TEST REPORT

Applicant:	Sony Corporation
EUT Description:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC and GNSS
Brand:	Sony
FCC ID:	PY7-73716J
Standards:	FCC 47 CFR Part 2 Subpart J FCC 47 CFR Part 15 Subpart C
Date of Receipt:	2023/11/14
Date of Test:	2023/11/14 to 2024/02/18 (FCC ID: PY7-64228M (Lead Model)) 2023/11/14 to 2024/03/01 (FCC ID: PY7-73716J (This Model))
Date of Issue:	2024/03/01

TOWE. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

the results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of the model are manufactured with identical electrical and mechanical components. All sample tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise. without written approval of TOWE, the test report shall not be reproduced except in full.

ACCREDITED
CERTIFICATE #7088.01

Huang Kun
Approved By:

Chen Chengfu
Reviewed By:

Revision History

Rev.	Issue Date	Description	Revised by
01	2024/03/01	Original	Chen Chengfu

Summary of Test Results

Clause	FCC Part	Test Items	Result
4.1	§15.203/15.247(b)	Antenna Requirement	PASS
4.2	§15.207	AC Power Line Conducted Emission	PASS
4.3	§15.247 (b)(3)	Output Power	PASS*
4.4	§15.247 (a)(2)	Occupied Bandwidth	Reporting purposes only
4.5	§15.247 (e)	Power Spectral Density	PASS
4.6	§15.247(d)	Band Edge for Conducted Emissions	PASS
4.7	§15.247(d)	Spurious RF Conducted Emissions	PASS
4.8	§15.205/15.209	Radiated Spurious emissions and Band Edge	PASS*
Test Method: ANSI C63.10-2013, KDB 558074 D01 15.247 Mesa Guidance v05r02.			
Remark:			
Pass: refers to FCC ID PY7-64228M (lead) data.			
PASS: There is FCC ID PY7-73716J (this model) spot check data.*			

Table of Contents

1 General Description

1.1 Lab Information

1.1.1 Testing Location

These measurements tests were conducted at the Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. facility located at F401 and F101, Building E, Hongwei Industrial Zone, Liuxian 3rd Road, Bao'an District, Shenzhen, China. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014
Tel.: +86-755-27212361
Contact Email: info@towewireless.com

1.1.2 Test Facility / Accreditations

A2LA (Certificate Number: 7088.01)
This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

FCC Designation No.: CN1353
Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized as an accredited testing laboratory. Designation Number: CN1353.

ISED CAB identifier: CN0152
Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.
CAB identifier: CN0152
Company Number: 31000

1.2 Client Information

1.2.1 Applicant

Applicant:	Sony Corporation
Address:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan

1.2.2 Manufacturer

Manufacturer:	Sony Corporation
Address:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan

1.3 Product Information

EUT Description:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC and GNSS		
Brand:	Sony		
Hardware Version:	A		
Software Version:	1.116(Only Conduction) 1.78(Only Radiation)		
SN.:	HQ63B1055E(Only Conduction) HQ63B10532(Only Radiation)		
Modulation Type:	802.11b:	DSSS-DBPSK, DQPSK, CCK	
	802.11g&n:	OFDM-BPSK, QPSK, 16QAM, 64QAM, 254QAM	
Smart System:	☒SISO	802.11b/g/n	/
	☒MIMO	802.11n	(2)TX(2)RX
	☒CDD	802.11b/g	(2)TX(2)RX
Frequency Range:	2400 ~ 2483.5MHz		
Channel Frequency:	20M bandwidth Channel: 2412 ~ 2462MHz		
Channel Number:	11:	802.11b/g/n20	
Remark: The above EUT's information was declared by applicant, please refer to the specifications or user's manual for more detailed description.			

1.4 REUSE OF TEST DATA

1.4.1 INTRODUCTION

According to the manufacturer the major change between FCC ID: PY7-64228M (Lead Model), and FCC ID: PY7-73716J (This Model) is changing band configuration by software, The FCC ID: PY7-64228M (Lead Model conducted test data shall remain representative of FCC ID: PY7-73716J so, FCC ID: PY7-73716J (This Model leverages conducted test data from FCC ID: PY7-64228M (Lead Model).

1.4.2 DEVICE DIFFERENCES

The equipment under test (EUT) in this filing FCC ID: PY7-73716J (This Model) and the reference device certified under FCC ID: PY7-64228M (Lead Model) share a common design. The components used for 2.4GHz and 5GHz Wi-Fi and BT and NFC, including antennas and output power are identical between the EUT and reference device.

1.4.3 Spot Check Verification Data

In this filing, the worst-case data and spot checks were tested on the EUT as noted below, against the reference device. All the necessary test cases were performed to verify the variant EUT is still in compliance with the spot checked results to the reference device and was performed using the guidance of ANSI C63.10-2013.

According to FCC KDB 484596 D01 v02r02, Spot checks of the following tests were performed:

Sport check Items	PY7-73716J Worst case Result		PY7-64228M Worst case Result		|Delta(dB)|	
Output Power	Peak:	22.94	Peak:	23.39	Peak:	0.45
	Average:	20.12	Average:	20.09	Average:	0.03
Radiated Spurious Emission	Peak:	52.24	Peak:	53.26	Peak:	1.02
Radiated Band Edge	Average:	45.64	Average:	48.09	Average:	2.45

2 Test Configuration

2.1 Test Channel

Frequency Channels							
Channel	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz	/	

Remark:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Modulation Type	**Test Channel**	**Test Frequency**
802.11b/g/n20	The Lowest channel (CH1)	2412MHz
	The Middle channel (CH6)	2437MHz
	The Highest channel (CH11)	2462MHz

2.2 Worst-case configuration and Mode

Modulation Type	**SISO - Data Rate**	**MIMO - Data Rate**
802.11b	1 Mbps	2 Mbps
802.11g	6 Mbps	12 Mbps
802.11n20	MCS0 (6.5 Mbps)	MCS0 (13 Mbps)
Transmitting mode:	Keep the EUT was programmed to be in continuously transmitting mode.	
Normal Link:	Keep the EUT operation to normal function.	

2.3 Test Duty Cycle

TestMode	Frequency[MHz]	T(ms)	T Period(ms)	Duty Cycle(%	1/T	VBW Set
11B-CDD	2412	12.43	12.59	98.73	0.08	10Hz
11B-CDD	2437	12.43	12.61	98.57	0.08	10Hz
11B-CDD	2462	12.43	12.60	98.65	0.08	10Hz
11G-CDD	2412	2.07	2.10	98.57	0.48	10Hz
11G-CDD	2437	2.06	2.10	98.10	0.49	10Hz
11G-CDD	2462	2.06	2.10	98.10	0.49	10Hz
11N20MIMO	2412	1.93	1.96	98.47	0.518	10Hz
11N20MIMO	2437	1.92	1.96	97.96	0.52	1KHz
11N20MIMO	2462	1.92	1.96	97.96	0.52	1KHz

Note: If Duty Cycle>98% VBW is set to 10Hz.

2.4 Support Unit used in test

The EUT has been tested as an independent unit.

2.5 Test Environment

Temperature:	Normal: 15℃ ~ 35℃
Humidity:	40-75 % RH Ambient
DC Voltage:	DC 3.89V
AC Voltage:	AC 120V/60Hz
Remark: The testing environment is within the scope of the EUT user manual and meets the requirements of the standard testing environment.	

2.6 Test RF Cable

For all conducted test items: The offset level is set spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.

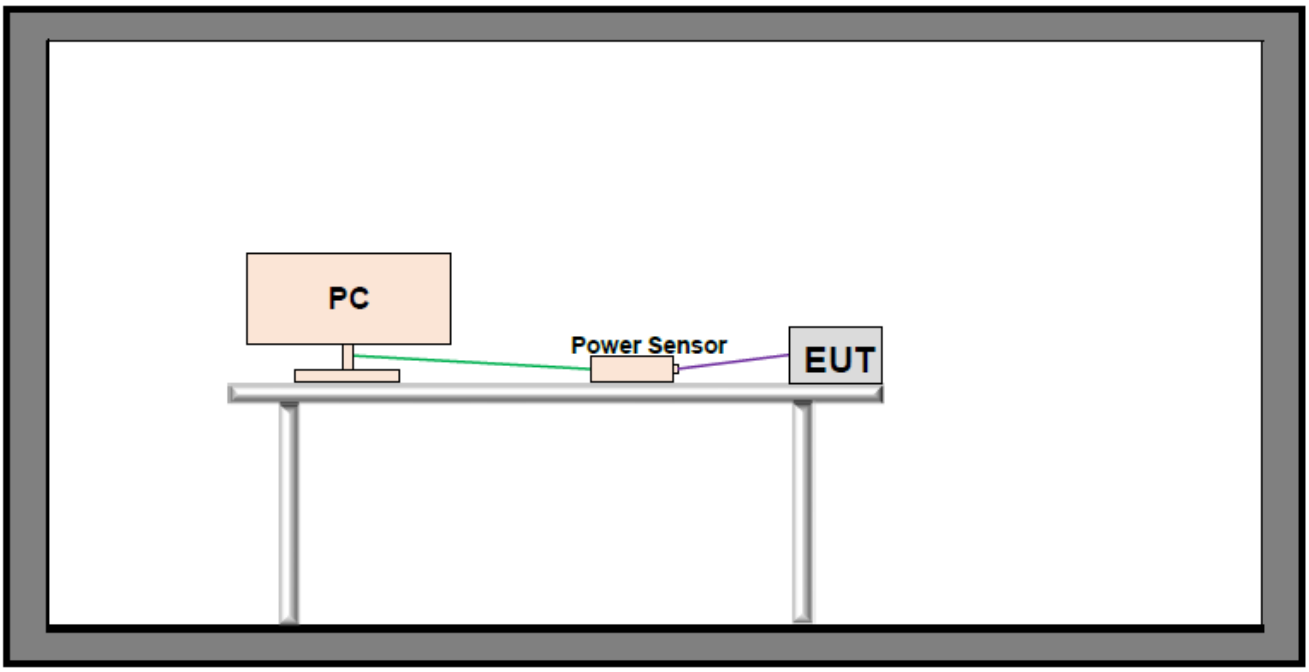
2.7 Modifications

No modifications were made during testing.

