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# *MINIPROG C User Manual*

## *Ver101*

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## Contents

# *Chapter 1*
# *Introduction*

The **Miniprog C** programmer is an RL78/R8C Family device programmer that can program a single device at a time. The Miniprog Programmer connects to a host PC using USB and provides flexible programming options that allow the user to fully customize the process. The **Miniprog C** programmer provides an economical and reliable means of programming a wide range of RL78/R8C microcontroller units (MCUs). It is designed with a versatile hardware platform to support programming of different MCUs. The **Miniprog C** programmer can be used to program single devices by copying data held in an internal flash memory to the MCUs' internal memory.

**Miniprog C** provides an RS232 communication port for interfacing and automating the production programming process.

**Miniprog C** works only with Crypto V500 or above software revisions

## 1.1 Features

The **Miniprog C** features include:

- Economical means of programming the internal flash memory of a wide range of RL78/R8C family of microcontroller units.
- Stand-alone programming mode of operation.
- Single +5V, 3A dc power supply requirement.
- One pair of 14 pin FRC male connectors to accommodate MCU target.
- Multicolor Status LED.
- Supports encryption of hex file with a 16 digit password key.
- Supports Factory reset & firmware upgrades
- User has the option to set product count
- RS232 communication port for interfacing external systems through AT commands.

## 1.2 Overview

CRYPTO software allows user to encrypt and download the hex-file from PC to **Miniprog C** using USB connection. Only if the encryption key in programmer and key used for hex-file encryption matches code will be successfully programmed. This help the user to share hex-file (encrypted) with EMS provider as the encrypted hex file can be used only with the respective programmer. In addition to this CRYPTO allows user to set number of targets to be programmed, once target count is reached programmer will wipe out its internal memory and won't program any further targets.

Crypto V500 Also displays the current target and files loaded on the connected **Miniprog C** .User also can set a file ID which is needed in the AT command for

initiation of programming, File ID helps to confirm the compatibility of required hex code on the programmer.

## 1.3 Miniprog C Programmer Connections

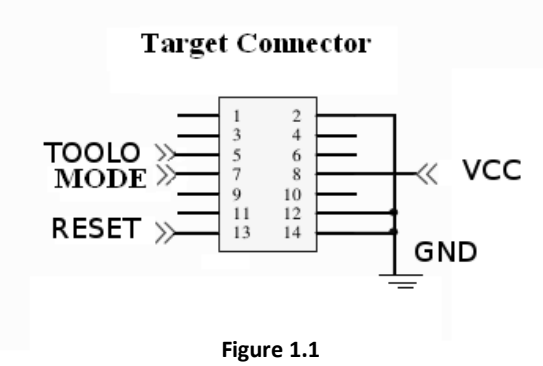


**Figure 1.1**

**Note:** For RL78 targets TOOL0 will be used
For R8C targets MODE will be used

# *Chapter 2*
# *Operation*

This chapter explains how to use **Miniprog C** device in USB_MODE & PROGRAM_MODE. The only required connection for stand-alone operation is the +5V, 3A dc power connection.

## 2.1 Software Installation

To install Crypto software:

- Insert the CD-ROM into the CD-ROM drive of the host computer. Click on the Setup to start the installation process.
- Follow instructions in the installation process.
- When the setup program is complete, Crypto icon will be available in Start menu->Neona.
- To start Crypto, click the newly created icon.

## 2.2 Driver Installation

To install the required driver:

- Insert the CD-ROM into the CD-ROM drive of the host computer. Copy the Octoprog.inf file to your system.
- Press and Hold the Start Button on programmer while connecting the USB cable. (This will initialize the programmer in USB_MODE, Refer section 2.3) & follow the steps below.

  (Note: Miniprog C is powered from USB here)

1. Right click on **my computer** & select **properties->device manager.** Right click on RENESAS OCTOPROG & select **Update driver Software**

