RNXV Evaluation Kit
User's Guide

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QUALITY MANAGEMENT SYSTEM
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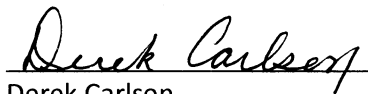**Object of Declaration: RNXV Evaluation Kit**

EU Declaration of Conformity

This declaration of conformity is issued by the manufacturer.
The development/evaluation tool is designed to be used for research and development in a laboratory environment. This development/evaluation tool is not a Finished Appliance, nor is it intended for incorporation into Finished Appliances that are made commercially available as single functional units to end users under EU EMC Directive 2004/108/EC and as supported by the European Commission's Guide for the EMC Directive 2004/108/EC (8th February 2010).
This development/evaluation tool complies with EU RoHS2 Directive 2011/65/EU.
For information regarding the exclusive, limited warranties applicable to Microchip products, please see Microchip's standard terms and conditions of sale, which are printed on our sales documentation and available at www.microchip.com.
Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA

Derek Carlson
VP Development Tools

16-July-2013
Date

NOTES:

RNXV EVALUATION KIT USER'S GUIDE

Table of Contents

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NOTES:

Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a "DS" number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is "DSXXXXXA", where "XXXXX" is the document number and "A" is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the RNXV Evaluation Kit User's Guide. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- Warranty Registration
- Recommended Reading
- The Microchip Web Site
- Development Systems Customer Change Notification Service
- Customer Support
- Document Revision History

DOCUMENT LAYOUT

This document describes how to use the RNXV Evaluation Kit. The manual layout is as follows:

- **Chapter 1. "Overview"** – This chapter describes the RN-XV-EK1 as an evaluation kit which supports the RNXV series of modules for both Wi-Fi® and Bluetooth® platforms. The board connects to a PC via a standard USB cable which is included in the kit, and provides two push button switches to control WPS mode and to reset the RN171XV module.

- **Chapter 2. "Getting Started"** – This chapter describes the hardware and software setup required to evaluate the RNXV series modules using the RN-XV-EK1 evaluation board. The RNXV modules (sold separately) mount on the evaluation board and contain either the RN171 or RN41/RN42 modules depending on the part number.

- **Chapter 3. "Application Interface Concerns"** – This chapter provides design concerns related to powering the evaluation board, sensor interface settings, mode settings, and restoring factory settings for RN171XV and RN41/42XV modules mounted on RNXV Evaluation Board.
- **Appendix A. "RN-XV-EK1 Evaluation Board Schematic and PCB Details"** – This appendix provides the RN-XV-EK1 Evaluation Boards schematic, PCB layout and Bill of Materials (BOM).

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	*MPLAB® IDE User's Guide*
	Emphasized text	...is the *only* compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	*File>Save*
Bold characters	A dialog button	Click **OK**
	A tab	Click the **Power** tab
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	`#define START`
	Filenames	`autoexec.bat`
	File paths	`c:\mcc18\h`
	Keywords	`_asm, _endasm, static`
	Command-line options	`-Opa+, -Opa-`
	Bit values	`0, 1`
	Constants	`0xFF, 'A'`
Italic Courier New	A variable argument	`file`.o, where `file` can be any valid filename
Square brackets [ ]	Optional arguments	`mcc18 [options] file [options]`
Curly brackets and pipe character: { | }	Choice of mutually exclusive arguments; an OR selection	`errorlevel {0|1}`
Ellipses...	Replaces repeated text	`var_name [, var_name...]`
	Represents code supplied by user	`void main (void) { ... }`

WARRANTY REGISTRATION

Please complete the enclosed Warranty Registration Card and mail it promptly. Sending in the Warranty Registration Card entitles you to receive new product updates. Interim software releases are available at the Microchip web site.

RECOMMENDED READING

This user's guide describes how to use the RNXV Evaluation Board. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources.

RN171 Module Data Sheet (DS75084)

RN171XV Module Data Sheet

RN41 Module Data Sheet

RN42 Module Data Sheet

RN41XV-RN42XV Module Data Sheet

PICDEM™ PIC18 Explorer Demonstration Board User's Guide (DS51721)

Explorer 16 Development Board User's Guide (DS51589)

WiFly Command Reference, Advanced Features and Appplications User's Guide

THE MICROCHIP WEB SITE

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- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
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The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers and other language tools. These include the MPLAB® C compiler; MPASM™ and MPLAB 16-bit assemblers; MPLINK™ and MPLAB 16-bit object linkers; and MPLIB™ and MPLAB 16-bit object librarians.
- **Emulators** – The latest information on the Microchip MPLAB REAL ICE™ in-circuit emulator.
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debugger, MPLAB ICD 3.
- **MPLAB® IDE** – The latest information on Microchip MPLAB IDE, the Windows® Integrated Development Environment for development systems tools. This list is focused on the MPLAB IDE, MPLAB SIM simulator, MPLAB IDE Project Manager and general editing and debugging features.
- **Programmers** – The latest information on Microchip programmers. These include the MPLAB PM3 device programmers and the PICkit™ 3 development programmers.

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- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or FAE for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through our web site at: http://support.microchip.com

DOCUMENT REVISION HISTORY

Revision A (December 2013)

This is the initial released version of the document.

NOTES:

Chapter 1. Overview

1.1 INTRODUCTION

The RN-XV-EK1 is an evaluation kit to support the RNXV series of modules for both Wi-Fi® and Bluetooth® platforms. The board connects to a PC via a standard USB cable which is included in the kit, and provides 2 push button switches to control WPS mode and to reset the RN171XV module. The board has connectors to connect to the RNXV module, as well as headers that enables prototyping. It is compatible with all RNXV antenna options. The kit does not include any RNXV modules.

The RNXV modules have certified Bluetooth or Wi-Fi connectivity which are helpful in replacing the existing systems with 802.15.4 modules. The RNXV modules are pre-loaded with firmware to simplify integration and minimize applications development time. The modules are based on the popular 2 x 10 (2mm) socket footprint often found in embedded applications.

The RNXV Evaluation Kit details can be downloaded from the Microchip web site http://www.microchip.com/RN-XV-EK1.

This chapter discusses the following topics:

• RN-XV-EK1 Evaluation Kit Features
• RN-XV-EK1 Evaluation Kit Contents and Part Details
• RN-XV-EK1 Evaluation Board Contents
• RN-XV-EK1 Evaluation Kit Related Demo Applications

1.2 RN-XV-EK1 EVALUATION KIT FEATURES

The RNXV Evaluation Kit has the following features:

• Supports ultra low-power FCC/CE/IC certified 2.4 GHz IEEE 802.11b/g RN171 module through RN171XV
• Supports low-power FCC/CE/IC certified 2.4 GHz IEEE 802.15.1 RN41/42 modules through RN41/42XV
• Supports several antenna options, depending on the RN171XV, RN41XV and RN42XV modules selected
• Powers up RN171XV, RN41XV and RN42XV modules
• Supports WPS (FN) push button for easy configuration of RN171XV module
• Reset (RST) push button wakes the RN171XV module
• Standard USB mini connector
• Hardware interface: USB via FTDI chip
• Brings the RNXV signals out on headers for easy debugging
• The evaluation board's moisture sensitivity level (MSL) is 1
• Size - 1.58" x 1" x 0.25"
• Weight - Approx. 6.5 g

1.3   RN-XV-EK1 EVALUATION KIT CONTENTS AND PART DETAILS

The package kit contents contain the following development tools listed in Table 1-1 with part number details.

TABLE 1-1:   RNXV EVALUATION KIT CONTENTS

Description	Part Number
RNXV Evaluation Board	RN-XV-EK1
USB cable	

Figure 1-1 illustrates the evaluation kit contents of RN-XV-EK1.