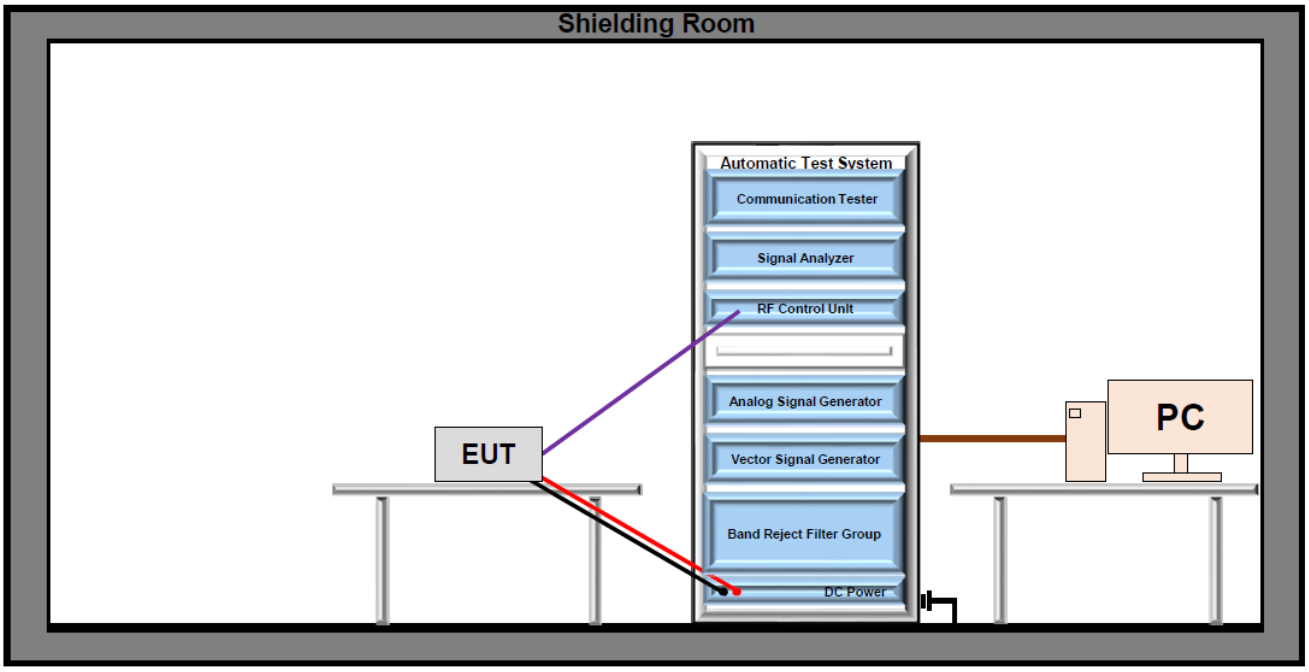
2.8 Test Setup Diagram

2.8.1 Conducted Configuration

Setup 1

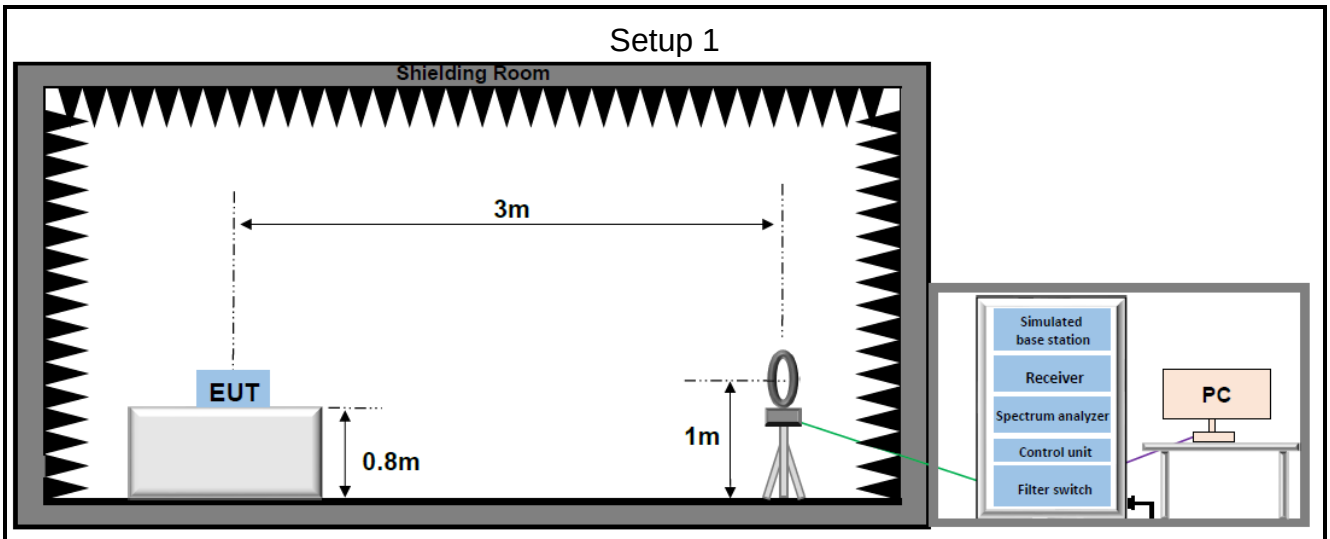


Setup 2



2.8.2 Radiated Configuration

Setup 1



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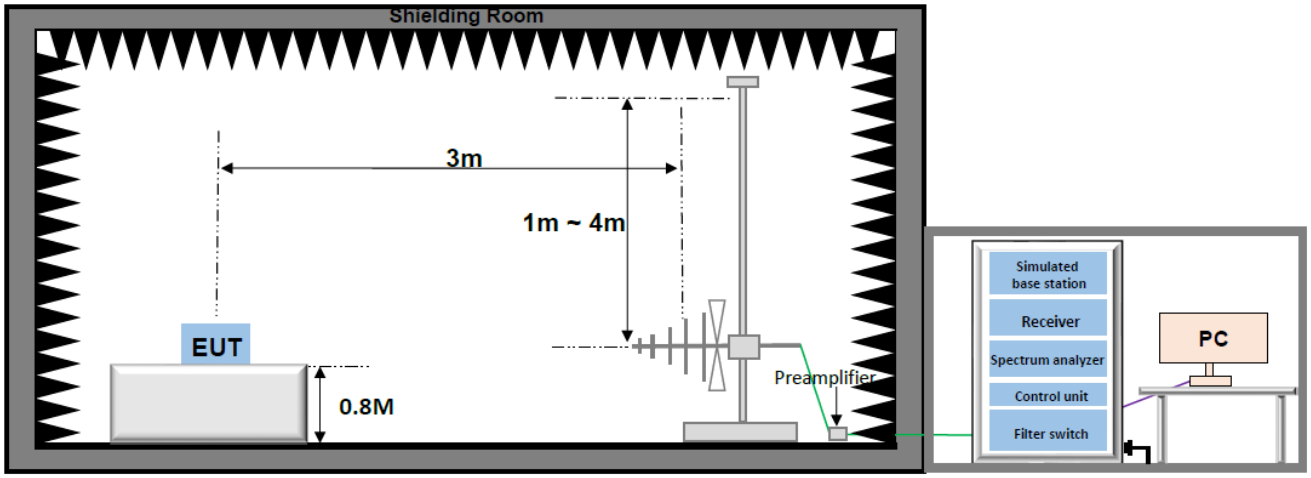
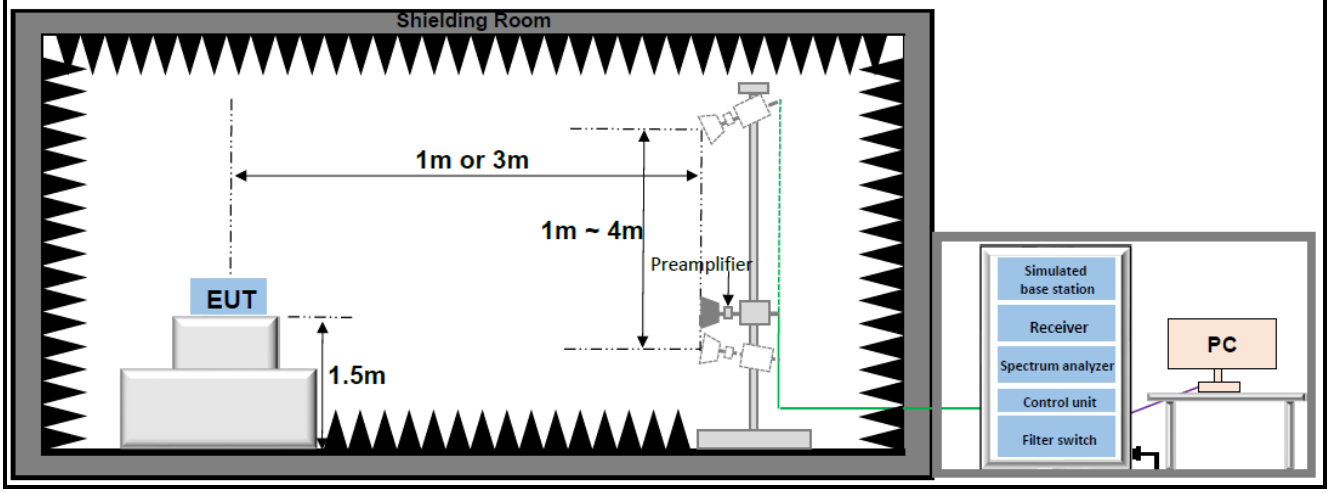


Setup 3



Directional gain calculations:

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices
  Array Gain = 10 log(N_{ANT}/N_{SS}=1) dB
- For power measurements on IEEE 802.11 devices:
  Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leqslant 4$;
  Array Gain = 0 dB (i.e., no array gain) for channel widths $\geqslant$ 40 MHz for any N_{ANT};
  Array Gain = 5 log(N_{ANT}/N_{SS}=1) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geqslant 5$.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Unequal antenna gains, with equal transmit powers. For antenna gains given by G1, G2, ···, GN dBi

- If transmit signals are correlated, then
  Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + \cdots + 10^{GN/20})^2 / N_{ANT}$] dBi [Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]
- If all transmit signals are completely uncorrelated, then
  Directional gain = 10 log[($10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10}$)/$N_{ANT}$] dBi

The Power and PSD limit should be modified if the directional gain of EUT is over 6dBi.

The EUT supports CDD System.

Transmit signals are completely uncorrelated					
ANT Gain6 (dBi)	ANT Gain7 (dBi)	Directional gain For Power (dBi)	Directional gain For PSD (dBi)	Power Limit Reduction (dBm)	PSD Limit Reduction (dBm)
-2.8	-1.9	-1.9	0.67	0	0

3 Equipment and Measurement Uncertainty

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, whichever is less, and where applicable is traceable to recognized national standards.

3.1 Test Equipment List

RF-03					
Description	**Manufacturer**	**Model**	**SN**	**Last Due**	**Cal Due**
Signal Analyzer	Keysight	N9020A	US46470429	2023/04/08	2024/04/07
Signal Generator	R&S	SMR20	101027	2023/04/08	2024/04/07
Wireless Communication Tester	R&S	CMW270	102840	2023/06/27	2024/06/26
UP/Down-Converter	R&S	CMW-Z800A	100572	2023/06/27	2024/06/26
Hygrometer	BingYu	HTC-1	N/A	2023/06/01	2024/05/31
Vector Signal Generator	R&S	SMM100A	549353	2023/06/27	2024/06/26
RF Control Unit	Tonscend	JS0806-2	23C80620671	2023/06/27	2024/06/26
Power Sensor	Anritsu	MA24408A	12520	2023/07/28	2024/07/27
Shielding Room 13	Taihemaorui	4*3*3	N/A	2023/04/01	2026/03/31
Measurement Software	Tonscend	JS1120-3	10659	N/A	N/A

Radiated Emission					
Description	**Manufacturer**	**Model**	**S.N.**	**Last Due**	**Cal Due**
Loop Antenna	Schwarzbeck	FMZB 1519C	1519C-028	2023/06/29	2025/06/28
Biconic Logarithmic Periodic Antennas	Schwarzbeck	VULB9163	1643	2023/06/25	2025/06/24
Double-Ridged Horn Antennas	Schwarzbeck	BBHA 9120D	2809	2023/06/25	2025/06/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	1290	2023/06/25	2025/06/24
Signal Analyzer	Keysight	N9020A	MY49100252	2023/04/08	2024/04/07
Signal Analyzer	Keysight	N9010B	MY63440541	2023/06/27	2024/06/26
EMI Tester Receiver	Rohde & Schwarz	ESR7	102719	2023/08/17	2024/08/16
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	150645	2023/04/08	2024/04/07
Low Noise Amplifier	Tonscend	TAP9K3G40	AP23A8060273	2023/04/08	2025/04/07
Low Noise Amplifier	Tonscend	TAP01018050	AP22G806258	2023/04/08	2025/04/07
Band Reject Filter Group	Townshend	JS0806-F	23A806F0652	N/A	N/A
Test Software	Tonscend	TS+	Version: 5.0.0	N/A	N/A

Conducted Emission					
Description	**Manufacturer**	**Model**	**S.N.**	**Last Due**	**Cal Due**
EMI Tester Receiver	Rohde & Schwarz	ESR3	103108	2023/07/28	2024/07/27
LISN	Rohde & Schwarz	ENV 216	102836	2023/04/08	2024/04/07
Test software	Rohde & Schwarz	ELEKTRA v4.61	N/A	N/A	N/A

3.2 Measurement Uncertainty

Parameter	U_{lab}
Frequency Error	679.98Hz
Output Power	0.76dB
Conducted Spurious Emissions	2.22dB
Conducted Emissions(150KHz~30MHz)	2.43dB
Radiated Emissions(9kHz~30MHz)	2.40dB
Radiated Emissions(30MHz~1000MHz)	4.66dB
Radiated Emissions(1GHz~18GHHz)	5.42dB
Radiated Emissions(18GHz~40GHHz)	5.46dB

Uncertainty figures are valid to a confidence level of 95%

4 Test Results

4.1 Antenna Requirement

Standard Applicable:	47 CFR Part 15C Section 15.203 /247(b)
15.203 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 o of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
The antenna gain and type as provided by the manufacturer are as follows: The antenna Type is PIFA. With Ant6 gain is -2.8dBi, Ant7 gain is -1.9dBi. Antenna Anti-Replacement Construction: An embedded-in antenna design is used.	

