

Test Report

FCC ID: 2ANRXUPAIRFAIRY

Product Name:	UPAIR
Trademark:	 , GTEN , 极天创新 , UPAIR
Model Name :	UPAIR Fairy
Prepared For :	Shenzhen Jitian Innovation Technology Co., Ltd.
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Test Date:	Nov. 13, 2018 to Dec. 13, 2018
Date of Report :	Dec. 13, 2018
Report No.:	BCTC-LH180100288E

VERIFICATION OF COMPLIANCE

Applicant's name **Shenzhen Jitian Innovation Technology Co., Ltd.**

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South 1st Ave, Nanshan District, Shenzhen

Manufacture's Name **Shenzhen Jitian Innovation Technology Co., Ltd.**

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Product description

Product name UPAIR

Model Name: UPAIR Fairy

FCC Part15.407, ANSI C63.10-2013

Standards KDB 789033 D02 General UNII Test Procedures New Rules v01r02

KDB 662911 D01 Multiple Transmitter Output v02r01

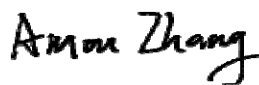
This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Test Result

Pass

Prepared by(Engineer): Amou Zhang



Reviewer(Supervisor): Eric Yang



Approved(Manager): Carson Zhang



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1.TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	RSS-GEN 15.207	N/A
Radiated Emissions	RSS-GEN 15.407(b), 15.209	PASS
26dB bandwidth and 99%dB Bandwidth	RSS-247 15.403(i) 15.407(e)	PASS
Minimum 6 dB bandwidth	15.407(e)	PASS
Power density	RSS-247 15.407 (a)	PASS
Maximum Peak Output Power	RSS-247 15.407 (a)	PASS
Emissions from out of band	RSS-247 15.407 (b)	PASS
Transmission in case of Absence of Information	RSS-247 15.407(c)	PASS
Frequency Stability	RSS-247 15.407(g)	PASS
Antenna Requirement	15.203	PASS

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2) For all test, the setup authorization of the prototype testing software comes from the customer. (including output power and other parameters)

2.GENERAL PRODUCT INFORMATION

2.1. Product Function

Refer to Technical Construction Form and User Manual.

2.2. Description of Device (EUT)

Product Name:	UPAIR
Model No.:	UPAIR Fairy
Trade Name:	 , GTEN , 极天创新 , UPAIR
Operation Frequency:	5745-5825MHz(802.11n(HT20)) 2406~2475 MHz(Only receive)
Channel numbers:	See channel list
Modulation technology:	64QAM, 16QAM, QPSK, BPSK for OFDM
Data Rate	802.11n(HT20):MCS0-MCS15;
Antenna Type:	Internal antenna
Antenna gain:	5.0dBi
Power supply:	DC 11.1V

Note: 1.The remote uses a dual-band antenna, 2.4g and 5.8g.
2.The remote 5.8g is support 2x2 MIMO mode.

Channel List for 802.11n (20)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

2.3. Independent Operation Modes

The basic operation modes are:

These is Digital Transmission system (DTS) and have modulation OFDM, DSSS, DBPSK, DQPSK, CCK, 16QAM, 64QAM. According exploratory test, EUT will have maximum output power in those data rate (802.11n: MCS0), so those data rate were used for all test. The equipment enables high-speed access without wires to network assets. This adapter uses the IEEE 802.11 protocol to enable wireless communications between the host and Wireless router.

802.11n(20)

Frequency	Band 4
Low	5745MHz
Middle	5785MHz
High	5825MHz

Note1: Directional Gain=5dBi+10log(2)=8.01dBi

Note2: The EUT 802.11n is support 2x2 MIMO mode.

2.4. Test Sites

2.4.1. Test Facilities

Lab Qualifications : FCC Registration No.: 712850
IC Registered No.: 23583

2.5. List of Test and Measurement Instruments

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45109572	2018.06.20	2019.06.20
2	Test Receiver (9kHz-7GHz)	R&S	ESR7	101154	2018.06.20	2019.06.20
3	Bilog Antenna (30MHz-3GHz)	SCHWARZBEC K	VULB9163	VULB9163-942	2018.06.23	2019.06.23
4	Horn Antenna (1GHz-18GHz)	SCHWARZBEC K	BBHA9120D	1541	2018.06.23	2019.06.22
5	Horn Antenna (18GHz-40GHz)	SCHWARZBEC K	BBHA9170	822	2018.08.06	2019.08.06
6	Amplifier (9KHz-6GHz)	SCHWARZBEC K	BBV9744	9744-0037	2018.06.20	2019.06.20
7	Amplifier (0.5GHz-18GHz)	SCHWARZBEC K	BBV9718	9718-309	2018.06.20	2019.06.20
8	Amplifier (18GHz-40GHz)	MITEQ	TTA1840-35-H G	2034381	2018.08.06	2019.08.06
9	Loop Antenna (9KHz-30MHz)	SCHWARZBEC K	FMZB1519B	014	2018.06.23	2019.06.23
10	RF cables1 (9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	2018.02.12	2019.02.12
11	RF cables2 (30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	2018.03.27	2019.03.27
12	RF cables3 (1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	2018.06.19	2019.06.19
13	Power Metter	Keysight	E4419	\	2018.04.15	2019.04.15
14	Power Sensor (AV)	Keysight	E9 300A	\	2018.04.15	2019.04.15
15	Signal Analyzer 20kHz-26.5GHz	KEYSIGHT	N9020A	MY49100060	2018.08.14	2019.08.13
16	Test Receiver 9kHz-40GHz	R&S	FSP40	100550	2018.06.13	2019.06.12
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Software	Frad	EZ-EMC	FA-03A2 RE	\	\

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESR3	102075	2018.06.20	2019.06.20
2	LISN	SCHWARZBEC K	NSLK8127	8127739	2018.06.19	2019.06.19
3	LISN	R&S	ENV216	101375	2018.06.20	2019.06.20
4	RF cables	Huber+Suhnar	9kHz-30MHz	B1702988-0008	2018.02.12	2019.02.12
5	Software	Frad	EZ-EMC	EMC-CON 3A1	\	\

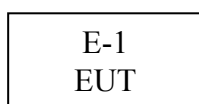
3. TEST SET-UP AND OPERATION MODES

3.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



3.3. Auxiliary Equipment

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	UPAIR	 GTEN , 极天创新, UPAIR	UPAIR Fairy	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

3.4. Countermeasures to Achieve EMC Compliance

None.

