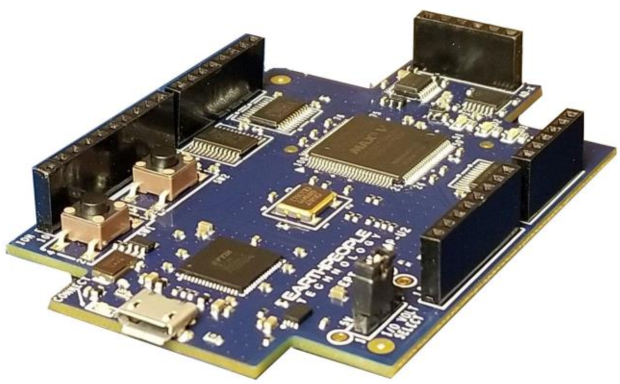
UnoMax CPLD Development System

Data Sheet



The UnoMax is a small form factor CPLD Development System. The core functions of the UnoMax are a two channel USB to Serial chip, 570 Logic Cell CPLD and a four channel 300KSample/Sec ADC. The board is powered from a USB port. The Input/Output connectors are organized to match the Arduino Uno. There is also an additional six pin header for the analog input signals.

The UnoMax is designed from the ground up as a development board for beginners. All of the Inputs/Outputs are protected by the 74LVC8245 transceiver chips. These transceivers provide both voltage level translations and protection from over current and over voltage. The transceivers can sink up to 50mA per pin. So, the UnoMax can drive LEDs and sensors directly. The analog inputs have a buffer amp on each input pin. Each Op-Amp on the analog inputs has a 1MHz filter

The board also includes the following parts.

- Intel/Altera 5M570 CPLD with 440 Macrocells
- 4 Channel ADC 300KSamples/Second
- 66 MHz oscillator for driving USB data transfers and users code
- Three bidirectional voltage translator/bus transceivers
- 24 user Input/Outputs available as three 8 bit ports
- Ports have jumper selectable 3.3V/5 Volt Input/Output
- Four Green LED’s accessible by the user
- Two PCB switches accessible by the user

