Bestway (Hong Kong) International Ltd.

RF TEST REPORT

Report Type:
FCC Part 15.247 & ISED RSS-247 RF report

Model:
S200206

Report Number:
2405B1900SHA-001

Issue Date:
June 19, 2024

Document Control Number:
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Report no. 2405B1900SHA-001

Applicant:	Bestway (Hong Kong) International Ltd. SUITE 713, 7/FLOOR, EAST WING, TSIM SHA TSUI CENTRE, 66 MODY ROAD, KOWLOON, HONG KONG
Manufacturer:	Bestway Inflatables & Material Corp. No. 208 Jin Yuan Wu Road, Shanghai, 201812, China
Manufacturing site:	Bestway (Nantong) Recreation Corp. No. 8, West Huimin Road, Rugao Economic and Technology Development Zone, Jiangsu, 226503, China
FCC ID:	2AS3R-200206R
IC:	26017-200206R

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

RSS-247 Issue 3 (August 2023): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen Issue 5 (February 2021) Amendment 2: General Requirements for Compliance of Radio Apparatus

PREPARED BY:	**REVIEWED BY:**
Scout Gong	Eric Li
Project Engineer	Reviewer

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Revision History

Report No.	Version	Description	Issued Date
2405B1900SHA-001	Rev. 01	Initial issue of report	June 19, 2024

Measurement Result Summary

TEST ITEM	FCC REFERENCE	IC REFERENCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	RSS-247 Issue 3 Clause 5.2	Pass
Maximum conducted output power and e.i.r.p.	15.247(b)(3)	RSS-247 Issue 3 Clause 5.4	Pass
Power spectrum density	15.247(e)	RSS-247 Issue 3 Clause 5.2	Pass
Emission outside the frequency band	15.247(d)	RSS-247 Issue 3 Clause 5.5	Pass
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	RSS-Gen Issue 5 Clause 8.9&8.10	Pass
Power line conducted emission	15.207(a)	RSS-Gen Issue 5 Clause 8.8	Pass
Occupied bandwidth	-	RSS-Gen Issue 5 Clause 6.6	Tested
Antenna requirement	15.203	-	Pass

Notes:
1: NA =Not Applicable
2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.
3. Additions, Deviations and Exclusions from Standards: None.

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1 General Information

1.1 Description of Equipment Under Test (EUT)

Product name:	Electric Spas
Type/Model/PMN:	S200206
HVIN:	26017-200206R
Description of EUT:	EUT is a wireless Electric Spas with BLE and Wi-Fi module.
Rating:	110-120 VAC, 60Hz, 12A
Category of EUT:	Class B
Brand name:	Bestway
EUT type:	☐ Tabletop ☒ Floor standing
Software Version:	-
Hardware Version:	-
Sample Identification No.:	0240330-18-003
Sample received date:	March 30, 2024
Date of test:	March 30, 2024, to June 19, 2024

1.2 Technical Specification

Frequency Band:	2400MHz ~ 2483.5MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n(HT20)
Type of Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n(HT20): OFDM (64-QAM, 16-QAM, QPSK, BPSK)
Operating Frequency:	2412MHz to 2462MHz for IEEE 802.11b/g/n(HT20)
Channel Number:	11 Channels for 802.11b, 802.11g and 802.11n(HT20)
Channel Separation:	5 MHz

1.3 Antenna Information

No.	Antenna Type	Gain	Note
1	PCB antenna	2 dBi	Internal type

Mode	Tx/Rx Function	Beamforming function	CDD function	Directional gain (dBi)
802.11b	1Tx/1Rx	NO	NO	-
802.11g	1Tx/1Rx	NO	NO	-
802.11n(HT20)	1Tx/1Rx	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 CAB identifier.: CN0014
	VCCI Registration Lab Member No: 3598 (Registration No.: R-14243, G-10845, C-14723, T-12252)
	A2LA Accreditation Lab Certificate Number: 3309.02

2 Test Specifications

2.1 Standards or Specification

47CFR Part 15 (2023)
ANSI C63.10 (2020)
KDB 558074 (v05r02)
RSS-247 Issue 3 (August 2023)
RSS-Gen Issue 5 (February 2021) Amendment 2

2.2 Mode of Operation During the Test

While testing transmitting mode of EUT, the internal modulation and continuous transmission was applied.

Software name	Manufacturer	Version	Supplied by
UI_mptool	-	1V16	Client

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

Frequency Band (MHz)	Mode	Lowest (MHz)	Middle (MHz)	Highest (MHz)
2400-2483.5	802.11b	2412	2437	2462
	802.11g	2412	2437	2462
	802.11n(HT20)	2412	2437	2462

Data rate and Power setting:
The pre-scan for the conducted power with all rates in each modulation and band was used, and the worst case was found and used in all test cases. After this pre-scan, we choose the following table of the data rata as the worst case.

Frequency Band (MHz)	Mode	Worst case data rate	Power Setting
2400-2483.5	802.11b	1Mbps	Default
	802.11g	6Mbps	Default
	802.11n(HT20)	MCS0	Default

The EUT will use two types of antennas, and there have the following test mode:
Radiated test mode:
Mode 1: EUT transmitted signal with internal antenna.
Conducted test mode:
Mode 2: EUT transmitted signal from PCBA RF port connected to SPA directly.
We have verified all test modes, and list all the results in this report.

2.3 Test Software List

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71
Conducted emission	SKET Auto EMC Test Software	Keleto	V3.0
Radiated emission	SKET Auto EMC Test Software	Keleto	V3.0

2.4 Test Peripherals List

Item No.	Name	Brand and Model	Description
1	Laptop computer	DELL 5480	100-240V AC, 50/60Hz

2.5 Test Environment Condition:

Test items	Temperature	Humidity
Minimum 6dB Bandwidth	20°C	50%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	21°C	52%RH
Power line conducted emission	21°C	52%RH

2.6 Instrument List

Conducted Emission						
Used	Equipment	Manufacturer	Type	Internal no.	Calibration date	Due date
☑	Test Receiver	R&S	ESR7	EC 6194	2024-02-08	2025-02-07
☑	A.M.N.	R&S	ESH2-Z5	EC 3119	2023-11-20	2024-11-19
☑	Attenuator	Hua Xiang	Ts5-10db-6g	EC 6194-1	2023-12-08	2024-12-07
☑	Shielded room	Zhongyu	-	EC 2838	2024-01-11	2025-01-10
Radiated Emission						
Used	Equipment	Manufacturer	Type	Internal no.	Calibration date	Due date
☑	Test Receiver	R&S	ESIB 26	EC 3045	2023-08-23	2024-08-22
☑	Test Receiver	R&S	ESR	EC 6501	2023-09-25	2024-09-24
☑	Bilog Antenna	TESEQ	CBL 6112B	EC 6411	2023-09-13	2024-09-12
☑	Pre-amplifier	Tonscend	tap01018050	EC 6432-1	2023-12-08	2024-12-07
☑	Horn antenna	Tonscend	bha9120d	EC 6432-2	2024-02-15	2025-02-14
☑	Horn antenna	ETS	3117	EC 4792-1	2023-09-16	2024-09-15
☑	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2023-09-13	2024-09-12
☑	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC 5262	2023-09-25	2024-09-24
☑	Semi-anechoic chamber	Albatross project	-	EC 3048	2023-07-13	2024-07-12
RF test						
Used	Equipment	Manufacturer	Type	Internal no.	Calibration date	Due date
☑	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2024-03-08	2025-03-07
☑	Vector Signal Generator	Agilent	N5182B	EC 5175	2024-03-08	2025-03-07
☑	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2024-03-08	2025-03-07
☑	Test Receiver	R&S	ESCI 7	EC 4501	2024-03-08	2025-03-07
☑	Signal generator	Agilent	N5182A	EC 6172	2023-08-09	2024-08-08
☑	Signal generator	Agilent	N5181A	EC 6171	2023-08-09	2024-08-08
☑	Climate chamber	GWS	MT3065	EC 6021	2024-03-08	2025-03-07
Additional instrument						
Used	Equipment	Manufacturer	Type	Internal no.	Calibration date	Due date
☑	Thermo-Hygrograph	Testo	175h1	EC 6643	2023-08-29	2024-08-28
☑	Pressure meter	YM3	Shanghai Mengde	EC 3320	2023-08-17	2024-08-16

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	± 0.74dB
Minimum 6dB bandwidth	
Powe spectrum density	
Emission outside the frequency band	
Occupied bandwidth	
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

3 Minimum 6dB Bandwidth

Test Result: Pass

3.1 Limit

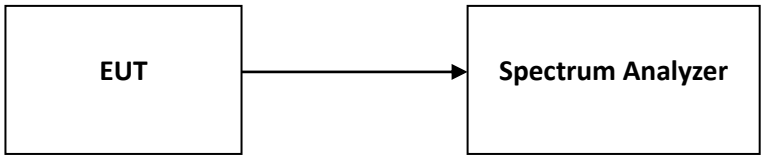
For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2 Measurement Procedure

The EUT was tested according to Subclause 11.8 of ANSI C63.10.

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)

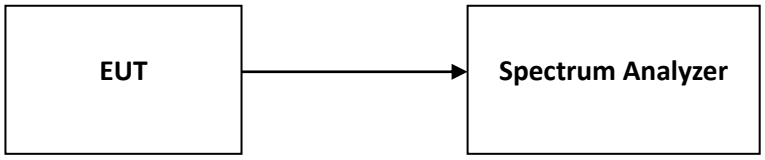
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

4.2 Measurement Procedure

The EUT was tested according to Subclause 11.9.2.2 of ANSI C63.10.

a) Measure the duty cycle, x, of the transmitter output signal as described in Section 6.0.
b) Set span to at least 1.5 x OBW.
c) Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz.
d) Set VBW ≥ 3 x RBW.
e) Number of points in sweep ≥ 2 x span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
f) Sweep time = auto.
g) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
h) Do not use sweep triggering. Allow the sweep to “free run”.
i) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
j) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
k) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on- and off-times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is 25 %.