4. EMISSION TEST RESULTS

4.1. Conducted Emission Measurement

POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi -peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

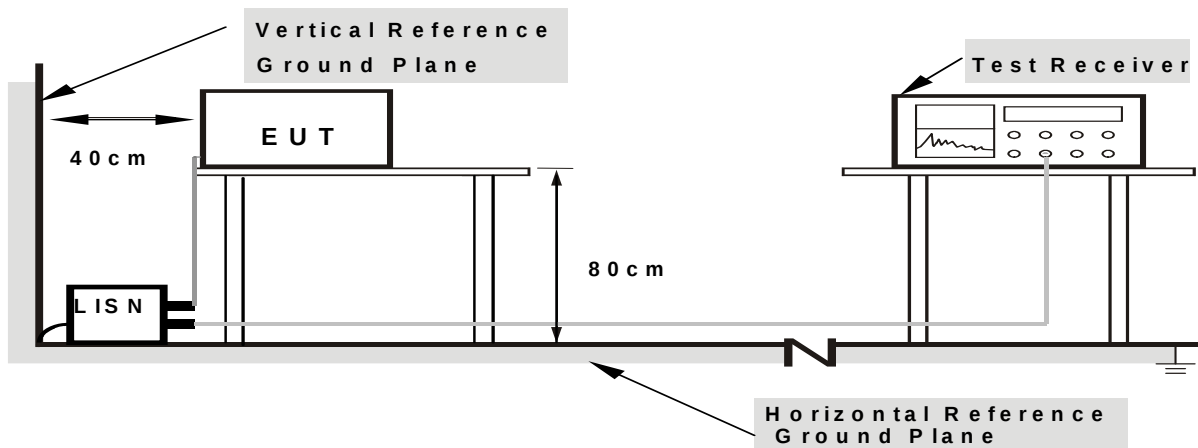
4.1.1. TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.2. DEVIATION FROM TEST STANDARD

No deviation

4.1.3. TEST SETUP



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

4.1.4. EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest all adapter's emission, only the adapter 1's data was worst and the data was recording in the report.

The data only show the worst mode.

If peak level comply with Quasi-Peak limit, then the Quasi-Peak level is deemed to comply with Quasi-Peak limit.

4.1.5. TEST RESULTS

NOTE: This EUT is powered by the DC only, this test item is not applicable.

4.2. Radiated Emission Measurement

4.2.1. Radiated Emission Limits (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 3MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2.2. TEST PROCEDURE

- The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 1.5 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
- For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.
The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

Note:

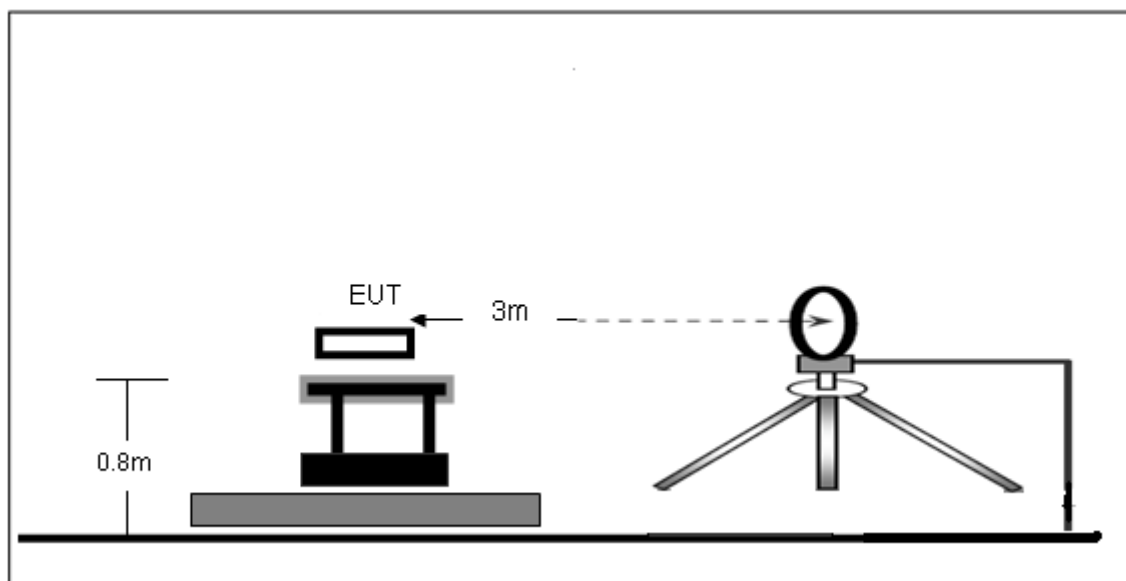
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3. DEVIATION FROM TEST STANDARD

