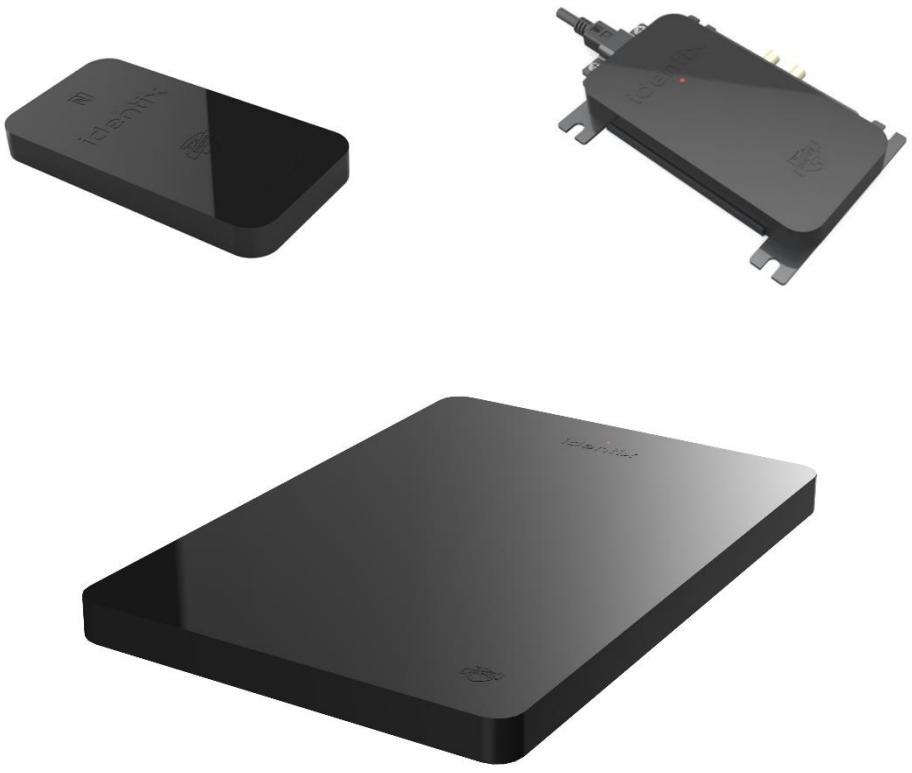
identix

miniPad, miniPad SMA and rPad

User Guide



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RELEASE 3.0

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Introduction

This guide applies to miniPad / rPad devices with firmware release 4.0 or newer

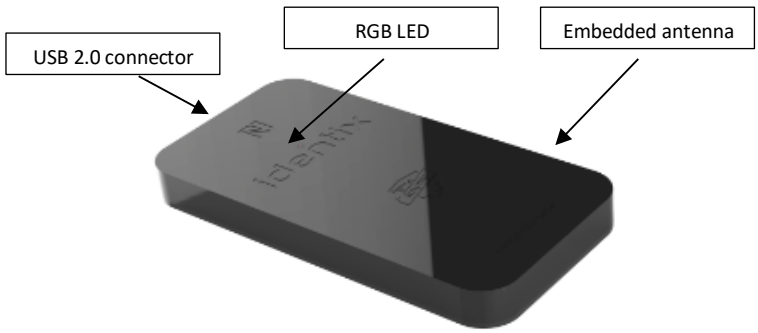
Identix miniPad and rPad are stationary, small form factor, UHF Gen2 RFID tag readers with USB connectivity. This guide provides detailed instructions for installing, connecting, configuring, operating and troubleshooting the Identix miniPad and rPad UHF RFID family of readers.

The intended audience for this guide is anyone installing an Identix miniPad or rPad reader. The assumed primary users of this guide are systems engineers and IT personnel with experience and basic knowledge of:

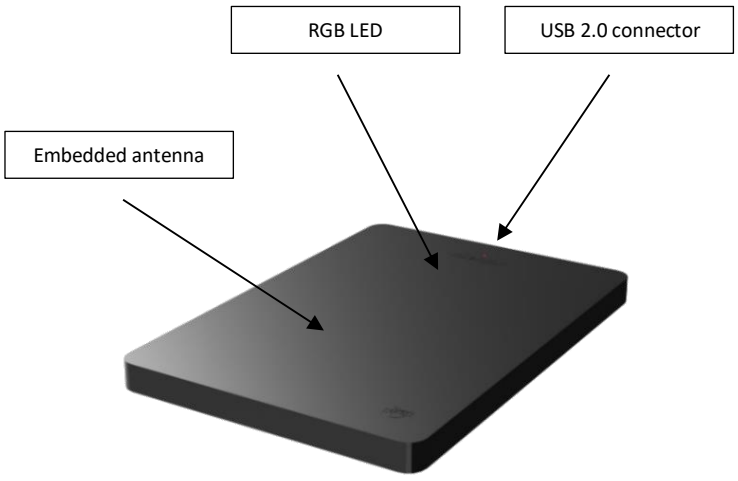
- Software development
- Hardware systems integration
- Network connectivity

This guide also assumes that the user has a high-level understanding of RFID, RFID systems management, and a basic familiarity with the EPCglobal Gen 2 specification.

Identix miniPad



Identix rPad



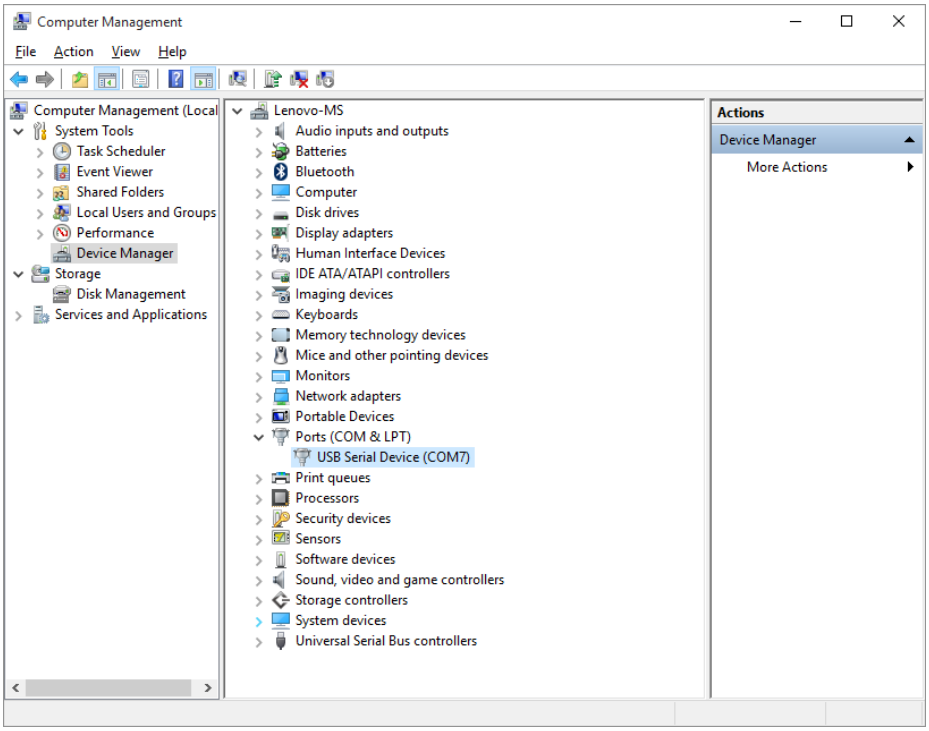
Downloading Windows drivers

If you're using miniPad or rPad with Windows XP, Windows 7 or 8, you will need to download the appropriate drivers from the Identix support web site.

If you're using Windows 10 or newer, Mac or Linux, then you don't need any special driver to work with miniPad or rPad.

Installing the miniPad – rPad USB Driver on Windows XP, Windows 7 or 8

1. Download the *miniPad-rPad* Windows USB driver file from **https://idntx.zendesk.com**
2. Connect the miniPad or rPad to your PC using the mini USB cable provided.
3. Once Microsoft Windows detects the new device, set the downloaded INF file as the device driver file.
4. Open Windows Device Manager, search for the miniPad / rPad device, right-click on the device and then select Update Driver Software.
5. Browse your computer and find the location of the *miniPad-rPad.inf*, click Next
6. After installing the drivers correctly, Windows will map a new virtual COM port to the connected miniPad / rPad RFID reader.
7. You may check the successful installation of the driver looking at the Computer management applet



Configuring the device operating mode

The miniPad / rPad device can operate in three different modes:

HID Keyboard Emulation

In this mode of operation, miniPad / rPad emulates a keyboard wedge. When reading RFID tags, miniPad / rPad sends reading data to the host computer as if it were a keyboard. In this scenario, the device operates autonomously sending data through a *virtual keyboard (HID)* connected to the USB port.

By default, miniPad / rPad operates in HID Mode
with the transmitting power configured in 15dBm

RAW Mode

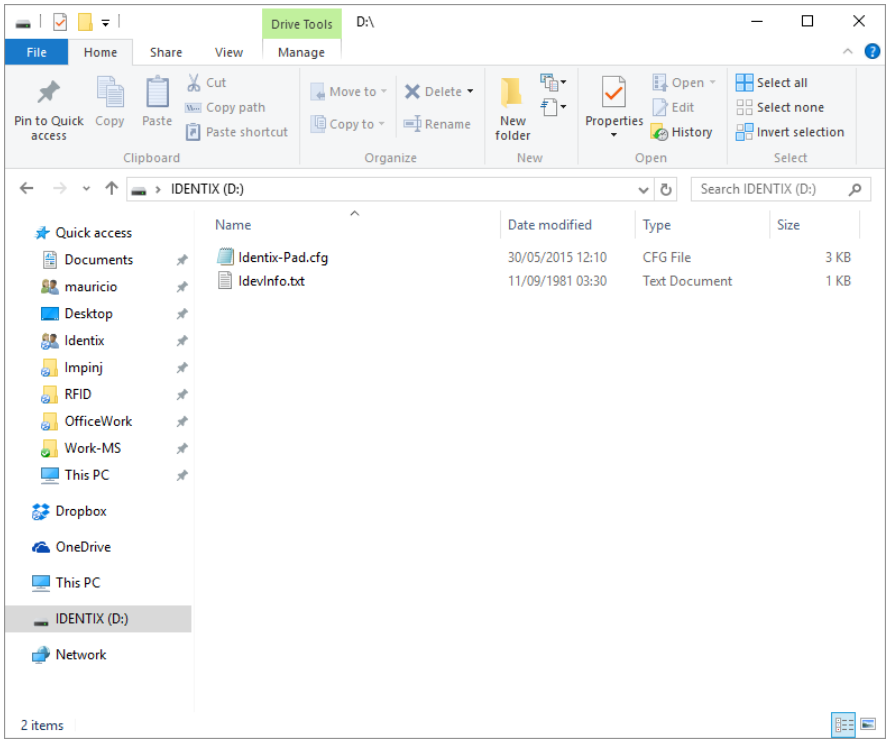
In this mode of operation, a host application controls the miniPad / rPad device. *The host application communicates with the miniPad / rPad device using simple ASCII based commands.* The connection between the host (PC) and the device is via a virtual COM (serial) port over USB.

Transparent Mode

In this mode of operation, a host application controls the miniPad / rPad device. The host application communicates with the miniPad / rPad device using the *IRI – Impinj Reader Interface - protocol*. The connection between the host (PC) and the device is via a virtual COM (serial) port over USB.

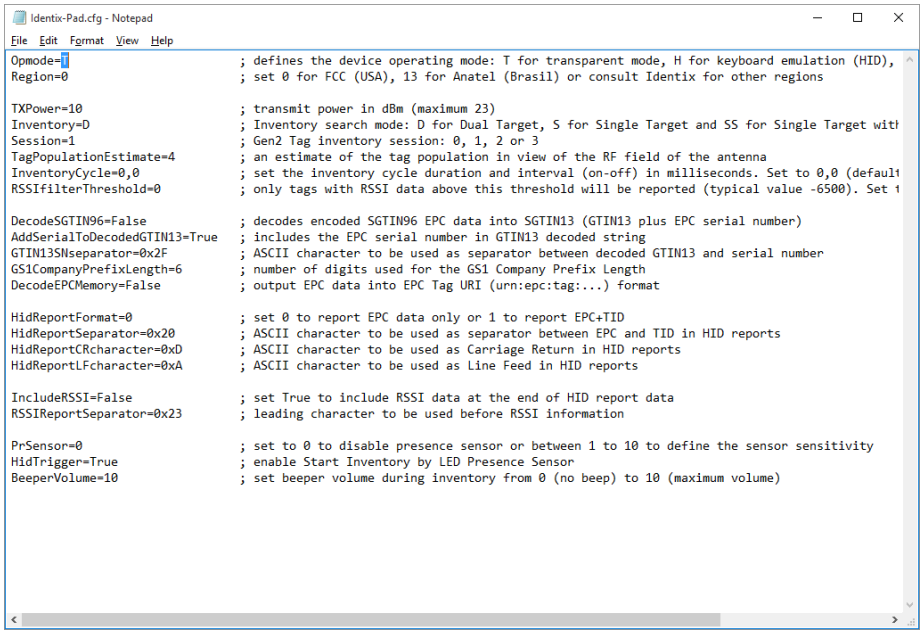
Changing the operating mode

A *configuration file* (“Identix-Pad.cfg”) is stored inside a removable drive (labeled IDENTIX that mounts automatically when the miniPad / rPad device connects to the host computer), allows the user to switch between Transparent, HID Keyboard Emulation and RAW modes.



To change the operation mode between Transparent and HID, edit the entry “Opmode” on the configuration file.

Warning! Use only Windows Notepad to edit the configuration file.

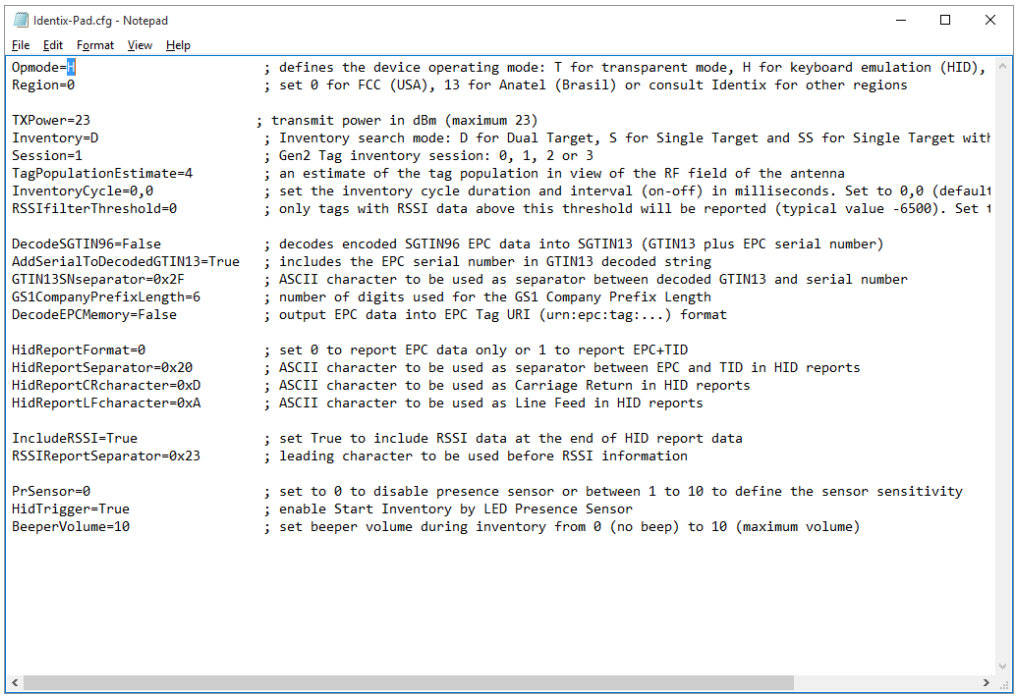


After saving the configuration file, the miniPad / rPad reader will automatically switch to the selected operating mode.

