

# SPIGen 7 User Guide

## Table of Contents

1 Important Notice .....	2
2 Introduction .....	3
3 Using SPIGen .....	5
4 Configuring SPIGen .....	11
6 References .....	17
6 References .....	17
7 Revision History .....	18

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## 2 Introduction

### 2.1 About SPIGen

SPIGen is a configurable SPI generator written for Microsoft Windows XP, Microsoft Vista, and Microsoft Windows 7.

SPIGen uses the USB port of your computer and the USB SPI Dongle (P/N: KITUSBSPIDGLEVME) to interface with an evaluation board (EVB) or any other test platform. The type of SPI and the number of bits per word are fully configurable.

In addition, SPIGen allows the user to save SPI commands to a list of Quick Commands. This makes sending a variety of messages faster and easier. There is also a batch mode that can be used to send a series of Quick Commands with one click.

SPIGen also gives you access to 9 other pins on the USB SPI dongle. You can toggle these pins high or low and incorporate them into your batch command sequences.

Finally, all configuration settings, Quick Commands, and Batch Commands can be saved to a configuration file and retrieved for later use. Once the configuration file is set up, from that point forward you can load your settings and start working immediately. You can do this for any number of different devices and easily switch between them.

**NOTE:** This software is not supported. Use it at your own risk.

### 2.2 Installing SPIGen on Your Computer

SPIGen includes a *README.txt* file that describes the operating systems on which the software should be installed. Before you install the program, read the *README.txt* file to check the compatibility of the installation program and your computer.

You need to log in as the administrator to install the SPIGen. Once the program has been installed, any user can use it (they don't need administrator privileges).

### 2.3 Uninstalling SPIGen

SPIGen can be uninstalled by Windows through the Control Panel. To access the Control Panel.

For Windows XP:

1. Click the **Start** button
2. Then select **Settings**
3. Then select **Control Panel**
4. Next, double-click **Add/Remove Programs**
5. Find **SPIGen** in the list of programs, and then click **Add/Remove**.

For Windows 7 or Windows Vista:

1. Click the **Start** button
2. Then select **Control Panel**
3. Next, double-click **Programs and Features**
4. Find **SPIGen 7.0** in the list of programs, and then click **Uninstall**.

This invokes an uninstall wizard that guides you through the rest of the process.

If the wizard tells you it was not able to delete some part of the program, this is because there were other files in the program's directory. If you saved any configuration files, these could prevent the uninstall wizard from completely removing the software.

All you need to do in order to finish the job is to delete the folder (and all its contents) where SPIGen was installed. Do this after the uninstall wizard has finished.

## 2.4 Program Limitations

- The maximum SPI clock frequency is 4.0 MHz (using USB SPI Dongle).
- The maximum SPI word size is currently limited to 40 bits.

## 3 Using SPIGen

### 3.1 Sending One SPI Message at a Time

When the **Single Command** page is selected in the **Device View** window, you can send single SPI commands one at a time. You can also save common commands in a list of Quick Commands to make it easier and faster to send them in the future.

There are two ways to edit the SPI word you would like to send, depending on how you decide to configure SPIGen. You can either view the words in binary or hexadecimal format. Use the Binary or Hex radio buttons on the **Single Command** page to switch between the modes.

