



RF Test Report

For

Beijing Inhand Networks Technology Co., Ltd.

	FCC Part 15 Subpart E §15. 407		
Test Standards:	IC RSS-247 Issue 2		
Product Description:	Edge Router		
Tested Model:	<u>ER605</u>		
	FCC:ER606, ER608, ER609, ER615, ER616, ER618, ER610,		
Additional Model No.	<u>ER625, ER626, ER628, ER620, ER655, ER656, ER658,</u>		
	<u>ER665, ER666, ER668, ER695, ER696, ER698</u>		
	IC:ER608, ER615, ER618, ER625		
Brand Name:	inhand		
FCC ID:	2AANYER605		
IC:	<u>11594A-ER605</u>		
Classification	(NII)Unlicensed National Information Infrastructure		
Report No.:	EC2210042RF02		
Tested Date:	2022-11-02 to 2022-11-23		
Issued Date:	<u>2023-01-14</u>		
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Note: The test results in this report apply exclusively to the tested model / sample. Without written approval of

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2023.01.14	Valid	Original Report



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Summary of Test Result

FCC Rule	IC Rule	Description	Limit	Result	Remark
2.1049	RSS-247	6dB & 99%	-	Pass	U-NII-1
15.403(i)	Section 6	Bandwidth	>500kHz	Pass	U-NII-3
15.407(a)	RSS-247 Section 6	Maximum Conducted Output Power	≤30dBm For AP ≤23.98dBm For Client	Pass	U-NII-1
			≤30dBm	Pass	U-NII-3
		Maximum e.i.r.p.	200 mW or 10 + 10 log10B	Pass	U-NII-1
		E.I.R.P. Power Spectral Density	≤10dBm/MHz	Pass	U-NII-1
15.407(a)	RSS-247 Section 6	Power Spectral Density	≤17dBm/MHz For AP ≤11dBm/MHz For Client	Pass	U-NII-1
			≤30dBm/500kHz	Pass	U-NII-3
15.407(b)	RSS-247 Section 6	Unwanted Emissions	15.407(b) 15.209(a)	Pass	Under limit 4.18 dB at 17355 MHz
15.207	RSS-Gen 8.8	AC Conducted Emission	15.207(a)	Pass	Under limit 11.59 dB at 0.544 MH
15.407(g)	RSS-Gen 6.11	Frequency Stability	Within Operation Band	Not Required	-
15.407(c)	RSS-247 6.4(a)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
15.203 & 15.407(a)	RSS-Gen 6.8	Antenna Requirement	15.203 & 15.407(a) RSS-GEN 6.8	Pass	-



1 .Test Laboratory

1.1 Test facility

CNAS (accreditation number: L11138)

Hunan Ecloud Testing Technology Co., Ltd. has obtained the accreditation of China National

Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1244, Test Firm Registration Number: 793308)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the US Federal Communications

Commission list of test facilities recognized to perform electromagnetic emissions measurements.

ISED(CAB identifier: CN0012, ISED# :24347)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the Wireless Device Testing

Laboratories list of innovation, Science and Economic Development Canada to test to Canadian

radio equipment requirements.

A2LA (Certificate Code: 4895.01)

Hunan Ecloud Testing Technology Co., Ltd. has been listed by American Association for Laboratory

Accreditation to perform electromagnetic emission measurement.



2 General Description

2.1 Applicant

Beijing Inhand Networks Technology Co., Ltd. Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing

2.2 Manufacturer

Beijing Inhand Networks Technology Co., Ltd.

Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing

2.3 General Description Of EUT

Product	Edge Router	
Model No.	ER605	
FCC ID:	2AANYER605	
IC:	11594A-ER605	
Additional No.	FCC:ER606, ER608, ER609, ER615, ER616, ER618, ER610, ER625, ER626, ER628, ER620, ER655, ER656, ER658, ER665, ER666, ER668, ER695, ER696, ER698 IC:ER608, ER615, ER618, ER625	
Difference Description	These models are the same in these:appearance,PCB layout and basic software function;The only difference is that the products are used in different markets.	
HW Version	V1.2	
SW Version	V2.0	
Power Supply	9-48Vdc	
Extreme temperature	-20°C ~70°C	
Modulation Technology 256QAM,64QAM, 16QAM, QPSK, BPSK for OF		
Modulation Type	802.11a/n/ac : OFDM	
Operating Frequency	U-NII-1:5150~5250MHz U-NII-3:5725~5850MHz	
Max. Output Power	U-NII-1: 802.11a : 17.66 dBm (0.0583 W) 802.11n HT20 MIMO: 18.45 dBm (0.0700 W) 802.11n HT40 MIMO : 18.6 dBm (0.0724 W) 802.11ac VHT20 MIMO: 18.59 dBm (0.0723 W) 802.11ac VHT40 MIMO: 18.72 dBm (0.0745 W) 802.11ac VHT80 MIMO: 18.46 dBm (0.0701 W) U-NII-3: 802.11a : 14.46 dBm (0.0279 W) 802.11n HT20 MIMO: 17.19 dBm (0.0524 W) 802.11n HT40 MIMO: 15.21 dBm (0.0332 W)	

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Report No.: EC2210042RF02

	802.11ac VHT20 MIMO : 16.77 dBm (0.0475 W) 802.11ac VHT40 MIMO: 14.68 dBm (0.0294 W) 802.11ac VHT80 MIMO: 14.42 dBm (0.0277 W)		
Max. E.I.R.P.	18.74 dBm (0.748 W)		
Antenna Type	Sucker antenna		
Antenna Gain (dBi)	Ant 1 : 0.02dBi Gain at U-NII-1 0.02dBi Gain at U-NII-3		
	Ant 2 : 0.02dBi Gain at U-NII-1 0.02dBi Gain at U-NII-3		
Sample No.	2210042R-1/1		
Sample Received Date	2022-11-02		
I/O Ports	Refer to user's manual		
Cable Supplied	Refer to user's manual		

NOTE:

- 1. The above EUT information is declared by manufacturer. Our laboratory is not responsible for the information provided by the manufacturer.
- 2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
- 3. Pre-scan all voltages, the report only lists the worst voltage DC12V test results.

2.4 Modification of EUT

No modifications are made to the EUT during all test items.



2.5 Applicable Standards

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

- FCC Part 15 Subpart E §15.407
- ANSI C63.10-2013
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- IC RSS-247 Issue 2
- IC RSS-Gen Issue 5

Remark:

1. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, ICES-003 recorded in a separate test report.



3 Test Configuration of Equipment Under Test

3.1 Carrier Frequency and Channel

U-NII-1

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
38	5190 MHz	46	5230 MHz
40	5200 MHz	48	5240 MHz
42	5210 MHz		

U-NII-3

Channel	Frequency	Channel	Frequency
149	5745 MHz	157	5785 MHz
151	5755 MHz	159	5795 MHz
153	5765 MHz	161	5805 MHz
155	5775 MHz	165	5825 MHz

3.2 Test Mode

Based on the baseline scan, the worst - case data rates were:

802.11a mode: 6 Mbps

802.11n HT20 mode: MCS0

802.11n HT40 mode: MCS0

802.11n VHT20 mode: Nssi MCS0

802.11n VHT40 mode: Nssi MCS0

802.11n VHT80 mode: Nssi MCS0

Note: The product can be used as both an Access point and a Client device. Only the worst Client device test results are listed in the report.

