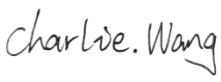
RF Test Report

Applicant:	Quectel Wireless Solutions Co., Ltd.
Address:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233
Product:	Wi-Fi & Bluetooth Module
Model No.:	FCM561D-P
Brand Name:	QUECTEL
FCC ID:	XMR2023FCM561DP
Standards:	FCC CFR47 Part 15C
Report No.:	PD20230183RF06
Issue Date:	2024/01/08
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

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Revision History

Report No.	Version	Description	Issue Date	Note
PD20230183RF06	1	Initial Report	2024/01/08	Valid

CONTENTS

Test Summary

No.	Test Case	FCC Rules	Verdict
1	Output Power Measurement	15.247(b)	PASS
2	6dB and 99% Bandwidth Measurement	15.247(a)(2)	PASS
3	Power Spectral Density Measurement	15.247(e)	PASS
4	Conducted Band Edges and Spurious Emission Measurement	15.247(d)	PASS
5	Radiated Band Edges and Spurious Emission Measurement	15.247(d)	PASS
6	AC Conducted Emission Measurement	15.207	NA
7	Antenna Requirements	15.203 & 15.247(b)	PASS
Date of Testing:2023/11/13 to 2024/01/06 Date of Sample Received: 2023/11/07			
• 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.			

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

2.2 General Information

Product	Wi-Fi & Bluetooth Module
Model	FCM561D-P
SN	1. E1823G51F000027 2. E1823G51F000026
Hardware Version	R1.0
Software Version	NA
Antenna Type	PCB Antenna
Antenna Gain	1.0 dBi
Additional Beamforming Gain	NA
Max. Conducted Power	Wi-Fi 2.4G: 18.25dBm
Operating temperature range	-40 °C to 85 °C
Operating voltage range	3.0 V to 3.6 V; Rated Power Supply Voltage 3.3V
Type of Modulation	WLAN 802.11b/g/n HT20/ ax HE20: BPSK,QPSK,CCK,16QAM,64QAM
Operating Frequency Range(s)	802.11b/g/n HT20/ax HE20: 2412 to 2462MHz
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 Standard(s)

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

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- 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.

AC power line Conducted Emission was tested under maximum output power.

Test Mode	Data Rate(Mbps)
802.11b	1
802.11g	6
802.11n HT20	MCS0
802.11ax HE20	MCS0

3.2 Carrier Frequency and Channel

Frequency Band	Channel	Freq.(MHz)	Channel	Freq.(MHz
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	/	/

3.3 Equipment List

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
Spectrum Analyzer	KEYSIGHT	N9020B	PWC0055	1 Year	2024/10/11
Vector Signal Generator	R&S	SMBV100B	PWC0011	1 Year	2024/10/11
Power Meter Unit	Tonscend	JS0806-2-8CH	PWC0013	1 Year	2024/10/13
DC Power	KEYSIGHT	E3640A	PWC0046	1 Year	2024/10/11
Anechoic Chamber	ETS.LINDGREN	Fact 3-2m	PWB0003	3 Years	2024/08/28
Shielded Chamber	Maorui	MR543	PWC0041	3 Years	2026/08/26
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	Tonseced	JS1120-3 V3.2.22	/	/	/
Test Software	R&S	ELEKTRA V4.20.2	/	/	/

3.4 Support Equipment List

Equipment	Manufacturer	Description	Model	Serial Number
EVB	QUECTEL	NA	NA	NA
USB Cable	NA	NA	NA	NA

3.5 Test Uncertainty

No.	Parameter	Uncertainty
1	DTS Bandwidth	1.9 %
2	Occupied channel bandwidth	1.9 %
3	Duty Cycle	0.11 %
4	Maximum Conducted Output Power	1.18 dB
5	Maximum Power Spectral Density Level	0.98 dB
6	Band-edge Compliance	1.21dB
7	Unwanted Emissions In Non-restricted Frequency Bands	9kHz-7GHz: 1.21 dB 7GHz-40GHz: 3.31 dB
11	Radiated Spurious Emission	4.46 dB
12	Temperature	3 °C
13	Humidity	1.3 %
14	Supply Voltages	0.006 V