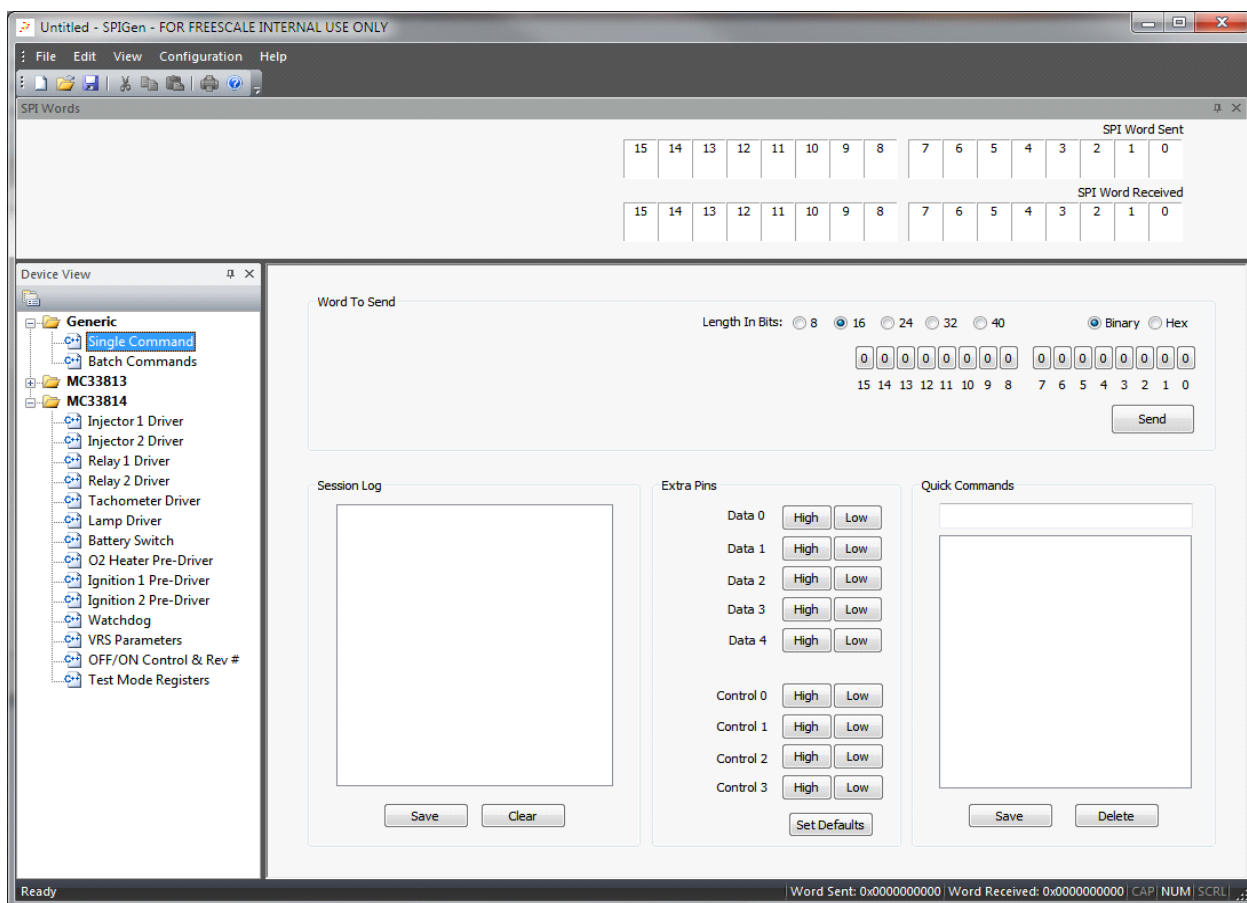


Figure 1. SPIGen Single Command Page

#### 3.1.1 Sending a Command in Binary Mode

When using the binary mode, each bit in the SPI word is displayed as a button, and a string of these buttons are connected to form the Word To Send. Clicking each button toggles the corresponding bit between 0 and 1. When all the bits are set as desired, the message can be sent by clicking the **Send** button.

The response, labeled SPI Word Received, is shown in the **SPI Words** window. Each time a word is sent, the received word is updated.

Incoming and outgoing messages can also be recorded in the Session Log.

### 3.1.2 Sending a Command in Hexadecimal Mode

When using the hexadecimal mode, words can be typed directly into the text box labeled **Word To Send**. Upper and lower case letters are accepted. Once the command has been inserted, it can be sent by clicking **Send** button.

The response, labeled SPI Word Received, is shown in the **SPI Words** window. Each time a word is sent, the received word is updated.

Incoming and outgoing messages can also be recorded in the Session Log.

### 3.1.3 Setting the SPI Word Length

To set the length of the SPI word, click on one of the **Length In Bits** buttons on the **Single Command** page. The SPI word length values are 8, 16, 24, 32, and 40 bits.

When selecting a device specific page (MC33814, for example), the SPI word length is automatically set to the length required by the device.

### 3.1.4 Displaying the SPI Words Window

The SPI Words window can be displayed by selecting **Toolbars and Docking Windows** from the **View** menu and then checking the **SPI Words** option. If the **SPI Words** option is on and SPIGen is closed, the setting is remembered and the **SPI Words** window will be displayed the next time SPIGen is run.

### 3.2 Supported Devices

The devices that are currently supported by SPIGen will be shown in the Device View window on the left side of the main window. The device name (e.g. MC33814) will be displayed, and all of the pages that support the registers and other functionality of the device will be shown beneath the device name. The pages for a specific device can be displayed by clicking the “+” sign to the left of the device name when the pages are hidden. The device pages can be hidden by clicking the “-” sign to the left of the device name when the pages are displayed. Clicking on the page name will display that page in the main window area of SPIGen.