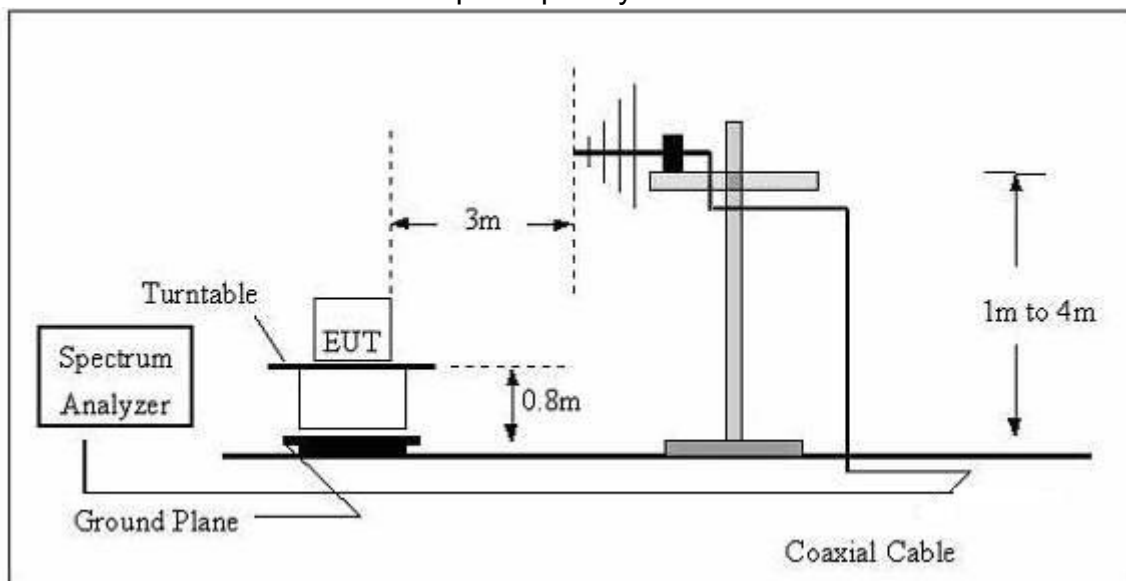
No deviation

4.2.4. TEST SETUP

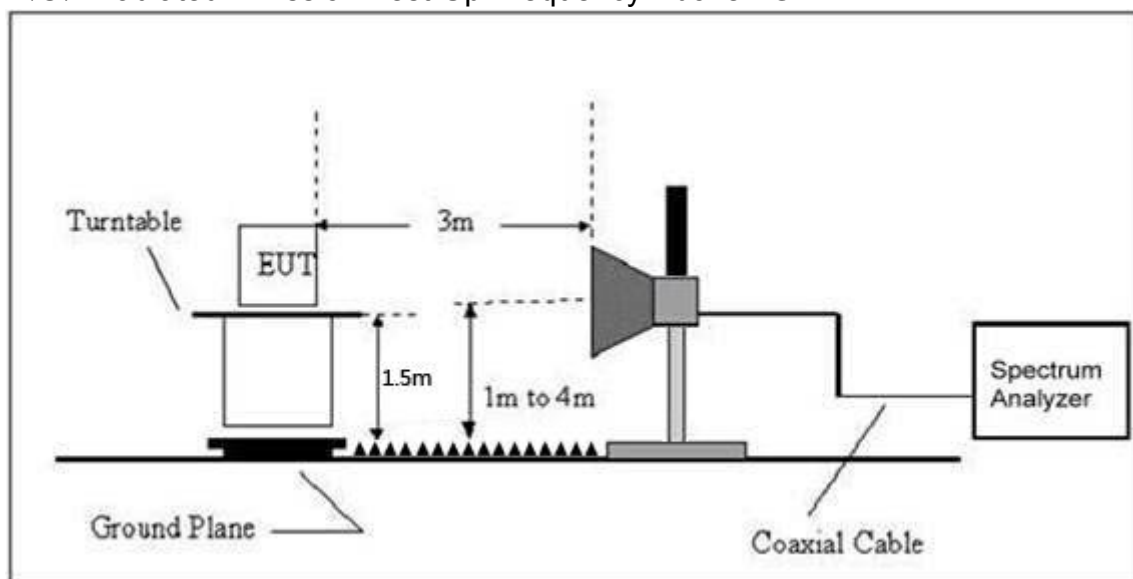
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



4.2.5. EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

We pretest all adapter's emission, only the adapter 1's data was worst and the data was recording in the report.

The data only show the worst mode.

Radiated Spurious Emission (Below 30MHz)

EUT :	UPAIR	Model Name :	UPAIR Fairy
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	101kPa	Polarization :	---
Test Voltage :	DC 11.1V		
Test Mode :	TX		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

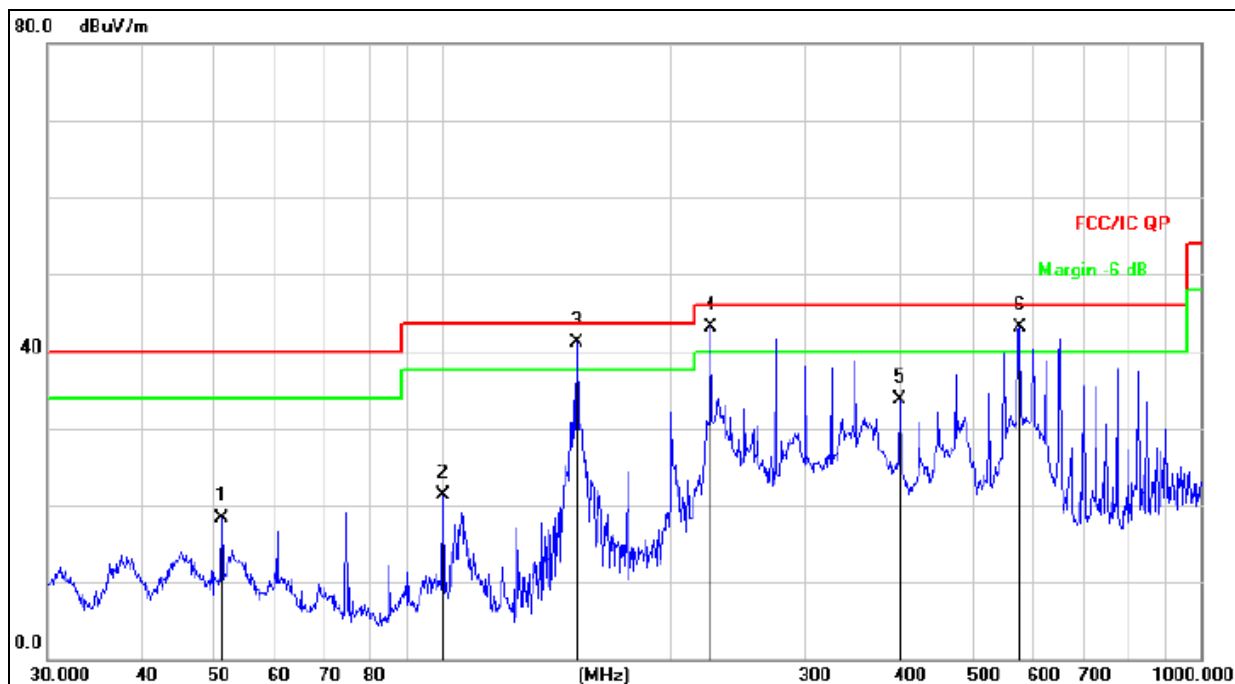
Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.



