



# FCC RADIO TEST REPORT

**FCC ID** : 2AFZZK2G  
**Equipment** : Mobile Phone  
**Brand Name** : Xiaomi  
**Model Name** : M2011K2G  
**Applicant** : Xiaomi Communications Co., Ltd.  
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road,  
Haidian District, Beijing, China, 100085  
**Manufacturer** : Xiaomi Communications Co., Ltd.  
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road,  
Haidian District, Beijing, China, 100085  
**Standard** : FCC Part 15 Subpart C §15.225

The product was received on Nov. 10, 2020 and testing was started from Nov. 17, 2020 and completed on Nov. 20, 2020. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

*Louis Wu*

Reviewed by: Louis Wu

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**  
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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### History of this test report

Report No.	Version	Description	Issued Date
FR0N0303E	01	Initial issue of report	Dec. 17, 2020



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.207	AC Power Line Conducted Emissions	Pass	Under limit 14.58 dB at 11.236 MHz
3.2	15.215(c)	20dB Spectrum Bandwidth	Pass	-
	2.1049	99% OBW Spectrum Bandwidth	Reporting only	-
3.3	15.209	Field Strength of Fundamental Emissions	Pass	Max level -12.12 dB $\mu$ V/m at 0.135 MHz
		Radiated Spurious Emissions	Pass	Under limit 8.66 dB at 30.000 MHz
3.4	15.203	Antenna Requirements	Pass	-

<b>Declaration of Conformity:</b> The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
<b>Comments and Explanations:</b> The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Ruby Zou



# 1. General Description

## 1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE/5G NR, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ax, Wi-Fi 5GHz 802.11a/n/ac/ax, NFC, WPC/WPT and GNSS.

Product Specification subjective to this standard	
Sample 1	Memory (8+256GB)
Sample 2	Memory (8+128GB)
Antenna Type	WWAN: PIFA Antenna WLAN <2400 MHz ~ 2483.5 MHz> <Ant. 5>: PIFA Antenna <Ant. 7>: PIFA Antenna <5150 MHz ~ 5850 MHz> <Ant. 8>: PIFA Antenna <Ant. 10>: PIFA Antenna Bluetooth <Ant. 5>: PIFA Antenna <Ant. 7>: PIFA Antenna GPS/Glonass/Galileo/BDS: PIFA Antenna NFC: planar Antenna WPC/WPT: Coil antenna

**Remark:** The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

## 1.2 Modification of EUT

No modifications are made to the EUT during all test items.



### 1.3 Testing Location

<b>Test Site</b>	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory		
<b>Test Site Location</b>	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		
	TH03-HY	CO05-HY	03CH07-HY
<b>Test Engineer</b>	Oscar Chi	Tom Lee	Jesse Wang, Stan Hsieh and Ken Wu
<b>Temperature</b>	23.5°C	23~26°C	23~25°C
<b>Relative Humidity</b>	58.8%	40~50%	56~62%

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190

### 1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.225
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ ANSI C63.10-2013

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.



## 2. Test Configuration of Equipment Under Test

### 2.1 Descriptions of Test Mode

Investigation has been done on all the possible configurations.

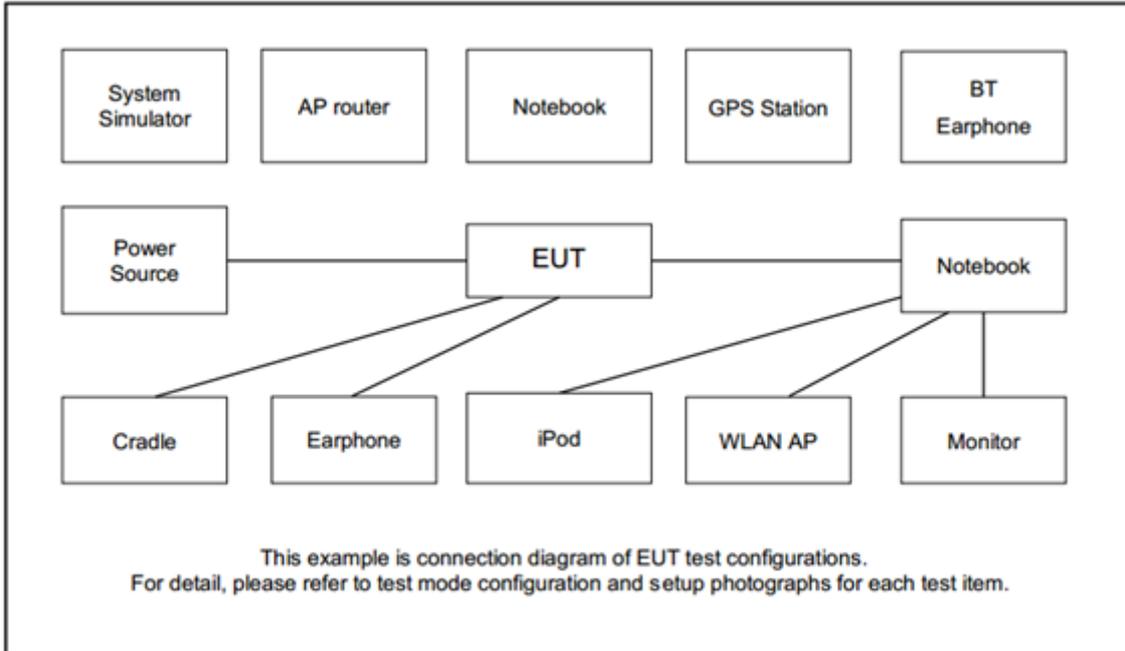
The following table is a list of the test modes shown in this test report.

Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Radiated Emissions 9kHz~30MHz
Radiated Emissions 30MHz~1GHz	

Pre-scanned tests, X, Y, Z in three orthogonal panels to determine the final configuration (Y plane as worst plane) from all possible combinations.