4.2 AC Power Line Conducted Emissions

Limits

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
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.		

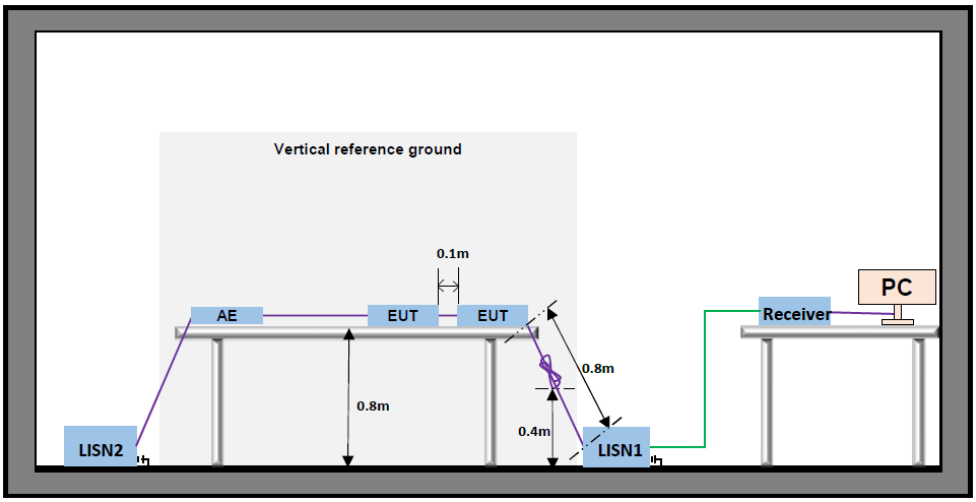
Test Procedure

ANSI C63.10-2013, Section 6.2.

Test Settings

1. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
3. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
4. Set the test-receiver system to Peak detect function and specified bandwidth (if bandwidth =9kHz) with maximum hod mode. Then measurement is also conducted by average detector and Quasi-Peak detector function respectively.
5. Both sides of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Test Setup

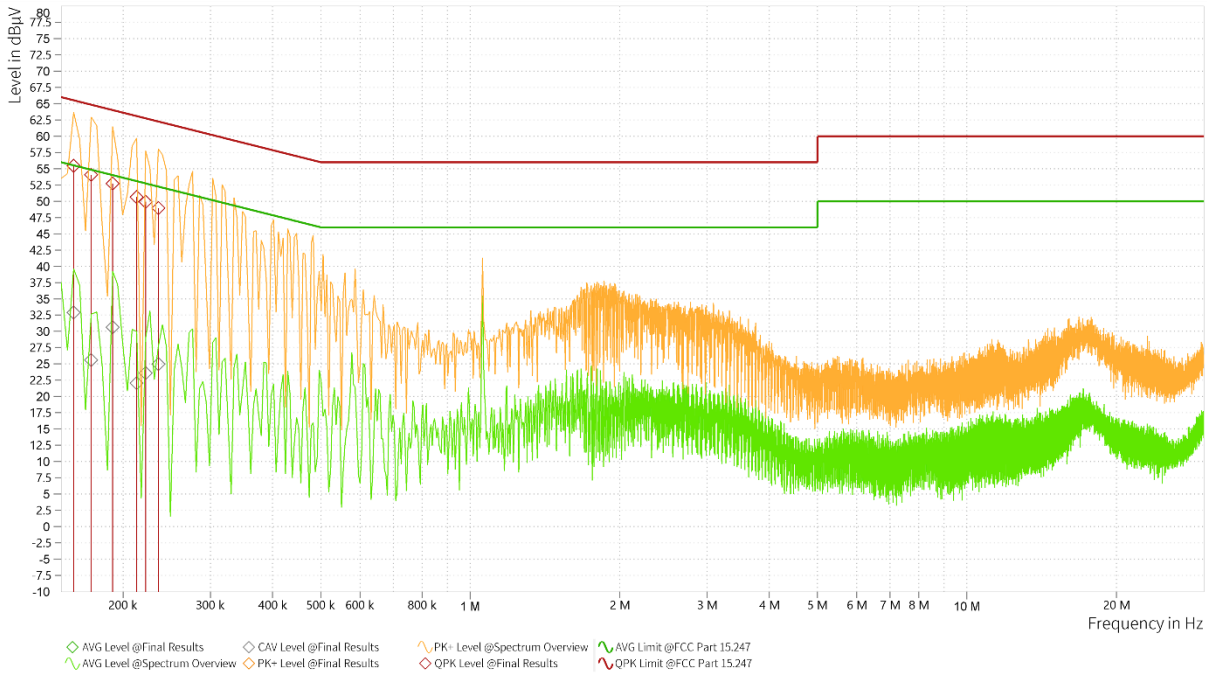


Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result:

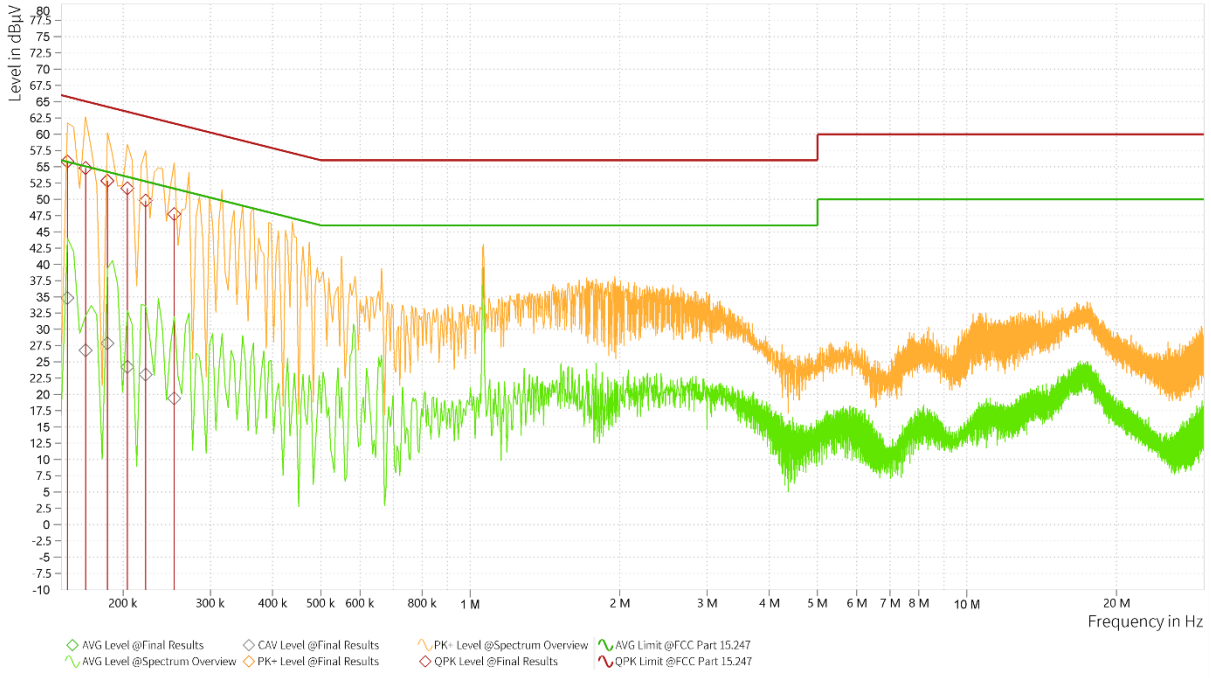
Test mode:	Transmitting		
Test Voltage:	AC 120V / 60Hz	Phase:	Line



Rg	Frequency [MHz]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	CAV Raw Lvl [dBµV]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	QPK Raw Lvl [dBµV]	Correction [dB]	Line
1	0.159	32.90	55.52	22.61	22.42	55.47	65.52	10.05	44.99	10.48	L1
1	0.173	25.60	54.84	29.24	15.11	54.08	64.84	10.76	43.58	10.49	L1
1	0.191	30.63	54.01	23.38	20.14	52.71	64.01	11.31	42.22	10.49	L1
1	0.213	22.05	53.09	31.03	11.56	50.65	63.09	12.43	40.16	10.49	L1
1	0.222	23.60	52.74	29.14	13.10	49.90	62.74	12.85	39.40	10.50	L1
1	0.236	24.96	52.25	27.29	14.46	48.96	62.25	13.30	38.45	10.50	L1

Note:
1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Level = Raw Level[dBµV] + Correction[dB]
3. Margin = Limit[dBµV] - Level[dBµV]

Test mode:	Transmitting		
Test Voltage:	AC 120V / 60Hz	Phase:	Neutral



Rg	Frequency [MHz]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	CAV Raw Lvl [dBµV]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	QPK Raw Lvl [dBµV]	Correction [dB]	Line
1	0.155	34.82	55.75	20.93	24.39	55.78	65.75	9.97	45.35	10.43	N
1	0.168	26.80	55.06	28.26	16.38	54.80	65.06	10.26	44.38	10.42	N
1	0.186	27.87	54.21	26.35	17.46	52.84	64.21	11.37	42.43	10.41	N
1	0.204	24.26	53.45	29.19	13.85	51.67	63.45	11.78	41.27	10.40	N
1	0.222	23.06	52.74	29.68	12.66	49.79	62.74	12.95	39.39	10.40	N
1	0.254	19.41	51.64	32.24	9.01	47.73	61.64	13.91	37.33	10.40	N

Note:
1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Level = Raw Level[dBµV] + Correction[dB]
3. Margin = Limit[dBµV] - Level[dBµV]

4.3 Output Power

Limits

If with directional antenna gains less than 6 dBi, the limit is 30dBm.

Test Procedure

ANSI C63.10:2013 Section 11.9.1.3(PKPM1) or 11.9.2.3.2(AVGPM-G)

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. The power output was measured on the EUT antenna port using RF Cable with attenuator connected to a power meter via wideband power sensor. Peak output power was read directly from power meter.
3. Measure and record the results in the test report.

Test Setup

Refer to section 2.8.1 Setup 1 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.4 Occupied Bandwidth

Limits

DTSBW: The minimum 6 dB bandwidth shall be at least 500 kHz.
99%BW: None, for reporting purposes only.

Test Procedure

ANSI C63.10:2013 Section 11.8.2 and 6.9.3

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. The transmitter output is connected to a spectrum analyzer:
3. RBW = 100kHz(DTS)
4. RBW = 1% - 5%(99%BW)
5. VBW ≥ 3 times the RBW
6. Sweep = Auto
7. Detector = Peak
8. Trace = Max hold
9. The trace was allowed to stabilize
10. Measure and record the results in the test report.

Test Notes

DTS: The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X= 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.

Test Setup

Refer to section 2.8.1 Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.5 Power Spectral Density

Limits

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

Test Procedure

ANSI C63.10:2013 Section 11.10.2(PKPSD)

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously
2. The transmitter output is connected to a spectrum analyzer
3. 3kHz ≤ RBW ≤ 100 kHz
   (If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.)
4. VBW ≥ 3 times the RBW
5. Span = 1.5 times the DTS bandwidth
6. Sweep = Auto
7. Detector = Peak
8. Trace = Max hold
9. The trace was allowed to stabilize
10. Measure and record the results in the test report.