Radiated Spurious Emission (Between 30MHz – 1GHz)

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Polarization :	Horizontal
Test Voltage :	DC 11.1V		
Test Mode : (Worst)	Link Mode		



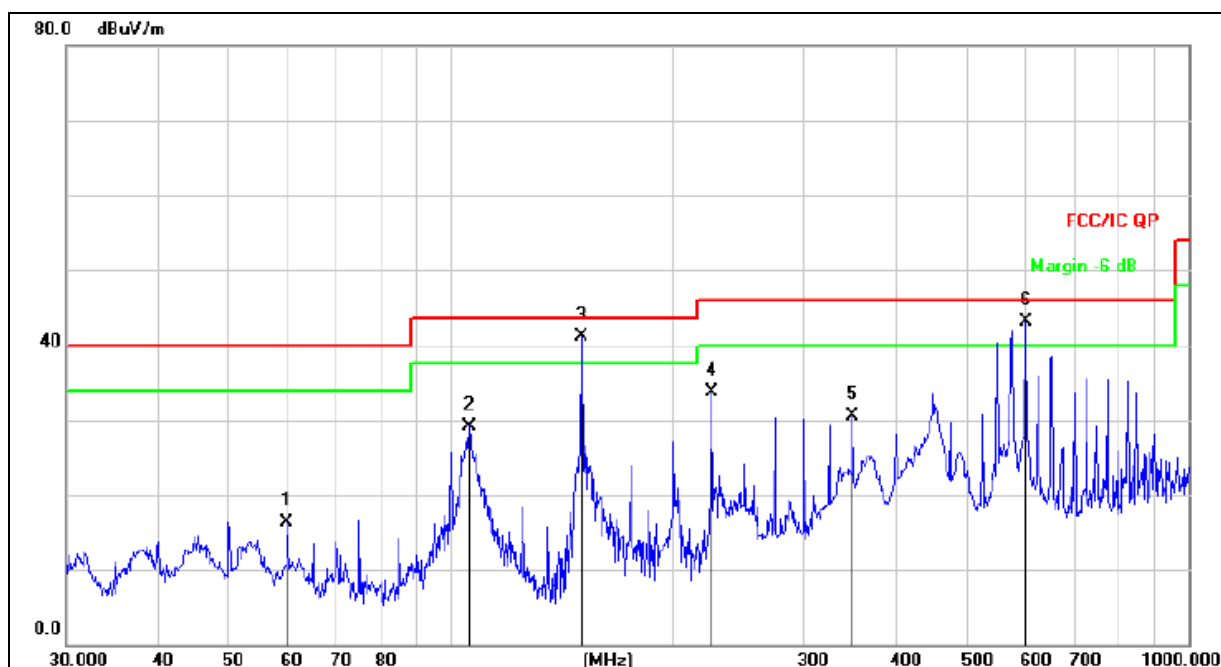
Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		50.9420	32.45	-14.10	18.35	40.00	-21.65	QP
2		99.8777	36.78	-15.56	21.22	43.50	-22.28	QP
3	*	150.0108	60.02	-18.97	41.05	43.50	-2.45	QP
4	!	225.3080	59.15	-16.13	43.02	46.00	-2.98	QP
5		400.4319	45.64	-11.99	33.65	46.00	-12.35	QP
6	!	576.6443	50.25	-7.05	43.20	46.00	-2.80	QP



Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Polarization :	Vertical
Test Voltage :	DC 11.1V		
Test Mode : (Worst)	Link Mode		



Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		59.8588	31.97	-15.57	16.40	40.00	-23.60	QP
2		105.6415	44.86	-15.66	29.20	43.50	-14.30	QP
3	*	150.0108	59.99	-18.97	41.02	43.50	-2.48	QP
4		225.3080	49.85	-16.13	33.72	46.00	-12.28	QP
5		350.4768	42.67	-12.17	30.50	46.00	-15.50	QP
6	!	601.4265	49.84	-6.72	43.12	46.00	-2.88	QP



Radiated Spurious Emission (Above 1GHz)
For the frequency band 5.725-5.850GHz (802.11n HT20)

ANT1+ANT2

	Freq.	Receiver Reading	Detector	Polar	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limit	Result
	(MHz)	(dBμV)	(PK/QP/Ave)	(H/V)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	
Lower Channel 5745MHz	11490.00	56.36	PK	H	37.15	10.55	28.12	57.88	74.00	Pass
	11490.00	47.45	Ave	H	37.15	10.55	28.12	48.97	54.00	Pass
	17235.00	58.56	PK	H	37.44	10.84	28.43	60.39	74.00	Pass
	17235.00	47.36	Ave	H	37.44	10.84	28.43	49.19	54.00	Pass
	11490.00	56.42	PK	V	37.15	10.55	28.12	57.94	74.00	Pass
	11490.00	46.71	Ave	V	37.15	10.55	28.12	48.23	54.00	Pass
	17235.00	58.25	PK	V	37.44	10.84	28.43	60.08	74.00	Pass
	17235.00	48.17	Ave	V	37.44	10.84	28.43	50.00	54.00	Pass
Middle Channel 5785MHz	11570.00	57.25	PK	H	37.15	10.89	28.35	59.34	74.00	Pass
	11570.00	46.41	Ave	H	37.15	10.89	28.35	48.50	54.00	Pass
	17355.00	58.14	PK	H	37.44	10.95	28.54	60.19	74.00	Pass
	17355.00	48.36	Ave	H	37.44	10.95	28.54	50.41	54.00	Pass
	11570.00	57.27	PK	V	37.15	10.89	28.35	59.36	74.00	Pass
	11570.00	47.49	Ave	V	37.15	10.89	28.35	49.58	54.00	Pass
	17355.00	59.72	PK	V	37.44	10.95	28.54	61.77	74.00	Pass
	17355.00	47.31	Ave	V	37.44	10.95	28.54	49.36	54.00	Pass
Upper Channel 5825MHz	11650.00	55.71	PK	H	37.29	10.96	28.56	57.94	74.00	Pass
	11650.00	46.57	Ave	H	37.29	10.96	28.56	48.80	54.00	Pass
	17475.00	57.68	PK	H	37.65	11.15	28.75	59.93	74.00	Pass
	17475.00	48.74	Ave	H	37.65	11.15	28.75	50.99	54.00	Pass
	11650.00	56.61	PK	V	37.29	10.96	28.56	58.84	74.00	Pass
	11650.00	47.32	Ave	V	37.29	10.96	28.56	49.55	54.00	Pass
	17475.00	55.14	PK	V	37.65	11.15	28.75	57.39	74.00	Pass
	17475.00	46.04	Ave	V	37.65	11.15	28.75	48.29	54.00	Pass

Remark:

Emission Level = Antenna Factor + Cable Loss – Pre-amplifier.

