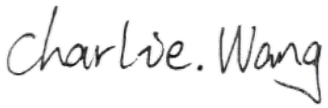
RF Test Report

Applicant:	Quectel Wireless Solutions Co., Ltd.
Address:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, 200233 China
Product:	Wi-Fi & Bluetooth Module
Model No.:	FC906A
Brand Name:	QUECTEL
FCC ID:	XMR202403FC906A
Standards:	FCC CFR47 Part 15E
Report No.:	PD20240030RF11
Issue Date:	2024/05/14
Test Result:	PASS *

* **The above equipment has been tested and compliance with the requirement of the relative standards by Hefei Panwin Technology Co., Ltd.**



Reviewed By: Charlie Wang **Approved By:** Alec Yang

Hefei Panwin Technology Co., Ltd.

Floor 1, Zone E, Plant 2#, Mingzhu Industrial Park, No.106 Chuangxin Avenue, High-tech Zone, Hefei City, Anhui Province,China

TEL: 0551-63811775

Revision History

Report No.	Version	Description	Issue Date	Note
PD20240030RF11	1	Initial Report	2024/05/14	Valid

CONTENTS

Summary of Test Results

No.	Test Case	FCC Rules	Verdict
1	Occupied Bandwidth Measurement	15.407(e)	PASS
2	Maximum Conducted Output Power Measurement	15.407(a)	PASS
3	Power Spectral Density Measurement	15.407(a)	PASS
4	Unwanted Emissions Measurement	15.407(b)	PASS
5	AC Conducted Emission Measurement	15.207	NA
6	Antenna Requirements	15.203 & 15.407(a)	PASS
7	Frequency Stability[Note1]	15.407(g)	NA

Date of Testing: 2024/04/02 to 2024/05/11
Date of Sample Received: 2024/04/02

• We, Hefei Panwin Technology Co., Ltd., would like to declare that the tested sample has been evaluated in accordance with the procedures given in applied standard(s) in **Section 2.3** of this report and shown compliance with the applicable technical standards.

• All indications of PASS/FAIL in this report are based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.

Note1: Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

1 General Information

1.1 Notes of the Test Report

This report is invalid without signature of auditor and approver or with any alterations. The report shall not be partially reproduced without written approval of the testing company. Entrusted test results are only responsible for incoming samples. If there is any objection to the testing report, it shall be raised to the testing company within 15 days from the date of receiving the report. In the test results, "NA" means "not applicable", and the test items marked with "Δ" are subcontracted projects.

1.2 Test Facility

FCC (Designation number: CN1361, Test Firm Registration Number: 473156)

Hefei Panwin Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

A2LA (Certificate Number: 6849.01)

Hefei Panwin Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

1.3 Testing Laboratory

Company Name	Hefei Panwin Technology Co., Ltd.
Address	Floor 1, Zone E, Plant 2#, Mingzhu Industrial Park, No.106 Chuangxin Avenue, High-tech Zone, Hefei City, Anhui Province,China
Telephone	+86-0551-63811775
Post Code	230031

2 General Description of Equipment under Test

2.1 Details of Application

Applicant	Quectel Wireless Solutions Co., Ltd.
Applicant Address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, 200233 China
Manufacturer	Quectel Wireless Solutions Co., Ltd.
Manufacturer Address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, 200233 China

2.2 General Information

Product	Wi-Fi & Bluetooth Module
Model	FC906A
SN	1. E1N24AH09000079 2. E1N24AH09000044
Hardware Version	R1.0
Software Version	/
Antenna Type	External Antenna
Max. Conducted Power	Wi-Fi 5G: 17.50dBm
WLAN Mode Supported:	802.11a 802.11n 20M/40M 802.11ac 20M/40M/80M
Antenna Gain	5150MHz to 5250MHz: -0.70dBi 5250MHz to 5350MHz: -0.80dBi 5470MHz to 5725MHz: -1.20dBi 5725MHz to 5850MHz: -1.50dBi
Directional Gain	NA
Test Band	U-NII-1(5150MHz-5250MHz) U-NII-2A(5250MHz-5350MHz) U-NII-2C(5470MHz-5725MHz) U-NII-3(5725MHz-5850MHz)
Operating voltage	Typical 3.6Vdc
Modulation Type	802.11a/n/ac:DSSS,BPSK,QPSK,DBPSK,DQPSK,16QAM,64QAM, 256QAM
Fixed frequency software name	ADB Command

Note: The declared of product specification for EUT and/or Antenna presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

2.3 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart E
- FCC KDB 789033 D02 General UN ll Test Procedures New Rules v02r01
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

3 Test Condition

3.1 Test Configuration

Test mode

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). The worst cases were recorded in this report.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes (Z, X, Y axis), receiver antenna polarization (horizontal and vertical), the worst emission was found in Z position and the worst case was recorded.This report presents the data for the worst polarity.

Test Mode	Data Rate(Mbps)
802.11a	6
802.11n 20M	MCS0
802.11n 40M	MCS0
802.11ac 20M	MCS0
802.11ac 40M	MCS0
802.11ac 80M	MCS0

3.2 Wireless Technology and Frequency Range

Wireless Technology	Bandwidth		Channel	Frequency
Wi-Fi	U-NII-1	20MHz	36	5180 MHz
			40	5200 MHz
			44	5220 MHz
			48	5240 MHz
		40MHz	38	5190 MHz
			46	5230 MHz
		80MHz	42	5210 MHz
	U-NII-2A	20MHz	52	5260 MHz
			56	5280 MHz
			60	5300 MHz
			64	5320 MHz
		40MHz	54	5270 MHz
			62	5310 MHz
		80MHz	58	5290 MHz
	U-NII-2C	20MHz	100	5500 MHz
			104	5520 MHz
			108	5540 MHz
			112	5560 MHz
			116	5580 MHz
			120	5600 MHz
			124	5620 MHz
			128	5640 MHz
			132	5660 MHz
			136	5680 MHz
			140	5700 MHz
			144	5720 MHz
		40MHz	102	5510 MHz
			110	5550 MHz
			118	5590 MHz
			126	5630 MHz
			134	5670 MHz
			142	5710 MHz
		80MHz	106	5530 MHz
			122	5610 MHz
			138	5690 MHz
	U-NII-3	20MHz	149	5745 MHz

