RF EXPOSURE REPORT

Report No.: DDT-B24042312-1E02V1

Applicant	:	Rhino Sp. z o o
Applicant Address	:	Strzegomska 140A，54-429 Wrocław，Poland
Equipment Under Test	:	Smart Metering Gateway
Model No.	:	Rhino AP GSM
Trade Mark	:	N/A
Contain Cellular FCC ID	:	XMR201906EG21G
SRD FCC ID	:	2BE63APGSM915V21
Manufacturer	:	Rhino Sp. z o o
Manufacturer Address	:	Strzegomska 140A，54-429 Wrocław，Poland

Issued By: Tianjin Dongdian Testing Service Co., Ltd.

Address: Building D-1, No. 19, West Road, Microelectronics Industrial Park, Development Area, Tianjin, China

Tel: +86-22-58038033, E-mail: ddt@dgddt.com, http://www.ddttest.com

REPORT

Table of Contents

Test Report Declare

Applicant	:	Rhino Sp. z o o
Address	:	Strzegomska 140A，54-429 Wrocław，Poland
Equipment under Test	:	Smart Metering Gateway
Model No.	:	Rhino AP GSM
Trade Mark	:	N/A
Contain Cellular FCC ID	:	XMR201906EG21G
SRD FCC ID	:	2BE63APGSM915V21
Manufacturer	:	Rhino Sp. z o o
Address	:	Strzegomska 140A，54-429 Wrocław，Poland

Standard Used:
KDB447498 D01 General RF Exposure Guidance v06

We Declare:
The equipment described above is tested by Tianjin Dongdian Testing Service Co., Ltd and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Tianjin Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	DDT-B24042312-1E02V1		
Date of Receipt:	May. 14, 2024	**Date of Test:**	May. 14, 2024~ Jun. 26, 2024

Prepared By:

Novak Wei

Novak Wei/Engineer

Approved By:

Aaron Zhang

Aaron Zhang/RF Manager

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Tianjin Dongdian Testing Service Co., Ltd.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Jun. 27, 2024	
V1	According request, change the ant1&ant2 to TX-chain1& TX-chain2 in the report. This report (DDT-B24042312-1E02V1) replaces the original report (DDT B24042312-1E02), which is invalid.	Oct. 11, 2024	Novak Wei

1. General information

1.1. Description of Equipment

EUT Description	:	Smart Metering Gateway									
Model Number	:	Rhino AP GSM									
Trade Mark	:	N/A									
Serial Number	:	N/A									
Hardware Version	:	2.1									
Software Version	:	0.1.211									
Sample Type	:	mobile Device									
Frequency band	:	E-UTRA	Duplex Mode	Tx (MHz)	Rx (MHz)	Supported Channel Bandwidth					
						1.4	3	5	10	15	20
		Band 2	FDD	1850-1910	1930-1990	☒	☒	☒	☒	☒	☒
		Band 4	FDD	1710-1755	2110-2155	☒	☒	☒	☒	☒	☒
		Band 12	FDD	699-716	729-746	☒	☒	☒	☒	---	---
		Band 13	FDD	777-787	746-756	---	---	☒	☒	---	---
	:	ISM	Frequency (MHz)			Supported Channel Bandwidth					
	:	2GFSK	902MHz-928MHz			1MHz					
Type of modulation	:	E-UTRA	UL: QPSK&16QAM DL: QPSK&16QAM								
	:	ISM	2GFSK								
Smart Condition	:	E-UTRA	☒SISO ☐MIMO ☐Diversity								
	:	TX-chain1	☒SISO ☐MIMO ☐Diversity								
	:	TX-chain2	☒SISO ☐MIMO ☐Diversity								
Antenna Type	:	E-UTRA : sucker antenna TX-chain1& TX-chain2: sucker antenna									
Antenna Information	:	Mode	Antenna1		Antenna2						
	:	E-UTRA	Peak Gain 2dBi		N/A						
	:	ISM	Peak Gain 3dBi		Peak Gain 3dBi						
Power Supply	:	DC 12V									

1.2. Assess laboratory

Tianjin Dongdian Testing Service Co., Ltd.

Address: Building D-1, No. 19, Weisi Road, Microelectronics Industrial Park Development Area, Tianjin, China., 300385

Tel: +86-22-58038033, http://www.ddttest.com, Email: ddt@dgddt.com

NVLAP (National Voluntary Laboratory Accreditation Program) CODE: 500036-0

CNAS (China National Accreditation Service for Conformity Assessment) CODE: L13402

FCC Designation Number: CN5004; FCC Test Firm Registration Number: 368676

ISED (Innovation, Science and Economic Development Canada) Company Number: 27768

Conformity Assessment Body Identifier: CN0125

VCCI Facility Registration Number: C-20089, T-20093, R-20125, G-20122

2. RF Exposure Evaluation

2.1. Requirement

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

Limits for General Population/Uncontrolled Exposure

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
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
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
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
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density.

Note1: Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure.

Note2: General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

2.2. Calculation method

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } S(mW/cm^2) = \frac{E^2}{377}$$

E = Electric field (V/m)
P = Peak RF output power (mW)
G = EUT Antenna numeric gain (numeric)=
d = Separation distance between radiator and human body (m)
The formula can be changed to

We can change the formula to:

$$S = \frac{30 \times P \times G}{377 \times d^2} \quad \text{or, } d = \sqrt{\frac{30 \times P \times G}{377 \times S}}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2 m, as well as the gain of the used antenna, the RF power density can be obtained.

2.3. Estimation result

Mode	Band	Output power Tune up (dBm)	Output power Tune up (mW)	Antenna Gain (dBi)	Antenna Gain (mW)	MPE Value (mW/cm2)	MPE ratio	MPE Limit (mW/cm2)
E-UTRA	LTE Band2	25	316.23	2.0	1.58	0.099706	0.099706	1.00
	LTE Band 4	25	316.23	2.0	1.58	0.099706	0.099706	1.00
	LTE Band 12	25	316.23	2.0	1.58	0.099706	0.213961	0.47
	LTE Band 13	25	316.23	2.0	1.58	0.099706	0.192482	0.52
ISM	TX-chain1	15	31.62	3.0	2.38	0.012552	0.012552	1.00
	TX-chain2	13	19.95	3.0	2.38	0.007920	0.007920	1.00

Maximum Simultaneous transmission MPE Ratio for E-UTRA and TX-chain1：

Maximum MPE ratio E-UTRA	Maximum MPE ISM TX-chain1	∑MPE ratios	Limit	Results
0.213961	0.012552	0.226513	1.000	Pass

Maximum Simultaneous transmission MPE Ratio for E-UTRA and TX-chain2：

Maximum MPE ratio E-UTRA	Maximum MPE ISM TX-chain2	∑MPE ratios	Limit	Results
0.213961	0.007920	0.221881	1.000	Pass

Maximum Simultaneous transmission MPE Ratio for TX-chain1 and TX-chain2：

Maximum MPE TX-chain1	Maximum MPE ISM TX-chain2	∑MPE ratios	Limit	Results
0.012552	0.007920	0.020472	1.000	Pass

Note: The estimation distance is 20 cm.

Conclusion: No SAR evaluation required since transmitter power is below FCC threshold.

END OF REPORT