Simple Bluetooth® Controls

AVI1010

Modules

The **AVI1010 BLE Modules** are RF modules built on the CSR1010 chipset, which provide a single-chip solution to controlling all types of lighting and other devices, whether line-connected or battery-powered.

Controlling host and radio interfaces, the on-chip micro-controller runs both the Bluetooth Stack and the Avi-on Bluetooth Mesh Application Stack. The on-chip RF transceiver includes the complete receiver and transmitter functions and integrated antenna or external antenna options.

There are five versions of the AVI1010 BLE modules available:

- **AVI1010INT** (includes onboard antenna; shown at right)

- **AVI1010UFL** (includes male U.FL connector for use with external antennas)
- **AVI1010WIR** (includes assembled wire antenna)
- **AVI1010NA** (supports external wire antenna)
- **AVI1010VIA** (supports external antenna through via; includes additional ground via for isolation)

Powered by Avi-on™ Platform & Firmware

Modules ship pre-loaded with standard *Powered by Avi-on™* firmware suitable for prototype builds and testing of lighting and control devices. The complete *app-cloud-module-support* package enables manufacturers to design and ship products in less than six months.

Firmware customization for PWM, I2C, UART, SPI, TRIAC, ADC and other dimming protocols is available upon request.

Avi-on Module Features

- One step integration using *Powered by Avi-on™* platform of app-cloud-firmware-support. Includes plug-and-play interoperability with the *Powered by Avi-on™* product ecosystem
- Compatible with UART, I2C, SPI, and PWM dimming interfaces
- Up to +85°C operating temp; higher temp versions available upon request
- Internal EEPROM memory provides storage for the Bluetooth software parameter and application parameter
- Electrical:
  - DC Supply: 1.8V ~3.6V
  - Low current consumption: 24 mA @3V (Peak Current)
- High performance integrated antenna (on AVI1010INT)

Table of Contents

1. Detailed Specifications

Characteristic	Detailed Description
RF Technology	• Frequency Hopping Spread Spectrum
RF Frequency	• 2400 to 2483.5 MHz USA/EUROPE/JAPAN • 2446.5 to 2483.5 MHz France
Modulation Schemes	• 0.5 BT, GFSK • Index: 0.28 – 0.35.
Operating Frequency	• 2400 ~ 2483.5 MHz ISM band
Channel Numbers	• 40 (f = 2402 + k*2 MHz, k=0, 1, 2, …39)
Data Rate	• 1 Mbps (Typically)
Transmitter Output Power	• 9 dBm Internal Antenna • 9 dBm External Antenna
Receiver Sensitivity	• -93 dBm Typical
Antenna Type	• Integrated PCB antenna
Operating Voltage	• 1.8V ~3.6VDC • Brownout: ○ If VBATT < 1.8V, power cycle required to release device from brownout state
Current Consumption	• 18 mA@3.3V active mode • 35 mA@1.8V active Mode • Max. <5uA@3V Sleep mode (estimated)
Size	• 18mm × 12mm × 2.3mm (L x W x H) • Size does not include antenna
Operating Temp	• -30°C to +85°C

