

**FCC/IC - TEST REPORT**Report Number : **709502306120-00B** Date of Issue: March 12, 2024Model : **AccuFab-CEL**

Product Type : 3D Printer

FCC ID : 2AMG4-CEL

IC : 24652-CEL

Applicant : SHINING 3D Tech Co., Ltd.

Address : No.1398, Xiangbin Road, Wenyan, Xiaoshan, Hangzhou,
Zhejiang, China

Manufacturer : SHINING 3D Tech Co., Ltd.

Address : No.1398, Xiangbin Road, Wenyan, Xiaoshan, Hangzhou,
Zhejiang, ChinaTest Result : ☒ **Positive** ☐ **Negative**Total pages including
Appendices : **317**

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch No.16 Lane, 1951 Du Hui Road, Shanghai 201108, P.R. China
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FCC Registration No.:	820234
FCC Designation Number:	CN1183
ISED CAB identifier	CN0101
IC Registration No.:	31668

3 Description of the Equipment under Test

Product: 3D Printer

Model no.: AccuFab-CEL

Hardware Version Identification No. (HVIN) AccuFab-CEL

Product Marketing Name (PMN) AccuFab-CEL

FCC ID: 2AMG4-CEL

IC: 24652-CEL

Options and accessories: NA

Rating: AC 110-240V, 50/60Hz

RF Transmission Frequency: For NFC: 13.56 MHz
For 2.4G Wi-Fi:
For 802.11b/g/n-HT20: 2412~2462 MHz

For 5G Wi-Fi:

Band (GHz)	Operating Channel Number	Channel center frequencies for 20MHz bandwidth (MHz)
5.15GHz~5.25GHz	36	5180
	40	5200
	44	5220
	48	5240
5.25GHz~5.35GHz	52	5260
	56	5280
	60	5300
	64	5320
5.5GHz~5.7GHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	132	5660

5.725GHz~5.825GHz	136	5680
	140	5700
	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

Band (GHz)	Operating Channel Number	Channel center frequencies for 40MHz bandwidth (MHz)
5.15GHz~5.25GHz	38	5190
	46	5230
5.25GHz~5.35GHz	54	5270
	62	5310
5.5GHz~5.7GHz	102	5510
	110	5550
	118	5590
	134	5670
5.725GHz~5.825GHz	151	5755
	159	5795

Band (GHz)	Operating Channel Number	Channel center frequencies for 80MHz bandwidth (MHz)
5.15GHz~5.25GHz	42	5210
5.25GHz~5.35GHz	58	5290
5.5GHz~5.7GHz	106	5530
5.725GHz~5.825GHz	155	5775

The device shall not be capable of transmitting in the 5600-5650 MHz band.

No. of Operated Channel:

For NFC: 13.56 MHz

For 2.4G Wi-Fi:

11 for 802.11b/802.11g/802.11n(H20)

For 5G Wi-Fi:

5180~5240 MHz (U-NII-1)

5260~5320 MHz (U-NII-2A)

5500~5700 MHz (U-NII-2C)

5745~5825 MHz (U-NII-3)



Modulation:	For NFC: ASK For 2.4G Wi-Fi: SISO: Direct Sequence Spread Spectrum (DSSS) for 802.11b Orthogonal Frequency Division Multiplexing (OFDM) for 802.11g MIMO: Orthogonal Frequency Division Multiplexing (OFDM) for 802.11n For 5G Wi-Fi: MIMO: Orthogonal Frequency Division Multiplexing (OFDM) for 802.11a/n/ac
Hardware Version:	A040
Software Version:	3.5.30
Data speed:	2.4G Wi-Fi: SISO: 11b 1-11Mbps 11g 6-54Mbps MIMO: 11n HT20 6.5 ~ 144.4Mbps 5G Wi-Fi: MIMO: 11a 6 ~ 54Mbps, 11n HT20 13 ~ 144.4Mbps, 11n HT 40 27 ~ 300Mbps, 11ac VHT20 13 ~ 173.3Mbps, 11ac VHT40 27 ~ 400Mbps, 11ac VHT80 58.5 ~ 866.7Mbps
Antenna Type:	For NFC: PCB loop For 2.4GHz & 5GHz: FPC
Antenna Gain:	For NFC: 2dBi Antenna1: 5.39 dBi for 2.4GWi-Fi, Antenna2: 3.23 dBi for 2.4GWi-Fi Antenna1: 4.3 dBi for 5GWi-Fi, Antenna2: 5.72 dBi for 5GWi-Fi
Directional gain:	For 2.4GHz Wi-Fi output power & power spectral density: 7.39 dBi Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi $G1 = 5.39$ dBi, $G2 = 3.23$ dBi, $N_{ANT} = 2$ So Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi = $10 \log[(10^{5.39/20} + 10^{3.23/20})^2 / 2]$ dBi = 7.39 dBi For 5GHz Wi-Fi output power & power spectral density: 8.05 dBi Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi $G1 = 4.3$ dBi, $G2 = 5.72$ dBi, $N_{ANT} = 2$ So Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi = $10 \log[(10^{4.3/20} + 10^{5.72/20})^2 / 2]$ dBi = 8.05 dBi



The Equipment supports MIMO and does not support beamforming and CDD modulation, and all antennas have the different gain,
According to KDB662911 D01 chapter F d) (i) :
Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi
[Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.],

Description of the EUT: The Equipment Under Test (EUT) is a 3D Printer with NFC and Wi-Fi Module. The EUT support NFC operated at 13.56MHz and Wi-Fi operated at 2.4GHz and 5GHz.

Test sample no.: SHA-748811-1 (Radiated sample)
SHA-748811-2 (Conducted sample)

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment, antenna gain or any information supplied.

The device shall not be capable of transmitting in the 5600-5650 MHz band.



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart E, 2021 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart E - Unlicensed National Information Infrastructure Devices
RSS-Gen Issue 5 Amendment 2 February 2021	General Requirements for Compliance of Radio Apparatus
RSS-247 Issue 3 August 2023	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

Test Method:

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02

KDB 905462 D03 Client Without DFS New Rules v01r02

ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices



5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart E & RSS-247 Issue 3/RSS-Gen Issue 5						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207 & RSS-GEN 8.8	Conducted emission AC power port	16-18	Site 1	☒	☐	☐
§15.407(a)(2), (e) & RSS-247 6.2.1.2, RSS-247 6.2.2.1, RSS-247 6.2.3.1, RSS-247 6.2.4.2, RSS-Gen 6.7	Emission bandwidth	19-20	Site 1	☒	☐	☐
15.407(a)(1)(2)(3) & RSS-247 6.2	Maximum Conducted Output Power and EIRP	21-22	Site 1	☒	☐	☐
15.407(a)(1)(2)(3) & RSS-247 6.2	Maximum Power Spectral Density	23-24	Site 1	☒	☐	☐
§15.407(g) & RSS-GEN 6.11	Frequencies Stability	25	Site 1	☒	☐	☐
§15.407(b)(1), 15.407(b)(2), 15.407(b)(3), 15.407(b)(4), 15.407(b)(8), 15.407(b)(9), 15.209 & RSS-247 6.2 RSS-GEN 8.9	Unwanted Emissions	26-59	Site 1	☒	☐	☐
§15.203 & RSS-Gen 6.8	Antenna requirement	See note 1		☒	☐	☐

Remark 1: The EUT only operation at 2.4G Wi-Fi and 5G Wi-Fi UNII Band (5180MHz-5240MHz, 5260~5320 MHz, 5500~5700 MHz, 5745MHz-5825MHz). The EUT operate as Clients Device without Radar Detection.

Note 1: The EUT uses a PCB loop antenna and two FPC antenna, which PCB gain is 2dBi and FPC gain is Antenna1: 5.39 dBi for 2.4GWi-Fi, Antenna2: 3.23 dBi for 2.4GWi-Fi, Antenna1: 4.3 dBi for 5GWi-Fi, Antenna2: 5.72 dBi for 5GWi-Fi. In accordance to §15.203 and RSS-Gen 6.8, It is considered sufficiently to comply with the provisions of this section.

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(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.



6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AMG4-CEL, IC: 24652-CEL complies with Section 15.207, 15.209, 15.407 of the FCC Part 15, Subpart E Rules and RSS-247, RSS-GEN.

This report is only for 5GHz Wi-Fi, for the 2.4GHz Wi-Fi test report please refer to 709502306120-00A, for 5GHz Wi-Fi DFS test report please refer to 709502306120-00C, for the 13.56MHz NFC test report please refer to 709502306120-00D. The TX and RX range is 5180MHz-5240MHz, 5260MHz-5320MHz, 5500MHz-5700MHz, 5745MHz-5825MHz.

We tested it and listed the worst data in this report.

