



QuickUSB Diagnostics
User Guide



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Overview

The QuickUSB Diagnostics application provides an immediate way to verify the functionality of a QuickUSB Module without having to write any software. It gives a baseline program to verify the functionality of the interface between a QuickUSB Module and target hardware. It allows the user to exercise almost every function in the library. The VB6 source code is provided as a sample with the QuickUSB Library to demonstrate how to write software for QuickUSB.

The QuickUSB Diagnostics Application

Running the Application

You can run the QuickUSB Diagnostics application (see Figure 1) using the shortcut installed in the Windows Start Menu by navigating to “All Programs” → “Bitwise Systems QuickUSB” → “QuickUSB Diagnostics”. Alternately, you can run the QuickUSB Diagnostics executable directly by running the file: “<Installation Directory>\Bitwise Systems\QuickUSB\QuickUsbDiag\QuickUsbDiag.exe”.

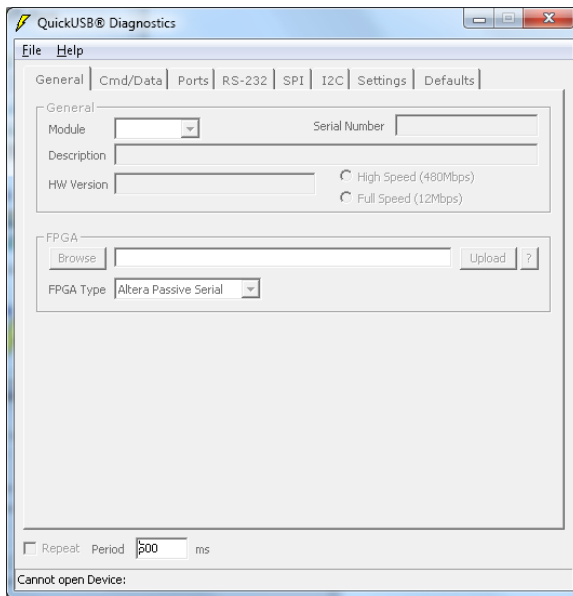


Figure 1: QuickUSB Diagnostics with no module connected.

Connecting a Module

Connect a QuickUSB Module to the USB port of the host computer. If the system does not detect one or more QuickUSB Modules then the QuickUSB Diagnostics application will be disabled, as shown in Figure 1. A message in the status bar at the bottom of the window will display the message “Cannot open Device:”. Once the system detects a QuickUSB Module is connected the form will be enabled (Figure 2), allowing you to navigate through the various tabs.

The User Interface

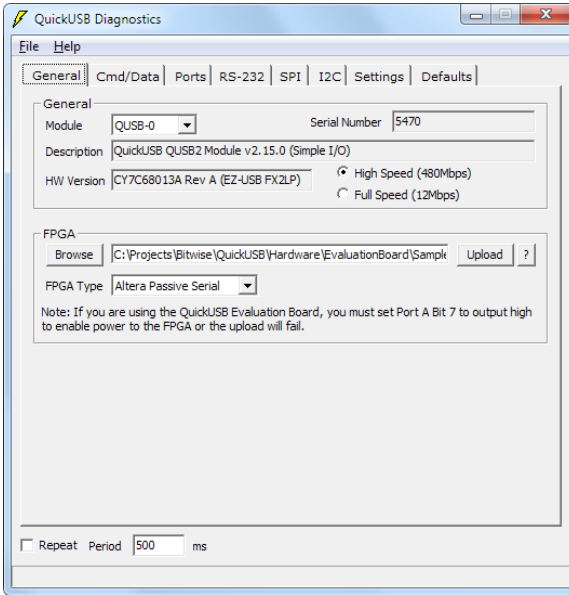


Figure 2: QuickUSB Diagnostics with a module connected.

The Menu Bar

The “File” Menu

“Exit”

Select “File” → “Exit” to quit the QuickUSB Diagnostics application.

The “Help” Menu

“About”

Select “Help” → “About” to view more information about the QuickUSB Diagnostics application, as well as the QuickUSB DLL version and driver version currently in use.

