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EMC TEST REPORT

Report Type:
FCC Part 15C

Model:
PW15A

REPORT NUMBER:
191100178SHA-002

ISSUE DATE:
Oct. 31, 2019

DOCUMENT CONTROL NUMBER:
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TEST REPORT

Report no.: 191100178SHA-001

Applicant:	Popsockets LLC
Address of Applicant:	5757 Central Ave Boulder, CO 80301
Manufacturer:	JABIL
Address of Manufacturer:	CARRETERA NOGALES KM13.5, TECHNOLOGY PARK INT AV. Guadalupe No. 225, ZIP CODE: 45010, Zapopan, Jalisco, Mexico
FCC ID:	2ATTRPW15A

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:
47CFR Part 15 (2017): Radio Frequency Devices (Subpart C) **ANSI C63.10 (2013):** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

TESTED, PREPARED AND CHECKED BY :	REVIEWED AND APPROVED BY :
Team Leader Henry Lu Shenzhen UnionTrust Quality and Technology Co., Ltd.	Reviewer Daniel Zhao Intertek Testing Services Shanghai

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Revision History

Report No.	Version	Description	Issued Date
191100178SHA-002	Rev. 01	Initial issue of report	Oct. 31, 2019

Measurement result summary

TEST ITEM	FCC REFERANCE	RESULT
Antenna Requirement	15.203	Pass
Power line conducted emission	15.207	Pass
Radiated emission	15.209	Pass
20dB bandwidth	15.215	Pass

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Qi Certified 15w Home Wireless Charger
Type/Model:	PW15A
Description of EUT:	Qi Certified 15w Home Wireless Charger
Rating:	Model of Adapter: ASSA67A-190130 Input: 100-240 V~50/60 Hz 0.8 A Max Output: 19.0 VDC ⎓ 1.3 A Provided by applicant
EUT type:	☒ Table top ☐ Floor standing
Operating Frequency Range:	127.772 KHz
Antenna Type:	Coil antenna
Sample received date:	Oct. 18, 2019
Date of test:	Oct. 18, 2019 to Oct. 23, 2019

1.2 Description of Test Facility

All tests were sub-contracted and conducted by Shenzhen UnionTrust Quality and Technology Co., Ltd.

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109

Telephone: +86 (0) 755 2823 0888

Fax: +86 (0) 755 2823 0886

Tested, Prepared and Checked by Henry Lu from Shenzhen UnionTrust Quality and Technology Co., Ltd.

Reviewed and Approved by Daniel Zhao from Intertek Testing Services Shanghai.

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/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

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: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2017)
ANSI C63.10 (2013)

2.2 Mode of operation during the test

Within this test report, EUT was tested under all available operation modes and tested under its rating voltage and frequency.

Test Item	EMI Test Modes
Conducted emission	Mode 1 :Operating with Max. Power Output
Radiated emission	Mode 1 :Operating with Max. Power Output

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	e3	Audix	9.160323
Radiated emission	e3	Audix	9.160333

2.4 Test peripherals list

Item No.	Name	Band and Model	Note
1	Resistive Load	102-03	(25W, 18Ω)*2

2.5 Test environment condition:

Test items	Temperature	Humidity
Power line conducted emission	24.5°C	45% RH
Radiated Emissions	24.3°C	57% RH

2.6 Instrument 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 Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
☒	Receiver	R&S	ESIB26	100114	Nov. 24, 2018	Nov. 24, 2019
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	Dec. 03, 2018	Dec. 03, 2019
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 08, 2018	Dec. 08, 2019
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Dec. 08, 2018	Dec. 08, 2019
☒	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2018	Nov. 24, 2019

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. 24, 2018	Nov. 24, 2019
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 24, 2018	Nov. 24, 2019
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2018	Nov. 24, 2019

2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Radiated Emissions in restricted frequency bands below 1GHz	± 4.9dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.2dB
Power line conducted emission	± 3.8dB

3 Radiated Emissions

Test result: **Pass**

3.1 Limit

3.1.1 The field strength of any emissions shall not exceed the general radiated emission limits in §15.209.

Frequency	Field strength (microvolt/meter)	Limit (dBµV/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:

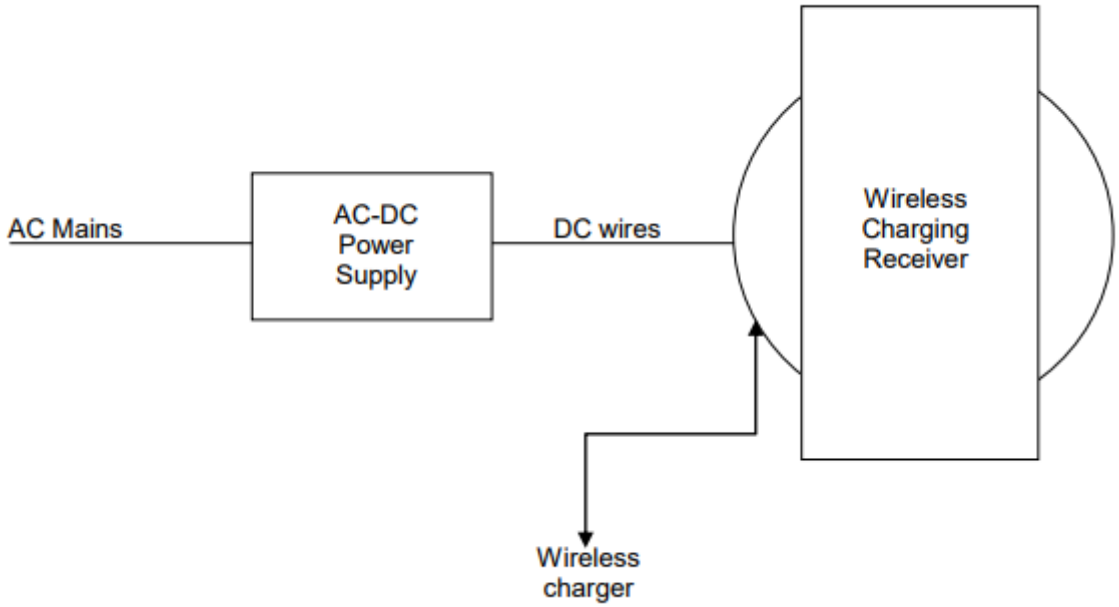
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBµV/m) = 20 log Emission level (µV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.
4. 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)

   Example:

   Field strength limit for 13.56MHz = 15848 µV/m at 30m
   = 84 dBµV/m at 30m
   = 84 dBµV/m + 40log(30/3) dB at 3m
   = 124 dBµV/m at 3m

