

Produkte
Products

Prüfbericht - Nr.: 01200001 001		Seite 1 von 90	
<i>Test Report No.:</i>		<i>Page 1 of 90</i>	
Auftraggeber: <i>Client:</i>		BW Technologies Limited. 2840- 2nd Avenue S.E., Calgary, AB, Canada T2A 7X9,	
Gegenstand der Prüfung: <i>Test item:</i>		ImpactXtreme	
Bezeichnung: <i>Identification:</i>	IXW01	Serien-Nr.: <i>Serial No.</i>	Engineering Sample
Wareneingangs-Nr.: <i>Receipt No.:</i>	1403011050	Eingangsdatum: <i>Date of receipt:</i>	07.08.2010
Prüfort: <i>Testing location:</i>		Refer Page 4 of 90 for test facilities	
Prüfgrundlage: <i>Test specification:</i>		FCC Part 15, Subpart C ANSI C63.10-2009 KDB558074	
Prüfergebnis: <i>Test Result:</i>		Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test items passed the test specification(s).</i>	
Prüflaboratorium: <i>Testing Laboratory:</i>		TÜV Rheinland (India) Pvt. Ltd. 82/A, 3rd Main, West Wing, Electronic City Phase 1 Hosur Road, Bangalore – 560 100. India	
geprüft / tested by:		kontrolliert / reviewed by:	
08.10.2012 Vinay.N Engineer 		10.10.2012 Raghavendra Kulkarni Manager 	
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>
Sonstiges / Other Aspects:		FCC ID: R90-IX-WL-1, This product has FCC Part 15 Subpart E test report with report number 01200002 001 by TUV Rheinland.	
Abkürzungen:	P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet	Abbreviations:	P(ass) = passed F(ail) = failed 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. <i>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.</i>			

Test Result Summary

Clause	Test Item	Result
FCC 15.247(b) (3)	Conducted Output Power	Pass
FCC 15.247(a) (2)	6dB Bandwidth	Pass
FCC 15.247(e)	Power Spectral Density	Pass
FCC 15.247(d)	Band-edge compliance	Pass
FCC 15.209	Spurious Radiated Emissions	Pass
FCC 15.205	Restricted Bands of Operation	Pass

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Power Spectral Density	Section 15.247(e)24
6 dB Bandwidth	Section 15.247(a)(2).....38
Band-edge Compliance	Section 15.247(d)64
Spurious Radiated Emissions and Restricted Bands of Operation	Section 15.209 and 15.20586
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List of Type and Measurement Instruments

TÜV Rheinland (India) Pvt. Ltd, Bangalore

Equipment	Manufacturer	Model	S/N	Calibration Due Date
EMI Test Receiver	Rohde &Schwarz	ESU 40	100288	21.07.2013
EMI Test Receiver	Rohde &Schwarz	ESCI	100661	17.03.2013
Hybrid Log Periodic antenna	ETS Lindgren	3142D	00081354	26.07.2013
Broadband Horn Antenna	Frankonia	HAX-18	HAX18-802	23.03.2013
Double-Ridged Waveguide Horn Antenna	ETS Lindgren	116794	00133356	01-09-2013
Emission Horn Antenna	ETS Lindgren	116706	00107323	24-08-2013
Active Loop Antenna	Frankonia	LAX-10	LAX-10-800	11-04-2013
Spectrum Analyser	Agilent Technologies	E4407B	US41192772	17.03.2013

Honeywell Technology Solutions, Bangalore

Kind of Equipment	Manufacturer	Type	S/N	Calibrated Due Date
EMI Test Receiver	R&S	ESU26	100229	14.12.2012
Log Periodic Antenna	EMCO	3148	66012	27.10.2012
E8257D-PSG Analog Signal Generator	Agilent	E8257D	US46461028	25.09.2013
Double Ridge Guide Horn Antenna	EMCO	3117	64055	01.11.2012
Double Ridge Guide Horn Antenna	ETS Lindgren	3177	00119022	24.02.2013
Biconical Antenna	EMCO	3104C	69263	27.10.2012

Testing Facilities

- 1) TÜV Rheinland (India) Private Limited
No. 108, West Wing
Electronic city Phase I
Bangalore – 560100
India
- 2) Honeywell Technology Solutions Lab (HTSL)
Survey No. 19/2, Devarabisanahalli Village
KR Puram Hobli,
Bangalore East Taluk
Bangalore – 560 037

General Product Information

Product Function and Intended Use

The Impact Xtreme is a compact, portable gas monitor designed to be carried or worn without hindering the user. Its purpose is to monitor the atmosphere continuously for hazardous levels of up to six gases. Audible and visual alarms alert the user to danger when hazardous conditions are detected. The Impact Xtreme has been designed to alert the user to potentially hazardous atmospheres while carrying out his/her normal duties. Therefore, the monitor must be kept switched on and worn as close to the breathing area as possible, and several accessories are provided to allow the monitor to be worn in a number of different ways:

- a. On the chest b. On a belt c. Attached to a body harness

The monitor is provided with various methods to enable the user to comply safely and easily with confined space regulations.

Ratings and System Details

Operating Frequency	2400MHz – 2483.5MHz 5725MHz – 5850MHz 5150MHz - 5725MHz (Covered in FCC Part 15E Report)	
No. of channel	Please refer Table of Carrier Frequencies	
Channel Spacing	5MHz for 2.4GHz band 20MHz for 5GHz band	
Transmitted Power	802.11a	17.66 dBm
	802.11b	21.71 dBm
	802.11g	24.35 dBm
Data Rate	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11b: 1,2, 5.5,11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps	
Antenna Type	PCB Antenna	
Number of antenna	2	
Antenna Gain	2.35dBi max	
Supply Voltage	6V DC (Battery)	
Dimensions	130mm x 120mm x 50mm	
Environmental	Rechargeable battery: -40°C to +60°C (-40°F to 140°F)	

Test Conditions: Voltage: 6V Battery

Environmental conditions: Temperature: +23 °C **RH:** 62%

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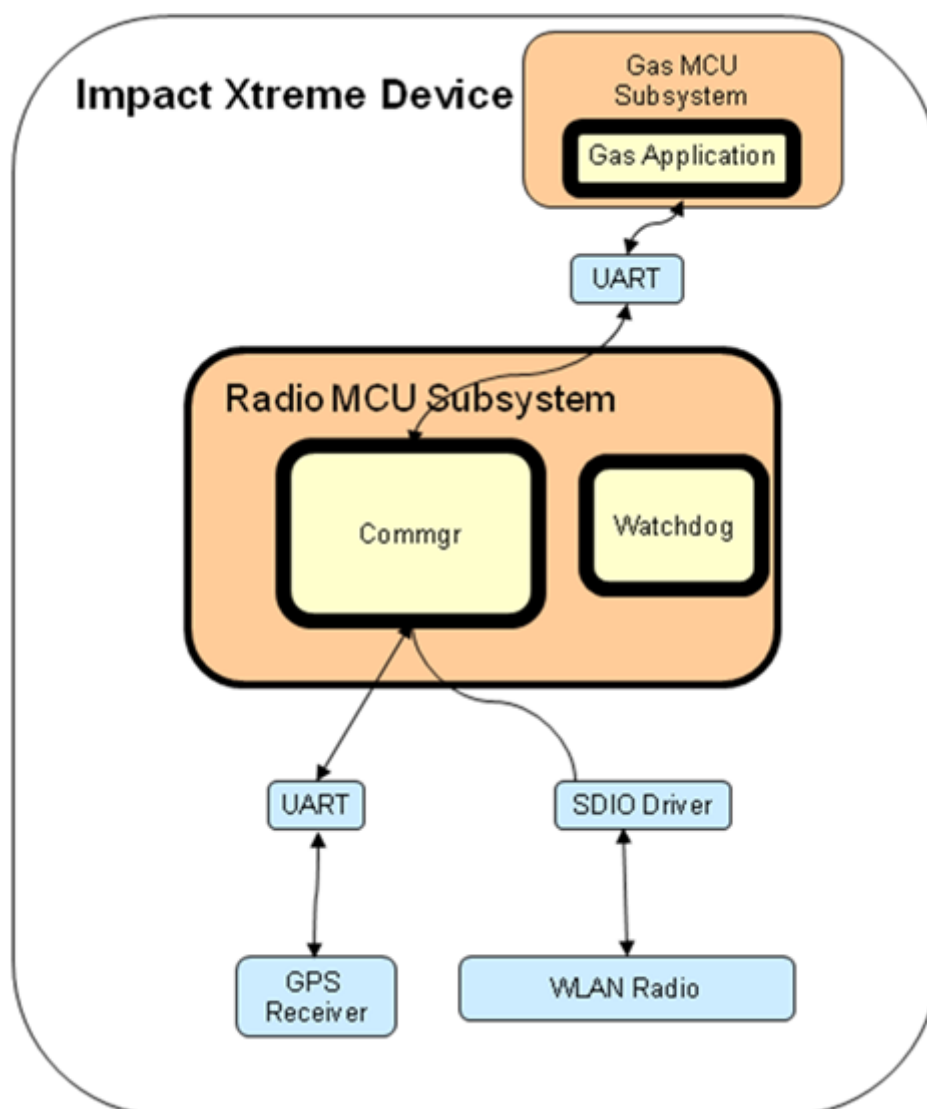
Operation Descriptions

The monitor can be supplied with six gas sensors, for detecting oxygen (enrichment and deficiency), flammable gases (up to the Lower Explosive Limit) and two toxic gases (for personal safety) all housed in an easily replaceable cartridge. An alternative arrangement using infrared sensors for flammable is also available. Various sensor technologies are used to achieve this. In the vast majority of cases, electrochemical technology is used to detect oxygen and toxic gases while catalytic combustion technology is used to detect flammable gases. Infrared technology is used to detect flammable gases.

Two types of cartridges are available.

One is disposable where the cartridge has a fixed life and once this has expired the cartridge is disposed of. The other is a Serviceable Cartridge where the sensors can be individually replaced when required. The serviceable cartridge type can be only used in the ImpactXtreme.

Block Diagram



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Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The test was performed under continuous transmission to obtain the maximum emissions.

Test Operation and Test Software

Continuous transmission was enabled through test software and Channel / data rate selection was done with the software. All the tests were performed at 16dBm power setting for 2.4GHz band and at 13dBm setting for 5GHz band which are maximum available power settings for this product.

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 results are reported in this report.

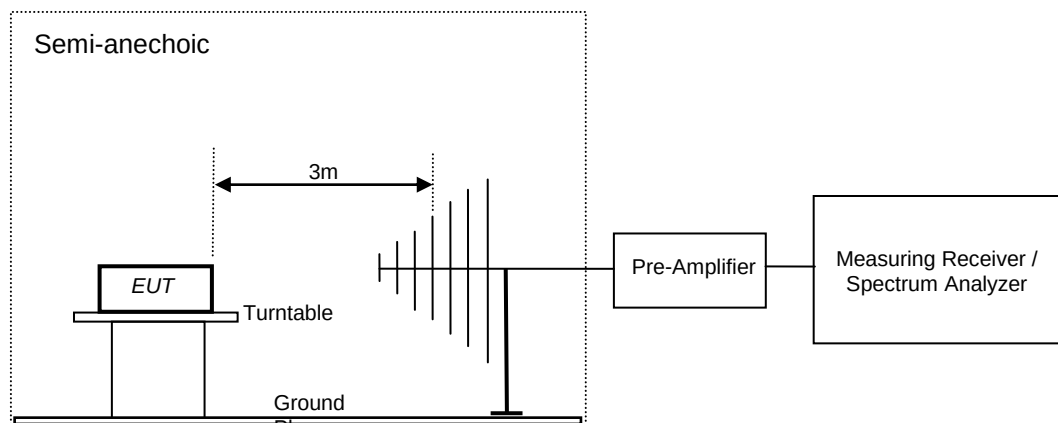
Table of carrier frequencies

Frequency Band (MHz)	Channel No.		Frequency (MHz)
2400 – 2483.5	1		2412
	2		2417
	3		2422
	4		2427
	5		2432
	6		2437
	7		2442
	8		2447
	9		2452
	10		2457
	11		2462
	B Mode Only	12	2467
		13	2472
5725 – 5850	149		5745
	153		5765
	157		5785
	161		5805
	165		5825

Test Methodology

Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2009. 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. 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.



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Test Results

Conducted Output Power

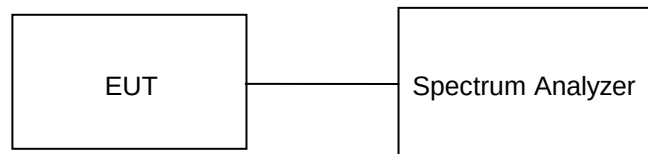
Section 15.247(b) (3)

Result

Pass

Test Specification	FCC Part 15 Subpart C
Measurement Bandwidth (RBW)	1 MHz
Requirement	<1 watt (30dBm) for Digital Transmission System.

Test Method:



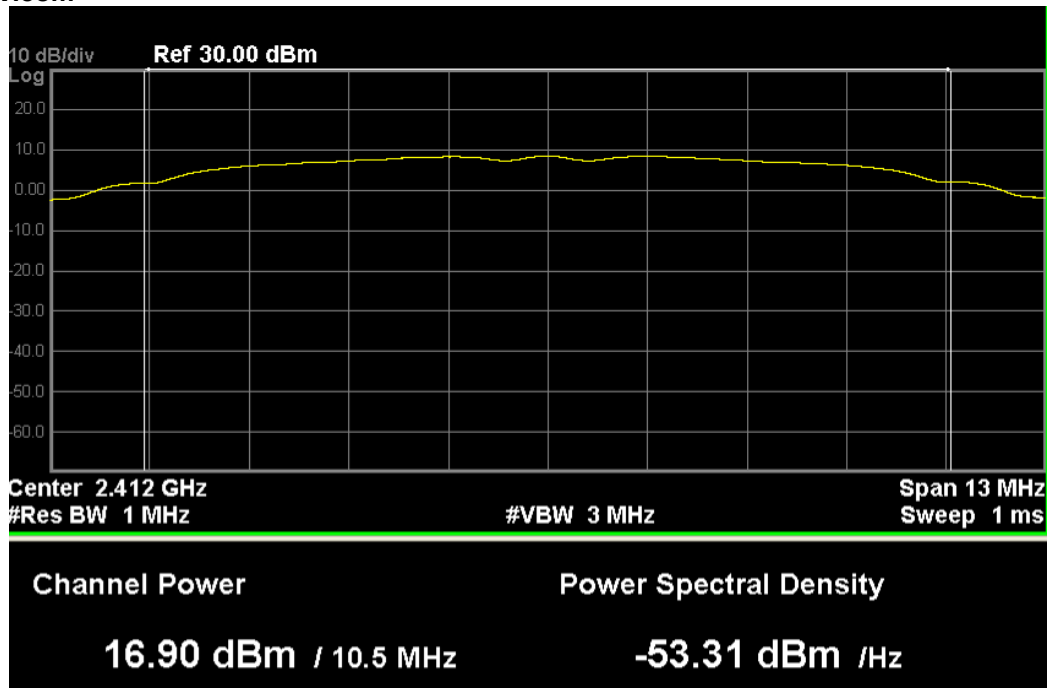
Test Result:

Cable Loss: 1.5 dB

Modulation: 802.11b

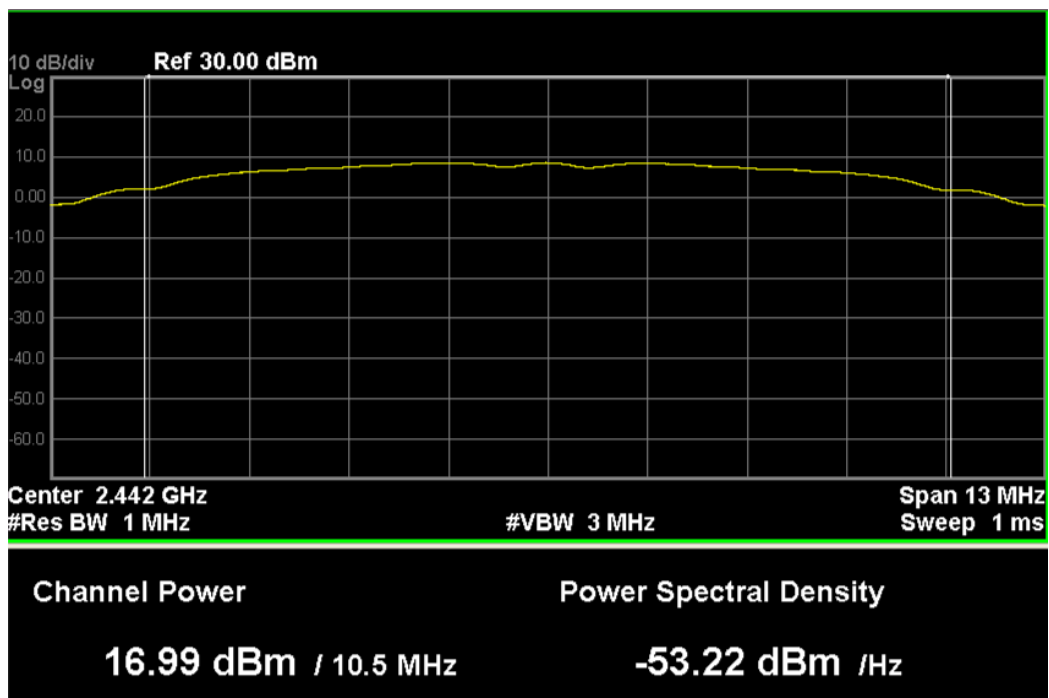
Data Rate (Mbps)	Frequency (MHz)	Measured RF Output power (dBm)	Total Output power (dBm)	Limit (dBm)
1	2412	16.90	18.40	30
	2442	16.99	18.49	30
	2472	15.89	17.39	30
11	2412	20.04	21.54	30
	2442	20.21	21.71	30
	2472	19.06	20.56	30

