

1. Order No. G-45-2018-01852**2. Client**

2.1 Name : o2ones Co., Ltd.

2.2 Address : 503, Glory Tower, 3-10, Gumi-ro 9beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do,
Republic of Korea.

2.3 Date of Receipt : : May 29, 2018

3. Use of Report : Validation**4. Test Sample : AvoirRing (Model Name: SM-201)****5. Date of Test : June 14, 2018 ~ June 20, 2018****6. Test Method Used : FCC Part 15 Subpart B, ANSI C 63.4:2014****7. Testing Environment :** Temp. (Minimum 23.5 °C, Maximum 25.7 °C) ,
Humidity (Minimum 42.0 % R.H., Maximum 50.0 % R.H.)
Atmospheric Pressure : (Minimum 101.8 kPa, Maximum 102.6 kPa)**8. Test Results : Complied****9. Measurement Uncertainty : Refer to attachment**The confidence level is about 95 %, $k = 2$

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by	Technical Manager
	Name : Calix Kim (Signature)	Name : Paul Kang (Signature)

The above test report is the accredited test results by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

June 25, 2018

Accredited by KOLAS Republic of KOREA
SGS Korea Co., Ltd. Gunpo Laboratory
4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807

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Revision History

Revision	Report Number	Description
0	F690501/RF-EMC003600(G)	Initial
1		
2		

1. General Information

1.1 Client Information

Applicant : o2ones Co., Ltd.
 Address of Applicant : 503, Glory Tower, 3-10, Gumi-ro 9beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea.

Manufacturer : o2ones Co., Ltd.
 Address of Manufacturer : 503, Glory Tower, 3-10, Gumi-ro 9beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea.

1.2 Test Laboratory

Name and Address : SGS Korea Co., Ltd.
 Giheung 1 Laboratory : 35, Giheungdanji-ro 121beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
 Giheung 2 Laboratory : 23, Giheungdanji-ro 24beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
 Gunpo Laboratory : 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, 15807, Republic of Korea

Phone : + 82 31 428 5700
 Fax : + 82 31 427 2370
 e-mail : paul.kang@sgs.com

1.3 General Information of E.U.T.

Classification	Description
Product Name	AvoirRing
Model Name	SM-201
EMI Classification	Class B
Highest Internal Frequency	2.4 MHz
Serial No.	-
Test Voltage	120 V~, 60 Hz (for Travel Adapter)
Rated Voltage	3.7 Vd.c., 15 mA h, 55.5 mW h
Operating Temperature	(-)10 °C ~ (+)60 °C
H/W Version	v0.4
S/W Version	v1.1.0

1.4 Operating Modes and Conditions

Operating mode	Operating condition
1) Charging Mode	Charging State.

1.5 Auxiliary Equipments

Description	Model	Serial No.	Manufacturer
Charging Cradle	ORC-101	-	-
Travel Adapter	MCS-04KR	RA320001185	-

1.6 Cable List

Start		END		Cable Spec.		Used Core
Name	I/O Port	Name	I/O Port	Length	Shield	
EUT	DC IN	Travel Adapter	DC OUT	1.0	Unshield	No
Travel Adapter	AC IN	AC Source	AC OUT	-	Shield	-

1.7 System Configurations

Description	Model	Serial No.	Manufacturer
Main Board	Avoir Ring Bridge Rev0.4	-	-
Sub Board	AVOIR BRIDGE NFC(REV0.2)	-	-
Button	AVOIR_RING_BUTTON(REV0.2)	-	-
Speaker	KK2 78R	-	-
ANT	AVOIR_RING_BLE_ANT(REV(0.3)	-	-
Battery	251212	-	-

1.8 Test System Layout**1.9 Modifications**

There was no modified item during the test.

1.10 Applicable Standards for Testing

Standards	Status	Deviation
FCC Part 15 Subpart B	Applicable	No Deviation

1.11 Summary of Test Results

Test Item	Basic Standards	Results
Conducted Emission	ANSI C 63.4:2014 FCC Part 15 Subpart B	Complied
Radiated Emission	ANSI C 63.4:2014 FCC Part 15 Subpart B	Complied

Note 1 : Test methods of all test items are performed according to the basic standards in this table.

EMISSION

2.1 Test Results

Test Items	Basic Standards	Test Results
Conducted Emission	ANSI C 63.4:2014 FCC Part 15 Subpart B	Complied
Radiated Emission	ANSI C 63.4:2014 FCC Part 15 Subpart B	Complied

2.2 Test Method and Limits

2.2.1 Test Method

Test Items	Measuring Frequency Range	RBW	Measuring Distance
Conducted Emission	0.15 MHz ~ 30 MHz	9 kHz	-
Radiated Emission	30 MHz ~ 1 GHz	120 kHz	10 m & 3 m
	Above 1 GHz	1 MHz	3 m

2.2.2 Test Limits

-Conducted Emission Limits at Mains Port

Frequency Range	Limits(dB(μ V))		Class
	Quasi-peak	Average	
0.15 MHz ~ 0.5 MHz	79	66	Class A
0.5 MHz ~ 30 MHz	73	60	
0.15 MHz ~ 0.5 MHz	66 to 56	56 to 46	Class B
0.5 MHz ~ 5 MHz	56	46	
5 MHz ~ 30 MHz	60	50	

Note : The lower limit shall apply at the transition frequencies. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

-Radiated Emission Limits below 1 GHz

Frequency Range	Limits(dB(μ V/m))	Class
	Quasi-peak	
30 MHz ~ 88 MHz	39.1	Class A
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 960 MHz	46.4	
960 MHz ~ 1 GHz	49.5	
30 MHz ~ 88 MHz	40	Class B
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 960 MHz	46	
960 MHz ~ 1 GHz	54	

-Radiated Emission Limits above 1 GHz (3m method)

Frequency Range	Limits(dB(μ V/m))		Class
	Average	Peak	
Above 1 GHz	59.5	79.5	Class A
Above 1 GHz	54	74	Class B

2.3 Conducted Emission

The initial preliminary exploratory scans were performed over the measuring frequency range(0.15 MHz to 30 MHz) using a max hold mode incorporating a Peak detector and Average detector and using the software of EMC32(Version V8.52.0 from R&S). The final test data was measured using a Quasi-Peak detector and Average detector.

2.3.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Cal. Due Date
Two-Line V-Network	ENV216	R & S	100190	2019.05.14
Test Receiver	ESCI 7	R & S	100911	2019.02.20

Note : The calibration period of every equipment is 1 year.

2.3.2 Test Site

Shield Room in Gunpo Laboratory

2.3.3 Environment Conditions and data

Temperature : (minimum 23.5, maximum 24.4) °C

Humidity : (minimum 43.0, maximum 44.0) %R.H.

