

# **ARIA X2**

## **Module Integration Guide**

Version 1.0.0

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# TABLE OF CONTENTS

OVERVIEW ..... 1

FEATURES..... 1

MECHANICAL SPECIFICATIONS ..... 2

PAD SIGNALS AND ASSIGNMENT ..... 3

DESIGNING ARIA X2 INTO END APPLICATION ..... 4

PROGRAMMING ..... 5

REFLOW PROFILE AND CLEANING ..... 8

PACKAGING..... 8

REGULATORY TESTING AND CONFIGURATION ..... 9

REGULATORY STATEMENTS ..... 9

REVISION HISTORY ..... 15

# OVERVIEW

The Aria X2 is a Cortex-M4 based radio module using the EFR32MG12 microcontroller from Silicon Labs. The Aria X2 is capable of sending and receiving DMX data over proprietary wireless 802.15.4, as well as sending and receiving configuration commands and firmware updates over BLE.

## FEATURES

Low energy consumption

- 70  $\mu$ A/MHz in Active Mode (EM0)
- 1.5  $\mu$ A EM2 DeepSleep current
- Supply voltage: 1.8V to 3.8V

High Performance 32-bit 40 MHz ARM Cortex®-M4 with DSP instruction and floating-point unit for efficient signal processing

- 1024kB Flash memory
- 256kB RAM
- 2.4 GHz and Sub-GHz radio operation
- Transmit power:
  - 2.4 GHz radio: Up to 19 dBm
  - Sub-GHz radio: Up to 20 dBm

