7.4 DUTY CYCLE

7.4.1 Applicable Standard

According to KDB 558074 D01 15.247 Meas Guidance v05 Section 6.

7.4.2 Conformance Limit

No limit requirement.

7.4.3 Measuring Instruments

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

7.4.4 Test Setup

Please refer to Section 6.1 of this test report.

7.4.5 Test Procedure

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW $\geqslant$ OBW if possible; otherwise, set RBW to the largest available value. Set VBW $\geqslant$ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T $\leqslant$ 16.7 microseconds.)

The transmitter output is connected to the Spectrum Analyzer. We tested accroding to the zero-span measurement method, 6.0)b) in KDB 558074

The largest availble value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if T $\leqslant$ 6.25 microseconds. (50/6.25 = 8)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/T.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
Set to the maximum power setting and enable the EUT transmit continuously.
The EUT was operating in controlled its channel.
Use the following spectrum analyzer settings:
Span = Zero Span
RBW = 8MHz(the largest available value)
VBW = 8MHz (≥ RBW)
Number of points in Sweep >100
Detector function = peak
Trace = Clear write
Measure T_{total} and T_{on}
Calculate Duty Cycle = T_{on} / T_{total}

7.4.6 Test Results

EUT:	DashCam	Model No.:	W1
Temperature:	20 ℃	Relative Humidity:	48%
Test Mode:	802.11b/g/n20/n40	Test By:	Loren Luo

Mode	Data rate	Channel	T_{on}	T_{total}	Duty Cycle	Duty Cycle Factor (dB)	VBW Setting
802.11b	1Mbps	6	-	-	100%	0	10Hz
802.11g	6Mbps	6	-	-	100%	0	1KHz
802.11n HT20	MCS0	6	-	-	100%	0	1KHz
802.11n HT40	MCS0	6	-	-	100%	0	3KHz

Note: All the modulation modes were tested, the data of the worst mode are described in the following table.

7.5 MAXIMUM OUTPUT POWER

7.5.1 Applicable Standard

According to FCC Part 15.247(b)(3) and KDB 558074 D01 15.247 Meas Guidance v05 Section 8.3.2.3.

7.5.2 Conformance Limit

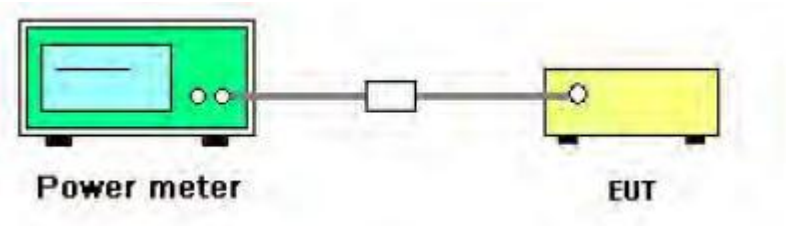
The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm). If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

7.5.3 Measuring Instruments

The following table is the setting of the power meter.

Power meter parameter	Setting
Detector	Peak

7.5.4 Test Setup



7.5.5 Test Procedure

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the *DTS bandwidth* and shall utilize a fast-responding diode detector.

7.5.6 EUT opration during Test

The EUT was programmed to be in continuously transmitting mode.

7.5.7 Test Results

EUT:	DashCam	Model No.:	W1
Temperature:	20 ℃	Relative Humidity:	48%
Test Mode:	802.11b/g/n20/n40	Test By:	Loren Luo

Test Channel	Frequency (MHz)	Power Setting	Duty Cycle Factor (dB)	Peak Output Power (dBm)	Maximum Output Power(dBm)	LIMIT (dBm)	Verdict
	802.11b						
1	2412	Default	0	13.1	13.1	30	PASS
6	2437	Default	0	13.2	13.2	30	PASS
11	2462	Default	0	13.1	13.1	30	PASS
	802.11g						
1	2412	Default	0	12.4	12.4	30	PASS
6	2437	Default	0	12.0	12.0	30	PASS
11	2462	Default	0	12.1	12.1	30	PASS
	802.11n HT20						
1	2412	Default	0	11.9	11.9	30	PASS
6	2437	Default	0	11.9	11.9	30	PASS
11	2462	Default	0	12.0	12.0	30	PASS
	802.11n HT40						
3	2422	Default	0	11.8	11.8	30	PASS
6	2437	Default	0	12.0	12.0	30	PASS
9	2452	Default	0	11.7	11.7	30	PASS

7.6 POWER SPECTRAL DENSITY

7.6.1 Applicable Standard

According to FCC Part 15.247(e) and KDB 558074 D01 15.247 Meas Guidance v05 Section 8.4.

7.6.2 Conformance Limit

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.6.3 Measuring Instruments

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

7.6.4 Test Setup

Please refer to Section 6.1 of this test report.

7.6.5 Test Procedure

The testing follows Measurement Procedure Subclause 11.10.2 of ANSI C63.10

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 *RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

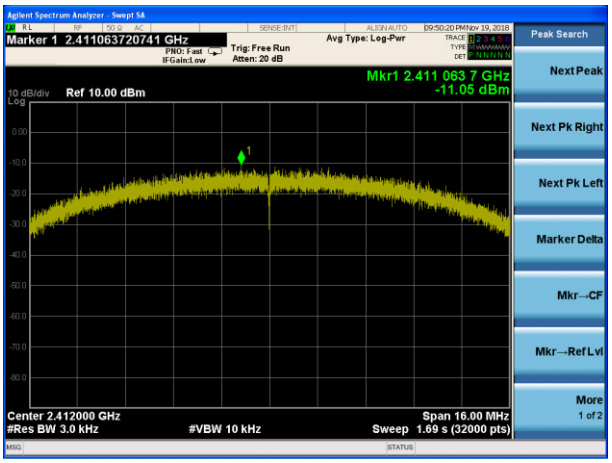
7.6.6 Test Results

EUT:	DashCam	Model No.:	W1
Temperature:	20 ℃	Relative Humidity:	48%
Test Mode:	802.11b/g/n20/n40	Test By:	Loren Luo

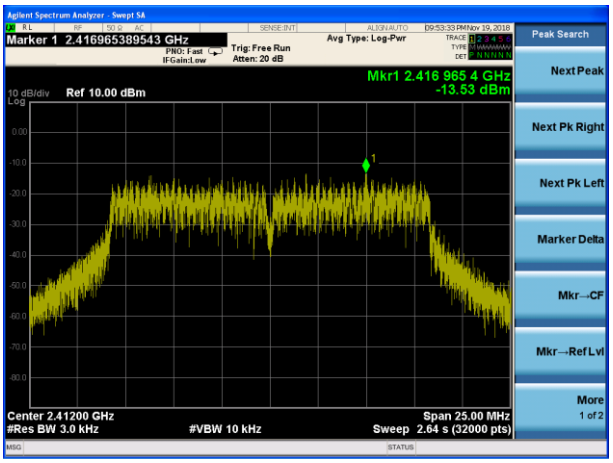
Test Channel	Frequency (MHz)	Duty Cycle Factor(dB)	Peak Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Verdict
	802.11b				
1	2412	0	-11.05	8	PASS
6	2437	0	-11.00	8	PASS
11	2462	0	-11.75	8	PASS
	802.11g				
1	2412	0	-13.53	8	PASS
6	2437	0	-14.65	8	PASS
11	2462	0	-13.00	8	PASS
	802.11n HT20				
1	2412	0	-13.83	8	PASS
6	2437	0	-13.61	8	PASS
11	2462	0	-13.38	8	PASS
	802.11n HT40				
3	2422	0	-13.83	8	PASS
6	2437	0	-13.61	8	PASS
9	2452	0	-13.38	8	PASS

