

MaxReader Development Kit

Capture, transmit and store more data with
F-RAM high-performance wireless memory

EPC Gen2 Wireless Protocol (860MHz – 960MHz)



Quick Reference Guide

Quick Reference Guide

**MaxReader Development Kit
MaxArias Gen2 Reader Platform**



STEP 1: Kit Contents

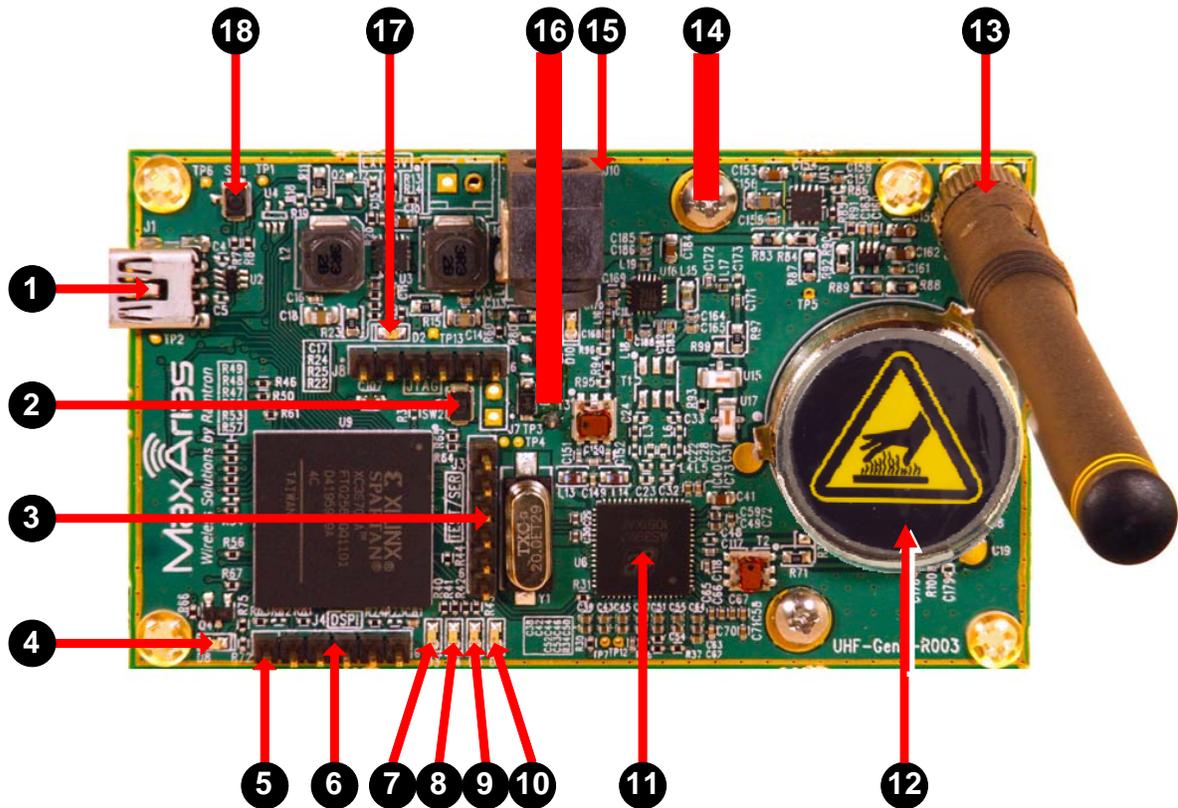
Please ensure that you have received all items shown below.



<u>Item</u>	<u>Description</u>
[1]	Kit sleeve
[2]	USB mini-B cable
[3]	6-position 0.100" pitch DSPI cable
[4]	DC power supply
[5]	Power adapters**
[6]	MaxReader Quick Startup Guide
[7]	CD with software, drivers & user manuals
[8]	RFID UHF reader (MaxReader)
[9]	WM72016-EVAL MaxArias evaluation board (2)
[10]	1/2-wave antenna (packaged under DSPI cable)

STEP 2: MaxReader Board

Please familiarize yourself with the MaxReader PCB layout.



[1] CONNECTOR – USB mini B	[10] LED – RF Power ON
[2] BUTTON – Reset (hard)	[11] AS3992 RFIC
[3] CONNECTOR – Test	[12] CIRCULATOR
[4] LED – FPGA Ready	[13] SMA ANTENNA CONNECTOR
[5] DSPI BUS, PIN 1	[14] HEAT SINK (bottom x2)
[6] CONNECTOR – DSPI	[15] CONNECTOR – Power 5V
[7] LED – DSPI Link	[16] BUZZER (bottom)
[8] LED – Tag Detect	[17] LED –Power ON
[9] LED – Authenticated	[18] BUTTON – Reset (serial port)



IMPORTANT NOTE: Please connect the supplied ½ -wave dipole antenna to the reader’s SMA connector prior to applying power to the reader.

STEP 3: USB Driver

Apply power to the reader by plugging in the supplied 5V power supply to the MaxReader's power connector [14].

Prior to connecting MaxReader to your computer, please ensure that you have located or downloaded the latest FTDI Virtual COM Port (VCP) driver, either on the supplied CD or the internet:

CD:

Drivers will be located in the Apps_Drivers\CDM20814_WHQL_Certified directory on the supplied CD-ROM.

Internet:

Updated FTDI drivers can be downloaded from:

www.ftdichip.com/Drivers/VCP.htm

The current tested version of the FTDI Virtual COM Port (VCP) driver for Windows is: v2.08.14. For Mac OS, the current version is v2.2.16.

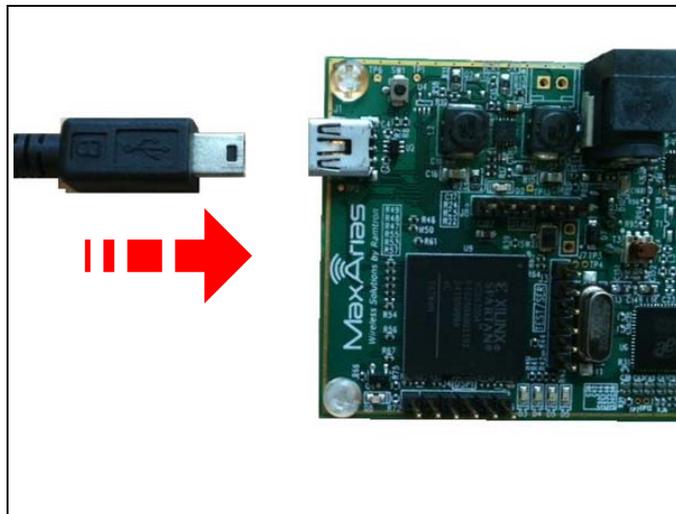
STEP 4: Connecting the USB Cable

Connect the Gen2 MaxReader to your computer using the USB cable supplied in your development kit.

Computer:



MaxReader:



STEP 5: USB Driver Install

Your computer must install a USB driver to support the interface to the MaxReader.

Allow your computer to automatically install the required FTDI USB driver. Once the driver has been installed correctly, MaxReader's buzzer should emit a short rising chirp.

In the event that the serial port driver does not correctly install, manual installation of the USB VCP driver is required. Please refer to the User Guide for GUI document supplied on the CD-ROM for manual installation instructions.

