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) ≥ 3 × RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

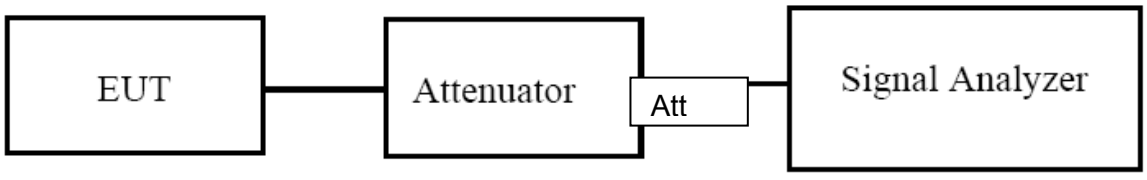
f) Allow the trace to stabilize.

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 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION 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.

6.6 TEST RESULTS

EUT：	802.11ac WiFi Module	Model Name. ：	802R8822
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX Frequency Band 3(5725-5850MHz)		

Note: A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

Mode	Channel	Frequency (MHz)	-6dB bandwidth (MHz)	-6dB bandwidth (MHz)	Limit (KHz)	Result
			Antenna A	Antenna B		
802.11a	149	5745	16.47	16.49	≧500	Pass
	157	5785	16.47	16.49	≧500	Pass
	165	5825	16.51	16.49	≧500	Pass
802.11 n20	149	5745	17.69	17.66	≧500	Pass
	157	5785	17.72	17.68	≧500	Pass
	165	5825	17.67	17.69	≧500	Pass
802.11 n40	151	5755	36.49	36.49	≧500	Pass
	159	5795	36.48	36.46	≧500	Pass
802.11 ac20	149	5745	17.67	17.65	≧500	Pass
	157	5785	17.73	17.67	≧500	Pass
	165	5825	17.68	17.63	≧500	Pass
802.11 ac40	149	5745	36.48	36.49	≧500	Pass
	157	5785	36.51	36.49	≧500	Pass
802.11 ac80	155	5775	76.00	76.34	≧500	Pass

Test plot

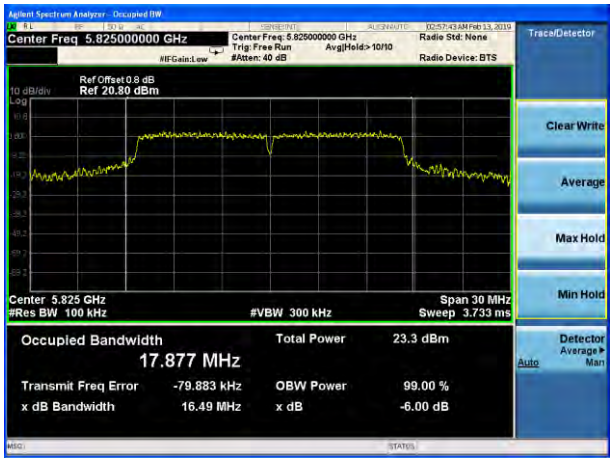
(802.11a) 6dB Bandwidth plot on channel 149

(802.11 n20) 6dB Bandwidth plot on channel 149

(802.11a) 6dB Bandwidth plot on channel 157

(802.11 n20) 6dB Bandwidth plot on channel 157

(802.11a) 6dB Bandwidth plot on channel 165



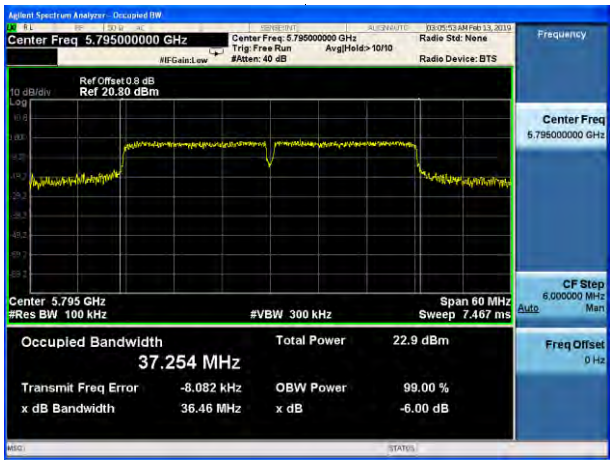
(802.11 n20) 6dB Bandwidth plot on channel 165

Test plot

(802.11 n40) 6dB Bandwidth plot on channel 151

(802.11 AC20) 6dB Bandwidth plot on channel 149

(802.11 n40) 6dB Bandwidth plot on channel 159



(802.11 AC20) 6dB Bandwidth plot on channel 157

(802.11 AC20) 6dB Bandwidth plot on channel 165

Test plot

(802.11 AC40) 6dB Bandwidth plot on channel 151

(802.11 AC80) 6dB Bandwidth plot on channel 155

(802.11 AC40) 6dB Bandwidth plot on channel 159

7. MAXIMUM CONDUCTED OUTPUT POWER

7.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407

This device type is client devices, so their maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW
5250~5350	250mW or 10dBm +10logB whichever is less
5470~5725	250mW or 10dBm +10logB whichever is less
5725~5850	1W

Note: where B is the 26 dB emission bandwidth in megahertz.

7.2 TEST PROCEDURE

· Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)

Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).

a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:

• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).

• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".

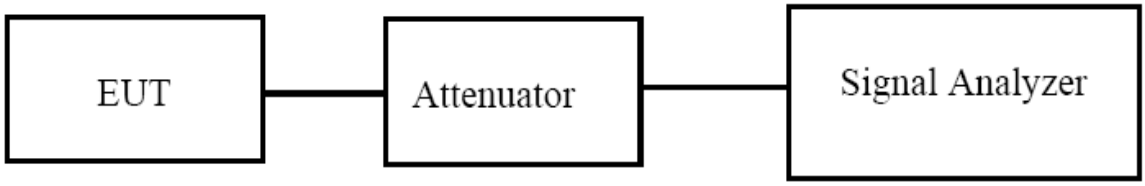
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION 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.

7.6 TEST RESULTS

EUT：	802.11ac WiFi Module	Model Name. ：	802R8822
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX (5G) Mode Frequency Band 1 (5150-5250MHz)		

Note:

EUT has two antennas, and different modes support different transmit mode what describe as Following form:

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

SISO Mode:

Test Channel	Frequency	Maximum output power. Antenna port		Total Power	LIMIT	Result
		(AV) (dBm)		(AV)		
	(MHz)	ANT A	ANT B	dBm	dBm	
TX 802.11a Mode						
CH36	5180	17.8	17.4	-	23.98	Pass
CH40	5200	17.6	17.3	-	23.98	Pass
CH48	5240	17.5	18.0	-	23.98	Pass
TX 802.11 n20M Mode						
CH36	5180	17.7	17.3	-	23.98	Pass
CH40	5200	17.4	18.0	-	23.98	Pass
CH48	5240	17.9	17.8	-	23.98	Pass
TX 802.11 n40M Mode						
CH38	5190	14.3	14.7	-	23.98	Pass
CH46	5230	16.2	16.5	-	23.98	Pass
TX 802.11 AC20M Mode						
CH36	5180	17.1	17.2	-	23.98	Pass
CH40	5200	17.7	18.3	-	23.98	Pass
CH48	5240	17.8	17.9	-	23.98	Pass
TX 802.11 AC40M Mode						
CH38	5190	14.3	14.5	-	23.98	Pass
CH46	5230	16.0	16.2	-	23.98	Pass
TX 802.11 AC80M Mode						
CH42	5210	14.3	14.3	-	23.98	Pass

MIMO Mode:

Test Channel	Frequency	Maximum output power. Antenna port		Total Power	LIMIT	Result
		(AV) (dBm)		(AV)		
	(MHz)	ANT A	ANT B	dBm	dBm	
TX 802.11 n20M Mode						
CH36	5180	12.7	12.6	15.66	21.95	Pass
CH40	5200	11.5	12.1	14.82	21.95	Pass
CH48	5240	12.7	12.8	15.76	21.95	Pass
TX 802.11 n40M Mode						
CH38	5190	13.9	15.0	17.50	21.95	Pass
CH46	5230	14.6	15.8	18.25	21.95	Pass
TX 802.11 AC20M Mode						
CH36	5180	12.4	11.7	15.07	21.95	Pass
CH40	5200	12.5	12.4	15.46	21.95	Pass
CH48	5240	12.3	11.8	15.07	21.95	Pass
TX 802.11 AC40M Mode						
CH38	5190	14.3	14.5	17.41	21.95	Pass
CH46	5230	14.6	15.3	17.97	21.95	Pass
TX 802.11 AC80M Mode						
CH42	5210	13.8	13.7	16.76	21.95	Pass

Note: For 802.11n/ac 5GHz has MIMO mode. Directional gain=8.03dbi
8.03dbi>6.0 dbi so power limit= 250mW-(8.03-6)=21.95 in dBm

EUT：	802.11ac WiFi Module	Model Name. ：	802R8822
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX (5G) Mode Frequency Band 2A (5250-5350MHz)		

Note:

EUT has two antennas, and different modes support different transmit mode what describe as Following form:

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

SISO Mode:

Test Channel	Frequency	Maximum output power. Antenna port		Total Power	LIMIT	Result
		(AV) (dBm)		(AV)		
	(MHz)	ANT A	ANT B	dBm	dBm	
TX 802.11a Mode						
CH52	5260	16.8	16.4	–	23.98	Pass
CH56	5280	16.9	16.6	–	23.98	Pass
CH64	5320	16.0	16.1	–	23.98	Pass
TX 802.11 n20M Mode						
CH52	5260	17.0	16.8	–	23.98	Pass
CH56	5280	17.1	17.1	–	23.98	Pass
CH64	5320	16.6	17.2	–	23.98	Pass
TX 802.11 n40M Mode						
CH54	5270	19.5	19.0	–	23.98	Pass
CH62	5310	16.1	15.4	–	23.98	Pass
TX 802.11 AC20M Mode						
CH52	5260	17.6	17.3	–	23.98	Pass
CH56	5280	17.4	17.2	–	23.98	Pass
CH64	5320	17.1	17.7	–	23.98	Pass
TX 802.11 AC40M Mode						
CH54	5270	19.0	19.8	–	23.98	Pass
CH62	5310	15.4	15.5	–	23.98	Pass
TX 802.11 AC80M Mode						
CH58	5290	14.2	14.2	–	23.98	Pass

MIMO Mode:

Test Channel	Frequency	Maximum output power. Antenna port		Total Power	LIMIT	Result
		(AV) (dBm)		(AV)		
	(MHz)	ANT A	ANT B	dBm	dBm	
TX 802.11 n20M Mode						
CH52	5260	12.0	13.0	15.54	21.95	Pass
CH56	5280	12.0	13.0	15.54	21.95	Pass
CH64	5320	11.1	12.1	14.64	21.95	Pass
TX 802.11 n40M Mode						
CH54	5270	13.8	15.8	17.92	21.95	Pass
CH62	5310	14.1	15.6	17.92	21.95	Pass
TX 802.11 AC20M Mode						
CH52	5260	10.8	12.8	14.92	21.95	Pass
CH56	5280	11.8	12.6	15.23	21.95	Pass
CH64	5320	11.5	12.9	15.27	21.95	Pass
TX 802.11 AC40M Mode						
CH54	5270	15.6	16.6	19.14	21.95	Pass
CH62	5310	14.5	15.7	18.15	21.95	Pass
TX 802.11 AC80M Mode						
CH58	5290	13.6	14.2	16.92	21.95	Pass

Note: For 802.11n/ac 5GHz has MIMO mode. Directional gain=8.03dbi
8.03 dbi>6.0 dbi so power limit= 250mW-(8.03-6)
or (11dBm +10logB)-(8.03-6) in dBm.

