UM0853
User manual

M24LR64-R tool kit user guide

1 Introduction

The purpose of this user manual is to teach how to use the M24LR64-R tool kit with the *M24LRxx_Application_Software*. It describes the *M24LRxx_Application_Software* interface and its menus, and shows how to send commands to M24LR64-R tags.

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2 Tool kit descriptions

2.1 Development kit

Ordering information: **DEVKIT-M24LR-A**

The development kit contains:

- a middle-range RF reader (ISO 15693, RF 13.56 MHz) interfaced via the USB bus and an external power supply to have a greater read range. *Figure 1* shows the RF reader.
- an external antenna, shown in *Figure 2*.
- a serial EEPROM USB reader, shown in *Figure 3*: it is an I²C bus reader (interfaced via the USB bus).
- an I²C bus cable to connect the serial EEPROM USB reader to the I^2C bus of the reference antenna. *Figure 4* shows the cable to use.
- M24LR64-R reference antennas:
  - ANT1-M24LR-A shown in *Figure 5*:
    RF antenna size: 75 mm × 45 mm (2.9 in × 1.77 in)
  - ANT2-M24LR-A shown in *Figure 6*:
    RF antenna size: 20 mm × 40 mm (0.79 in × 1.57 in)
- M24LR64-R samples in SO8 package (see *Figure 7*)

Figure 1. RF reader (ISO 15693, RF 13.56 MHz)

Figure 2. External antenna

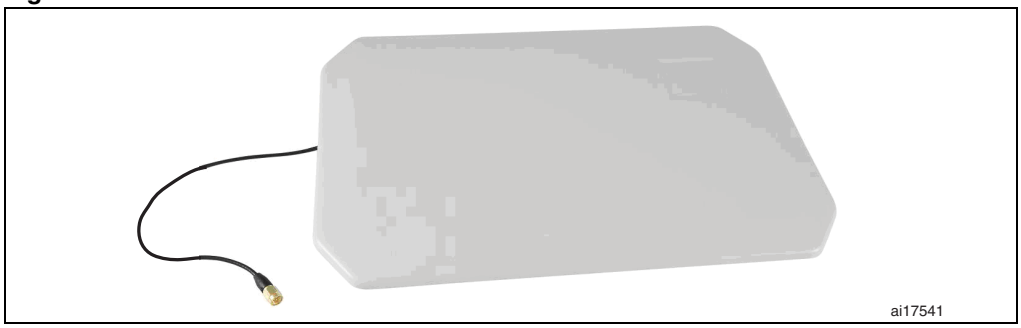


Figure 3. Serial EEPROM USB reader

Figure 4. I²C bus cable

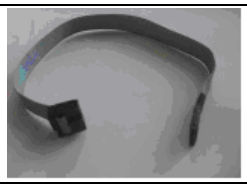


Figure 5. ANT1-M24LR-A reference antenna

Figure 6. ANT2-M24LR-A reference antenna

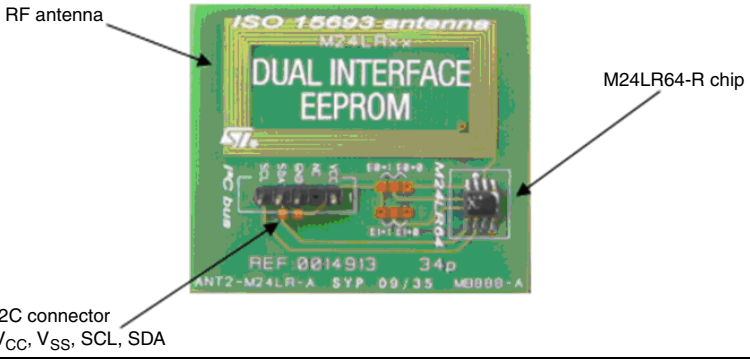
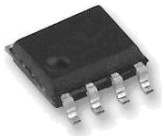


Figure 7. M24LR64-R in SO8 package



2.2 M24LR64-R demonstration kit

Ordering information: **DEMOKIT-M24LR-A**

The demonstration kit contains:

- a middle-range RF reader (ISO 15693, RF 13.56 MHz) interfaced via the USB bus, shown in *Figure 8*
- an M24LR64-R's reference antenna: PRIM2-M24LR-A shown in *Figure 9*
  RF antenna size: 20 mm × 40 mm (0.79 in x 1.57 in)
- Optional: STM32-PRIMER2 (to be ordered separately) shown in *Figure 10*

Figure 8. RF reader

Figure 9. PRIM2-M24LR-A reference antenna

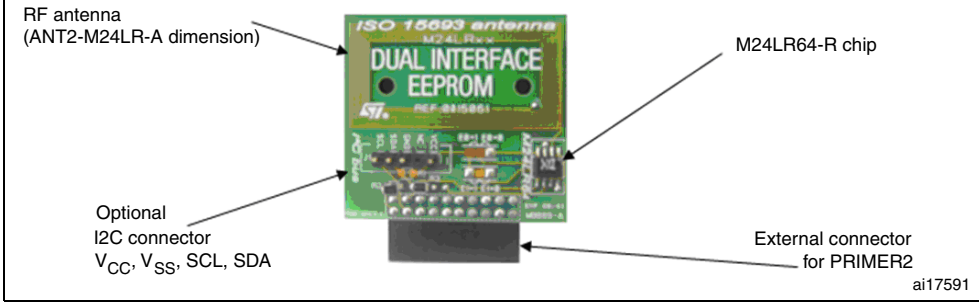


Figure 10. STM32-PRIMER2

1. Not included in the kit, to be ordered separately.

2.3 Starter kit

Ordering information: STARTKIT-M24LR-A

The starter kit contains:

- a short-range RF reader (ISO 15693, RF 13.56 MHz), interfaced via the USB bus (including the external I²C bus cable + connector) illustrated in *Figure 11*
- M24LR64-R's reference antennas:
  - ANT1-M24LR-A shown in *Figure 12*: RF antenna size: 75 mm × 45 mm (2.9 in × 1.77 in)
  - ANT2-M24LR-A shown in *Figure 13*: RF antenna size: 20 mm × 40 mm (0.79 in × 1.57 in)
- M24LR64-R samples in SO8 package (see *Figure 7*)

Figure 11. I²C & RF reader

Figure 12. ANT1-M24LR-A reference antenna

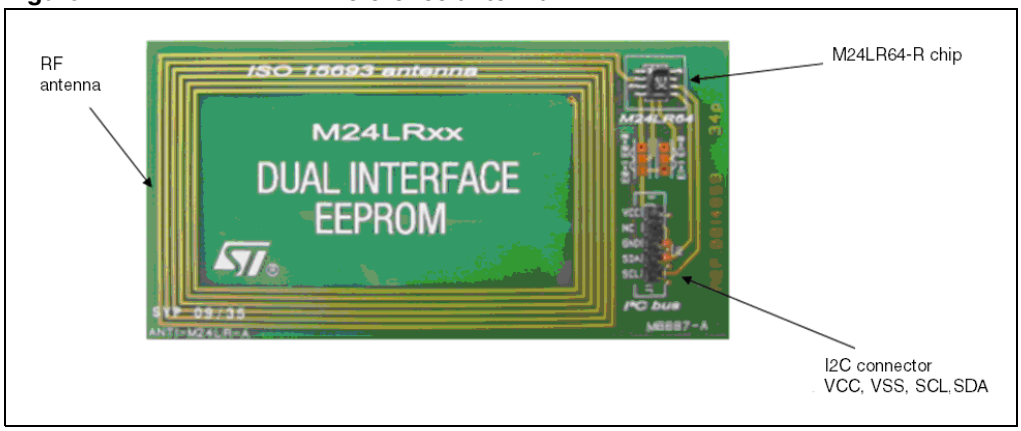


Figure 13. ANT2-M24LR-A reference antenna

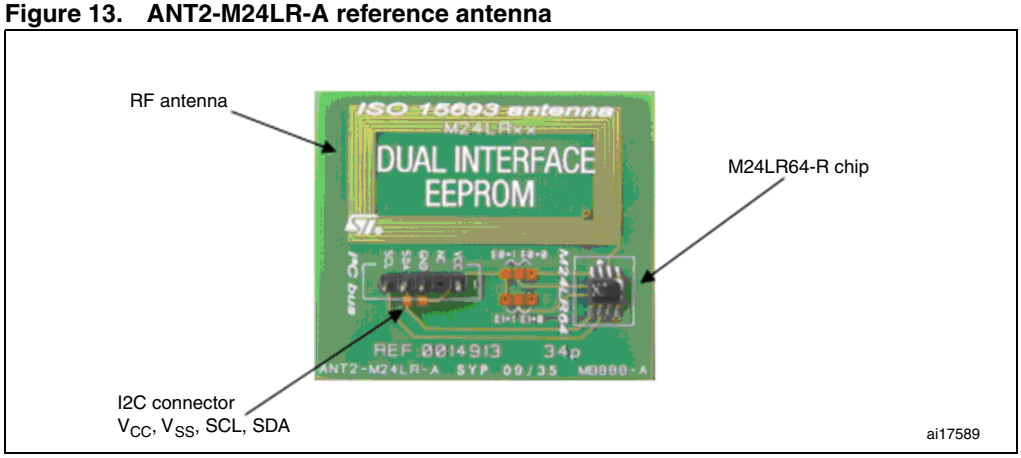
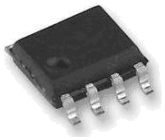


Figure 14. M24LR64-R in SO8 package



3 How to control the RF and I²C channels from your screen

3.1 Starting *M24LRxx_Application_Software*

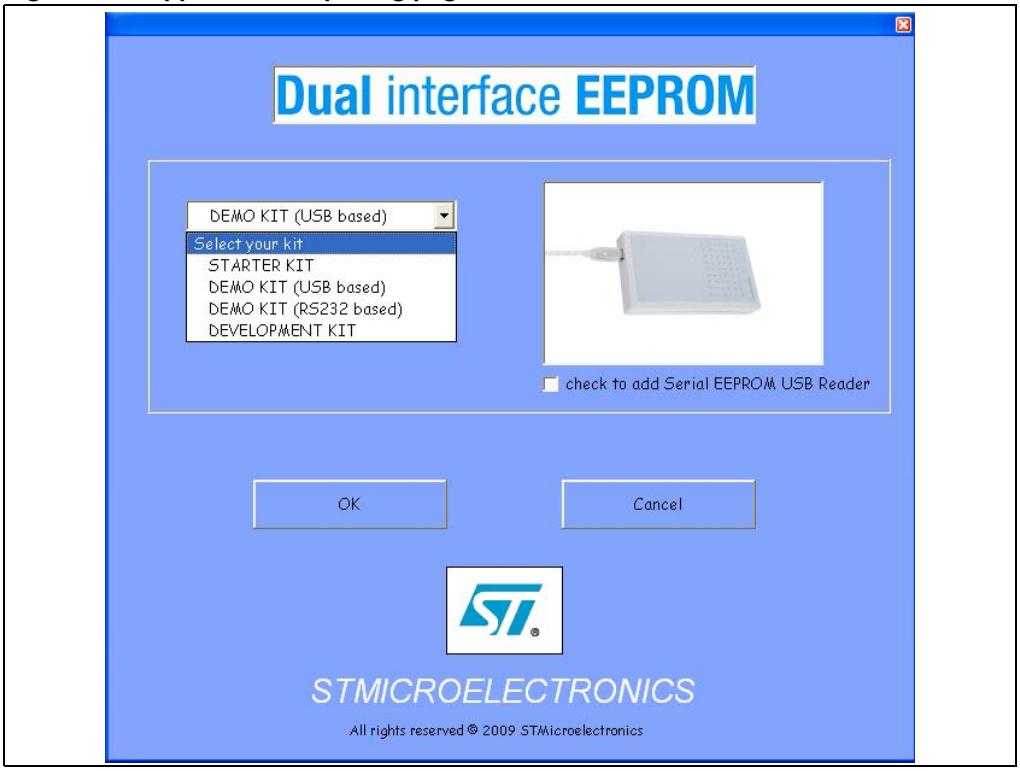
Before starting, you must have:

- previously installed all the drivers. For how to install the required drivers, please refer to UM0863: “M24LR64-R tool driver install guide”
- connected the reader’s USB cable

3.1.1 Choosing your tool kit

On the PC desktop, double click on the *M24LRxx_Application_Software* icon. On launching the software, you will be prompted to select the kit you wish to use as shown in *Figure 15*.