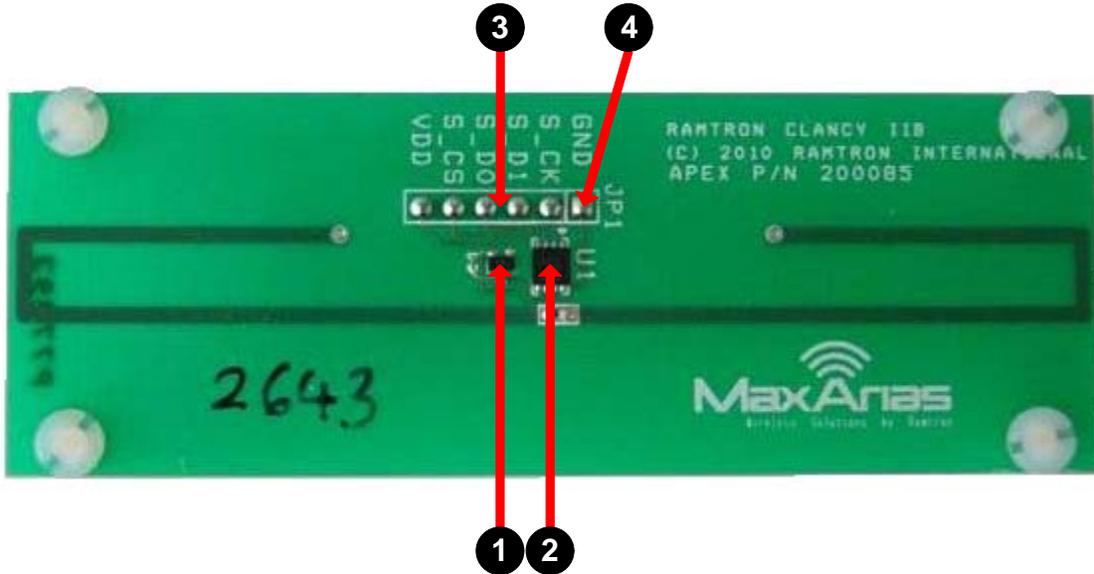
IMPORTANT NOTE:

The MaxReader Development Kit comes with a Graphical User Interface (GUI). This GUI is designed to facilitate command manipulation between MaxReader and the WM72016 Evaluation Board. Please refer to page 19 for instructions on how to use the GUI.

If additional assistance is required, please e-mail:
MaxArias@Ramtron.com.

STEP 6: WM72016 Evaluation Board

Please familiarize yourself with the MaxArias evaluation board layout.



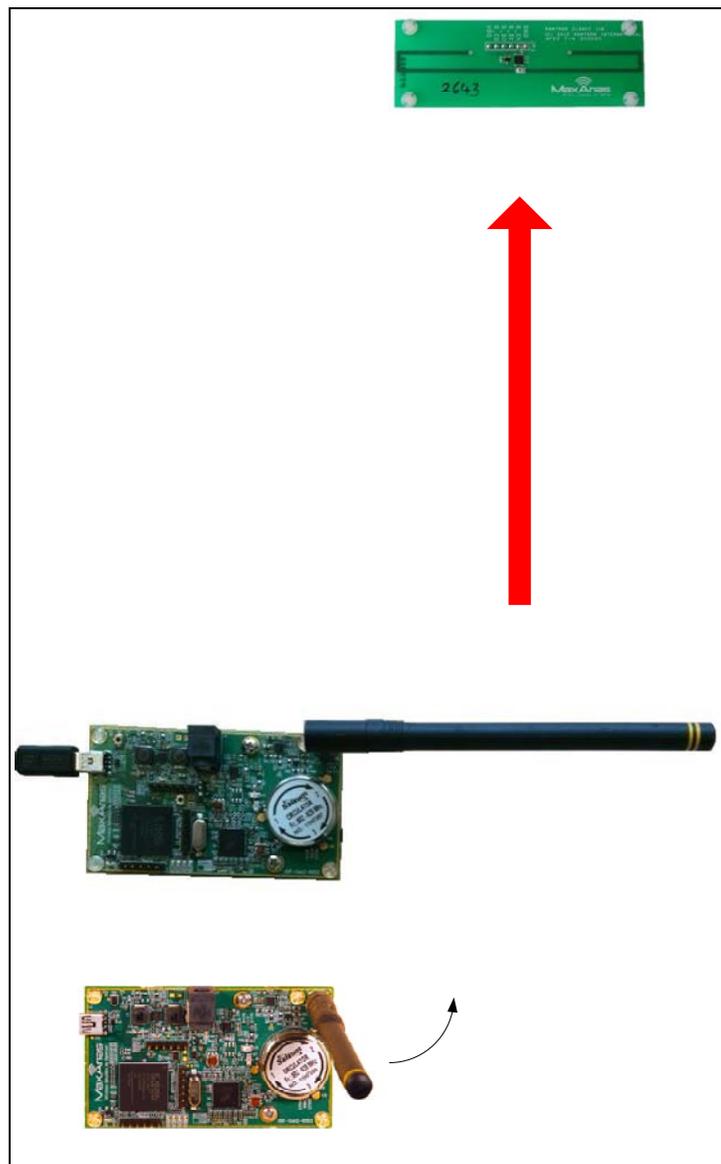
- | | |
|-----|---|
| [1] | IC – Schottky diode (polarity protection) |
| [2] | IC – MaxArias WM72016 |
| [3] | PORT – DSPI |
| [4] | DSPI bus connector “pin 1” |



IMPORTANT NOTE: Metal surfaces, metal desk brackets, and other metal objects may negatively impact the performance on the PHY communication link between the MaxReader and the WM72016 evaluation board. Other types of materials may also have a positive or negative effect on the reader’s RF field. In this case, a performance improvement will be seen by distancing the reader and evaluation tag from the object(s) in question.

STEP 7: MaxReader RF Field Orientation

Place the WM72016 evaluation tag in the reader's RF zone as shown below (power supply cable not shown). Ensure that the polarity of the reader's antenna is the same as the antenna on the WM72016 evaluation board.



STEP 8: Terminal Setup

Your computer's interface to MaxReader is performed through a host terminal. Several terminals are readily available for a variety of systems, such as HyperTerminal (from Hilgraeve, Inc.) and PuTTY using Windows and Terminal using Mac OS.

HyperTerminal

Windows XP HyperTerminal is natively available on your computer.

Windows 7 HyperTerminal may be downloaded online at www.hilgraeve.com.

Refer to STEP 8a to configure HyperTerminal.

PuTTY

PuTTY is a free open-source terminal client for your Windows XP or Windows 7 computer. The PuTTY client terminal may be downloaded online at www.PuTTY.org.

Refer to STEP 8b to configure PuTTY.

NOTE: Some Windows 7 users may experience difficulties with HyperTerminal and may prefer PuTTY client software.

Mac OS

Mac OS has a built-in terminal client which can be used for command line communication with MaxReader. A sample AppleScript “maxterm.zip” to configure and launch the terminal is available on the MaxReader Development Kit landing page:

www.ramtron.com/go/MaxReaderDevKit.