EUT：	802.11ac WiFi Module	Model Name. ：	802R8822
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX (5G) Mode Frequency Band 2C (5470-5725MHz)		

Note:

EUT has two antennas, and different modes support different transmit mode what describe as Following form:

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

SISO Mode:

Test Channel	Frequency	Maximum output power. Antenna port		Total Power	LIMIT	Result
		(AV) (dBm)		(AV)		
	(MHz)	ANT A	ANT B	dBm	dBm	
TX 802.11a Mode						
CH100	5500	16.5	17.0	-	23.98	Pass
CH120	5600	17.2	17.0	-	23.98	Pass
CH140	5700	17.1	17.0	-	23.98	Pass
TX 802.11 n20M Mode						
CH100	5500	17.1	17.5	-	23.98	Pass
CH120	5600	17.4	18.1	-	23.98	Pass
CH140	5700	16.8	17.0	-	23.98	Pass
TX 802.11 n40M Mode						
CH102	5510	14.5	14.9	-	23.98	Pass
CH118	5590	19.2	19.1	-	23.98	Pass
CH134	5670	18.8	18.6	-	23.98	Pass
TX 802.11 AC20M Mode						
CH100	5500	17.3	17.1	-	23.98	Pass
CH120	5600	16.9	16.7	-	23.98	Pass
CH140	5700	17.4	16.1	-	23.98	Pass
TX 802.11 AC40M Mode						
CH102	5510	13.7	15.1	-	23.98	Pass
CH118	5590	19.5	18.5	-	23.98	Pass
CH134	5670	18.6	17.8	-	23.98	Pass
TX 802.11 AC80M Mode						
CH 106	5530	14.3	14.3	-	23.98	Pass
CH 122	5610	18.1	18.4	-	23.98	Pass

MIMO Mode:

Test Channel	Frequency	Maximum output power. Antenna port		Total Power	LIMIT	Result
		(AV) (dBm)		(AV)		
	(MHz)	ANT A	ANT B	dBm	dBm	
TX 802.11 n20M Mode						
CH100	5500	12.0	12.7	15.37	21.95	Pass
CH120	5600	11.4	12.1	14.77	21.95	Pass
CH140	5700	12.2	12.1	15.16	21.95	Pass
TX 802.11 n40M Mode						
CH102	5510	14.3	14.5	17.41	21.95	Pass
CH118	5590	14.7	15.3	18.02	21.95	Pass
CH134	5670	15.1	16.0	18.58	21.95	Pass
TX 802.11 AC20M Mode						
CH100	5500	11.2	11.7	14.47	21.95	Pass
CH120	5600	11.3	12.3	14.84	21.95	Pass
CH140	5700	12.9	12.6	15.76	21.95	Pass
TX 802.11 AC40M Mode						
CH102	5510	14.0	14.6	17.32	21.95	Pass
CH118	5590	15.6	15.9	18.76	21.95	Pass
CH134	5670	17.4	16.8	20.12	21.95	Pass
TX 802.11 AC80M Mode						
CH 106	5530	14.6	15.0	17.81	21.95	Pass
CH 122	5610	18.2	17.8	21.01	21.95	Pass

Note: For 802.11n/ac 5GHz has MIMO mode. Directional gain=8.03dbi
8.03 dbi>6.0 dbi so power limit= 250mW-(8.03-6)
or (11dBm +10logB)-(8.03-6) in dBm.

EUT：	802.11ac WiFi Module	Model Name. ：	802R8822
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX (5G) Mode Frequency Band 3 (5725-5850MHz)		

Note:

EUT has two antennas, and different modes support different transmit mode what describe as Following form:

Mode	Tx/Rx
802.11a	1Tx, 2Rx
802.11n/ac	1Tx /2Tx, 2Rx

SISO Mode:

Test Channel	Frequency	Maximum output power. Antenna port		Total Power	LIMIT	Result
		(AV) (dBm)		(AV)		
	(MHz)	ANT A	ANT B	dBm	dBm	
TX 802.11a Mode						
CH149	5745	17.7	17.5	–	30	Pass
CH157	5785	18.5	18.3	–	30	Pass
CH165	5825	18.8	18.6	–	30	Pass
TX 802.11 n20M Mode						
CH149	5745	17.6	17.5	–	30	Pass
CH157	5785	18.3	18.2	–	30	Pass
CH165	5825	17.9	18.6	–	30	Pass
TX 802.11 n40M Mode						
CH151	5755	17.1	17.6	–	30	Pass
CH159	5795	18.5	18.8	–	30	Pass
TX 802.11 AC20M Mode						
CH149	5745	17.5	17.6	–	30	Pass
CH157	5785	18.2	18.2	–	30	Pass
CH165	5825	18.4	18.5	–	30	Pass
TX 802.11 AC40M Mode						
CH151	5755	17.4	17.7	–	30	Pass
CH159	5795	18.7	18.4	–	30	Pass
TX 802.11 AC80M Mode						
CH155	5775	18.0	17.9	–	30	Pass

MIMO Mode:

Test Channel	Frequency	Maximum output power. Antenna port		Total Power	LIMIT	Result
		(AV) (dBm)		(AV)		
	(MHz)	ANT A	ANT B	dBm	dBm	
TX 802.11 n20M Mode						
CH149	5745	16.9	17.0	19.96	27.97	Pass
CH157	5785	18.3	18.5	21.41	27.97	Pass
CH165	5825	18.3	18.4	21.36	27.97	Pass
TX 802.11 n40M Mode						
CH151	5755	17.5	17.6	20.56	27.97	Pass
CH159	5795	18.1	18.3	21.21	27.97	Pass
TX 802.11 AC20M Mode						
CH149	5745	17.1	17.9	20.53	27.97	Pass
CH157	5785	18.0	18.6	21.32	27.97	Pass
CH165	5825	18.5	18.8	21.66	27.97	Pass
TX 802.11 AC40M Mode						
CH151	5755	17.6	18.1	20.87	27.97	Pass
CH159	5795	18.2	18.3	21.26	27.97	Pass
TX 802.11 AC80M Mode						
CH155	5775	17.5	17.9	20.71	27.97	Pass

Note: For 802.11n/ac 5GHz has MIMO mode. Directional gain=8.03dbi
8.03dbi>6.0 dbi so power limit= 1W-(8.03-6)=27.97 in dBm.

8. OUT OF BAND EMISSIONS

8.1 APPLICABLE STANDARD

According to FCC §15.407(b)

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

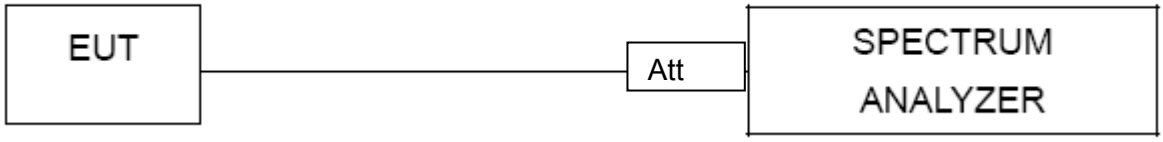
8.2 TEST PROCEDURE

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.

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION 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.

8.6 TEST RESULTS

EUT：	802.11ac WiFi Module	Model Name. ：	802R8822
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 12V

Note: A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

TX (5G) Mode Frequency Band 1/2A (5150-5350MHz)

5.15~5.35 GHz

(802.11a) Band Edge, Left Side

(802.11n20) Band Edge, Left Side

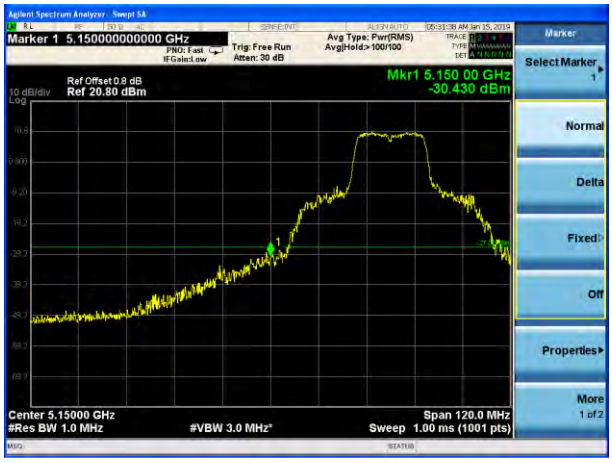
(802.11a) Band Edge, Right Side

(802.11n20) Band Edge, Right Side

5.15~5.35 GHz

(802.11n40) Band Edge, Left Side

(802.11ac20) Band Edge, Left Side



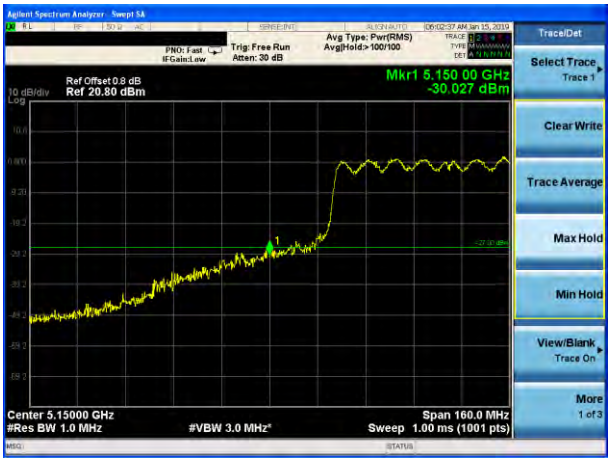
(802.11n40) Band Edge, Right Side

(802.11ac20) Band Edge, Right Side

5.15~5.35 GHz

(802.11ac40) Band Edge, Left Side

(802.11ac80) Band Edge, Left Side



(802.11ac40) Band Edge, Right Side

(802.11ac80) Band Edge, Right Side

TX (5G) Mode Frequency Band 2C (5470-5725MHz)