3.2 Block diagram and test set up

EUT Block diagram



TEST REPORT

For table top equipment

Figure 1. Below 30MHz

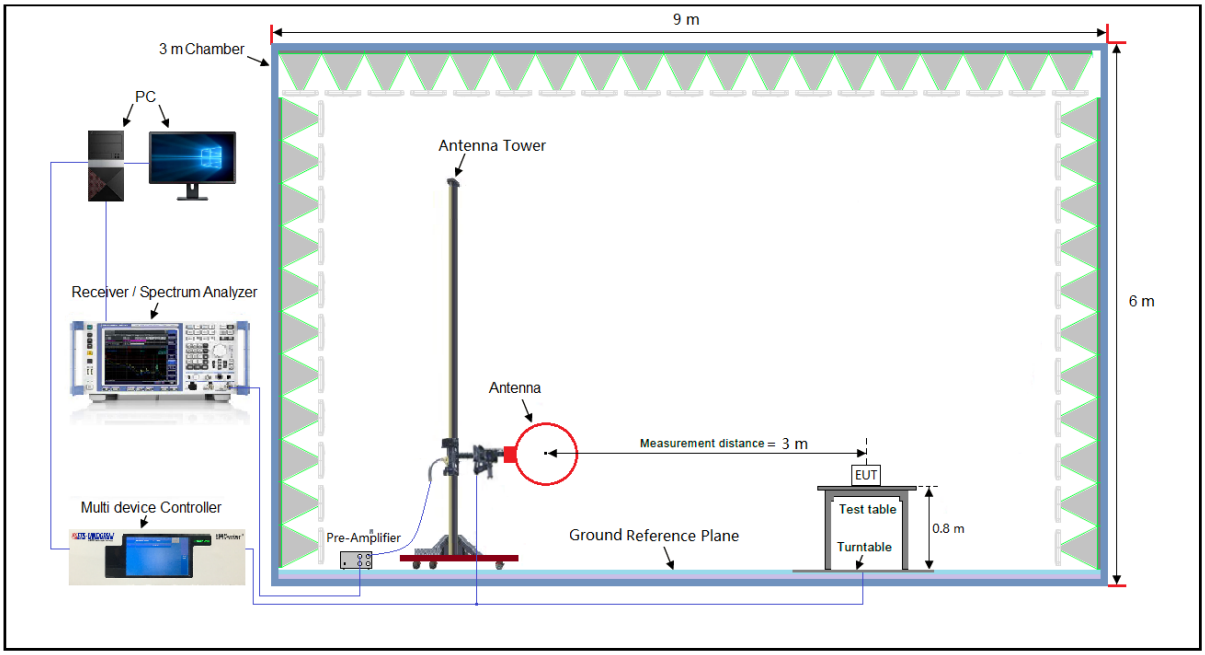
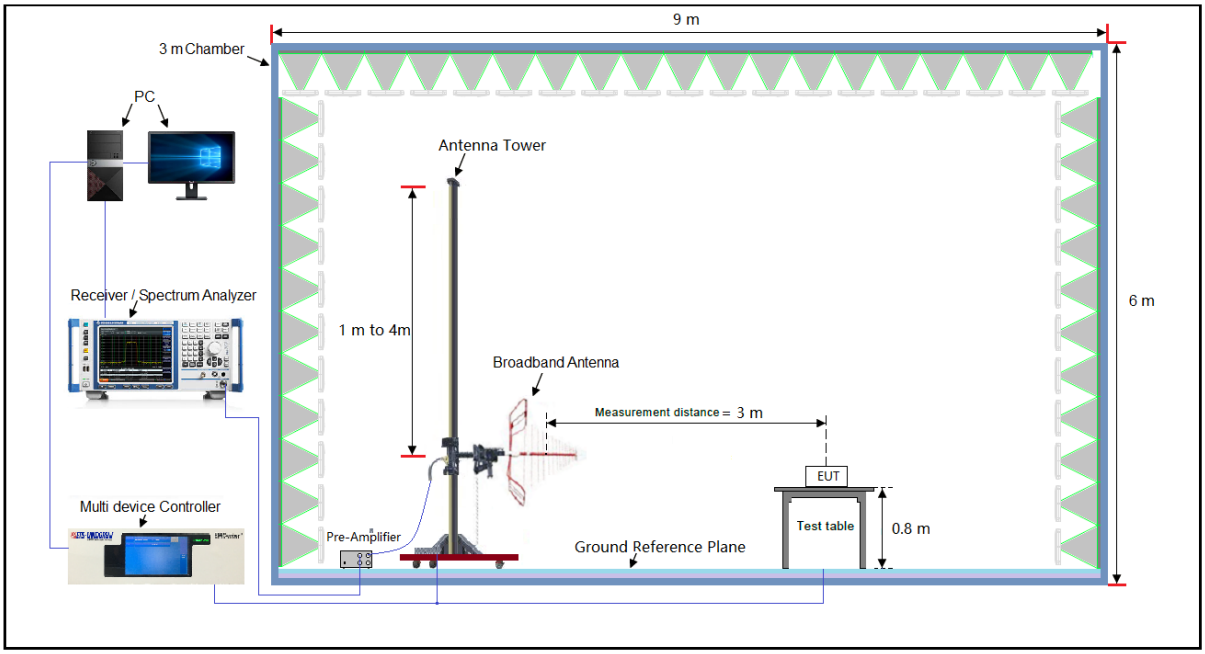


Figure 2. 30MHz to 1GHz



3.3 Measurement Procedure

1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

3) 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.

4) 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.

5) For measurement frequency below 30MHz, all measurements shall perform with the measuring antenna oriented at three orientations (parallel, perpendicular, and ground parallel).