STEP 8a: HyperTerminal Setup

1. Open HyperTerminal window on your computer.

Windows XP:

Start → All Programs → Accessories → Communications → HyperTerminal

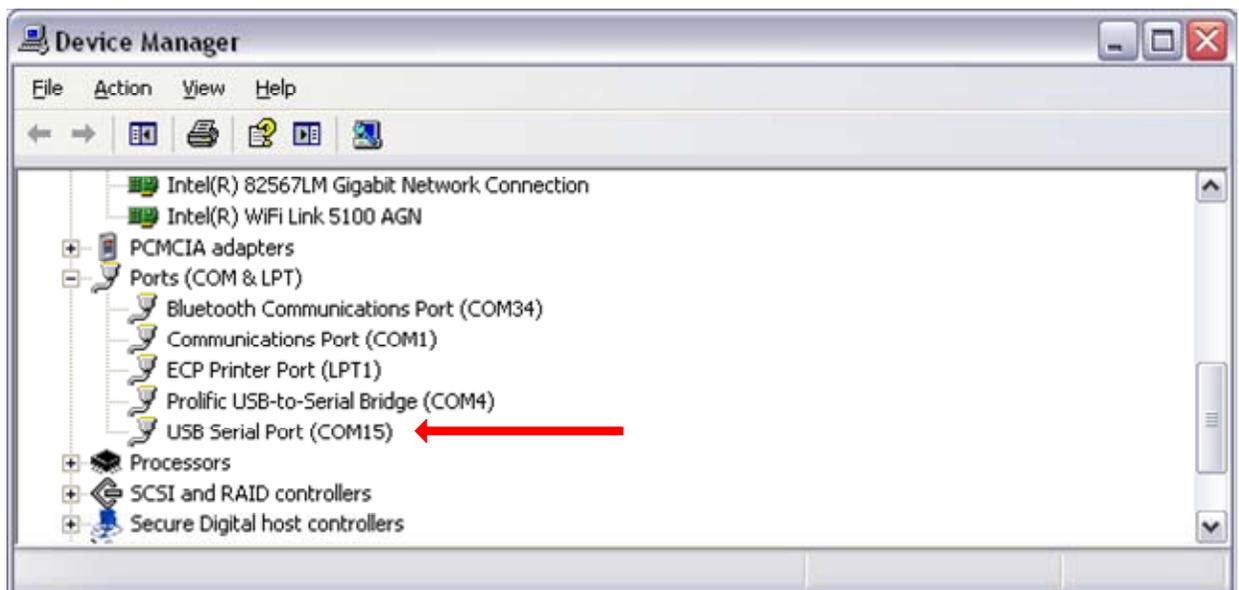
Windows 7:

Download HyperTerminal at: www.hilgraeve.com and start application.

2. Enter name of terminal and select OK.

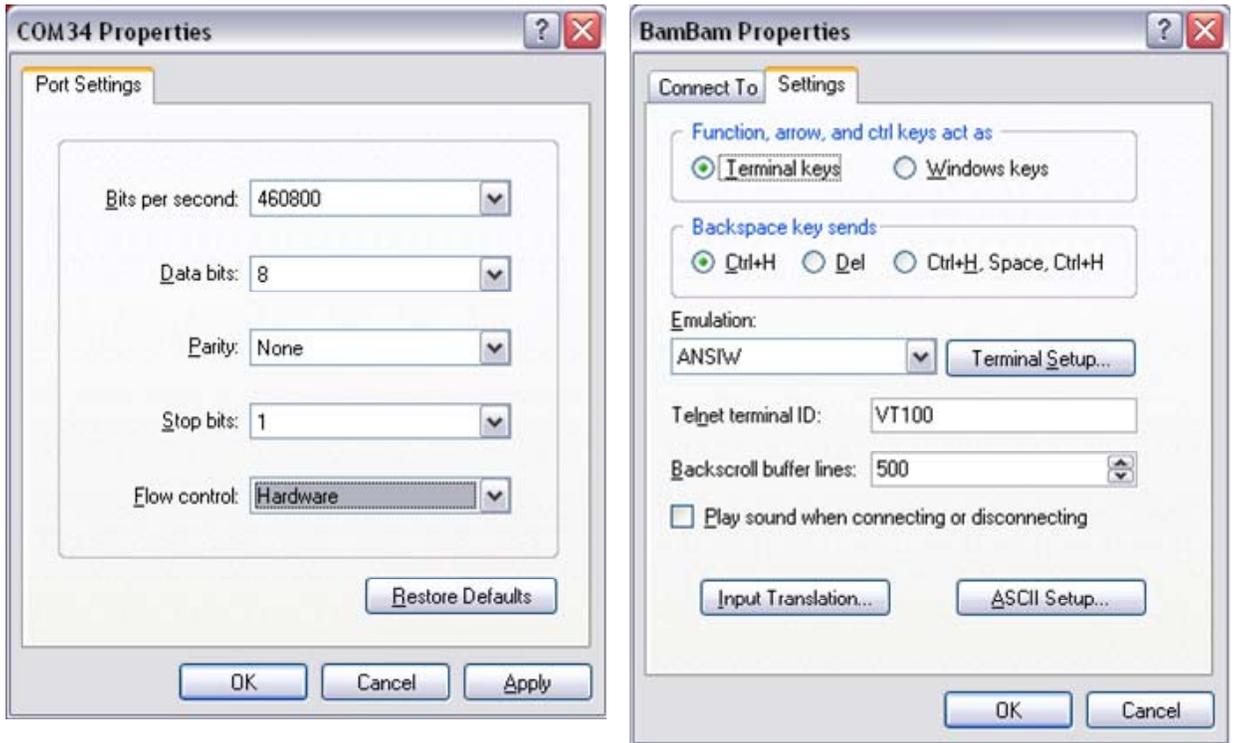
3. In the “Connect To” window, select the COM port that is connected to your MaxReader. The COM port your MaxReader is connected to can be determined from your computer’s Device Manager.

Start → Control Panel → System → Hardware → Device Manager

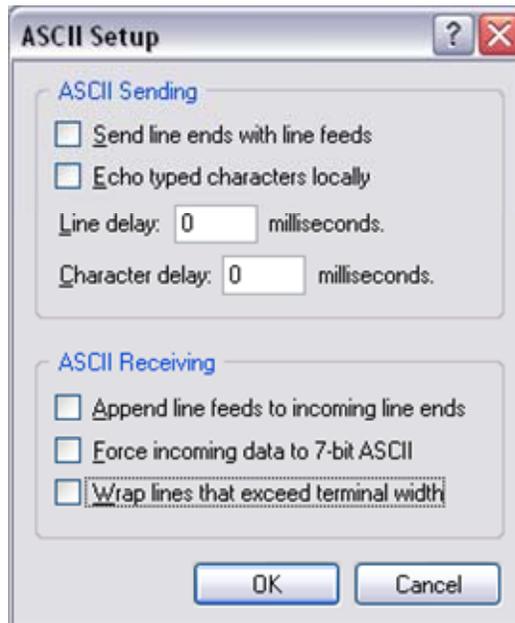


The MaxReader is identified as “USB Serial Port” as shown above.

