



FCC Part 15 Subpart B and ANSI C63.4

EMI TEST REPORT

**FOR
SYNCUP PETS**

MODEL: TMUS-SUP-1

FCC ID : 2ASXC-TMO-NBT-01

REPORT NUMBER: 4789004574A-US-E0-V0

ISSUE DATE : Aug. 28, 2019

Prepared for

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	Aug. 23, 2019	Initial Issue	Evelyn Lee
--	Aug. 28, 2019	P.8 Revise test mode description and add mode 10 P. 17-18 Add test results for mode 10 P. 23-24 Add test results for mode 10	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: T-mobile Usa, Inc.
12920 Se 38th Street, Bellevue, Washington, United States,
98006

EUT DESCRIPTION: SYNCUP PETS

MODEL: TMUS-SUP-1

DATE TESTED: Aug. 20, 2019 ~ Aug. 22, 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/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 : Aug. 28, 2019
Project Handler

Approved and Authorized By:



Roy Chen Date : Aug. 28, 2019
Operations Manager

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	5.1
Radiated disturbance above 1 GHz	1000MHz ~ 6000MHz	2	4.3
	6000-18000MHz	2	4.7
	18000-40000MHz	2	4.5

5. EQUIPMENT UNDER TEST

5.1. Description of EUT

EUT Name:	SYNCUP PETS
Model:	TMUS-SUP-1
Power Rating:	100-240Vac, 50-60Hz, 0.2A 3.7V 430mAh (for battery)
Highest Frequency within EUT:	2400MHz
Condition of EUT:	Engineering Sample
Date Of Receipt Of Sample:	May 9, 2018

5.2. Test Mode

Mode	Description	Conducted Emission	Radiated Emission
Mode 1	LTE band 2 +WiFi middle channel with charge mode @ x-axis	v	v
Mode 2	LTE band 4 +WiFi middle channel with charge mode@ x-axis	v	v
Mode 3	LTE band 12 +WiFi middle channel with charge mode@ x-axis	v	v
Mode 4	LTE band 66 +WiFi middle channel with charge mode@ x-axis	v	v
Mode 5	LTE band 12 +WiFi low channel with charge mode@ x-axis	v	v
Mode 6	LTE band 12 +WiFi high channel with charge mode@ x-axis	v	v
Mode 7	LTE band 12 +WiFi middle channel with charge mode@ y-axis	-	v
Mode 8	LTE band 12 +WiFi middle channel with charge mode@ z-axis	-	v
Mode 9	LTE band 12+WiFi middle channel stand alone mode@ x-axis	-	v
Mode 10	LTE band 12 Rx +BT with charge mode@ x-axis	v	v

Note: LTE band 12 received 3 channels have been evaluated. The middle channel is worst channel.

Test Items		Test Mode
Emission	Conducted Emission	Mode 1, 10
	Radiated Emission	Mode 1, 10

Note: After evaluating Mode 10, the test result is less than Limit 20dB; therefore, the test results of above 1 GHz is not shown in the report.

5.3. EUT Operation Test Setup

Mode 1:

- a. Set EUT to x-axis.
- b. Set EUT to LTE Tx mode.
- c. Run "Internet Explorer.exe" on Notebook to set the LTE band to band 2.
- d. Turn on the Device Router then it will connects to the EUT via WiFi automatically.
- e. Run "Ping.exe" on Notebook to confirm the WiFi connection status.
- f. Run "Keysight Signal Studio for Global Navigation Satellite System.exe" on Notebook to control the GPS Simulator to transmit GPS signal for the connection of EUT.
- g. Run "Internet Explorer.exe" on Notebook to confirm the connection status of GPS.
- h. Connect Smart Phone and EUT via Bluetooth.

Mode 10:

- a. Set EUT to x-axis.
- b. Set EUT to LTE Rx mode.
- c. Connect Smart Phone and EUT via Bluetooth.

5.4. Accessory

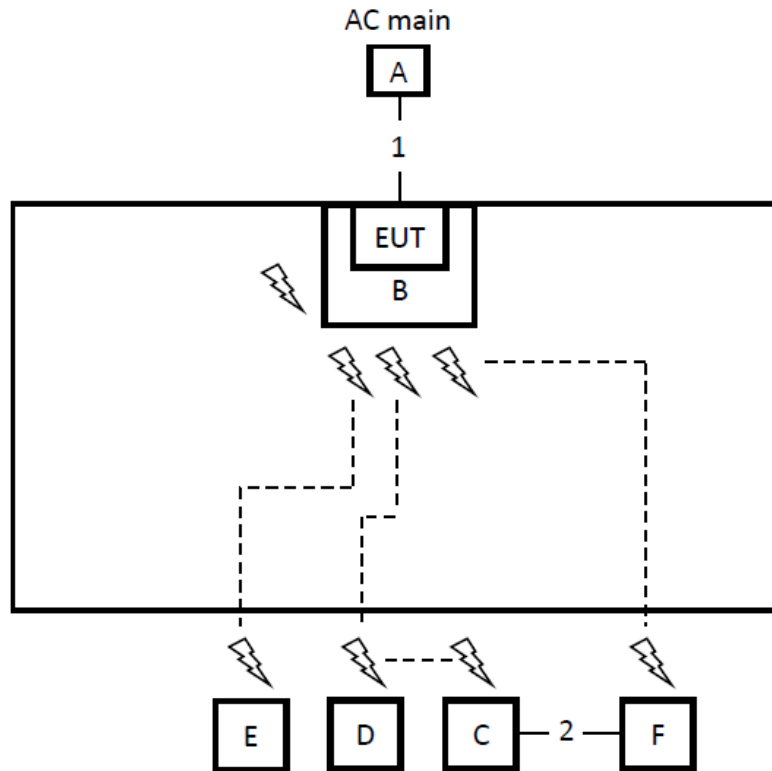
Item	Accessory	Brand Name	Model Name	Note
-	PSU Adapter	PHIHONG	AN05A-050E	Input: 100-240Vac, 50-60Hz, 0.2A Output: 5.0 Vdc, 1.0A
-	USB cable	N/A	N/A	Shield Length: 1m
-	Charger	Cybertan	N/A	N/A
-	Collar mount	CyberTAN	N/A	N/A
-	Bands	CyberTAN	N/A	N/A