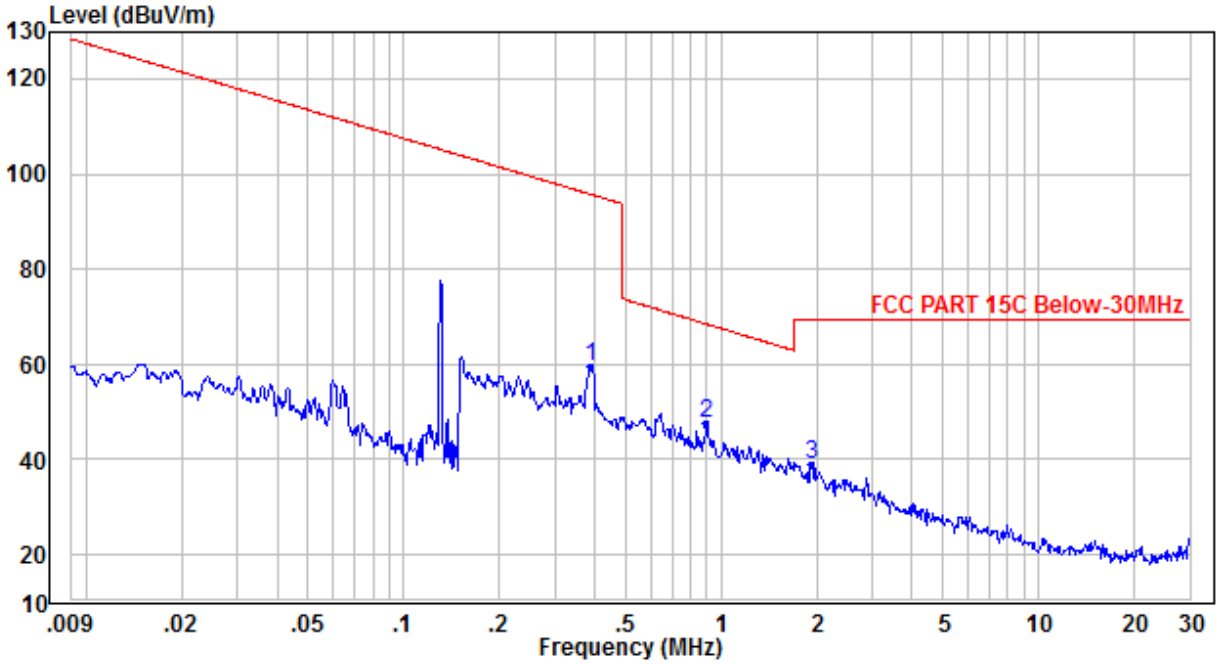
6) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

7) 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.

3.4 Test Results of Radiated Emissions

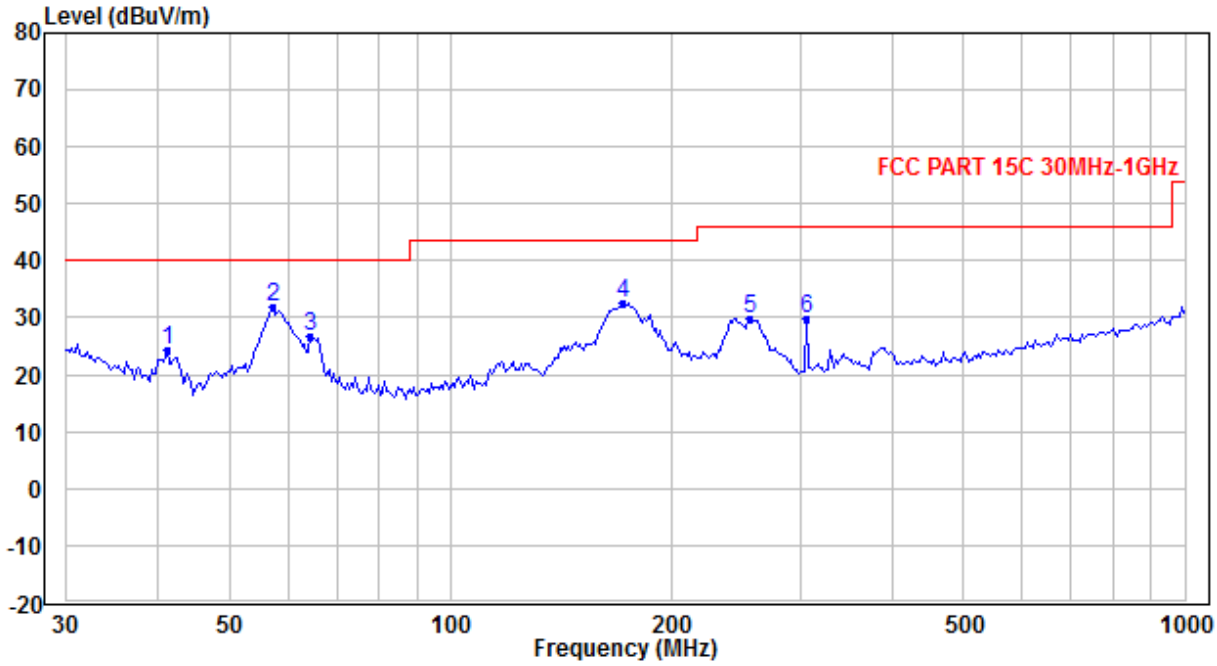
Radiated Emission Test Data (9 KHz ~ 30 MHz):

