Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**19660379 001**	**Seite 1 von 85** *Page 1 of 85*
Auftraggeber: *Client:*	**The Kroger Co. 11450 Grooms Rd., Blue Ash, OH 45242, United States**	
Gegenstand der Prüfung: *Test item:*	**Gen 3 Zooter**	
Bezeichnung: *Identification:*	**SRG3APWC**	**Serien-Nr.:** *Serial No.* Engineering Sample
Wareneingangs-Nr.: *Receipt No.:*	**1803307436**	**Eingangsdatum:** *Date of receipt:* 16.03.2018
Prüfort: *Testing location:*	**Refer Page 5 of 85 for test facilities**	
Prüfgrundlage: *Test specification:*	**FCC Part 15 Subpart C 15.247 ANSI C63.10-2013**	
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test items passed the test specification(s).*	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (India) Pvt. Ltd.** 27/B, 2nd corss, Electronic City Phase 1 Bangalore – 560 100. India FCC Test Site Registration no.: **496599**	

geprüft / *tested by:*			**kontrolliert** / *reviewed by:*		
16.03.2018	Girish Kumar G Engineer		04.06.2018	Saibaba Siddapur Assistant Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges /*Other Aspects:* **FCC ID :PBR-SZG3APWC, On receipt the equipment was in good condition**

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.

CIN: U72501KA1996PTC020653

TEST SUMMARY

Section	Test item	Result	Remarks
15.247 (b) (3)	Maximum Conducted Output Power	Pass	**Gen 3 Zooter** contains both FCC uncertified and certified radio modules, hence antenna port measurements of certified modules are excluded. Refer FCC ID of the certified radio modules listed in the below table.
15.247 (a) (2)	6 dB / DTS Bandwidth	Pass	
15.247 (e)	Maximum Power Spectral Density	Pass	
15.247 (d)	Emissions in non – restricted band	Pass	
15.247 (a)(1)	Conducted Spurious Emissions	Pass	
15.247 (d) / (15.209 & 15.205)	Restricted bands of Emissions and Restricted Bands of Operation.	Pass	
15.207	Conducted emission on A.C power lines	NA	

*** -> RF power verified**
NA -> Not Applicable, as DUT will power on over PoE

Gen 3 Zooter has integrated with following certified radio modules:

Sl No.	Radio Protocol	FCC ID	Tested By	Report Number
1	ZigBee	PBR-SZMDLNR1	TUV Rheinland India	01200091 001
2	ZigBee	PBR-SZMDLM3BR1	TUV Rheinland India	19660372 001
3	ZigBee	PBR-SZMDLM3BR1	TUV Rheinland India	19660372 001
4	BLE	PBR-SZMDLBTNR1	TUV Rheinland India	19660373 001

Table of Contents

1 GENERAL REMARKS

1.1 Complimentary Materials

All attachments are integral part of this test report.

APPENDIX 1: TEST SETUP PHOTOS

APPENDIX 2: EUT EXTERNAL PHOTOS

APPENDIX 3: EUT INTERNAL PHOTOS

APPENDIX 4: FCC LABEL AND LABEL LOCATION

APPENDIX 5: BLOCK DIAGRAM

APPENDIX 6: SPECIFICATION OF EUT

APPENDIX 7: SCHEMATIC DIAGRAM

APPENDIX 8: BILL OF MATERIAL

APPENDIX 9: USER MANUAL

APPENDIX 10: MAXIMUM PERMISSIBLE EXPOSURE INFORMATION

2 TEST SITES

2.1 Testing Facilities

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

2.2 List of Test and Measurement Instruments

Table 1: Test and measurements instrument used

Equipment	Manufacturer	Model Name	Serial Number	Calibration Due Date	Periodicity	Used for Test Items
Signal Analyser	Rohde & Schwarz	FSV7	101644	15.12.2018	Yearly	Antenna - Port Measurements
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	24-10-2018	Yearly	Radiated Spurious Emission
Active loop antenna	Frankonia	LAX-10	LAX-10-800	15-01-2019	Yearly	
Biconical Antenna	Schwarzbeck mess-elektronik	VHBB-9124 / BBA-9106	9124-656	09-01-2019	Yearly	
Log-Periodic Antenna	Schwarzbeck mess-elektronik	VUSLP-9111B	9111B-111	16-01-2019	Yearly	
Broadband Horn Antenna	Frankonia	HAX-18	HAX18-802	16-09-2018	Yearly	
Emission Horn Antenna	ETS Lindgren	116706	00107323	22-06-2018	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

Gen 3 Zooter has cameras integrated in the product, which will be used for the displaying 360-degree view through LAN port/server. It also has three ZigBee modules mounted on it. These ZigBee Modules are used for wireless data communication with other ZigBee device. It also has BLE module mounted on it which can be used to communicate to the other BLE devices. Apart from all these, it also contains Wi-Fi modules. It has two Wi-Fi modules mounted on it supporting a, b, and g mode. These two Wi-Fi modules are capable of communicating over six channels simultaneously, creating a high speed/throughput Wireless connectivity network. It is used as a camera and wireless access point.

Note: Product supports simultaneous transmission operation.

3.2 Ratings and System Details

Table 2: Ratings and System Details

Operating frequency range	2400 MHz to 2483.5 MHz			
Radio Protocol	**ZigBee**		**BLE**	**Wi-Fi**
RF Power	PBR-SZMDLNR1	0.44 dBm	-0.42 dBm	10.78 dBm
	PBR-SZMDLM3BR1	18.93 dBm		
Channel Spacing	5 MHz		2 MHz	5 MHz
Modulation	DSSS		GFSK	802.11b: DSSS 802.11g: OFDM
Number of antennas	3		1	2
Antenna type	PCB			
Antenna gain	PBR-SZMDLNR1	2.0 dBi	2.0 dBi	4.03 dBi (Tx) 4.32 dBi (Rx)
	PBR-SZMDLM3BR1	3.27 dBi		
Supply Voltage to Product	+56 VDC, 4 pair Power over Ethernet			
Environmental conditions	Temp: 5°C to 40°C Humidity: 20%-80% RH			

3.3 Measurement Uncertainty:

Table 3: 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 %

4 TEST SET-UP AND OPERATION MODE

4.1 Principle of Configuration Selection

Transmission was enabled with highest possible duty cycle transmission on low, mid and high channels to obtain maximum emissions.

4.2 Test Operation and Test Software

Testing software was used to enable the continuous transmission on low/mid/high channels for Wi-Fi.

Test Software, Software Version, Hardware Version used:

Protocol	FCC ID	Software used for TX	Software Version	Hardware Version
Zigbee	PBR-SZMDLNR1	Chipconflash Utility	1	Rev C
Zigbee	PBR-SZMDLM3BR1	Smart RF Flashprogrammer 2	1.7.5	Rev A
Zigbee	PBR-SZMDLM3BR1	Smart RF Flashprogrammer 2	1.7.5	Rev A
BLE	PBR-SZMDLBTNR1	Smart RF Flashprogrammer 2	1.7.5	Rev B
Wi-Fi	Uncertified	RTP Utility	1	1

4.3 Special Accessories and Auxiliary Equipment

- None

4.4 Countermeasures to achieve EMC Compliance

- None

4.5 Test modes – data rates and modulations

For Radiated spurious emissions only the worst case results i.e. the emissions with less margin are reported in this report.

4.6 List of Frequencies and Frequency bands

Frequency Band (MHz)	Channel No.	Frequency (MHz)
2400-2483.5	11	2405
	12	2410
	13	2415
	14	2420
	15	2425
	16	2430
	17	2435
	18	2440
	19	2445
	20	2450
	21	2455
	22	2460
	23	2465
	24	2470
	25	2475

Table 4: List of Center Frequiences of ZigBee

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
2400 – 2483.5	0	2402
	1	2404
	2	2406
	3	2408
	:	:
	:	:
	18	2438
	19	2440
	20	2437
	:	:
	:	:
	36	2474
	37	2476
	38	2478
	39	2480

Table 5: List of Center Frequiences of BLE

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
2400 – 2483.5	1	2412
	2	2417
	3	2422
	4	2427
	5	2432
	6	2437
	7	2437
	8	2447
	9	2452
	10	2457
	11	2462

Table 6: List of Wi-Fi center Frequencies

Note:

- The test was performed with the following power settings during transmission,

Protocol	FCC ID	Channel number	Power settings
ZigBee	PBR-SZMDLNR1	11 to 25	01 dBm
ZigBee	PBR-SZMDLM3BR1	11 to 25	19 dBm
		26	13 dBm
ZigBee	PBR-SZMDLM3BR1	11 to 25	19 dBm
		26	13 dBm
BLE	PBR-SZMDLBTNR1	0 to 39	3 dBm
Wi-Fi	Uncertified	1 to 11	13 dBm

- Testing was performed on the sample with the TUV Identification Number : 1803307436-1-1-1

5 RADIATED TEST METHODOLOGY

5.1 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.

