

FCC TEST REPORT

Product Name: Clock Radio

Trade Mark:



or PHILIPS

Model No.: TAR7606/37

Add. Model No.: TAR7606/10, TAR7606, TAR7606xx/yy,
R7606xx/yy (xx=AA-ZZ or blank denoted
different color; yy=00-99 denoted different
country destination)

Report Number: 210528019RFC-3

Test Standards: FCC 47 CFR Part 15 Subpart C

FCC ID: 2AR2STAR7606

Test Result: PASS

Date of Issue: November 29, 2021

Prepared for:

MMD Hong Kong Holding Limited
Unit 1006, 10th Floor, C-Bons International Center, 108 Wai Yip Street,
Kwun Tong, Kowloon, Hong Kong

Prepared by:

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November 29, 2021

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UTTR-RF-FCCPART15.209-V1.1

Version

Version No.	Date	Description
V1.0	November 29, 2021	Original



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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	MMD Hong Kong Holding Limited
Address of Applicant:	Unit 1006, 10th Floor, C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Manufacturer:	MMD Hong Kong Holding Limited
Address of Manufacturer:	Unit 1006, 10th Floor, C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Clock Radio
Model No.:	TAR7606/37
Add. Model No.:	TAR7606/10, TAR7606, TAR7606xx/yy, R7606xx/yy (xx=AA-ZZ or blank denoted different color; yy=00-99 denoted different country destination)
Trade Mark:	 or PHILIPS
DUT Stage:	Production Unit
EUT Supports Function:	112kHz
Sample Received Date:	September 16, 2021
Sample Tested Date:	October 19, 2021 to October 26, 2021
Note: The additional model TAR7606/10, TAR7606, TAR7606xx/yy, R7606xx/yy (xx=AA-ZZ or blank denoted different color; yy=00-99 denoted different country destination) is identical with the test model TAR7606/37 except the model number for marketing purpose.	

1.2.2 Description of Accessories

Adapter	
Model No.:	AS340-090-AD280
Input:	100-240 V~50/60 Hz 1.2A
Output:	9V  2.8A,
DC Cable:	1.5 Meter, Shielded with one ferrite

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Nominal Operating Frequency:	112kHz
Type of Modulation:	ASK
Number of Channels:	1
Antenna Type:	Coil antenna
Maximum Field Strength:	69.87 dBμV/m at 3 meter
Normal Test Voltage:	120 Vac

1.4 OTHER INFORMATION

None

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

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Description	Manufacturer	Model No.	Serial Number	Supplied by
Mobile phone	Xiaomi Corporation	Mi10S	N/A	UnionTrust
Cement load	KaiGuang letter	N/A	N/A	UnionTrust

2)Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	USB Cable	USB Port	0.5Meter	UnionTrust

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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Telephone: +86 (0) 755 2823 0888
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1.7 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

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None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.2 dB
2	Conducted emission 150KHz-30MHz	±2.7 dB
3	Radiated emission 9KHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.6 dB
5	Radiated emission 1GHz-18GHz	± 4.4 dB
6	Radiated emission 18GHz-26GHz	± 4.6 dB
7	Radiated emission 26GHz-40GHz	± 4.6 dB

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2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart C Test Cases			
Test Item	Test Requirement	Test Method	Result
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203	N/A	PASS
Conducted Emission	FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
Radiated Emissions	FCC 47 CFR Part 15 Subpart C Section 15.209	ANSI C63.10-2013 Section 6.3 & 6.5 & 6.6	PASS
20DB Bandwidth	FCC 47 CFR Part 15 Subpart C Section 15.215(c)	ANSI C63.10-2013	Pass

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3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	3m SAC	ETS-Lindgren	3m	Euroshiedpn-C T001270-1317	Jan. 22, 2021	Jan. 21, 2024
☒	Loop Antenna	ETS-Lindgren	6502	00202525	Nov. 14, 2020	Nov. 13, 2021
☒	Receiver	ROHDE & SCHWARZ	ESIB26	100114	Nov. 18, 2020	Nov. 17, 2021
☒	Broadband Antenna (Pre-amplifier)	ETS-Lindgren	3142E	00201566	Nov. 14, 2020	Nov. 13, 2021
☒	Pre-amplifier	HP	8447F	2805A02960	Nov. 10, 2020	Nov. 09, 2021
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 14, 2020	Nov. 13, 2021
☒	Spectrum analyzer	R&S	FSV40-N	101653	Apr. 22, 2021	Apr. 21, 2022
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Nov. 18, 2020	Nov.17, 2021
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 18, 2020	Nov.17, 2021
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 18, 2020	Nov.17, 2021
☒	Test Software	Audix	e3	Software Version: 9.160323		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
NT/NV	+15 to +35	120	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
AC Power Line Conducted Emission	23.2	46	101.1	David Zhang
20 dB Bandwidth	26.1	49	99.9	Fire Huo
Radiated Emissions	26.1	49	99.9	Fire Huo

4.2 TEST CHANNELS

Frequency	Test RF Channel
112kHz	Channel 1
	112kHz

4.3 EUT TEST STATUS

Frequency	Tx Function	Description
112kHz	1Tx	1. Keep the EUT in continuously transmitting during the test.

