Prüfbericht-Nr.: *Test report no.*:	**CN24QLIU 003**	**Auftrags-Nr.:** *Order no.*:	168500420	Seite 1 von 21 *Page 1 of 21*
Kunden-Referenz-Nr.: *Client reference no.*:	N/A	**Auftragsdatum:** *Order date:*	2024-08-20	
Auftraggeber: *Client*:	ECARX (Hubei) Tech Co., Ltd B1336, Taizi Lake Industry Park, No 18 ShenLong AVE, WH, China			
Prüfgegenstand: *Test item*:	ECU-Display Head Unit			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	EEBABCDE1			
Auftrags-Inhalt: *Order content*:	Test Report			
Prüfgrundlage: *Test specification*:	CFR47 FCC Part 15: Subpart C Section 15.247 RSS-247 Issue 3 August 2023 RSS-Gen Issue 5 February 2021			

Wareneingangsdatum: *Date of sample receipt*:	2024-09-02	Please refer to Photo Document
Prüfmuster-Nr.: *Test sample no:*	S202409024250-ZJA01/2 S202409024250-ZJA02/2	
Prüfzeitraum: *Testing period*:	2024-09-02 - 2024-09-27	
Ort der Prüfung: *Place of testing*:	Refer to section 2.1	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüfergebnis*: *Test result**:	Pass	

geprüft von: tested by:	X Hardy Suo	**genehmigt von:** *authorized by*:	X Lin Lin
Datum: *Date:* 2024-10-12		**Ausstellungsdatum:** *Issue date:* 2024-10-12	
Stellung / Position:	Sachverständige(r)/Expert	**Stellung** / Position:	Sachverständige(r)/Expert

Sonstiges / *Other*:
FCC ID: 2BD49-EEBABCDE1
IC: 31788-EEBABCDE1, HVIN: EEBABCDE1

This report is for 2.4GHz Wi-Fi.

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*: Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* *Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Prüfbericht-Nr.: CN24QLIU 003
Test report no.:

Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
2	Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben. Informationen zur Verifizierung der Authentizität unserer Dokumente erhalten Sie auf folgender Webseite: go.tuv.com/digital-signature *As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. For information on verifying the authenticity of our documents, please visit the following website: go.tuv.com/digital-signature*
3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.* *Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.*
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. *The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the “Zero Guard Band Rule” and “Simple Acceptance” in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.*

Test Summary

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER
RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY
RESULT: Pass

5.1.4 99%DB BANDWIDTH
RESULT: Pass

5.1.5 6DB BANDWIDTH
RESULT: Pass

5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH
RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION
RESULT: Pass

Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of 2.4GHz Wi-Fi.

Appendix B: Photographs of the Test Set-up.

2 Test Sites

2.1 Test Facilities

Shenzhen UnionTrust Quality and Technology Co., Ltd.
Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

FCC Accreditation Designation No.: CN1194

ISED CAB identifier: CN0032

The tests at the test sites have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☒	3m SAC	ETS-LINDGREN	3m	Euroshiedpn-CT001270-1317	11-Nov-2023	10-Nov-2026
☒	Receiver	R&S	ESIB26	100114	27-Oct-2023	26-Oct-2024
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	29-Mar-2024	28-Mar-2025
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	30-Oct-2023	29-Oct-2024
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	30-Oct-2023	29-Oct-2024
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	30-Oct-2023	29-Oct-2024
☒	Preamplifier	HP	8447F	2805A02960	31-Oct-2023	30-Oct-2024
☒	Band Rejection Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50702	G248	27-Oct-2023	26-Oct-2024
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	1-Apr-2024	31-Mar-2025
☒	Pre-amplifier	ETS-Lindgren	00118385	00201874	1-Apr-2024	31-Mar-2025
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	30-Oct-2023	29-Oct-2024
☒	Pre-amplifier	ETS-Lindgren	00118384	00202652	30-Oct-2023	29-Oct-2024
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted RF test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	29-Mar-2024	28-Mar-2025
☒	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	27-Oct-2023	26-Oct-2024

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Table 2: Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radiated emission 9kHz-30MHz	± 4.7 dB
2	Radiated emission 30MHz-1GHz	± 4.9 dB
3	Radiated emission 1GHz-18GHz	± 4.8 dB
4	Radiated emission 18GHz-26GHz	± 5.1 dB
5	Radiated emission 26GHz-40GHz	± 5.1 dB
6	Conducted spurious emissions	± 2.7 dB
7	RF Power, Conducted	± 0.68 dB
8	Occupied Bandwidth	± 1.86 %
9	Radio Frequency	2.4 GHz: ± 6.5 x 10^{-8}
10	Transmission Time	± 0.19 %

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The Shenzhen UnionTrust Quality and Technology Co., Ltd. Test facility located at Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is an ECU-Display Head Unit intended to be assembled into automotive environment, which supports FM, GNSS, Bluetooth (dual mode), 2.4G Wi-Fi and 5.2G/5.8G Wi-Fi technologies.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment:	ECU-Display Head Unit
Type Designation:	EEBABCDE1
FCC ID:	2BD49-EEBABCDE1
IC:	31788-EEBABCDE1
HVIN:	EEBABCDE1
Operating Voltage:	DC 9-16V
Testing Voltage:	DC 12V
Operating Temperature Range:	-40 °C ~ +75 °C
Operating Frequency Mode:	Bluetooth: Classic BR, EDR + BLE 2.4G Wi-Fi: 802.11 b/g/n20/n40/ax20/ax40 5.2G/5.8G Wi-Fi: 802.11 a/n20/n40/ac20/ac40/ac80/ax20/ax40/ax80 FM: 88-108MHz GNSS (1559-1610MHz): BDS, Galileo, GLONASS, GPS, SBAS
Technical Specification of Bluetooth (dual mode)	
Operating Frequency:	2402 MHz to 2480 MHz
Type of Modulation:	GFSK, π/4-DQPSK, 8DPSK
Channel Number:	BR & EDR mode:79 channels, Low Energy mode:40 channels
Channel Separation:	BR & EDR mode:1MHz, Low Energy mode:2MHz
Data Rate:	BR & EDR mode: 1Mbps, 2Mbps, 3Mbps Low Energy mode: 1Mbps, 2Mbps
Antenna Type:	Integral Antenna
Antenna Gain:	3.6 dBi Max. (declared by client)
Technical Specification of 2.4GHz Wi-Fi	
Operating Frequency:	2412 - 2462MHz for 802.11b/g/n(HT20)/ax(HE)20 2422 - 2452MHz for 802.11n(HT40)/ax(HE40)
Type of Modulation:	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM) OFDMA(BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM)
Data Rate:	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 for 802.11n MCS0~MCS11 for 802.11ax

Channel Number:	11 channels for 802.11b/g/n(HT20)/ax(HE)20 7 channels for 802.11n(HT40)/ax(HE40)
Channel Separation:	5 MHz
Antenna Type:	Integral Antenna
Antenna Number:	1Tx1Rx Note: EEBABCDE1 has two Wi- Fi Antennas (ANT1 and ANT2), and ANT2 disabled by client via firmware and cannot works.
Antenna Gain:	3.6 dBi Max. (declared by client)
Technical Specification of 5.2GHz Wi-Fi	
Operating Frequency:	5180 - 5240MHz, 802.11 a/n20/n40/ac20/ac40/ac80/ax20/ax40/ax80
Type of Modulation:	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) OFDMA (BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM)
Data Rate:	6/9/12/18/24/36/48/54 Mbps for 802.11a MCS0~MCS15 for 802.11n/ac MCS0~MCS11 for 802.11ax
Channel Number:	7 channels
Channel Separation:	20MHz, 40MHz, 80MHz
Antenna Type:	Integral Antenna
Antenna Number:	1Tx1Rx Note: EEBABCDE1 has two Wi- Fi Antennas (ANT1 and ANT2), and ANT2 disabled by client via firmware and cannot works.
Antenna Gain:	5.9 dBi Max. (Provided by the Client)
Technical Specification of 5.8GHz Wi-Fi	
Operating Frequency:	5745 - 5825MHz, 802.11 a/n20/n40/ac20/ac40/ac80/ax20/ax40/ax80
Type of Modulation:	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Data Rate:	6/9/12/18/24/36/48/54 Mbps for 802.11a MCS0~MCS15 for 802.11n/ac MCS0~MCS11 for 802.11ax
Channel Number:	8 channels
Channel Separation:	20MHz, 40MHz, 80MHz
Antenna Type:	Integral Antenna
Antenna Number:	1Tx1Rx Note: EEBABCDE1 has two Wi- Fi Antennas (ANT1 and ANT2), and ANT2 disabled by client via firmware and cannot works.
Antenna Gain:	7.6 dBi Max. (declared by client)

Table 4: RF Channel and Frequency of 2.4GHz Wi-Fi

RF Channel	802.11 b/g/n(HT20)/ax(HE20)	802.11 n(HT40)/ax(HE40)
	Frequency (MHz)	Frequency (MHz)
01	**2412**	**/**
02	2417	/
03	2422	**2422**
04	2427	2427
05	2432	2432
06	**2437**	**2437**
07	2442	2442
08	2447	2447
09	2452	**2452**
10	2457	/
11	**2462**	**/**

Test frequencies are lowest channel: 2412 MHz, middle channel: 2437 MHz and highest channel: 2462 MHz for 802.11b/g/n(HT20)/ax(HE20)
Test frequencies are lowest channel: 2422 MHz, middle channel: 2437 MHz and highest channel: 2452 MHz for 802.11n(HT40)/ax(HE40)

3.3 Independent Operation Modes

The basic operation modes are:

A. On, 2.4GHz Wi-Fi transmitting mode
   1) Low Channel
   2) Middle Channel
   3) High Channel

B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- ID Label and Location Info
- Schematics
- Operation Description

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model EEBABCDE1 in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	DELL	Latitude 3400	16238087894	UnionTrust
Mouse	LENOVO	MS-370	609013974	UnionTrust
High Speed Power Supplies	Keithley	2303	N/A	UnionTrust

The device is powered by rechargeable battery during test.

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.1Meter	Applicant
2	Antenna Cable	SMA	0.1Meter	Applicant

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

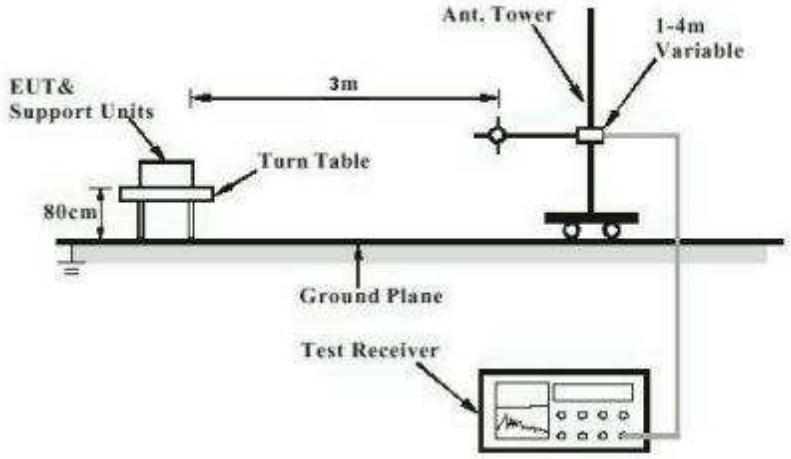


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

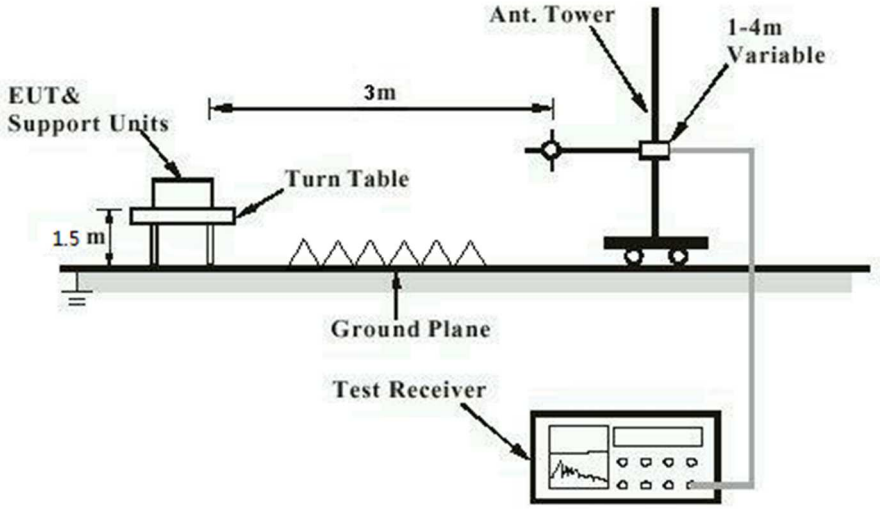
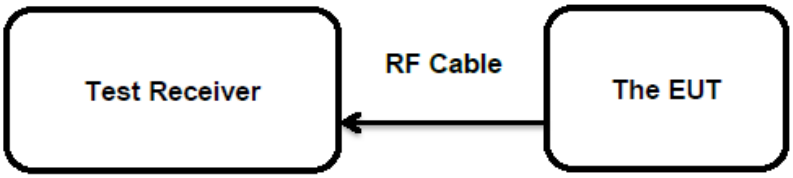


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(b)(4) and Part 15.203 RSS-Gen Clause 6.8
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has an Integral Antenna, the directional gain of antenna is 3.6dBi for 2.4GHz Wi-Fi, and the antenna connector is designed with permanent attachment and no consideration of replacement.

Therefore, the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Peak Conducted Output Power

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(b)(3) RSS-247 Clause 5.4(d)
Basic standard	:	ANSI C63.10: 2013
Limits	:	< 1 W (Maximum Conducted Peak Power) e.i.r.p. <4W
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-09-02 to 2024-09-24
Input voltage	:	DC 12V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	22.8 ℃
Relative humidity	:	46.8 %
Atmospheric pressure	:	99.8 kPa

For details refer to following test result.

Table 6: Test Result of Maximum Peak Conducted Output Power

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
			(dBm)	(W)	
802.11b	1 Mbps	2412	13.19	0.0208	< 1.0
		2437	12.66	0.0185	
		2462	12.25	0.0168	
802.11g	6 Mbps	2412	20.28	0.1067	
		2437	20.19	0.1045	
		2462	19.39	0.0869	
802.11n (HT20)	MCS0	2412	21.10	0.1288	
		2437	21.23	0.1327	
		2462	20.34	0.1081	
802.11n (HT40)	MCS0	2422	21.32	0.1355	
		2437	21.38	0.1374	
		2452	21.48	0.1406	
802.11ax (HE20)	MCS0	2412	21.22	0.1324	
		2437	21.47	0.1403	
		2462	20.60	0.1148	
802.11ax (HE40)	MCS0	2422	21.34	0.1361	
		2437	21.52	0.1419	
		2452	21.70	0.1479	

Max. e.i.r.p.=21.70dBm+3.6dBi=25.30dBm, which is less than 36dBm=4W.

Note:

1) The cable loss is taken into account in results.
2) Antenna gain(G) of 2.4GHz Wi-Fi: 3.6dBi
   e.i.r.p.=$P_{(Peak\ power)}$+ G, which is far below the 4 W

5.1.3 Conducted Power Spectral Density

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(e) RSS-247 Clause 5.2(b)
Basic standard	:	ANSI C63.10: 2013
Limits	:	8 dBm / 3kHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-09-02 to 2024-09-24
Input voltage	:	DC 12V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	22.8 ℃
Relative humidity	:	46.8 %
Atmospheric pressure	:	99.8 kPa

For the measurement records, refer to the appendix A.

5.1.4 99%dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	RSS-Gen clause 6.7
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-09-02 to 2024-09-24
Input voltage	:	DC 12V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	22.8 ℃
Relative humidity	:	46.8 %
Atmospheric pressure	:	99.8 kPa

For the measurement records, refer to the appendix A.

5.1.5 6dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(a)(2) RSS-247 Clause 5.2(a)
Basic standard	:	ANSI C63.10: 2013
Limits	:	> 500 KHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-09-02 to 2024-09-24
Input voltage	:	DC 12V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	22.8 ℃
Relative humidity	:	46.8 %
Atmospheric pressure	:	99.8 kPa

For the measurement records, refer to the appendix A.

5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) RSS-247 Clause 5.5
Basic standard	:	ANSI C63.10: 2013
Limits	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-09-02 to 2024-09-24
Input voltage	:	DC 12V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	22.8 ℃
Relative humidity	:	46.8 %
Atmospheric pressure	:	99.8 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix A.

5.1.7 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3 & 5.5
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Table 5
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2024-09-24 to 2024-09-27
Input voltage	:	DC 12V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	Refer to test result
Relative humidity	:	Refer to test result
Atmospheric pressure	:	Refer to test result

Remark:
Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix A.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix B.