Test plot

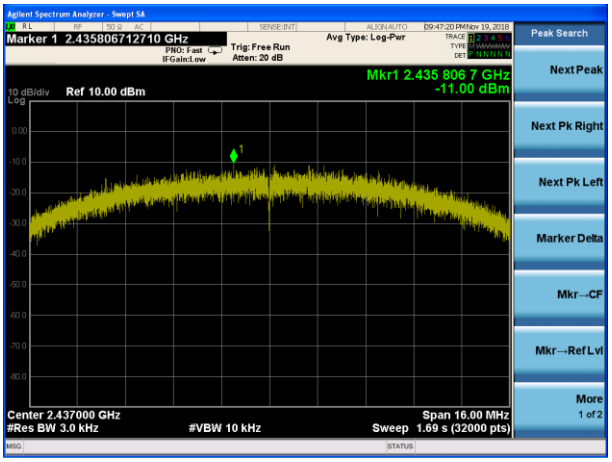
(802.11b) PSD plot on channel 1



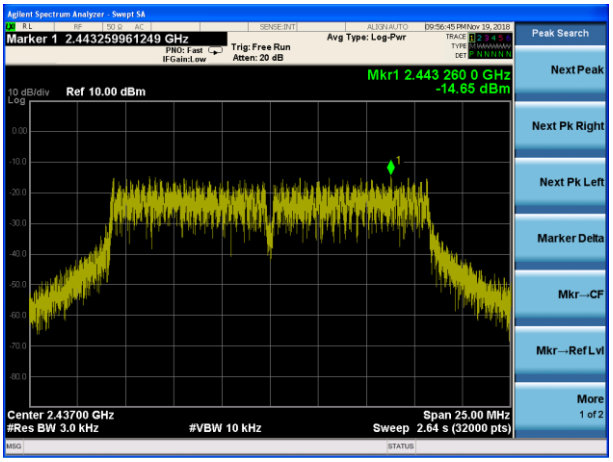
(802.11g) PSD plot on channel 1



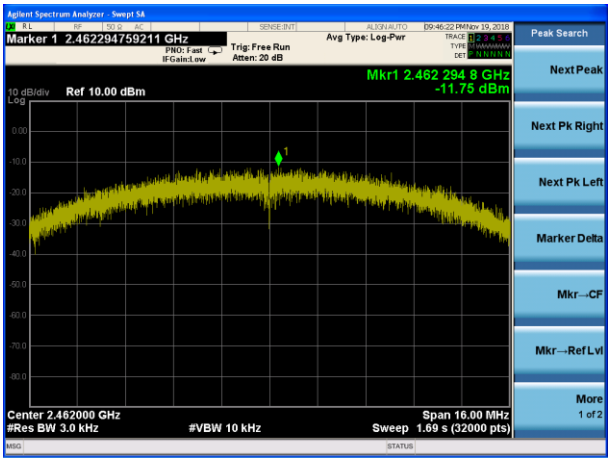
(802.11b) PSD plot on channel 6



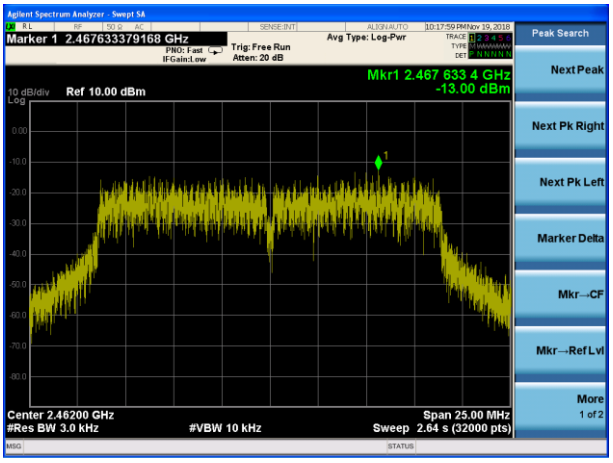
(802.11g) PSD plot on channel 6



(802.11b) PSD plot on channel 11

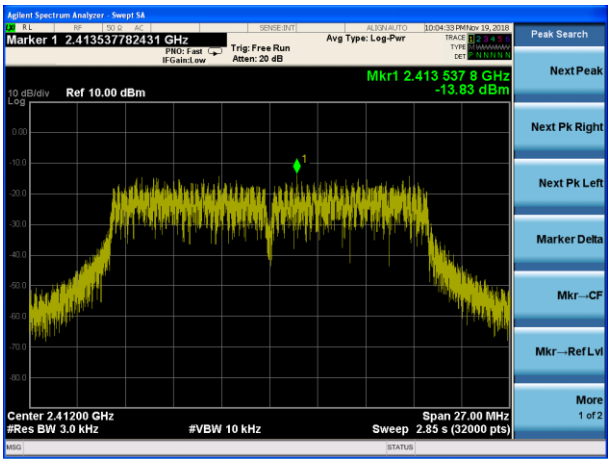


(802.11g) PSD plot on channel 11

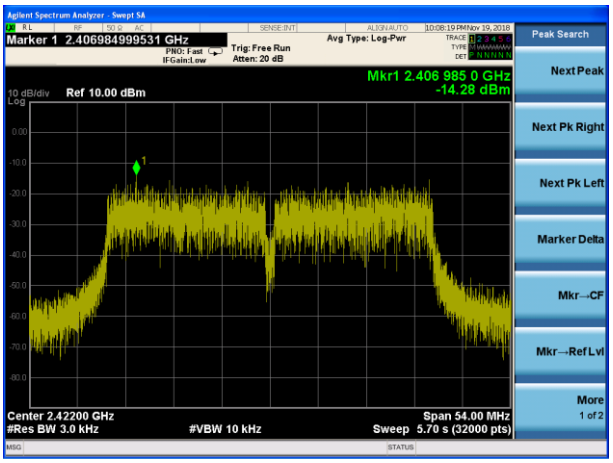


Test plot

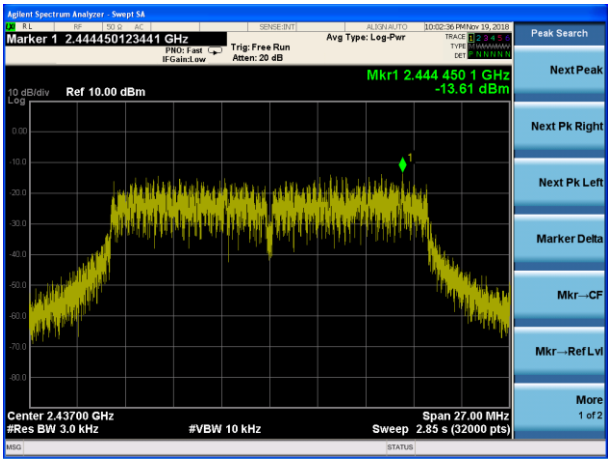
(802.11n HT20) PSD plot on channel 1



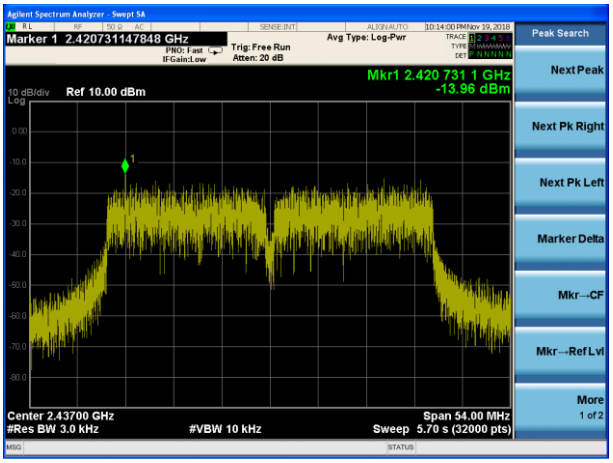
(802.11n HT40) PSD plot on channel 3



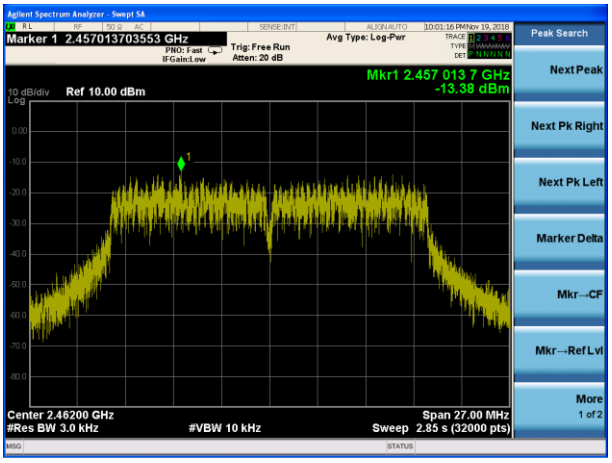
(802.11n HT20) PSD plot on channel 6



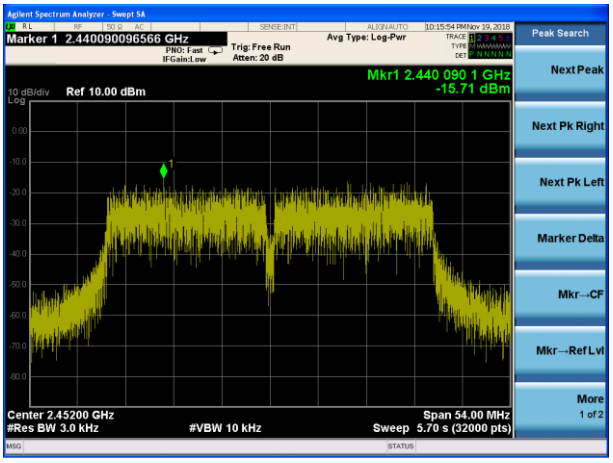
(802.11n HT40) PSD plot on channel 6



(802.11n HT20) PSD plot on channel 11



(802.11n HT40) PSD plot on channel 9



7.7 CONDUCTED BAND EDGE MEASUREMENT

7.7.1 Applicable Standard

