Sunway Products (Hong Kong) Company Limited

TEST REPORT

SCOPE OF WORK
EMC TESTING–SPM-228L

REPORT NUMBER
200520076GZU-001

ISSUE DATE	**[REVISED DATE]**
23 September 2020	[----------]

PAGES
19

DOCUMENT CONTROL NUMBER
FCC Part 15:2019-e

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TEST REPORT

Applicant Name & Address	:	Sunway Products (Hong Kong) Company Limited No. C, 16/F, Chinaweal Centre, 414-424 Jaffe Road, WANCHAI, Hong Kong SAR, China
Manufacturing Site	:	Sunway Electric Manufacturing (Guangzhou) Company Limited Jintian Industry Zone, Huadong Town, Huadu District, GUANGZHOU Guangdong 510890.
Intertek Report No:	:	200520076GZU-001
FCC ID:	:	2ATAD-SPM-228L

Test standards

CFR 47, FCC Part 15, Subpart B:2019

Sample Description

Product	:	Kitchen Machine
Model No.	:	SPM-228L
Electrical Rating	:	120V~ 50/60Hz 1200W (Heater: 1050W; Motor: 800W).
Serial No.	:	Not Labeled
Date Received	:	20 May 2020
Date Test Conducted	:	20 August 2020 to 10 September 2020

Prepared and Checked By

Oscar Gao

Project Engineer

Approved By:

Helen Ma

Team Leader

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CONTENT

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1. TEST RESULTS SUMMARY

Classification of EUT: Class B

Test Item	Standard	Result
Conducted disturbance voltage at mains ports	**CFR 47, FCC Part 15, Subpart B**	**Pass**
Radiated emission (30 MHz–1 GHz)	**CFR 47, FCC Part 15, Subpart B**	**Pass**
Radiated emission (Above 1 GHz)	**CFR 47, FCC Part 15, Subpart B**	**Pass**
Remark: Reference publication is used for methods of measurement: ANSI C63.4:2014		

Remark:

1. The symbol “N/A” in above table means Not Applicable.
2. When determining the test results, measurement uncertainty of tests has been considered.

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2. EMC RESULTS CONCLUSION

RE: EMC Testing Pursuant to FCC part 15 performed on the Kitchen Machine, Model: SPM-228L.

We tested the Kitchen Machine, Model: SPM-228L, to determine if it was in compliance with the relevant standards as marked on the Test Results Summary. We found that the unit met the requirement of FCC part 15 standard when tested as received. The worst case's test data was presented in this test report.

The product covered by this report is a household and indoor use Kitchen Machine, rated 120V, 60Hz. It has a USB output for charging the matched tablet PC.

The production units are required to conform to the initial sample as received when the units are placed on the market.

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3. LABORATORY MEASUREMENTS

Configuration Information

Support Equipment:	N/A
Rated Voltage and frequency under test:	120 V~; 60 Hz
Condition of Environment:	Temperature: 22~28°C Relative Humidity:35~60% Atmosphere Pressure:86~106kPa

Notes:

1. The EMI measurements had been made in the operating mode produced the largest emission in the frequency band being investigated consistent with normal applications. An attempt had been made to maximize the emission by varying the configuration of the EUT.

2. Test Facility accreditation:
A2LA Certificate Number 0078.10
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch is accredited by A2LA and Listed in FCC website. FCC accredited test labs may perform both Certification testing under Parts 15 and 18 and Declaration of Conformity testing.