SUMMARY:

All tests according to the regulations cited on page 6 were

■ - Performed

□ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: January 2, 2024

Testing Start Date: January 2, 2024

Testing End Date: March 8, 2024

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch

Reviewed by:

Prepared by:

Tested by:

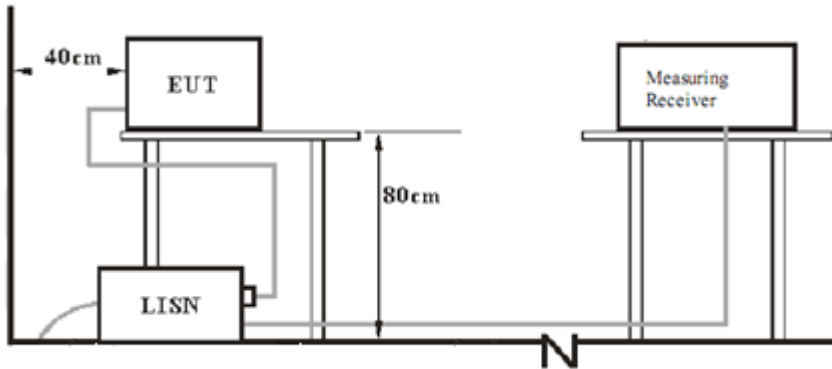
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Project Engineer

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Test Engineer

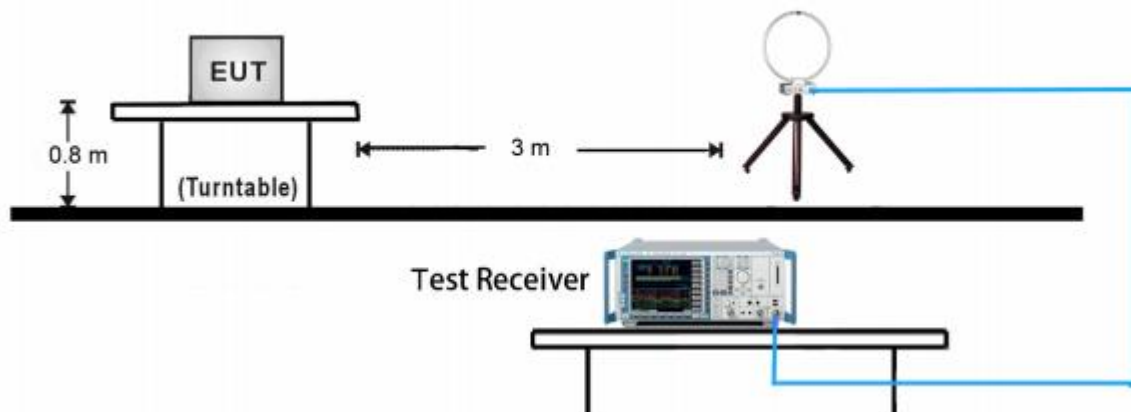
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

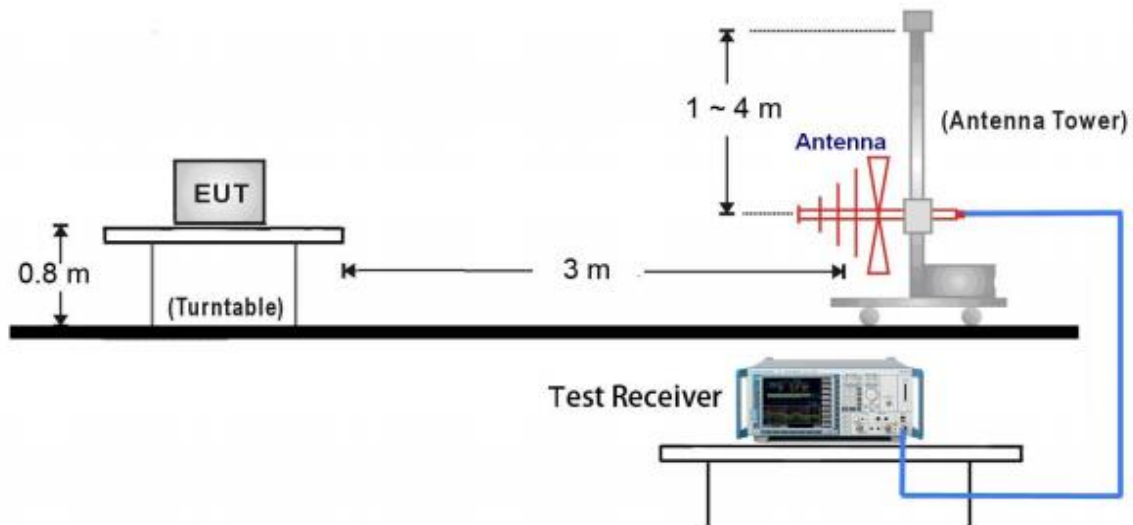


7.2 Radiated test setups

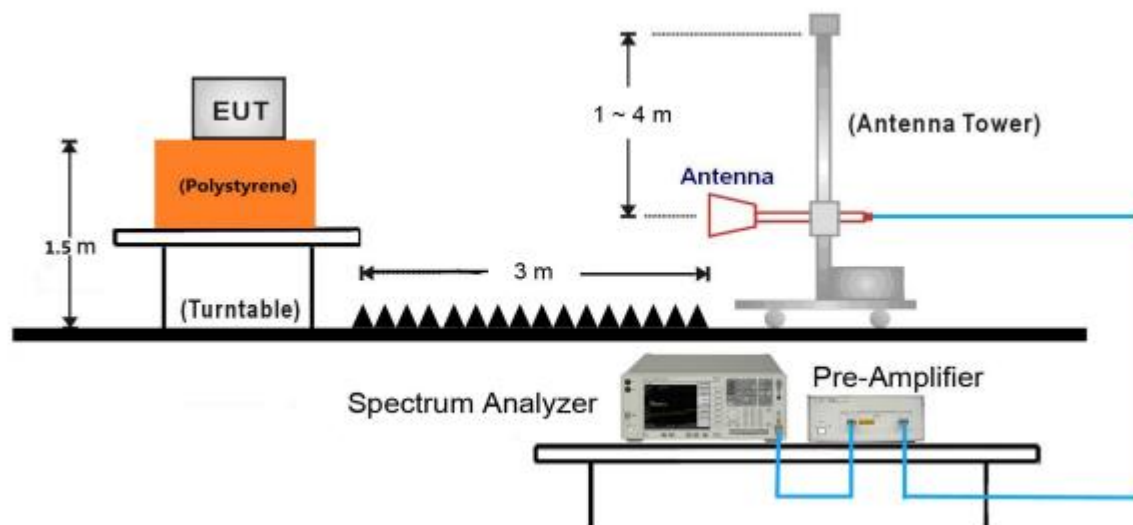
9kHz ~ 30MHz Test Setup:



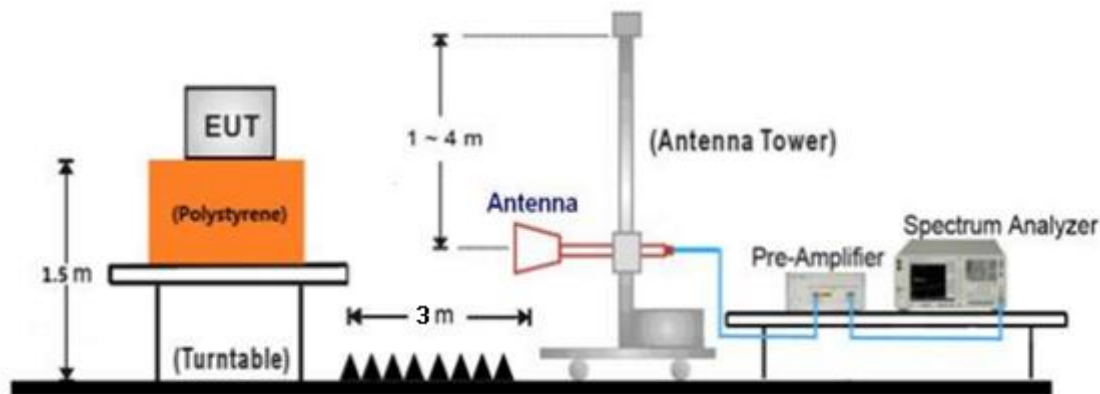
30MHz ~ 1GHz Test Setup:



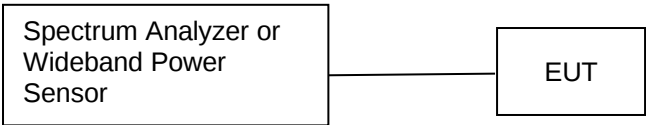
1GHz ~ 18GHz Test Setup:



18GHz ~ 40GHz Test Setup:



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenove	E470	PF-OU5TS7 17/09

Test software: SecureCRT.exe, which used to control the EUT in continues transmitting mode.

