

S2022EU3

5G Long Range RF Module Specification



Module Name: S2022EU3	
Module Type: 5G High Power Long Range Module	
Revision: V0.1	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
Approval:	
Title:	
Signature:	Date:

Revision History

Revision	Summary	Release Date	Revised By
0.1	Initial release	2025-10-20	
0.2	Photo and package update	2026-01-26	
0.3	Update channel lists	2026-05-17	

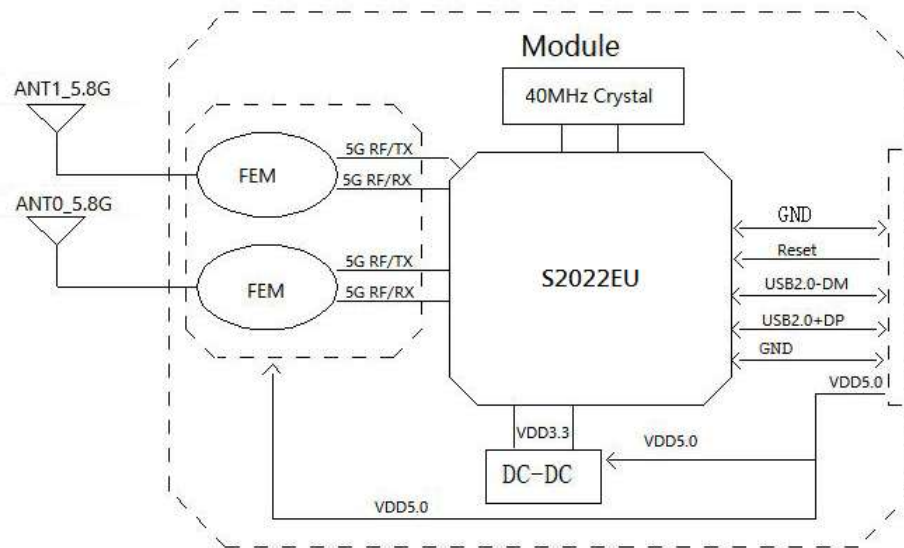
Introduction

The S2022EU3 is a high-power single band RF module for the world wide 5150–5250 MHz , 5725–5850 MHz and 5850–5895 MHz ISM band. The module supported adaptive channel hopping system and supported 2x2 multi-antenna on the 5G band. The S2022EU3 module offers feature-rich wireless connectivity and reliable throughput from an extended distance at different kinds of work environment. This module is idea for use on UAVs application.

1.1 Features

- OFDM wireless module
- Operating Frequencies : 5150–5250 MHz , 5725–5850 MHz and 5850–5895 MHz
- Host Interface is USB2.0
- Wireless data rate can reach up to throughput for long range video application
- Connect to external antenna through IPEX connectors
- Power Supply: VBAT 5V±0.25V power supply.

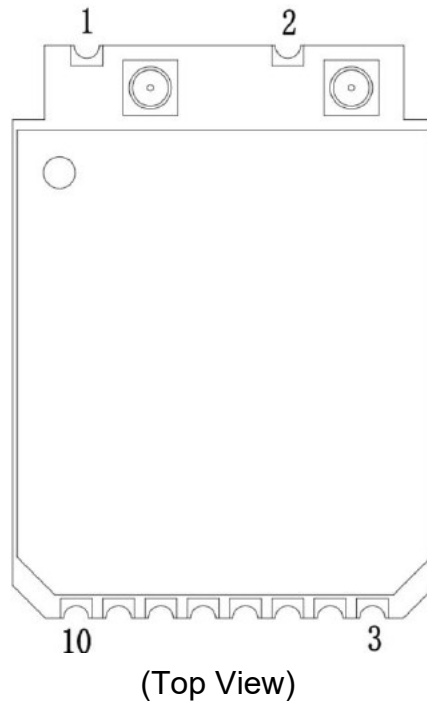
1.2 Block Diagram



1.3 General Specifications

Module Name	S2022EU3
Chipset	S2022EU
Frequency Range	5150–5250 MHz , 5725–5850 MHz and 5850–5895 MHz
Modulation/Demodulati	BPSK,QPSK,16QAM,64QAM,256QAM
RF data rate	Up to 54Mbps
Host Interface	USB 2.0
RF Impedance	50Ω
Antenna	Connect to external antenna through IPEX connectors
Rx Sensitivity	Rx Sensitivity -95dBm (Min)
Dimension	27.0*20.0*3.4mm (L*W*H)
Storage Temperature	-20°C to +70°C
Storage Humidity	10% to 95% RH (Non-Condensing)

