Suzhou Le Tu Intelligent Technology Co., Ltd.

RF TEST REPORT

Report Type:
FCC Part 15.247 RF report

Model:
NR200, NR200L, NR200.*, NR200L.*
(*=1-99 or A-Z or M1-M9)

REPORT NUMBER:
220802106SHA-001

ISSUE DATE:
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Intertek Testing Services Shanghai
Building No.86, 1198 Qinzhou Road (North)
Caohejing Development Zone
Shanghai 200233, China

Telephone: 86 21 6127 8200
www.intertek.com

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TEST REPORT

Report no.: 220802106SHA-001

Applicant:	Suzhou Le Tu Intelligent Technology Co., Ltd. 3 Floor, 1 Building, 17, Dongwang Road, Suzhou Industrial Park, Jiangsu 215123, P.R.China
Manufacturer:	Suzhou Le Tu Intelligent Technology Co., Ltd. 3 Floor, 1 Building, 17, Dongwang Road, Suzhou Industrial Park, Jiangsu 215123, P.R.China
FCC ID:	2A8GFNR200L

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2020): 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 Erick Liu	Reviewer Wakeyou Wang

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Revision History

Report No.	Version	Description	Issued Date
220802106SHA-001	Rev. 01	Initial issue of report	December 2, 2022

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Measurement result summary

TEST ITEM	FCC REFERANCE	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
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.

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	ROBOT VACUUM AND MOP
Type/Model:	NR200, NR200L, NR200.*, NR200L.*(*=1-99 or A-Z or M1-M9)
Description of EUT:	EUT is Robotic mopping cleaner with WIFI function, all models are same except model names, after evaluation, we choose NR200 for all tests.
Rating:	16.8V battery
EUT type:	☐ Table top ☒ Floor standing
Software Version:	/
Hardware Version:	/
Sample identification number:	0220910-01-001
Sample received date:	September 12, 2022
Date of test:	September 12, 2022 – October 28, 2022

1.2 Technical Specification

Frequency Band:	2400MHz ~ 2483.5MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n(HT20), IEEE 802.11n(HT40)
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) IEEE 802.11n(HT40): OFDM (64-QAM, 16-QAM, QPSK, BPSK)
Operating Frequency:	2412MHz to 2462MHz for IEEE 802.11b/g/n(HT20) 2422MHz to 2452MHz for IEEE 802.11n(HT40)
Channel Number:	11 Channels for 802.11b, 802.11g and 802.11n(HT20) 7 Channels for 802.11n(HT40)
Channel Separation:	5 MHz
Antenna:	PCB Antenna, 2.76dBi

Mode	Tx/Rx Function	Beamforming function	CDD function
802.11b	1Tx/1Rx	NO	NO
802.11g	1Tx/1Rx	NO	NO
802.11n(HT20)	1Tx/1Rx	NO	NO
802.11n(HT40)	1Tx/1Rx	NO	NO

1.3 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 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 (2020)
ANSI C63.10 (2013)
KDB 558074(v05r02)

2.2 Mode of operation during the test

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

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

Frequency Band (MHz)	Mode	Frequency (MHz)	Power Setting
2400-2483.5	802.11b	2412	Default
		2437	Default
		2462	Default
	802.11g	2412	5B
		2437	Default
		2462	Default
	802.11n(HT20)	2412	Default
		2437	Default
		2462	Default
	802.11n(HT40)	2422	Default
		2437	Default
		2462	Default

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Data rate VS Power:

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. 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
2400-2483.5	802.11b	1Mbps
	802.11g	6Mbps
	802.11n(HT20)	MCS0
	802.11n(HT40)	MCS0

The EUT will use two types antenna, 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 choose the worst mode 1 for radiated test and mode 2 for conducted test as representatively to list the results in this report.

2.3 Test software list

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

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	DELL 5480	-
2	RF cable	/	0.2m length; 0.5dB loss
3	Base station	NA0004	/

2.5 Test environment condition:

Test items	Temperature	Humidity
Minimum 6dB Bandwidth	24.5°C	49% RH
Maximum conducted output power and e.i.r.p.		
Power spectrum density		
Emission outside the frequency band		
Radiated Emissions in restricted frequency bands	24.7°C	52% RH
Power line conducted emission	25.1°C	51% RH

2.6 Instrument list

Conducted Emission/Disturbance Power/Tri-loop Test/CDN method					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESCS 30	EC 2107	2023-07-14
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2022-12-07
☐	A.M.N.	R&S	ENV 216	EC 3393	2024-07-03
☐	A.M.N.	R&S	ENV4200	EC 3558	2023-06-09
☐	Absorbing clamp	R&S	MDS 21	EC 2108	2023-06-18
☐	CDN	Frankonia	CDN M2M316	EC 5969	2023-03-15
☐	CDN	Schaffner	CDN M316	EC 2113-1	2023-07-15
☒	Attenuator	Weinschel	68-6-44	EC 3043-9	2023-02-05
☐	Tri-loop	Schwarzbeck	HXYZ 9170	EC 3384	2023-10-10
☐	Voltage Probe	Schwarzbeck	TK9420	EC 4888	2023-09-10
☐	Current probe	R&S	EZ-17	EC 3221	2023-03-15
☐	I.S.N.	FCC	FCC-TLISN -T2-02	EC 3754	2023-02-05
☐	I.S.N.	FCC	FCC-TLISN -T4-02	EC 3755	2023-02-05
☐	I.S.N.	FCC	FCC-TLISN -T8-02	EC 3756	2023-02-05
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2023-09-11
☒	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2023-06-09
☒	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2023-06-09
☒	Horn antenna	R&S	HF 906	EC 3049	2023-11-16
☐	Horn antenna	ETS	3117	EC 4792-1	2023-01-09
☐	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2023-07-08
☐	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2023-03-07
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2023-03-05
☐	Power sensor	Agilent	U2021XA	EC 5338-1	2023-03-05

☐	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2023-03-05
☐	Vector Signal Generator	Agilent	N5182B	EC 5175	2023-03-05
☐	Power meter	Keysight	N1911A	EC 4318	2023-05-11
☐	Wideband Radio Communication Tester	R&S	CMW500	EC 5944	2022-12-07
☐	Mobile Test System	LitePoint	IQxel	EC 5176	2023-01-09
☐	Test Receiver	R&S	ESCI 7	EC 4501	2023-09-11
☐	Spectrum analyzer	Agilent	E7402A	EC 2254	2023-09-11
Tet Site					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☐	Shielded room	Zhongyu	-	EC 2838	2023-01-07
☐	Shielded room	Zhongyu	-	EC 2839	2023-01-14
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2023-07-30
☐	Fully-anechoic chamber	Albatross project	-	EC 3047	2023-07-30
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☐	Spectrum analyzer	Agilent	E7402A	EC 2254	2023-07-14
☐	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2023-02-28
☐	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 2122	2023-03-11
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 5198	2023-01-18
☐	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3326	2023-03-28
☐	Pressure meter	YM3	Shanghai Mengde	EC 3320	2023-07-00

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
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

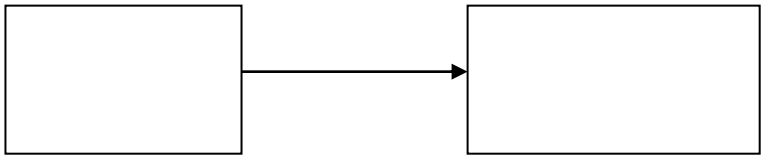
For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2 Measurement Procedure

The 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)

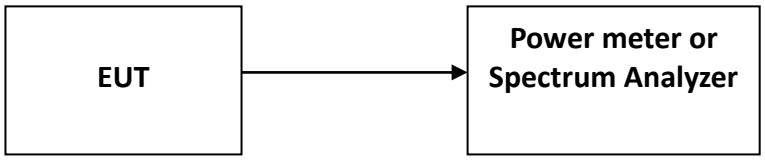
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

4.2 Measurement Procedure

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 9.2.2.4) for compliance requirements.

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).

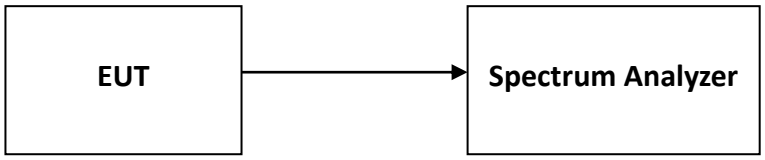
5.2 Measurement Procedure

The power output was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 10.5) for compliance requirements.

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

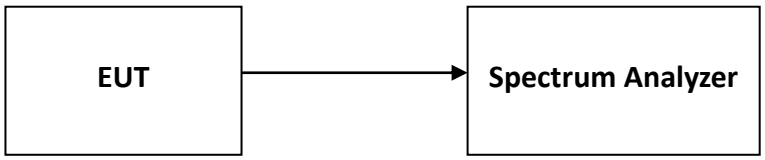
The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 11.0) for compliance requirements.

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 0.1 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.

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For Radiated emission above 30MHz:

a) The EUT was placed on the top of a rotating table 0.1 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.

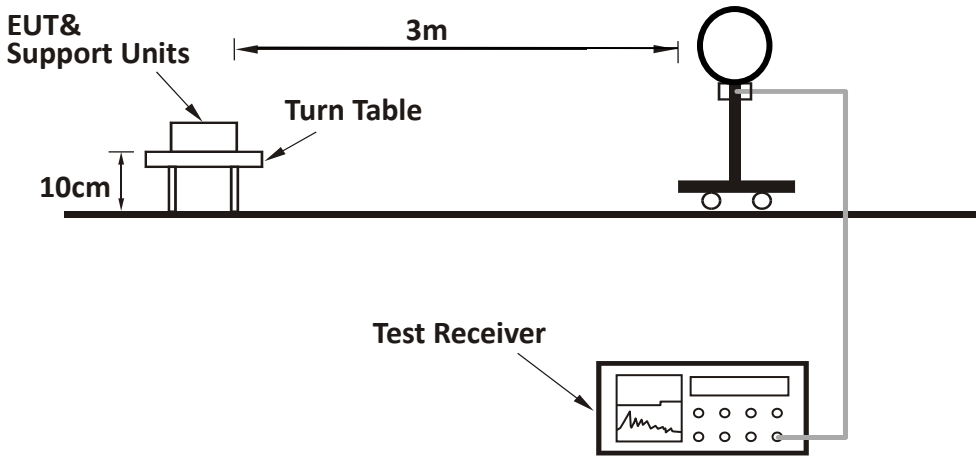
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