5.5. Block diagram showing the configuration of system tested

Conducted test configuration:

Radiated test configuration:

Mode 1:



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.	Note
A	Adapter	PHIHONG TECHNOLOGY	AN05A-050E	N/A	N/A
B	Charger	Cybertan	N/A	N/A	N/A
C	Notebook	DELL	Latitude E5470	5M2MWF2	N/A
D	Smart WiFi Router	NETGEAR	R7000P	4TJ17375A06D5	N/A
E	Smart Phone	HTC	One X9 dual sim	HT6C3BK00731	N/A
F	GPS Simulator	KEYSIGHT	N5172B	MY56200315	N/A

Item	Connection	Shielded Type	Length	Note
1	USB cable	Shielded	1 m	N/A
2	RJ-45 Cable	Non-shielded	1.5 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	2019/8/8	2020/8/7
☐	Four-Line V-Network	Rohde & Schwarz	ENV432	101298	2017/12/7	N/A
☒	Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2019/8/6	2020/8/5
☒	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 Antenna with 5dB Attenuator	SCHWARZ BECK	VULB 9168 & N-6-05	9168-773 & AT-N0539	2019/1/14	2020/1/13
☒	Double Ridged Guide Horn Antenna	SCHWARZ BECK	BBHA 9120 D	1686	2019/1/16	2020/1/15
☐	Broadband Horn Antenna	SCHWARZ BECK	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	2018/3/13	2019/3/12
☒	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 (dB μ V)		☒ Class B (dB μ V)	
	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

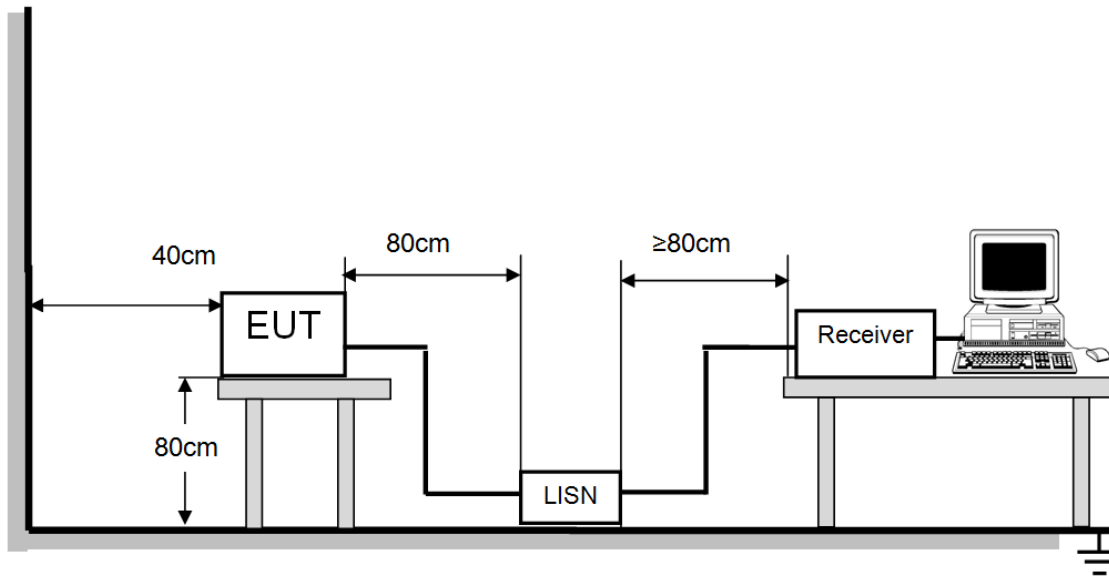
The following table is the setting of the receiver

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.