2. Pin Assignments



Pin Definition

No	Pin Name	Type	Description
1	GND	P	Ground connections
2	GND	P	Ground connections
3	GND	P	Ground connections
4	VDD5.0	P	DC 5.0V power supply
5	VDD5.0	P	DC 5.0V power supply
6	RESET	I	Reset input, this Pin can externally shutdown/reset the Module, Active Low, internal pull high by 47K resistor
7	GND	P	GND
8	USB2.0_DM	AI/O	USB Transmitter/Receiver Differential Pair
9	USB2.0_DP	AI/O	USB Transmitter/Receiver Differential Pair
10	GND	P	Ground connections
	J0	RF	5G RF to IPEX connector for ANT0
	J1	RF	5G RF to IPEX connector for ANT1

P:Power, I:Input, O:Output, I/O:In/Output, RF: Analog RF Port A I/O: Analog In/Output; AI: Analog Input; AO: Analog Output;

3. Electrical and Thermal Specifications

3.1 Recommended Operating Conditions

Parameters		Min	Typical	Max	Units
Supply Voltage	VDD33	4.75	5	5.25	V
External Antenna			1.5	2	
Ambient		-20	25	70 °C	°C

Notes: * This module built-in high-power FEMs will generate more heat, in order to ensure the module work stably within rated temperature range, additional heat dissipation devices must be added by customers. Ensure that the junction temperature of module chipset is within rated value: $T_j < 125^{\circ}\text{C}$

3.2 Digital I/O DC Specifications

Symbol	Symbol Parameter	Min	Typ.	Max	Units
VIH	Input High Voltage	2.0	3.3	3.6	V
VIL	Input Low Voltage	--	0	0.9	V
VOH	Output High	2.97		3.3	V
VOL	Output Low Voltage			0.33	V

3.3 Current Consumption

Conditions : VDD5.0=5V ; Ta:25°C			
Use Case	VDD5.0 Current (Cont.TX mode)		
	Typ(I _{RMS})	Max(I _{Peak})	Unit
BPSK, TX @ 29dBm (one TX RF test)	759	976	mA
64QAM @ 24 dBm (one TX RF test)	420	780	mA
BPSK TX@28 dBm (Two TX RF test)	930	1510	mA
BPSK, RX (RX RF test)	215	250	mA

4. RF Specifications

4.1 5G RF Specification

Conditions : VDD5.0=5V ; Ta:25°C

Features	Description
Frequency Range	UNII-1 (5150–5250 MHz) UNII-3 (5725–5850 MHz) UNII-4 (5850–5895 MHz)
Channel Bandwidth	10MHz/20MHz/40MHz
Modulation	BPSK,QPSK,16QAM,64QAM,256QAM
Frequency Tolerance	$\leq \pm 20\text{ppm}$

Channel List : 5.15 – 5.25 GHz

10MHz		20MHz		40MHz	
Channel	MHz	Channel	MHz	Channel	MHz
36	5180	36	5180	42	5210
38	5190	40	5200		
40	5200	44	5220		
42	5210	48	5240		
44	5220				
46	5230				
48	5240				

