



RF Exposure Evaluation Report

Application No.: SZEM1912021042CR
Applicant: Viloc nv
Address of Applicant: Posthofbrug 6-8 5/106 2600 Berchem, Belgium
Manufacturer: Viloc nv
Address of Manufacturer: Posthofbrug 6-8 5/106 2600 Berchem, Belgium
Equipment Under Test (EUT):
Product Name: electronic tag
Model No.: STABIL1
Trade mark: Viloc
FCC ID: 2AVRJSTABIL1
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
47 CFR Part 2.1091
Date of Receipt: 2019-12-10
Date of Test: 2019-12-13 to 2019-12-16
Date of Issue: 2019-12-16

Test Result :	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager



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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-12-16		Original

Authorized for issue by:			
			
		Peter Geng /Project Engineer	
			
		Eric Fu /Reviewer	



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4 General Information

4.1 General Description of EUT

Power Supply:	DC 3V by battery
Antenna Gain:	0dBi
Antenna Type:	Monopole
Modulation type:	FSK
For LoRa narrow band	
Channel Spacing:	0.492MHz
Number of Channels:	51
Operation Frequency:	902.5 MHz-927.5MHz
For LoRa wide band	
Operation Frequency:	903-927MHz
For 2.4G Self-define	
Channel Spacing:	2 MHz
Number of Channels:	40
Operation Frequency:	2402MHz to 2480MHz



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4.2 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

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.3 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..

4.4 Deviation from Standards

None.

4.5 Abnormalities from Standard Conditions

None.

4.6 Other Information Requested by the Customer

None.



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5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 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: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is 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.

5.1.2 Test Procedure

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



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5.1.3 4.1.3 EUT RF Exposure Evaluation

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

For LoRa narrow band

Channel	Frequency (MHz)	MaxConducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
Middle	915	21.25	133.35	0.0265	0.61	PASS

For LoRa wide band

Channel	Frequency (MHz)	MaxConducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest	903	21.29	134.59	0.0268	0.602	PASS

For 2.4G self-define

According to the Equation of calculation of EIRP in clause 9.5 in ANSI C63.10, the EIRP is -1.61dBm

Channel	Frequency (MHz)	MaxConducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest	2402	-1.61	0.690	0.0002	1	PASS

Note: Refer to report No. SZEM191202104201 for EUT test Max Conducted Peak Output Power value.

The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

1) exposure conditions for simultaneous transmission operations

Simultaneous transmission MPE test is not required, because the Max. sum of the MPE ratios for LoRa wideband and 2.4G self-define is $0.0445+0.0002=0.0447 < 1$

- End of the Report -



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