FCC Test Report

FCC ID:2AIF5-EM200

Product:	SWIMBOT
Trade Name:	SWIMBOT
Model Number:	EM200
Serial Model:	N/A
Report No.:	NTEK- 2016NT03244887F4

Prepared for

LIVE-TRACK-TECH

2 TER CHEMIN SCRIBE MEUDON, FRANCE

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name	:	Live-Track-Tech
Address	:	2 TER Chemin Scribe Meudon, France
Manufacturer's Name	:	Shenzhen Elink Technology Co.,Ltd.
Address	:	Room 531, Block A, Mingyou Procurement Center, Xixiang, Bao'an District,Shenzhen

Product description

Product name	:	SWIMBOT
Model and/or type reference	:	N/A
Standards	:	FCC Part15B:01 Oct.2015 ANSI C63.4:2014

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with Part 15 of FCC Rules. And it is applicable only to the tested sample identified in the report.

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Date of Test	:	
Date (s) of performance of tests	:	24 Mar. 2016 ~ 19 Apr. 2016
Date of Issue	:	19 Apr. 2016
Test Result	:	**Pass**

Testing Engineer : Susan

(Susan Su)

Technical Manager : Jason Chen

(Jason Chen)

Authorized Signatory : Sam . Chen

(Sam Chen)

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1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
FCC Part15B:2014 ANSI C63.4: 2014	Conducted Emission	Class B	PASS	
	Radiated Emission	Class B	PASS	

NOTE:

(1) 'N/A' denotes test is not applicable in this Test Report

(2) For client's request and manual description, the test will not be executed.

1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd
Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.
FCC Registration Number:238937; IC Registration Number:9270A-1
CNAS Registration Number:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95** %.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
NTEKC01	ANSI	150 KHz ~ 30MHz	3.2	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
NTEKA01	ANSI	30MHz ~ 1000MHz	4.7	
		1GHz ~12.4GHz	5.0	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	SWIMBOT
Trade Name	SWIMBOT
Model Name	EM200
Serial Model	N/A
Model Difference	N/A
Product Description	The EUT is a Industrial SWIMBOT. Connecting I/O port: USB, DC in Operation Frequency: BT:2402~2480 MHz WIFI:802.11b/g/n(20MHz): 2412~2462MHz 802.11n(40MHz):2422~2452MHz Modulation Type: BT(1Mbps): GFSK BT EDR(2Mbps): π/4-DQPSK BT EDR(3Mbps): 8-DPSK IEEE 802.11b : DSSS (CCK, QPSK, DBPSK) IEEE 802.11g/n (HT20/HT40) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Power Source	DC Voltage
Adapter	N/A
Battery	DC 3.7V, 700mAh

2.1.1 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Connect to PC
Mode 2	BT +Charging

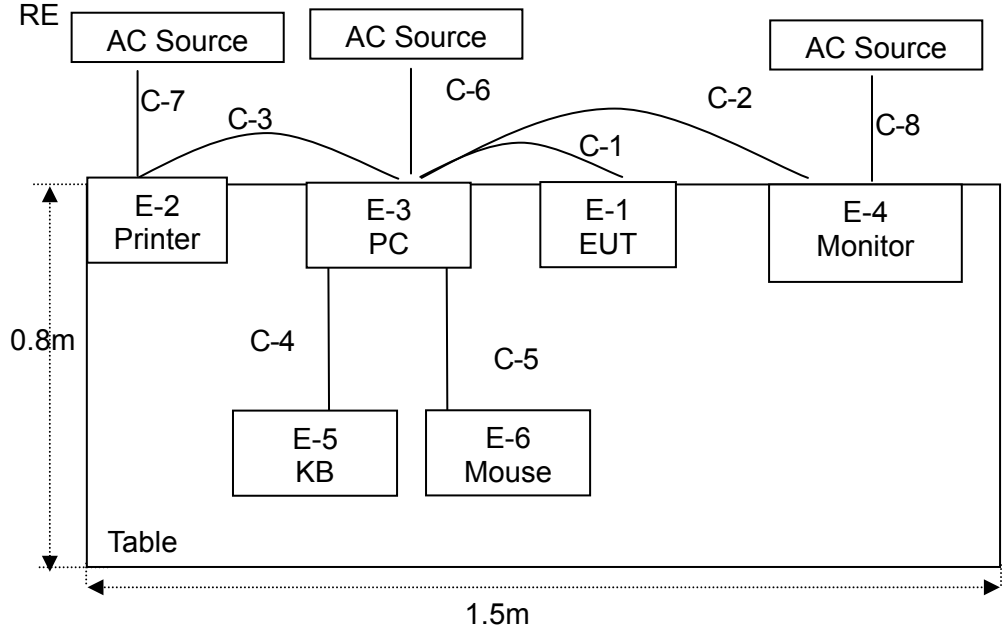
For Conducted Test	
Final Test Mode	Description
Mode 1	Connect to PC

For Radiated Test	
Final Test Mode	Description
Mode 1	Connect to PC

Note: Final Test Mode: Through Pre-scan, find the mode 1 is the worst case.
Only the worst case mode is recorded in the report.

