EMI TEST REPORT

FOR

Newton's Meter

MODEL: NM_SERIES_A01

FCC ID: 2ATZ5-NMSERIESA01

REPORT NUMBER: 4788873577A-US-E0-V0

ISSUE DATE : Jul. 31, 2019

Prepared for

Newtons Meter Pte Ltd.

#27-15, International Plaza, 10 Anson Road

Tel: +65 94554578

Prepared by

Underwriters Laboratories Taiwan Co., Ltd.

Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Tel: +886.2.2896.7790

Fax: +886.3.583.7948

Website: www.ul.com

Testing Laboratory

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	Jul. 24, 2019	Initial Issue	Evelyn Lee
--	Jul. 26, 2019	P.3 Revise the result of Radiated emission (Above 1 GHz) to PASS P.5 Modify date tested P.7 Modify measurement uncertainty P.8 Revise Highest Frequency within EUT to 2480MHz P.12 Tick equipment model of BBHA 9120 D and EMC051835BE P.21-25 Supplement data for Above 1G	Evelyn Lee
--	Jul. 31, 2019	P.5 Modify date tested P.8 Add Note in the table of test mode	Evelyn Lee

Summary of Test Results			
Standard	**Test Item**	**Limit**	**Result**
FCC Part 15 Subpart B Class B ANSI C63.4:2014	Conducted emission	Class B	PASS
	Radiated emission (Below 1 GHz)	Class B	PASS
	Radiated emission (Above 1 GHz)	Class B	PASS

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Newtons Meter Pte Ltd. #27-15, International Plaza, 10 Anson Road
EUT DESCRIPTION:	Newton's Meter
MODEL:	NM_SERIES_A01
DATE TESTED:	Jun. 6, 2019 ~ Jul. 30, 2019

APPLICABLE STANDARDS	
STANDARDS	**TEST RESULTS**
FCC Part 15 Subpart B: Class B ANSI C63.4:2014	**PASS**

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/orobservations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Evelyn Lee Date : Jul. 31, 2019
Project Handler

Approved and Authorized By:

Hank Yang Date : Jul. 31, 2019
Engineer

2. TEST METHODOLOGY

All tests were performed in accordance with the procedures documented FCC Part 15 Subpart B and ANSI C63.4.

3. FACILITIES AND ACCREDITATION

Test Location	Underwriters Laboratories Taiwan Co., Ltd.,
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Description	All measurement facilities use to collect the measurement data are located at Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

4. CALIBRATION AND UNCERTAINTY

4.1. Measuring Instrument Calibration

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Test Item	Measurement Frequency Range	K	U(dB)
Conducted disturbance at mains terminals ports	0.15MHz ~ 30MHz	2	1.7
966-1 Test Site			
Radiated disturbance below 1 GHz	30MHz ~ 1000MHz	2	5.2
Radiated disturbance above 1 GHz	1000MHz ~ 6000MHz	2	4.5
	6000-18000MHz	2	4.9

5. EQUIPMENT UNDER TEST

5.1. Description of EUT

EUT Name：	Newton's Meter
Model：	NM_SERIES_A01
Power Rating:	DC 5V
Highest Frequency within EUT:	2480MHz
Condition of EUT:	Engineering Sample
Date Of Receipt Of Sample:	Jun. 3, 2019

5.2. Test Mode

The pre-test mode:

Mode	Description	Conducted Emission	Radiated Emission
Mode 1	Link BT with Adapter charge mode	v	v
Mode 2	Link BT with NB charge mode	–	v
Mode 3	Link BT mode	–	v

Note: The EUT was investigated in three orthogonal axes X/Y/Z, it was determined that X axis was worst-case. Therefore, all final radiated testing was performed with the EUT in X axis.

After pre-testing, the final test mode was displayed as below table.

Test Items		**Test Mode**
Emission	Conducted Emission	Mode 1
	Radiated Emission	Mode 2

5.3. EUT Operation Test Setup

Mode 1:
a. Set the EUT to charge mode with AC adapter.
b. Run APP “Newton’s Meter” on smart phone to connect the smart phone via Bluetooth and then monitor the connection status.

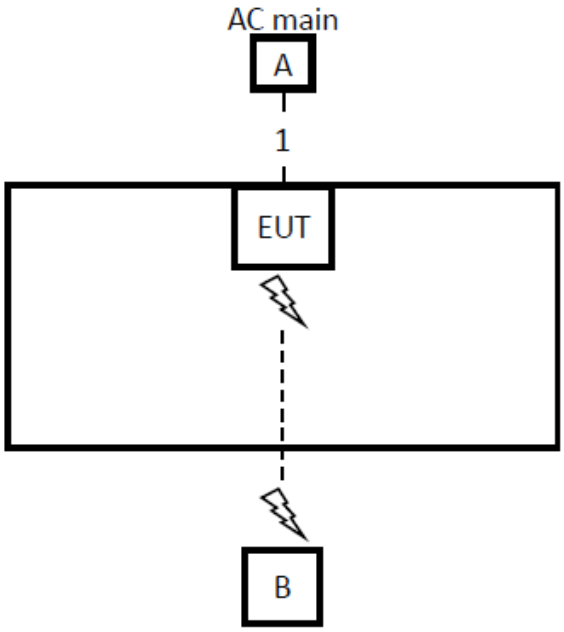
Mode 2:
a. Set the EUT to charge mode with Notebook.
b. Run APP “Newton’s Meter” on smart phone to connect the smart phone via Bluetooth and then monitor the connection status.