1 Block Diagram

Figure 1-1 UnoMax Component Location

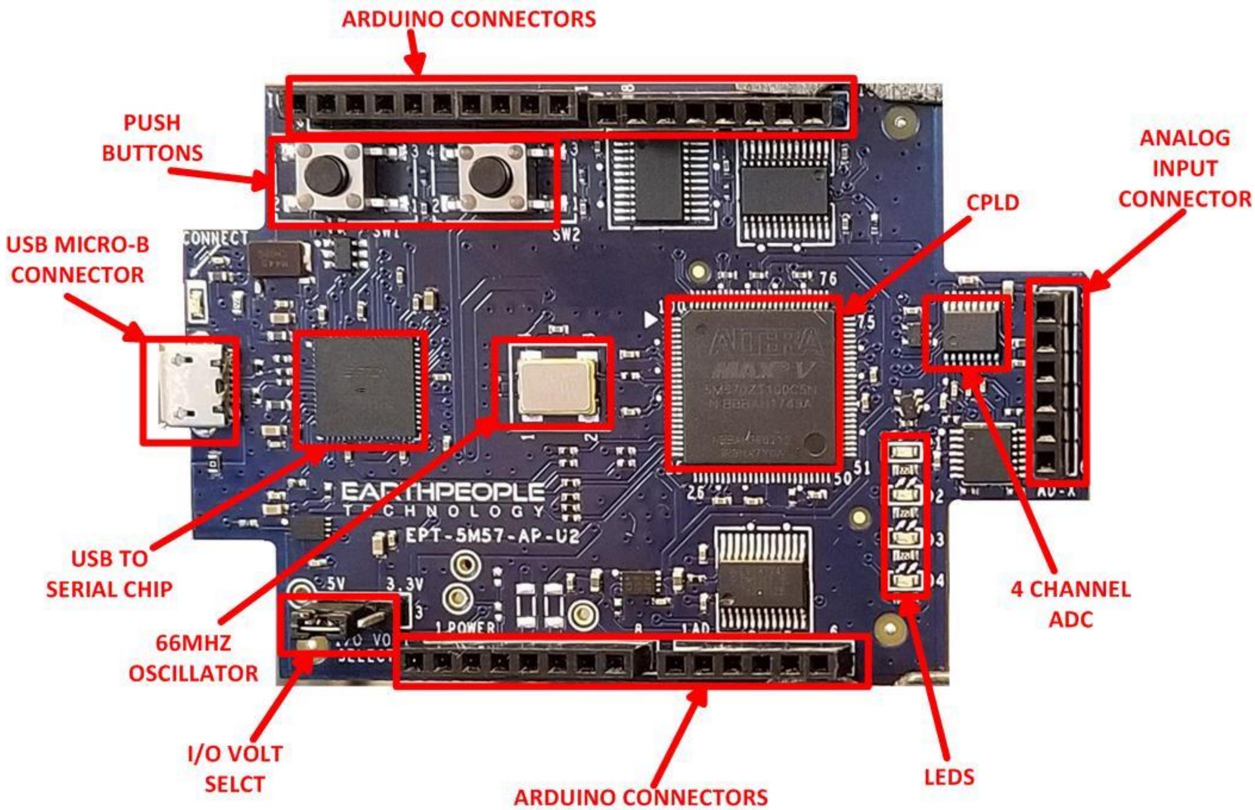
