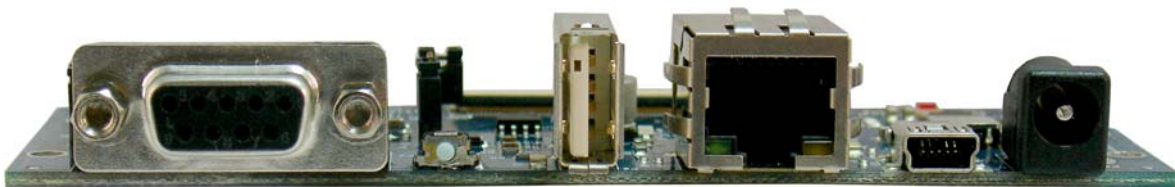
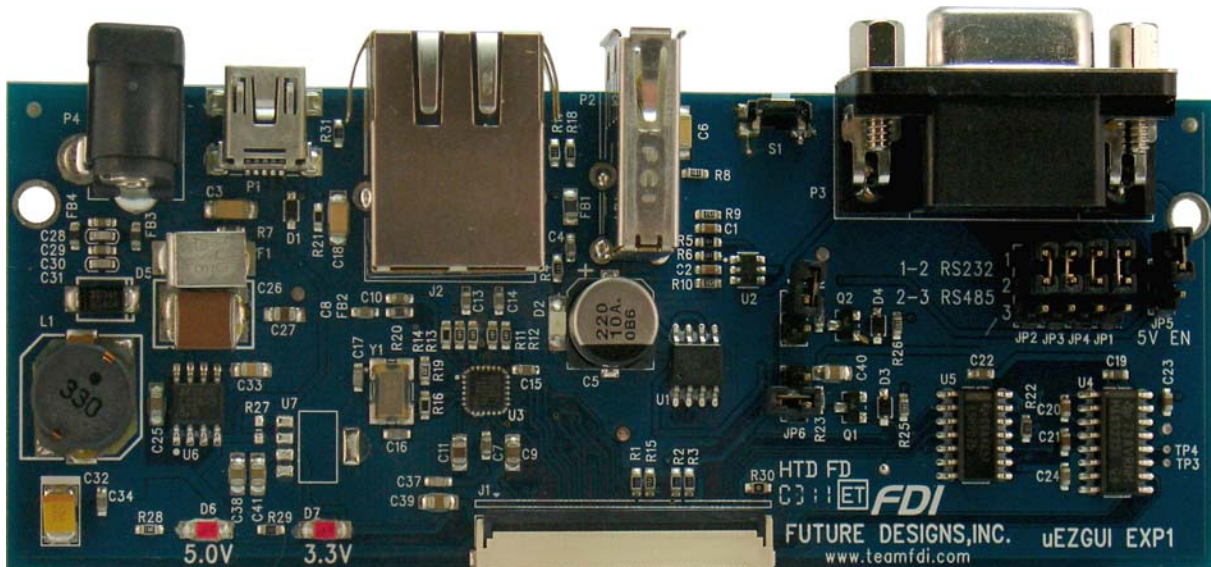


# *uEZGUI-EXP1*

## User's Manual



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## Table of Contents

Introduction	3
Functional Description	3
Expansion Board Capabilities	3
Expansion Connector	3
Expansion Connector Cable Details	7
DC Power Input – P4	8
Serial Port – P3	8
USB Device – P1	9
USB Host – P2	9
Ethernet – J2	10
Connecting to the uEZGUI Boards	10