4. Set the COM port properties and settings as shown below.



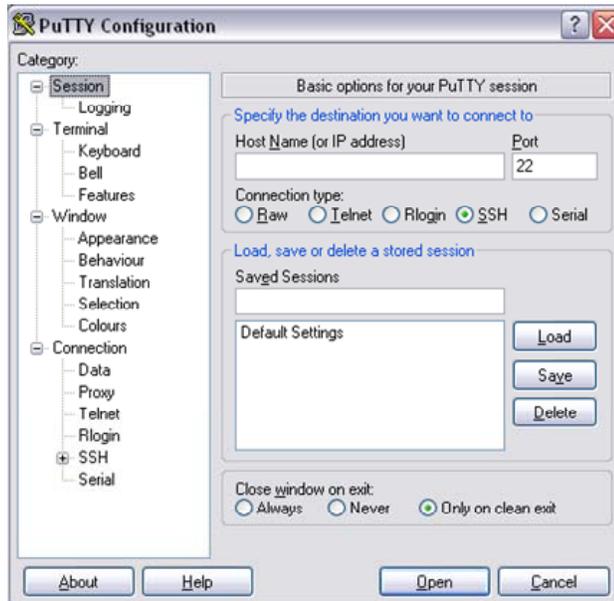
5. Set the ASCII setup as shown below.



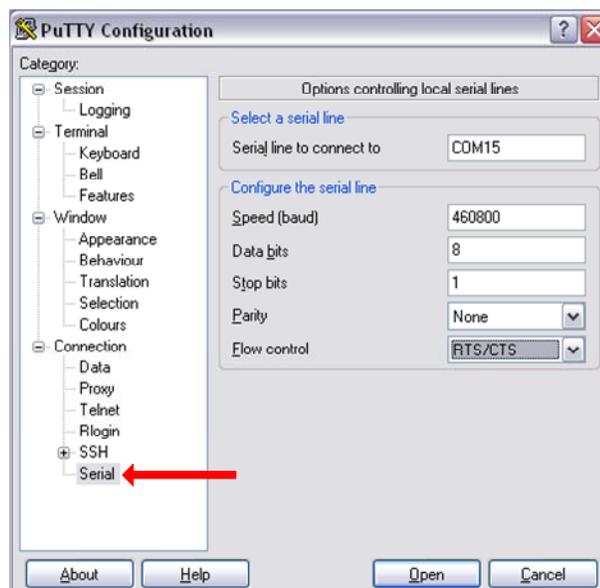
HyperTerminal is now configured.

STEP 8b: PuTTY Setup

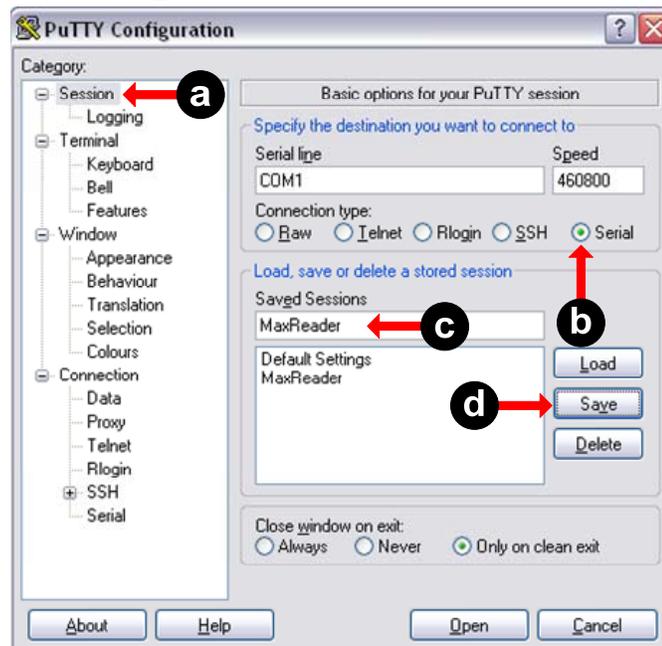
1. Start PuTTY application. The client software should appear as shown below.



2. Set the serial port definitions as shown below. The COM port MaxReader utilizes is found in your computer's Device Manager as described in STEP 6a.



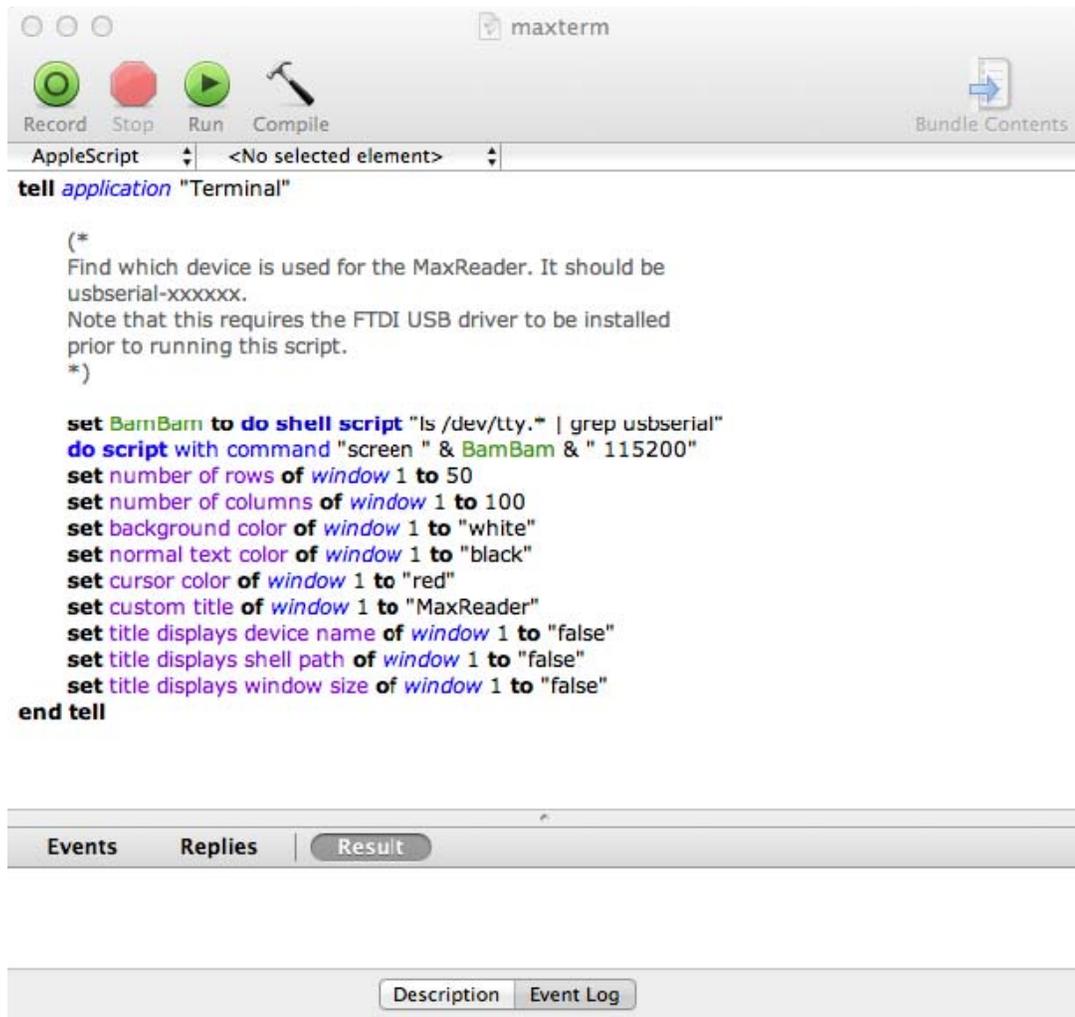
3. Under menu item “Terminal → Keyboard”, ensure that “Control-H” is used as the backspace key.
4. Complete PuTTY configuration by:
 - a. Selecting the Session category.
 - b. Select the “Serial” connection type.
 - c. Entering a configuration name.
 - d. Saving the configuration.



