



7. Test of Conducted Spurious Emission

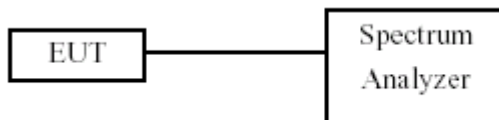
7.1 Test Limit

Below -20dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

7.2 Test Procedure

- The transmitter output was connected to the spectrum analyzer via a low lose cable.
- Set RBW of spectrum analyzer to 100 KHz and VBW of spectrum analyzer to 300 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
- Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20dB relative to the maximum measured in-band peak PSD level.
- The band edges was measured and recorded.

7.3 Test Setup Layout



7.4 Test Result and Data

Test Result : PASS

Test Date : Sep. 27, 2018

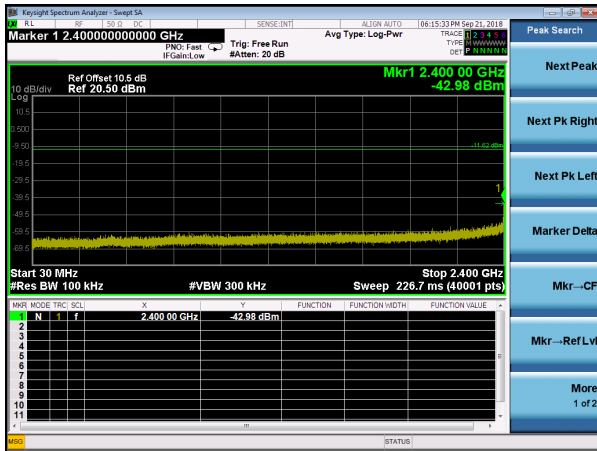
Temperature : 23°C

Humidity : 64%

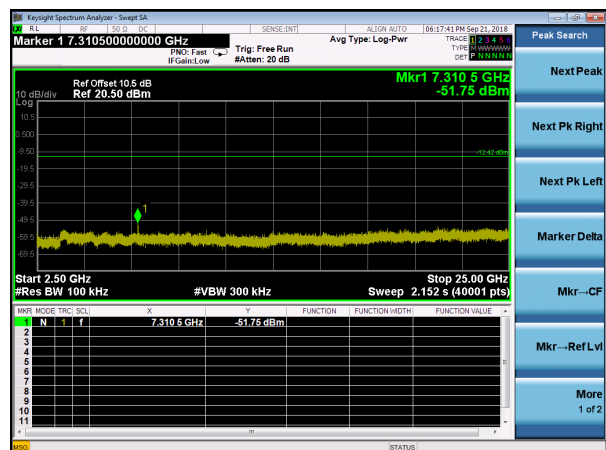
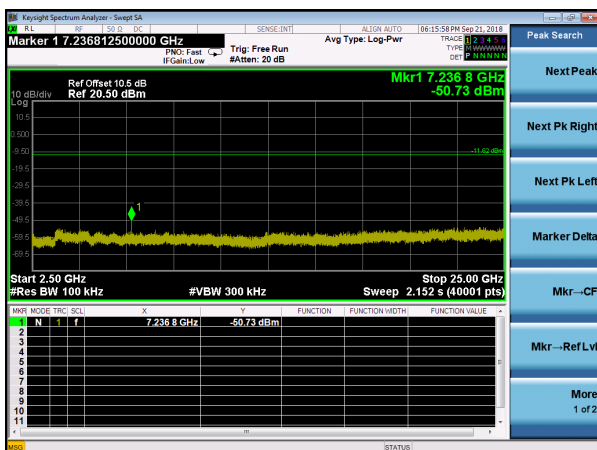
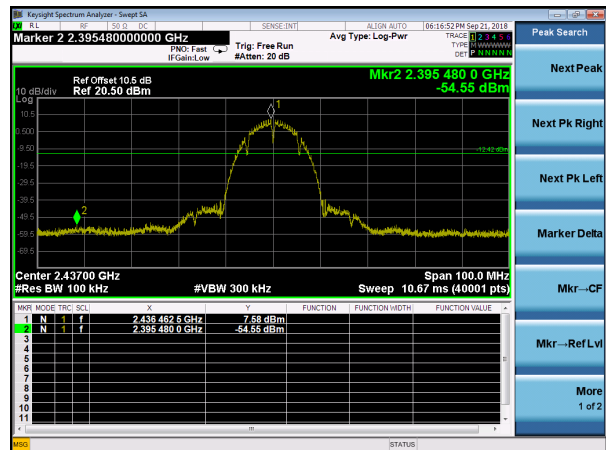
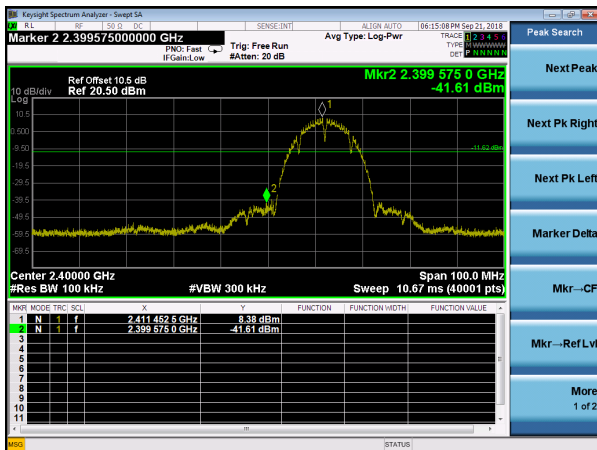
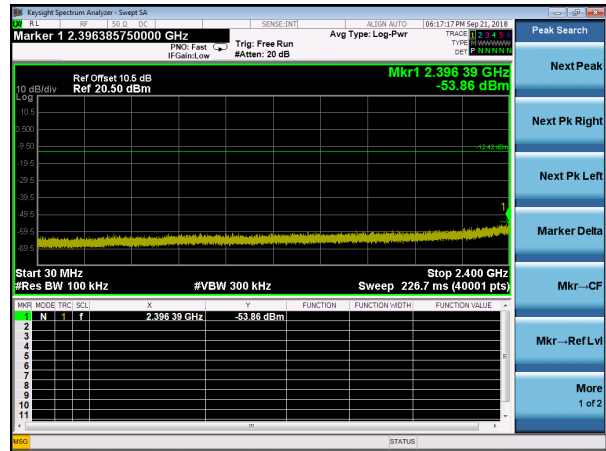
Note: Test plots refers to the following pages.



