

RSL10 Stand-Alone Flash Loader Manual

M-20823-011
January 2025

Table of Contents

	Page
RSL10 Stand-Alone Flash Loader Manual	1
Table of Contents	2
1. Introduction	3
1.1 Purpose	3
1.2 Intended Audience	3
1.3 Conventions	3
1.4 Further Reading	3
2. Flash Loader Overview	4
2.1 Introduction	4
2.2 Flash Loader Operations and Options	4
2.2.1 Flash Regions	6
2.3 Supported Flash Loader Hardware	6
2.3.1 SEGGER or IAR Systems J-Link for Arm Processors	6
2.4 Trouble-Shooting	6
3. Flash Loader User Interface	8
3.1 The Program Page	8
3.2 The Tools Page	9
3.3 The Options Page	10
3.4 The Progress Dialog	10
4. Command-Line Usage	12
4.1 The Program Command	13
4.2 The Erase Command	13
4.3 The Verify Command	13
4.4 The Read Command	14

CHAPTER 1

Introduction

1.1 PURPOSE

IMPORTANT: onsemi acknowledges that this document might contain the inappropriate terms “white list”, “master” and “slave”. We have a plan to work with other companies to identify an industry wide solution that can eradicate non-inclusive terminology but maintains the technical relationship of the original wording. Once new terminologies are agreed upon, future products will contain new terminology.

This manual provides the information that you need to use the stand-alone flash loader. It describes the operations that the flash loader can perform, and explains how to configure the flash loader to connect to an RSL10 radio IC.

The stand-alone flash loader is used to program, erase and read flash memory in RSL10.

1.2 INTENDED AUDIENCE

This manual is aimed at software development professionals who are responsible for developing and/or maintaining applications based on RSL10.

This manual assumes that a reader will have some familiarity with embedded software development.

1.3 CONVENTIONS

In general, numbers are presented in decimal notation. In cases where hexadecimal notation is more convenient, these numbers are identified by the prefix “0x”. For example, the decimal number 123456 can also be represented as 0x1E240.

The following special fonts are used in this manual to signify particular types of information:

`monospace font`

Commands and their options, file and path names, error messages, code samples and code snippets.

mono bold

A placeholder that represents where you would specify the appropriate information. For example, you would replace **filename** with the actual name of the file.

bold

Used for menu names and menu items.

1.4 FURTHER READING

For more information that will help you to use the RSL10 radio IC, refer to the following documents:

- *RSL10 Getting Started Guide*
- *RSL10 Hardware Reference Manual*
- *RSL10 Firmware Reference Manual*
- *RSL10 Evaluation and Development Board Manual*
- *J-Link/J-Trace User Guide* (document UM08001-R41) available from the SEGGER website: www.segger.com

CHAPTER 2

Flash Loader Overview

2.1 INTRODUCTION

The stand-alone flash loader can perform the following operations to an RSL10 radio IC:

- Program the contents of a data file to flash memory.
- Verify that the contents of a file match the contents of flash memory.
- Erase regions of flash memory.
- Verify that regions of flash memory are erased.
- Read the contents of flash memory and save them to a data file.

When programming data from or saving data to a file, the stand-alone flash loader supports the following data file formats:

- Intel Hex
- Motorola S-record

The stand-alone flash loader communicates with the RSL10 JTAG debug port using a Segger or IAR Systems® J-Link™ for Arm® processors. This setup is illustrated in the [figure "How the Stand-Alone Flash Loader Communicates with the Radio IC"](#) (Figure 1).