Test Setup

Refer to section 2.8.1 Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.6 Band Edge for Conducted Emissions

Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated. intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph 15.247(b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure

ANSI C63.10:2013 Section 11.11.3

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously
2. The transmitter output is connected to a spectrum analyzer
3. RBW = 100kHz
4. VBW = 300kHz
5. Point ≥ 2 x span/RBW
6. Sweep = Auto
7. Detector = Peak
8. Trace = Max hold
9. The trace was allowed to stabilize
10. Measure and record the results in the test report

Test Setup

Refer to section 2.8.1 Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.7 Spurious RF Conducted Emissions

Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated. intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph 15.247(b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure

ANSI C63.10:2013 Section 11.11.3

Test Settings

1. Set to the maximum power setting and enable the EUT transmit continuously.
2. Activate frequency hopping function if necessary.
3. The transmitter output is connected to a spectrum analyzer
4. The spectrum from 30MHz - 26.5GHz
5. RBW = 100kHz
6. VBW = 300kHz
7. Sweep = Auto
8. Detector = Peak
9. Trace = Max hold
10. The trace was allowed to stabilize
11. Measure and record the results in the test report

Test Setup

Refer to section 2.8.1 Setup 2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

4.8 Radiated Spurious Emissions and Band Edge

Limits

Spurious emissions are permitted in an of the frequency bands:

MHz	MHz	MHz	MHz	GHz	GHz
0.090 - 0.110	12.29 - 12.293	149.9 - 150.05	1660 - 1710	4.5 - 5.15	14.47 - 14.5
0.495 - 0.505	12.51975 - 1252025	156.52475 - 156.52525	1718.8 - 1722.2	5.35 - 5.46	15.35 - 16.2
2.1735 - 2.1905	12.5767 - 12.57725	156.7 - 156.9	2200 - 2300	7.25 - 7.75	17.7 - 21.4
4.125 - 128	13.36 - 13.41	162.0125 - 167.17	2310 - 2390	8.025 - 8.5	22.01 - 23.12
4.17725 - 4.17775	16.42 - 16.423	167.72 - 173.2	2483.5 - 2500	9.0 - 9.2	23.6 - 24.0
4.20725 - 4.20775	16.69475 - 16.69525	240 - 285	2655 - 2900	9.3 - 9.5	31.2 - 31.8
6.215 - 6.218	1680425 - 1680475	322 - 335.4	3260 - 3267	10.6 - 12.7	36.43 - 36.5
6.26775 - 6.26825	25.5 - 25.67	399.9 - 410	3332 - 3339	13.25 - 13.4	
6.31175 - 6.31225	37.5 - 38.25	608 - 614	3345.8 - 3358		
8.291 - 8.294	73 - 74.6	960 - 1240	3600 - 4400		
8.362 - 8.366	74.8 - 75.2	1300 - 1427			
8.37625 - 8.38675	108 - 121.94	1435 - 1626.5			
8.41425 - 8.41475	123 - 138	1645.5 - 1646.5			

Radiated disturbance of an intentional radiator:

Frequency	Field strength (μV/m)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	74.0	Peak	3
		54.0	Average	

Test Procedure

ANSI C63.10:2013 Section 6.4 & 6.5 & 6.6

Test Settings

1. For radiated emissions measurements performed at frequencies less than or equal to 1GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80cm above the reference ground plane.
2. For radiated emissions measurements performed at frequencies above 1GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 150cm above the ground plane.
3. Radiated measurements shall be made with the measurement antenna positioned in both horizontal and vertical polarization. The measurement antenna shall be varied from 1m to 4m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level (i.e, field strength or received power), when orienting the measurement antenna in vertical polarization, the minimum height of the lowest element of the antenna shall clear the site reference ground plane by at least 25cm.
4. For each suspected emission, the EUT was ranged its worst case and then tune the antenna tower(from 1~4m) and turntable(from 0~360°) find the maximum reading. Preamplifier and a high pass filter are used for the test in order get better signal level comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
7. spectrum analyzer setting:

   Measurements 30MHz ~ 1000MHz: RBW = 120 kHz; VBW ≥ 300 kHz; Detector = Peak

Measurements Above 1000MHz: RBW = 1 MHz; VBW ≥ 3 MHz; Detector = Peak

Average Measurements Above 1000MHz:

RBW = 1 MHz, VBW ≥ 1/T, with peak detector for average measurements.

8. The field strength is calculated by adding the Antenna Factor, Cable Factor. The basic equation with a sample calculation is as follows:

   Level = Reading(dBμV) + AF(dB/m) + Factor(dB):

   AF = Antenna Factor(dB/m)

   Factor = Cable Factor(dB) - Preamplifier gain(dB)

   Margin = Limit(dBμV/m) – Level(dBμV/m)

9. Repeat above procedures until all frequencies measured was complete.
10. Measure and record the results in the test report.

Test Notes

1. Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. the disturbance between 9KHz to 30MHz was very low. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be recorded, so only the harmonics had been displayed.
2. If the peak measurement value does not exceed the average limit, it is determined that further investigation is not necessary.

Test Setup

Refer to section 2.8.2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix.**

5 Test Setup Photos

The detailed test data see: **Test Setup Photos**

Appendix

DTS Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B-CDD	Ant6	2412	9.040	2407.480	2416.520	0.5	PASS
11B-CDD	Ant7	2412	8.080	2407.960	2416.040	0.5	PASS
11B-CDD	Ant6	2437	7.600	2433.440	2441.040	0.5	PASS
11B-CDD	Ant7	2437	8.080	2432.960	2441.040	0.5	PASS
11B-CDD	Ant6	2462	9.520	2456.960	2466.480	0.5	PASS
11B-CDD	Ant7	2462	8.080	2457.960	2466.040	0.5	PASS
11G-CDD	Ant6	2412	16.320	2403.840	2420.160	0.5	PASS
11G-CDD	Ant7	2412	15.360	2404.520	2419.880	0.5	PASS
11G-CDD	Ant6	2437	15.280	2429.440	2444.720	0.5	PASS
11G-CDD	Ant7	2437	16.280	2428.840	2445.120	0.5	PASS
11G-CDD	Ant6	2462	15.920	2453.840	2469.760	0.5	PASS
11G-CDD	Ant7	2462	15.280	2454.240	2469.520	0.5	PASS
11N20MIMO	Ant6	2412	15.040	2404.440	2419.480	0.5	PASS
11N20MIMO	Ant7	2412	14.960	2404.560	2419.520	0.5	PASS
11N20MIMO	Ant6	2437	16.720	2428.600	2445.320	0.5	PASS
11N20MIMO	Ant7	2437	15.880	2428.600	2444.480	0.5	PASS
11N20MIMO	Ant6	2462	15.960	2453.600	2469.560	0.5	PASS
11N20MIMO	Ant7	2462	16.480	2453.640	2470.120	0.5	PASS