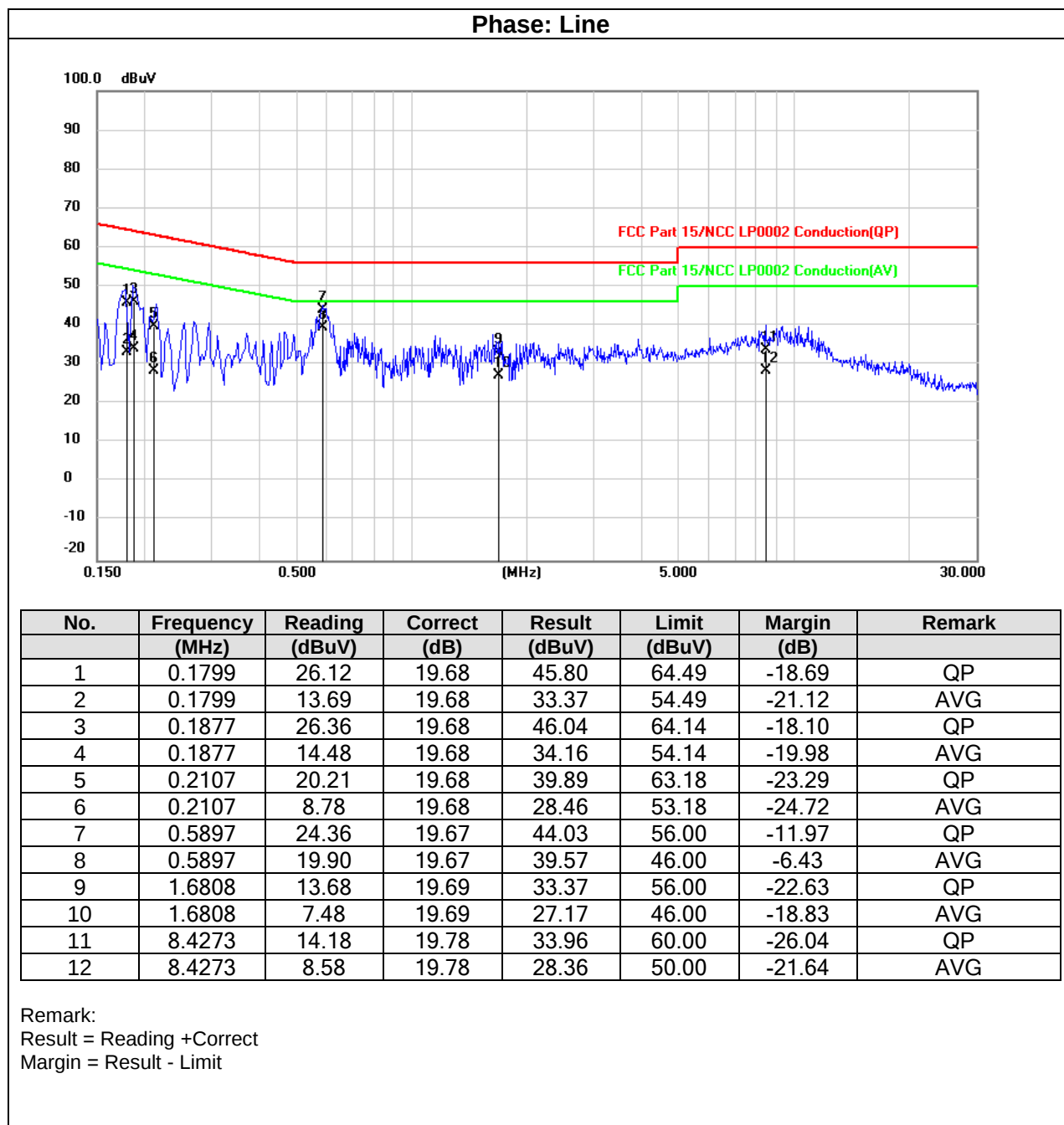
6.1.3. Test Setup



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

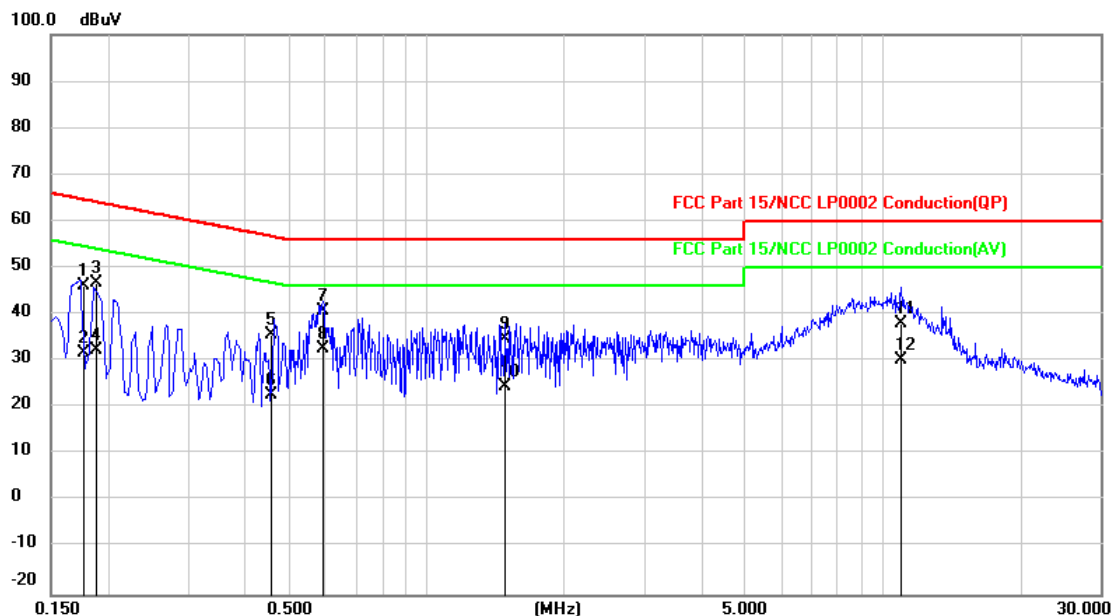
6.1.4. Test Result

Test Mode:	Mode 1	Temperature:	23°C
Test Voltage:	AC 120V/60Hz	Humidity:	60%
Tested By:	Edison Lin	Test Date:	Aug. 22, 2019



Test Mode:	Mode 1	Temperature:	23°C
Test Voltage:	AC 120V/60Hz	Humidity:	60%
Tested By:	Edison Lin	Test Date:	Aug. 22, 2019

