RN52SRC Bluetooth® Audio Module Command Reference User's Guide

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Object of Declaration: RN52SRC Bluetooth® Audio Module

EU Declaration of Conformity

Manufacturer: Microchip Technology Inc.
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                   Chandler, Arizona, 85224-6199
                   USA

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.

This development/evaluation tool, when incorporating wireless and radio-telecom functionality, is in compliance with the essential requirement and other relevant provisions of the R&TTE Directive 1999/5/EC and the FCC rules as stated in the declaration of conformity provided in the module datasheet and the module product page available at www.microchip.com.

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Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA

Derek Carlson
VP Development Tools

12-Sep-14
Date

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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 "DSXXXXXXXXA", where "XXXXXXXX" 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 RN52SRC Bluetooth® Audio Module. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- 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 RN52SRC Bluetooth® Audio Module as a development tool to emulate and debug firmware on a target board. This document includes the following chapters:

- **Chapter 1. "Introduction"** provides a brief overview of the RN52SRC, highlighting its features and uses.
- **Chapter 2. "Command Interface"** provides information on the module interface.

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
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>
`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)`
		`{ ...`
		`}`

Notes	A Note presents information that we want to re-emphasize, either to help you avoid a common pitfall or to make you aware of operating differences between some device family members. A Note can be in a box, or when used in a table or figure, it is located at the bottom of the table or figure.	**Note:** This is a standard note box. **CAUTION** **This is a caution note.** **Note 1:** This is a note used in a table.

RECOMMENDED READING

The following documents are recommended as supplemental reference resources.

RN52 Bluetooth® Audio Module Data Sheet (DS70005120)

Consult this document for detailed information on the RN52SRC Bluetooth® Audio Module. Reference information found in this data sheet includes:

- Device pinout and packaging details
- Device electrical specifications
- List of features included on the device

This document is available for download from the Microchip website (www.microchip.com).

Bluetooth Core Specification v4.0, 30 June 2010

This specification is available for download from www.bluetooth.org.

Bluetooth Core Specification v4.1, 3 December 2013

Bluetooth® Core Specification 4.1 is an important evolutionary update to the Bluetooth Core Specification. It rolls up adopted Bluetooth Core Specification Addenda (CSA 1, 2, 3, and 4) while adding new features and benefits. Bluetooth 4.1 improves usability for consumers, empowers innovation for product developers, and extends the technology's foundation as an essential link for the Internet of Things.

This specification is available for download from www.bluetooth.org.

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- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listings
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The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers and other language tools
- **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 X IDE** – The latest information on Microchip MPLAB X IDE, the Windows® Integrated Development Environment for development systems tools
- **Programmers** – The latest information on Microchip programmers including the PICkit™ 3 development programmer

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

Customers should contact their distributor, representative or field application engineer (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 the web site at: http://support.microchip.com

DOCUMENT REVISION HISTORY

Revision A (February 2015)

Initial release of this document.

NOTES:

Chapter 1. Introduction

This document describes the operation of the RN52SRC Bluetooth® Audio Module command interface. The command interface operates over the serial UART port.

The RN52SRC firmware enables Bluetooth Master mode operation to connect to another Bluetooth Slave device, which supports the enabled profiles. The RN52SRC firmware supports the A2DP-SRC, HFP-AG, and AVRCP-TG profiles. The RN52SRC can connect to a standard RN52 module or any other Bluetooth audio device with A2DP-SNK, HFP-HF, AVRCP-CT profiles enabled.

As a Master Bluetooth device, the RN52SRC module can only connect to one Slave device at a time except when using the A2DP dual-streaming. In this instance, the module can connect to two Slave Bluetooth A2DP devices.

1.1 SUPPORTED BLUETOOTH PROFILES

1.1.1 A2DP-SRC

The firmware supports streaming audio to a A2DP-SNK enabled device. The audio will be streamed wirelessly from the A2DP-SRC to the A2DP-SNK device.

To connect to a A2DP-SNK device, issue the "C,<address>" command using the Bluetooth address of the A2DP-SNK device. Use the "Q" command to ensure the A2DP profile is connected and streaming audio. Plug-in the analog audio source to the microphone inputs on the RN52SRC.