Upon saving the configuration, the configuration name should appear in a list of stored sessions as shown. The configuration can be recalled at any time by loading a previously saved session.

STEP 8c: Mac OS Setup

1. Download the maxterm AppleScript from the MaxArias web site as indicated above. Double click the icon to launch the AppleScript editor. You should see the following:

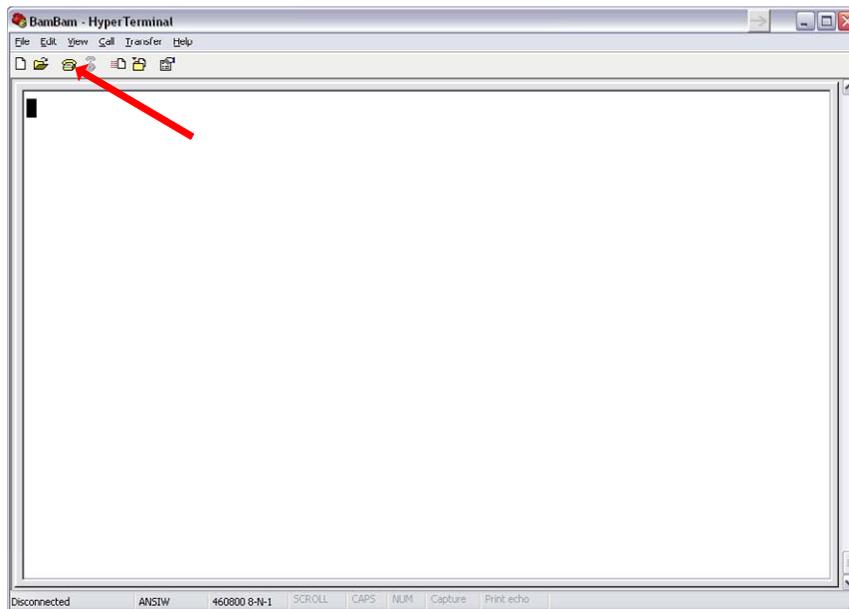


2. Click the Run button to launch the script. A terminal will open for use with the CLI.

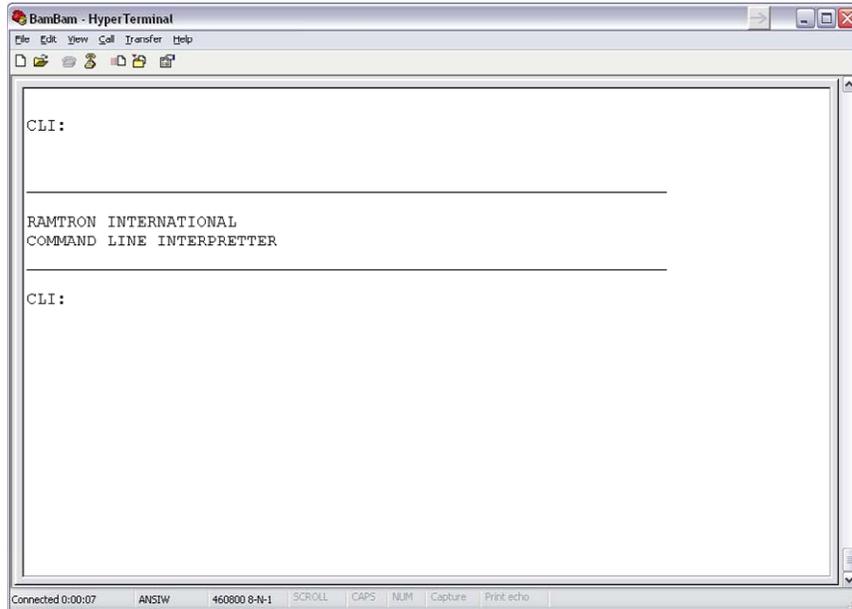
3. The Terminal may be hidden at launch if a Terminal session was not already active.
4. Follow the CLI instruction below.
5. When the CLI session is complete, type `<ctrl>a<ctrl>\` to release the maxReader and close the session.

STEP 9: Starting Communications

In the HyperTerminal window, connect to the MaxReader selecting the icon as shown below. In PuTTY, select the configuration name followed by the OPEN button at the bottom of the window.



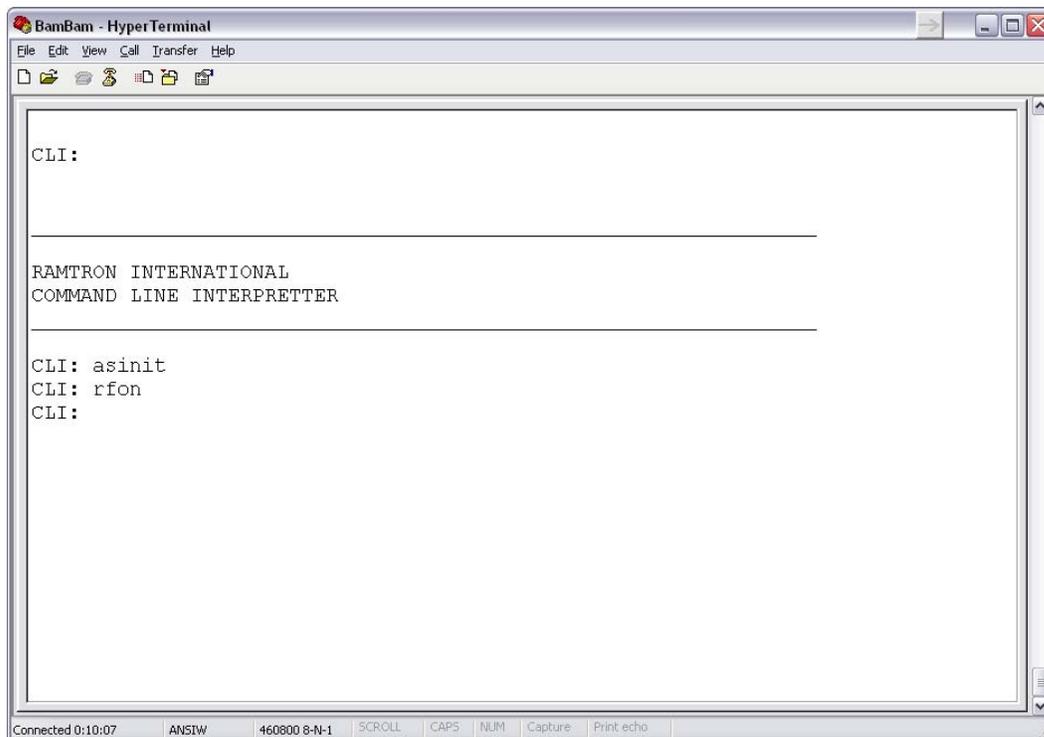
Press ENTER several times until the Ramtron CLI banner is displayed as shown below.



