

Prüfbericht-Nr.: <i>Test report no.:</i>	CN24QLIU 004	Auftrags-Nr.: <i>Order no.:</i>	168500420	Seite 1 von 22 <i>Page 1 of 22</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2024-08-20	
Auftraggeber: <i>Client:</i>	ECARX (Hubei) Tech Co., Ltd B1336, Taizi Lake Industry Park, No 18 ShenLong AVE, WH, China			
Prüfgegenstand: <i>Test item:</i>	ECU-Display Head Unit			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	EEBABCDE1			
Auftrags-Inhalt: <i>Order content:</i>	Test Report			
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart E Section 15.407 RSS-247 Issue 3 August 2023 RSS-Gen Issue 5 February 2021			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2024-09-02	Please refer to Photo Document		
Prüfmuster-Nr.: <i>Test sample no.:</i>	S202409024250-ZJA01/2 S202409024250-ZJA02/2			
Prüfzeitraum: <i>Testing period:</i>	2024-09-02 - 2024-09-28			
Ort der Prüfung: <i>Place of testing:</i>	Refer to section 2.1			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	 Hardy Suo	genehmigt von: <i>authorized by:</i>	 Lin Lin	
Datum: <i>Date:</i>	2024-10-12	Ausstellungsdatum: <i>Issue date:</i>	2024-10-12	
Stellung / Position:	Sachverständige(r)/Expert	Stellung / Position:	Sachverständige(r)/Expert	
Sonstiges / <i>Other:</i>	FCC ID: 2BD49-EEBABCDE1 IC: 31788-EEBABCDE1, HVIN: EEBABCDE1 This report is for 5GHz Wi-Fi.			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* 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
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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. <i>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.</i>
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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. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen 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 bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. <i>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.</i>

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM CONDUCTED OUTPUT POWER

RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY

RESULT: Pass

5.1.4 FREQUENCY STABILITY

RESULT: Pass

5.1.5 26dB BANDWIDTH AND 99% BANDWIDTH

RESULT: Pass

5.1.6 6dB BANDWIDTH

RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION

RESULT: Pass

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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 5GHz 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
☒	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
☒	Band Rejection Filter (5150MHz~5880MHz)	Micro-Tronics	BRM50716	G186	27-Oct-2023	26-Oct-2024
☒	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 basis 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	5.6 GHz: ± 6.4 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) Co., Ltd. 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, $\pi/4$ -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 5GHz Wi-Fi

U-NII-1					
20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

U-NII-3					
20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, 5G Wi-Fi wireless 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
- Schematics
- ID Label and Location Info
- 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 tests 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)

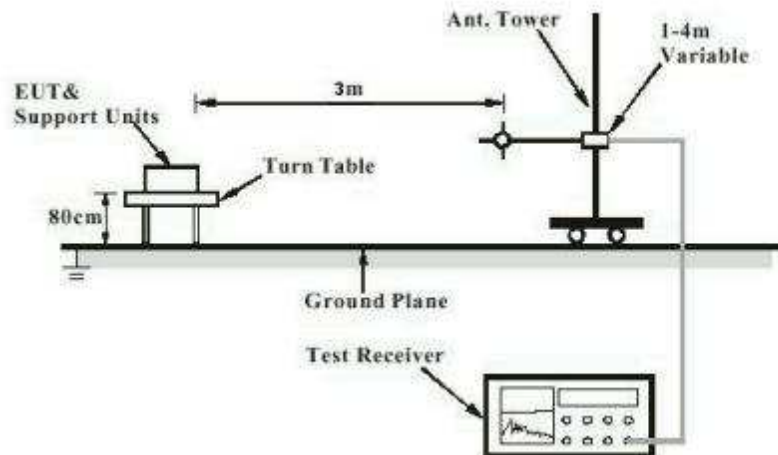


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

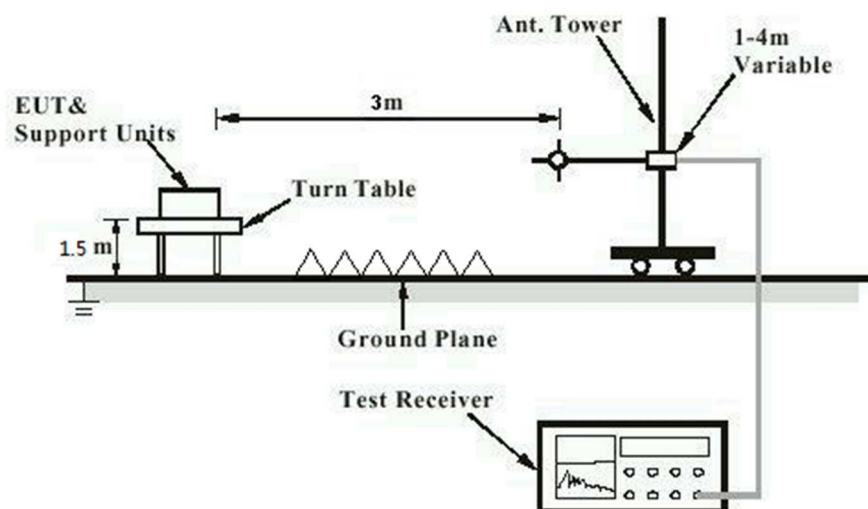
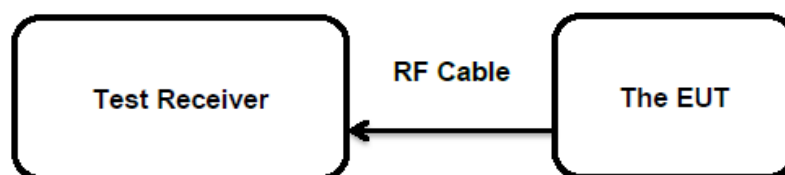


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.203
RSS-247 clause 6.8

According to the manufacturer declared, the EUT has an Integral Antenna, the directional gain of antenna is 5.9dBi for 5.2GHz Wi-Fi & 7.6dBi for 5.8GHz 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.

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5.1.2 Maximum Conducted Output Power

RESULT:

Pass

Test Specification

Test standard	: FCC Part 15.407(a)(1)&(2)&(4) RSS-247 clause 6.2
Basic standard	: ANSI C63.10: 2013
Limits	: FCC: <250mW (24dBm) (5150-5250MHz) * <250mW (24dBm) (5250-5350MHz, 5470-5725MHz) * 250 mW (24dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz, where is lesser. <1W (30dBm) (5725-5850MHz) IC: * Max e.i.r.p. < 200mW (23dBm) (5150-5250MHz) * 200 mW (23dBm) or 10 dBm + 10 log B, where B is the 99% emission bandwidth in MHz, where is lesser. * Max conducted output power < 250mW (24dBm) (5250-5350MHz) * 250 mW (24dBm) or 11 dBm + 10 log B, where B is the 99% emission bandwidth in MHz, where is lesser. * Max e.i.r.p. < 1W (30dBm) (5250-5350MHz) * 1 W (30dBm) or 17 dBm + 10 log B, where B is the 99% emission bandwidth in MHz, where is lesser. Max conducted output power < 1W (30dBm) (5725-5850MHz)
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 °C
Relative humidity	: 46.8 %
Atmospheric pressure	: 99.8 kPa

For details refer to following test result.

Table 6: Test Result of Maximum Conducted Output Power, 5.2GHz Wi-Fi

Test Mode	Data Rate	Test Channel	Measured Average Power		Limit (W)
			(dBm)	(W)	
802.11a	1 Mbps	5180	9.19	0.0083	< 0.25 or 0.169*
		5200	9.80	0.0095	
		5240	10.16	0.0104	
802.11n (HT20)	MCS0	5180	9.24	0.0084	
		5200	9.77	0.0095	
		5240	10.19	0.0104	
802.11n (HT40)	MCS0	5190	9.30	0.0085	
		5230	9.92	0.0098	
802.11ac (VHT20)	MCS0	5180	9.22	0.0084	
		5200	9.73	0.0094	
		5240	10.14	0.0103	
802.11ac (VHT40)	MCS0	5190	9.44	0.0088	
		5230	9.86	0.0097	
802.11ac (VHT80)	MCS0	5210	10.63	0.0116	
802.11ax (HE20)	MCS0	5180	9.44	0.0088	
		5200	9.96	0.0099	
		5240	10.40	0.0110	
802.11ax (HE40)	MCS0	5190	10.56	0.0114	
		5230	11.16	0.0131	
802.11ax (HE80)	MCS0	5210	10.85	0.0122	

Max. e.i.r.p.=11.16dBm+5.9dBi=17.06dBm, which is less than 36dBm=4W.

*IC e.i.r.p. limit is 200 mW (23dBm) or 10 dBm + 10 log B, the minimum B=16.951MHz, hence the e.i.r.p. limit=22.29dBm=0.169W

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G) of 5.2GHz Wi-Fi: 5.9 dBi

Table 7: Test Result of Maximum Conducted Output Power, 5.8GHz Wi-Fi

Test Mode	Data Rate	Test Channel	Measured Average Power		Limit (dBm)
			(dBm)	(W)	
802.11a	1 Mbps	5745	10.63	0.0116	< 28.4 (=30dBm-1.6dB)
		5785	9.88	0.0097	
		5825	10.10	0.0102	
802.11n (HT20)	MCS0	5745	10.69	0.0117	
		5785	9.89	0.0097	
		5825	10.09	0.0102	
802.11n (HT40)	MCS0	5755	10.36	0.0109	
		5795	9.70	0.0093	
802.11ac (VHT20)	MCS0	5745	10.72	0.0118	
		5785	10.09	0.0102	
		5825	10.19	0.0104	
802.11ac (VHT40)	MCS0	5755	10.20	0.0105	
		5795	9.90	0.0098	
802.11ac (VHT80)	MCS0	5775	11.06	0.0128	
802.11ax (HE20)	MCS0	5745	10.94	0.0124	
		5785	10.17	0.0104	
		5825	10.39	0.0109	
802.11ax (HE40)	MCS0	5755	10.76	0.0119	
		5795	10.07	0.0102	
802.11ax (HE80)	MCS0	5775	11.40	0.0138	

Max. e.i.r.p.=11.40dBm+7.6dBi=19.0dBm, which is less than 28.4dBm.

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G) of 5.8GHz Wi-Fi: 7.6 dBi

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5.1.3 Conducted Power Spectral Density

RESULT:**Pass****Test Specification**

Test standard	: FCC part 15.407(a) RSS-247 clause 6.2
Basic standard	: ANSI C63.10: 2013 KDB 789033 D02 v01r03
Limits	: FCC: <11dBm/MHz (5150-5250MHz, 5250-5350MHz, 5470-5725MHz) <30dBm/500kHz (5725-5850MHz) IC: e.i.r.p. spectral density <10dBm/MHz (5150-5250MHz) <11dBm/1MHz (5250-5350MHz) <30dBm/500kHz (5725-5850MHz)
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 °C
Relative humidity	: 46.8 %
Atmospheric pressure	: 99.8 kPa

For the measurement records, refer to the appendix A.

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5.1.4 Frequency Stability

RESULT:

Pass

Test Specification

Test standard	: FCC Part 15.407(g) RSS-Gen Clause 6.11
Basic standard	: ANSI C63.10: 2013
Limits	: Within assigned bands
Kind of test site	: Shielded Room

Note: The test item was declared by manufacture.

Prüfbericht - Nr.: **CN24QLIU 004**
Test Report No.:Seite 19 von 22
Page 19 of 22**5.1.5 26dB Bandwidth and 99% Bandwidth****RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.407(e) RSS-Gen Clause 6.6
Basic standard	: ANSI C63.10: 2013
Limits	: N/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 °C
Relative humidity	: 46.8 %
Atmospheric pressure	: 99.8 kPa

For the measurement records, refer to the appendix A.

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5.1.6 6dB Bandwidth

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.407(e) RSS-Gen Clause 6.6
Basic standard	: ANSI C63.10: 2013
Limits	: At least 500kHz (5725-5850MHz)
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 °C
Relative humidity	: 46.8 %
Atmospheric pressure	: 99.8 kPa

For the measurement records, refer to the appendix A.

5.1.7 Radiated Spurious Emission

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.407(b) & FCC Part 15.205 & FCC Part 15.209 RSS-247 clause 6.2 & RSS-GEN clause 8.9 and 8.10
Basic standard	: ANSI C63.10: 2013 KDB 789033 D02 v01r03
Limits	: • For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz. • For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz. • For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz. Emissions outside the band 5470-5600 MHz and 5650-5725 MHz shall not exceed -27 dBm/MHz e.i.r.p. • For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. • Restricted Bands meet the requirement of 15.209 limit and RSS-GEN
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 2024-09-25 to 2024-09-28
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.

