Prüfbericht-Nr.: *Test report no.:*	**ULR-TC568820300000049F**	**Auftrags-Nr.:** *Order no.:*	**166489005 0010**	Seite 1 von 170 *Page 1 of 170*
Kunden-Referenz-Nr.: *Client reference no.:*	NA	**Auftragsdatum:** *Order date:*	2020-10-08	
Auftraggeber: *Client:*	GE Vingmed Ultrasound AS Strandpromenaden 45, N-3183, Horten, Norway			
Prüfgegenstand: *Test item:*	Vscan Air CL			
Bezeichnung.: *Identification .:*	A1			
Auftrags-Inhalt: *Order content:*	Testing and issue of Test Report and Grant Certificate			
Prüfgrundlage: *Test specification:*	FCC Part 15 Subpart C 15.247, 15.207 RSS 247 Issue 2 and RSS GEN Issue 5			
Wareneingangsdatum: *Date of sample receipt:*	2020-10-23			
Prüfmuster-Nr & Serien-Nr.: *Test sample no & serial no.:*	A002935536-001 A002935536-002 & VA004000417			
Prüfzeitraum: *Testing period:*	2020-10-23 - 2020-10-27			
Ort der Prüfung: *Place of testing:*	Wireless laboratory, Bangalore			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (India) Pvt. Ltd. 27/B,2nd cross road, Electronic city Phase1, Banglore-560100, India FCC Test Site Registration No: 496599 ISED Test Site Registration No.: 3466E-1			
Prüfergebnis*: *Test result*:*	Pass			

geprüft von: *tested by:*		**genehmigt von:** *authorized by:*	
Datum: *Date:* 2020-11-27		**Ausstellatum:** *Issue date:* 2020-11-27	
Stellung / *Position:*	**Rajesh M Gowda** Engineer	**Stellung** / *Position:*	**Mahammadgouse Kaladagi** Assistant Manager
Sonstiges / *Other:*	FCC ID: YOM-VSCANAIR IC ID: 9136A-VSCANAIR		

Zustand des Prüfgegenstandes bei Anlieferung: **Prüfmuster vollständig und unbeschädigt**
Condition of the test item at delivery: ***Test item complete and undamaged***

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m test specification(s)		*F(ail) = failed a.m test specification(s)*	*N/A = not applicable*	*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 only 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 test mark.
V05

TEST SUMMARY

Test Item	Applicable Standard		Result
	FCC	ISED	
Maximum conducted (average) output power	FCC 15.247(b)(3)	RSS 247 Issue 2, Section 5.4 (d)	Pass
Maximum Power Spectral Density	FCC 15.247(e)	RSS 247 Issue 2, Section 5.2 (b)	Pass
DTS Bandwidth	FCC 15.247(a)(2)	RSS 247 Issue 2, Section 5.2 (a)	Pass
Emissions in non-restricted frequency bands	FCC 15.247(d)	RSS 247 Issue 2, Section 5.5	Pass
Spurious Radiated Emissions and Restricted Bands of Operation	FCC 15.209 / FCC 15.205	RSS-Gen Issue 5, Section 8.9 /8.10	Pass
Conducted Emissions on a.c Power Lines	FCC 15.207	RSS-Gen Issue 5, Section 8.8	Pass

Product Category: Electronics Testing
Test Discipline: EMC Test Facility

REVISION HISTORY OF THIS REPORT

Report Number	Version	Description	Issue date
ULR-TC568820300000049F	01	Initial issue of report	2020-11-27

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1 GENERAL REMARKS

1.1 Attachments

All attachments are part of this test report and are issued in separate document

1. TEST SETUP PHOTOS

2: EUT EXTERNAL PHOTOS

3: EUT INTERNAL PHOTOS

4: FCC LABEL AND LABEL LOCATION

5: BLOCK DIAGRAM

6: SPECIFICATION OF EUT

7: SCHEMATIC DIAGRAM

8: BILL OF MATERIAL

9: USER MANUAL

10: MAXIMUM PERMISSIBLE EXPOSURE INFORMATION

2 TEST SITES

2.1 Testing Facilities

1. TÜV Rheinland (India) Pvt.Ltd.,
   27/B, 2nd Cross,
   ElectronicCityPhase1
   Bangalore – 560 100,
   India

2. TUV Rheinland (India) Private Limited
   108 , Beside ISBR Business School,
   Electronic city Phase I
   Bangalore - 560 100.
   India

2.2 List of Test and Measurement Instruments

Table 1: List of test and measurement instruments

Equipment	Manufacturer	Model Name	Serial Number	Firmware Versions	Calibration Due Date	Periodicity	Test Facility
EMI Receiver	Rohde & Schwarz	ESU 40	100288	4.43 SP3	11.10.2021	Yearly	Radiated Spurious Emission
Active loop antenna	Frankonia	LAX-10	LAX-10-800	-	16.07.2021	Yearly	
Baloon and Biconical Antenna	Schwarzbeck mess-elektronik	VHBB-9124 / BBA-9106	01028	-	02.09.2021	Yearly	
Log – Periodic Antenna	Schwarzbeck mess-elektronik	VUSLP-9111B	9111B-111	-	31/08/2021	Yearly	
Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1944	-	30.01.2021	Yearly	
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170-0904	-	29.01.2021	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	-	
Fully Anechoic Chamber	Albatross	-	-	-	-	-	
Spectrum Analyser	Agilent Technologies	E4407B	US41192772	A.14.06	10.08.2021	Yearly	Antenna - Port Measurements
EMI Receiver	Rohde & Schwarz	ESW 44	101732	-	10.12.2020	Yearly	AC Power line conducted emission
LISN	Rohde & Schwarz	ENV 216	100022	-	05.09.2020	Yearly	
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100811	-	05.08.2021	Yearly	

Table 2: Instrument application Software versions

SL. No.	Test Type	Application software	Version
1	Radiated spurious emission measurement in SAC	EMC 32	10.60.00
2	Radiated spurious emission measurement in FAC	EMC 32	10.60.00

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

Vscan Air CL consists of a dual headed probe which integrates both, curved and linear array transducers, and an app which can be installed on Android or iOS mobile devices.

Vscan Air CL is a battery-operated software-based general-purpose ultrasound imaging system for use by qualified and trained healthcare professionals or practitioners that are legally authorized or licensed by law in the country, state or other local municipality in which he or she practices. The users may or may not be working under supervision or authority of a physician. Users may also include Medical Students working under the supervision or authority of a physician during their education / training. The device is enabling visualization and measurement of anatomical structures and fluid including blood flow.

3.2 Ratings and System Details of Equipment under Test

Table 3: Ratings and System Details as declared by Client*

Radio Protocol		Wi-Fi	BLE
Operating Frequency Range		2412MHz to 2462MHz	2402MHz to 2480MHz
No. of Channels		11 (Refer Table 5)	40 (Refer Table 6)
Channel Spacing		5MHz	2MHz
Maximum Measured Power (e.i.r.p)		17.01 dBm (6Mbps 2437MHz)	7.61 dBm(1Mbps 2480MHz)
Modulation		802.11b: DSSS (DBPSK/DQPSK/CCK) 802.11g/n: OFDM (BPSK/QPSK/16QAM/64QAM)	GFSK
Number of antennas		1	
Antenna Gain		2.53 dBi	
Antenna Type		PCB Antenna	
Supply Voltage to Product		3.6V DC Li-Ion battery	
Environmental conditions	Storage	-40°C to +70°C Relative Humidity <95%	
	Operating	0°C to + 35°C Relative Humidity <95%	
EUT Dimension		130 x 65 x 30 mm (LxWxT)	

***Disclaimer**: The information/data is supplied by the client and the same is considered to arrive at the final value. Any changes made apart from the specified specification, can directly impact on the tests results. Refer the products user manual for more details.

Note: Product Vscan Air CL has multiple protocols. All the supported wireless protocols and their respective test results are issued in separate test reports, refer clause 4.6 Report references

3.3 Measurement Uncertainty:

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k = 2$

Table 4: Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±3 ℃
Supply Voltages	±3 %
Time	±5 %

Note: The Listed Measurement Uncertainties are the worst-case uncertainty, for the respective test cases. Above Table is for reporting purpose only and not used in determining Final Pass/Fail verdict.

4 TEST SET-UP AND OPERATION MODE

4.1 Principle of Configuration Selection

Transmission was enabled with highest possible duty cycle on low, mid and high channels.

This product operates in 2 mode (Linear and Convex) as described in below table of this test report, these mode of operations are related to analog circuitry and do not affect the RF characteristics.

4.1.1 EUT Mode of operation

Mode	Description
Convex / Curved	Deep scanning uses curved transduser, with Wi-Fi in Tx and Rx mode and BLE is used for initial paring
Linear	Shallow scanning uses Linear transduser with Wi-Fi in Tx and Rx mode and BLE is used for initial paring
Charging mode	Probe will automatically turn off during charging, i.e. Wi-Fi and BLE are turned off

4.1.2 Following configurations are used for testing

Test cases	Mode of operation
All conducted RF test cases	Special configuration tool is used to enable the Wi-Fi and BLE continuous transmission as needed
All radiated test cases < 1 GHz	Linear mode, Convex mode and charging mode as defined in 4.1.1
All radiated test cases > 1 GHz	Special configuration tool is used to enable the Wi-Fi and BLE continuous transmission as needed
Power line conducted emission	charging mode as defined in 4.1.1

4.2 Test Operation and Test Software

Hardware Version of Vscan Air CL: GP000010 Rev7
Hardware Version of Digital board: GP200400 Rev7
Hardware Version of HV board: GP200401 Rev6
Hardware Version of Analog board: GP200402 Rev5
Hardware Version of USB flex: GP200109 Rev1

Software Version of Vscan Air: 1.0.14.289
APP Software name: Vscan Air
APP Software Version: 1.0.14.14997

EUT can be configured for different test conditions using calibrator tool commands
Calibrator tool version = 0.80

Medical Device name of the probe: Vscan Air CL
Medical Device name of the application SW (app): Vscan Air

Brand	Model	REF	Part Number
Vscan	Air for Android	Vscan Air for Android	GP000240
	Air for iOS	Vscan Air for iOS	GP000250

Wireless Charging Pad - Anker A2503
AC/DC Power adapter - XP Power VEU10US050

4.3 Special Accessories and Auxiliary Equipment

- None

4.4 Countermeasures to achieve EMC Compliance

- None

4.5 List of frequencies

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
2412 – 2462	**1**	**2412**
	2	2417
	3	**2422**
	4	2427
	5	2432
	6	**2437**
	7	2442
	8	2447
	9	**2452**
	10	2457
	11	**2462**

Table 5: List of Wi-Fi center Frequencies

Channel used for Wi-Fi testing

Channel Bandwidth 20MHz

Channel low : 2412MHz

Channel mid : 2437MHz

Channel high : 2462MHz

Channel Bandwidth 40MHz

Channel low : 2422MHz

Channel high : 2452MHz

Frequency Band (GHz)	Channel No.	Frequency (MHz)
BLE (2.4-2.4835)	**0**	**2402**
	1	2404
	2	2406
	3	2408
	:	:
	:	:
	18	2438
	19	**2440**
	20	2437
	:	:
	:	:
	36	2474
	37	2476
	38	2478
	39	**2480**

Table 6: List of BLE Center frequencies

Channel used for BLE testing

Channel low : 2402MHz

Channel mid : 2440MHz

Channel High : 2480MHz

Note:

TUV Sample Identification number : A002935536-005 -Radiated & SAR test Sample
A002935536-006– Conducted test Sample

4.6 Report references

Note: Product Vscan Air CL has multiple protocols. All the supported wireless protocols and their respective test results are issued in saparate test reports, following table lists the report numbers.

Radio Protocol	Report Number
RF test report for Wi-Fi (2.4GHz) & BLE (2.4GHz) – (This report)	ULR-TC568820300000049F
RF test report for Wi-Fi (5GHz)	ULR-TC568820300000050F
SAR test report for Wi-Fi (2.4 & 5GHz)	ULR-TC568820300000054F
RF test report for Wireless power transmission systems, Wireless charger (111 kHz to 205 kHz)	ULR-TC568820300000053F

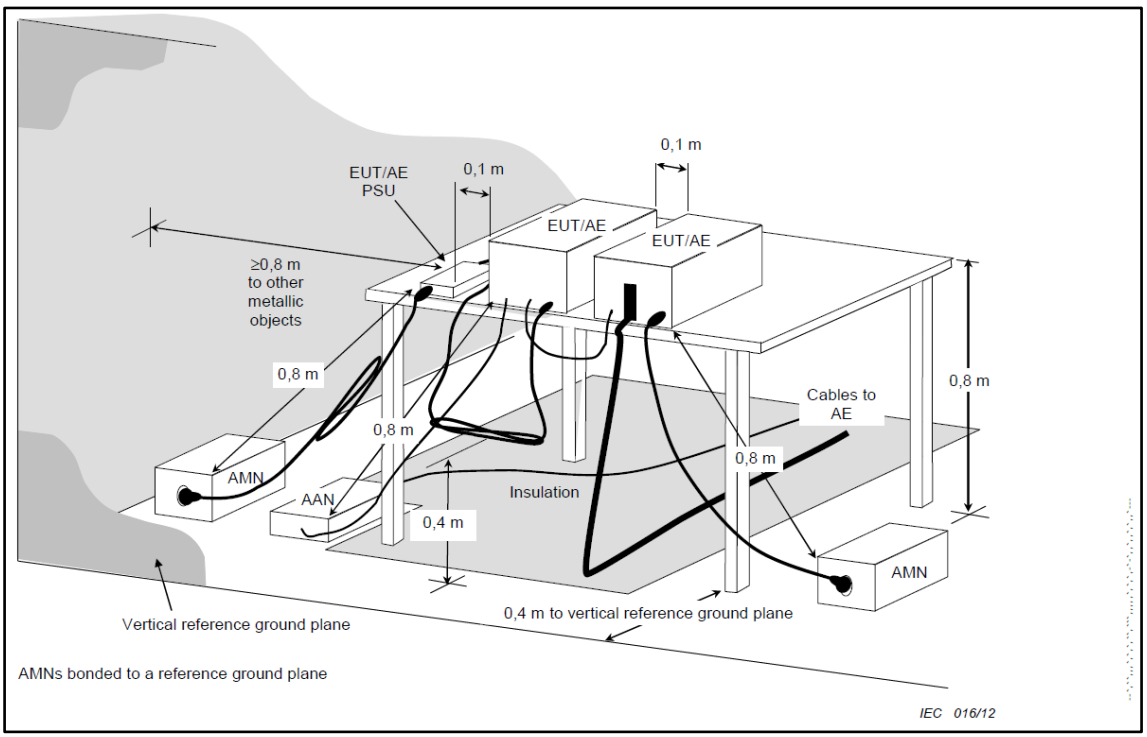
5 TEST METHODOLOGY

5.1 Conducted Spurious Emission Test on AC Power Line

Measured levels of ac power-line conducted emission across the 50Ω LISN port (to which the EUT is connected). All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer.

The device is placed on the test table, raised 80cm above the referance ground plane. The vertical conducting plane is located 40cm to the rear of the device. AC Conducted emission measurement is made over frequency range from 150kHz to 30MHz, this measurement was performed with EUT powered by 2 methods and both method are tested individually, one with an AC adaptor with 110V AC 60Hz supply and second with Wireless charger with supply 110V AC 60Hz.

5.1.1 Test Setup Configuration



5.2 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 for below 1 GHz & 1.5 m height for above 1 GHz measurement, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360˚ for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, 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 1000 MHz was performed by horn antenna, The measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 200 MHz was performed by Baloon and Biconical Antenna, and mesurement from 200 MHz to 1 GHz was performed by Log-Periodic Antenna.
The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded

5.2.1 Test Setup Configuration

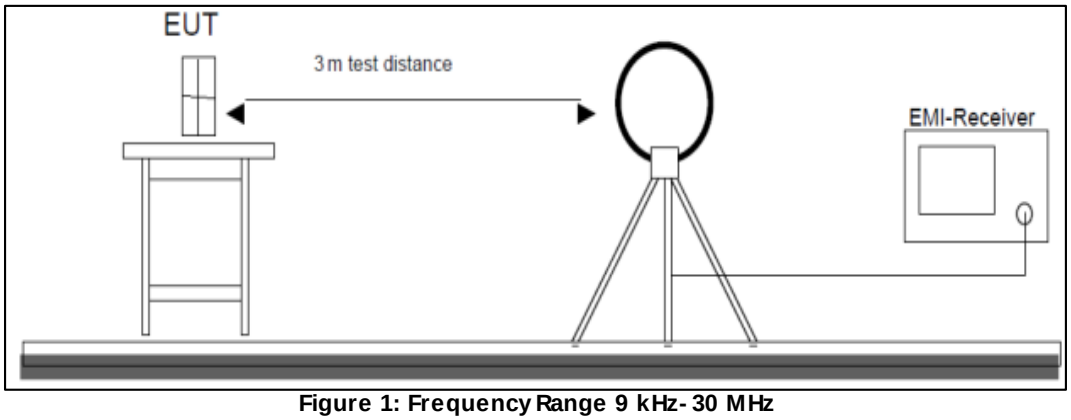


Figure 1: Frequency Range 9 kHz - 30 MHz

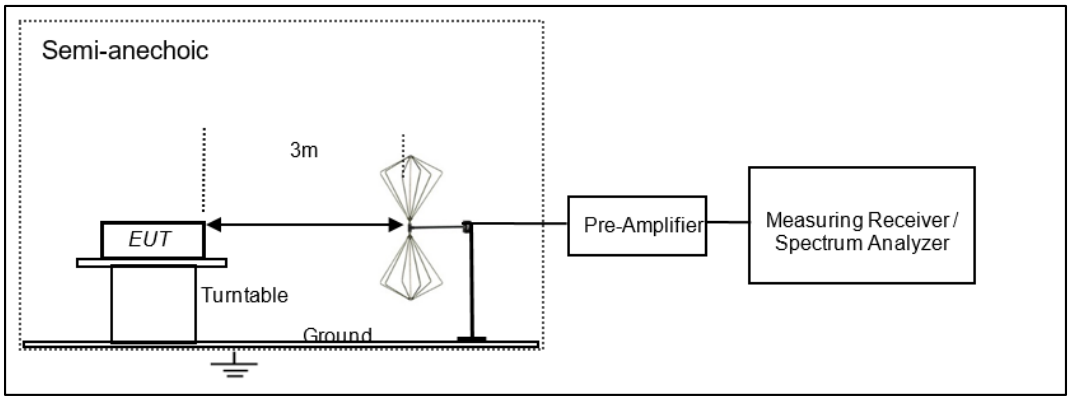


Figure 2: Frequency Range 30 MHz – 200 MHz

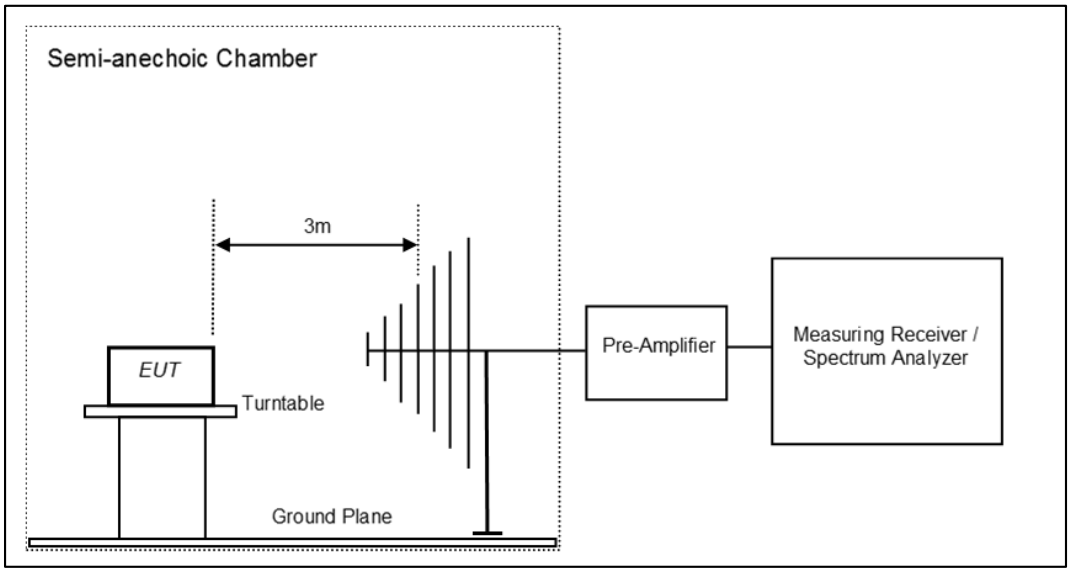


Figure 3: Frequency Range 200 MHz - 1GHz

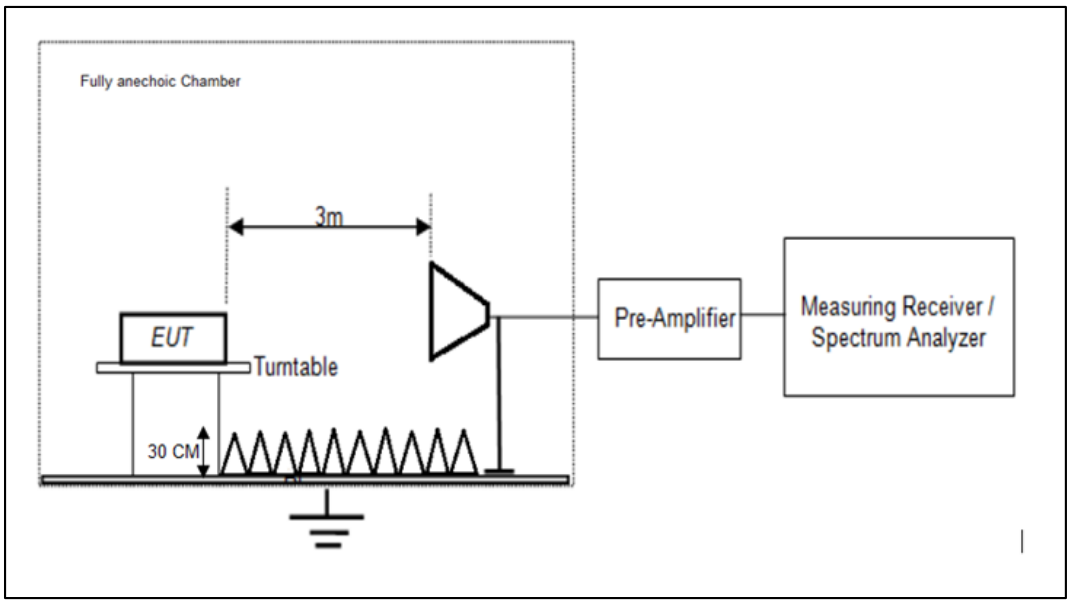


Figure 4: Frequency Range above 1 GHz

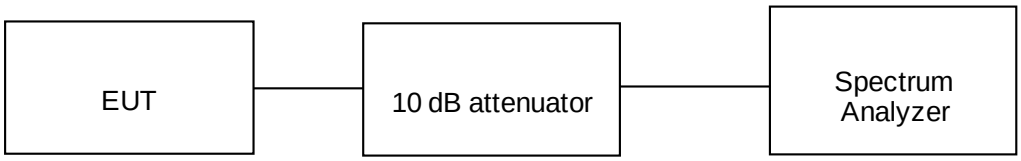
6 TEST RESULTS FOR Wi-Fi

6.1 Maximum Average Conducted Output Power

Result ***Pass***

Test Specification	FCC part 15 Subpart C 15.247 (b)(3) / RSS 247 Issue 2, Section 5.4 (d)
Test Method	Subclause 11.9.2.2.4 of ANSI C63.10
Measurement Bandwidth	300 kHz
Detector	Average sample detector mode
Port of testing	Antenna port
Requirement	Power ≤ 1 W (30 dBm) & e.i.r.p ≤ 4 W (36 dBm)

Test Method



Test Condition

Normal Test Condition:

Temperature (Norm) = + 25 °C Voltage = 3.6V DC Li-Ion battery Relative humidity: 62%

KDB Guidelines applied:

Measurements were made as per section 8.3.2.2 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

Test results:

Note:
1. All the losses are included during measurement and final values are mentioned in the test report.
2. Total Average Output power (dBm) = Measured Average power (dBm) + Attenuator factor (10dB) + Cable loss (0.6dB)
3. This product do not support additional beamforming gain / directional gain, it uses signal antenna and hence directional gain of the single antenna is 2.53 dBi
4. Maximum (e.i.r.p) = Maximum Average output power (dBm) + antenna gain (2.53 dBi)

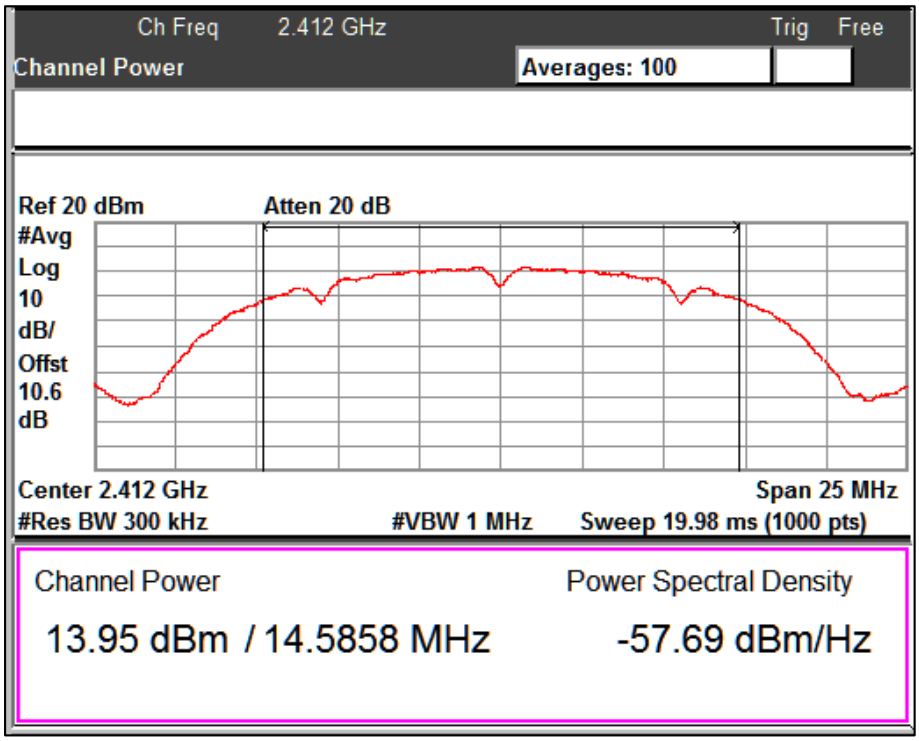
Modulation: 802.11b

Data rate (Mbps)	Channel Frequency (MHz)	Measured Average Power (dBm)	Duty cycle %	Duty cycle correction factor (dB)	Maximum Average output power (dBm)	Maximum (e.i.r.p) (dBm)	Power Limit (dBm)	e.i.r.p Limit (dBm)
1	2412	13.95	99.42	0.025	13.98	16.51	30	36
	2437	14.07	99.42	0.025	14.10	16.63	30	36
	2462	13.91	99.42	0.025	13.94	16.47	30	36
11	2412	13.68	93.51	0.291	13.97	16.50	30	36
	2442	13.89	93.52	0.291	14.18	16.71	30	36
	2462	13.56	93.51	0.291	13.85	16.38	30	36

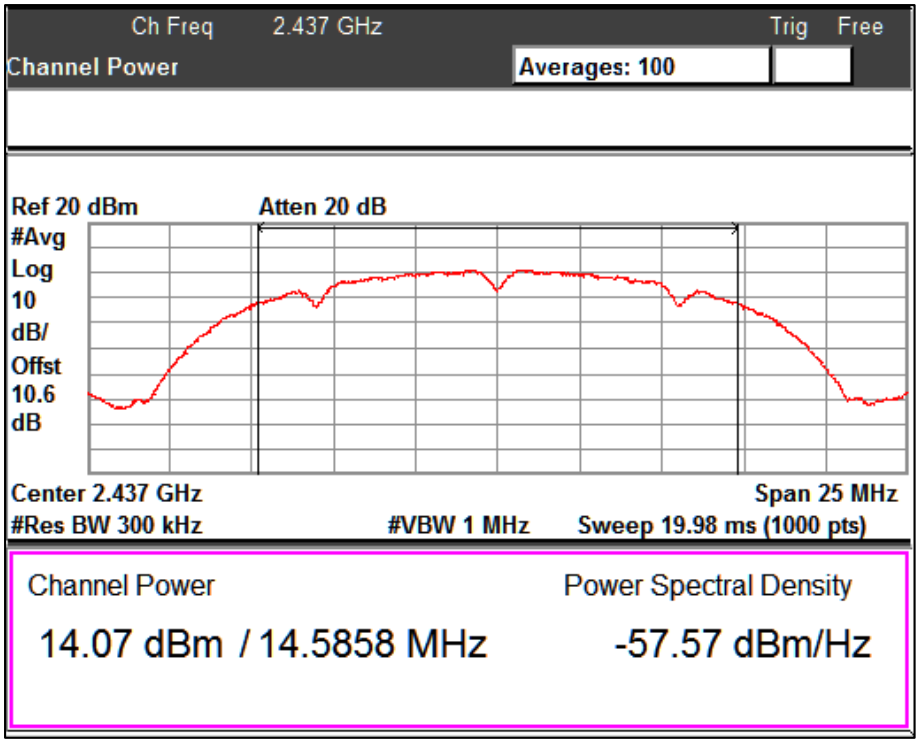
*Note: Duty Cycle Correction Factor Calculation

10*LOG (1/X) Where X is Duty Cycle is considered in below results

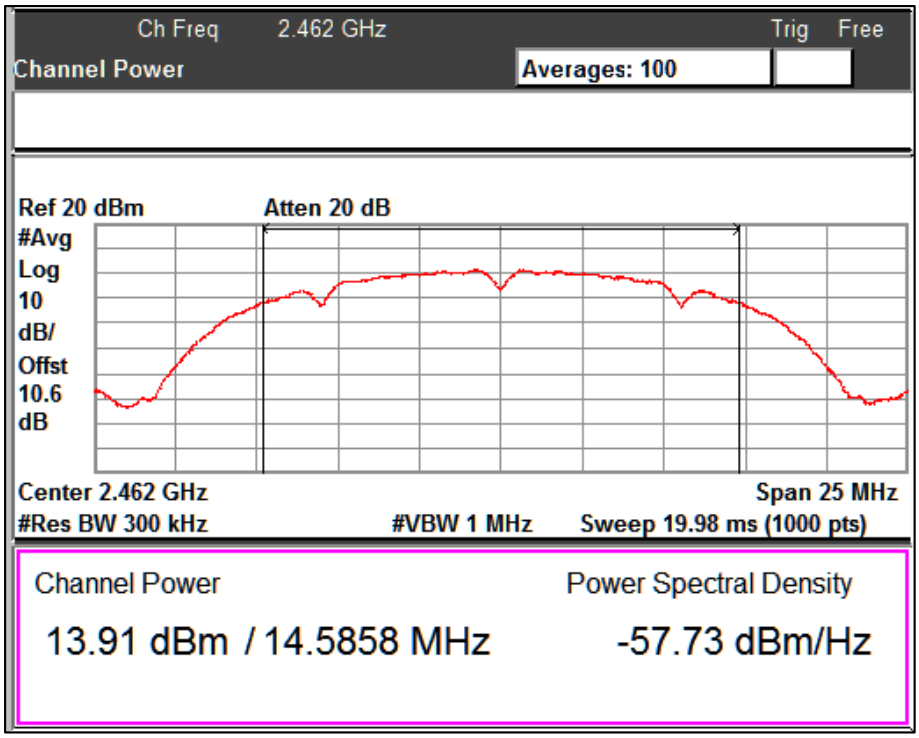
Duty cycle correction Factor is considered in Final Average Power



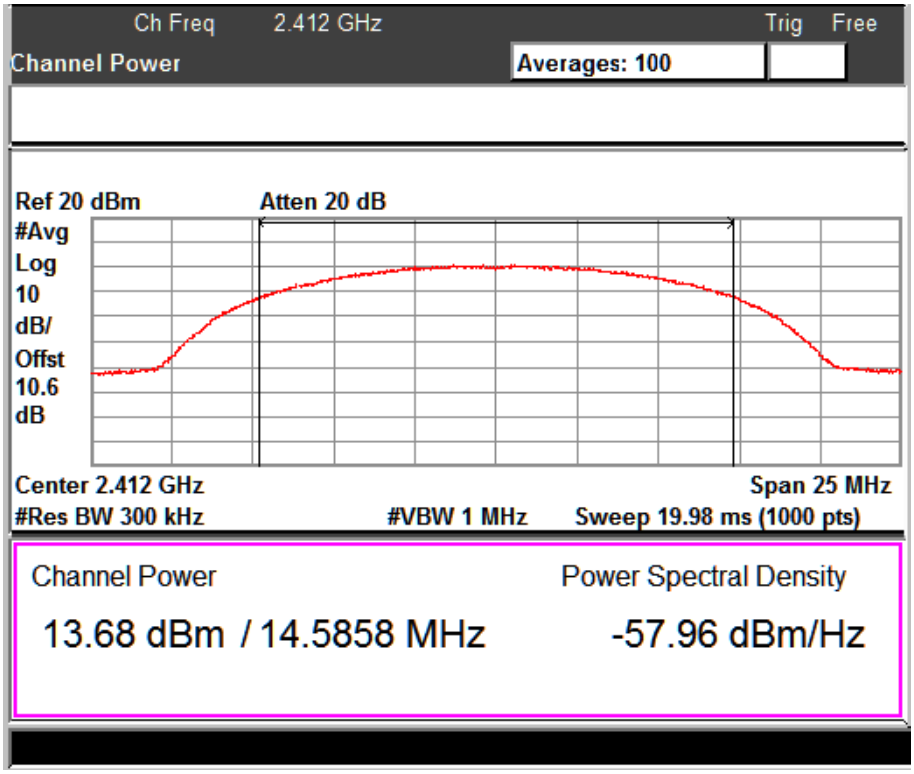
Data Rate: 1Mbps Channel Frequency: 2412MHz



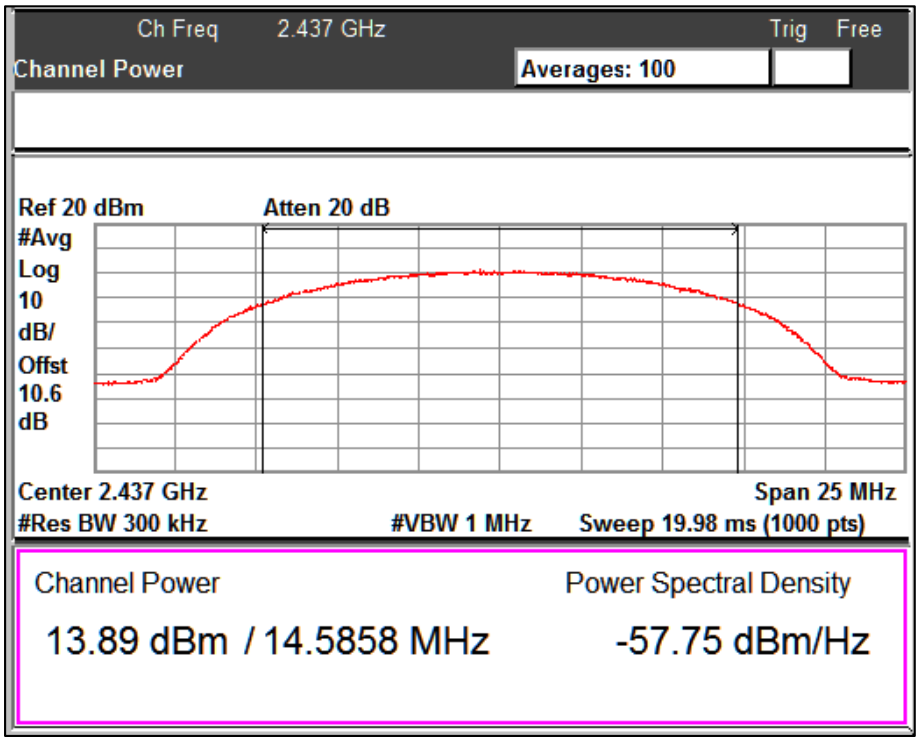
Data Rate: 1Mbps Channel Frequency: 2437MHz



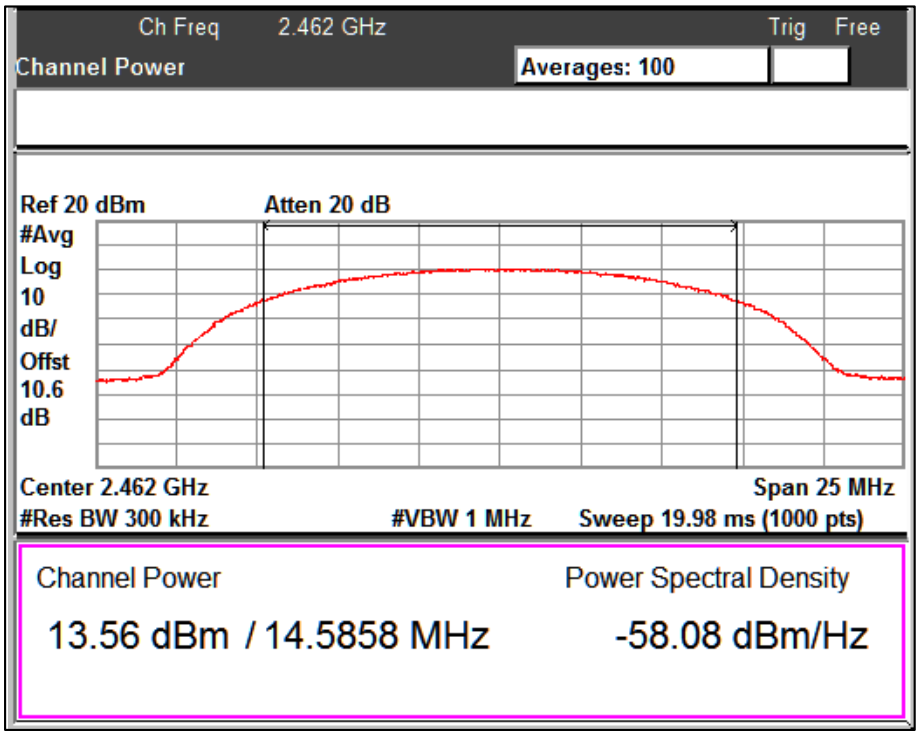
Data Rate: 1Mbps Channel Frequency: 2462MHz