STEP 10: Initialize Gen2 MaxReader Hardware

Initialize the MaxReader and enable RF power by entering the following CLI commands:

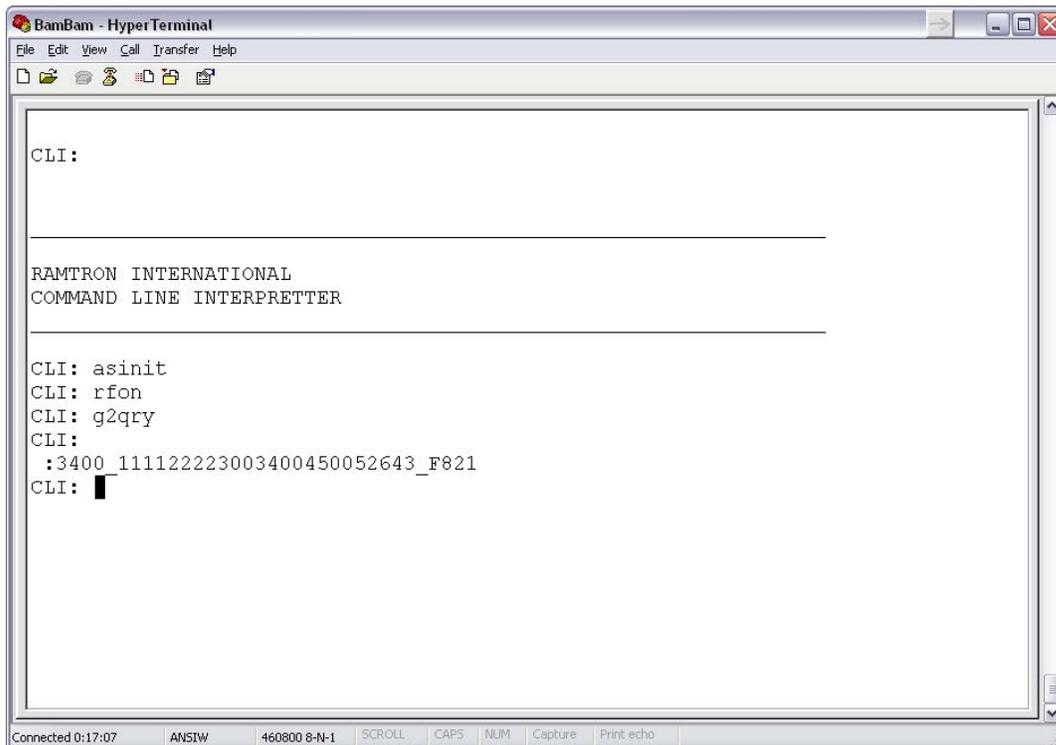
ASINIT
RFON



STEP 11: Querying the WM72016 Eval Board

The MaxArias WM72016 evaluation tag may now be queried by the MaxReader. Enter the following CLI command in the HyperTerminal to read the Gen2 EPC identifier.

