



FCC Part 15C Test Report

FCC ID: 2ADUTLGPAU0A

Product Name:	Panda Wireless AC600 Dual Band Wireless AC USB Adapter
Trademark:	N/A
Model Name :	PAU0A IGU0A, PCU0A
Prepared For :	Panda Wireless, Inc.
Address :	15559 Union Ave, Suite 300, Los Gatos,CA 95032, United States
Prepared By :	Shenzhen BCTC Technology Co., Ltd.
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Test Date:	Apr. 22 - May 04, 2017
Date of Report :	May 04, 2017
Report No.:	BCTC-LH170300671-1E



VERIFICATION OF COMPLIANCE

Applicant's name..... Panda Wireless, Inc.

Address 15559 Union Ave, Suite 300, Los Gatos, CA 95032, United States

Manufacture's Name Panda Wireless, Inc.

Address 15559 Union Ave, Suite 300, Los Gatos, CA 95032, United States

Product description

Product name..... : Panda Wireless AC600 Dual Band Wireless AC USB Adapter

Trademark : N/A

Model Name : PAU0A
IGU0A, PCU0A

Test procedure : FCC Part15.407

ANSI C63.10-2013

Standards KDB789033 D02 General UNII Test Procedures New Rules v01r02

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): Snow Zeng

Reviewer(Supervisor): Jade Yang

Approved(Manager): Carson Zhang





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1.TEST SUMMARY

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

Note: N/A means not applicable.

1.1. TEST FACILITY

Shenzhen BCTC Technology Co., Ltd.

Add. : No.101,Yousong Road,Longhua New District, Shenzhen,China

FCC Registered No.: 187086

IC Registered No.: 12655A

1.2. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$



2.GENERAL PRODUCT INFORMATION

2.1. Product Function

Refer to Technical Construction Form and User Manual.

2.2. Description of Device (EUT)

Equipment	Panda Wireless AC600 Dual Band Wireless AC USB Adapter	
Trade Name	N/A	
Model Name	PAU0A IGU0A, PCU0A	
Model Difference	The product's different for model number and outlook color.	
Product Description	The EUT is a Panda Wireless AC600 Dual Band Wireless AC USB Adapter	
	Operation Frequency:	5180-5240, 5745-5825MHz(802.11a/n(HT20)) 5190-5230, 5755-5795MHz(802.11n(HT40))
	Modulation Type:	OFDM/DSSS
	Bit Rate of Transmitter	Data speed (IEEE 802.11a): 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps Data speed (IEEE 802.11n): Up to 433Mbps
	Antenna Type:	PCB Antenna
	Antenna Gain:	0dBi
Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.		
Channel List	Please refer to the Note 2.	
Power Source	DC 5V	
Adapter	N/A	
hardware version	---	
Software version	---	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



Channel list

802.11a/n20

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	40	5200	44	5220
48	5240	149	5745	153	5765
157	5785	161	5805	165	5825

802.11n40

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230		
151	5755	159	5795		

802.11ac 80

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210	155	5775		

2.3. Independent Operation Modes

The basic operation modes are:

Pretest Mode	Description
Mode 1	802.11a CH36/CH40/ CH48/CH149/CH157/CH165
Mode 2	802.11n(HT20) CH36/CH40/CH48/CH149/CH157/CH165
Mode 3	802.11n(HT40) CH38/CH46/CH151/CH159
Mode 4	802.11ac(HT80) CH42/ CH155
Mode 5	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11a CH36/CH40/ CH48/CH149/CH157/CH165
Mode 2	802.11n(HT20) CH36/CH40/CH48/CH149/CH157/CH165
Mode 3	802.11n(HT40) CH38/CH46/CH151/CH159
Mode 4	802.11ac(HT80) CH42/ CH155

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported
- (3) According to ANSI C63.10 standards, the test results are both the "worst case" and "worst setup"
MCS0 for 802.a , MCS0 for 802.11n(HT20), MCS1 for 802.11n(H40), MCS0 for 802.11ac(HT80).



2.4. List of Test and Measurement Instruments

Conduction test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESCI	1166.5950K03 -101165-ha	2016.08.27	2017.08.26
2	LISN	SCHWARZBECK	NSLK8127	8127739	2016.08.27	2017.08.26
3	LISN	R&S	NSLK8126	8126487	2016.08.27	2017.08.26
4	RF cables	R&S	R204	R20X	2016.08.27	2017.08.26
5	Attenuator	R&S	ESH3-Z2	143206	2016.08.27	2017.08.26

Radiation test, Band-edge test and 6db bandwidth test equipment

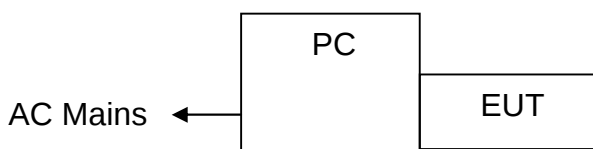
Item	equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45108040	2016.08.27	2017.08.26
2	Test Receiver (9kHz-7GHz)	R&S	ESPI	101318	2016.08.27	2017.08.26
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB 9168	VULB91 68-438	2016.08.27	2017.08.26
4	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1201	2016.09.03	2017.09.03
5	Horn Antenna (14GHz-40GHz)	SCHWARZBECK	BBHA 9170	9170-181	2016.09.03	2017.09.03
6	Amplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	9744-0037	2016.08.27	2017.08.26
7	Amplifier (1GHz-18GHz)	SCHWARZBECK	BBV9718	9718-309	2016.08.27	2017.08.26
8	Amplifier (18GHz-40GHz)	SCHWARZBECK	BBV 9721	9721-205	2016.08.27	2017.08.26
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	00014	2016.09.03	2017.09.03
10	RF cables1 (9kHz-1GHz)	R&S	R203	R20X	2016.08.27	2017.08.26
11	RF cables2 (1GHz-40GHz)	R&S	R204	R21X	2016.08.27	2017.08.26
12	Antenna connector	Florida RF Labs	N/A	RF 01#	2016.08.27	2017.08.26
13	Power Metter	ANRITSU	ML2487A	6K00001568	2016.08.27	2017.08.26
14	Power Sensor (AV)	ANRITSU	ML2491A	030989	2016.08.27	2017.08.26
15	Signal Analyzer 9kHz-26.5GHz	Agilent	N9010A	MY48030494	2016.08.27	2017.08.26
16	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	2016.08.27	2017.08.26
17	D.C. Power Supply	LongWei	PS-305D	010964729	2016.08.27	2017.08.26



3. TEST SET-UP AND OPERATION MODES

3.1. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



3.2. Special Accessories and Auxiliary Equipment

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Panda Wireless AC600 Dual Band Wireless AC USB Adapter	N/A	PAU0A	N/A	EUT
E-2	PC (Provide by test lab)	ASUS	AWT8000	N/A	I/P: AC 100-240V 60/60Hz

Item	Shielded Type	Ferrite Core	Length	Note

3.3. Countermeasures to Achieve EMC Compliance

None.

3.4. Test Operation Mode and Test Software

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

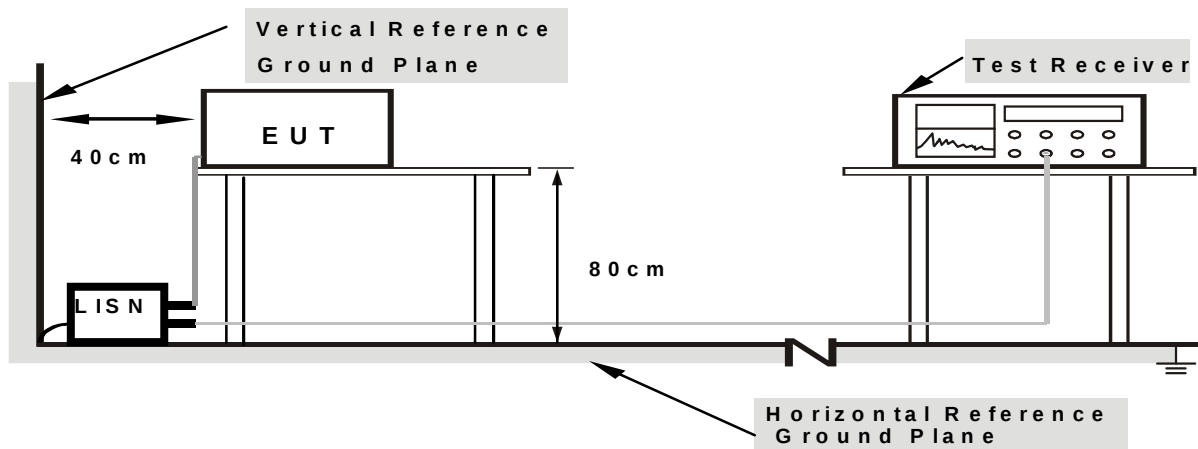
4.1.1. TEST PROCEDURE

- 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- 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 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.

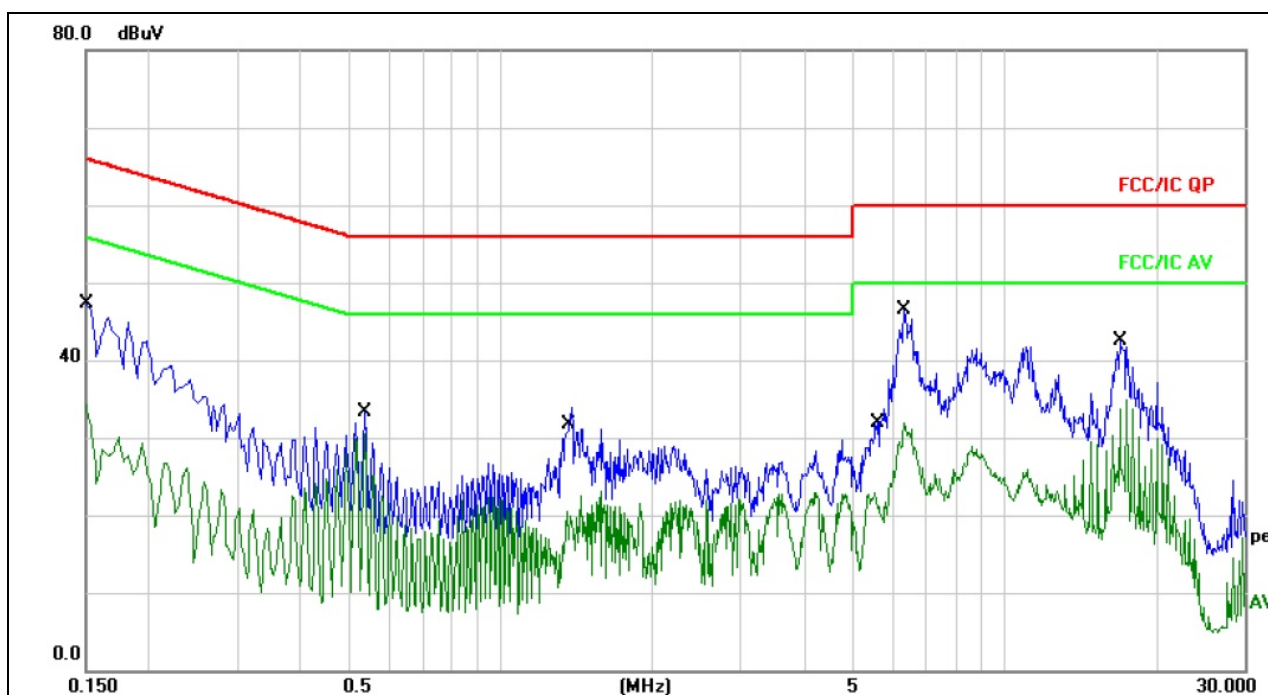
If peak level comply with Quasi-Peak limit, then the Quasi-Peak level is deemed to comply with Quasi-Peak limit.

We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in the report.

4.1.5. TEST RESULTS



Temperature :	25 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 5



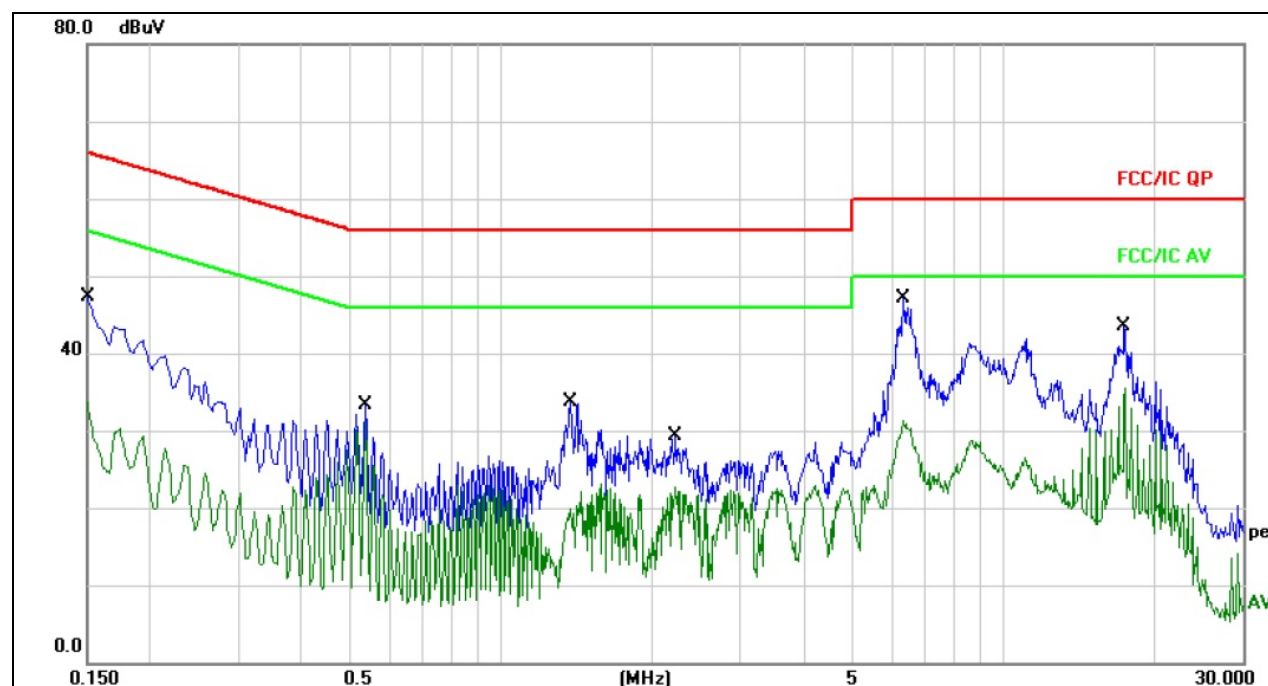
Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	37.24	10.05	47.29	65.99	-18.70	QP	
2		0.1500	24.16	10.05	34.21	55.99	-21.78	AVG	
3		0.5380	23.08	10.12	33.20	56.00	-22.80	QP	
4		0.5380	20.46	10.12	30.58	46.00	-15.42	AVG	
5		1.3540	23.63	10.17	33.80	56.00	-22.20	QP	
6		1.3540	10.25	10.17	20.42	46.00	-25.58	AVG	
7		5.5420	21.53	10.12	31.65	60.00	-28.35	QP	
8		5.5420	12.88	10.12	23.00	50.00	-27.00	AVG	
9	*	6.3460	36.33	10.09	46.42	60.00	-13.58	QP	
10		6.3460	21.84	10.09	31.93	50.00	-18.07	AVG	
11		16.9540	32.35	10.16	42.51	60.00	-17.49	QP	
12		16.9540	24.74	10.16	34.90	50.00	-15.10	AVG	