3.2.1 Antenna Port Conducted Measurement

Summary table of Test Cases				
Modulation				
Test Item	902.11 a	802.11n HT20/	802.11n HT40/	802 44 co V/UT90
	802.11 a	802.11ac VHT20	802.11ac VHT40	802.11ac VH180
	Mode 1: CH36	Mode 1: CH36	Mode 1: CH38	Mode 1: CH42
U-NII-1	Mode 2: CH44	Mode 2: CH44	Mode 2: CH46	Mode 2: -
	Mode 3: CH48	Mode 3: CH48	Mode 3: -	Mode 3: -

Summary table of Test Cases				
Modulation				
Test Item	902 11 0	802.11n HT20/	802.11n HT40/	902 11 oo \/UT90
	802.11 a	802.11ac VHT20	802.11ac VHT40	802.11ac VH180
	Mode 1: CH149	Mode 1: CH149	Mode 1: CH151	Mode 1: CH155
U-NII-3	Mode 2: CH157	Mode 2: CH157	Mode 2: CH159	Mode 2: -
	Mode 3: CH165	Mode 3: CH165		Mode 3: -

3.2.2 Radiated Emission Test (Below 1GHz)

Radiated	Modulation
Test Cases	802.11n HT20 CH157

Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type. It was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

2. Following channel(s) was (were) selected for the final test as listed above.

3. All the below test modes were conducted, only reported the worst case mode 802.11n HT20 CH157.



Summary table of Test Cases					
	Modulation				
Test Item	902 11 0	802.11n HT20/ 802.11n HT40/			
	002.11 a	802.11ac VHT20	802.11ac VHT40		
	Mode 1: CH36	Mode 1: CH36	Mode 1: CH38	Mode 1: CH42	
U-NII-1	Mode 2: CH44	Mode 2: CH44	Mode 2: CH46	Mode 2: -	
	Mode 3: CH48	Mode 3: CH48	Mode 3: -	Mode 3: -	

3.2.3 Radiated Bandedge and Radiated Emission Test (Above 1GHz)

Summary table of Test Cases					
Tost	Modulation				
Itom	902 11 0	802.11n HT20/	802.11n HT20/ 802.11n HT40/		
item	002.11 a	802.11ac VHT20	802.11ac VHT40	002.11aC VI1100	
	Mode 1: CH149	Mode 1: CH149	Mode 1: CH151	Mode 1: CH155	
U-NII-3	Mode 2: CH157	Mode 2: CH157	Mode 2: CH159	Mode 2: -	
	Mode 3: CH165	Mode 3: CH165		Mode 3: -	

- Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type. It was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.
 - 2. Following channel(s) was (were) selected for the final test as listed above
 - 3. For frequency above 18GHz, the measured value is much lower than the limit, therefore, it is not reflected in the report.
 - 4. Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit, so it was not reported above 18GHz.

3.2.4 Power Line Conducted Emission Test:

AC	
Conducted	Mode 1 : RLAN Linking + RJ45 ping + Adapter
Emission	

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3.3 Support Equipment

ltem	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	NETGEAR	R7800	PY315100319	N/A	shielded, 1.8 m
2.	Notebook	Lenovo	E470C	FCC SDoC	N/A	shielded cable DC O/P 1.8 m unshielded AC I/P cable1.2 m
3.	Adapter	KUANEN	KT241120200EUL	FCC SDoC	N/A	N/A



3.4 Test Setup

The EUT is continuously communicating to the WIFI tester during the tests.

EUT was set in the Hidden menu mode to enable WIFI communications.