Atmospheric Pressure : (minimum 101.8, maximum 101.8) kPa

Test Date: June 18, 2018

Freq. (MHz)	Line (H/N)	Level (dB μ V)		CL (dB)	LISN (dB)	Result (dB μ V)		Limit (dB μ V)		Margin (dB)	
		Q/P	A/V			Q/P	A/V	Q/P	A/V	Q/P	A/V
0.35	N	11.02	0.42	0.08	9.70	20.80	10.20	59.06	49.06	38.26	38.86
0.53	N	17.52	1.82	0.08	9.70	27.30	11.60	56.00	46.00	28.70	34.40
16.74	N	25.04	5.54	0.16	9.80	35.00	15.50	60.00	50.00	25.00	34.50
17.39	N	24.33	6.13	0.17	9.80	34.30	16.10	60.00	50.00	25.70	33.90
18.71	H	17.42	3.12	0.18	9.70	27.30	13.00	60.00	50.00	32.70	37.00
19.37	H	17.31	3.01	0.19	9.70	27.20	12.90	60.00	50.00	32.80	37.10

Measurement Uncertainty : 3.21 dB (The confidential level is about 95%, k=2)

Note : • Line (H) : Hot

• Line (N) : Neutral

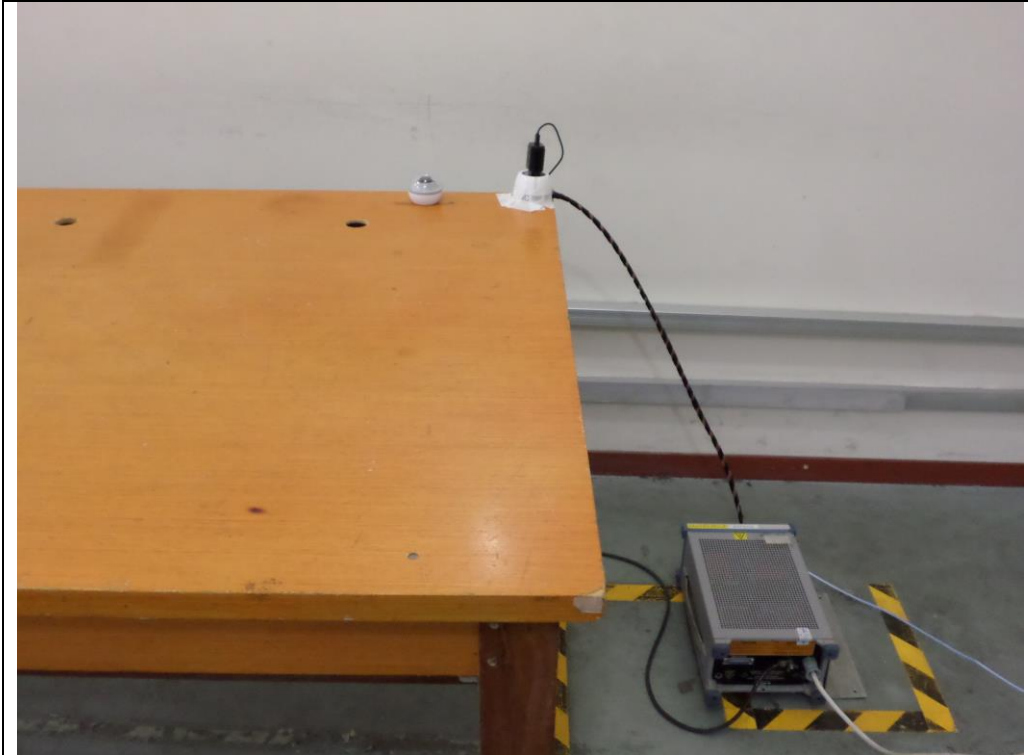
• CL: Cable Loss

• LISN : LISN Factor

• Result = Level + CL + LISN

• Margin = Limit – Result

See Appendix A (Conducted Emission)

2.3.4 Photographs of Conducted Emission at the Mains Terminal

2.4 Radiated Emission

The initial preliminary exploratory scans were performed at 3 m distance over the measuring frequency range(30 MHz to 5 GHz) using a max hold mode incorporating a Peak detector and using the software of EP5RE(Version Ver3.10.20 from TOYO). The final test data was measured using a Quasi-Peak detector below 1 GHz at 3 m distance and a Peak and Average detector above 1 GHz at 3 m distance. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

2.4.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Cal. Due Date
Horn Antenna (KOLAS)	HF906	R & S	100326	2020.02.14
Signal Conditioning Unit	SCU 18	R & S	102244	2018.09.22
Test Receiver	ESU26	R & S	100109	2019.02.07
Bilog Antenna (KOLAS)	VULB9163	SCHWARZBECK	01126	2020.03.26
Amplifier	8447F	HP	2944A03909	2018.08.11

Note : Only the calibration period of Antennas is 2 years but the period of every equipment is 1 year.

2.4.2 Test Site

3m SEMI-ANECHOIC CHAMBER Gunpo Laboratory (Below 1 GHz, Above 1 GHz)

2.4.3 Environment Conditions and data

Below 1 GHz (3 m method)

Temperature : (minimum 24.5, maximum 25.5) °C

Humidity : (minimum 50.0, maximum 50.0) %R.H.

Atmospheric Pressure : (minimum 102.6, maximum 102.6) kPa

Test Date: June 14, 2018

Above 1 GHz (3 m method)

Temperature : (minimum 24.7, maximum 25.7) °C

Humidity : (minimum 42.0, maximum 42.0) %R.H.

Atmospheric Pressure : (minimum 100.8, maximum 100.8) kPa

Test Date: June 20, 2018

Below 1 GHz (3 m method)

Freq. (MHz)	Level (dB(μV))	Pol. (H/V)	A (°)	H (cm)	AF (dB/m)	CL (dB)	Amp. (dB)	Result (dB(μV/m))	Limit (dB(μV/m))	Margin (dB)
46.65	46.30	V	70	200	14.33	1.22	28.10	33.75	40.00	6.25
46.69	33.90	H	25	200	14.33	1.22	28.10	21.35	40.00	18.65
50.05	45.30	V	47	100	14.39	1.29	28.10	32.88	40.00	7.12
306.09	32.90	H	225	300	13.56	3.00	27.44	22.02	47.00	24.98
787.33	42.40	H	28	100	20.97	4.79	28.54	39.62	47.00	7.38
819.90	42.40	V	242	100	21.00	4.91	28.46	39.85	47.00	7.15

Measurement Uncertainty (Horizontal) : 5.31 dB (The confidential level is about 95%, k=2)

Measurement Uncertainty (Vertical) : 5.73 dB (The confidential level is about 95%, k=2)

Note: • AF = Antenna Factor

• Pol.(H) = Horizontal

• Margin = Limit – F/S

• A : Angle

• CL = Cable Loss

• Pol.(V) = Vertical

• F/S = Level + AF + CL – Amp.

• H : Height

• F/S = Field Strength

• Amp. = Amplifier Gain

Above 1 GHz (3 m method)

Freq. (MHz)	Level (dBμV)	Pol. (H/V)	A (°)	H (cm)	AF (dB/m)	CL (dB)	Amp. (dB)	CF (dB)	Result (dB μV/m)	Limit (dB μV/m)	Margin (dB)
Peak Detector											
8 015.24	40.50	V	26	100	36.00	18.42	37.22	0.00	57.70	74.00	16.30
11 286.64	40.00	H	169	200	38.07	18.39	38.29	0.00	58.17	74.00	15.83
11 802.66	40.70	H	188	200	38.40	18.54	38.44	0.00	59.20	74.00	14.80
12 070.46	39.80	V	26	100	38.36	19.27	38.50	0.00	58.93	74.00	15.07
12 307.91	40.30	V	167	100	38.30	19.59	38.50	0.00	59.69	74.00	14.31
12 310.35	40.00	H	25	200	38.30	19.57	38.50	0.00	59.37	74.00	14.63
Average Detector											
8 015.24	25.50	V	26	100	36.00	18.42	37.22	0.00	42.70	54.00	11.30
11 286.64	25.00	H	169	200	38.07	18.39	38.29	0.00	43.17	54.00	10.83
11 802.66	25.70	H	188	200	38.40	18.54	38.44	0.00	44.20	54.00	9.80
12 070.46	24.60	V	26	100	38.36	19.27	38.50	0.00	43.73	54.00	10.27
12 307.91	25.30	V	167	100	38.30	19.59	38.50	0.00	44.69	54.00	9.31
12 310.35	25.00	H	25	200	38.30	19.57	38.50	0.00	44.37	54.00	9.63

Measurement Uncertainty (Horizontal) : 5.73 dB (The confidential level is about 95%, k=2)

Measurement Uncertainty (Vertical) : 5.85 dB (The confidential level is about 95%, k=2)

Note: • AF = Antenna Factor

• Pol.(H) = Horizontal

• Margin = Limit – F/S

• A : Angle

• CL = Cable Loss

• Pol.(V) = Vertical

• F/S = Level + AF + CL – Amp.