2.2 DESCRIPTION OF TEST SETUP

RE



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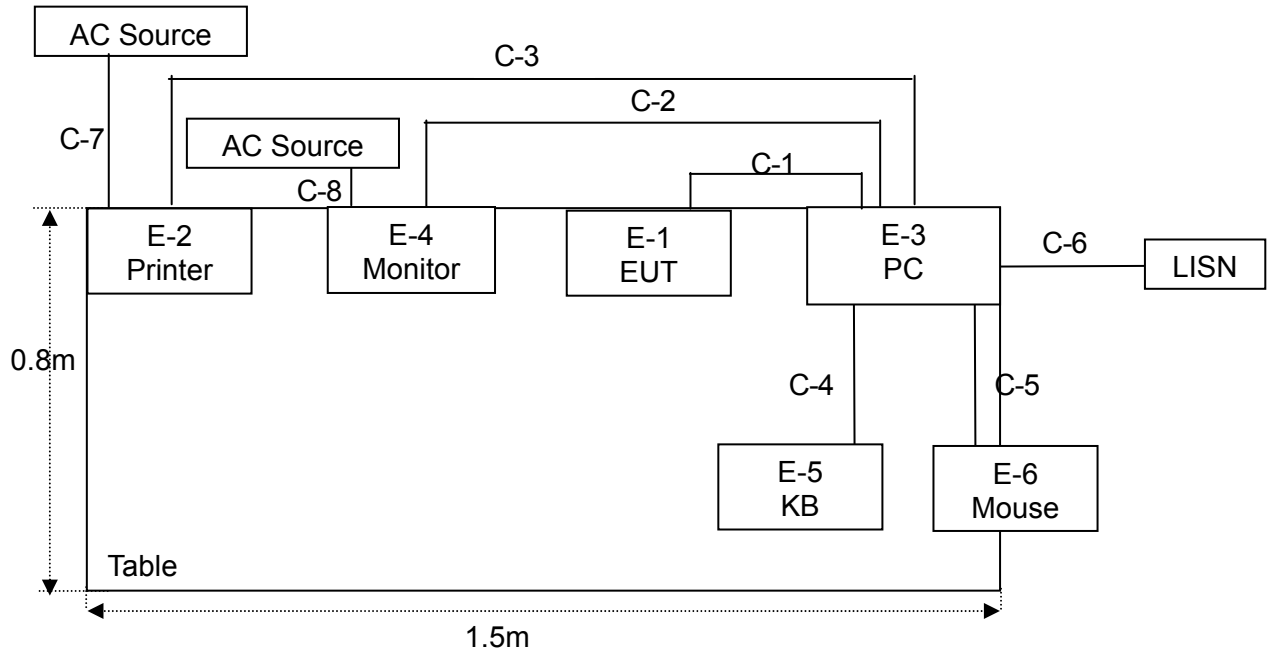


2.3 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	SWIMBOT	SWIMBOT	EM200	N/A	EUT
E-2	Printer	Canon	L11121E	LBP2900	
E-3	Personal computer	DELL	FT4Y23X	34413561645	
E-4	Monitor	DELL	IN2020MB	cn-0y6mhx-74261-11f-67e s	
E-5	Keyboard	DELL	SK-8185	OY526KUS	
E-6	Mouse	DELL	MS111-P	cn-011d3v-71581-11e-1th7	

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note
C-1	USB Cable	unshielded	NO	1.2m	
C-2	VGA	unshielded	NO	1.0m	
C-3	USB Cable	unshielded	NO	1.2m	
C-4	USB Cable	unshielded	NO	1.0m	
C-5	USB Cable	unshielded	NO	1.0m	
C-6	Power Line	unshielded	NO	1.2m	
C-7	Power Line	unshielded	NO	1.2m	
C-8	Power Line	unshielded	NO	1.2m	

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.
(3) “YES” means “shielded” “with core”; “NO” means “unshielded” “without core”.

2.4 MEASUREMENT INSTRUMENTS LIST

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2015.07.06	2016.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2015.06.07	2016.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2015.07.06	2016.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.07	2016.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2015.06.07	2016.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2015.07.06	2016.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2015.07.06	2016.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2015.07.06	2016.07.05	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2015.06.08	2016.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2015.07.06	2016.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2015.07.06	2016.07.05	1 year
12	Test Cable	N/A	R-01	N/A	2015.07.06	2016.07.05	1 year
13	Test Cable	N/A	R-02	N/A	2015.07.06	2016.07.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2015.06.06	2016.06.05	1 year
2	LISN	R&S	ENV216	101313	2015.08.24	2016.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2015.08.24	2016.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.06.07	2016.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2015.06.07	2016.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2015.06.08	2016.06.07	1 year
7	Test Cable	N/A	C01	N/A	2015.06.08	2016.06.07	1 year
8	Test Cable	N/A	C02	N/A	2015.06.08	2016.06.07	1 year
9	Test Cable	N/A	C03	N/A	2015.06.08	2016.06.07	1 year

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

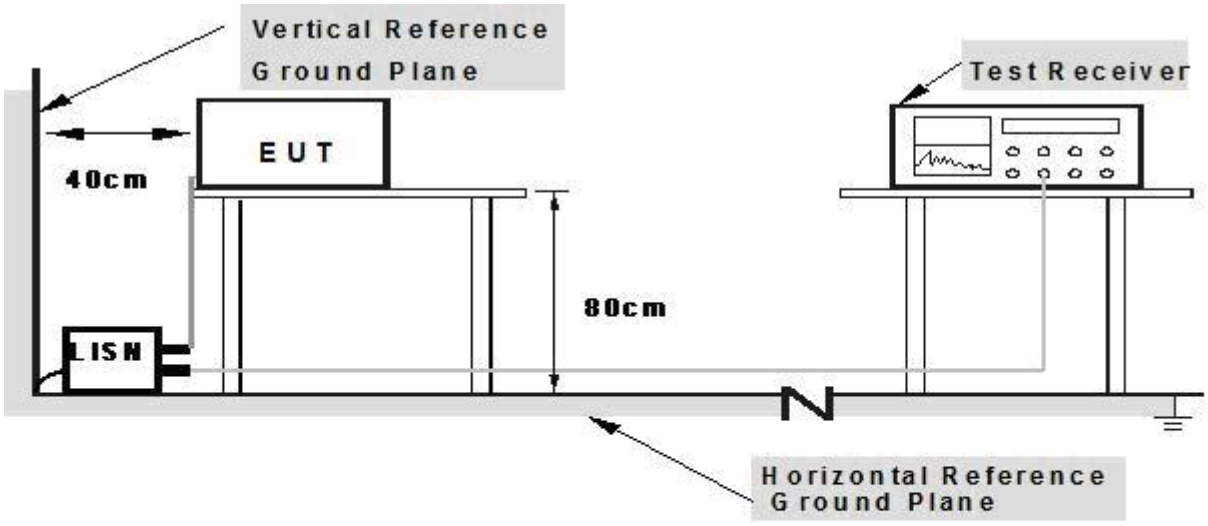
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