Modulation Type: 802.11b, CH 01

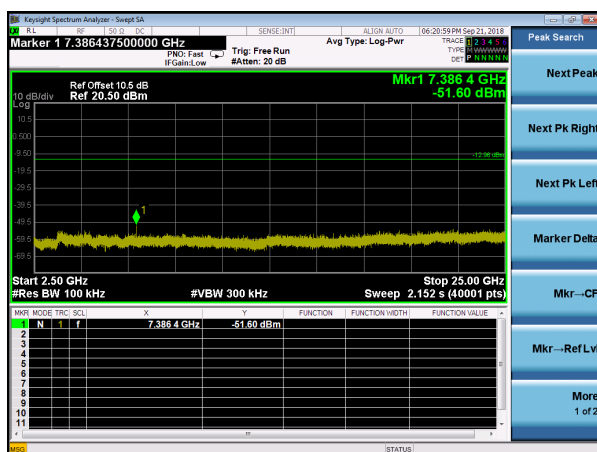
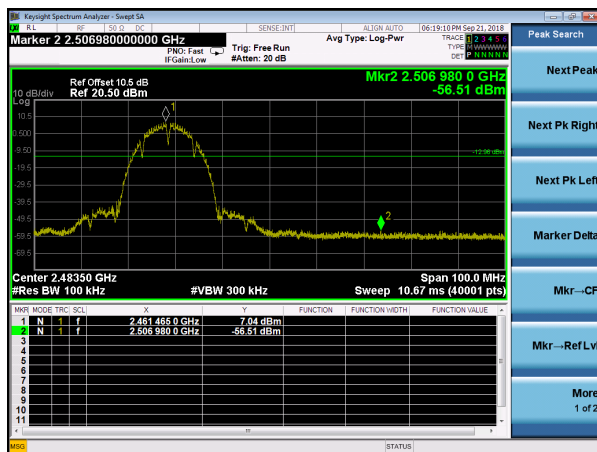
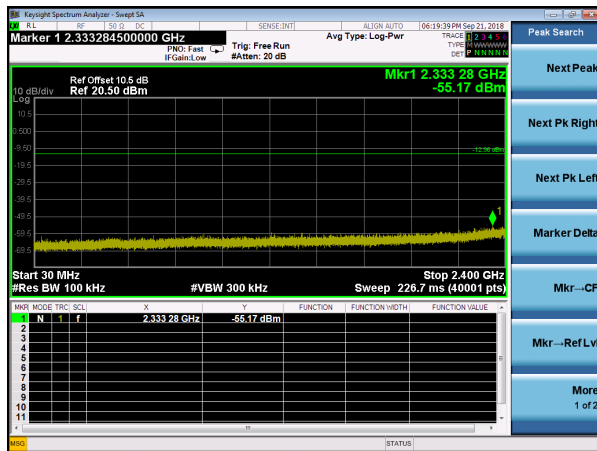


Modulation Type: 802.11b, CH 06



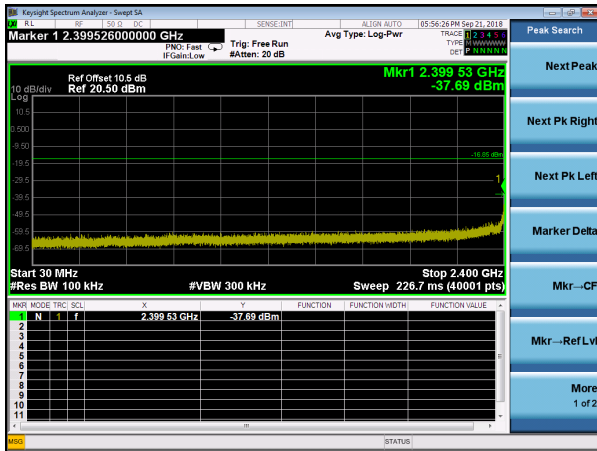


Modulation Type: 802.11b, CH 11

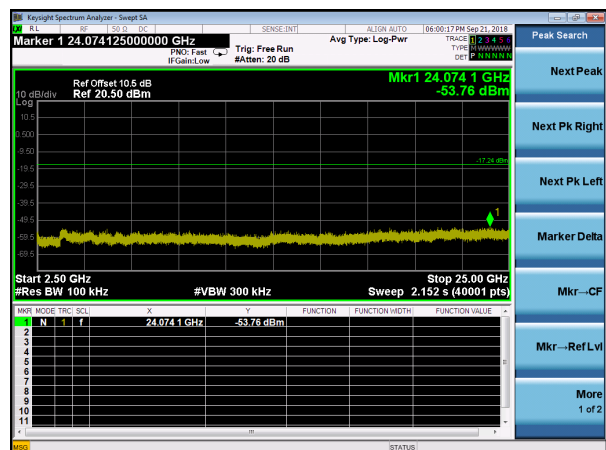
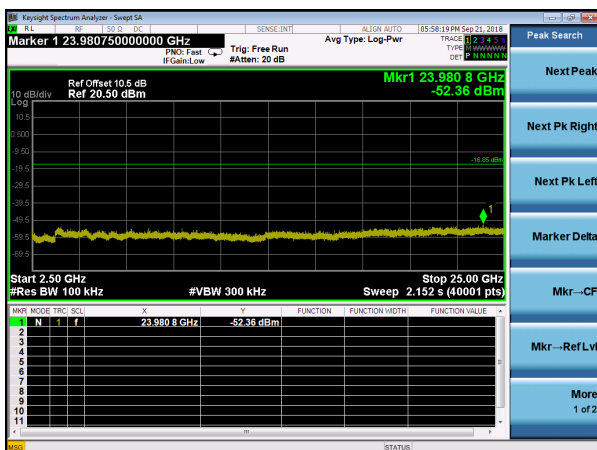
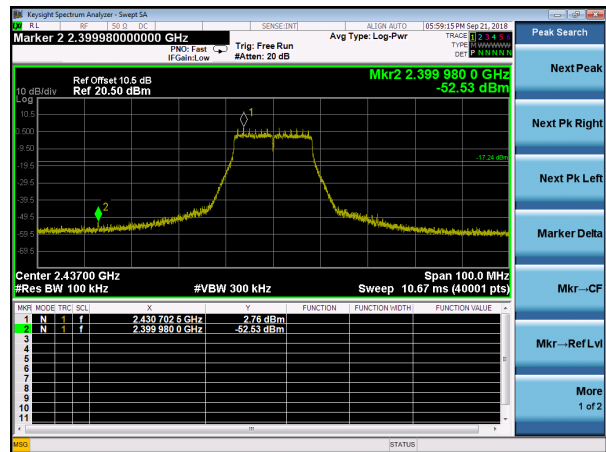
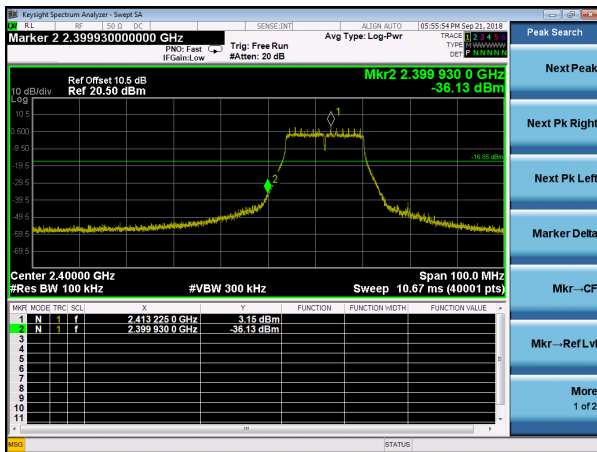
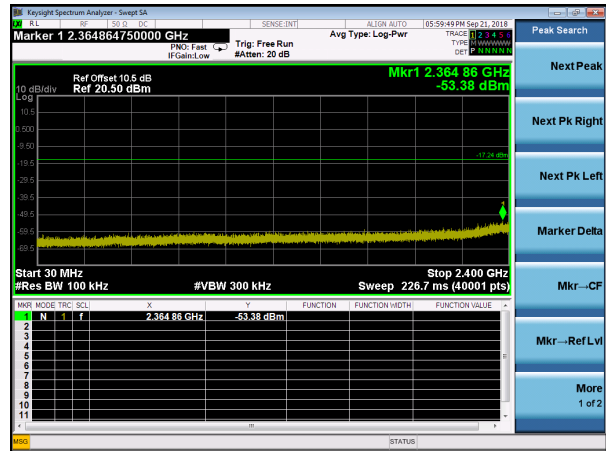