Figure 15. Application’s opening page



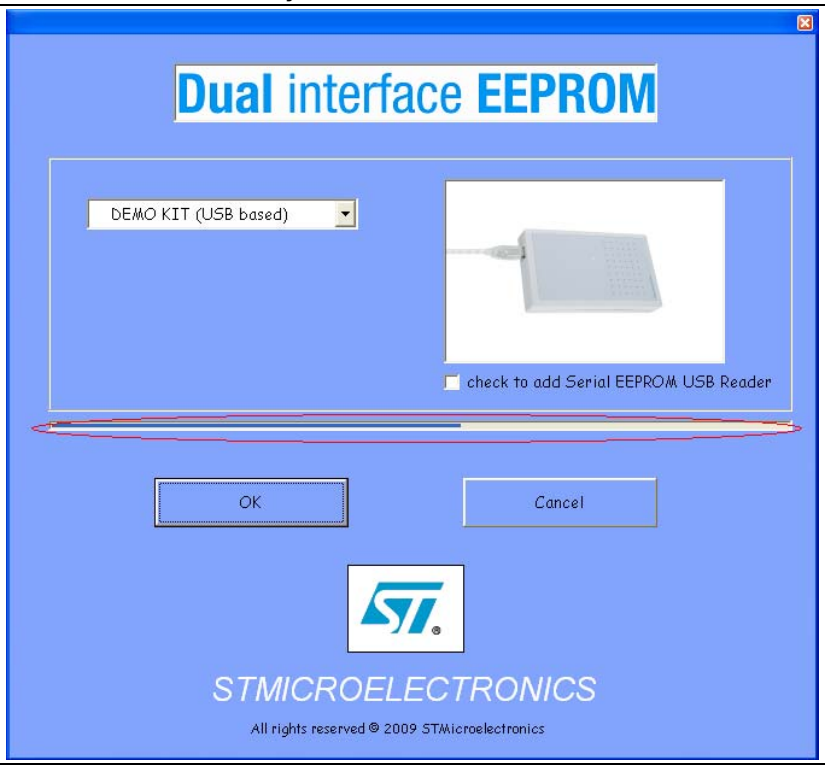
Select your kit from the list below and press the OK button:

- STARTER KIT
- DEMO KIT (USB based)
- DEMO KIT (based on the RS232 port - old version)
- DEVELOPMENT KIT

If you select DEMO KIT (USB based), you can also play with the SERIAL EEPROM USB reader by checking the box to add the Serial EEPROM USB reader.

Once the kit has been selected, the software checks that the selected readers are well connected. A progress bar appears during the check as shown in *Figure 16*.

Figure 16. Connection check by the software



If a problem occurs, a window appears to indicate what the problem is:

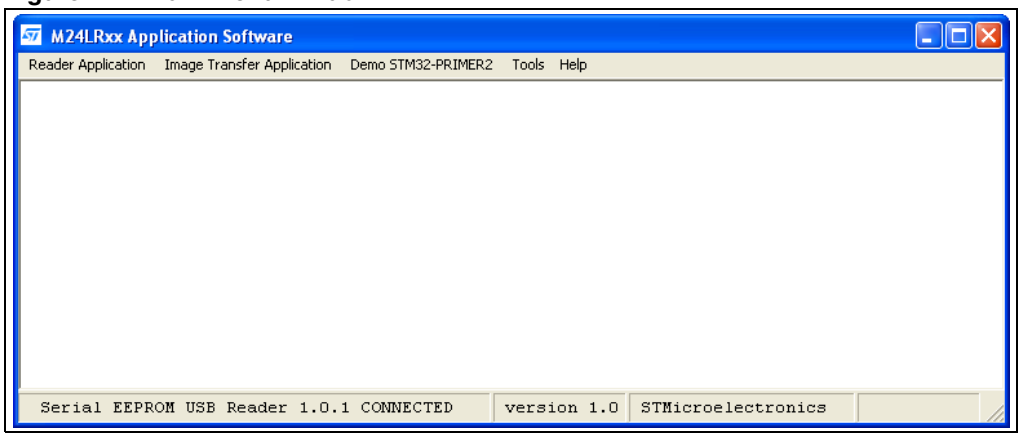
- If the development kit is used, the problem could be:
  - medium-range RF reader not plugged in the USB port
  - medium-range RF reader driver not installed
  - I²C bus reader not plugged in the USB port
  - I²C bus reader driver not installed
- If the demo kit is used, the problem could be:
  - medium-range RF reader not plugged in the USB port
  - medium-range RF reader driver not installed
- If the starter kit is used, the problem could be:
  - Short-range RF reader not plugged in the USB port
  - Short-range RF reader driver not installed

3.1.2 Main menu

If all the drivers have been installed correctly, and the selected readers have been plugged, the window shown in *Figure 17* appears.

The connection status of the readers as well as the version of the software are displayed at the bottom of the window.

Figure 17. Main menu window

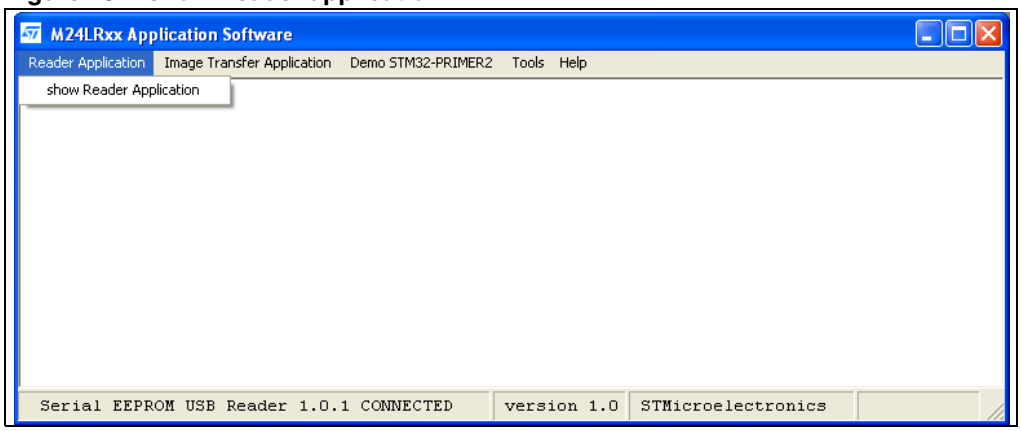


You can use the menu at the top of the window to select several applications:

Reader Application menu

Select **show Reader application** (*Figure 18*) to manage all the I²C and RF functions of the M24LR64-R.

Figure 18. show Reader application

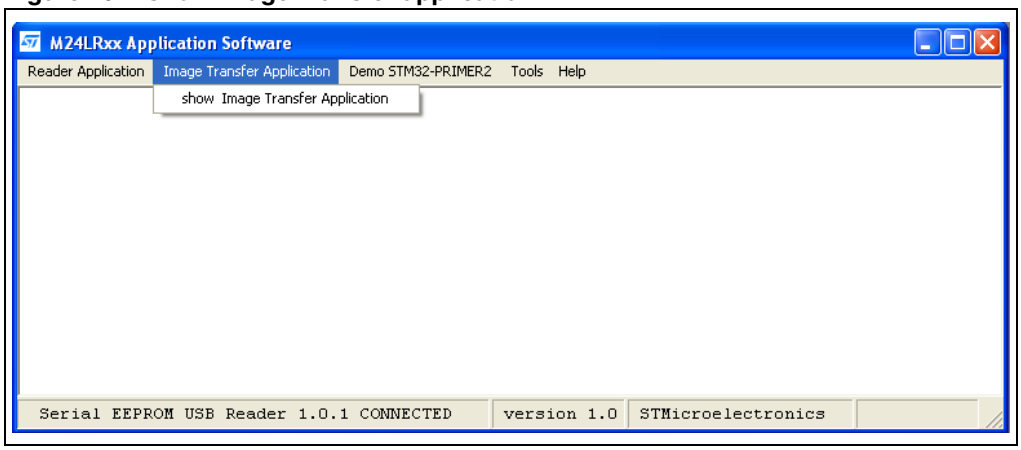


3.1.3 Image Transfer Application menu

Figure 19 shows the Image Transfer Application menu.

Select **show Image Transfer application** to upload or download a picture to or from the M24LR64-R by RF or I²C.

Figure 19. show Image Transfer application



3.1.4 Demo STM32-PRIMER2 menu

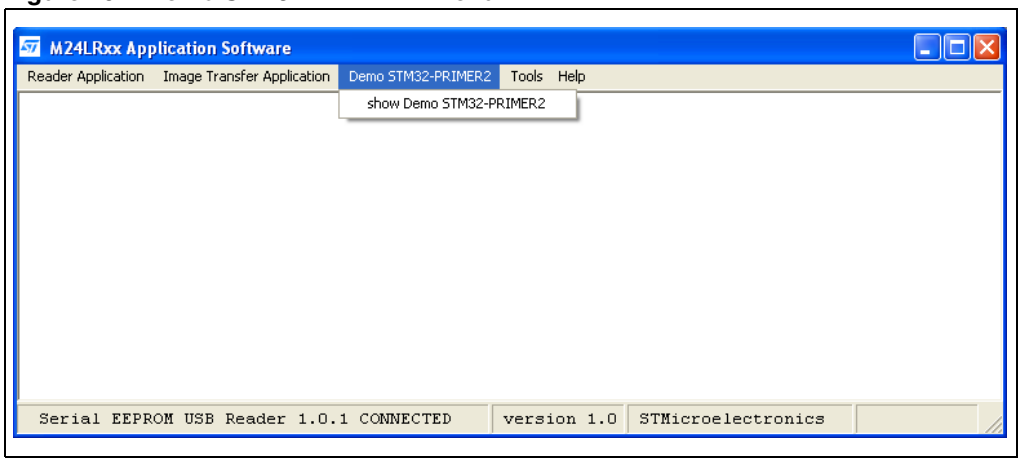
Figure 20 shows the **Demo STM32-PRIMER2 menu**.

Select **show Demo STM32-PRIMER2** to upload or download a picture to or from the M24LR64-R by RF.

Pictures are formatted to be usable by the “Dual EE” firmware of your STM32-PRIMER2 demo.

Refer to UM0850 for details on how to use Dual EE.

Figure 20. Demo STM32-PRIMER2 menu

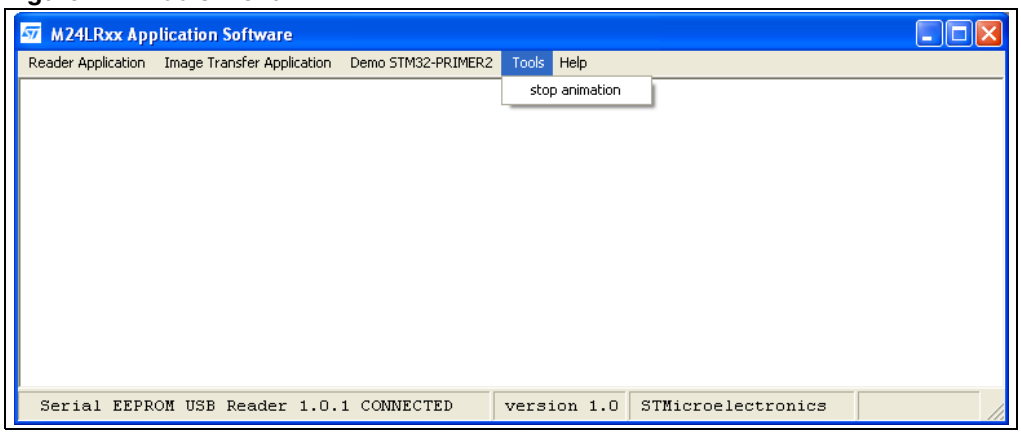


3.1.5 Tools menu

Figure 21 shows the Tools menu.