2. Regulatory Certifications

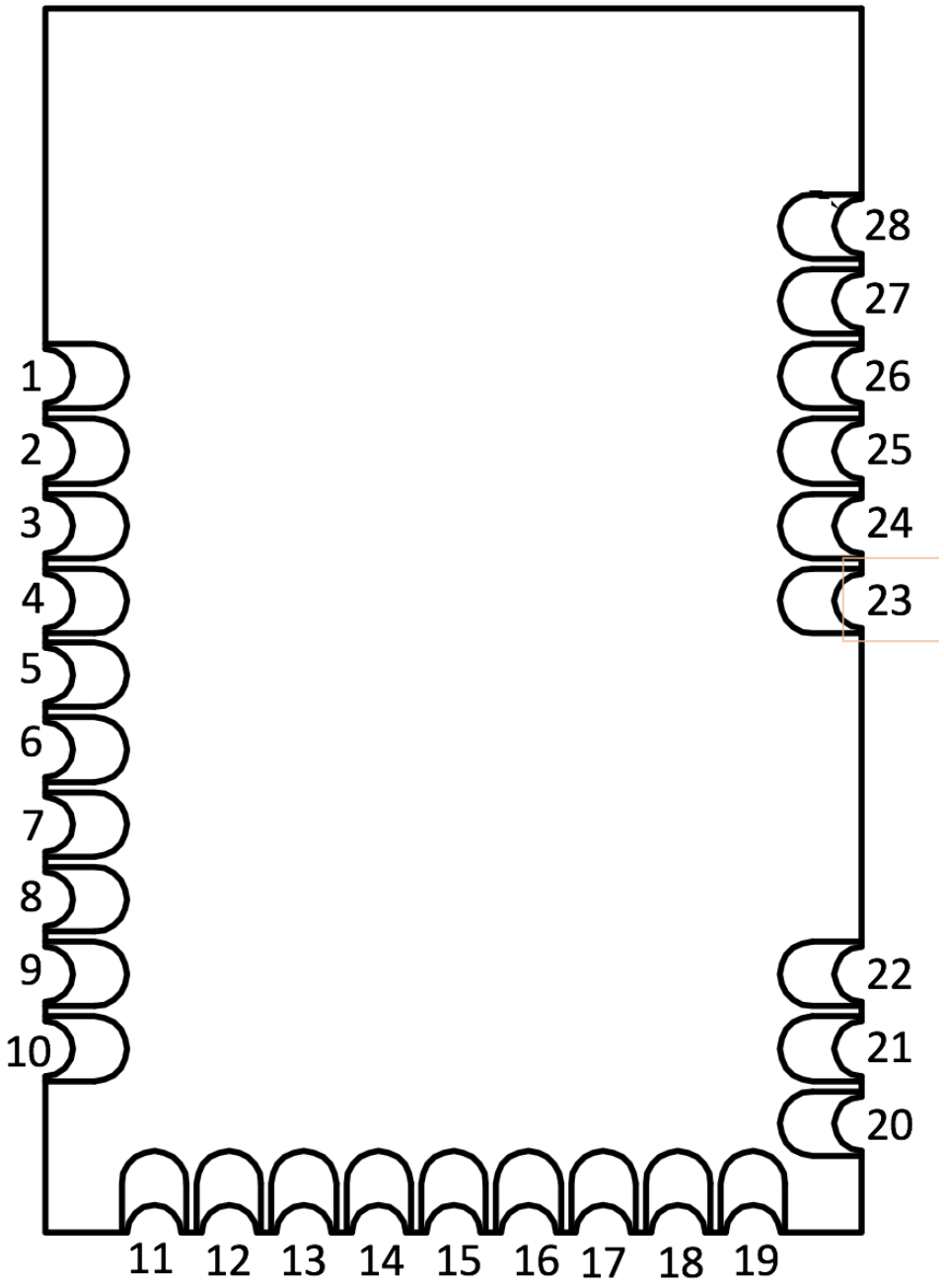
Feature	Detailed Description
USA	• **FCC: N/A** • FCC part 15.247, 15.209, 15B,
European	• **CE: N/A**
Canada	• **IC: NA** • … • …
BQB	• **DID: NA** • **Qualified Design ID: N/A**

