



3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.205

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (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).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. Test the EUT in the lowest channel, the Highest channel

Note:

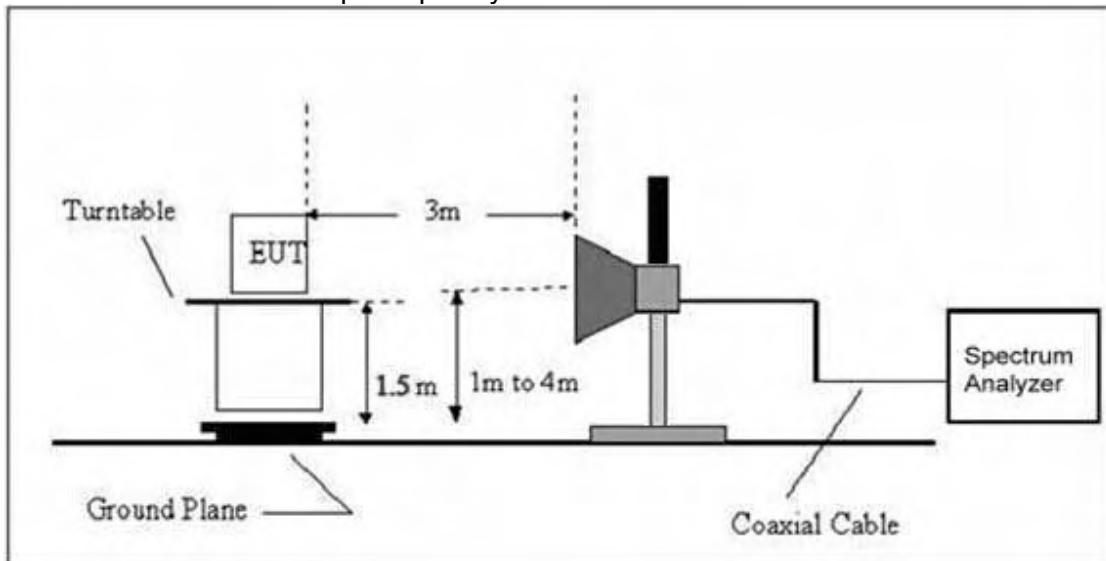
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



3.3.6 TEST RESULT

802.11b

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
							operation frequency:2412
V	2390.00	37.87	13.83	51.70	74.00	-22.30	PK
V	2390.00	26.31	13.83	40.14	54.00	-13.86	AV
V	2400.00	38.08	13.85	51.93	74.00	-22.07	PK
V	2400.00	25.88	13.85	39.73	54.00	-14.27	AV
H	2390.00	38.17	13.83	52.00	74.00	-22.00	PK
H	2390.00	26.34	13.83	40.17	54.00	-13.83	AV
H	2400.00	38.03	13.85	51.88	74.00	-22.12	PK
H	2400.00	26.29	13.85	40.14	54.00	-13.86	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
							operation frequency:2462
V	2483.50	38.08	14.02	52.10	74.00	-21.90	PK
V	2483.50	26.55	14.02	40.57	54.00	-13.43	AV
V	2500.00	38.02	14.06	52.08	74.00	-21.92	PK
V	2500.00	25.99	14.06	40.05	54.00	-13.95	AV
H	2483.50	38.21	14.02	52.23	74.00	-21.77	PK
H	2483.50	26.59	14.02	40.61	54.00	-13.39	AV
H	2500.00	37.82	14.06	51.88	74.00	-22.12	PK
H	2500.00	26.85	14.06	40.91	54.00	-13.09	AV

Remark:

1. Emission Level = Meter Reading + Factor, 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.



802.11g

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2412							
V	2390.00	37.55	13.83	51.38	74.00	-22.62	PK
V	2390.00	26.10	13.83	39.93	54.00	-14.07	AV
V	2400.00	37.77	13.85	51.62	74.00	-22.38	PK
V	2400.00	25.67	13.85	39.52	54.00	-14.48	AV
H	2390.00	37.86	13.83	51.69	74.00	-22.31	PK
H	2390.00	26.13	13.83	39.96	54.00	-14.04	AV
H	2400.00	37.72	13.85	51.57	74.00	-22.43	PK
H	2400.00	26.07	13.85	39.92	54.00	-14.08	AV

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2462							
V	2483.50	37.77	14.02	51.79	74.00	-22.21	PK
V	2483.50	26.34	14.02	40.36	54.00	-13.64	AV
V	2500.00	37.71	14.06	51.77	74.00	-22.23	PK
V	2500.00	25.78	14.06	39.84	54.00	-14.16	AV
H	2483.50	37.90	14.02	51.92	74.00	-22.08	PK
H	2483.50	26.38	14.02	40.40	54.00	-13.60	AV
H	2500.00	37.50	14.06	51.56	74.00	-22.44	PK
H	2500.00	26.63	14.06	40.69	54.00	-13.31	AV

Remark:

1. Emission Level = Meter Reading + Factor, 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.

**802.11n(20MHz)**

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2412							
V	2390.00	37.67	13.83	51.50	74.00	-22.50	PK
V	2390.00	26.18	13.83	40.01	54.00	-13.99	AV
V	2400.00	37.88	13.85	51.73	74.00	-22.27	PK
V	2400.00	25.74	13.85	39.59	54.00	-14.41	AV
H	2390.00	37.97	13.83	51.80	74.00	-22.20	PK
H	2390.00	26.21	13.83	40.04	54.00	-13.96	AV
H	2400.00	37.83	13.85	51.68	74.00	-22.32	PK
H	2400.00	26.15	13.85	40.00	54.00	-14.00	AV

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2462							
V	2483.50	37.88	14.02	51.90	74.00	-22.10	PK
V	2483.50	26.41	14.02	40.43	54.00	-13.57	AV
V	2500.00	37.82	14.06	51.88	74.00	-22.12	PK
V	2500.00	25.85	14.06	39.91	54.00	-14.09	AV
H	2483.50	38.01	14.02	52.03	74.00	-21.97	PK
H	2483.50	26.45	14.02	40.47	54.00	-13.53	AV
H	2500.00	37.62	14.06	51.68	74.00	-22.32	PK
H	2500.00	26.70	14.06	40.76	54.00	-13.24	AV

Remark:

1. Emission Level = Meter Reading + Factor, 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.

**802.11n(40MHz)**

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2422							
V	2390.00	37.99	13.83	51.82	74.00	-22.18	PK
V	2390.00	26.39	13.83	40.22	54.00	-13.78	AV
V	2400.00	38.20	13.85	52.05	74.00	-21.95	PK
V	2400.00	25.96	13.85	39.81	54.00	-14.19	AV
H	2390.00	38.29	13.83	52.12	74.00	-21.88	PK
H	2390.00	26.41	13.83	40.24	54.00	-13.76	AV
H	2400.00	38.15	13.85	52.00	74.00	-22.00	PK
H	2400.00	26.36	13.85	40.21	54.00	-13.79	AV

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2452							
V	2483.50	38.20	14.02	52.22	74.00	-21.78	PK
V	2483.50	26.63	14.02	40.65	54.00	-13.35	AV
V	2500.00	38.14	14.06	52.20	74.00	-21.80	PK
V	2500.00	26.07	14.06	40.13	54.00	-13.87	AV
H	2483.50	38.33	14.02	52.35	74.00	-21.65	PK
H	2483.50	26.67	14.02	40.69	54.00	-13.31	AV
H	2500.00	37.94	14.06	52.00	74.00	-22.00	PK
H	2500.00	26.93	14.06	40.99	54.00	-13.01	AV

Remark:

1. Emission Level = Meter Reading + Factor, 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.



4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

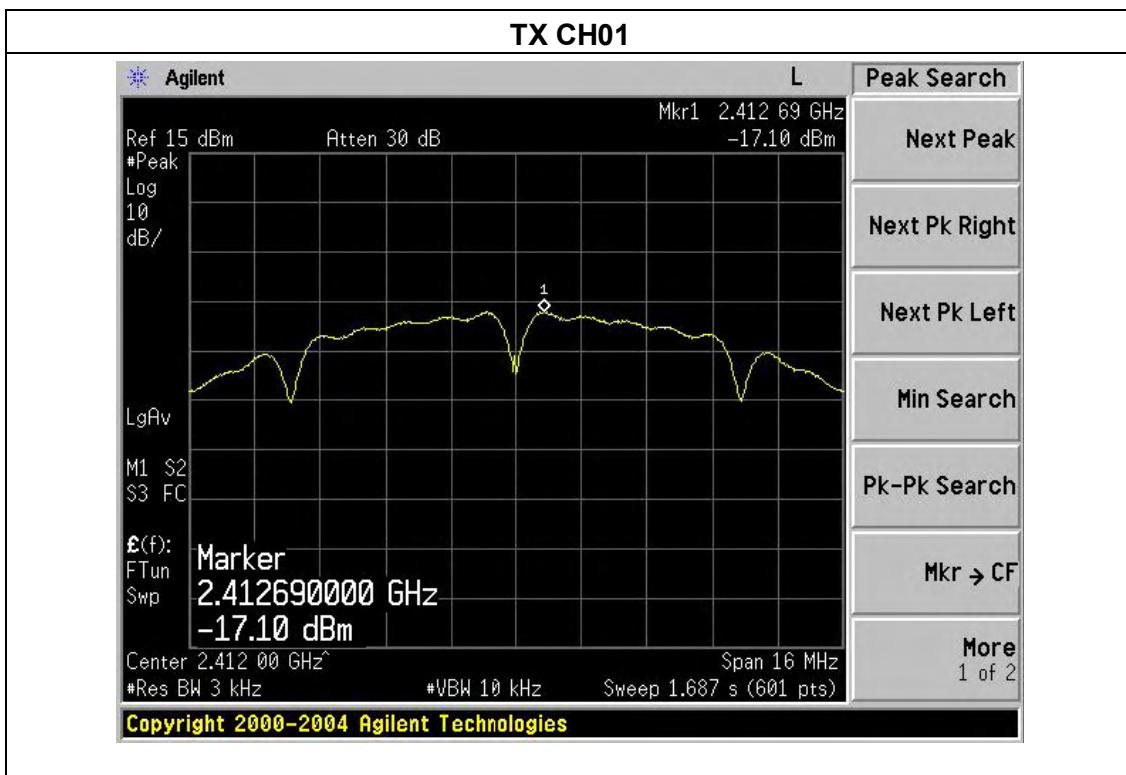
Note: Power Spectral Density(dBm)=Reading+Cable Loss

