FranklinWH Energy Storage Inc.

RF TEST REPORT

Report Type:
FCC Part 15.247 RF report

Model:
aGate X (may be followed by blank;
may be followed by A to Z; may be followed by 0 to 9;
may be followed by symbol.)

REPORT NUMBER:
240600353SHA-001

ISSUE DATE:
September 2, 2024

DOCUMENT CONTROL NUMBER:
TTRF15.247-02_V1 © 2018 Intertek

Intertek Testing Services (Shanghai FTZ) Co., Ltd.
Building No.86, 1198 Qinzhou Road (North)
Caohejing Development Zone
Shanghai 200233, China

Telephone: 86 21 6127 8200
www.intertek.com

Total Quality. Assured.

TEST REPORT

Report no.: 240600353SHA-001

Applicant:	FranklinWH Energy Storage Inc. 8 The Green ,Ste A, Dover, DE 19901,USA
Manufacturer:	FranklinWH Technologies Co., Ltd. Room 301, Building 5A Skyworth Innovation Park, No.8 Tangtou 1st Road, Tangtou community Shiyan sub-district , Baoan District, Shenzhen, Guangdong, China
Factory:	Dongguan Shingi Electronics Co., Ltd. No. 1 Yadi South Road, Qiaotou Town , Dongguan City , Guangdong Province , China.
FCC ID:	2BCMR-AGATEX20

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:
47CFR Part 15 (2023): Radio Frequency Devices (Subpart C) **ANSI C63.10 (2020):** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

PREPARED BY:	**REVIEWED BY:**
	
Project Engineer Sky Yang	Reviewer Wakeyou Wang

Total Quality. Assured.

TEST REPORT

Content

Total Quality. Assured.

TEST REPORT

Revision History

Report No.	Version	Description	Issued Date
240600353SHA-001	Rev. 01	Initial issue of report	September 2, 2024

Measurement result summary

TEST ITEM	FCC REFERENCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	Pass
Maximum conducted output power and e.i.r.p.	15.247(b)(3)	Pass
Power spectrum density	15.247(e)	Pass
Emission outside the frequency band	15.247(d)	Pass
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	Pass
Power line conducted emission	15.207(a)	Pass
Occupied bandwidth	-	Tested
Antenna requirement	15.203	Pass

Notes: 1: NA =Not Applicable

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	aGate
Type/Model:	aGate X (may be followed by blank; may be followed by A to Z; may be followed by 0 to 9； may be followed by symbol.)
Description of EUT:	The EUT is an Energy storage control system which supports 2.4G, 5G Wi-Fi (802.11b/g/n/a/ac mode), BT and LTE function. LTE function uses a certified module, the FCC ID is XMR201909EC25AFX.
Rating:	120/208VAC ; 120V/240VAC
	120/208VAC is 3-wire form 3-phase, 4-wire network.
Category of EUT:	Class B
EUT type:	☐ Table top ☒ Floor standing
Sample received date:	June 27, 2024
Date of test:	July 11, 2024 to September 2, 2024

Note:
All models are same except for model name, different names represent different sales regions.

1.2 Technical Specification

Frequency Band:	2400MHz ~ 2483.5MHz
Support Standards:	Bluetooth LE
Type of Modulation:	GFSK
Channel Number:	40 (0 - 39)
Data Rate:	1Mbps
Channel Separation:	2 MHz
Antenna Information:	PCB Antenna, 5.9dBi

1.3 Description of Test Facility

Name:	Intertek Testing Services (Shanghai FTZ) Co., Ltd.
Address:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L21189
	FCC Accredited Lab Designation Number: CN0175
	IC Registration Lab Registration code No.: 2042B-1
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

All tests were sub-contracted.

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng Science and Technology Park, Longhua District, Shenzhen, China 518109

Telephone: +86 (0) 755 282 0888

Fax: +86 (0) 755 2823 0886

TEST REPORT

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

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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.

IC-Registration No.: 21600-1

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

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 (2023)
ANSI C63.10 (2020)
KDB 558074 (v05r02)

2.2 Mode of operation during the test

The lowest, middle and highest channel were tested as representatives.

Frequency Range (MHz)				2402 ~ 2480			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	**2402**	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	**19**	**2440**	29	2460	**39**	**2480**

Data rate VS Power:
The test setting software is offered by the applicant. The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

Test software			
Test Software	EmsDevTools.exe		
Working Mode	BLE		
Test Channel	2402MHz	2440MHz	2480MHz

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.
Radiated test mode: EUT transmitted signal with BT antenna;
Conducted test mode: EUT transmitted signal from BT RF port connected to SPA directly;

2.3 Test software list

Test Items	Manufacturer	Version
Conducted emission	EMC-CON	3A1.1
Radiated emission	Audix	9.160323

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Notebook	DELL, Latitude 3400	NA
2	DELL	DELL, MS111	NA

2.5 Test environment condition:

Test items	Temperature	Humidity
Minimum 6dB Bandwidth	24.1°C	48.6% RH
Maximum conducted output power and e.i.r.p.		
Power spectrum density		
Emission outside the frequency band		
Occupied bandwidth		
Radiated Emissions in restricted frequency bands	24.8°C	54.1% RH
Power line conducted emission	24.4°C	49.6% RH