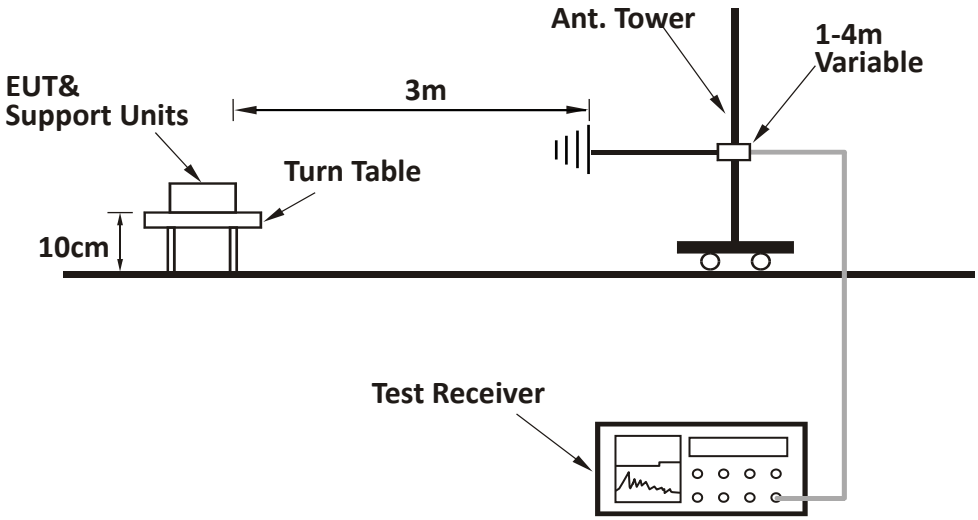
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

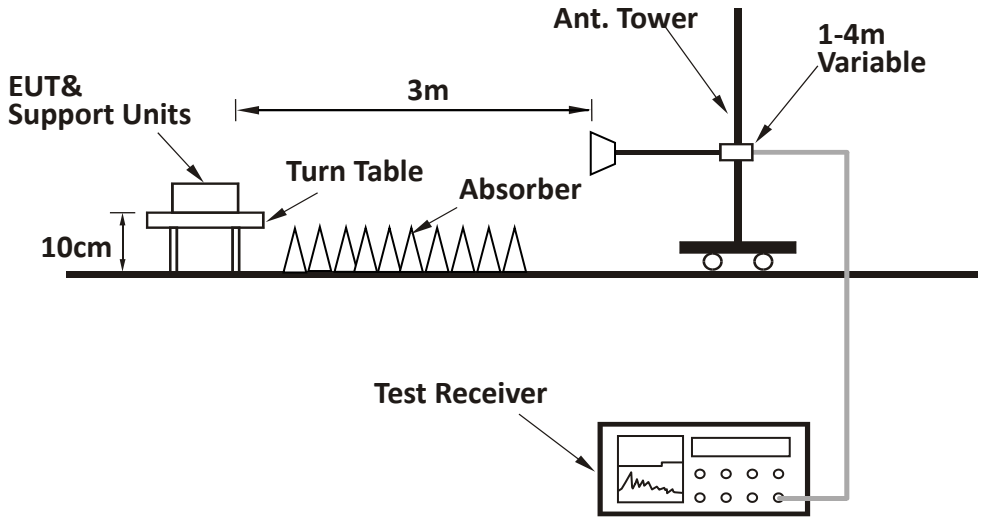
For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



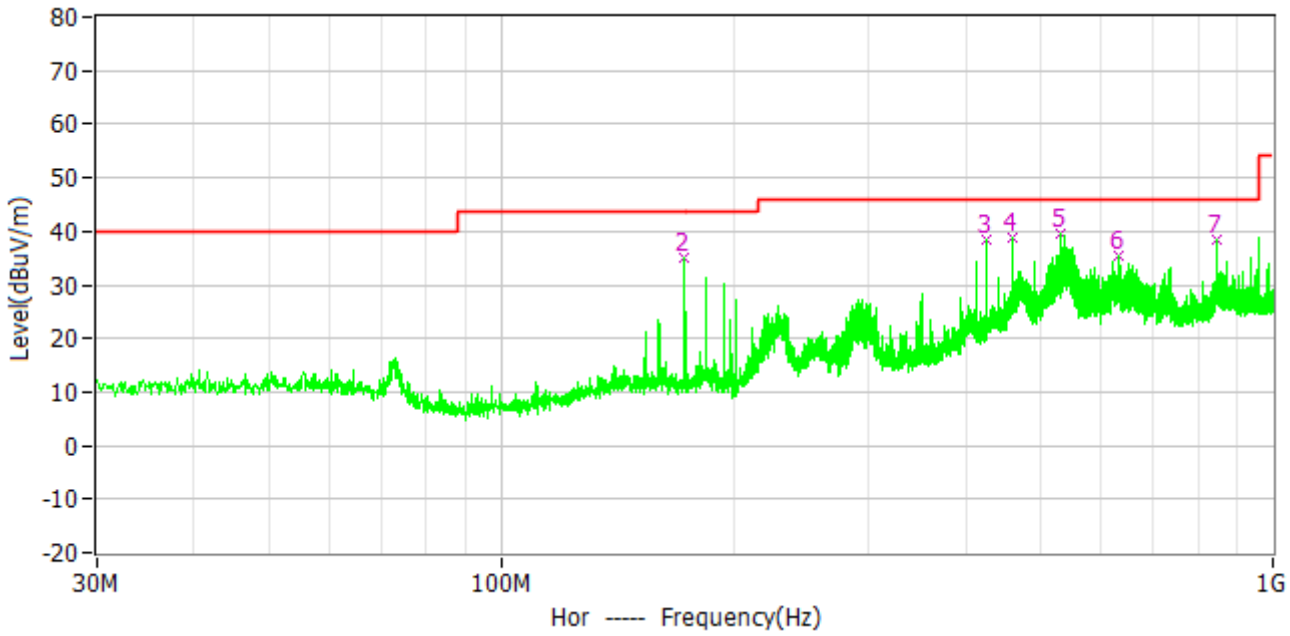
For Radiated emission above 1GHz:

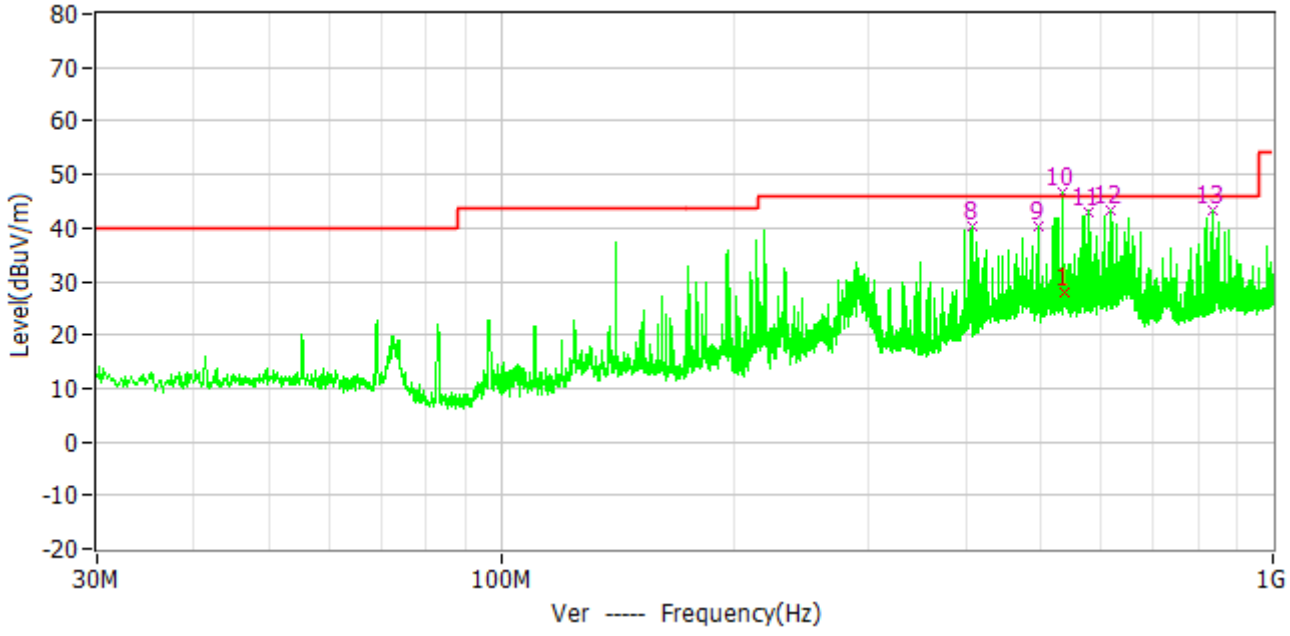


7.4 Test Results of Radiated Emissions

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.

The worst waveform from 30MHz to 1000MHz is listed as below:





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Test data below 1GHz

No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar
1	537.901MHz	46.0	28.1	-17.9	7.2	20.9	QP	Ver
2*	173.172MHz	43.5	35.1	-8.4	21.4	13.7	PK	Hor
3*	426.536MHz	46.0	38.6	-7.4	20.4	18.2	PK	Hor
4*	459.128MHz	46.0	38.9	-7.1	19.8	19.1	PK	Hor
5*	532.266MHz	46.0	39.5	-6.5	18.7	20.8	PK	Hor
6*	633.049MHz	46.0	35.3	-10.7	12.7	22.6	PK	Hor
7*	844.897MHz	46.0	38.5	-7.5	12.7	25.8	PK	Hor
8*	407.621MHz	46.0	40.3	-5.7	22.6	17.7	PK	Ver
9*	496.861MHz	46.0	40.3	-5.7	20.2	20.1	PK	Ver
!10*	533.915MHz	46.0	46.6	0.6	25.7	20.9	PK	Ver
11*	576.692MHz	46.0	43.1	-2.9	21.4	21.7	PK	Ver
12*	616.753MHz	46.0	43.3	-2.7	20.9	22.4	PK	Ver
13*	835.488MHz	46.0	43.2	-2.8	17.4	25.8	PK	Ver

Note: We used the QP detector to scan the no.10 test point, please refer to test point 1 for the QP result.
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. Delta= Level - Limit
4. If the PK Level is lower than AV limit, the AV test can be elided.

Example: Assuming LISN Factor = 10.00dB, Cable Loss = 2.00dB,
Original Receiver Reading = 10.00dBuV, Limit = 66.00dBuV.
Then Factor = 10.00 + 2.00 = 12.00dB;
Level = 10dBuV + 12.00dB = 22.00dBuV;
Delta = 22.00dBuV - 66.00dBuV = –44.00dB.