Test Cases	
<b>AC Conducted Emission</b>	Mode 1 : WPT Charging with Mobile Phone + USB Cable (Charging from Adapter) for Sample 1
<b>Remark:</b> For Radiated Test Cases, the tests were performed with Sample 1	

## 2.2 Connection Diagram of Test System



## 2.3 Table for Supporting Units

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Mobile Phone	mi	venus	N/A	N/A	N/A

## 2.4 EUT Operation Test Setup

The EUT charger with other phone via wireless power transfer function



### 3. Test Results

#### 3.1 AC Power Line Conducted Emissions Measurement

##### 3.1.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

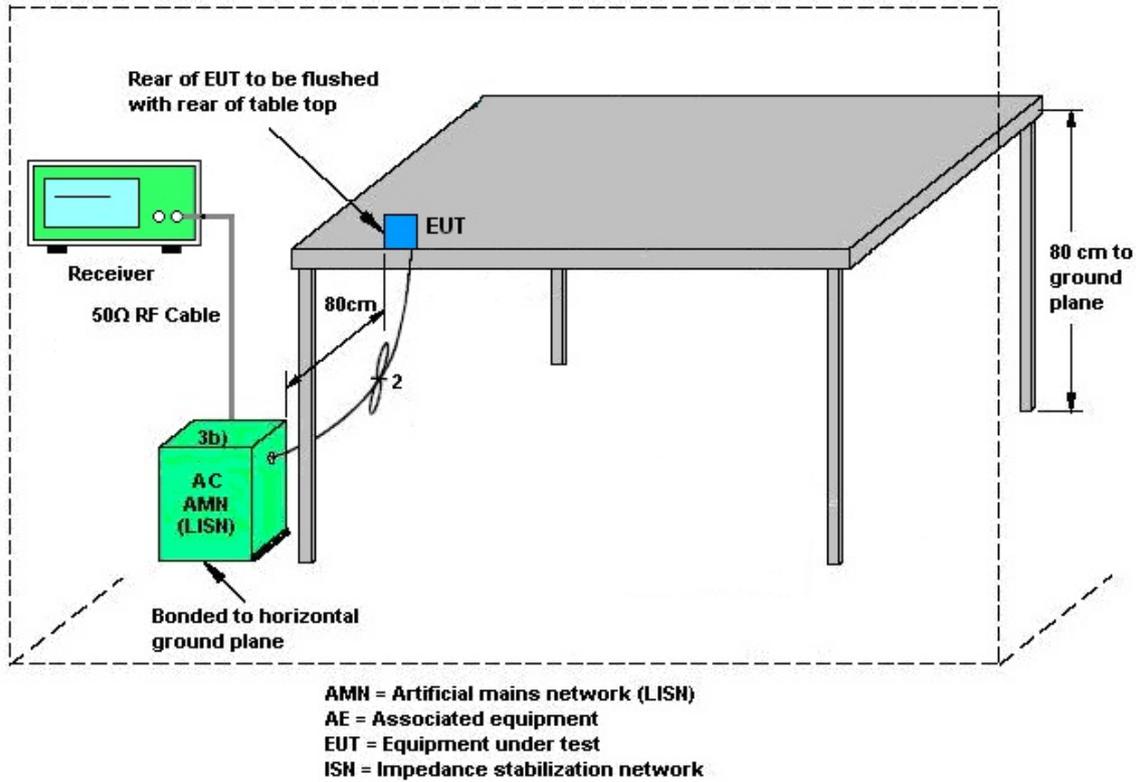
##### 3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

##### 3.1.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

### 3.1.4 Test setup



### 3.1.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

## 3.2 20dB and 99% OBW Spectrum Bandwidth Measurement

### 3.2.1 Limit

Reporting only

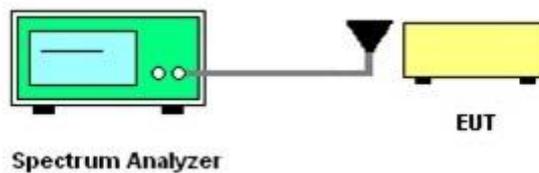
### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.
4. Measured the 99% OBW.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Conducted Test Items

Please refer to Appendix B.

### 3.3 Radiated Emissions Measurement

#### 3.3.1 Limit

The field strength of any emissions which appear band shall not exceed the general radiated emissions limits.

Frequencies (MHz)	Field Strength ( $\mu\text{V/m}$ )	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

#### 3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.3.3 Measuring Instrument Setting

The following table is the setting of receiver:

Receiver Parameter	Setting
Attenuation	Auto
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

**Note:** The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz and 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