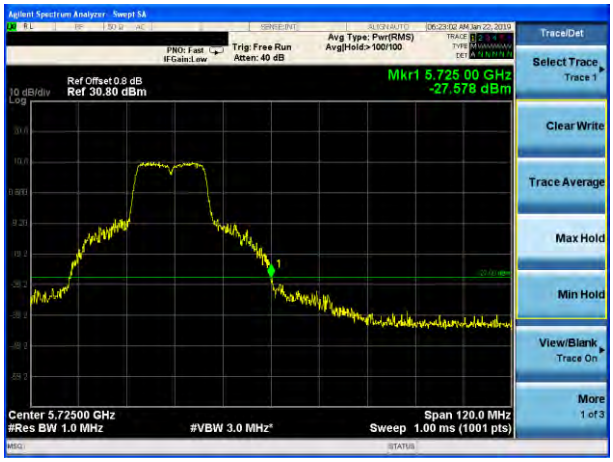
5.47~5.725 GHz

(802.11a) Band Edge, Left Side

(802.11n20) Band Edge, Left Side

(802.11a) Band Edge, Right Side

(802.11n20) Band Edge, Right Side



TX (5G) Mode Frequency Band 2C (5470-5725MHz)

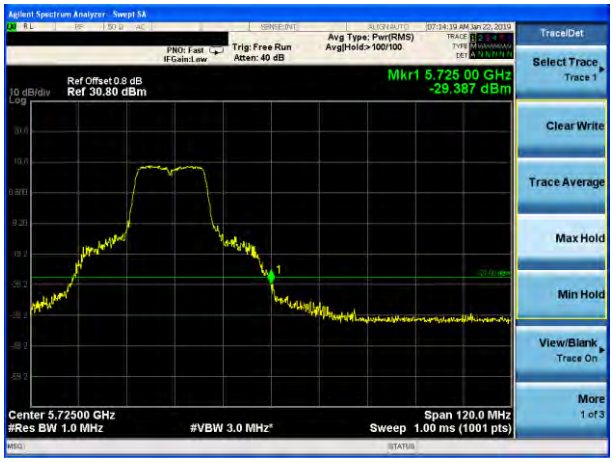
5.47~5.725 GHz

(802.11n40) Band Edge, Left Side

(802.11ac20) Band Edge, Left Side

(802.11n40) Band Edge, Right Side

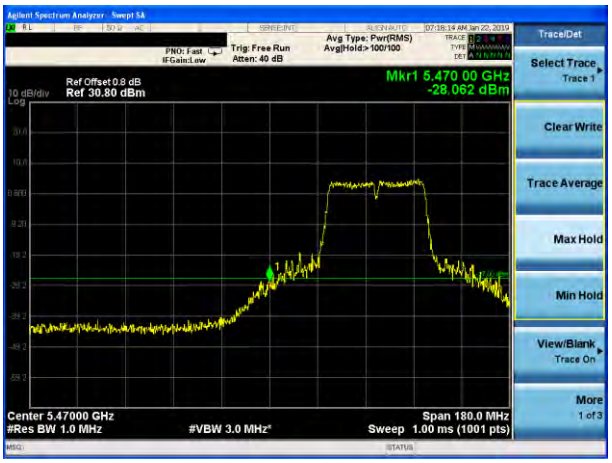
(802.11ac20) Band Edge, Right Side



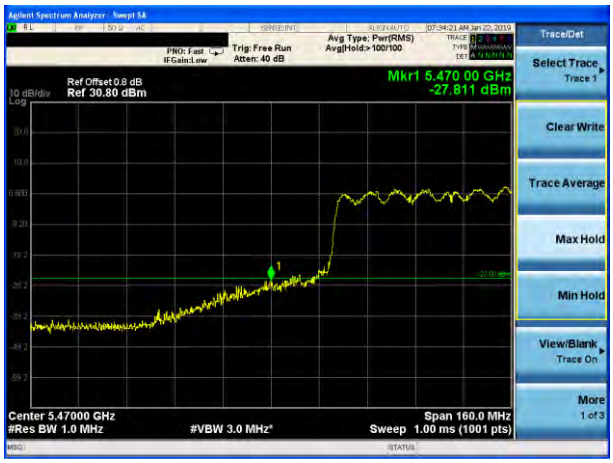
TX (5G) Mode Frequency Band 2C (5470-5725MHz)

5.47~5.725 GHz

(802.11ac40) Band Edge, Left Side



(802.11ac80) Band Edge, Left Side



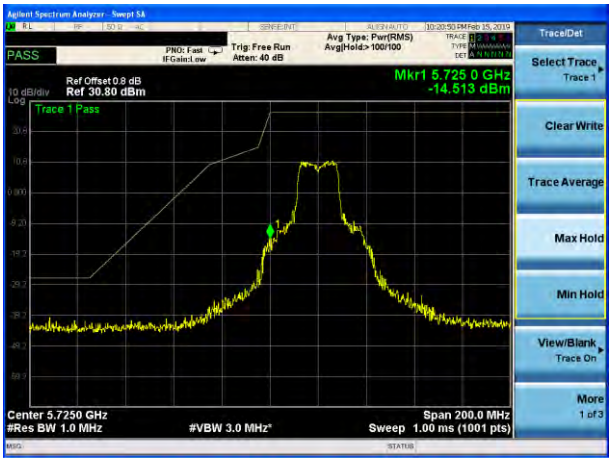
(802.11n40) Band Edge, Right Side

(802.11ac80) Band Edge, Right Side

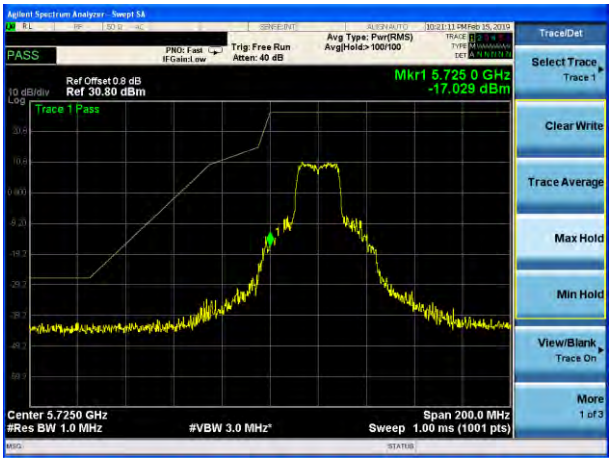
TX (5G) Mode Frequency Band 3 (5.725~5.850 GHz)

5.725~5.85 GHz

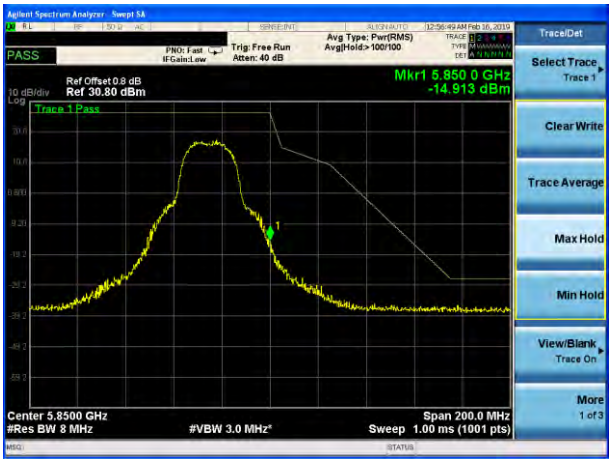
(802.11a) Band Edge, Left Side



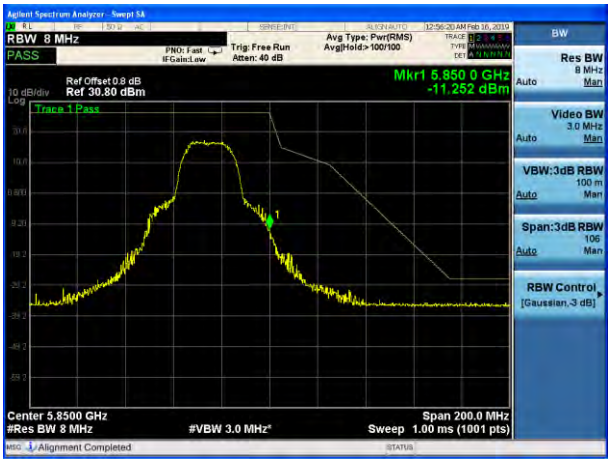
(802.11n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side



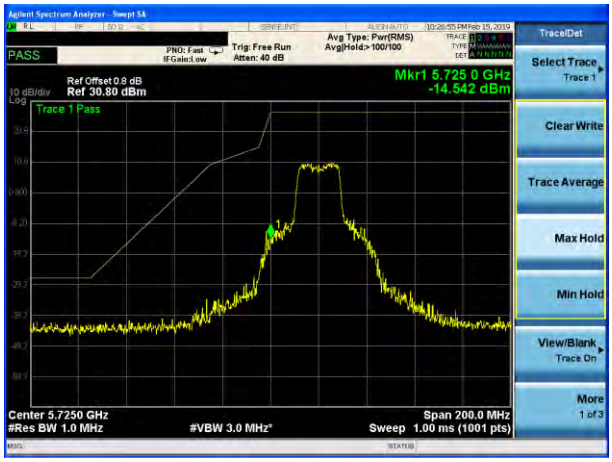
(802.11n20) Band Edge, Right Side



5.725~5.85 GHz

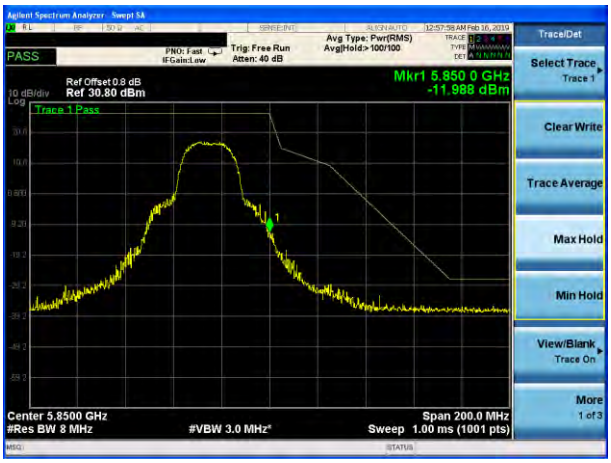
(802.11n40) Band Edge, Left Side

(802.11ac20) Band Edge, Left Side



(802.11n40) Band Edge, Right Side

(802.11ac20) Band Edge, Right Side



5.725~5.85 GHz

(802.11ac40) Band Edge, Left Side

(802.11ac80) Band Edge, Left Side

(802.11ac40) Band Edge, Right Side

(802.11ac80) Band Edge, Right Side

9.SPURIOUS RF CONDUCTED EMISSIONS

9.1CONFORMANCE LIMIT

1. Below -27dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

9.2MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

9.3TEST SETUP

Please refer to Section 6.1 of this test report.