4 Test Items Description

Ambient condition

Shielded Chamber

Temperature [°C]	23.4 to 24.2
Humidity [%RH]	31 to 37
Pressure [kPa]	101.8 to 102.3

Anechoic Chamber

Temperature [°C]	20.5 to 25.1
Humidity [%RH]	42 to 47
Pressure [kPa]	101.2 to 102.3

4.1 Output Power Measurement

4.1.1 Limit of Output Power

Rule Part 15.247 (b) (3) specifies that “For systems using digital modulation in the 902-928 MHz 2400-2483.5 MHz: 1 Watt.”

Average Output Power	≤1W(30dBm)

4.1.2 Measuring Instruments

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

4.1.3 Test Procedures

The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.2.2.4 Method AVGSA-2. Method AVGSA-2 uses trace averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction. The procedure for this method is as follows:

1. Measure the duty cycle D of the transmitter output signal as described in 11.6.
2. Set span to at least 1.5 times the OBW.
3. Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
4. Set VBW ≥ [3 × RBW].
5. Number of points in sweep ≥[2 ×span/RBW]. (This gives bin-to-bin spacing ≤RBW / 2, so that narrowband signals are not lost between frequency bins.)
6. Sweep time = auto.
7. Detector = RMS (i.e., power averaging), if available. Otherwise, use the 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 such 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 OBW of the signal using the Instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
11. Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.

4.1.4 Test Setup

4.1.5Test Results

See Appendix A.1.

4.2 6dB and 99% Bandwidth Measurement

4.2.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz

4.2.2 Measuring Instruments

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

4.2.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.8.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1% to 5% of the 99% OBW and the VBW is set to 3 times of the RBW.
6. Measure and record the results in the test report.

4.2.4 Test Setup

4.2.5 Test Results

See Appendix A.2.

4.3 Power Spectral Density Measurement

4.3.1 Limit of Power Spectral Density

Rule Part 15.247(e) specifies that" For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2 Measuring Instruments

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

4.3.3 Test Procedures

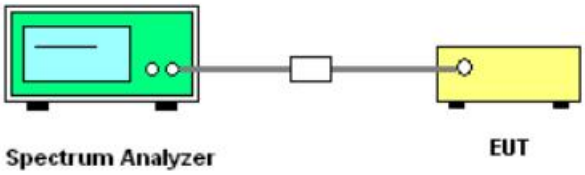
The testing follows ANSI C63.10-2013 clause 11.10.5.

Method AVGPSD-2 uses trace averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction.

The following procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., D < 98%), when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than ±2%):

1. Measure the duty cycle (D) of the transmitter output signal as described in 11.6.
2. Set instrument center frequency to DTS channel center frequency.
3. Set span to at least 1.5 times the OBW.
4. Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
5. Set VBW ≥ [3 × RBW].
6. Detector = power averaging (rms) or sample detector (when rms not available).
7. Ensure that the number of measurement points in the sweep ≥ [2 × span / RBW].
8. Sweep time = auto couple.
9. Do not use sweep triggering; allow sweep to "free run."
10. Employ trace averaging (rms) mode over a minimum of 100 traces.
11. Use the peak marker function to determine the maximum amplitude level.
12. Add [10 log (1 / D)], where D is the duty cycle measured in step a), to the measured PSD to compute the average PSD during the actual transmission time.
13. If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).

4.3.4 Test Setup



4.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.3.

4.4 Conducted Band Edges and Spurious Emission Measurement

4.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band， In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

4.4.2 Measuring Instruments

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

4.4.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 11.13.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

4.4.4 Test Setup

4.4.5 Test Result

Please refer to Appendix A.4.