FIGURE 1-1:   RNXV EVALUATION KIT CONTENTS

RN-XV-EK1

RNXV Evaluation board for the RN171 module with USB cable

Note: The RNXV modules such as RN171XV, RN41XV or RN42XV are sold separately and are not part of the standard RN-XV-EK1 Evaluation Kit.
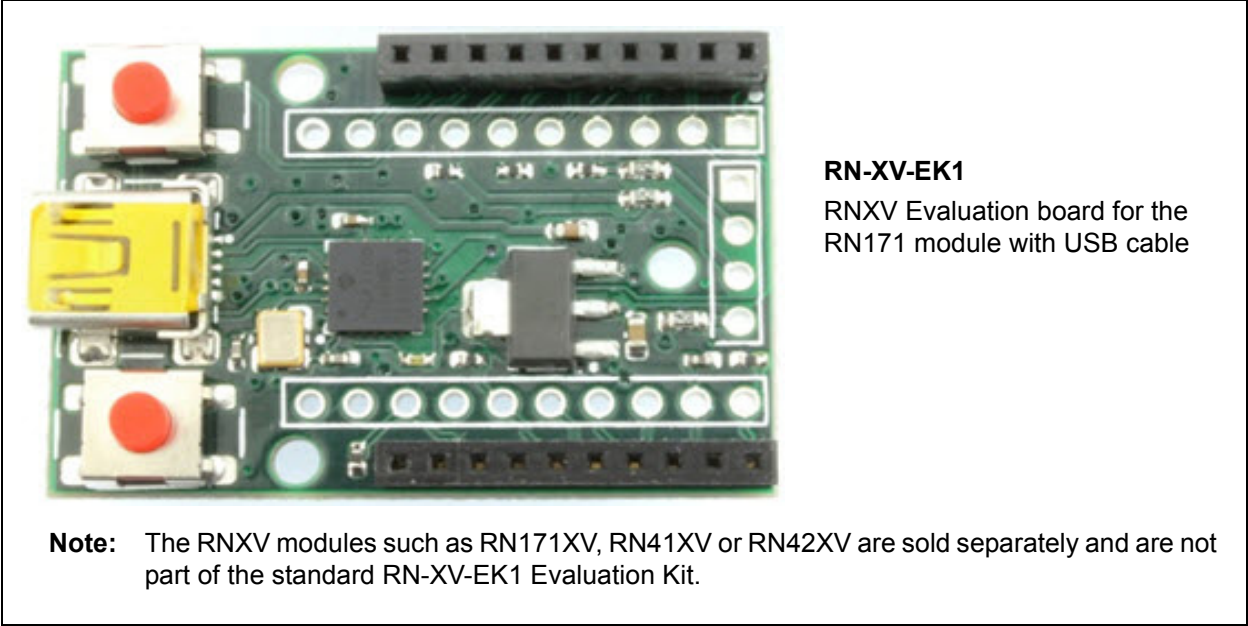
1.4   RN-XV-EK1 EVALUATION BOARD CONTENTS

This section describes the hardware for RN-XV-EK1 Evaluation board, which enables user to evaluate the RNXV modules. The RNXV modules, which are sold separately, is mounted on the evaluation board and contains the RNXV Wi-Fi or Bluetooth. Figure 1-2 shows the RN-XV-EK1 components.

FIGURE 1-2: **RN-XV-EK1 EVALUATION BOARD COMPONENTS**

RN-XV Signal Header 1

RX - input to evaluation board
TX - output from evaluation board

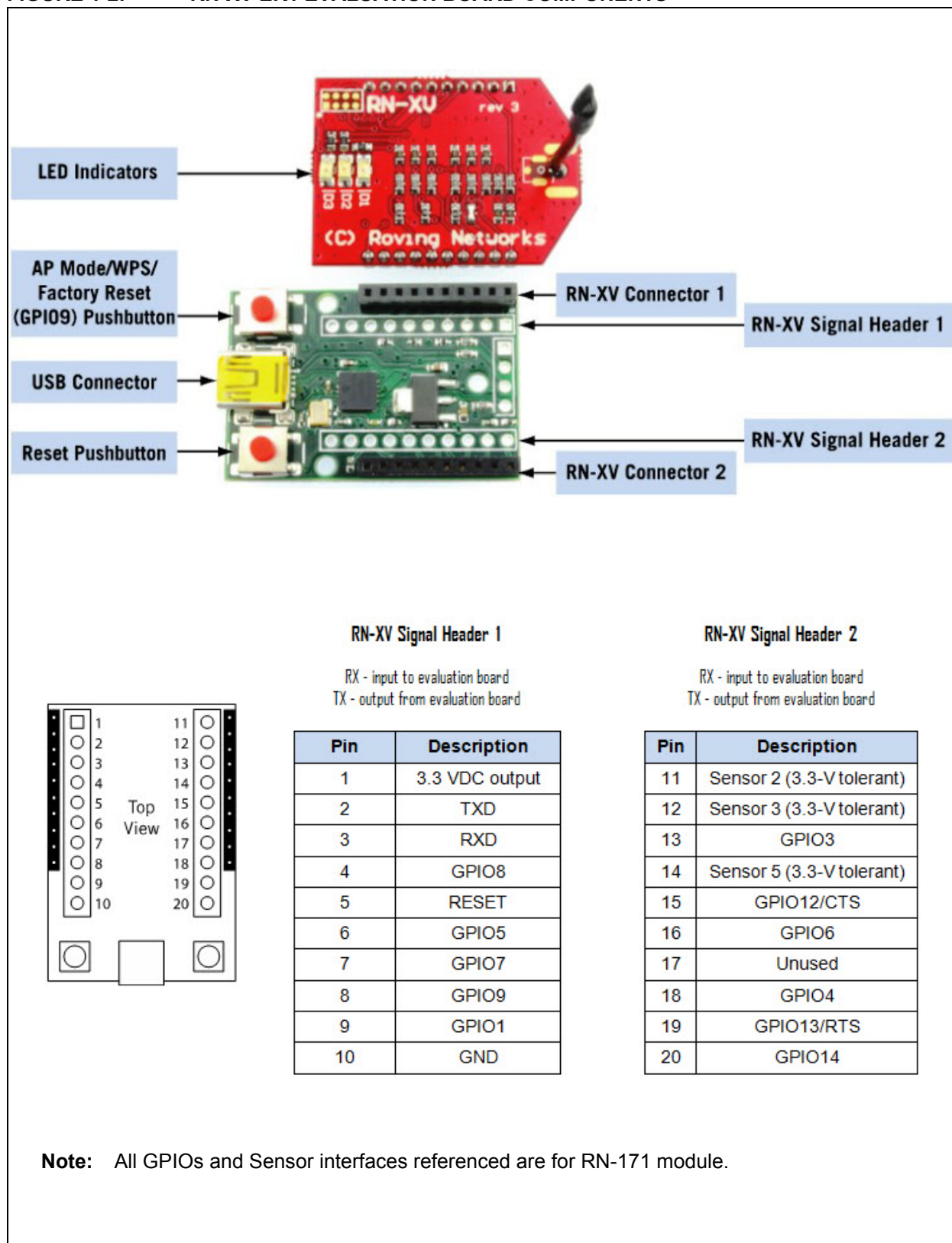| Pin	Description
1	3.3 VDC output
2	TXD
3	RXD
4	GPIO8
5	RESET
6	GPIO5
7	GPIO7
8	GPIO9
9	GPIO1
10	GND

RN-XV Signal Header 2

RX - input to evaluation board
TX - output from evaluation board

Pin	Description
11	Sensor 2 (3.3-V tolerant)
12	Sensor 3 (3.3-V tolerant)
13	GPIO3
14	Sensor 5 (3.3-V tolerant)
15	GPIO12/CTS
16	GPIO6
17	Unused
18	GPIO4
19	GPIO13/RTS
20	GPIO14

Note: All GPIOs and Sensor interfaces referenced are for RN-171 module.

RNXV Evaluation Kit User's Guide

Table 1-2 gives details on the hardware availability with module interface.

TABLE 1-2: **RNXV EVALUATION KIT HARDWARE AVAILABILITY WITH MODULE INTERFACE**

Hardware	Description	RN-XV-EK1 with RN171XV	RN-XV-EK1 with RN41/42XV
Evaluation Board	Contains connectors for Wi-Fi/Bluetooth modules.	For RN171 Module	For RN41/42 module
Power-Up	Interface for powering up the evaluation boards.	USB	USB
Push Buttons	To enter RESET and WPS (Wi-Fi Protected Setup) mode in RN171XV module.	Available	Available
Communication Interface	UART and USB	Available	Available
USB Connector On-board	Provides power to the evaluation board and supports communication (COM Port).	Available	Available
Antenna Connections	Supported by RNXV modules based on the module selected.	No	No

1.5   RN-XV-EK1 EVALUATION KIT RELATED DEMO APPLICATIONS

Resources related to RN-XV-EK1 can be downloaded from the Microchip web site http://www.microchip.com/RN-XV-EK1.

> **Note:** For details on working with RN171 module firmware, refer to "*WiFly Command Reference, Advanced Features and Applications User's Guide*"; and for RN41/41 module, refer to the *Bluetooth Command Reference & Advanced Information User's Guide* from the Microchip web site http://www.microchip.com.

Chapter 2. Getting Started

2.1 INTRODUCTION

This chapter describes the hardware and software setup required to evaluate the RNXV series modules using the RN-XV-EK1 evaluation board. The RNXV modules (sold separately) mount on the evaluation board and contain either the RN171 or RN41/RN42 modules depending on the part number. The board connects to a PC or embedded controllers via the standard USB cable serial port interface. The evaluation board also provides two push button switches to control (Wi-Fi Protected Setup) WPS mode and to reset the module without any software configuration while using RN171XV module. The board has connectors to drop in the RNXV, as well as headers that enable wires access to the RNXV signals.

This chapter discusses the following topics:

- Hardware Requirements
- Software/Utility Requirements
- Modules Configuration

2.2 HARDWARE REQUIREMENTS

The RN-XV-EK1 requires RN171XV or RN41XV/RN42XV boards along with an USB cable as its hardware setup for connection with PC/laptop and to run the demo applications.

