PARKER HANNIFIN CORPORATION
8145 LEWIS ROAD
MINNEAPOLIS, MN 55427

RE: Modular User Manual

Statement: the module is not for sale to third parties -- it is a limited module. It is only sold to customers as part of a complete Parker sensor product.

Per the FCC's guidance here:

https://apps.fcc.gov/kdb/GetAttachment.html?id=1SjvWefMMUr61bRufmPyxw%3D%3D&desc=996369%20D03%20OEM%20Manual%20v01r01&tracking_number=44637)

If the modular transmitter is **only approved for use by the grantee in its own products and not intended for sale to third parties**, the integration instructions may not be detailed but this must be declared in the filing. In that case, it is permitted to place the instructions in the theory-of-operation exhibit folder using long-term confidentiality. The applicant must include a statement in the filing that the module is not for sale and the user manual integration instructions are internal confidential manufacturing documents. The grant of certification for such a modular transmitter must be limited.

Reference Information as follows:

1.0 Description:

The Parker SensoNEXT RF module (part number QX-008-798) is an MCU+RF transceiver + interface for integration into IoT sensor products produced only by Parker Hannifin corporation. As such it is a limited single modular transmitter, and the module is not for sale to outside companies.
The RF section is based on the Texas Instruments CC1352R Multi-Band Wireless MCU. The MCU incorporates one RF section that has 2 RF sections that it switches between to support:

1. 2.4GHz frequencies for Bluetooth Low Energy 5.2 communications.
2. Sub-GHz frequencies for IEEE 802.15.4 communications.

The Sub-GHz RF output is capable of operating at 900MHz (FCC markets) or 868MHz (for CE markets), an external antenna (Parker QX-008-387) is connected to J9 and supports both of these frequency ranges.
The 2.4GHz BLE output is routed thru an RF switch/connector J10. An external antenna (Parker QX-008-1018) may be connected to this connector. If the antenna is not connected, the switch function of J10 routes the RF signal to an on-board chip antenna (A1) for short range communication.
Note, J9 and J10 are physically not compatible, so the external antennas cannot be connected to the incorrect port.
The two RF outputs are connected to a singe radio inside the CC1352R and thus are physically incapable of operating simultaneously.
The CC1352 transceiver, RF balun, and power regulator are covered by an RF shield (Parker QX-008-1008)

2.0 Block diagram

A1: Internal chip antenna (2.4 GHz)
J3: Daughterboard connector
J8: Daughterboard connector
J9: Sub-1GHz antenna connector
J10: 2.4GHz BLE antenna connector
U2: Johanson balun
U4: IMU/motion sensor
U7: External memory chip
U9: Barometric pressure sensor