Margin = Emission Level - Limit

Other harmonics emissions are lower than 20dB below the allowable limit.

Out of Band edge for 5725-5850MHz

Test CH.	Test Segment	Result	Limit
(MHz)	(MHz)	(dBm/MHz)	(dBm/MHz)
Lowest	Below 5715	-47.56	-27
	5715 to 5725	-41.28	-17
Highest	5850 to 5860	-40.64	-17
	Above 5860	-46.37	-27

Note: the data just list the worst cases

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5. 26DB AND 99% BANDWIDTH TEST

5.1. Applied procedures / limit

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

5.2. TEST PROCEDURE

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- 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%.

The following procedure shall be used for measuring (99 %) power bandwidth:

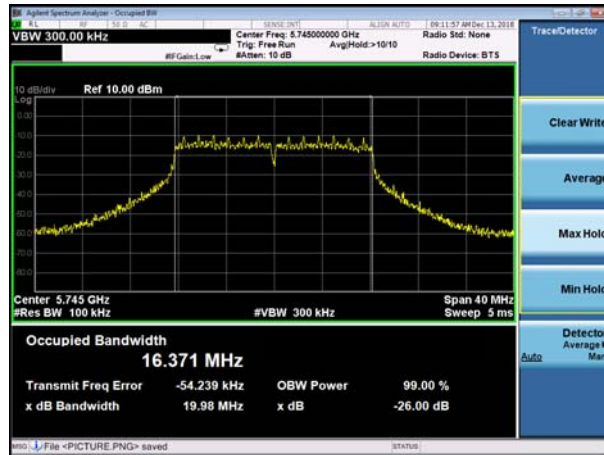
- Set center frequency to the nominal EUT channel center frequency.
- Set span = 1.5 times to 5.0 times the OBW.
- Set RBW = 1 % to 5 % of the OBW
- Set VBW $\geq 3 \cdot$ RBW
- Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- Use the 99 % power bandwidth function of the instrument (if available).
- 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.

5.3. Test result

Mode	Channel	Frequency (MHz)	99% bandwidth(MHz)		26dB bandwidth (MHz)		Result
			ANT 1	ANT 2	ANT 1	ANT 2	
802.11 n20	CH149	5745	13.371	16.366	19.98	19.79	Pass
	CH157	5785	16.394	16.385	20.04	19.50	Pass
	CH165	5825	16.394	16.400	18.84	19.73	Pass

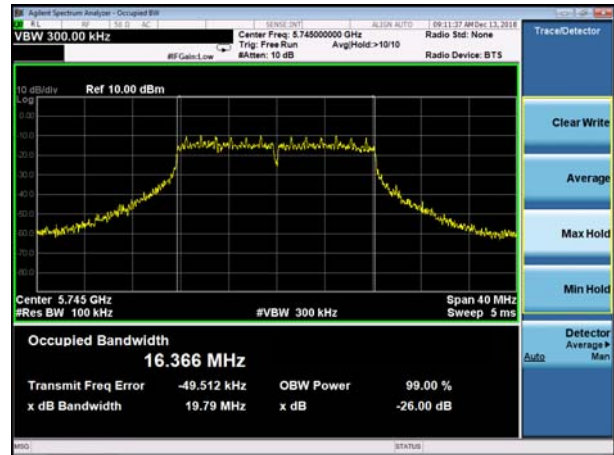
Antenna 1

(802.11n20) -26dB&99% Bandwidth plot on channel 149

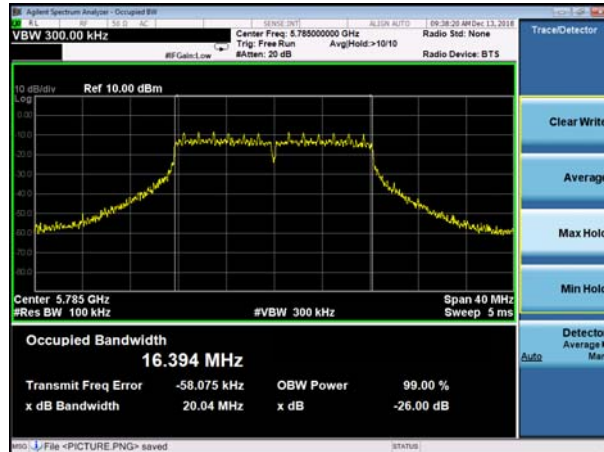


Antenna 2

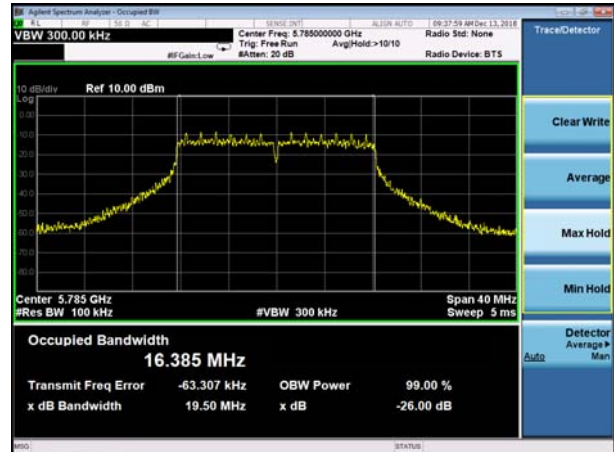
(802.11n20) -26dB&99% Bandwidth plot on channel 149