Select **stop animation** to stop the animation in the reader application interface.

Figure 21. Tools menu

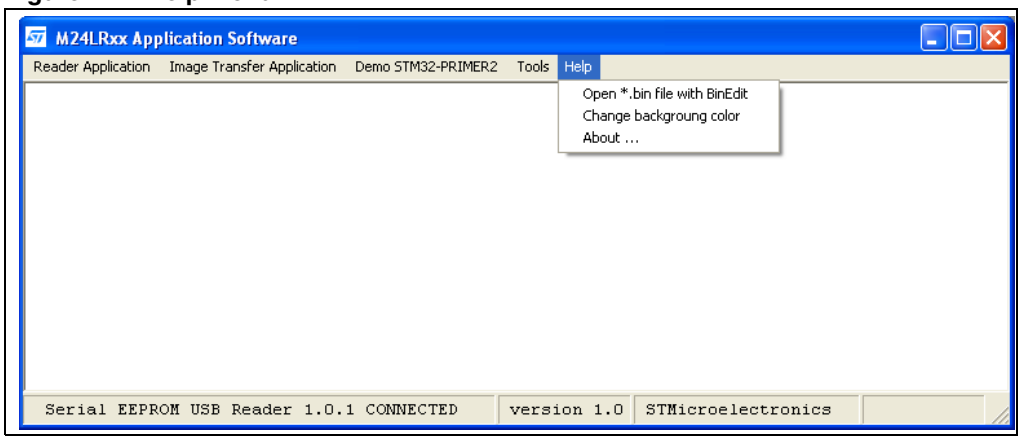


3.1.6 Help menu

Figure 22 shows the Help menu:

- **Open *.bin file with BinEdit** gives you access to a freeware for reading binary files (*.bin format).
- **Change background color** allows you to change the color of the main window.
- **About** provides information about the software.

Figure 22. Help menu

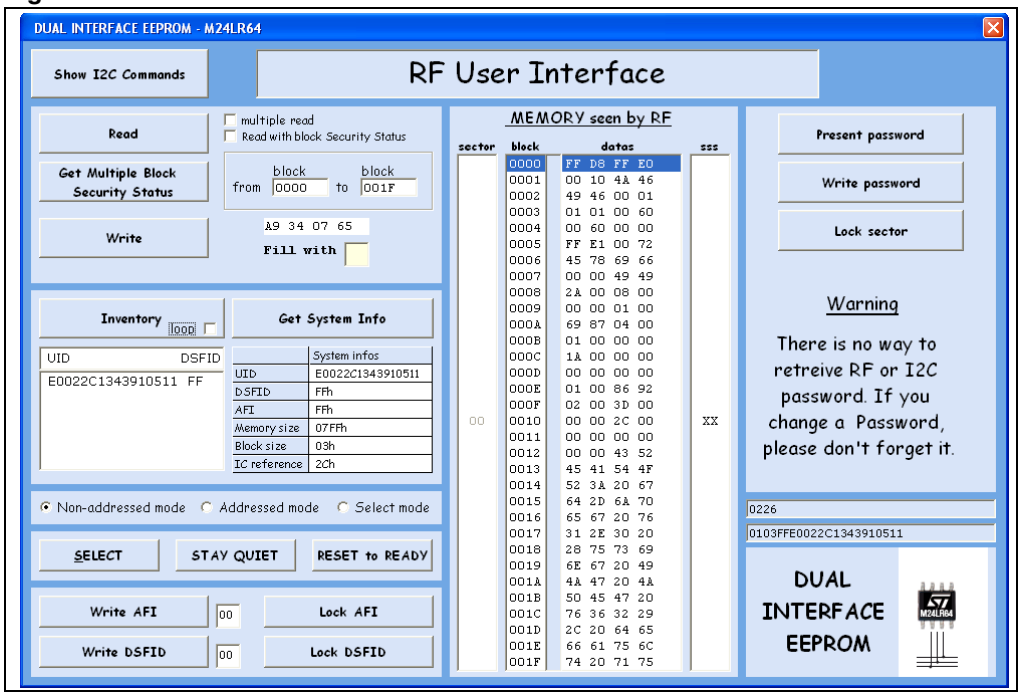


3.2 RF channel commands

Select **show Reader Application** in the main menu. The *RF user interface* opens. It is shown in *Figure 23*. With this interface you can send any command to the M24LR64-R tag present in the RF reader field.

The **Show I2C Commands** button is used to switch from the RF user interface to the I²C user interface.

Figure 23. RF user interface



3.2.1 Inventory command

The **Inventory** button launches an Inventory command and thus detects the tags present in the RF field. The command is associated with an anticollision algorithm to detect each tag individually (see *Figure 25*).

The **Loop** option is used to loop on inventory commands. It is selected (or deselected) by checking (or unchecking) the box next to **Loop**.

Figure 24. Inventory button

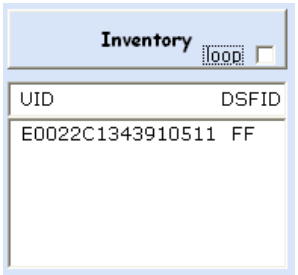
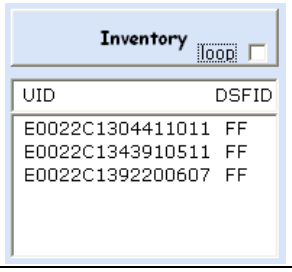
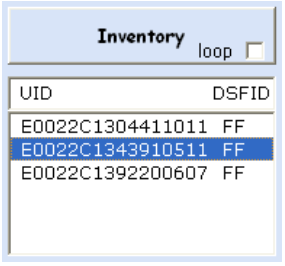


Figure 25. Three tags detected



You can select a tag in the list of detected UIDs by clicking on the desired UID in the list as shown in *Figure 26*. The selected UID will then be used in all RF requests sent in Addressed mode.

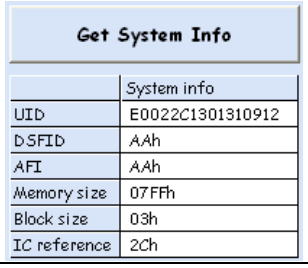
Figure 26. Specific UID selected



3.2.2 Get System Info command

The **Get System Info** button launches a Get System Info command, thus filling the **System info** fields.

Figure 27. Get System Info button



3.2.3 Viewing RF requests and answers

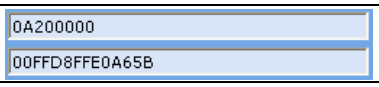
Figure 28. RF TAG REQUEST/ANSWER report

The **RF TAG REQUEST report** button shows the RF request sent by the RF reader to the tag.

The **RF TAG ANSWER report** button shows the RF answer from the tag, detected by the RF reader.

Figure 29 shows an example of a reader's RF request and the corresponding answer from the tag.

Figure 29. RF request and RF answer



The RF read request is at address 0000. The RF answer is the read data: FF D8 FF E0.

3.2.4 Selecting the RF mode

The RF ISO 15693 protocol allows the user to communicate in RF in three different modes: the Non-addressed mode, the Addressed mode and the Select mode. For further details, please refer to the M24LR64-R datasheet.

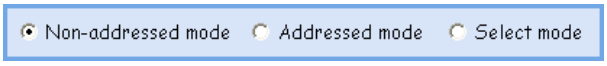
The Non-addressed, Addressed or Select mode can be selected by clicking on the desired mode as shown in *Figure 30*, *Figure 31* or *Figure 32*.

Non-addressed mode

Selecting the Non-addressed mode clears the bits 5 and 6 in the Request_flags of the RF request (bit 5 = 0, bit 6 = 0).

The request is executed by any M24LR64-R device (please refer to the M24LR64-R datasheet for details).

Figure 30. Selecting the Non-addressed mode



Addressed mode

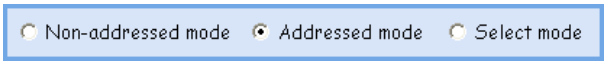
Selecting the Addressed mode clears bit 5 and sets bit 6 in the Request_flags of the RF request (bit 5 = 0, bit 6 = 1).

The request is addressed. The UID field is present (please refer to the M24LR64-R datasheet for details).

After an Inventory command (see *Section 3.2.1: Inventory command*), you will be able to click on an UID to select a specific tag. The desired UID will be sent with the request if the Addressed mode is chosen.

If no specific UID tag is selected, the device sends “00 00 00 00 00 00 00 00” instead of the UID value.

Figure 31. Selecting the Addressed mode



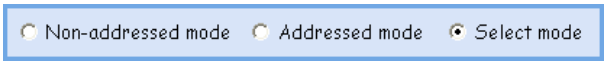
Select mode

Selecting the Select mode sets bit 5 and clears bit 6 in the Request_flags of the RF request (bit 5 = 1 and bit 6 = 0).

The request is executed only by the M24LR64-R device in the Select State (please refer to the M24LR64-R datasheet for details).

To select a tag, refer to the *SELECT* paragraph below, and to the M24LR64-R datasheet (Select paragraph).

Figure 32. Selecting the Select mode

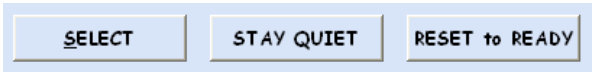


3.2.5 Managing the M24LR64-R states

The M24LR64-R can be in different states: Power-off, Ready, Quiet and Selected (refer to the M24LR64-R datasheet for details).

The interface shown in *Figure 33* is used to send three types of RF request to place the M24LR64-R in one out of three specific states: Selected, Quiet and Ready.

Figure 33. Device state management interface



SELECT

The **SELECT** button is used to send a Select RF request with the UID of a specific tag (*Section 3.2.1: Inventory command*) (refer to the M24LR64-R datasheet for details).

If no tag was selected after the Inventory request, the device sends “00 00 00 00 00 00 00 00” instead of the UID value.

STAY QUIET

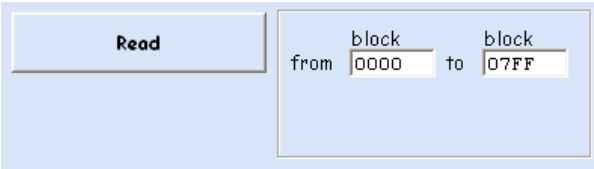
The **STAY QUIET** button is used to send a Stay Quiet RF request (refer to the M24LR64-R datasheet for details).

RESET TO READY

The **RESET TO READY** button is used to send a Reset to Ready RF request (refer to the M24LR64-R datasheet for details).

3.2.6 Read command

Figure 34. Initiating a read operation



By pressing the Read button, you launch RF requests to read the contents of the M24LR64-R EEPROM from the block address specified in the **from** field to the block address specified in the **to** field.

The result of the read operation is displayed in the **MEMORY seen by RF** area (see *Figure 35* to *Figure 38*).

From **0000** to **07FF** reads all M24LR64-R EEPROM contents. *Figure 35* and *Figure 36* only show the results for sector 0 and sector 3F, respectively.