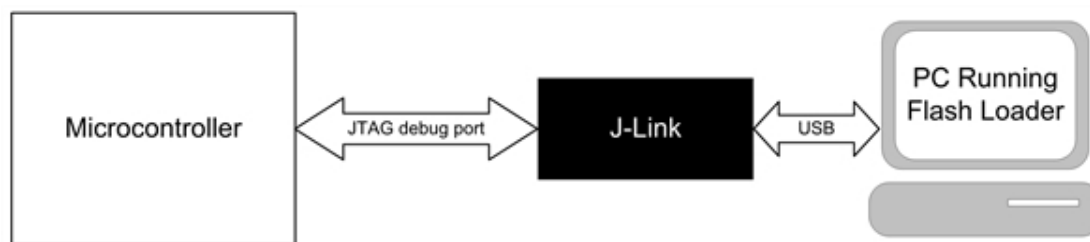


Figure 1. How the Stand-Alone Flash Loader Communicates with the Radio IC

The RSL10 radio IC contains multiple sections, all of which can be managed by the stand-alone flash loader. See the *RSL10 Hardware Reference Manual* for more information about the sections.

2.2 FLASH LOADER OPERATIONS AND OPTIONS

The stand-alone flash loader can perform a variety of operations, and supports the grouping of certain operations. [Chapter 3 "Flash Loader User Interface"](#) on page 8 describes the operations and options available from the graphical user interface, and [Chapter 4 "Command-Line Usage"](#) on page 12 describes the ones available from the command line.

Program flash memory

This operation reads the contents of a data file and writes the data to flash memory. Optionally, the flash loader can:

- Erase all of flash memory before programming.
- Verify that the contents of the data file were correctly written to flash memory by reading back the flash contents and comparing it with the file contents.

Verify flash memory against a file

RSL10 Stand-Alone Flash Loader Manual

This operation reads the contents of a data file, then reads the corresponding contents of flash memory and compares the data. The flash loader reports if there are differences.

Erase flash memory

This operation erases sections of flash memory. By default, this operation erases all of flash memory. This operation can also erase one or more user-specified regions of flash memory.

Verify erased

This operation verifies that sections of the flash memory are erased. By default, this operation verifies that all of flash memory is erased. This operation can also verify that one or more user-specified regions of flash memory is erased.

Read flash memory

This operation reads sections of flash memory and saves the data in a data file. By default, this operation reads all of flash memory. This operation can also read one or more user-specified regions of flash memory.

The stand-alone flash loader has several global options:

Device options

These options control how the stand-alone flash loader communicates with the RSL10 radio IC. See [Section 2.3 “Supported Flash Loader Hardware” on page 6](#) for information on these options.

JTAG speed

This option determines the JTAG clock speed that the stand-alone flash loader uses when communicating with the RSL10 radio IC.

Reset device

This operation determines whether the stand-alone flash loader should reset the RSL10 radio IC after completing the requested operation.

The [table “Mapping Tasks to User Interfaces” \(Table 1\)](#) maps the tasks you want to accomplish to specific information about the steps, using either the graphical user interface or the command line interface.

Table 1. Mapping Tasks to User Interfaces

Task	Graphical User Interface	Command Line Interface
Program flash memory	Section 3.1 “The Program Page” on page 8	Section 4.1 “The Program Command” on page 13
Verify flash memory against a file	Section 3.1 “The Program Page” on page 8	Section 4.3 “The Verify Command” on page 13
Erase flash memory	Section 3.1 “The Program Page” on page 8	Section 4.2 “The Erase Command” on page 13
Verify erased flash memory	Section 3.2 “The Tools Page” on page 9	Section 4.3 “The Verify Command” on page 13
Read flash memory	Section 3.2 “The Tools Page” on page 9	Section 4.4 “The Read Command” on page 14
Set device options	Section 3.3 “The Options Page” on page 10	table “Program Command Options” (Table 4)
Determine JTAG speed	Section 3.3 “The Options Page” on page 10	table “Program Command Options” (Table 4)
Reset the device	Section 3.3 “The Options Page” on page 10	table “Program Command Options” (Table 4)

RSL10 Stand-Alone Flash Loader Manual

2.2.1 Flash Regions

When the flash loader is performing operations on user-specified regions of flash memory, a standard format is used to specify one or more ranges of addresses in flash memory.

start-end, start-end, . . . , start-end

Each **start** and **end** address is a decimal or C-formatted hexadecimal address. Both the **start** and **end** addresses are included in the range. You must specify at least one range, but there is no limit to the number of ranges that you can include.