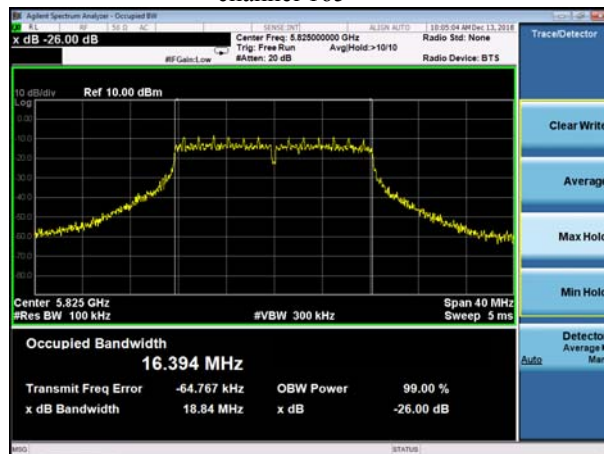
(802.11n20) -26dB&99% Bandwidth plot on channel 157



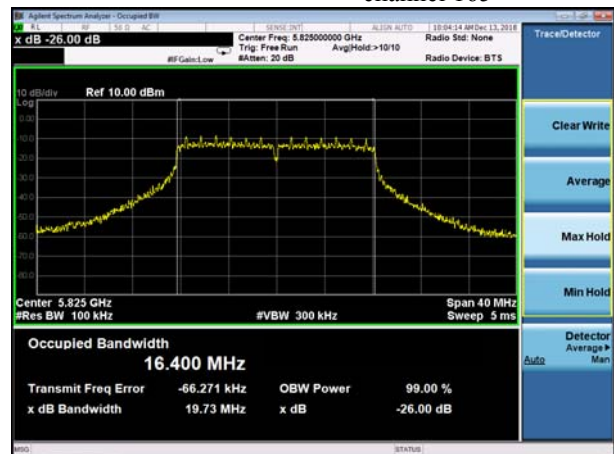
(802.11n20) -26dB&99% Bandwidth plot on channel 157



(802.11n20) -26dB&99% Bandwidth plot on channel 165



(802.11n20) -26dB&99% Bandwidth plot on channel 165



6. MINIMUM 6 DB BANDWIDTH

6.1. Applied procedures / limit

According to FCC §15.407(e)

(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

6.2. TEST PROCEDURE

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ 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.

6.3. Test result

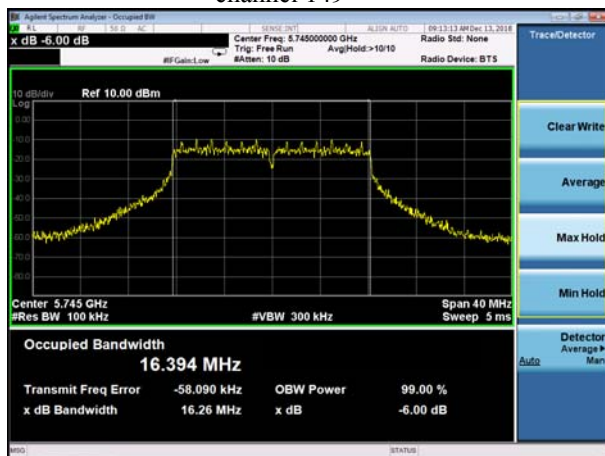
6dB bandwith

Mode	Channel	Frequency (MHz)	-6dB bandwidth (MHz)		Limit (KHz)	Result
			ANT A	ANT B		
802.11 n20	149	5745	16.26	16.32	500	Pass
	157	5785	16.30	16.29	500	Pass
	165	5825	16.28	16.30	500	Pass



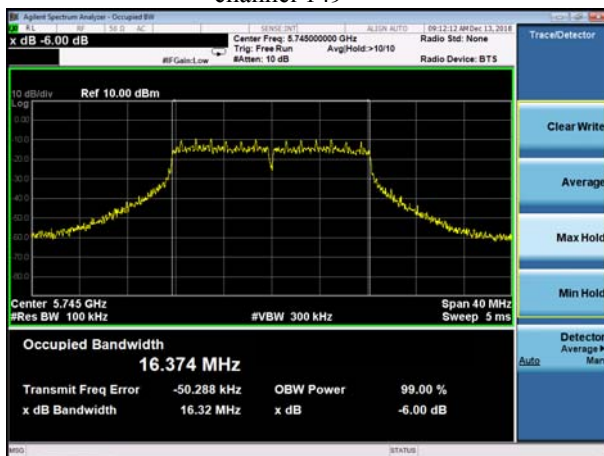
Antenna 1

(802.11n20) -6dB Bandwidth plot on
channel 149

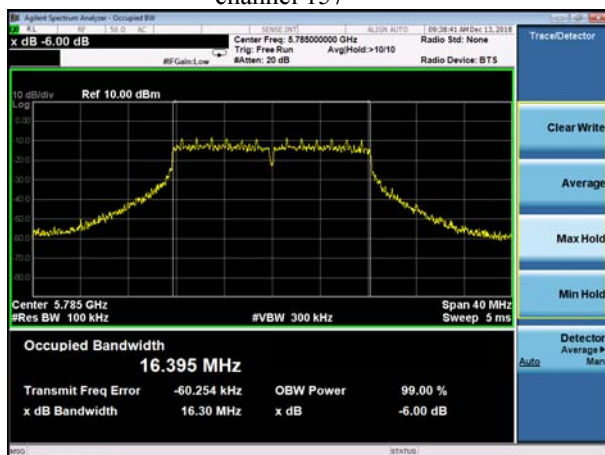


Antenna 2

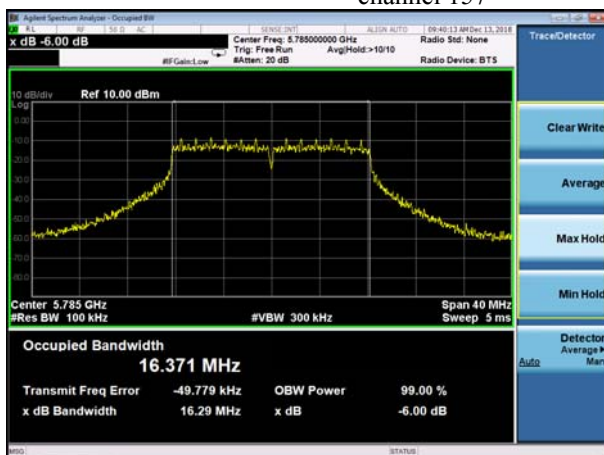
(802.11n20) -6dB Bandwidth plot on
channel 149