Figure 35. Result of the read operation - Sector 00h

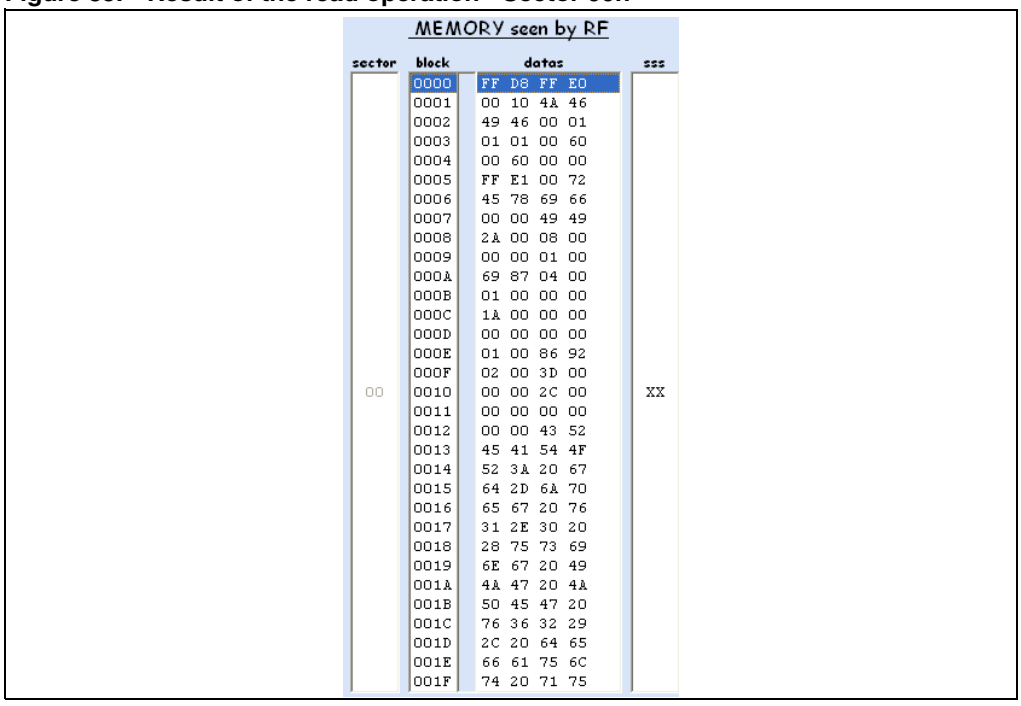
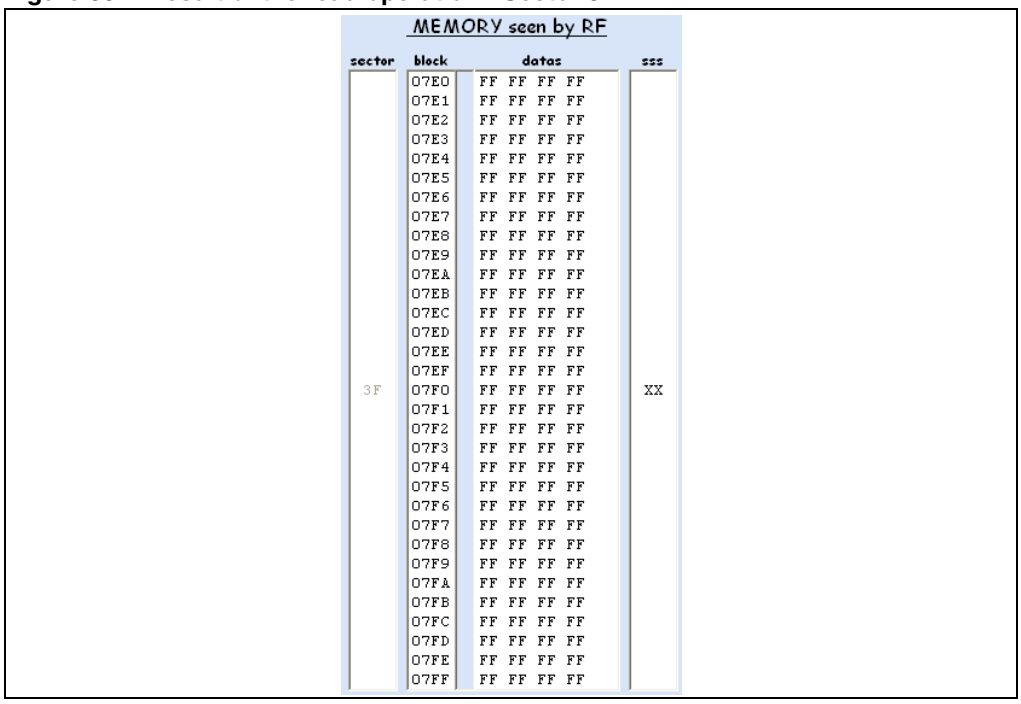


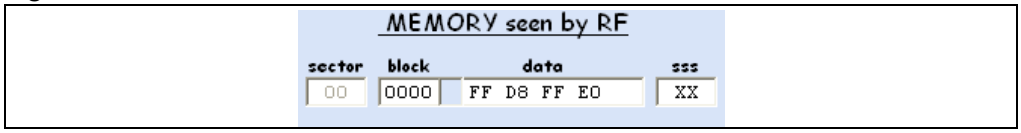
Figure 36. Result of the read operation - Sector 3Fh



Use the arrows on the keyboard to change the sector or block to be read.

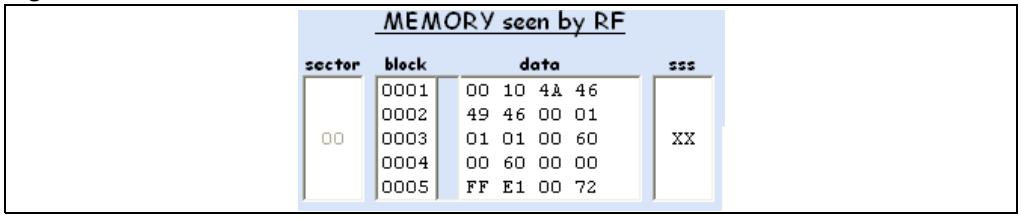
From **0000** to **0000** reads block 0 in sector 0 as shown in *Figure 37*.

Figure 37. Sector 0 block 0



From **0001** to **0005** reads the blocks 1, 2, 3, 4, 5 in sector 0 as shown in *Figure 38*.

Figure 38. Sector 0 blocks 1 to 5



How to read the memory area with the RF Interface:

- The first column (**sector**) indicates the sector read.
- The second column (**block**) indicates the address of the block read.
- The third column (**data**) shows the contents of the M24LR64-R at the specified addresses.
- The fourth column (**sss**) gives the sector security status.

Example: in *Figure 38* above, the data **49 46 00 01** means:

49 (49h Hex) is the first piece of data read in block number 0002 (sector 0)

46 (46h Hex) is the second piece of data read in block number 0002 (sector 0)

00 (00h Hex) is the third piece of data read in block number 0002 (sector 0)

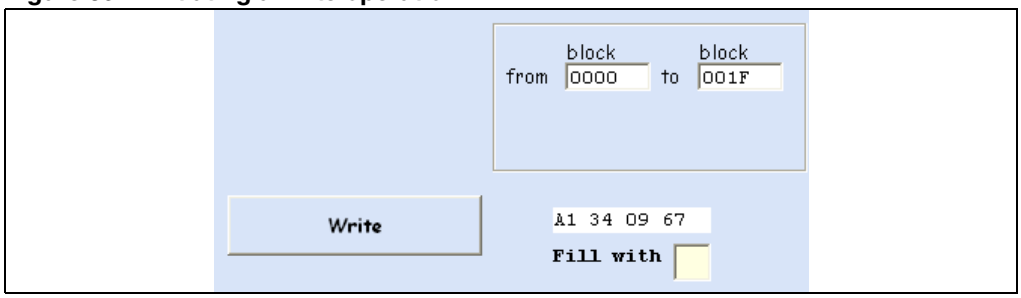
01 (01h Hex) is the fourth piece of data read in block number 0002 (sector 0)

3.2.7 Write command

The **Write** button launches RF requests to write data to the M24LR64-R EEPROM from the block address specified in the **from** field to the block address entered in the **to** field.

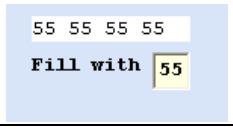
In *Figure 39*, the Write command fills the blocks 0000h to 001Fh with “A1 34 09 67”.

Figure 39. Initiating a write operation



You can choose to write the same byte four times by changing the value in the **Fill with** field. In the example below, the byte 55 is to be written four times.

Figure 40. Fill with 55



Get Multiple Block Security Status command

The **Get Multiple Block Security Status** button launches RF requests to read the security statuses of the blocks that correspond to the address range specified in the **from** and **to** fields.

Figure 41. Get Multiple Block Security Status button

Addresses are managed in the same way as for read operations. In *Figure 42* the security status byte is shown for the blocks with addresses ranging between 0x00E0 and 0x00FF (sector 07).

Figure 42. Security status byte for sector 07

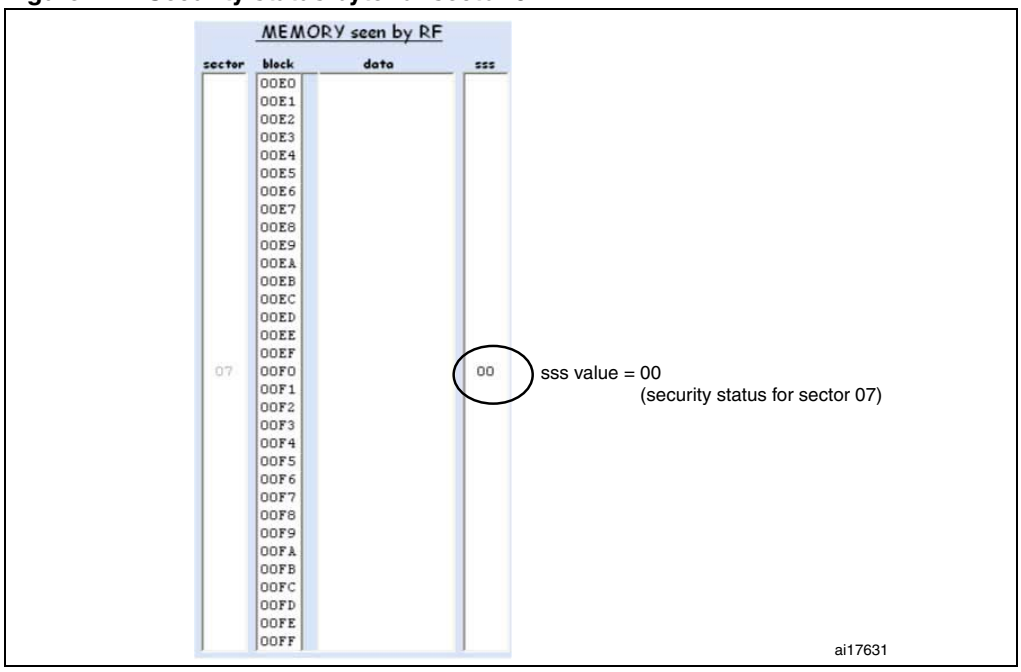
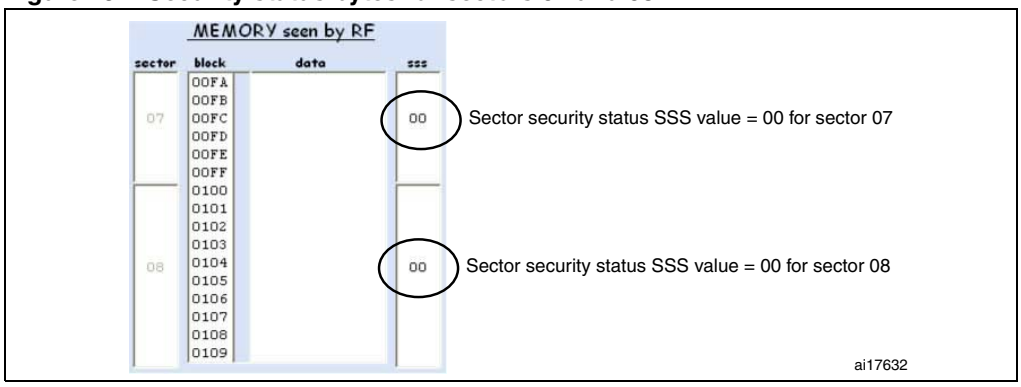


Figure 43 shows the security status bytes for the blocks located at addresses 00FAh to 0109h (sector 07 & sector 08).