Reading RFID Tags

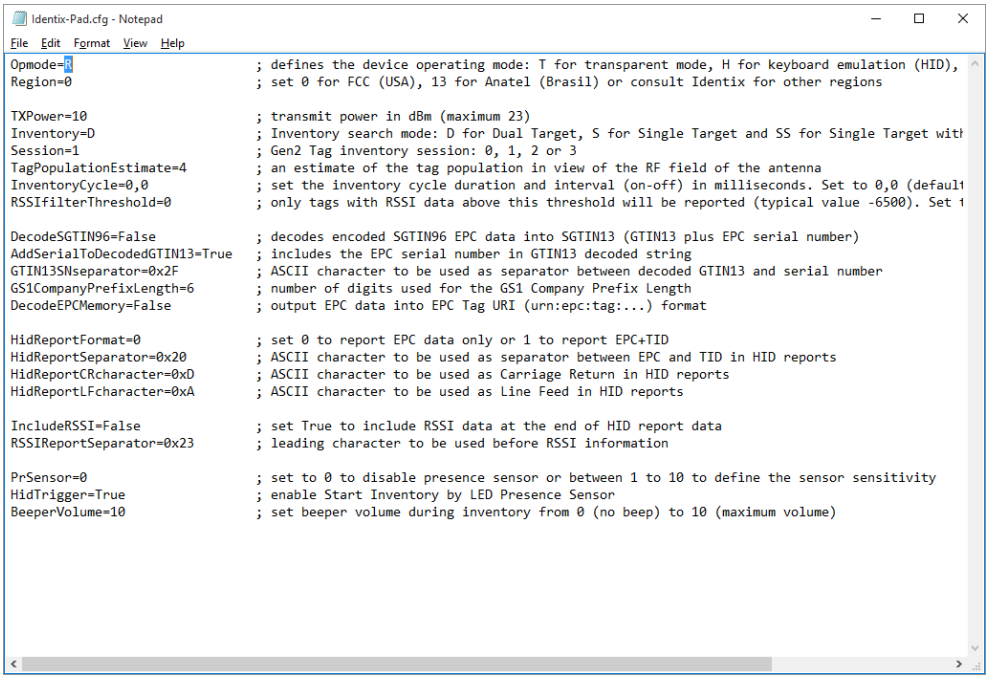
In HID Keyboard Emulation Mode Operation

1. Configure the miniPad / rPad reader to operate in HID Keyboard Emulation mode.
2. Open an application like Excel or Notepad.
3. Place UHF RFID tags on top of the miniPad or rPad embedded antenna.
4. See the tags reading results at the opened application.

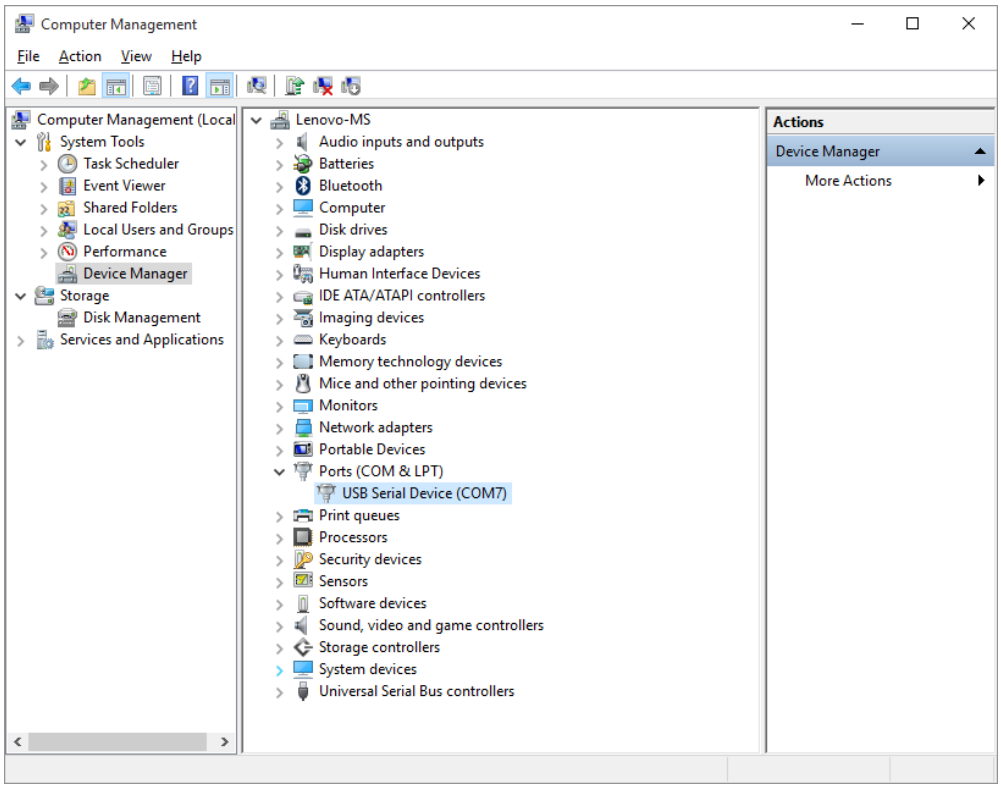


In RAW Mode Operation

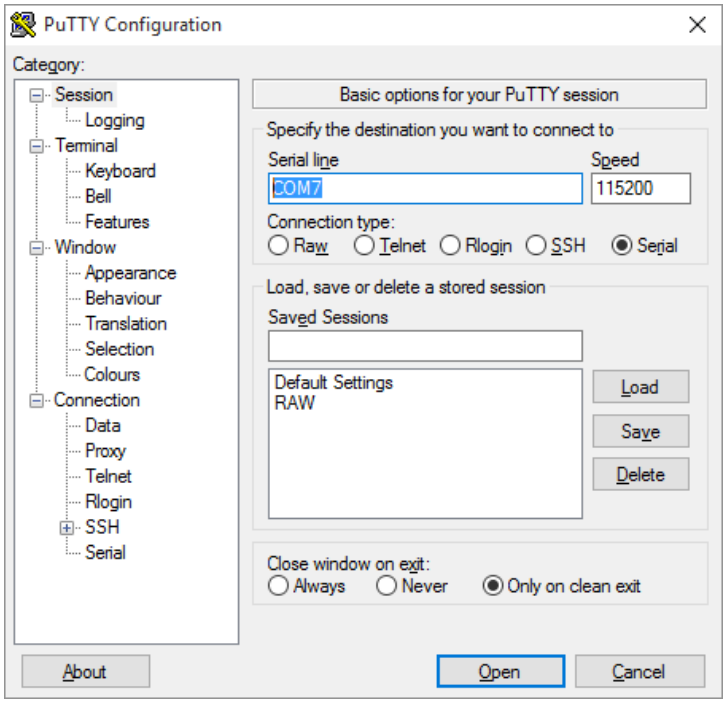
1. Configure the miniPad / rPad reader to operate in HID Keyboard Emulation mode.



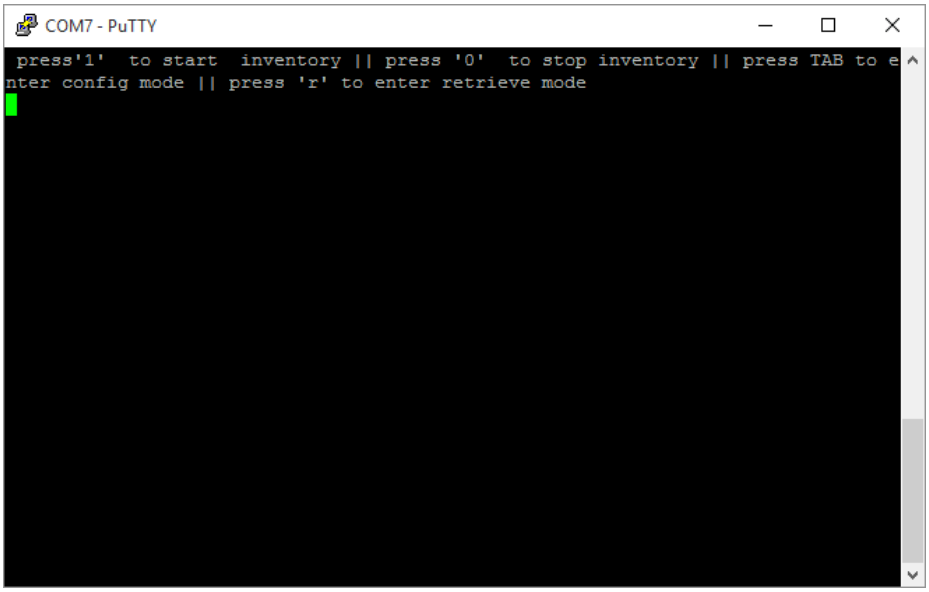
2. Identify the virtual COM port that Windows assigned to the miniPad – rPad device using the "Computer Management" applet.



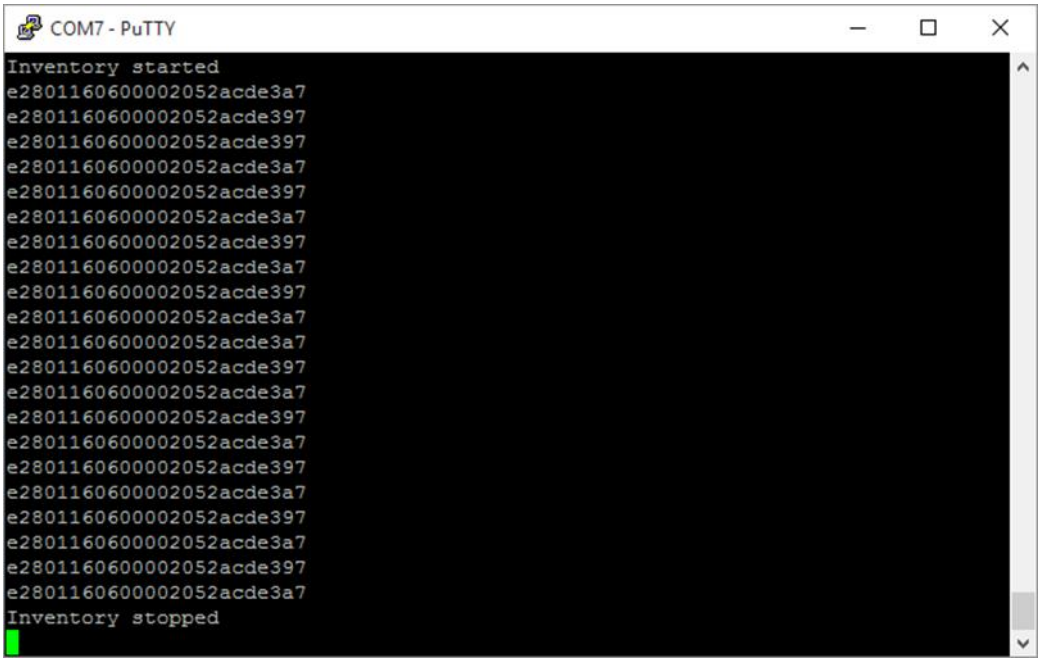
3. Download a terminal emulation program like Putty. You can get it from: http://www.putty.org/
4. Execute Putty.exe and a screen like the following one will be displayed.
    a. Select the COM virtual port
    b. Set the Speed to 115.200 Bps
    c. Set the Connection type to “Serial”
    d. Hit the “Open” button



5. Once you open the connection and hit “enter” a screen like this one will be displayed.

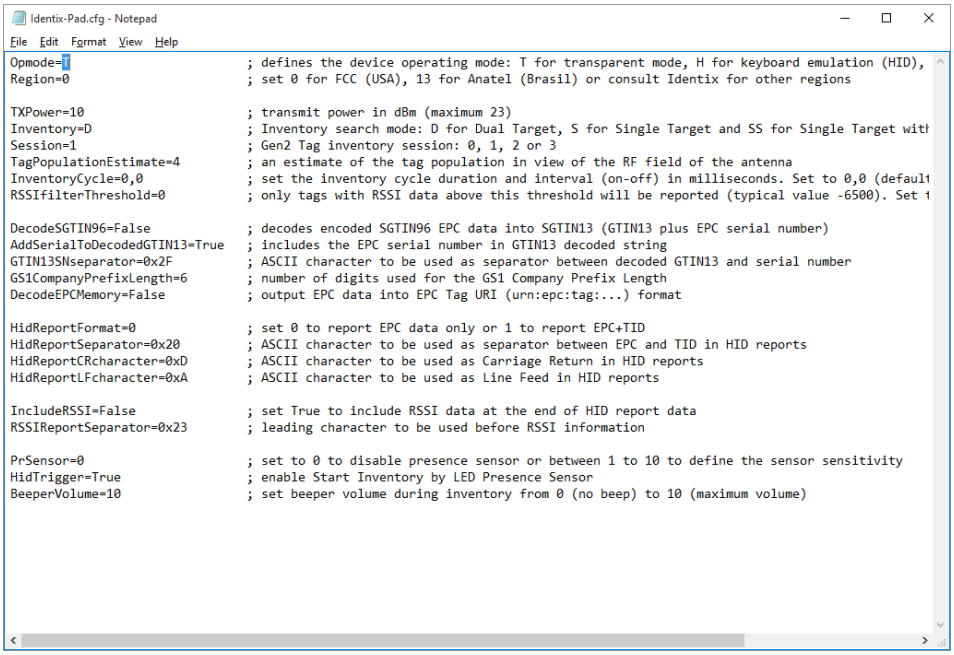


6. Press “1” and hit “Enter”, then inventory of tags will start immediately. If you enter “0” and “Enter”, inventory of tags will stop.



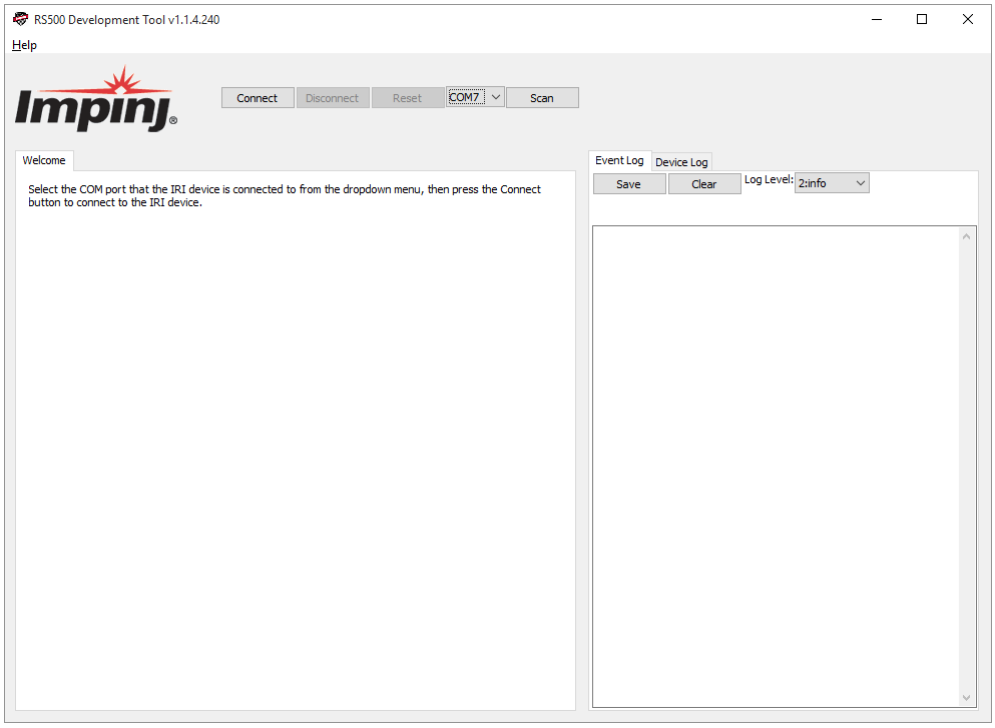
In Transparent Mode Operation

1. Configure the device to operate in “Transparent Mode” by editing the configuration file.

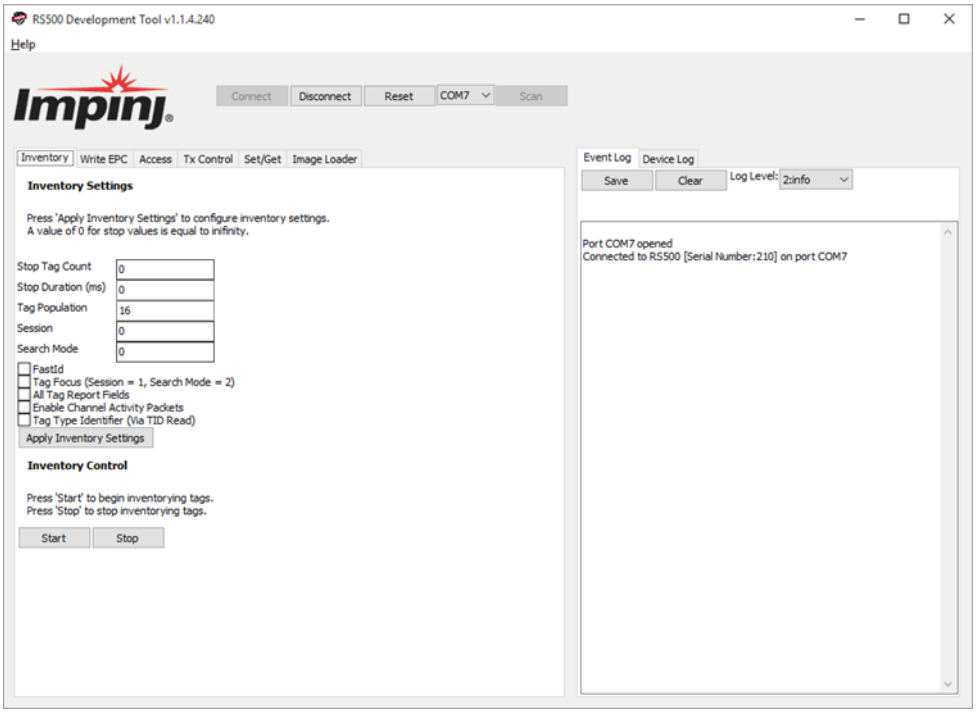


2. Download a copy of the RS500 Development Tool.exe file from https://idntx.zendesk.com
3. Connect the miniPad or rPad to your PC using the miniUSB cable. At this point, the RGB LED, should go on with pink color.
4. Place UHF RFID tags on top of the miniPad or rPad embedded antenna.