7 List of Tables

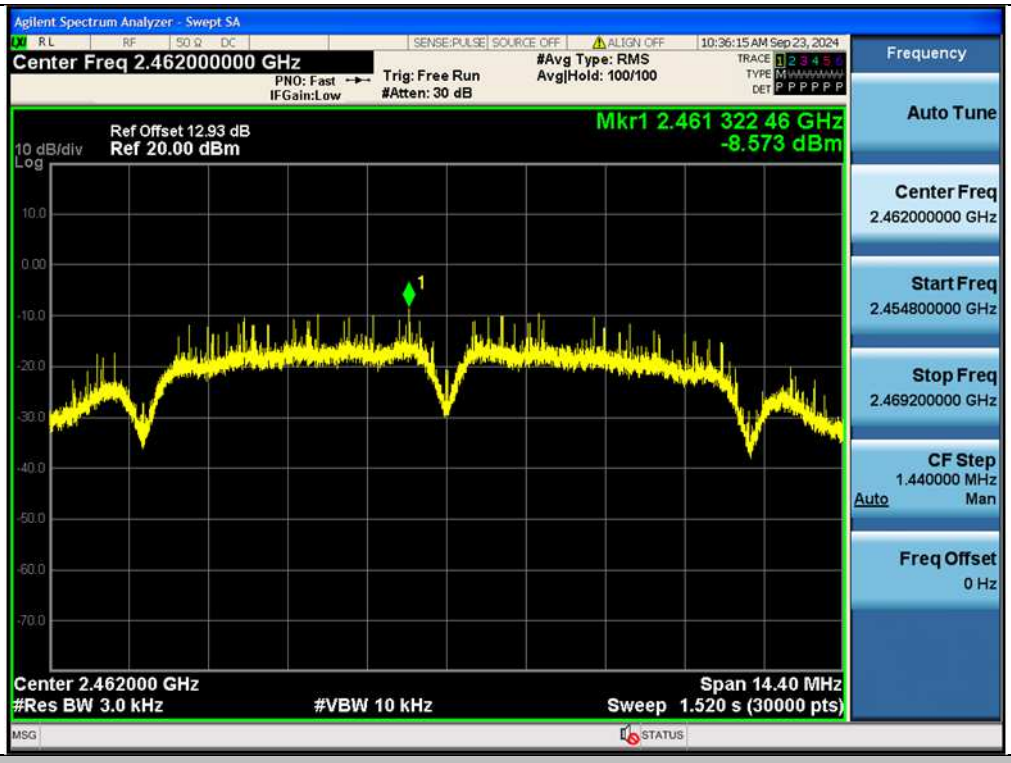
Appendix A: Test Results of 2.4GHz Wi-Fi

Appendix A.1: Test Results of Conducted Power Spectral Density

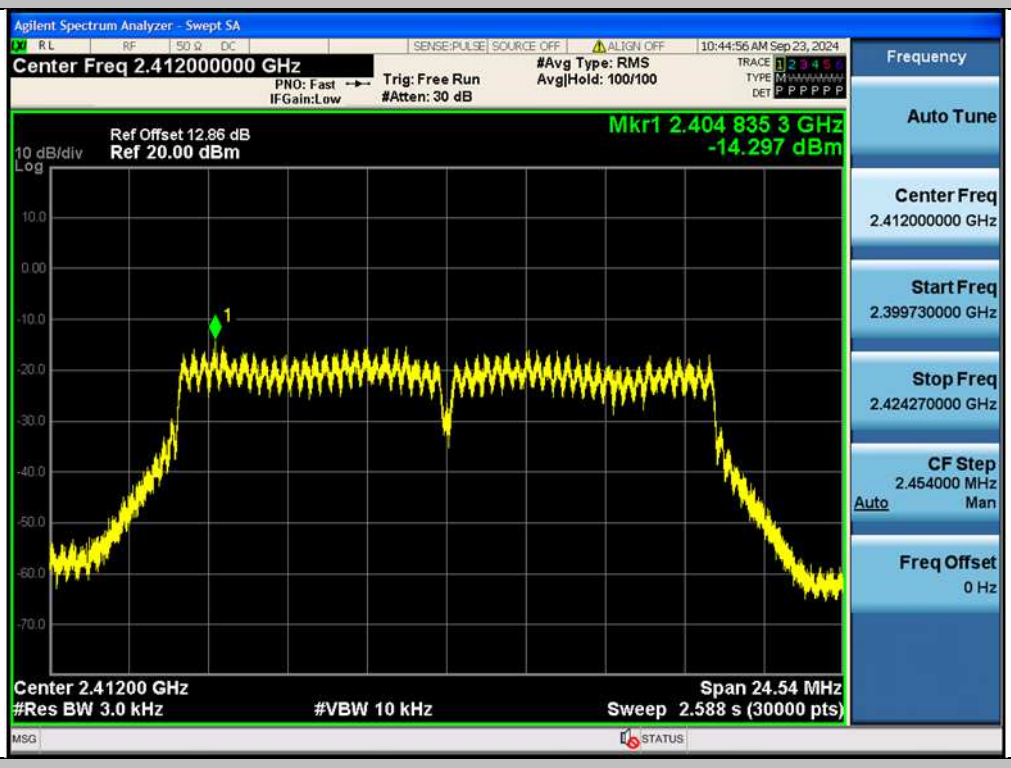
TestMode	Antenna	Frequency[MHz]	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-7.72	≤8.00	PASS
11B	Ant1	2437	-8.22	≤8.00	PASS
11B	Ant1	2462	-8.57	≤8.00	PASS
11G	Ant1	2412	-14.30	≤8.00	PASS
11G	Ant1	2437	-14.17	≤8.00	PASS
11G	Ant1	2462	-14.95	≤8.00	PASS
11N20SISO	Ant1	2412	-12.98	≤8.00	PASS
11N20SISO	Ant1	2437	-12.96	≤8.00	PASS
11N20SISO	Ant1	2462	-14.62	≤8.00	PASS
11N40SISO	Ant1	2422	-15.52	≤8.00	PASS
11N40SISO	Ant1	2437	-15.39	≤8.00	PASS
11N40SISO	Ant1	2452	-15.51	≤8.00	PASS
11AX20SISO	Ant1	2412	-13.54	≤8.00	PASS
11AX20SISO	Ant1	2437	-13.73	≤8.00	PASS
11AX20SISO	Ant1	2462	-14.49	≤8.00	PASS
11AX40SISO	Ant1	2422	-16.61	≤8.00	PASS
11AX40SISO	Ant1	2437	-16.11	≤8.00	PASS
11AX40SISO	Ant1	2452	-15.50	≤8.00	PASS

