

RN4020 PICtail™/PICtail Plus Board User's Guide

OVERVIEW

The RN4020 PICtail Plus Daughter Board is a Bluetooth® Low Energy demonstration board that showcases the Microchip RN4020 Certified Bluetooth Low Energy (BTLE) module. The RN4020 module is a single-mode Bluetooth Smart module that complies with Bluetooth Core Specification 4.0. The high-speed UART interface and the General Purpose Input Output (GPIO) Ports are available on the RN4020 module to configure, control and transfer data.

The RN4020 PICtail Plus Daughter Board has PICtail Plus and PICtail connectors to interface with a PIC® microcontroller (MCU) on the development boards that support PICtail Plus or PICtail interface with the required pin mapping. The PICtail board also has a PIC18 USB-to-UART serial bridge on the board to enable easy serial connection to a PC over USB. The PIC18 also exposes a command shell to control its GPIO ports.

FEATURES

- Microchip RN4020 Certified Bluetooth Low Energy (BTLE) module
- PICtail Plus Daughter Board or PICtail Daughter Board connection interfaces
- PIC18 USB-to-UART serial bridge/converter with a command shell for IO control
- Status LEDs and utility button

BOARD CONFIGURATION

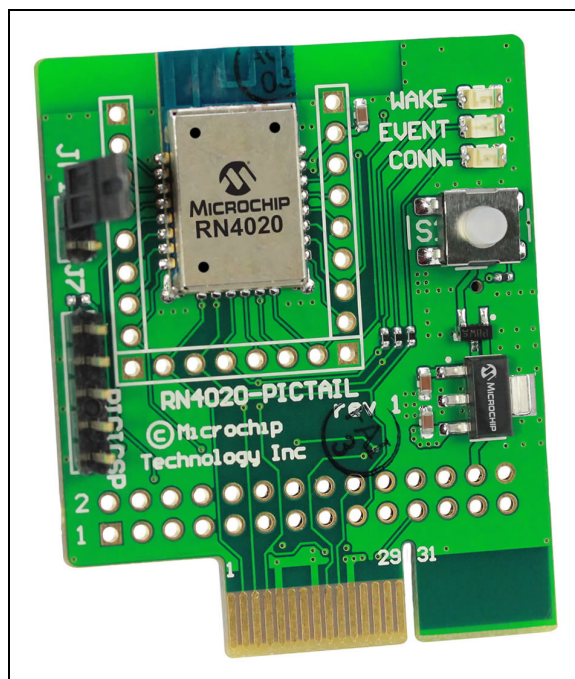
The jumper JP1 on the board can be used to select between PICtail mode or USB-to-UART bridge mode.

When JP1 is shorted, the board operates in PICtail mode. In this mode, the UART, control signals, and digital inputs/outputs can be accessed over the standard PICtail Plus or PICtail connection interfaces to be driven by a PIC MCU. The USB-to-UART serial bridge over J5 is turned off.

When JP1 is open, the board operates in USB-to-UART bridge mode. In this mode, the PIC18 USB-to-UART serial bridge over J5 is turned on, and the PICtail interface should not be used.

Note: Ensure that the USB mini-B cable is detached when operating in PICtail mode.

FIGURE 1: Microchip RN4020 Certified Bluetooth Low Energy (BTLE) Module



GETTING STARTED

The RN4020 module on the RN4020 PICtail Plus Daughter Board exposes a high speed UART interface which can be used to issue ASCII commands to configure and control the RN4020 module. For more information on the RN4020 commands, configuration and examples, refer to the user's guide for the RN4020 module.

While in PICtail mode, the board can be plugged into any standard Microchip development board that supports the PICtail Plus, or PICtail, connection interface.

Note: Ensure that the PICtail connector pin-out on the host MCU development platform supports the pin-out on the PICtail interface on the RN4020 PICtail Plus Daughter Board.