4.5 Radiated Band Edges and Spurious Emission Measurement

4.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

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	8
Above 960	500	3

4.5.2 Measuring Instruments

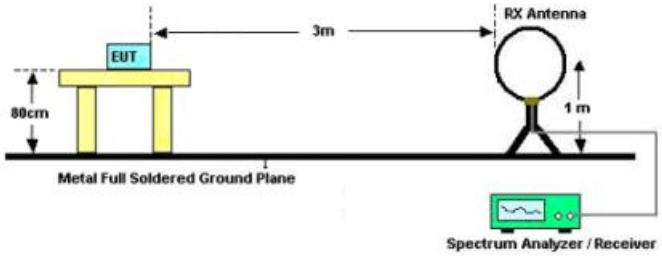
The section 3.3 of List of Measuring Equipment of this test report is used for test.

4.5.3 Test Procedures

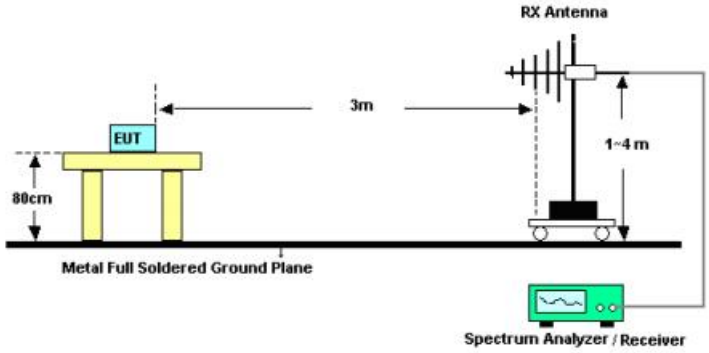
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. 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.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level -Pre-amp Factor = Level
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.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured.
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
   (3) Set RBW = 1 MHz, VBW= 3MHz for ≥ 1 GHz for peak measurement
   For average measurement:
   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.

4.5.4 Test Setup

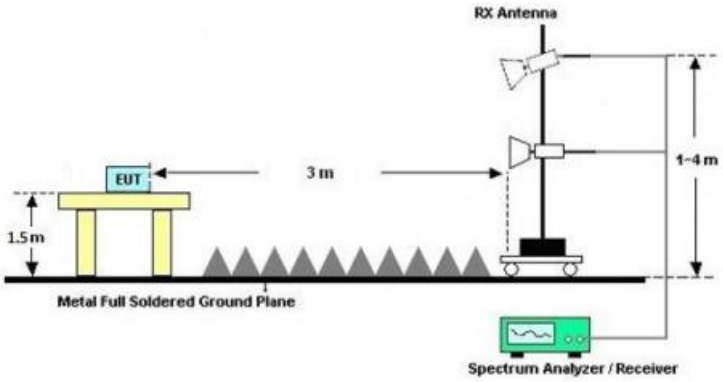
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



4.5.5 Test 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.

4.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.1.

4.5.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHzwhichever is lower)

Please refer to Appendix B.1.

4.5.8 Duty Cycle

Please refer to Appendix B.2.

4.6 AC Conducted Emission Measurement

4.6.1 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.
Decreases with the logarithm of the frequency.