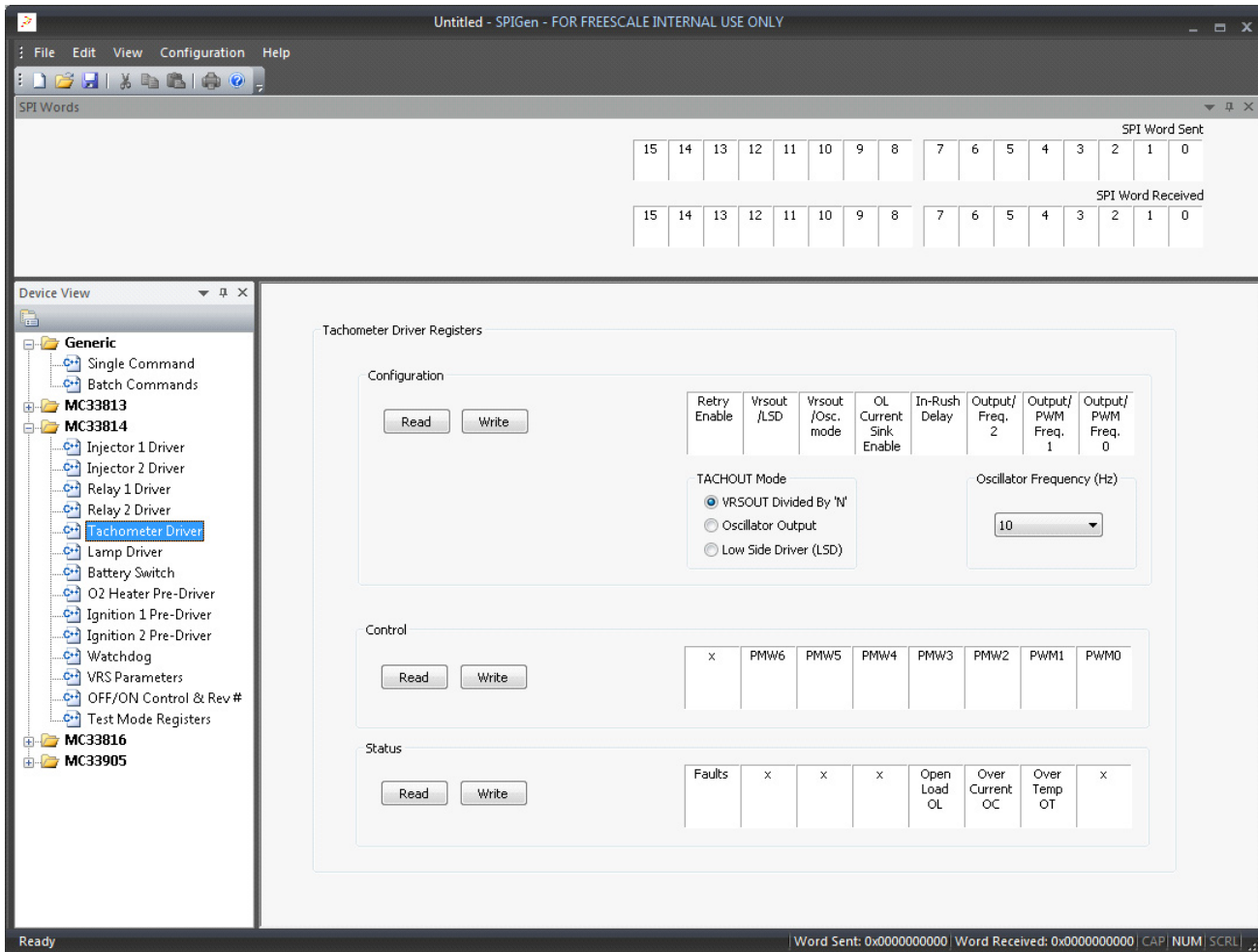


Figure 2. SPIGen Device View

### 3.3 Using Quick Commands

SPI messages can be stored for later by using the Quick Commands feature. To save a SPI message to the list of Quick Commands, make sure the **Single Command** page is selected. Then assemble the desired message by toggling the appropriate bits in the Word To Send (if you are using Binary mode), or by typing in the Hex command (if you are using Hex mode). When all of the bits have been set correctly,

type the name of the message in the **Quick Commands** box, and click the **Save** button next to it. This adds your message to the list of Quick Commands.

It does not matter whether you save your command in Binary or Hex. You can switch modes at any time and the commands will be interpreted correctly.

Once a Quick Command is saved, it can be selected at any time and immediately sent without having to toggle individual bits. Selecting a Quick Command will automatically update all bits in the Word To Send word (or it will update the text when in hex mode). The message can then be sent by clicking the **Send** button.

### 3.4 Sending a Batch of SPI Messages

A batch of SPI messages can be sent with a single click when the **Batch Command** Page is selected (**Figure 3**). All of the commands that were previously saved as Quick Commands are listed in the **Commands Available** list. A command can be moved to the **Commands To Send** list by selecting it and then clicking the right arrow button. The same can be accomplished by double-clicking the command.

Similarly, a command can be removed from the **Commands To Send** list by selecting it and clicking the left arrow button. The same can be accomplished by double-clicking the command.

To clear all commands from the **Commands To Send** list, click the **Clear All** button.

The commands in the **Commands To Send** box can be rearranged using the up and down arrow buttons. To move a command up one position, highlight the command and then click the up arrow button. To move a command down one position, highlight the command and then click the down arrow button.

Once a list of **Commands To Send** has been assembled, the entire list can be sent by clicking the **Send Once** button. The top command in the Commands To Send list is sent first, immediately followed by the next command down, and so on until all of the commands in the **Commands To Send** list are sent.

The whole process can be repeated indefinitely by clicking the **Send Continuously** button. Clicking the **Stop** button (which is not visible until the Continuous Send is started) halts the process.

Batches can also be saved for future use.