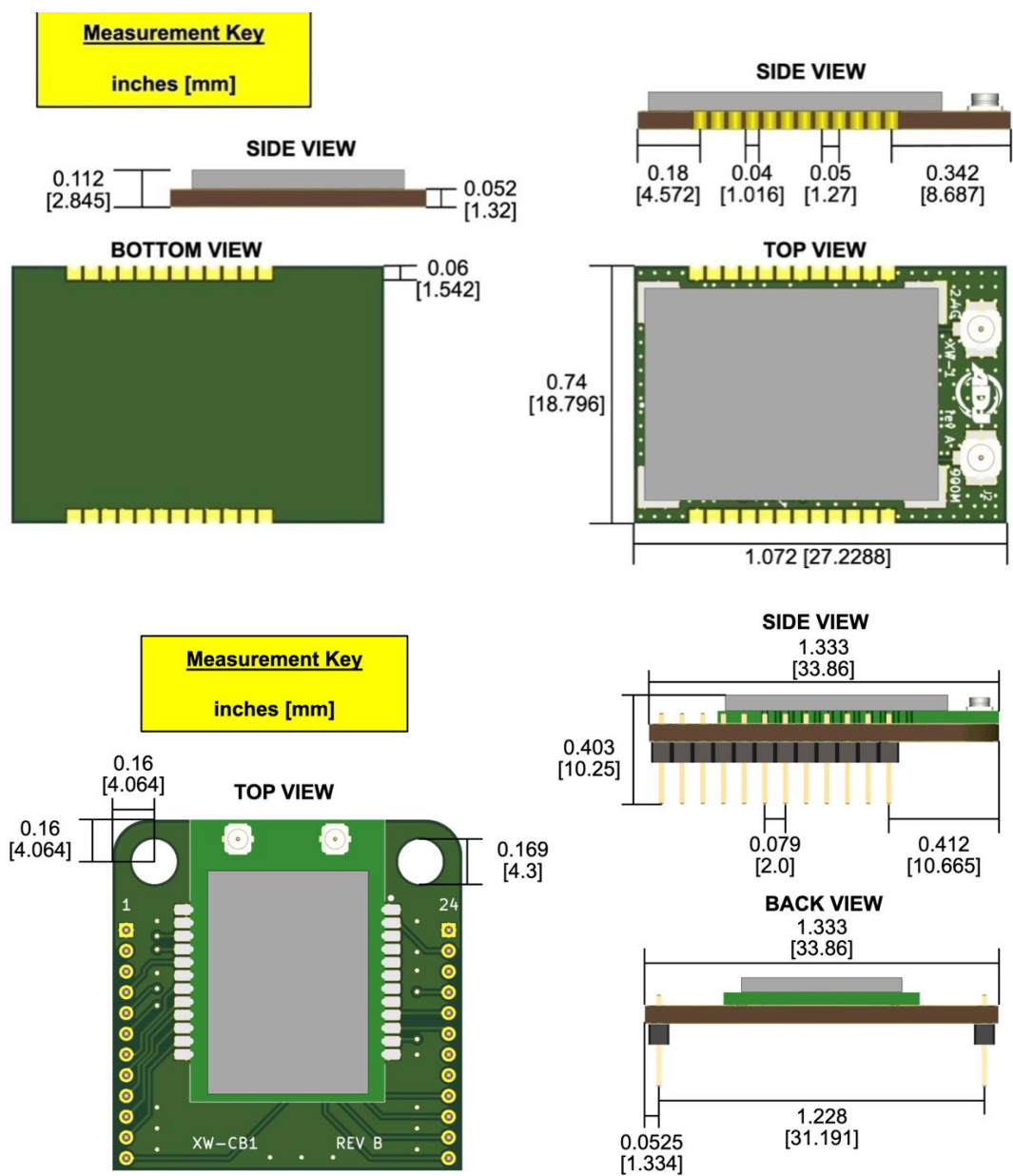
Up to 28 GPIO

Easy integration

- Carrier board fits a Synapse RF220UF1 socket
- Capable of Over-The-Air (OTA) firmware updates using BLE

# MECHANICAL SPECIFICATIONS

Module Dimensions	27.22 x 18.79 x 2.8 mm
Carrier Board	33.86 x 33.86 x 10.25 mm



## ANTENNA

This product has one external antenna. The antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

No.	Antenna Type	Frequency Range	Gain	Impedance
1	Stubby Antenna	2400-2500MHz	0dBi	50ohm
2	Stubby Antenna	863-928MHz	0dBi	50ohm



2.4-2.5GHZ

主要技术指标		Main technical specifications	
频率范围 (MHZ)	2400-2500	Frequency Range (MHZ)	2400-2500
特性阻抗( $\Omega$ )	50	Impedance( $\Omega$ )	50
增益(dBi)	>0	Gain(dBi)	>0
输出电压 驻波比	$\leq 2.5$	VSWR	$\leq 2.5$
最大功率	50W	Admitted Power	50W
极化方式	垂直极化	Polarization	Linear,Vertical
连接方式	SMAJ-J	Connector Type	SMAJ-J
物理性能		Physical Properties	
天线本体材料	ABS	Antenna Base	ABS

天线尺寸	Φ9.8*28mm	Antenna Dimension	Φ9.8*28mm
工作温度	-30℃~+75℃	Operating Temp	-30℃~+75℃
保存温度	-30℃~+75℃	Storage Temp	-30℃~+75℃

**863-928MHZ**

主要技术指标		Main technical specifications	
频率范围 (MHZ)	863-928	Frequency Range (MHZ)	863-928
特性阻抗(Ω)	50	Impedance(Ω)	50
增益(dBi)	>0	Gain(dBi)	>0
输出电压 驻波比	≤2.5	VSWR	≤2.5
最大功率	50W	Admitted Power	50W
极化方式	垂直极化	Polarization	Linear,Vertical
连接方式	SMAJ-J	Connector Type	SMAJ-J
物理性能		Physical Properties	

天线本体材料	ABS	Antenna Base	ABS
天线尺寸	Φ9.8*28mm	Antenna Dimension	Φ9.8*28mm
工作温度	-30℃~+75℃	Operating Temp	-30℃~+75℃
保存温度	-30℃~+75℃	Storage Temp	-30℃~+75℃