Modulation Type: 802.11g, CH 01

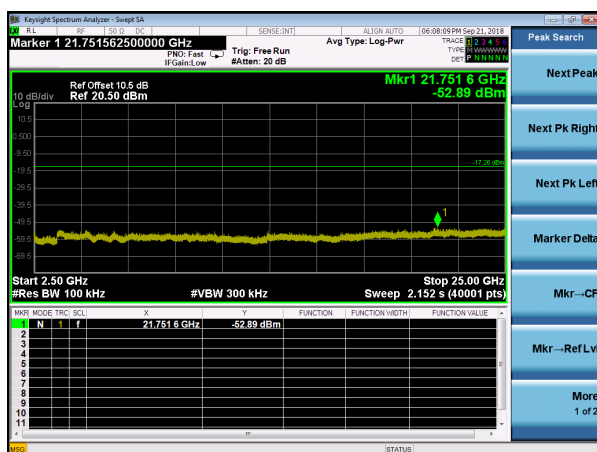
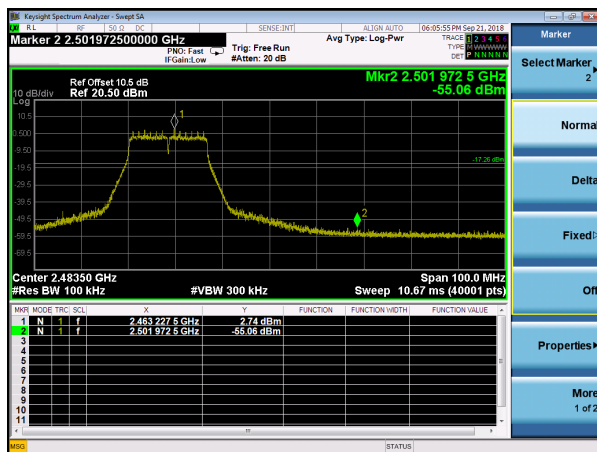
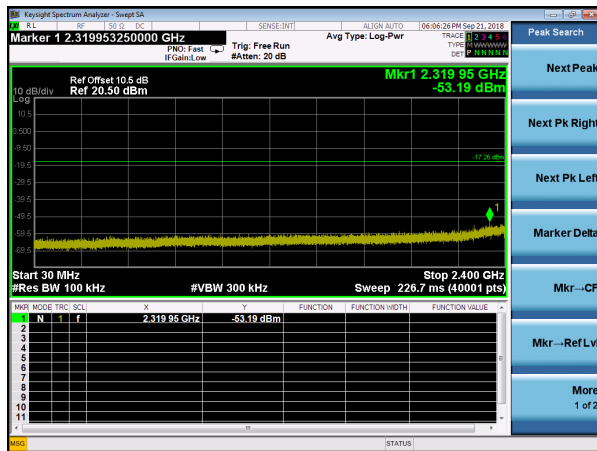