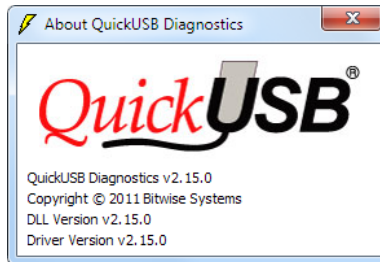


Figure 3: The QuickUSB Diagnostics About Dialog.

The “General” Tab

The “General” Tab gives general information about the selected QuickUSB Module (see Figure 2).

The “General” Section

The “General” section shows the information about the selected QuickUSB Module.

The “Module” Combo Box

Displays the currently selected QuickUSB Module. If more than one QuickUSB Module is connected to your computer, you can choose between the modules using this drop-down list. All actions taken by the Diagnostics application are performed on the selected QuickUSB Module.

The “Serial Number” Text Box

The “Serial Number” text box shows the serial number of the currently selected QuickUSB Module.

The “Description” Text Box

The “Description” text box shows a description of the version of firmware currently loaded in the QuickUSB Module in the following format: “QuickUSB QUSB2 Module v<version number> (<I/O Model>)” where <version number> is the version of the firmware loaded and <I/O Model> is the I/O Waveform Model loaded.

The “HW Version” Text Box

The “HW Version” text box shows the hardware version of the Cypress FX2 on the QuickUSB Module.

The Connection Speed Radio Buttons

The “High Speed” / “Full Speed” radio buttons show at which speed the QuickUSB Module is connected to the PC. If you would like to switch to the other speed, simply click on the desired radio button. The QuickUSB Module will re-enumerate and connect at the selected speed.

The “FPGA” Section

The FPGA section allows you to program an Altera FPGA in passive serial mode, or a Xilinx FPGA in slave serial mode provided the FPGA’s are connected as to the QuickUSB Module as described in the QuickUSB User Guide.

The “Browse” Button

Click the “Browse” button to browse the PC’s hard drive to locate the *.rbf (Altera) or *.bin (Xilinx) configuration file to program to the target FPGA.

The “Browse” Text Box

The “Browse” text box displays the path to the configuration file selected using the “Browse” button. Alternately, you can type the path and filename of the configuration file directly.

The “FPGA Type” Combo Box

Select your desired configuration method and target FPGA from the “FPGA Type” Combo Box.

The “Upload” Button

Click the “Upload” Button to configure the target FPGA with the selected configuration file. The configuration status will appear below the text box containing the configuration file path. Once the configuration has successfully completed, the status bar at the bottom of the form will display “FPGA was successfully configured.”

The User Interface

The “?” Button

Click the “?” button to check the configuration status of the FPGA. If the FPGA is configured, the status bar will display “FPGA was successfully configured”. If the FPGA is not configured, the status bar will display “FPGA Configuration Failed”.

Configuring an FPGA

Follow these instructions to configure an FPGA:

1. (Applies when using the QuickUSB Evaluation Board) Under the “Ports” tab, set Port A Bit 7 to output high to turn on power to the FPGA.
2. Select the FPGA type: In the “FPGA Type” list, select either “Altera Passive Serial” or “Xilinx Slave Serial”.
3. Locate the configuration file: Click “Browse” and browse to the configuration file for your FPGA (*.rbf for Altera or *.bin for Xilinx). Once selected, the path to the file will appear in the text box.
4. Configure the FPGA: Click the “Upload” button. This will configure the FPGA with the selected configuration file. The configuration status will appear below the text box containing the configuration file path name. Once the configuration has successfully completed, the status bar at the bottom of the form will display “FPGA was successfully configured.”

Click the “?” button to determine the status of an FPGA Configuration. The status message will display in the status bar at the bottom of the form.

The “Cmd/Data” Tab

On the “Cmd/Data” tab, you can easily transfer data between the QuickUSB Module and the target device without having to write any software (see Figure 4).