1.1.1.1 A2DP DUAL-STREAMING

The firmware also supports simultaneous streaming of audio to two A2DP-SNK enabled devices. To connect to two A2DP-SNK devices, issue the "C,<address>" command one after the other using the Bluetooth addresses of the two A2DP-SNK devices.

1.1.2 HFP-AG

Voice audio call to a HFP enabled device is supported. Once the voice call is established with the HFP-HF device, the voice data is streamed bidirectionally between the two connected devices enabling intercom functionality. Both wide-band and narrow-band voice calls and respective codecs CVSD and MSBC are supported. The codecs are automatically negotiated during connection establishment. The wide-band support can be disabled by using the extended feature in the $S\%$, $<val>$ command.

Connect a microphone to the microphone inputs on the RN52SRC and a pair of headphones to the speaker/headphone outputs on the RN52SRC. Refer to Table 2-4 in **Chapter 2. "Command Interface"** for the related commands.

> **Note:** The HFP-AG does not support simultaneously connecting to two HFP-HF devices to enable a feature similar to A2DP dual-streaming.

1.1.3 AVRCP-TG

The AVRCP profile is supported in Target mode. Once the AVRCP connection is established with the AVRCP-CT device, the RN52SRC device can receive the AVRCP commands sent by the connected AVRCP-CT device and take appropriate actions.

When the AVRCP profile is connected, the AVRCP-TG receives AVRCP commands from the connected device AVRCP-CT. The received AVRCP commands are formatted into a response and sent to the UART command console.

The response is formatted as follows:

```
AVRCP:<operation>,<message>
```

Table 1-1 lists the available operations and messages.

TABLE 1-1: AVRCP OPERATIONS AND MESSAGES

Operation	Message	Description
Play	0 or 1	Track Play command was issued in the connected device.
Stop	0 or 1	Track Stop command was issued in the connected device.
Pause	0 or 1	Track Pause command was issued in the connected device.
Rwnd	0 or 1	Track Rewind command was issued in the connected device.
FFwd	0 or 1	Track Fast Forward command was issued in the connected device.
Next	0 or 1	Track Skip Next command was issued in the connected device.
Prev	0 or 1	Track Skip Previous command was issued in the connected device.
VolUp	0 or 1	Volume Up command was issued in the connected device.
VolDown	0 or 1	Volume Down command was issued in the connected device.
Vol	0-100%	Volume command was issued in the connected device.

1.1.4 RN52-EK with RN52SRC Firmware Setup

The RN52SRC firmware can be evaluated on the RN52-EK development board. The RN52SRC DFU (`.dfu`) image available on the Microchip RN52 web page can be used with the Microchip Bluetooth DFU Utility to upgrade the RN52 module on the RN52-EK with standard RN52 firmware to RN52SRC firmware. It is highly recommended to save the current firmware on the RN52-EK using the save current firmware option in the "Upgrade Action Selection" step while running the Microchip Bluetooth DFU Utility. Note that once the upgrade has successfully completed, the RN52-EK will have RN52SRC firmware with DFU-over-UART enabled for future DFUs.

The following steps can be used to connect the RN52-EK with RN52SRC firmware as a Master Bluetooth device to another RN52-EK with default standard RN52 firmware as a Slave Bluetooth device. Refer to **Section 2.3 "Command Interface"** for information on the commands referenced in this procedure.

1. Connect the RN52-EK with RN52SRC firmware (Master) to a PC using the USB mini-B receptacle (UART).
2. Connect a pair of headphones into the speaker jack (SPK) and an analog audio source or a microphone to the microphone jack (MIC) on the RN52-EK with RN52SRC firmware (Master).
3. Connect the other RN52-EK with standard RN52 firmware (Slave) to a PC using the USB mini-B receptacle (UART) or power-on any other Bluetooth Audio Slave device.

4. If using the RN52-EK with standard RN52 firmware as a Slave, connect a pair of headphones into the speaker jack (SPK) and a microphone to the microphone jack (MIC).

5. Place the Slave device into Discovery mode.

6. Run a terminal emulator program to open the COM port on the PC to which the RN52-EK with RN52SRC firmware (Master) is connected.

7. On the open COM terminal, initiate inquiry scanning on the RN52-EK with RN52SRC firmware (Master) to discover nearby Bluetooth devices using the "F" command.