			153	5765 MHz
			157	5785 MHz
			161	5805 MHz
			165	5825 MHz
		40MHz	151	5755 MHz
			159	5795 MHz
		80MHz	155	5775 MHz
Does this device support TPC function?		☐ Yes		☑ No
Does this device support TDWR band?		☑ Yes		☐ No

3.3 Equipment List

Conducted

Instrument	Manufacturer	Model	Asset No.	Cal. Interval	Cal. Due Date
Spectrum Analyzer	KEYSIGHT	N9020B	PWC0048	1 Year	2024/10/11
RF Control Unit	Tonseced	JS0806-2	PWC0055	/	/
Shielded Chamber	Maorui	MR543	PWC0041	3 Years	2026/08/26
Test Software	Tonseced	JS1120-3 V3.2.22	/	/	/

Radiated

Instrument	Manufacturer	Model	Asset No.	Cal. Interval	Cal. Due Date
EMI Test Receiver	R&S	ESR7	PWB0023	1 Year	2024/10/11
Spectrum Analyzer	R&S	FSV3044	PWB0024	1 Year	2024/10/11
Loop Antenna	R&S	HFH2-Z2E	PWB0026	1 Year	2024/10/21
TRILOG Broadband Antenna	Schwarzbeck	VULB9162	PWB0029	1 Year	2024/10/14
Double-Ridged Guide Antenna	ETS-Lindgren	3117	PWB0031	1 Year	2024/10/12
k Type Horn Antenna	Steatite Antennas	QMS-00880	PWB0035	1 Year	2024/10/17
Anechoic Chamber	ETS.LINDGREN	Fact 3-2m	PWB0003	3 Years	2026/06/05
Pre-Amplifier	R&S	SCU18F	PWB0034	1 Year	2024/10/11
Pre-Amplifier	R&S	SCU40F1	PWB0036	1 Year	2024/10/11
Pre-Amplifier	COM-MW	DLNA8	PWB0094	1 Year	2024/11/08

Test Software	R&S	ELEKTRA 4.20.2	/	/	/

3.4 Support Equipment List

Equipment	Manufacturer	Description	Model	Serial Number
External Antenna	QUECTEL	Wi-Fi Antenna	YEBT038WFA	/
EVB	QUECTEL	/	/	/
USB Cable	/	1m	/	/
Adapter	Xiamen Xinsenhai Electronics Co., Ltd	Output:12V 60W	P60EB120500	/

3.5 Test Uncertainty

No.	Parameter	Uncertainty
1	Emission Bandwidth	1.9%
2	Occupied channel bandwidth	1.9%
3	Min emission bandwidth	1.9%
4	Unwanted Emissions Measurement	9kHz-7GHz: 1.21dB 7GHz-40GHz: 3.31dB
5	Radiated Band Edges and Spurious Emission	Below 1GHz: 4.88 dB Above 1GHz: 5.06 dB
6	Temperature	3 °C
7	Humidity	1.3 %
8	Supply voltages	0.006 V

4 Test Items Description

Ambient condition

Shielded Chamber

Temperature [°C]	21.4 to 24.1
Humidity [%RH]	37 to 48
Pressure [kPa]	100.2 to 101.4

Anechoic Chamber

Temperature [°C]	20.3 to 24.7
Humidity [%RH]	41 to 59
Pressure [kPa]	100.3 to 102.0

4.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

4.1.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

The minimum 6 dB bandwidth shall be at least 500 kHz

26dB and 99% Occupied bandwidth are reporting only.

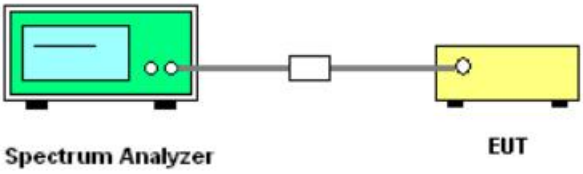
4.1.2 Measuring Instruments

The measuring equipment is listed in the section 3.3 of this test report.

4.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01Section C) Emission bandwidth.
2. For 6dB BW, Set RBW = 100kHz.
   For 26dB BW, Set RBW = approximately 1% of the emission bandwidth.
   For 99% OBW, Set RBW = 1% to 5% of the OBW.
3. For 26dB BW. Set the VBW > RBW.
   For 6dB BW & 99% OBW. Set the VBW ≥ 3 × RBW
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission.Compare this with the RBW setting of the analyzer, Readjust RBW and repeat measurements needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set1% to 5% of the OBW and set the Video bandwidth (VBW) ≥ 3* RBW.
8. Measure and record the results in the test report.

4.1.4 Test Setup



4.1.5 Test Results

See Appendix A.1.

4.2 Maximum Conducted Output Power Measurement

4.2.1 Limit of Maximum Conducted Output Power

<FCC 14 -30 CFR 15.407>

For the band 5.15–5.25 GHz.

(i) For an outdoor access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U–NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U–NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2)For the 5.25 – 5.35 GHz and 5.47 – 5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3)For the band 5.725–5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2.2 Measuring Instruments

The measuring equipment is listed in the section 3.3 of this test report.

4.2.3 Test Procedures

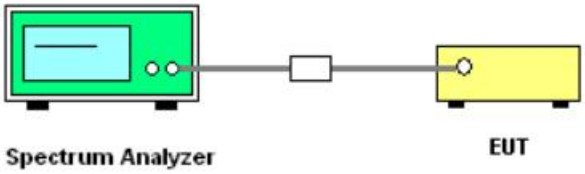
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

1. Measure the duty cycle, x, of the transmitter output signal as described in II.B.
2. Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
3. Set RBW = 1 MHz.
4. Set VBW ≥ 3 MHz.
5. Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
6. Sweep time = auto.
7. Detector = power averaging (rms), if available. Otherwise, use sample detector mode.
8. Do not use sweep triggering. Allow the sweep to "free run."
9. Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.
10. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
11. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is 25%.

For Straddle Channel, According to KDB 789033 D02 General UNll Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-Nl-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

4.2.4 Test Setup



4.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.2.

