

This user guide addresses the features, setup and operation of the VERSAMCU-PPR for Flash programming of Cyrod Technologies' 8051 microcontrollers.

## Table of Contents

<b>1</b>	<b>Overview: Parallel Programmer for Versa 8051 Microcontrollers</b>	<b>2</b>
<b>2</b>	<b>VERSAMCU-PPR Kit Contents</b>	<b>2</b>
<b>3</b>	<b>VERSAMCU-PPR Hardware Overview</b>	<b>3</b>
	3.1.1 Installing an MCU device into the PLCC-44 Socket	3
	3.2 Installing the PLCC Adaptor to the VERSAMCU-PPR	3
	3.3 Power Supply	3
	3.4 Serial Port Connection	4
	3.5 VERSAMCU-PPR System Setup	4
<b>4</b>	<b>Installing the Versa Ware PPR Software</b>	<b>5</b>
<b>5</b>	<b>Using the Versa Ware PPR Software</b>	<b>6</b>
	5.1 Starting the Program	6
	5.2 Selecting the Com Port	7
<b>6</b>	<b>Versa Ware PPR Functions</b>	<b>7</b>
	6.1 Data Buffer Load	7
	6.2 Data Buffer Edit Function	9
	6.3 Data Buffer Save Command	9
	6.4 IC Command	9
	6.5 Chip Erase Command	10
	6.6 Blank Check	11
	6.7 Program	11
	6.8 Verify	12
	6.9 Security	12
	6.10 Configuration	12
	6.11 Automatic Device Programming	13
	6.12 Read	15
	6.13 Send	15
<b>7</b>	<b>Other Functions of Versa Ware PPR</b>	<b>16</b>
	7.1 Device Cycle Tests	16
	7.2 Upgrade Firmware	16

## 1. Overview: Parallel Programmer for Versa 8051 Microcontrollers

The VERSAMCU-PPR is a low-cost, single-device parallel programmer that supports Cyrod's industry standard, 8051-based MCU drop-in replacements.

The VERSAMCU-PPR allows designers to develop code for parts that only support parallel programming. Cyrod's ISP (in-system programming) products can be programmed via their UARTs using Cyrod's pre-loaded ISP code. However, if these ISP capable devices are to be used with another ISP firmware (i.e. the user has a customer ISP code solution) this must be programmed into the Flash memory with a parallel programmer like the VERSAMCU-PPR before using the serial programming capability. We recommend performing device programming for production with a commercial programmer from a third party supplier, rather than with the VERSAMCU-PPR.

## 2. VERSAMCU-PPR Kit Contents

The VERSAMCU-PPR kit ships complete with:

- o Parallel programmer board
- o PLCC-44 socket adapter (if requested)
- o DB9 Serial cable
- o 12V switching wall-mount adapter 100-240V 50/60Hz with US plug model
- o CD-ROM with Versa Ware PPR Programming Software (also available from [www.cyrod.com](http://www.cyrod.com))



Figure 1: VERSAMCU-PPR Kit Contents

## 3. VERSAMCU-PPR Hardware Overview

The following sections describe installation and use of the Versa Parallel Programmer.

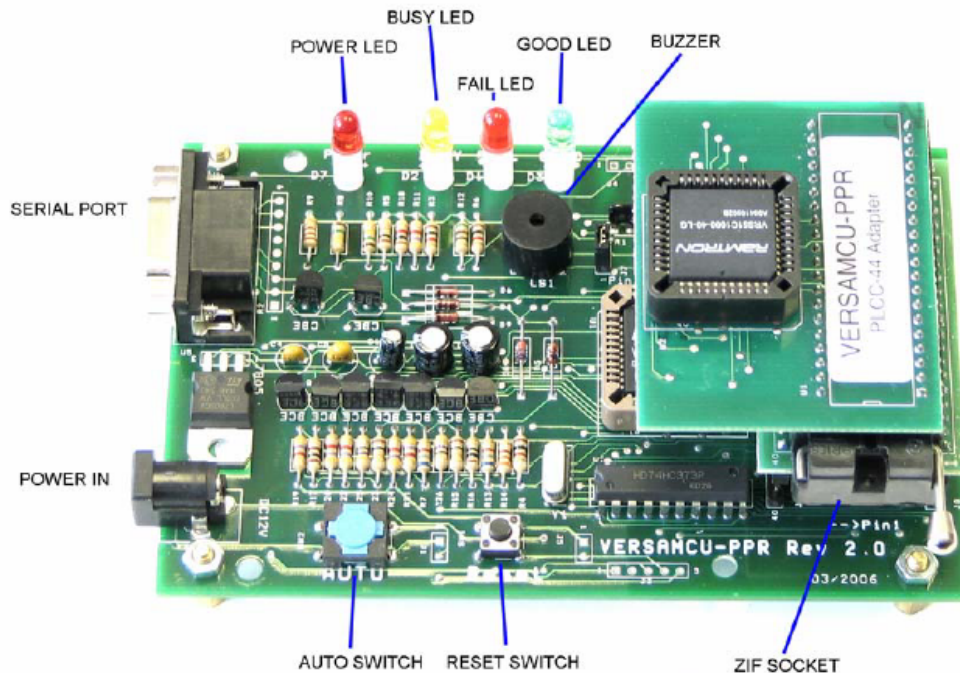


Figure 2: VERSAMCU-PPR Board Overview

### 3.1.1 Installing an MCU device into the PLCC-44 Socket

Figure 2 demonstrates the MCU orientation in the PLCC-44 socket.