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Data rate: 1 Mbps

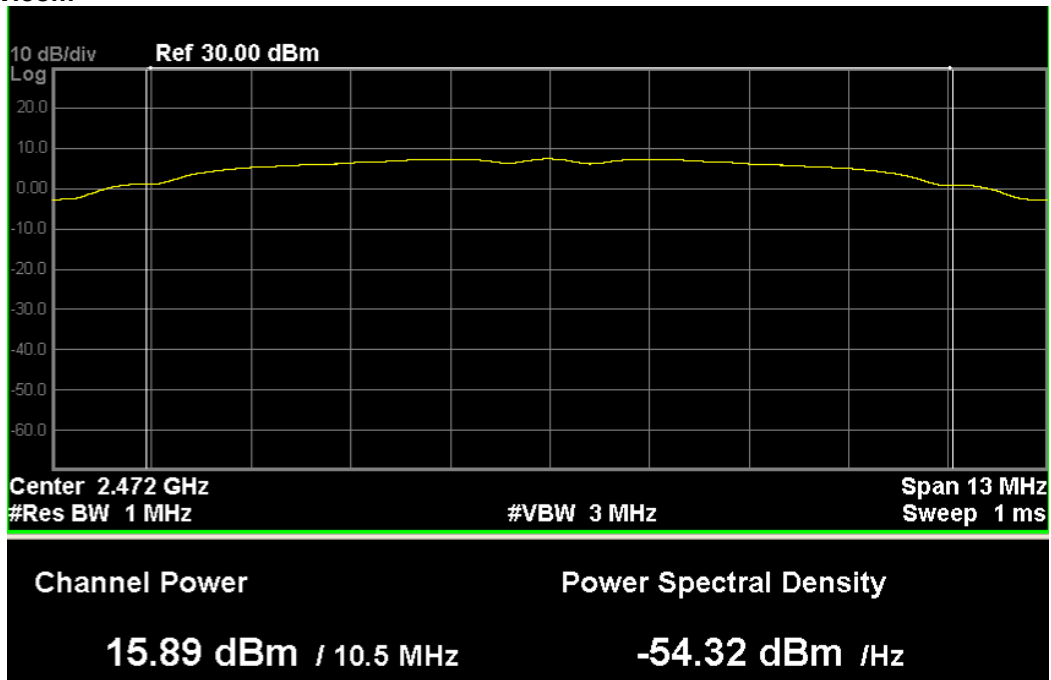
Channel Frequency: 2412 MHz



Data rate: 1 Mbps

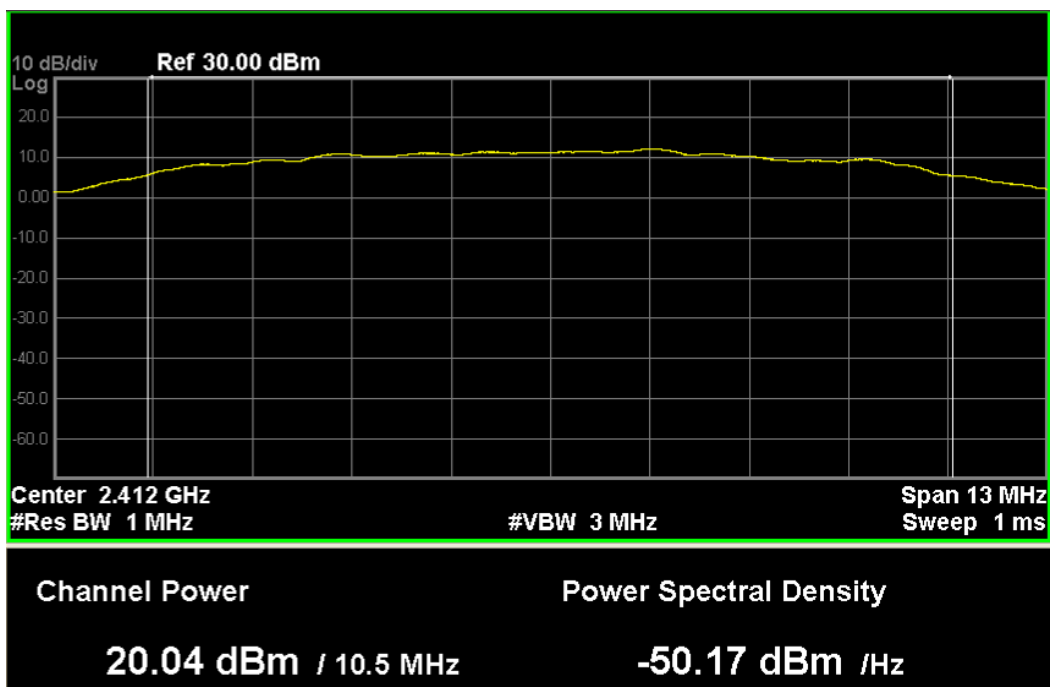
Channel Frequency: 2442 MHz

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Data rate: 1 Mbps

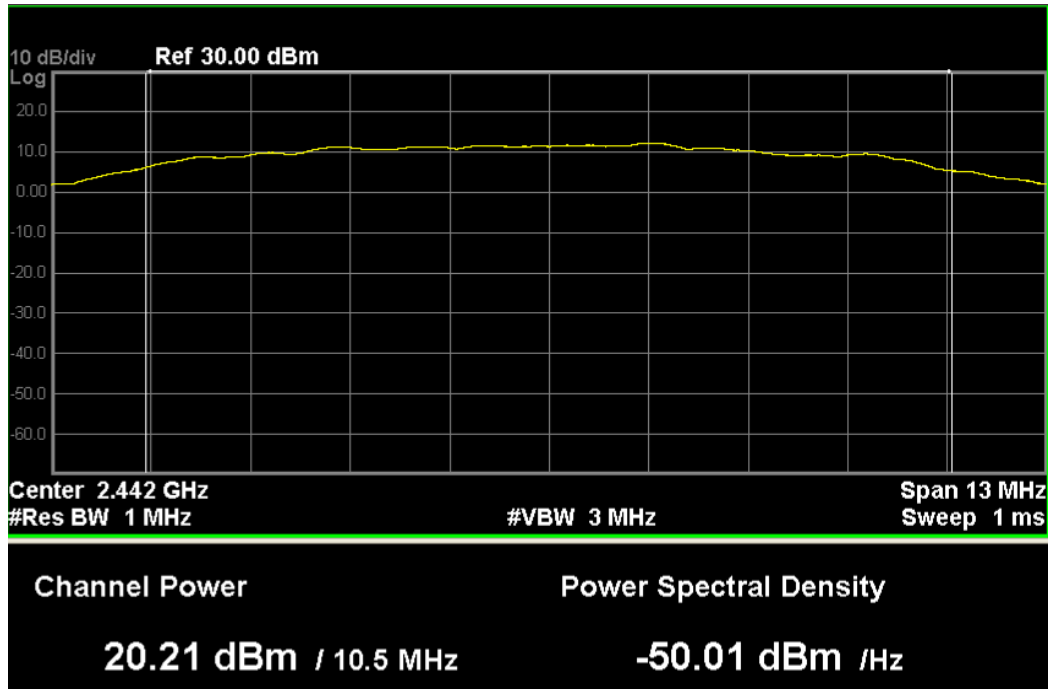
Channel Frequency: 2472 MHz



Data rate: 11 Mbps

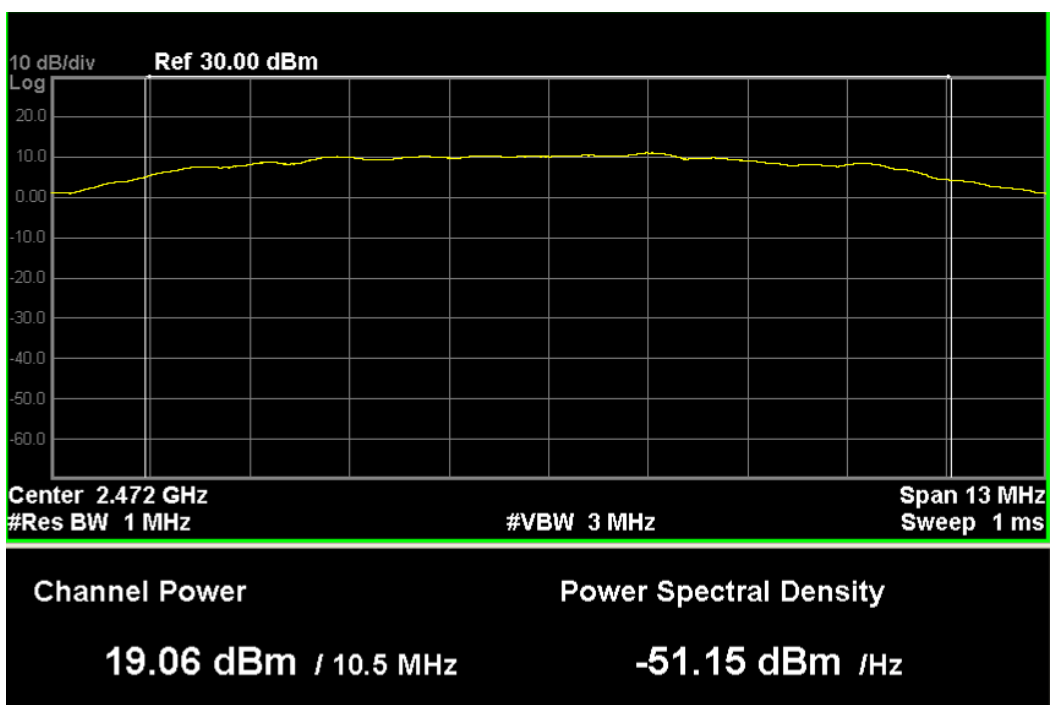
Channel Frequency: 2412 MHz

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Data rate: 11 Mbps

Channel Frequency: 2442 MHz



Data rate: 11 Mbps

Channel Frequency: 2472 MHz

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Modulation: 802.11g

Cable Loss: 0.8 dB

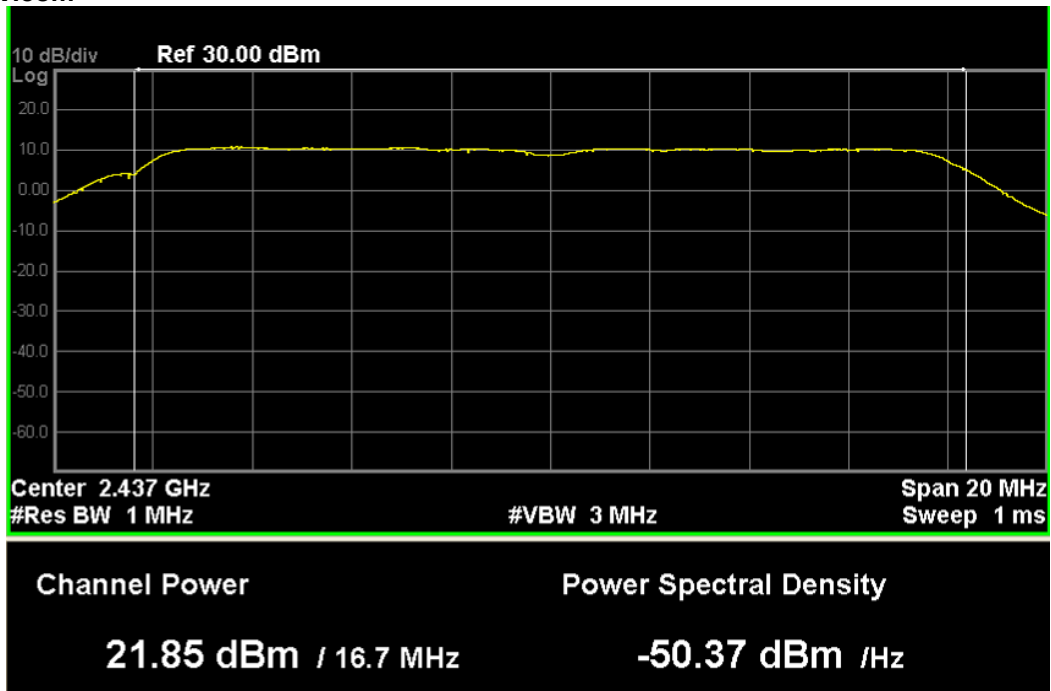
Data Rate (Mbps)	Frequency (MHz)	Measured RF Output power (dBm)	Total Output power (dBm)	Limit (dBm)
6	2412	21.44	22.94	30
	2437	21.85	23.35	30
	2462	20.97	22.47	30
24	2412	21.95	23.45	30
	2437	22.44	23.94	30
	2462	21.51	23.01	30
54	2412	22.12	23.62	30
	2437	22.85	24.35	30
	2462	21.83	23.33	30



