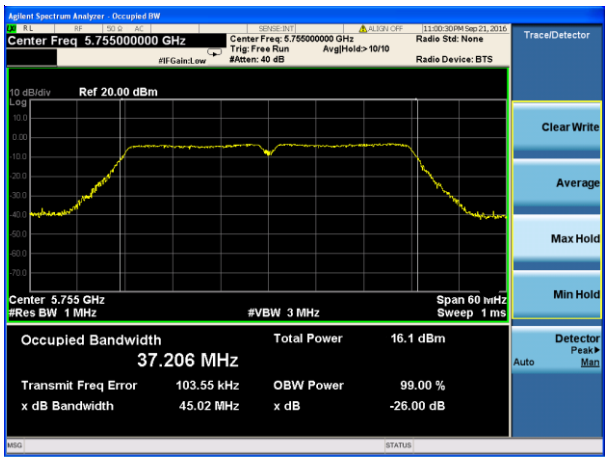
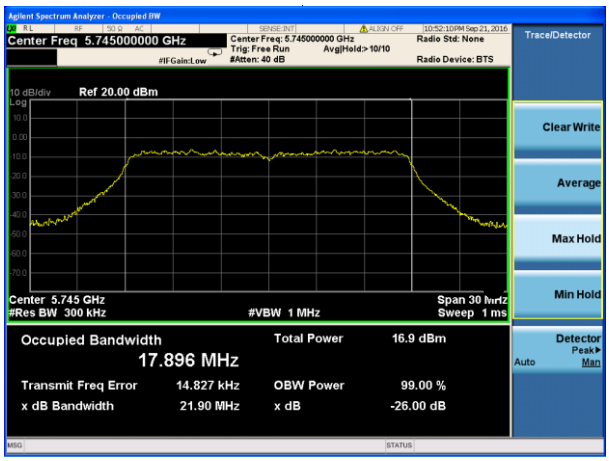
Test plot

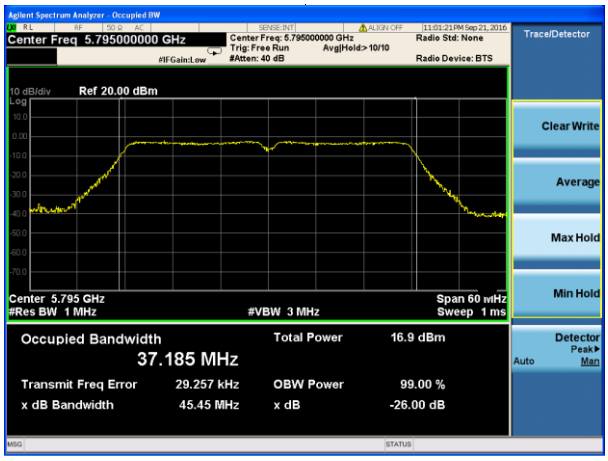
(802.11 n40) Bandwidth plot on channel 151



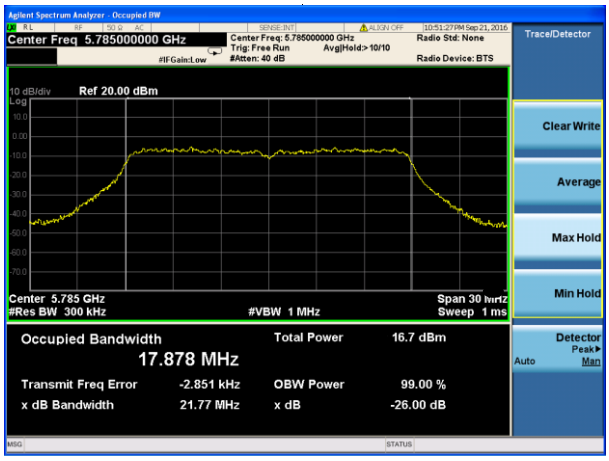
(802.11 AC20) Bandwidth plot on channel 149



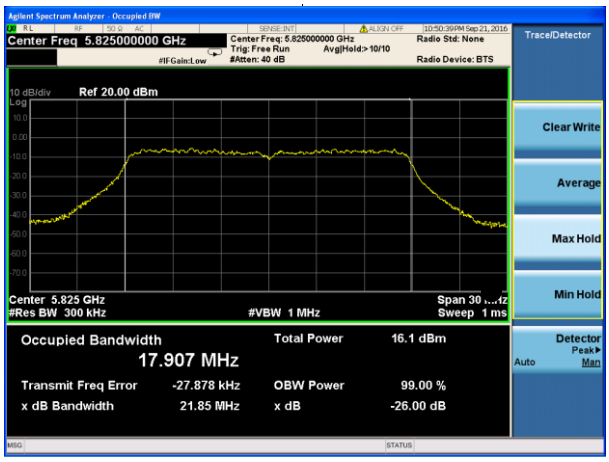
(802.11 n40) Bandwidth plot on channel 159



(802.11 AC20) Bandwidth plot on channel 157

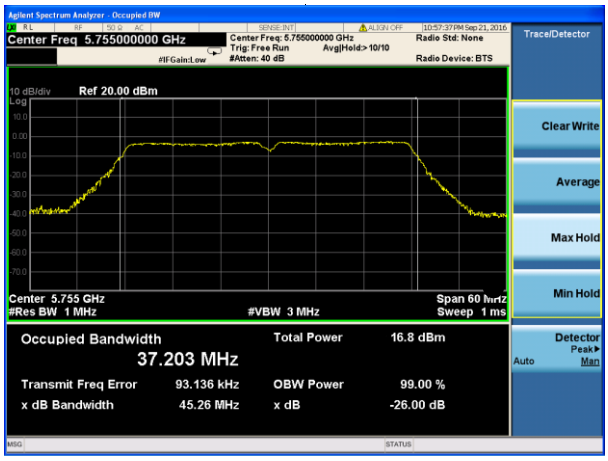


(802.11 AC20) Bandwidth plot on channel 165

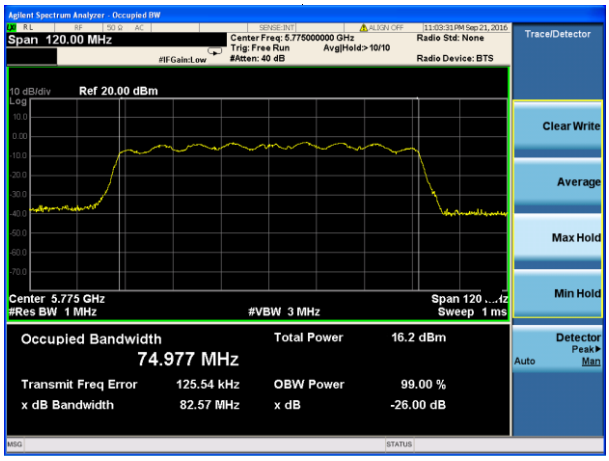


Test plot

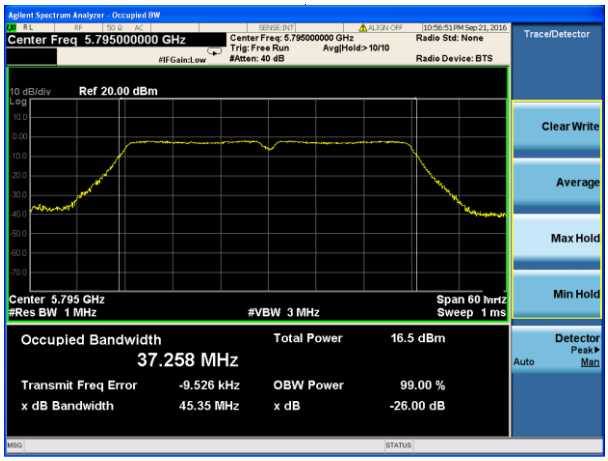
(802.11 AC40) Bandwidth plot on channel 151



(802.11 AC80) Bandwidth plot on channel 155



(802.11 AC40) Bandwidth plot on channel 159



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.

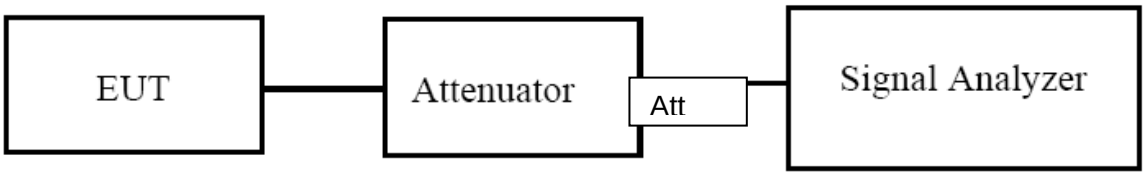
f) Allow the trace to stabilize.