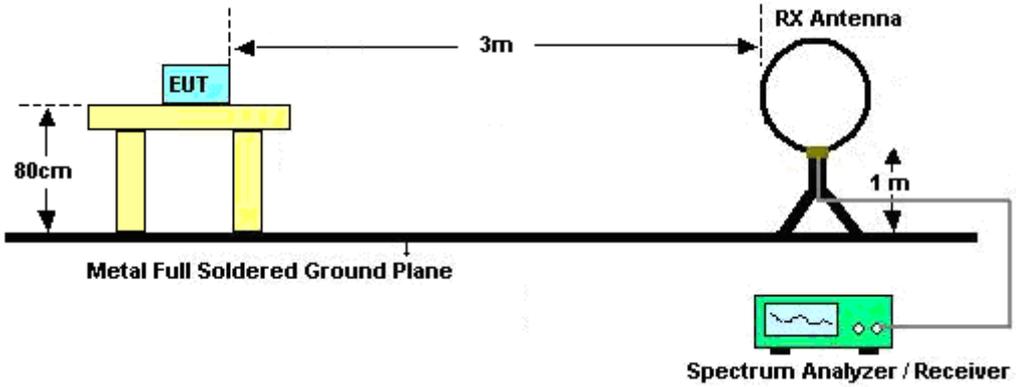


### 3.3.4 Test Procedures

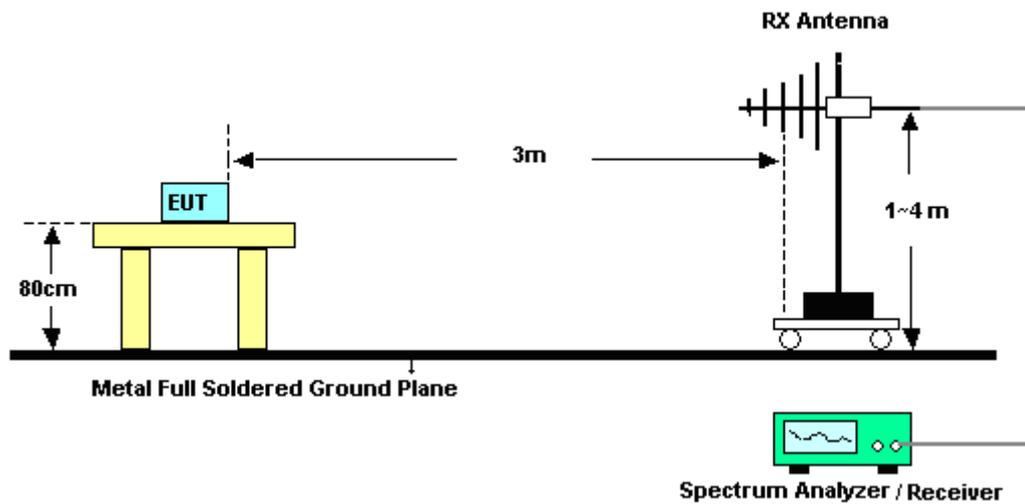
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
7. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver.

### 3.3.5 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



### 3.3.6 Test Result of Radiated Emissions Measurement

Please refer to Appendix C.



## **3.4 Antenna Requirements**

### **3.4.1 Standard Applicable**

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

### **3.4.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.



### 4. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	AC POWER	AFC-500W	F10407001 1	50Hz~60Hz	Apr. 09, 2020	Nov. 20, 2020	Apr. 08, 2021	Conducted (TH03-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 02, 2020	Nov. 20, 2020	Mar. 01, 2021	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Sep. 03, 2020	Nov. 20, 2020	Sep. 02, 2021	Conducted (TH03-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Nov. 18, 2020	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102317	9kHz~3.6GHz	Sep. 11, 2020	Nov. 18, 2020	Sep. 10, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 20, 2019	Nov. 18, 2020	Nov. 19, 2020	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Nov. 18, 2020	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 02, 2020	Nov. 18, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 02, 2020	Nov. 18, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 02, 2020	Nov. 18, 2020	Mar. 01, 2021	Conduction (CO05-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D0 1N-06	35419 & 03	30MHz~1GHz	Apr. 29, 2020	Nov. 17, 2020~ Nov. 18, 2020	Apr. 28, 2021	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Dec. 26, 2019	Nov. 17, 2020~ Nov. 18, 2020	Dec. 25, 2020	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	May 19, 2020	Nov. 17, 2020~ Nov. 18, 2020	May 18, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971/4, MY28655/4	9kHz~30MHz	Feb. 25, 2020	Nov. 17, 2020~ Nov. 18, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4, MY24971/4, MY15682/4	30MHz~1GHz	Feb. 25, 2020	Nov. 17, 2020~ Nov. 18, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
Controller	ChainTek	Chaintek 3000	N/A	Control Turn table	N/A	Nov. 17, 2020~ Nov. 18, 2020	N/A	Radiation (03CH07-HY)
Controller	Max-Full	MF7802	MF7802083 68	Control Ant Mast	N/A	Nov. 17, 2020~ Nov. 18, 2020	N/A	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Nov. 17, 2020~ Nov. 18, 2020	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Nov. 17, 2020~ Nov. 18, 2020	N/A	Radiation (03CH07-HY)
USB Data Logger	TECPEL	TR-32	HE17XB249 5	N/A	N/A	Nov. 17, 2020~ Nov. 18, 2020	N/A	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A(MX E)	MY5329005 3	20Hz~26.5GHz	May 21, 2020	Nov. 17, 2020~ Nov. 18, 2020	May 20, 2021	Radiation (03CH07-HY)
Software	Audix	E3 6.2009-8-24	805040046 56H	N/A	N/A	Nov. 17, 2020~ Nov. 18, 2020	N/A	Radiation (03CH07-HY)



## 5. Uncertainty of Evaluation

### Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.3
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### Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.9
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.7
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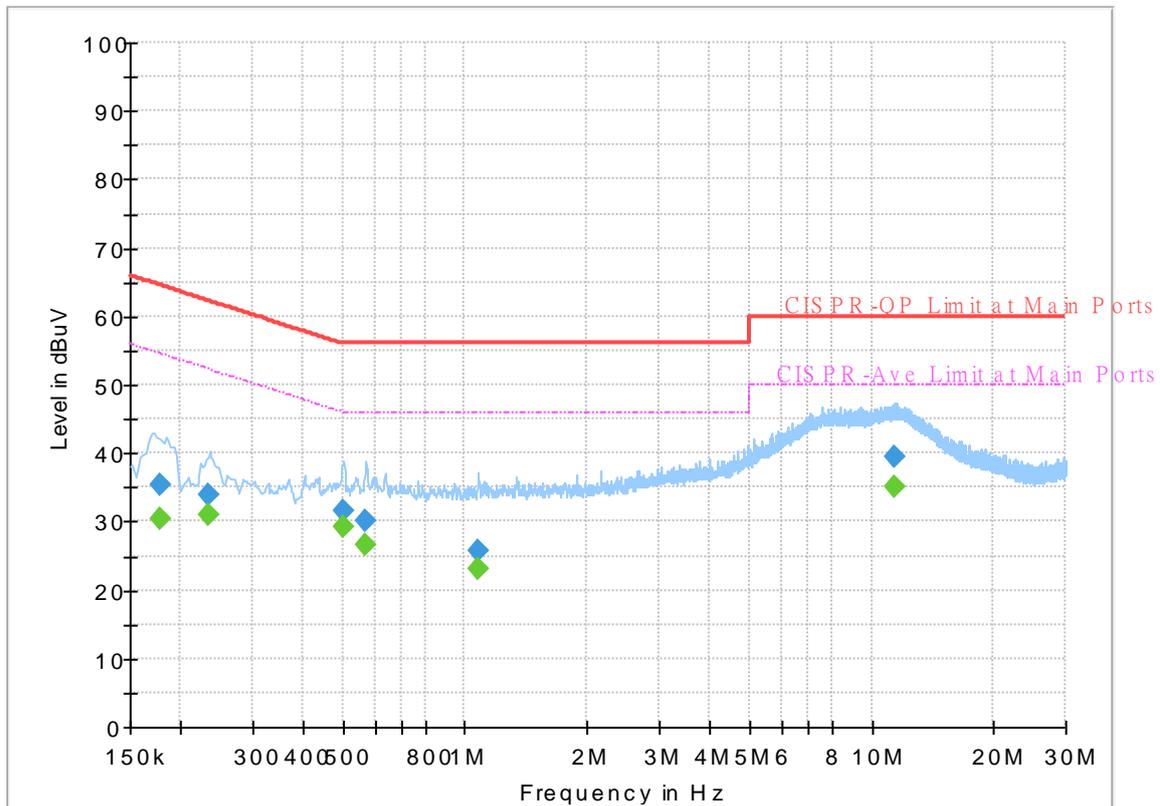
## Appendix A. Test Results of Conducted Emission Test