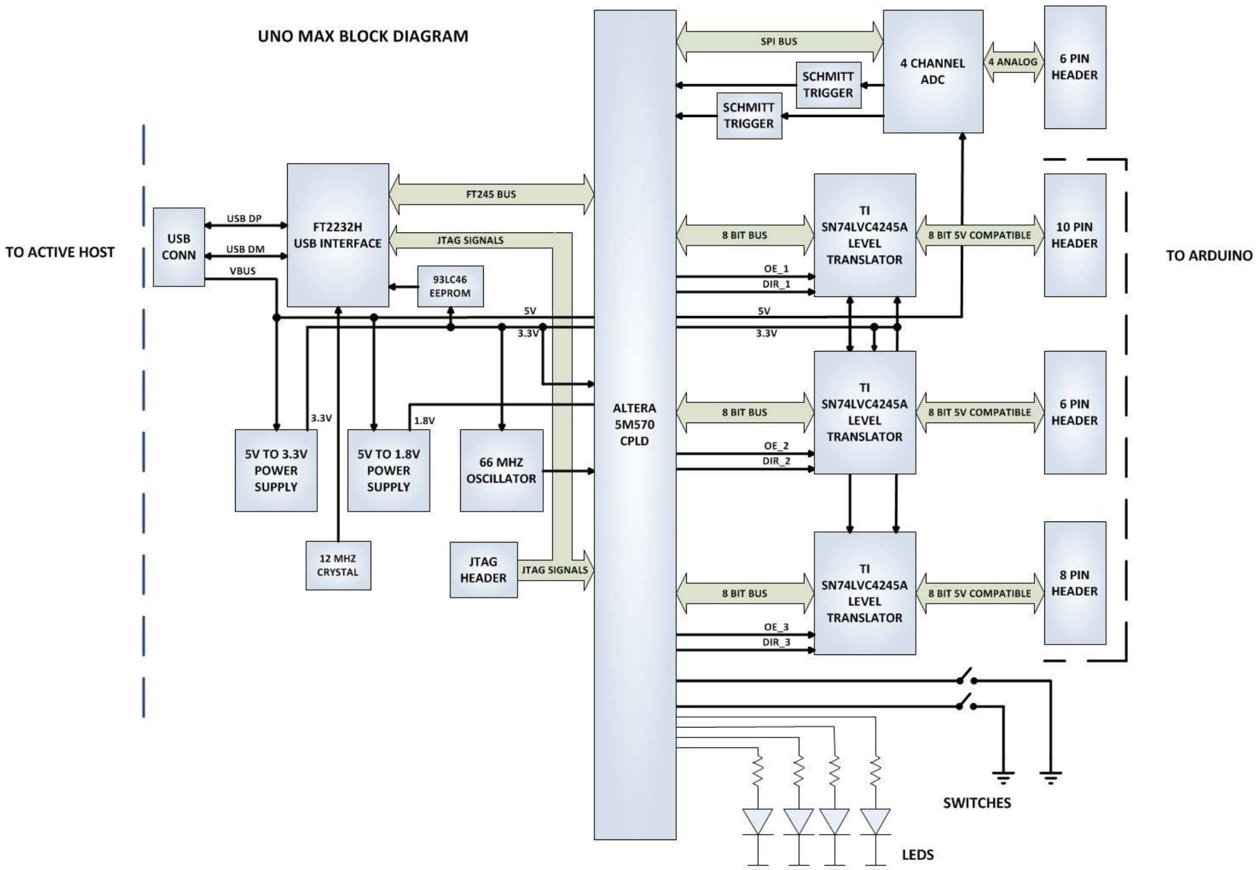
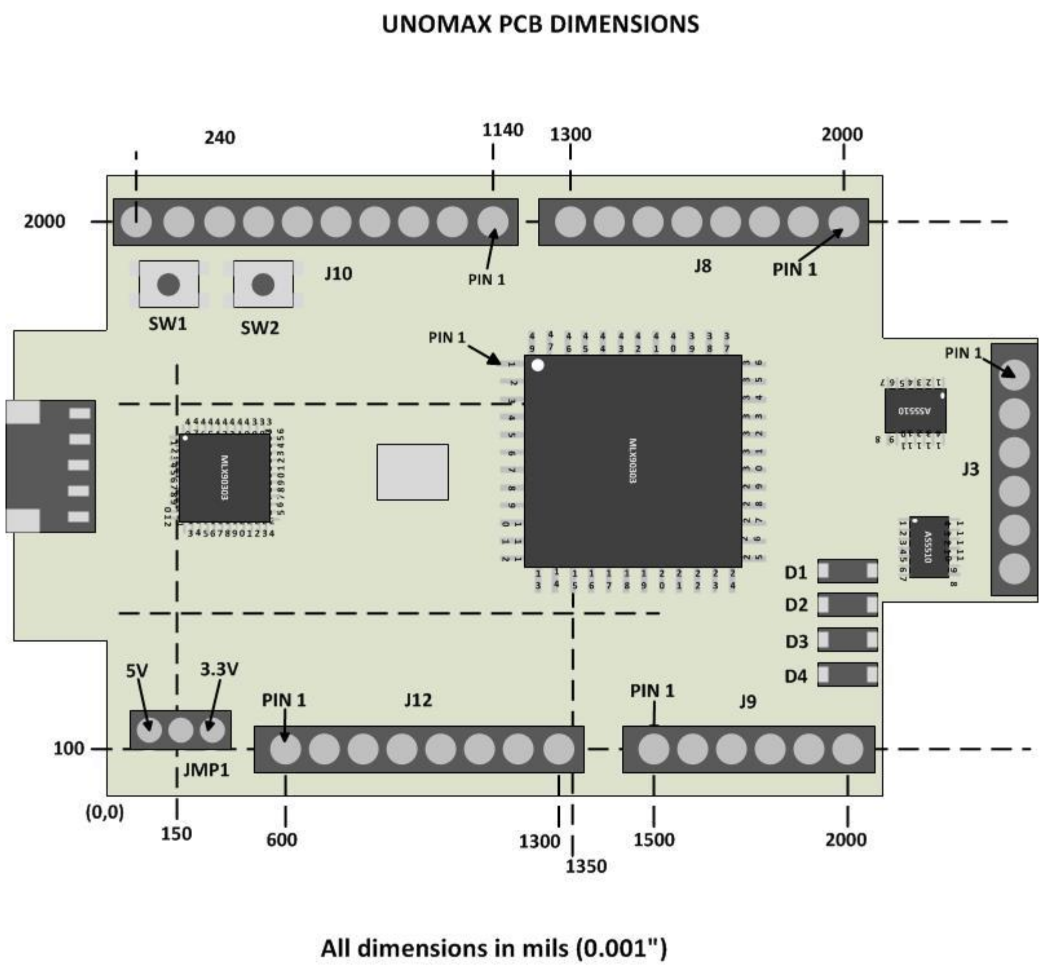