The following are the steps to setup the Evaluation Board demo:

1. Mount RN171XV or RN41/42XV to RN-XV-EK1 evaluation board on the available connector headers.
2. Power-up the modules/board through the USB cable via computer/laptop.
3. Download and install the FTDI drivers from the Microchip web site.
4. Once the FTDI drivers are installed, the COM port is automatically assigned based on the active connection.

Figure 2-1 shows the completed RN-VX-EK1 evaluation board hardware setup with RN171XV board (RN171 as module base).

FIGURE 2-1:   HARDWARE SETUP WITH RN171XV BOARD

2.3   SOFTWARE/UTILITY REQUIREMENTS

The following software tools/utilities are required to run the demo applications:

- Terminal Emulator Application such as TeraTerm (for Windows OS) or CoolTerm (for MAC OS). The Terminal Emulator program is used to send the configuration commands to the module over a UART interface. The emulator also displays information transmitted from the module.
- RN-XV-EK1 board uses the FTDI chip set. Windows automatically installs the drivers for the USB-serial cable. If the drivers are not automatically installed, download and install the FTDI drivers from the Microchip web site "http://ww1.microchip.com/downloads/en/DeviceDoc/FTDI-Drivers.zip" FTDI Chipset Drivers.
- Once the FTDI drivers are installed, the COM port is automatically assigned based on the active connection.

## 2.4   MODULES CONFIGURATION

RN171XV CONFIGURATION

RN171XV with RN171 as module base is mounted on RNXV Evaluation Kit. The RN171 operates in two modes:

- Data mode (default)
- Command mode

2.4.1   Data Mode

In Data mode, the RN171 module is essentially a data pipe. When the module receives data over Wi-Fi, it strips the TCP/IP or UDP headers and trailers, and passes the user payload data to the UART. When data is written to the UART, the module constructs the TCP/IP packet and sends it out over Wi-Fi. Thus, the entire process of sending/receiving data to the host is transparent to the end application/user microcontroller.

FIGURE 2-2: **APPLICATION INTERFACE FOR DATA AND COMMAND MODES**
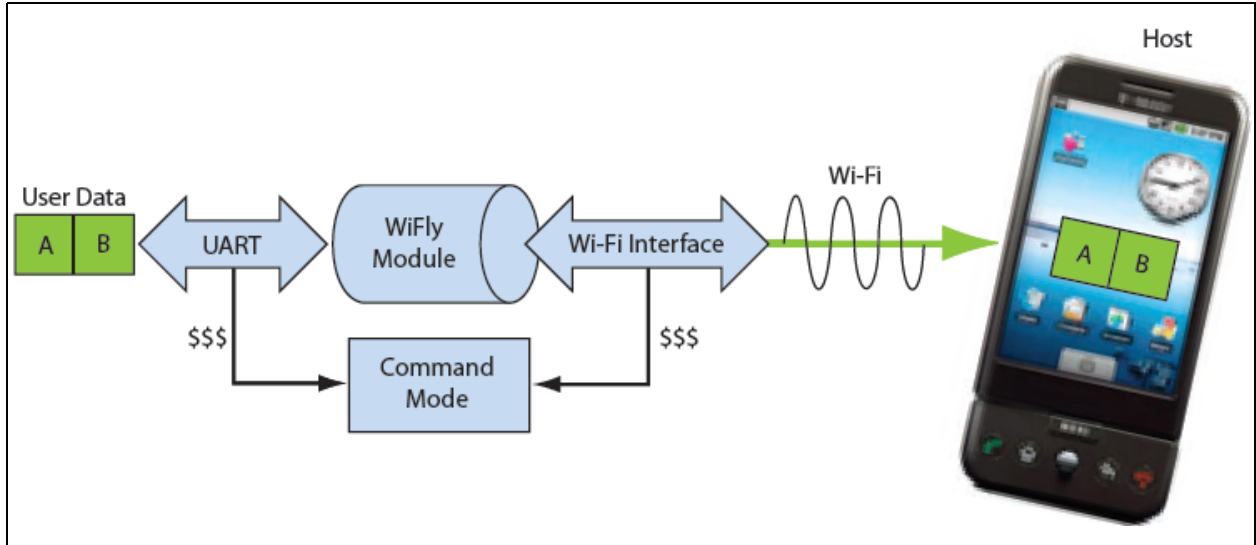
2.4.2 Command Mode

By default, the RN171 module is in Data mode. Sending an escape sequence $$$ causes the module to enter the Command mode. Once in Command mode, the module can be configured using simple ASCII commands. To exit Command mode and return to the Data mode, type `exit <cr>`. Figure 2-2 shows an application interface for Data and Command modes.

Basic configuration requires the wireless network access point's name (SSID) and the authentication password. The RN171 module can associate with only one network at a time. It is recommended to begin evaluation by configuring the RN171 module using an open access point to simplify the setup.

The following two methods are used to configure the RN171 module:

1. Over the UART, that is connected to a computer/laptop or to a microcontroller
2. Through Wi-Fi using Ad hoc networking

Terminal emulator utility is required to type the commands and to monitor the activity/transactions.

2.4.3   Configuration Using a USB Cable

The evaluation board uses a USB cable to enable the host computer to communicate with the RN171 module on the evaluation board. The procedures in this section describe how to use a terminal emulator to go into Configuration mode, send commands to find networks, associate with an access point, and save configuration.

2.4.3.1   CONFIGURE THE MODULE USING A TERMINAL EMULATOR

Either the TeraTerm (for Windows OS) or CoolTerm (for Mac OS-X), terminal emulator utility can be used. Also legacy evaluation boards use a USB-to-serial cable for connecting the evaluation board with the computer/laptop. When using the RN171 evaluation board, use the COM port to which the USB-to-serial cable is connected.
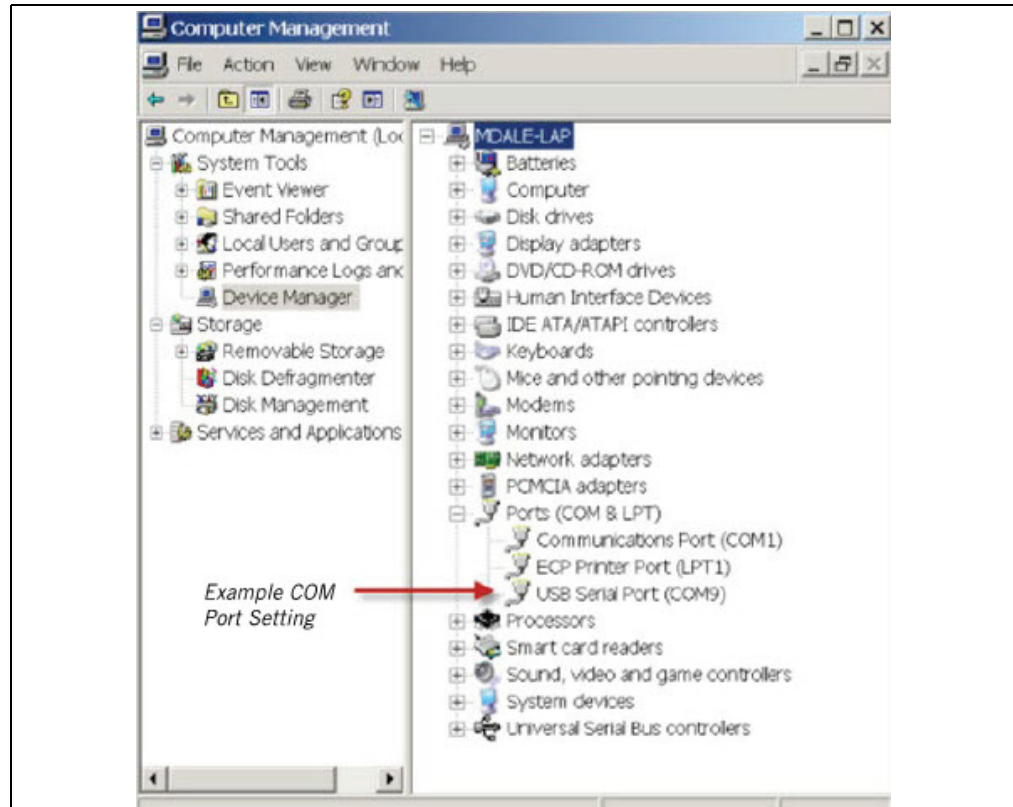
The following are the steps to communicate with the module using a terminal emulator:

1. Determine the COM port that is assigned to the USB cable (the port is COM9 in the example shown in Figure 2-3).
2. Open the available terminal emulation program and specify the COM port.
3. When using TeraTerm, go to Serial option and select the COM port number from the drop-down menu.
4. The serial port with the required settings are as follows:
    - Baud: 9600
    - Data bits: 8
    - Parity: None
    - Stop bits: 1
    - Flow control: None
5. Type the commands through the terminal emulator program and to the assigned program.