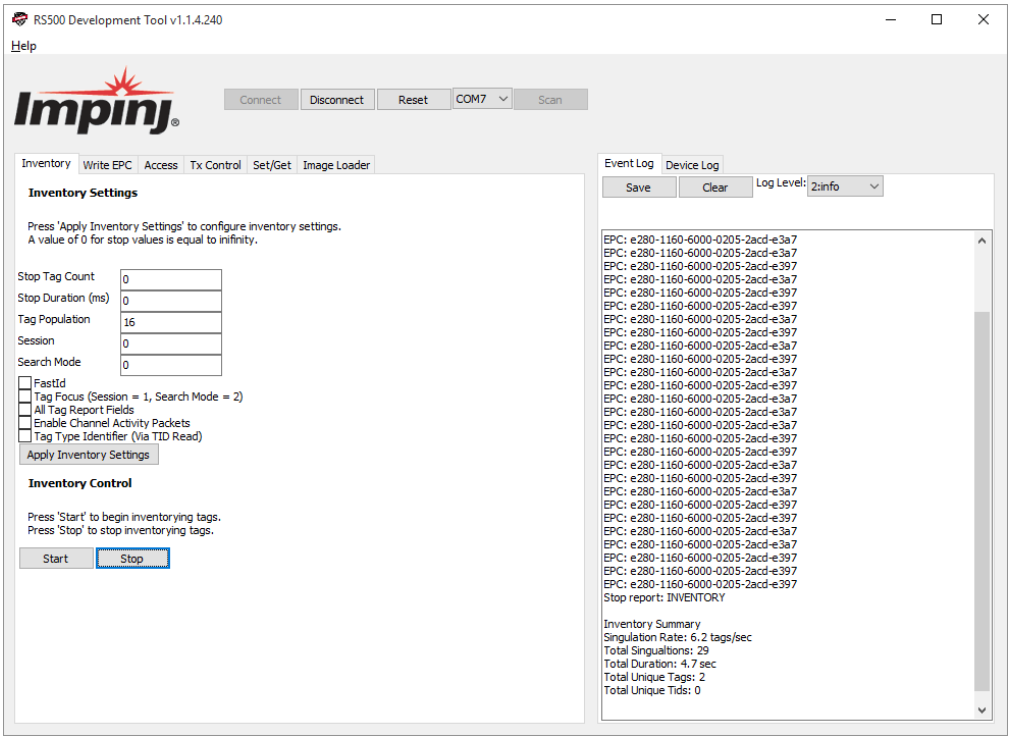
5. Open the RS500 Development Tool software by double-clicking on the “RS500 Development Tool.exe” file. A screen like the following one will appear.



1. Press the “Scan” button to detect the COM port corresponding to the hardware. Press the “Connect” button to connect to the hardware.



2. Under the “Inventory” tab, start an inventory by pressing the “Start” button.
3. At this point, the “Event Log” on the right-hand side of the GUI will show the stream of EPCs of the tags that are read by the miniPad or rPad.
4. Try moving the tag relative to the antenna, or introducing a new tag, and observe the change in the reads displayed in the Event Log.



Configuration File settings

When operating in **HID and RAW modes**, operating parameters like: transmitted power, inventory mode and other settings may be changed via the Configuration File stored on the Identix drive.

The Configuration File name is “Identix-Pad.cfg”.

Attention! The settings on the Configuration File have no effect when the device is running in Transparent mode

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Operating Mode

Opmode=H, defines the device operating mode: T for transparent mode, H for keyboard emulation (HID), R for raw serial data output and allows users to configure the miniPad – rPad mode of operation.

Regulatory Region

Region=0, sets the reader for FCC (USA), 13 for Anatel (Brasil)

Each country determines the frequencies / channels UHF RFID readers may operate. Set this field according to the regulatory region you are in.

Attention! The regions marked in Blue are only available on the European version of the miniPad and rPad devices. CHECK FOR AVAILABILITY OF EUROPEAN VERSION WITH IDENTIX REPRESENTATIVE

FCC PART 15 247	0
HONG KONG 920 925 MHZ	3
TAIWAN 922 928 MHZ	4
ETSI EN 302 208 V1 4 1	*7*
KOREA 917 921 MHZ	8
MALAYSIA 919 923 MHZ	9
CHINA 920 925 MHZ	10
SOUTH AFRICA 915 919 MHZ	12
BRAZIL 902 907 AND 915 928 MHZ	13
THAILAND 920 925 MHZ	14
SINGAPORE 920 925 MHZ	15
AUSTRALIA 920 926 MHZ	16
INDIA 865 867 MHZ	*17*
URUGUAY 916 928 MHZ	18
VIETNAM 920 925 MHZ	19
ISRAEL 915 917 MHZ	20
PHILIPPINES 918 920 MHZ	21
INDONESIA 923 925 MHZ	23
NEW ZEALAND 921P5 928 MHZ	24
JAPAN 916 921 MHZ NO LBT	25
PERU 916 928 MHZ	26
RUSSIA 916 921 MHZ	27

Transmitted Power

TXPower=15 set the transmit power in dBm (maximum 23).

This setting allows to define the transmitter power the RFID radio will use for inventory tags.

Attention! miniPad and rpad devices allow a maximum transmission power of 23dBm.

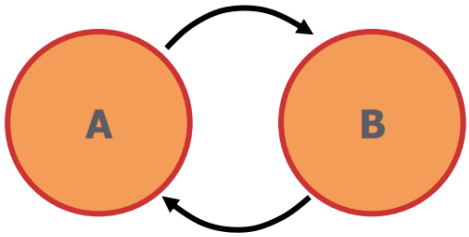
Inventory Search Mode

Inventory= X sets the tag inventory search mode: D for Dual Target, S for Single Target and SS for Single Target with Suppression

- Gen2 compliant RFID tags have four logical sessions
  - An inventory round operates in one and only one logical session
  - The session is set by a parameter in the *Query* command

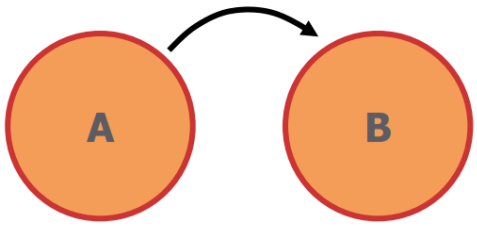
- Each *session* has an independent inventory flag
  - The tag toggles the state of its inventory flag once it has been counted
  - The *inventory* flag has two states, A or B (logical 0 or 1 respectively)

Dual Target



- Moves all 'A' tags into 'B'
- Moves all 'B' tags into 'A'
- Generates many, many reads
- Good for small populations or static environments

Single Target



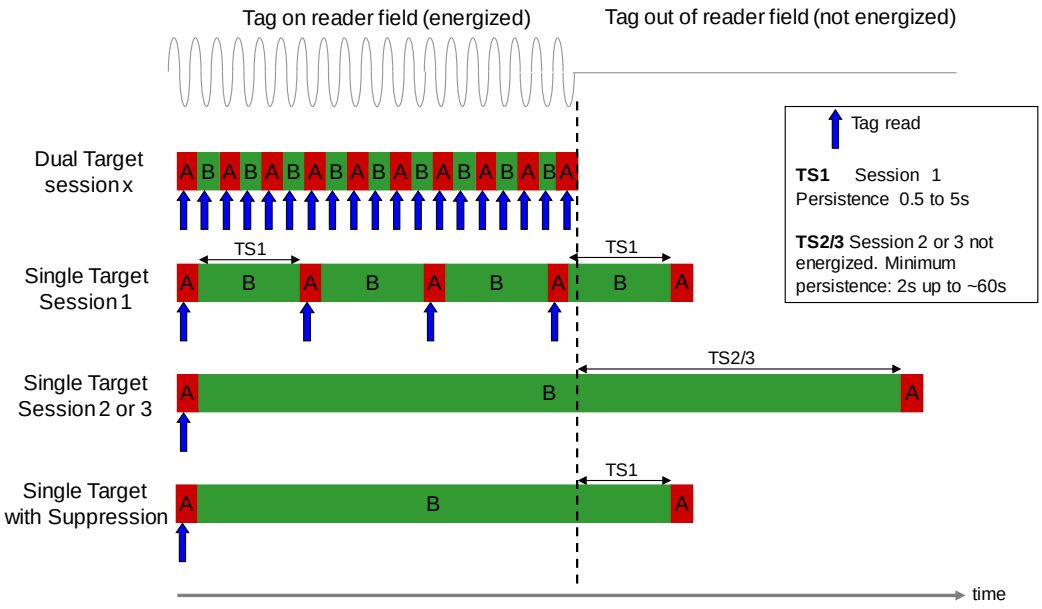
- Moves all 'A' tags into 'B'
- Reads tags once
- Allows 'B' tags to stay quiet
- Good for high population, dynamic environments

Single Target with Suppression

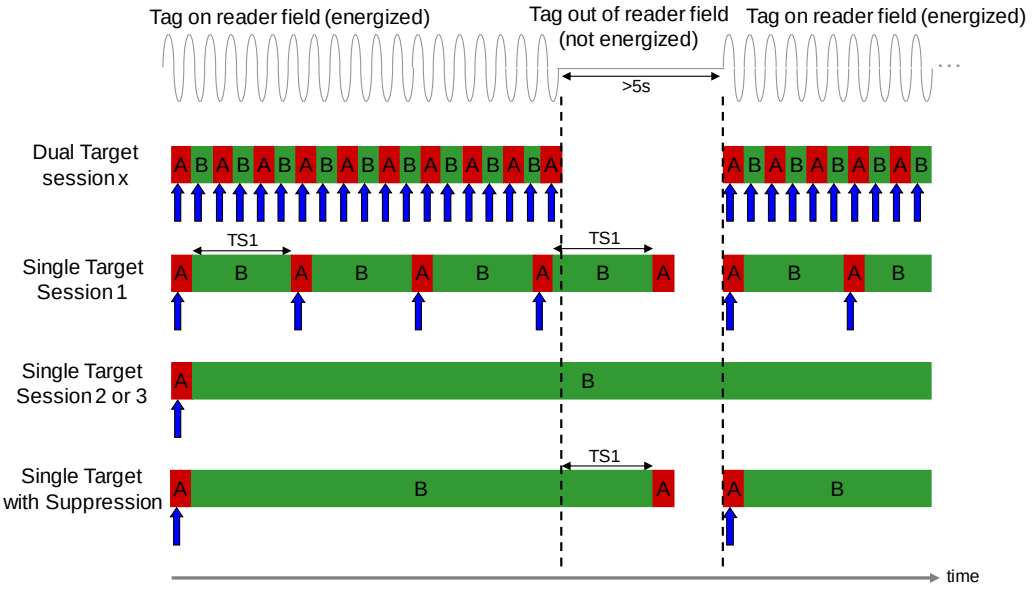
- Suppression algorithm further reduces the number of times tags are re-read
- Potentially improves read percentages up to 20%

	Session 0		Session 1		Session 2		Session 3	
	Tag energized	Tag not energized	Tag energized	Tag not energized	Tag energized	Tag not energized	Tag energized	Tag not energized
Single Target	Infinite	0	0.5 to 5s	0.5 to 5s	Infinite	2s min Up to 60s	Infinite	2s min Up to 60s
Single Target with Suppression			Infinite	0.5 to 5s				

Behavior of *Search Mode* and *Sessions*



Behavior of *Search Mode* and *Sessions* on intermittent reading field



Inventory Gen2 Session

Session= X set the session under Gen2 standard for Tag inventory. Chose session: 0, 1, 2 or 3.

Tag Population Estimate

TagPopulationEstimate= 4 an estimate of the tag population in view of the RF field of the antenna

- Defines the estimation of the tag population you want to read
- This parameter is used to optimize the anti-collision algorithm
- Set this value to a power of 2

RSSI Filter

RSSIfilterThreshold=X, only tags with RSSI data above this threshold will be reported (typical value -6500). Set to 0 to disable RSSI filtering

- This is a “filter” that allows users to configure the threshold above a given Received Signal Strength Indication, the tags will be reported

Automatic decoding of SGTIN96 encoded data

DecodeSGTIN96=False - decodes encoded SGTIN96 EPC data into SGTIN13 (GTIN13 plus EPC serial number)

AddSerialToDecodedGTIN13=True - includes the EPC serial number in GTIN13 decoded string

GTIN13SNseparator=0x2F - ASCII character to be used as separator between decoded GTIN13 and serial number

GS1CompanyPrefixLength=6 - number of digits used for the GS1 Company Prefix Length

DecodeEPCMemory=False - output EPC data into EPC Tag URI (urn:epc:tag:...) format

- This setting allows miniPad – rpad to automatic decode the tags EPC memory (SGTIN96 format) data into to UPC / EAN-13 “human readable” barcode format.

Include TID on inventory reports

HidReportFormat=0 - set 0 to report EPC data only or 1 to report EPC+TID

HidReportSeparator=0x20 - ASCII character to be used as separator between EPC and TID in HID reports

HidReportCRcharacter=0xD - ASCII character to be used as Carriage Return in HID reports

HidReportLFcharacter=0xA - ASCII character to be used as Line Feed in HID reports

- This setting allows miniPad – rpad to automatic include the TID (Tag Unique ID) data in tag read reports.

