




Test Report No:
2380159R-RFUSV17S-A

RF EXPOSURE EVALUATION DECLARATION

Product Name	freeRAN LTE Base Station
Brand Name	 UBIiK
Model No.	BS1AL-EO9100-US
FCC ID	2AXTDBS1ALEO9100US
Applicant's Name / Address	Ubiik Inc. 19F., No. 17, Sec. 1, Chengde Rd., Datong Dist., Taipei City 103, Taiwan (R.O.C.)
Manufacturer's Name / Address	Ubiik Inc. 19F., No. 17, Sec. 1, Chengde Rd., Datong Dist., Taipei City 103, Taiwan (R.O.C.)
Test Method Requested, Standard	FCC CFR Title 47 Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.
Verdict Summary	IN COMPLIANCE
Documented By	 Hailey Peng
Approved By	 Rueyyan Lin
Date of Receipt	Aug. 04, 2023
Date of Issue	Jan. 05, 2024
Report Version	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

1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Jan. 05, 2024

Permissive Change

Report No.	Version	Description	Issued Date
22C0676R-RFUSV17S-A	V2.0	Original application.	Mar. 15, 2023
2380159R-RFUSV17S-A	V1.0	<u>Class II Permissive Change (C2PC)</u> 1. Adding the Cat.1 1.4 MHz, 3 MHz and Cat-M1 1.4 MHz functions. 2. Adding two same type antennas (model: DS0915-0726WNM and model: DS0915-0727WNM) but higher gain than the original certificate. 3. Adding the LVDS module, and it is not radio frequency components. 4. Adding the MicroSD Card for marketing. 5. Changing the product name to "freeRAN LTE Base Station" from "freeRAN IoT Base Station". 6. Adding the second source of WWAN module for EUT contains (brand name: UBIK, model: RC7611, FCC ID: 2AXTDRC76B).	Jan. 05, 2024

1. General Information

1.1. EUT Description

RF General Information			
Function	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
Cat.1 1.4 MHz	902 ~ 928	925.7 ~ 927.3	OFDMA 16QAM
Cat-M1 1.4 MHz			
Cat.1 3 MHz		926.3	
Cat-M1 3 MHz			

The EUT contains a WWAN module, and the WWAN module has two sources and the detail as below.

Source	Brand	Model	FCC ID	Bands	Operating Frequency Range (MHz)	Modulation Type
Main Source	UBIIK	RC7611-1	2AXTDRC76B	LTE Band 2	Uplink: 1850 ~ 1910 Downlink: 1930 ~ 1990	QPSK / 16QAM
				LTE Band 4	Uplink: 1710 ~ 1755 Downlink: 2110 ~ 2115	
				LTE Band 13	Uplink: 777 ~ 787 Downlink: 746 ~ 756	
Second Source	UBIIK	RC7611	2AXTDRC76B	LTE Band 2	Uplink: 1850 ~ 1910 Downlink: 1930 ~ 1990	QPSK / 16QAM
				LTE Band 4	Uplink: 1710 ~ 1755 Downlink: 2110 ~ 2115	
				LTE Band 13	Uplink: 777 ~ 787 Downlink: 746 ~ 756	

From the above, main source of WWAN module (model: RC7611-1) was selected as representative model for the test and its data was recorded in this report.

Note: The above EUT information is declared by the manufacturer.

1.2. Testing Location Information

Testing Location Information		
Test Laboratory : DEKRA Testing and Certification Co., Ltd.		
1	ADD: No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.	
(TAF: 3024)	TEL: +886-3-582-8001 FAX: +886-3-582-8958	
2	ADD: No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.	
(TAF: 3024)	TEL: +886-3-582-8001 FAX: +886-3-582-8958	
Test site number for address 1 includes HC-SR02. Test site number for address 2 includes HC-CB02, HC-CB03, HC-CB04, HC-SR10 and HC-SR12.		

2. RF Exposure Evaluation

2.1. Test Limit

(A) Test Limit for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Test Limit for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz; *Plane-wave equivalent power density

Power Density (S) is calculated by the following formula:

$$S = (P \cdot G) / 4\pi R^2$$

where:

S = power density (in appropriate units, e.g. mW/ cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

π = 3.1416

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

2.2. Test Result of RF Exposure Evaluation

Exposure Environment: General Population / Uncontrolled Exposure

Evaluation Mode	E.I.R.P (dBm)	E.I.R.P (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Test Result (PASS/FAIL)
Cat.1 1.4 MHz	33.260	2118.361	0.421	0.618	PASS
Cat.1 3 MHz	33.190	2084.491	0.415	0.618	PASS
Cat-M1 1.4 MHz	33.330	2152.782	0.428	0.618	PASS
Cat-M1 3 MHz	33.240	2108.628	0.419	0.618	PASS
LTE Band 2	25.800	380.189	0.076	1.000	PASS
LTE Band 4	24.600	288.403	0.057	1.000	PASS
LTE Band 13	25.400	346.737	0.069	0.518	PASS

Distance (cm): 20 for Maximum Permissible Exposure.

Co-location
<p>Conclusion:</p> <p>The formula of calculated the MPE is:</p> <p>$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$</p> <p>CPD = Calculation power density</p> <p>LPD = Limit of power density</p> <p>Cat-M1 1.4 MHz + LTE = 0.693 + 0.133 = 0.826, therefore the maximum calculations of above situations are less than the "1" limit.</p>

Note:

1. The above EUT information is declared by the manufacturer.
2. The results are based on the maximum power.