According to FCC Part 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05 Section 8.7.

7.7.2 Conformance Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

7.7.3 Measuring Instruments

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

7.7.4 Test Setup

Please refer to Section 6.1 of this test report.

7.7.5 Test Procedure

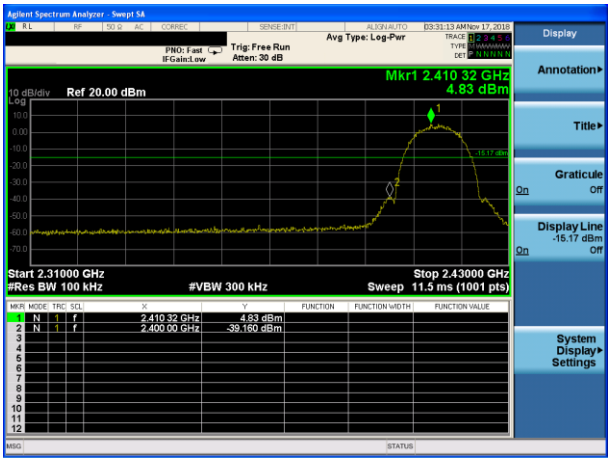
The testing follows FCC KDB 558074 D01 15.247 Meas Guidance v05 Section 8.7.
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
Set to the maximum power setting and enable the EUT transmit continuously.
The EUT was operating in controlled its channel.
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.
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.
Repeat above procedures until all measured frequencies were complete.

7.7.6 Test Results

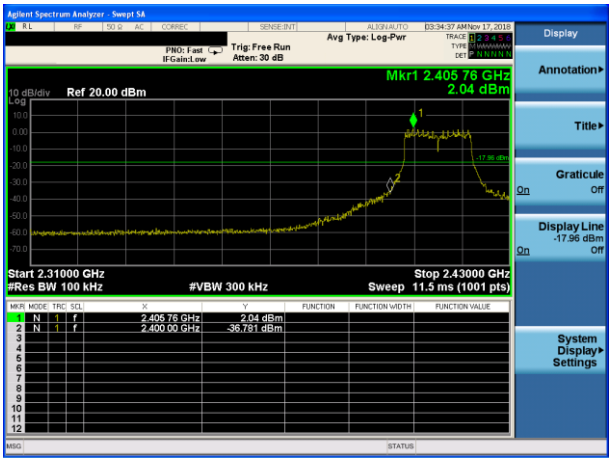
EUT:	DashCam	Model No.:	W1
Temperature:	20 ℃	Relative Humidity:	48%
Test Mode:	802.11b/g/n20/n40	Test By:	Loren Luo