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Appendix A: Test Results of 5GHz Wi-Fi

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

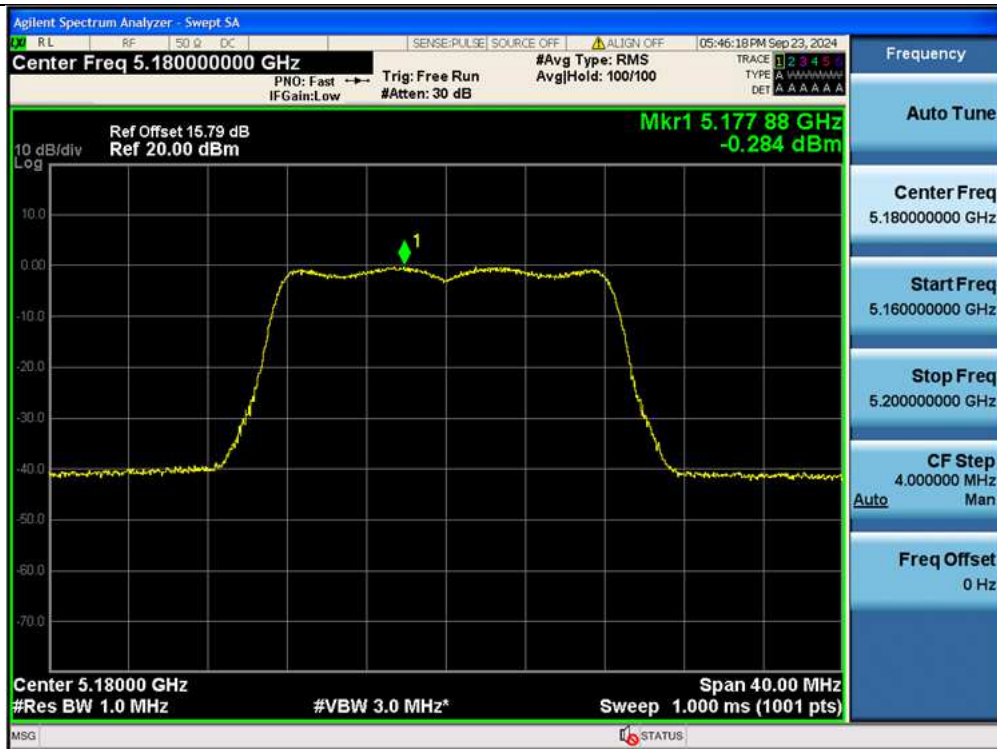
TestMode	Antenna	Frequency[MHz]	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	Ant1	5180	-0.13	<11.00	PASS
11A	Ant1	5220	0.16	<11.00	PASS
11A	Ant1	5240	0.74	<11.00	PASS
11A	Ant1	5745	-0.90	<28.40	PASS
11A	Ant1	5785	-1.86	<28.40	PASS
11A	Ant1	5825	-2.19	<28.40	PASS
11N20SISO	Ant1	5180	-0.40	<11.00	PASS
11N20SISO	Ant1	5220	-0.18	<11.00	PASS
11N20SISO	Ant1	5240	0.49	<11.00	PASS
11N20SISO	Ant1	5745	-1.24	<28.40	PASS
11N20SISO	Ant1	5785	-1.98	<28.40	PASS
11N20SISO	Ant1	5825	-2.37	<28.40	PASS
11N40SISO	Ant1	5190	-3.46	<11.00	PASS
11N40SISO	Ant1	5230	-2.77	<11.00	PASS
11N40SISO	Ant1	5755	-5.07	<28.40	PASS
11N40SISO	Ant1	5795	-5.69	<28.40	PASS
11AC20SISO	Ant1	5180	-0.23	<11.00	PASS
11AC20SISO	Ant1	5220	-0.51	<11.00	PASS
11AC20SISO	Ant1	5240	0.37	<11.00	PASS
11AC20SISO	Ant1	5745	-1.18	<28.40	PASS
11AC20SISO	Ant1	5785	-1.99	<28.40	PASS
11AC20SISO	Ant1	5825	-2.42	<28.40	PASS
11AC40SISO	Ant1	5190	-3.52	<11.00	PASS
11AC40SISO	Ant1	5230	-2.83	<11.00	PASS
11AC40SISO	Ant1	5755	-5.02	<28.40	PASS
11AC40SISO	Ant1	5795	-5.58	<28.40	PASS
11AC80SISO	Ant1	5210	-6.40	<11.00	PASS
11AC80SISO	Ant1	5775	-6.03	<28.40	PASS
11AX20SISO	Ant1	5180	-0.19	<11.00	PASS
11AX20SISO	Ant1	5220	-0.11	<11.00	PASS
11AX20SISO	Ant1	5240	0.19	<11.00	PASS
11AX20SISO	Ant1	5745	-1.16	<28.40	PASS
11AX20SISO	Ant1	5785	-2.07	<28.40	PASS
11AX20SISO	Ant1	5825	-2.13	<28.40	PASS
11AX40SISO	Ant1	5190	-2.09	<11.00	PASS
11AX40SISO	Ant1	5230	-2.67	<11.00	PASS
11AX40SISO	Ant1	5755	-4.55	<28.40	PASS
11AX40SISO	Ant1	5795	-4.86	<28.40	PASS
11AX80SISO	Ant1	5210	-4.74	<11.00	PASS
11AX80SISO	Ant1	5775	-6.17	<28.40	PASS

Note: 1. The Result and Limit Unit is dBm/500 kHz in the band 5.725–5.85 GHz.

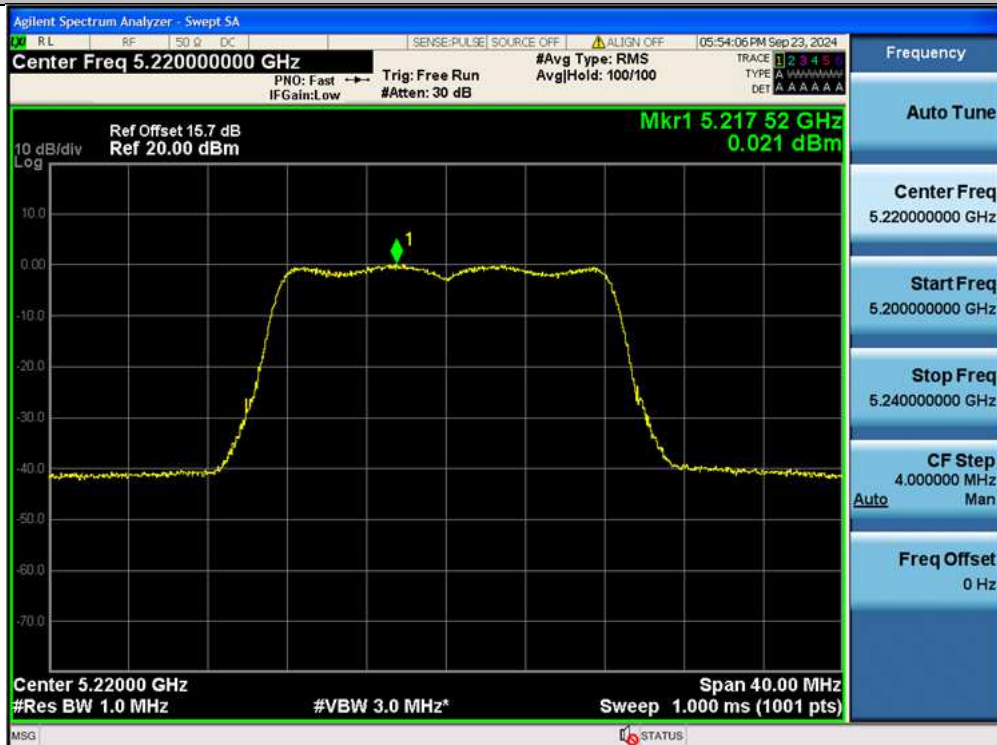
2. The Duty Cycle Factor and RBW Factor is compensated in the graph.

3. Max. conducted PSD for 5150-5250MHz is 0.74dBm/MHz, the e.i.r.p. PSD = 0.74dBm/MHz + 5.9dB = 6.64dBm/MHz that is less than limit 10dBm/MHz.

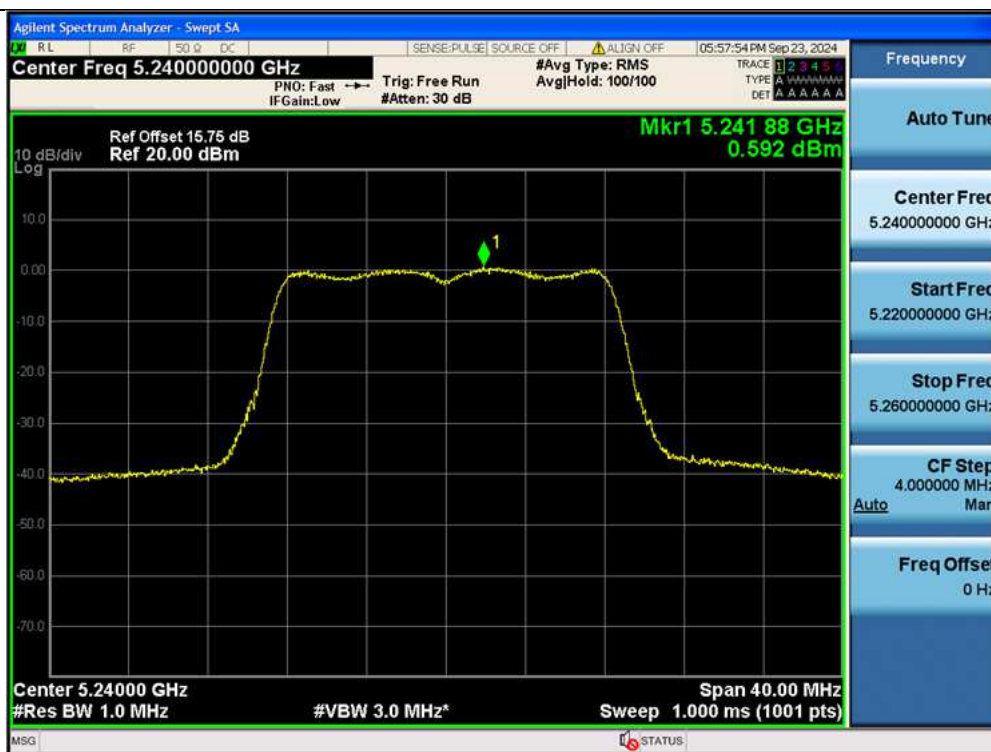
4. The max. ANT gain for 5150-5250MHz is 5.9dBi; The max. ANT gain for 5720-5850MHz is 7.6dBi.