#### Warning

Use caution when inserting a device into the PLCC socket and pay attention to device orientation to avoid device/socket damage.

### 3.2 Installing the PLCC Adaptor to the VERSAMCU-PPR

To begin using the programmer, insert the PLCC adaptor into the VERSAMCU-PPR ZIF socket. Once inserted, lower the ZIF socket lever to secure the adaptor. In Figure 2, a VRS51C1000-40-L / CRD89C51RD-40-L has been installed on the board to demonstrate chip-orientation.

### 3.3 Power Supply

The VERSAMCU-PPR ships with a 12V 1.2A switching power supply with an input voltage range of 100V to 240V and a frequency of 50Hz to 60Hz. The power supply input is a standard US 2-prong plug.

### 3.4 Serial Port Connection

Communication between the VERSAMCU-PPR and the PC is achieved via an RS-232 link. The Versa Ware PPR software will use COM1 as the default serial port. This can be changed to COM2, COM3 or COM4. A USB to serial converter can be used for PCs unequipped with an RS-232 serial port.

### 3.5 VERSAMCU-PPR System Setup

The VERSAMCU-PPR is used in conjunction with Cyrod's Versa Ware PPR software, which runs on a PC. The software provides a user-friendly interface to program Cyrod MCUs.

#### Connecting the Power Supply and Serial Cable

Connect the serial cable between the DB9 connector on the VERSAMCU-PPR board and an available serial port on the host computer. Next, connect the power supply to the board. When the programmer is powered-on, the POWER LED will light up.

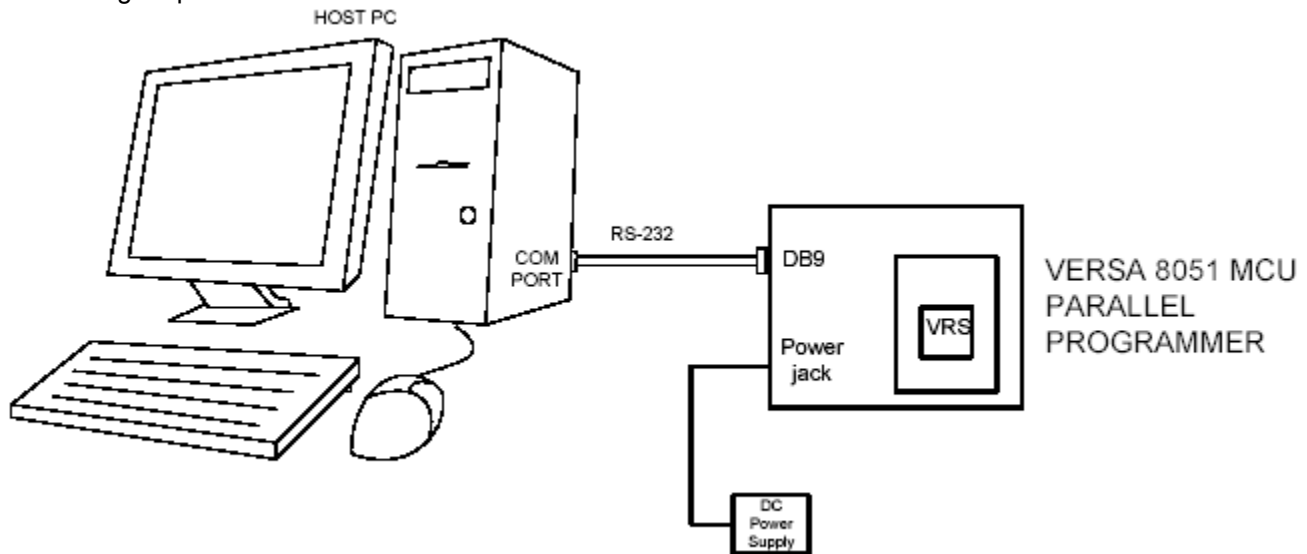


Figure 3: VERSAMCU-PPR System Setup

## 4. Installing the Versa Ware PPR Software

The Versa Ware PPR software is available on the CD-ROM provided with the VERSAMCU-PPR kit or can be downloaded from the Cyrod web site at [www.Cyrod.com/support/](http://www.Cyrod.com/support/). Select the Parallel programmer Setup Software and follow the installation instructions (the web site provides the latest version).



Figure 4: Versa Ware PPR Software Setup

## 5. Using the Versa Ware PPR Software

### 5.1 Starting the Program

Before starting the program, make sure that the programmer is powered-up.