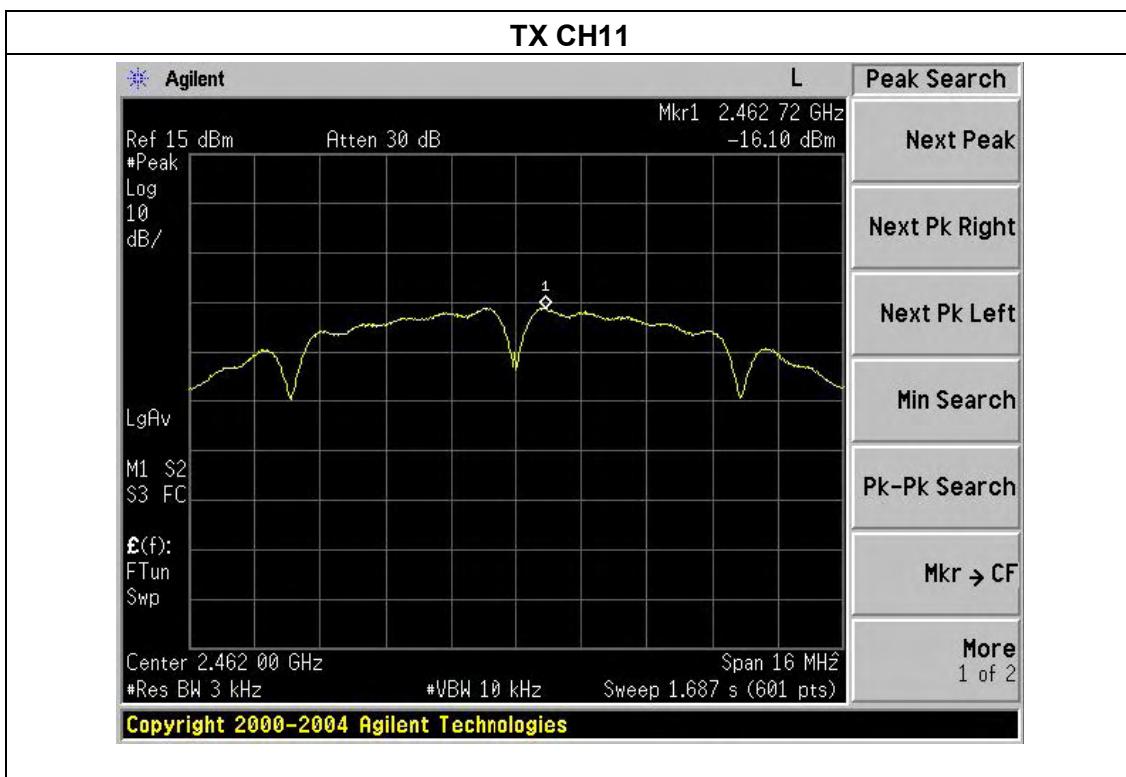
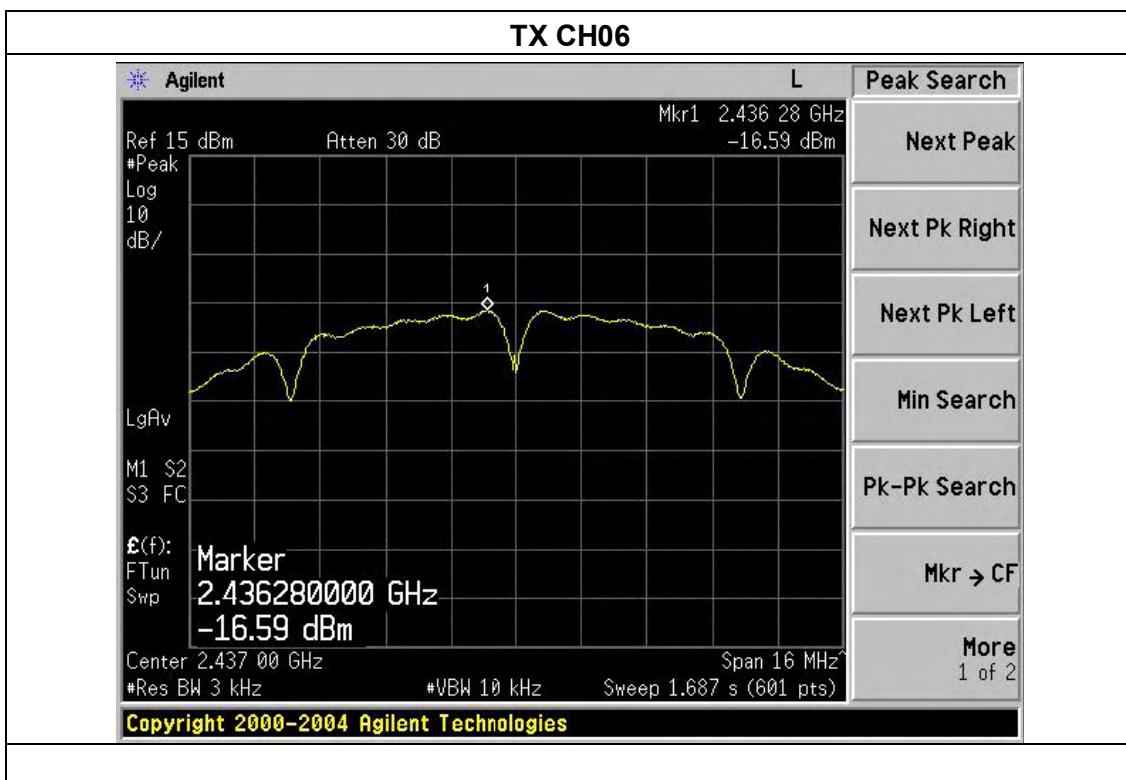


4.1.5 TEST RESULTS

Temperature :	25°C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 32V from adapter
Test Mode :	TX b Mode		

Frequency	Reading(dBm)	Cable Loss (dB)	Power Spectral Density(dBm)	Limit (dBm)	Result
2412 MHz	-17.10	0.5	-16.60	8	PASS
2437 MHz	-16.59	0.5	-16.09	8	PASS
2462 MHz	-16.10	0.5	-15.60	8	PASS

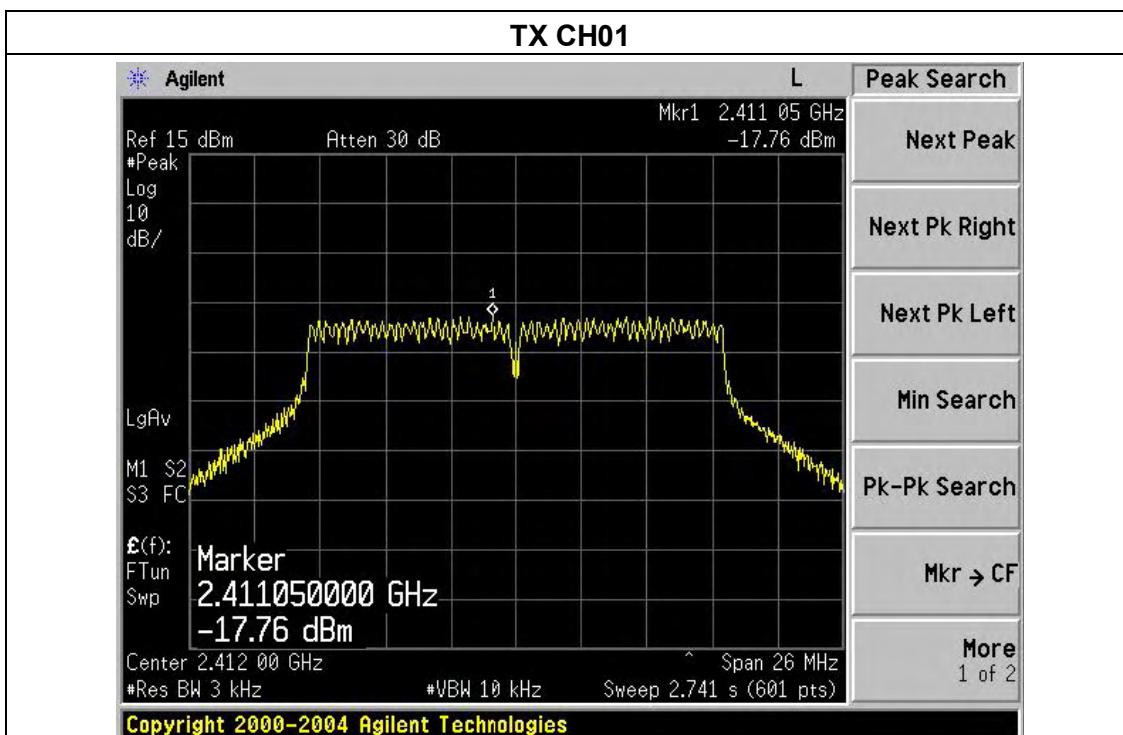


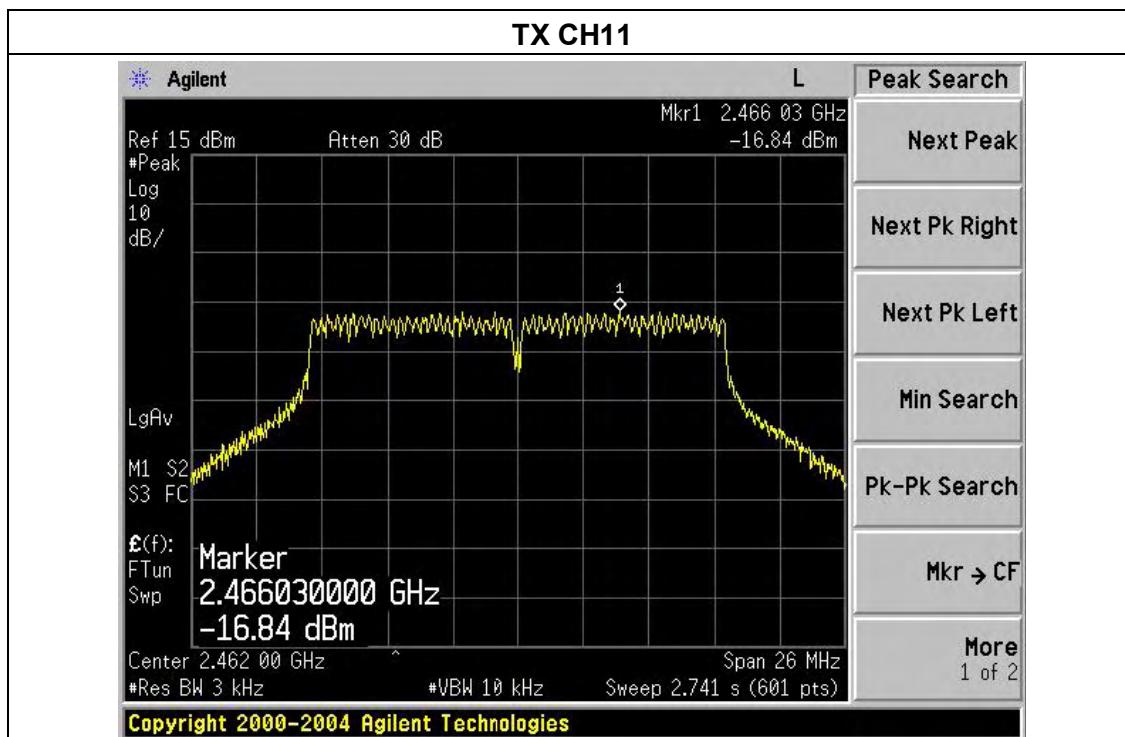
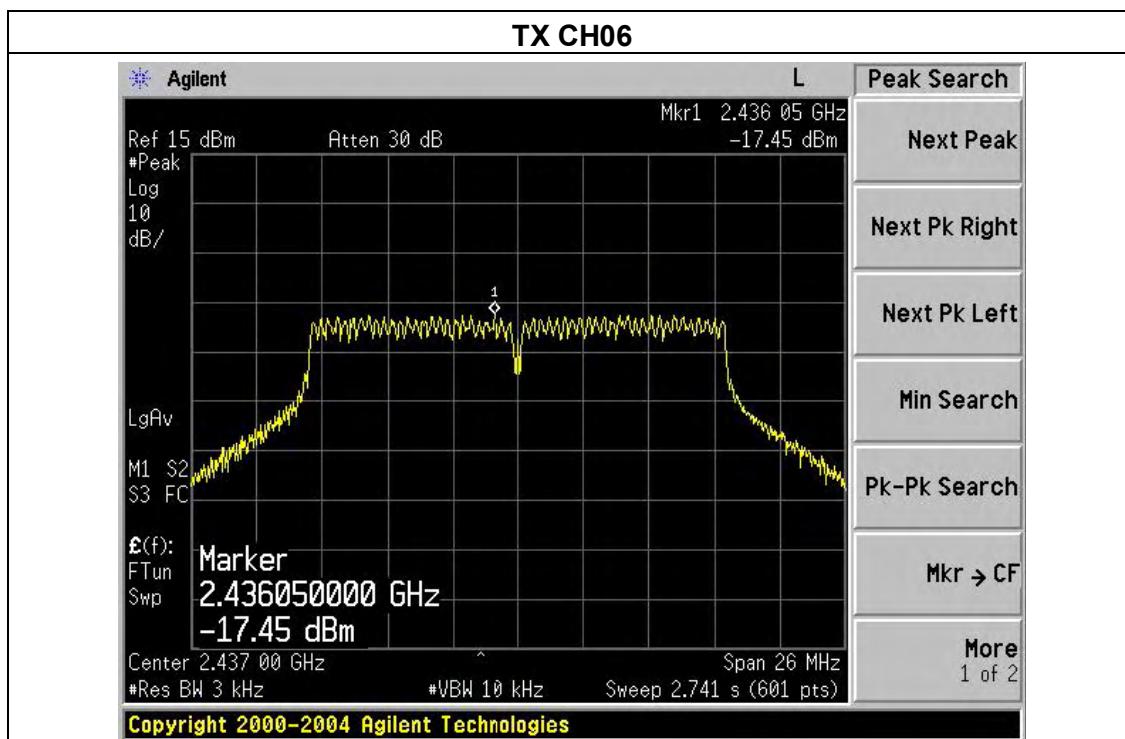