The following picture is a screenshot of the test software

MT7915 QA 0.0.2.10 FF:FF:FF:FF:FF:FF	
TX/RX EEFROM MAC _BEF RF Page RU Page About	
SingleBand v Cal Cal I 0.RC_CAL v Cal Kormal Mode v MIT915 :: 4 T 4	
Channel 6 2437-fw Mode Rate System BW Per-Pkt Primary LTF+GI OFDM MCS=7; 54 Mbps 20 20 0 <td></td>	
V TX/EXO V TX/EXI V TX/EX2 V TX/EX3	
Tx EX	
SGI T TSSI STBC Hss 4 TXX frame setting LDPC Spatial TX frame setting Hss 4	
0800 0000 FFFFFFFFF 00000000000 001122334455 0000	
Payload Repeat Packet Tx Time [AA [1024]	
V Random (1)	
Inter -64.0 to 63.5 10.0 + 24 Repeat 0 Facket -64.0 to 63.5 10.0 + 24 0.0 - + 0.0 - + 00 + 00	
Start TX Transmitted : 0 Conti. 0:HORMAL MODE Ch, Freesable	
Reset Power	
TX Tone Single V DC V thr (only one)	
Fower 0 Freq. 1C	

Setup diagram for Conducted Test





Setup diagram for Radiation(9KHz~30MHz) Test



Setup diagram for Radiation(Below 1G) Test





Setup diagram for Radiation(Above1G) Test



3.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5 dB and 10dB attenuator.

 $Offset(dB) = RF \ cable \ loss(dB) + attenuator \ factor(dB).$ = 5 + 10 = 15 (dB)

For all radiated test items:

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level



Over Limit $(dB\mu V/m) = Level(dB\mu V/m) - Limit Level (dB\mu V/m)$



4 Test Result

4.1 6dB 26dB and 99% Occupied Bandwidth Measurement

4.1.1 Limit of 6dB 26dB and 99% Bandwidth

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C. The minimum 6 dB bandwidth shall be at least 500 kHz for U-NII-3.

4.1.2 Test Procedures

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
- 4. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto,Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is approximately 1% based on EBW as observed on the result of pre-sequence measurement.
- 5. 99% Band width Measurement: Set the spectrum analyzer as 1%~5% of emission BW

Sweep=auto,Detector = Peak, Trace Mode = Max Hold, VBW \geq 3*RBW , span=1.5 times to 5.0

times the OBW, Manually readjust RBW until the RBW/EBW ratio is approximately 1% based on EBW as observed on the result of pre-sequence measurement.

- Minimum Emission Bandwidth Measurement: Set the spectrum analyzer RBW=100KHz, VBW ≥3*RBW, Sweep=auto,Detector = Peak, Trace Mode = Max Hold, Mark the peak frequency and –6dB (upper and lower) frequency.
- According to RSS-GEN section 6.7, for IC 6 dB bandwidth measurement, the spectrum analyzer's resolution bandwidth (RBW) setting should be 1%-5% of OBW, and set the Video bandwidth (VBW) ≥3* RBW.
- 8. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
- 9. Measure and record the results in the test report.

4.1.3 Test Result of 6dB Bandwidth, 26dB and 99% Bandwidth

26dB Bandwidth: Refer to Appendix A199% Bandwidth: Refer to Appendix A26dB Bandwidth: Refer to Appendix A3



4.2 Maximum Conducted Output Power Measurement

4.2.1 Limit of Output Power

FCC

Operation Band	EUT Category		Limit
		Access Point(Mater Device)	1 Watt(30dBm)
U-NII-1		Fixed point-to-point Acess Ponit	1 Watt(30dBm)
	\checkmark	Mobile and portable client device	250mW(23.98dBm)
U-NII-2A			250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C			250mW(23.98dBm) or 11dBm+10 log B
U-NII-3	\checkmark		1 W(30dBm)

IC

Operation Frequency Band	Limit
5150~5250 MHz	EIRP shall not exceed 200 mW or 10 + 10 logB, dBm
5250~5350 MHz	Conducted output power shall not exceed 250 mW or 11 +10 logB
	EIRP shall not exceed 1.0 W or 17 + 10 logB, dBm
5470~5600 MHz and 5650~5725 MHz	Conducted output power shall not exceed 250 mW or 11 +10 logB
	EIRP shall not exceed 1.0 W or 17 + 10 logB, dBm
5725~5850 MHz	The maximum conducted output power over the frequency band of
	operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6 dBi.

