

WISA TECHNOLOGIES Inc.
Model No.: 444-2311
FCC ID: 2BF3Q-2311

USER MANUAL

Revision History

Rev. No.	History	Issue Date	Remarks
1.0	Draft Release	5/22/2024	Pending FCC Grant
1.1	Add OEM and Warning Statements	6/17/2024	
1.2	Added statements, changed Art Signal antenna gain	6/17/2024	
1.3	Modified Band Plan, Art Signal antenna gain	8/5/2024	
1.4	Added Max Power and Directional Gain Tables	8/8/2024	

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1. Introduction:

The 444-2311 WiSA E Transceiver Module features up to eight independent channels of HD audio, WiSA E transmits and receives uncompressed 24-bit 48 kHz sound over a 5 GHz Wi-Fi network it creates. This module is based on the RTL8730EAH SoC.

Its Core Applications are

- HDTVs
- Soundbars
- TV audio expansion
- Soundbar system expansion

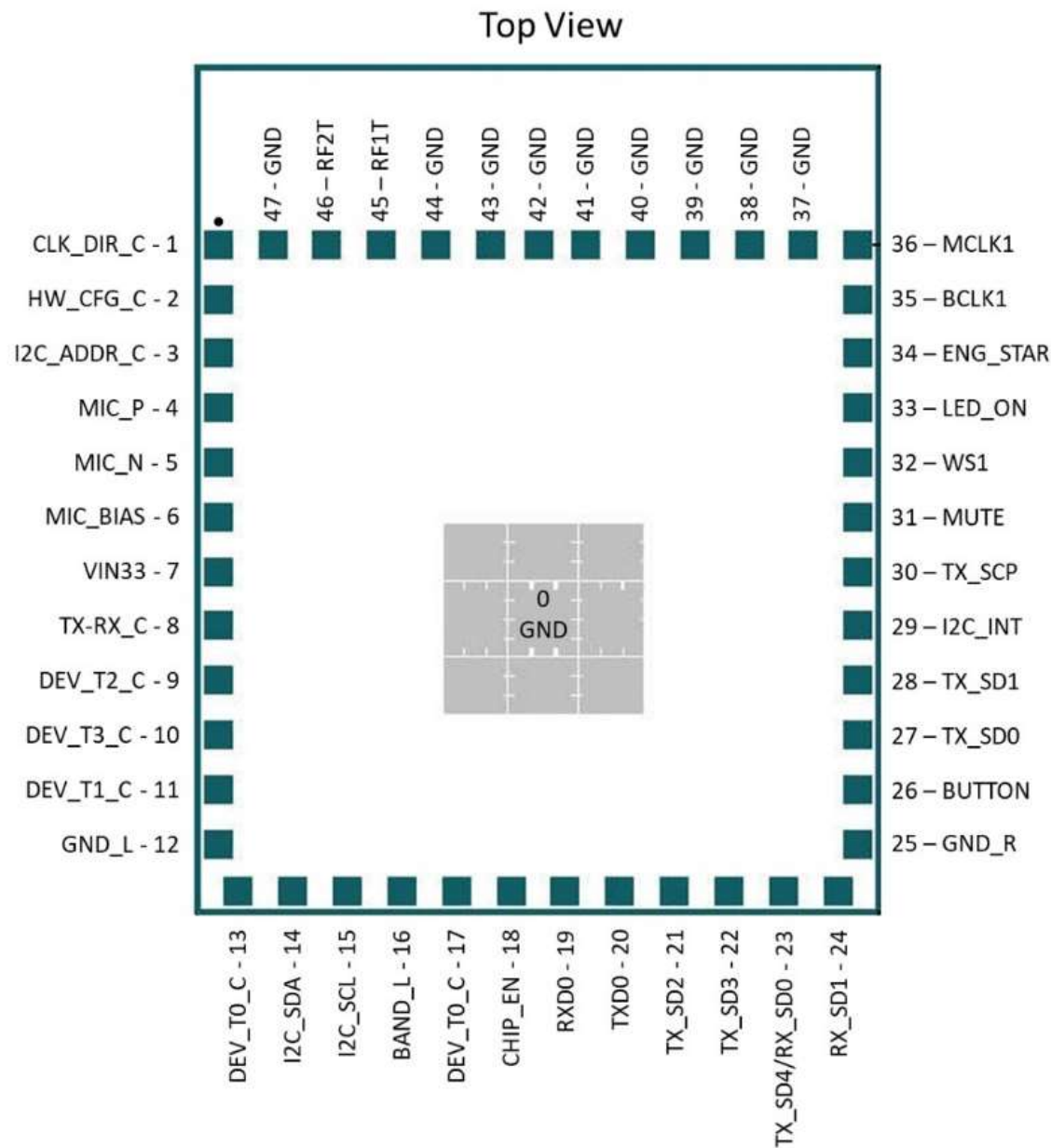
The module contains all the necessary radio transceiver and digital baseband circuitry to form a complete digital wireless node without the need for external processing. The module can operate in UNII-1, UNII-3, and UNII-4 bands of the 5 GHz spectrum, enabling worldwide coverage.