Channel List 5.725 – 5.865 GHz

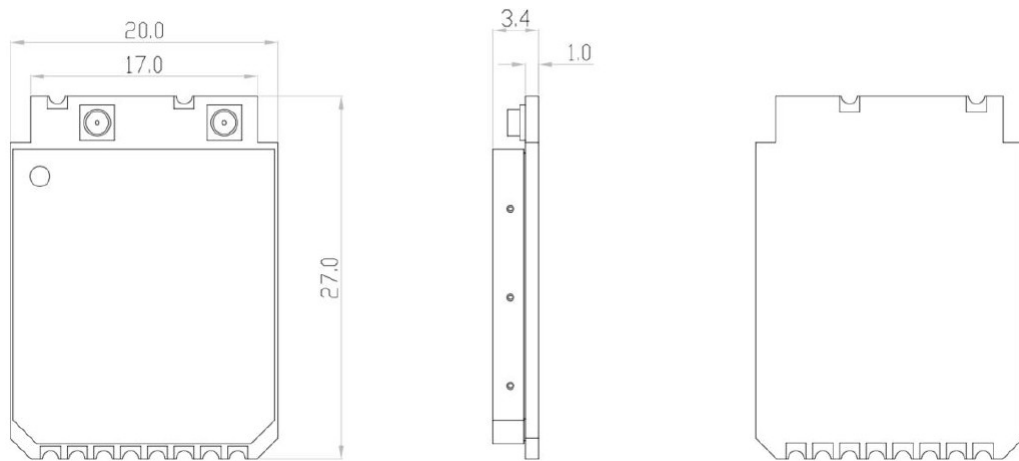
10MHz		20MHz		40MHz	
Channel	MHz	Channel	MHz	Channel	MHz
149	5745	149	5745	155	5775
151	5755	153	5765	163	5815
153	5765	157	5785		
155	5775	161	5805		
157	5785	165	5825		
159	5795	169	5845		
161	5805	173	5865		
163	5815				
165	5825				
167	5835				
169	5845				
171	5855				
173	5865				

4.2 5G Transmitter Specifications

TX Power & EVM (Typical)	29±3dBm& EVM< -15dB@BPSK 29±3dBm& EVM<-28dB@OFDM
RX Sensitivity Receiver Minimum Input @PER	BPSK:-95dBm@PER<10% OFDM:-76dBm@PER<10%

5. Mechanical Specifications

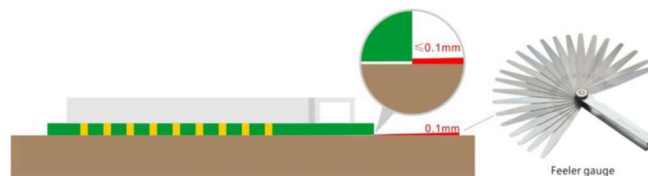
5.1 Module Outline Drawing



(Top view)

Module dimension: 27.0mm*20.0mm*3.4mm (L*W*H; Tolerance: $\pm 0.3\text{mm}_L/W$, $\pm 0.2\text{mm}_H$)

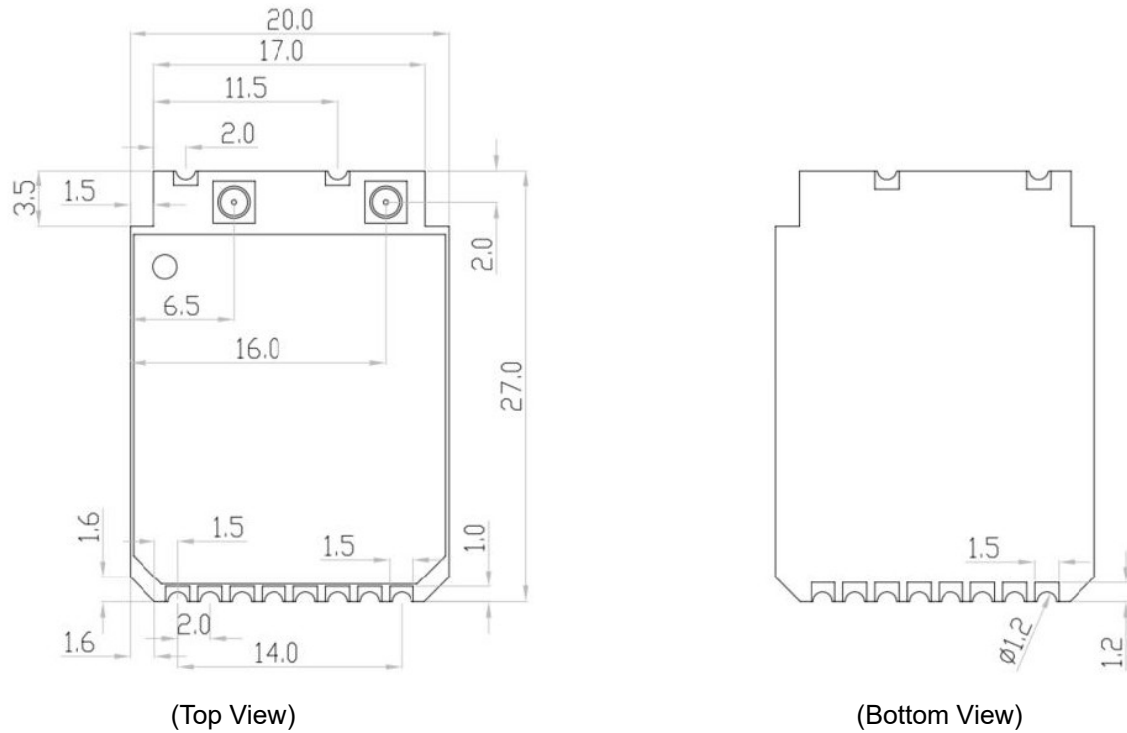
IPEX / MHF-1 connector dimension: 3.0*2.6*1.2mm (L*W*H, $\varnothing 2.0\text{mm}$)