11B-Ant1-2412-PASS

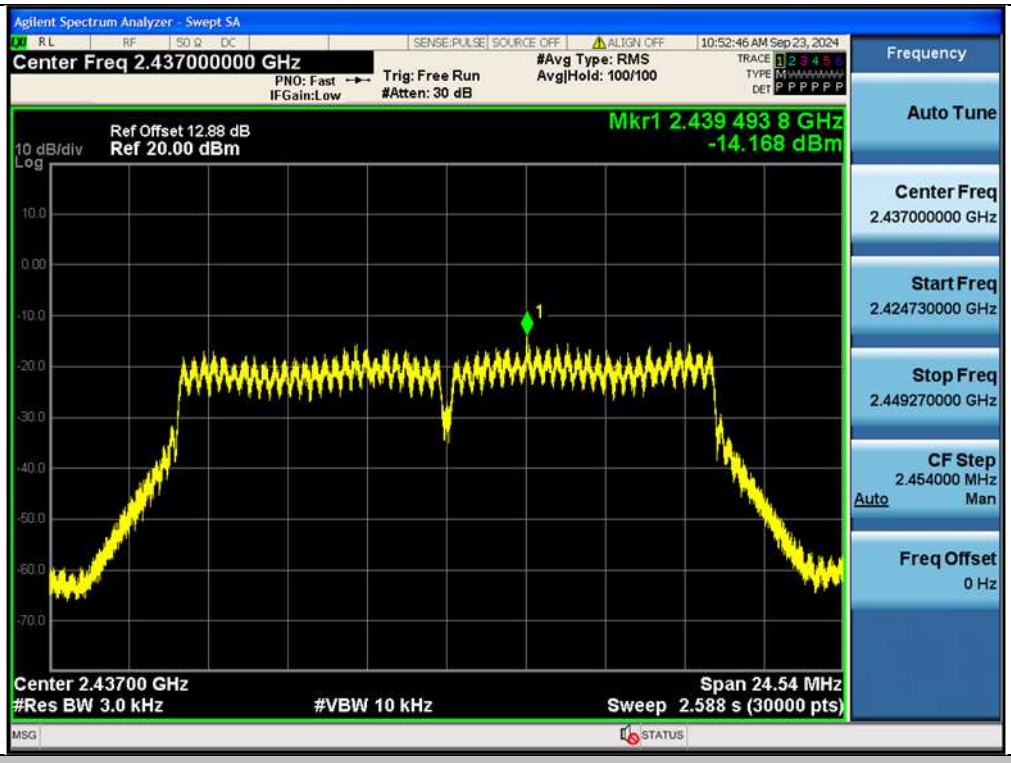
11B-Ant1-2437-PASS



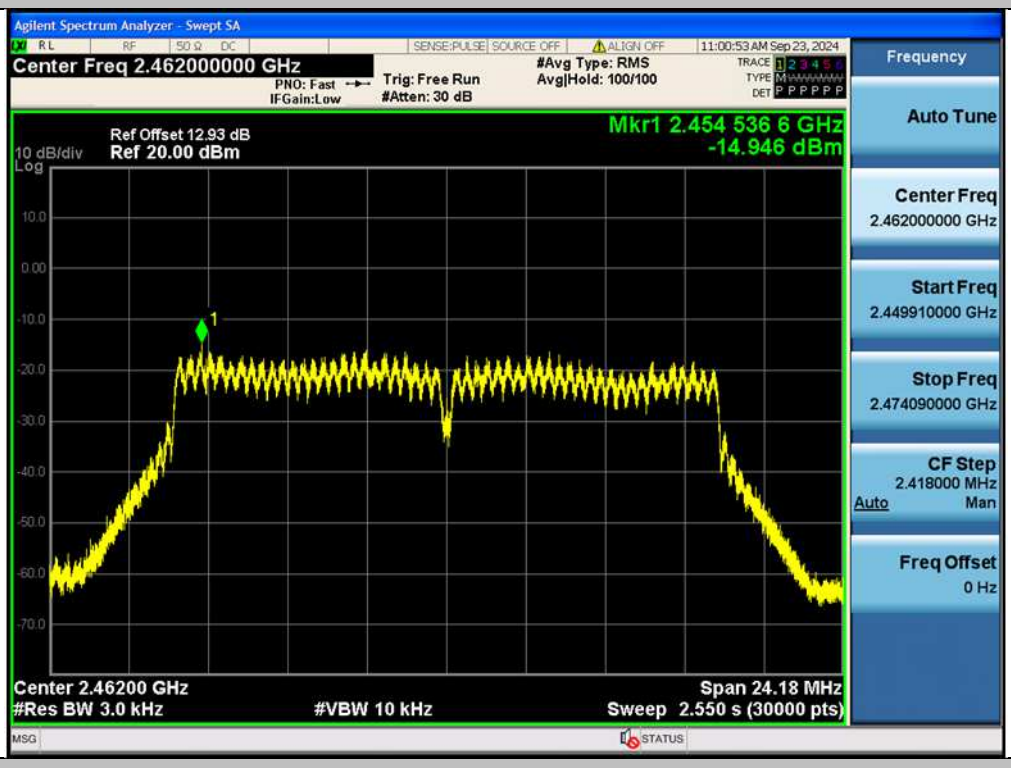
11B-Ant1-2462-PASS



11G-Ant1-2412-PASS

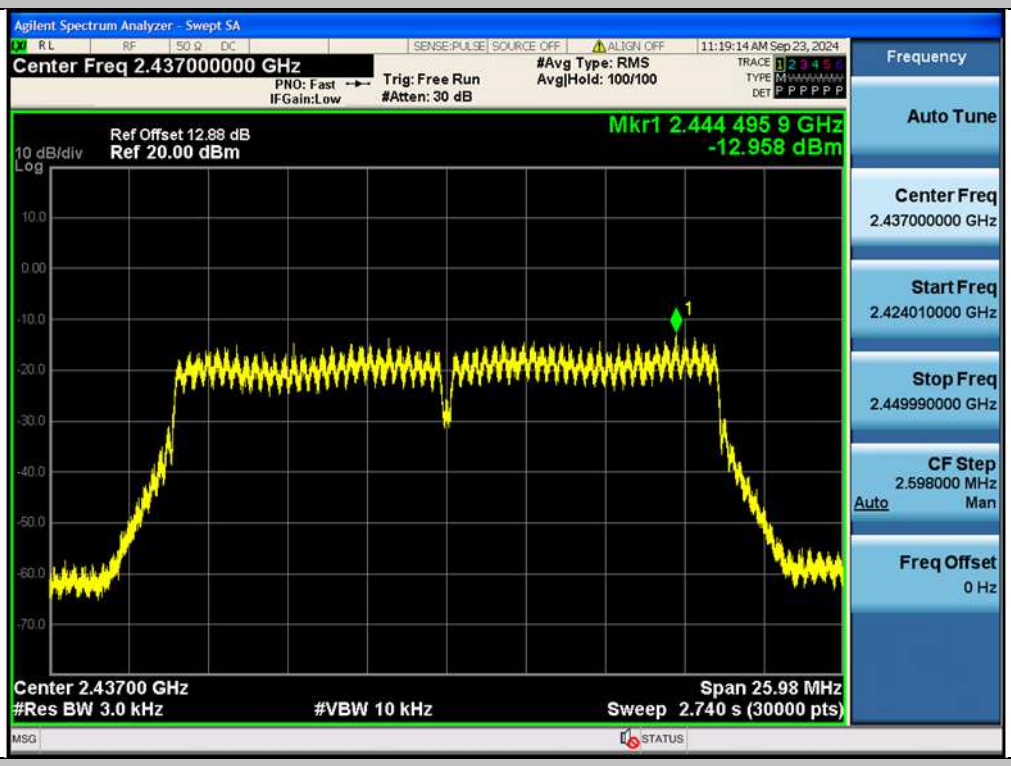


11G-Ant1-2437-PASS

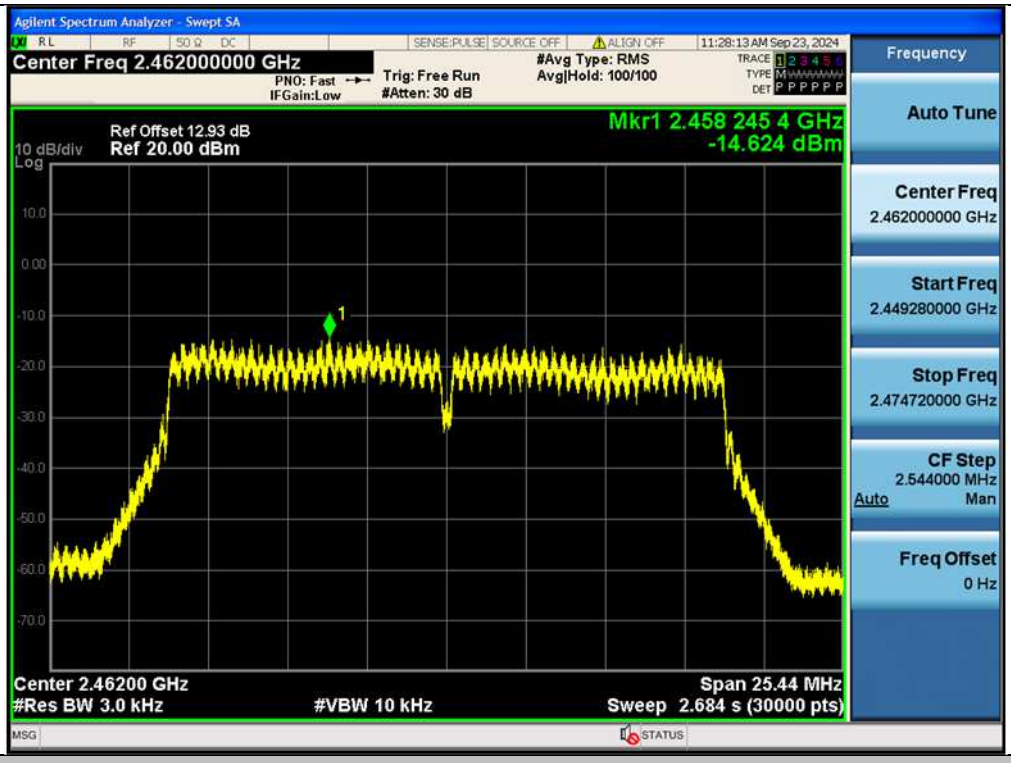


11G-Ant1-2462-PASS

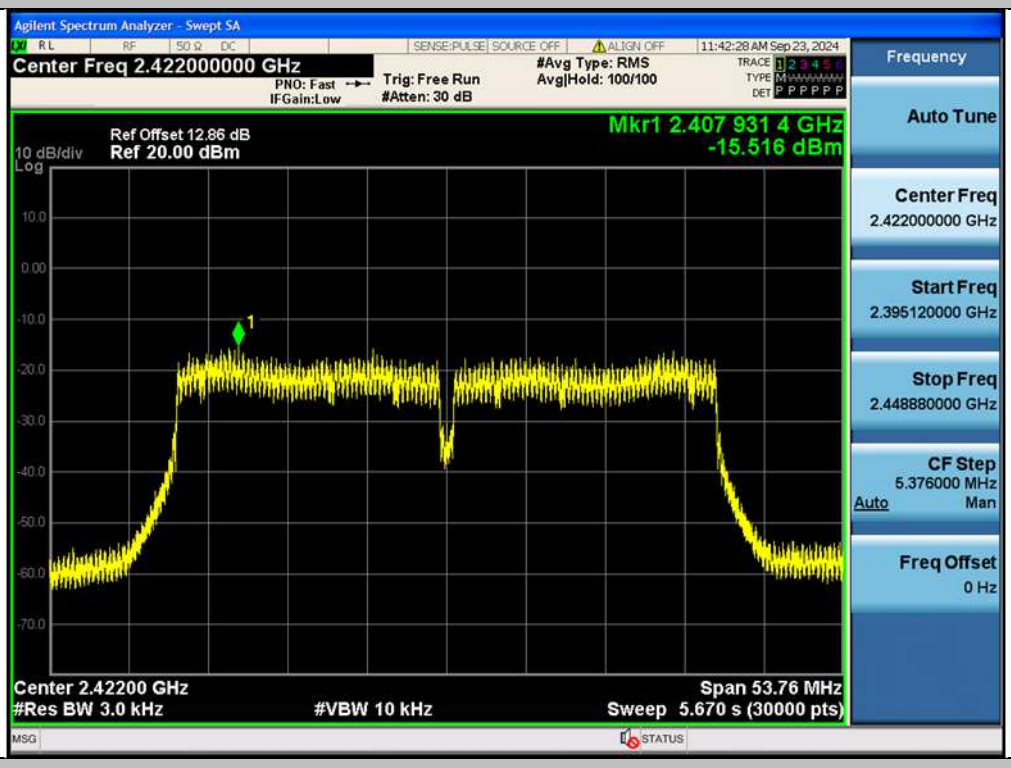
11N20SISO-Ant1-2412-PASS



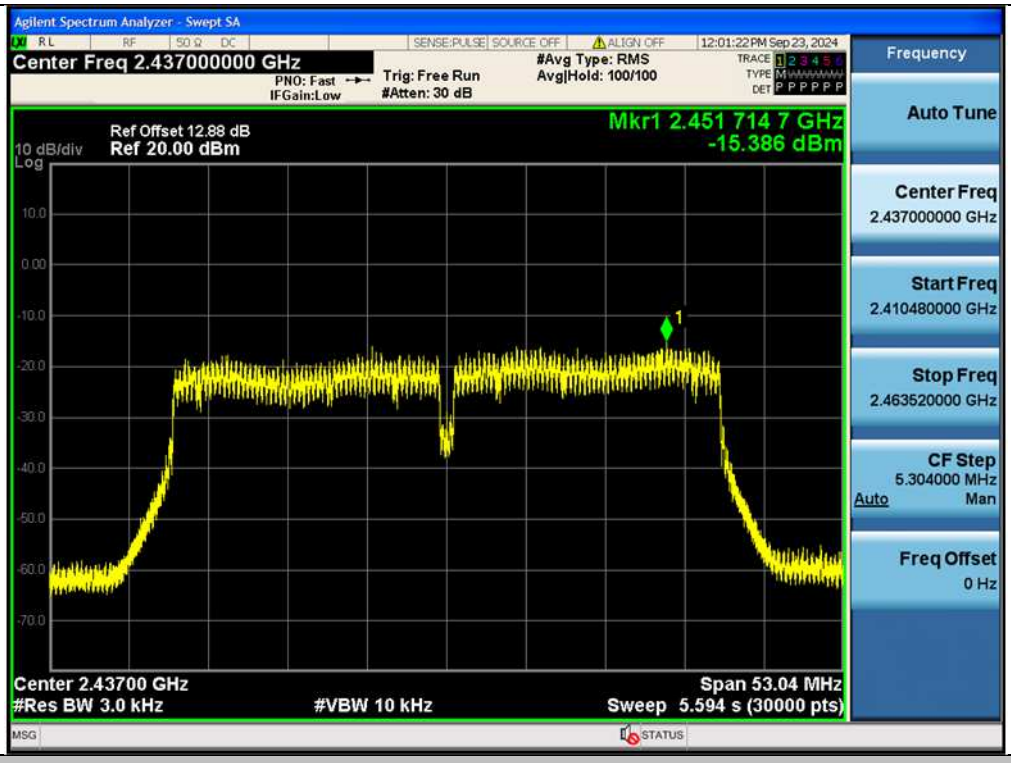
11N20SISO-Ant1-2437-PASS



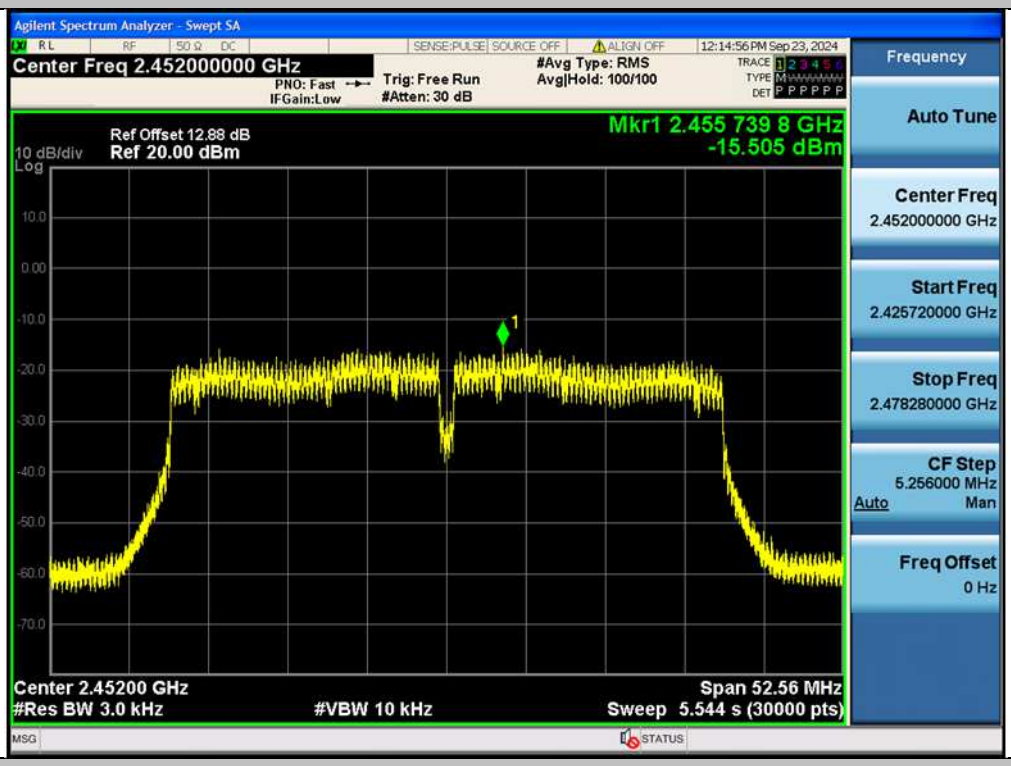
11N20SISO-Ant1-2462-PASS



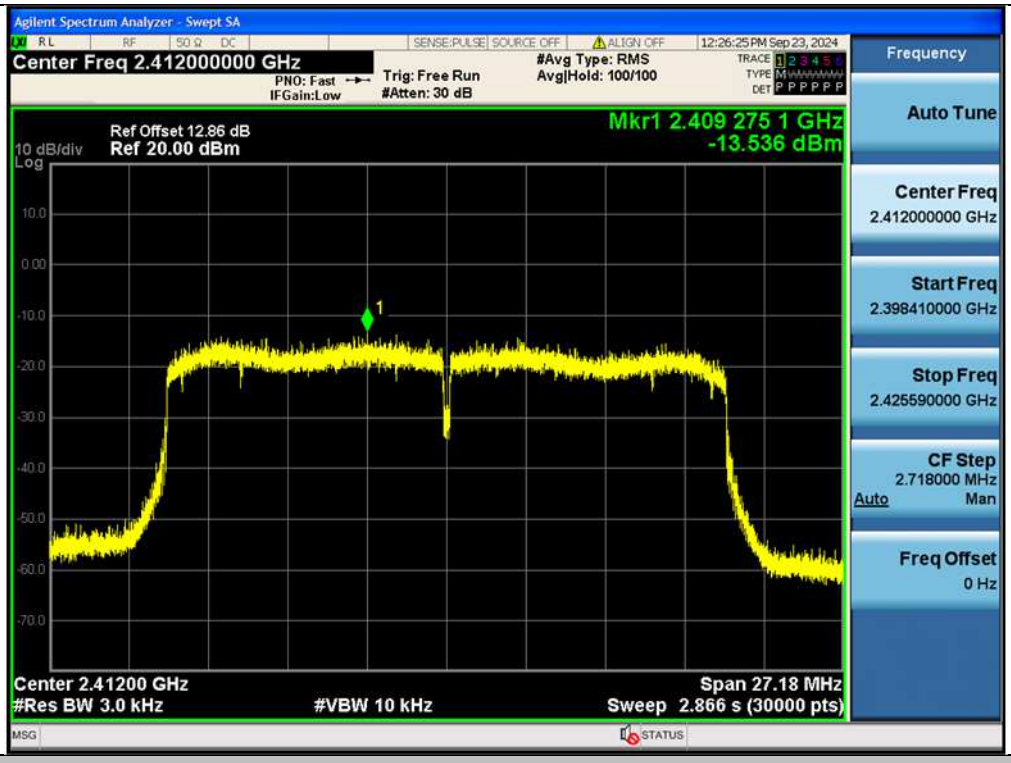
11N40SISO-Ant1-2422-PASS



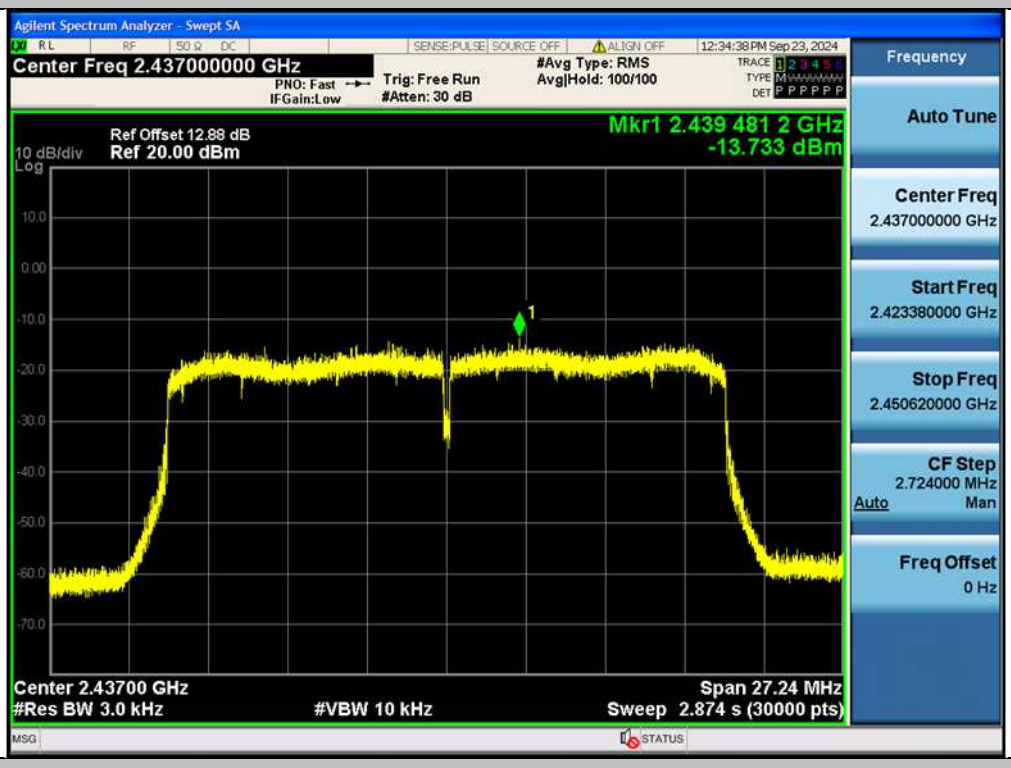
11N40SISO-Ant1-2437-PASS



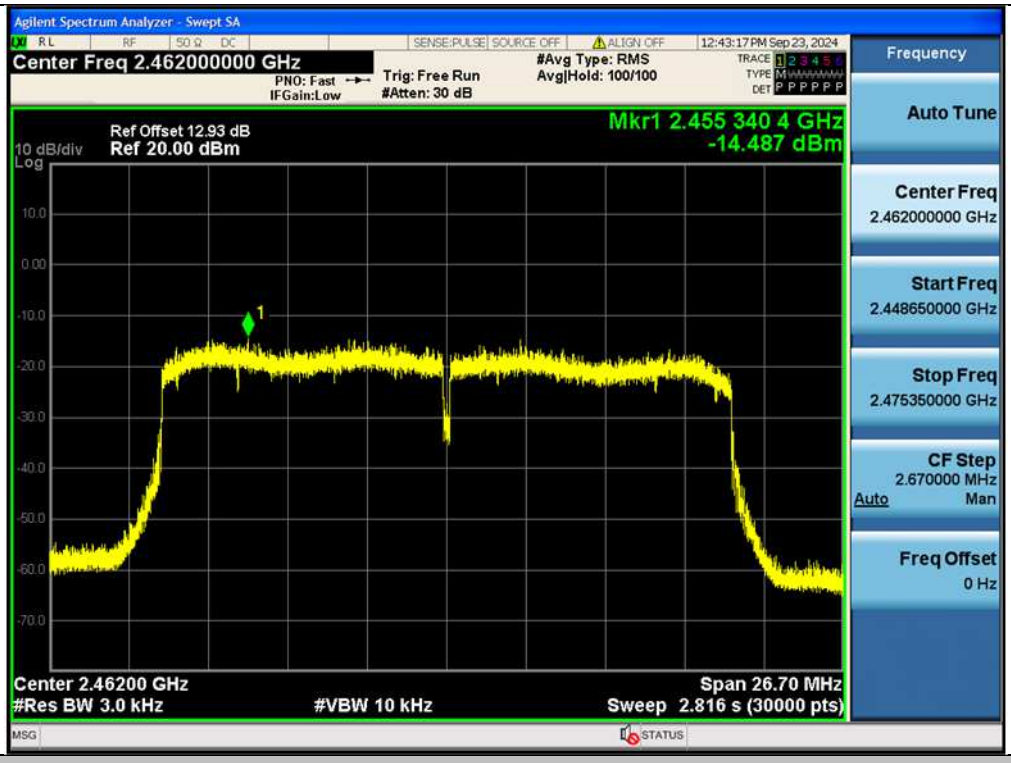
11N40SISO-Ant1-2452-PASS



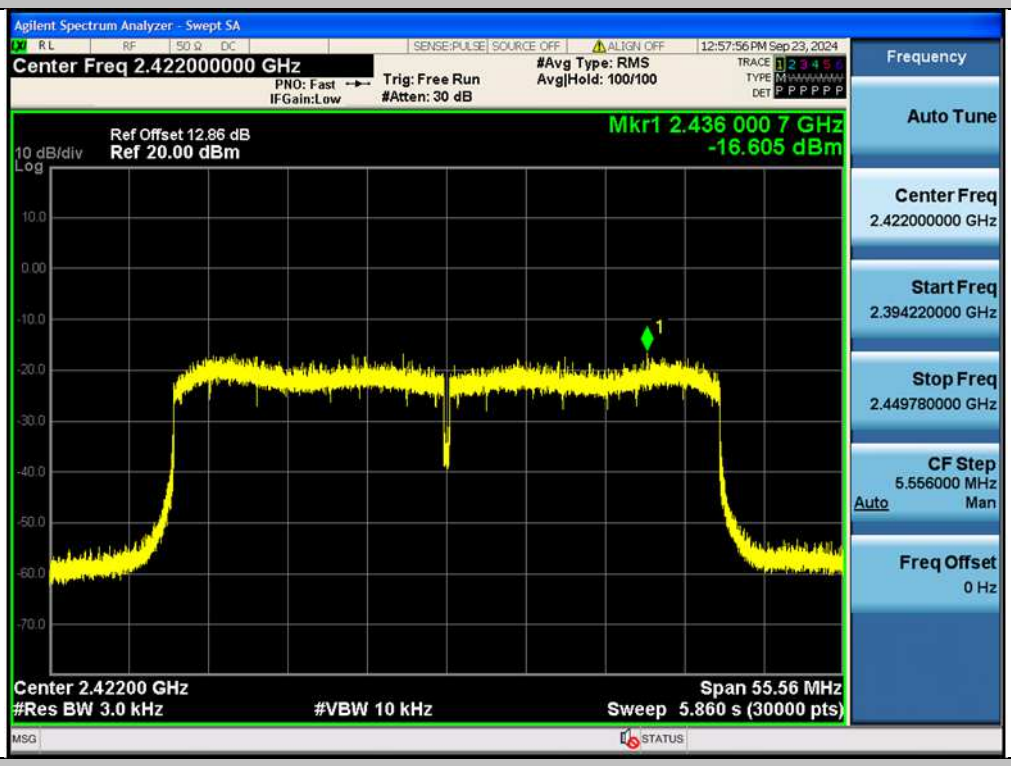
11AX20SISO-Ant1-2412-PASS



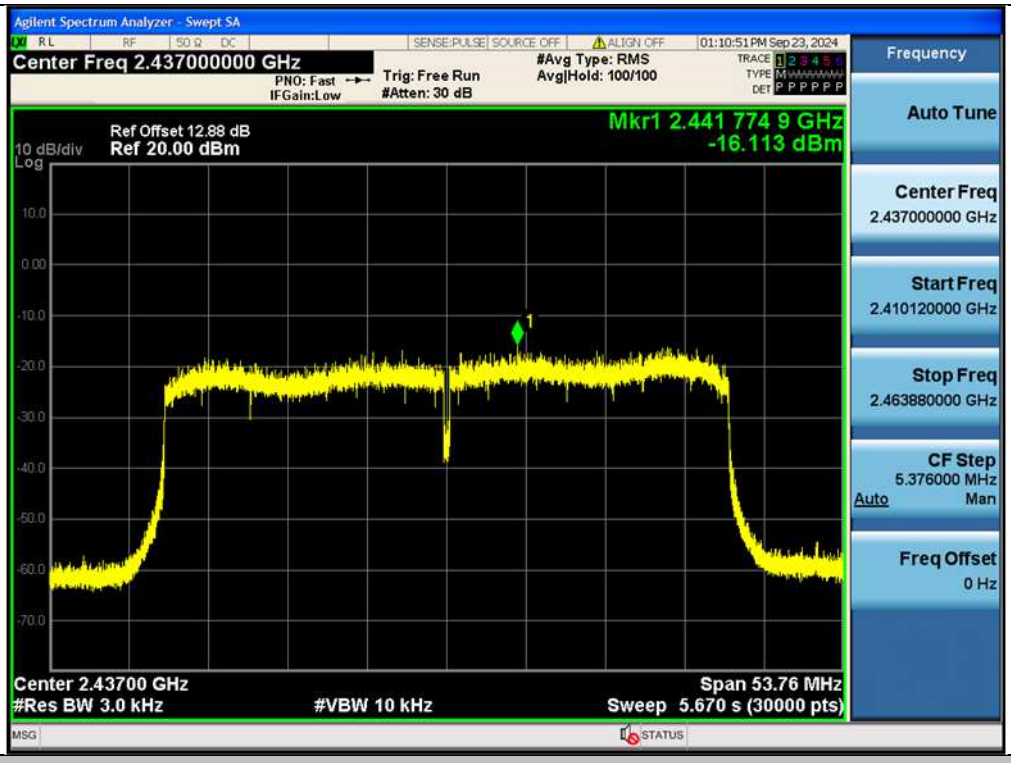
11AX20SISO-Ant1-2437-PASS



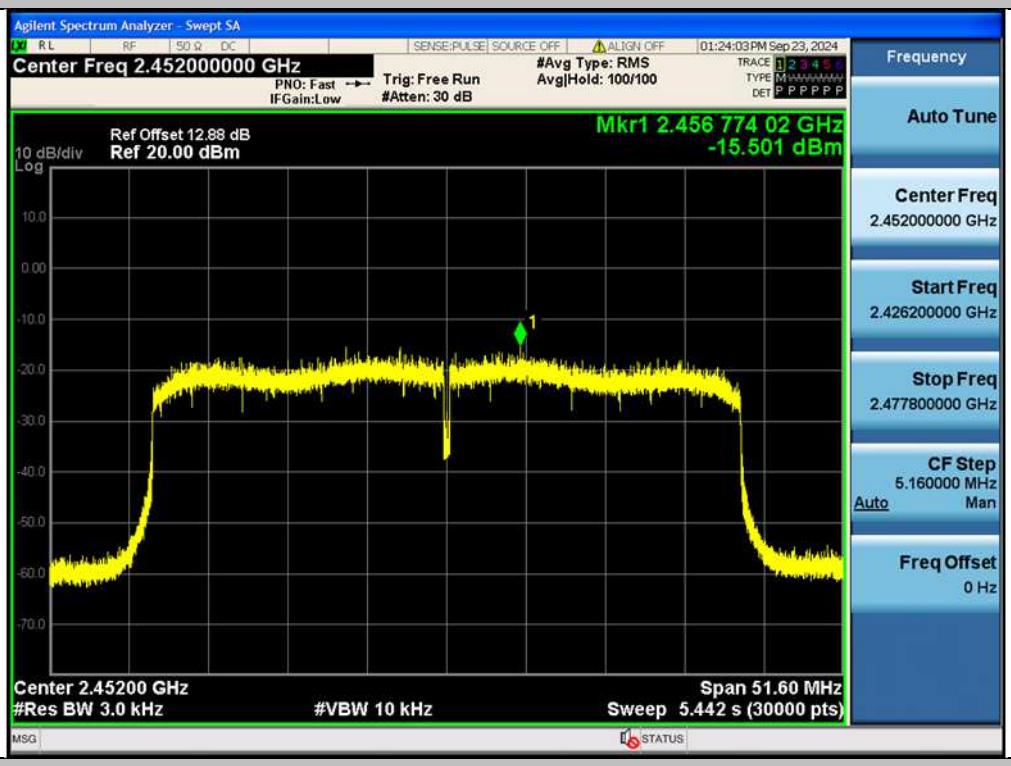
11AX20SISO-Ant1-2462-PASS



11AX40SISO-Ant1-2422-PASS



11AX40SISO-Ant1-2437-PASS



11AX40SISO-Ant1-2452-PASS

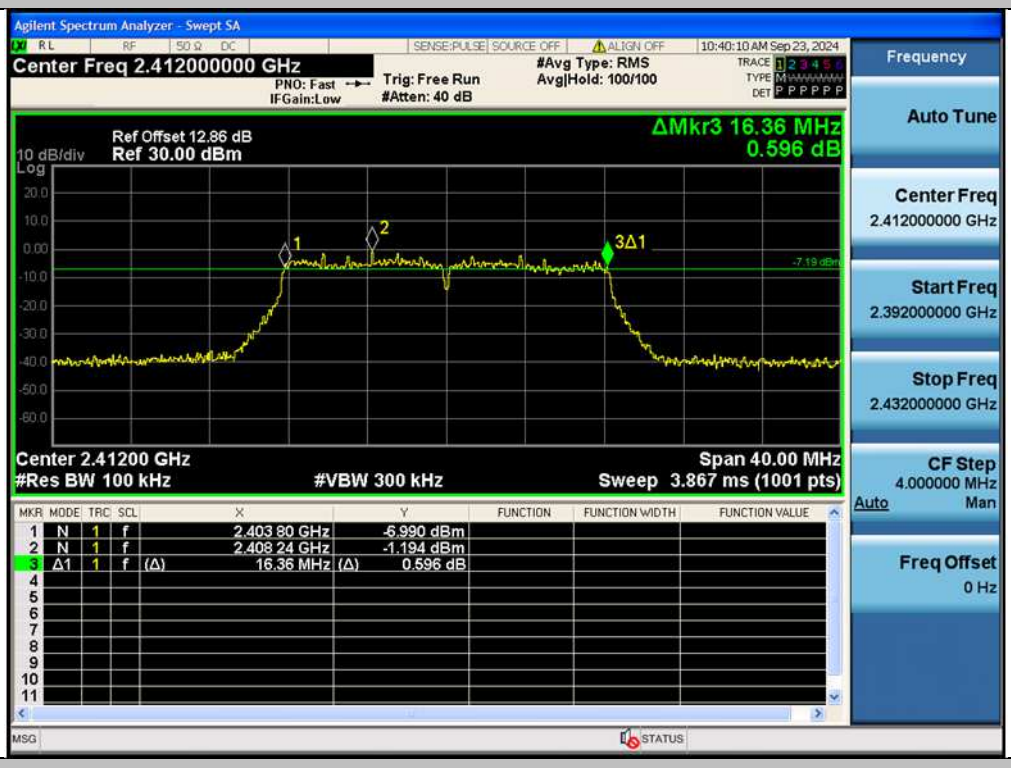