4.4 TEST MODES

Test Item	EMI Test Modes
Radiated Emission	Mode 1 : Wireless charging (Max 10W)+BT Link+USB Output(5V/1A) Mode 2: No-load working mode
Conducted Emission	Mode 1 : Wireless charging (Max 10W)+BT Link+USB Output(5V/1A) Mode 2: No-load working mode

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

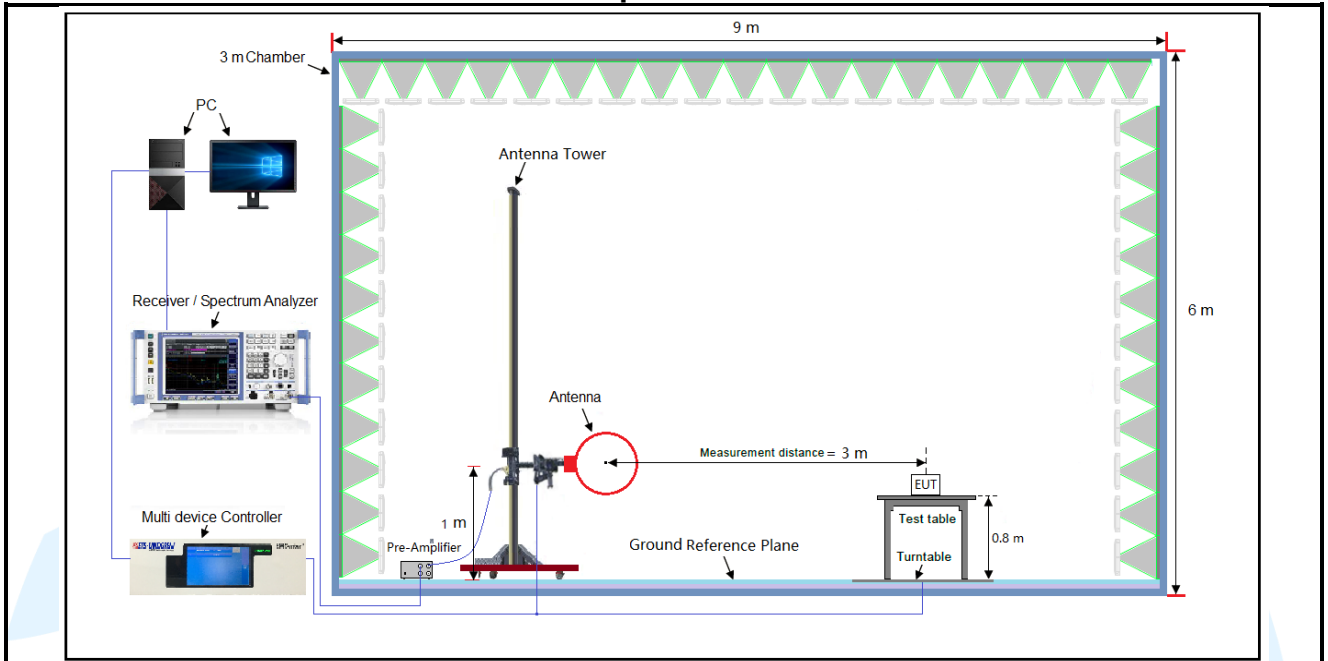


Figure 1. Below 30MHz

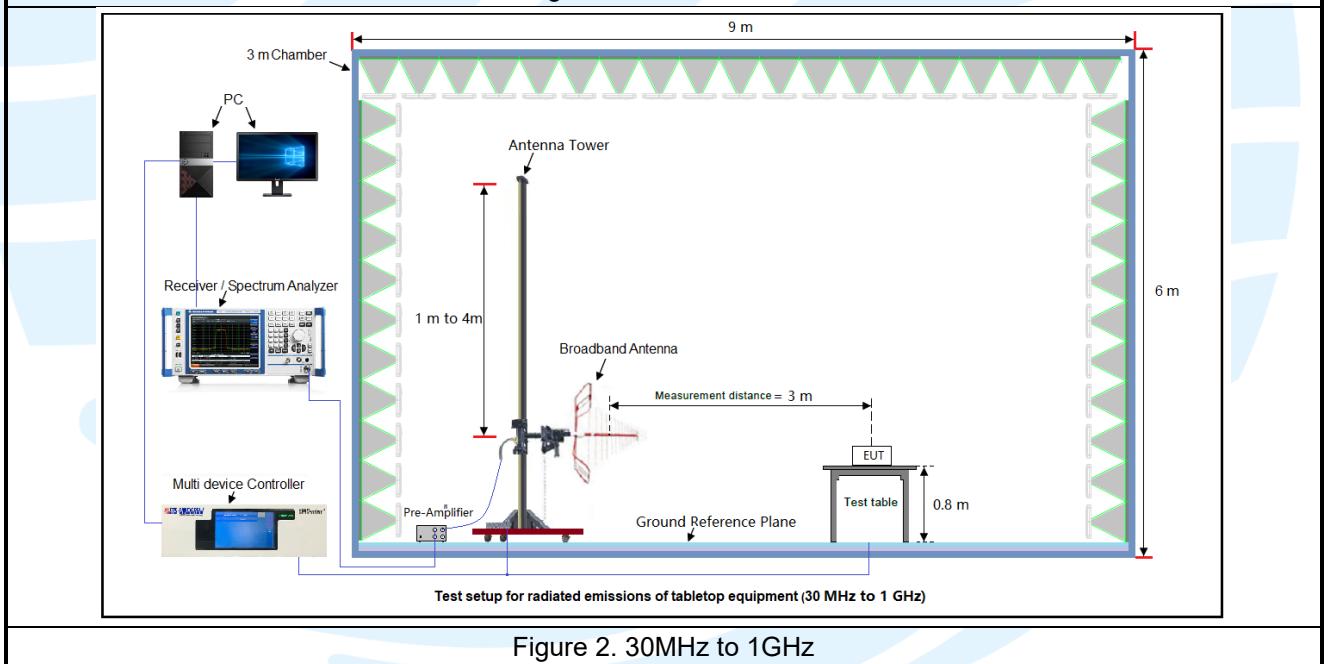
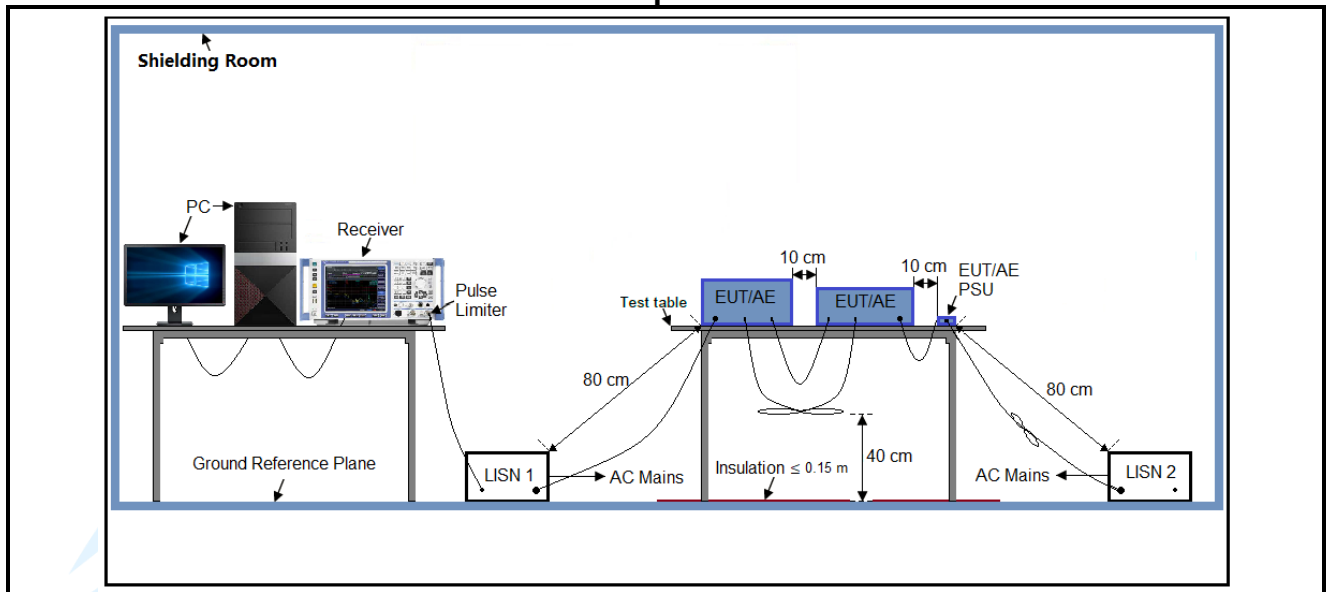
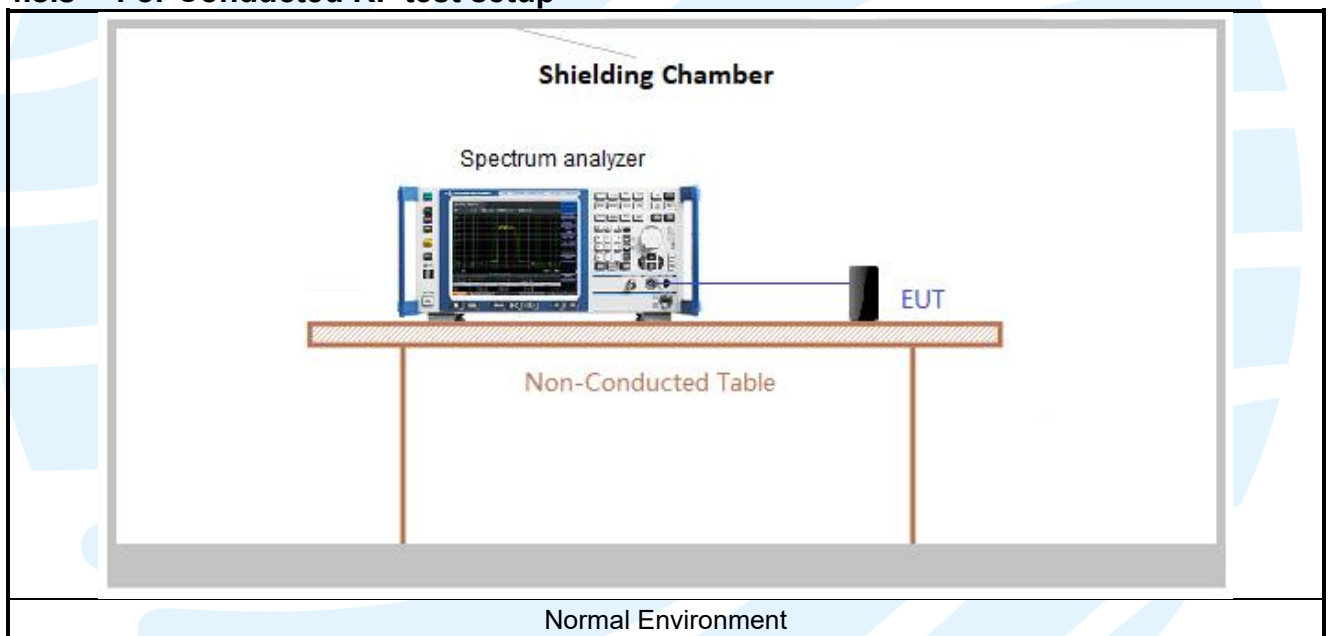