> **Note:**   The COM port number is found in the following location path:
>
> - For Windows OS: Open Computer Management. Click on *System Tools>Device Manager.* Browse to Ports (COM & LPT) and expand the selection for serial ports. Use TeraTerm for other configuration settings and monitoring. This is illustrated in Figure 2-3.
> - For MAC OS: When using CoolTerm, view and select the port from the same terminal emulator application.

**FIGURE 2-3:** FINDING THE COM PORT NUMBER IN WINDOWS

2.4.3.2 ENTER COMMAND MODE

The following are the steps to enter the Command mode in a terminal emulator:

1. Type $$$ on the keyboard sequentially with no additional characters before or after each $ sign. The module replies with CMD (on terminal emulator) to indicate that it is in Command mode.
2. Type show net <cr> to display the current network settings (Figure 2-4 shows the current network settings for version 2.28).

> **Note:** When a command is completed, the terminal displays a prompt using the format <X.XX>, where X.XX indicates the module's firmware version.

FIGURE 2-4: CURRENT NETWORK SETTINGS
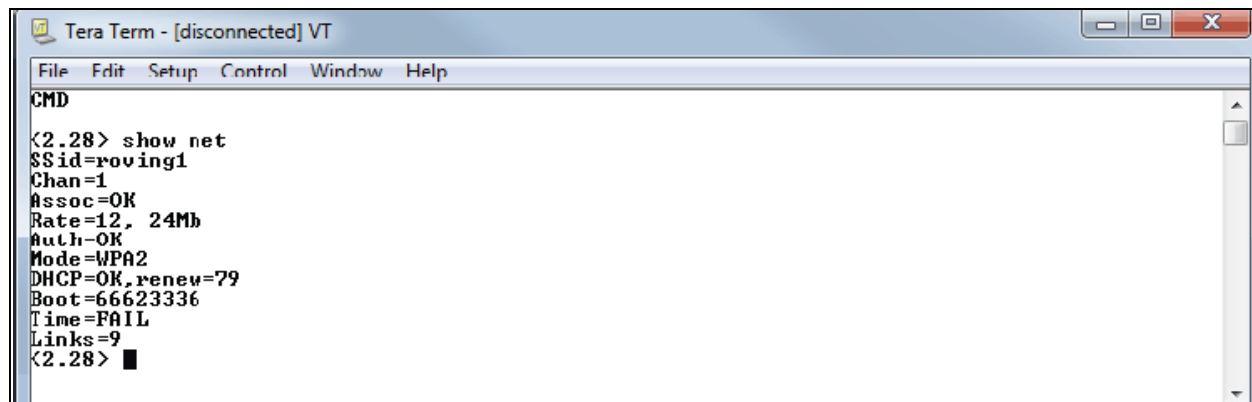
The RN171 module supports a variety of command keywords. The WiFly Command Reference, Advanced Features and Applications User's Guide from the Microchip web site http://www.microchip.com provides a complete list of command reference.

RN41/42XV CONFIGURATION

RN41/42XV with RN41/42 module base is mounted on RNXV Evaluation Kit. The RN41/42 also operates in two modes:

• Data mode (default)
• Command mode

While in Data mode, the module operates as a data pipe. When the module receives data, it strips the Bluetooth headers and trailers and passes the user data to the UART port. When data is written to the UART port, the module constructs the Bluetooth packet and sends it out over the Bluetooth wireless connection. Thus, the entire process of sending/receiving data to the host is transparent to the end microcontroller. The Figure 2-5 illustrates the operational modes.

FIGURE 2-5: **DATA & COMMAND MODES**
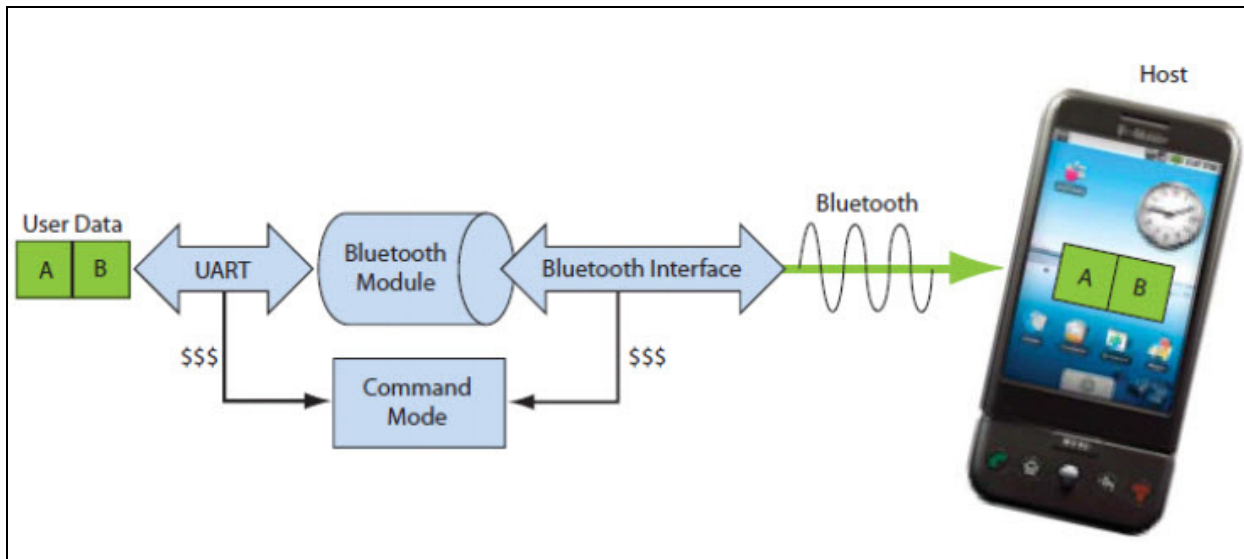
The default configuration for the Bluetooth module is:

• Bluetooth slave mode
• Bluetooth pin code 1234
• Serial port 115,200 Kbps baud rate, 8 bits, no parity, 1 stop bit
• Serial port flow control disabled
• Low-power mode off

Configuration is done by putting the module in the Command mode and sending ASCII commands over the UART port or the Bluetooth link. Reboot the module for settings to take effect. The changed configuration parameters persist until next change happens or until a factory reset is performed.

There are two ways to configure the Bluetooth module:

• Local configuration using computer's serial port
• Via Bluetooth

Terminal emulator utility is required to type the commands and to monitor the activity/transactions.

2.4.4 Configuring the Module over the UART Port

Connect the module to any computer/laptop. Connection can be done using the RS-232 DB9 port or via a USB cable. When RN-XV-EK1 evaluation board is used as RN41/42XV base board, connection is done using a USB cable.

With the Bluetooth module connected and powered on, run a terminal emulator and open the COM port to which the cable is connected. The terminal emulator's communication settings must be the default serial port settings:

- Baud rate 115,200 kbps
- 8 bits
- No parity
- 1 stop bit
- Hardware flow control enabled

> **Note:** Use local configuration at any time when the module does NOT have a Bluetooth connection, as well as under certain conditions. If the module is in Configuration mode and a connection occurs, the module exits the Configuration mode and data passes back and forth from the remote module.

Once a connection is made, Command mode can be entered only if the boot-up configuration timer has not expired (60 seconds). To remain in Configuration mode, set the configuration timer to 225.

2.4.5 Remote Configuration Using Bluetooth

It is often useful to configure the module remotely over a Bluetooth connection. Before performing remote configuration using Bluetooth, first pair the Bluetooth module with any computer. For computer/laptop with Bluetooth capability and running Windows, click **Bluetooth devices** in the system tray at the bottom right of the computer screen. Select **Add a Bluetooth device** and follow the on-screen instructions. For Mac OS-X, click the Bluetooth icon, select **Setup Bluetooth device** and follow the on-screen instructions. Once a connection is made, the module enters the command mode if the boot-up configuration timer has not expired (60 seconds). To remain in Configuration mode, set the configuration timer to 255.

When the configuration is finished, reset the module or send the **---** command, which causes the module to exit Configuration mode and enables data to pass normally.

> **Note:** Configuration mode (local or remote) is NEVER enabled when the module is in auto-mode and is connected over Bluetooth.

2.4.6 Enter Command Mode

To enter Command mode, launch a terminal emulator and specify the module's default settings. Table 2-1 shows the serial port settings.

TABLE 2-1: SERIAL PORT SETTINGS

Setting	Value
Port	COM port to which module is attached
Baud rate	115200
Data rate	8 bits
Patiry	None
Stop bits	1
Flow control	None

RNXV Evaluation Kit User's Guide

Type `$$$` into the terminal emulator to enter Command mode.

The module returns the string `CMD`, which indicates that the connection and terminal settings are correct. While in Command mode, the module accepts ASCII bytes as commands. When a valid command is entered, the module returns `AOK`. It returns `ERR` for an invalid command and `?` for unrecognized commands. Type `h` `<cr>` to see a list of commands.