3. Default Pin Assignments

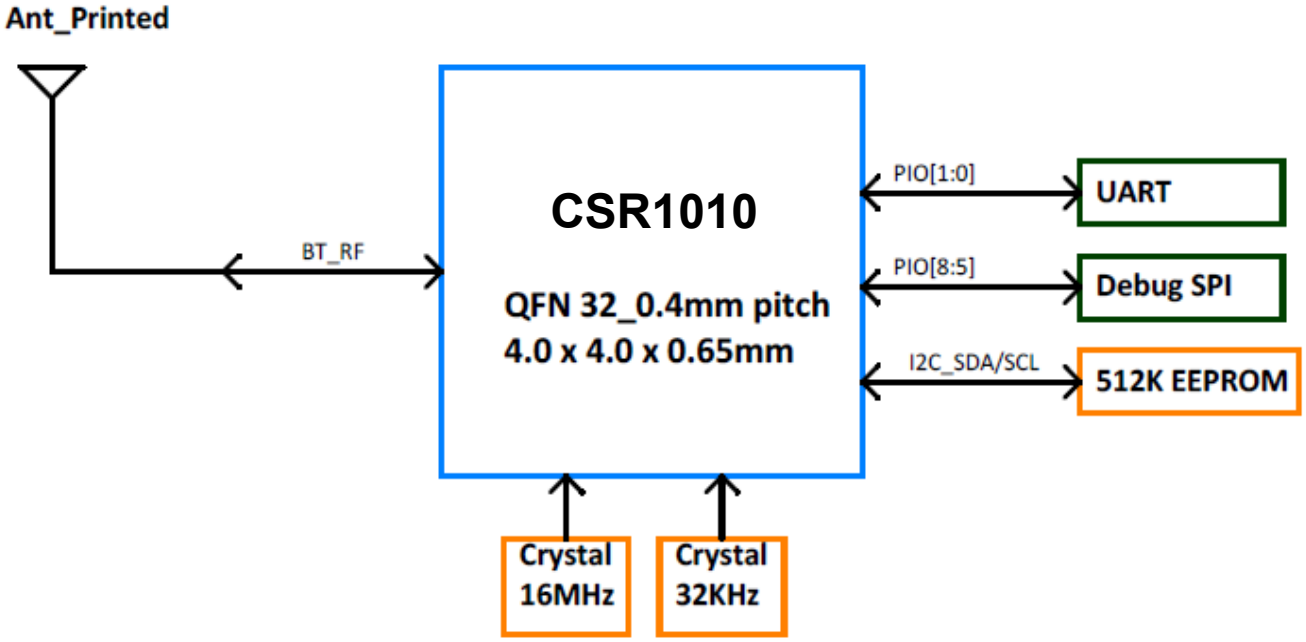
Pins	Name	Function	Description
1	WAKE	I	If not used, leave floating
2	XTAL_32K_IN	Analog in	32.768KHz installed, Do not connect to this Pin.
3	XTAL_32K_OUT	Analog In	32.768KHz installed, Do not connect to this Pin.
4	I2C_SCL	I/O	SPI serial flash installed, or I2C clock Input / output.
5	VBATT	Power	Power input.
6	I2C_SDA	I/O	SPI serial flash installed, or I2C data Input / output.
7	SPI_PION	I	Selects SPI debug or Programmable I/O, Pull-High: SPI debug Pull-down: Programmable I/O line, default is Pull-down.
8	PIO[11]	I/O	Programmable I/O
9	PIO[10]	I/O	Programmable I/O
10	PIO[9]	I/O	Programmable I/O
11	SPI_MISO/PIO[8]	I/O	SPI data output or Programmable I/O
12	SPI_MOSI/PIO[7]	I/O	SPI data input or Programmable I/O
13	SPI_CSB/PIO[6]	I/O	SPI select or Programmable I/O
14	SPI_CLK/PIO[5]	I/O	SPI clock or Programmable I/O
15	PIO[4]	I/O	Programmable I/O
16	VDD_PADS	Power	Positive supply for all digital I/O ports
17	PIO[3]	I/O	Programmable I/O
18	UART0_RX/PIO[2]	I/O	UART RX or Programmable I/O

19	UART0_TX/PIO[1]	I/O	UART TX or Programmable I/O
20	AIO[0]	I/O	Analogue Programmable I/O
21	AIO[1]	I/O	Analogue Programmable I/O
22	AIO[2]	I/O	Analogue Programmable I/O
23	GND	Ground	Ground
24	GND	Ground	Ground
25	GND	Ground	Ground
26	GND	Ground	Ground
27	EXT Antenna	Antenna	External Antenna for AVI1010VIA
28	GND	Ground	Ground

