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Prüfbericht - Nr.: *Test Report No.:*	**19660146 002**		**Seite 1 von 75** *Page 1 of 75*
Auftraggeber: *Client:*	**Redpine Signals Inc.** **2107 N.First Street,** **Suite 680** **San Jose, CA 95131-2019** **U.S.A**		
Gegenstand der Prüfung: *Test item:*	**802.11 abgn WiFi/BT/Zigbee MODULE**		
Bezeichnung: *Identification:*	**RS9113DB**	**Serien-Nr.:** *Serial No.*	**Engineering Sample**
Wareneingangs-Nr.: *Receipt No.:*	**1803095560**	**Eingangsdatum:** *Date of receipt:*	**31.08.2015**
Prüfort: *Testing location:*	**Refer Page 4 of 75 for test facilities**		
Prüfgrundlage: *Test specification:*	**FCC Part 15, Subpart E** **ANSI C63.10-2013**		
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The tests item passed the test specification(s).*		
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (India) Pvt. Ltd.** 82/A, 3rd Main, West Wing, Electronic City Phase 1 Hosur Road, Bangalore – 560 100. India FCC Registration No.: 176555		

geprüft / *tested by:*			**kontrolliert** / *reviewed by:*		
05.04.2016	Shrikanth S Naik Engineer		07.04.2016	Raghavendra Kulkarni Sr. Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges / *Other Aspects:* **FCC ID: XF6-RS9113DB, Class II Permissive Change**

Abkürzungen:				***Abbreviations:***			
P(ass)	=	***entspricht Prüfgrundlage***		***P(ass)***	=	***passed***	
F(ail)	=	***entspricht nicht Prüfgrundlage***		***F(ail)***	=	***failed***	
N/A	=	***nicht anwendbar***		***N/A***	=	***not applicable***	
N/T	=	***nicht getestet***		***N/T***	=	***not tested***	

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.

Test Result Summary

Clause	Test Item	Result
FCC part 15.407 (a)	Emission Bandwidth (26dB Bandwidth), Minimum Emission Bandwidth (6dB Bandwidth) & 99 Percent Occupied Bandwidth	Pass
FCC Part 15.407 (a)	Maximum Conducted Output Power	Pass
FCC Part 15.407 (a)	Maximum Power Spectral Density (PSD)	Pass
FCC Part 15.407 (b)	Unwanted Emissions	Pass
15.209/15.205/15.407	Radiated Spurious Emissions and Restricted bands of operation	Pass

Note: Conducted measurements are done according to the procedure given in KDB No. **789033 D02 General UNII Test Procedures New Rules v01r01**

The Module is originally certified for FCC with FCC ID: **XF6-RS9113DB,** with respect to the changes made to originally certified module Class 2 permissive change has been applied.
Changes made to the originally certified module are listed in the below table.

Application Purpose	Antenna	Wi-Fi (5GHz)
Class II Permissive Change	Redpine Antenna	40MHz Channel added in the band 5150 MHz to 5250 MHz and band 5725MHz to 5850MHz is covered under Part E
	Molex Antenna	Additional antenna
	Fractus Antenna	Additional antenna

Also, to address the test results for the above changes, the original test report 19660146 001 is been updated to 19660146 002

Content

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List of Test and Measurement Instruments

TUV Rheinland (India) Pvt. Ltd., Bangalore

Equipment	Manufacturer	Model Name	Serial Number	Calibration Due Date	Periodicity	Used for Test Items
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	23.11.2016	Yearly	Spurious Radiated Emissions
Broadband Antenna	Frankonia	ALX-4000	ALX-4000-806	10.06.2016	Yearly	
Active Loop Antenna	Frankonia	LAX-10	LAX-10-800	22.12.2016	Yearly	
Broadband Horn Antenna	Frankonia	HAX-18	HAX18-802	14.03.2017	Yearly	
Emission Horn Antenna	ETS Lindgren	116706	00107323	02.11.2016	Yearly	
Anechoic Chamber	Frankonia	-	-	-	-	
Spectrum Analyser	Agilent Technologies	E4407B	US41192772	15.04.2016	Yearly	Antenna - Port Conducted Tests

Testing Facilities:

1) TUV Rheinland (India) Private Limited
No. 108, West Wing
Electronic city Phase I
Bangalore – 560100

General Product Information

Product Function and Intended Use

The RS9113 module integrates a multi-threaded MAC processor with integrated analog peripherals and support for digital peripherals, baseband digital signal processor, analog front-end, crystal oscillator, calibration OTP memory, Dual band RF transceiver, Dual-band high-power amplifiers, baluns, diplexers, diversity switch and Quad-SPI Flash thus providing a fully-integrated solution for embedded wireless applications. The RS9113 based chips and modules leverage and improve upon Redpine's proven low power innovations from Lite-FTM products (RS9110) and provide WLAN 802.11n, BT4.0 and ZigBee convergence solution for integration into mobile and M2M communication devices. It can connect to a host processor through SDIO, USB, SPI or UART interfaces.

Ratings and System Details

Operating Frequency	5150 – 5250 MHz 5725 – 5850 MHz	
No. of channel	Refer page 8, Table 2	
Channel Spacing	20 MHz, 40MHz	
Transmitted Power (Conducted)	802.11a_20MHz_UNII3	**7.46 dBm**
	802.11n_20MHz_UNII3	**7.07 dBm**
	802.11n_40MHz_UNII1	**6.22 dBm**
	802.11n_40MHz_UNII3	**5.11 dBm**
Modulation	802.11a	OFDM with BPSK,QPSK, 16-QAM, 64-QAM
	802.11n	BPSK,QPSK,16-QAM,64-QAM
Data Rate	802.11n: MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps	
Antenna Type	Refer table 2	
Number of antenna	Refer table 2	
Antenna Gain	Refer table 2	
Supply Voltage	3.0 - 3.6 V DC from host device	
Environmental	-40ºC to +85ºC	

Test Conditions:

Supply Voltage: 5V DC from USB

Environmental conditions:

Temperature: +23 º C **RH:** 62%

List of Antenna Used:

Make	Model/Part #	Antenna Gain at 2.4GHz (dBi)	Antenna Gain at 5 GHz (dBi)	Type of Antenna
Redpine	-	0.99	4.42	Trace
Molex	PS-47950-001	3	4.6	External
Fractus	FR05-S1-NO-1-004	1.8	4.9	Chip

Table 1

Test Set-up and Operation Mode

Principle of Configuration Selection
Transmission was enabled with 100% duty cycle on low, mid and high channel.

Test Operation and Test Software
Test software was used to enable the transmission with 100% duty cycle, changing channels (low/mid/high) and data rates on the EUT for the tests in this report.

Special Accessories and Auxiliary Equipment
- None

Countermeasures to achieve EMC Compliance
- None

Test Modes – Data Rates and Modulations
For Radiated spurious emissions, the tests were performed for all data rates and only worst case results are reported in this report.

Note: Among the 3 antennas listed in table 1, Fractus antenna has highest power level input radiated test. Hence same power level was used to perform antenna port tests.

Table of Carrier frequencies:

Frequency Band	Channel No.	Frequency (MHz)
5GHz Band – 20MHz Bandwidth Channel List		
5150 – 5250 MHz	36	5180
	40	5200
	44	5220
	48	5240
5725 – 5850MHz	149	5745
	143	5765
	157	5785
	161	5805
	165	5825
5GHz Band – 40MHz Bandwidth Channel List		
5150 – 5250 MHz	38	5190
	46	5230
5725 – 5850MHz	151	5755
	159	5795

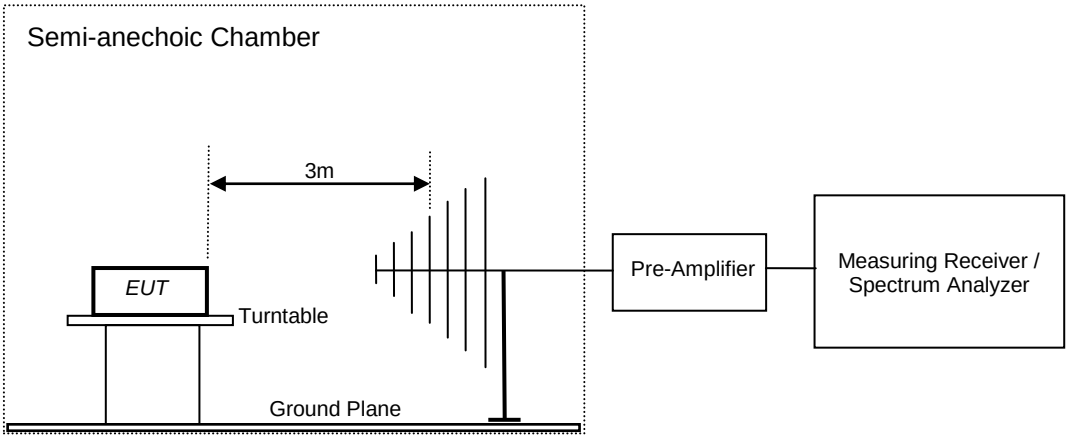
Table 2

Test Methodology

Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable, and the EUT is 3 meters far from the measuring antenna for below 1GHz & The equipment under test (EUT) was placed at the middle of the 1.5m high turntable, and the EUT is 3 meters far from the measuring antenna for above 1GHz. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000MHz was performed by horn antenna. The measurement below 30MHz was performed by loop antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.

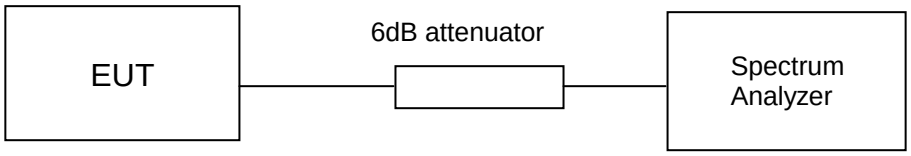


Test Results

Emission Bandwidth (26dB) **Section 15.407(a)**
Result **Pass**

Test Specification	FCC Part 15 Section 15.407(a)
Measurement Bandwidth (RBW)	300 kHz

Test Method:

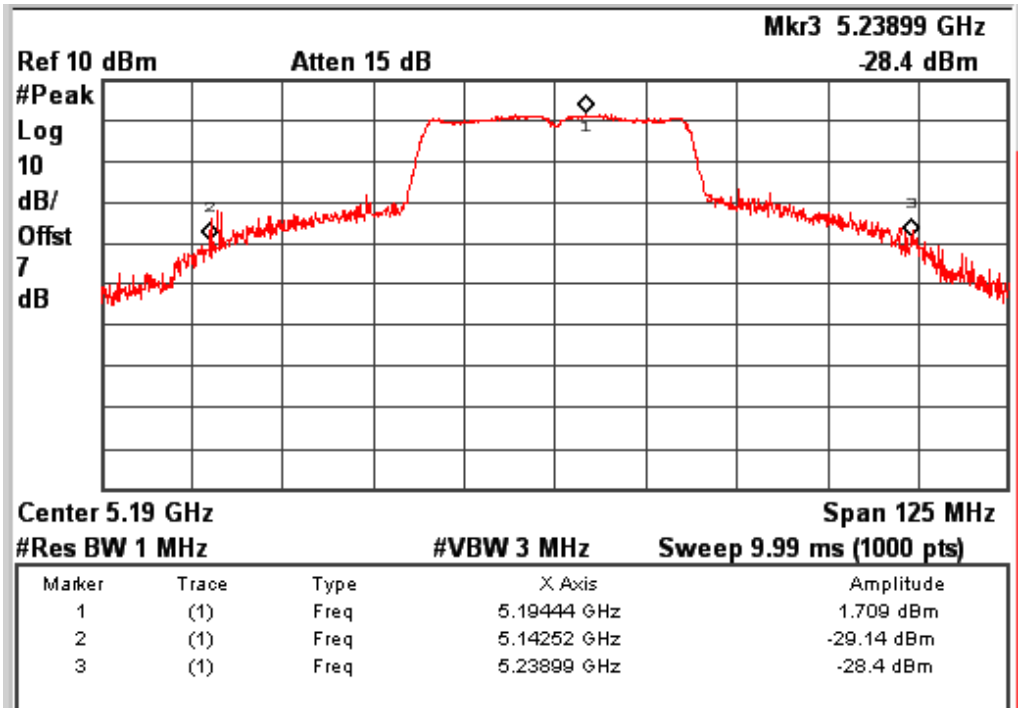


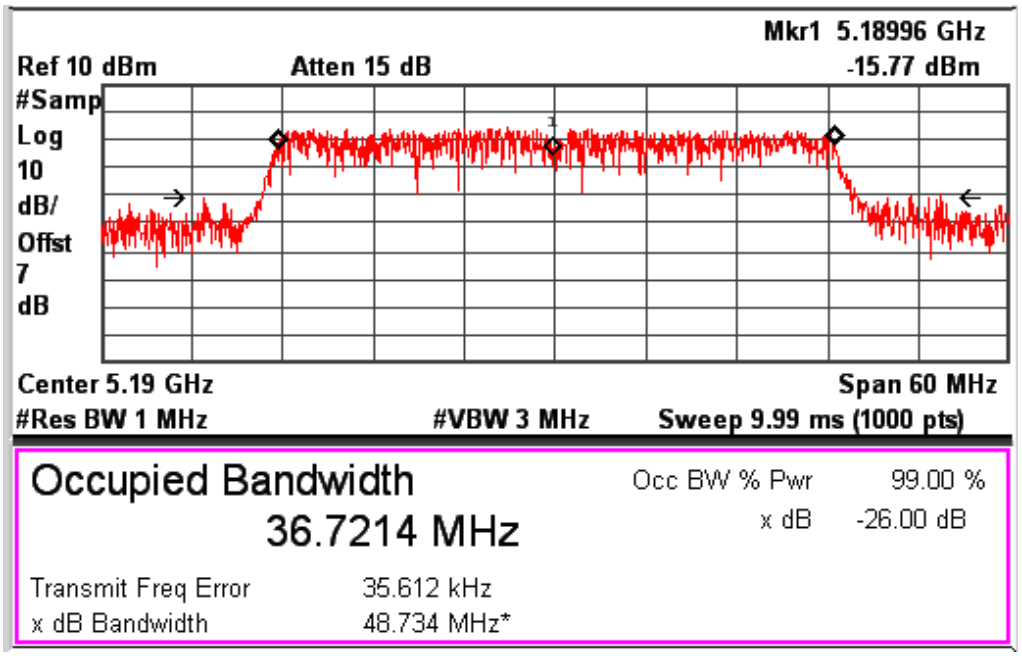
Test Result:

Attenuation (6dB) + cable loss (1dB) of 7dB is included in the results.

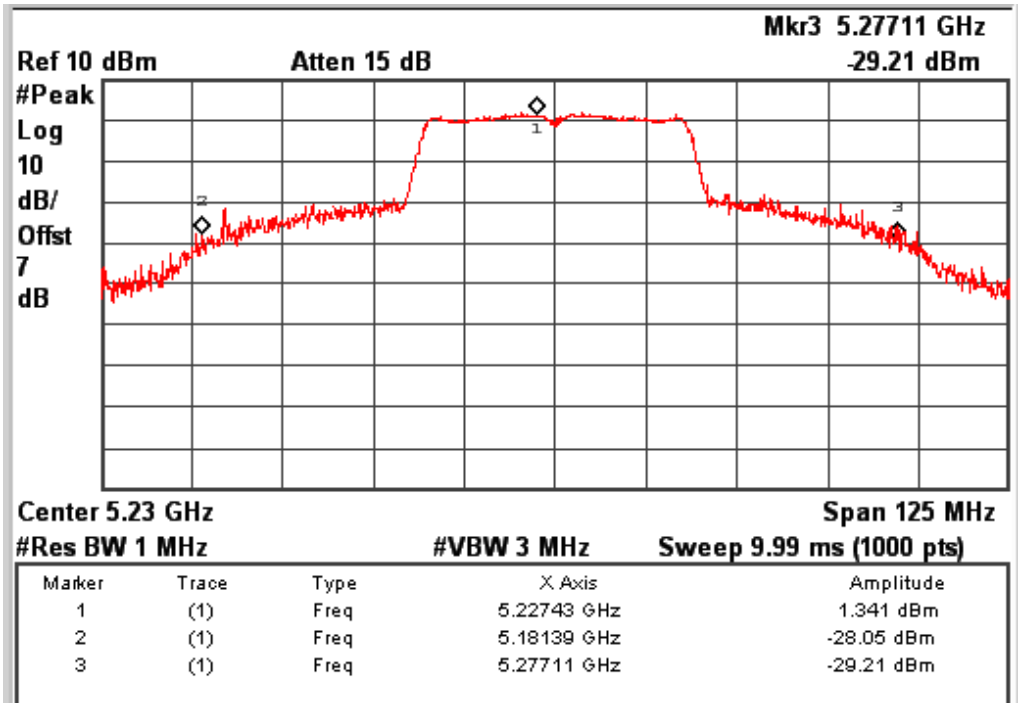
Modulation: 802.11n – 40 MHz Channel

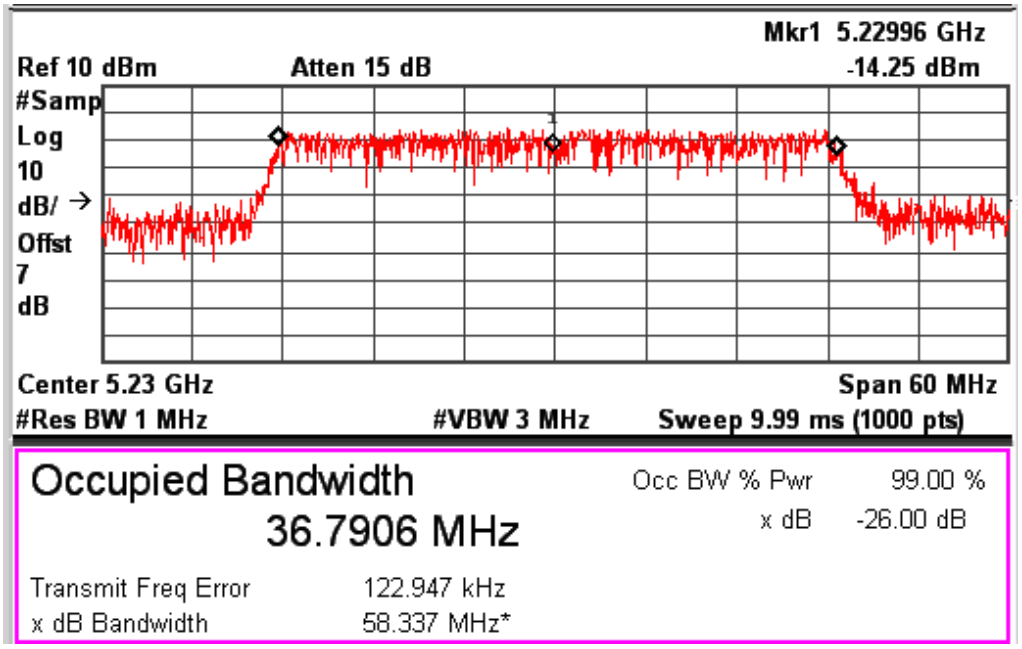
Data Rate	Channel. No	Frequency (MHz)	EBW (MHz)	OBW (MHz)
MCS0	38	5190	96.47	36.72
	46	5230	95.72	36.79
MCS4	38	5190	91.96	36.83
	46	5230	90.59	36.77
MCS7	38	5190	91.97	36.99
	46	5230	91.72	36.84



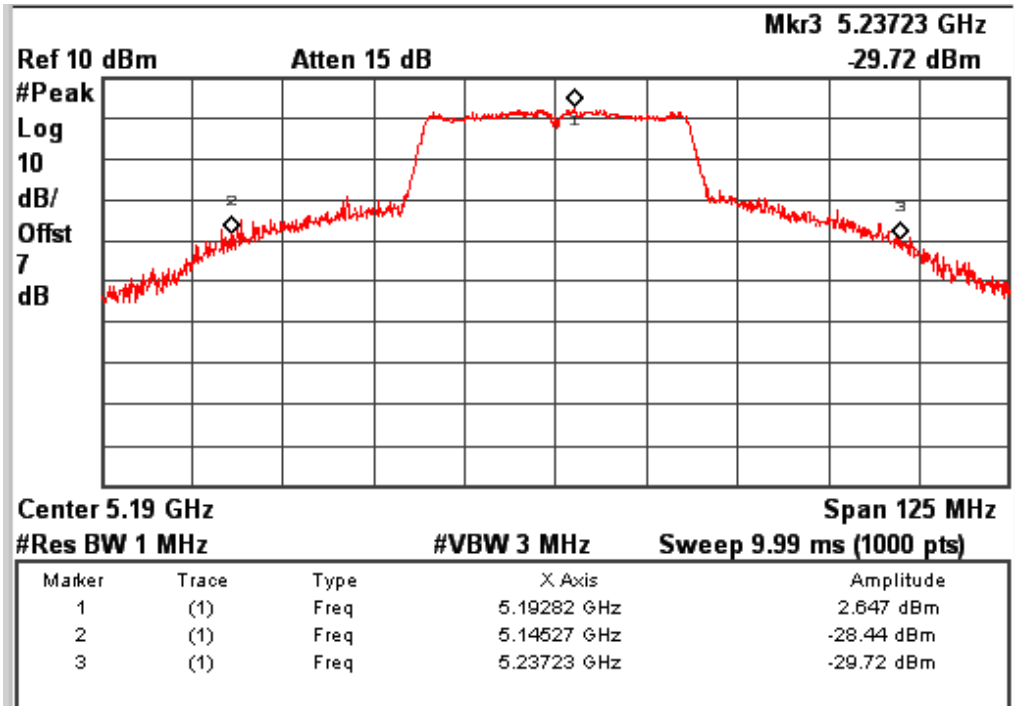


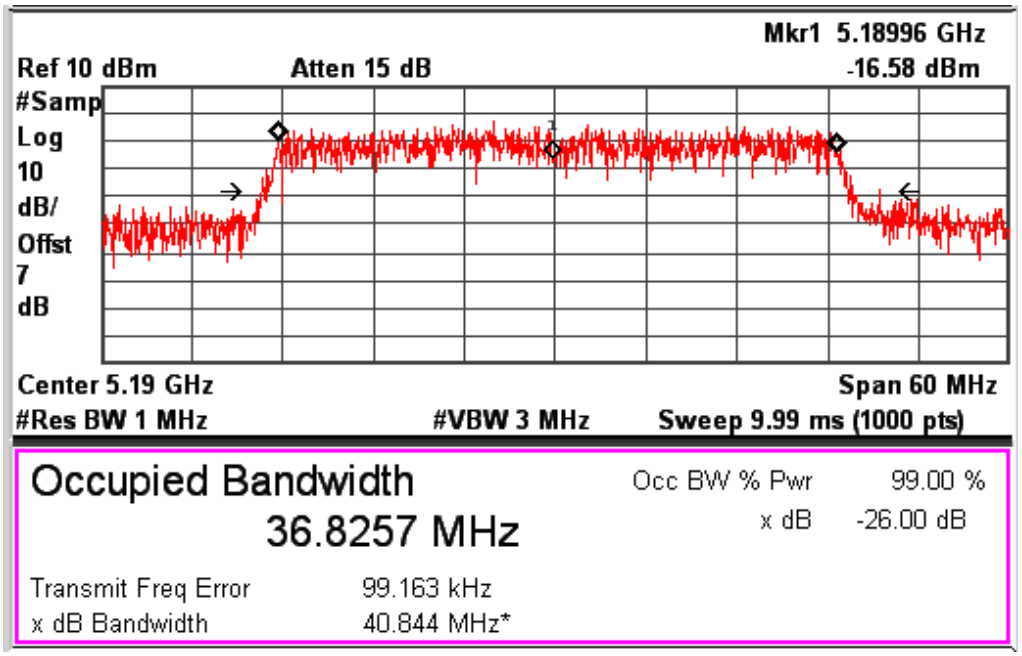
Data Rate: MCS0 **Channel Frequency: 5190MHz**



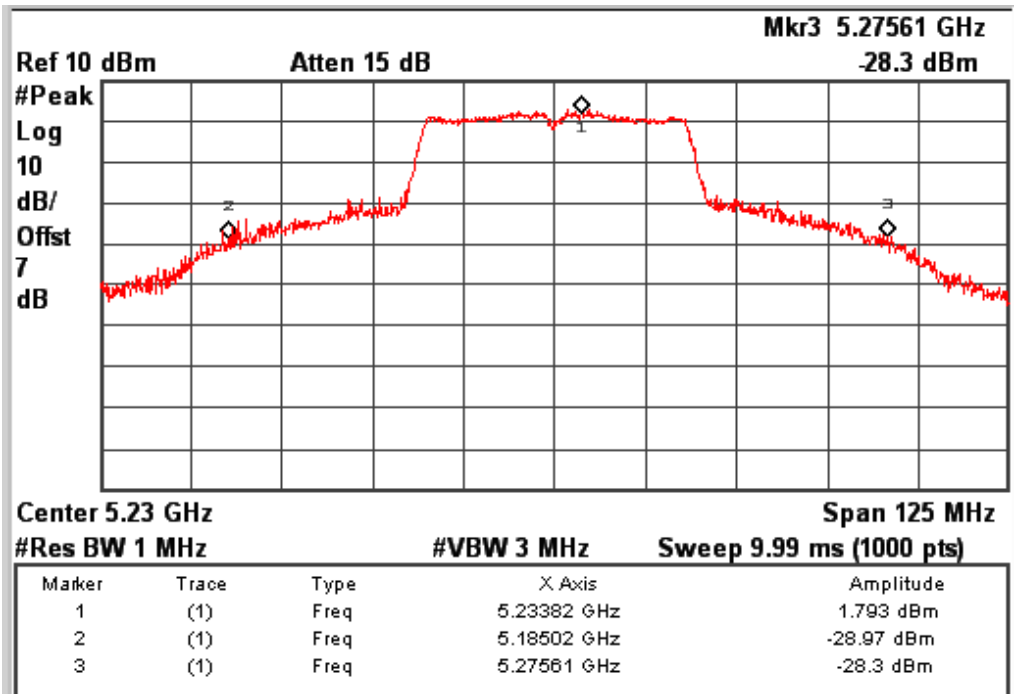


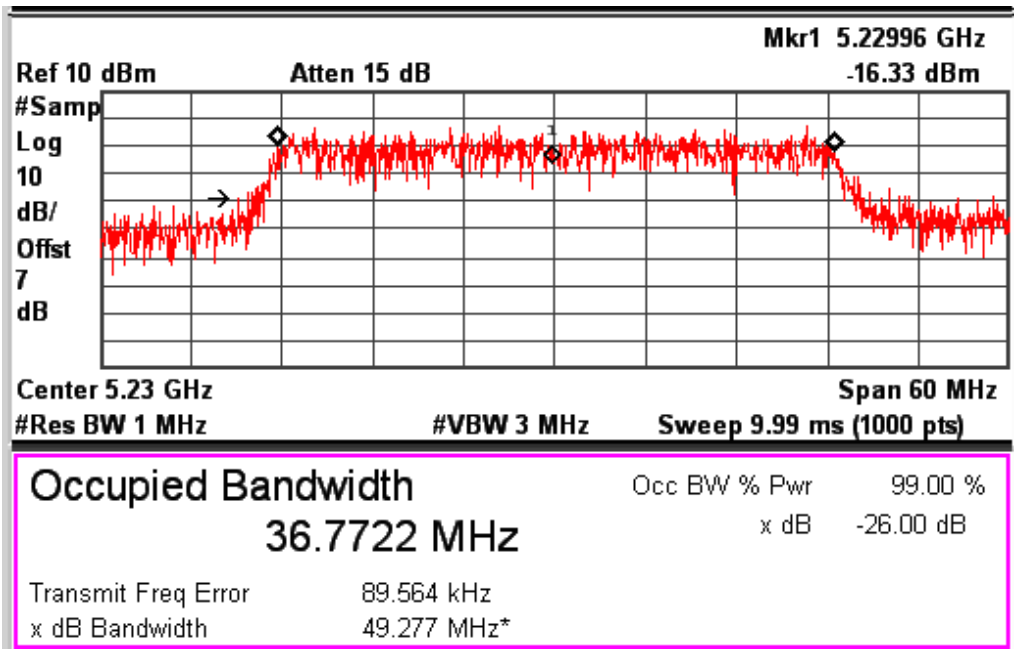
Data Rate: MCS0 **Channel Frequency: 5230MHz**