## PIN SIGNALS AND ASSIGNMENT

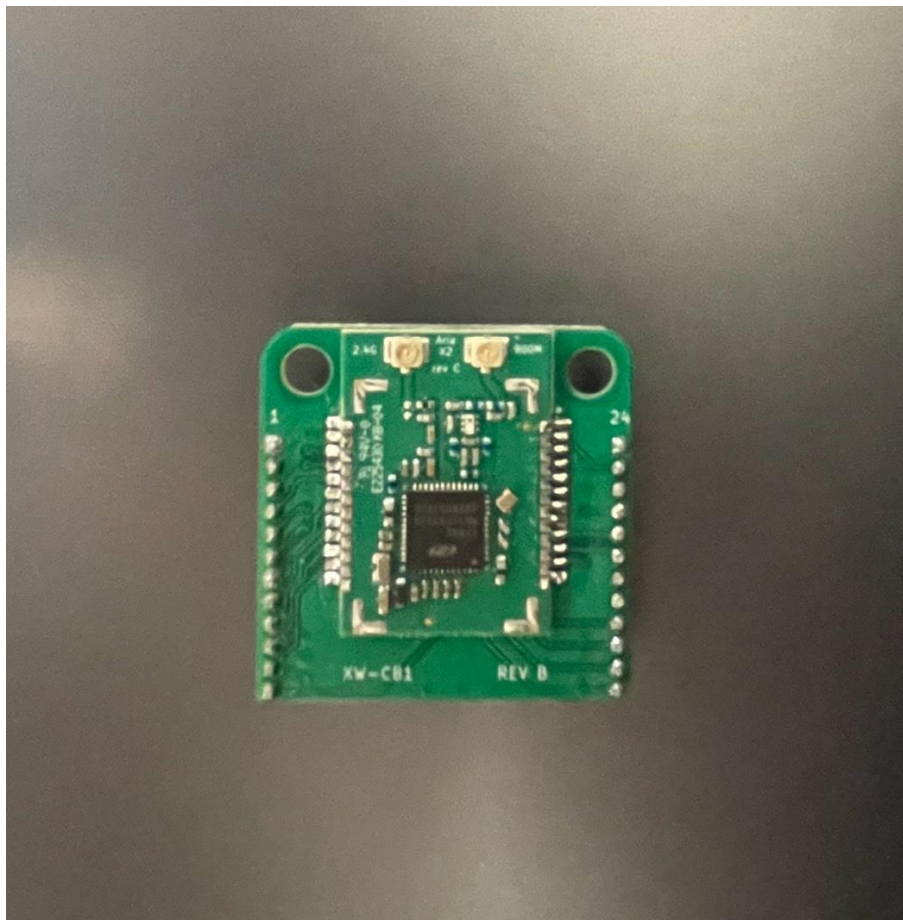
Pin #	Name	Description
1	GND	Ground input
2	GND	Ground input
3	GPIO	Unused
4	COMM_RX	Incoming serial communication from external MCU
5	COMM_TX	Outgoing serial communication to external MCU
6	GND	Ground input
7	GPIO	Unused
8	GPIO	Unused
9	DMX_RX	Incoming DMX signal
10	DMX_TX	Outgoing DMX signal
11	DMX_CTS	Clear-to-Send, asserted when ready to receive DMX data
12	GND	Ground input
13	GND	Ground input
14	VCC	Power input
15	GPIO	Unused
16	GPIO	Unused
17	GPIO	Unused
18	GPIO	Unused
19	GPIO	Unused
20	GPIO	Unused