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

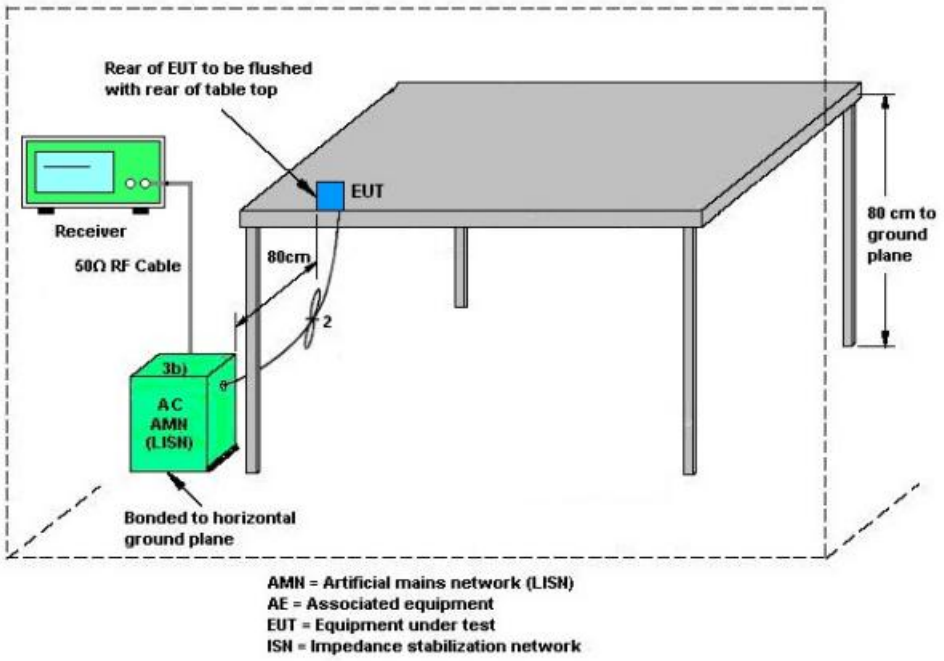
4.6.2 Measuring Instruments

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

4.6.3 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.

4.6.4 Test Setup



4.6.5 Test Result

Please refer to Appendix A.5.

Remark: The sample is powered by USB. This test item is not applicable.

4.7 Antenna Requirements

4.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

4.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

4.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

Appendix A – Test Results of Conducted Test

A.1 Conducted Output Power

Test Result Average

Test Mode	Antenna	Frequency [MHz]	Average power [dBm]	Duty Cycle [%]	DC Factor [dBm]	Result [dBm]	Limit [dBm]	Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
11B	Ant1	2412	17.20	98.94	0.05	17.25	≤30.00	1.00	18.25	≤36.00	PASS
11B	Ant1	2437	16.78	100.00	0.00	16.78	≤30.00	1.00	17.78	≤36.00	PASS
11B	Ant1	2462	16.96	98.73	0.06	17.02	≤30.00	1.00	18.02	≤36.00	PASS
11G	Ant1	2412	14.99	98.30	0.07	15.06	≤30.00	1.00	16.06	≤36.00	PASS
11G	Ant1	2437	15.08	98.30	0.07	15.15	≤30.00	1.00	16.15	≤36.00	PASS
11G	Ant1	2462	14.91	98.30	0.07	14.98	≤30.00	1.00	15.98	≤36.00	PASS
11N20SISO	Ant1	2412	13.89	98.18	0.08	13.97	≤30.00	1.00	14.97	≤36.00	PASS
11N20SISO	Ant1	2437	13.99	98.18	0.08	14.07	≤30.00	1.00	15.07	≤36.00	PASS
11N20SISO	Ant1	2462	13.83	98.18	0.08	13.91	≤30.00	1.00	14.91	≤36.00	PASS
11AX20SISO	Ant1	2412	13.73	94.65	0.24	13.97	≤30.00	1.00	14.97	≤36.00	PASS
11AX20SISO	Ant1	2437	13.86	94.65	0.24	14.10	≤30.00	1.00	15.10	≤36.00	PASS
11AX20SISO	Ant1	2462	13.70	94.65	0.24	13.94	≤30.00	1.00	14.94	≤36.00	PASS

Test Result Average_AX Part RU

Test Mode	Antenna	Frequency [MHz]	Ru Size	Ru Index	Average power [dBm]	Duty Cycle [%]	DC Factor [dBm]	Result [dBm]	Limit [dBm]	Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
11AX20SISO	Ant1	2412	26Tone	RU0	2.84	17.25	7.63	10.47	≤30.00	1.00	11.47	≤36.00	PASS
11AX20SISO	Ant1	2412	26Tone	RU4	5.25	17.25	7.63	12.88	≤30.00	1.00	13.88	≤36.00	PASS
11AX20SISO	Ant1	2412	26Tone	RU8	4.58	17.25	7.63	12.21	≤30.00	1.00	13.21	≤36.00	PASS
11AX20SISO	Ant1	2412	52Tone	RU37	1.33	9.86	10.06	11.39	≤30.00	1.00	12.39	≤36.00	PASS
11AX20SISO	Ant1	2412	52Tone	RU39	2.54	10.09	9.96	12.50	≤30.00	1.00	13.50	≤36.00	PASS
11AX20SISO	Ant1	2412	52Tone	RU40	1.40	10.07	9.97	11.37	≤30.00	1.00	12.37	≤36.00	PASS
11AX20SISO	Ant1	2412	106Tone	RU53	1.43	9.15	10.39	11.82	≤30.00	1.00	12.82	≤36.00	PASS