Figure 1-2 UnoMax Block Diagram



2 Mechanical Dimensions

Figure 2-1 UnoMax Mechanical Dimensions



3 Pin Mapping

Figure 3-1. Pin Mapping between Connectors, MAXV CPLD and User code

Component	Pin	Net Name	Pin on CPLD	Signal in EPT Project Pinout
66MHz Oscillator	3	GCLK	12	aa[1]

Reset	2	NA	44	aa[0]
U12	16	AD0	24	JTAG_TCK (Not In Project)
	17	AD1	23	JTAG_TDI (Not In Project)
	18	AD2	25	JTAG_TDO (Not In Project)
	19	AD3	22	JTAG_TMS (Not In Project)
	38	BD0	19	BD_INOUT0
	39	BD1	18	BD_INOUT1
	40	BD2	17	BD_INOUT2
	41	BD3	16	BD_INOUT3
	43	BD4	15	BD_INOUT4
	44	BD5	14	BD_INOUT5
	45	BD6	7	BD_INOUT6
	46	BD7	6	BD_INOUT7
	48	BC0	5	BC_IN1
	52	BC1	4	BC_IN0
	53	BC2	3	BC_OUT2
	54	BC3	2	BC_OUT1
	55	BC4	1	BC_OUT0
SW1	1	SW_USER_1	20	SW_USER_1
SW2	1	SW_USER_2	21	SW_USER_23
U7	2	TR_DIR_1	100	TR_DIR_1

U4	2	TR_DIR_2	29	TR_DIR_2
U5	2	TR_DIR_3	85	TR_DIR_3
U7	22	TR_OE_1	86	TR_OE_1
U4	22	TR_OE_2	28	TR_OE_2
U5	22	TR_OE_3	74	TR_OE_3
D1	1	LED_GR_1_N	54	LED0
D2	1	LED_GR_2_N	53	LED1
D3	1	LED_GR_3_N	52	LED2
D4	1	LED_GR_4_N	51	LED3
U9	16	ADC_EOC	67	ADC_EOC
	12	ADC_CS	68	ADC_CS
	13	ADC_SCLK	69	ADC_CLK
	14	ADC_DIN	70	ADC_MOSI
	15	ADC_DOUT	71	ADC_MISO
	8	ADC_CNVST	72	ADC_CNVST
U7	21	LB0	87	LB_IOH0
	20	LB1	89	LB_IOH1
	19	LB2	91	LB_IOH2
	18	LB3	92	LB_IOH3
	17	LB4	96	LB_IOH4
	16	LB5	97	LB_IOH5
	15	LB6	98	LB_IOH6
	14	LB7	99	LB_IOH7

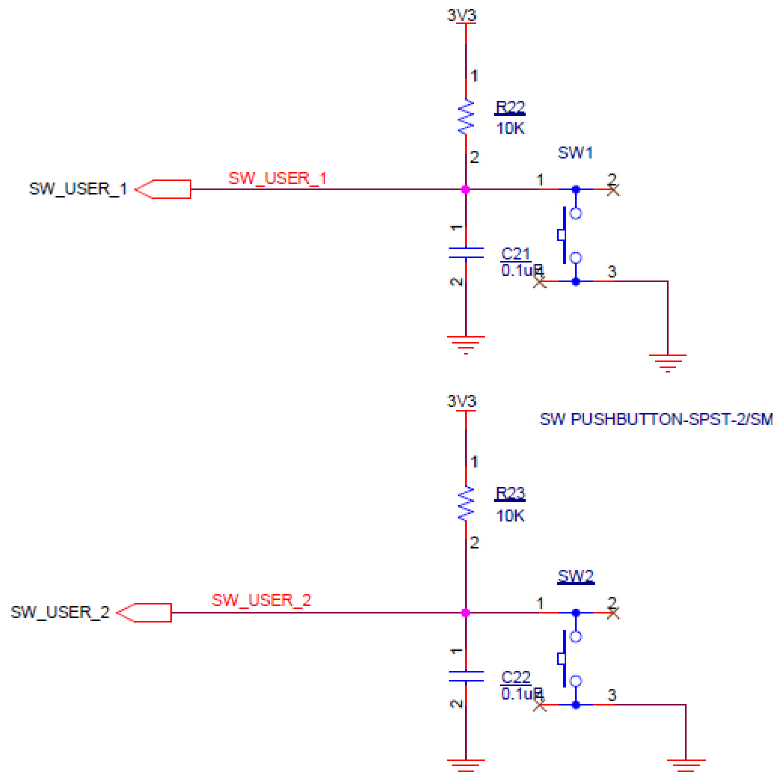
U4	21	LB8	42	LB_SER0
	20	LB9	41	LB_AD0
	19	LB10	40	LB_AD1
	18	LB11	38	LB_AD2
	17	LB12	36	LB_AD3
	16	LB13	35	LB_AD4
	15	LB14	34	LB_AD5
	14	LB15	33	LB_SER1
U5	21	LB16	81	LB_IOL0
	20	LB17	82	LB_IOL1
	19	LB18	83	LB_IOL2
	18	LB19	84	LB_IOL3
	17	LB20	78	LB_IOL4
	16	LB21	77	LB_IOL5
	15	LB22	76	LB_IOL6
	14	LB23	75	LB_IOL7

4 Pushbutton switches

The UnoMax includes two push button switches. Both are momentary contact switches. They include a 1uF cap to ground to debounce both switches.

