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FranklinWH Energy Storage Inc

RF TEST REPORT

Report Type:
FCC Part 15.247 RF report

Model:
aGate X

REPORT NUMBER:
230201553SHA-001

ISSUE DATE:
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TEST REPORT

Report no.: 230201553SHA-001

Applicant:	FranklinWH Energy Storage Inc 1731 Technology Dr., Suite 530, San Jose, CA 95110, 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 Electrics Co., Ltd. 151 Naner street, Qiaodong Road, Shanhe Village, Qiaotou Town, Dongguan City, Guangdong Province, China
FCC ID:	2BCMR-AGATEX01US

SUMMARY:

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

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

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Revision History

Report No.	Version	Description	Issued Date
230201553SHA-001	Rev. 01	Initial issue of report	June 12, 2023

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
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
Description of EUT:	The EUT is an Energy storage control system which supports WiFi (802.11a/g mode), BLE and LTE function. LTE function uses a certified module, the FCC ID is XMR201909EC25AFX, the IC ID is 10224A-2019EC25AFX.
Rating:	120/208VAC； 120V/240VAC
EUT type:	☒ Table top ☐ Floor standing
Sample No:	S202302211111-ZJA01/2
Software Version:	V1.4.1
Hardware Version:	1.1
Sample received date:	February 21, 2023
Date of test:	February 22, 2023 to February 23, 2023

1.2 Technical Specification

Frequency Range:	2400MHz ~ 2483.5MHz
Support Standards:	IEEE 802.11g
Type of Modulation:	IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK)
Channel Number:	11 Channels for 802.11g
Data Rate:	IEEE 802.11g: Up to 54 Mbps
Channel Separation:	5 MHz

1.3 Antenna information

Antenna No.	Model	Antenna type	Antenna Gain	Note
1	Antenna 0	FPC antenna	4.13dBi	/
2	Antenna 1	FPC antenna	4.13dBi	/

Mode	Tx/Rx Function	Beamforming function	CDD function
802.11g	2Tx/2Rx	NO	NO

1.4 Description of Test Facility

Name:	Intertek Testing Services Shanghai
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 L0139
	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 2823 0888

Fax: +86 (0) 755 2823 0886

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

Reviewed and approved by Wakeyou Wang 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.

TEST REPORT

IC-Registration No.: 21600

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.

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

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15
ANSI C63.10 (2013)
KDB 558074 (v05r02)
KDB 662911 (v02r01)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the continuously transmission was applied by following software.

Software name	Manufacturer	Version	Supplied by
wifi_test.exe	NA	V1	Client

Power Setting (Provided by the customer)
Power Setting: not applicable, test used software default power level.

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

Frequency Band (MHz)	Modulation	Lowest (L) (MHz)	Middle (M) (MHz)	Highest (H) (MHz)
2400-2483.5	OFDM	2412	2437	2462

2.3 Test software list

Test Items	Software	Manufacturer	Version
Radiated emission	e3	Audix	9.160323
Conducted emission	e3	Audix	9 20151119i

2.4 Test peripherals list

Item No.	Name	Band and Model	S/N number
1	Laptop computer	Lenovo E450	SL10G10780

2.5 Test environment condition:

Test items	Temperature	Humidity
Minimum 6dB Bandwidth	24.3°C	51.3% 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	23.9°C	52.2% RH
Power line conducted emission	23.5°C	49.6% RH