Figure 2. 30MHz to 1GHz

4.5.2 For Conducted Emissions test setup



4.5.3 For Conducted RF test setup



4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. Only the worst case data were recorded in this test report.

All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 15	Radio Frequency Devices
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
EUT Antenna:
This product has a permanent antenna, fulfill the requirement of this section.

5.3 20DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.215 (c)

Test Method: ANSI C63.10

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency
- Span = approximately 2 to 5 times the OBW
- RBW = 1% to 5% of the OBW
- VBW $\geq 3 \times$ RBW
- Sweep = auto;
- Detector function = peak
- Trace = max hold
- All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down bandwidth of the emission.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.4.3 for details.

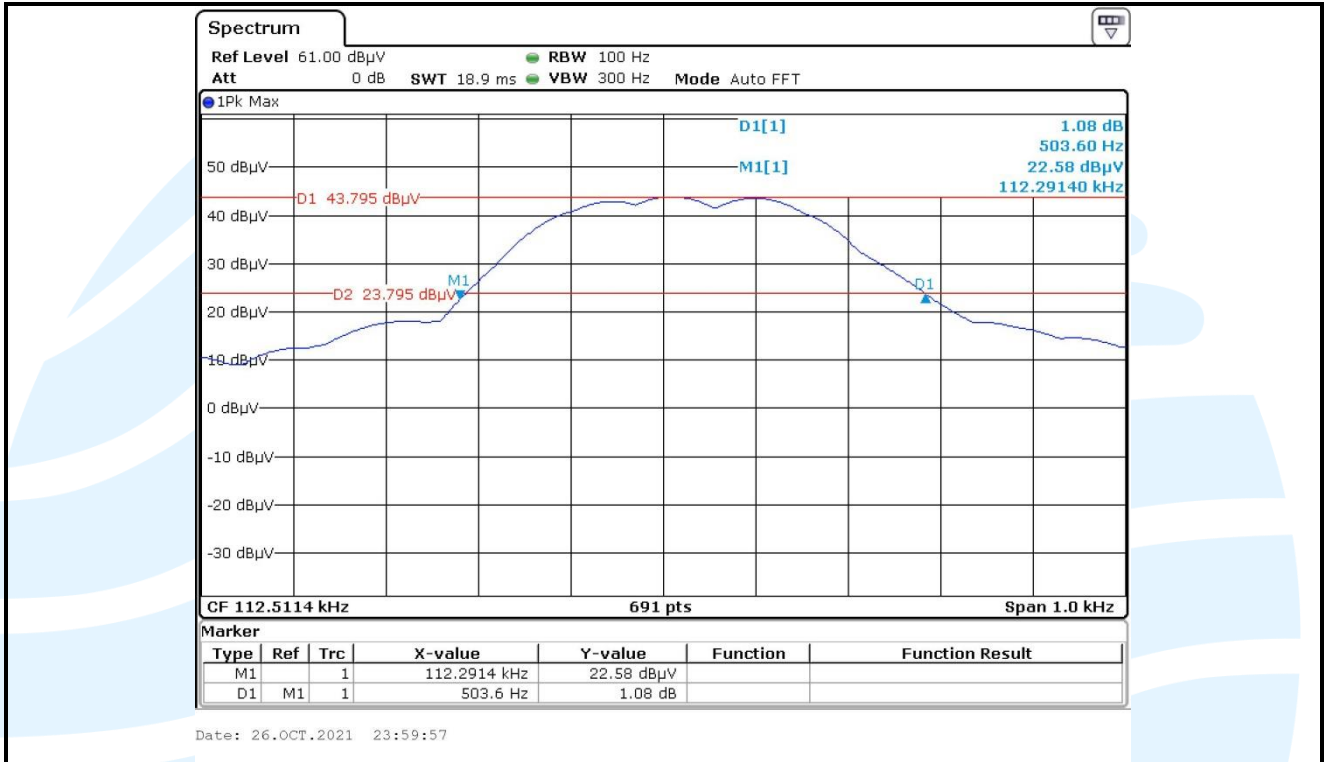
Instruments Used: Refer to section 3 for details