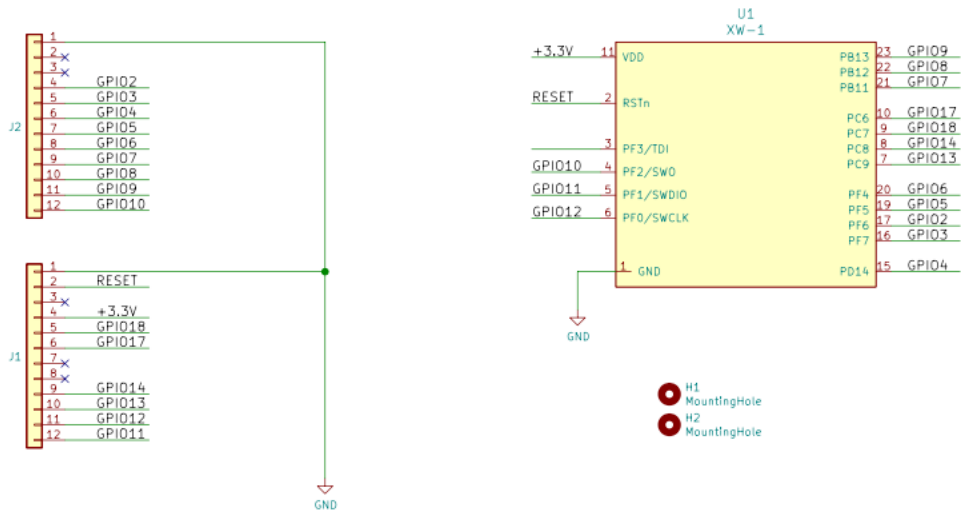


21	GPIO	Unused
22	GPIO	Unused
23	RESET_N	Reset (active low)
24	GND	Ground input

# DESIGNING ARIA X2 INTO END APPLICATION

The Aria X2 was designed to be implemented using a carrier board (XW-CB1) that fits a Synapse RF220UF1 socket.