Temperature :	25°C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 32V from adapter
Test Mode :	TX g Mode		

Frequency	Reading(dBm)	Cable Loss (dB)	Power Spectral Density(dBm)	Limit (dBm)	Result
2412 MHz	-17.76	0.5	-12.26	8	PASS
2437 MHz	-17.45	0.5	-16.95	8	PASS
2462 MHz	-16.84	0.5	-16.34	8	PASS

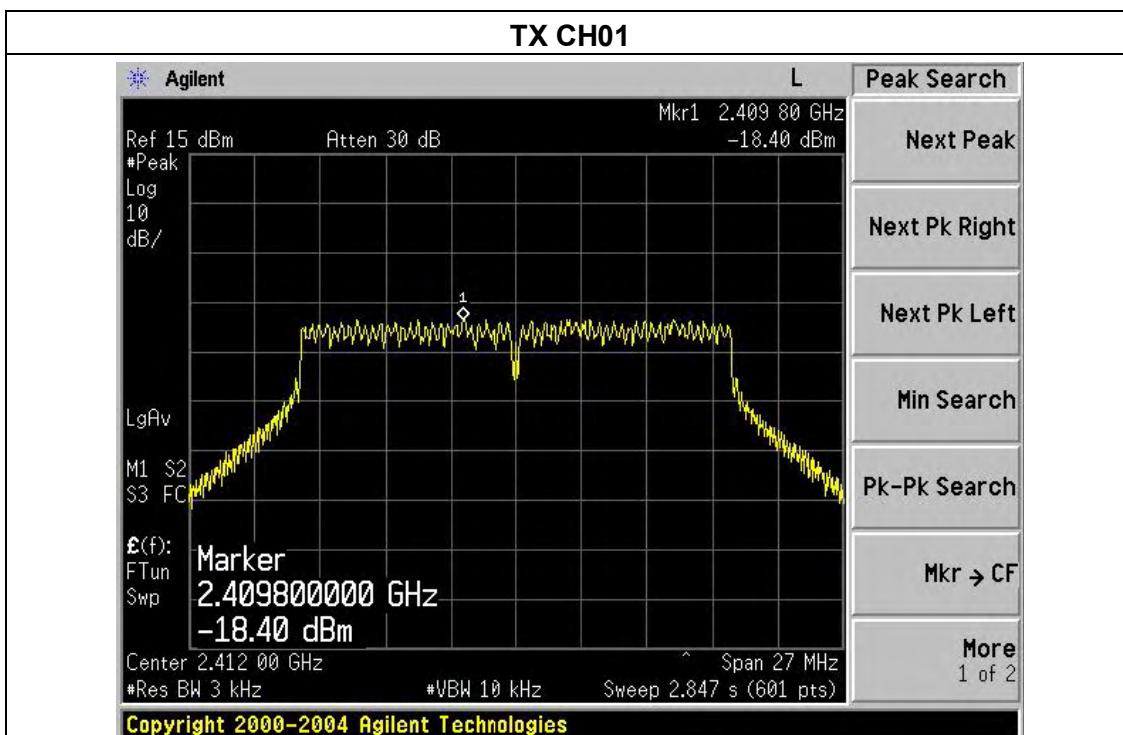


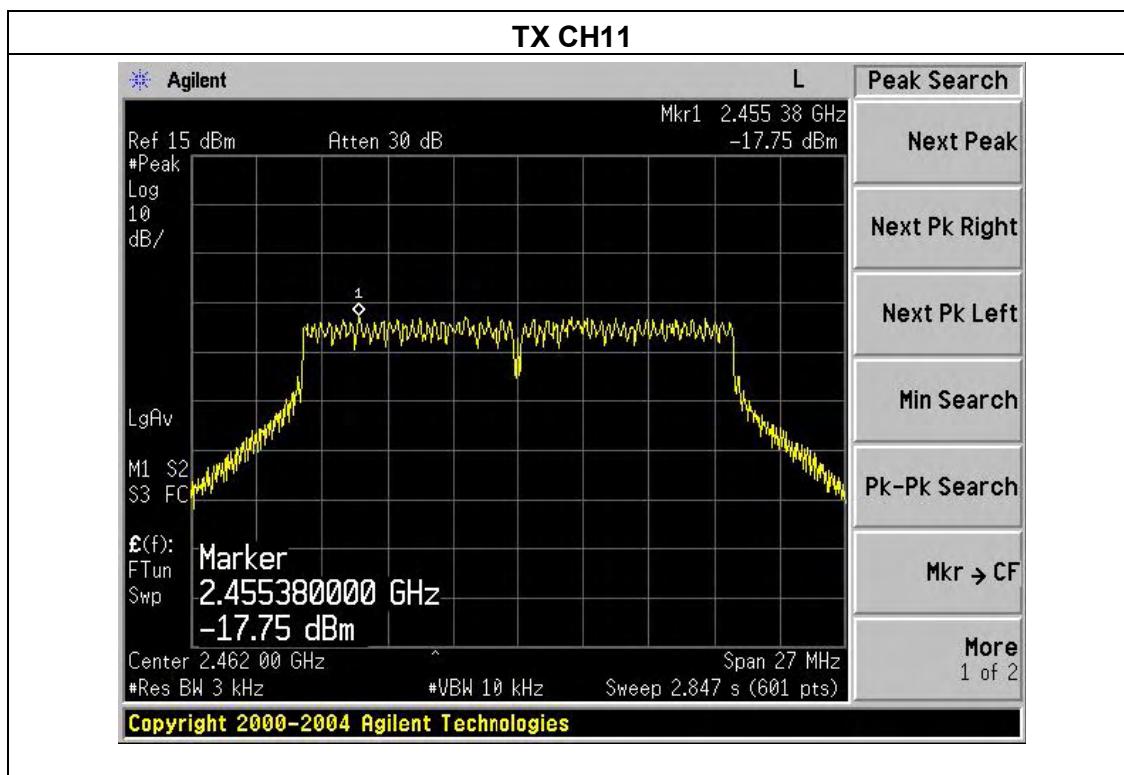
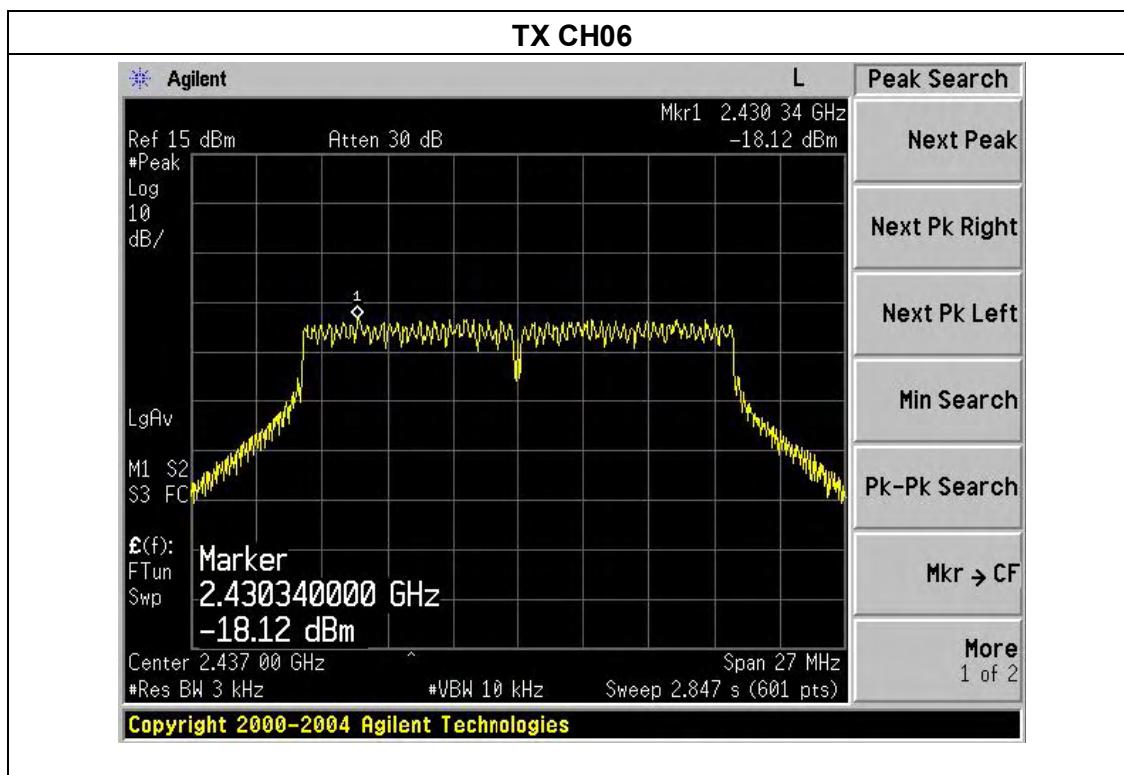