Module Bow and Twist: $\leq 0.1\text{mm}$

5.2 Mechanical Dimension

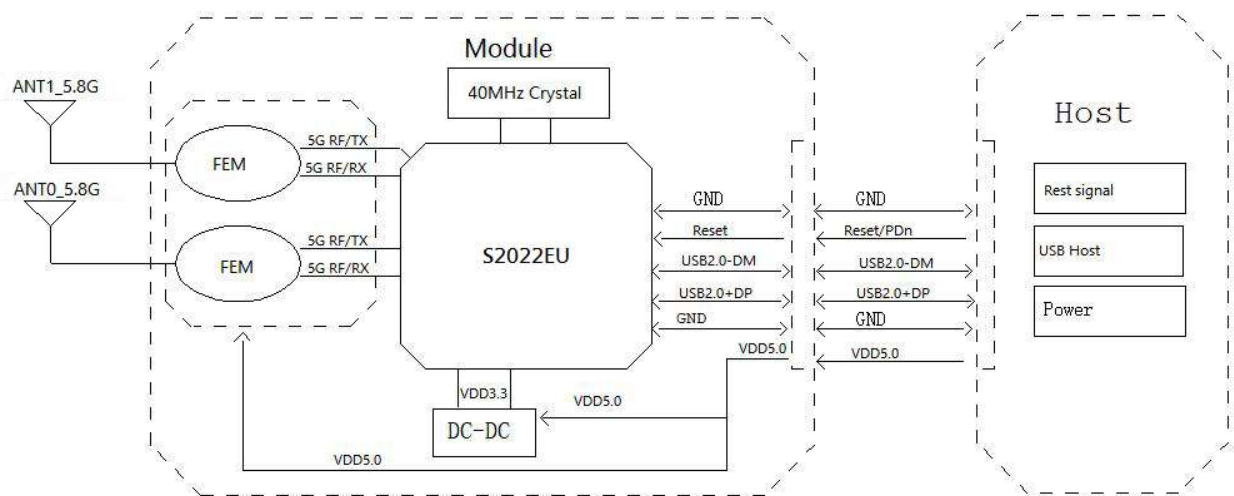
Mechanical Dimensions



Module dimension: Typical (L*W * H): 27.0mm*20.0mm*3.4mm Tolerance : +/-0.15mm (Design size: mm)