Data rate: 6 Mbps

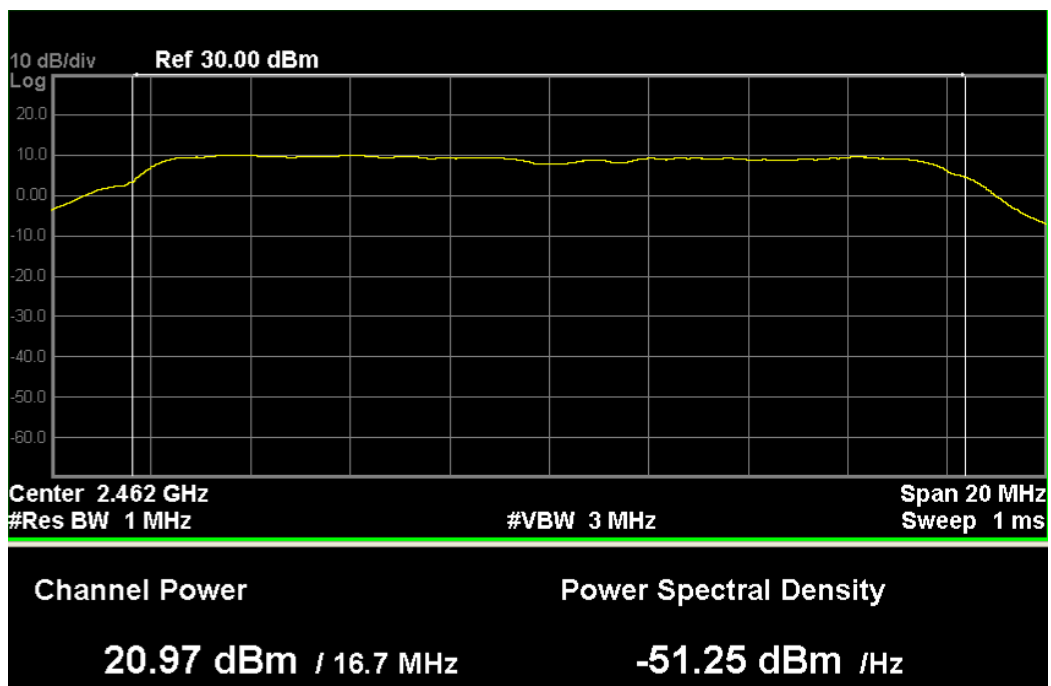
Channel Frequency: 2412 MHz

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Data rate: 6 Mbps

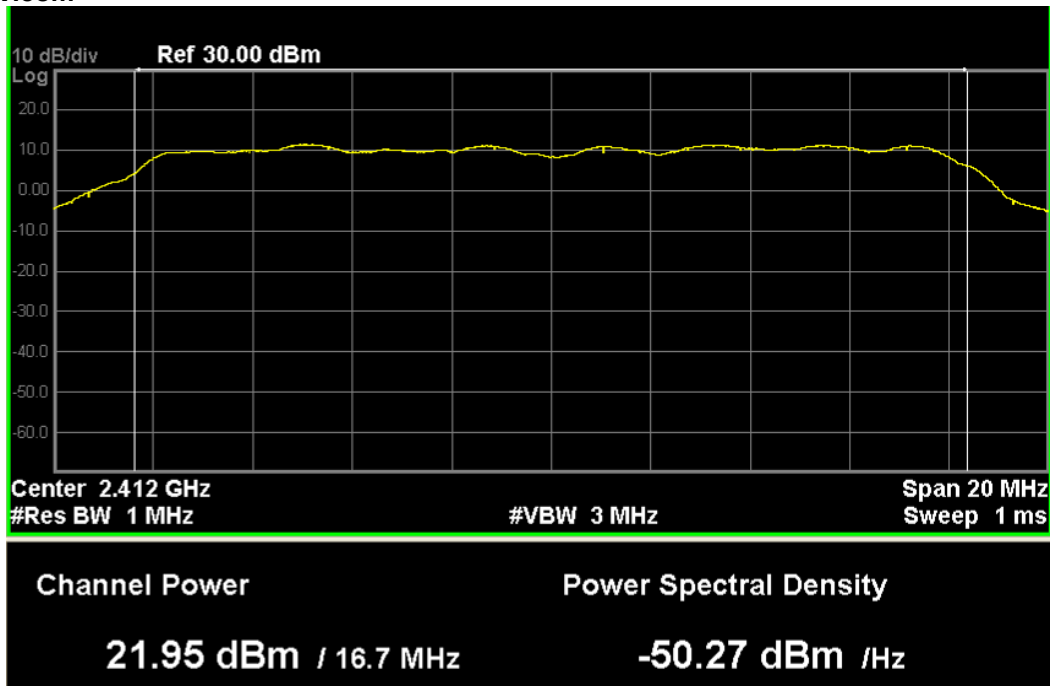
Channel Frequency: 2437 MHz



Data rate: 6 Mbps

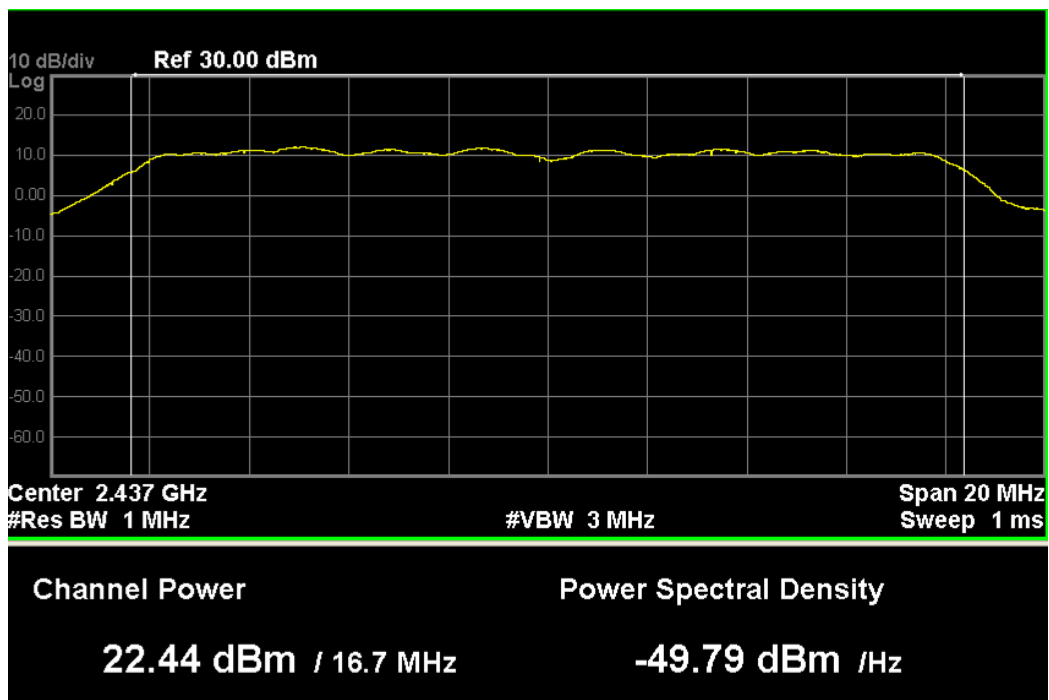
Channel Frequency: 2462 MHz

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Data rate: 24 Mbps

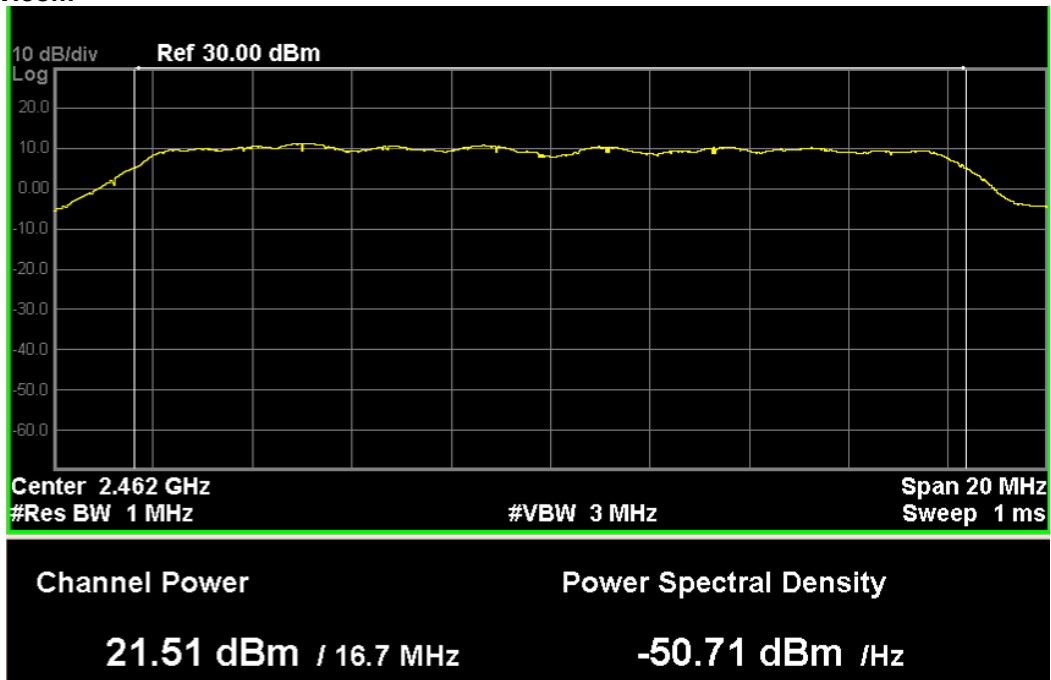
Channel Frequency: 2412 MHz



Data rate: 24 Mbps

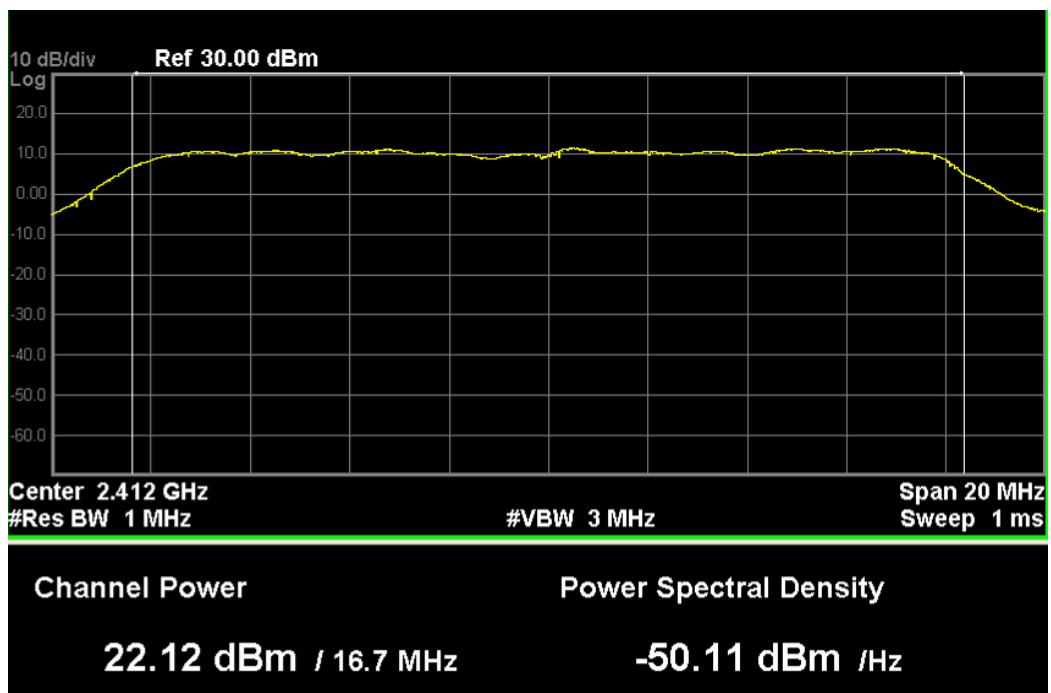
Channel Frequency: 2437 MHz

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Data rate: 24 Mbps

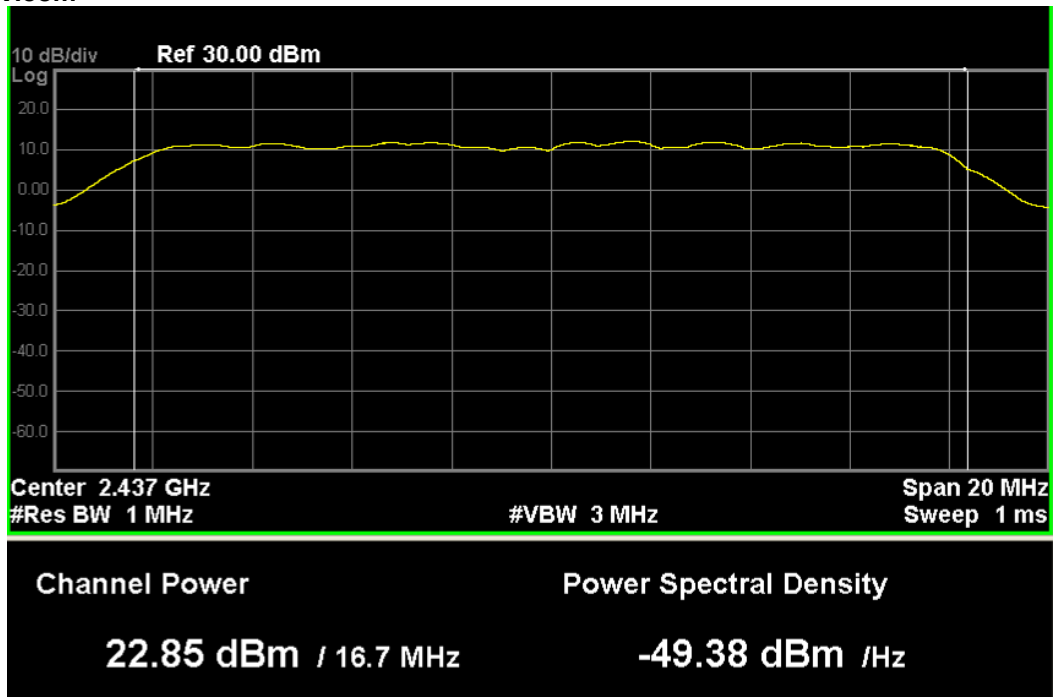
Channel Frequency: 2462 MHz



Data rate: 54 Mbps

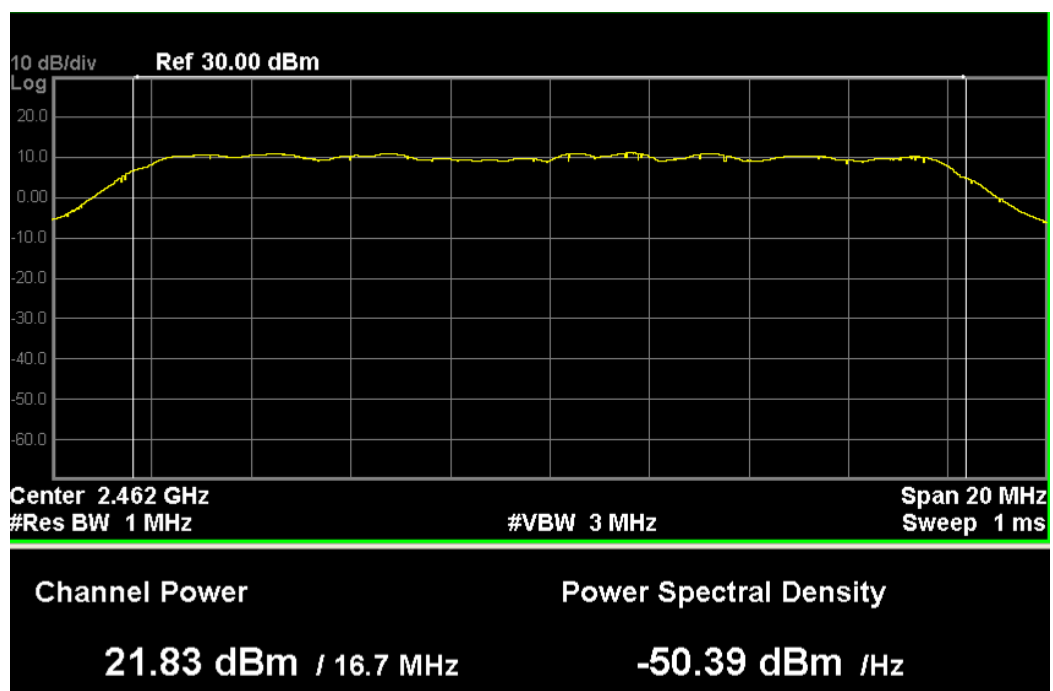
Channel Frequency: 2412 MHz

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Data rate: 54 Mbps

Channel Frequency: 2437 MHz



Data rate: 54 Mbps

Channel Frequency: 2462 MHz

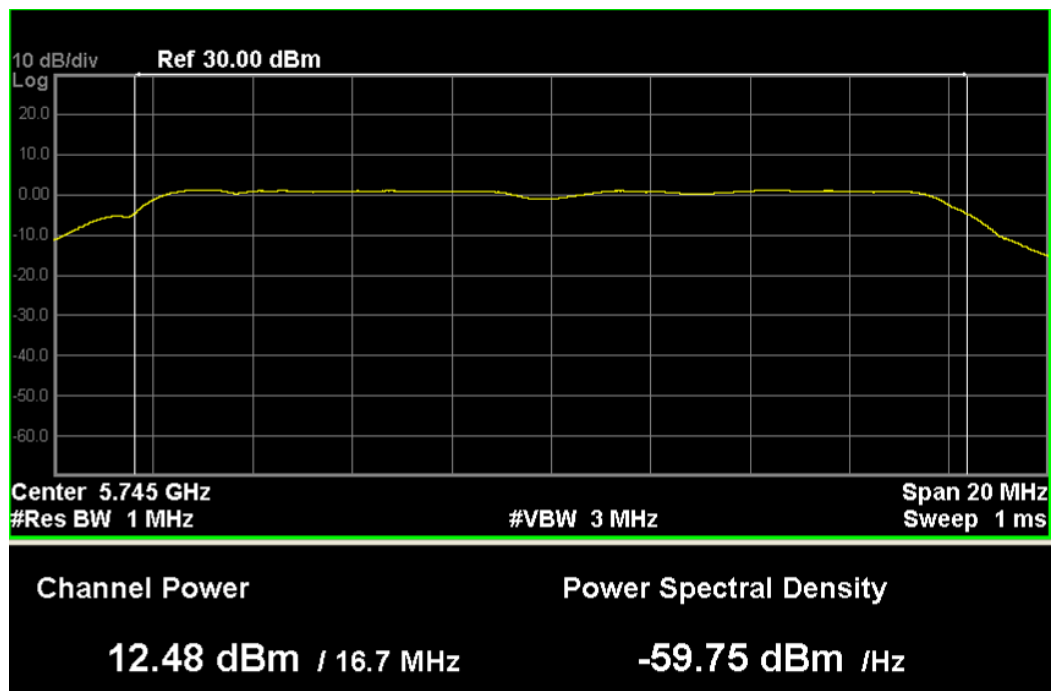
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Modulation: 802.11a

Test Results:

Cable Loss: 4 dB

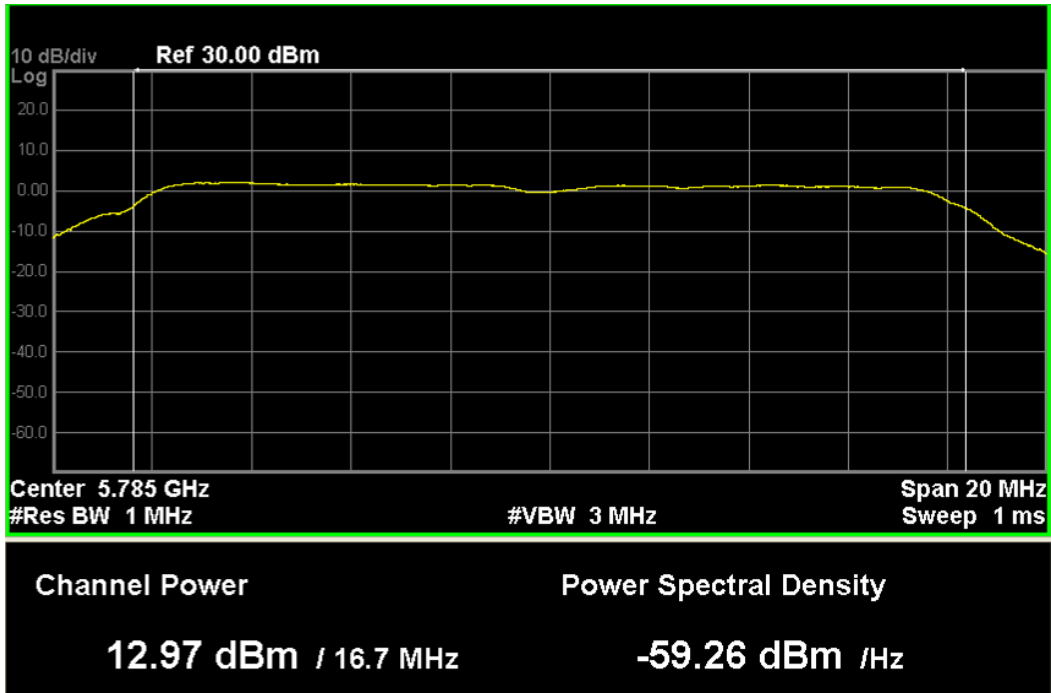
Data Rate (Mbps)	Frequency (MHz)	Measured RF Output power (dBm)	Total Output power (dBm)	Limit (dBm)
6	5745	12.48	16.48	30
	5785	12.97	16.97	30
	5825	12.72	16.72	30
24	5745	13.23	17.23	30
	5785	13.66	17.66	30
	5825	13.62	17.62	30
54	5745	13.61	17.61	30
	5785	13.57	17.57	30
	5825	13.53	17.53	30