2.6 Instrument list

Conducted Emission						
Used	Equipment	Manufacturer	Type	Internal no.	Cal. date	Due date
☑	Receiver	R&S	ESR7	101181	Nov. 1, 2022	Oct. 31, 2023
☑	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 1, 2022	Oct. 31, 2023
☑	LISN	R&S	ESH2-Z5	860014/024	Nov. 1, 2022	Oct. 31, 2023
☑	Test Software	Audix	e3	Software Version: 9 20151119i		
Radiated Emission						
Used	Equipment	Manufacturer	Type	Internal no.	Due date	Due date
☑	3m SAC	ETS-LINDGREN	3m	Euroshiedpn-CT001270-1317	Jan. 22, 2021	Jan. 21, 2024
☑	Receiver	R&S	ESIB26	100114	Nov. 3, 2022	Nov. 2, 2023
☑	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 21, 2022	Nov. 20, 2023
☑	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec.13, 2022	Dec.12, 2023
☑	6dB Attenuator	Talent	RA6A5-N-18	18103001	Dec.13, 2022	Dec.12, 2023
☑	Preamplifier	HP	8447F	2805A02960	Nov. 1, 2022	Oct. 31, 2023
☑	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	Apr. 16, 2023	Apr. 15, 2025
☑	Pre-amplifier	ETS-LINDGREN	00118385	00201874	Nov. 1, 2022	Oct. 31, 2023
☑	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 21, 2022	Nov. 20, 2023
☑	Preamplifier	ETS-LINDGREN	00118384	00202652	Nov. 21, 2022	Nov. 20, 2023
☑	Test Software	Audix	e3	Software Version: 9.160323		
RF test						
Used	Equipment	Manufacturer	Type	Internal no.	Due date	Due date
☑	EXA Spectrum Analyzer	KEYSIGHT	N9020A	MY51286807	Nov. 1, 2022	Oct. 31, 2023
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Nov. 3, 2022	Nov. 2, 2023

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.

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-40GHz	±4.6 dB
8	Radio frequency	2.4 GHz: $\pm 6.5 \times 10^{-8}$
9	Occupied Channel Bandwidth	± 1.86 %
10	RF output power, conducted	± 0.68 dB
11	Power Spectral Density	± 0.6 dB
12	Spurious emissions, conducted	± 2.7 dB
13	Time	± 0.19 %

3 Minimum 6dB bandwidth

Test result: Pass

3.1 Limit

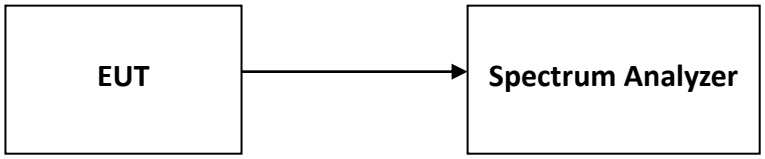
For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2 Measurement Procedure

The minimum 6dB bandwidth is measured using the Spectrum Analyzer according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" (clause 8.2) for compliance requirements.

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 A

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).

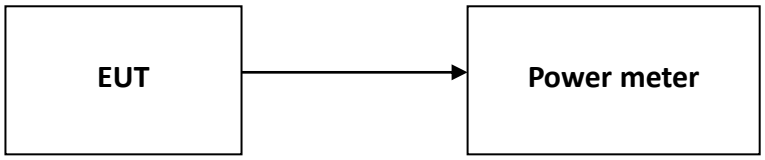
4.2 Measurement Procedure

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 8.3.1) for compliance requirements.

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
2. Measure out each test modes’ peak or average output power, record the power level.

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

4.3 Test Configuration



4.4 Test Results of Maximum conducted output power

Please refer to Appendix A

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

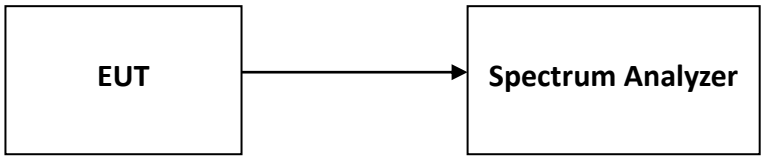
The power output was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 8.4) for compliance requirements.

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:

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 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 amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

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

5.3 Test Configuration



5.4 Test Results of Power spectrum density

Please refer to Appendix A

6 Emission outside the frequency band

Test result: **Pass**

6.1 Limit

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

6.2 Measurement Procedure

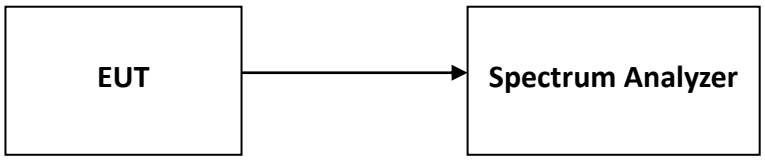
The EUT was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" (clause 8.5) for compliance requirements.