5.1.1 Test Setup Configuration

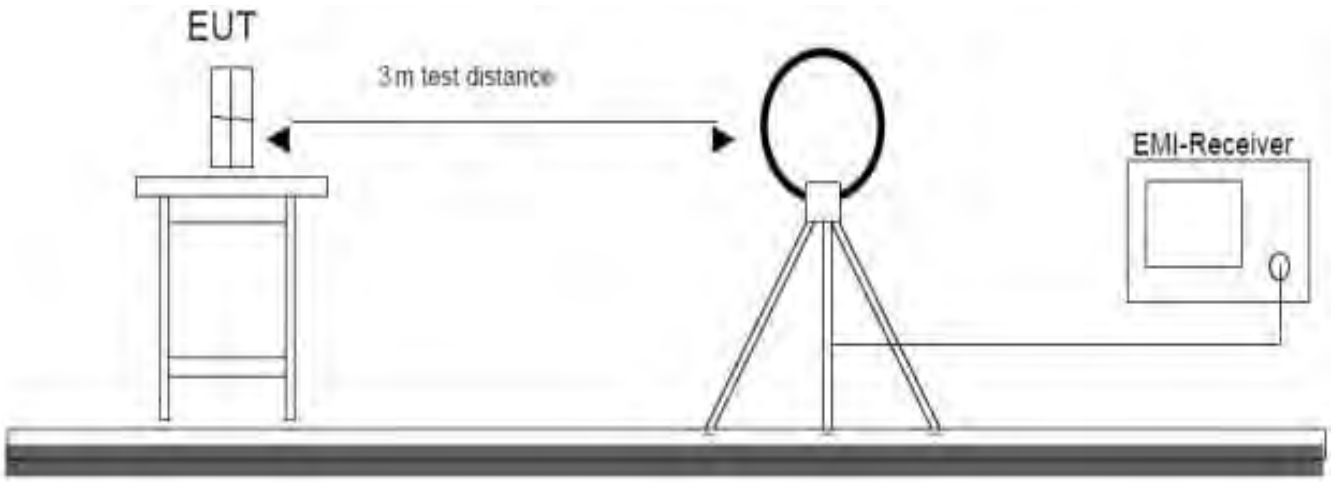


Figure 1: Frequency Range 9 kHz- 30 MHz

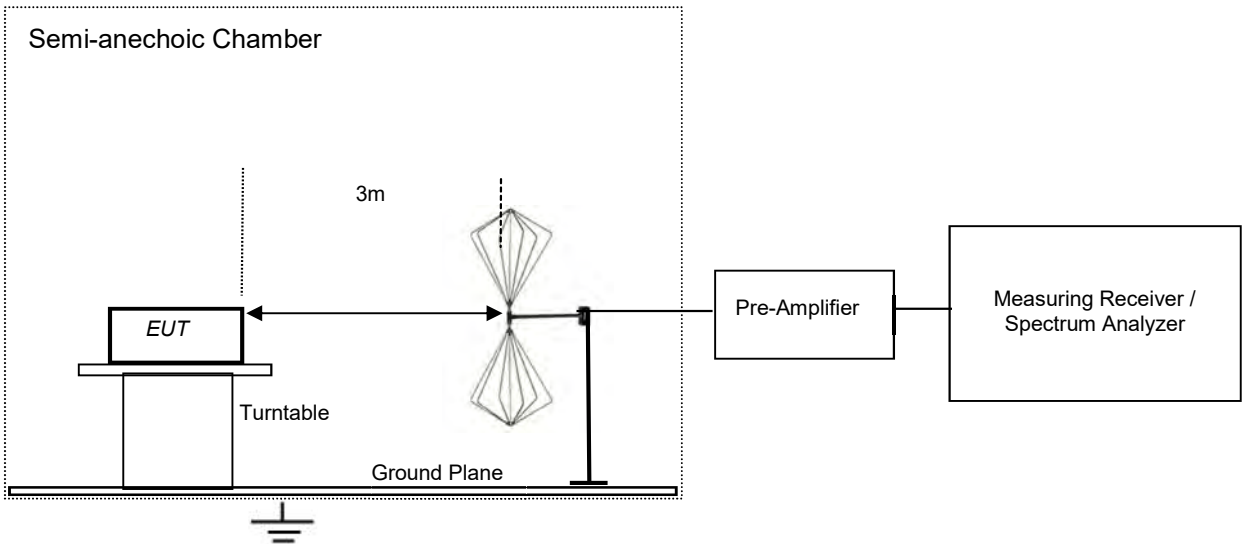


Figure 2: Frequency Range 30 MHz – 200 MHz

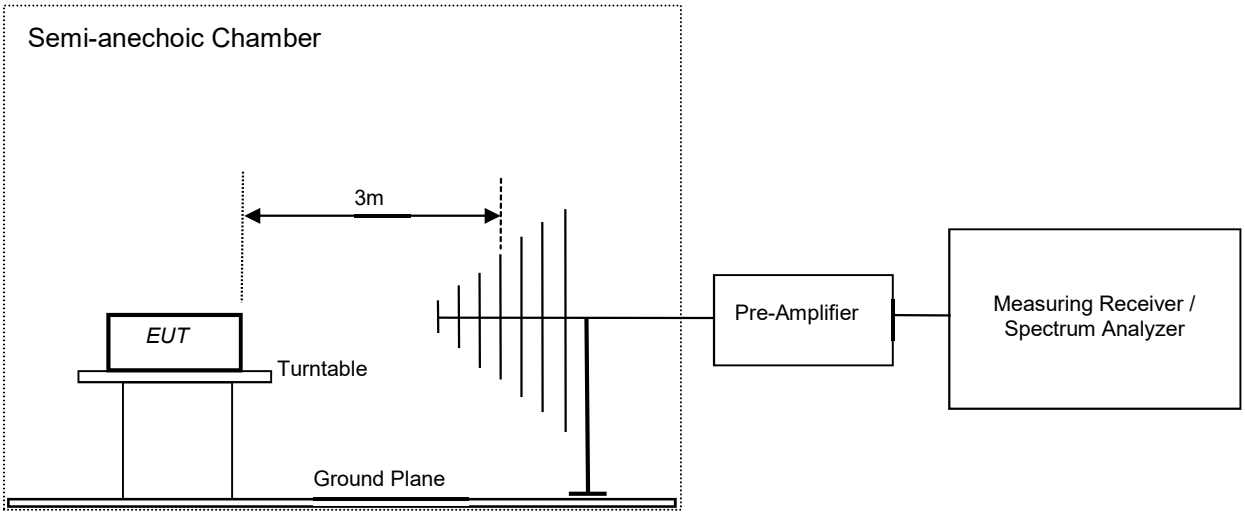


Figure 3: Frequency Range 200 MHz - 1GHz

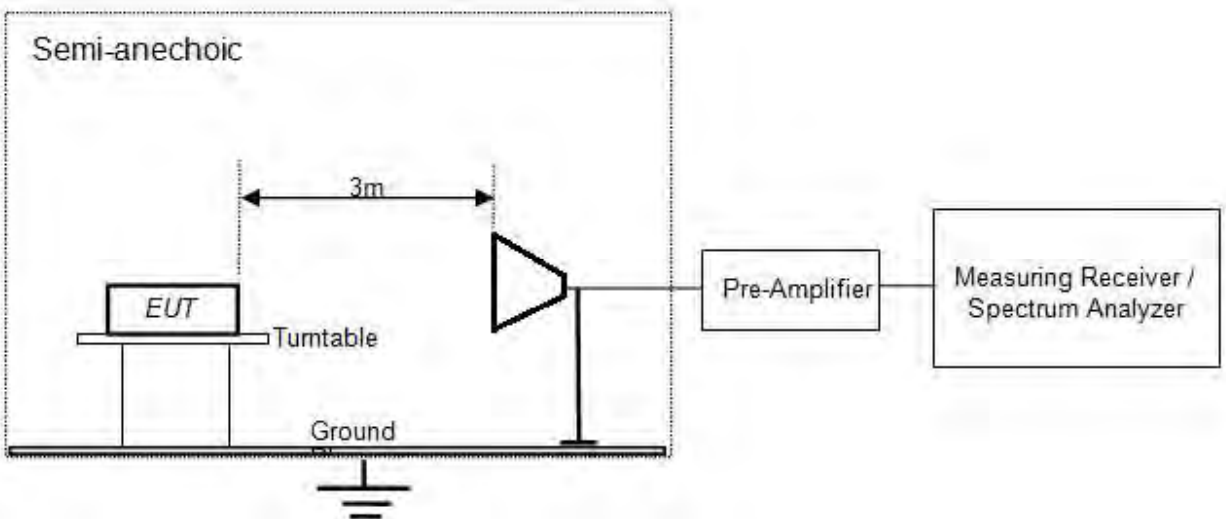


Figure 4: Frequency Range above 1 GHz

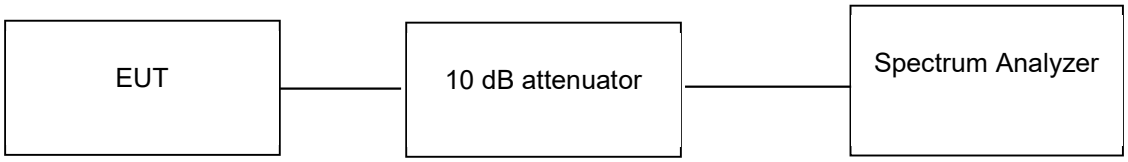
6 Test Results

6.1 Maximum conducted output power

Result ***Passed***

Test Specification	FCC part 15 Subpart C 15.247 (b)(3)
Measurement Bandwidth	1 MHz
Detector	Peak
Requirement	≤ 1 W (30 dBm)

Test Method:



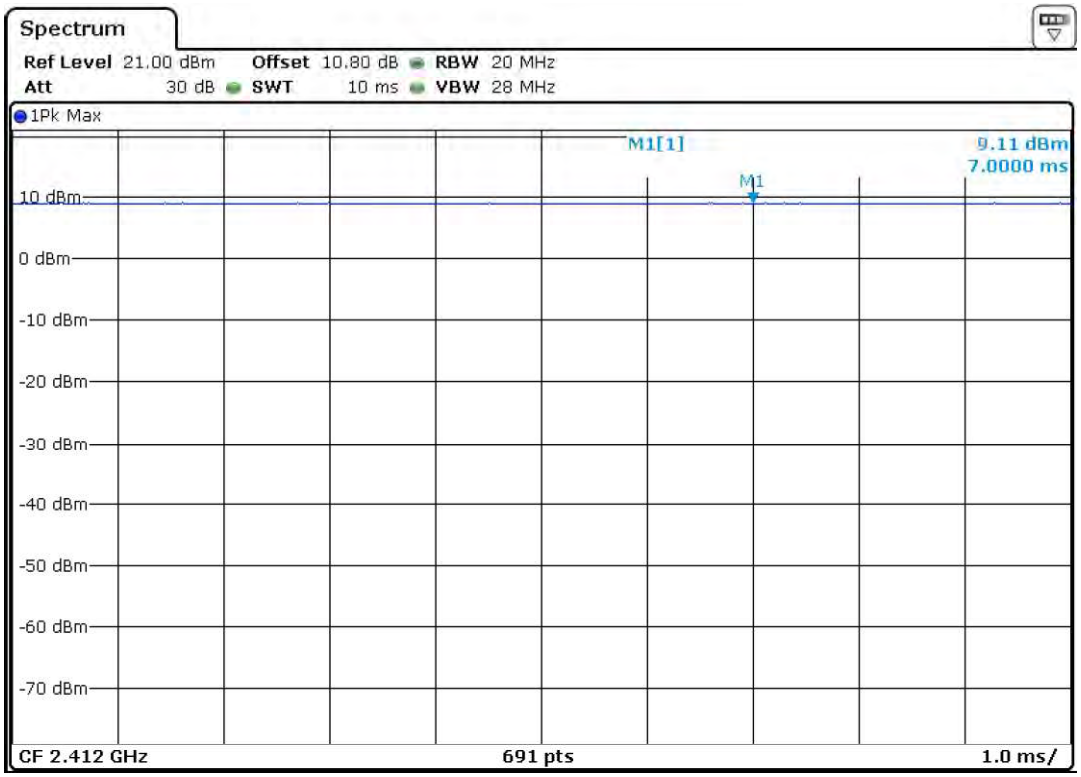
Test results:

10 dB attenuator + 0.8 Cable loss = 10.8 dB offset is considered in below result

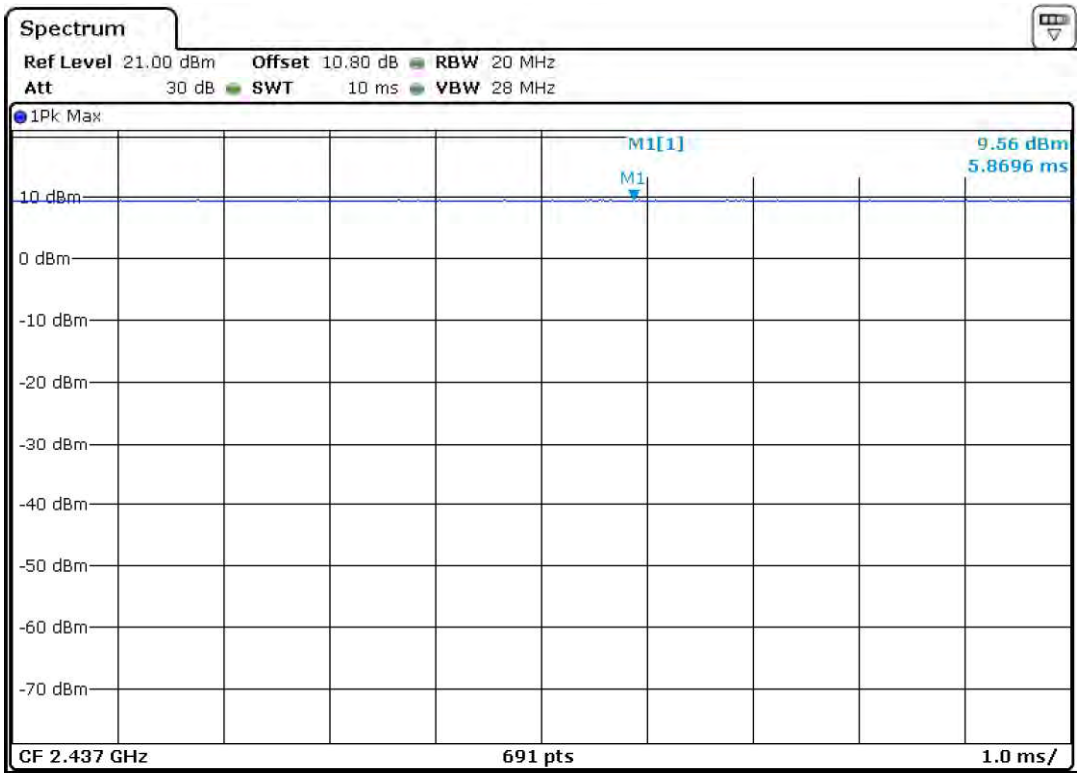
Note: Measurements were made as per section 9.1.1 in KDB 558074 D01 DTS Meas Guidance v04.

Protocol: 802.11b & 802.11g

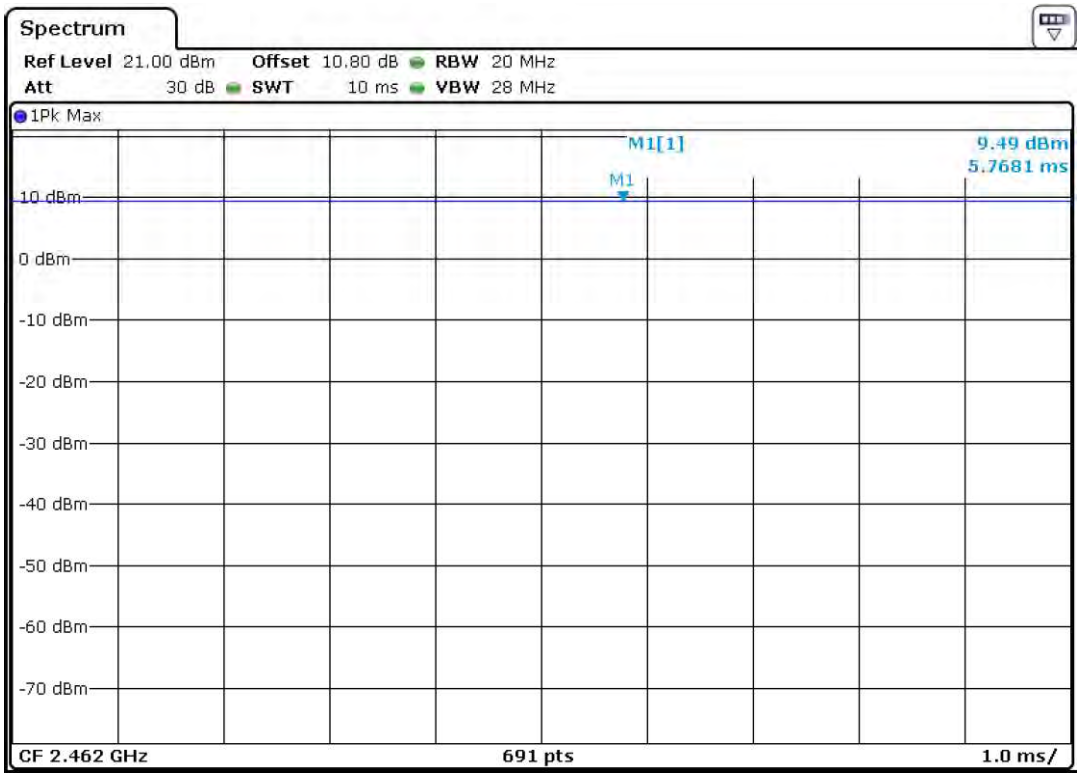
Data Rate (Mbps)	Channel No.	Frequency (MHz)	Output power (dBm)	Limit (dBm)
1	1	2412	9.11	30
	6	2437	9.56	30
	11	2462	9.49	30
11	1	2412	9.24	30
	6	2437	9.68	30
	11	2462	9.49	30
6	1	2412	10.43	30
	6	2437	10.78	30
	11	2462	10.56	30
24	1	2412	9.33	30
	6	2437	9.71	30
	11	2462	9.40	30
54	1	2412	8.98	30
	6	2437	9.44	30
	11	2462	9.28	30