11A-Ant1-5180-PASS



11A-Ant1-5220-PASS



11A-Ant1-5240-PASS



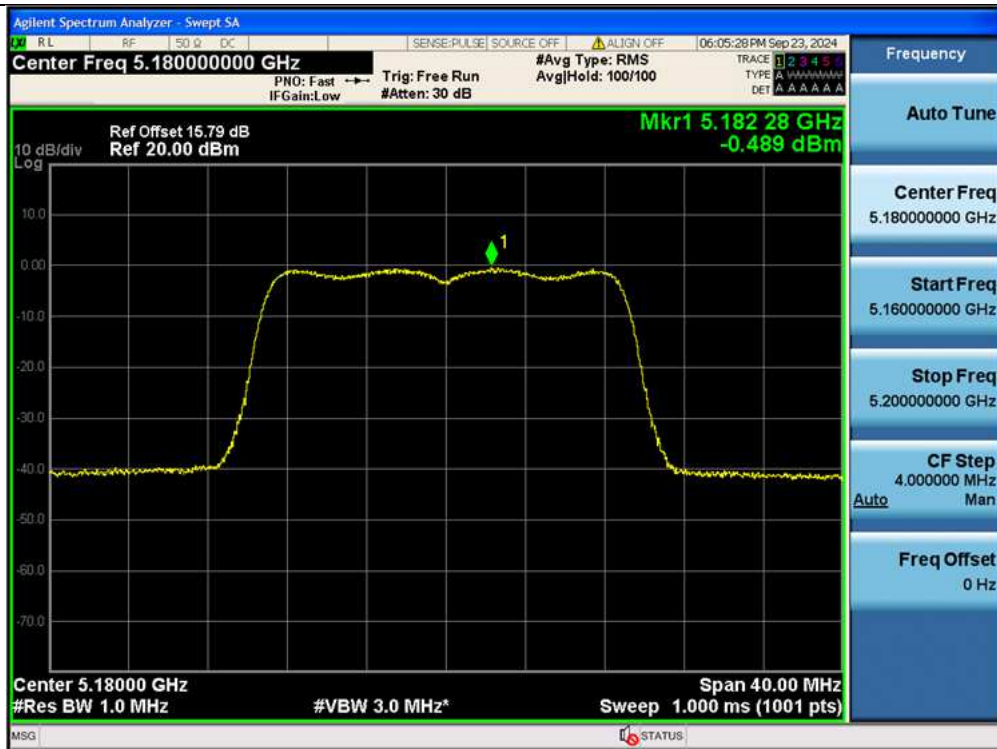
11A-Ant1-5745-PASS



11A-Ant1-5785-PASS



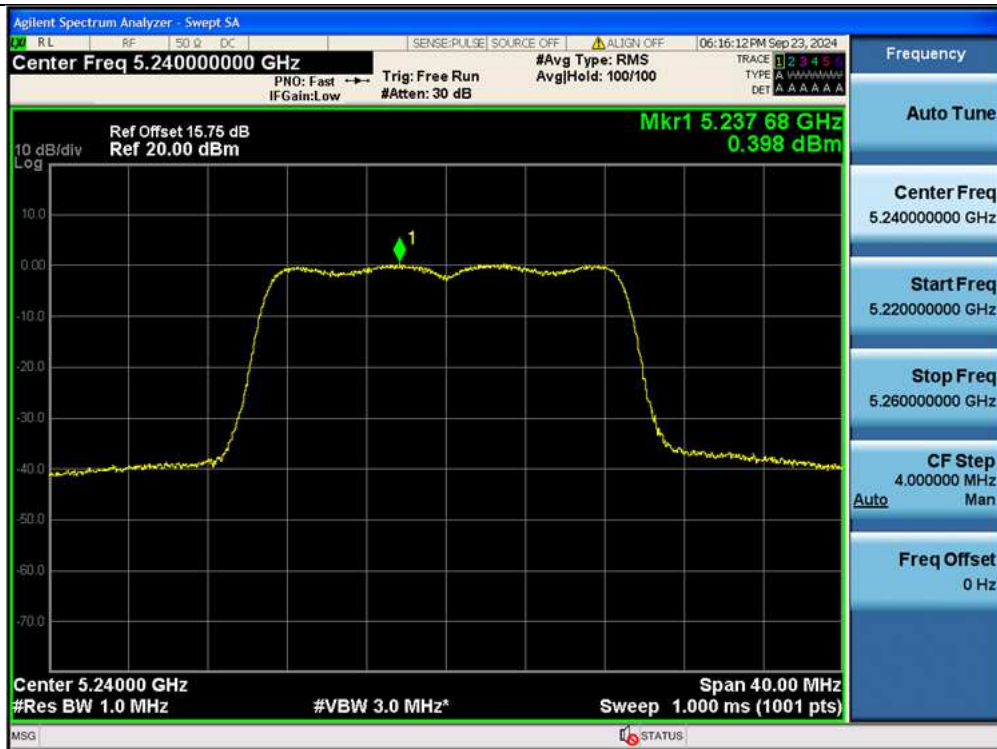
11A-Ant1-5825-PASS



11N20SISO-Ant1-5180-PASS



11N20SISO-Ant1-5220-PASS



11N20SISO-Ant1-5240-PASS



11N20SISO-Ant1-5745-PASS



11N20SISO-Ant1-5785-PASS



11N20SISO-Ant1-5825-PASS



11N40SISO-Ant1-5190-PASS



11N40SISO-Ant1-5230-PASS



11N40SISO-Ant1-5755-PASS



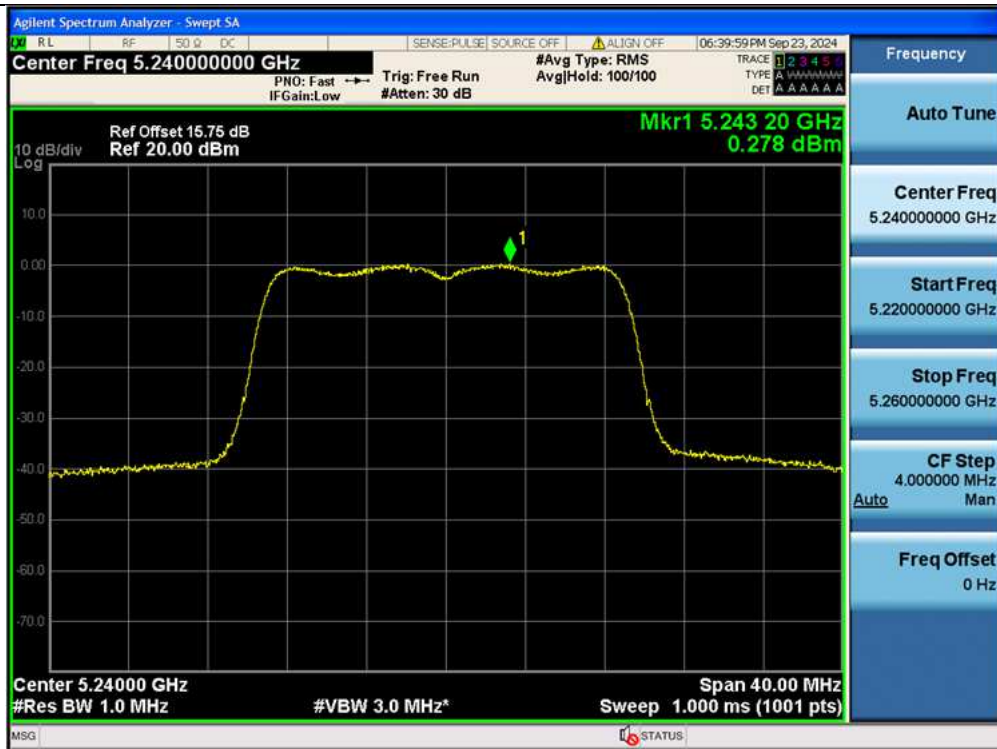
11N40SISO-Ant1-5795-PASS



11AC20SISO-Ant1-5180-PASS



11AC20SISO-Ant1-5220-PASS



11AC20SISO-Ant1-5240-PASS



11AC20SISO-Ant1-5745-PASS



11AC20SISO-Ant1-5785-PASS



11AC20SISO-Ant1-5825-PASS



11AC40SISO-Ant1-5190-PASS



11AC40SISO-Ant1-5230-PASS



11AC40SISO-Ant1-5755-PASS



11AC40SISO-Ant1-5795-PASS



11AC80SISO-Ant1-5210-PASS



11AC80SISO-Ant1-5775-PASS



11AX20SISO-Ant1-5180-PASS



11AX20SISO-Ant1-5220-PASS



11AX20SISO-Ant1-5240-PASS



11AX20SISO-Ant1-5745-PASS



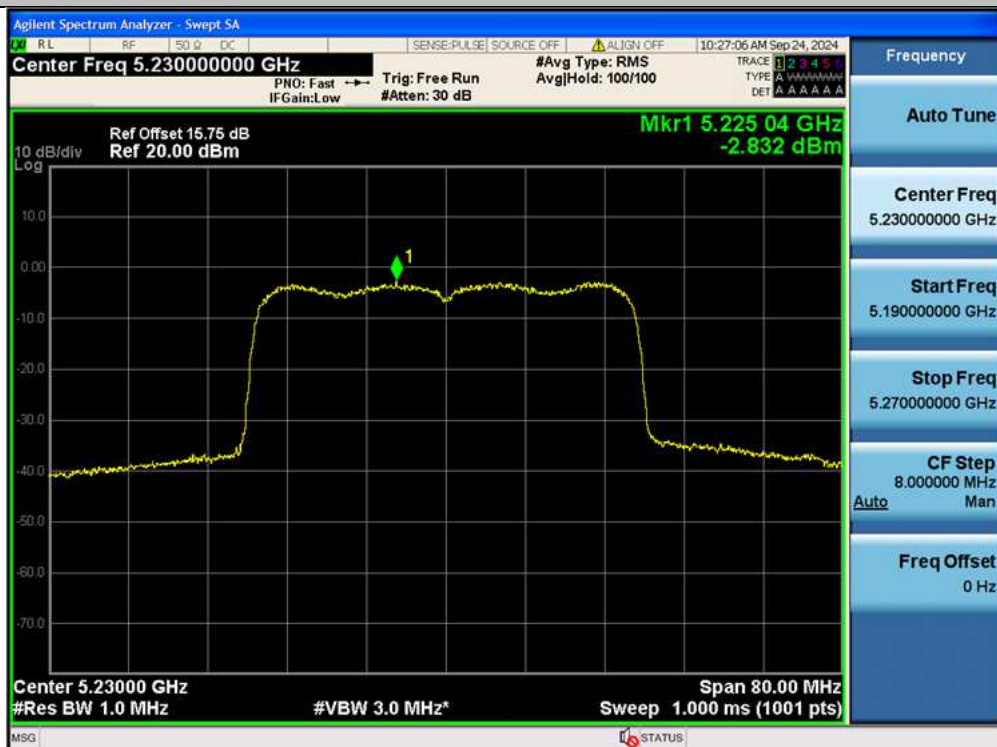
11AX20SISO-Ant1-5785-PASS



11AX20SISO-Ant1-5825-PASS



11AX40SISO-Ant1-5190-PASS



11AX40SISO-Ant1-5230-PASS



11AX40SISO-Ant1-5755-PASS



11AX40SISO-Ant1-5795-PASS



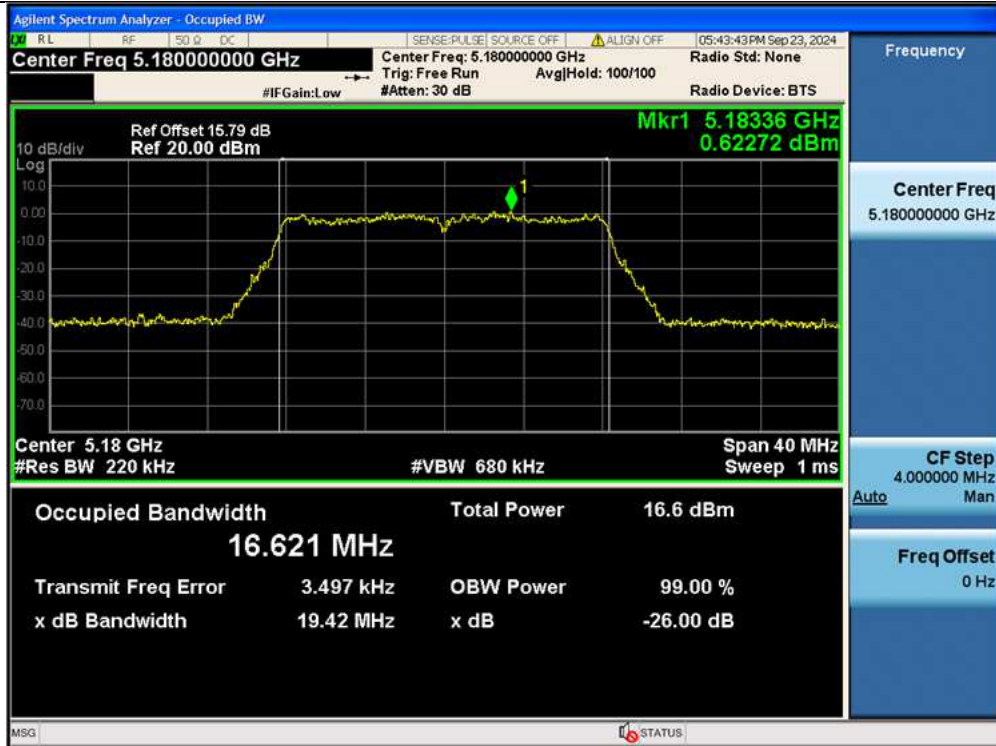
11AX80SISO-Ant1-5210-PASS



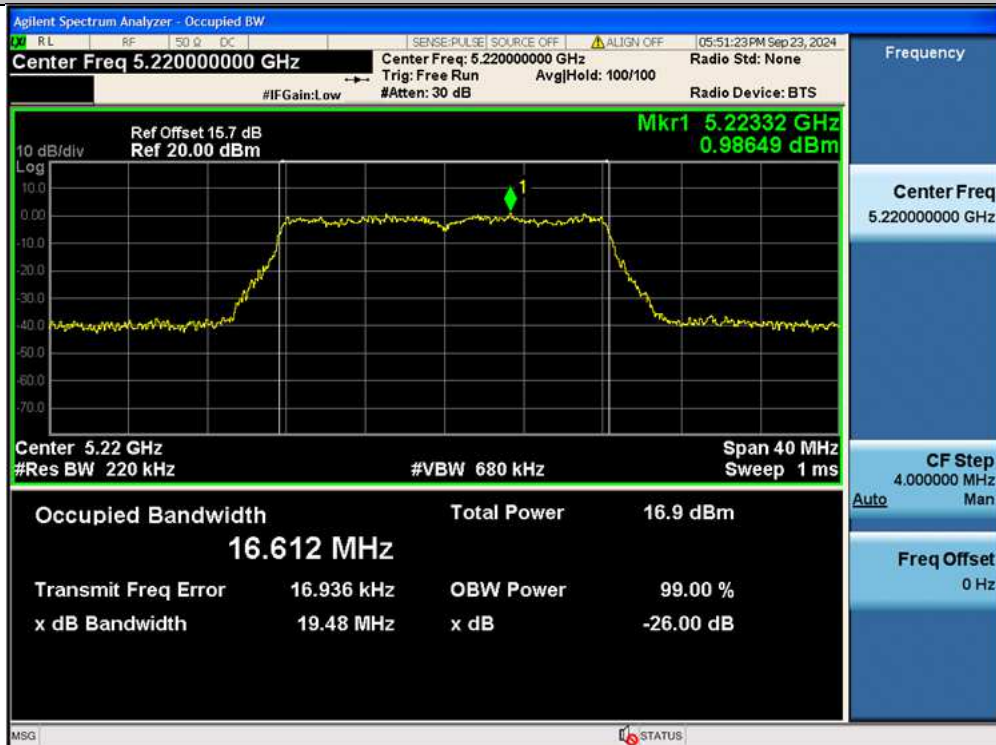
11AX80SISO-Ant1-5775-PASS

Appendix A.2: Test Results of 26dB Bandwidth

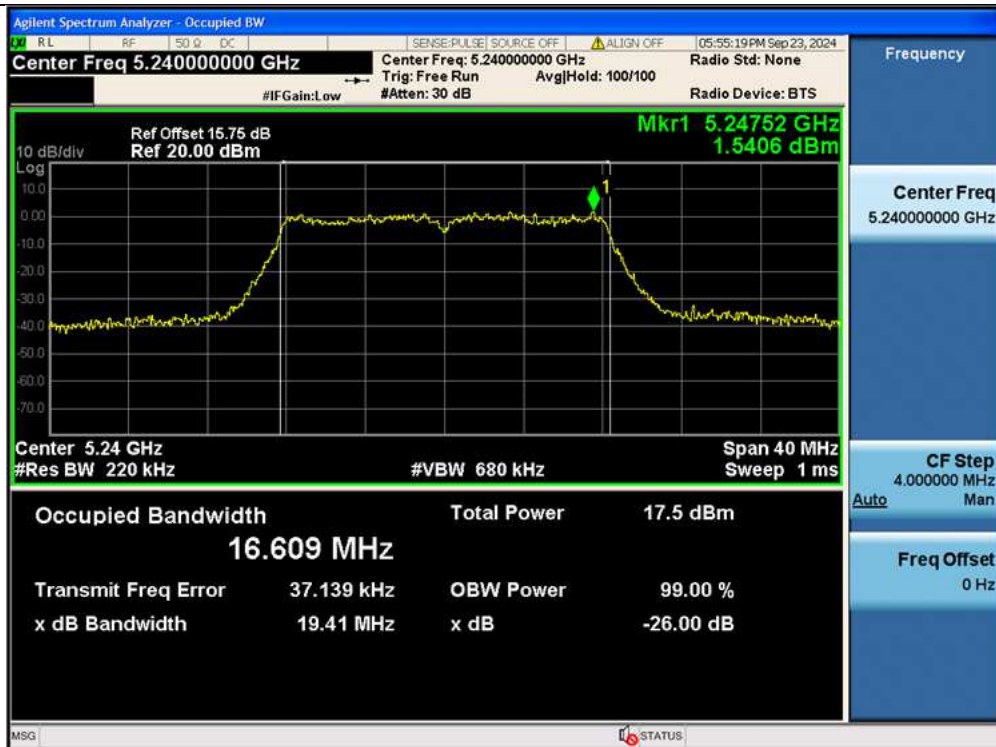
TestMode	Antenna	Frequency[MHz]	26db EBW [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	19.42	---	PASS
11A	Ant1	5220	19.48	---	PASS
11A	Ant1	5240	19.41	---	PASS
11N20SISO	Ant1	5180	19.63	---	PASS
11N20SISO	Ant1	5220	19.91	---	PASS
11N20SISO	Ant1	5240	20.09	---	PASS
11N40SISO	Ant1	5190	40.43	---	PASS
11N40SISO	Ant1	5230	40.28	---	PASS
11AC20SISO	Ant1	5180	19.72	---	PASS
11AC20SISO	Ant1	5220	19.90	---	PASS
11AC20SISO	Ant1	5240	19.78	---	PASS
11AC40SISO	Ant1	5190	40.27	---	PASS
11AC40SISO	Ant1	5230	40.22	---	PASS
11AC80SISO	Ant1	5210	81.52	---	PASS
11AX20SISO	Ant1	5180	20.29	---	PASS
11AX20SISO	Ant1	5220	20.20	---	PASS
11AX20SISO	Ant1	5240	20.30	---	PASS
11AX40SISO	Ant1	5190	40.24	---	PASS
11AX40SISO	Ant1	5230	39.84	---	PASS
11AX80SISO	Ant1	5210	80.58	---	PASS