Phase: Neutral



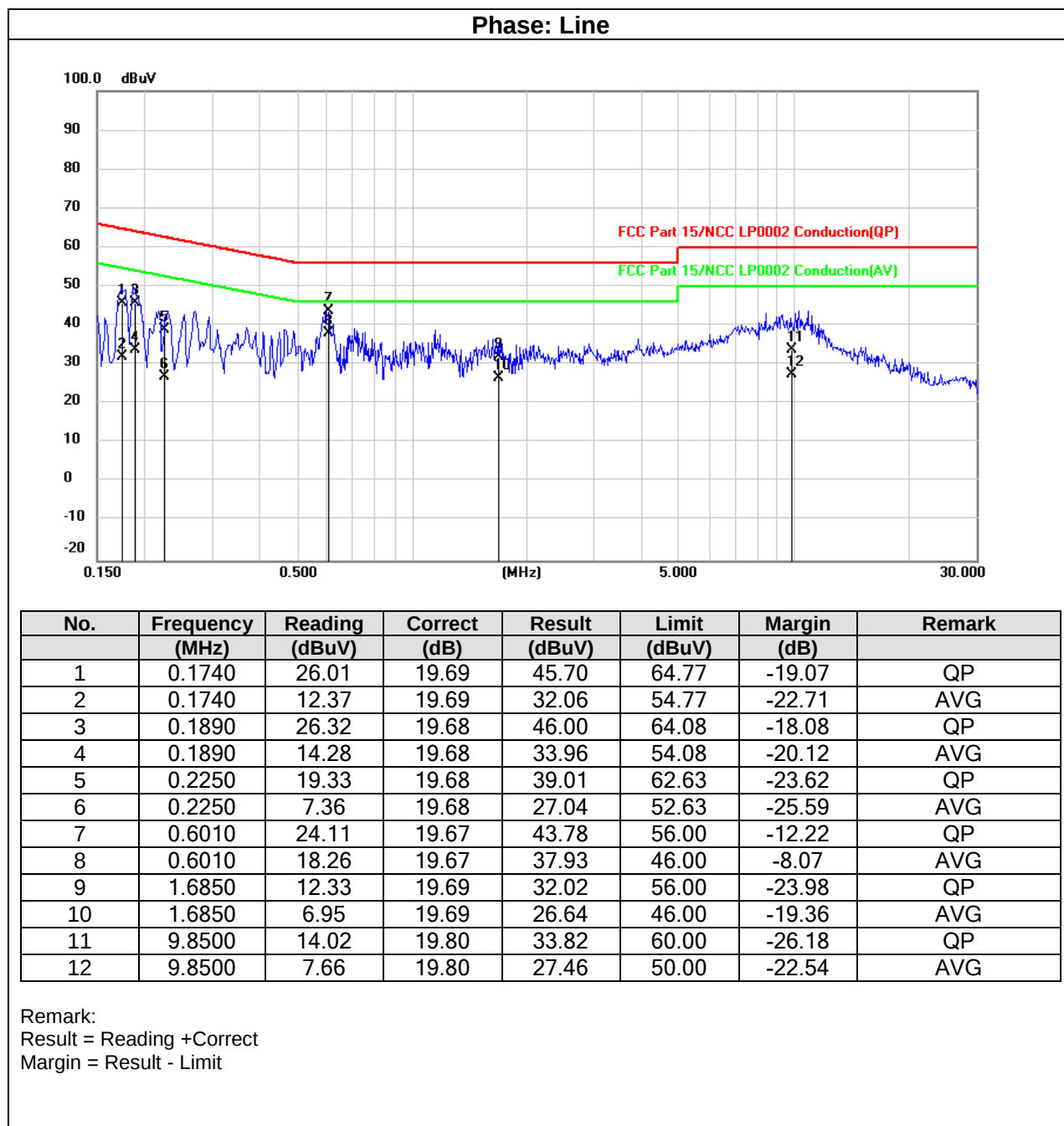
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1777	26.46	19.68	46.14	64.59	-18.45	QP
2	0.1777	12.20	19.68	31.88	54.59	-22.71	AVG
3	0.1884	26.96	19.68	46.64	64.11	-17.47	QP
4	0.1884	12.80	19.68	32.48	54.11	-21.63	AVG
5	0.4577	16.05	19.67	35.72	56.73	-21.01	QP
6	0.4577	3.21	19.67	22.88	46.73	-23.85	AVG
7	0.5934	21.21	19.67	40.88	56.00	-15.12	QP
8	0.5934	12.98	19.67	32.65	46.00	-13.35	AVG
9	1.4964	15.12	19.68	34.80	56.00	-21.20	QP
10	1.4964	4.82	19.68	24.50	46.00	-21.50	AVG
11	11.0268	18.32	19.85	38.17	60.00	-21.83	QP
12	11.0268	10.42	19.85	30.27	50.00	-19.73	AVG

Remark:

Result = Reading +Correct

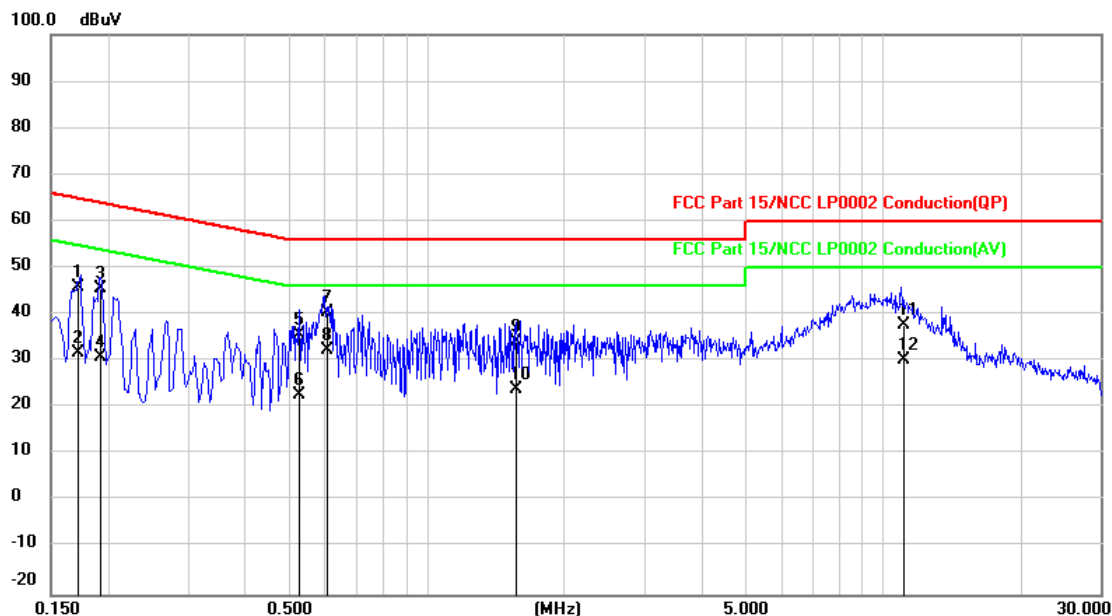
Margin = Result - Limit

Test Mode:	Mode 10	Temperature:	23°C
Test Voltage:	AC 120V/60Hz	Humidity:	60%
Tested By:	Edison Lin	Test Date:	Aug. 28, 2019



Test Mode:	Mode 10	Temperature:	23°C
Test Voltage:	AC 120V/60Hz	Humidity:	60%
Tested By:	Edison Lin	Test Date:	Aug. 28, 2019