8. Use the "C,<address>" command on the RN52SRC module to pair and connect to the RN52-EK with standard RN52 firmware (Slave) or to the Bluetooth Audio Slave device using its address as indicated by the result of the "F" command.

9. After successfully pairing and connecting, the audio signal on the analog audio source or the microphone on the RN52-EK with RN52SRC firmware (Master) can be heard on the headphones on the RN52-EK with standard RN52 firmware (Slave), since by default the A2DP profile is active.

10. The command "A" can be issued if HFP is enabled on both the Master and Slave devices to enable a bidirectional voice connection (SCO audio). The microphone voice signal from the microphone on the RN52-EK with RN52SRC firmware (Master) can be heard on the headphones on RN52-EK with standard RN52 firmware (Slave) and the microphone on RN52-EK with standard RN52 firmware (Slave) can be heard on the headphones on the RN52-EK with RN52SRC firmware (Master).

11. The command "E" can be issued on the RN52SRC module to end the voice connection and revert back to A2DP audio-streaming.

12. The command "Q" can be issued on the RN52SRC module to observe the status of the RN52SRC device. See **2.3.2 "Action Commands"** for information on this command.

1.2 SERIAL PORT (UART)

The UART port on the RN52SRC module can be used to issue the RN52 commands. Table 1-2 shows the default configuration for the Bluetooth module.

> **Note:** Since the SPP data profile is not supported, Data mode is not available on the RN52SRC module unlike on the standard RN52. Therefore, GPIO9 is not used to switch to Data mode on the RN52SRC.

TABLE 1-2: DEFAULT CONFIGURATION AND SERIAL PORT SETTINGS

Options	Setting
Bluetooth® Mode	Master
Bluetooth PIN Code (for legacy pairing mode, can be changed)	1234
Baud Rate	115,200 Kbps
Bits	8
Parity	None
Stop bits	1
Flow Control	Enabled

1.3 CONNECTING WITH A MICROCONTROLLER

Figure 1-1 shows a simple schematic in which a microcontroller controls the RN52SRC module. This schematic shows the minimum configuration required for the microcontroller to perform the following functions:

- Configure and control the module
- Get the module's status information (see the "Q" command for details)
- Stream audio over the Bluetooth link

FIGURE 1-1: CONNECTING THE RN52SRC TO A MICROCONTROLLER
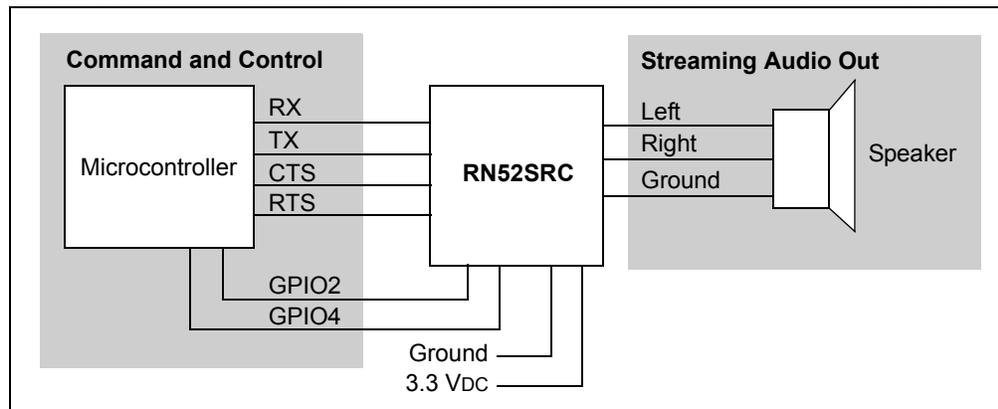
1.4   USING PIO LINES

The RN52SRC module PIOs are configurable as Action commands. The I/O configuration does not persist and must be done through the "I@" and "I&" commands when the module is running.

A 16-bit mask is used to refer to each GPIO in the "I@" and "I&" commands. The default state is undefined until they are configured.

1.4.1   PIO Input/output Example

To configure PIO 5-PIO7 as inputs with an internal pull-up resistor, and 12 and 13 as outputs, issue the following commands:

```
I@,3000\r      // Configures 12 and 13 as outputs, the remainder
               // are inputs
I@\r"          // Read the PIO mask
3004\r\n       // PIO2 (bit 2 = 0004) always configured as output
I&,20E0\r      // Enable internal pull-up on GPIO 5,6, 7, and 13
               // to drive High and clear the remaining levels
```

1.5   DEVICE FIRMWARE UPDATE

The Device Firmware Update (DFU) uses the UART port to update the firmware in the RN52SRC. Implementing the DFU feature is highly encouraged as firmware updates offer new features that enhance the functions of the RN52SRC module.