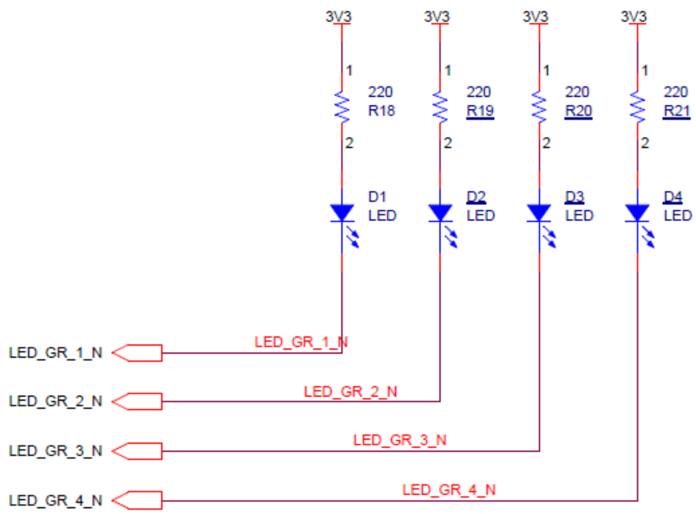
Component	**Net Name**	**Pin on CPLD**	**Signal in EPT Project Pinout**

SW1	SW_USER_1	20	SW_USER_1
SW2	SW_USER_2	21	SW_USER_23



5 LEDs

The UnoMax includes four Green LEDs. The LEDs are connected to the CPLD in a “Current Sink” configuration. This means the LEDs Anodes are permanently connected to +3.3V. Each Cathode side of the LEDs are connected to an individual I/O of the CPLD. In order to turn on the LED, the CPLD I/O must apply a low signal. This will complete the LED drive circuit and current will flow through the LED. To turn the LED off, the CPLD I/O must either “float” or drive a high onto the pin.

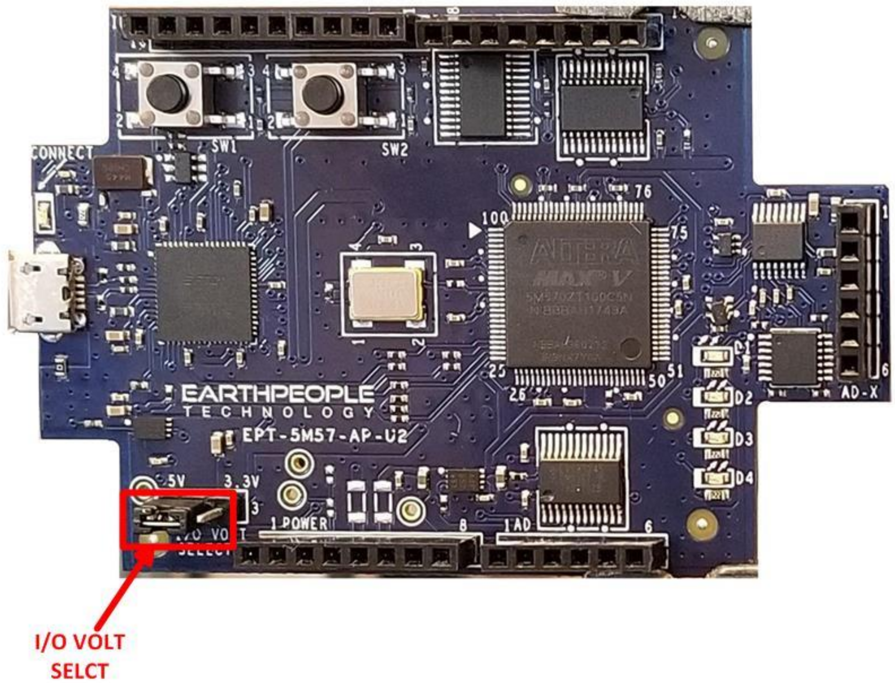


Component	Net Name	Pin on FPGA	Signal in EPT Project Pinout
LED1	LED[1]	50	LED[0]
LED2	LED[2]	51	LED[1]
LED3	LED[3]	52	LED[2]
LED4	LED[4]	53	LED[3]

6 Inputs/Outputs

The UnoMax is designed from the ground up as a development board for beginners. All of the Inputs/Outputs are protected by the 74LVC8245 transceiver chips. These transceivers provide both voltage level translations and protection from over current and over voltage. The transceivers can sink up to 50mA per pin.