2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Receiver	R&S	ESR7	1316.3003K07-101181-K3	26-Oct-2024
☑	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	26-Oct-2024
☑	LISN	R&S	ESH2-Z5	860014/024	26-Oct-2024
☑	LISN	ETS-Lindgren	3816/2SH	00201088	26-Oct-2024
☑	Test Software	EZ-EMC	EZ-CON	Software Version: EMC-CON 3A1.1	
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	3m SAC	ETS-LINDGREN	3m	Euroshiedpn-CT001270-1317	10-Nov-2026
☑	Receiver	R&S	ESIB26	100114	26-Oct-2024
☑	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	28-Mar-2025
☑	Loop Antenna	ETS-LINDGREN	6502	00202525	29-Oct-2024
☑	Broadband Antenna	ETS-LINDGREN	3142E	00201566	29-Oct-2024
☑	6dB Attenuator	Talent	RA6A5-N-18	18103001	29-Oct-2024
☑	Preamplifier	HP	8447F	2805A02960	30-Oct-2024
☑	Band Rejection Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50702	G248	26-Oct-2024
☑	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	31-Mar-2025
☑	Pre-amplifier	ETS-Lindgren	00118385	00201874	31-Mar-2025
☑	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	29-Oct-2024
☑	Pre-amplifier	ETS-Lindgren	00118384	00202652	29-Oct-2024
☑	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A
☑	Test Software	Audix	e3	Software Version: 9.160323	
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	EXA Spectrum Analyzer	KEYSIGHT	N9020A	MY51286807	26-Oct-2024
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	26-Oct-2024

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
Maximum peak output power	± 0.68dB
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 4.80dB
Emission outside the frequency band	± 4.80dB
Power line conducted emission	± 2.7dB

3 Minimum 6dB bandwidth

Test result: Pass

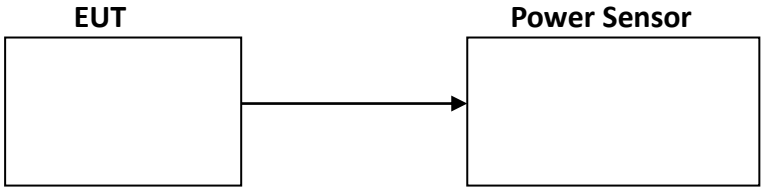
3.1 Limit

For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2 Measurement Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

3.3 Test Configuration



3.4 Test Results of Minimum 6dB bandwidth

Please refer to Appendix

4 Maximum conducted output power and e.i.r.p.

Test result: Pass

4.1 Limit

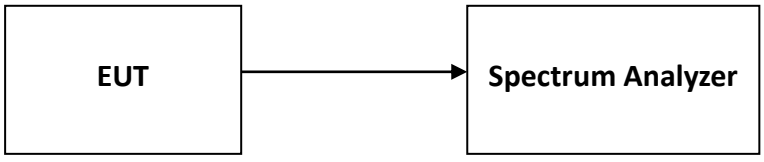
For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 W. (The e.i.r.p. shall not exceed 4 W)

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

4.2 Measurement Procedure

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ 3 × RBW.
c) Set span ≥ 3 x RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

4.3 Test Configuration



4.4 Test Results of Maximum conducted output power

Please refer to Appendix

5 Power spectrum density

Test result: **Pass**

5.1 Limit

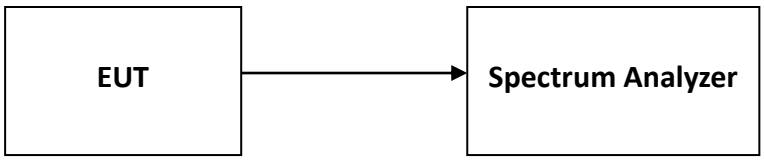
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 8dBm/MHz and 8+ (6 –antenna gain-beam forming gain).

5.2 Measurement Procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 × RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.3 Test Configuration



5.4 Test Results of Power spectrum density

Please refer to Appendix

6 Emission outside the frequency band

Test result: **Pass**

6.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

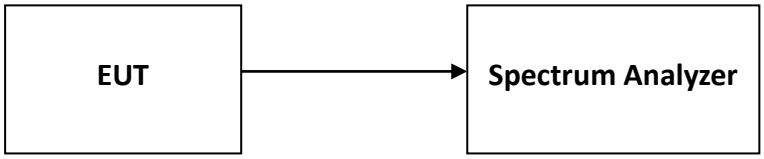
6.2 Measurement Procedure

Reference level measurement
Establish a reference level by using the following procedure:
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.

Emission level measurement
a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ 3 x RBW.
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

6.3 Test Configuration



6.4 The results of Emission outside the frequency band

Please refer to Appendix

7 Radiated Emissions in restricted frequency bands

Test result: **Pass**

7.1 Limit

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	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

7.2 Measurement Procedure

For Radiated emission below 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c) Both X and Y axes of the antenna are set to make the measurement.
d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

TEST REPORT

For Radiated emission above 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

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

c) The height of antenna 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.