As shown in the reference design in Figure 1-2, when an external USB Host is connected to the UART-USB bridge DFU port, the bridge enumerates as a virtual COM port. Then, at the command window, execute the "$" command to place the RN52SRC into DFU mode. Use the DFU wizard to then perform a DFU on the RN52SRC module. Optionally, PIO3 can be used to enter DFU mode.

FIGURE 1-2:   UART DFU PORT USING UART-USB BRIDGE SCHEMATIC
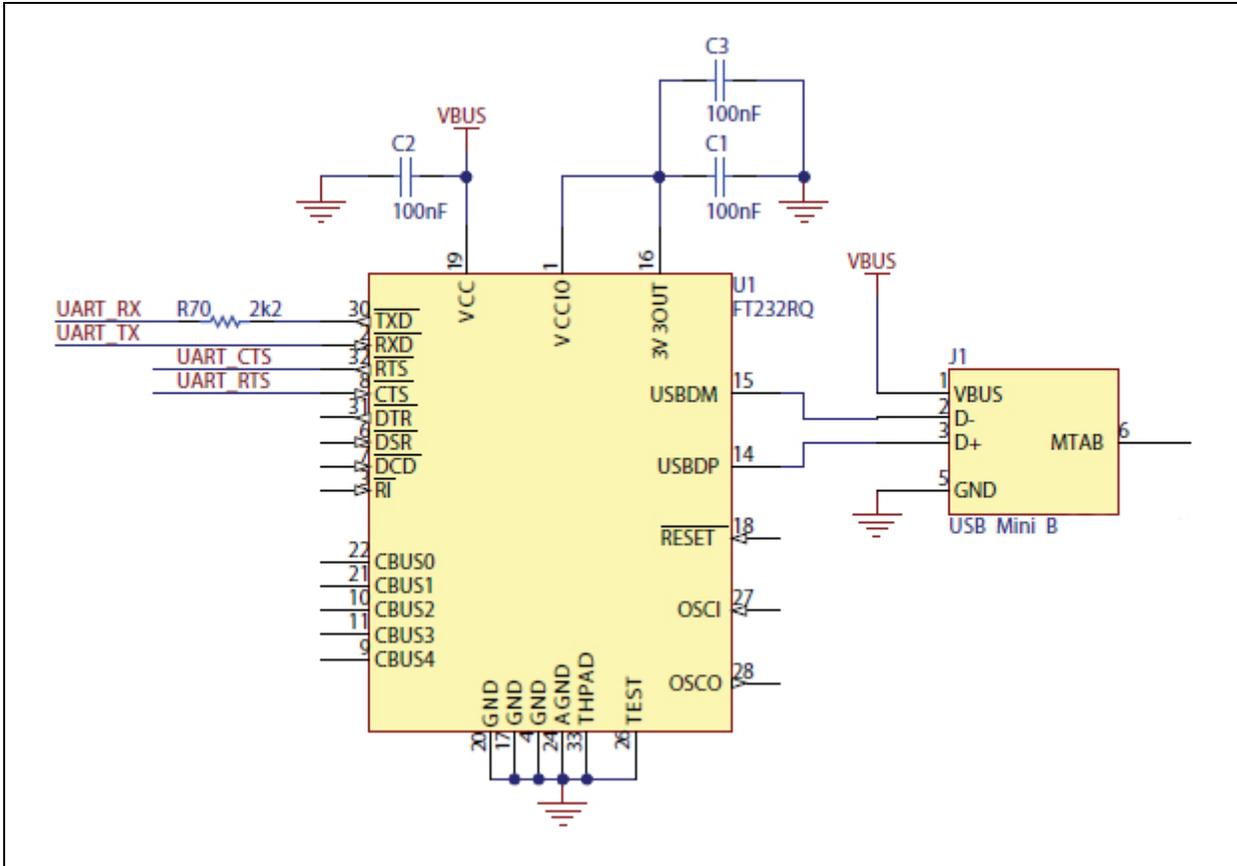
1.5.1   Using the DFU Loader Utility

The DFU Loader Utility is available for downloaded from the Microchip RN52SRC product page: http://www.microchip.com/rn52. Once on the site, expand the **Documentation and Software** section to obtain the zip archive of the utility. The instructions to perform a DFU are provided in the `RN52-EK DFU ProcedureGuide.pdf` file included in the zip archive. Please note that the module can be updated only if the specific DFU image is provided.