Test Engineer :	Tom Lee	Temperature :	23~26°C
		Relative Humidity :	40~50%

## EUT Information

Report NO : 0N0303  
 Test Mode : Mode 1  
 Test Voltage : 120Vac/60Hz  
 Phase : Line

Full Spectrum



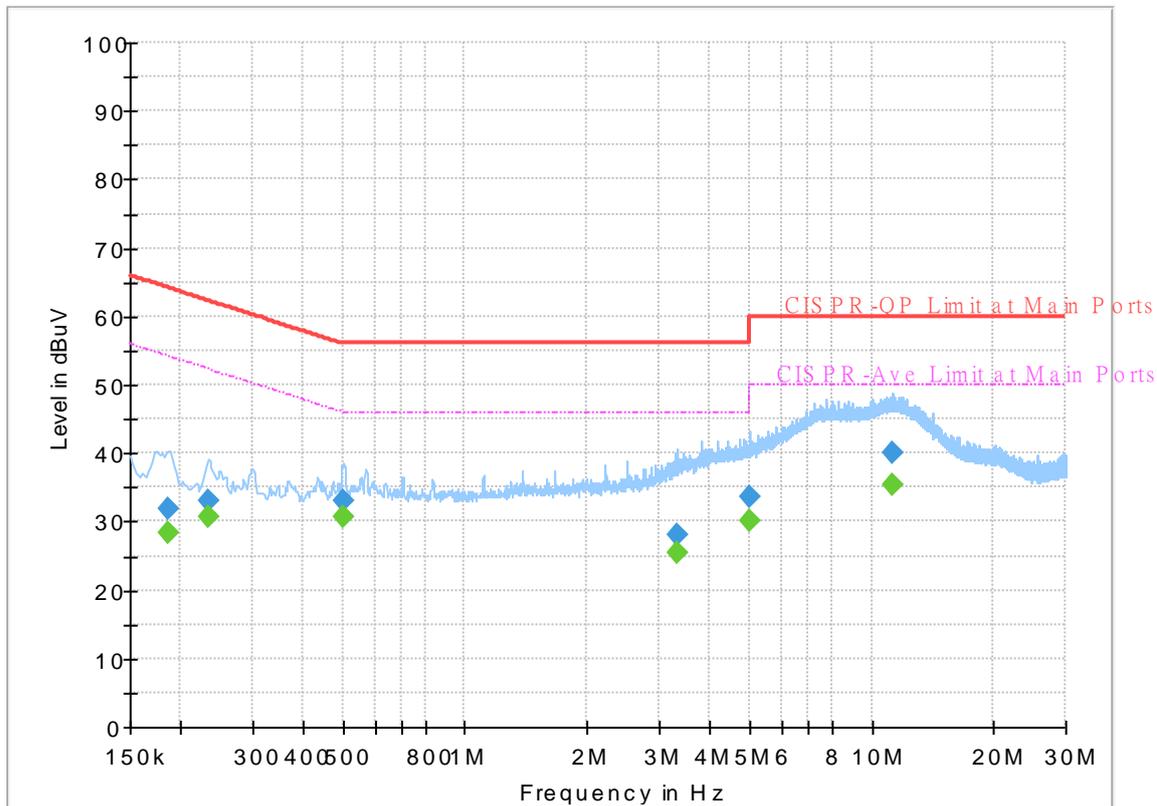
## Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.177000	---	30.33	54.63	24.30	L1	OFF	19.4
0.177000	35.51	---	64.63	29.12	L1	OFF	19.4
0.233430	---	30.91	52.33	21.42	L1	OFF	19.4
0.233430	33.84	---	62.33	28.49	L1	OFF	19.4
0.502980	---	29.23	46.00	16.77	L1	OFF	19.5
0.502980	31.69	---	56.00	24.31	L1	OFF	19.5
0.569670	---	26.63	46.00	19.37	L1	OFF	19.5
0.569670	30.19	---	56.00	25.81	L1	OFF	19.5
1.074120	---	22.99	46.00	23.01	L1	OFF	19.5
1.074120	25.63	---	56.00	30.37	L1	OFF	19.5
11.397750	---	35.07	50.00	14.93	L1	OFF	20.0
11.397750	39.59	---	60.00	20.41	L1	OFF	20.0

# EUT Information

Report NO : 0N0303  
 Test Mode : Mode 1  
 Test Voltage : 120Vac/60Hz  
 Phase : Neutral