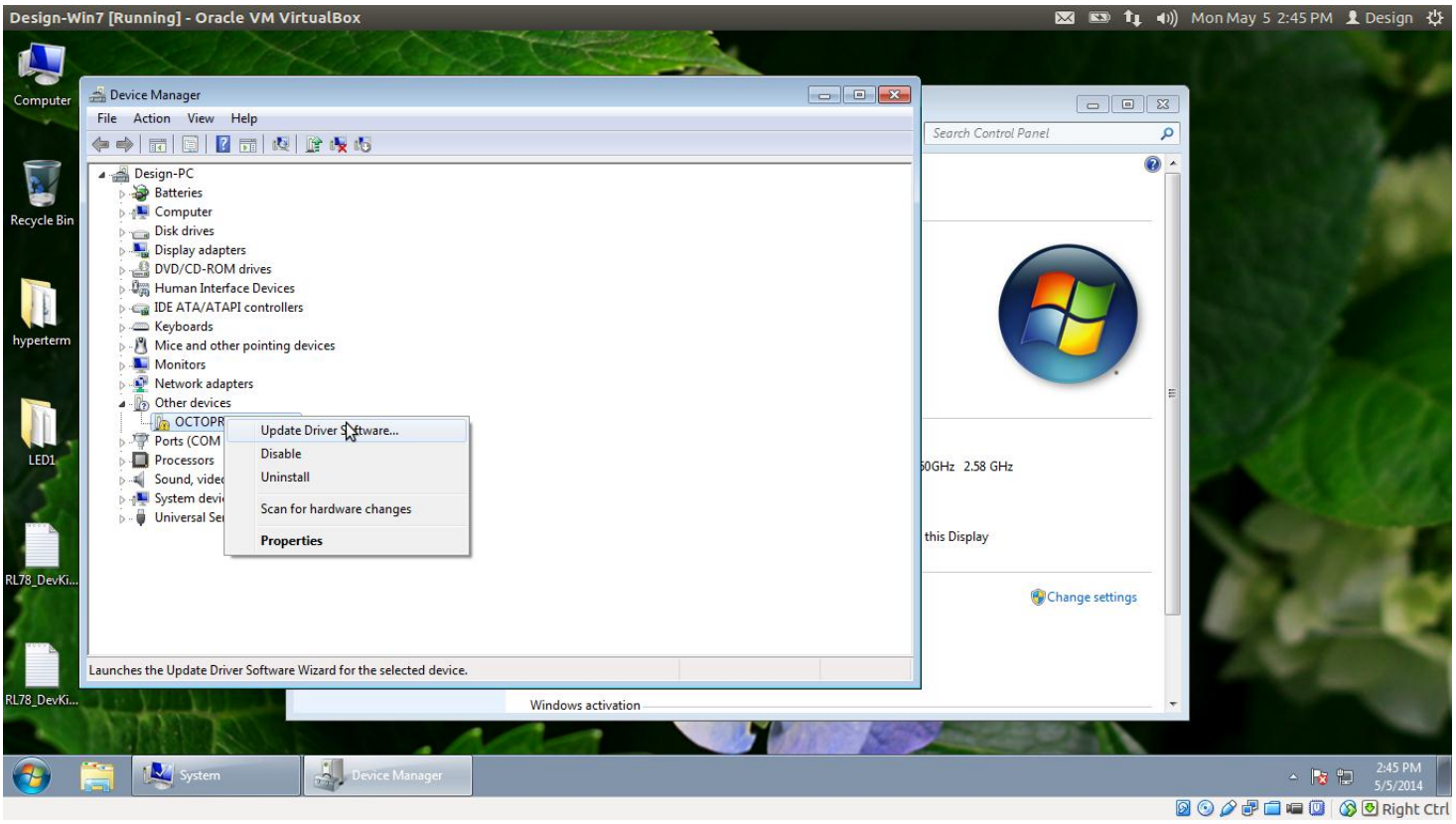


**Figure 2.1**

2. Select **Browse my computer for diver software**

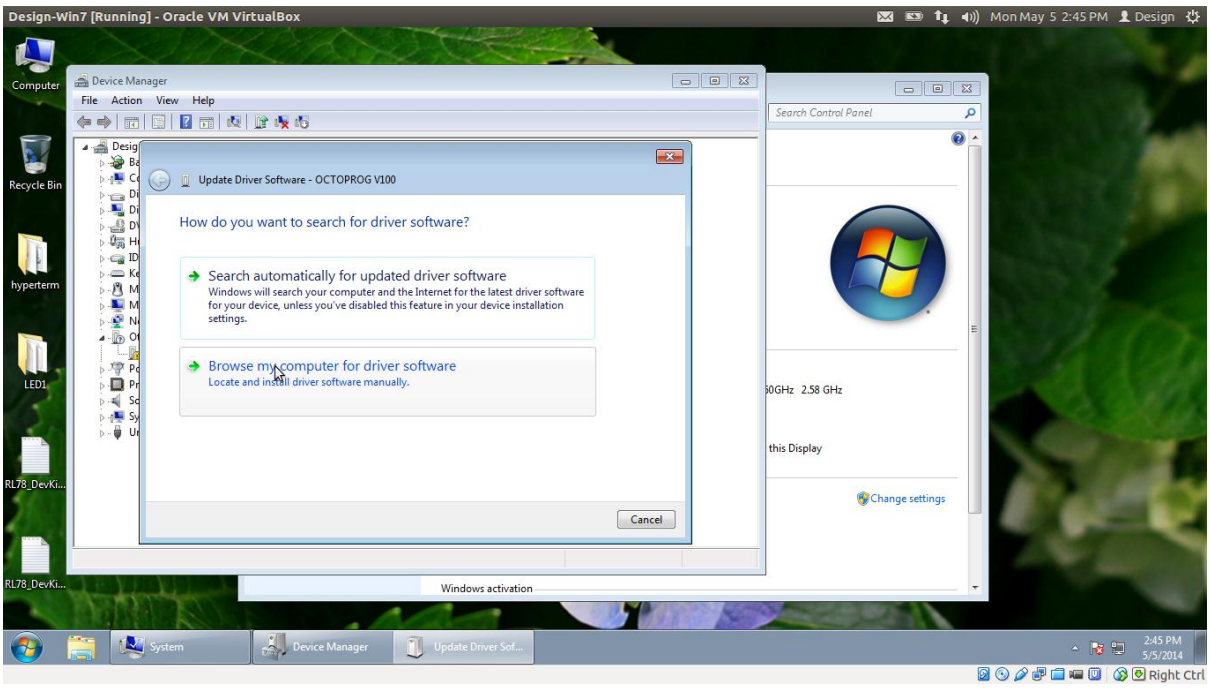


**Figure 2.2**

3. Select **Let me pick from a list of device drivers on my computer**

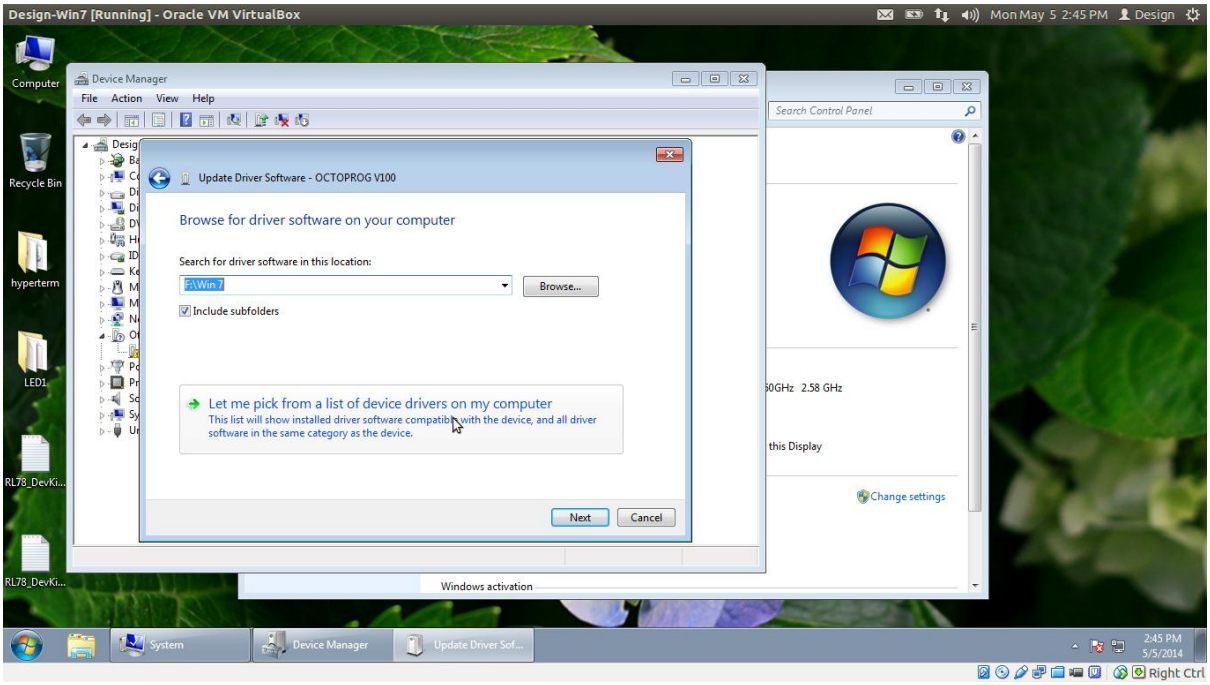


**Figure 2.3**

4. Select your device type from the list. Select **Show all devices** &click **next**

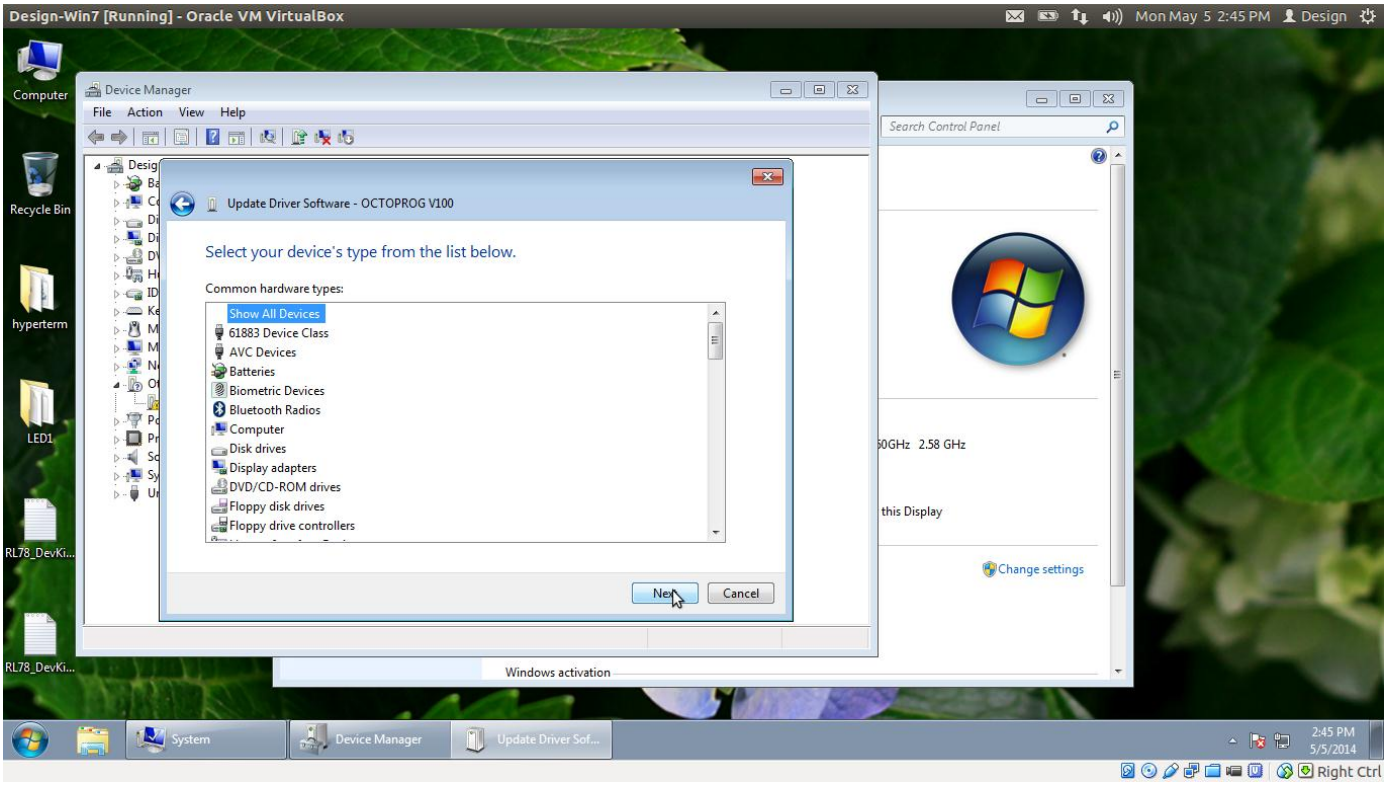


**Figure 2.4**

5. Select **Have disk**

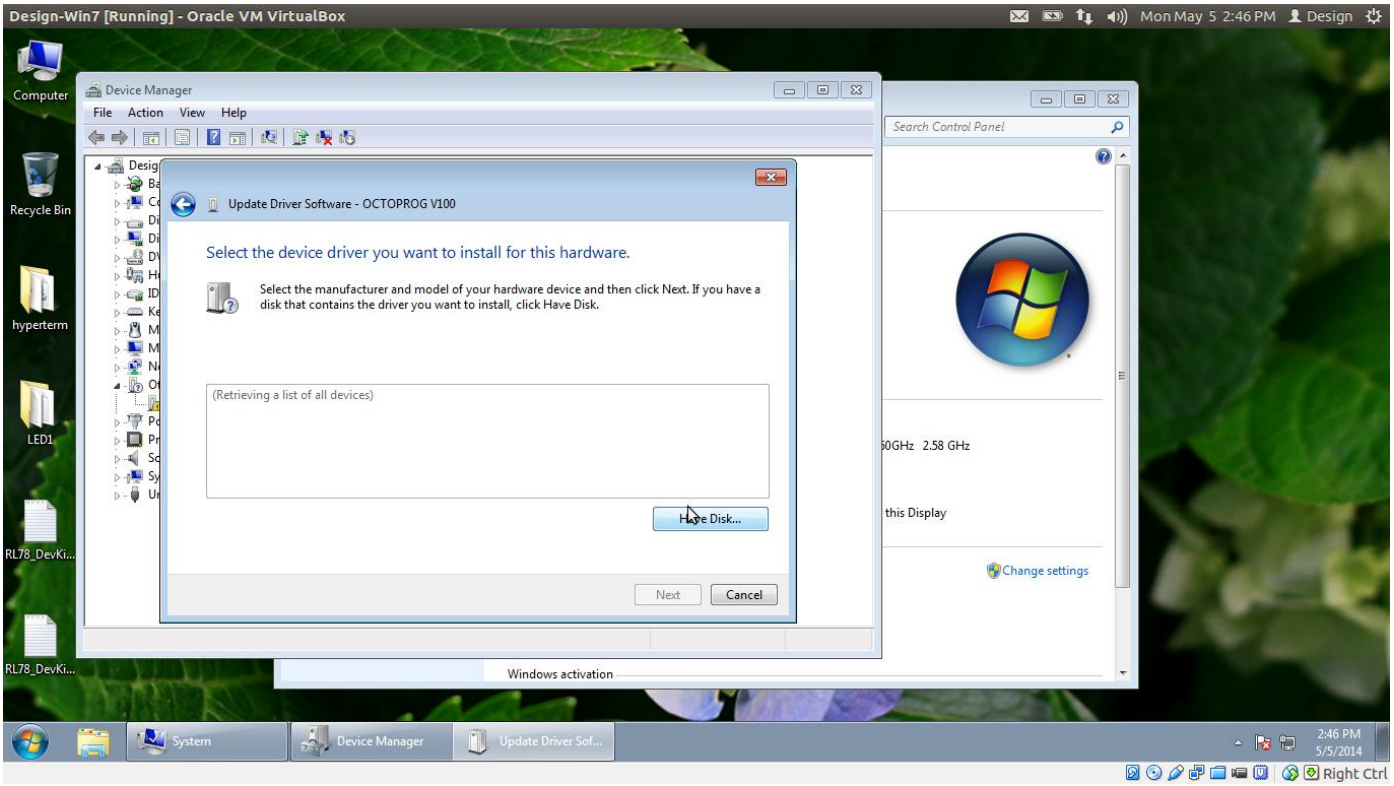


**Figure 2.5**

6. Select **Browse**

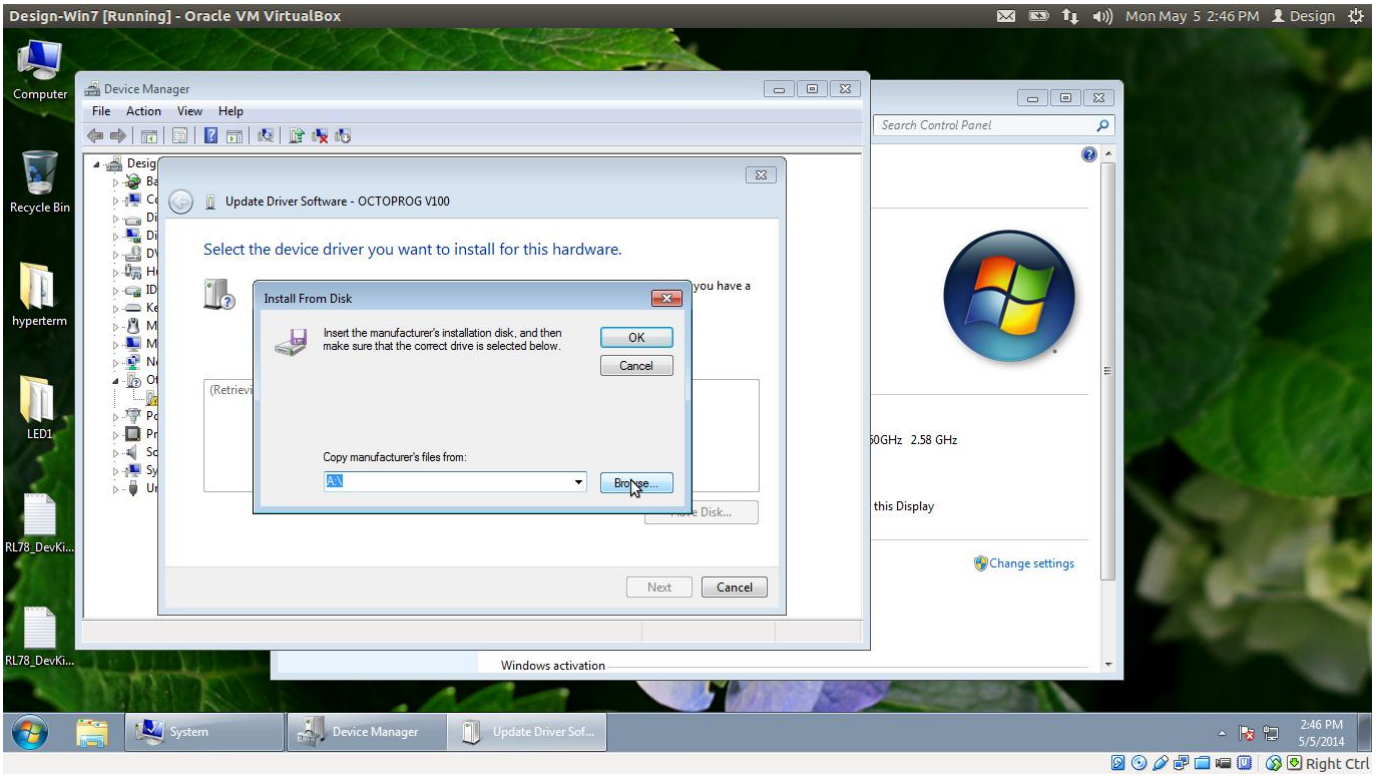