4.3 Power Spectral Density Measurement

4.3.1 Limit of Power Spectral Density

Rule FCC Part 15.407(a)(1)/ Part 15.407(a)(2)/Part 15.407(a)(3

For an indoor access point operating in the band 5.15–5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.

For client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the 5.25-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any1 megahertz band.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

For Straddle Channel, According to KDB 789033 D02 General UNll Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-Nll-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.3.2 Measuring Instruments

The measuring equipment is listed in the section 3.3 of this test report.

4.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNll Test Procedures New Rules v02r01 Section F) Maximum power spectral density.

1.Measure the duty cycle.

2.Set span to encompass the entire emission bandwidth (EBW) of the signal.

3.Set RBW ≥ 1/T, where T is defined in II.B.I.a).

4.Set VBW ≥ 3 RBW.

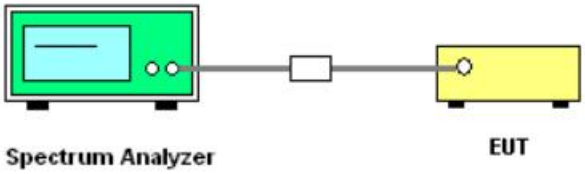
5.If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

6.If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

7. Care must be taken to ensure that the measurements are performed during a period of continuous

transmission or are corrected upward for duty cycle.

4.3.4 Test Setup



4.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.3.

4.4 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

4.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27dBm/MHz.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of-27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

For transmitters operating in the 5470-5725 MHz band: all emissions outside of the 5470-5725MHz band shall not exceed an EIRP of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band:
15.407(b)(4)(i) 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 15.6dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30-88	100	3
88 -216	150	3
216 - 960	200	3
Above 960	500	3

EIRP (dBm)	Field Strength at 3m (dB μ V/m)
- 27	68.2

Note: The following formula is used to convert the EIRP to field strength.

$$EIRP = E_{Meas} + 20\log(d_{Meas}) - 104.7$$

where

EIRP is the equivalent isotropically radiated power, in dBm

E_{Meas} is the field strength of the emission at the measurement distance, in dBμV/m

d_{Meas} is the measurement distance, in m

4.4.2 Measuring Instruments

The measuring equipment is listed in the section 3.3 of this test report.

4.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNll Test Procedures New Rules v02r01 Section G) Unwanted emissions measurement.

   (1)Procedure for Unwanted Emissions Measurements Below 1000MHz
   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2)Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
   - RBW= 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

   (3)Procedures for Average Unwanted Emissions Measurements Above 1000MHz
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent
   - VBW ⩾ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.

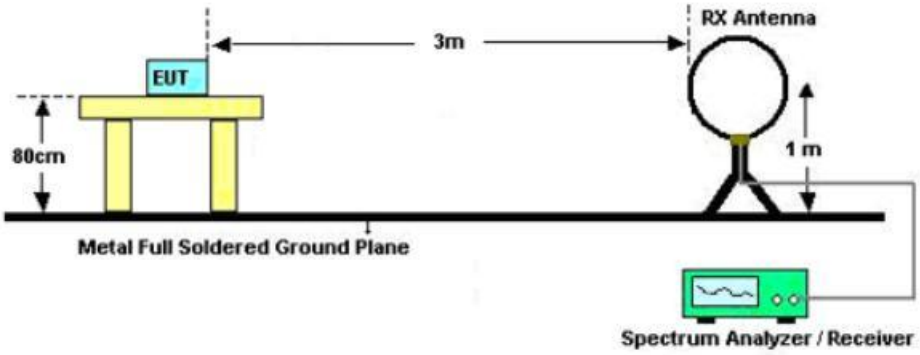
4.. The antenna is a broadband antenna and its height is adjusted between one meter and four.

meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.

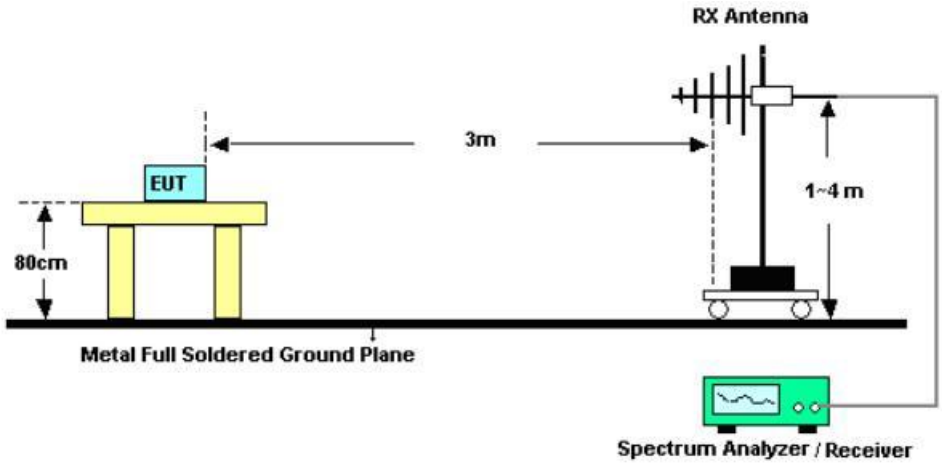
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

4.4.4 Test Setup

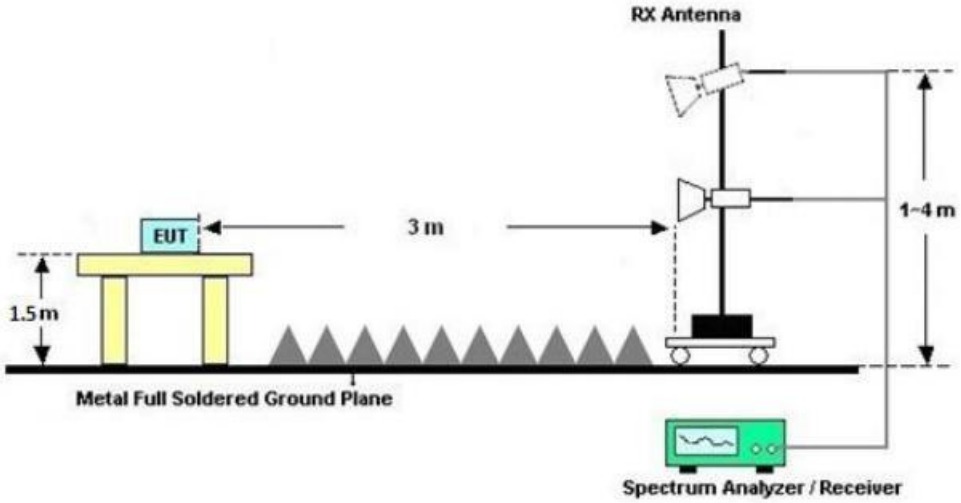
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



4.4.5Test Results of Radiated Spurious Emissions (9 kHz - 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

4.4.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.1.