Modulation Type: 802.11g, CH 06



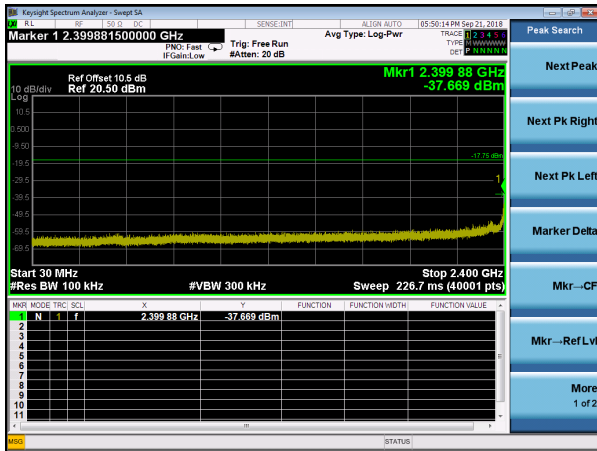


Modulation Type: 802.11g, CH 11

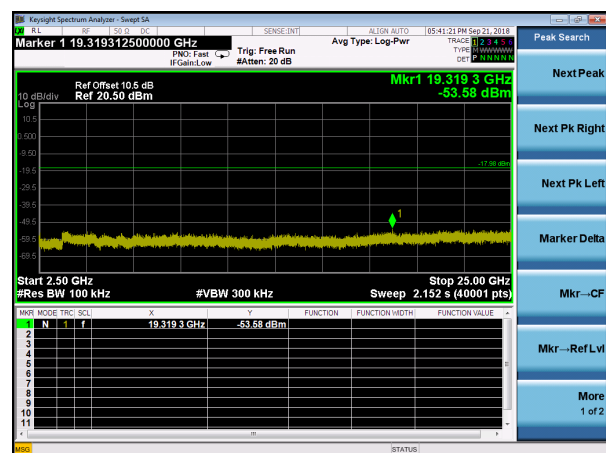
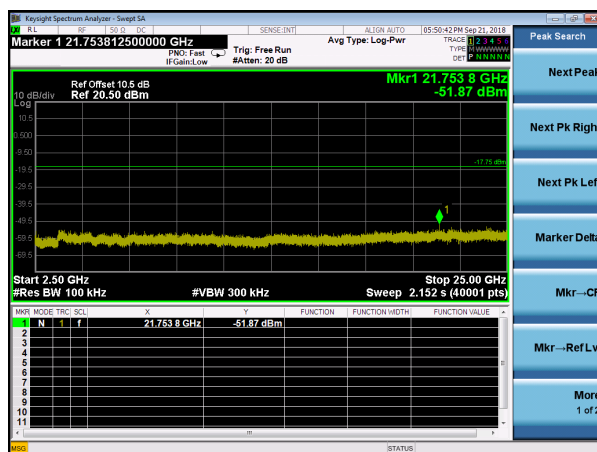
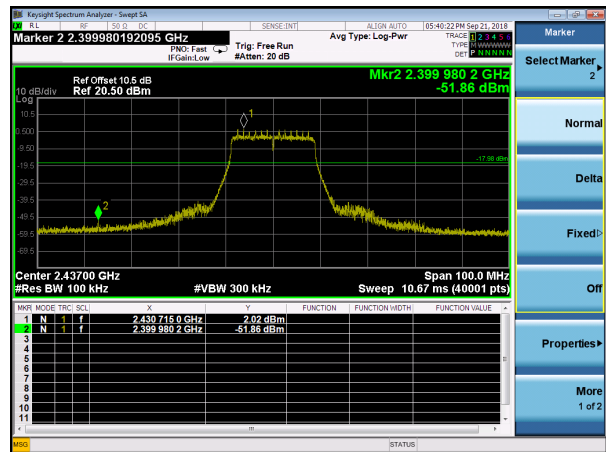
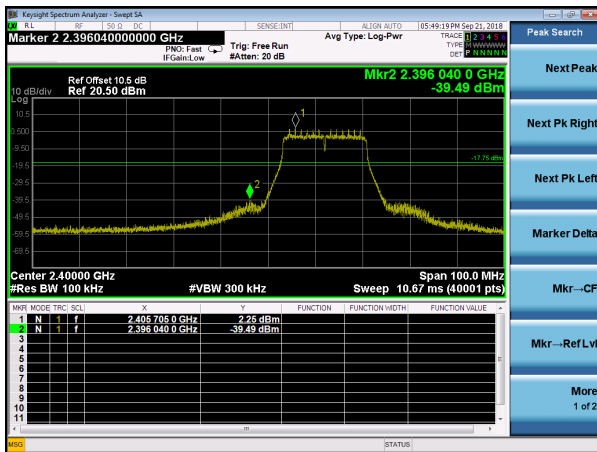
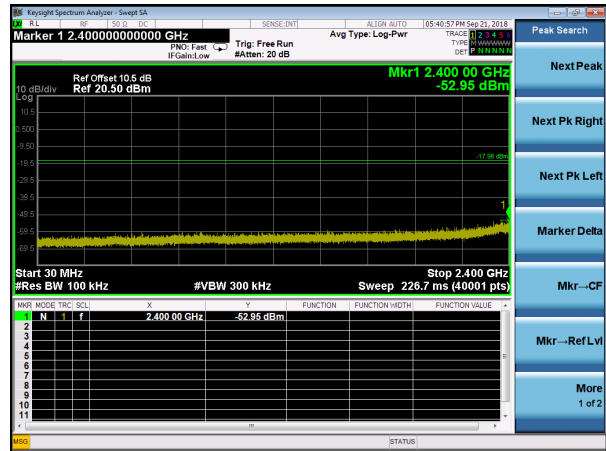




Modulation Type: 802.11n HT20, CH01

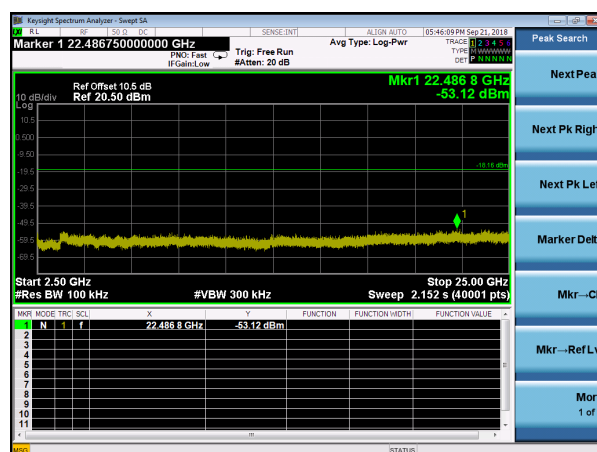
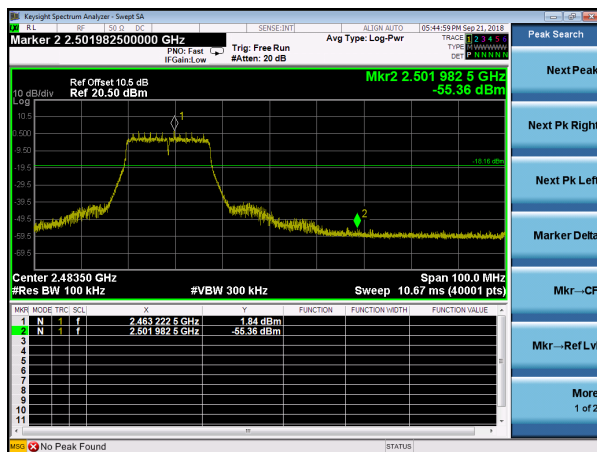
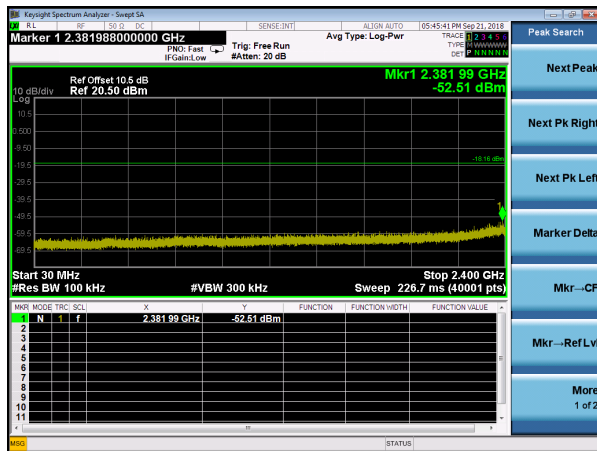


Modulation Type: 802.11n HT20, CH06





Modulation Type: 802.11n HT20, CH011





8. On Time, Duty Cycle and Measurement methods

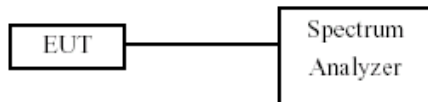
8.1 Test Limit

None; for reporting purposes only.