For example:

- 0x00040000-0x0007FFFF
- 0-127,256-1023,196-199

For more information about using the flash regions, see [Section 3.2 “The Tools Page” on page 9](#), [Section 4.2 “The Erase Command” on page 13](#), and [Section 4.4 “The Read Command” on page 14](#).

2.3 SUPPORTED FLASH LOADER HARDWARE

2.3.1 SEGGER or IAR Systems J-Link for Arm Processors

The Segger J-Link Arm Emulator for Arm® Cortex®-M3 cores, also sold as the IAR Systems J-Link for Arm Processors, is a small Arm JTAG hardware debug probe. It connects via USB to the PC host running Windows®, and supports JTAG communication clock speeds up to 12 MHz. The J-Link device connects to the target using a standard 20-pin JTAG cable. This flash loader requires J-Link version 8.0 or higher.

The stand-alone flash loader can connect to a J-Link device in one of two ways:

- J-Link devices can be connected directly to the computer via USB. Each J-Link device is assigned a serial number. You can optionally enter this number in the flash loader GUI. If multiple J-Link devices are connected and no serial number is provided, a J-Link window will pop up and request the device selection. If the flash loader is unable to connect to the J-Link device via USB, it fails with an error. The flash loader does not attempt to default to a connected device.
- The stand-alone flash loader can also connect over a network to a J-Link device connected to another computer. On the remote computer to which the J-Link device is connected, you must run the *jlinktcpserver.exe* program. In this case, you must provide the hostname of the remote computer and the TCP/IP port number (usually 19020) to the flash loader to use the remote J-Link device. See the *J-Link/J-Trace User Guide* (document UM08001-R41) from Segger for more information.

2.4 TROUBLE-SHOOTING

The [table “Common Errors and Their Solutions” \(Table 2\)](#) provides a brief guide to fixing the most common errors that might occur when you use the stand-alone flash loader. It is not a comprehensive guide to all possible problems. If you try these solutions and they don’t work, contact your onsemi customer support representative.

RSL10 Stand-Alone Flash Loader Manual

Table 2. Common Errors and Their Solutions

Description of Error	Possible Causes	Possible Solutions
No emulators connected to the USB window. Asks for IP address.	You have not connected the J-Link emulator, or the J-link drivers are not properly installed.	Connect the J-link emulator, make sure the drivers are properly installed. Make sure the version of J-link DLL is greater than 4.7x.
Connect Failed	The J-Link is physically connected, but the device is not connected or not communicating with it.	Some ways of checking the connection and communication are: <ul style="list-style-type: none"> • Use the NOP command on the Tools page of the graphical user interface to check the connection and communication. • Use J-Link Commander, which is provided by Segger in their tools, to check that the J-Link and the device can communicate. For more information, see the online help in the J-Link Commander interface.
Erase Failed	The address specified for the erasure is not valid.	Verify that the address specified for erasure can be erased and that the location is valid.
Program Failed	The address specified for the program is not valid. The area specified from the address is too small for the size of the program.	Verify that the address specified for loading the program is valid, and that the area to be programmed has adequate space for the program.
Verify Failed	There was a problem during programming and the flash loader could not verify the contents of flash.	Check that the file being used for the comparison is the same as what should be in flash memory. For more information about verifying flash memory, see Section 3.1 "The Program Page" on page 8 or Section 4.3 "The Verify Command" on page 13 .

CHAPTER 3

Flash Loader User Interface

To start the stand-alone flash loader from a short-cut, use the Windows Start menu and type **Flashloader.exe**.