Temperature :	25 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 5



Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1500	37.25	10.05	47.30	65.99	-18.69	QP	
2		0.1500	23.71	10.05	33.76	55.99	-22.23	AVG	
3		0.5380	23.15	10.12	33.27	56.00	-22.73	QP	
4		0.5380	20.90	10.12	31.02	46.00	-14.98	AVG	
5		1.3740	23.59	10.17	33.76	56.00	-22.24	QP	
6		1.3740	11.86	10.17	22.03	46.00	-23.97	AVG	
7		2.2340	19.14	10.18	29.32	56.00	-26.68	QP	
8		2.2340	12.51	10.18	22.69	46.00	-23.31	AVG	
9	*	6.3420	36.98	10.09	47.07	60.00	-12.93	QP	
10		6.3420	21.18	10.09	31.27	50.00	-18.73	AVG	
11		17.4740	33.35	10.16	43.51	60.00	-16.49	QP	
12		17.4780	25.30	10.16	35.46	50.00	-14.54	AVG	



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 (microvolt/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 / 1 MHz 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 EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height 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.
- 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter.
- Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

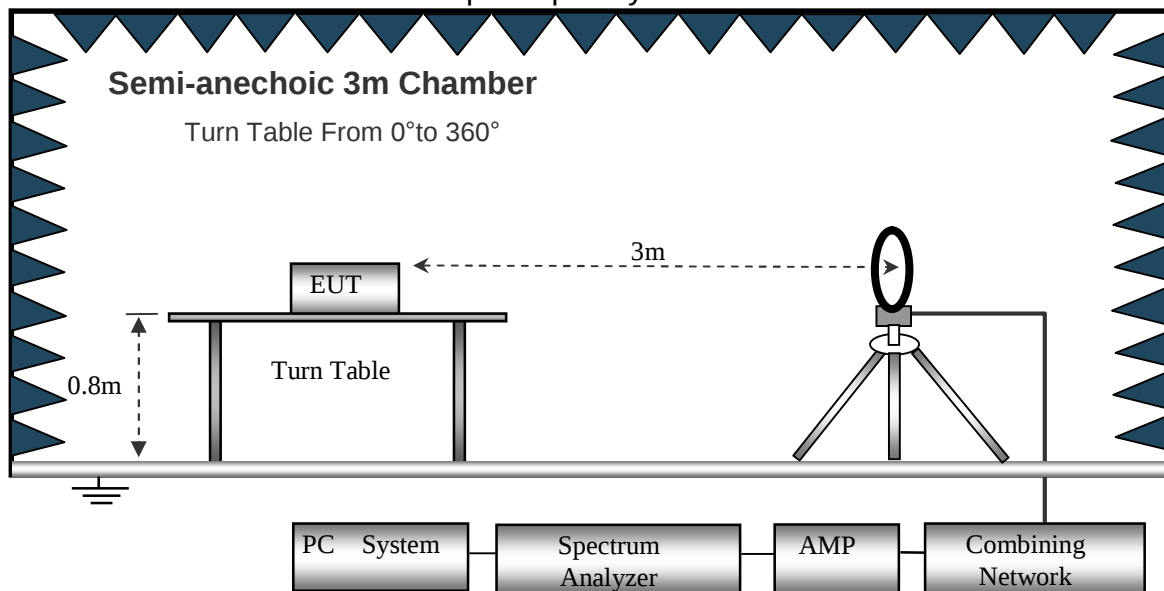
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3. DEVIATION FROM TEST STANDARD

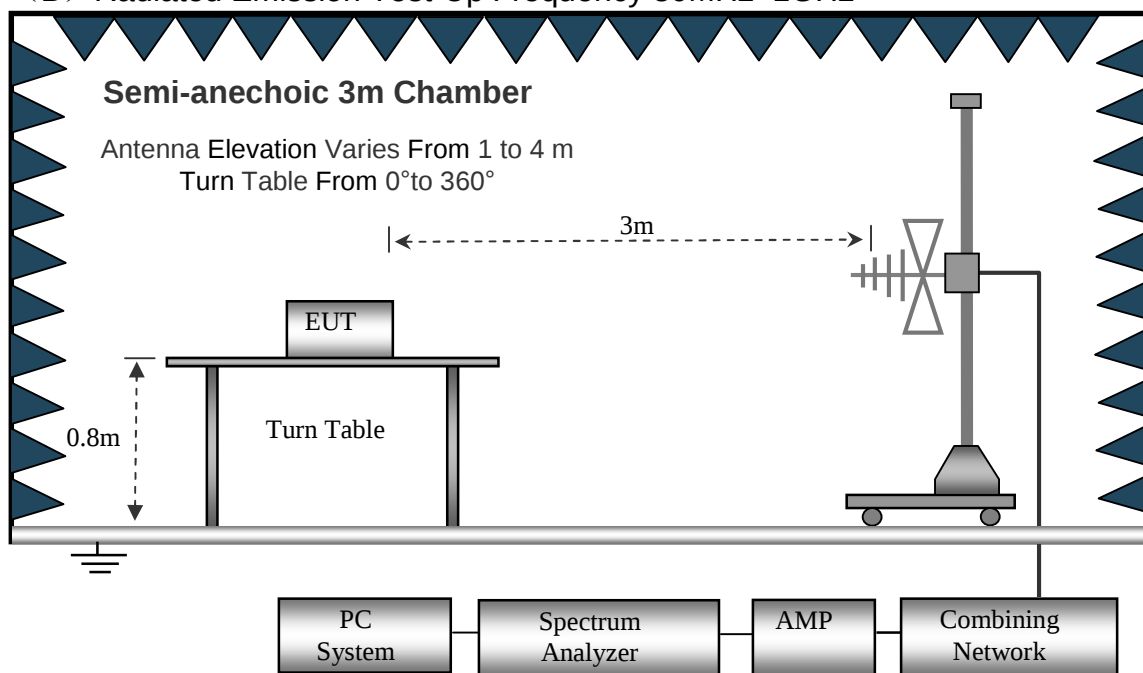
No deviation

4.2.4. TEST SETUP

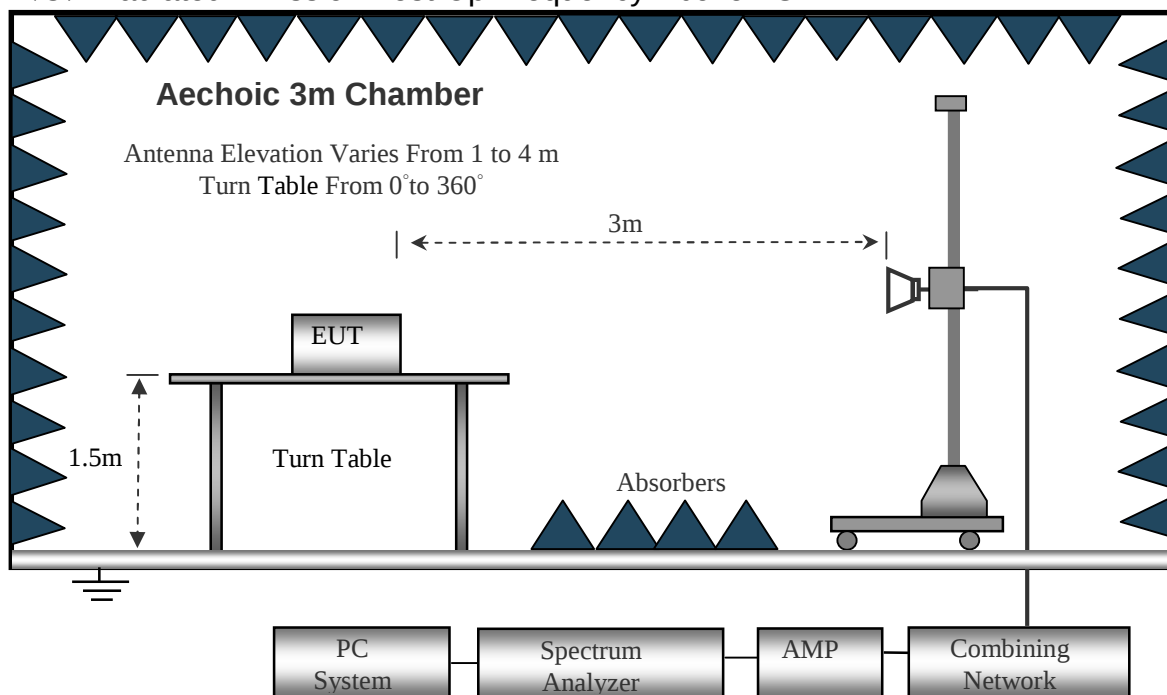
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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)

Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	---
Test Voltage :	DC 5V		
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.

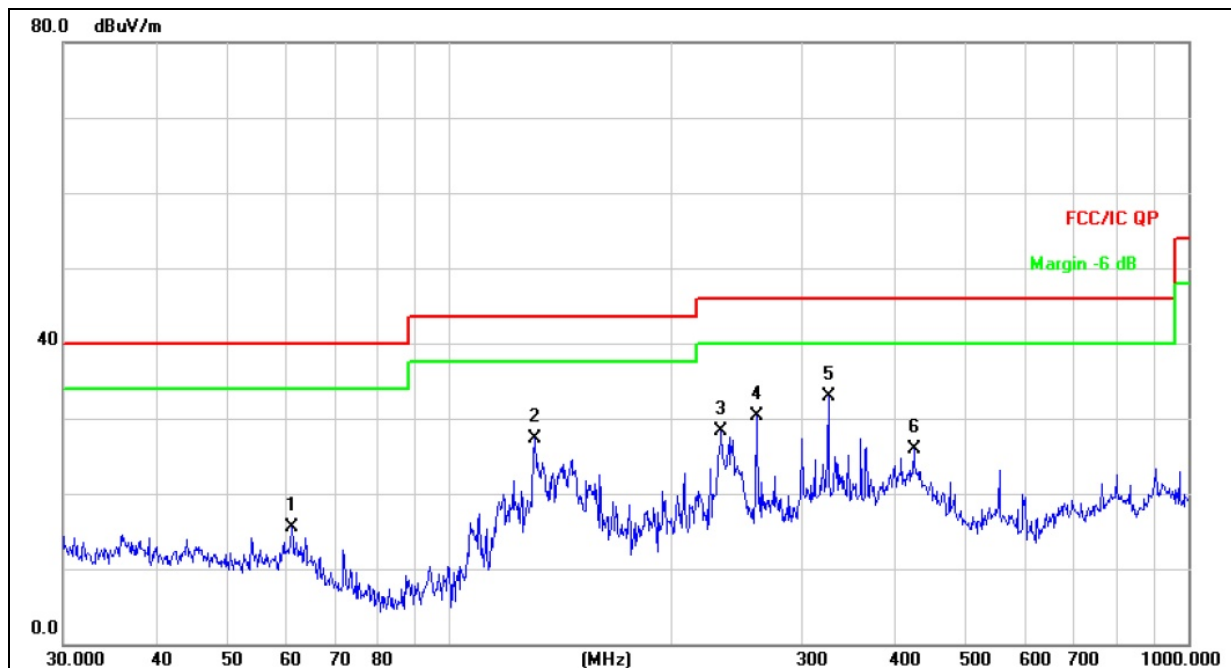
Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

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



Radiated Spurious Emission (Between 30MHz – 1GHz)

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 5V		
Test Mode : (Worst)	Link Mode		



Remark:

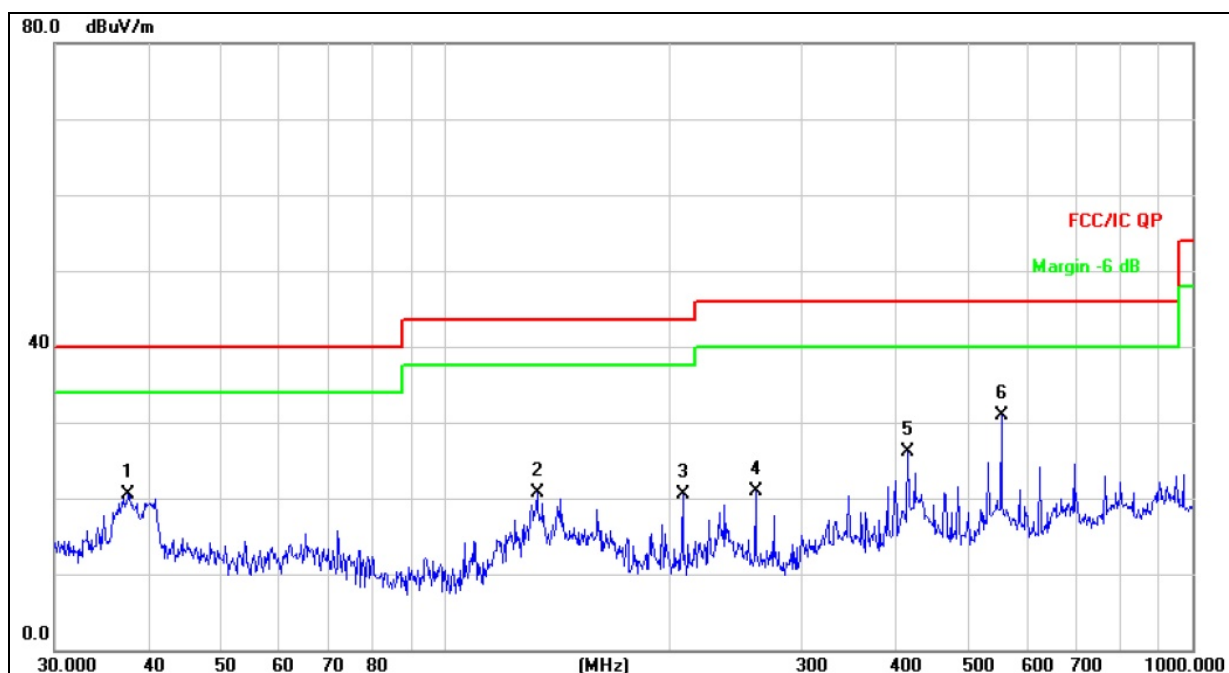
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

All interfaces was connected, and BT TX mode was link.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		61.1316	27.34	-11.75	15.59	40.00	-24.41	QP
2		130.3789	41.38	-14.08	27.30	43.50	-16.20	QP
3		233.3487	43.13	-14.87	28.26	46.00	-17.74	QP
4		260.1444	44.18	-13.91	30.27	46.00	-15.73	QP
5	*	325.5958	44.80	-11.92	32.88	46.00	-13.12	QP
6		425.0280	35.44	-9.60	25.84	46.00	-20.16	QP



Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 5V		
Test Mode : (Worst)	Link Mode		



Remark:

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

All interfaces was connected, and BT TX mode was link.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		37.6798	29.26	-8.74	20.52	40.00	-19.48	QP
2		132.6850	34.52	-13.91	20.61	43.50	-22.89	QP
3		207.8501	36.40	-15.98	20.42	43.50	-23.08	QP
4		260.1444	34.76	-13.91	20.85	46.00	-25.15	QP
5		416.1791	35.90	-9.83	26.07	46.00	-19.93	QP
6	*	554.8254	37.84	-6.96	30.88	46.00	-15.12	QP



Radiated Spurious Emission (Above 1GHz)

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/ m)	Margin (dB)	Detector Type
802.11a Band 1 Operation frequency:5180									
V	10360.00	57.31	39.55	17.85	26.83	62.44	74	-11.56	PK
V	10360.00	38.29	39.55	17.85	26.83	43.42	54	-10.58	AV
V	15540.00	52.36	38.33	18.63	28.21	60.87	74	-13.13	PK
V	15540.00	34.78	38.33	18.63	28.21	43.29	54	-10.71	AV
V	25450.00	37.13	37.23	20.36	30.35	50.61	74	-23.39	PK
H	10360.00	57.82	39.55	17.85	26.83	62.95	74	-11.05	PK
H	10360.00	38.75	39.55	17.85	26.83	43.88	54	-10.12	AV
H	15540.00	52.55	38.33	18.63	28.21	61.06	74	-12.94	PK
H	15540.00	34.01	38.33	18.63	28.21	42.52	54	-11.48	AV
H	25450.00	37.11	37.23	20.36	30.35	50.59	74	-23.41	PK
802.11a Band 1 Operation frequency:5200									
V	10400.00	57.64	39.61	17.89	26.89	62.81	74	-11.19	PK
V	10400.00	38.96	39.61	17.89	26.89	44.13	54	-9.87	AV
V	15600.00	52.75	38.47	18.67	28.27	61.22	74	-12.78	PK
V	15600.00	34.56	38.47	18.67	28.27	43.03	54	-10.97	AV
V	25450.00	37.62	37.23	20.36	30.35	51.10	74	-22.90	PK
H	10400.00	56.97	39.61	17.89	26.89	62.14	74	-11.86	PK
H	10400.00	37.84	39.61	17.89	26.89	43.01	54	-10.99	AV
H	15600.00	52.36	38.47	18.67	28.27	60.83	74	-13.17	PK
H	15600.00	34.12	38.47	18.67	28.27	42.59	54	-11.41	AV
H	25450.00	38.00	37.23	20.36	30.35	51.48	74	-22.52	PK
802.11a Band 1 Operation frequency:5240									
V	10480.00	56.84	39.69	17.93	26.94	62.02	74	-11.98	PK
V	10480.00	38.69	39.69	17.93	26.94	43.87	54	-10.13	AV
V	15720.00	52.29	38.53	18.73	28.32	60.81	74	-13.19	PK
V	15720.00	34.31	38.53	18.73	28.32	42.83	54	-11.17	AV
V	25450.00	37.40	37.23	20.36	30.35	50.88	74	-23.12	PK
H	10480.00	56.73	39.69	17.93	26.94	61.91	74	-12.09	PK
H	10480.00	39.29	39.69	17.93	26.94	44.47	54	-9.53	AV
H	15720.00	52.20	38.53	18.73	28.32	60.72	74	-13.28	PK
H	15720.00	34.21	38.53	18.73	28.32	42.73	54	-11.27	AV
H	25450.00	36.32	37.23	20.36	30.35	49.80	74	-24.20	PK
Remark: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/ m)	(dB)	
802.11n(HT20) Band 1 Operation frequency:5180									
V	10360.00	56.98	39.55	17.85	26.83	62.11	74	-11.89	PK
V	10360.00	38.07	39.55	17.85	26.83	43.20	54	-10.80	AV
V	15540.00	52.06	38.33	18.63	28.21	60.57	74	-13.43	PK
V	15540.00	34.58	38.33	18.63	28.21	43.09	54	-10.91	AV
V	25450.00	37.56	37.23	20.36	30.35	51.04	74	-22.96	PK
H	10360.00	57.49	39.55	17.85	26.83	62.62	74	-11.38	PK
H	10360.00	39.52	39.55	17.85	26.83	44.65	54	-9.35	AV
H	15540.00	52.25	38.33	18.63	28.21	60.76	74	-13.24	PK
H	15540.00	33.82	38.33	18.63	28.21	42.33	54	-11.67	AV
H	25450.00	36.91	37.23	20.36	30.35	50.39	74	-23.61	PK
802.11n(HT20) Band 1 Operation frequency:5200									
V	10400.00	57.31	39.61	17.89	26.89	62.48	74	-11.52	PK
V	10400.00	38.74	39.61	17.89	26.89	43.91	54	-10.09	AV
V	15600.00	52.45	38.47	18.67	28.27	60.92	74	-13.08	PK
V	15600.00	34.36	38.47	18.67	28.27	42.83	54	-11.17	AV
V	25450.00	37.35	37.23	20.36	30.35	50.83	74	-23.17	PK
H	10400.00	57.64	39.61	17.89	26.89	62.81	74	-11.19	PK
H	10400.00	38.62	39.61	17.89	26.89	43.79	54	-10.21	AV
H	15600.00	52.06	38.47	18.67	28.27	60.53	74	-13.47	PK
H	15600.00	33.93	38.47	18.67	28.27	42.40	54	-11.60	AV
H	25450.00	36.76	37.23	20.36	30.35	50.24	74	-23.76	PK
802.11n(HT20) Band 1 Operation frequency:5240									
V	10480.00	57.07	39.69	17.93	26.94	62.25	74	-11.75	PK
V	10480.00	37.85	39.69	17.93	26.94	43.03	54	-10.97	AV
V	15720.00	52.50	38.53	18.73	28.32	61.02	74	-12.98	PK
V	15720.00	34.45	38.53	18.73	28.32	42.97	54	-11.03	AV
V	25450.00	37.59	37.23	20.36	30.35	51.07	74	-22.93	PK
H	10480.00	56.96	39.69	17.93	26.94	62.14	74	-11.86	PK
H	10480.00	38.45	39.69	17.93	26.94	43.63	54	-10.37	AV
H	15720.00	52.41	38.53	18.73	28.32	60.93	74	-13.07	PK
H	15720.00	34.35	38.53	18.73	28.32	42.87	54	-11.13	AV
H	25450.00	37.44	37.23	20.36	30.35	50.92	74	-23.08	PK
Remark: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/ m)	(dB)	
802.11n(HT40) Band 1 Operation frequency:5190									
V	10380.00	57.03	39.55	17.85	26.83	62.16	74	-11.84	PK
V	10380.00	38.10	39.55	17.85	26.83	43.23	54	-10.77	AV
V	15570.00	52.10	38.33	18.63	28.21	60.61	74	-13.39	PK
V	15570.00	33.61	38.33	18.63	28.21	42.12	54	-11.88	AV
V	25450.00	37.60	37.23	20.36	30.35	51.08	74	-22.92	PK
H	10380.00	57.54	39.55	17.85	26.83	62.67	74	-11.33	PK
H	10380.00	38.56	39.55	17.85	26.83	43.69	54	-10.31	AV
H	15570.00	52.29	38.33	18.63	28.21	60.80	74	-13.20	PK
H	15570.00	34.84	38.33	18.63	28.21	43.35	54	-10.65	AV
H	25450.00	36.88	37.23	20.36	30.35	50.36	74	-23.64	PK
802.11n(HT40) Band 1 Operation frequency:5230									
V	10460.00	57.01	39.69	17.93	26.94	62.19	74	-11.81	PK
V	10460.00	38.48	39.69	17.93	26.94	43.66	54	-10.34	AV
V	15690.00	52.45	38.53	18.73	28.32	60.97	74	-13.03	PK
V	15690.00	33.39	38.53	18.73	28.32	41.91	54	-12.09	AV
V	25450.00	37.39	37.23	20.36	30.35	50.87	74	-23.13	PK
H	10460.00	57.01	39.69	17.93	26.94	62.19	74	-11.81	PK
H	10460.00	38.48	39.69	17.93	26.94	43.66	54	-10.34	AV
H	15690.00	52.45	38.53	18.73	28.32	60.97	74	-13.03	PK
H	15690.00	34.38	38.53	18.73	28.32	42.90	54	-11.10	AV
H	25450.00	37.78	37.23	20.36	30.35	51.26	74	-22.74	PK
802.11n(HT80) Band 1Operation frequency:5210									
V	10420.00	56.69	39.61	17.89	26.89	61.86	74	-12.14	PK
V	10420.00	38.65	39.61	17.89	26.89	43.82	54	-10.18	AV
V	15630.00	52.10	38.47	18.67	28.27	60.57	74	-13.43	PK
V	15630.00	33.95	38.47	18.67	28.27	42.42	54	-11.58	AV
V	25450.00	37.63	37.23	20.36	30.35	51.11	74	-22.89	PK
H	10420.00	56.69	39.61	17.89	26.89	61.86	74	-12.14	PK
H	10420.00	38.65	39.61	17.89	26.89	43.82	54	-10.18	AV
H	15630.00	52.10	38.47	18.67	28.27	60.57	74	-13.43	PK
H	15630.00	33.95	38.47	18.67	28.27	42.42	54	-11.58	AV
H	25450.00	37.23	37.23	20.36	30.35	50.71	74	-23.29	PK
Remark: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/ m)	(dB)	
802.11a Band 4 Operation frequency:5745									
V	11490.00	57.12	39.73	18.19	27.31	62.89	74	-11.11	PK
V	11490.00	38.16	39.73	18.19	27.31	43.93	54	-10.07	AV
V	17235.00	53.18	38.59	18.92	28.41	61.92	74	-12.08	PK
V	17235.00	33.67	38.59	18.92	28.41	42.41	54	-11.59	AV
V	25450.00	37.17	37.23	20.36	30.35	50.65	74	-23.35	PK
H	11490.00	57.63	39.73	18.19	27.31	63.40	74	-10.60	PK
H	11490.00	38.62	39.73	18.19	27.31	44.39	54	-9.61	AV
H	17235.00	53.37	38.59	18.92	28.41	62.11	74	-11.89	PK
H	17235.00	33.90	38.59	18.92	28.41	42.64	54	-11.36	AV
H	25450.00	36.95	37.23	20.36	30.35	50.43	74	-23.57	PK
802.11a Band 4 Operation frequency:5785									
V	11570.00	57.45	39.76	18.25	27.39	63.33	74	-10.67	PK
V	11570.00	38.83	39.76	18.25	27.39	44.71	54	-9.29	AV
V	17355.00	53.57	38.62	19.16	28.48	62.59	74	-11.41	PK
V	17355.00	33.45	38.62	19.16	28.48	42.47	54	-11.53	AV
V	25450.00	37.46	37.23	20.36	30.35	50.94	74	-23.06	PK
H	11570.00	56.78	39.76	18.25	27.39	62.66	74	-11.34	PK
H	11570.00	38.71	39.76	18.25	27.39	44.59	54	-9.41	AV
H	17355.00	53.18	38.62	19.16	28.48	62.20	74	-11.80	PK
H	17355.00	34.01	38.62	19.16	28.48	43.03	54	-10.97	AV
H	25450.00	37.84	37.23	20.36	30.35	51.32	74	-22.68	PK
802.11a Band 4 Operation frequency:5825									
V	11650.00	57.21	39.79	18.32	27.42	63.16	74	-10.84	PK
V	11650.00	37.94	39.79	18.32	27.42	43.89	54	-10.11	AV
V	17475.00	53.62	38.66	19.24	28.53	62.73	74	-11.27	PK
V	17475.00	33.54	38.66	19.24	28.53	42.65	54	-11.35	AV
V	25450.00	37.70	37.23	20.36	30.35	51.18	74	-22.82	PK
H	11650.00	57.10	39.79	18.32	27.42	63.05	74	-10.95	PK
H	11650.00	38.54	39.79	18.32	27.42	44.49	54	-9.51	AV
H	17475.00	52.54	38.66	19.24	28.53	61.65	74	-12.35	PK
H	17475.00	33.44	38.66	19.24	28.53	42.55	54	-11.45	AV
H	25450.00	37.61	37.23	20.36	30.35	51.09	74	-22.91	PK
Remark: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/ m)	(dB)	
802.11n(HT20) Band 4 Operation frequency:5745									
V	11490.00	57.19	39.73	18.19	27.31	62.96	74	-11.04	PK
V	11490.00	38.21	39.73	18.19	27.31	43.98	54	-10.02	AV
V	17235.00	53.25	38.59	18.92	28.41	61.99	74	-12.01	PK
V	17235.00	34.71	38.59	18.92	28.41	43.45	54	-10.55	AV
V	25450.00	37.73	37.23	20.36	30.35	51.21	74	-22.79	PK
H	11490.00	57.70	39.73	18.19	27.31	63.47	74	-10.53	PK
H	11490.00	38.67	39.73	18.19	27.31	44.44	54	-9.56	AV
H	17235.00	53.44	38.59	18.92	28.41	62.18	74	-11.82	PK
H	17235.00	33.94	38.59	18.92	28.41	42.68	54	-11.32	AV
H	25450.00	37.01	37.23	20.36	30.35	50.49	74	-23.51	PK
802.11n(HT20) Band 4 Operation frequency:5785									
V	11570.00	57.52	39.76	18.25	27.39	63.40	74	-10.60	PK
V	11570.00	37.88	39.76	18.25	27.39	43.76	54	-10.24	AV
V	17355.00	53.64	38.62	19.16	28.48	62.66	74	-11.34	PK
V	17355.00	34.49	38.62	19.16	28.48	43.51	54	-10.49	AV
V	25450.00	37.52	37.23	20.36	30.35	51.00	74	-23.00	PK
H	11570.00	57.85	39.76	18.25	27.39	63.73	74	-10.27	PK
H	11570.00	38.76	39.76	18.25	27.39	44.64	54	-9.36	AV
H	17355.00	53.25	38.62	19.16	28.48	62.27	74	-11.73	PK
H	17355.00	34.05	38.62	19.16	28.48	43.07	54	-10.93	AV
H	25450.00	37.90	37.23	20.36	30.35	51.38	74	-22.62	PK
802.11n(HT20) Band 4 Operation frequency:5825									
V	11650.00	57.28	39.79	18.32	27.42	63.23	74	-10.77	PK
V	11650.00	37.99	39.79	18.32	27.42	43.94	54	-10.06	AV
V	17475.00	53.69	38.66	19.24	28.53	62.80	74	-11.20	PK
V	17475.00	34.58	38.66	19.24	28.53	43.69	54	-10.31	AV
V	25450.00	37.76	37.23	20.36	30.35	51.24	74	-22.76	PK
H	11650.00	57.17	39.79	18.32	27.42	63.12	74	-10.88	PK
H	11650.00	38.59	39.79	18.32	27.42	44.54	54	-9.46	AV
H	17475.00	53.60	38.66	19.24	28.53	62.71	74	-11.29	PK
H	17475.00	34.48	38.66	19.24	28.53	43.59	54	-10.41	AV
H	25450.00	38.67	37.23	20.36	30.35	52.15	74	-21.85	PK
Remark: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/ m)	(dB)	
802.11n(HT40) Band 4 Operation frequency:5755									
V	11510.00	56.96	39.73	18.19	27.31	62.73	74	-11.27	PK
V	11510.00	38.06	39.73	18.19	27.31	43.83	54	-10.17	AV
V	17265.00	53.03	38.59	18.92	28.41	61.77	74	-12.23	PK
V	17265.00	32.58	38.59	18.92	28.41	41.32	54	-12.68	AV
V	25450.00	37.54	37.23	20.36	30.35	51.02	74	-22.98	PK
H	11510.00	57.47	39.73	18.19	27.31	63.24	74	-10.76	PK
H	11510.00	38.51	39.73	18.19	27.31	44.28	54	-9.72	AV
H	17265.00	53.22	38.59	18.92	28.41	61.96	74	-12.04	PK
H	17265.00	33.80	38.59	18.92	28.41	42.54	54	-11.46	AV
H	25450.00	36.82	37.23	20.36	30.35	50.30	74	-23.70	PK
802.11n(HT40) Band 4 Operation frequency:5795									
V	11590.00	57.29	39.76	18.25	27.39	63.17	74	-10.83	PK
V	11590.00	38.72	39.76	18.25	27.39	44.60	54	-9.40	AV
V	17385.00	53.42	38.62	19.16	28.48	62.44	74	-11.56	PK
V	17385.00	33.36	38.62	19.16	28.48	42.38	54	-11.62	AV
V	25450.00	37.33	37.23	20.36	30.35	50.81	74	-23.19	PK
H	11590.00	57.62	39.76	18.25	27.39	63.50	74	-10.50	PK
H	11590.00	37.61	39.76	18.25	27.39	43.49	54	-10.51	AV
H	17385.00	53.03	38.62	19.16	28.48	62.05	74	-11.95	PK
H	17385.00	33.91	38.62	19.16	28.48	42.93	54	-11.07	AV
H	25450.00	37.71	37.23	20.36	30.35	51.19	74	-22.81	PK
802.11ac(HT80) Band 4 Operation frequency:5775									
V	11550.00	57.05	39.76	18.25	27.39	62.93	74	-11.07	PK
V	11550.00	37.84	39.76	18.25	27.39	43.72	54	-10.28	AV
V	17325.00	53.47	38.62	19.16	28.48	62.49	74	-11.51	PK
V	17325.00	34.44	38.62	19.16	28.48	43.46	54	-10.54	AV
V	25450.00	37.57	37.23	20.36	30.35	51.05	74	-22.95	PK
H	11550.00	56.94	39.76	18.25	27.39	62.82	74	-11.18	PK
H	11550.00	38.43	39.76	18.25	27.39	44.31	54	-9.69	AV
H	17325.00	53.38	38.62	19.16	28.48	62.40	74	-11.60	PK
H	17325.00	32.35	38.62	19.16	28.48	41.37	54	-12.63	AV
H	25450.00	36.48	37.23	20.36	30.35	49.96	74	-24.04	PK
Remark: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit 2. If peak below the average limit, the average emission was no test. 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.									