Test plot For

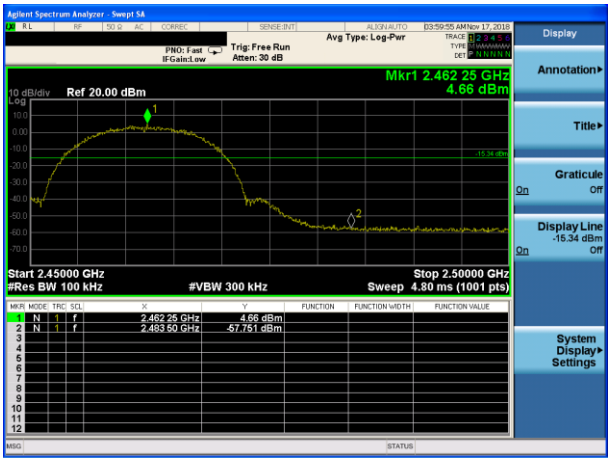
802.11b: Band Edge-Low Channel



802.11g: Band Edge-Low Channel



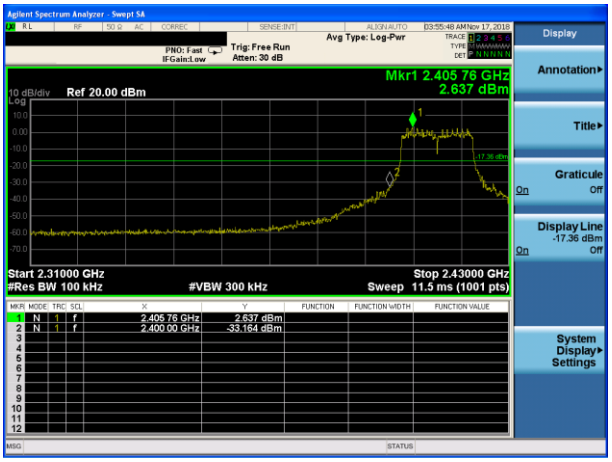
802.11b: Band Edge-High Channel



802.11g: Band Edge-High Channel

Test plot For

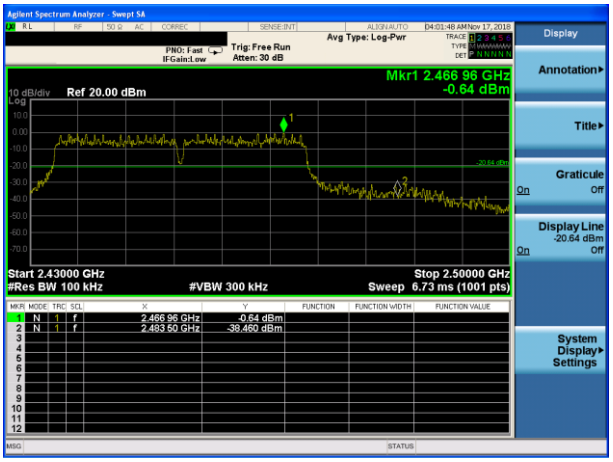
802.11n HT20: Band Edge-Low Channel



802.11n HT40: Band Edge-Low Channel

802.11n HT20: Band Edge-High Channel

802.11n HT40: Band Edge-High Channel



7.8 SPURIOUS RF CONDUCTED EMISSIONS

7.8.1 Conformance Limit

1. Below -20dB 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.

7.8.2 Measuring Instruments

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

7.8.3 Test Setup

Please refer to Section 6.1 of this test report.

7.8.4 Test Procedure

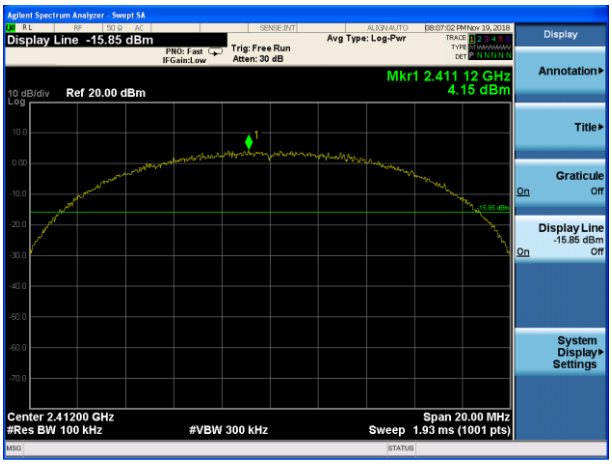
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting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

7.8.5 Test Results

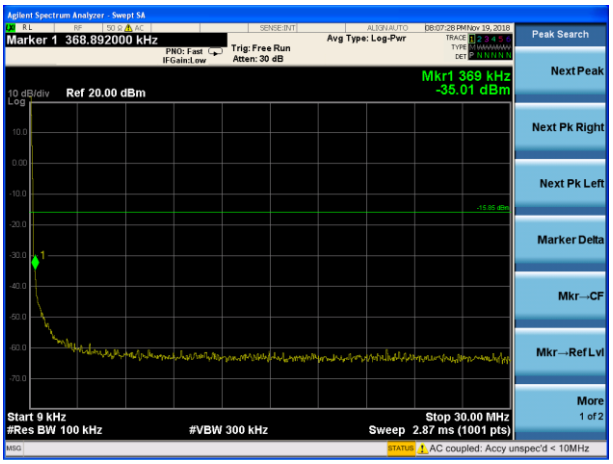
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