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 A

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.

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.

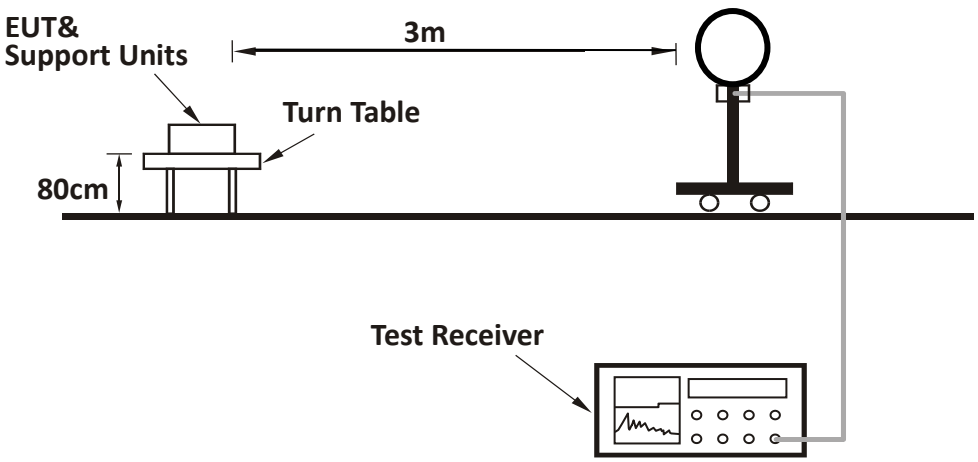
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

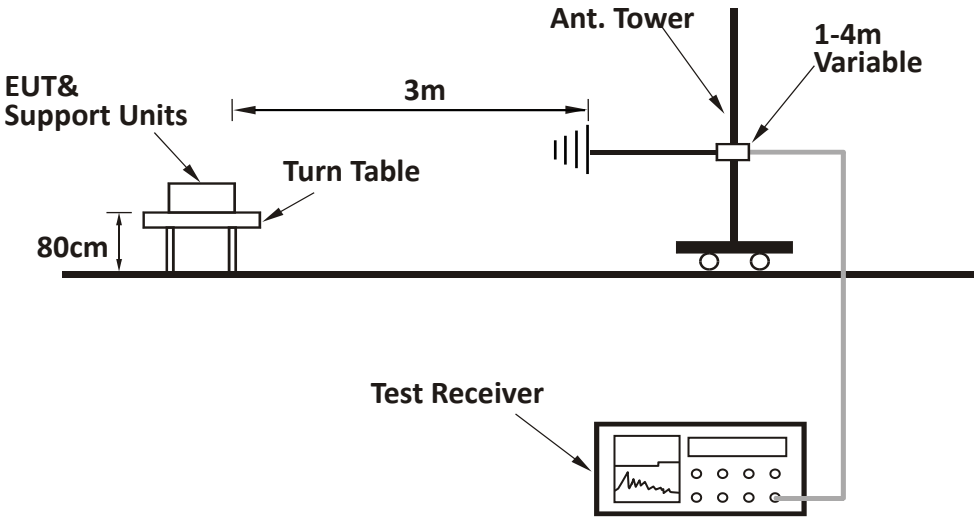
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

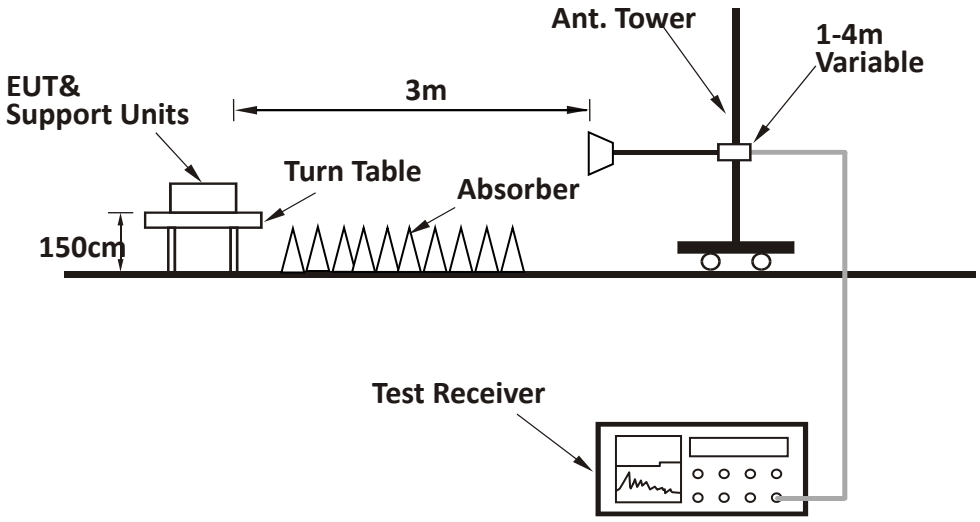
For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