The module contains all the necessary power management and analog circuitry needed to operate the chip. The chip is powered from a +3.3 V supply input and generates all its internal core voltages. The RF section and wireless protocol of this module has been certified globally, including North America, Europe, China, Japan, and Korea.

Features:

- Eight maximum number of independent audio channels (1)
- Uncompressed 24-bit 48 kHz sound
- Signal latency: 20 milliseconds transport latency
- Channel synchronization: ± 1 audio sample at 48 kHz sample rate
- Dual U.FL diversity antennas for multipath and fading mitigations
- Energy Star capable
- Product Size (mm): 25.0 (W) X 31.0 (L) X 2.8 (H)

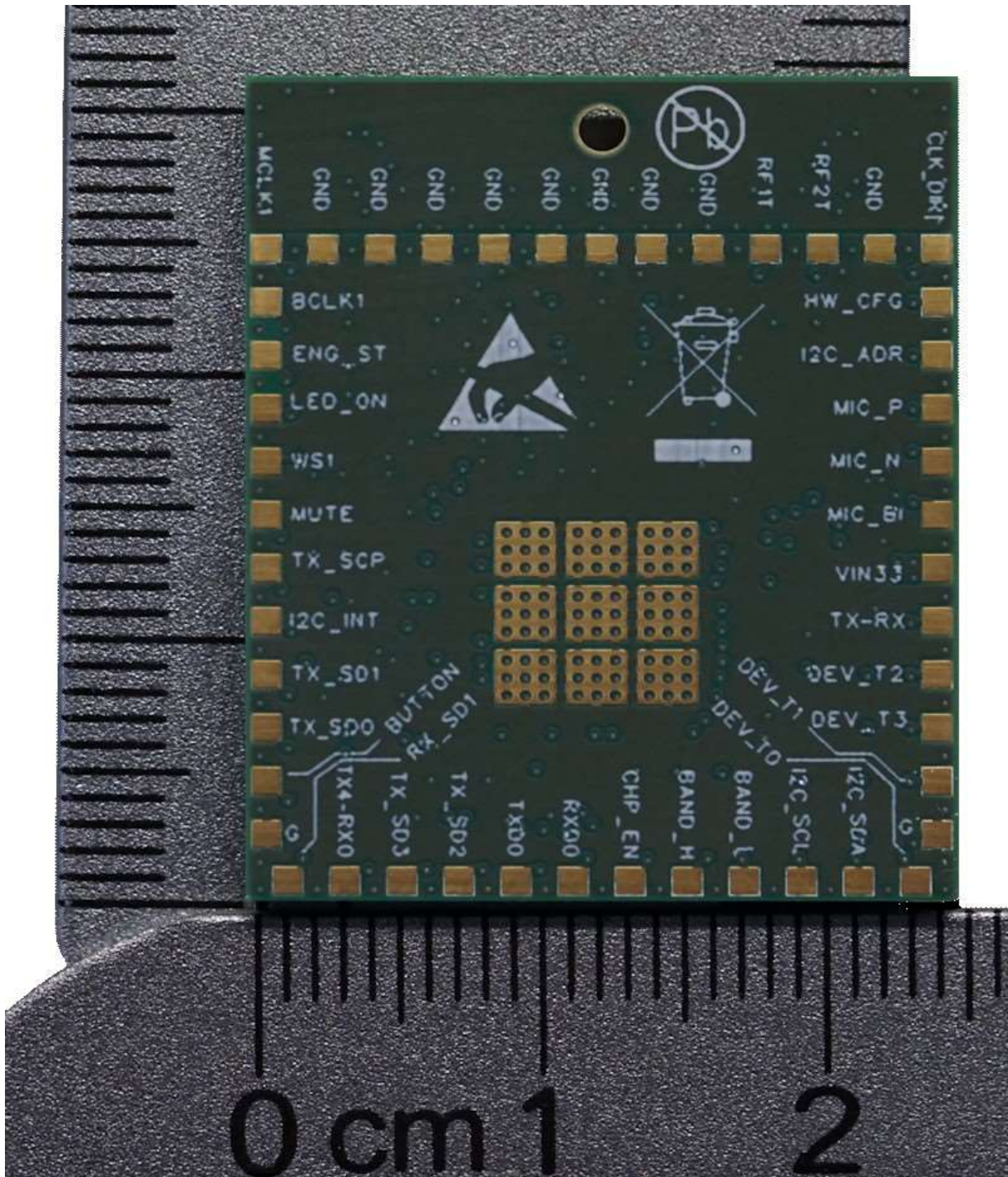
Note (1): The subwoofer channel can be repeated up to four times.