5. BAND EDGE COMPLIANCE TEST

5.1. Limits

According to FCC §15.407(b)

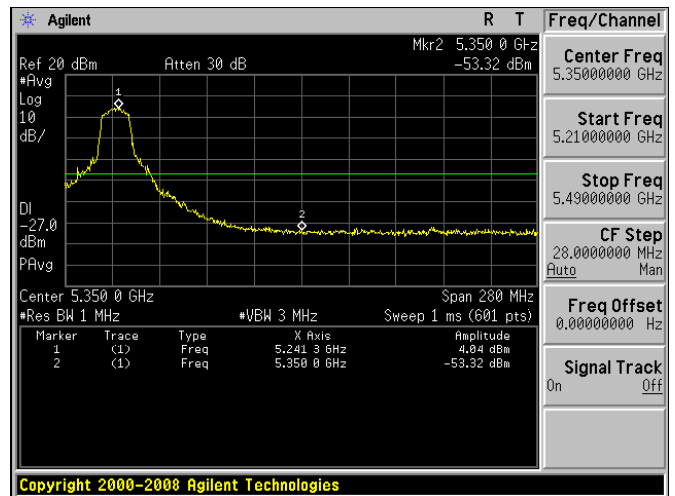
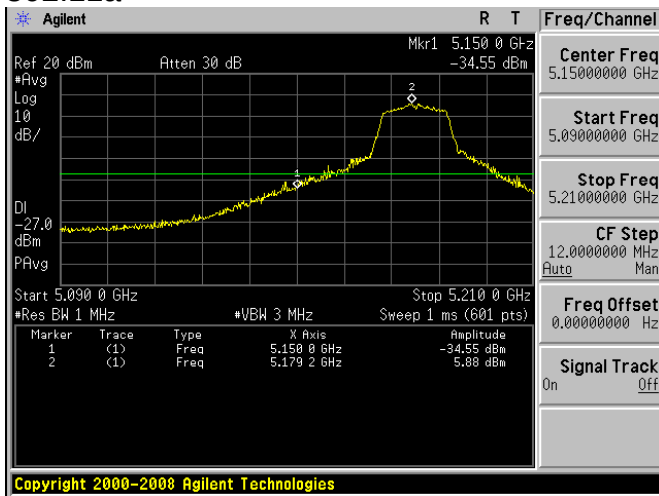
- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below 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.

5.2. TEST PROCEDURE

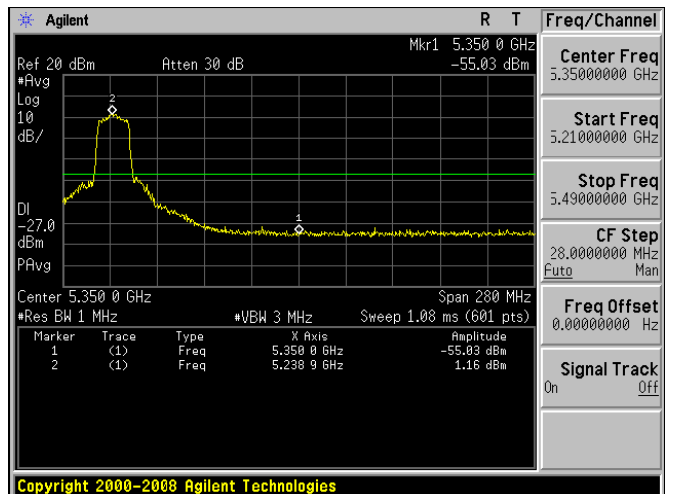
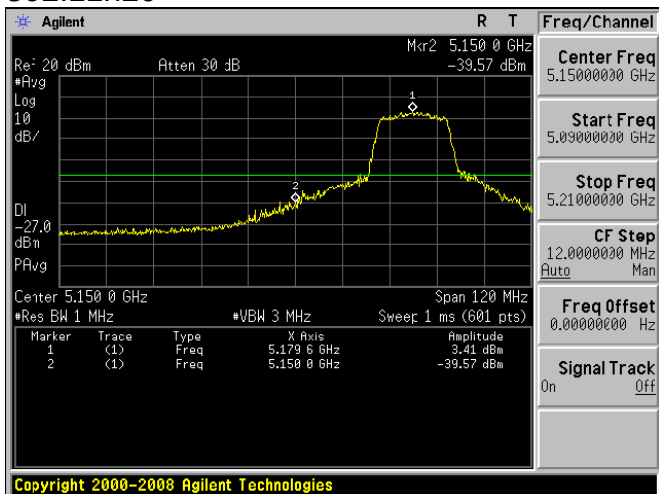
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

5.3. Test Data

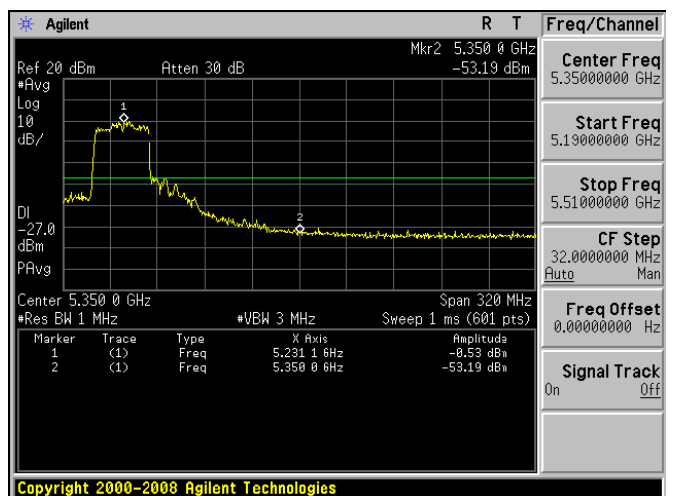
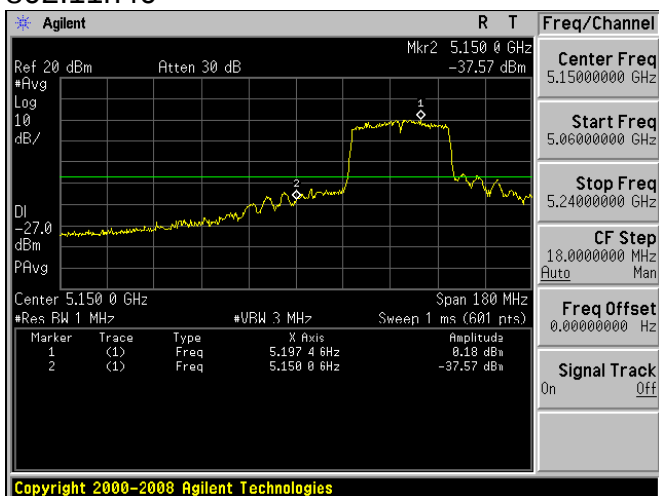
Please see data as below:

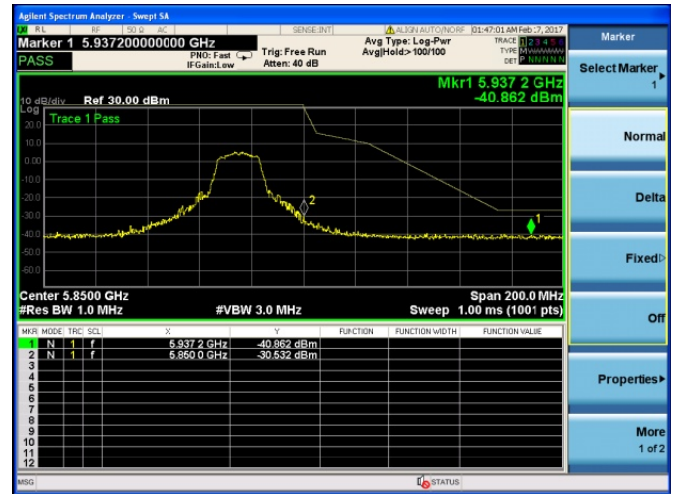
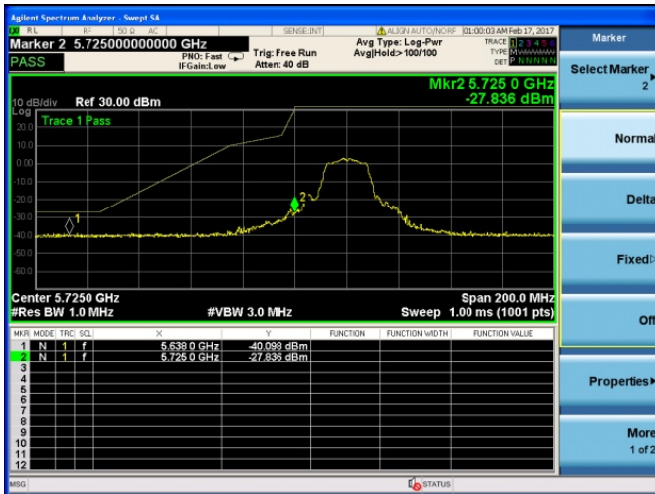
Band 1
802.11a

802.11n20

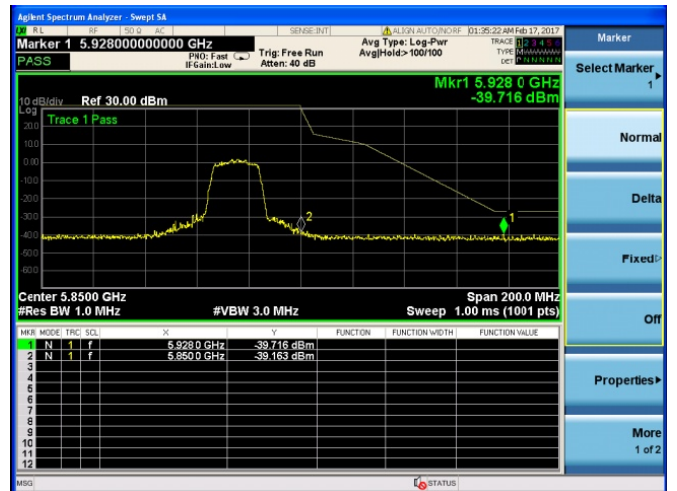
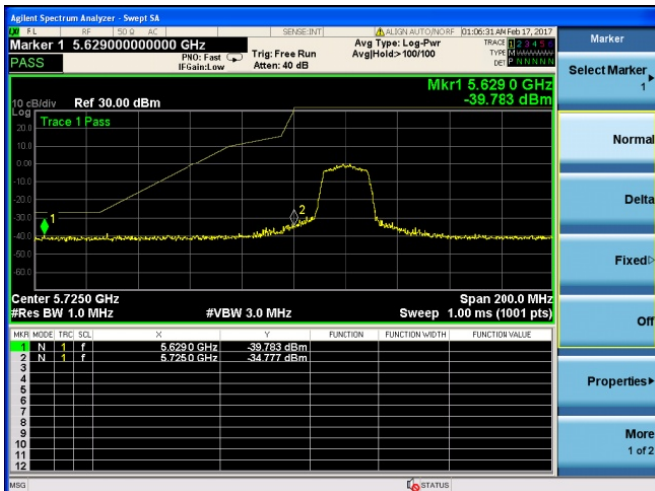