Data Rate: 11Mbps Channel Frequency: 2412MHz



Data Rate: 11Mbps Channel Frequency: 2437MHz



Data Rate: 11Mbps Channel Frequency: 2462MHz

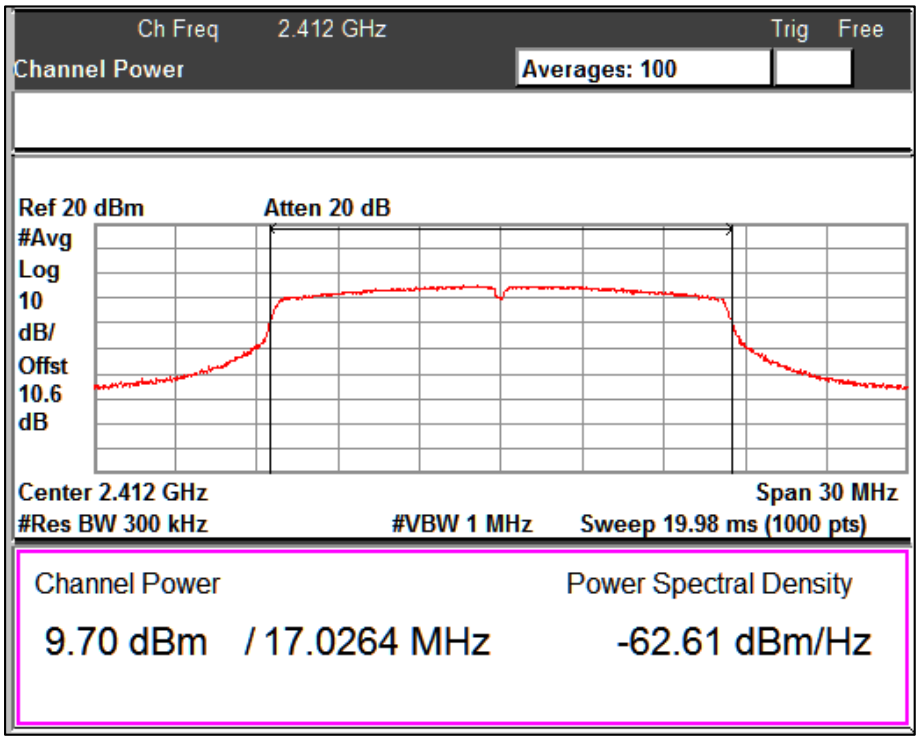
Modulation: 802.11g

Data rate (Mbps)	Channel Frequency (MHz)	Measured Average Power (dBm)	Duty cycle %	Duty cycle correction factor (dB)	Final Average power (dBm)	Maximum (e.i.r.p) (dBm)	Power Limit (dBm)	e.i.r.p Limit (dBm)
6	2412	9.70	96.08	0.174	9.87	12.40	30	36
	2437	14.31	96.07	0.174	14.48	17.01	30	36
	2462	9.63	96.07	0.174	9.80	12.33	30	36
24	2412	9.01	86.15	0.648	9.66	12.19	30	36
	2437	12.93	86.13	0.649	13.58	16.11	30	36
	2462	8.86	86.13	0.649	9.51	12.04	30	36
54	2412	8.49	73.85	1.316	9.81	12.34	30	36
	2437	10.07	73.83	1.318	11.39	13.92	30	36
	2462	8.34	73.84	1.317	9.66	12.19	30	36

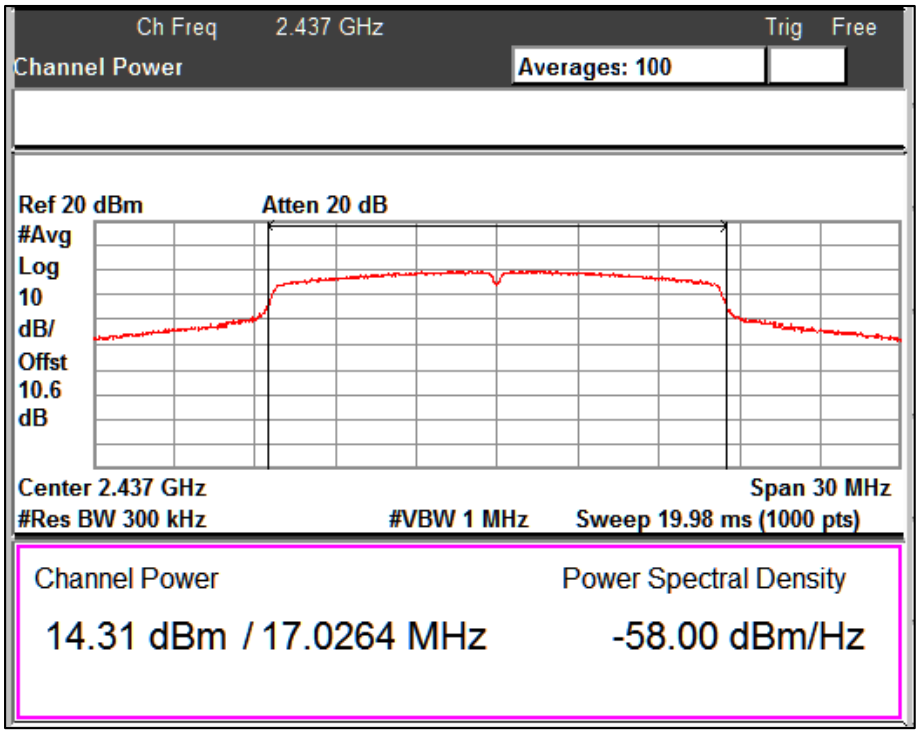
*Note: Duty Cycle Correction Factor Calculation

10*LOG (1/X) Where X is Duty Cycle is considered in below results

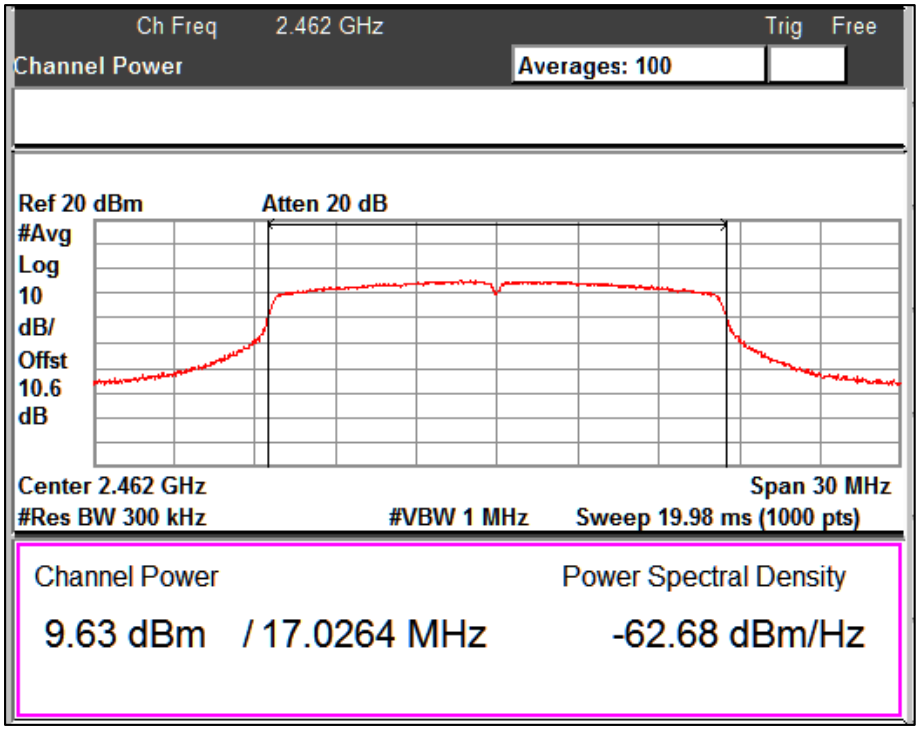
Duty cycle correction Factor is considered in Final Average Power



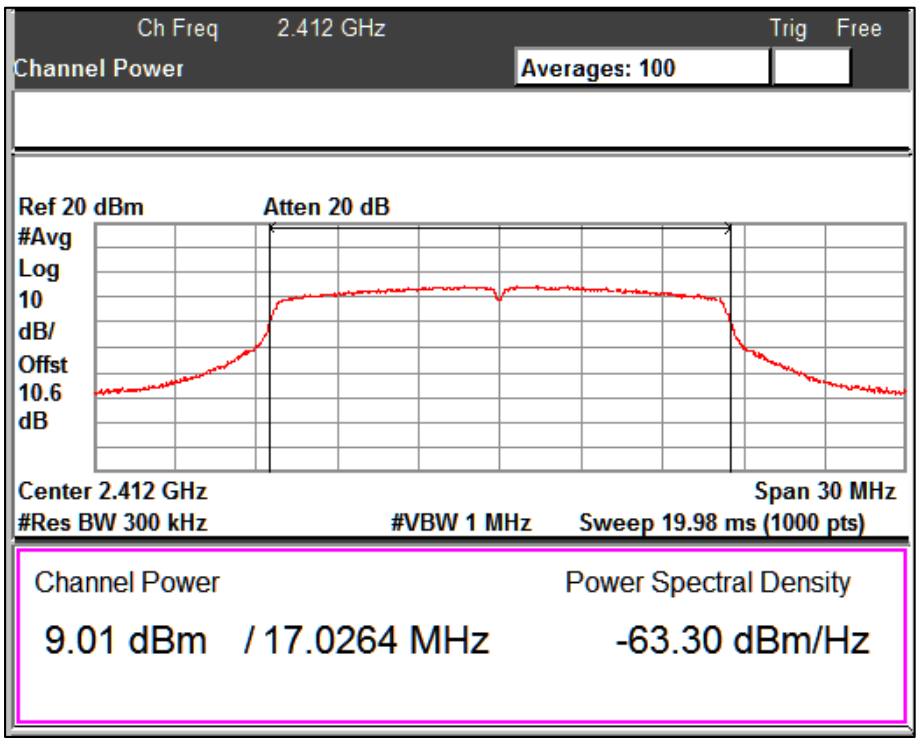
Data Rate: 6Mbps Channel Frequency: 2412MHz



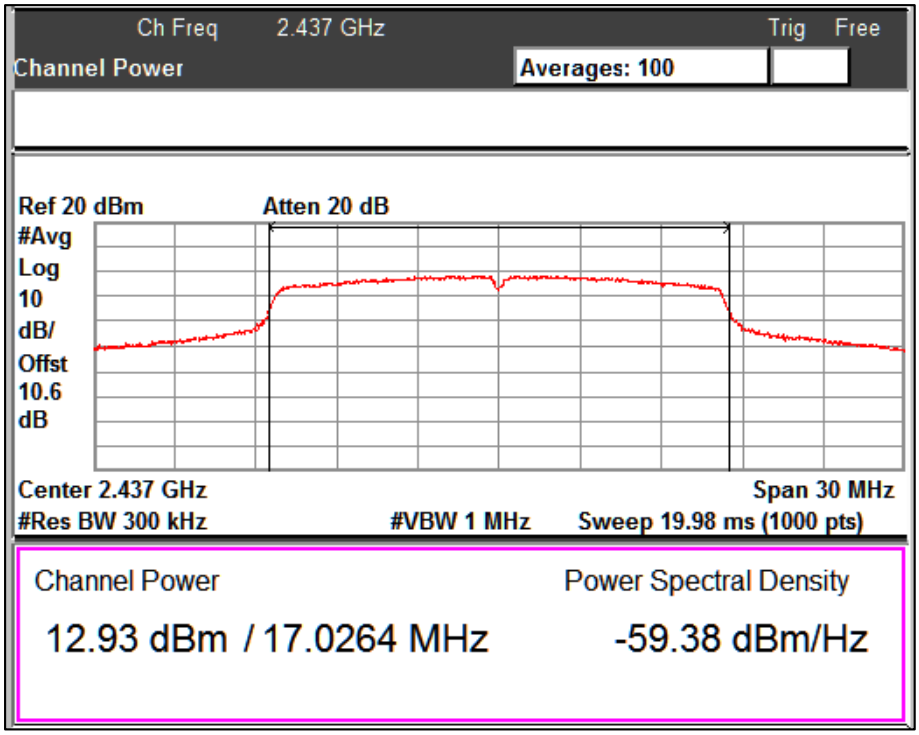
Data Rate: 6Mbps Channel Frequency: 2437MHz



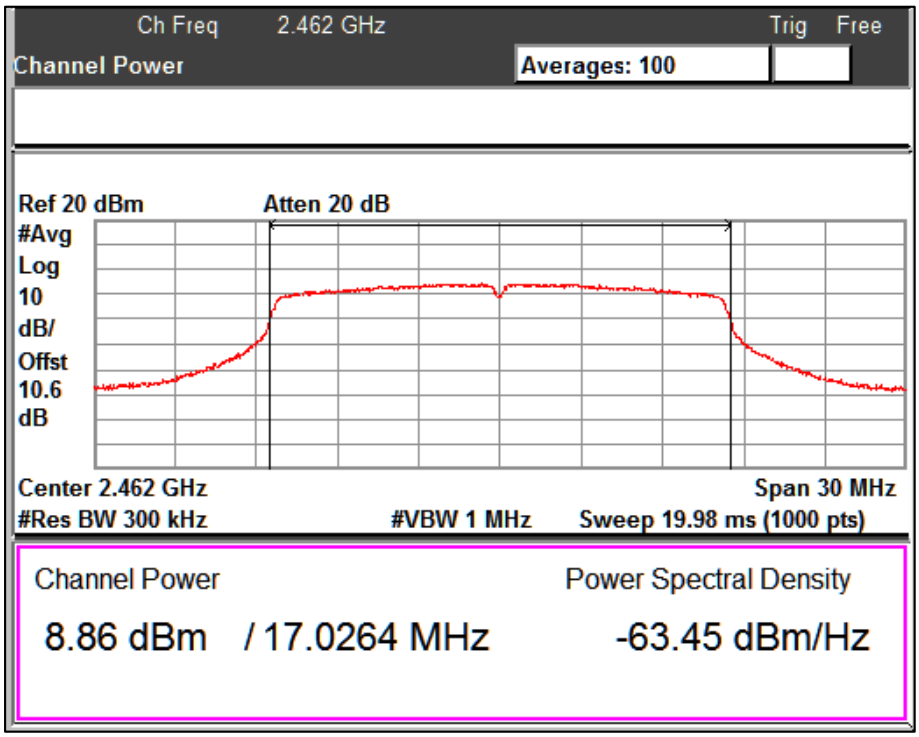
Data Rate: 6Mbps Channel Frequency: 2462MHz



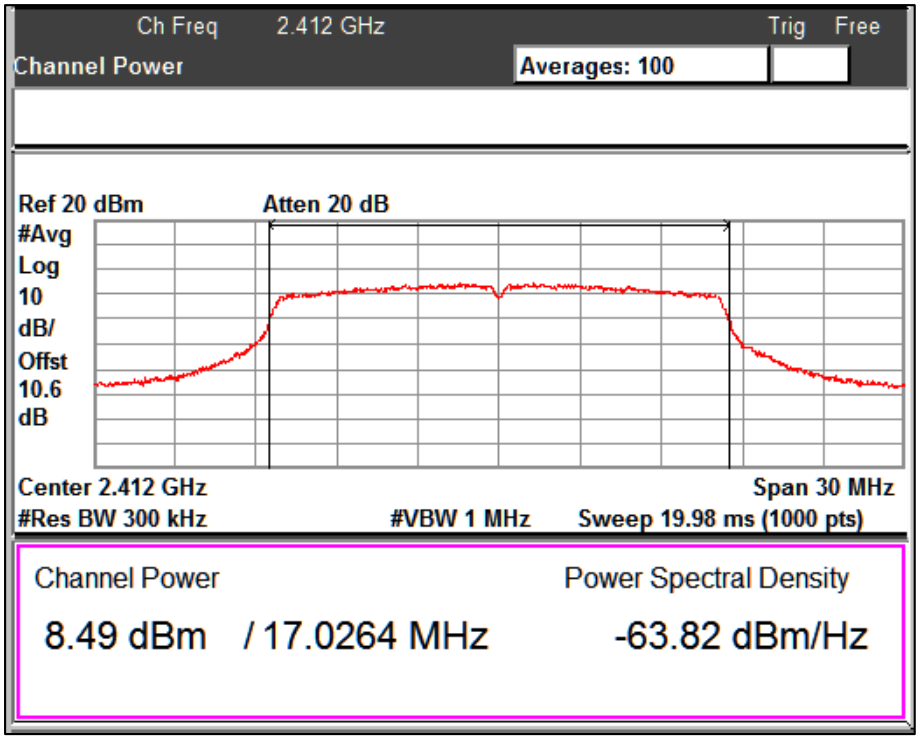
Data Rate: 24Mbps Channel Frequency: 2412MHz



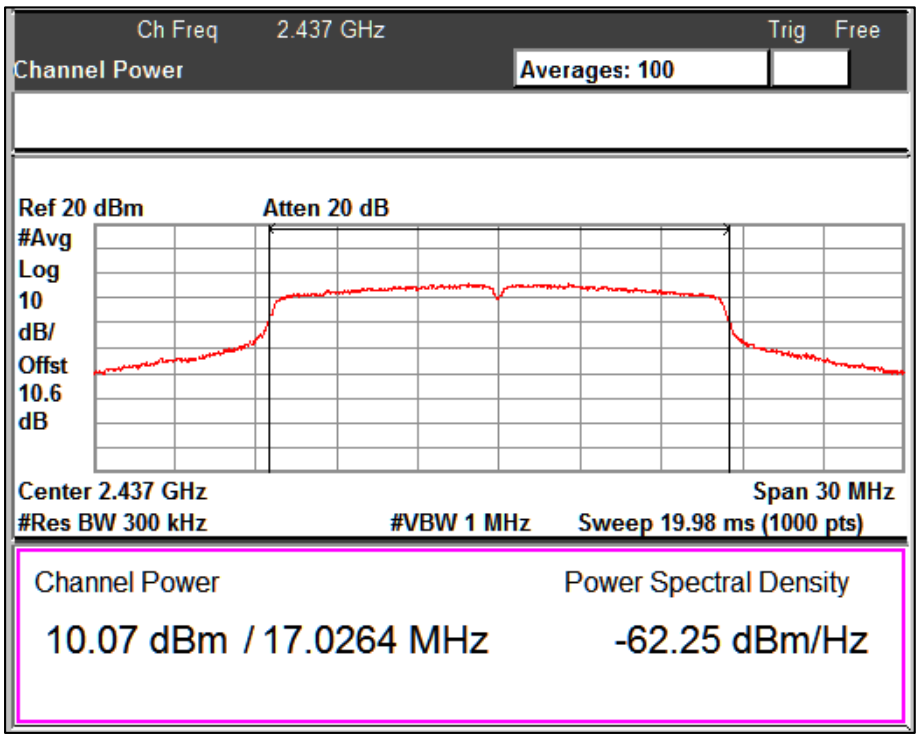
Data Rate: 24Mbps Channel Frequency: 2437MHz



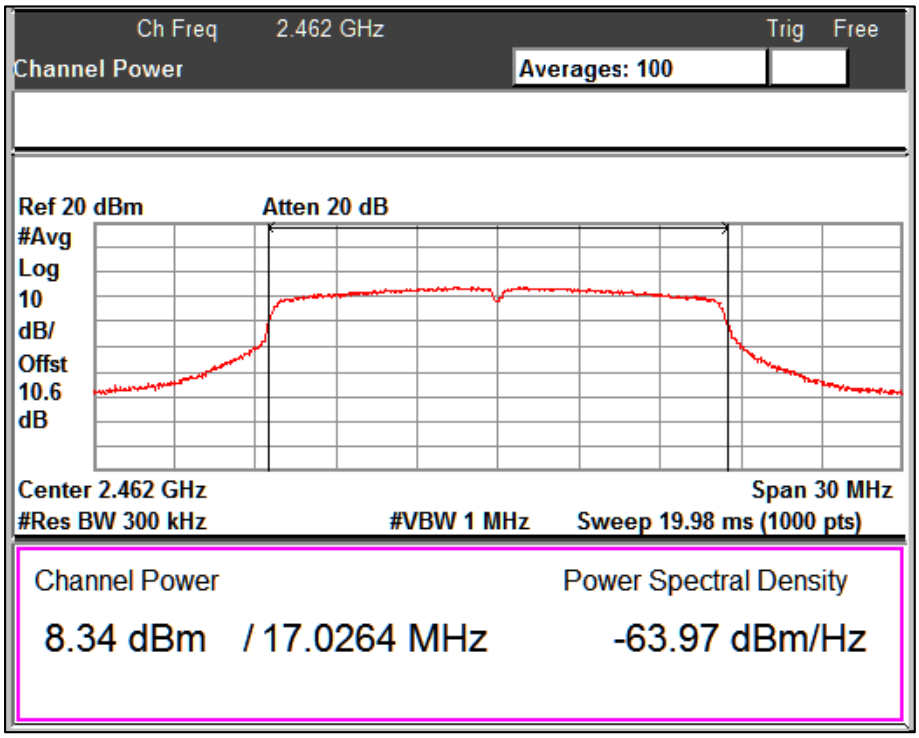
Data Rate: 24Mbps Channel Frequency: 2462MHz



Data Rate: 54Mbps Channel Frequency: 2412MHz



Data Rate: 54Mbps Channel Frequency: 2437MHz



Data Rate: 54Mbps Channel Frequency: 2462MHz

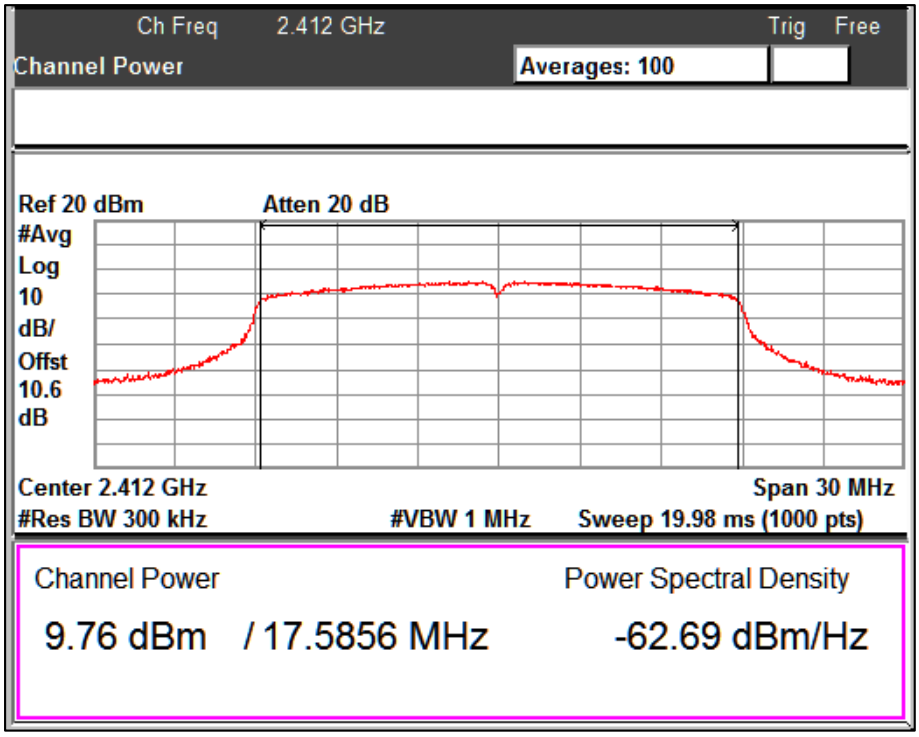
Modulation: 802.11n_20MHz

Data rate (Mbps)	Channel Frequency (MHz)	Measured Average Power (dBm)	Duty cycle %	Duty cycle correction factor (dB)	Final Average power (dBm)	Maximum (e.i.r.p) (dBm)	Power Limit (dBm)	e.i.r.p Limit (dBm)
MCS0	2412	9.76	95.34	0.207	9.97	12.50	30	36
	2437	13.64	95.33	0.208	13.85	16.38	30	36
	2462	9.79	95.33	0.208	10.00	12.53	30	36
MCS4	2412	8.93	78.06	1.076	10.01	12.54	30	36
	2437	11.96	78.03	1.078	13.04	15.57	30	36
	2462	8.88	78.03	1.078	9.96	12.49	30	36
MCS7	2412	8.39	68.92	1.617	10.01	12.54	30	36
	2437	8.90	68.90	1.618	10.52	13.05	30	36
	2462	8.33	68.91	1.617	9.95	12.48	30	36

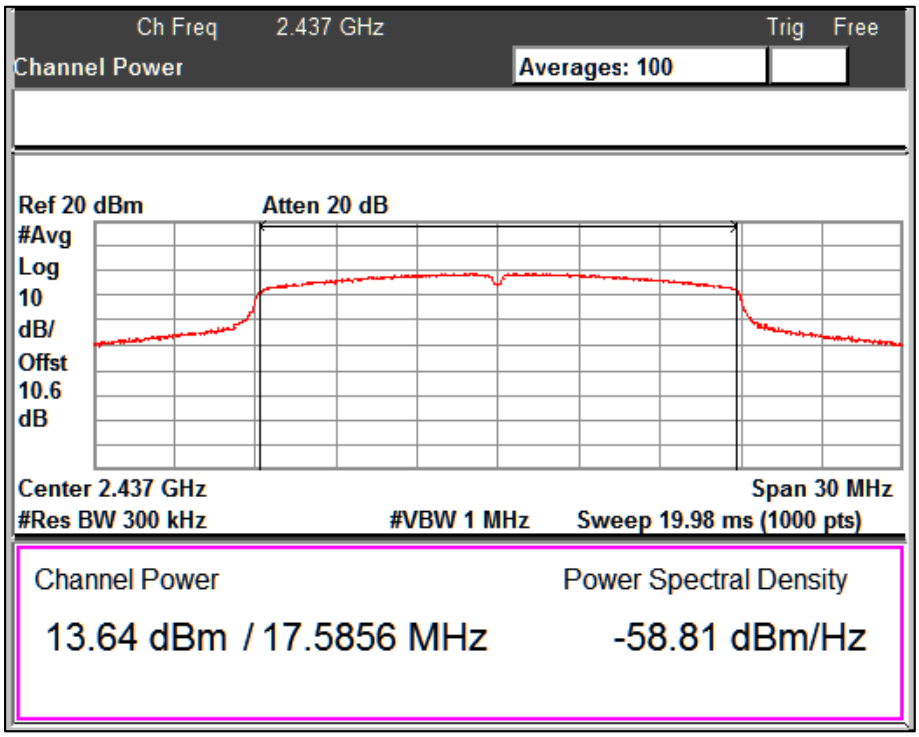
*Note: Duty Cycle Correction Factor Calculation

10*LOG (1/X) Where X is Duty Cycle is considered in below results

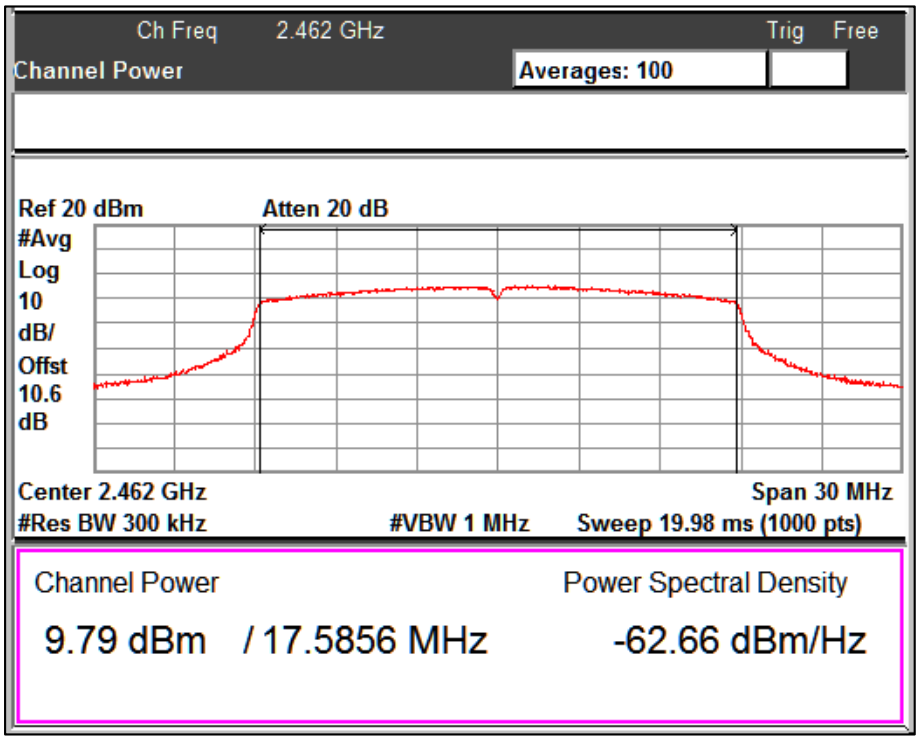
Duty cycle correction Factor is considered in Final Average Power



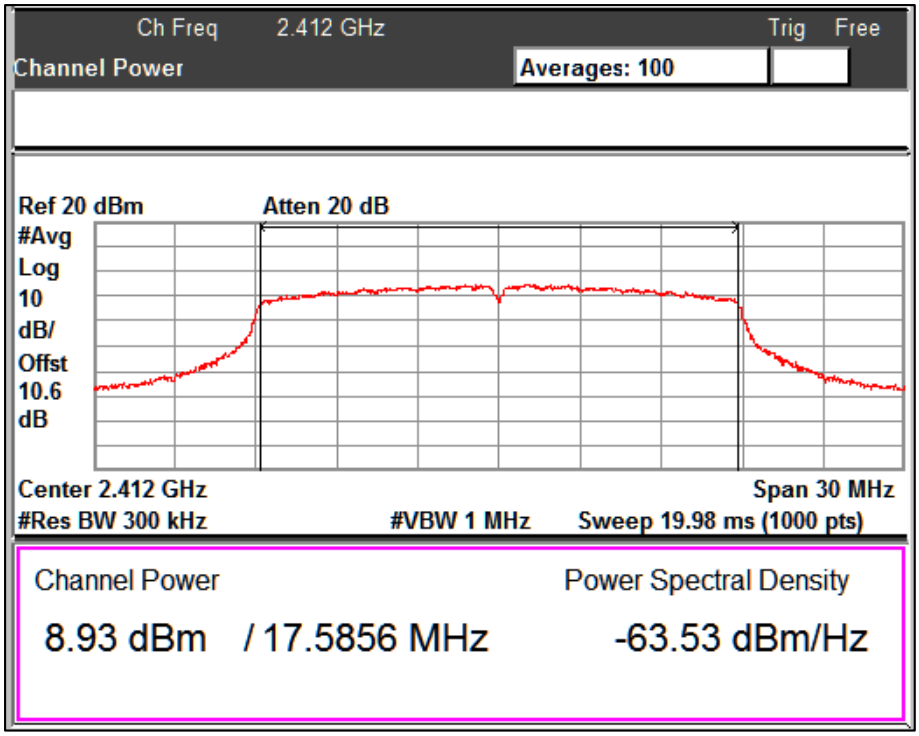
Data Rate: MCS0 Channel Frequency: 2412MHz



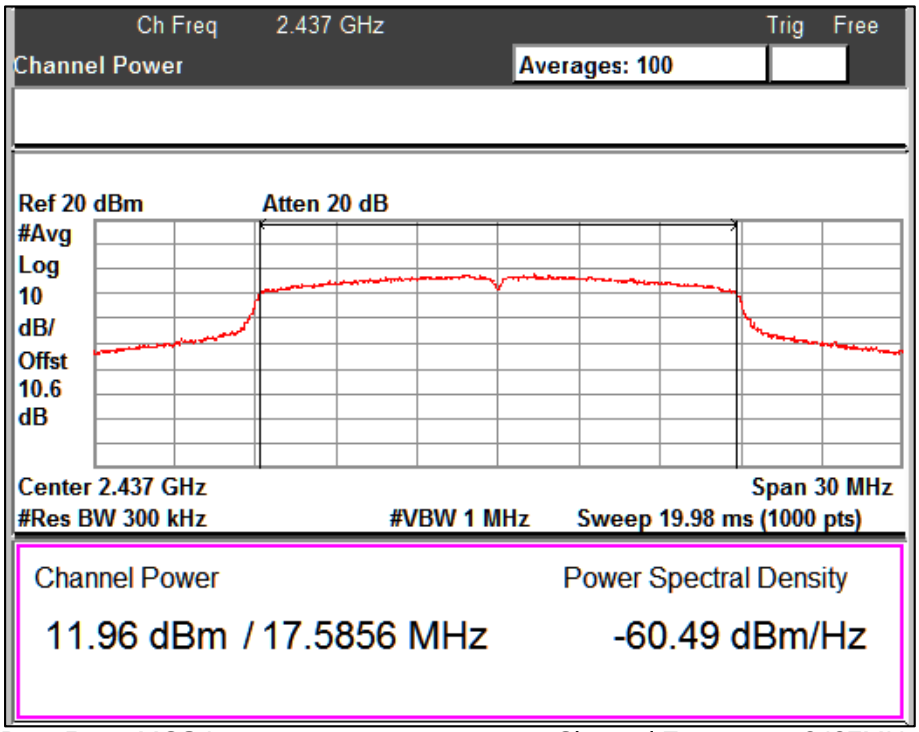
Data Rate: MCS0 Channel Frequency: 2437MHz



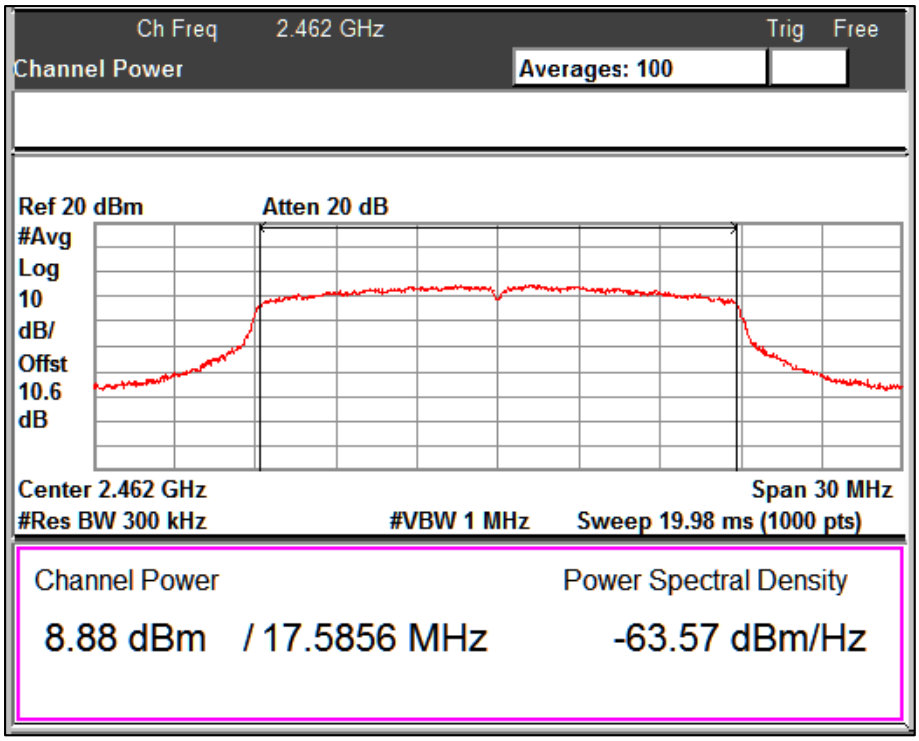
Data Rate: MCS0 Channel Frequency: 2462MHz



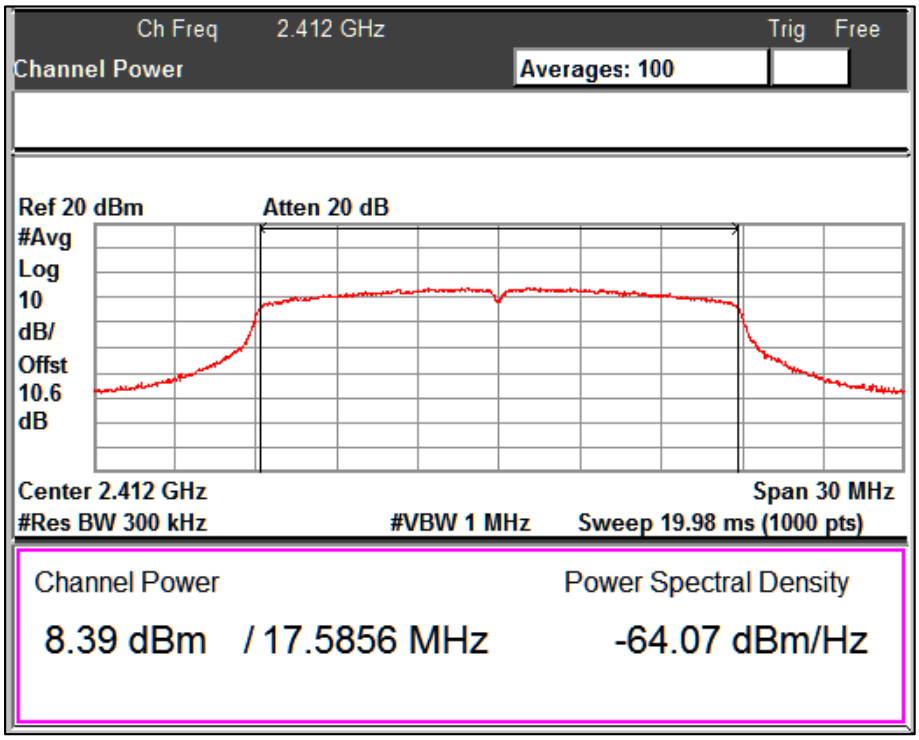
Data Rate: MCS4 Channel Frequency: 2412MHz