d) 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

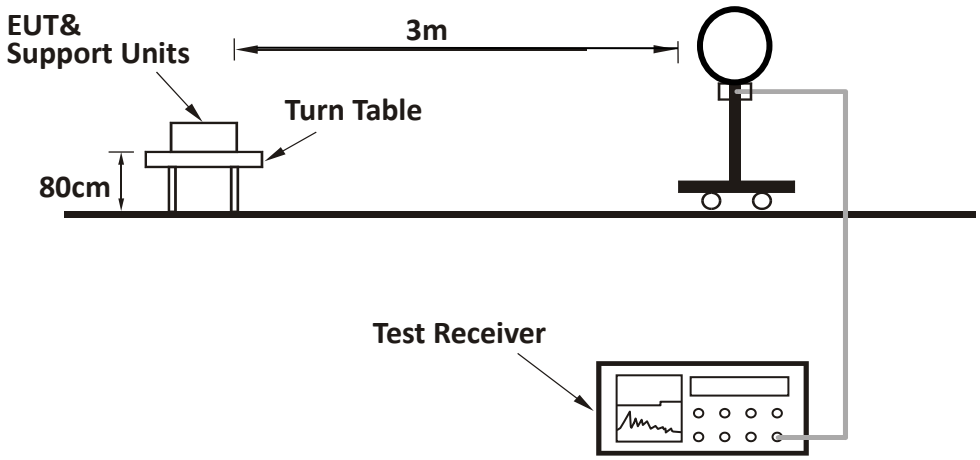
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

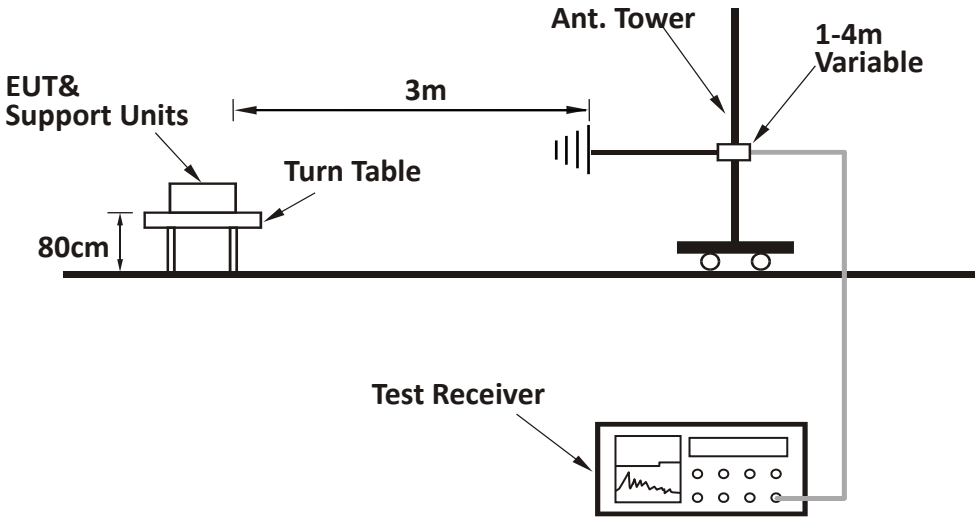
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported

7.3 Test Configuration

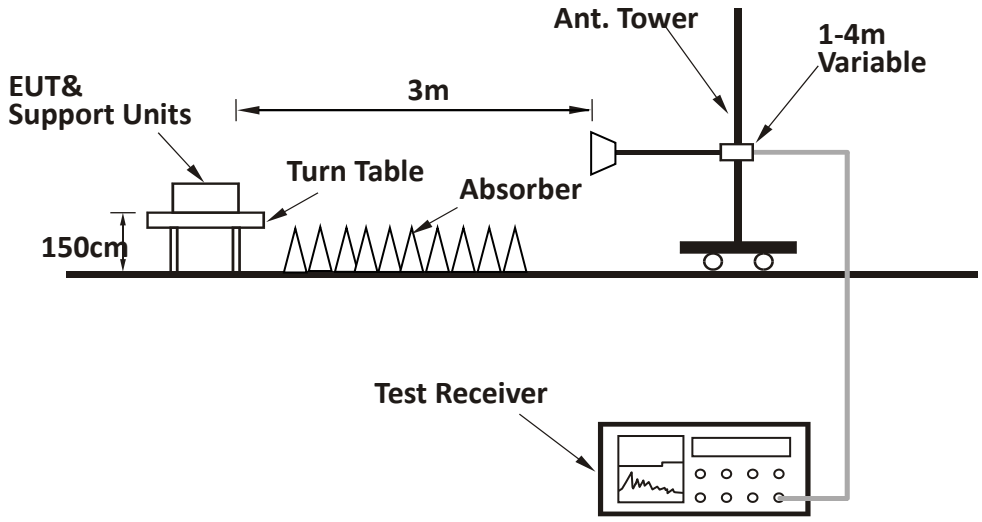
For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



For Radiated emission above 1GHz:

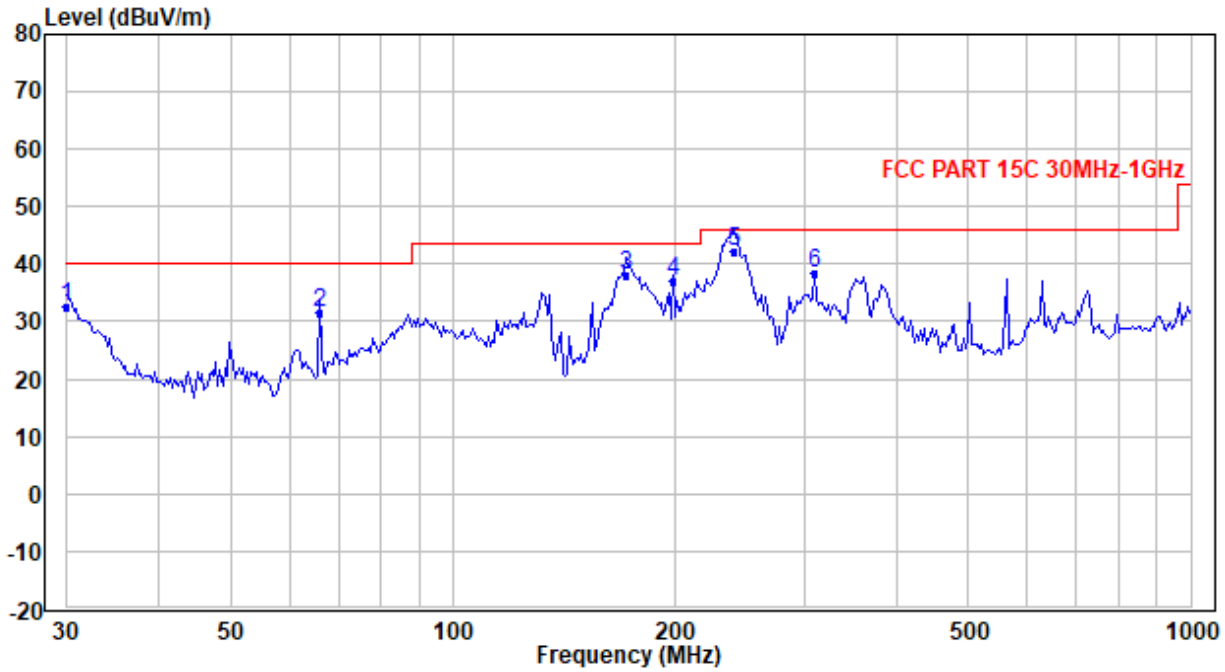


7.4 Test Results of Radiated Emissions

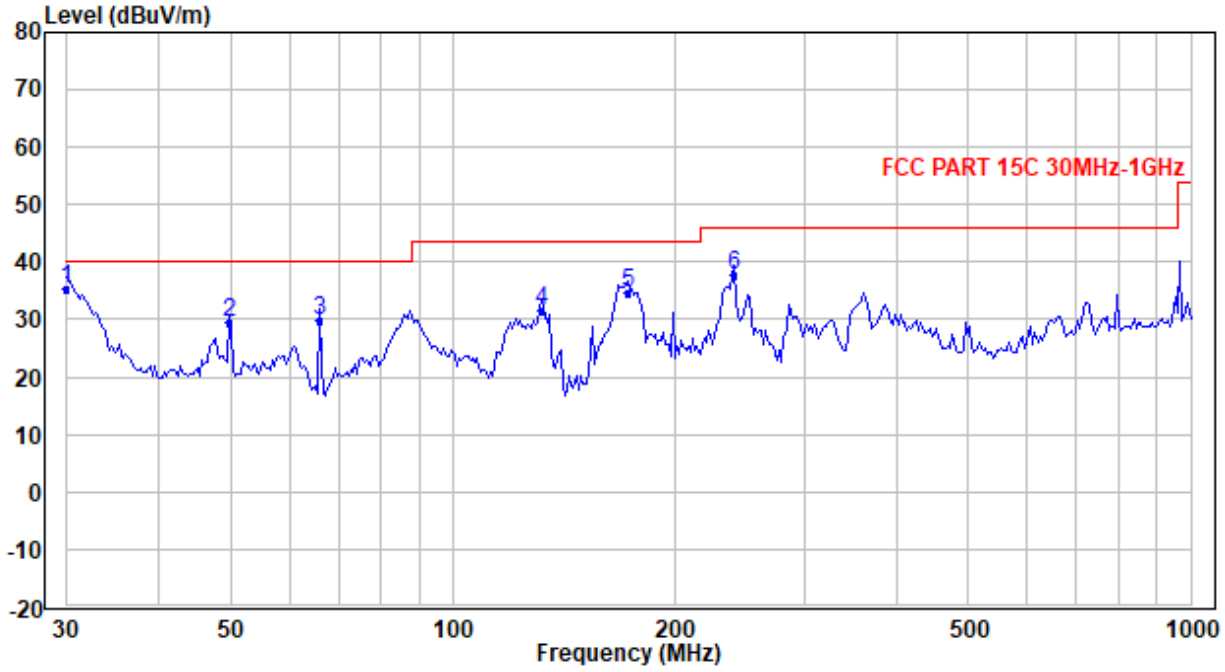
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

We test all models and the worst waveform from 30MHz to 1000MHz is listed as below:

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 30MHz~1GHz:

Polarization	Frequency (MHz)	Measured level (dBμV/m)	Factor (dB/m)	Limits (dBμV/m)	Margin (dB)	Detector
H	30.000	32.57	-4.08	40.00	7.43	QP
	65.907	31.67	-17.73	40.00	8.33	QP
	171.389	38.13	-11.75	43.50	5.37	QP
	198.642	37.03	-11.15	43.50	6.47	QP
	240.144	42.06	-10.62	46.00	3.94	QP
	309.271	38.55	-8.55	46.00	7.45	QP
V	30.000	35.47	-4.08	40.00	4.53	QP
	49.757	29.52	-13.54	40.00	10.48	QP
	65.907	29.73	-17.73	40.00	10.27	QP
	132.149	31.42	-15.47	43.50	12.08	QP
	172.598	34.63	-11.56	43.50	8.87	QP
	240.144	37.60	-10.62	46.00	8.40	QP

Remark:

1. Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Measured level= Original Receiver Reading + Factor
3. Margin = Limit – Measured level
4. All possible modes of operation were investigated, only the worst-case emissions reported.