8.2 Test Procedure

KDB 558074 Zero-Span Spectrum Analyzer Method.

8.3 Test Setup Layout



8.4 Test Result and Data

Temperature : 23°C

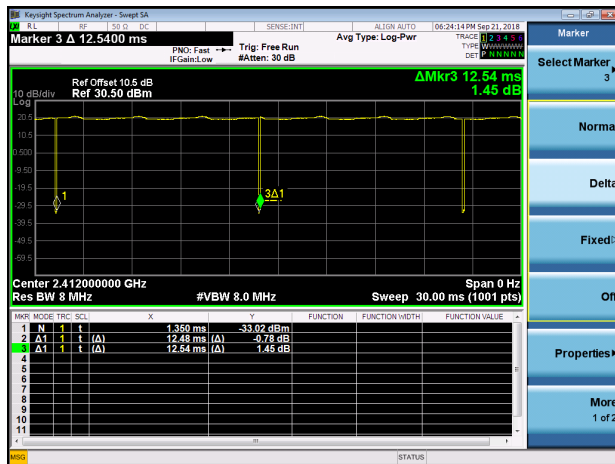
Humidity : 64%

Test Date : Sep. 27, 2018

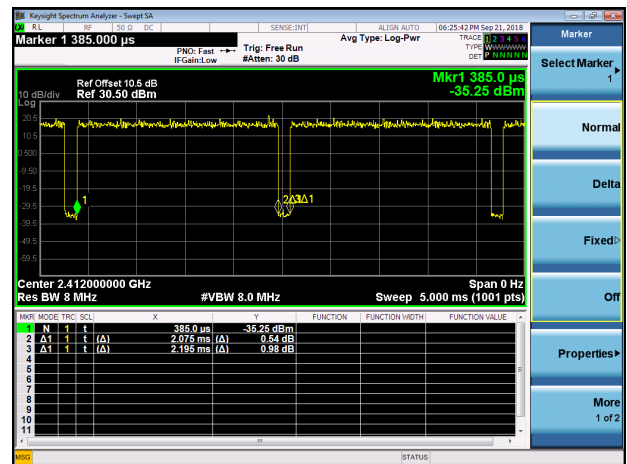
Modulation Type	On Time (msec)	Period Time (msec)	Duty Cycle (%)	1/T Minimum VBW(Hz)	Duty Cycle correction Factor (dB)
802.11b	12.48	12.54	99.52%	80.13	0.02
802.11g	2.07	2.19	94.52%	483.09	0.24
802.11n HT20	1.93	2.05	94.15%	518.13	0.26



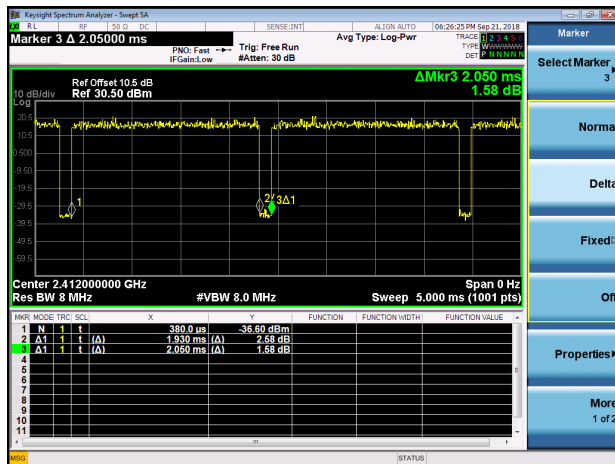
Modulation Standard: 802.11b



Modulation Standard: 802.11g



Modulation Type: 802.11n HT20





9. 6dB Bandwidth Measurement Data

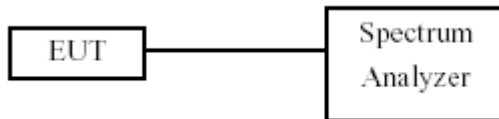
9.1 Test Limit

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

9.2 Test Procedures

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 1~5% of the emission bandwidth and VBW $\geq 3 \times$ RBW.
- The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.
- The 6dB Bandwidth was measured and recorded.

9.3 Test Setup Layout



9.4 Test Result and Data

Temperature : 23°C

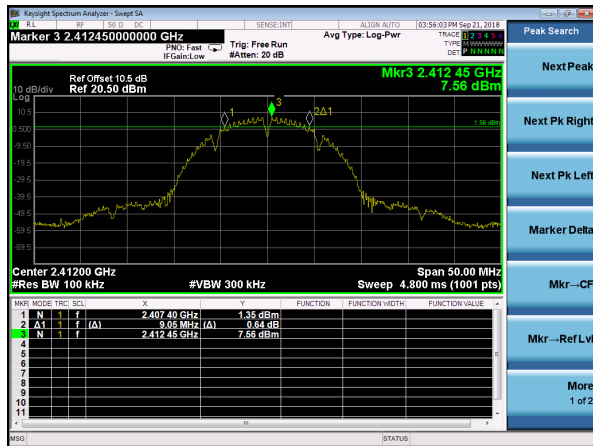
Humidity : 64%

Test Date : Sep. 27, 2018

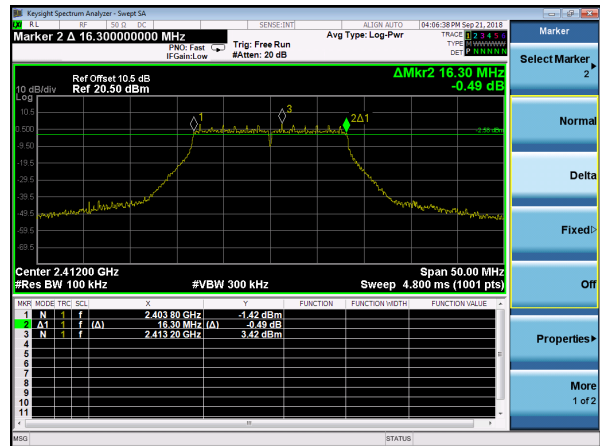
Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
IEEE 802.11b (1Mbps)	01	2412	9.05	0.5
	06	2437	9.05	0.5
	11	2462	9.00	0.5
IEEE 802.11g (6Mbps)	01	2412	16.30	0.5
	06	2437	16.30	0.5
	11	2462	16.30	0.5
IEEE 802.11n HT20 (6.5Mbps)	01	2412	17.30	0.5
	06	2437	17.30	0.5
	11	2462	17.30	0.5