9.4TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW= 300KHz to measure the peak field strength , and mwasure frequeny range from 9KHz to 26.5GHz.

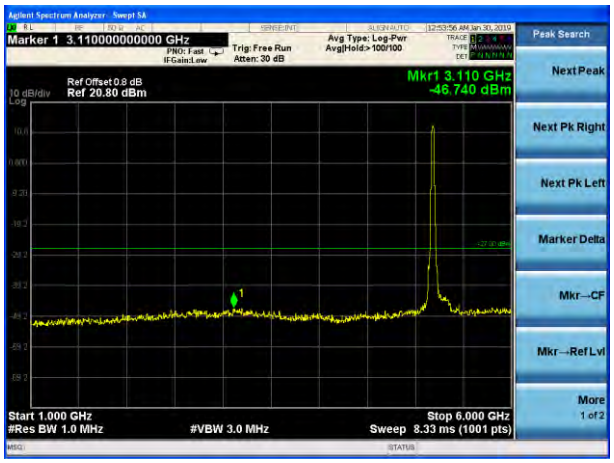
9.5TEST RESULTS

Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

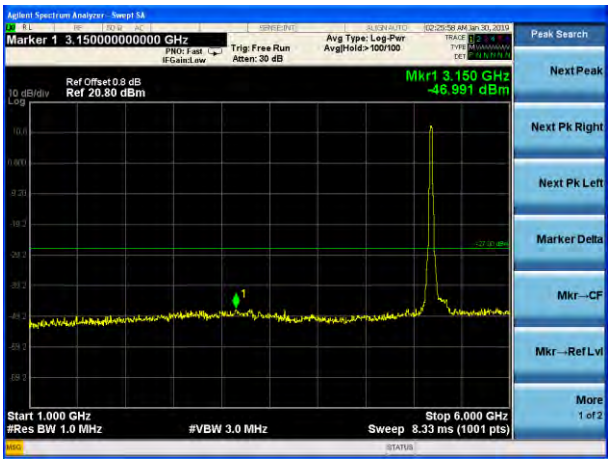
TX (5G) Mode Frequency Band 1 (5150-5250MHz)

Test Plot

802.11a on channel 36



802.11n20 on channel 36



802.11a on channel 36

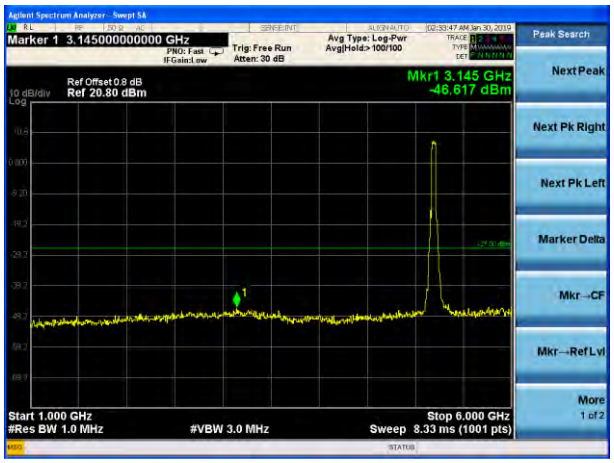
802.11n20 on channel 36

Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B ,only shown Antenna B Plot.

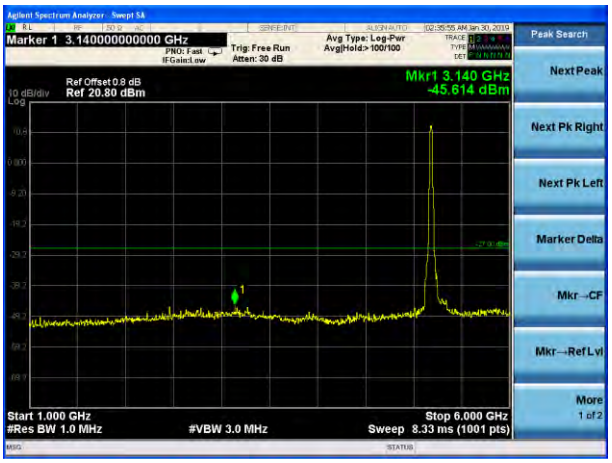
2.Pre-test all modes and channels, only the worst data is recorded in the report

Test Plot

802.11n40 on channel 38



802.11ac20 on channel 36



802.11n40 on channel 38

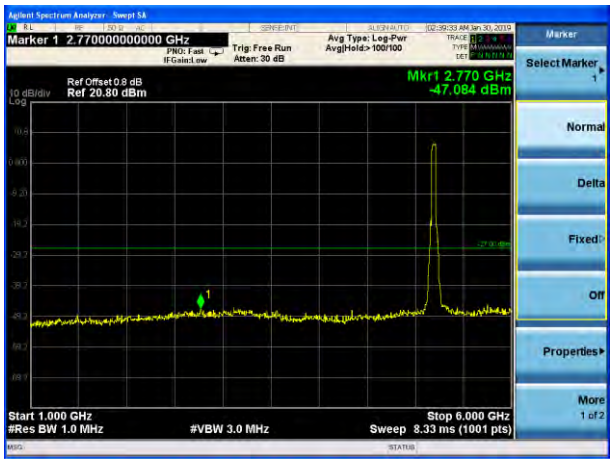
802.11ac20 on channel 36

Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B ,only shown Antenna B Plot.

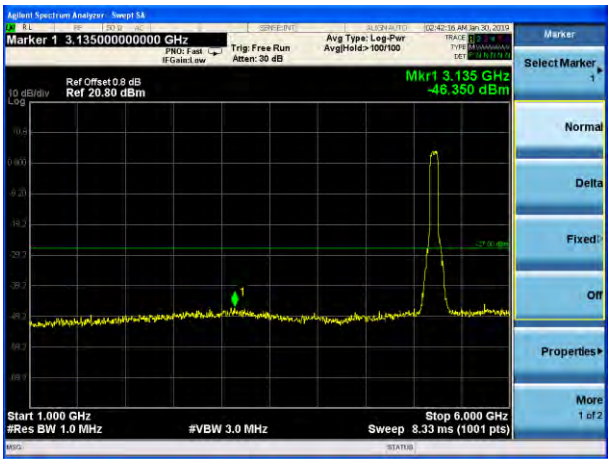
2.Pre-test all modes and channels, only the worst data is recorded in the report

Test Plot

802.11ac40 on channel 38



802.11ac80 on channel 42



802.11ac40 on channel 38

802.11ac80 on channel 42

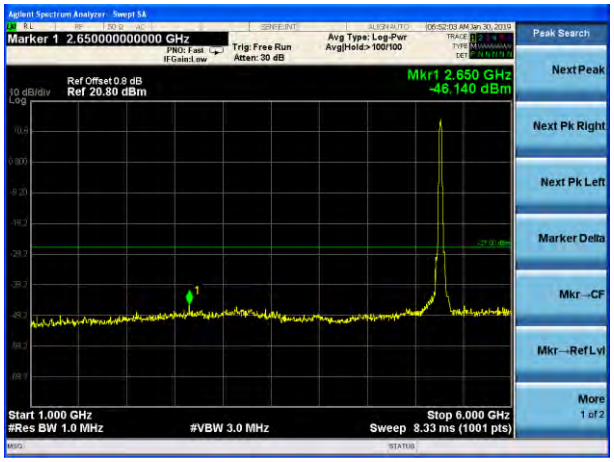
Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B ,only shown Antenna B Plot.

2.Pre-test all modes and channels, only the worst data is recorded in the report

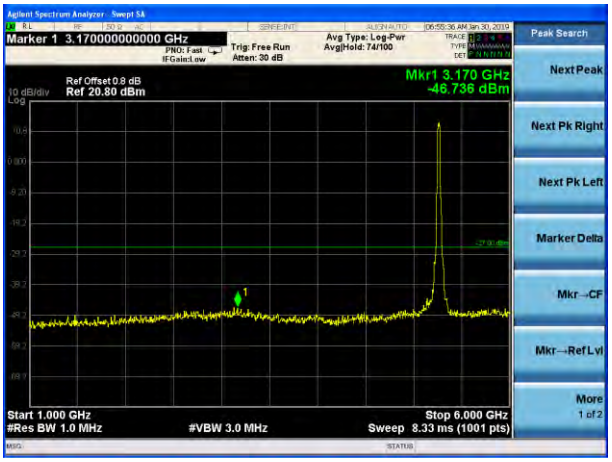
TX (5G) Mode Frequency Band 2A (5250-5350MHz)

Test Plot

802.11a on channel 52



802.11n20 on channel 52



802.11a on channel 52

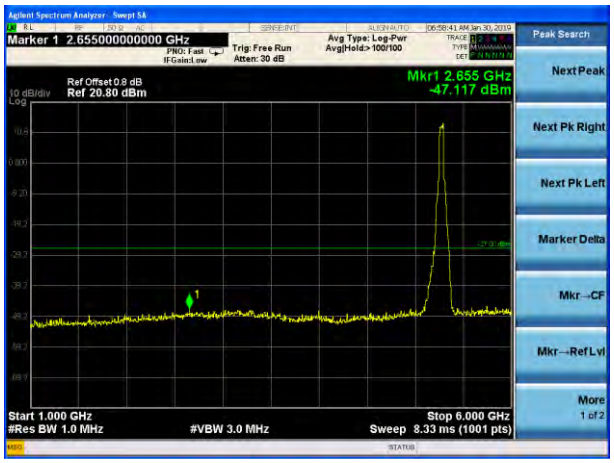
802.11n20 on channel 52

Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B,only shown Antenna B Plot.