Include RSSI on inventory reports

IncludeRSSI=False - set True to include RSSI data at the end of HID report data

RSSIReportSeparator=0x23 - leading character to be used before RSSI information

- This setting allows miniPad – rpad to automatic include the RSSI value (Received Signal Strength Indication) in tag read reports

Modifying configuration settings in HID Keyboard Emulation mode

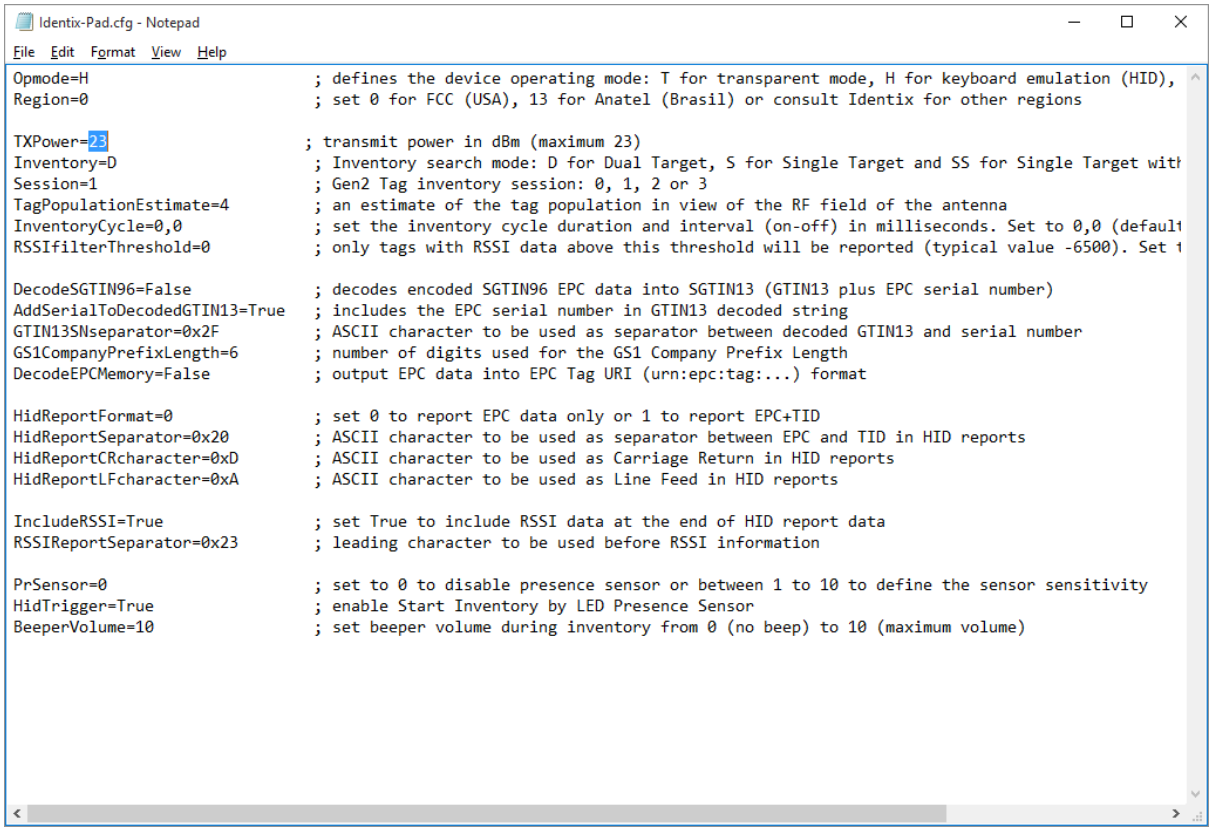
Once the device is running in HID Keyboard Emulation mode of operation, simply open the configuration file “Identix-Pad.cfg” and edit it using Notepad.

Warning! Use only Windows Notepad to edit the configuration file.

For example, to change the Transmitter Power from 10dBm to 23dBm, just edit the corresponding entry from “TXPower=10” to “TXPower=23”.

Save the file and the miniPad – rPad device will immediately accept this new setting.

Attention! if you put and invalid value or change the configuration file inappropriately, the wrong setting will be ignored.



You may change any other setting using the same procedure.

Modifying configuration settings in RAW mode

Once the device is running in RAW mode of operation you can change the settings on the configuration file in two different ways:

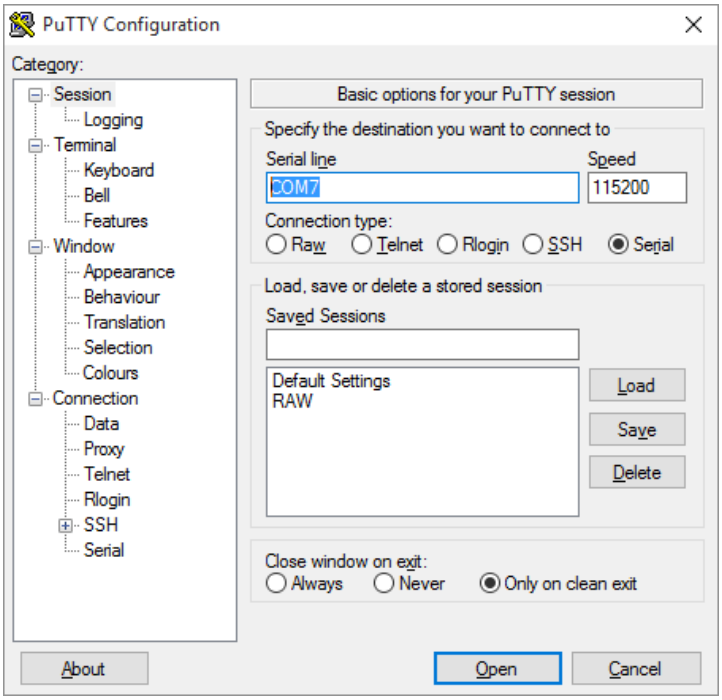
1) By editing the configuration file “Identix-Pad.cfg” and changing the desired settings. While running in RAW mode, the new settings on the configuration file will only take effect when the computer is rebooted.

Warning! Use only Windows Notepad to edit the configuration file.

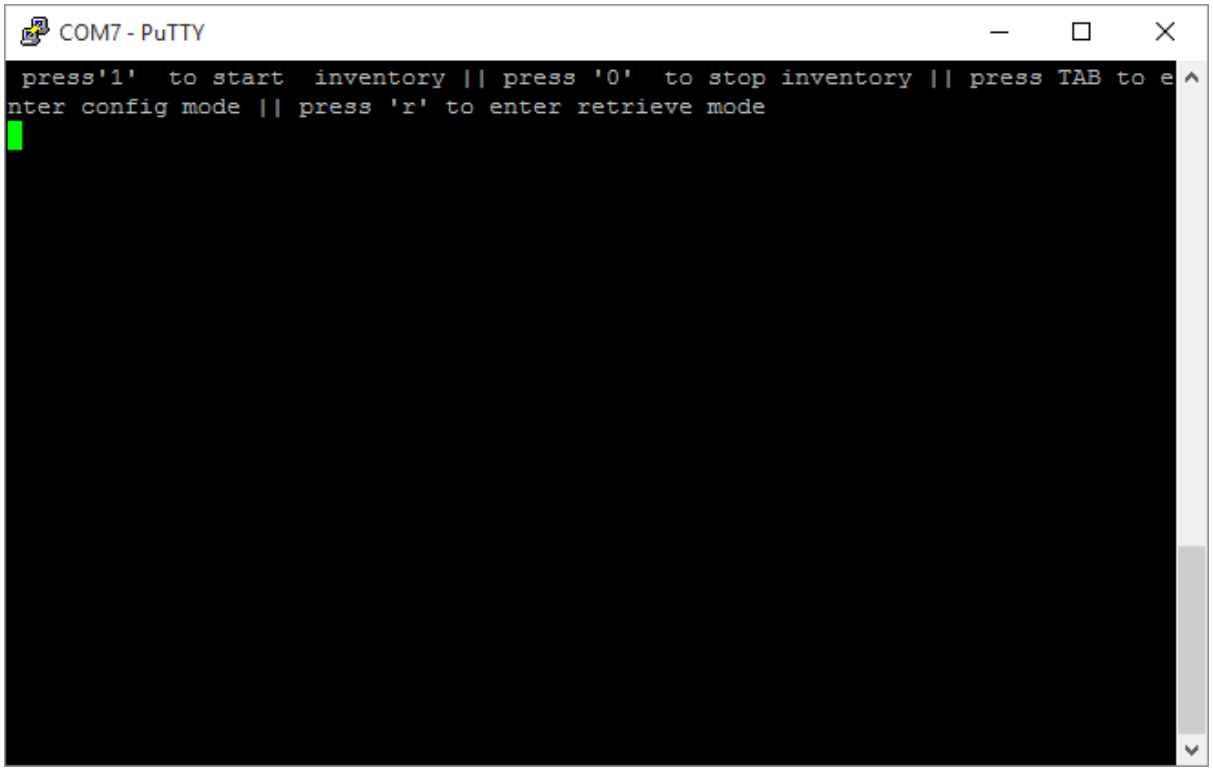
2) The other way of changing the operating parameters without requiring a reboot is via user commands on the terminal emulation program. In this case, simply open the serial port using a terminal emulation program like Putty.

Modifying settings via command line

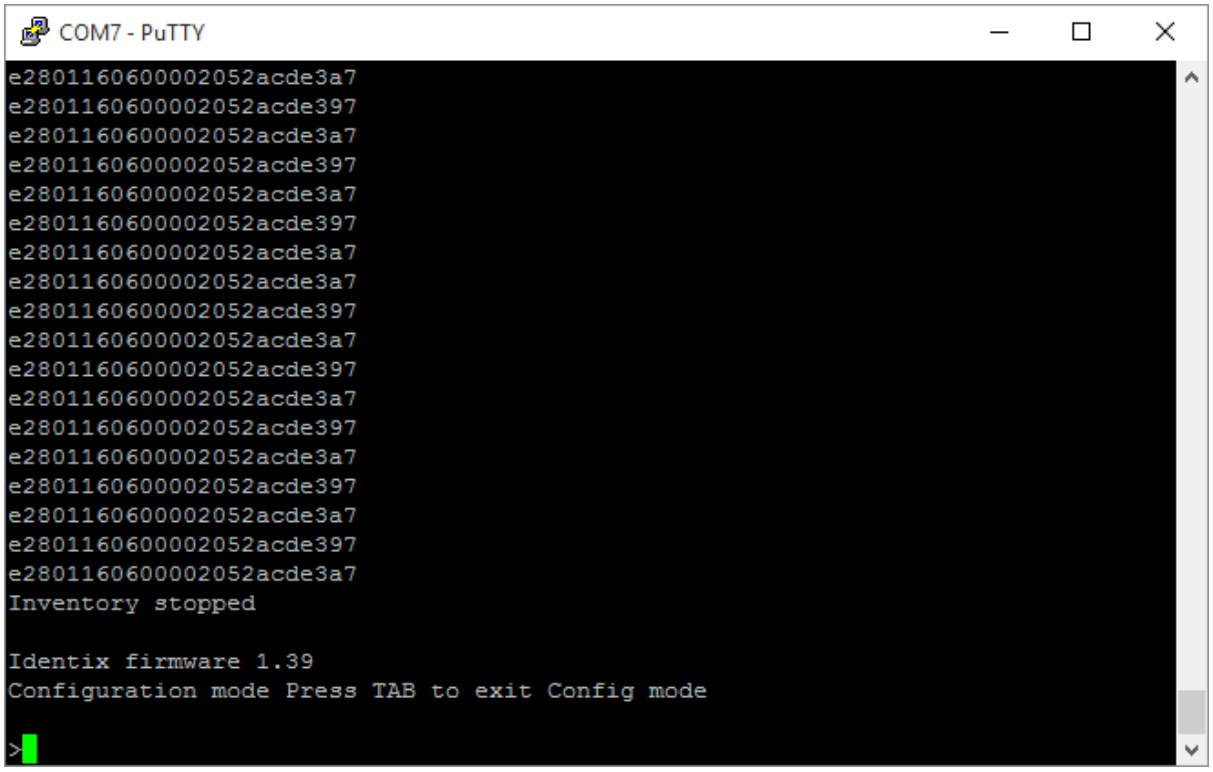
a. Download a terminal emulation program like Putty. You can get it from: http://www.putty.org/
b. Execute Putty.exe and a screen similar to the following one will be displayed.
c. Select the COM virtual port
d. Set the Speed to 115.200 Bps
e. Set the Connection type to “Serial”
f. Hit the “Open” button



3) Once you open the connection and hit “enter”, a screen similar to this one will be displayed.



4) To enter the configuration command prompt, hit “TAB”. The device will now be ready to accept configuration commands.

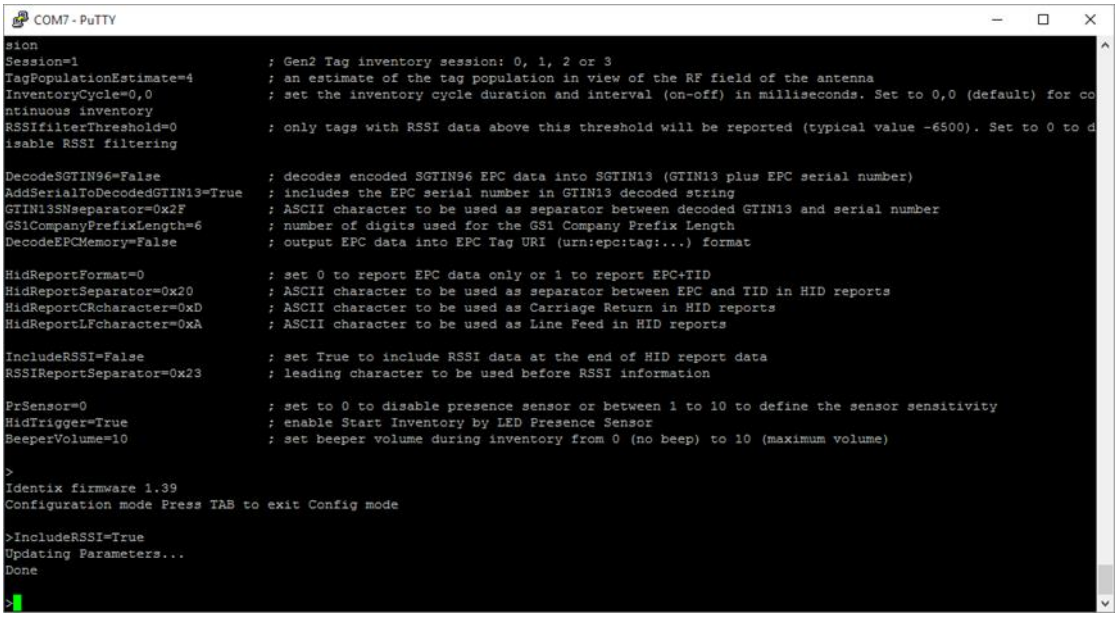


5) For example, if you want to have the RSSI data reported along with the tags inventory data, just enter the command exactly as it appears on the Configuration File.

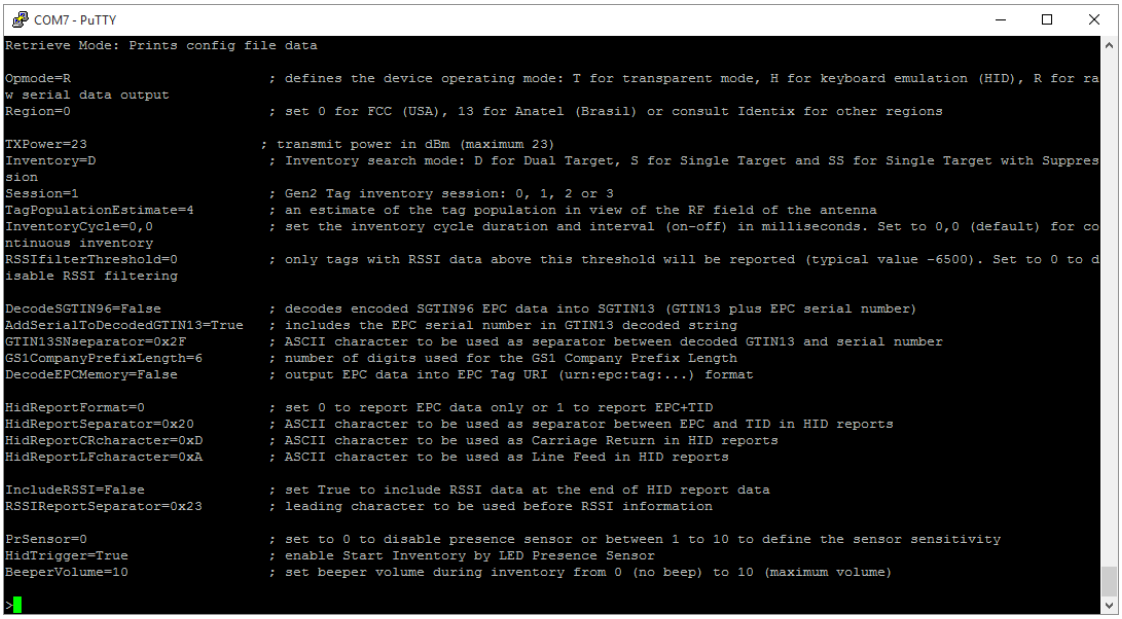
Type “IncludeRSSI=True” and hit “Return”

Attention! All commands are case sensitive.