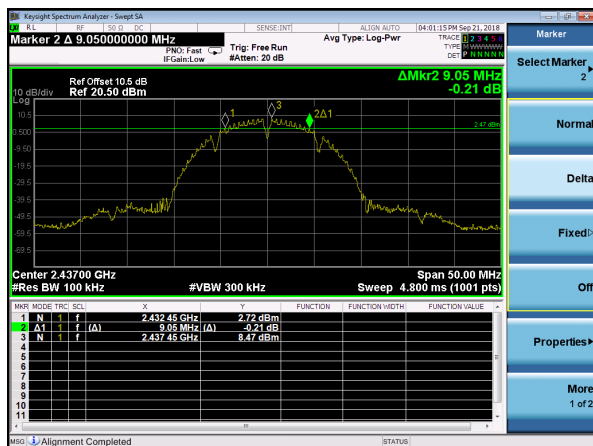
Modulation Type: 802.11b
CH01



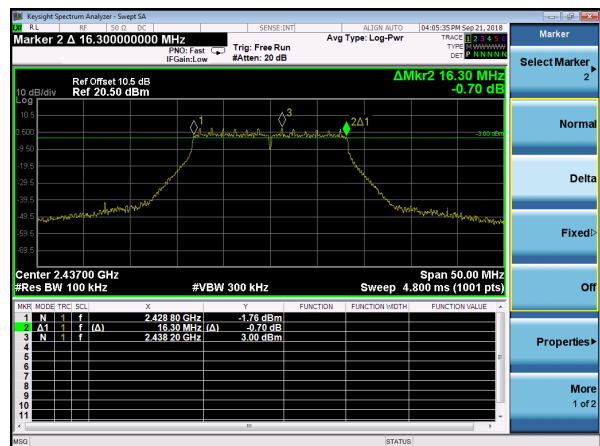
Modulation Type: 802.11g
CH01



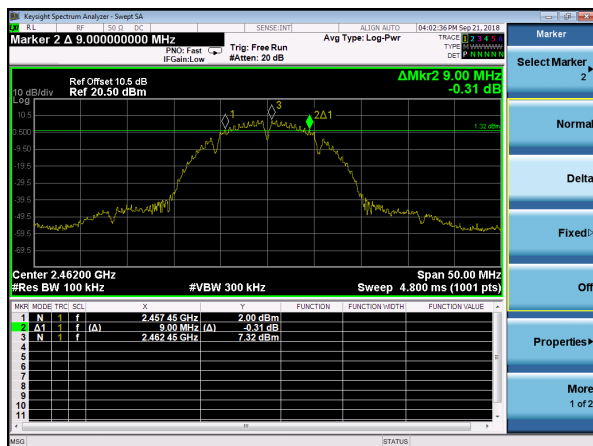
CH06



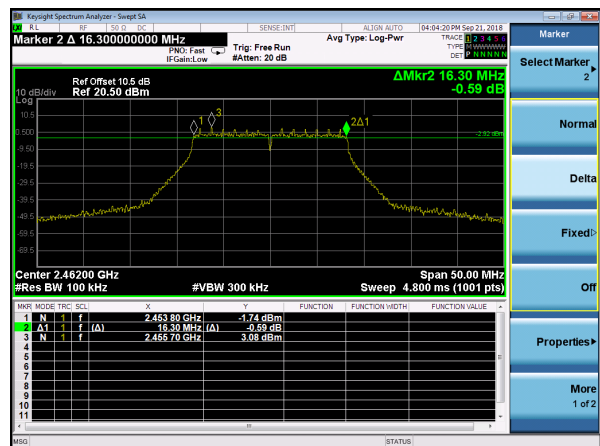
CH06



CH11

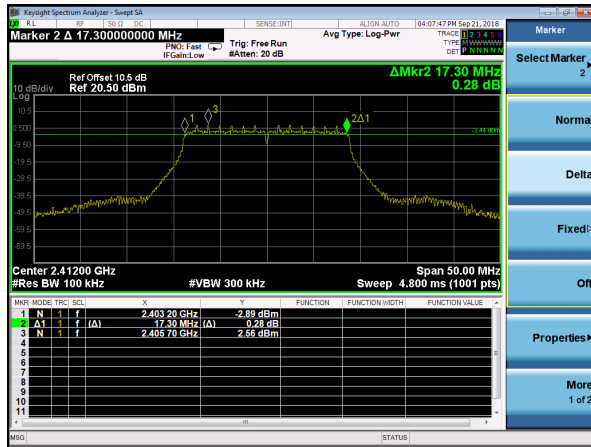


CH11

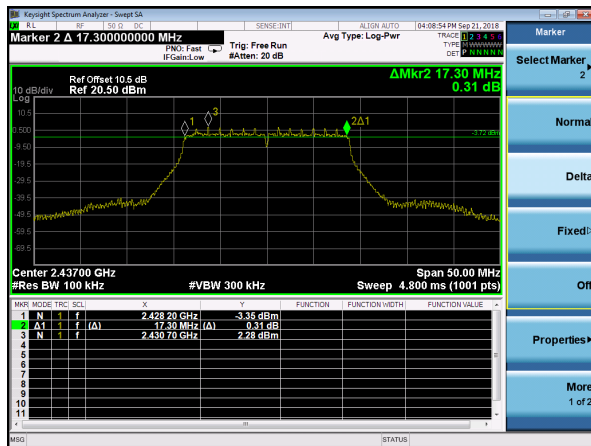




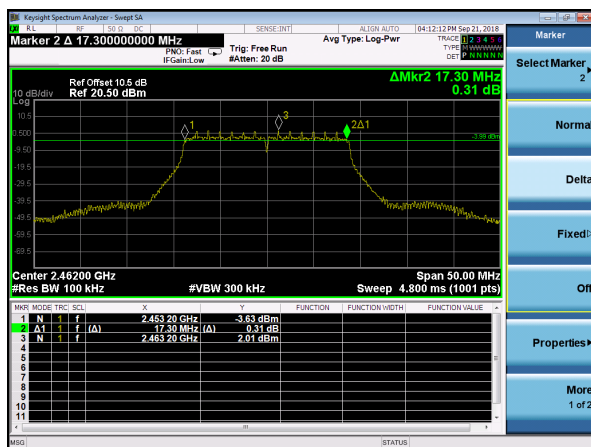
Modulation Type: 802.11n HT20
CH01



CH06



CH11





10. Maximum Peak and Average Output Power

10.1 Test Limit

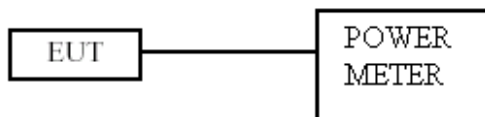
The Maximum Peak Output Power Measurement is 30dBm.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