Radiated Emission Test Data (Above 1GHz):

Lowest Channel:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4804	36.08	-2.08	34.00	54.00	20.00	Average	Horizontal
2	4804	48.23	-2.08	46.15	74.00	27.85	Peak	Horizontal
3	7206	33.88	1.30	35.18	54.00	18.82	Average	Horizontal
4	7206	45.34	1.30	46.64	74.00	27.36	Peak	Horizontal
5	4804	36.07	-2.08	33.99	54.00	20.01	Average	Vertical
6	4804	47.92	-2.08	45.84	74.00	28.16	Peak	Vertical
7	7206	33.99	1.30	35.29	54.00	18.71	Average	Vertical
8	7206	45.64	1.30	46.94	74.00	27.06	Peak	Vertical

Middle Channel:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4880	35.93	-2.05	33.88	54.00	20.12	Average	Horizontal
2	4880	47.94	-2.05	45.89	74.00	28.11	Peak	Horizontal
3	7320	34.39	1.31	35.70	54.00	18.30	Average	Horizontal
4	7320	45.75	1.31	47.06	74.00	26.94	Peak	Horizontal
5	4880	35.87	-2.05	33.82	54.00	20.18	Average	Vertical
6	4880	47.54	-2.05	45.49	74.00	28.51	Peak	Vertical
7	7320	34.21	1.31	35.52	54.00	18.48	Average	Vertical
8	7320	45.74	1.31	47.05	74.00	26.95	Peak	Vertical

Highest Channel:

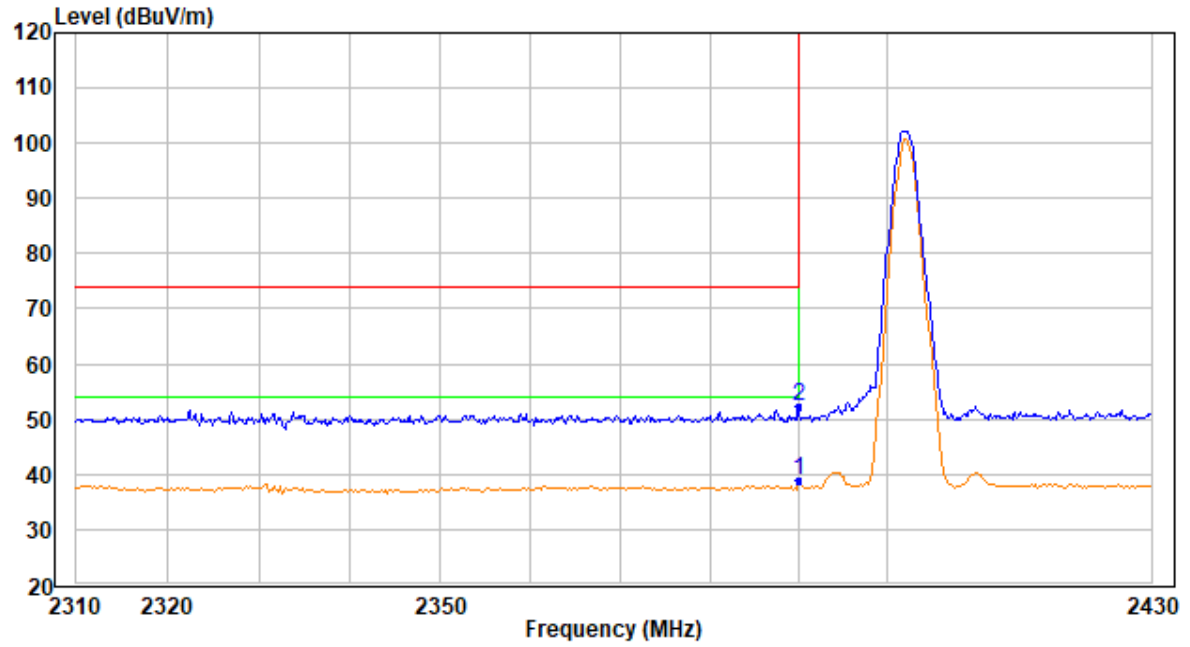
No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4960	36.07	-2.02	34.05	54.00	19.95	Average	Horizontal
2	4960	47.98	-2.02	45.96	74.00	28.04	Peak	Horizontal
3	7440	34.11	1.32	35.43	54.00	18.57	Average	Horizontal
4	7440	47.32	1.32	48.64	74.00	25.36	Peak	Horizontal
5	4960	36.28	-2.02	34.26	54.00	19.74	Average	Vertical
6	4960	48.92	-2.02	46.90	74.00	27.10	Peak	Vertical
7	7440	34.05	1.32	35.37	54.00	18.63	Average	Vertical
8	7440	46.21	1.32	47.53	74.00	26.47	Peak	Vertical

Remark: 1. Correction Factor = Antenna Factor + Cable Loss (- Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Result = Original Receiver Reading + Correction Factor
3. Margin = Limit - Result