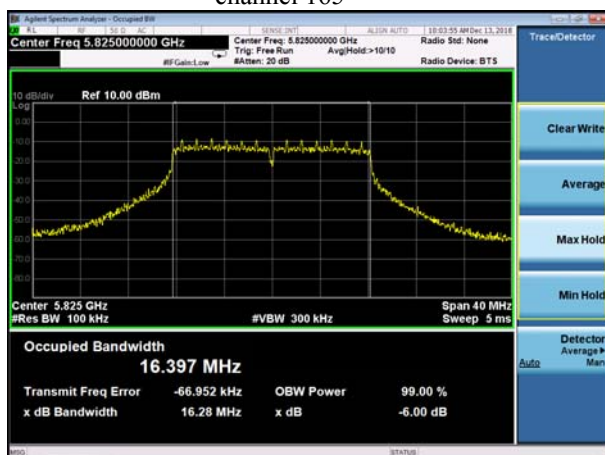
(802.11n20) -6dB Bandwidth plot on
channel 157



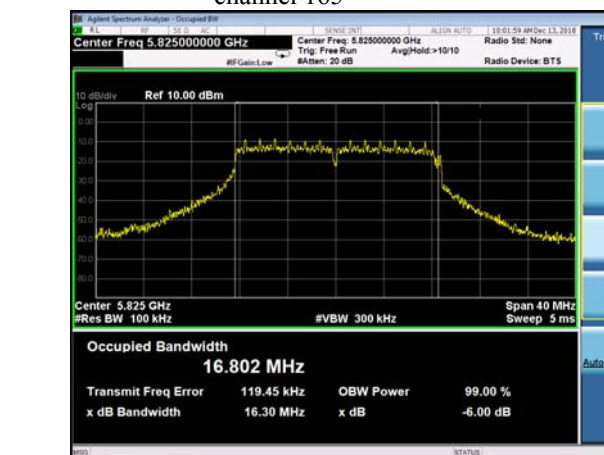
(802.11n20) -6dB Bandwidth plot on
channel 157



(802.11n20) -6dB Bandwidth plot on
channel 165



(802.11n20) -6dB Bandwidth plot on
channel 165



7. OUTPUT POWER TEST

7.1. Limits

For mobile and portable 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 band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

7.2. Test setup

1. The maximum average conducted output power can be measured using Method PM-G (Measurement using a gated RF average power meter):
2. Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.
 - a. The Transmitter output (antenna port) was connected to the power meter.
 - b. Turn on the EUT and power meter and then record the power value.
 - c. Repeat above procedures on all channels needed to be tested.

7.3. Test result

Test Channel	Frequency	Maximum output		Total Power	LIMIT	Result
		(PK) (dBm)		(PK)		
	(MHz)	ANT 1	ANT 2	dBm	dBm	
TX 802.11 n20M Mode						
CH 149	5745	10.27	10.96	13.64	30	Pass
CH 157	5785	10.41	11.05	13.75	30	Pass
CH 165	5825	10.16	10.85	13.53	30	Pass

8. PEAK POWER SPECTRAL DENSITY TEST

8.1. Limits

In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

In addition, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.

8.2. Test setup

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 v01.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. For U-NII1, U-NII-2A, U-NII-2C Band:
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
For U-NII-3 Band:
Set RBW=510 kHz, VBW=3*RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).

8.3. Test data

Mode	Frequency	Measured Power Density (dBm)		Total power density (dBm)	Limit (dBm)	Result
		ANT A	ANT B			
802.11 n20	5745 MHz	-17.308	-18.899	-15.02	30	PASS
	5785 MHz	-16.120	-16.604	-13.34	30	PASS
	5825 MHz	-19.666	-20.481	-17.04	30	PASS



Antenna 1

(802.11n20) PSD plot on channel 149



Antenna 2

(802.11n20) PSD plot on channel 149



(802.11n20) PSD plot on channel 157



(802.11n20) PSD plot on channel 157



(802.11n20) PSD plot on channel 165



(802.11n20) PSD plot on channel 165



9. FREQUENCY STABILITY

9.1. Limits

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.

9.2. Test setup

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

9.3. Test data

U-NII-1:5725-5850MHz worst case at 802.11n HT20 middle channel

Voltage(%)	Power(VDC)	TEMP(° C)	f(MHz)	fc(MHz)	Max. Deviation (MHz)	Max. Deviation (ppm)
100%	3.7	-20	5745.01038	5745	0.01038	-1.8068
100%		-10	5745.01049	5745	0.01049	-1.8259
100%		0	5745.01302	5745	0.01302	-2.2663
100%		10	5745.01158	5745	0.01158	-2.0157
100%		20	5745.01067	5745	0.01067	-1.8573
100%		30	5745.01234	5745	0.01234	-2.1480
100%		40	5745.01226	5745	0.01226	-2.1346
100%		50	5745.01246	5745	0.01246	-2.1688
Low Battery power	3.33	20	5745.01235	5745	0.01235	-2.1497
High Battery power	4.07	20	5745.01369	5745	0.01369	-2.3829
Limits			± 20 ppm			
Result			Complies			

10. TRANSMISSION IN THE ABSENCE OF DATA

10.1. Limits

According to §15.407(c)

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 a description of how this requirement is met.

10.2. Test result

No non-compliance noted:

Refer to the theory of operation.