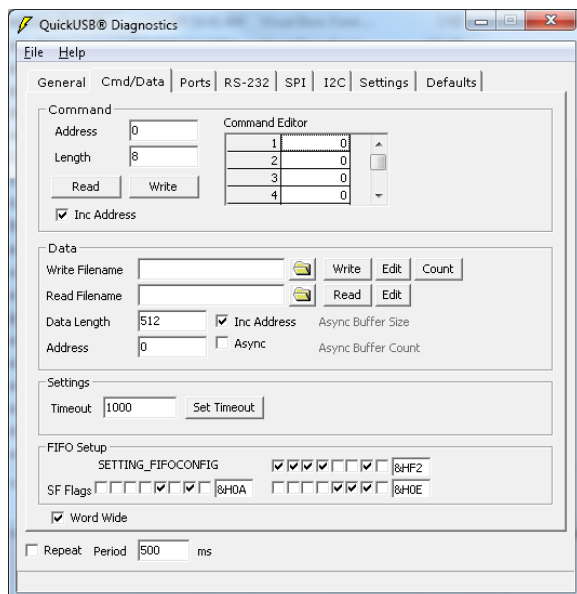


Figure 4 – The “Cmd/Data” Tab

General Settings

The “Word Wide” Check Box

The “Word Wide” check box sets the data bus width. If the “Word Wide” check box is checked, the QuickUSB Module will be set in word-wide mode with a 16-bit wide data bus. If unchecked, the module will be set in byte-wide mode with an 8-bit wide data bus.

The “Period” Text Box

Enter the period (in ms) you would like the repeat timer to execute the last command performed. The command will only execute when the “Repeat” check box is checked.

The “Repeat” Check Box

If the “Repeat” check box is checked, a timer will execute the last command performed at the rate specified in the “Period” text box. For example, if you want to perform a command write every 1000 ms, enter 1000 into the “Period” text box. Check the “Repeat” check box and click “Write” in the “Command” section. The QuickUSB Diagnostics application will perform a command write every 1000 ms.

The “Command” Section

The “Command” section allows you to perform command writes reads over the High-Speed Parallel Port.

The “Address” Text Box

The “Address” text box contains the starting address that you would like the data to be written.

The “Length” Text Box

The “Length” text box contains the number of bytes to transfer. The maximum length for a command transfer is 64 bytes.

The “Command Editor” Field

The “Command Editor” field contains the data to write when performing a command write or the data that was returned when performing a command read.

The “Inc Address” Check Box

The “Inc Address” check box controls the automatic increment feature of the address when performing a command write or read. If checked, the address on the GPIFADR address bus will increment with every byte (in byte-wide mode) or every word (in word-wide mode). If unchecked, the GPIFADR address value will remain at the value specified in the “Address” text box.

The “Read” Button

Click the “Read” button to perform a command read of the length specified in the “Length” text box. The data read from the QuickUSB command read will be displayed in the “Command Editor” field.

The “Write” Button

Click the “Write” button to perform a command write of the length specified in the “Length” text box. The data in the “Command Editor” field will be written over the HSPP.

Performing a Command Write

To execute a Command Write, perform the following steps:

1. Select the data bus width using the “Word Wide” check box at the bottom of the form. If the “Word Wide” check box is checked, the QuickUSB Module will be set in word-wide mode and the data bus will be 16 bits wide. If the check box is unchecked, the QuickUSB Module will be set in byte-wide mode and the data bus will be 8 bits wide.
2. Enter the starting address for the data in the “Address” text box.

The User Interface

3. Enter the number of items to transfer in the “Length” text box.
4. The “Command Editor” box allows you to edit the data that is written during a command write. Modify the data you would like to write.
5. If the “Inc Address” check box is checked, the address will automatically increment for every word (in word-wide mode) or byte (in byte-wide mode) transferred.
6. Click the “Write” button, and the QuickUSB Module will perform a command write.

Performing a Command Read

To execute a command read, perform the following steps:

1. Select the data bus with the “Word Wide” check box at the bottom of the form. If the “Word Wide” check box is checked, the QuickUSB Module will be set in word-wide mode and the data bus will be 16 bits wide. If the check box is unchecked, the QuickUSB module will be set in byte wide mode and the data bus will be 8 bits wide.
2. Enter the starting address for the data in the “Address” text box.
3. Enter the number of items to transfer in the “Length” text box.
4. If the “Inc Address” check box is checked, the address will automatically increment for every word (in word-wide mode) or byte (in byte-wide mode) transferred.
5. Click the “Read” button, and the QuickUSB Module will perform a command read.
6. The data read from the QuickUSB command read will be displayed in the “Command Editor” box.