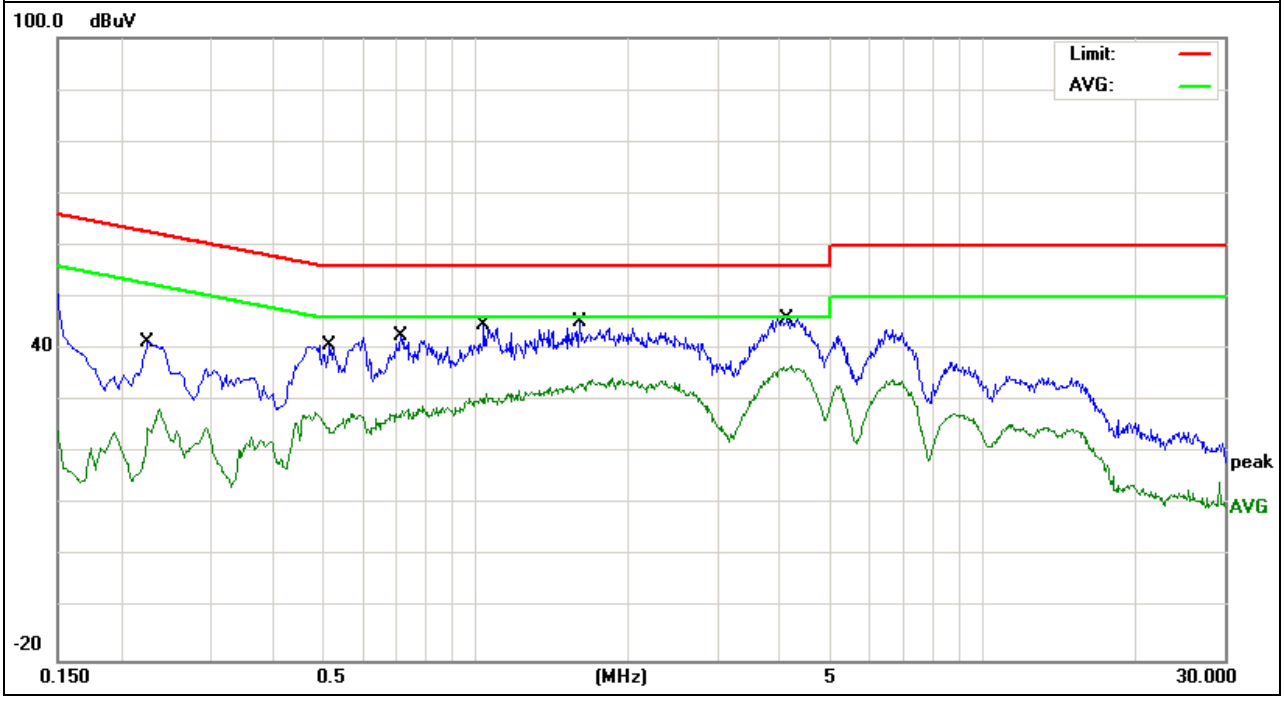
3.1.5 TEST RESULTS

EUT:	SWIMBOT	Model Name. :	EM200
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2016-3-31
Test Mode:	Mode 1	Phase :	L
Test Voltage:	DC 5V From PC AC 120V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.2260	31.27	10.13	41.40	62.59	-21.19	QP
0.2260	14.62	10.13	24.75	52.59	-27.84	AVG
0.5180	31.03	9.80	40.83	56.00	-15.17	QP
0.5180	15.82	9.80	25.62	46.00	-20.38	AVG
0.7140	32.63	9.78	42.41	56.00	-13.59	QP
0.7140	18.37	9.78	28.15	46.00	-17.85	AVG
1.0420	34.77	9.84	44.61	56.00	-11.39	QP
1.0420	21.56	9.84	31.40	46.00	-14.60	AVG
1.6100	35.32	9.78	45.10	56.00	-10.90	QP
1.6100	23.43	9.78	33.21	46.00	-12.79	AVG
4.1139	36.23	9.75	45.98	56.00	-10.02	QP
4.1139	26.77	9.75	36.52	46.00	-9.48	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