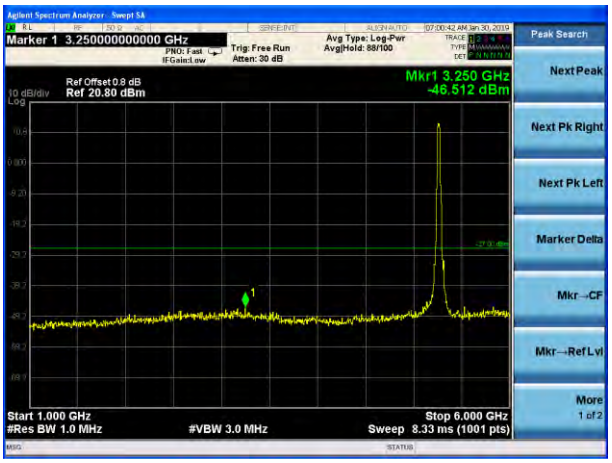
2.Pre-test all modes and channels, only the worst data is recorded in the report

Test Plot

802.11n40 on channel 54



802.11ac20 on channel 52



802.11n40 on channel 54

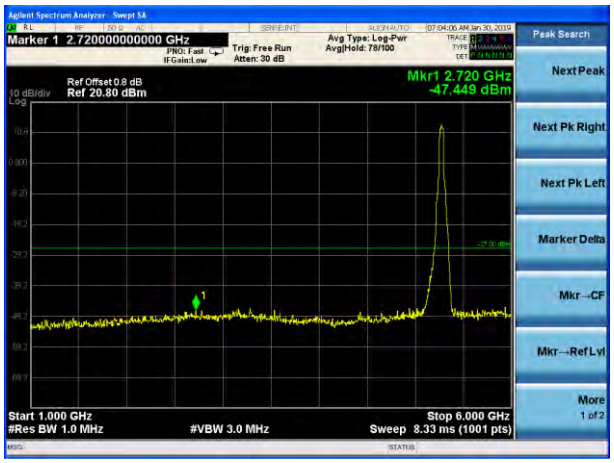
802.11ac20 on channel 52

Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

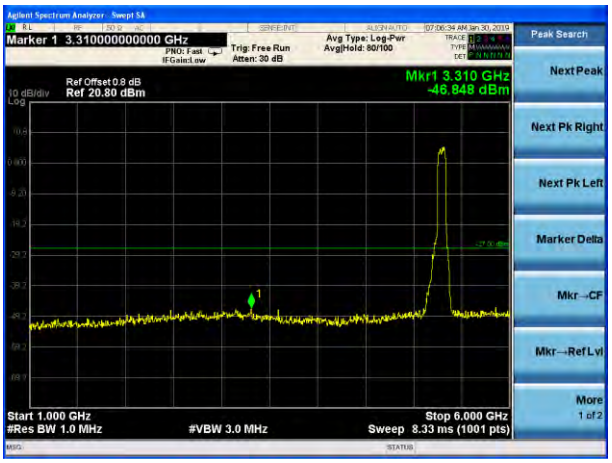
2.Pre-test all modes and channels, only the worst data is recorded in the report

Test Plot

802.11ac40 on channel 54



802.11ac80 on channel 58



802.11ac40 on channel 54

802.11ac80 on channel 58

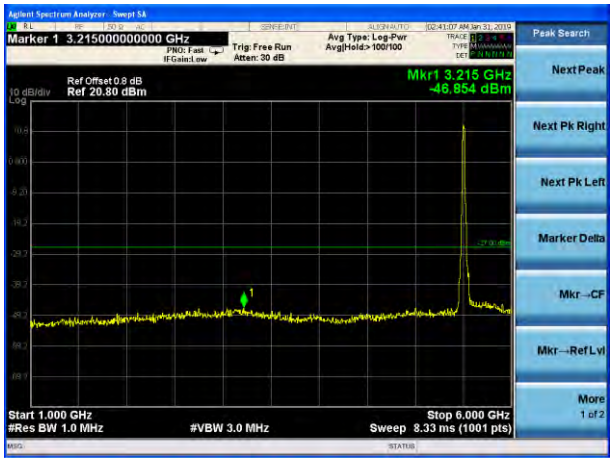
Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

2.Pre-test all modes and channels, only the worst data is recorded in the report

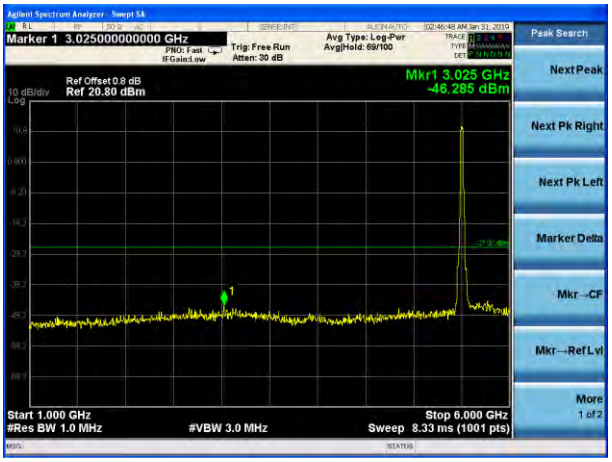
TX (5G) Mode Frequency Band 2C (5740-5725MHz)

Test Plot

802.11a on channel 120



802.11n20 on channel 120



802.11a on channel 120

802.11n20 on channel 120

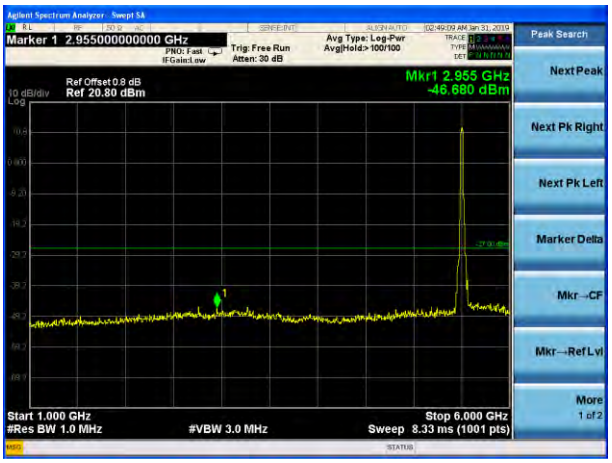
Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

2.Pre-test all modes and channels, only the worst data is recorded in the report

Test Plot

802.11n40 on channel 118

802.11ac20 on channel 120



802.11n40 on channel 118

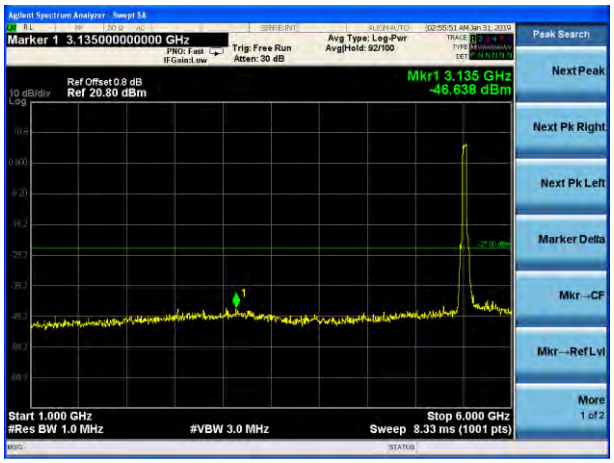
802.11ac20 on channel 120

Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

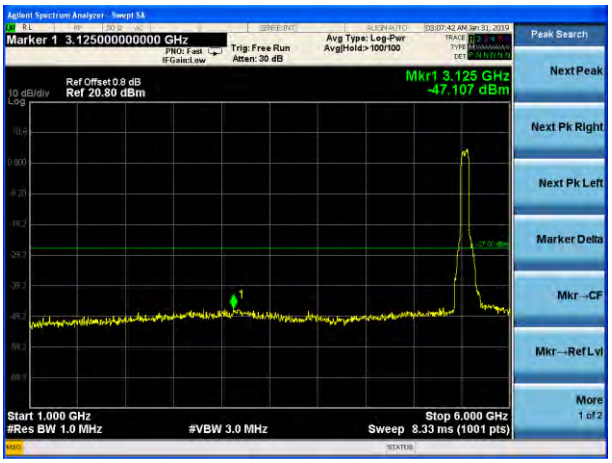
2.Pre-test all modes and channels, only the worst data is recorded in the report

Test Plot

802.11ac40 on channel 118



802.11ac80 on channel 106



802.11ac40 on channel 118

802.11ac80 on channel 106

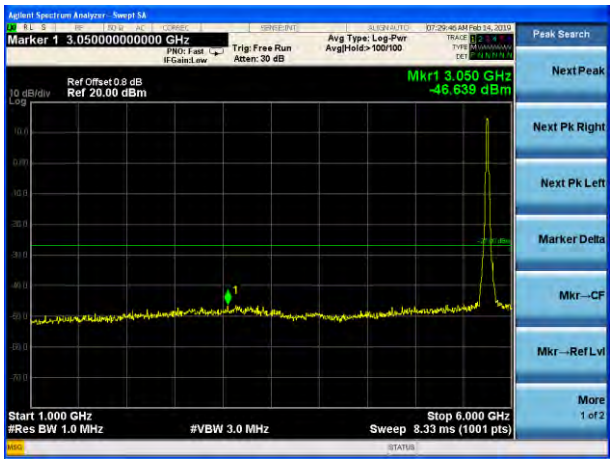
Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

2.Pre-test all modes and channels, only the worst data is recorded in the report

TX (5G) Mode Frequency Band 3 (5725-5850MHz)

Test Plot

802.11a on channel 149



802.11n20 on channel 149

802.11a on channel 149

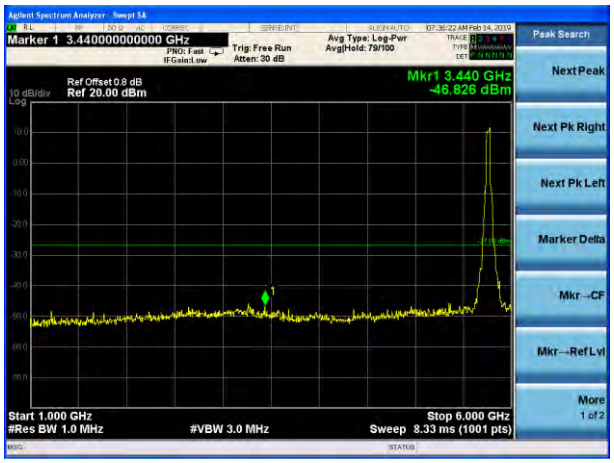
802.11n20 on channel 149

Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

2.Pre-test all modes and channels, only the worst data is recorded in the report

Test Plot

802.11n40 on channel 151



802.11ac20 on channel 149

802.11n40 on channel 151

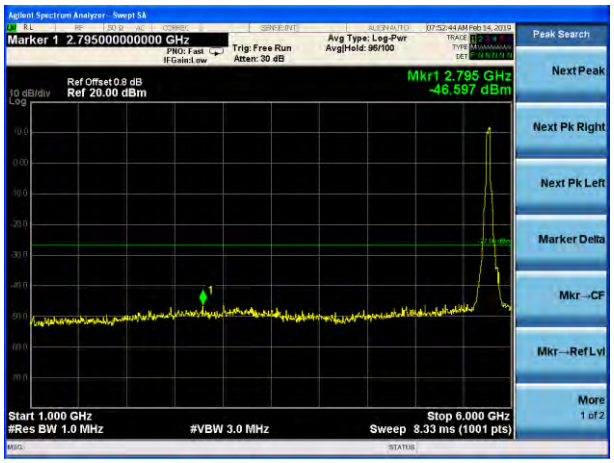
802.11ac20 on channel 149

Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

2.Pre-test all modes and channels, only the worst data is recorded in the report

Test Plot

802.11ac40 on channel 151



802.11ac80 on channel 155

802.11ac40 on channel 151

802.11ac80 on channel 155

Note: 1.A(B) Represent the value of antenna A and B, The worst data is Antenna B, only shown Antenna B Plot.