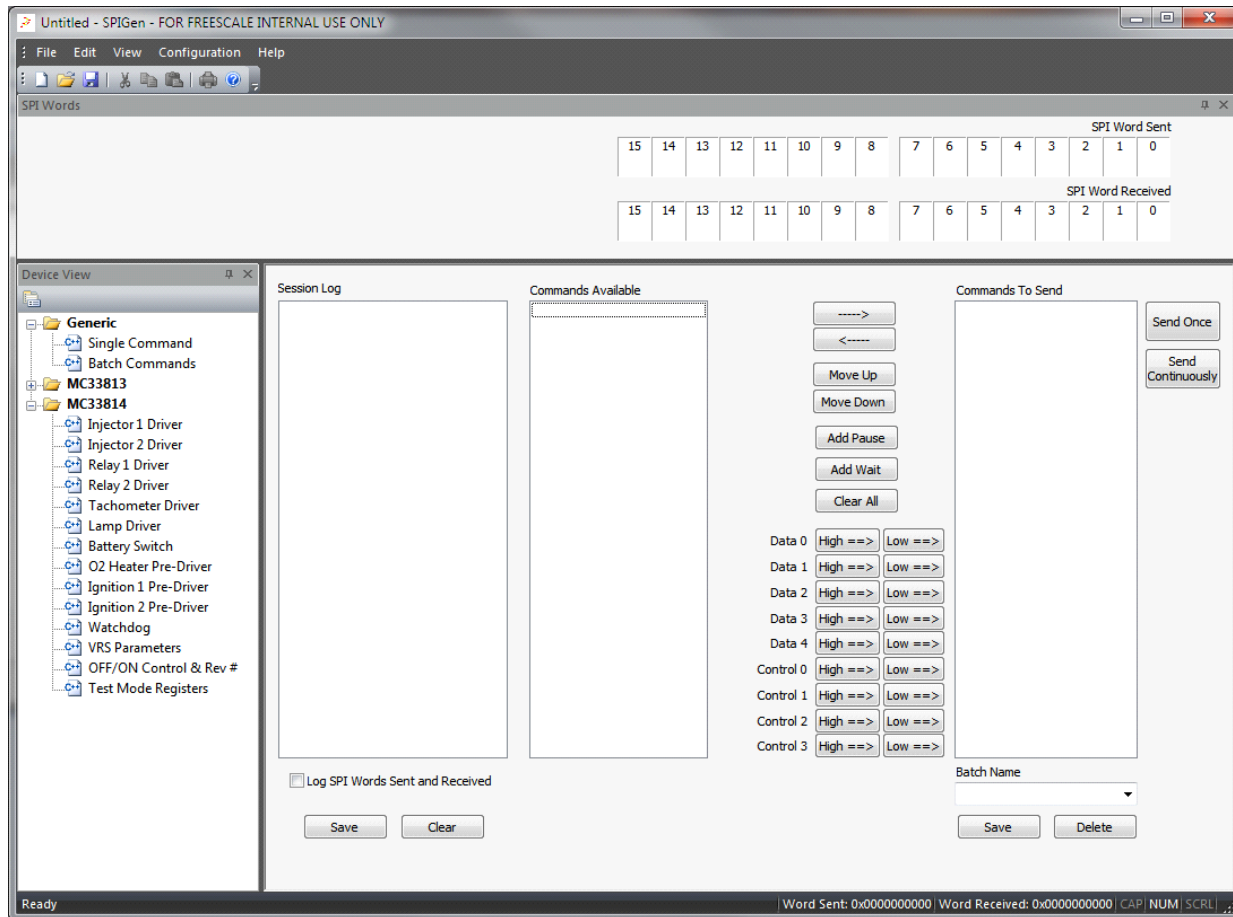


Figure 3. SPIGen Batch Commands Page

## 3.5 Using the Pause and Wait Features

When sending a Batch of Commands, you can insert pauses and wait intervals into the Batch to control the flow of the commands.

### 3.5.1 The Pause Feature

The **Add Pause** button can be used to insert a pause into the **Commands To Send** box. When the pause is encountered, all SPI transfers are suspended, and a message box appears prompting the user to **Click OK to Continue**. Clicking the **OK** button will cause the batch of SPI commands to continue as usual. Clicking the **Cancel** button will halt the transfer, and no further messages will be sent.

The Pause Feature is useful for situations where the test setup must be changed somewhere in the middle of a long list of commands. The Pause Feature allows the user to send several messages, then halt the transfers long enough to change something (like a voltage level, for instance), and then resume the rest of the transfers. The same scenario could be accomplished by sending one batch of commands, clearing them, and then separately sending another batch of commands. However, the Pause Feature makes this possible without having to reassemble the list of commands each time.

### 3.5.2 The Wait Feature

The **Add Wait** button can be used to insert a time delay into the batch of commands in the **Commands To Send** list. When the **Add Wait** button is clicked, you will be prompted to enter a delay time. Type the desired time in the space provided and select the correct units. The minimum wait time is 1 ms, and the maximum time is approximately 10,000 hours. Due to speed limitations of the Windows operating system, it is difficult to get accurate wait delays below 15 ms. The accuracy you get will depend on the speed of your computer.

## 3.6 Saving and Deleting Your Batches

Batches can be easily saved for later use. The first step is to assemble the batch in the **Commands To Send** list. See *Sending a Batch of SPI Messages* for details. Once the batch has been assembled, click the **Save** button. You are then prompted for the name of the batch to be saved. Enter the name in the space provided, and click **OK**.

The new batch name then appears in the drop-down list located beneath the **Commands To Send** list. You can select this batch at any time and the appropriate commands will automatically appear in the **Commands To Send** list, where you can send them as usual.

If several batches have been saved, you can quickly switch between the batches by navigating through the batch list using the arrow keys, and then hitting enter when the batch you want to send is highlighted.

To delete a batch, select it from the list and click the **Delete** button.

## 3.7 Using the Extra Pins on the USB SPI Dongle

Once the Extra Pins have been configured, you can control them by adding them to a batch. First make sure the **Batch Command** page is selected.

To toggle a pin high, click the **High** button located next to the pin name you would like to toggle. This will add “\* Set High: Pin Name” to the **Commands To Send** list. The pin won’t go high until the batch is sent by clicking either the **Send Once** button or the **Send Continuously** button.

Similarly, to toggle a pin low, you would click the “Low” button located next to the pin name you would like to toggle. This adds “\* Set Low: Pin Name” to the **Commands To Send** list. The pin won’t go low until the batch is sent by clicking either the **Send Once** button or the **Send Continuously** button.

## 3.8 Saving and Clearing the Session Log

The Session Log appears on both the **Single Command** page and the **Batch Commands** page. The contents of the Session Log are also the same on both pages, regardless of whether single commands or batches of commands were sent.