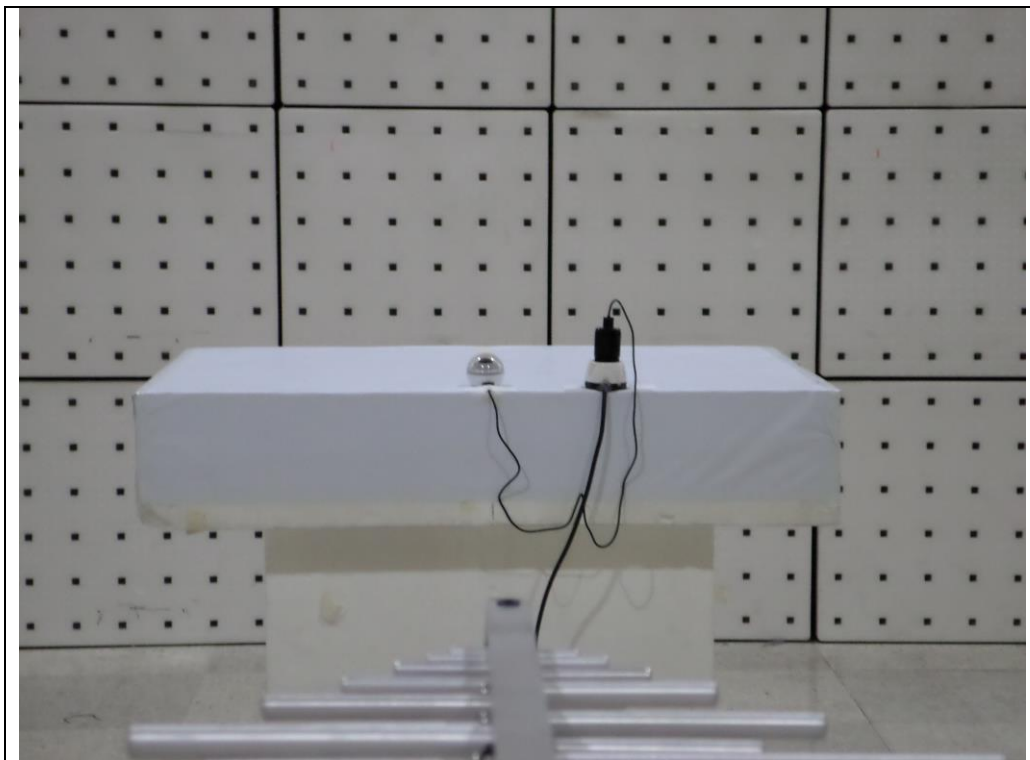
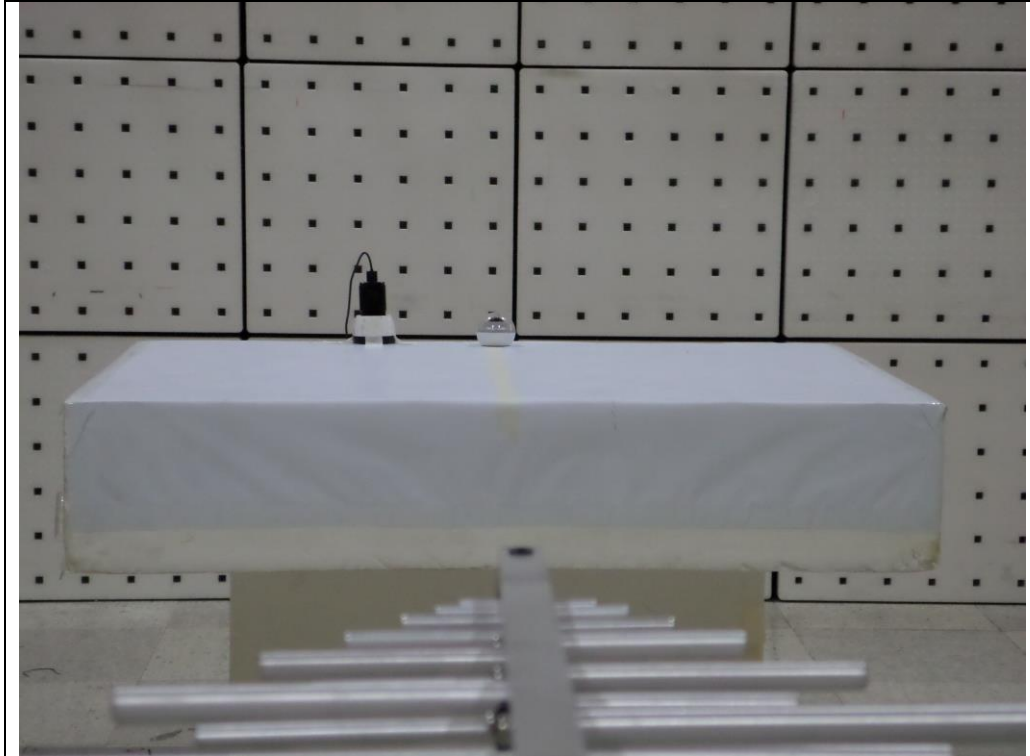
• H : Height