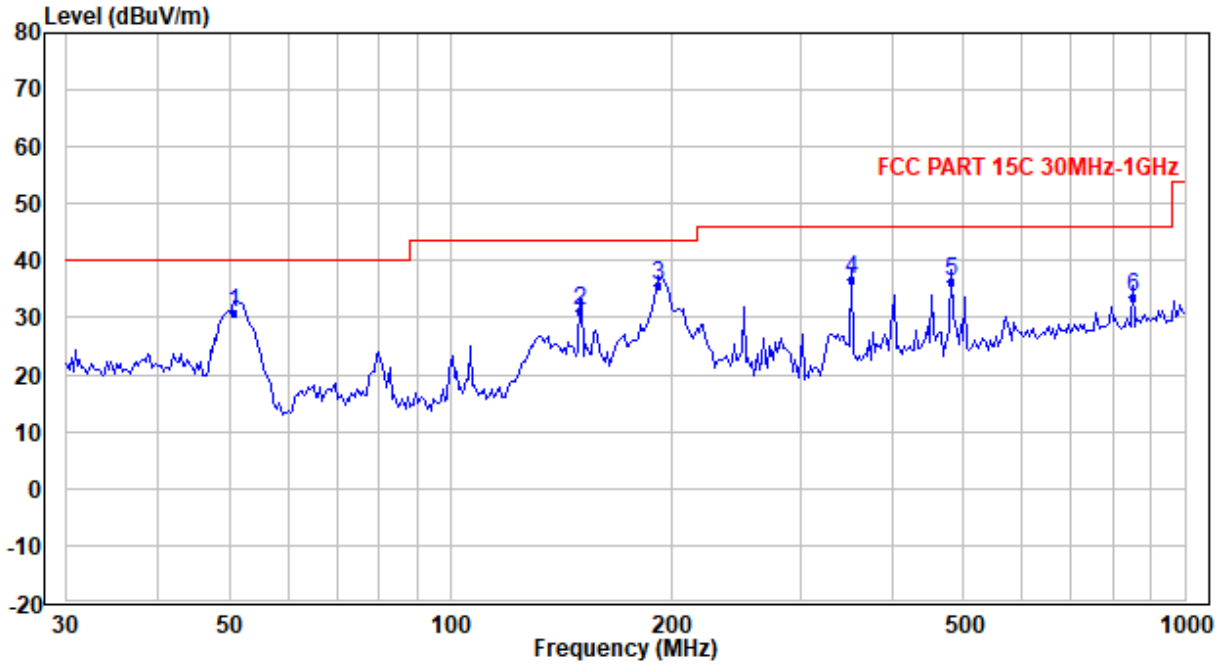
For Radiated emission above 1GHz:



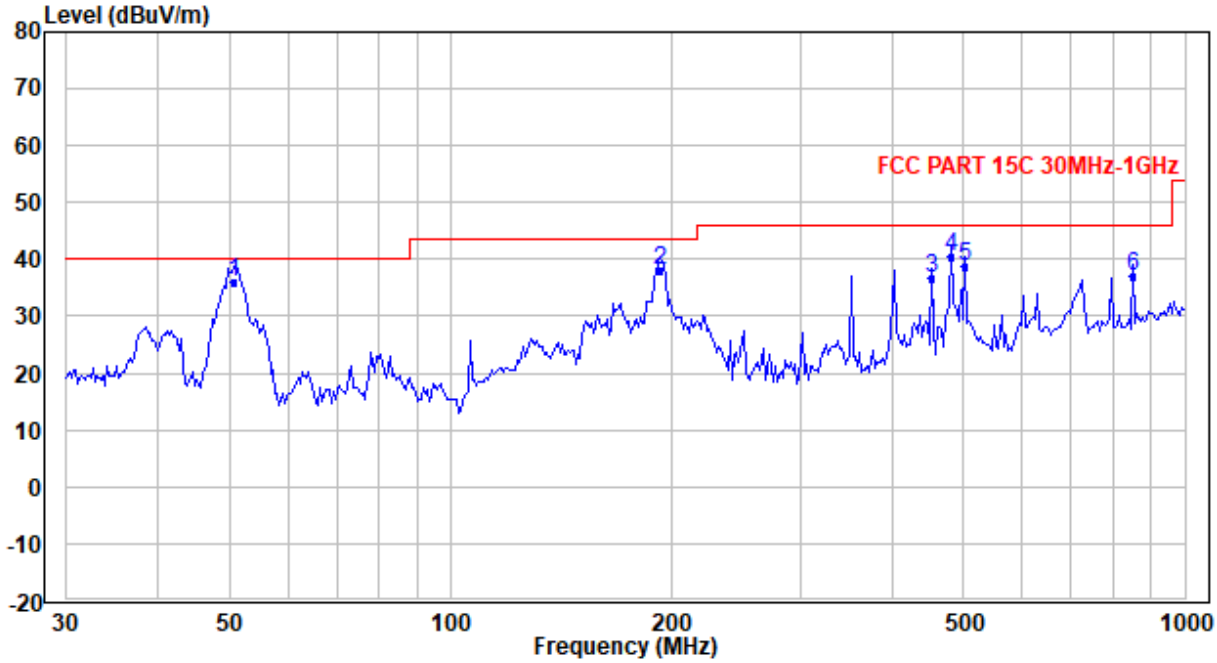
7.4 Test Results of Radiated Emissions

Radiated Emissions(30MHz-1GHz)
Test data 30MHz~1GHz:

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 data 30MHz~1GHz:

Polarization	Frequency (MHz)	Measured level (dBμV/m)	Factor (dB/m)	Limits (dBμV/m)	Margin (dB)	Detector
H	50.817	30.90	-14.84	40.00	9.10	QP
	149.968	31.28	-14.66	43.50	12.22	QP
	191.784	35.51	-10.46	43.50	7.99	QP
	350.972	36.55	-4.80	46.00	9.45	QP
	481.511	36.46	-3.05	46.00	9.54	QP
	850.760	33.76	3.49	46.00	12.24	QP
V	50.817	35.93	-14.84	40.00	4.07	QP
	193.137	38.07	-10.47	43.50	5.43	QP
	452.001	36.59	-3.35	46.00	9.41	QP
	481.511	40.58	-3.05	46.00	5.42	QP
	502.247	38.65	-1.92	46.00	7.35	QP
	850.760	37.03	3.49	46.00	8.97	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): ANT 0

IEEE 802.11g_ Channel 1:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	37.76	-2.40	35.36	74.00	38.64	Peak	Horizontal
2	4824.00	25.20	-2.40	22.80	54.00	31.20	Average	Horizontal
3	7236.00	41.03	1.63	42.66	74.00	31.34	Peak	Horizontal
4	7236.00	28.62	1.63	30.25	54.00	23.75	Average	Horizontal
5	4824.00	36.39	-2.40	33.99	74.00	40.01	Peak	Vertical
6	4824.00	25.05	-2.40	22.65	54.00	31.35	Average	Vertical
7	7236.00	37.99	1.63	39.62	74.00	34.38	Peak	Vertical
8	7236.00	27.83	1.63	29.46	54.00	24.54	Average	Vertical