1.6   FACTORY DEFAULT USING PIO4

To reset the module to the factory defaults, PIO4 should be High on power-up and then toggle Low, High, Low, High with a one second wait between the transitions.

Chapter 2. Command Interface

This chapter describes the command interface for the RN52SRC module.

The module is controlled by the user through input/output lines (i.e., physical device pins) and a UART interface.

The following topics are covered:

- Reserved PIO Lines
- Event/Status Register
- Command Interface
- Firmware Release Version

2.1 RESERVED PIO LINES

The RN52SRC module has 11 PIO lines. Several PIO are reserved for specific functions during boot-up and run-time. Table 2-1 lists the reserved PIOs and their functions.

TABLE 2-1: RESERVED PIO LINES AND FUNCTIONS

PIO	Condition	Function	Use
2	Output	Toggles from High to Low for 100 ms to indicate a state change in the RN52SRC. The MCU should enter CMD mode and poll the state register using the "Q" action command. This I/O is reserved and is not available for general use at run-time.	Run-time, Reserved
3	Input at Boot-up	Enter DFU mode at boot-time if PIO3 is driven High. The device will enter DFU mode in three seconds. PIO3 should be asserted High only before the device enters DFU mode and not after.	Boot-up, Config
4	Input at Boot-up	To reset the module to the factory defaults, PIO4 should be High on power-up and then toggle Low, High, Low, High with a one second wait between the transitions.	Boot-up, Config
5	Input at Run-time	Used for the Volume Up button. Low is active. Set EK buttons extended feature to activate.	Run-time, Config
7	Input at Boot-up	Driven Low will set UART baud rate to 9600, High default baud 115200.	Boot-up, Config
10	Input at Run-time	Used for the Volume Down button. Low is active. Set EK button's extended feature to activate.	Run-time, Config
11	Input at Run-time	Used to enter Pairing mode. Low is active. Set EK button's extended feature to activate.	Run-time, Config
12	Input at Run-time	Used to toggle reconnect or disconnect to previously connected device. Low is active. Set EK button's extended feature to activate.	Run-time, Config
13	Input at Run-time	Used to toggle voice call initiate or terminate if HFP-AG profile is connected. Low is active. Set EK button's extended feature to activate.	Run-time, Config

Note: Since the RN52SRC module does not support the SPP data profile, GPIO9 is not assigned the function on the Command/Data mode control pin unlike on the standard RN52.

2.1.1 Status Change Notification Through PIO2

The RN52SRC drives PIO2 as an output to notify an external MCU of an event or status change. Status changes include changes to profile connections or voice call connections. The MCU should enter Command mode and issue the "Q" command to retrieve the latest status. See **Section 2.2 "Event/Status Register"** for more information regarding status changes.

PIO2 is held Low for each new event and remains latched Low until the "Q" command unlatches PIO2 back to High.