Data rate: 6 Mbps

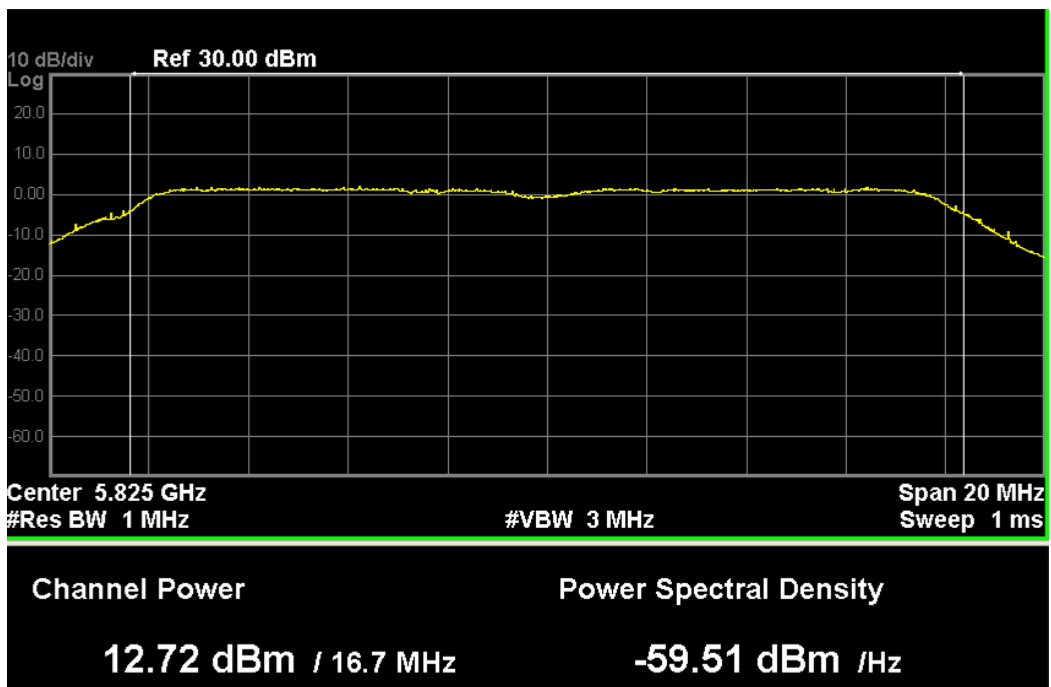
Channel Frequency: 5745 MHz

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Data rate: 6 Mbps

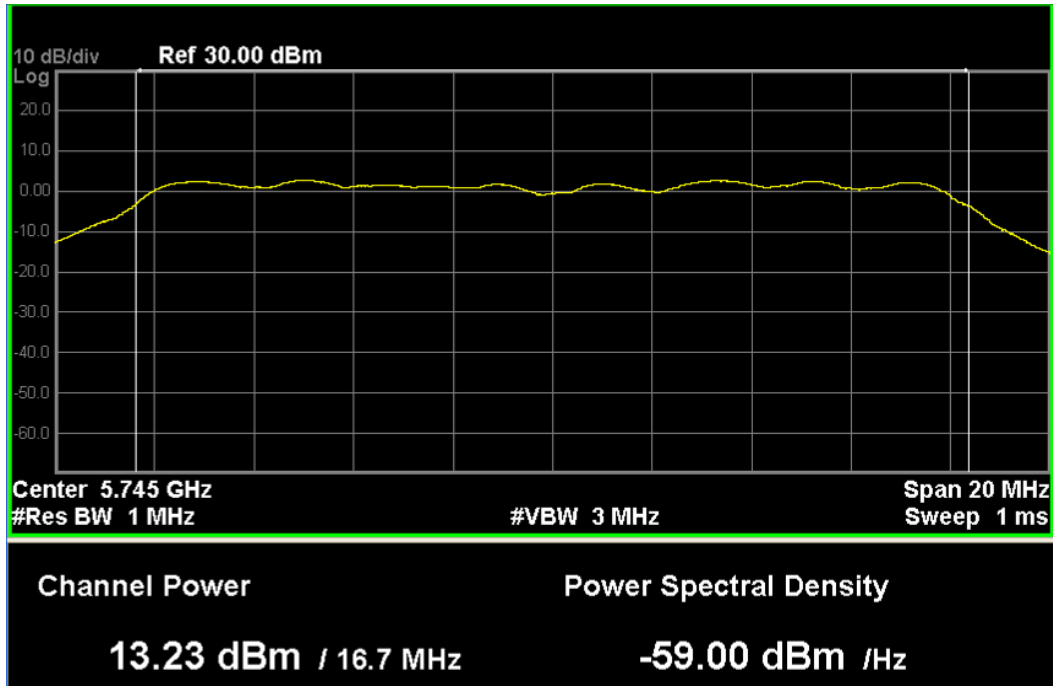
Channel Frequency: 5785 MHz



Data rate: 6 Mbps

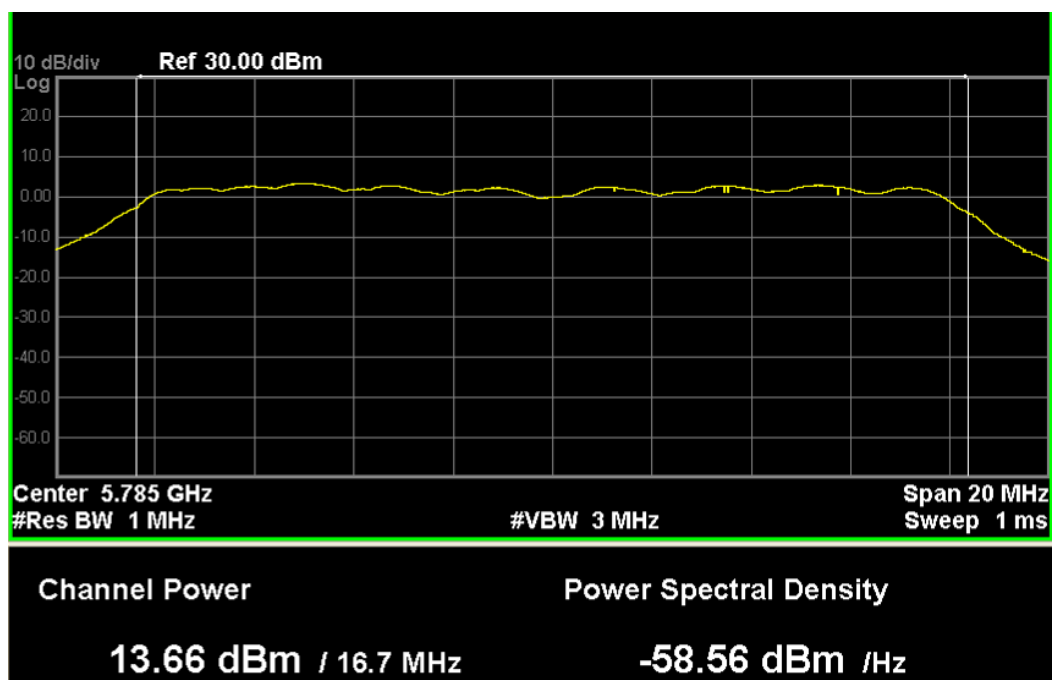
Channel Frequency: 5825 MHz

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Data rate: 24 Mbps

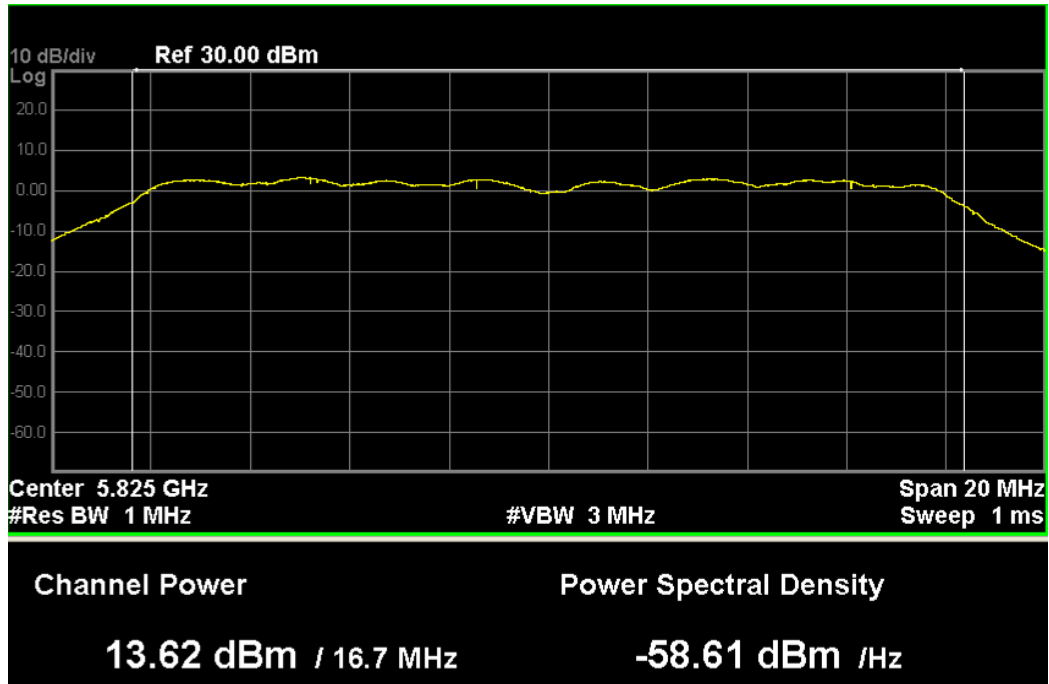
Channel Frequency: 5745 MHz



Data rate: 24 Mbps

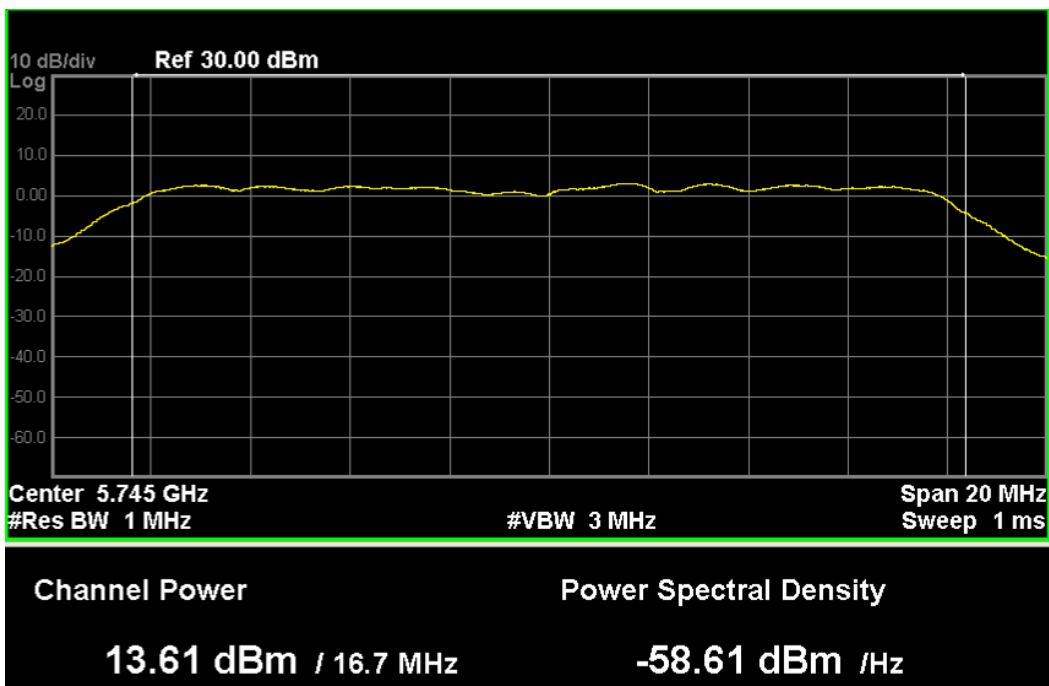
Channel Frequency: 5785 MHz

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Data rate: 24 Mbps

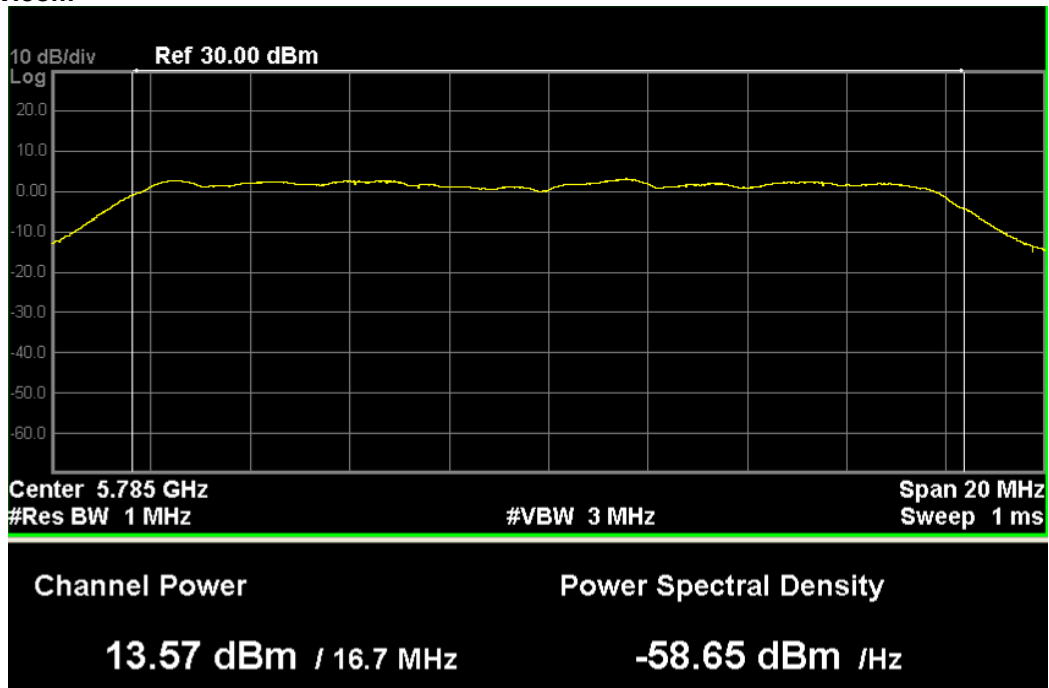
Channel Frequency: 5825 MHz



Data rate: 54 Mbps

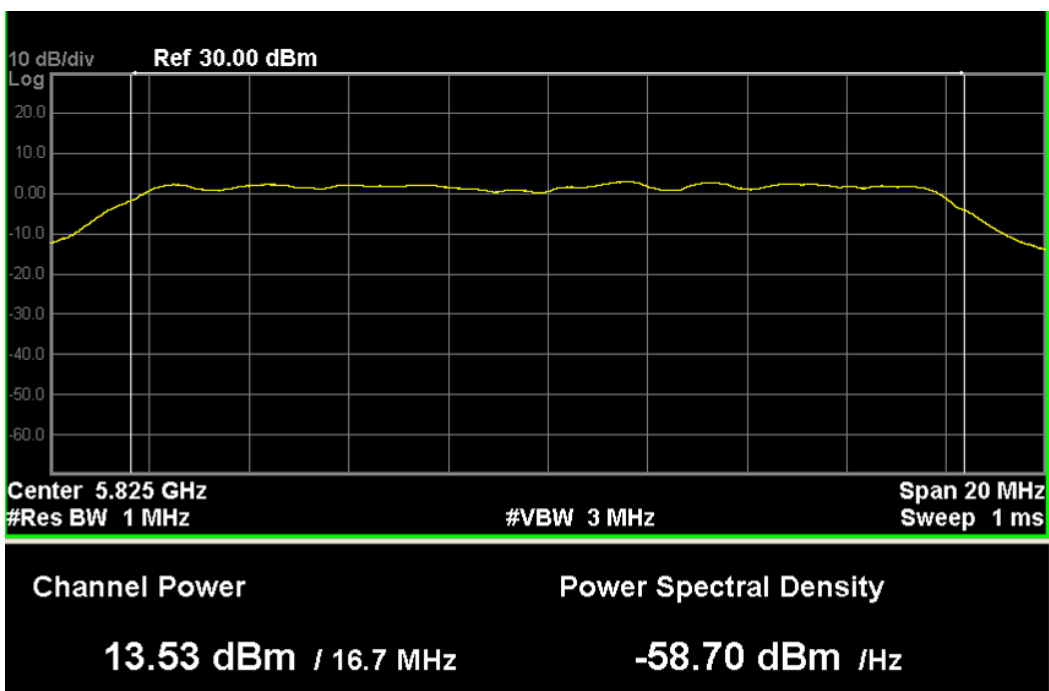
Channel Frequency: 5745 MHz

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Data rate: 54 Mbps

Channel Frequency: 5785 MHz



Data rate: 54 Mbps

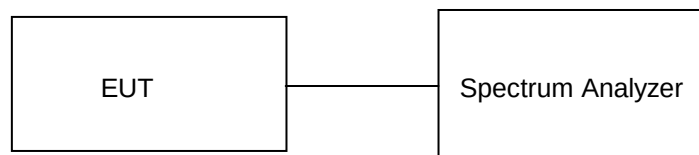
Channel Frequency: 5825 MHz

Power Spectral Density**Section 15.247(e)****Result****Pass**

Test Specification
Detector Function
Requirement

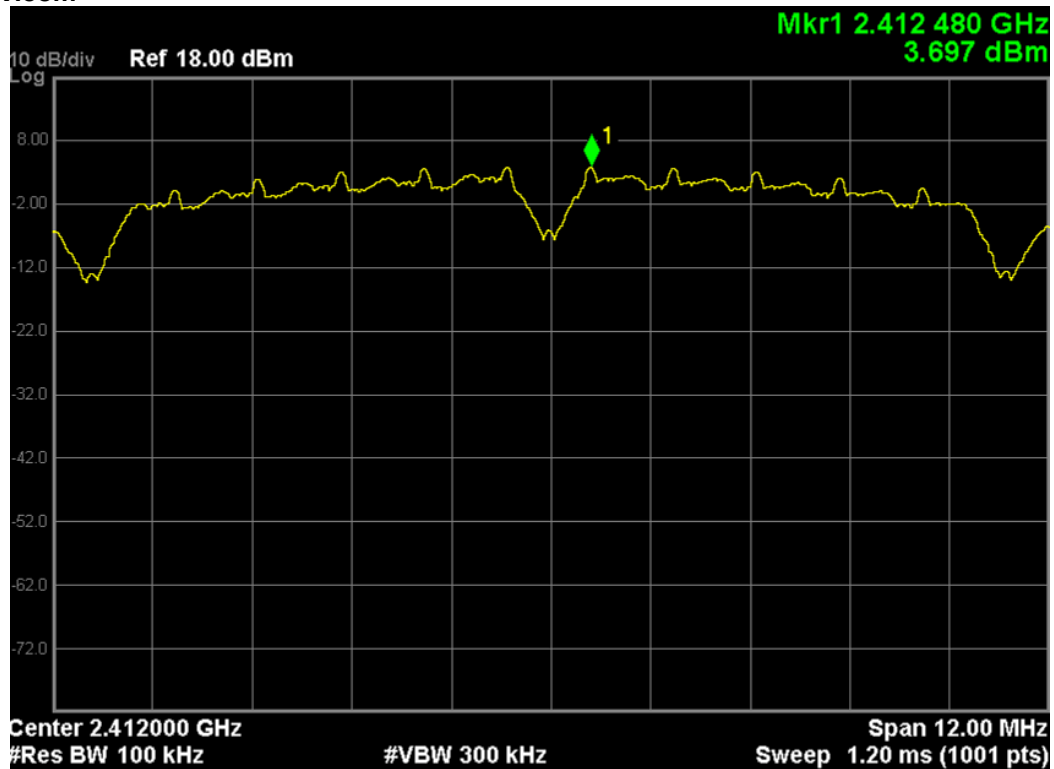
FCC Part 15 Section 15.247 (e)
Peak

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 Result:****Modulation: 802.11b****Cable Loss: 1.5dB****Band Width Correction Factor = -15.2dB**

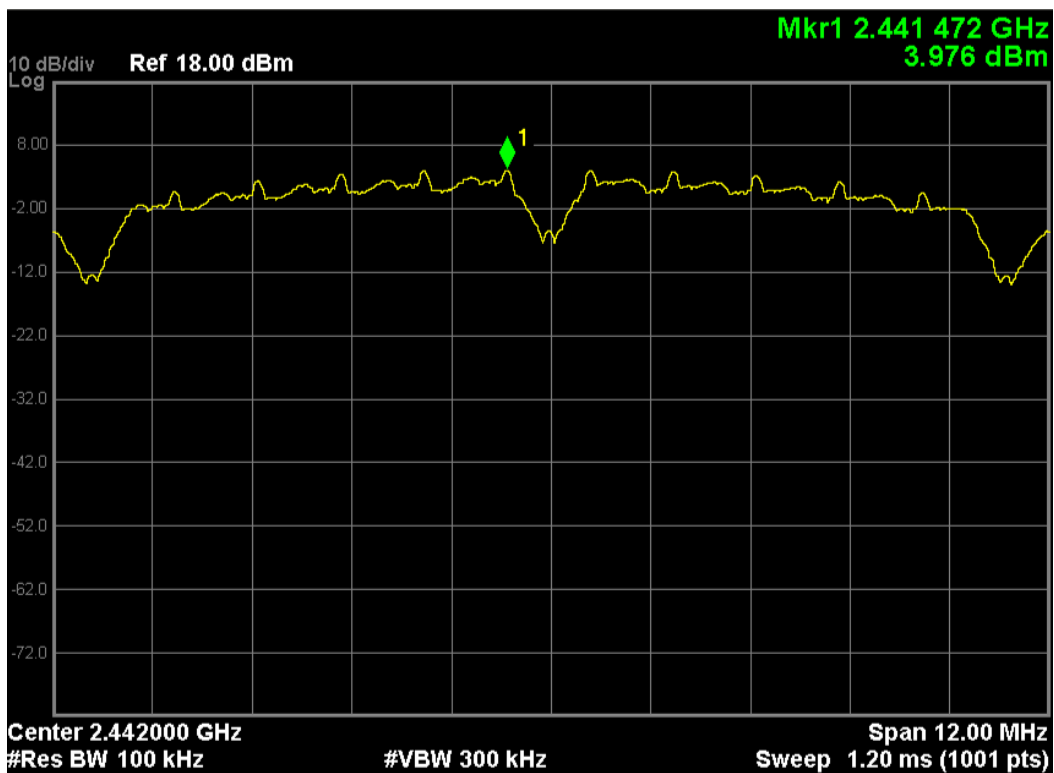
Data Rate (Mbps)	Frequency (MHz)	Measured PSD (dBm)	PSD (dBm)	Limit (dBm)
1	2412	3.69	-10.01	8.00
	2442	3.97	-9.73	8.00
	2472	2.91	-10.79	8.00
11	2412	5.27	-8.43	8.00
	2442	5.53	-8.17	8.00
	2472	4.48	-9.22	8.00