Appendix A.2: Test Results of 6dB Bandwidth

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.600	2406.960	2416.560	0.5	PASS
11B	Ant1	2437	9.520	2432.440	2441.960	0.5	PASS
11B	Ant1	2462	9.600	2456.960	2466.560	0.5	PASS
11G	Ant1	2412	16.360	2403.800	2420.160	0.5	PASS
11G	Ant1	2437	16.360	2428.880	2445.240	0.5	PASS
11G	Ant1	2462	16.120	2453.800	2469.920	0.5	PASS
11N20SISO	Ant1	2412	16.920	2403.240	2420.160	0.5	PASS
11N20SISO	Ant1	2437	17.320	2428.480	2445.800	0.5	PASS
11N20SISO	Ant1	2462	16.960	2453.200	2470.160	0.5	PASS
11N40SISO	Ant1	2422	35.840	2404.080	2439.920	0.5	PASS
11N40SISO	Ant1	2437	35.360	2419.400	2454.760	0.5	PASS
11N40SISO	Ant1	2452	35.040	2434.560	2469.600	0.5	PASS
11AX20SISO	Ant1	2412	18.120	2402.960	2421.080	0.5	PASS
11AX20SISO	Ant1	2437	18.160	2428.160	2446.320	0.5	PASS
11AX20SISO	Ant1	2462	17.800	2452.640	2470.440	0.5	PASS
11AX40SISO	Ant1	2422	37.040	2403.440	2440.480	0.5	PASS
11AX40SISO	Ant1	2437	35.840	2419.480	2455.320	0.5	PASS
11AX40SISO	Ant1	2452	34.400	2435.280	2469.680	0.5	PASS