3. Test Location:
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
All tests were performed at:
Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Except Radiated Emissions was performed at:
Room 102/104, No 203, KeZhu Road, Science City, GETDD Guangzhou, China

4. Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conducted Emission (9 kHz-150 kHz)	2.79 dB
2	Conducted Emission (150 kHz-30 MHz)	2.55 dB
3	Disturbance Power (30 MHz-300 MHz)	3.04 dB
4	Radiated Emission (30 MHz-1 GHz)	4.80 dB
5	Radiated Emission (1 GHz-6 GHz)	4.97 dB
6	Radiated Emission (6 GHz-18 GHz)	4.89 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty is calculated in accordance with CISPR16-4-2:2011
The measurement uncertainty is given with a confidence of 95%, k=2.
Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

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4. EQUIPMENT USED DURING TEST

Conducted Disturbance-Mains Terminal (1)

Equipment No.	Equipment	Model	Manufacturer	Calibration Interval
EM080-05	EMI receiver	ESCI	R&S	1Y
EM006-05	LISN	ENV216	R&S	1Y
SA047-112	Digital Temperature-Humidity Recorder	RS210	YIJIE	1Y
EM004-04	EMC shield Room	8m×3m×3m	Zhongyu	1Y

Radiated Disturbance （30 MHz-1 GHz）

Equipment No.	Equipment	Model	Manufacturer	Calibration Interval
EM030-04	3m Semi-Anechoic Chamber	9×6×6 m3	ETS-LINDGREN	1Y
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S	1Y
EM033-01	TRILOG Super Broadband test Antenna （30 MHz-3 GHz）	VULB 9163	SCHWARZBECK	1Y
EM031-02-01	Coaxial cable	/	R&S	1Y
EM036-01	Common-mode absorbing clamp	CMAD 20B	TESEQ	1Y
SA047-118	Digital Temperature-Humidity Recorder	RS210	YIJIE	1Y
EM045-01-01	EMC32 software (RE/RS)	V10.01.00	R&S	N/A

Radiated Disturbance （1-18 GHz）

Equipment No.	Equipment	Model	Manufacturer	Calibration Interval
EM030-04	3m Semi-Anechoic Chamber	9×6×6 m3	ETS-–LINDGREN	1Y
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S	1Y
EM031-03	Signal and Spectrum Analyzer (10 Hz~40 GHz)	R&S FSV40	R&S	1Y
EM033-02	Bouble-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)	R&S HF907	R&S	1Y
EM033-02-02	Coaxial cable(1 GHz-18 GHz)	N/A	R&S	1Y
EM022-03	2.45 GHz Filter	BRM 50702	Micro-Tronics	1Y
SA047-118	Digital Temperature-Humidity Recorder	RS210	YIJIE	1Y
EM045-01-01	EMC32 software (RE/RS)	V10.01.00	R&S	N/A

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Detail of the equipment calibration due date:

Equipment No.	Cal. Due date (DD-MM-YYYY)
Conducted Disturbance-Mains Terminal (1)	
EM080-05	19/07/2021
EM006-05	07/06/2021
SA047-112	16/08/2021
EM004-04	21/05/2021
Radiated Disturbance (30 MHz-1 GHz)	
EM030-04	10/04/2021
EM031-02	16/08/2021
EM033-01	18/07/2021
EM031-02-01	12/04/2021
EM036-01	21/07/2021
SA047-118	21/07/2021
EM045-01-01	N/A
Radiated Disturbance (1-18 GHz)	
EM030-04	10/04/2021
EM031-02	16/08/2021
EM031-03	06/07/2021
EM033-02	18/06/2021
EM033-02-02	12/04/2021
EM022-03	10/05/2021
SA047-118	21/07/2021
EM045-01-01	N/A