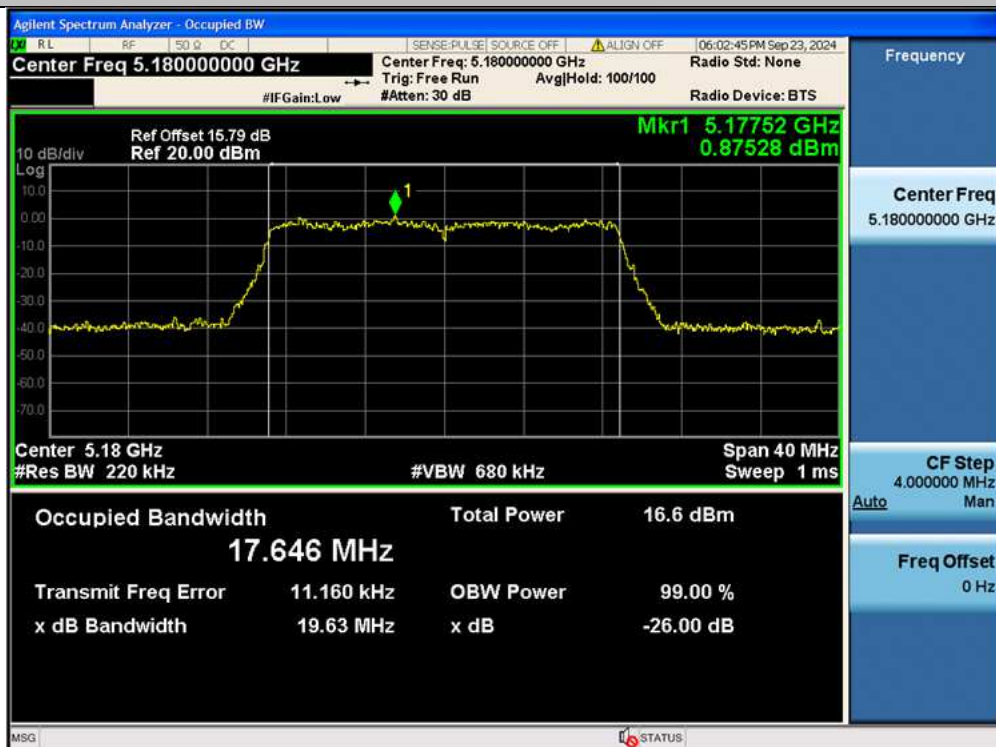
11A-Ant1-5180



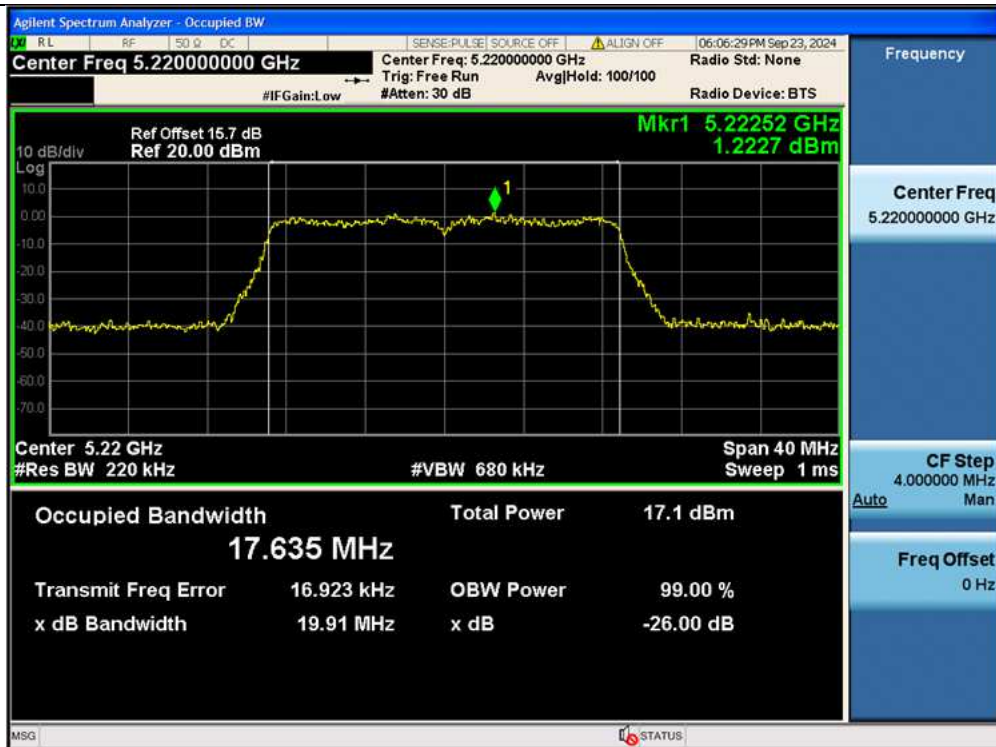
11A-Ant1-5220



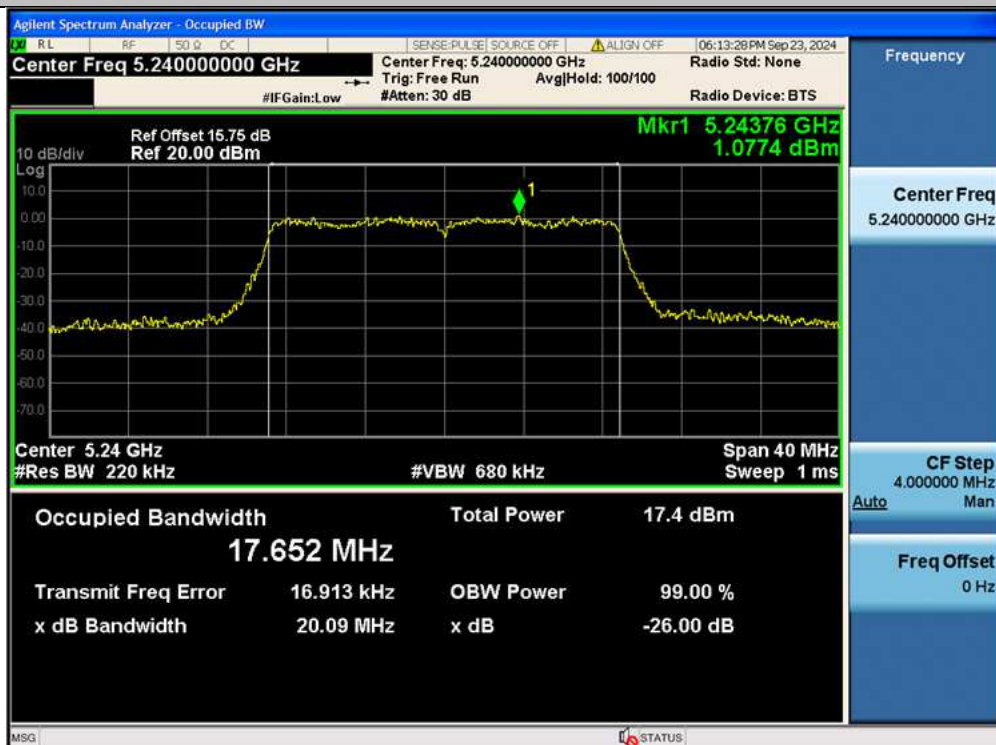
11A-Ant1-5240



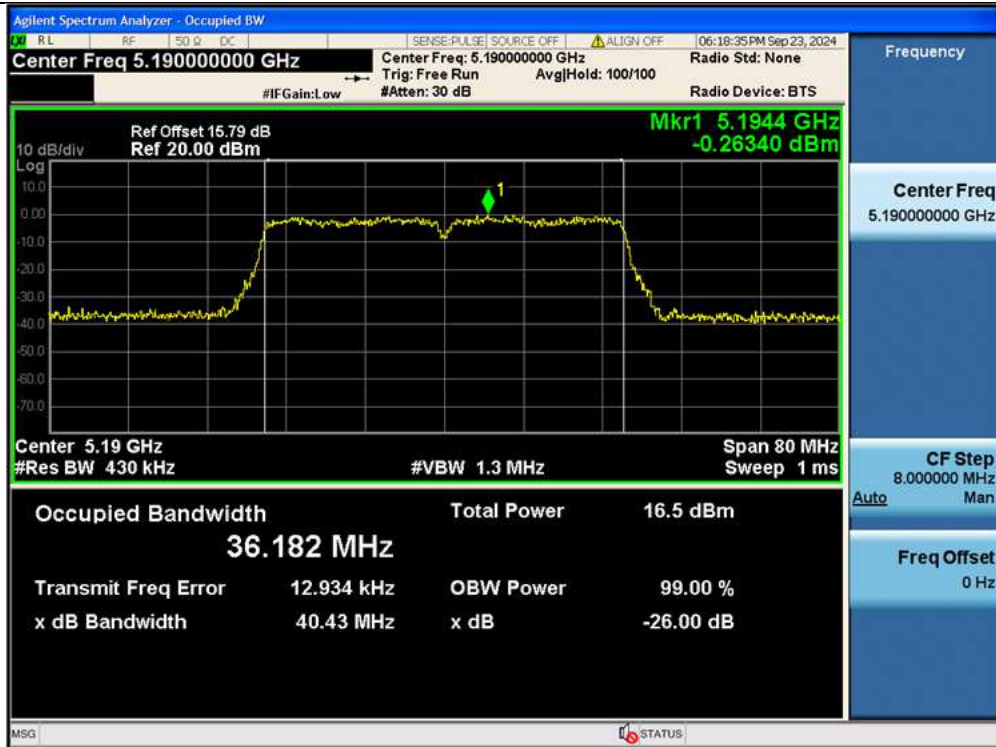
11N20SISO-Ant1-5180



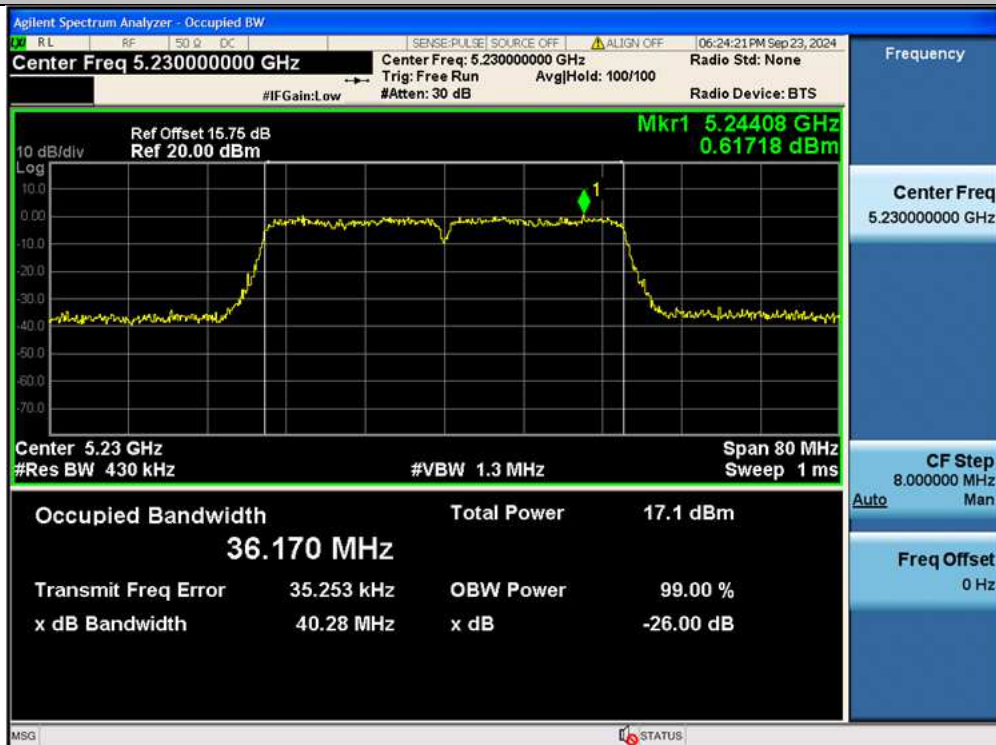
11N20SISO-Ant1-5220



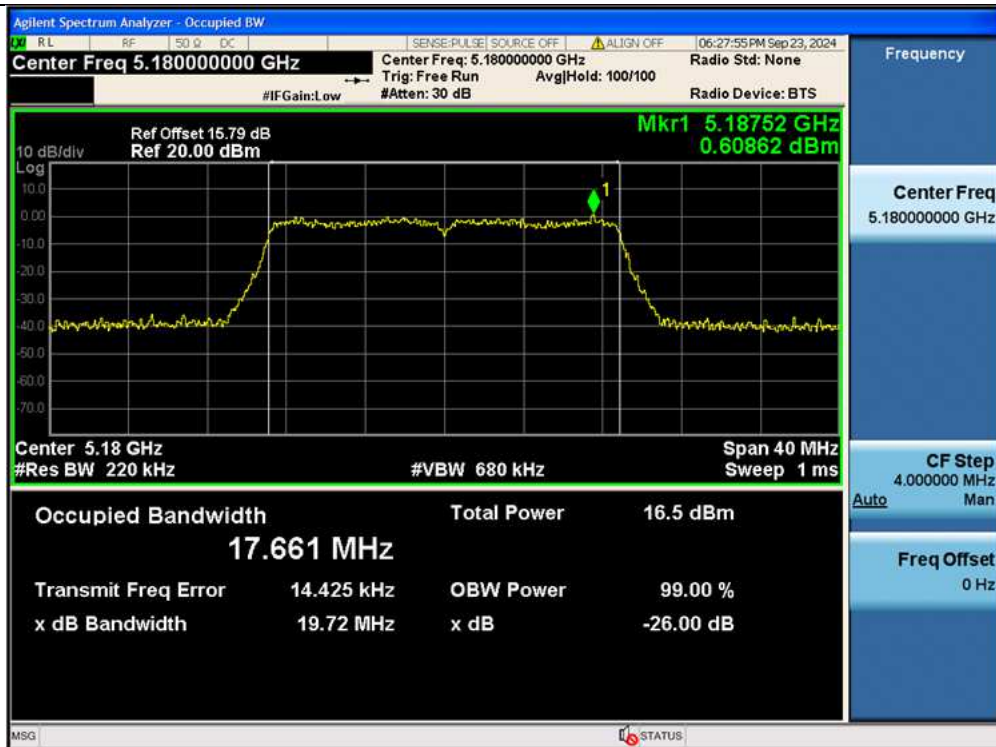
11N20SISO-Ant1-5240



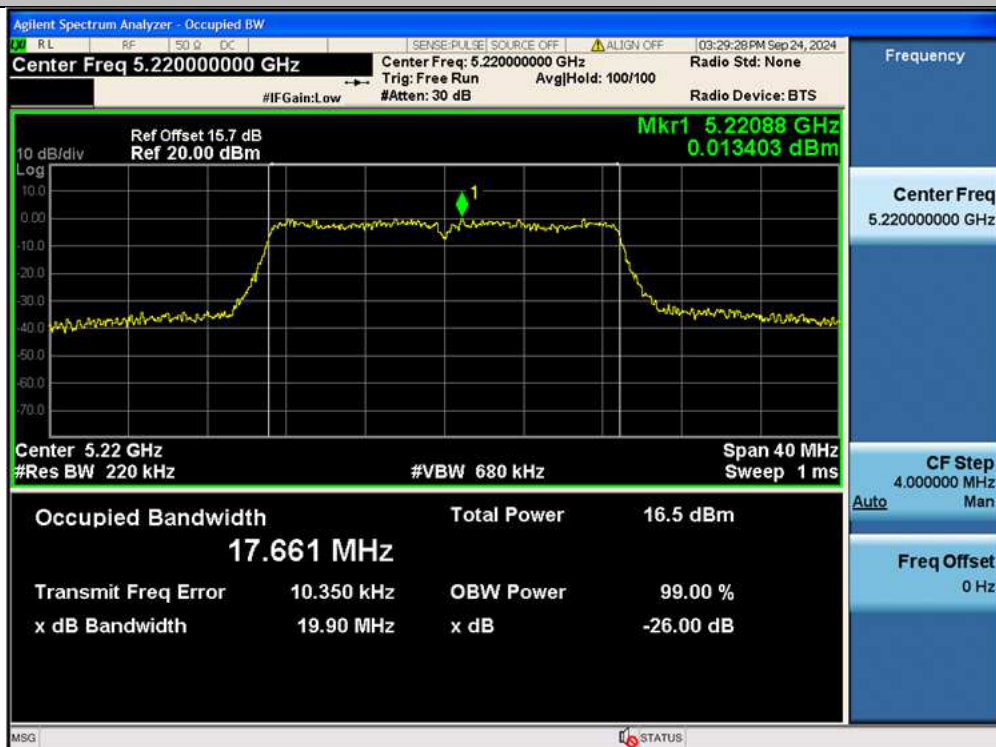
11N40SISO-Ant1-5190



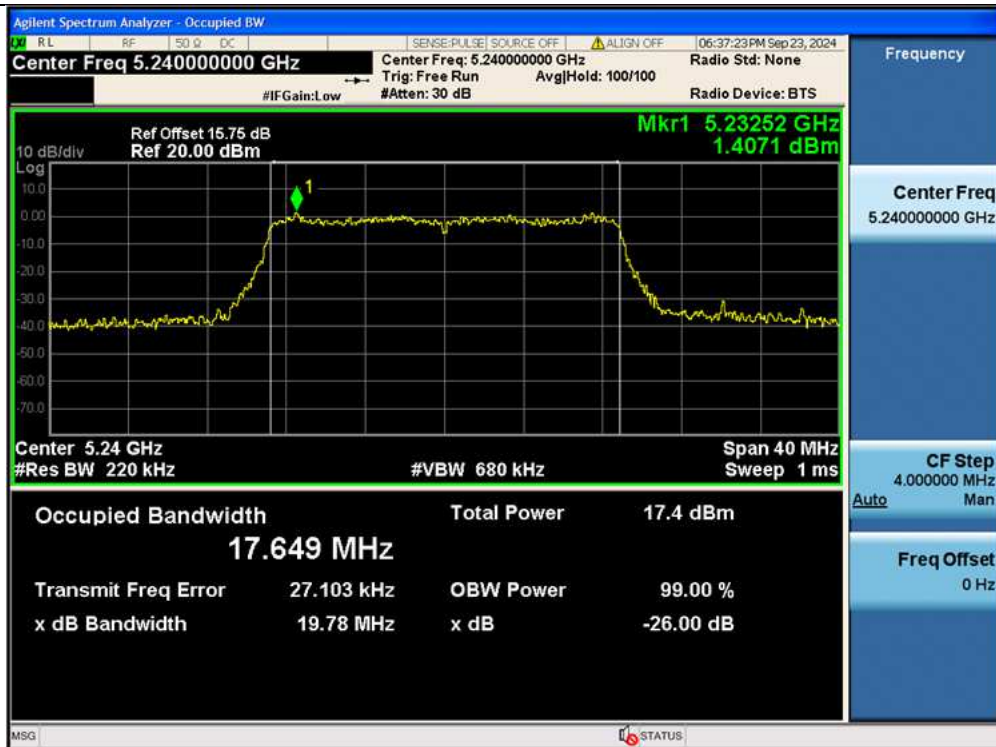
11N40SISO-Ant1-5230



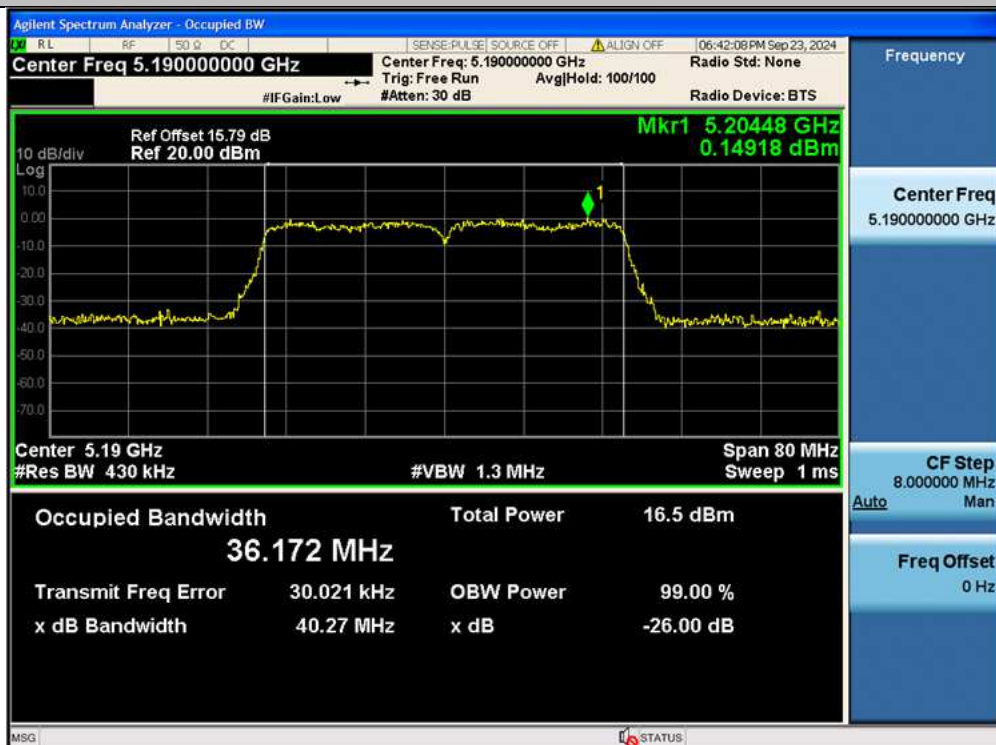
11AC20SISO-Ant1-5180



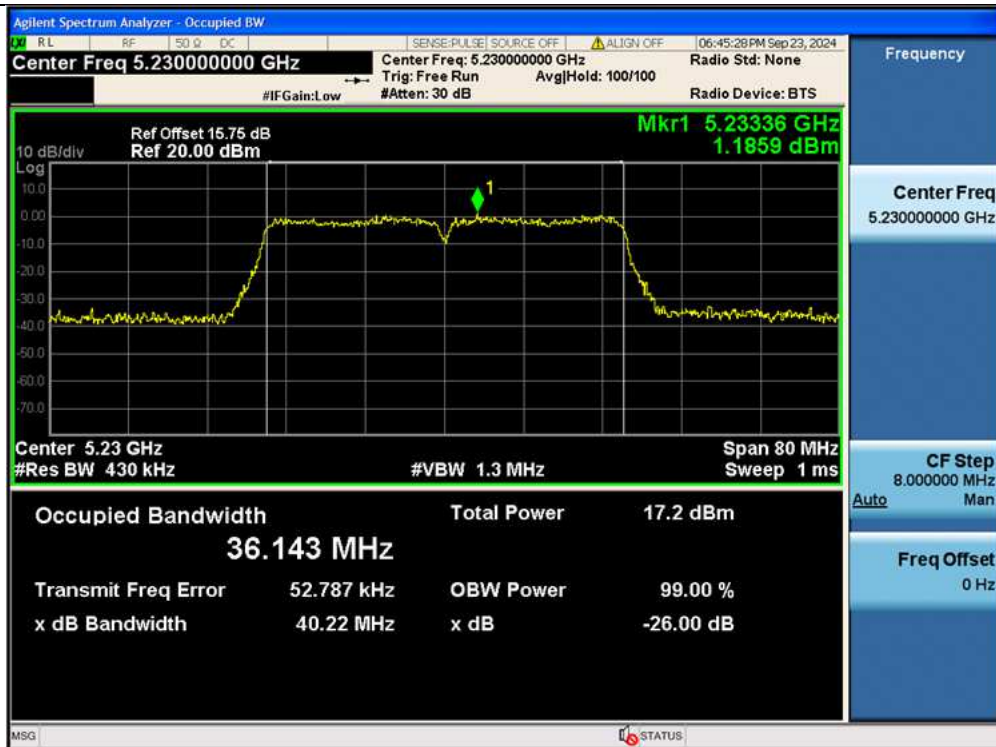
11AC20SISO-Ant1-5220



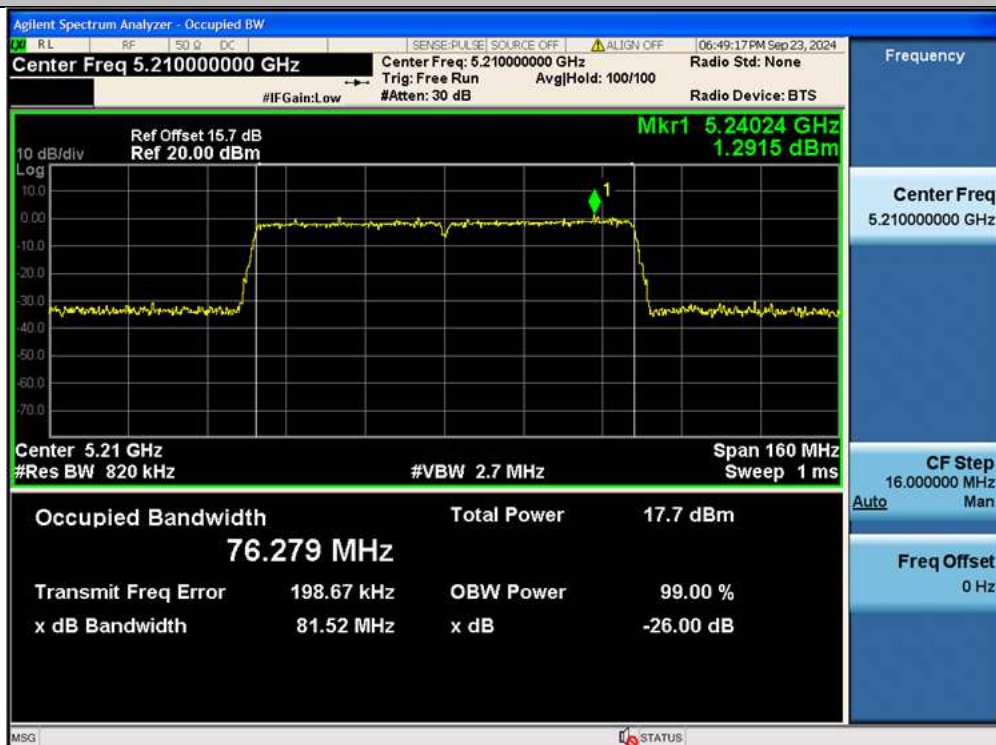
11AC20SISO-Ant1-5240



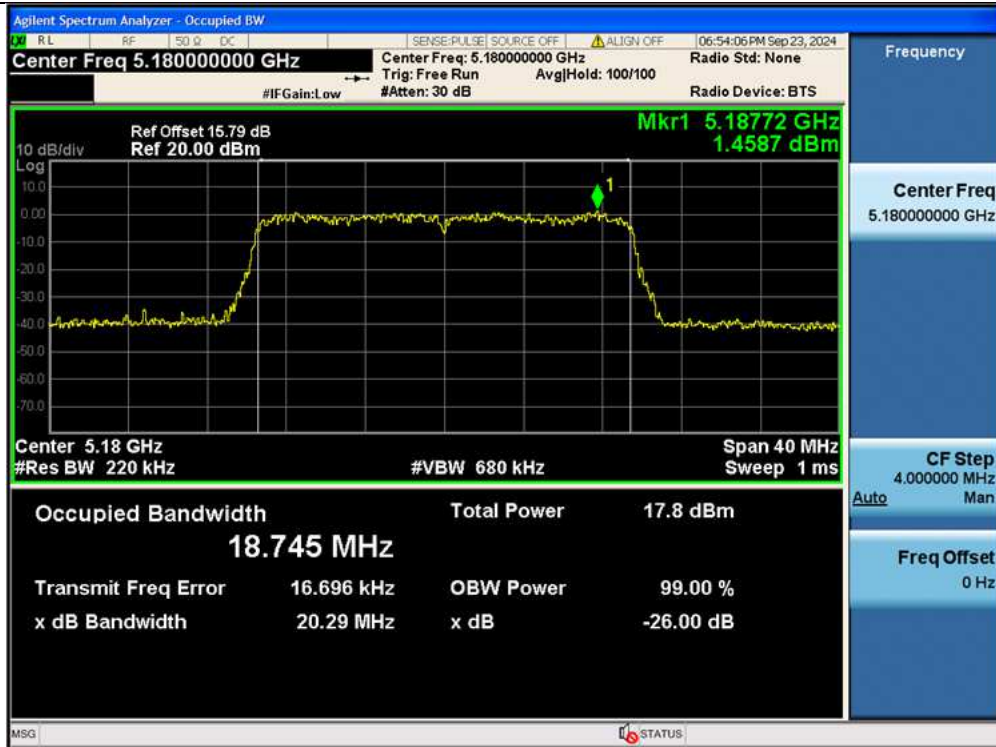
11AC40SISO-Ant1-5190



11AC40SISO-Ant1-5230



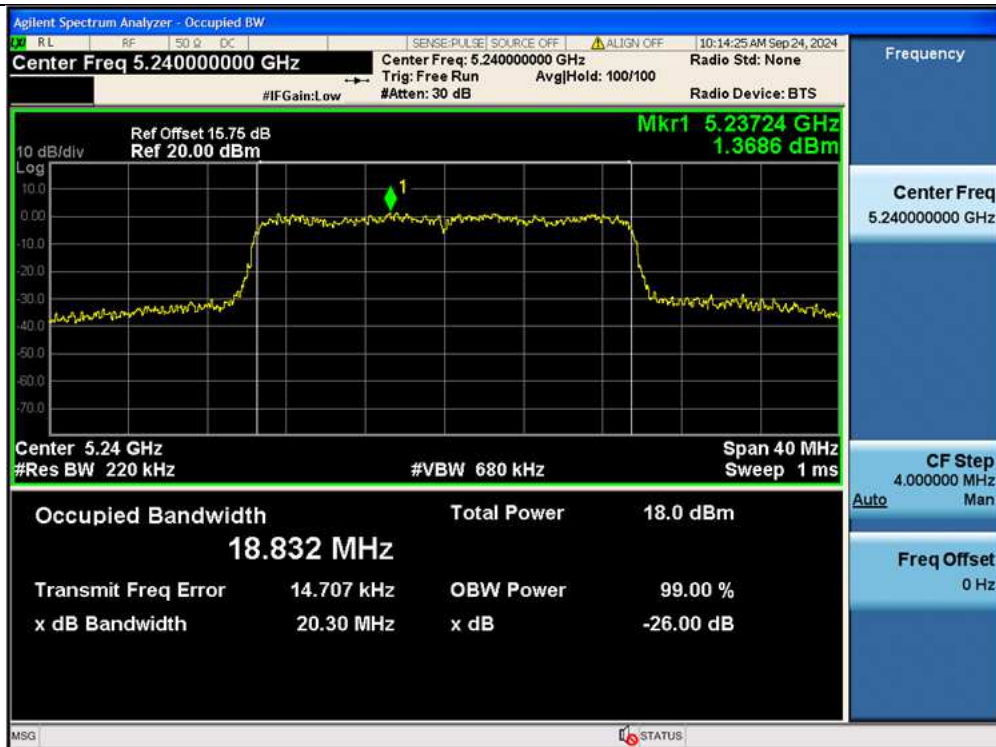
11AC80SISO-Ant1-5210



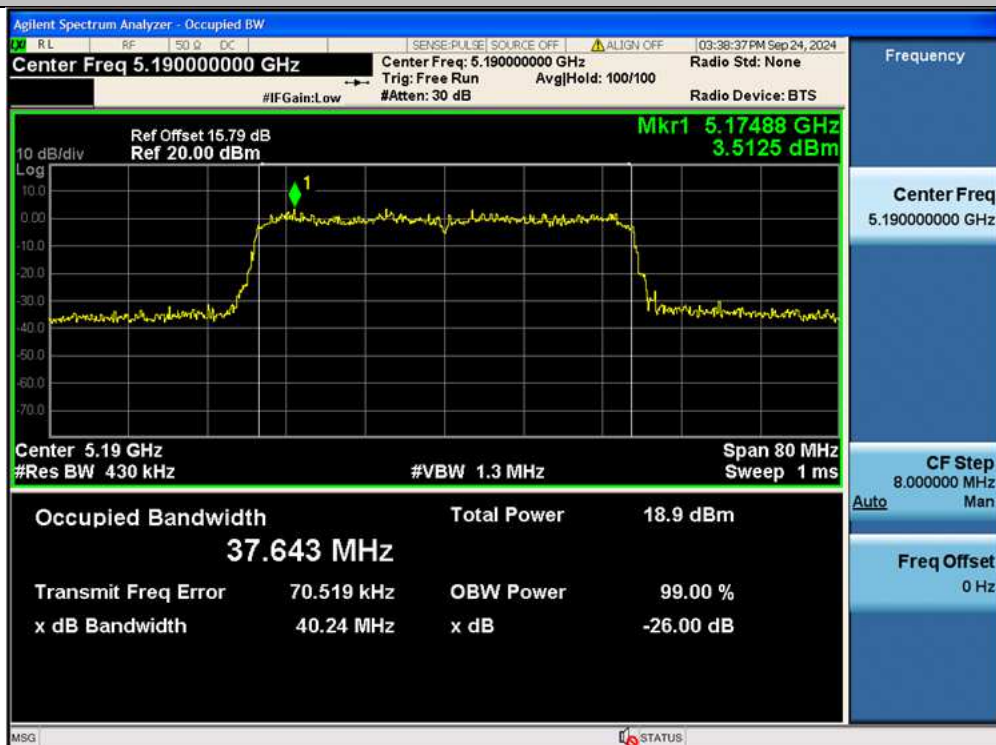