Full Spectrum



## Final\_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.185280	---	28.45	54.25	25.80	N	OFF	19.5
0.185280	31.87	---	64.25	32.38	N	OFF	19.5
0.234150	---	30.79	52.30	21.51	N	OFF	19.5
0.234150	33.00	---	62.30	29.30	N	OFF	19.5
0.500640	---	30.64	46.00	15.36	N	OFF	19.5
0.500640	33.12	---	56.00	22.88	N	OFF	19.5
3.329250	---	25.45	46.00	20.55	N	OFF	19.7
3.329250	28.20	---	56.00	27.80	N	OFF	19.7
4.988220	---	30.17	46.00	15.83	N	OFF	19.8
4.988220	33.67	---	56.00	22.33	N	OFF	19.8
11.235750	---	35.42	50.00	14.58	N	OFF	20.1
11.235750	40.08	---	60.00	19.92	N	OFF	20.1



# Appendix B. Test Results of Conducted Test Items

## B1. Test Result

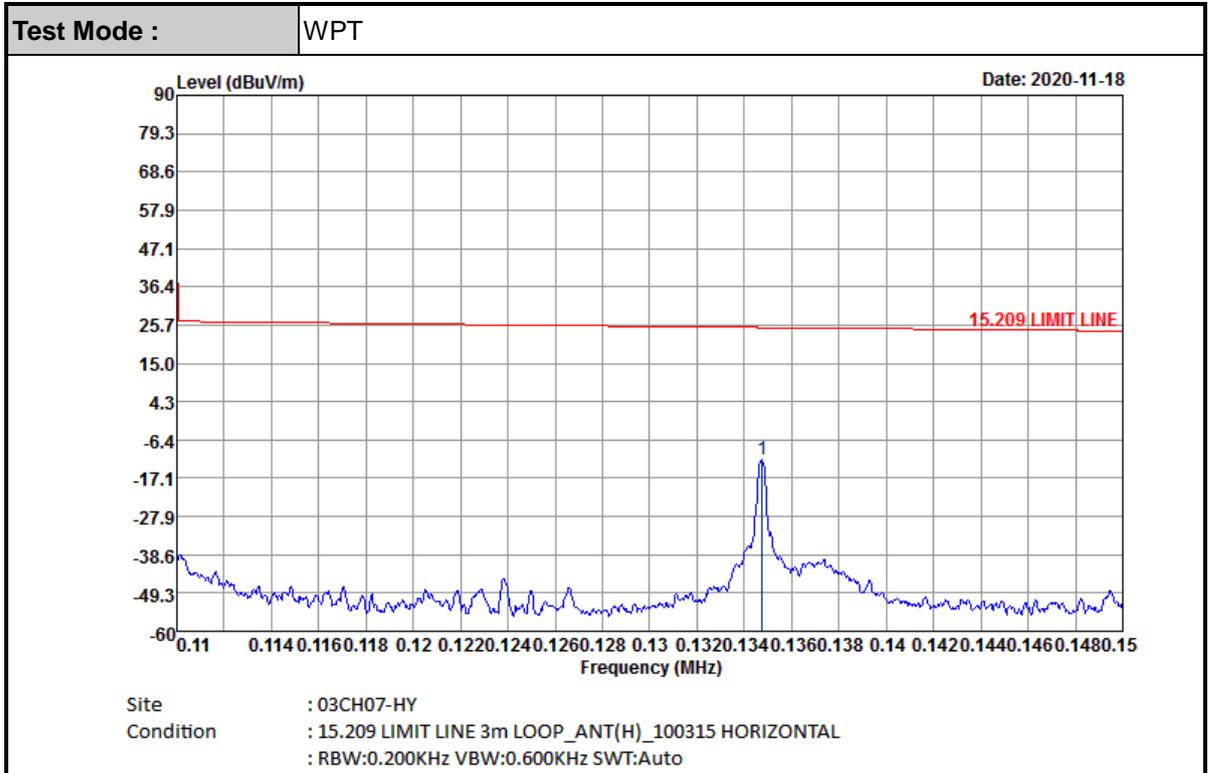
Test mode		WPT	
<b>20dB Bandwidth (kHz)</b>	0.780	<b>99% OccupiedBW(kHz)</b>	0.660