FIGURE 2-1:   PIO2 EVENT NOTIFICATION
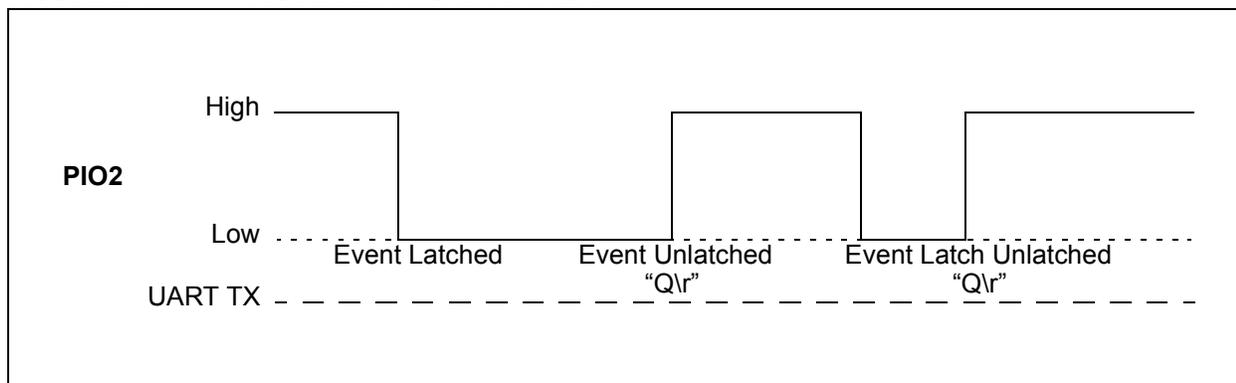
2.2   EVENT/STATUS REGISTER

The "Q\r" Action command returns a multi-byte list, where each value is expressed as 00-FF. The byte list is ordered little-endian (byte 0 LSB, byte N last) and is terminated by carriage return and line feed characters (\r\n).

Table 2-2 describes the current status bytes. For example, the byte string "070A\r\n" indicates A2DP, AVRCP and HFP profiles are connected and the connection state is "Active Call (10)".

Connection state values (bits 0-3) do not change unless the module status changes.

The module drives GPIO2 as noted in **Section 2.1 "Reserved PIO Lines"** to notify that the Event/Status register has been changed.

TABLE 2-2:   PROFILE STATUS AND CONNECTION

BYTE0	
Bit	**Description**
0	AVRCP active connection to remote device
1	A2DP active connection to remote device
2	HFP active connection to remote device
3-7	Reserved

BYTE1	
Bit	**Description**
0-3	Connection States: 0-15 (see Table 2-3)
4-7	Reserved

TABLE 2-3:   CONNECTION STATES IN BYTE 1, BITS 0-3

Value	State	Description
0	Init	Logically OFF, but physically ON.
1-2	Reserved	Reserved
3	Idle	Idle state.
4	Connectable	The module is connectable.
5	Discoverable and Connectable	The module is discoverable and connectable.
6	Connecting	The module is in the process of establishing a connection.
7	Inquiry	The module is scanning for nearby Bluetooth® devices.
8	Connected	The module is connected to a Bluetooth device.
9	Audio Streaming	The module is streaming A2DP audio.
10	Active Voice Call	The module has established an active voice call and bidirectional voice transfer.
11-15	Reserved	Reserved

RN52SRC Bluetooth Audio Module User's Guide

2.3 COMMAND INTERFACE

All commands are divided into the following types:

• Set/Get Commands
• Action Commands

Table 2-4 lists and provides brief descriptions of all commands by type.

TABLE 2-4:   COMMAND DESCRIPTIONS

Type	Command Name	Description
Set/Get	SF	Set all parameters to factory default.
	SK	Set connection mask.
	SM	Set microphone gain levels.
	SN	Set advertised Bluetooth® name.
	SP	Set PIN code for legacy pairing.
	SS	Set speaker gain levels.
	S-	Set serialized name.
	S%	Set extended feature.
Action	A	Initiate voice connection.
	AV+	Send AVRCP Volume Up command.
	AV-	Send AVRCP Volume Down command.
	B	Reconnect to previous device.
	C	Connect to a remote Bluetooth device.
	D	Display the configuration settings.
	E	Terminate an active call.
	F	Initiates inquiry scanning.
	L	List all devices in the Paired Device List (PDL).
	H	Display Help text.
	I@	Configure PIO direction.
	I&	Configure PIO level and input pull-up.
	K	Disconnect the connected device.
	Q	Display the connection status.
	R	Reboot the module.
	U	Reset and clear all previously paired devices in the PDL.
	V	Display the firmware level.
	@	Enable/disable module discoverability.
	$	Initiate DFU and place module in DFU mode.
	+	Local echo toggle.

2.3.1   Set/Get Commands

The following parameters can be written and read from the command console using SET and GET commands. SET and GET use the following syntax where the parameter is a single character.

```
S<char>,<value>\r   // Set a parameter
G<char>\r           // Read a parameter
```

The parameter <char> is a single character. All SET commands are non-blocking and will return immediately. Unless otherwise noted, Set commands do not take effect until the RN52SRC module is rebooted with the "R,1" command. Not all Set parameters are readable with a Get.