The “Data” Section

The “Data” section allows you to perform data reads and writes over the High-Speed Parallel Port of the QuickUSB Module. Please note that data write and read waveforms generated by the QuickUSB Module will differ depending on the version of firmware loaded. Please consult the QuickUSB User Guide for more information on the different I/O model waveforms.

The “Write Filename” Text Box

In the “Write Filename” text box, type the path and file name of the binary file (*.bin) you wish to transfer. Alternately, you can click the “Folder” icon button to locate the binary file. The path is displayed in the text box.

The “Write” Button

Click on the “Write” button to perform a data write using the file specified in the “Write Filename” text box as the source. The data write transfer will start and the address specified in the “Address” text box and will transfer the amount of data specified in the “Length” text box.

The “Count” Button

Click the “Count” button to perform a data write with an incrementing count instead of using the file specified in the “Write Filename” text box. This is useful when debugging hardware, so you can easily see where breaks in the data occur.

The Write “Edit” Button

Click on the “Edit” button to the right of the “Write” button to open the hex editor and view and edit the file specified in the “Write Filename” text box.

The “Read Filename” Text Box

In the “Read Filename” text box, type the path and file name of the binary file (*.bin) to write the data returned by the data read function. Alternately, you can click the “Folder” icon button to locate the binary file. The path is displayed in the text box.

The “Read” Button

Click the “Read” button and the QuickUSB Module will perform a data read. The data returned from the data read function will be written to the file specified in the “Read Filename” text box.

The Read “Edit” Button

To view the data returned by the data read function, click the “Edit” button to the right of the “Read” button. The hex editor will open the file specified in the “Read Filename” textbox, allowing you to view the data after a read.

The “Data Length” Text Box

In the “Data Length” text box, enter the number of bytes (in byte-wide mode) or words (in word-wide mode) to transfer.

The “Address” Text Box

In the “Address” text box, enter the starting address for the data transfer.

The “Inc Address” Check Box

If the “Inc Address” check box is checked, the address will automatically increment for every byte (in byte-wide mode) or word (in word-wide mode) transferred.

The “Async” Check Box

Checking the “Async” checkbox will tell the QuickUSB Diagnostics application to use the asynchronous (non-blocking) function calls for data reads and writes.

The “Async Buffer Size” Text Box

Enter the asynchronous buffer size into the “Async Buffer Size” text box. This is only available for making asynchronous function calls if the “Async” check box is checked.

The “Async Buffer Count” Text Box

Enter the buffer count into the “Async Buffer Count” text box. This is only available for making asynchronous function calls if the “Async” check box is checked.

Performing a Data Write

To perform a Data Write, perform the following steps:

1. In the “Write Filename” text box, type the file name of the binary file (*.bin) you wish to transfer. Alternately, you can click the “Folder” icon button to locate the binary file. The path is displayed in the text box.
2. If you wish to edit the file, click the “Edit” button to the right of the “Write” button. This will open the hex editor and allow you to modify the file in any way.
3. Select the data bus with the “Word Wide” check box at the bottom of the form. If the “Word Wide” check box is checked, the QuickUSB Module will be set in word-wide mode and the data bus will be 16 bits wide. If the check box is unchecked, the QuickUSB Module will be set in byte-wide mode and the data bus will be 8 bits wide.
4. In the “Data Length” text box, enter the number of items to transfer.
5. In the “Address” text box, enter the starting address for the data transfer.
6. If the “Inc Address” check box is checked, the address will automatically increment for every word (in word-wide mode) or byte (in byte-wide mode) transferred.
7. Click the “Write” button and the QuickUSB Module will perform a data write.

The User Interface

- Alternatively, you can click the “Count” button and the QuickUSB Module will perform a data write with an incrementing count, instead of using the file specified in the “Write Filename” text box. This is useful when debugging hardware, so you can easily see where breaks in the data occur.