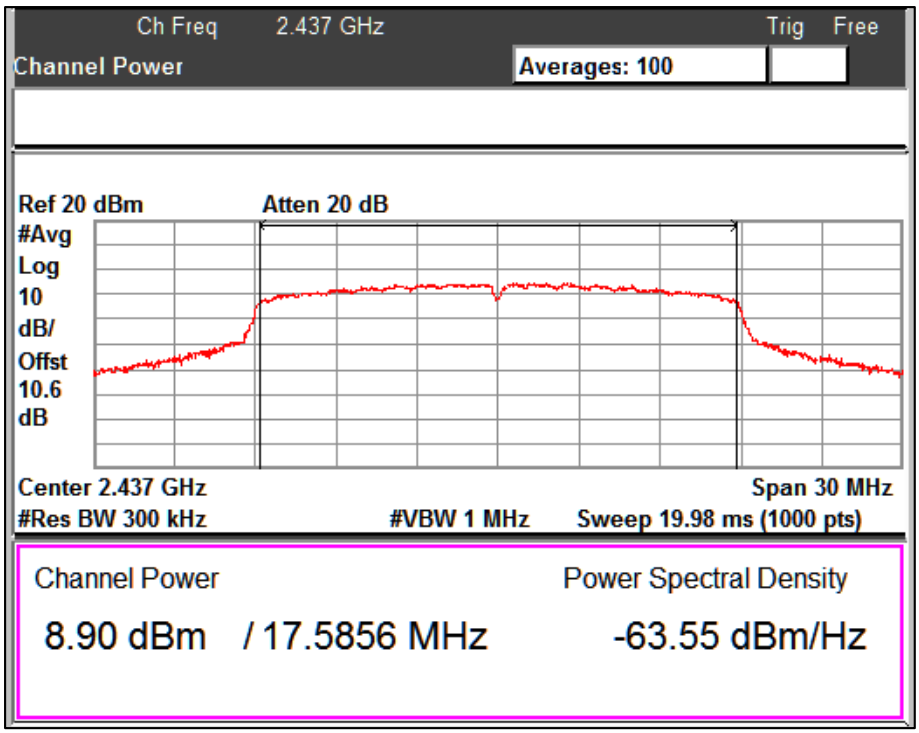
Data Rate: MCS4 Channel Frequency: 2437MHz



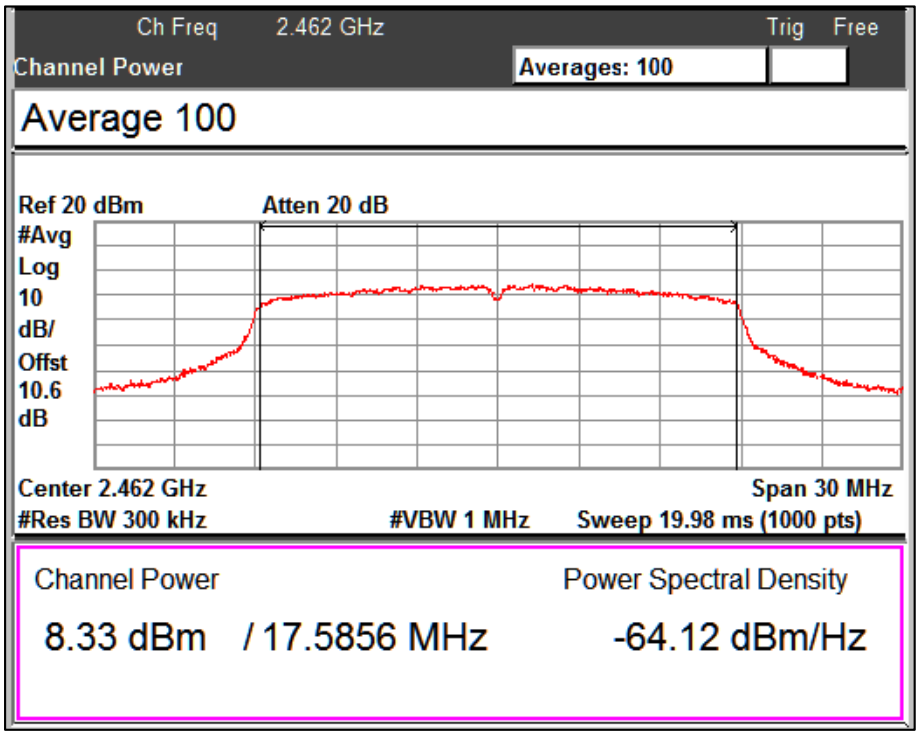
Data Rate: MCS4 Channel Frequency: 2462MHz



Data Rate: MCS7 Channel Frequency: 2412MHz



Data Rate: MCS7 Channel Frequency: 2437MHz



Data Rate: MCS7 Channel Frequency: 2462MHz

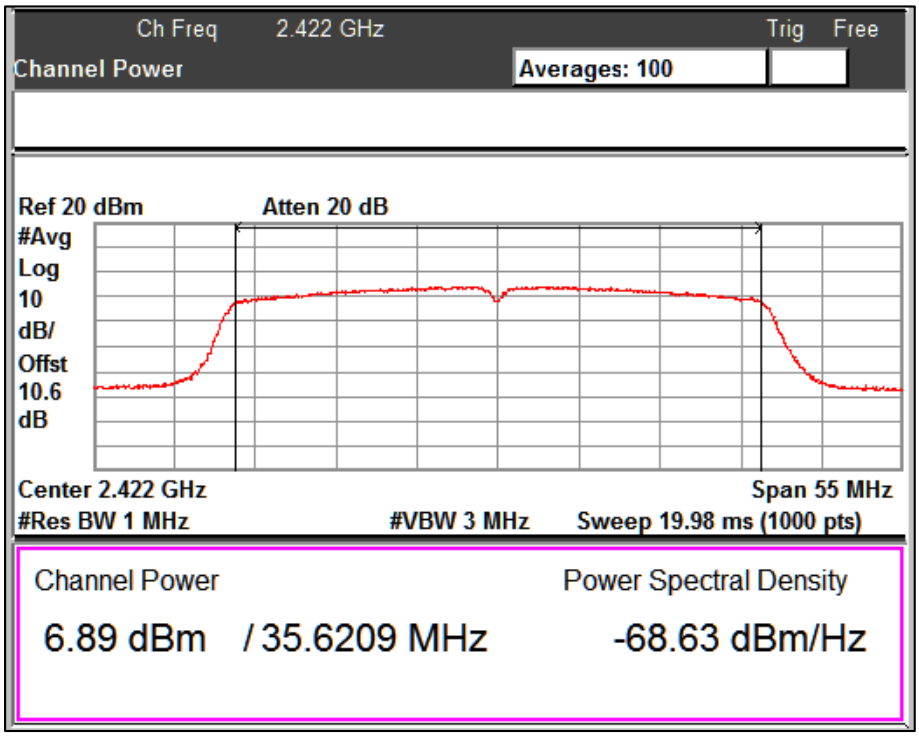
Modulation: 802.11n_40MHz

Data rate (Mbps)	Channel Frequency (MHz)	Measured Average Power (dBm)	Duty cycle %	Duty cycle correction factor (dB)	Final Average power (dBm)	Maximum (e.i.r.p) (dBm)	Power Limit (dBm)	e.i.r.p Limit (dBm)
MCS0	2422	6.89	90.90	0.414	7.30	9.83	30	36
	2452	7.04	90.86	0.417	7.46	9.99	30	36
MCS4	2422	5.54	64.55	1.901	7.44	9.97	30	36
	2452	5.64	64.37	1.913	7.55	10.08	30	36
MCS7	2422	4.69	53.81	2.692	7.38	9.91	30	36
	2452	4.87	53.76	2.695	7.57	10.10	30	36

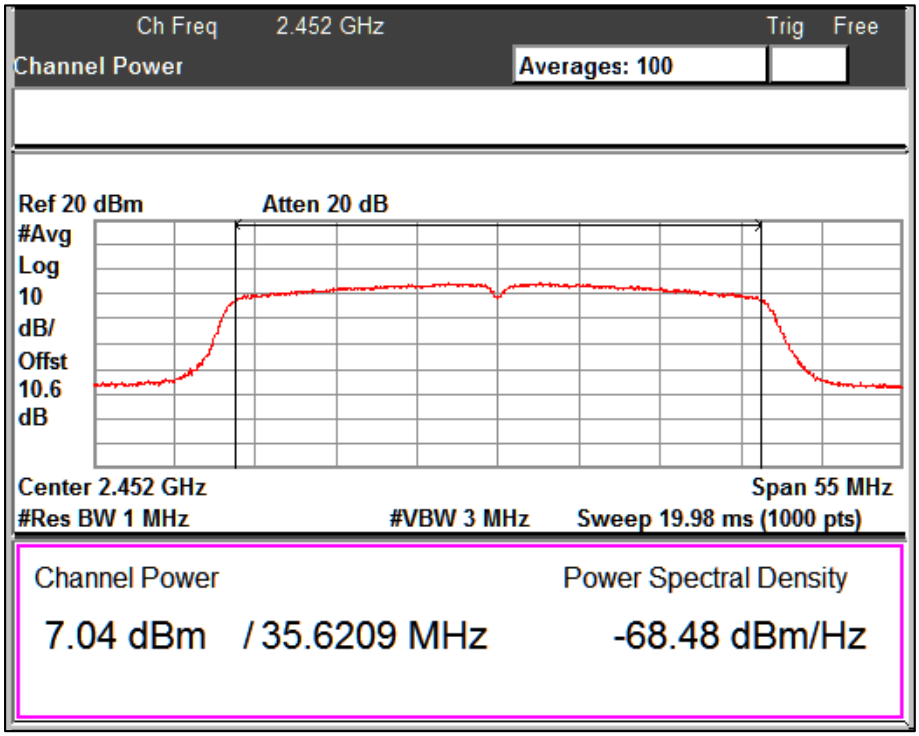
*Note: Duty Cycle Correction Factor Calculation

10*LOG (1/X) Where X is Duty Cycle is considered in below results

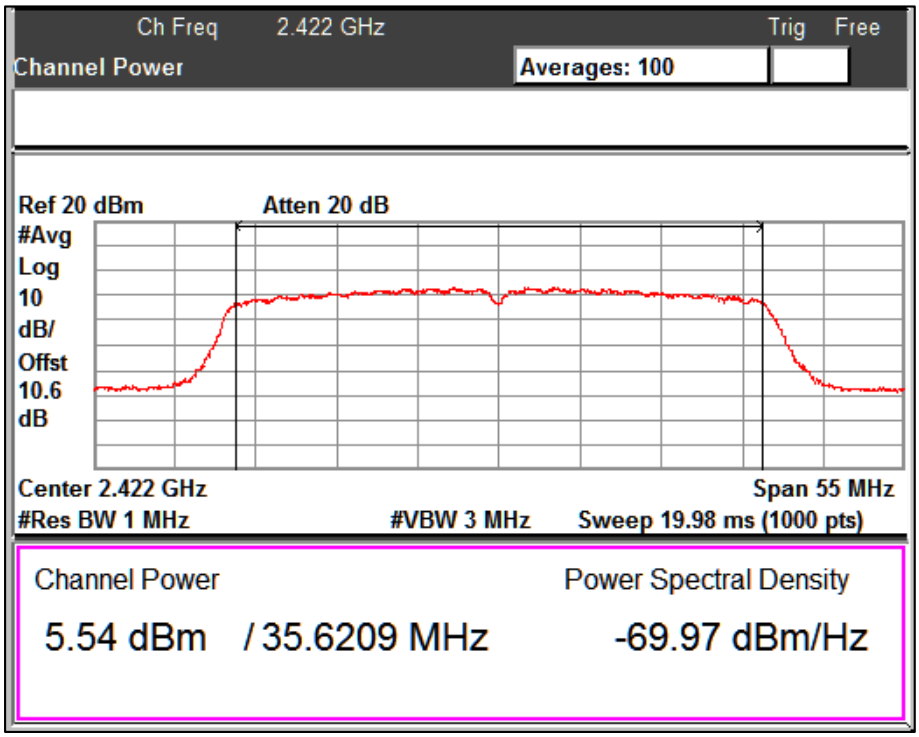
Duty cycle correction Factor is considered in Final Average Power



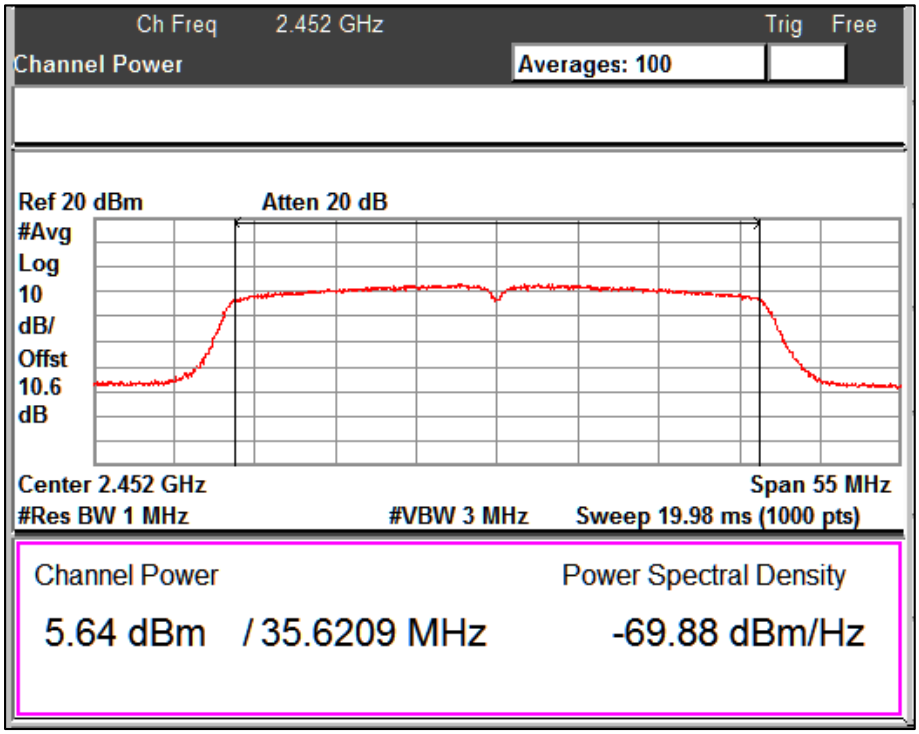
Data Rate: MCS0 Channel Frequency: 2422MHz



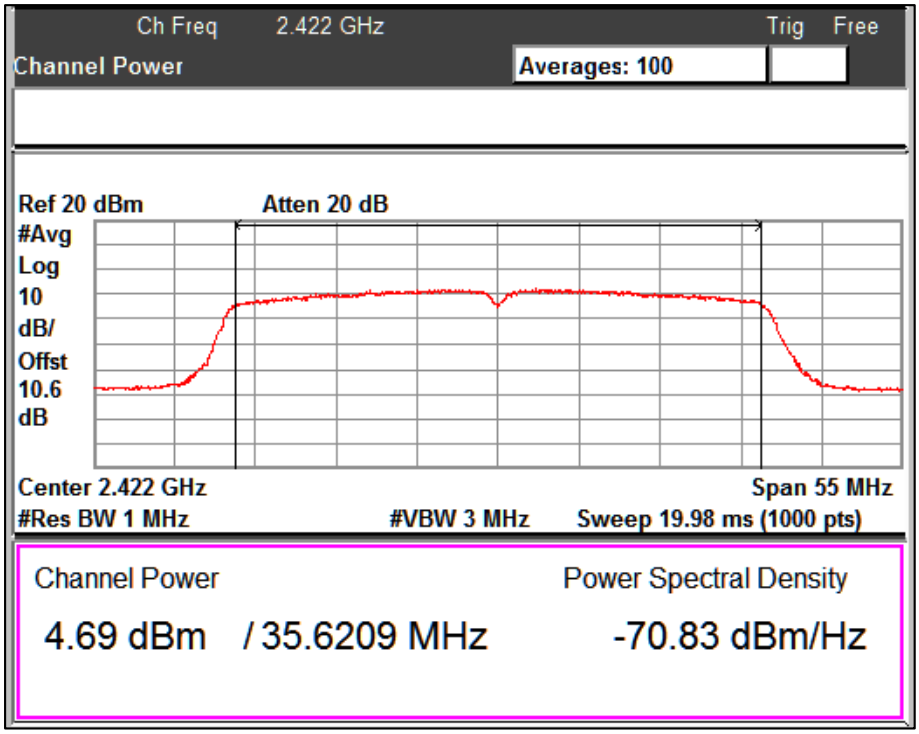
Data Rate: MCS0 Channel Frequency: 2452MHz



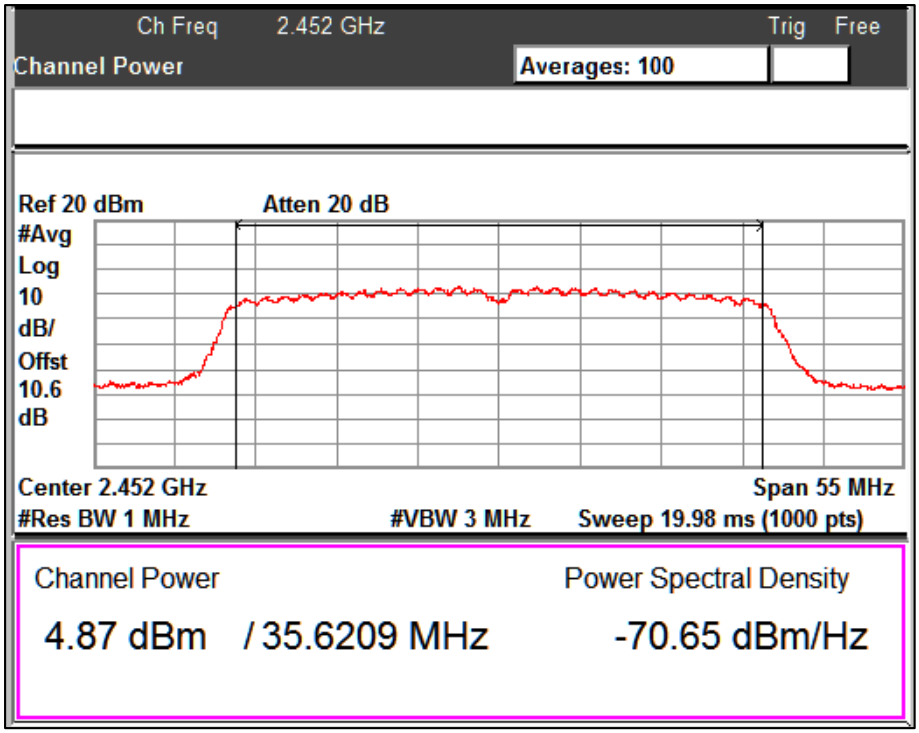
Data Rate: MCS4 Channel Frequency: 2422MHz



Data Rate: MCS4 Channel Frequency: 2452MHz



Data Rate: MCS7 Channel Frequency: 2422MHz



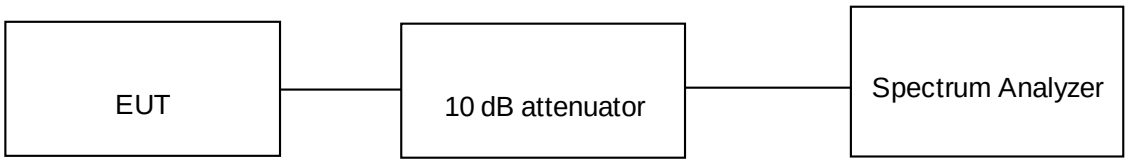
Data Rate: MCS7 Channel Frequency: 2452MHz

6.2 Maximum Power Spectral Density

Result ***Pass***

Test Specification	FCC part 15 Subpart C 15.247 (e) / RSS 247 Issue 2, Section 5.2 (b)
Test Method	Subclause 11.10.5 of ANSI C63.10
Measurement Bandwidth	100 kHz
Detector	Average sample detector mode
Port of testing	Antenna port
Requirement	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm

Test Method:



Test Condition

Normal Test Condition:

Temperature (Norm) = + 25°C Voltage = 3.6V DC Li-Ion battery Relative humidity: 62 %

KDB Guidelines applied:

Measurements were made as per section 8.4 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

Test results:

Note:
1. All the losses are included during measurement and final values are mentioned in the test report.
2. Total Average PSD (dBm) = Measured Average PSD (dBm) + Attenuator factor (10dB) + Cable loss (0.6dB)
3. This product do not support additional beamforming gain / directional gain, it uses signal antenna and hence directional gain of the single antenna is 2.53 dBi

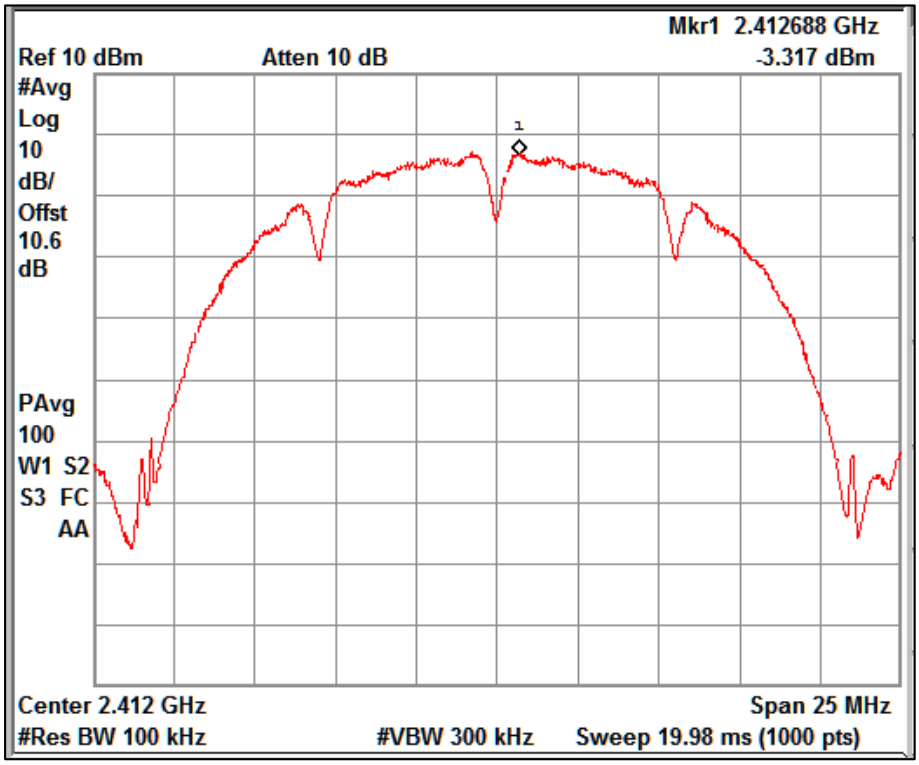
Modulation: 802.11b

Data rate (Mbps)	Channel Frequency (MHz)	Measured average PSD (dBm/100kHz)	Duty cycle %	Duty cycle correction factor (dB)	Maximum average PSD (dBm/100kHz)	PSD Limit (dBm/100kHz)
1	2412	-3.32	99.42	0.025	-3.28	8
	2437	-3.29	99.42	0.025	-3.26	8
	2462	-3.85	99.42	0.025	-3.81	8
11	2412	-4.49	93.51	0.291	-4.20	8
	2442	-4.02	93.52	0.291	-3.73	8
	2462	-3.95	93.51	0.291	-3.65	8

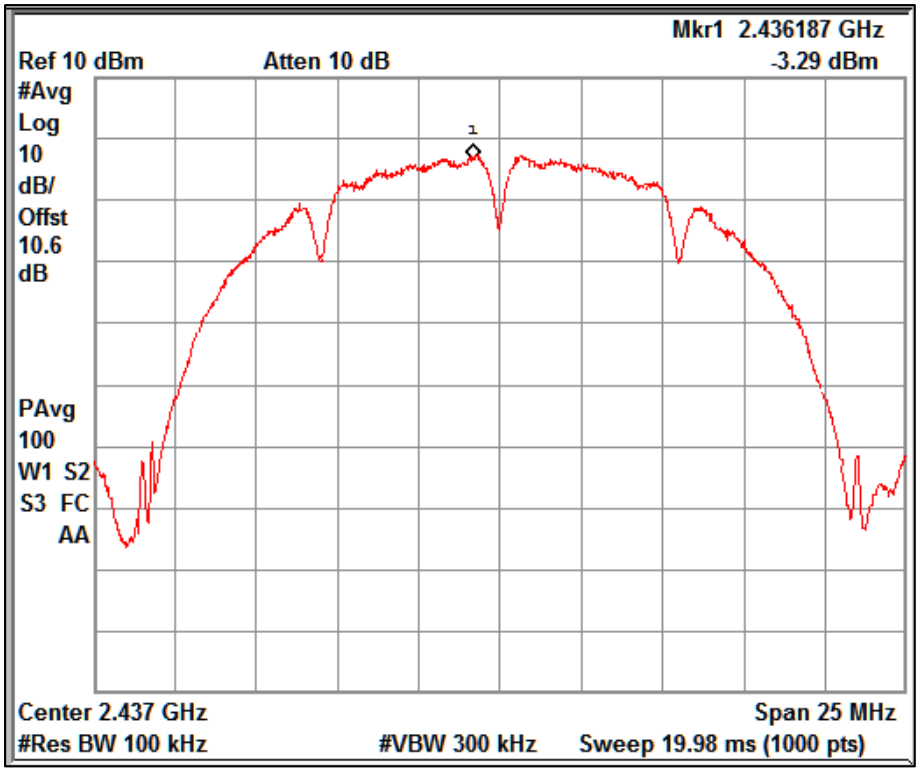
*Note: Duty Cycle Correction Factor Calculation

10*LOG (1/X) Where X is Duty Cycle is considered in below results

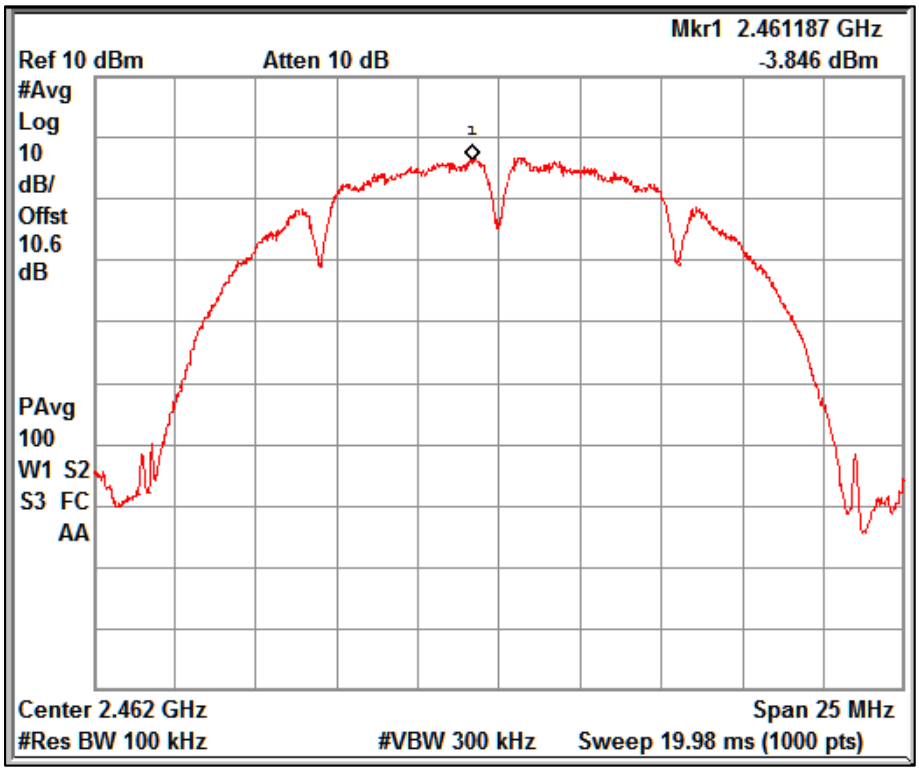
Duty cycle correction Factor is considered in Final Average PSD



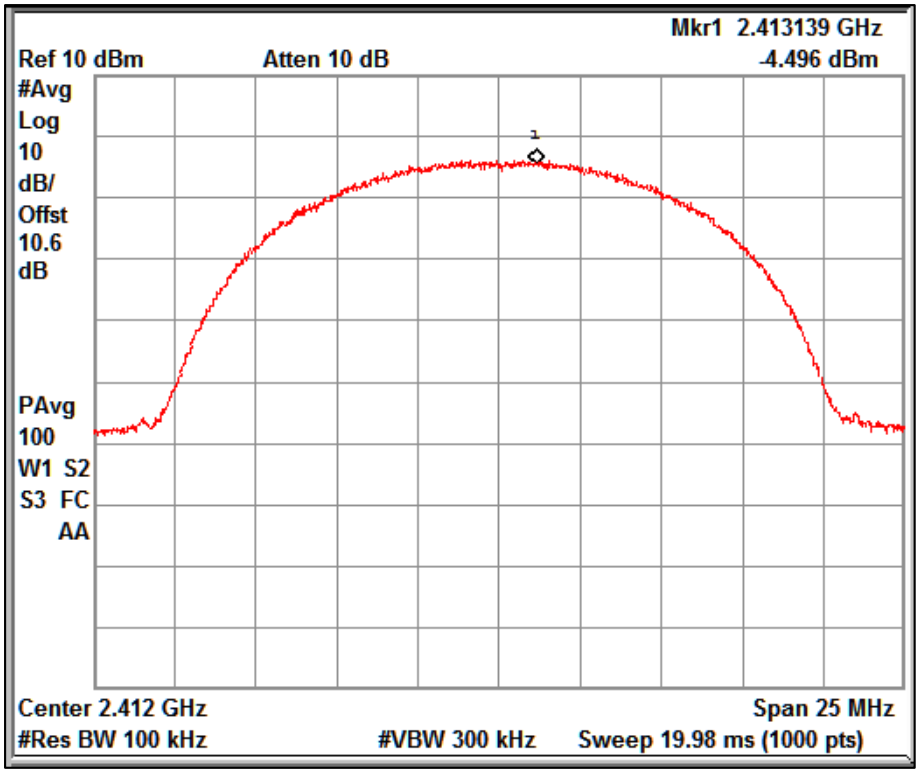
Data Rate: 1Mbps Channel Frequency: 2412MHz



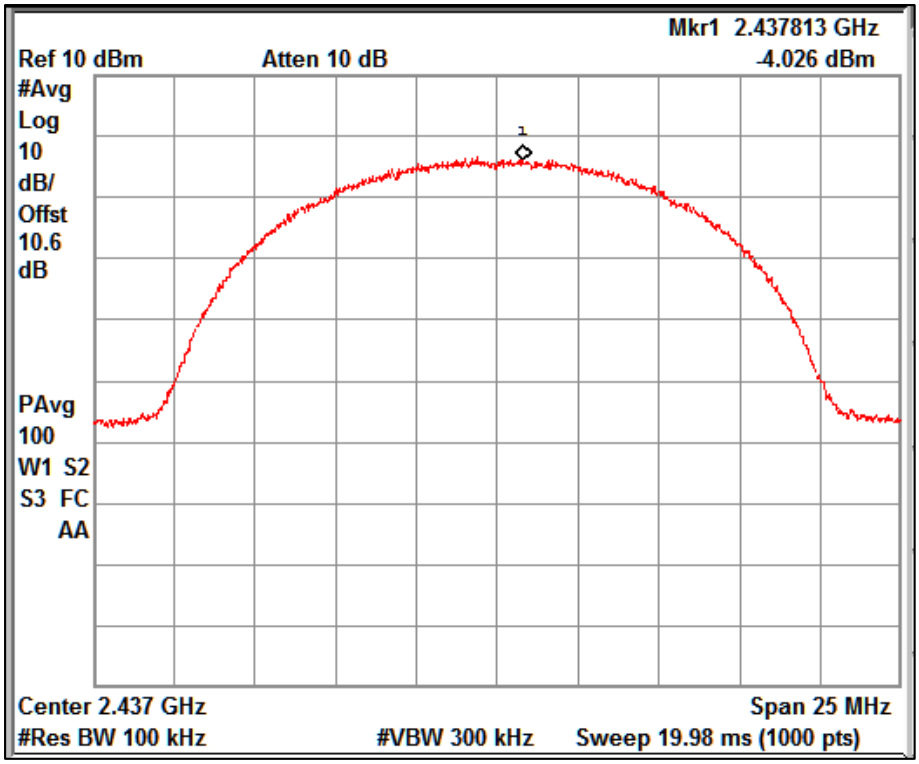
Data Rate: 1Mbps Channel Frequency: 2437MHz



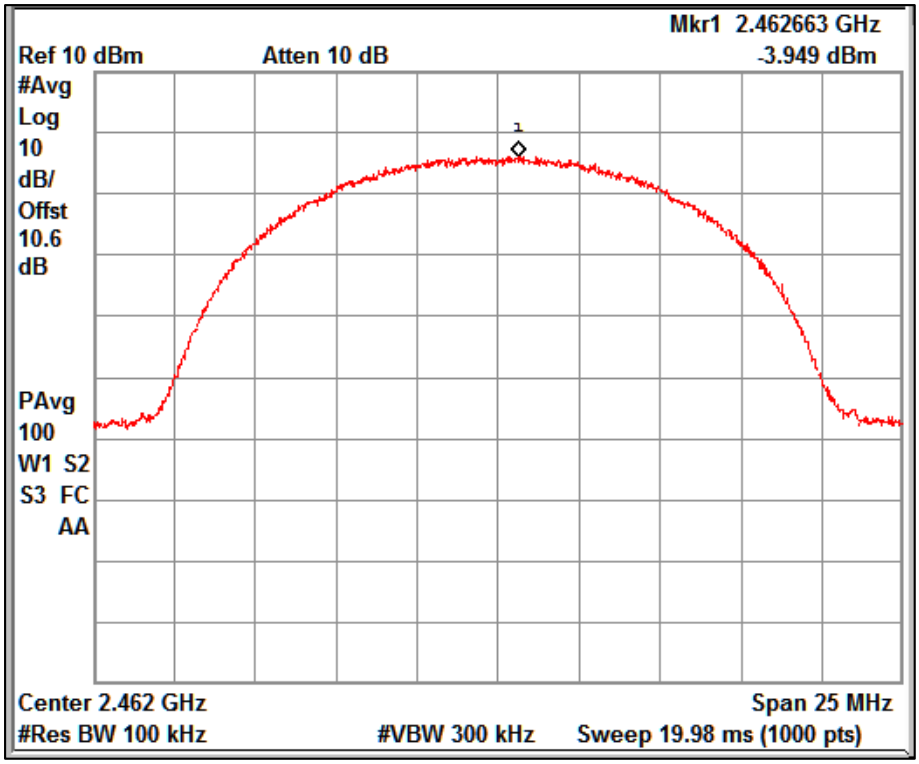
Data Rate: 1Mbps Channel Frequency: 2462MHz



Data Rate: 11Mbps Channel Frequency: 2412MHz



Data Rate: 11Mbps Channel Frequency: 2437MHz



Data Rate: 11Mbps Channel Frequency: 2462MHz

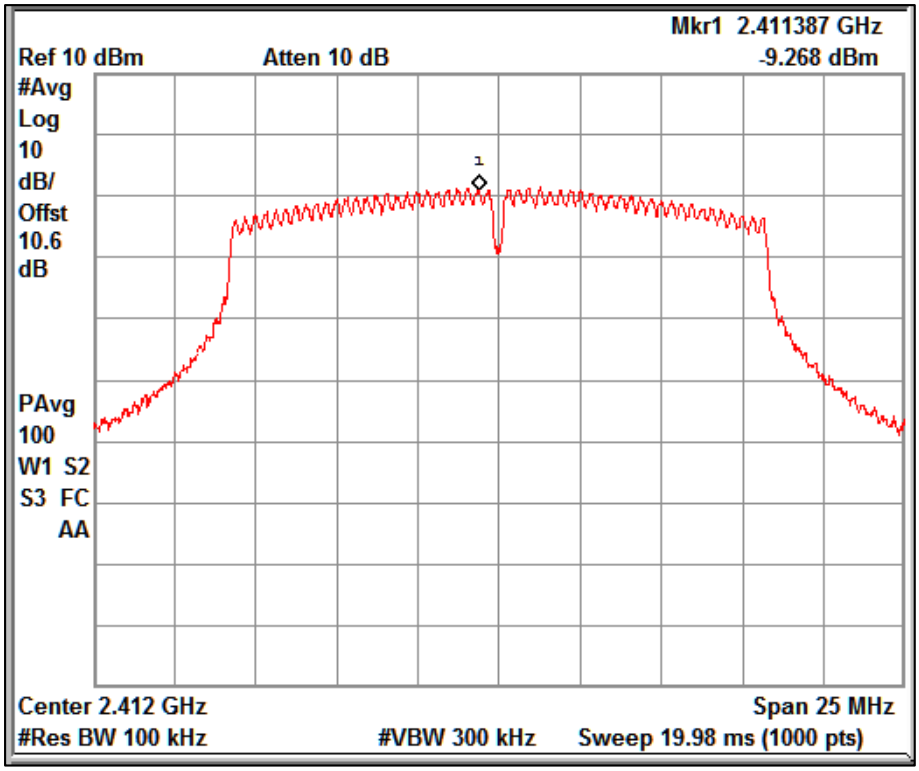
Modulation: 802.11g

Data rate (Mbps)	Channel Frequency (MHz)	Measured average PSD (dBm/100kHz)	Duty cycle %	Duty cycle correction factor (dB)	Maximum average PSD (dBm/100kHz)	PSD Limit (dBm/100kHz)
6	2412	-9.26	96.08	0.174	-9.09	8
	2437	-4.42	96.07	0.174	-4.25	8
	2462	-8.78	96.07	0.174	-8.61	8
24	2412	-8.95	86.15	0.648	-8.30	8
	2437	-5.51	86.13	0.649	-4.86	8
	2462	-8.90	86.13	0.649	-8.25	8
54	2412	-9.50	73.85	1.316	-8.18	8
	2437	-8.50	73.83	1.318	-7.18	8
	2462	-10.71	73.84	1.317	-9.39	8