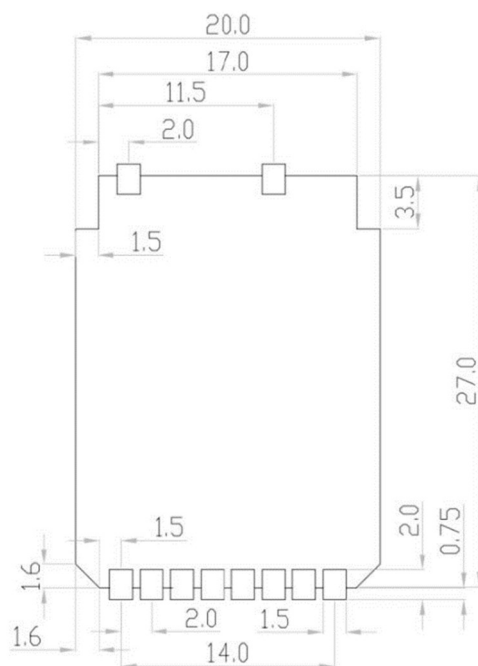
Application Information

5.3 Typical Application Circuit



(Design Units:mm)

5.4 Recommend PCT layout Footprint



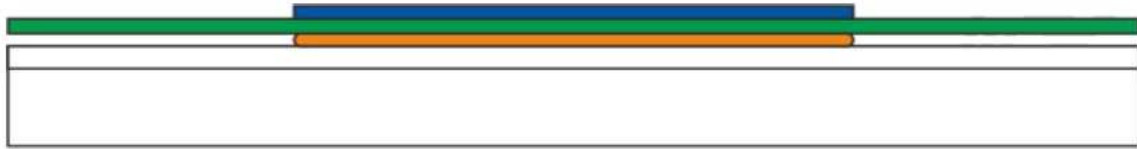
(Design Units:mm)

Notes: GND PAD area for heat dissipation are suggested at the bottom of module.

5.5 Thermal Dissipation

This module is designed to work on an extreme temperature range (-20°C to +70°C), to make sure the module can work properly for a long time, long range and achieve a better performance on conditions like maximum power or high data transmission. Recommended to add thermally conductive pad (thermal conductivity 4W/mK, thickness <1.5mm) between the heat-sink and solder mask area of module for full heat conduction.

The heat sink recommended size $\geq 27 \times 20$ mm, It is located directly below the module, gold-plated, The green area is Module place, The orange area is TCP (Thermal conductive silicone pad), The white area is aluminum-extruded heat-sink !



(Heat sink installed with Module)

Notes: For better heat dissipation, It is recommended to add fans to cooling.

Package and Storage Information

5.6 Package Dimensions



Package specification:

1. 60 modules per blister plate, and 1200 modules per box.
2. The blister is bound with wire membrane and put into anti-static vacuum bag.
3. Put 1 bag of dry beads (20g) and 1 PCS humidity card in each ant-static vacuum bag..
6. The outer box size is 35.2*21.5*15.5cm.

5.7 Label

Description: 5G RF module	
Model: S2022EU3	CE FCC
Input: DC 5V	RoHS
FCC ID: 2BMXW-S2022EU3	
Sonix Technology Co., Ltd.	

6.1 Storage Conditions

Absolute Maximum Ratings:

Storage temperature: -40°C to +85°C

Storage humidity: 10% to 95% RH (Non-Condensing)

Recommended Storage Conditions:

Storage temperature: 5°C to +40°C

Storage humidity: 20% to 90% RH

Please use this Module within 12month after vacuum-packaged.

The Module shall be stored without opening the packing.

After the packing opened, the Module shall be used within 72hours.

When the color of the humidity indicator in the packing changed, the Module shall be baked before soldering.

Baking condition : 60°C, 24hours, 1time.

ESD Sensitivity:

ESD Protection: 2KV(HBM, Maximum rating)

The Module is a static-sensitive electronic device.

Do not operate or store near strong electrostatic fields.

Take proper ESD precautions!



ESD CAUTION

The Module is designed to comply with the FCC statement. FCC ID is 2BMXW-S2022EU3. The host system using Module, should have label indicated it contain modular 's FCC ID: 2BMXW-S2022EU3. This radio module must not installed to collocate and operating simultaneously with other radios in host system additional testing and equipment authorization may be required to operating simultaneously with other radio.

The Module and its antenna must not be co-located or operating in conjunction with any other transmitter or antenna within a host device.