11. ANTENNA REQUIREMENT

11.1. STANDARD REQUIREMENT

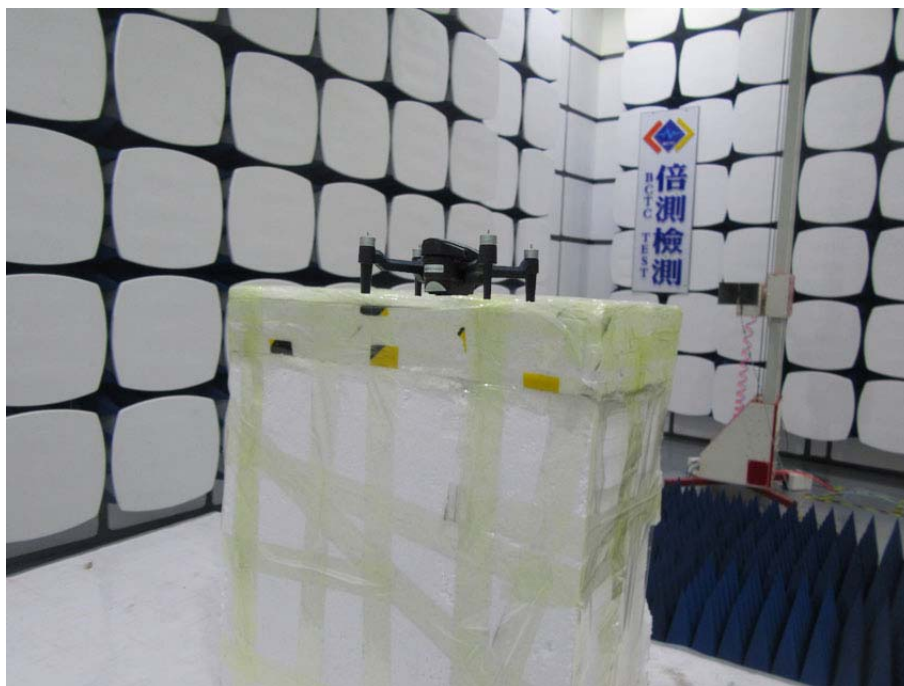
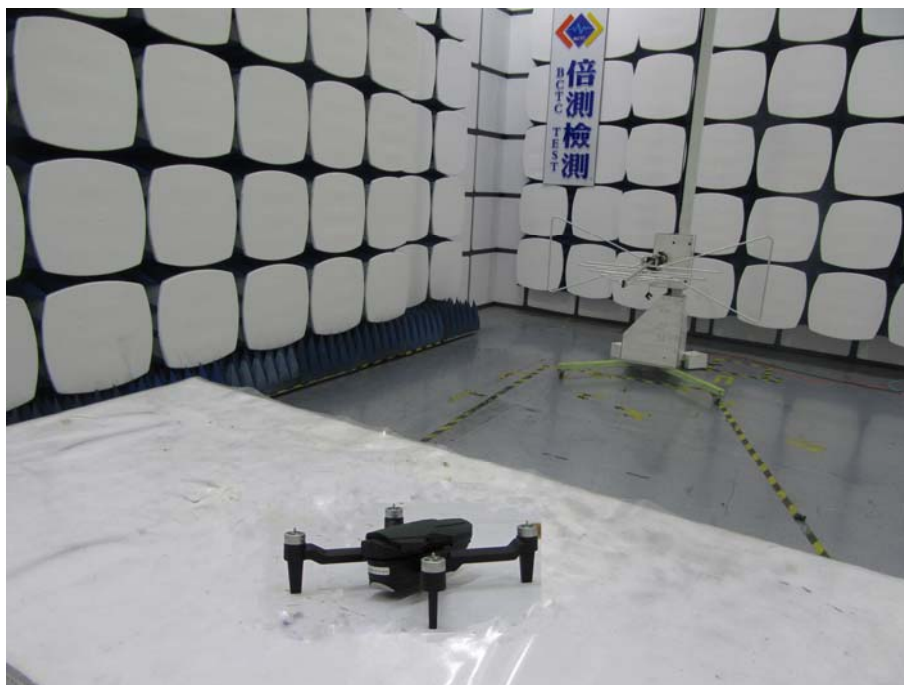
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

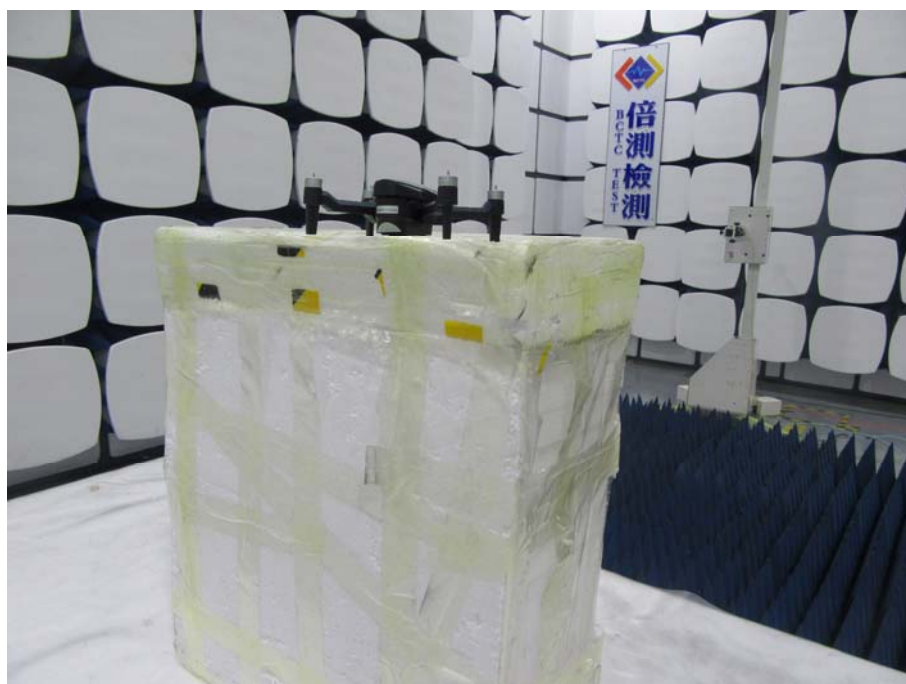
11.2. EUT ANTENNA

The EUT antenna is Internal antenna, It comply with the standard requirement.

12. PHOTOGRAPHS OF TEST SET-UP

Radiated Emission Test





13. EUT PHOTO



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