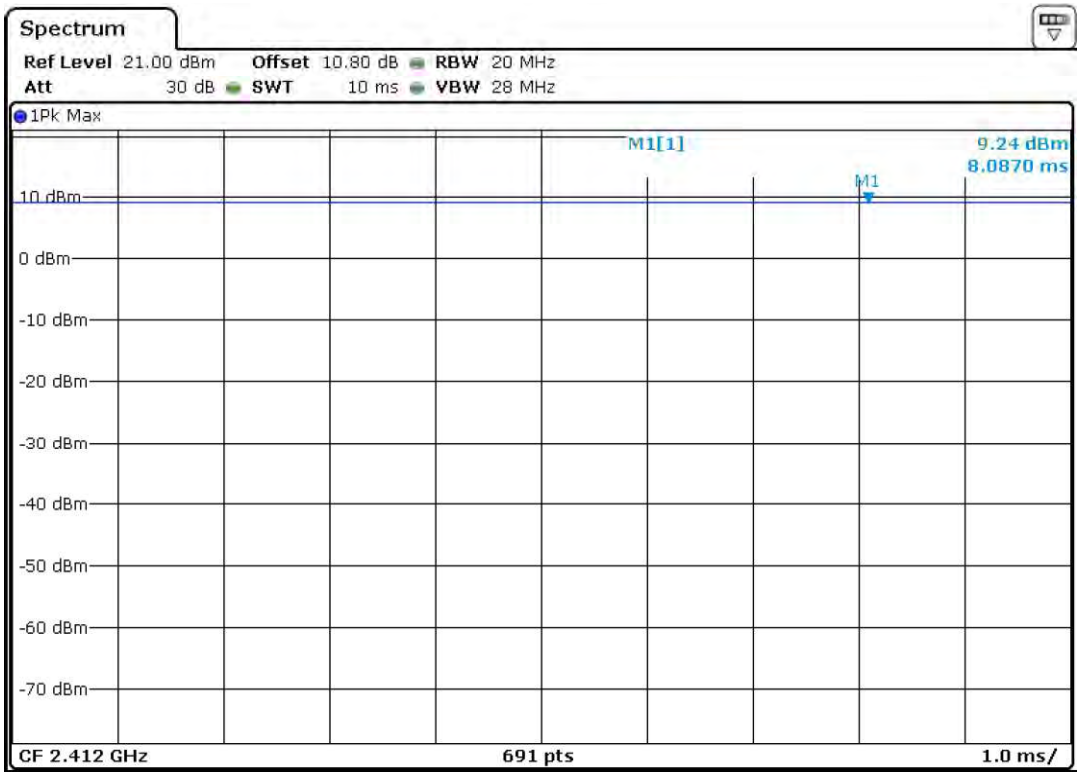
1Mbps Channel low



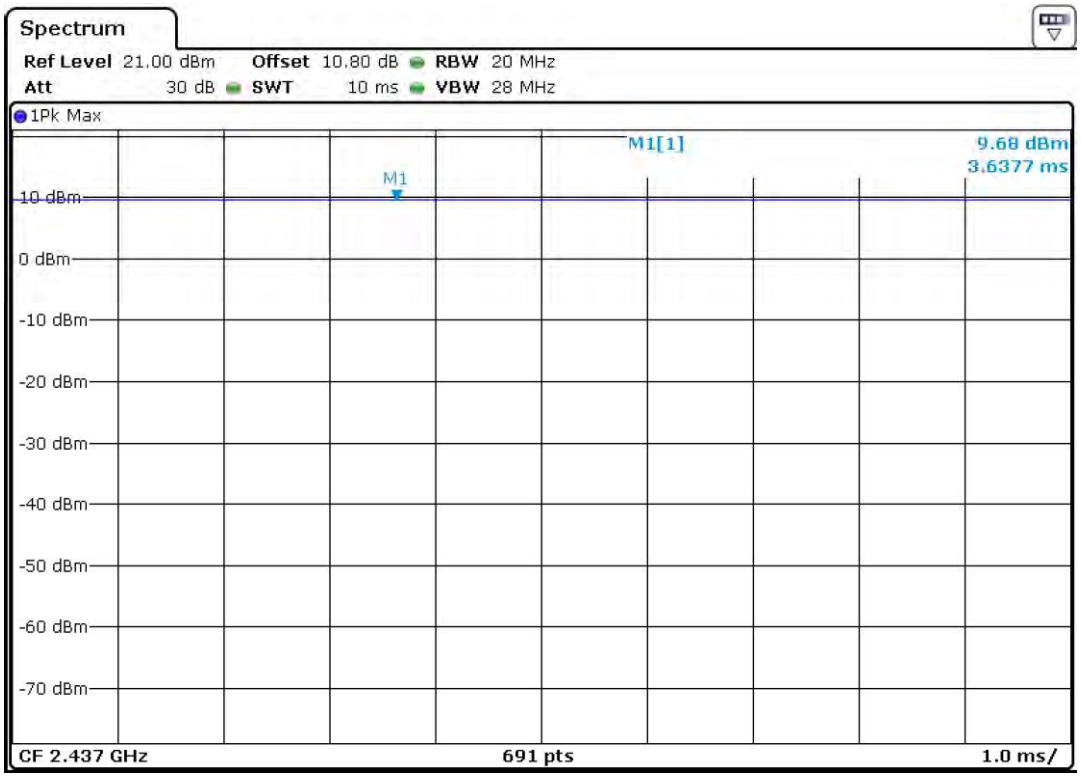
1Mbps Channel mid



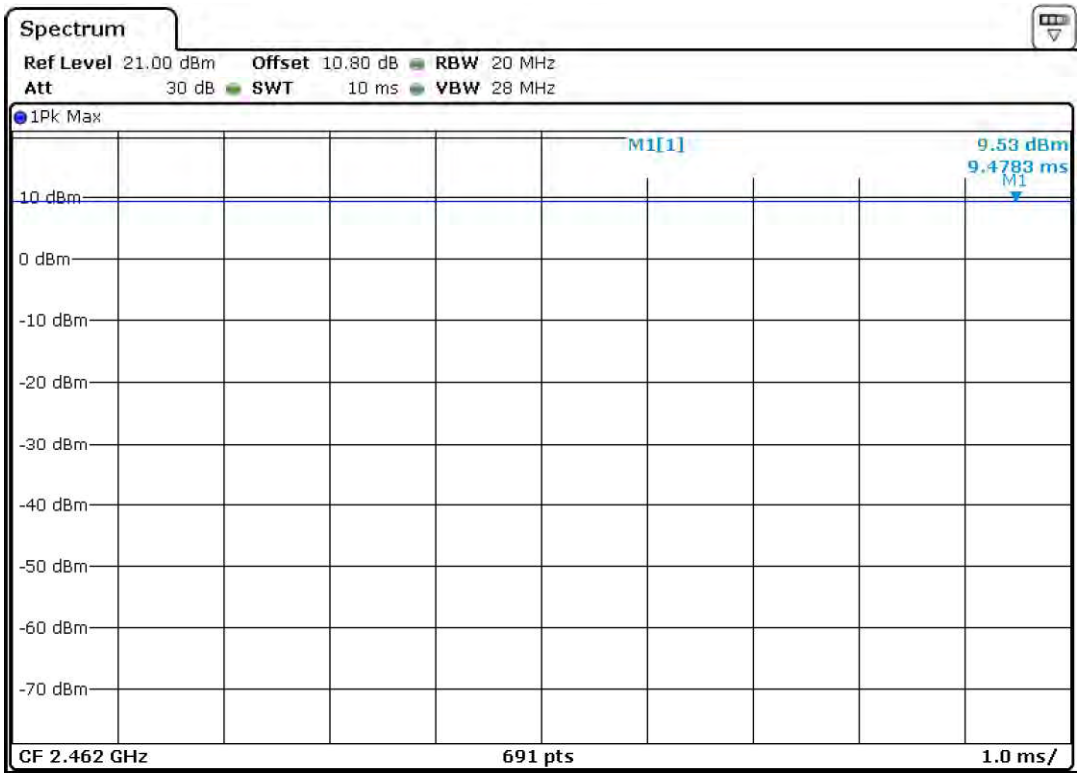
1Mbps Channel High



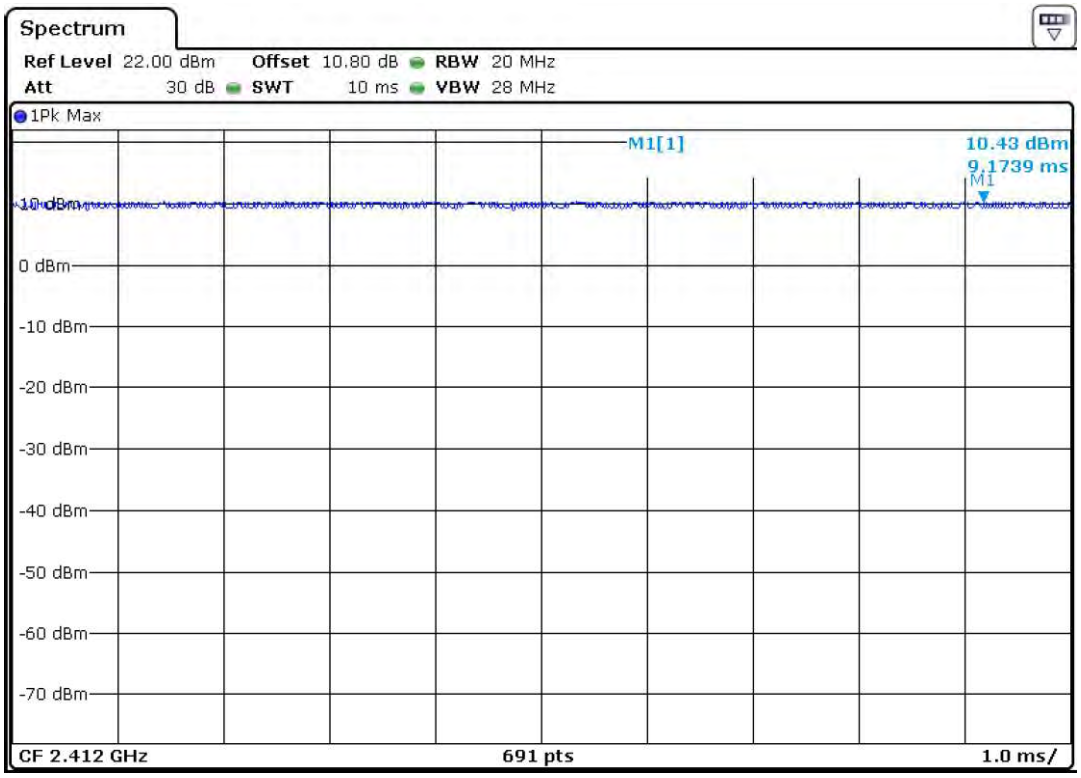
11 Mbps Channel low



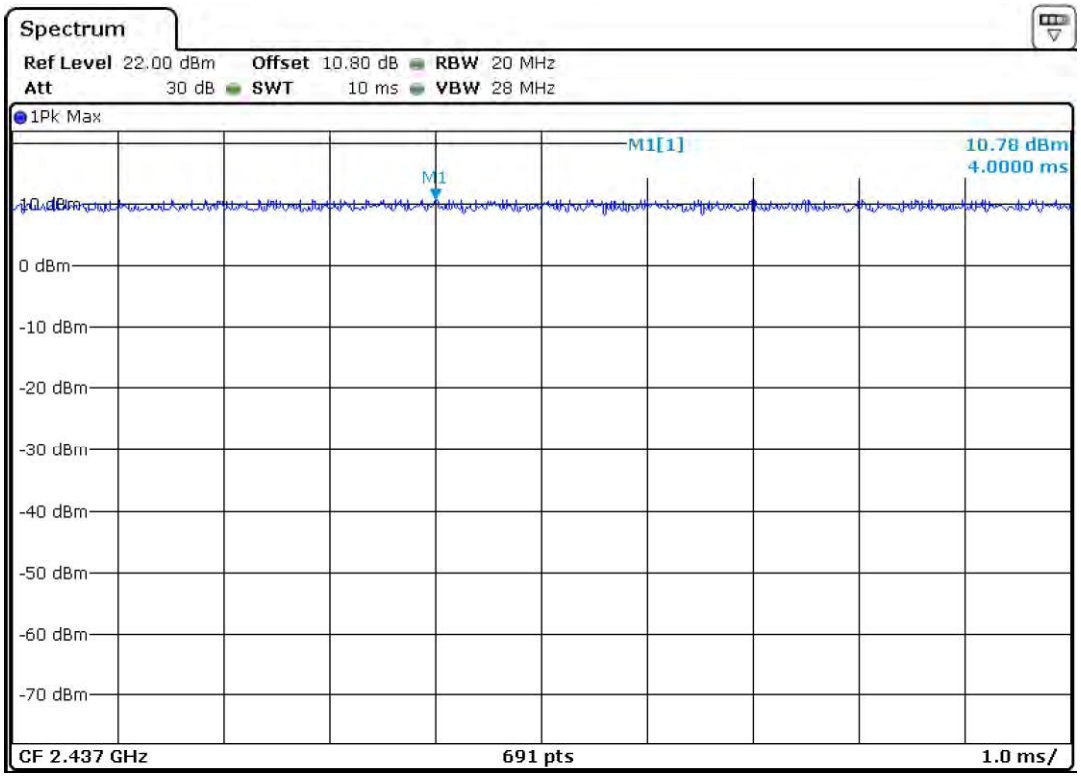
11 Mbps Channel mid



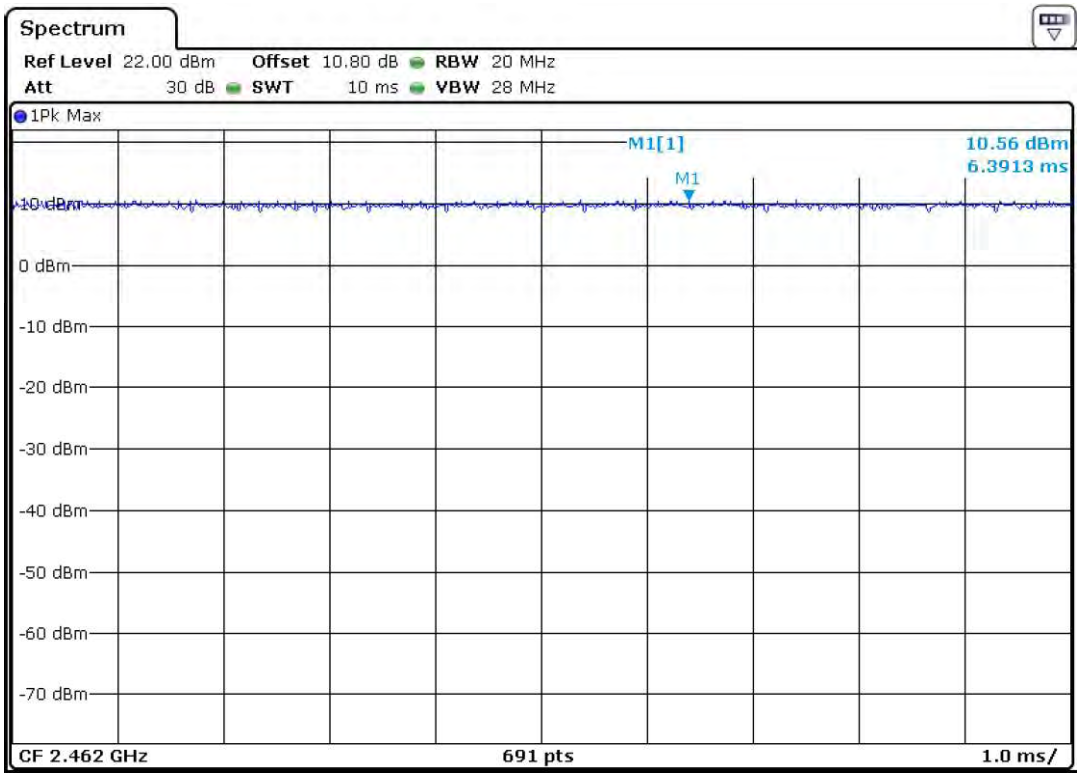
11 Mbps Channel High



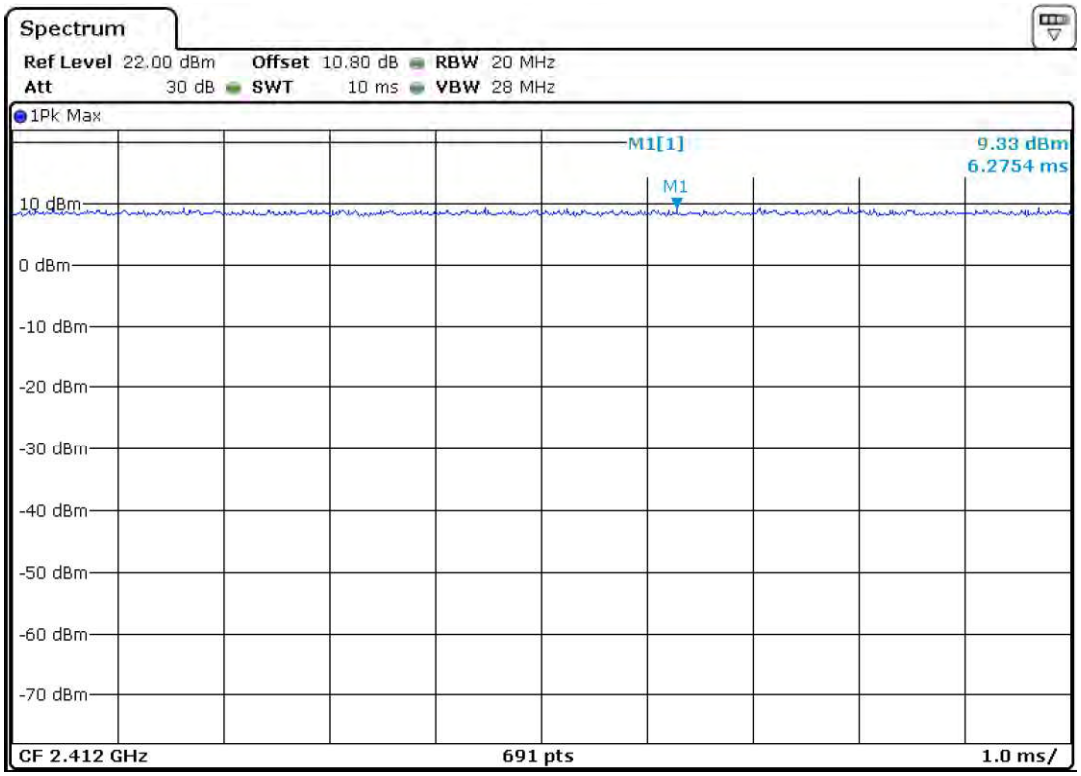