The system was configured to channel:

Test Mode	Channel (MHz)		
802.11a, 802.11n HT20 802.11ac VHT20	5G WIFI-Band 1		
	CH36 (5180MHz)	CH40 (5200MHz)	CH48 (5240MHz)
	5G WIFI-Band 2		
	CH52 (5260MHz)	CH56 (5280MHz)	CH64 (5320MHz)
	5G WIFI-Band 3		
	CH100 (5500MHz)	CH108 (5540MHz)	CH116 (5580MHz)
	CH132 (5660MHz)	CH136 (5680MHz)	CH140 (5700MHz)
	5G WIFI-Band 4		
	CH149 (5745MHz),	CH157 (5785MHz)	CH165 (5825MHz)

Test Mode	Channel (MHz)		
802.11n HT40 802.11ac VHT40	5G WIFI-Band 1		
	CH38 (5190MHz)	CH46 (5230MHz)	
	5G WIFI-Band 2		
	CH54 (5270MHz)	CH62 (5310MHz)	
	5G WIFI-Band 3		
	CH102 (5510MHz)	CH110 (5550MHz)	CH118 (5590MHz)
	CH134 (5670MHz)		
	5G WIFI-Band 4		
	CH151 (5755MHz)	CH159 (5795MHz)	

Test Mode	Channel (MHz)		
802.11ac VHT80	5G WIFI-Band 1		
	CH42 (5210MHz)		
	5G WIFI-Band 2		
	CH58 (5290MHz)		
	5G WIFI-Band 3		
	CH106 (5530MHz)		
	5G WIFI-Band 4		



	CH155 (5775MHz)
--	-----------------

The pre-test has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

	Modulation Type	Data Rate	Index Value (Power level setting)
MIMO	802.11a OFDM	6Mbps	11
	802.11n (HT20): OFDM	MCS0 (13Mbps)	11
	802.11n (HT40): OFDM	MCS0 (27Mbps)	8
	802.11ac (VHT20): OFDM	11ac 13Mbps	11
	802.11ac (VHT40): OFDM	11ac 27Mbps	8
	802.11ac (VHT80): OFDM	11ac 58.5Mbps	7

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. An EMI test receiver is used to test the emissions from both sides of AC line

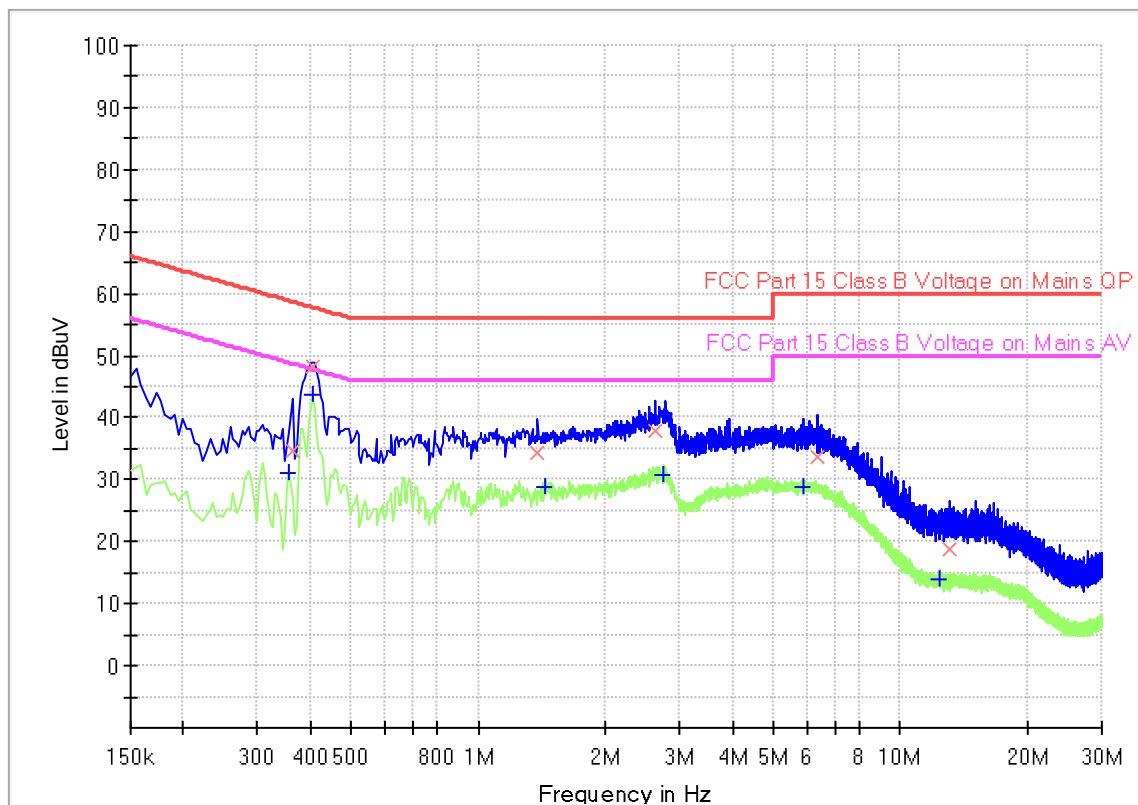
Limit

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

Conducted Emission

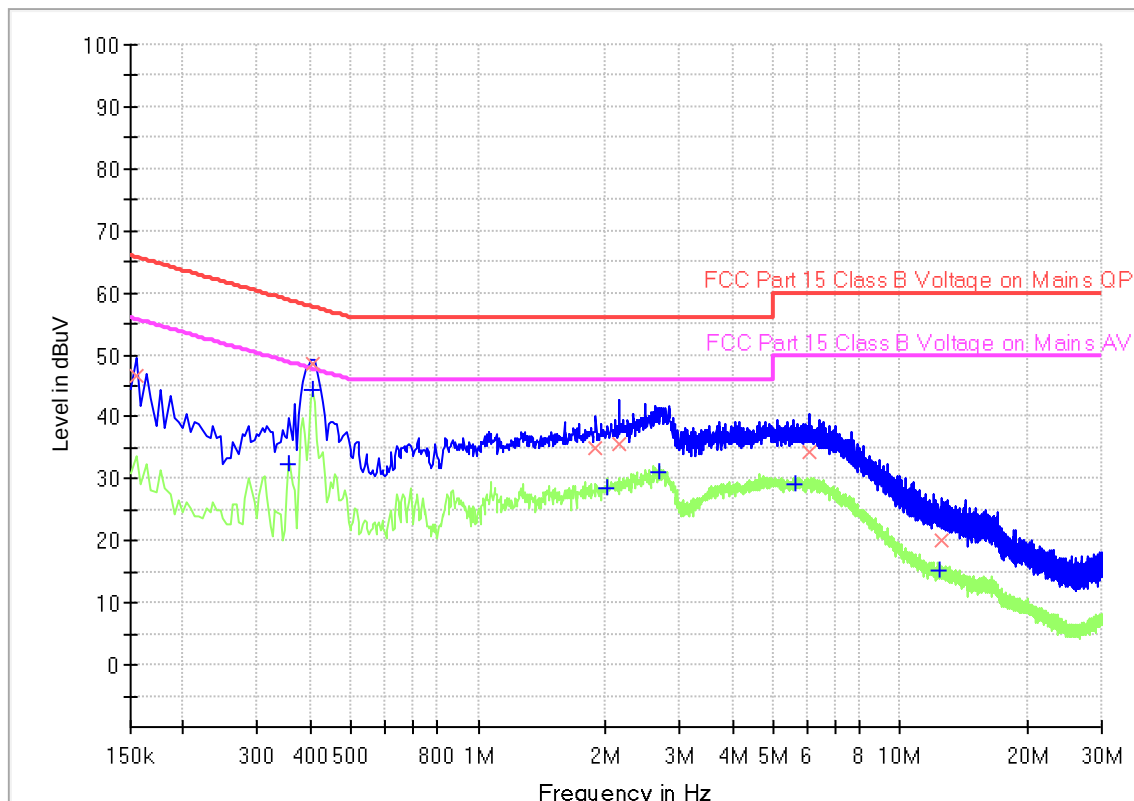
Product Type : 3D Printer
 M/N : AccuFab-CEL
 Operating Condition : Mode 1: Tx_802.11a, 5500MHz MIMO
 Test Specification : L-Line
 Comment : AC 120V/60Hz