IEEE 802.11g_ Channel 6:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	36.64	-2.34	34.30	74.00	39.70	Peak	Horizontal
2	4874.00	26.10	-2.34	23.76	54.00	30.24	Average	Horizontal
3	7311.00	39.25	1.69	40.94	74.00	33.06	Peak	Horizontal
4	7311.00	27.13	1.69	28.82	54.00	25.18	Average	Horizontal
5	4874.00	36.96	-2.34	34.62	74.00	39.38	Peak	Vertical
6	4874.00	25.82	-2.34	23.48	54.00	30.52	Average	Vertical
7	7311.00	37.99	1.69	39.68	74.00	34.32	Peak	Vertical
8	7311.00	27.25	1.69	28.94	54.00	25.06	Average	Vertical

IEEE 802.11g_ Channel 11:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	37.17	-2.29	34.88	74.00	39.12	Peak	Horizontal
2	4924.00	25.56	-2.29	23.27	54.00	30.73	Average	Horizontal
3	7386.00	37.75	1.73	39.48	74.00	34.52	Peak	Horizontal
4	7386.00	27.22	1.73	28.95	54.00	25.05	Average	Horizontal
5	4924.00	37.17	-2.29	34.88	74.00	39.12	Peak	Vertical
6	4924.00	25.56	-2.29	23.27	54.00	30.73	Average	Vertical
7	7386.00	37.75	1.73	39.48	74.00	34.52	Peak	Vertical
8	7386.00	26.29	1.73	28.02	54.00	25.98	Average	Vertical

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 = Limit - Result
4. The Peak level is less than AV limit, so only peak value was recorded in final data.
5. WiFi transmitting generated the higher emission than WiFi and LTE simultaneously, so the data of WiFi transmitting was recorded as final result.

Radiated Emission Test Data (Above 1GHz): ANT 1

IEEE 802.11g_ Channel 1:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	35.23	-2.40	32.83	74.00	41.17	Peak	Horizontal
2	4824.00	25.53	-2.40	23.13	54.00	30.87	Average	Horizontal
3	7236.00	38.74	1.63	40.37	74.00	33.63	Peak	Horizontal
4	7236.00	27.63	1.63	29.26	54.00	24.74	Average	Horizontal
5	4824.00	36.16	-2.40	33.76	74.00	40.24	Peak	Vertical
6	4824.00	26.45	-2.40	24.05	54.00	29.95	Average	Vertical
7	7236.00	36.58	1.63	38.21	74.00	35.79	Peak	Vertical
8	7236.00	27.66	1.63	29.29	54.00	24.71	Average	Vertical

IEEE 802.11g_ Channel 6:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	35.97	-2.34	33.63	74.00	40.37	Peak	Horizontal
2	4874.00	25.25	-2.34	22.91	54.00	31.09	Average	Horizontal
3	7311.00	37.55	1.68	39.23	74.00	34.77	Peak	Horizontal
4	7311.00	26.71	1.68	28.39	54.00	25.61	Average	Horizontal
5	4874.00	36.63	-2.34	34.29	74.00	39.71	Peak	Vertical
6	4874.00	25.46	-2.34	23.12	54.00	30.88	Average	Vertical
7	7311.00	37.40	1.68	39.08	74.00	34.92	Peak	Vertical
8	7311.00	26.97	1.68	28.65	54.00	25.35	Average	Vertical

IEEE 802.11g_ Channel 11:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	35.36	-2.29	33.07	74.00	40.93	Peak	Horizontal
2	4924.00	25.20	-2.29	22.91	54.00	31.09	Average	Horizontal
3	7386.00	36.59	1.73	38.32	74.00	35.68	Peak	Horizontal
4	7386.00	25.96	1.73	27.69	54.00	26.31	Average	Horizontal
5	4924.00	34.90	-2.29	32.61	74.00	41.39	Peak	Vertical
6	4924.00	24.15	-2.29	21.86	54.00	32.14	Average	Vertical
7	7386.00	36.32	1.73	38.05	74.00	35.95	Peak	Vertical
8	7386.00	25.55	1.73	27.28	54.00	26.72	Average	Vertical

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 = Limit - Result
4. The Peak level is less than AV limit, so only peak value was recorded in final data.
5. WiFi transmitting generated the higher emission than WiFi and LTE simultaneously, so the data of WiFi transmitting was recorded as final result.