Test Plot

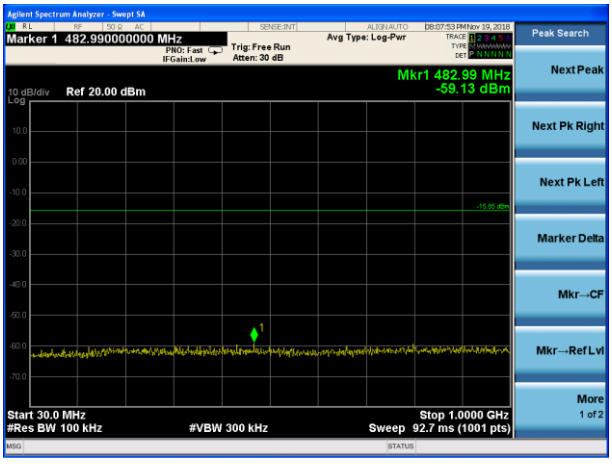
802.11b on channel 01



802.11b on channel 01



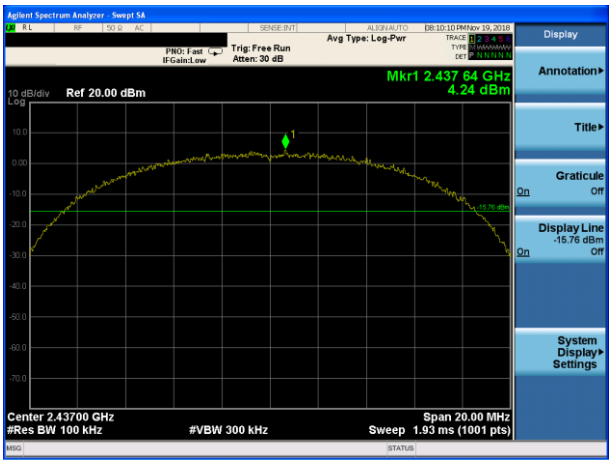
802.11b on channel 01



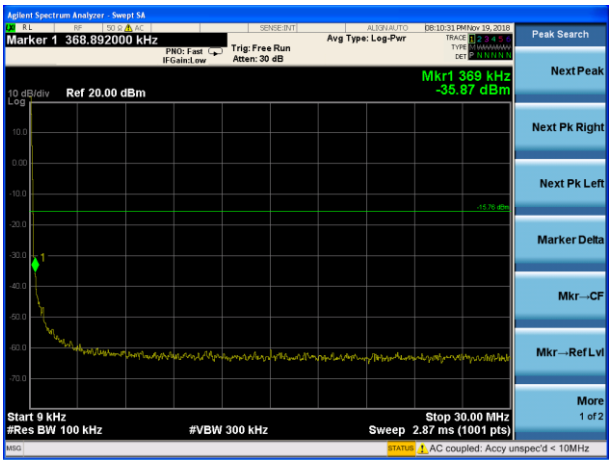
802.11b on channel 01

Test Plot

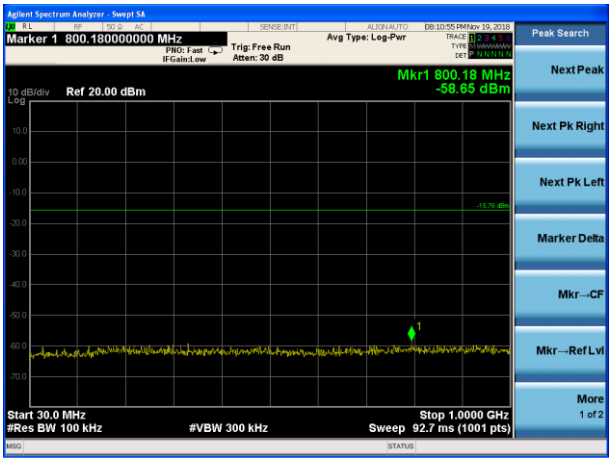
802.11b on channel 06



802.11b on channel 06



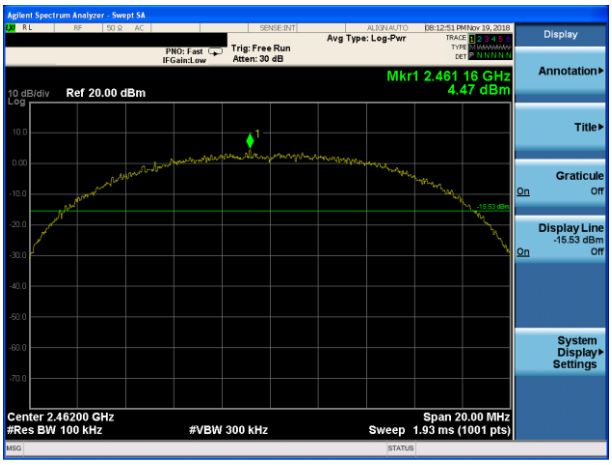
802.11b on channel 06



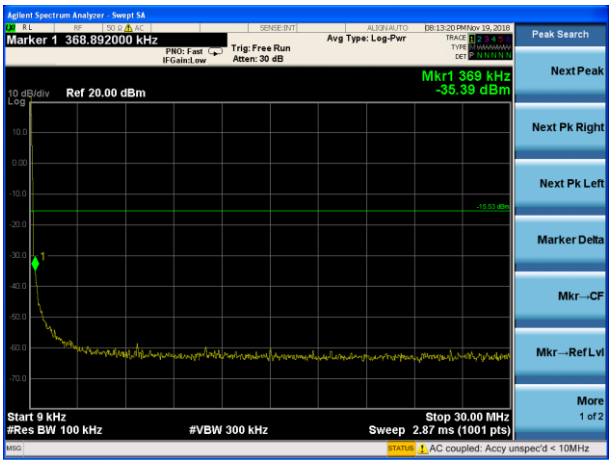
802.11b on channel 06

Test Plot

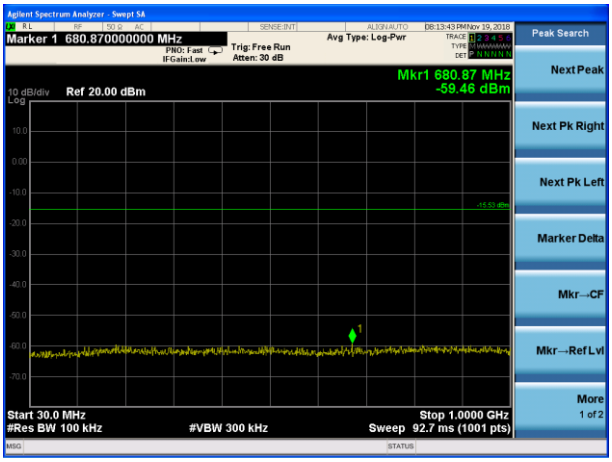
802.11b on channel 11



802.11b on channel 11



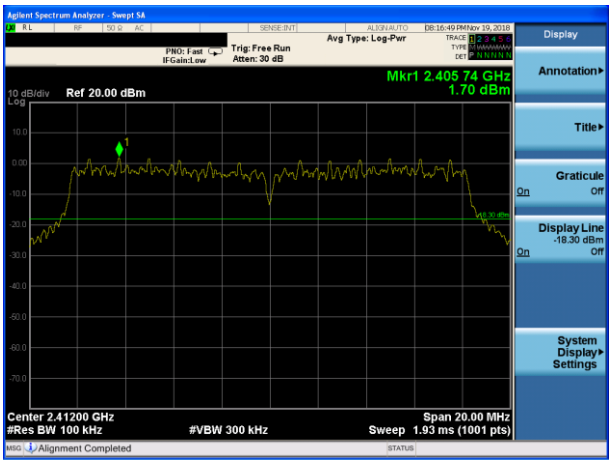
802.11b on channel 11



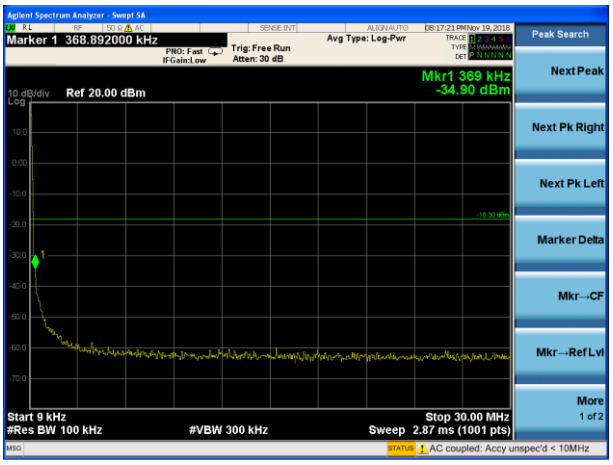
802.11b on channel 11

Test Plot

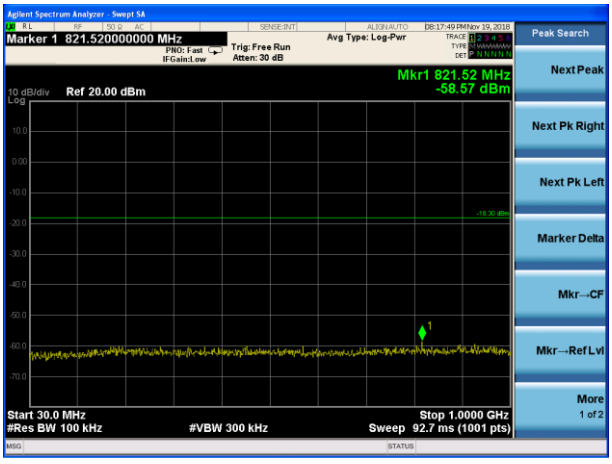
802.11g on channel 01