Parallel (worst orientation)

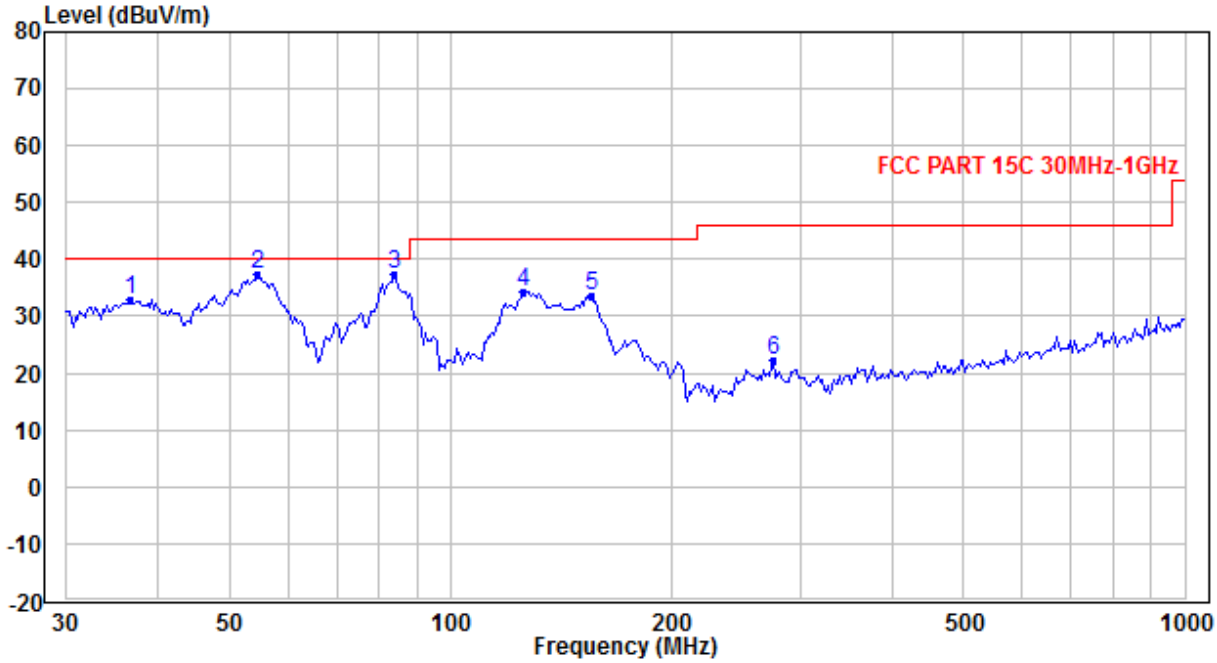


Radiated Emission Test Data (30 MHz ~ 1 GHz):

Horizontal



Vertical


Level (dBuV/m)
80
70
60
50
40
30
20
10
0
-10
-20
30
50
100
200
500
1000
Frequency (MHz)
FCC PART 15C 30MHz-1GHz
1
2
3
4
5
6

TEST REPORT

Test data 9 KHz ~ 30 MHz:

Parallel (worst orientation)

Frequency (MHz)	Measured level (dBμV/m)	Factor (dB)	Limits (dBμV/m)	Margin (dB)	Detector
0.391	59.62	-16.92	95.76	36.14	Peak
0.901	47.42	-16.83	68.48	21.06	Peak
1.934	38.89	-16.69	69.50	30.61	Peak

Test data 30MHz~1GHz:

Polarization	Frequency (MHz)	Measured level (dBμV/m)	Factor (dB)	Limits (dBμV/m)	Margin (dB)	Detector
H	41.158	24.38	-10.65	40.00	15.62	Peak
	57.265	31.74	-14.11	40.00	8.26	Peak
	64.532	26.81	-14.20	40.00	13.19	Peak
	171.389	32.66	-10.48	43.50	10.84	Peak
	255.823	29.90	-8.32	46.00	16.10	Peak
	304.955	29.77	-7.23	46.00	16.23	Peak
V	36.524	32.91	-8.67	40.00	7.09	Peak
	54.517	37.50	-13.86	40.00	2.50	Peak
	83.694	37.32	-13.22	40.00	2.68	Peak
	125.806	34.31	-11.54	43.50	9.19	Peak
	155.331	33.55	-10.77	43.50	9.95	Peak
	274.446	22.13	-7.65	46.00	23.87	Peak

