

RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2108020887AT
Applicant: Viloc nv
Address of Applicant: Posthofbrug 6-8 5/106 Antwerp 2600 Belgium
Manufacturer: Viloc nv
Address of Manufacturer: Posthofbrug 6-8 5/106 Antwerp 2600 Belgium
Equipment Under Test (EUT):
EUT Name: Electronic tag
Model No.: STABIL2
Trade Mark: Viloc
Standard(s) : 47 CFR PART 1, Subpart I, Section 1.1307
 47 CFR PART 1, Subpart I, Section 1.1310
 47 CFR PART 2, Subpart J, Section 2.1091
 KDB447498 D01 General RF Exposure Guidance v06
Date of Receipt: 2021-08-22
Date of Evaluation: 2021-08-25 to 2021-09-02
Date of Issue: 2021-09-07

Evaluation Result:	Pass*
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* In the configuration evaluated, the EUT complied with the standards specified above.

Kobe Jian
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-09-07		Original

Authorized for issue by			
		 <hr/> Curry Wu/Project Engineer	
		 <hr/> Ricky Liu /Reviewer	



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2 Evaluation Summary

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

Declaration of End-product Grouping:

Model No.: STABIL2-NINEBOT-700-US, ST2-1200-A01, ST2-550-A01

Only the model STABIL2-NINEBOT-700-US was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above models, with only difference as below:

- STABIL2-NINEBOT-700-US = casing ST2-NINEBOT-700 + 700mAh battery + Module (STABIL2 + SMT Antenna ANT-A01)
- ST2-1200-A01 = casing ST2-1200 + 1200mAh battery + Module (STABIL2 + SMT Antenna ANT-A01)
- ST2-550-A01 = casing ST2-550 + 550mAh battery + Module (STABIL2 + SMT Antenna ANT-A01)



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4 General Information	
4.1 Details of E.U.T.	
Power supply:	DC 3.7V Lithium Ion Battery: 3.7V 700mAh non-rechargeable battery for STABIL2-NINEBOT-700-US Lithium Ion Battery: 3.7V 1200mAh non-rechargeable battery for ST2-1200-A01 Lithium Ion Battery: 3.7V 550mAh non-rechargeable battery for ST2-550-A01
For Lora:	
Antenna Gain:	0dBi
Antenna Type:	SMT Antenna
Modulation type:	FSK
62KHz Bandwidth	
Channel Spacing:	0.5MHz
Number of Channels:	50
Operation Frequency:	903 MHz-927.5MHz
Technology Type:	Hopping
Test Channels:	903MHz, 915MHz, 927.5MHz
125KHz Bandwidth	
Channel Spacing:	0.5MHz
Number of Channels:	50
Operation Frequency:	903 MHz-927.5MHz
Technology Type:	Hopping
Test Channels:	903MHz, 915MHz, 927.5MHz
250KHz Bandwidth	
Channel Spacing:	0.5MHz
Number of Channels:	50
Operation Frequency:	903 MHz-927.5MHz
Technology Type:	Hopping
Test Channels:	903MHz, 915MHz, 927.5MHz
500KHz Bandwidth	
Channel Spacing:	1MHz
Number of Channels:	25
Operation Frequency:	903 MHz-927MHz
Technology Type:	Hopping
Test Channels:	903MHz, 915MHz, 927MHz
For Self-define:	
Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK
Number of Channels:	40



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Channel Spacing:	2MHz
Antenna Type:	SMT Antenna
Antenna Gain:	0dBi

4.2 Evaluating Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
 198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
 Guangzhou, China 510663

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No tests were sub-contracted.



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4.3 Facility

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

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

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

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.4 Deviation from Standards

None

4.5 Abnormalities from Standard Conditions

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 EUT RF Exposure Evaluation

For Lora:

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:

Channel	Frequency (MHz)	Max Conducted 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	19.50	89.13	0.0177	0.61	PASS

Note: Refer to report No. GZCR210802088701 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.

For 2.4GHz Self-define:

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:

Channel	Frequency (MHz)	Max Conducted 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	-5.07	0.31	0.000006	1.0	PASS

Note: Refer to report No. GZCR210802088702 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.

The Lora and 2.4G self-define can't transmit at the same time, so no need exposure conditions for simultaneous transmission operation



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6 EUT Constructional Details (EUT Photos)

Refer to Appendix - external and internal photos for GZCR2108020887AT

- End of the Report -



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