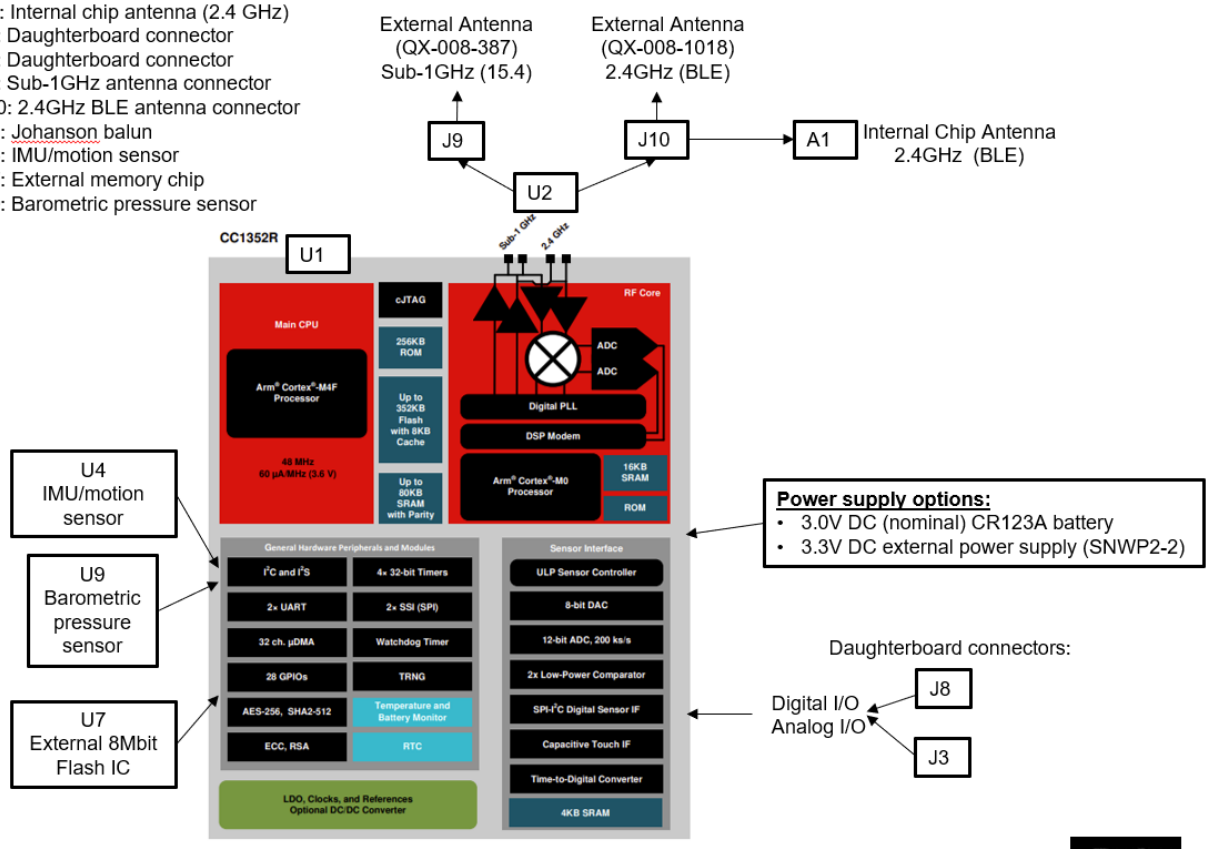

Figure 4-1. CC1352R Block Diagram

3.0 Connector/component ID

A1: Internal chip antenna (2.4 GHz)
J3: Daughterboard connector
J8: Daughterboard connector
J9: Sub-1GHz antenna connector
J10: 2.4GHz BLE antenna connector
U2: Johanson balun
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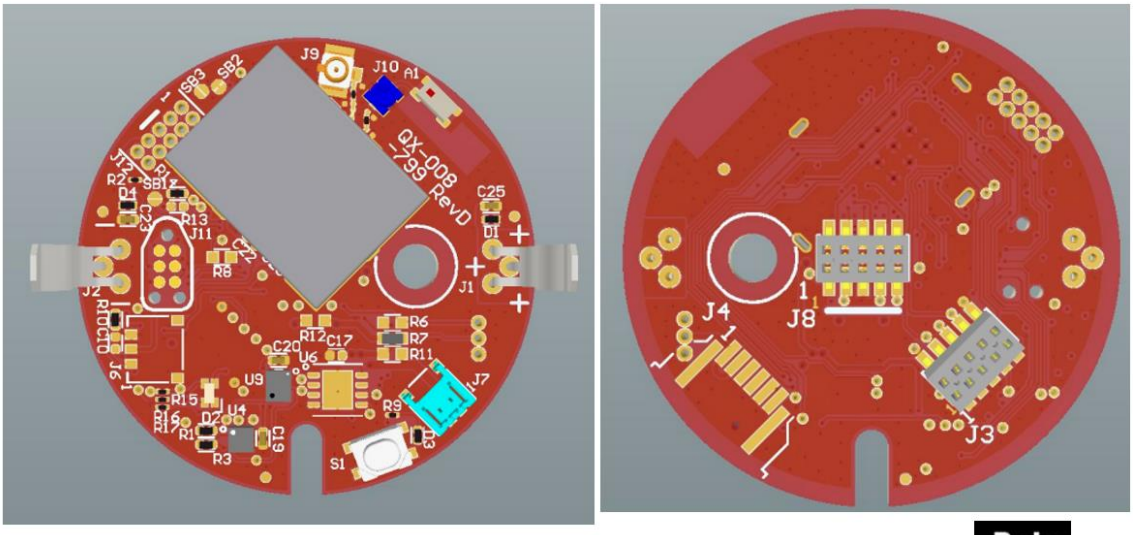

4.0 Pinout

Connector J8 - IO

Pin Name	Pin Number	Purpose
DB_P1	1	GPIO (configurable – input/output/analog)
VDDS3	2	Constant battery power
DB_P3	3	GPIO (configurable – input/output/analog)
DB_P4	4	GPIO (configurable – input/output/analog)
Gnd	5	Ground connection
DB_P6	6	GPIO (configurable – input/output/analog)
DB_P7	7	GPIO (configurable – input/output/analog)
DB_P8	8	GPIO (configurable – input/output/analog)
DB_P9	9	GPIO (configurable – input/output/analog)
VDD_DB	10	Switchable, configurable (1.8, 2.5, or 3.0 volts) regulated power out

