

UN6GHZ PRE-APPROVAL GUIDANCE CHECKLIST

1. Antennas

1.1 Information for all the antennas, i.e., type, gain and relative positions within host, must be included in the filing.

Please refer to page6 of “MX21V1.0 天线测试报告” for antenna specification.

Please refer to document “EP-2303C106-1 Appendix for Internal Photographs & MX21V1.0 天线测试报告” for the antenna positions.

1.2 Show how the (aggregate, if applicable) antenna gain was computed/measured (as in TCB Workshop Presentation Aggregate Antenna Gain Review, April 2021). Provide equation(s) used to calculate Directional Gain and provide example calculation showing how the DG was calculated with the antenna gain of individual antennas. Provide details (references or attached documents) on how the individual antenna gains were derived, i.e., declared by the host manufacturer, based on data sheet, or measured. Since the CBP needs to detect a small signal, the worst case scenario to consider is when the receiver has the lowest antenna gain.

The device has the same maximum antenna gain for each antenna.



According to FCC KDB 662911 D01v02r01:

CDD Directional Gain = Antenna Gain + Array Gain, Array Gain = 0 dB for $NANT \leq 4$;

Beamforming Directional Gain = Antenna Gain + $10 \cdot \log(NANT/NSS)$.

Please refer to page11 of “BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for detailed above antenna information.

(3) Table for Filed Antenna:

Ant.	Brand	Part number	Type	Connector	Frequency Range (MHz)	Gain (dBi)
1		MX21V1.0	PIFA	I-PEX	5900-7100	5.89
2		MX21V1.0	PIFA	I-PEX	5900-7100	6.27

CDD Directional Gain = Antenna Gain + Array Gain, Array Gain = 0 dB for $NANT \leq 4$; Beamforming Directional Gain = Antenna Gain + $10 \cdot \log(NANT/NSS)$.

1.3 For conducted test in MIMO cases, show that the testing was done for that path that has the lowest antenna gain.

The device supports CDD and not supports MIMO.

2. Contention Based Protocol (CBP)

2.1 CBP testing shall be performed on one channel in each sub-band of operation for both narrowest and widest bandwidths.

Please refer to page 233 of “BTL-FCCP-4-2303C106 R00_Wi-Fi 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for the test channel and bandwidth information as follows. The narrowest and widest bandwidths were test for each UNII band.

Detection power level and detection probability

Bands	Test Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	interference Frequency (MHz)	Detection power level (dBm)	Detection Power Limit (dBm)	Number of Times	Number of Detected	Detection Probability	Detection Probability Limit	Test Result
UNII-5	802.11ax	20	37	6135	6175	-67.45	-58.73	10	10	100%	90%	Pass
					6950	-85.01	-58.73	10	9	90%	90%	Pass
	802.11ax	160	15	6025	6025	-58.80	-58.73	10	9	90%	90%	Pass
					6100	-81.23	-58.73	10	10	100%	90%	Pass
UNII-6	802.11ax	20	101	6455	6455	-59.29	-58.51	10	10	100%	90%	Pass
					6430	-88.35	-58.51	10	10	100%	90%	Pass
	802.11ax	160	111	6505	6505	-57.64	-58.51	10	9	90%	90%	Pass
					6680	-85.98	-58.51	10	10	100%	90%	Pass
UNII-7	802.11ax	20	117	6635	6635	-57.02	-58.22	10	10	100%	90%	Pass
					6690	-89.63	-58.22	10	10	100%	90%	Pass
	802.11ax	160	143	6665	6665	-58.31	-58.22	10	9	90%	90%	Pass
					6740	-80.21	-58.22	10	9	90%	90%	Pass
UNII-8	802.11ax	20	197	6935	6935	-81.35	-58.58	10	10	100%	90%	Pass
					6910	-88.14	-58.58	10	10	100%	90%	Pass
	802.11ax	160	207	6985	6985	-57.20	-58.58	10	9	90%	90%	Pass
					7060	-83.70	-58.58	10	10	100%	90%	Pass

2.2 Use three separate 10 MHz AWGN signals when testing a 160 MHz channel. The simulated incumbent signal must be a 10 MHz wide AWGN signal

Please refer to page 233 of “BTL-FCCP-4-2303C106 R00_Wi-Fi 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for the test summary information.