5.4. Accessory

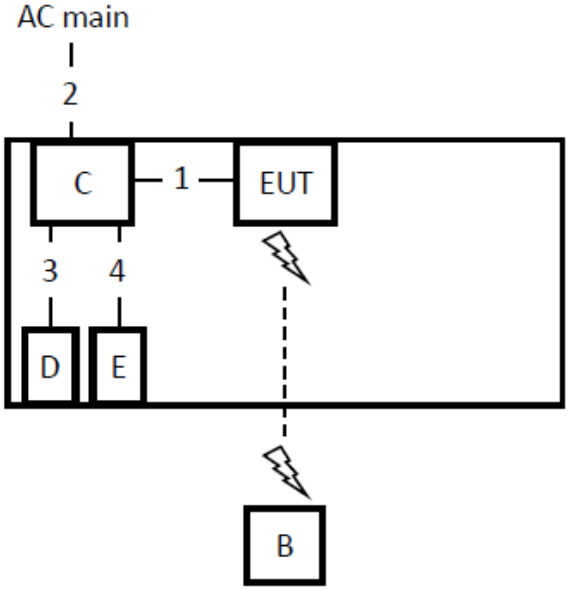
Item	Accessory	Brand Name	Model Name	Note
1	USB cable	N/A	N/A	Length: 0.2m, Shielded

5.5. Block diagram showing the configuration of system tested

Conducted test configuration:
Radiated test configuration:
Mode 1:



Mode 2:



5.6. Description of support units

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	Mfr/Brand	Model/Type No.	Series No.	FCC ID	Note
A	AC adapter	HTC	TC U250	79H00098-01M	N/A	N/A
B	Smart Phone	HTC	One X9 dual sim	HT6C3BK00731	N/A	N/A
C	Notebook	DELL	Latitude E5470	5M2MWF2	N/A	N/A
D	Earphone	TECO	XYFSE005	N/A	N/A	N/A
E	Mouse	DELL	MS116t	0DV0RH-71616-71B-0ZU2	N/A	N/A

Item	Connection	Shielded Type	Length	Note
2	Power cable	Non-shielded	2.8 m	N/A
3	Audio cable	Non-shielded	1.5 m	N/A
4	USB cable	Shielded	1.8 m	N/A

Note: (1) for detachable type I/O cable should be specified the length in m in “Length” column.

5.7. Measuring Instrument List

Instrument						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Expired date**
	Conducted Disturbance					
☒	EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2018/11/14	2019/11/13
☒	Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2018/8/5	2019/8/4
☒	Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2018/8/2	2019/8/1
☒	Measurement Software	Farad	EZ-EMC Ver: EMEC-3A1	N/A	N/A	N/A
	Radiated Disturbance					
	966-1					
☒	EMI Test Receiver	Rohde & Schwarz	ESR7	101755	2018/11/27	2019/11/26
☒	Trilog-Broadband Antena with 5dB Attenuator	SCHWARZBECK	VULB 9168 & N-6-05	9168-773 & AT-N0539	2019/1/14	2020/1/13
☒	Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	1686	2019/1/16	2020/1/15
☐	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	759	2018/11/13	2019/11/12
☒	Preamplifier	EMC Instrument	EMC330E	980404	2019/1/8	2020/1/7
☒	Preamplifier	EMC Instrument	EMC051835BE	980407	2019/1/8	2020/1/7
☐	Preamplifier	EMC Instrument	EMC184045SE	980408	2019/3/21	2020/3/19
☒	Measurement Software	Farad	EZ-EMC Ver: EMEC-3A1	N/A	N/A	N/A

6. EMISSION TEST

6.1. Conducted Disturbance Measurement

6.1.1. Limits of conducted disturbance voltage and common mode disturbance

FREQUENCY (MHz)	☐Class A (dBμV)		☒Class B (dBμV)	
	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.

(3) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
Margin Level = Measurement Value - Limit Value

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

6.1.2. 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.

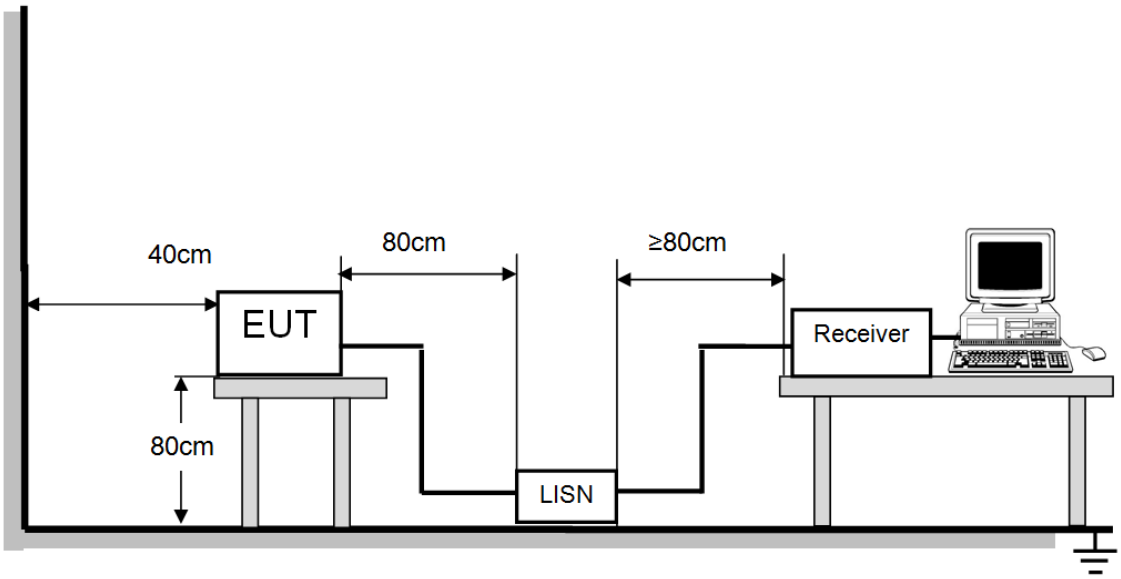
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

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 at least 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.