**Remark:** Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

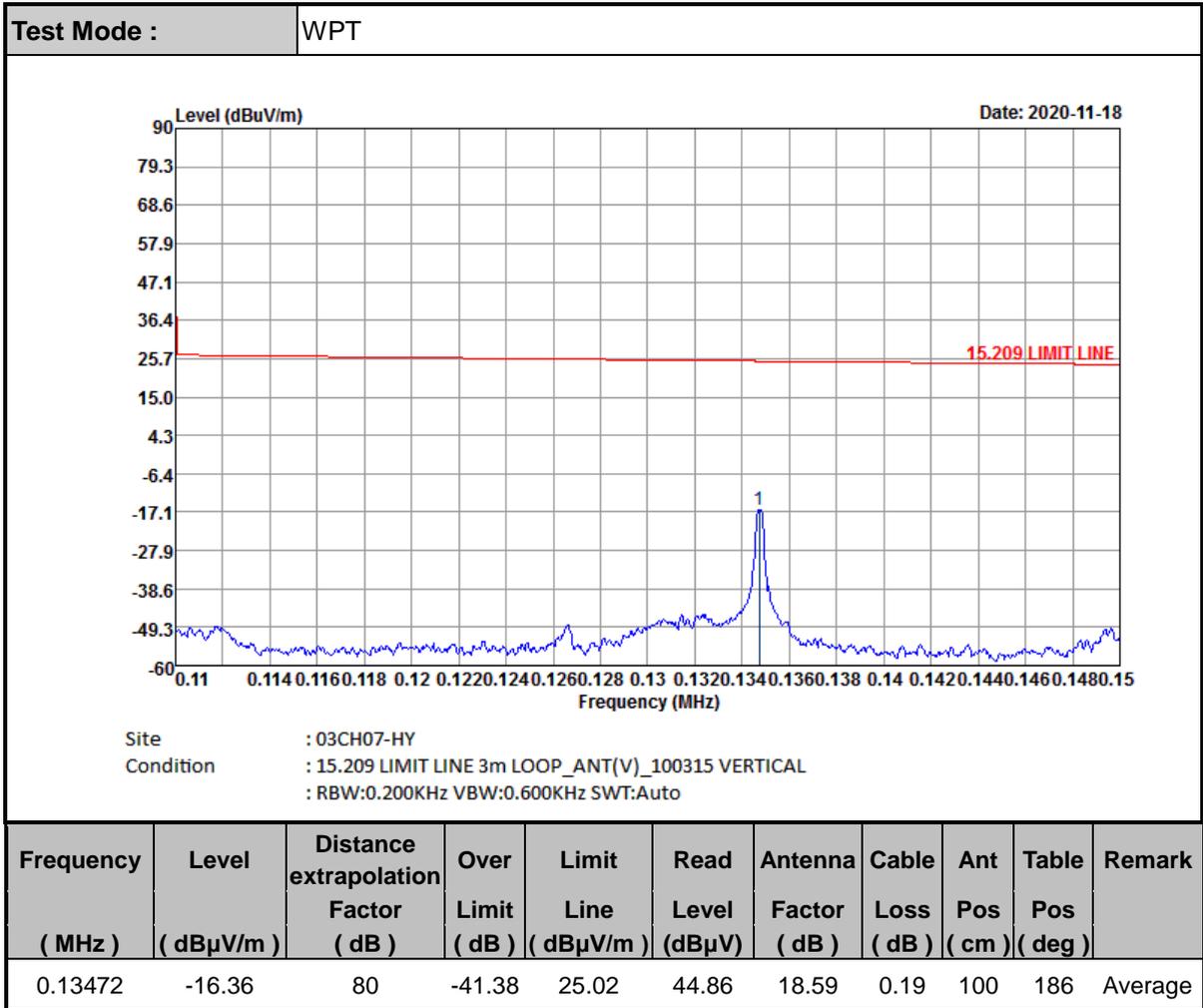


## Appendix C. Test Results of Radiated Test Items

### C1. Test Result of Field Strength of Fundamental Emissions

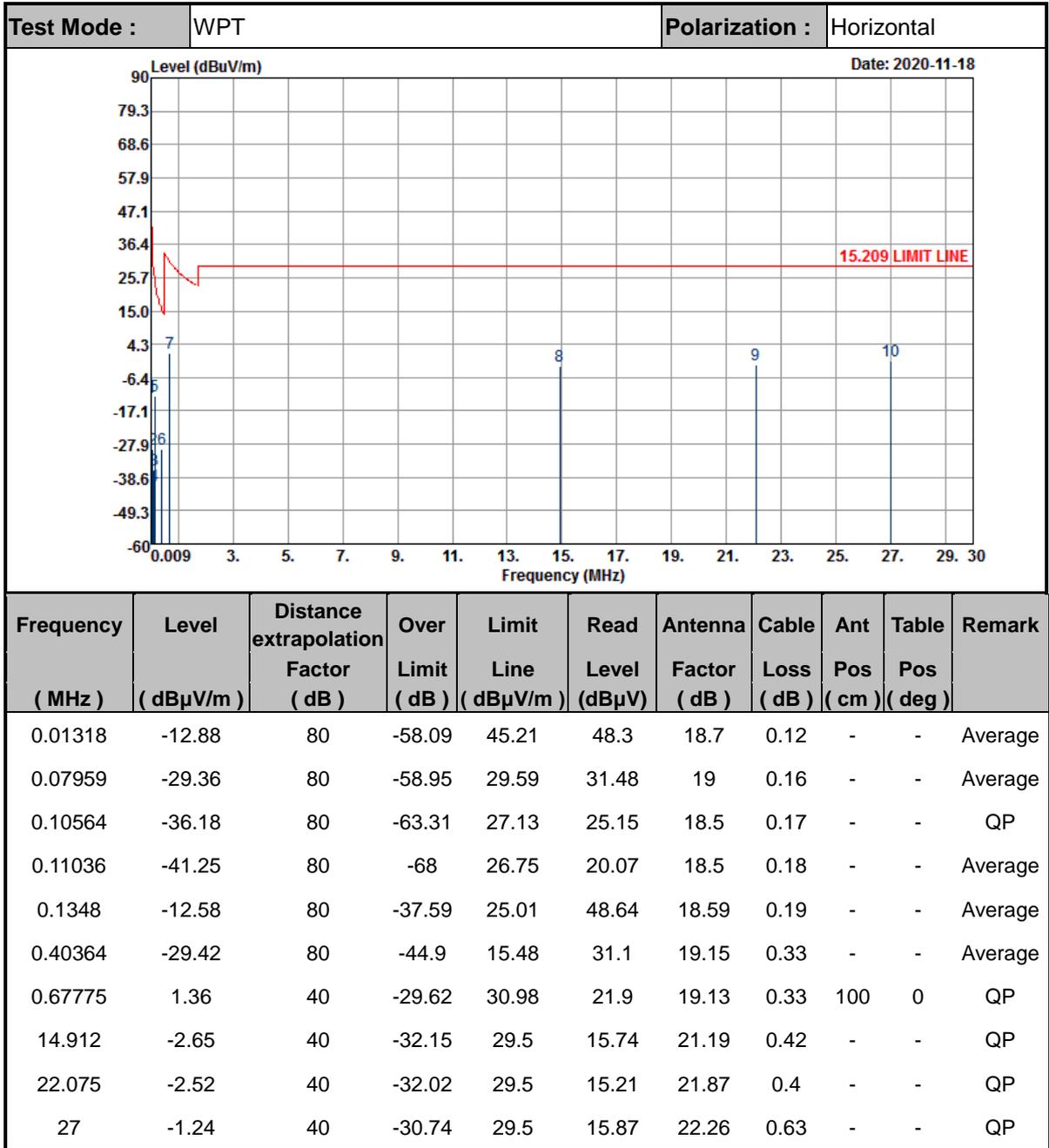


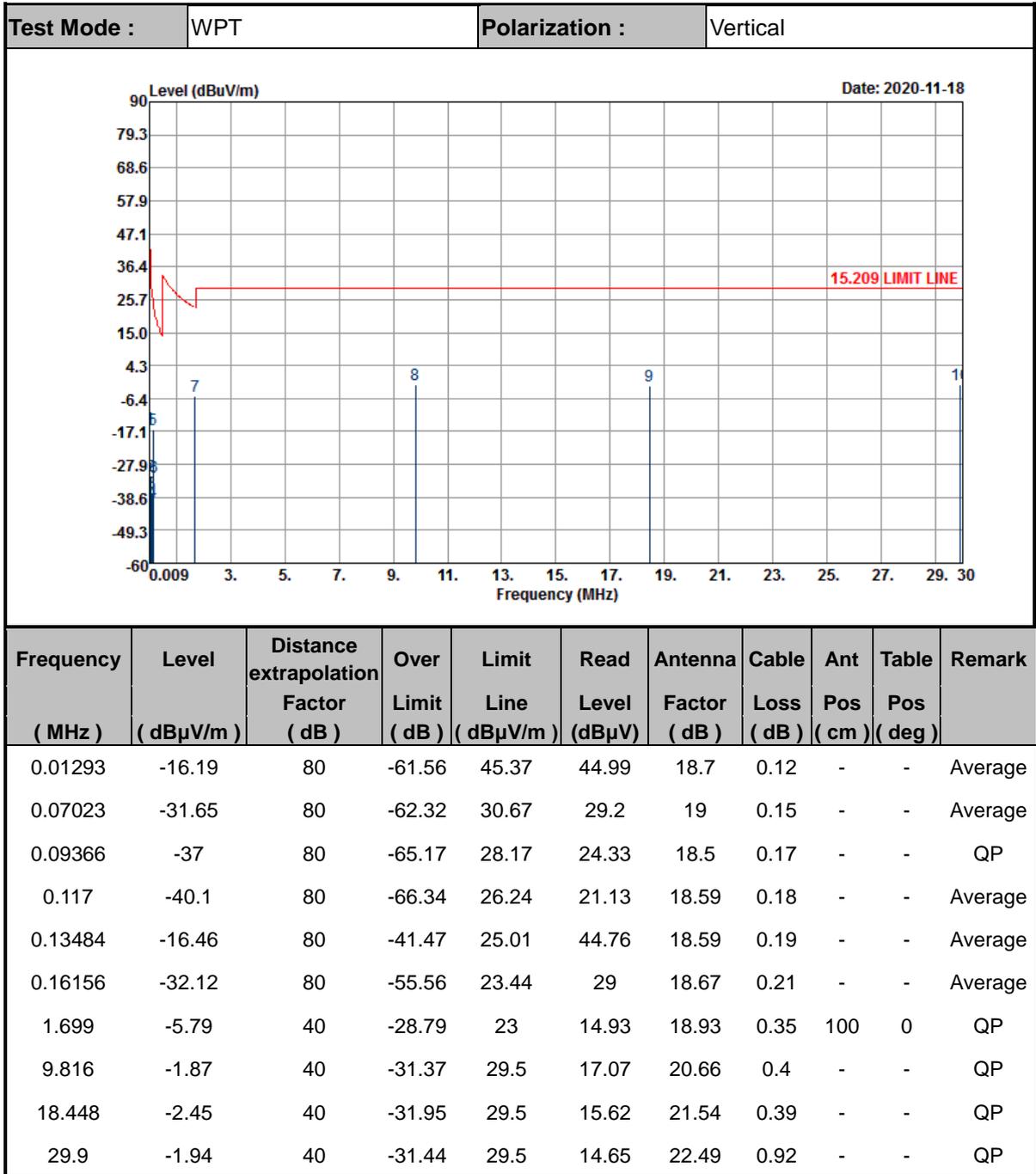
Frequency ( MHz )	Level ( dB $\mu$ V/m )	Distance extrapolation Factor ( dB )	Over Limit ( dB )	Limit Line ( dB $\mu$ V/m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
0.13476	-12.12	80	-37.13	25.01	49.1	18.59	0.19	100	295	Average





C2. Results of Radiated Spurious Emissions (9 kHz~30MHz)