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).

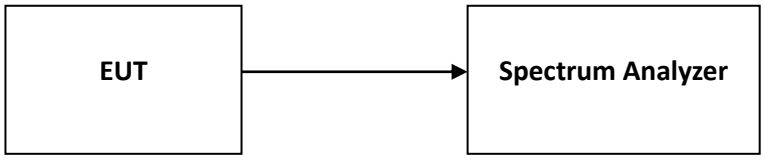
5.2 Measurement Procedure

The EUT was tested according to Subclause 11.10 of ANSI C63.10.

This procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., duty cycle < 98 %), and when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than ± 2 %):

a) Measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.
b) Set instrument center frequency to DTS channel center frequency.
c) Set span to at least 1.5 x OBW.
d) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
e) Set VBW ≥3 x RBW.
f) Detector = power averaging (RMS) or sample detector (when RMS not available).
g) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h) Sweep time = auto couple.
i) Do not use sweep triggering. Allow sweep to “free run”.
j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
k) Use the peak marker function to determine the maximum amplitude level.
l) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.
m) If resultant value exceeds the limit, then reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

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 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 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

6.2 Measurement Procedure

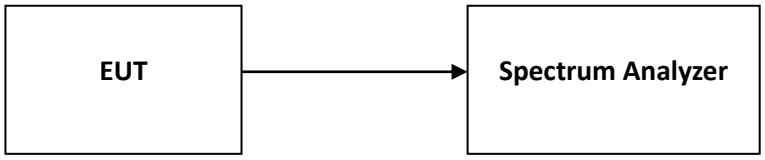
The EUT was tested according to Subclause 11.11 of ANSI C63.10.

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

The EUT was tested according to Subclause 11.12 of ANSI C63.10.

For Radiated emission below 30MHz:

a) The EUT was placed on the top of a rotating turntable 0.1 meters above the ground in a 3-meter chamber room. The turntable 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.

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For Radiated emission above 30MHz:

a) The EUT was placed on the top of a rotating turntable 0.1 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3-meter chamber room for test. The turntable 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 varies 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.

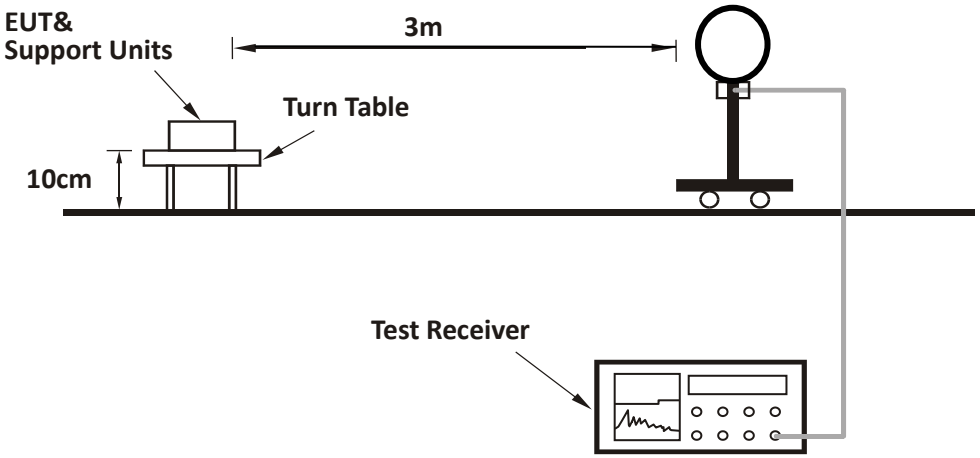
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets the average limit, measurement with the average detector is unnecessary.

Note:

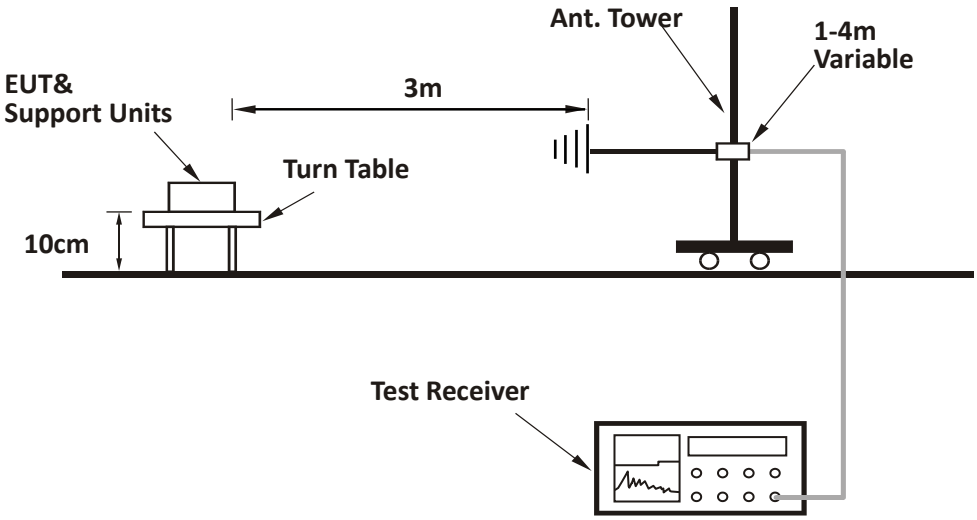
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz, and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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



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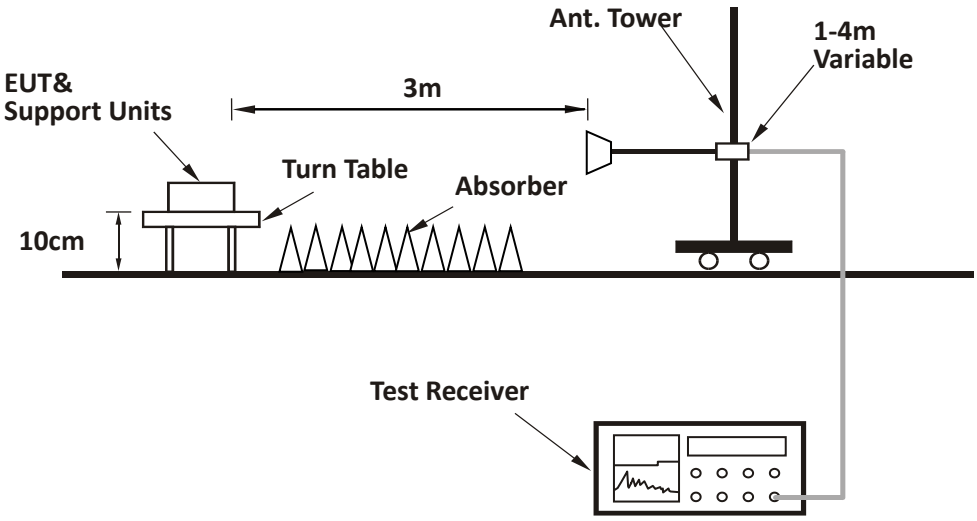
For radiated emission above 1GHz:

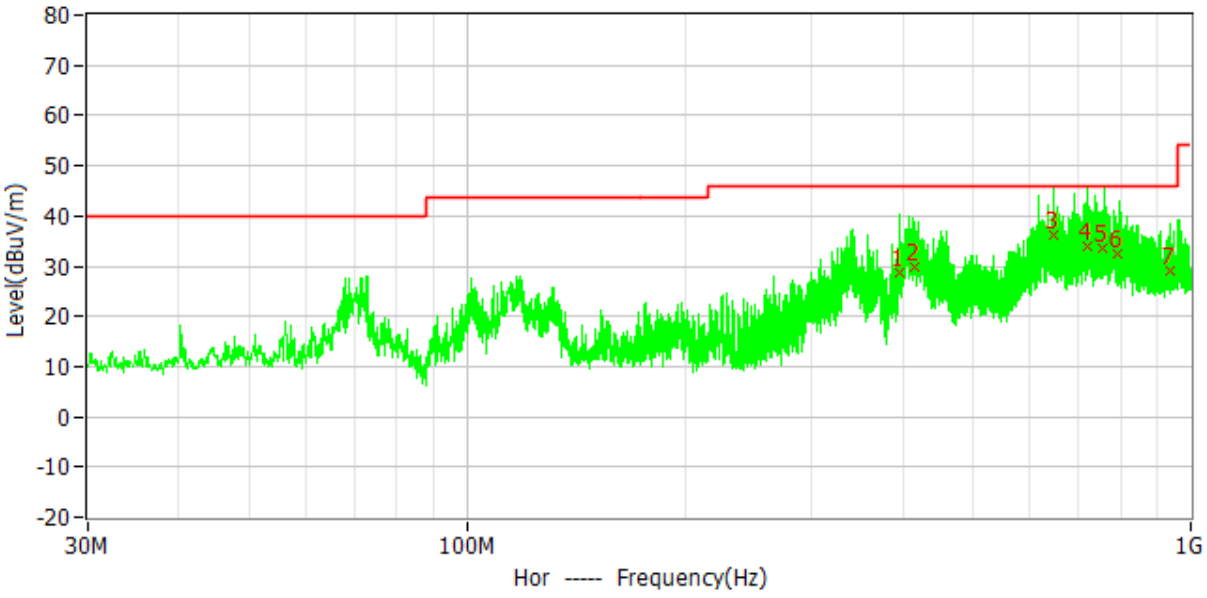


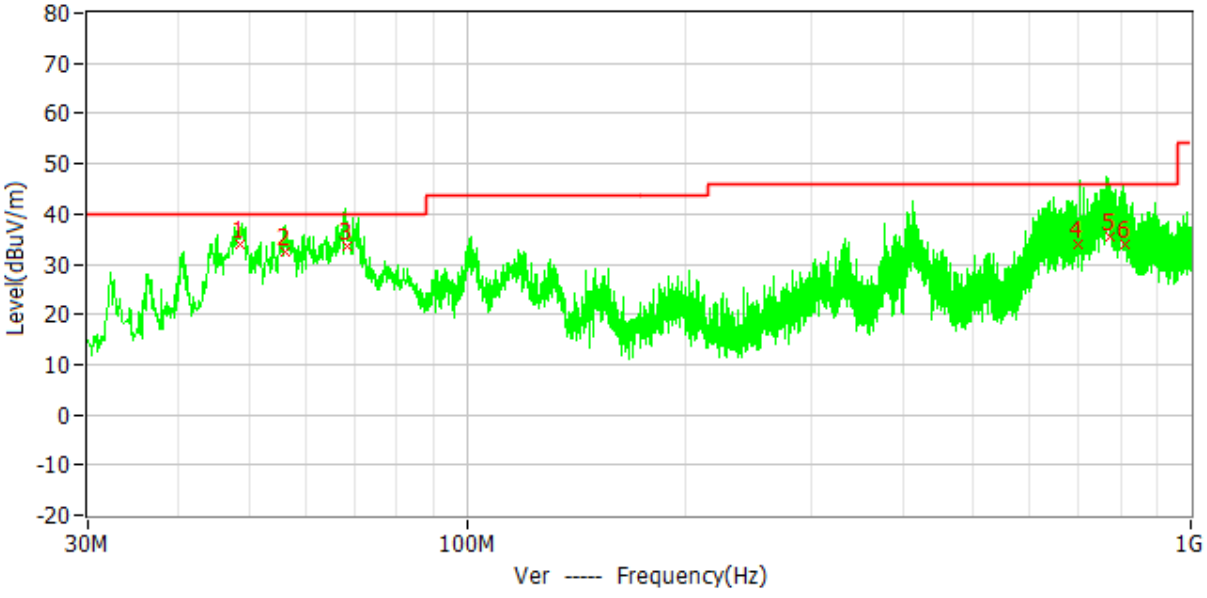
7.4 Test Results of Radiated Emissions

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:

Test Curve (30MHz to 1GHz):





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Test Data:

Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Original Receiver Reading dBuV	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB/m)	Detector
H	395.014	28.70	10.90	17.80	46.00	17.30	QP
	416.335	29.90	11.50	18.40	46.00	16.10	QP
	648.155	36.30	13.00	23.30	46.00	9.70	QP
	717.936	34.00	9.60	24.40	46.00	12.00	QP
	753.050	33.70	8.70	25.00	46.00	12.30	QP
	790.554	32.40	6.80	25.60	46.00	13.60	QP
	934.086	28.90	1.50	27.40	46.00	17.10	QP
V	48.670	33.90	19.40	14.50	40.00	6.10	QP
	56.263	32.50	18.40	14.10	40.00	7.50	QP
	68.302	33.70	21.00	12.70	40.00	6.30	QP
	699.499	34.00	9.90	24.10	46.00	12.00	QP
	771.974	35.30	10.00	25.30	46.00	10.70	QP
	809.730	33.80	7.90	25.90	46.00	12.20	QP

Remark:

1. *Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), 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*
4. *If the PK Corrected Reading is lower than AV limit, the AV test can be elided.*

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 Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m.
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m.
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

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Test Data:
The emission was conducted from 1GHz to 25GHz.

802.11b

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dBuV/m)	Detector
L	H	2390.00	45.60	31.70	74.00	28.40	PK
	H	2390.00	34.80	31.70	54.00	19.20	AV
	V	2390.00	46.70	31.70	74.00	27.30	PK
	V	2390.00	35.00	31.70	54.00	19.00	AV
	H	2412.00	48.80	-22.60	Fundamental	/	PK
	H	2412.00	48.50	-22.60	Fundamental	/	AV
	V	2412.00	49.60	-22.60	Fundamental	/	PK
	V	2412.00	49.50	-22.60	Fundamental	/	AV
	H	4824.00	54.80	-14.10	74.00	19.20	PK
	H	4824.00	43.60	-14.10	54.00	10.40	AV
	V	4824.00	54.50	-14.10	74.00	19.50	PK
	V	4824.00	43.30	-14.10	54.00	10.70	AV
M	H	2437.00	49.50	-22.50	Fundamental	/	PK
	H	2437.00	49.40	-22.50	Fundamental	/	AV
	V	2437.00	48.80	-22.50	Fundamental	/	PK
	V	2437.00	48.70	-22.50	Fundamental	/	AV
	H	4874.00	53.80	-14.00	74.00	20.20	PK
	H	4874.00	44.70	-14.00	54.00	9.30	AV
	V	4874.00	53.20	-14.00	74.00	20.80	PK
	V	4874.00	43.80	-14.00	54.00	10.20	AV
H	H	2462.00	49.40	-22.20	Fundamental	/	PK
	H	2462.00	49.10	-22.20	Fundamental	/	AV
	V	2462.00	48.80	-22.20	Fundamental	/	PK
	V	2462.00	48.40	-22.20	Fundamental	/	AV
	H	2483.50	46.00	31.90	74.00	28.00	PK

	H	2483.50	36.60	31.90	54.00	17.40	AV
	V	2483.50	45.30	31.90	74.00	28.70	PK
	V	2483.50	35.50	31.90	54.00	18.50	AV
	H	4924.00	54.20	-13.80	74.00	19.80	PK
	H	4924.00	44.90	-13.80	54.00	9.10	AV
	V	4924.00	53.20	-13.80	74.00	20.80	PK
	V	4924.00	44.60	-13.80	54.00	9.40	AV

802.11g

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dBuV/m)	Detector
L	H	2390.00	45.70	31.70	74.00	28.30	PK
	H	2390.00	36.60	31.70	54.00	17.40	AV
	V	2390.00	45.50	31.70	74.00	28.50	PK
	V	2390.00	34.40	31.70	54.00	19.60	AV
	H	2412.00	49.30	-22.60	Fundamental	/	PK
	H	2412.00	49.20	-22.60	Fundamental	/	AV
	V	2412.00	49.10	-22.60	Fundamental	/	PK
	V	2412.00	48.80	-22.60	Fundamental	/	AV
	H	4824.00	54.40	-14.10	74.00	19.60	PK
	H	4824.00	45.70	-14.10	54.00	8.30	AV
	V	4824.00	55.90	-14.10	74.00	18.10	PK
	V	4824.00	46.30	-14.10	54.00	7.70	AV
M	H	2437.00	49.30	-22.50	Fundamental	/	PK
	H	2437.00	49.20	-22.50	Fundamental	/	AV
	V	2437.00	49.10	-22.50	Fundamental	/	PK
	V	2437.00	49.00	-22.50	Fundamental	/	AV
	H	4874.00	52.10	-14.00	74.00	21.90	PK
	H	4874.00	44.00	-14.00	54.00	10.00	AV
	V	4874.00	54.00	-14.00	74.00	20.00	PK

	V	4874.00	44.20	-14.00	54.00	9.80	AV
H	H	2462.00	49.00	-22.20	Fundamental	/	PK
	H	2462.00	48.90	-22.20	Fundamental	/	AV
	V	2462.00	48.90	-22.20	Fundamental	/	PK
	V	2462.00	48.80	-22.20	Fundamental	/	AV
	H	2483.50	45.90	31.90	74.00	28.10	PK
	H	2483.50	36.20	31.90	54.00	17.80	AV
	V	2483.50	45.70	31.90	74.00	28.30	PK
	V	2483.50	35.30	31.90	54.00	18.70	AV
	H	4924.00	55.20	-13.80	74.00	18.80	PK
	H	4924.00	45.30	-13.80	54.00	8.70	AV
	V	4924.00	54.80	-13.80	74.00	19.20	PK
	V	4924.00	44.60	-13.80	54.00	9.40	AV

802.11n (HT20)

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dBuV/m)	Detector
L	H	2390.00	45.50	31.70	74.00	28.50	PK
	H	2390.00	35.70	31.70	54.00	18.30	AV
	V	2390.00	45.30	31.70	74.00	28.70	PK
	V	2390.00	36.20	31.70	54.00	17.80	AV
	H	2412.00	48.70	-22.60	Fundamental	/	PK
	H	2412.00	48.60	-22.60	Fundamental	/	AV
	V	2412.00	49.40	-22.60	Fundamental	/	PK
	V	2412.00	49.20	-22.60	Fundamental	/	AV
	H	4824.00	54.10	-14.10	74.00	19.90	PK
	H	4824.00	45.10	-14.10	54.00	8.90	AV
	V	4824.00	54.50	-14.10	74.00	19.50	PK
	V	4824.00	45.60	-14.10	54.00	8.40	AV
M	H	2437.00	48.40	-22.50	Fundamental	/	PK

TEST REPORT

	H	2437.00	48.30	-22.50	Fundamental	/	AV
	V	2437.00	49.00	-22.50	Fundamental	/	PK
	V	2437.00	48.70	-22.50	Fundamental	/	AV
	H	4874.00	54.80	-14.00	74.00	19.20	PK
	H	4874.00	45.60	-14.00	54.00	8.40	AV
	V	4874.00	54.60	-14.00	74.00	19.40	PK
	V	4874.00	44.50	-14.00	54.00	9.50	AV
H	H	2462.00	49.10	-22.20	Fundamental	/	PK
	H	2462.00	48.80	-22.20	Fundamental	/	AV
	V	2462.00	48.70	-22.20	Fundamental	/	PK
	V	2462.00	48.50	-22.20	Fundamental	/	AV
	H	2483.50	45.00	31.90	74.00	29.00	PK
	H	2483.50	36.10	31.90	54.00	17.90	AV
	V	2483.50	44.60	31.90	74.00	29.40	PK
	V	2483.50	35.40	31.90	54.00	18.60	AV
	H	4924.00	55.30	-13.80	74.00	18.70	PK
	H	4924.00	44.80	-13.80	54.00	9.20	AV
	V	4924.00	54.60	-13.80	74.00	19.40	PK
	V	4924.00	45.60	-13.80	54.00	8.40	AV

Note: Choose the worst power to test as representative.