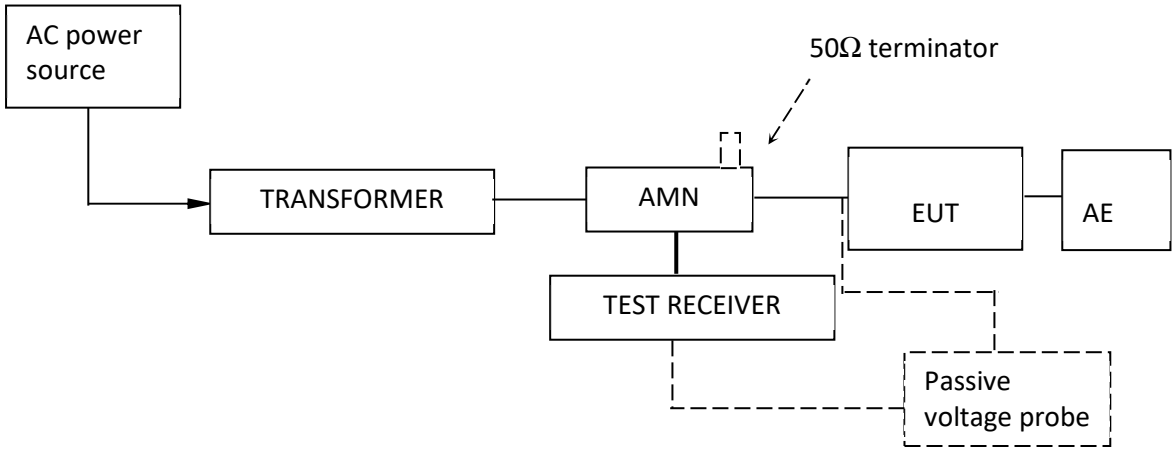
TEST REPORT

5. EMI TEST

5.1 Conducted Disturbance Voltage at mains ports

Test Result: Pass

5.1.1 Block Diagram of Test Setup



5.1.2 Test Setup and Procedure

The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.
The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane(Ground Reference Plane).And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The EUT keeps a distance of at least 0.8m from any other of the metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT. During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.
The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.

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5.1.3 Limit

Frequency range MHz	**AC mains terminals** dB (uV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50
Note 1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. Note 2: The lower limit is applicable at the transition frequency.		

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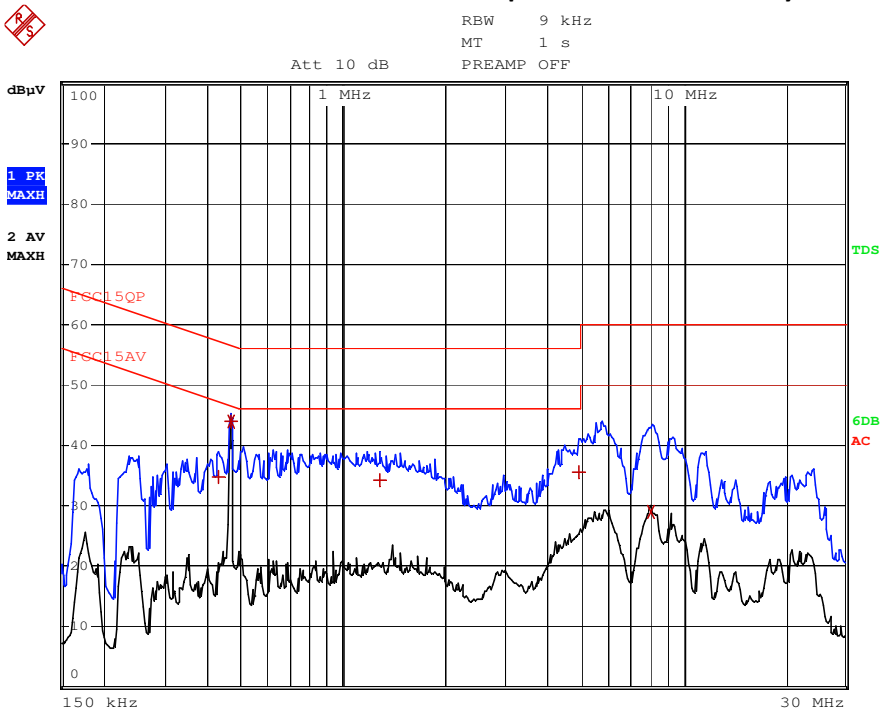
5.1.4 Test Data and curve

At mains terminal:

Tested Wire: Live **Operation Mode: Standby mode with Pad charging**



EDIT PEAK LIST (Final Measurement Results)