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.

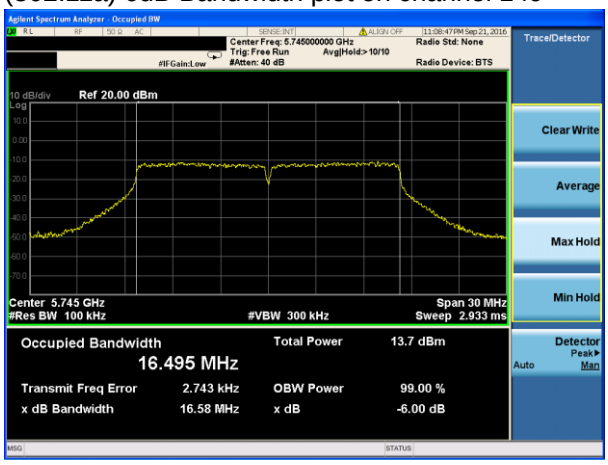
6.6 TEST RESULTS

EUT：	Wireless LAN equipment	Model Name. ：	SBT200DI
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5G) Mode Frequency Band IV (5725-5825MHz)		

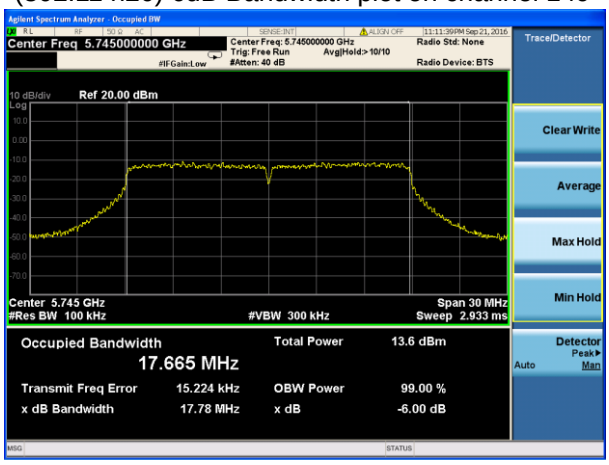
Mode	Channel	Frequency (MHz)	-6dB bandwidth (MHz)	Limit (KHz)	Result
802.11a	149	5745	16.58	500	Pass
	157	5785	16.55	500	Pass
	165	5825	16.57	500	Pass
802.11 n20	149	5745	17.78	500	Pass
	157	5785	17.75	500	Pass
	165	5825	17.76	500	Pass
802.11 n40	151	5755	36.52	500	Pass
	159	5795	36.57	500	Pass
802.11 AC20	149	5745	17.80	500	Pass
	157	5785	17.77	500	Pass
	165	5825	17.71	500	Pass
802.11 AC40	149	5745	36.56	500	Pass
	157	5785	36.53	500	Pass
802.11 AC80	155	5775	75.08	500	Pass

Test plot

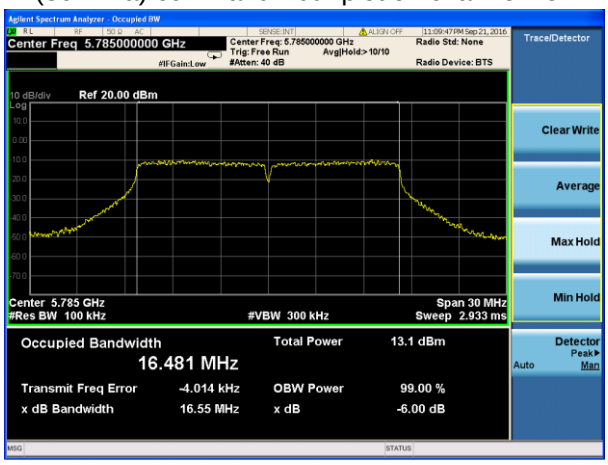
(802.11a) 6dB Bandwidth plot on channel 149



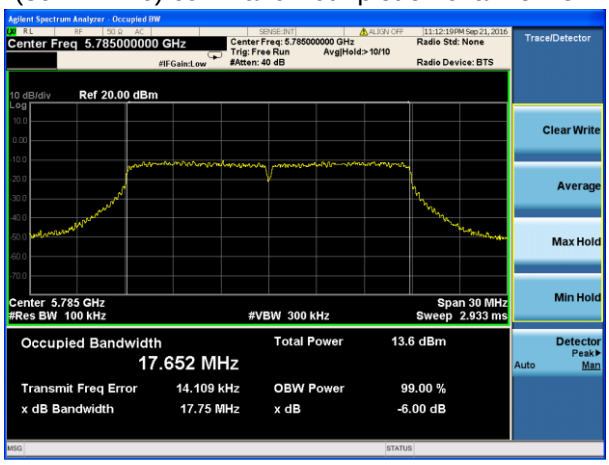
(802.11 n20) 6dB Bandwidth plot on channel 149



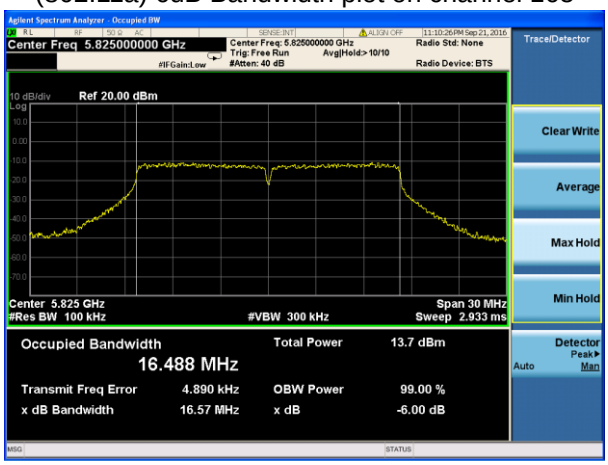
(802.11a) 6dB Bandwidth plot on channel 157



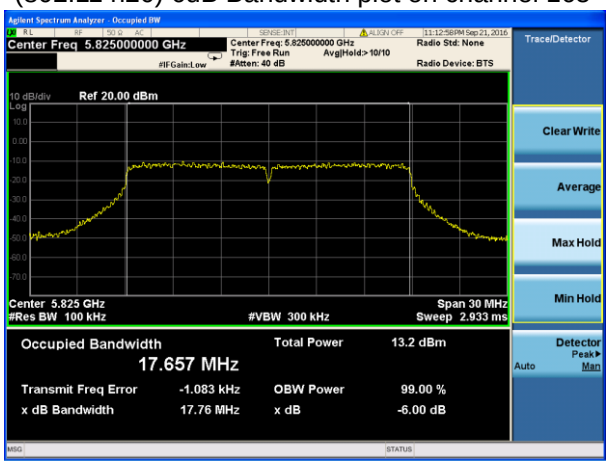
(802.11 n20) 6dB Bandwidth plot on channel 157



(802.11a) 6dB Bandwidth plot on channel 165

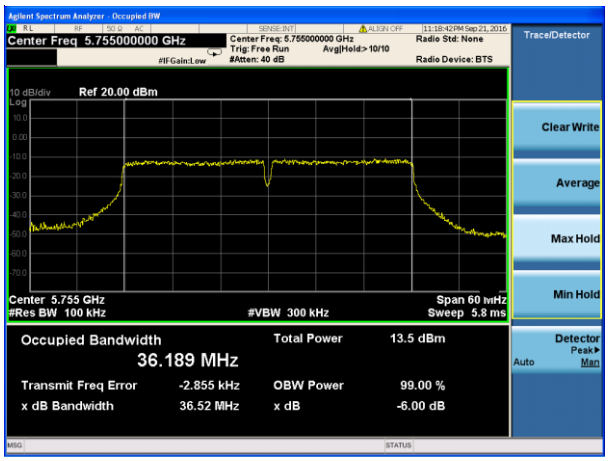


(802.11 n20) 6dB Bandwidth plot on channel 165

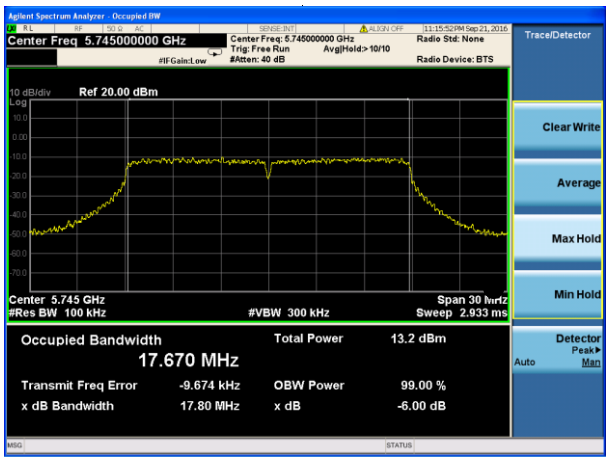


Test plot

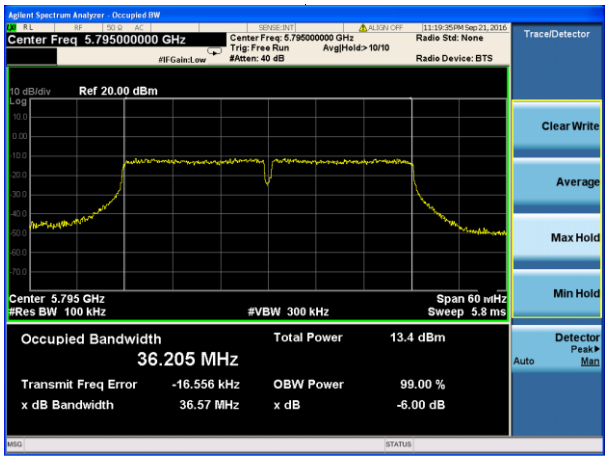
(802.11 n40) 6dB Bandwidth plot on channel 151