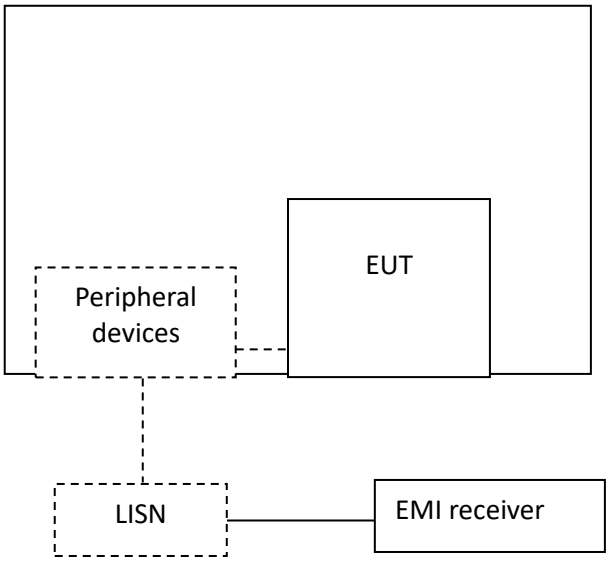
8 Power Line Conducted Emission

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

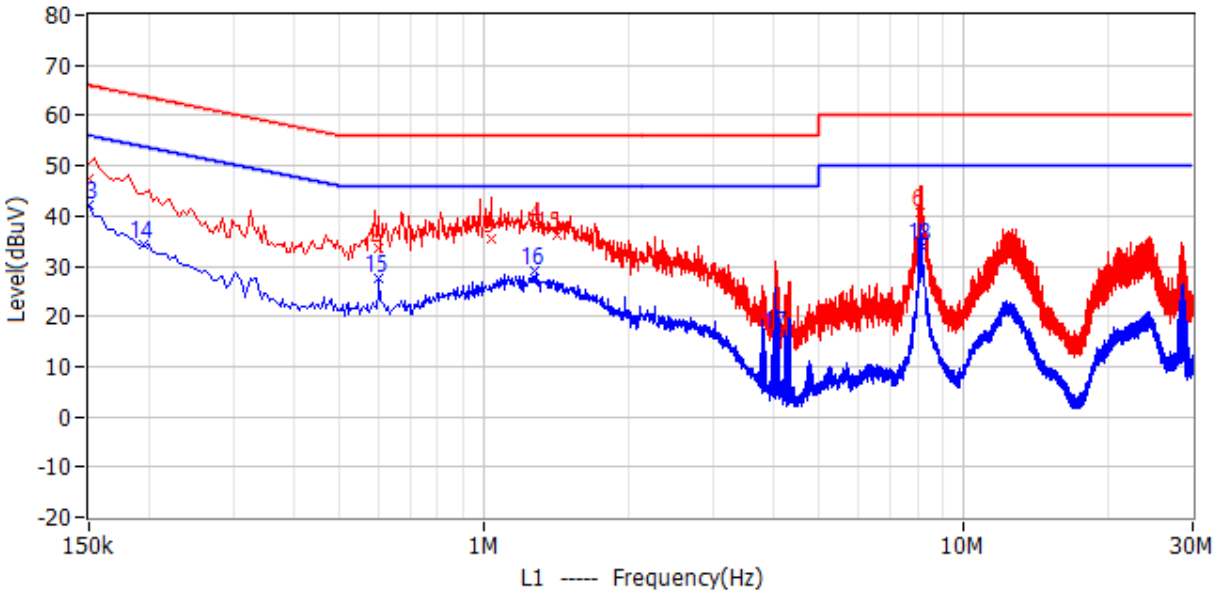
Measured levels of ac powerline conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be 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.

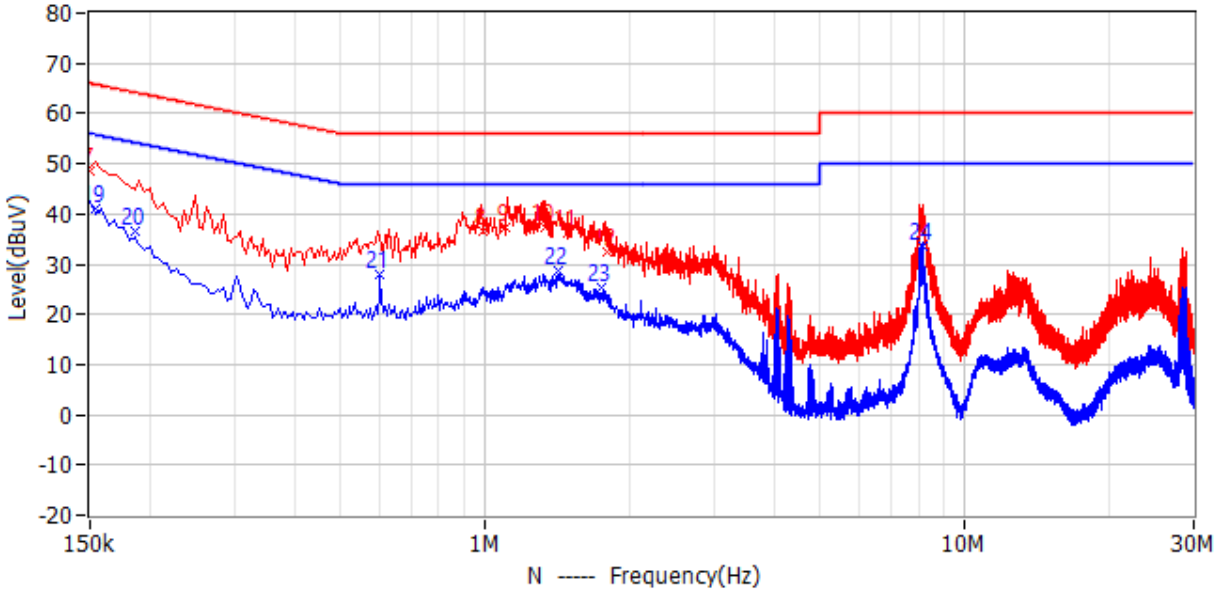
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on 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 Voltage: 120V AC / 60 Hz
Test Curve:





TEST REPORT

Test Data:

Frequency	Limit (dBuV)	Corrected Reading (dBuV)	Margin (dB)	Original Receiver Reading (dBuV)	Correct Factor (dB)	Detector	Phase
150.000kHz	66.00	47.50	18.50	41.30	6.20	QP	L1
600.000kHz	56.00	33.60	22.40	27.40	6.20	QP	L1
1.037MHz	56.00	35.50	20.50	29.30	6.20	QP	L1
1.293MHz	56.00	37.90	18.10	31.70	6.20	QP	L1
1.424MHz	56.00	36.00	20.00	29.80	6.20	QP	L1
8.133MHz	60.00	40.80	19.20	34.30	6.50	QP	L1
150.000kHz	66.00	48.40	17.60	42.20	6.20	QP	N
987.000kHz	56.00	36.40	19.60	30.20	6.20	QP	N
1.104MHz	56.00	37.40	18.60	31.20	6.20	QP	N
1.329MHz	56.00	37.30	18.70	31.10	6.20	QP	N
1.482MHz	56.00	36.20	19.80	30.00	6.20	QP	N
1.793MHz	56.00	32.30	23.70	26.10	6.20	QP	N
150.000kHz	56.00	42.30	13.70	36.10	6.20	CAV	L1
195.000kHz	53.80	34.40	19.40	28.20	6.20	CAV	L1
604.500kHz	46.00	27.40	18.60	21.20	6.20	CAV	L1
1.275MHz	46.00	28.90	17.10	22.70	6.20	CAV	L1
4.083MHz	46.00	16.50	29.50	10.20	6.30	CAV	L1
8.142MHz	50.00	33.80	16.20	27.30	6.50	CAV	L1
154.500kHz	55.80	41.10	14.70	34.90	6.20	CAV	N
186.000kHz	54.20	36.60	17.60	30.50	6.10	CAV	N
604.500kHz	46.00	28.00	18.00	21.80	6.20	CAV	N
1.424MHz	46.00	28.80	17.20	22.60	6.20	CAV	N
1.748MHz	46.00	25.30	20.70	19.10	6.20	CAV	N
8.183MHz	50.00	33.40	16.60	26.90	6.50	CAV	N

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

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

9 Occupied Bandwidth

Test Result: **Pass**

9.1 Limit

None.