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Data rate: 1 Mbps

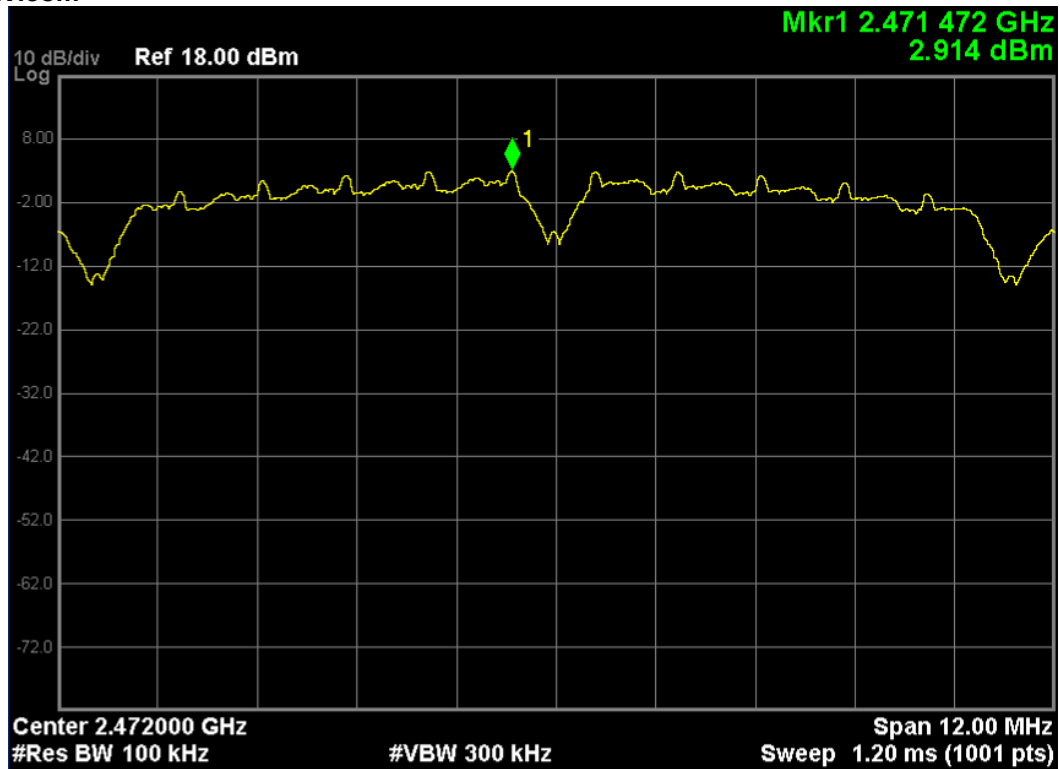
Channel Frequency: 2412 MHz



Data rate: 1 Mbps

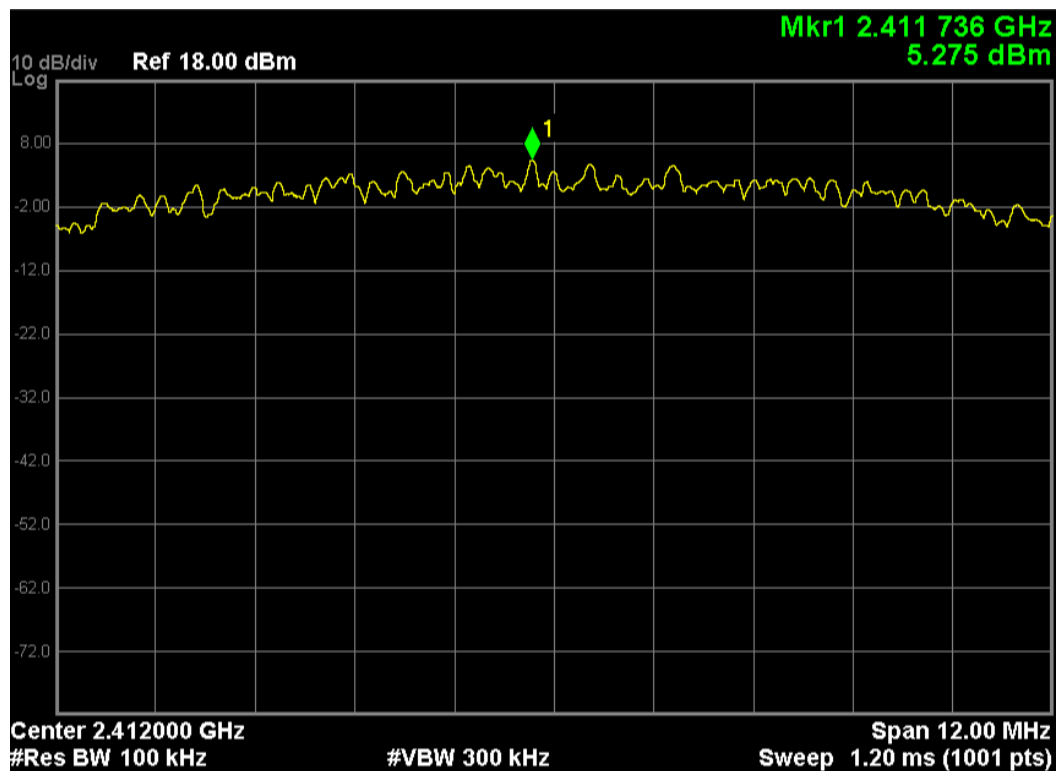
Channel Frequency: 2442 MHz

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Data rate: 1 Mbps

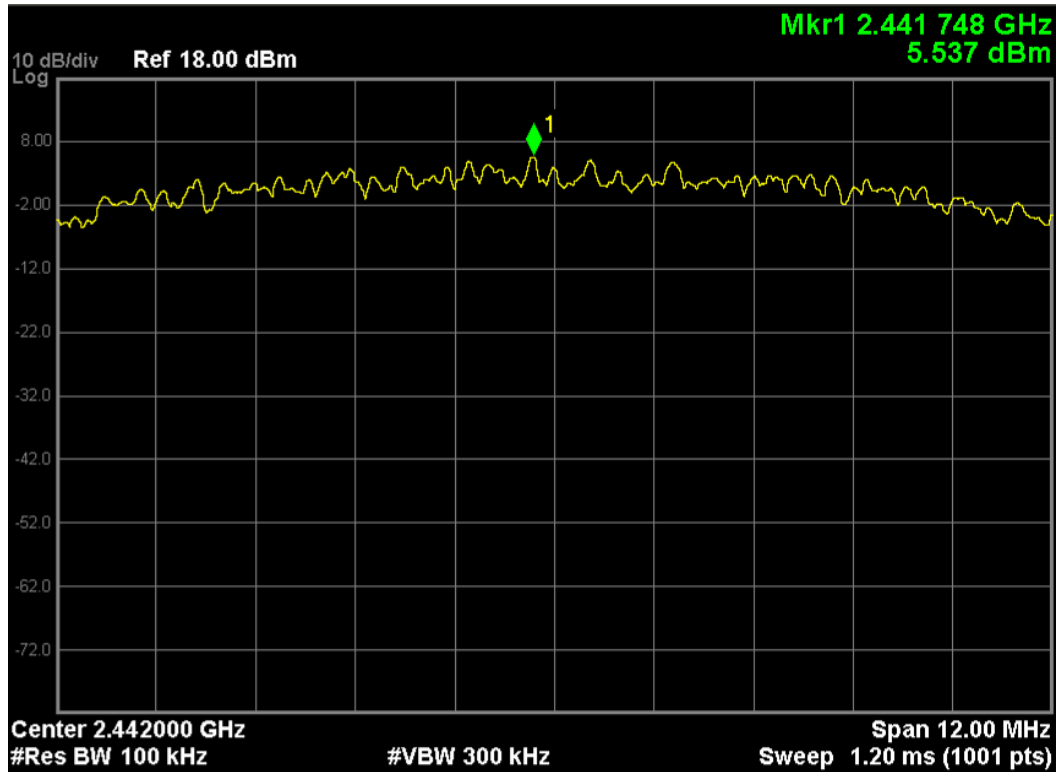
Channel Frequency: 2472 MHz



Data rate: 11 Mbps

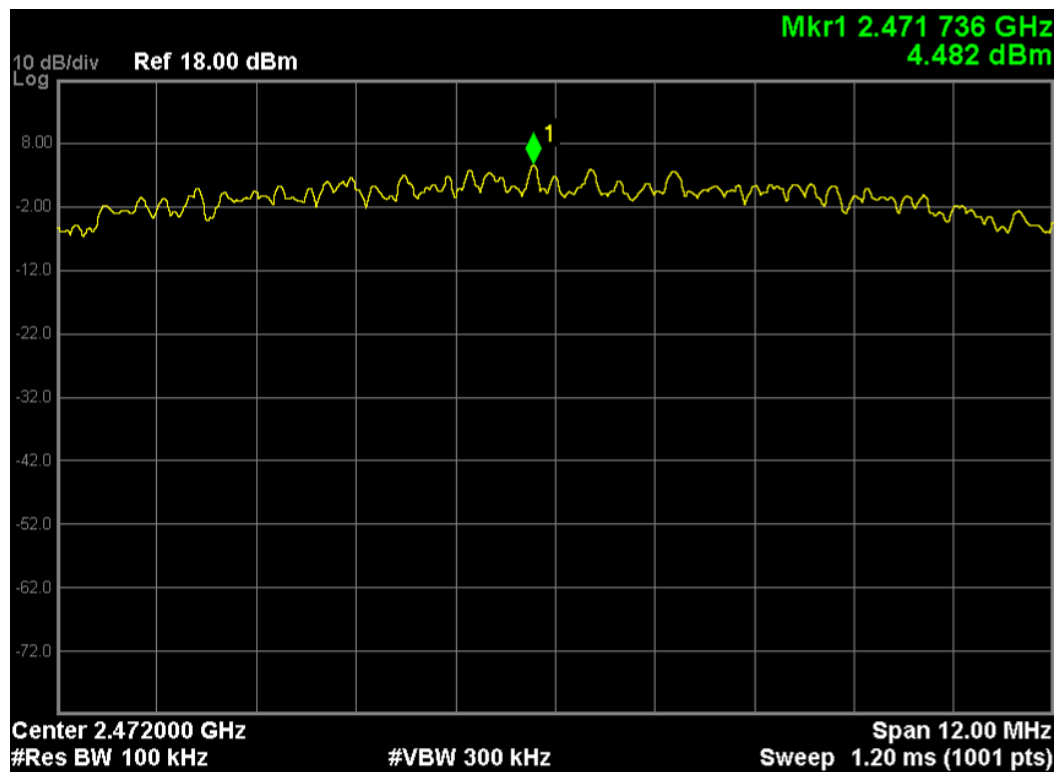
Channel Frequency: 2412 MHz

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Data rate: 11 Mbps

Channel Frequency: 2442 MHz



Data rate: 11 Mbps

Channel Frequency: 2472 MHz

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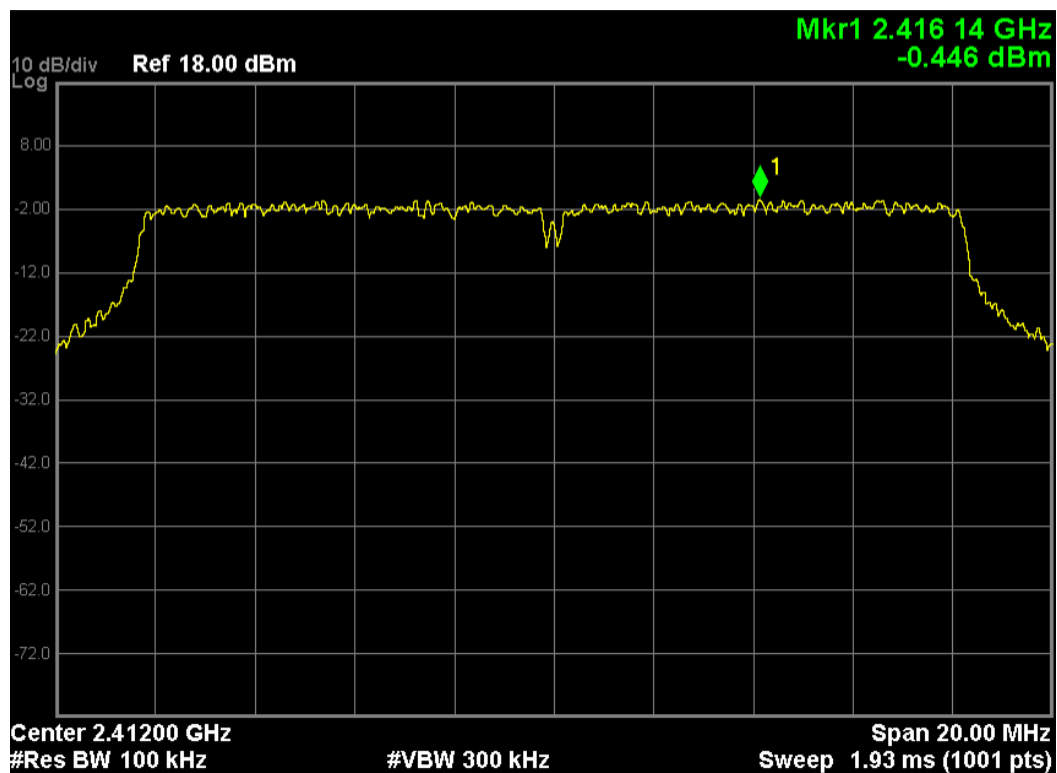
Test Result:

Modulation: 802.11g

Cable Loss: 1.5 dB

Band Width Correction Factor = -15.2dB

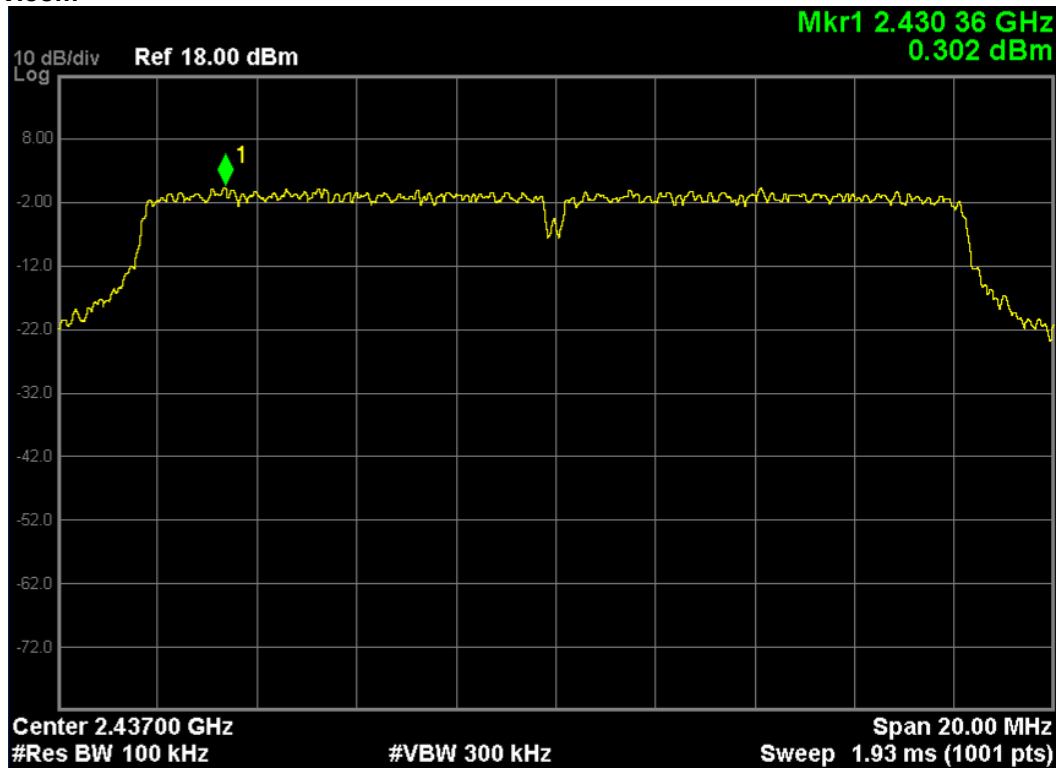
Data Rate (Mbps)	Frequency (MHz)	Measured PSD (dBm)	PSD (dBm)	Limit (dBm)
6	2412	-0.44	-14.14	8.00
	2437	0.30	-13.40	8.00
	2462	-0.32	-14.02	8.00
24	2412	0.99	-12.71	8.00
	2437	1.71	-11.99	8.00
	2462	0.87	-12.83	8.00
54	2412	1.33	-12.37	8.00
	2437	1.99	-11.71	8.00
	2462	1.15	-12.55	8.00