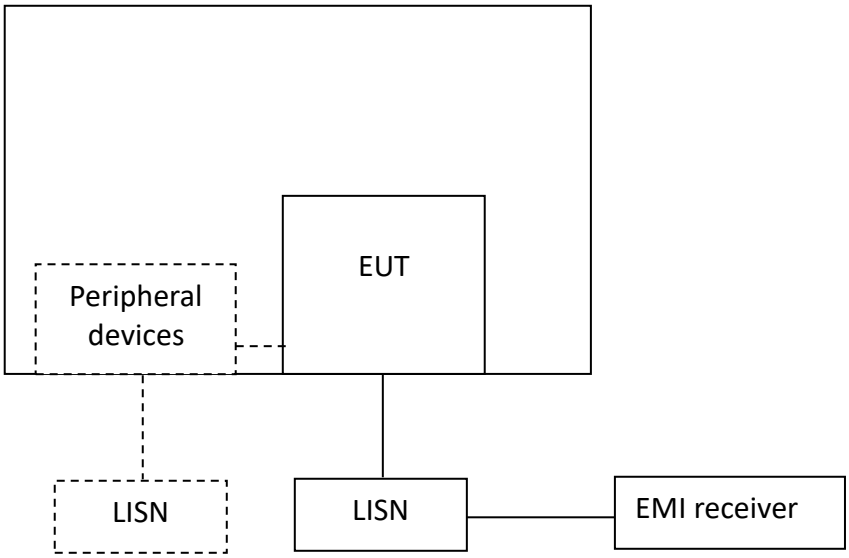
8 Power line conducted emission

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.

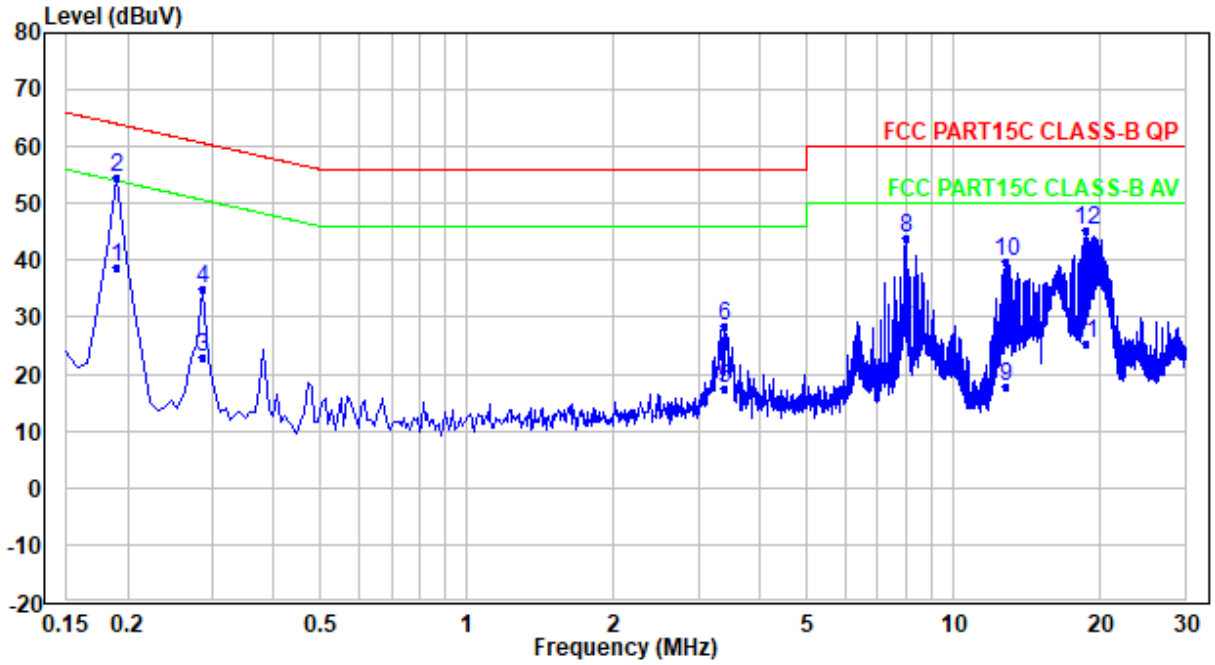
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on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