6 Mbps Channel low



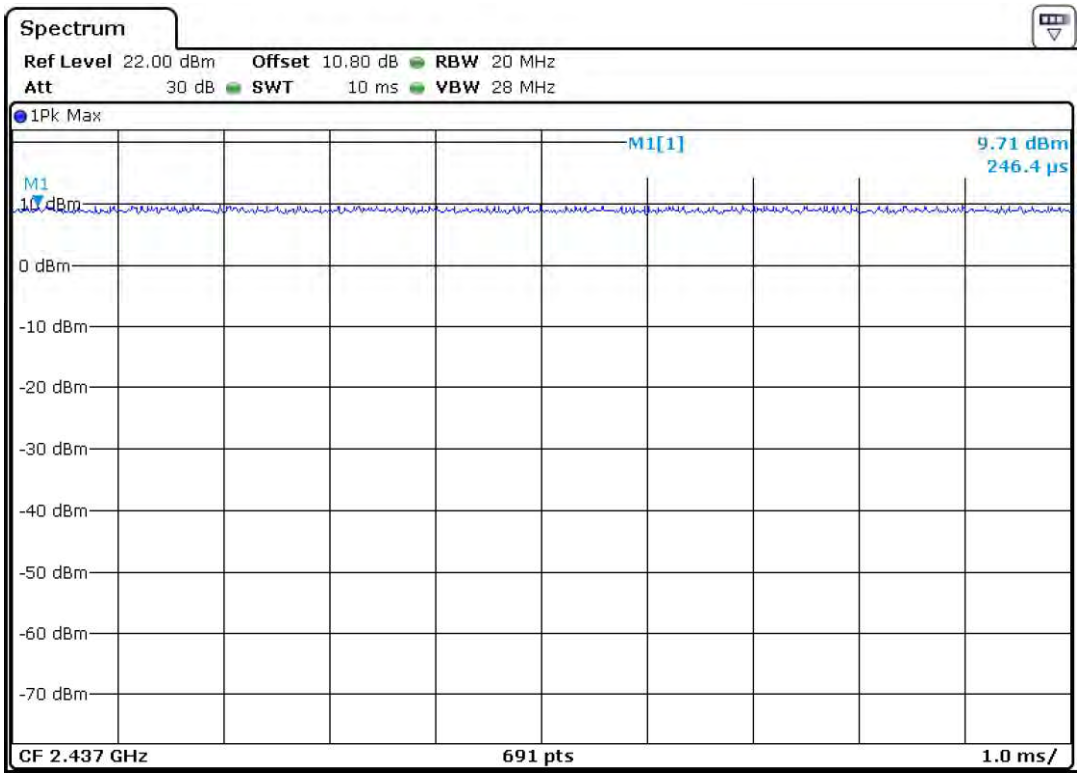
6 Mbps Channel mid



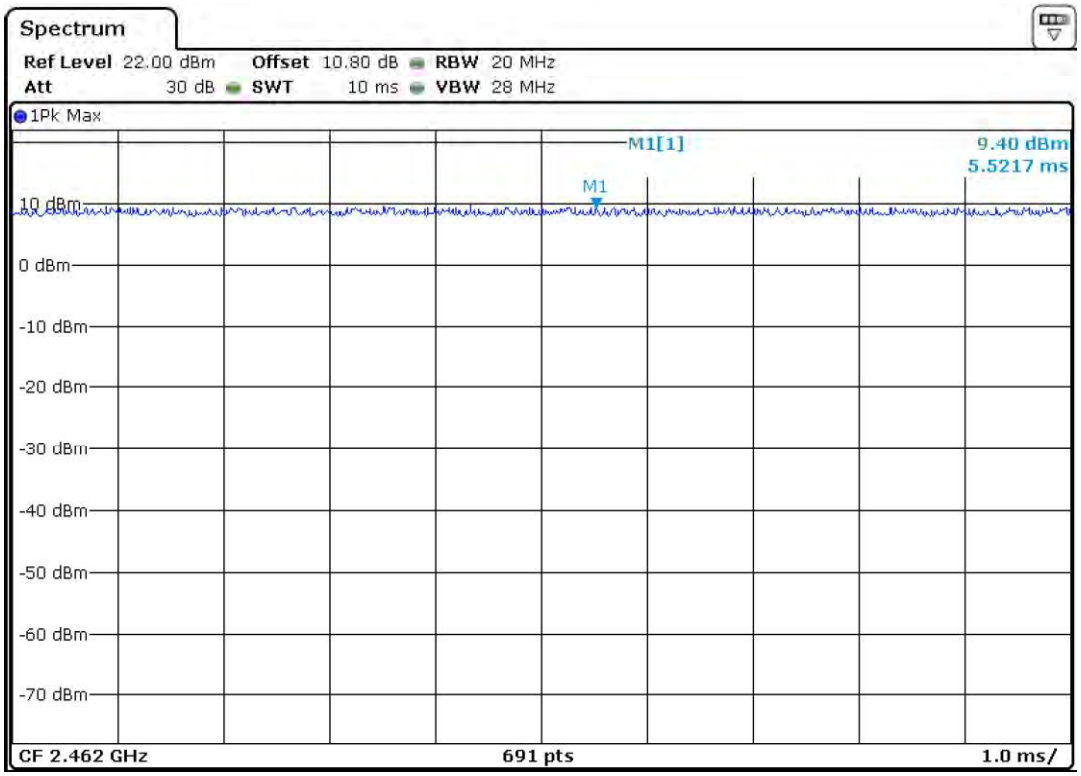
6 Mbps Channel High



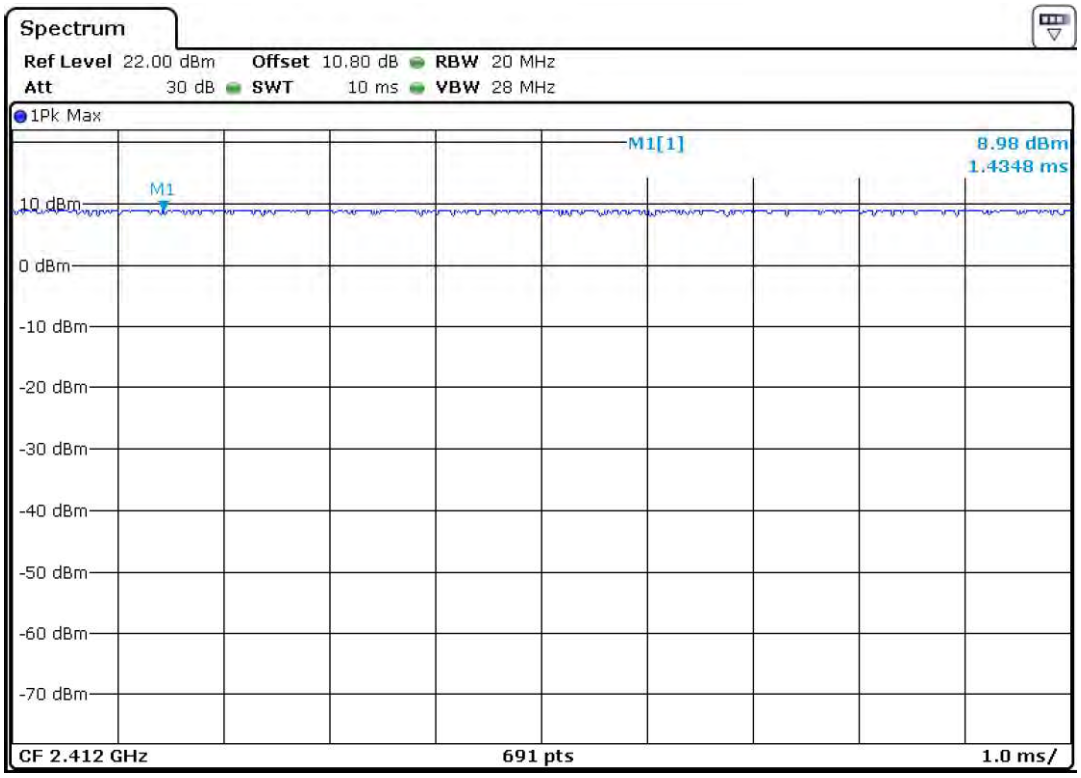
24 Mbps Channel low



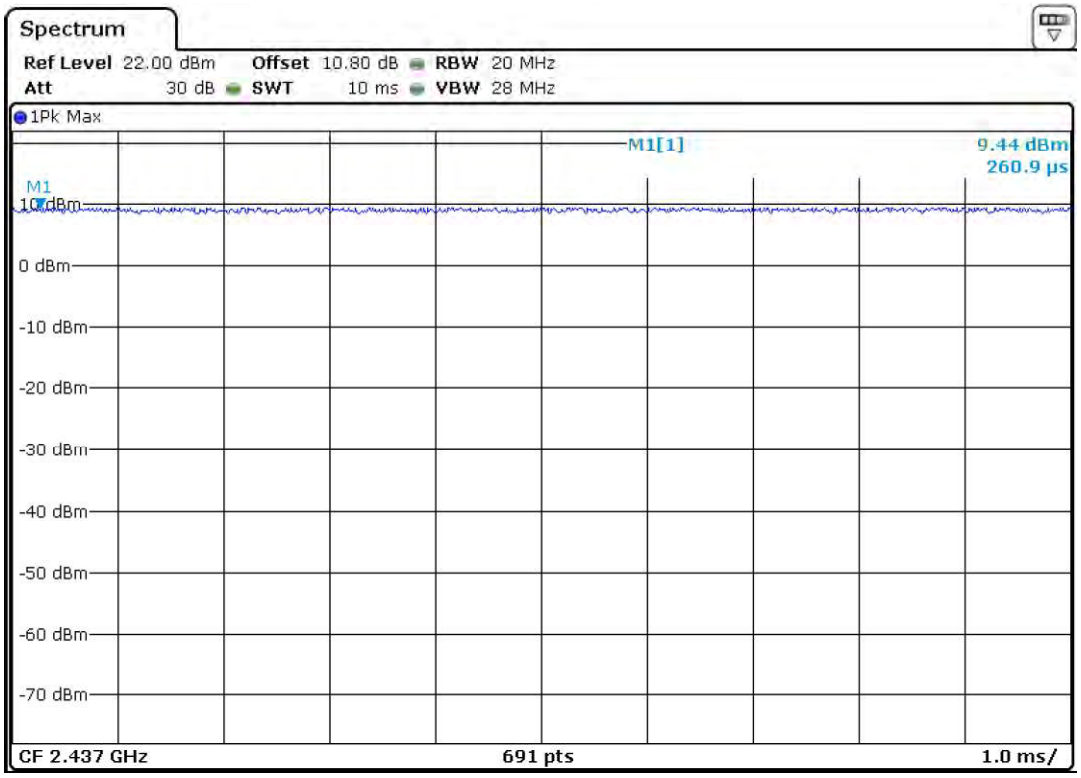
24 Mbps Channel mid



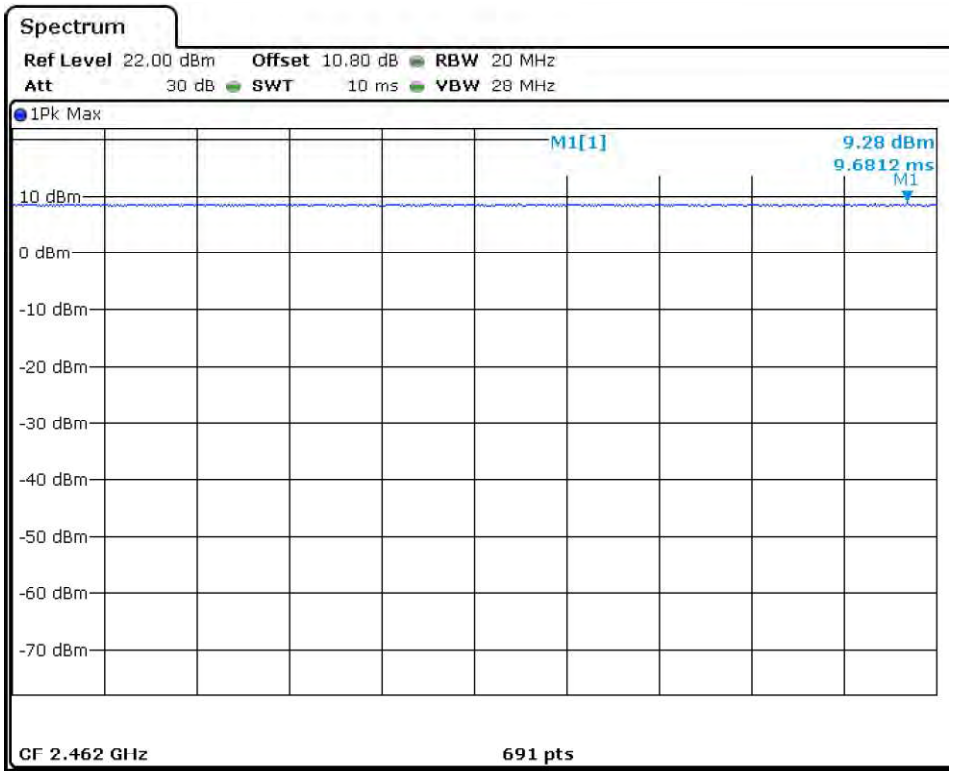
24 Mbps Channel high



54 Mbps Channel low

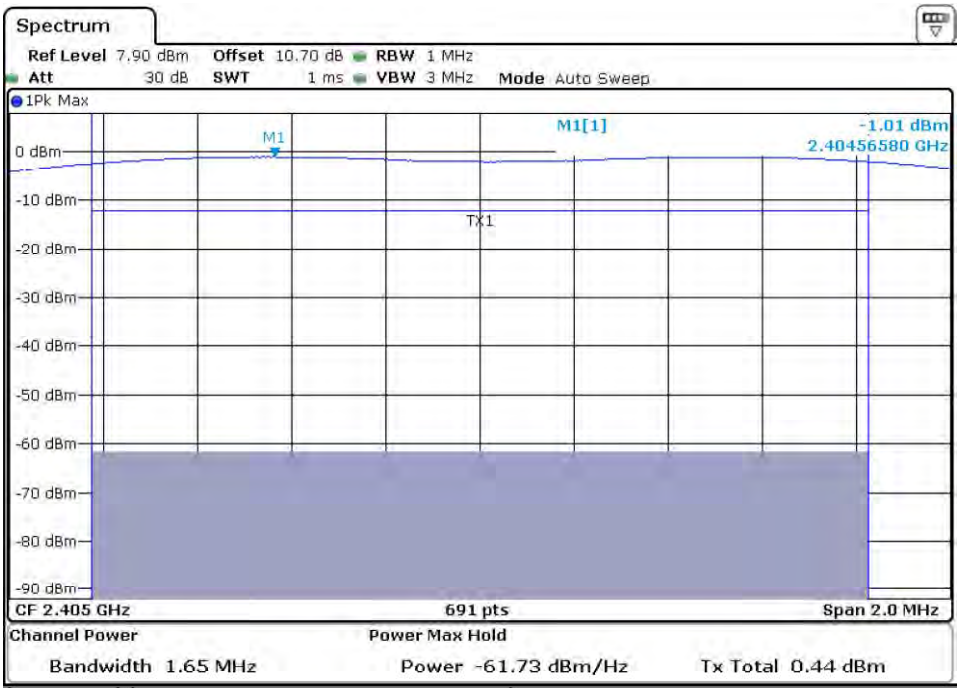