6.1.3. Test Setup

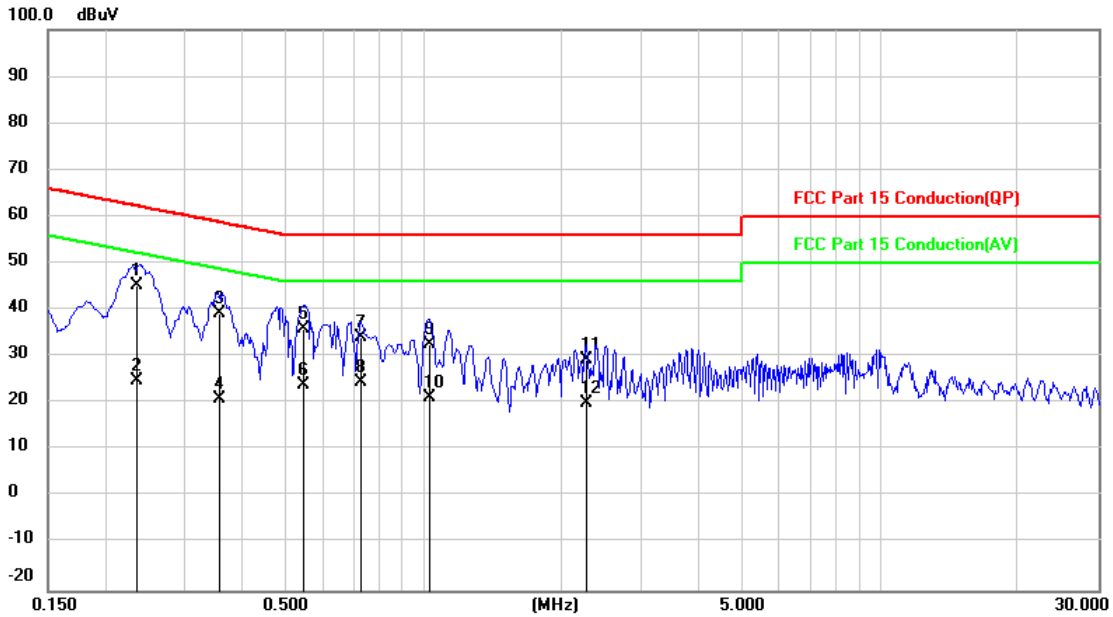


For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

6.1.4. Test Result

Test Mode:	Mode 1	Temperature:	23℃
Test Voltage:	AC 120V/60Hz	Humidity:	60%
Tested By:	Edison Lin	Test Date:	Jun. 6, 2019

Phase: Line

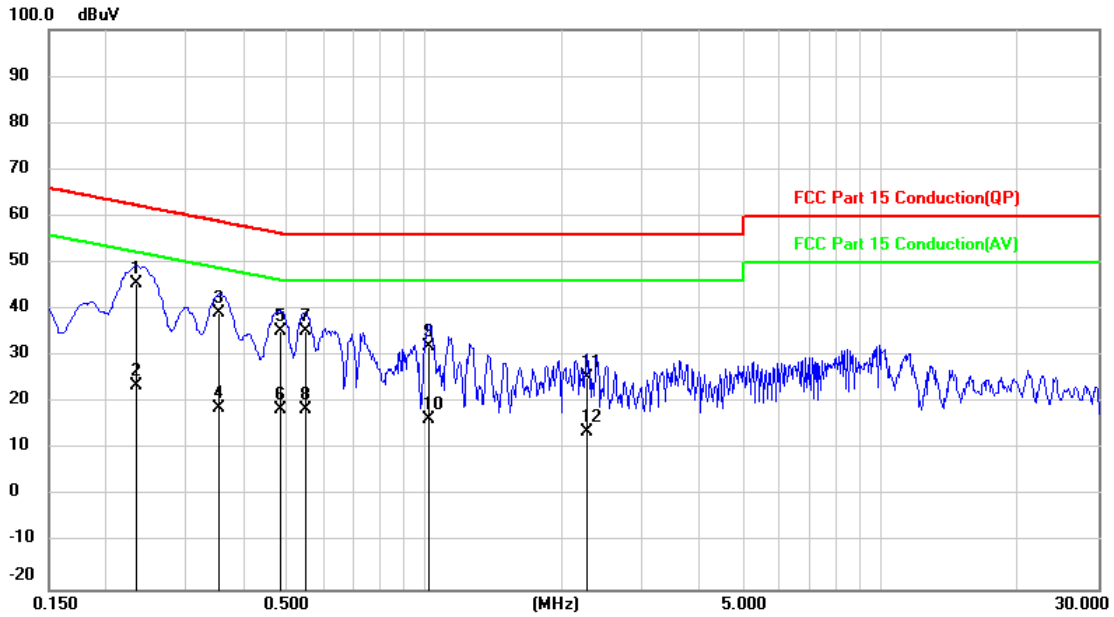


No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2348	25.70	19.68	45.38	62.28	-16.90	QP
2	0.2348	5.11	19.68	24.79	52.28	-27.49	AVG
3	0.3571	19.44	19.67	39.11	58.80	-19.69	QP
4	0.3571	1.16	19.67	20.83	48.80	-27.97	AVG
5	0.5459	16.28	19.67	35.95	56.00	-20.05	QP
6	0.5459	4.19	19.67	23.86	46.00	-22.14	AVG
7	0.7266	14.43	19.68	34.11	56.00	-21.89	QP
8	0.7266	5.01	19.68	24.69	46.00	-21.31	AVG
9	1.0227	13.11	19.68	32.79	56.00	-23.21	QP
10	1.0227	1.70	19.68	21.38	46.00	-24.62	AVG
11	2.2685	9.66	19.69	29.35	56.00	-26.65	QP
12	2.2685	0.41	19.69	20.10	46.00	-25.90	AVG