Temperature :	25°C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 32V from adapter
Test Mode :	TX n Mode(20M)		

Frequency	Reading(dBm)	Cable Loss (dB)	Power Spectral Density(dBm)	Limit (dBm)	Result
2412 MHz	-18.40	0.5	-17.90	8	PASS
2437 MHz	-18.12	0.5	-17.62	8	PASS
2462 MHz	-17.75	0.5	-17.25	8	PASS

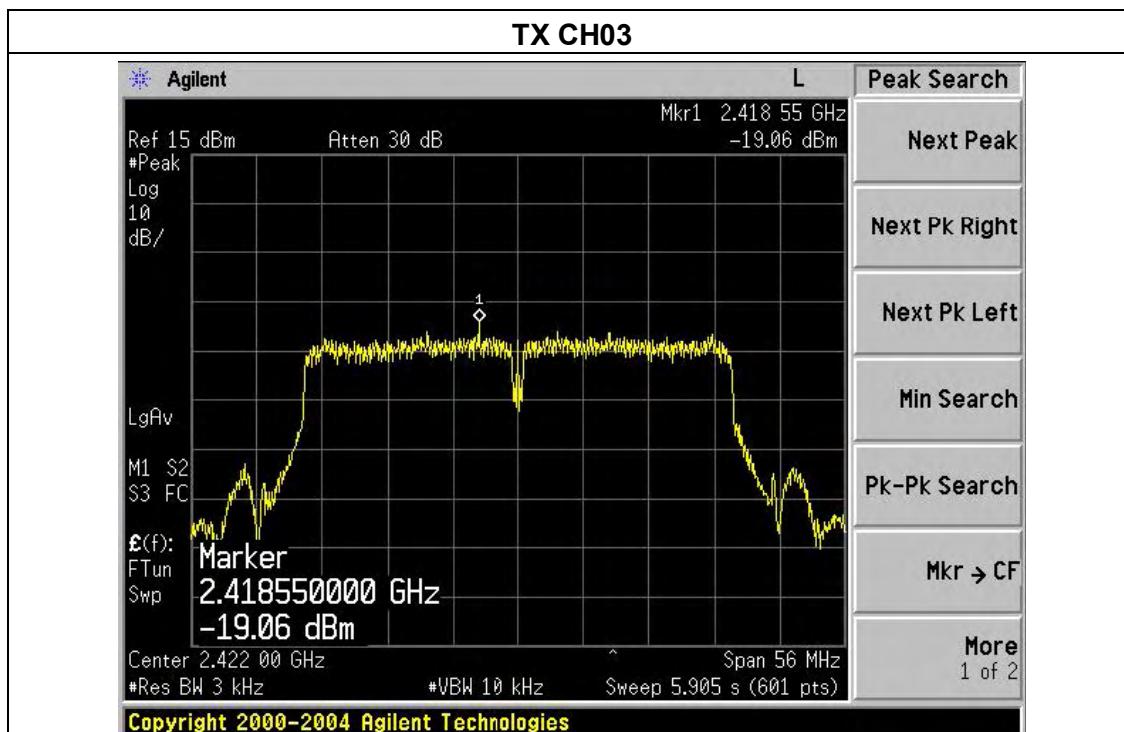


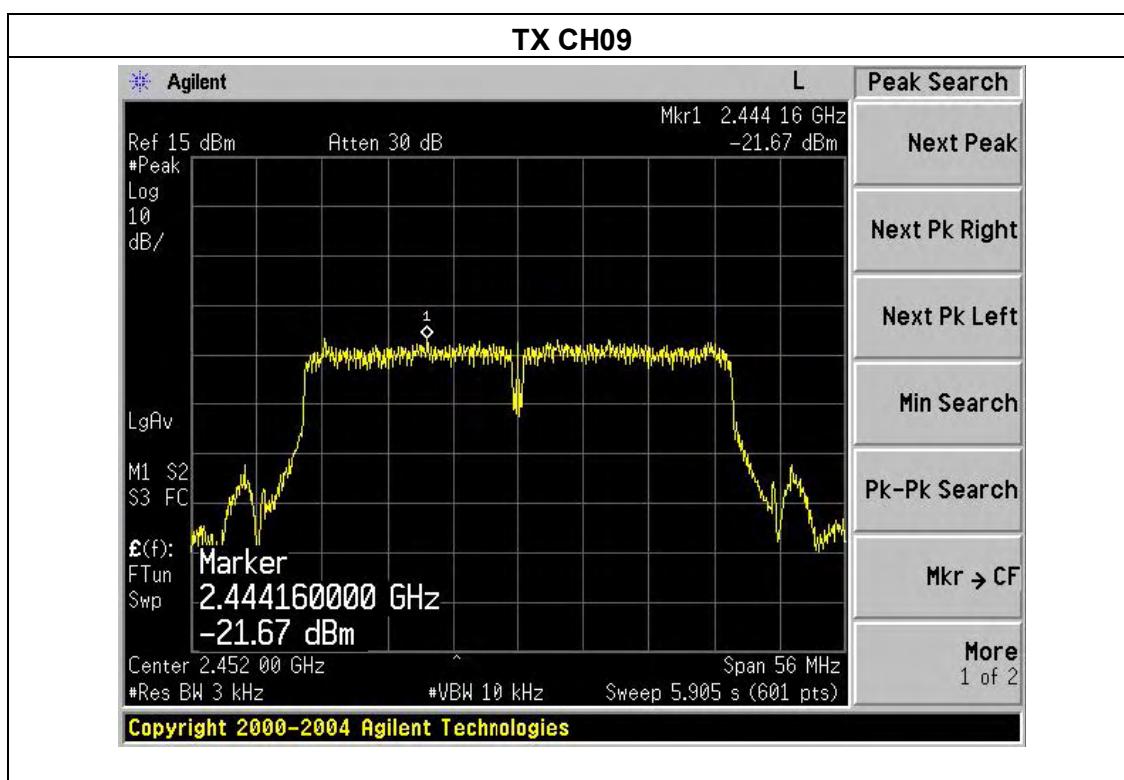
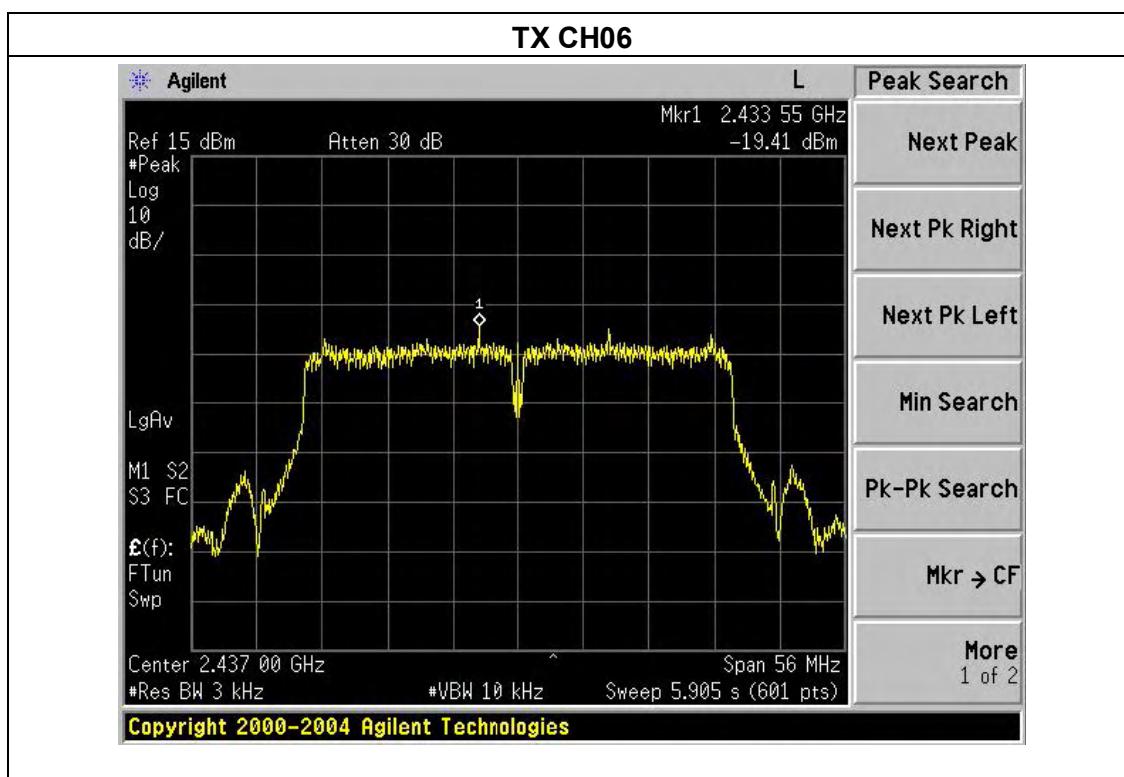




Temperature :	25°C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 32V from adapter
Test Mode :	TX n Mode(40M)		

Frequency	Reading(dBm)	Cable Loss (dB)	Power Spectral Density(dBm)	Limit (dBm)	Result
2412 MHz	-19.06	0.5	-18.56	8	PASS
2437 MHz	-19.41	0.5	-18.91	8	PASS
2462 MHz	-21.67	0.5	-21.17	8	PASS







5. BANDWIDTH TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. 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.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

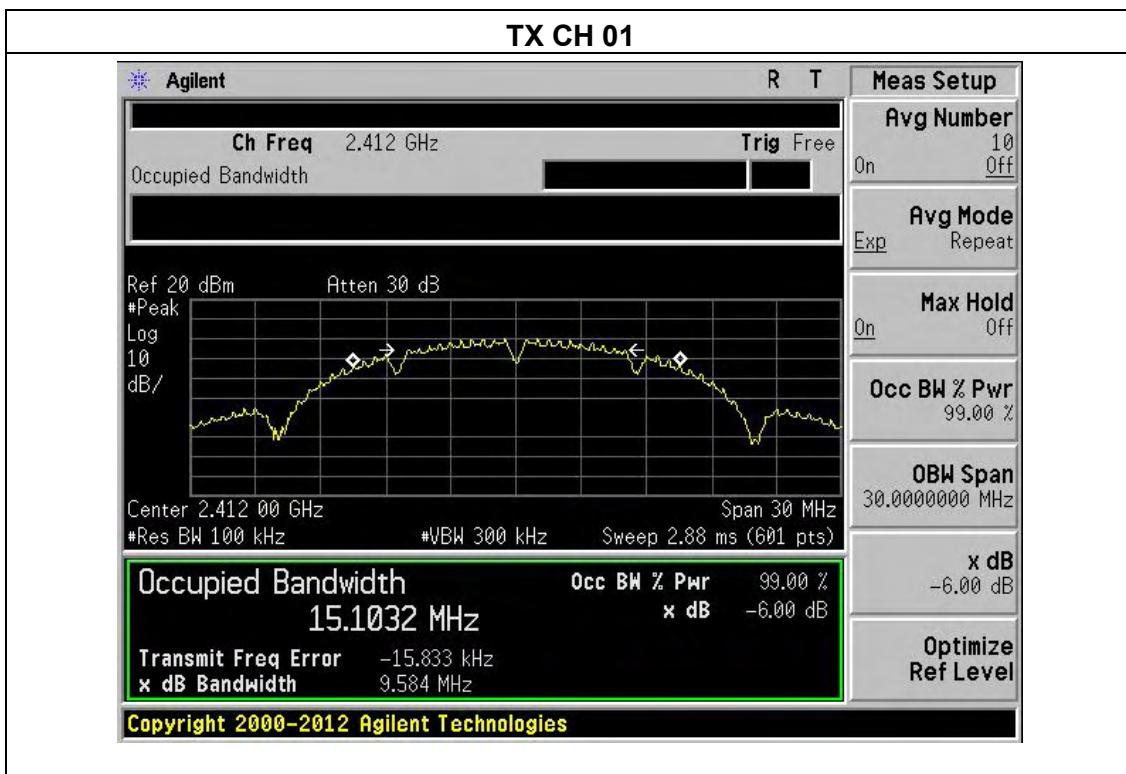
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