TEST REPORT

Test result above 1GHz:

The emission was conducted from 1GHz to 25GHz

802.11-b mode

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2390	49.60	74.00	24.40	PK
	V	2390	50.20	74.00	23.80	PK
	H	4824	51.20	74.00	22.80	PK
	V	4824	51.40	74.00	22.60	PK
M	H	4874	50.80	74.00	23.20	PK
	V	4874	51.30	74.00	22.70	PK
H	H	2483.5	55.20	74.00	18.80	PK
	H	2483.5	42.40	54.00	11.60	AV
	V	2483.5	55.80	74.00	18.20	PK
	V	2483.5	43.30	54.00	10.70	AV
	H	4924	51.40	74.00	22.60	PK
	H	4924	51.80	74.00	22.20	PK

802.11-g mode

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2390	49.60	74.00	24.40	PK
	V	2390	49.90	74.00	24.10	PK
	H	4824	50.80	74.00	23.20	PK
	V	4824	51.50	74.00	22.50	PK
M	H	4874	49.70	74.00	24.30	PK
	V	4874	50.10	74.00	23.90	PK
H	H	2483.5	55.30	74.00	18.70	PK
	H	2483.5	42.60	54.00	11.40	AV
	V	2483.5	55.70	74.00	18.30	PK
	V	2483.5	43.50	54.00	10.50	AV
	H	4924	50.90	74.00	23.10	PK
	H	4924	50.50	74.00	23.50	PK

TEST REPORT

802.11-n20 mode

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2390	50.10	74.00	23.90	PK
	V	2390	50.60	74.00	23.40	PK
	H	4824	50.80	74.00	23.20	PK
	V	4824	50.90	74.00	23.10	PK
M	H	4874	51.20	74.00	22.80	PK
	V	4874	51.30	74.00	22.70	PK
H	H	2483.5	55.30	74.00	18.70	PK
	H	2483.5	43.10	54.00	10.90	AV
	V	2483.5	55.40	74.00	18.60	PK
	V	2483.5	43.00	54.00	11.00	AV
	H	4924	51.60	74.00	22.40	PK
	H	4924	51.70	74.00	22.30	PK

802.11-n40 mode

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2390	49.60	74.00	24.40	PK
	V	2390	49.90	74.00	23.80	PK
	H	4844	51.60	74.00	22.80	PK
	V	4844	51.70	74.00	22.60	PK
M	H	4874	49.80	74.00	23.20	PK
	V	4874	50.70	74.00	22.70	PK
H	H	2483.5	52.70	74.00	18.80	PK
	V	2483.5	53.30	74.00	18.20	PK
	H	4904	51.40	74.00	22.60	PK
	H	4904	51.80	74.00	22.20	PK

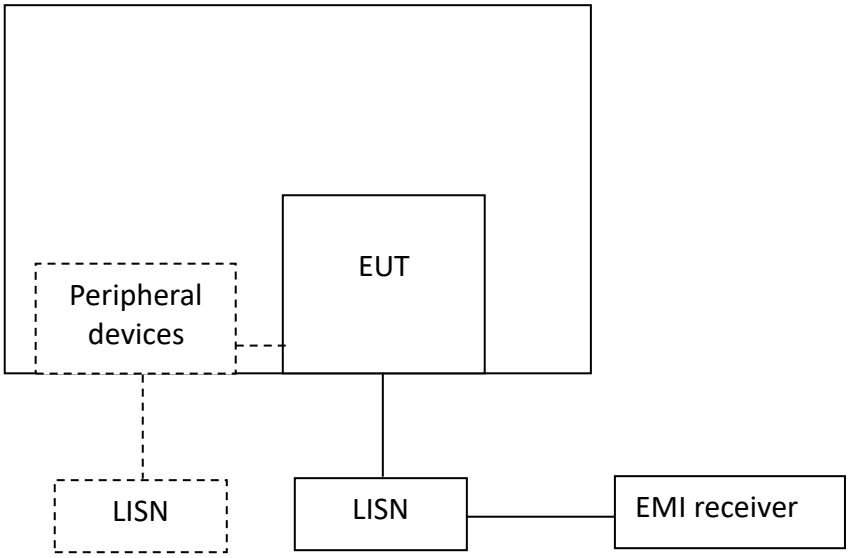
8 Power line conducted emission

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



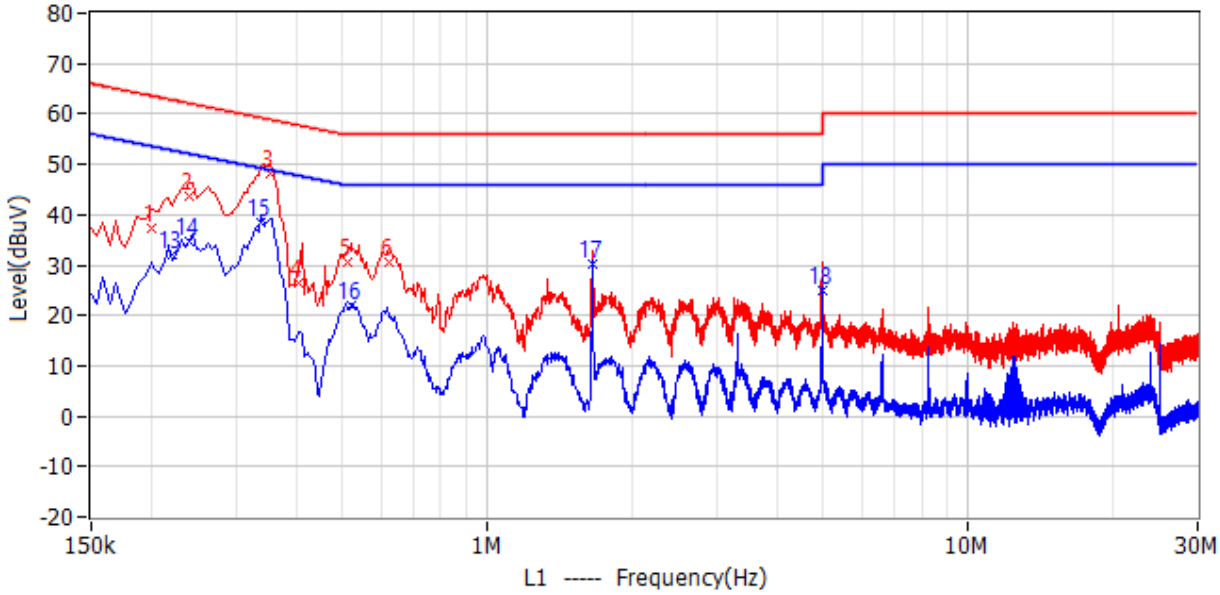
8.3 Measurement Procedure

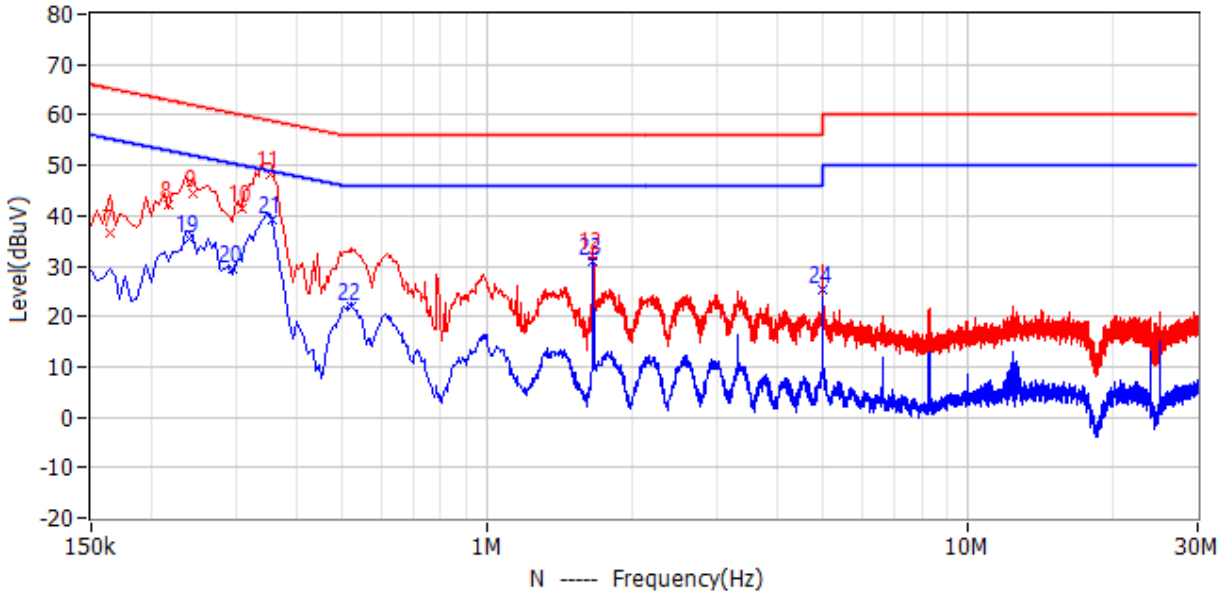
Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be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





No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	199.500kHz	63.6	37.3	-26.3	31.1	6.2	QP	L1
2	240.000kHz	62.1	43.7	-18.4	37.5	6.2	QP	L1
3	352.500kHz	58.9	48.0	-10.9	41.8	6.2	QP	L1
4	406.500kHz	57.7	26.6	-31.1	20.4	6.2	QP	L1
5	510.000kHz	56.0	30.6	-25.4	24.4	6.2	QP	L1
6	622.500kHz	56.0	30.4	-25.6	24.2	6.2	QP	L1
7	163.500kHz	65.3	36.6	-28.7	30.4	6.2	QP	N
8	217.500kHz	62.9	42.3	-20.6	36.0	6.3	QP	N

TEST REPORT

No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
9	244.500kHz	61.9	44.3	-17.6	38.1	6.2	QP	N
10	307.500kHz	60.0	41.4	-18.6	35.2	6.2	QP	N
11	352.500kHz	58.9	48.3	-10.6	42.1	6.2	QP	N
12	1.662MHz	56.0	32.2	-23.8	25.9	6.3	QP	N
13	222.000kHz	52.7	32.0	-20.7	25.8	6.2	CAV	L1
14	240.000kHz	52.1	34.6	-17.5	28.4	6.2	CAV	L1
15	339.000kHz	49.2	38.6	-10.6	32.4	6.2	CAV	L1
16	519.000kHz	46.0	22.0	-24.0	15.8	6.2	CAV	L1
17	1.662MHz	46.0	30.1	-15.9	23.9	6.2	CAV	L1
18	4.992MHz	46.0	25.1	-20.9	18.8	6.3	CAV	L1
19	240.000kHz	52.1	35.5	-16.6	29.3	6.2	CAV	N
20	294.000kHz	50.4	29.3	-21.1	23.1	6.2	CAV	N
21	357.000kHz	48.8	39.2	-9.6	33.0	6.2	CAV	N
22	519.000kHz	46.0	21.9	-24.1	15.6	6.3	CAV	N
23	1.662MHz	46.0	30.8	-15.2	24.5	6.3	CAV	N
24	4.988MHz	46.0	25.4	-20.6	19.1	6.3	CAV	N

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. Delta= Level - Limit
4. If the PK Level is lower than AV limit, the AV test can be elided.

Example: Assuming LISN Factor = 10.00dB, Cable Loss = 2.00dB,
Original Receiver Reading = 10.00dBuV, Limit = 66.00dBuV.
Then Factor = 10.00 + 2.00 = 12.00dB;
Level = 10dBuV + 12.00dB = 22.00dBuV;
Delta = 22.00dBuV - 66.00dBuV = –44.00dB.

9 Occupied Bandwidth

Test result: **Tested**

9.1 Limit

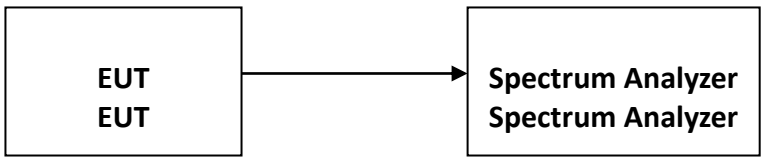
None

9.2 Measurement Procedure

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.