11AX20SISO-Ant1-5180



11AX20SISO-Ant1-5220



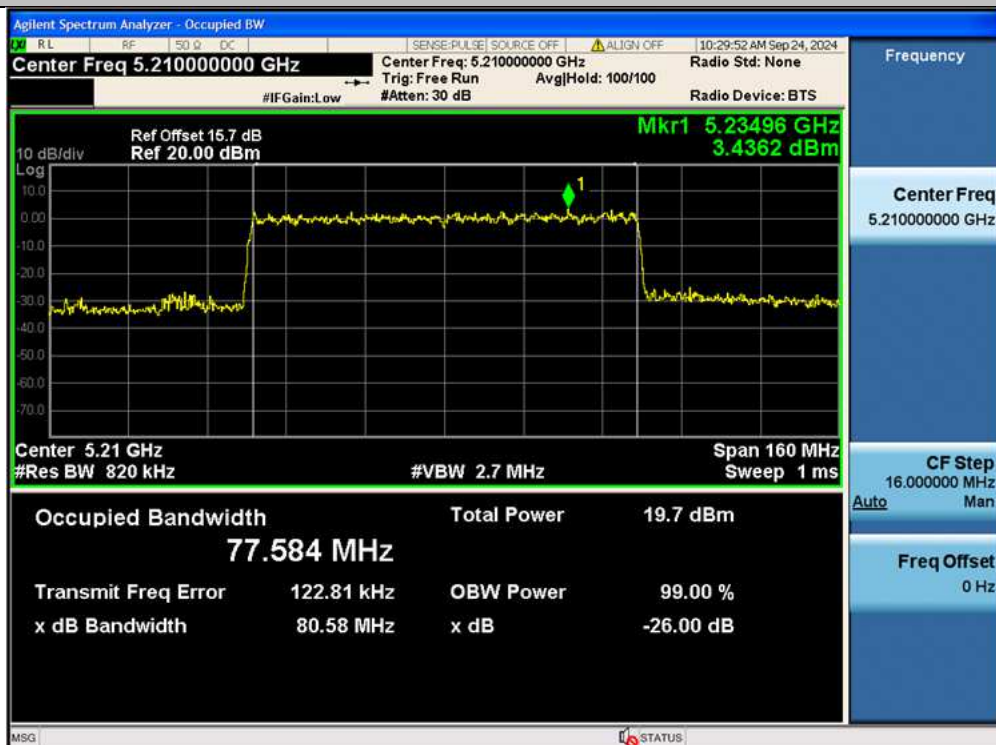
11AX20SISO-Ant1-5240



11AX40SISO-Ant1-5190



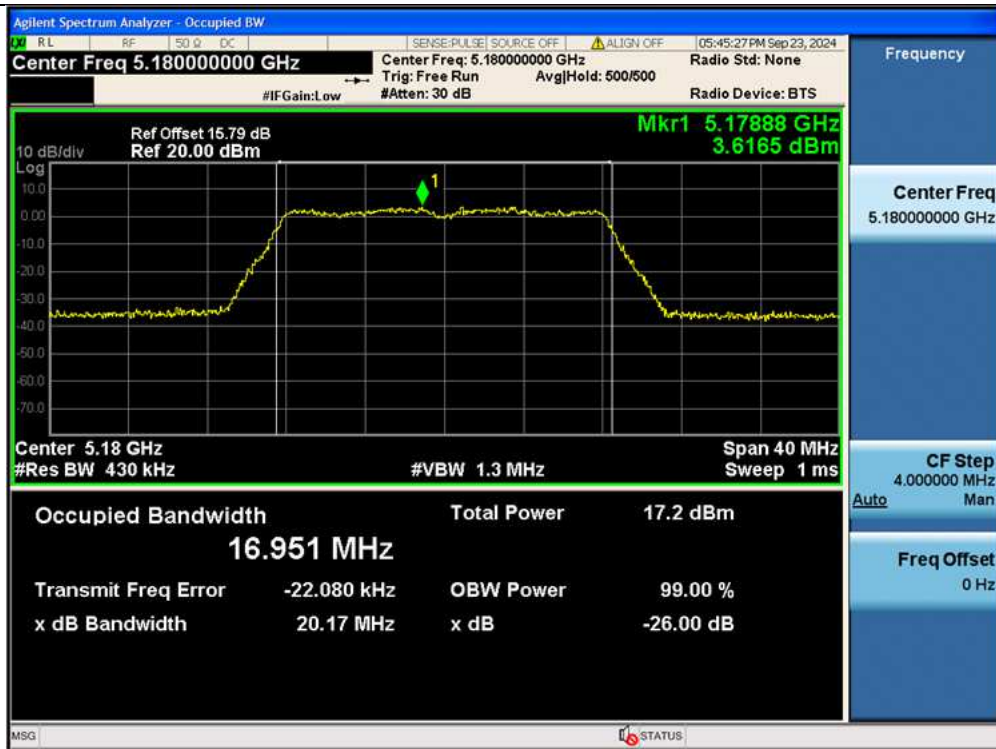
11AX40SISO-Ant1-5230



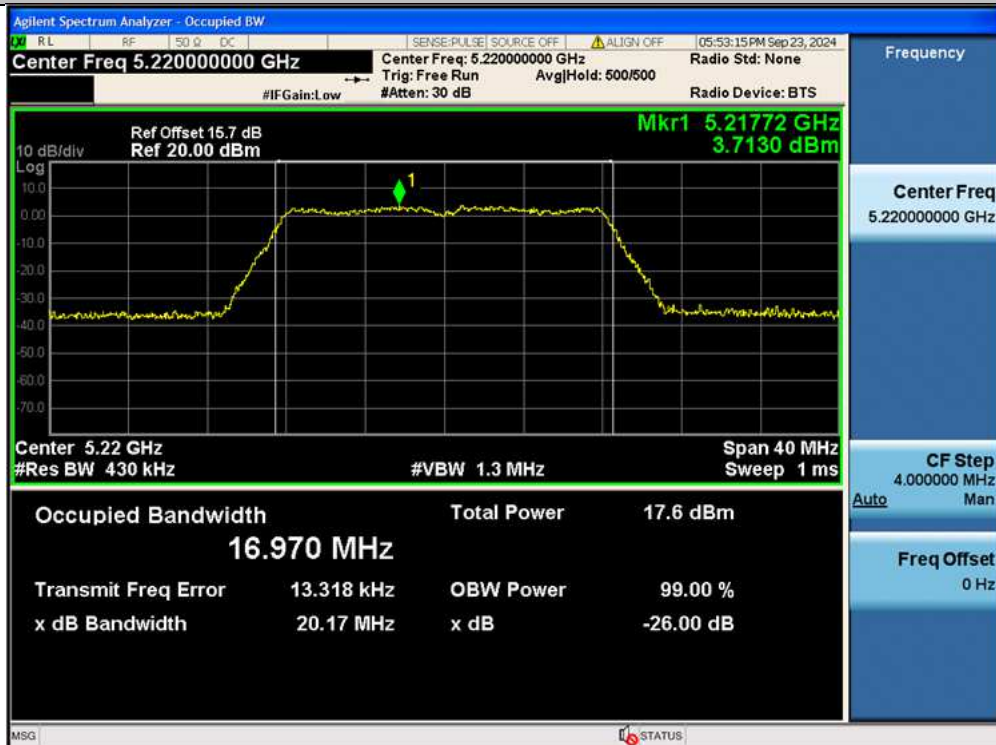
11AX80SISO-Ant1-5210

Appendix A.3: Test Results of 99% Bandwidth

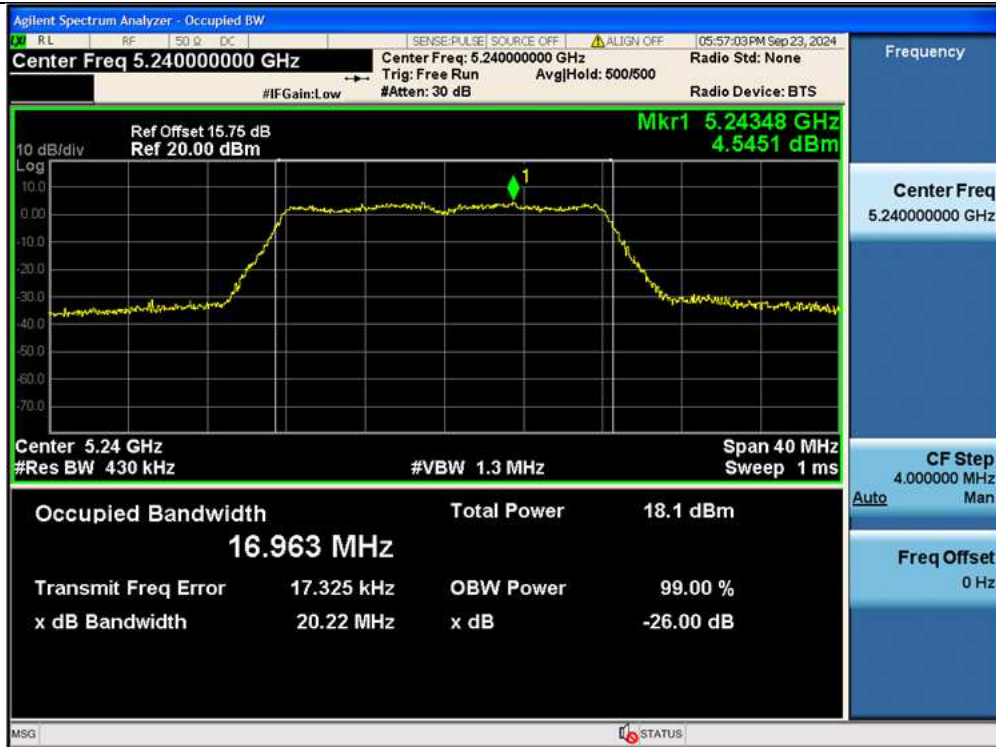
TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	16.951	5171.5024	5188.4534	---	PASS
11A	Ant1	5220	16.970	5211.5283	5228.4983	---	PASS
11A	Ant1	5240	16.963	5231.5358	5248.4988	---	PASS
11A	Ant1	5745	17.006	5736.4863	5753.4923	---	PASS
11A	Ant1	5785	16.989	5776.5040	5793.4930	---	PASS
11A	Ant1	5825	17.034	5816.4614	5833.4954	---	PASS
11N20SISO	Ant1	5180	17.818	5171.0855	5188.9035	---	PASS
11N20SISO	Ant1	5220	17.838	5211.1127	5228.9507	---	PASS
11N20SISO	Ant1	5240	17.853	5231.0965	5248.9495	---	PASS