10.2 Test Procedures

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

10.3 Test Setup Layout



**10.4 Test Result and Data**

Temperature : 23°C
Test Date : Sep. 27, 2018

Humidity : 64%

Modulation Type	Channel	Frequency (MHz)	Peak Power Output (dBm)	Total Peak Power (dBm)	Total Peak Power (mW)	Limit (dBm)
IEEE 802.11b (1Mbps)	01	2412	18.52	18.52	71.121	30.00
	06	2437	18.16	18.16	65.464	30.00
	11	2462	17.84	17.84	60.814	30.00
IEEE 802.11g (6Mbps)	01	2412	21.91	21.91	155.239	30.00
	06	2437	21.61	21.61	144.877	30.00
	11	2462	21.74	21.74	149.279	30.00
IEEE 802.11n HT20 (6.5Mbps)	01	2412	22.36	22.36	172.187	30.00
	06	2437	21.88	21.88	154.170	30.00
	11	2462	21.61	21.61	144.877	30.00

Modulation Type	Channel	Frequency (MHz)	Avg. Power Output (dBm)	Total Avg. Power (dBm)	Total Avg. Power (mW)
IEEE 802.11b (1Mbps)	01	2412	15.75	15.75	37.584
	06	2437	15.42	15.42	34.834
	11	2462	15.09	15.09	32.285
IEEE 802.11g (6Mbps)	01	2412	13.51	13.51	22.439
	06	2437	13.21	13.21	20.941
	11	2462	13.31	13.31	21.429
IEEE 802.11n HT20 (6.5Mbps)	01	2412	12.89	12.89	19.454
	06	2437	12.49	12.49	17.742
	11	2462	12.32	12.32	17.061

Note: Average power is for reference only.



11. Power Spectral Density

11.1 Test Limit

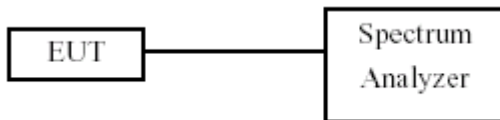
The Maximum of Power Spectral Density Measurement is 8dBm.

If transmitting antennas of directional gain greater than 6 dBi are used, the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

11.2 Test Procedures

- The transmitter output was connected to spectrum analyzer.
- The spectrum analyzer's resolution bandwidth were set at 3kHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.
- The power spectral density was measured and recorded.

11.3 Test Setup Layout



11.4 Test Result and Data

Temperature : 23℃

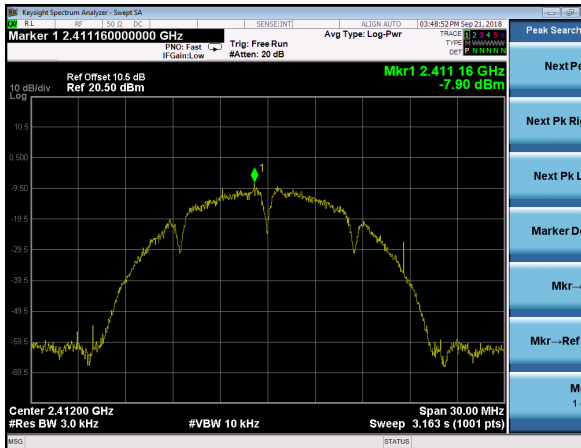
Humidity : 64%

Test Date : Sep. 27, 2018

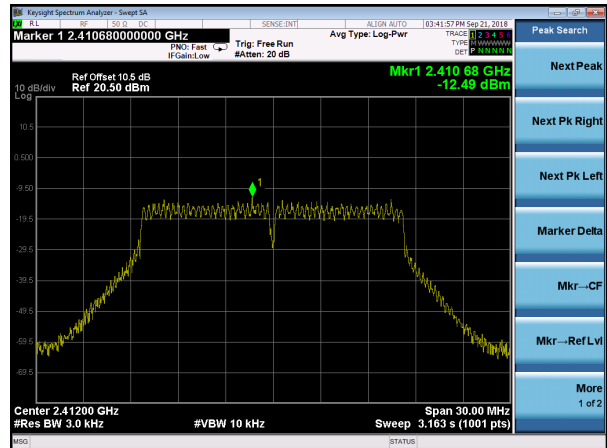
Modulation Type	CH	Freq. (MHz)	Maximum Power Density of 3 kHz Bandwidth (dBm)	Sum chain (dBm)	Duty Cycle CF(dB)	Total PSD (dBm)	Limit (dBm)
IEEE 802.11b (1Mbps)	01	2412	-7.9	-7.90	0.00	-7.90	8.00
	06	2437	-8.26	-8.26	0.00	-8.26	8.00
	11	2462	-9.22	-9.22	0.00	-9.22	8.00
IEEE 802.11g (6Mbps)	01	2412	-12.49	-12.49	0.00	-12.49	8.00
	06	2437	-11.86	-11.86	0.00	-11.86	8.00
	11	2462	-12.53	-12.53	0.00	-12.53	8.00
IEEE 802.11n HT20 (6.5Mbps)	01	2412	-14.09	-14.09	0.00	-14.09	8.00
	06	2437	-14.51	-14.51	0.00	-14.51	8.00
	11	2462	-14.05	-14.05	0.00	-14.05	8.00