Connector J3 - Expansion

Pin Name	Pin Number	Purpose
Gnd	1	Ground connection
VDDS3	2	Constant battery power in
COEX2	3	Radio Coexistence interface pin 2: input from external radio, external radio transmitter on (active high)
UART0_TX	4	UART Tx
DIO_14	5	GPIO (configurable – input/output)
COEX1	6	Radio Coexistence interface pin 1: input from external radio, time pulse (active high)
UART0_RX	7	UART Rx

COEX0	8	Radio Coexistence interface pin 0, output to external radio, SensoNODE radio transmitting (active high)
VDDS3	9	Constant battery power in
Gnd	10	Ground connection

5.0 Electrical Characteristics

Temperature:

Storage temperature: -4°F to 158°F [-20°C to 85°C], battery limited

Operating temperature: -4°F to 158°F [-20°C to 85°C], battery limited

Input voltage:

3.0V (nominal) from CR123A battery, operating range 2.7V to 3.3V

3.3V ±0.1V from external power supply (Parker SNWP2-2)

6.0 RF characteristics:

900MHz 802.15.4 Sub-GHz RF section:

channels: 64

200kHz channel spacing

Channel ID: 0 – 63, corresponding to Center Frequency 902.4Mhz – 927.6MHz

50kHz deviation

2-GFSK modulation

311kHz Rx Bandwidth

Tx power: 9.60dBm (Maximum Tx power +12dBm)

2.4GHz Hz Bluetooth Low Energy 5.2 RF section:

channels: 40

2Mhz channel spacing

Channel ID: BLE standard, from 2.402MHz to 2.480MHz

1 MBps phy

Power Value: 3.54dBm (max Tx power +4dBm)

Antenna used

Antenna Type	Brand/ manufacturer	Model No.	Max. Antenna Gain
Dipole Antenna (2.4GHz)	SINBON	QX-008-1018	3.4dBi
Chip Antenna (2.4GHz)	JOHANSON TECHNOLOGY	2450AT18D0100	2.6dBi
Dipole Antenna (915MHz)	SINBON	QX-008-387	1.5dBi

Instruction to Host product manufacturer when choosing external connector:
Unique antenna connector must be used on our Part 15 authorized transmitters used in the host product. Here is a list of acceptable unique connectors (as seen on Model No drawings):

Brand/ manufacturer	Model No.
Hirose	MS-156C-LP-068
I-PEX	20851-001R (SW23 Plug)
Hirose	U.FL connector

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FCC&IC regulatory compliance statement

§15.19 Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

RSS-Gen Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

l'appareil contient des émetteurs/récepteurs exempts de licence qui sont conformes aux CNR exempts de licence d'Innovation, Sciences et Développement économique Canada. L'exploitation est soumise aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage,
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

§15.21 Information to user
Warning: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

RF Exposure compliance statement
This Module complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.
ce matériel est conforme aux limites de dose d'exposition aux rayonnements, CNR-102 énoncée dans un autre environnement.cette eqipment devrait être installé et exploité avec distance minimale de 20 entre le radiateur et votre corps.

Labelling Instruction for Host Product Integrator
Please notice that if the FCC and IC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. For FCC, this exterior label should follow "Contains FCC ID: 2ACDM-SNG4". In accordance with FCC KDB guidance 784748 Labeling Guidelines. For IC, this exterior label can use wording "Contains IC: 11983-SNG4".

§ 15.19 Labelling requirements shall be complied on end user device.
Labelling rules for special device, please refer to *§2.925, § 15.19 (a)(5)* and relevant KDB publications. For E-label, please refer to *§2.935*.

Installation Notice to Host Product Manufacturer
The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module. The module is limited to installation in mobile application, a separate approval is required for all other operating configurations, including portable configurations with respect to *§2.1093* and difference antenna configurations.

Antenna Change Notice to Host manufacturer
If you desire to increase antenna gain and either change antenna type or use same antenna type certified, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID&IC ID (new application) procedure followed by a Class II permissive change application.

FCC other Parts, Part 15B Compliance Requirements for Host product manufacturer
This modular transmitter is only FCC authorized for the specific rule parts listed on our grant, host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

Host manufacturer in any case shall ensure host product which is installed and operating with the module is in compliant with Part 15B requirements.

Please note that For a Class B or Class A digital device or peripheral, the instructions furnished the user manual of the end-user product shall include statement set out in *§15.105 Information to the user* or such similar statement and place it in a prominent location in the text of host product manual. Original texts as following:

For Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

For Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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