4.4.7 Test Result of Radiated Spurious Emissions (30MHz - 10th Harmonic or 40GHz whichever is lower)

Please refer to Appendix B.1

4.4.8 Duty Cycle

Please refer to Appendix A.4.

4.5 AC Conducted Emission Measurement

4.5.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	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.

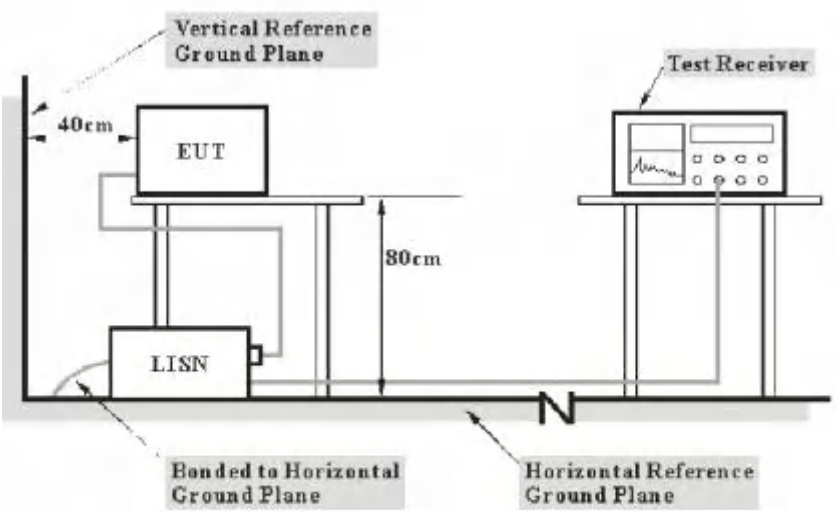
4.5.2 Measuring Instruments

The section 3.3 of List of Measuring Equipment of this test report is used for test.

4.5.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth =9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

4.5.4 Test Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

4.5.5 Uncertainty Measurement

Where relevant,the following measurement uncertainty levels have been estimated for tests performed on the EUT. The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

CASE	Uncertainty
Continuous Emission (AC port)	2.92 dB

4.5.6 Test Result

Remark: The product is DC powered, this test item is not applicable.

4.6 Antenna Requirements

4.6.1 Standard Applicable

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 or 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 6dBi.

4.6.2 Antenna Anti-Replacement Construction

The antenna is External on the main PCB and no consideration of replacement. The best case gain of the antenna is -0.70dBi.

Appendix A – Test Results of Conducted Test

A.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

Test Result_26dB Bandwidth

Test Mode	Antenna	Frequency[MHz]	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	21.000	5169.640	5190.640	---	---
11A	Ant1	5220	23.280	5209.320	5232.600	---	---
11A	Ant1	5240	21.520	5229.360	5250.880	---	---
11A	Ant1	5260	21.240	5249.680	5270.920	---	---
11A	Ant1	5300	21.320	5289.520	5310.840	---	---
11A	Ant1	5320	25.920	5307.480	5333.400	---	---
11A	Ant1	5500	25.520	5486.080	5511.600	---	---
11A	Ant1	5580	21.560	5569.160	5590.720	---	---
11A	Ant1	5700	25.480	5688.680	5714.160	---	---
11A	Ant1	5720	29.560	5703.080	5732.640	---	---
11A	Ant1	5720_UNII-2C	21.92	5703.080	5725	---	---
11A	Ant1	5720_UNII-3	7.64	5725	5732.640	---	---
11A	Ant1	5745	29.560	5728.560	5758.120	---	---
11A	Ant1	5785	23.760	5772.040	5795.800	---	---
11A	Ant1	5825	21.400	5814.240	5835.640	---	---
11N20SISO	Ant1	5180	22.000	5169.360	5191.360	---	---
11N20SISO	Ant1	5220	21.360	5209.360	5230.720	---	---
11N20SISO	Ant1	5240	21.680	5228.920	5250.600	---	---
11N20SISO	Ant1	5260	22.520	5248.920	5271.440	---	---
11N20SISO	Ant1	5300	20.880	5289.560	5310.440	---	---
11N20SISO	Ant1	5320	21.320	5309.440	5330.760	---	---
11N20SISO	Ant1	5500	21.440	5489.320	5510.760	---	---
11N20SISO	Ant1	5580	23.880	5568.720	5592.600	---	---
11N20SISO	Ant1	5700	24.280	5689.440	5713.720	---	---
11N20SISO	Ant1	5720	22.720	5708.000	5730.720	---	---
11N20SISO	Ant1	5720_UNII-2C	17	5708.000	5725	---	---
11N20SISO	Ant1	5720_UNII-3	5.72	5725	5730.720	---	---
11N20SISO	Ant1	5745	27.640	5730.920	5758.560	---	---
11N20SISO	Ant1	5785	21.240	5774.280	5795.520	---	---
11N20SISO	Ant1	5825	23.200	5814.280	5837.480	---	---
11N40SISO	Ant1	5190	39.440	5170.320	5209.760	---	---
11N40SISO	Ant1	5230	39.920	5210.160	5250.080	---	---
11N40SISO	Ant1	5270	39.680	5250.160	5289.840	---	---