• F/S = Field Strength

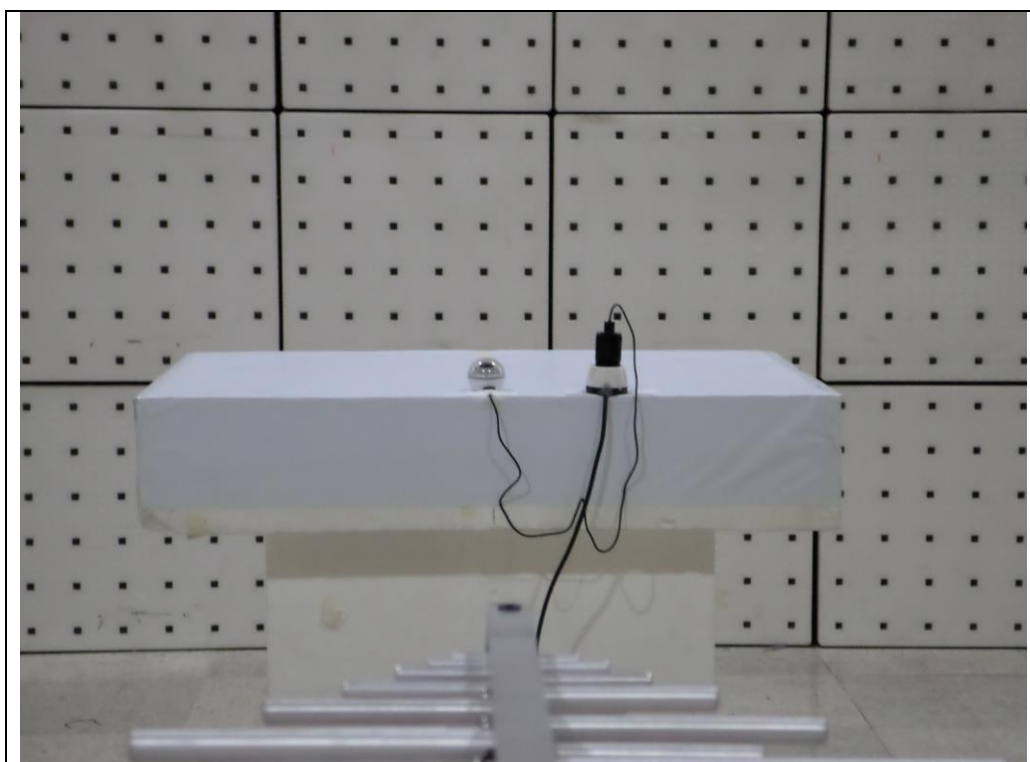
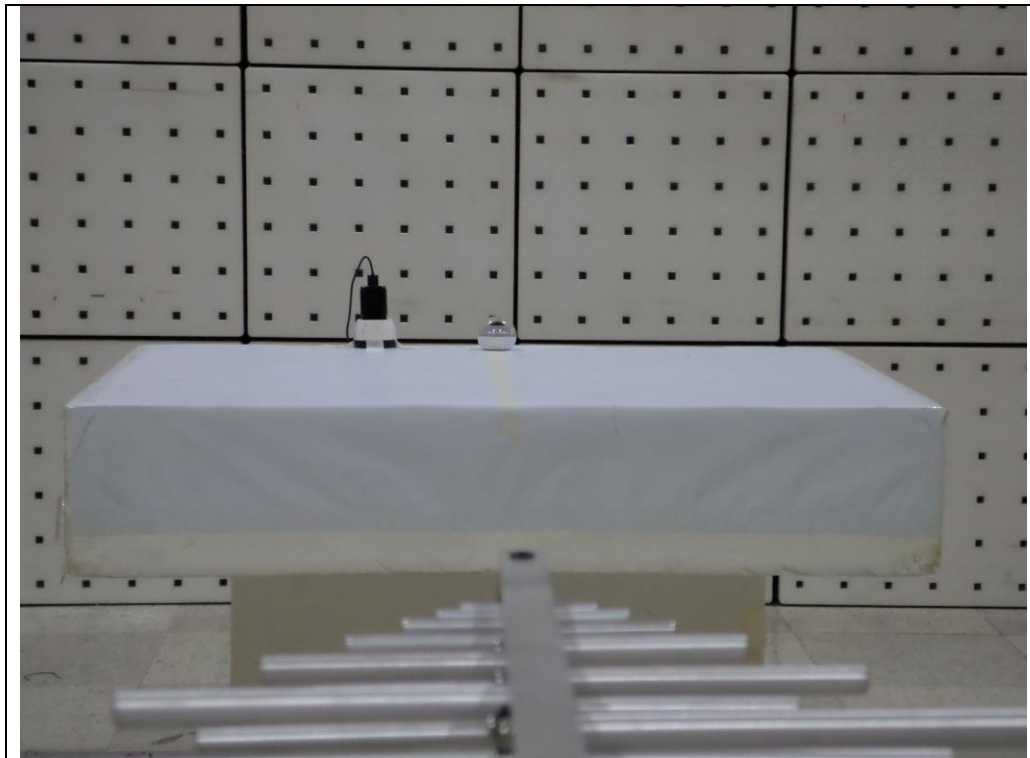
• Amp. = Amplifier Gain

See Appendix B (Radiated Emission)