11AX20SISO	Ant1	2412	106Tone	RU54	1.52	9.15	10.39	11.91	≤30.00	1.00	12.91	≤36.00	PASS
11AX20SISO	Ant1	2437	26Tone	RU0	3.16	17.03	7.69	10.85	≤30.00	1.00	11.85	≤36.00	PASS
11AX20SISO	Ant1	2437	26Tone	RU4	5.16	17.22	7.64	12.80	≤30.00	1.00	13.80	≤36.00	PASS
11AX20SISO	Ant1	2437	26Tone	RU8	4.57	17.25	7.63	12.20	≤30.00	1.00	13.20	≤36.00	PASS
11AX20SISO	Ant1	2437	52Tone	RU37	-1.27	10.09	9.96	8.69	≤30.00	1.00	9.69	≤36.00	PASS
11AX20SISO	Ant1	2437	52Tone	RU39	2.34	10.09	9.96	12.30	≤30.00	1.00	13.30	≤36.00	PASS
11AX20SISO	Ant1	2437	52Tone	RU40	1.13	10.09	9.96	11.09	≤30.00	1.00	12.09	≤36.00	PASS
11AX20SISO	Ant1	2437	106Tone	RU53	1.16	9.15	10.39	11.55	≤30.00	1.00	12.55	≤36.00	PASS
11AX20SISO	Ant1	2437	106Tone	RU54	1.28	9.15	10.39	11.67	≤30.00	1.00	12.67	≤36.00	PASS
11AX20SISO	Ant1	2462	26Tone	RU0	3.70	17.25	7.63	11.33	≤30.00	1.00	12.33	≤36.00	PASS
11AX20SISO	Ant1	2462	26Tone	RU4	5.63	17.25	7.63	13.26	≤30.00	1.00	14.26	≤36.00	PASS
11AX20SISO	Ant1	2462	26Tone	RU8	4.66	17.25	7.63	12.29	≤30.00	1.00	13.29	≤36.00	PASS
11AX20SISO	Ant1	2462	52Tone	RU37	1.55	10.07	9.97	11.52	≤30.00	1.00	12.52	≤36.00	PASS
11AX20SISO	Ant1	2462	52Tone	RU39	2.51	10.07	9.97	12.48	≤30.00	1.00	13.48	≤36.00	PASS
11AX20SISO	Ant1	2462	52Tone	RU40	1.19	10.07	9.97	11.16	≤30.00	1.00	12.16	≤36.00	PASS
11AX20SISO	Ant1	2462	106Tone	RU53	1.71	8.96	10.48	12.19	≤30.00	1.00	13.19	≤36.00	PASS
11AX20SISO	Ant1	2462	106Tone	RU54	1.39	9.15	10.39	11.78	≤30.00	1.00	12.78	≤36.00	PASS

A.2 6dB and 99% Bandwidth

Test Result 6dB Bandwidth

Test Mode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	10.040	2406.960	2417.000	0.5	PASS
11B	Ant1	2437	9.560	2432.440	2442.000	0.5	PASS
11B	Ant1	2462	10.000	2456.960	2466.960	0.5	PASS
11G	Ant1	2412	15.120	2404.440	2419.560	0.5	PASS
11G	Ant1	2437	15.120	2429.440	2444.560	0.5	PASS
11G	Ant1	2462	15.120	2454.440	2469.560	0.5	PASS
11N20SISO	Ant1	2412	15.080	2404.480	2419.560	0.5	PASS
11N20SISO	Ant1	2437	15.120	2429.440	2444.560	0.5	PASS
11N20SISO	Ant1	2462	15.080	2454.440	2469.520	0.5	PASS
11AX20SISO	Ant1	2412	15.120	2404.440	2419.560	0.5	PASS
11AX20SISO	Ant1	2437	15.120	2429.440	2444.560	0.5	PASS
11AX20SISO	Ant1	2462	15.120	2454.440	2469.560	0.5	PASS