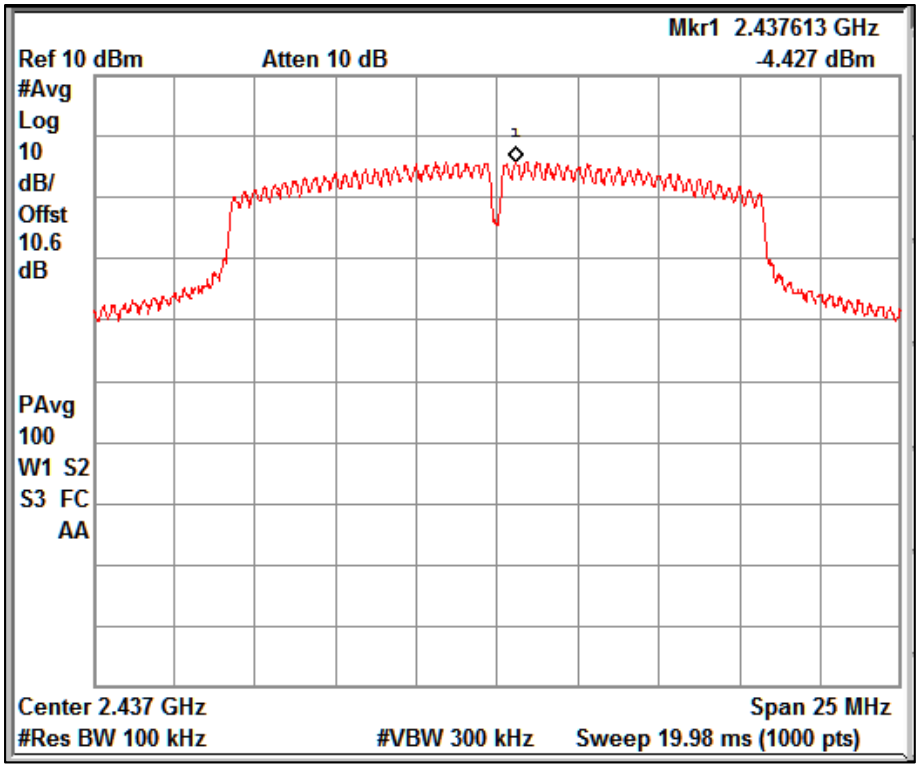
*Note: Duty Cycle Correction Factor Calculation

10*LOG (1/X) Where X is Duty Cycle is considered in below results

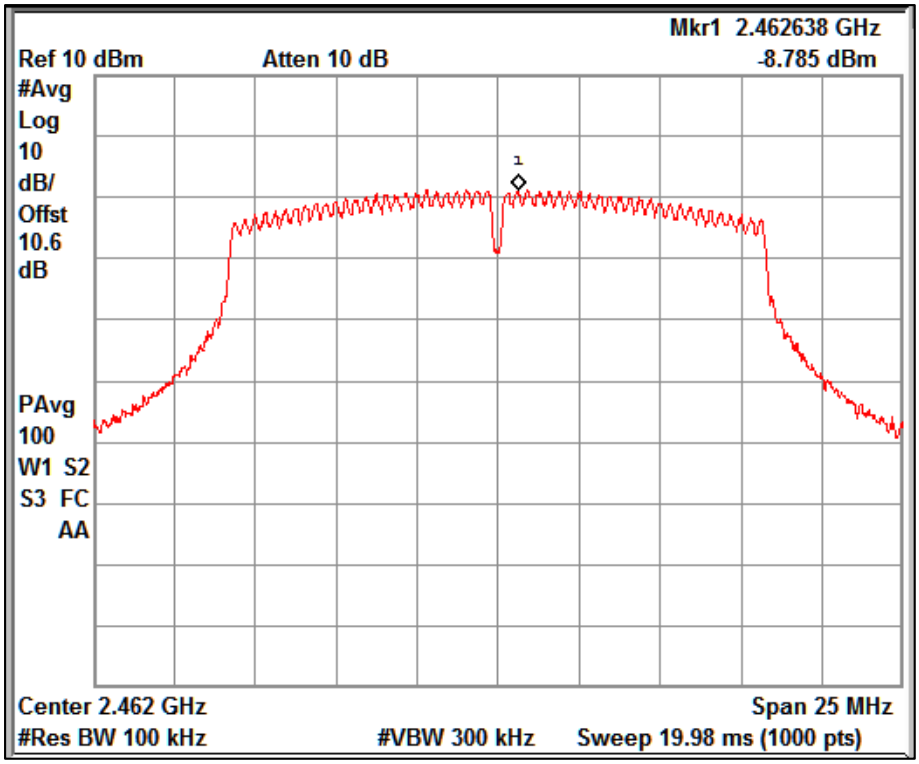
Duty cycle correction Factor is considered in Final Average PSD



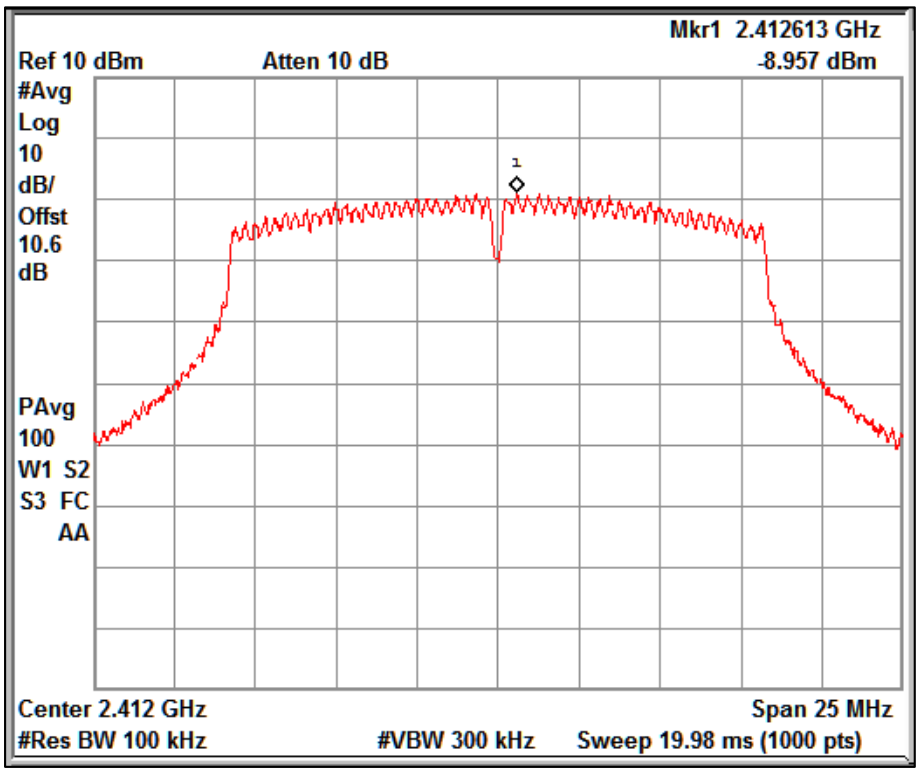
Data Rate: 6Mbps Channel Frequency: 2412MHz



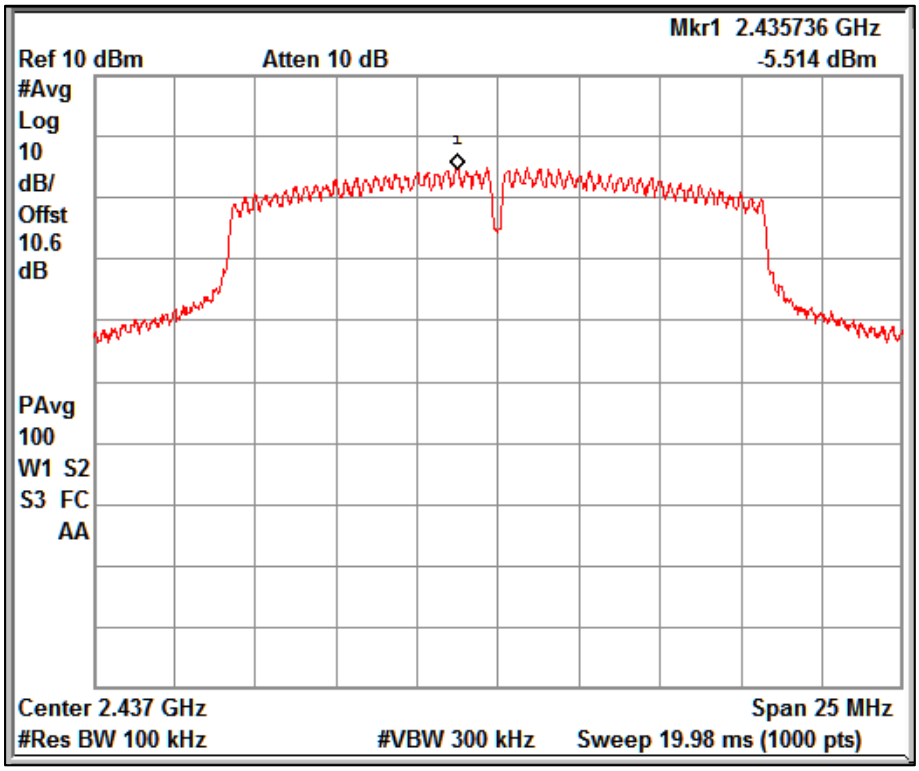
Data Rate: 6Mbps Channel Frequency: 2437MHz



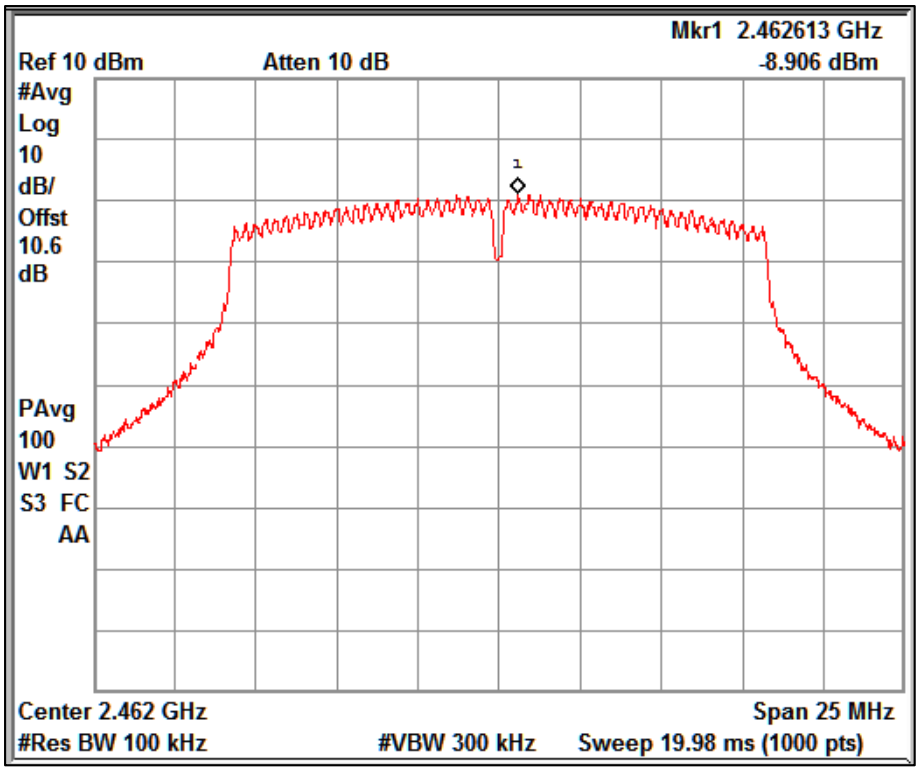
Data Rate: 6Mbps Channel Frequency: 2462MHz



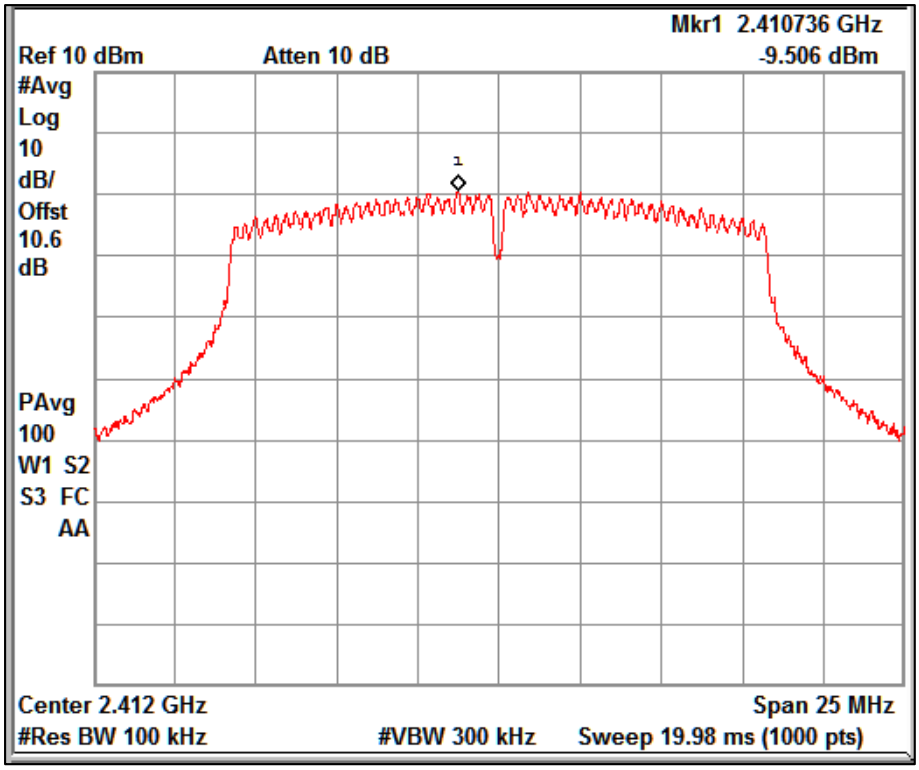
Data Rate: 24Mbps Channel Frequency: 2412MHz



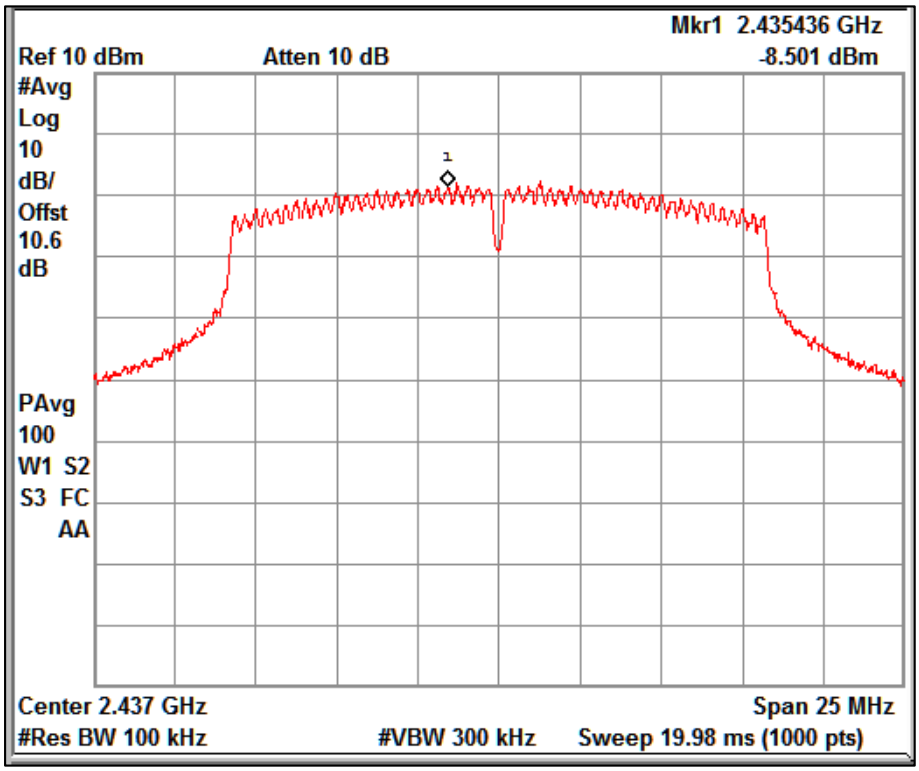
Data Rate: 24Mbps Channel Frequency: 2437MHz



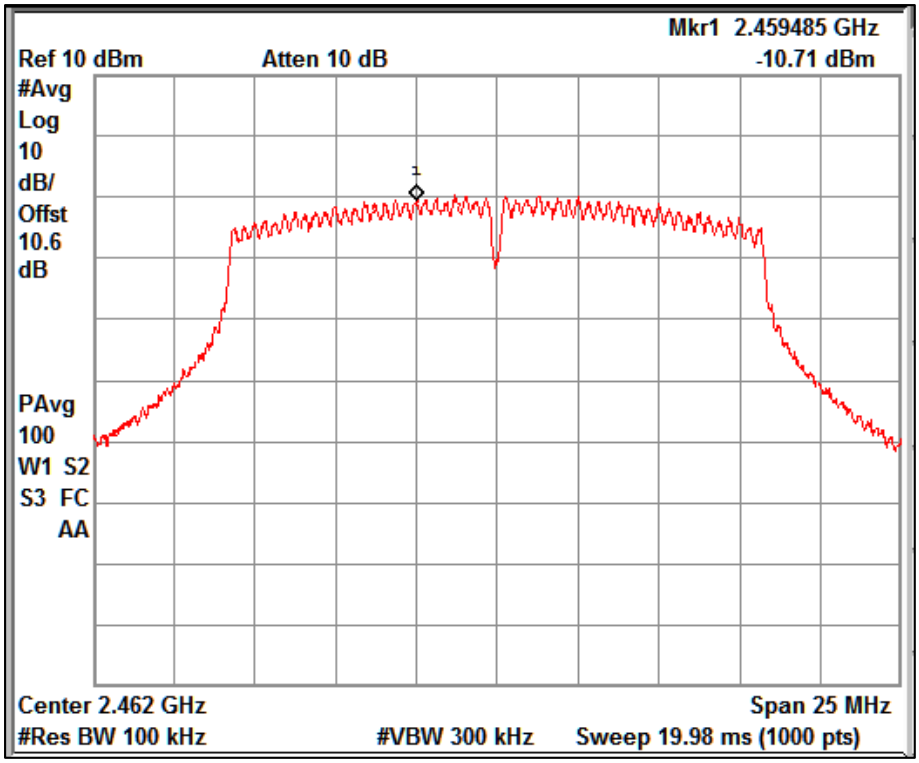
Data Rate: 24Mbps Channel Frequency: 2462MHz



Data Rate: 54Mbps Channel Frequency: 2412MHz



Data Rate: 54Mbps Channel Frequency: 2437MHz



Data Rate: 54Mbps Channel Frequency: 2462MHz

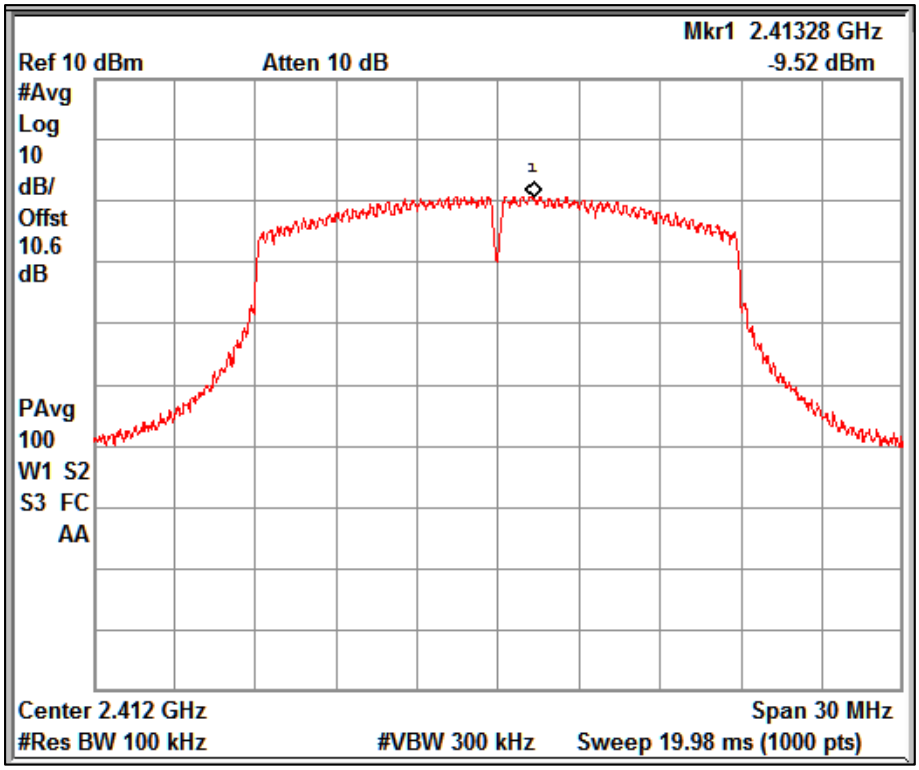
Modulation: 802.11n_20MHz

Data rate (Mbps)	Channel Frequency (MHz)	Measured average PSD (dBm/100kHz)	Duty cycle %	Duty cycle correction factor (dB)	Maximum average PSD (dBm/100kHz)	PSD Limit (dBm/100kHz)
MCS0	2412	-9.52	95.34	0.207	-9.31	8
	2437	-5.94	95.33	0.208	-5.73	8
	2462	-9.01	95.33	0.208	-8.80	8
MCS4	2412	-10.19	78.06	1.076	-9.11	8
	2437	-7.24	78.03	1.078	-6.16	8
	2462	-9.16	78.03	1.078	-8.08	8
MCS7	2412	-10.34	68.92	1.617	-8.72	8
	2437	-10.15	68.90	1.618	-8.53	8
	2462	-10.01	68.91	1.617	-8.39	8

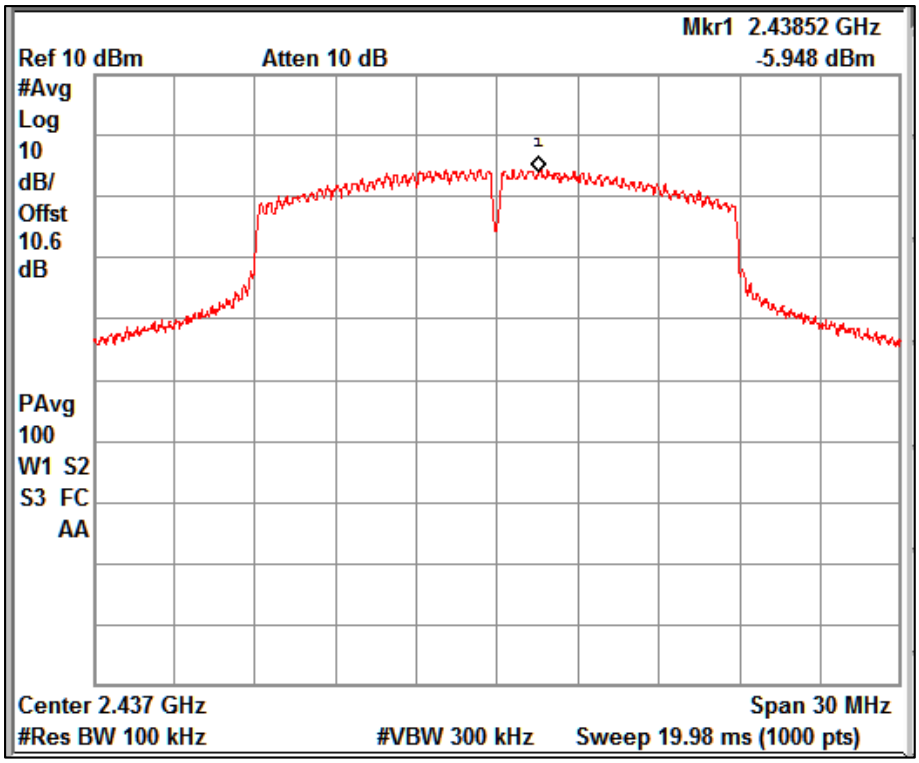
*Note: Duty Cycle Correction Factor Calculation

10*LOG (1/X) Where X is Duty Cycle is considered in below results

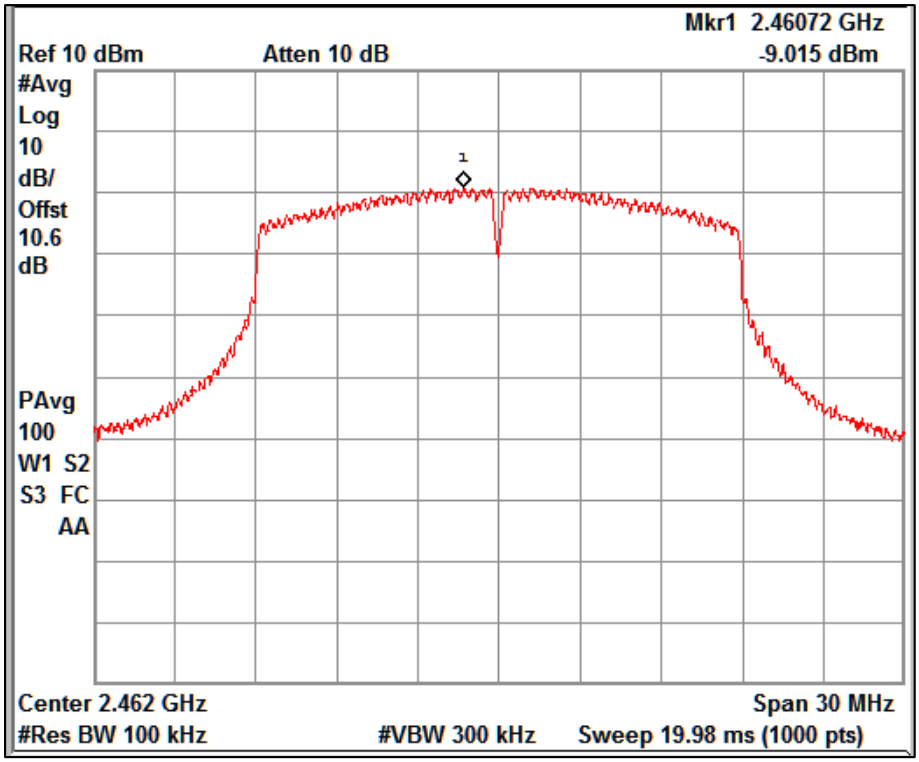
Duty cycle correction Factor is considered in Final Average PSD



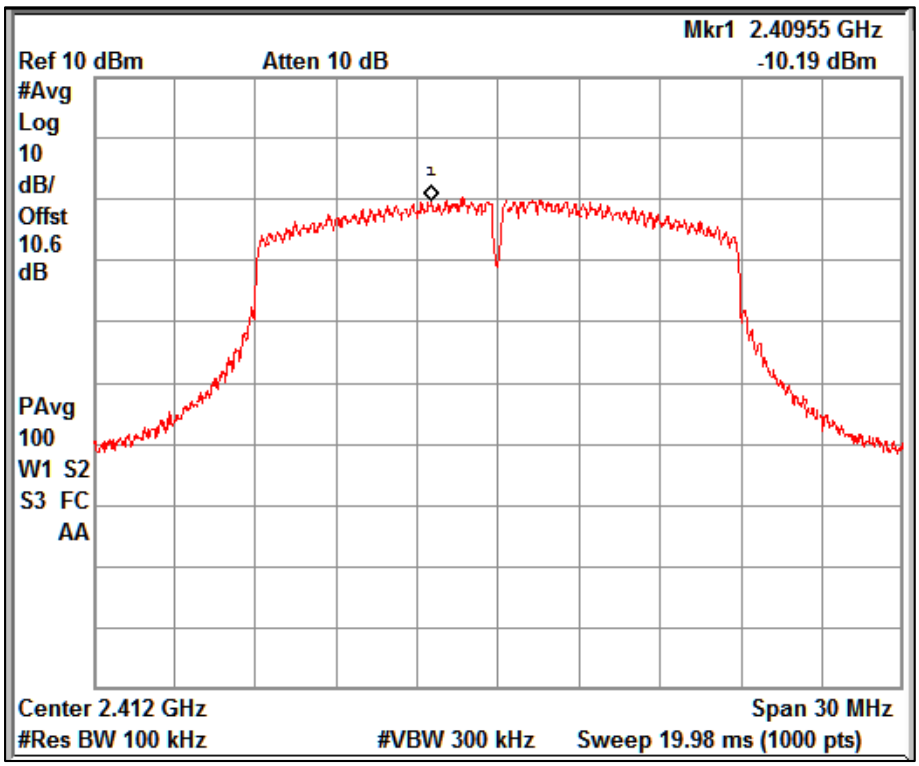
Data Rate: MCS0 Channel Frequency: 2412MHz



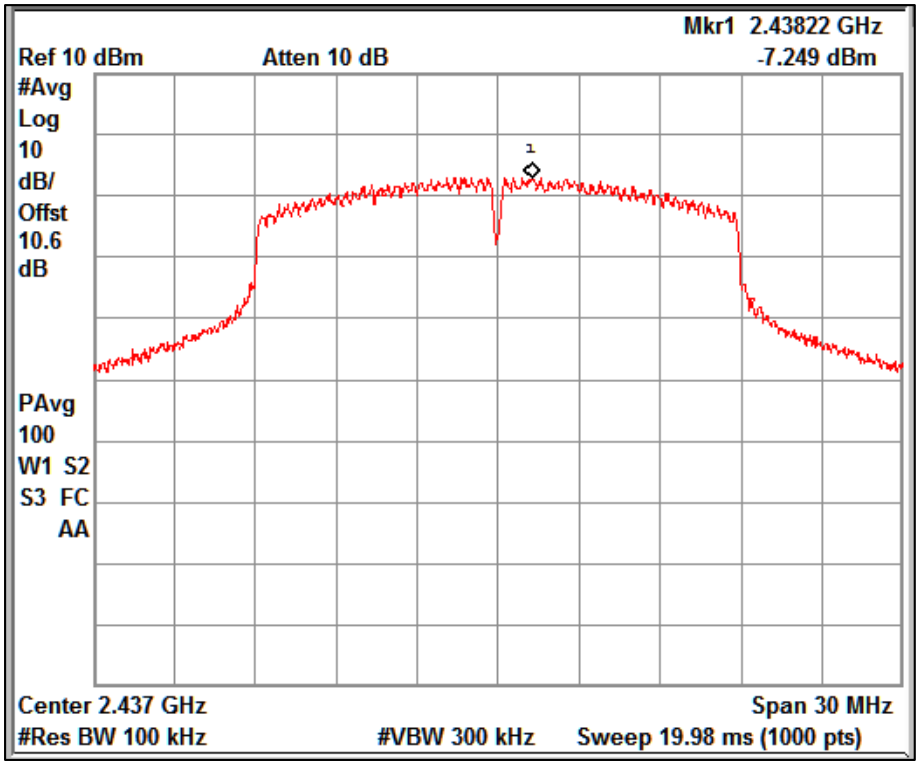
Data Rate: MCS0 Channel Frequency: 2437MHz



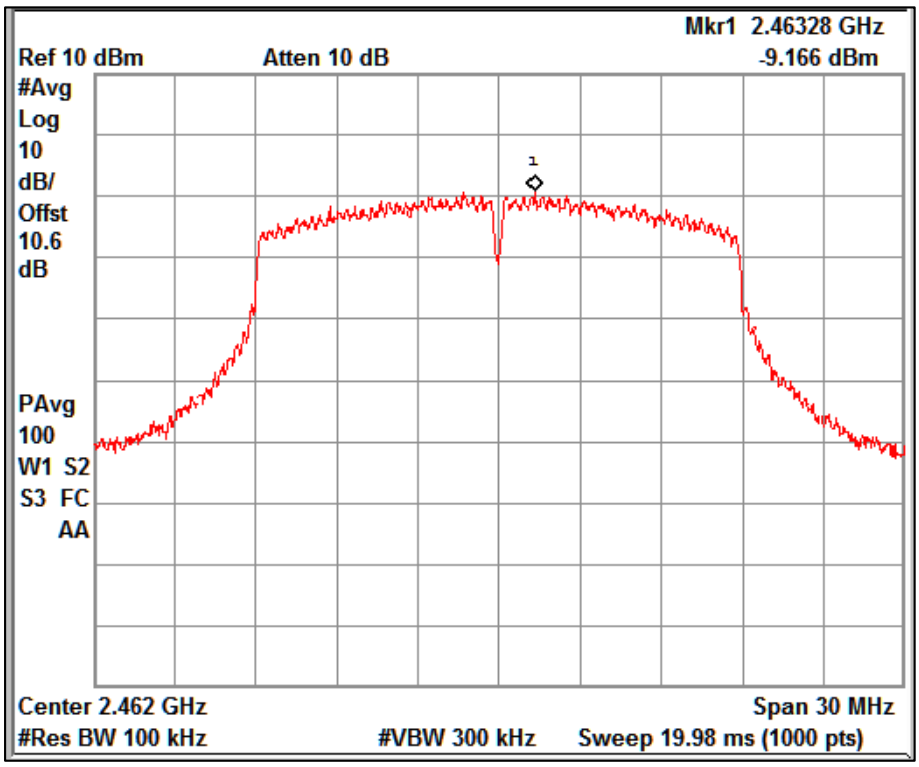
Data Rate: MCS0 Channel Frequency: 2462MHz



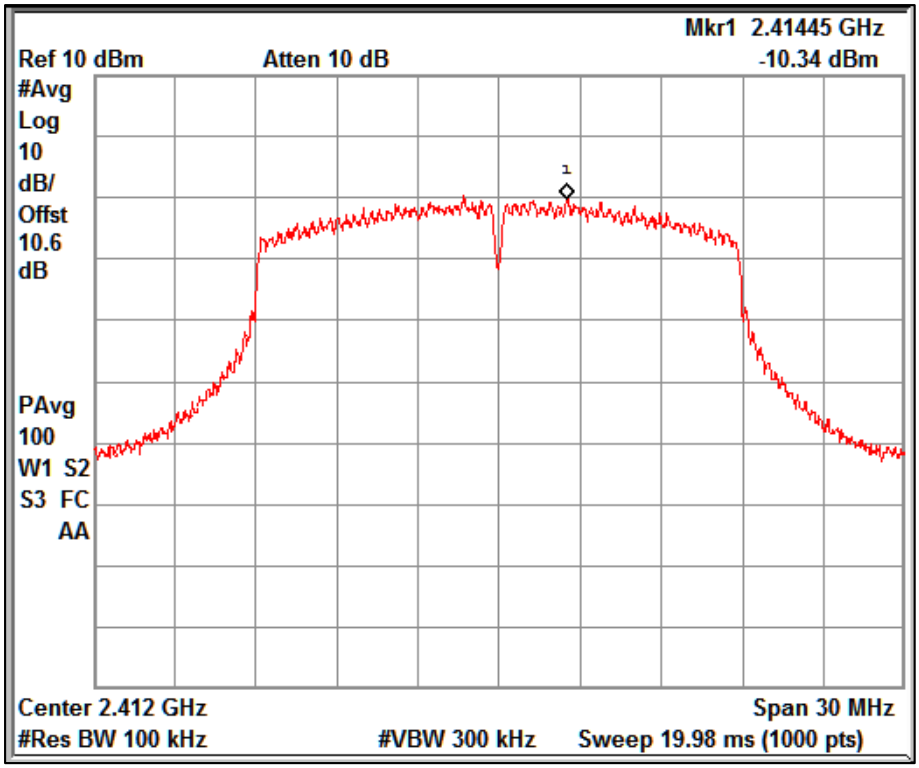
Data Rate: MCS4 Channel Frequency: 2412MHz



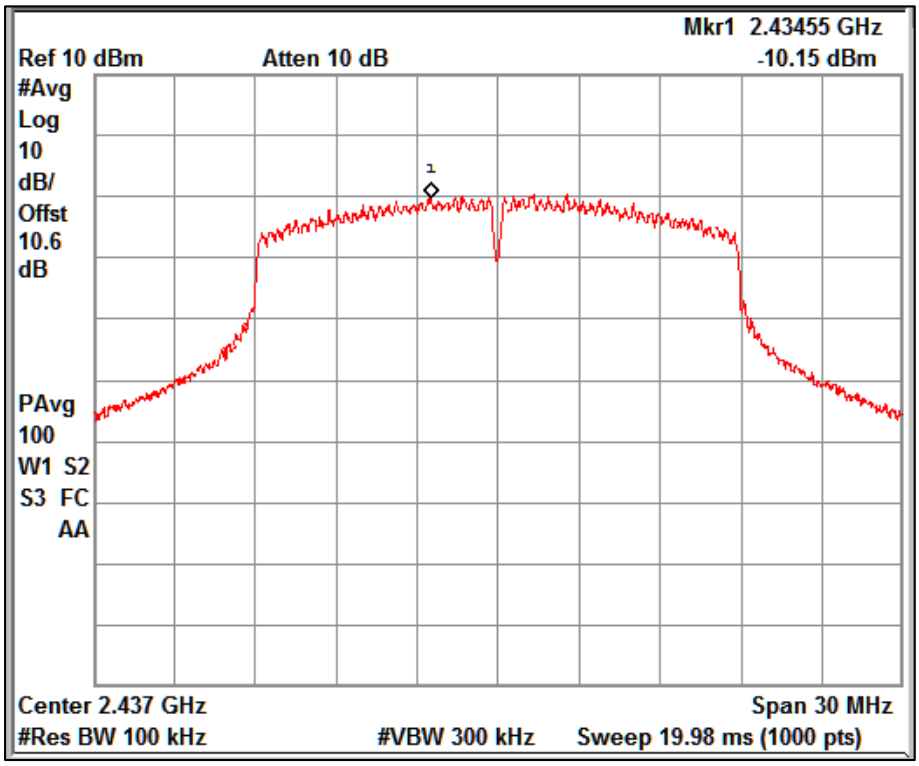
Data Rate: MCS4 Channel Frequency: 2437MHz