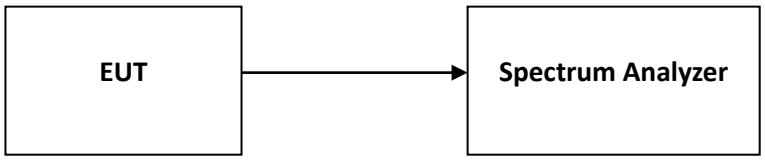
9.2 Measurement Procedure

The occupied bandwidth per RSS-Gen Issue 4 Clause 6.6 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 A.

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.

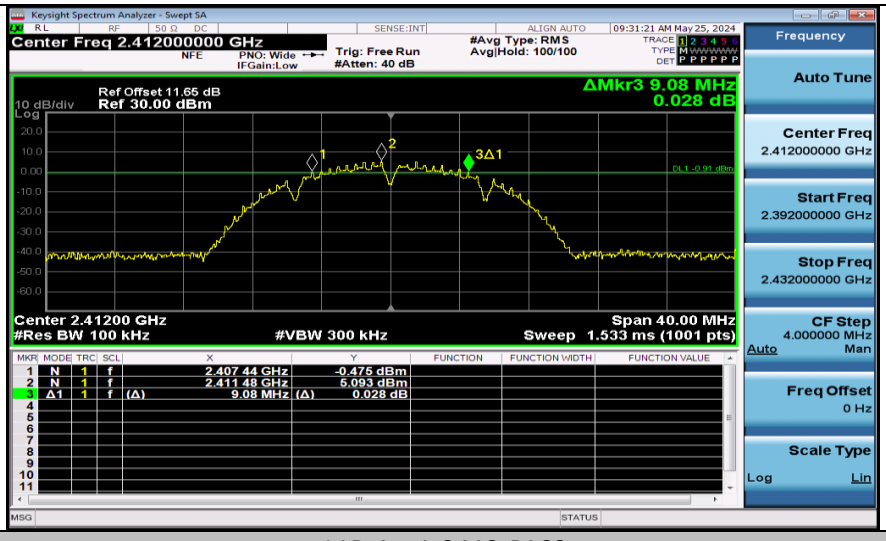
11 Appendix A: Test Results

11.1 DTS Bandwidth

11.1.1 Test Data

Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	9.080	2407.440	2416.520	0.5	PASS
		2437	9.000	2432.480	2441.480	0.5	PASS
		2462	8.560	2457.440	2466.000	0.5	PASS
11G	Ant1	2412	16.320	2403.840	2420.160	0.5	PASS
		2437	16.320	2428.840	2445.160	0.5	PASS
		2462	16.360	2453.800	2470.160	0.5	PASS
11N20SISO	Ant1	2412	17.320	2403.440	2420.760	0.5	PASS
		2437	17.560	2428.200	2445.760	0.5	PASS
		2462	17.560	2453.200	2470.760	0.5	PASS

11.1.2 Test Plots



11B-Ant1-2412-PASS

Total Quality. Assured.

TEST REPORT

11B-Ant1-2437-PASS

11B-Ant1-2462-PASS

11G-Ant1-2412-PASS

TEST REPORT

11G-Ant1-2437-PASS

11G-Ant1-2462-PASS

11N20SISO-Ant1-2412-PASS

Total Quality. Assured.

TEST REPORT

11N20SISO-Ant1-2437-PASS

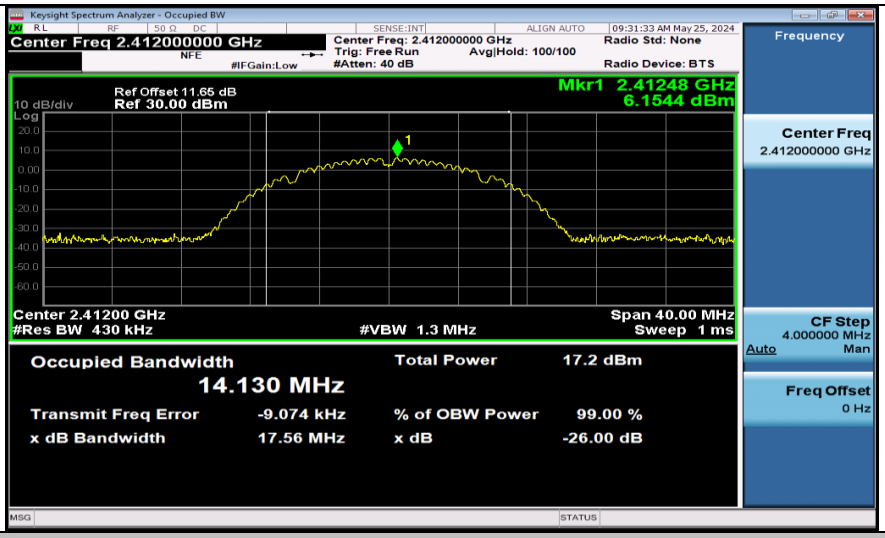
11N20SISO-Ant1-2462-PASS

11.2 Occupied Channel Bandwidth

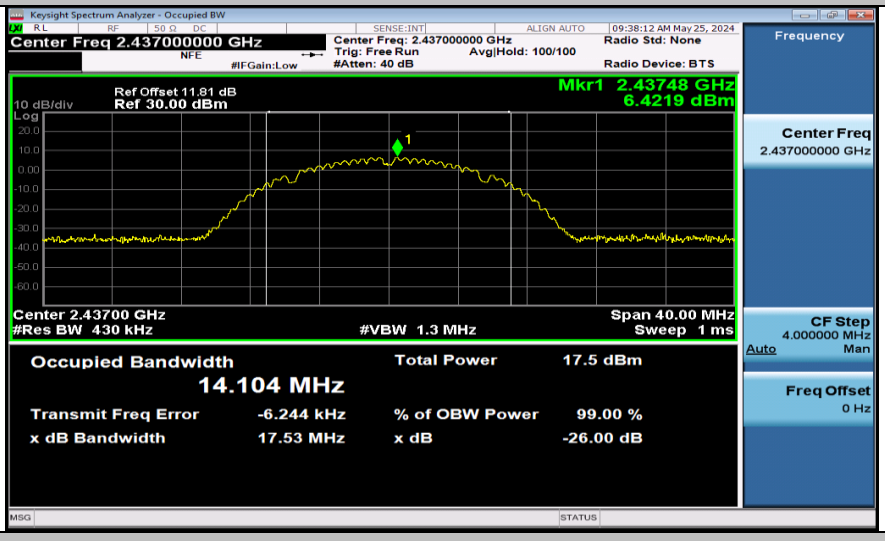
11.2.1 Test Data

Test Mode	Antenna	Channel Frequency [MHz]	OCB [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	14.130	2404.9259	2419.0559	---	---
		2437	14.104	2429.9418	2444.0458	---	---
		2462	14.087	2454.9346	2469.0216	---	---
11G	Ant1	2412	17.220	2403.3449	2420.5649	---	---
		2437	17.114	2428.4461	2445.5601	---	---
		2462	17.153	2453.3789	2470.5319	---	---
11N20SISO	Ant1	2412	18.311	2402.8348	2421.1458	---	---
		2437	18.285	2427.8060	2446.0910	---	---
		2462	18.311	2452.8387	2471.1497	---	---