Remark:
Result = Reading +Correct
Margin = Result - Limit

Test Mode:	Mode 1	Temperature:	23℃
Test Voltage:	AC 120V/60Hz	Humidity:	60%
Tested By:	Edison Lin	Test Date:	Jun. 6, 2019

Phase: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2339	25.76	19.68	45.44	62.31	-16.87	QP
2	0.2339	3.83	19.68	23.51	52.31	-28.80	AVG
3	0.3546	19.47	19.67	39.14	58.85	-19.71	QP
4	0.3546	-0.84	19.67	18.83	48.85	-30.02	AVG
5	0.4819	15.64	19.67	35.31	56.31	-21.00	QP
6	0.4819	-1.16	19.67	18.51	46.31	-27.80	AVG
7	0.5490	15.71	19.67	35.38	56.00	-20.62	QP
8	0.5490	-1.08	19.67	18.59	46.00	-27.41	AVG
9	1.0227	12.51	19.68	32.19	56.00	-23.81	QP
10	1.0227	-3.27	19.68	16.41	46.00	-29.59	AVG
11	2.2676	5.70	19.69	25.39	56.00	-30.61	QP
12	2.2676	-5.93	19.69	13.76	46.00	-32.24	AVG

Remark:
Result = Reading +Correct
Margin = Result - Limit

6.2. Radiated Disturbance Measurement (below 1G)

6.2.1. Limits of radiated disturbance measurement

FREQUENCY (MHz)	☒Class B
	☒At 3m
	(microvolts/meter)
30 – 88	100
88 – 216	150
216 – 960	200
960 – 1000	500

NOTE:

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

(2) Emission level (dBμV/m)=20*log Emission level (uV/m).

(3) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor,

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use),

Margin Level = Measurement Value - Limit Value.

6.2.2. Test Procedure

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

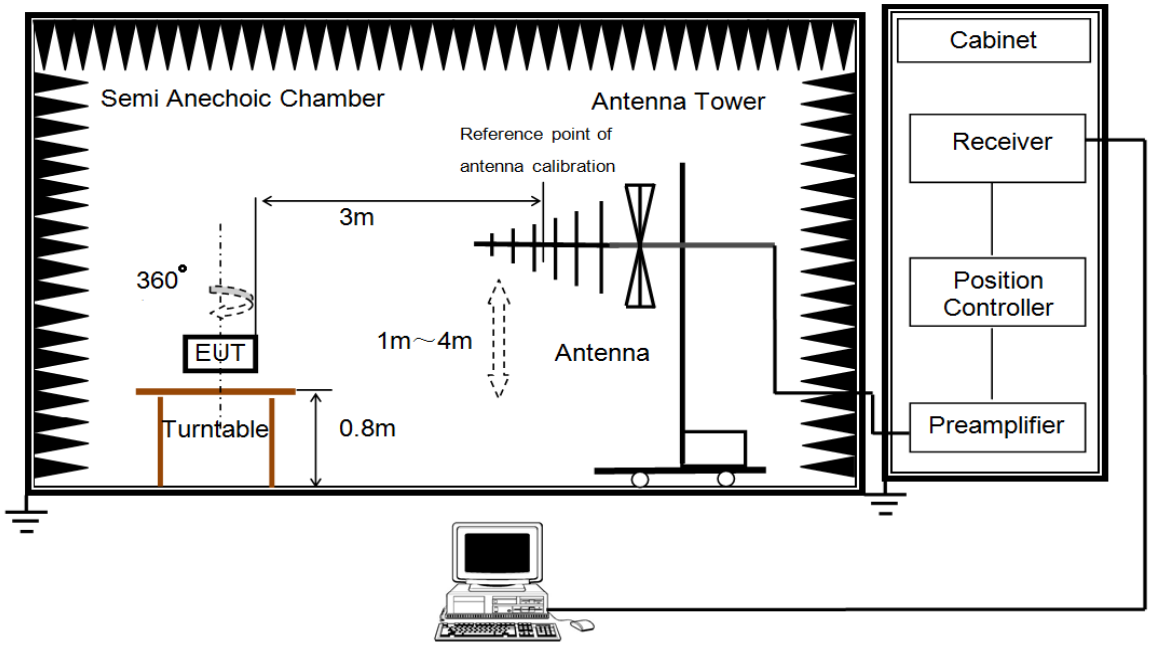
b. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