2.4.4 Photographs of Radiated Emission (3m method below 1 GHz)



2.4.5 Photographs of Radiated Emission (3m method above 1 GHz)



3. Photographs of EUT

- Front View of EUT



- Rear View of EUT



- Left View of EUT



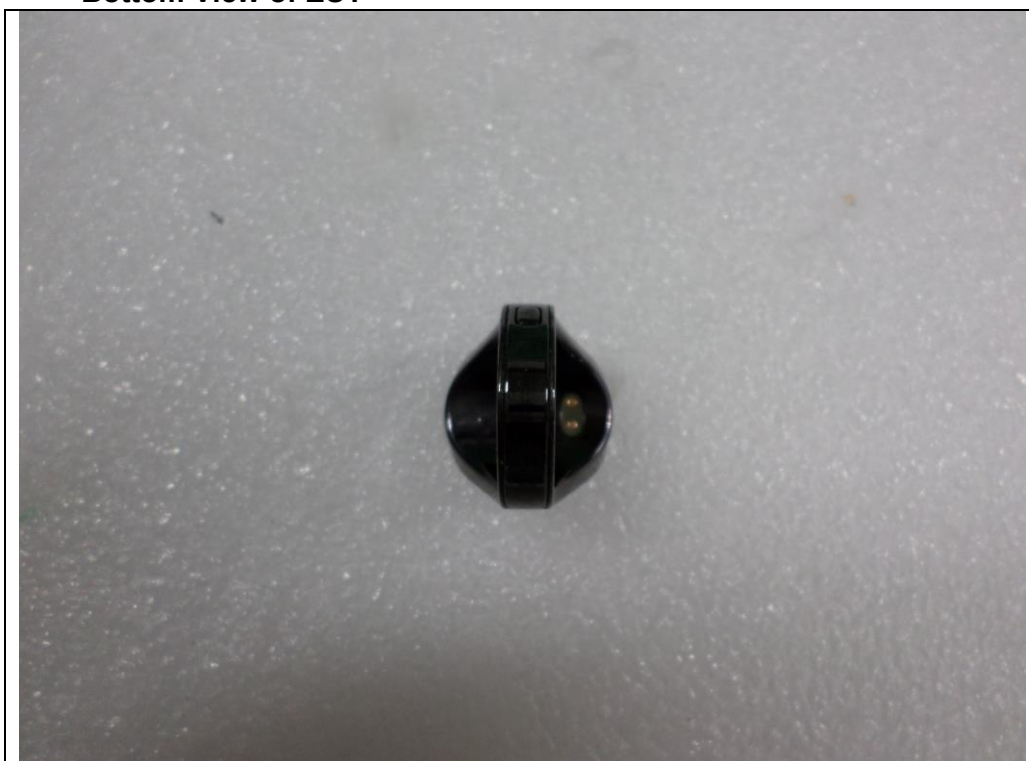
- Right View of EUT



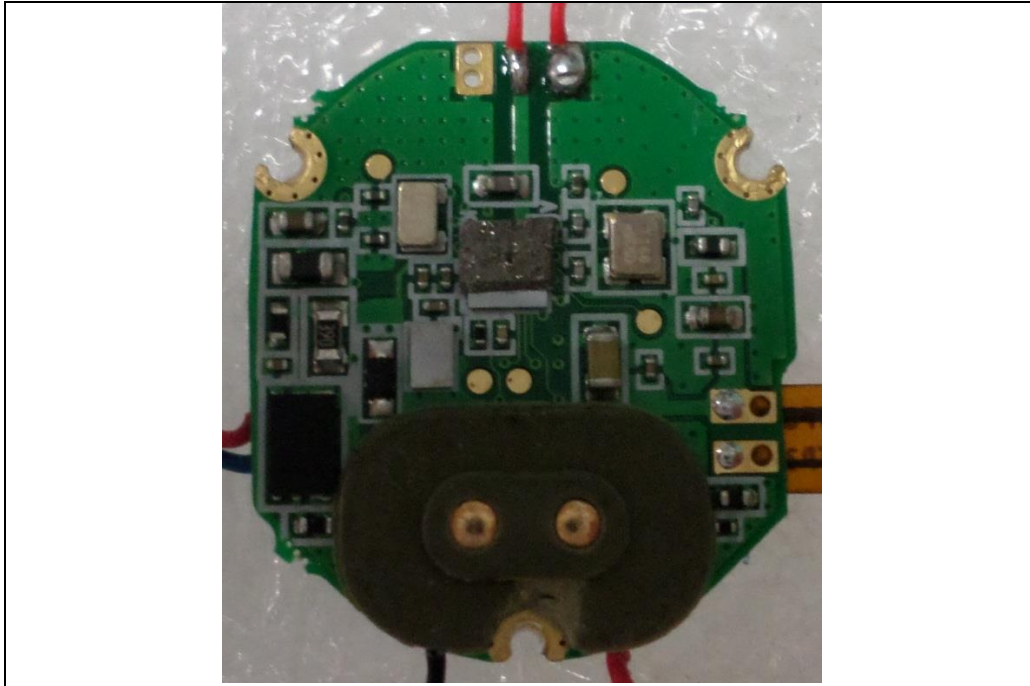
- Top View of EUT