Test Graphs

11B-CDD-Ant6-2412-PASS

11B-CDD-Ant7-2412-PASS

11B-CDD-Ant6-2437-PASS

11B-CDD-Ant7-2437-PASS

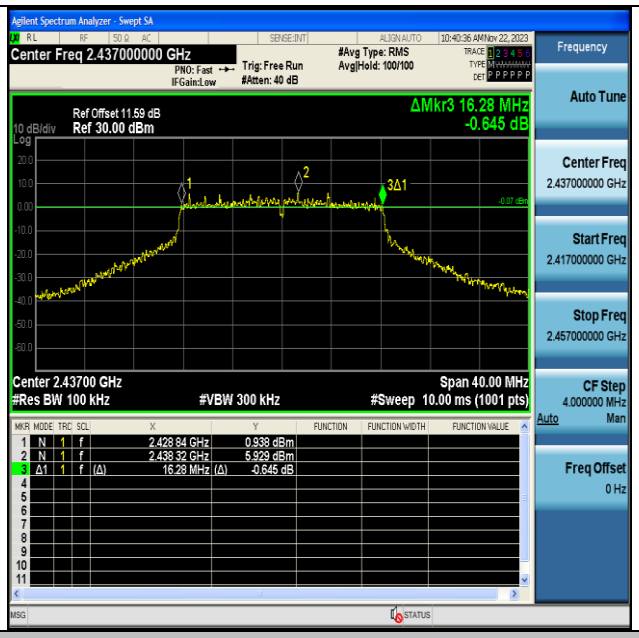
11B-CDD-Ant6-2462-PASS

11B-CDD-Ant7-2462-PASS

11G-CDD-Ant6-2412-PASS

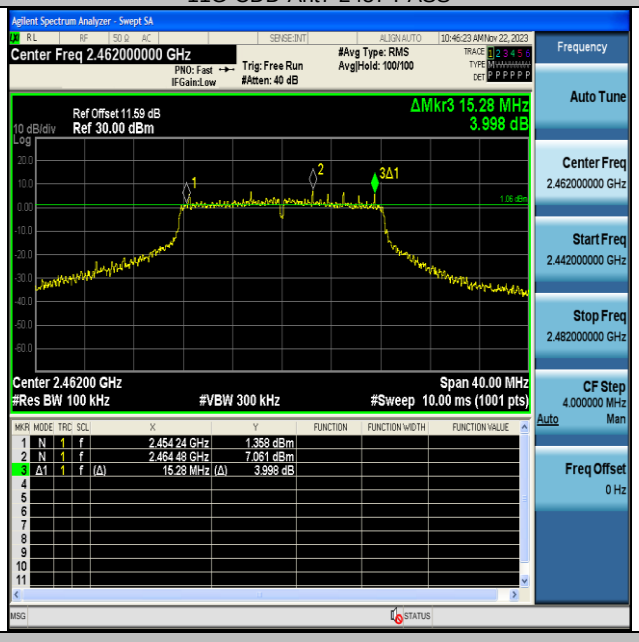
11G-CDD-Ant7-2412-PASS

11G-CDD-Ant6-2437-PASS



11G-CDD-Ant7-2437-PASS

11G-CDD-Ant6-2462-PASS

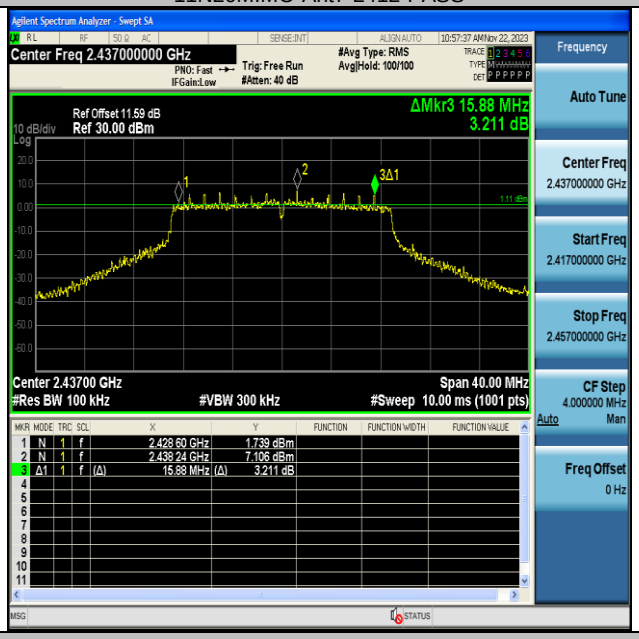


11G-CDD-Ant7-2462-PASS

11N20MIMO-Ant6-2412-PASS

11N20MIMO-Ant7-2412-PASS

11N20MIMO-Ant6-2437-PASS



11N20MIMO-Ant7-2437-PASS

11N20MIMO-Ant6-2462-PASS

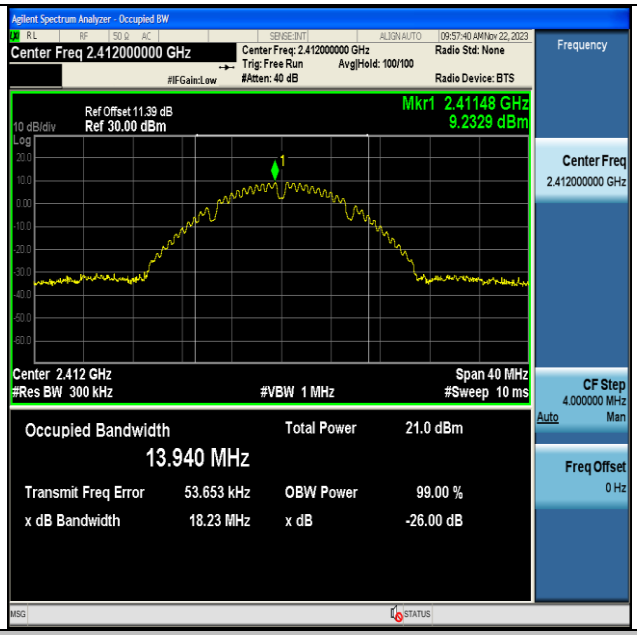
11N20MIMO-Ant7-2462-PASS

Occupied Channel Bandwidth

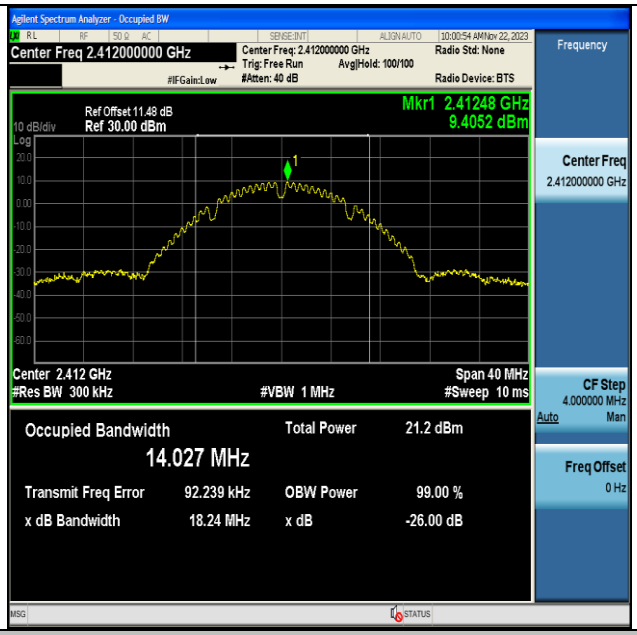
Test Result

TestMode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B-CDD	Ant6	2412	13.940	2405.0837	2419.0237	---	---
11B-CDD	Ant7	2412	14.027	2405.0787	2419.1057	---	---
11B-CDD	Ant6	2437	14.052	2430.0020	2444.0540	---	---
11B-CDD	Ant7	2437	13.989	2430.0198	2444.0088	---	---
11B-CDD	Ant6	2462	14.050	2454.8919	2468.9419	---	---
11B-CDD	Ant7	2462	14.080	2454.9683	2469.0483	---	---
11G-CDD	Ant6	2412	16.695	2403.6816	2420.3766	---	---
11G-CDD	Ant7	2412	16.550	2403.7226	2420.2726	---	---
11G-CDD	Ant6	2437	16.730	2428.6500	2445.3800	---	---
11G-CDD	Ant7	2437	16.683	2428.6491	2445.3321	---	---
11G-CDD	Ant6	2462	16.738	2453.5680	2470.3060	---	---
11G-CDD	Ant7	2462	16.615	2453.6305	2470.2455	---	---
11N20MIMO	Ant6	2412	17.863	2403.1062	2420.9692	---	---
11N20MIMO	Ant7	2412	17.793	2403.1174	2420.9104	---	---
11N20MIMO	Ant6	2437	17.916	2428.0766	2445.9926	---	---
11N20MIMO	Ant7	2437	17.919	2428.0139	2445.9329	---	---
11N20MIMO	Ant6	2462	17.901	2453.0031	2470.9041	---	---
11N20MIMO	Ant7	2462	17.820	2453.0289	2470.8489	---	---

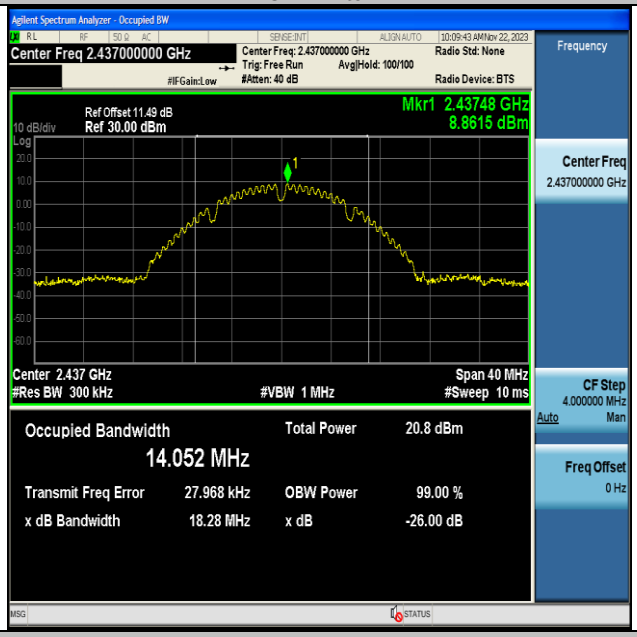
Test Graphs



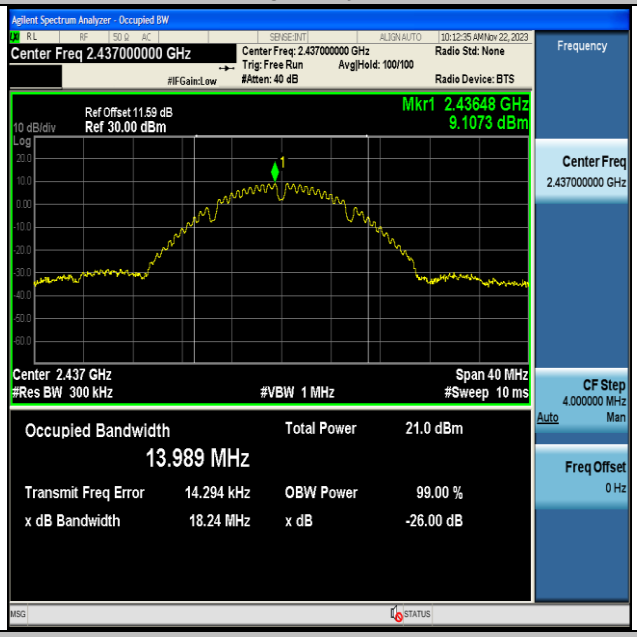
11B-CDD-Ant6-2412



11B-CDD-Ant7-2412



11B-CDD-Ant6-2437



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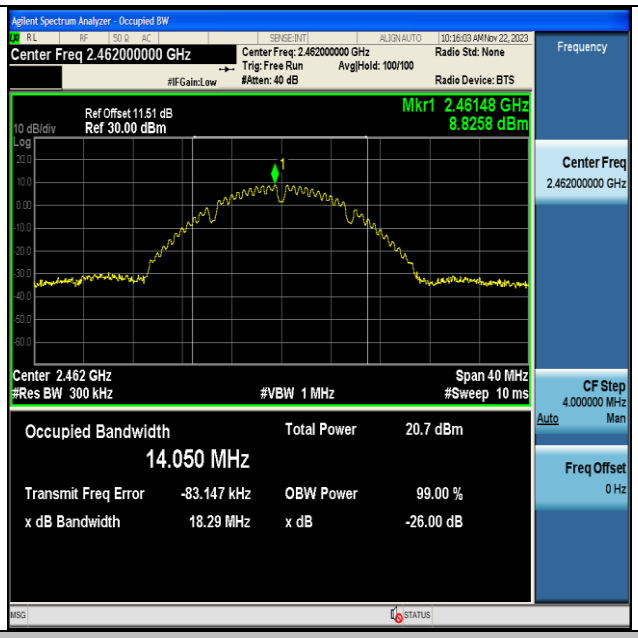
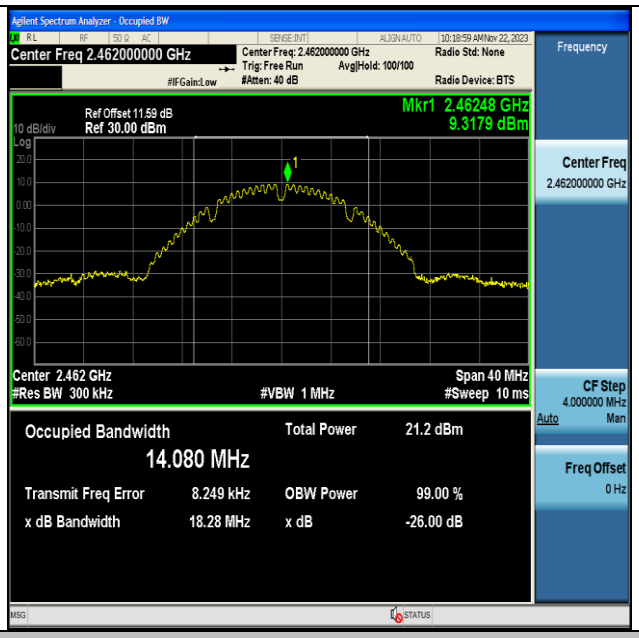
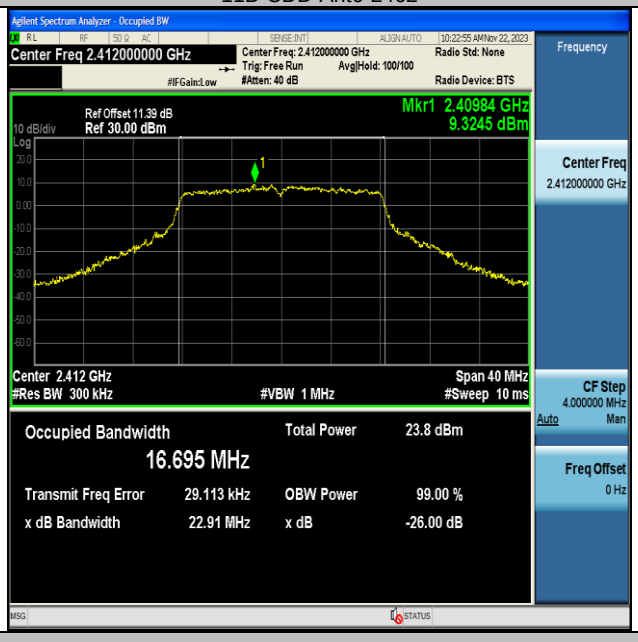


