TESTING (OR CALIBRATION)
NVLAP LAB CODE 600141-0

Registration No.788871

MPE REPORT

Report No.: SRTC2019-9004(F)-19052401(I)

Product Name: Automatic Cleaning Machine

Marketing Name: Whiz

Product Model: A00000101A01

Applicant: SoftBank Robotics Corp.

Manufacturer: SoftBank Robotics Corp.

Specification: FCC Part §2.1091, §1.1307(b), §1.1310(2019)

FCC ID: 2ATI9-A00000101A01

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30 Shixing Street, Shijingshan District,

Beijing, P.R.China

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1 GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).
The test results relate only to individual items of the samples which have been tested.
The certification and accreditation identifiers used in this report shall not be applicable to the tested or calibrated samples thereof. The manufacturer shall not mark the tested samples or items (or a separate part of the item) with the identifiers of certification and accreditation to mislead relevant parties about the tested samples or items.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, P.R.China
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1.3 Applicant's details

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1.4 Manufacturer's details

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Fax:	---
Email:	huijun.wang@g.softbank.co.jp

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2019-05-24
Testing Start Date:	2019-05-24
Testing End Date:	2019-09-03
Testing Site 1:	Building 15,No.30,Shixing Street,Shijingshan District,Beijing,China

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	30

Normal Supply Voltage (V d.c.):	25.2

2 DESCRIPTION OF THE DEVICE UNDER TEST

Common info

Power Supply	Battery/Charger
HW Version	V 1.0.0
SW Version	V 1.0.X
LBCM Serial	0002190500113

LORA

Frequency Range	902~928MHz
Number of Channel	51
Modulation Type	LoRaTM
Antenna Gain	0.2dBi

WCDMA

Frequency Range	WCDMA Band II: Tx:1852.4~1907.6MHz Rx:1932.4~1987.6MHz WCDMA Band IV: Tx:1712.4~1752.6MHz Rx:2112.4~2152.6MHz WCDMA Band V: Tx:826.4~846.6MHz Rx:871.4~891.6MHz
Mode	HSDPA/HSUPA
Emission Designator	4M50F9W
Duplex Mode	FDD
Duplex Spacing	WCDMA Band II:80MHz WCDMA Band IV:400MHz WCDMA Band V:45MHz
Antenna Gain	WCMDA B2:2.0dBi WCMDA B4:2.0dBi WCMDA B5:0.2dBi

LTE

Frequency Range	LTE Band 2: Tx:1850~1910MHz Rx:1930~1990MHz LTE Band 4: Tx:1710~1755MHz Rx:2110~2155MHz LTE band5: Tx:824~849MHz Rx:869~894MHz LTE Band 7: Tx:2500~2570MHz Rx:2620~2690MHz LTE Band 12: Tx:699~716 MHz Rx:729~746 MHz LTE Band 13: Tx:777~787 MHz Rx:746~756 MHz LTE Band 26: Tx:814~849 MHz Rx:859~894MHz LTE Band 30: Tx:2305~2315 MHz Rx:2350~2360 MHz LTE Band 41: Tx:2496~2690 MHz Rx:2496~2690 MHz LTE Band 66: Tx:1710~1780 MHz Rx:2110~2200 MHz
Modulation Type	QPSK 16QAM 64QAM
CA Combine	Uplink CA:CA_7C/CA_41C
Duplex Mode	FDD/TDD
Antenna Gain	LTE B5/12/13/26:0.2dBi LTE B2/4/66:2.0dBi LTE B7/30/41:3.0dBi

3 REFERENCE SPECIFICATION

Specification	Version	Title
2.1091	2019	Radiofrequency radiation exposure evaluation: mobile devices.
1.1307(b)	2019	Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.
1.1310	2019	Radiofrequency radiation exposure limits.
KDB447498	October 23, 2015	RF exposure procedures and equipment authorization policies for mobile and portable devices

4 RESULT SUMMARY

No.	Test case	FCC reference
1	MPE Calculation	FCC Part §2.1091, FCC Part §1.1307(b) FCC Part §1.1310 KDB 447498

This Test Report Is Approved by: Mr. Peng Zhen	Review by: Mr. Li Bin
Tested and issued by: Mr. Chang Tianyu	Approved date: 20190905

5 TEST RESULTS

5.1 Average Power Output Test Result

LORA TEST RESULT

Modulation type	**902.5MHz**	915.0MHz	927.5MHz
Average Power Output (dBm)	**15.35**	15.34	15.27