A quick check to confirm that user has entered the Command mode is to type the `X` `<cr>` command after entering Command mode. This command shows summary of the module's current settings, such as the Bluetooth name, device class and serial port settings. Figure 2-6 illustrates the view of current settings.

FIGURE 2-6: VIEW CURRENT SETTINGS
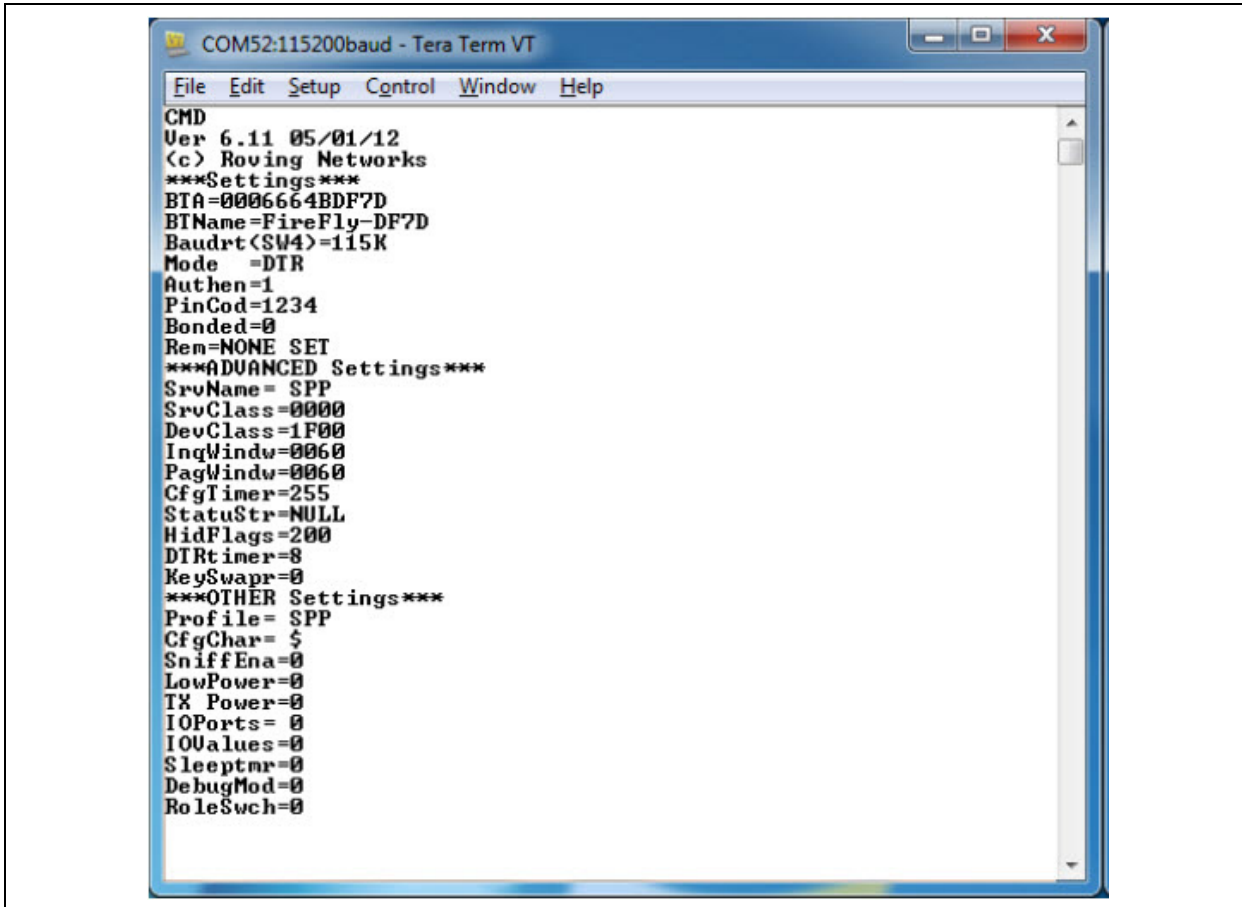
To return to data mode, type --- <cr> or reset the module and re-connect.

The RN41/42 modules support a variety of command keywords. The Bluetooth Data Module Command Reference & Advanced Information User's Guide from the Microchip web site http://www.microchip.com/bluetooth provides a complete list of command reference.

Chapter 3. Application Interface Concerns

3.1 INTRODUCTION

This section provides the design concerns related to powering the evaluation board, sensor interface settings, mode settings and restoring factory settings for RN171XV and RN41/42XV modules mounted on RNXV Evaluation Board.

3.2 RN171XV MODULE CONCERNS

3.2.1 Powering the Module

The RN171XV module is powered using 5V supplied from USB host connected to RN-XV-EK1 board.

3.2.2 Sensor Interfaces

The module input voltage on the sensor inputs must not exceed 1.2V. The Analog-to-Digital Converter (ADC) saturates at 400 mV. It is recommended to use the sensor power output to drive analog devices that are attached to the sensor pins.

> **Note:** The RN-XV adds an extra voltage divider on the SENSOR inputs. Sensor pins 2 and 3 have a resistor network (using 400 kohms and 100 kohms) in front of sensors 4 and 5, respectively. Hence, the SENSOR inputs on the RN-XV saturate the ADC at 2280mV and can accept up to 5V.

3.2.3 Sensor Inputs

For RN-171-XV connector pins 13, 15, 18, and 19 can be configured as GPIO pins or sensor inputs, depending on the installed resistors.

• *Sensor inputs* - Pins 19 and 20
• *GPIOs* - Pins 13, 15, and 18

For details, refer to "*RN-171-XV 802.11 b/g Wireless LAN Module Datasheet*" from the Microchip web site http://www.microchip.com.

3.2.4 GPIO9 Functions

The AP push button is connected to GPIO9. Depending on the state of GPIO9, the module enters into three different modes: AP mode, Factory reset and WPS mode.

3.2.4.1 AP MODE

To put the module into AP mode, GPIO9 must be high when the module powers up or wakes from a sleep state. Press the AP mode button to drive GPIO9 high, and then press the RESET button to reset the module. The module is in default AP mode, which creates a default access point network with the default parameters as listed in Table 3-1.

> **Note:** This default mode overwrites any software settings.

TABLE 3-1:   DEFAULT AP MODE SETTINGS

Setting	AP Mode Default
SSID	WiFlyAP-XX, where XX is the last two bytes of the module's MAC address
Channel	1
DHCP Server	Enabled
IP Address	1.2.3.4
Netmask	255.255.255.0
Gateway	1.2.3.4

Once the module boots, other Wi-Fi-enabled devices (such as, computers, iPhones, iPads, Android tablets, etc.) are able to find the module when access points are scanned.

3.2.4.2   FACTORY RESET

In Factory Reset mode, the module is restored to the factory defaults.

Perform the following steps to restore the defaults:

1. Put the module into default AP mode as described in **AP Mode**.
2. Press the **AP Mode** push button 5 times (with 1 or more seconds interval between presses).

This feature is useful in case the module is misconfigured and is no longer responding.

3.2.5   Reset

The RESET push button reboots the module.

3.3   RN41/42XV MODULE CONCERNS

The following sections provide information on designing with the RN41XV and RN42XV module, including radio interference, factory reset, connection status, etc.

3.3.1   Powering the Module

Apply ONLY 3.3 V ± 10% regulated power to pin 1 (VDD) and pin 10 (GND). The module does not have an on-board voltage regulator and MUST be powered from a regulated 3.3 V power supply (3.3 V VDC output).

3.3.2   Reset Circuit

The RN41XV and RN42XV modules contain a 1k Ω pull-up to VDD, and the reset polarity is active low. The module's reset pin has an optional power-on reset circuit with a delay, which must only be required if the input power supply has a very slow ramp or tends to bounce or have instability on power-up. Often a microcontroller or embedded CPU I/O is available to generate the reset once power is stable. If not, designers can use one of the many low-cost power supervisor chips currently available, such as the MCP809, and MCP102/121.

3.3.3   GPIO and Sensor Configuration

For RN41XV and RN42XV Bluetooth Module connectors, the available pins can be configured as GPIO pins or sensor inputs, depending on the installed resistors.

- *Sensor inputs* - Pins 4, 6, 7, 8, 13, 15, 17 and 18
- *GPIOs* - Pins 9 and 11

For details, refer to "*RN41XV & RN42XV Bluetooth Module Datasheet*" from the Microchip web site http://www.microchip.com.

3.3.4 Factory Reset Using GPIO4

It is recommended that designers connect GPIO4 (pin 8) to a switch, jumper, or resistor so it can be accessed. This pin is used to reset the module to its factory default settings, which is critical in situations where the module has not been properly configured. To reset the module to the factory defaults, GPIO4 should be high on power-up and then toggle low-to-high twice (simultaneously) with one second interval between the transitions.

3.3.5 Connection Status

The RN41XV and RN42XV modules have an on-board green LED to indicate the connection status. The connection status LED is located in the lower right corner of the module.