5.1.5 TEST RESULTS

Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 32V from adapter
Test Mode :	TX b Mode		

Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
2412	9.584	500	Pass
2437	10.090	500	Pass
2462	9.588	500	Pass

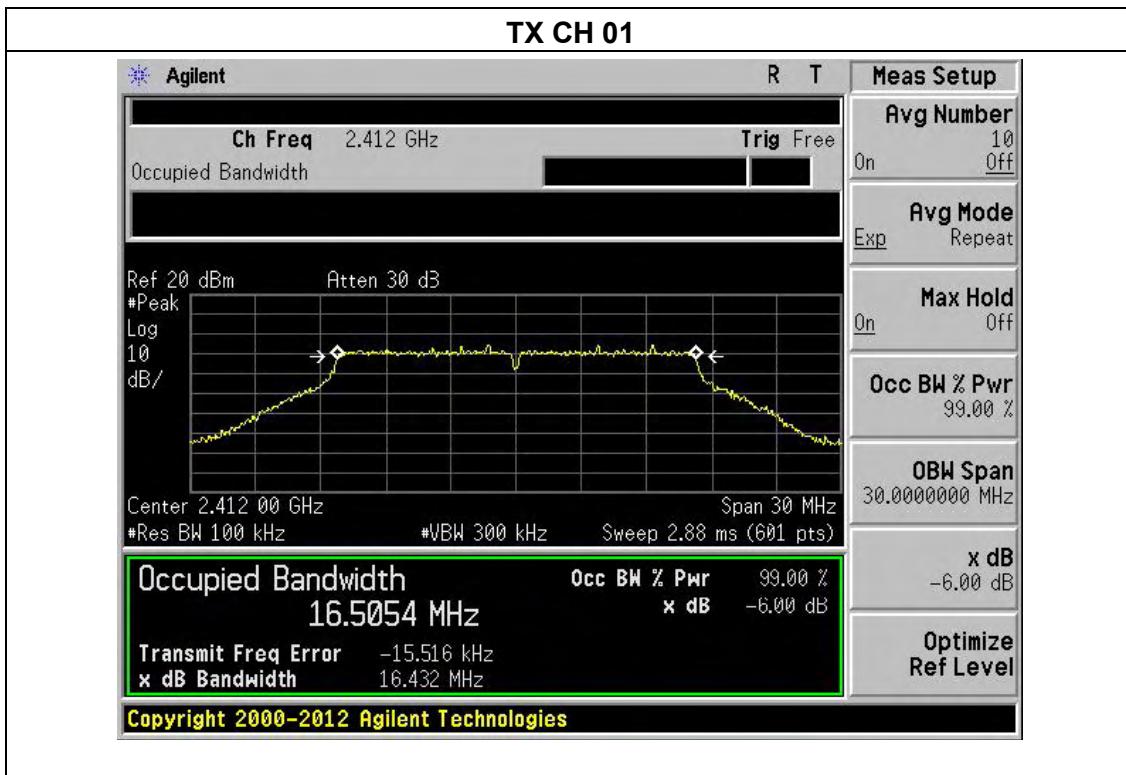


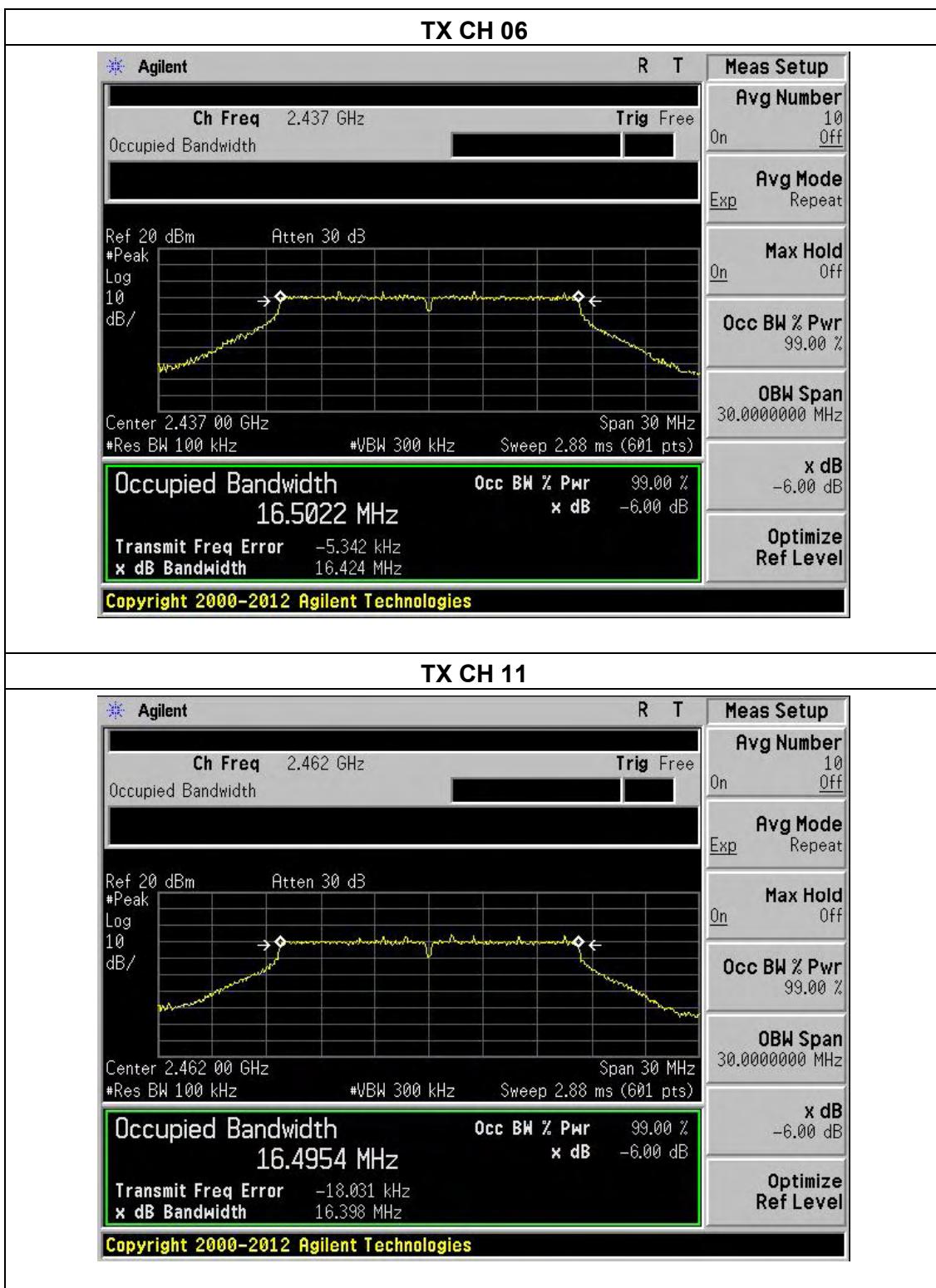




Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 32V from adapter
Test Mode :	TX g Mode		

Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
2412	16.432	500	Pass
2437	16.424	500	Pass
2462	16.398	500	Pass

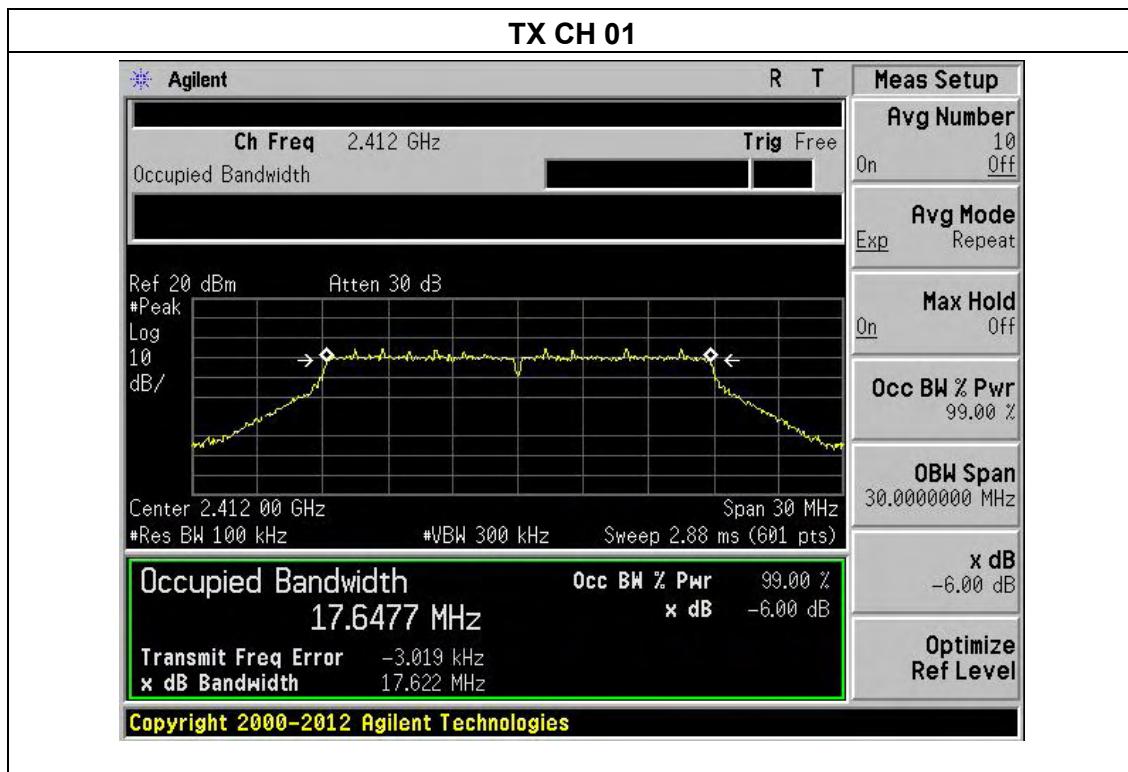






Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 32V from adapter
Test Mode :	TX n Mode(20M)		

Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
2412	17.622	500	Pass
2437	17.603	500	Pass
2462	17.603	500	Pass