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.357000	---	30.93	48.80	17.87	1000.0	9.000	L1	19.6
0.361500	34.68	---	58.69	24.01	1000.0	9.000	L1	19.6
0.406500	---	43.75	47.72	3.97	1000.0	9.000	L1	19.6
0.406500	48.15	---	57.72	9.57	1000.0	9.000	L1	19.6
1.383000	34.37	---	56.00	21.63	1000.0	9.000	L1	19.6
1.446000	---	28.68	46.00	17.32	1000.0	9.000	L1	19.6
2.616000	37.87	---	56.00	18.13	1000.0	9.000	L1	19.6
2.755500	---	30.71	46.00	15.29	1000.0	9.000	L1	19.6
5.869500	---	28.97	50.00	21.03	1000.0	9.000	L1	19.6
6.387000	33.66	---	60.00	26.34	1000.0	9.000	L1	19.6
12.417000	---	13.92	50.00	36.08	1000.0	9.000	L1	19.8
13.083000	18.93	---	60.00	41.07	1000.0	9.000	L1	19.8

Product Type : 3D Printer
 M/N : AccuFab-CEL
 Operating Condition : Mode 1: Tx_802.11a, 5500MHz MIMO
 Test Specification : N-Line
 Comment : AC 120V/60Hz



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.154500	46.57	---	65.75	19.18	1000.0	9.000	N	19.6
0.357000	---	32.39	48.80	16.41	1000.0	9.000	N	19.6
0.406500	---	44.21	47.72	3.51	1000.0	9.000	N	19.6
0.406500	48.48	---	57.72	9.24	1000.0	9.000	N	19.6
1.900500	35.10	---	56.00	20.90	1000.0	9.000	N	19.6
2.026500	---	28.50	46.00	17.50	1000.0	9.000	N	19.6
2.152500	35.47	---	56.00	20.53	1000.0	9.000	N	19.6
2.683500	---	30.93	46.00	15.07	1000.0	9.000	N	19.6
5.653500	---	29.23	50.00	20.77	1000.0	9.000	N	19.7
6.099000	34.45	---	60.00	25.55	1000.0	9.000	N	19.7
12.430500	---	15.12	50.00	34.88	1000.0	9.000	N	19.9
12.480000	20.07	---	60.00	39.93	1000.0	9.000	N	19.9

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
 Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

9.2 Emission bandwidth

1、 Test Method of 26dB Bandwidth

According to KDB789033 D02

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Limit: No limit

2、 Test Method of 6dB Bandwidth

According to KDB789033 D02

- a) Set RBW = 100KHz
- b) Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Limit: $\geq 500\text{KHz}$

3、 Test Method of 99% Bandwidth

According to KDB789033 D02

- a) Set center frequency to the nominal EUT channel center frequency
- b) Set span = 1.5 times to 5.0 times the OBW.
- c) Set RBW = 1 % to 5 % of the OBW
- d) Set VBW $\geq 3 \cdot \text{RBW}$
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99 % power bandwidth function of the instrument (if available).
- g) If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

Limit: No limit



26dB Bandwidth Test Result:

Test data should be referred to Appendix A for 709502306120-00B.

6dB Bandwidth Test Result:

Test data should be referred to Appendix A for 709502306120-00B.

99% Bandwidth Test Result

Test data should be referred to Appendix A for 709502306120-00B.

9.3 Maximum conducted output power and EIRP

Test Method

According to C63.10, the EUT was placed on 0.8m height table, the RF output of EUT was connected to the Spectrum Analyzer by RF cable. The path loss was compensated to the results for each measurement.

1. Measure the duty cycle
2. Use the following spectrum analyzer settings:
RBW=1MHz, VBW≥3MHz, Span≥ the 99% Bandwidth of the emission being measured
Sweep = auto, Detector function = power averaging.
3. Trace average at least 100 traces in power averaging (rms) mode
4. 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

15.407 Limits:

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.

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 $11 \text{ dBm} + 10 \log B$, where B is the 26dB emission bandwidth in megahertz.

For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

RSS 247 Limits:

For client devices in the 5.15-5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz.

For the 5.25-5.35 GHz bands, shall comply with the following:

- a) The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less;
- b) The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

For the 5.47-5.6 and 5.65-5.725 GHz bands, The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less.

The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.



For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

Maximum conducted output power Test Result:

Test data should be referred to Appendix A for 709502306120-00B.

9.4 Maximum power spectral density

Test Method

According to C63.10, the EUT was placed on 0.8m height table, the RF output of EUT was connected to the test power meter by RF cable. The path loss was compensated to the results for each measurement.

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power...." (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
 2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
 3. Make the following adjustments to the peak value of the spectrum, if applicable:
 - a) If Method SA-2 or SA-2 Alternative was used, add $10 \log (1/x)$, where x is the duty cycle, to the peak of the spectrum.
 - b) If Method SA-3 Alternative was used and the linear mode was used in II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
 4. The result is the Maximum PSD over 1 MHz reference bandwidth.
 5. For devices operating in the bands 5.15–5.25 GHz, 5.25–5.35 GHz, and 5.47–5.725 GHz, the preceding procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5) & RSS-247 6.2. For devices operating in the band 5.725–5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
 - a) Set $RBW \geq 1/T$, where T is defined in II.B.I.a).
 - b) Set $VBW \geq 3$ RBW.
 - c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log (500 \text{ kHz}/RBW)$ to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
 - d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10 \log (1\text{MHz}/RBW)$ to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
 - e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.
- Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since RBW=100 kHz is available on nearly all spectrum analyzers.



Limit: The maximum power spectral density shall not exceed 11dBm for the 5.15-5.25GHz, 5.25-5.35GHz, 5.47-5.725 GHz Band in any 1 megahertz band.
For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30dBm in any 1 500kHz band.

Test Result:

Test data should be referred to Appendix A for 709502306120-00B.



9.5 Frequencies Stability

Test Method

1. Connect the UUT to the spectrum analyzer
2. Set Centre Frequency of the channel under test.
3. Set Detector PEAK
4. Set RBW: 10KHz, VBW: 3RBW
5. Set Span: Encompass the entire emissions bandwidth (EBW) of the signal.
6. Allow the trace to stabilize, find the peak value of the power envelope and record the frequency, then calculated the frequency drift.

The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.

User manual temperature is 20 to 35 °C.

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 user's manual.

Limit: 20ppm

Test Results (All conditions and all modes were performed, only list Worst-Case in the report)
Remark: NV is normal Voltage: 120V~, HV is High Voltage: 138V~, LV is Low Voltage: 102V~, NT is normal Temperature: +25 °C.

Test Result:

Test data should be referred to Appendix A for 709502306120-00B.

9.6 Unwanted emissions

Transmitting spurious emission test result as below:

Test Method

Radiated Mode:

1. The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned
5. Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW $\geq$ RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, VBW $\geq$ RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

Limit

(1) 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.



(2) 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.

(3) 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.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(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 15.6 dBm/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.

According to part 15.407(b) & RSS-247 6.2, the radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205 and RSS-GEN 8.10, must comply with the radiated emission limits specified in section 15.209 & RSS-GEN 8.9.

Frequency MHz	Field Strength uV/m	Field Strength dBμV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

The only worse case listed in the report.

Transmitting spurious emission worse case test result:

Transmitting spurious emission test result as below:



802.11a Modulation 5180MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5131.4	Horizontal	51.17	PK	74	22.83	Pass
1000-7000	#5150	Horizontal	51.61	PK	74	22.39	Pass
1000-7000	#5150	Vertical	55.37	PK	74	18.63	Pass
1000-7000	#5150	Vertical	46.5	AV	54	7.5	Pass
7000-40000	*10375.5	Horizontal	51.98	PK	74	22.02	Pass
7000-40000	*10365.87	Vertical	51.77	PK	74	22.23	Pass

802.11a Modulation 5200MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10402.7	Horizontal	51.12	PK	74	22.88	Pass
7000-40000	*10401.57	Vertical	51.75	PK	74	22.25	Pass

802.11a Modulation 5240MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10482.6	Horizontal	51.93	PK	74	22.07	Pass
7000-40000	*10481.47	Vertical	51.25	PK	74	22.75	Pass

802.11a Modulation 5260MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10518.87	Horizontal	52.26	PK	74	21.74	Pass
7000-40000	*10520	Vertical	51.77	PK	74	22.23	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB μ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11a Modulation 5280MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10560	Horizontal	50.89	PK	74	23.11	Pass
7000-40000	*10560.07	Vertical	50.68	PK	74	23.32	Pass

802.11a Modulation 5320MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5350	Horizontal	46.91	PK	74	27.09	Pass
1000-7000	#5350	Vertical	48.94	PK	74	25.06	Pass
7000-40000	10639.57	Horizontal	51.05	PK	74	22.95	Pass
7000-40000	10649.77	Vertical	50.47	PK	74	23.53	Pass