The **Session Log** can hold approximately 10,000 entries. When the log is full, a message box prompts the user to either save the **Session Log** to a text file, or clear it and erase the contents forever. No further SPI commands can be sent until one of these actions is taken.

To save the **Session Log** at any time, simply click the **Save** button next to the log. This opens a dialog box that allows you to choose a filename. The log is saved to the filename in ASCII (text) format.

To clear the **Session Log** at any time, simply click the **Clear** button next to the log. This empties the entire log without saving.

## 4 Configuring SPIGen

### 4.1 The SPI Parameters Tab

To edit the configuration settings in SPIGen, click **Settings** in the **Configuration** menu.

You can use the **SPI Parameters** tab to select the type of SPI protocol you want to use. There are several different types of SPI protocols that vary based on the polarities of the signals and the actions taken on each clock edge.

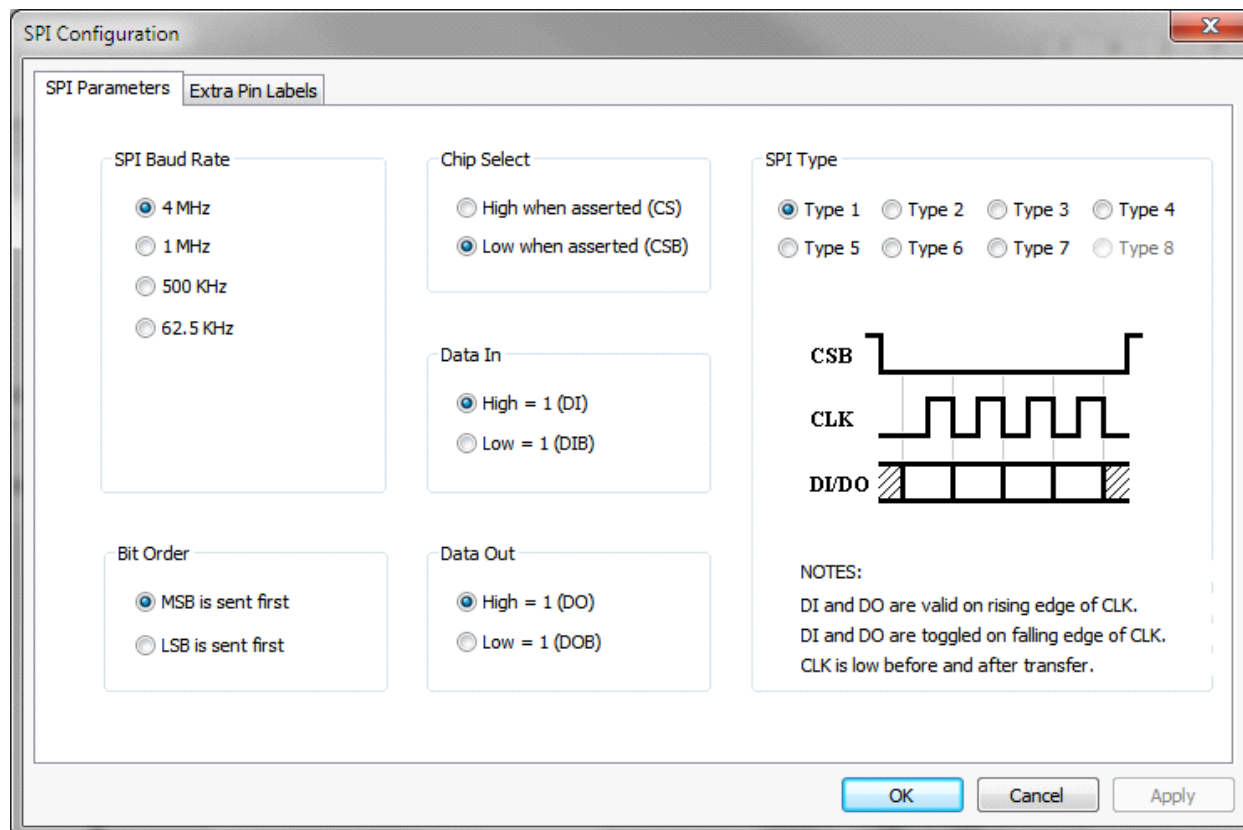


Figure 4. SPI Parameters Tab

#### 4.1.1 SPI Baud Rate

This setting is used to set the clock rate for the SPI bus on the USB SPI Dongle. The baud rate can be set to 62.5 KHz, 500 KHz, 1 MHz or 4 MHz.

#### 4.1.2 Bit Order

SPIGen can send your SPI messages, starting with the most significant bit (MSB – the left-most bit) and working down to the least significant bit (LSB – the right-most bit), or it can start with the LSB and work its way up to the MSB. Choose the option that best fits your SPI configuration.

### 4.1.3 Chip Select, Data In, and Data Out

You can select the polarity of the Chip Select signal. For instance, if Chip Select is **High when asserted**, then the Chip Select pin will remain low when the computer is idle, and it will go high when the computer is sending a SPI command. If Chip Select is **Low when asserted**, the Chip Select pin will remain high when the computer is idle, and it will go low when the computer is sending a SPI command.

You can also select the polarity of the Data In and Data Out signals. If you select **High = 1**, then the pin will go high when a 1 is sent and it will go low a 0 is sent. If you select **Low = 1**, then the pin will go low when a 1 is sent and it will go high when a 0 is sent.