11N40SISO	Ant1	5310	39.600	5290.080	5329.680	---	---
11N40SISO	Ant1	5510	40.080	5489.440	5529.520	---	---
11N40SISO	Ant1	5550	40.240	5529.760	5570.000	---	---
11N40SISO	Ant1	5670	40.240	5649.760	5690.000	---	---
11N40SISO	Ant1	5710	39.680	5690.160	5729.840	---	---
11N40SISO	Ant1	5710_UNII-2C	34.84	5690.160	5725	---	---
11N40SISO	Ant1	5710_UNII-3	4.84	5725	5729.840	---	---
11N40SISO	Ant1	5755	39.440	5735.080	5774.520	---	---
11N40SISO	Ant1	5795	40.080	5775.000	5815.080	---	---
11AC20SISO	Ant1	5180	22.320	5169.320	5191.640	---	---
11AC20SISO	Ant1	5220	22.720	5209.240	5231.960	---	---
11AC20SISO	Ant1	5240	21.640	5229.240	5250.880	---	---
11AC20SISO	Ant1	5260	23.480	5248.920	5272.400	---	---
11AC20SISO	Ant1	5300	21.600	5289.080	5310.680	---	---
11AC20SISO	Ant1	5320	21.320	5309.360	5330.680	---	---
11AC20SISO	Ant1	5500	22.200	5489.240	5511.440	---	---
11AC20SISO	Ant1	5580	25.800	5569.200	5595.000	---	---
11AC20SISO	Ant1	5700	27.000	5688.640	5715.640	---	---
11AC20SISO	Ant1	5720	22.120	5709.160	5731.280	---	---
11AC20SISO	Ant1	5720_UNII-2C	15.84	5709.160	5725	---	---
11AC20SISO	Ant1	5720_UNII-3	6.28	5725	5731.280	---	---
11AC20SISO	Ant1	5745	20.880	5734.600	5755.480	---	---
11AC20SISO	Ant1	5785	21.440	5774.200	5795.640	---	---
11AC20SISO	Ant1	5825	21.640	5814.240	5835.880	---	---
11AC40SISO	Ant1	5190	39.680	5170.000	5209.680	---	---
11AC40SISO	Ant1	5230	39.760	5210.160	5249.920	---	---
11AC40SISO	Ant1	5270	39.760	5250.080	5289.840	---	---
11AC40SISO	Ant1	5310	39.440	5290.320	5329.760	---	---
11AC40SISO	Ant1	5510	39.680	5490.080	5529.760	---	---
11AC40SISO	Ant1	5550	39.360	5530.240	5569.600	---	---
11AC40SISO	Ant1	5670	40.240	5649.920	5690.160	---	---
11AC40SISO	Ant1	5710	39.360	5690.320	5729.680	---	---
11AC40SISO	Ant1	5710_UNII-2C	34.68	5690.320	5725	---	---
11AC40SISO	Ant1	5710_UNII-3	4.68	5725	5729.680	---	---
11AC40SISO	Ant1	5755	39.680	5735.160	5774.840	---	---
11AC40SISO	Ant1	5795	39.520	5775.160	5814.680	---	---
11AC80SISO	Ant1	5210	81.120	5169.360	5250.480	---	---
11AC80SISO	Ant1	5290	80.320	5249.840	5330.160	---	---
11AC80SISO	Ant1	5530	80.800	5489.360	5570.160	---	---

11AC80SISO	Ant1	5610	80.480	5569.840	5650.320	---	---
11AC80SISO	Ant1	5690	80.800	5649.040	5729.840	---	---
11AC80SISO	Ant1	5690_UNII-2C	75.96	5649.040	5725	---	---
11AC80SISO	Ant1	5690_UNII-3	4.84	5725	5729.840	---	---
11AC80SISO	Ant1	5775	81.280	5734.200	5815.480	---	---

Test Result_6dB Bandwidth

U-NII-3

Test Mode	Antenna	Frequency[MHz]	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5745	16.280	5736.840	5753.120	0.5	PASS
11A	Ant1	5785	15.480	5776.960	5792.440	0.5	PASS
11A	Ant1	5825	16.400	5816.760	5833.160	0.5	PASS
11N20SISO	Ant1	5745	17.040	5736.680	5753.720	0.5	PASS
11N20SISO	Ant1	5785	17.560	5776.200	5793.760	0.5	PASS
11N20SISO	Ant1	5825	17.520	5816.200	5833.720	0.5	PASS
11N40SISO	Ant1	5755	36.320	5736.840	5773.160	0.5	PASS
11N40SISO	Ant1	5795	36.320	5776.840	5813.160	0.5	PASS
11AC20SISO	Ant1	5745	17.120	5736.200	5753.320	0.5	PASS
11AC20SISO	Ant1	5785	17.520	5776.200	5793.720	0.5	PASS
11AC20SISO	Ant1	5825	17.120	5816.240	5833.360	0.5	PASS
11AC40SISO	Ant1	5755	36.320	5736.840	5773.160	0.5	PASS
11AC40SISO	Ant1	5795	36.320	5776.840	5813.160	0.5	PASS
11AC80SISO	Ant1	5775	75.840	5736.920	5812.760	0.5	PASS

Test Result_99% Bandwidth

Test Mode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	16.850	5171.5459	5188.3959	---	---
11A	Ant1	5220	17.188	5211.3710	5228.5590	---	---
11A	Ant1	5240	17.095	5231.4603	5248.5553	---	---
11A	Ant1	5260	17.021	5251.5040	5268.5250	---	---
11A	Ant1	5300	17.100	5291.4219	5308.5219	---	---
11A	Ant1	5320	17.198	5311.3886	5328.5866	---	---
11A	Ant1	5500	17.289	5491.3443	5508.6333	---	---
11A	Ant1	5580	17.191	5571.3924	5588.5834	---	---
11A	Ant1	5700	17.323	5691.2967	5708.6197	---	---
11A	Ant1	5720	17.337	5711.3024	5728.6394	---	---
11A	Ant1	5720_UNII-2C	13.698	5711.3024	5725	---	---
11A	Ant1	5720_UNII-3	3.639	5725	5728.6394	---	---
11A	Ant1	5745	17.368	5736.2523	5753.6203	---	---