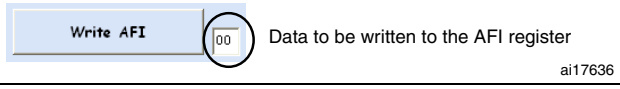
Figure 43. Security status bytes for sectors 07 and 08



3.2.8 Write AFI command

The **Write AFI** button launches a Write AFI command. The data in the dedicated field next to the **Write AFI** button are written to the AFI register.

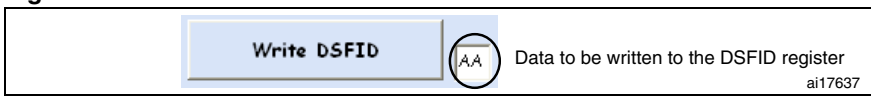
Figure 44. Write AFI command



3.2.9 Write DSFID command

The **Write DSFID** button launches a Write DSFID command. The data in the dedicated field next to the **Write DSFID** button are written to the DSFID register.

Figure 45. Write DSFID command



3.2.10 Lock AFI command

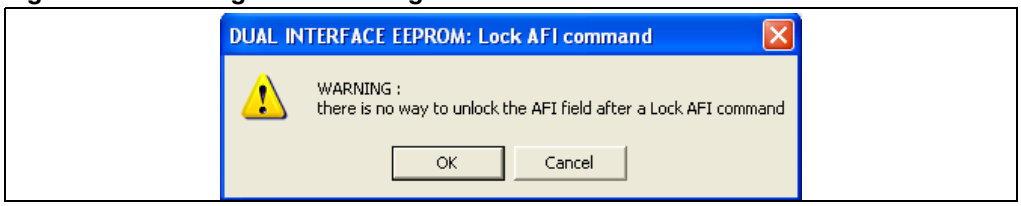
The **Lock AFI** button launches a Lock AFI command. The execution of this command locks the AFI field *permanently*.

Figure 46. Lock AFI command

Caution: Once the AFI field has been locked, it cannot be unlocked.

For this reason, a warning (shown in *Figure 47*) is displayed before locking the AFI. To abort the Lock AFI command, click on **Cancel**. To confirm the command, click on **OK**.

Figure 47. Warning before locking the AFI field



3.2.11 Lock DSFID command

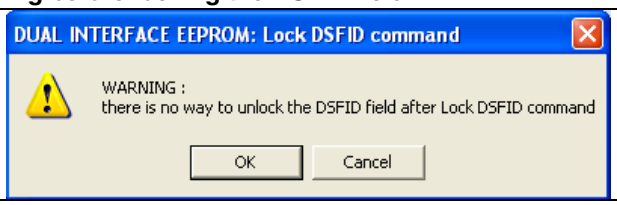
The **Lock DSFID** button launches a Lock DSFID command. When executed, this command locks the DSFID field permanently.

Figure 48. Lock DSFID command

Caution: Once the DSFID field has been locked, it cannot be unlocked.

This is the reason why a warning (shown in *Figure 49*) is displayed before locking the DSFID field. To abort the Lock DSFID command, click on **Cancel**. To confirm the command, click on **OK**.

Figure 49. Warning before locking the DSFID field

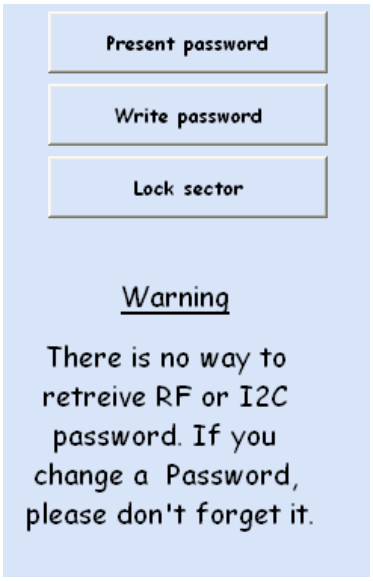


3.2.12 RF password management

The user interface displays a warning concerning password changes: you should be very careful when you change a password because there is no way of retrieving forgotten RF passwords. You have to remember the new passwords you enter. The sectors locked by a password can only be unlocked if you can provide the correct password. *Figure 50* shows the diplayed warning.

By default, the RF and I²C passwords are '00 00 00 00'.

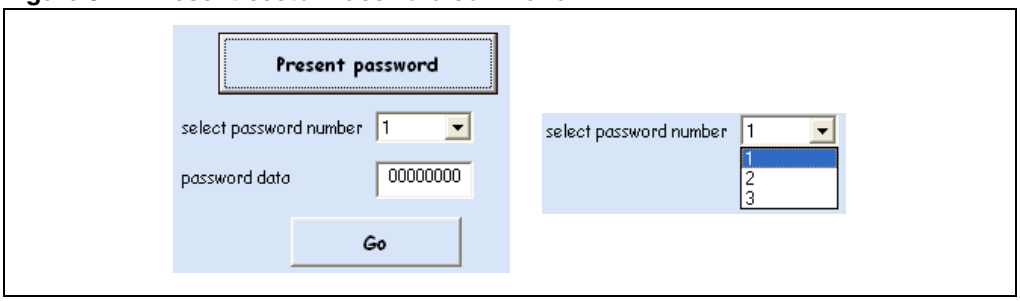
Figure 50. Warning displayed on the user interface



Present-sector Password command

The **Present password** button issues a Present-sector Password command with the data filled in the **password data** field and the selected password number.

Figure 51. Present-sector Password command



The result of the Present-sector Password command appears in the RF answer field. *Figure 52* shows a successful command, and *Figure 53* shows an example where an error occurred.

Figure 52. Present-sector Password command successful

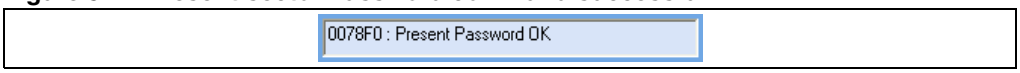
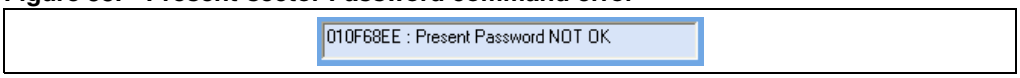


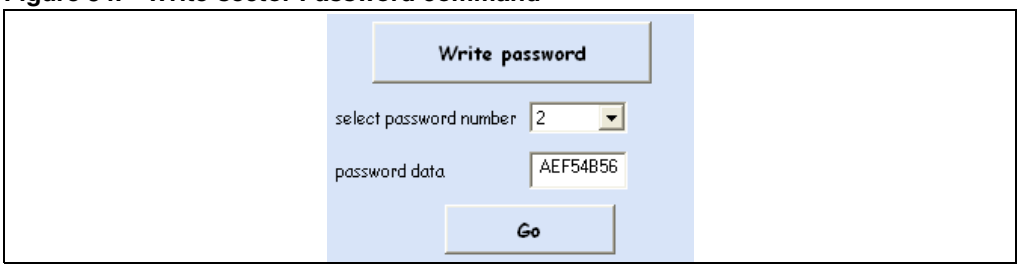
Figure 53. Present-sector Password command error



Write-sector Password command

The **Write Password** button issues a Write-sector Password command with the data filled in the **password data** field and the selected password number.

Figure 54. Write-sector Password command



When you press the **Write password** button, a warning pops up to prevent any unwanted password change. To abort the Write-sector Passord command, click on **Cancel**. To confirm the command, click on **OK**.

Figure 55. Warning before changing the password

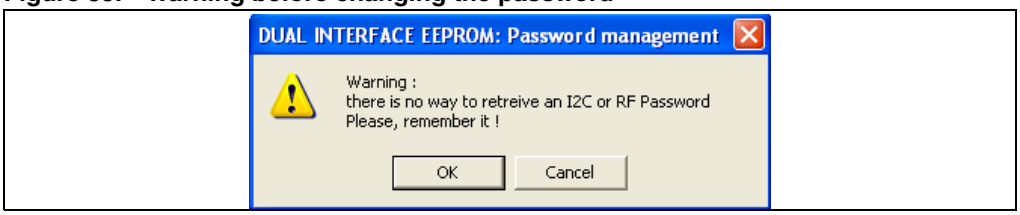
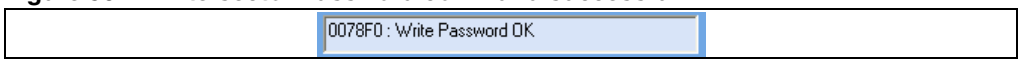
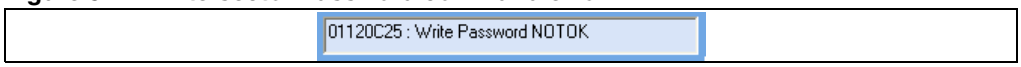


Figure 56. Write-sector Password command successful



Write Password HS

Figure 57. Write-sector Password command error



Lock-sector Password command

The **Lock sector** button issues a Lock-sector Password command with the data configured in the **select sector number**, **select password number** and **select lock config** fields.

Figure 58. Lock-sector Password command

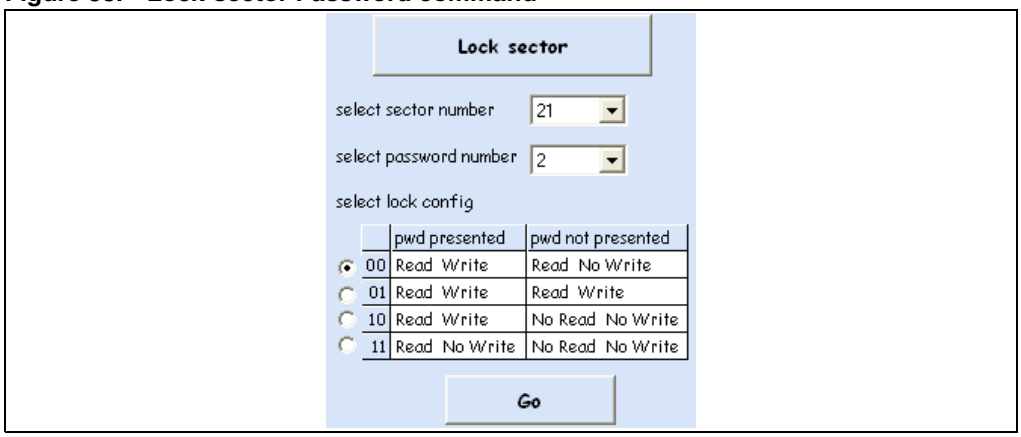


Figure 59. Lock-sector Password command successful

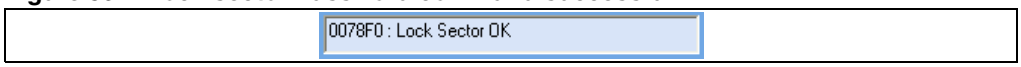
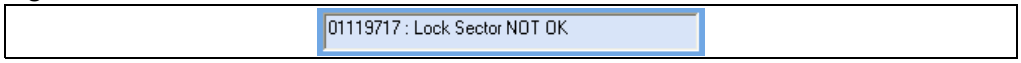


