shield covers much of the bottom side of the board. Customers are requested not to remove this shield.

Connectors

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.

J1 – Top side of board – Alternate Power Connector – 2 Pin				
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.				
Connector on MicroComU board:		AMP part # 5-104363-1		
Mating connector (board-to-wires):		AMP part # 5-103957-1		
Mating connector (board-to-board):		TBD		
Pin(s)	Net	Logic level	Direction	Description
1	V_ACDC	N/A	Input power	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.
2	GND	N/A	Ground return	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.

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

J3 – Top side of board – I2C Connector – 4 Pin

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.

Connector on MicroComU board:		AMP part # 5-104363-3		
Mating connector (board-to-wires):		AMP part # 5-103957-3		
Mating connector (board-to-board):		TBD		
Pin(s)				
Net	Logic level	Direction	Description	
1	GND	N/A	Ground reference	Ground reference.
2	ED_EXTI2C_SDA	3.3V CMOS	Bidirectional	I2C Serial Data line.
3	ED_EXTI2C_SCL	3.3V CMOS	Output from MicroComU	I2C Serial Clock line.
3	V_5V_EXT_F	N/A	Export power	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.

J5 – Top side of board – AUX I/O Connector – 6 Pin				
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.				
Connector on MicroComU board:		AMP part # 5-104363-5		
Mating connector (board-to-wires):		AMP part # 5-103957-5		
Mating connector (board-to-board):		TBD		
Pin(s)	Net	Logic level	Direction	Description
1	ED_GATE	3.3V CMOS, 5V tolerant	Input to MicroComU	Gate input to limit data collection to times when gate input is high.
2	ED_EXT_AUX_BB3	3.3V CMOS, 5V tolerant	TBD	Function is TBD. Call XIA to discuss customer requirements.
3	ED_EXT_AUX_BB2	3.3V CMOS, 5V tolerant	TBD	Function is TBD. Call XIA to discuss customer requirements.
4	ED_EXT_AUX_BB1	3.3V CMOS, 5V tolerant	TBD	Function is TBD. Call XIA to discuss customer requirements.
5	ED_EXT_AUX_BB0	3.3V CMOS, 5V tolerant	TBD	Function is TBD. Call XIA to discuss customer requirements.
6	GND	N/A	Ground reference	Ground reference.

J9 – Bottom side of board – Mini-USB connector, 5 Pin

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.

Connector on MicroComU board:		Samtec part # MUSB-05-S-B-SM-A-K		
Mating cable:		Any USB2.0 A-to-MiniB cable. Example: Molex part # 88732-8602		
Pin(s)	Net	Logic level	Direction	Description
1	V_USB_BUS	N/A	Input power	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 MUST be powered externally via the Alternate or Primary power connectors.
2	DF_CYP_USBDN	Differential, 5V	Bidirectional	USB data pin, negative polarity.
3	DF_CYP_USBDP	Differential, 5V	Bidirectional	USB data pin, positive polarity.
4	N/C	N/A	N/A	USB ID pin, not used.
5	GND	N/A	Ground return	Ground return.

J10 – Bottom side of board – Primary Power Connector, 2 Pin 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.				
Connector on MicroComU board:			CUI part # PJ-047A	
Mating connector:			CUI part # PP3-002A	
Mating ACDC wall wart + cable + connector assembly:			CUI part # EMS050120-P5P-SZ (Note 2)	
Pin(s)	Net	Logic level	Direction	Description
Center pin	V_ACDC	N/A	Input power	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.
Shell	GND	N/A	Ground return	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.

J11 – Bottom side of board – Alternate MicroDXP Signal Connector, 2 Pin 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.				
Connector on MicroComU board:			Johnson Components part # 142-0701-551	
Mating cable:			Any 50 ohm impedance coax cable with SMA connector	
Pin(s)	Net	Signal range	Direction	Description
Center pin	A_UDXP_INPUT	Approx +/-6V. See MicroDXP documentation.	Input to MicroComU/ MicroDXP board set	Preamp signal to be routed up to MicroDXP board.
Shield	GND	N/A	Ground reference	Ground reference.

Jumper Settings

The MicroComU board contains no jumpers.

Switch Settings

SW1 – Top side of board – I2C Selection DIP Switches	
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>	
SW1 position 1	ON
SW1 position 2	OFF
SW1 position 3	ON
SW1 position 4	OFF
<i>To connect PIC microcontroller on the MicroDXP board to external I2C devices, set:</i>	
SW1 position 1	OFF
SW1 position 2	ON
SW1 position 3	OFF
SW1 position 4	ON
<i>SW1 positions 5 & 6 are reserved for future use. Leave them at their default setting of:</i>	
SW1 position 5	ON
SW1 position 6	ON
<i>SW1 positions 7 & 8 are reserved for factory testing. Leave them at their default setting of:</i>	
SW1 position 7	ON
SW1 position 8	ON

SW2 – Top side of board – User DIP Switches	
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>	
SW2 position 1	ON
SW2 position 2	ON
SW2 position 3	ON
SW2 position 4	ON
SW2 position 5	ON
SW2 position 6	ON
SW2 position 7	ON
SW2 position 8	ON

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.

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

LED Indicators

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

D4 – Top side of board – MicroDXP Power Good LED	
D4 illuminated (green)	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.
D4 not illuminated	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.

D5 – Top side of board – Main Power Good LED	
D5 illuminated (green)	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.
D5 not illuminated	MicroComU/MicroDXP board set is (a) switched off, or (b) there is a fault in the MicroComU board's 1 power rail.

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

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

D8 – Top side of board – Microcontroller LED	
D8 illuminated or blinking (orange)	Cypress microcontroller firmware on MicroComU board may illuminate or blink this LED. Further documentation of this behavior will be forthcoming.
D8 not blinking	Further documentation of this behavior will be forthcoming.