When you run the stand-alone flash loader with no command-line options, it operates in graphical mode. In this mode, the flash loader displays the graphical user interface shown in [Chapter 3 "Flash Loader User Interface" on page 8](#). The user interface consists of three pages:

- The **Program** page allows you to program and verify the contents of flash memory.
- The **Tools** page allows you to erase and read the contents of flash memory.
- The **Options** page allows you to control how the flash loader accesses the RSL10 radio IC.

For a list of all the tasks you can do with this application, and where to find the corresponding graphical user interface or command line interface steps, see the [table "Mapping Tasks to User Interfaces" \(Table 1\)](#).

3.1 THE PROGRAM PAGE

Use the controls on the **Program** page (shown in the [figure "The Stand-Alone Flash Loader Program Page" \(Figure 2\)](#)) to program and verify the contents of flash memory.

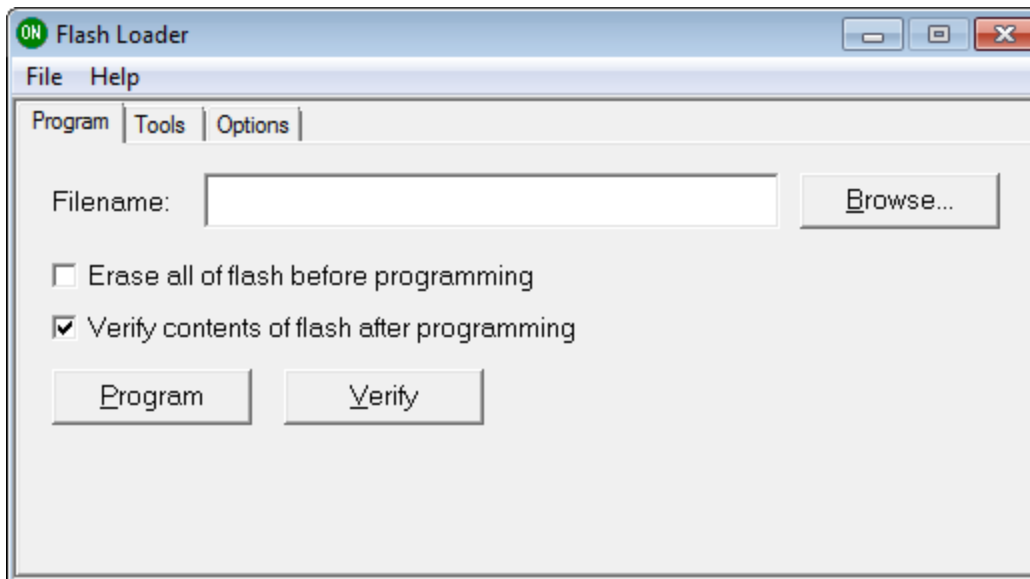


Figure 2. The Stand-Alone Flash Loader Program Page

For all operations on this page, first enter a filename or click **Browse...** to select a file. The rest of the controls are:

Program button

Copies the contents of the file to flash memory.

Verify button

Verifies that the contents of flash memory match the contents of the file.

Erase all of flash before programming

RSL10 Stand-Alone Flash Loader Manual

Erases the main section of flash memory. By default, the flash loader only erases blocks of flash memory that are overwritten with data in the file.

Verify contents of flash after programming

To program and verify the flash memory in one operation, check this box.

3.2 THE TOOLS PAGE

Use the controls on the **Tools** page (shown in the [figure "The Stand-Alone Flash Loader Tools Page"](#) (Figure 3)) of the flash loader to perform various operations on regions of flash memory.