TABLE 3-2: CONNECTION STATUS LED

Setting	AP Mode Default
Blink at 1 Hz	The module is discoverable and waiting for a connection.
Blink at 10 Hz	The module is in command mode.
Solid	The module is connected to another device over Bluetooth.

RNXV Evaluation Kit User's Guide

NOTES:

Appendix A. RN-XV-EK1 Evaluation Board Schematic and PCB Details

A.1   INTRODUCTION
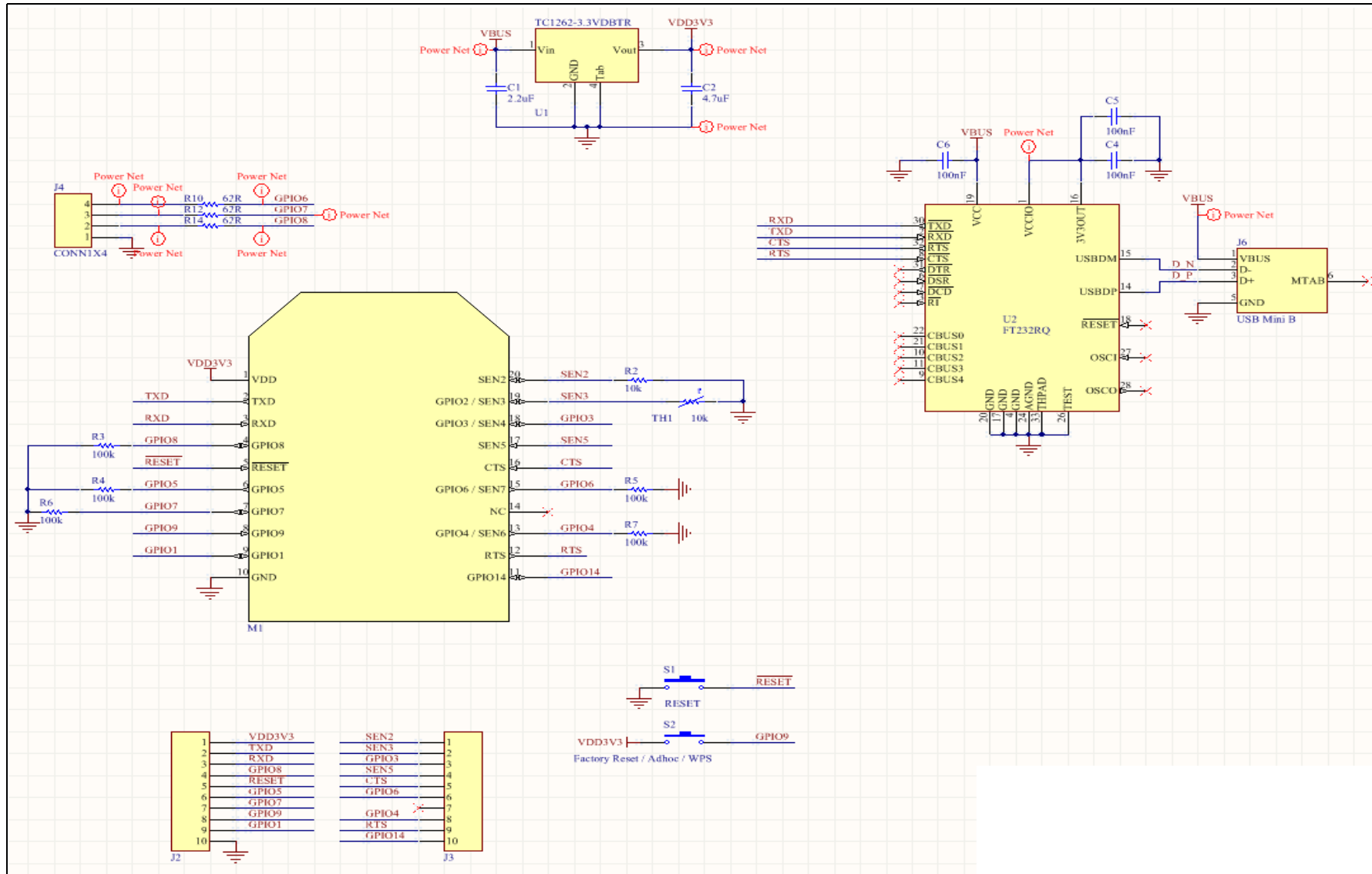
This appendix provides the RN-XV-EK1 Evaluation Board schematic, PCB layout and Bill of Materials (BOM).

- RN-XV-EK1 Evaluation Board Schematic
- RN-XV-EK1 Evaluation Board PCB Layout
- RN-XV-EK1 Evaluation Board Bill of Materials
- RN-XV-EK1 Physical Dimensions

A.2   RN-XV-EK1 EVALUATION BOARD SCHEMATIC

Figure A-1 shows the Evaluation Board schematic.

FIGURE A-1:   RN-XV-EK1 EVALUATION BOARD SCHEMATIC

A.3   RN-XV-EK1 EVALUATION BOARD PCB LAYOUT

The RN-XV-EK1 Evaluation Board is a 2-layer, FR4, 0.062 inch, plated through hole PCB construction. Figure A-2 through Figure A-6 show the PCB constructions and Assembly Drawings.
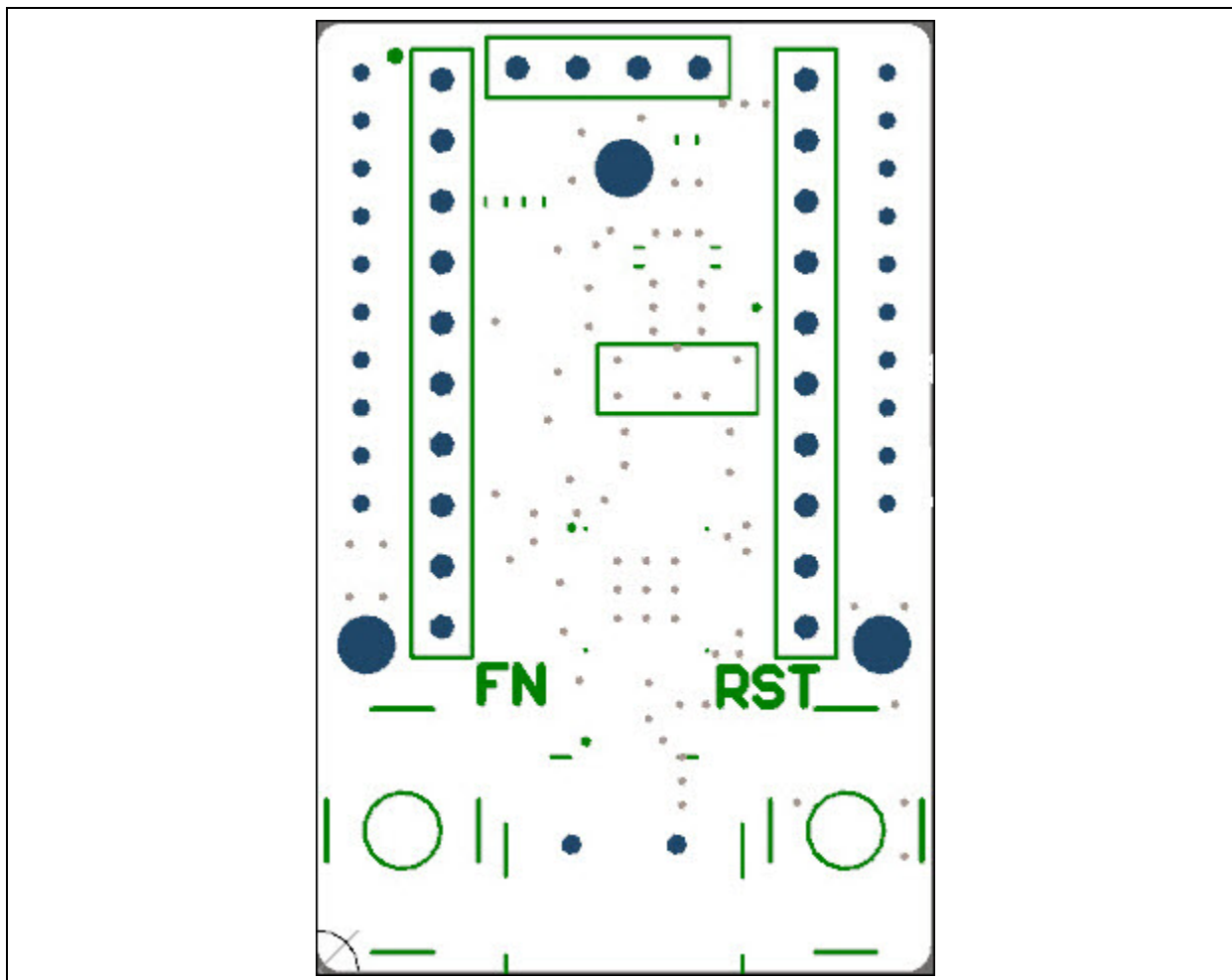
FIGURE A-2:   RN-XV-EK1 EVALUATION BOARD TOP SILKSCREEN