54 Mbps Channel mid

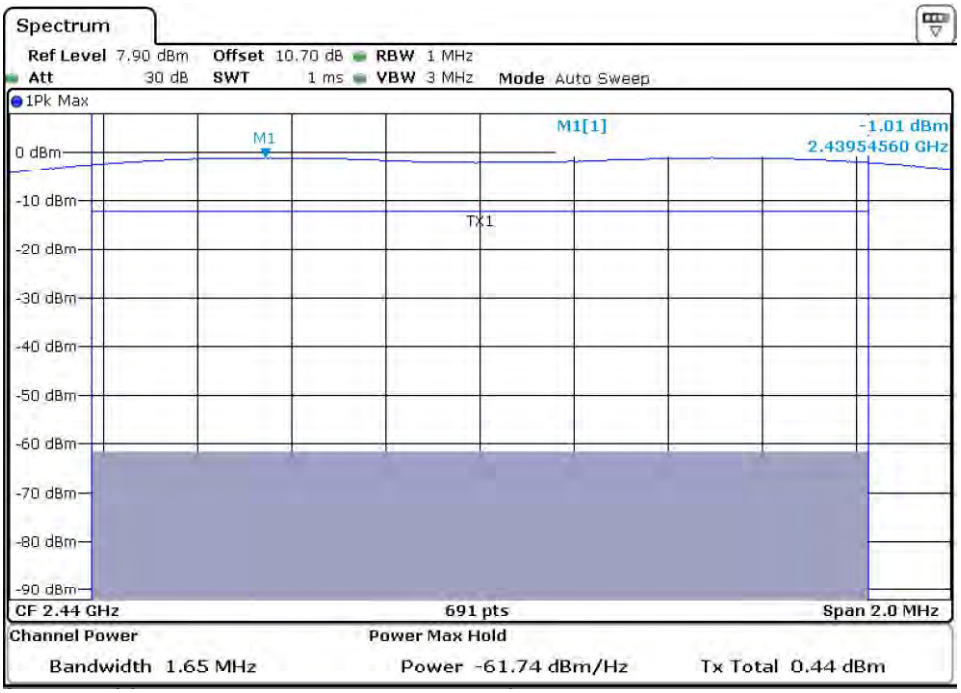


54 Mbps Channel high

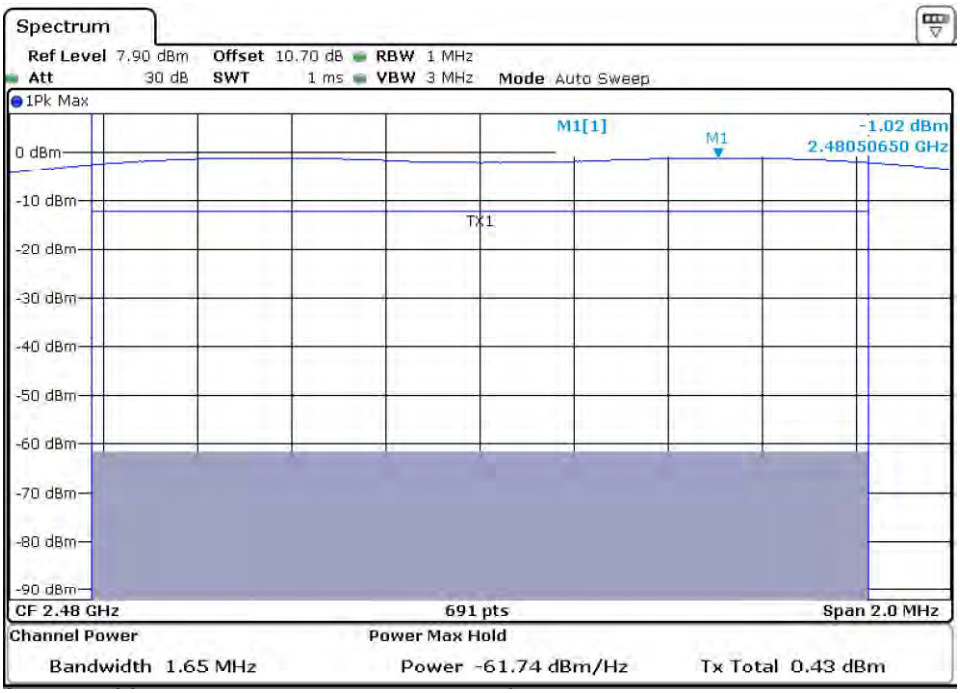
ZigBee 1:



Channel low



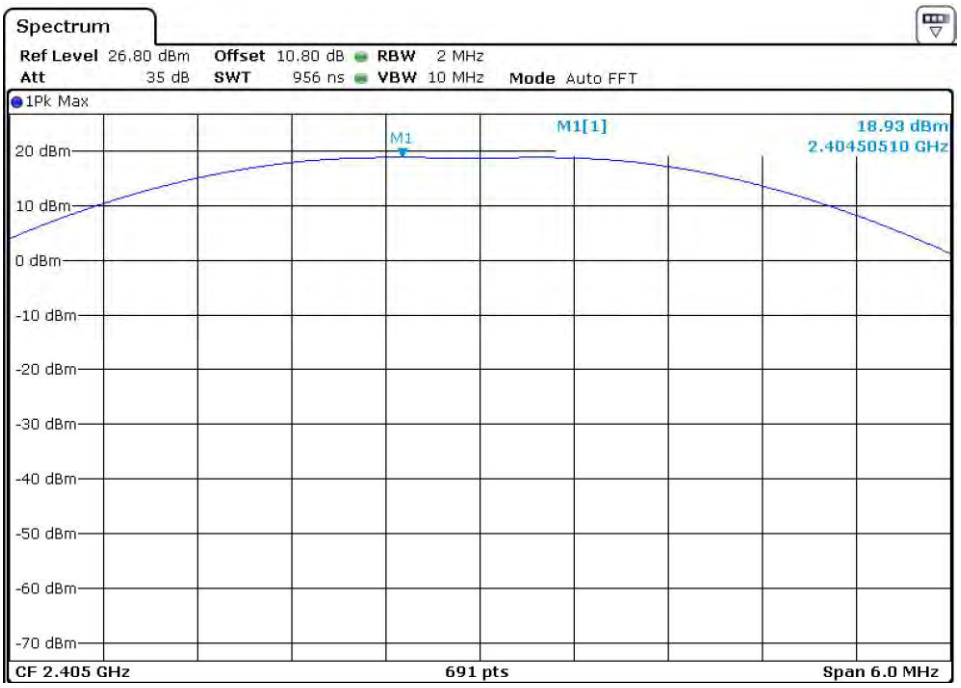
Channel mid



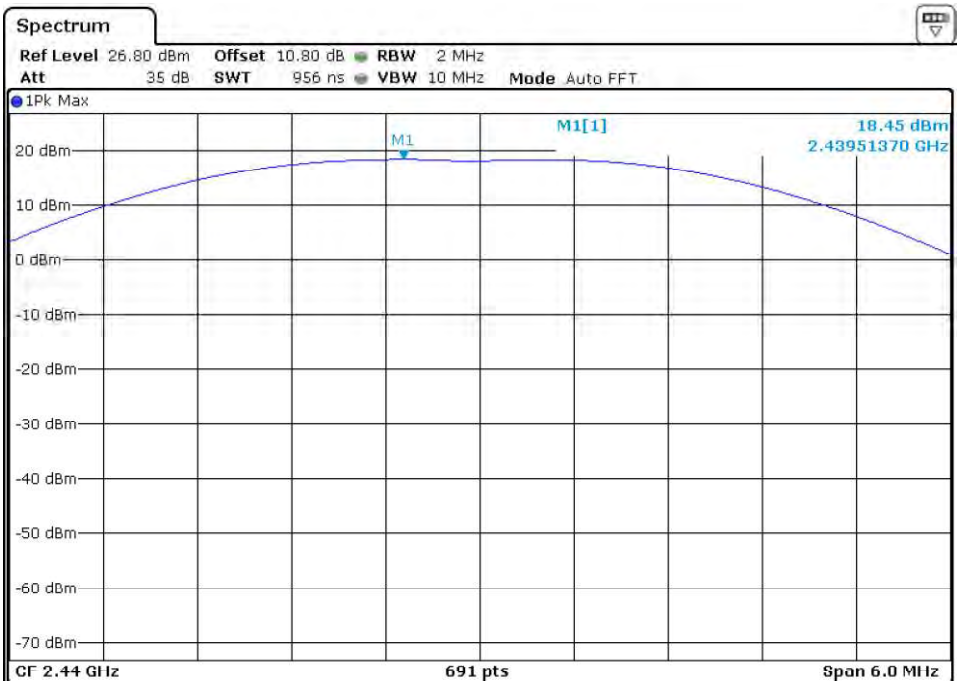
Channel high

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	2405	0.44	30	-29.56
Mid	2440	0.44	30	-29.56
High	2480	0.43	30	-29.57

ZigBee 2 & 3:

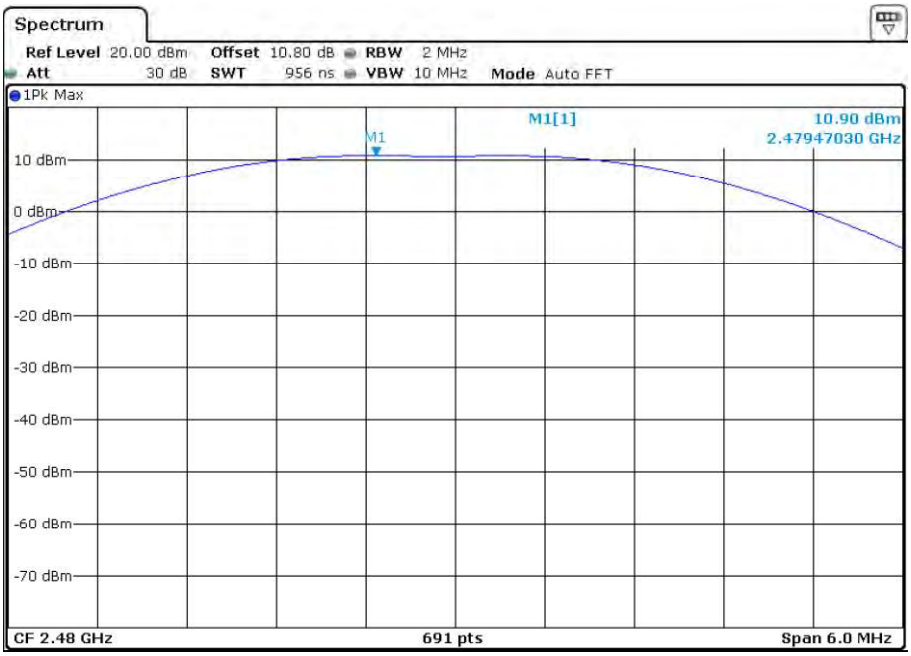


Channel low



Channel mid

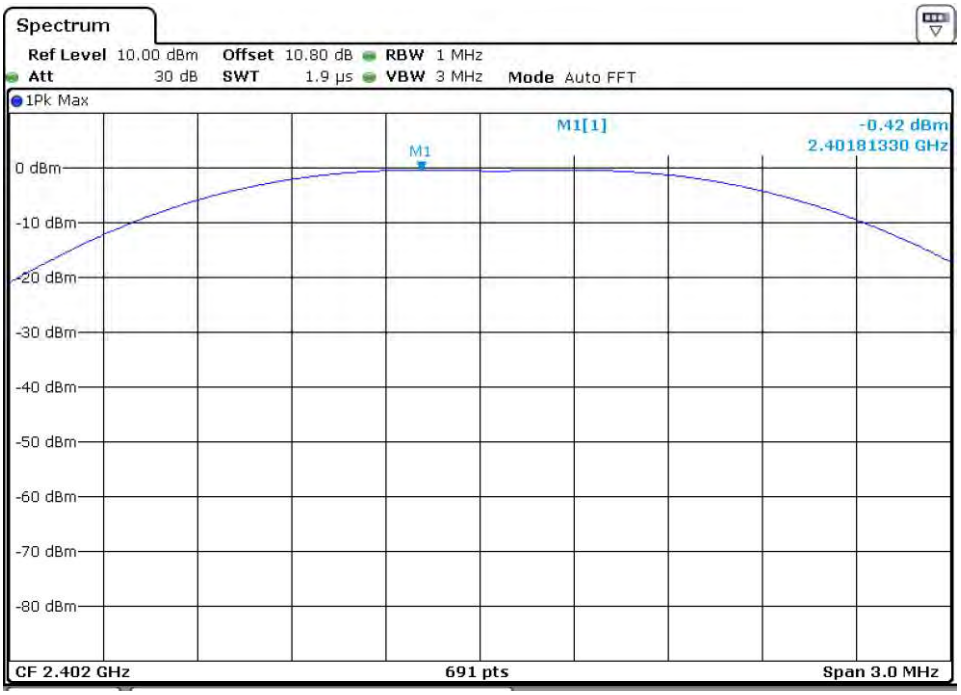
Channel number 25



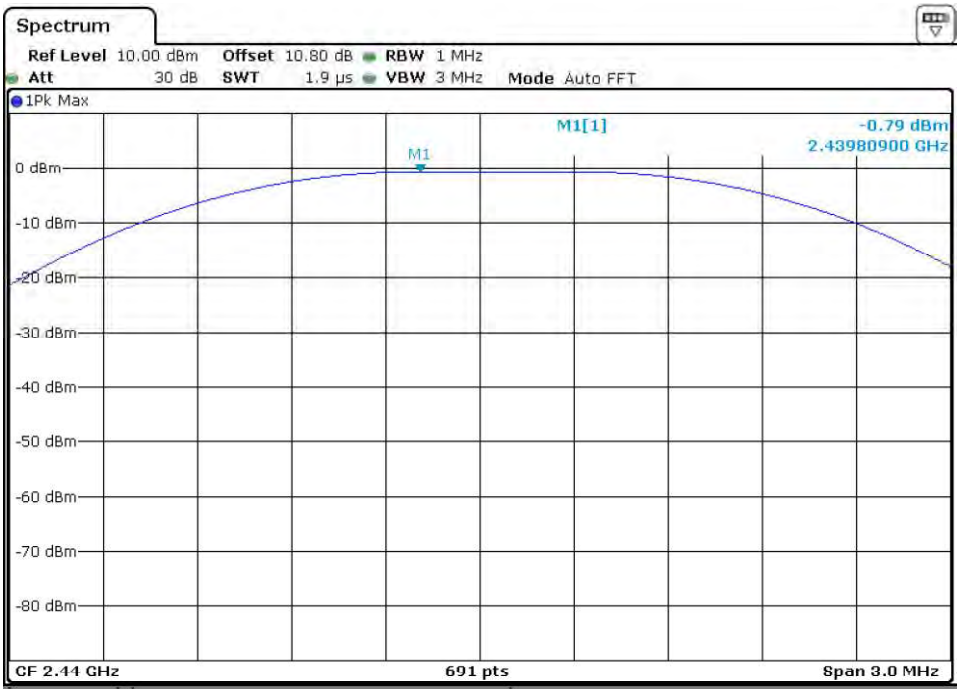
Channel high

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	2405	18.93	30	-11.07
Mid	2440	18.45	30	-11.55
25	2475	17.73	30	-12.27
High	2480	10.90	30	-19.1

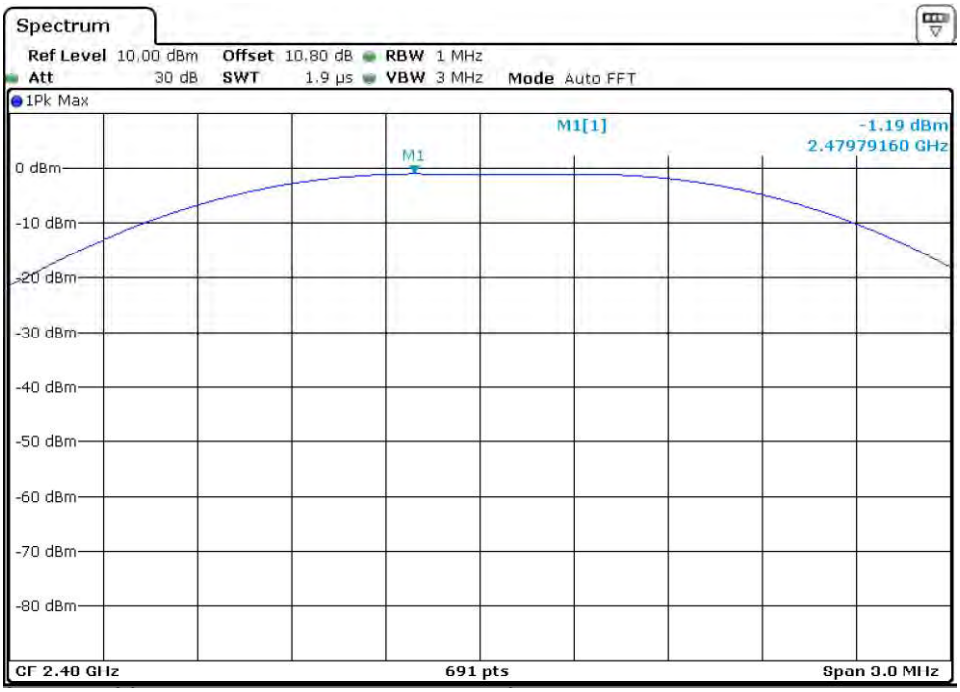
Bluetooth Low Energy:



Channel low



Channel mid



Channel high

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-0.42	30	-30.42
Mid	2440	-0.79	30	-30.79
High	2480	-1.19	30	-31.19

Power Table for Simultaneous Transmission (Only the worst case readings are tabulated)

ZigBee 1	ZigBee 2	ZigBee 3	Wi-Fi (6Mbps) 2.4GHz	BLE	Sum	Sum
mW	mW	mW	mW	mW	mW	dBm
1.106	78.162	78.162	11.040	0.907	169.38	22.28
1..106	69.984	69.984	11.967	0.833	153.87	21.87
1.104	12.302	12.302	11.376	0.760	37.84	15.78

Maximum possible power value = 1.106 + 78.162 + 78.162 + 11.967 + 0.907 = 170.30 mW

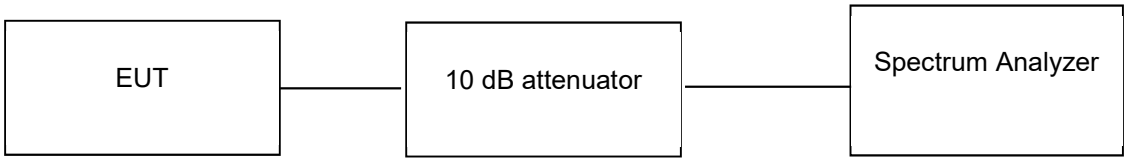
Note: Transmitter output signals from the modules are declared as not correlated.

6.2 Maximum Power Spectral Density

Result ***Pass***

Test Specification	FCC Part 15 Subpart C Section 15.247 (e)
Detector Function	Peak
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:

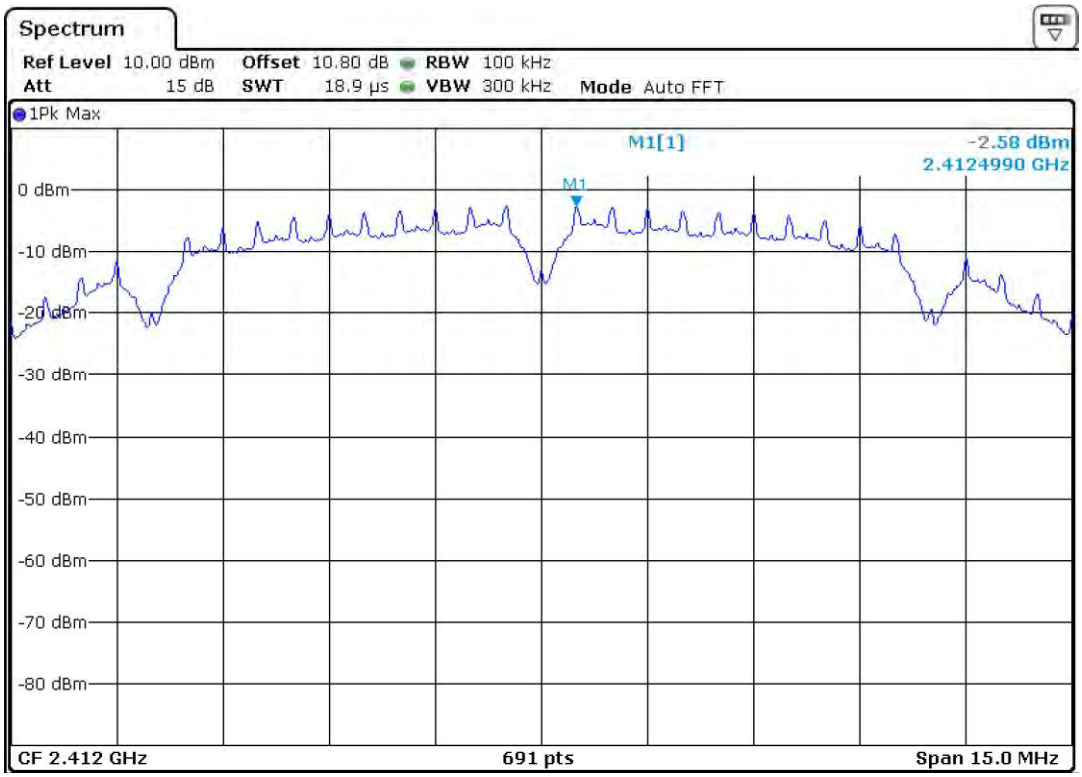


Test results for 802.11 b

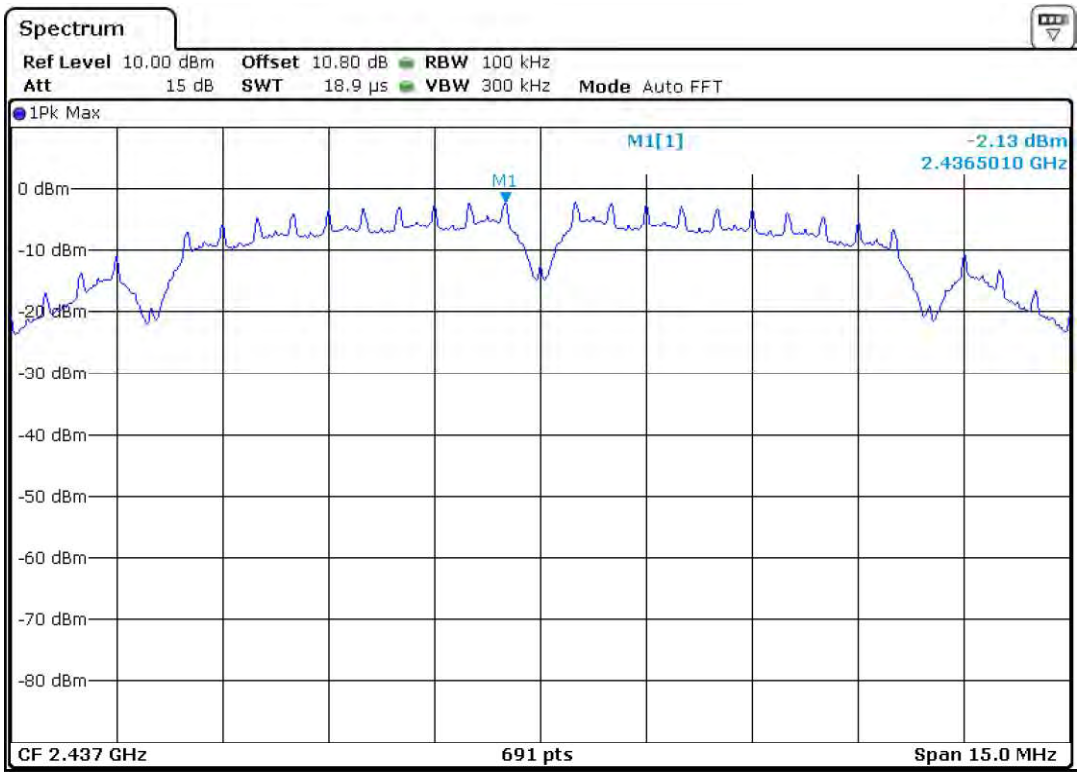
10 dB attenuator + 0.8 Cable loss = 10.8 dB offset is considered in below result

Note: Measurements were made as per section 10.2 in KDB 558074 D01 DTS Meas Guidance v04.