Test Mode: Transmitter mode

Test Results: Pass

Test Data:

Frequency (MHz)	20 dB Bandwidth (Hz)	Pass / Fail
0.112	503.6	Pass

The test plot as follows:

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5.4 RADIATED SPURIOUS EMISSIONS

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.209

Test Method: ANSI C63.10-2013 Section 6.3 & 6.5

Receiver Setup:

Frequency	RBW
0.009 MHz-0.150 MHz	200/300 kHz
0.150 MHz -30 MHz	9/10 kHz
30 MHz-1 GHz	100/120 kHz
Above 1 GHz	1 MHz

Limits:

Spurious Emissions

Frequency	Field strength (microvolt/meter)	Limit (dB μ V/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

Remark:

- The lower limit shall apply at the transition frequencies.
- Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
- For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.
- For Below 30MHz, the measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance). the measured field strength was extrapolated to distance 300 meters, using the formula that the limit of field strength varies as the inverse distance square (80dB per decade of distance)

Example:

Field strength limit for 125 kHz	= 19.2 μ V/m	at 300m
	= 25.67 dB μ V/m	at 300m
	= 25.67dB μ V/m + 40log(300/3) dB	at 3m
	= 105.67 dB μ V/m	at 3m

Test Setup: Refer to section 4.4.1 for details.

Test Procedures:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna 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.
- 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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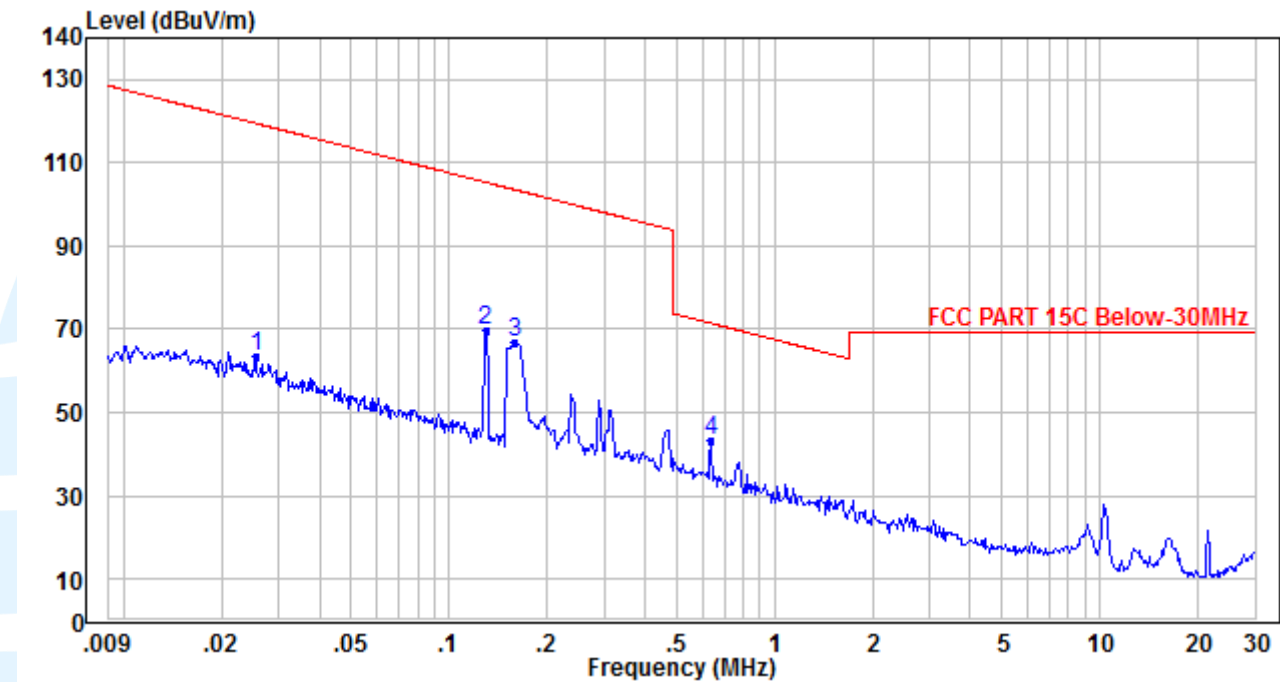
- 6) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- 7) The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.(for portable and mobile devices)

Equipment Used: Refer to section 3 for details.