All commands respond with "AOK,<opt msg>\r\n" indicating success, or "ERR,<opt msg>\r\n" if the command fails. The string <opt msg> indicates optional message text.

SF,1

Description

Sets all parameters to factory default values. The changes do not take effect until the module is rebooted. This is a write-only parameter.

Default

Not applicable.

Example

```
SF,1   // Invoke factory defaults
R,1    // Reboot module
```

SK,<byte>

Description

Byte value to enable specific profiles that can be connected by remote Bluetooth hosts. See the Byte0 definition in Table 2-2 for the profile value.

- 1 – A2DP
- 2 – AVRCP
- 4 – HFP

Default

0D, all profiles.

Example

```
SK,03     // Enable A2DP and AVRCP
```

SM,<hex8>

Description

Sets microphone gain levels. The speaker level can be set from 00 through 1F.

Default

0A.

Example

```
SM,0C      // Set microphone gain to 0x0C level
```

SN,<string>

Description

Sets the Bluetooth friendly name advertised during an inquiry scan. The string can be up to 16 characters.

Default

RN52SRC-*XXXX*, where *XXXX* is the last 4 digits of the module's MAC address. When you set the name, *-XXXX* is not appended to <string>.

Example

```
SN,MyDevice  // Set the device name to "MyDevice"
```

SP,<1,2>,<string>

Description

Sets the four digit PIN code used for legacy pairing (A2DP dual-streaming devices).

Default

1234.

Example

```
SP,1,0123    // Set the PIN code for Device 1 to 0123
```

SS,<hex8>

Description

Sets speaker gain levels. The speaker level can be set from 00 through 0F.

Default

0B.

Example

```
SS,09         // Set the speaker level to 0x09
```

S-,<string>

Description

Sets the serialized name. This is a write-only parameter.

Default

RN52SRC.

Example

```
S-,AUDIO    // Set Bluetooth name to friendly address "AUDIO-b1b0"
            // where b0 and b1 hex values are for the first two
            // bytes (right-most) of the MAC address (i.e., AUDIO-51A2)
```

S%,<hex16>

Description

Sets extended features:

- Bit 0: Enable EK buttons
- Bit 1: Enable reconnect on power-on
- Bit 2: Discoverable on start-up
- Bit 3-Bit 5: Reserved
- Bit 6: Disable AG wide-band voice support
- Bit 7-Bit 9: Reserved
- Bit 10: Enable PDL scan reconnect on power-on
- Bit 11-Bit 15: Reserved

Default

0006.

Example

```
S%,0447   // Enables all extended features
```

2.3.2   Action Commands

Action commands make immediate changes to the module and do not require a reboot. The format of an action command is as follows:

```
<char>,<optional argument>\r
```

All Action commands are non-blocking and will return immediately. If background processing is required, event notification should be used to determine whether the operation succeeded or failed.

All commands respond with "AOK,<opt msg>" indicating success, or "ERR,<opt msg>" if the command fails. The string <opt msg> indicates optional message text.

A

Description

Initiates a voice connection to the connected Bluetooth device if the HFP profile is active and connected.

Default

Not applicable.

Example

```
A         // Initiate a voice connection
```

AV+

Description

Sends a AVRCP Volume Up command.

Default

Not applicable.

Example

```
AV+       // Send AVRCP command to increase the volume
```

AV−

Description

Sends a AVRCP Volume Down command.

Default

Not applicable.

Example

```
AV-       // Send AVRCP command to decrease the volume
```

B

Description

Attempt to reconnect profiles to most recently paired and connected device. Reconnect will be attempted on the profiles specified in the connection mask. See the "SK,<byte>" command.

If A2DP dual-streaming is desired, issuing the command reconnects to both Bluetooth devices.

Use the "Q" command to retrieve the Bluetooth profile connection status in byte 0 (bits 0-3) value.

Default

Not applicable.

Example

```
B          // Attempt a reconnect to the previously connected device
```

C,<address>

Description

Initiate a connection to a remote Bluetooth device that is available for connection using its Bluetooth address.

If A2DP dual-streaming is desired, consecutively issuing the command again using the Bluetooth addresses of the two A2DP-SNK devices connects to both devices.

Default

Not applicable.

Example

```
C,000666930003     // Initiates a connection to the Bluetooth device
                   // with address 0x000666930003
```

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D

Description

Display configuration settings. Table 2-5 lists the fields.