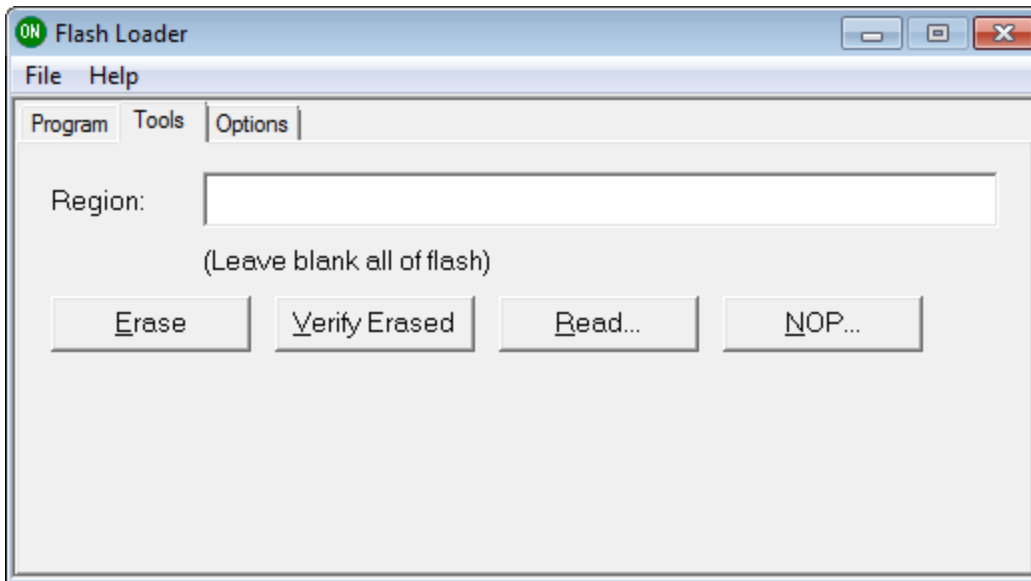


Figure 3. The Stand-Alone Flash Loader Tools Page

For all operations on this page, first enter a region in the **Region** field. If you leave this field blank, the operation applies to all of flash memory. For information on the format of a region, see [Section 2.2.1 "Flash Regions"](#) on page 6.

The controls on this page are applied to the entry in the **Region** field:

Erase button

Erases the region of flash memory.

Verify Erased button

Verifies that the region of flash memory is erased.

Read... button

Reads the contents of the region of flash memory and saves the data. When you press the **Read...** button, the flash loader prompts you to select a file for saving the data.

NOP... button

Sends a null command to the flash memory to ensure that connectivity is as expected.

RSL10 Stand-Alone Flash Loader Manual

3.3 THE OPTIONS PAGE

Use the controls on the **Options** page (shown in the figure "The Stand-Alone Flash Loader Options Page" (Figure 4)) to control how the flash loader accesses the RSL10 radio IC.