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## Introduction

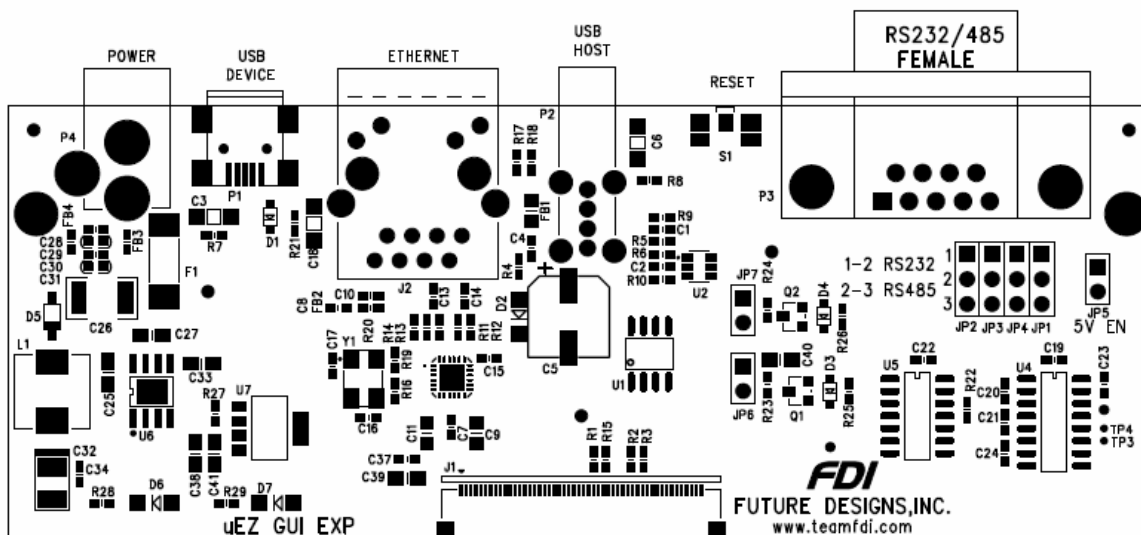
The uEZGUI-EXP-1 is a quick and easy solution for adding additional hardware to the uEZGUI family of products. The uEZGUI-EXP-1 offers the hardware necessary for USB Host and Device, Ethernet, RS232, and RS485.

## Functional Description

- RS232/RS485 Serial communication
- USB Host and Device
- 10/100 Ethernet

## Expansion Board Capabilities

The uEZGUI Expansion Board enhances the capabilities of the standard uEZGUI board to include additional IO capabilities. The Expansion Board is connected to the uEZGUI main board via a 50pin FPC cable.



## Expansion Connector

The uEZGUI-2478-43WQS includes a 50 pin FPC Expansion Connector that provides a wide variety of capabilities for user expansion, ranging from 10/100 Ethernet to USB Host, etc. The table below provides the pin out and signal names available on this connector:

Pin #	Pin Name	Pin Description	Input/output
1	Ground (GND)		Power
2	P0.11_RXD2_SCL2_MAT3	P0[11] - General purpose digital input/output pin.	Input/output
		RXD2 - Receiver input for UART2.	Input
		SCL2 - I2C2 clock input/output ( <b>this is not an open-drain pin</b> )	Input/output
		MAT3[1] -Match output for Timer3, channel 1.	Output
3	P0.10_TXD2_SDA2_MAT3	P0[10] - General purpose digital input/output pin.	Input/Output
		SDA2 - I2C2 data input/output ( <b>this is not an open-drain pin</b> ).	Input/Output
		MAT3[0] - Match output for Timer3, channel 0.	Output
4	P0.20_DTR1_SCL1	TXD2 -Transmitter output for UART2.	Output
		P0[20] - General purpose digital input/output pin.	Input/Output
		DTR1 - Data Terminal Ready output for UART1	Output
5	P0.19_DSR1_SDA1	SCL1 - I2C1 clock input/output ( <b>this is not an open-drain pin</b> )	Input/Output
		P0[19] - General purpose digital input/output pin.	Input/Output
		SDA1-I2C1 data input/output ( <b>this is not an open-drain pin</b> ).	Input/Output
6	P0.22_RTS1	DSR1 - Data Set Ready input for UART1.	Input
		P0[22] - General purpose digital input/output pin.	Input/Output
7	P0.17_CTS1_MISO_MISO0	RTS1 - Request to Send output for UART1.	Output
		P0 [17] - General purpose digital input/output pin	Input/Output
		CTS1 - Clear to Send input for UART1.	Input
		MISO - Master In Slave Out for SPI.	Input/Output
8	P0.16_RXD1_SSEL0	MISO0 - Master In Slave Out for SSP0.	Input/Output
		P0[16] - General purpose digital input/output pin.	Input/Output
		SSEL0 - Slave Select for SP0.	Input/Output
9	P0.15_TXD1_SCK0_TXD1_SCK	RXD1 - Receiver input for UART1.	Input
		P0[15] - General purpose digital input/output pin.	Input/Output
		SCK0 - Serial clock for SSP0.	Input/Output
		TXD1 – Transmitter output for UART1.	Output
10	Ground (GND)		Power
11	USB1_DM	SCK - Serial clock for SPI.	Input/Output
		P0[30] - General purpose digital input/output pin.	Input/Output
12	USB1_DP	USB_D--1 - USB port 1 bidirectional D--line.	Input/Output
		P4[29] - General purpose digital input/output pin.	Input/Output
13	USB1H_PWRD	USB_D+1 - USB port 1 bidirectional D+ line.	Input/Output
		P4[26] -General purpose digital input/output pin.	Input/Output
14	USB1H_OVC	BLS0 - LOW active Byte Lane select signal 0.	Output
15	USB1H_PPWR	P4[24] - General purpose digital input/output pin.	Input/Output
		P0[19] - General purpose digital input/output pin.	Input/Output
		CAP1[1] - Capture input for Timer 1, channel 1	Input
		USB_PPWR1 - Port Power enable signal for USB port 1.	Output