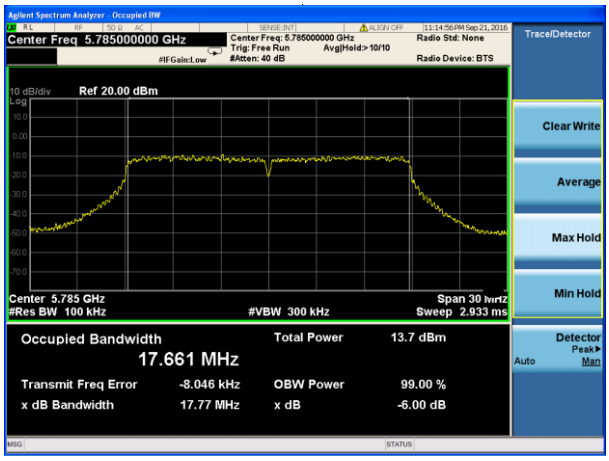
(802.11 AC20) 6dB Bandwidth plot on channel 149



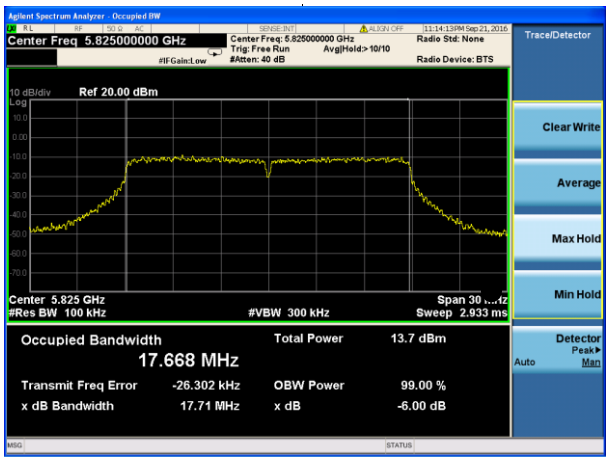
(802.11 n40) 6dB Bandwidth plot on channel 159



(802.11 AC20) 6dB Bandwidth plot on channel 157

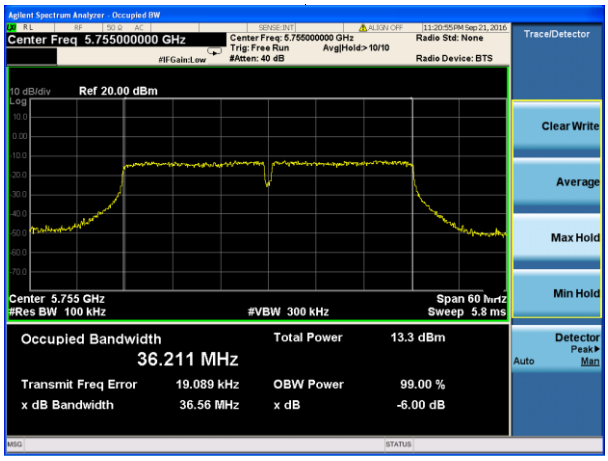


(802.11 AC20) 6dB Bandwidth plot on channel 165

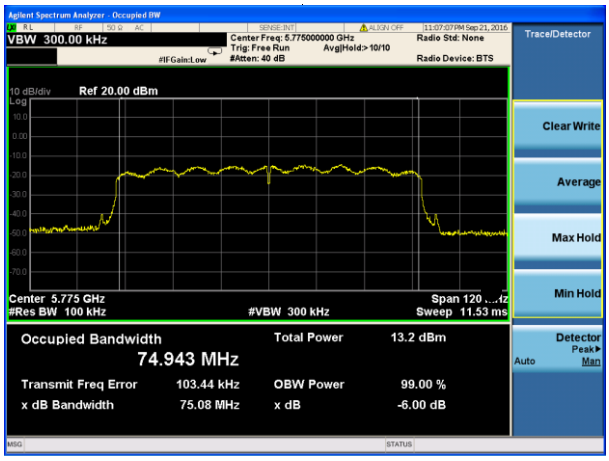


Test plot

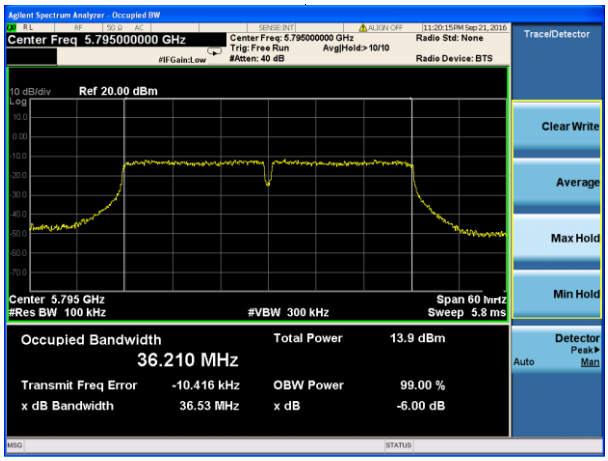
(802.11 AC40) 6dB Bandwidth plot on channel 151



(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

The maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW
5725~5850	1W

The maximum e.i.r.p should not exceed:

Frequency Band(MHz)	Limit
5150~5250	200mW or 10dBm +10logB whichever is less
5725~5850	N/A

Note: Where “B” is the 99% emission bandwidth in MHz

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".

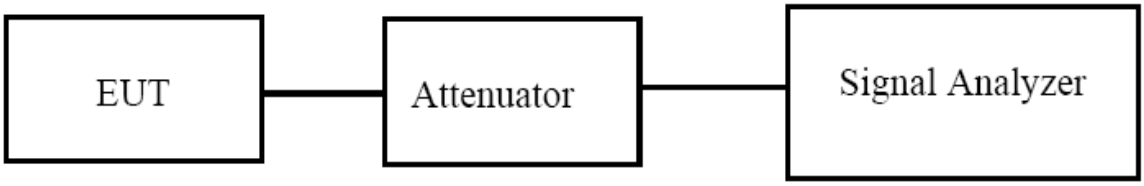
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(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：	Wireless LAN equipment	Model Name. ：	SBT200DI
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5G) Mode Frequency Band I (5150-5250MHz)		

Test Channel	Frequency	Maximum output power. Antenna port (AV)	LIMIT	Result
	(MHz)	(dBm)	dBm	
TX 802.11a Mode				
CH36	5180	15.74	23.98	Pass
CH40	5200	16.08	23.98	Pass
CH48	5240	**16.51**	23.98	Pass
TX 802.11 n20M Mode				
CH36	5180	15.23	23.98	Pass
CH40	5200	15.52	23.98	Pass
CH48	5240	15.16	23.98	Pass
TX 802.11 n40M Mode				
CH38	5190	15.11	23.98	Pass
CH46	5230	14.84	23.98	Pass
TX 802.11 AC20M Mode				
CH36	5180	14.98	23.98	Pass
CH40	5200	15.66	23.98	Pass
CH48	5240	15.55	23.98	Pass
TX 802.11 AC40M Mode				
CH38	5190	15.03	23.98	Pass
CH46	5230	15.09	23.98	Pass
TX 802.11 AC80M Mode				
CH42	5210	14.92	23.98	Pass

Note:4.71dbi<6.0 dbi so power density limit= 10log(250)=23.98dBm

EUT：	Wireless LAN equipment	Model Name. ：	SBT200DI
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX (5G) Mode Frequency Band IV (5725-5825MHz)		