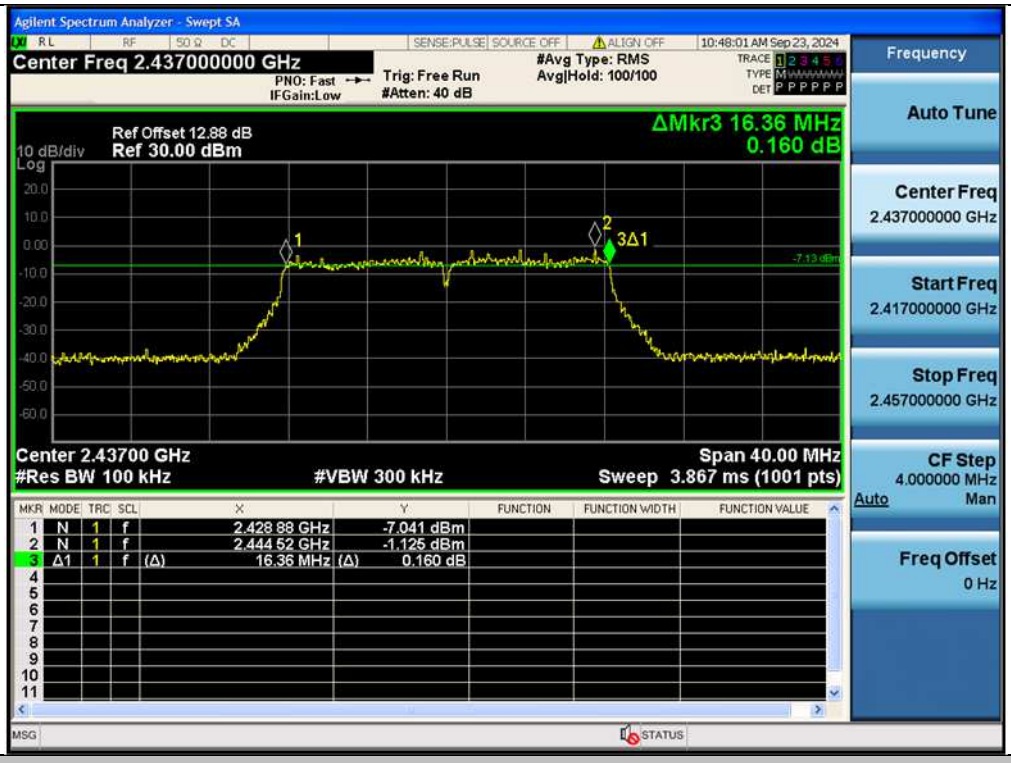
11B-Ant1-2412-PASS

11B-Ant1-2437-PASS

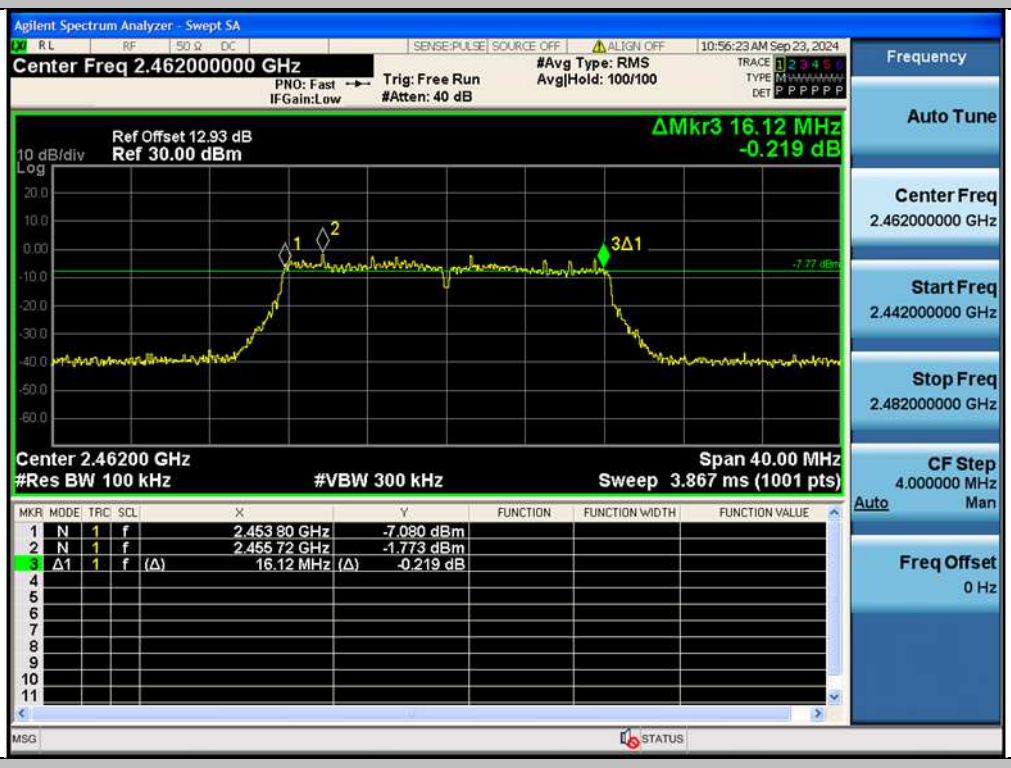
11B-Ant1-2462-PASS



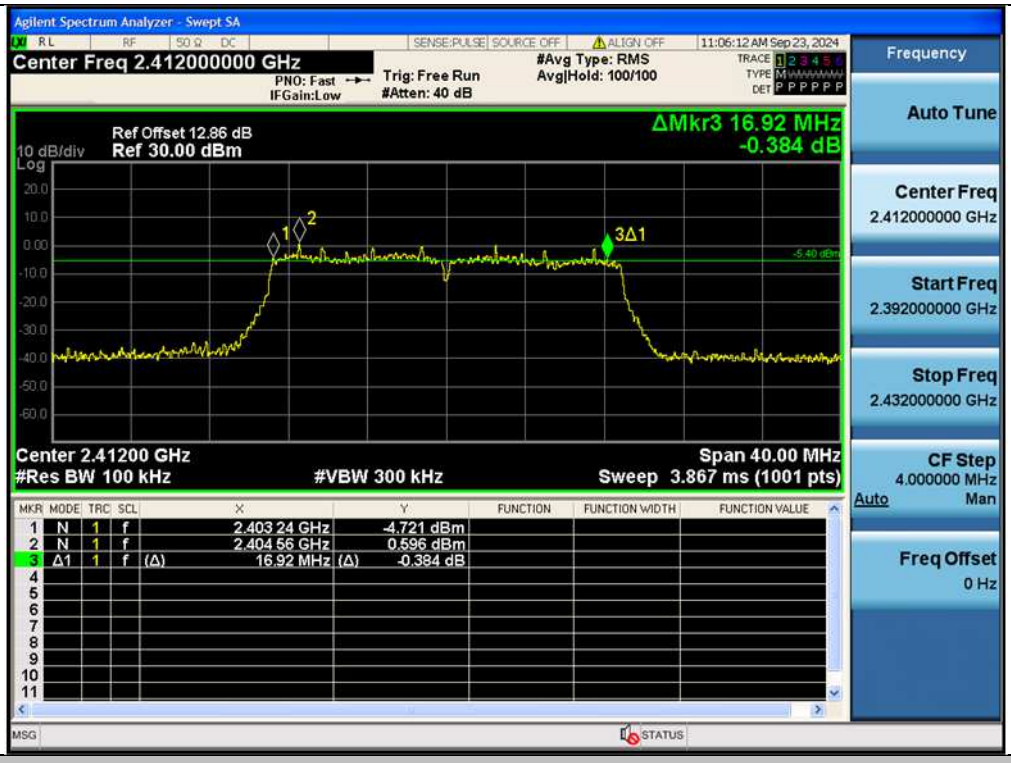
11G-Ant1-2412-PASS



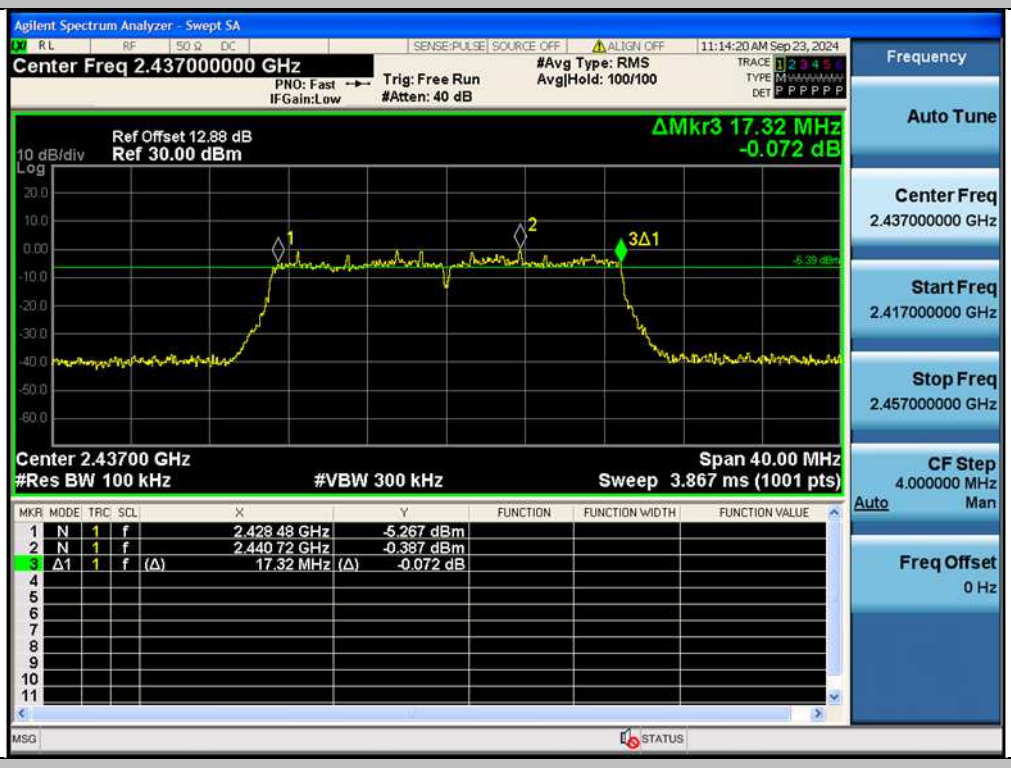
11G-Ant1-2437-PASS



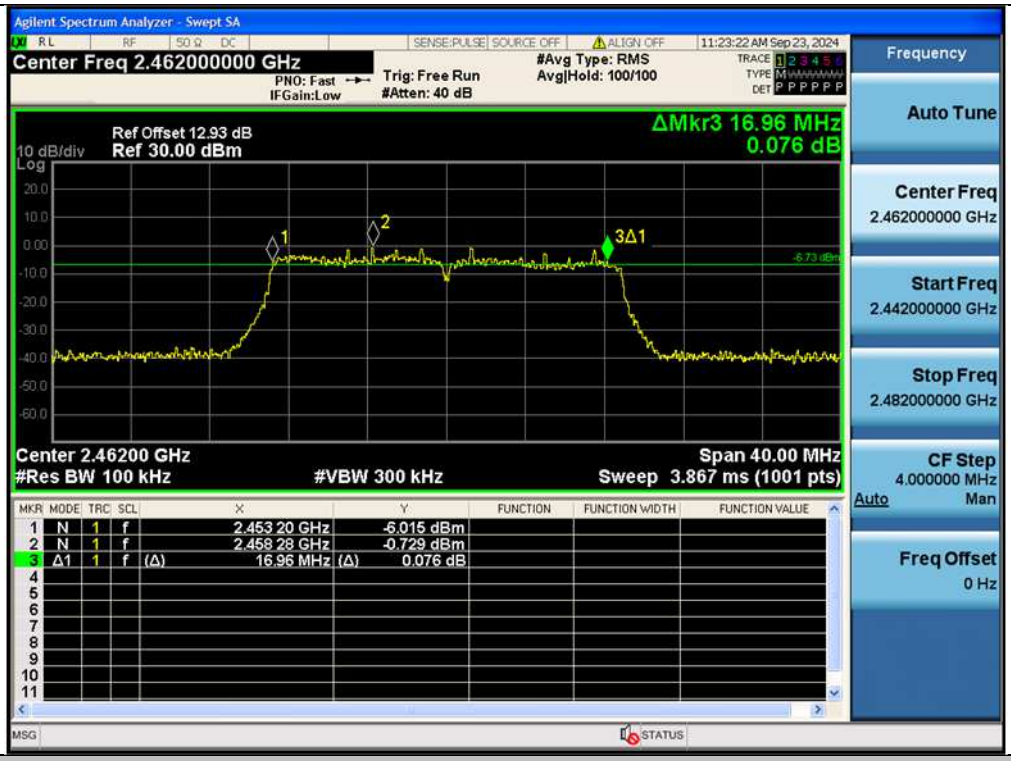
11G-Ant1-2462-PASS



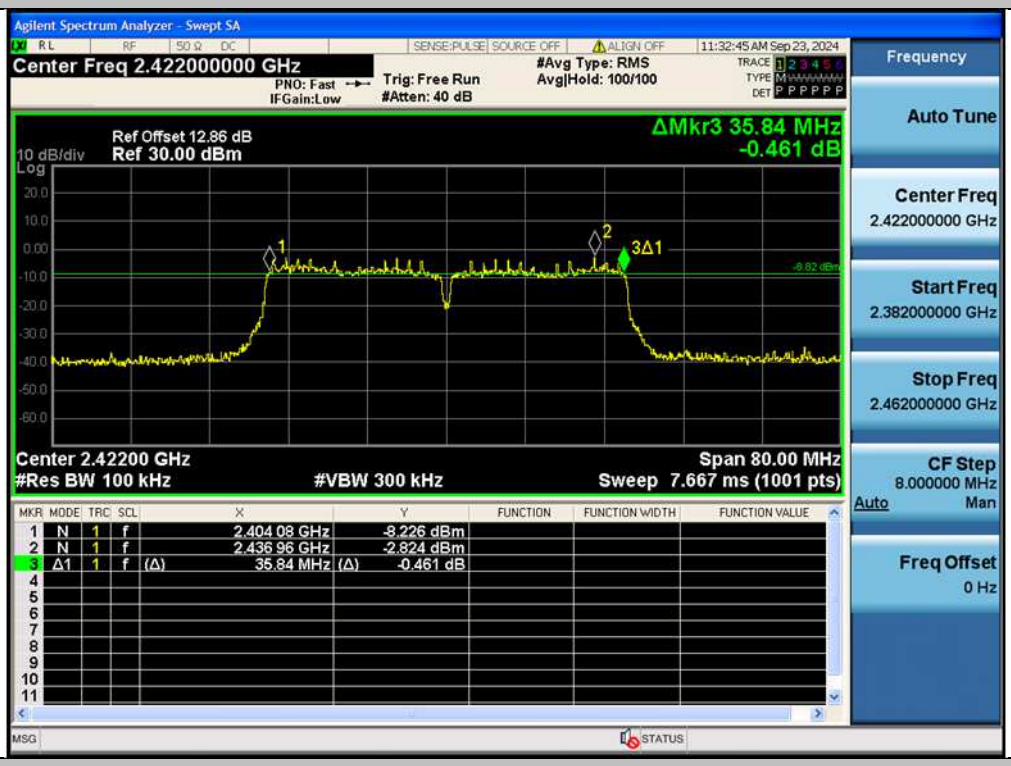
11N20SISO-Ant1-2412-PASS



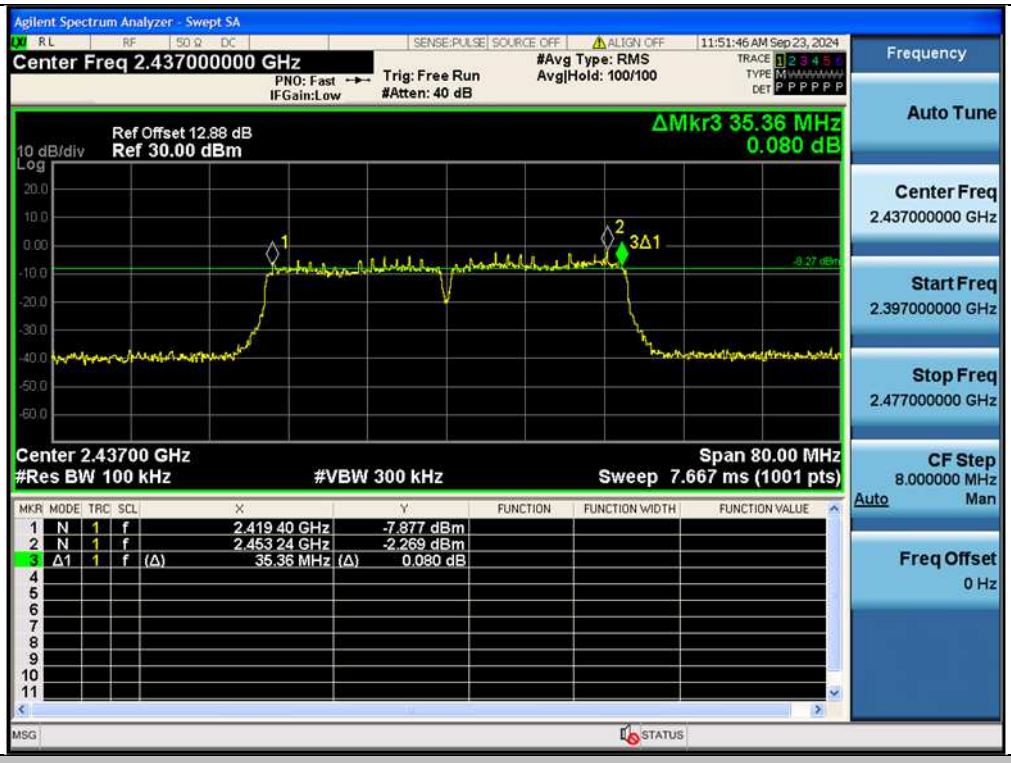
11N20SISO-Ant1-2437-PASS



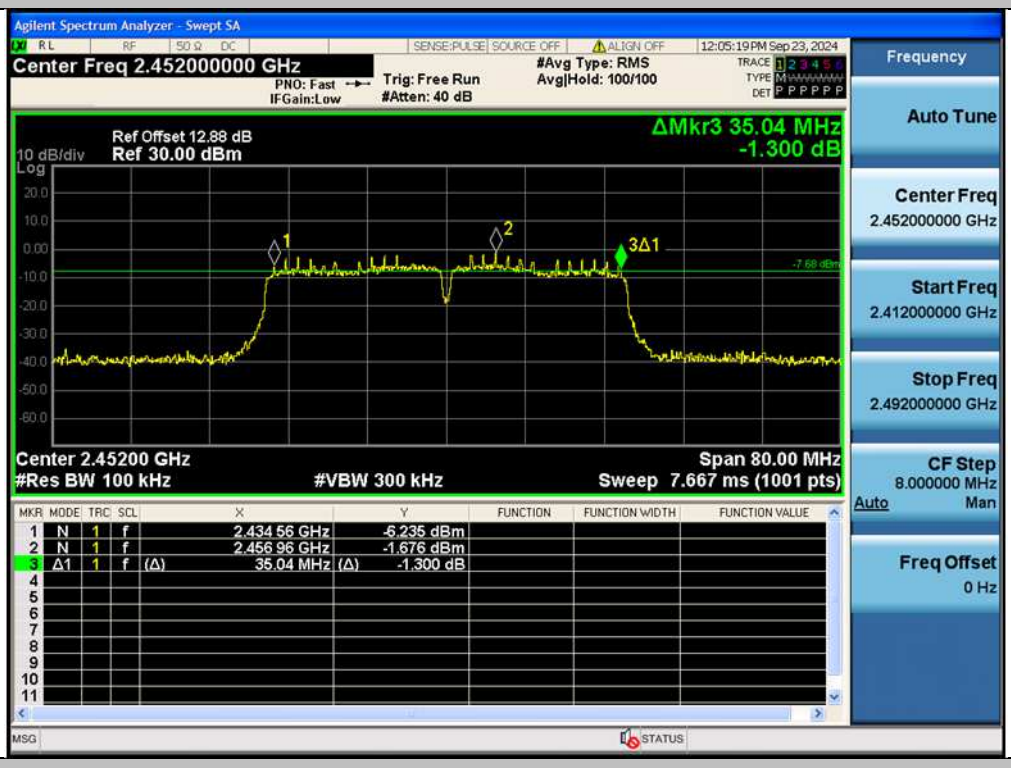
11N20SISO-Ant1-2462-PASS



11N40SISO-Ant1-2422-PASS

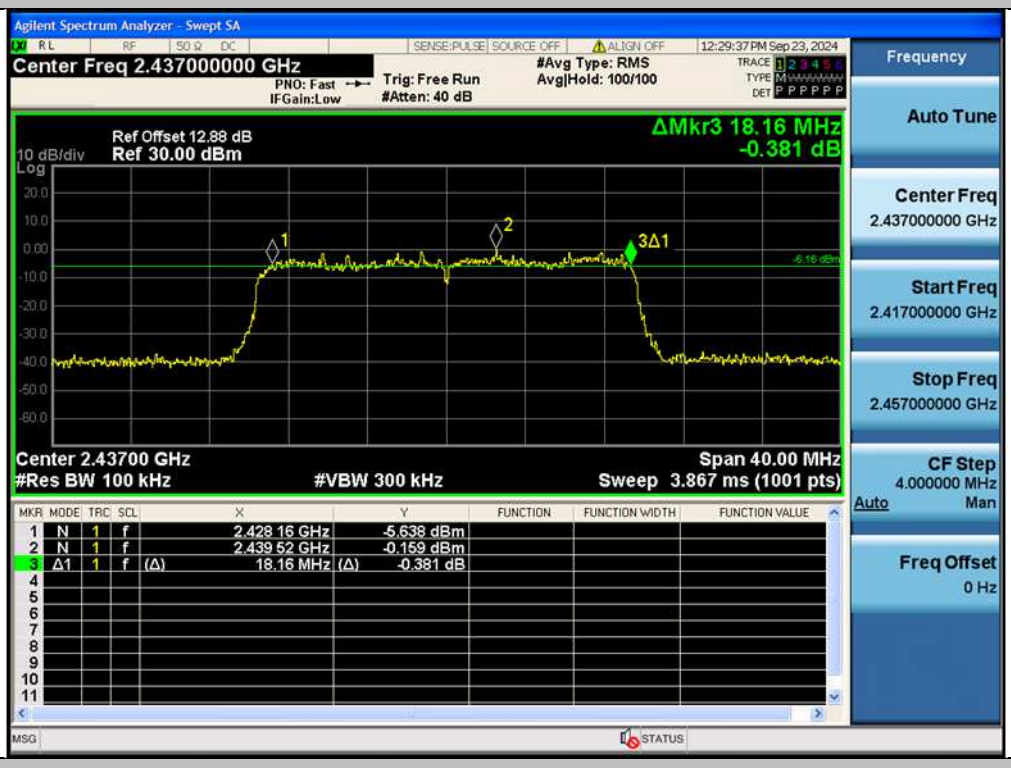


11N40SISO-Ant1-2437-PASS

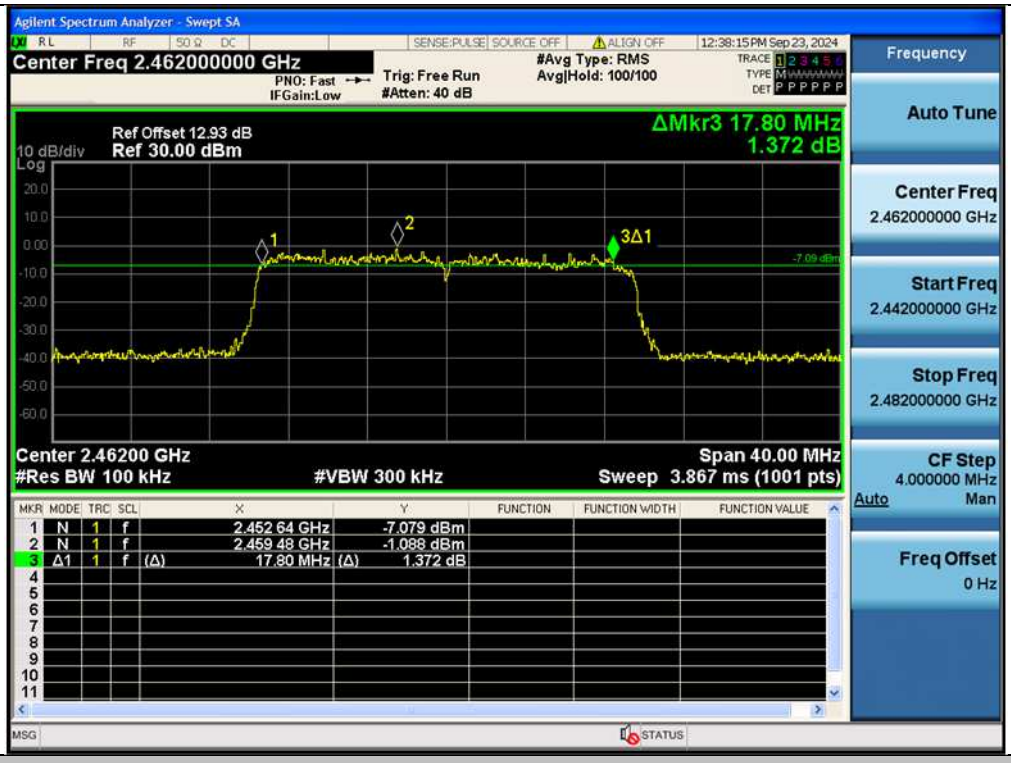


11N40SISO-Ant1-2452-PASS

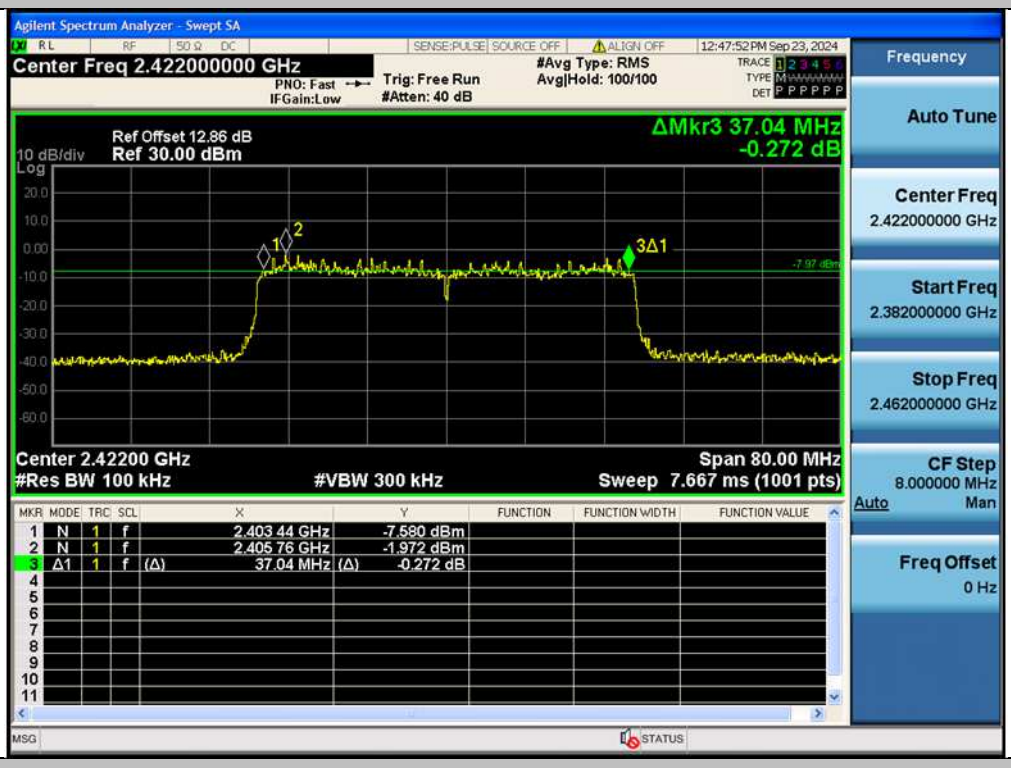
11AX20SISO-Ant1-2412-PASS



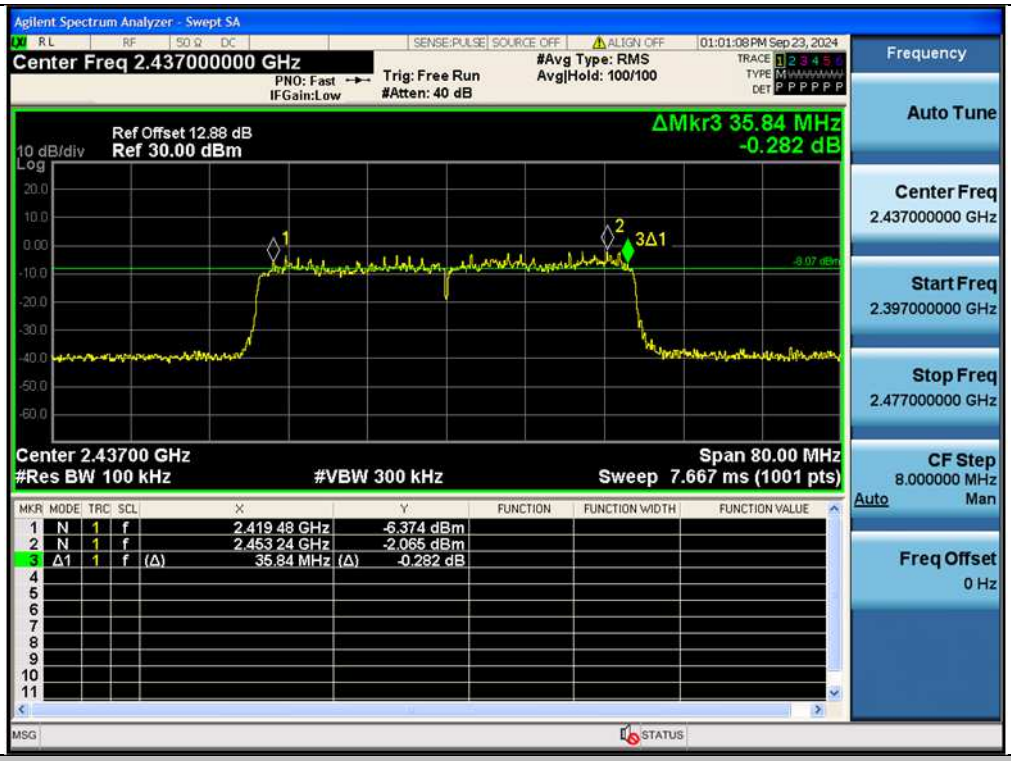
11AX20SISO-Ant1-2437-PASS



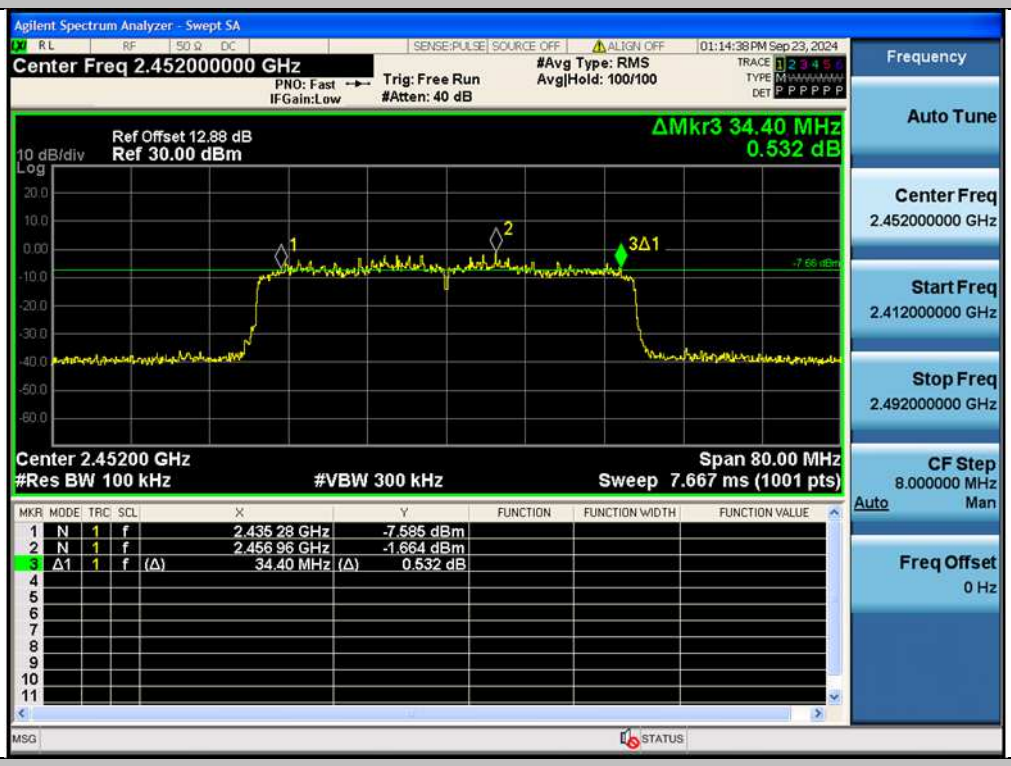
11AX20SISO-Ant1-2462-PASS



11AX40SISO-Ant1-2422-PASS



11AX40SISO-Ant1-2437-PASS



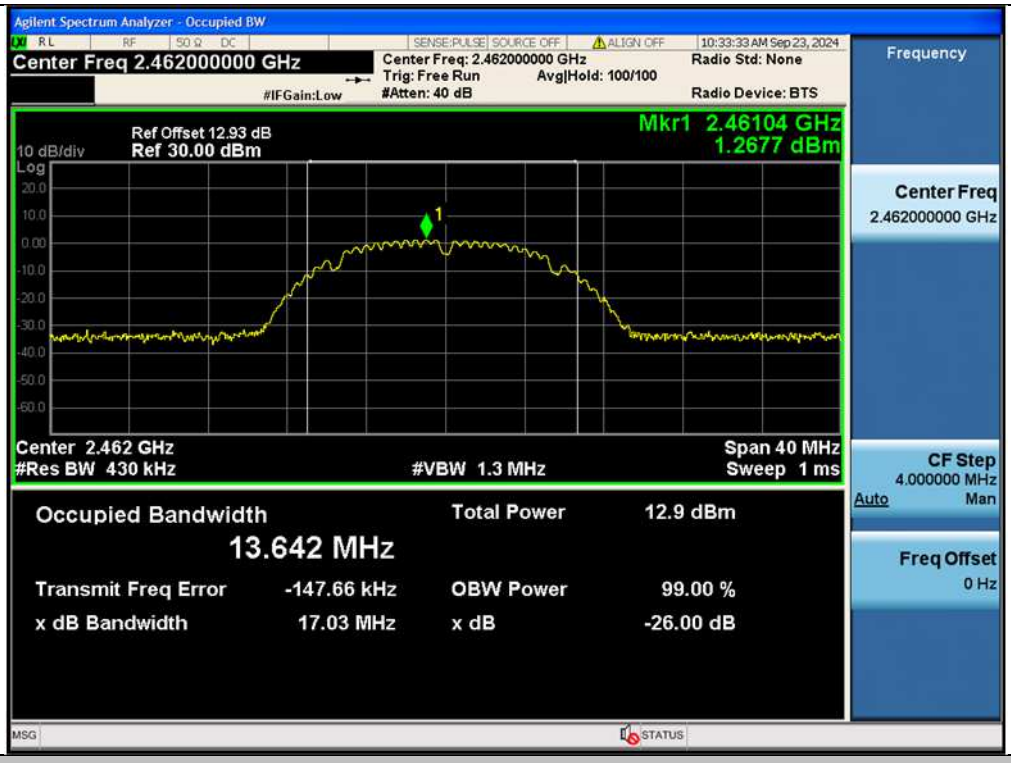
11AX40SISO-Ant1-2452-PASS

Appendix A.3: Test Results of 99% Bandwidth