802.11n40

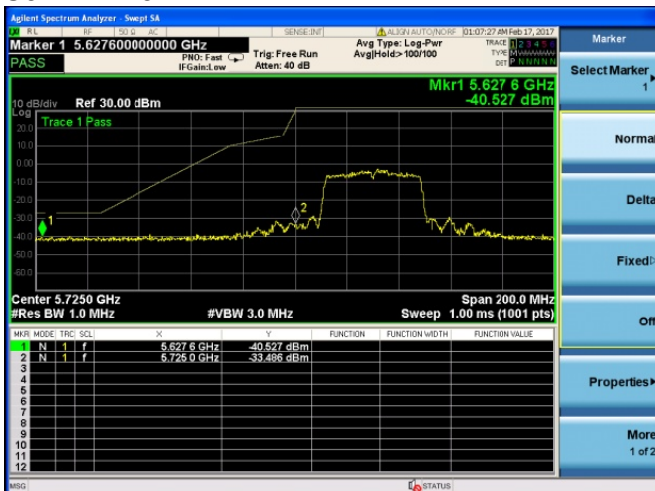


Band 4
802.11a

802.11n20

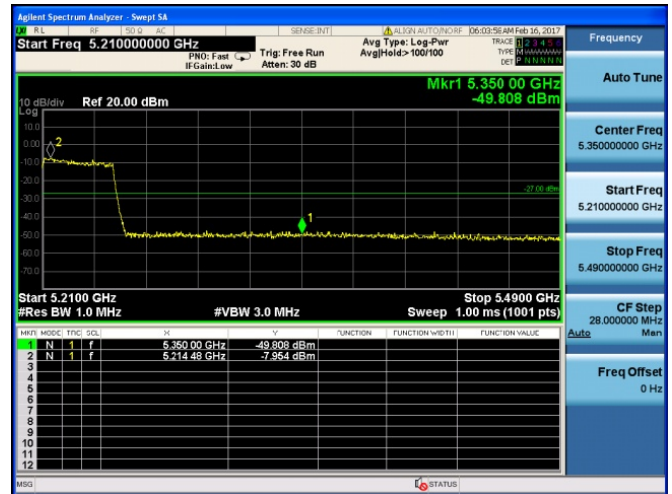
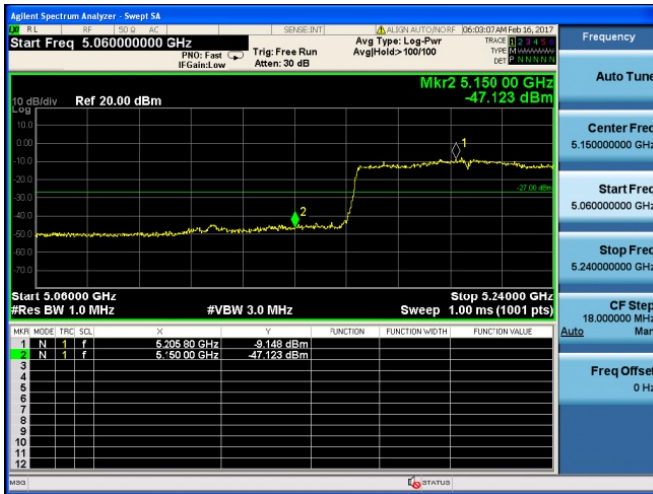


802.11n40

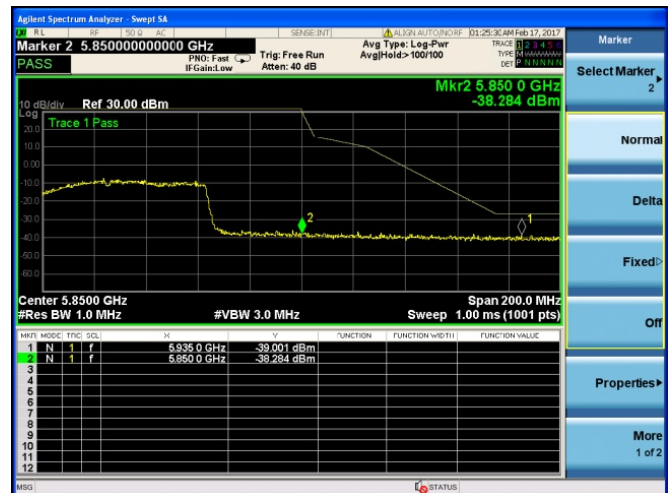
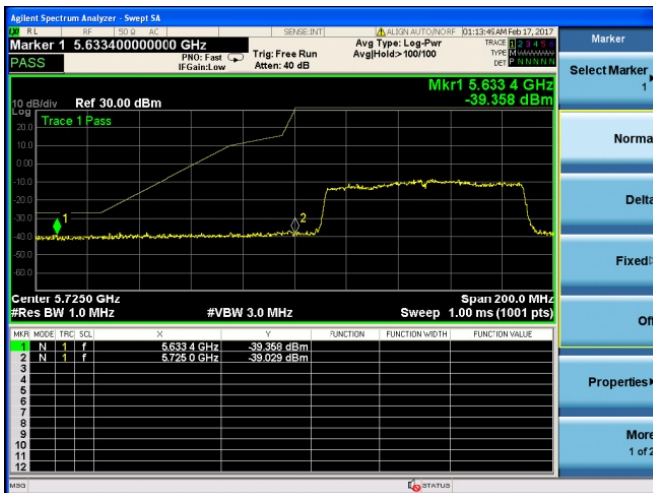




Band 1 802.11ac



Band 4 802.11ac





6. 26DB AND 99% BANDWIDTH TEST

6.1. Limits

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.

6.2. TEST PROCEDURE

- 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%.
The following procedure shall be used for measuring (99 %) power bandwidth:
 1. Set center frequency to the nominal EUT channel center frequency.
 2. Set span = 1.5 times to 5.0 times the OBW.
 3. Set RBW = 1 % to 5 % of the OBW
 4. Set VBW $\geq$ 3*RBW
 5. 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.
 6. Use the 99 % power bandwidth function of the instrument (if available).
 7. 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.



26dB bandwidth

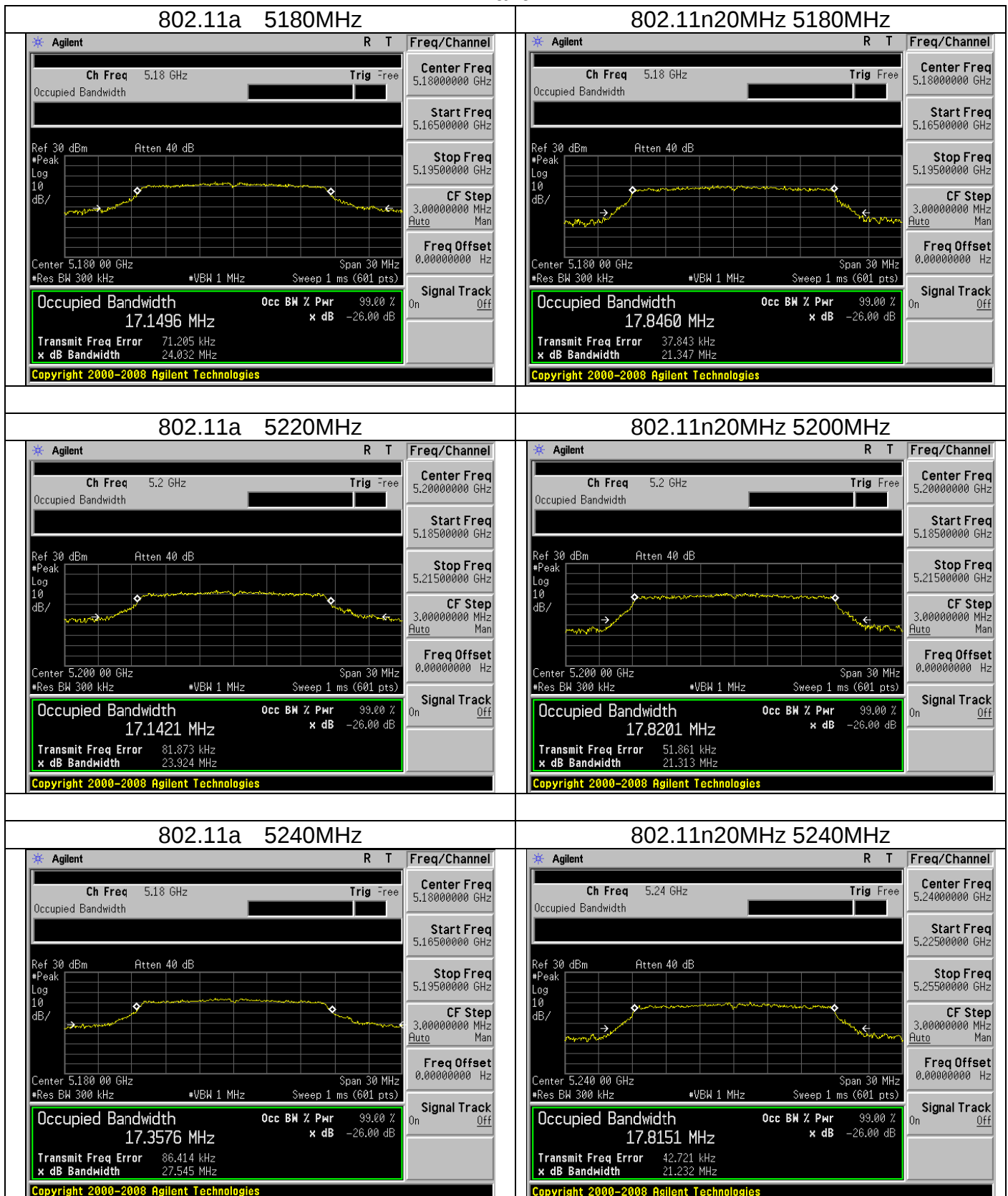
	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5180	17.150	24.032
	5200	17.142	23.924
	5240	17.358	27.55
802.11n (HT20)	5180	17.846	21.35
	5200	17.820	21.31
	5240	17.815	21.23
802.11n (HT40)	5190	36.086	39.00
	5230	36.132	38.90
802.11ac (HT80)	5210	75.346	75.53

6dB bandwidth

	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
802.11a	5745	16.32	16.57	>0.5
	5785	16.07	16.54	>0.5
	5825	16.36	16.53	>0.5
802.11n (HT20)	5745	17.62	17.59	>0.5
	5785	17.65	17.65	>0.5
	5825	17.59	17.59	>0.5
802.11n (HT40)	5755	36.41	35.99	>0.5
	5795	36.42	36.03	>0.5
802.11ac (HT80)	5775	75.96	75.29	>0.5