Figure 60. Lock-sector Password command error



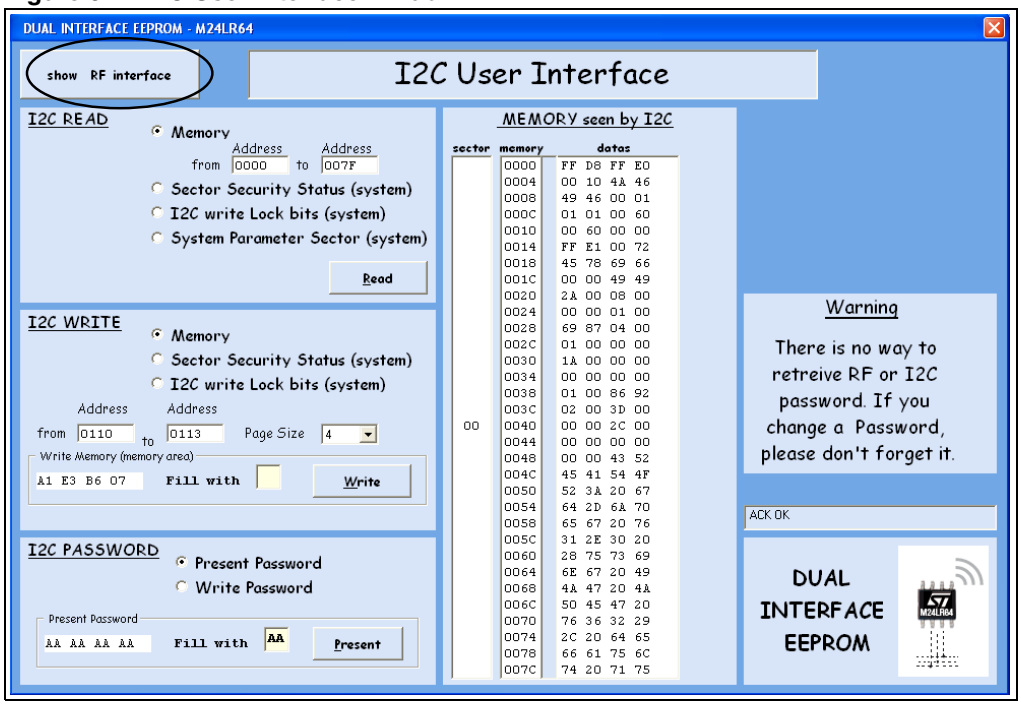
3.3 I²C channel

You can use the I2C *User Interface window*, illustrated in *Figure 62*, to exchange data between a tag connected to the I2C reader and the M24LR64-R.

With the **Show RF interface** button (*Figure 61*) you can switch from the RF user interface to the I2C user interface.

Figure 61. Button to switch between the RF and I2C interfaces

Figure 62. I2C User Interface window



3.3.1 I2C READ commands

The **Read** button issues read commands to the M24LR64-R connected to the I2C reader. To do so, select the I2C READ area, and then press on the **Read** button.

Read command to the memory array

To read the memory array, select **Memory** from the list and specify the address range to be read. Then click on the **Read** button. Addresses are managed in the same way as for RF commands (see *Section 3.2.6: Read command*).

Figure 63 shows an example where the user choses to issue a Read Memory operation from address 0010h to address 003Fh.

Figure 63. Reading the memory array

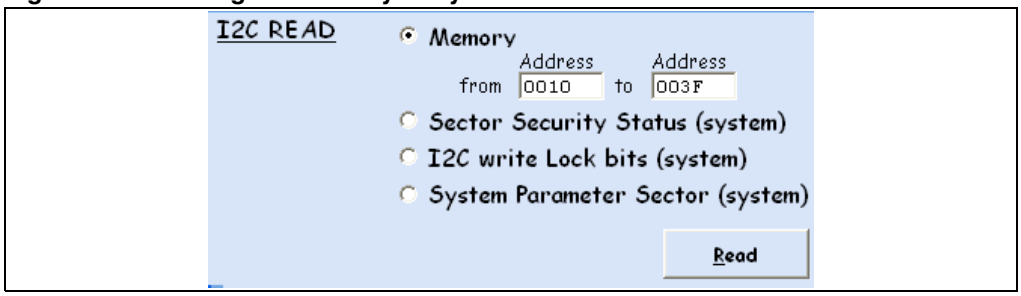


Figure 64. Result of a Read operation to the memory array

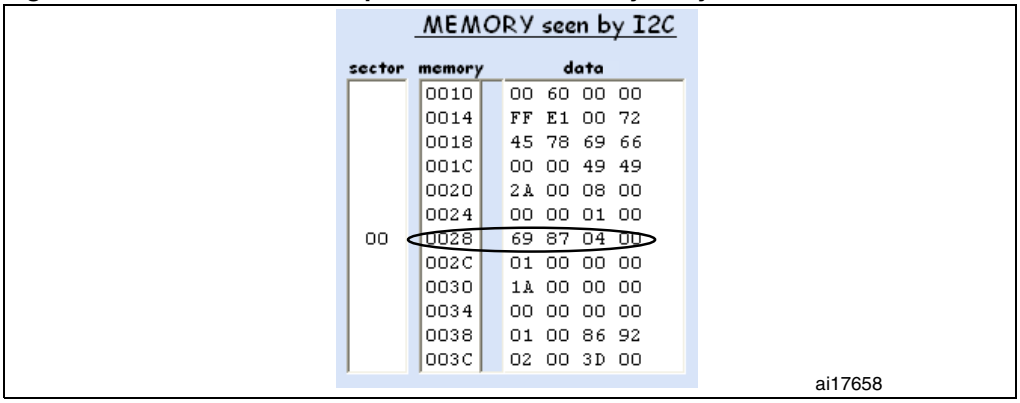


Figure 64 illustrates the result of the Read operation to the memory array. The first column shows which sector is read. The second column indicates the address of the first byte in the page. Then the third column gives the data.

Let us take the example corresponding to the data < 69 87 04 00 >

69 (69h Hex) is data for address 0028h (sector 0)

87 (87h Hex) is data for address 0029h (sector 0)

04 (04h Hex) is data for address 002Ah (sector 0)

00 (00h Hex) is data for address 002Bh (sector 0)

Reading the sector security status

To read all the sector security status bytes (RF block security), select **Sector Security Status (system)** then press the **Read** button.

Figure 65 shows how to launch an operation to read the sector security status.

Figure 65. Reading the sector security status

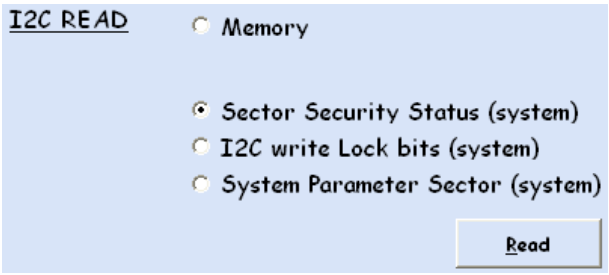
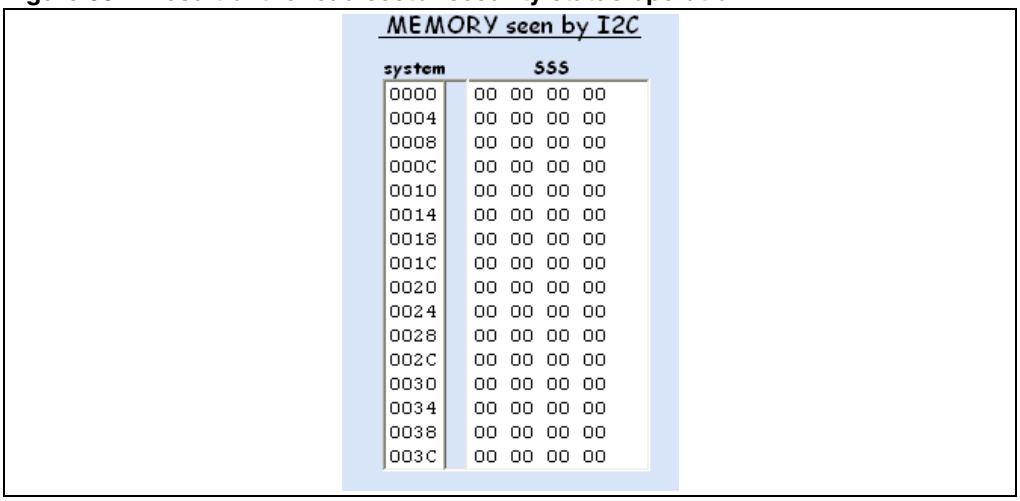


Figure 66. Result of the read sector security status operation



Reading the I2C_Write_Lock bit area

To read the 2C_Write_Lock bit area (I2C sector security), select **I2C write lock bits (system)** and press the **Read** button.

Figure 67 shows how to launch an operation to read the I2C_Write_Lock bit area.

Figure 67. Reading the I2C_Write_Lock bit area

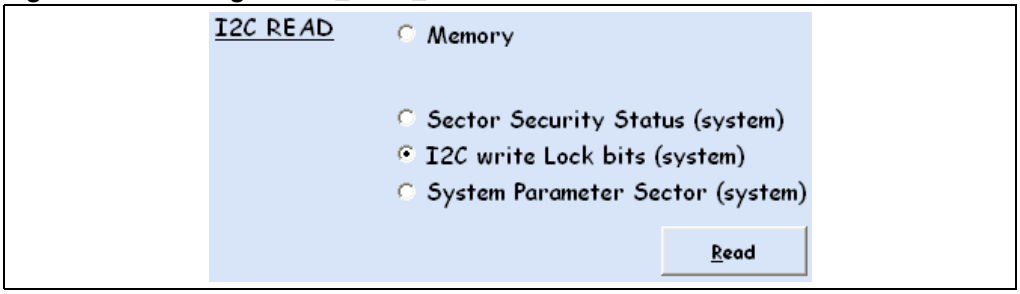
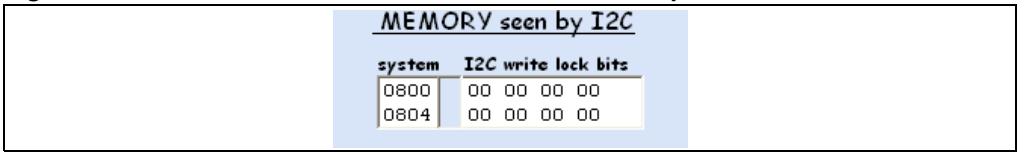


Figure 68. Result of the I2C_Write_Lock bit area read operation



Reading the system parameter sector

To read the data in the system parameter sector, select **System Parameter Sector (system)** and press the **Read** button.

Figure 69 shows how to launch an operation to read the system parameter sector.

Figure 69. Reading the system parameter sector

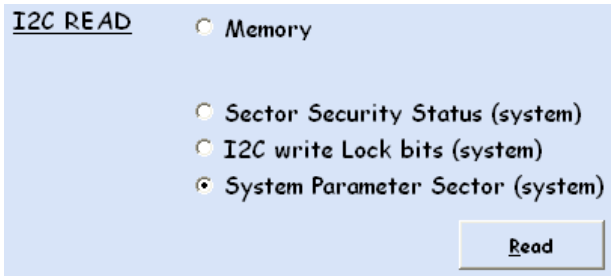
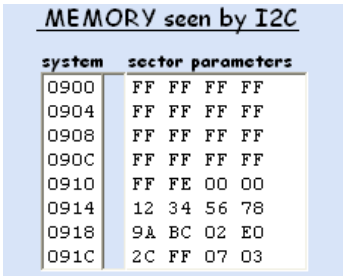


Figure 70. Result of the read system parameter sector operation



Please, refers to the M24LR64-R dataheet for the system parameters.

3.3.2 I2C WRITE commands

The **Write** button is used to issue write commands to the M24LR64-R connected to the I2C reader. The button is located in the I2C WRITE area of the I2C User Interface window (see *Figure 62*).