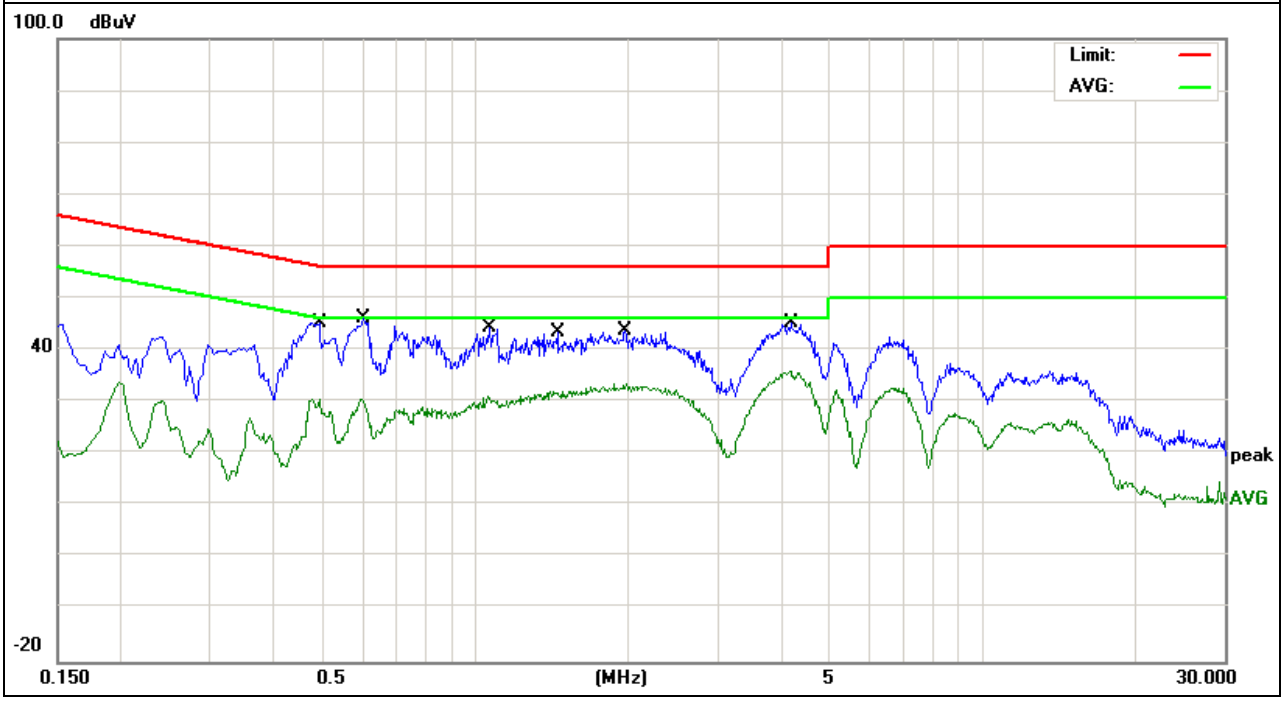


EUT:	SWIMBOT	Model Name. :	EM200
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2016-3-31
Test Mode:	Mode 1	Phase :	N
Test Voltage:	DC 5V From PC AC 120V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.4940	35.49	9.83	45.32	56.10	-10.78	QP
0.4940	19.61	9.83	29.44	46.10	-16.66	AVG
0.6020	36.33	9.81	46.14	56.00	-9.86	QP
0.6020	20.58	9.81	30.39	46.00	-15.61	AVG
1.0700	34.36	9.86	44.22	56.00	-11.78	QP
1.0700	21.29	9.86	31.15	46.00	-14.85	AVG
1.4500	33.51	9.82	43.33	56.00	-12.67	QP
1.4500	22.04	9.82	31.86	46.00	-14.14	AVG
1.9740	33.88	9.75	43.63	56.00	-12.37	QP
1.9740	23.54	9.75	33.29	46.00	-12.71	AVG
4.1819	35.42	9.72	45.14	56.00	-10.86	QP
4.1819	26.20	9.72	35.92	46.00	-10.08	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