**Figure 2.6**

7. Select Octoprog.inf file.
8. Select **Yes**

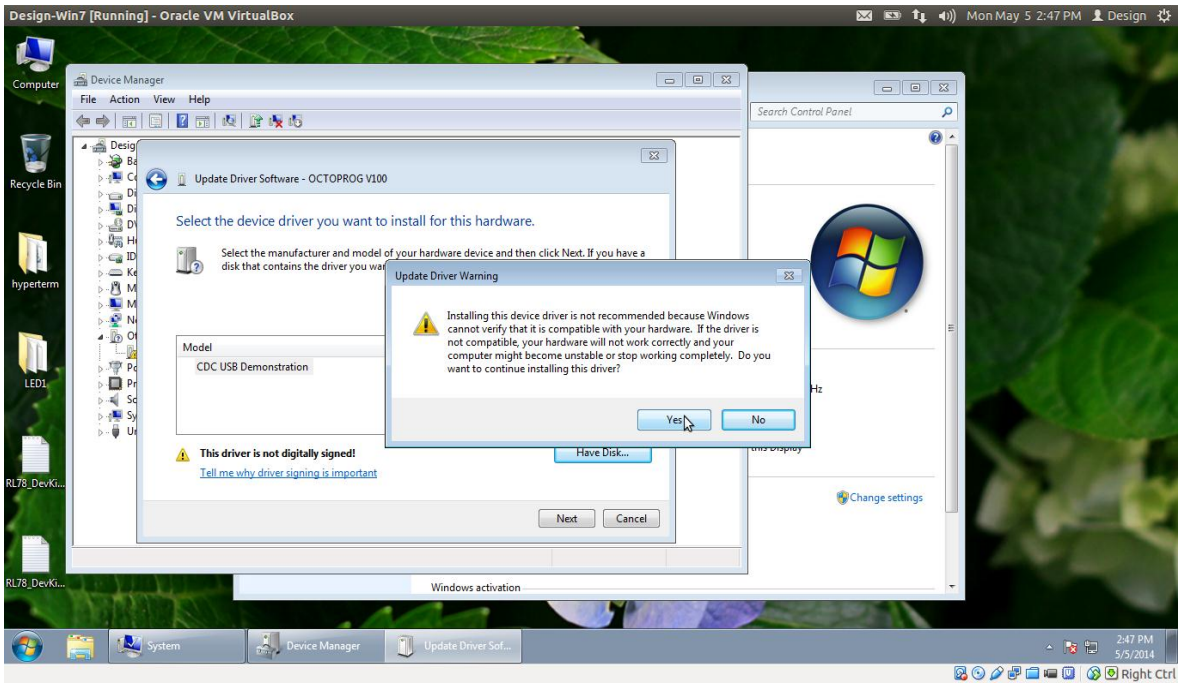


**Figure 2.7**

9. Select **Install this driver software anyway**

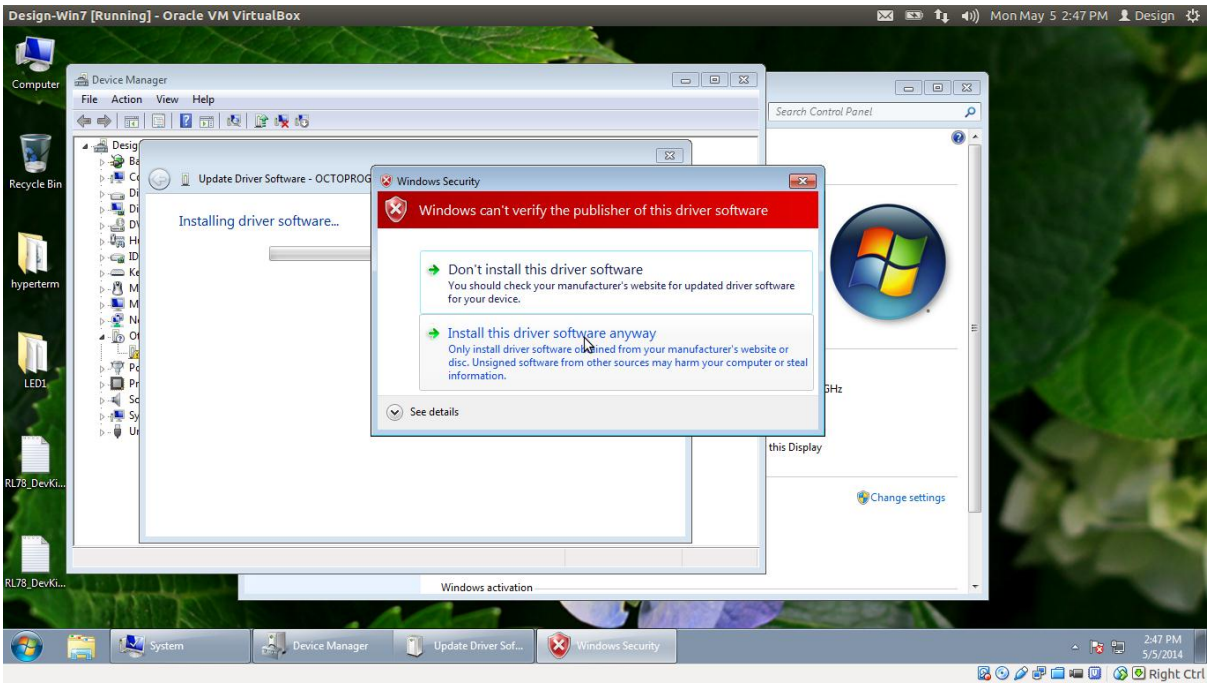


**Figure 2.8**

10. Driver successfully installed

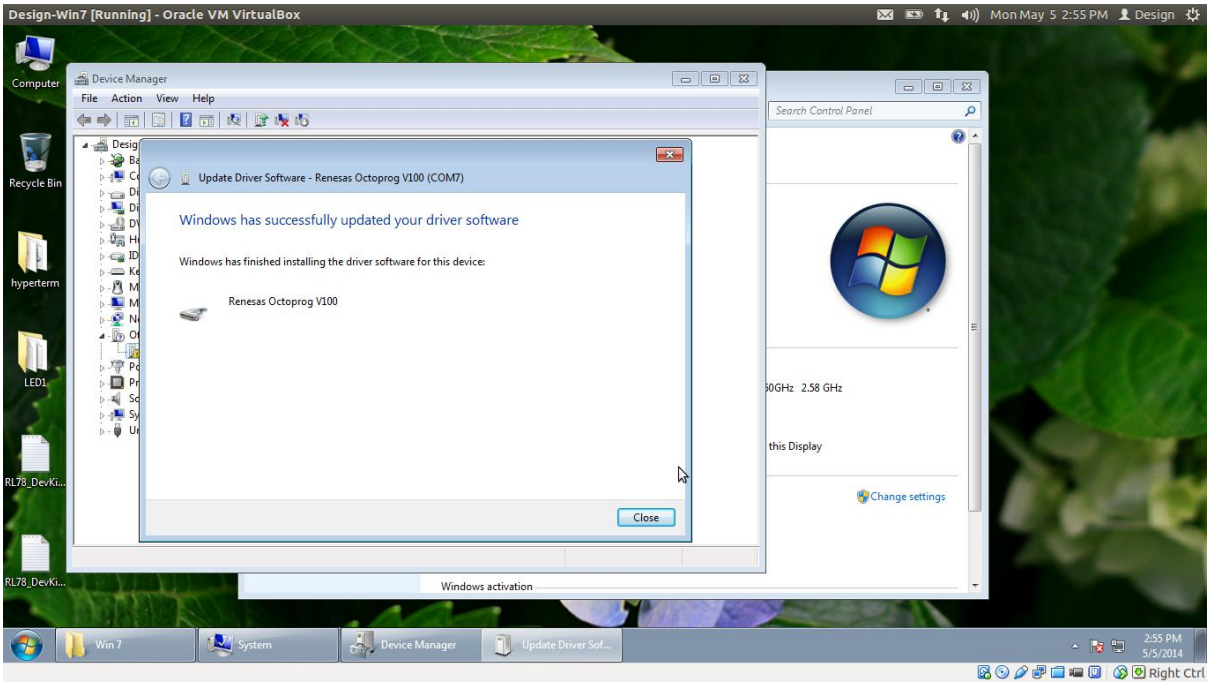


**Figure 2.9**

11. Driver is installed properly

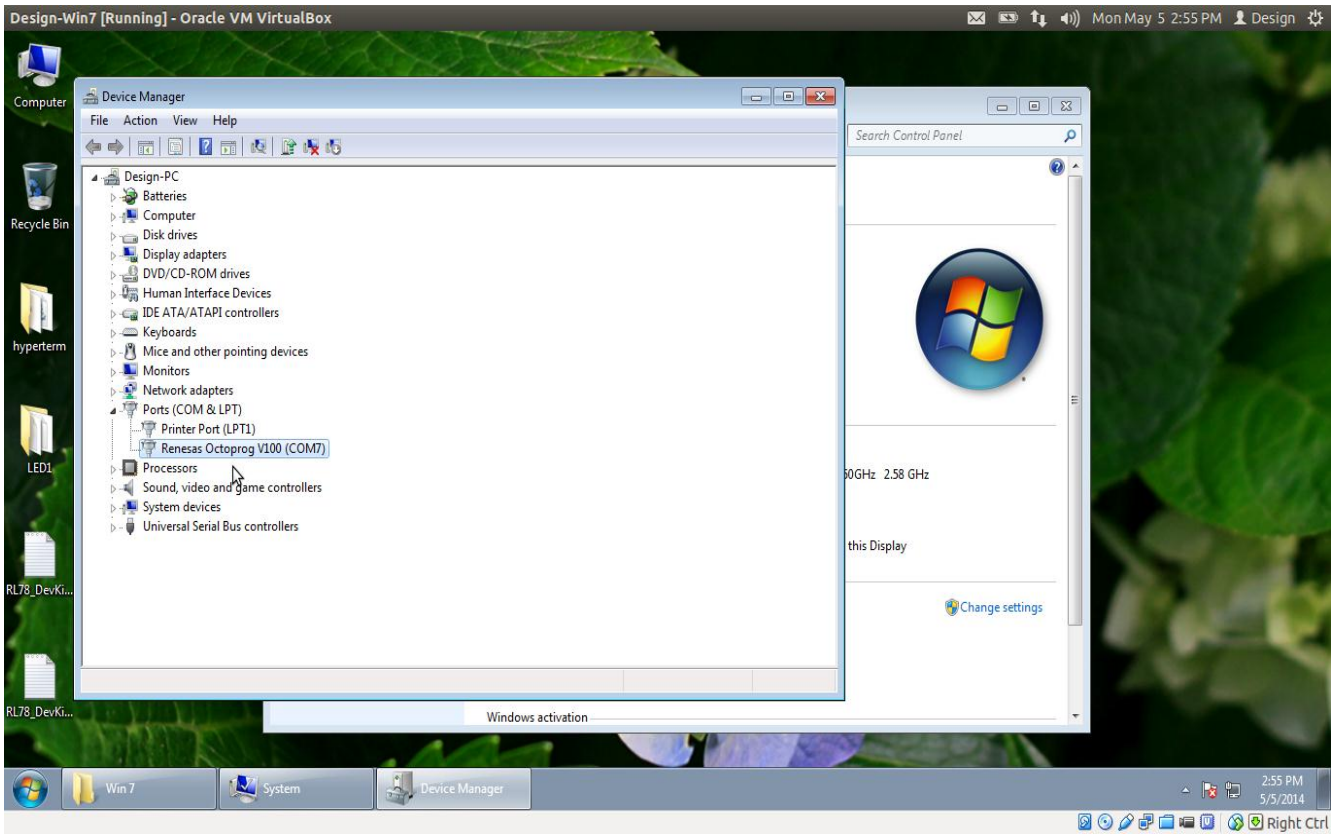


**Figure 2.10**

## 2.3 Running Crypto Application:

**Miniprog C** has two modes: USB_MODE & PROGRAM_MODE.

To get into USB_MODE, we have to power up the **Miniprog C** pressing the **START** switch simultaneously. In USB_MODE, the LED blink once. When we power up the device without holding START key, it will get into PROGRAM_MODE& the LED turns red, blue, and green in order then turned off.

**To download a program from the PC to the Miniprog C:**

- Power up the Miniprog C, pressing the **START** switch to get into the USB mode. USB cable should be connected to the PC& run the CryptoV500 application program.
- Select Com port & click on Connect. If connection is established, the red button in the application will turn green.