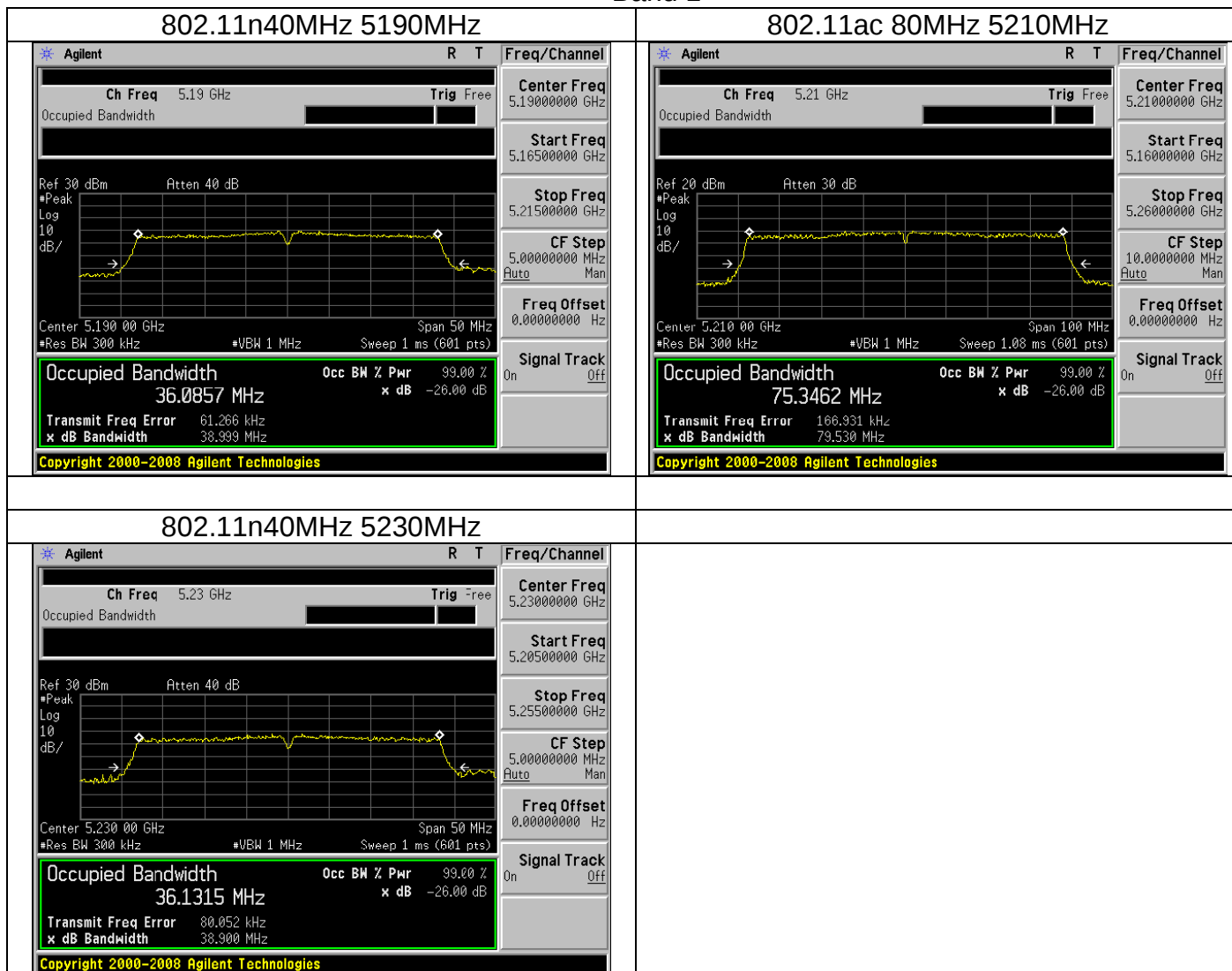


Band 1



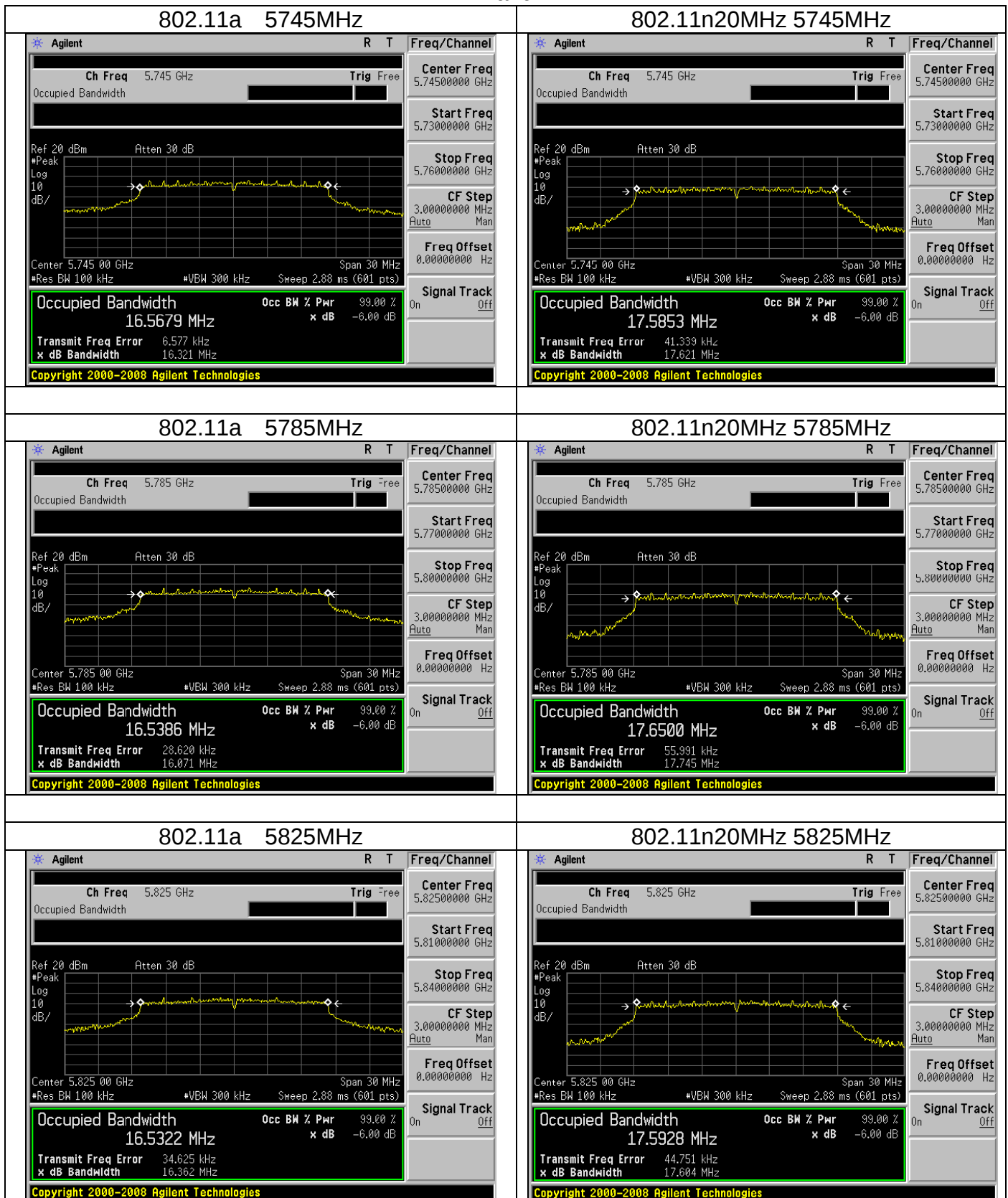


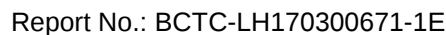
Band 1





Band 4





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

	Frequency (MHz)	Average Output Power(dBm)	Duty Factor (dB)	Total Output Power(dBm)	FCC Limit (dBm)	FCC Limit (mW)	Result
802.11a	5180	4.35	0.06	4.41	23.98	250	Pass
	5220	4.31	0.06	4.37	23.98	250	Pass
	5240	4.28	0.06	4.34	23.98	250	Pass
	5745	4.38	0.06	4.44	30.00	1000	Pass
	5785	4.39	0.06	4.45	30.00	1000	Pass
	5825	4.32	0.06	4.38	30.00	1000	Pass
802.11n (HT20)	5180	4.27	0.07	4.34	23.98	250	Pass
	5220	4.29	0.07	4.36	23.98	250	Pass
	5240	4.18	0.07	4.25	23.98	250	Pass
	5745	4.24	0.07	4.31	30.00	1000	Pass
	5785	4.21	0.07	4.28	30.00	1000	Pass
	5825	4.25	0.07	4.32	30.00	1000	Pass
802.11n (HT40)	5190	4.29	0.14	4.43	23.98	250	Pass
	5230	4.22	0.14	4.36	23.98	250	Pass
	5755	4.25	0.14	4.39	30.00	1000	Pass
	5795	4.19	0.14	4.33	30.00	1000	Pass
802.11ac (HT80)	5210	4.29	0.28	4.57	23.98	250	Pass
	5775	4.30	0.28	4.58	30.00	1000	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.
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 $10 \log(1/\text{duty cycle})$.



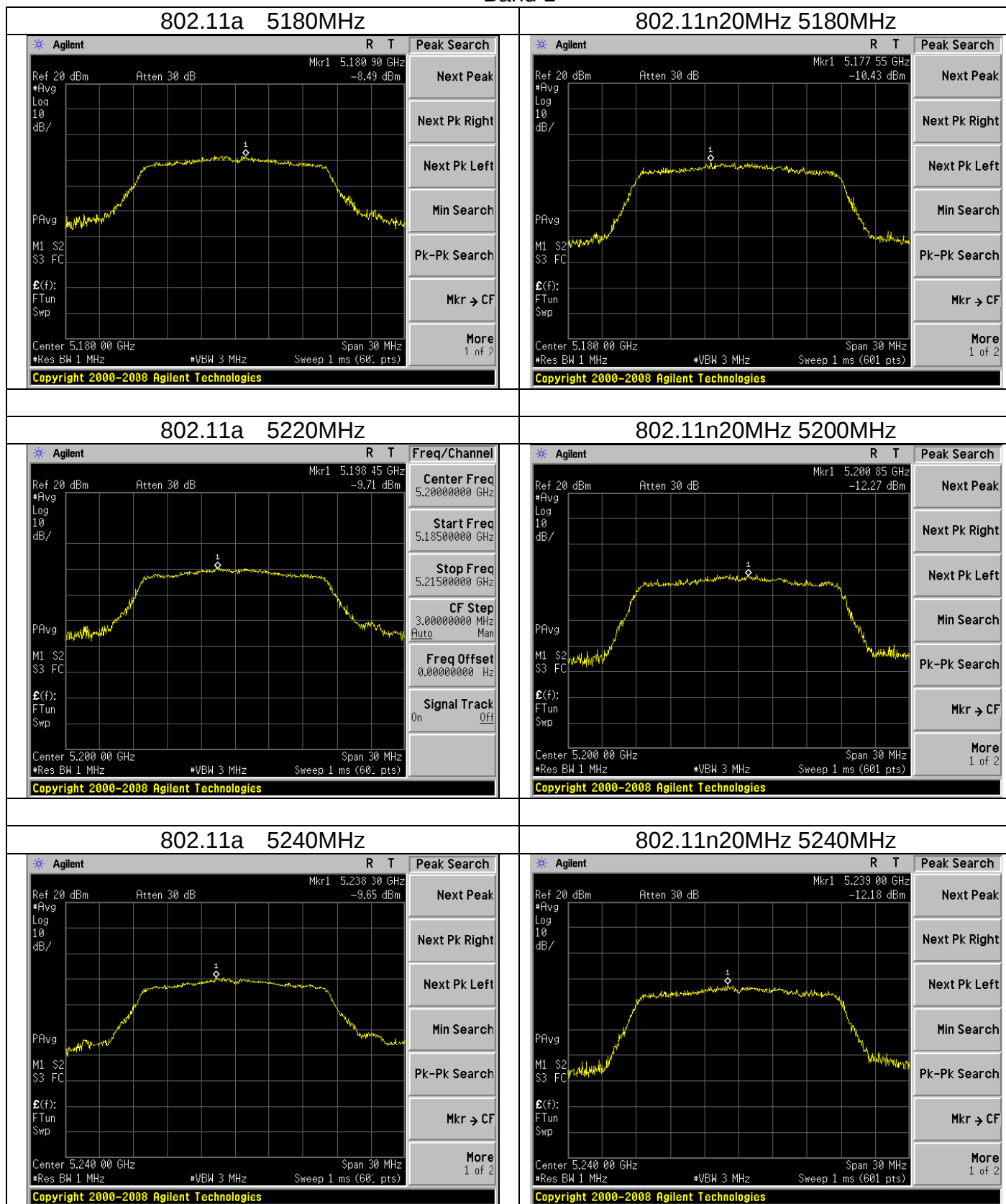
8.3. Test data

Test data as below

	Frequency (MHz)	Reading Level (dBm)	Duty factor (dB)	Duty factor 10 log (1MHz/ RBW)	PPSD (dBm)	FCC Limit (dBm)	Result
802.11a	5180	-8.49	0.06	0.0	-2.11	11.00	Pass
	5220	-9.71	0.06	0.0	-1.98	11.00	Pass
	5240	-9.65	0.06	0.0	-1.84	11.00	Pass
	5745	-4.66	0.06	2.92	-1.68	30.00	Pass
	5785	-3.95	0.06	2.92	-0.97	30.00	Pass
	5825	-3.93	0.06	2.92	-0.95	30.00	Pass
802.11n (HT20)	5180	-10.43	0.07	0.0	-2.23	11.00	Pass
	5220	-12.27	0.07	0.0	-2.09	11.00	Pass
	5240	-12.18	0.07	0.0	-2.30	11.00	Pass
	5745	-4.45	0.07	2.92	-1.46	30.00	Pass
	5785	-4.88	0.07	2.92	-1.89	30.00	Pass
	5825	-4.02	0.07	2.92	-1.03	30.00	Pass
802.11n (HT40)	5190	-13.81	0.14	0.0	-5.33	11.00	Pass
	5230	-14.88	0.14	0.0	-5.76	11.00	Pass
	5755	-5.62	0.14	2.92	-2.56	30.00	Pass
	5795	-5.41	0.14	2.92	-2.35	30.00	Pass
802.11ac (HT80)	5210	-5.24	0.28	0.0	-5.70	11.00	Pass
	5775	-6.16	0.28	2.92	-2.96	30.00	Pass