B is the 99% emission bandwidth in megahertz.





4.2.2 Test Procedures

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.
- 4. Spectrum Analyzer is used as the auxiliary test equipment to conduct the output power measurement.
- Set span to encompass the entire emission bandwidth (EBW) of the signal. Set sweep trigger to "free run.", RBW = 1 MHz, Set VBW ≥ 3MHz, Number of points in sweep ≥ 2 x span / RBW, Sweep time = auto, Detector = power averaging (rms).
- 6. Video filtering shall be applied to power signal (rms), it shall be set to operate on a linear voltage signal.
- 7. Trace average at least 100 traces in power averaging (rms) mode.
- 8. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

4.2.3 Test Result of Output Power

Refer to Appendix B



4.3 Power Spectral Density Measurement

4.3.1 Limits of Power Spectral Density

FCC

Operztion Band	EUT Category		Limit
U-NII-1		Access Point(Mater Device)	17dPm/\/\
		Fixed point-to-point Acess Ponit	
		Mobile and portable client device	11dBm/ MHz
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3			30 dBm/500kHz

IC

Operztion Frequency Band	Limit	
5150~5250 MHz	EIRP spectral density 10 dBm / MHz	
5250~5350 MHz	11dBm / MHz	
5470~5600 MHz and 5650~5725	11dBm / MHz	
MHz		
5725~5850 MHz	30 dBm/500kHz	

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



4.3.2 Test Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
- 4. For UNII-1: Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = RMS, traces 100 sweeps of video averaging(SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
- 5. For UNII-3: Set RBW=470KHz, VBW=1.5MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = RMS, traces 100 sweeps of video averaging(SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
- 6. User the cursor on spectrum to peak search the highest level of trace.
- 7. Record the max. reading and add 10 log(1/duty cycle).
- 8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

4.3.3 Test Result of Power Spectral Density

Refer to Appendix C

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4.4 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

4.4.1 Limit of Unwanted Emissions

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

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

For transmitters operating in the 5470-5600 MHz and 5650-5725MHz band: all emissions outsideof the 5470-5600 MHz and 5650-5725MHz band shall not exceed an EIRP of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 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.

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



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

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

$$E = \frac{1000000\sqrt{30P}}{1000000}$$

3

µV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBµV/m)		
-17	78.3		
-27	68.3		

(3) KDB789033 D02 v02r01 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

4.4.2 Test Procedures

- The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.
 - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
 - RBW = 1 MHz
 - VBW ≥ 3 MHz
 - Detector = Peak
 - Sweep time = auto
 - Trace mode = max hold
 - (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz



- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
- 2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
- 3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- 4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
- 5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
- 6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
- 7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	95.86	1.39	0.72	1KHz
802.11n HT20	94.89	1.30	0.77	1KHz
802.11n HT40	91.43	0.64	1.56	3KHz
802.11ac HT20	90.67	0.68	1.47	3KHz
802.11ac HT40	85.37	0.35	2.86	3KHz
802.11ac HT80	75.00	0.18	5.56	10KHz

8. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level









4.4.3 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



802.11a CH36 5180MHz **21~25**℃ Test Mode : Temperature : Test Engineer : Jack Liu Relative Humidity : 62~65% Frequencey Range 5.00GHz~5.20GHz **Polarization** : Horizontal Test Site : 3m Chamber Temp/Humi : 24℃/62% Tested by : Jack Pol/Phase : HORIZONTAL Power rating: DC 12V Test Mode : 802.11a CH36 (5180MHz) EUT : Edge Router Model No. : ER605 130 Level (dBuV/m) Date: 2022-11-06 120 100 80 EP 60 40 20 0 5000 5090. 5110. Frequency (MHz) 5170. 5030. 5050. 5070. 5130. 5150. 5200 Reading Preamp Limit level dBuV/m Freq Cable Antenna 0ver level dBuV factor dB/m loss dB factor dB limit dB level Remark MHz dBuV/m 5150.000 5177.800 51.92 94.59 48.18 90.76 31.32 31.34 8.17 8.21 35.75 35.72 68.20 68.20 -16.28 26.39 Peak Peak