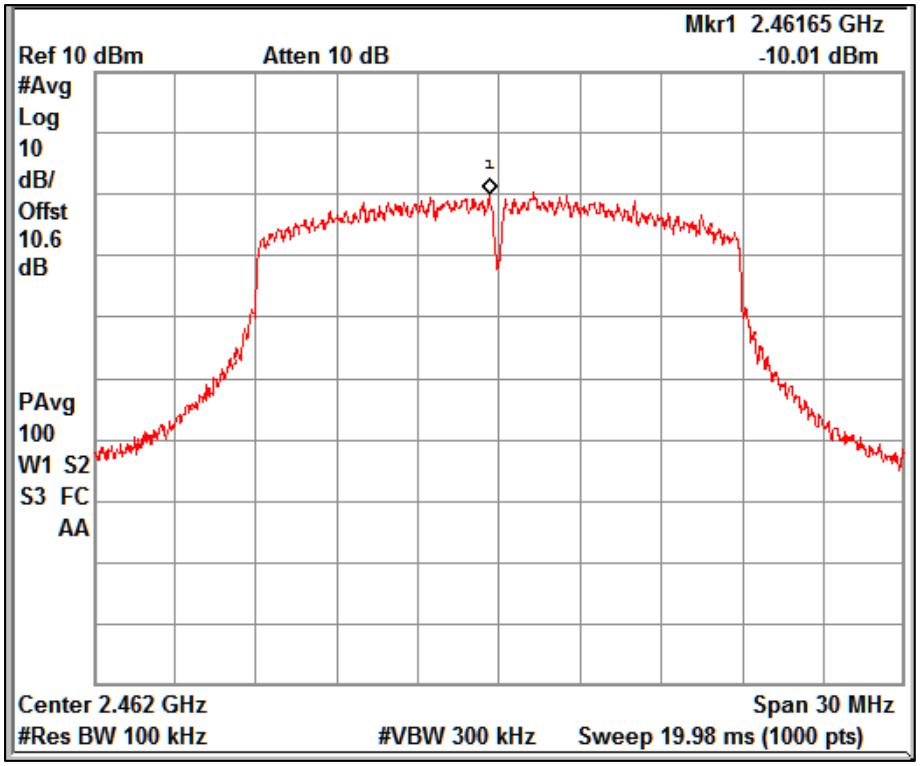
Data Rate: MCS4 Channel Frequency: 2462MHz



Data Rate: MCS7 Channel Frequency: 2412MHz



Data Rate: MCS7 Channel Frequency: 2437MHz



Data Rate: MCS7 Channel Frequency: 2462MHz

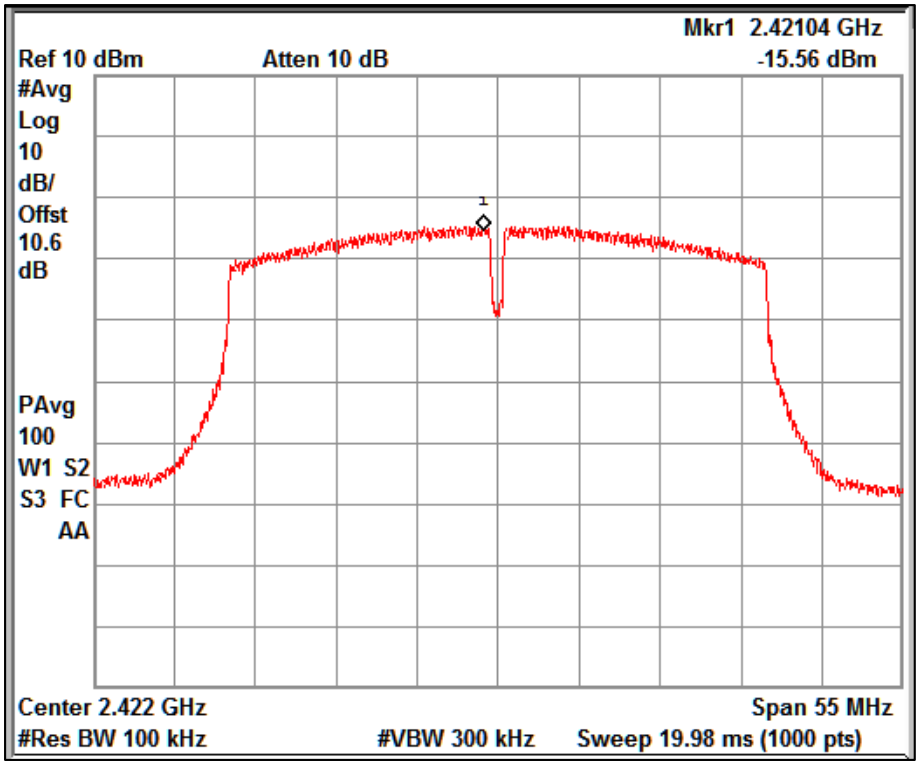
Modulation: 802.11n_40MHz

Data rate (Mbps)	Channel Frequency (MHz)	Measured average PSD (dBm/100kHz)	Duty cycle %	Duty cycle correction factor (dB)	Maximum average PSD (dBm/100kHz)	PSD Limit (dBm/100kHz)
MCS0	2422	-15.56	90.90	0.414	-15.15	8
	2452	-13.92	90.86	0.417	-13.50	8
MCS4	2422	-15.14	64.55	1.901	-13.24	8
	2452	-15.66	64.37	1.913	-13.75	8
MCS7	2422	-15.81	53.81	2.692	-13.12	8
	2452	-16.13	53.76	2.695	-13.43	8

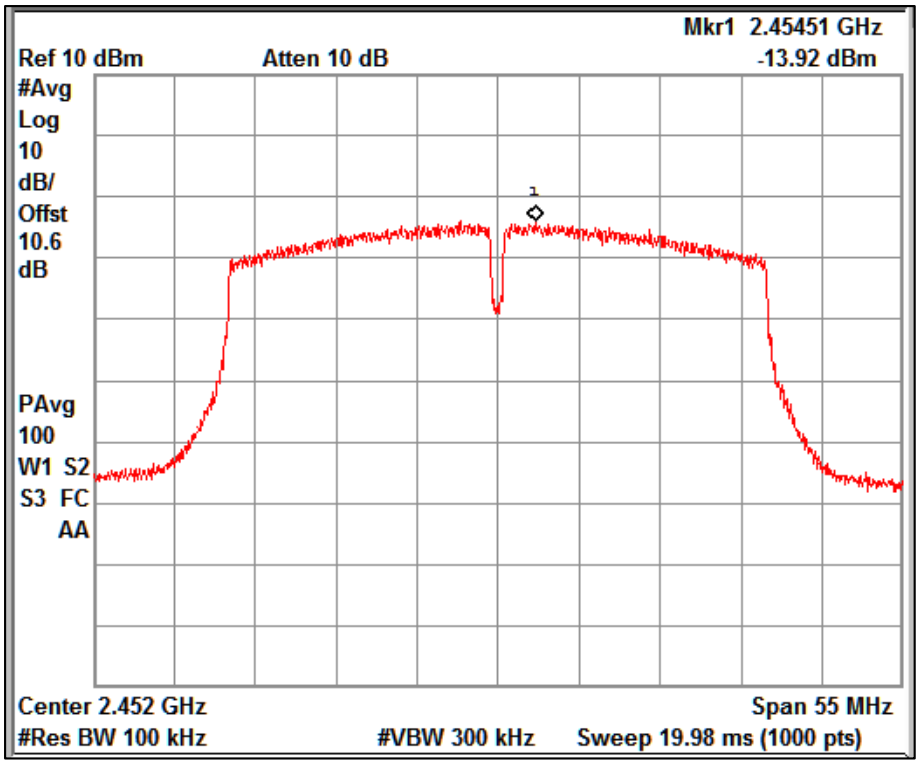
*Note: Duty Cycle Correction Factor Calculation

10*LOG (1/X) Where X is Duty Cycle is considered in below results

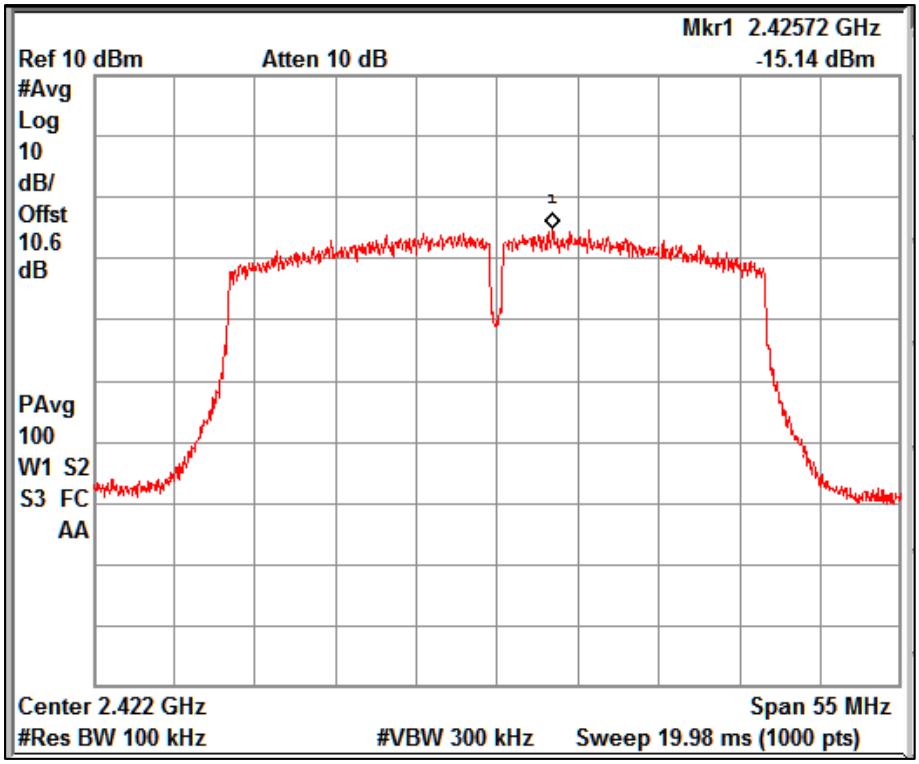
Duty cycle correction Factor is considered in Final Average PSD



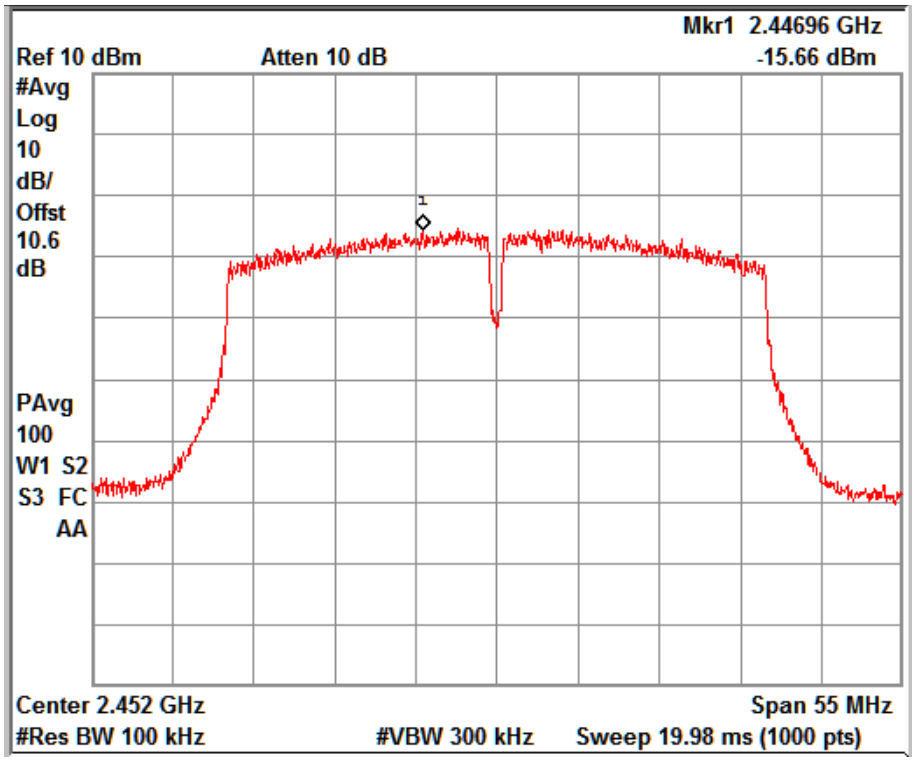
Data Rate: MCS0 Channel Frequency: 2422MHz



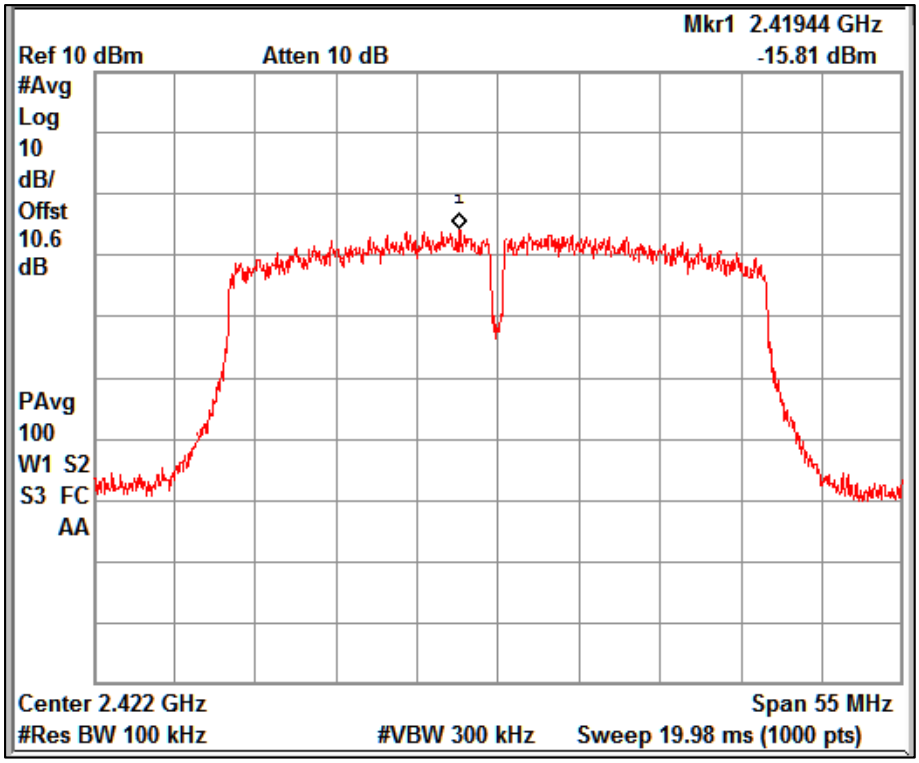
Data Rate: MCS0 Channel Frequency: 2452MHz



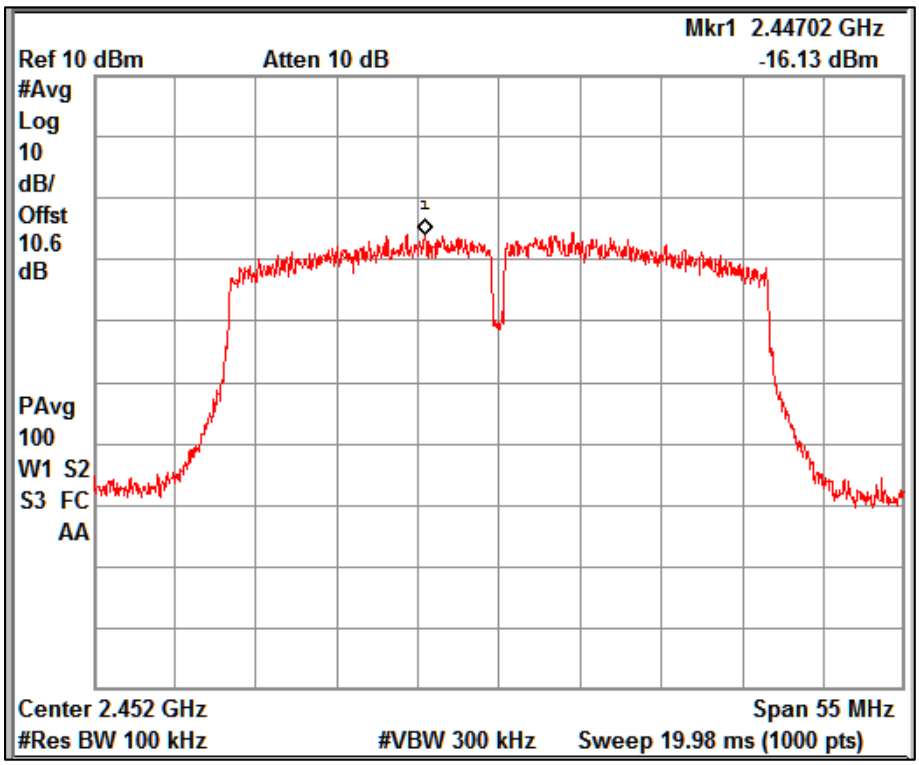
Data Rate: MCS4 Channel Frequency: 2422MHz



Data Rate: MCS4 Channel Frequency: 2452MHz



Data Rate: MCS7 Channel Frequency: 2422MHz

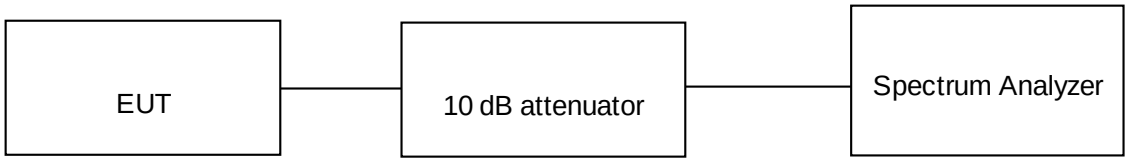


Data Rate: MCS7 Channel Frequency: 2452MHz

6.3 DTS Bandwidth

Result	***Pass***
Test Specification	FCC part 15 Subpart C 15.247 (a) (2) / RSS 247 Issue 2, Section 5.2 (a)
Test Method	Subclause 11.8 of ANSI C63.10
Measurement Bandwidth	100 kHz
Detector	Peak
Port of testing	Antenna port
Requirement	The minimum 6 dB bandwidth shall be at least 500 kHz

Test Method:



Test Condition

Normal Test Condition:

Temperature (Norm) = + 25 °C Voltage = 3.6V DC Li-Ion battery Relative humidity: 62 %

KDB Guidelines applied:

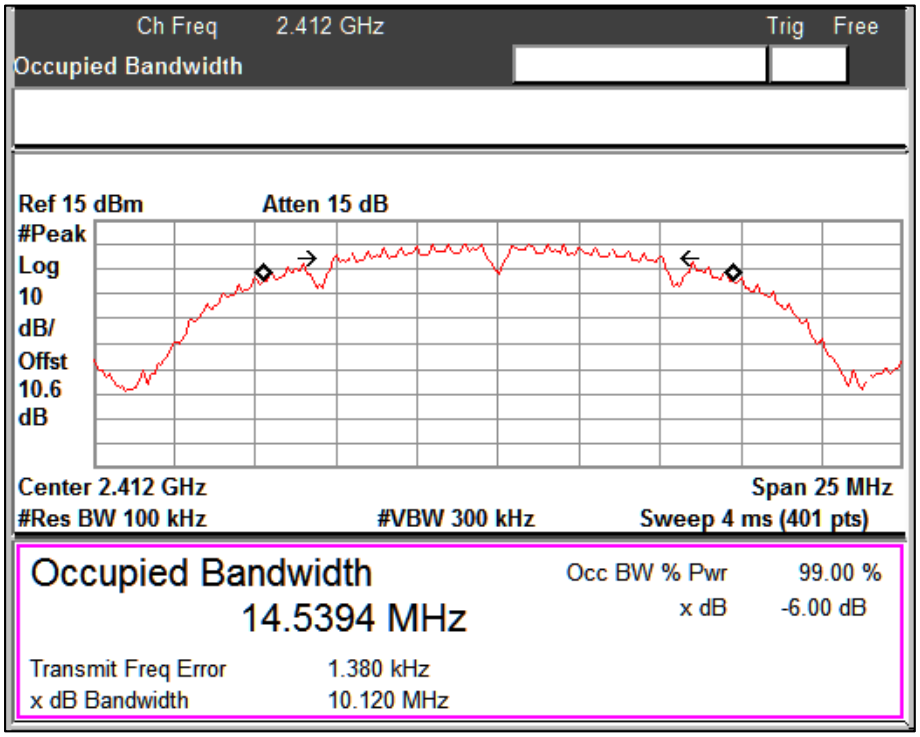
Measurements were made as per section 8.2 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

Test results:

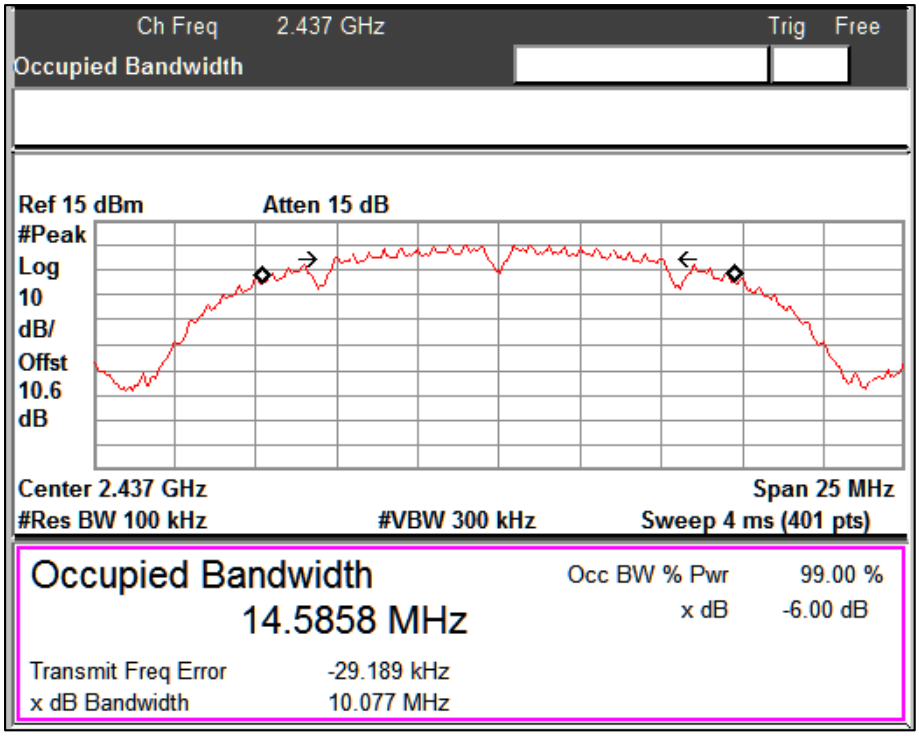
Note:
1. All the losses are included during measurement and final values are mentioned in the test report.

Modulation: 802.11b

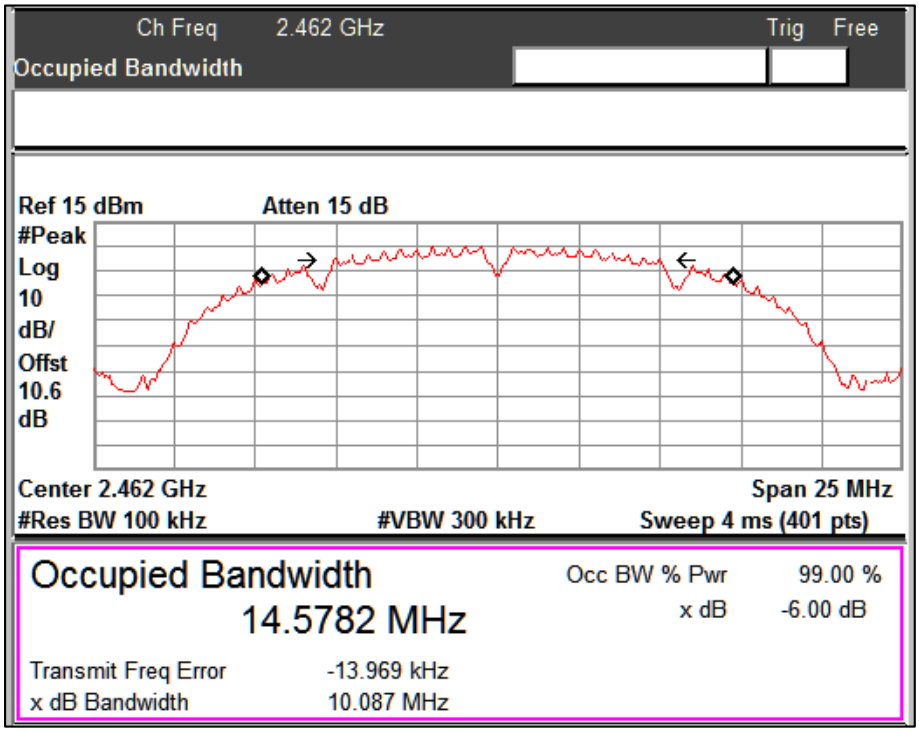
Data rate (Mbps)	Channel Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)	Minimum Limit (MHz)
1	2412	10.12	14.53	0.5
	2437	10.07	14.58	0.5
	2462	10.08	14.57	0.5
11	2412	10.37	14.55	0.5
	2442	9.82	14.52	0.5
	2462	10.16	14.50	0.5



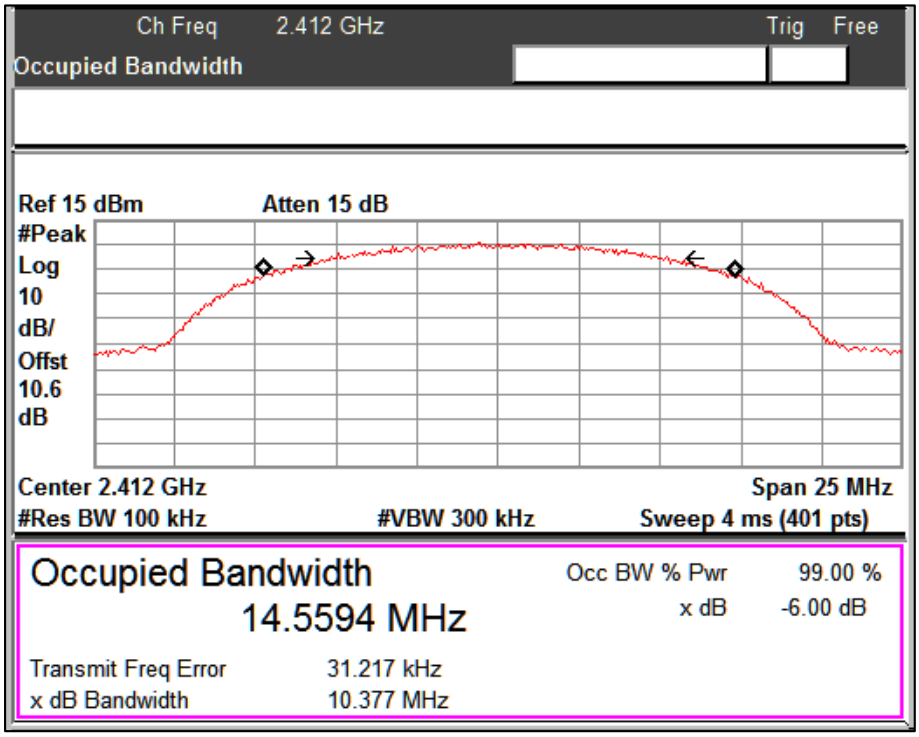
Data Rate: 1Mbps Channel Frequency: 2412MHz



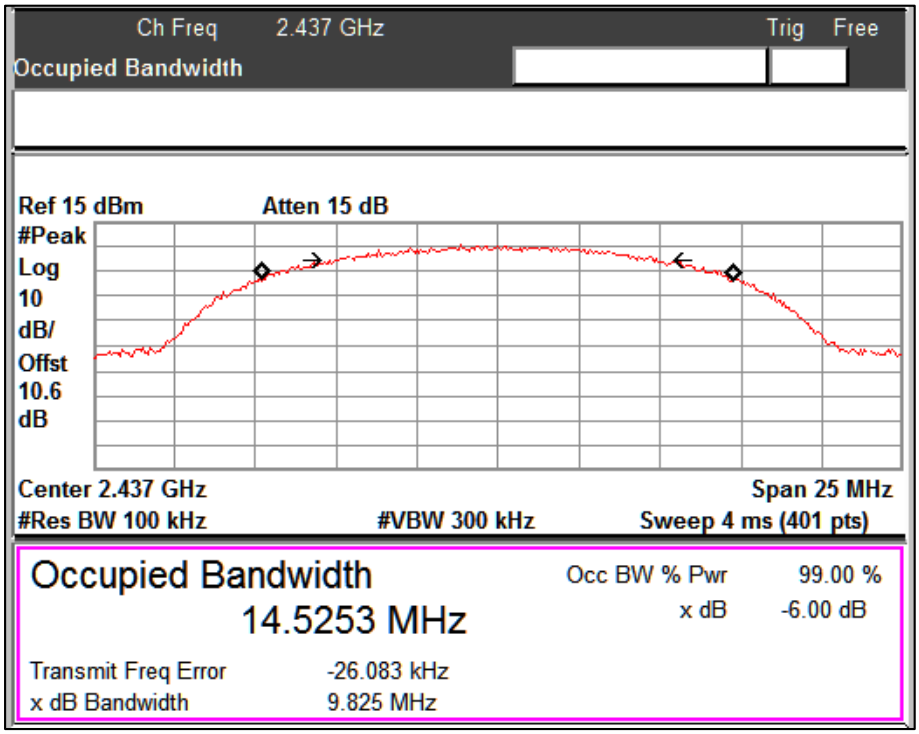
Data Rate: 1Mbps Channel Frequency: 2437MHz



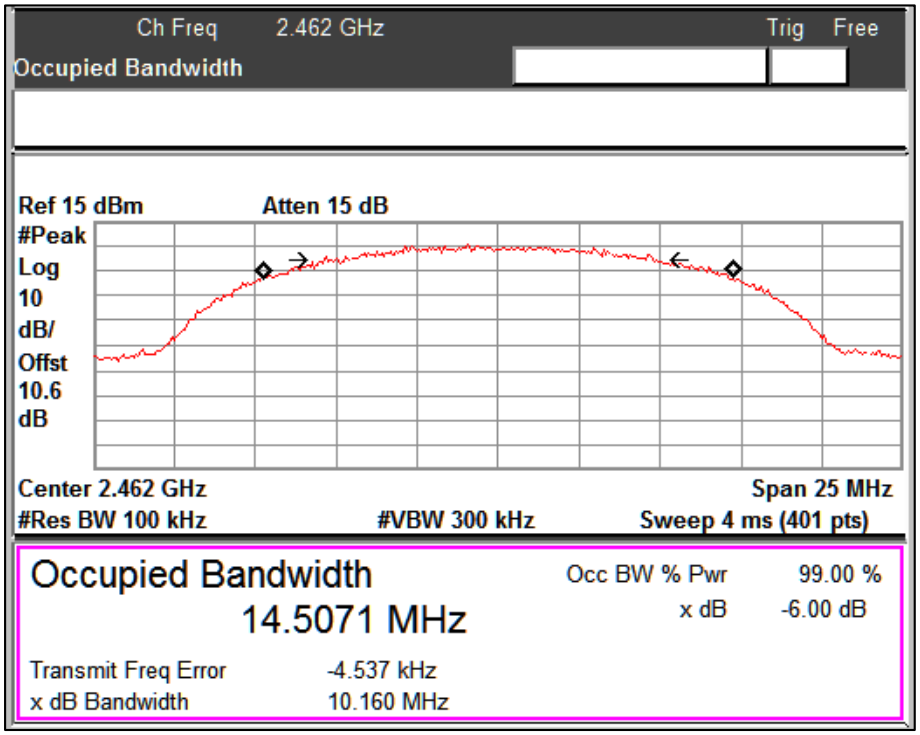
Data Rate: 1Mbps Channel Frequency: 2462MHz



Data Rate: 11Mbps Channel Frequency: 2412MHz



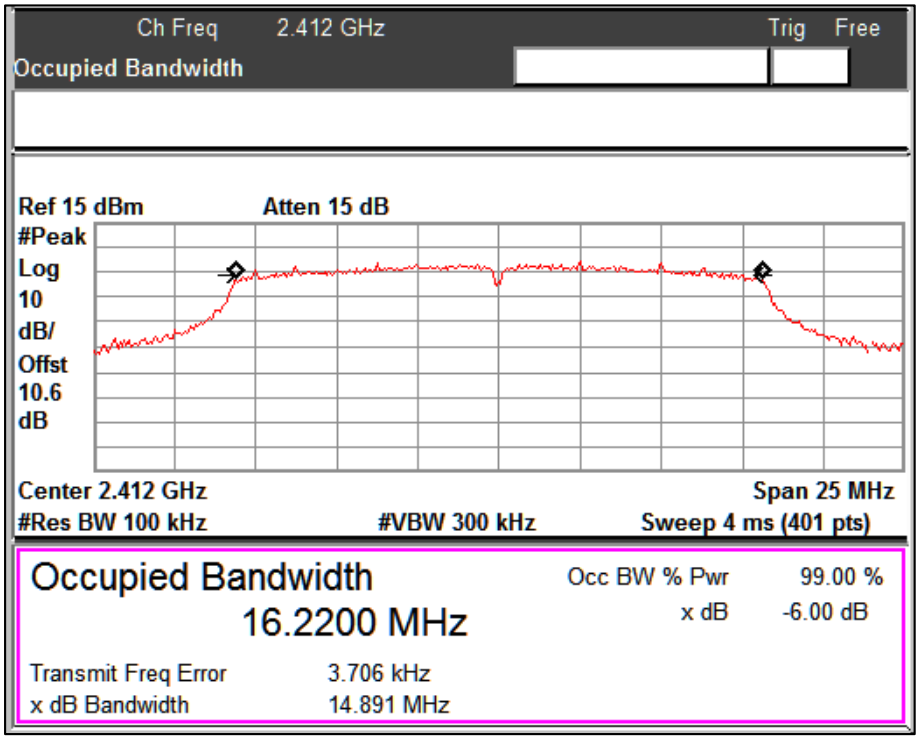
Data Rate: 11Mbps Channel Frequency: 2437MHz



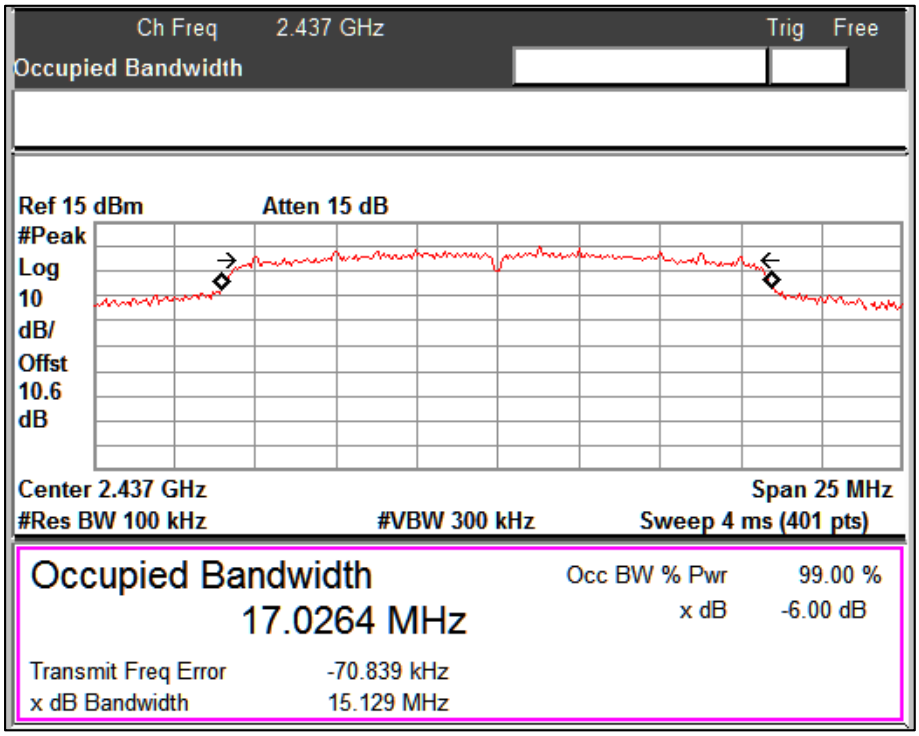
Data Rate: 11Mbps Channel Frequency: 2462MHz

Modulation: 802.11g

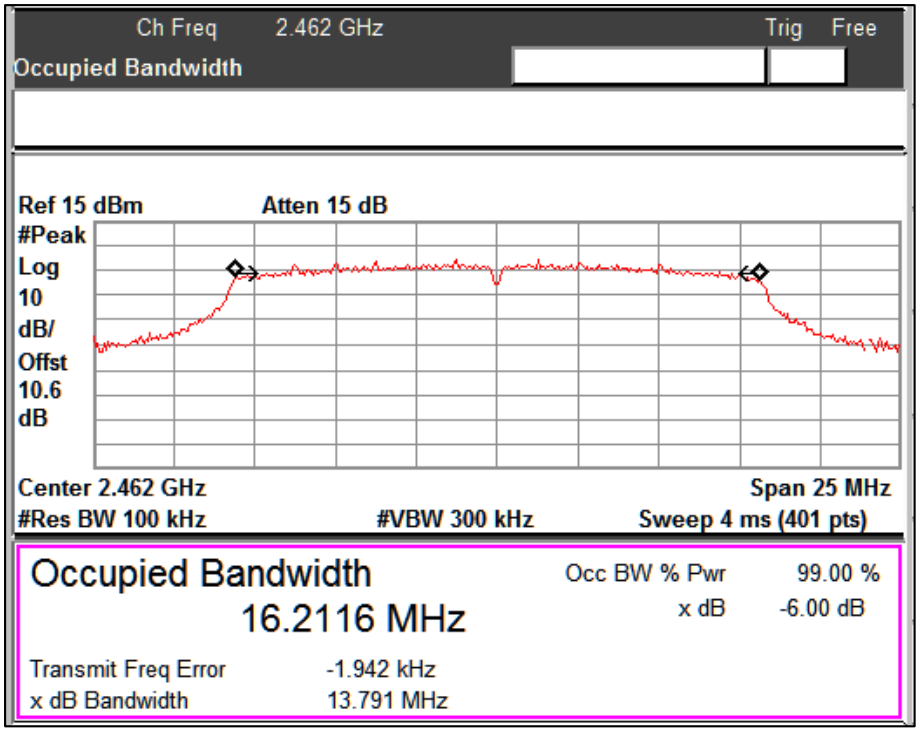
Data rate (Mbps)	Channel Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)	Minimum Limit (MHz)
6	2412	14.89	16.22	0.5
	2437	15.12	17.02	0.5
	2462	13.79	16.21	0.5
24	2412	15.41	16.20	0.5
	2437	15.13	16.41	0.5
	2462	15.35	16.25	0.5
54	2412	15.22	16.21	0.5
	2437	15.67	16.28	0.5
	2462	15.14	16.22	0.5