Performing a Data Read

To perform a data read, perform the following steps:

- In the “Read Filename” text box, type the name of the binary file (*.bin) to write the data returned by the Data Read function. Alternately, you can click the “Folder” icon button to locate the binary file. The path is displayed in the text box.
- Select the data bus with the “Word Wide” check box at the bottom of the form. If the “Word Wide” check box is checked, the QuickUSB Module will be set in word-wide and the data bus will be 16 bits wide. If the check box is unchecked, the QuickUSB Module will be set in byte-wide and the data bus will be 8 bits wide.
- In the “Data Length” text box, enter the number of items to transfer.
- In the “Address” text box, enter the starting address for the data transfer.
- If the “Inc Address” check box is checked, the address will automatically increment for every word (in word-wide mode) or byte (in byte-wide mode) transferred.
- Click the “Read” button and the QuickUSB Module will perform a data read.
- To view the data, click the “Edit” button to the right of the “Read” button. The hex editor will open the file specified in the “Read Filename” textbox, allowing you to view the data after a read.

The “Settings” Section

The “Settings” section of the “Cmd/Data” tab allows you to set certain settings for the QuickUSB Module that pertain to command and data transfers.

The “Timeout” Text Box

Enter the desired timeout value for a Data Read or Data Write function call into the “Timeout” text box.

The “Set Timeout” Button

Click the “Set Timeout” button to write the timeout setting specified in the “Timeout” text box to the QuickUSB Module.

The “FIFO Setup” Section

The “FIFO Setup” section displays the status of output endpoint 2 (EP2) and input endpoint 6 (EP6) FIFO’s, as well as the current value of the IFCONFIG register.

The “SETTING_FIFOCONFIG” Bit Check Box

The “SETTING_FIFOCONFIG” bit check box displays the setting of the LSB of the SETTING_FIFO_CONFIG register. Please refer to the QuickUSB User Guide for more information on the registers and their values. Hover the mouse pointer over the individual bit check boxes to view the individual bit names. Please refer to the QuickUSB User Guide for more information on the registers and their functions.

The “SF Flags” Bit Check Box

The “SF Flags” bit check box shows the “Empty” and “Full” status of the EP2 (output) and EP6 (input) FIFO’s in the QuickUSB Module. Hover the mouse over the individual bit check boxes to view the individual bit names. Please refer to the QuickUSB User Guide for more information on the registers and their functions.

The “Ports” Tab

The Ports tab lists GPIO Ports A-E. You can manually set the direction and value of the ports here, as well as read the current value of the ports (see Figure 5).

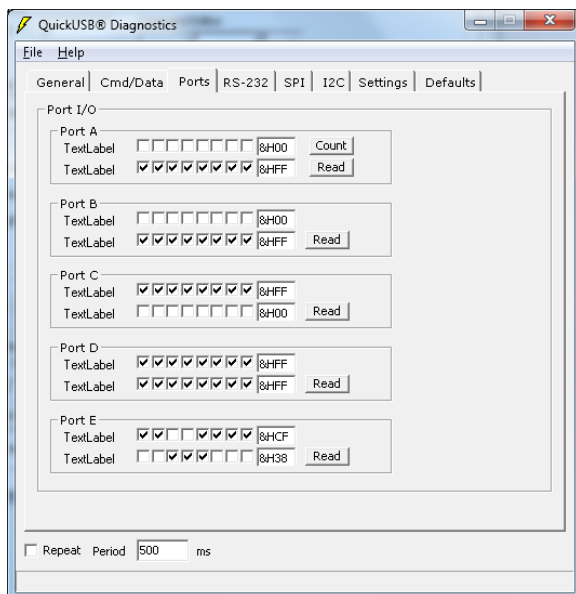


Figure 5 – The “Ports” Tab

The “Port” Section

The direction and value of each I/O pin for every port can be individually configured using this section.

The “Dir” Bit Check Box

Under each Port section, the “Dir” bit check box sets the direction for each I/O pin in the corresponding port. Checking the check box sets the corresponding pin as an output. Un-checking the check box sets the corresponding pin as an input. Alternately, you can type the hex value for the port direction into the text box. For example, entering “&H81” in the “Dir” text box for Port A will set pins PA0 and PA7 as outputs.