Trace1: FCC15QP
Trace2: FCC15AV
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	430 kHz	34.88 L1	-22.37
1 Quasi Peak	466 kHz	43.91 L1	-12.66
2 Average	466 kHz	43.99 L1	-2.58
1 Quasi Peak	1.29 MHz	34.20 L1	-21.79
1 Quasi Peak	4.974 MHz	35.53 L1	-20.46
2 Average	8.078 MHz	28.92 L1	-21.08

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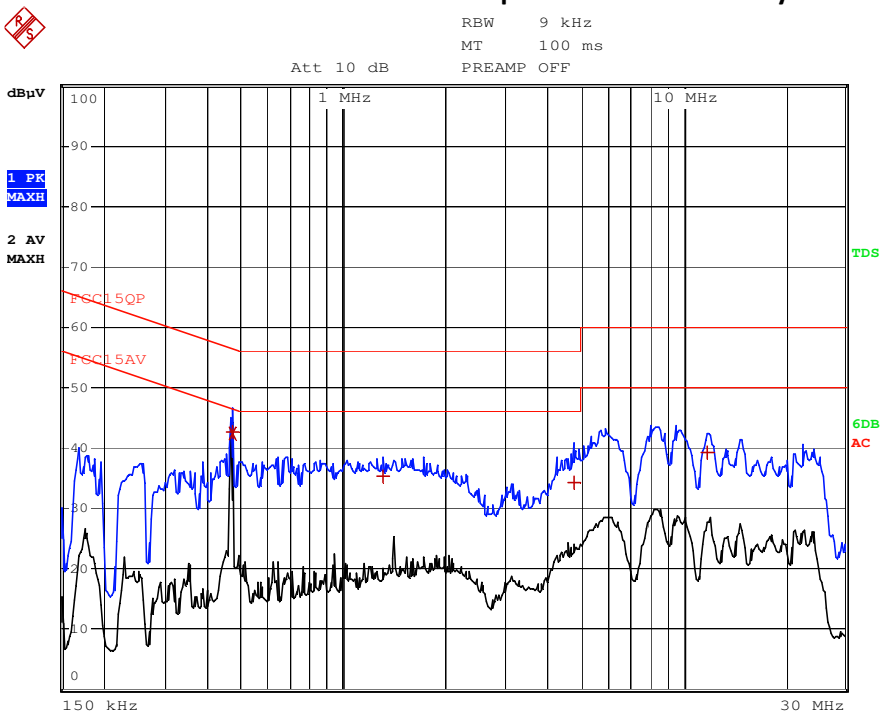
Tested Wire: Neutral **Operation Mode: Standby mode with Pad charging**



EDIT PEAK LIST (Final Measurement Results)

Trace1: FCC15QP
Trace2: FCC15AV
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	470 kHz	42.77 L1	-13.74
2 Average	470 kHz	42.51 L1	-3.99
1 Quasi Peak	1.306 MHz	35.41 L1	-20.59
1 Quasi Peak	4.77 MHz	34.12 L1	-21.87
1 Quasi Peak	11.798 MHz	39.15 L1	-20.85

Remark:
1. Corr. (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBµV) = Corr. (dB) + Read Level (dBµV)
3. Delta Limit (dB) = Level (dBµV)-Limit (dBµV)
4. The worst case's test data was presented in this test report