FRONT SIDE



BACK SIDE



2. User Manual Regulatory Statements

FCC

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.

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.

This device is restricted to indoor use.

This equipment complies with FCC 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.

ISED

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'émetteur/récepteur exempt de licence contenu dans 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;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
Les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux

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.
Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20cm de distance entre la source de rayonnement et votre corps

The transmitter module may not be co-located with any other transmitter or antenna.
Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne

This module is intended for OEM integrators under the following conditions:

The OEM or integrator is obligated to adhere to these requirements and restrictions as a condition for using the module's certification. The OEM or integrator is responsible to perform the required additional host regulatory testing and/or obtaining the required host approvals for compliance.

1. List of applicable rules

This module is certified pursuant to Part 15 rules section 15.407 and RSS-247.

2. Antenna

This module has been approved to operate with the antenna types listed below, with the maximum permissible gain indicated.

Manufacture	Part Number	Peak Antenna Gain		
		UNII-1 and UNII-2A	Low UNII-2C	High UNII-2C and UNII-3/4
		5.15-5.35 GHz	5.45-5.65 GHz	5.65-5.90 GHz
Antenova	SRF2W012	4.0 dBi	4.0 dBi	4.0 dBi
Art Signal	ARTS-RWPM-321	6.37 dBi	5.94 dBi	5.13 dBi

Manufacture	Part Number	Directional Gain		
		UNII-1 and UNII-2A	Low UNII-2C	High UNII-2C and UNII-3/4
		5.15-5.35 GHz	5.45-5.65 GHz	5.65-5.90 GHz
Antenova	SRF2W012	4.0 dBi	4.0 dBi	4.0 dBi
Art Signal	ARTS-RWPM-321 (Notes 1,2)	5.37 dBi	4.94 dBi	4.13 dBi

Note 1: Directional Gain = Peak Gain – Cable Loss

Note 2: Cable Loss = 1dB

Table 1: Antenna List including cables

3. Label and compliance information

FCC

The host product must be labeled in a visible area with the following " Contains FCC ID: 2BF3Q-2311 ".

The end product shall bear the following 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.

ISED

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains transmitter module IC: IC: 9129A-2311”.

Contient le module d'émission IC: IC: 9129A-2311

The Host Model Number (HMN) must be indicated at any location on the exterior of the end product or product packaging or product literature which shall be available with the end product or online.

4. Information on test modes and additional testing requirements

This module is restricted to integration into hosts for indoor use only.

This module has been approved under stand-alone configuration.

The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093/RSS-102 and different antenna configurations

The information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host can be found at KDB Publication 996369 D04.

OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.) OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the IC authorization is no longer considered valid and the IC No. cannot 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 IC authorization.

5. Additional testing, Part 15 Subpart B disclaimer

Appropriate measurements (e.g. 15 B compliance) and if applicable additional equipment authorizations (e.g. SDoC) of the host product to be addressed by the integrator/manufacturer.

This module is only FCC/ISED authorized for the specific rule part 15.407/RSS-247 listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC/ISED rules that apply to the host product as being Part 15 Subpart B/ICES-003 compliant.

6. Note EMI Considerations

Note that a host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties

For standalone mode, reference the guidance in D04 Module Integration Guide and for simultaneous mode; see D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.

7. How to make changes

If any changes or modifications need to be made to the integrated product, such as adding or adjusting the antenna or cable, follow the guidelines provided by Grantee.

For further assistance, please contact:

WiSA Technologies Inc.

15268 NW Greenbrier Parkway
Beaverton, OR 97006
+1(866) 668-0116

8. The user manual of the end product should include (information for OEMs)

The module must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Information To Be Supplied to the End User by the OEM or Integrator FCC

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

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least **20 cm** from all persons.