TABLE 2-5:   **CONFIGURATION SETTING FIELDS**

Field Name	Description
BTA	Bluetooth® address of the device.
BTACx	Bluetooth address, name, and active profiles of the connected device and A2DP dual-streaming devices. 'x' can be 1 or 2 indicating the device while A2DP dual-streaming.
DTName	Bluetooth name of the device.
ConnectionMask	Connection mask.
PinCode1	Legacy PIN code for Bluetooth Device 1 in A2DP dual-streaming mode.
PinCode2	Legacy PIN code for Bluetooth Device 2 in A2DP dual-streaming mode.
CodecsEnabled	Codes enabled.
AudioCodec	Active audio codec (i.e., SBC, VoiceNB, VoiceWB).
ExtFeatures	Extended features.

Default

Not applicable.

Example

```
D          // Display configuration settings
```

E

Description

Terminate an active voice call.

Default

Not applicable.

Example

```
E          // Terminate an active voice call
```

F,[<hex16>]

Description

Initiates inquiry scanning for nearby Bluetooth devices and lists the devices found. The argument indicates the optional time in seconds for the inquiry to be active.

Default

Not applicable.

Examples

```
F          // Start inquiry scanning
```

or

```
F,30       // Perform inquiry scanning for 30 seconds
```

L

Description

Lists all the devices in the Paired Device List (PDL), which contains up to eight previously paired devices.

Default

Not applicable.

Example

```
L          // Lists all devices that were previously paired
```

H

Description

Displays and provides brief descriptions of all supported commands. Useful when accessing the command console from a terminal emulator.

Default

Not applicable.

Example

```
H          // Display Help text
```

```
I@
I@,<hex16>
```

Description

This command configures the GPIO direction. A 16-bit mask is used to set PIO direction: bit ON for output, bit OFF for input. If no argument is specified, the current configuration is returned.

Default

Not applicable.

Example

```
I@        // Return current configuration

I@,3000   // Configure GPIO 12 and 13 as outputs
          // The remainders are inputs
```

```
I&
I&,<hex16>
```

Description

Configure PIO level and input pull-up. Bit ON is logical High, bit OFF logical Low. If no argument is specified, the current levels are returned. The 16-bit <hex16> value is the PIO bit map (e.g., bit 4 = PIO4).

When a PIO is configured as an output, "I&,<hex16>" drives the level High for the PIO specified in <hex16>.

When a PIO is configured as input, "I&" configures the PIO to use a pull-up (bit set) or pull-down (bit clear).

Default

Not applicable.

Example

```
I&,20E0   // Enable internal pull-up on GPIO 5, 6, 7, and 13
          // to drive High and clear the remaining GPIOs

I&        // Returns the current GPIO levels
```

```
K
```

Description

Disconnect the connected device (dual-stream).

Default

Not applicable.

Example

```
K         // Disconnect from the connected device
```

Q

Description

Displays the byte (ASCII hex) string indicating connected profiles, connection states, and other events. See **Section 2.2 "Event/Status Register"** for more information.

Default

Not applicable.

Example

```
Q        // Returns the status register value
```

R,1

Description

Drops all active connections and reboots the module.

Default

Not applicable.

Example

```
R,1      // Drop active connections and reboot module
```

U,[<1,2>]

Description

Resets and clears all the previously paired devices in the Paired Device List (A2DP dual-streaming devices).

Default

Not applicable.

Example

```
U        // Clear all previously paired devices
```

V

Description

Display the firmware version.

Default

Not applicable.

Example

```
V        // Display the firmware version
```

```
@,<decimal>
```

Description

Enables or disables discoverability of the module.

Default

Not applicable.

Example

```
@,0        // Disable discoverability

@,1        // Enable discoverability
```

```
$
```

Description

Initiates Device Firmware Update (DFU)-over-UART and places the module into DFU mode.

Default

Not applicable.

Example

```
$          // Initiates DFU-over-UART
```

```
+
```

Description

Local echo toggle, which can be helpful when accessing the command console from a terminal emulator.

Default

Not applicable.

Example

```
+          // Toggles echo ON and OFF
```

2.4   FIRMWARE RELEASE VERSION

Version	Description
1.0	RN52SRC v1.00 firmware – RN52SRC-I/RM100

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