802.11a Modulation 5500MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5460	Horizontal	50.31	PK	74	23.69	Pass
1000-7000	*#5470	Horizontal	49.81	PK	74	24.19	Pass
1000-7000	#5460	Vertical	51.23	PK	74	22.77	Pass
1000-7000	*#5470	Vertical	53.28	AV	74	20.72	Pass
7000-40000	10999.4	Horizontal	51.95	PK	74	22.05	Pass
7000-40000	11030	Vertical	52.5	PK	74	21.5	Pass

802.11a Modulation 5540MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11080.36	Horizontal	50.1	PK	74	23.9	Pass

Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBuV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) "#" is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

802.11a Modulation 5580MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11160.93	Horizontal	50.87	PK	74	23.13	Pass
7000-40000	11160.32	Vertical	50.65	PK	74	23.35	Pass

802.11a Modulation 5660MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11321.87	Horizontal	50.02	PK	74	23.98	Pass
7000-40000	11321.56	Vertical	50.11	PK	74	23.89	Pass

802.11a Modulation 5680MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11360.87	Horizontal	51.23	PK	74	22.77	Pass
7000-40000	11361.65	Vertical	49.74	PK	74	24.26	Pass

Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBuV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) "#" is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11a Modulation 5700MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5725	Horizontal	47.62	PK	74	26.38	Pass
1000-7000	*#5725	Vertical	53.69	PK	74	20.31	Pass
1000-7000	*#5725	Vertical	44	AV	54	10	Pass
7000-40000	11394.37	Horizontal	51.98	PK	74	22.02	Pass
7000-40000	11398.9	Vertical	51.61	PK	74	22.39	Pass

802.11a Modulation 5745MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*5645.72	Horizontal	51.42	PK	74	22.58	Pass
1000-7000	*5650	Horizontal	50.11	PK	74	23.89	Pass
1000-7000	*#5723.19	Horizontal	59.63	PK	118.1	58.47	Pass
1000-7000	*5642.47	Vertical	52.75	PK	74	21.25	Pass
1000-7000	*5650	Vertical	51.23	PK	74	22.77	Pass
1000-7000	*#5723.9	Vertical	65.99	PK	119.7	53.71	Pass
7000-40000	11490.7	Horizontal	50.52	PK	74	23.48	Pass
7000-40000	11490.13	Vertical	51.37	PK	74	22.63	Pass

802.11a Modulation 5785MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11570.33	Horizontal	49.67	PK	74	24.33	Pass
7000-40000	11570.33	Vertical	50.14	PK	74	23.86	Pass

802.11a Modulation 5825MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5850.63	Horizontal	59.06	PK	121.3	62.24	Pass
1000-7000	*5925	Horizontal	50.31	PK	74	23.69	Pass
1000-7000	*5948.32	Horizontal	51.82	PK	74	22.18	Pass
1000-7000	*#5850.39	Vertical	59.1	PK	121.3	62.2	Pass
1000-7000	*5965	Vertical	49.23	PK	74	24.77	Pass
1000-7000	*5943.37	Vertical	51.63	PK	74	22.37	Pass
7000-40000	11649.93	Horizontal	52.21	PK	74	21.79	Pass
7000-40000	11648.8	Vertical	49.95	PK	74	24.05	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB μ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11n 20 Modulation 5180MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5149.32	Horizontal	50.2	PK	74	23.8	Pass
1000-7000	#5148.76	Vertical	53.06	PK	74	20.94	Pass
7000-40000	*10361.9	Horizontal	51.16	PK	68.2	17.04	Pass
7000-40000	*10361.9	Vertical	50.58	PK	68.2	17.62	Pass

802.11n 20 Modulation 5200MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10401.57	Horizontal	50.94	PK	68.2	17.26	Pass
7000-40000	*10403.83	Vertical	51.01	PK	68.2	17.19	Pass

802.11n 20 Modulation 5240MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10483.73	Horizontal	51.78	PK	68.2	16.42	Pass
7000-40000	*10478.8	Vertical	51.73	PK	68.2	16.47	Pass

802.11n 20 Modulation 5260MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10521.7	Horizontal	50.71	PK	68.2	17.49	Pass
7000-40000	*10527.93	Vertical	51.51	PK	68.2	16.69	Pass

Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBuV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) "#" is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

802.11n 20 Modulation 5300MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	10600.47	Horizontal	51.14	PK	74	22.86	Pass
7000-40000	10600.47	Vertical	52.01	PK	74	21.99	Pass

802.11n 20 Modulation 5320MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5350.96	Horizontal	48.12	PK	74	25.88	Pass
1000-7000	#5350.09	Vertical	47.55	PK	74	26.45	Pass
7000-40000	10637.87	Horizontal	50.52	PK	74	23.48	Pass
7000-40000	10637.87	Vertical	51.42	PK	74	22.58	Pass

802.11n 20 Modulation 5500MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5468.49	Horizontal	50.35	PK	74	23.65	Pass
1000-7000	*#5467.79	Vertical	53.96	PK	74	20.04	Pass
7000-40000	*#5467.79	Vertical	43.6	AV	54	10.4	Pass
7000-40000	10999.4	Horizontal	51.02	PK	74	22.98	Pass
7000-40000	10998.27	Vertical	51.04	PK	74	22.96	Pass

802.11n 20 Modulation 5540MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11080.51	Horizontal	50.36	PK	74	23.64	Pass
7000-40000	11080.38	Vertical	49.23	PK	74	24.77	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

802.11n 20 Modulation 5580MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11160.97	Horizontal	50.32	PK	74	23.68	Pass
7000-40000	11160.54	Vertical	49.83	PK	74	24.17	Pass

802.11n 20 Modulation 5660MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11320.34	Horizontal	50.52	PK	74	23.48	Pass
7000-40000	11320.38	Vertical	49.37	PK	74	24.63	Pass

802.11n 20 Modulation 5680MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11360.27	Horizontal	50.89	PK	74	23.11	Pass
7000-40000	11361.61	Vertical	50.26	PK	74	23.74	Pass

Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11n 20 Modulation 5700MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5725.33	Horizontal	47.41	PK	74	26.59	Pass
1000-7000	*#5728.78	Vertical	55.3	PK	74	18.7	Pass
1000-7000	*#5728.78	Vertical	43.5	AV	54	10.5	Pass
7000-40000	11406.83	Horizontal	51.56	PK	74	22.44	Pass
7000-40000	11401.17	Vertical	51.6	PK	74	22.4	Pass

802.11n 20 Modulation 5745MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*5642.99	Horizontal	51.21	PK	74	22.79	Pass
1000-7000	*5650	Horizontal	50.32	PK	74	23.68	Pass
1000-7000	*#5724.66	Horizontal	60.61	PK	121.4	60.79	Pass
1000-7000	*5647.22	Vertical	51.81	PK	74	22.19	Pass
1000-7000	*5650	Vertical	50.01	PK	74	23.99	Pass
1000-7000	*#5723.24	Vertical	67.04	PK	118.2	51.16	Pass
7000-40000	11490.13	Horizontal	51.11	PK	74	22.89	Pass
7000-40000	11489.57	Vertical	52.09	PK	74	21.91	Pass

802.11n 20 Modulation 5785MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11570.6	Horizontal	51.45	PK	74	22.55	Pass
7000-40000	11571.73	Vertical	51.47	PK	74	22.53	Pass

Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBuV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) "#" is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

802.11n 20 Modulation 5825MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5850.09	Horizontal	55.84	PK	121.3	65.46	Pass
1000-7000	*5925	Horizontal	50.16	PK	74	23.84	Pass
1000-7000	*5942.92	Horizontal	51.38	PK	74	22.62	Pass
1000-7000	*#5850.67	Vertical	56.53	PK	121.3	64.77	Pass
1000-7000	*5925	Vertical	51.41	PK	74	22.59	Pass
1000-7000	*5927.76	Vertical	50.76	PK	74	23.24	Pass
7000-40000	11650.5	Horizontal	50.96	PK	74	23.04	Pass
7000-40000	11650.5	Vertical	50.12	PK	74	23.88	Pass

802.11n 40 Modulation 5190MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5148.34	Horizontal	56.66	PK	74	17.34	Pass
1000-7000	#5148.34	Horizontal	46.1	AV	54	7.9	Pass
1000-7000	#5146.52	Vertical	60.73	PK	74	13.27	Pass
1000-7000	#5146.52	Vertical	52.3	AV	54	1.7	Pass
7000-40000	*10378.9	Horizontal	50.24	PK	74	23.76	Pass
7000-40000	*10387.97	Vertical	51.92	PK	74	22.08	Pass

802.11n 40 Modulation 5230MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10459.37	Horizontal	51.01	PK	74	22.99	Pass
7000-40000	*10459.37	Vertical	50.47	PK	74	23.53	Pass