TestMode	Antenna	Channel Frequency [MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	13.554	2405.1063	2418.6603	---	PASS
11B	Ant1	2437	13.574	2430.3399	2443.9139	---	PASS
11B	Ant1	2462	13.642	2455.0313	2468.6733	---	PASS
11G	Ant1	2412	16.903	2403.4738	2420.3768	---	PASS
11G	Ant1	2437	16.904	2428.6128	2445.5168	---	PASS
11G	Ant1	2462	16.955	2453.4272	2470.3822	---	PASS
11N20SISO	Ant1	2412	17.771	2403.0779	2420.8489	---	PASS
11N20SISO	Ant1	2437	17.832	2428.1468	2445.9788	---	PASS
11N20SISO	Ant1	2462	17.781	2453.0487	2470.8297	---	PASS
11N40SISO	Ant1	2422	36.501	2403.7464	2440.2474	---	PASS
11N40SISO	Ant1	2437	36.303	2418.9408	2455.2438	---	PASS
11N40SISO	Ant1	2452	36.051	2433.9619	2470.0129	---	PASS
11AX20SISO	Ant1	2412	18.806	2402.5378	2421.3438	---	PASS
11AX20SISO	Ant1	2437	18.819	2427.6761	2446.4951	---	PASS
11AX20SISO	Ant1	2462	18.815	2452.5323	2471.3473	---	PASS
11AX40SISO	Ant1	2422	37.724	2403.1652	2440.8892	---	PASS
11AX40SISO	Ant1	2437	37.651	2418.3346	2455.9856	---	PASS
11AX40SISO	Ant1	2452	37.386	2433.2656	2470.6516	---	PASS