Phase: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1720	26.31	19.68	45.99	64.86	-18.87	QP
2	0.1720	11.95	19.68	31.63	54.86	-23.23	AVG
3	0.1920	25.82	19.68	45.50	63.95	-18.45	QP
4	0.1920	11.26	19.68	30.94	53.95	-23.01	AVG
5	0.5210	15.94	19.67	35.61	56.00	-20.39	QP
6	0.5210	3.11	19.67	22.78	46.00	-23.22	AVG
7	0.6020	20.74	19.67	40.41	56.00	-15.59	QP
8	0.6020	12.58	19.67	32.25	46.00	-13.75	AVG
9	1.5620	14.39	19.69	34.08	56.00	-21.92	QP
10	1.5620	4.28	19.69	23.97	46.00	-22.03	AVG
11	11.1200	17.92	19.85	37.77	60.00	-22.23	QP
12	11.1200	10.28	19.85	30.13	50.00	-19.87	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:

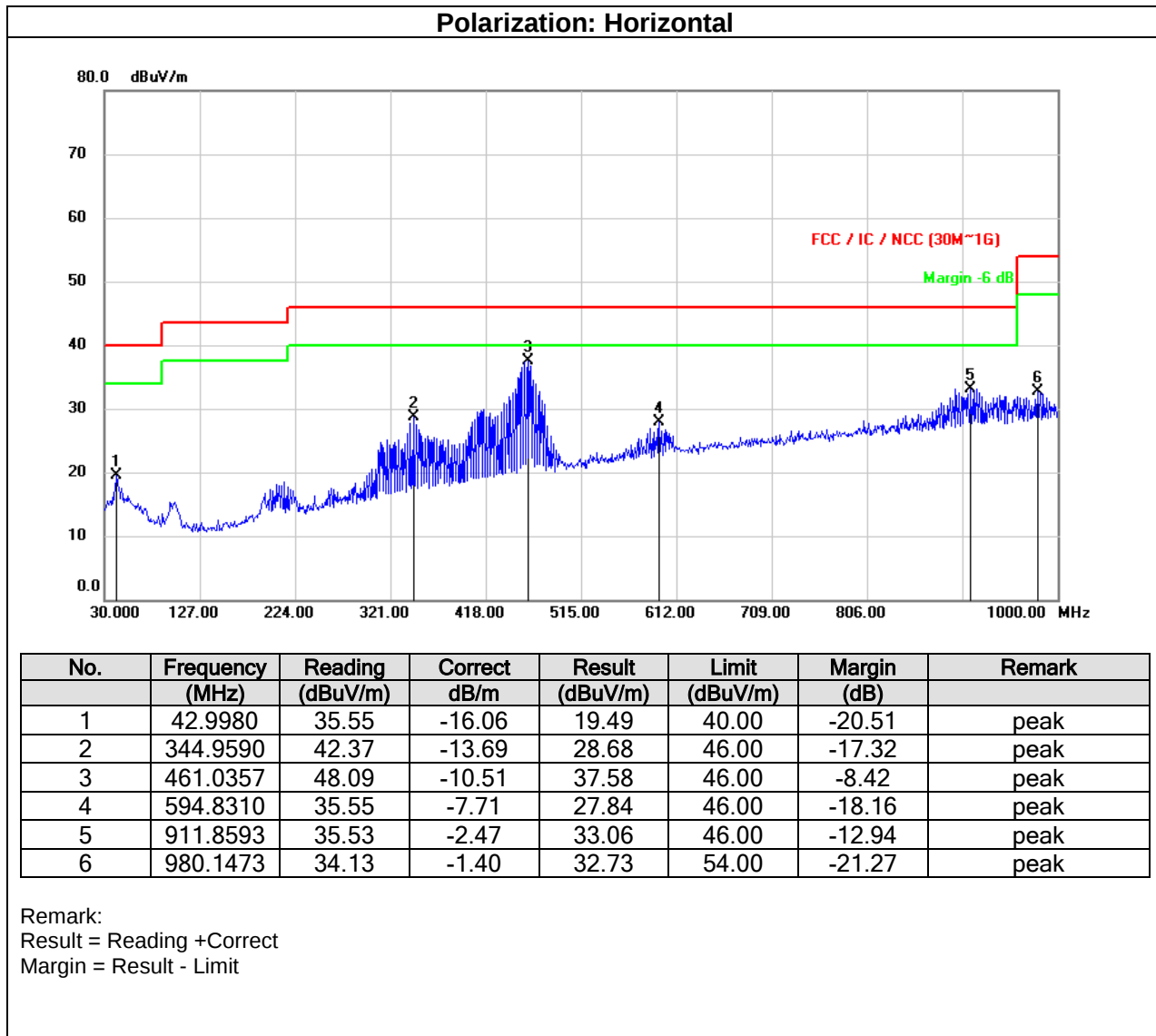
- (1) The tighter limit applies at the band edges.
- (2) Emission level (dB μ V/m)=20*log Emission level (uV/m).
- (3) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor,
Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use),
Margin Level = Measurement 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.