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.

The antenna(s) used for this transmitter must not transmit simultaneously with any other antenna or transmitter.

This module cannot be installed into a host with a weatherized enclosure.

The host must be powered from a wired permanent indoor local power connection, battery powered is not allowed.

The host must bear a statement in a conspicuous location on the device and the user's manual: "FCC regulations restrict the operation of this device to indoor use only."

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

ISED

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'émetteur/récepteur exempt de licence contenu dans 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;

2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux

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.
Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20cm de distance entre la source de rayonnement et votre corps

The transmitter module may not be co-located with any other transmitter or antenna.
Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

NCC

【使用手冊】應包含「取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。」

Without permission granted by the NCC, any company, enterprise, or user is not allowed to change frequency, enhance transmitting power or alter original characteristic as well as performance to a approved low power radio-frequency devices. The low power radio-frequency devices shall not influence aircraft security and interfere legal communications; If found, the user shall cease operating immediately until no interference is achieved. The said legal communications means radio communications is operated in compliance with the Telecommunications Management Act. The low power radio-frequency devices must be susceptible with the interference from legal communications or ISM radio wave radiated devices.

本公司於說明書中提供所有必要資訊以指導使用者/安裝者正確的安裝及操作

應避免影響附近雷達系統之操作

EU/UK

Model No. 444-2311
www.wisatechnologies.com

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15268 NW Greenbrier Parkway
Beaverton, OR 97006 USA
TEL (503) 615 7700
FAX: (503) 615 4432

- i. This equipment should be installed and operated with minimum distance **20cm** between the radiator & your body.
- ii. The device is restricted to indoor use only when operating in the 5150-5350 MHz frequency ranges in the following countries:

	AT	BE	BG	HR	CY	CZ	DK
	EE	FI	FR	DE	EL	HU	IE
	IT	LV	LT	LU	MT	NL	PL
	PT	RO	SK	SI	ES	SE	UK

3. Frequency Bands

The 444-2311 is capable of operating worldwide.

	UNII-1 Channels				UNII-2 Channels																UNII-3 Channels					UNII-4 Chan			
Country	3 6	4 0	4 4	4 8	5 2	5 6	6 0	6 4	1 0 0	1 0 4	1 0 8	1 1 2	1 1 6	1 2 0	1 2 4	1 2 8	1 3 2	1 3 6	1 4 0	1 4 4	1 4 9	1 5 3	1 5 7	1 6 1	1 6 5	1 6 9	1 7 3	1 7 7	
USA	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓
EU (ETSI)	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		✓	✓	✓	✓	✓	✓	✓	
UK	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		✓	✓	✓	✓	✓	✓	✓	
Korea	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	✓	✓	✓	✓	✓			
Japan	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Australia	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X				X	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓	
Canada	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X				X	X	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
Taiwan	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	✓	✓	✓	✓	✓				
China	✓	✓	✓	✓	X	X	X	X													✓	✓	✓	✓	✓				
Singapore	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	✓	✓	✓	✓	✓				
Mexico	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	✓	✓	✓	✓	✓				
Brazil	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	✓	✓	✓	✓	✓				
Legend:					DFS Channels				X	Non-DFS Channels				✓															

Table 2: DFS and Non-DFS Channels Vs Country

4. Maximum Transmit Power

Compliance with 2014/53/EU Radio Equipment Directive (RED)

In accordance with Article 10.8(a) and 10.8(b) of the RED, the following table provides information on the frequency bands used and the maximum RF transmit power of the product for sale in the EU:

Frequency Range (MHz)	Maximum Output (dBm/mW)
5150 - 5250	20.67 dBm (117 mW)
5250 - 5350	20.67 dBm (117 mW)
5470 - 5725	20.54 dBm (113 mW)
5725 - 5835	13.2 dBm (20.9 mW)
5835 - 5875	13.2 dBm (20.9 mW)

Table 2: Maximum Transmit Power

The maximum possible output transmit power is +20.67 dBm EIRP.

5. OEM Operating Environment

Operating Temperature: 0 to 70C at printed circuit board (PCB) ambient

Storage Temperature: -40 to 100C PCB ambient

6. OEM Operating Instructions

The client module accepts one channel of 24-bit uncompressed digital audio at sample rates of 48 KHz.

Operating instructions at the electrical I/O and software interface level are not relevant to the end user and are proprietary in nature. The end user should not have understanding of how to manipulate the transmitter at this level.