Remark:

1. Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Measured level= Original Receiver Reading + Factor
3. Margin = Limit – Measured level

4 Power line conducted emission

Test result: **Pass**

4.1 Limit

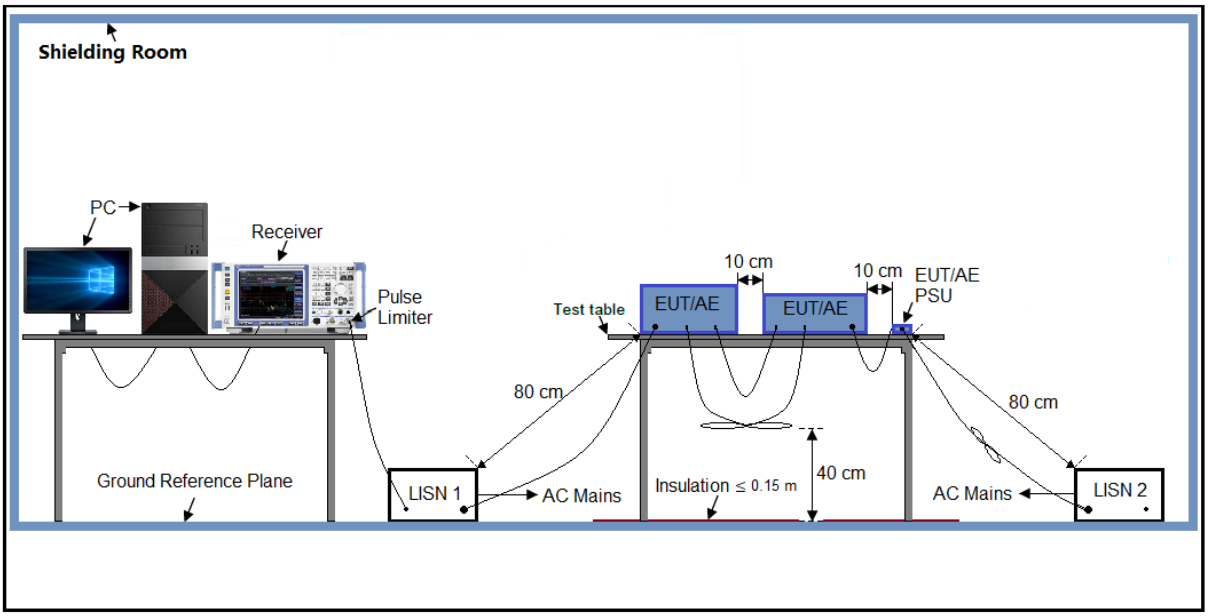
4.1.1 Limits for conducted disturbance voltage at the mains ports of class B device

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz
2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