Appendix A: Test results

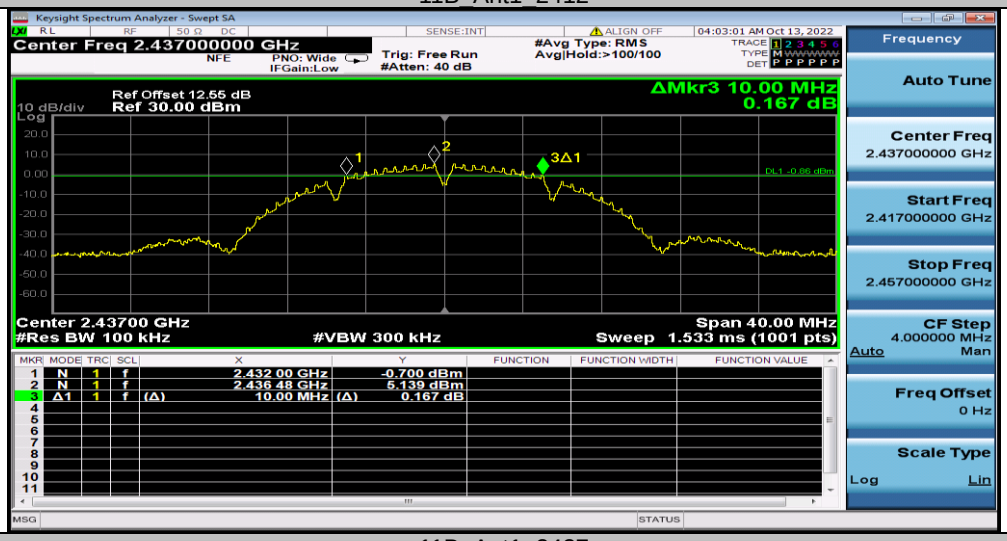
DTS Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	10.040	2406.960	2417.000	0.5	PASS
		2437	10.000	2432.000	2442.000	0.5	PASS
		2462	10.040	2456.960	2467.000	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	16.320	2453.840	2470.160	0.5	PASS
11N20SISO	Ant1	2412	17.600	2403.200	2420.800	0.5	PASS
		2437	17.600	2428.200	2445.800	0.5	PASS
		2462	17.600	2453.200	2470.800	0.5	PASS
11N40SISO	Ant1	2422	35.600	2404.480	2440.080	0.5	PASS
		2437	35.120	2419.400	2454.520	0.5	PASS
		2452	35.040	2434.480	2469.520	0.5	PASS