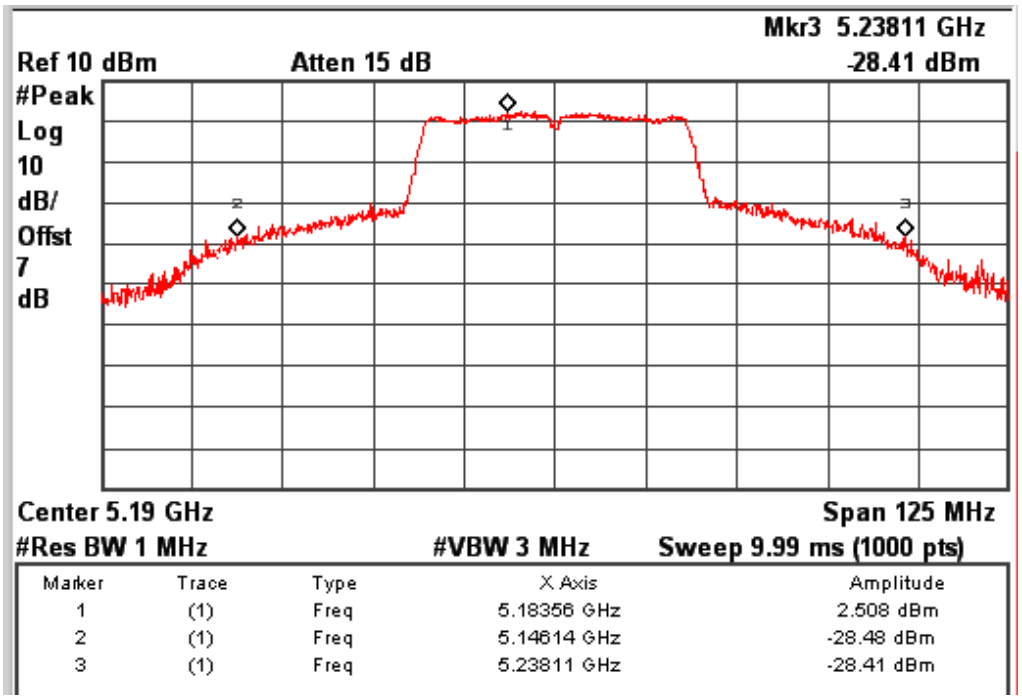


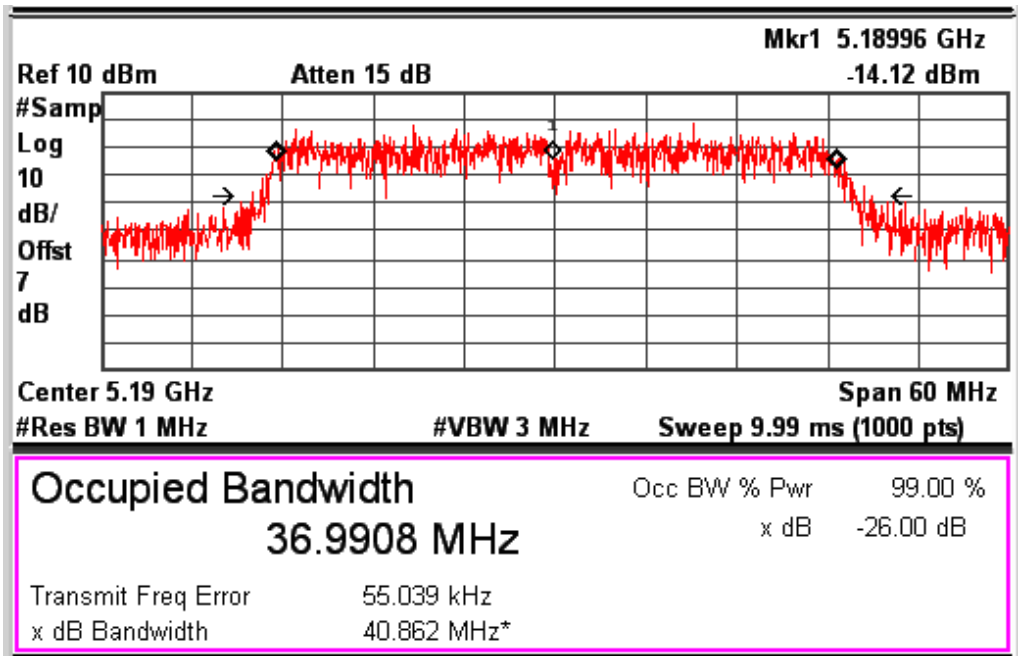
Data Rate: MCS4 **Channel Frequency: 5190MHz**



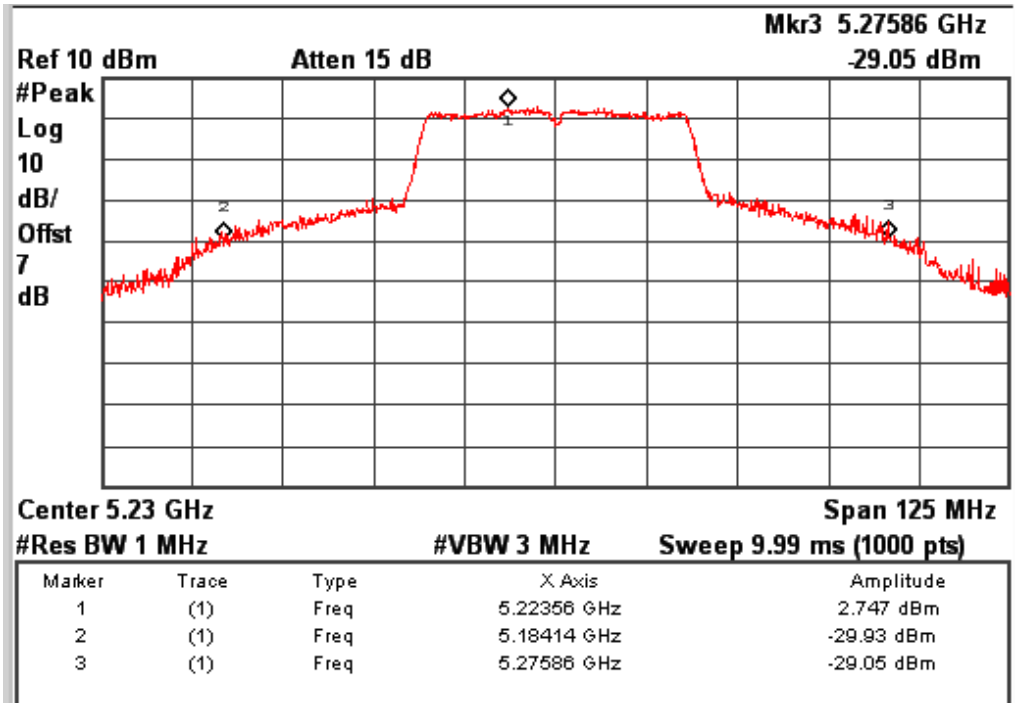


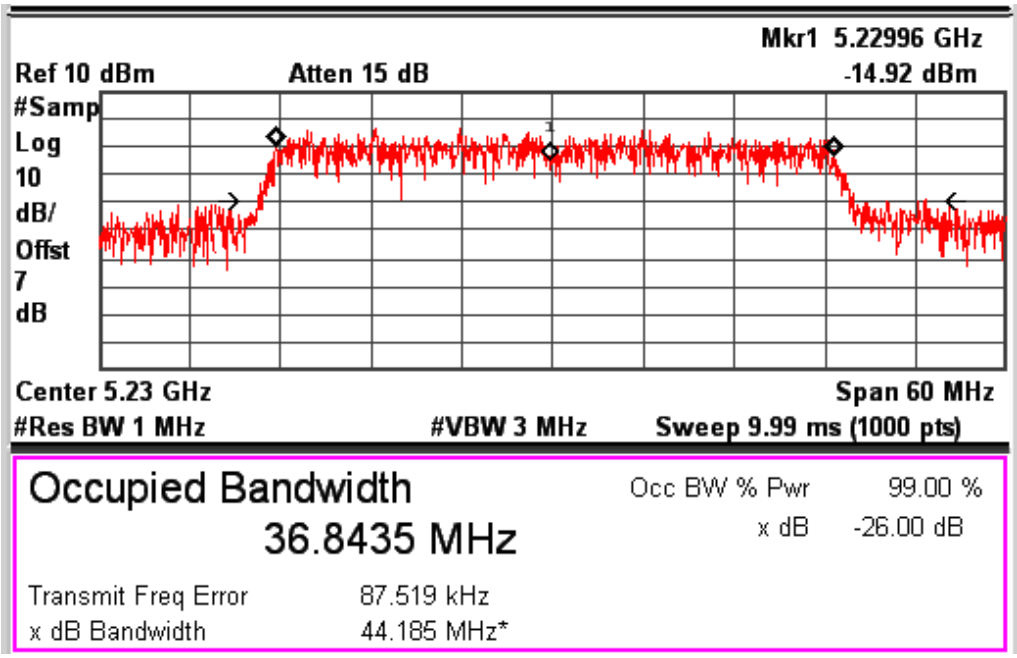
Data Rate: MCS4 **Channel Frequency: 5230MHz**





Data Rate: MCS7 **Channel Frequency: 5190MHz**



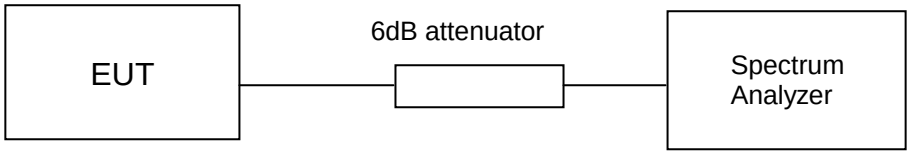


Data Rate: MCS7 **Channel Frequency: 5230MHz**

6dB Bandwidth **Section 15.407(e)**
Result **Pass**

Test Specification	FCC Part 15 Section 15.407(e)
Measurement Bandwidth (RBW)	100 kHz

Test Method:

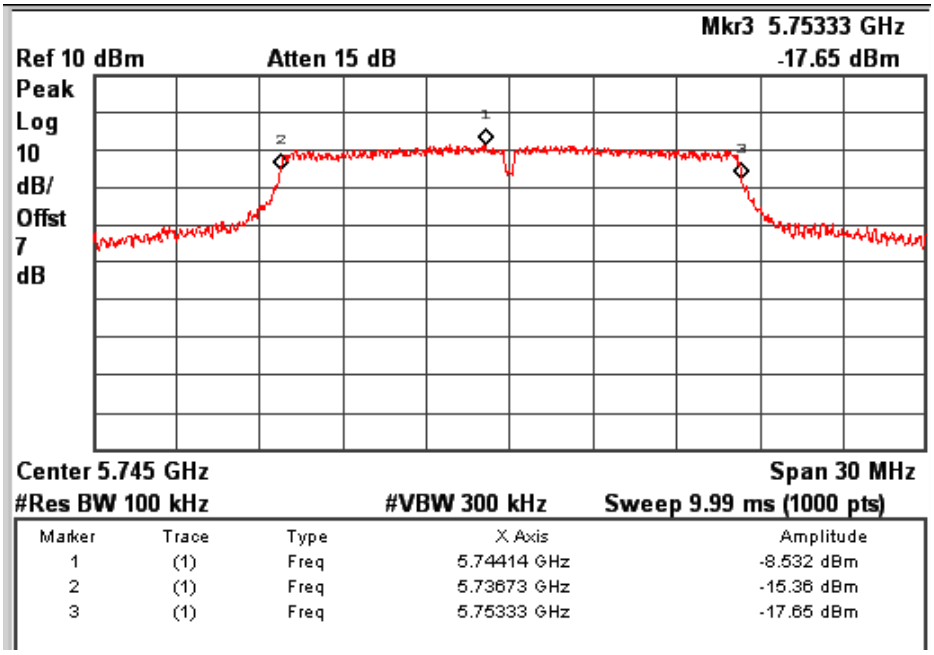


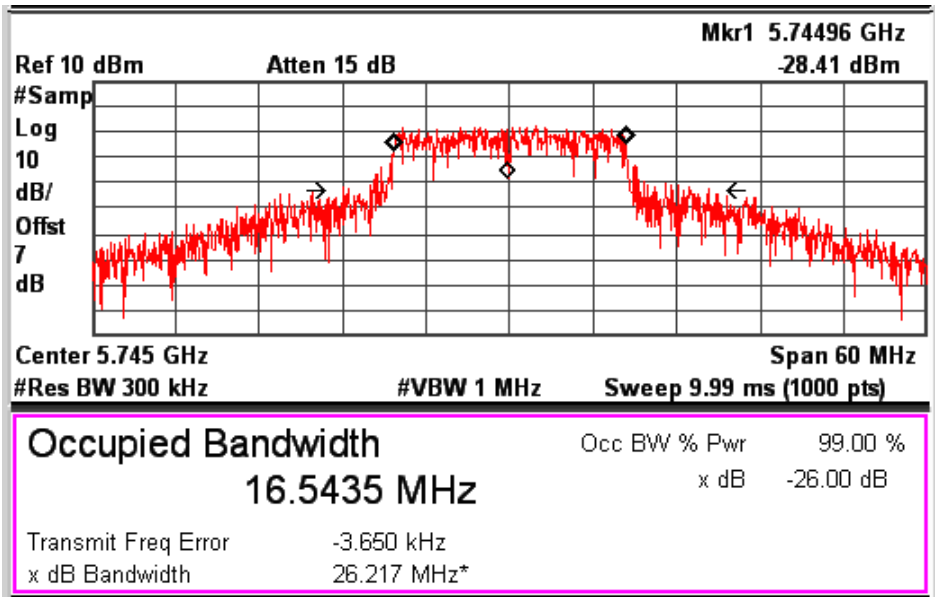
Test Result:

Attenuation (6dB) + cable loss (1dB) of 7dB is included in the results.

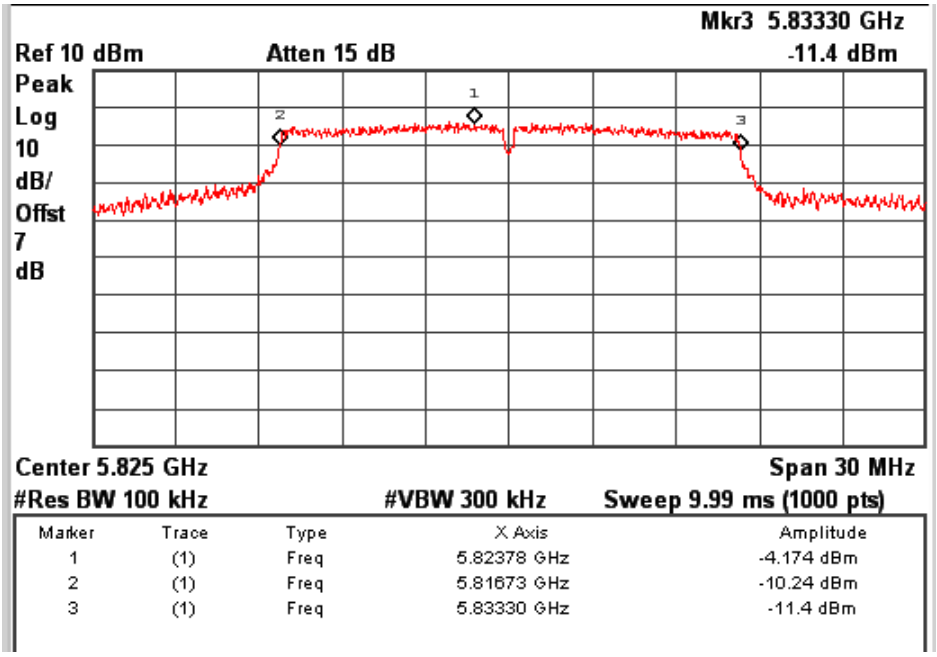
Modulation: 802.11a – 20MHz Channel

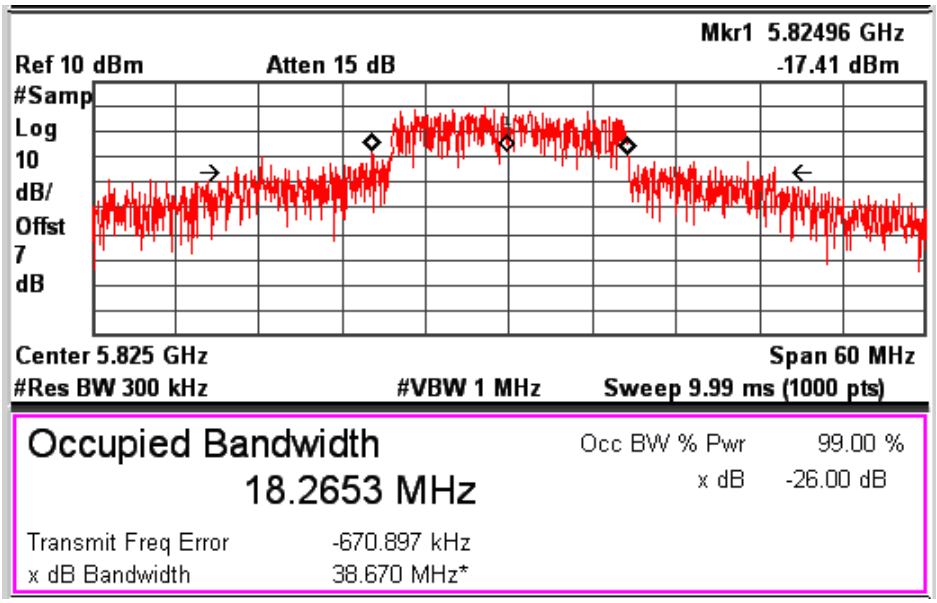
Data Rate (Mbps)	Channel. No	Frequency (MHz)	6 dB Bandwidth (MHz)	OBW (MHz)
6	149	5745	16.60	16.54
	165	5825	16.57	18.27
24	149	5745	16.51	16.61
	165	5825	16.54	18.41
54	149	5745	16.51	16.87
	165	5825	16.57	18.57



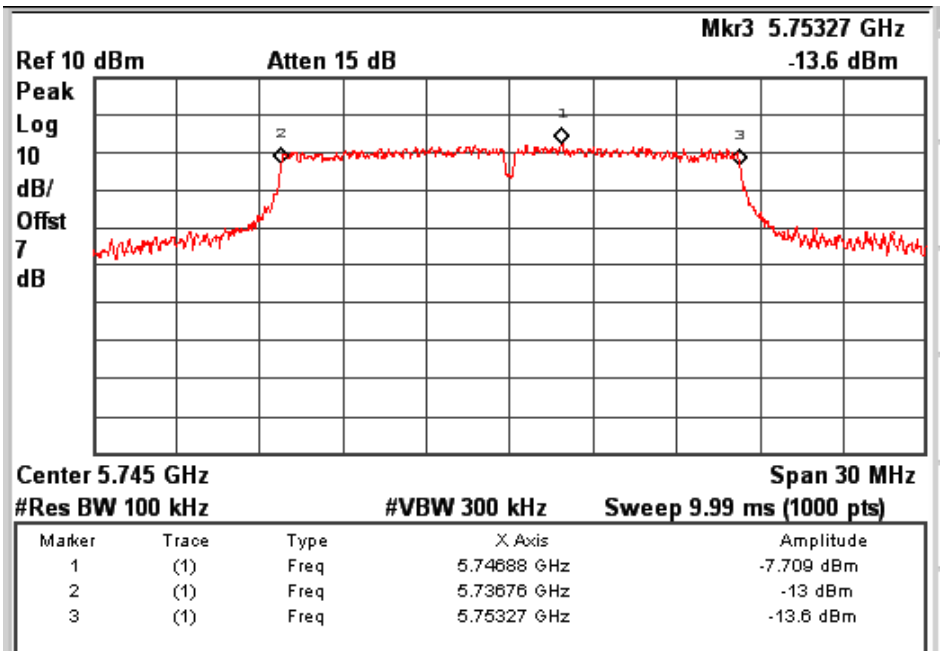


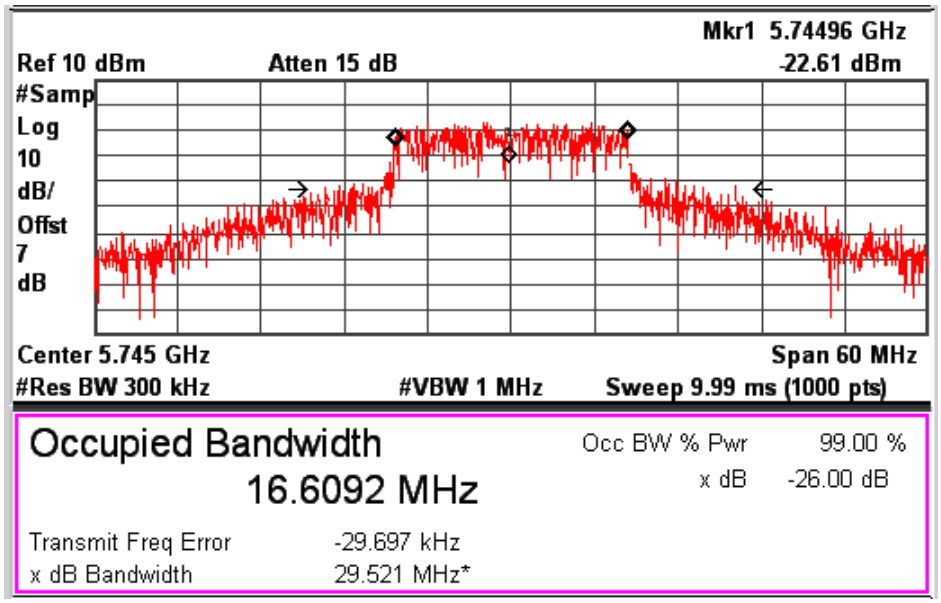
Data Rate: 6 Mbps **Channel Frequency: 5745MHz**



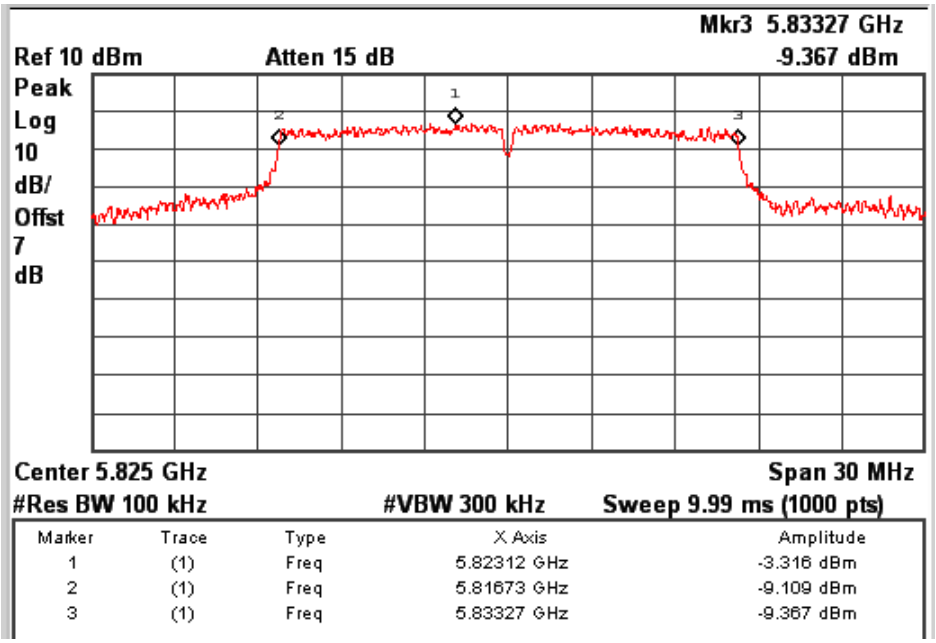


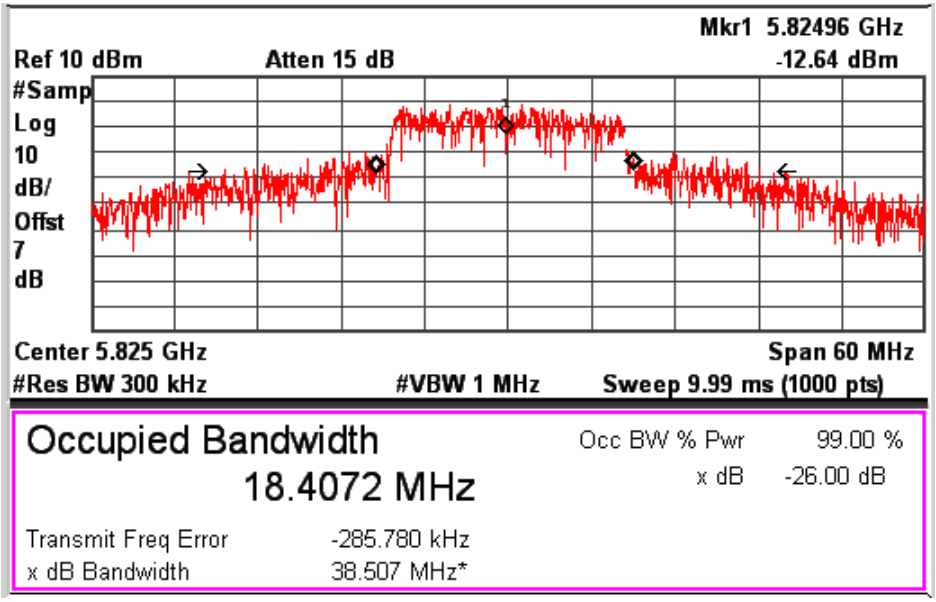
Data Rate: 6 Mbps **Channel Frequency: 5825MHz**



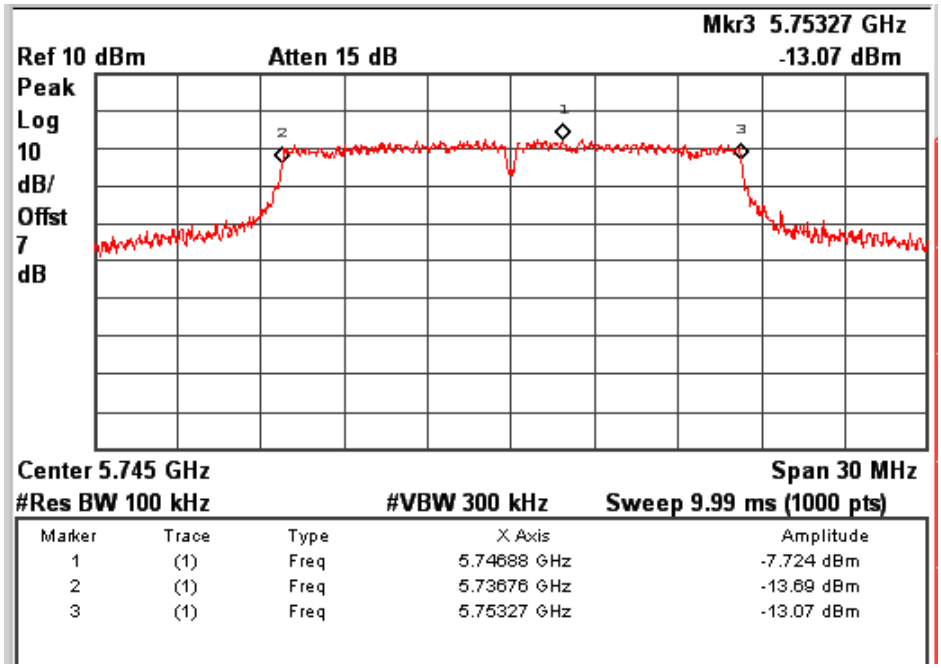


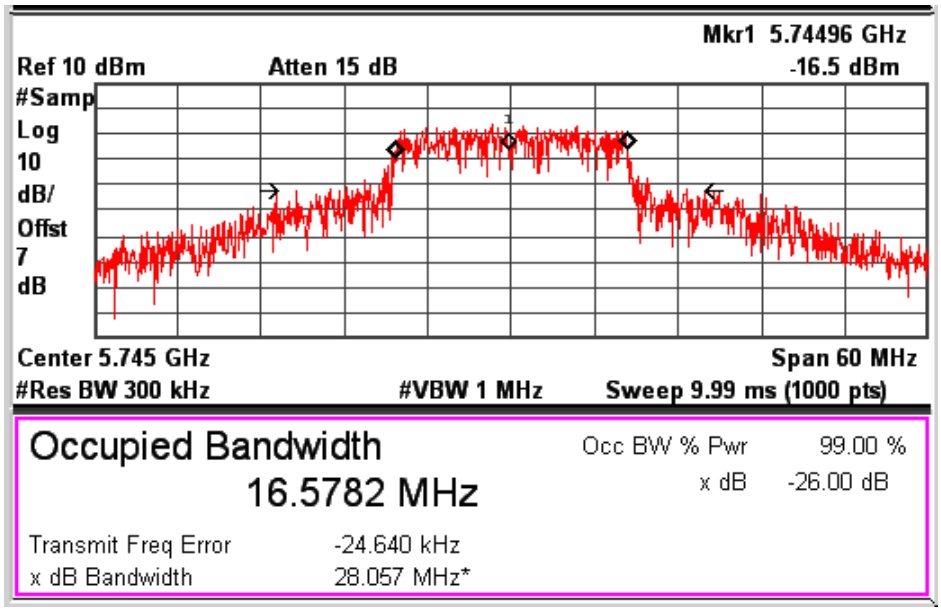
Data Rate: 24 Mbps **Channel Frequency: 5745MHz**