16	P0.9_I2STX_SDA_MOSI1_MAT2.3	P0[9] -General purpose digital input/output pin	Input/Output
		I2STX_SDA - I2S transmit data. It is driven by the transmitter and read by the receiver. Corresponds to the signal SD in the I2S-bus specification.	Input/Output
		MAT2[3] - Match output for Timer 2, channel 3	Output
		MOSI1 - Master Out Slave In for SSP1.	Input/Output
17	P0.8_I2STX_WS_MISO1_MAT 2.2	P0[8] -General purpose digital input/output pin.	Input/Output
		I2STX_WS - I2S Transmit word select. It is driven by the master and received by the slave. Corresponds to the signal WS in the I2S-bus specification.	Input/Output
		MAT2[2] - Match output for Timer 2, channel 2	Output
		MISO1 - Master In Slave Out for SSP1.	Input/Output
18	P0.7_I2STX_CLK_SCK1_M AT 2.1	P0[7] – General purpose digital input/output pin.	Input/Output
		I2STX_CLK - I2S transmit clock. It is driven by the master and received by the slave. Corresponds to the signal SCK in the I2S-bus specification.	Input/Output
		MAT2[1] - Match output for Timer 2, channel 1	Output
		SCK1 - Serial Clock for SSP1.	Input/Output
19	P0.6_I2SRX_SDA_SSEL1_MAT2.0	P0[6] - General purpose digital input/output pin	Input/Output
		I2SRX_SDA - I2S Receive data. It is driven by the transmitter and read by the receiver. Corresponds to the signal SD in the I2S-bus specification.	Input/Output
		SSEL1 - Slave Select for SSP1.	Input/Output
		MAT2[0] - Match output for Timer 2, channel 0	Output
20	P0.5_I2SRX_WS_TD2_CAP 2.1	P0[5] - General purpose digital input/output pin.	Input/Output
		I2SRX_WS - I2S Receive word select. It is driven by the master and received by the slave. Corresponds to the signal WS in the I2S-bus specification.	Input/Output
		TD2 - CAN2 transmitter output.	Output
		CAP2[1] - Capture input for Timer 2, channel 1	Input
21	P0.4_I2SRX_CLK_RD2_CAP 2.0	P0[4] -General purpose digital input/output pin.	Input/Output
		I2SRX_CLK - I2S Receive clock. It is driven by the master and received by the slave. Corresponds to the signal SCK in the I2S-bus specification.	Input/Output
		RD2 - CAN2 receiver input	Input
		CAP2[0] - Capture input for Timer 2, channel 0	Input
22	Ground (GND)		Power