Test Channel	Frequency	Maximum output power. Antenna port (AV)	LIMIT
	(MHz)	(dBm)	(dBm)
TX 802.11a Mode			
CH 149	5745	16.12	30
CH 157	5785	16.21	30
CH 165	5825	16.24	30
TX 802.11 n20M Mode			
CH 149	5745	16.14	30
CH 157	5785	16.24	30
CH 165	5825	**16.31**	30
TX 802.11 n40M Mode			
CH 151	5755	16.17	30
CH 159	5795	16.24	30
TX 802.11 AC20M Mode			
CH 149	5745	16.08	30
CH 157	5785	16.24	30
CH 165	5825	16.25	30
TX 802.11 AC40M Mode			
CH 151	5755	16.08	30
CH 159	5795	16.14	30
TX 802.11 AC80M Mode			
CH 155	5775	16.21	30

Note:4.71dbi<6.0 dbi so power density limit= 30

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 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

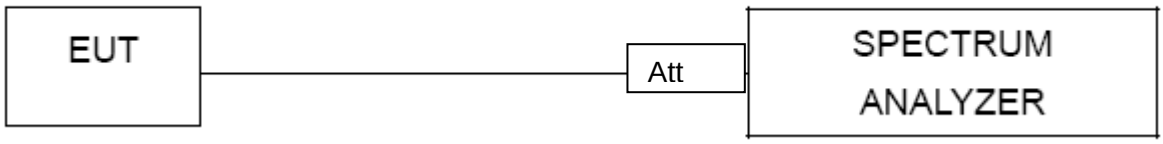
8.2 TEST PROCEDURE

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

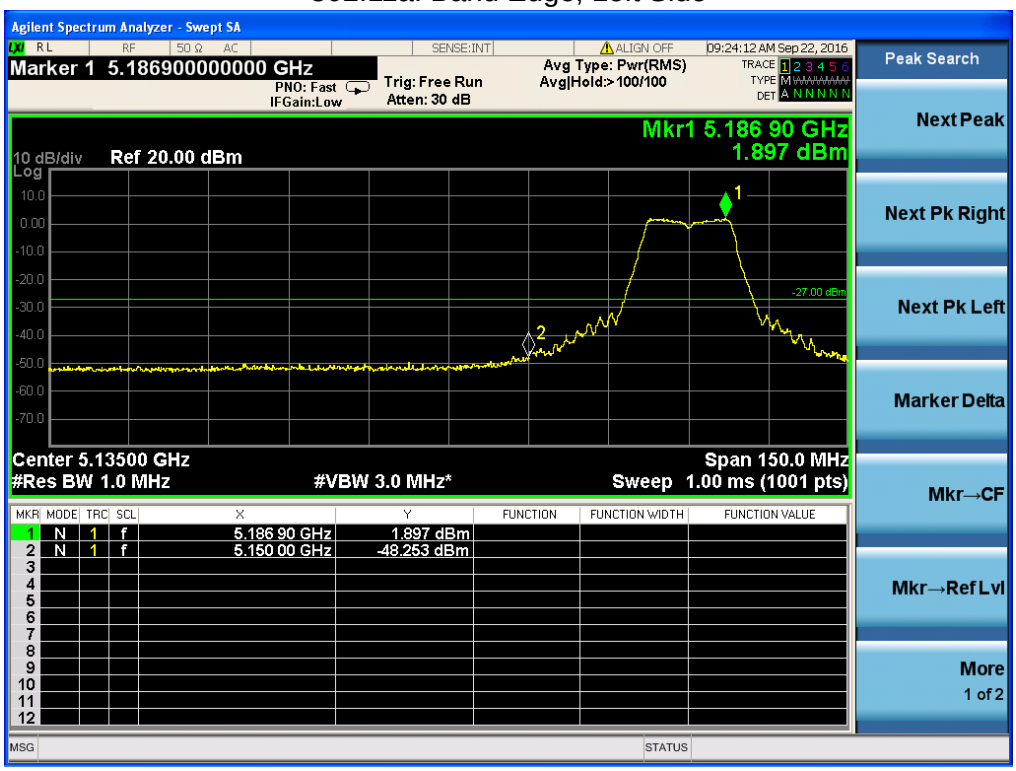
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULTS

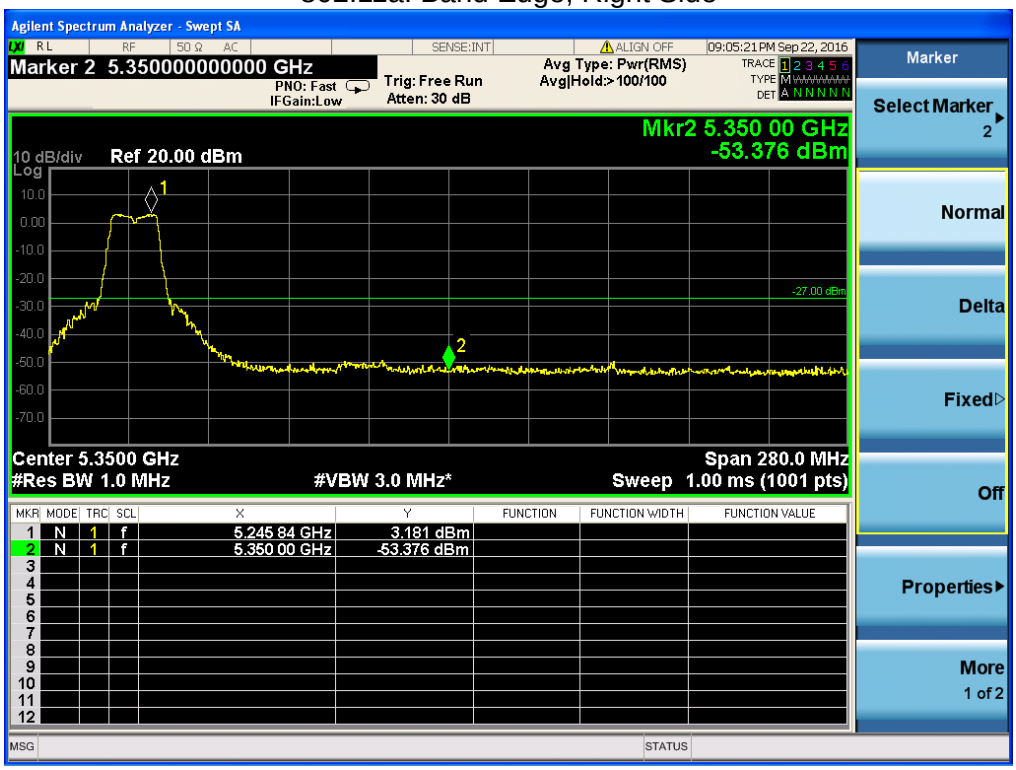
EUT：	Wireless LAN equipment	Model Name. ：	SBT200DI
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 5V