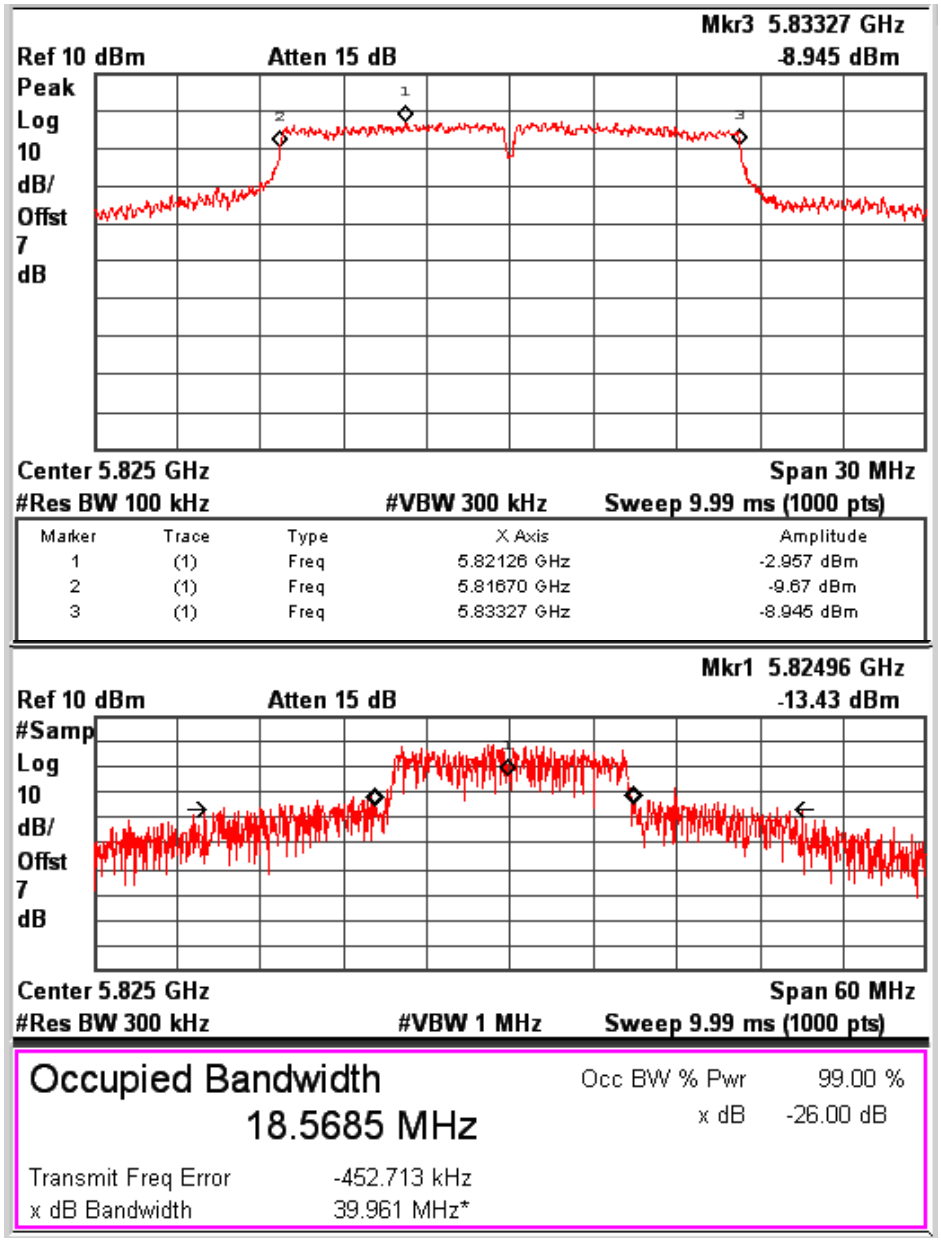


Data Rate: 24 Mbps **Channel Frequency: 5825MHz**





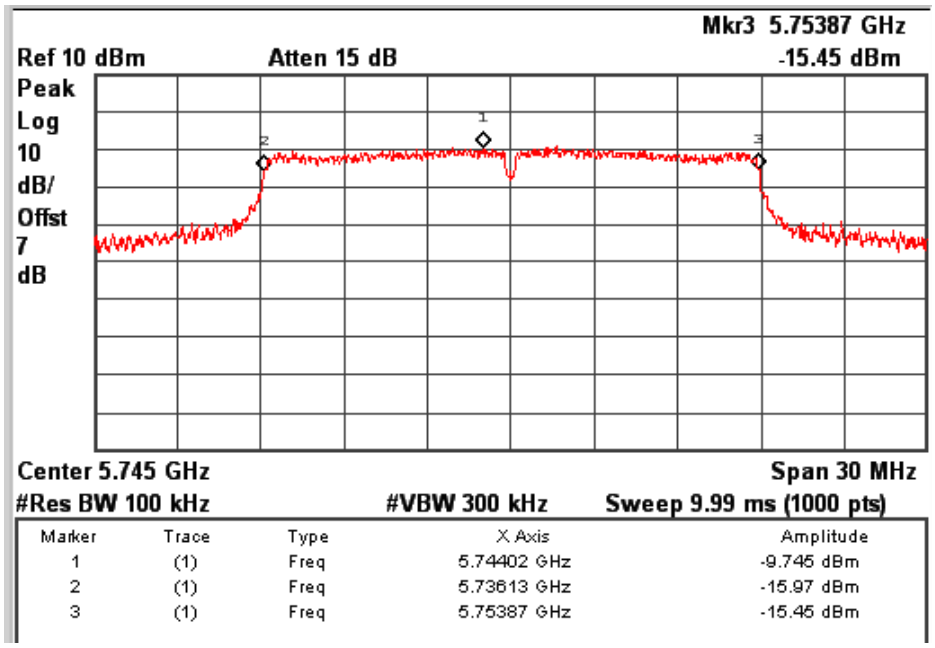
Data Rate: 54 Mbps **Channel Frequency: 5745MHz**

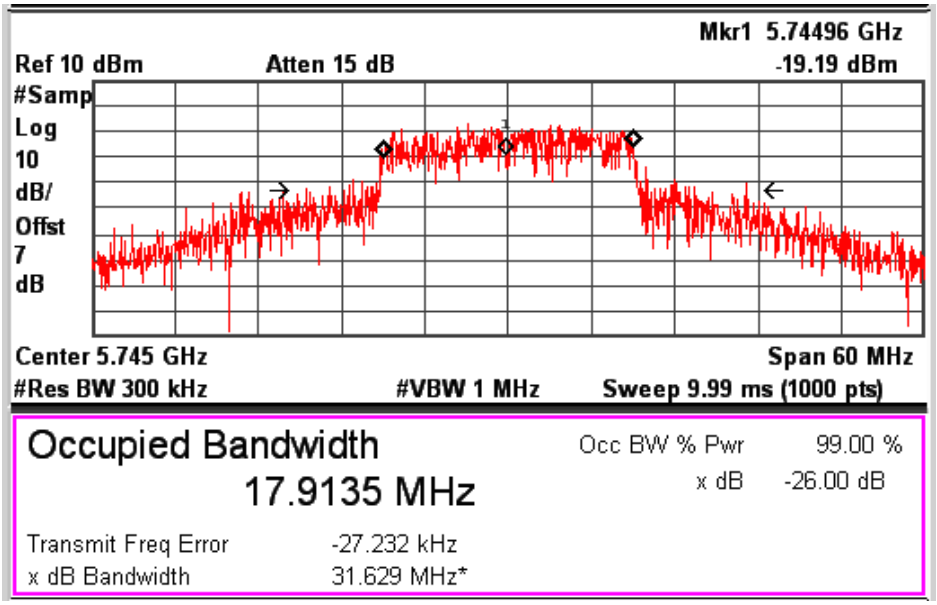


Data Rate: 54 Mbps **Channel Frequency: 5825MHz**

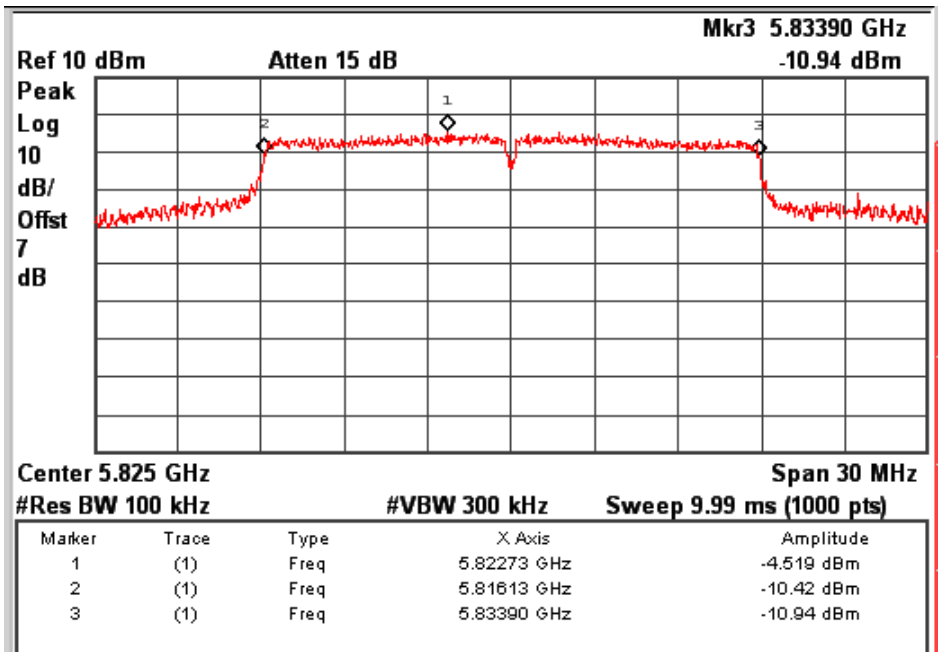
Modulation: 802.11n – 20MHz Channel

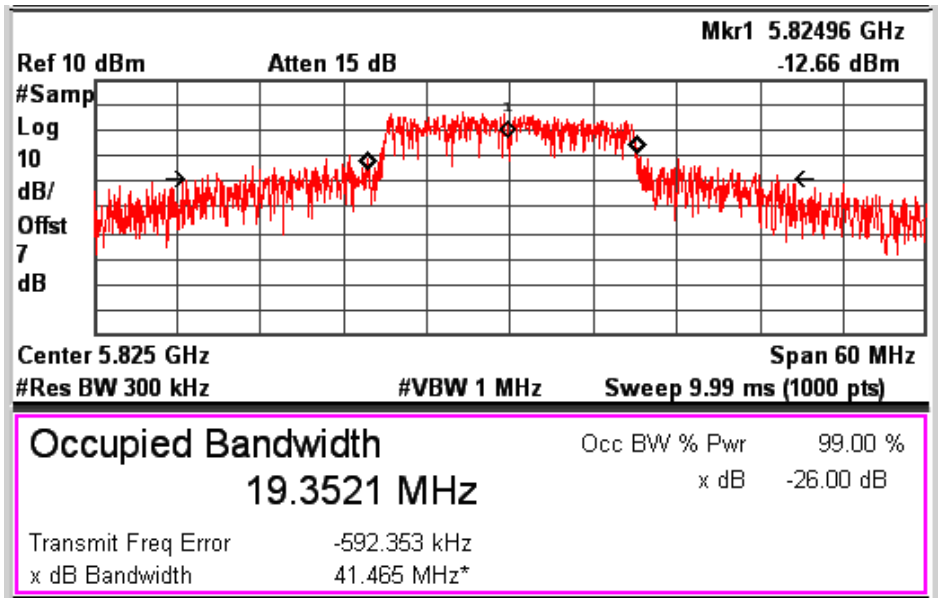
Data Rate	Channel. No	Frequency (MHz)	EBW (MHz)	OBW (MHz)
MCS0	149	5745	17.74	17.91
	165	5825	17.77	19.35
MCS4	149	5745	17.77	17.86
	165	5825	17.74	19.27
MCS7	149	5745	17.77	17.90
	165	5825	17.74	19.84



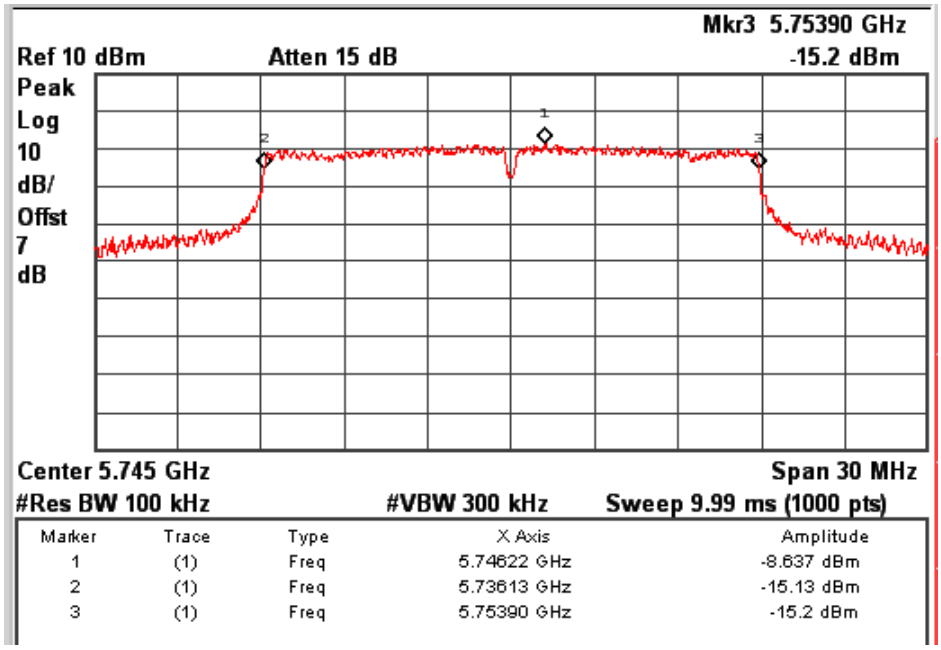


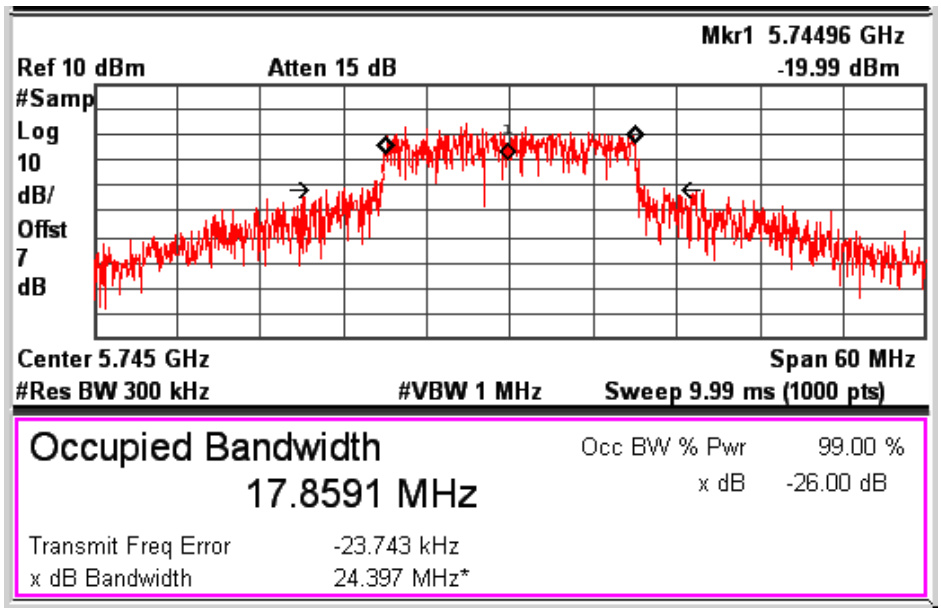
Data Rate: MCS0 **Channel Frequency: 5745MHz**



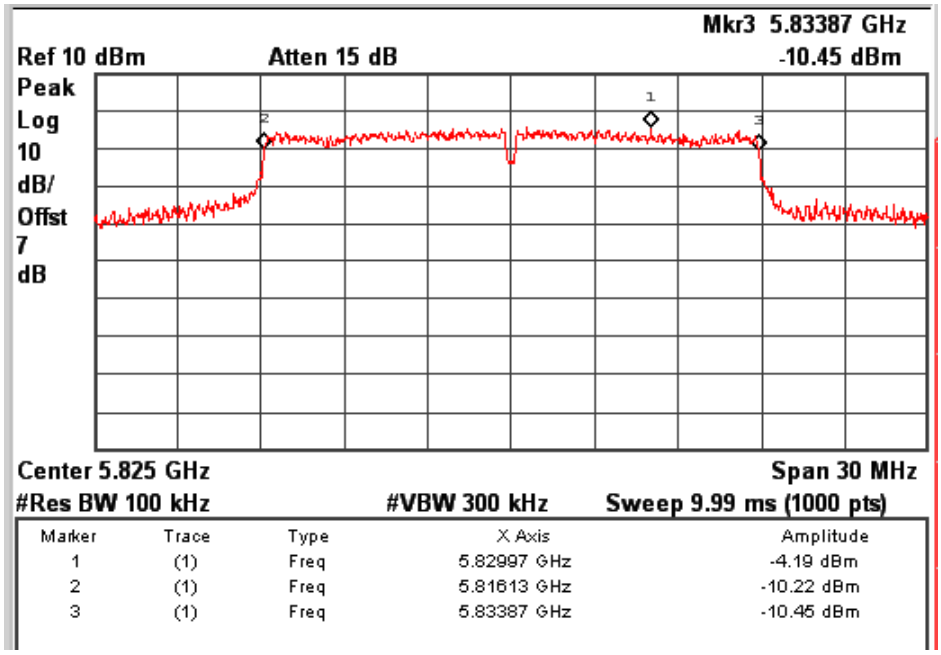


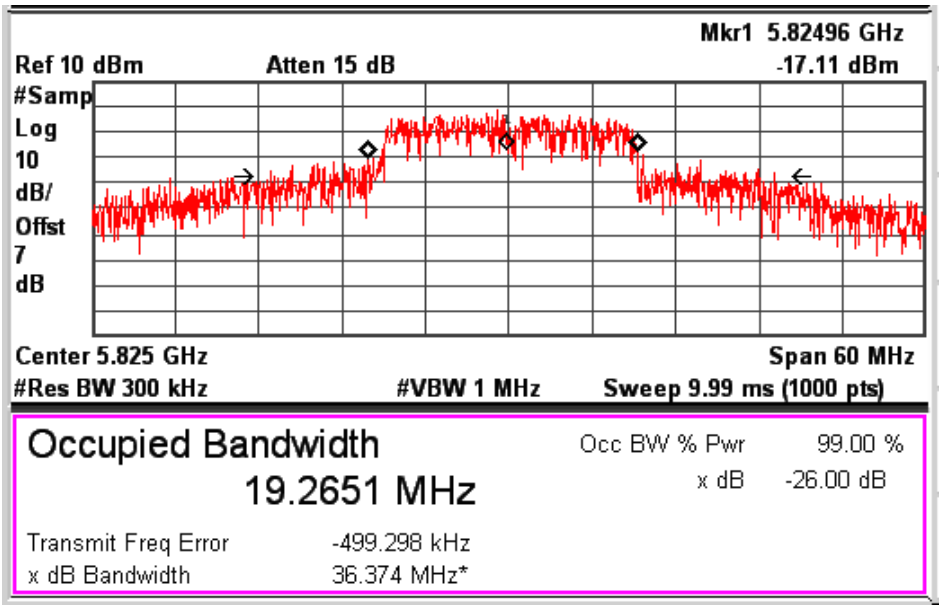
Data Rate: MCS0 **Channel Frequency: 5825MHz**



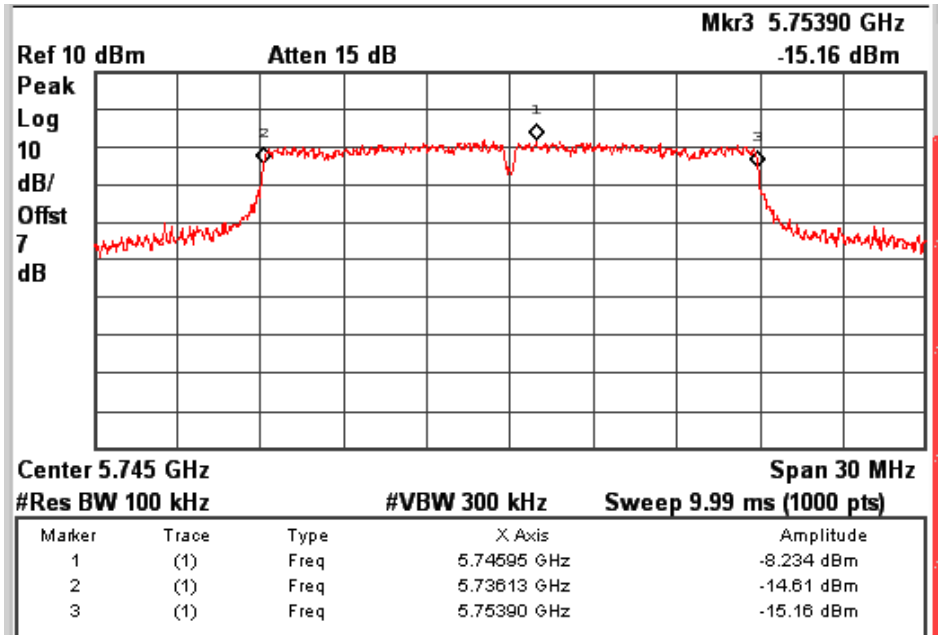


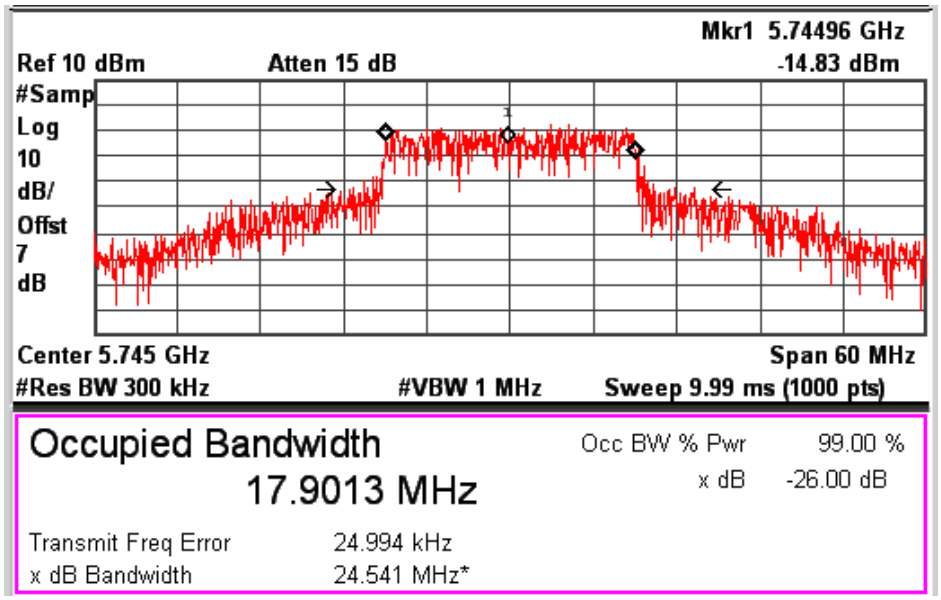
Data Rate: MCS4 **Channel Frequency: 5745MHz**



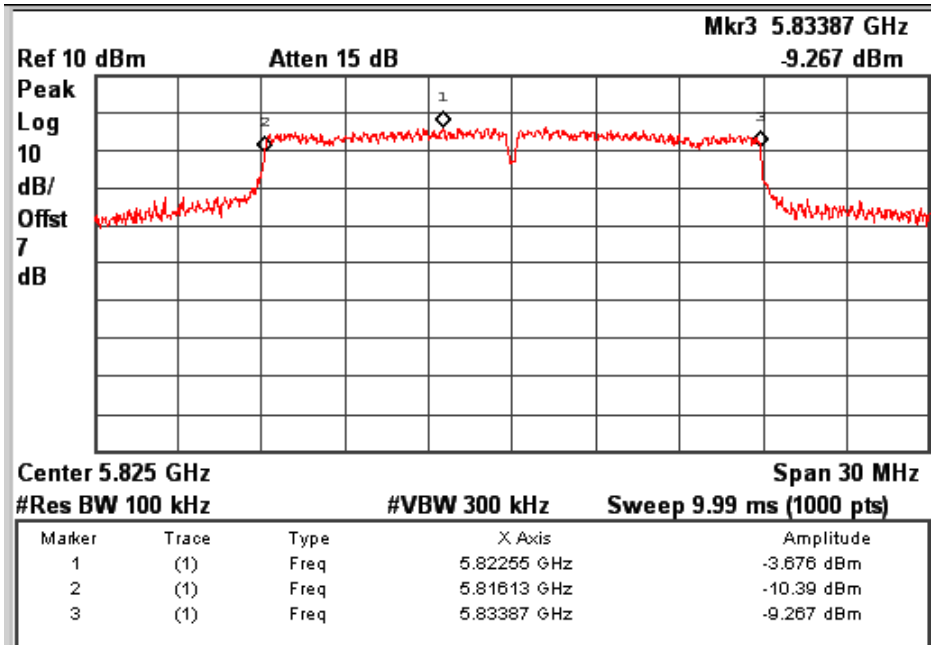


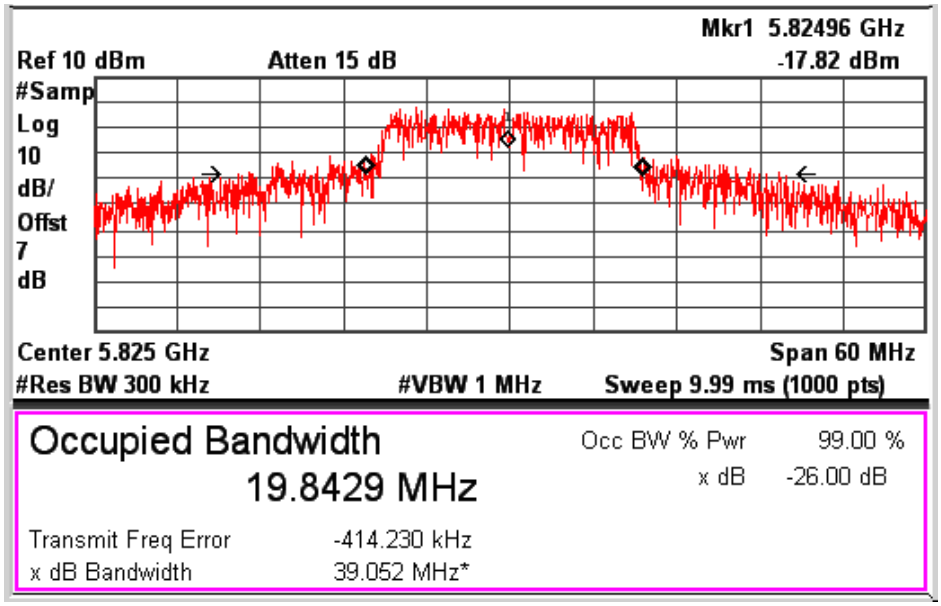
Data Rate: MCS4 **Channel Frequency: 5825MHz**





Data Rate: MCS7 **Channel Frequency: 5745MHz**

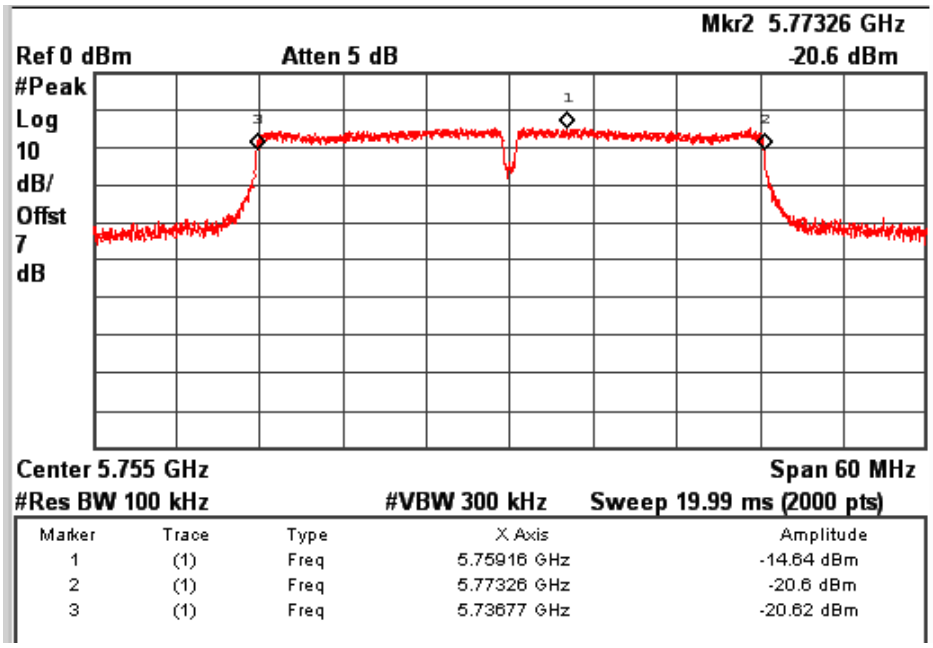


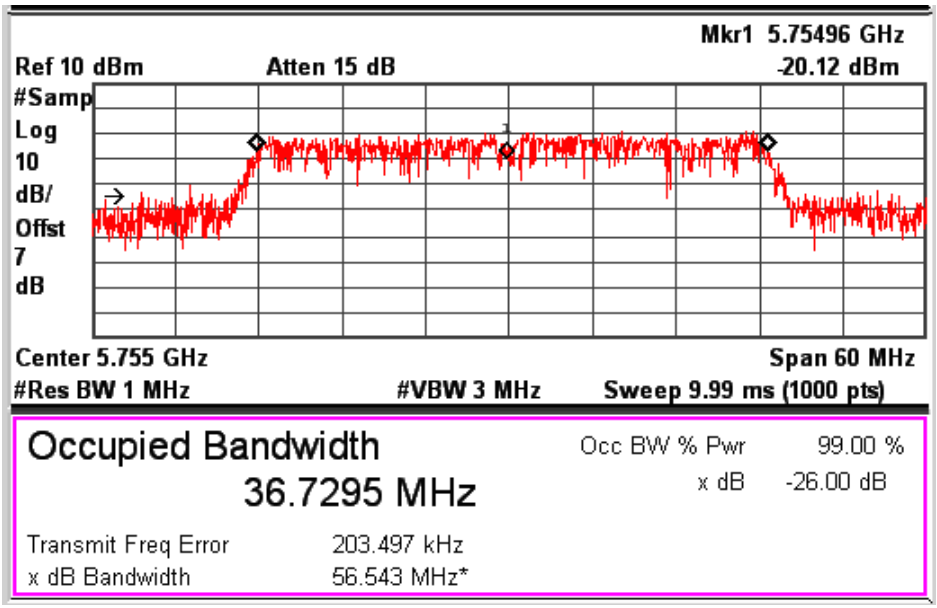


Data Rate: MCS7 **Channel Frequency: 5825MHz**

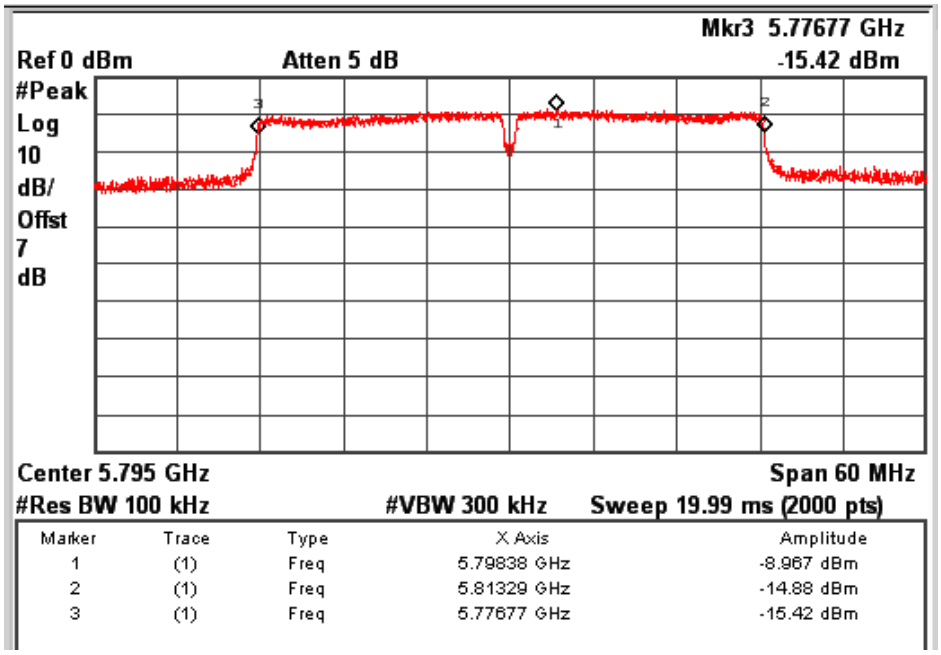
Modulation: 802.11n – 40MHz Channel

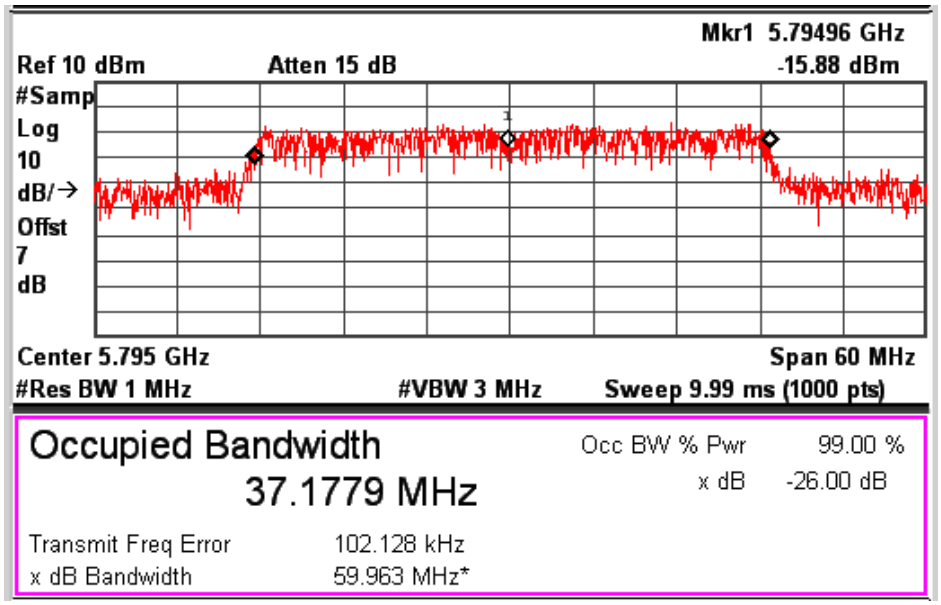
Data Rate	Channel. No	Frequency (MHz)	6 dB Bandwidth (MHz)	OBW (MHz)
MCS0	151	5755	-36.49	36.73
	159	5795	-36.52	37.18
MCS4	151	5755	-36.52	36.83
	159	5795	-36.52	37.19
MCS7	151	5755	-36.49	36.95
	159	5795	-36.49	37.04