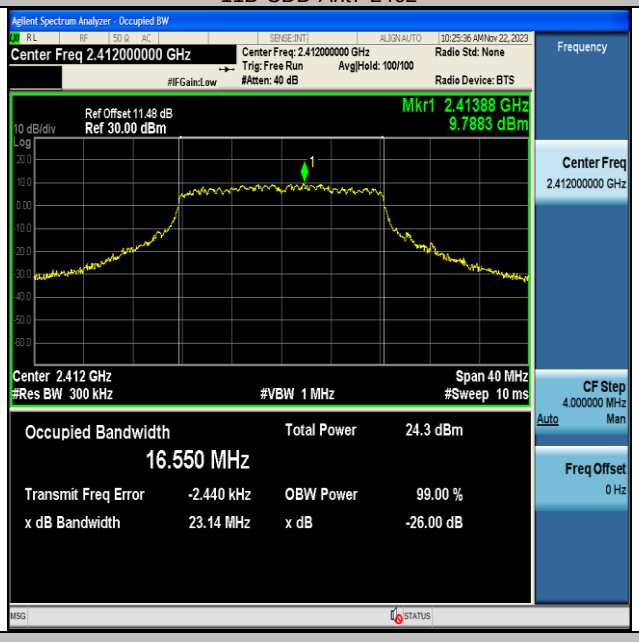
11B-CDD-Ant6-2462



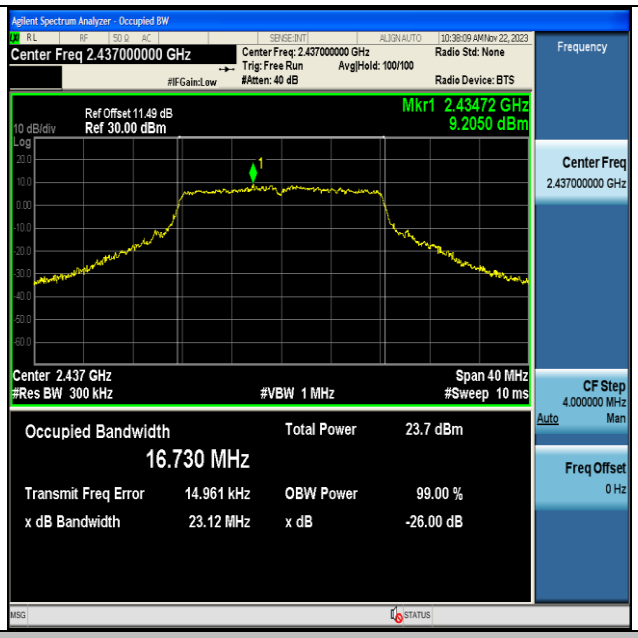
11B-CDD-Ant7-2462



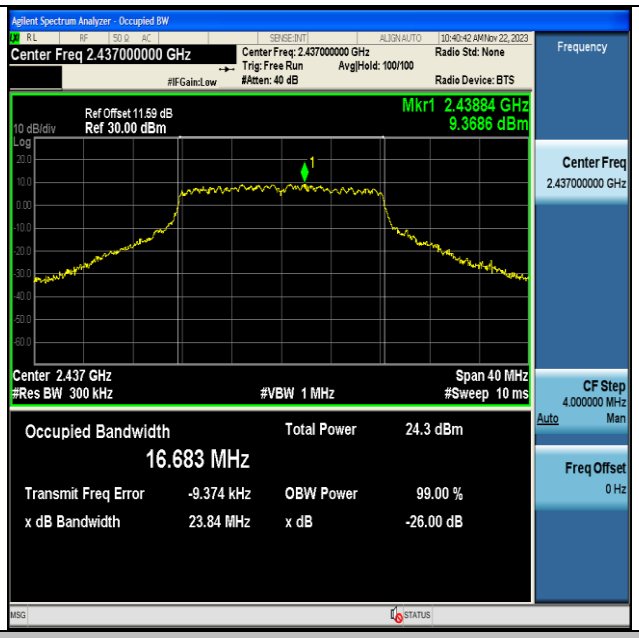
11G-CDD-Ant6-2412



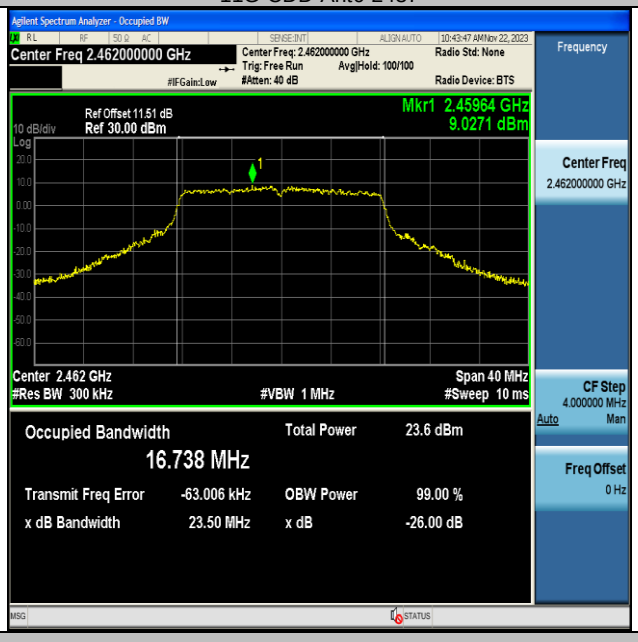
11G-CDD-Ant7-2412



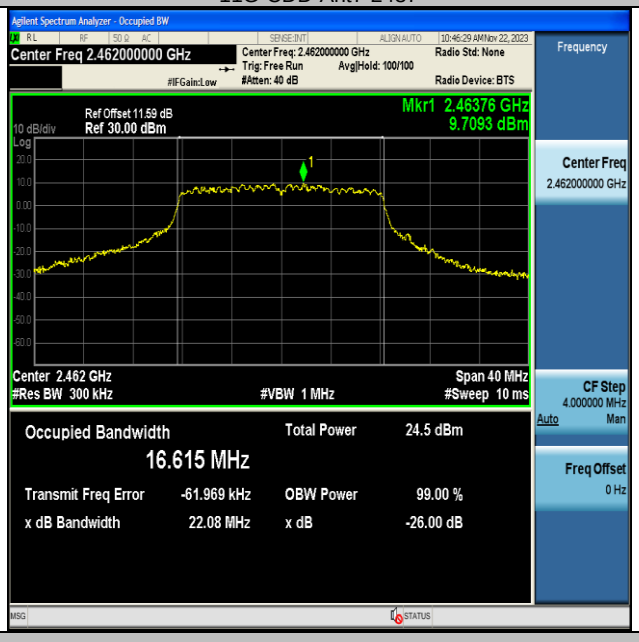
11G-CDD-Ant6-2437



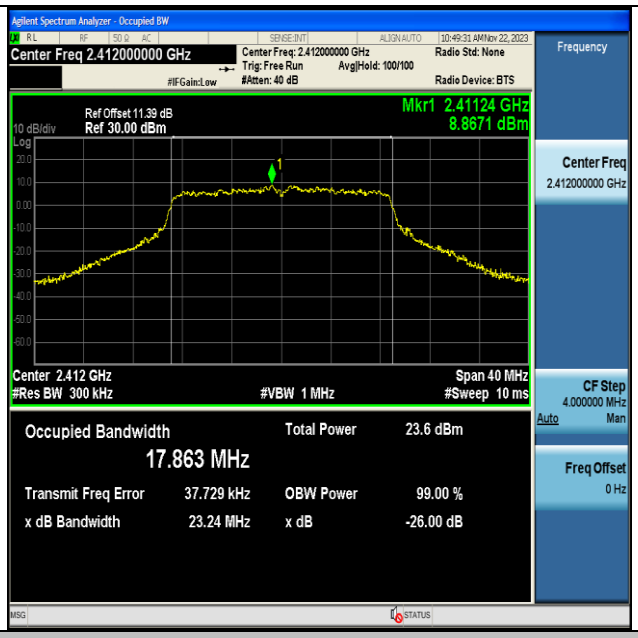
11G-CDD-Ant7-2437



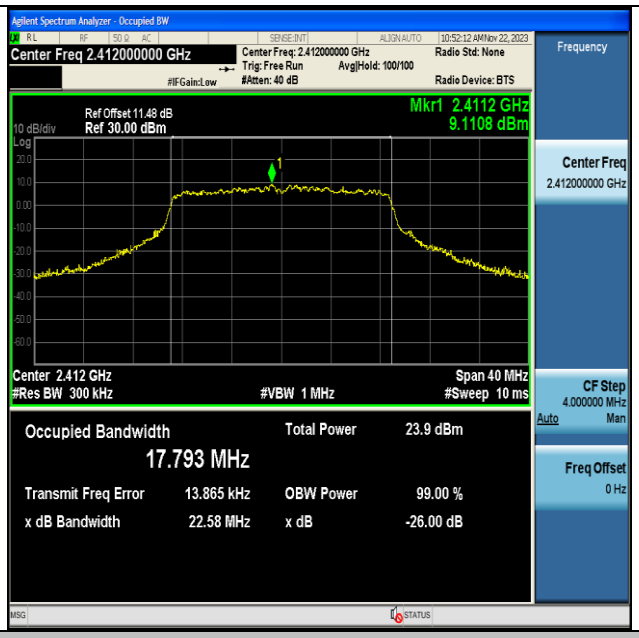
11G-CDD-Ant6-2462



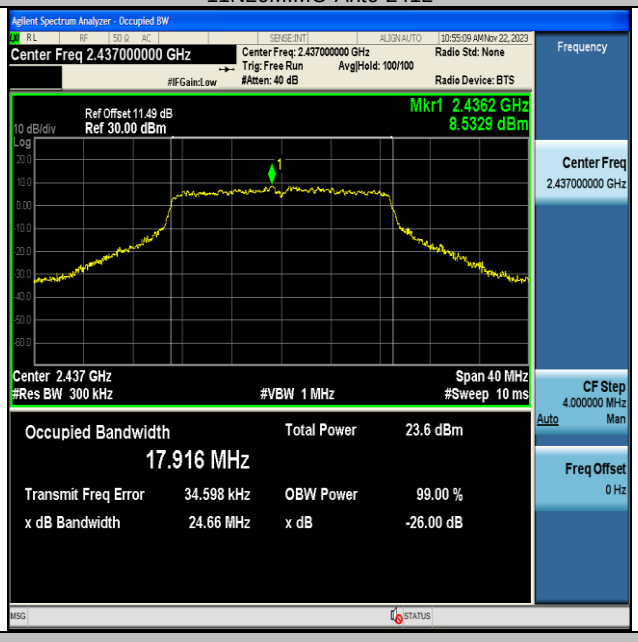
11G-CDD-Ant7-2462



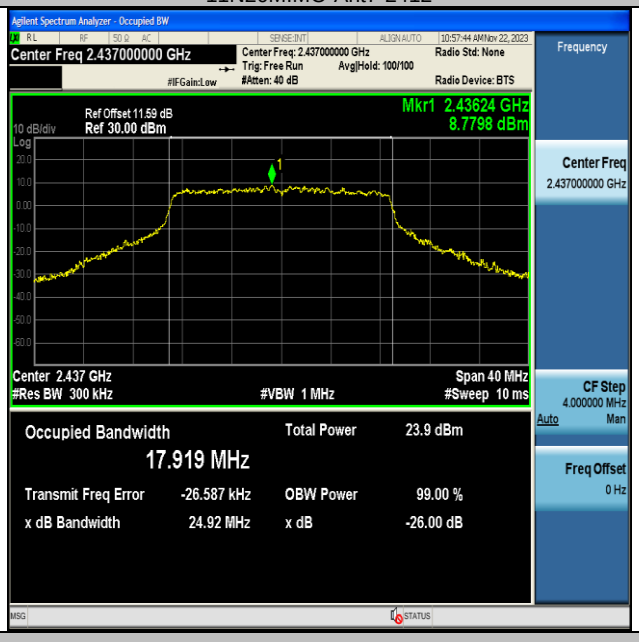
11N20MIMO-Ant6-2412



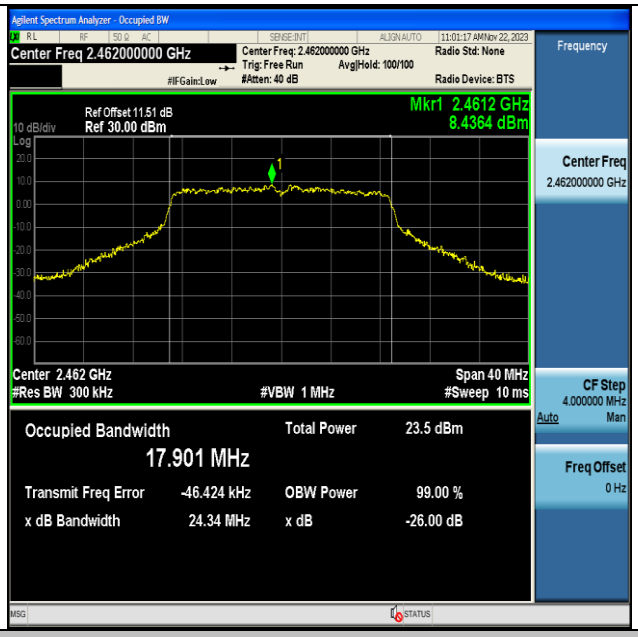
11N20MIMO-Ant7-2412



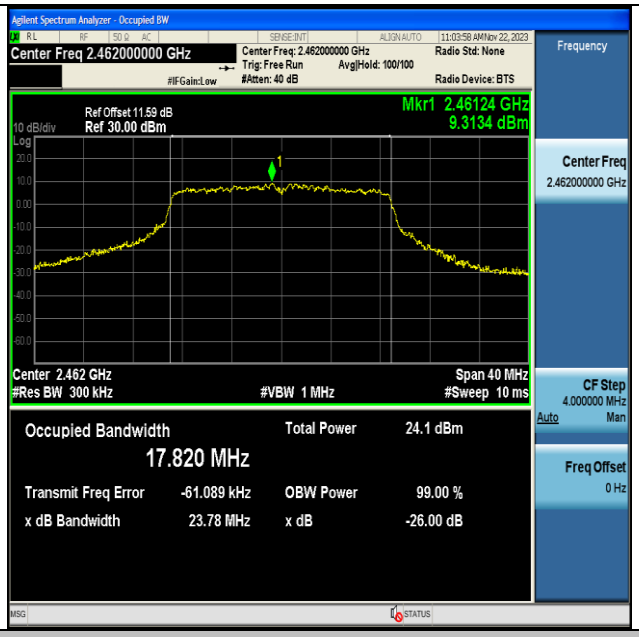
11N20MIMO-Ant6-2437



11N20MIMO-Ant7-2437



11N20MIMO-Ant6-2462



11N20MIMO-Ant7-2462

Maximum conducted output power

FCC ID: PY7-64228M (Lead Model)