**Before Connection Established:**

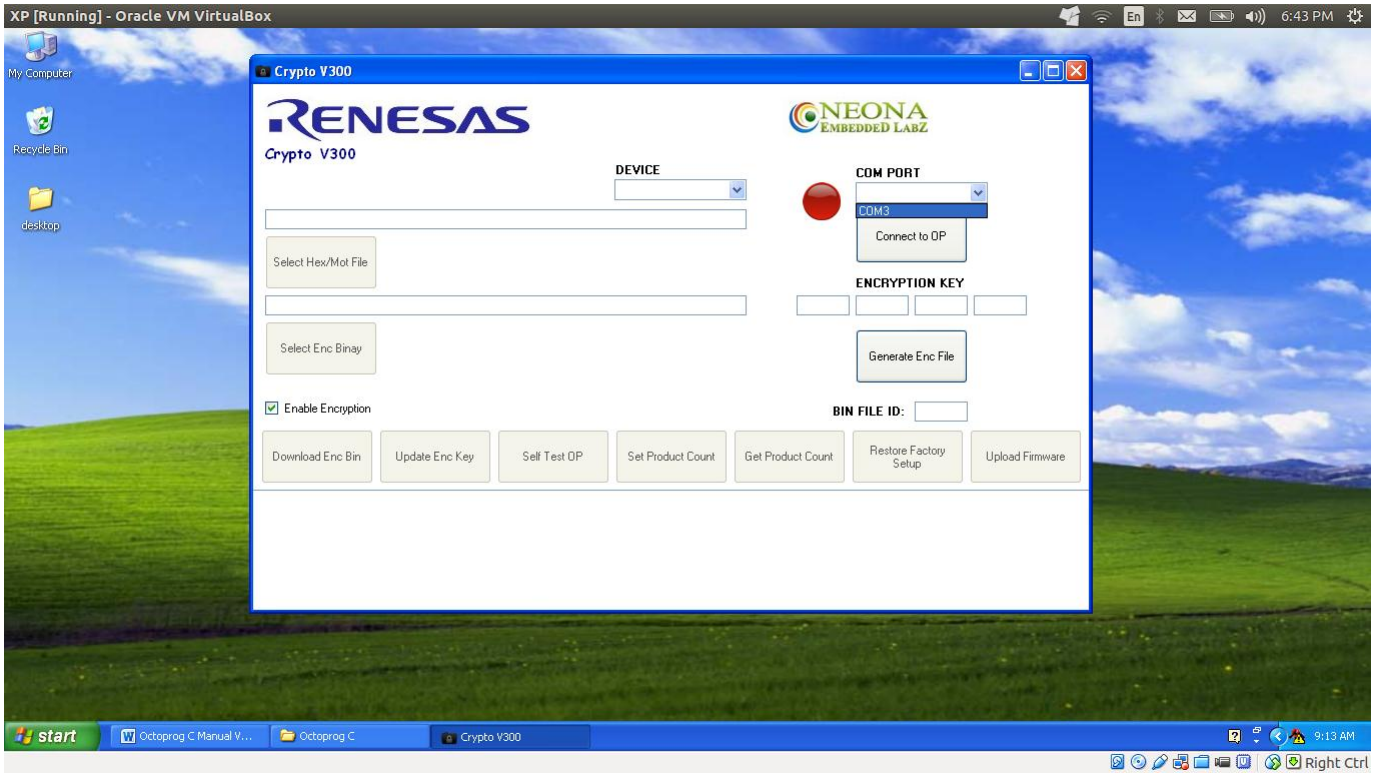


**Figure2.11**

**After Connection Established:**

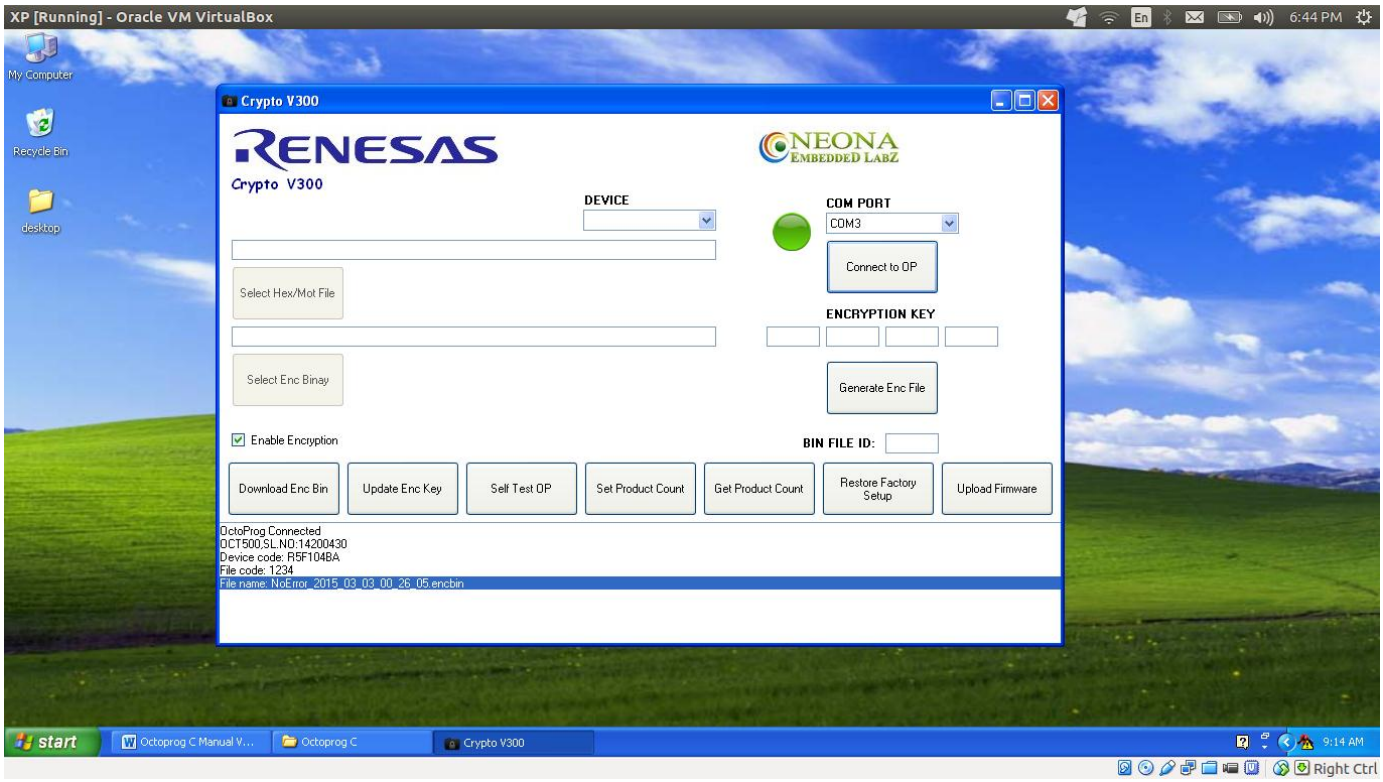


**Figure2.12**

- Select device RL78 or R8C/2X series.
- Creating Binary File: This option is available only in RL78 device. Disable **Enable encryption.** Select hex file using **Select Hex/BIN File** button & select **Generate Bin File** button. This will generate the binary file in the folder of file to be encrypted with time stamp & .bin file extension.
- Creating Encrypted File: Select **Enable encryption**. If RL78 device is selected, select the hex/bin file to be encrypted using **Select Hex/BIN File** button. If R8C2x device is selected, select the mot file to be encrypted using **Select MOT File** button. Enter the encryption key provided by the manufacturer & select **Generate Enc File** button. This will generate an encrypted file in the folder of file to be encrypted with time stamp & .encbin file extension.