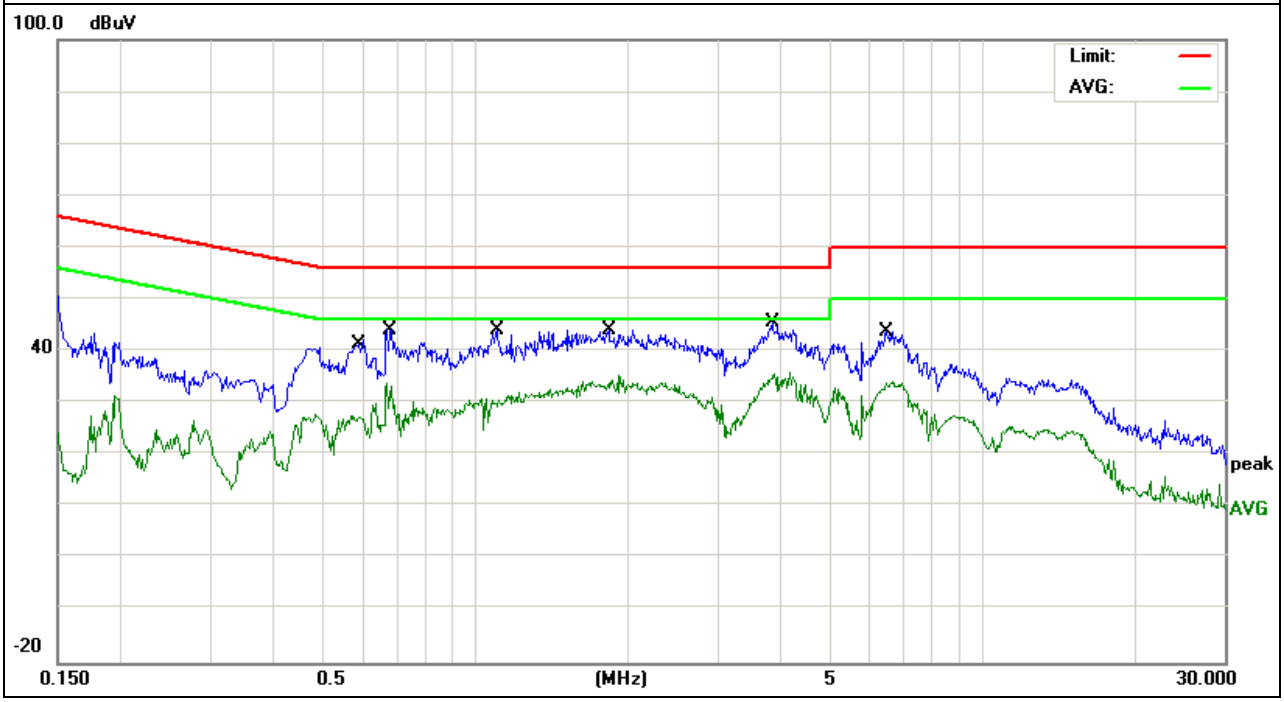


EUT:	SWIMBOT	Model Name. :	EM200
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2016-3-31
Test Mode:	Mode 1	Phase :	L
Test Voltage:	DC 5V From PC AC 240V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.5898	31.58	9.79	41.37	56.00	-14.63	QP
0.5898	17.17	9.79	26.96	46.00	-19.04	AVG
0.6780	34.42	9.78	44.20	56.00	-11.80	QP
0.6780	23.33	9.78	33.11	46.00	-12.89	AVG
1.1019	34.21	9.84	44.05	56.00	-11.95	QP
1.1019	20.73	9.84	30.57	46.00	-15.43	AVG
1.8340	34.16	9.75	43.91	56.00	-12.09	QP
1.8340	23.32	9.75	33.07	46.00	-12.93	AVG
3.8580	35.86	9.75	45.61	56.00	-10.39	QP
3.8580	25.22	9.75	34.97	46.00	-11.03	AVG
6.4739	33.89	9.77	43.66	60.00	-16.34	QP
6.4739	23.99	9.77	33.76	50.00	-16.24	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

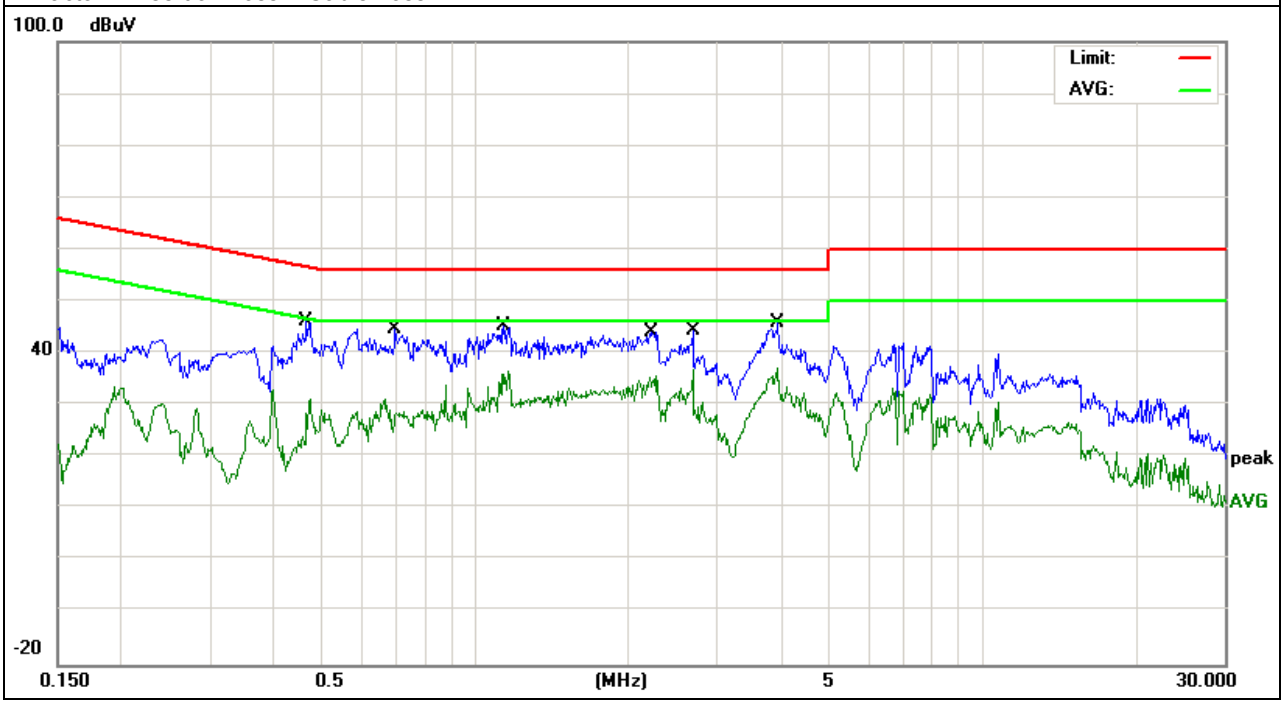


EUT:	SWIMBOT	Model Name. :	EM200
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2016-3-31
Test Mode:	Mode 1	Phase :	N
Test Voltage:	DC 5V From PC AC 240V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.4660	36.30	9.90	46.20	56.58	-10.38	QP
0.4660	18.79	9.90	28.69	46.58	-17.89	AVG
0.6937	34.70	9.81	44.51	56.00	-11.49	QP
0.6937	17.92	9.81	27.73	46.00	-18.27	AVG
1.1377	35.35	9.85	45.20	56.00	-10.80	QP
1.1377	26.18	9.85	36.03	46.00	-9.97	AVG
2.2259	34.35	9.75	44.10	56.00	-11.90	QP
2.2259	25.09	9.75	34.84	46.00	-11.16	AVG
2.6899	34.56	9.74	44.30	56.00	-11.70	QP
2.6899	18.32	9.74	28.06	46.00	-17.94	AVG
3.9540	35.98	9.72	45.70	56.00	-10.30	QP
3.9540	27.29	9.72	37.01	46.00	-8.99	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.1.6 RADIATED EMISSION MEASUREMENT

3.1.7 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 3m)
	dBuV/m	dBuV/m
30 ~ 88	39.0	40.0
88 ~ 216	43.5	43.5
216 ~ 960	46.5	46.0
Above 960	49.5	54.0

Notes:

(1) The limit for radiated test was performed according to as following: FCC PART 15B /ICES-003.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

3.1.8 TEST PROCEDURE

Test Arrangement for Radiated Emissions up to 1 GHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency below 1GHz.

Test Arrangement for Radiated Emissions above 1 GHz.