802.11g on channel 01



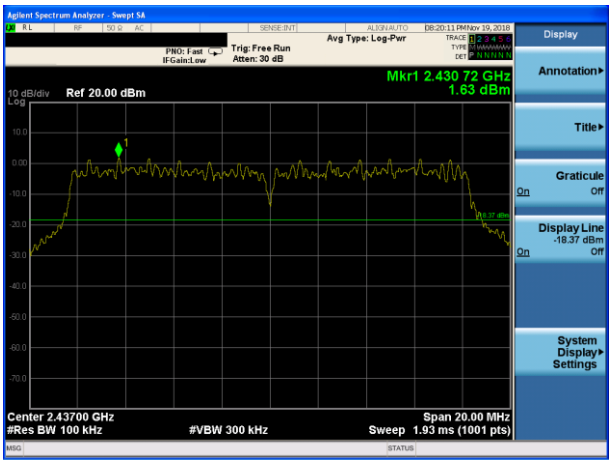
802.11g on channel 01



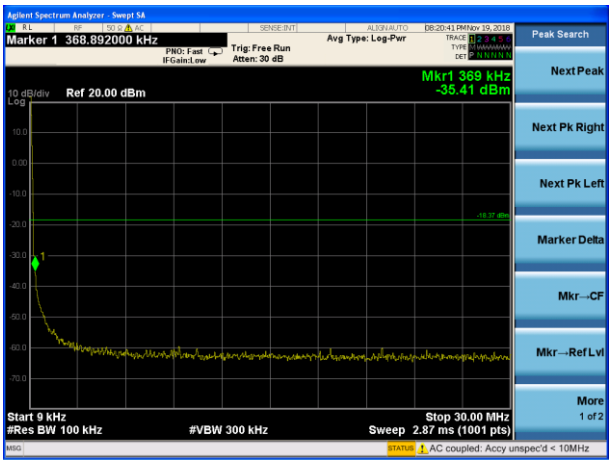
802.11g on channel 01

Test Plot

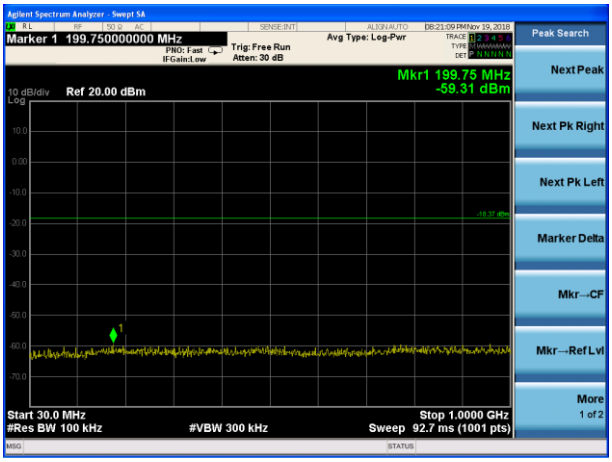
802.11g on channel 06



802.11g on channel 06



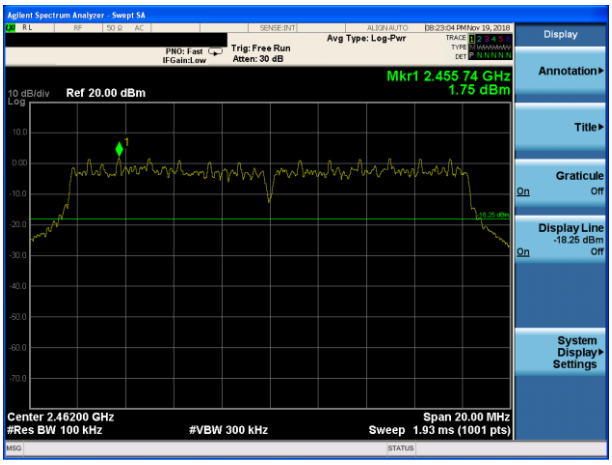
802.11g on channel 06



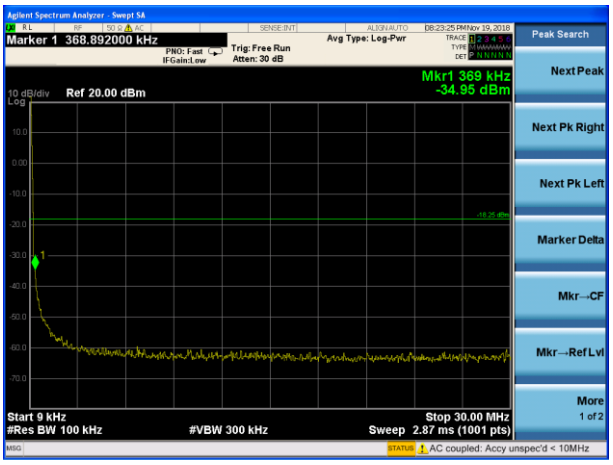
802.11g on channel 06

Test Plot

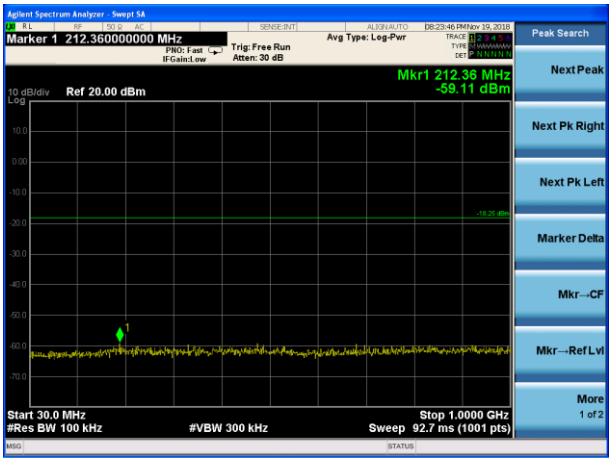
802.11g on channel 11



802.11g on channel 11



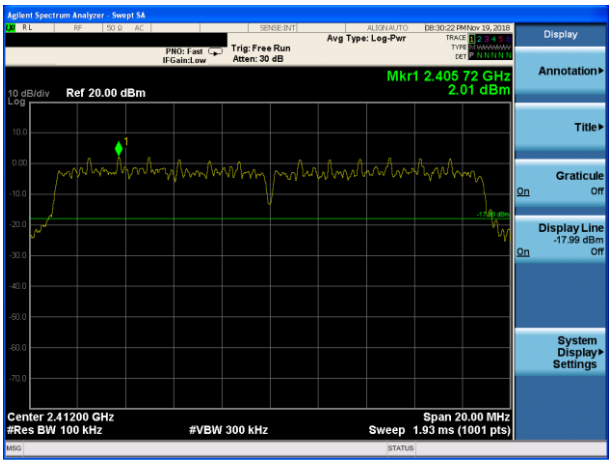
802.11g on channel 11



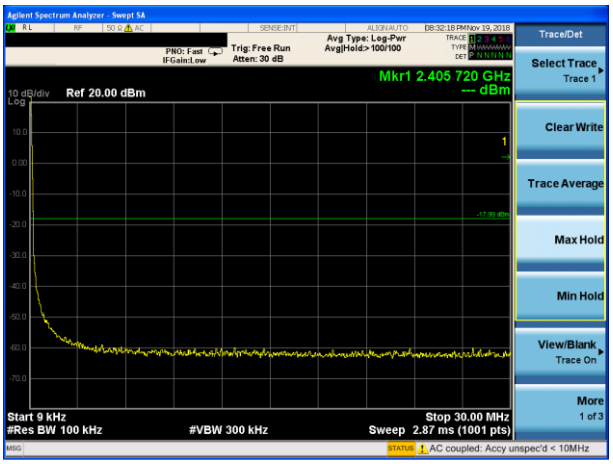
802.11g on channel 11

Test Plot

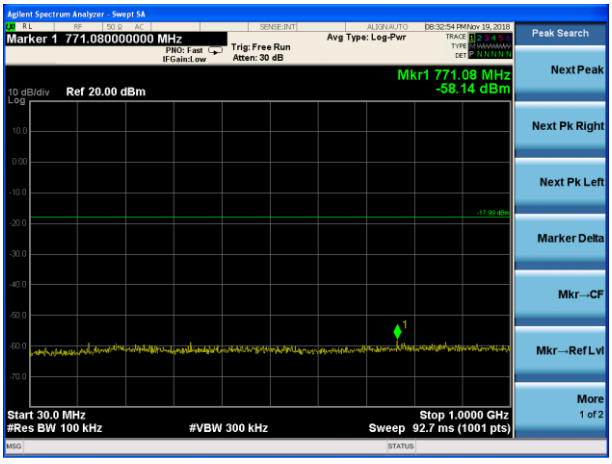
802.11n HT20 on channel 01



802.11n HT20 on channel 01