- o To initiate the Versa Ware PPR software, click on the following icon created on your desktop:



Figure 5: Versa Ware PPR Software Icon

- o When the program begins, the following window will appear:

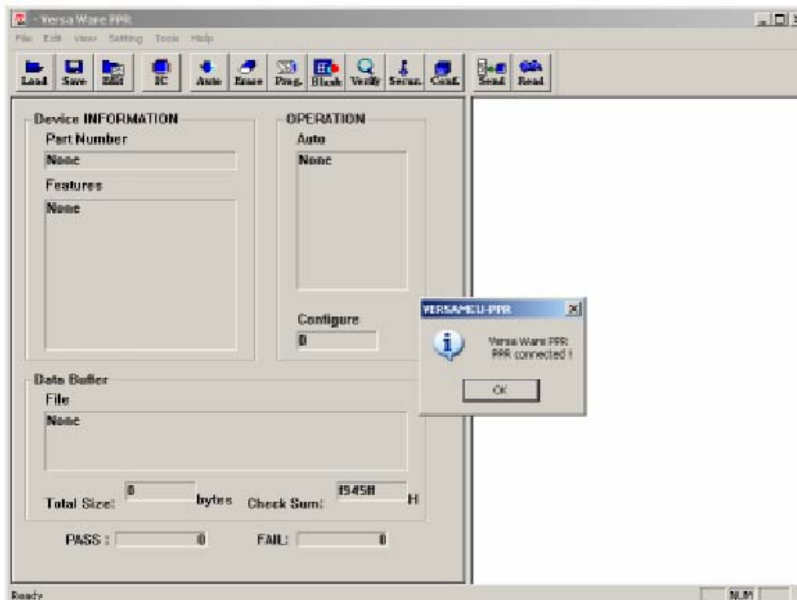


Figure 6: Versa Ware PPR Software Startup

If the following pop-up window appears, verify that the VERSAMCU-PPR is connected to the appropriate serial port:



Figure 7: Versa Ware PPR Message: "PPR not Found"

## 5.2 Selecting the COM Port

By default, the port is set to COM1. If the device is connected to a different port, the Versa Ware PPR software will be unable to connect with the VERSAMCU-PPR board. To reconfigure the software for COM1, open the Setting>Port.Sel menu and select the appropriate port.

The following image demonstrates the port setting:

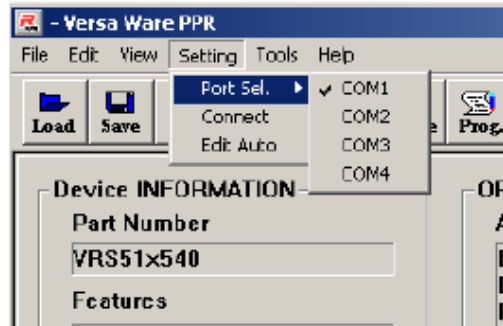


Figure 8: Port Selection

Once the port is configured, select Setting->Connect to establish a connection with the VERSAMCU-PPR.

## 6. Versa Ware PPR Functions

### 6.1 Data Buffer Load



Load is used to load a Hex file into the Versa Ware PPR memory buffer. The <Load> button opens the Hex file containing the program to be downloaded to the MCU. Load is also accessible from File → Open(O). Once Load is activated, a standard File Open window will appear and will point to the path of the last file that was opened. By default, Versa Ware PPR looks for a \*.bin file. However, the “File of type” scroll down menu also offers the standard \*.hex file option, which is the recommended format.

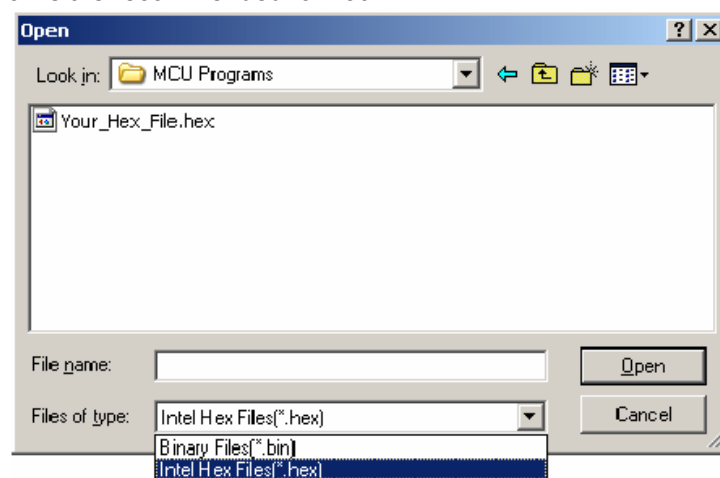


Figure 9: Loading a Hex File into the Data Buffer

Once the file is selected, click <Open > to load it to the buffer memory. The software will now ask how the file should be loaded into the buffer. The two configurable parameters are:

- The program's start address
- The initial state of the buffer

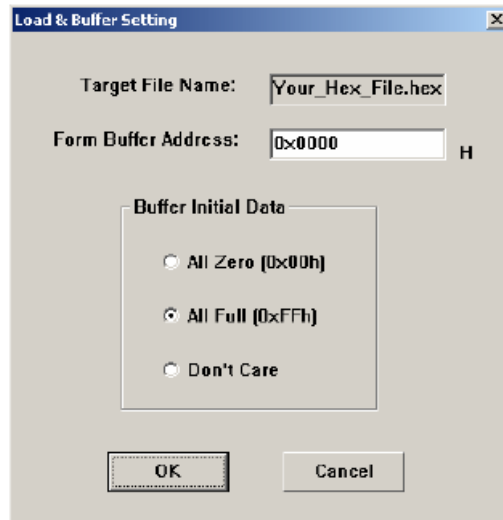


Figure 10: Configuring Data Buffer Settings

The state of the buffer memory can be initialized to either 00h or FFh. It can also be left as is by selecting “Don't Care”. After configuration is complete, the program will return to the main window and the data buffer section will show that the file is open, its total size and its check sum.

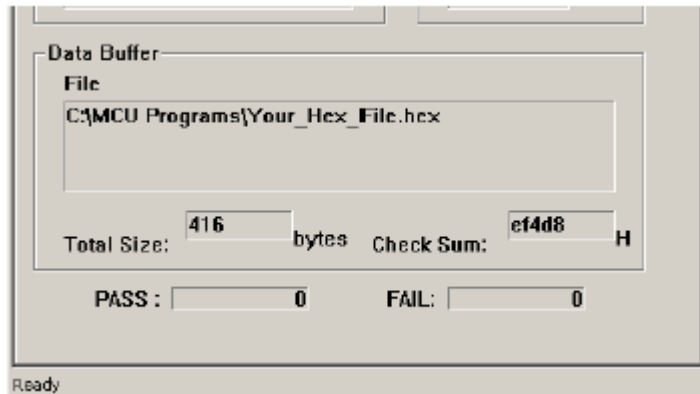


Figure 11: Hex File Size and Check Sum



### 6.2 Data Buffer Edit



Versa Ware PPR includes a data buffer content edit function that enables the user to view the contents of the data buffer and modify them on the fly. Clicking <Edit > will open the TestName window. Each line represents the contents of 16 consecutive addresses in Hex format.

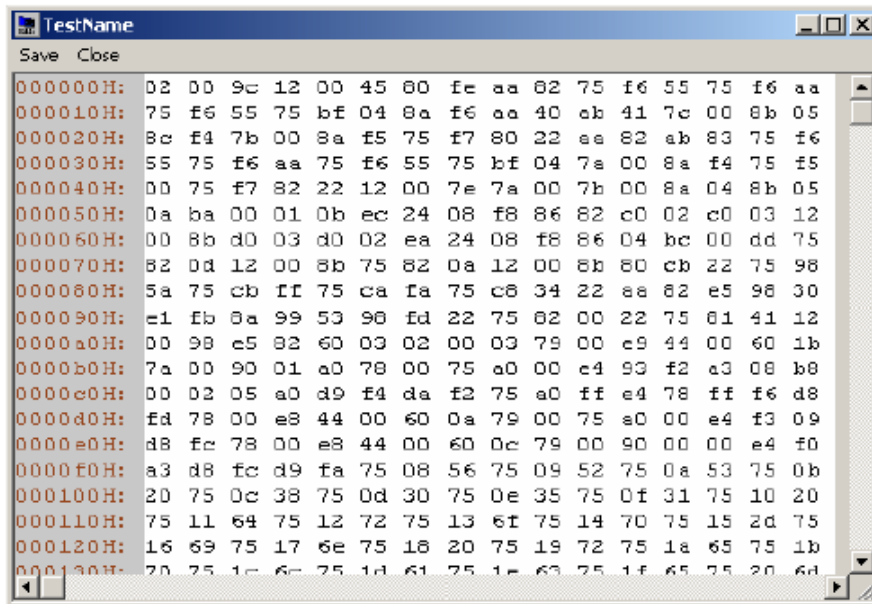


Figure 12: TestName Window

To edit the Flash memory content, select the memory cell by double clicking on a given datum and enter the desired value. Please note that there is no way to verify whether the new Hex value is valid. Entering an invalid value may cause the device to behave erratically once it is programmed with the Hex file and may make the Versa Ware PPR software unstable. Content of the data buffer may be saved in a file by clicking <Save> in the TestName window.

### 6.3 Data Buffer Save

From the Versa Ware PPR main window, the <Save> button saves the data buffer content in binary file format.

### 6.4 Select Target IC

The IC command allows the user to determine which MCU will be programmed or read from. When the <IC> button is clicked, a Select a target window will open, offering a choice of devices. Select the target device by highlighting the part number and clicking <OK>. The lower portion of the Select a target window shows a general description of the selected device.