Test Graphs

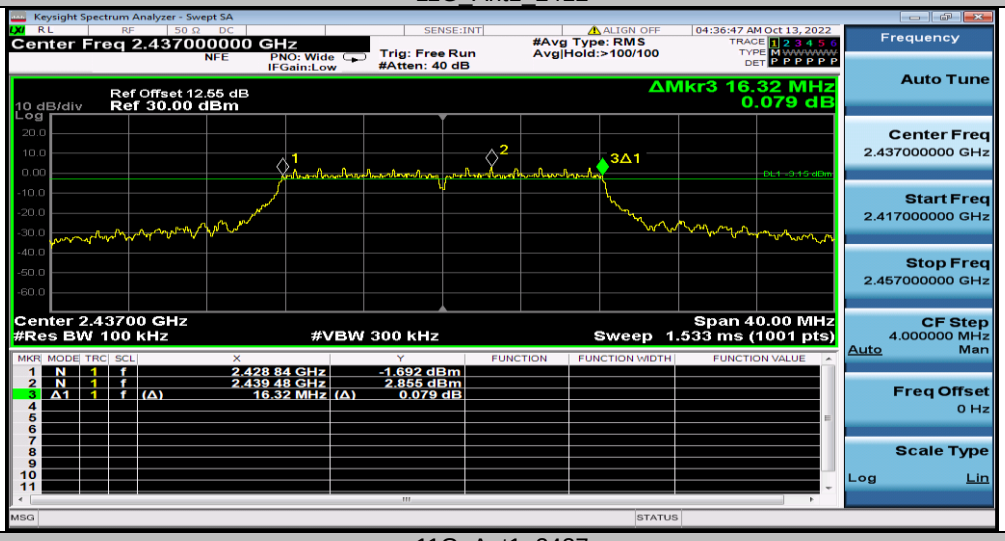
11B_Ant1_2412



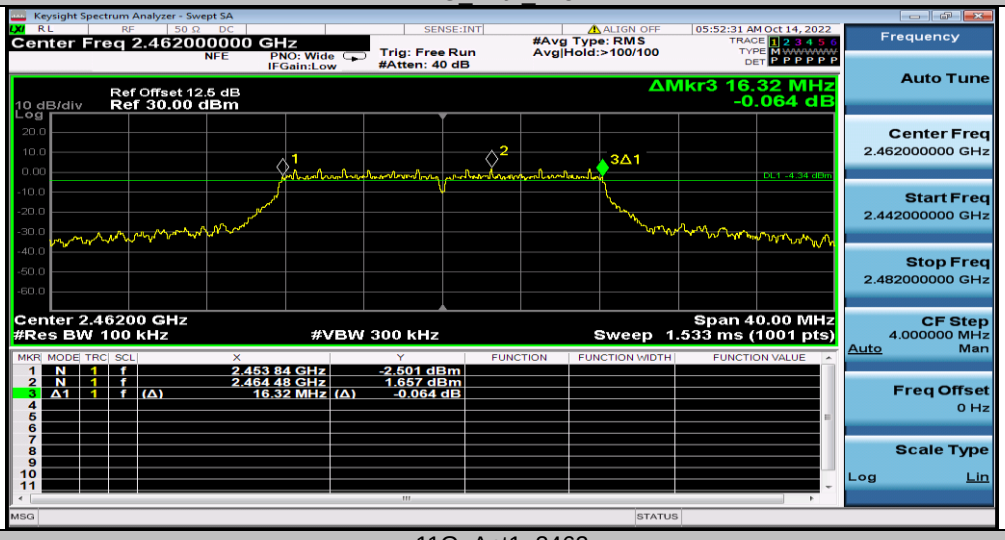
11B_Ant1_2437

11B_Ant1_2462

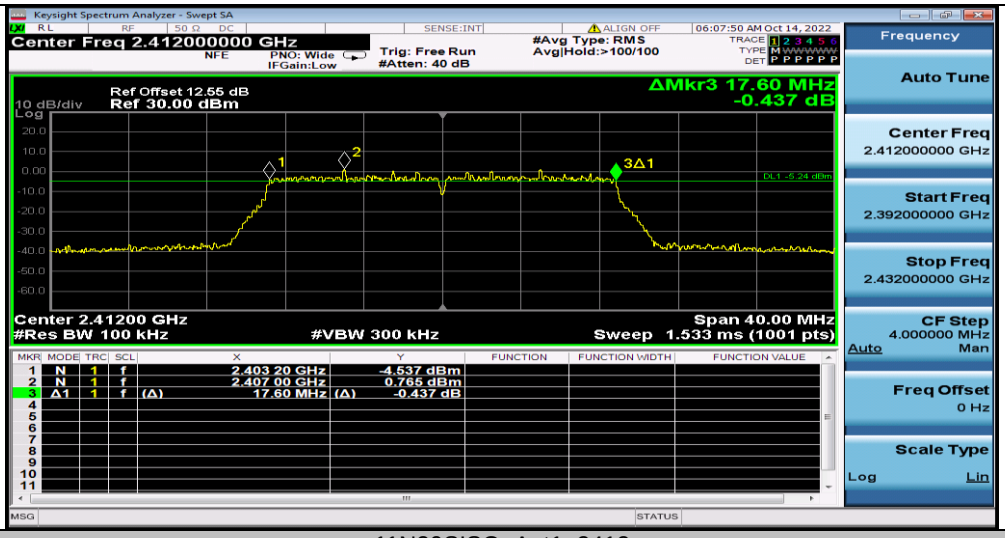
11G_Ant1_2412



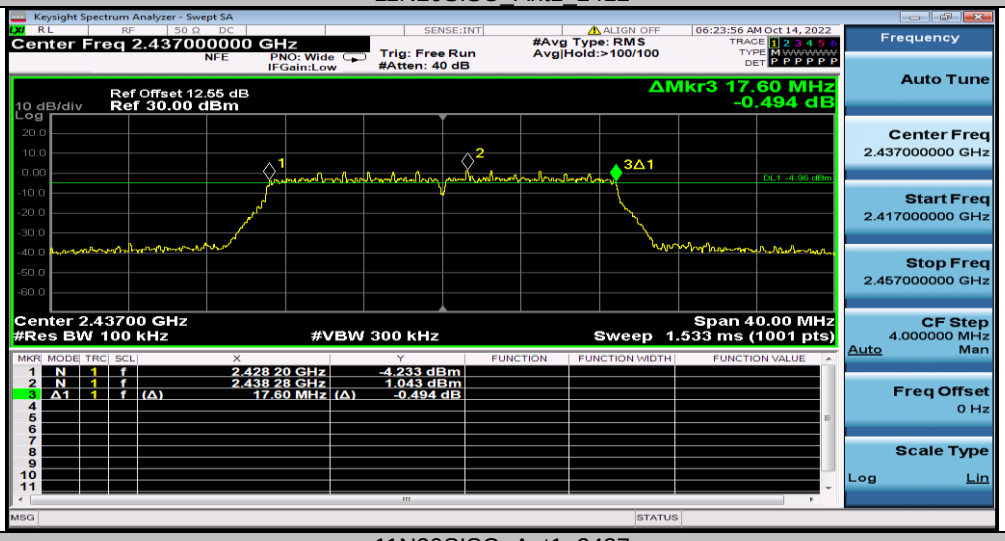
11G_Ant1_2437



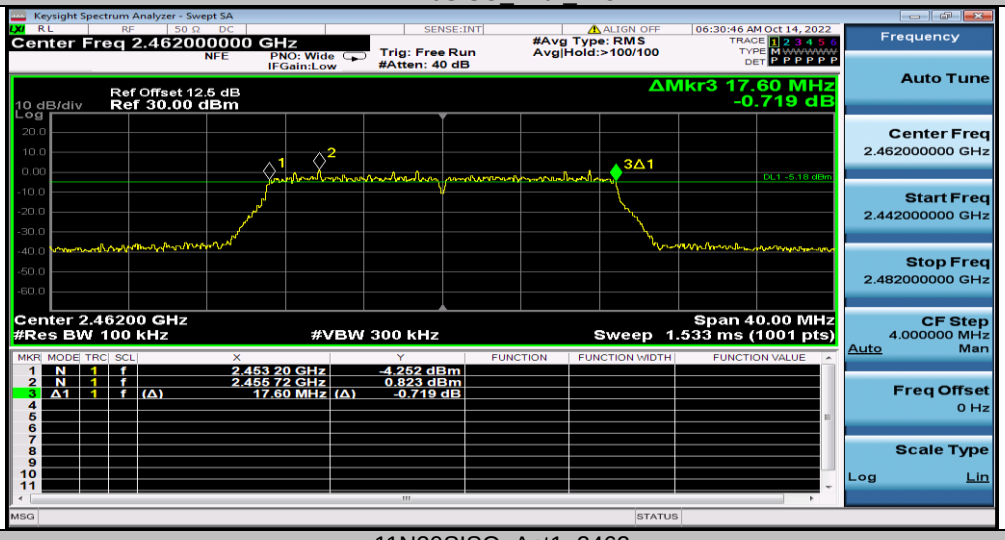
11G_Ant1_2462



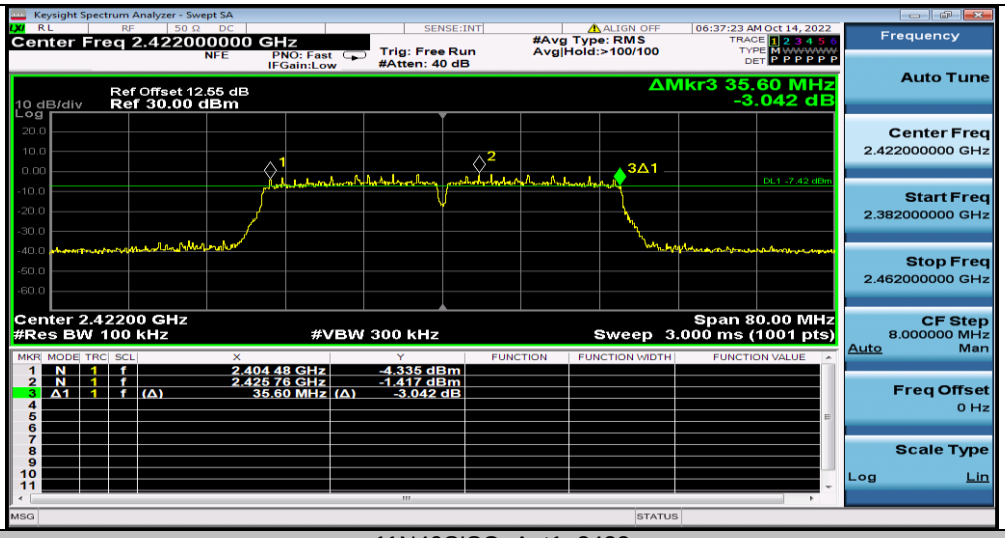
11N20SISO_Ant1_2412



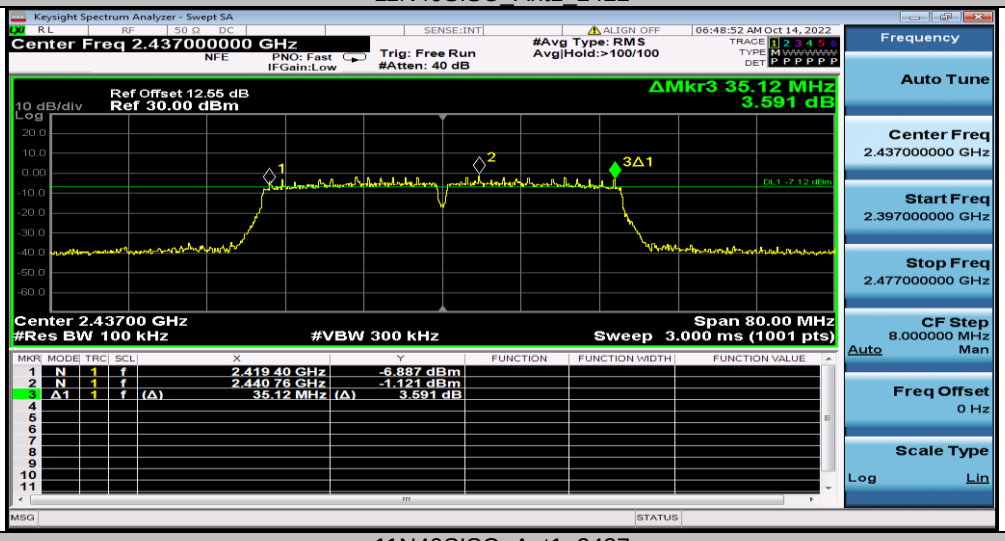
11N20SISO_Ant1_2437



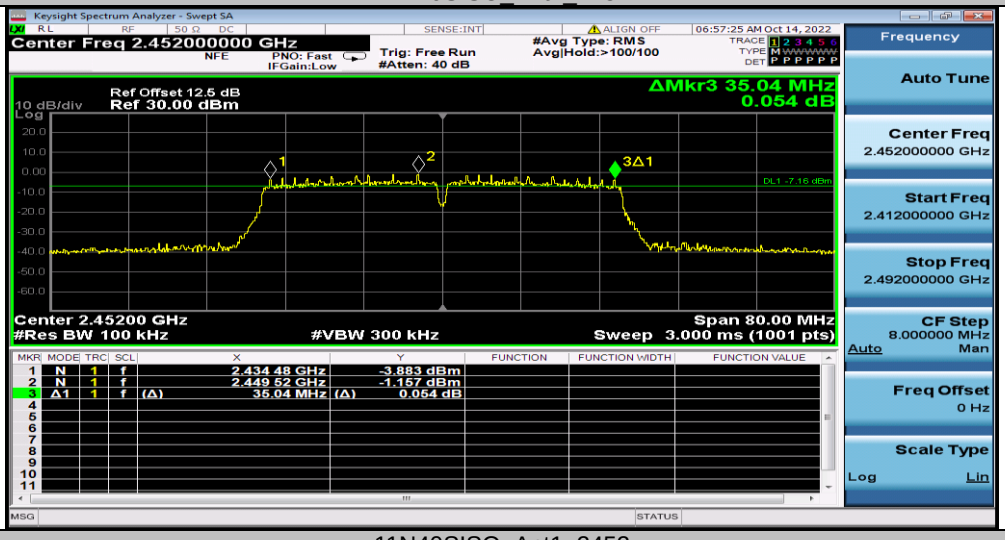
11N20SISO_Ant1_2462



11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452

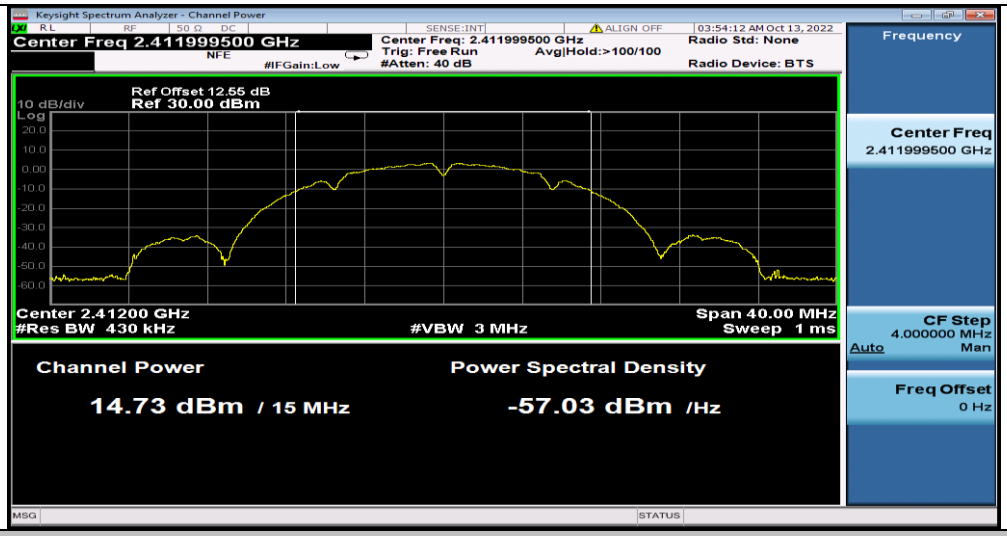
TEST REPORT

Maximum conducted output power

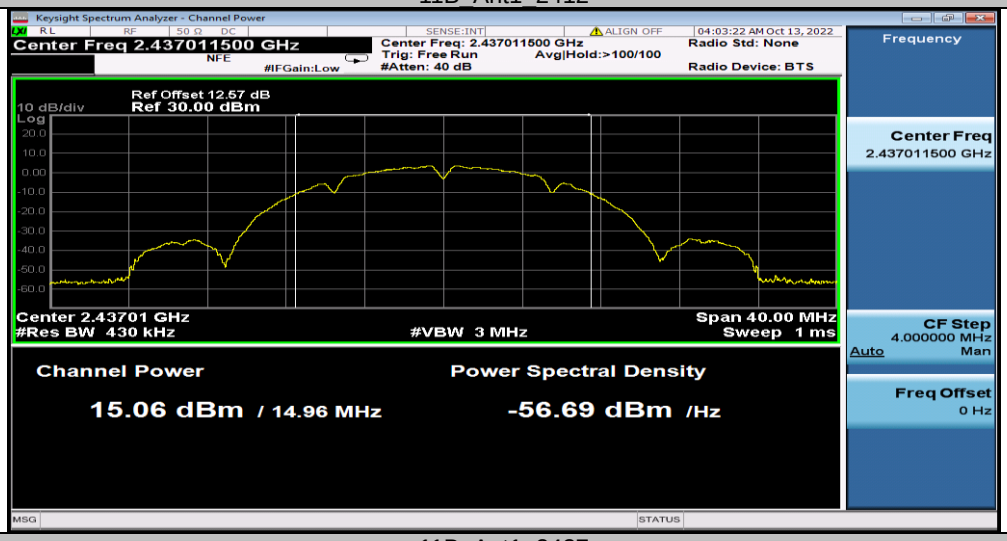
Test Result Average

TestMode	Antenna	Frequency[MHz]	Set Power	AV Power[dBm]	Conducted Limit[dBm]	EIRP [dBm]	EIRP Limit[dBm]	Verdict
11B	Ant1	2412	---	14.74	≤30.00	17.50	≤36.00	PASS
		2437	---	15.09	≤30.00	17.85	≤36.00	PASS
		2462	---	14.95	≤30.00	17.71	≤36.00	PASS
11G	Ant1	2412	---	13.20	≤30.00	15.96	≤36.00	PASS
		2437	---	14.45	≤30.00	17.21	≤36.00	PASS
		2462	---	13.39	≤30.00	16.15	≤36.00	PASS
11N20SISO	Ant1	2412	---	12.51	≤30.00	15.27	≤36.00	PASS
		2437	---	12.80	≤30.00	15.56	≤36.00	PASS
		2462	---	12.66	≤30.00	15.42	≤36.00	PASS
11N40SISO	Ant1	2422	---	12.78	≤30.00	15.54	≤36.00	PASS
		2437	---	12.97	≤30.00	15.73	≤36.00	PASS
		2452	---	12.94	≤30.00	15.70	≤36.00	PASS