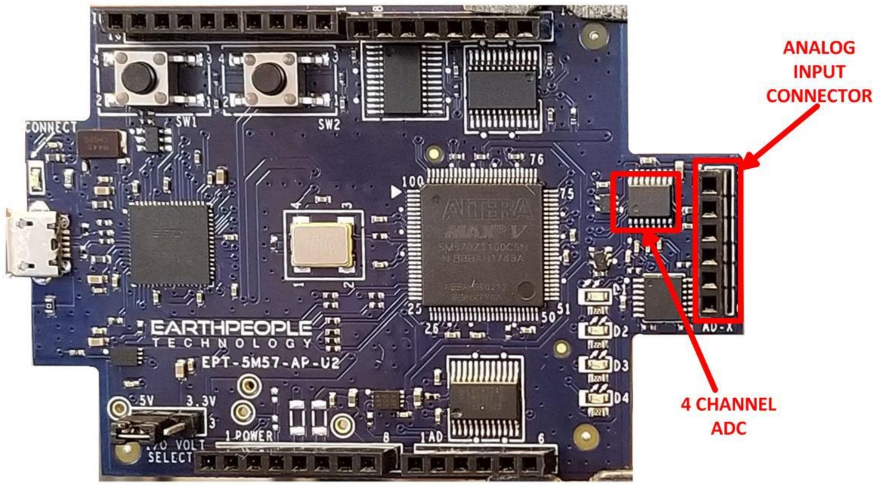
There are 24 Inputs/Outputs which are selectable between +3.3V and +5 Volt. JMP1 is used to select which voltage the 24 Inputs/Outputs are set to.

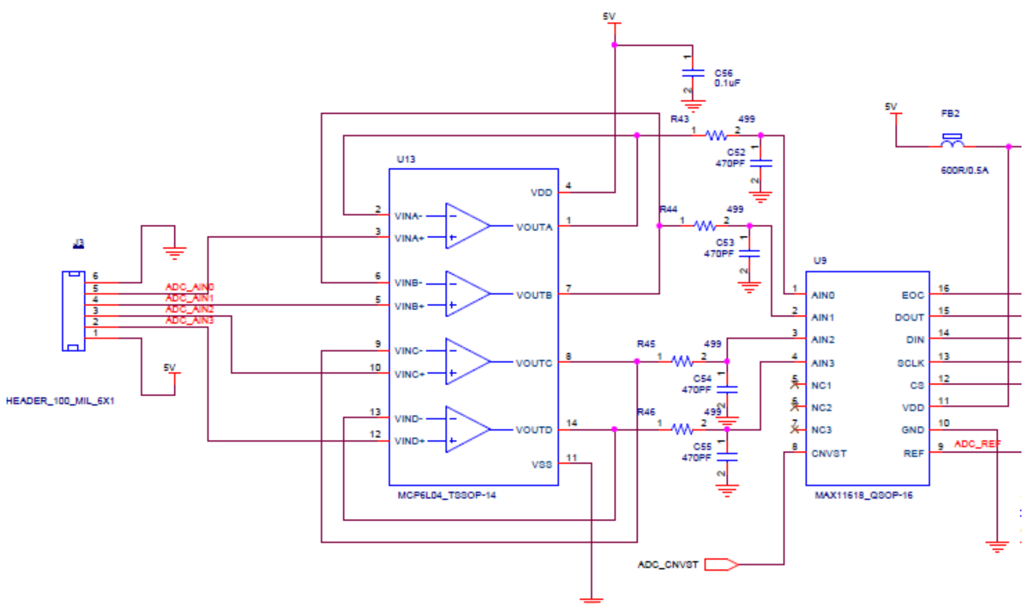


The I/O's are organized as three 8 bit directional ports. Each port must be defined as input or output. This means that all 8 bits of a port will point in the same direction, depending on the direction bit of the transceiver. The direction bit can be changed at any time, so that a port can change from input to output in minimum setup time of 6 nanoseconds. Each port also has an enable pin. This enable pin will enable or disable the bits of the port. If the port is disabled, the bits will "float".