Test Result Peak

TestMode	Antenna	Frequency[MHz]	Peak Power [dBm]	Conducted Limit[dBm]	Verdict
11B-CDD	Ant6	2412	19.38	30	PASS
11B-CDD	Ant7	2412	19.42	30	PASS
11B-CDD	total	2412	22.41	30	PASS
11B-CDD	Ant6	2437	19.43	30	PASS
11B-CDD	Ant7	2437	19.33	30	PASS
11B-CDD	total	2437	22.39	30	PASS
11B-CDD	Ant6	2462	19.52	30	PASS
11B-CDD	Ant7	2462	19.61	30	PASS
11B-CDD	total	2462	22.58	30	PASS
11G-CDD	Ant6	2412	19.98	30	PASS
11G-CDD	Ant7	2412	20.29	30	PASS
11G-CDD	total	2412	23.15	30	PASS
11G-CDD	Ant6	2437	20.03	30	PASS
11G-CDD	Ant7	2437	20.71	30	PASS
11G-CDD	total	2437	23.39	30	PASS
11G-CDD	Ant6	2462	20.28	30	PASS
11G-CDD	Ant7	2462	21.05	30	PASS
11G-CDD	total	2462	22.06	30	PASS
11N20MIMO	Ant6	2412	20.05	30	PASS
11N20MIMO	Ant7	2412	20.18	30	PASS
11N20MIMO	total	2412	23.13	30	PASS
11N20MIMO	Ant6	2437	20.07	30	PASS
11N20MIMO	Ant7	2437	20.61	30	PASS
11N20MIMO	total	2437	23.36	30	PASS
11N20MIMO	Ant6	2462	19.59	30	PASS
11N20MIMO	Ant7	2462	20.16	30	PASS
11N20MIMO	total	2462	22.89	30	PASS

Test Result Average

TestMode	Antenna	Frequency[MHz]	Average Power [dBm]	Conducted Limit[dBm]	Verdict
11B-CDD	Ant6	2412	16.96	30	PASS
11B-CDD	Ant7	2412	17.03	30	PASS
11B-CDD	total	2412	20.01	30	PASS
11B-CDD	Ant6	2437	16.88	30	PASS
11B-CDD	Ant7	2437	16.68	30	PASS
11B-CDD	total	2437	19.79	30	PASS
11B-CDD	Ant6	2462	16.94	30	PASS
11B-CDD	Ant7	2462	17.22	30	PASS
11B-CDD	total	2462	20.09	30	PASS
11G-CDD	Ant6	2412	15.05	30	PASS
11G-CDD	Ant7	2412	16.12	30	PASS
11G-CDD	total	2412	18.63	30	PASS
11G-CDD	Ant6	2437	15.12	30	PASS
11G-CDD	Ant7	2437	15.73	30	PASS
11G-CDD	total	2437	18.45	30	PASS
11G-CDD	Ant6	2462	15.25	30	PASS
11G-CDD	Ant7	2462	15.93	30	PASS
11G-CDD	total	2462	18.61	30	PASS
11N20MIMO	Ant6	2412	15.07	30	PASS
11N20MIMO	Ant7	2412	15.98	30	PASS
11N20MIMO	total	2412	18.56	30	PASS
11N20MIMO	Ant6	2437	15.12	30	PASS
11N20MIMO	Ant7	2437	15.68	30	PASS
11N20MIMO	total	2437	18.42	30	PASS
11N20MIMO	Ant6	2462	14.71	30	PASS
11N20MIMO	Ant7	2462	15.47	30	PASS
11N20MIMO	total	2462	18.12	30	PASS

FCC ID: PY7-73716J (This Model)

Test Result Peak

TestMode	Antenna	Frequency[MHz]	Peak Power [dBm]	Conducted Limit[dBm]	Verdict
11B-CDD	Ant6	2462	20.00	30	PASS
11B-CDD	Ant7	2462	19.25	30	PASS
11B-CDD	total	2462	22.65	30	PASS
11G-CDD	Ant6	2412	19.84	30	PASS
11G-CDD	Ant7	2412	19.88	30	PASS
11G-CDD	total	2412	22.87	30	PASS
11N20MIMO	Ant6	2412	19.89	30	PASS
11N20MIMO	Ant7	2412	19.96	30	PASS
11N20MIMO	total	2412	22.94	30	PASS

Test Result Average

TestMode	Antenna	Frequency[MHz]	Average Power [dBm]	Conducted Limit[dBm]	Verdict
11B-CDD	Ant6	2462	16.65	30	PASS
11B-CDD	Ant7	2462	17.53	30	PASS
11B-CDD	total	2462	20.12	30	PASS
11G-CDD	Ant6	2412	15.22	30	PASS
11G-CDD	Ant7	2412	16.33	30	PASS
11G-CDD	total	2412	18.82	30	PASS
11N20MIMO	Ant6	2412	14.87	30	PASS
11N20MIMO	Ant7	2412	15.74	30	PASS
11N20MIMO	total	2412	18.34	30	PASS

Maximum power spectral density

Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B-CDD	Ant6	2412	-8.98	≤8.00	PASS
11B-CDD	Ant7	2412	-7.54	≤8.00	PASS
11B-CDD	total	2412	-5.19	≤8.00	PASS
11B-CDD	Ant6	2437	-9.26	≤8.00	PASS
11B-CDD	Ant7	2437	-8.21	≤8.00	PASS
11B-CDD	total	2437	-5.69	≤8.00	PASS
11B-CDD	Ant6	2462	-8.71	≤8.00	PASS
11B-CDD	Ant7	2462	-7.83	≤8.00	PASS
11B-CDD	total	2462	-5.24	≤8.00	PASS
11G-CDD	Ant6	2412	-11.92	≤8.00	PASS
11G-CDD	Ant7	2412	-10.59	≤8.00	PASS
11G-CDD	total	2412	-8.19	≤8.00	PASS
11G-CDD	Ant6	2437	-12.38	≤8.00	PASS
11G-CDD	Ant7	2437	-10.54	≤8.00	PASS
11G-CDD	total	2437	-8.35	≤8.00	PASS
11G-CDD	Ant6	2462	-11.70	≤8.00	PASS
11G-CDD	Ant7	2462	-10.06	≤8.00	PASS
11G-CDD	total	2462	-7.79	≤8.00	PASS
11N20MIMO	Ant6	2412	-12.00	≤8.00	PASS
11N20MIMO	Ant7	2412	-10.40	≤8.00	PASS
11N20MIMO	total	2412	-8.12	≤8.00	PASS
11N20MIMO	Ant6	2437	-12.49	≤8.00	PASS
11N20MIMO	Ant7	2437	-11.32	≤8.00	PASS
11N20MIMO	total	2437	-8.86	≤8.00	PASS
11N20MIMO	Ant6	2462	-10.93	≤8.00	PASS
11N20MIMO	Ant7	2462	-10.40	≤8.00	PASS
11N20MIMO	total	2462	-7.65	≤8.00	PASS