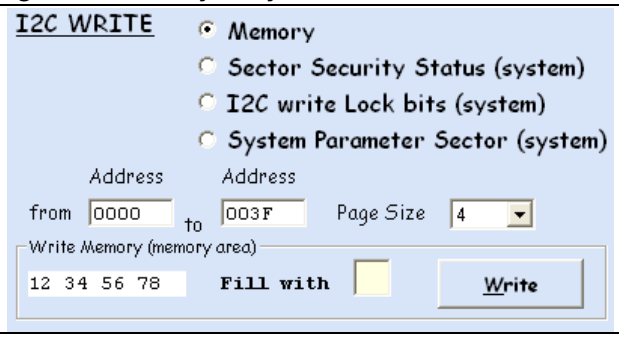
To issue a command, select the I2C WRITE area and press the **Read** button.

Write command to the memory array

To write to the memory array, select **Memory** and choose the address range to be written. Then press the **Write** button. Addresses are managed is the same way as for RF commands (see *Section 3.2.6: Read command*).

Figure 71 shows how to launch a write operation to the memory array.

Figure 71. Writing to the memory array



In this example, a write operation is issued to write the data < 12 34 56 78 > to EEPROM memory addressses 0000 to 003F by I2C communication.

Note that in the I2C answer, you are notified of whether the write cycle succeeded or failed (see *Figure 72* and *Figure 73*).

Figure 72. Write cycle successful

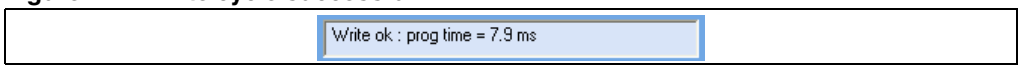


Figure 73. Write cycle failed (no write cycle detected)

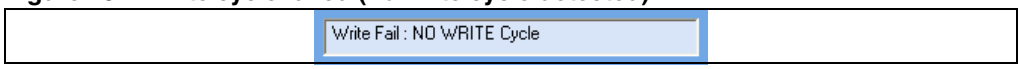
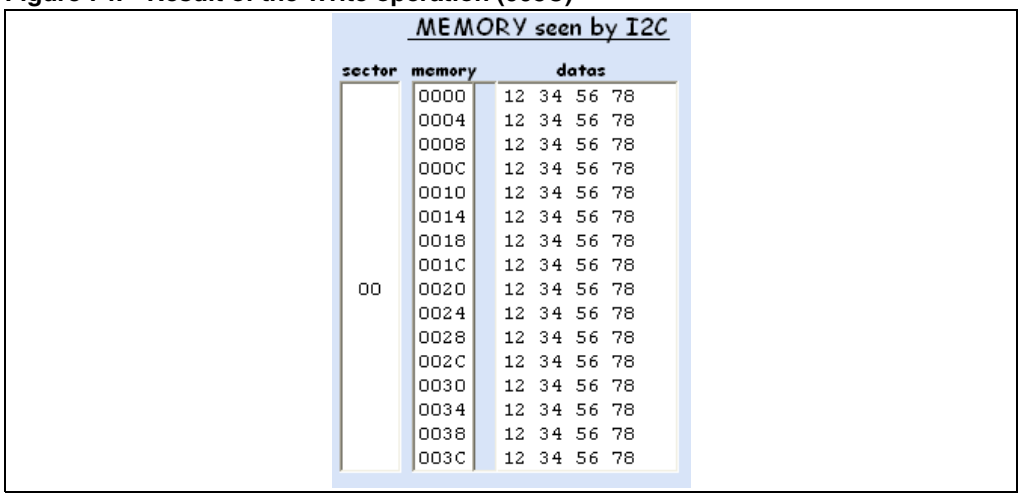


Figure 74 shows the result of the write operation.

Figure 74. Result of the Write operation (003C)



You can write 1, 2, 3 or 4 bytes by playing with the **Page Size** field.

Figure 75. Page Size field

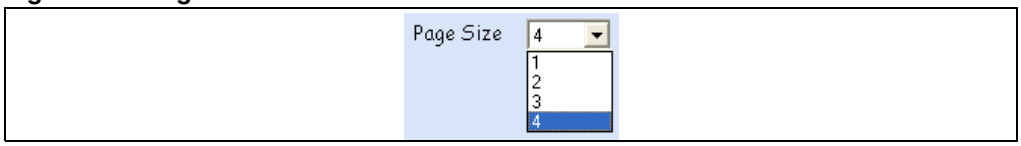
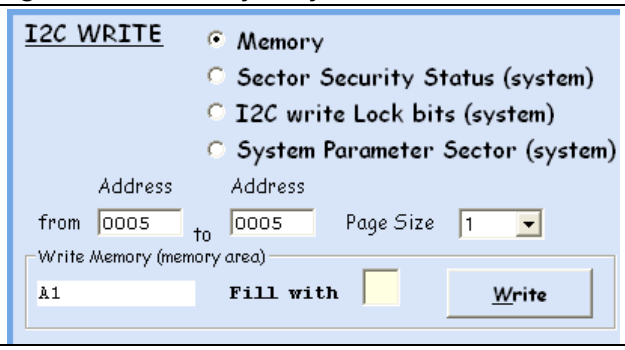


Figure 76 shows how to write “A1” to EEPROM memory address 0005.

Figure 76. Writing A1 to the memory array



Writing to the sector security status area

To write to the sector security status area, select **Sector Security Status (system)** and type the address range to be written, then press the **Write** button. Addresses are managed is the same way as for RF commands (see *Section 3.2.6: Read command*).

Please note that the I2C password has to be presented successfully prior to writing to the Sector Security Status area.

Figure 77 shows how to write to the sector security status area.

Figure 77. Writing to the sector security status area

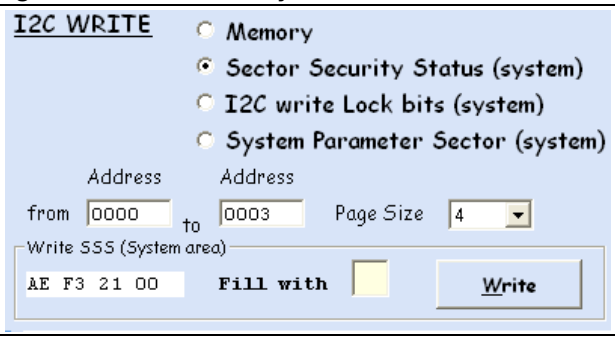
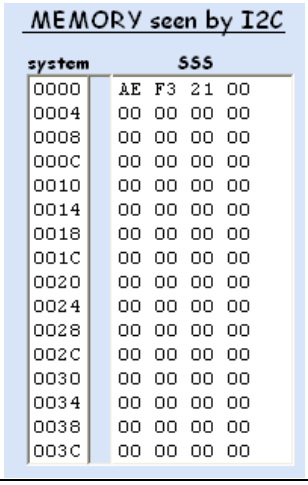


Figure 78 shows the result of the operation.

Figure 78. Result of the write to sector security status area operation



Writing to the I2C_Write_Lock bit area

To write to the I2C_Write_Lock bit area, select **I2C write lock bits (system)** and fill the address range to be written, then press the **Write** button. Addresses are managed is the same way as for RF commands (see *Section 3.2.6: Read command*).

Please note that the I2C password has to be presented successfully prior to writing to the I2C_Write_Lock bit area

Figure 79 shows how to launch a write operation to the I2C_Write_Lock bit area.

Figure 79. Writing to the I2C_Write_Lock bit area

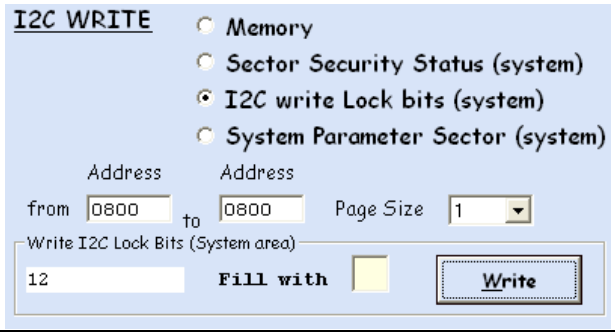
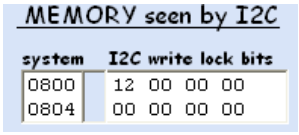


Figure 80 shows the result of the operation.

Figure 80. Result of the write to I2C_Write_Lock bit area operation



3.3.3 I2C PASSWORD commands

In the I2C PASSWORD area of the I2C User Interface window (see *Figure 62*), select **Present Password** to be able to send an I2C Present Password command. The button at the bottom right-hand side of the I2C PASSWORD area will indicate **Present**.

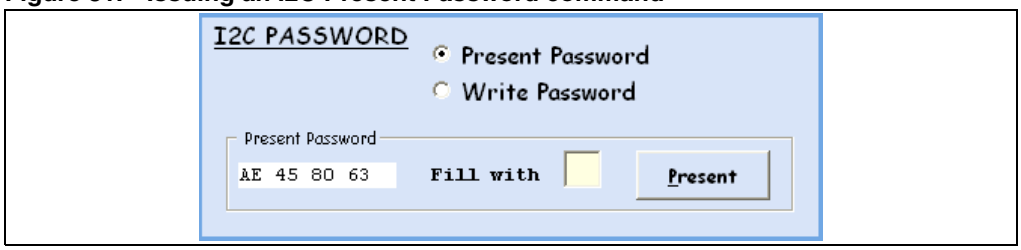
In the same area, select **Write Password** to be able to send an I2C Write Password command. The button at the bottom right-hand side of the I2C PASSWORD area will indicate **Write**.

I2C Present Password command

To issue an I2C Present Password command, select **Present Password** and type the I2C password into the **Present Password** field.

Figure 81 shows how to launch an I2C Present Password command.

Figure 81. Issuing an I2C Present Password command



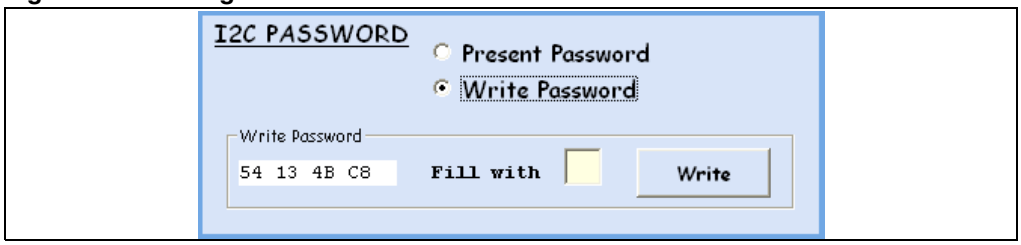
In this example, an I2C Present Password command is sent with the I2C password <AE 45 80 63 >.

I2C Write Password command

To issue an I2C Write Password command, select **Write Password** and type the I2C password ito the **Write Password** field.

Figure 82 shows how to launch an I2C Write Password command.

Figure 82. Issuing an I2C Write Password command



In this example, an I2C Write Password command is sent with the I2C password <54 13 4B C8 >.

A warning (see *Figure 83*) was added to prevent unwanted password changes.

Figure 83. Warning

Note that in the I2C answer, you are notified of whether the write cycle succeeded or failed (see *Figure 84* and *Figure 85*).