The new setting will be saved on the configuration file and automatically applied when you leave the configuration mode command prompt.



6) To retrieve the current configuration data, just type “r” while in the main RAM mode command prompt.



How to integrate miniPad and rPad devices with user's application

miniPad and rPad devices were designed for easy integration with virtually any existing software application. The devices may be used in different platforms including, Intel based PCs, MACs, tablets and small computer boards such as RaspberryPi, BeagleBone Black and others.

HID Keyboard Wedge Emulation – read/inventory only

This is the simplest and straightforward way of integration. The device will behave as it were a "barcode scanner", simply reporting the RFID read data as it were a human typing on a keyboard.

Software Development

The other way of integration between miniPad and rPad devices with businesses applications is via software development. There are basically two options for doing that.

RAW Operating Mode - ASCII commands – read/inventory only

This is the simplest way of to develop the code to integrate the devices with the business application. **Virtually all programing languages may be used** since there are only two functions that must be used: 1) connection over a serial port and 2) parsing of ASCII strings.

Using the RAW operating mode will allow users programmatically to configure the devices and execute inventory (read only). If your application requires writing into the RFID tags, you will need to use the IRI Application Programming Interface.

IRI - Low level API – read/inventory and write commands

IRI stands for "Impinj Reader Interface". It is a low level API that allow users to develop integration software with all features available, including reading, inventory and writing into RFID tags.

IRI was developed in C language and is available in 02 forms

1) A "wrapper" for .NET developed by Identix. This library can be downloaded directly from the Identix support web site: *https://idntx.zendesk.com*
2) Source codes in C. A special license / authorization is required. Please contact Identix for further details.

Supported Operating Systems and Programming Languages

Operating System	Programing Language Operating Mode
Windows	Visual Studio C# (IRI) Java (RAW) ANSI C (IRI and RAW) Phyton (IRI and RAW) Others (Raw)
Linux	Java (RAW) ANSI C (IRI and RAW) Phyton (IRI and RAW)

	Other (RAW)
MacOS	Java (RAW) ANSI C (IRI and RAW) Phyton (IRI and RAW) Other (RAW)
Android	Java (RAW) ANSI C (IRI and RAW) Phyton (IRI and RAW) Other (RAW)
Other	Any (Raw)

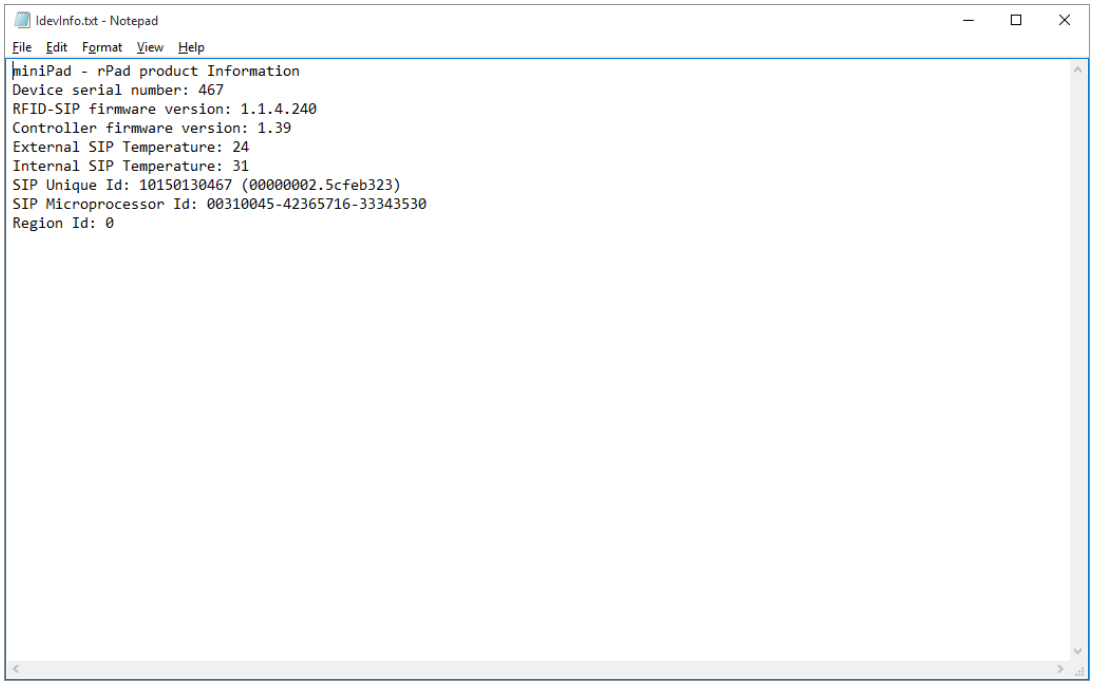
Firmware Management

miniPad and rPad devices have 02 distinct firmwares with specific instructions for updating each one of them. The first one is the "RFID-SIP" firmware (related to low level functions of the UHF Gen2 protocol) and the other one is the "Controller Firmware" (which manages the device connectivity to the Host computer).

Obtaining the device serial number and Firmware versions

An information file ("Idevinfo.txt") is created inside a removable drive (labeled IDENTIX that mounts automatically when the miniPad / rPad device connects to the host computer) automatically when the miniPad / rPad device connects to a computer. Open the file on notepad to obtain

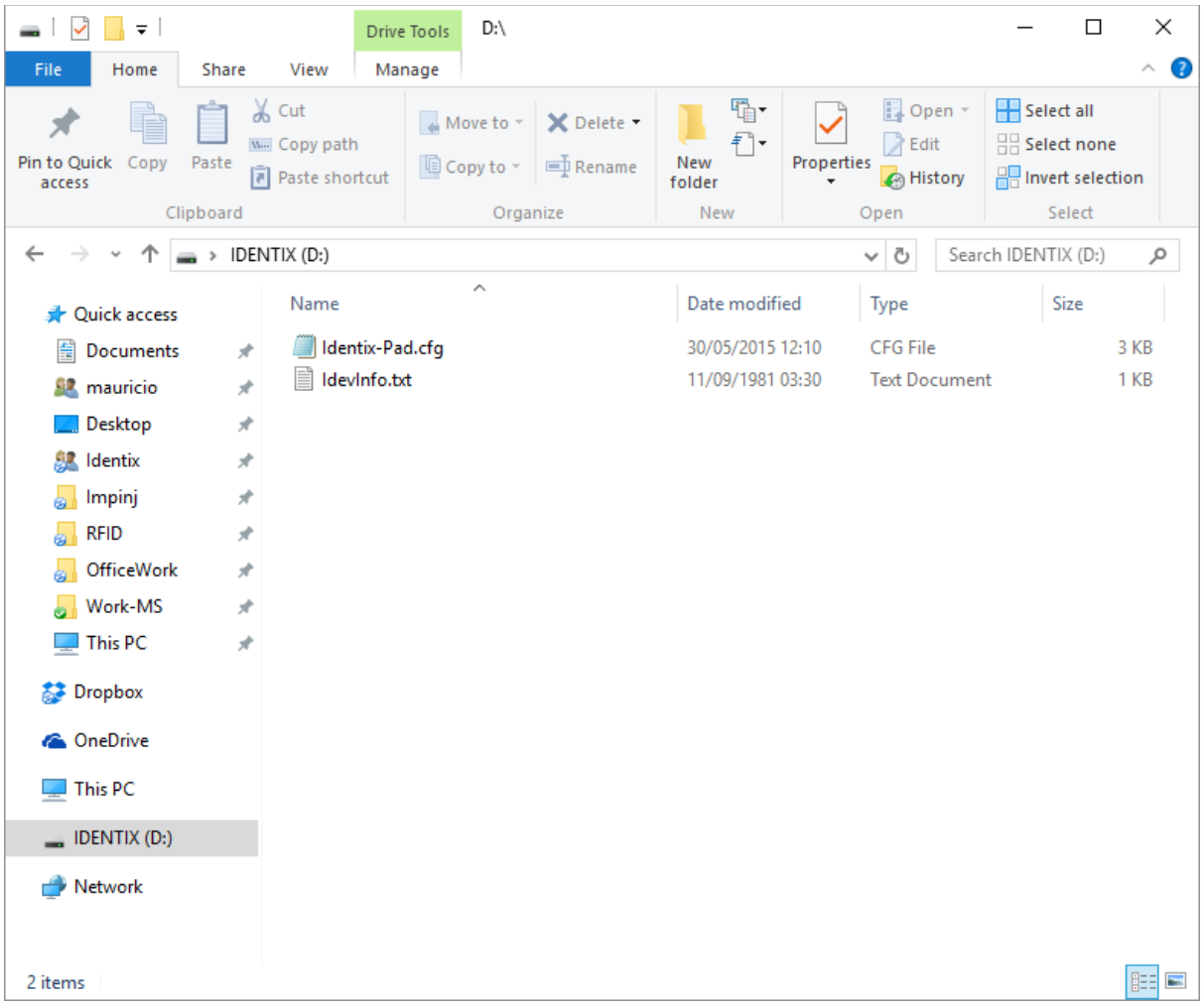
- Device serial number
- RFID SIP firmware version
- Controller firmware version
- Internal and external temperatures of the device



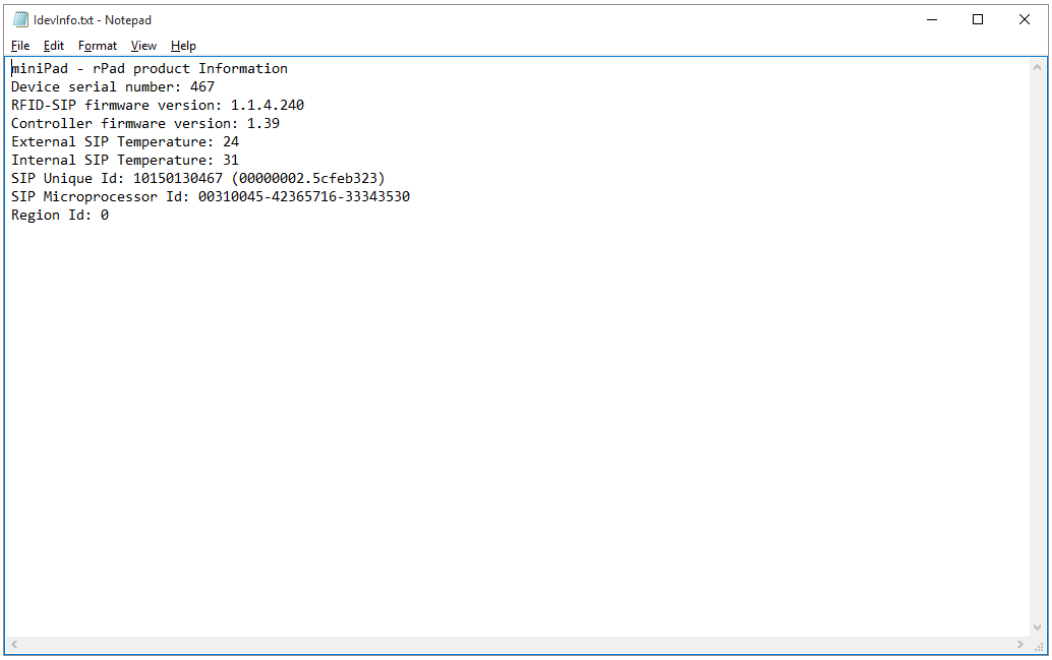
Updating the "Controller Firmware" on miniPad – rPad devices

miniPad and rPad devices have 02 distinct firmwares with specific instructions for updating each one of them. The first one is the "RFID-SIP" firmware (related to low level functions of the UHF Gen2 protocol) and the other one is the "Controller Firmware" (which manages the device connectivity to the Host computer). This chapter contains specific instructions to update the "Controller Firmware" only.

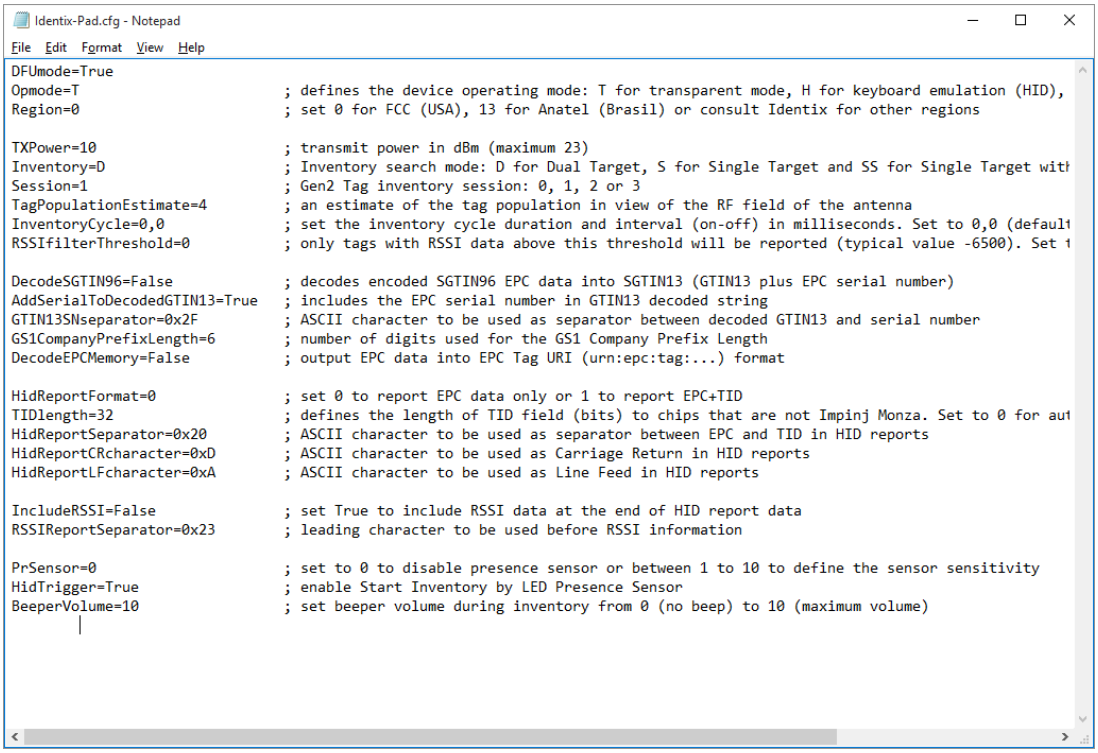
1) Open the device information file to identify the current firmware version. Connect your device to a Windows machine and open the "Identix" drive that is automatically mounted when you connect the device to the computer. The file that contains the device information is named "IdevInfo.txt"



2) Identify the Controller Firmware version by opening the “IdevInfo.txt” file on Notepad.