The firmware running on the Microchip 8/16/32-bit PIC MCU can be used to interface over UART and IO ports with the RN4020 on the PICtail board. Refer to the **Other Information** section for information about downloading PIC workspaces for PICtail mode.

RN4020 PICTAIL PLUS DAUGHTER BOARD

While in USB-to-UART Bridge mode, the board can be plugged into a PC that supports serial COM ports. When plugged in over USB mini-B receptacle J5 to a PC, the board enumerates as a serial COM port. A terminal emulator application on the PC can be used to open the COM port and issue commands when the RN4020 is in Command mode, or to transfer data when it is in Microchip Low Power Data Profile (MLDP) mode.

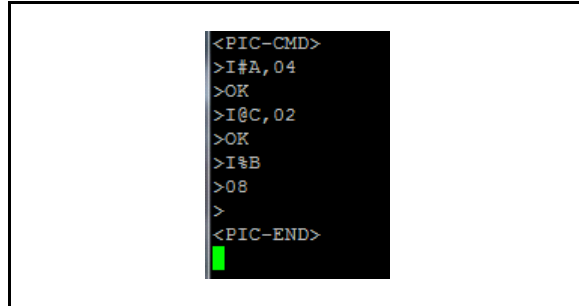
The USB-to-UART Bridge mode enables a simple command shell running on the USB-to-UART Bridge that is used to control the GPIOs on RN4020 through the PIC18. Typing \$\$\$ with a carriage return on the terminal emulator will enter the PIC18 command shell, as seen in Figure 2.

Typing \$\$\$ with a carriage return a second time on the terminal emulator will exit the PIC18 command shell. There is a 1 second guard band duration for both entry into and exit out of the command shell. Command shell is entered or exited only if there is no data transfer during the duration of the guard band.

EXAMPLE 1:

```
I#A,04 // Sets the PIC18 IO port RA2 to logic HIGH
I@C,02 // Sets the direction of PIC18 IO port RC1 to input
I%B // Reads the logic levels on PIC18 IO port RB
```

FIGURE 2: PIC18 Command Shell



The supported commands are listed in Table 1. The supported commands can be issued with carriage return after entering the PIC18 command shell, as in the example that is shown below.

TABLE 1: BASIC COMMANDS SUPPORTED IN THE PIC18 COMMAND SHELL

Basic Commands Supported	Description
I#X,YY	Sets or Clears the IO port A/B/C on PIC18
I@X,YY	Sets the direction of the IO port A/B/C on PIC18
I%X	Reads the IO port A/B/C on PIC18
H	Provides help on supported commands and may show additional commands, if available
V	Version of the command shell

Legend: X – A or B or C; YY – Hex byte value

OTHER INFORMATION

To obtain the most recent and complete RN4020 data sheet, user's guide, and code examples, visit the Microchip web site: www.microchip.com/rn4020