G2QRY



```
BamBam - HyperTerminal
File Edit View Call Transfer Help
[Icons]

CLI:

-----

RAMTRON INTERNATIONAL
COMMAND LINE INTERPRETTER

-----

CLI: asinit
CLI: rfon
CLI: g2qry
CLI:
:3400_111122223003400450052643_F821
CLI: █

Connected 0:17:07  ANSIW  460800 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

The MaxReader may also be put into a continuous-query scan mode to allow a determination of how well the WM72016 evaluation board responds in its current environment. This is done with one of several CLI commands as shown below. Press ENTER to exit continuous-query scan mode.

G2CQRY, G2SCAN, G2FASTSCAN

Once the evaluation board has responded with its EPC identifier (using G2QRY), further commands can be performed to read and write the tag's memory – refer to the MaxReader CLI User Guide for details. When the Gen2 interface is not in use, disable RF power using the following CLI command:

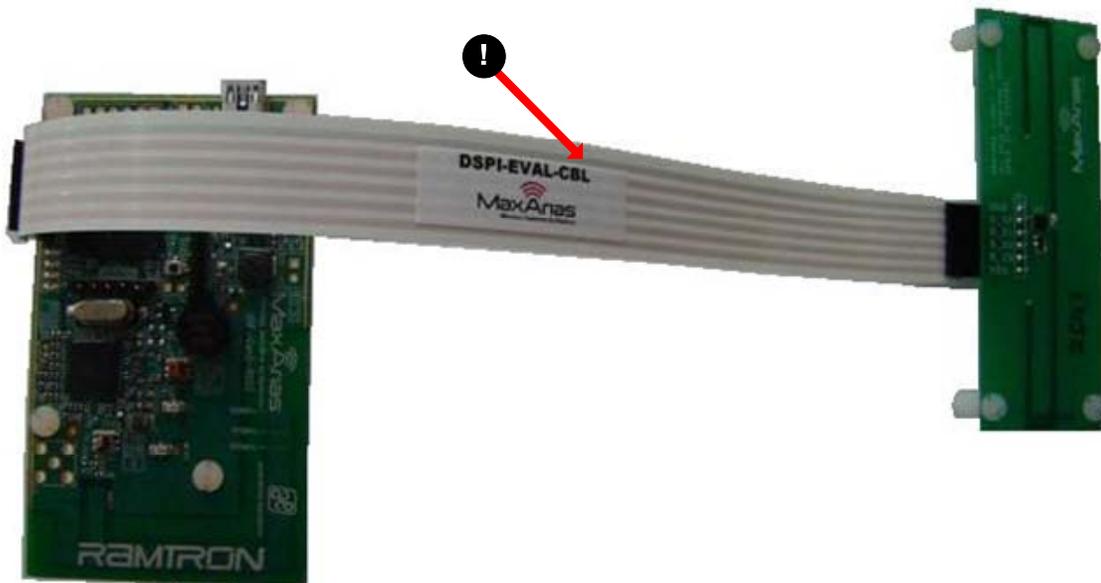
RFOFF

STEP 12: Connecting the DSPI Interface

The DSPI serial interface on the MaxArias WM72016 evaluation board connects to the MaxReader DSPI port with the supplied 6-position ribbon cable as shown below. If the cable is connected correctly, the DSPI link LED will be lit.

Please note pin1 connectivity.

1. Signal 1 on the DSPI cable is a dark color and high-lighted as shown below.
2. Pin 1 on the WM72016 evaluation board is labeled as “GND” and has a printed box around it on the silk screen as described in STEP 6
3. Pin 1 on the MaxReader is the left-most pin on the DSPI connector when viewed with the USB connector to the left, as shown in STEP 2. In addition, pin 1 can be identified by a square solder pad on the opposite side of the MaxReader.



Please refer to the MaxReader CLI User Guide for detail on DSPI commands.

Support

A Command Line Interpreter (CLI) User Guide has been included with the evaluation kit software package. Please refer to the guide for details on the complete CLI instruction set.

Additional assistance may be obtained by e-mailing:
MaxArias@Ramtron.com

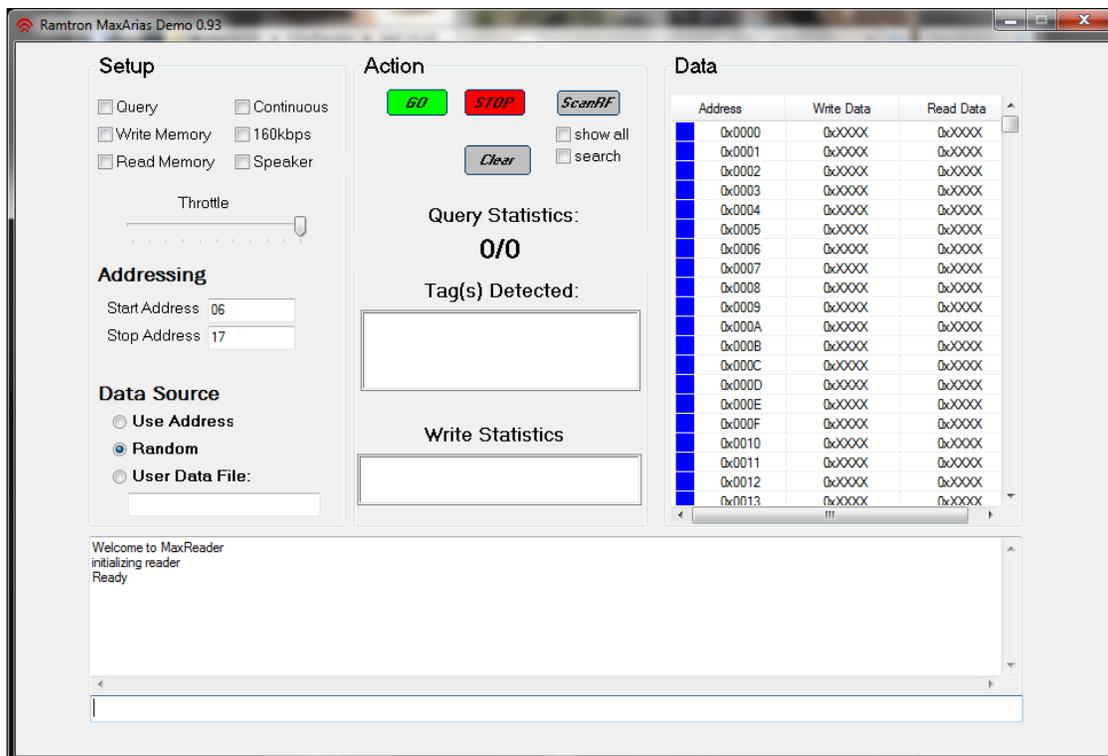
Notes

1. Prior to writing data to the WM72016, please review the datasheet regarding the device's memory map.
2. Please familiarize yourself with the various WM72016 memory banks, function registers and internal address pointers.
3. Normal user application data is written to the WM72016 starting at the memory location highlighted in **GREEN**, and terminating at the memory location highlighted in **RED**.

DSPI Address	Gen-2 Memory Bank	Gen-2 Address	Word Pointer (EBV8)	Description
0x000-0x003	RESERVED	0x000	0x00	Kill Password[31:16]
0x004-0x00D	EPC	0x000	0x00	CRC
0x010-0x013	TID	0x000	0x00	TID - Word 0: xE201
0x016	USER	0x002	0x02	Control/Status Register Working Stored Address Register
0x017	USER	0x003	0x03	
0x018	USER	0x004	0x04	USER Memory - Start
0x019	USER	0x005	0x05	
0x01A	USER	0x006	0x06	
...	