TEST REPORT

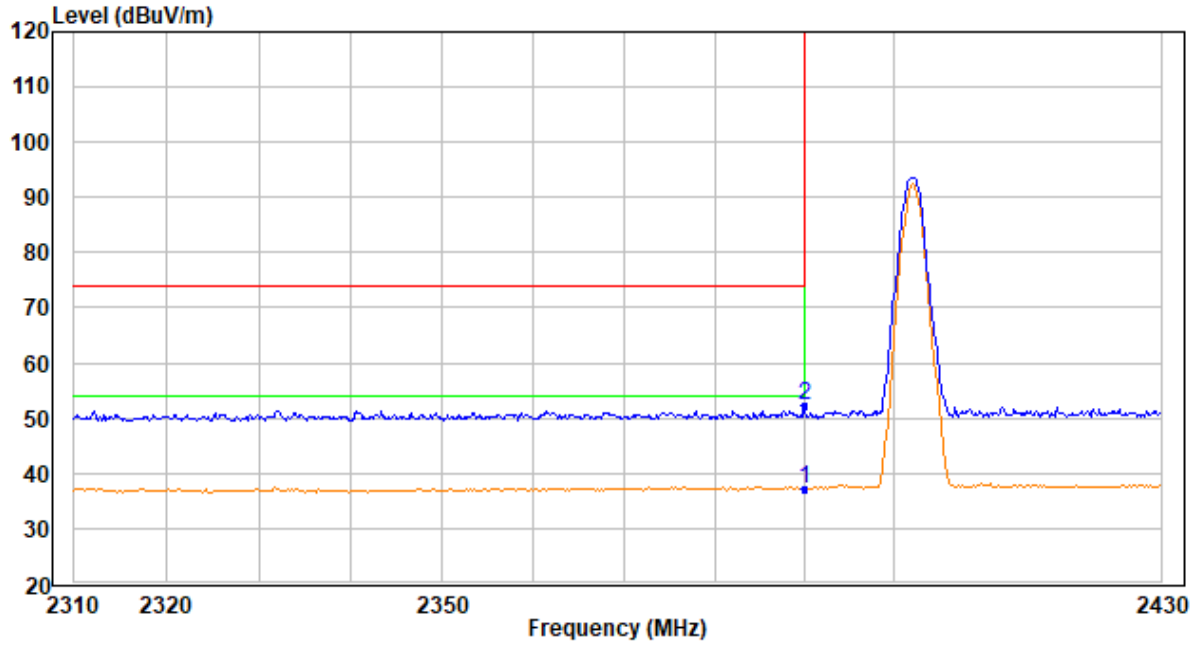
Band Edge Measurements (Radiated)

Test Channel:	Lowest Channel	Ant. Polar. :	Horizontal



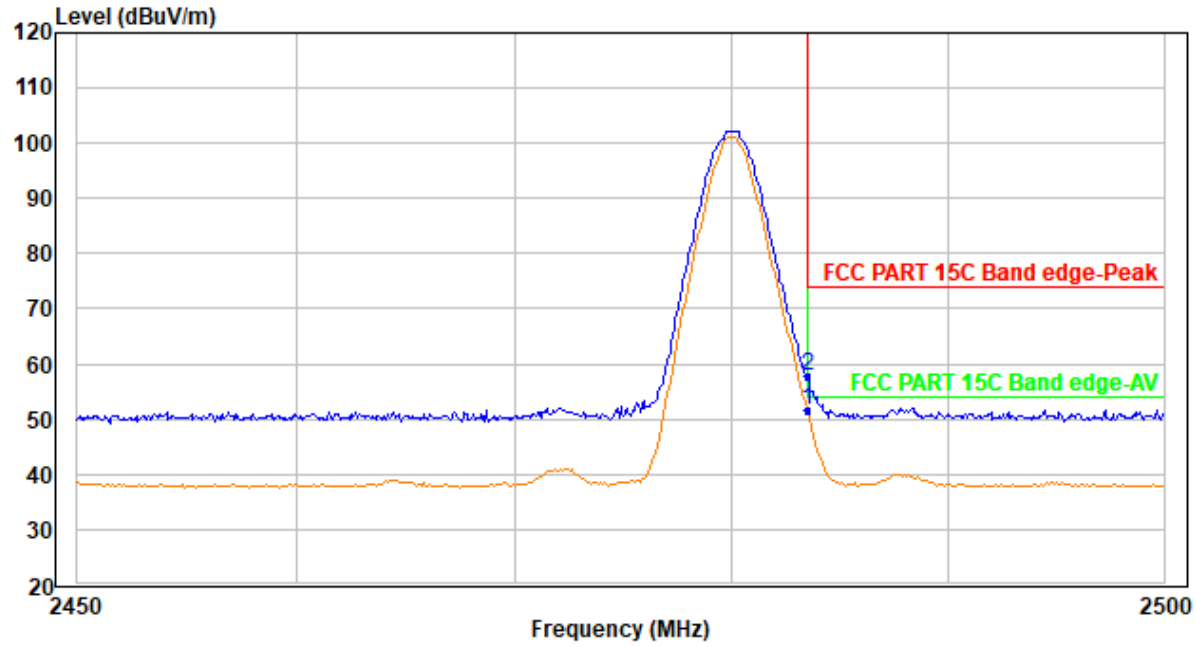
Frequency (MHz)	Peak level (dBµV/m)	Peak Limit (dBµV/m)	AV level (dBµV/m)	AV Limit (dBµV/m)	Conclusion
2390.000	52.25	74.00	38.75	54.00	Pass