### 4.1.4 SPI Type

There are a number of different flavors for the SPI protocol. Some transfer data on the falling edge of clock, others transfer data on the rising edge of clock. The same is true of the data read in. It can occur on one edge of the clock or the other. Some types of SPIs both read and transfer data on the same edge, while others read on one edge and transfer on the other. On some SPIs, the clock stays low when a message isn't being sent, and on others the clock stays high between transfers.

All of these variations are represented by seven distinct SPI Types. When you click the button for each type, a picture is displayed for that type that shows on which clock edge the data changes, and on which clock edge the data is read. For clarity, the notes beneath each picture describe the transitions and when they occur.

Select the SPI type that best matches your application.

## 4.2 The Extra Pin Labels Tab

You can use the **Extra Pin Labels** tab to customize the names associated with the digital output pins on the USB SPI Dongle. There are a total of 9 extra pins you can use. The custom label allows you to name the pins according to their actual function. The extra pin labels are saved in the SPIGen configuration file.

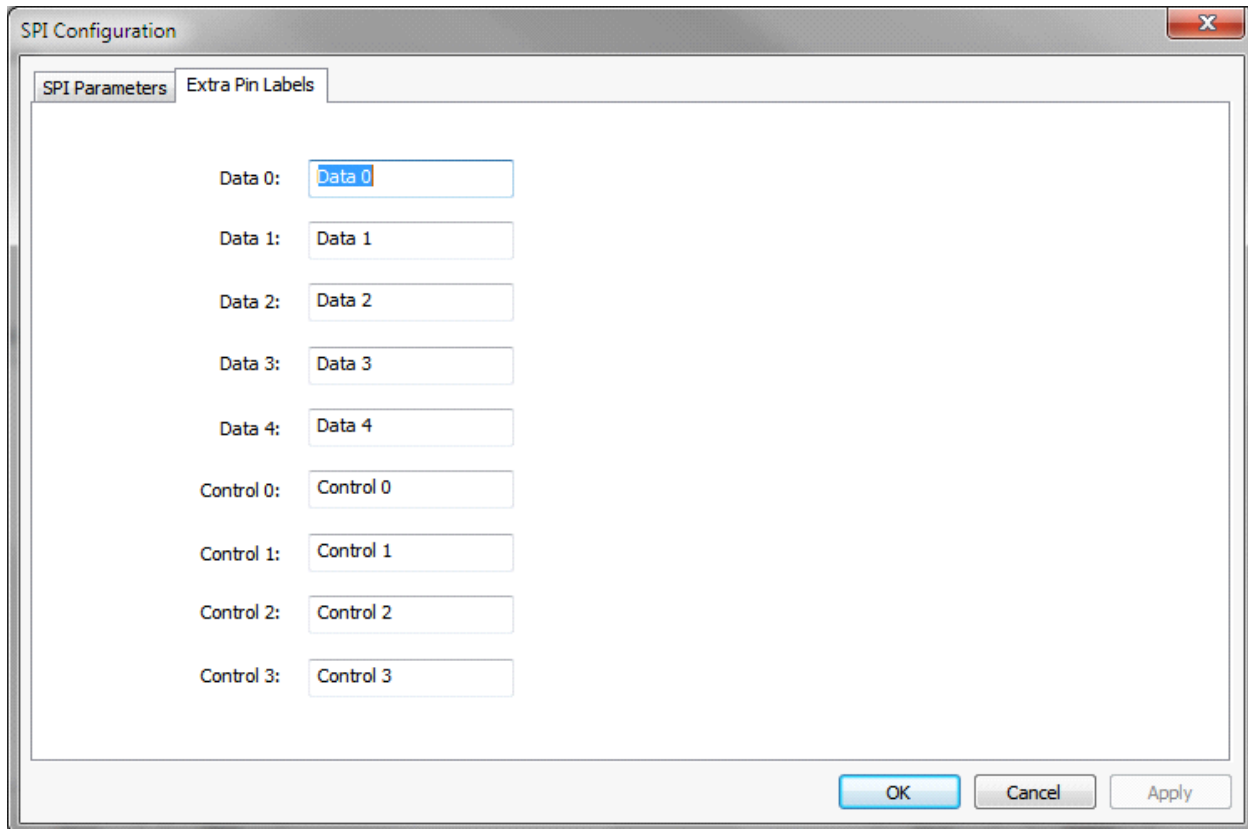


Figure 5. Extra Pin Labels Tab

## 5 Advanced Topics

### 5.1 Adding Support for New Devices

SPIGen 7 supports adding device specific functionality using plug-in modules. These plug-ins are Windows DLLs that can be loaded by SPIGen. During initialization the application core will discover all available plug-ins. It will then load and register each plug-in. This is necessary to allow the plug-in to communicate back to SPIGen.

To add a plug-in to SPIGen, it must be placed in the **Plug-ins** directory. This can be found in the installation directory (typically `C:\Program Files\SPIGen\Plugins`). As Freescale develops plug-ins to support additional devices, they will be posted on the [SPIGen web site](#) for download. This allows new functionality to be added, without having to install a new version of SPIGen.

### 5.2 Reordering Quick Commands

There is no way to reorder the Quick Commands in the main program other than deleting them and retyping in the new commands in the desired order. You can, however, reorder the commands into any order you choose by manually editing the configuration file.

The configuration file is just an ASCII (text) file, and it can be edited using a text editor (such as Notepad). Be careful when using Microsoft Word or any other word processing program to edit the configuration file. Program-specific characters that may work their way into the file will not be interpreted correctly by SPIGen. If you use a word processing program, it is important you save the file as TEXT ONLY.