0x3FB	USER	0x3E7	0x8767	16k Memory: END (BLK_SIZE > 16 wrds/blk)

Graphical User Interface (GUI) Set Up

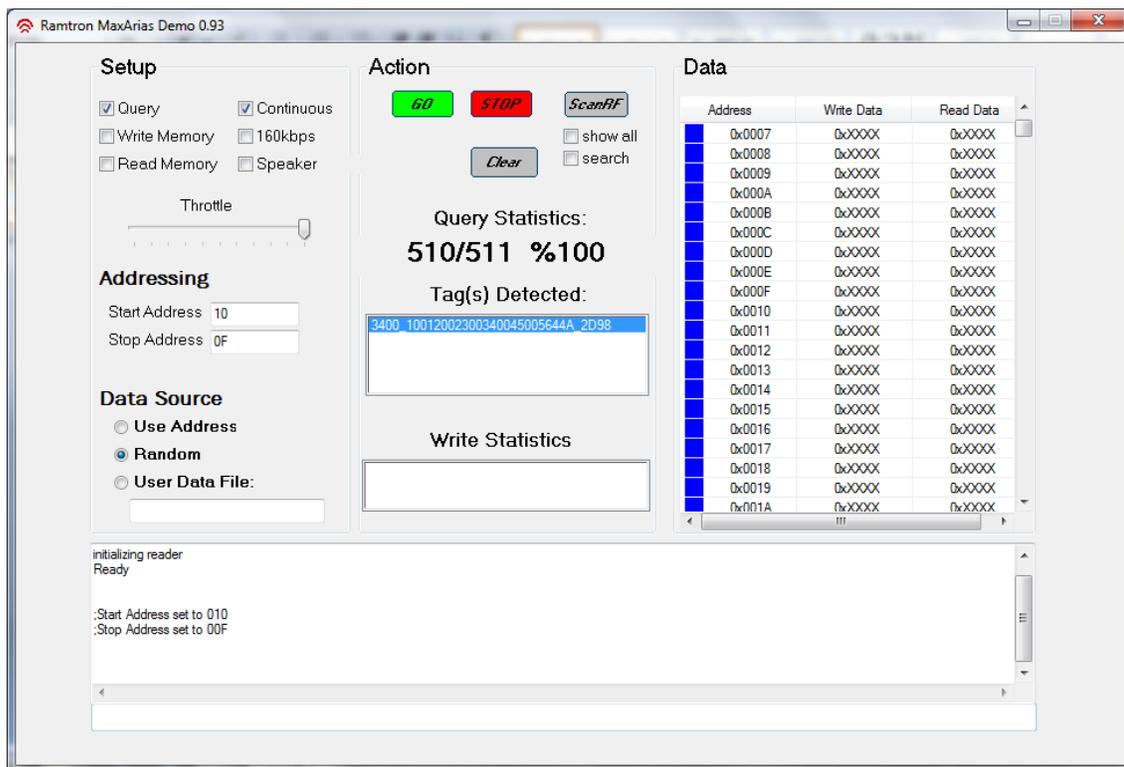
1. Connect the MaxReader to the host computer using a USB cable.
2. Connect the Power Supply to the reader and to an available wall outlet
3. Double click the MaxArias.exe icon. The window below will appear.
4. If the drivers have been installed correctly, MaxReader will emit a short rising tone. When the USB interface is disconnected MaxReader will emit a short falling tone.



Operation Examples

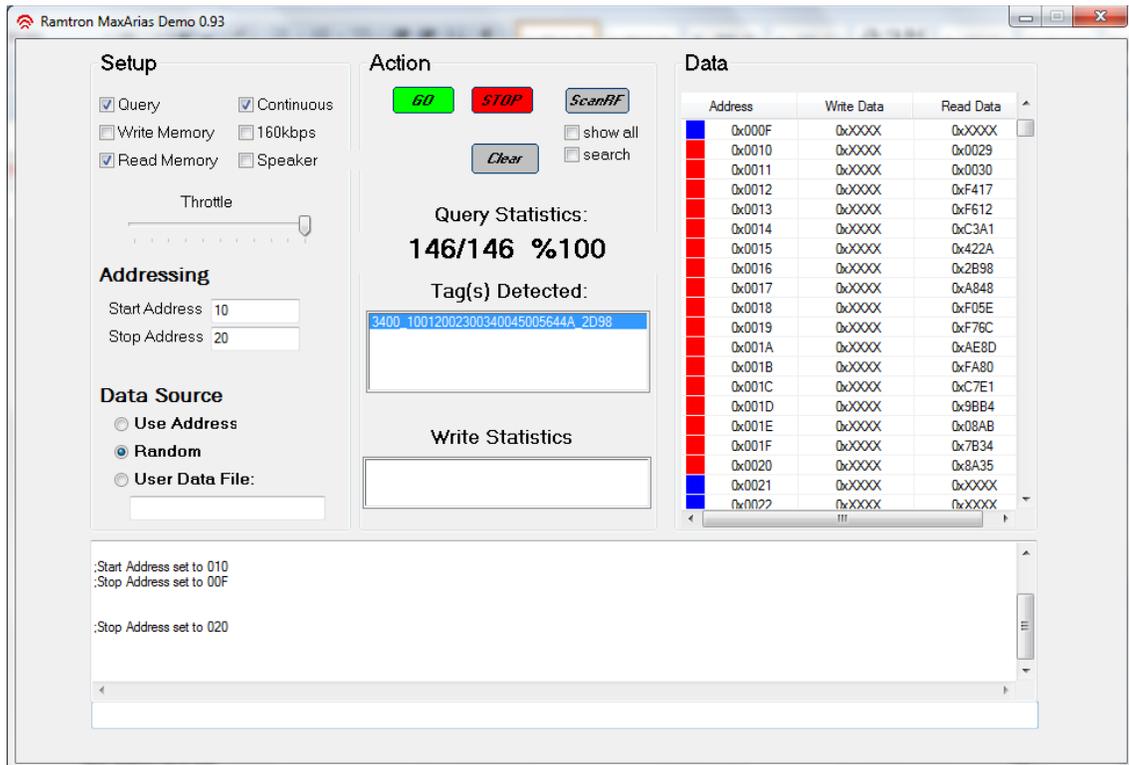
Example #1: Simple Query

In this example MaxReader has been setup to continuously perform GEN2 QUERY command. Note that the MaxReader has detected a tag shown in the “Tag(s) Detected” field and has been successfully read/identified (queried) 100% of the time. Each time a tag is successfully queried, the “Query Statistics” will improve.



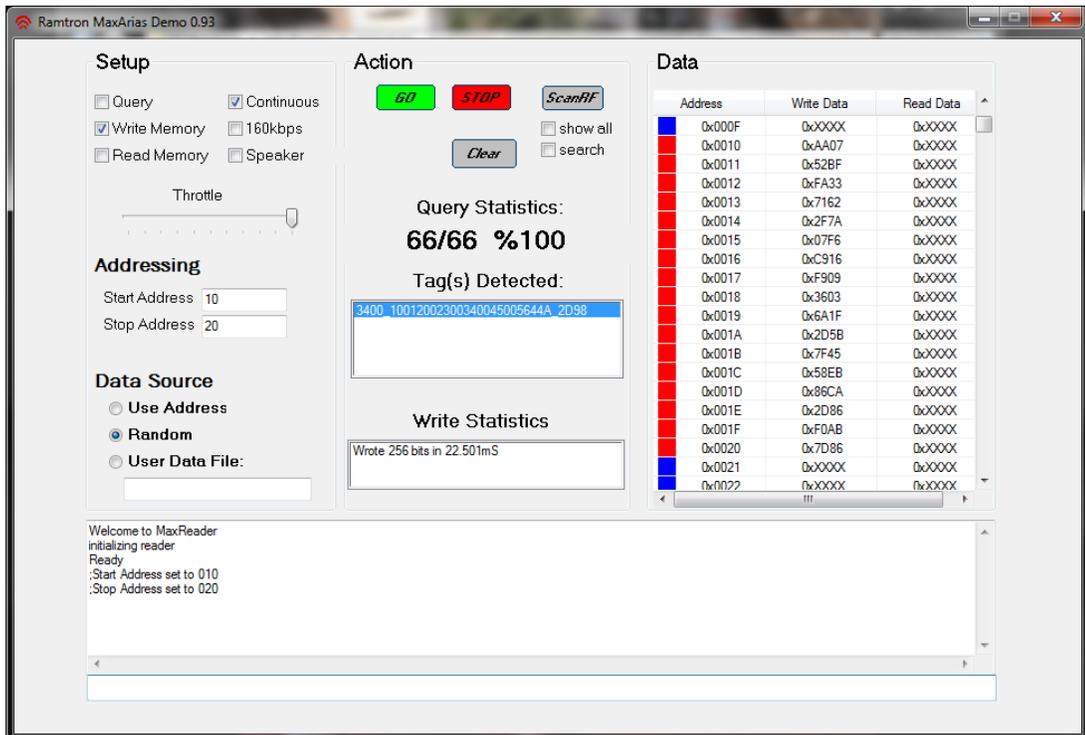
Example #2: Simple Read

In this next example, start address is still 0x10 and the end address is now 0x20. The “Data” window shows the entire memory contents of the WM72016 Evaluation Board with addresses 0x10 to 0x20 being read.



Example #3: Simple Write

In this next example a WRITE command will be used to show data being written to a specific memory location. The same address range as the example above (0x10 to 0x20) will be written to. Note the read data is displayed next to the write data in the “Data” window.



Warning



The circulator housing and heat sinks (see page 3) can become hot during continuous use of the MaxReader board. Please take precaution to avoid skin contact with these components.

About Ramtron International Corp.

Ramtron International Corporation, headquartered in Colorado Springs, Colorado, is a *fabless* semiconductor company that designs, develops and markets specialized semiconductor memory and integrated semiconductor solutions used in a wide range of product applications and markets worldwide.

Ramtron pioneered the integration of ferroelectric materials into semiconductor products that enabled a new class of nonvolatile memory, called ferroelectric random access memory, or F-RAM. Ramtron's ferroelectric memories combine high-speed performance of Random Access Memory (RAM) with true nonvolatile storage that delivers the ability to save data without power. Since commercializing the technology, Ramtron has sold hundreds of millions of F-RAM devices into demanding applications such as automotive safety and entertainment systems, portable medical devices, industrial process control systems, smart electricity meters, and consumer printer cartridges. As the most power-efficient of any nonvolatile memory technology on the market, F-RAM products promise to pave the way for the development of ultra-efficient battery powered products and energy harvesting applications, among others. For more information, visit www.ramtron.com.