11N20SISO	Ant1	5745	17.898	5736.0416	5753.9396	---	PASS
11N20SISO	Ant1	5785	17.852	5776.0638	5793.9158	---	PASS
11N20SISO	Ant1	5825	17.859	5816.0443	5833.9033	---	PASS
11N40SISO	Ant1	5190	36.434	5171.7899	5208.2239	---	PASS
11N40SISO	Ant1	5230	36.441	5211.8439	5248.2849	---	PASS
11N40SISO	Ant1	5755	36.394	5736.7533	5773.1473	---	PASS
11N40SISO	Ant1	5795	36.391	5776.7834	5813.1744	---	PASS
11AC20SISO	Ant1	5180	17.796	5171.1048	5188.9008	---	PASS
11AC20SISO	Ant1	5220	17.844	5211.0860	5228.9300	---	PASS
11AC20SISO	Ant1	5240	17.833	5231.1208	5248.9538	---	PASS
11AC20SISO	Ant1	5745	17.851	5736.0656	5753.9166	---	PASS
11AC20SISO	Ant1	5785	17.827	5776.0811	5793.9081	---	PASS
11AC20SISO	Ant1	5825	17.863	5816.0459	5833.9089	---	PASS
11AC40SISO	Ant1	5190	36.447	5171.8213	5208.2683	---	PASS
11AC40SISO	Ant1	5230	36.349	5211.8739	5248.2229	---	PASS
11AC40SISO	Ant1	5755	36.401	5736.7485	5773.1495	---	PASS