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength.Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

Note：For the hand-held device, the EUT should be measured for all 3 axes and only the worst

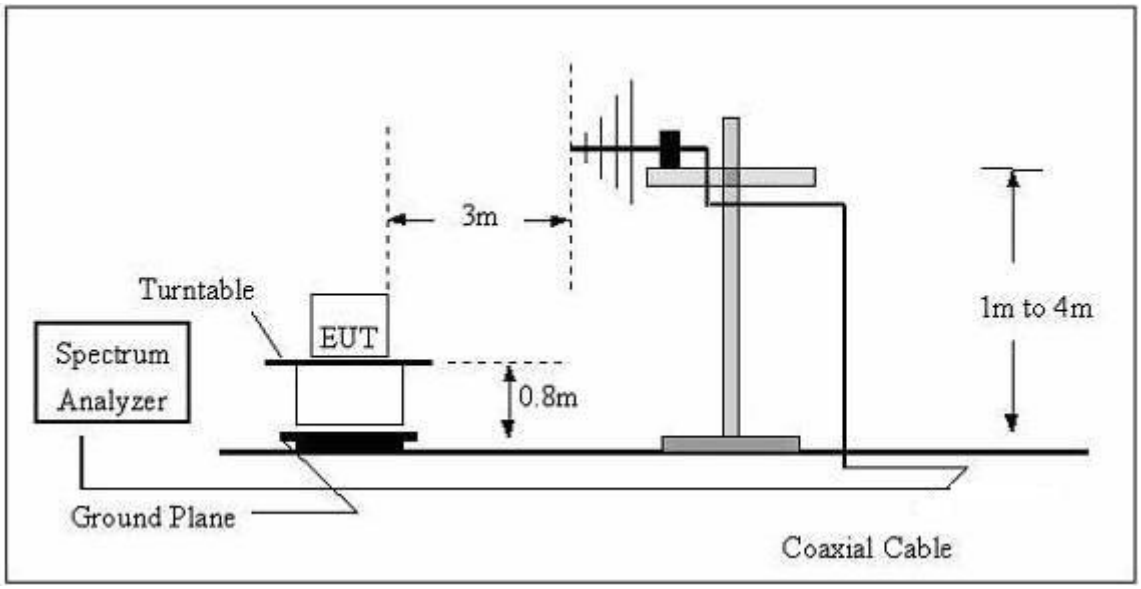
case is recorded in the report

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

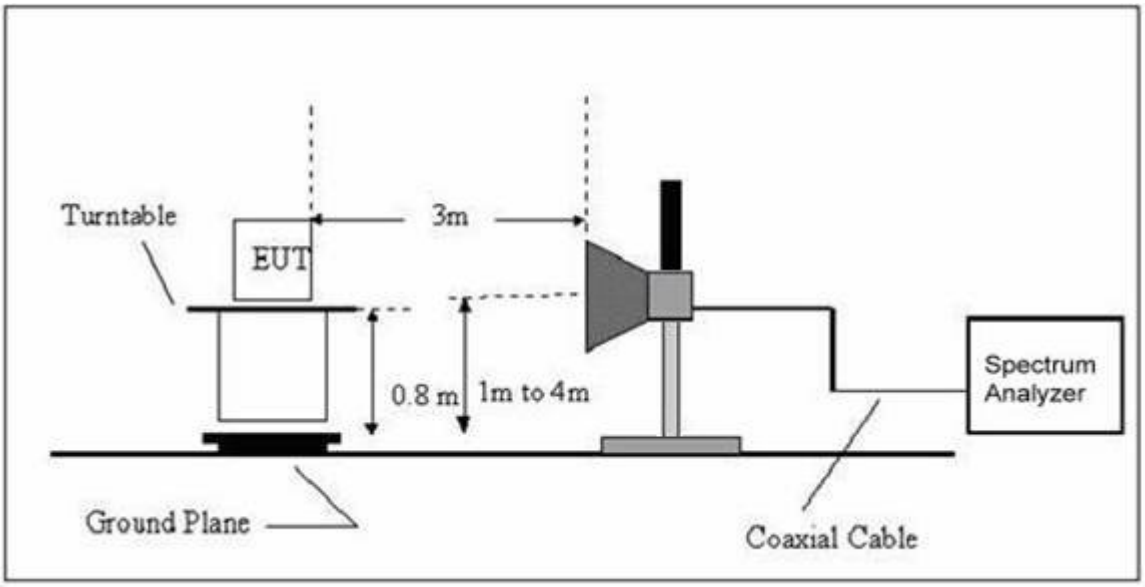
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Avg	1 MHz	10 Hz