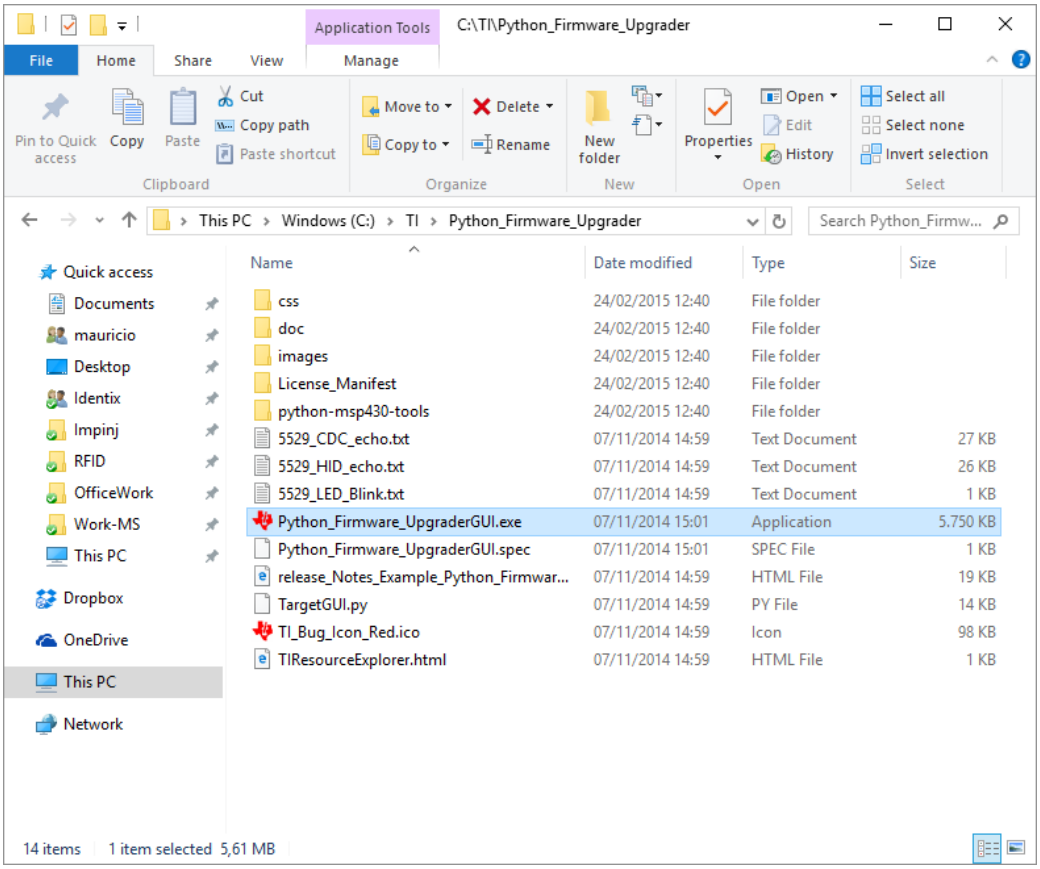


3) After having the new firmware file on your hands (available for download at the Identix support web site), put your device in DFU (Device Firmware Update) mode. To do that, open the Identix-Pad.cfg file on Notepad and include the statement “*DFUmode=True*” on the first line of the file. The statement is case sensitive so be careful editing the configuration file.



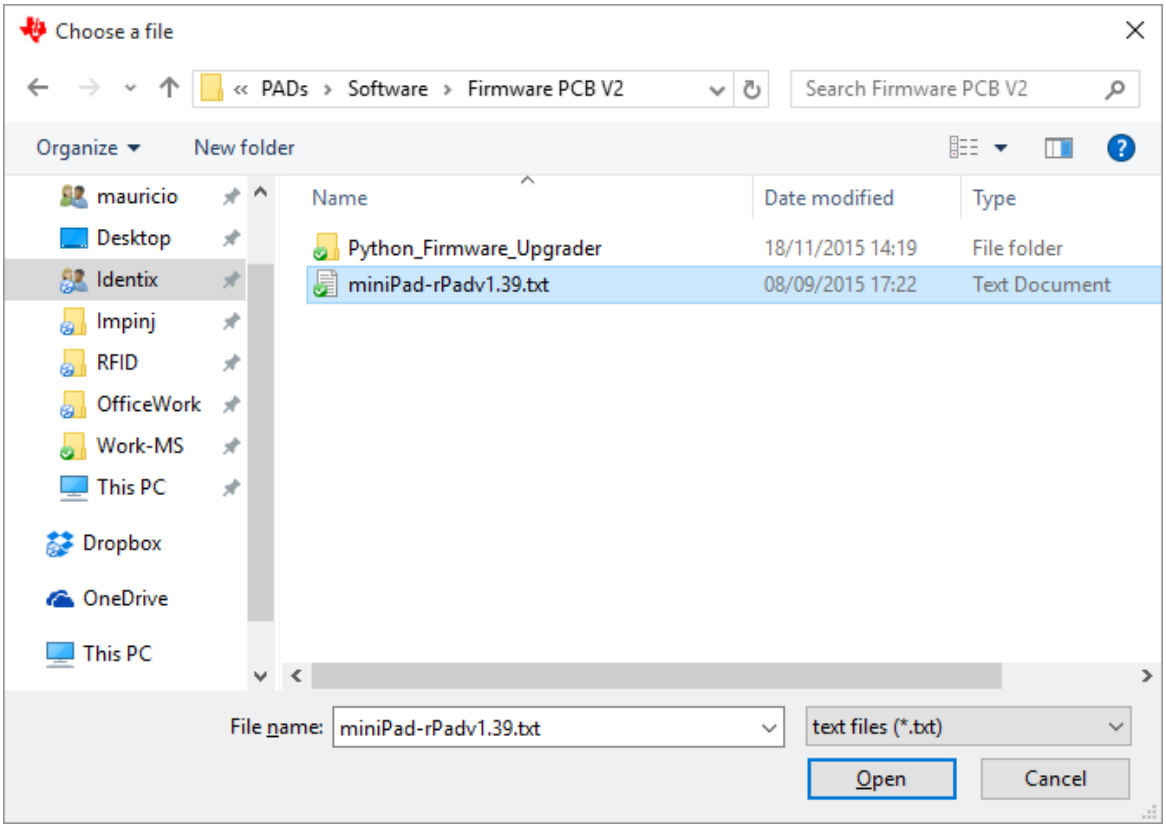
4) After saving the configuration file on Notepad, the device will reboot and enter in “DFU mode”. The “Identix” drive will dismount and your will no longer have access to the configuration file.

5) Locate the “Python_Firmware Upgrade”. Identix provides this utility on a zipped file. Create a folder and unzip all content of the zip package inside it. Execute the file “Pyton_Firmware_UpgradeGUI.exe” by double clicking over it.



6) Once the program is executed, a scree like the one below must be displayed. The program will automatically recognize the miniPad / rPad device and a “ready….” Message will be displayed.

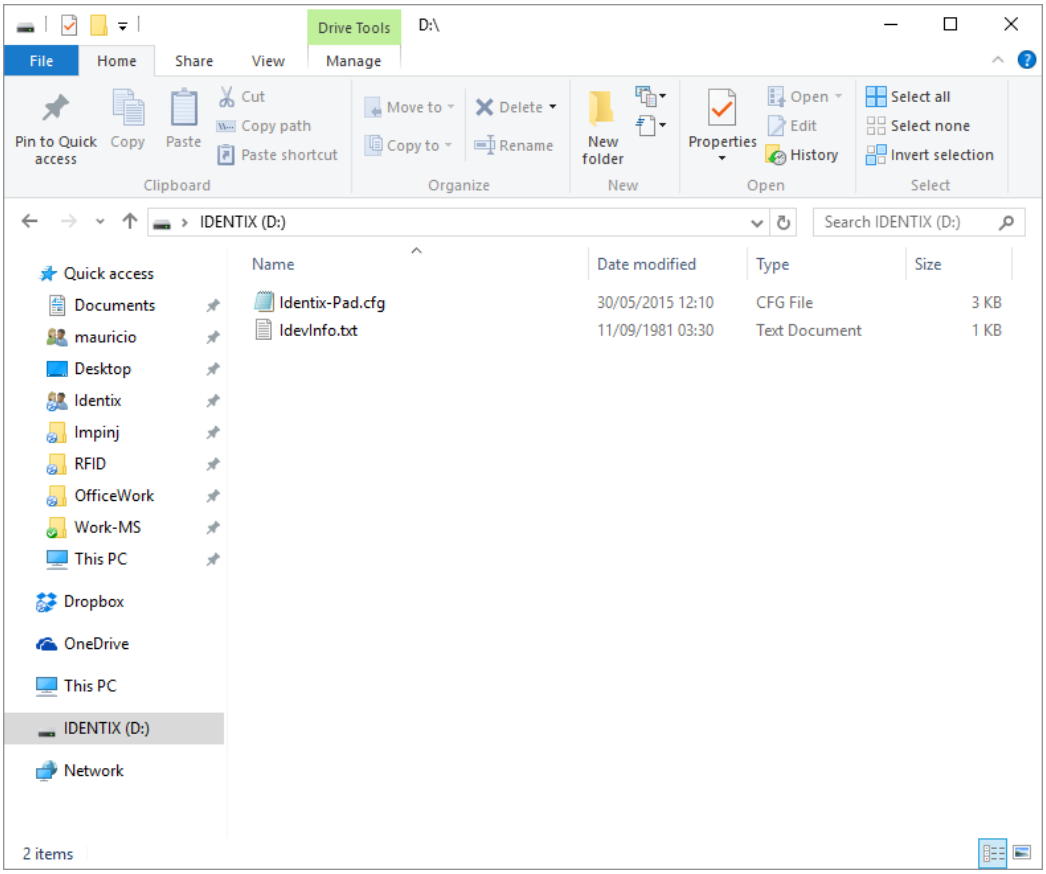
7) Select the new firmware file by the the menu “File / Open User Firmware”. In the example blow the firmware file is “miniPad-rPad1.39.txt”

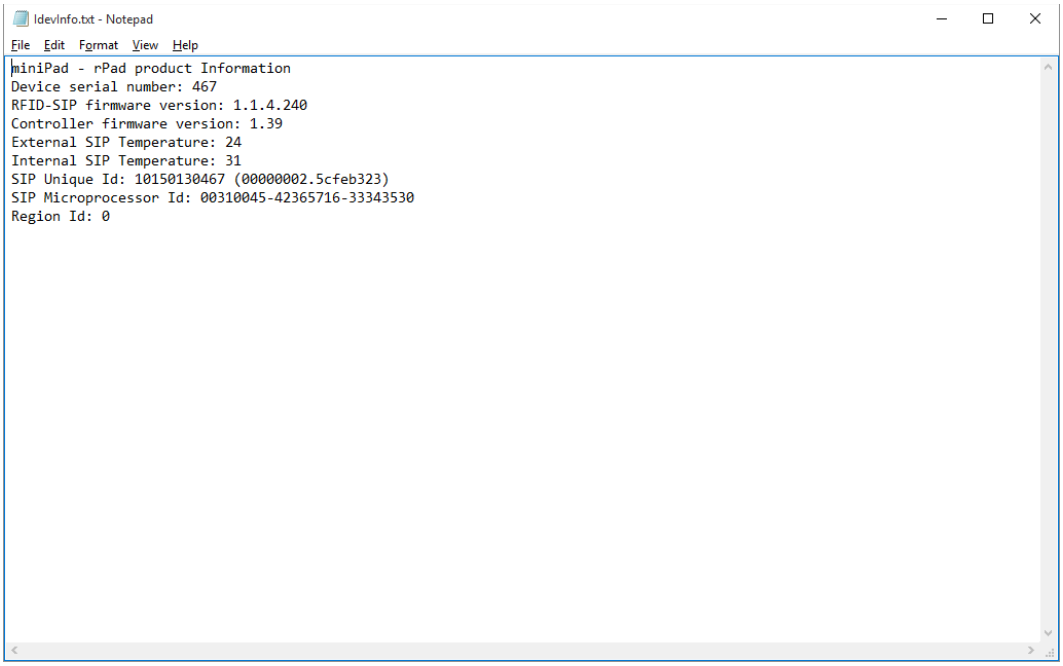


8) When selecting the file, the firmware update process will start automatically. Once finished the “Programming: OK” message will appear

Attention! DO NOT INTERRUPT THIS PROCESS, OTHEWISE YOUR DEVICE MAY BECOME PERMANENTLY DEMAGED.

9) Disconnect and reconnect the miniPad – rPad device to the computer. Open the device information file to verify if everything went ok.

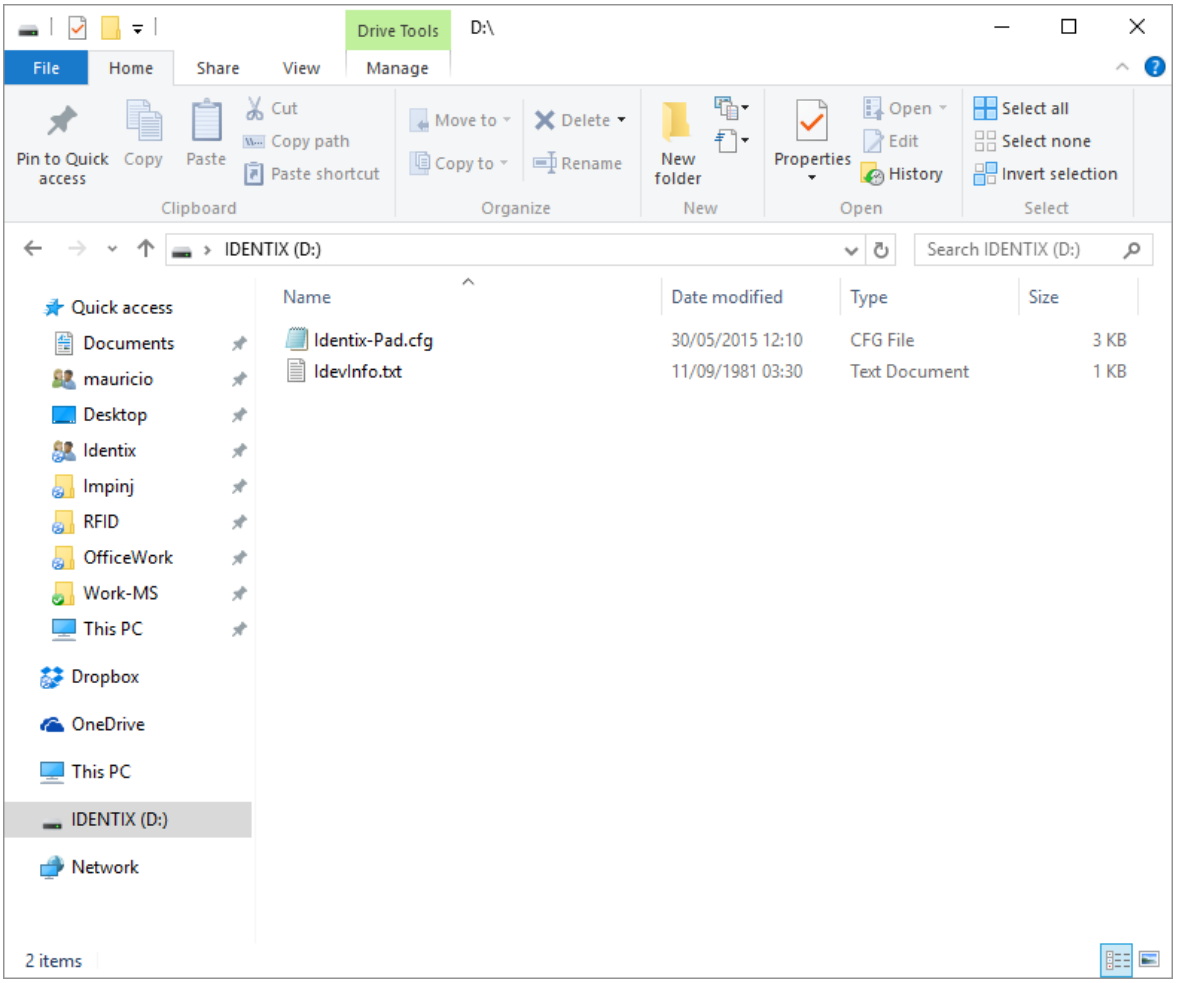




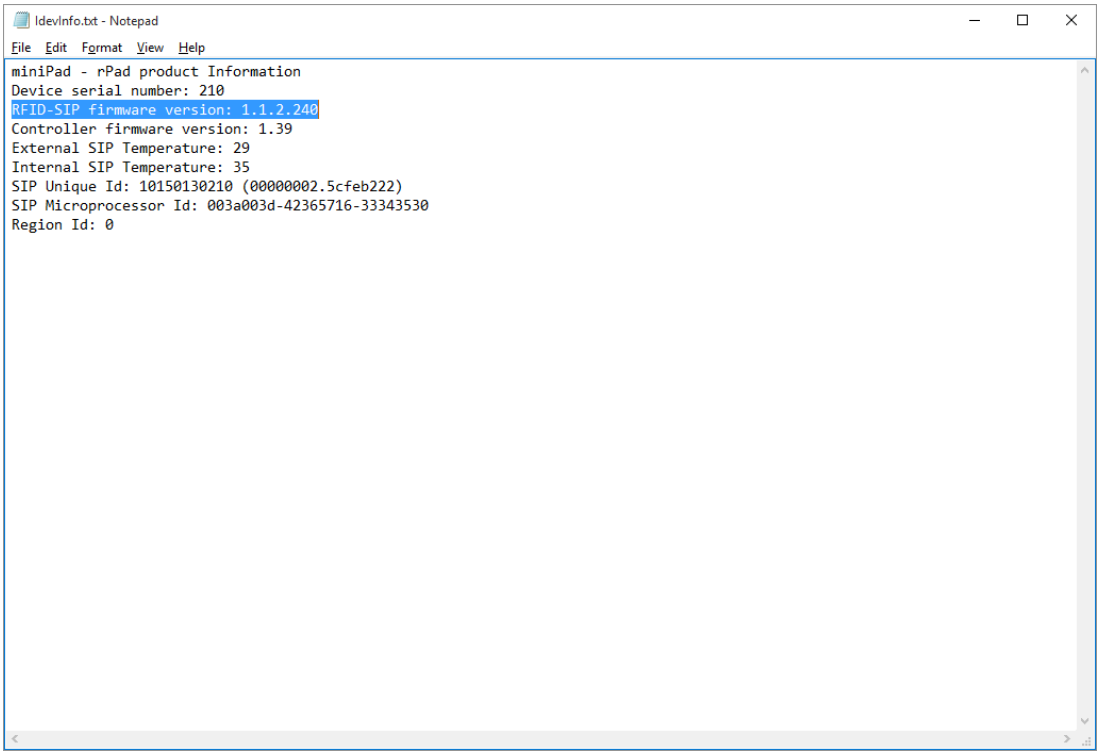
Updating the "RFID SIP Firmware" on miniPad – rPad devices

miniPad and rPad devices have 02 distinct firmwares with specific instructions for updating each one of them. The first one is the "RFID-SIP" firmware (related to low level functions of the UHF Gen2 protocol) and the other one is the "Controller Firmware" (which manages the device connectivity to the Host computer). This chapter contains specific instructions to update the "RFID SIP Firmware" only.