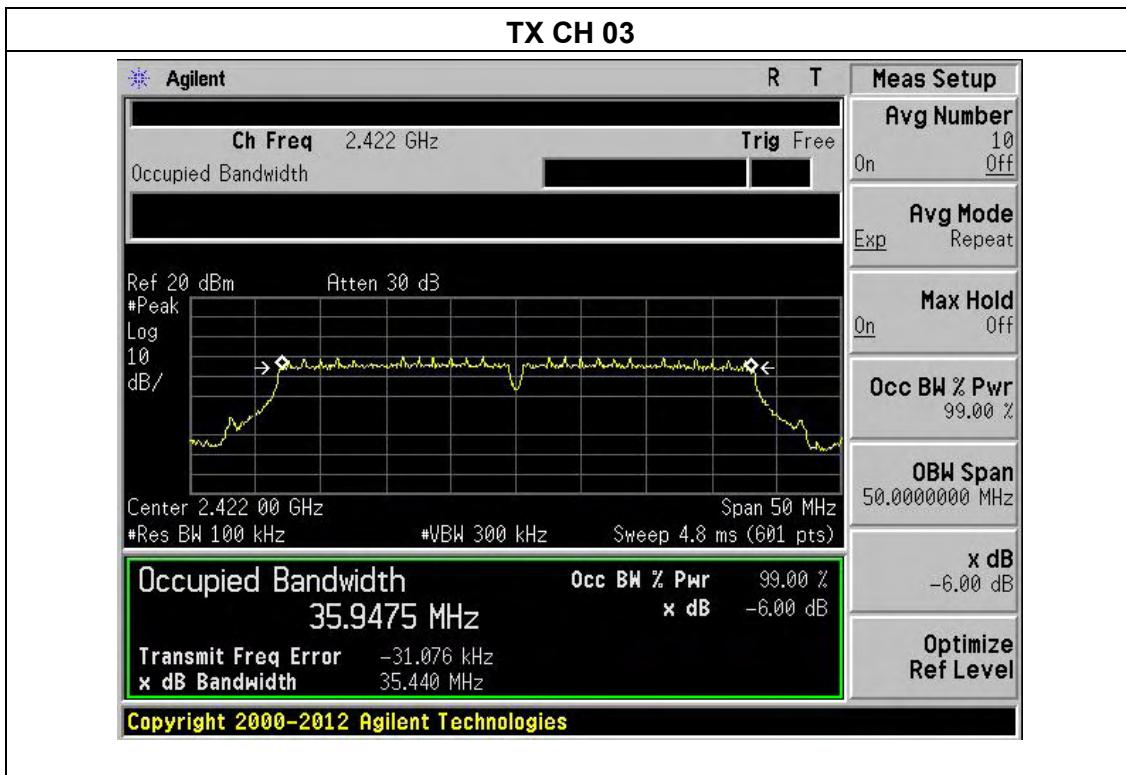


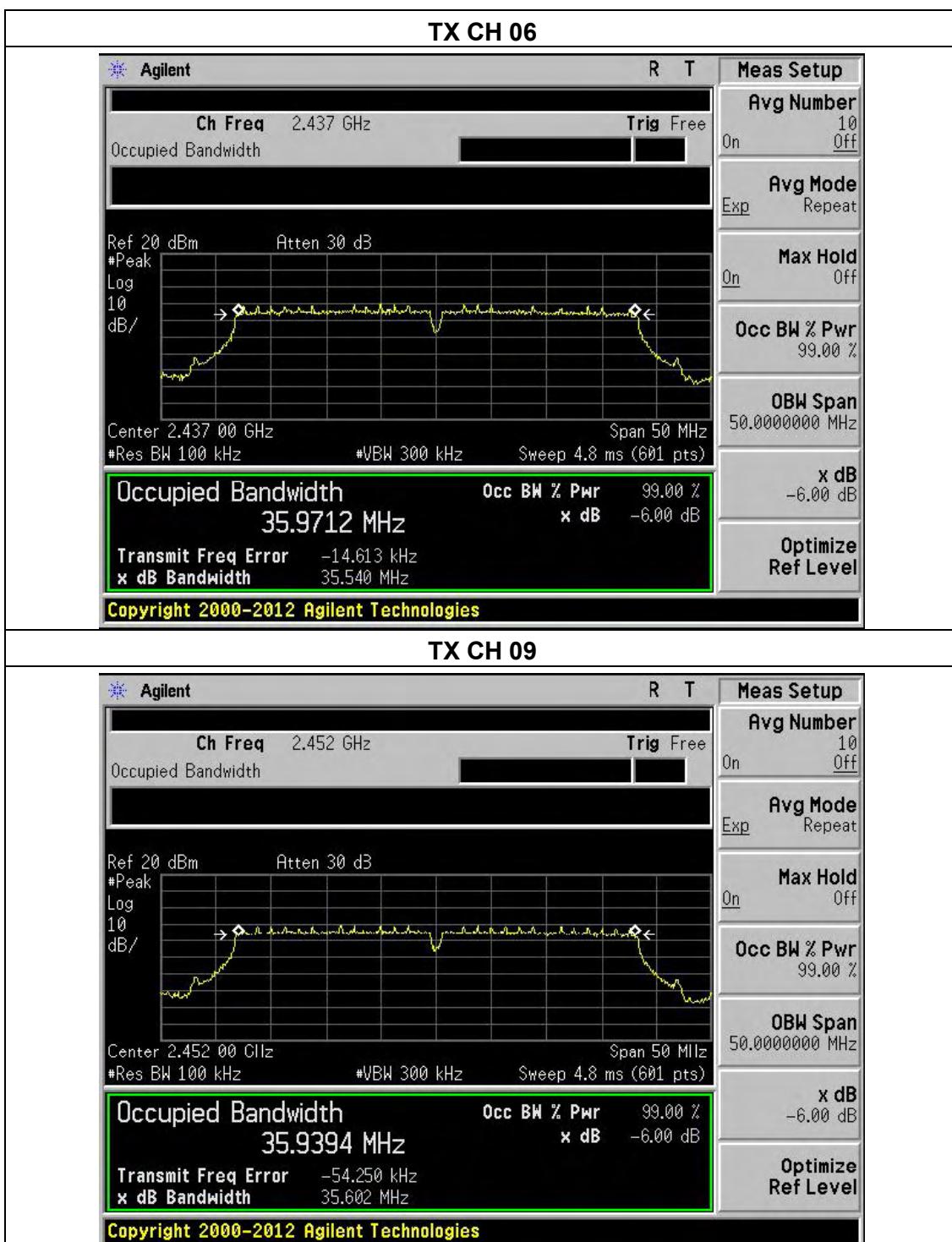




Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 32V from adapter
Test Mode :	TX n Mode(40M)		

Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
2422	35.440	500	Pass
2437	35.540	500	Pass
2452	35.602	500	Pass







6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

- The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 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.



6.1.5 TEST RESULTS

Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 32V from adapter

	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
802.11b	2412	17.40	30
	2437	17.39	30
	2462	17.35	30
802.11g	2412	15.20	30
	2437	15.21	30
	2462	15.23	30
802.11n20	2412	14.31	30
	2437	14.29	30
	2462	14.24	30
802.11n40	2422	13.45	30
	2437	13.53	30
	2452	13.43	30



7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

7.1 APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

7.2 TEST PROCEDURE

- a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b) 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.
- c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- d) 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.
- e) Repeat above procedures until all measured frequencies were complete.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



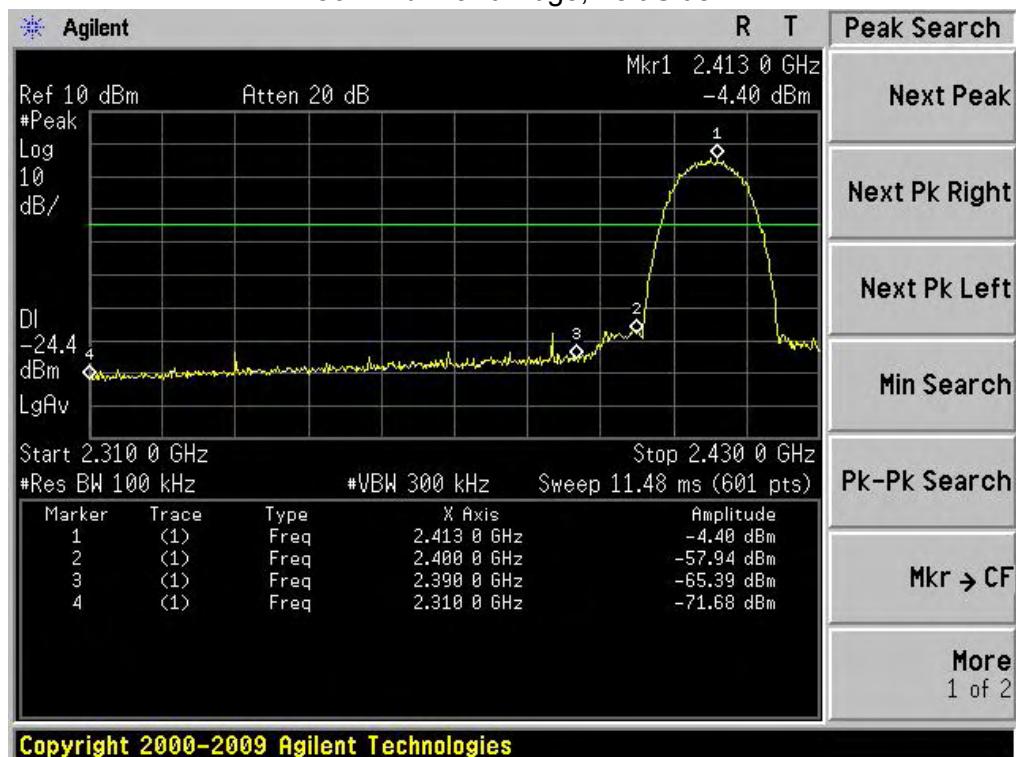
7.5 EUT OPERATION CONDITIONS

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.