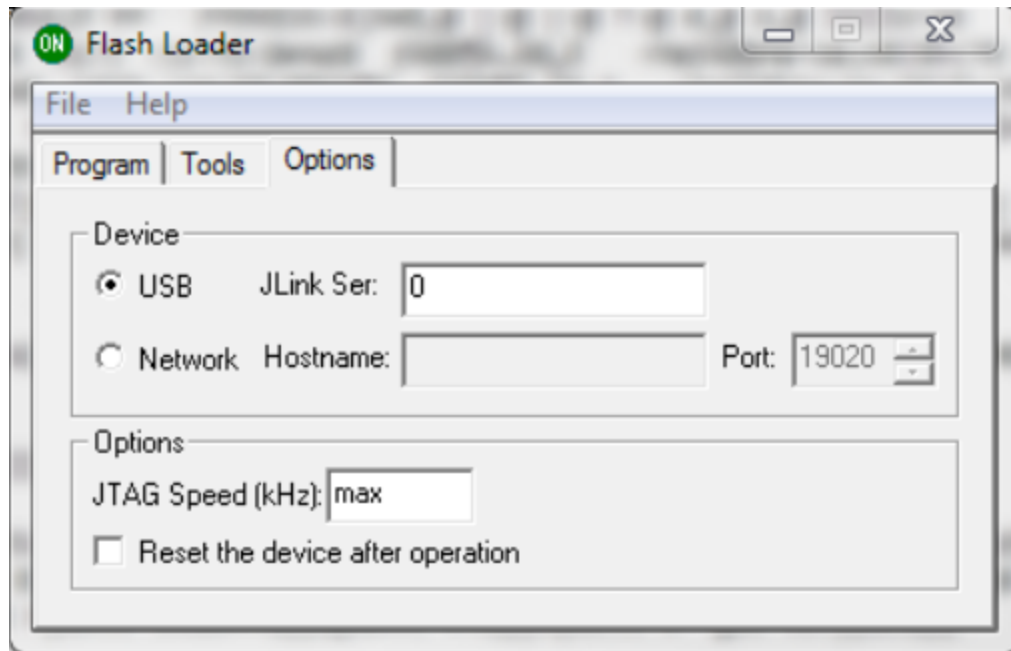


Figure 4. The Stand-Alone Flash Loader Options Page

In the **Device** section of the page, you can select either a **USB** or **Network** J-Link device:

- For a USB J-Link device, select the J-Link device serial number.
- For a network J-Link device, enter the **Hostname** and **Port** of the computer running the *jlinktcpserver.exe* program.

In the **Options** section, you can:

- Change the **JTAG Speed**. Enter **max** to use the maximum JTAG Speed supported by the J-Link device, or a number to specify the speed in kHz.
- Check the **Reset the device after operation** box to have the flash loader reset the connected RSL10 radio IC after completing any operation.

3.4 THE PROGRESS DIALOG

The stand-alone flash loader displays the progress dialog box shown in the figure "The Progress Dialog" (Figure 5) when performing any operation that communicates with the RSL10 radio IC. The dialog shows the current operation at the top, the overall progress in a progress bar, and various progress and status messages in the large text box.

RSL10 Stand-Alone Flash Loader Manual

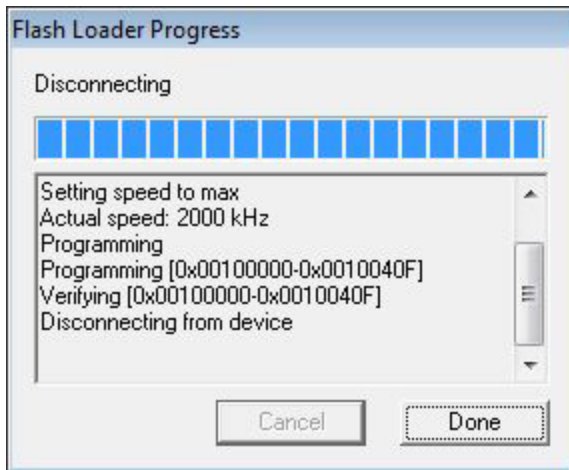


Figure 5. The Progress Dialog

Press **Cancel** at any time to stop the operation.

After the operation completes, or after you press **Cancel**, the dialog remains open so that you can inspect or copy the output of the operation. To copy, select the contents of the dialog and press Ctrl-C. Press **Done** to dismiss the progress dialog.

CHAPTER 4

Command-Line Usage

To start the stand-alone flash loader from the command line, navigate to the location of the *Flashloader.exe* file in the *RSL10 Utility Apps* folder. Add the location of *Flashloader.exe* to the system PATH environment variable to allow easy access to this command.

When you run the stand-alone flash loader from the Windows command processor (CMD.EXE) with command-line options, it operates in command-line mode. In this mode, the command-line options determine the operation to perform, and all progress and messages are displayed on the console.

Usage:

```
flashloader options command command-options
```

The options are global flash loader options. Possible global options are listed in the [table "Global Flash Loader Command-Line Options" \(Table 3\)](#).