WCDMA TEST RESULT

Band	Mode		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
2	Release 99	RMC,12.2kbps	**1852.4**	**9262**	**22.85**
			1880.0	9400	22.70
			1907.6	9538	22.83
4	Release 99	RMC,12.2kbps	1712.4	1312	23.03
			1732.4	**1412**	**23.10**
			1752.6	1513	23.04
5	Release 99	RMC,12.2kbps	826.4	4132	23.08
			836.6	4183	23.07
			846.6	**4233**	**23.13**

LTE TEST RESULT

Band	BW (MHz)	Modulation	Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
2	20	QPSK	1860	18700	22.68
			1880	18900	22.78
			1900	**19100**	**22.96**
4	20	QPSK	**1720**	**20050**	**23.18**
			1732.5	20175	23.10
			1745	20300	23.08
5	10	QPSK	**829**	**20450**	**23.57**
			836.5	20525	23.54
			844	20600	23.48
7	20	QPSK	2510	20850	21.19
			2535	21100	21.37
			2560	**21350**	**21.48**
CA_7C	20+20	QPSK	2510(PCC)	20850	25.17
			2525.1(PCC)	21001	25.11
			2540.2(PCC)	**21152**	**25.20**
12	10	QPSK	704	23060	23.37
			707.5	**23095**	**23.50**
			711	23130	23.35
13	10	QPSK	**782**	**23230**	**23.53**
			782	23230	23.53
			782	23230	23.53
26	15	QPSK	821.5	26765	22.87
			831.5	**26865**	**23.04**
			841.5	26965	22.93
30	10	QPSK	**2310**	**27710**	**21.67**
			2310	27710	21.67
			2310	27710	21.67
41	20	QPSK	**2506**	**39750**	**21.39**
			2593	40620	21.37
			2680	41490	21.19
CA_41C	20+20	QPSK	2506(PCC)	39750	25.91
			2583.1(PCC)	40521	25.91
			2660.2(PCC)	**41292**	**25.96**
66	20	QPSK	**1720**	**132072**	**23.37**
			1745	132322	23.26
			1770	132572	23.28

5.2 Calculation result

FCC LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure ☐

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	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) Limits for General Population/Uncontrolled Exposure ☑

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	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

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

Stand-Alone Transmission Mode

Calculation procedure:

According to §2.1091, §1.1307(b) and §1.1310, systems operating under the provisions of this 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.

The **$S = PG / (4\pi R^2)$**

Where S = power density in mW/cm^2

P = transmit power in mW

G = numeric gain of transmit antenna

R = distance (cm)

The calculations in the table below use the highest gain of antenna for client EUT. These calculations represent worst case in terms of the exposure levels.

Stand-Alone Transmission Mode

Mode/Band	Freq (MHz)	Power		Antenna Gain		R (cm)	S (mW/cm^2)	Limits (mW/cm^2)
		(dBm)	(mW)	(dBi)	(Numeric)			
LORA	**902.5**	**15.35**	**34.28**	**0.2**	**1.0**	**20**	**0.01**	**0.6**
WCDMA B2	1852.4	22.85	192.75	2.0	1.6	20	0.06	1.0
WCDMA B4	1732.4	23.10	204.17	2.0	1.6	20	0.06	1.0
WCDMA B5	846.6	23.13	205.59	0.2	1.0	20	0.04	0.6
LTE B2	1900	22.96	197.70	2.0	1.6	20	0.06	1.0
LTE B4	1720	23.18	207.97	2.0	1.6	20	0.07	1.0
LTE B5	829	23.57	227.51	0.2	1.0	20	0.05	0.6
LTE B7	2560	21.48	140.60	3.0	2.0	20	0.06	1.0
LTE CA_7C	2540.2(PCC)	25.20	331.13	3.0	2.0	20	0.13	1.0
LTE B12	707.5	23.50	223.87	0.2	1.0	20	0.05	0.5
LTE B13	782	23.53	225.42	0.2	1.0	20	0.05	0.5
LTE B26	831.5	23.04	201.37	0.2	1.0	20	0.04	0.6
LTE B30	2310	21.67	146.89	3.0	2.0	20	0.06	1.0
LTE B41	2506	21.39	137.72	3.0	2.0	20	0.05	1.0
LTE CA_41C	**2660.2(PCC)**	**25.96**	**394.46**	**3.0**	**2.0**	**20**	**0.16**	**1.0**
LTE B66	1720	23.37	217.27	2.0	1.6	20	0.07	1.0

Note: $1mW/cm^2$ from §1.1310 Table 1.

Simultaneous Transmission Mode

According KDB 447498 D01, there are two antennas for cellular and Lora respective ,so simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0.

Mode/Band	Ratio (Normalized)	Limits(Normalized)
LORA+ LTE CA_41C	0.01/0.6+0.16/1.0=**0.18**	1.0

According to the KDB447498 D01 section 7.1 determine the device is exclusion from SAR test.

---End of Test Report---