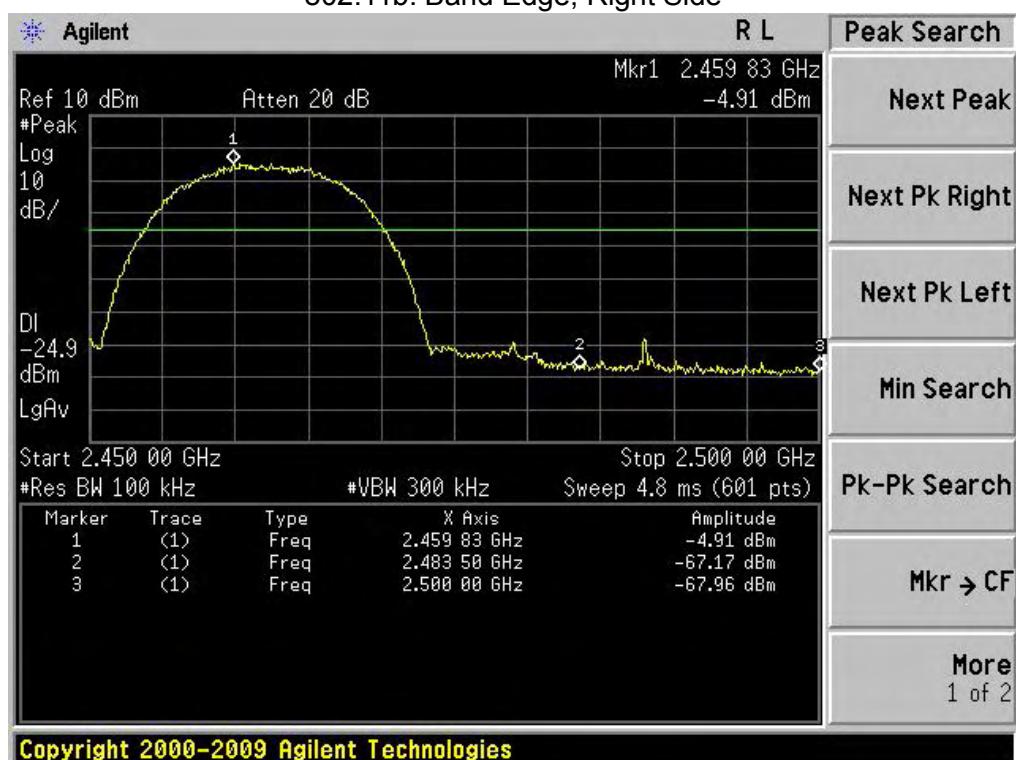
7.1 TEST RESULTS



802.11b: Band Edge, Left Side



802.11b: Band Edge, Right Side

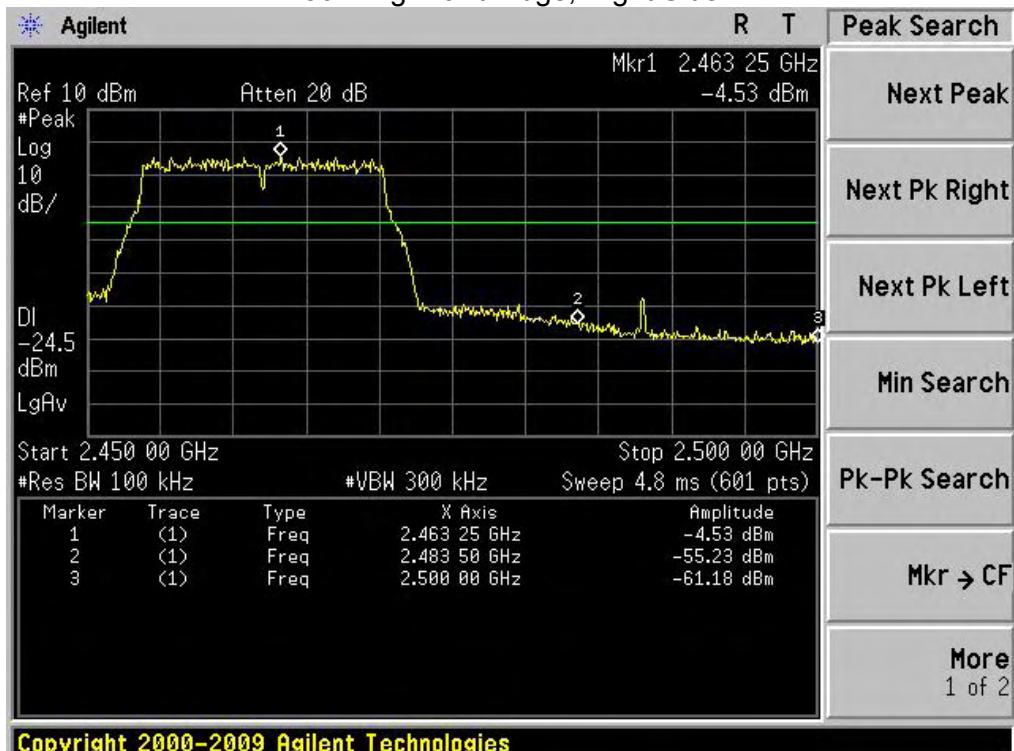




802.11g: Band Edge, Left Side

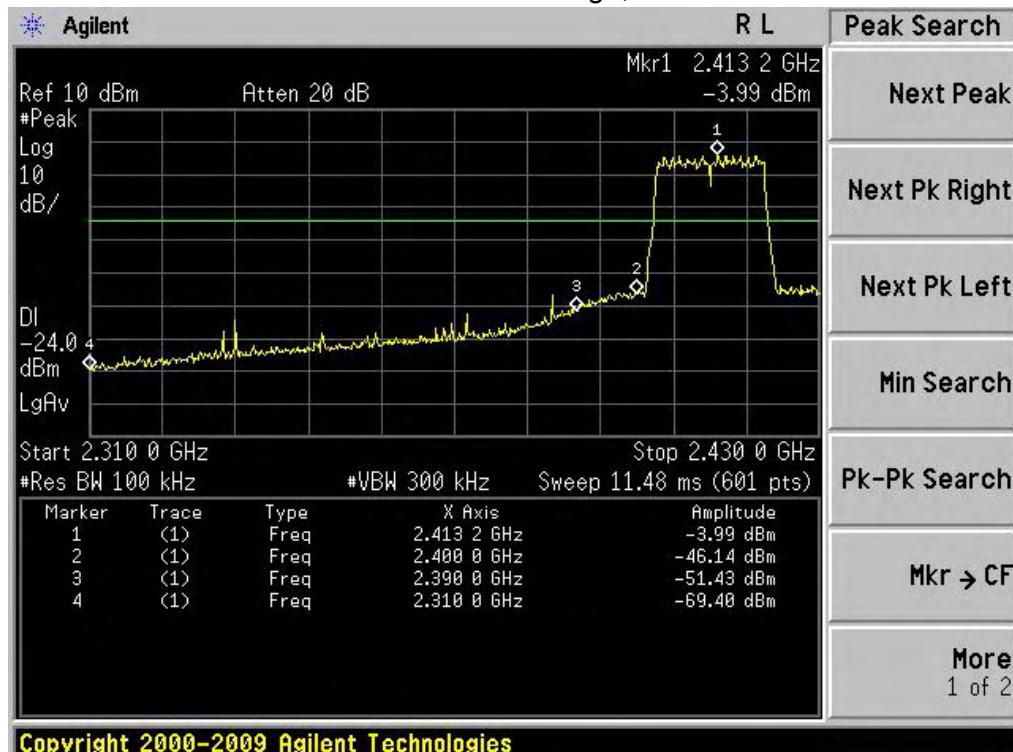


802.11g: Band Edge, Right Side

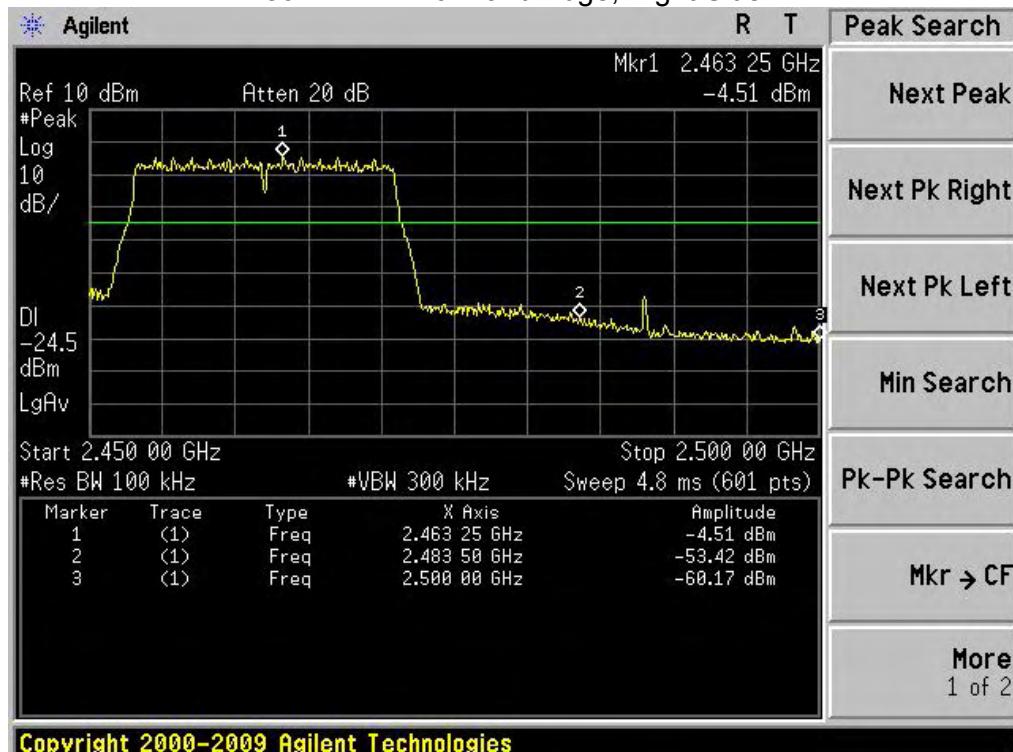




802.11n-HT20: Band Edge, Left Side

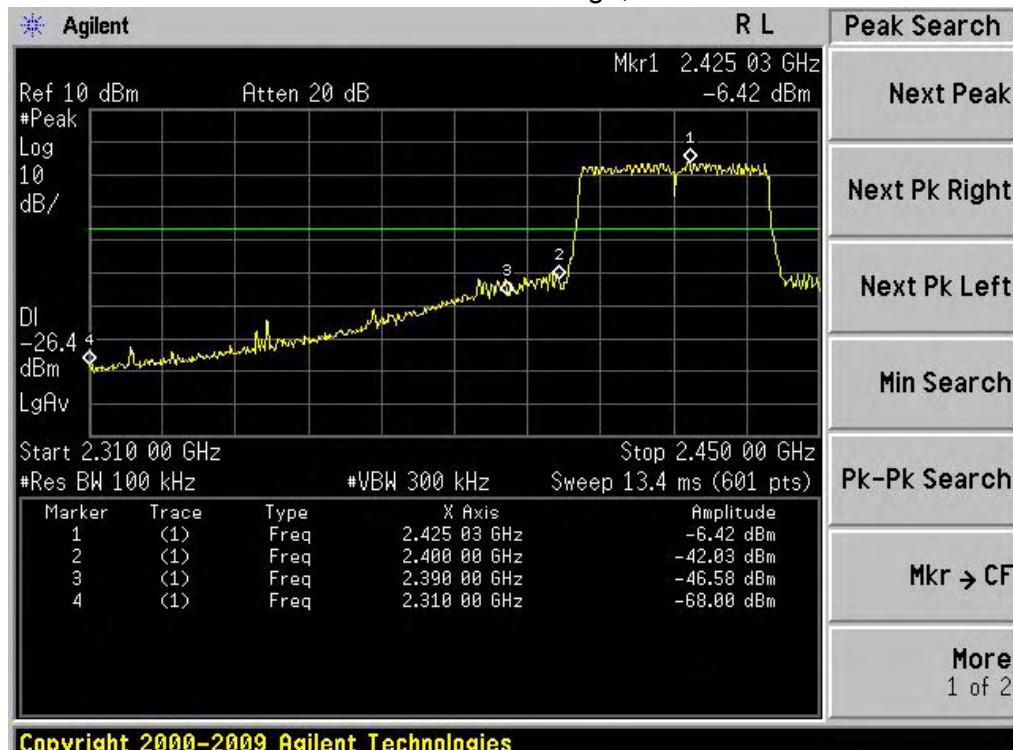


802.11n-HT20: Band Edge, Right Side

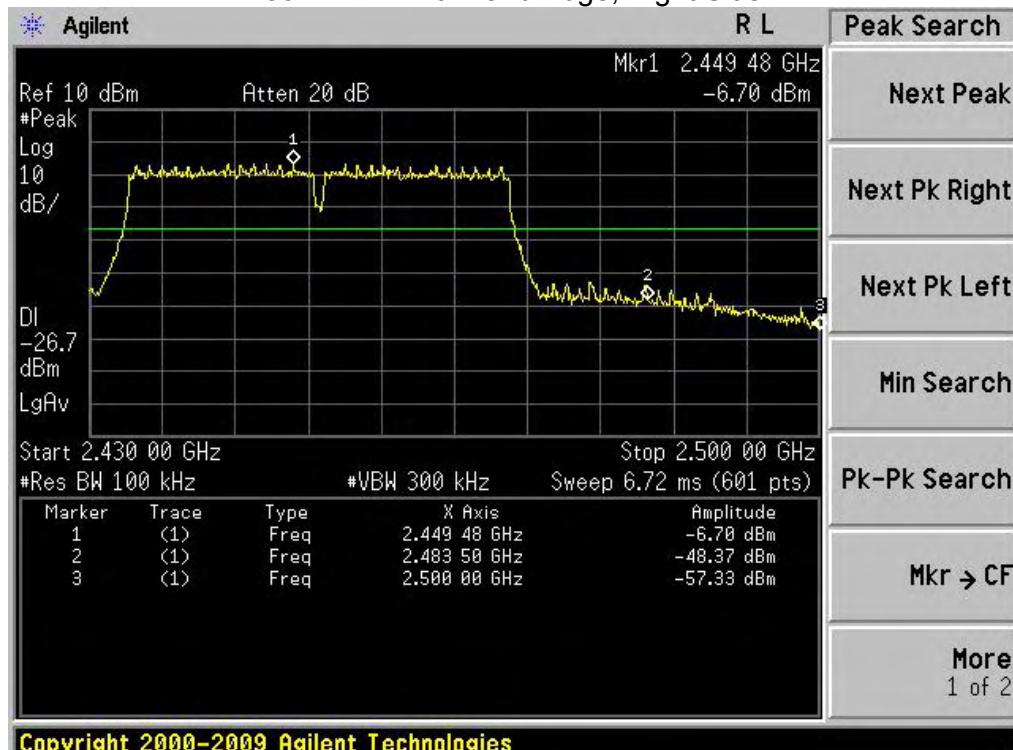




802.11n-HT40: Band Edge, Left Side