2.Pre-test all modes and channels, only the worst data is recorded in the report

10. Frequency Stability Measurement

10.1 LIMIT

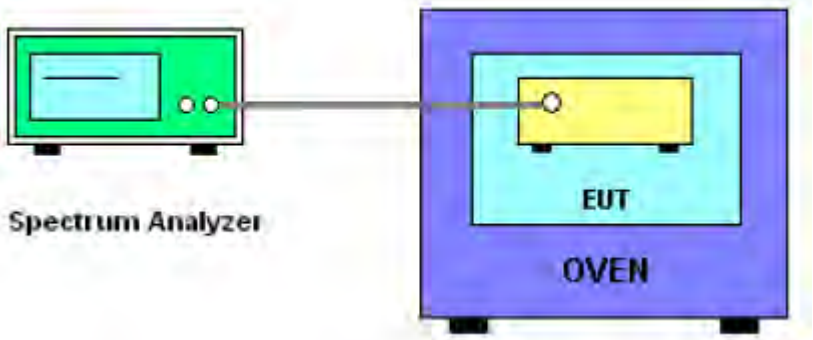
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

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

10.2 TEST PROCEDURES

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. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10_6 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
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°C~70°C.

10.3 TEST SETUP LAYOUT



10.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

10.5 TEST RESULTS

EUT：	802.11ac WiFi Module	Model Name. ：	802R8822
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX Frequency Band I (5150-5250MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5180.0410	5180	0.0410	-7.9151
		V max (V)	13.80	5180.0263	5180	0.0263	-5.0772
		V min (V)	10.20	5180.0446	5180	0.0446	-8.6100
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5180.0265	5180	0.0265	-5.1158
		T (°C)	-10	5180.0392	5180	0.0392	-7.5676
		T (°C)	0	5180.0427	5180	0.0427	-8.2432
		T (°C)	10	5180.0659	5180	0.0659	-12.7220
		T (°C)	20	5180.0223	5180	0.0223	-4.3050
		T (°C)	30	5180.0234	5180	0.0234	-4.5174
		T (°C)	40	5180.0542	5180	0.0542	-10.4633
		T (°C)	50	5180.0264	5180	0.0264	-5.0965
		T (°C)	60	5180.0270	5180	0.0270	-5.2124
		T (°C)	70	5180.0299	5180	0.0299	-5.7722
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5200.0314	5200	0.0314	-6.0385
		V max (V)	13.80	5200.0189	5200	0.0189	-3.6346
		V min (V)	10.20	5200.0641	5200	0.0641	-12.3269
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5200.0365	5200	0.0365	-7.0192
		T (°C)	-10	5200.0134	5200	0.0134	-2.5769
		T (°C)	0	5200.0532	5200	0.0532	-10.2308
		T (°C)	10	5200.0169	5200	0.0169	-3.2500
		T (°C)	20	5200.0294	5200	0.0294	-5.6538
		T (°C)	30	5200.0367	5200	0.0367	-7.0577
		T (°C)	40	5200.0642	5200	0.0642	-12.3462
		T (°C)	50	5200.0427	5200	0.0427	-8.2115
		T (°C)	60	5200.0718	5200	0.0718	-13.8077
		T (°C)	70	5200.0631	5200	0.0631	-12.1346
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5240.0169	5240	0.0169	-3.2252
		V max (V)	13.80	5240.0411	5240	0.0411	-7.8435
		V min (V)	10.20	5240.0463	5240	0.0463	-8.8359
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5240.0132	5240	0.0132	-2.5191
		T (°C)	-10	5240.0236	5240	0.0236	-4.5038
		T (°C)	0	5240.0524	5240	0.0524	-10.0000
		T (°C)	10	5240.0187	5240	0.0187	-3.5687
		T (°C)	20	5240.0312	5240	0.0312	-5.9542
		T (°C)	30	5240.0267	5240	0.0267	-5.0954
		T (°C)	40	5240.0734	5240	0.0734	-14.0076
		T (°C)	50	5240.0815	5240	0.0815	-15.5534
		T (°C)	60	5240.0244	5240	0.0244	-4.6565
		T (°C)	70	5240.0316	5240	0.0316	-6.0305
Limits				± 20 ppm			
Result				Complies			

EUT：	802.11ac WiFi Module	Model Name. ：	802R8822
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX Frequency Band I (5150-5250MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5260MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5260.0352	5260	0.0352	-6.6920
		V max (V)	13.80	5260.0311	5260	0.0311	-5.9125
		V min (V)	10.20	5260.0197	5260	0.0197	-3.7452
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5260MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5260.0426	5260	0.0426	-8.0989
		T (°C)	-10	5260.0298	5260	0.0298	-5.6654
		T (°C)	0	5260.0319	5260	0.0319	-6.0646
		T (°C)	10	5260.0470	5260	0.0470	-8.9354
		T (°C)	20	5260.0332	5260	0.0332	-6.3118
		T (°C)	30	5260.0422	5260	0.0422	-8.0228
		T (°C)	40	5260.0102	5260	0.0102	-1.9392
		T (°C)	50	5260.0318	5260	0.0318	-6.0456
		T (°C)	60	5260.0418	5260	0.0418	-7.9468
		T (°C)	70	5260.0229	5260	0.0229	-4.3536
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5280MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5280.0653	5280	0.0653	-12.3674
		V max (V)	13.80	5280.0214	5280	0.0214	-4.0530
		V min (V)	10.20	5280.0297	5280	0.0297	-5.6250
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5280MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5280.0329	5280	0.0329	-6.2311
		T (°C)	-10	5280.0174	5280	0.0174	-3.2955
		T (°C)	0	5280.0295	5280	0.0295	-5.5871
		T (°C)	10	5280.0316	5280	0.0316	-5.9848
		T (°C)	20	5280.0312	5280	0.0312	-5.9091
		T (°C)	30	5280.0295	5280	0.0295	-5.5871
		T (°C)	40	5280.0413	5280	0.0413	-7.8220
		T (°C)	50	5280.0225	5280	0.0225	-4.2614
		T (°C)	60	5280.0132	5280	0.0132	-2.5000
		T (°C)	70	5280.0349	5280	0.0349	-6.6098
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5320MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5320.0421	5320	0.0421	-7.9135
		V max (V)	13.80	5320.0126	5320	0.0126	-2.3684
		V min (V)	10.20	5320.0418	5320	0.0418	-7.8571
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5320MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5320.0296	5320	0.0296	-5.5639
		T (°C)	-10	5320.0185	5320	0.0185	-3.4774
		T (°C)	0	5320.0423	5320	0.0423	-7.9511
		T (°C)	10	5320.0314	5320	0.0314	-5.9023
		T (°C)	20	5320.0631	5320	0.0631	-11.8609
		T (°C)	30	5320.0292	5320	0.0292	-5.4887
		T (°C)	40	5320.0319	5320	0.0319	-5.9962
		T (°C)	50	5320.0457	5320	0.0457	-8.5902
		T (°C)	60	5320.0316	5320	0.0316	-5.9398
		T (°C)	70	5320.0189	5320	0.0189	-3.5526
Limits				± 20 ppm			
Result				Complies			

EUT：	802.11ac WiFi Module	Model Name. ：	802R8822
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX Frequency Band 2C (5470-5725MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5500.0421	5500	0.0421	-7.6545
		V max (V)	13.80	5500.0236	5500	0.0236	-4.2909
		V min (V)	10.20	5500.0218	5500	0.0218	-3.9636
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5500.0412	5500	0.0412	-7.4909
		T (°C)	-10	5500.0268	5500	0.0268	-4.8727
		T (°C)	0	5500.0187	5500	0.0187	-3.4000
		T (°C)	10	5500.0236	5500	0.0236	-4.2909
		T (°C)	20	5500.0124	5500	0.0124	-2.2545
		T (°C)	30	5500.0328	5500	0.0328	-5.9636
		T (°C)	40	5500.0152	5500	0.0152	-2.7636
		T (°C)	50	5500.0132	5500	0.0132	-2.4000
		T (°C)	60	5500.0247	5500	0.0247	-4.4909
		T (°C)	70	5500.0326	5500	0.0326	-5.9273
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5600MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5600.0365	5600	0.0365	-6.5179
		V max (V)	13.80	5600.0215	5600	0.0215	-3.8393
		V min (V)	10.20	5600.0427	5600	0.0427	-7.6250
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5600MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5600.0231	5600	0.0231	-4.1250
		T (°C)	-10	5600.0421	5600	0.0421	-7.5179
		T (°C)	0	5600.0238	5600	0.0238	-4.2500
		T (°C)	10	5600.0289	5600	0.0289	-5.1607
		T (°C)	20	5600.0428	5600	0.0428	-7.6429
		T (°C)	30	5600.0321	5600	0.0321	-5.7321
		T (°C)	40	5600.0427	5600	0.0427	-7.6250
		T (°C)	50	5600.0283	5600	0.0283	-5.0536
		T (°C)	60	5600.0124	5600	0.0124	-2.2143
		T (°C)	70	5600.0123	5600	0.0123	-2.1964
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5700.0586	5700	0.0586	-10.2807
		V max (V)	13.80	5700.0524	5700	0.0524	-9.1930
		V min (V)	10.20	5700.0271	5700	0.0271	-4.7544
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5700.0632	5700	0.0632	-11.0877
		T (°C)	-10	5700.0289	5700	0.0289	-5.0702
		T (°C)	0	5700.0528	5700	0.0528	-9.2632
		T (°C)	10	5700.0243	5700	0.0243	-4.2632
		T (°C)	20	5700.0168	5700	0.0168	-2.9474
		T (°C)	30	5700.0285	5700	0.0285	-5.0000
		T (°C)	40	5700.0316	5700	0.0316	-5.5439
		T (°C)	50	5700.0124	5700	0.0124	-2.1754
		T (°C)	60	5700.0286	5700	0.0286	-5.0175
		T (°C)	70	5700.0269	5700	0.0269	-4.7193
Limits				± 20 ppm			
Result				Complies			