11B-Ant1-2412

11B-Ant1-2437

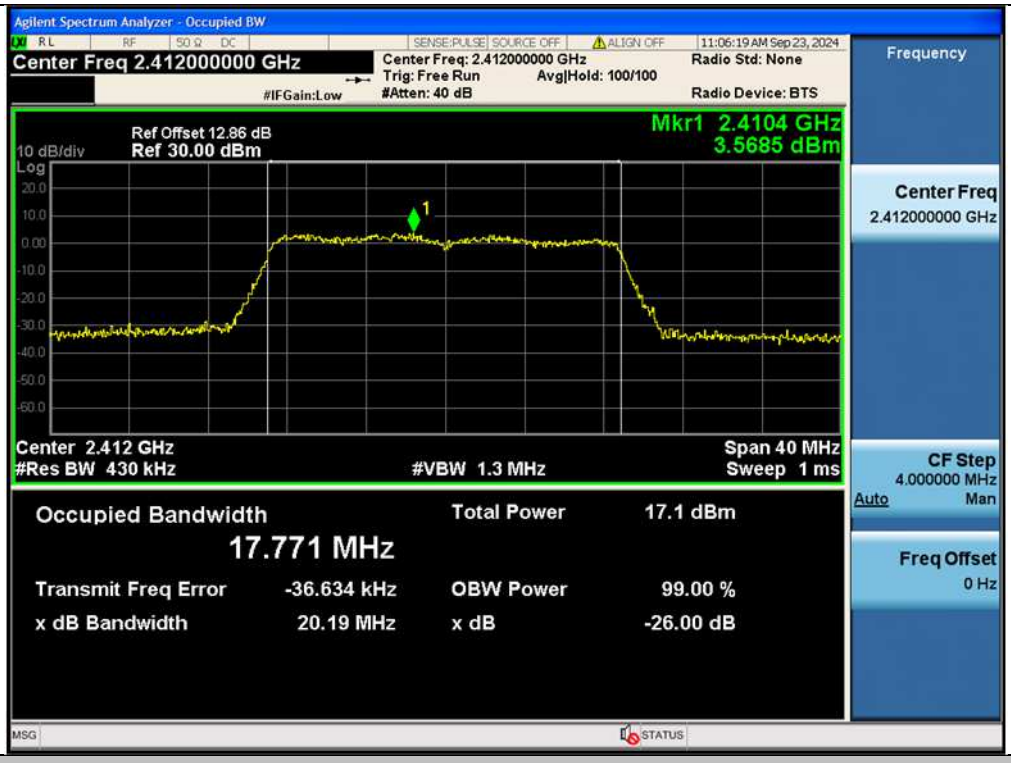


11B-Ant1-2462

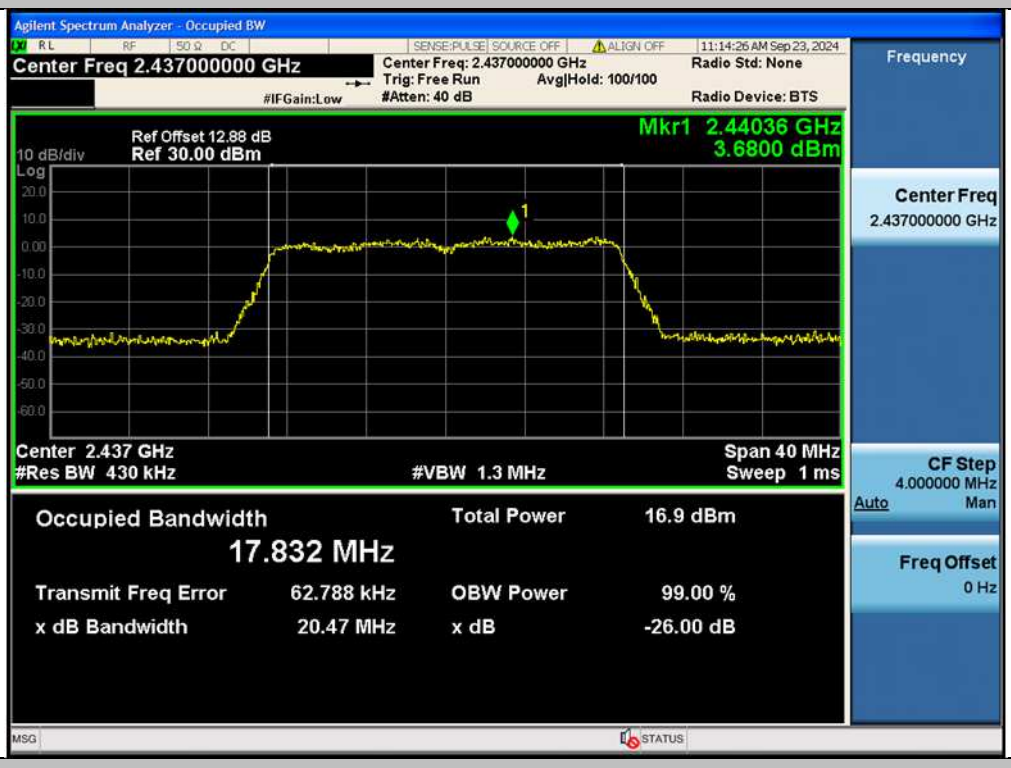
11G-Ant1-2412

11G-Ant1-2437

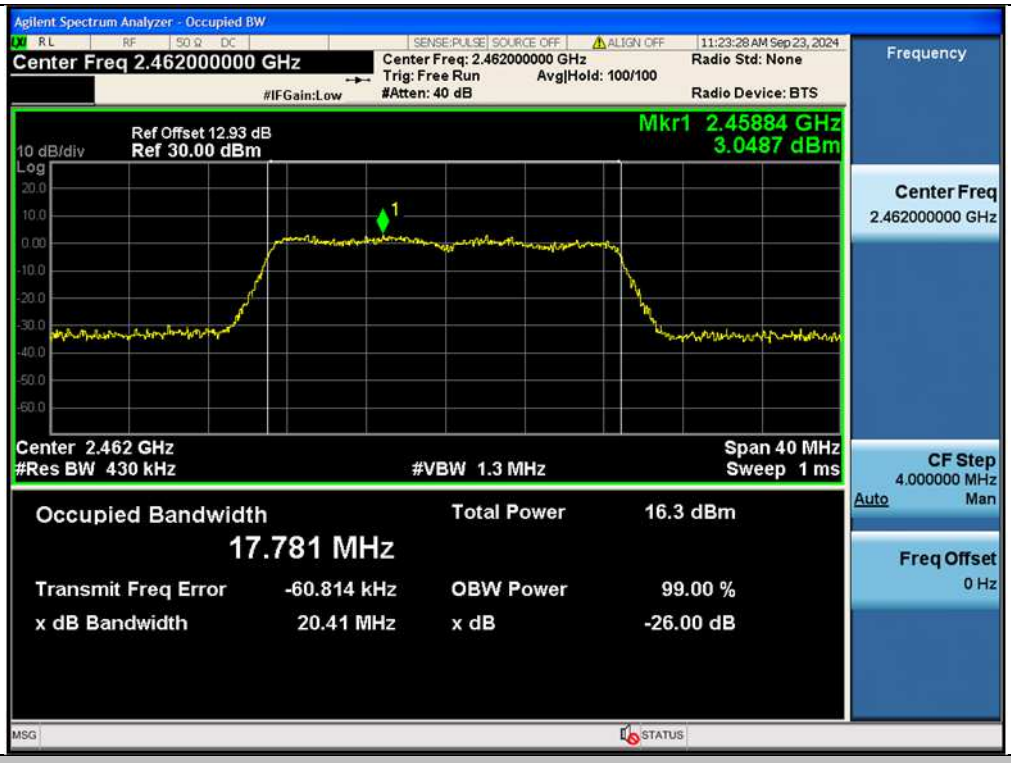
11G-Ant1-2462



11N20SISO-Ant1-2412

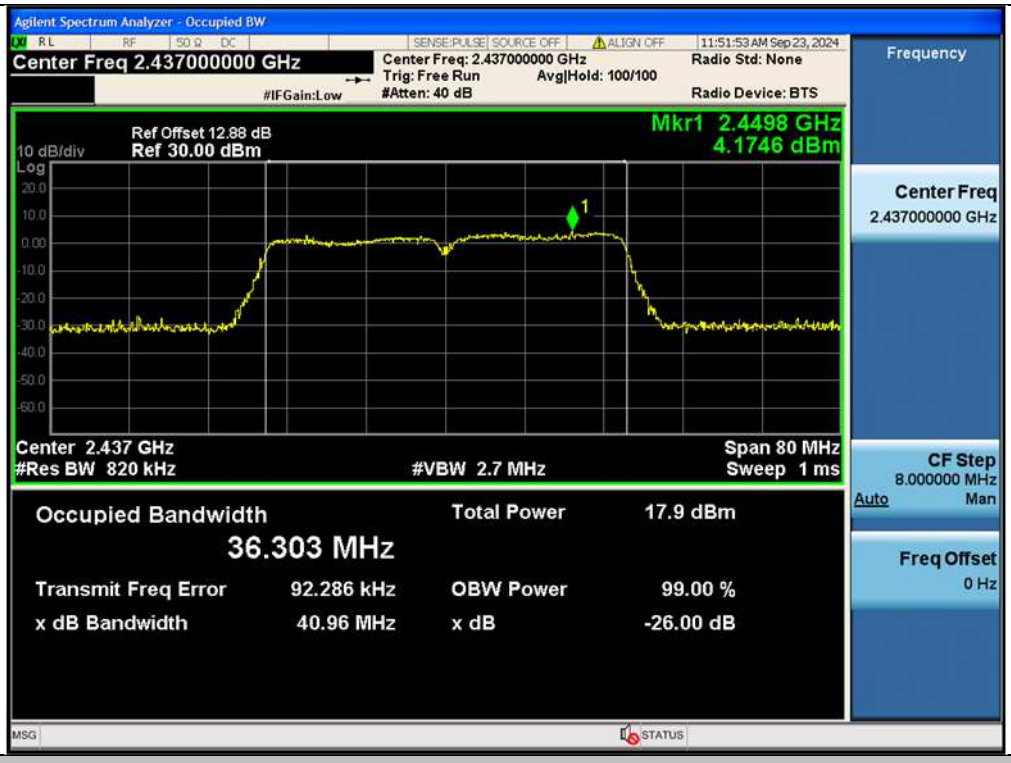


11N20SISO-Ant1-2437



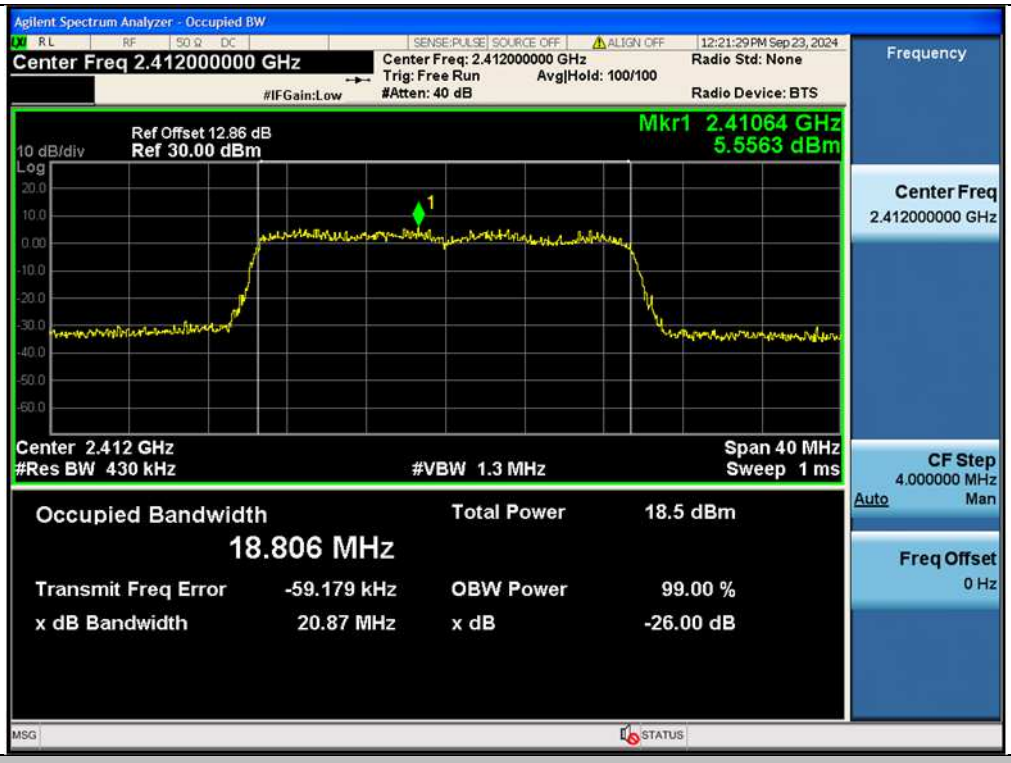
11N20SISO-Ant1-2462

11N40SISO-Ant1-2422

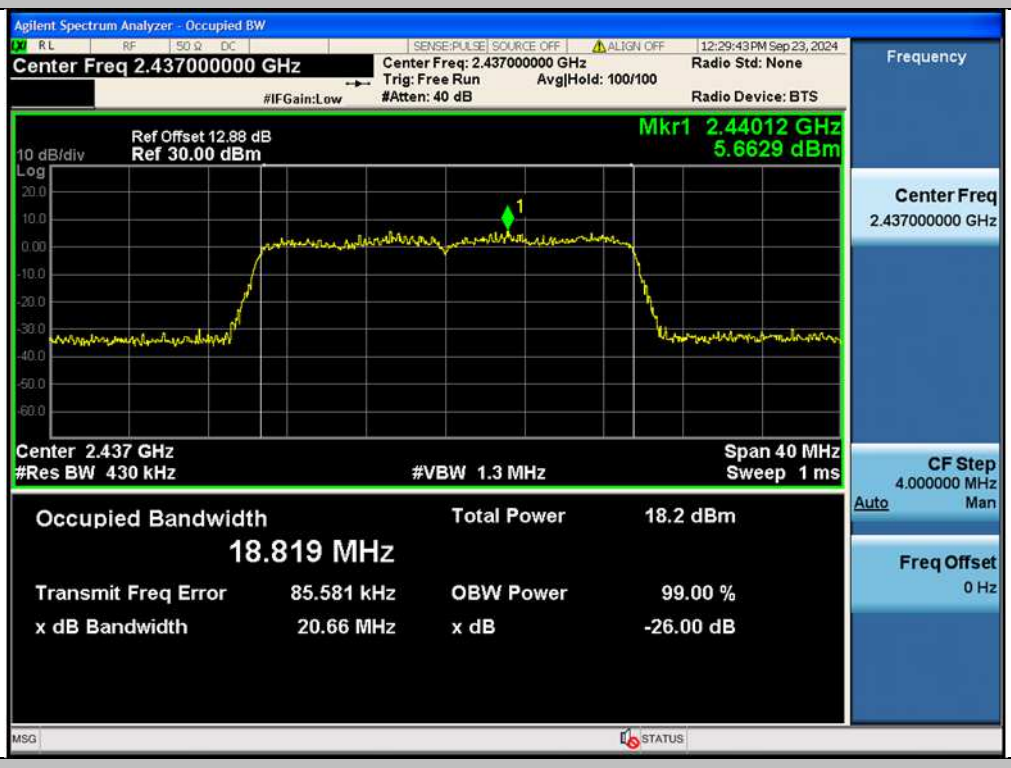


11N40SISO-Ant1-2437

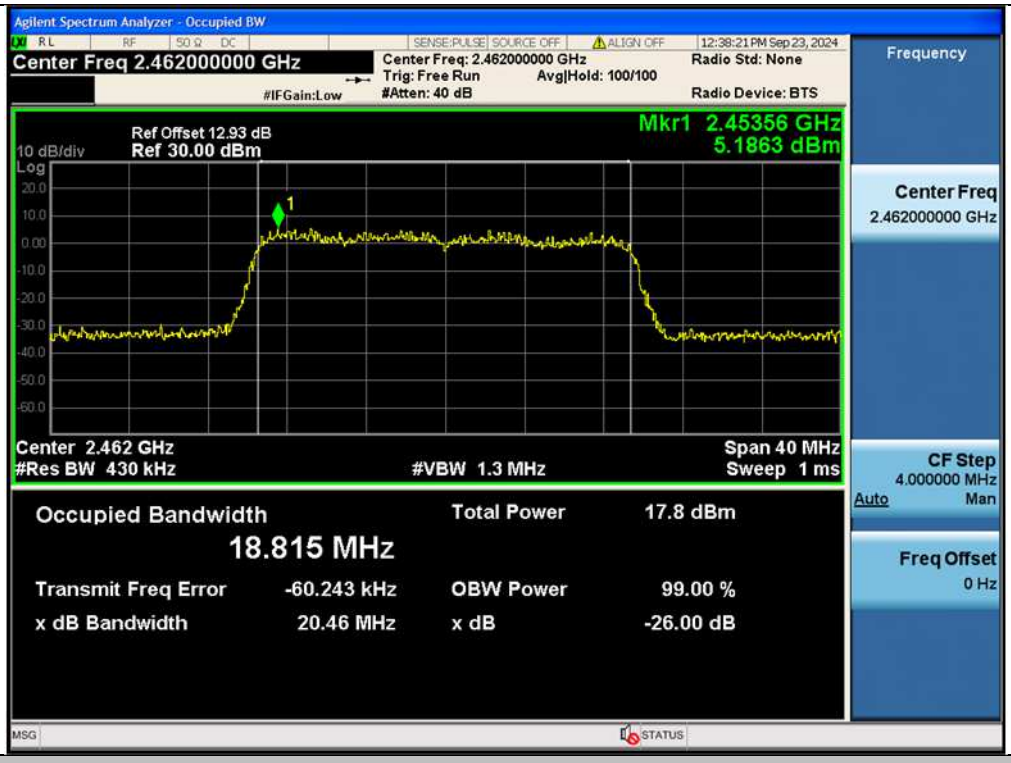
11N40SISO-Ant1-2452



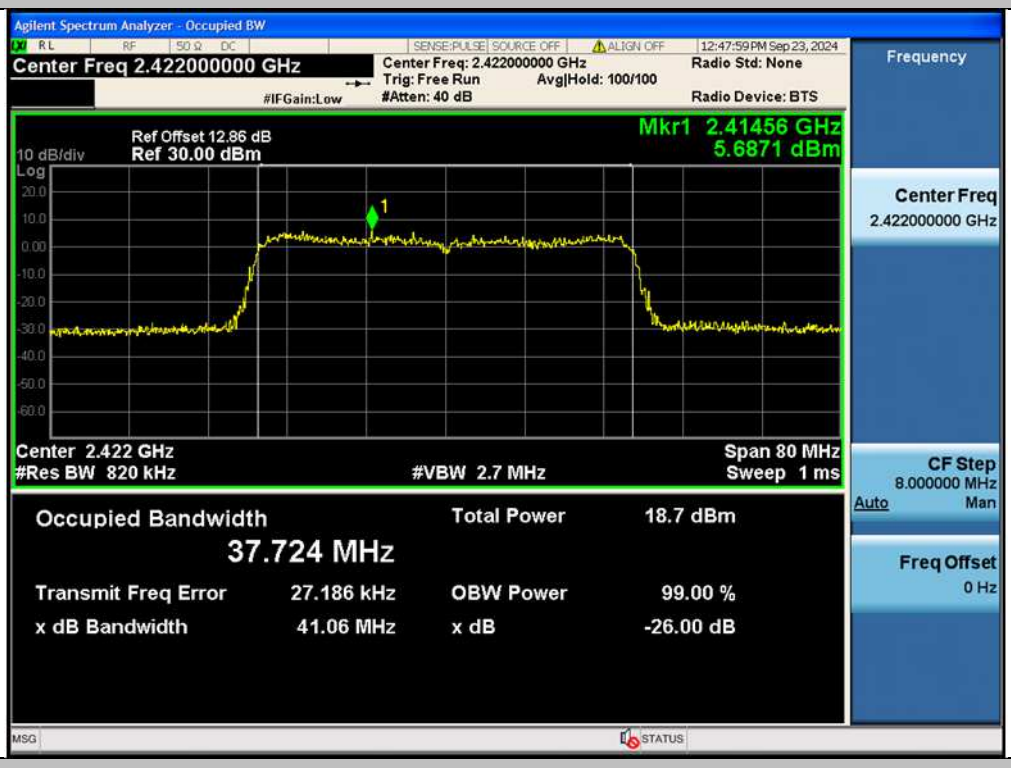
11AX20SISO-Ant1-2412



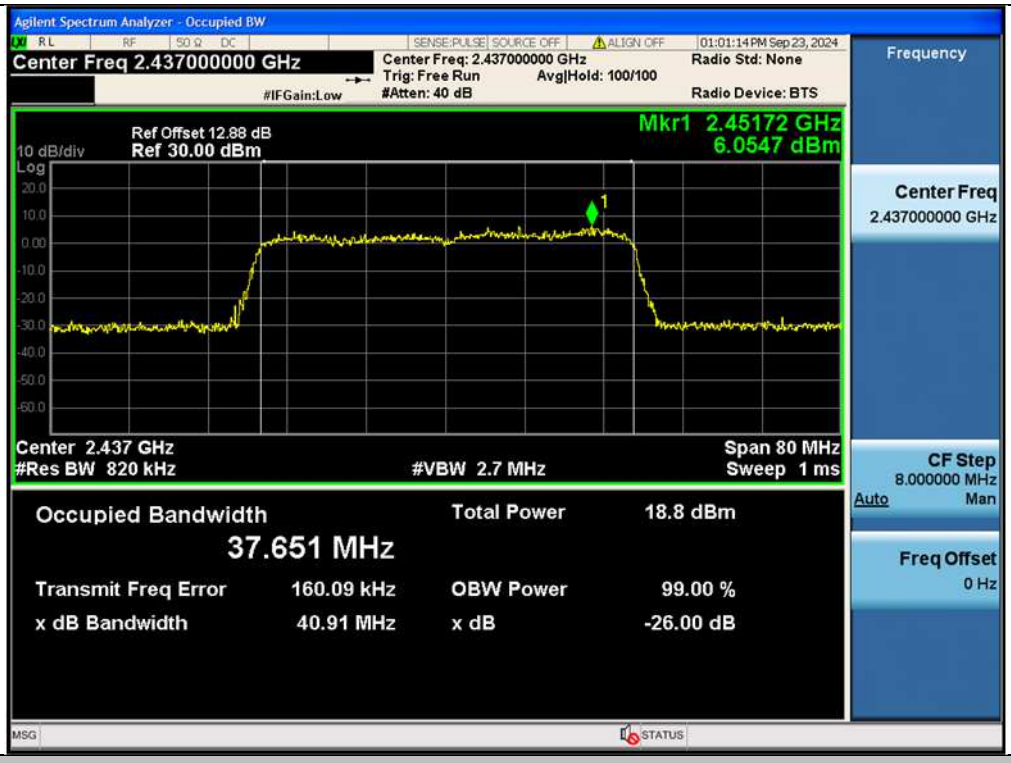
11AX20SISO-Ant1-2437



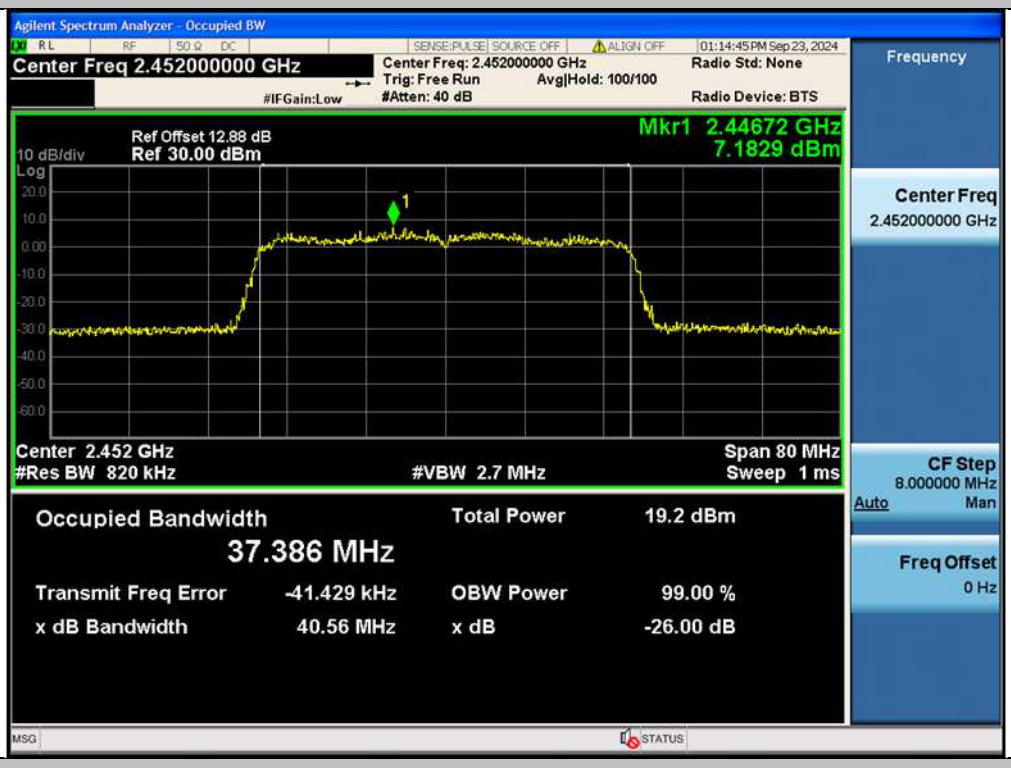
11AX20SISO-Ant1-2462



11AX40SISO-Ant1-2422



11AX40SISO-Ant1-2437

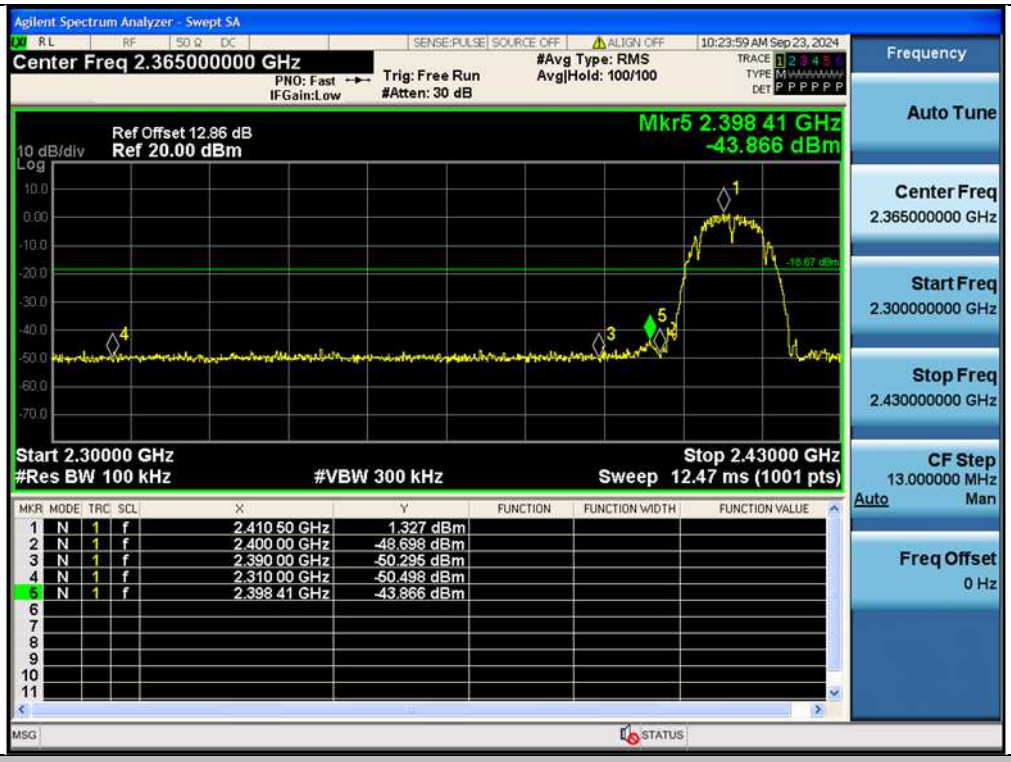


11AX40SISO-Ant1-2452

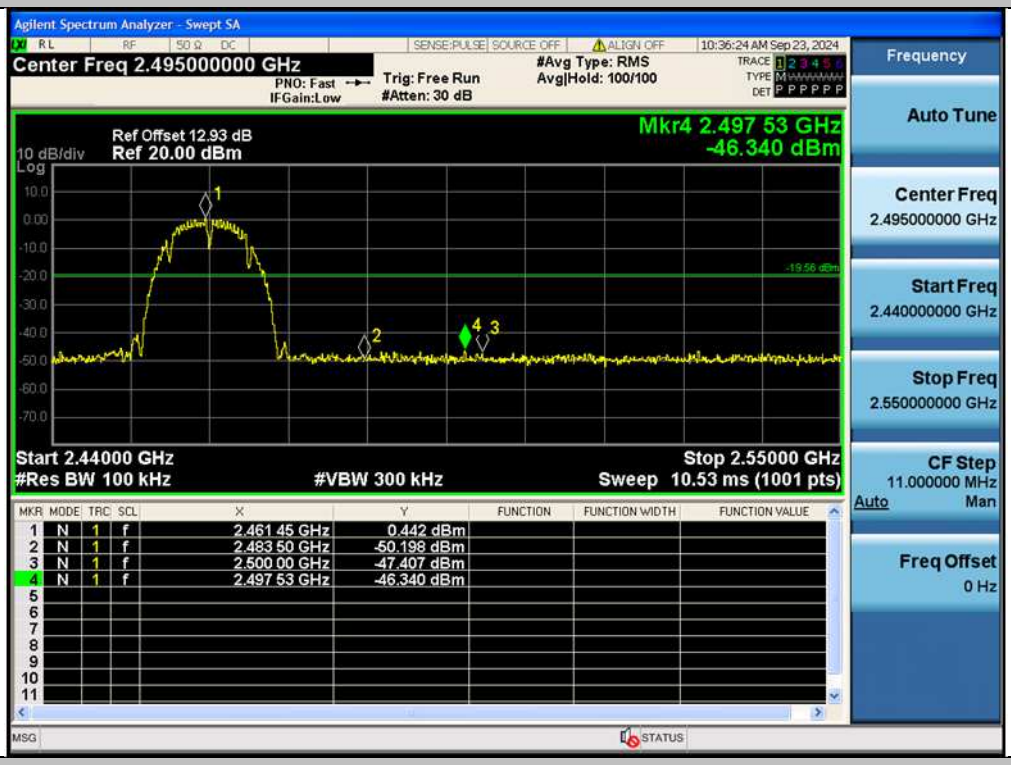
Appendix A.4: Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

Band Edge

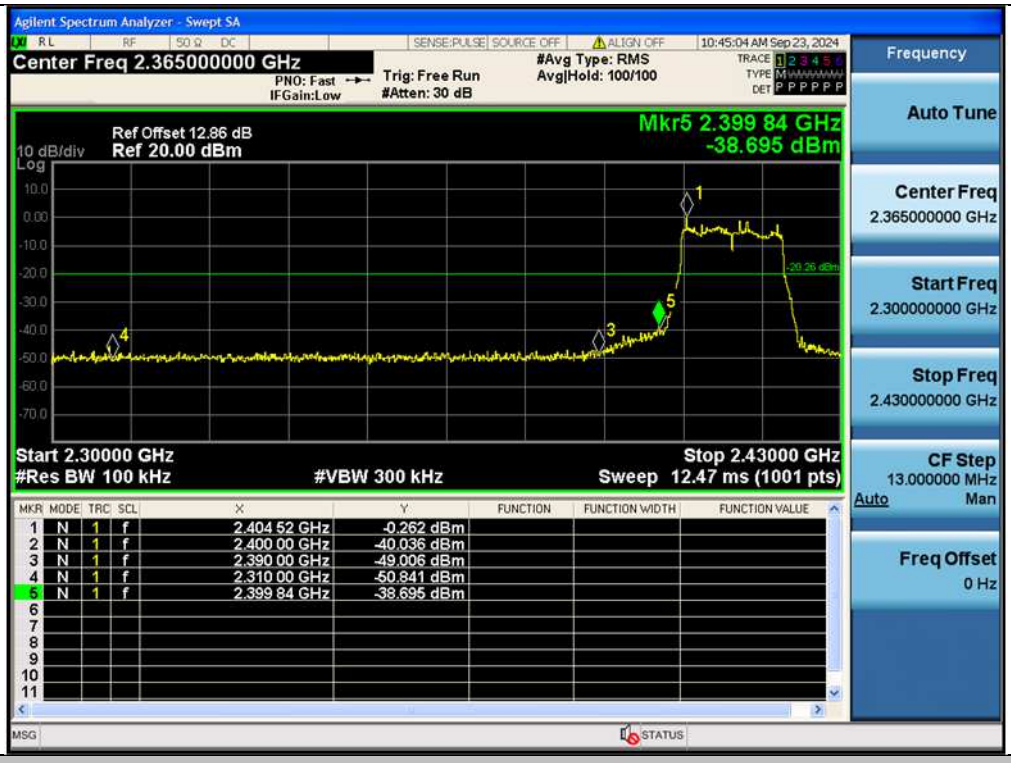
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	1.33	-43.87	≤-18.67	PASS
11B	Ant1	High	2462	0.44	-46.34	≤-19.56	PASS
11G	Ant1	Low	2412	-0.26	-38.7	≤-20.26	PASS
11G	Ant1	High	2462	-0.71	-45.05	≤-20.71	PASS
11N20SISO	Ant1	Low	2412	0.30	-38.26	≤-19.7	PASS
11N20SISO	Ant1	High	2462	-0.26	-46.79	≤-20.26	PASS
11N40SISO	Ant1	Low	2422	-2.24	-40.62	≤-22.24	PASS
11N40SISO	Ant1	High	2452	-1.74	-42.49	≤-21.74	PASS
11AX20SISO	Ant1	Low	2412	0.31	-36.21	≤-19.69	PASS
11AX20SISO	Ant1	High	2462	-0.44	-46.15	≤-20.44	PASS
11AX40SISO	Ant1	Low	2422	-2.30	-39.74	≤-22.3	PASS
11AX40SISO	Ant1	High	2452	-1.68	-40.3	≤-21.68	PASS