Data rate: 6 Mbps

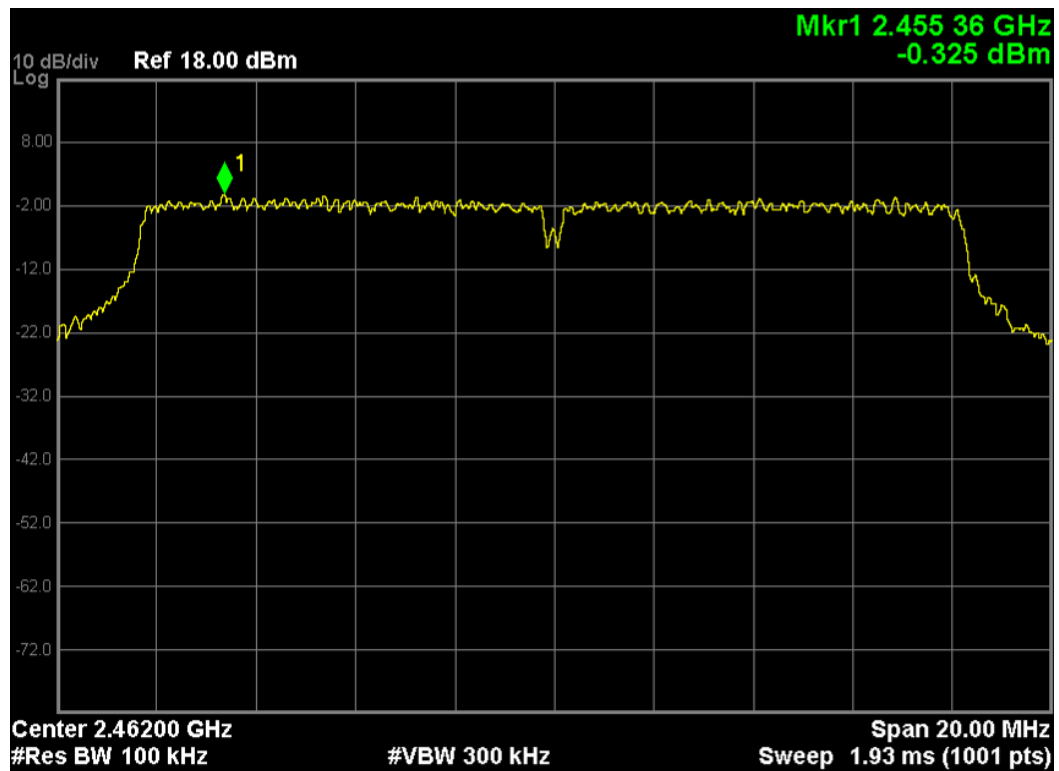
Channel Frequency: 2412 MHz

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Data rate: 6 Mbps

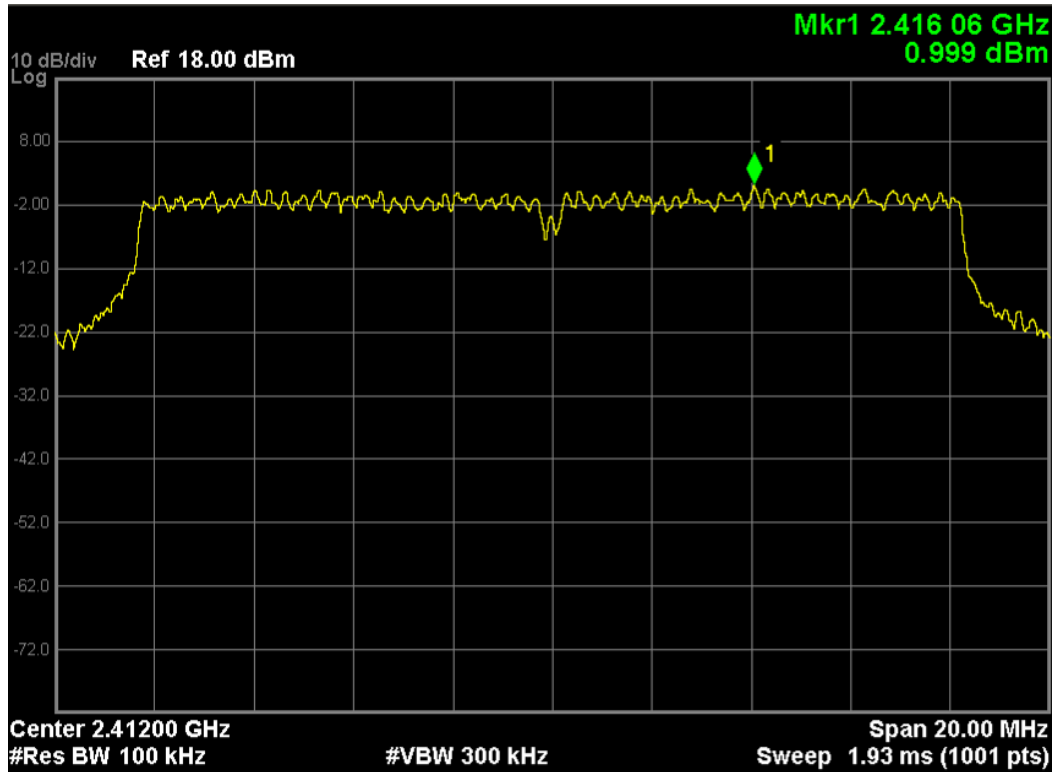
Channel Frequency: 2437 MHz



Data rate: 6 Mbps

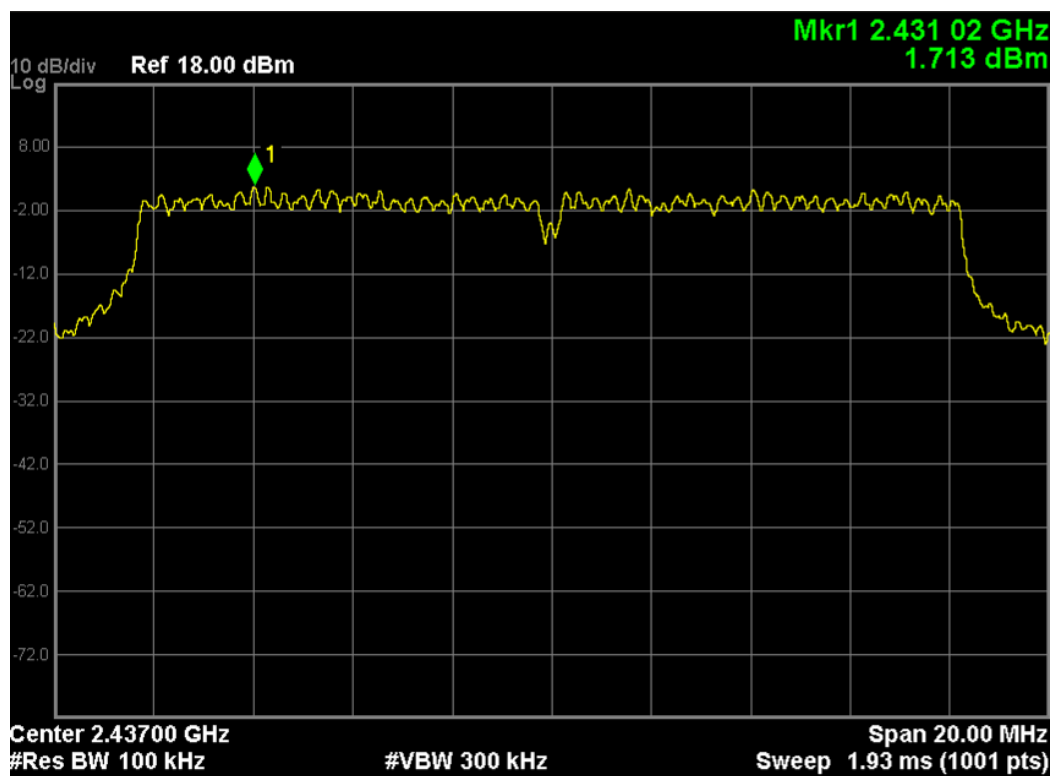
Channel Frequency: 2462 MHz

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Data rate: 24 Mbps

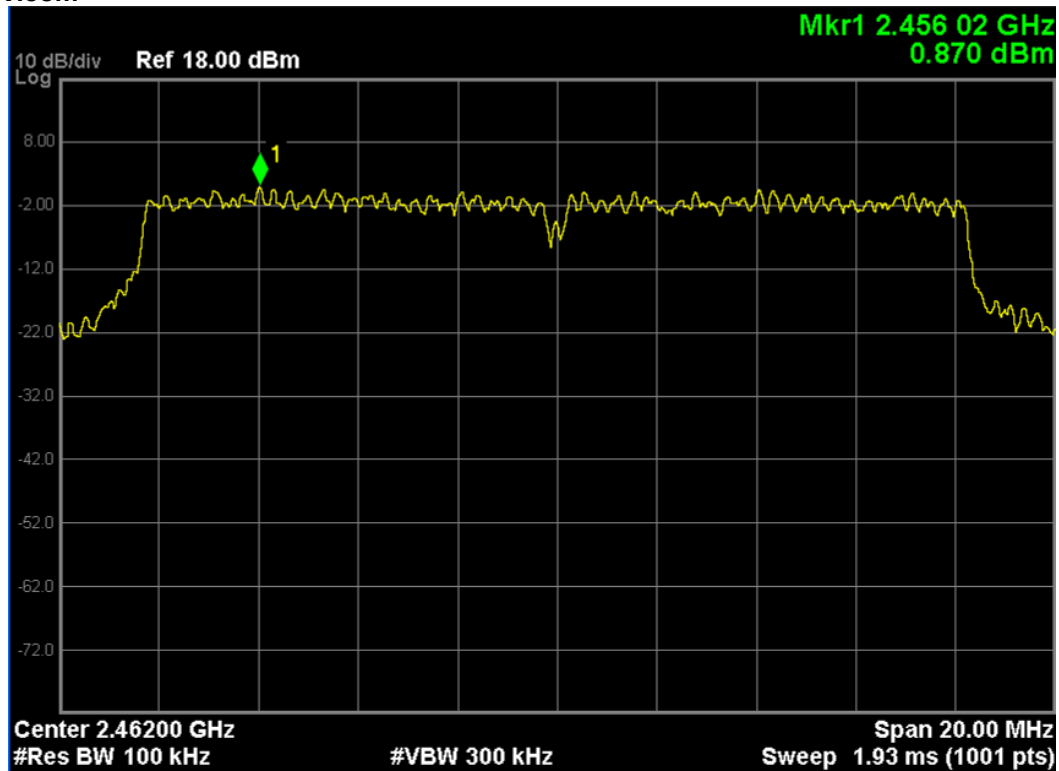
Channel Frequency: 2412 MHz



Data rate: 24 Mbps

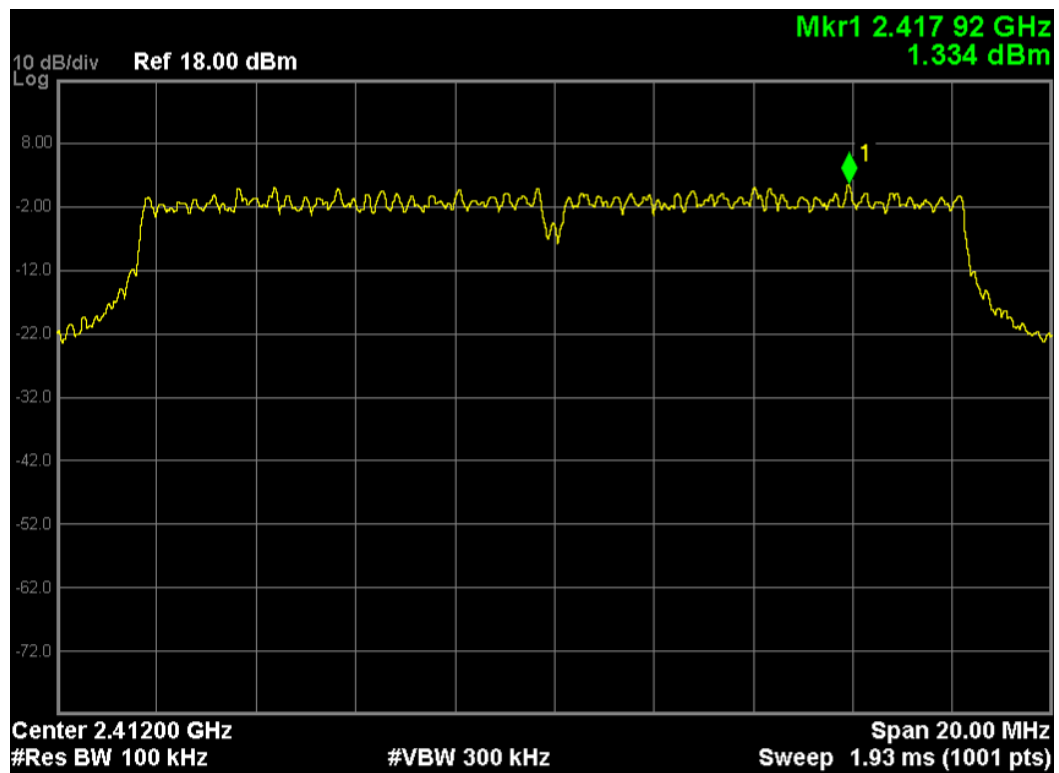
Channel Frequency: 2437 MHz

www.tuv.com



Data rate: 24 Mbps

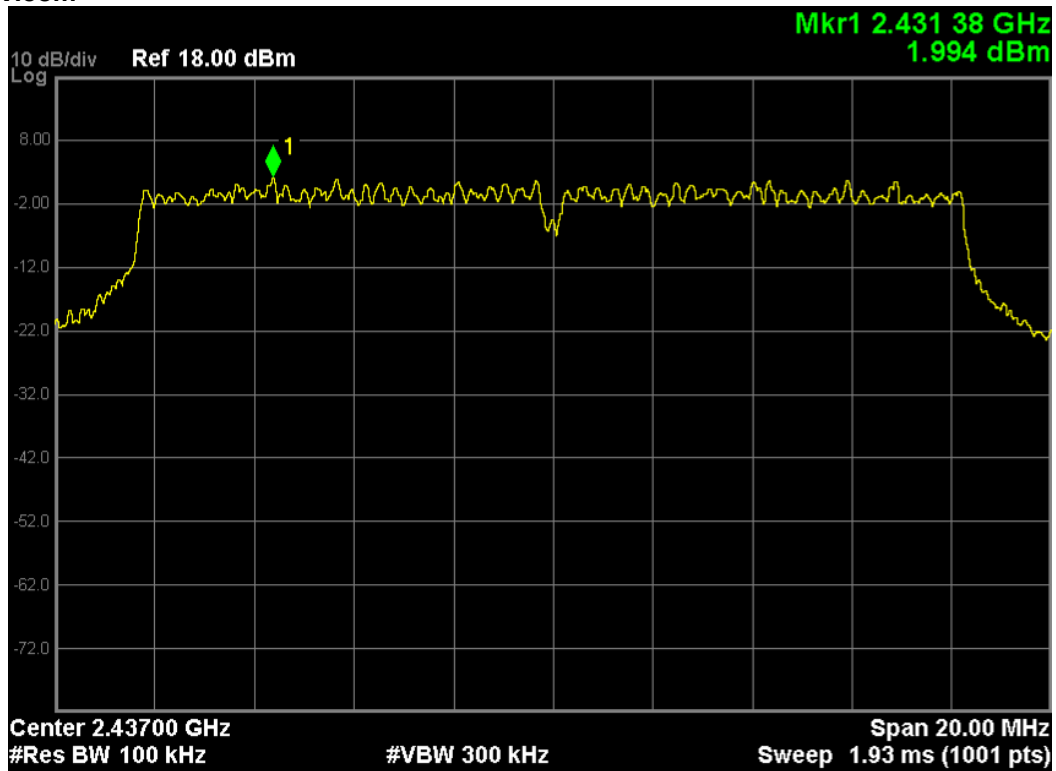
Channel Frequency: 2462MHz



Data rate: 54 Mbps

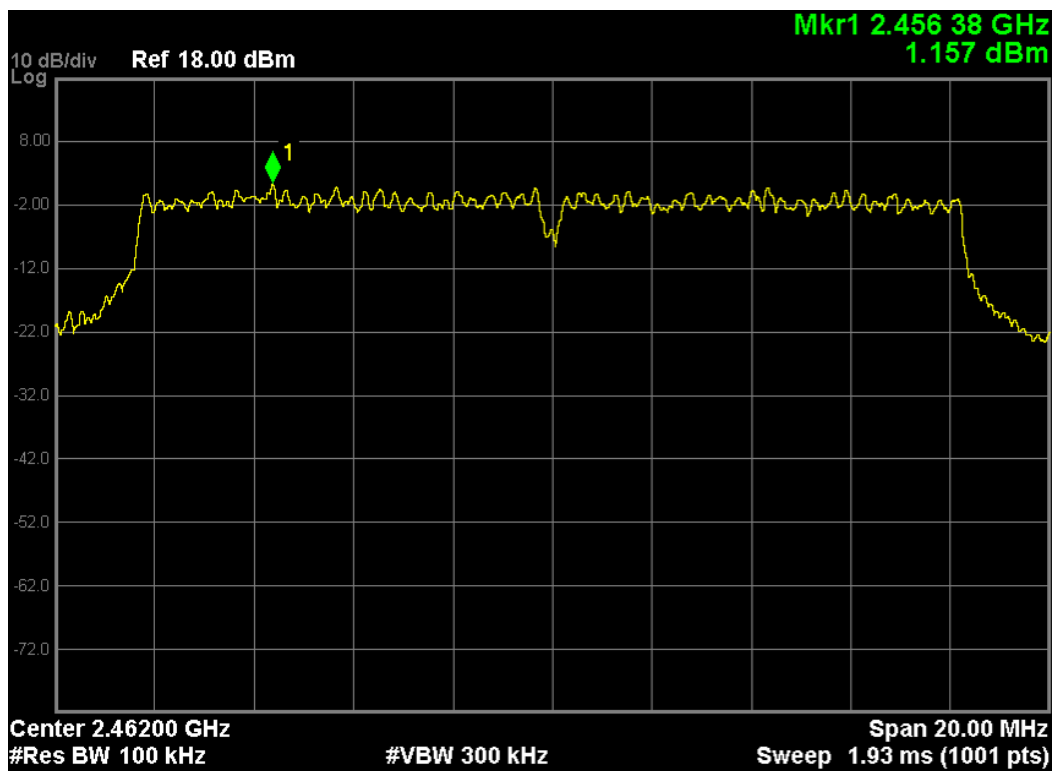
Channel Frequency: 2412 MHz

www.tuv.com



Data rate: 54 Mbps

Channel Frequency: 2437 MHz



Data rate: 54 Mbps

Channel Frequency: 2462 MHz

www.tuv.com

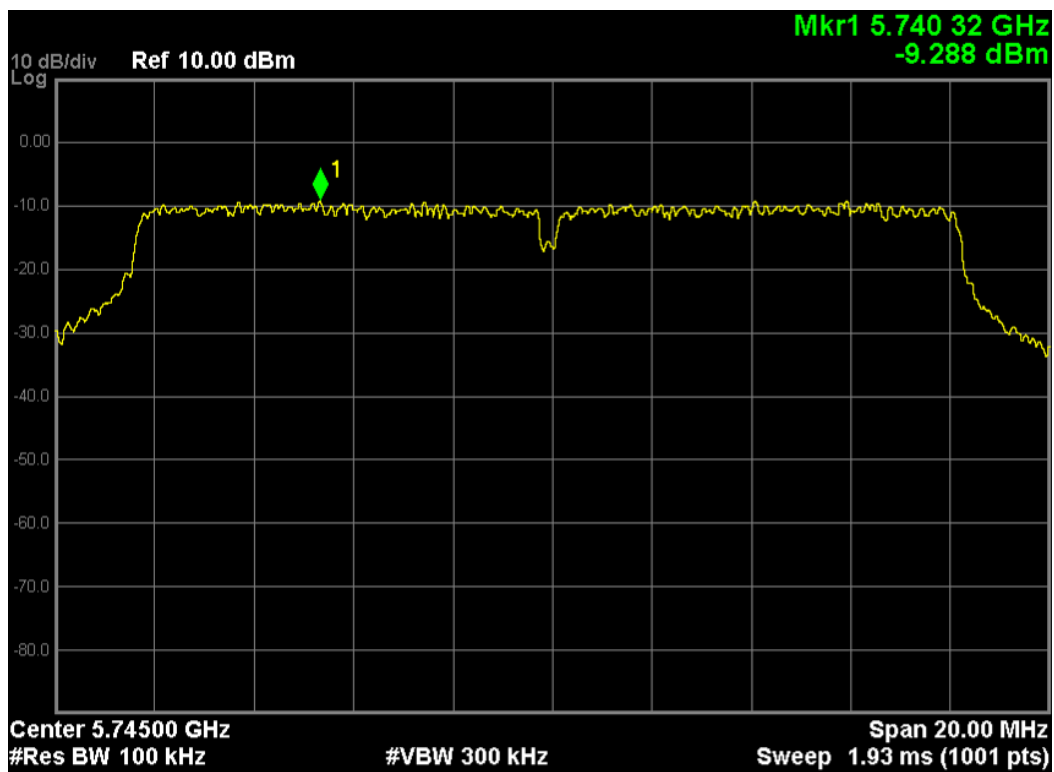
Test Result:

Modulation: 802.11.a

Cable Loss: 4 dB

Band Width Correction Factor = -15.2dB

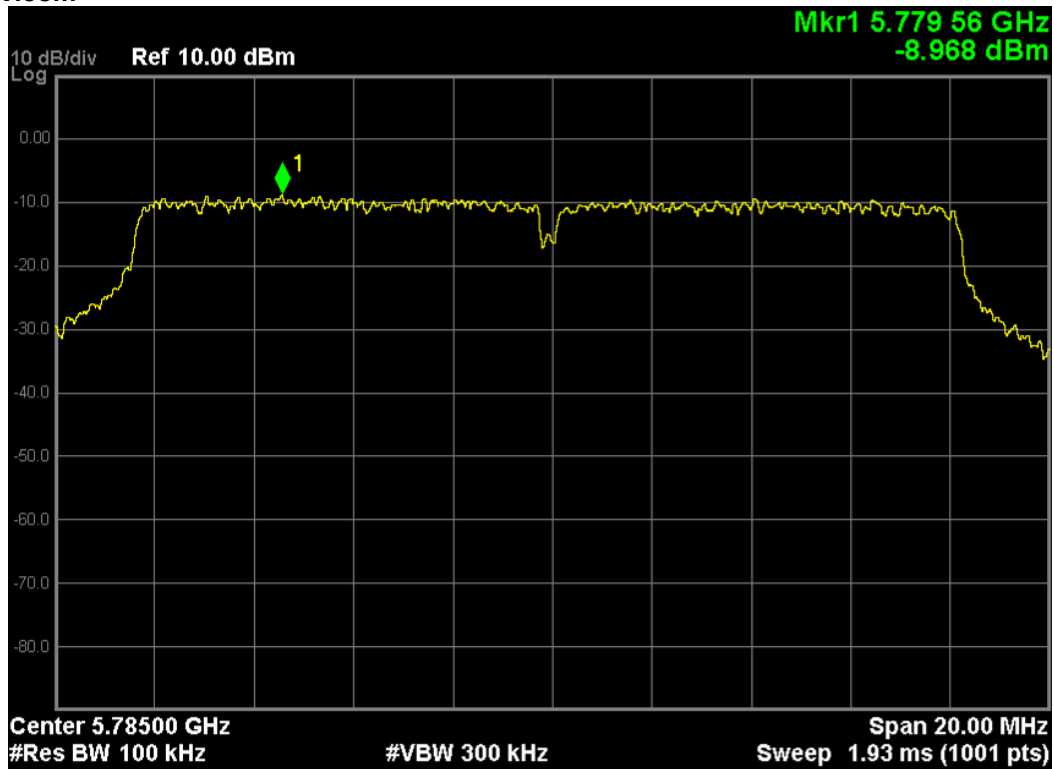
Data Rate (Mbps)	Frequency (MHz)	Measured PSD (dBm)	PSD (dBm)	Limit (dBm)
6	5745	-9.28	-20.48	8.00
	5785	-8.96	-20.16	8.00
	5825	-9.36	-20.56	8.00
24	5745	-7.57	-18.77	8.00
	5785	-7.29	-18.49	8.00
	5825	-7.75	-18.95	8.00
54	5745	-7.41	-18.61	8.00
	5785	-6.94	-18.14	8.00
	5825	-7.28	-18.48	8.00