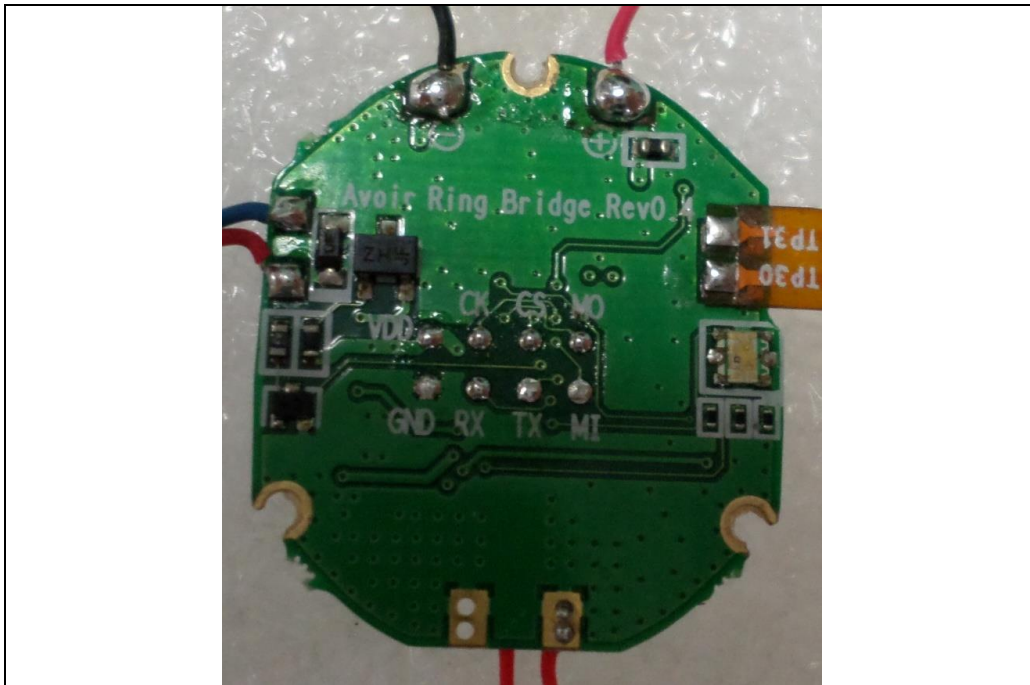
- Bottom View of EUT



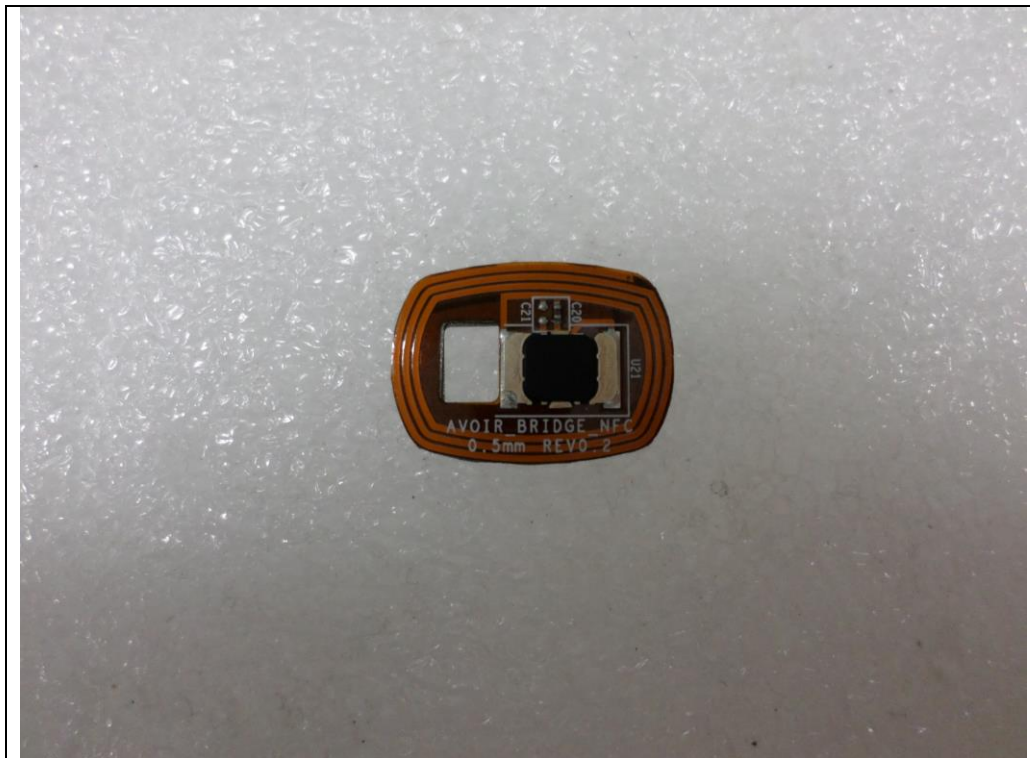
- Front View of Main Board



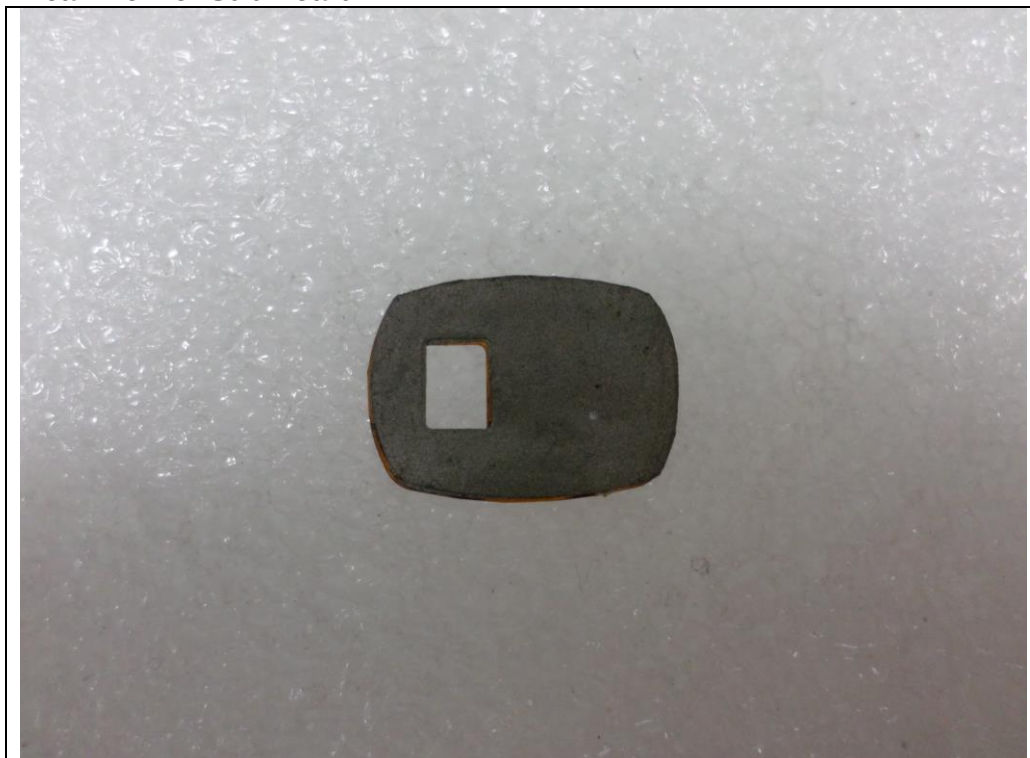
- Rear View of Main Board



- Front View of Sub Board



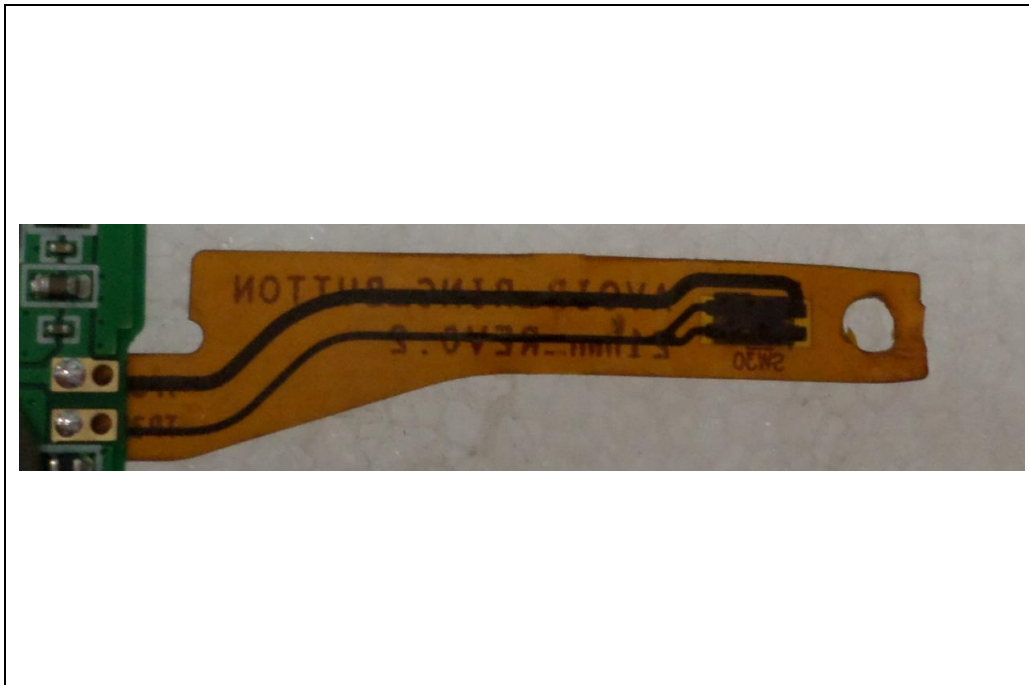
- Rear View of Sub Board



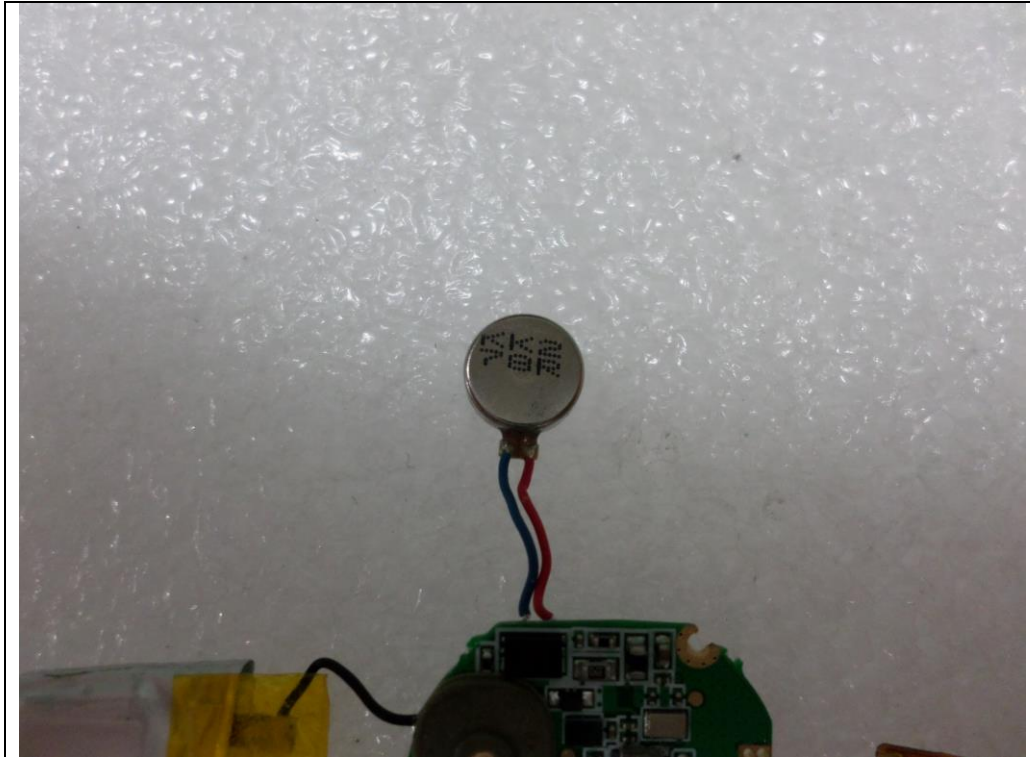