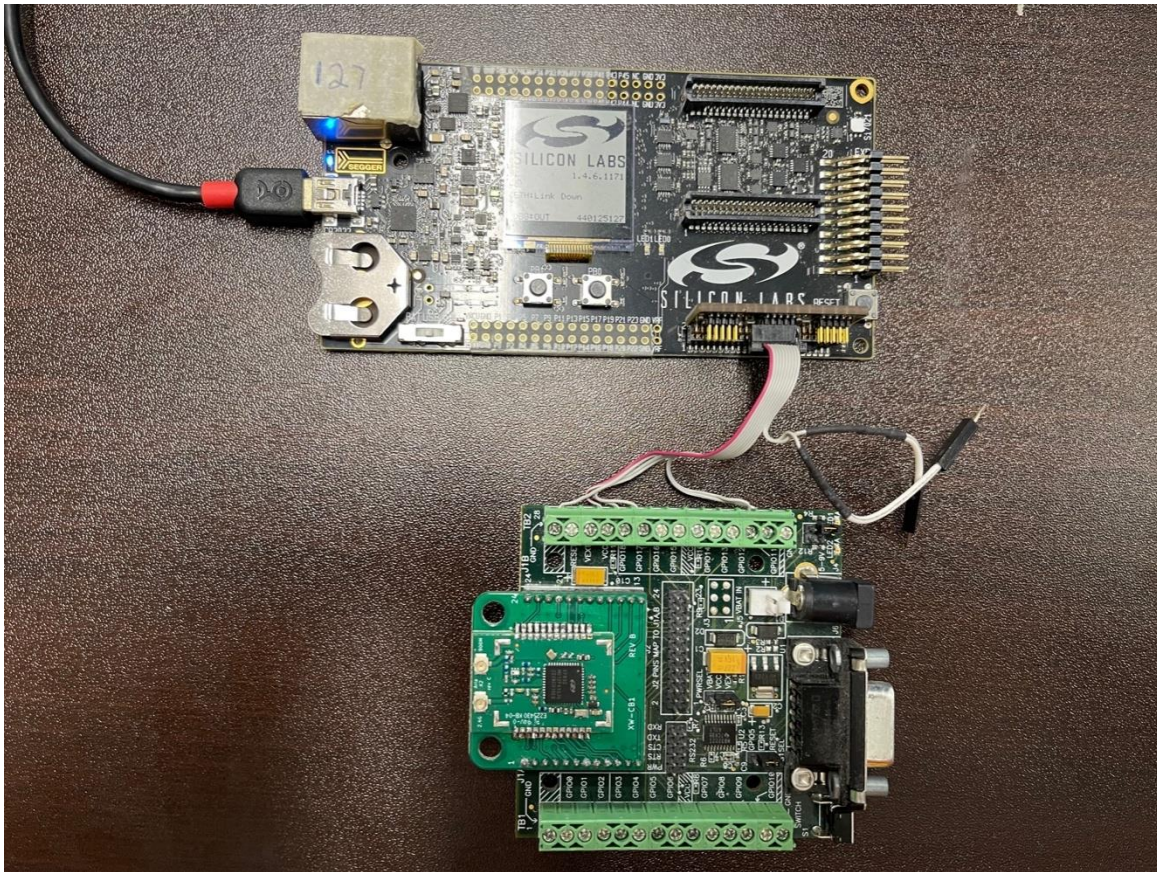


# PROGRAMMING

The Aria X2 can be programmed using a JTAG interface or over the air via BLE.

## PROGRAMMING VIA JTAG

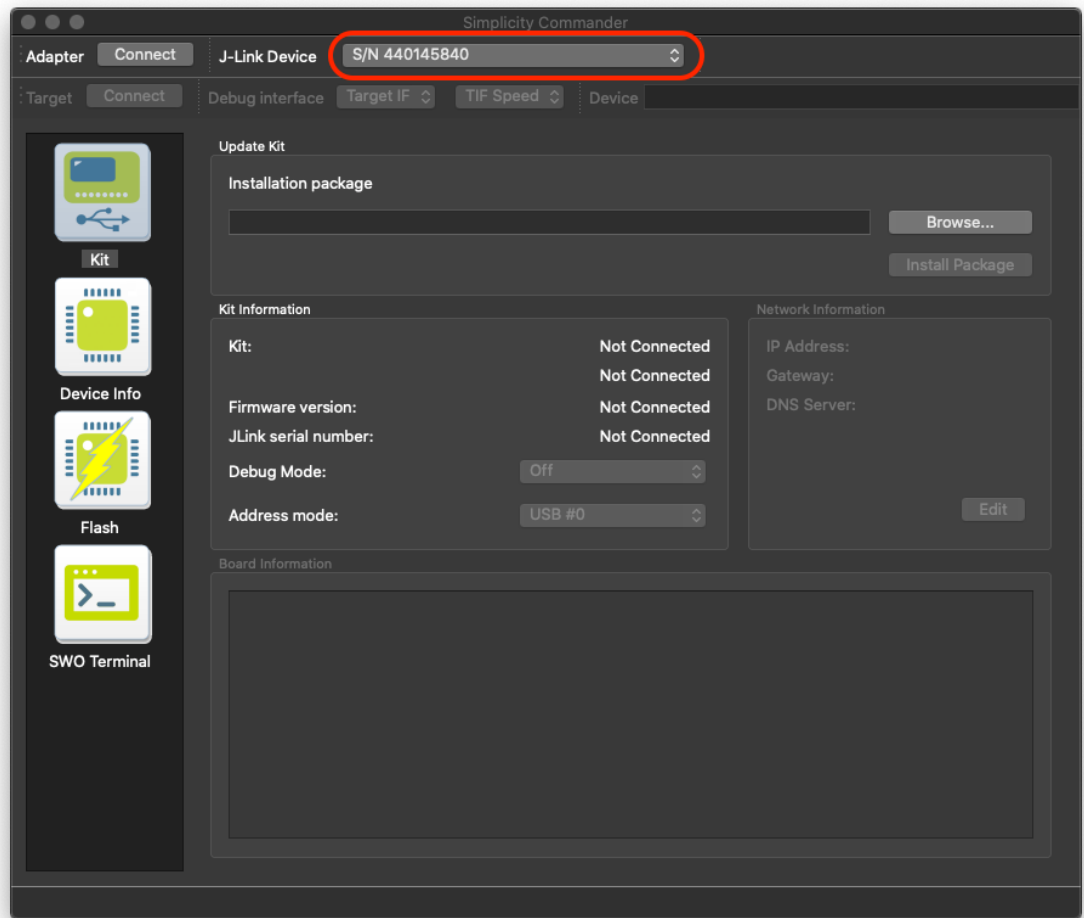
The process for reprogramming the wireless modules includes a Silabs development board with the necessary debug wires broken out (3.3V, GND, SWDIO, SWCLK). The wireless module's carrier board (XW-CB1) fits the Synapse RF220UF1's socket, so a breakout board from Synapse (500202.01A) is used to easily access the pins, as well as provide a reset button.