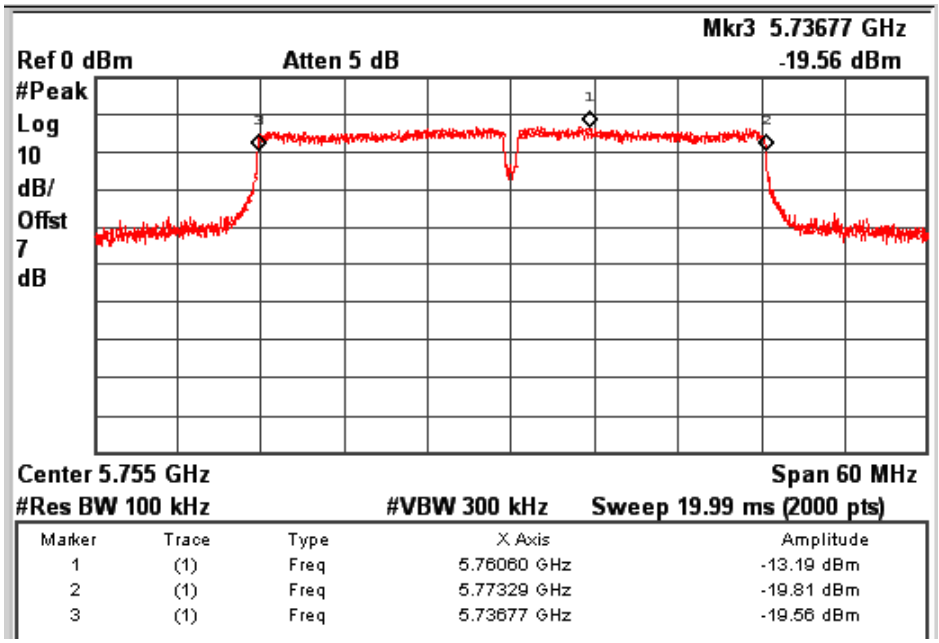


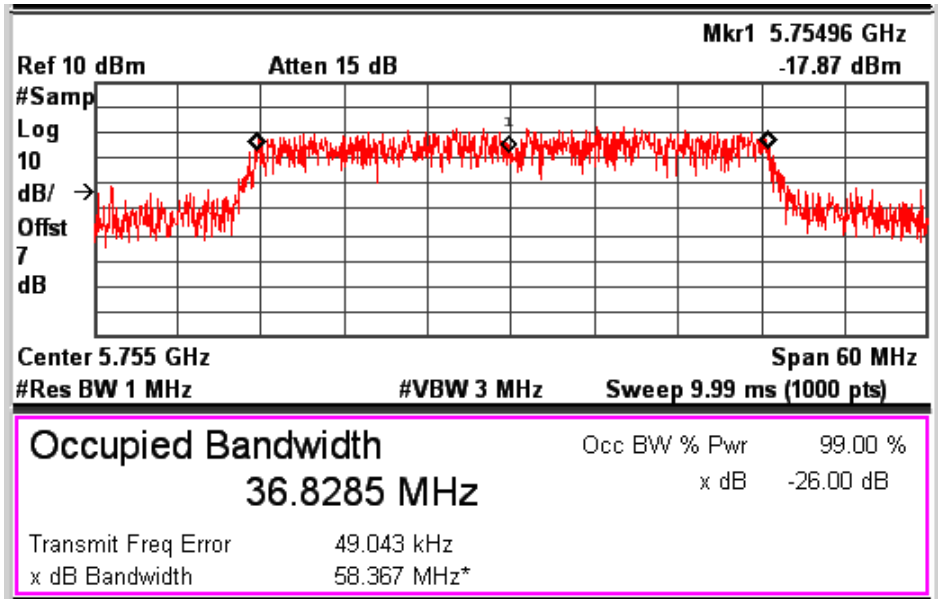
Data Rate: MCS0 **Channel Frequency: 5755MHz**



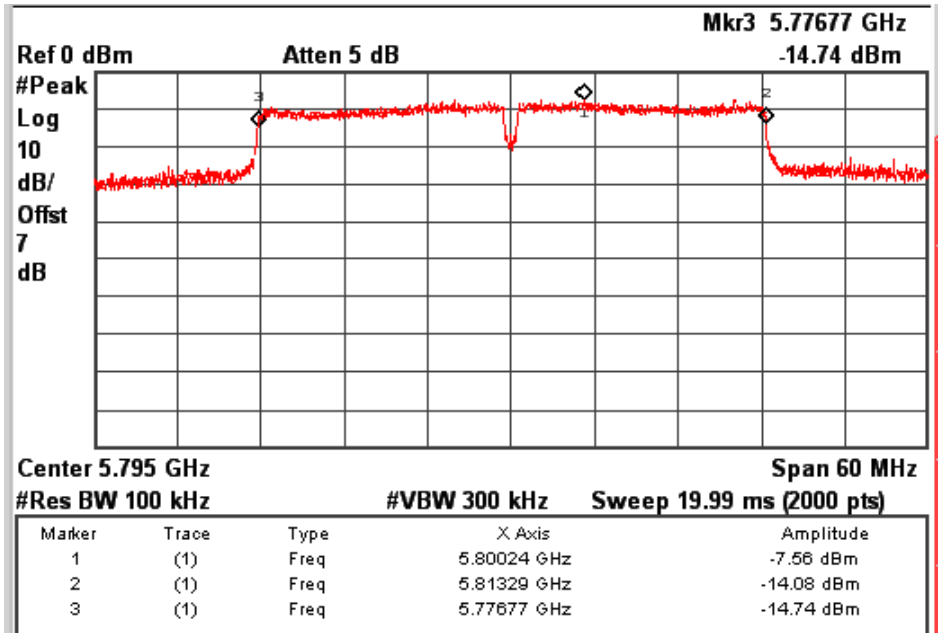


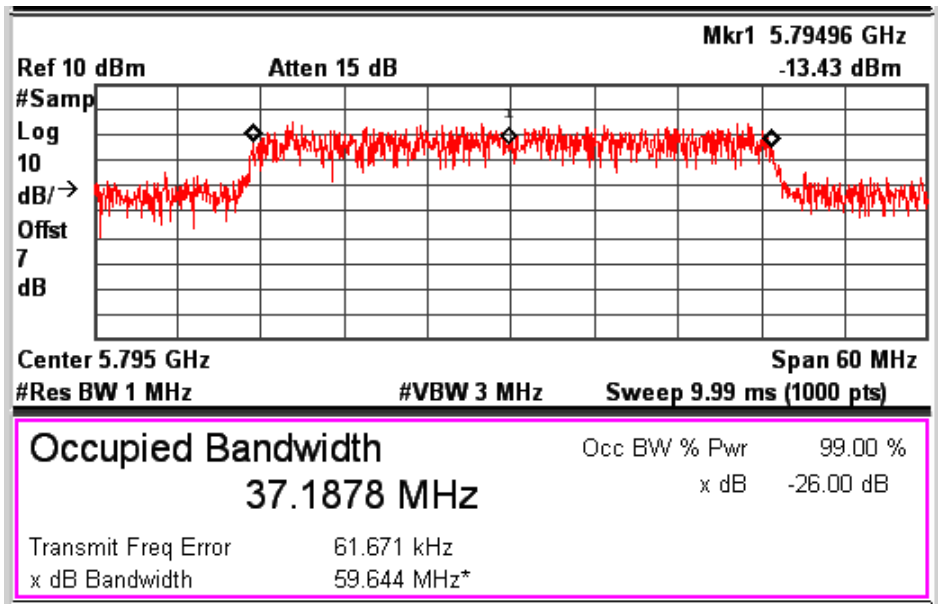
Data Rate: MCS0 **Channel Frequency: 5795MHz**



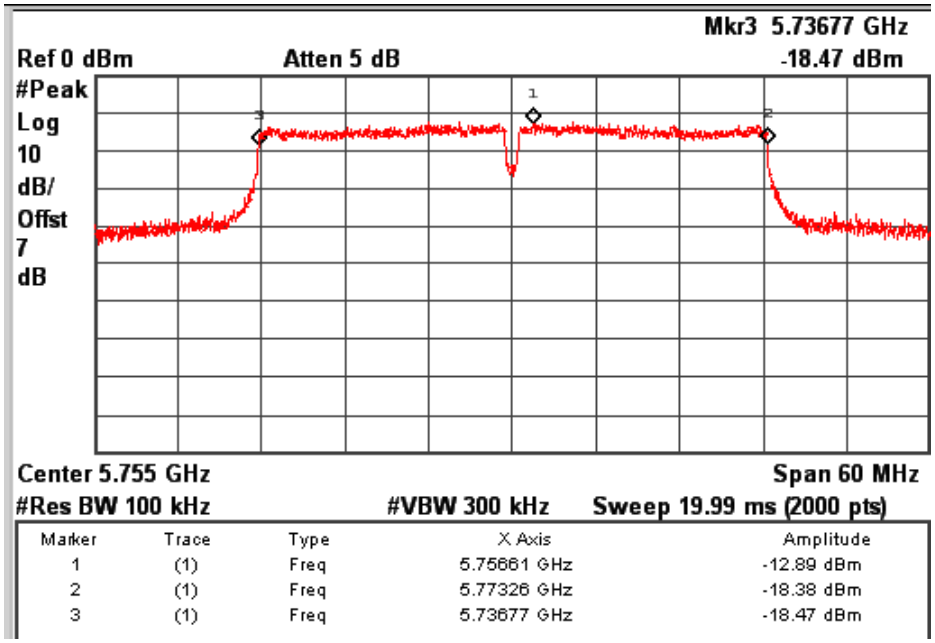


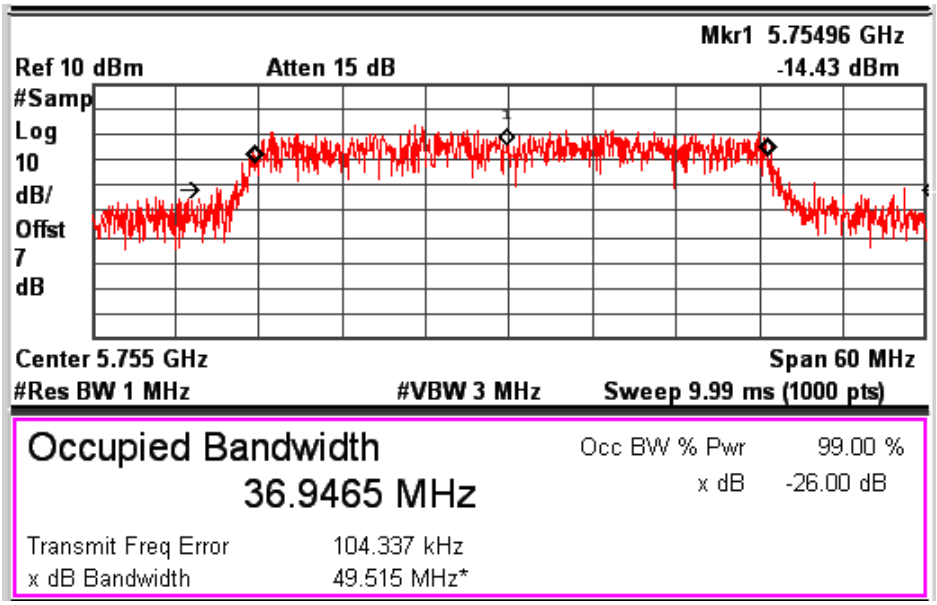
Data Rate: MCS4 **Channel Frequency: 5755MHz**



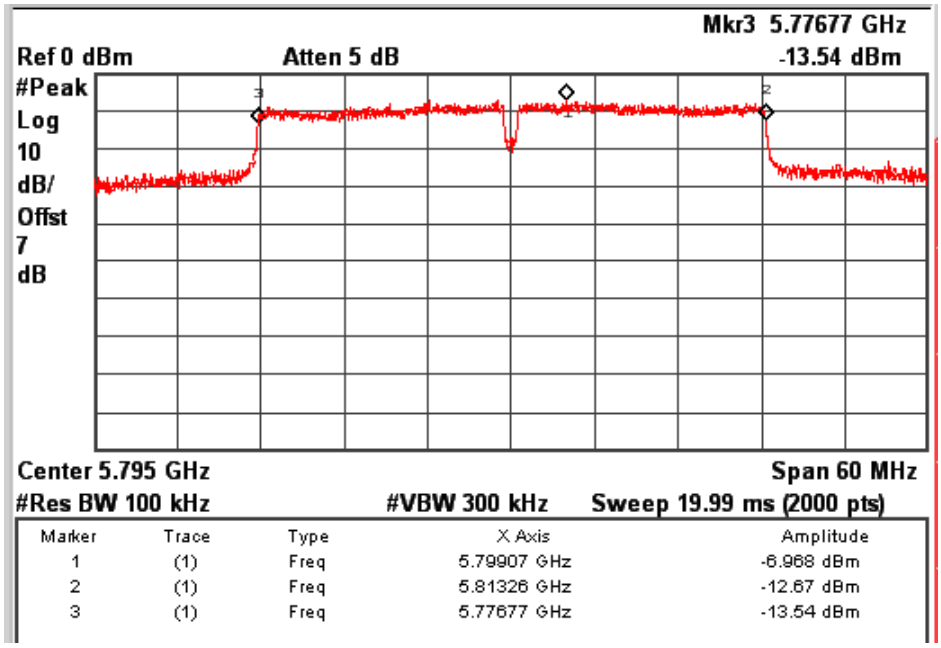


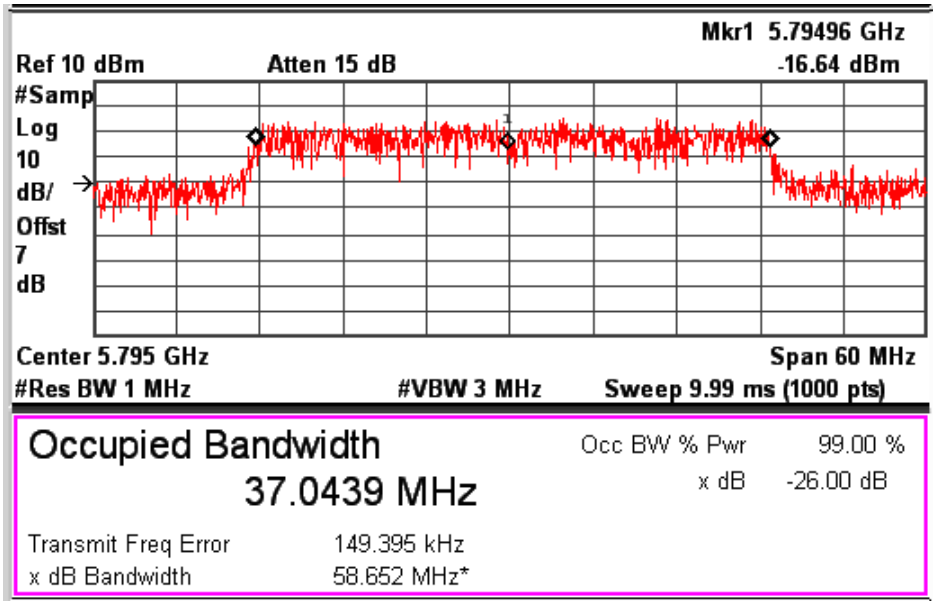
Data Rate: MCS4 **Channel Frequency: 5795MHz**





Data Rate: MCS7 **Channel Frequency: 5755MHz**



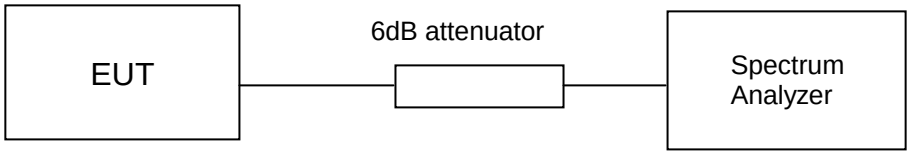


Data Rate: MCS7 **Channel Frequency: 5795MHz**

Maximum conducted output power **Section 15.407(a)**
Result **Pass**

Test Specification	FCC Part 15 Subpart E
Measurement Bandwidth (RBW)	1 MHz
Requirement	For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4dBm + 10log B, where B is the 26- dB emission bandwidth in MHz

Test Method:

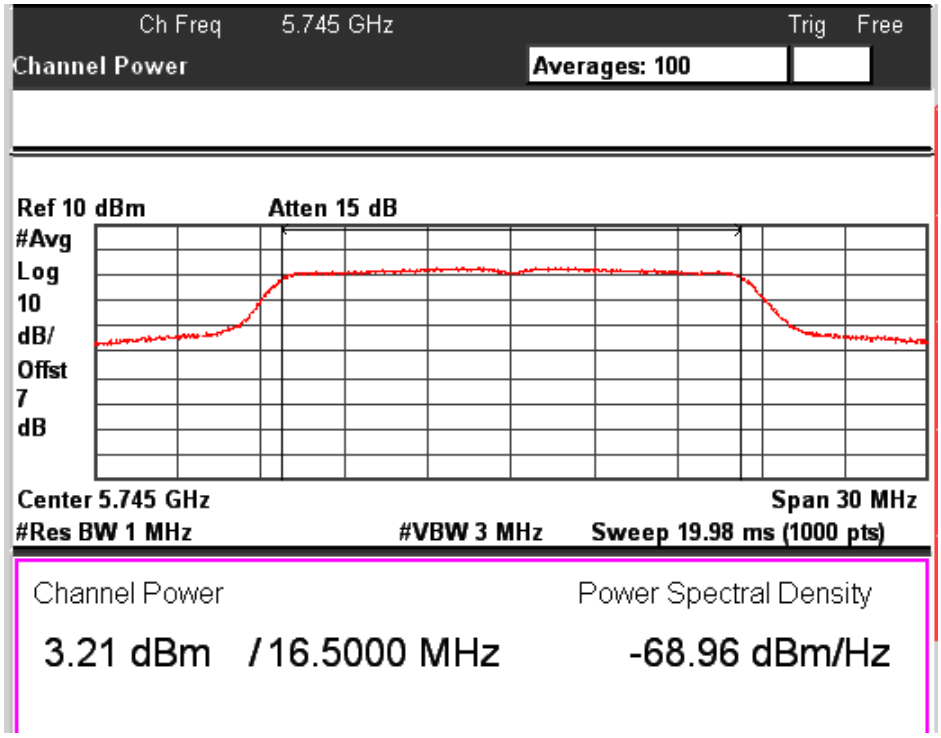


Test Result:

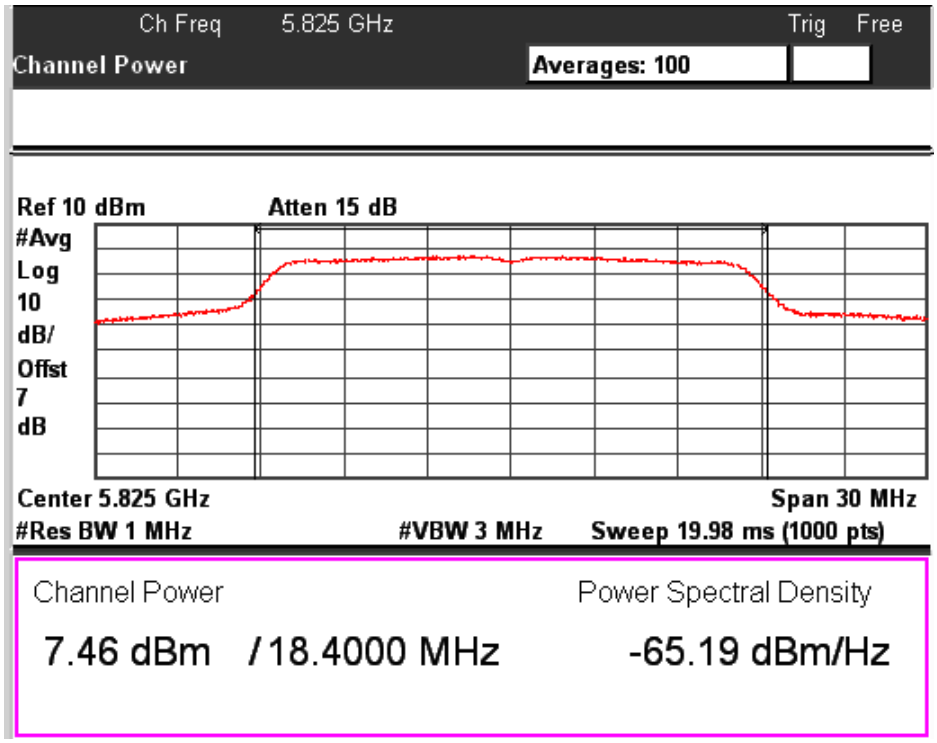
Attenuation (6dB) + cable loss (1dB) of 7dB is included in the results.

Modulation: 802.11a – 20MHz Channel

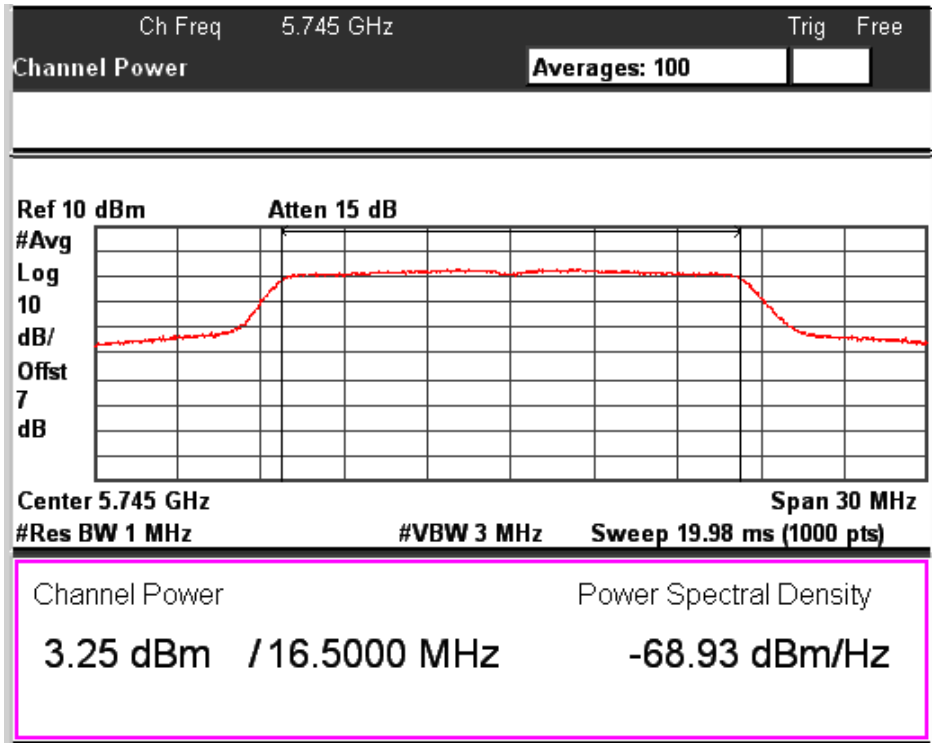
Data Rate (Mbps)	Channel No.	Frequency (MHz)	Output power (dBm)	Limit (dBm)	Margin (dB)
6	149	5745	3.21	30.00	-26.79
	165	5825	7.46	30.00	-22.54
24	149	5745	3.25	30.00	-26.75
	165	5825	7.37	30.00	-22.63
54	149	5745	3.24	30.00	-26.76
	165	5825	7.35	30.00	-22.65



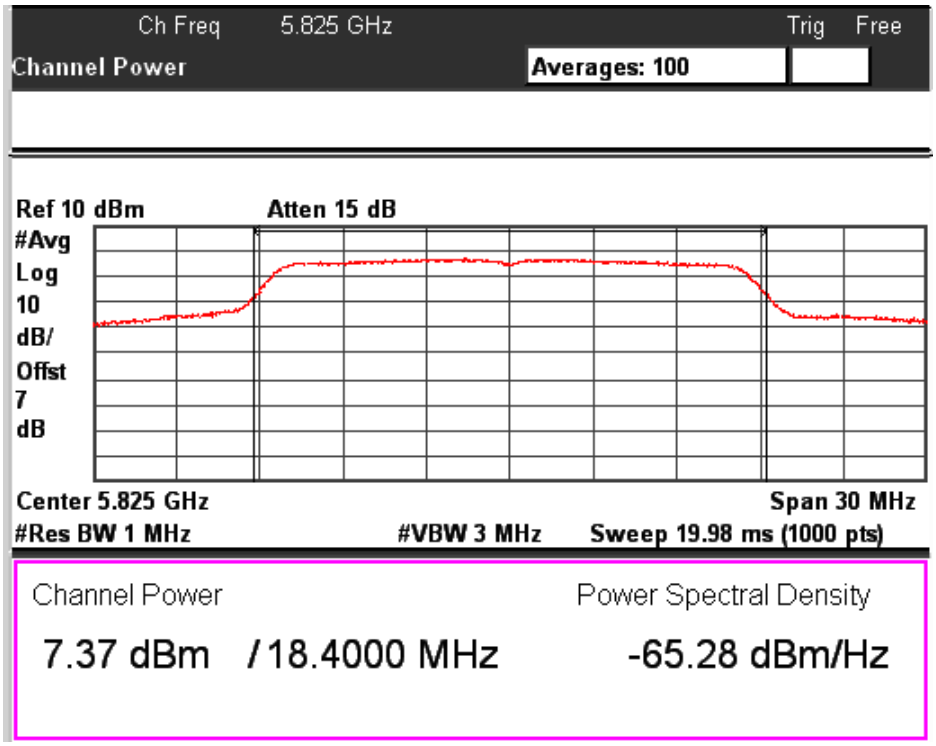
Data Rate: 6Mbps **Channel Frequency: 5745MHz**