5.2G

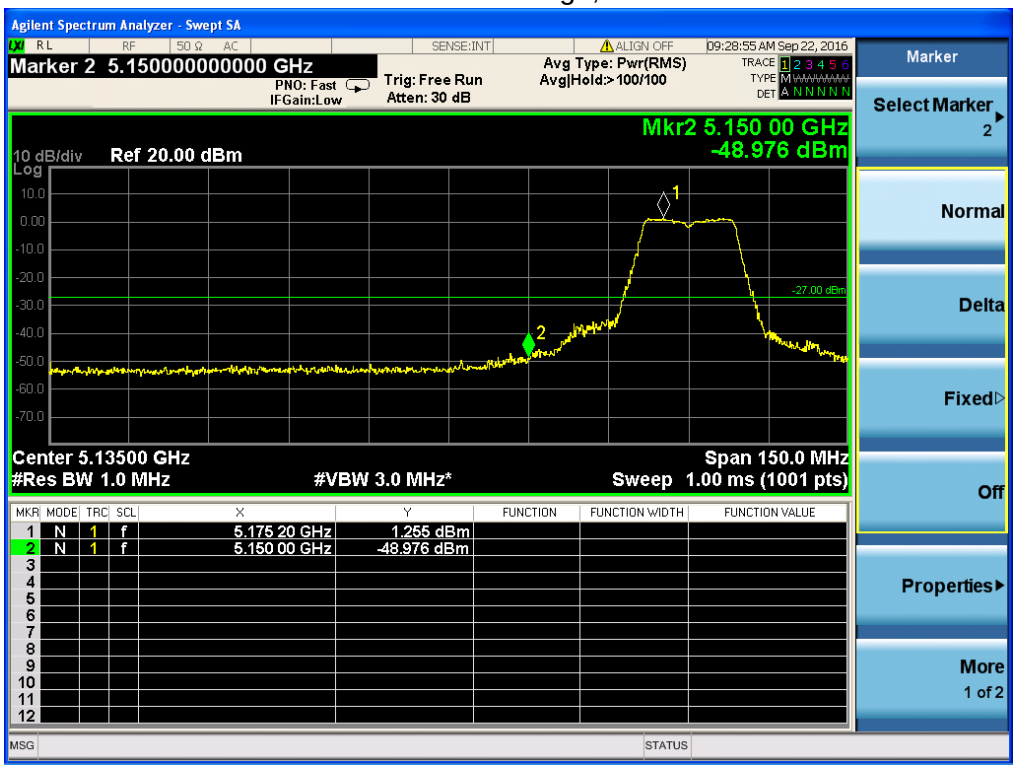
802.11a: Band Edge, Left Side



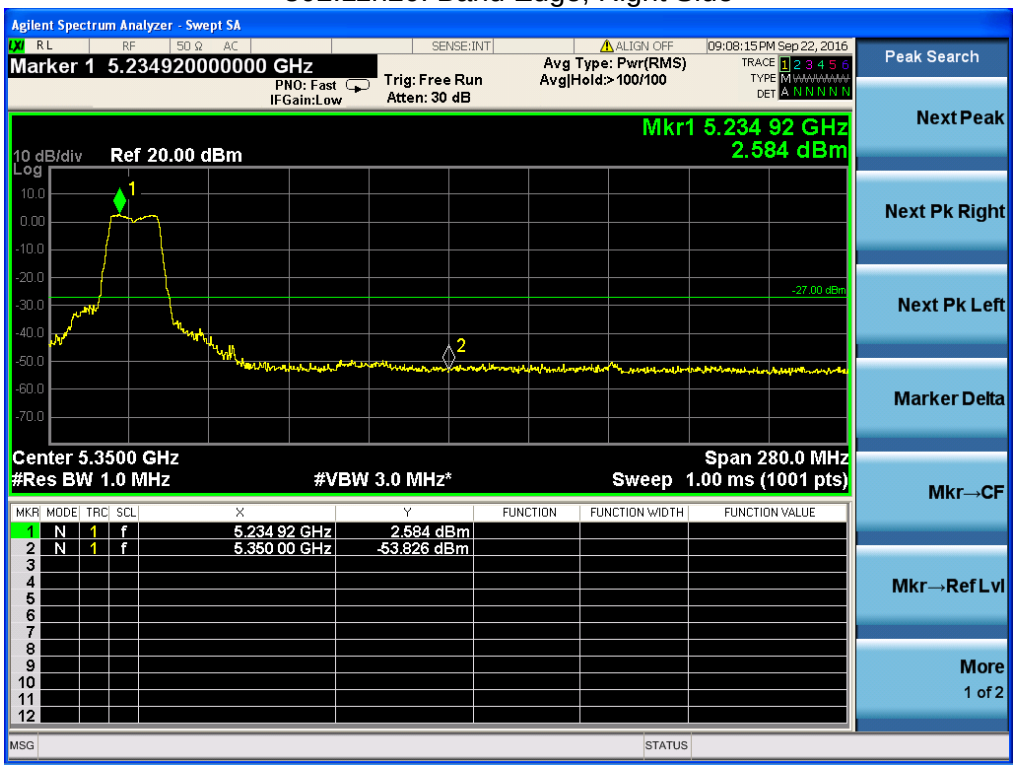
802.11a: Band Edge, Right Side



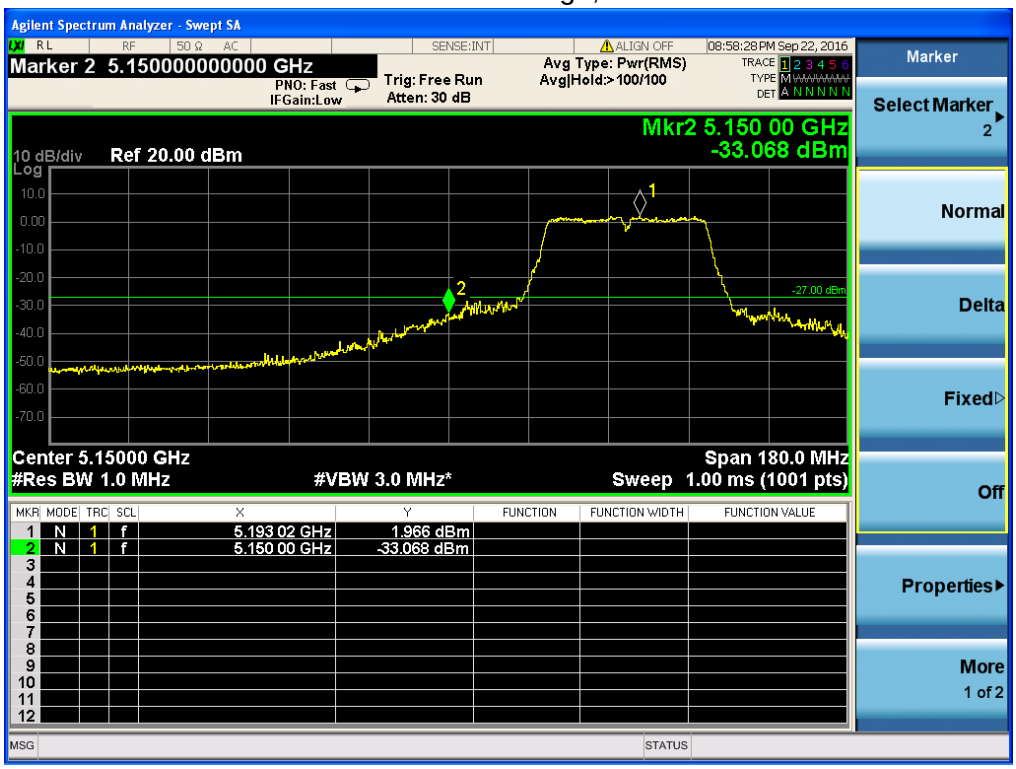
802.11n20: Band Edge, Left Side



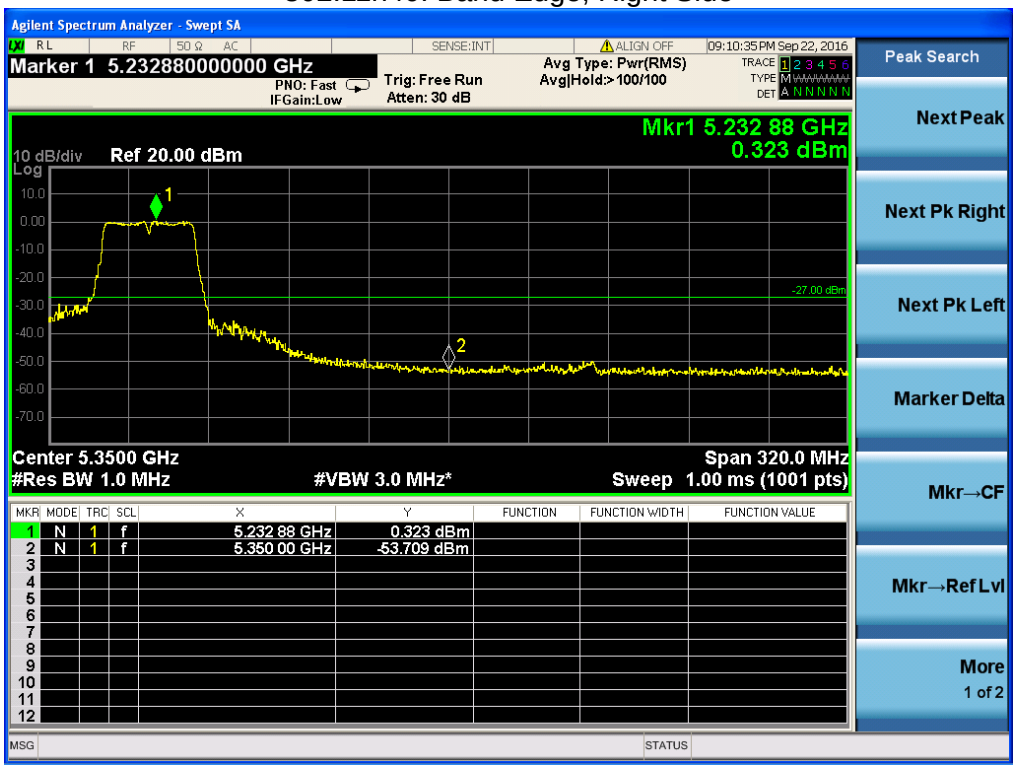
802.11n20: Band Edge, Right Side



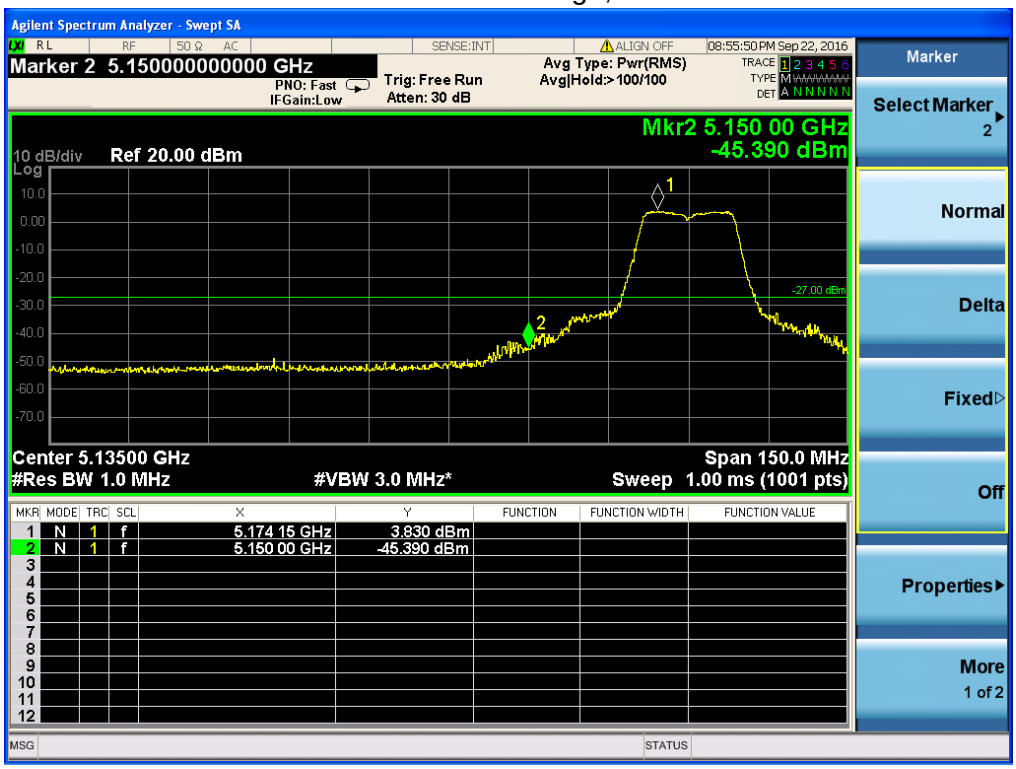
802.11n40: Band Edge, Left Side



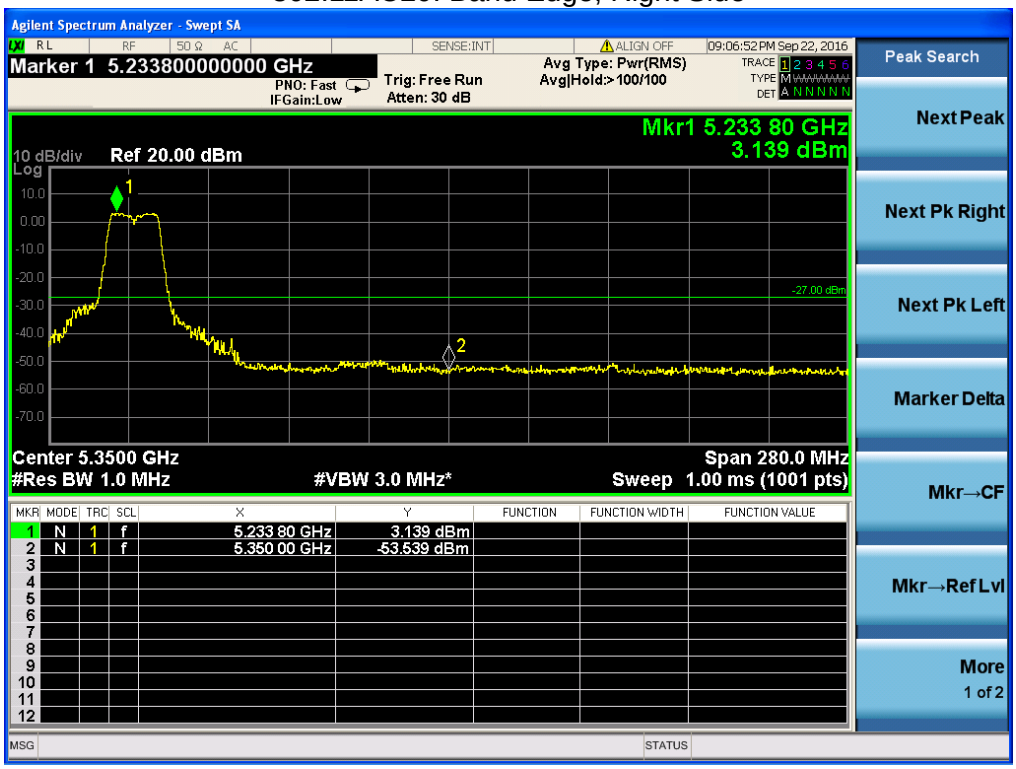
802.11n40: Band Edge, Right Side



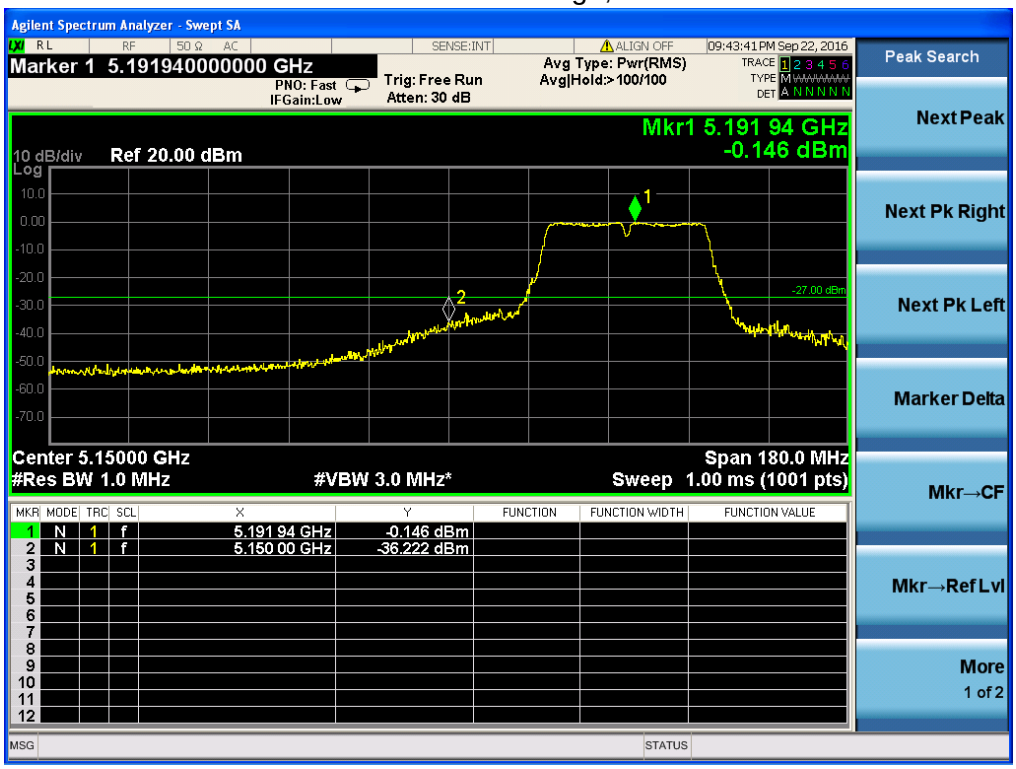
802.11AC20: Band Edge, Left Side



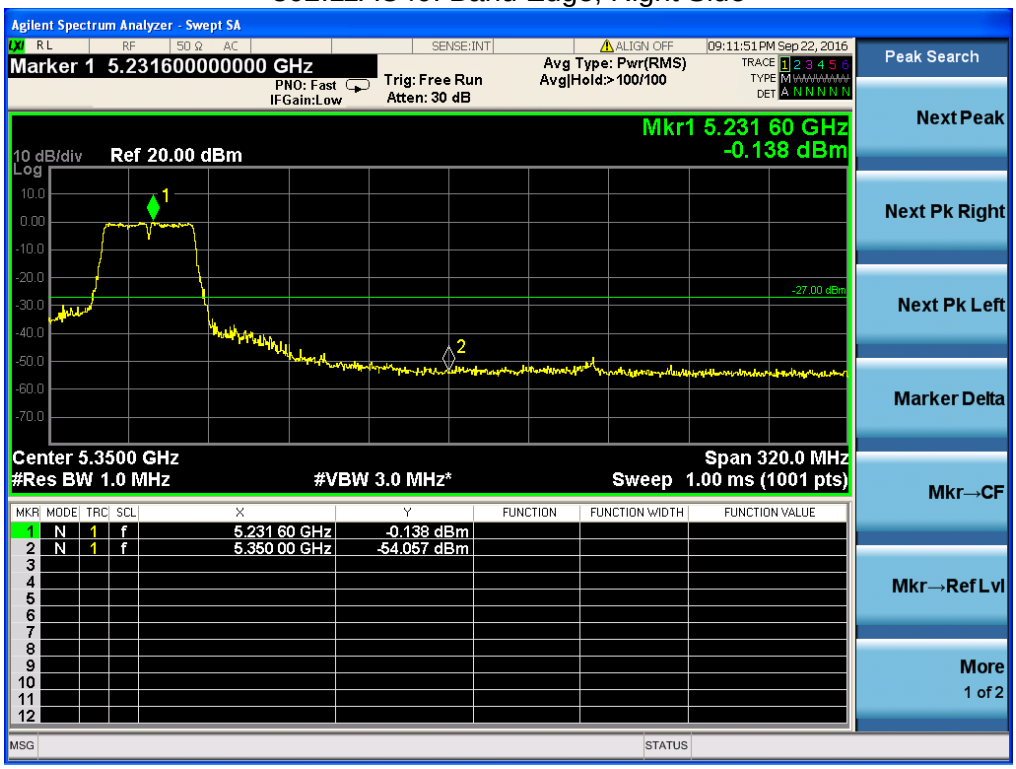
802.11AC20: Band Edge, Right Side



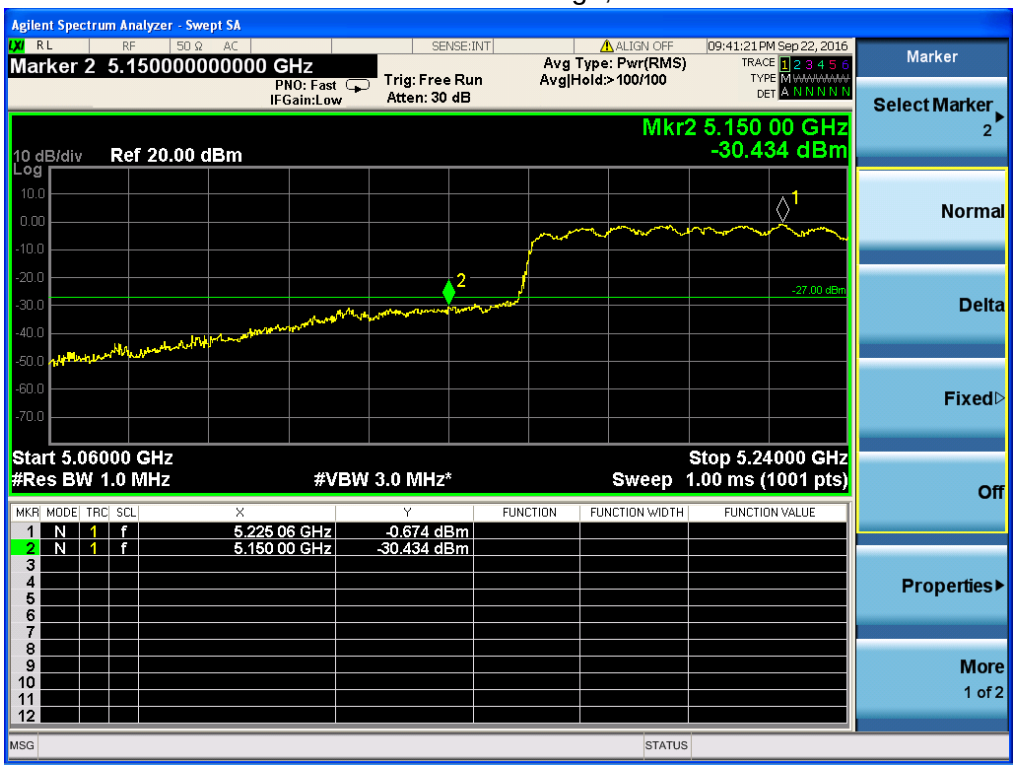
802.11AC40: Band Edge, Left Side



802.11AC40: Band Edge, Right Side



802.11AC80: Band Edge, Left Side



802.11AC80: Band Edge, Right Side

5.8G

802.11a: Band Edge, Left Side

802.11a: Band Edge, Right Side

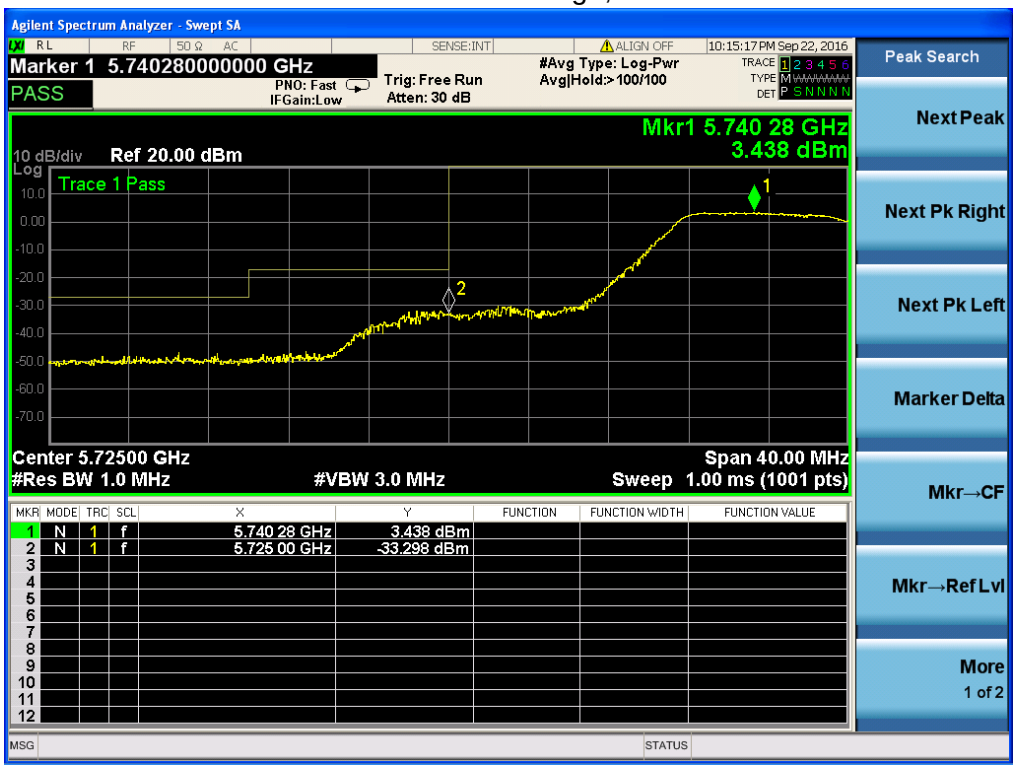
802.11n20: Band Edge, Left Side

802.11n20: Band Edge, Right Side

802.11n40: Band Edge, Left Side

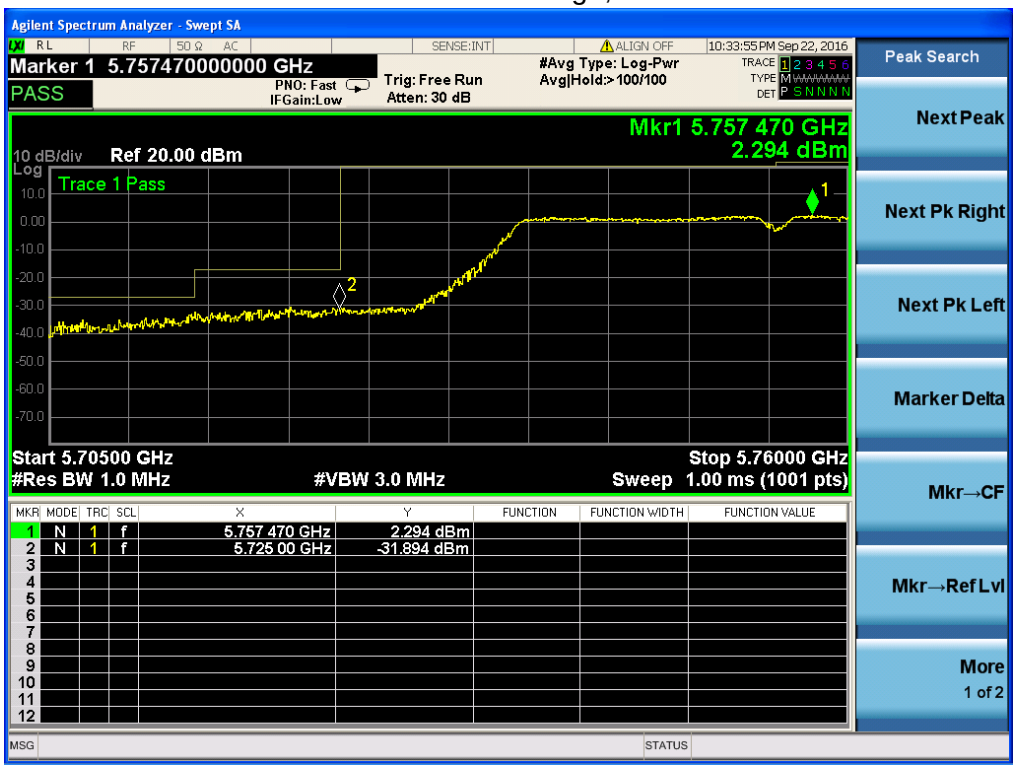