4.4.4 Test Result of Radiated Spurious at Band Edges





























































































































































































































































4.4.5 Test Result of Radiated Spurious Emission (1GHz ~ 10th Harmonic)















least 20dB below the specification limit, so it was not reported above 18GHz.

















































































































































































































































































4.4.6 Test Result of Radiated Spurious Emission (30MHz ~ 1GHz)

Test Mode :	802.11	802.11N20 CH157 5785MHz				ture :	21~25 ℃	21~25 ℃	
Test Engineer :	Jack L	iu			Relative	Humidity	: 62~65%	62~65%	
Frequencey Rang	ge 30MH	z~1GHz			Polarizat	ion :	Horizont	al	
130 Level (d	BuV/m)						Date: 20	022-11-06	
120									
100									
80									
60						FC	C PART15	E PEAK -6dB	
40 20	2	Mur for		Je Muran	her Management and the second	6	47	مرور و	
⁰ 30 100.	200.	300.	400. Ere	500.	600. /Hz)	700.	800. 90	0. 1000	
Freq R 10 MHz dl	eading evel BuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark	
125.060 142.520 240.490 295.780 348.160 694.450	53. 37 52. 67 50. 59 51. 92 44. 99 35. 63	12. 10 13. 96 11. 92 13. 19 14. 11 19. 77	2. 11 2. 28 3. 00 3. 35 3. 68 5. 30	32. 66 32. 66 32. 66 32. 64 32. 69 32. 41	34. 92 36. 25 32. 85 35. 82 30. 09 28. 29	$\begin{array}{r} 43.50\\ 43.50\\ 46.00\\ 46.00\\ 46.00\\ 46.00\\ 46.00\end{array}$	-8.58 -7.25 -13.15 -10.18 -15.91 -17.71	QP QP QP QP QP QP QP	



Test Mo	de :		802.11N20 CH157 5785MHz				Temperature :			21~25°	21~25℃				
Test Eng	gineer	·:	Jack	Jack Liu				Relative Humidity :			62~65%	62~65%			
Frequen	ncey R	lange	30MH	lz~1GH	lz					Po	larizati	ion :	Vertica		
130	Level	(dBu	V/m)										Date:	2022-1	1-06
130															
100															
80															
60												FC		15E PE -6	AK dB
40		2	تــــــــــــــــــــــــــــــــــــ	3		5									
20	M W	em,MV	No a	Vind	Vw	A mage	W	hay an	Hunder	etta ho	y48	how we have the second with the	had an a feast manual of the	www.	Anorald
0	30 1	00.	200.	30) 0 .	40	0. Fre	50 eque)0. ncy (I	60 ИН2	0. :)	700.	800.	900.	1000
Fre MH	eq Iz	Read leve dBu	ding el V	Ante fact dB/m	nna or	Ca lo d	ble ss B	Pr fa	eamp ctor dB	1 dB	evel uV/m	Limit level dBuV/m	Over limi dB	t Re	mark
52. 142. 221. 294. 371. 448.	310 520 090 810 440 070	46. 46. 47. 47. 47. 36.	51 47 28 46 22 97	15. 3 13. 9 10. 1 13. 1 14. 6 16. 2		1.3 2.2 2.9 3.3 3.7 4.1	7 8 1 5 9	32. 32. 32. 32. 32. 32. 32.	65 66 66 64 71 79	30 30 27 31 32 24	. 56 . 05 . 71 . 35 . 91 . 63	40.00 43.50 46.00 46.00 46.00 46.00	-9. 4 -13. 4 -18. 2 -14. 6 -13. 0 -21. 3	4 QP 5 QP 9 QP 5 QP 9 QP 7 QP	



4.5 AC Conducted Emission Measurement

4.5.1 Limit of AC Conducted Emission

FCC §15.207

IC RSS-GEN 8.8

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

Frequency Range	Quasi Peak(dBµV)	Average(dBµV)
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

4.5.2 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.