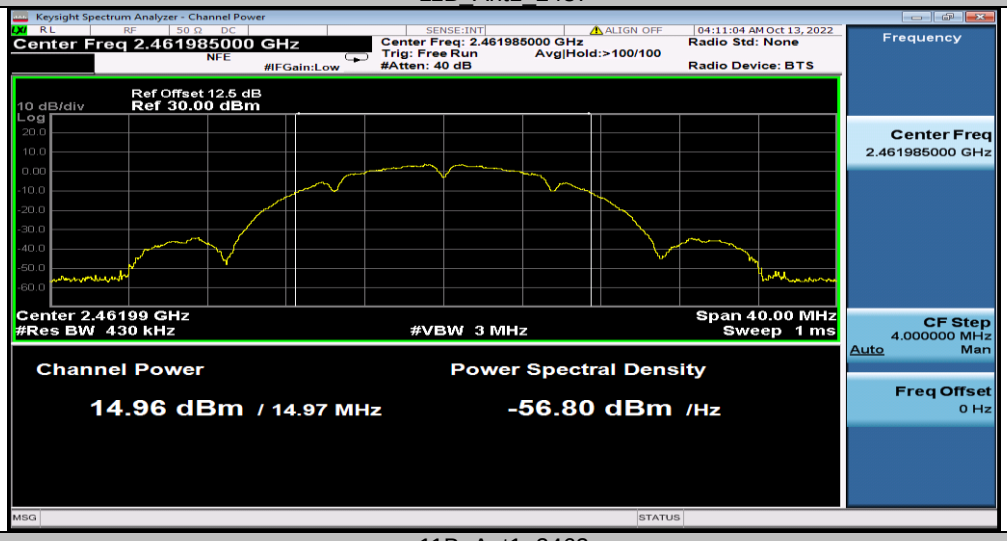
Test Graphs Average



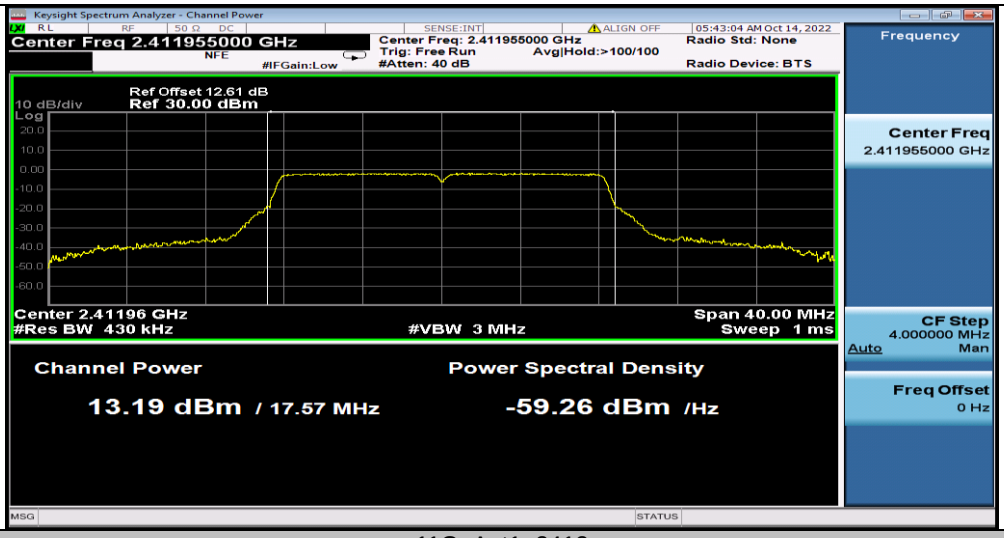
11B_Ant1_2412



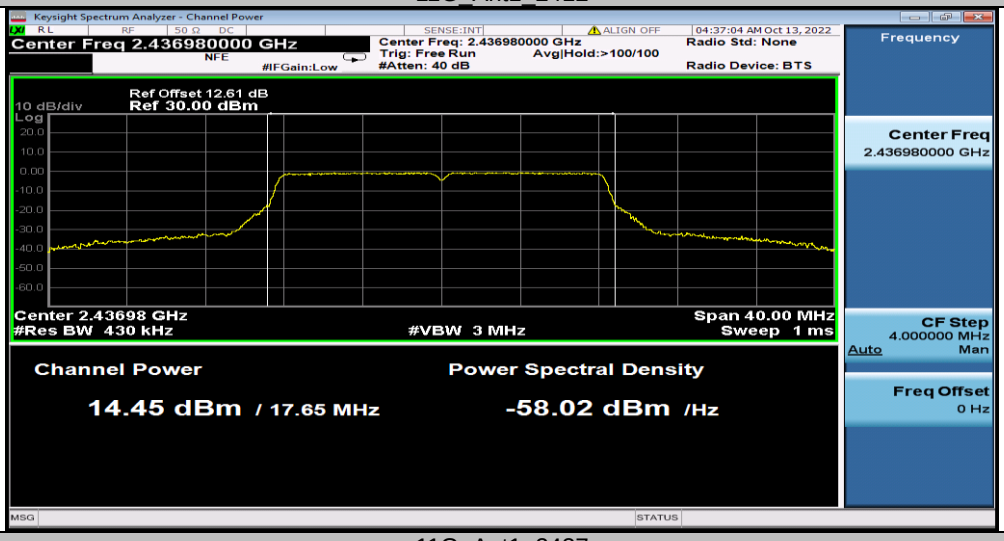
11B_Ant1_2437



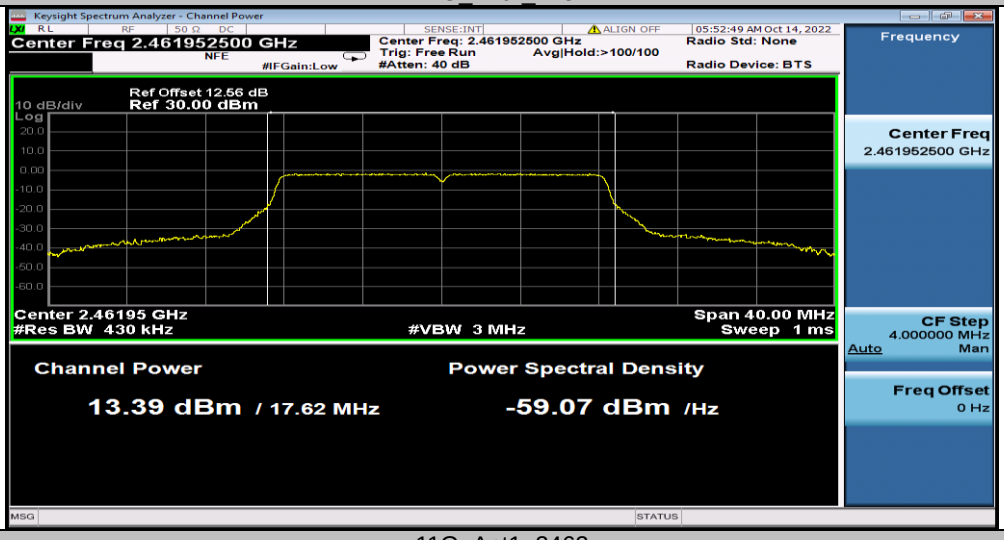
11B_Ant1_2462



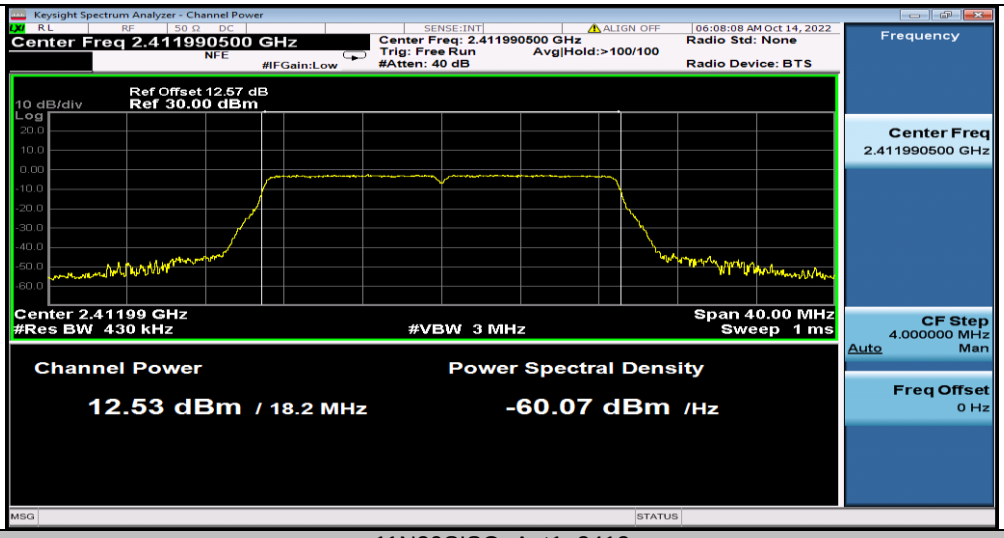
11G_Ant1_2412



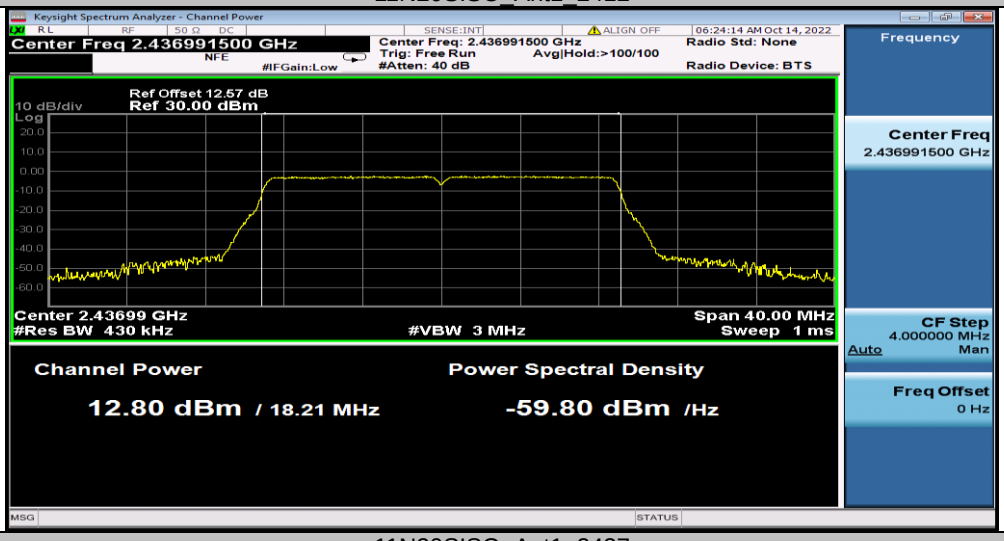
11G_Ant1_2437



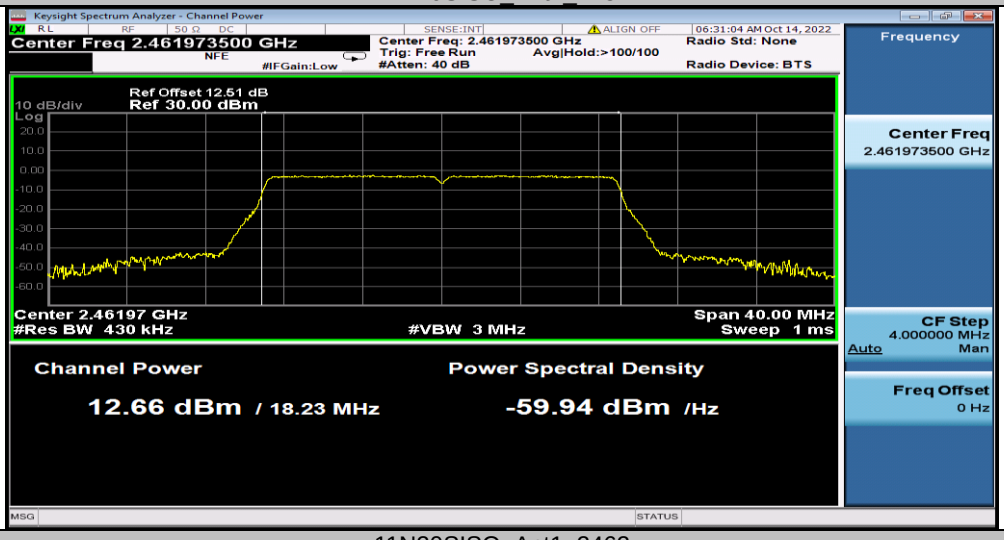
11G_Ant1_2462



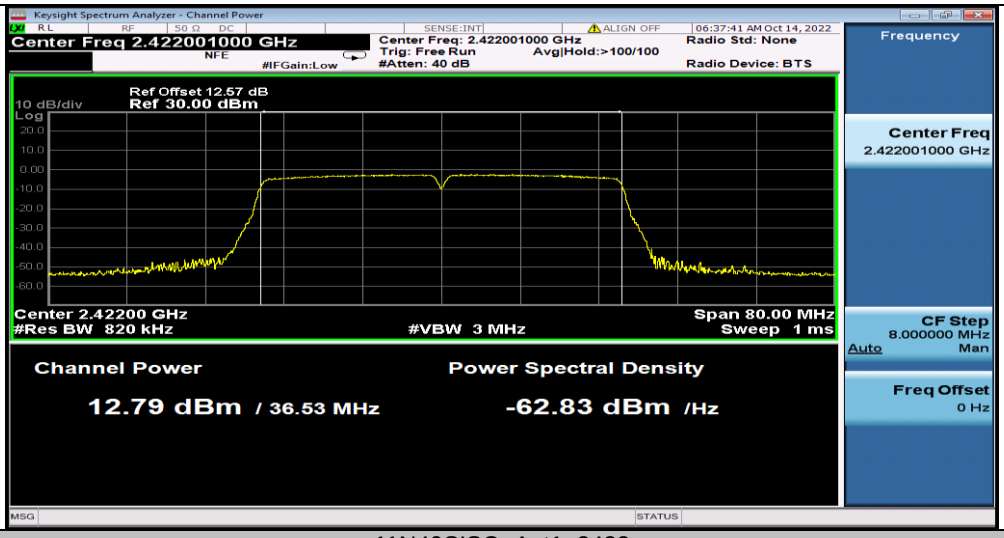
11N20SISO_Ant1_2412



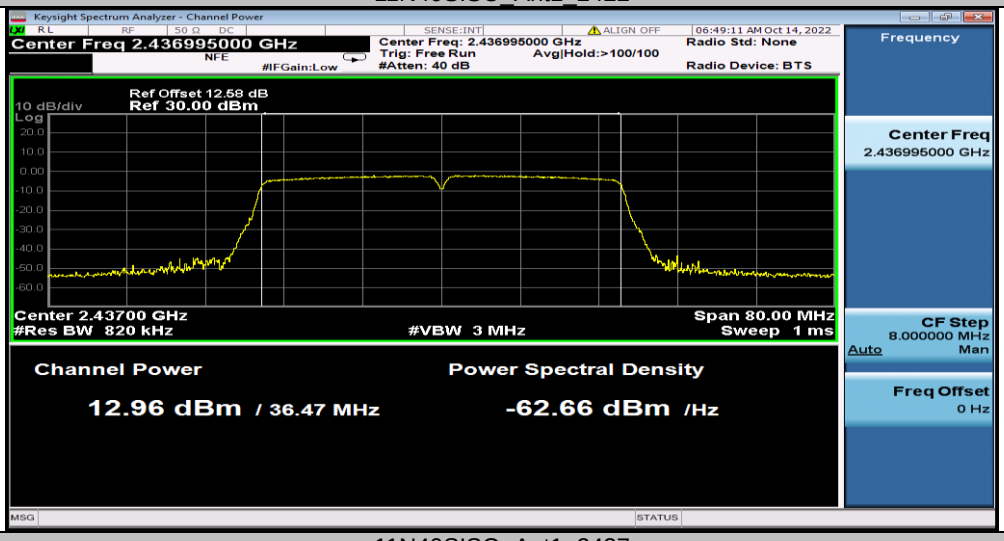
11N20SISO_Ant1_2437



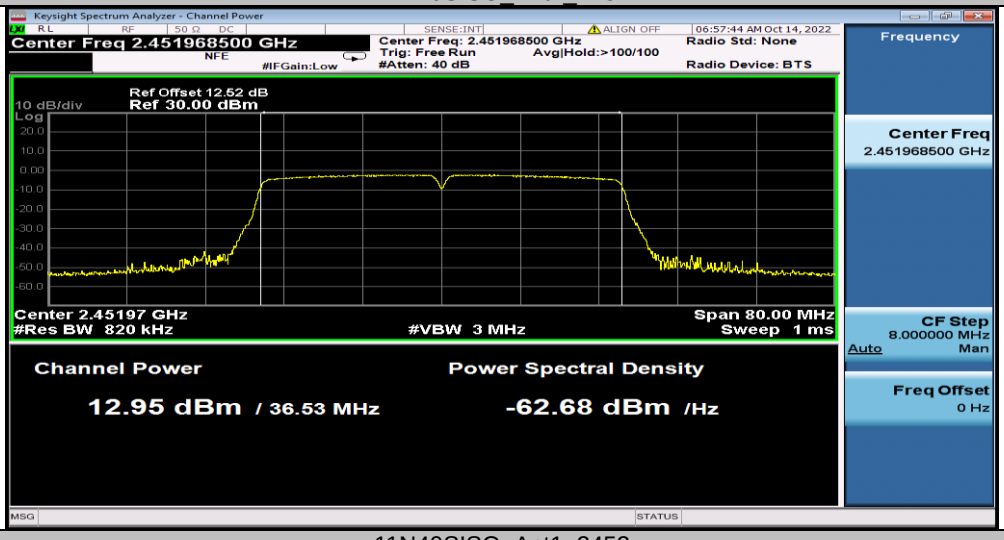