4.2 Block diagram and test set up

For table top equipment



4.3 Measurement Procedure

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

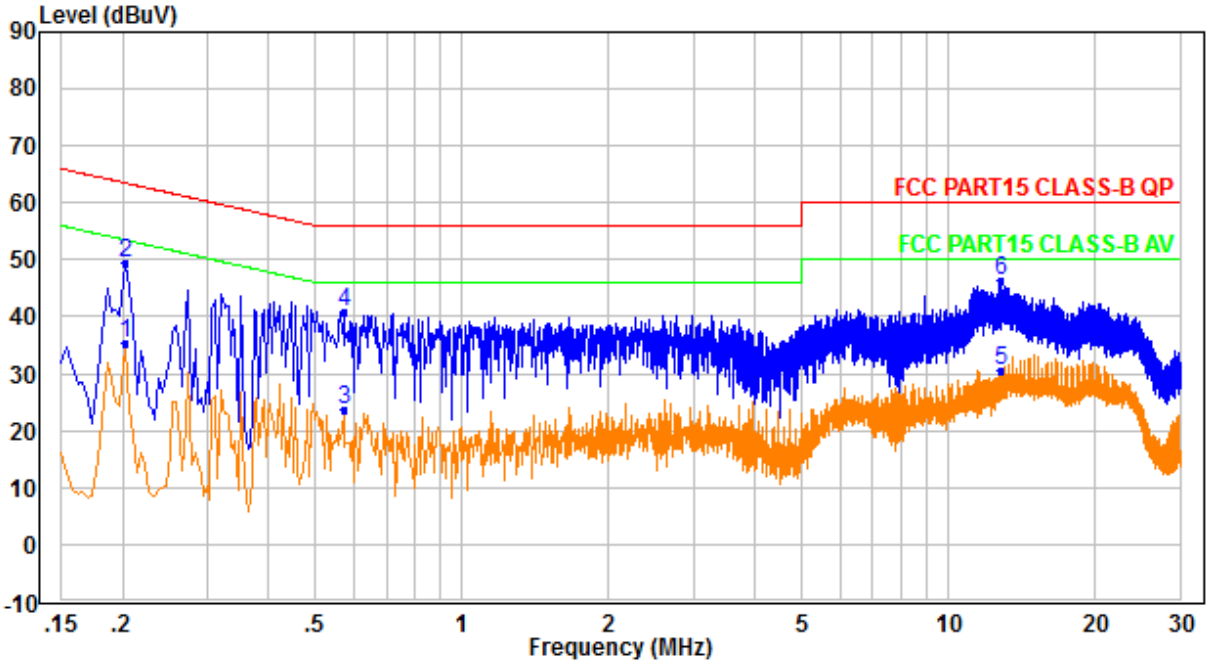
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.10. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

4.4 Test Results of Power line conducted emission

Test Curve:

L Line

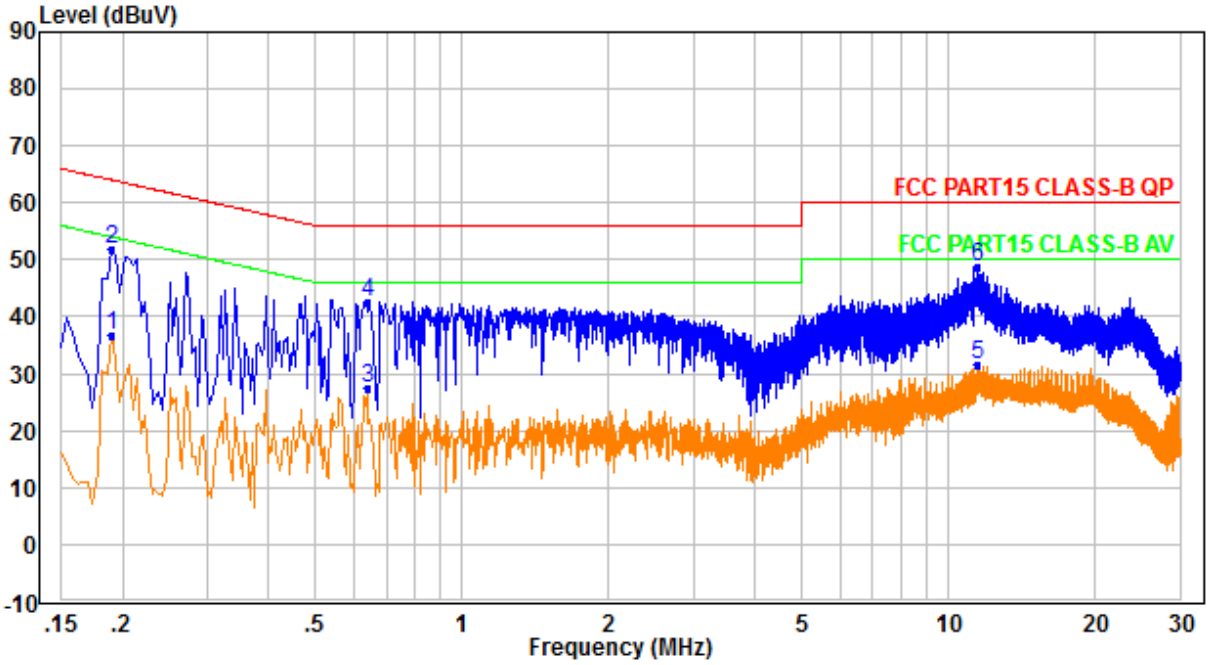


Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.202	49.33	63.53	14.20	35.22	53.53	18.31
0.570	40.81	56.00	15.19	23.72	46.00	22.28
12.877	46.50	60.00	13.50	30.49	50.00	19.51

Test Curve:

N Line



Test Data:

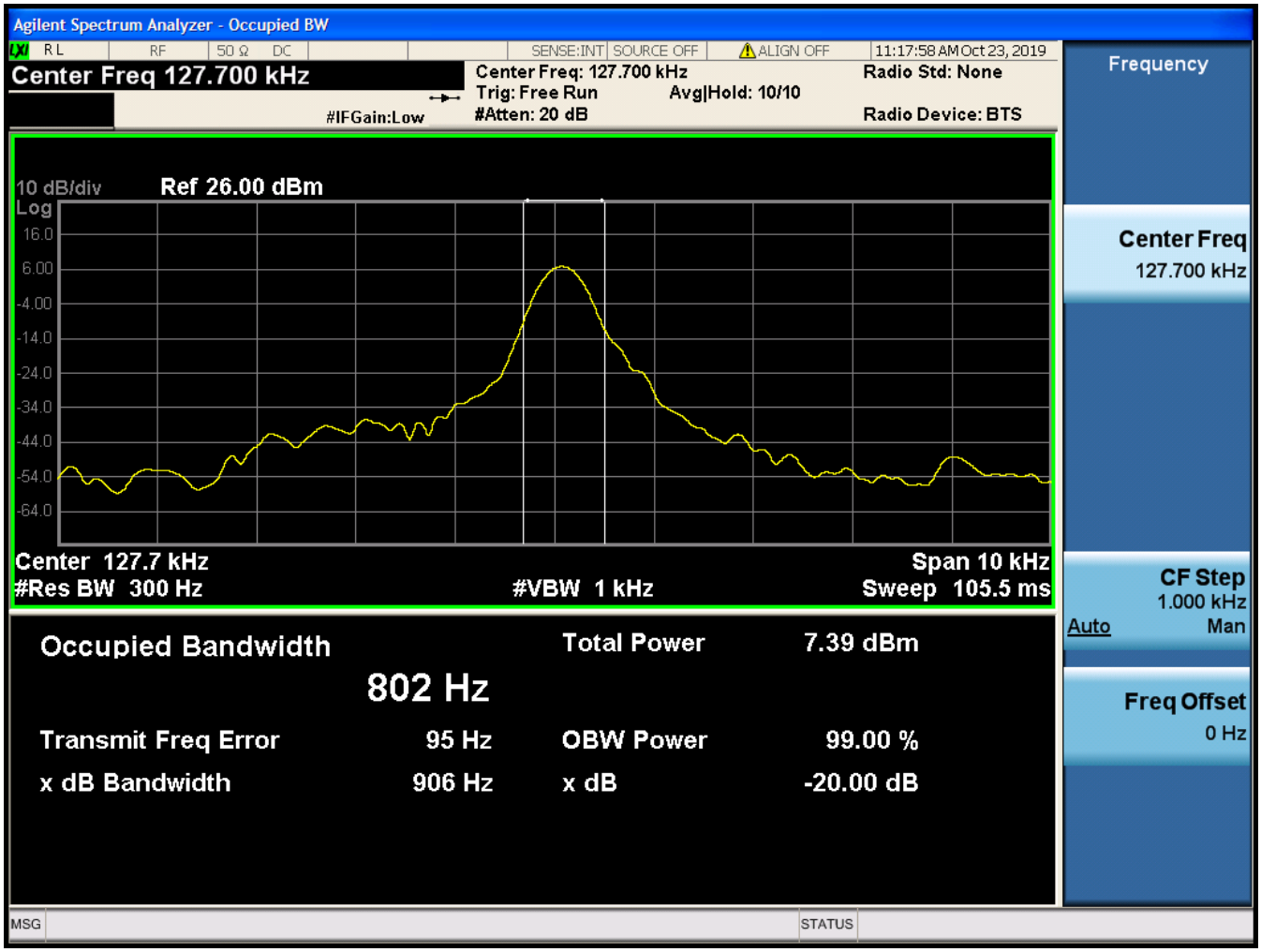
Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.190	51.72	64.04	12.32	36.65	54.04	17.39
0.638	42.50	56.00	13.50	27.45	46.00	18.55
11.485	48.70	60.00	11.30	31.69	50.00	18.31

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading

5 Measured Bandwidth

Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designed (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

127.7kHz



6 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.

Appendix I: Photograph of test setup

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

Appendix II: Photograph of equipment under test

Refer to Appendix 2 for EUT external and internal photos.

********** END **********