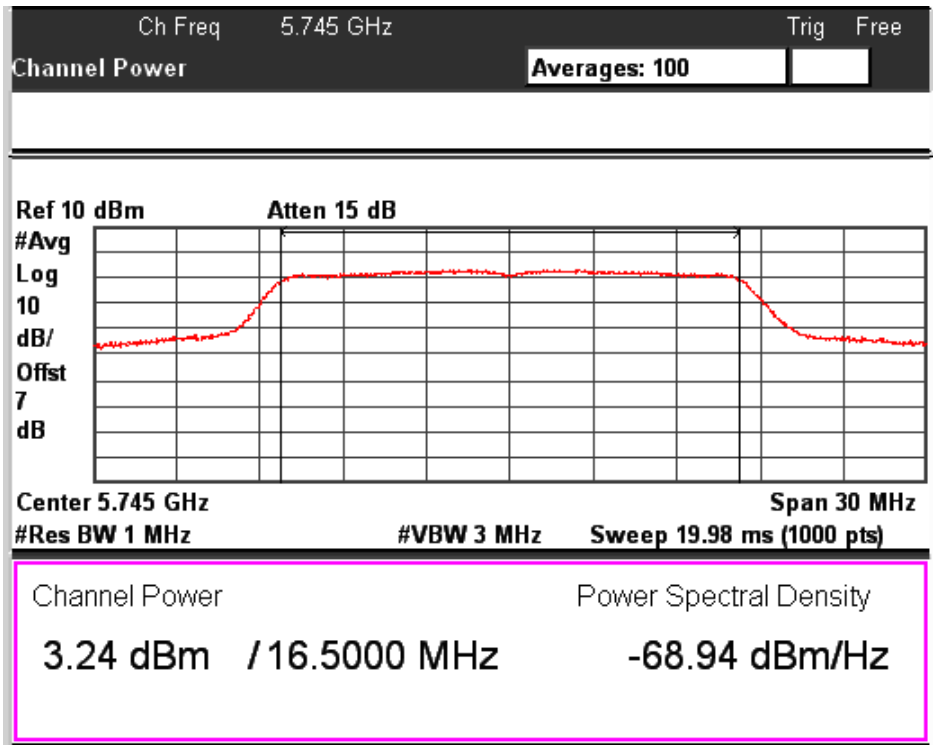
Data Rate: 6Mbps **Channel Frequency: 5825MHz**



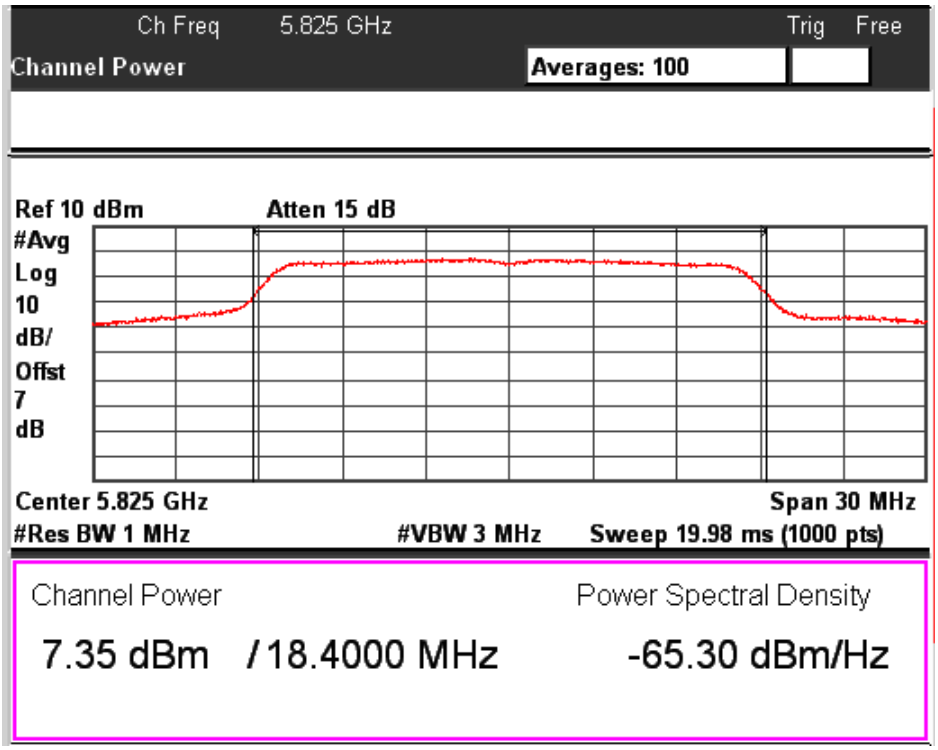
Data Rate: 24Mbps **Channel Frequency: 5745MHz**



Data Rate: 24Mbps **Channel Frequency: 5825MHz**



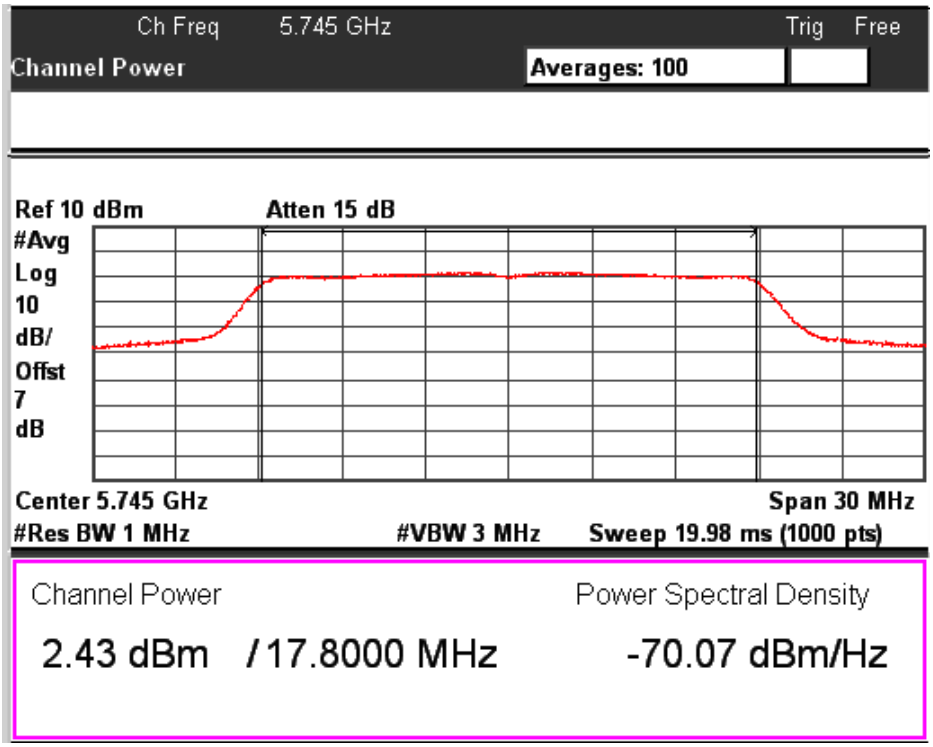
Data Rate: 54Mbps **Channel Frequency: 5745MHz**



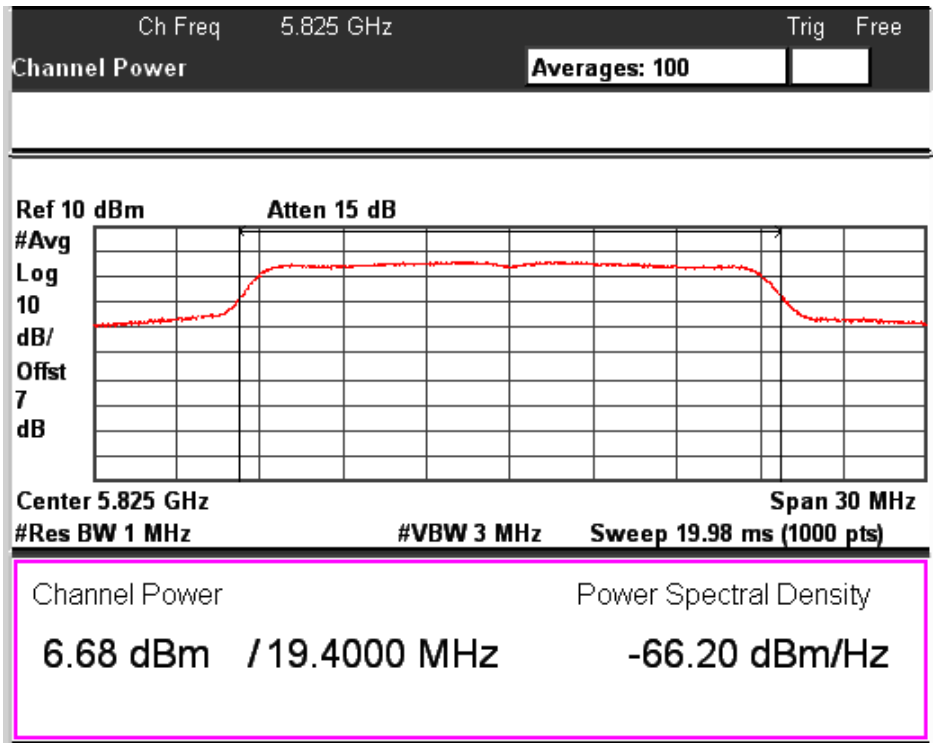
Data Rate: 54Mbps **Channel Frequency: 5825MHz**

Modulation: 802.11n – 20 MHz Channel

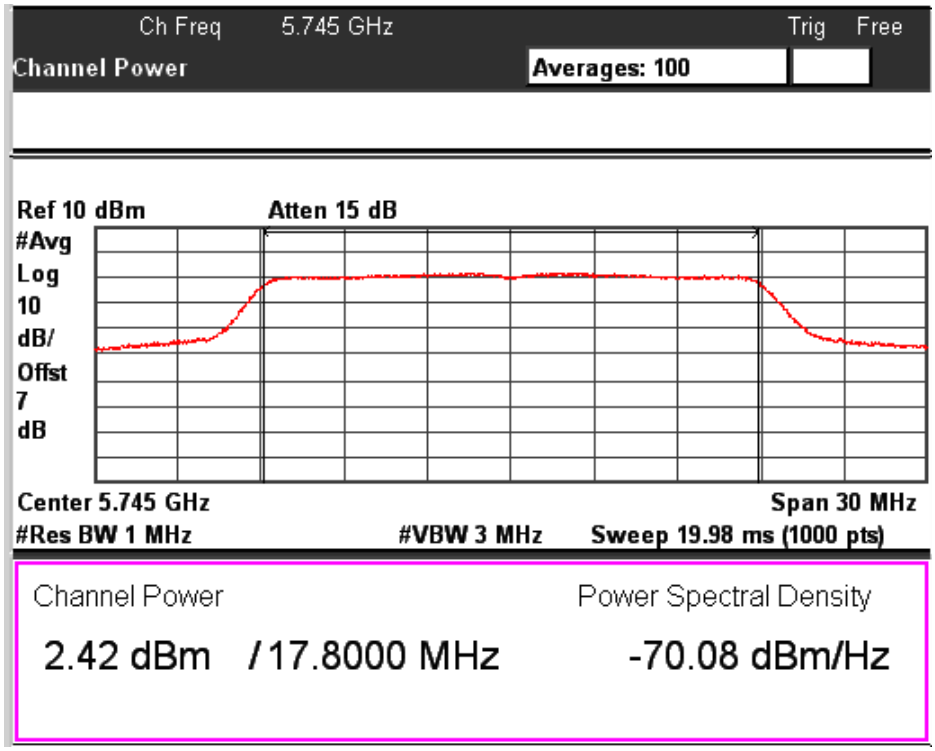
Data Rate (Mbps)	Channel No.	Frequency (MHz)	Output power (dBm)	Limit (dBm)	Margin (dB)
MCS0	149	5745	2.43	30.00	-27.57
	165	5825	6.68	30.00	-23.32
MCS4	149	5745	2.42	30.00	-27.58
	165	5825	7.07	30.00	-22.93
MCS7	149	5745	2.65	30.00	-27.35
	165	5825	6.76	30.00	-23.24



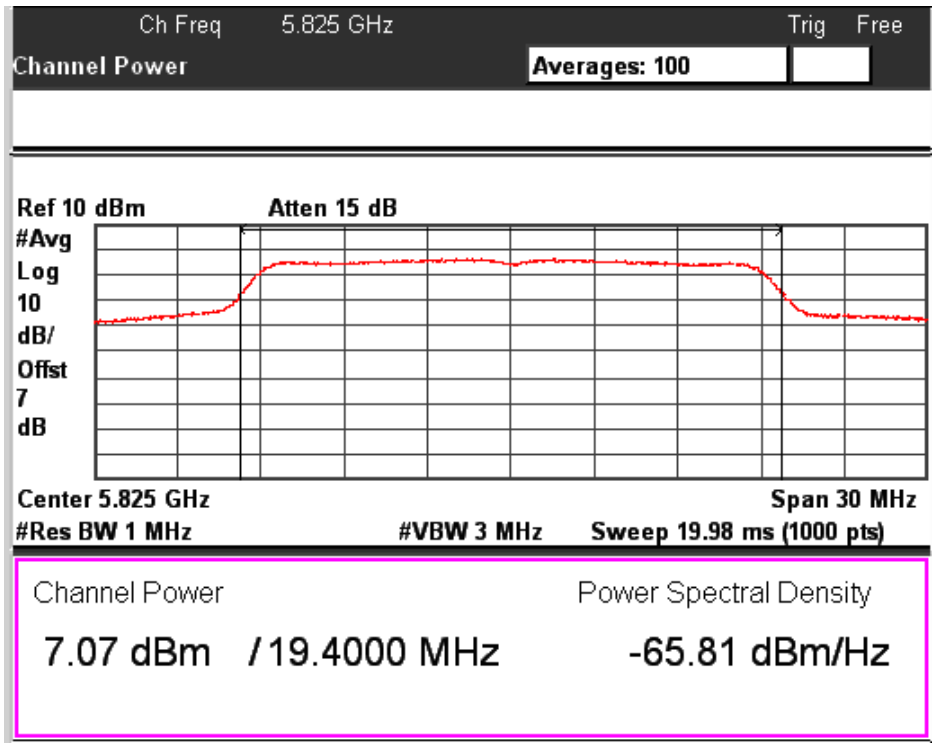
Data Rate: MCS0 **Channel Frequency: 5745MHz**



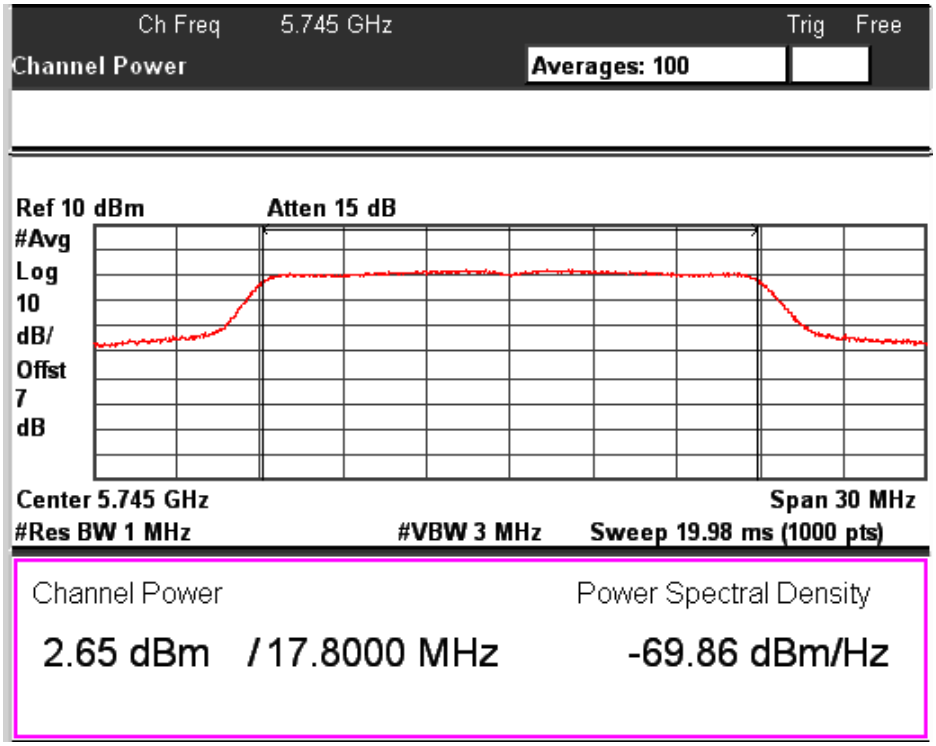
Data Rate: MCS0 **Channel Frequency: 5825MHz**



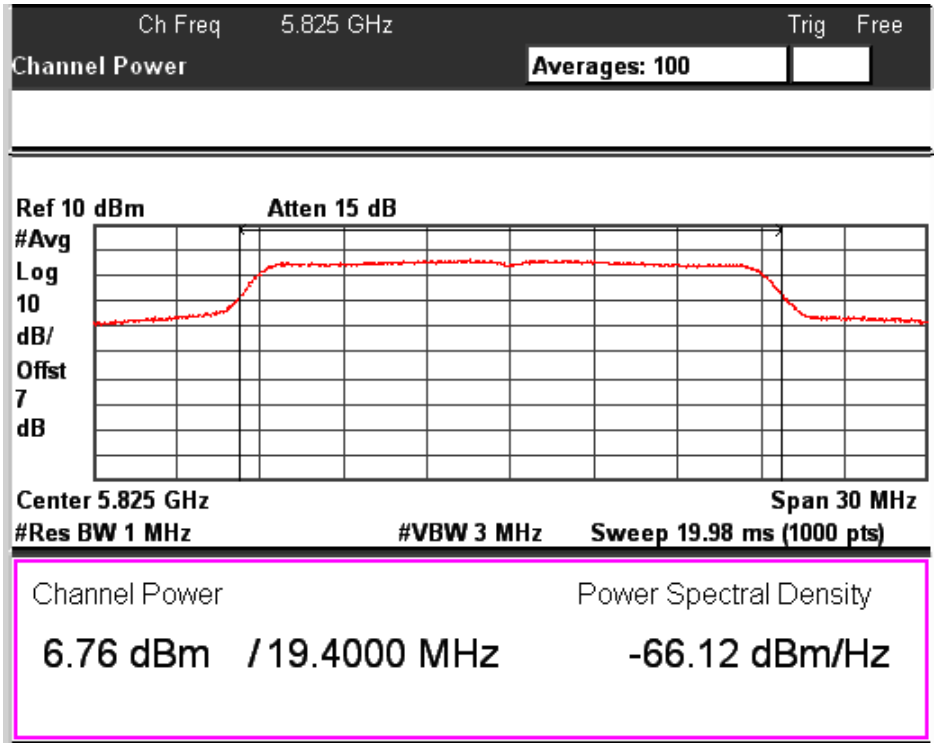
Data Rate: MCS4 **Channel Frequency: 5745MHz**



Data Rate: MCS4 **Channel Frequency: 5825MHz**



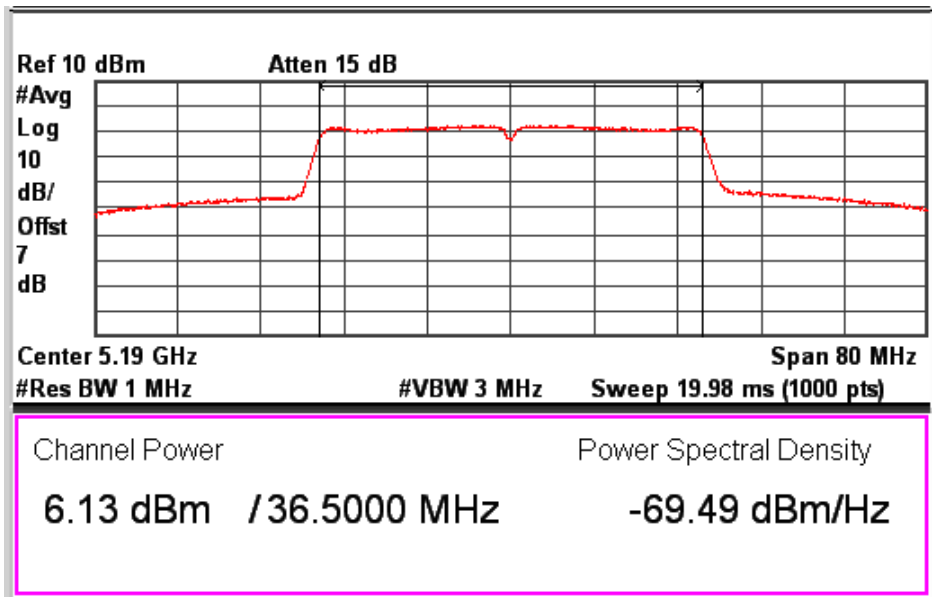
Data Rate: MCS7 **Channel Frequency: 5745MHz**



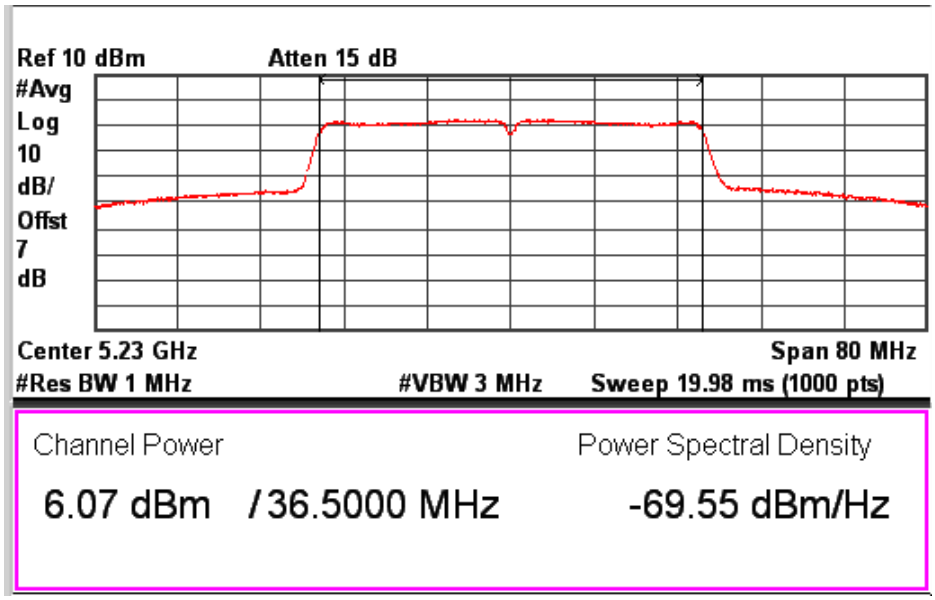
Data Rate: MCS7 **Channel Frequency: 5825MHz**

Modulation: 802.11n – 40 MHz Channel

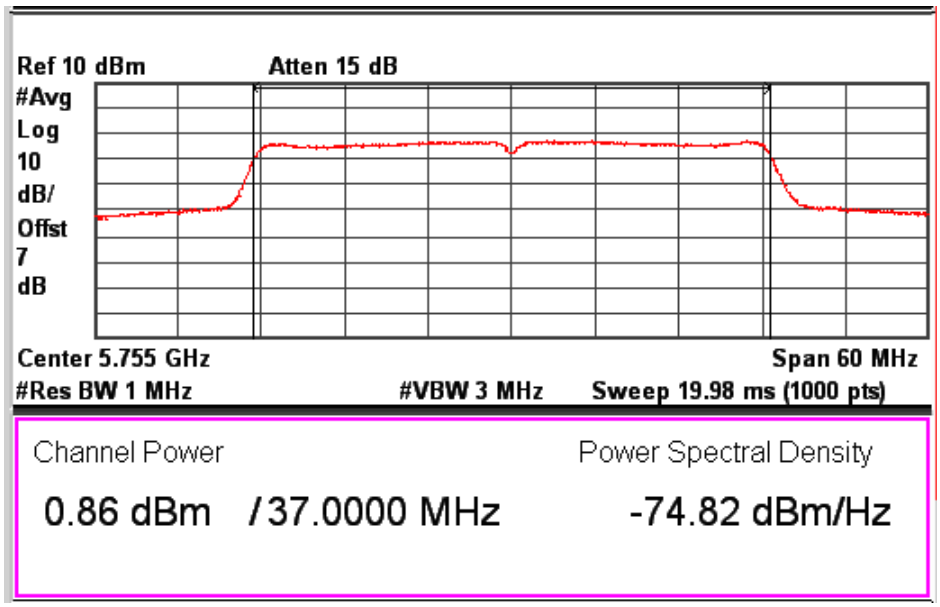
Data Rate	Channel No.	Frequency (MHz)	Output power (dBm)	Limit (dBm)	Margin (dB)
MCS0	38	5190	6.13	30.00	-23.87
	46	5210	6.07	30.00	-23.93
	151	5755	0.86	30.00	-29.14
	159	5795	5.11	30.00	-24.89
MCS4	38	5190	5.95	30.00	-24.05
	46	5210	6.17	30.00	-23.83
	151	5755	0.85	30.00	-29.15
	159	5795	5.09	30.00	-24.91
MCS7	38	5190	6.11	30.00	-23.89
	46	5210	6.22	30.00	-23.78
	151	5755	0.80	30.00	-29.20
	159	5795	5.05	30.00	-24.95



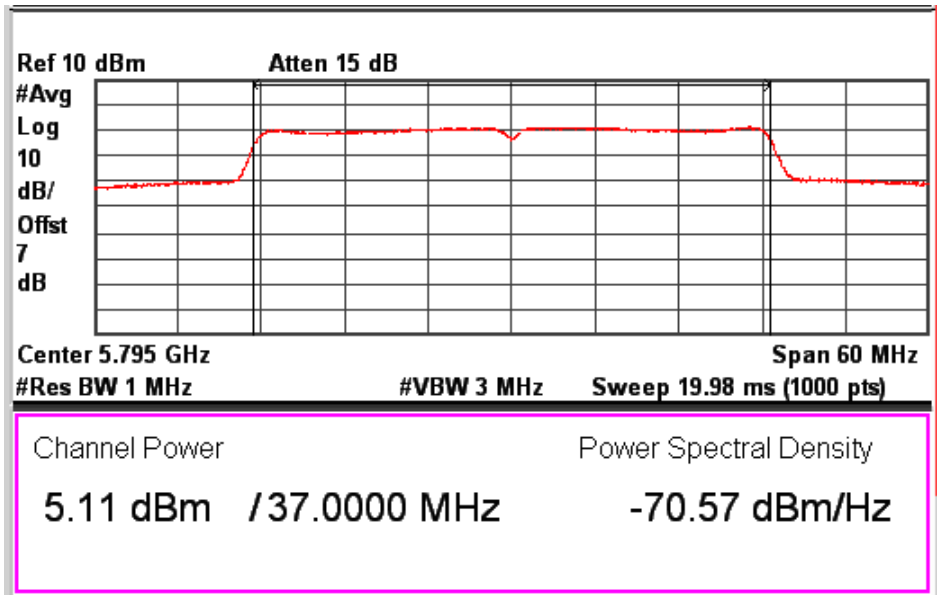
Data Rate: MCS0 **Channel Frequency: 5190MHz**



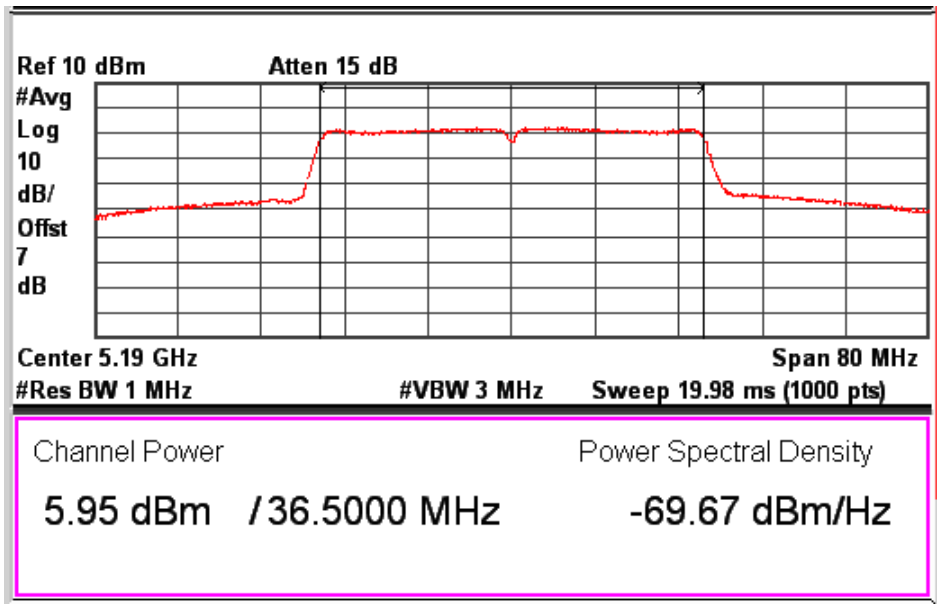
Data Rate: MCS0 **Channel Frequency: 5230MHz**



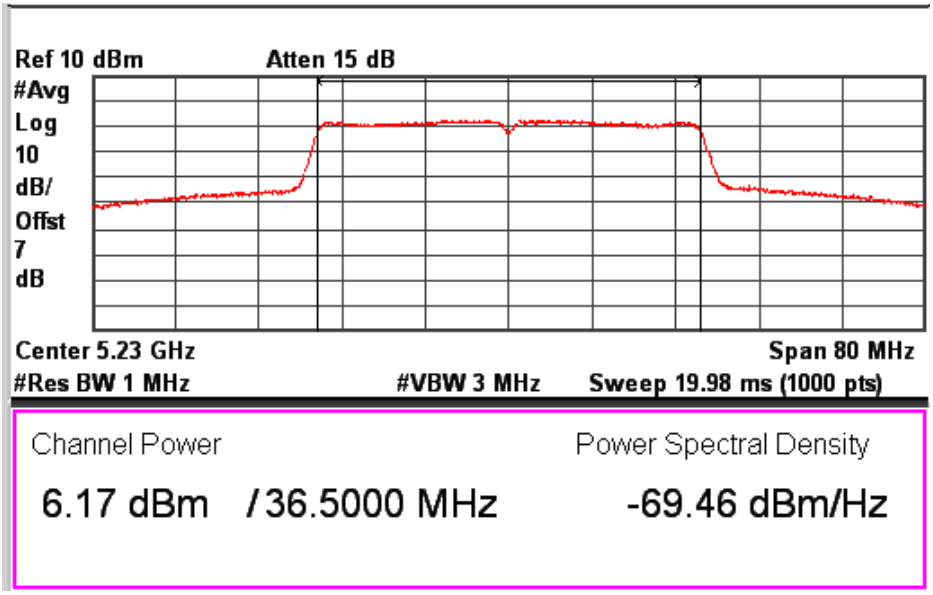
Data Rate: MCS0 **Channel Frequency: 5755MHz**