802.11n 40 Modulation 5270MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10543.23	Horizontal	51.34	PK	74	22.66	Pass
7000-40000	*10539.27	Vertical	52.04	PK	74	21.96	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB μ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11n 40 Modulation 5310MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5352.46	Horizontal	54.64	PK	74	19.36	Pass
1000-7000	#5352.46	Horizontal	46.1	AV	54	7.9	Pass
1000-7000	#5352.31	Vertical	57.29	PK	74	16.71	Pass
1000-7000	#5352.31	Vertical	48.9	AV	54	5.1	Pass
7000-40000	10624.83	Horizontal	52.08	PK	74	21.92	Pass
7000-40000	10628.8	Vertical	51.59	PK	74	22.41	Pass

802.11n 40 Modulation 5510MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5468.86	Horizontal	55.6	PK	74	18.4	Pass
1000-7000	*#5468.86	Horizontal	45.6	AV	54	8.4	Pass
1000-7000	*#5469.64	Vertical	58.47	PK	74	15.53	Pass
1000-7000	*#5469.64	Vertical	48.7	AV	54	5.3	Pass
7000-40000	11019.23	Horizontal	52.29	PK	74	21.71	Pass
7000-40000	11020.37	Vertical	49.9	PK	74	24.1	Pass

802.11n 40 Modulation 5550MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11100.43	Horizontal	51.03	PK	74	22.97	Pass
7000-40000	11100.29	Vertical	50.24	PK	74	23.76	Pass

802.11n 40 Modulation 5590MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11181.3	Horizontal	51.31	PK	74	22.69	Pass
7000-40000	11180.73	Vertical	50.64	PK	74	23.36	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB μ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11n 40 Modulation 5670MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5725.34	Horizontal	45.91	PK	74	28.09	Pass
1000-7000	*#5725.88	Vertical	48.18	PK	74	25.82	Pass
7000-40000	11339.97	Horizontal	50.68	PK	74	23.32	Pass
7000-40000	11339.4	Vertical	50.09	PK	74	23.91	Pass

802.11n 40 Modulation 5755MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*5642.62	Horizontal	51.23	PK	74	22.77	Pass
1000-7000	*5650	Horizontal	50.72	PK	74	23.28	Pass
1000-7000	*#5714.16	Horizontal	56.83	PK	109.2	52.37	Pass
1000-7000	*5641.07	Vertical	51.03	PK	74	22.97	Pass
1000-7000	*5650	Vertical	50.81	PK	74	23.19	Pass
1000-7000	*#5718.44	Vertical	62.22	PK	110.4	48.18	Pass
7000-40000	11509.4	Horizontal	50.87	PK	74	23.13	Pass
7000-40000	11510.53	Vertical	51.19	PK	74	22.81	Pass

802.11n 40 Modulation 5795MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*5851.48	Horizontal	61.04	PK	118.8	57.76	Pass
1000-7000	*5925	Horizontal	50.32	PK	74	23.68	Pass
1000-7000	*5927.88	Horizontal	51.48	PK	74	22.52	Pass
1000-7000	*5860.18	Vertical	64.39	PK	109.4	45.01	Pass
1000-7000	*5925	Vertical	50.18	PK	74	23.82	Pass
1000-7000	*5926.32	Vertical	51.29	PK	74	22.71	Pass
7000-40000	11589.67	Horizontal	49.72	PK	74	24.28	Pass
7000-40000	11590.43	Vertical	51.31	PK	74	22.69	Pass

802.11ac 20 Modulation 5180MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5148.83	Horizontal	51.32	PK	74	22.68	Pass
1000-7000	#5148.9	Vertical	56.36	PK	74	17.64	Pass
1000-7000	#5148.9	Vertical	46.1	AV	54	7.9	Pass
7000-40000	*10363.6	Horizontal	52.2	PK	68.2	16	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB μ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11ac 20 Modulation 5200MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10427.07	Horizontal	51.23	PK	68.2	16.97	Pass
7000-40000	*10393.07	Vertical	51.4	PK	68.2	16.8	Pass

802.11ac 20 Modulation 5240MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10482.03	Horizontal	51.56	PK	68.2	16.64	Pass
7000-40000	*10476.37	Vertical	50.53	PK	68.2	17.67	Pass

802.11ac 20 Modulation 5260MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10516.6	Horizontal	51.49	PK	68.2	16.71	Pass
7000-40000	*10520.73	Vertical	51.45	PK	68.2	16.75	Pass

802.11ac 20 Modulation 5300MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10610.1	Horizontal	51.33	PK	74	22.67	Pass
7000-40000	*10600.33	Vertical	49.65	PK	74	24.35	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11ac 20 Modulation 5320MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5350.2	Horizontal	47.42	PK	74	26.58	Pass
1000-7000	#5351.04	Vertical	47.64	PK	74	26.36	Pass
7000-40000	10641.27	Horizontal	50.3	PK	74	23.7	Pass
7000-40000	10639	Vertical	51.04	PK	74	22.96	Pass

802.11ac 20 Modulation 5500MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5468.25	Horizontal	49.48	PK	74	24.52	Pass
1000-7000	*#5469.75	Vertical	50.31	PK	74	23.69	Pass
7000-40000	11020.37	Horizontal	50.88	PK	74	23.12	Pass
7000-40000	10997.7	Vertical	51.9	PK	74	22.1	Pass

802.11ac 20 Modulation 5540MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11080.28	Horizontal	50.76	PK	74	23.24	Pass
7000-40000	11080.43	Vertical	50.32	PK	74	23.68	Pass

802.11ac 20 Modulation 5580MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11160.82	Horizontal	50.49	PK	74	23.51	Pass
7000-40000	11161.44	Vertical	50.28	PK	74	23.72	Pass

Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBuV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) "#" is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11ac 20 Modulation 5660MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11360.42	Horizontal	50.12	PK	74	23.88	Pass
7000-40000	11359.92	Vertical	50.98	PK	74	23.02	Pass

802.11ac 20 Modulation 5680MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11360.63	Horizontal	49.93	PK	74	24.07	Pass
7000-40000	11360.84	Vertical	48.34	PK	74	25.66	Pass

802.11ac 20 Modulation 5700MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5726.6	Horizontal	48.52	PK	74	25.48	Pass
1000-7000	*#5725.38	Vertical	53.92	PK	74	20.08	Pass
1000-7000	*#5725.38	Vertical	42.9	AV	54	11.1	Pass
7000-40000	11397.77	Horizontal	52.28	PK	74	21.72	Pass
7000-40000	11402.3	Vertical	52.34	PK	74	21.66	Pass

Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBuV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) "#" is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

802.11ac 20 Modulation 5745MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*5648.69	Horizontal	51.55	PK	74	22.45	Pass
1000-7000	*5650	Horizontal	50.28	PK	74	23.72	Pass
1000-7000	*#5723.47	Horizontal	68.94	PK	118.7	49.76	Pass
1000-7000	*5647.77	Vertical	52.03	PK	74	21.97	Pass
1000-7000	*5650	Vertical	50.12	PK	74	23.88	Pass
1000-7000	*#5723.04	Vertical	67.14	PK	117.7	50.56	Pass
7000-40000	11492.4	Horizontal	53.53	PK	74	20.47	Pass
7000-40000	11491.27	Vertical	52.81	PK	74	21.19	Pass

802.11ac 20 Modulation 5785MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11573.43	Horizontal	51.64	PK	74	22.36	Pass
7000-40000	11570.6	Vertical	50.67	PK	74	23.33	Pass

802.11ac 20 Modulation 5825MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5853	Horizontal	56.51	PK	115.4	58.89	Pass
1000-7000	*5925	Horizontal	50.37	PK	74	23.63	Pass
1000-7000	*5928.61	Horizontal	51.87	PK	74	22.13	Pass
1000-7000	*#5851.06	Vertical	57.76	PK	119.8	62.04	Pass
1000-7000	*5925	Vertical	50.26	PK	74	23.74	Pass
1000-7000	*5929.69	Vertical	51.03	PK	74	22.97	Pass
7000-40000	11652.91	Vertical	51.36	PK	74	22.64	Pass
7000-40000	11652.77	Vertical	51.7	PK	74	22.3	Pass

802.11ac 40 Modulation 5190MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5148.62	Horizontal	59.08	PK	74	14.92	Pass
1000-7000	#5148.62	Horizontal	49.3	AV	54	4.7	Pass
1000-7000	#5148.76	Vertical	60.87	PK	74	13.13	Pass
1000-7000	#5148.76	Vertical	52.6	AV	54	1.4	Pass
7000-40000	*10377.67	Horizontal	52.32	PK	68.2	15.88	Pass
7000-40000	*10325.63	Vertical	52.81	PK	68.2	15.39	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB μ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11ac 40 Modulation 5230MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10462.2	Horizontal	51.86	PK	68.2	16.34	Pass
7000-40000	*10462.2	Vertical	51.37	PK	68.2	16.83	Pass