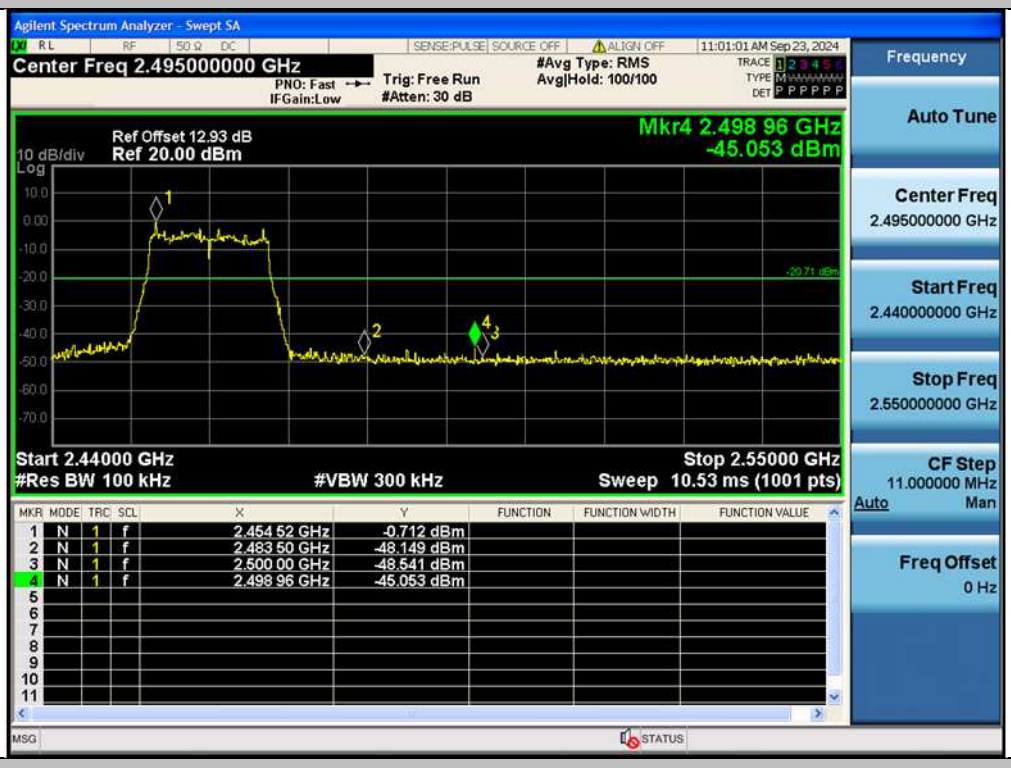
11B-Ant1-2412-PASS



11B-Ant1-2462-PASS

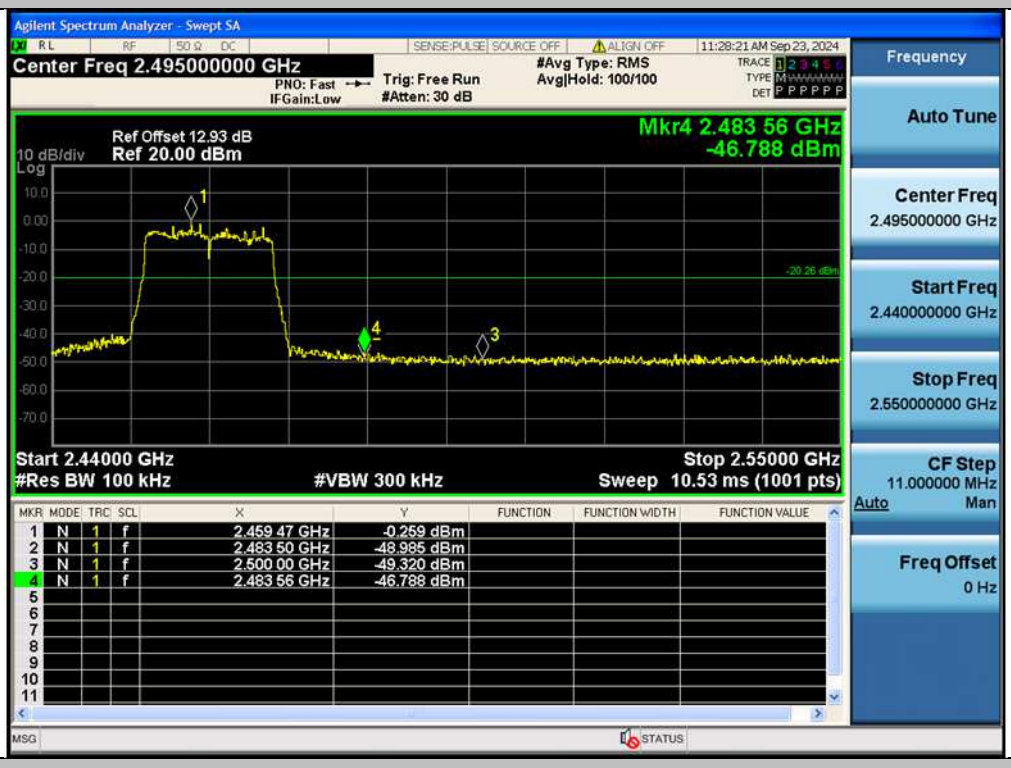


11G-Ant1-2412-PASS



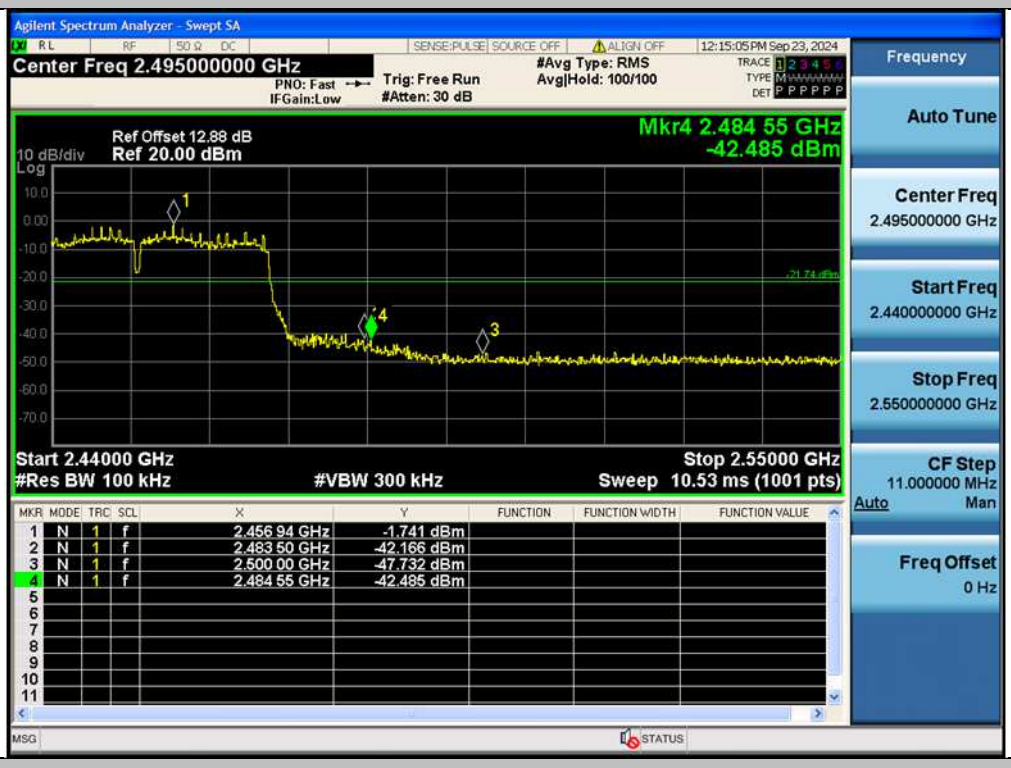
11G-Ant1-2462-PASS

11N20SISO-Ant1-2412-PASS



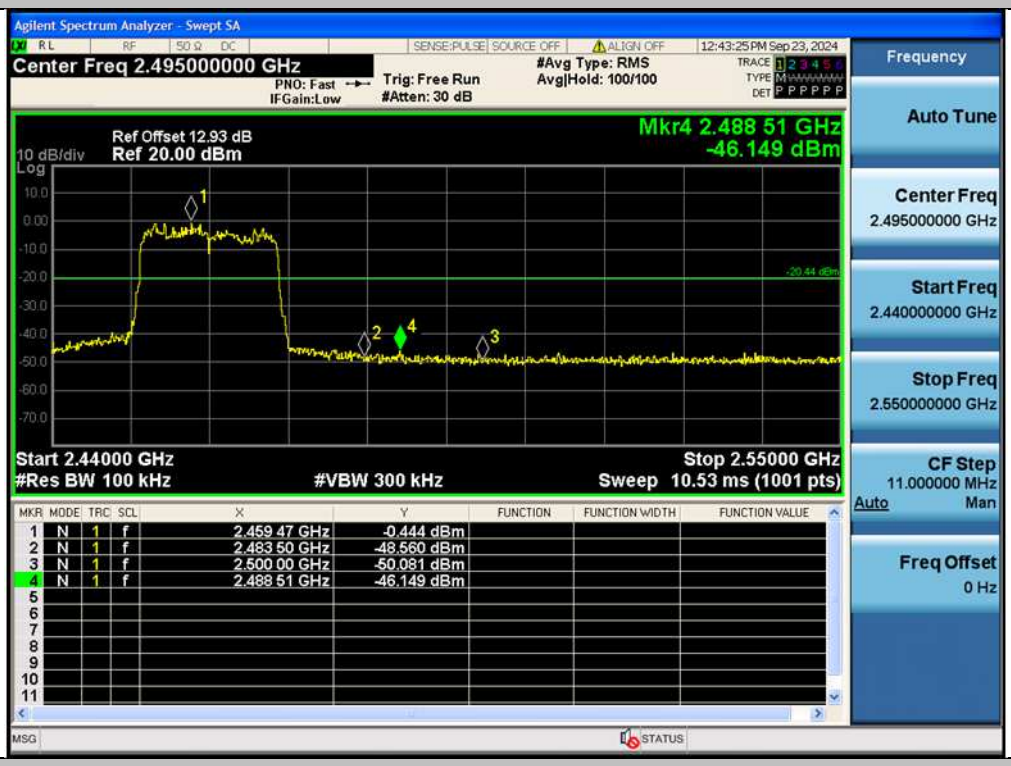
11N20SISO-Ant1-2462-PASS

11N40SISO-Ant1-2422-PASS



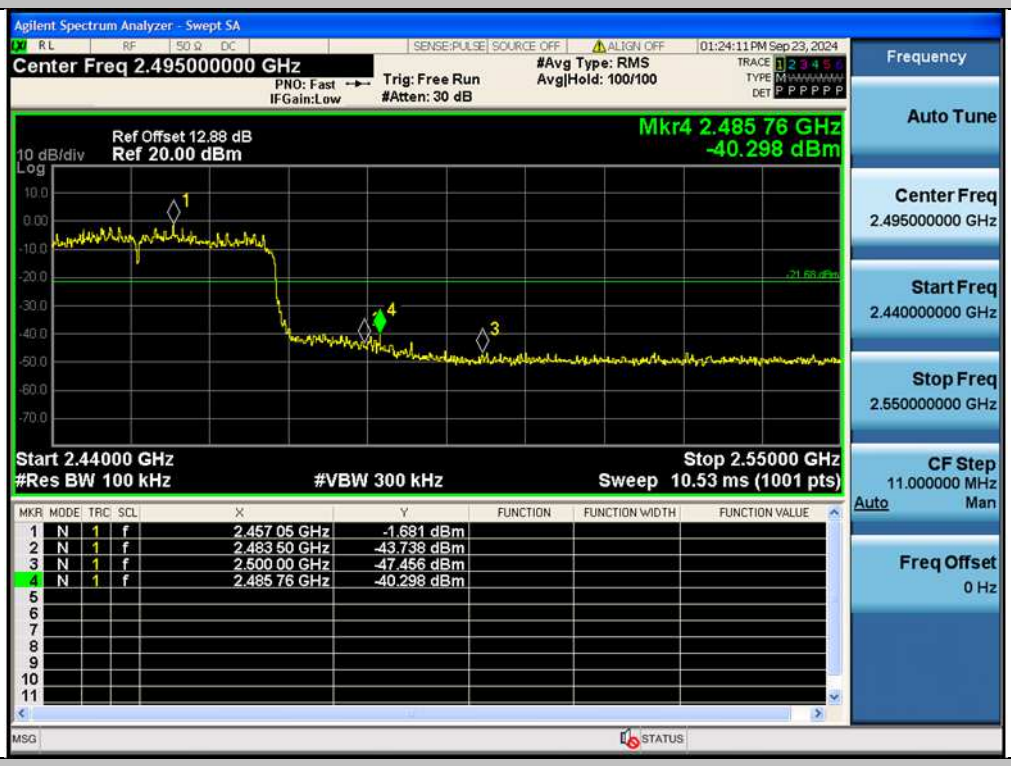
11N40SISO-Ant1-2452-PASS

11AX20SISO-Ant1-2412-PASS



11AX20SISO-Ant1-2462-PASS

11AX40SISO-Ant1-2422-PASS



11AX40SISO-Ant1-2452-PASS

Conducted Spurious Emission

TestMode	Antenna	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	0~Reference	1.29	1.29	---	PASS
11B	Ant1	2412	30~1000	1.29	-58.04	≤-18.71	PASS
11B	Ant1	2412	1000~26500	1.29	-47.32	≤-18.71	PASS
11B	Ant1	2437	0~Reference	0.74	0.74	---	PASS
11B	Ant1	2437	30~1000	0.74	-57.04	≤-19.26	PASS
11B	Ant1	2437	1000~26500	0.74	-46.5	≤-19.26	PASS
11B	Ant1	2462	0~Reference	-0.73	-0.73	---	PASS
11B	Ant1	2462	30~1000	-0.73	-57.67	≤-20.73	PASS
11B	Ant1	2462	1000~26500	-0.73	-47.26	≤-20.73	PASS
11G	Ant1	2412	0~Reference	-1.58	-1.58	---	PASS
11G	Ant1	2412	30~1000	-1.58	-57.64	≤-21.58	PASS
11G	Ant1	2412	1000~26500	-1.58	-46.53	≤-21.58	PASS
11G	Ant1	2437	0~Reference	-3.20	-3.20	---	PASS
11G	Ant1	2437	30~1000	-3.20	-55.9	≤-23.2	PASS
11G	Ant1	2437	1000~26500	-3.20	-46.9	≤-23.2	PASS
11G	Ant1	2462	0~Reference	-0.75	-0.75	---	PASS
11G	Ant1	2462	30~1000	-0.75	-57.51	≤-20.75	PASS
11G	Ant1	2462	1000~26500	-0.75	-46.41	≤-20.75	PASS
11N20SISO	Ant1	2412	0~Reference	-0.07	-0.07	---	PASS
11N20SISO	Ant1	2412	30~1000	-0.07	-57.27	≤-20.07	PASS
11N20SISO	Ant1	2412	1000~26500	-0.07	-47.6	≤-20.07	PASS
11N20SISO	Ant1	2437	0~Reference	-3.29	-3.29	---	PASS
11N20SISO	Ant1	2437	30~1000	-3.29	-57.93	≤-23.29	PASS
11N20SISO	Ant1	2437	1000~26500	-3.29	-47.08	≤-23.29	PASS
11N20SISO	Ant1	2462	0~Reference	-4.08	-4.08	---	PASS
11N20SISO	Ant1	2462	30~1000	-4.08	-57.55	≤-24.08	PASS
11N20SISO	Ant1	2462	1000~26500	-4.08	-47.9	≤-24.08	PASS
11N40SISO	Ant1	2422	0~Reference	-2.99	-2.99	---	PASS
11N40SISO	Ant1	2422	30~1000	-2.99	-57.82	≤-22.99	PASS
11N40SISO	Ant1	2422	1000~26500	-2.99	-46.74	≤-22.99	PASS
11N40SISO	Ant1	2437	0~Reference	-2.74	-2.74	---	PASS
11N40SISO	Ant1	2437	30~1000	-2.74	-56.42	≤-22.74	PASS
11N40SISO	Ant1	2437	1000~26500	-2.74	-47.62	≤-22.74	PASS
11N40SISO	Ant1	2452	0~Reference	-2.47	-2.47	---	PASS
11N40SISO	Ant1	2452	30~1000	-2.47	-57.69	≤-22.47	PASS
11N40SISO	Ant1	2452	1000~26500	-2.47	-47.03	≤-22.47	PASS
11AX20SISO	Ant1	2412	0~Reference	-2.09	-2.09	---	PASS
11AX20SISO	Ant1	2412	30~1000	-2.09	-57.51	≤-22.09	PASS
11AX20SISO	Ant1	2412	1000~26500	-2.09	-46.4	≤-22.09	PASS
11AX20SISO	Ant1	2437	0~Reference	-0.90	-0.90	---	PASS
11AX20SISO	Ant1	2437	30~1000	-0.90	-57.93	≤-20.9	PASS
11AX20SISO	Ant1	2437	1000~26500	-0.90	-46.58	≤-20.9	PASS
11AX20SISO	Ant1	2462	0~Reference	-3.80	-3.80	---	PASS