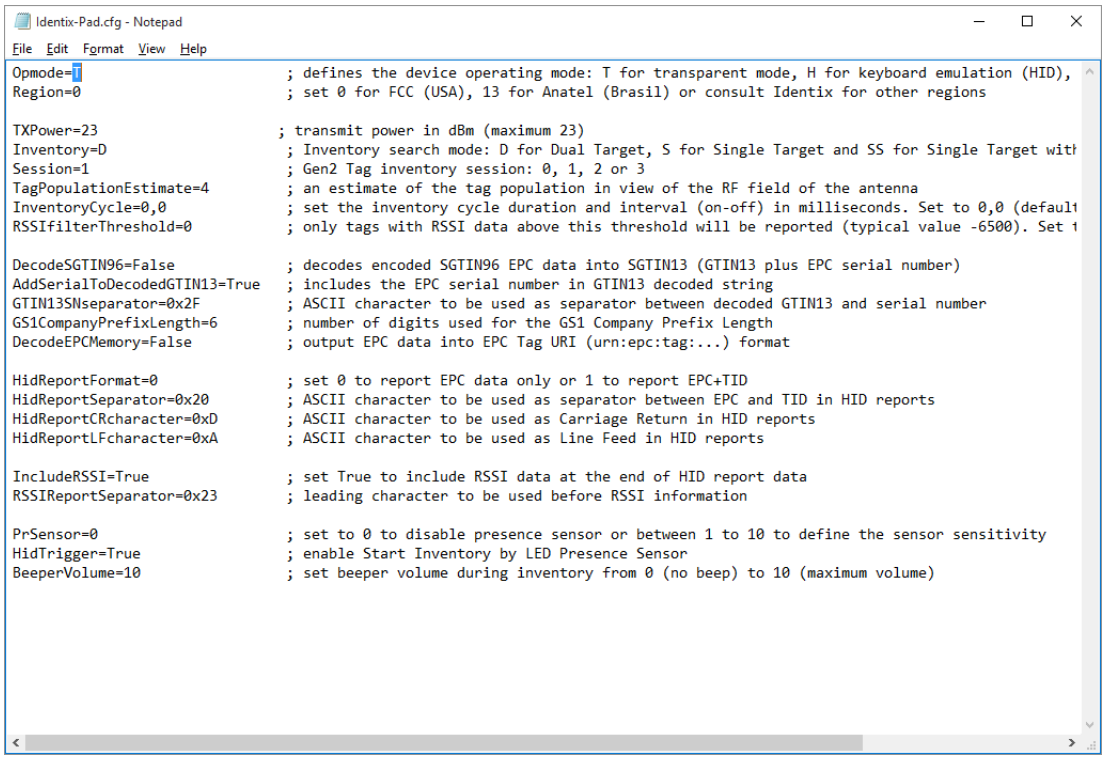
1) Open the device information file to identify the current firmware version. Connect your device to a Windows machine and open the "Identix" drive that is automatically mounted when you connect the device to the computer. The file that contains the device information is named "IdevInfo.txt"



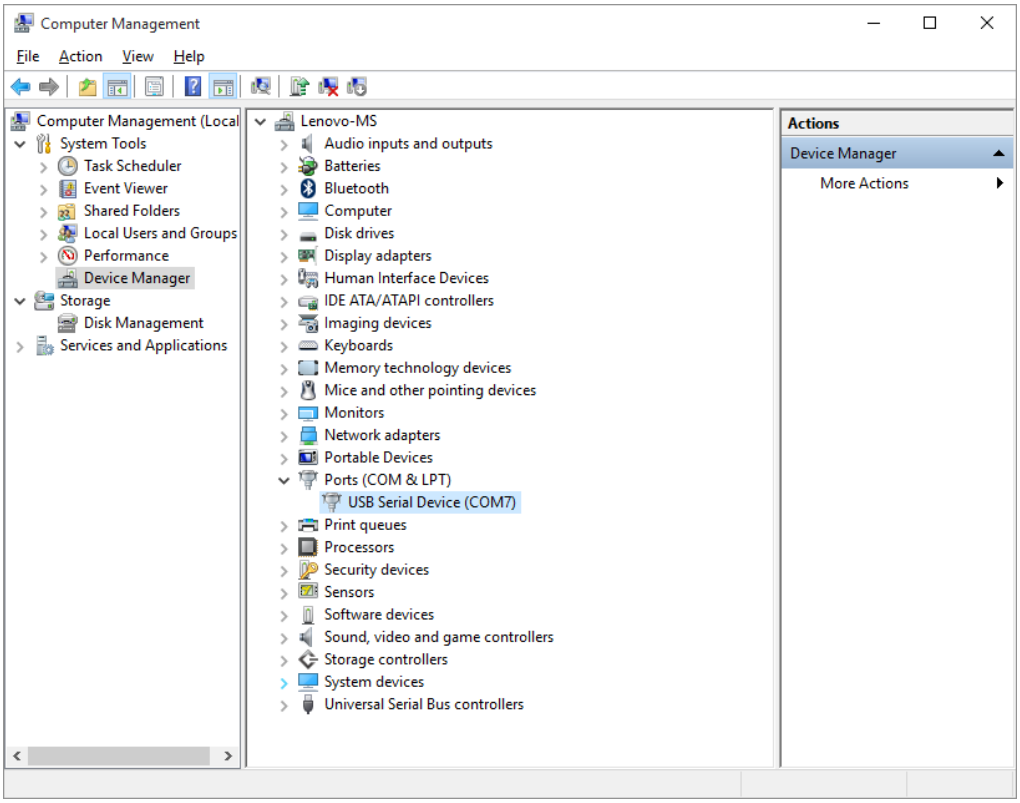
2) Identify the RFID SIP version by opening the “IdevInfo.txt” file on Notepad.



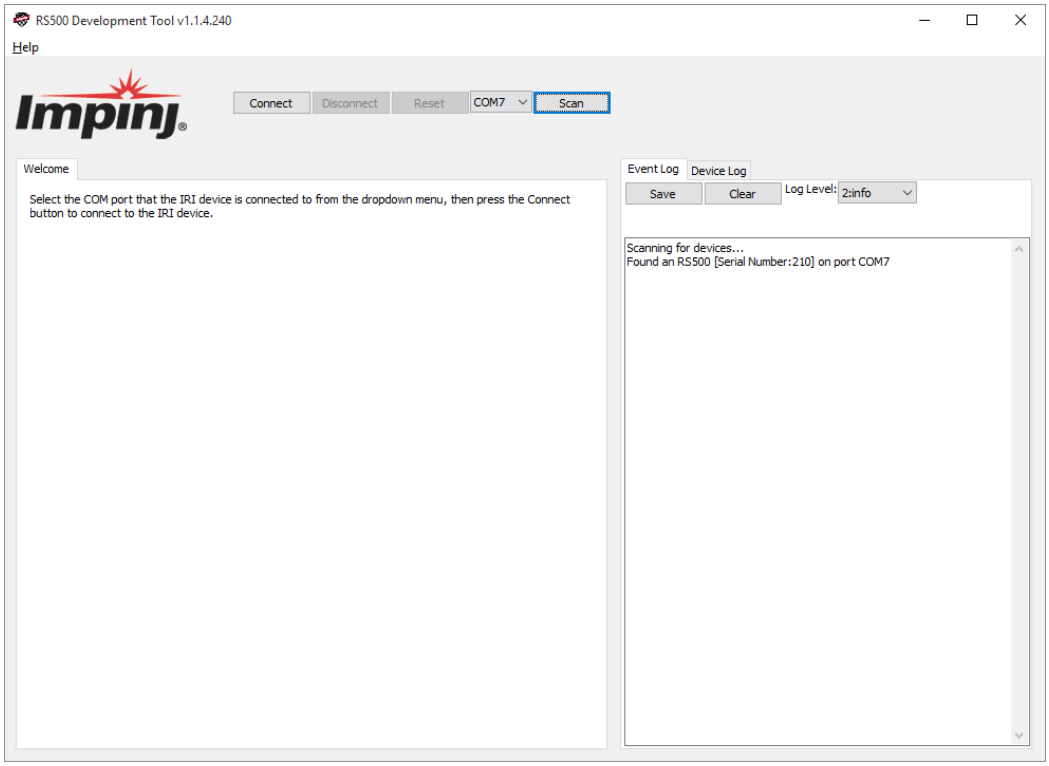
3) Make sure your device is configured to work in “Transparent Mode”. Set the option “*Opmode=T*” on the Identix-Pad.cfg file located inside the “Identix” drive.



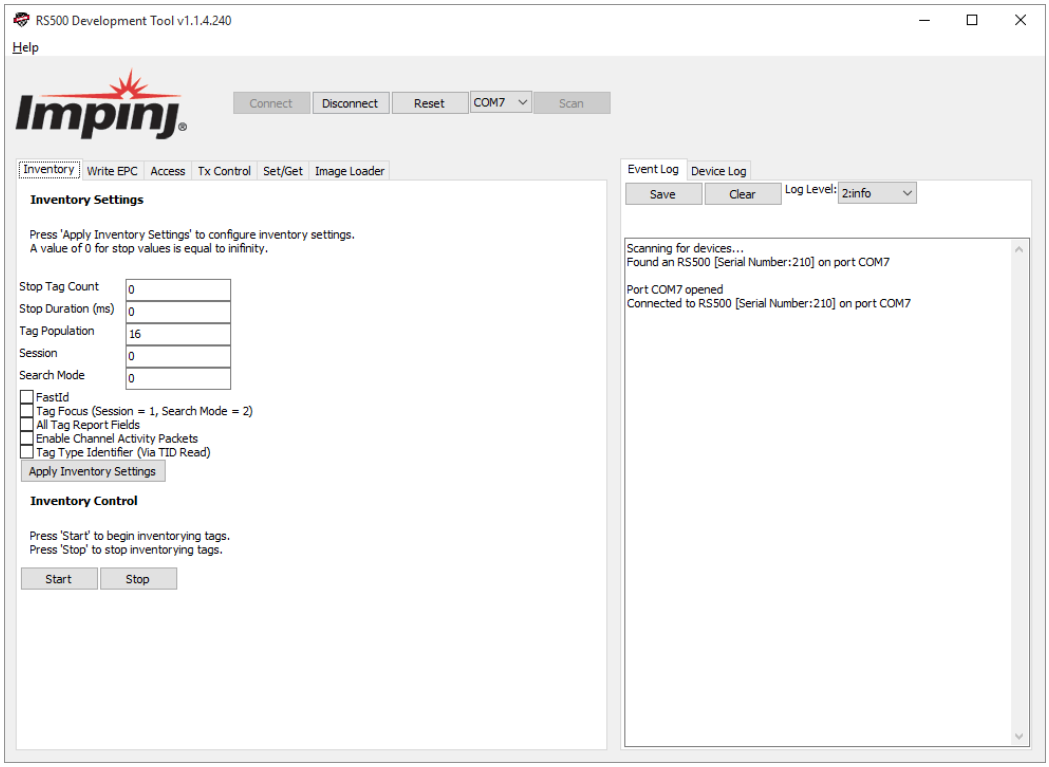
4) Verify the COM port your computer assigns to the miniPad – rPad device by opening the “Computer Management” Windows applet.



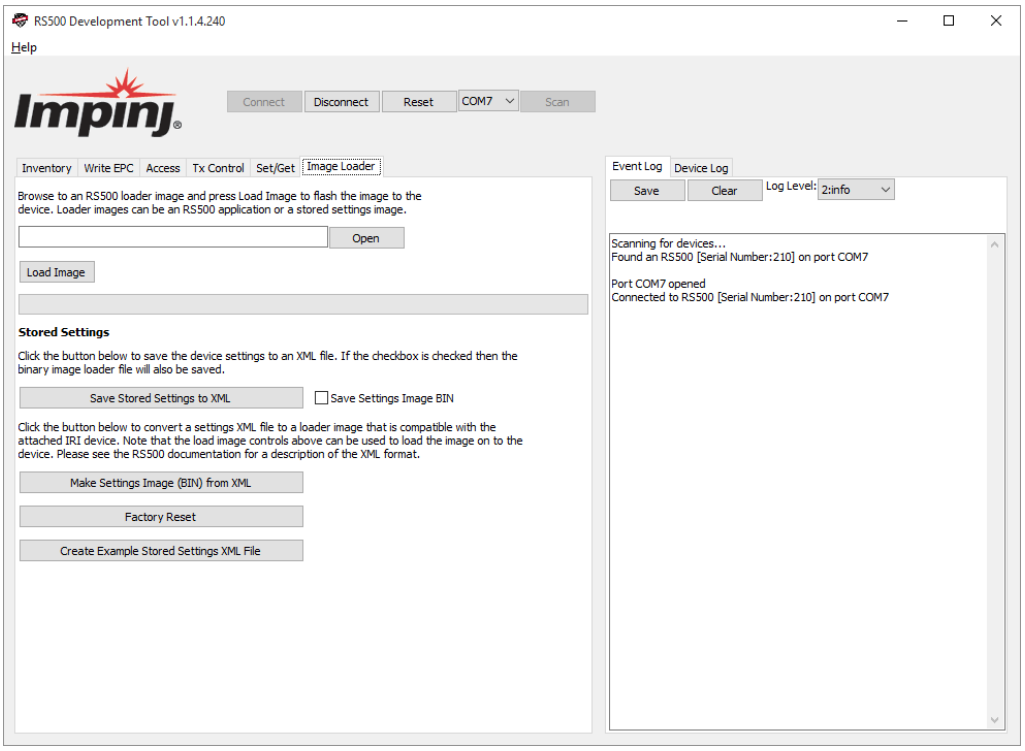
5) Open the “RS500 Development Tool” or the “Indy Demo Tool” provided by Identix. Click “Scan” to automatically detect the miniPad – rPad device.