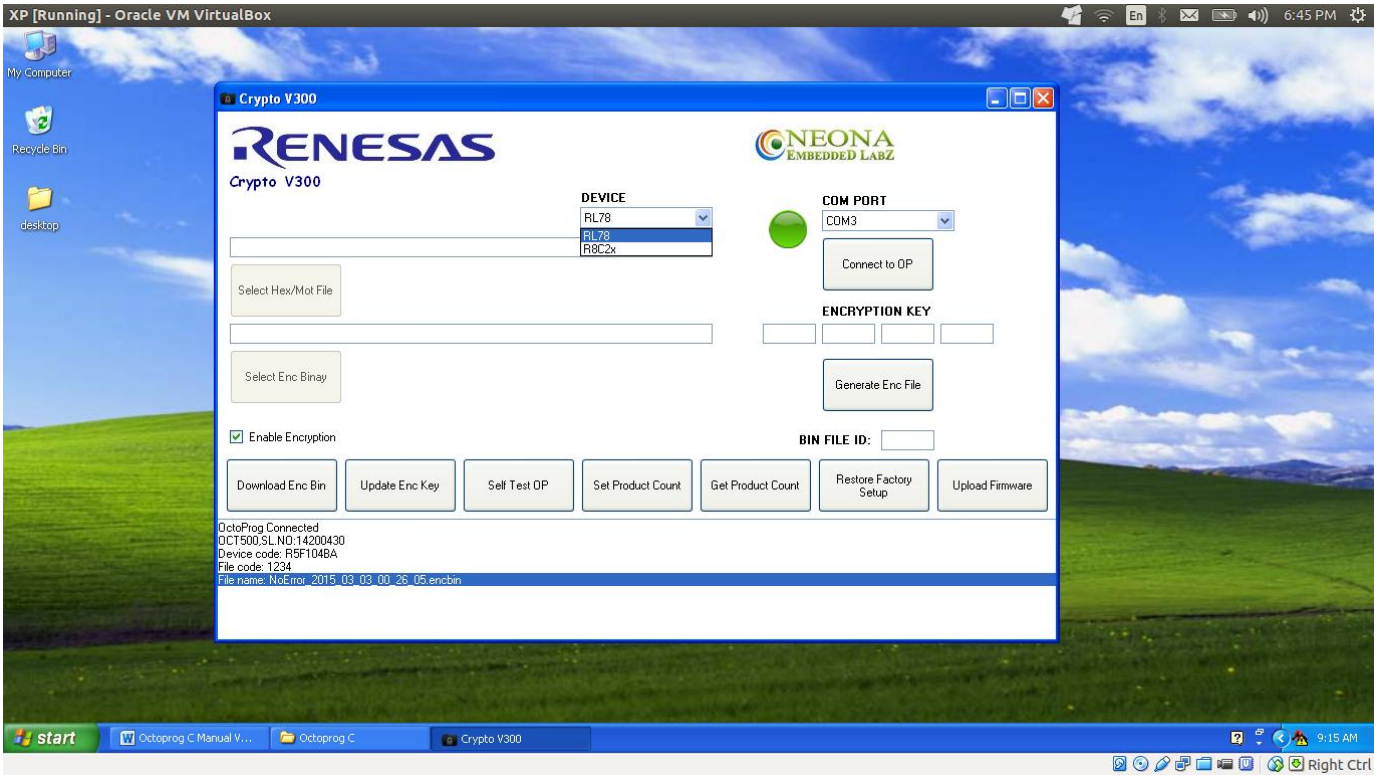


**Figure2.13**

- Downloading Encrypted File: Select **Enable encryption**. Select encrypted file using **Select Enc Binary** button. Enter an 8 digit Binary File ID & select **Download Enc File** button. If we have selected RL78 series, we need to provide the part number of RL78 to start programming (E.g. R5F104BA). If we have selected R8C/2X series, we need to just select **Download Enc File**. This will download the encrypted file to the internal flash memory of Miniprog C.
- Downloading Binary File: **This option is available only in RL78 device**. Disable **Enable encryption**. Select binary file using **Select Binary** button & enter an 8 byte Binary File ID. Select **Download Enc File** button & provide the part number of RL78 to start programming (E.g. R5F104BA). This will download the binary file to the internal flash memory of Miniprog C.

**Note:** Downloading a new program will erase the target count in the Miniprog C. **So after downloading an encrypted/binary file, it is mandatory to set the target count in** Miniprog C**.** Please refer section **to set the target count.**

**For RL78 Family:**

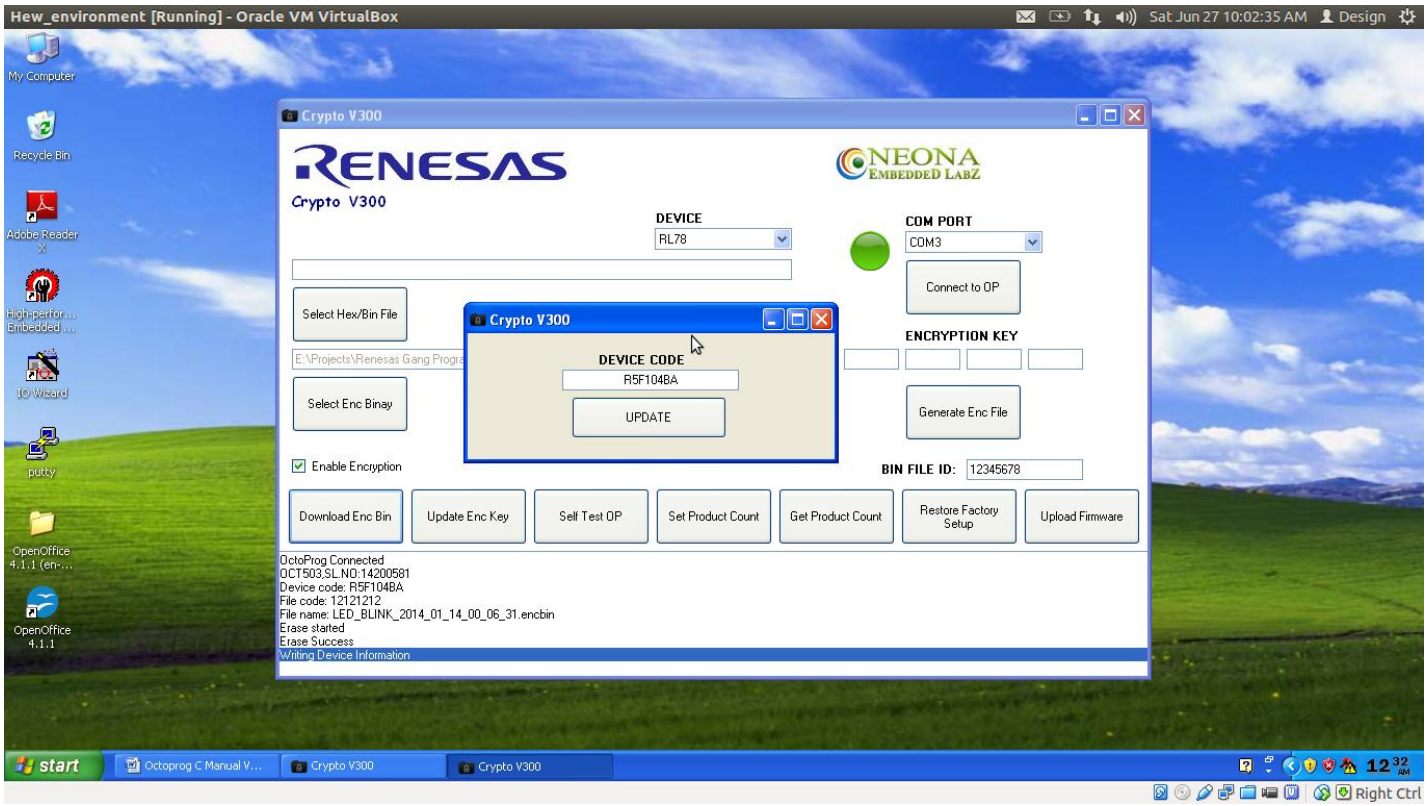


**Figure2.14**

**To set the target count:**

- Select the **Set Product Count** button.
- A new window will open asking the encryption key of the Miniprog C. & the new count. If we provide 9,999,999 as the target count, target count is set as infinity. Maximum target count that can be set is 5,000,000.

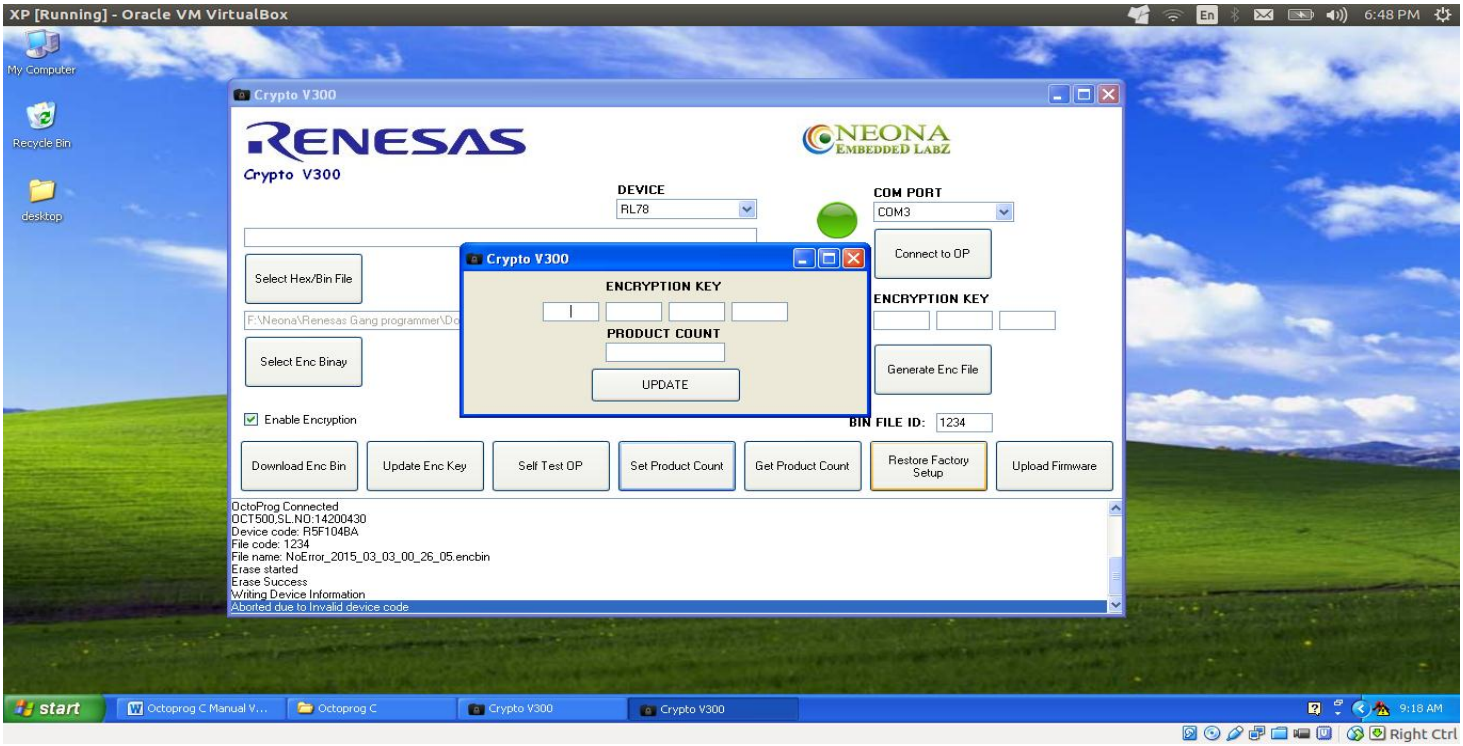


**Figure2.15**

**Self Test:**

- Remove all the targets board connections from Miniprog C., click on **Self-Test OP.** This will give each target's status in text view.