11.2.2 Test Plots

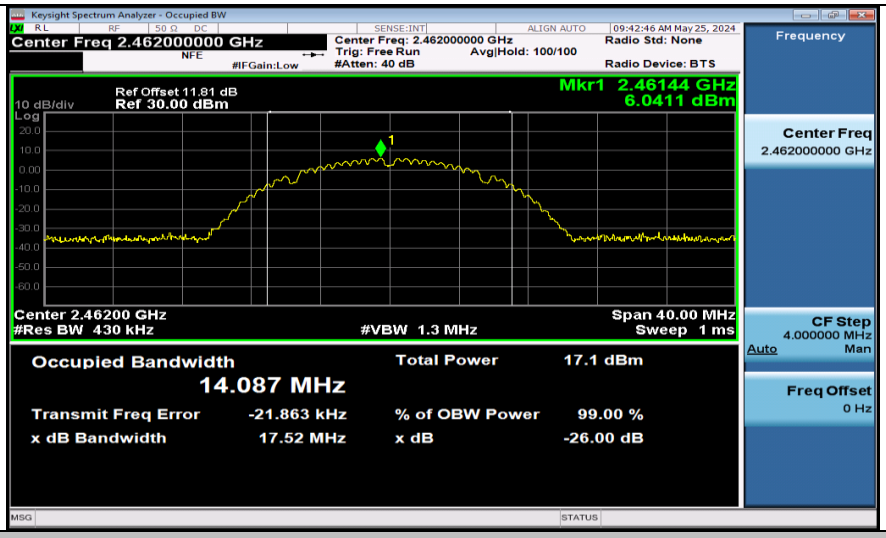


11B-Ant1-2412

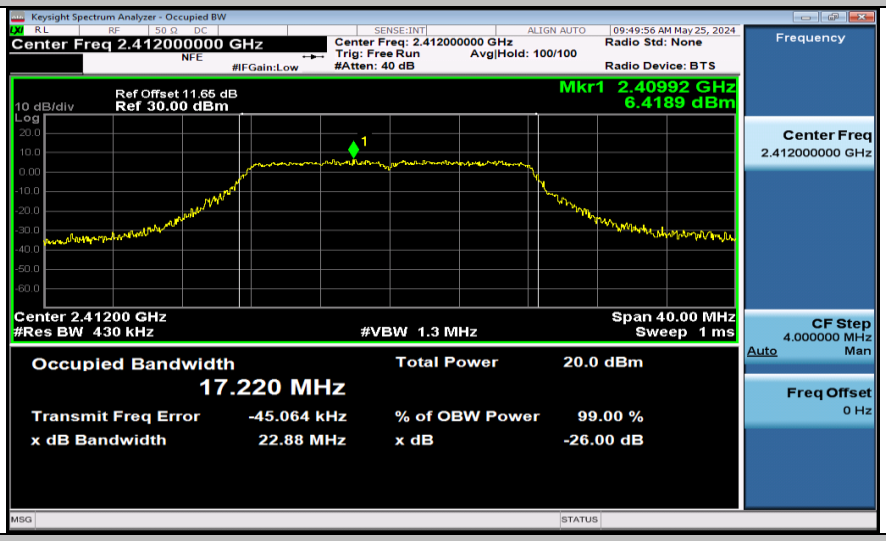


11B-Ant1-2437

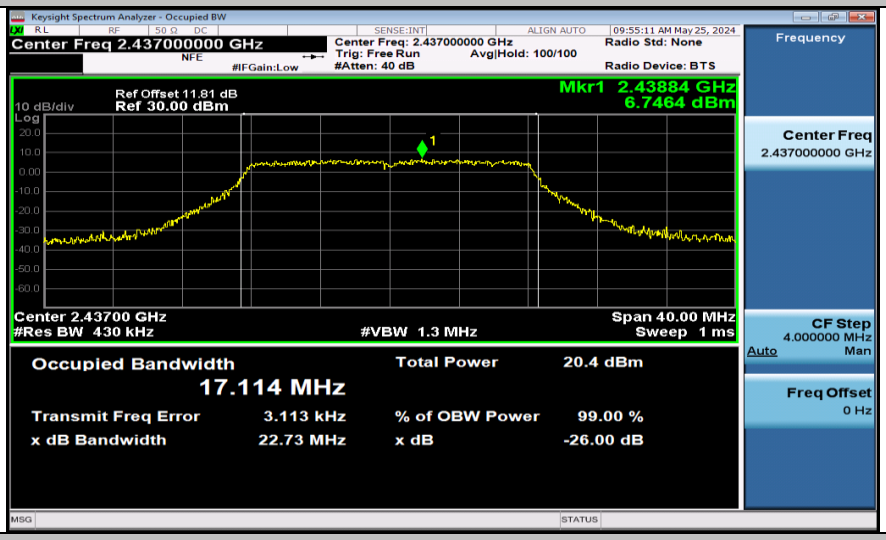
TEST REPORT



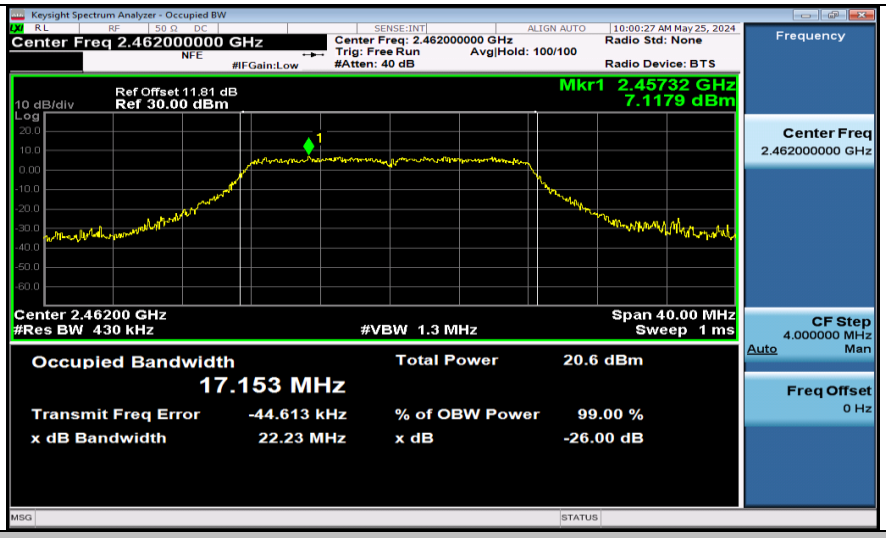
11B-Ant1-2462



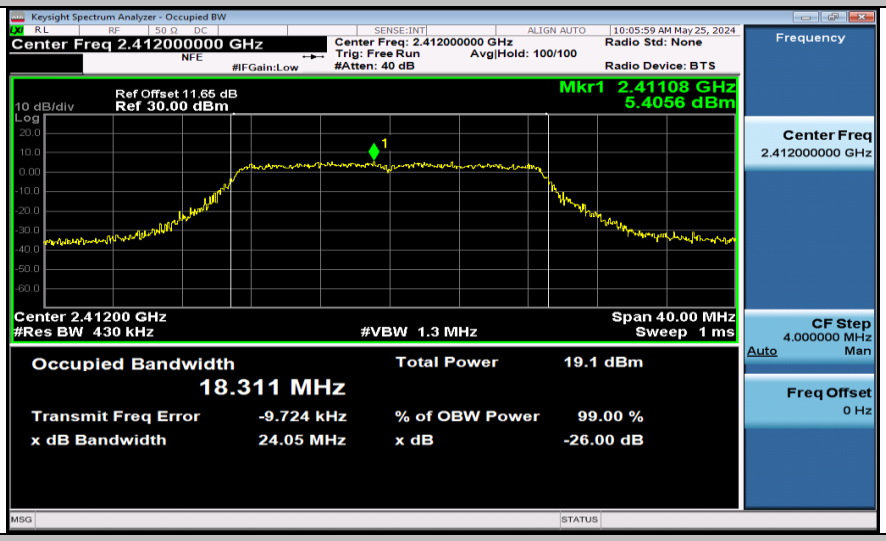
11G-Ant1-2412



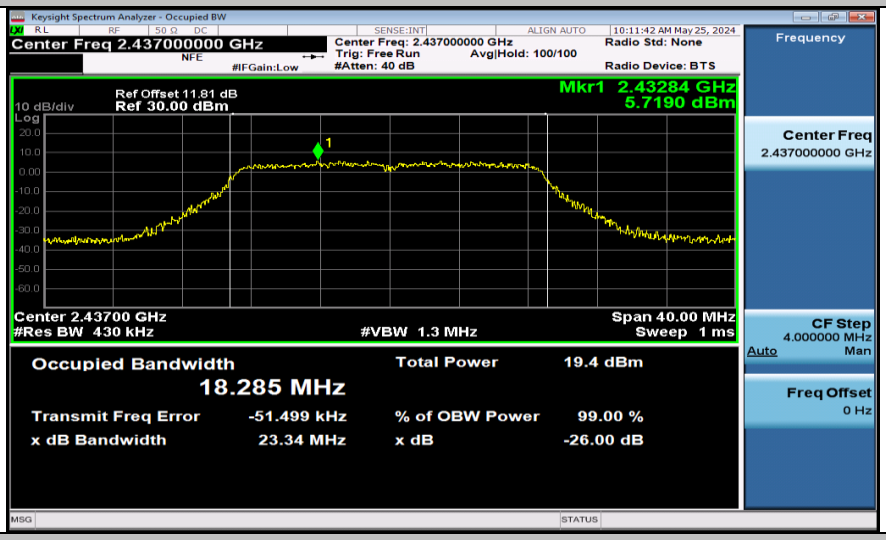
11G-Ant1-2437



11G-Ant1-2462

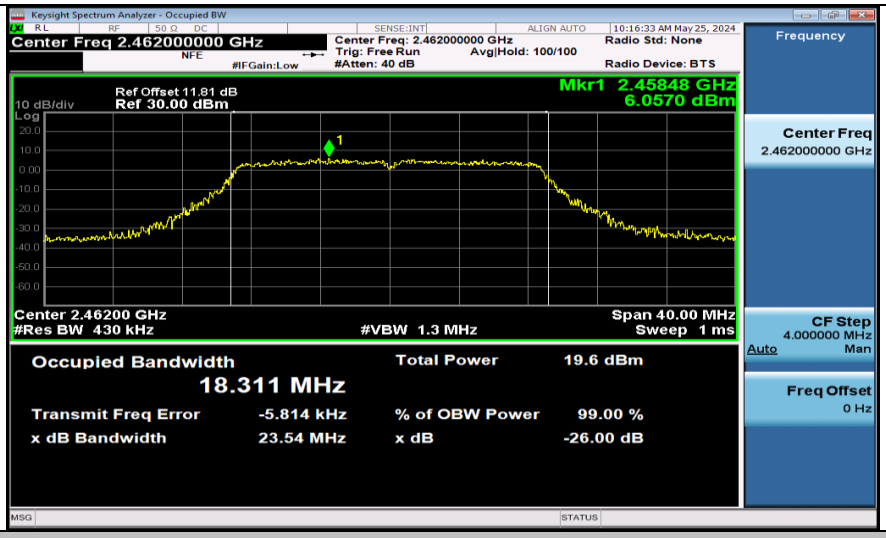


11N20SISO-Ant1-2412



11N20SISO-Ant1-2437

TEST REPORT



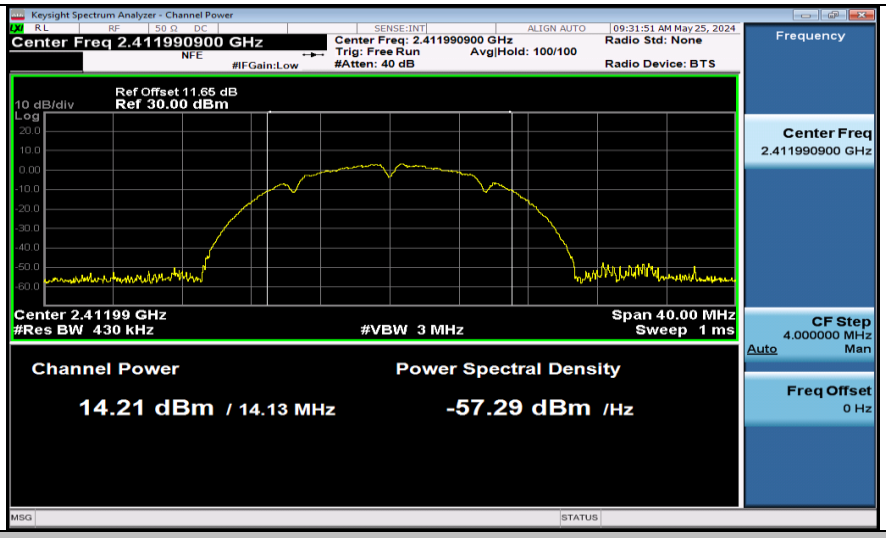
11N20SISO-Ant1-2462

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

11.3.1 Test Data

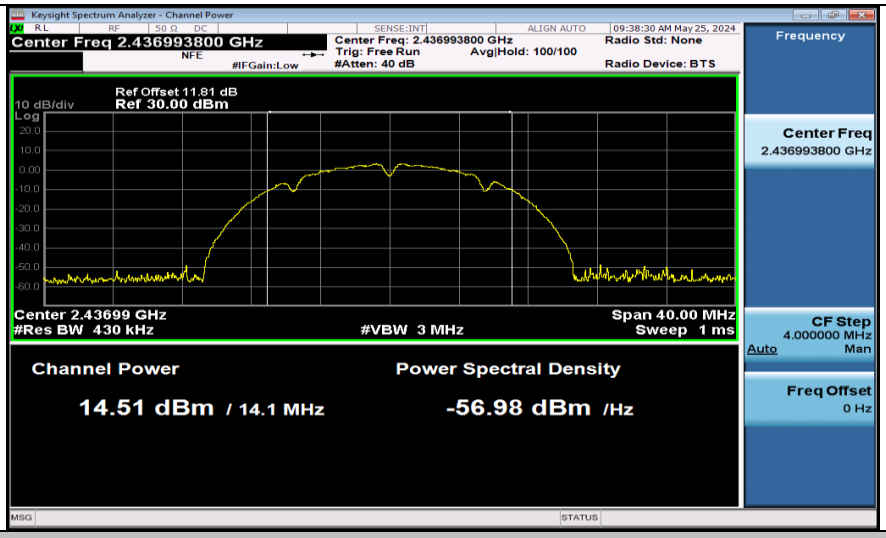
Test Mode	Antenna	Frequency [MHz]	Average power [dBm]	Duty Cycle [%]	DC Factor [dBm]	Result [dBm]	Limit [dBm]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
11B	Ant1	2412	14.21	98.88	0.05	14.26	≤30.00	16.26	≤36.00	PASS
11B	Ant1	2437	14.51	99.12	0.04	**14.55**	≤30.00	16.55	≤36.00	PASS
11B	Ant1	2462	14.12	99.04	0.04	14.16	≤30.00	16.16	≤36.00	PASS
11G	Ant1	2412	13.85	94.09	0.26	14.11	≤30.00	16.11	≤36.00	PASS
11G	Ant1	2437	14.23	94.52	0.24	14.47	≤30.00	16.47	≤36.00	PASS
11G	Ant1	2462	14.22	94.06	0.27	14.49	≤30.00	16.49	≤36.00	PASS
11N20SISO	Ant1	2412	12.71	93.66	0.28	12.99	≤30.00	14.99	≤36.00	PASS
11N20SISO	Ant1	2437	13.17	93.66	0.28	13.45	≤30.00	15.45	≤36.00	PASS
11N20SISO	Ant1	2462	13.32	93.66	0.28	13.60	≤30.00	15.60	≤36.00	PASS