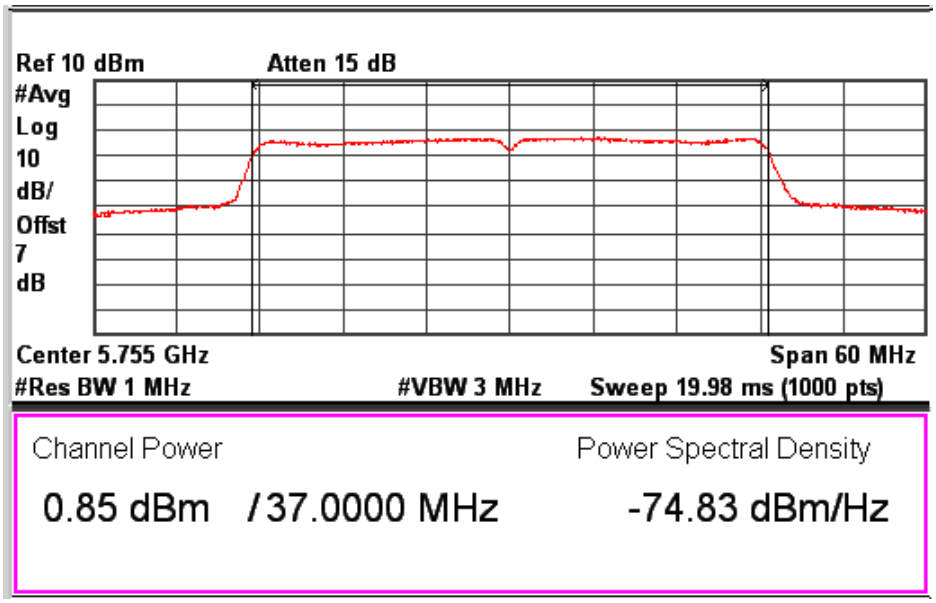
Data Rate: MCS0 **Channel Frequency: 5795MHz**



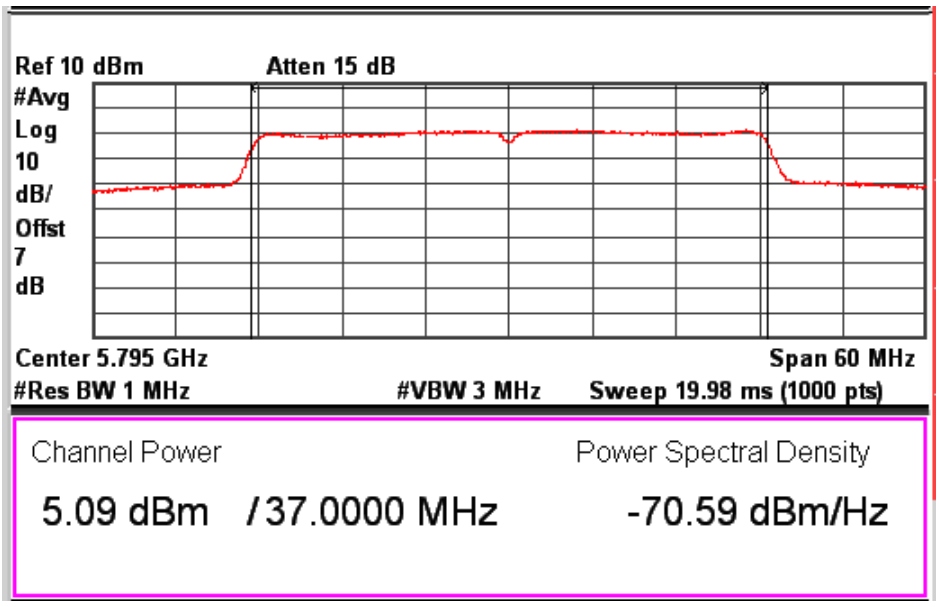
Data Rate: MCS4 **Channel Frequency: 5190MHz**



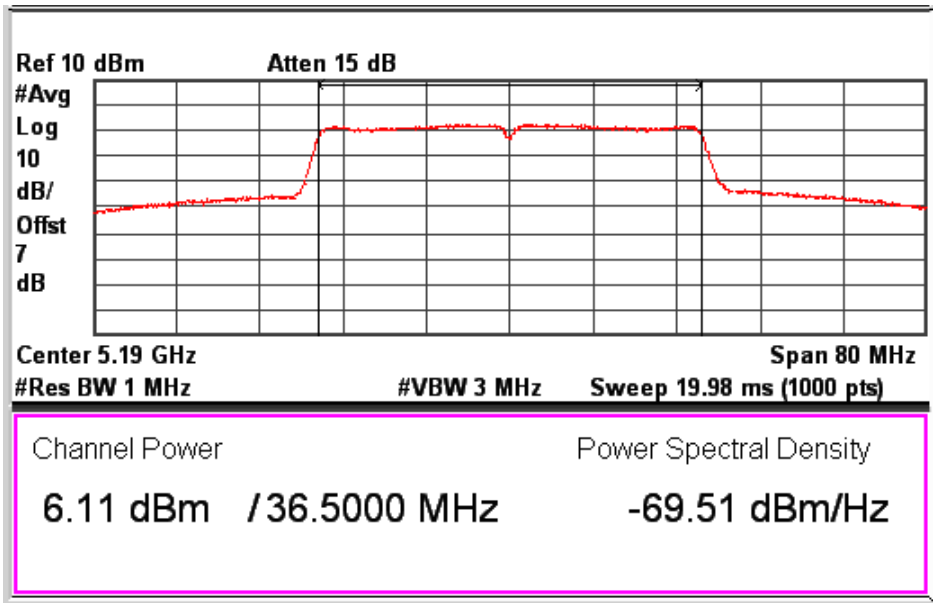
Data Rate: MCS4 **Channel Frequency: 5230MHz**



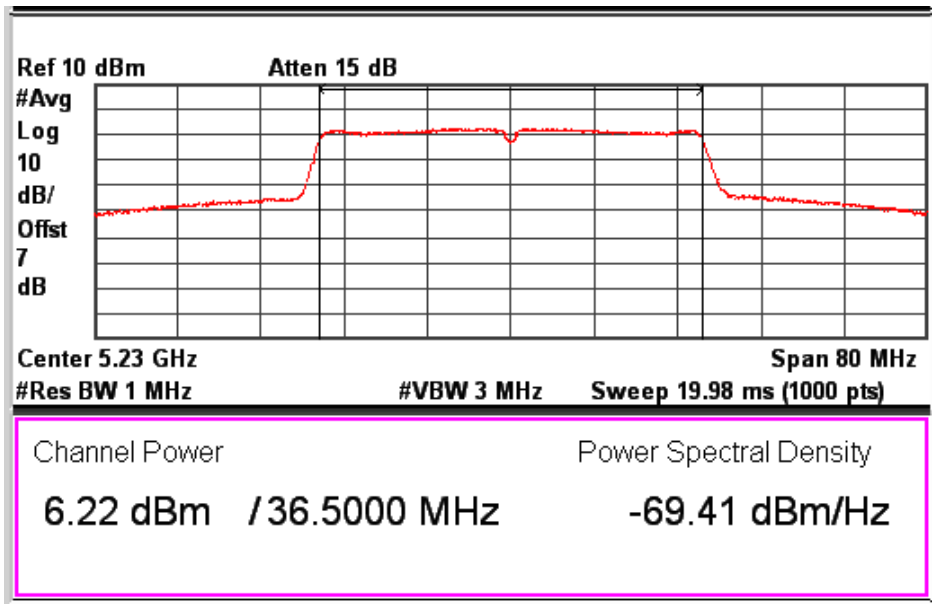
Data Rate: MCS4 **Channel Frequency: 5755MHz**



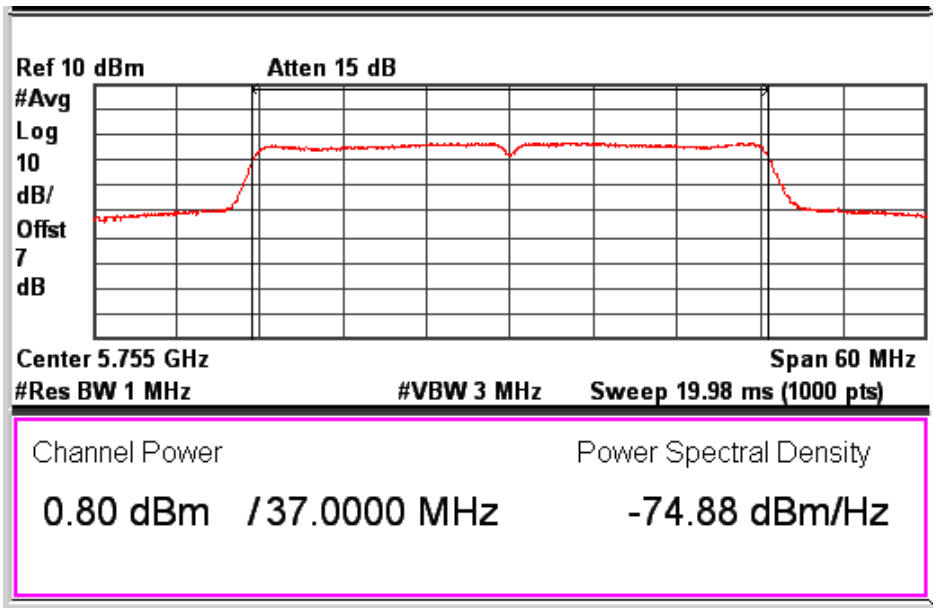
Data Rate: MCS4 **Channel Frequency: 5795MHz**



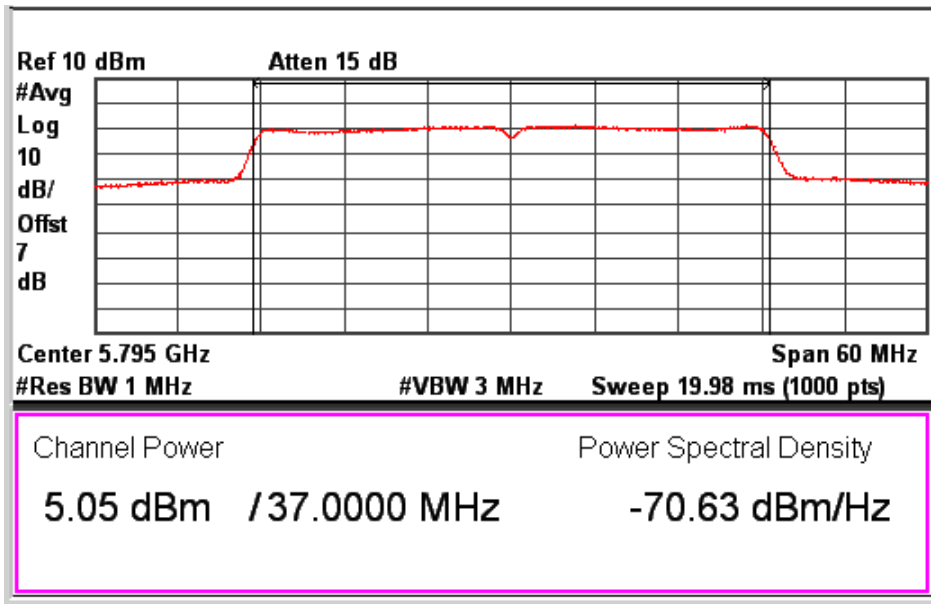
Data Rate: MCS7 **Channel Frequency: 5190MHz**



Data Rate: MCS7 **Channel Frequency: 5230MHz**



Data Rate: MCS7 **Channel Frequency: 5755MHz**



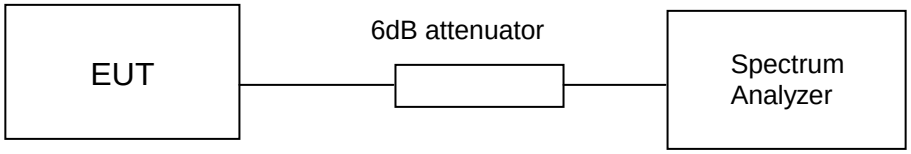
Data Rate: MCS7 **Channel Frequency: 5795MHz**

Maximum Power Spectral Density **Section 15.407 (a)**
Result **Pass**

Test Specification FCC Part 15 Section 15.407 (a)
Requirement the peak power spectral density shall not exceed 4 dBm in any 1-MHz band

Note: Though the rule refers to “peak power spectral density”, the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission.

Test Method:

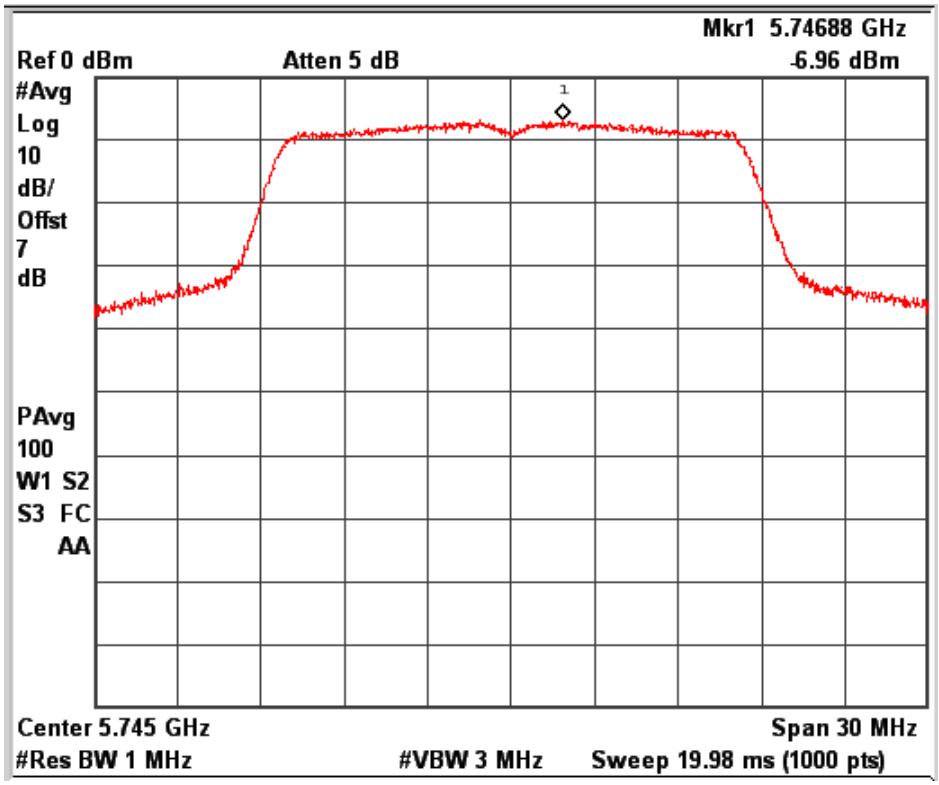


Test Result:

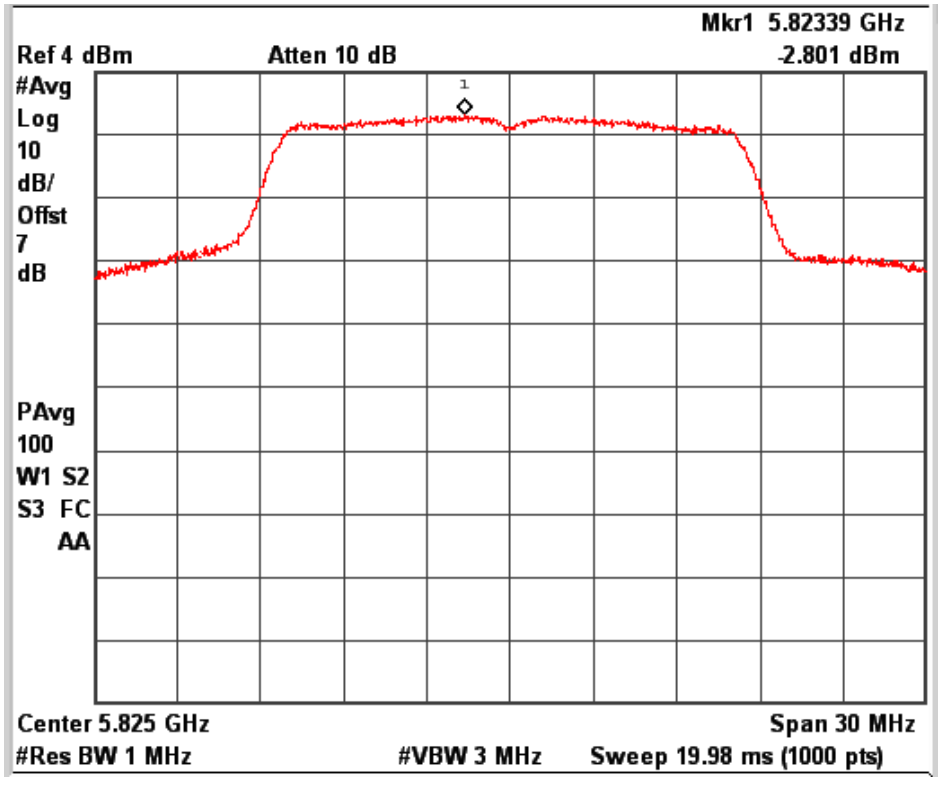
Attenuation (6dB) + cable loss (1dB) of 7dB is included in the results.

Modulation: 802.11a

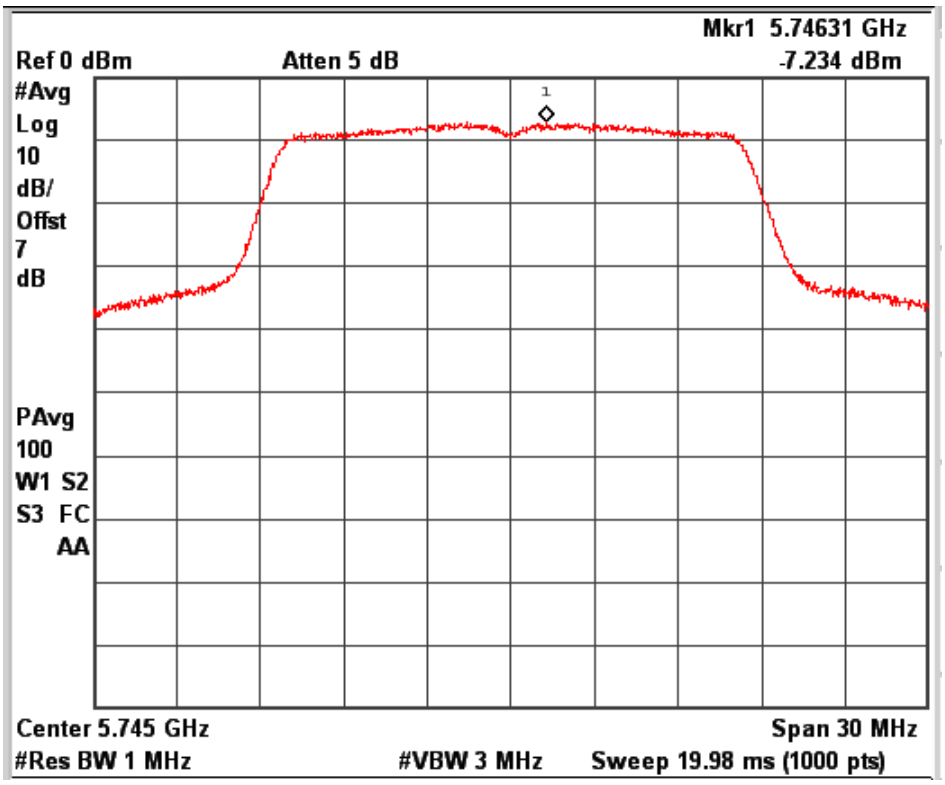
Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
6	149	5745	-6.96	30.00	-36.96
	165	5825	-2.80	30.00	-32.80
24	149	5745	-7.23	30.00	-37.23
	165	5825	-3.15	30.00	-33.15
54	149	5745	-7.27	30.00	-37.27
	165	5825	-2.95	30.00	-32.95



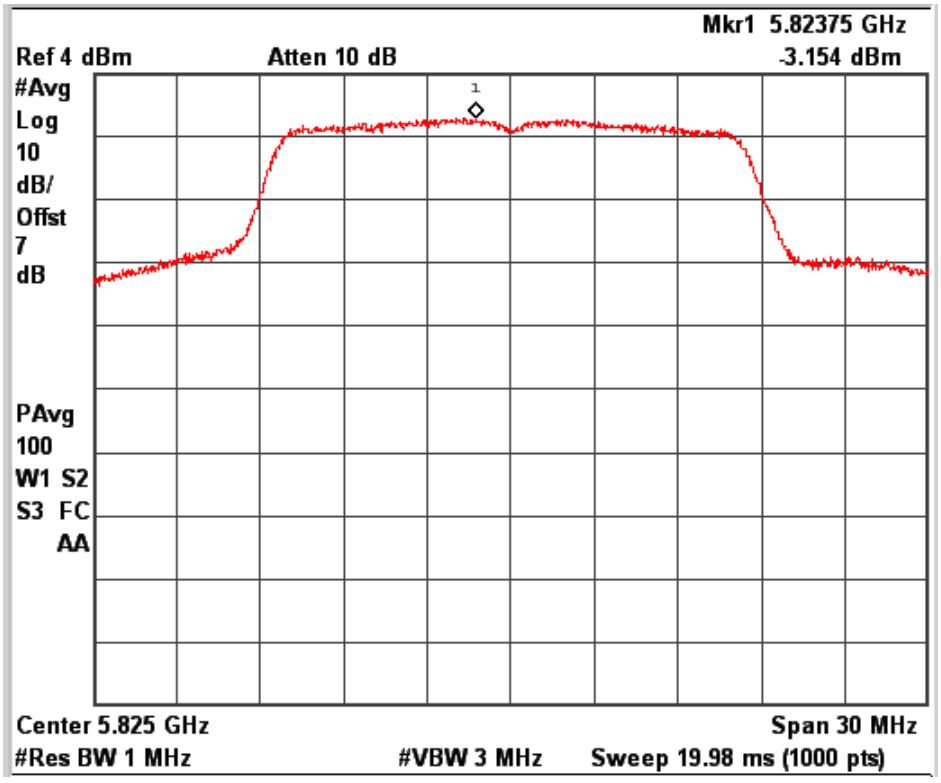
Data Rate: 6Mbps **Channel Frequency: 5745MHz**



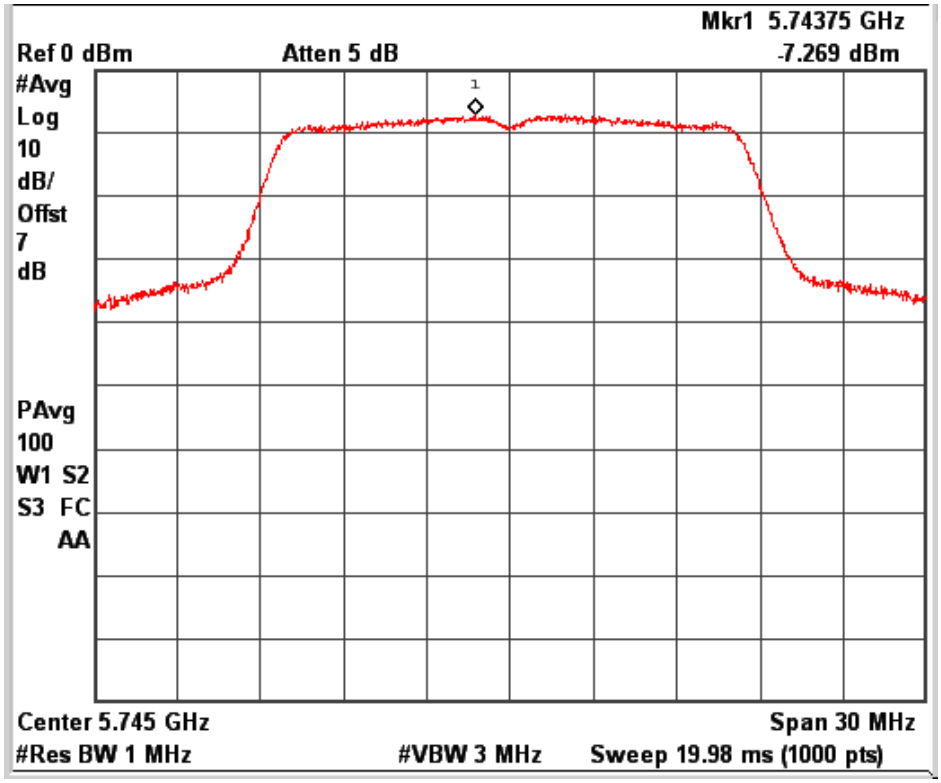
Data Rate: 6Mbps **Channel Frequency: 5825MHz**



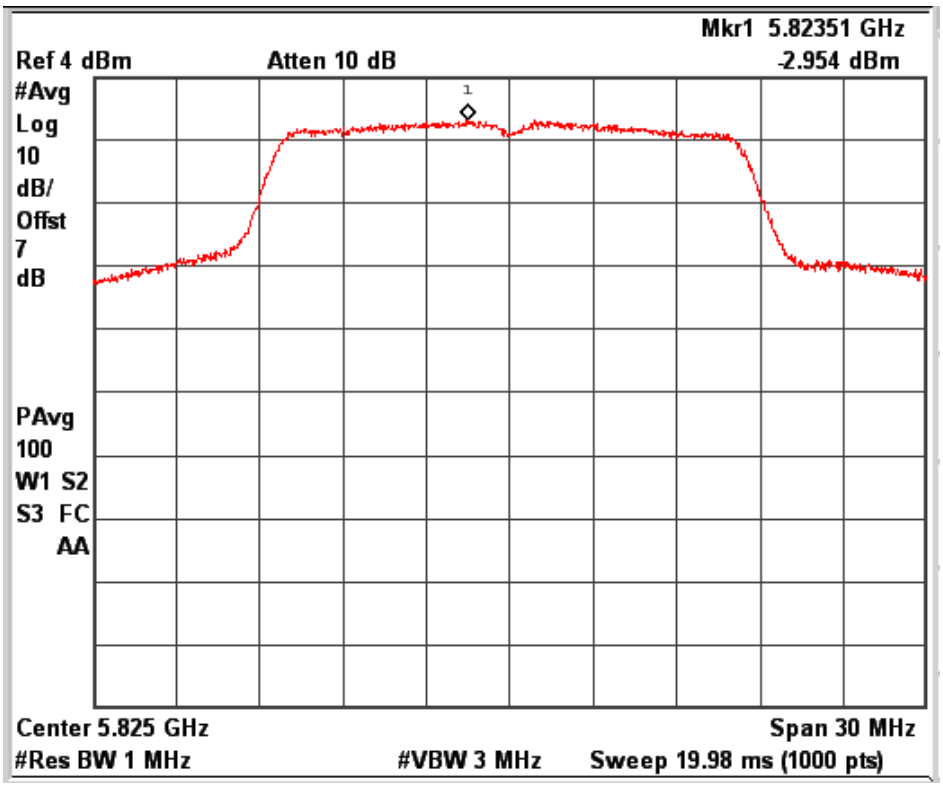
Data Rate: 24Mbps **Channel Frequency: 5745MHz**



Data Rate: 24Mbps **Channel Frequency: 5825MHz**



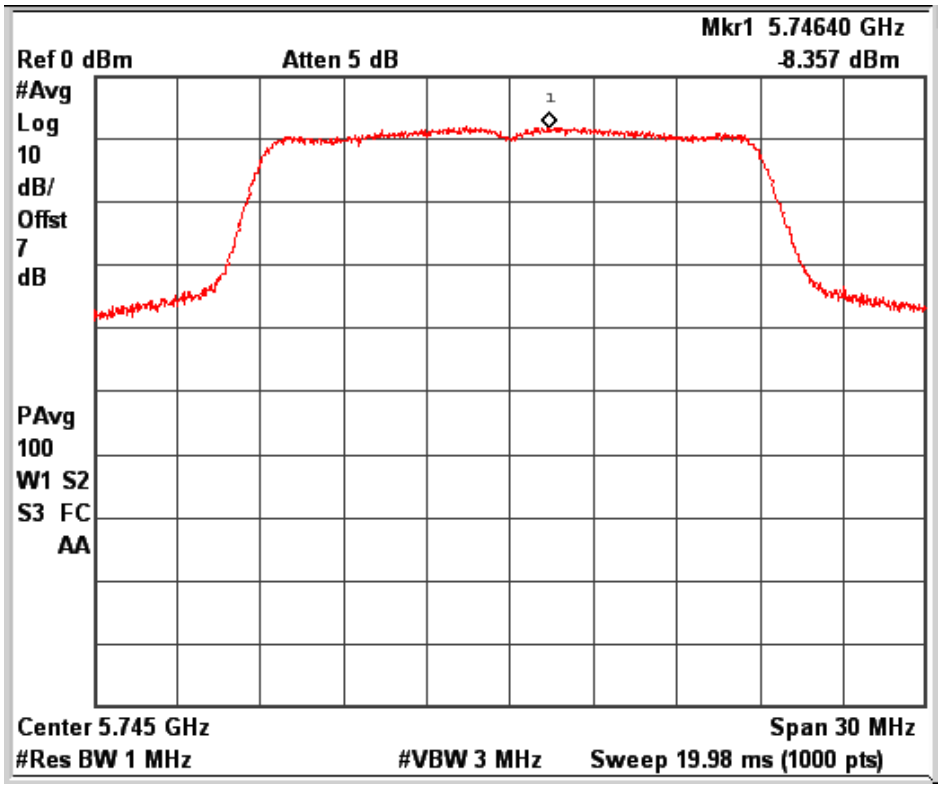
Data Rate: 54Mbps **Channel Frequency: 5745MHz**