23	RESET_IN	External reset input: A LOW on this pin resets the device, causing I/O ports and peripherals to take on their default states, and processor execution to begin at address 0. TTL with hysteresis, 5 V tolerant	Input
24	RESET_OUT	RSTOUT - This is a 3.3 V pin. LOW on this pin indicates LPC2478 being in Reset state	Output
25	P0.26_AD03_AOUT_RXD3	P0[26] General purpose digital input/output pin.	Input
		AD0[3] - A/D converter 0, input 3.	Output
		AOUT - D/A converter output.	Input
		RXD3 - Receiver input for UART3	Input/Output
26	P1.31_SCK1_AD0.5	P1[31] – General purpose digital input/output pin.	Input/Output
		SCK1 - Serial Clock for SSP1.	Input/Output
		AD0[5] - A/D converter 0, input 5	Input
27	P1.17_ENET_MDIO	P1[17] - General purpose digital input/output pin.	Input/Output
		ENET_MDIO - Ethernet MIIM data input and Output	Input/Output
28	P1.16_ENET_MDC	P1[16] - General purpose digital input/output pin.	Input/Output
		ENET_MDC - Ethernet MIIM clock	Output
29	Ground (GND)		Power
30	P1.15_ENET_REFCLK	P1[15] – General purpose digital input/output pin.	Input/Output
		ENET_REF_CLK/ENET_RX_CLK – Ethernet Reference Clock (RMII interface)/ Ethernet Receive Clock (MII interface)	Input
31	P1.14_ENET_RX_ER	P1[14] –General purpose digital input/output pin.	Input/Output
		ENET_RX_ER - Ethernet receive error (RMII/MII interface)	Input
32	3p3 volts		Power
33	P1.10_ENET_RXD1	P1[10] – General purpose digital input/output pin.	Input/Output
		ENET_RXD1 - Ethernet receive data 1 (RMII/MII interface)	Input
34	P1.9_ENET_RXD0	P1[9] - General purpose digital input/output pin.	Input/Output
		ENET_RXD0 - Ethernet receive data 0 (RMII/MII interface)	Input
35	P1.8_ENET_CRSDV	P1[8] - General purpose digital input/output pin.	Input/Output
		ENET_CRS_DV/ENET_CRS – Ethernet Carrier Sense/Data Valid (RMII interface)/ Ethernet Carrier Sense (MII interface)	Input
36	P1.4_ENET_TXEN	P1[4] - General purpose digital input/output pin.	Input/Output
		ENET_TX_EN - Ethernet transmit data enable (RMII/MII interface)	Output
37	P1.1_ENET_TXD1	P1[1] - General purpose digital input/output pin.	Input/Output
		ENET_TXD1 - Ethernet transmit data 1 (RMII/MII interface)	Output
38	P1.0_ENET_TXD0	P1[0] - General purpose Digital input/output pin.	Input/Output
		ENET_TXD0 - Ethernet transmit data 0 (RMII/MII interface)	Output
39	Ground (GND)		Power
40	ISP_ENTRY	I/O - P2[10] - General purpose digital input/output pin. <b>Note:</b> LOW on this pin while RESET is LOW forces on-chip boot loader to take over control of the part after a reset.	Input/output
41	P0.3_RXD0	P0[3] - General purpose digital input/output pin.	Input/Output
		RXD0 - Receiver input for UART0	Input
42	P0.2_TXD0	P0[2] - General purpose digital input/output pin.	Input/Output
		TXD0 - Transmitter output for UART0	Output

43	USBD_DP	P0[31] - General purpose digital input/output pin.	Input/Output
		USB_D+2 - USB port 2 bidirectional D+ line	Input/Output
44	USBD_DM	USB_D-2 - USB port 2 bidirectional D -line	Input/Output
45	USBD_VBUS	P1[30] - General purpose digital input/output pin.	Input/Output
		USB_PWRD2 - Power Status for USB port 2.	Input
		VBUS - Monitors the presence of USB bus power. <b>Note:</b> This signal must be HIGH for USB reset to occur. I - AD0[4] - A/D converter 0, input 4	Input
46	5volts (5VO)	5.0 Volts DC	Power
47	5volts (5VO)	5.0 Volts DC	Power
48	5volts (5VO)	5.0 Volts DC	Power
49	3p3 volts (3V3)	3.3 Volts DC	Power
50	3p3 volts (3V3)	3.3 Volts DC	Power

## Expansion Connector Cable Details

The maximum length for the expansion connector cables is as follows:

General Purpose IO, TTL, Serial, etc = 6" recommended maximum, 8" absolute maximum

Ethernet, high-speed IO, etc = 3" recommended maximum, 4" absolute maximum

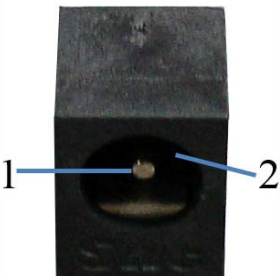
The following table provides example part numbers for the expansion cables:

Description	Mfg	Mfg PN	Digi-Key Pn
3" 20-pin 0.5mm	Molex	21020-0209	WM10226-ND
6" 20-pin 0.5mm	Molex	21020-0215	WM10218-ND
3" 50-pin 0.5mm	Molex	21020-7650	WM10231-ND
6" 50-pin 0.5mm	Molex	21020-0548	WM10223-ND

Note: These lengths are only recommendations. The actual lengths utilized will be dependent on the expansion board circuitry, layouts and general environment of the application. It is up to the customer to test and validate the functional operation and use of the expansion connectors.