Test Result 99% Bandwidth

Test Mode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	14.606	2404.7060	2419.3120	---	---
11B	Ant1	2437	14.556	2429.7285	2444.2845	---	---
11B	Ant1	2462	14.656	2454.6696	2469.3256	---	---
11G	Ant1	2412	16.393	2403.7965	2420.1895	---	---
11G	Ant1	2437	16.399	2428.7897	2445.1887	---	---
11G	Ant1	2462	16.381	2453.7931	2470.1741	---	---
11N20SISO	Ant1	2412	17.409	2403.2936	2420.7026	---	---
11N20SISO	Ant1	2437	17.398	2428.2942	2445.6922	---	---
11N20SISO	Ant1	2462	17.396	2453.2917	2470.6877	---	---
11AX20SISO	Ant1	2412	18.290	2402.8915	2421.1815	---	---
11AX20SISO	Ant1	2437	18.305	2427.8668	2446.1718	---	---
11AX20SISO	Ant1	2462	18.289	2452.8792	2471.1682	---	---

Test Result 99% Bandwidth_AX Part RU

Test Mode	Antenna	Frequency[MHz]	Ru Size	Ru Index	DTS BW [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
11AX20SISO	Ant1	2412	26Tone	RU0	18.336	2402.1816	2420.5176	---	---
11AX20SISO	Ant1	2412	26Tone	RU4	16.639	2403.6882	2420.3272	---	---
11AX20SISO	Ant1	2412	26Tone	RU8	16.921	2403.6242	2420.5452	---	---
11AX20SISO	Ant1	2412	52Tone	RU37	18.243	2402.2625	2420.5055	---	---
11AX20SISO	Ant1	2412	52Tone	RU39	16.625	2403.6977	2420.3227	---	---
11AX20SISO	Ant1	2412	52Tone	RU40	17.856	2403.7767	2421.6327	---	---
11AX20SISO	Ant1	2412	106Tone	RU53	18.073	2402.4345	2420.5075	---	---
11AX20SISO	Ant1	2412	106Tone	RU54	17.886	2403.6680	2421.5540	---	---
11AX20SISO	Ant1	2437	26Tone	RU0	18.197	2427.1526	2445.3496	---	---
11AX20SISO	Ant1	2437	26Tone	RU4	16.876	2428.5166	2445.3926	---	---
11AX20SISO	Ant1	2437	26Tone	RU8	17.096	2428.4639	2445.5599	---	---
11AX20SISO	Ant1	2437	52Tone	RU37	18.247	2427.2518	2445.4988	---	---
11AX20SISO	Ant1	2437	52Tone	RU39	16.840	2428.6116	2445.4516	---	---
11AX20SISO	Ant1	2437	52Tone	RU40	18.018	2428.6284	2446.6464	---	---
11AX20SISO	Ant1	2437	106Tone	RU53	17.958	2427.4238	2445.3818	---	---
11AX20SISO	Ant1	2437	106Tone	RU54	18.165	2428.3925	2446.5575	---	---
11AX20SISO	Ant1	2462	26Tone	RU0	18.196	2452.1552	2470.3512	---	---
11AX20SISO	Ant1	2462	26Tone	RU4	16.556	2453.5946	2470.1506	---	---
11AX20SISO	Ant1	2462	26Tone	RU8	17.089	2453.4166	2470.5056	---	---
11AX20SISO	Ant1	2462	52Tone	RU37	18.191	2452.2626	2470.4536	---	---
11AX20SISO	Ant1	2462	52Tone	RU39	16.801	2453.6531	2470.4541	---	---
11AX20SISO	Ant1	2462	52Tone	RU40	18.254	2453.3734	2471.6274	---	---
11AX20SISO	Ant1	2462	106Tone	RU53	17.490	2452.4042	2469.8942	---	---
11AX20SISO	Ant1	2462	106Tone	RU54	17.793	2453.7625	2471.5555	---	---