L1 Line

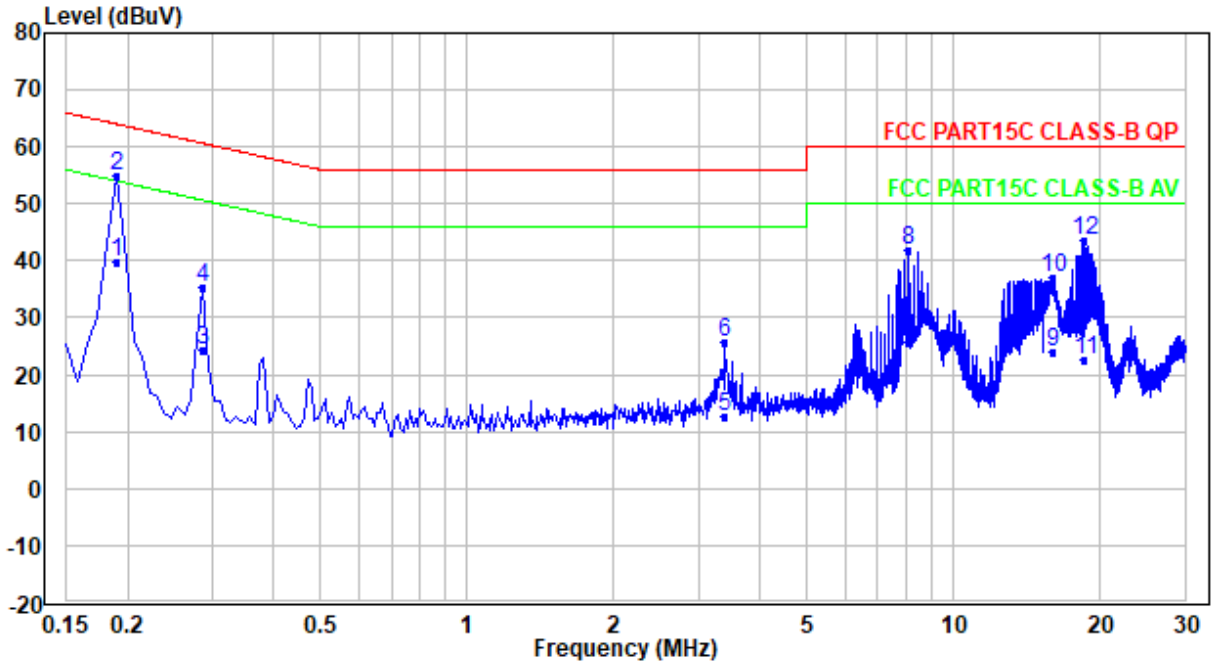


Test Data:

Frequency (MHz)	Quasi-peak			Average		
	Level dB(μV)	Limit dB(μV)	Margin (dB)	Level dB(μV)	Limit dB(μV)	Margin (dB)
0.190	54.71	64.04	9.33	38.71	54.04	15.33
0.286	34.90	60.64	25.74	22.90	50.64	27.74
3.389	28.45	56.00	27.55	17.45	46.00	28.55
7.980	43.77	60.00	16.23	27.77	50.00	22.23
12.851	39.71	60.00	20.29	17.71	50.00	32.29
18.778	45.22	60.00	14.78	25.22	50.00	24.78

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	54.74	64.04	9.30	39.74	54.04	14.30
0.286	35.29	60.64	25.35	24.29	50.64	26.35
3.389	25.60	56.00	30.40	12.60	46.00	33.40
8.124	41.75	60.00	18.25	25.75	50.00	24.25
16.027	37.11	60.00	22.89	24.11	50.00	25.89
18.650	43.61	60.00	16.39	22.61	50.00	27.39

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.
2. Level = Original Receiver Reading + Correct Factor
3. Margin = Limit - Level
4. All possible modes of operation were investigated, only the worst-case emissions reported.

9 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.

Appendix A: Test results

Refer to Appendix A for test results.

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