## DC Power Input - P4

The uEZGUI-EXP1 supports a 7VDC-24VDC 1A (min) Power Supply. The connector is 2.1mm with center positive.

	Pin Number	Description
	1	7VDC to 24VDC, +/- 10%, 1.0A (min)
	2	Power Supply Ground

## Serial Port - P3

The uEZGUI-EXP1 Board includes one female DB9 Serial Port Connector. This connector may operate in either RS232 or RS485 (Full-duplex) interface levels depending on jumper settings of JP1 through JP4.

Jumpers JP1 – JP4 select the operating mode of the serial port;

Jumper 1-2 for RS232 levels, using UART0

Jumper 2-3 for RS485 levels, using UART1

When operating as RS232, the serial port may also be optionally configured to support ISP programming of the LPC2478 using FlashMagic Software. To enable ISP programming, jumper JP6 & JP7 must be loaded. Note that with these jumpers loaded, operation of the LPC2478 may be affected by the RS232 interface signals. Refer to the FlashMagic user manual for details.

Pin Number	RS485 Mode	RS232 Mode
1	No Connect	No Connect
2	485_RDB-	TXD (Output)
3	485_TDA+	RXD (Input)
4	Signal Ground	No Connect
5	Signal Ground	Signal Ground
6	Signal Ground	Signal Ground
7	485_RDA+	(OPT) RTS
8	485_TDB-	(OPT) CTS
9	(OPT 5V)	No Connect



## USB Device - P1

The UEZGUI-EXP1 Board includes one USB Device Interface allowing the unit to be connected to a USB Host, such as a PC. Through this connection, the uEZGUI represents a peripheral to the USB Host. The operational mode of the port is dependent on the software utilized (i.e. Mass Storage or Human-Interface).

Note: The USB Device connector of the Expansion Board is connected in parallel to the USB Device connector of the uEZGUI Main board. **To avoid damage or improper operation, do not connect both of these at the same time.**

The UEZGUI-EXP1 Board may also be powered via the USB Device connector. Care must be taken to not overload the USB Host since 500mA is the maximum current allowable via USB.

Pin Number	Description
1	USB 5V
2	D-
3	D+
4	NC
5	Signal Ground

## USB Host - P2

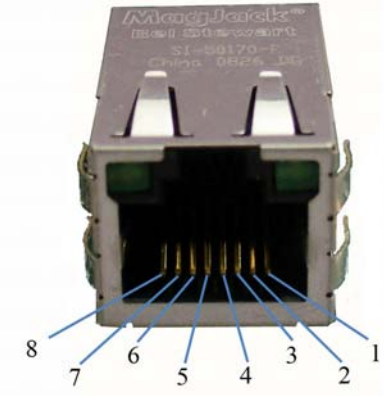
The uEZGUI-EXP1 Board includes one USB Host Port allowing the unit to interface to various USB peripherals such as a USB Flash Drive (Thumb Drive). The operational mode of this port is dependent on the software utilized (i.e. driver support)

Pin Number	Description
1	USB VBus
2	D-
3	D+
4	Signal Ground

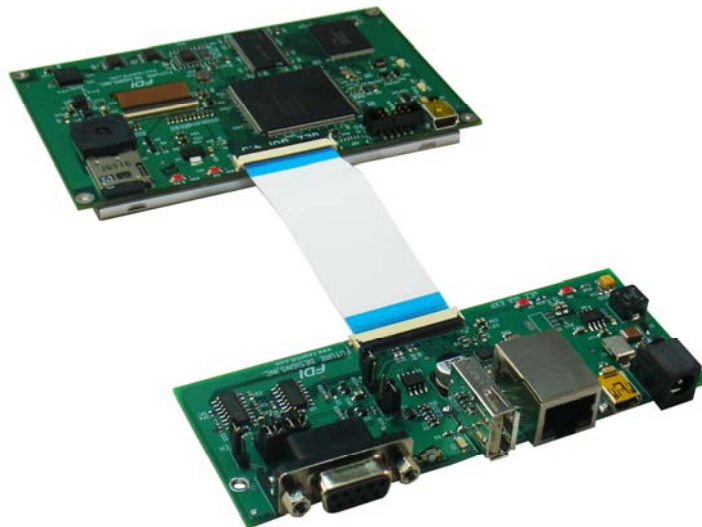
## Ethernet - J2

The UEZGUI-EXP1 Board includes one 10/100 Ethernet Port to interface to a local area network via CAT5 cable.