To reorder the Quick Commands, find the area in the configuration file where all of the Quick Commands appear together. Each should begin with `[QuickCommand]`, and all of them should be listed together (one after another). You can cut and paste these lines in any order you like, as long as all of the `[QuickCommand]` lines appear AFTER the `[ApplyNow]` line.

When you run SPIGen and load the file, the program adds the Quick Commands to the list in the order they appear in the file.

Be careful not to change the syntax of the lines, or errors could result in the program.

### 5.3 Reordering Batches

There is no way to reorder the Batches in the main program other than deleting them and recreating them in the desired order. You can, however, reorder the Batches into any order you choose by manually editing the configuration file.

The configuration file is just an ASCII (text) file, and it can be edited using a text editor (such as Notepad). Be careful using Word or any other word processing program to edit the configuration file, because program-specific characters that may work their way into the file will not be interpreted correctly by SPIGen. If you use a word processing program, it is important you save the file as TEXT ONLY.

To reorder the Batches, find the area in the configuration file where all of the Batches appear together. Every item associated with a Batch will begin with `[BatchItem]`, and all of them should be listed together (one after another). Every `[BatchItem]` has a number associated with it. The first `[BatchItem]` with a "1" in it contains the name of Batch #1. All of the following `[BatchItem]`s that contain a "1" are commands in Batch #1.

Similarly, the first [BatchItem] with a “2” in it contains the name of Batch #2, and all of the items after that containing a “2” are the commands in Batch #2. The process is the same for all of the Batches you saved.

If you want to change the order of the Batches, you not only have to change the order in which they appear in the configuration file, but you also have to change the numbers associated with each batch [BatchItem].

The numbers MUST start with “1” at the top and increase down throughout the file. Also, every command in the same batch MUST have the same number.

Be careful to not change the syntax of the lines, or errors could result in the program.

## 5.4 Updating USB to SPI Dongle Firmware

SPIGen is capable of updating the firmware on the USB to SPI Dongle. This is useful for loading the dongle with custom firmware for configuring and controlling specific devices beyond what is capable using the standard dongle firmware.

To update the dongle firmware, make sure the dongle is plugged into a USB port on your computer. From the SPIGen “USB To SPI Dongle” menu select “Update Firmware”.