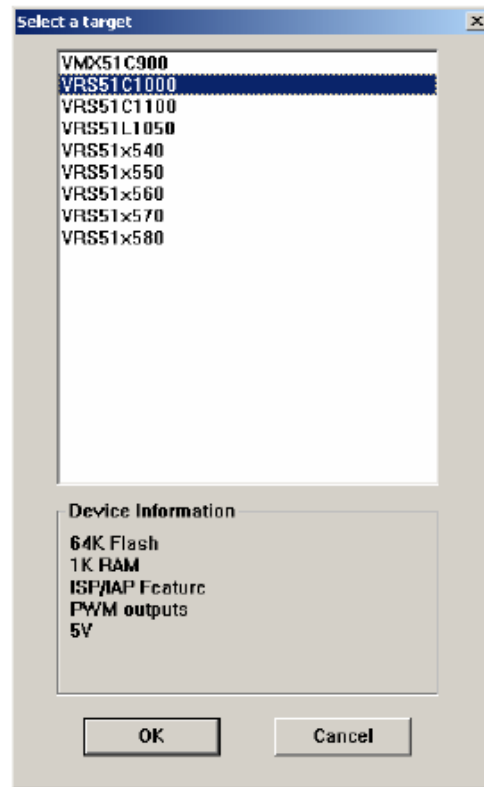


Figure 13: Target IC Selection Window



Each time the target IC is changed, the data buffer should be reloaded before a program operation is performed in order to synchronize the data buffer content with the device Flash memory configuration. Failure to reload the data buffer content will likely generate programming errors.

## 6.5 Chip Erase

Chip erase will erase the entire contents of the Flash, including the ISP firmware on devices with ISP/IAP. During the erase process, the message “Erase...” will be displayed. Once the erase is complete, the status message “Chip Erase => Pass” will appear.

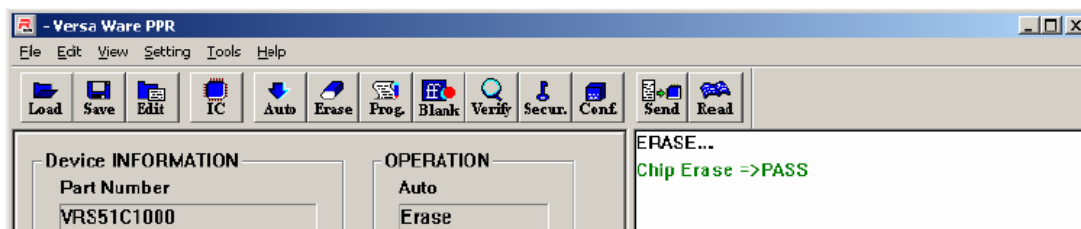


Figure 14: Chip Erase Operation Result

## 6.6 Blank Check

Blank check verifies that the entire content of the Flash memory has been erased, so that all cells are FFh. A blank check should only be started after the chip erase command is complete, otherwise, program instability may result.

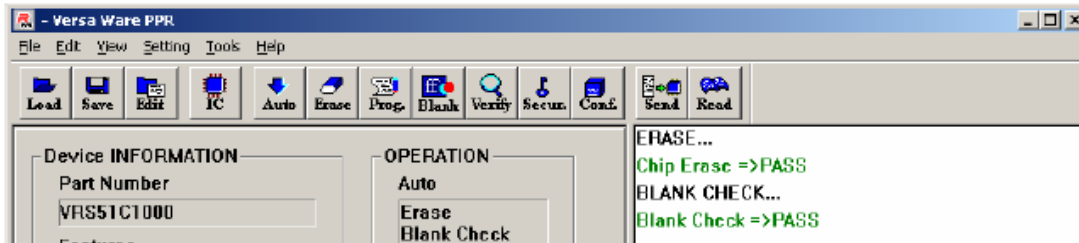


Figure 15: Blank Check Operation Result

## 6.7 Program

Program writes the contents of the data buffer into the Flash memory. During device programming, a pop-up window will display the progress of the program operation.

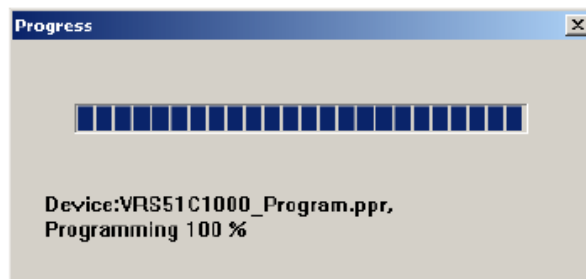


Figure 16: Device Programming Progress Bar

Once Flash programming is complete, the progress window will disappear and a status message on the outcome of the Flash program operation will appear, as shown below:

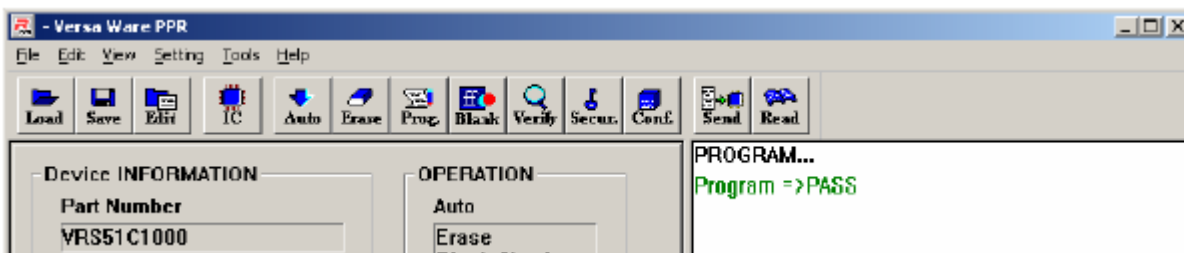


Figure 17: Program Operation Result

## 6.8 Verify

Verify reads the content of the target device's Flash memory and compares it to the content of the data buffer. The results of the Flash verification process are displayed in the operation status section of the Versa Ware PPR software main window.

## 6.9 Security

Clicking on <Secur.> will activate the Flash security feature, preventing attempts to read back the Flash memory content. Once security is activated, all Flash read operations will result in 0 for each byte read. Any attempt to verify after security has been activated will generate an error message. The only way to deactivate security is to perform a chip erase.

## 6.10 Configuration

The conf. command activates the ISP feature on the VRS51x1xxx / CRD89x51xx (VRS51C1000 / CRD89C51RD, VRS51L1050 / CRD89L51RD, VRS51C1100 / CRD89C512RD), which configures the ISP boot code and defines how much memory is allocated to the ISP firmware. The VRS51x1xxx's / CRD89x51xx ISP boot feature enables the programming of a piece of code in the upper section of the Flash memory and forces the processor to automatically jump to this address upon reset or power-on reset.

When activated, the portion of memory reserved for the ISP firmware will be protected from a full erase of the Flash memory from the device's IAP module. Cyrod has developed an ISP firmware for programming of the VRS51x1xxx / CRD89x51xx via the UART.

Clicking on <Conf.> opens the Config Setting window (below):

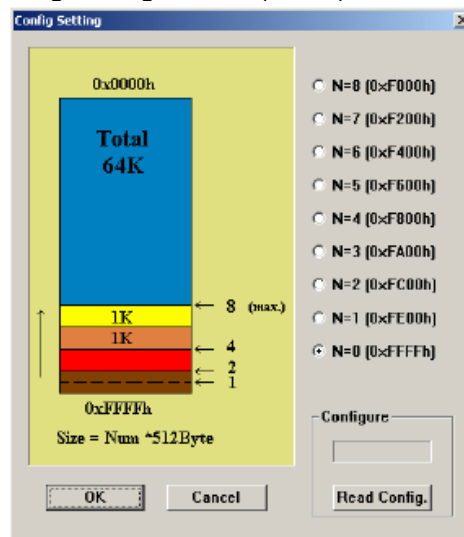


Figure 18: Configuration Setting Window

The N value on the right side of the Config Setting window defines how much Flash memory is reserved for the ISP boot code. For example setting N = 2 will reserve memory address 0000h to FBFFh (63K) to the program memory

and the upper 1KB of the Flash memory for the ISP boot code. To activate the ISP firmware upon reset, the three following conditions must be respected:

- 1) N must not equal 0
- 2) The data buffer must contain the SP boot code in the correct location
- 3) Address 0000h must be set to FFh

Setting N to 0 will disable the ISP boot feature and the processor will start from address 0000h upon reset (independently of the value present at address 0000h). If the selected <ISP Page Config> is NOT 0 when the device is to be programmed, the program counter will automatically jump to the ISP program start address defined by the following relationship:

$$\text{PC Reset jump address} = 0000\text{h} - (\text{<ISP Page Config>} * 200\text{h})$$

The downloaded Hex file contains the proper code to start at this address. When the selected <ISP Page Config> is 0, the VRS51C1000 program counter starts at address 0000h upon reset.

**Notes on Programming the ISP Firmware Provided by Cyrod**

Cyrod has standardized all ISP devices to be delivered with latest version of the ISP code ISP\_V3 (for information on ISP\_V3 please refer to the ISP\_V3 Programmers guide at [www.cyrod.com/support](http://www.cyrod.com/support). However, there are several older versions of the ISP firmware in the field. The source code and the Hex files of these programs are available at for users at [http://www.cyrod.com/ support/](http://www.cyrod.com/support/).

The configuration setting varies with the target device and the ISP firmware:

ISP Firmware Version	Configuration Setting
All versions of ISPV1	N = 7
All versions of ISPV2	N = 7
ISPV3	N = 2

**6.11 Automatic Device Programming**

The auto command allows the user to combine many of the programming commands mentioned above into one automated process. These automatic device-programming operations are customizable. To select the operations to be implemented during the programming process, open the Auto Selection dialog from Setting → Edit Auto.