11.3.2 Test Plots

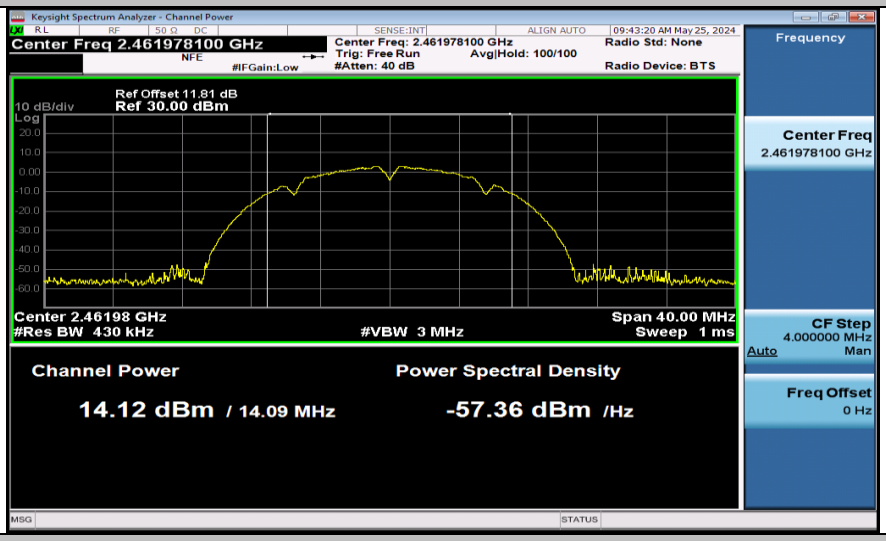


11B-Ant1-2412-PASS

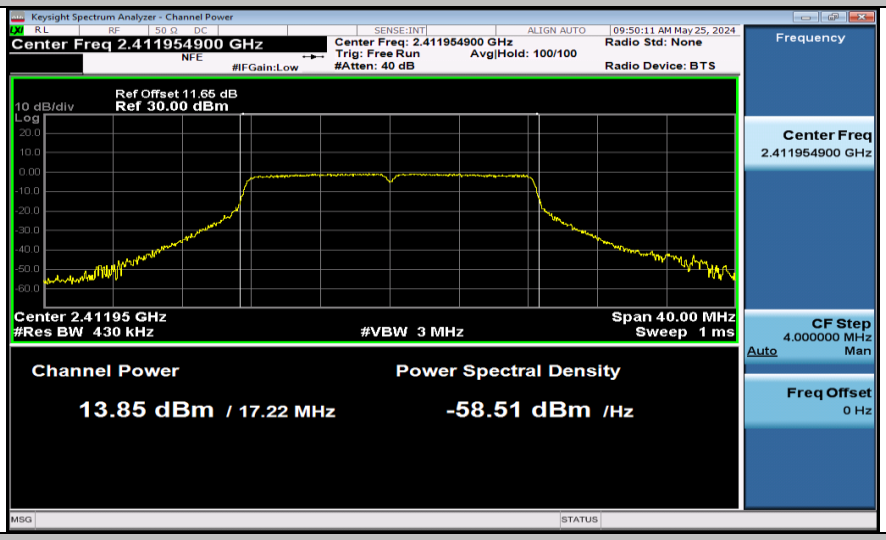
TEST REPORT



11B-Ant1-2437-PASS

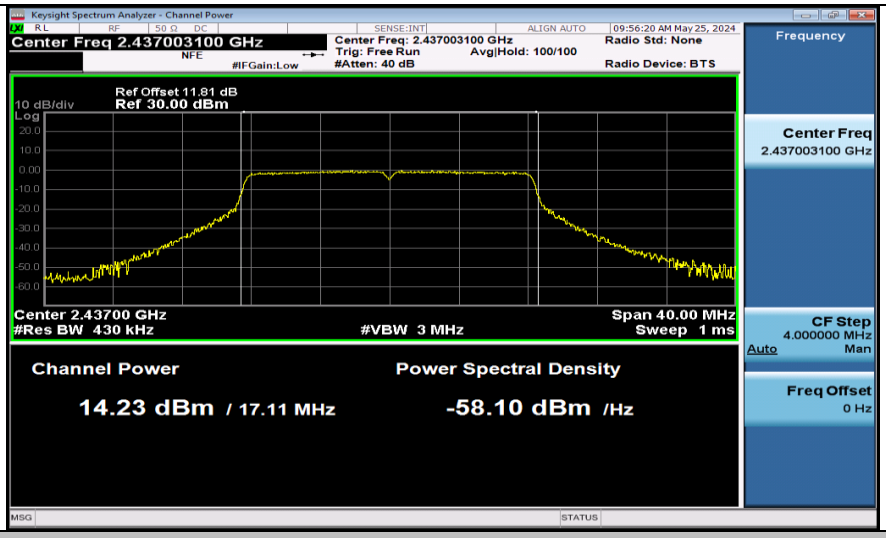


11B-Ant1-2462-PASS

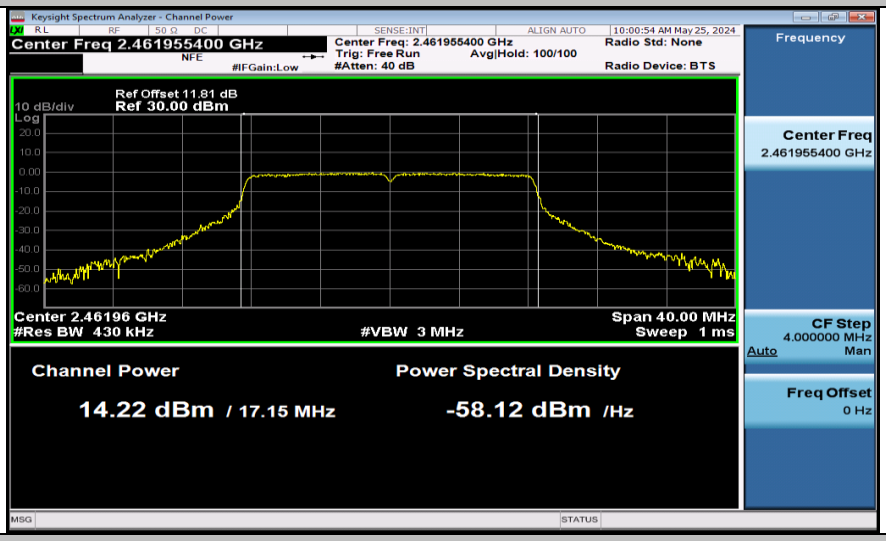


11G-Ant1-2412-PASS

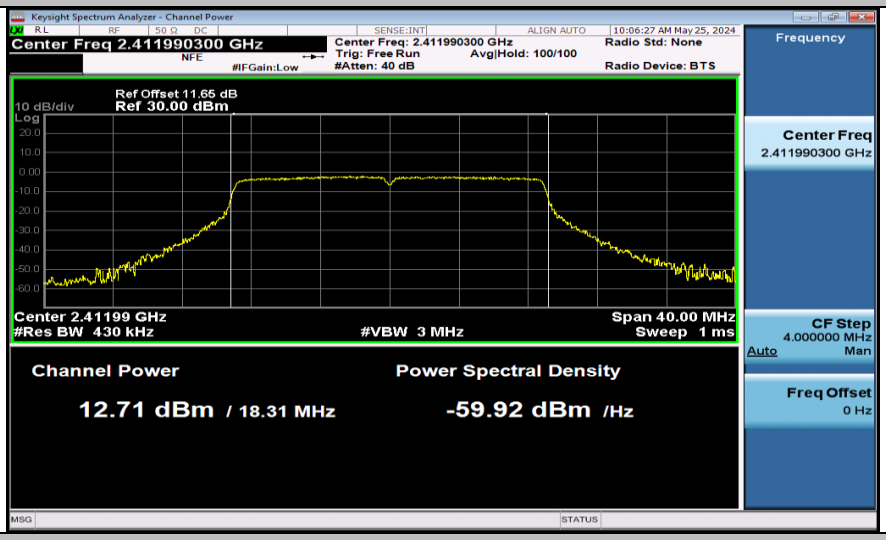
TEST REPORT



11G-Ant1-2437-PASS

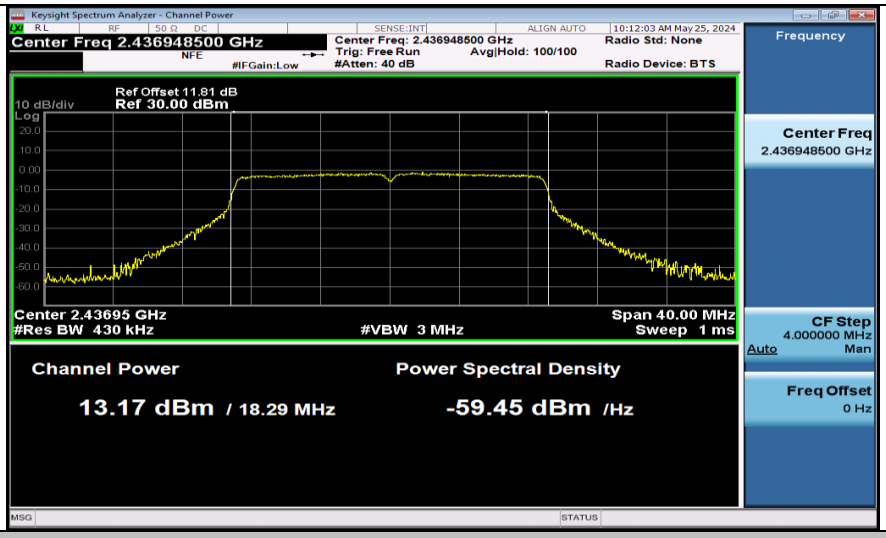


11G-Ant1-2462-PASS

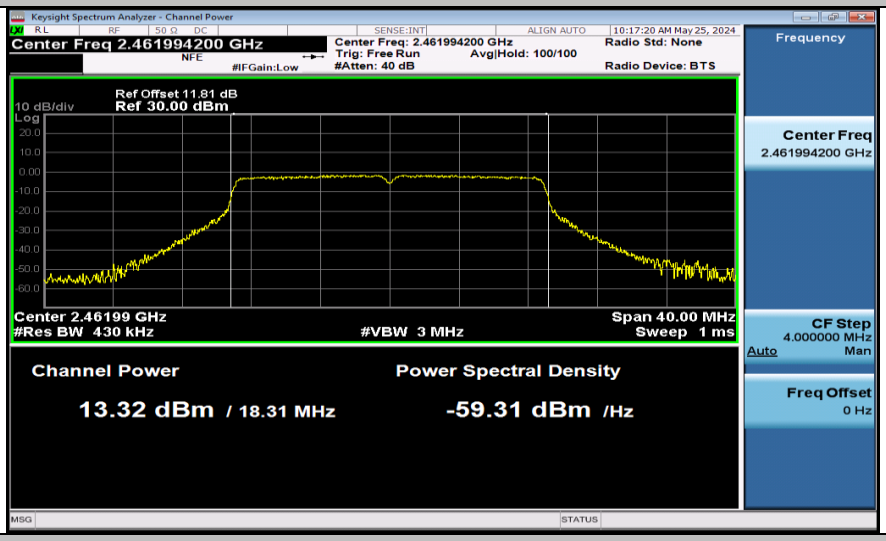


11N20SISO-Ant1-2412-PASS

TEST REPORT



11N20SISO-Ant1-2437-PASS



11N20SISO-Ant1-2462-PASS

11.4 Maximum power spectrum density

11.4.1 Test Data

Test Mode	Antenna	Frequency [MHz]	Result [dBm/3-100kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-16.987	≤8.00	PASS
		2437	-16.829	≤8.00	PASS
		2462	-17.030	≤8.00	PASS
11G	Ant1	2412	-18.159	≤8.00	PASS
		2437	-17.498	≤8.00	PASS
		2462	-17.462	≤8.00	PASS
11N20SISO	Ant1	2412	-19.052	≤8.00	PASS
		2437	-17.600	≤8.00	PASS
		2462	-18.745	≤8.00	PASS

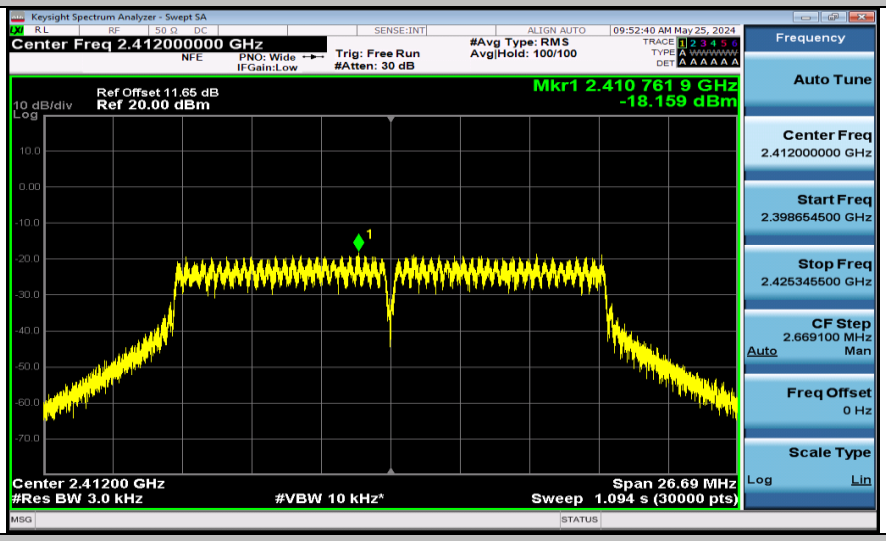
11.4.2 Test Plots

11B-Ant1-2412-PASS

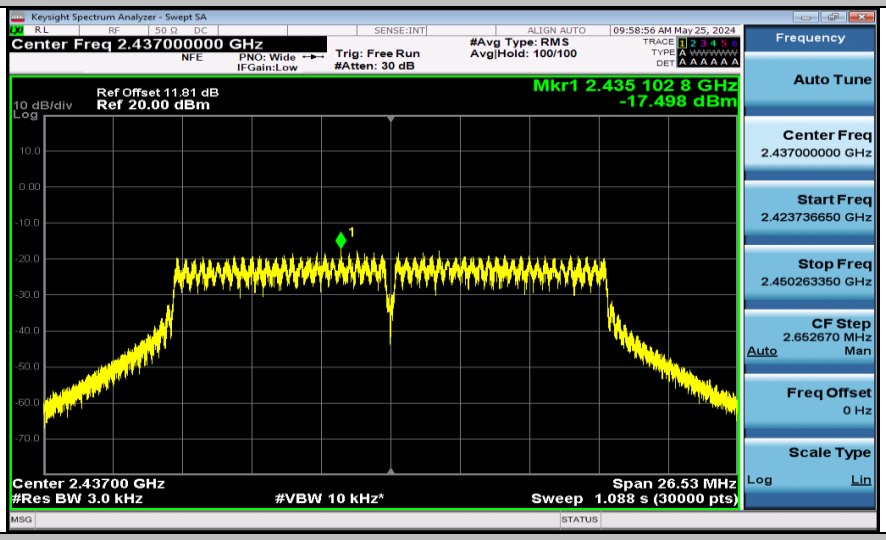
11B-Ant1-2437-PASS

TEST REPORT

11B-Ant1-2462-PASS



11G-Ant1-2412-PASS



11G-Ant1-2437-PASS