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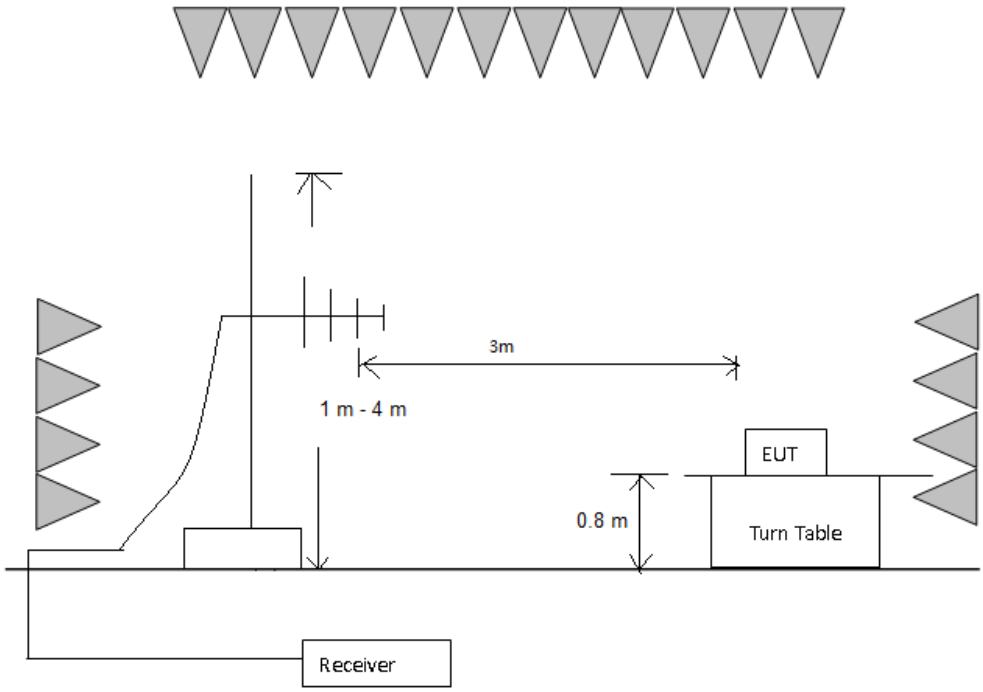
5.2 Radiated Emission 30 MHz -1000 MHz

Test Result: Pass

5.2.1 Block Diagram of Test Setup



5.2.2 Test Setup and Procedure

The measurement was applied in a semi-anechoic chamber. The EUT and simulators were placed on a 0.8 m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mask. The antenna moved up and down between from 1 meter to 4 meters to find out the maximum emission level.

Broadband antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4 requirement during radiated test.
The bandwidth setting on R&S Test Receiver was 120 kHz.

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

TEST REPORT

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper Frequency of Radiated Measurement
Below 1.705 MHz	30MHz
1.705 MHz – 108 MHz	1 GHz
108 MHz – 500 MHz	2 GHz
500 MHz – 1 GHz	5 GHz
Above 1 GHz	5th harmonic of the highest frequency or 40 GHz, whichever is lower.
At transitional frequencies the lower limit applies.	

Remark: Radiated Emission was performed from 30 MHz to 1 GHz.

5.2.3 Limit

Class B limit at 3m test distance:

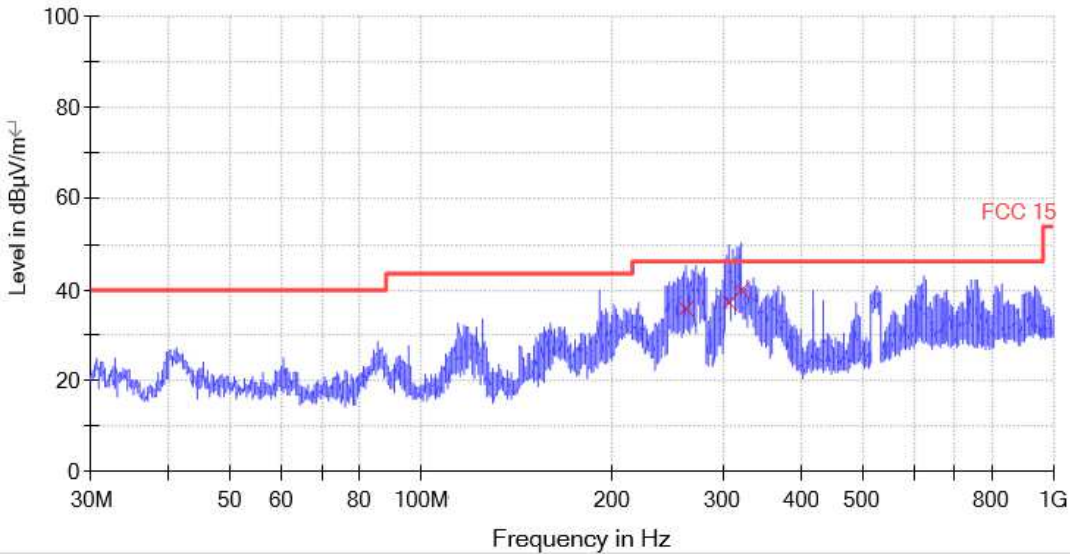
Frequency range MHz	Quasi-peak limits dB (µV/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
960 to 1000	54
At transitional frequencies the lower limit applies.	