802.11n40: Band Edge, Right Side

802.11AC20: Band Edge, Left Side



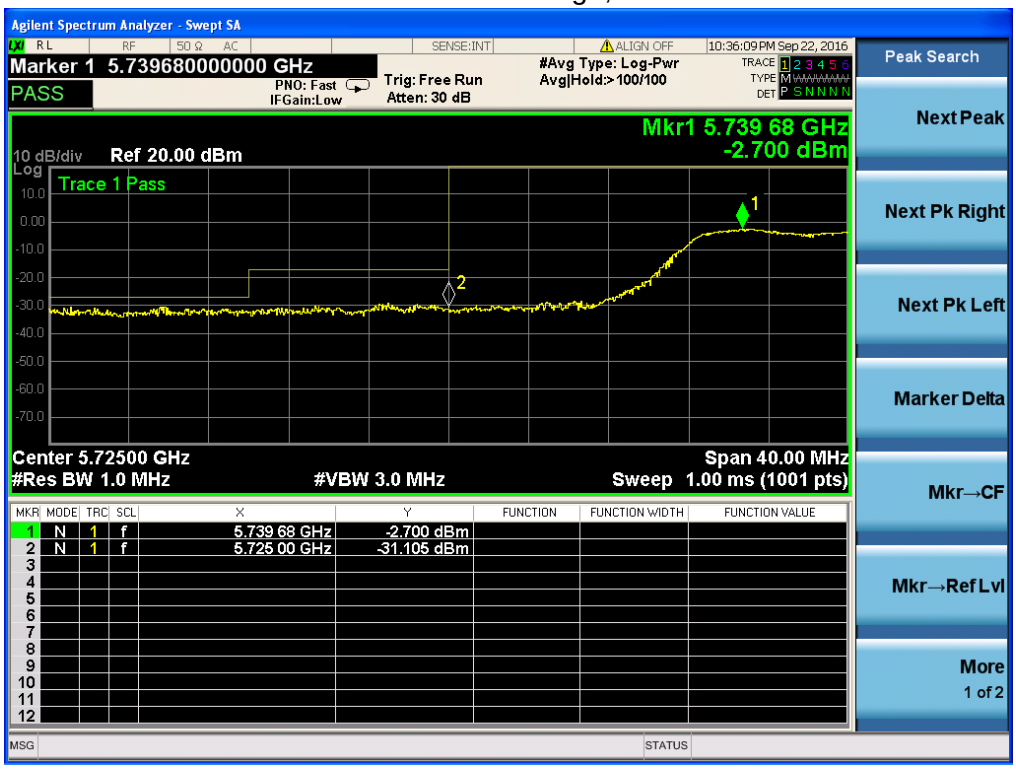
802.11AC20: Band Edge, Right Side

802.11AC40: Band Edge, Left Side



802.11AC40: Band Edge, Right Side

802.11AC80: Band Edge, Left Side



802.11AC80: Band Edge, Right Side

9. Frequency Stability Measurement

9.1 LIMIT

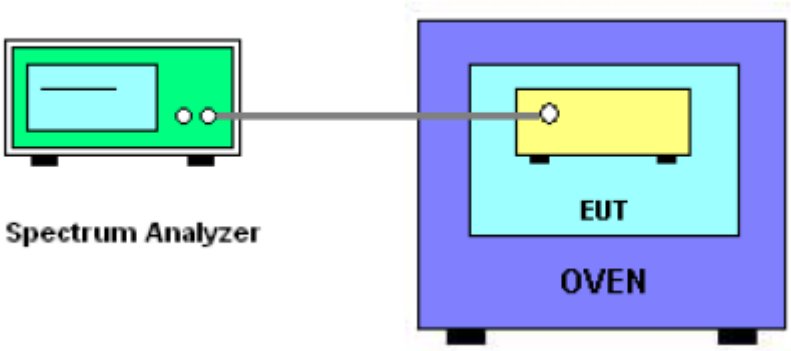
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

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

9.2 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.

9.3 TEST SETUP LAYOUT



9.4 EUT OPERATION DURING TEST

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

9.5 TEST RESULTS

EUT :	Wireless LAN equipment	Model Name. :	SBT200DI
Temperature :	25 ℃	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 5V
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)	5.00	5180.01254	5180	0.01254	-2.4208
		V max (V)	5.75	5180.00852	5180	0.00852	-1.6448
		V min (V)	4.25	5180.01264	5180	0.01264	-2.4402
