

Test report No:  
2410620R-RF-US-P20V01

## RF Exposure Evaluation Exemption Report

Product Name	IEEE 802.11a/b/g/n/ac 2T2R USB Wi-Fi Module Integrated Bluetooth 2.1+EDR/4.2/5.1
Model and /or type reference	SKI.WB663U.2
FCC ID	2AR82-SKIWB663U21
IC	24728-SKIWB663U21
Applicant's name / address	Guangzhou Shikun Electronics Co., Ltd NO.6 Liankun Road, Huangpu District, Guangzhou 510530, China
Test method requested, standard	FCC 47CFR §2.1091
Verdict Summary	IN COMPLIANCE
Documented By (name / position & signature)	Tim Cao/Project Manager 
Approved by (name / position & signature)	Jack Zhang/ Manager 
Date of issue	2024-04-11
Report Version	V1.1
Report template No	Template_FCC MPE-RF-V1.0

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## COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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## GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date (receive sample)	Feb. 04, 2024
Date (start test)	Feb. 29, 2024
Date (finish test)	Mar. 19, 2024

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

## ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15°C - 35 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

## POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

## ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	: Equipment Under Test
QP	: Quasi-Peak
CAV	: CISPR Average
AV	: Average
CDN	: Coupling Decoupling Network
SAC	: Semi-Anechoic Chamber
OATS	: Open Area Test Site
BW	: Bandwidth
AM	: Amplitude Modulation
PM	: Pulse Modulation
HCP	: Horizontal Coupling Plane
VCP	: Vertical Coupling Plane
UN	: Nominal voltage
Tx	: Transmitter
Rx	: Receiver
N/A	: Not Applicable
N/M	: Not Measured

## DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
2410620R-RF-US-P20V01	V1.0	Initial issue of report.	2024-04-07
2410620R-RF-US-P20V01	V1.1	Page 11: Update test data. (The test report No.: 2410620R-RF-US-P20V01 V1.1 is to replace the test report No.: 2410620R-RF-US-P20V01 V1.0, and test report 2410620R-RF-US-P20V01 V1.0 is obsoleted.)	2024-04-11

## REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with FCC 47CFR §2.1091.
3. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, it is not necessary to account the uncertainty associated with the measurement result.
4. The test results presented in this report relate only to the object tested.
5. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
6. This report will not be used for social proof function in China market.
7. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:
  - Chapter 1.3 Antenna information.

## 1. RF Exposure Evaluation

### 1.1. Limits

According to § 1.1307(b)(3)(i)(C)

Using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R <sup>2</sup> .
1.34-30	3,450 R <sup>2</sup> /f <sup>2</sup> .
30-300	3.83 R <sup>2</sup> .
300-1,500	0.0128 R <sup>2</sup> f.
1,500-100,000	19.2R <sup>2</sup> .

Finally, when 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the SAR-based exemption threshold.

### 1.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 18°C and 78% RH.

### 1.3. Test Result of RF Exposure Evaluation

Product Name .....	IEEE 802.11a/b/g/n/ac 2T2R USB Wi-Fi Module Integrated Bluetooth 2.1+EDR/4.2/5.1
Model No. ....	SKI.WB663U.2
FCC ID.....	2AR82-SKIWB663U21
IC .....	24728-SKIWB663U21

Wireless specification .....	Bluetooth V5.1					
Operating frequency range(s) .....	2402~2480 MHz					
Type of Modulation .....	GFSK					
PHYs .....	<input checked="" type="checkbox"/>	GFSK	<input checked="" type="checkbox"/>	Pi/4 DQPSK	<input checked="" type="checkbox"/>	8DPSK
Data Rate .....	<input checked="" type="checkbox"/>	1Mbit/s	<input checked="" type="checkbox"/>	2Mbit/s	<input checked="" type="checkbox"/>	3Mbit/s
Number of channel .....	79					

Wireless specification .....	Bluetooth 5.1					
Operating frequency range(s)	2402~2480MHz					
Type of Modulation .....	GFSK					
PHYs .....	<input checked="" type="checkbox"/>	LE 1M	<input checked="" type="checkbox"/>	LE 2M	<input type="checkbox"/>	LE Coded S=2/8
Data Rate .....	<input checked="" type="checkbox"/>	1Mbit/s	<input checked="" type="checkbox"/>	2Mbit/s	<input type="checkbox"/>	500/125 Kbit/s
Number of channel .....	40					

Wireless specification .....	802.11b/g/n					
Operating frequency range(s) .....	802.11b/g/n(20MHz): 2412~2472MHz 802.11n(40MHz): 2422~2462MHz					
Type of Modulation .....	802.11b: DSSS-DBPSK, DQPSK, CCK 802.11g/n: OFDM-BPSK, QPSK, 16QAM, 64QAM					
Number of channels .....	802.11b/g/n(20MHz): 13 802.11b/g/n(40MHz): 9					