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



4.5.3 Test Result of AC Conducted Emission



Result Level= Reading Level + LISN Factor + Cable Loss





Result Level= Reading Level + LISN Factor + Cable Loss



4.6 Frequency Stability Measurement

4.6.1 Limit of Frequency Stability

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.

4.6.2 Test Procedures

- To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
- 2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
- The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

NT: 25℃ LT: -20℃ HT: 70℃ NV: 12Vdc LV: 9Vdc HV: 48Vdc

4.6.3 Test Result of Frequency Stability

N/A



4.7 Automatically Discontinue Transmission

4.7.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

4.7.2 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.



4.8 Antenna Requirements

4.8.1 Standard Applicable

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.8.2 Antenna Connected Construction

An sucker antenna design is used.

4.8.3 Antenna Gain

The antenna peak gain of EUT is 0.02dBi for each antenna less than 6 dBi. For MIMO transmitting mode , the total peak gain is 3.01dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

No antenna other than that furnished by the responsible party shall be used with the device. This device use a permanently attached antennas. The use of a standard antenna jack or electrical connector is prohibited. This device is compliant with FCC Part 15.203.



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	Keysight	N9010A	MY56070788	2021-12-28	2022-12-27	Conducted
Power Sensor	Keysight	U2021XA	MY56510025	2021-12-30	2022-12-29	Conducted
Power Sensor	Keysight	U2021XA	MY57030005	2021-12-30	2022-12-29	Conducted
Power Sensor	Keysight	U2021XA	MY56510018	2021-12-30	2022-12-29	Conducted
Power Sensor	Keysight	U2021XA	MY56480002	2021-12-30	2022-12-29	Conducted
Thermal Chamber	Howkin	UHL-34	19111801	2022-04-18	2023-04-17	Conducted
Base Station	R&S	CMW 270	101231	2021-12-28	2022-12-27	Conducted
Signal Generator (Interferer)	Keysight	N5182B	MY56200384	2021-12-28	2022-12-27	Conducted
Signal Generator (Blocker)	Keysight	N5171B	MY56200661	2021-12-28	2022-12-27	Conducted

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV 40	101433	2021-12-29	2022-12-28	Radiation
Amplifier	Sonoma	310	363917	2021-12-29	2022-12-28	Radiation
Amplifier	Schwarzbeck	BBV 9718	327	2021-12-30	2022-12-29	Radiation
Amplifier	Narda	TTA1840-35-HG	2034380	2022-04-27	2023-04-26	Radiation
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-051	2020-02-14	2023-02-13	Radiation
Broadband Antenna	Schwarzbeck	VULB 9168	9168-757	2020-09-27	2023-09-26	Radiation
Horn Antenna	Schwarzbeck	BBHA 9120 D	1677	2020-02-14	2023-02-13	Radiation
Horn Antenna	COM-POWER	AH-1840	101117	2021-06-05	2024-06-04	Radiation
Test Software	Auidx	E3	6.111221a	N/A	N/A	Radiation
Filter	Micro-Tronics	BRM 50702	G266	N/A	N/A	Radiation



Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
LISN	R&S	ENV216	102125	2021-12-29	2022-12-28	Conducted
LISN	R&S	ENV432	101327	2021-12-29	2022-12-28	Conducted
EMI Test Receiver	R&S	ESR3	102143	2021-12-30	2022-12-29	Conducted
EMI Test Software	Audix	E3	N/A	N/A	N/A	Conducted

N/A: No Calibration Required



6 Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	3.29dB
	30MHz ~ 1GHz	5.40dB
Radiated emission	1GHz ~ 18GHz	5.03dB
	18GHz ~ 40GHz	5.21dB