Detection power level and detection probability

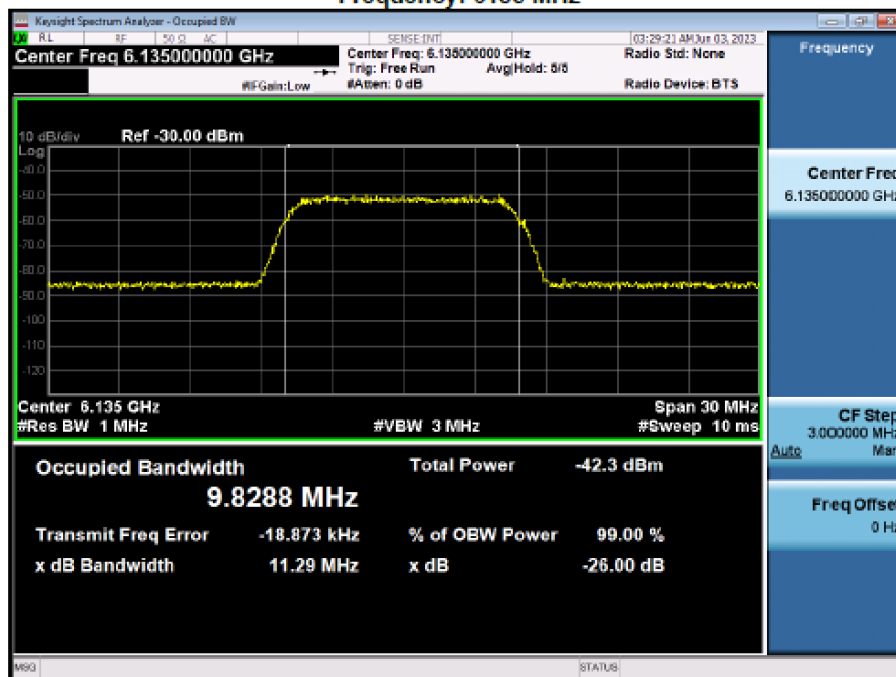
Bands	Test Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Interference Frequency (MHz)	Detection power level (dBm)	Detection Power Limit (dBm)	Number of Times	Number of Detected	Detection Probability	Detection Probability Limit	Test Result
UNII-5	802.11ax	20	37	6135	6175	-67.45	-58.73	10	10	100%	90%	Pass
	802.11ax	160	15	6025	5950	-65.01	-58.73	10	9	90%	90%	Pass
				6025	6025	-58.80	-58.73	10	9	90%	90%	Pass
				6100	6100	-61.23	-58.73	10	10	100%	90%	Pass
UNII-6	802.11ax	20	101	6455	6455	-59.29	-58.51	10	10	100%	90%	Pass
	802.11ax	160	111	6430	6430	-68.35	-58.51	10	10	100%	90%	Pass
				6505	6505	-57.64	-58.51	10	9	90%	90%	Pass
				6580	6580	-65.98	-58.51	10	10	100%	90%	Pass
UNII-7	802.11ax	20	117	6535	6535	-57.02	-58.22	10	10	100%	90%	Pass
	802.11ax	160	143	6590	6590	-69.63	-58.22	10	10	100%	90%	Pass
				6665	6665	-58.31	-58.22	10	9	90%	90%	Pass
				6740	6740	-60.21	-58.22	10	9	90%	90%	Pass
UNII-8	802.11ax	20	197	6935	6935	-61.35	-58.58	10	10	100%	90%	Pass
	802.11ax	160	207	6910	6910	-66.14	-58.58	10	10	100%	90%	Pass
				6985	6985	-57.20	-58.58	10	9	90%	90%	Pass
				7060	7060	-63.70	-58.58	10	10	100%	90%	Pass

Please refer to page 224~232 of “BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for the AWGN signal plots.

” for the AWGN signal plots.

Test Mode	UNII-5, UNII-6, UNII-7, UNII-8
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**Incumbent Signal (AWGN)
Frequency: 6135 MHz**



2.3 Report lowest AWGN signal detectable by EUT

Please refer to page 233 of “BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for lowest AWGN signal detectable by EUT.

Detection power level and detection probability

Bands	Test Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Interference Frequency (MHz)	Detection power level (dBm)	Detection Power Limit (dBm)	Number of Times	Number of Detected	Detection Probability	Detection Probability Limit	Test Result
UNII-5	802.11ax	20	37	6135	6175	-67.45	-56.73	10	10	100%	90%	Pass
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	802.11ax	160	207	6985	6985	-57.20	-56.58	10	9	90%	90%	Pass
					7060	-63.70	-56.58	10	10	100%	90%	Pass

2.4 Verify that the testing was performed with the AWGN signal set to lowest level (for example, - 100 dBm) and increased until the EUT detects and stops transmitting.

The test was performed with a lowest AWGN signal level and increased until the EUT detects and stop transmission, and the AWGN level of AWGN signal detected (Stop but with Beacon signal) and AWGN level of the stopped transmission are recorded in the report.

Please refer to page 233 of “BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” of RF report for the information.