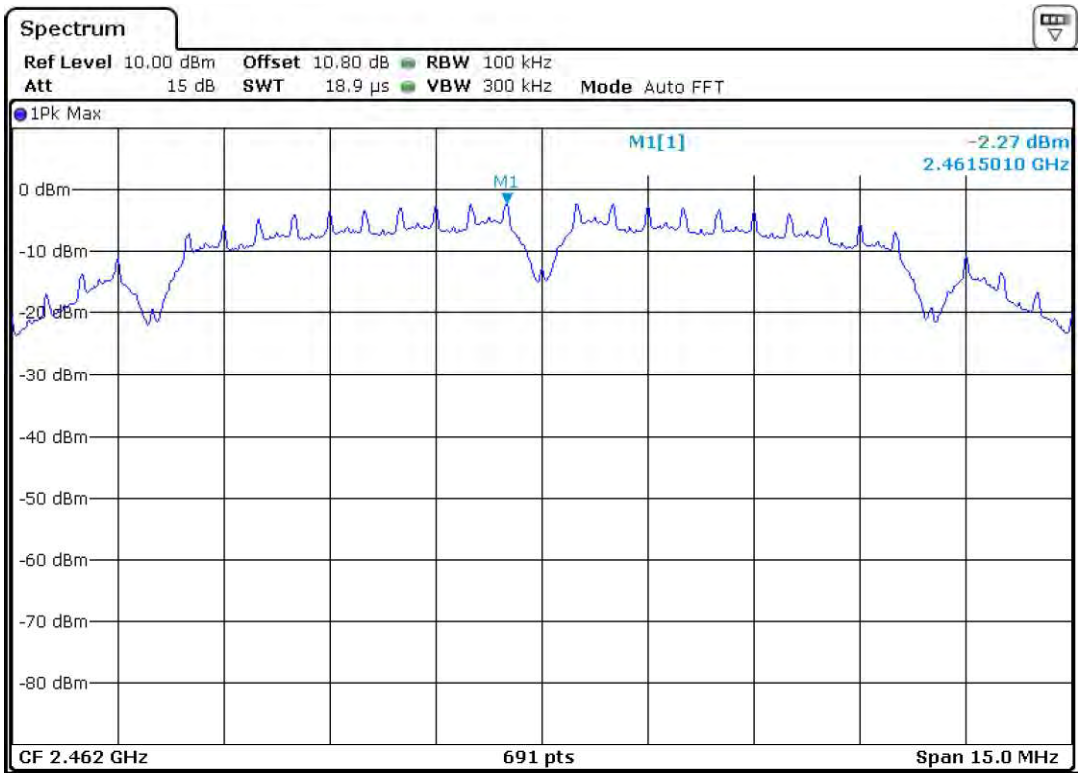
802.11 Protocol	Data rate (Mbps)	Channel Frequency (MHz)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
b	1	2412.00	-2.58	8.00	-10.58
		2437.00	-2.13	8.00	-10.13
		2462.00	-2.27	8.00	-10.27
	11	2412.00	-1.78	8.00	-9.78
		2437.00	-1.56	8.00	-9.56
		2462.00	-1.98	8.00	-9.98



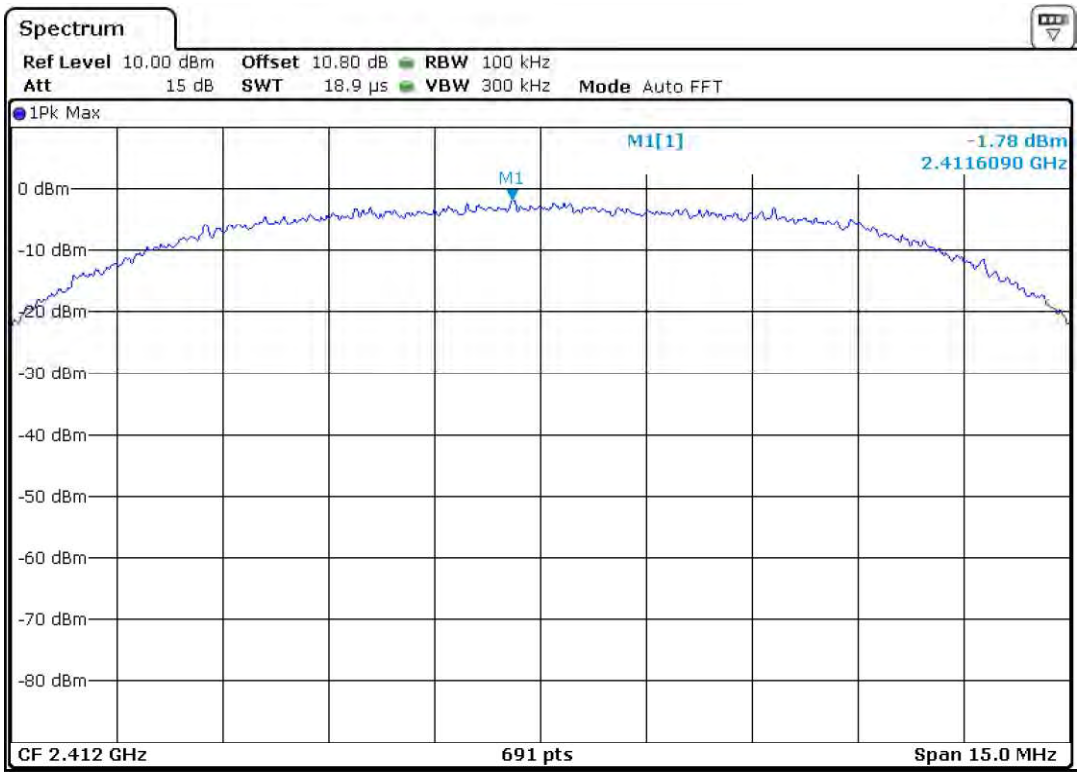
1 Mbps Channel low



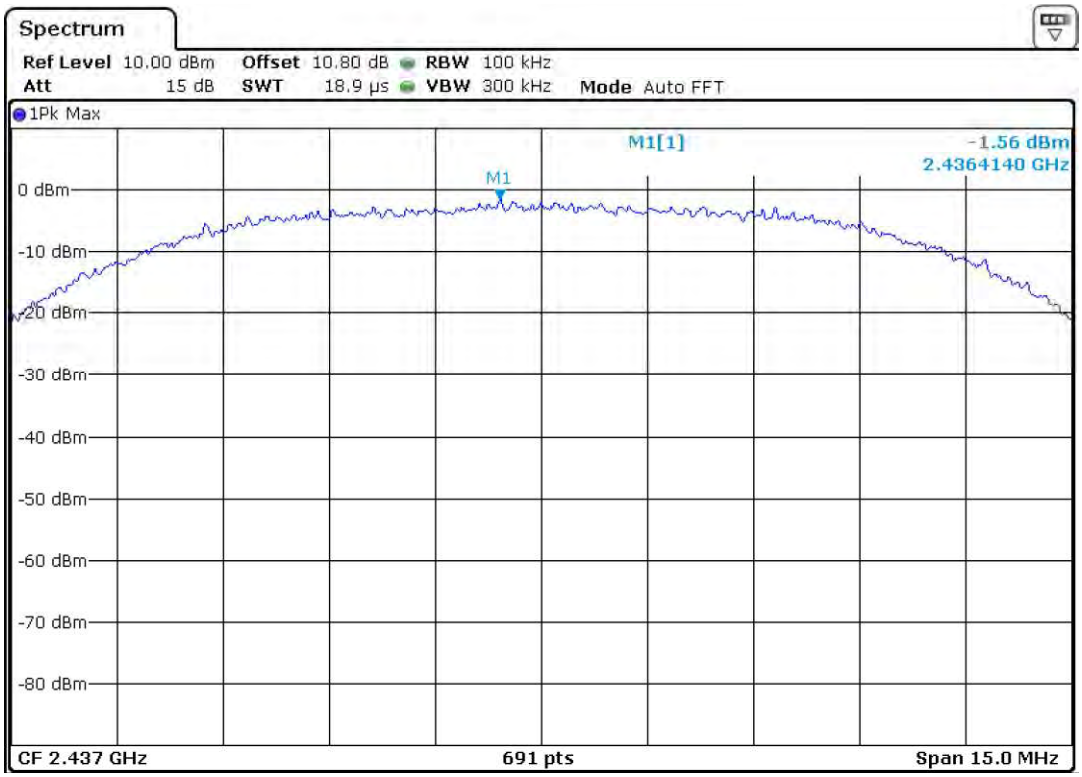
1Mbps Channel mid



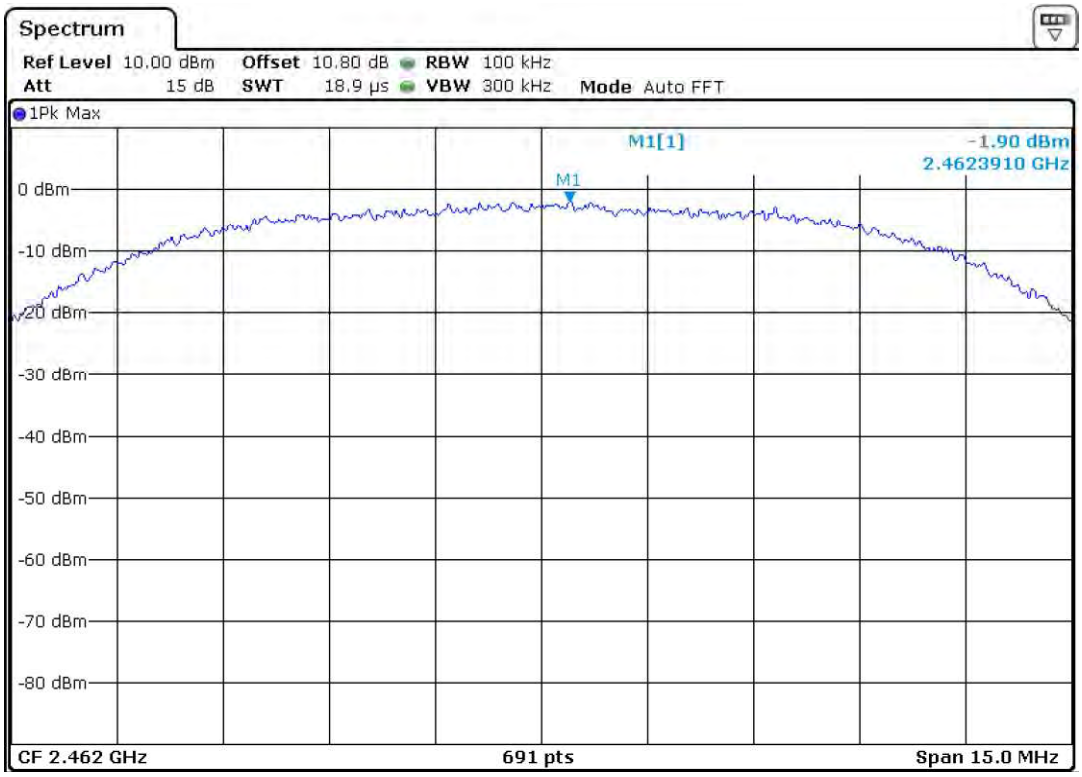
1 Mbps Channel high



11 Mbps Channel low



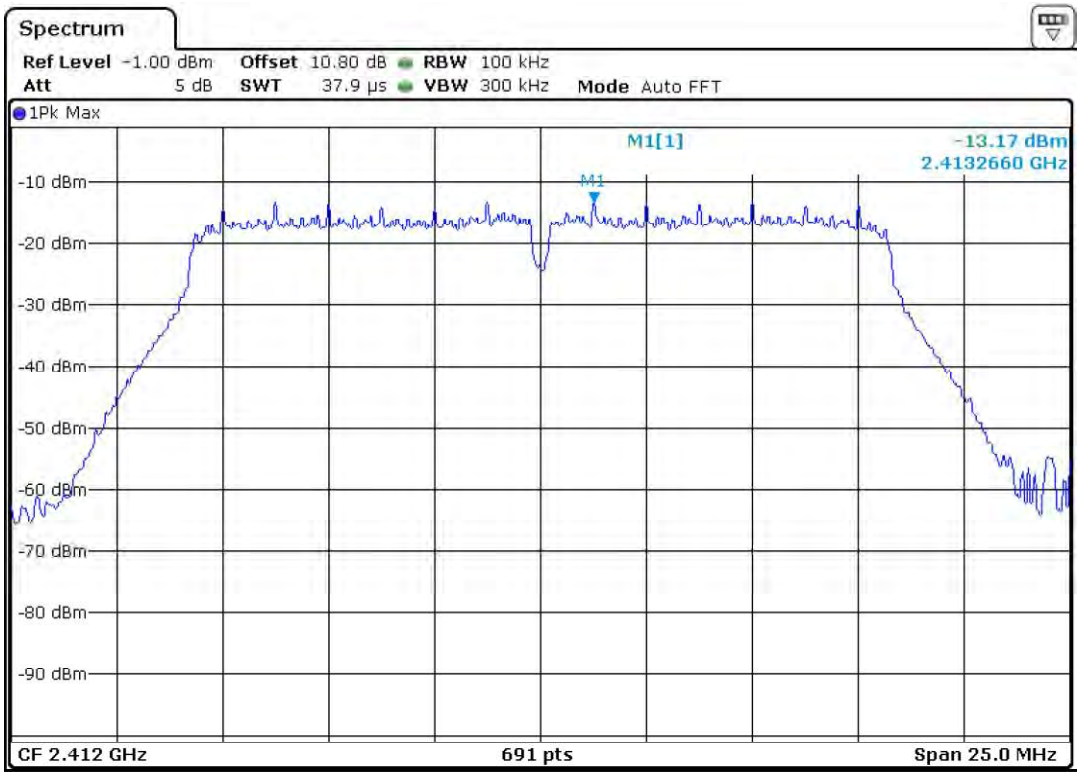
11 Mbps Channel mid



11 Mbps Channel high

Test results for 802.11g

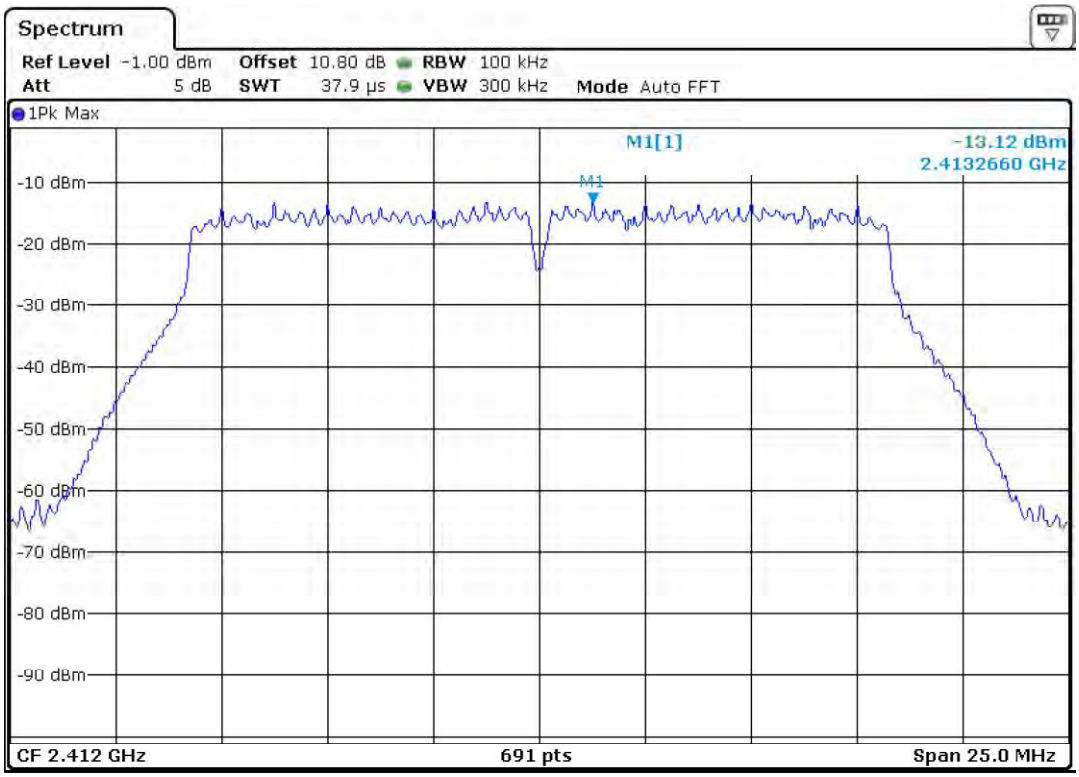
802.11 Protocol	Data rate (Mbps)	Channel Frequency (MHz)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
g	6	2412.00	-13.17	8.00	-21.17
		2437.00	-12.89	8.00	-20.89
		2462.00	-12.94	8.00	-20.94
	24	2412.00	-13.12	8.00	-21.12
		2437.00	-12.85	8.00	-20.85
		2462.00	-12.87	8.00	-20.87
	54	2412.00	-13.17	8.00	-21.17
		2437.00	-12.86	8.00	-20.86
		2462.00	-12.95	8.00	-20.95