Table 3. Global Flash Loader Command-Line Options

Global Option	Description
-h	Display the usage message.
-u serial_number	Use the specified USB J-Link device. If no USB or network J-Link device is specified, the flash loader tries to connect to the J-Link device it finds. If it finds more than one J-Link device, you are prompted to select a device to use. If the flash loader finds no J-Link devices, the connection fails, and you are asked to connect on the network, which you can cancel.
-n hostname:port	Use the specified host and port to access a network J-Link device.
-s speed	Specify the maximum JTAG speed in kHz to communicate with the RSL10 radio IC, or specify the value max to use the maximum speed supported by the flash loader hardware. The actual JTAG speed might be slower.
-r	Reset the device after the operation finishes.
-v	Display verbose output.

The command determines which flash loader operation to perform. Some commands allow command-options that control the behavior of the command. The commands are:

program

Write the contents of a data file to flash memory.

erase

Erase a region of flash memory.

verify

Verify that the contents of flash memory match the contents of a data file, or verify that a region of flash memory is erased.

read

Read a region of flash memory and save the data to a data file.

RSL10 Stand-Alone Flash Loader Manual

For a list of all the tasks you can do with this application, and where to find the corresponding graphical user interface or command line interface steps, see the [table "Mapping Tasks to User Interfaces" \(Table 1\)](#).

4.1 THE PROGRAM COMMAND

Use the `flashloader program` command to write the contents of a data file to flash memory. By default, the `flashloader program` command only erases the regions of flash memory that are being written. The `flashloader program` command takes the options shown in the [table "Program Command Options" \(Table 4\)](#).

Table 4. Program Command Options

Program Command Option	Description
filename	The name of the data file to write to flash memory (required).
<code>-e</code>	Erase all of flash memory before programming.
<code>-v</code>	Verify the contents of flash memory after programming.

Some examples of the `flashloader program` command:

- To write the contents of *blinky.hex* to the main section of flash memory:
`flashloader program blinky.hex`
- To write the contents of *blinky.srec* to flash memory using a remote J-Link device on a machine named `jlinkserver` port 19020:
`flashloader -n jlinkserver:19020 program blinky.srec -i`
- To erase all of flash memory, write the contents of *blinky.hex* to the flash memory, verify that the contents of flash memory match the file, then reset the device:
`flashloader -r program blinky.hex -e -v`

4.2 THE ERASE COMMAND

Use the `flashloader erase` command to erase a region of flash memory. By default, the `flashloader erase` command erases all of flash memory. The `flashloader erase` command takes the options shown in the [table "Erase Command Options" \(Table 5\)](#).

Table 5. Erase Command Options

Erase Command Option	Description
region	Override the default behavior to erase one or more ranges of flash memory.

Some examples of the `flashloader erase` command:

- To erase all of flash memory:
`flashloader erase`
- To erase two blocks of flash memory, using local J-Link device number 2:
`flashloader -u 2 erase 0x00040000-0x0003FFFF,0x00070000-0x0007FFFF`

4.3 THE VERIFY COMMAND

Use the `flashloader verify` command to perform two similar operations:

1. Verify that a region of flash memory is erased.
2. Verify that the contents of flash memory match the contents of a data file.

RSL10 Stand-Alone Flash Loader Manual

By default, the `flashloader verify` command verifies that all of flash memory is erased. The `flashloader verify` command takes the options shown in the [table "Verify Command Options" \(Table 6\)](#). You can only specify a **region** or **filename** option, but not both.

Table 6. Verify Command Options

Verify Command Option	Description
region	Override the default behavior to verify that one or more regions of flash memory are erased.
filename	Override the default behavior to verify that the contents of flash memory match the contents of a data file.

Some examples of the `flashloader verify` command:

- To verify that the entire main section of flash memory is erased, then reset the device:
`flashloader -r verify`
- To verify that the contents of flash memory match the contents of *blinky.srec*:
`flashloader verify blinky.srec`

4.4 THE READ COMMAND

Use the `read` command to read a region of flash memory and write the data to a data file. By default, the `read` command reads all of flash memory. The `read` command takes the options shown in the [table "Read Command Options" \(Table 7\)](#).