4. Pin Assignment

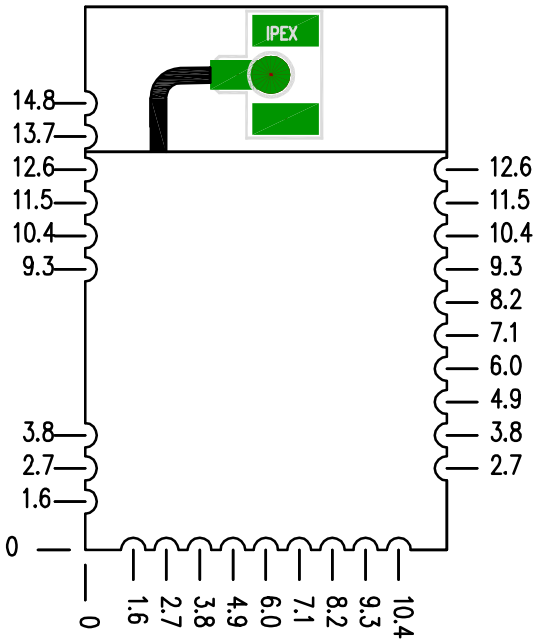


5. System Architecture

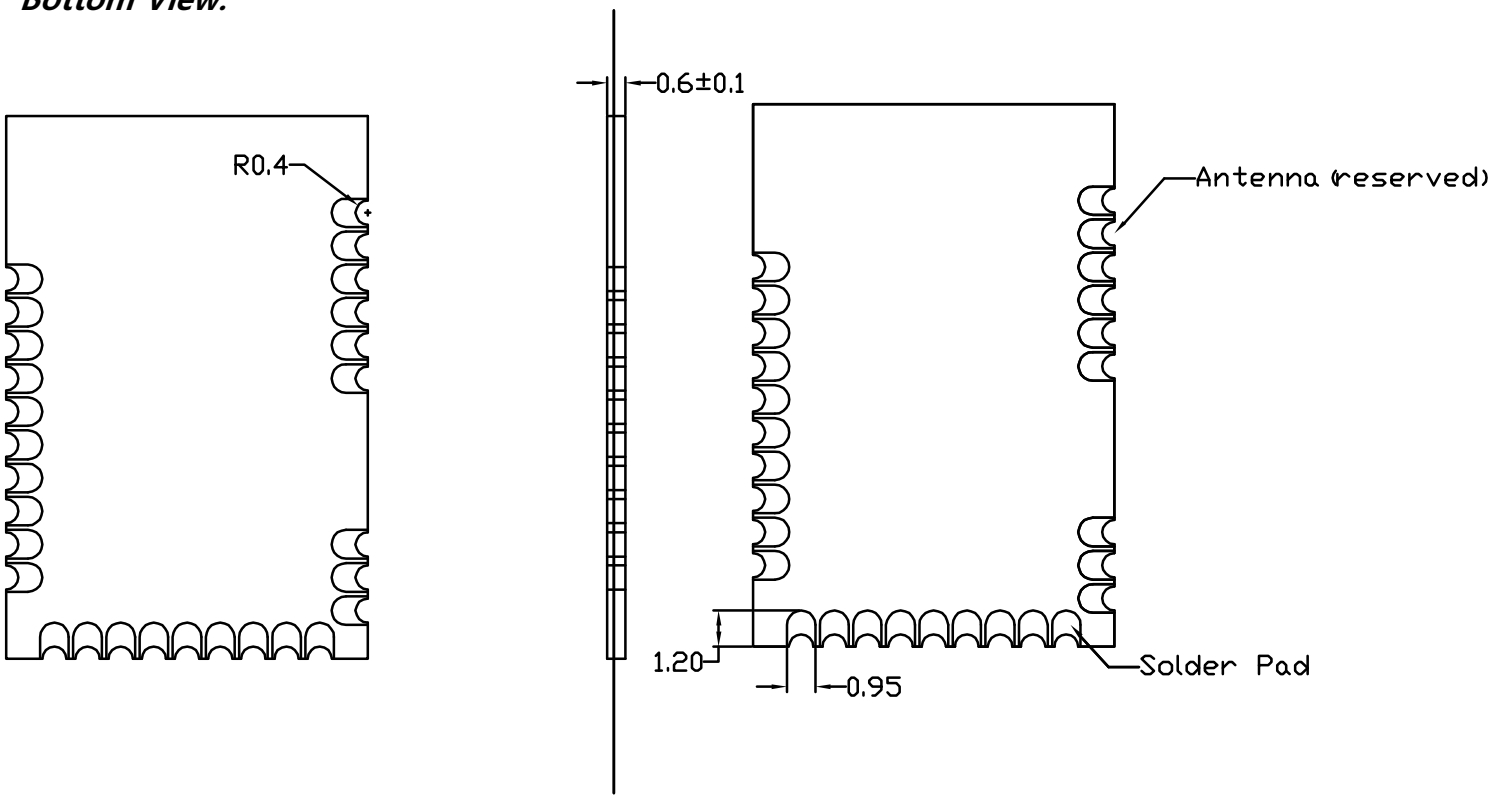


6. Mechanicals

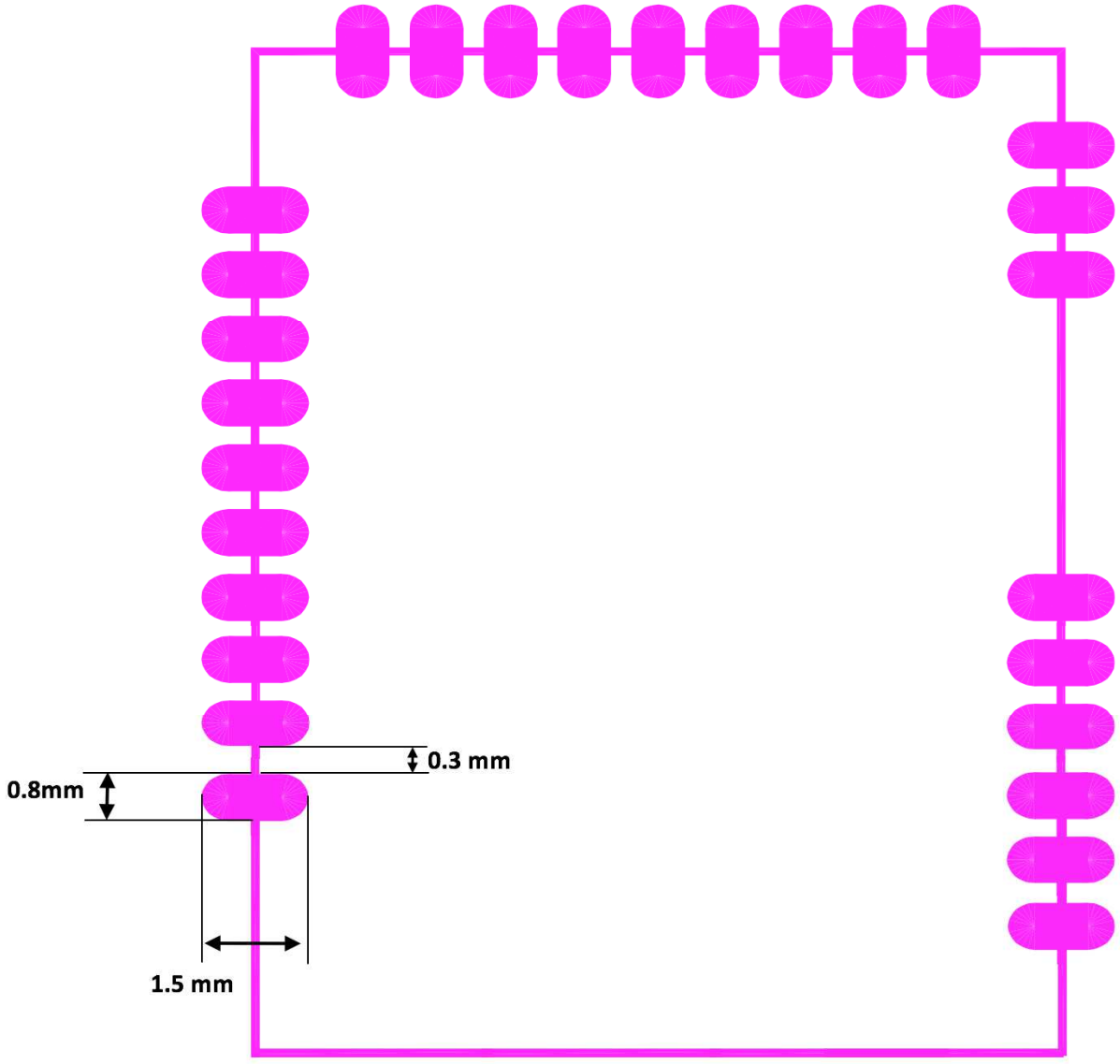
Top View:



Bottom View:



7. Pad Layout



8. Antennas

The AVI1010 series of modules are all functionally the same, with the exception of antenna design. In each module configuration, there are multiple antenna options. Avi-on has pre-certified several antennas for use with the AVI1010, customized for various lighting applications.

Based on the specific application, Avi-on can provide recommendations based on cost and performance qualifications. We also offer the Avi-on Certification Program, which:

- Benchmarks your product's RF performance versus other devices
- Provides feedback and recommendations about how to improve
- Provides a professional test report
- Enables you to use the *Powered by Avi-on* logo on your products

9. Packaging

The standard shipment of production AVI1010 modules arrive in trays, but Avi-on provides the option for tape and reel packaging (AVI1010XXX-TR), for additional costs. Please contact Avi-on for details.

10. Avi-on Integration Kit

This kit is designed to enable manufacturers to quickly develop lighting and power controls using the *Powered by Avi-on™* app-cloud-firmware platform. The daughter board comes with an Avi-on-INT module and is loaded with Avi-on's standard PWM firmware.

Board details plus other firmware and dimming protocols available upon request.

11. Document Record

Date	Revision	Reason to Change
08/18/2016	0.1	Document Created
08/24/2016	0.2	Initial Review

Federal Communication Commission Interference Statement

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 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.

FCC Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter.

This End equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following:

“Contains FCC ID: 2AFZI-AVI1010”.

Manual Information to the End User
The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

Canada Statement

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Caution Exposure:

This device meets the exemption from the routine evaluation limits in section 2.5 of RSS102 and users can obtain Canadian information on RF exposure and compliance.
Le dispositif répond à l'exemption des limites d'évaluation de routine dans la section 2.5 de RSS102 et les utilisateurs peuvent obtenir des renseignements canadiens sur l'exposition aux RF et le respect.

The final end product must be labelled in a visible area with the following:
The Industry Canada certification label of a module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the Industry Canada certification number of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:
Contains transmitter module IC: 20544-AVI1010

This End equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

The end user manual shall include all required regulatory information/warning as show in this manual.