Figure 84. Write Password cycle successful

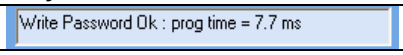
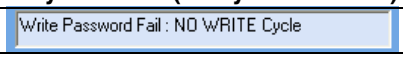


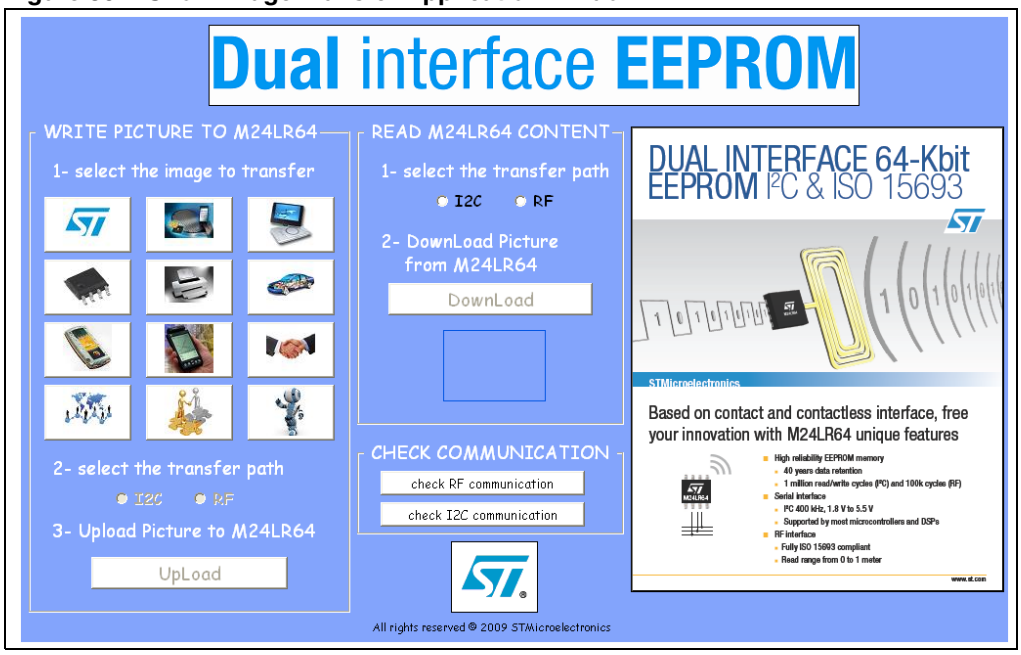
Figure 85. Write Password cycle failed (no cycle detected)



4 Data transfer management (picture demo)

Select **show Image Transfer Application** from the main menu of the *M24LRxx_Application_Software* application.

Figure 86. Show Image Transfer Application window



The show Demo application allows you to play with the M24LR64-R device with both interfaces: I2C and RF.

With this demo you can load a picture by RF or I2C (.jpeg file of 2 Kbytes) into the M24LR64-R device. You can also download and display the contents of the memory by I2C or RF. If JPG-like contents were previously loaded into the EEPROM, you will be able to visualize them.

4.1 Check communication

This tool help you test the I2C or RF communications between the M24LR64-R device and the reader.

Figure 87. Check communication tool

If you want to use the RF interface to check communications, click on the **check RF communication** button. If you want to use the I2C bus, click on the **check I2C communication** button.

4.1.1 Check communication by RF

After clicking on **check RF communication**, the button changes to **running** as shown in *Figure 88*.

If the circle next to the **running** button is green, the communication by RF between the M24LR64-R and the reader is OK.

Figure 88. RF communication between the tag and the reader is OK

If the circle next to the **running** button is red, the communication by RF between the M24LR64-R and the reader is NOT OK

Figure 89. No RF communication between the tag and the reader

4.1.2 Check communication by I2C

After clicking on **check I2C communication**, the button changes to **running** as shown in *Figure 90*.

If the circle next to the **running** button is green, the communication by I2C between the M24LR64-R and the reader is OK.

Figure 90. I2C communication between the tag and the reader is OK

If the circle next to the **running** button is red, the upload by I2C failed.

Figure 91. Failed upload by I2C

4.2 Writing a picture to your M24LR64-R

In the show Demo application window, go to the WRITE PICTURE TO M24LR64 area (see *Figure 92*) , and choose the picture you would like to upload into the memory. Click on the picture to select it.

Figure 92. WRITE PICTURE TO M24LR64

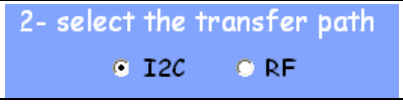
In *Figure 93*, the ST logo was chosen as an example.

Figure 93. Picture to be uploaded

After selecting the picture, you need to choose which of the I2C or RF interface you will use to upload it to the memory of the M24LR64-R device.

To upload it by I2C, click on **I2C** as shown below.

Figure 94. Selecting I2C to upload the picture

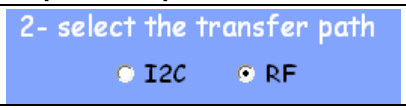


You then have to click on the **Upload by I2C** button as shown in *Figure 95*.

Figure 95. Uploading the picture by I2C

To upload the picture by RF, click on **RF** as shown below.

Figure 96. Selecting RF to upload the picture



You then have to click on the **Upload by RF** button to launch the upload process (see *Figure 97*).

Figure 97. Uploading the picture by RF

You can use the CHECK COMMUNICATION area to verify whether the data are written successfully or not.

If the I2C bus was used, click on **check I2C communication**. The color of the circle will tell you if the upload process was successful (green circle like in *Figure 98*) or failed (red circle like in *Figure 99*).

Figure 98. I2C upload process successful

Figure 99. I2C upload process failed

If the RF interface was used, click on **check RF communication**. The color of the circle will tell you if the upload process was successful (green circle like in *Figure 100*) or failed (red circle like in *Figure 101*).

Figure 100. RF upload process successful

Figure 101. RF upload process failed

4.3 Read/display the M24LR64-R's contents

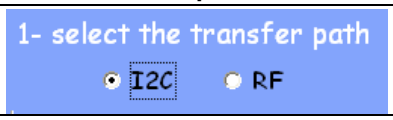
In the show Demo application window, the READ M24LR64 CONTENT area allows you to display the contents of the memory on your computer screen if the picture was uploaded.

Figure 102. READ M24LR64 CONTENT interface

You first have to select which of the I2C or RF interface you will use to download the picture from the memory of the M24LR64-R.

To download it by I2C, click on **I2C** as shown below.

Figure 103. Selecting I2C to download the picture

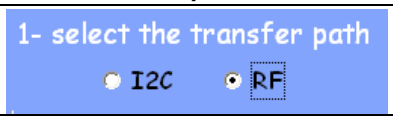


You then have to click on the **Upload by I2C** button to launch the upload process (see *Figure 104*).

Figure 104. Downloading the picture by I2C

To download the picture by RF, click on **RF** as shown below.

Figure 105. Selecting RF to download the picture

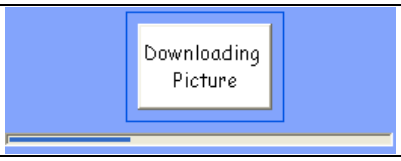


You then have to click on the **Upload by RF** button to launch the upload process (see *Figure 106*).

Figure 106. Downloading the picture by RF

The application reads the contents of the EEPROM. A progress bar (shown in *Figure 107*) indicates that the process is running.

Figure 107. Progress bar



If the download process is successful, the picture is displayed on the screen like in *Figure 108*. Otherwise, an error message appears (see *Figure 109*).

Figure 108. The ST logo is displayed

Figure 109. Error message

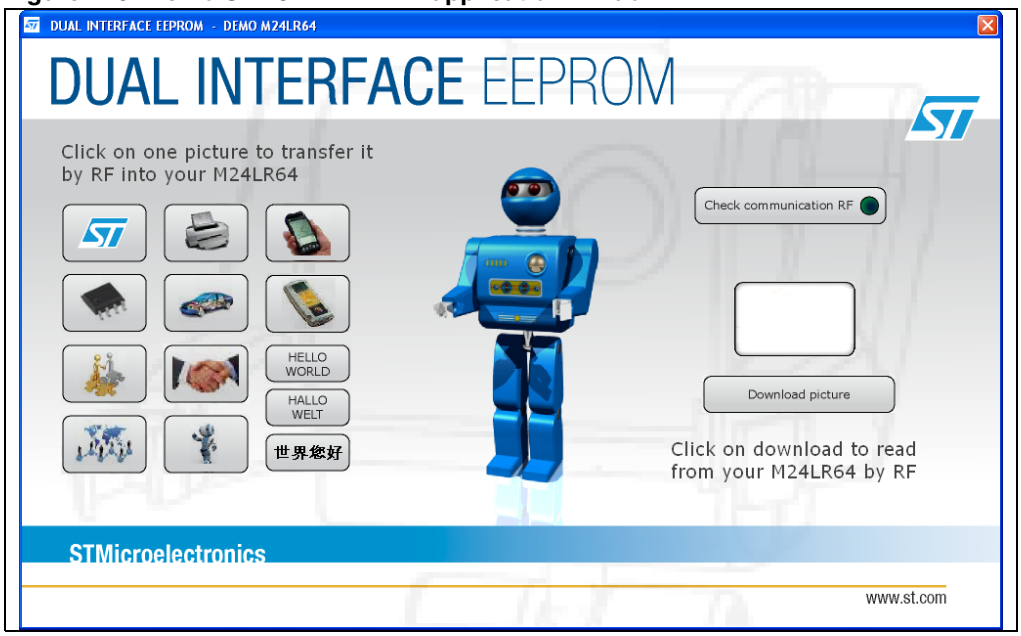
You can use the CHECK COMMUNICATION area to verify whether the data were read successfully or not.

If you used the I2C bus to download the picture, click on **check I2C communication**. The color of the circle will tell you if the upload process was successful (green circle) or failed (red circle).
If you used the RF interface to download the picture, click on **check RF communication**. The color of the circle will tell you if the upload process was successful (green circle) or failed (red circle).

5 Demo application for use with DEMOKIT-M24LR-A

The demo application window, shown in *Figure 110*, is intended for use with the DEMOKIT-M24LR-A kit. All the pictures are in the bitmap format to be compliant with the STM32-PRIMER2 firmware and LCD screen driver.

Figure 110. Demo STM32-PRIMER2 application window



5.1 Checking the RF communication

To check the RF communication between the reader and the reference antenna, press the **check RF communication** button (see *Figure 111*). The button changes to **running**. If the RF communication between the reader and the reference antenna is good, the circle is green like in *Figure 112*. If there is no RF communication between the reader and the reference antenna, the circle appears red like in *Figure 113*.

Figure 111. Check RF communication button

Figure 112. RF communication ongoing between reader and reference antenna

Figure 113. No RF communication between reader and reference antenna

5.2 Uploading a picture to your DEMOKIT-M24LR-A by RF

Use the frame shown below to upload a picture by RF.

Figure 114. Upload frame

Click on a picture to upload the picture in bmp format to the M24LR64-R by RF.

You can use the three additional icons on the right-hand side (HELLO WORLD, HALLO WELT...) to decrease the upload time (3 seconds versus 20 seconds).

5.3 Downloading a picture from your DEMOKIT-M24LR-A by RF

Press the **click to dowload Picture** button shown below to download a picture by RF. Once dowloaded, the picture appears next to the button as shown in *Figure 116* and *Figure 117*.

Figure 115. Click to download Picture button

Figure 116. HELLO WORLD picture downloaded

Figure 117. ST logo downloaded

5.4 Check communication status

You can use the CHECK COMMUNICATION area to verify whether the data were written or read successfully or not.

The green circle (*Figure 118*) indicates that the RF upload/download process is going smoothly.

The red circle (*Figure 119*) indicates that errors are occurring during the RF upload/download process.

Figure 118. Upload/download process going smoothly

Figure 119. Upload/download process with errors

5.5 Using your STM32-PRIMER2 to read the contents of the reference antenna by I2C

If the picture was uploaded by RF as described above, you will be able to display it on the LCD screen of your STM32-PRIMER2.

Please refer to the UM0850 user guide to configure your STM32-PRIMER2 and use the embedded software.

Enjoy your M24LR64-R kit!

6 Revision history

Table 1. Document revision history

Date	Revision	Changes
28-Jan-2010	1	Initial release.

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