EUT：	802.11ac WiFi Module	Model Name. ：	802R8822
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX Frequency(5725-5850MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (° C)	20	V nom (V)	12.00	5745.00183	5745	0.00183	-0.3184
		V max (V)	13.80	5745.00000	5745	0.00000	-0.0008
		V min (V)	10.20	5745.00919	5745	0.00919	-1.6003
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5745.01189	5745	0.01189	-2.0696
		T (°C)	-10	5745.00700	5745	0.00700	-1.2178
		T (°C)	0	5745.01234	5745	0.01234	-2.1479
		T (°C)	10	5745.00866	5745	0.00866	-1.5073
		T (°C)	20	5745.00220	5745	0.00220	-0.3831
		T (°C)	30	5745.00597	5745	0.00597	-1.0399
		T (°C)	40	5745.00951	5745	0.00951	-1.6560
		T (°C)	50	5745.00932	5745	0.00932	-1.6214
		T (°C)	60	5745.01260	5745	0.01260	-2.1939
		T (°C)	70	5745.01318	5745	0.01318	-2.2935
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12.00	5785.00204	5785	0.00204	-0.3528
		V max (V)	13.80	5785.00765	5785	0.00765	-1.3221
		V min (V)	10.20	5785.01098	5785	0.01098	-1.8978
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5785.01167	5785	0.01167	-2.0168
		T (°C)	-10	5785.01168	5785	0.01168	-2.0194
		T (°C)	0	5785.00393	5785	0.00393	-0.6797
		T (°C)	10	5785.00963	5785	0.00963	-1.6650
		T (°C)	20	5785.00000	5785	0.00000	-0.0002
		T (°C)	30	5785.01326	5785	0.01326	-2.2913
		T (°C)	40	5785.00472	5785	0.00472	-0.8151
		T (°C)	50	5785.00107	5785	0.00107	-0.1853
		T (°C)	60	5785.00184	5785	0.00184	-0.3181
		T (°C)	70	5785.00015	5785	0.00015	-0.0263
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (° C)	20	V nom (V)	12.00	5825.00486	5825	0.00486	-0.8342
		V max (V)	13.80	5825.00789	5825	0.00789	-1.3542
		V min (V)	10.20	5825.00097	5825	0.00097	-0.1659
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5825.00189	5825	0.00189	-0.3251
		T (°C)	-10	5825.00754	5825	0.00754	-1.2939
		T (°C)	0	5825.00995	5825	0.00995	-1.7074
		T (°C)	10	5825.00439	5825	0.00439	-0.7535
		T (°C)	20	5825.00049	5825	0.00049	-0.0839
		T (°C)	30	5825.00285	5825	0.00285	-0.4891
		T (°C)	40	5825.01200	5825	0.01200	-2.0594
		T (°C)	50	5825.00156	5825	0.00156	-0.2671
		T (°C)	60	5825.00931	5825	0.00931	-1.5986
		T (°C)	70	5825.00375	5825	0.00375	-0.6445
Limits				± 20 ppm			
Result				Complies			

11. DYNAMIC FREQUENCY SELECTION(DFS)

11.1 APPLICABILITY OF DFS REQUIREMENTS

EUT is client and operates as client without radar detection function.

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Not required	Yes
Channel Move Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes
Client Beacon Test	N/A	Yes	Yes

Additional requirements for devices with multiple bandwidth modes	Operational Mode	
	Master or Client With Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required

Note
Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

11.2 INTERFERENCE THRESHOLD VALUES, MASTER OR CLIENT INCORPORATING IN-SERVICE MONITORING

Maximum Transmit Power	Value (see notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.
Note 3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

11.3 DFS RESPONSE REQUIREMENT VALUES

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the 99% power bandwidth See Note 3.

Note 1: The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:
• For the Short pulse radar Test Signals this instant is the end of the Burst.
• For the Frequency Hopping radar Test Signal, this instant is the end of the last radar Burst generated.
• For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.
Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate Channel changes (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.
Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.

11.4 SHORT PULSE RADAR TEST WAVEFORMS

As the EUT is a Client Device with no Radar Detection, only one type radar pulse is required for the testing. Radar Pulse type 0 was used in the evaluation of the Client device for the purpose of measuring the Channel Move Time and the Channel Closing Transmission Time.

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Trials
0	1	1428	18	60%	30
1	1	Test A Test B	$\text{Roundup}\left(\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right)$	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a
Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A

A minimum of 30 unique waveforms are required for each of the short pulse radar types 2 through 4. For short pulse radar type 1, the same waveform is used a minimum of 30 times. If more than 30 waveforms are used for short pulse radar types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms.
If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B. The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

11.5 CALIBRATION SETUP AND DFS TEST RESULTS

Radar Waveform Calibration Procedure

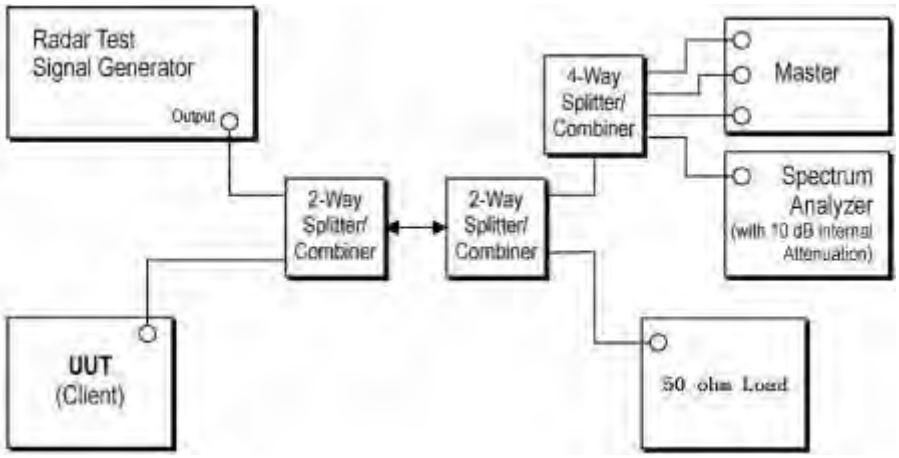
1) A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to place of the master

2) The interference Radar Detection Threshold Level is -62dBm + 0dBi +1dB = -61dBm that had been taken into account the output power range and antenna gain.

3) The following equipment setup was used to calibrate the conducted radar waveform. A vector signal generator was utilized to establish the test signal level for radar type 0. During this process there were no transmissions by either the master or client device. The spectrum analyzer was switched to the zero spans (time domain) at the frequency of the radar waveform generator. Peak detection was used. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz. The spectrum analyzer had offset -1.0dB to compensate RF cable loss 1.0dB.

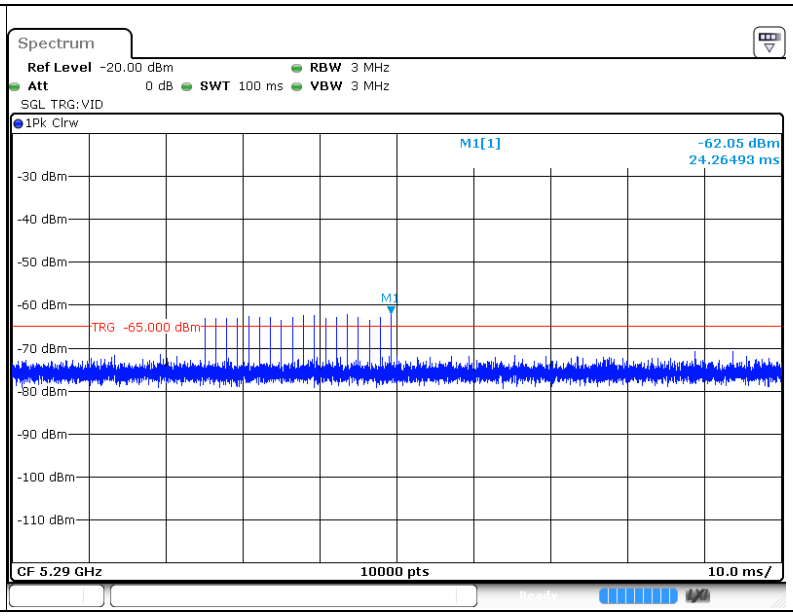
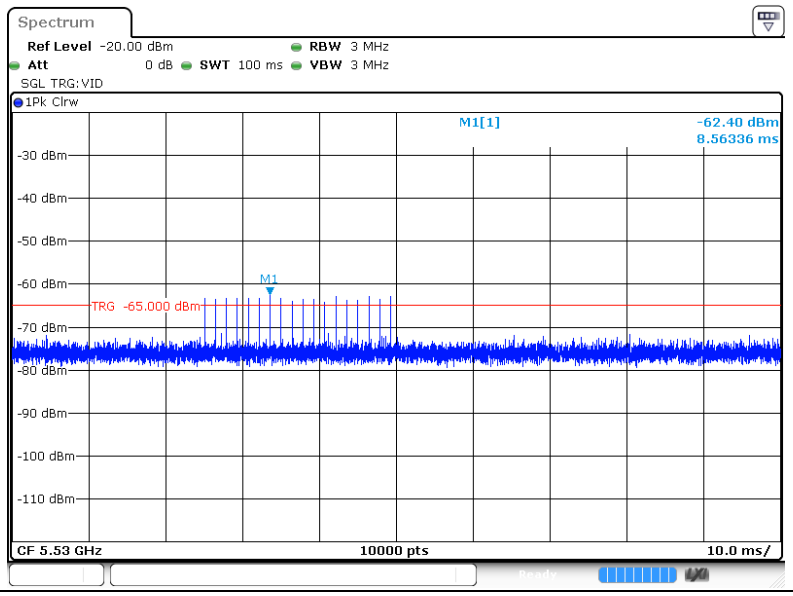
4) The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was - -62dBm + 0dBi +1dB = -61dBm. Capture the spectrum analyzer plots on short pulse radar waveform.