Data rate: 6 Mbps

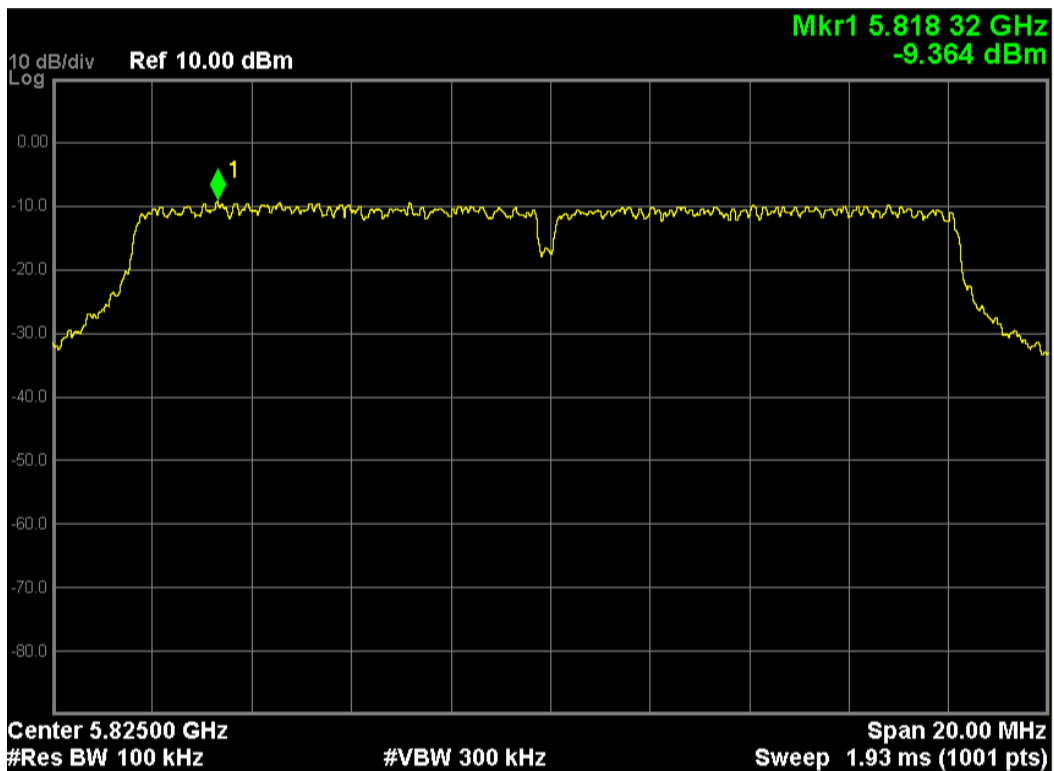
Channel Frequency: 5745 MHz

www.tuv.com



Data rate: 6 Mbps

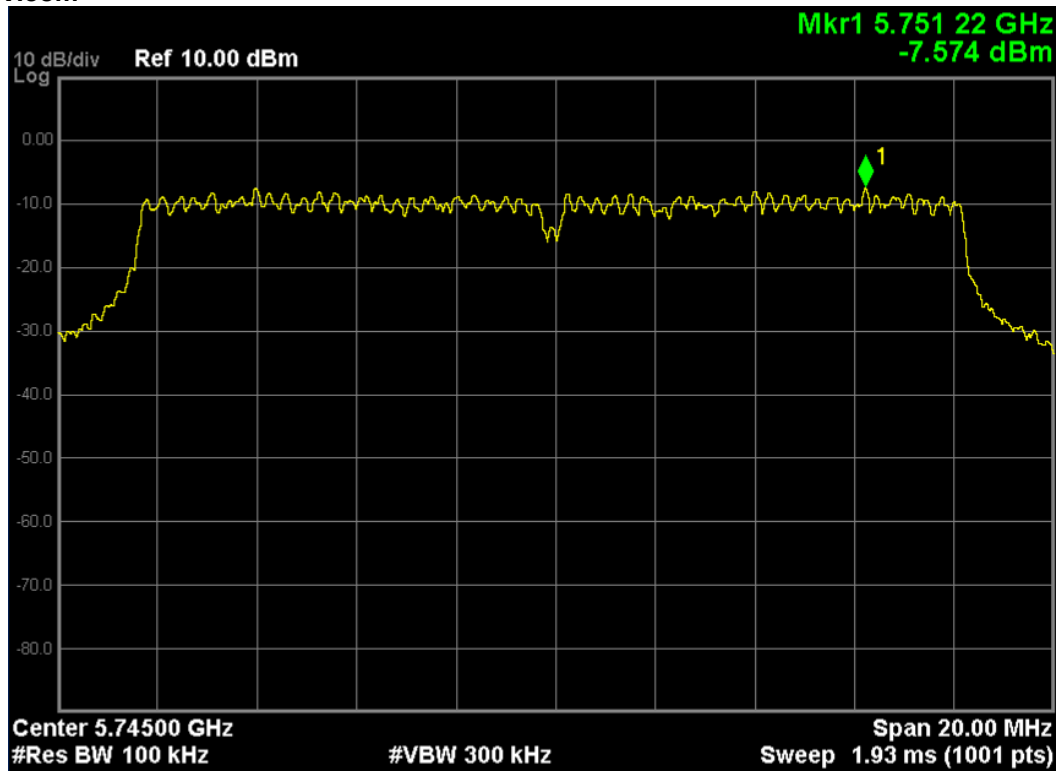
Channel Frequency: 5785 MHz



Data rate: 6 Mbps

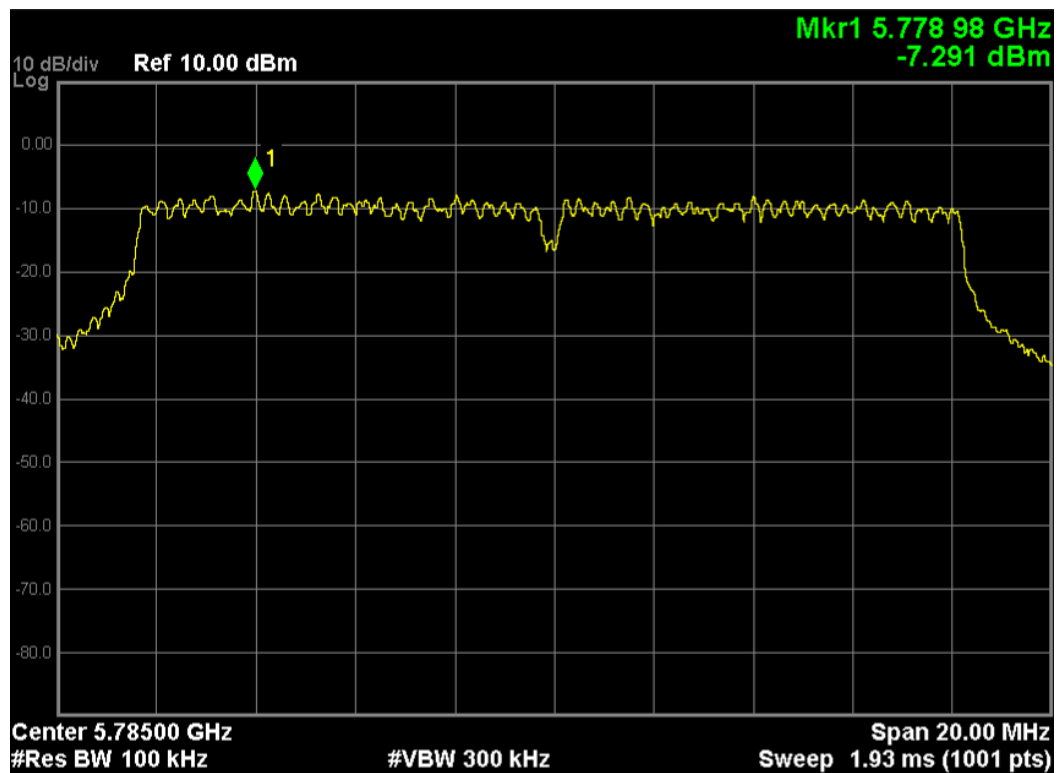
Channel Frequency: 5825 MHz

www.tuv.com



Data rate: 24 Mbps

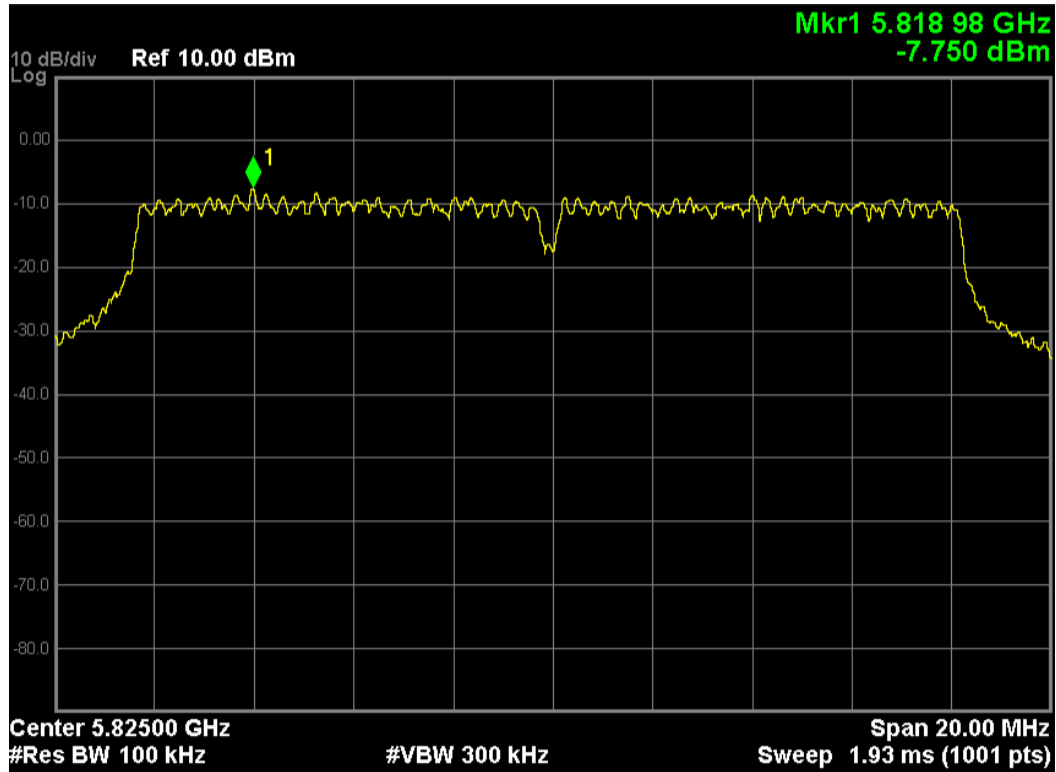
Channel Frequency: 5745 MHz



Data rate: 24 Mbps

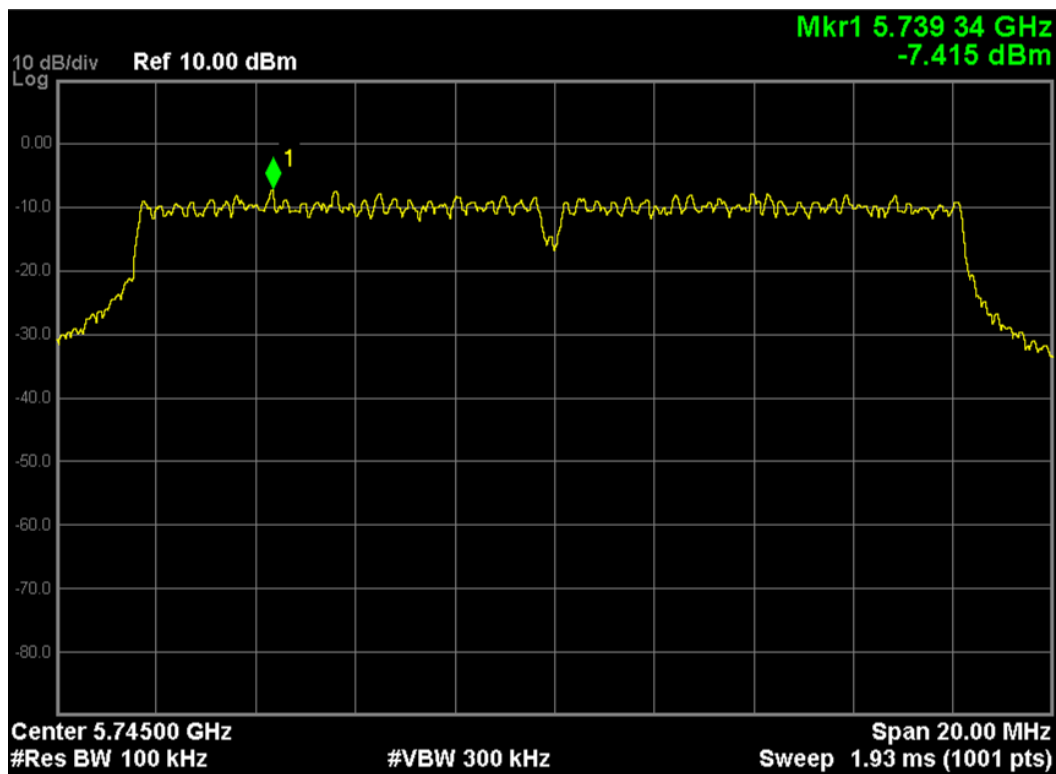
Channel Frequency: 5785 MHz

www.tuv.com



Data rate: 24 Mbps

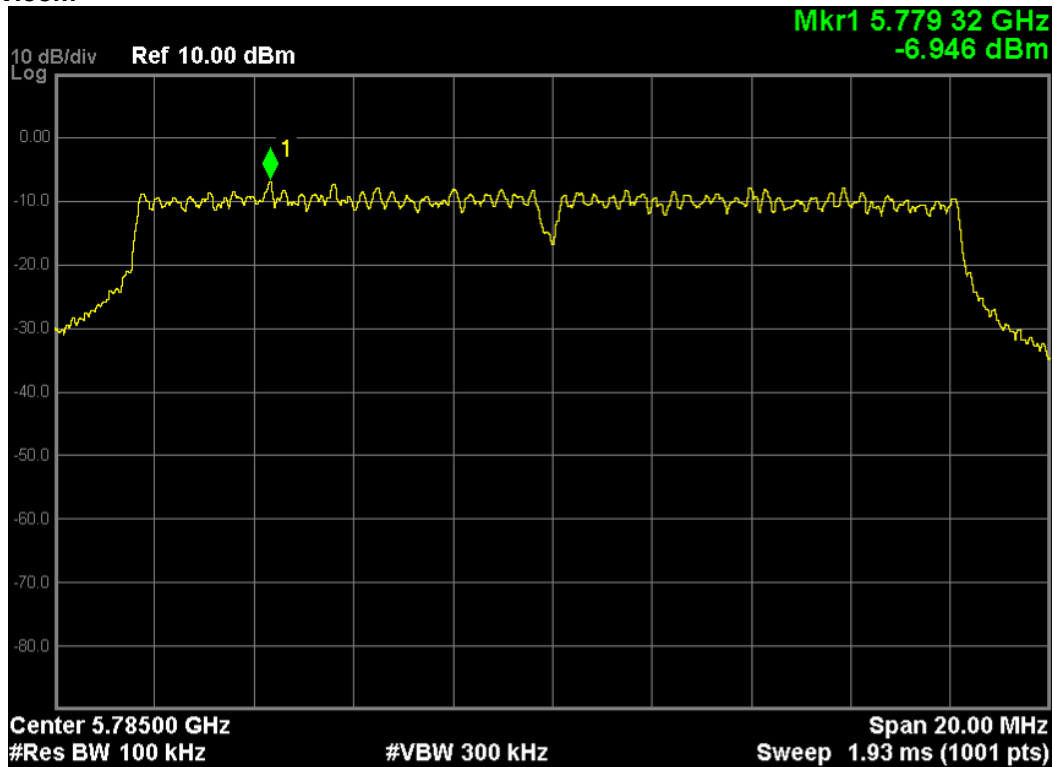
Channel Frequency: 5825 MHz



Data rate: 54 Mbps

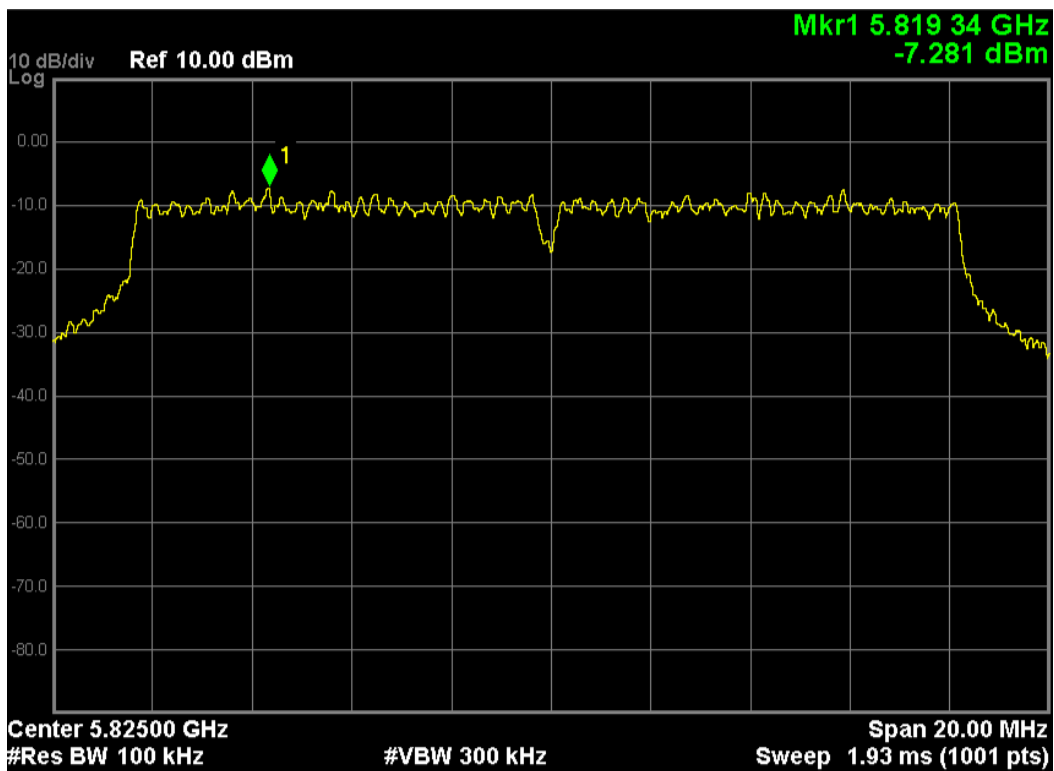
Channel Frequency: 5745 MHz

www.tuv.com



Data rate: 54 Mbps

Channel Frequency: 5785 MHz



Data rate: 54 Mbps

Channel Frequency: 5825 MHz

www.tuv.com

6 dB Bandwidth

Section 15.247(a)(2)

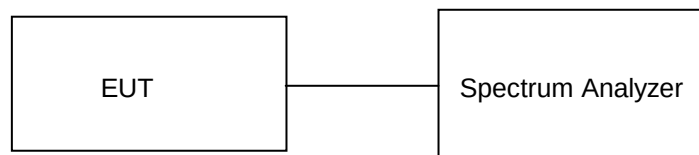
Result

Pass

Test Specification
Requirement

FCC Part 15 Section 15.247 (a) (2)
The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Method:

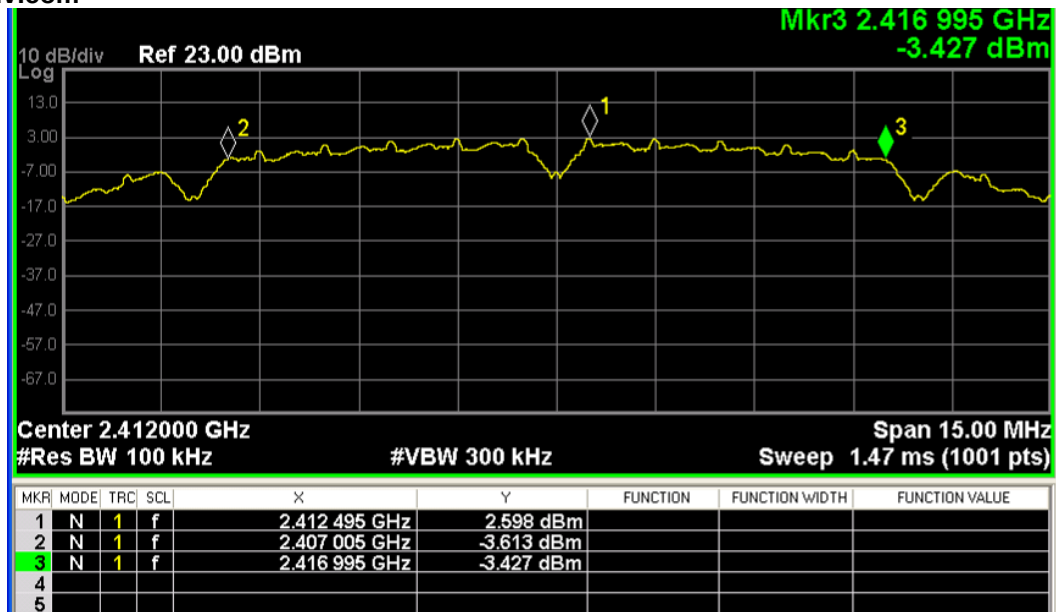


Test Result:

Modulation: 802.11b

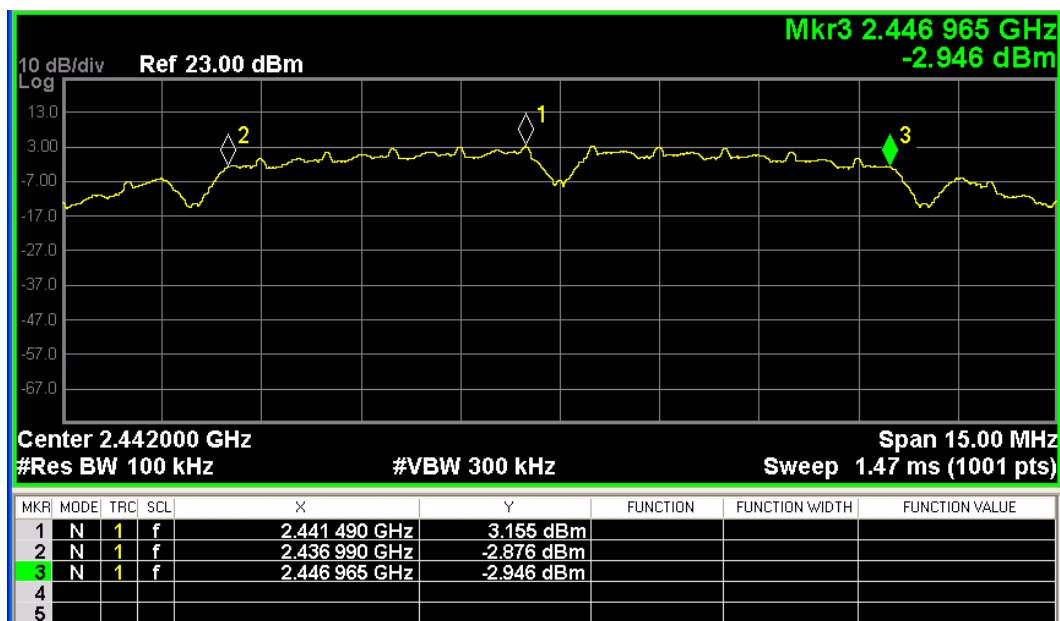
Date Rate (Mbps)	Carrier Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
1	2412	2407.00	2416.99	09.99	13.50
	2442	2436.99	2446.96	09.97	13.74
	2472	2466.96	2476.99	10.03	13.83
11	2412	2406.99	2416.84	09.85	13.51
	2442	2436.57	2446.83	10.26	13.55
	2472	2466.57	2476.84	10.27	13.59