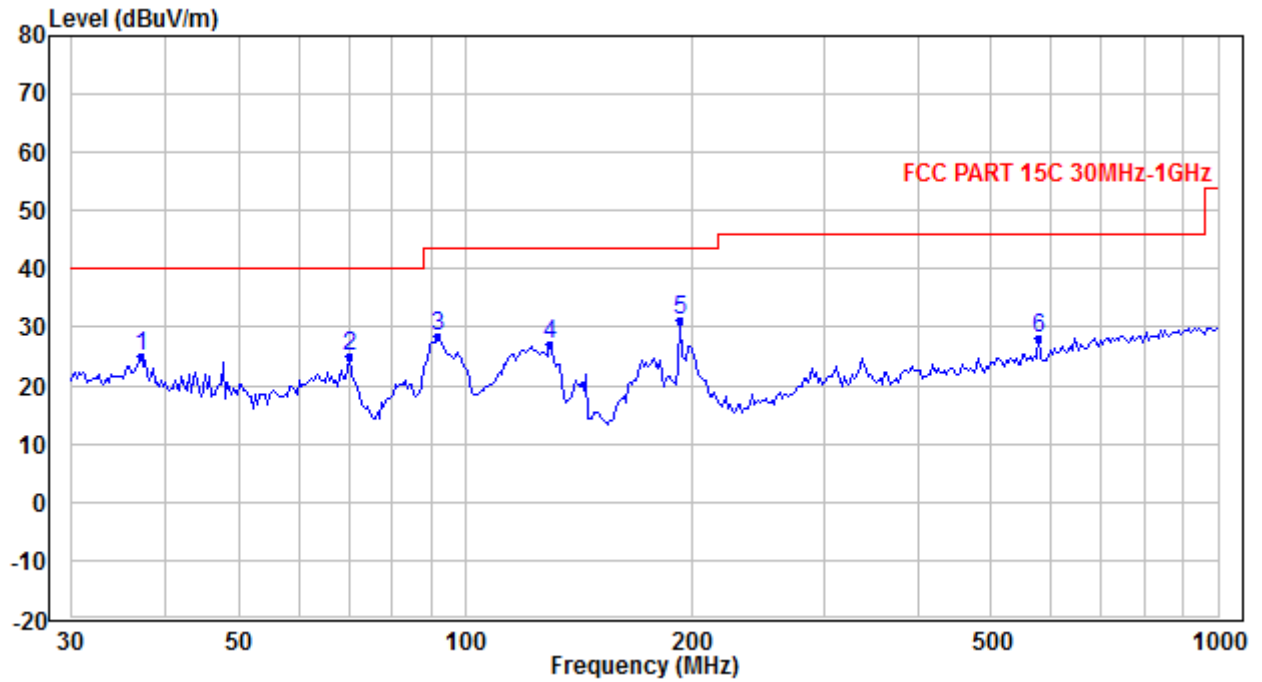
Test Result: Pass

Radiated Emission Test Data (9 KHz ~ 30MHz):

worst case test data: X axes



No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	0.025	75.05	-11.74	63.31	119.49	-56.18	Peak
2	0.130	86.71	-16.84	69.87	105.35	-35.48	Peak
3	0.160	83.86	-17.00	66.86	103.52	-36.66	Peak
4	0.636	61.54	-18.15	43.39	71.52	-28.13	Peak

Radiated Emission Test Data (30 MHz ~ 1 GHz):
Horizontal


No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	37.041	31.53	-6.42	25.11	40.00	-14.89	QP
2	70.210	42.24	-17.25	24.99	40.00	-15.01	QP
3	91.700	44.86	-16.24	28.62	43.50	-14.88	QP
4	129.392	42.89	-15.89	27.00	43.50	-16.50	QP
5	193.137	41.70	-10.56	31.14	43.50	-12.36	QP
6	578.036	29.61	-1.52	28.09	46.00	-17.91	QP

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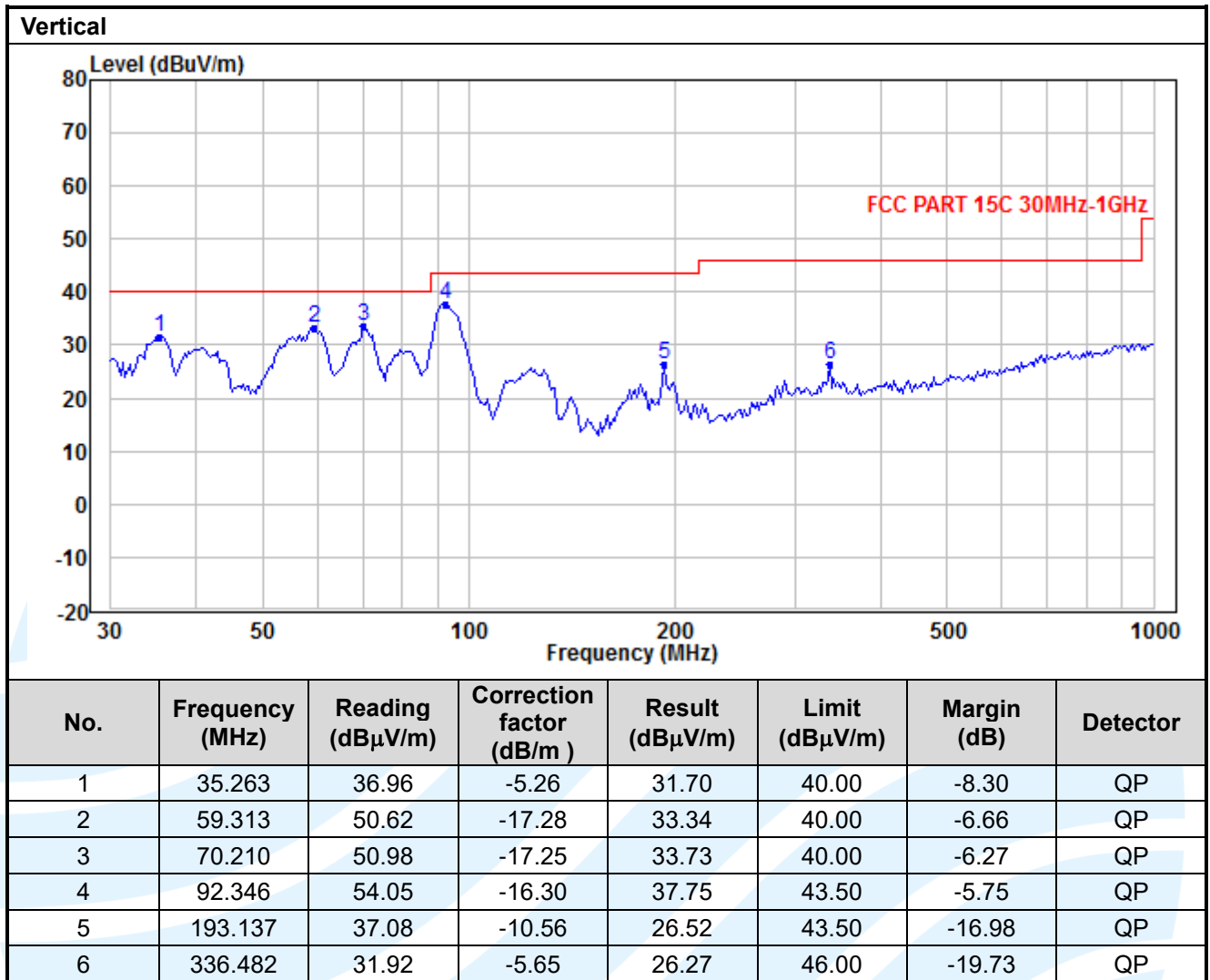
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Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit
4. All possible modes of operation were investigated, only the worst-case emissions reported. It is worst-case while wireless charging and Bluetooth are working simultaneously.