3.1.9 TEST SETUP

For Radiated Emission 30~1000MHz



(B) Radiated Emission Test Set-Up Frequency Above 1GHz



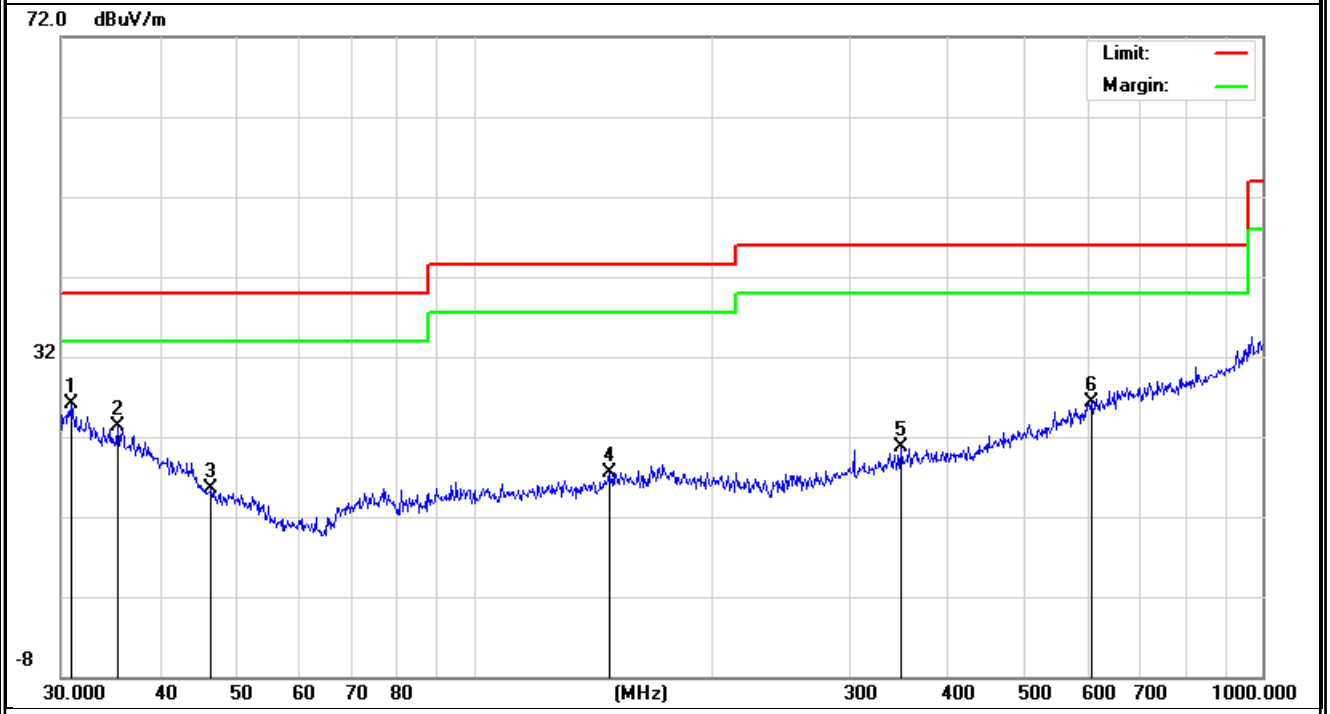
3.1.10 TEST RESULTS

TEST RESULTS (30~1000 MHz)

EUT:	SWIMBOT	Model Name. :	EM200
Temperature:	24 ℃	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2016-3-31
Test Mode :	Mode 1	Polarization :	Horizontal
Test Power :	DC 5V From PC AC 120V/60Hz		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	30.9618	6.85	19.22	26.07	40.00	-13.93	QP
H	35.375	6.07	17.14	23.21	40.00	-16.79	QP
H	46.503	5.17	10.42	15.59	40.00	-24.41	QP
H	148.441	6.00	11.57	17.57	43.50	-25.93	QP
H	348.0274	6.71	14.07	20.78	46.00	-25.22	QP
H	607.7867	6.60	19.69	26.29	46.00	-19.71	QP

Remark:
Factor = Antenna Factor + Cable Loss - Amplifier.

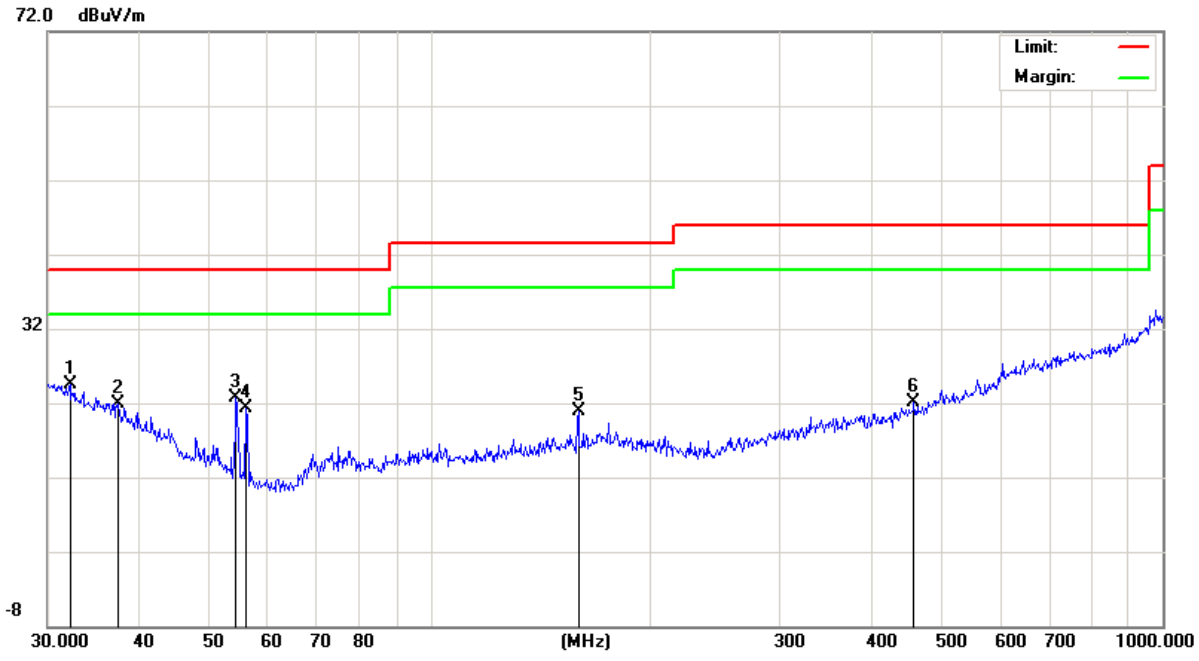


EUT:	SWIMBOT	Model Name. :	EM200
Temperature:	24 ℃	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2016-3-31
Test Mode :	Mode 1	Polarization :	Vertical
Test Power :	DC 5V From PC AC 120V/60Hz		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	32.1794	5.82	18.73	24.55	40.00	-15.45	QP
V	37.4164	5.81	16.09	21.90	40.00	-18.10	QP
V	54.261	14.79	7.84	22.63	40.00	-17.37	QP
V	56.0007	14.65	6.70	21.35	40.00	-18.65	QP
V	159.2251	9.33	11.50	20.83	43.50	-22.67	QP
V	457.5073	5.93	16.09	22.02	46.00	-23.98	QP

Remark:

Factor = Antenna Factor + Cable Loss - Amplifier.