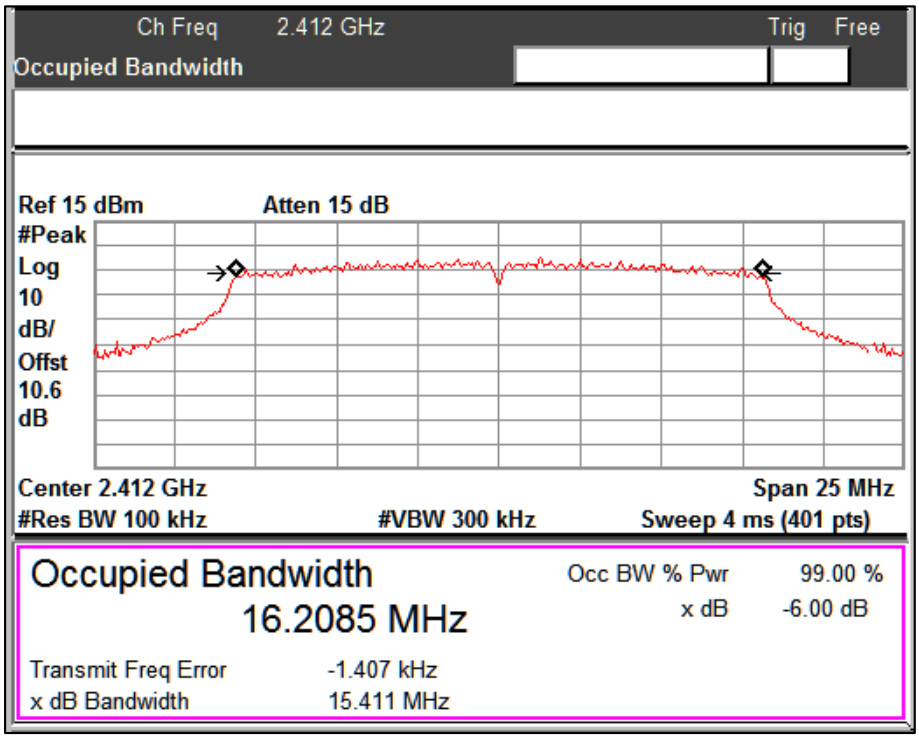
Data Rate: 6Mbps Channel Frequency: 2412MHz



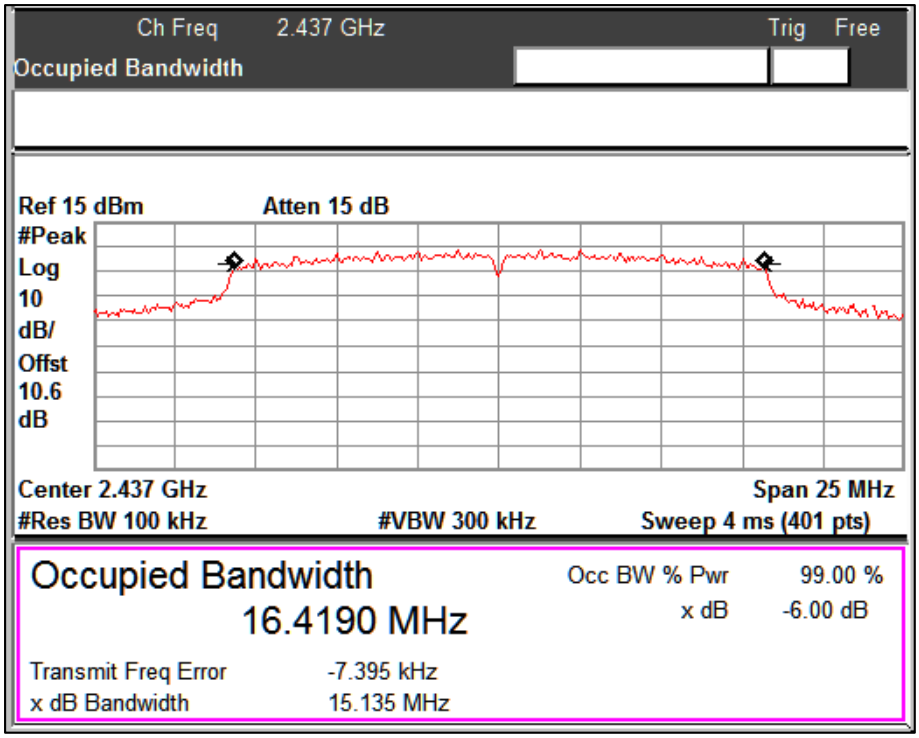
Data Rate: 6Mbps Channel Frequency: 2437MHz



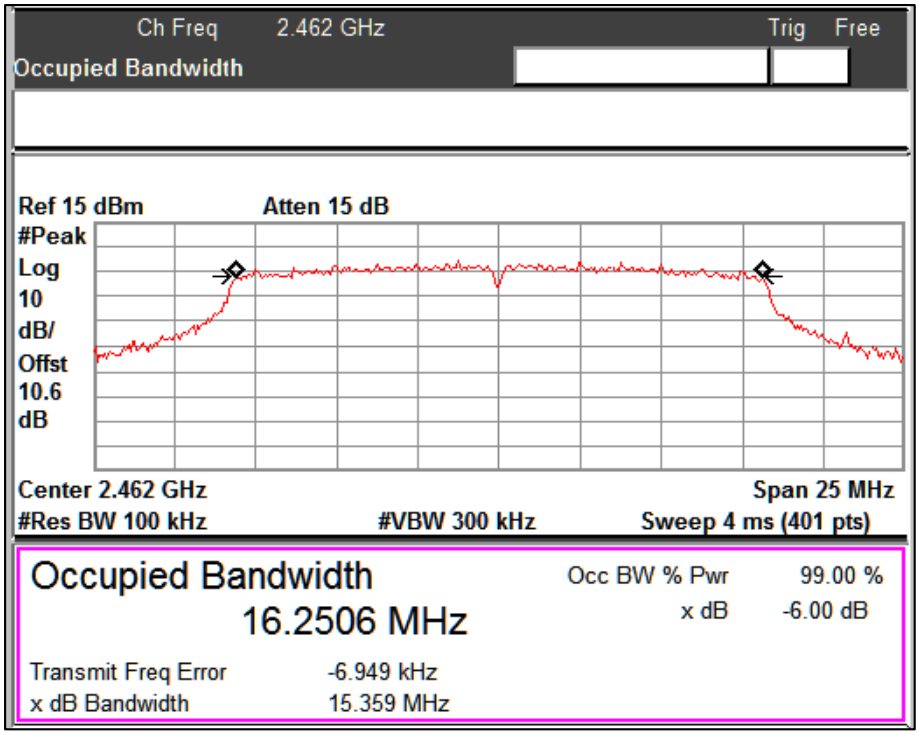
Data Rate: 6Mbps Channel Frequency: 2462MHz



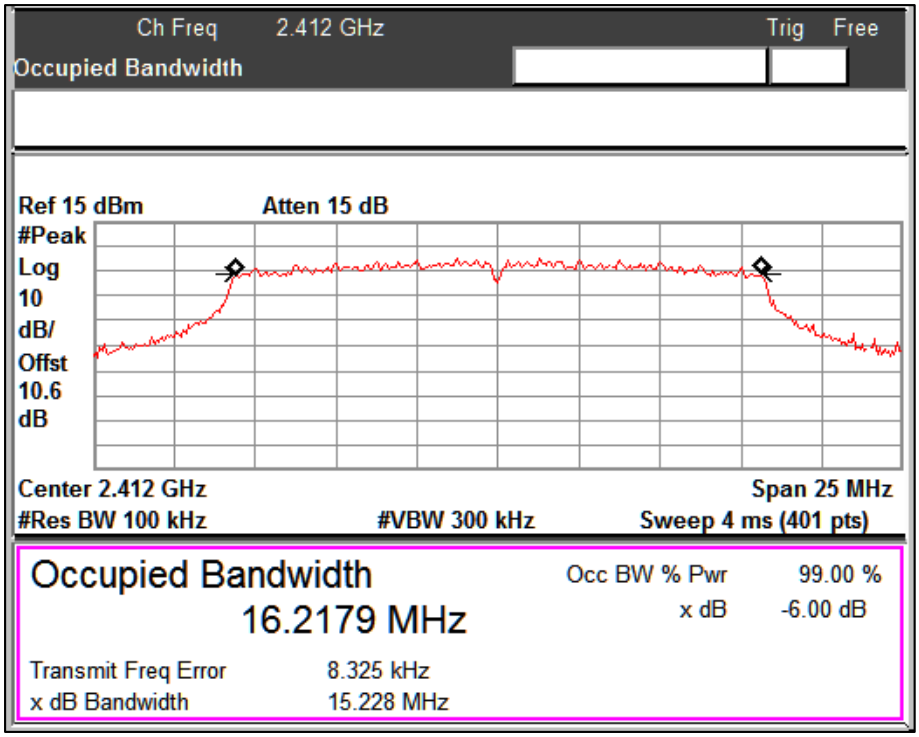
Data Rate: 24Mbps Channel Frequency: 2412MHz



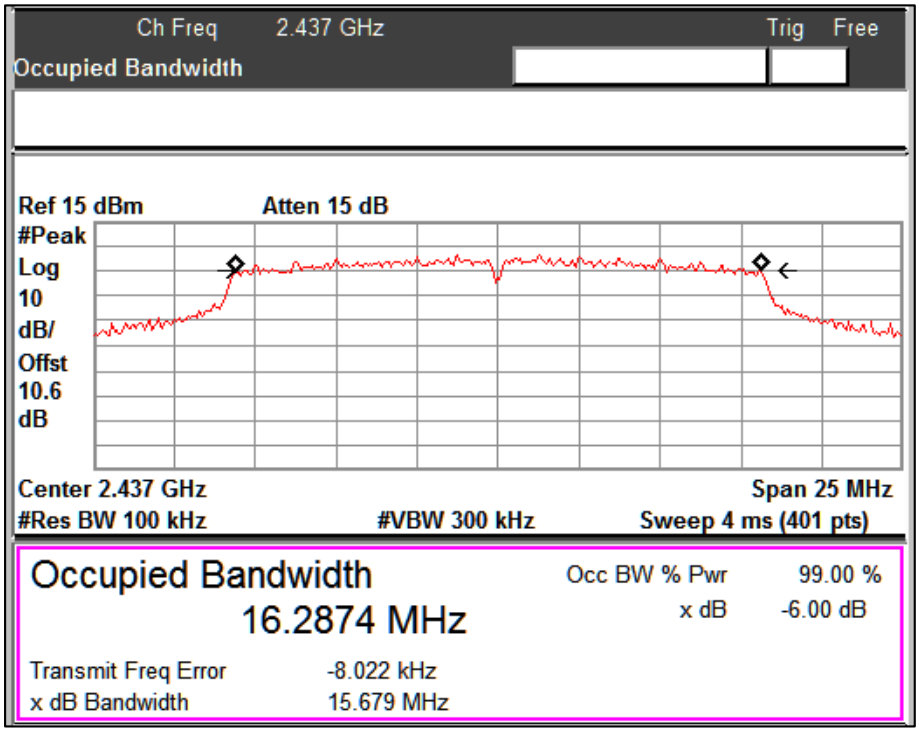
Data Rate: 24Mbps Channel Frequency: 2437MHz



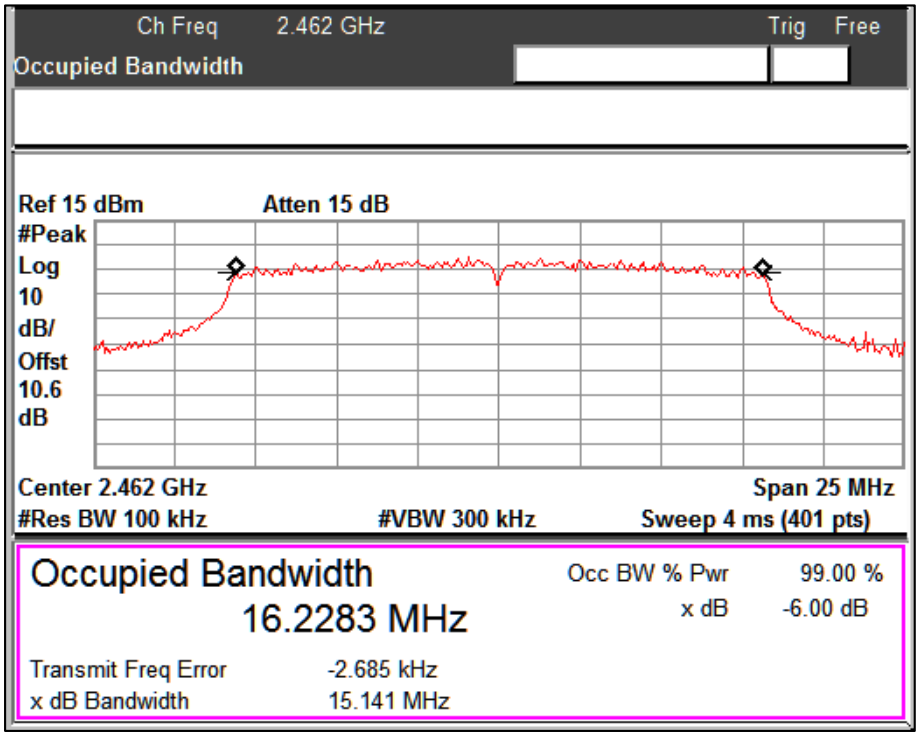
Data Rate: 24Mbps Channel Frequency: 2462MHz



Data Rate: 54Mbps Channel Frequency: 2412MHz



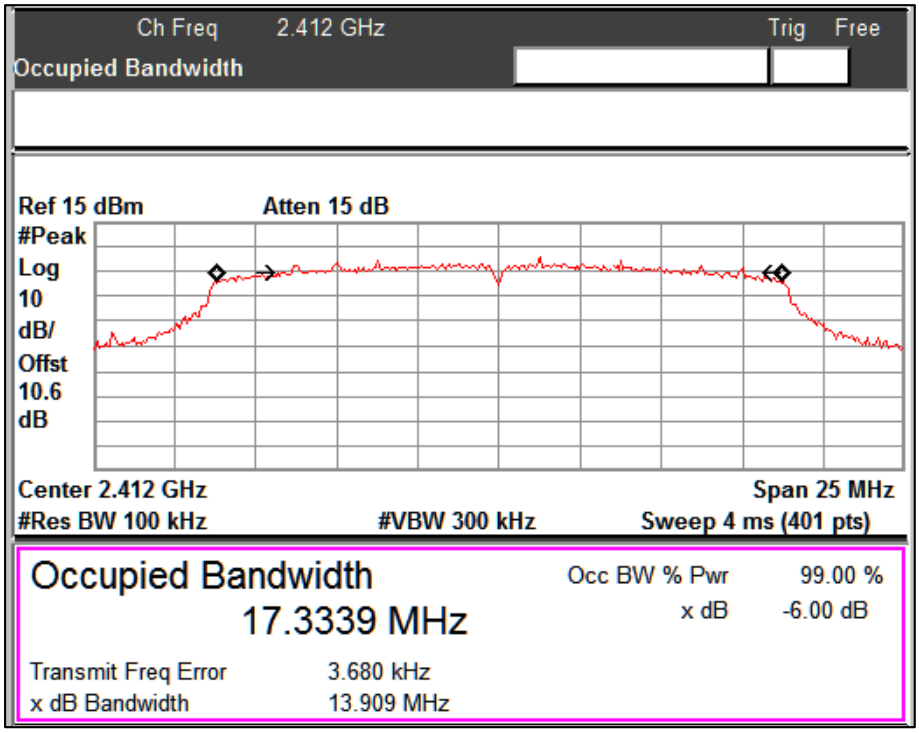
Data Rate: 54Mbps Channel Frequency: 2437MHz



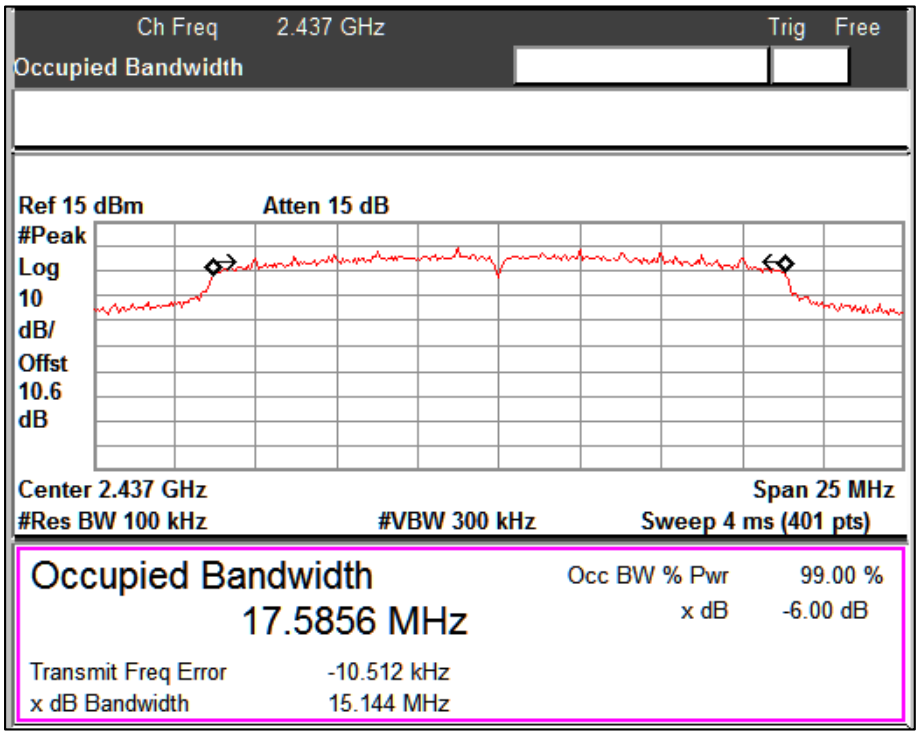
Data Rate: 54Mbps Channel Frequency: 2462MHz

Modulation: 802.11n_20MHz

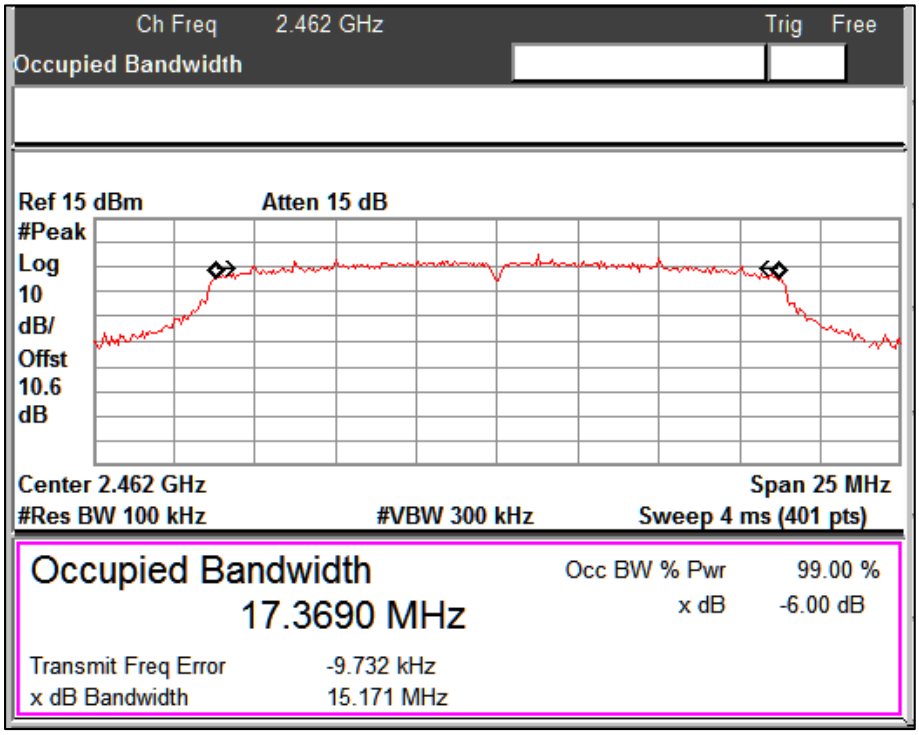
Data rate (Mbps)	Channel Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)	Minimum Limit (MHz)
MCS0	2412	13.90	17.33	0.5
	2437	15.14	17.58	0.5
	2462	15.17	17.36	0.5
MCS4	2412	15.11	17.38	0.5
	2437	15.16	17.48	0.5
	2462	15.19	17.39	0.5
MCS7	2412	15.19	17.39	0.5
	2437	15.09	17.43	0.5
	2462	15.30	17.40	0.5



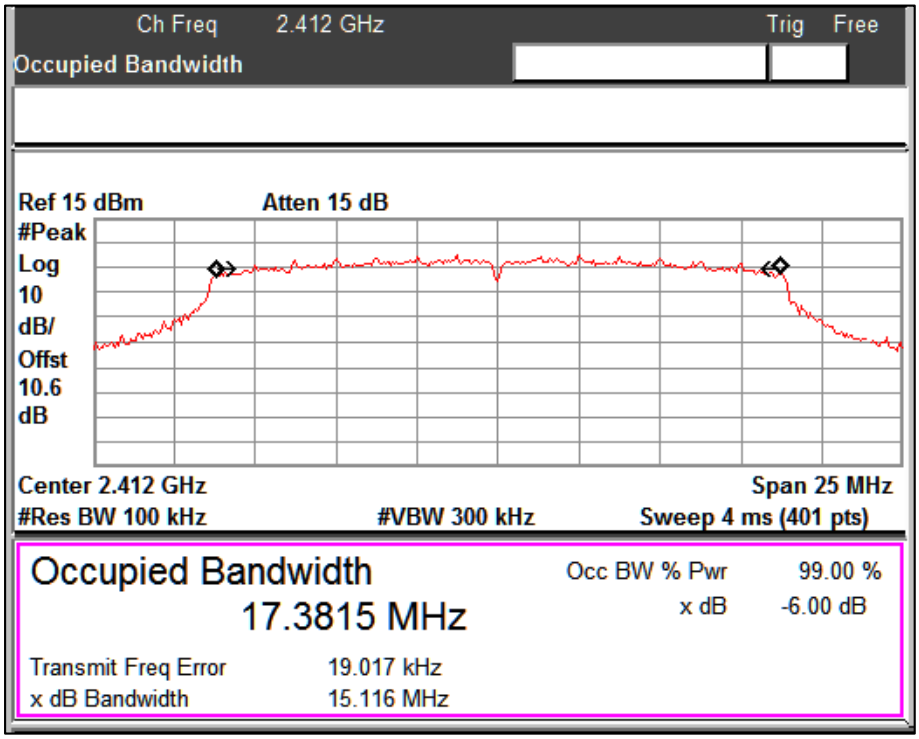
Data Rate: MCS0 Channel Frequency: 2412MHz



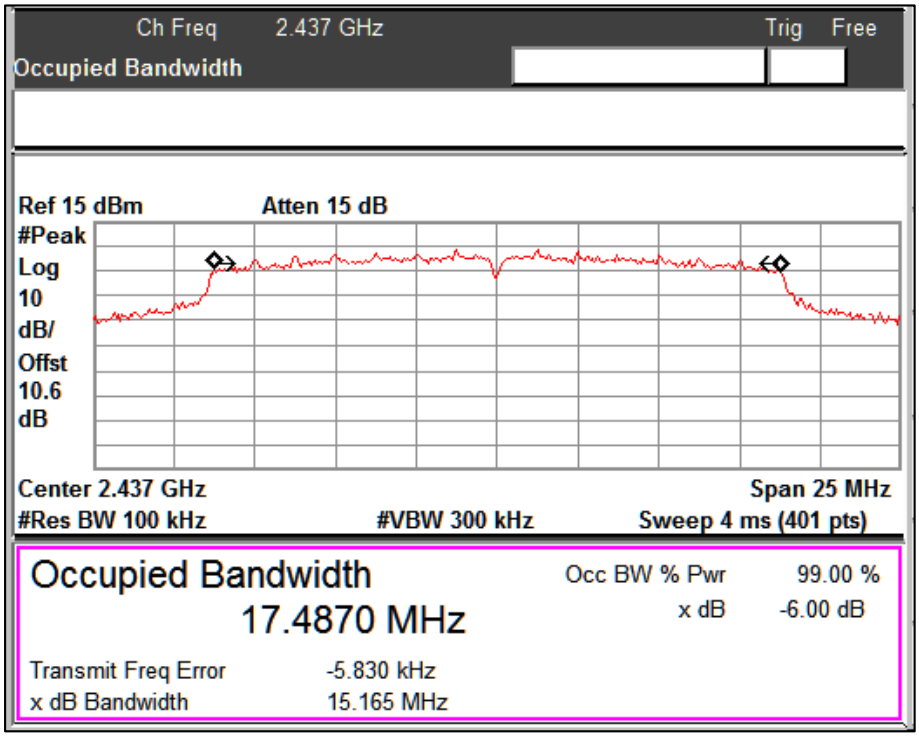
Data Rate: MCS0 Channel Frequency: 2437MHz



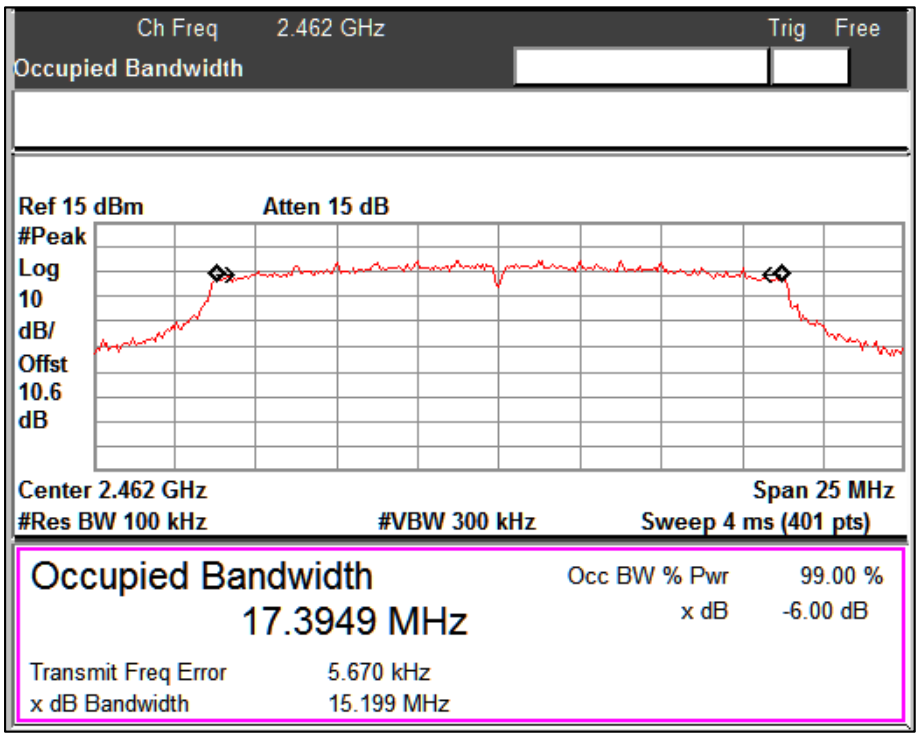
Data Rate: MCS0 Channel Frequency: 2462MHz



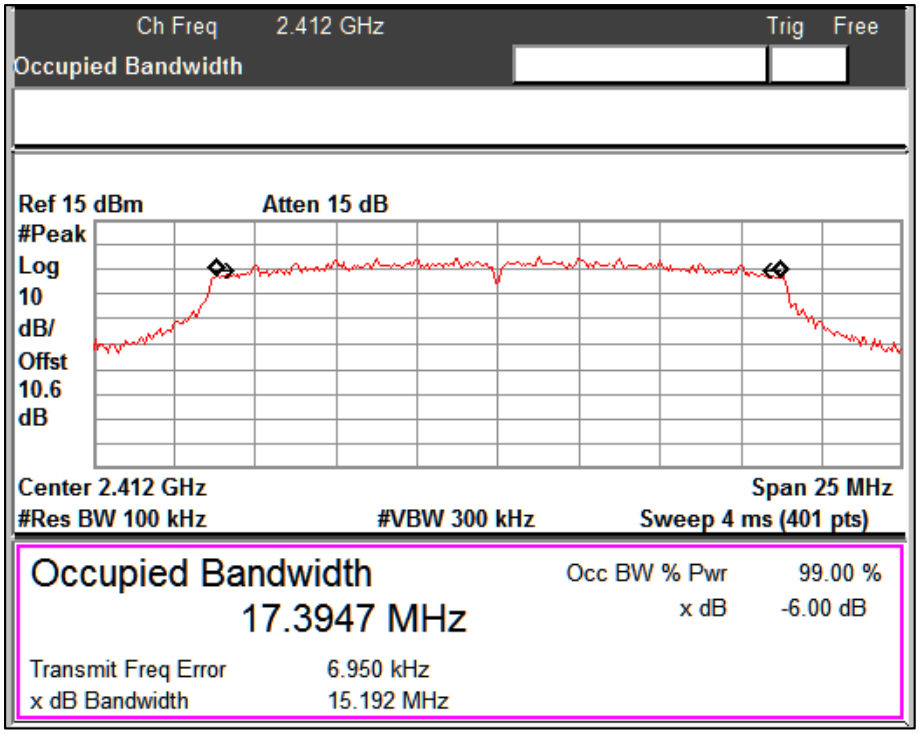
Data Rate: MCS4 Channel Frequency: 2412MHz



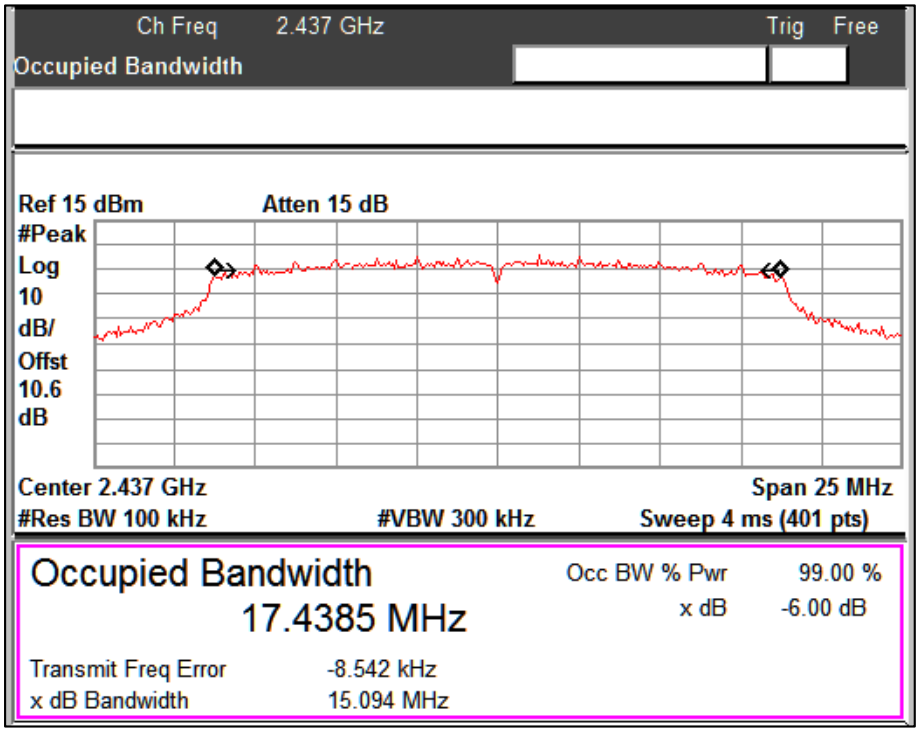
Data Rate: MCS4 Channel Frequency: 2437MHz



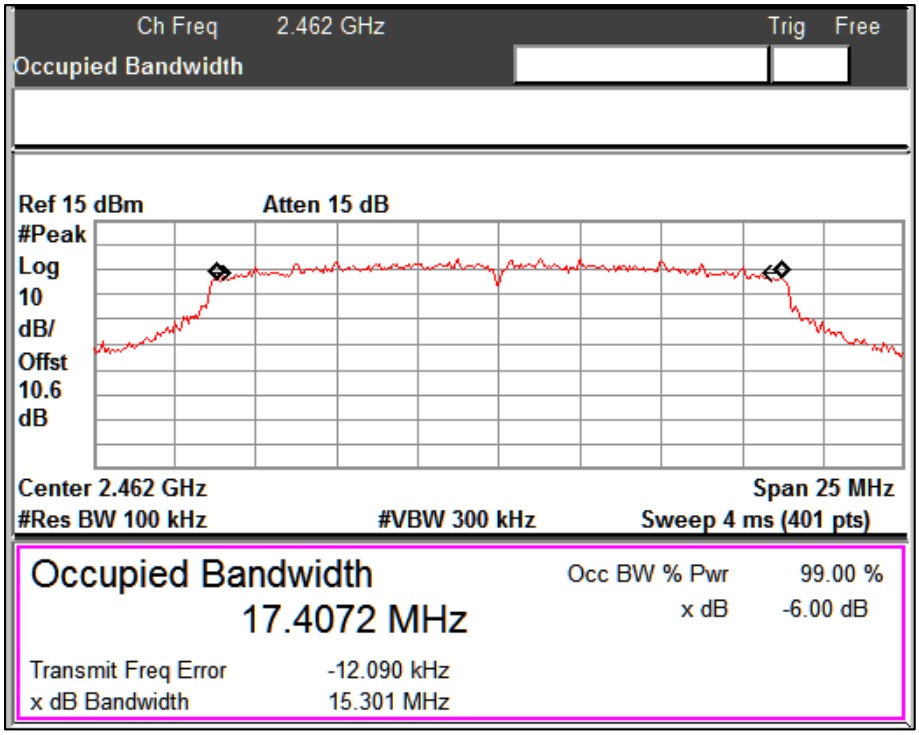
Data Rate: MCS4 Channel Frequency: 2462MHz



Data Rate: MCS7 Channel Frequency: 2412MHz



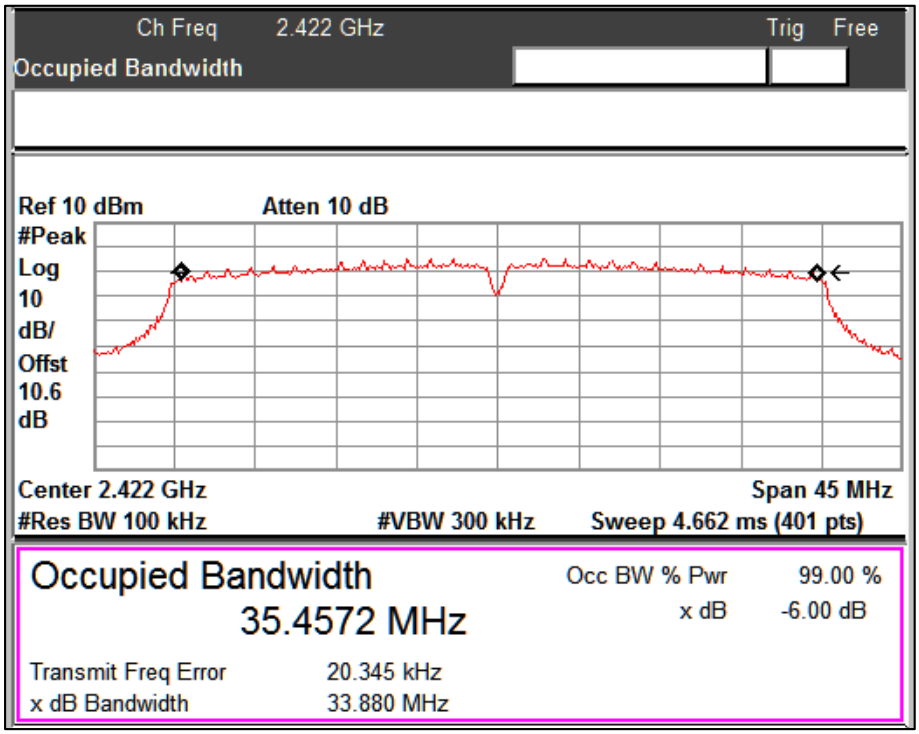
Data Rate: MCS7 Channel Frequency: 2437MHz



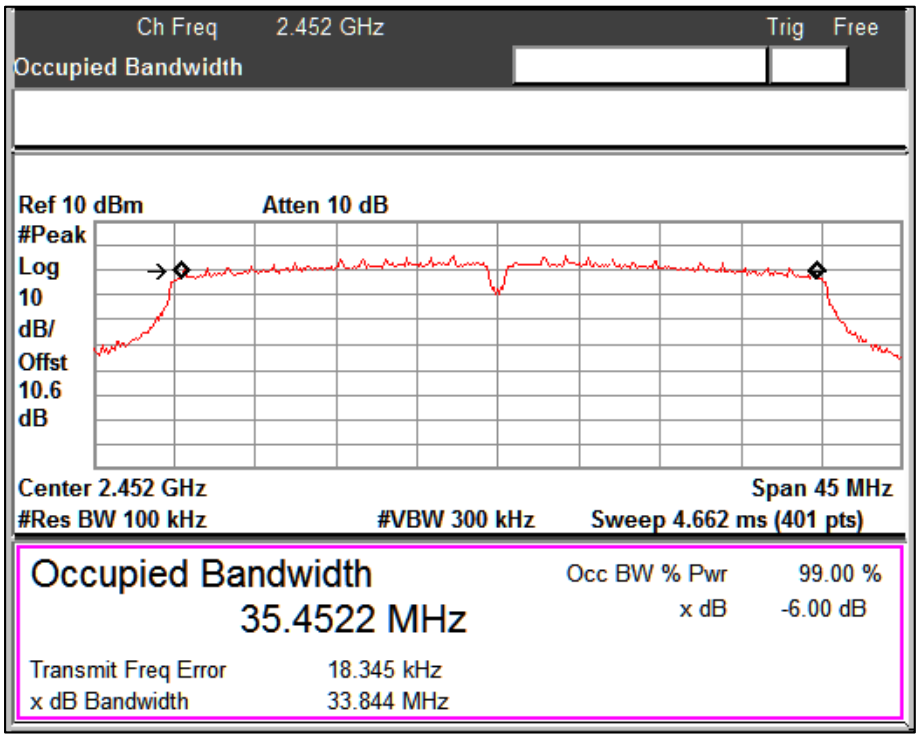
Data Rate: MCS7 Channel Frequency: 2462MHz