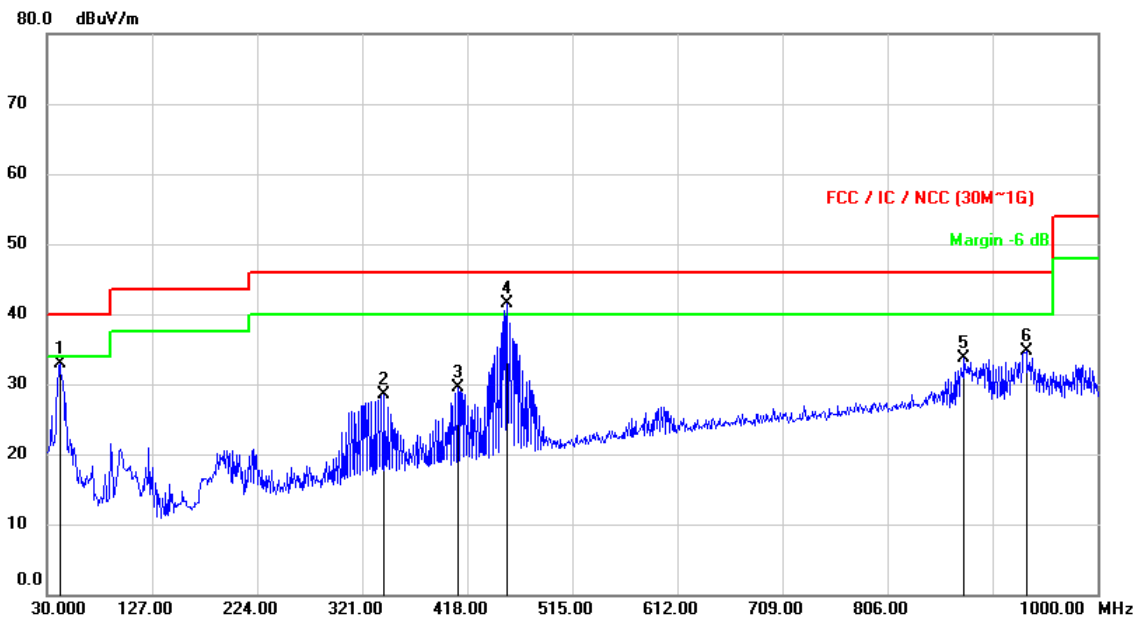
6.2.4. Test Result

Test Mode:	Mode 1	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Edison Lin	Test Date:	Aug. 20, 2019



Test Mode:	Mode 1	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Edison Lin	Test Date:	Aug. 20, 2019

Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	41.8663	49.05	-16.15	32.90	40.00	-7.10	peak
2	341.7257	42.22	-13.76	28.46	46.00	-17.54	peak
3	410.0783	41.26	-11.81	29.45	46.00	-16.55	peak
4	455.2156	52.09	-10.62	41.47	46.00	-4.53	peak
5	877.5537	36.68	-2.99	33.69	46.00	-12.31	peak
6	934.4280	36.73	-2.08	34.65	46.00	-11.35	peak

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

Test Mode:	Mode 10	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Edison Lin	Test Date:	Aug. 28, 2019

Polarization: Horizontal

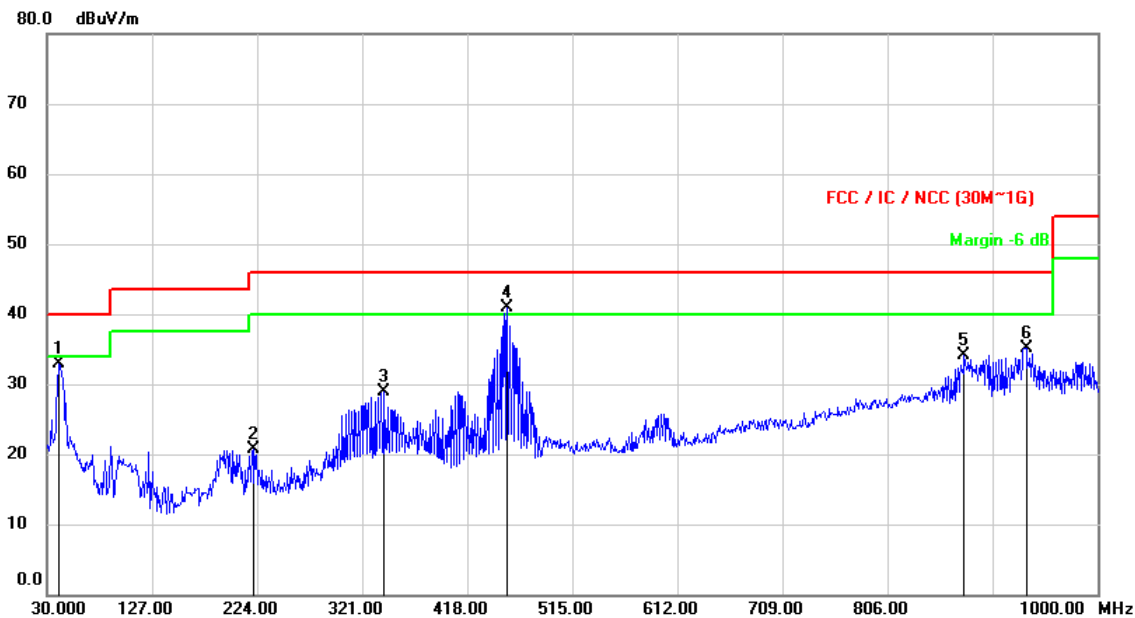


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	87.2300	41.30	-21.62	19.68	40.00	-20.32	peak
2	344.2800	42.87	-13.71	29.16	46.00	-16.84	peak
3	460.6800	46.59	-10.52	36.07	46.00	-9.93	peak
4	594.5400	36.05	-7.72	28.33	46.00	-17.67	peak
5	920.4600	34.38	-2.32	32.06	46.00	-13.94	peak
6	979.6300	33.63	-1.41	32.22	54.00	-21.78	peak

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

Test Mode:	Mode 10	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Edison Lin	Test Date:	Aug. 20, 2019