7 Analog connector

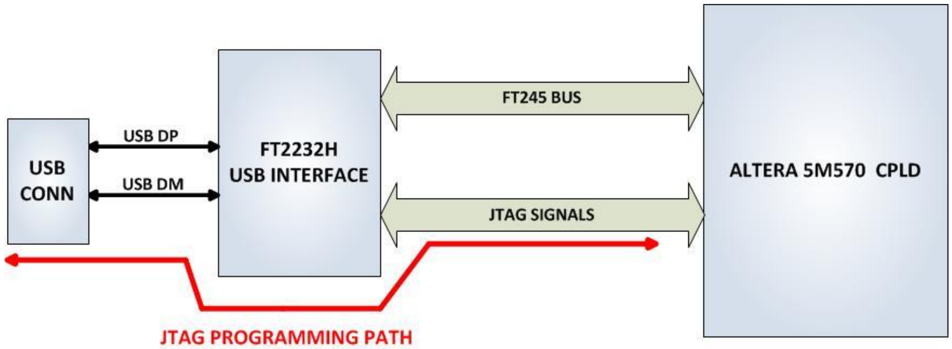
The UnoMax includes a six pin analog input connector. This connector provides a path from the pins to the input of the four Op-Amp buffers. Each Op-Amp includes a 1MHz low pass filter. Each Op-Amp provides a buffer for the analog signals to the ADC inputs.





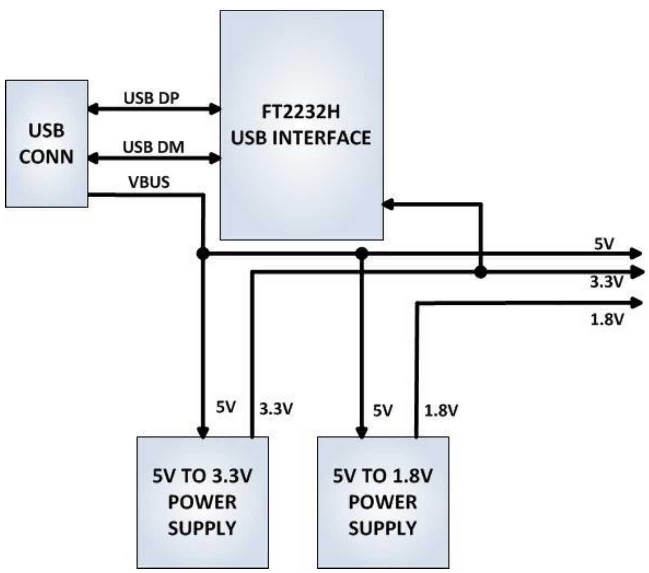
8 MAXV Programming

The UnoMax uses the second channel of the FT2232H chip as a dedicated CPLD programming port. The CPLD must be programmed via JTAG signals and the FT2232H has built in JTAG signals.



9 UnoMax Power

The UnoMax is powered from the USB bus of a Host/PC. The USB supplies a maximum of +5V @ 500mA's. The components of the UnoMax must share this power with the user code that will run inside the CPLD along with any external power use.



1.1.1 Core Board Power Budget

Device	Part Number	+1.8V Power	+3.3V Power

CPLD	5M570	??? Defined by user code. EPT-Transfer-Demo code: 50mA	??? Defined by user code. . EPT-Transfer-Demo code: 50mA
Bus Transceivers	74LVC8245		15mA (All eight I/O's active)
USB Chip	FT2232H		60 mA (no sink current supplied to I/O's)
USB EEPROM	93LC56		2 mA (write current) 1 mA (read current)
66MHz Oscillator	CB3LV-3I-66M0		10 mA
ADC Four Channel	MAX11618EEE+		17 mA
Op-Amp driver	MCP6L04		0.5 mA (all four amps active)
Schmitt Buffer	74LVC1G17SE		1mA
User LEDs			20 mA
Total		**50mA**	**175.5mA**

*Theoritical Values only. This data needs to be validated

1.1.2 Core Board VUSB Power Budget

Device	**Part Number**	**VUSB**		
+1.8V Power Supply	MCP1725-1802E	70mA		
+3.3V Power Supply	MCP1725-3302E	215mA		
Total		**285mA**		

* Theoritical Values only. This data needs to be validated