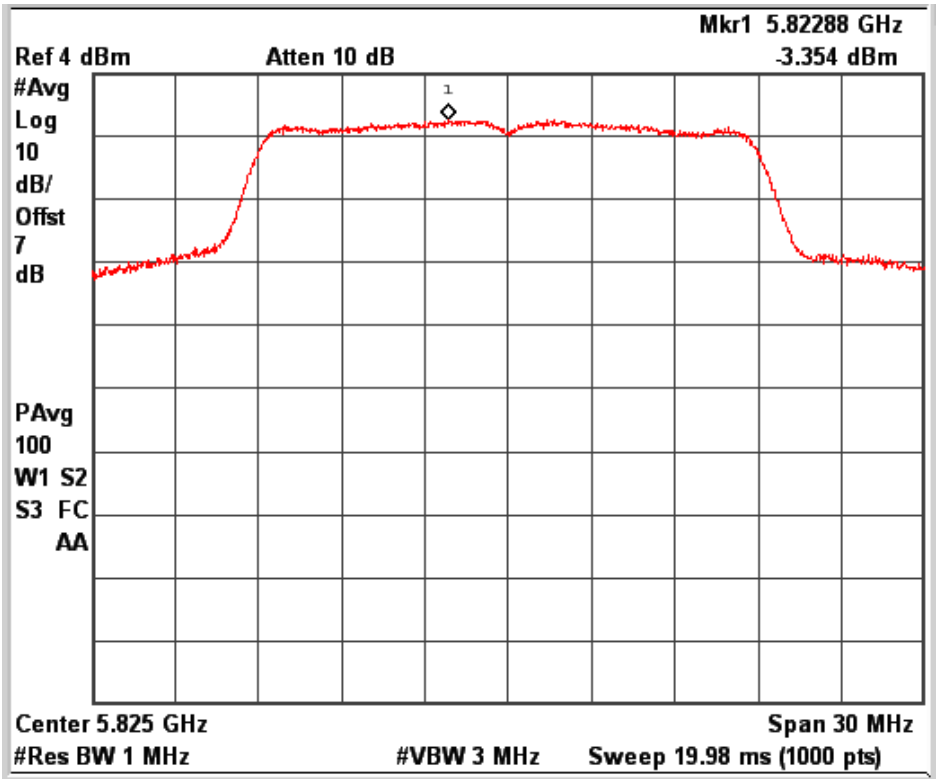
Data Rate: 54Mbps **Channel Frequency: 5825MHz**

Modulation: 802.11n

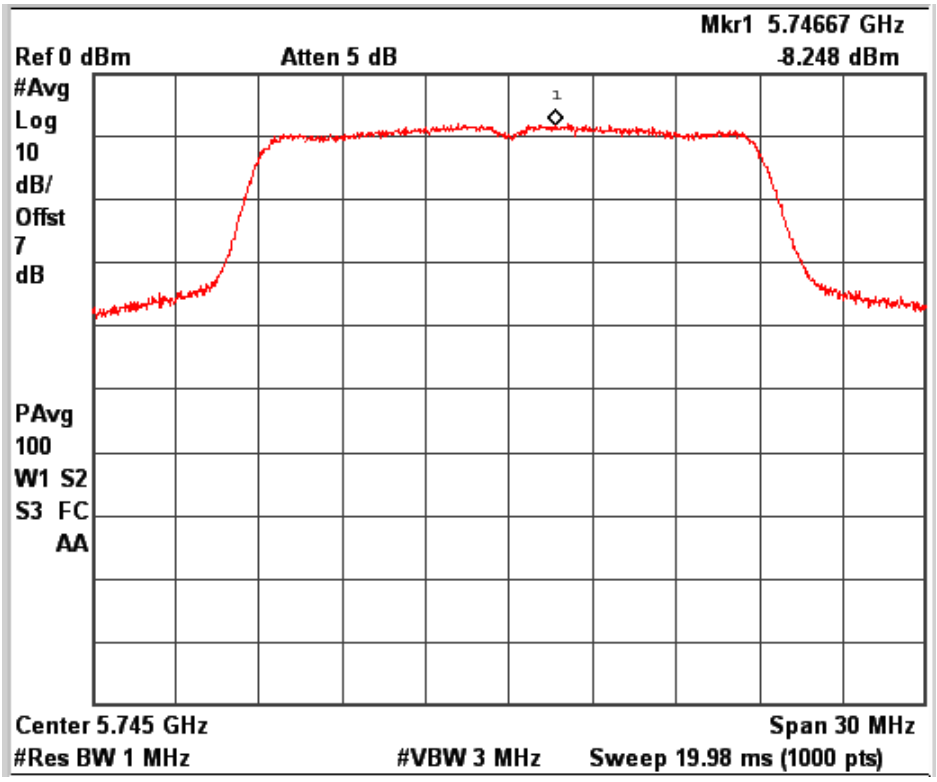
Data Rate	Channel No.	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
MCS0	149	5745	-8.36	30.00	-38.36
	165	5825	-3.35	30.00	-33.35
MCS4	149	5745	-8.25	30.00	-38.25
	165	5825	-3.47	30.00	-33.47
MCS7	149	5745	-7.99	30.00	-37.99
	165	5825	-3.69	30.00	-33.69



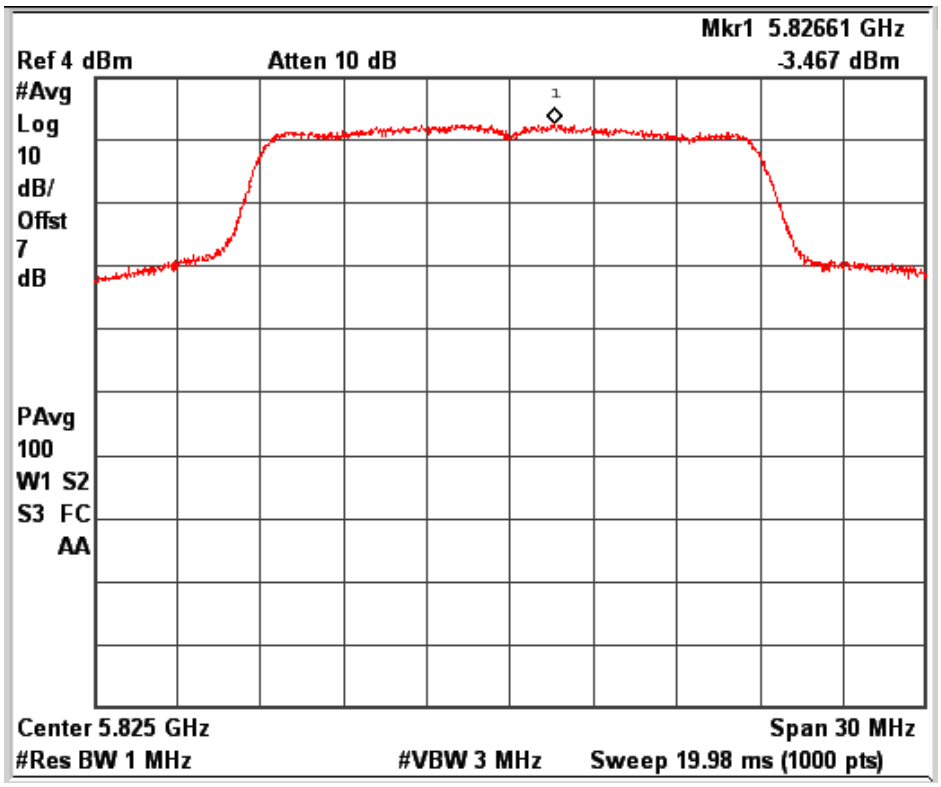
Data Rate: MCS0 **Channel Frequency: 5745MHz**



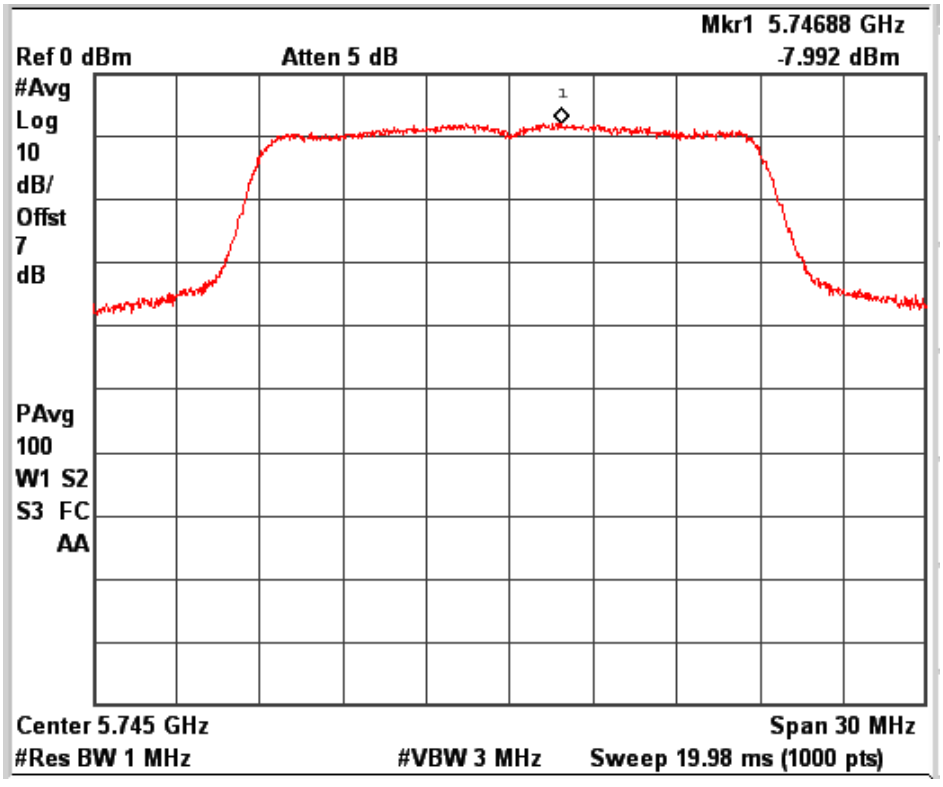
Data Rate: MCS0 **Channel Frequency: 5825MHz**



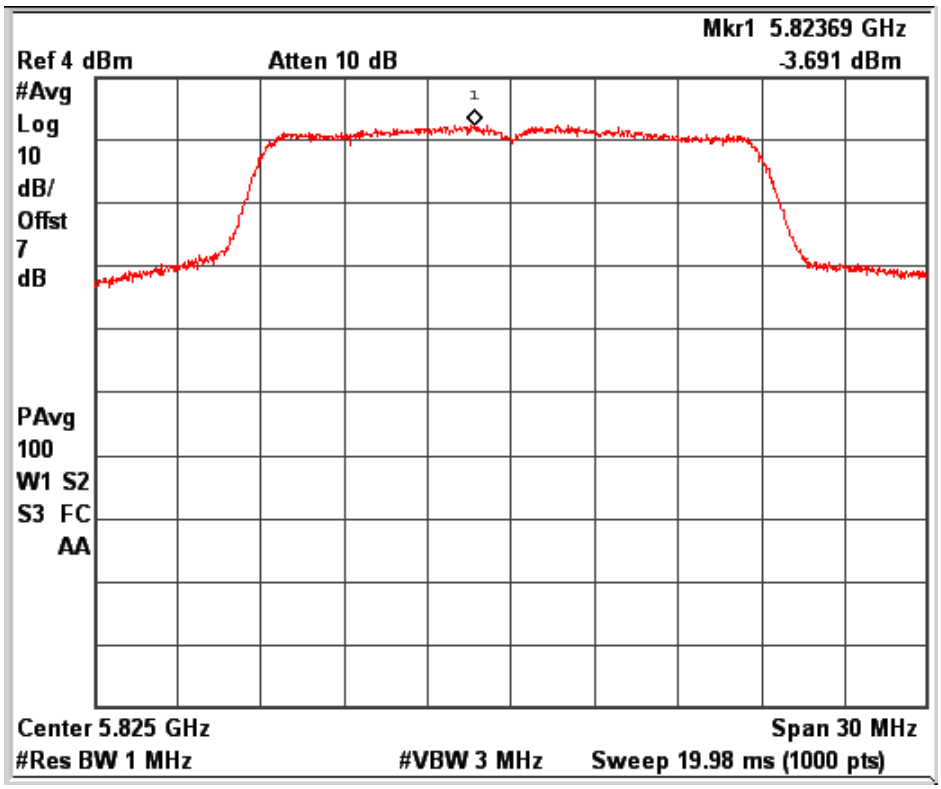
Data Rate: MCS0 **Channel Frequency: 5745MHz**



Data Rate: MCS0 **Channel Frequency: 5825MHz**



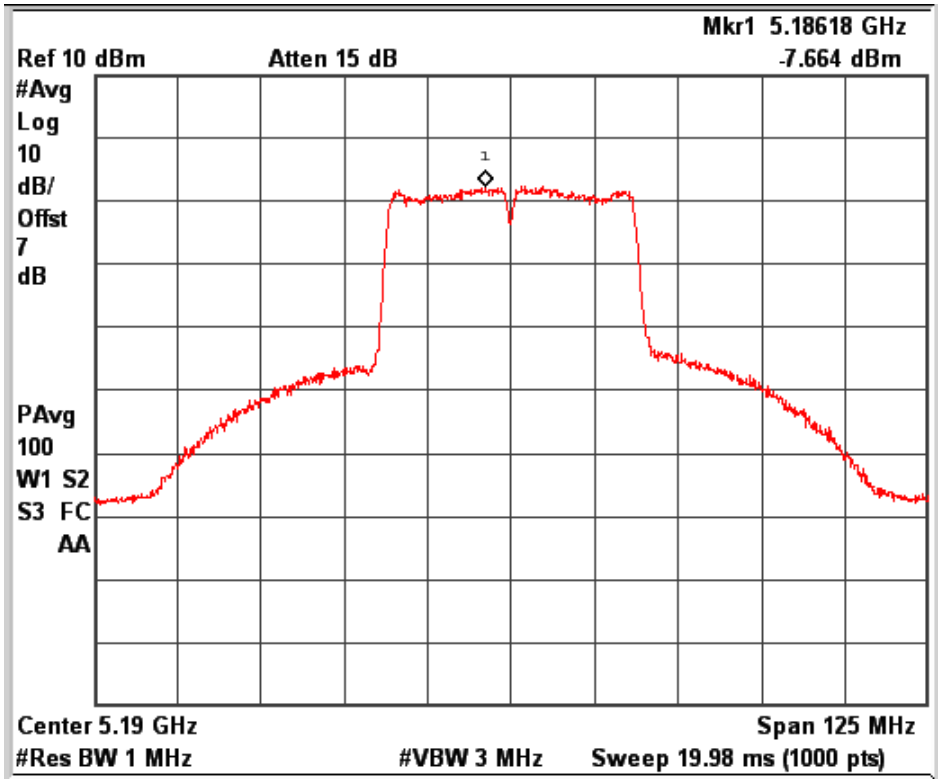
Data Rate: MCS0 **Channel Frequency: 5745MHz**



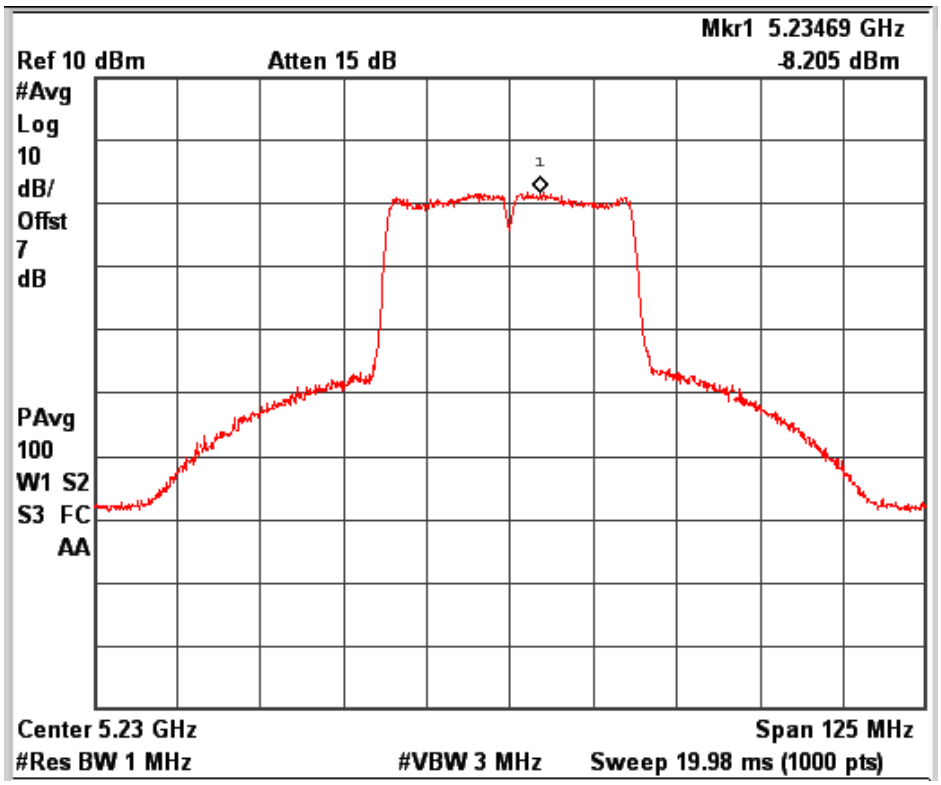
Data Rate: MCS0 **Channel Frequency: 5825MHz**

Modulation: 802.11n – 40 MHz Channel

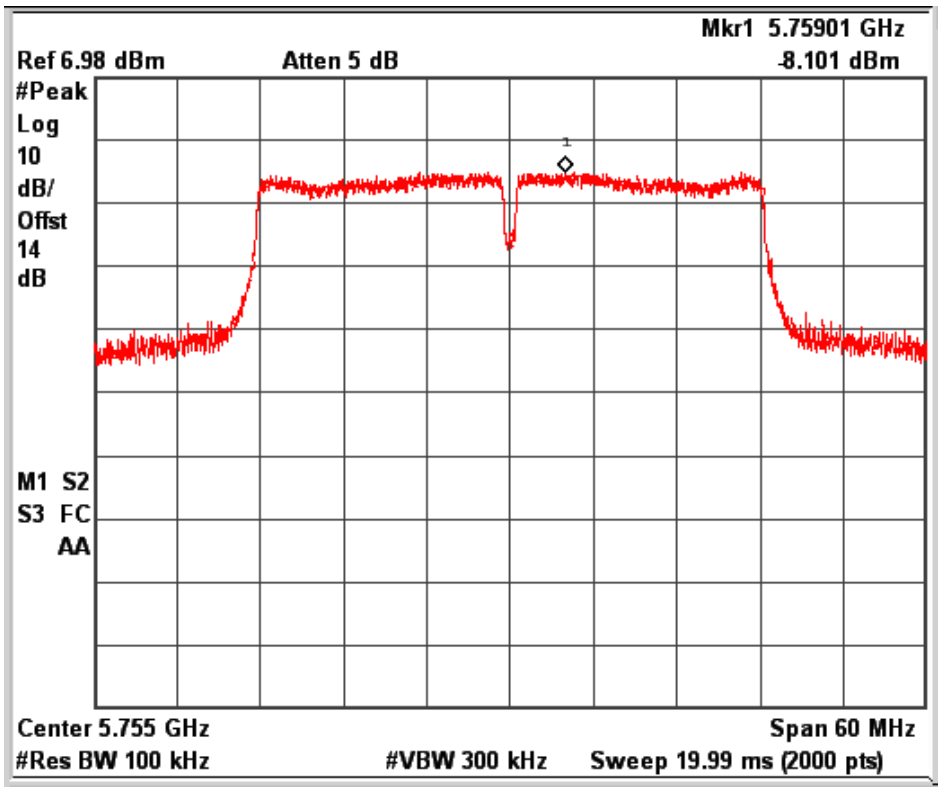
Data Rate	Channel No.	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
MCS0	38	5190	-7.66	17.00	-24.66
	46	5230	-8.21	17.00	-25.21
	151	5755	-8.10	30.00	-38.10
	159	5795	-2.09	30.00	-32.09
MCS4	38	5190	-8.58	11.00	-19.58
	46	5230	-7.78	11.00	-18.78
	151	5755	-6.34	30.00	-36.34
	159	5795	-0.96	30.00	-30.96
MCS7	38	5190	-8.16	11.00	-19.16
	46	5230	-7.98	11.00	-18.98
	151	5755	-6.13	30.00	-36.13
	159	5795	-0.21	30.00	-30.21



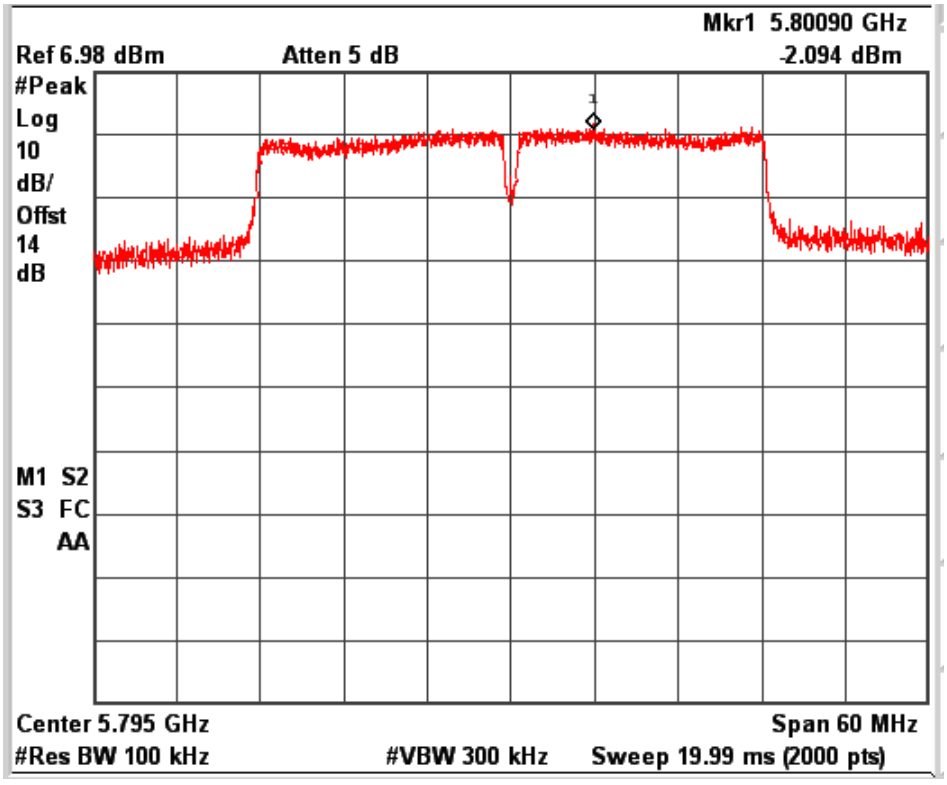
Data Rate: MCS0 **Channel Frequency: 5190MHz**



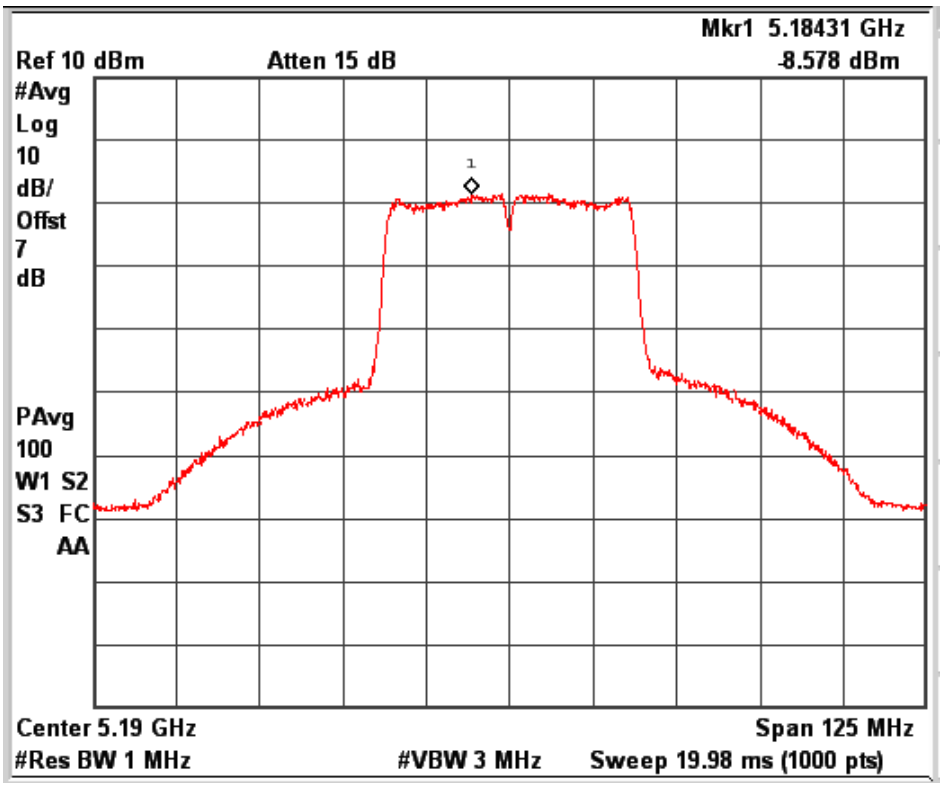
Data Rate: MCS0 **Channel Frequency: 5230MHz**



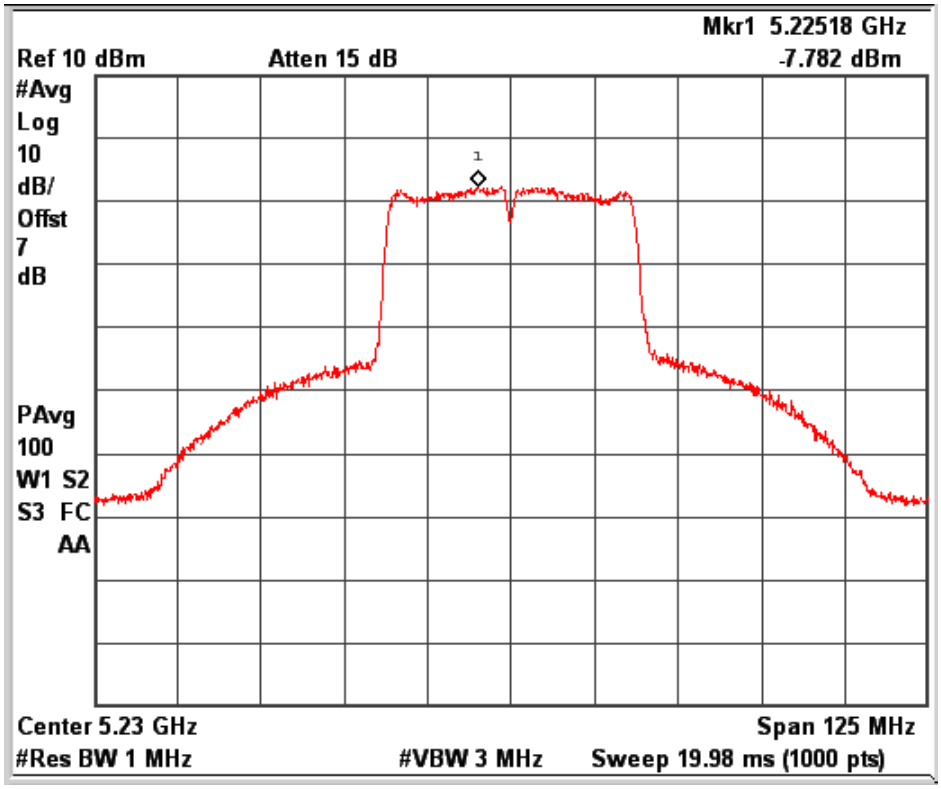
Data Rate: MCS0 **Channel Frequency: 5755MHz**



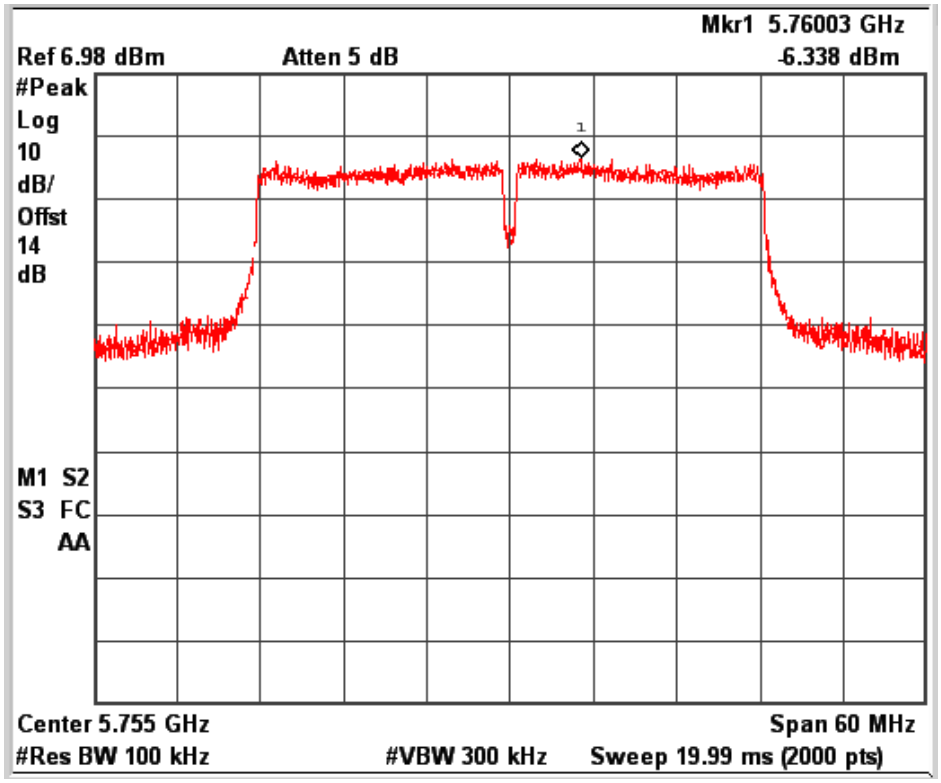
Data Rate: MCS0 **Channel Frequency: 5795MHz**