c. The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

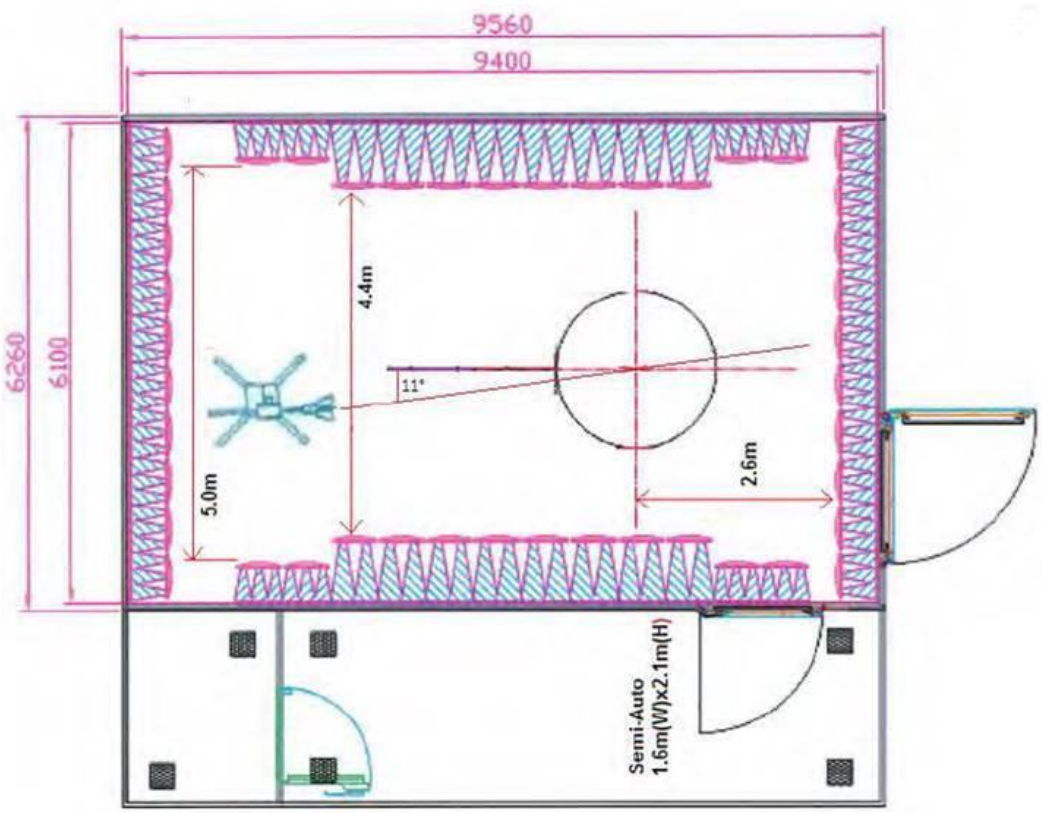
d. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

e. For the actual test configuration, please refer to the related Item: EUT Test Photos.

6.2.3. Test Setup



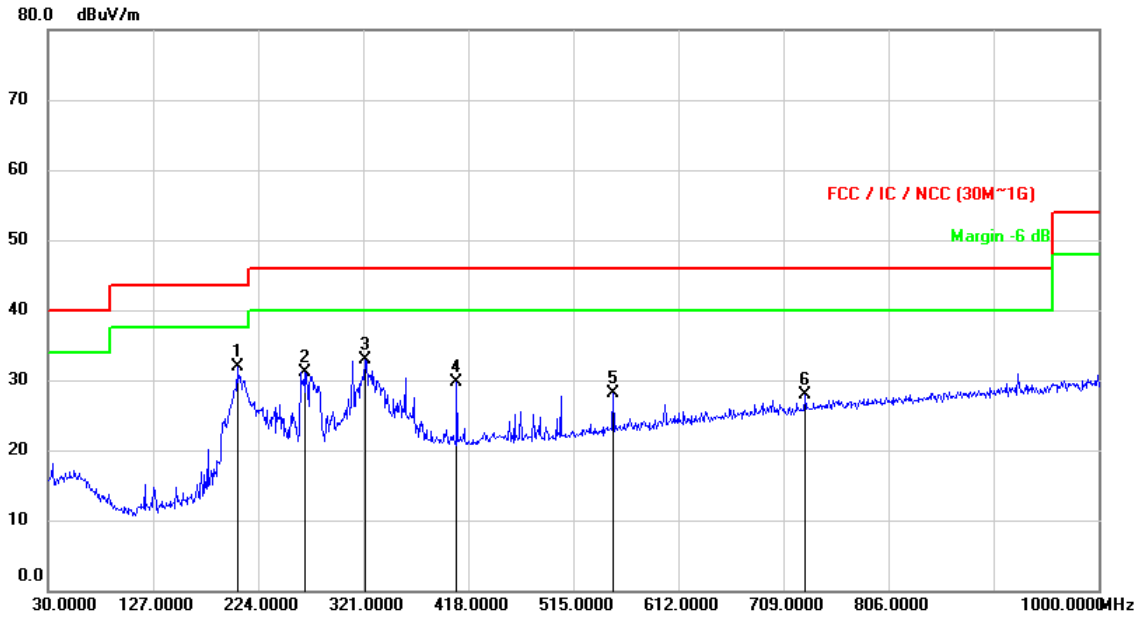
For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.



6.2.4. Test Result

Test Mode:	Mode 2	Temperature:	25℃
Test Voltage:	DC 5V	Humidity:	52%
Tested By:	Edison Lin	Test Date:	Jun. 6, 2019