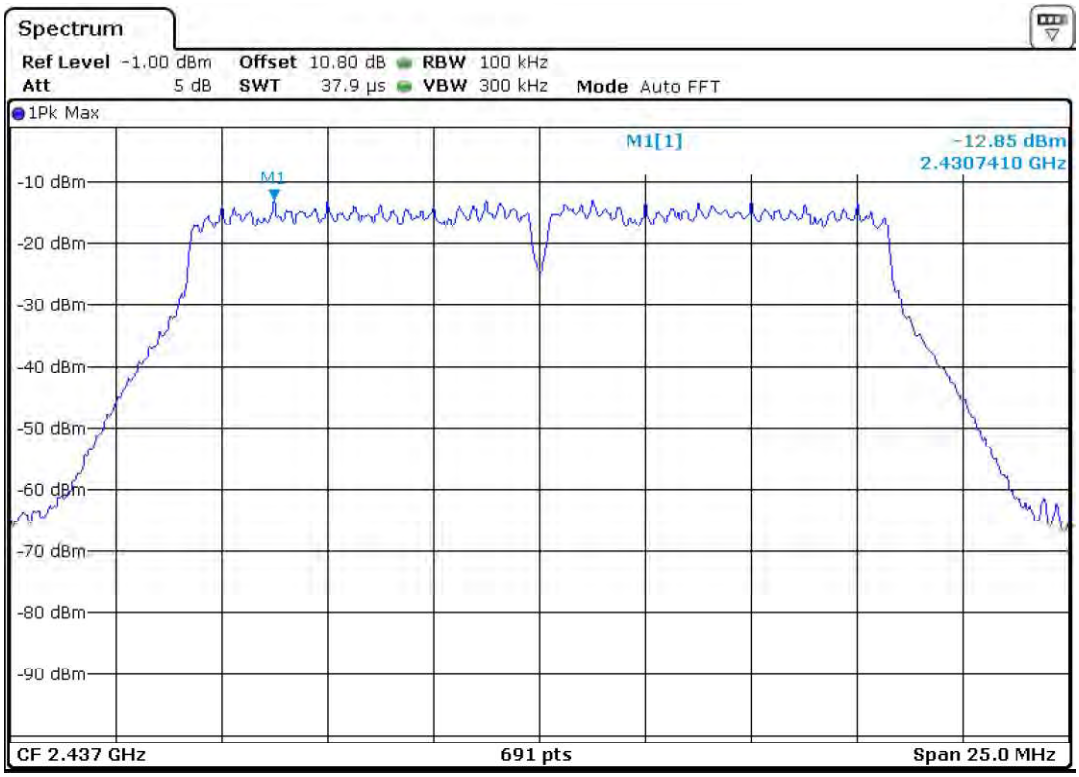
6 Mbps Channel low

6 Mbps Channel mid

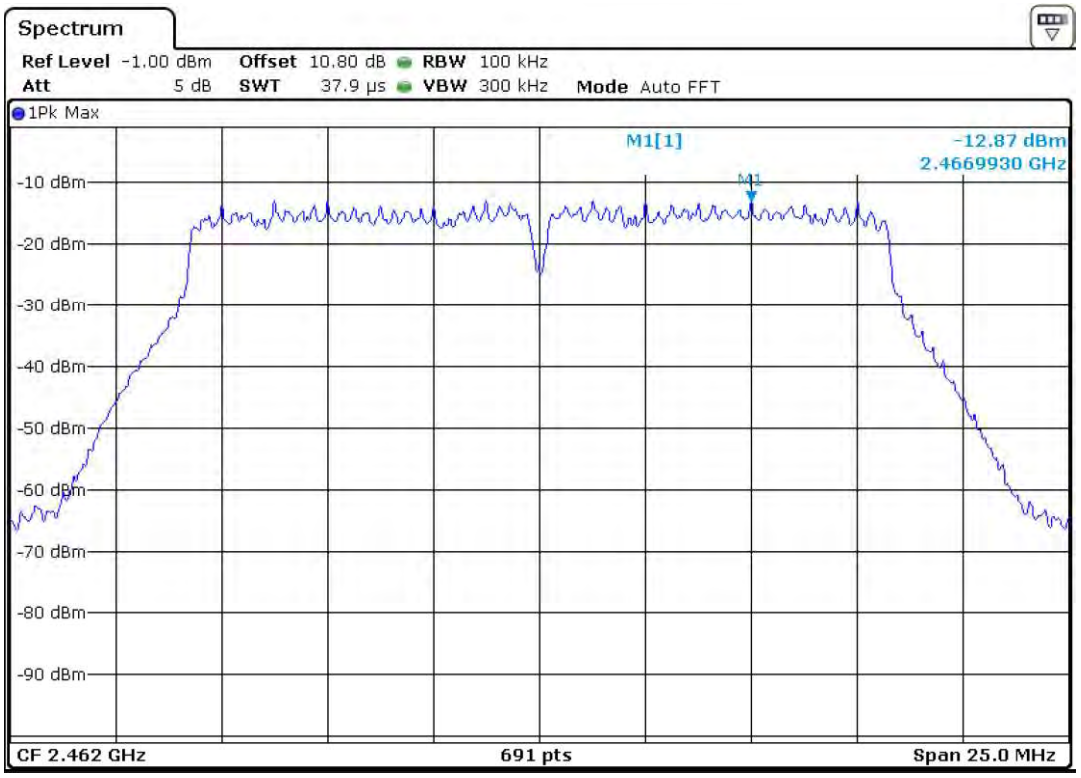
6 Mbps Channel high



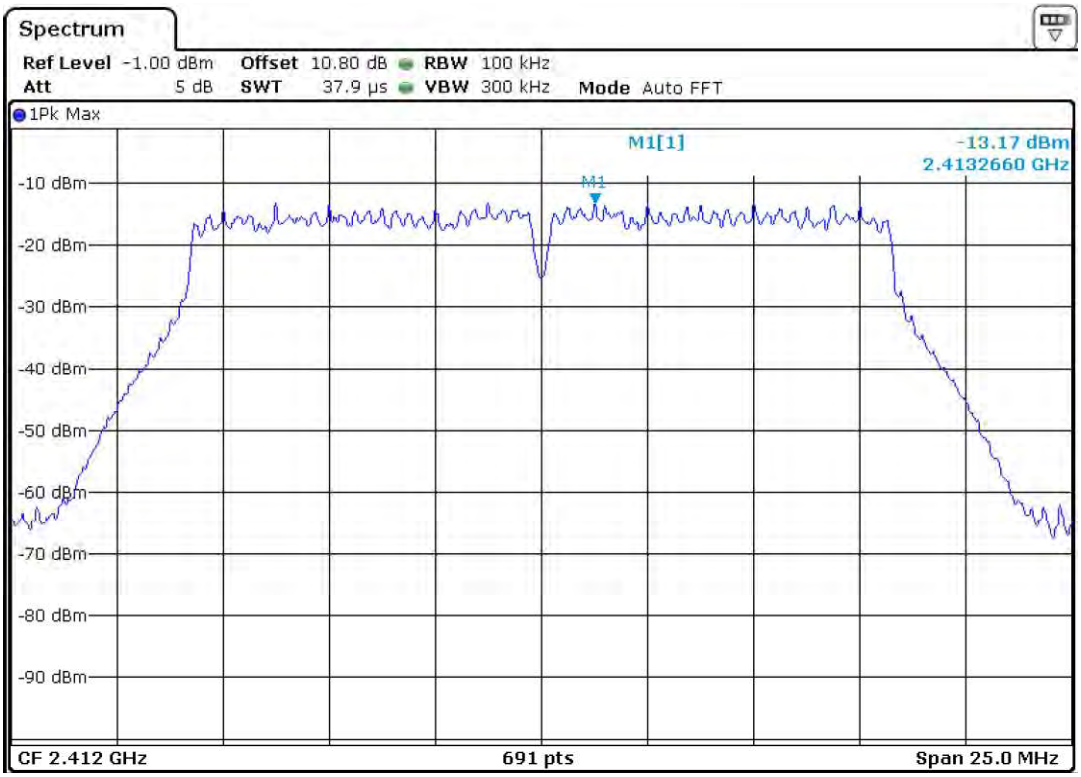
24 Mbps Channel low



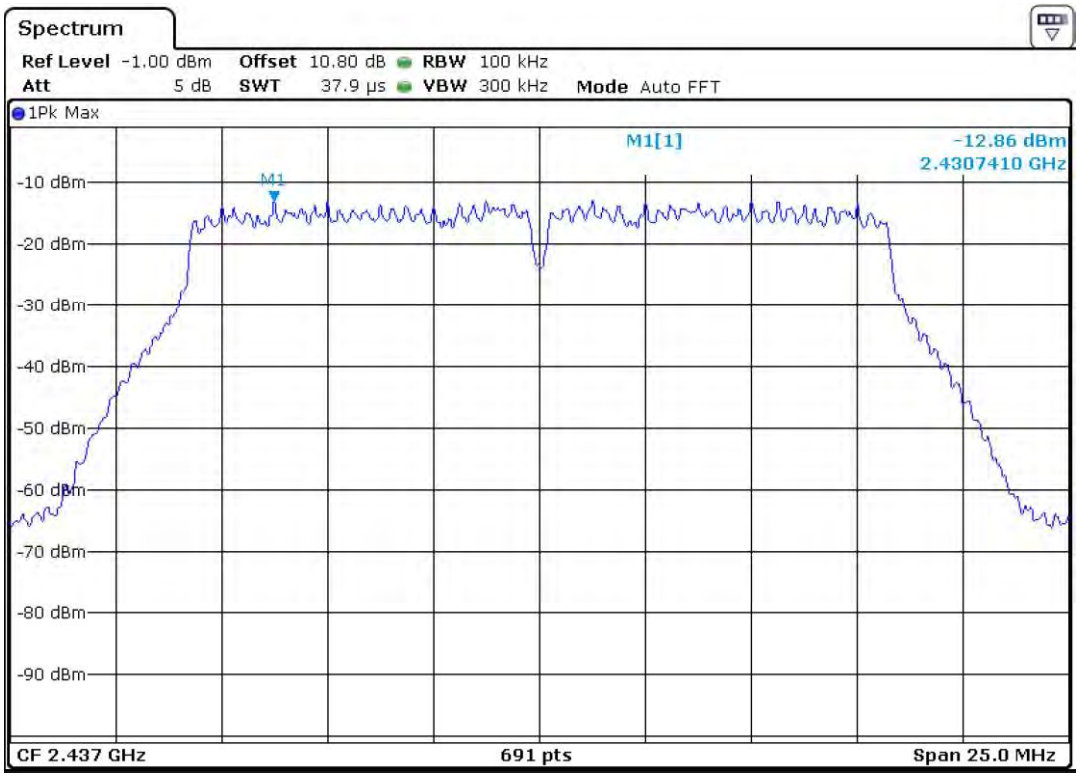
24 Mbps Channel mid



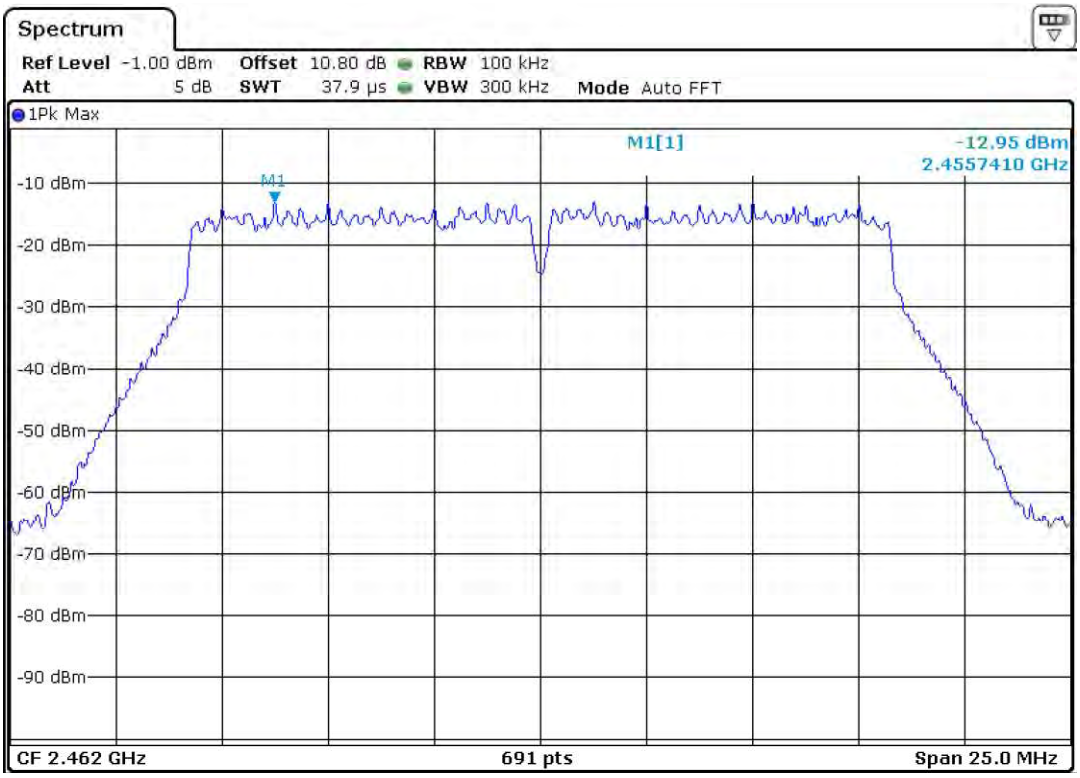
24 Mbps Channel high



54 Mbps Channel low



54 Mbps Channel mid



54 Mbps Channel high