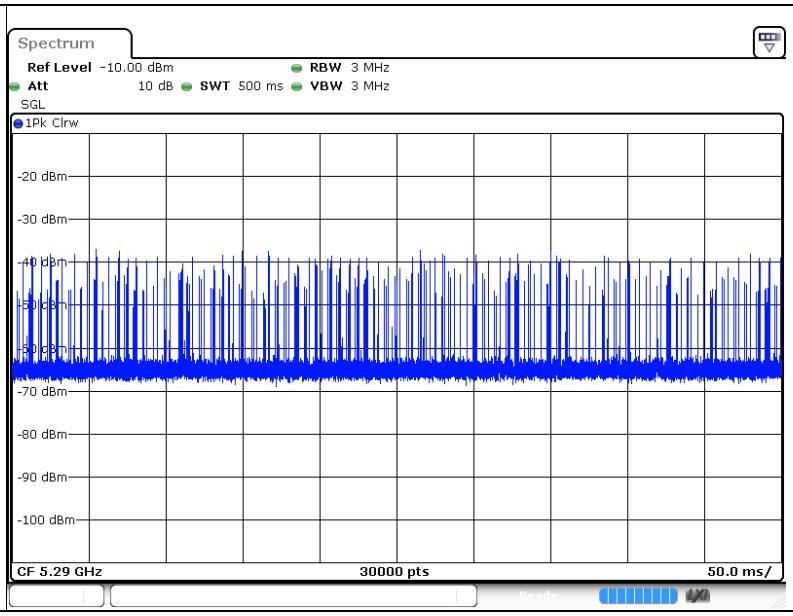
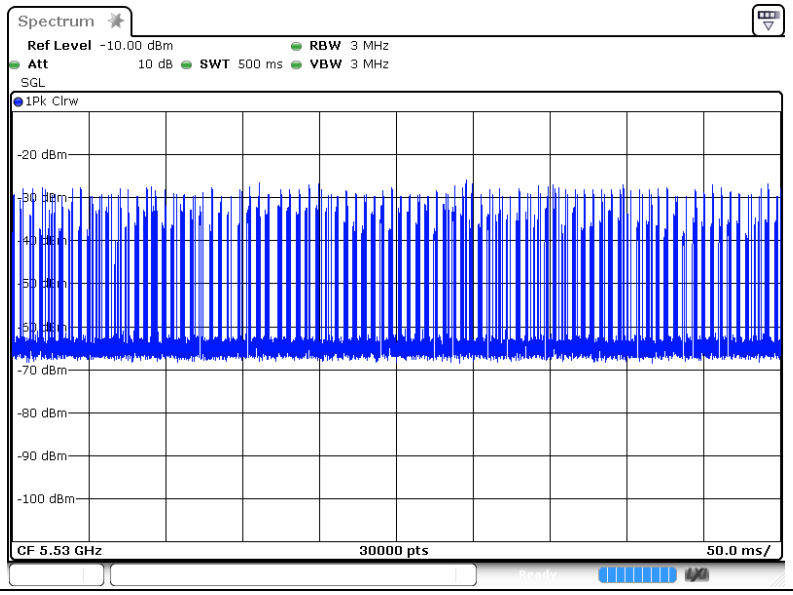
11.6 CONDUCTED CALIBRATION SETUP



Wireless AP	Manufacturer :	LINKSYS LLC
	Model No. :	WRT32X
	FCC ID :	Q87-WRT3200ACM

11.7 RADAR WAVEFORM CALIBRATION RESULT

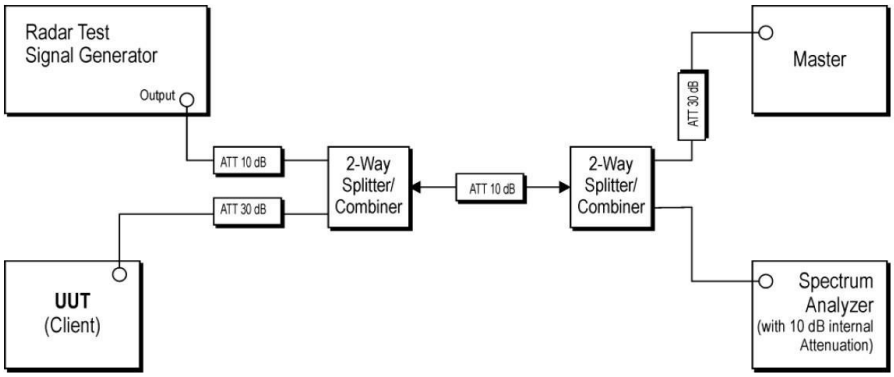
Reference DFS test signal
5290MHz

Reference DFS test signal
5530MHz


EUT data traffic (Slave)
5290MHz

EUT data traffic (Slave)
5530MHz


11.8 IN-SERVICE MONITORING: CHANNEL MOVE TIME, CHANNEL CLOSING TRANSMISSION TIME AND NON-OCCUPANCY PERIOD

TEST CONFIGURATION:

Setup for Client with injection at the Master



Wireless AP	Manufacturer :	LINKSYS LLC
	Model No. :	WRT32X
	FCC ID :	Q87-WRT3200ACM

TEST PROCEDURE:

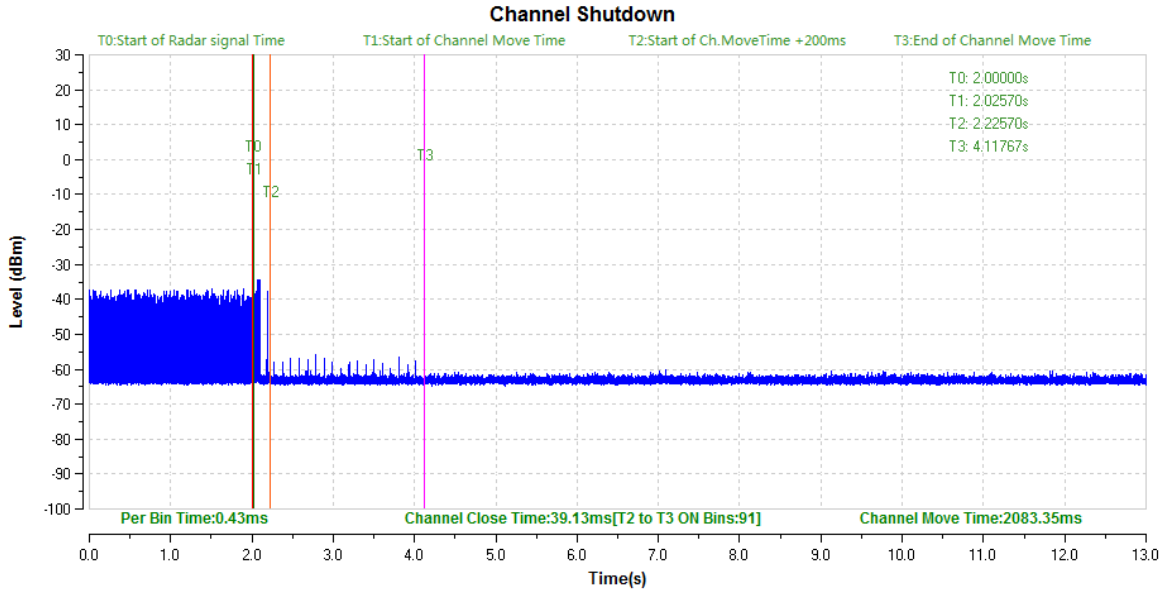
1. The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
2. The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device
3. A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
4. EUT will associate with the master at channel. The file "iperf.exe" specified by the FCC is Streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
5. When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
6. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom In 600ms plot of the Short Pulse Radar Type
7. Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: Dwell (0.3ms) =S (12000ms) / B (4000); where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by: C (ms)= N X Dwell (0.3ms); where C is the Closing Time, N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission and Dwell is the dwell time per bin.
8. Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

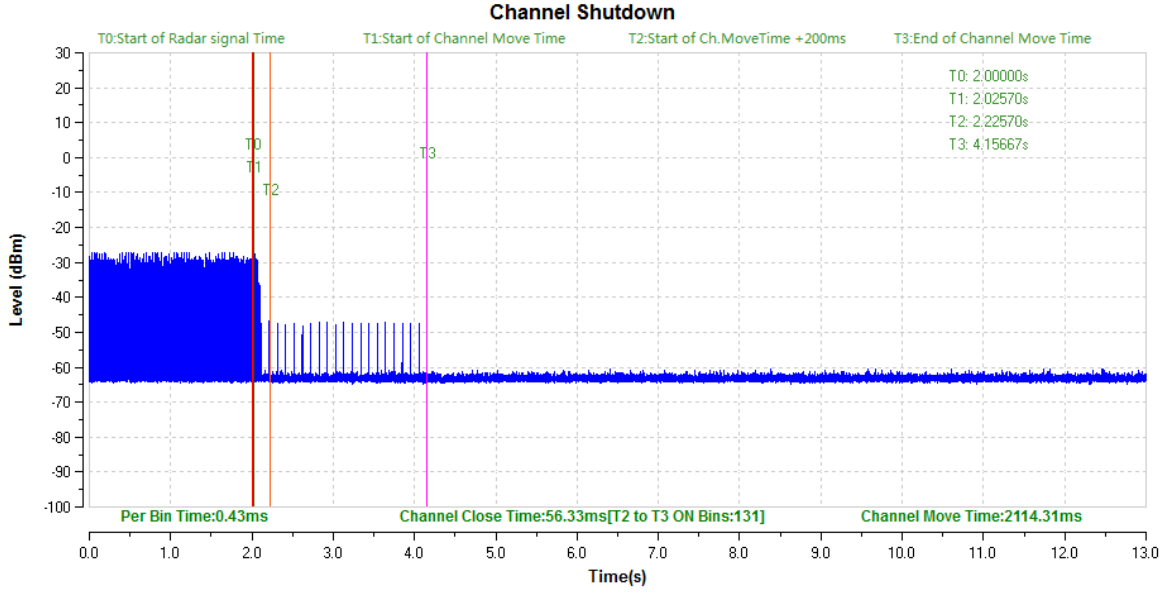
TEST MODE:

Please refer to the clause 2.2

11.9 RESULT OF CHANNEL MOVE TIME, CHANNEL CLOSING TRANSMISSION TIME AND NON-OCCUPANCY PERIOD FOR CLIENT BEACON TEST

BW/ Channel	Maximum EIRP Power(dBm)	Test Item	Test Result	Limit	Result
80MHz/ 5290MHz	22.52	Channel Move Time	2083.35ms	＜10s	PASS
		Channel Closing Transmission Time	39.13ms	＜260ms	PASS
80MHz/ 5530MHz	23.41	Channel Move Time	2114.31ms	＜10s	PASS
		Channel Closing Transmission Time	56.33ms	＜260ms	PASS

80MHz/5290MHz
Band II Channel Move Time& Channel Closing Transmission Time


80MHz/5530MHz
Band II Channel Move Time& Channel Closing Transmission Time


12. ANTENNA REQUIREMENT

12.1 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.

12.2 EUT ANTENNA

The EUT has two types of antenna. Only the highest antenna gain Antenna Type 1 data has been recorded in this test report, please refer to antenna list for more antenna information.

Table 1:

Antenna	Antenna Type	Antenna Gain(dBi)
		5G
A(main)	PIFA	5.6
B(aux)	PIFA	4.4

Table 2:

Antenna	Antenna Type	Antenna Gain(dBi)
		5G
A(main)	Dipole	2
B(aux)	Dipole	2

It comply with the standard requirement.

END OF REPORT