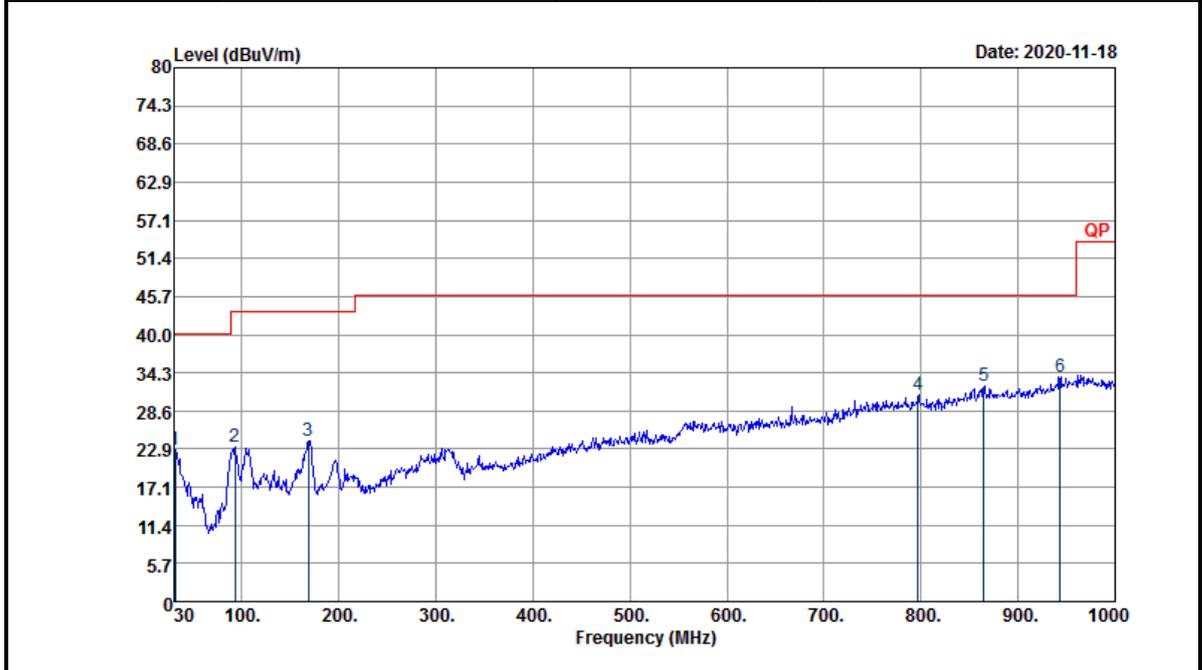
**Note:**

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
3. Limit line = specific limits (dBμV) + distance extrapolation factor

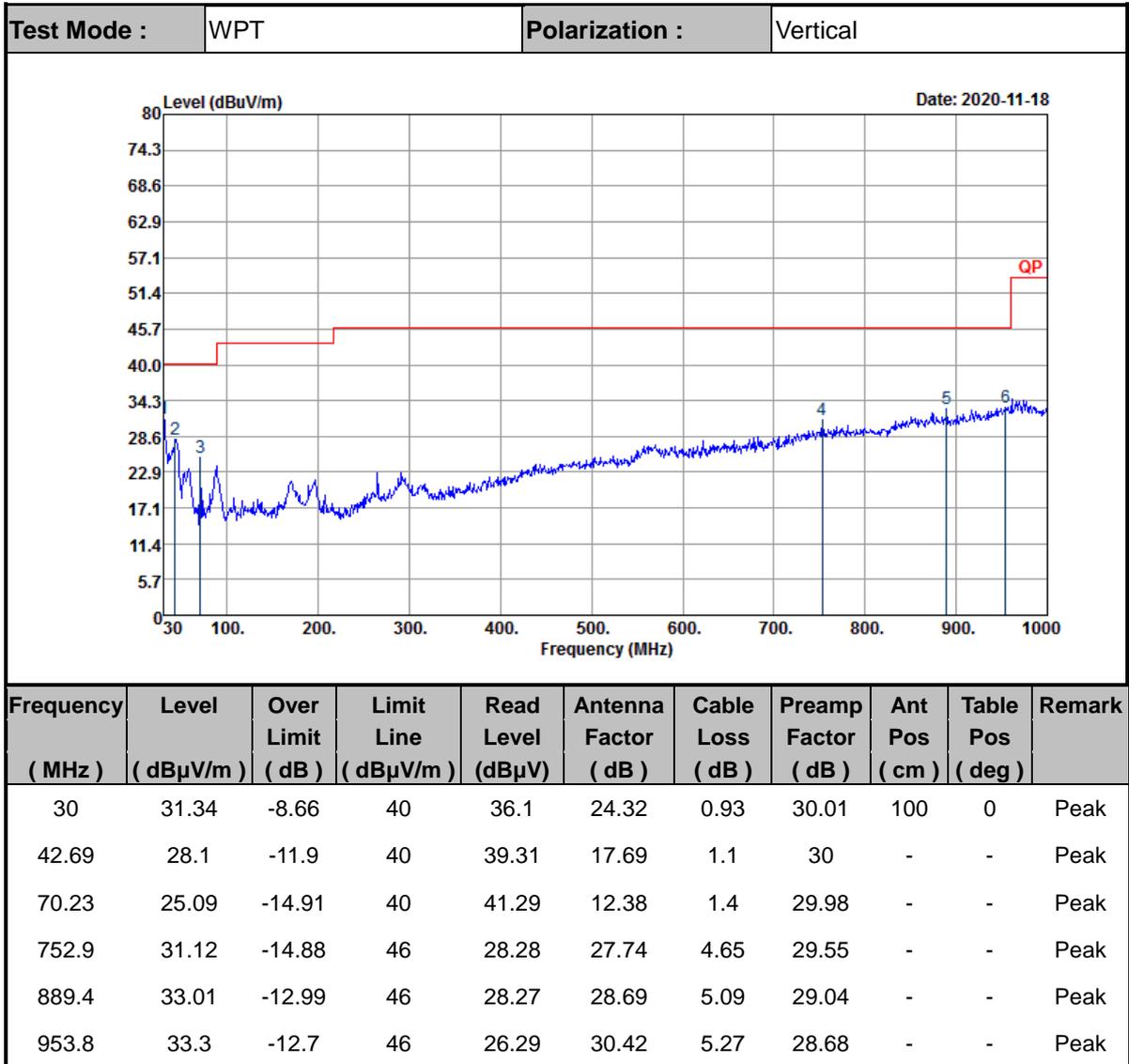


**C3. Results of Radiated Spurious Emissions (30MHz~1GHz)**

Test Mode :	WPT	Polarization :	Horizontal
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Frequency ( MHz )	Level ( dB $\mu$ V/m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V/m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
31.08	22.66	-17.34	40	27.6	24.12	0.95	30.01	-	-	Peak
92.91	23.13	-20.37	43.5	36.41	15.08	1.61	29.97	-	-	Peak
168.51	24.09	-19.41	43.5	36.17	15.68	2.18	29.94	-	-	Peak
797	30.98	-15.02	46	27.85	27.75	4.84	29.46	-	-	Peak
864.9	32.36	-13.64	46	27.63	28.87	5.01	29.15	-	-	Peak
943.3	33.62	-12.38	46	27.32	29.8	5.24	28.74	100	0	Peak



**Note:**

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.