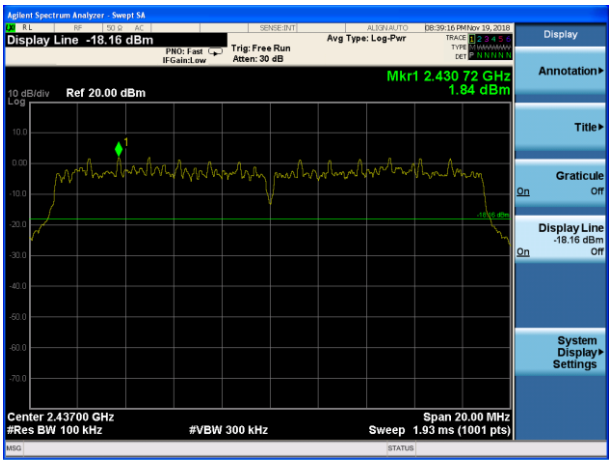
802.11n HT20 on channel 01



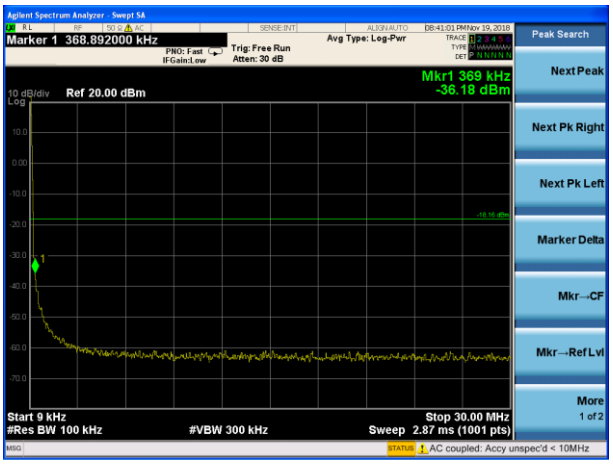
802.11n HT20 on channel 01

Test Plot

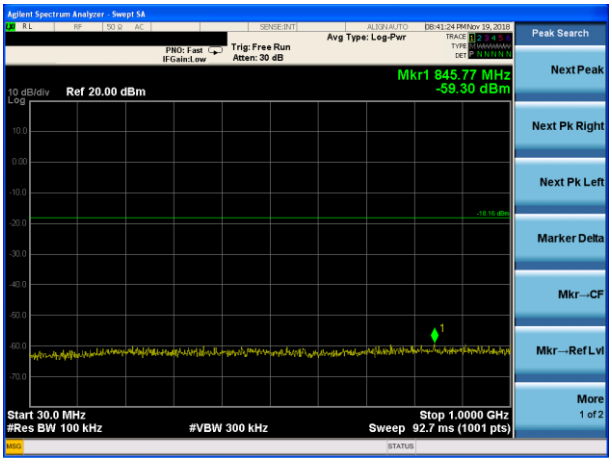
802.11n HT20 on channel 06



802.11n HT20 on channel 06



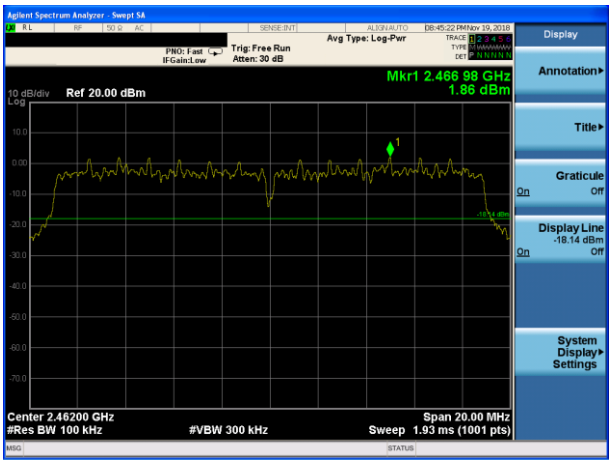
802.11n HT20 on channel 06



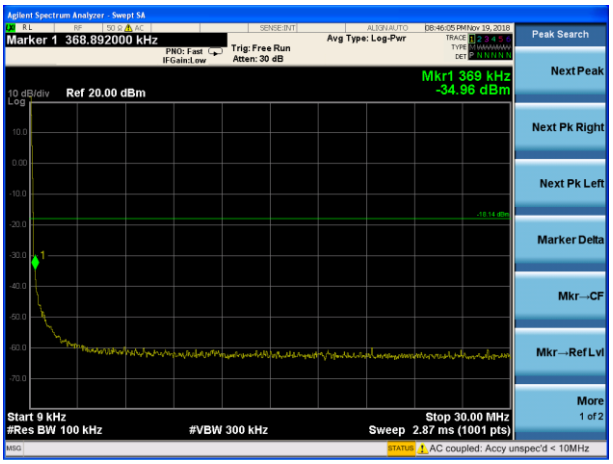
802.11n HT20 on channel 06

Test Plot

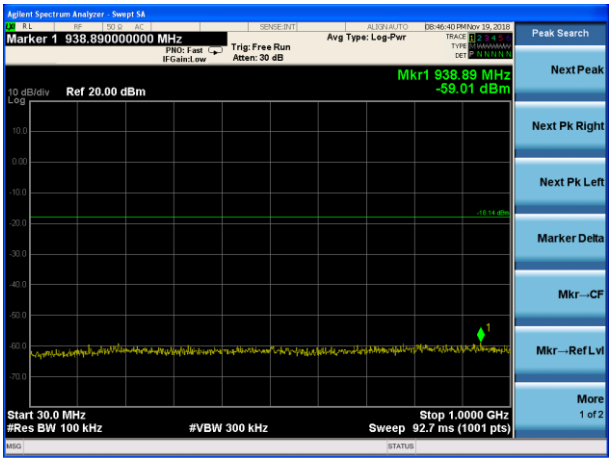
802.11n HT20 on channel 11



802.11n HT20 on channel 11



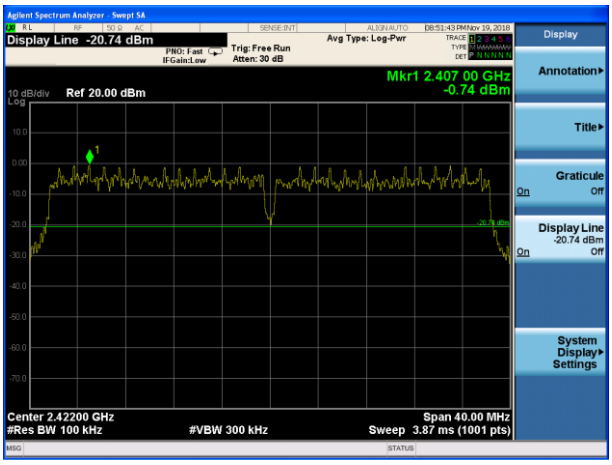
802.11n HT20 on channel 11



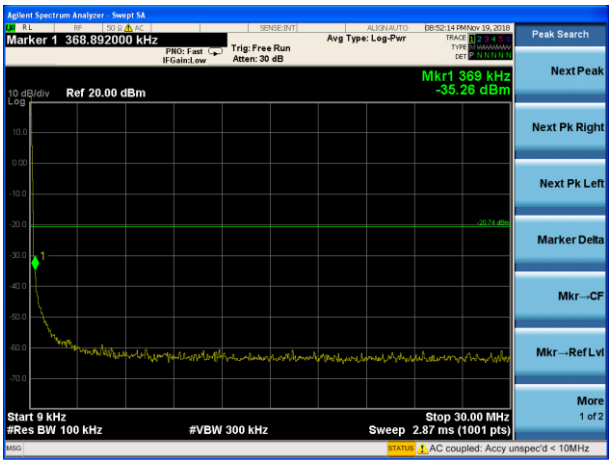
802.11n HT20 on channel 11

Test Plot

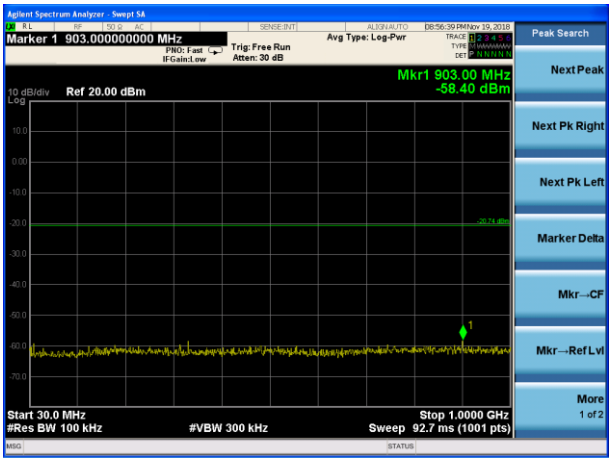
802.11n HT40 on channel 03



802.11n HT40 on channel 03



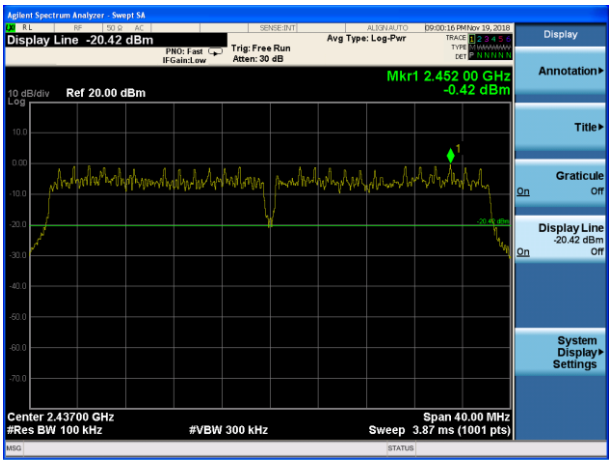