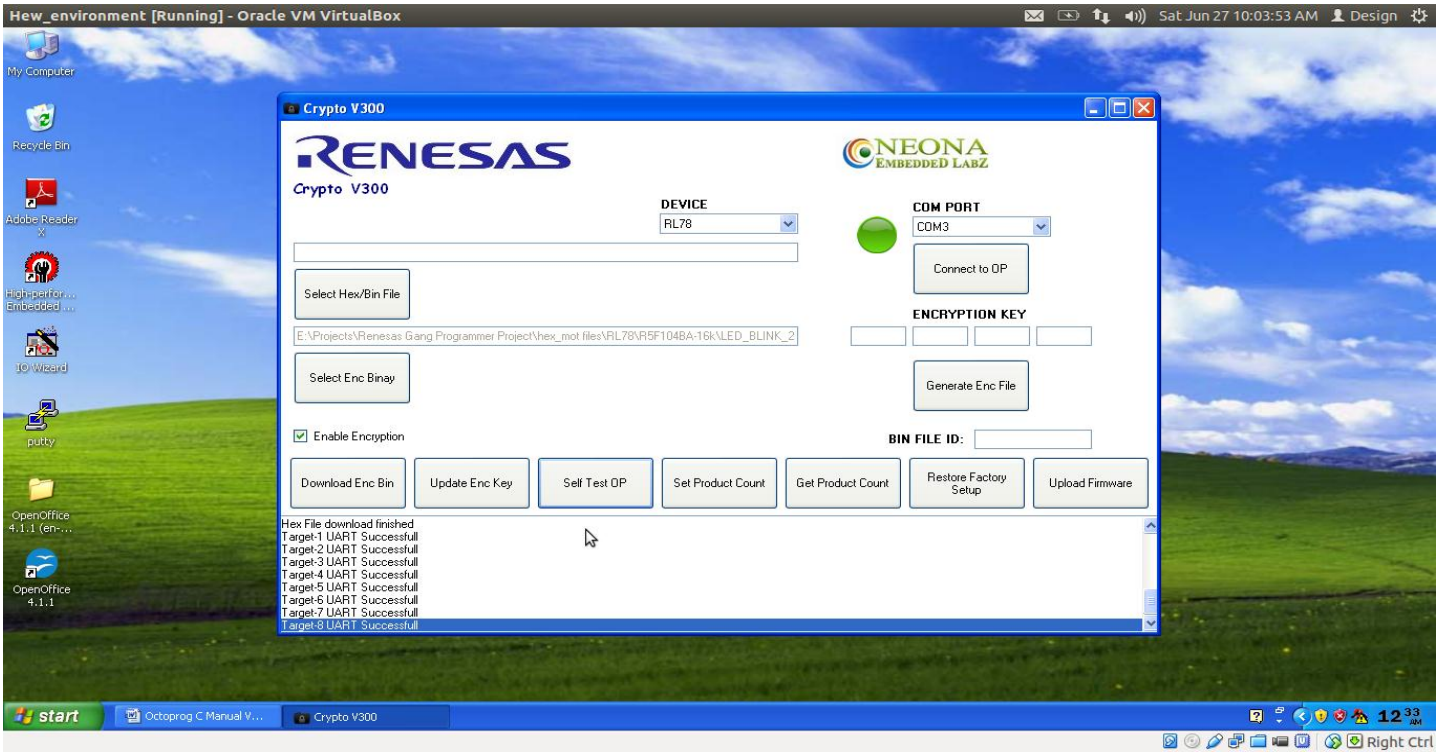


**Figure2.16**

**To get Factory Reset:**

- After connecting to the device, if we click on **Restore Factory Setup,** Miniprog C. will be reset to factory setup. In factory set up
- Erase program, target count & encryption key. Encryption key is set to default key which is set by the manufacturer.


**Figure2.17**

**To update encryption key:**

- After connecting the device, click on **Update Enc Key.** This will ask for Old Encryption key & New Encryption Key. If old Encryption Key is matching with the encryption key of the Miniprog C., then only you can change the encryption key.


**Figure2.18**

For each command, log is updated in the application text view.

**To Upload Firmware:**

1. Ensure that Miniprog C is connected successfully to PC. Green LED indication should appear near “Connect to OP” button.
2. Click on upload firmware

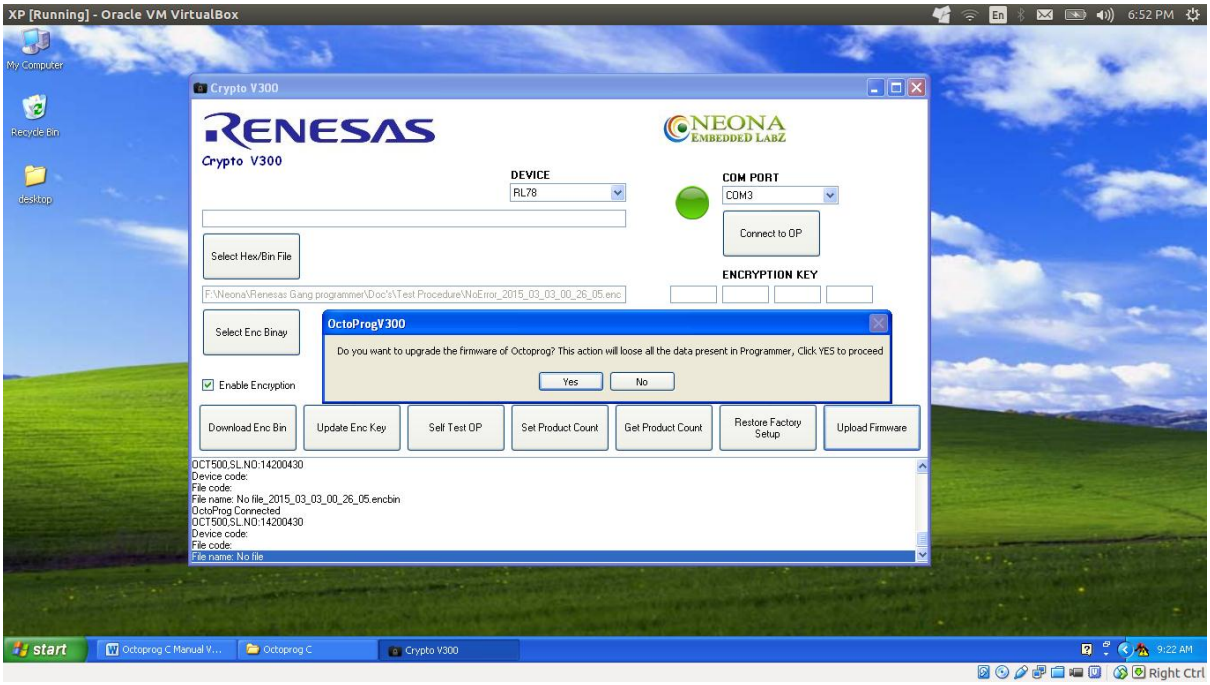


**Figure 2.19**

3. If firmware is needed to be uploaded, click on yes in this window.
4. Select **.octfrm** file & it will ask for whether we need to upload the new firmware. Select Yes.

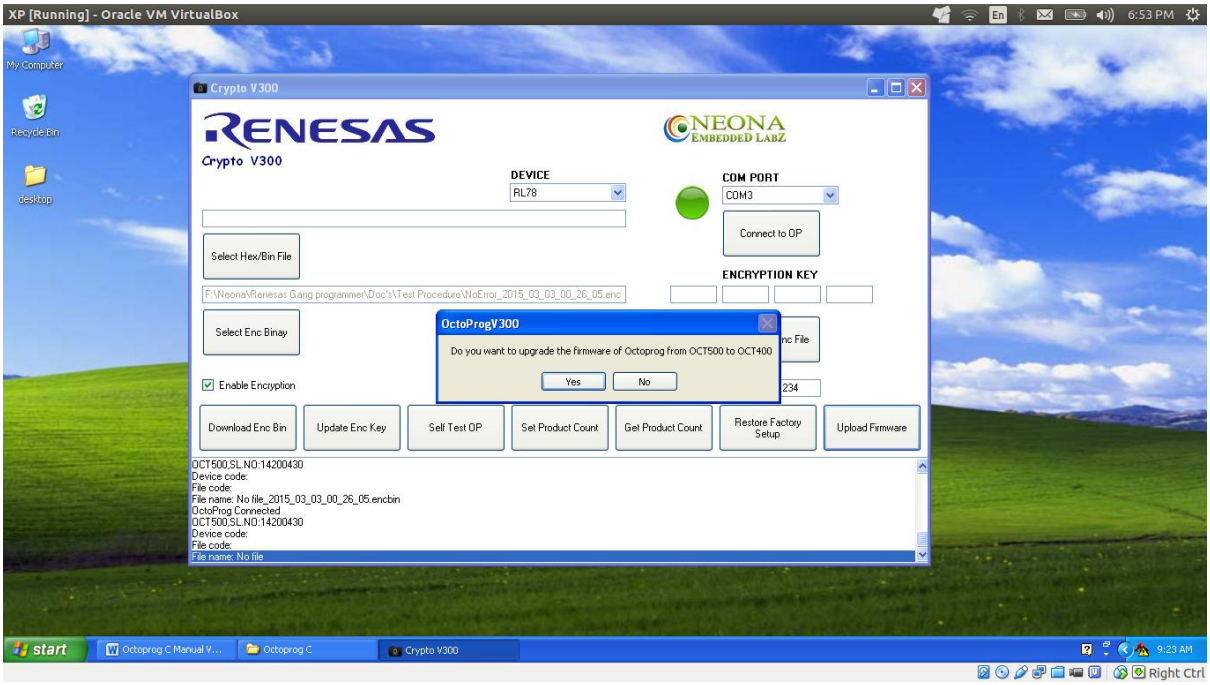


**Figure 2.20**

**Note: Miniprog C. firmware is different for different micro controllers. Kindly contact NEONA for the correct and latest firmware of your target Device**