5.5 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.207

Test Method: ANSI C63.10-2013 Section 6.2

Limits:

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

Test Setup: Refer to section 4.4.2 for details.

Test Procedures:

Test frequency range :150KHz-30MHz

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Equipment Used: Refer to section 3 for details.

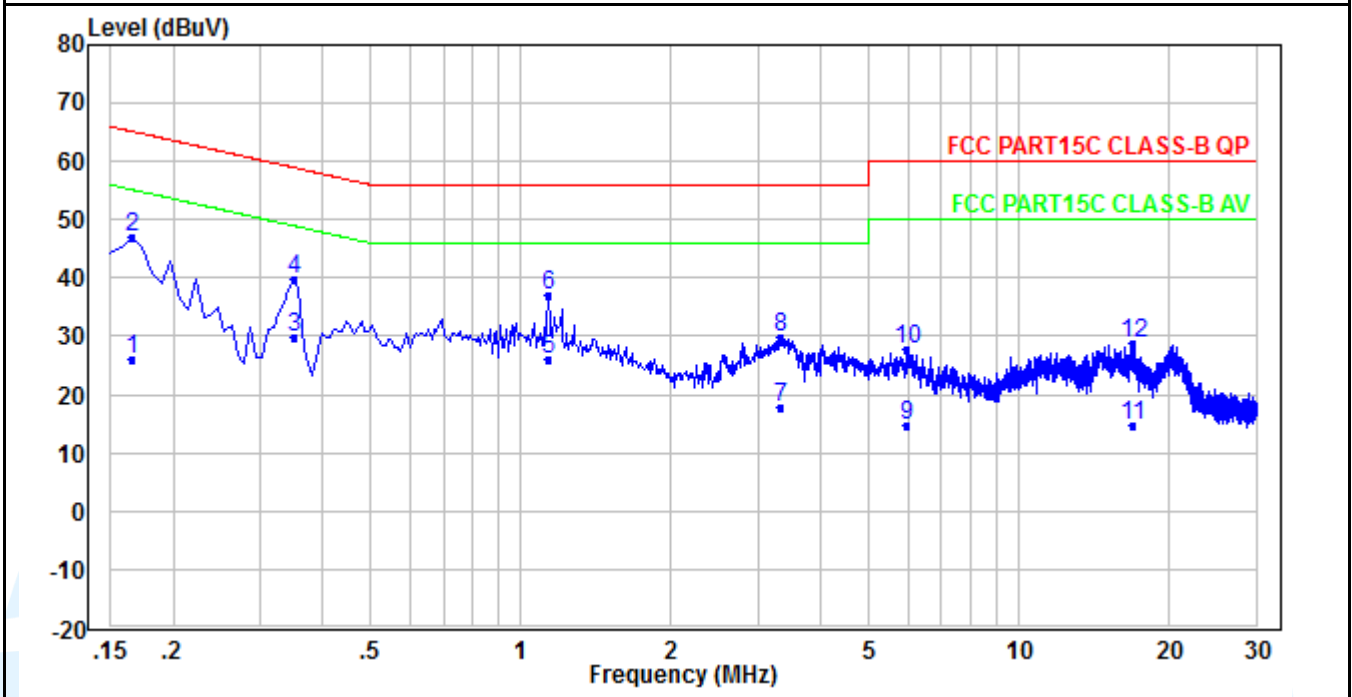
Test Result: Pass

The measurement data as follows:

Quasi Peak and Average:

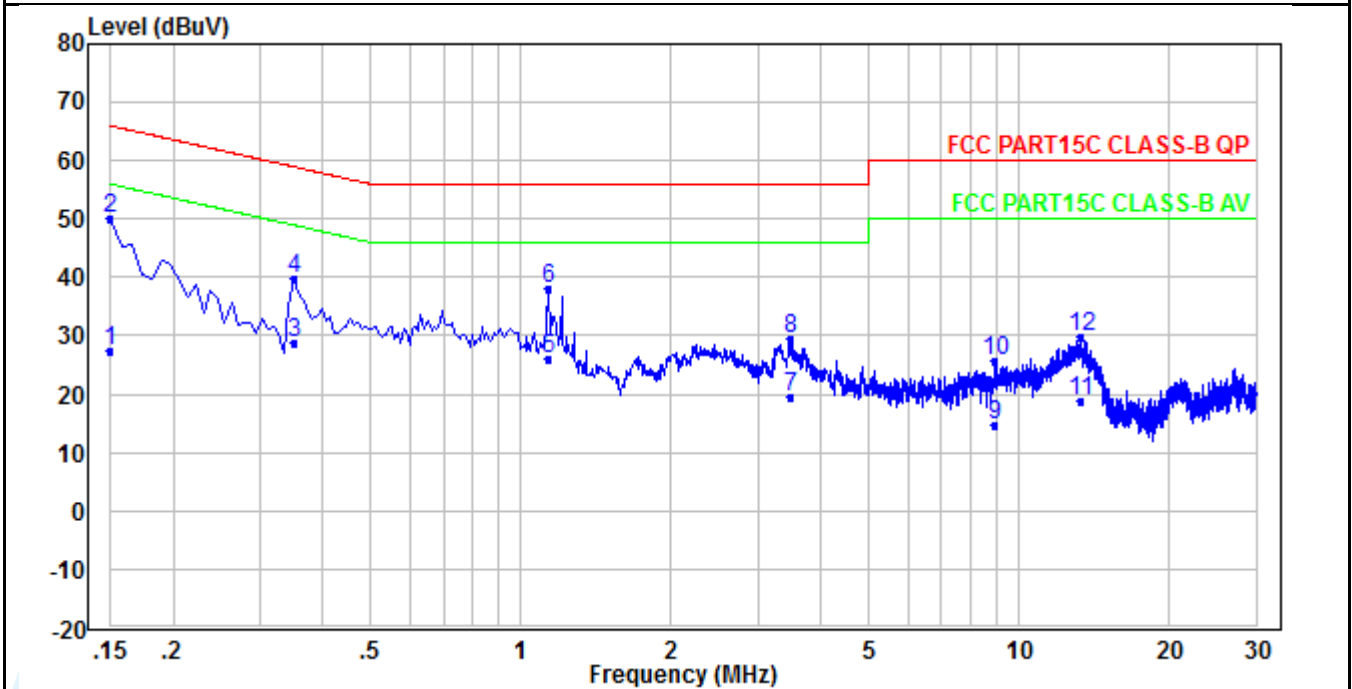
Mode 1:

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.166	16.14	9.75	25.89	55.16	-29.27	Average
2	0.166	37.14	9.75	46.89	65.16	-18.27	QP
3	0.350	20.00	9.77	29.77	48.96	-19.19	Average
4	0.350	30.00	9.77	39.77	58.96	-19.19	QP
5	1.134	16.20	9.89	26.09	46.00	-19.91	Average
6	1.134	27.20	9.89	37.09	56.00	-18.91	QP
7	3.333	7.70	10.02	17.72	46.00	-28.28	Average
8	3.333	19.70	10.02	29.72	56.00	-26.28	QP
9	5.941	4.51	10.24	14.75	50.00	-35.25	Average
10	5.941	17.51	10.24	27.75	60.00	-32.25	QP
11	16.947	4.31	10.45	14.76	50.00	-35.24	Average
12	16.947	18.31	10.45	28.76	60.00	-31.24	QP

Neutral Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.150	17.51	9.75	27.26	56.00	-28.74	Average
2	0.150	40.51	9.75	50.26	66.00	-15.74	QP
3	0.350	18.98	9.76	28.74	48.96	-20.22	Average
4	0.350	29.98	9.76	39.74	58.96	-19.22	QP
5	1.134	16.27	9.83	26.10	46.00	-19.90	Average
6	1.134	28.27	9.83	38.10	56.00	-17.90	QP
7	3.493	9.49	10.02	19.51	46.00	-26.49	Average
8	3.493	19.49	10.02	29.51	56.00	-26.49	QP
9	8.980	4.25	10.31	14.56	50.00	-35.44	Average
10	8.980	15.25	10.31	25.56	60.00	-34.44	QP
11	13.291	8.43	10.45	18.88	50.00	-31.12	Average
12	13.291	19.43	10.45	29.88	60.00	-30.12	QP

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.
5. All possible modes of operation were investigated, only the worst-case emissions reported. It is worst-case while wireless charging and Bluetooth are working simultaneously.

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UTTR-RF-FCCPART15.209-V1.1

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