MEASUREMENT	UNCERTAINTY
Occupied Channel Bandwidth	±57.212Hz
RF output power, conducted	±1.04dB
Power density, conducted	±2.31dB
Emissions, conducted	±2.18dB

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





Appendix A1: Emission Bandwidth

Test Result

TestMode	Antenna	Channel	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
	Ant1	5180	30.960	5165.400	5196.360		
	Ant2	5180	31.120	5164.920	5196.040		
	Ant1	5220	30.760	5204.800	5235.560		
	Ant2	5220	23.240	5209.280	5232.520		
	Ant1	5240	31.440	5224.920	5256.360		
11 0	Ant2	5240	22.960	5229.520	5252.480		
	Ant1	5745	32.480	5729.240	5761.720		
	Ant2	5745	32.440	5729.320	5761.760		
	Ant1	5785	32.040	5769.280	5801.320		
	Ant2	5785	32.960	5767.680	5800.640		
	Ant1	5825	29.680	5810.320	5840.000		
	Ant2	5825	32.240	5808.960	5841.200		
	Ant1	5180	22.240	5169.680	5191.920		
	Ant2	5180	20.360	5169.760	5190.120		
	Ant1	5220	20.520	5209.720	5230.240		
	Ant2	5220	20.680	5209.800	5230.480		
	Ant1	5240	20.840	5229.680	5250.520		
	Ant2	5240	20.440	5229.840	5250.280		
	Ant1	5745	34.000	5728.320	5762.320		
	Ant2	5745	33.680	5728.760	5762.440		
	Ant1	5785	34.400	5768.120	5802.520		
	Ant2	5785	35.280	5767.360	5802.640		
	Ant1	5825	30.480	5809.760	5840.240		
	Ant2	5825	31.480	5809.920	5841.400		
	Ant1	5190	41.680	5169.280	5210.960		
	Ant2	5190	40.320	5169.920	5210.240		
	Ant1	5230	41.600	5209.200	5250.800		
11N40MIMO	Ant2	5230	40.480	5209.920	5250.400		
	Ant1	5755	56.480	5730.680	5787.160		
	Ant2	5755	41.520	5734.520	5776.040		
	Ant1	5795	54.720	5765.720	5820.440		

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Report No.: EC2210042RF02

	Ant2	5795	43.120	5774.440	5817.560	
	Ant1	5180	20.720	5169.720	5190.440	
	Ant2	5180	20.280	5169.880	5190.160	
	Ant1	5220	20.640	5209.680	5230.320	
	Ant2	5220	20.400	5209.880	5230.280	
	Ant1	5240	20.800	5229.720	5250.520	
	Ant2	5240	20.520	5229.680	5250.200	
TACZUMINO	Ant1	5745	33.400	5729.280	5762.680	
	Ant2	5745	32.120	5729.840	5761.960	
	Ant1	5785	32.120	5769.480	5801.600	
	Ant2	5785	35.240	5766.160	5801.400	
	Ant1	5825	31.760	5809.280	5841.040	
	Ant2	5825	32.000	5808.840	5840.840	
	Ant1	5190	41.120	5169.600	5210.720	
	Ant2	5190	40.640	5169.680	5210.320	
	Ant1	5230	51.680	5205.920	5257.600	
	Ant2	5230	40.560	5209.840	5250.400	
TTAC40IVIIIVIO	Ant1	5755	60.560	5722.200	5782.760	
	Ant2	5755	48.080	5734.440	5782.520	
	Ant1	5795	60.240	5762.360	5822.600	
	Ant2	5795	40.880	5774.600	5815.480	
	Ant1	5210	92.320	5158.320	5250.640	
	Ant2	5210	80.960	5169.520	5250.480	
	Ant1	5775	101.280	5723.640	5824.920	
	Ant2	5775	80.800	5734.680	5815.480	