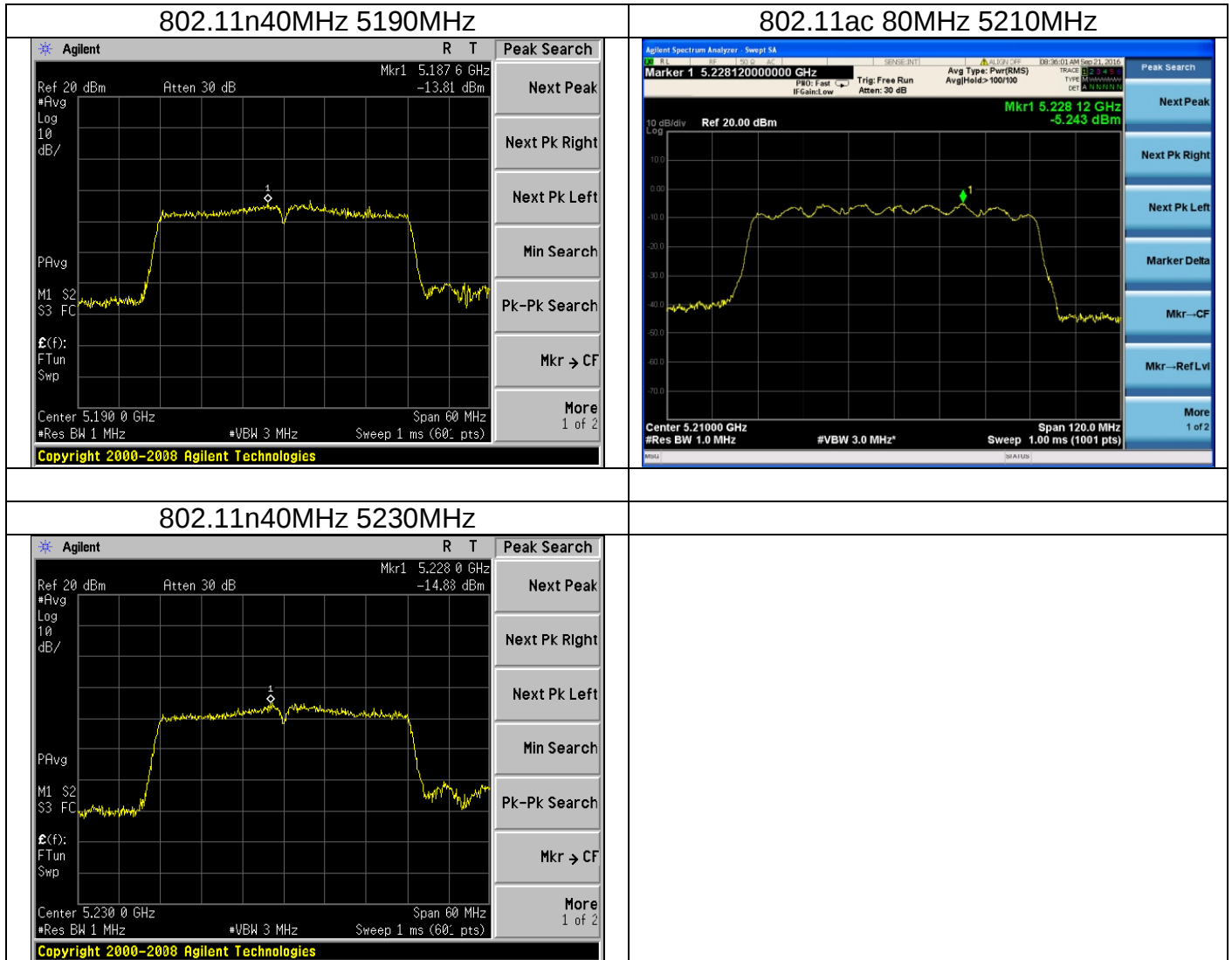


Band 1





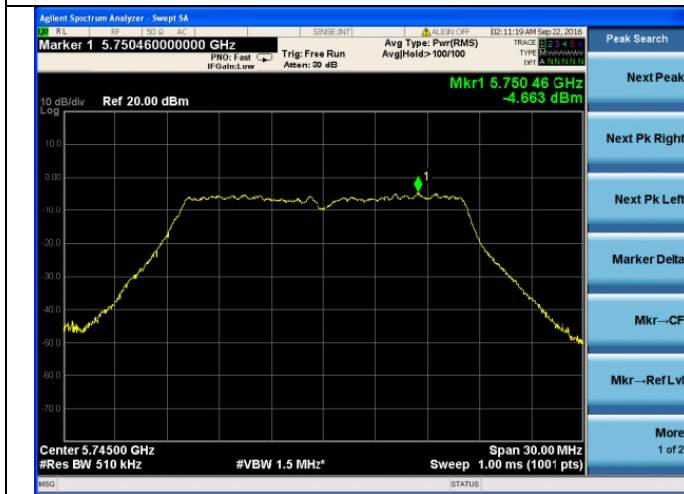
Band 1



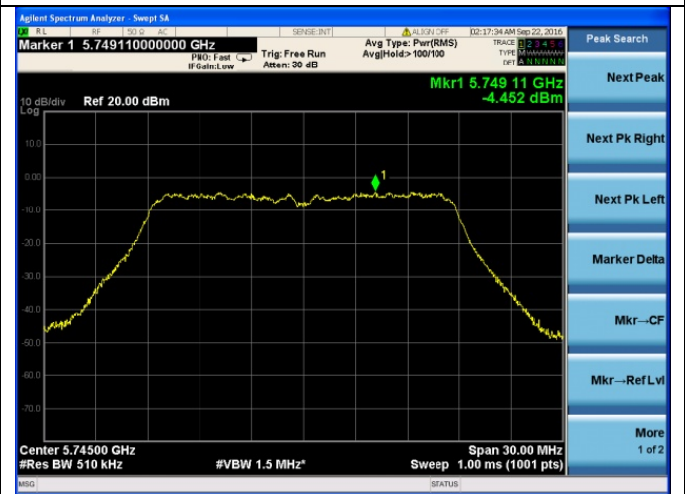


Band 4

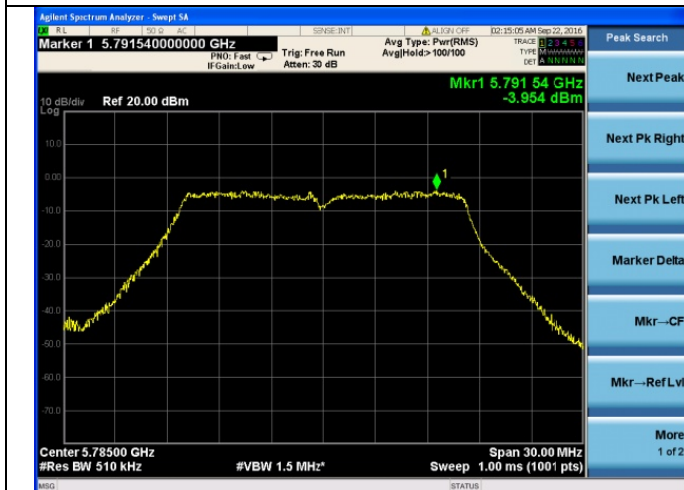
802.11a 5745MHz



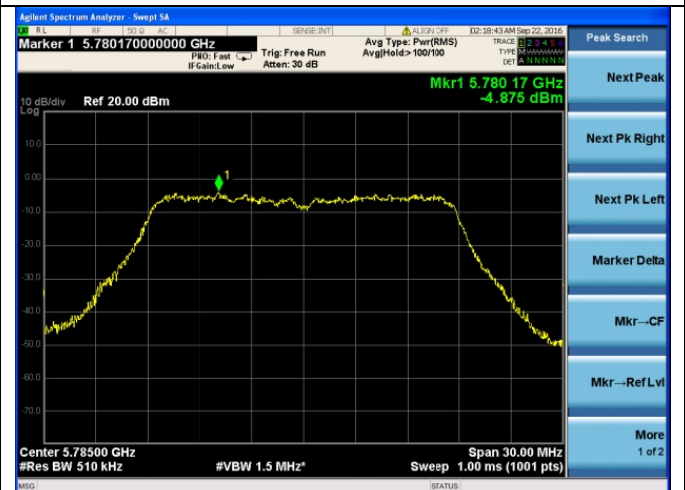
802.11n20MHz 5745MHz



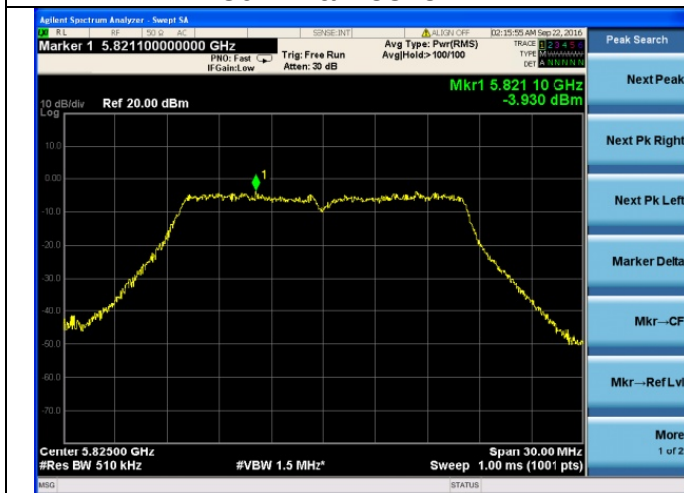
802.11a 5785MHz



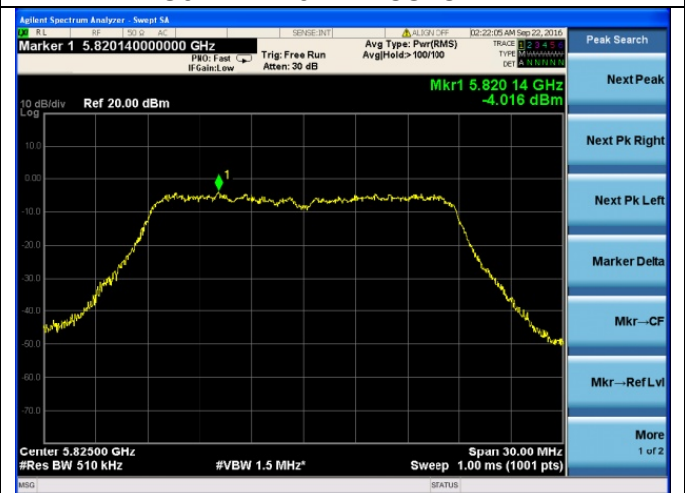
802.11n20MHz 5785MHz



802.11a 5825MHz



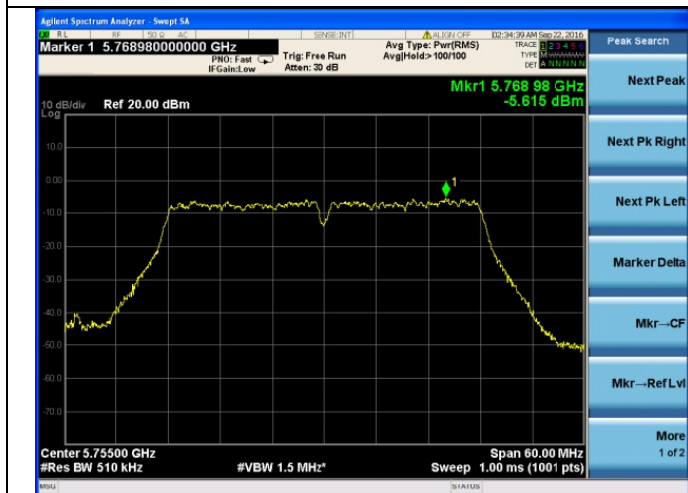
802.11n20MHz 5825MHz



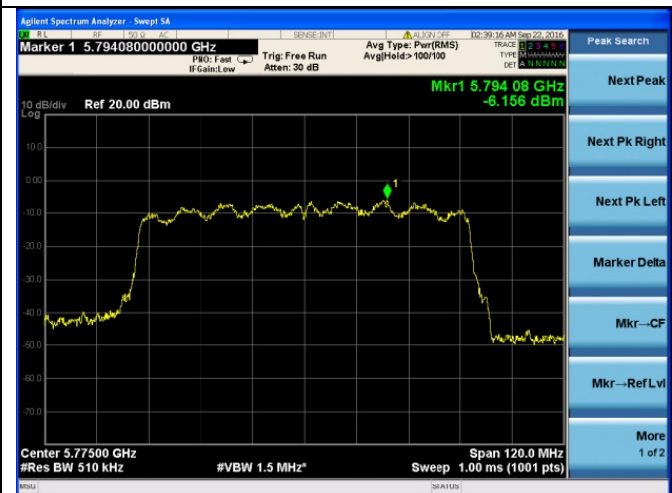


Band 4

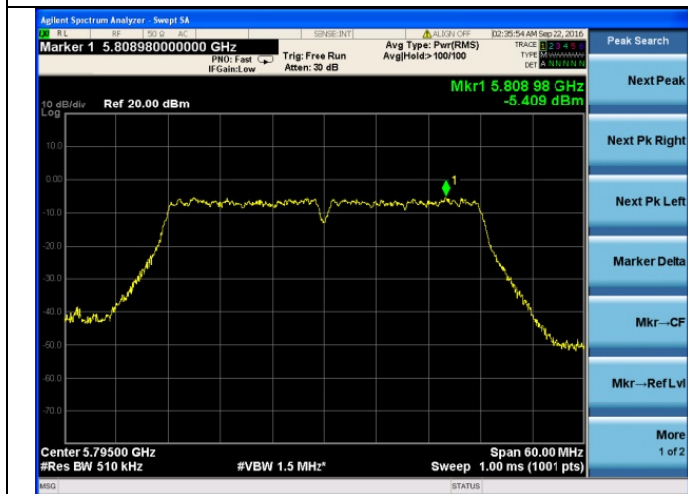
802.11n40MHz 5755MHz



802.11ac 80MHz 5775MHz



802.11n40MHz 5795MHz





9. DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

Formula:

$$\text{Duty Cycle} = T_{\text{on}} / (T_{\text{on}} + T_{\text{off}})$$

Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

Operation Mode	Duty Cycle	Duty Fator (dB) 10 * log (1/ Duty cycle)
802.11a	98.60%	0.06
802.11n(HT20)	98.50%	0.07
802.11n(HT40)	96.90%	0.14
802.11ac(HT80)	93.80%	0.28



802.11a



802.11n(HT20)





802.11n(HT40)



802.11ac(HT80)



10. FREQUENCY STABILITY

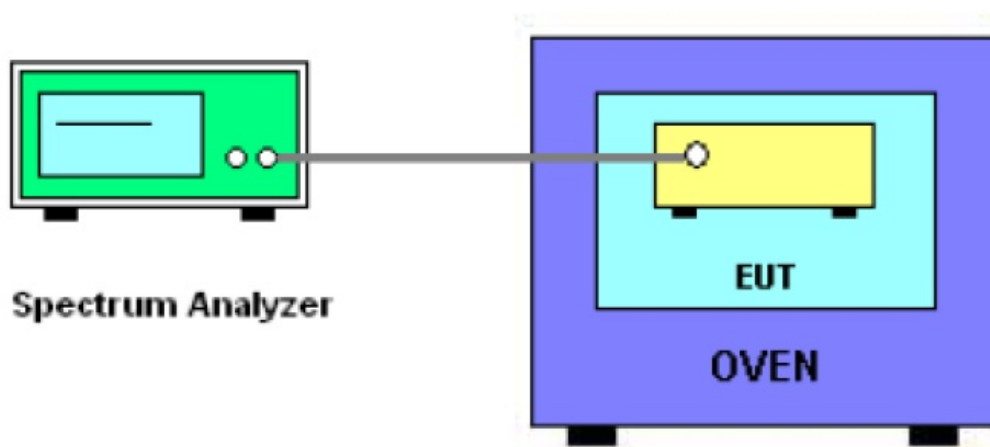
10.1. Limits

Manufactures 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. The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

10.2. Test setup

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 20 ppm (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is $-20^\circ\text{C} \sim 70^\circ\text{C}$.

10.3. Test setup Layout





10.4. Test data

Test data as below

Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5180	5.00	25	5180	5180.01189	-0.01189	-2.2954	± 20	Pass
	5.75		5180	5180.01053	-0.01053	-2.0328		Pass
	4.25		5180	5180.01137	-0.01137	-2.1950		Pass
	5.00	-20	5180	5180.01241	-0.01241	-2.3958		Pass
		-10	5180	5180.01124	-0.01124	-2.1699		Pass
		0	5180	5180.01147	-0.01147	-2.2143		Pass
		10	5180	5180.01128	-0.01128	-2.1776		Pass
		20	5180	5180.01245	-0.01245	-2.4035		Pass
		30	5180	5180.01078	-0.01078	-2.0811		Pass
		40	5180	5180.01035	-0.01035	-1.9981		Pass
		50	5180	5180.01114	-0.01114	-2.1506		Pass
		60	5180	5180.01162	-0.01162	-2.2432		Pass
		70	5180	5180.01178	-0.01178	-2.2741		Pass

Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5190	5.00	25	5190	5190.01389	-0.01389	-2.6763	± 20	Pass
	5.75		5190	5190.01247	-0.01247	-2.4027		Pass
	4.25		5190	5190.01245	-0.01245	-2.3988		Pass
	5.00	-20	5190	5190.01134	-0.01134	-2.1850		Pass
		-10	5190	5190.01167	-0.01167	-2.2486		Pass
		0	5190	5190.01152	-0.01152	-2.2197		Pass
		10	5190	5190.01147	-0.01147	-2.2100		Pass
		20	5190	5190.01187	-0.01187	-2.2871		Pass
		30	5190	5190.01235	-0.01235	-2.3796		Pass
		40	5190	5190.01452	-0.01452	-2.7977		Pass
		50	5190	5190.01234	-0.01234	-2.3776		Pass
		60	5190	5190.01374	-0.01374	-2.6474		Pass
		70	5190	5190.01268	-0.01268	-2.4432		Pass



Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5200	5.00	25	5200	5200.01244	-0.01244	-2.3923	± 20	Pass
	5.75		5200	5200.01312	-0.01312	-2.5231		Pass
	4.25		5200	5200.01167	-0.01167	-2.2442		Pass
	5.00	-20	5200	5200.01541	-0.01541	-2.9635		Pass
		-10	5200	5200.01247	-0.01247	-2.3981		Pass
		0	5200	5200.01345	-0.01345	-2.5865		Pass
		10	5200	5200.01246	-0.01246	-2.3962		Pass
		20	5200	5200.01512	-0.01512	-2.9077		Pass
		30	5200	5200.01241	-0.01241	-2.3865		Pass
		40	5200	5200.01246	-0.01246	-2.3962		Pass
		50	5200	5200.01262	-0.01262	-2.4269		Pass
		60	5200	5200.01357	-0.01357	-2.6096		Pass
		70	5200	5200.01175	-0.01175	-2.2596		Pass

Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5210	5.00	25	5210	5210.01251	-0.01251	-2.4012	± 20	Pass
	5.75		5210	5210.01169	-0.01169	-2.2438		Pass
	4.25		5210	5210.01245	-0.01245	-2.3896		Pass
	5.00	-20	5210	5210.01362	-0.01362	-2.6142		Pass
		-10	5210	5210.01456	-0.01456	-2.7946		Pass
		0	5210	5210.01257	-0.01257	-2.4127		Pass
		10	5210	5210.01624	-0.01624	-3.1171		Pass
		20	5210	5210.01247	-0.01247	-2.3935		Pass
		30	5210	5210.01624	-0.01624	-3.1171		Pass
		40	5210	5210.01452	-0.01452	-2.7869		Pass
		50	5210	5210.01364	-0.01364	-2.6180		Pass
		60	5210	5210.01429	-0.01429	-2.7428		Pass
		70	5210	5210.01346	-0.01346	-2.5835		Pass



Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5230	5.00	25	5230	5230.01421	-0.01421	-2.7170	± 20	Pass
	5.75		5230	5230.01341	-0.01341	-2.5641		Pass
	4.25		5230	5230.01256	-0.01256	-2.4015		Pass
	5.00	-20	5230	5230.01511	-0.01511	-2.8891		Pass
		-10	5230	5230.01187	-0.01187	-2.2696		Pass
		0	5230	5230.01547	-0.01547	-2.9579		Pass
		10	5230	5230.01426	-0.01426	-2.7266		Pass
		20	5230	5230.01274	-0.01274	-2.4359		Pass
		30	5230	5230.01314	-0.01314	-2.5124		Pass
		40	5230	5230.01267	-0.01267	-2.4226		Pass
		50	5230	5230.01287	-0.01287	-2.4608		Pass
		60	5230	5230.01367	-0.01367	-2.6138		Pass
		70	5230	5230.01461	-0.01461	-2.7935		Pass

Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5240	5.00	25	5240	5240.01613	-0.01613	-3.0782	± 20	Pass
	5.75		5240	5240.01426	-0.01426	-2.7214		Pass
	4.25		5240	5240.01345	-0.01345	-2.5668		Pass
	5.00	-20	5240	5240.01264	-0.01264	-2.4122		Pass
		-10	5240	5240.01315	-0.01315	-2.5095		Pass
		0	5240	5240.01267	-0.01267	-2.4179		Pass
		10	5240	5240.01594	-0.01594	-3.0420		Pass
		20	5240	5240.01514	-0.01514	-2.8893		Pass
		30	5240	5240.01361	-0.01361	-2.5973		Pass
		40	5240	5240.01287	-0.01287	-2.4561		Pass
		50	5240	5240.01412	-0.01412	-2.6947		Pass
		60	5240	5240.01361	-0.01361	-2.5973		Pass
		70	5240	5240.01274	-0.01274	-2.4313		Pass



Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5745	5.00	25	5745	5745.01189	-0.01189	-2.0696	±20	Pass
	5.75		5745	5745.01053	-0.01053	-1.8329		Pass
	4.25		5745	5745.01137	-0.01137	-1.9791		Pass
	5.00	-20	5745	5745.01124	-0.01124	-1.9565		Pass
		-10	5745	5745.01245	-0.01245	-2.1671		Pass
		0	5745	5745.01457	-0.01457	-2.5361		Pass
		10	5745	5745.01541	-0.01541	-2.6823		Pass
		20	5745	5745.01258	-0.01258	-2.1897		Pass
		30	5745	5745.01624	-0.01624	-2.8268		Pass
		40	5745	5745.01245	-0.01245	-2.1671		Pass
		50	5745	5745.01345	-0.01345	-2.3412		Pass
		60	5745	5745.01247	-0.01247	-2.1706		Pass
		70	5745	5745.01316	-0.01316	-2.2907		Pass

Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5755	5.00	25	5755	5755.01241	-0.01241	-2.1564	±20	Pass
	5.75		5755	5755.01264	-0.01264	-2.1964		Pass
	4.25		5755	5755.01258	-0.01258	-2.1859		Pass
	5.00	-20	5755	5755.01354	-0.01354	-2.3527		Pass
		-10	5755	5755.01261	-0.01261	-2.1911		Pass
		0	5755	5755.01326	-0.01326	-2.3041		Pass
		10	5755	5755.01276	-0.01276	-2.2172		Pass
		20	5755	5755.01624	-0.01624	-2.8219		Pass
		30	5755	5755.01258	-0.01258	-2.1859		Pass
		40	5755	5755.01361	-0.01361	-2.3649		Pass
		50	5755	5755.01297	-0.01297	-2.2537		Pass
		60	5755	5755.01611	-0.01611	-2.7993		Pass
		70	5755	5755.01422	-0.01422	-2.4709		Pass



Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5775	5.00	25	5775	5775.01246	-0.01246	-2.1576	± 20	Pass
	5.75		5775	5775.01312	-0.01312	-2.2719		Pass
	4.25		5775	5775.01278	-0.01278	-2.2130		Pass
	5.00	-20	5775	5775.01516	-0.01516	-2.6251		Pass
		-10	5775	5775.01426	-0.01426	-2.4693		Pass
		0	5775	5775.01378	-0.01378	-2.3861		Pass
		10	5775	5775.01264	-0.01264	-2.1887		Pass
		20	5775	5775.01358	-0.01358	-2.3515		Pass
		30	5775	5775.01462	-0.01462	-2.5316		Pass
		40	5775	5775.01326	-0.01326	-2.2961		Pass
		50	5775	5775.01275	-0.01275	-2.2078		Pass
		60	5775	5775.01641	-0.01641	-2.8416		Pass
		70	5775	5775.01342	-0.01342	-2.3238		Pass

Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5785	5.00	25	5785	5785.01215	-0.01215	-2.1003	± 20	Pass
	5.75		5785	5785.01362	-0.01362	-2.3544		Pass
	4.25		5785	5785.01248	-0.01248	-2.1573		Pass
	5.00	-20	5785	5785.01342	-0.01342	-2.3198		Pass
		-10	5785	5785.01267	-0.01267	-2.1901		Pass
		0	5785	5785.01426	-0.01426	-2.4650		Pass
		10	5785	5785.01327	-0.01327	-2.2939		Pass
		20	5785	5785.01275	-0.01275	-2.2040		Pass
		30	5785	5785.01316	-0.01316	-2.2748		Pass
		40	5785	5785.01267	-0.01267	-2.1901		Pass
		50	5785	5785.01512	-0.01512	-2.6137		Pass
		60	5785	5785.01547	-0.01547	-2.6742		Pass
		70	5785	5785.01378	-0.01378	-2.3820		Pass



Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5795	5.00	25	5795	5795.01457	-0.01457	-2.5142	± 20	Pass
	5.75		5795	5795.01263	-0.01263	-2.1795		Pass
	4.25		5795	5795.01254	-0.01254	-2.1639		Pass
	5.00	-20	5795	5795.01267	-0.01267	-2.1864		Pass
		-10	5795	5795.01341	-0.01341	-2.3141		Pass
		0	5795	5795.01328	-0.01328	-2.2916		Pass
		10	5795	5795.01267	-0.01267	-2.1864		Pass
		20	5795	5795.01467	-0.01467	-2.5315		Pass
		30	5795	5795.01326	-0.01326	-2.2882		Pass
		40	5795	5795.01514	-0.01514	-2.6126		Pass
		50	5795	5795.01361	-0.01361	-2.3486		Pass
		60	5795	5795.01267	-0.01267	-2.1864		Pass
		70	5795	5795.01413	-0.01413	-2.4383		Pass

Ref. Freq. (MHz)	Test Voltage (V)	Test Temp. (°C)	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)	Deviation (ppm)	Limit (ppm)	Result
5825	5.00	25	5825	5825.01246	-0.01246	-2.1391	± 20	Pass
	5.75		5825	5825.01361	-0.01361	-2.3365		Pass
	4.25		5825	5825.01425	-0.01425	-2.4464		Pass
	5.00	-20	5825	5825.01386	-0.01386	-2.3794		Pass
		-10	5825	5825.01249	-0.01249	-2.1442		Pass
		0	5825	5825.01416	-0.01416	-2.4309		Pass
		10	5825	5825.01326	-0.01326	-2.2764		Pass
		20	5825	5825.01287	-0.01287	-2.2094		Pass
		30	5825	5825.01411	-0.01411	-2.4223		Pass
		40	5825	5825.01326	-0.01326	-2.2764		Pass
		50	5825	5825.01274	-0.01274	-2.1871		Pass
		60	5825	5825.01417	-0.01417	-2.4326		Pass
		70	5825	5825.01365	-0.01365	-2.3433		Pass



11. TRANSMISSION IN THE ABSENCE OF DATA

11.1. 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.

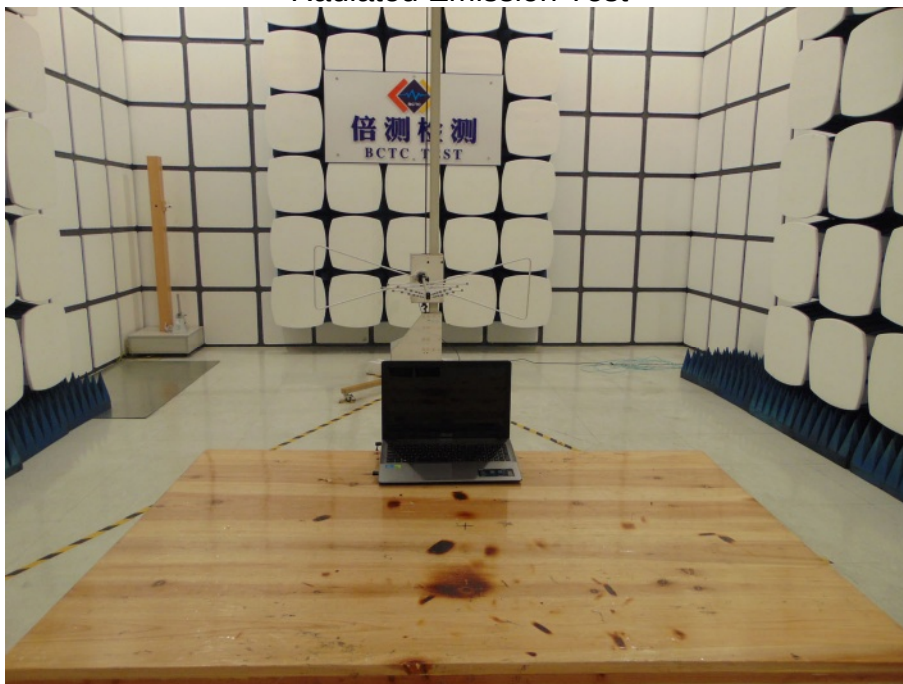
11.2. Test result

No non-compliance noted:

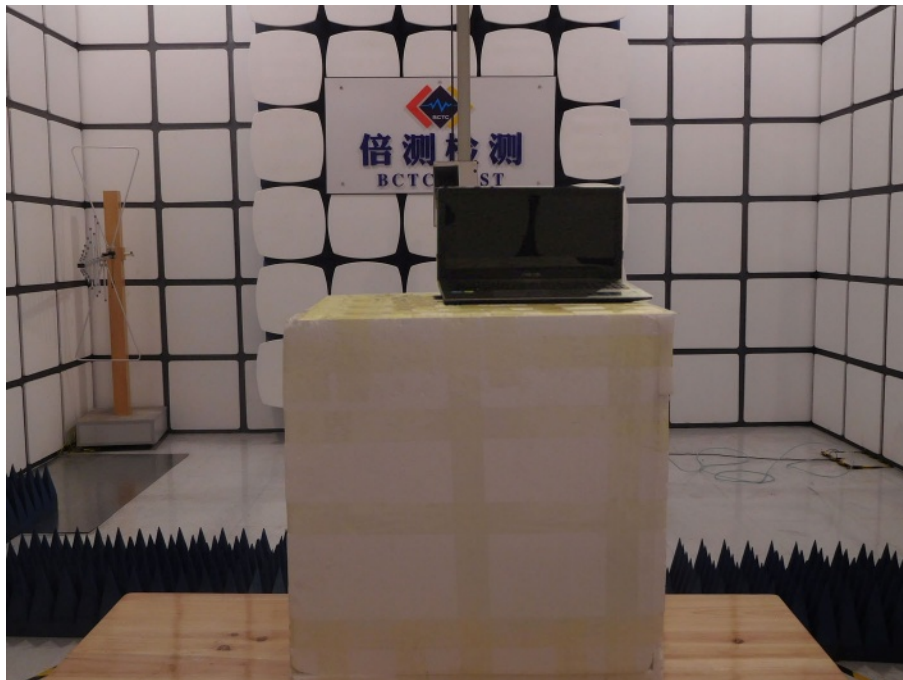
Refer to the theory of operation.

12. PHOTOGRAPHS OF TEST SET-UP

Radiated Emission Test



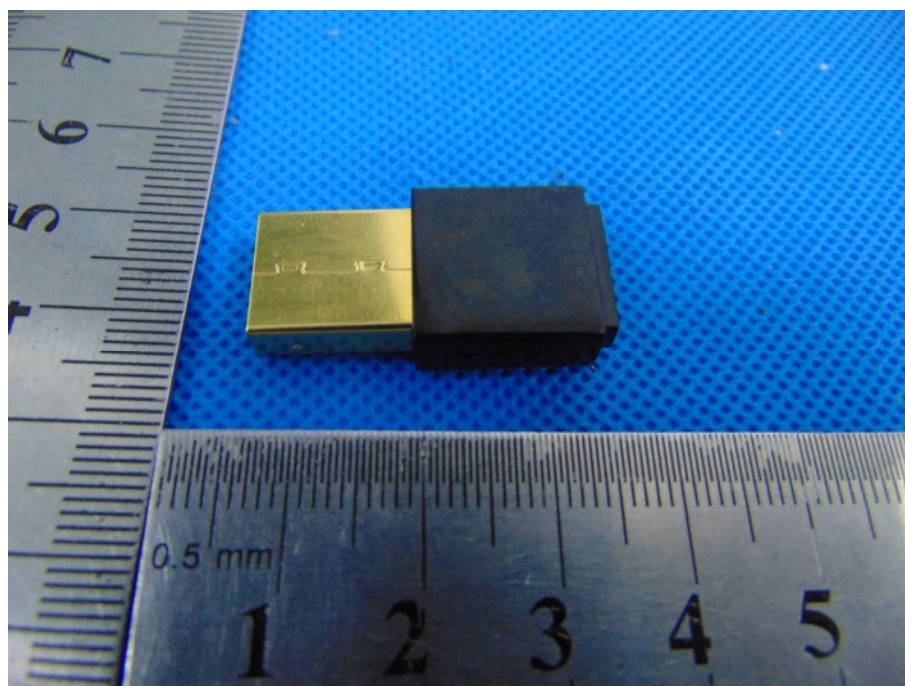
Radiated Measurement Photos

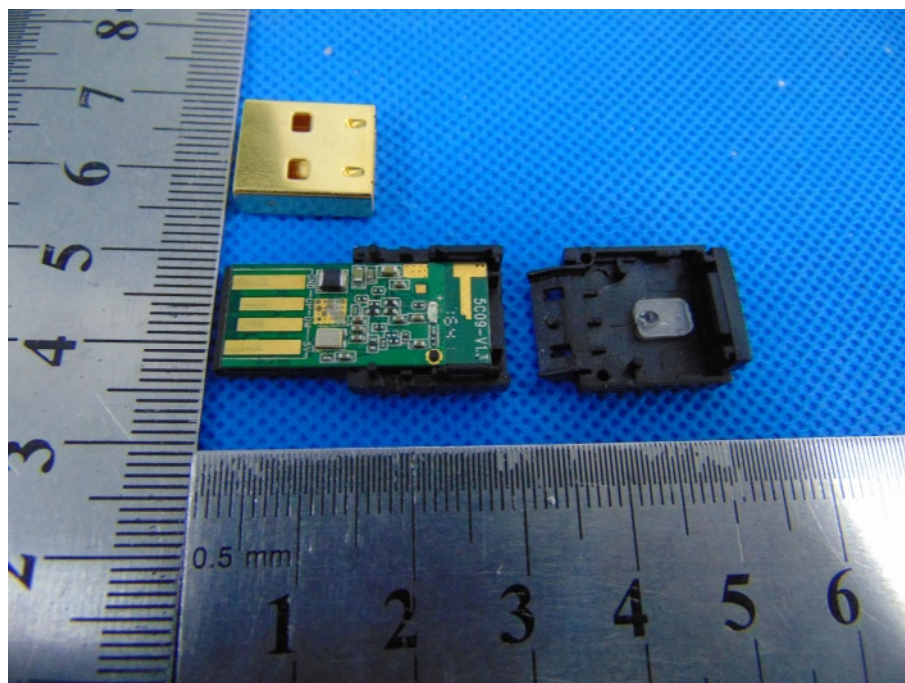


Conducted Measurement Photos



13. PHOTOGRAPHS OF THE EUT





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