The “Value” Bit Check Box

Under each Port section, the “Value” check box shows the value of each I/O pin in the corresponding port.

To read the value of the pins in the port, click the “Read” button. The “Value” bit check box will show the logic value of each pin. A checked bit box corresponds to logic high and an unchecked bit box corresponds to logic low.

To set the value of an I/O pin, set the pin as an output as described above and check the corresponding bit check box for the pin to set logic high or uncheck the corresponding bit check box to set logic low. For example, if Port A’s “Dir” value is &HFF (all outputs), setting the “Value” check box to &H1F will set PA0-PA4 high, and PA5-PA7 will be low.

The User Interface

The “Read” Button

To read the value of the pins in the port, click the “Read” button. The “Value” bit check box will show the logic value of each pin. A checked bit box corresponds to logic high and an unchecked bit box corresponds to logic low.

The “Count” Button

The “Count” button will perform an incrementing count on Port A. Pressing the “Count” button will set all I/O pins on Port A to outputs, and will output an incrementing count from 0 to 63 to Port A. The Port A value will be reset back to 0 after the count is completed.

The “RS-232” Tab

The “RS-232” tab allows you perform RS-232 reads and writes over both RS-232 ports available on the QuickUSB Module (see Figure 6).

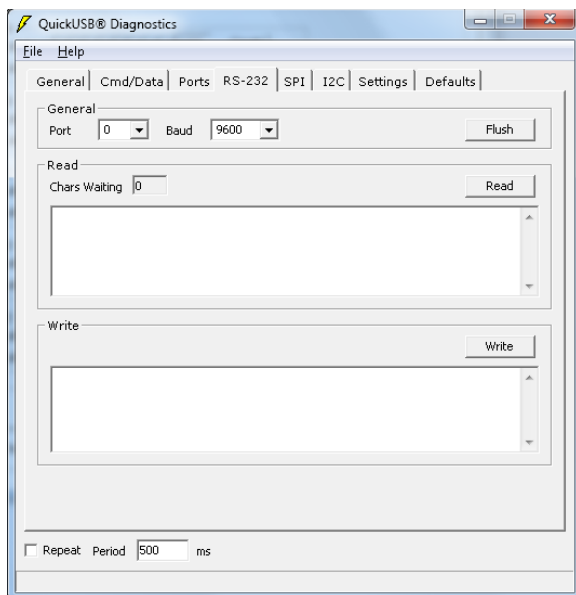


Figure 6 – The “RS-232” Tab

The “General” Section

In the “General” section, the user specifies the port number and baud rate for communicating over RS-232.

The “Port” Combo Box

To select the desired port use the “Port” drop-down list and select a port.

The “Baud” Combo Box

To set the baud rate, use the “Baud” drop-down list to select the baud rate.

The “Flush” Button

Clicking the “Flush” button will flush the transmit/receive buffers.

The “Read” Section

Use the “Read” section to read the data from the RS-232 port.

The “Chars Waiting” Text Box

The “Chars Waiting” text box displays the number of characters currently in the receive buffer.

The Read Text Box

The Read text box displays the data received when performing an RS-232 read.

The “Read” Button

Clicking the “Read” button will read the data from the RS-232 port and display it in the text box.

The “Write” Section

Use the “Write” section to write data over the selected QuickUSB RS-232 port.

The Write Text Box

Type the desired data to be written in the write text box, separated by spaces.

The “Write” Button

To write data, type the desired data into the text box in the “Write” section. Click the “Write” button to write the data over the RS-232 interface.

The “SPI” Tab

The “SPI” tab allows data to be transferred over the SPI interface (see Figure 7).