Test Channel:	Lowest Channel	Ant. Polar. :	Vertical



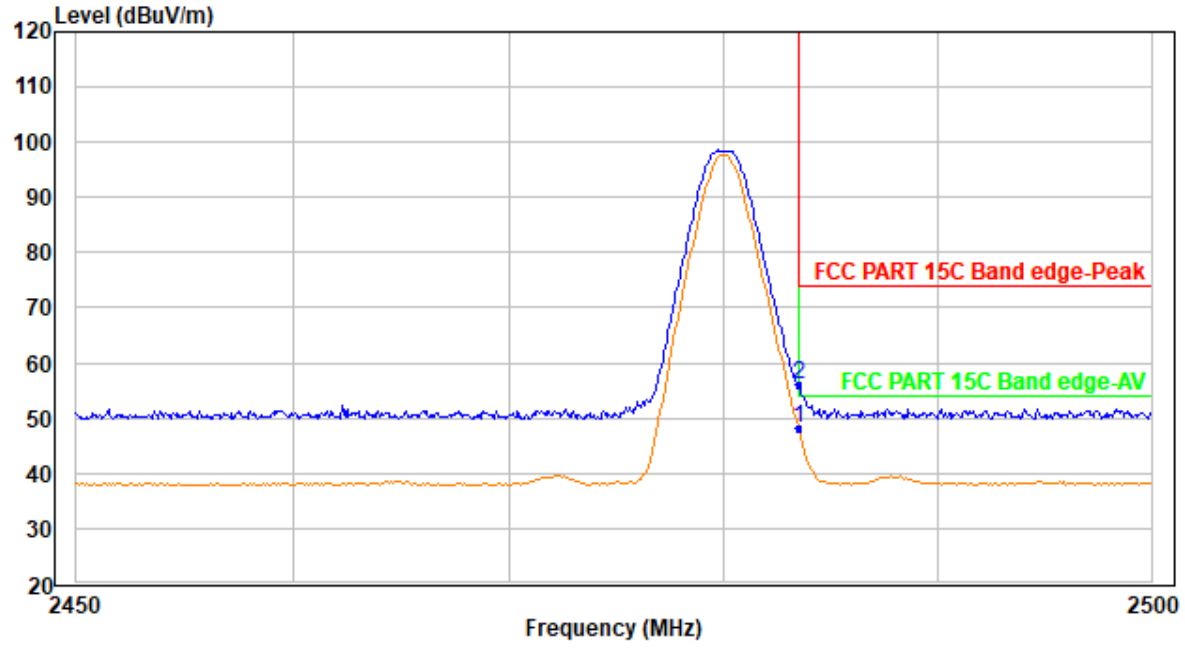
Frequency (MHz)	Peak level (dBµV/m)	Peak Limit (dBµV/m)	AV level (dBµV/m)	AV Limit (dBµV/m)	Conclusion
2390.000	52.19	74.00	37.32	54.00	Pass

Test Channel:	Highest Channel	Ant. Polar. :	Horizontal



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	57.65	74.00	51.65	54.00	Pass

Test Channel:	Highest Channel	Ant. Polar. :	Vertical



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	56.03	74.00	48.33	54.00	Pass

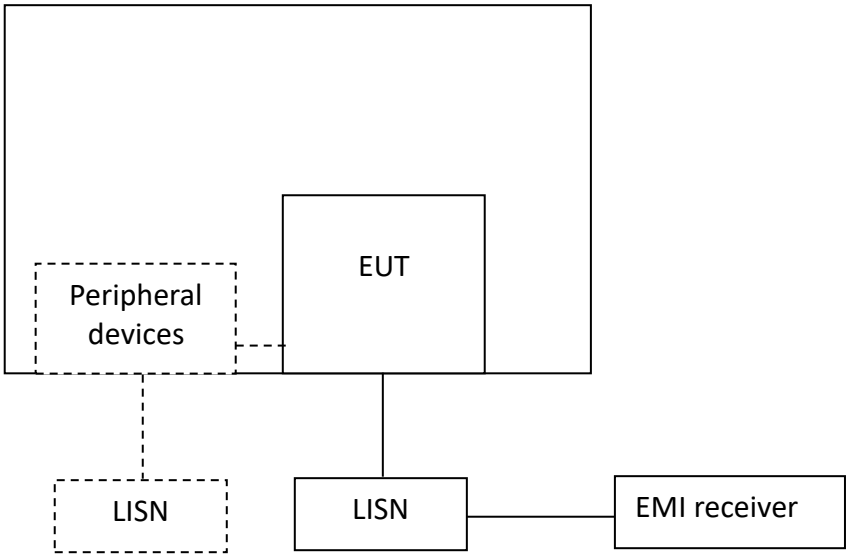
8 Power line conducted emission

Test result: **Pass**

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
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.		

8.2 Test Configuration



8.3 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.

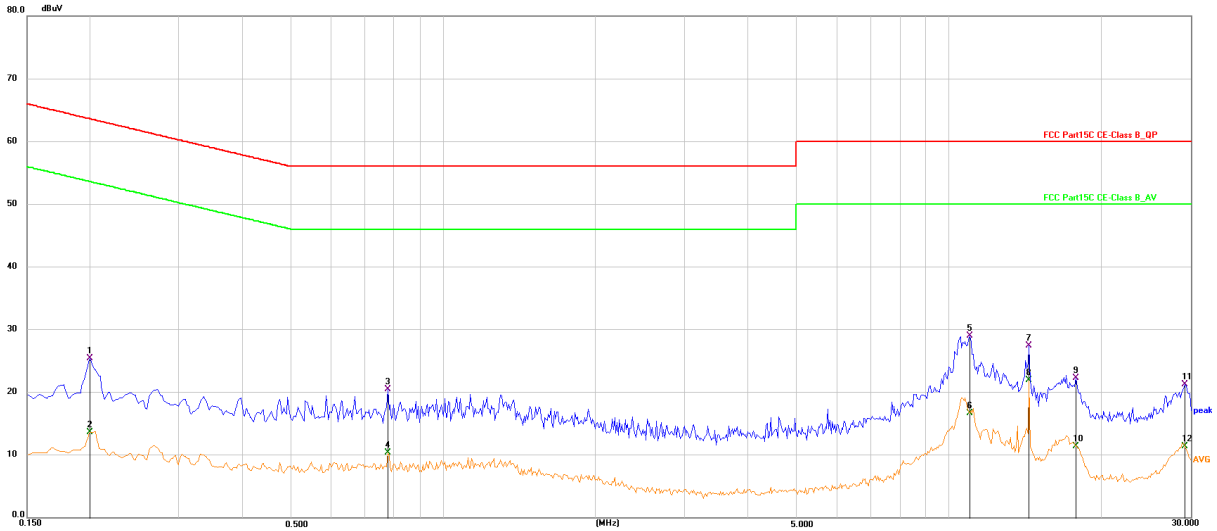
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. 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.