Modulation: 802.11n_40MHz

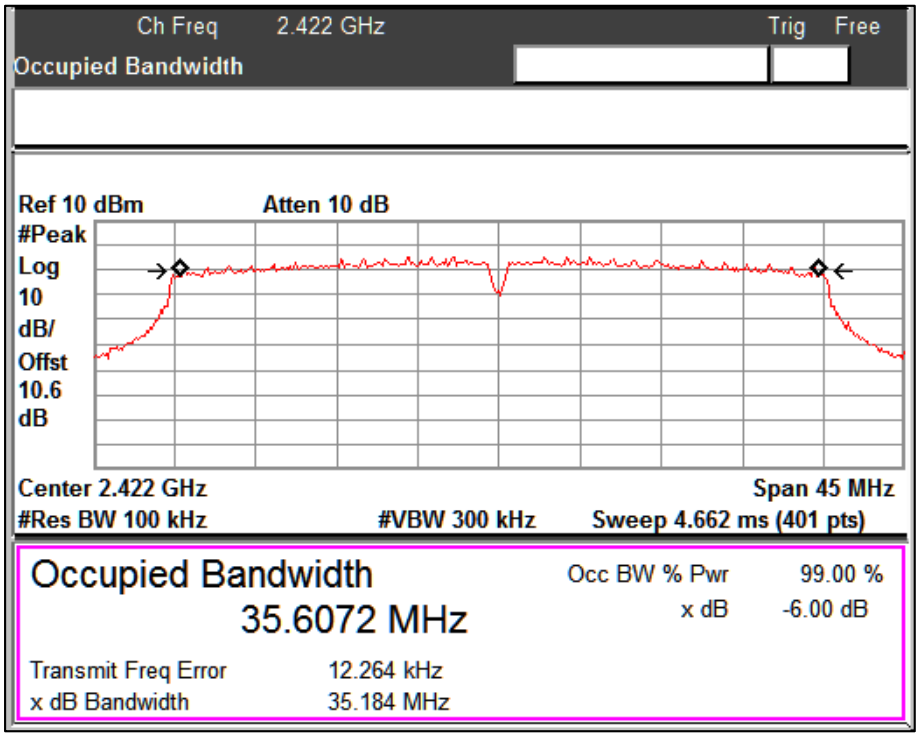
Data rate (Mbps)	Channel Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)	Minimum Limit (MHz)
MCS0	2422	33.88	35.45	0.5
	2452	33.84	35.45	0.5
MCS4	2422	35.18	35.60	0.5
	2452	33.95	35.56	0.5
MCS7	2422	35.19	35.62	0.5
	2452	35.17	35.58	0.5



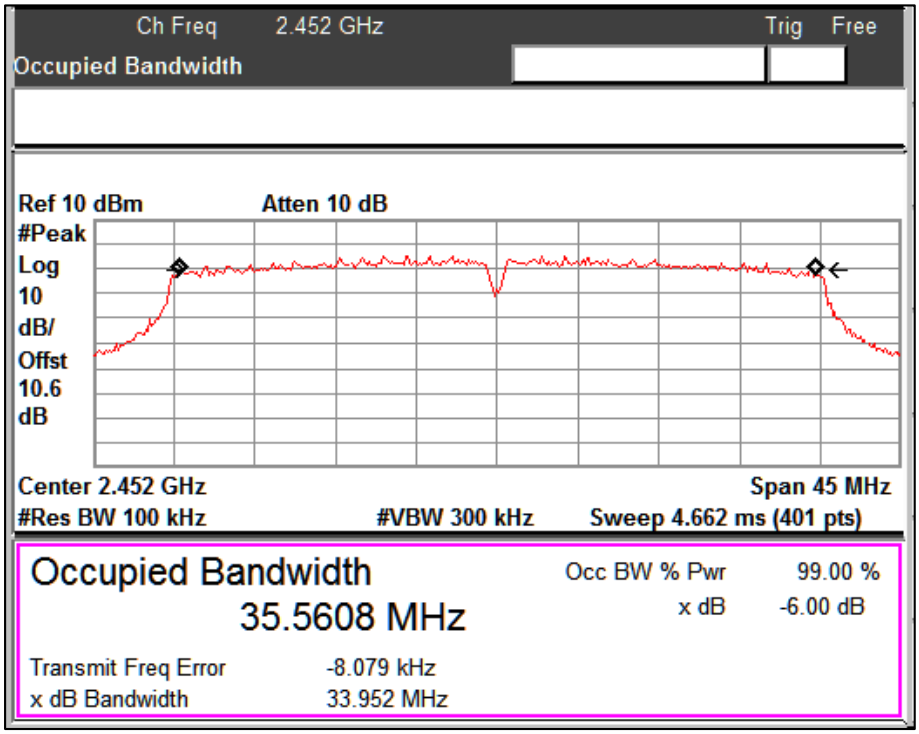
Data Rate: MCS0 Channel Frequency: 2422MHz



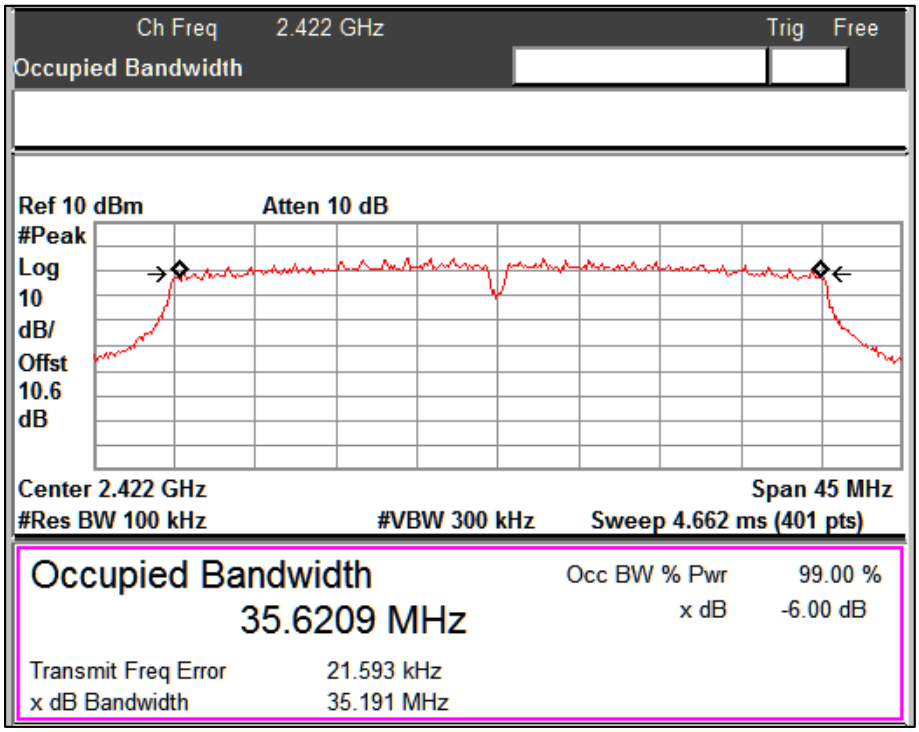
Data Rate: MCS0 Channel Frequency: 2452MHz



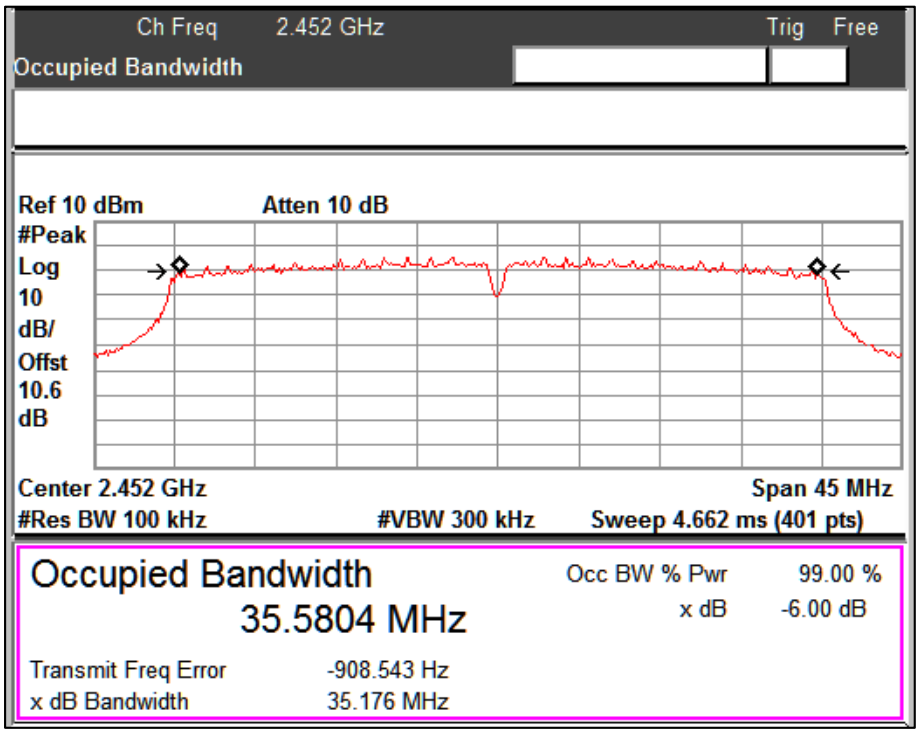
Data Rate: MCS4 Channel Frequency: 2422MHz



Data Rate: MCS4 Channel Frequency: 2452MHz



Data Rate: MCS7 Channel Frequency: 2422MHz



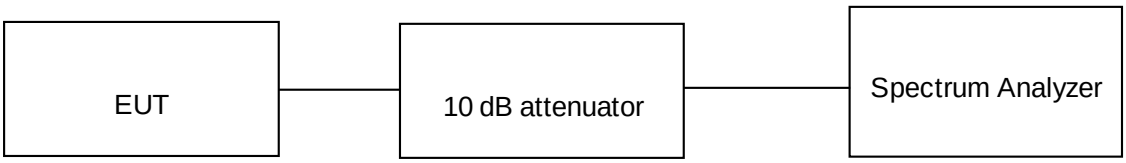
Data Rate: MCS7 Channel Frequency: 2452MHz

6.4 Emissions in non-restricted frequency bands and Conducted Spurious Emission

Result ***Pass***

Test Specification	FCC part 15 Subpart C 15.247 (d) / RSS 247 Issue 2, Section 5.5
Test Method	Subclause 11.11 of ANSI C63.10
Measurement Bandwidth	100 kHz
Detector	Peak
Port of testing	Antenna port
Requirement	In any 100kHz 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 30dB below that in the 100kHz 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

Test Method:



Test Condition

Normal Test Condition:

Temperature (Norm) = +25 °C Voltage = 3.6V DC Li-Ion battery Relative humidity: 62 %

KDB Guidelines applied:

Measurements were made as per section 8.5 in KDB 558074 D01 15.247 Measurement Guidance v05r02.

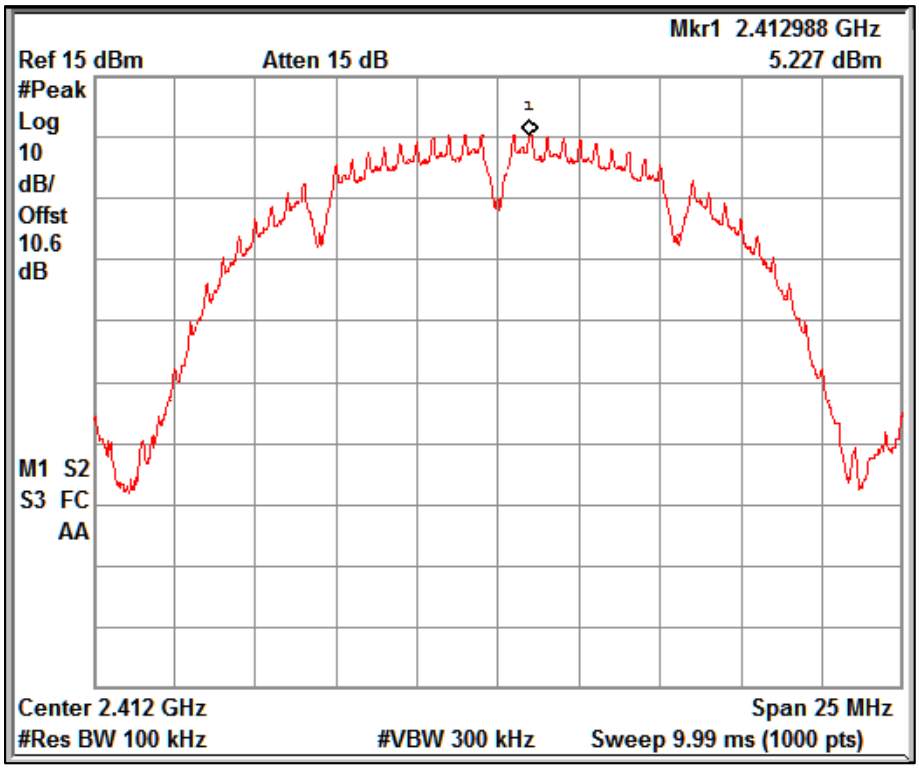
Test results:

Note:
1. All the losses are included during measurement and final values are mentioned in the test report.
2. Final Value (dBm) = Measured Value (dBm) + Attenuator factor (10dB) + Cable loss (0.6dB)
3. This product do not support additional beamforming gain / directional gain, it uses signal antenna and hence directional gain of the single antenna is 2.53 dBi

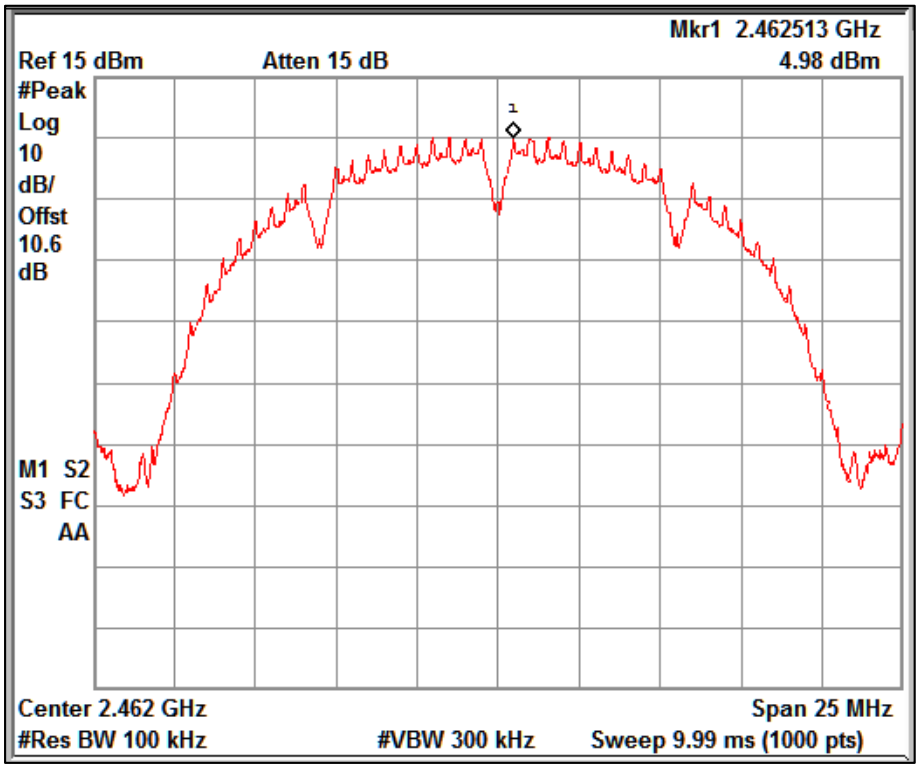
6.4.1 Band edge and reference plots

Modulation: 802.11b

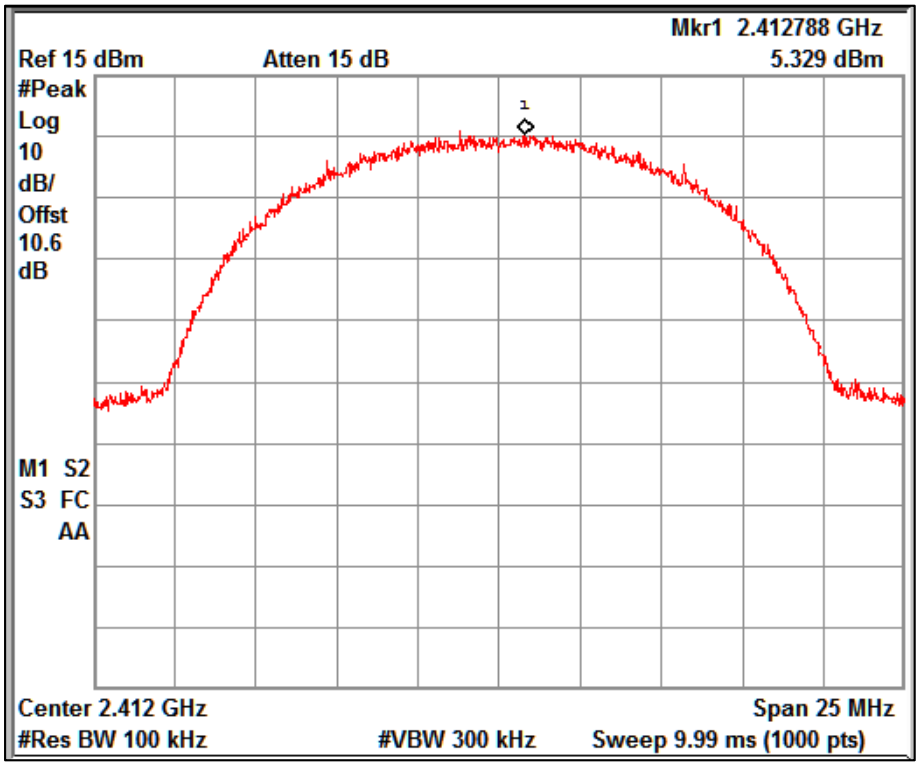
Data Rate (Mbps)	Channel Frequency (MHz)	Reference Value (B) (dBm)	Band edge Frequency (MHz)	Value at Band edge (A) (dBm)	A-B (dBc)	Minimum Limit (dBc)
1	2412	5.22	2397	-35.85	-41.07	-30
	2462	4.98	2483.5	-51.13	-56.11	-30
11	2412	5.32	2400	-37.90	-43.22	-30
	2462	4.99	2483.5	-51.06	-56.05	-30



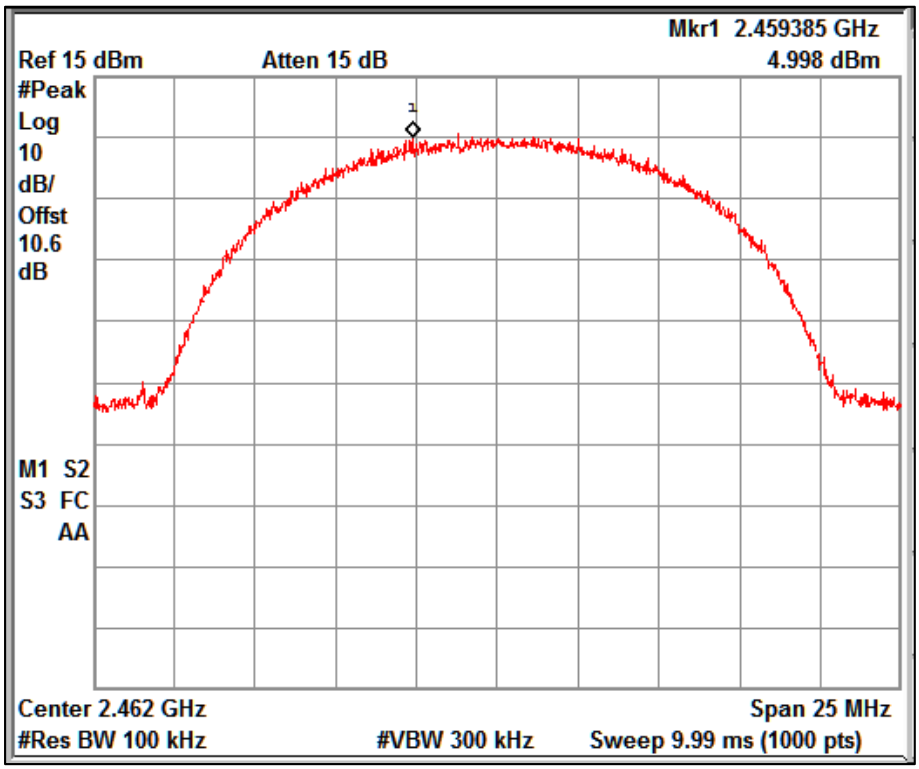
Data Rate: 1Mbps Reference plot for 2412MHz



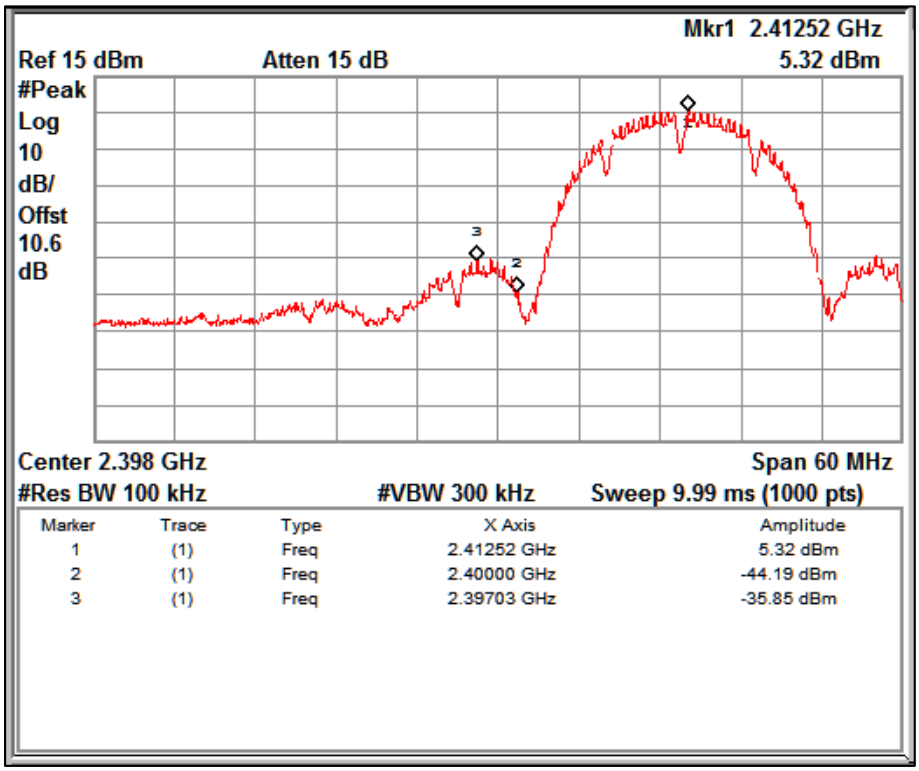
Data Rate: 1Mbps Reference plot for 2462MHz



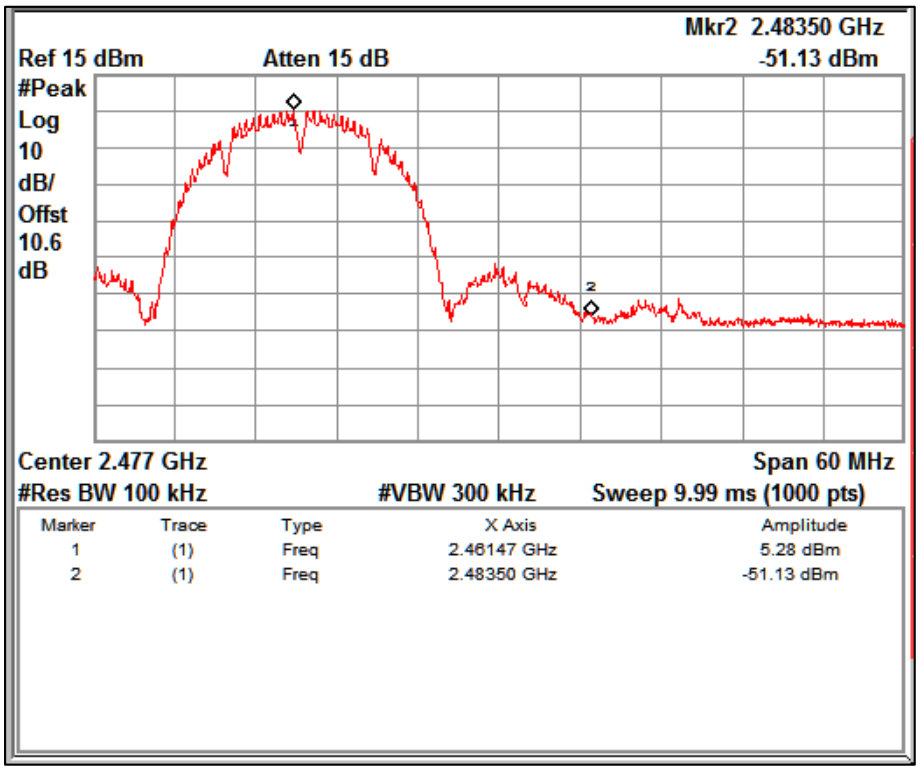
Data Rate: 11Mbps Reference plot for 2412MHz



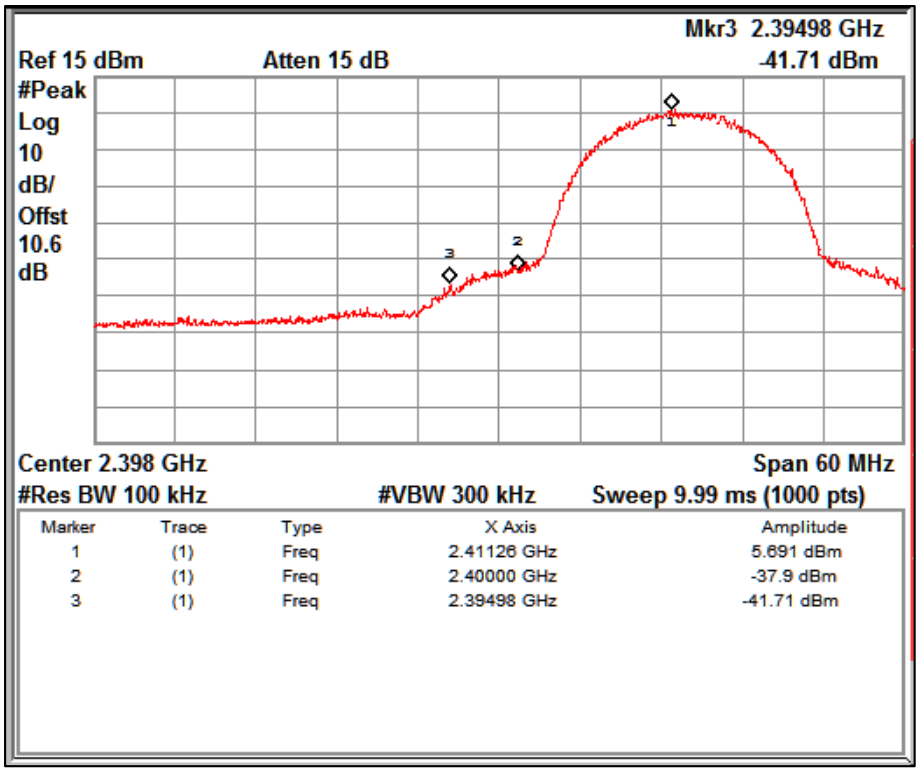
Data Rate: 11Mbps Reference plot for 2462MHz



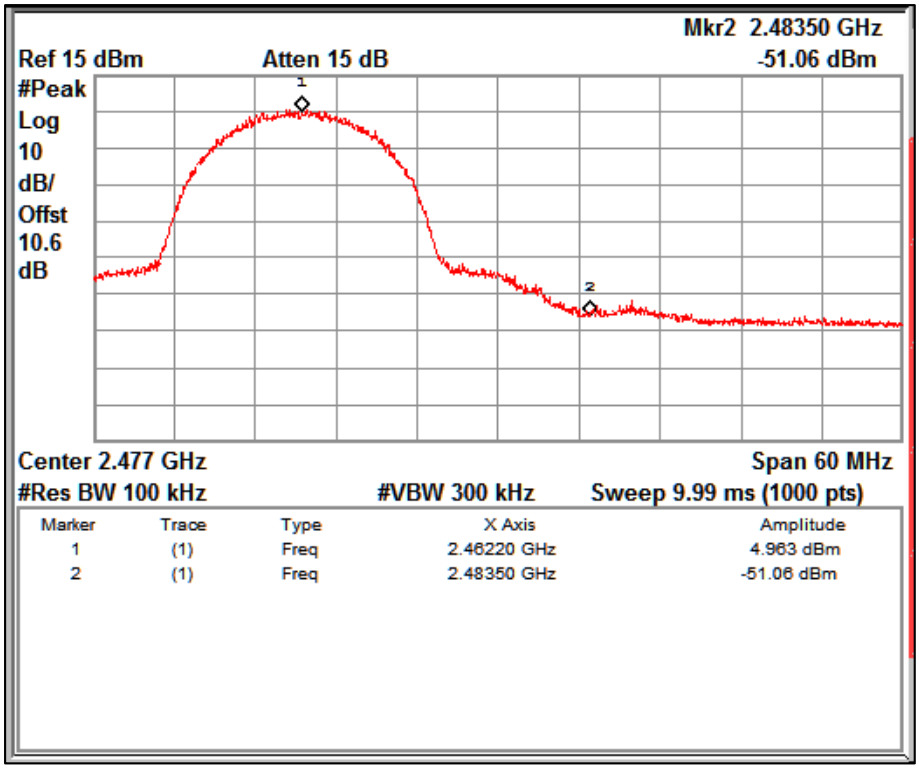
Data Rate: 1Mbps Band edge Channel Frequency 2412MHz



Data Rate: 1 Mbps Band edge Channel Frequency 2462MHz



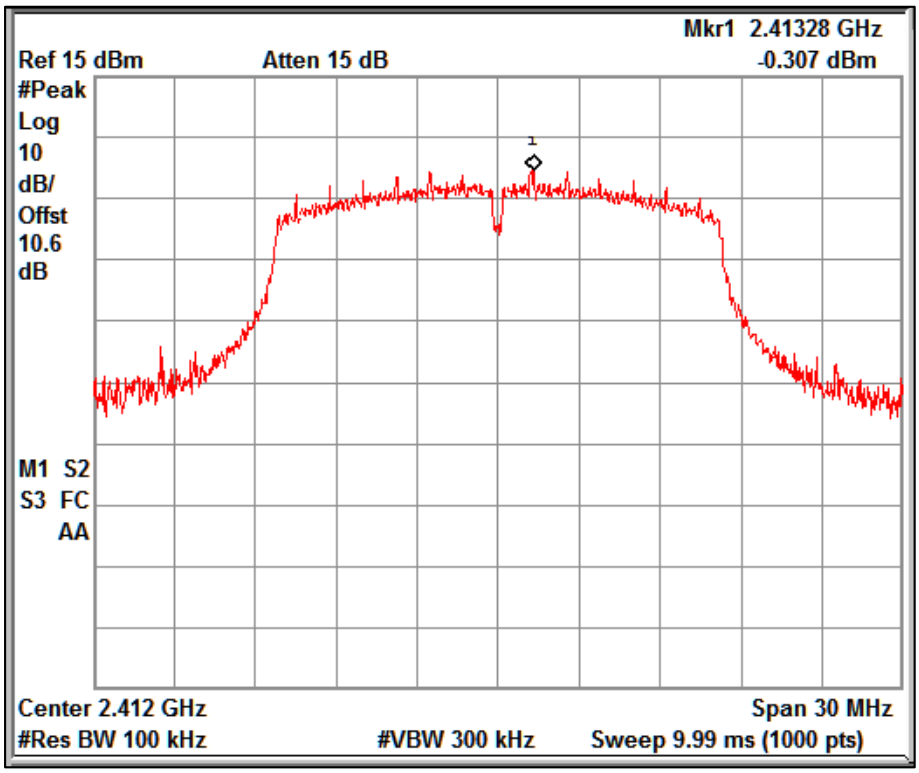
Data Rate: 11Mbps Band edge Channel Frequency 2412MHz



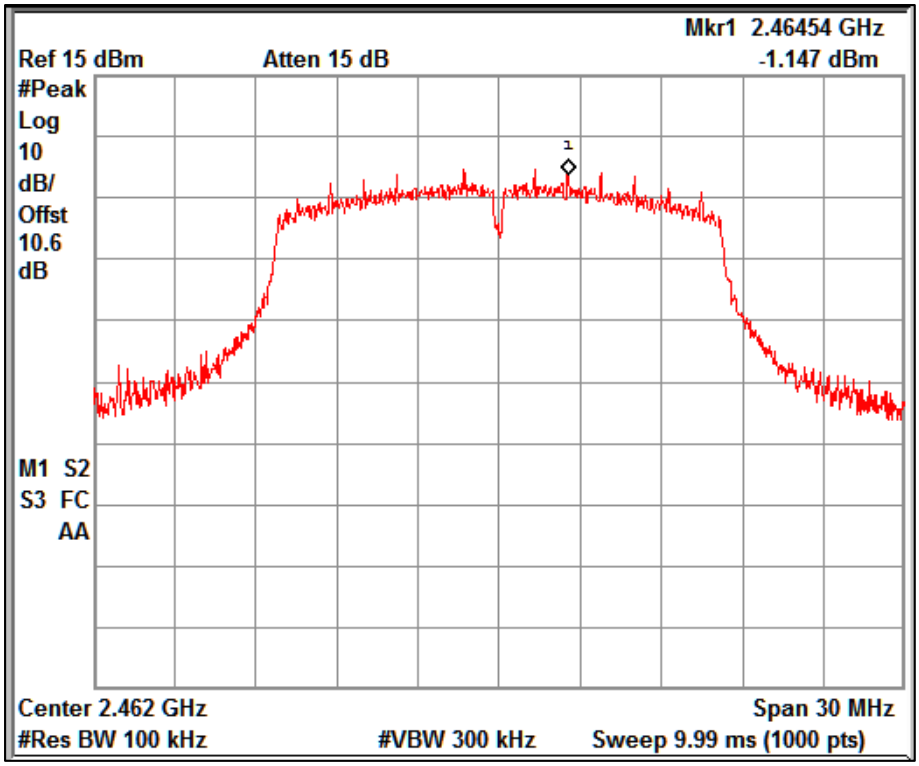
Data Rate: 11Mbps Band edge Channel Frequency 2462MHz

Modulation: 802.11g

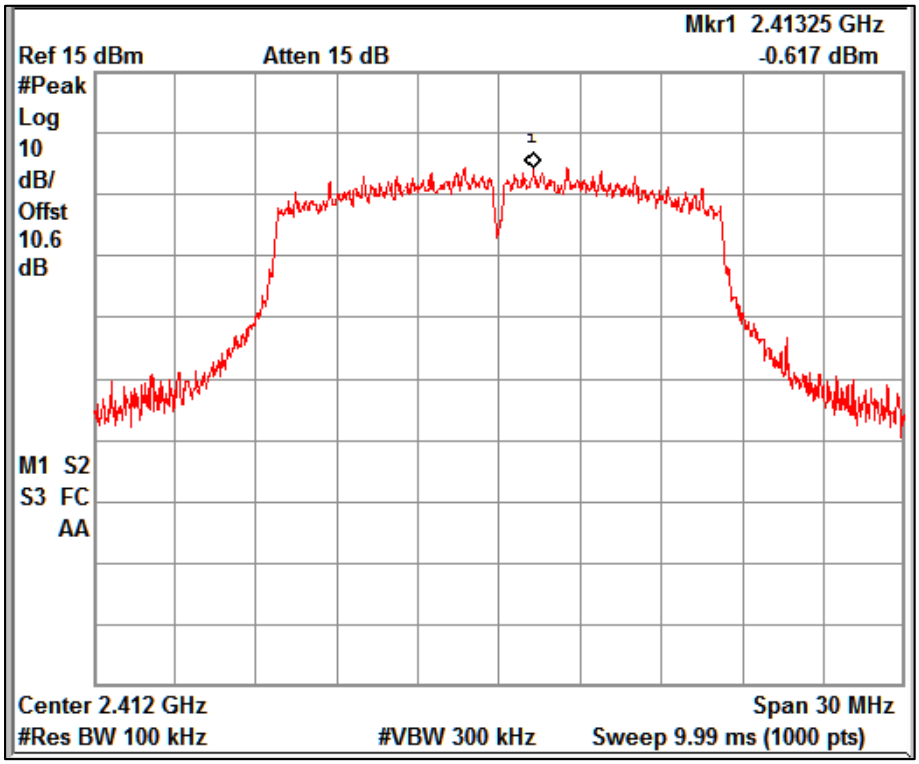
Data Rate (Mbps)	Channel Frequency (MHz)	Reference Value (B) (dBm)	Band edge Frequency (MHz)	Value at Band edge (A) (dBm)	A-B (dBc)	Minimum Limit (dBc)
6	2412	-0.30	2400	-37.38	-37.08	-30
	2462	-1.14	2483.5	-46.99	-45.85	-30
24	2412	-0.61	2400	-37.18	-36.57	-30
	2462	-0.63	2483.5	-44.01	-43.38	-30
54	2412	-0.38	2400	-36.35	-35.97	-30
	2462	-0.38	2483.5	-45.99	-45.61	-30