11N20SISO_Ant1_2462



11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452

Maximum power spectral density

Test Result

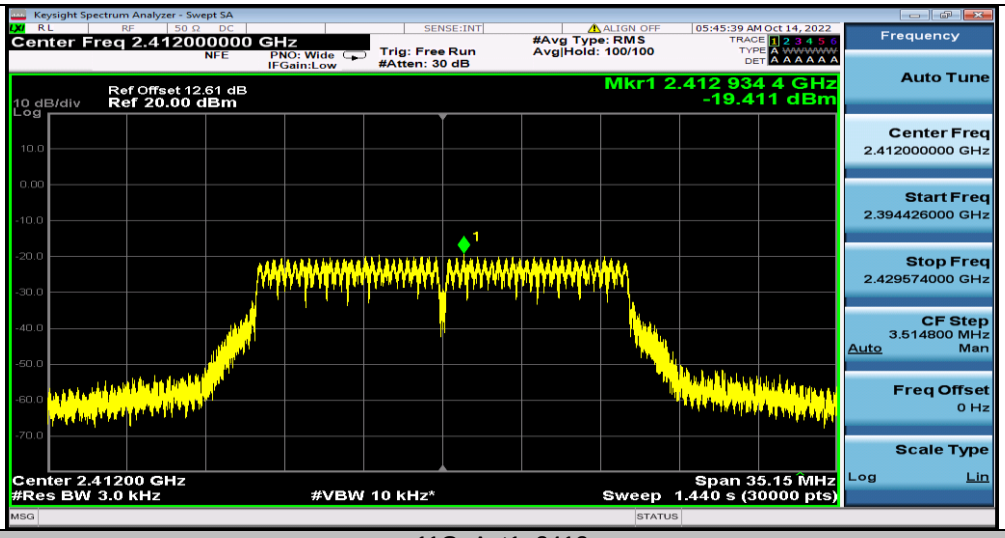
TestMode	Antenna	Frequency[MHz]	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-16.9	≤8.00	PASS
		2437	-16.56	≤8.00	PASS
		2462	-16.6	≤8.00	PASS
11G	Ant1	2412	-19.47	≤8.00	PASS
		2437	-18.34	≤8.00	PASS
		2462	-19.44	≤8.00	PASS
11N20SISO	Ant1	2412	-20.86	≤8.00	PASS
		2437	-20.6	≤8.00	PASS
		2462	-20.62	≤8.00	PASS
11N40SISO	Ant1	2422	-22.62	≤8.00	PASS
		2437	-22.69	≤8.00	PASS
		2452	-22.44	≤8.00	PASS