802.11n-HT40: Band Edge, Right Side





8. ANTENNA REQUIREMENT

8.1 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.

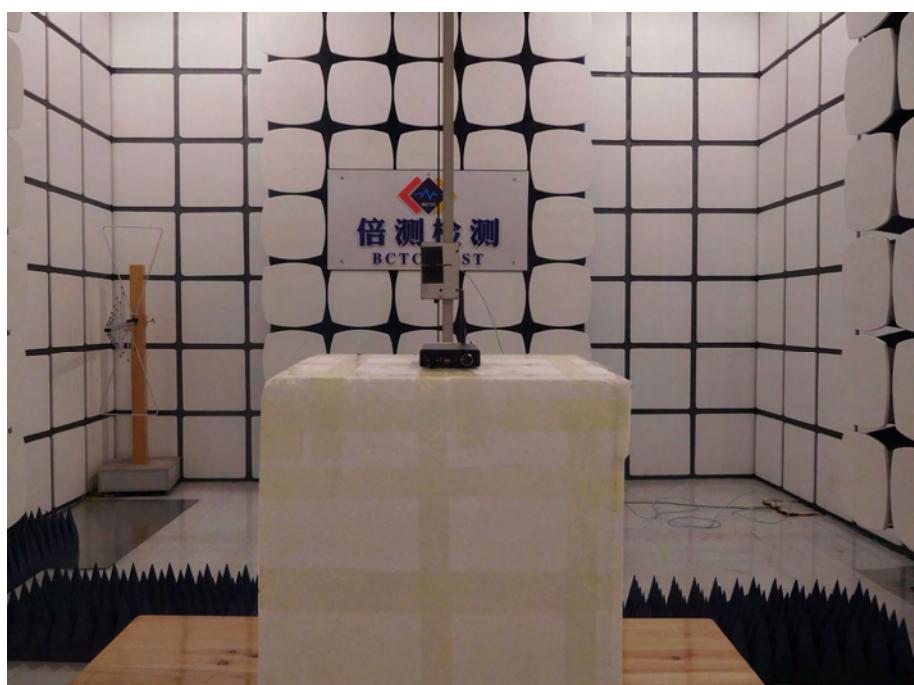
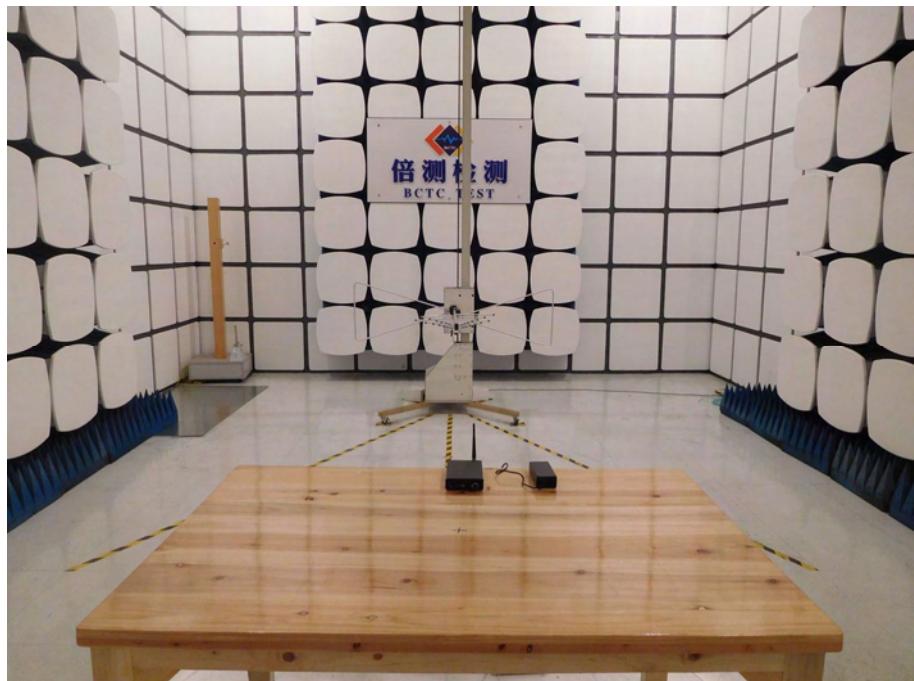
8.2 EUT ANTENNA

The EUT antenna is external antenna, and used Anti spiral antenna, It comply with the standard requirement.



9. EUT TEST PHOTO

Radiated Measurement Photos



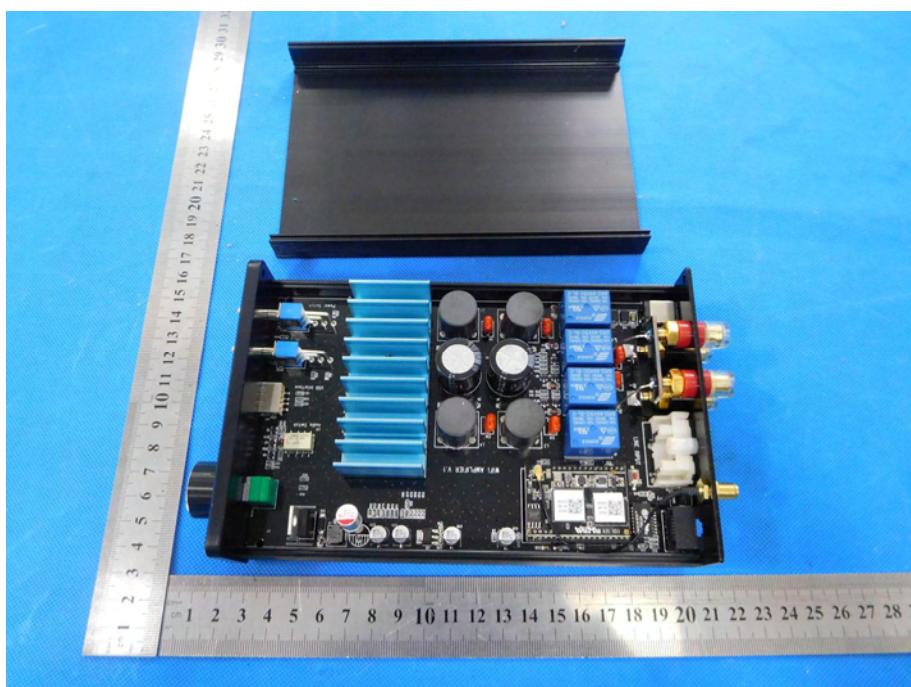
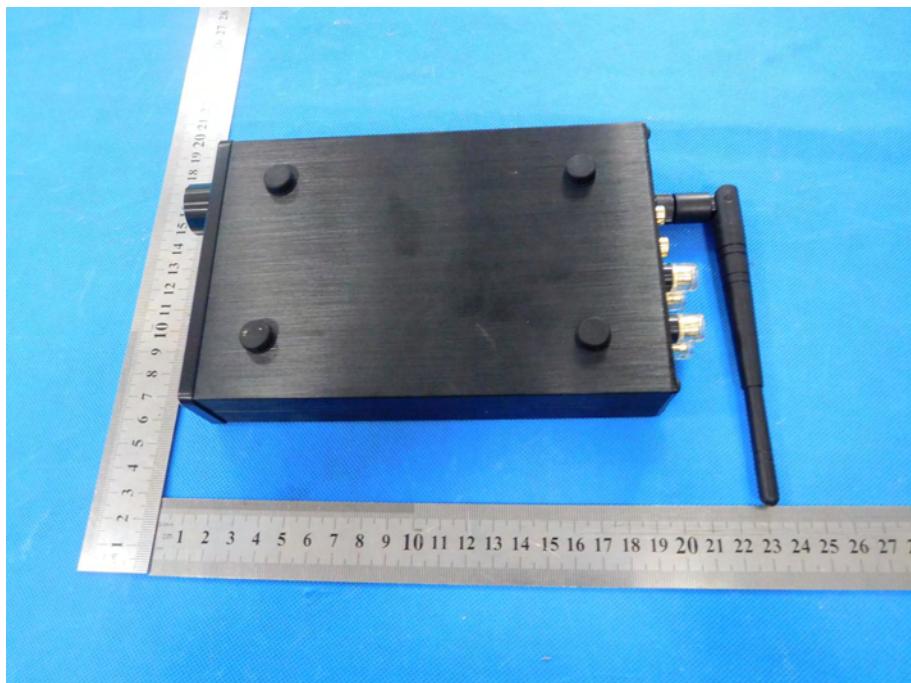


Conducted Measurement Photos



10. EUT PHOTO





※※※※ END OF REPORT ※※※※