802.11ac 40 Modulation 5270MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	*10541.53	Horizontal	51.28	PK	68.2	16.92	Pass
7000-40000	*10546.63	Vertical	52.05	PK	68.2	16.15	Pass

802.11ac 40 Modulation 5310MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5350.29	Horizontal	54.2	PK	74	19.8	Pass
1000-7000	#5350.29	Horizontal	45.4	AV	54	8.6	Pass
1000-7000	#5350.49	Vertical	57.49	PK	74	16.51	Pass
1000-7000	#5350.49	Vertical	48.4	AV	54	5.6	Pass
7000-40000	10620.3	Horizontal	50.28	PK	74	23.72	Pass
7000-40000	10627.1	Vertical	51.85	PK	74	22.15	Pass

802.11ac 40 Modulation 5510MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5468.92	Horizontal	55.79	PK	74	18.21	Pass
1000-7000	*#5468.92	Horizontal	45	AV	54	9	Pass
1000-7000	*#5470.88	Vertical	59.63	PK	74	14.37	Pass
1000-7000	*#5470.88	Vertical	49.7	AV	54	4.3	Pass
7000-40000	11020.37	Horizontal	51.68	PK	74	22.32	Pass
7000-40000	11019.8	Vertical	49.87	PK	74	24.13	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11ac 40 Modulation 5550MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11100.2	Horizontal	51.86	PK	74	22.14	Pass
7000-40000	11100.2	Vertical	51.37	PK	74	22.63	Pass

802.11ac 40 Modulation 5590MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	--	Horizontal	--	PK	74	--	Pass
1000-7000	--	Vertical	--	PK	74	--	Pass
7000-40000	11180.17	Horizontal	50	PK	74	24	Pass
7000-40000	11180.73	Vertical	50.51	PK	74	23.49	Pass

802.11ac 40 Modulation 5670MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5726.86	Horizontal	46.63	PK	74	27.37	Pass
1000-7000	*#5725.62	Vertical	46.14	PK	74	27.86	Pass
7000-40000	11340.53	Horizontal	50.69	PK	74	23.31	Pass
7000-40000	11340.53	Vertical	50.29	PK	74	23.71	Pass

802.11ac 40 Modulation 5755MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*5642.81	Horizontal	51.37	PK	74	22.63	Pass
1000-7000	*5650	Horizontal	50.26	PK	74	23.74	Pass
1000-7000	*#5724.61	Horizontal	56.7	PK	121.3	64.6	Pass
1000-7000	*5642.53	Vertical	51.96	PK	74	22.04	Pass
1000-7000	*5650	Vertical	50.29	PK	74	23.71	Pass
1000-7000	*#5716.96	Vertical	62.91	PK	109.7	46.79	Pass
7000-40000	11511.1	Horizontal	51.44	PK	74	22.56	Pass
7000-40000	11511.1	Vertical	51.99	PK	74	22.01	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dB μ V/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

802.11ac 40 Modulation 5795MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5724.8	Horizontal	59.05	PK	121.7	62.65	Pass
1000-7000	*5925	Horizontal	50.47	PK	74	23.53	Pass
1000-7000	*5928.53	Horizontal	51.03	PK	74	22.97	Pass
1000-7000	*#5853.24	Vertical	62.15	PK	114.8	52.65	Pass
1000-7000	*5925	Vertical	50.03	PK	74	23.97	Pass
1000-7000	*5929.31	Vertical	51.42	PK	74	22.58	Pass
7000-40000	11589.87	Horizontal	51.28	PK	74	22.72	Pass
7000-40000	11591.57	Vertical	50.86	PK	74	23.14	Pass

802.11ac 80 Modulation 5210MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5141.27	Horizontal	57.74	PK	74	16.26	Pass
1000-7000	#5141.27	Horizontal	47.3	PK	54	6.7	Pass
1000-7000	#5134.17	Vertical	60.9	PK	74	13.1	Pass
1000-7000	#5134.17	Vertical	52.4	PK	54	1.6	Pass
7000-40000	*10419.7	Horizontal	51.02	PK	68.2	17.18	Pass
7000-40000	*10423.1	Vertical	50.81	PK	68.2	17.39	Pass

802.11ac 80 Modulation 5290MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	#5350.35	Horizontal	47.84	PK	74	26.16	Pass
1000-7000	#5350	Vertical	50.44	PK	74	23.56	Pass
7000-40000	*10576.67	Horizontal	50.64	PK	68.2	17.56	Pass
7000-40000	*10586.3	Vertical	50.73	PK	68.2	17.47	Pass

802.11ac 80 Modulation 5530MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5463.58	Horizontal	51.07	PK	74	22.93	Pass
1000-7000	*#5466.14	Horizontal	53.26	PK	74	20.74	Pass
1000-7000	*#5466.14	Vertical	41.3	AV	54	12.7	Pass
7000-40000	11060.6	Horizontal	51.38	PK	74	22.62	Pass
7000-40000	11060.6	Vertical	61.66	PK	74	12.34	Pass



Remark:

- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) “#” is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11ac 80 Modulation 5610MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	*#5725.84	Horizontal	45.84	PK	74	28.16	Pass
1000-7000	*#5725.18	Vertical	46.88	PK	74	27.12	Pass
7000-40000	11220.4	Horizontal	50.86	PK	74	23.14	Pass
7000-40000	11220.97	Vertical	49.8	PK	74	24.2	Pass

802.11ac 80 Modulation 5775MHz MIMO							
Frequency Range MHz	Frequency MHz	Antenna Polarization	Emission Level(dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Result
1000-7000	5647.98	Horizontal	51.03	PK	74	22.97	Pass
1000-7000	*5650	Horizontal	50.21	PK	74	23.79	Pass
1000-7000	*#5724.61	Horizontal	59.13	PK	121.3	62.17	Pass
1000-7000	*5925	Horizontal	50.47	PK	74	23.53	Pass
1000-7000	*5647.29	Vertical	51.98	PK	74	22.02	Pass
1000-7000	*5650	Vertical	50.26	PK	74	23.74	Pass
1000-7000	*#5723.81	Vertical	75.08	PK	119.5	44.42	Pass
1000-7000	*5925	Vertical	50.47	PK	74	23.53	Pass
7000-40000	11549.63	Horizontal	51.85	PK	74	22.15	Pass
7000-40000	11551.33	Vertical	51.31	PK	74	22.69	Pass

Remark:

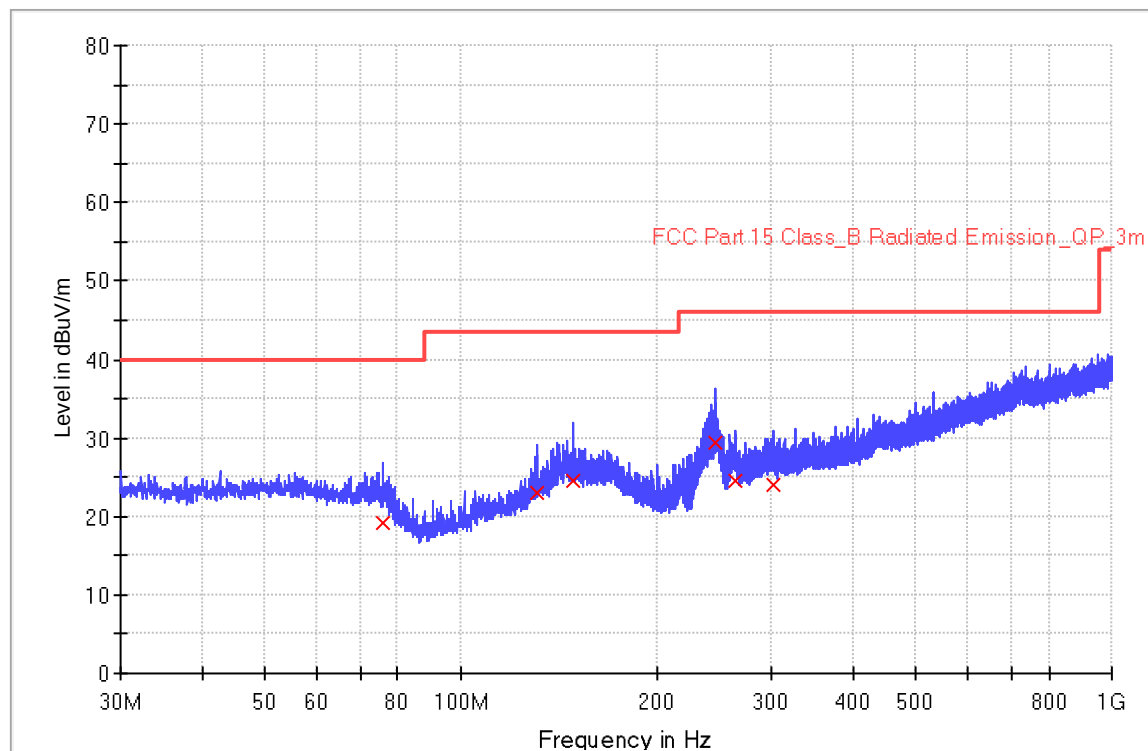
- (1) Above 1GHz Corrector factor= Antenna Factor +Cable Loss - Amp. Factor.
- (2) Below 1GHz Corrector factor= Antenna Factor +Cable Loss.
- (3) "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBuV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.
- (4) "#" is band edge band
- (5) Testing is carried out with frequency rang 30MHz to 40GHz, which data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The Low frequency, which start from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