Test Graphs

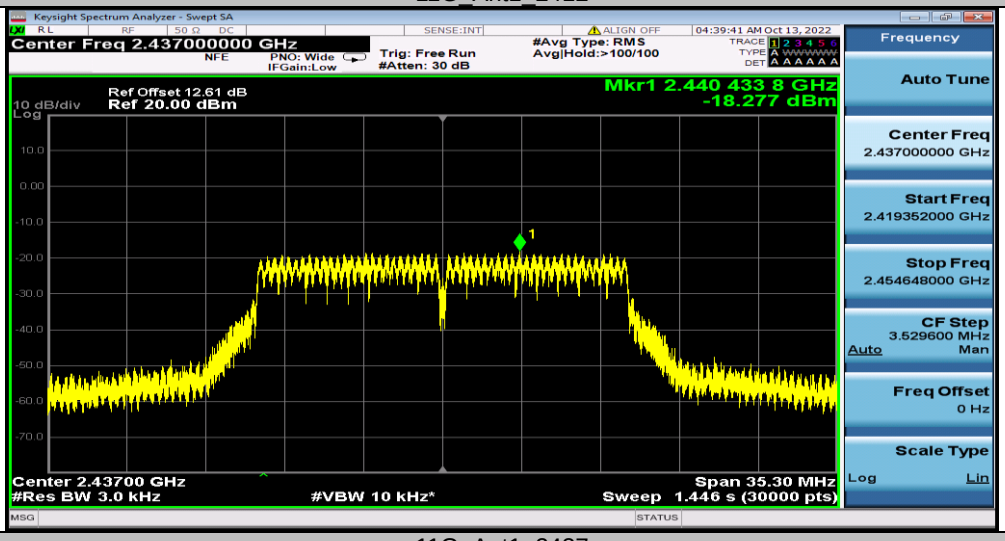
11B_Ant1_2412

11B_Ant1_2437

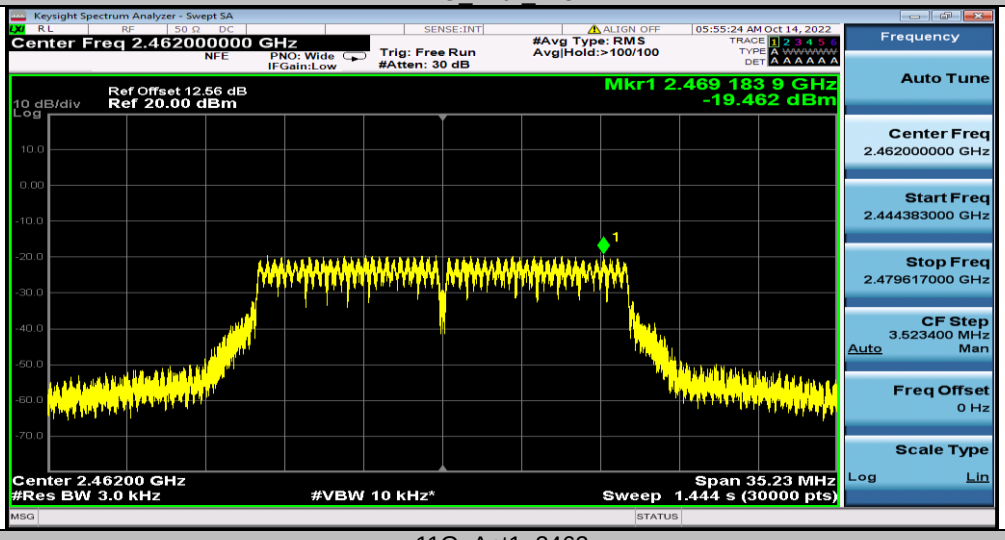
11B_Ant1_2462



11G_Ant1_2412



11G_Ant1_2437



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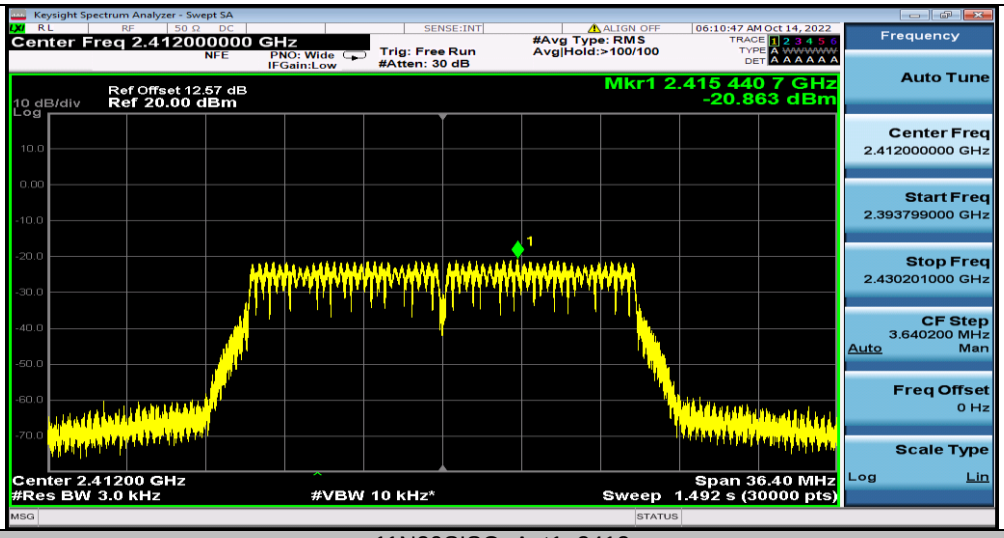

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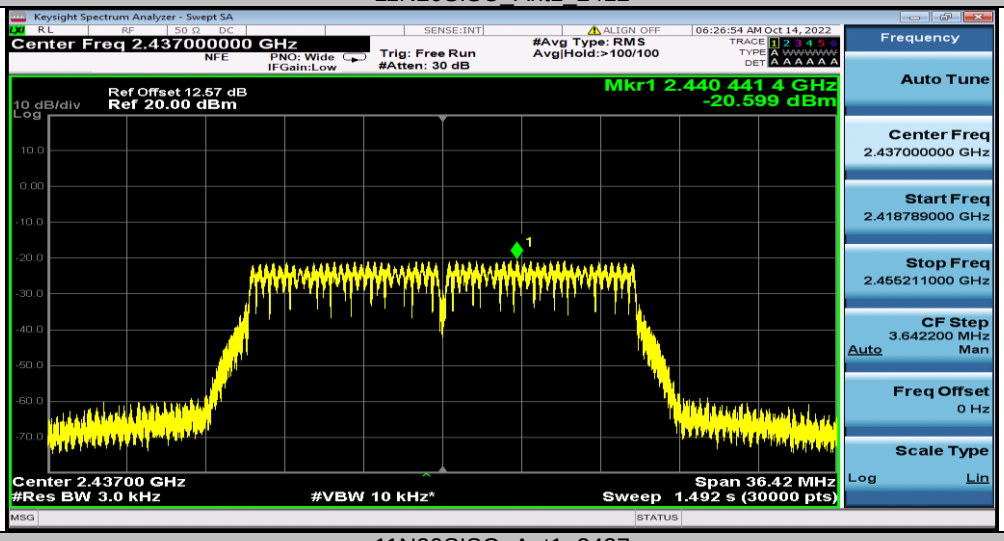

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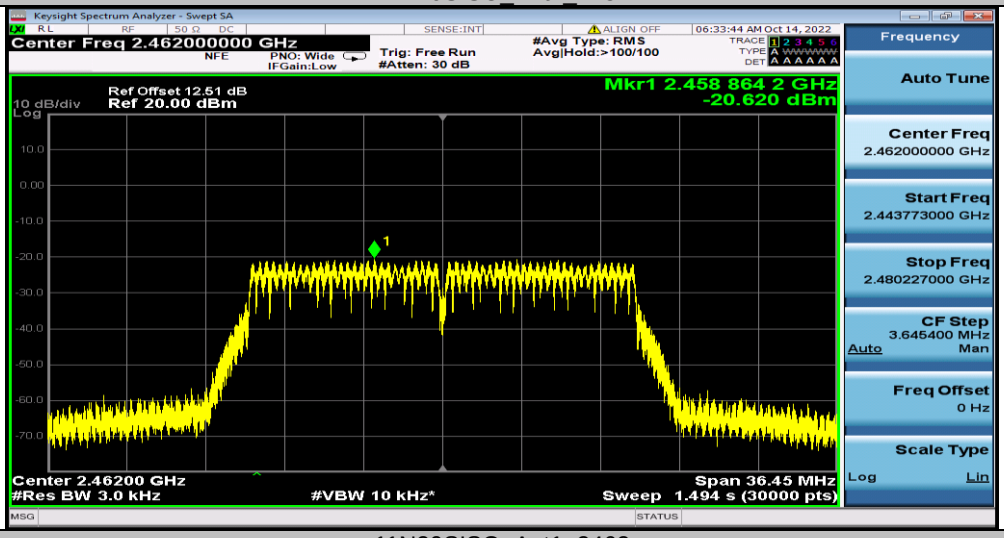

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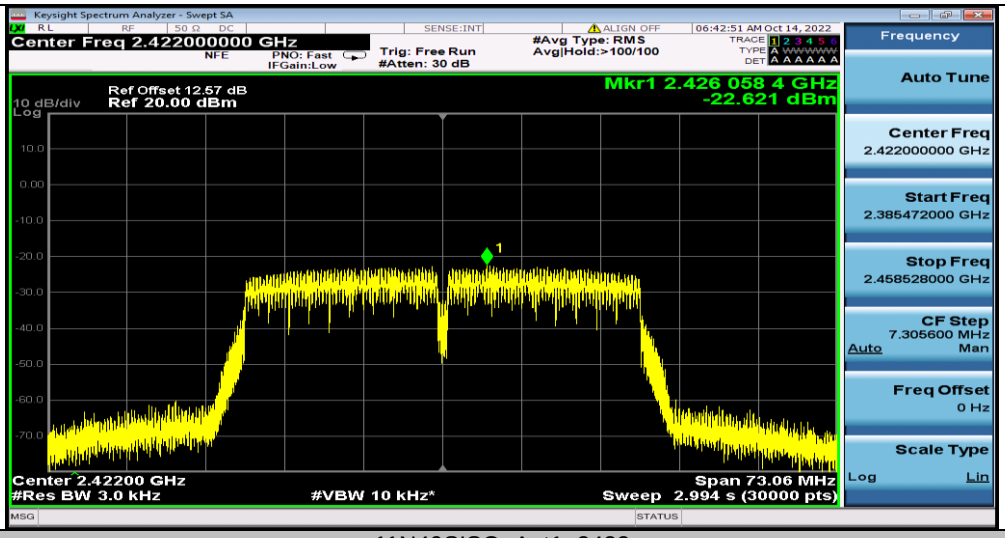

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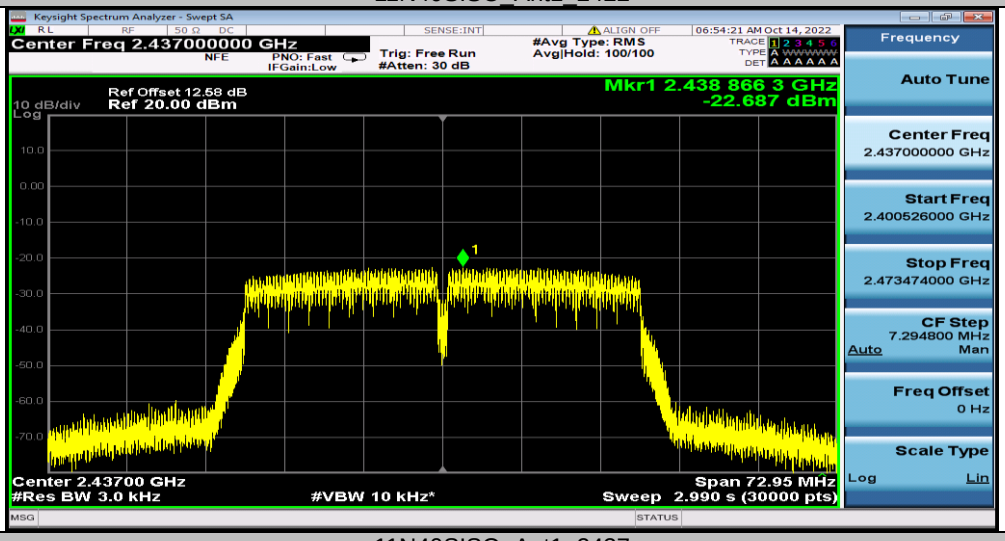

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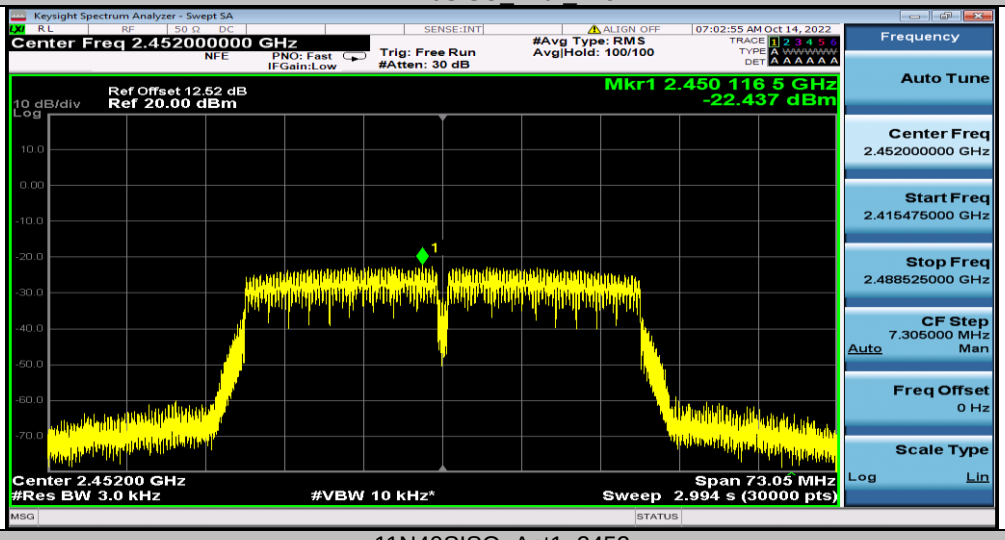

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