3.1.11 TEST RESULTS(1000~12400MHz)

All the modulation modes have been tested, and the worst result was report as below:

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	2484.854	45.96	-11.58	34.38	74.00	-39.62	peak
V	2484.854	31.44	-11.58	19.86	54.00	-34.14	AVG
V	4016.478	46.53	-3.78	42.75	74.00	-31.25	peak
V	4016.478	33.12	-3.78	29.34	54.00	-24.66	AVG
H	2199.817	44.83	-10.90	33.93	74.00	-40.07	peak
H	2199.817	31.57	-10.90	20.67	54.00	-33.33	AVG
H	3882.044	46.93	-4.06	42.87	74.00	-31.13	peak
H	3882.044	33.45	-4.06	29.39	54.00	-24.61	AVG

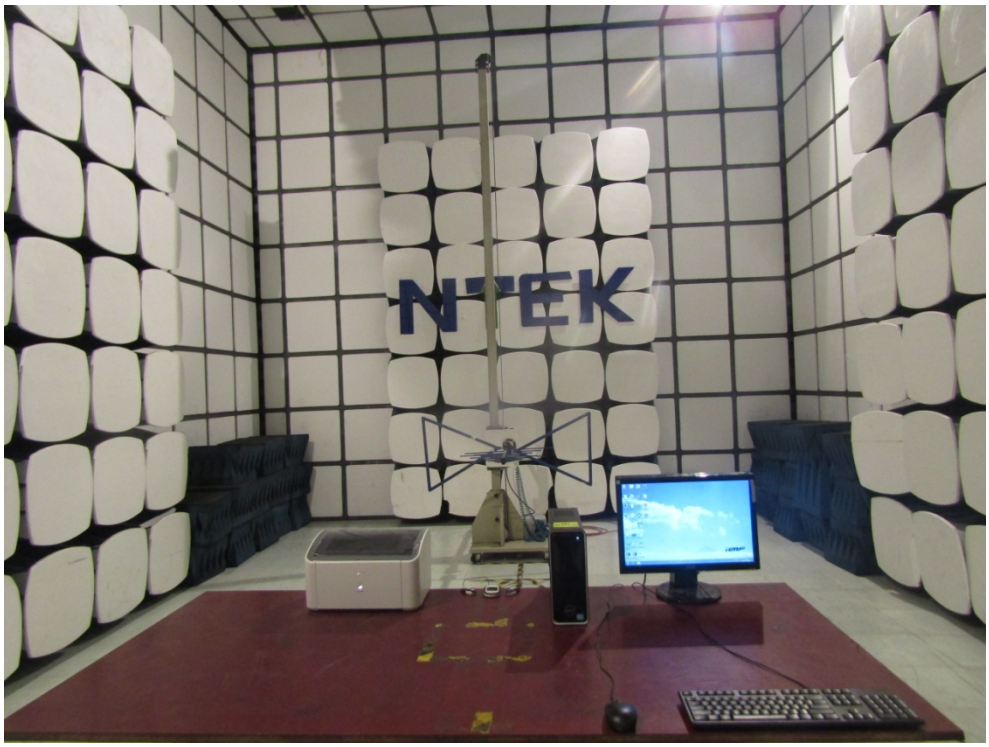
Remark:

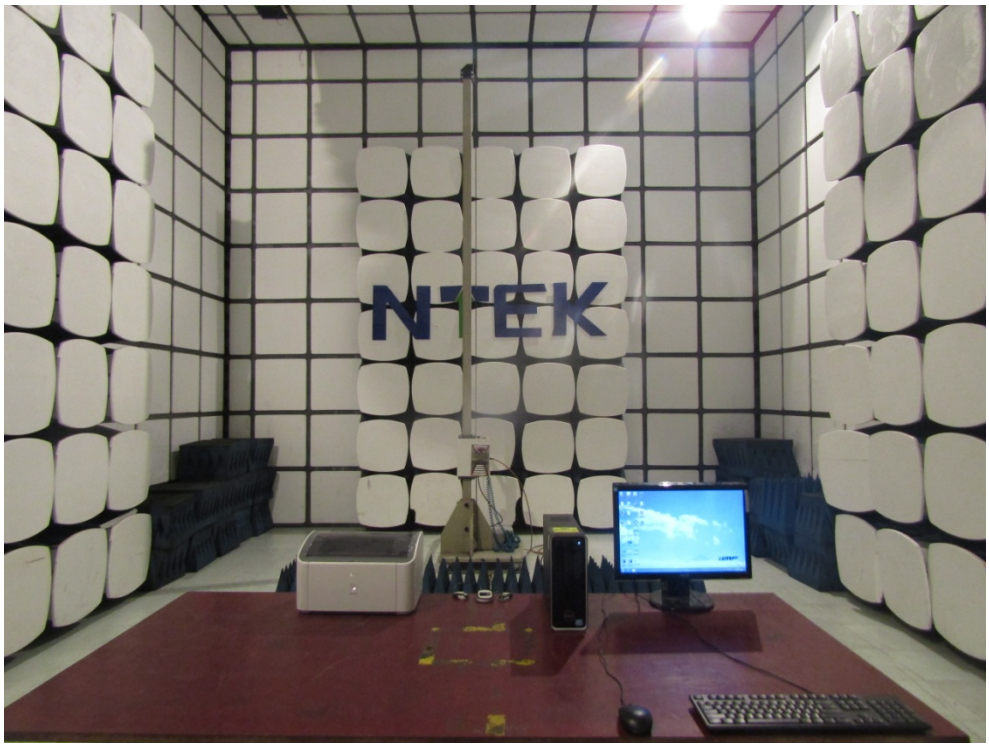
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level – Limit

All other emissions more than 20dB below the limit

4. EUT TEST PHOTO

Radiated Measurement Photos





Conducted Measurement Photos