Test Graphs

11B-CDD-Ant6-2412-PASS

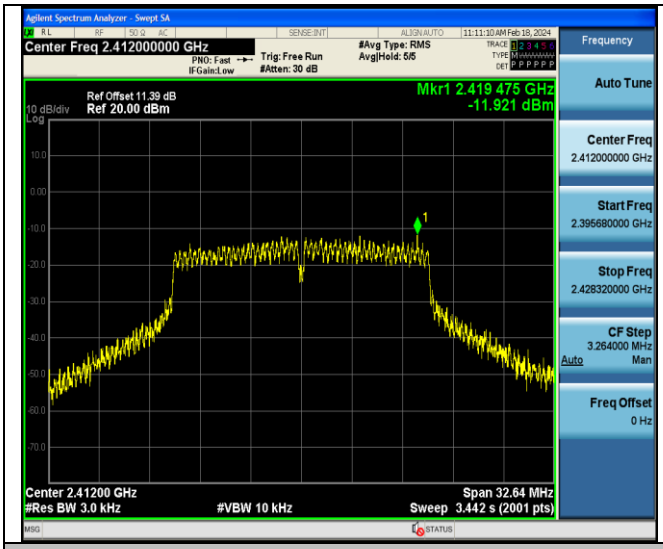
11B-CDD-Ant7-2412-PASS

11B-CDD-Ant6-2437-PASS

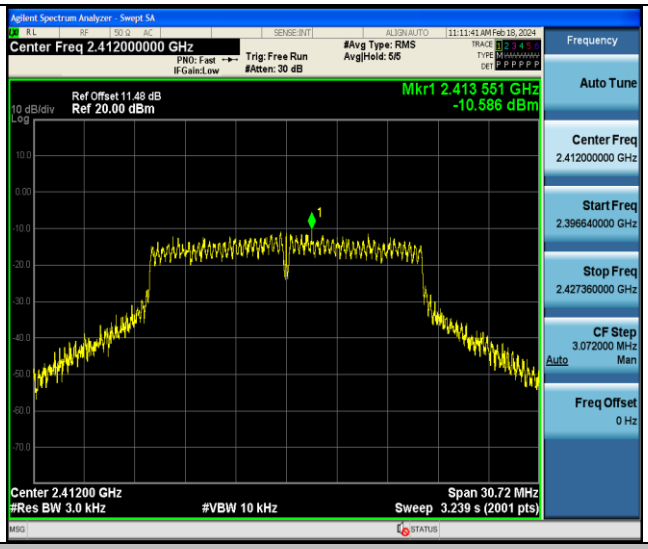
11B-CDD-Ant7-2437-PASS

11B-CDD-Ant6-2462-PASS

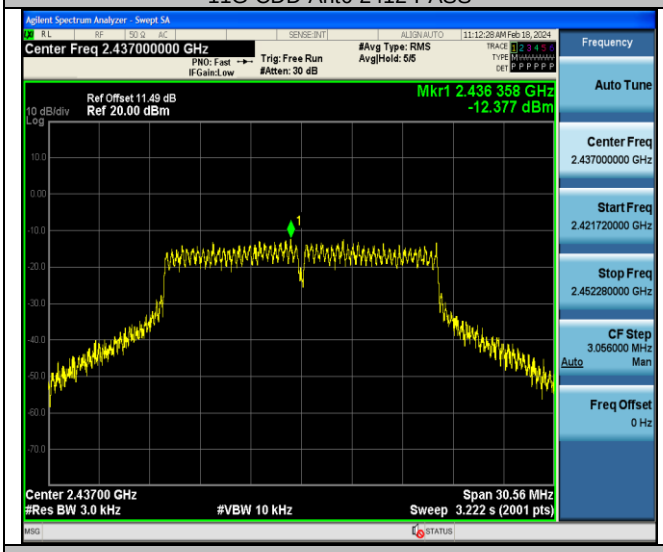
11B-CDD-Ant7-2462-PASS



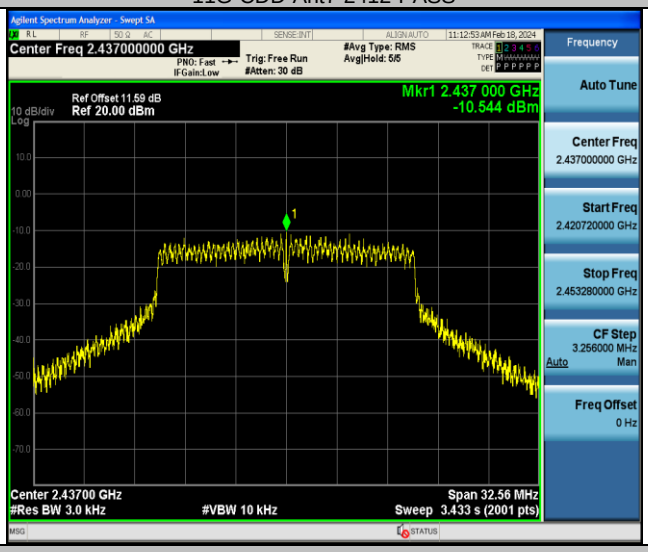
11G-CDD-Ant6-2412-PASS



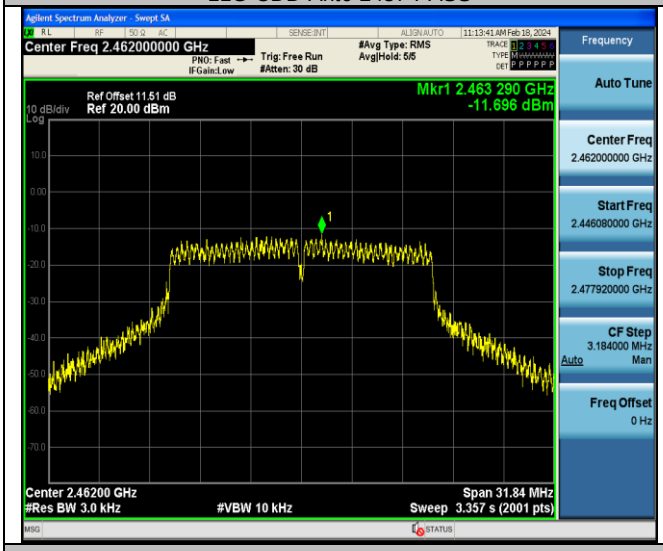
11G-CDD-Ant7-2412-PASS



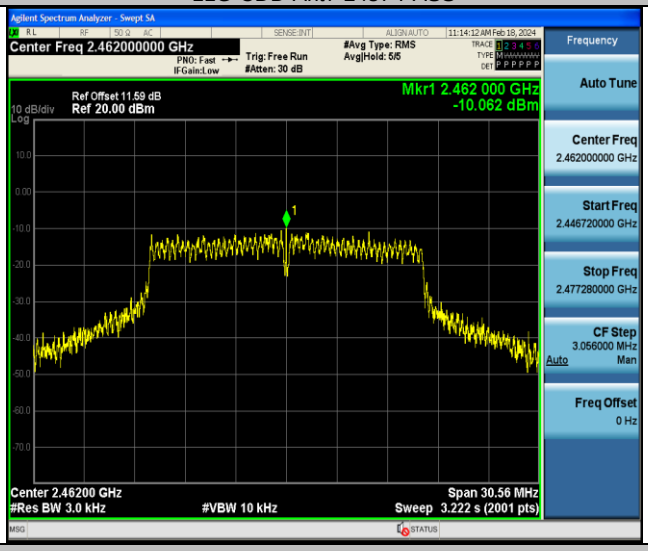
11G-CDD-Ant6-2437-PASS



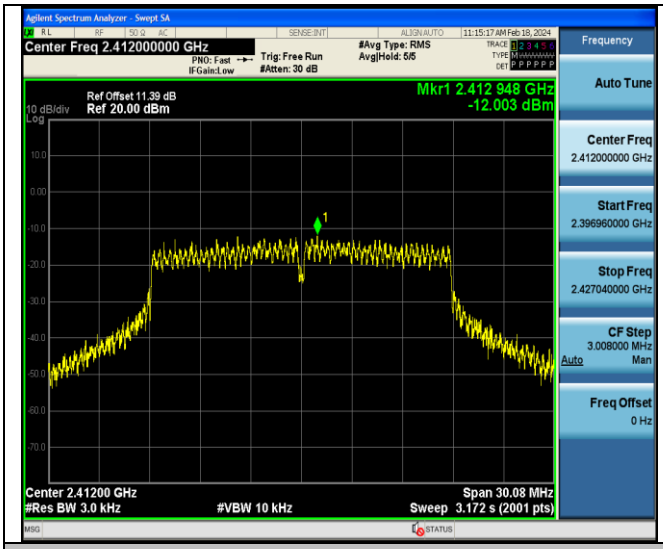
11G-CDD-Ant7-2437-PASS



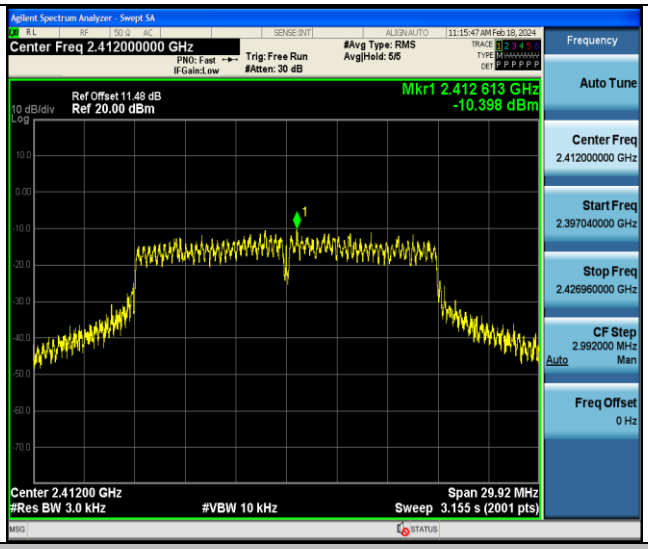
11G-CDD-Ant6-2462-PASS



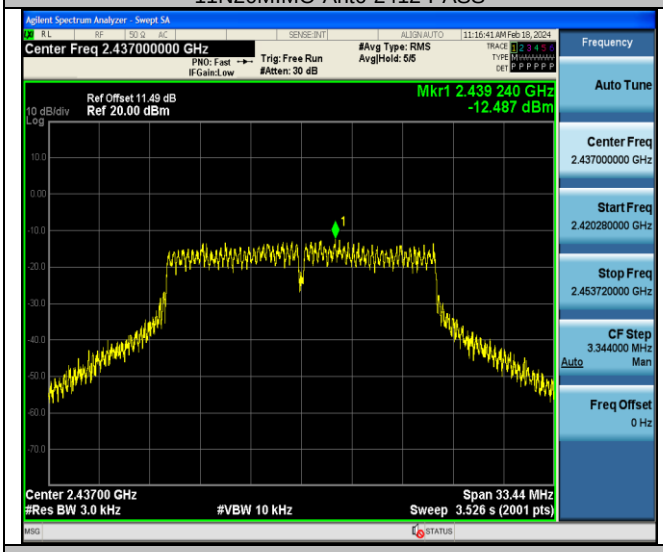
11G-CDD-Ant7-2462-PASS



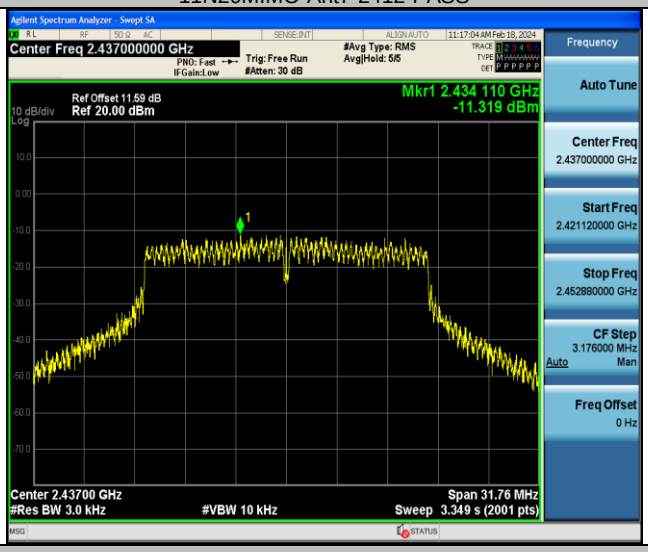
11N20MIMO-Ant6-2412-PASS



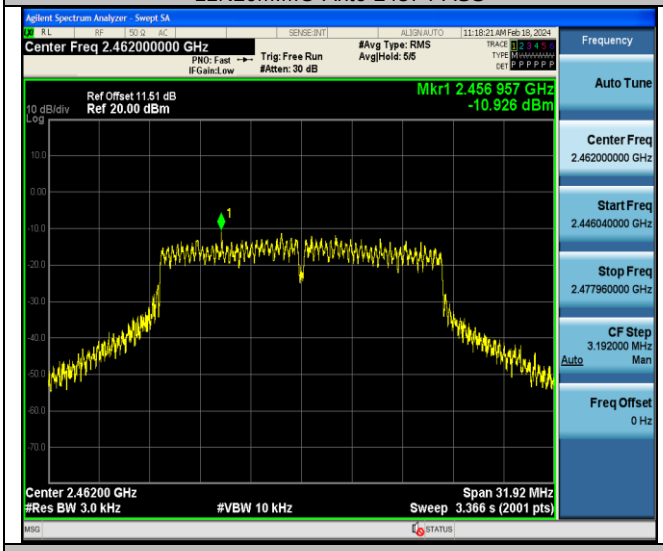
11N20MIMO-Ant7-2412-PASS



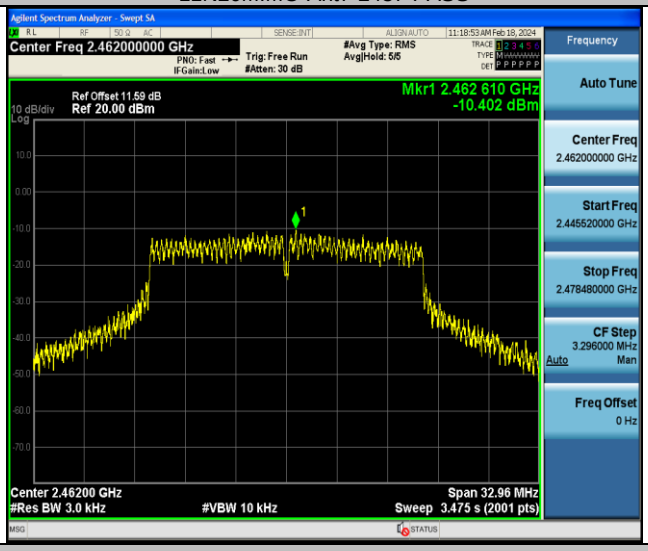
11N20MIMO-Ant6-2437-PASS



11N20MIMO-Ant7-2437-PASS



11N20MIMO-Ant6-2462-PASS



11N20MIMO-Ant7-2462-PASS

Band edge measurements

Test Result

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B-CDD	Ant6	Low	2412	8.24	-37.95	≤-11.76	PASS
11B-CDD	Ant7	Low	2412	9.22	-32.3	≤-10.78	PASS
11B-CDD	Ant6	High	2462	8.32	-46.29	≤-11.68	PASS
11B-CDD	Ant7	High	2462	9.55	-45.98	≤-10.45	PASS
11G-CDD	Ant6	Low	2412	4.16	-26.84	≤-15.84	PASS
11G-CDD	Ant7	Low	2412	6.77	-25.48	≤-13.23	PASS
11G-CDD	Ant6	High	2462	5.34	-44.39	≤-14.66	PASS
11G-CDD	Ant7	High	2462	6.84	-38.24	≤-13.17	PASS
11N20MIMO	Ant6	Low	2412	4.29	-25.76	≤-15.71	PASS
11N20MIMO	Ant7	Low	2412	6.37	-21.71	≤-13.63	PASS
11N20MIMO	Ant6	High	2462	5.79	-42.68	≤-14.21	PASS
11N20MIMO	Ant7	High	2462	7.09	-37.31	≤-12.91	PASS