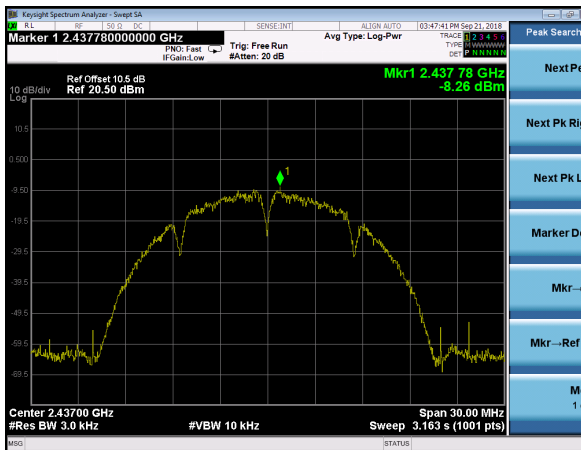
Modulation Type: 802.11b
CH01



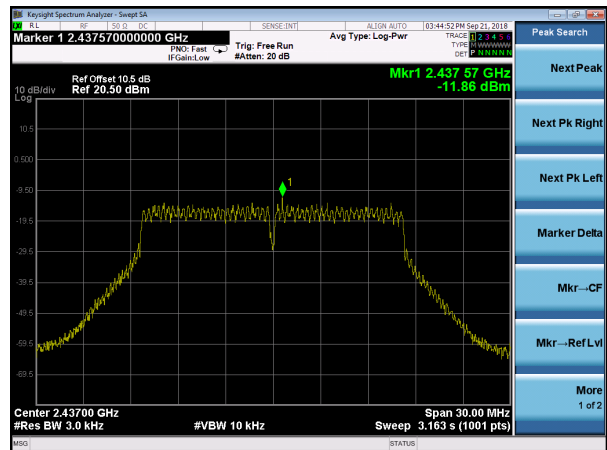
Modulation Type: 802.11g
CH01



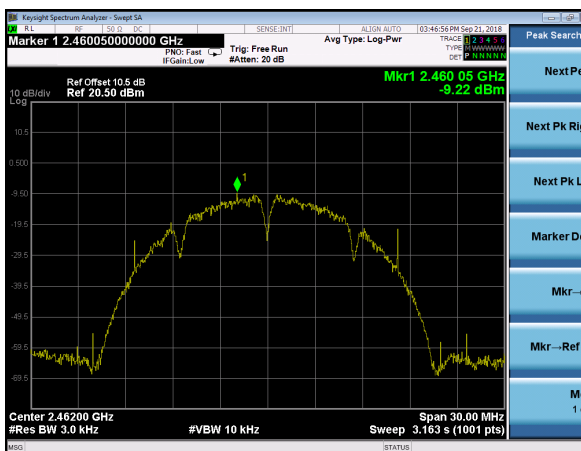
CH06



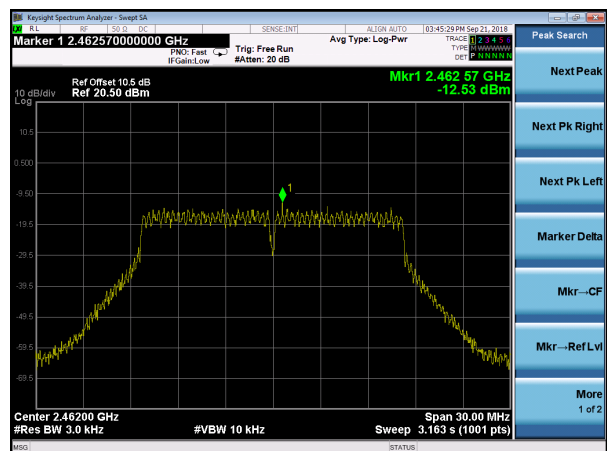
CH06



CH11

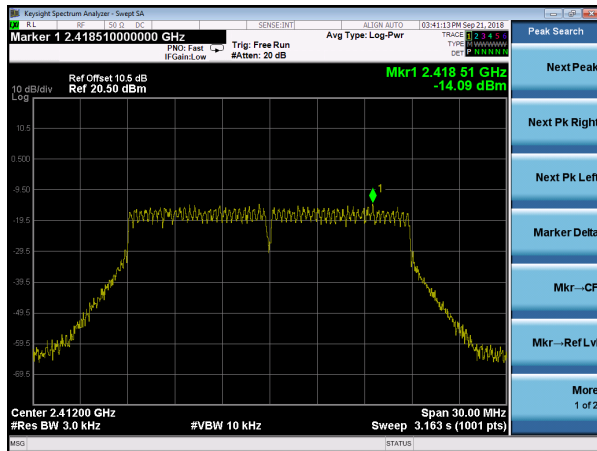


CH11

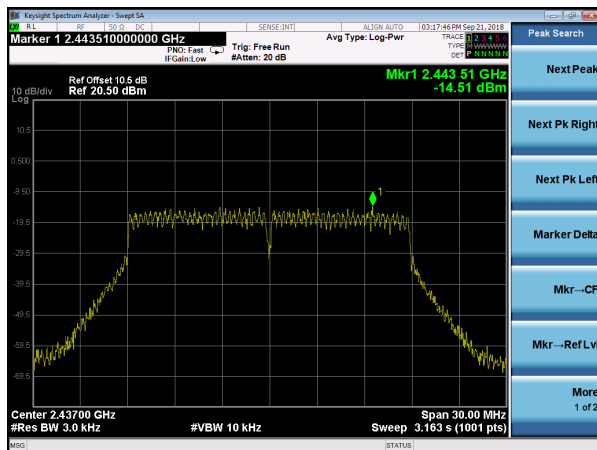




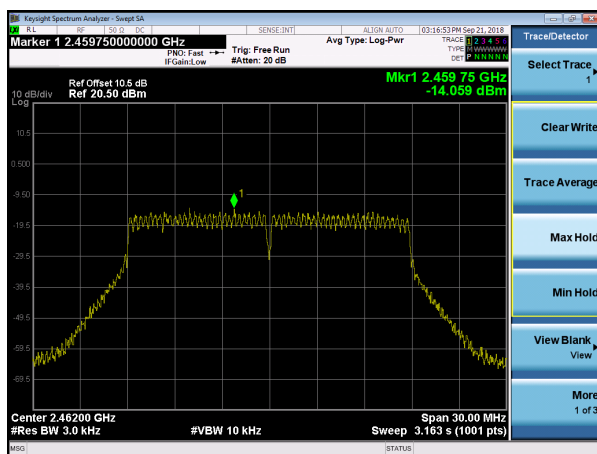
Modulation Type: 802.11n HT20
CH01



CH06



CH11





12. Radio Frequency Exposure

12.1 Applicable Standards

The measurements shown in this test report were made in accordance with the procedures given in FCC Part 2 (Section 2.1091)

KDB 447498

IEEE C95.1:2005

12.2 EUT Specification

Frequency band (Operating)	☒ WLAN: 2412MHz ~ 2462MHz ☐ WLAN: 5150MHz ~ 5250MHz ☐ WLAN: 5250MHz ~ 5350MHz ☐ WLAN: 5470MHz ~ 5725MHz ☐ WLAN: 5725MHz ~ 5850MHz ☐ Bluetooth: 2402MHz ~ 2480MHz
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation)
Exposure classification	☐ Occupational/Controlled exposure ($S = 5\text{mW/cm}^2$) ☒ General Population/Uncontrolled exposure ($S=1\text{mW/cm}^2$)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A
Remark: 1. The maximum output power is <u>22.36dBm (172.187mW)</u> at <u>2412MHz</u> (with <u>numeric 4.17 antenna gain.</u>) 2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance. 3. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.	



12.3 Test Results

No non-compliance noted.

12.4 Calculation

$$\text{Given } E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{3770}$$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \textbf{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²



12.5 Maximum Permissible Exposure

Maximum Permissible Exposure

Modulation Mode	Frequency band (MHz)	Max. Conducted output power(dBm)	Antenna Gain(dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
802.11n HT20	2412-2462	22.36	4.17	20	0.0895	1