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)	5	T (°C)	-20	5180.00248	5180	0.00248	-0.4788
		T (°C)	-10	5180.00168	5180	0.00168	-0.3243
		T (°C)	0	5180.01672	5180	0.01672	-3.2278
		T (°C)	10	5180.01124	5180	0.01124	-2.1699
		T (°C)	20	5180.01162	5180	0.01162	-2.2432
		T (°C)	30	5180.01265	5180	0.01265	-2.4421
		T (°C)	40	5180.01284	5180	0.01284	-2.4788
		T (°C)	50	5180.01275	5180	0.01275	-2.4614
		T (°C)	60	5180.01368	5180	0.01368	-2.6409
		T (°C)	70	5180.01495	5180	0.01495	-2.8861
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)	5.00	5200.02248	5200	0.02248	-4.3231
		V max (V)	5.75	5200.02185	5200	0.02185	-4.2019
		V min (V)	4.25	5200.02294	5200	0.02294	-4.4115
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)	5	T (°C)	-20	5200.00264	5200	0.00264	-0.5077
		T (°C)	-10	5200.00675	5200	0.00675	-1.2981
		T (°C)	0	5200.01668	5200	0.01668	-3.2077
		T (°C)	10	5200.01175	5200	0.01175	-2.2596
		T (°C)	20	5200.01768	5200	0.01768	-3.4000
		T (°C)	30	5200.02116	5200	0.02116	-4.0692
		T (°C)	40	5200.02062	5200	0.02062	-3.9654
		T (°C)	50	5200.02574	5200	0.02574	-4.9500