**To Enable/Disable Encryption:**

1. We can enable / Disable the Encryption option in Miniprog C by the Enable encryption check box in Crypto
2. This functionality is only available for RL78 devices
3. Enable/Disable Encryption is only supported by V300 or higher of Crypto software and V500 or higher of Miniprog C Firmware.

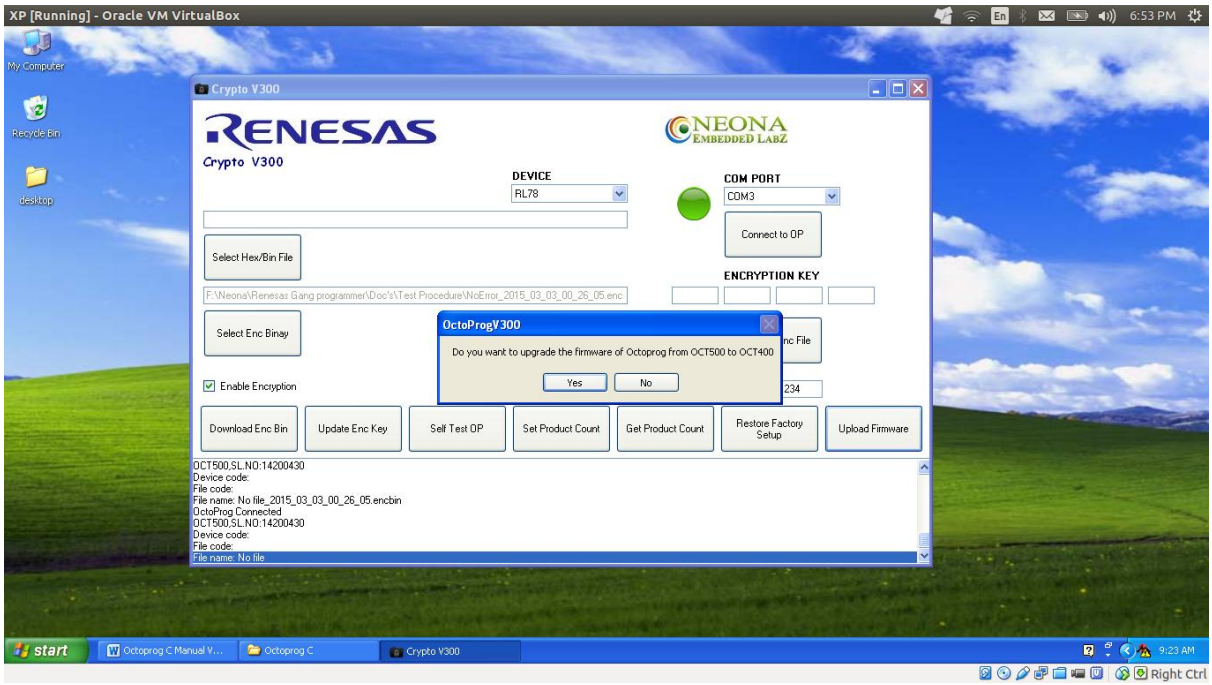


**Figure 2.21**

## Download program to target devices (Stand Alone Programming Steps):

Switch on the Miniprog C device using 5v, 3A adapter & connect the targets to the Miniprog C. Miniprog C can program the target devices with **START button** or **AT Commands.** Refer 2.5 Section to program with AT commands.

Press the **START** button for about 2 seconds to start flashing the connected target. When the Miniprog C is flashing the target, the target LEDs will be blue.

1. If flashing is completed successfully, target LED turns green.
2. If there is a failure in flashing, target LED will turn red.
3. After the target programming is completed, reset the Miniprog C by pressing **START** button or **AT commands**.
4. The target count will be decremented after each successful flashing. When target count becomes zero, the program downloaded to Miniprog C will be erased instantly. After that, if you try to download the program to target device, the led will glow white indicating no program is downloaded to Miniprog C. You can check the target count in USB_MODE.

### 2.4 LED INDICATIONS:

When Miniprog C gets into USB_MODE, the LED blink once.

LED indications in USB_MODE.

1. When Crypto software is connected to the device properly, status LED glows green.
2. When download ENC hex is success, following LED indications are there:
    1. Erasing success, status LED glows green
    2. Programming success, status LED glows green
    3. Successfully stored device information, status LED glows green
3. Update encryption key success, status LED glows green.
4. Set product count success, status LED glows green.
5. Restore factory set up command processing, status LED glows blue. Restore factory set up success, status LED glows green.

When Miniprog C gets into PROGRAM_MODE, status LED blinks once Red, Blue &Green

LED indications in PROGRAM_MODE after START button is pressed for programming the target device,

1. If there is no target hex file downloaded or target product count is not set or your target count limit is reached (i.e. when you reach the target count limit, the target program downloaded to RX will be erased & will be in no program downloaded condition), status LED glow white.
2. When programming is progressing then blue LED will be glowing.
3. When programming is failed, Red LED will be glowing.
4. When block programming is success, LED will blink Green.
5. When block verification is success (i.e. programming is completed successfully), Green LED will be glowing.

## 2.5 AT Commands & Responses:

The following AT commands are supported by the **Miniprog C** programmer. All the characters have to be in capital letters.

All the responses are terminated with a '\r' and '\n'.

### 2.5.1 AT+R

This command helps to reset the Miniprog C programmer.

| A | T | + | R | 0x0D |
|---|---|---|---|---|

Below given is the response from the programmer back on the reception of command.

| O | K | \r | \n | R | E | S | E | T | \r | \n |
|---|---|---|---|---|---|---|---|---|---|---|

### 2.5.2 AT+P

This command helps to initiate program from Miniprog C programmer.

| A | T | + | P | = | x | x | x | x | x | x | x | x | 0x0D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

xxxxxxxx – Represents the 8 digit File ID.

Below given are the responses from the programmer back on the reception of this command.

If the command is accepted and the File ID is matching Programmer will return 'OK' and start flash operation.

| O | K | \r | \n |
|---|---|---|---|

Once the flash operation is finished it will send flag packet

| Flag1 | Flag2 | Flag3 | Flag4 | Flag5 | Flag6 | Flag7 | Flag8 | \r | \n |
|---|---|---|---|---|---|---|---|---|---|

Each flag is an ASCII character. Value 'F' Indicates failure of programming and 'S' Indicates success.

For Eg: IF Target is having a successful programming it will return '**SFFFFFFF**'

If there is any error in the structure of AT command Programmer returns,

| | | | | | | |
|---|---|---|---|---|---|---|
| **E** | **R** | **R** | **O** | **R** | **\r** | **\n** |

If the File ID does not match with the loaded File ID on the programmer it returns,

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **F** | **I** | **L** | **E** | **I** | **D** | | **M** | **I** | **S** | **M** | **A** | **T** | **C** | **H** | **\r** | **\n** |

If the parameters on the AT command is invalid or out of range then programmer returns

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **I** | **N** | **V** | **A** | **L** | **I** | **D** | | **C** | **O** | **M** | **M** | **A** | **N** | **D** | **\r** | **\n** |

If an AT command frame is started and not finished in 3 seconds (between the reception of each character in AT Command) programmer discards the frame by sending

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C** | **O** | **M** | **M** | **A** | **N** | **D** | | **T** | **I** | **M** | **E** | **O** | **U** | **T** | **\r** | **\n** |

If there is not file present or the memory is cleared after reaching product count it returns

| | | | | | | |
|---|---|---|---|---|---|---|
| **E** | **M** | **P** | **T** | **Y** | **\r** | **\n** |

Start Key on the programmer can be used to flash the target manually, in such cases a second press is required to reset the programmer, this is indicated by sending the following packet. Under this condition, Reset command has to be send or Start key has to be pressed to finish the reset.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **M** | **A** | **N** | **U** | **A** | **L** | | **R** | **E** | **S** | **E** | **T** | **\r** | **\n** |

After a successful programming operation imitated by remote device the programmer will restart automatically after sending the below packet

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | **U** | **T** | **O** | | **R** | **E** | **S** | **E** | **T** | **\r** | **\n** |