Polarization: Horizontal

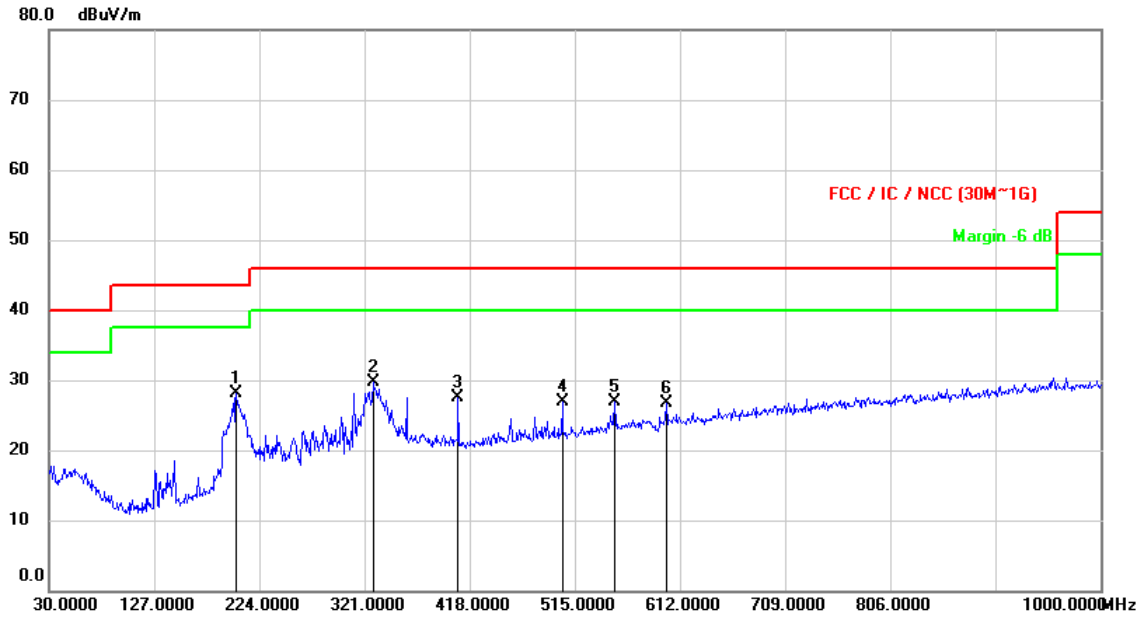


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	204.8587	50.22	-18.29	31.93	43.50	-11.57	peak
2	268.0703	47.04	-15.96	31.08	46.00	-14.92	peak
3	323.8777	47.04	-14.21	32.83	46.00	-13.17	peak
4	408.0090	41.64	-11.86	29.78	46.00	-16.22	peak
5	551.9893	36.88	-8.75	28.13	46.00	-17.87	peak
6	729.6933	32.88	-5.07	27.81	46.00	-18.19	peak

Remark:
Result = Reading +Correct
Margin = Result - Limit

Test Mode:	Mode 2	Temperature:	25℃
Test Voltage:	DC 5V	Humidity:	52%
Tested By:	Edison Lin	Test Date:	Jun. 6, 2019

Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	203.2743	46.34	-18.31	28.03	43.50	-15.47	peak
2	328.7923	43.75	-14.09	29.66	46.00	-16.34	peak
3	408.0090	39.45	-11.86	27.59	46.00	-18.41	peak
4	504.0067	36.51	-9.68	26.83	46.00	-19.17	peak
5	551.9893	35.67	-8.75	26.92	46.00	-19.08	peak
6	600.0043	34.24	-7.58	26.66	46.00	-19.34	peak

Remark:
Result = Reading +Correct
Margin = Result - Limit

6.3. Radiated Disturbance Measurement (above 1G)

6.3.1. Limits of radiated disturbance measurement

FREQUENCY (MHz)	☒Class B	
	☒At 3m	
	Average limit dB(μV/m)	Peak limit dB(μV/m)
1000-40000	54	74

NOTE:

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

(2) Emission level (dBμV/m)=20log Emission level (uV/m).

(3) If the highest frequency of the internal sources of the EUT is less than 108 MHz, themeasurement shall only be made up to 1 GHz.If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz,measurement shall only be made up to 5GHz. If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 40 GHz, whichever is less.

(4) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor,

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use),

Margin Level = Measurement Value - Limit Value.

6.3.2. Test Procedure

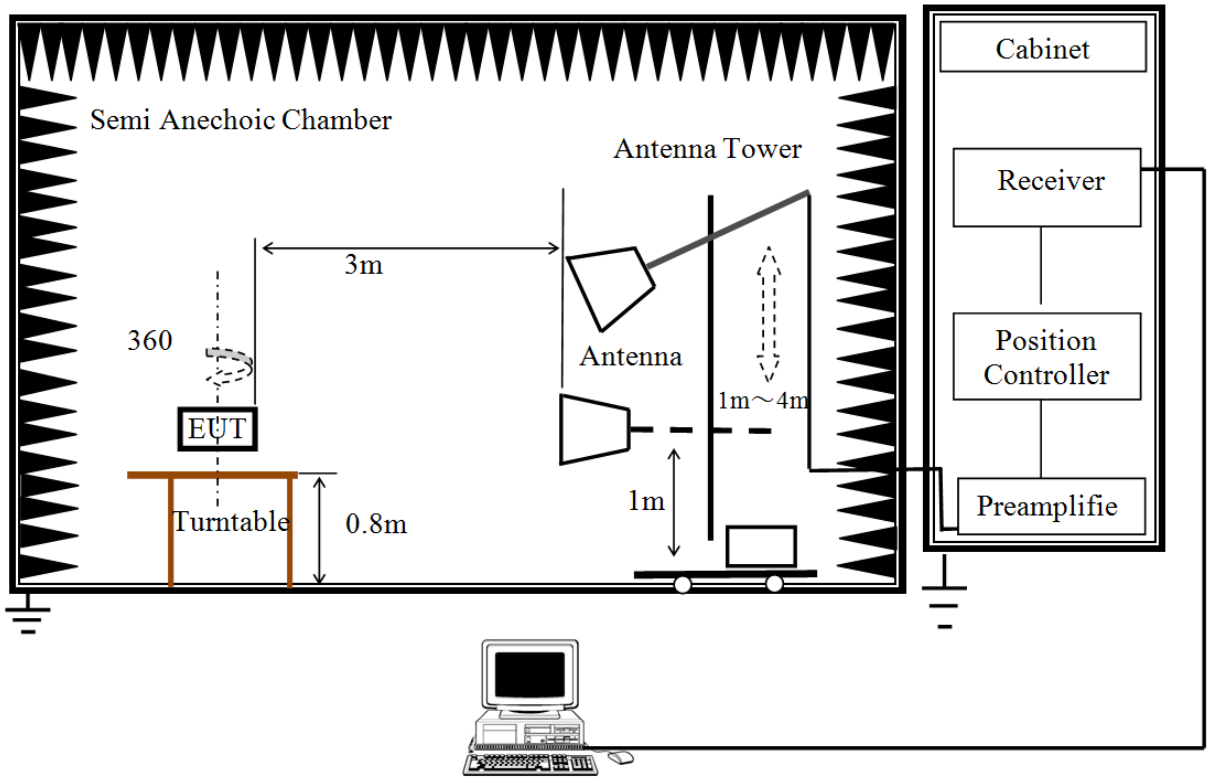
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