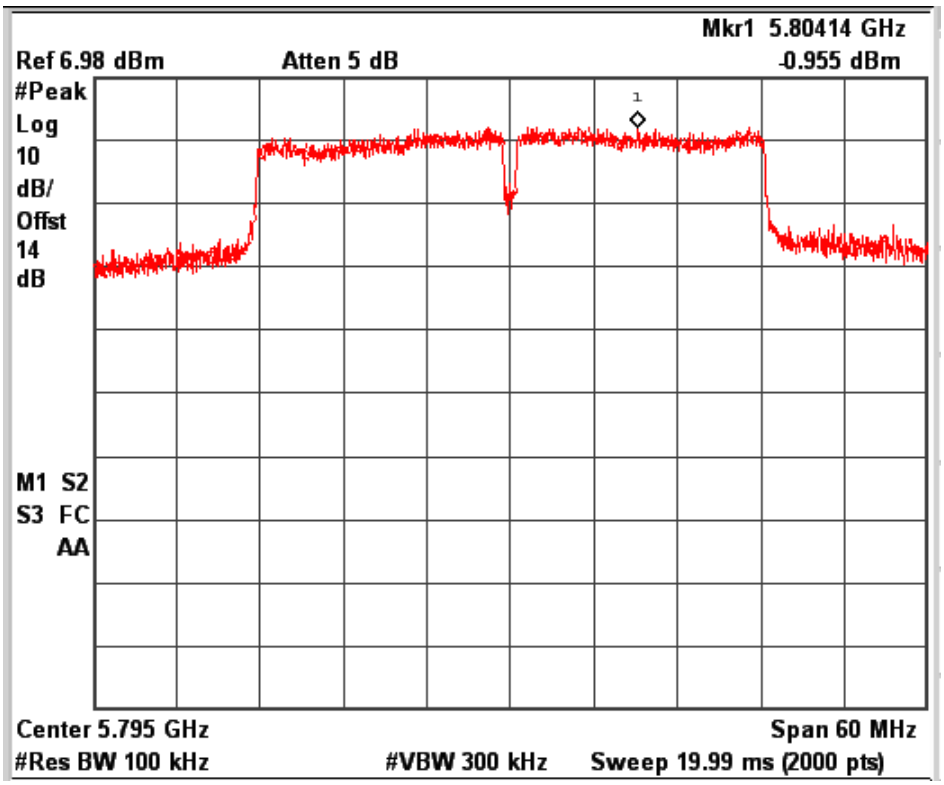
Data Rate: MCS4 **Channel Frequency: 5190MHz**



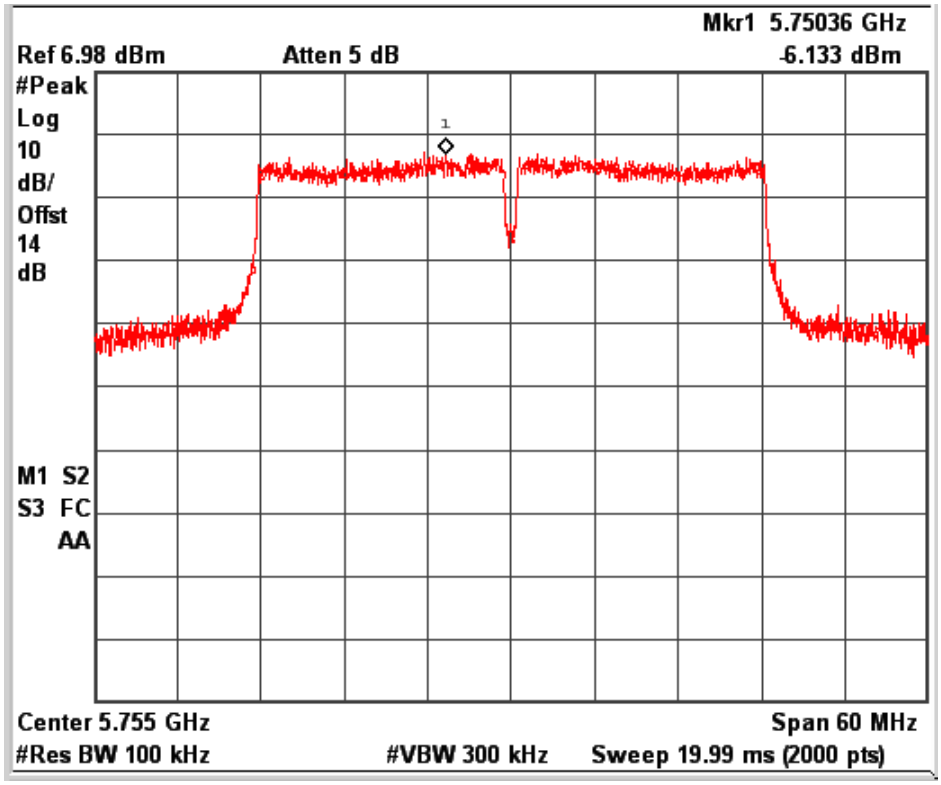
Data Rate: MCS4 **Channel Frequency: 5230MHz**



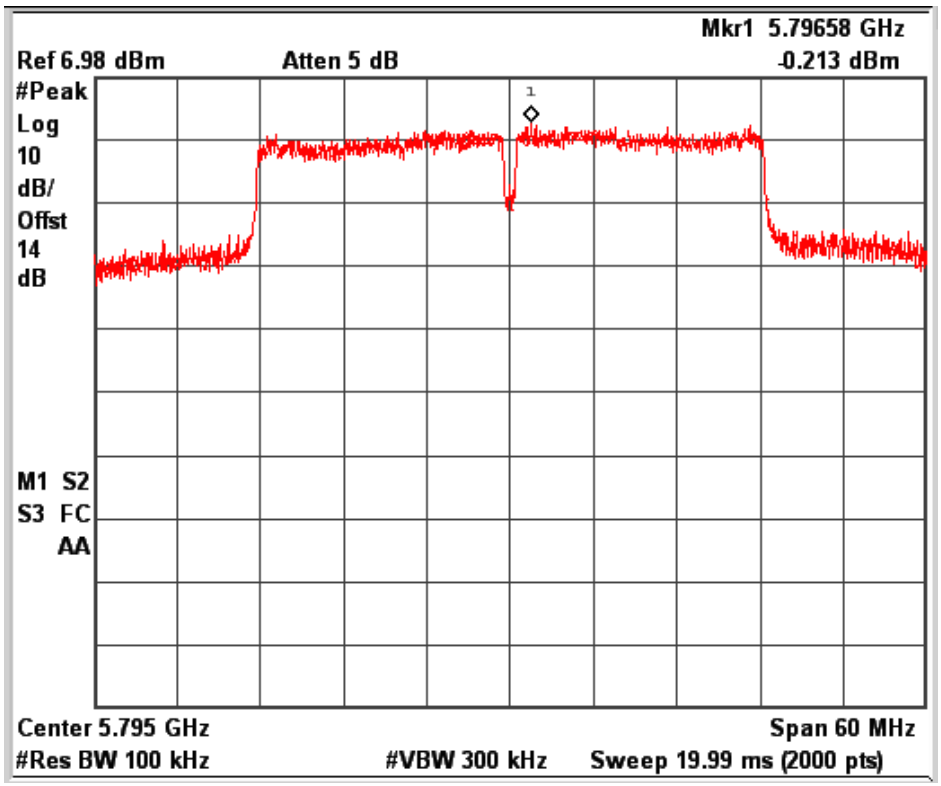
Data Rate: MCS4 **Channel Frequency: 5755MHz**



Data Rate: MCS4 **Channel Frequency: 5795MHz**



Data Rate: MCS7 **Channel Frequency: 5755MHz**



Data Rate: MCS7 **Channel Frequency: 5795MHz**

Radiated Spurious Emissions,
Restricted bands of operation and
Unwanted Emission **Section 15.209 /15.205/15.407 (b) (6)**
Result **Pass**

Test Specification	FCC Part 15 Section 15.209
Test Method	ANSI C63.10-2013
Measurement Location	Semi Anechoic Chamber
Measuring Distance	3m
Detection	QP for frequency below 1GHz, Peak/Average for frequency above 1GHz
Requirement	Should Comply with the limits stated in the below table.

Limit for Radiated Emission of Section 15.209:

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * the limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds To 88,50 – 53.80, 53.80 – 43.00 and 49.5dBμV/m at 3m range by extrapolation calculation and The measurement of loop antenna

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

Test results:

For frequencies Range 9 kHz – 1 GHz

No emissions were found in this frequency range.

For Frequencies above 1 GHz – 40 GHz

Emissions were found worst at data rate 54Mbps & MCS7, test result for same are reported below.

Note: No harmonics emissions were found.

802.11a: Channel Bandwidth - 20MHz; Data rate - 54 Mbps; Antenna - Fractus						
Frequency Bands	**Channel No./ Frequency**	**Frequency (MHz)**	**Polarization**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
5150-5250 (UNII -1)	36 (5180MHz)	5150 (Pk)	Vertical	70.46	74	-3.54
		5150 (Av)		48.64	54	-5.36
		5180 (Pk)		107.45	*	-
		5180 (Av)		96.71	*	-
		5150 (Pk)	Horizontal	69.27	74	-4.73
		5150 (Av)		44.95	54	-9.05
		5180 (Pk)		104.25	*	-
		5180 (Av)		93.54	*	-
	40 (5200MHz)	5200 (Pk)	Vertical	108.21	*	-
		5200 (Av)		97.89	*	-
		5200 (Pk)	Horizontal	105.68	*	-
		5200 (Av)		95.14	*	-
	48 (5240MHz)	5240 (Pk)	Vertical	107.98	*	-
		5240 (Av)		97.68	*	-
		5240 (Pk)	Horizontal	106.12	*	-
		5240 (Av)		95.89	*	-
5725-5850 (UNII - 3)	149 (5745MHz)	5715 (Pk)	Vertical	64.54	68.23	-3.69
		5725 (Pk)		72.09	78.23	-6.14
		5745 (Pk)		101.24	*	-
		5745 (Av)		90.9	*	-
		5715 (Pk)	Horizontal	60.53	68.23	-7.7
		5725 (Pk)		67.81	78.23	-10.42
		5745 (Pk)		97.49	*	-
		5745 (Av)		86.87	*	-
	157 (5785MHz)	5785 (Pk)	Vertical	103.98	*	-
		5785 (Av)		93.25	*	-
		5785 (Pk)	Horizontal	99.98	*	-
		5785 (Av)		89.45	*	-
	165 (5825MHz)	5825 (Pk)	Vertical	104.07	*	-
		5825 (Av)		93.47	*	-
		5850 (Pk)		70.41	78.23	-7.82
		5860 (Pk)		64.73	68.23	-3.5

		5825 (Pk)	Horizontal	100.13	*	-
		5825 (Av)		89.47	*	-
		5850 (Pk)		67.47	78.23	-10.76
		5860 (Pk)		60.52	68.23	-7.71

* - -> Fundamental Frequency
Pk-->Peak detector
AV-->Average Detector

802.11n: Channel Bandwidth - 20MHz; Data rate - MCS7; Antenna - Fractus						
Frequency Bands	**Channel No./ Frequency**	**Frequency (MHz)**	**Polarization**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
5150-5250 (UNII -1)	36 (5180MHz)	5150 (Pk)	Vertical	69.18	74	-4.82
		5150 (Av)		50.39	54	-3.61
		5180 (Pk)		107.25	*	-
		5180 (Av)		97.17	*	-
		5150 (Pk)	Horizontal	67.25	74	-6.75
		5150 (Av)		48.61	54	-5.39
		5180 (Pk)		103.62	*	-
		5180 (Av)		93.56	*	-
	40 (5200MHz)	5200 (Pk)	Vertical	107.98	*	-
		5200 (Av)		97.56	*	-
		5200 (Pk)	Horizontal	105.54	*	-
		5200 (Av)		94.86	*	-
	48 (5240MHz)	5240 (Pk)	Vertical	107.7	*	-
		5240 (Av)		98.35	*	-
		5240 (Pk)	Horizontal	106.08	*	-
		5240 (Av)		95.91	*	-
5725-5850 (UNII - 3)	149 (5745MHz)	5715 (Pk)	Vertical	63.84	68.23	-4.39
		5725 (Pk)		74.83	78.23	-3.4
		5745 (Pk)		100.59	*	-
		5745 (Av)		90.43	*	-
		5715 (Pk)	Horizontal	59.82	68.23	-8.41
		5725 (Pk)		70.6	78.23	-7.63
		5745 (Pk)		98.33	*	-
		5745 (Av)		86.23	*	-
	157 (5785MHz)	5785 (Pk)	Vertical	104.04	*	-
		5785 (Av)		93.68	*	-
		5785 (Pk)	Horizontal	98.76	*	-
		5785 (Av)		88.34	*	-
	165 (5825MHz)	5825 (Pk)	Vertical	103.88	*	-
		5825 (Av)		93.41	*	-
		5850 (Pk)		74.58	78.23	-3.65
		5860 (Pk)		67.21	68.23	-1.02
		5825 (Pk)	Horizontal	98.56	*	-
		5825 (Av)		88.29	*	-
		5850 (Pk)		68.71	78.23	-9.52
		5860 (Pk)		61.65	68.23	-6.58

* - -> Fundamental Frequency
Pk-->Peak detector
AV-->Average Detector

802.11n: Channel Bandwidth - 40MHz; Data rate - MCS7; Antenna - Fractus						
Freq Bands	**Ch No./ Frequency**	**Frequency (MHz)**	**Polarization**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
5150-5250 (UNII -1)	38 (5190MHz)	5150 (Pk)	Vertical	68.02	74	-5.98
		5150 (Av)		53.42	54	-0.58
		5190 (Pk)		100.06	*	-
		5190 (Av)		89.57	*	-
		5150 (Pk)	Horizontal	65.68	74	-8.32
		5150 (Av)		50.32	54	-3.68
		5190 (Pk)		97.4	*	-
		5190 (Av)		86.4	*	-
	46 (5230MHz)	5230 (Pk)	Vertical	100.78	*	-
		5230 (Av)		89.86	*	-
		5230 (Pk)	Horizontal	97.34	*	-
		5230 (Av)		86.79	*	-
5725-5850 (UNII - 3)	151 (5755MHz)	5715 (Pk)	Vertical	65.06	68.23	-3.17
		5725 (Pk)		68.19	78.23	-10.04
		5755 (Pk)		95.24	*	-
		5755 (Av)		84.2	*	-
		5715 (Pk)	Horizontal	59.71	68.23	-8.52
		5725 (Pk)		63.67	78.23	-14.56
		5755 (Pk)		90.19	*	-
		5755 (Av)		79.46	*	-
	159 (5795MHz)	5795 (Pk)	Vertical	99.94	*	-
		5795 (Av)		89.01	*	-
		5850 (Pk)		70.24	78.23	-7.99
		5860 (Pk)		66.8	68.23	-1.43
		5795 (Pk)	Horizontal	94.59	*	-
		5795 (Av)		84.51	*	-
		5850 (Pk)		65.55	78.23	-12.68
		5860 (Pk)		62.4	68.23	-5.83

* - -> Fundamental Frequency
Pk-->Peak detector
AV-->Average Detector

802.11a: Channel Bandwidth - 20MHz; Data rate - 54 Mbps; Antenna - Molex						
Freq Bands	**Ch No./ Frequency**	**Frequency (MHz)**	**Polarization**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
5150-5250 (UNII -1)	36 (5180MHz)	5150 (Pk)	Vertical	68.92	74	-5.08
		5150 (Av)		45.59	54	-8.41
		5180 (Pk)		100.93	*	-
		5180 (Av)		90.98	*	-

		5150 (Pk)	Horizontal	72.69	74	-1.31
		5150 (Av)		48.98	54	-5.02
		5180 (Pk)		106.78	*	-
		5180 (Av)		96.78	*	-
	40 (5200MHz)	5200 (Pk)	Vertical	100.34	*	-
		5200 (Av)		90.78	*	-
		5200 (Pk)	Horizontal	107.54	*	-
		5200 (Av)		97.21	*	-
	48 (5240MHz)	5240 (Pk)	Vertical	100.68	*	-
		5240 (Av)		91.8	*	-
		5240 (Pk)	Horizontal	107.04	*	-
		5240 (Av)		98.11	*	-
5725-5850 (UNII - 3)	149 (5745MHz)	5715 (Pk)	Vertical	63.18	68.23	-5.05
		5725 (Pk)		71.18	78.23	-7.05
		5745 (Pk)		99.42	*	-
		5745 (Av)		89.12	*	-
		5715 (Pk)	Horizontal	66.57	68.23	-1.66
		5725 (Pk)		73.56	78.23	-4.67
		5745 (Pk)		102.98	*	-
		5745 (Av)		93.24	*	-
	165 (5825MHz)	5825 (Pk)	Vertical	102.15	*	-
		5825 (Av)		91.47	*	-
		5850 (Pk)		68.01	78.23	-10.22
		5860 (Pk)		60.1	68.23	-8.13
		5825 (Pk)	Horizontal	109.36	*	-
		5825 (Av)		98.85	*	-
		5850 (Pk)		75.07	78.23	-3.16
		5860 (Pk)		66.9	68.23	-1.33

* - -> Fundamental Frequency
Pk-->Peak detector
AV-->Average Detector

802.11n: Channel Bandwidth - 20MHz; Data rate - MCS7; Antenna - Molex						
Freq Bands	**Ch No./ Frequency**	**Frequency (MHz)**	**Polarization**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
5150-5250 (UNII -1)	36 (5180MHz)	5150 (Pk)	Vertical	65.7	74	-8.3
		5150 (Av)		45.78	54	-8.22
		5180 (Pk)		98.78	*	-
		5180 (Av)		89.68	*	-
		5150 (Pk)	Horizontal	72.05	74	-1.95
		5150 (Av)		46.35	54	-7.65
		5180 (Pk)		105.07	*	-
		5180 (Av)		95.79	*	-
	40 (5200MHz)	5200 (Pk)	Vertical	100.45	*	-
		5200 (Av)		90.32	*	-
		5200 (Pk)	Horizontal	108.34	*	-
		5200 (Av)		97.89	*	-
	48 (5240MHz)	5240 (Pk)	Vertical	100.59	*	-
		5240 (Av)		91.52	*	-

		5240 (Pk)	Horizontal	108.28	*	-
		5240 (Av)		99.32	*	-
5725-5850 (UNII - 3)	149 (5745MHz)	5715 (Pk)	Vertical	59.49	68.23	-8.74
		5725 (Pk)		71.49	78.23	-6.74
		5745 (Pk)		96.92	*	-
		5745 (Av)		87.87	*	-
		5715 (Pk)	Horizontal	66.22	68.23	-2.01
		5725 (Pk)		76.54	78.23	-1.69
		5745 (Pk)		100.64	*	-
		5745 (Av)		91.87	*	-
	157 (5785MHz)	5785 (Pk)	Vertical	102.12	*	-
		5785 (Av)		92.21	*	-
		5785 (Pk)	Horizontal	106.84	*	-
		5785 (Av)		95.93	*	-
	165 (5825MHz)	5825 (Pk)	Vertical	99.57	*	-
		5825 (Av)		90.62	*	-
		5850 (Pk)		72.75	78.23	-5.48
		5860 (Pk)		64.52	68.23	-3.71
		5825 (Pk)	Horizontal	106.76	*	-
		5825 (Av)		97.52	*	-
		5850 (Pk)		75.57	78.23	-2.66
		5860 (Pk)		67.53	68.23	-0.7

* - -> Fundamental Frequency
Pk-->Peak detector
AV-->Average Detector

802.11n: Channel Bandwidth - 40MHz; Data rate - MCS7; Antenna - Molex						
Freq Bands	**Ch No./ Frequency**	**Frequency (MHz)**	**Polarization**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
5150-5250 (UNII -1)	38 (5190MHz)	5150 (Pk)	Vertical	68.93	74	-5.07
		5150 (Av)		48.31	54	-5.69
		5190 (Pk)		94.19	*	-
		5190 (Av)		84.66	*	-
		5150 (Pk)	Horizontal	73.05	74	-0.95
		5150 (Av)		52.41	54	-1.59
		5190 (Pk)		100.26	*	-
		5190 (Av)		90.64	*	-
	46 (5230MHz)	5230 (Pk)	Vertical	89.79	*	-
		5230 (Av)		79.12	*	-
		5230 (Pk)	Horizontal	99.94	*	-
		5230 (Av)		89.78	*	-
5725-5850 (UNII - 3)	151 (5755MHz)	5715 (Pk)	Vertical	63.36	68.23	-4.87
		5725 (Pk)		66.8	78.23	-11.43
		5755 (Pk)		92.04	*	-
		5755 (Av)		82.13	*	-
		5715 (Pk)	Horizontal	67.02	68.23	-1.21
		5725 (Pk)		68.32	78.23	-9.91
		5755 (Pk)		96.28	*	-
		5755 (Av)		87.76	*	-

	159 (5795MHz)	5795 (Pk)	Vertical	95.78	*	-
		5795 (Av)		86.23	*	-
		5850 (Pk)		68.21	78.23	-10.02
		5860 (Pk)		64.45	68.23	-3.78
		5795 (Pk)	Horizontal	99.23	*	-
		5795 (Av)		89.43	*	-
		5850 (Pk)		71.23	78.23	-7
		5860 (Pk)		66.32	68.23	-1.91

* - -> Fundamental Frequency
P-->Peak detector
AV-->Average Detector

802.11a: Channel Bandwidth - 20MHz; Data rate - 54 Mbps; Antenna - Redpine						
Freq Bands	**Ch No./ Frequency**	**Frequency (MHz)**	**Polarization**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
5725-5850 (UNII - 3)	149 (5745MHz)	5715 (Pk)	Vertical	59.85	68.23	-8.38
		5725 (Pk)		67.93	78.23	-10.3
		5745 (Pk)		98.65	*	-
		5745 (Av)		88.31	*	-
		5715 (Pk)	Horizontal	67.54	68.23	-0.69
		5725 (Pk)		75.26	78.23	-2.97
		5745 (Pk)		106.62	*	-
		5745 (Av)		95.75	*	-
	157 (5785MHz)	5785 (Pk)	Vertical	99.78	*	-
		5785 (Av)		89.32	*	-
		5785 (Pk)	Horizontal	107.24	*	-
		5785 (Av)		96.72	*	-
	165 (5825MHz)	5825 (Pk)	Vertical	99.32	*	-
		5825 (Av)		89.14	*	-
		5850 (Pk)		66.32	78.23	-11.91
		5860 (Pk)		61.35	68.23	-6.88
		5825 (Pk)	Horizontal	107.01	*	-
		5825 (Av)		96.54	*	-
		5850 (Pk)		75.78	78.23	-2.45
		5860 (Pk)		66.45	68.23	-1.78

* - -> Fundamental Frequency
Pk-->Peak detector
AV-->Average Detector

802.11n: Channel Bandwidth - 20MHz; Data rate - MCS7; Antenna - Redpine						
Freq Bands	**Ch No./ Frequency**	**Frequency (MHz)**	**Polarization**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
5725-5850 (UNII - 3)	149 (5745MHz)	5715 (Pk)	Vertical	55.48	68.23	-12.75
		5725 (Pk)		69.02	78.23	-9.21
		5745 (Pk)		97.16	*	-
		5745 (Av)		87.06	*	-
		5715 (Pk)	Horizontal	63.76	68.23	-4.47
		5725 (Pk)		76.28	78.23	-1.95
		5745 (Pk)		104.9	*	-
		5745 (Av)		94.74	*	-
	157 (5785MHz)	5785 (Pk)	Vertical	99.78	*	-
		5785 (Av)		89.32	*	-
		5785 (Pk)	Horizontal	107.24	*	-
		5785 (Av)		96.72	*	-
	165 (5825MHz)	5825 (Pk)	Vertical	98.04	*	-
		5825 (Av)		88.37	*	-
		5850 (Pk)		66.87	78.23	-11.36
		5860 (Pk)		60.22	68.23	-8.01
		5825 (Pk)	Horizontal	106.33	*	-
		5825 (Av)		96.21	*	-
		5850 (Pk)		75.54	78.23	-2.69
		5860 (Pk)		66.82	68.23	-1.41

* - -> Fundamental Frequency
Pk-->Peak detector
AV-->Average Detector

802.11n: Channel Bandwidth - 40MHz; Data rate - MCS7; Antenna - Redpine						
Freq Bands	**Ch No./ Frequency**	**Frequency (MHz)**	**Polarization**	**Field Strength (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
5150-5250 (UNII -1)	38 (5190MHz)	5150 (Pk)	Vertical	67.35	74	-6.65
		5150 (Av)		51.33	54	-2.67
		5190 (Pk)		95.89	*	-
		5190 (Av)		84.93	*	-
		5150 (Pk)	Horizontal	69.57	74	-4.43
		5150 (Av)		53.1	54	-0.9
		5190 (Pk)		100.8	*	-
		5190 (Av)		90.15	*	-
	46 (5230MHz)	5230 (Pk)	Vertical	96.67	*	-
		5230 (Av)		85.78	*	-
		5230 (Pk)	Horizontal	102.56	*	-
		5230 (Av)		92.34	*	-
5725-5850 (UNII - 3)	151 (5755MHz)	5715 (Pk)	Vertical	61.27	68.23	-6.96
		5725 (Pk)		65.09	78.23	-13.14
		5755 (Pk)		93.05	*	-
		5755 (Av)		82.62	*	-

		5715 (Pk)	Horizontal	66.5	68.23	-1.73
		5725 (Pk)		70.83	78.23	-7.4
		5755 (Pk)		101.02	*	-
		5755 (Av)		89.57	*	-
	159 (5795MHz)	5795 (Pk)	Vertical	96.16	*	-
		5795 (Av)		86.24	*	-
		5850 (Pk)		66.29	78.23	-11.94
		5860 (Pk)		61.46	68.23	-6.77
		5795 (Pk)	Horizontal	103.84	*	-
		5795 (Av)		93.11	*	-
		5850 (Pk)		71.78	78.23	-6.45
		5860 (Pk)		66.97	68.23	-1.26

* - -> Fundamental Frequency
Pk-->Peak detector
AV-->Average Detector

Power level Settings used during testing:

20MHz Channel

20MHz Channel: Power setting used for Molex antenna. Attenuation to antenna gain used is '0'								
Band	Channel Frequency (MHz)	Channel No.	Data Rate					
			MCS0	6Mbps	MCS4	24Mbps	MCS7	54Mbps
UNII 1	5180	36	10	11	10	11	10	11
	5200	40	14	14	14	14	14	14
	5240	48	14	14	14	14	14	14
UNII 3	5745	149	4	5	4	5	4	5
	5765	153	9	10	9	10	9	10
	5785	157	9	10	9	10	9	10
	5825	165	8	9	8	9	8	9

20MHz Channel: Power setting used for Fractus antenna Attenuation to antenna gain used is '0'								
Band	Channel Frequency (MHz)	Channel No.	Data Rate					
			MCS0	6Mbps	MCS4	24Mbps	MCS7	54Mbps
UNII 1	5180	36	12	12	12	12	12	12
	5200	40	14	14	14	14	14	14
	5240	48	14	14	14	14	14	14
UNII 3	5745	149	4	5	4	5	4	5
	5765	153	9	10	9	10	9	10
	5785	157	9	10	9	10	9	10
	5825	165	9	10	9	10	9	10

20MHz Channel: Power setting used for Redpine antenna. Attenuation to antenna gain used is '0'								
Band	Channel Frequency (MHz)	Channel No.	Data Rate					
			MCS0	6Mbps	MCS4	24Mbps	MCS7	54Mbps
UNII 3	5745	149	4	5	4	5	4	5
	5765	153	9	10	9	10	9	10
	5785	157	9	10	9	10	9	10
	5825	165	7	9	7	9	7	9

40MHz Channel

40MHz Channel: Power setting used for Molex antenna. Attenuation to antenna gain used is '0'					
Band	Channel Frequency (MHz)	Channel No.	Data rate		
			MCS0	MCS4	MCS7
UNII 1	5190	38	6	6	6
	5230	46	7	7	7
UNII 3	5755	151	2	2	2
	5795	159	7	7	7

40MHz Channel: Power setting used for Fractus antenna. Attenuation to antenna gain used is '0'					
Band	Channel Frequency (MHz)	Channel No.	Data rate		
			MCS0	MCS4	MCS7
UNII 1	5190	38	7	7	7
	5230	46	7	7	7
UNII 3	5755	151	3	3	3
	5795	159	8	8	8

40MHz Channel: Power setting used for Redpine antenna. Attenuation to antenna gain used is '0'					
Band	Channel Frequency (MHz)	Channel No.	Data rate		
			MCS0	MCS4	MCS7
UNII 1	5190	38	6	6	6
	5230	46	7	7	7
UNII 3	5755	151	2	2	2
	5795	159	6	6	6