8.4 Test Results of Power line conducted emission

Test Curve:

L Line

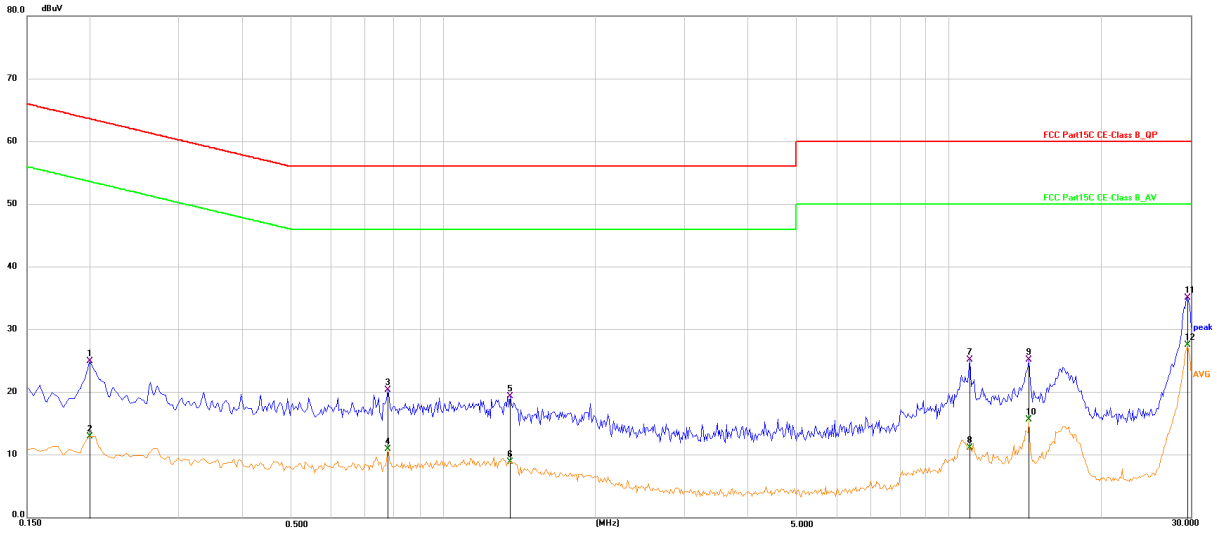


Test Data:

Frequency (MHz)	Quasi-peak			Average		
	Level dB(μV)	Limit dB(μV)	Margin (dB)	Level dB(μV)	Limit dB(μV)	Margin (dB)
0.1995	25.46	63.63	38.17	13.58	53.63	40.05
0.7754	20.47	56.00	35.53	10.35	46.00	35.65
11.0084	28.97	60.00	31.03	16.66	50.00	33.34
14.3834	27.46	60.00	32.54	21.88	50.00	28.12
17.8080	22.26	60.00	37.74	11.34	50.00	38.66
29.2830	21.29	60.00	38.71	11.34	50.00	38.66

TEST REPORT

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)
0.1995	24.98	63.63	38.65	12.98	53.63	40.65
0.7754	20.31	56.00	35.69	10.89	46.00	35.11
1.3560	19.39	56.00	36.61	8.88	46.00	37.12
10.9950	25.16	60.00	34.84	11.20	50.00	38.80
14.3834	25.20	60.00	34.80	15.64	50.00	34.36
29.6114	35.09	60.00	24.91	27.54	50.00	22.46

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

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Level = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

9 Occupied Bandwidth

Test result: **Tested**

9.1 Limit

None

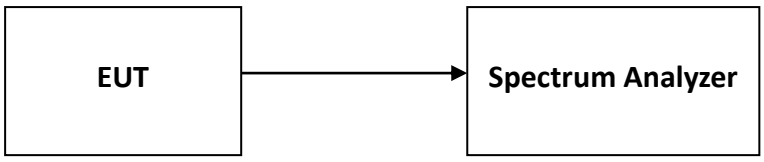
9.2 Measurement Procedure

The occupied bandwidth per RSS-Gen was measured using the Spectrum Analyzer.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

9.3 Test Configuration



9.4 The results of Occupied Bandwidth

Please refer to Appendix

10 Antenna requirement

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 shall be considered sufficient to comply with the provisions of this section.

Result:
EUT uses permanently attached antenna to the intentional radiator, so it can comply with the provisions of this section.

TEST REPORT

Appendix A: Test results

Refer to Appendix A for test results.

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