Polarization: Vertical



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

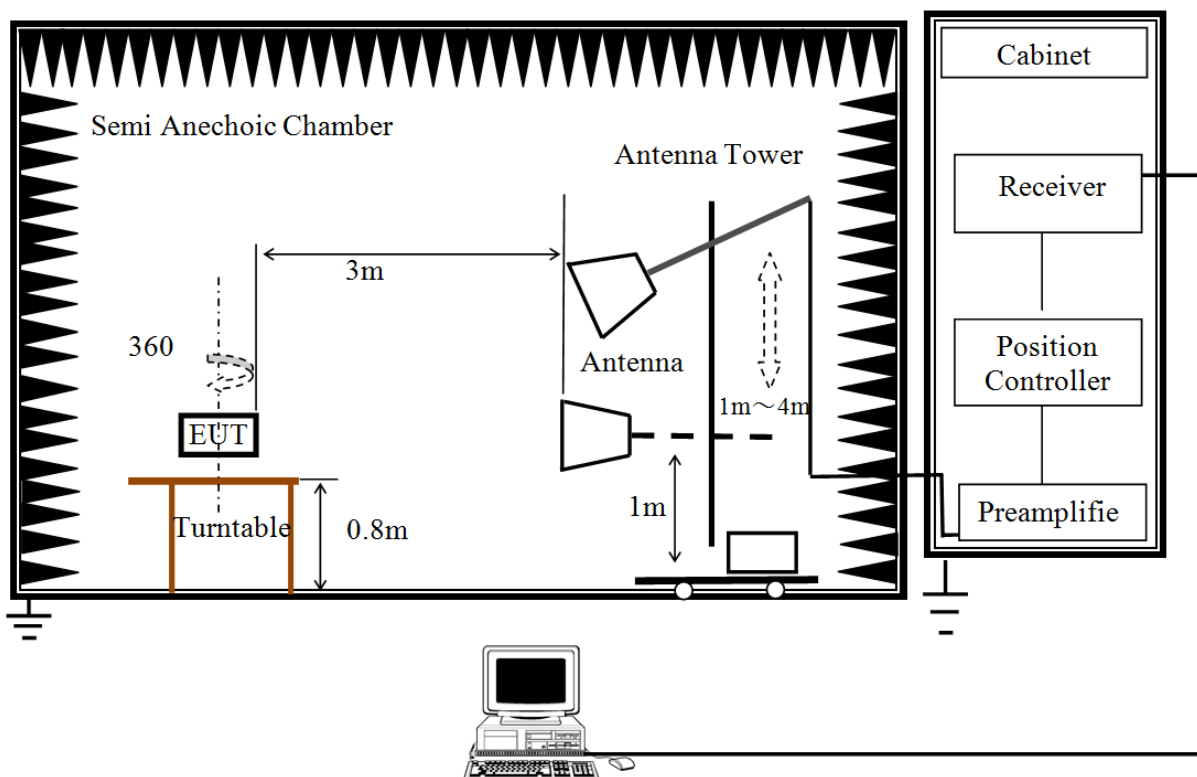
NOTE:

- (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, the measurement 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.