11A	Ant1	5785	17.270	5776.3223	5793.5923	---	---
11A	Ant1	5825	17.070	5816.4162	5833.4862	---	---
11N20SISO	Ant1	5180	18.107	5170.9478	5189.0548	---	---
11N20SISO	Ant1	5220	18.146	5210.8830	5229.0290	---	---
11N20SISO	Ant1	5240	18.131	5230.9183	5249.0493	---	---
11N20SISO	Ant1	5260	18.186	5250.8785	5269.0645	---	---
11N20SISO	Ant1	5300	18.158	5290.8556	5309.0136	---	---
11N20SISO	Ant1	5320	18.269	5310.7772	5329.0462	---	---
11N20SISO	Ant1	5500	18.287	5490.8848	5509.1718	---	---
11N20SISO	Ant1	5580	18.211	5570.8556	5589.0666	---	---
11N20SISO	Ant1	5700	18.263	5690.8595	5709.1225	---	---
11N20SISO	Ant1	5720	18.213	5710.8940	5729.1070	---	---
11N20SISO	Ant1	5720_UNII-2C	14.106	5710.8940	5725	---	---
11N20SISO	Ant1	5720_UNII-3	4.107	5725	5729.1070	---	---
11N20SISO	Ant1	5745	18.346	5735.8108	5754.1568	---	---
11N20SISO	Ant1	5785	18.165	5775.8864	5794.0514	---	---
11N20SISO	Ant1	5825	18.349	5815.8314	5834.1804	---	---
11N40SISO	Ant1	5190	36.407	5171.7592	5208.1662	---	---
11N40SISO	Ant1	5230	36.530	5211.7386	5248.2686	---	---
11N40SISO	Ant1	5270	36.555	5251.6931	5288.2481	---	---
11N40SISO	Ant1	5310	36.519	5291.7088	5328.2278	---	---
11N40SISO	Ant1	5510	36.491	5491.7692	5528.2602	---	---
11N40SISO	Ant1	5550	36.493	5531.7541	5568.2471	---	---
11N40SISO	Ant1	5670	36.737	5651.5911	5688.3281	---	---
11N40SISO	Ant1	5710	36.581	5691.7006	5728.2816	---	---
11N40SISO	Ant1	5710_UNII-2C	33.299	5691.7006	5725	---	---
11N40SISO	Ant1	5710_UNII-3	3.282	5725	5728.2816	---	---
11N40SISO	Ant1	5755	36.566	5736.7258	5773.2918	---	---
11N40SISO	Ant1	5795	36.527	5776.6799	5813.2069	---	---
11AC20SISO	Ant1	5180	18.135	5170.8759	5189.0109	---	---
11AC20SISO	Ant1	5220	18.203	5210.8775	5229.0805	---	---
11AC20SISO	Ant1	5240	18.104	5230.9826	5249.0866	---	---
11AC20SISO	Ant1	5260	18.255	5250.8075	5269.0625	---	---
11AC20SISO	Ant1	5300	18.180	5290.8540	5309.0340	---	---
11AC20SISO	Ant1	5320	18.149	5310.8941	5329.0431	---	---
11AC20SISO	Ant1	5500	18.099	5490.9280	5509.0270	---	---
11AC20SISO	Ant1	5580	18.285	5570.8923	5589.1773	---	---
11AC20SISO	Ant1	5700	18.268	5690.8492	5709.1172	---	---
11AC20SISO	Ant1	5720	18.105	5710.8966	5729.0016	---	---

11AC20SISO	Ant1	5720_UNII-2C	14.103	5710.8966	5725	---	---
11AC20SISO	Ant1	5720_UNII-3	4.002	5725	5729.0016	---	---
11AC20SISO	Ant1	5745	18.158	5735.8762	5754.0342	---	---
11AC20SISO	Ant1	5785	18.239	5775.8673	5794.1063	---	---
11AC20SISO	Ant1	5825	18.108	5815.8700	5833.9780	---	---
11AC40SISO	Ant1	5190	36.501	5171.7280	5208.2290	---	---
11AC40SISO	Ant1	5230	36.333	5211.8515	5248.1845	---	---
11AC40SISO	Ant1	5270	36.590	5251.5968	5288.1868	---	---
11AC40SISO	Ant1	5310	36.332	5291.7949	5328.1269	---	---
11AC40SISO	Ant1	5510	36.508	5491.7159	5528.2239	---	---
11AC40SISO	Ant1	5550	36.543	5531.7026	5568.2456	---	---
11AC40SISO	Ant1	5670	36.514	5651.7435	5688.2575	---	---
11AC40SISO	Ant1	5710	36.569	5691.7241	5728.2931	---	---
11AC40SISO	Ant1	5710_UNII-2C	33.276	5691.7241	5725	---	---
11AC40SISO	Ant1	5710_UNII-3	3.293	5725	5728.2931	---	---
11AC40SISO	Ant1	5755	36.684	5736.6052	5773.2892	---	---
11AC40SISO	Ant1	5795	36.578	5776.6621	5813.2401	---	---
11AC80SISO	Ant1	5210	76.056	5171.9617	5248.0177	---	---
11AC80SISO	Ant1	5290	75.935	5251.9011	5327.8361	---	---
11AC80SISO	Ant1	5530	76.120	5492.0890	5568.2090	---	---
11AC80SISO	Ant1	5610	76.078	5571.9983	5648.0763	---	---
11AC80SISO	Ant1	5690	76.115	5651.9100	5728.0250	---	---
11AC80SISO	Ant1	5690_UNII-2C	73.09	5651.9100	5725	---	---
11AC80SISO	Ant1	5690_UNII-3	3.025	5725	5728.0250	---	---
11AC80SISO	Ant1	5775	76.190	5736.9352	5813.1252	---	---