- Front View of Button



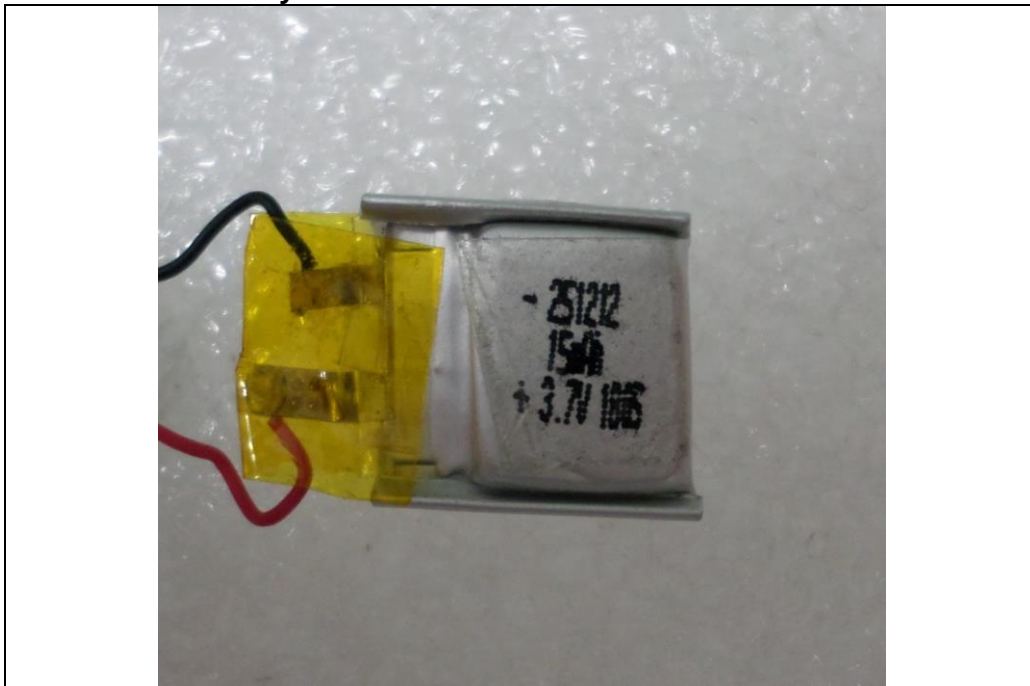
- Rear View of Button



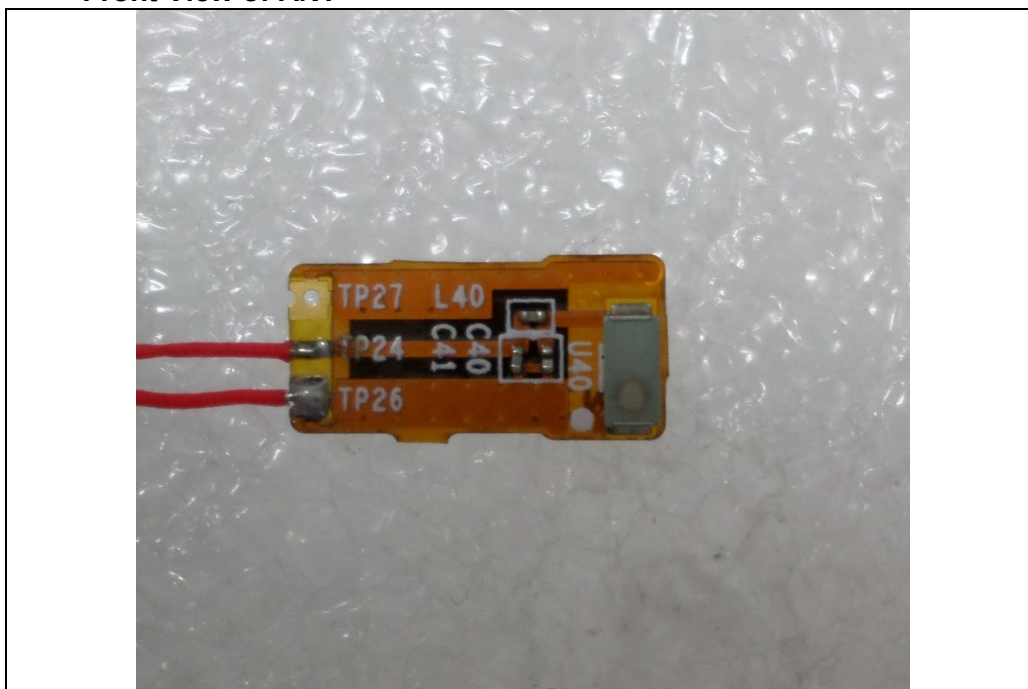
- View of Speaker



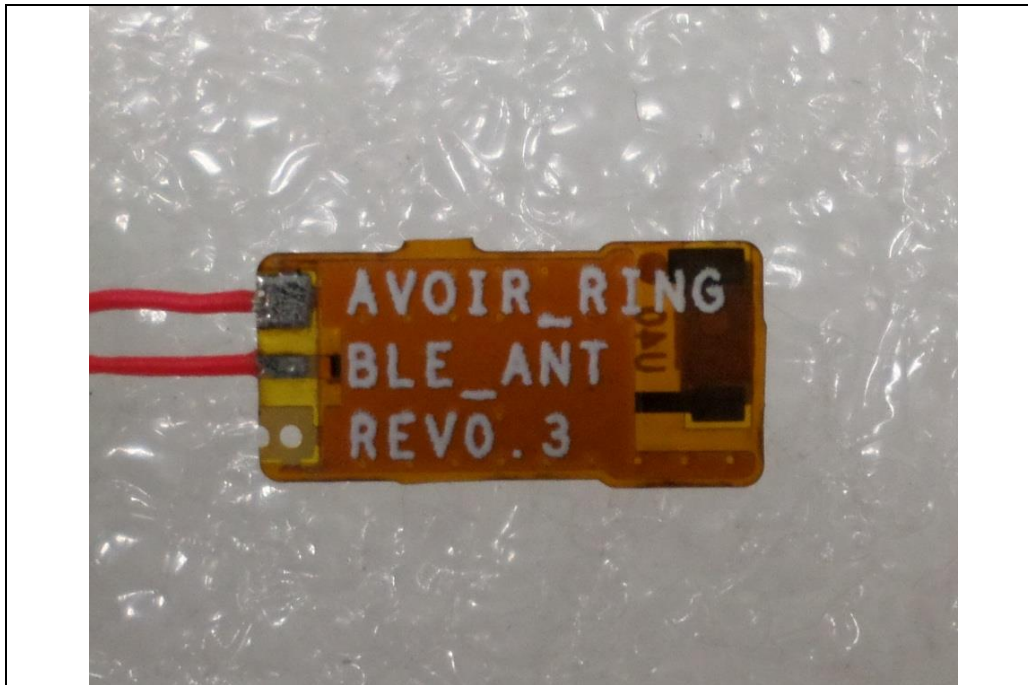
- View of Battery



- Front View of ANT



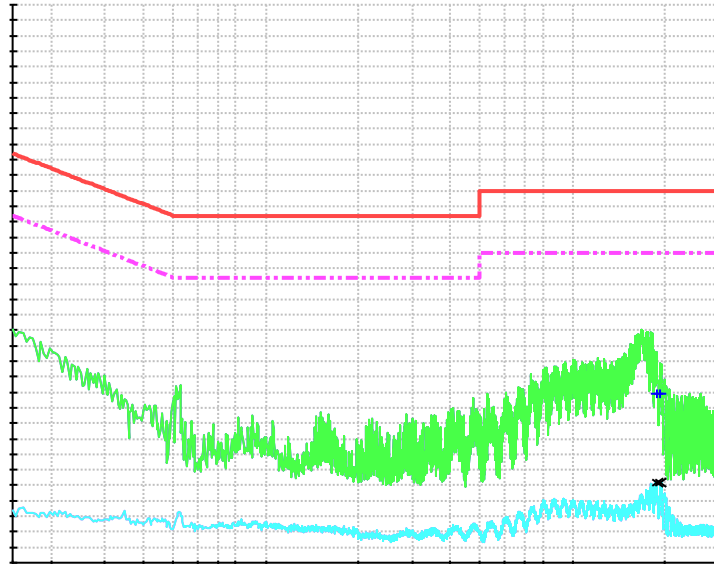
- Rear View of ANT



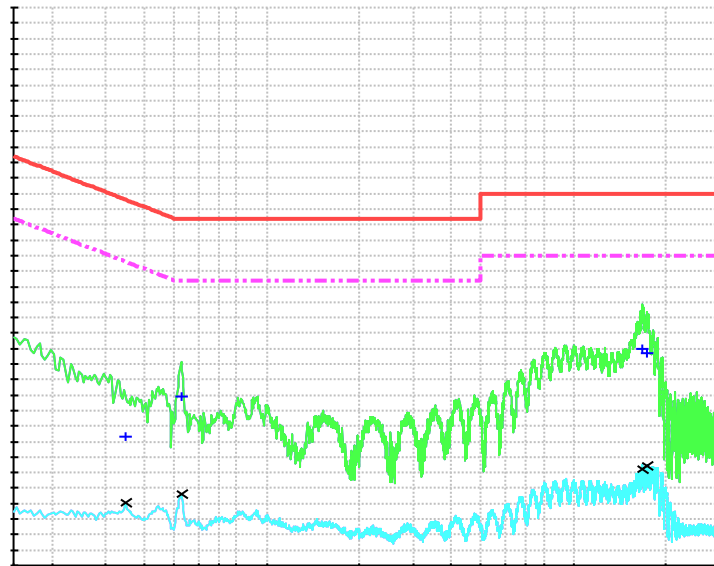