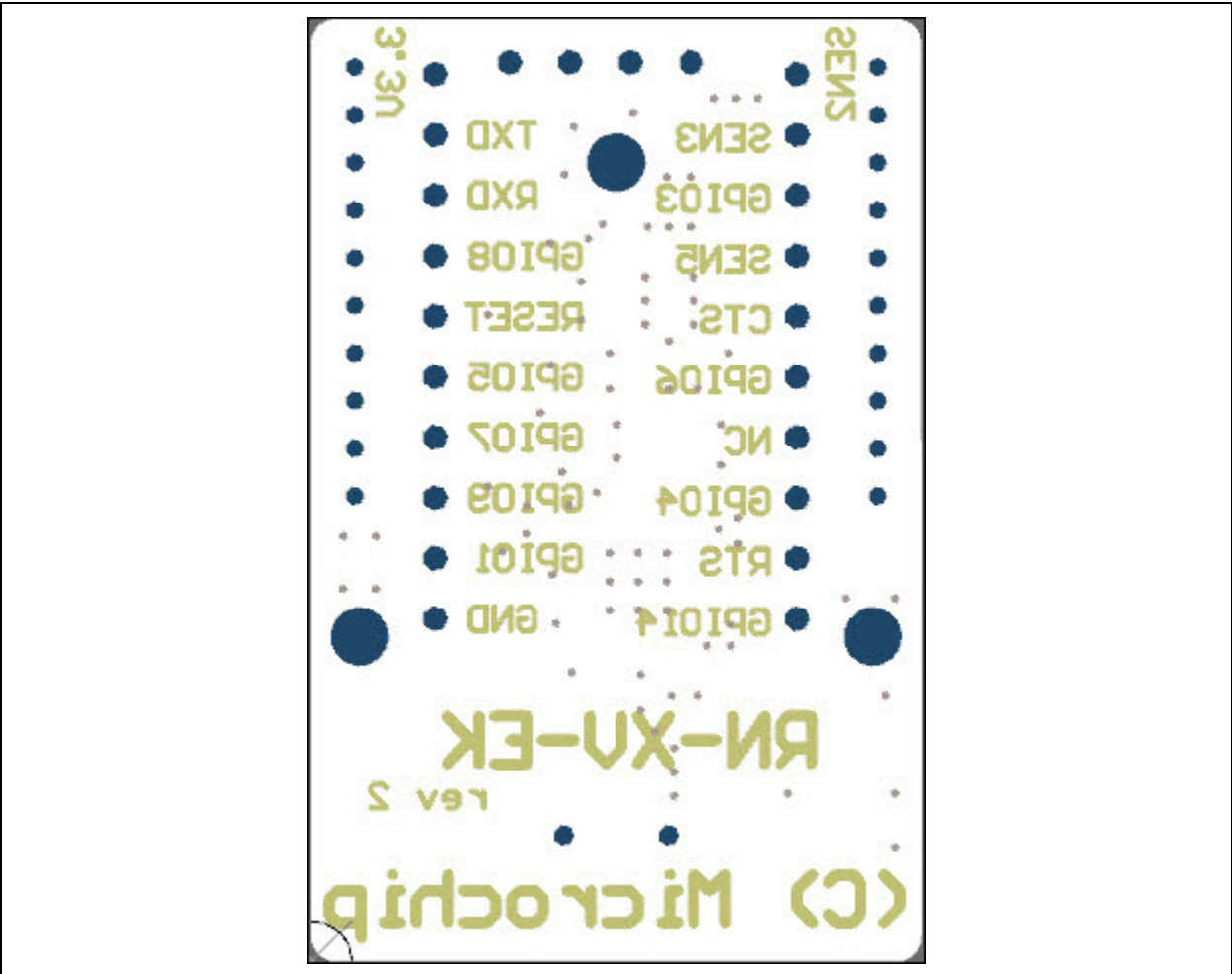**FIGURE A-3:** RN-XV-EK1 EVALUATION BOARD BOTTOM SILKSCREEN
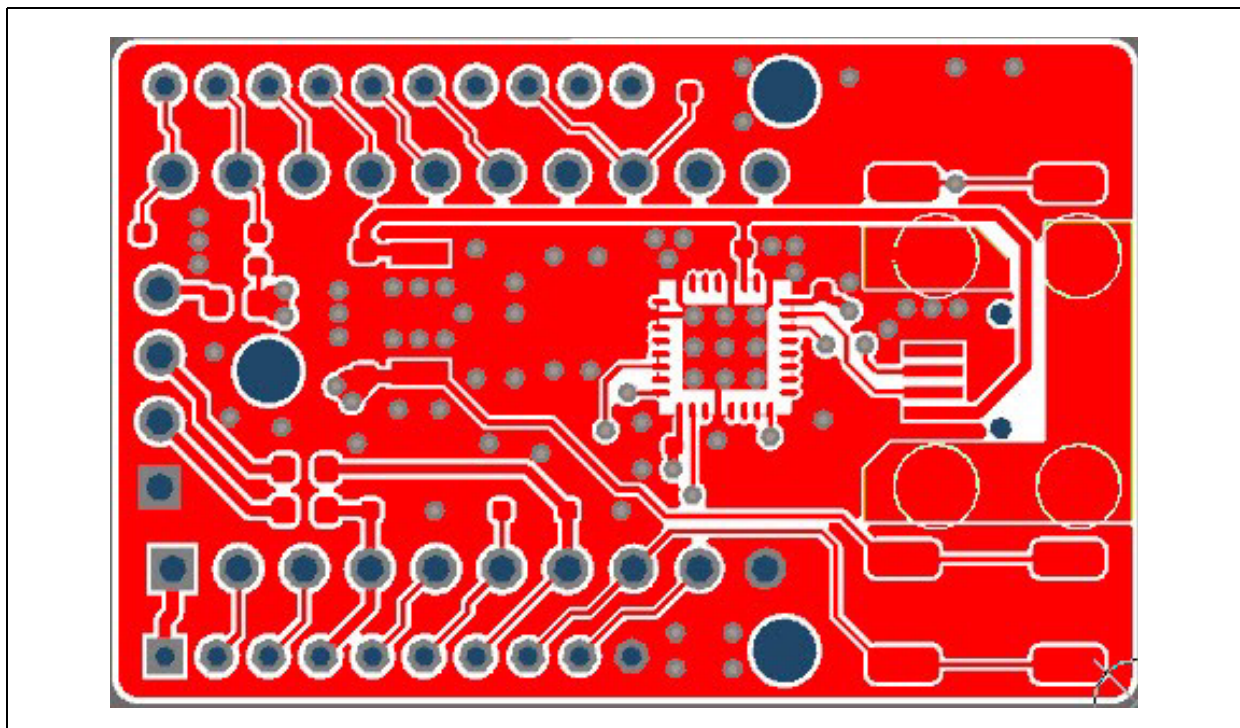
FIGURE A-4: RN-XV-EK1 EVALUATION BOARD TOP COPPER

