RF Exposure Evaluation Report

Application No.:	SZEM1911020571CR
Applicant:	UAB Teltonika
Address of Applicant:	Saltoniskiu g.9B LT-08105, Vilnius, Lithuania
Manufacturer:	UAB Teltonika
Address of Manufacturer:	Saltoniskiu g.9B LT-08105, Vilnius, Lithuania
Factory:	UAB Teltonika
Address of Factory:	Saltoniskiu g.9B LT-08105, Vilnius, Lithuania
EUT Name:	LTE Router
Model No.:	RUTX11
Trade mark:	Teltonika
FCC ID:	2AET4RUTX11
Standards:	47 CFR Part 1.1307
	47 CFR Part 1.1310
	47 CFR Part 2.1091
Date of Receipt:	2019-11-25
Date of Test:	2019-11-29 to 2019-12-13
Date of Issue:	2020-02-11
Test Result :	**PASS***

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

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1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2020-02-11		Original

Authorized for issue by:				
				
		Harry Wu /Project Engineer		
				
		Eric Fu /Reviewer		

2 Contents

3 General Description of EUT

Power Supply:	DC 12V AC/DC Adapter Mode: SJ-12015033 Input: AC100-240V, 50/60Hz, 0.8A Output: DC 12V, 1.5A
Cable:	DC Cable: 120cm, Unshielded Network Cable: 150cm, Unshielded BT Antenna: 150cm, Unshielded GPS Antenna: 300cm, Unshielded
For BLE:	
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V 4.0
Modulation Type:	GFSK
Number of Channel:	40
Antenna Type:	External Antenna
Antenna Gain:	3dBi
For 2.4G wifi:	
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM, QPSK,BPSK)
Antenna Type:	External Antenna
Antenna Gain:	Antenna 1: 5dBi, Antenna 2: 5dBi Two antennas can not synchronous transmission.
For 5G wifi:	
Operation Frequency:	

Band	Mode	Frequency Range(MHz)	Number of channels
UNII Band I	IEEE 802.11a	5180-5240	4
	IEEE 802.11n/ac 20MHz	5180-5240	4
	IEEE 802.11n/ac 40MHz	5190-5230	2
	IEEE 802.11ac 80MHz	5210	1

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	UNII Band III	IEEE 802.11a	5745-5825	5
		IEEE 802.11n/ac 20MHz	5745-5825	5
		IEEE 802.11n/ac 40MHz	5755-5795	2
		IEEE 802.11ac 80MHz	5775	1
Type of Modulation:	IEEE 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11n: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)			
Antenna type:	External Antenna			
Antenna gain	Antenna 1:5dBi; Antenna 2:5dBi Two antennas can not synchronous transmission.			
For 3G/LTE:				
Band:	WCDMA BAND II, BAND IV, BAND V LTE BAND 2,4,5,7,12,13,25,26,30,66			
Antenna type:	External Antenna			
Antenna gain	WCDMA BAND II:2dBi, BAND IV:2dBi, BAND V:3dBi LTE BAND 2:2dBi, BAND 4:2dBi, BAND 5:3dBi, BAND 7:2dBi, BAND 12:3dBi, BAND 13: 3dBi, BAND 25:2dBi, BAND 26: 3dBi, BAND 30: 0dBi, BAND66:2dBi			

3.1 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.
IC#: 4620C.

3.3 Deviation from Standards

None.

3.4 Abnormalities from Standard Conditions

None.

3.5 Other Information Requested by the Customer

None.

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4 RF Exposure Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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) 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
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4* Pi * R^2)$

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

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

4.1.3 EUT RF Exposure Evaluation

Remark: The Bluetooth, Wifi WCDMA and LTE functions can't synchronous transmission at the same time.
The RF Exposure Evaluations of WCDMA and LTE are referred to report: SZEM180500453602.

For BLE

Antenna: 3dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Antenna	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Result
Hightest	1	2480MHz	9.65	9.23	0.004	1.0	PASS

Note: Refer to report No. SZEM191102057102 for EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 2.4G WIFI

Antenna 1: 5dBi, Antenna 2: 5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.16 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Antenna	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Result
Low	1	2412MHz	20.49	111.94	0.07	1.0	PASS

Note: Refer to report No. SZEM191102057103 for EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 5GHz WIFI

Antenna 1:5dBi; Antenna 2:5dBi
Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.16in linear scale.
Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Result
5240 MHz	1	14.55	28.51	0.018	1.0	PASS

Note: Refer to report No. SZEM191102057104 for EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

- End of the Report -

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