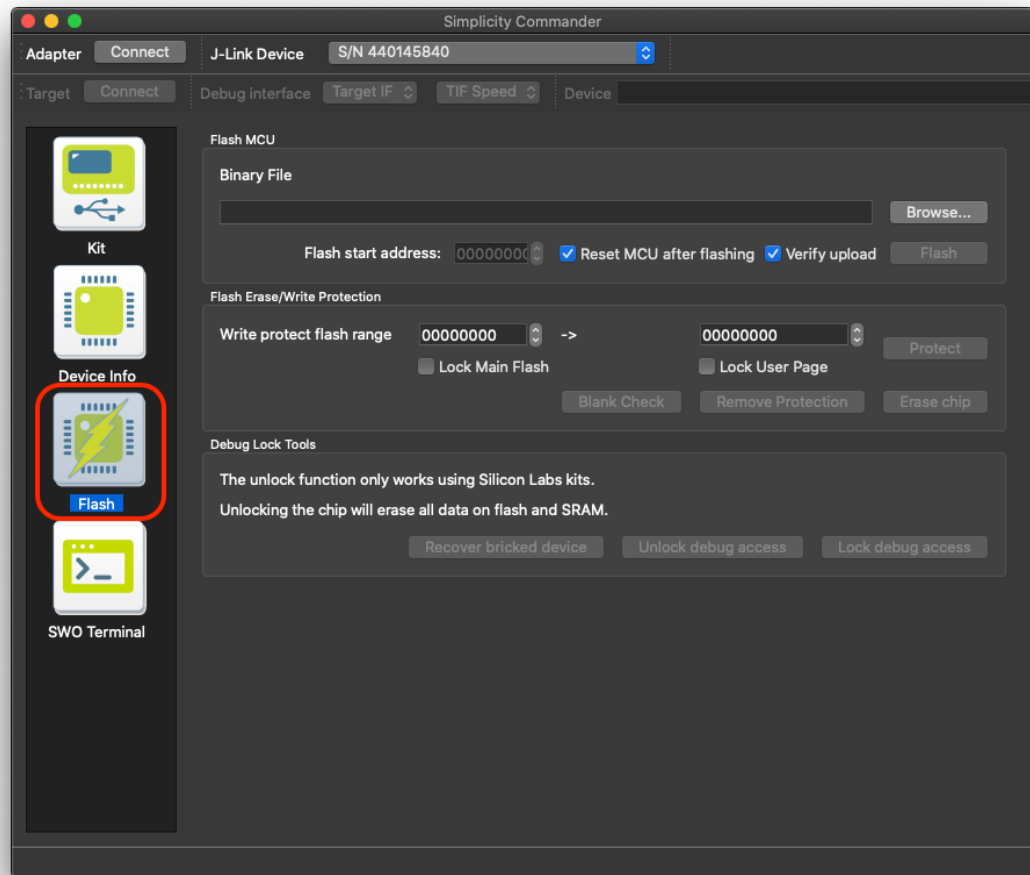
**Simplicity Commander** from Silicon Labs is used to flash the firmware onto the module.

1. Open up Simplicity Commander and connect the Silabs dev board to your PC's USB port. The board should be

automatically discovered by Commander.



2. Switch to the **Flash** tab.



3. **Browse** for the .s37 file to load onto the device.

4. Click **Flash** to program the device.

## PROGRAMMING VIA BLUETOOTH OTA DFU

The Aria X2 is capable of securely updating firmware via Over-The-Air Device Firmware Upgrade (OTA DFU), using signed and encrypted upgrade files in a custom GBL (Gecko Bootloader) format.

Before upgrading via OTA DFU, the encryption key and public key tokens must be flashed onto the device using **Simplicity Commander**.



# **CLEANING**

The use of “No Clean” paste is recommended as it does not require a wash phase after reflow. Washing a final assembly that uses the Aria X2 is not recommended as water may be captured under the module and/or RF shield causing part degradation.