The lowest AWGN signal detectable

Bands	Test Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Interference Frequency (MHz)	Detection power level (dBm)	EUT Status
UNII-5	802.11ax	20	37	6135	6175	-67.45	Stop Transmission
						-68.45	Stop But With Beacon Signal
	802.11ax	160	15	6025	5950	-55.01	Stop Transmission
						-66.01	Stop But With Beacon Signal
						-56.80	Stop Transmission
						-67.80	Stop But With Beacon Signal
						-61.23	Stop Transmission
						-62.23	Stop But With Beacon Signal
UNII-6	802.11ax	20	101	6455	6455	-59.29	Stop Transmission
						-60.29	Stop But With Beacon Signal
	802.11ax	160	111	6505	6430	-68.35	Stop Transmission
						-69.35	Stop But With Beacon Signal
						-57.64	Stop Transmission
						-58.64	Stop But With Beacon Signal
						-65.98	Stop Transmission
						-65.98	Stop Transmission

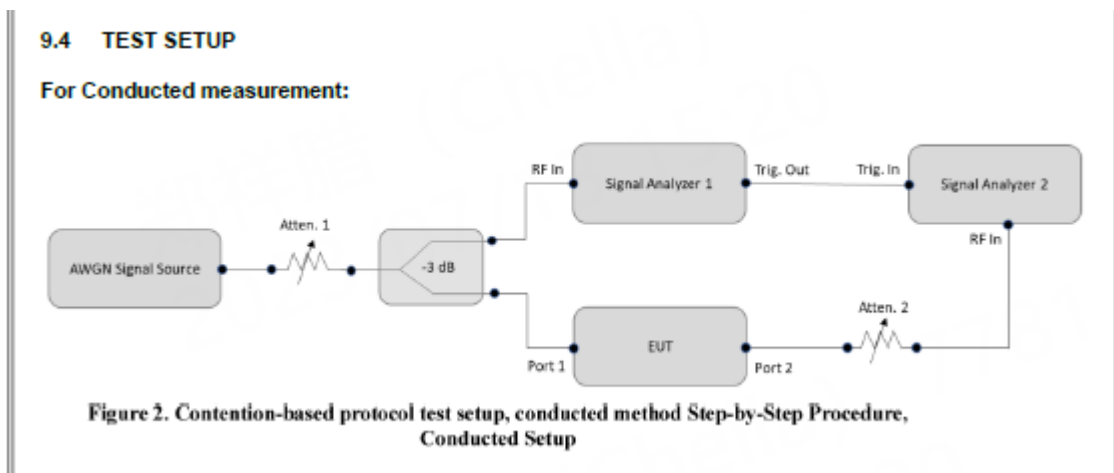
2.5 If conducted measurements are used, the detection threshold needs to be corrected to refer to a 0 dBi gain antenna and include all the applicable losses (cables, etc.). For instance, the report should show (at least): Detection Level = Injected AWGN Power (dBm) – Antenna Gain (dBi) + Path Loss (dB).

Conducted test is performed for this device.

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report.
- (2) The report format version is TP.1.1.1.
- (3) The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.
- (4) Declaration by manufacturer
- (5) Contention-Based Protocol Uses conducted method for testing.**

Please refer to page 33 of “BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for the test setup diagram as below.