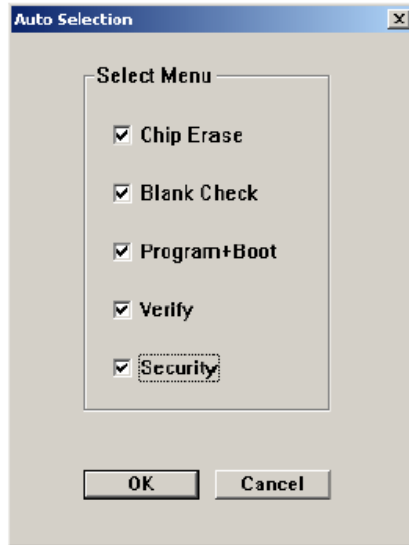


Figure 19: Editing Automatic Programming Configuration

Clicking on <Auto> will start the operations to be performed sequentially. A status message for each of the operations performed will be displayed.

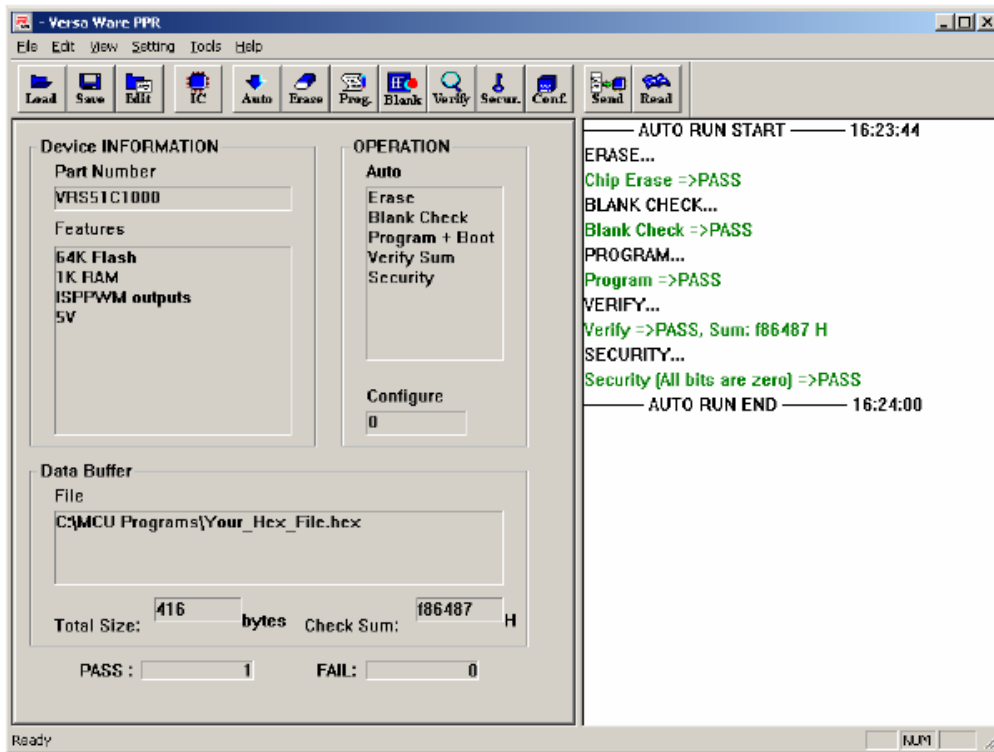


Figure 20: Automatic Programming Operation Result

If an operation fails, an error condition will be displayed in red below the operation that failed, and the automatic operation process will be terminated.

## 6.12 Read

The read command will read the Flash to the data buffer and display it. During the Flash memory read process, a popup window indicating the progress of the read operation will appear. At the end of the read operation, the pop-up window will close and the result of the read operation will be displayed.

### Note:

- Read operations overwrite data buffer content
- If the target device has been protected, no error will be displayed during the read operation. However, every location of the data buffer will be 00h.

## 6.13 Send

The VERSAMCU-PPR is controlled by an embedded VRS51C1100. This device features 64KB of data Flash memory, into which the data buffer can be copied, enabling the VERSAMCU-PPR to operate without the Versa Ware PPR software. This is useful when many devices must be programmed sequentially with the same program.

For standalone operation of the VERSAMCU-PPR, ensure that:

- 1) The correct target device is selected
- 2) The data buffer contains the Hex file to program into the device
- 3) The configuration options are set (if applicable)

Click on <Send> to transfer the data buffer contents and the configuration parameters to the embedded VRS51C1100 device. During the transfer, a pop-up window will appear to indicate the data transfer progress. At the end of the data transfer the operation status section of the Versa Ware PPR software window should indicate "Transmit Data to MCU => Pass".