# **PACKAGING**

The Aria X2 and the accompanying XW-CB1 carrier board each come in sheets of 20pcs.

# REGULATOR TESTING AND CONFIGURATION

If necessary, the Aria X2 module can be configured for host product evaluation for different operational conditions. In other words, if Aria X2 is implemented into a host system that needs secondary certifications the Aria X2 can be loaded with test firmware to put the radio into different constant transmission or reception states to verify the end device does not emit spurious emissions caused by the Aria X2.

## REGULATORY STATEMENTS

### FCC Statements

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.

Cet appareil est conforme à la section 15 des réglementations de la FCC. Le fonctionnement de l'appareil est sujet aux deux conditions suivantes:

1. cet appareil ne doit pas provoquer d'interférences néfastes, et
2. cet appareil doit tolérer les interférences reçues, y compris celles qui risquent de provoquer un fonctionnement indésirable.

**Note:** This product 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 product 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 product 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.

**Warning:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### **FCC Radiation Exposure Statement**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

### **FCC Modular Usage Statement**

**Note 1:** This module certified complies with RF exposure requirements under mobile or fixed condition; this module is to be installed only in mobile or fixed applications.

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the



body of the user or nearby persons. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

A fixed device is defined as a device is physically secured at one location and is not able to be easily moved to another location.

**Note 2:** Host product manufacturers must provide in their user manual the required RF exposure information for mobile & fixed usage of this module. Host product manufacturers must use the following RF exposure statement in their user manual "This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and all persons. This transmitter must not be co-location or operating in conjunction with any other antenna or transmitter."

**Note 3:** Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user shall have no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

**Note 4:** Additional testing and certification may be necessary when multiple modules are used.

**Note 5:** The module may be operated only with the stubby antenna with which it is authorized.

**Note 6:** To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Supplier's Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible

for ensuring that the after the module is installed and operational the host continues to be compliant with the part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, the manufacturer shall provide guidance to the host manufacturer for compliance with the part 15B requirements.

**Note 7:** The FCC ID label on the final system must be labeled with "Contains FCC ID: 2AVDP-ARI002"

**Note 8:** The FCC rule/s for this module are CFR 47 Part 15 Subpart C.

**Note 9:** This modular transmitter is only FCC authorized for the specific rule parts listed on its grant. The host product manufacturer is responsible to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product will require Part 15 Subpart B compliance when the modular transmitter is installed.

### **ISED Statements**

This device complies with Innovation, Science and Economic Development Canada's license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept and interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement Économique 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.

Under Innovation, Science and Economic Development Canada's regulations, this radio transmitter may only operate using the integral antenna under which it was approved.

Conformément à la réglementation d'Innovation, Sciences et Développement Économique Canada, le présent émetteur radio peut fonctionner avec une antenne fonctionnelle qu'en utilisant l'antenne intégrée sous laquelle il a été approuvé.

### **ISED RF Exposure Statement**

This equipment complies with ISED 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. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Le rayonnement de la classe B respecte ISED fixant un environnement non contrôlé. Installation et mise en œuvre de ce matériel devrait avec échangeur distance minimale entre 20 cm de ton corps. Lanceurs ou ne peuvent pas coexister cette antenne ou capteurs avec d'autres.

### **ISED Modular Usage Statement**

**NOTE 1:** When the ISED certification 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. This exterior label can use the wording "Contains transmitter module IC: 28121-ARI002" or "Contains IC: 28121-ARI002".

**NOTE 1:** Lorsque le numéro de certification ISED n'est pas visible lorsque le module est installé dans un autre appareil, l'extérieur de l'appareil dans lequel le module est installé doit également afficher une étiquette faisant référence au module inclus.

Cette étiquette extérieure peut être libellée Contient le module émetteur  
IC: 28121-ARI002 ou Contient IC: 28121-ARI002.

# REVISION HISTORY

REVISION	DATE	DESCRIPTION
1.0.0	May 16, 2023	Initial Release