Test Graphs

26dB Occupied Bandwidth

11A-Ant1-5180	11A-Ant1-5220
	
11A-Ant1-5240	11A-Ant1-5260

11A-Ant1-5300

11A-Ant1-5320

11A-Ant1-5500

11A-Ant1-5580

11A-Ant1-5700

11A-Ant1-5720

11A-Ant1-5745

11A-Ant1-5785

11A-Ant1-5825

11N20SISO-Ant1-5180

11N20SISO-Ant1-5220

11N20SISO-Ant1-5240

11N20SISO-Ant1-5260

11N20SISO-Ant1-5300

11N20SISO-Ant1-5320

11N20SISO-Ant1-5500

11N20SISO-Ant1-5580

11N20SISO-Ant1-5700

11N20SISO-Ant1-5720

11N20SISO-Ant1-5745

11N20SISO-Ant1-5785

11N20SISO-Ant1-5825

11N40SISO-Ant1-5190

11N40SISO-Ant1-5230

11N40SISO-Ant1-5270

11N40SISO-Ant1-5310

11N40SISO-Ant1-5510

11N40SISO-Ant1-5550

11N40SISO-Ant1-5670

11N40SISO-Ant1-5710

11N40SISO-Ant1-5755

11N40SISO-Ant1-5795

11AC20SISO-Ant1-5180

11AC20SISO-Ant1-5220

11AC20SISO-Ant1-5240

11AC20SISO-Ant1-5260

11AC20SISO-Ant1-5300

11AC20SISO-Ant1-5320

11AC20SISO-Ant1-5500

11AC20SISO-Ant1-5580

11AC20SISO-Ant1-5700

11AC20SISO-Ant1-5720

11AC20SISO-Ant1-5745

11AC20SISO-Ant1-5785

11AC20SISO-Ant1-5825

11AC40SISO-Ant1-5190

11AC40SISO-Ant1-5230

11AC40SISO-Ant1-5270

11AC40SISO-Ant1-5310

11AC40SISO-Ant1-5510

11AC40SISO-Ant1-5550

11AC40SISO-Ant1-5670

11AC40SISO-Ant1-5710

11AC40SISO-Ant1-5755

11AC40SISO-Ant1-5795

11AC80SISO-Ant1-5210

	
11AC80SISO-Ant1-5290	11AC80SISO-Ant1-5530
	
11AC80SISO-Ant1-5610	11AC80SISO-Ant1-5690
	
11AC80SISO-Ant1-5775	/
	/

6dB Bandwidth
U-NII-3

11A-Ant1-5745-PASS	11A-Ant1-5785-PASS
	
11A-Ant1-5825-PASS	11N20SISO-Ant1-5745-PASS
	
11N20SISO-Ant1-5785-PASS	11N20SISO-Ant1-5825-PASS
	
11N40SISO-Ant1-5755-PASS	11N40SISO-Ant1-5795-PASS
	
11AC20SISO-Ant1-5745-PASS	11AC20SISO-Ant1-5785-PASS

11AC20SISO-Ant1-5825-PASS

11AC40SISO-Ant1-5755-PASS

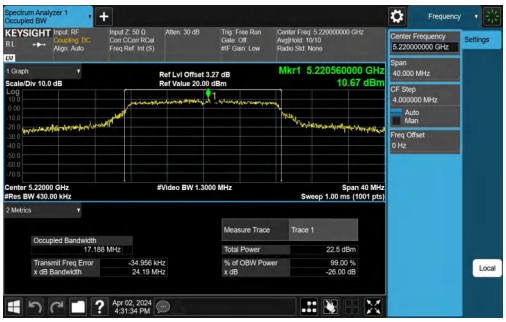
11AC40SISO-Ant1-5795-PASS

11AC80SISO-Ant1-5775-PASS

99% Bandwidth

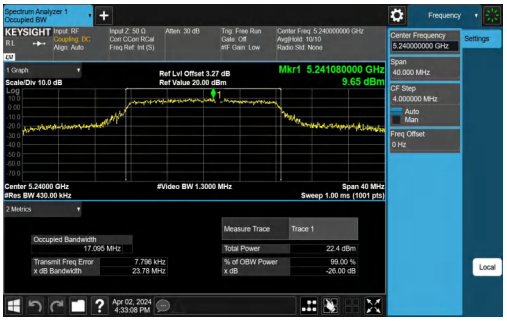
11A-Ant1-5180

11A-Ant1-5220

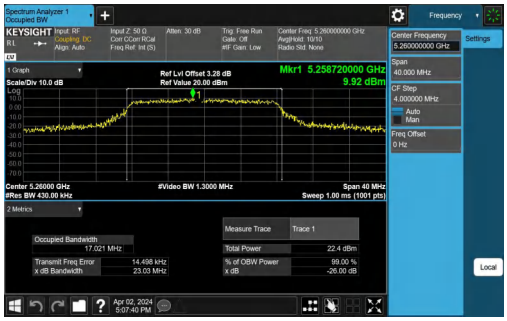


11A-Ant1-5240

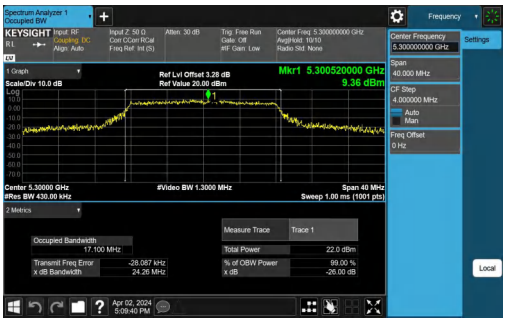
11A-Ant1-5260



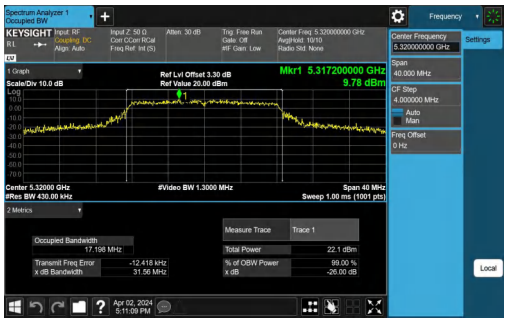
11A-Ant1-5300



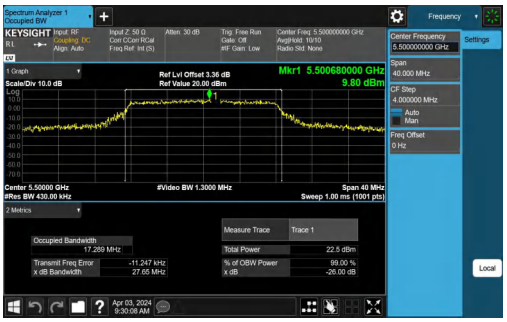
11A-Ant1-5320



11A-Ant1-5500



11A-Ant1-5580



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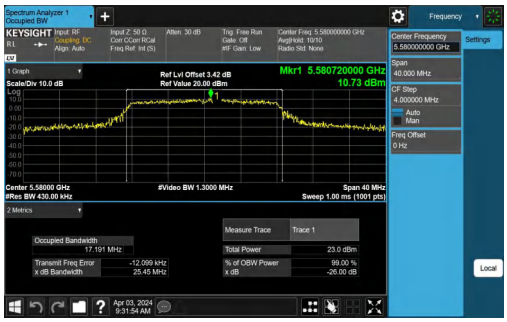