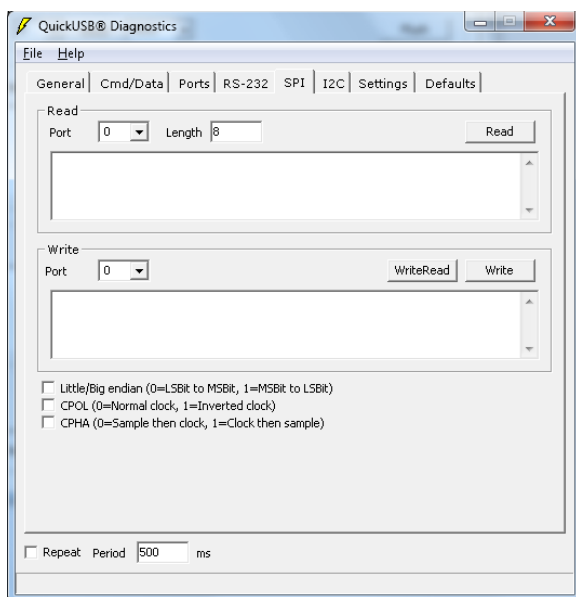


Figure 7 – The “SPI” Tab

The “Read” Section

Use the “Read” section to read data over the SPI Interface.

The “Port” Combo Box

To set the port to use to transfer data (the Slave Select signal) use the “Port” combo box. Ports 0-9 correspond to slave select signals 0-9, respectively.

The User Interface

The “Length” Text Box

Enter the number of bytes to read in the “Length” text box.

The Read Text Box

The Read Text Box displays the data returned from a SPI Read. The data is separated by spaces.

The “Read” Button

Clicking the “Read” button will execute an SPI read from the selected SPI port and display the data in the text box.

The “Write” Section

Use the “Write” section to write data over the SPI interface or to perform a simultaneous “Write/Read” over the SPI interface.

The “Port” Combo Box

To set the port to use to transfer data (the slave select signal) use the “Port” drop-down box. Ports 0-9 correspond to slave select signals 0-9, respectively.

The Write Text Box

Enter up to 64 bytes of data to be written in the write text box, separated by spaces. To enter data in hex, prefix the two hex digits with “&h”.

The “Write” Button

Clicking the “Write” button will write the data in the write text box to the selected SPI Port.

The “WriteRead” Button

Clicking the “WriteRead” button will perform a simultaneous SPI write and read, where the data in the write text box in the “Write” section will be written to the selected SPI port. At the same time, the function will read the data from the selected slave port and display it in the read text box in the “Read” section.

The “I2C” Tab

The “I2C” tab allows data to be transferred over the QuickUSB I2C interface (see Figure 8).

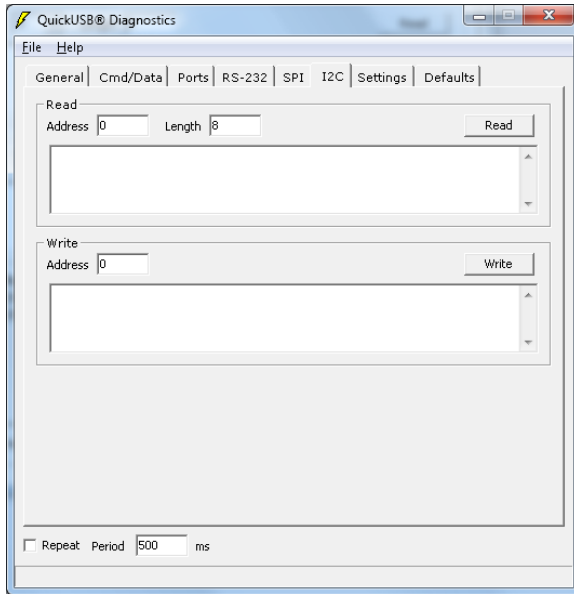


Figure 8 – The “I2C” Tab

The “Read” Section

Use the “Read” section to read data over the QuickUSB I2C interface.

The “Address” Text Box

Enter the address of the I2C slave device into the “Address” text box.

The “Length” Text Box

The “Length” text box contains the number of bytes to read.

The Read Text Box

The “Read” text box displays the data returned from a SPI Read, separated by spaces.

The “Read” Button

Click the “Read” button to read data from the selected I2C slave device. The data will display in the read text box, separated by spaces.

The “Write” Section

Use the “Write” section to write data over the QuickUSB I2C interface.

The “Address” Text Box

Enter the address of the I2C slave device in the “Address” text box.

The Write Text Box

Enter up to 64 bytes of data to be written in the write text box, separated by spaces. To enter data in hex, prefix the two hex digits with “&h”.