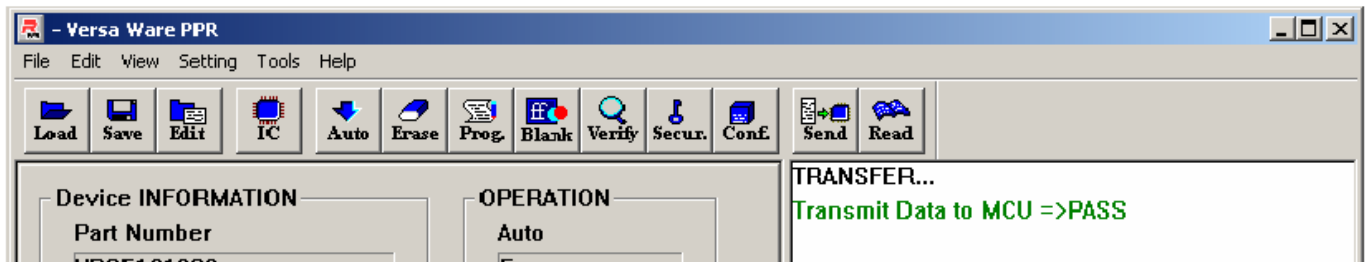


Figure 21: Send Operation Result

The VERSAMCU-PPR is now ready for standalone operation. The serial cable can be disconnected from the VERSAMCU-PPR, but the power supply must remain connected otherwise configuration settings will be lost.

To program a device in standalone mode:

- 1) Install the device to be programmed into the ZIF socket or on the adapter board
- 2) Press <Auto> on the VERSAMCU-PPR board
  - During device programming, the BUSY LED will light up
  - The buzzer will sound a few times during device programming
- 3) The GOOD or FAIL LED will light, depending on whether the device was successfully programmed
- 4) The device can now be removed and the next device programmed

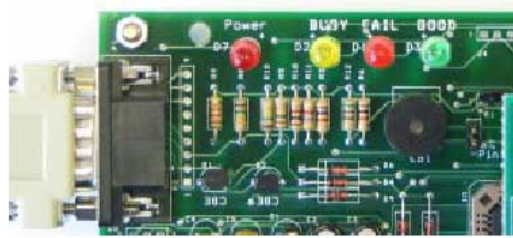


Figure 22: VERSAMCU-PPR LEDs

## 7. Other Functions of Versa Ware PPR

### 7.1 Device Cycle Test

A device cycle test is a test run of the commands configured for automatic device programming (see Section 13). This function is activated by selecting Tools → Cycle test. Once the cycle test has begun, the only way to halt it is to press RESET on the VERSAMCU-PPR board.

### 7.2 Upgrade Firmware

The Versa Ware PPR software can perform firmware upgrades to the VERSAMCU-PPR board. The VERSAMCU-PPR board has already been configured with firmware V2.8, which is compatible with Versa Ware PPR V2.8. Upgrading the VERSAMCU-PPR firmware is only necessary if a new version of the Versa Ware PPR software has been released (visit [www.Cyrod.com/support/](http://www.Cyrod.com/support/) for the latest software version).

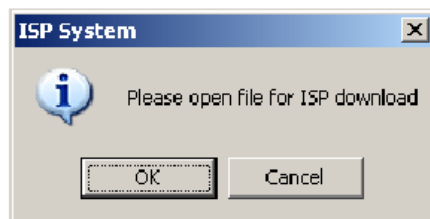


Figure 23: Upgrading PPR Firmware 1

Click <OK>.



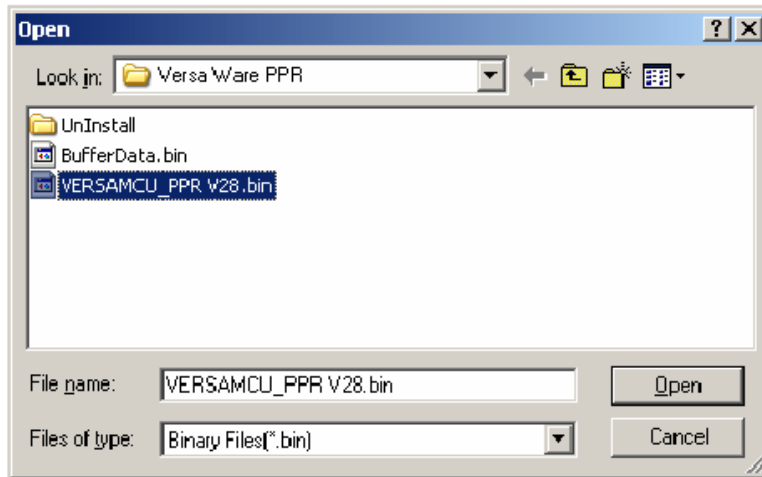


Figure 24: Upgrading PPR Firmware 2

Select Binary Files (\*.bin) in the “File of type” drop-down menu and select “VERSAMCU\_PPR V28.bin”. Click <Open>. The following warning message will appear:

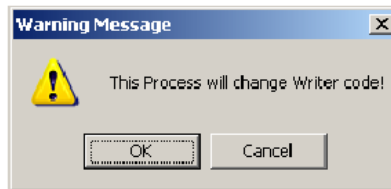


Figure 25: Upgrading PPR Firmware 3

Click <OK> to start the firmware upgrade. A pop-up window displaying the progress of the upgrade will appear. Do not run any other applications until the upgrade process is complete.

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