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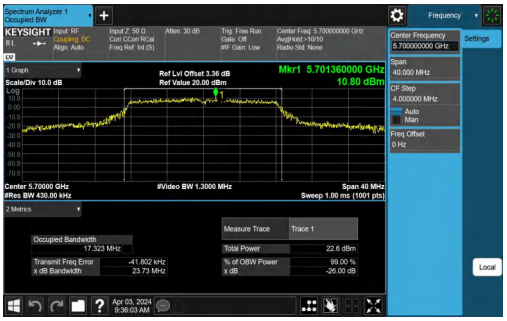

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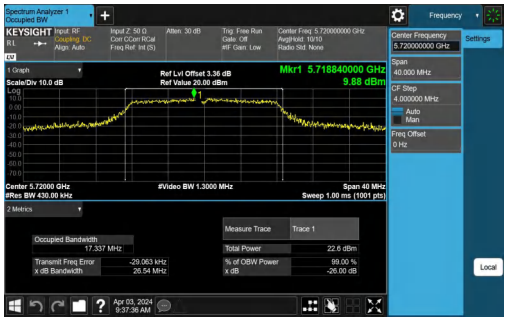

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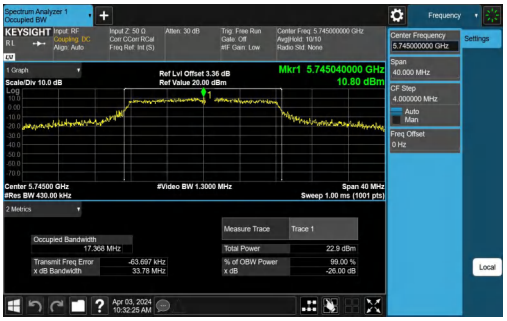

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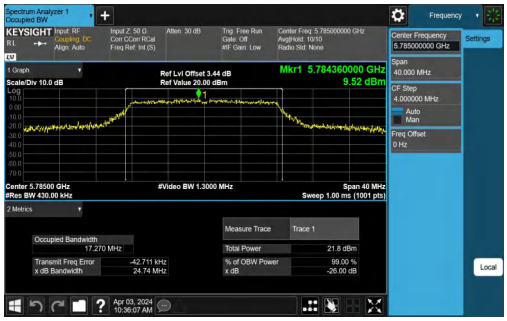

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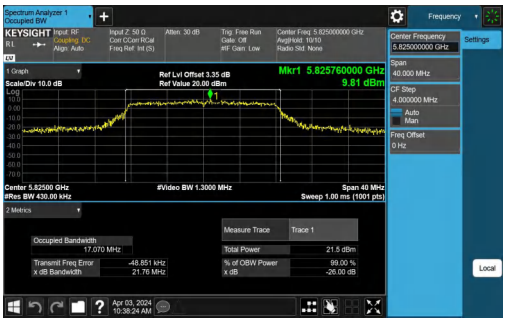
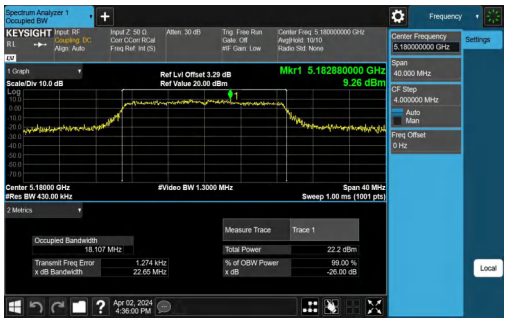


11N20SISO-Ant1-5220



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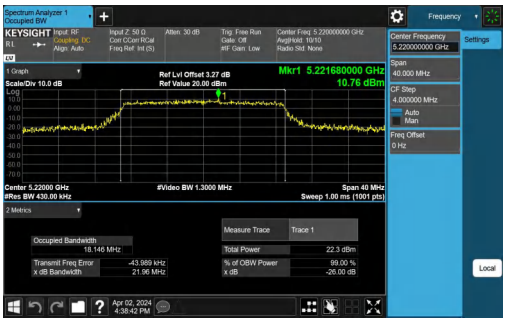

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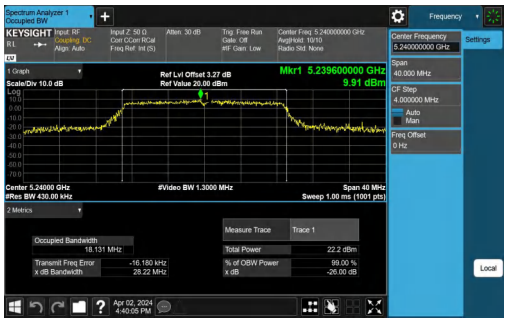

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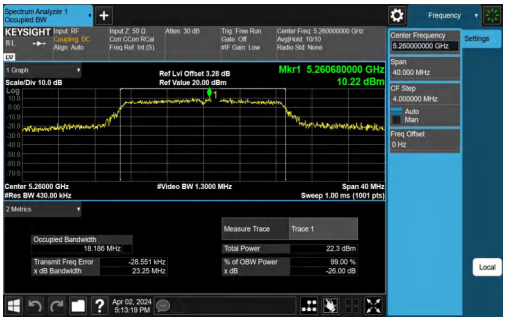

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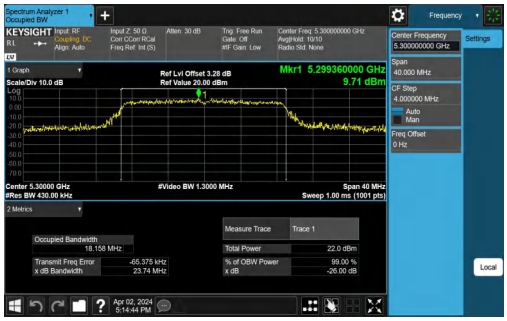

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