802.11n HT40 on channel 03



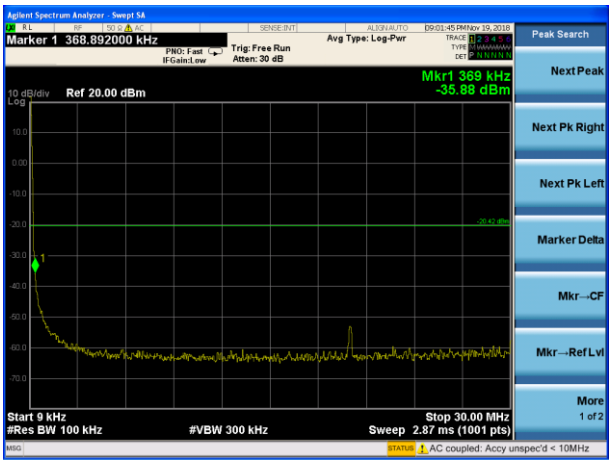
802.11n HT40 on channel 03

Test Plot

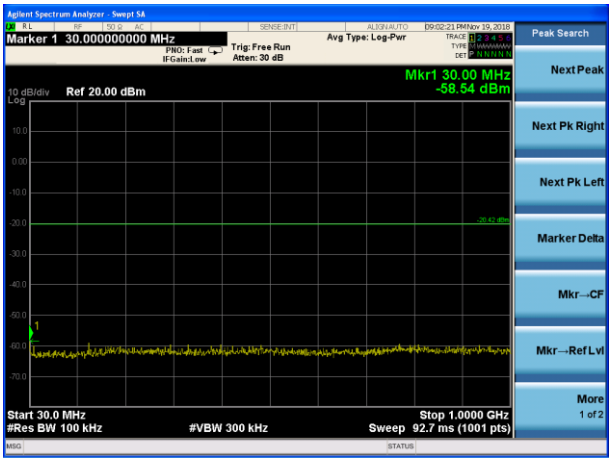
802.11n HT40 on channel 06



802.11n HT40 on channel 06



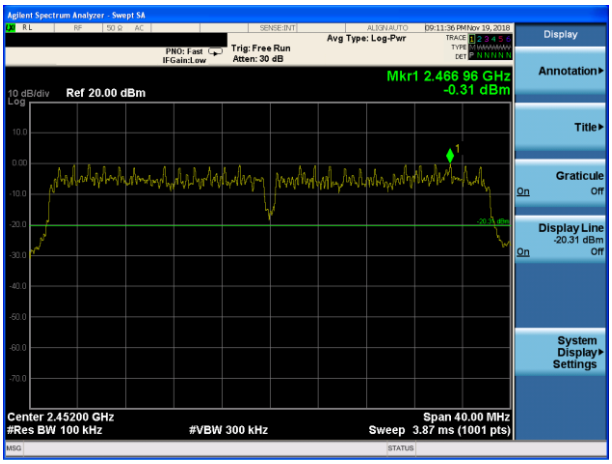
802.11n HT40 on channel 06



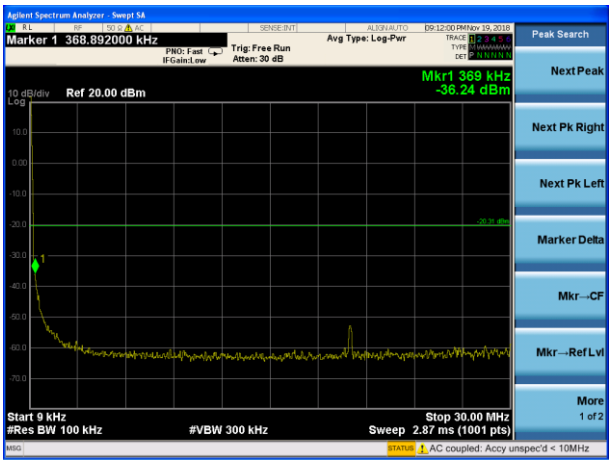
802.11n HT40 on channel 06

Test Plot

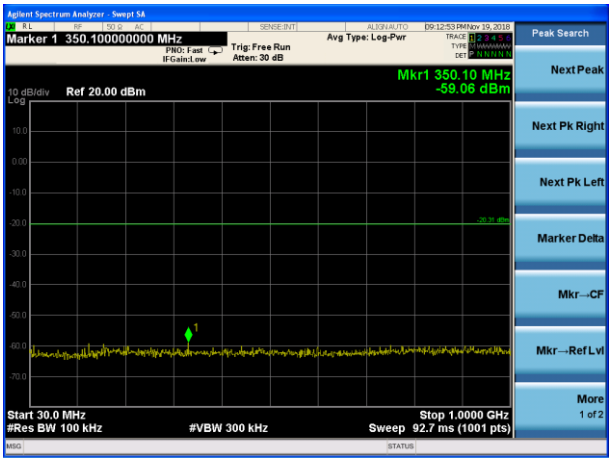
802.11n HT40 on channel 9



802.11n HT40 on channel 9



802.11n HT40 on channel 9



802.11n HT40 on channel 9

7.9 ANTENNA APPLICATION

7.9.1 Antenna 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.

7.9.2 Result

The EUT antenna is permanent attached FPCB antenna(Gain:1.9dBi). It comply with the standard requirement.

END OF REPORT