		T (°C)	60	5200.02263	5200	0.02263	-4.3519
		T (°C)	70	5200.02255	5200	0.02255	-4.3365
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)	5.00	5240.00185	5240	0.00185	-0.3531
		V max (V)	5.75	5240.00168	5240	0.00168	-0.3206
		V min (V)	4.25	5240.00648	5240	0.00648	-1.2366
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)	5	T (°C)	-20	5240.01178	5240	0.01178	-2.2481
		T (°C)	-10	5240.00347	5240	0.00347	-0.6622
		T (°C)	0	5240.01162	5240	0.01162	-2.2176
		T (°C)	10	5240.01214	5240	0.01214	-2.3168
		T (°C)	20	5240.01132	5240	0.01132	-2.1603
		T (°C)	30	5240.01385	5240	0.01385	-2.6431
		T (°C)	40	5240.01294	5240	0.01294	-2.4695
		T (°C)	50	5240.01267	5240	0.01267	-2.4179
		T (°C)	60	5240.00375	5240	0.00375	-0.7156
		T (°C)	70	5240.01286	5240	0.01286	-2.4542
Limits				± 20 ppm			
Result				Complies			

9. ANTENNA REQUIREMENT

9.1 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.

9.2 EUT ANTENNA

The EUT antenna is permanent attached metal PIFA antenna. It comply with the standard requirement.

END OF REPORT