- Inside of EUT



Appendix A : Conducted Emission



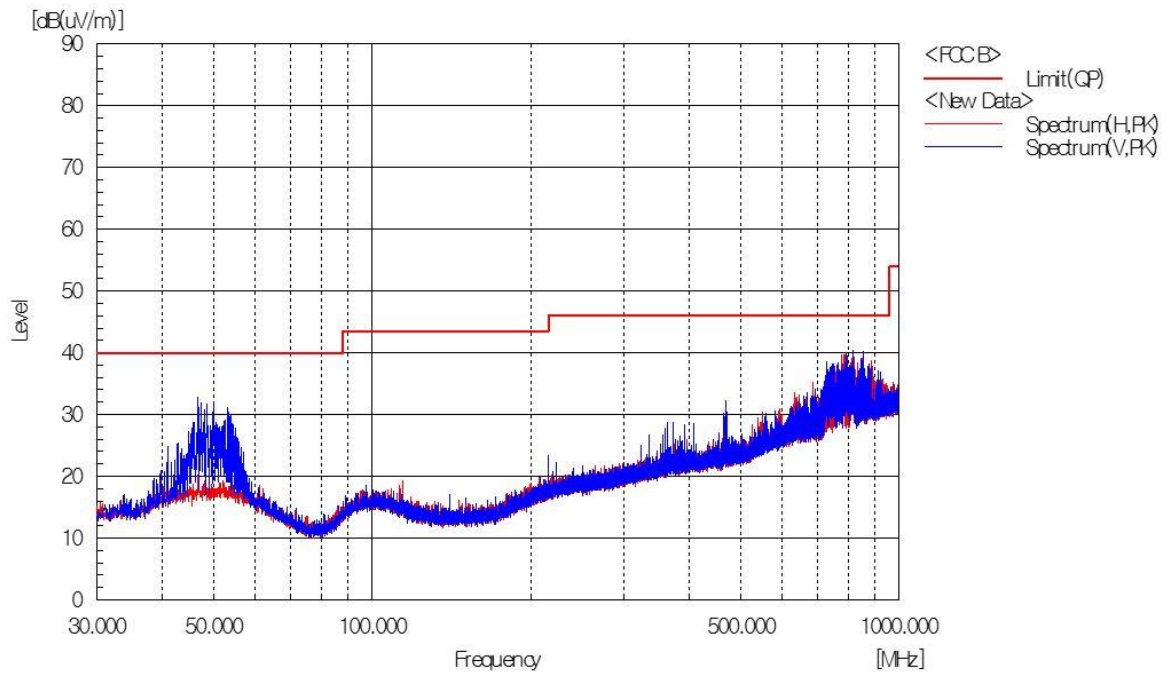
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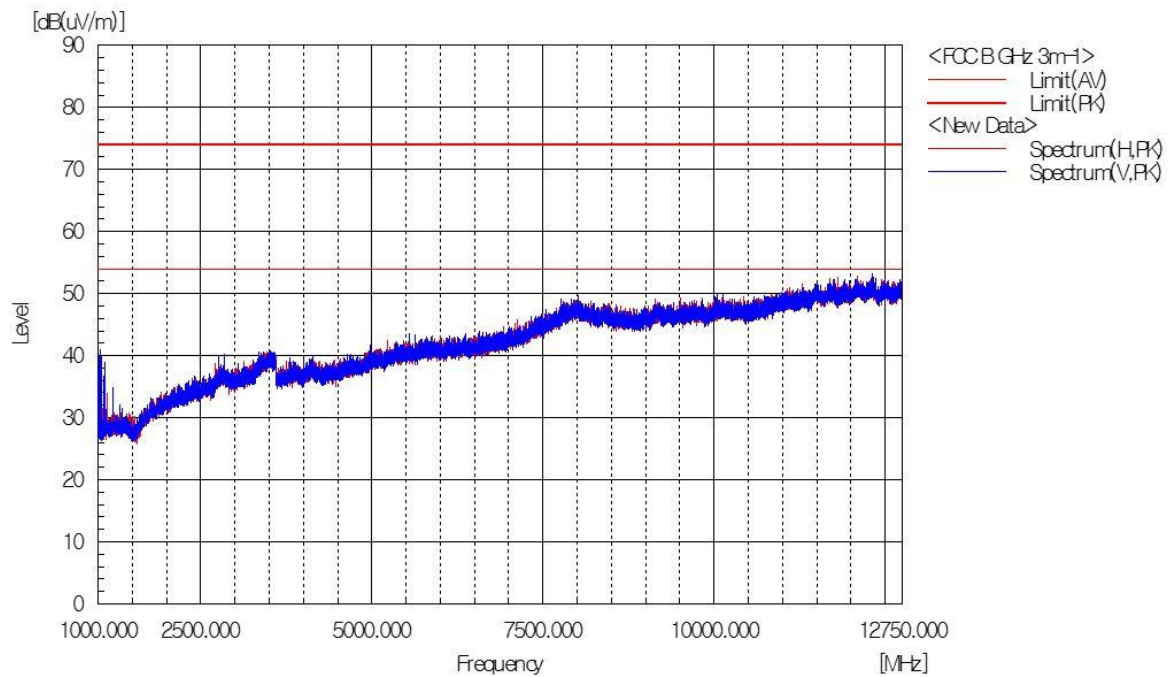
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Appendix B : Radiated Emission

Below 1 GHz



Above 1 GHz



- End of the Report -