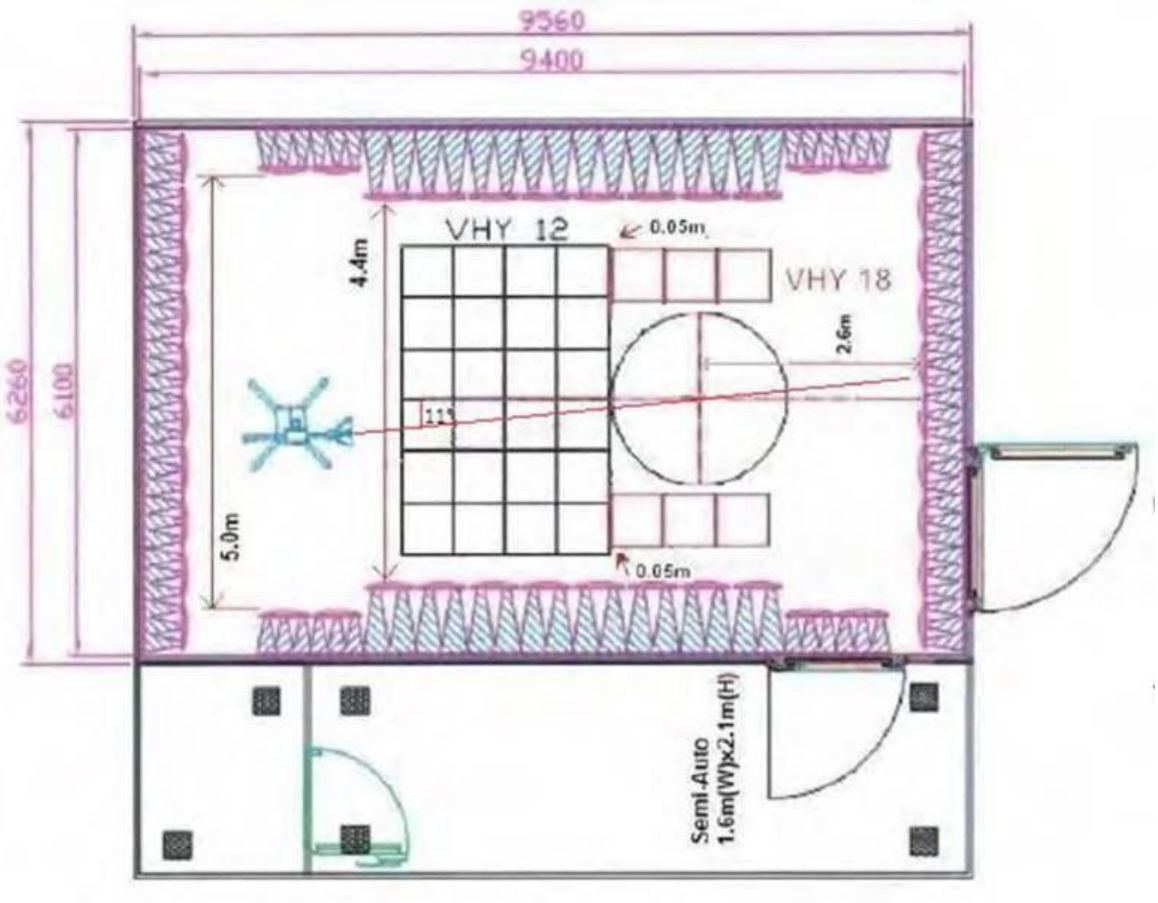
c. The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Average detector mode re-measured.

d. For the actual test configuration, please refer to the related Item:EUT Test Photos.