TEST REPORT

5.2.4 Test Data and Curve

Operation Mode: Motor running and charging mode with wireless connection

Horizontal



QP

Frequency (MHz)	Quasi Peak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
262.120000	35.8	120.000	H	14.8	10.2	46.0
306.480000	37.2	120.000	H	16.1	8.8	46.0
319.920000	39.9	120.000	H	16.3	6.1	46.0

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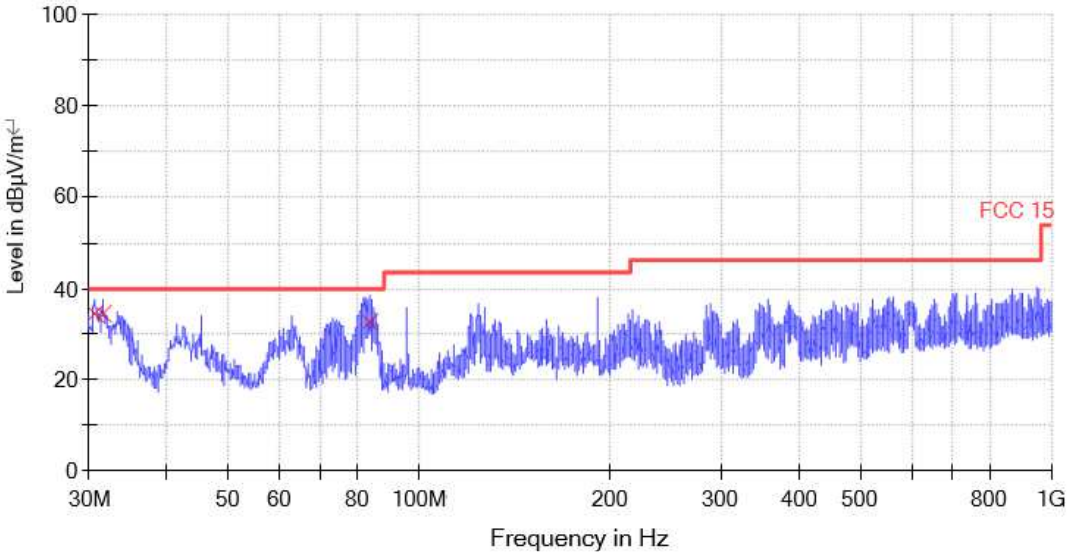
Vertical



Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.600000	34.2	120.000	V	10.2	5.8	40.0
31.600000	34.5	120.000	V	10.5	5.5	40.0
83.400000	32.6	120.000	V	10.3	7.4	40.0

Remark:
1. Corr. (dB) = Antenna Factor (dB) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB) + Read Level (dBµV)
3. Margin (dB) = Limit QPK (dBµV/m) –Quasi Peak (dBµV/m)