The User Interface

The “Write” button

Clicking the “Write” button will write the data in the text field to the addressed I2C slave device over the QuickUSB I2C interface.

The “Settings” Tab

The “Settings” tab allows you to configure the settings for the selected QuickUSB Module. All of the QuickUSB settings are volatile; they will return to their corresponding default values on power-up (see Figure 9).

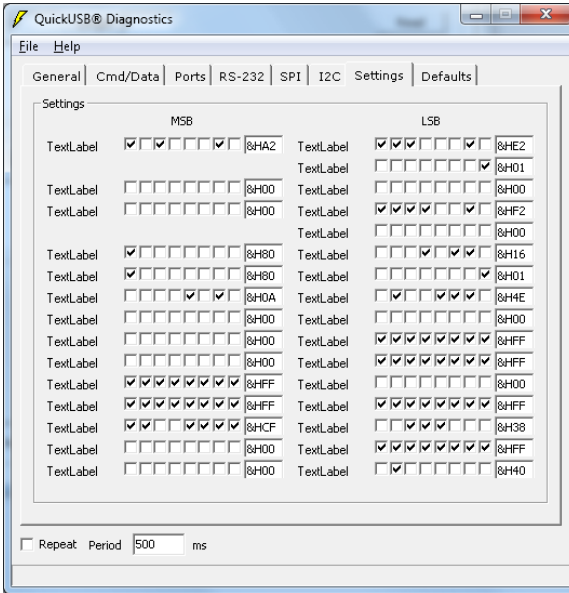


Figure 9 – The “Settings” Tab

The “Settings” Section

Each bit check box in the “Settings” section displays the contents of a QuickUSB settings register. Please refer to the QuickUSB User Guide for detailed information about each register.

Setting a QuickUSB Setting

To set a QuickUSB Setting register bit, simply check the corresponding bit check box. To clear a bit, uncheck the corresponding bit check box. The setting is written to the module every time a value is changed.

Alternately, you can type a value to write to the QuickUSB setting register in the text box. Hitting “Enter” after typing the value will write the value to the corresponding setting register.

The “Defaults” Tab

The “Defaults” tab allows you to configure the non-volatile defaults for the QuickUSB Module that are loaded on power-on (see Figure 10).

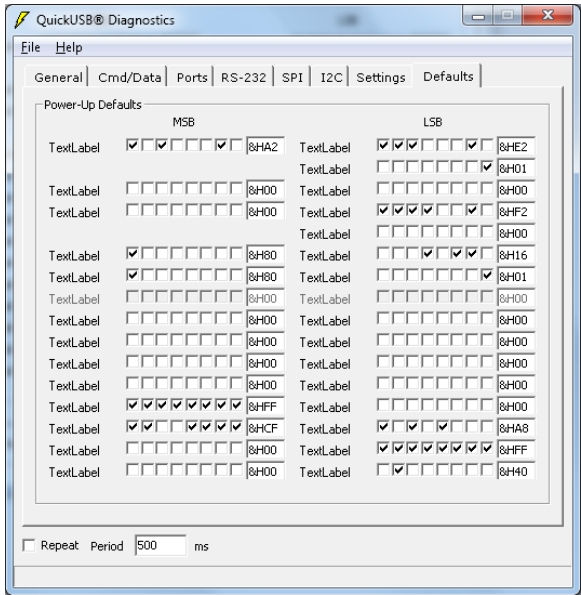


Figure 10 – The “Defaults” Tab

The “Power-Up Defaults” Section

Each bit check box in the “Defaults” section corresponds to a QuickUSB settings register. The value of a register entered in the “Defaults” section will be loaded to the corresponding QuickUSB setting value on power-on. Please refer to the QuickUSB User Guide for detailed information about each register.

Setting a QuickUSB Default

To set a QuickUSB default register bit, simply check the corresponding bit check box. To clear a bit, uncheck the corresponding bit check box. You will need to disconnect and reconnect the QuickUSB Module to load the default settings.

Alternately, you can type a value to write to the QuickUSB default register in the text box. Hitting “Enter” after typing the value will write the value to the corresponding defaults register. You will need to disconnect and reconnect the QuickUSB Module to load the default settings.