6.3.3. Test Setup



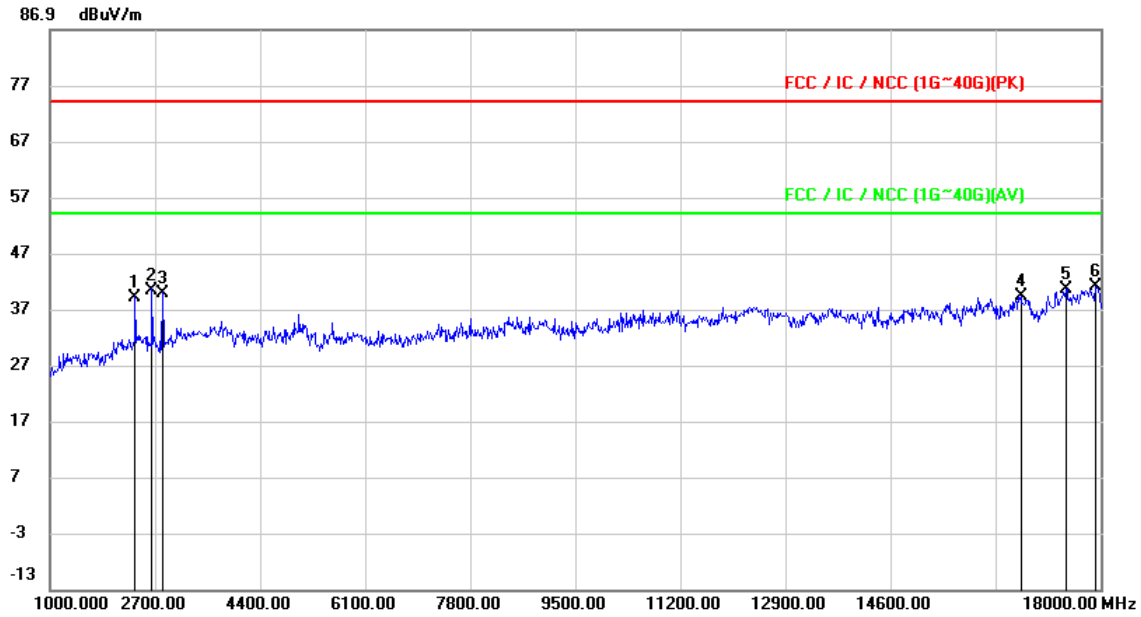
For the actual test configuration, please refer to Appendix I : Photographs of the Test Configuration.



6.3.4. Test Result

Test Mode:	Mode 2	Temperature:	23℃
Test Voltage:	DC 5V	Humidity:	55%
Tested By:	Edison Lin	Test Date:	Jul. 25, 2019

Polarization: Horizontal

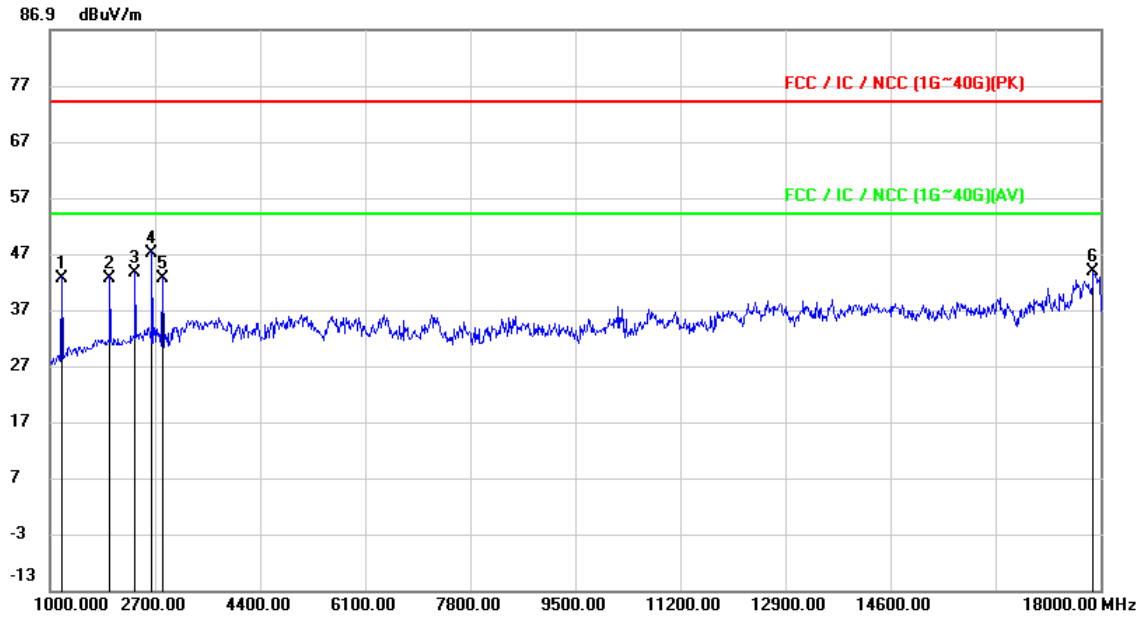


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2377.667	47.19	-8.24	38.95	74.00	-35.05	peak
2	2658.333	47.61	-7.22	40.39	74.00	-33.61	peak
3	2825.000	46.44	-6.67	39.77	74.00	-34.23	peak
4	16718.200	23.11	16.19	39.30	74.00	-34.70	peak
5	17442.400	20.57	20.06	40.63	74.00	-33.37	peak
6	17915.567	15.66	25.39	41.05	74.00	-32.95	peak

Remark:
Result = Reading +Correct
Margin = Result - Limit

Test Mode:	Mode 2	Temperature:	23℃
Test Voltage:	DC 5V	Humidity:	55%
Tested By:	Edison Lin	Test Date:	Jul. 25, 2019

Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1196.333	54.76	-12.17	42.59	74.00	-31.41	peak
2	2000.000	52.28	-9.80	42.48	74.00	-31.52	peak
3	2392.667	51.63	-8.18	43.45	74.00	-30.55	peak
4	2653.833	54.19	-7.22	46.97	74.00	-27.03	peak
5	2831.500	49.27	-6.65	42.62	74.00	-31.38	peak
6	17884.966	18.77	25.02	43.79	74.00	-30.21	peak

Remark:
Result = Reading +Correct
Margin = Result - Limit

Appendix I： Photographs of Test Configuration

Please refer to Test Configuration.

Appendix II：Photographs of the EUT

Please see the photographs of EUT in the test report no.: 4788873577-EP.

END OF REPORT