Transmitting spurious emission test result as below:

The worst case of Radiated Emission below 1GHz:

Site: 3 meter chamber	Time: 2023/01/07 - 10:08
Limit: FCC_Part15.209_RE(3m)_ClassB	Engineer: Wenqiang LU
Probe: VULB9168	Polarity: Horizontal
EUT: 3D Printer, Model no: AccuFab-CEL	Power: 120VAC, 60Hz for Cradle
Note: Transmit by at 802.11a channel 5500MHz MIMO.	
Note: Pre-scan with three orthogonal axis and the worst case as X axis.	

RE_VULB9168_pre_Cont_30-1000



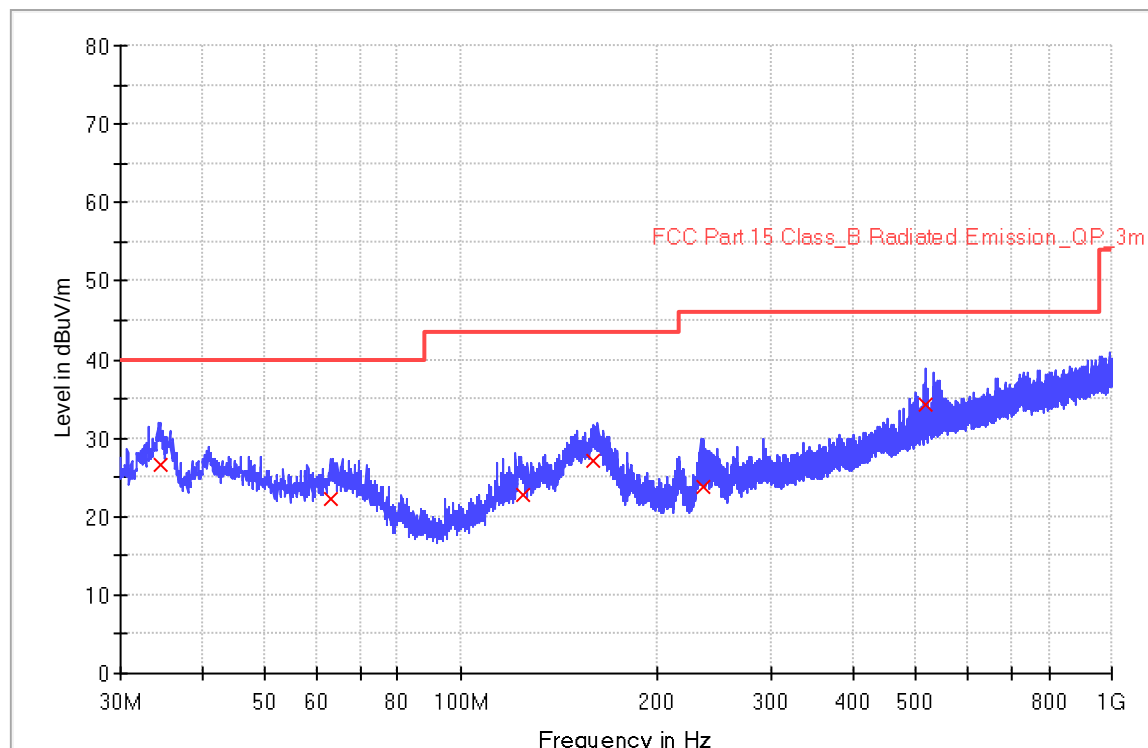
Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
75.960000	19.1	1000.0	120.000	200.0	H	224.0	17.3	20.9	40.0
130.920000	22.9	1000.0	120.000	148.0	H	54.0	19.3	20.6	43.5
148.840000	24.5	1000.0	120.000	152.0	H	177.0	21.0	19.0	43.5
246.600000	29.4	1000.0	120.000	100.0	H	99.0	19.9	16.7	46.0
263.280000	24.4	1000.0	120.000	100.0	H	292.0	20.1	21.6	46.0
301.400000	24.0	1000.0	120.000	100.0	H	103.0	21.5	22.0	46.0

The worst case of Radiated Emission below 1GHz:

Site: 3 meter chamber	Time: 2023/01/07 - 09:23
Limit: FCC_Part15.209_RE(3m)_ClassB	Engineer: Wenqiang LU
Probe: VULB9168	Polarity: Vertical
EUT: 3D Printer, Model no: AccuFab-CEL	Power: 120VAC, 60Hz for Cradle
Note: Transmit by at 802.11a channel 5500MHz MIMO.	
Note: Pre-scan with three orthogonal axis and the worst case as X axis.	

RE_VULB9168_pre_Cont_30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
34.520000	26.5	1000.0	120.000	100.0	V	238.0	19.4	13.5	40.0
62.920000	22.2	1000.0	120.000	149.0	V	54.0	19.7	17.8	40.0
124.800000	22.6	1000.0	120.000	102.0	V	89.0	18.5	20.9	43.5
160.160000	27.1	1000.0	120.000	115.0	V	294.0	20.9	16.4	43.5
235.200000	23.7	1000.0	120.000	100.0	V	106.0	18.9	22.3	46.0
516.400000	34.3	1000.0	120.000	100.0	V	186.0	26.9	11.7	46.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

10 Test Equipment List

List of Test Instruments
Test Site1

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE DATE
C	Wideband Radio Communication Tester	R&S	CMW500	S2110416b-YQ-EMC	2023-11-10	2024-11-9
	Vector signal generator	Agilent	N5182A	S2110417b-YQ-EMC	2023-11-10	2024-11-9
	RF automatic control unit	MWRFTest	MW100-RFCB	S2110418b-YQ-EMC	2023-9-28	2024-9-27
	Temperature Chamber	Shanghai HUCAN	HTT-100AP	S2201430b-YQ-EMC	2023-3-3	2024-3-2
	Signal Analyzer	R & S	FSV40	S1503003-YQ-EMC	2023-8-1	2024-7-31
RE	EMI Test Receiver	Rohde & Schwarz	ESR3	101906	2023-8-1	2024-7-31
	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2023-8-1	2024-7-31
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9168	961	2021-9-23	2024-9-22
	Double-ridged waveguide horn antenna	Rohde & Schwarz	HF907	102393	2021-4-13	2024-4-12
	Pre-amplifier	Rohde & Schwarz	SCU-18D	19006451	2023-8-1	2024-7-31
	Loop antenna	Rohde & Schwarz	HFH2-Z2	100443	2023-6-15	2024-6-14
	Double Ridged Horn Antenna	ETS-Lindgren	3116C	00246076	2023-7-7	2026-7-6
	3m Semi-anechoic chamber	TDK	9X6X6	----	2021-5-8	2024-5-7
CE	EMI Test Receiver	Rohde & Schwarz	ESR3	101907	2022-8-1	2023-7-31
	LISN	Rohde & Schwarz	ENV216	101924	2022-8-1	2023-7-31

Measurement Software Information			
Test Item	Software	Manufacturer	Version
C	MTS 8310	MWRFTest	3.0.0.0
RE	EMC 32	Rohde & Schwarz	V10.50.40
CE	EMC 32	Rohde & Schwarz	V9.15.03

C - Conducted RF tests

- Conducted peak output power
- 6dB Occupied Bandwidth
- Power spectral density*
- Conducted Band Edge and Out-of-Band Emissions

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, $\pm 3.16\text{dB}$
Radiated Disturbance	30MHz to 1GHz, $\pm 5.03\text{dB}$ (Horizontal) $\pm 5.12\text{dB}$ (Vertical) 1GHz to 18GHz, $\pm 5.15\text{dB}$ (Horizontal) $\pm 5.12\text{dB}$ (Vertical) 18GHz to 25GHz, $\pm 4.76\text{dB}$

Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2021, clause 4.4.3 and 4.5.1.



12 Photographs of Test Set-ups

Refer to the < Test Setup photos >.



13 Photographs of EUT

Refer to the < External Photos > & < Internal Photos >.

THE END