11AC40SISO	Ant1	5795	36.365	5776.7679	5813.1329	---	PASS
11AC80SISO	Ant1	5210	76.464	5171.9198	5248.3838	---	PASS
11AC80SISO	Ant1	5775	77.873	5735.9452	5813.8182	---	PASS
11AX20SISO	Ant1	5180	18.832	5170.5893	5189.4213	---	PASS
11AX20SISO	Ant1	5220	18.829	5210.5949	5229.4239	---	PASS
11AX20SISO	Ant1	5240	18.851	5230.5901	5249.4411	---	PASS
11AX20SISO	Ant1	5745	17.886	5736.0285	5753.9145	---	PASS
11AX20SISO	Ant1	5785	17.833	5776.0842	5793.9172	---	PASS
11AX20SISO	Ant1	5825	17.874	5816.0452	5833.9192	---	PASS
11AX40SISO	Ant1	5190	37.658	5171.2234	5208.8814	---	PASS
11AX40SISO	Ant1	5230	37.685	5211.2296	5248.9146	---	PASS
11AX40SISO	Ant1	5755	37.589	5736.1943	5773.7833	---	PASS
11AX40SISO	Ant1	5795	37.618	5776.1769	5813.7949	---	PASS
11AX80SISO	Ant1	5210	77.922	5171.1512	5249.0732	---	PASS
11AX80SISO	Ant1	5775	77.844	5735.9913	5813.8353	---	PASS