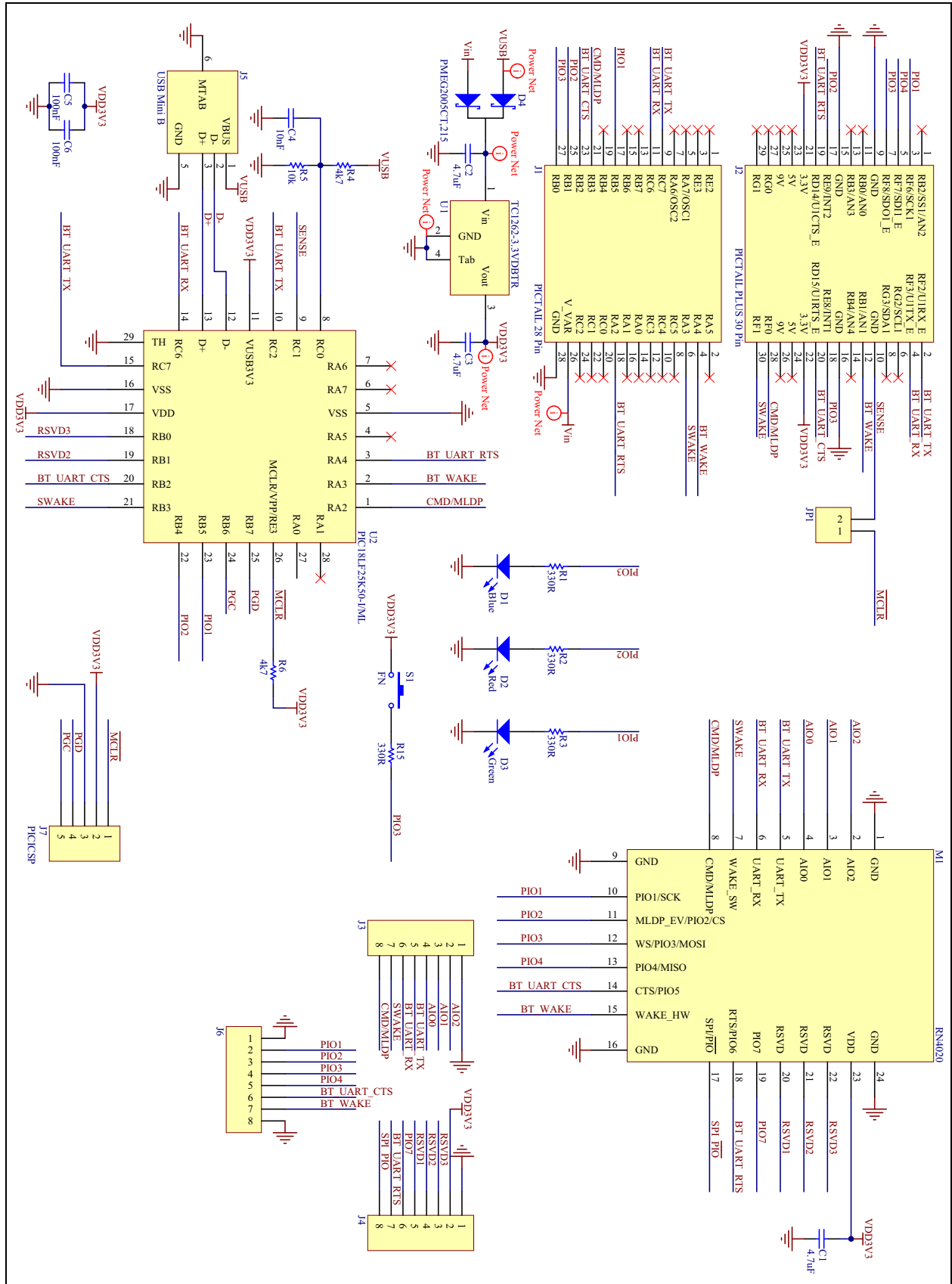
REVISION HISTORY

Revision A (June 2014)

This is the initial release of this document.

RN4020 PICTAIL PLUS DAUGHTER BOARD

BOARD SCHEMATIC



RN4020 PICTAIL PLUS DAUGHTER BOARD

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, PIC³² logo, rPIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MTP, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.


Analog-for-the-Digital Age, Application Maestro, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Omniclient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICkit, PICTail, REAL ICE, rFLAB, Select Mode, SQI, Serial Quad I/O, Total Endurance, TSHARC, UniWinDriver, WiperLock, ZENA and Z-Scale are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

GestIC and ULPP are registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2014, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

 Printed on recycled paper.

ISBN: 978-1-63276-253-5

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO/TS 16949 ==

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC[®] MCUs and dsPIC[®] DSCs, KEELOQ[®] code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.



MICROCHIP

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://www.microchip.com/support>
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110

Canada - Toronto
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2943-5100
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880-3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7830

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Dusseldorf
Tel: 49-2129-3766400

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Pforzheim
Tel: 49-7231-424750

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Venice
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Poland - Warsaw
Tel: 48-22-3325737

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820

03/25/14