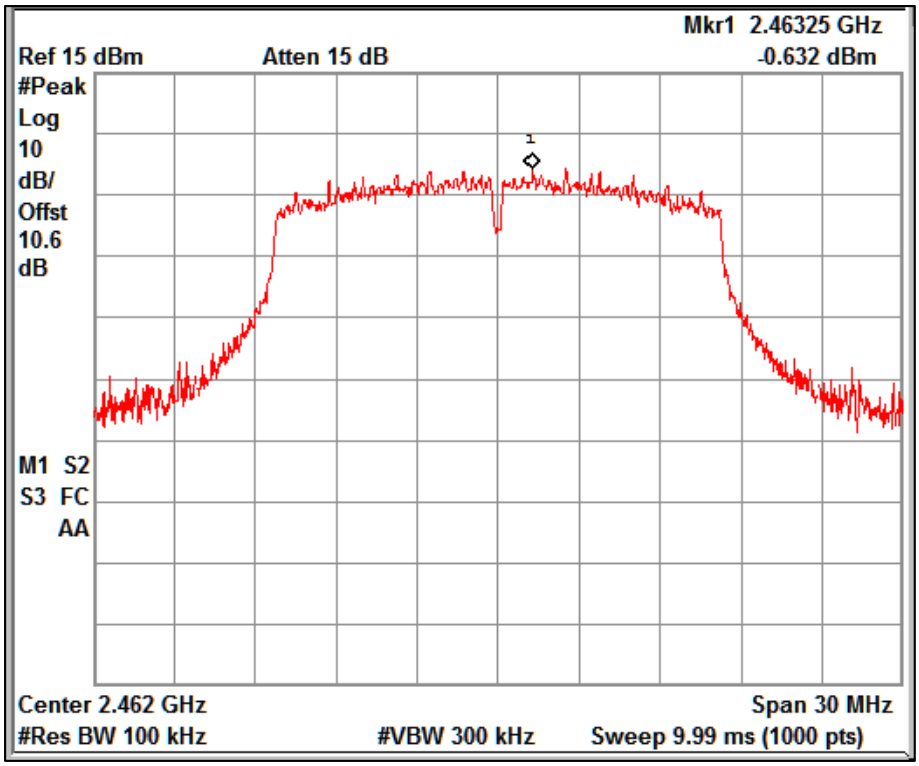
Data Rate: 6 Mbps Reference plot for 2412MHz



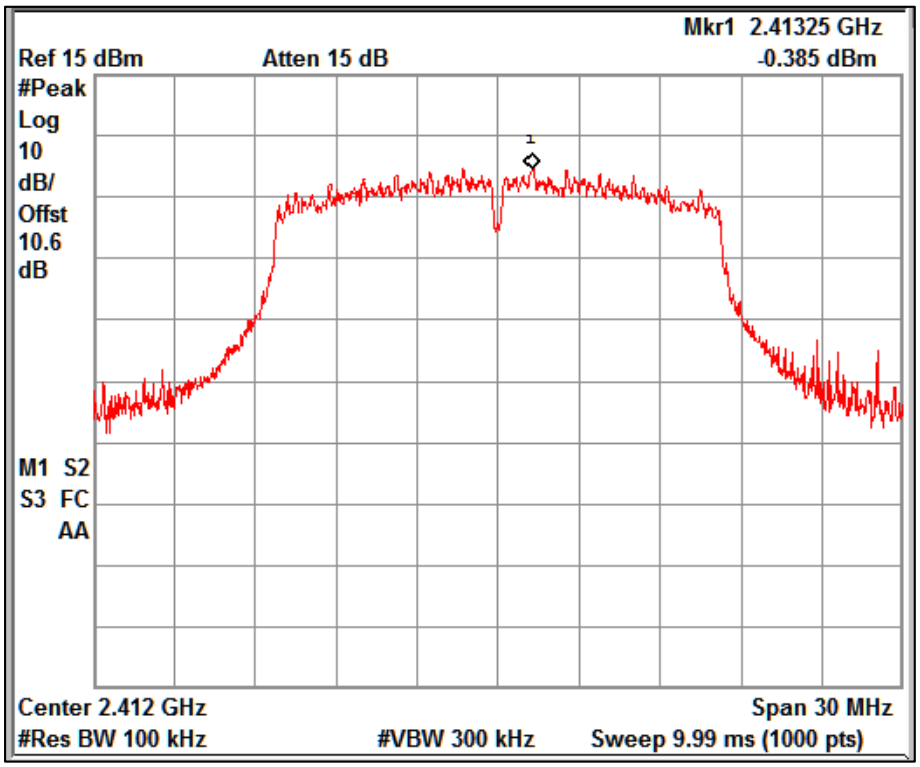
Data Rate: 6 Mbps Reference plot for 2462MHz



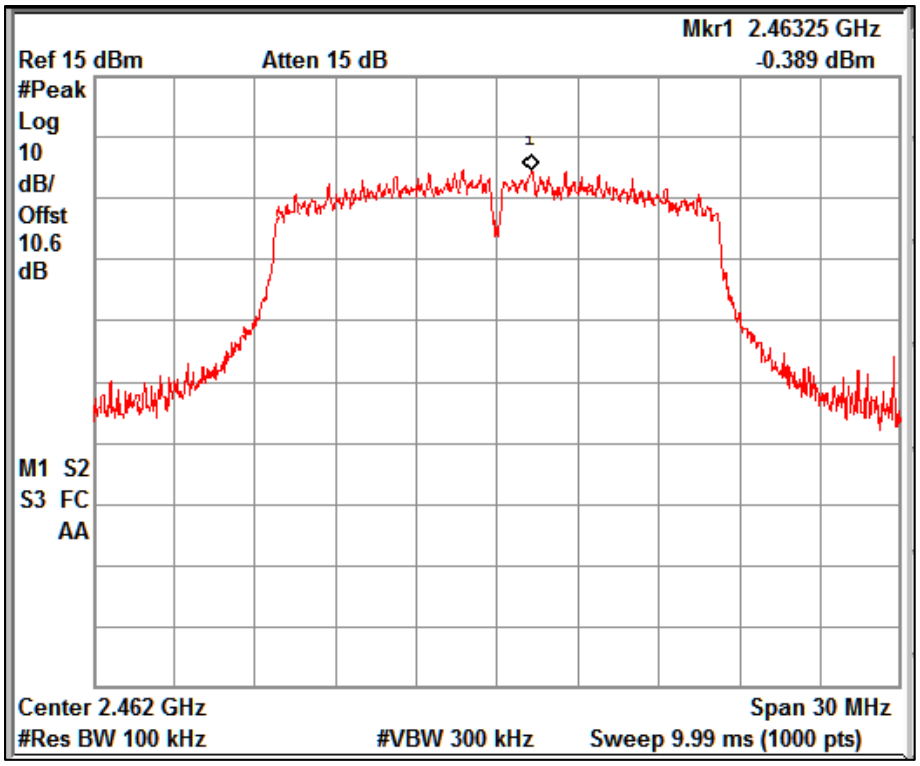
Data Rate: 24 Mbps Reference plot for 2412MHz



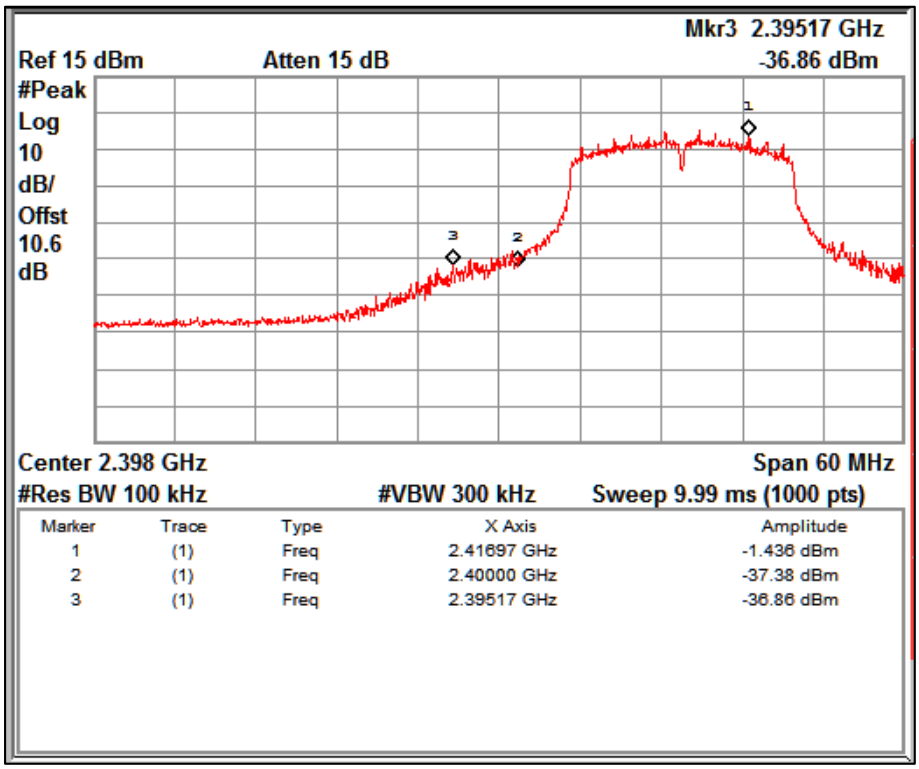
Data Rate: 24 Mbps Reference plot for 2462MHz



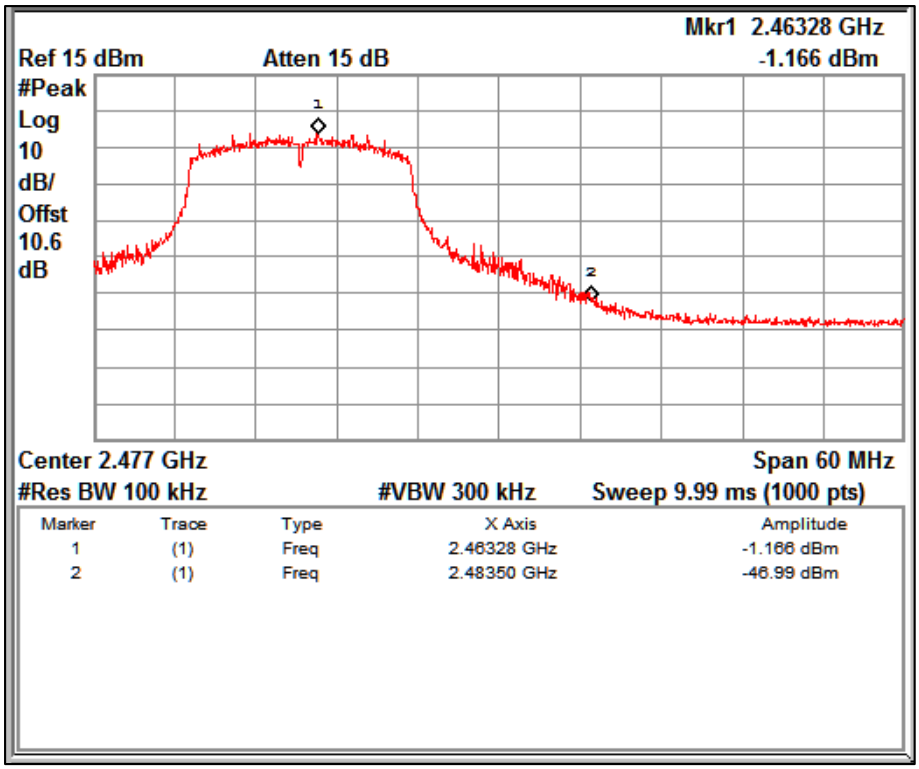
Data Rate: 54 Mbps Reference plot for 2412MHz



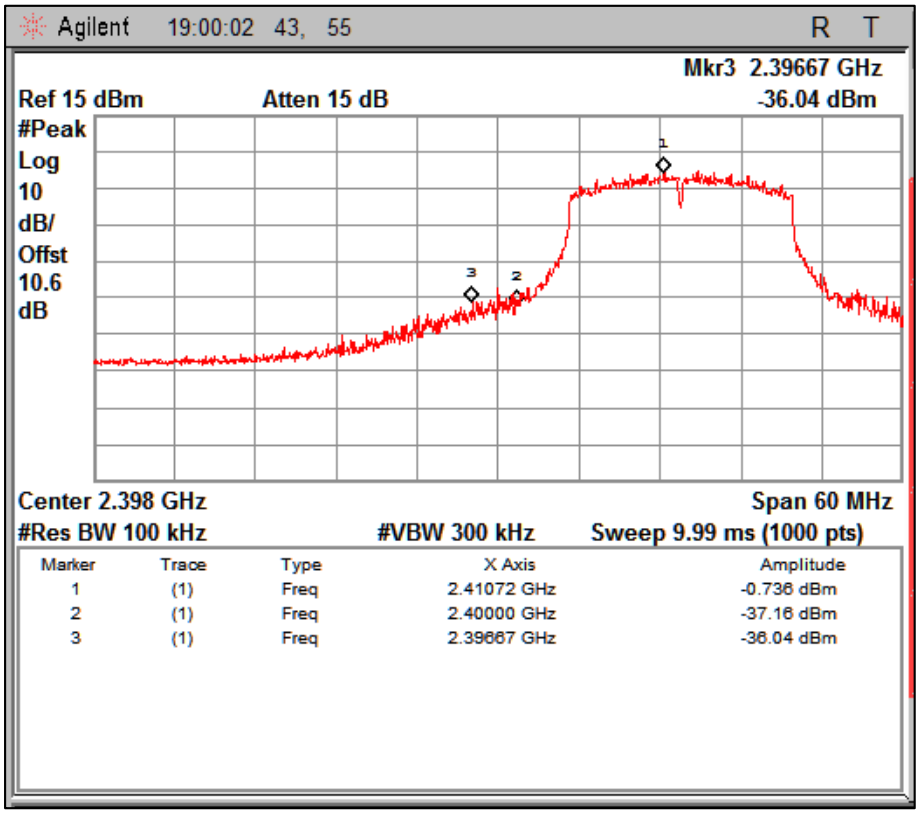
Data Rate: 54 Mbps Reference plot for 2462MHz



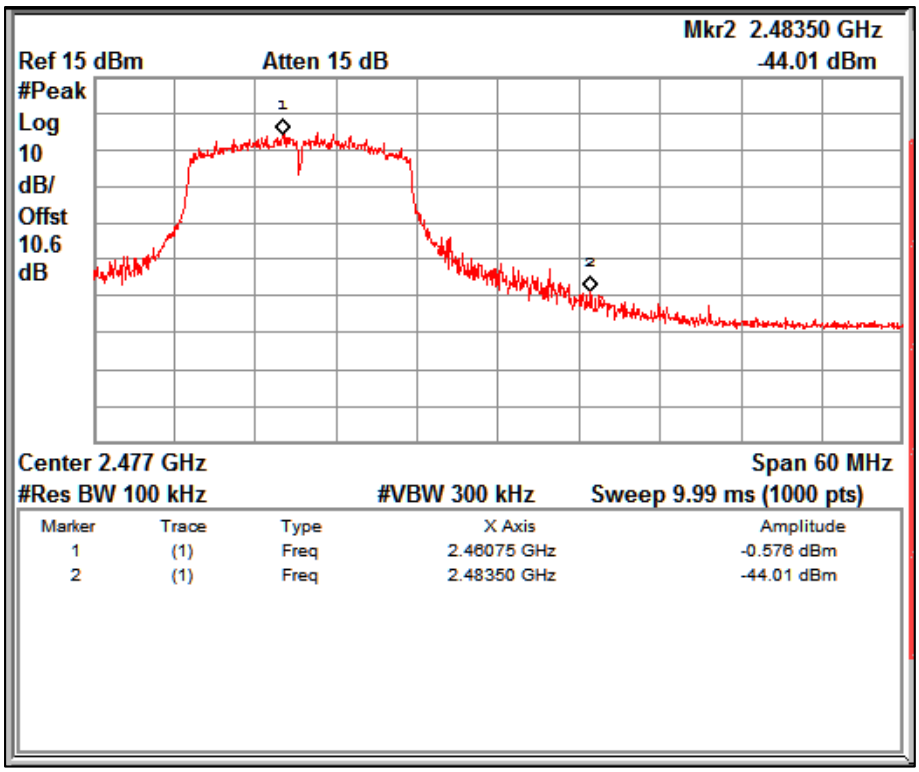
Data Rate: 6 Mbps Band edge Channel Frequency 2412MHz



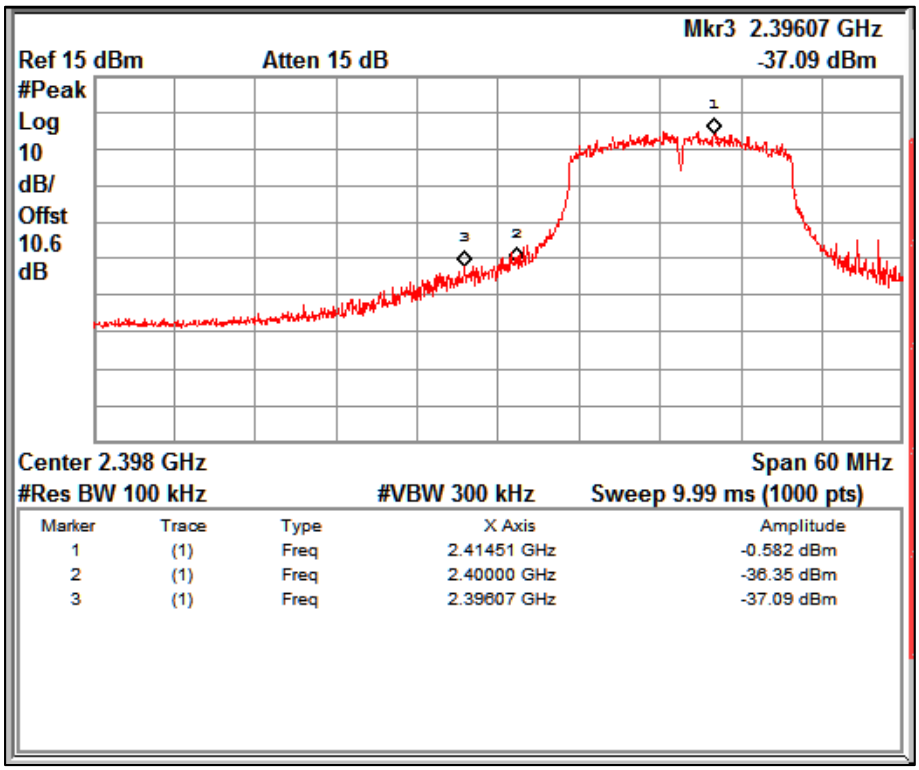
Data Rate: 6 Mbps Band edge Channel Frequency 2462MHz



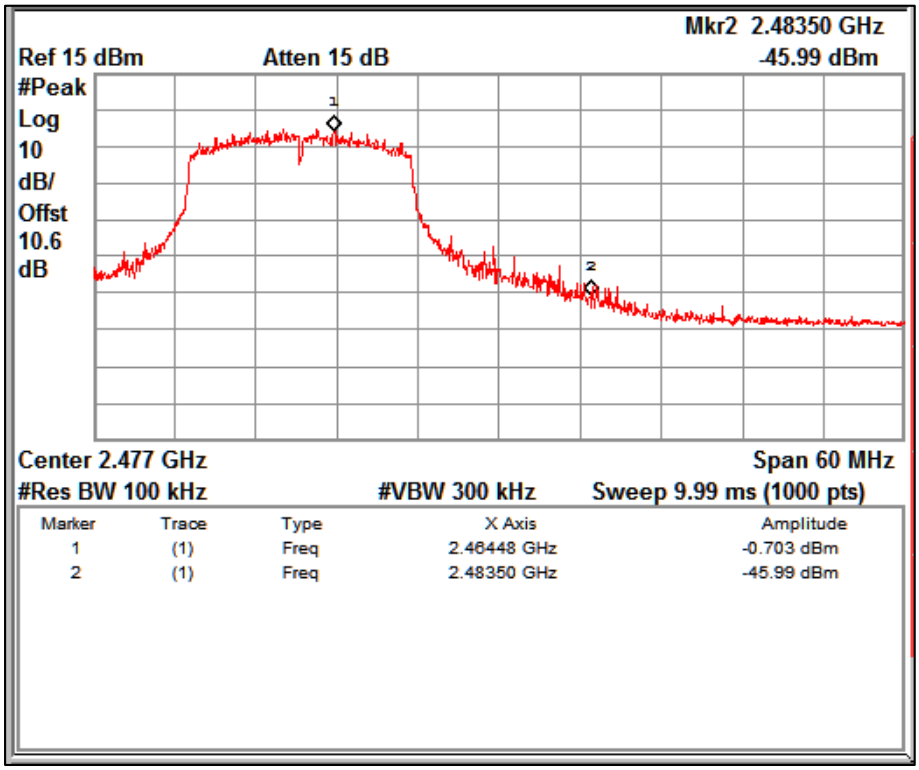
Data Rate: 24 Mbps Band edge Channel Frequency 2412MHz



Data Rate: 24 Mbps Band edge Channel Frequency 2462MHz



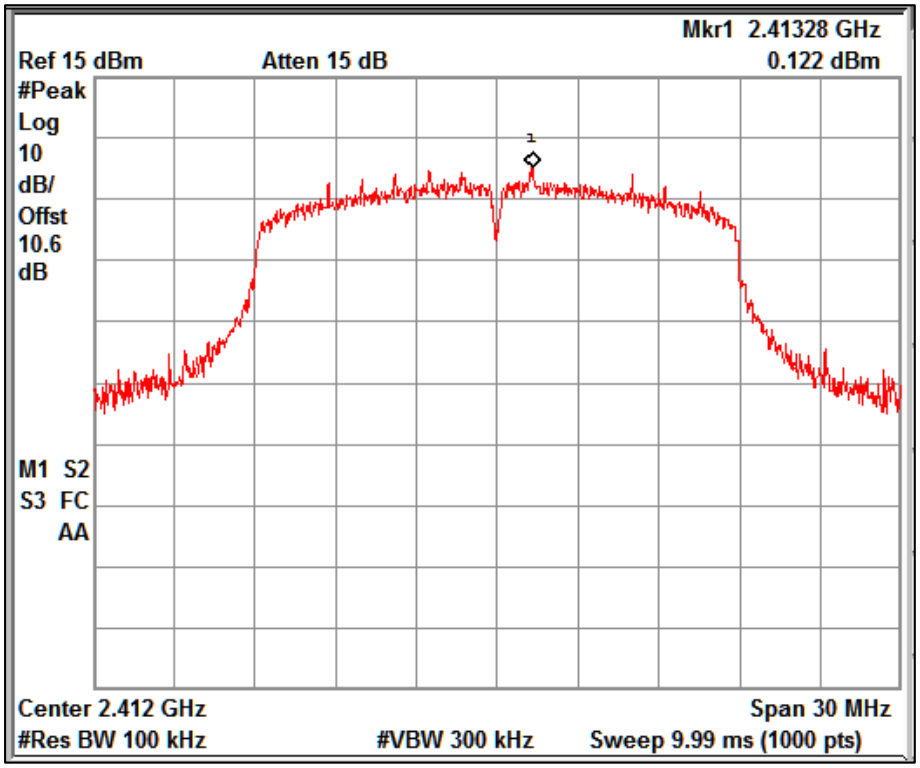
Data Rate: 54 Mbps Band edge Channel Frequency 2412MHz



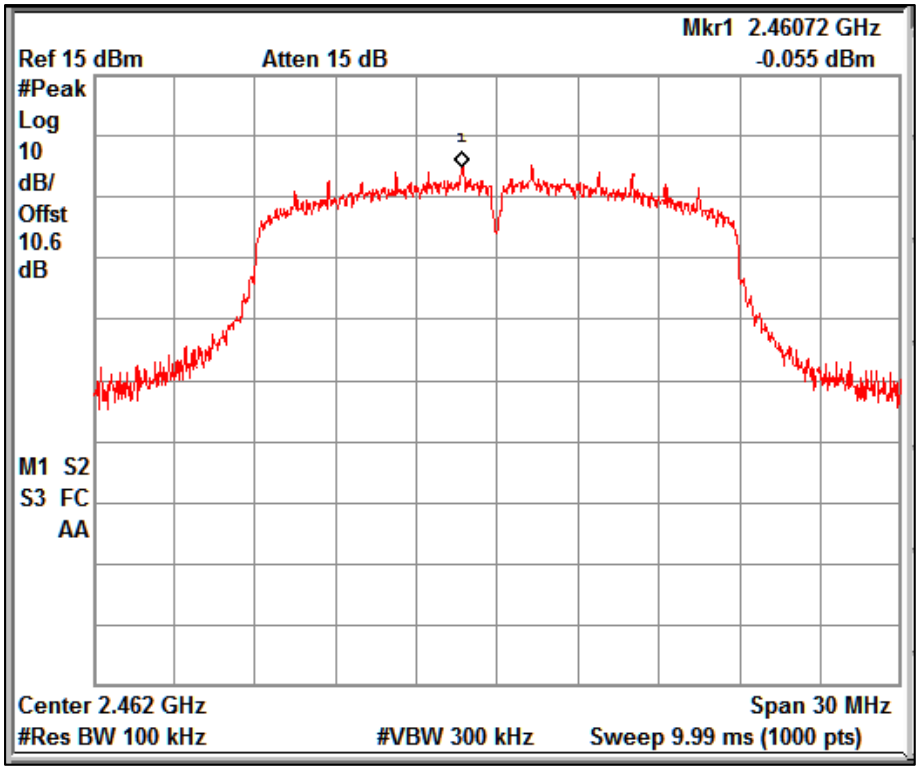
Data Rate: 54 Mbps Band edge Channel Frequency 2462MHz

Modulation: 802.11n_HT20

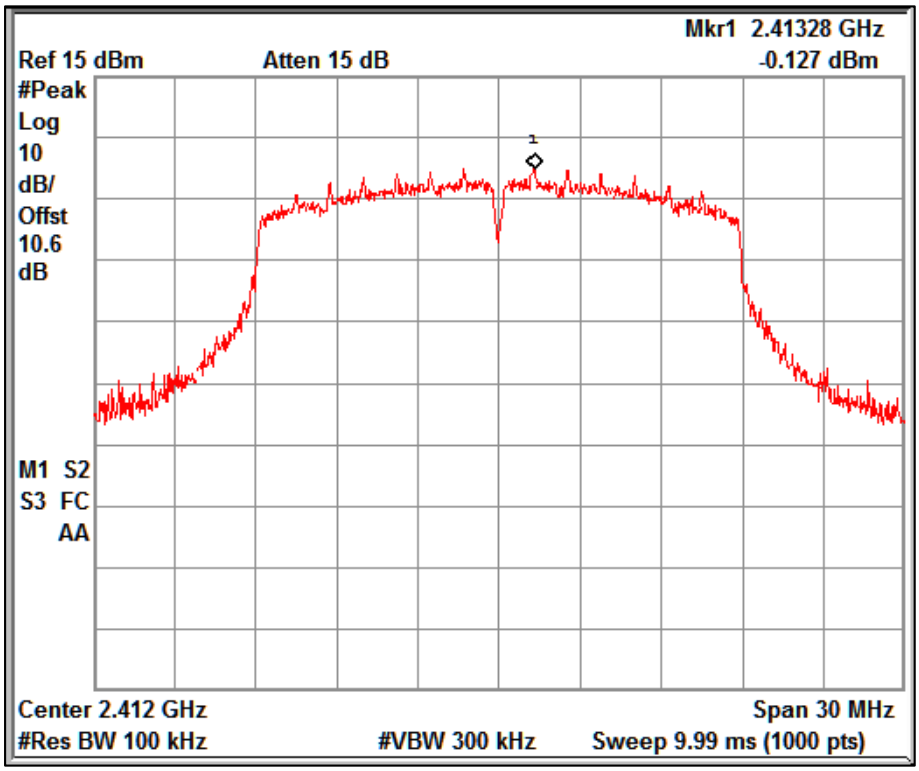
Data Rate (Mbps)	Channel Frequency (MHz)	Reference Value (B) (dBm)	Band edge Frequency (MHz)	Value at Band edge (A) (dBm)	A-B (dBc)	Minimum Limit (dBc)
MCS0	2412	0.12	2396	-33.67	-33.79	-30
	2462	-0.05	2483.5	-44.94	-44.89	-30
MCS4	2412	-0.12	2400	-35.89	-35.77	-30
	2462	-0.08	2483.5	-45.80	-45.72	-30
MCS7	2412	0.09	2400	-32.69	-32.78	-30
	2462	0.03	2483.5	-45.44	-45.47	-30



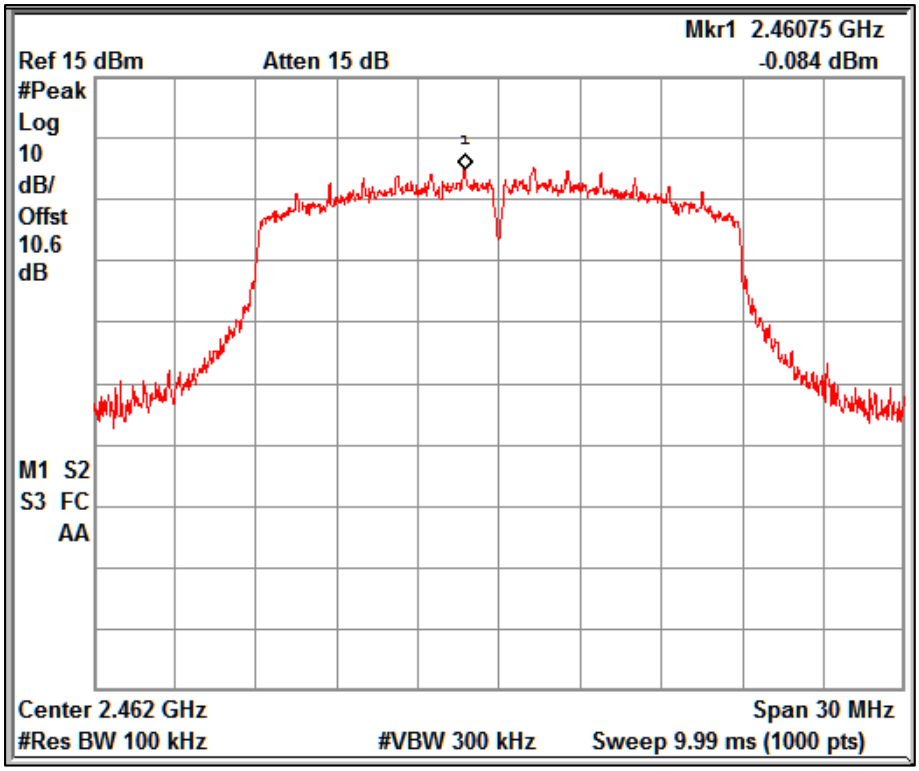
Data Rate: MCS0 Reference plot for 2412MHz



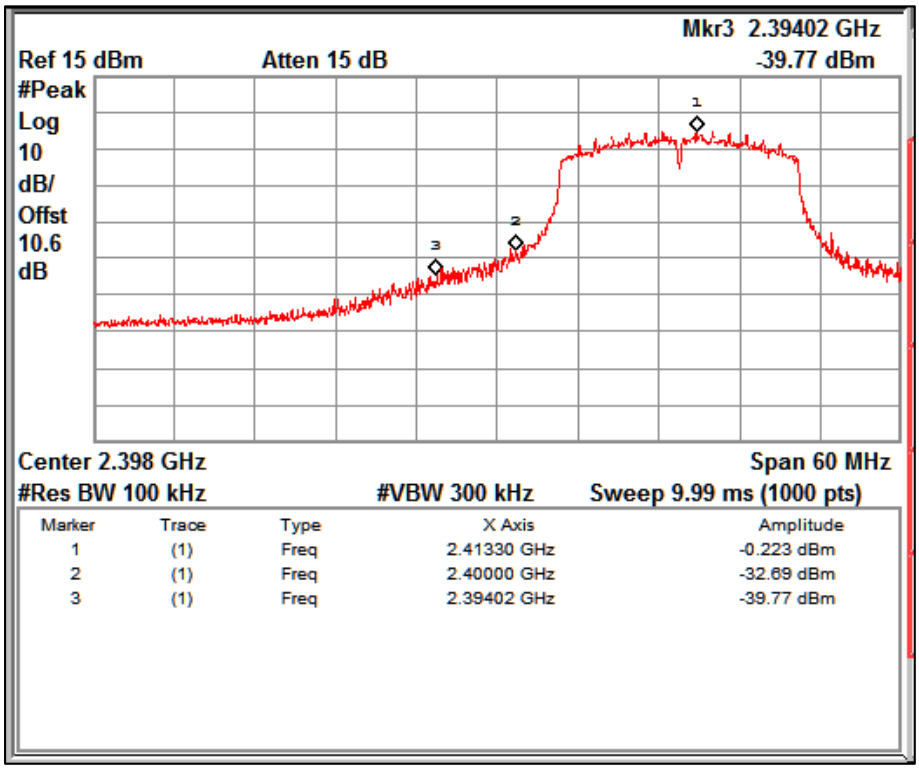
Data Rate: MCS0 Reference plot for 2462MHz



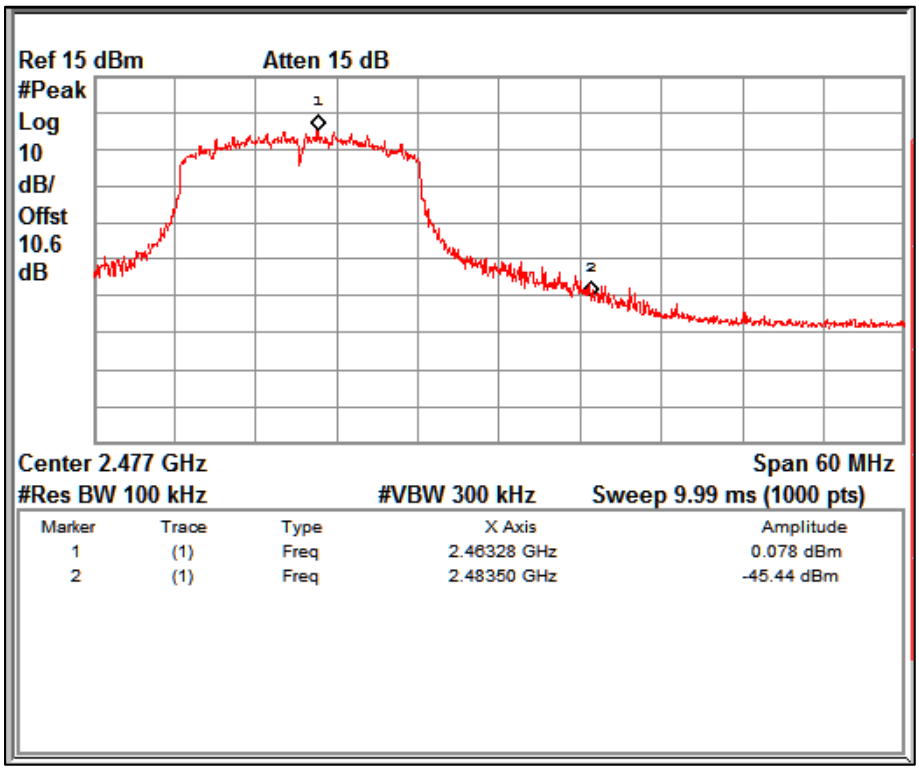
Data Rate: MCS4 Reference plot for 2412MHz



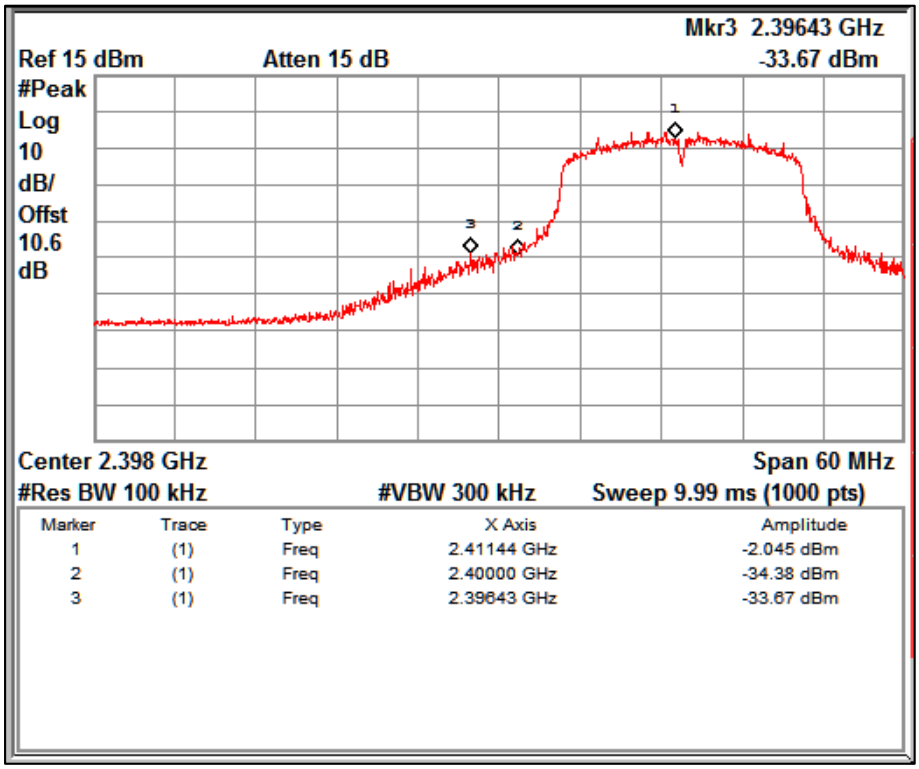
Data Rate: MCS4 Reference plot for 2462MHz



Data Rate: MCS7 Band edge Channel Frequency 2412MHz



Data Rate: MCS7 Band edge Channel Frequency 2462MHz



Data Rate: MCS0 Band edge Channel Frequency 2412MHz