Wireless specification ..... :	Wi-Fi		
Type of Modulation ..... :	OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM		
Frequency Range ..... :	<input checked="" type="checkbox"/>	5150MHz~5250MHz	<input type="checkbox"/> Outdoor AP <input checked="" type="checkbox"/> Indoor AP <input type="checkbox"/> Fixed point-to-point AP <input type="checkbox"/> Mobile and Portable Client
	<input checked="" type="checkbox"/>	5250MHz~5350MHz	
	<input checked="" type="checkbox"/>	5470MHz~5725MHz	<input checked="" type="checkbox"/> With TDWR Channels <input type="checkbox"/> Without TDWR Channels
	<input checked="" type="checkbox"/>	5725MHz~5850MHz	
Date Rate ..... :	802.11a: 6/9/12/18/24/36/48/54 Mbps		
	802.11n: up to 300 Mbps		
	802.11ac: up to 866.6 Mbps		



**Antenna information**

Bluetooth Antenna:

Material number.....:	61005-00778	61005-00701
Host model .....	43UM340E0UZ	75UM340E0UZ
Antenna Delivery .....	<input checked="" type="checkbox"/> 1TX + 1RX	
	<input type="checkbox"/> 2TX + 2RX	
	<input type="checkbox"/> Others:.....	
Antenna technology.....:	<input checked="" type="checkbox"/> SISO	
	<input type="checkbox"/> MIMO	<input type="checkbox"/> CDD
		<input type="checkbox"/> Beam-forming
Antenna Type .....	<input checked="" type="checkbox"/> External	<input type="checkbox"/> Dipole
		<input type="checkbox"/> Sectorized
		<input checked="" type="checkbox"/> FPC
	<input type="checkbox"/> Internal	<input type="checkbox"/> PIFA
		<input type="checkbox"/> PCB
		<input type="checkbox"/> Dipole
		<input type="checkbox"/> Others.....
Antenna Gain.....:	61005-00778: 2.48 dBi 61005-00701: 2.10 dBi	
	Note: The antenna used in the test was the highest gain antenna which Material number is 61005-00778.	

Wi-Fi Antenna:

Antenna serial number .....	61005-00780	61005-00782	61005-00697	61005-00699
Host model .....	43UM340E0UZ		75UM340E0UZ	
Antenna Delivery .....	<input checked="" type="checkbox"/> 1TX + 1RX			
	<input checked="" type="checkbox"/> 2TX + 2RX			
	<input type="checkbox"/> Others:.....			
Antenna technology.....:	<input checked="" type="checkbox"/> SISO			
	<input checked="" type="checkbox"/> MIMO	<input checked="" type="checkbox"/> CDD		
		<input type="checkbox"/> Beam-forming		
Antenna Type .....	<input checked="" type="checkbox"/> External	<input type="checkbox"/> Dipole		
		<input type="checkbox"/> Sectorized		
		<input checked="" type="checkbox"/> FPC		
	<input type="checkbox"/> Internal	<input type="checkbox"/> Ceramic Chip		
		<input type="checkbox"/> PIFA		
		<input type="checkbox"/> PCB		
		<input type="checkbox"/> Others.....		
2.4G Antenna Gain.....:	<b>Main Antenna(Wifi1):</b> 61005-00780: 2.51dBi 61005-00697: -0.43dBi <b>Aux Antenna(Wifi0):</b> 61005-00782: 2.94dBi 61005-00699: 2.93dBi			
	Note: The main antenna used in the test is 61005-00780 which had the highest gain, and			

	aux antenna is 61005-00782. Directional gain for MIMO-CDD power is 2.94dBi, for PSD is 5.95dBi.
5G Antenna Gain.....	<p><b>Main Antenna(Wifi1):</b>          61005-00780: 2.91dBi          61005-00697: 0.96dBi</p> <p><b>Aux Antenna(Wifi0):</b>          61005-00782: 2.68dBi          61005-00699:2.80dBi</p>
	<p>Note: The main antenna used in the test is 61005-00780 which had the highest gain, and aux antenna is 61005-00699. Directional gain for MIMO-CDD power is 2.91dBi, for PSD is 5.92dBi.</p>

Note:

1. BT&WLAN 2.4G, BT & WLAN 5G, WLAN 2.4G & WLAN 5G can't transmit simultaneously.
2. The antenna information for the EUT in clause 1.3 are provided and confirmed by the client.

The tune-up power is 0.5dB, the maximum conducted power we used to calculate RF exposure is 7.04dBm (=6.54dBm + 0.5db) for Bluetooth, 13.69dBm (= 13.19dBm + 0.5dB) for Wi-Fi 2.4G and 14.02dBm (=13.52dBm +0.5dB) for Wi-Fi 5G.

Band	Exposure Condition	Pmax (dBm)	EIRP (mW)	ERP (mW)	Distance (mm)	$\lambda / 2\pi$ (mm)	f(MHz)	Threshold ERP (mW)	RF exposure evaluation verdict
Bluetooth	Body	7.04	8.96	5.46	200	19.23	2483.5	768	Not required
Wi-Fi 2.4G	Body	13.69	46.03	28.06	200	19.23	2483.5	768	Not required
Wi-Fi 5G	Body	14.02	49.32	30.07	200	8.16	5850	768	Not required

Conclusion: RF exposure evaluation is not required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm.

\_\_\_\_\_ The End \_\_\_\_\_