FIGURE A-5: RN-XV-EK1 EVALUATION BOARD BOTTOM COPPER
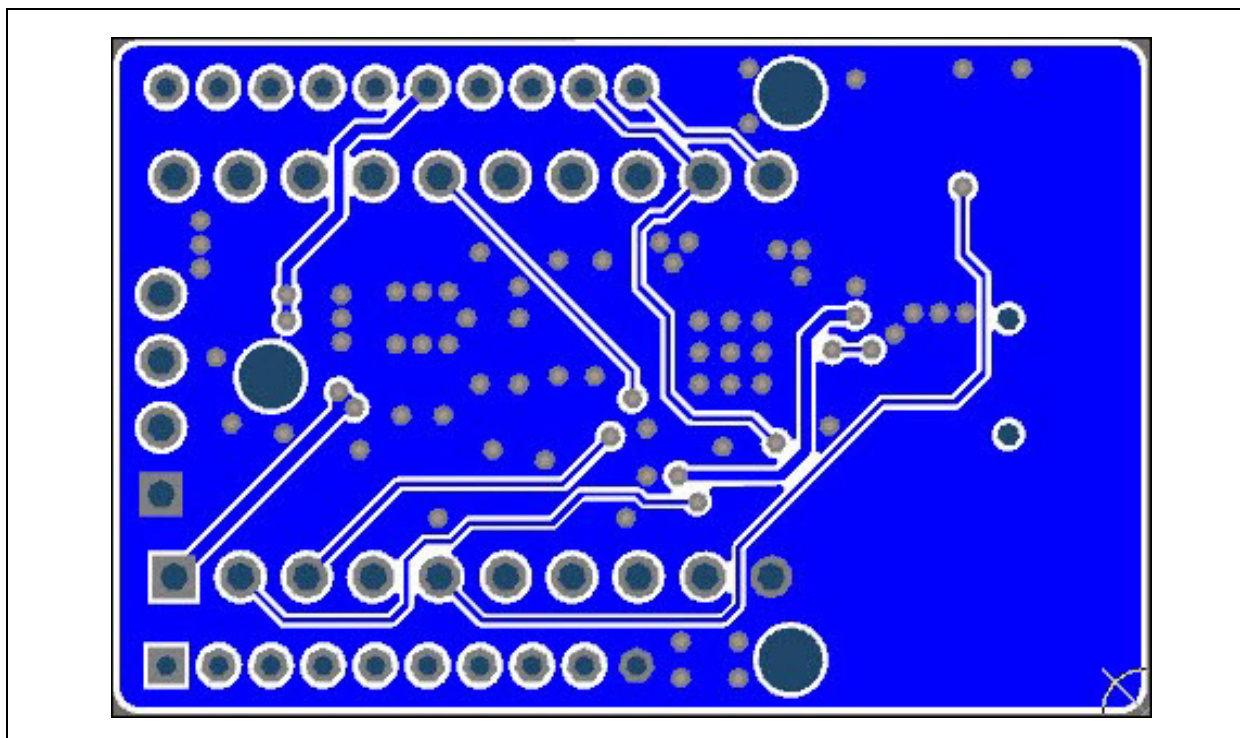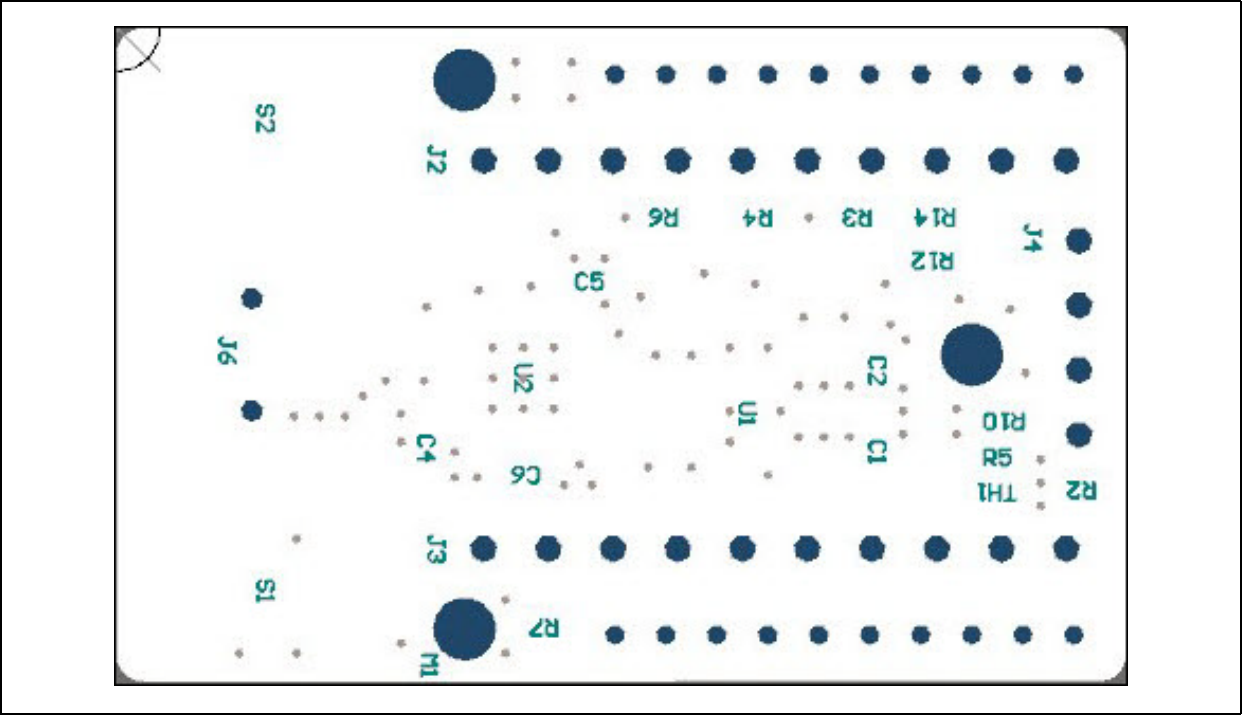
RNXV Evaluation Kit User's Guide

FIGURE A-6:   RN-XV-EK1 EVALUATION BOARD TOP ASSEMBLY

A.4   RN-XV-EK1 EVALUATION BOARD BILL OF MATERIALS

TABLE A-1:   RN-XV-EK1 EVALUATION BOARD BILL OF MATERIALS (BOM)

Reference	Value	Description	Vendor	Vendor P/N
C1	2.2uF	Cap ceramic, -20%, 80%, 16V, Y5V, 0603	TDK Corporation	C1608Y5V1C225Z
C2	4.7uF	Cap ceramic, 10%, 6.3V, X5R, 0603	Kemet	C0603C475K9PACTU
C4, C5, C6	100 nF	Cap ceramic, -20%, 80%, 16V, Y5V, 0402	Yageo	CC0402ZRY5V7BB104
J6	USB Mini B	CONN USB RCPT MINI B 5PS R/A SMD	JAE	DX2R005HN2E700
M1	—	RN-X Module - 2 x 10 pin female 2mm header	Microchip	RN-XV
R2	10k	Res, 0.5%,1/16W, 0402	Susumu	RR0510P-103-D
R3, R4, R5, R6, R7	100k	Res, 5%, 0.1W, 0402	Panasonic - ECG	ERJ-2GEJ104X
R10, R12, R14	62R	thick film, 5%, 0.1W, 0603	Panasonic - ECG	ERJ-3GEYJ620V
S1, S2	SPST	Tactile & Jog Switches 6x6 260gf RED SMT	Mountain Switch	101-TS6923T2605-EV
TH1	10k	NTC Thermistor, 10k, 0402	Murata Electronics North America	NCP15XH103F03RC
U1	TC1262-3.3V	Linear Voltage Regulator	Microchip	TC1262-3.3VDBTR
U2	FT232RQ	IC USB FS SERIAL UART 32-QFN	FTDI	FT232RQ-REEL

A.5   RN-XV-EK1 PHYSICAL DIMENSIONS

Figure A-7 shows the physical dimensions of the RN-XV-EK1 evaluation board.

FIGURE A-7:   RN-XV-EK1 PHYSICAL DIMENSIONS
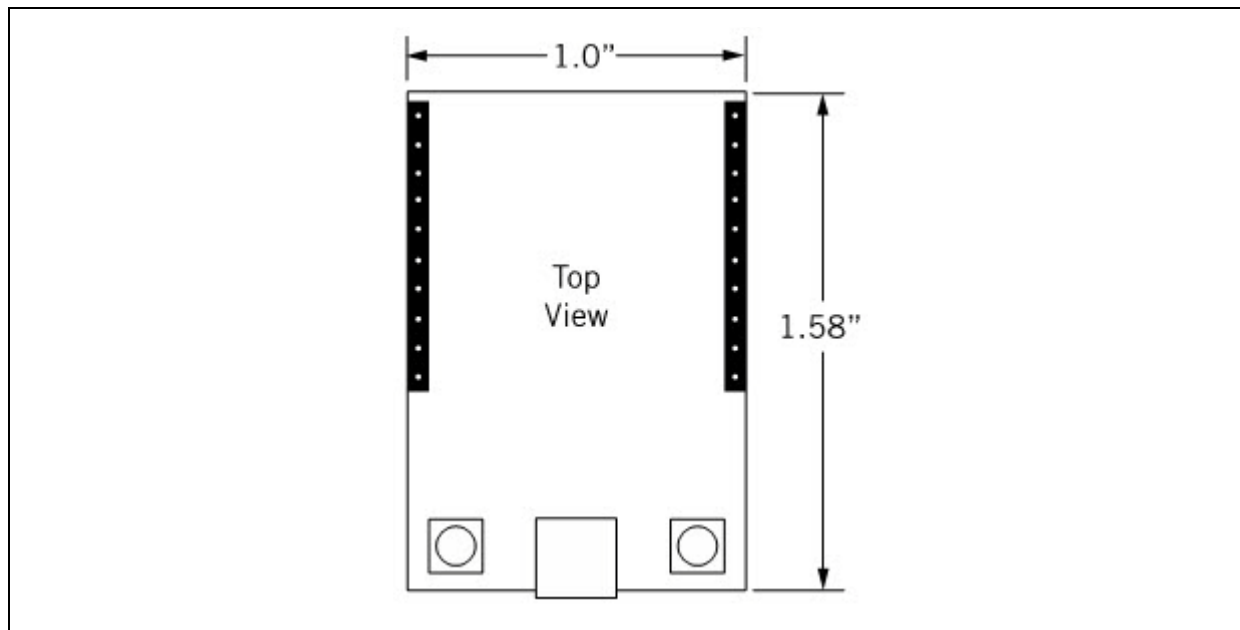
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