The modular must be installed in the host that assign by Company name: Sonix Technology Co., Ltd., Model no.: S2022EU3 if other host types used would need further evaluation and possible C2PC if they are not significantly similar to the one tested The WIFI Module is designed for a compact PCB design. It should be installed and operated with host or other minimum distance of 20 centimeters between the radiator and your body." To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed 0.5 dBi in the 5G. The module uses External antenna, the antennas are sold with the module.

Notice to OEM integrator

The end user manual shall include all required regulatory information/warning as show in this manual. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed. If the final product contains circuits of other FCC PART 15 Subparts, the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed The intended use is generally not for the general public. It is generally for industry/commercial use. The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required, the user has no access to the connector. Installation must be controlled. Installation requires special training.

This device complies with Part 15 of the FCC Rules.

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

2.2

This module has been assessed against the following FCC rule parts: CFR 47 FCC Part 15 E (NII). It is applicable to the modular transmitter.

2.3

This radio transmitter Module has been approved by Federal Communications Commission to operate with 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.

The concrete contents to check are the following three points.

- 1) Maximum antenna gains are shown in item 2.7 below.
- 2) Should be installed so that the end user cannot modify the antenna
- 3) Feed line should be designed in 50ohm

Fine-tuning of return loss etc. can be performed using a matching network.

The antenna shall not be accessible for modification or change by the end user.

2.4

The module complies with FCC Part 15.407 and apply for Single module approval.

2.5

Trace antenna designs: applicable.

Any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

The device must be professionally installed.

The intended use is generally not for the general public.

It is generally for industry/commercial use.

The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required.

The user has no access to the connector.

Installation must be controlled.

Installation requires special training.

2.6

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 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

2.7

The following antennas have been certified for use with this module.

Only antennas of the same type with equal or lower gain may also be used with this module.

Other types of antennas and/or higher gain antennas may require the additional authorization for operation. The installer should use unique antenna connector and 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. The manufacturer of module will inform installer to meet with the FCC part 15.203 in the warning part.

Antenna Specification list below:

5G:

Antenna type: External antenna

The max antenna gain (in dBi):

Antenna 1: 0.5dBi

Antenna 2: 0.5dBi

2.8 Please notice that if the FCC 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. This exterior label can use wording such as "Contains FCC ID: 2BMXW-S2022EU3 "; any similar wording that expresses the same meaning may be used.

2.9

Testing of the host product with all the transmitters installed - referred to as the composite investigation test - is recommended, to verify that the host product meets all the applicable FCC rules. The radio spectrum is to be investigated with all the transmitters in the final host product functioning to determine that no emissions exceed the highest limit permitted for any one individual transmitter as required by Section 2.947(f). The host manufacturer is responsible to ensure that when their product operates as intended it does not have any emissions present that are out of compliance that were not present when the transmitters were tested individually.

If the modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions). The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration.

2.10

Any company of the host device which install this modular should perform the test of radiated & conducted emission and spurious emission etc. according to 15.209 & 15.207, part 15E: 15.407, part 15B: class B requirement, only if the test result comply with 15.209 & 15.207 part 15 E 15.407, 15B class B requirement. Then the host can be sold legally.

The 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, If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

FCC Statement

1. 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.

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

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

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.

The device has been evaluated to meet general RF exposure requirement. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Declaration of conformity

This product complies with the radio interference requirements of the European community. Hereby, Sonix Technology CO., LTD. declares that the product is in compliance with the essential requirements and other relevant provisions of RE Directive 2014/53/EU. You can find the Declaration of Conformity on www.sonix.com.tw

RF frequency: 5.1G Custom: 5180 MHz to 5240 MHz

5.8G Custom: 5745 MHz to 5865 MHz

RF power: 5.1G Custom: 22.9dBm

5.8G Custom: 13.84dBm

Manufacturer Name: Sonix Technology CO., LTD.

Address: 2F-15, 9F & 10F, No.36, Taiyuan St., Zhubei City, Hsinchu County 302, Taiwan(R.O.C)

Product Name: 5G RF module

Trademark: /

Model: S2022EU3

Importer Information: XXXXX