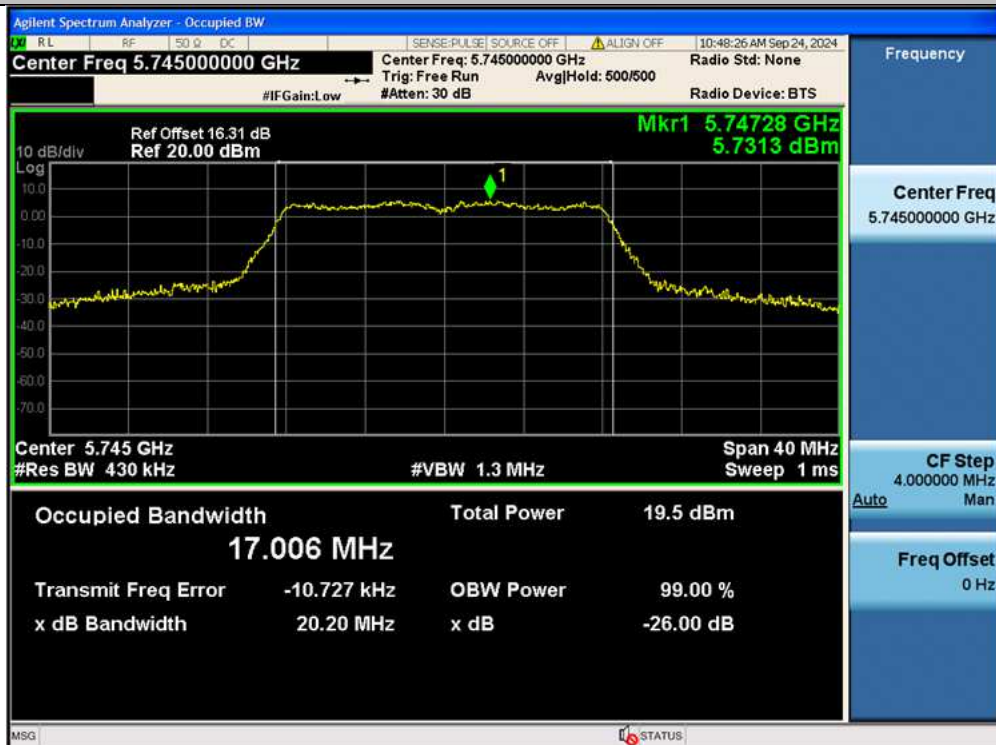
11A-Ant1-5180



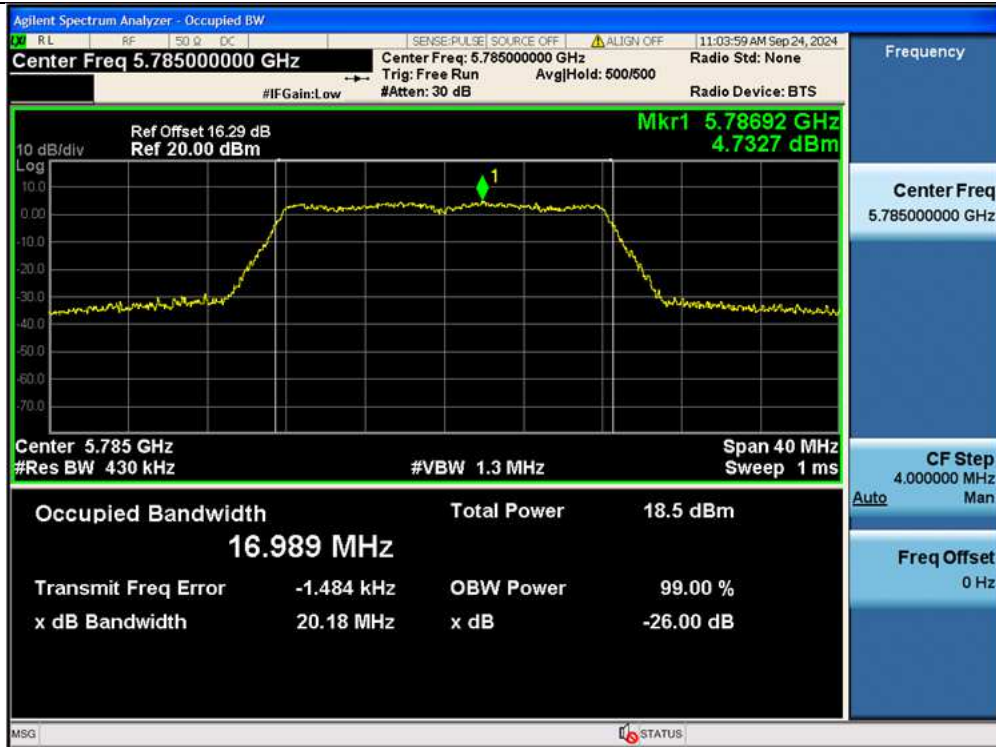
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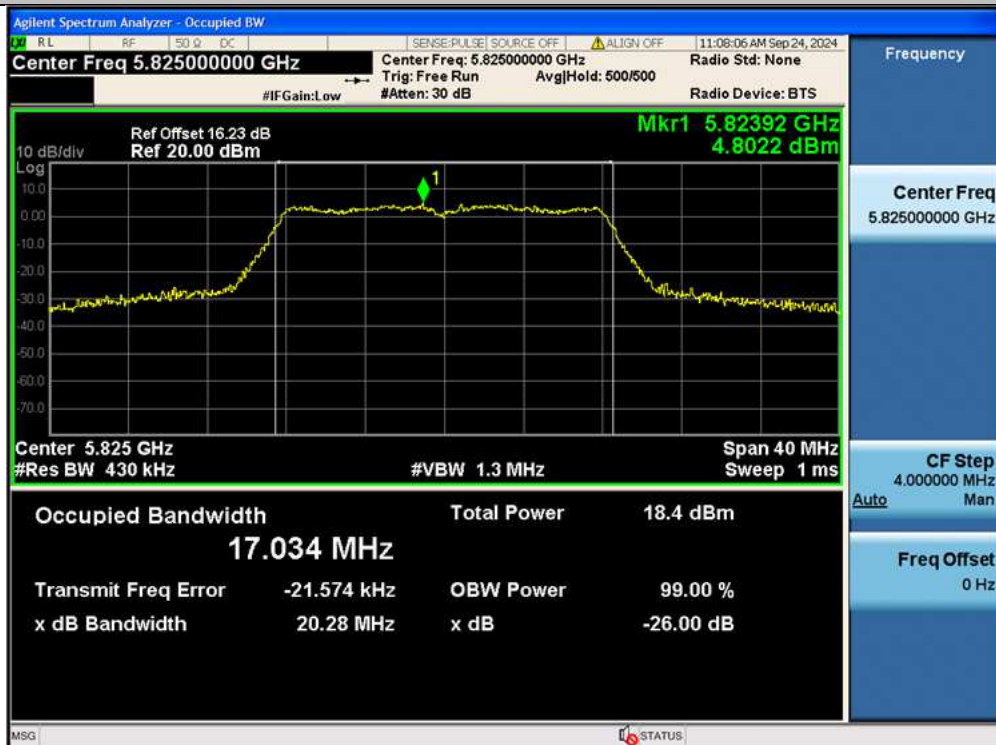
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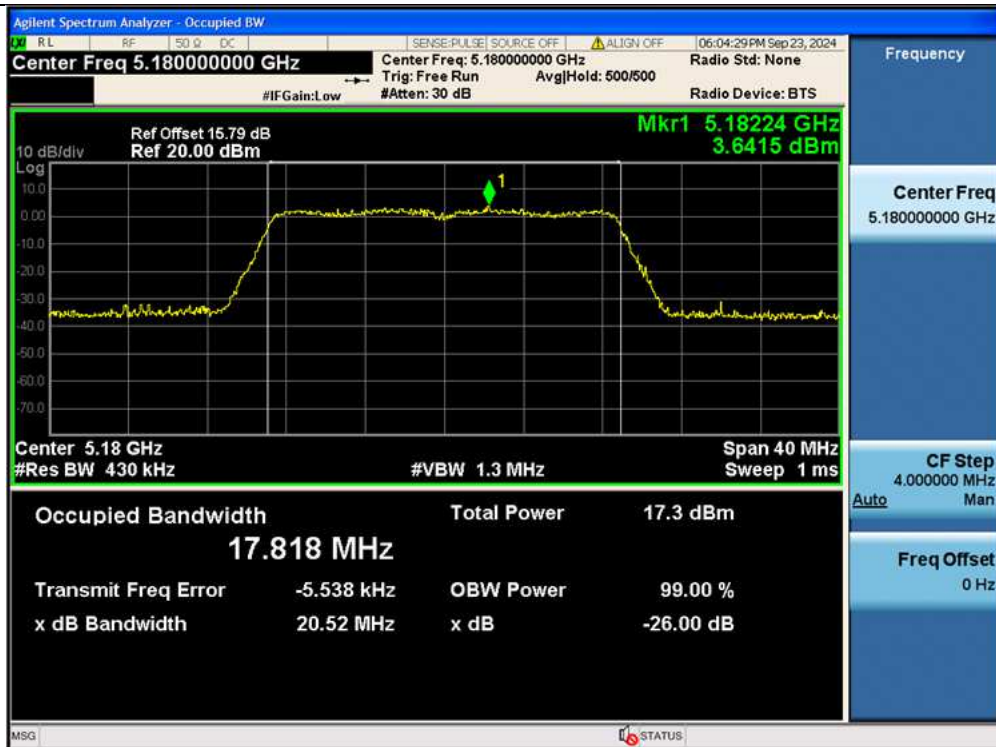
11A-Ant1-5745



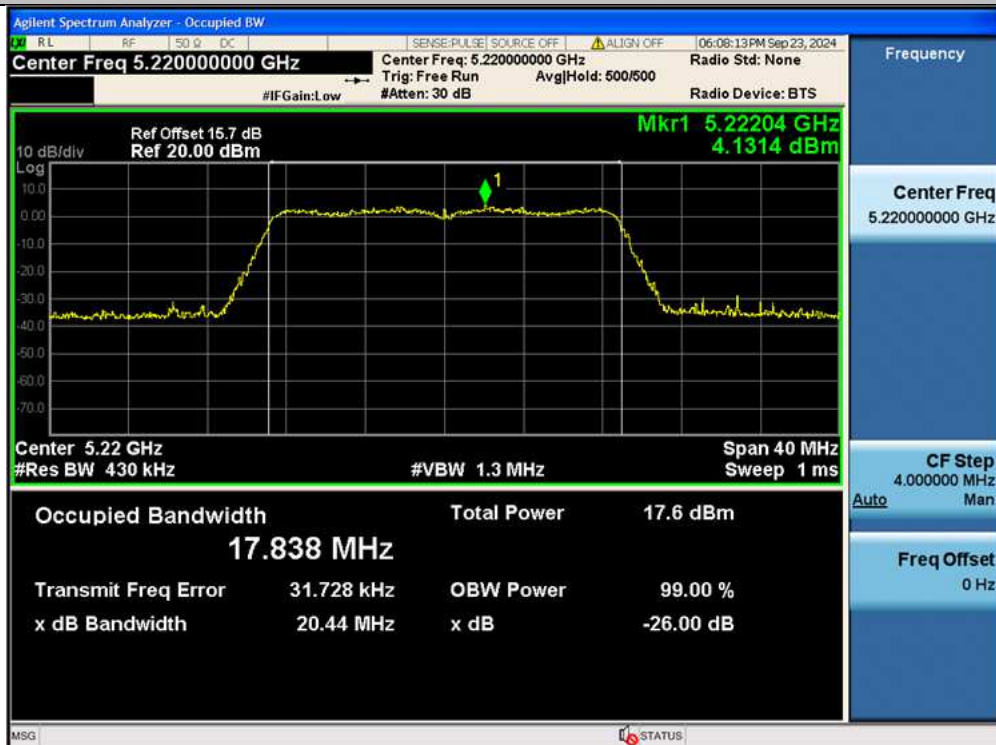
11A-Ant1-5785



11A-Ant1-5825



11N20SISO-Ant1-5180



11N20SISO-Ant1-5220