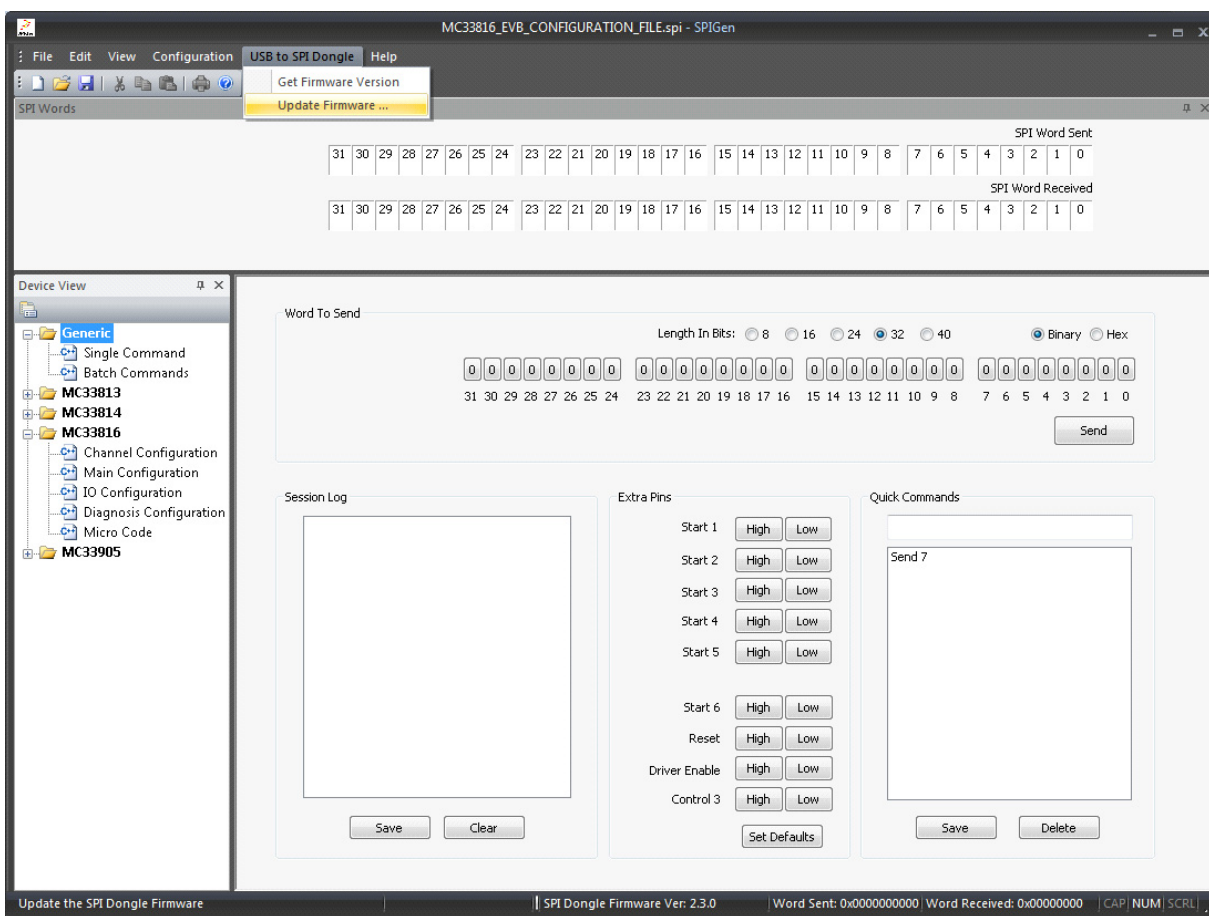
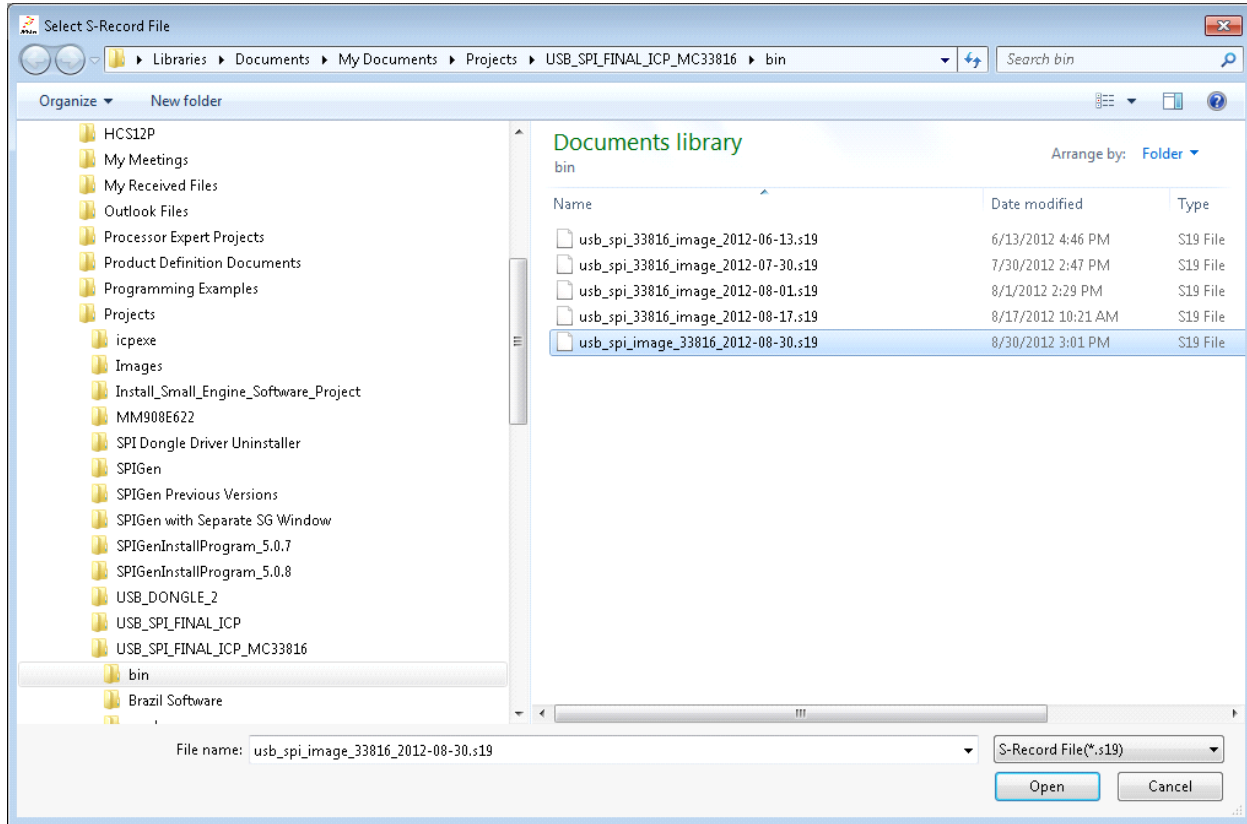


Figure 6. Firmware Update Menu

A “Select S-Record File” dialog box will appear. Select a valid USB to SPI dongle firmware image and click on the “Open” button.



**Figure 7. Select S-Record File**

A progress bar will appear on the SPIGen status bar to show the progress of the firmware update. When the update is complete, you will be prompted to remove and reinsert the dongle to complete the firmware update process.



## 6 References

Following are URLs where you can obtain information on other Freescale products and application solutions:

Document Number	Type	Description/URL
	Freescale Website	<a href="http://freescale.com">freescale.com</a>
	Freescale SPIGen Webpage	<a href="#">SPIGen - SPI Generator Download Home Page</a>
	Freescale Analog Webpage	<a href="http://freescale.com/analog">freescale.com/analog</a>
	Freescale Automotive Applications Webpage	<a href="http://freescale.com/automotive">freescale.com/automotive</a>

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## 7 Revision History

REVISION	DATE	DESCRIPTION OF CHANGES
0.1		<ul style="list-style-type: none"> <li>• First Draft</li> </ul>
0.2		<ul style="list-style-type: none"> <li>• Technical Additions</li> </ul>
1.0		<ul style="list-style-type: none"> <li>• Inserted Section 5.4</li> <li>• Updated document format.</li> <li>• In section 3.4, removed the final sentences of the first two paragraphs</li> <li>• Added text to section 3.5.2</li> <li>• Removed last sentence from section 3.8</li> <li>• Corrected units in section 4.1.1</li> <li>• Changed the numeral “eight” to “seven” in section 4.1.4</li> </ul>

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