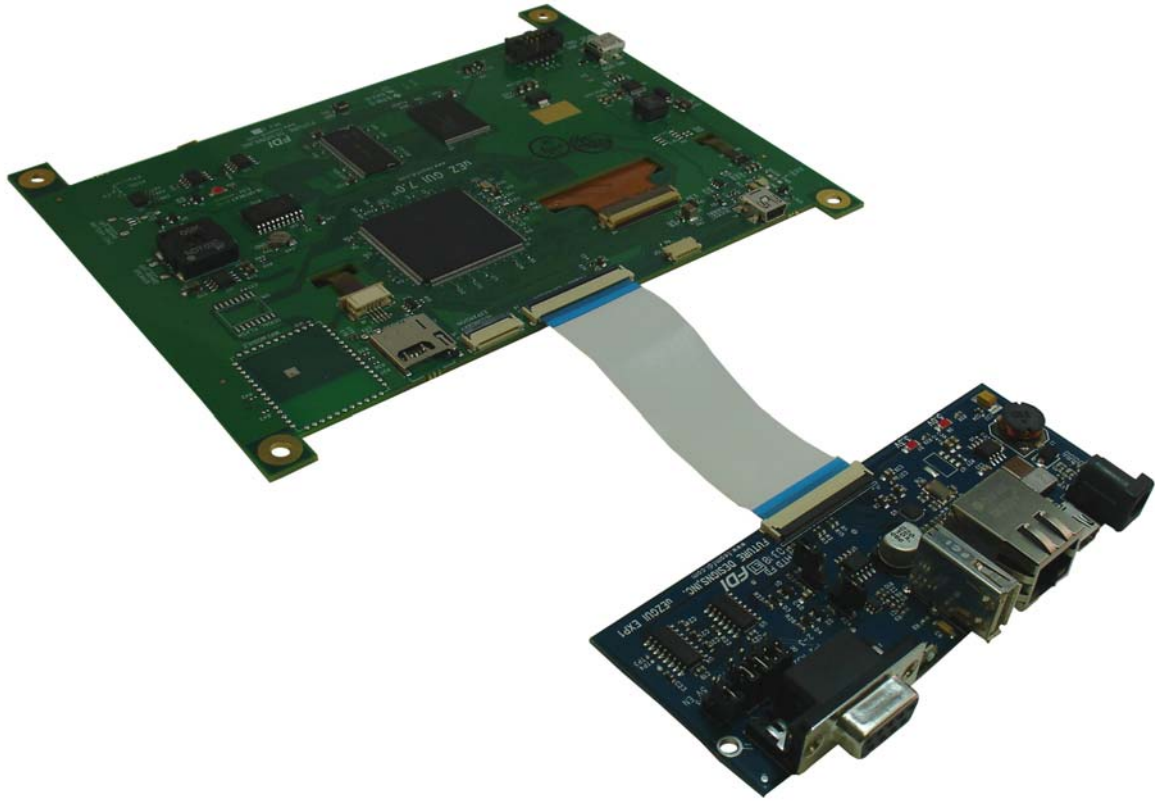
Please refer to the specific details of the LPC2478 processor being utilized for support of the Ethernet Port function.

	Pin Number	Description
	1	Tx+
	2	Tx-
	3	Rx+
	4	75 ohm terminated
	5	75 ohm terminated
	6	Rx-
	7	75 ohm terminated
	8	75 ohm terminated

## Connecting to the uEZGUI Boards



uEZGUI-2478-43WQS with uEZGUI-EXP1



uEZGUI-2478-70WVE with uEZGUI-EXP1



uEZGUI-2478-43WQS with uEZGUI-EXP1 mounted in OEM Housing