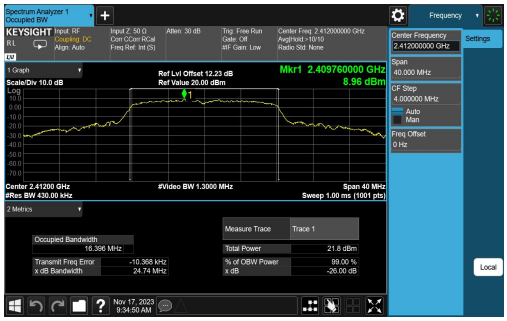
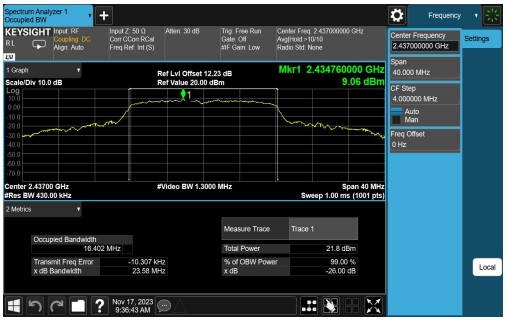
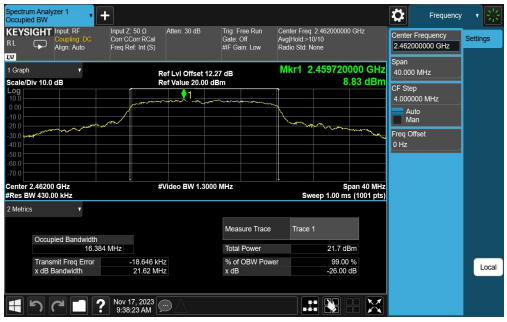
Test Graphs_6dB Bandwidth

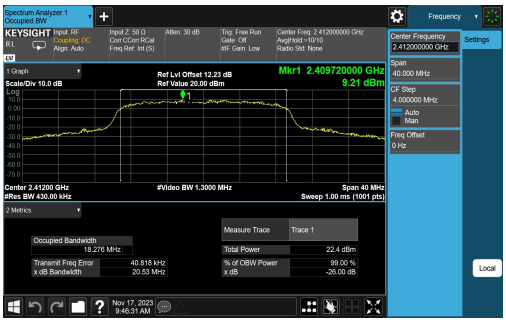
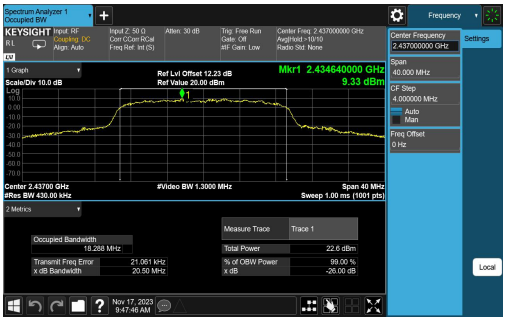
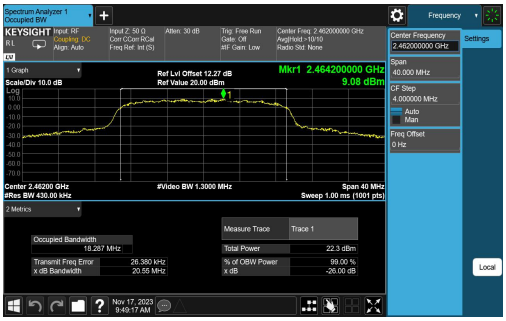
11B-Ant1-2412-PASS	11B-Ant1-2437-PASS
	

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	**11AX20SISO-Ant1-2412-PASS**
	

11AX20SISO-Ant1-2437-PASS	11AX20SISO-Ant1-2462-PASS
	

Test Graphs_99% Bandwidth

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	**11AX20SISO-Ant1-2412**
	
11AX20SISO-Ant1-2437	**11AX20SISO-Ant1-2462**
	

Test Graphs_99% Bandwidth_AX Part RU

11AX20SISO-Ant1-2412-26Tone-RU0	11AX20SISO-Ant1-2412-26Tone-RU4