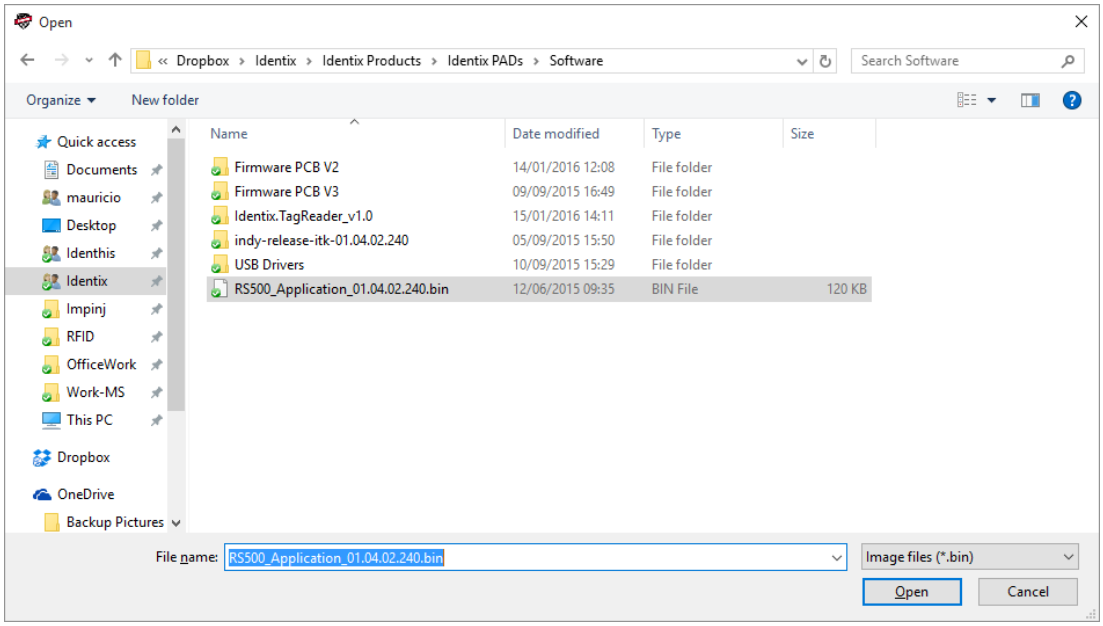
6) After a successful connection, the following screen is deployed.



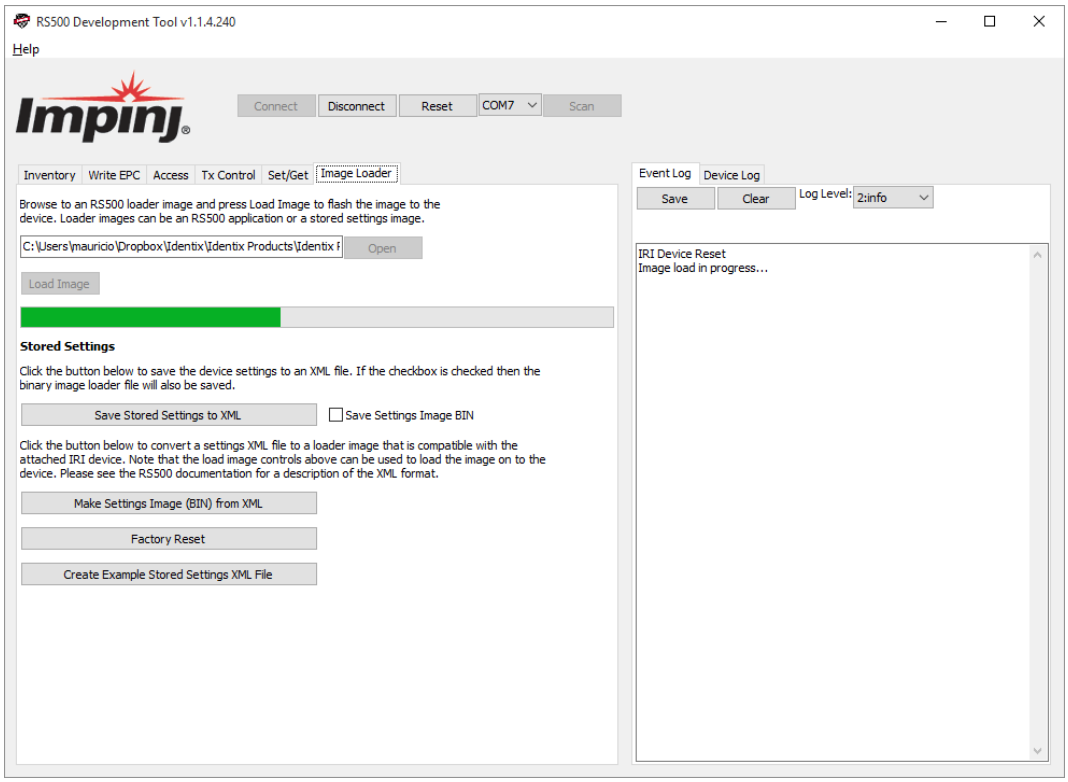
7) Now go to the “Image Loader” tab and select the RFID SIP firmware file provided by Identix. Hit the “Open” button to select the firmware file.



In this example the filename is “RS500_Application_01.04.02.240.bin”

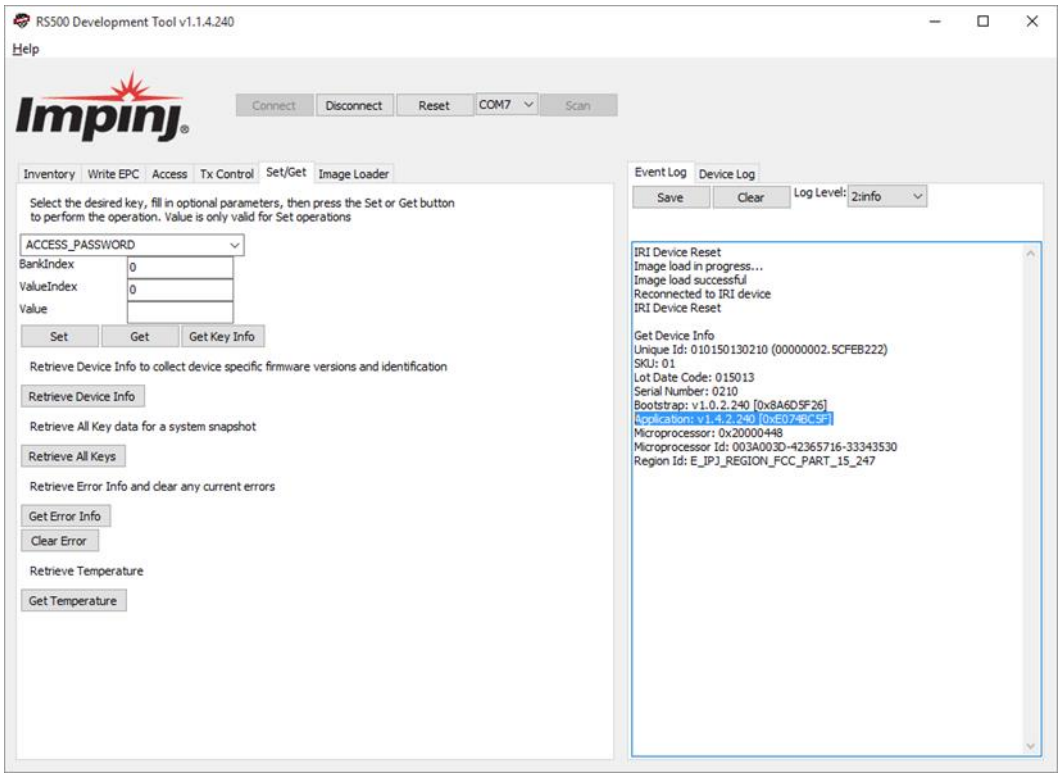


8) After selecting the desired RFID SIP Firmware file, press the" Load Image" button and the firmware update process will begin. A progress bar will be displayed and a "Download Completed Successfully" confirmation message will appear at the end of the update process.

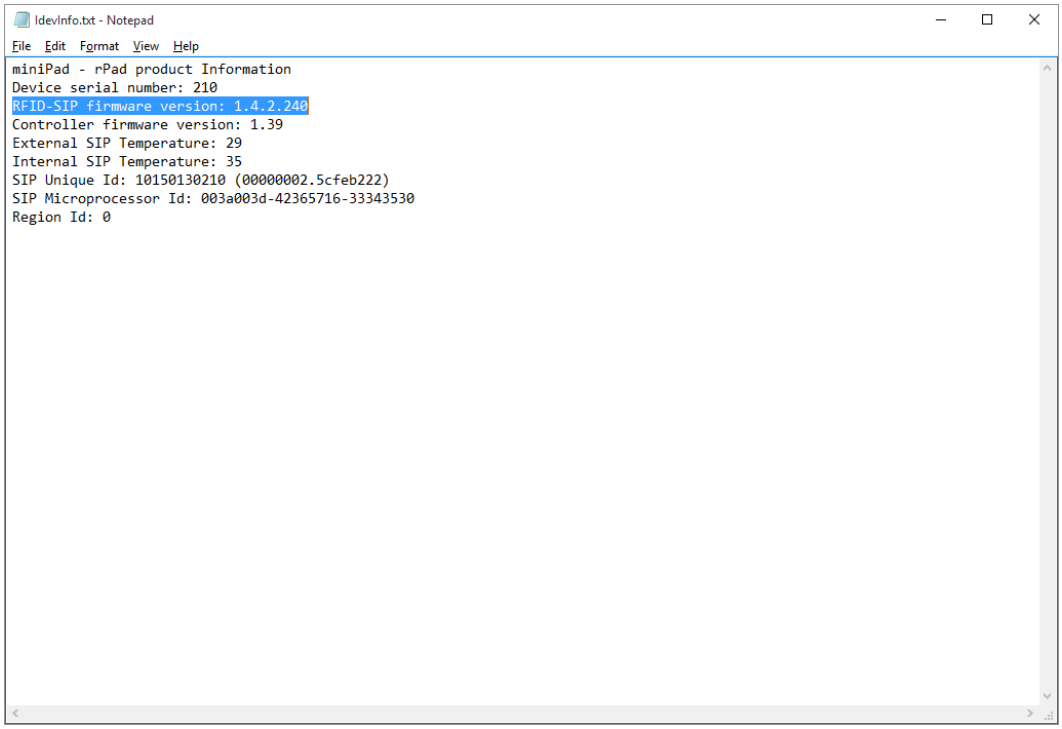


Attention! DO NOT INTERRUPT this process, otherwise your device may become permanently corrupted.

9) Now verify is the firmware was successfully updated to the desired version. Go to the "Set/Get" tab and hit the "Retrieve Device Info" button. The current firmware of the RFID SIP will be displayed on the right panel.



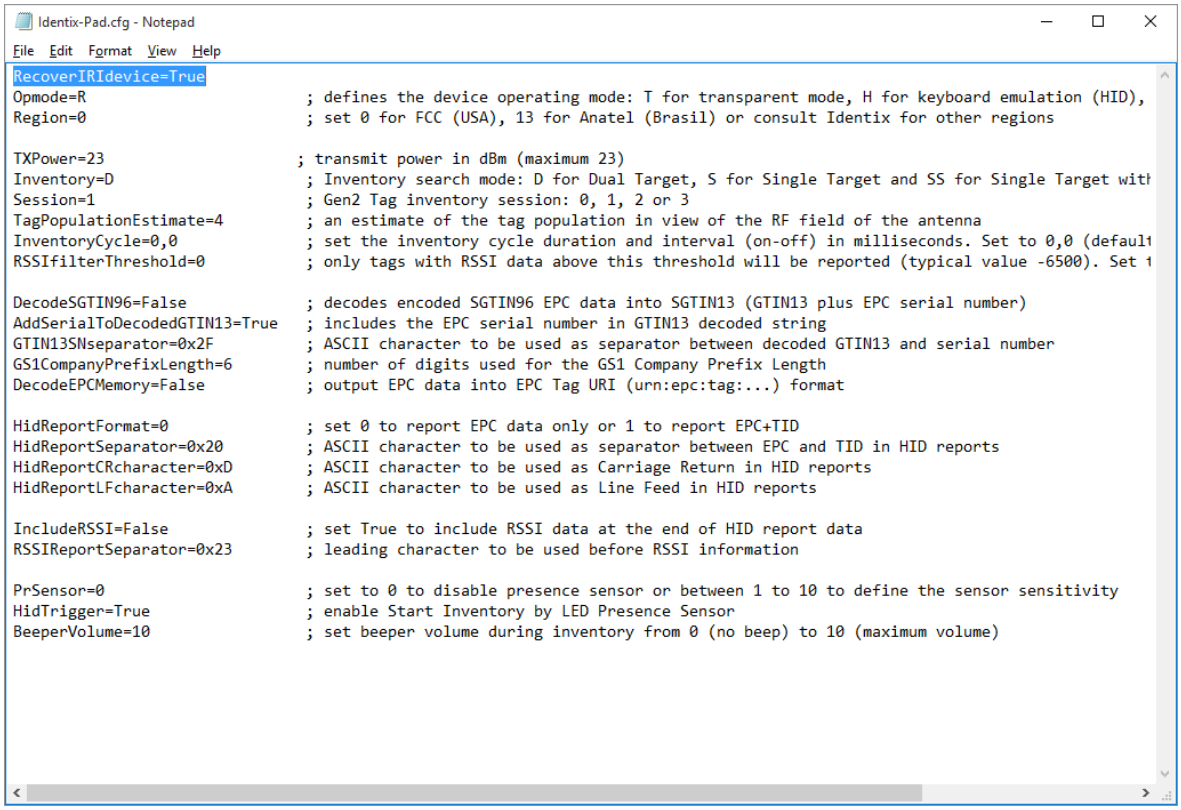
You can check also by reopening the "Idenvinfo.txt" file present on the Identix drive



Emergency recovery procedure for he RFID SIP Firmware

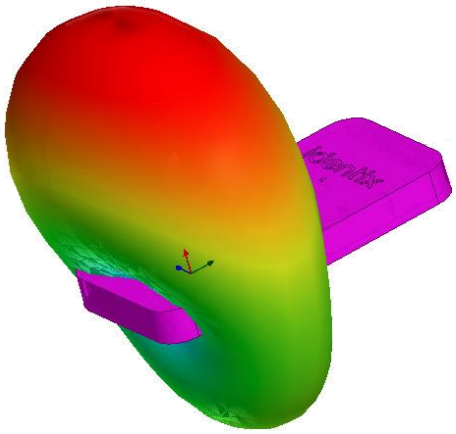
In the case the RFID SIP firmware update process fails and you're no longer able to connect to the device, you may use this procedure to reset the RFID SIP to the latest working firmware version.

Open the Identix-Pad.cfg file located inside the "Identix" drive. Insert on the first line of the configuration file the following statement/command: "*RecoverIRIdevice=True*" (without quotes). Disconnect and reconnect the device from the computer and verify if you're able to access the miniPad - rPad again.

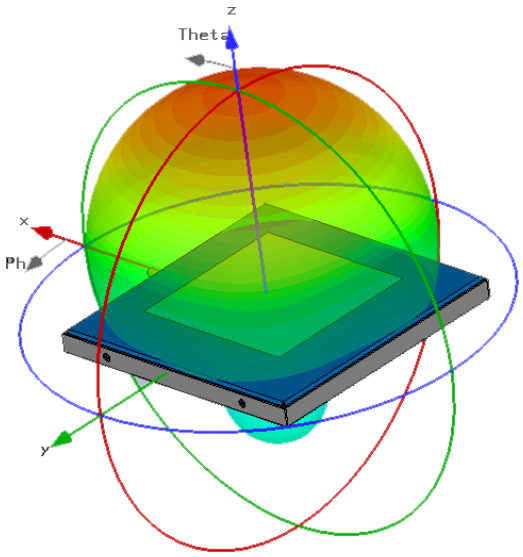


Antenna Radiation Patterns

Below are the antenna patterns for minPad and rPad respectively. Antenna gains are -4dBi for miniPad and +8dBi for rPad.



miniPad internal antenna radiation pattern



rPad internal antenna radiation pattern

Contacts

Sales: sales@idntx.com

Support: https://idntx.zendesk.com

FCC Statement

FCC Statement: §15.105 Digital Devices Statement. Class B Digital Devices.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of

the following measures: (1) reorient or relocate the receiving antenna, (2) increase the separation between the equipment and receiver, (3) connect the equipment into an outlet on a circuit different from that to which the receiver is connected or (4) consult the dealer or an experienced radio/TV technician for help.

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