Table 7. Read Command Options

Read Command Option	Description
region	Override the default behavior to read one or more regions of flash memory.
filename	The name of the data file to write the contents of flash memory to (required and must be the last parameter on the command line).

Some examples of the `flashloader read` command:

- To read all of flash memory and save it to *allflash.hex*:
`flashloader read allflash.hex`
- To read the contents of two blocks of flash memory and save it to *myflash.srec*, then reset the device:
`flashloader -r read 0x00040000-0x00041000,0x00070000-0x0007FFFF myflash.srec`

RSL10 Stand-Alone Flash Loader Manual

Windows is a registered trademark of Microsoft Corporation. Arm, Cortex, Keil, and uVision are registered trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere. Bluetooth is a registered trademark of Bluetooth SIG, Inc. All other brand names and product names appearing in this document are trademarks of their respective holders.

onsemi and the onsemi logo are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of onsemi's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. onsemi is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

Copyright 2024 Semiconductor Components Industries, LLC ("onsemi"). All rights reserved. Unless agreed to differently in a separate onsemi license agreement, onsemi is providing this "Technology" (e.g. reference design kit, development product, prototype, sample, any other non-production product, software, design-IP, evaluation board, etc.) "AS IS" and does not assume any liability arising from its use; nor does onsemi convey any license to its or any third party's intellectual property rights. This Technology is provided only to assist users in evaluation of the Technology and the recipient assumes all liability and risk associated with its use, including, but not limited to, compliance with all regulatory standards. onsemi reserves the right to make changes without further notice to any of the Technology.

The Technology is not a finished product and is as such not available for sale to consumers. Unless agreed otherwise in a separate agreement, the Technology is only intended for research, development, demonstration and evaluation purposes and should only be used in laboratory or development areas by persons with technical training and familiarity with the risks associated with handling electrical/mechanical components, systems and subsystems. The user assumes full responsibility/liability for proper and safe handling. Any other use, resale or redistribution for any other purpose is strictly prohibited.

The Technology is not designed, intended, or authorized for use in life support systems, or any FDA Class 3 medical devices or medical devices with a similar or equivalent classification in a foreign jurisdiction, or any devices intended for implantation in the human body. Should you purchase or use the Technology for any such unintended or unauthorized application, you shall indemnify and hold onsemi and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that onsemi was negligent regarding the design or manufacture of the board.

The Technology does not fall within the scope of the European Union directives regarding electromagnetic compatibility, restricted substances (RoHS), recycling (WEEE), FCC, CE or UL, and may not meet the technical requirements of these or other related directives.

THE TECHNOLOGY IS NOT WARRANTED AND PROVIDED ON AN "AS IS" BASIS ONLY. ANY WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT, ARE HEREBY EXPRESSLY DISCLAIMED. TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL ONSEMI BE LIABLE TO CUSTOMER OR ANY THIRD PARTY. IN NO EVENT SHALL ONSEMI BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER (INCLUDING, BUT NOT LIMITED TO, LOSS OR DISGORGEMENT OF PROFITS, LOSS OF USE AND LOSS OF GOODWILL), REGARDLESS OF WHETHER ONSEMI HAS BEEN GIVEN NOTICE OF ANY SUCH ALLEGED DAMAGES, AND REGARDLESS OF WHETHER SUCH ALLEGED DAMAGES ARE SOUGHT UNDER CONTRACT, TORT OR OTHER THEORIES OF LAW.

Do not use this Technology unless you have carefully read and agree to these limited terms and conditions. By using this Technology, you expressly agree to the limited terms and conditions. All source code is onsemi proprietary and confidential information.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for onsemi

19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA

Phone: 303-675-2175 or 800-344-3860 Toll Free

USA/Canada

Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada

Email: orderlit@onsemi.com

N. American Technical Support:

800-282-9855 Toll Free USA/Canada

Europe, Middle East and Africa Technical

Support: Phone: 421 33 790 2910

onsemi Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local
Sales Representative

M-20823-011