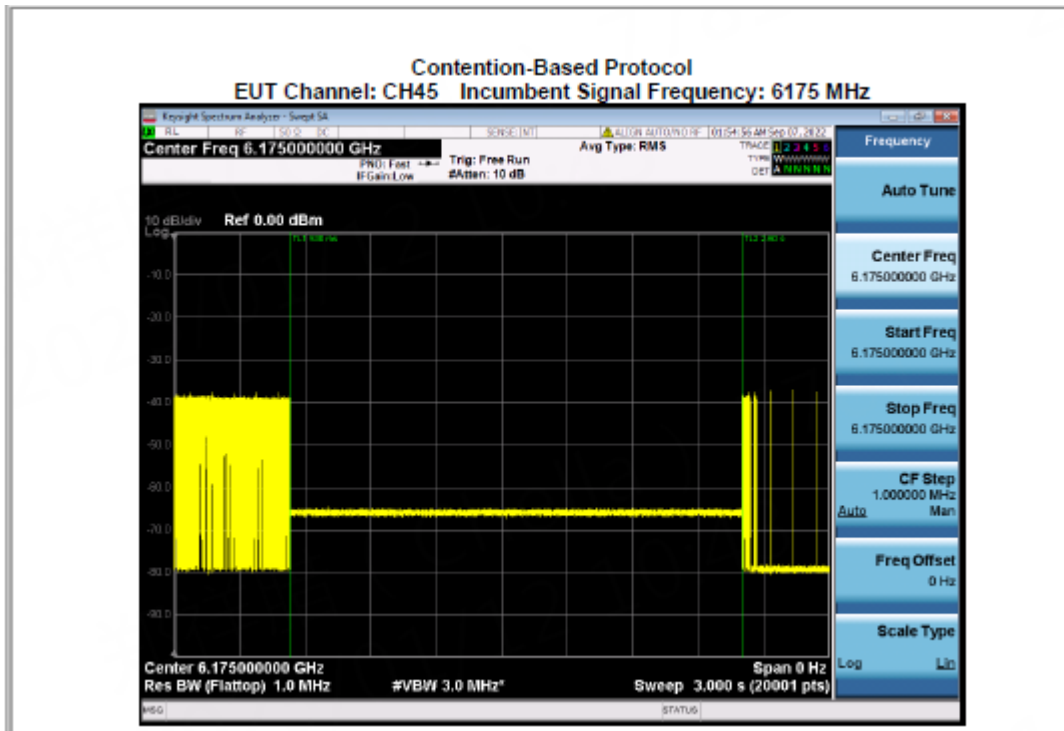


Please refer to page 31 of “BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for the relevant description.

to channel radio frequency energy (energy detect) and avoid simultaneous transmission.

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel (in which incumbent signal is transmitted) and stay off the incumbent channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm)¹. The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain.

2.6 Include plots showing EUT has stopped transmitting after detection of AWGN signal.
Please refer to page 234~241 of “BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for the test result.



2.7 Describe whether channel puncturing and/or bandwidth reduction mechanisms supported. The report needs to include a plot as an example for at least one of the AWGN signals used.

Not Support.

2.8 If radiated testing is used, show that spot-checks were done to identify which side of the EUT has the lowest sensitivity to the incumbent signal detection, and that side was indeed chosen for the test.

Conducted test is performed for this device.

3. Client Device Limitations

This device is not a client device.

4. Emission Mask

4.1 Power spectral density suppression complies with 47 CFR § 15.407(b)(6).

Please refer to APPENDIX F of “BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for the test result of Emission Mask.

4.2 If EUT supports OFDMA discuss testing of partial Resource Unit (RU) configurations. In any case the shape of the mask shall be based on full RU.

This device supports one configuration only in 802.11ax full RU mode.

This information is noted on page 13 of “BTL-FCCP-4-2303C106

R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8”

NOTE:

(1) For radiated emission band edge test, both Vertical and Horizontal are evaluated, but only the worst case (Vertical) is recorded.

(2) All X, Y and Z axes are evaluated, but only the worst case (X axis) is recorded.

(3) For IEEE 802.11ax modes, refer to TCB Workshop presentations on October 3, 2018, after evaluated, a testing are performed under fully loaded conditions (Full RU). In the test data, only the partially loaded conditions data are marked with tones.

4.3 OOBE limits only apply outside of the 5.925-7.125 GHz band. All in-band emissions need to meet the channel mask. In case a higher RBW for the in-Band Emissions Mask is used (i.e., a more conservative case) that should be noted.

Please refer to APPENDIX F of “BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for the test result of in-Band Emissions Mask.

5. Filing

99% of the occupied bandwidth must be contained within all the U-NII sub bands authorized for that equipment class.

Please refer to APPENDIX B of “BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8” for the test result of 99% of the occupied bandwidth.

6. Hearing Aid Compatibility (HAC)

Not Applicable.

7. Labelling

7.1 Label showing indoor only for Subordinate and APs.

Please refer to the document "Label and Label Location". The label showing "Indoor User only".)

7.2 E-labelling may be acceptable if proper justification is provided

Not Applicable.

8. Modular Certifications (when applicable)

Not Applicable.

9. RF Exposure

9.1 Demonstrate applicable classification (portable/mobile/fixed) in reference to worst-case scenario use cases

The RF Exposure report is “BTL-FCCP-5-2303C106 R00_MPE”. Page 9 of the report states that this device is a fixed device and the calculated distance is 20 cm.

9.2 Address $f > 6$ GHz RF exposure via most recent applicable KDB or TCB Workshop procedures.

“BTL-FCCP-5-2303C106 R00_MPE” was used the most recent KDB to count the RF exposure via.

9.3 Address all applicable simultaneous transmission conditions using the compliance condition $TER \leq 1$.

The RF Exposure report is “BTL-FCCP-5-2303C106 R00_MPE”. Page 8 of the report states that the device compliance simultaneous transmission conditions.

10. Security

Provide specific exhibit with device security description is required (complying with 47 CFR § 15.407(i))

11. Spurious Emissions

Show that measurements are made at the prescribed antenna heights, per KDB Publication 987594 D01, including measurements along all three axes, as per ANSI C63.10.

Spurious Emissions test items refer to page 23-26 of "BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8".

Spurious Emissions test result refer to APPENDIX D & E of the "BTL-FCCP-4-2303C106 R00_WI-FI 6E U-NII 5, U-NII 6, U-NII 7, U-NII 8".

All the test is performed according the KDB 987594 and ANSI C63.10 requirements.

For spurious emission test, every axis (X, Y, Z) was also verified. The test results shown in the report represent the worst-case emissions.