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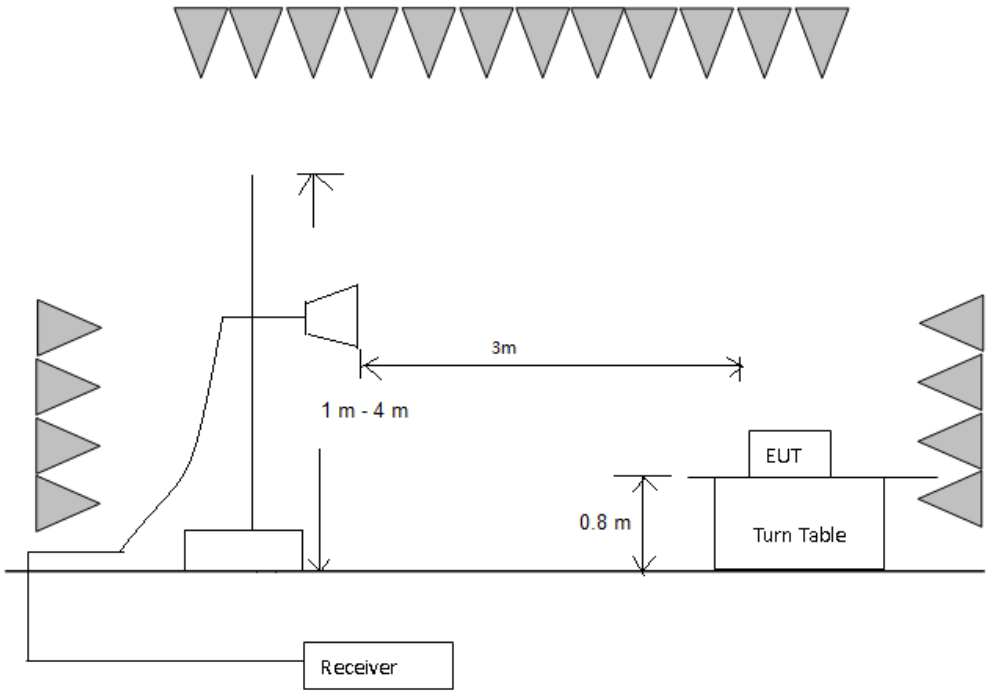
5.3 Radiated Emission above 1 GHz

Test Result: Pass

5.3.1 Block Diagram of Test Setup



5.3.2 Test Setup and Procedure

The measurement was applied in a semi-anechoic chamber with absorbing material placed on the ground. The EUT were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turntable varied every 30 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna pole. The antenna moved up and down from 1 meter to 4 meters to find out the maximum emission level.

Horn antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated during radiated test.

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

TEST REPORT

Highest Frequency Generated or Used in Device	Upper Frequency of Radiated Measurement
Below 1.705 MHz	30MHz
1.705 MHz – 108 MHz	1 GHz
108 MHz – 500 MHz	2 GHz
500 MHz – 1 GHz	5 GHz
Above 1 GHz	5th harmonic of the highest frequency or 40 GHz, whichever is lower.
At transitional frequencies the lower limit applies.	

Remark: Radiated Emission was performed from 1 GHz to 12.4 GHz since the highest frequency generated from the EUT was 2480 MHz.

5.3.3 Limit

Class B limit at 3m test distance:

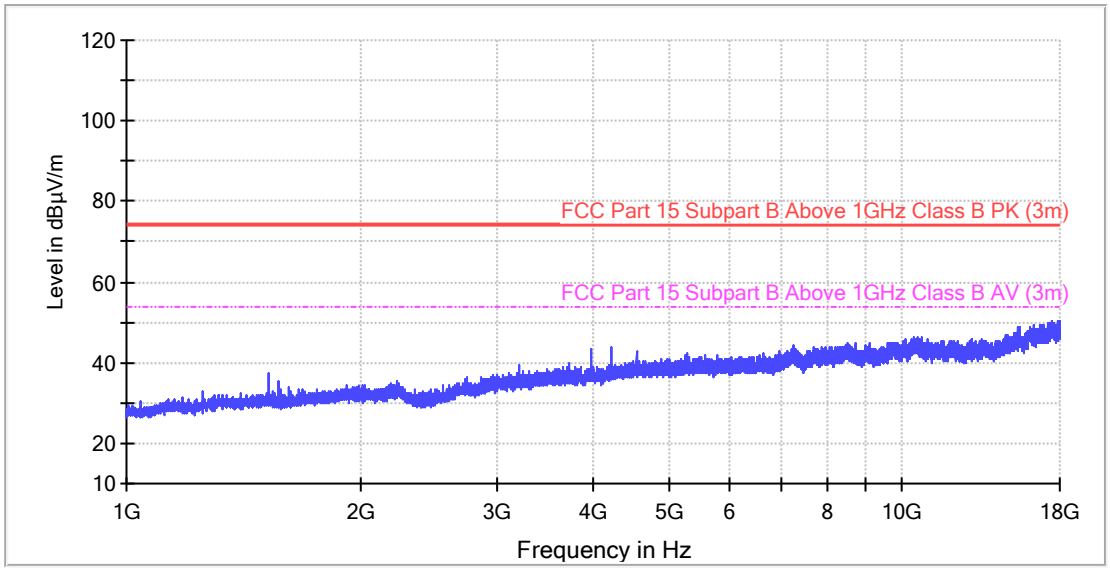
Frequency range MHz	Linear Average Detector dB (µV/m)	Peak Detector dB (µV/m)
> 1000	54	74
At transitional frequencies the lower limit applies.		

TEST REPORT

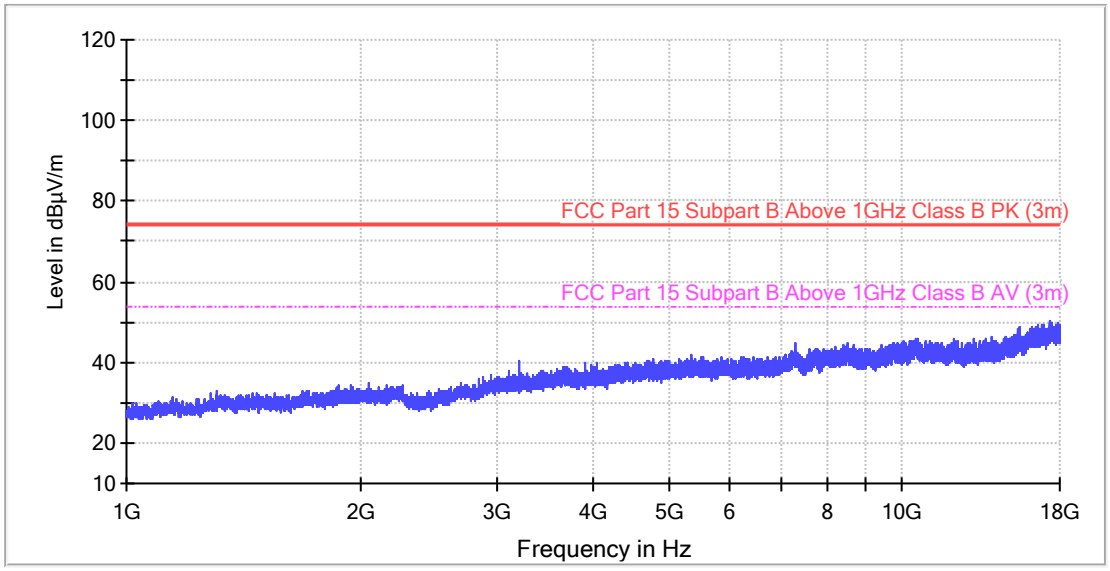
5.3.4 Test Data and Curve

Operation Mode: Wireless connection mode

Horizontal



Vertical



Remark:
1. Corr. (dB) = Antenna Factor (dB) + Cable Loss (dB) –Pre-amplifier (dB)
2. Peak (dBµV/m) = Corr. (dB) + Read Level (dBµV)
3. Margin (dB) = Limit Peak (dBµV/m) –Peak (dBµV/m)

**********End of Report**********