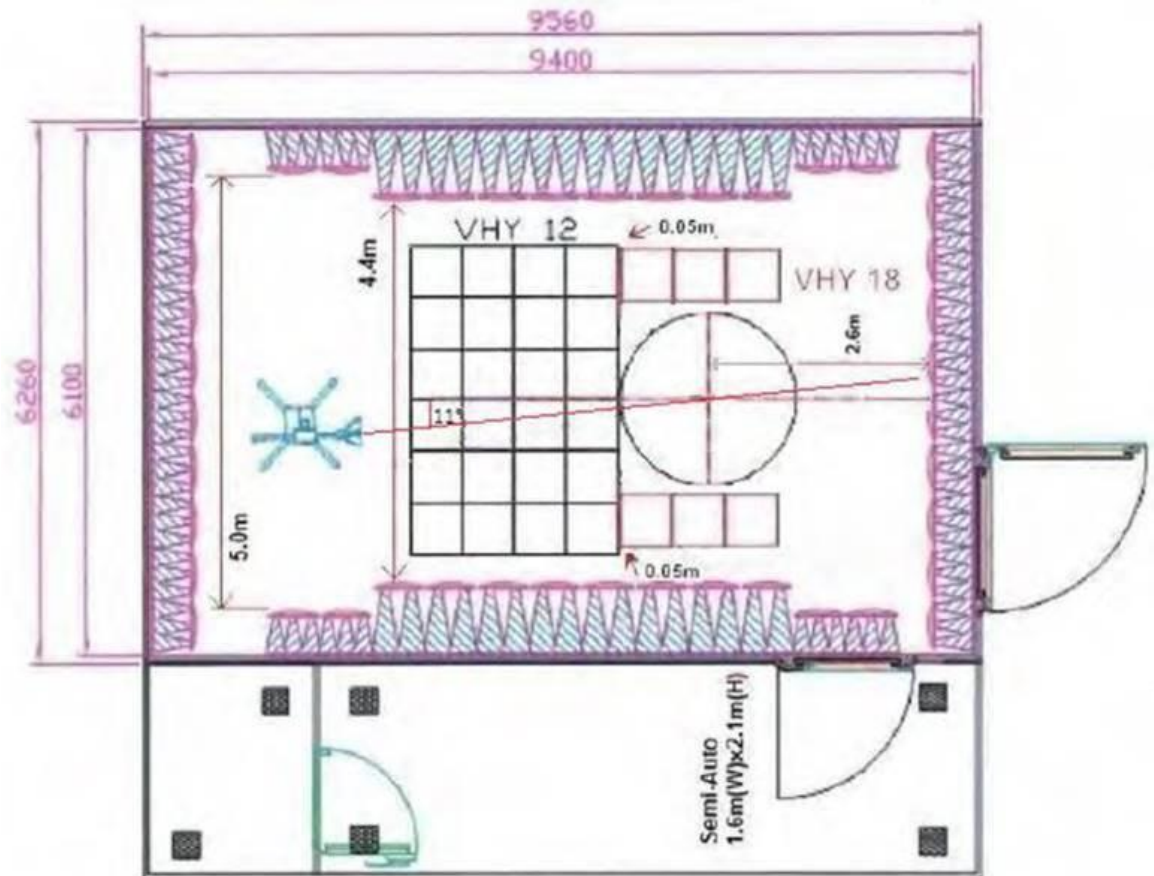
6.3.2. Test Procedure

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

6.3.3. Test Setup

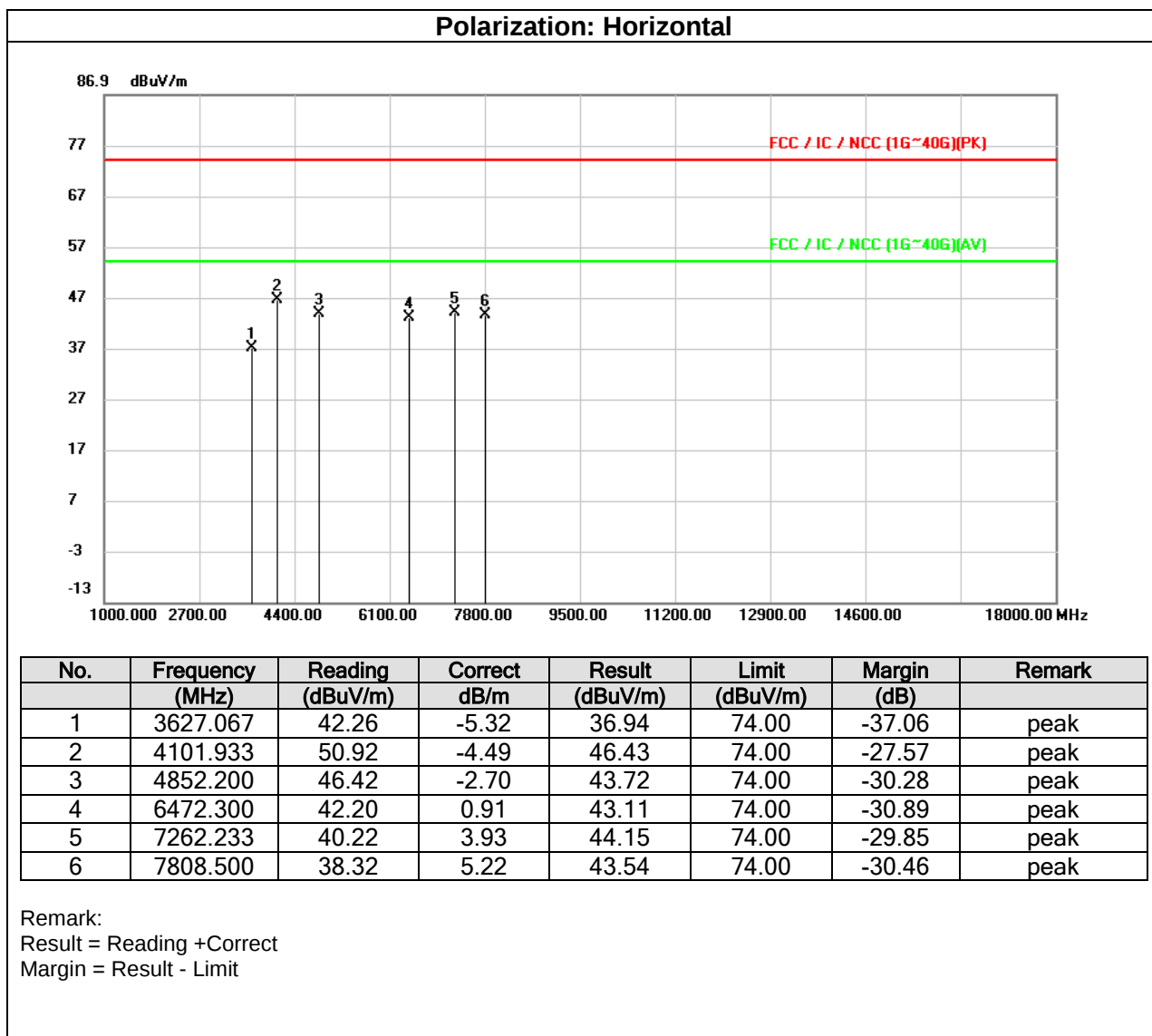


For the actual test configuration, please refer to Appendix I : Photographs of the Test Configuration.



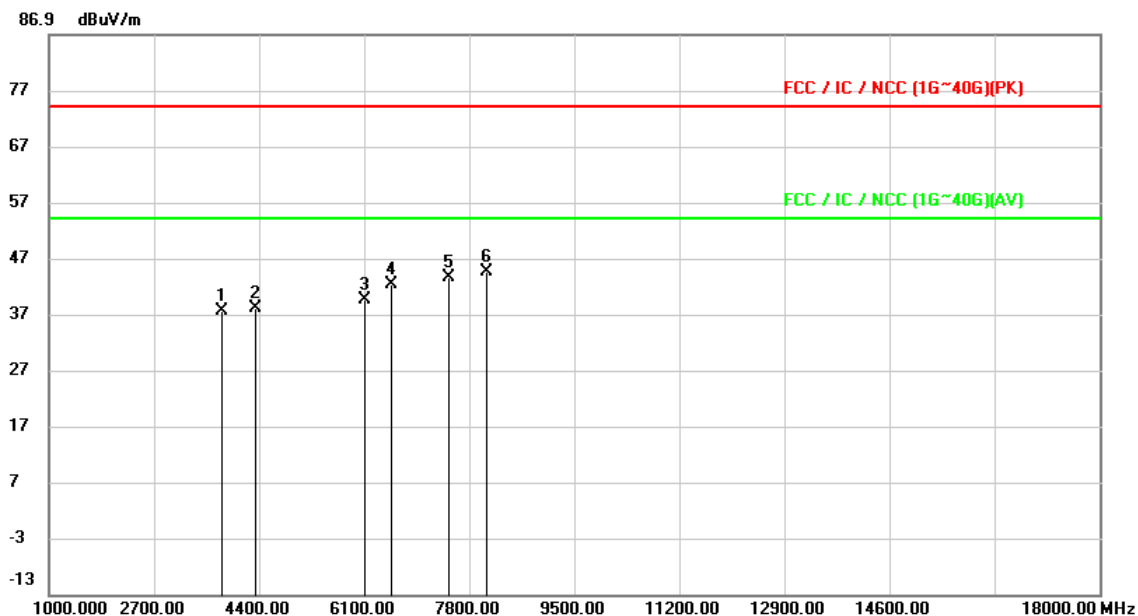
6.3.4. Test Result

Test Mode:	Mode 1	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Edison Lin	Test Date:	Aug. 22, 2019



Test Mode:	Mode 1	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Edison Lin	Test Date:	Aug. 22, 2019

Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3791.400	42.53	-5.07	37.46	74.00	-36.54	peak
2	4362.033	41.81	-3.76	38.05	74.00	-35.95	peak
3	6105.100	39.98	-0.35	39.63	74.00	-34.37	peak
4	6525.567	41.22	1.11	42.33	74.00	-31.67	peak
5	7483.800	38.93	4.60	43.53	74.00	-30.47	peak
6	8089.000	38.84	5.64	44.48	74.00	-29.52	peak

Remark:

Result = Reading +Correct

Margin = Result - Limit