www.tuv.com



Data Rate: 1 Mbps

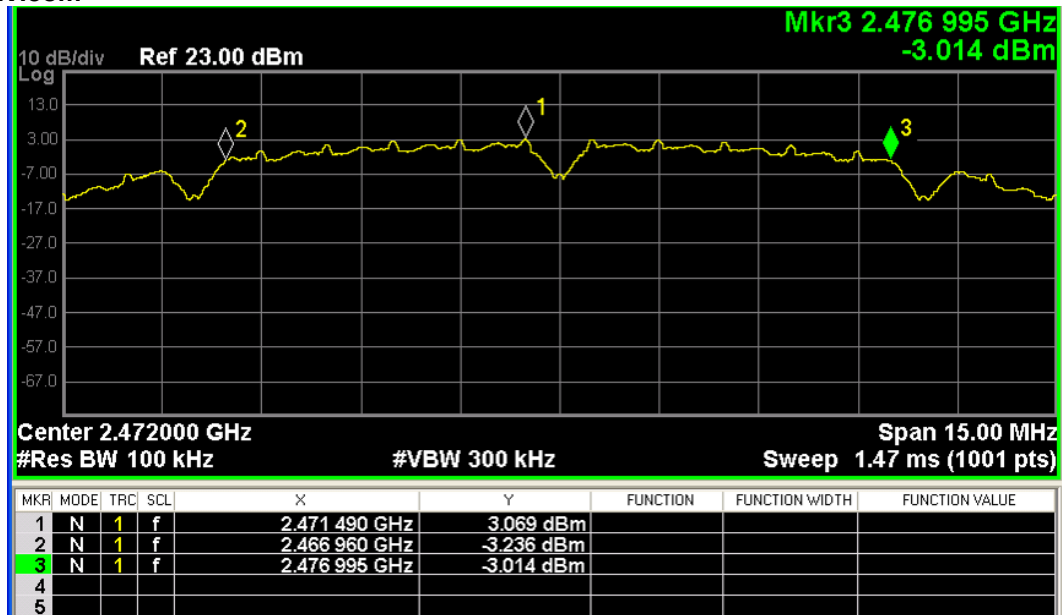
Channel frequency: 2412 MHz



Data Rate: 1 Mbps

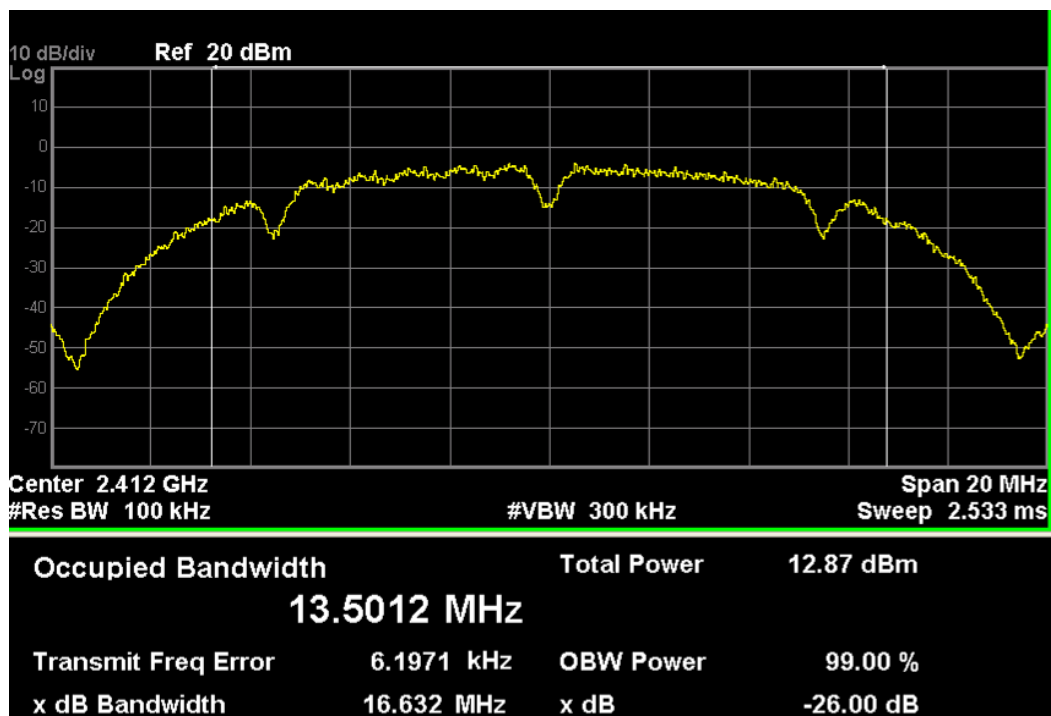
Channel frequency: 2442 MHz

www.tuv.com



Data Rate: 1 Mbps

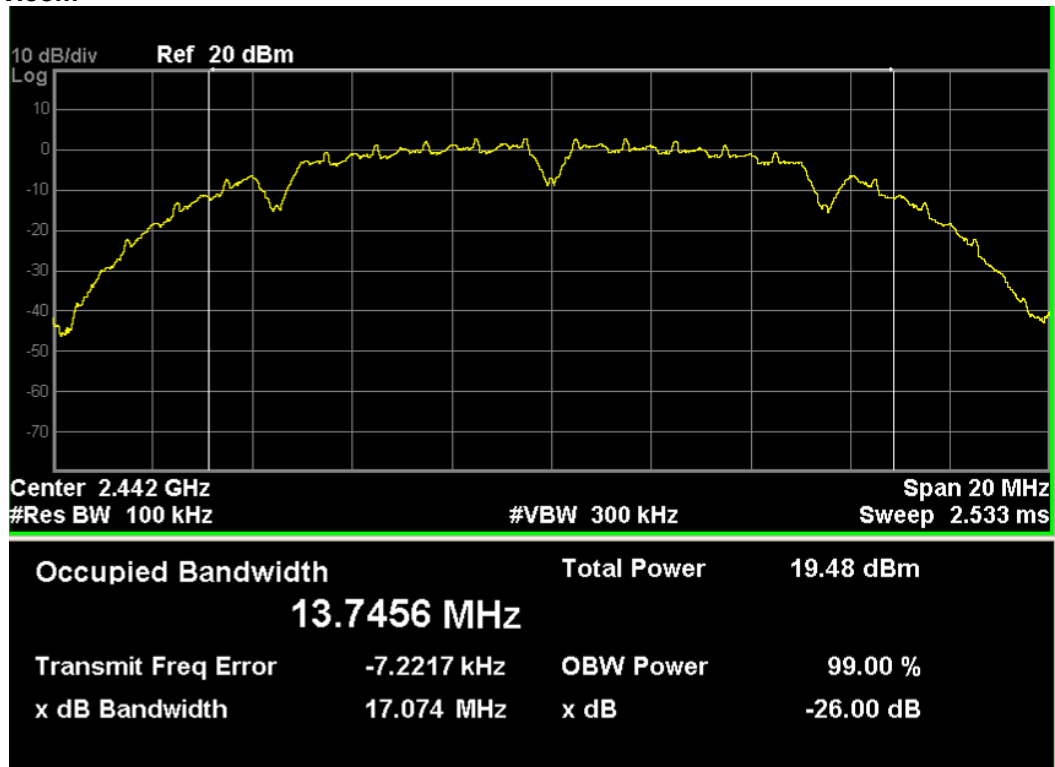
Channel frequency: 2472 MHz



Data rate: 1 Mbps

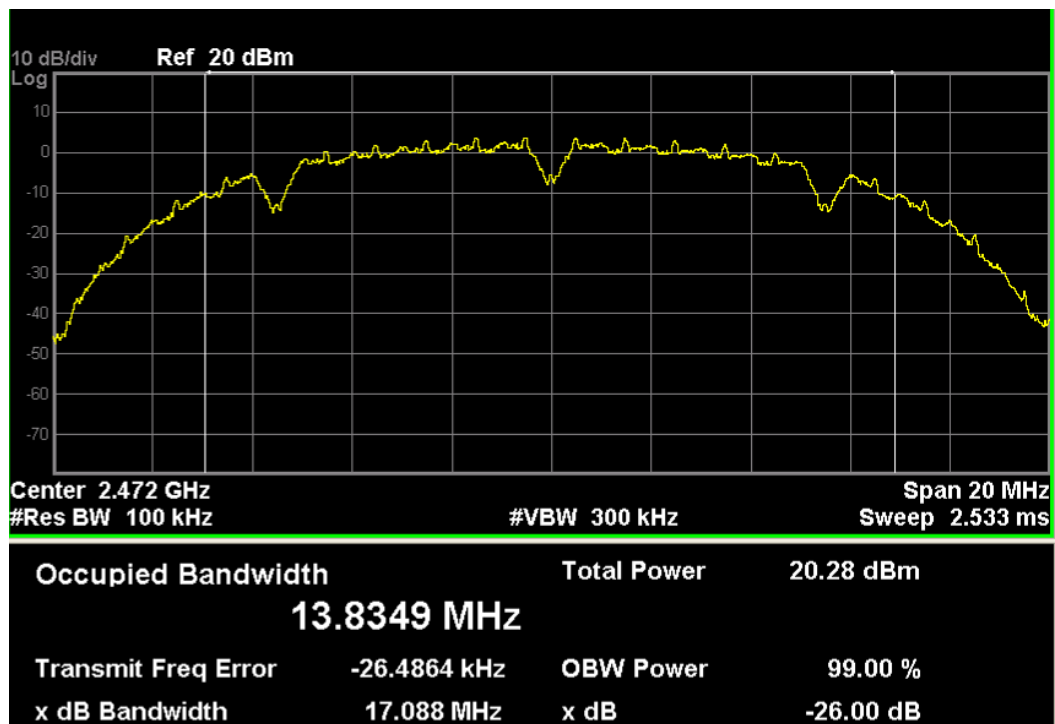
99% Occupied Bandwidth: Channel 2412MHz

www.tuv.com



Data rate: 1 Mbps

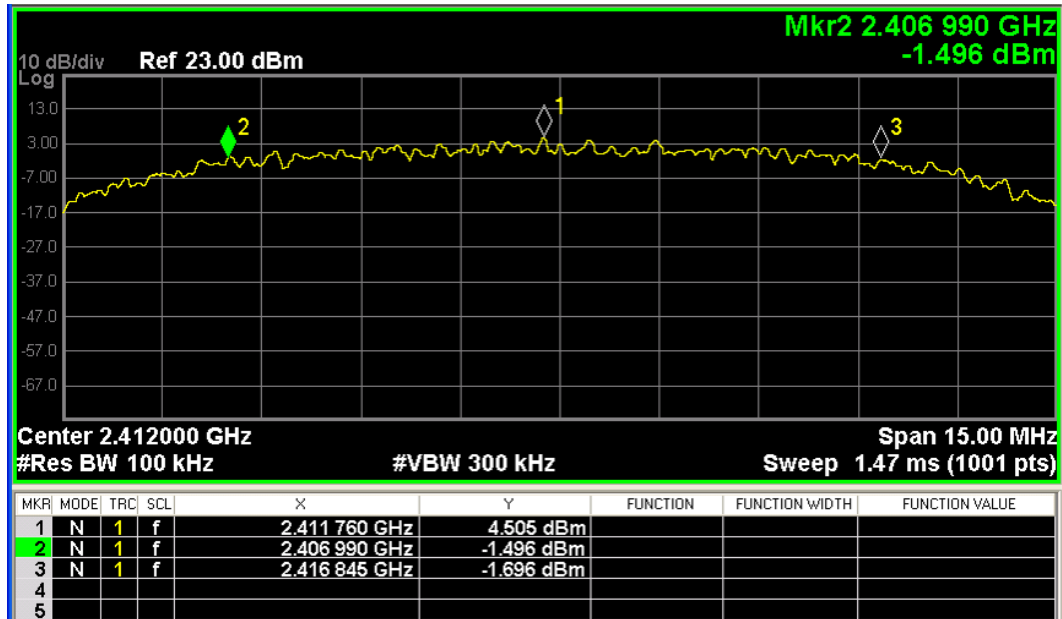
99% Occupied Bandwidth: Channel 2442MHz



Data rate: 1 Mbps

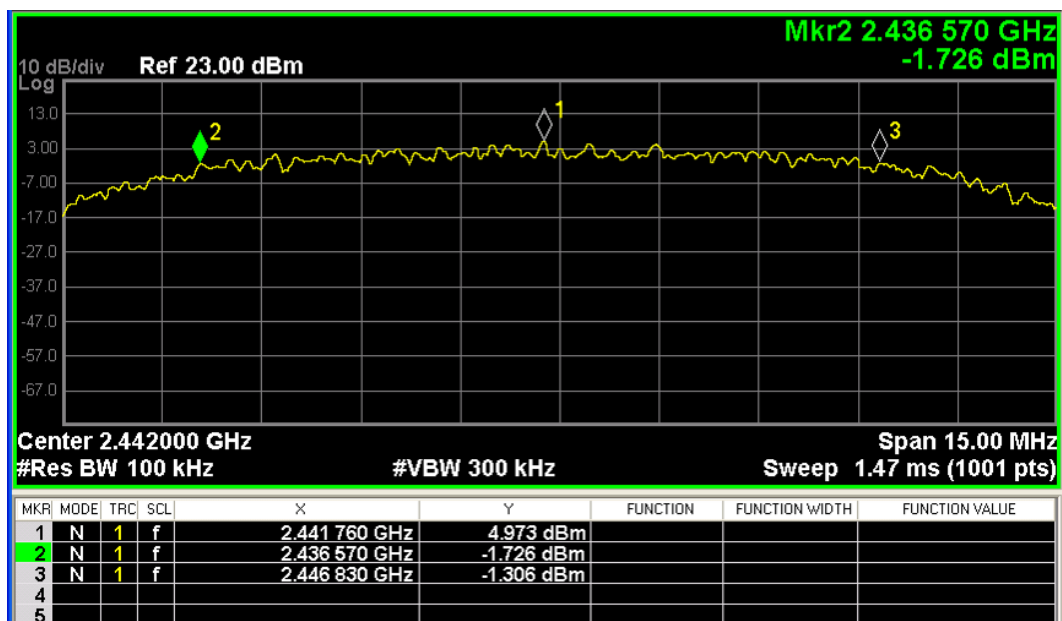
99% Occupied Bandwidth: Channel 2472MHz

www.tuv.com



Data Rate: 11 Mbps

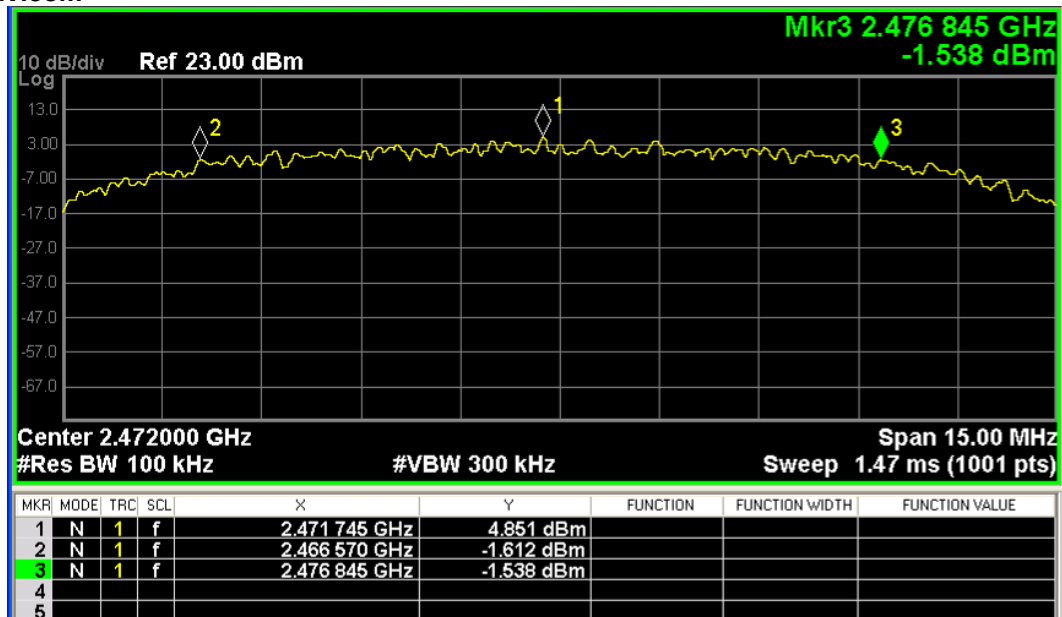
Channel frequencies: 2412 MHz



Data Rate: 11 Mbps

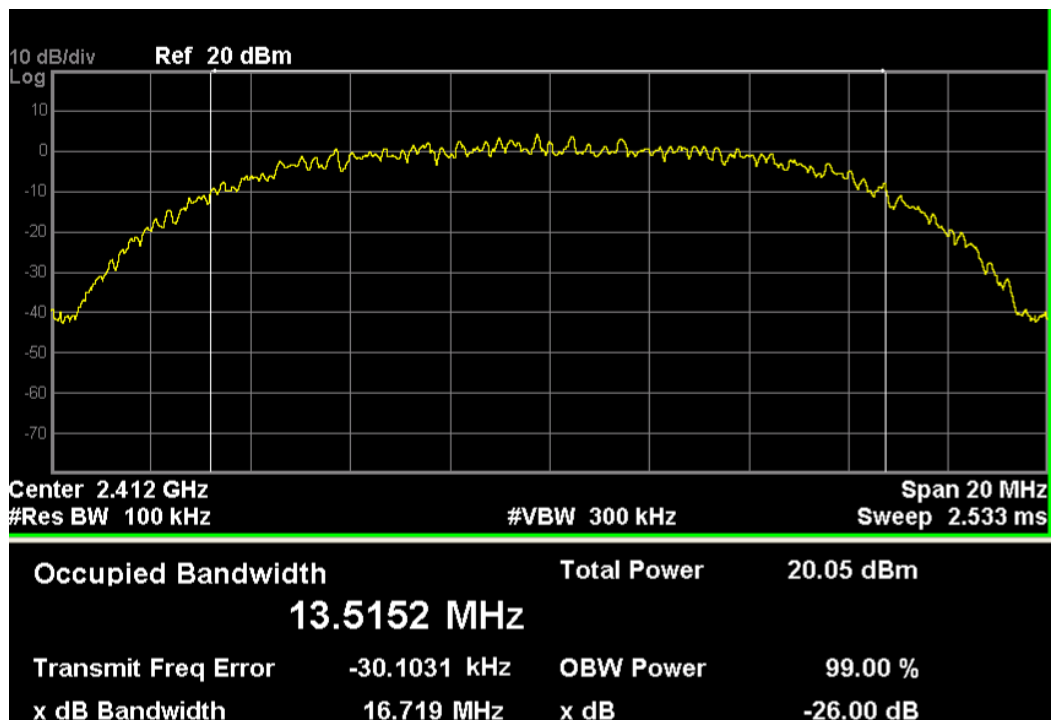
Channel frequency: 2442 MHz

www.tuv.com



Data Rate: 11 Mbps

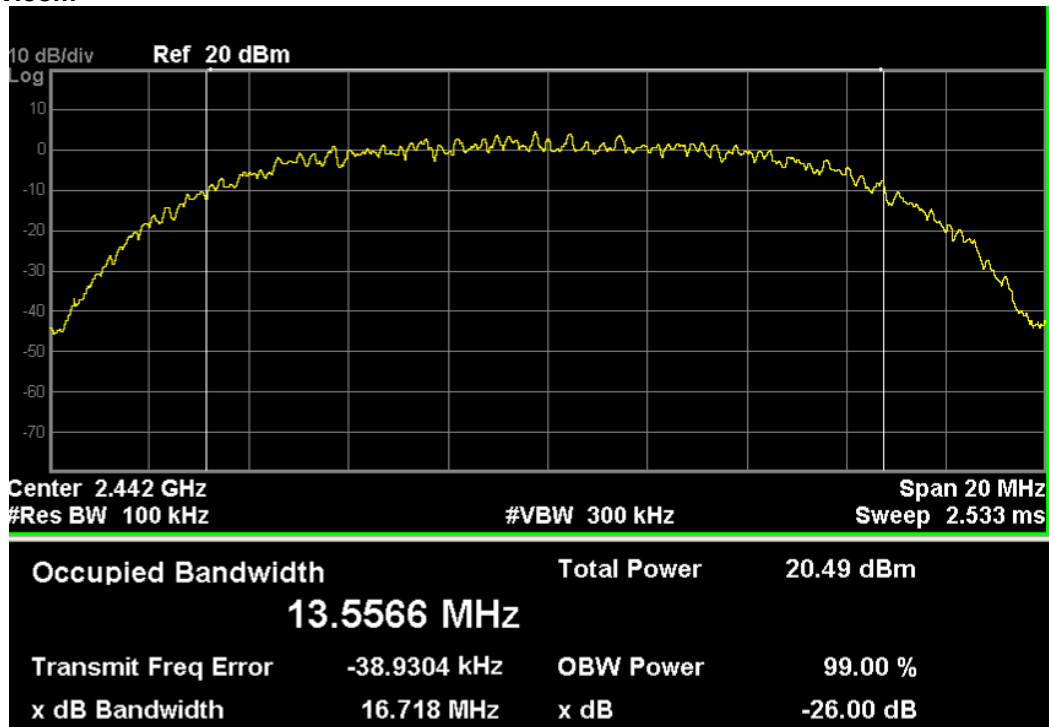
Channel frequency: 2472 MHz



Data rate: 11 Mbps

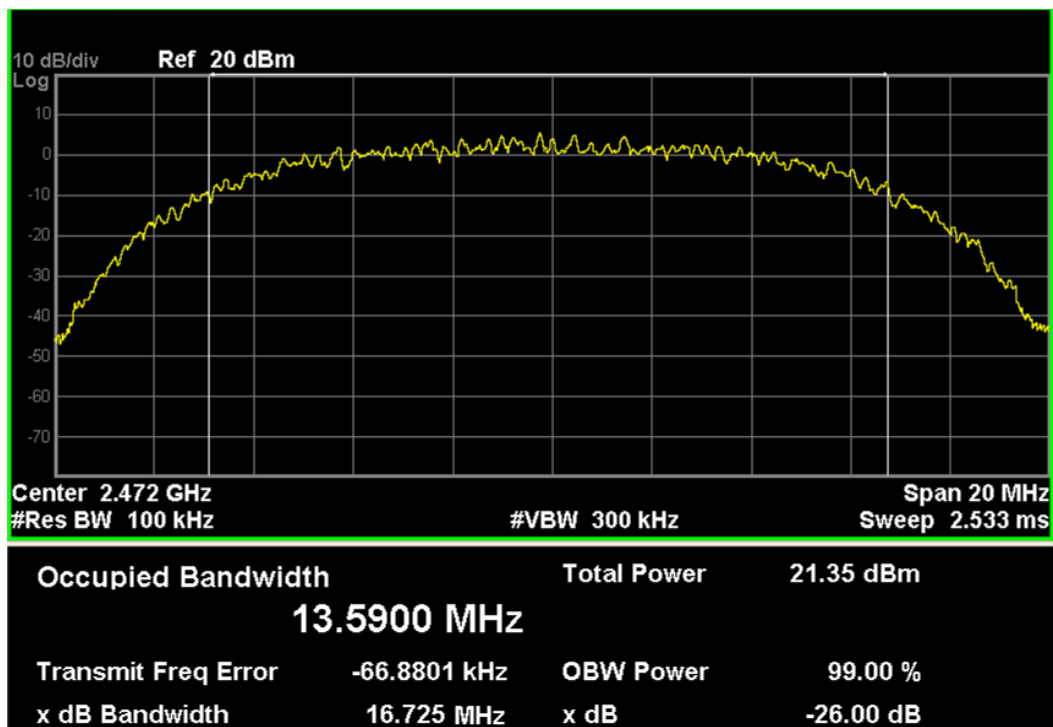
99% Occupied Bandwidth: Channel 2412MHz

www.tuv.com



Data rate: 11 Mbps

99% Occupied Bandwidth: Channel 2442MHz



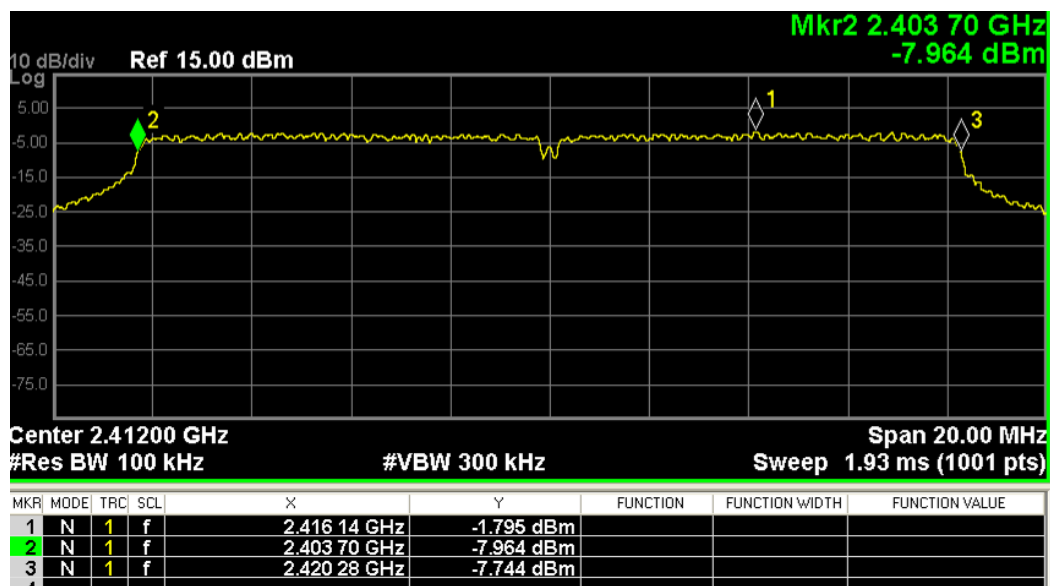
Data rate: 11 Mbps

99% Occupied Bandwidth: Channel 2472MHz

www.tuv.com

Modulation: 802.11g

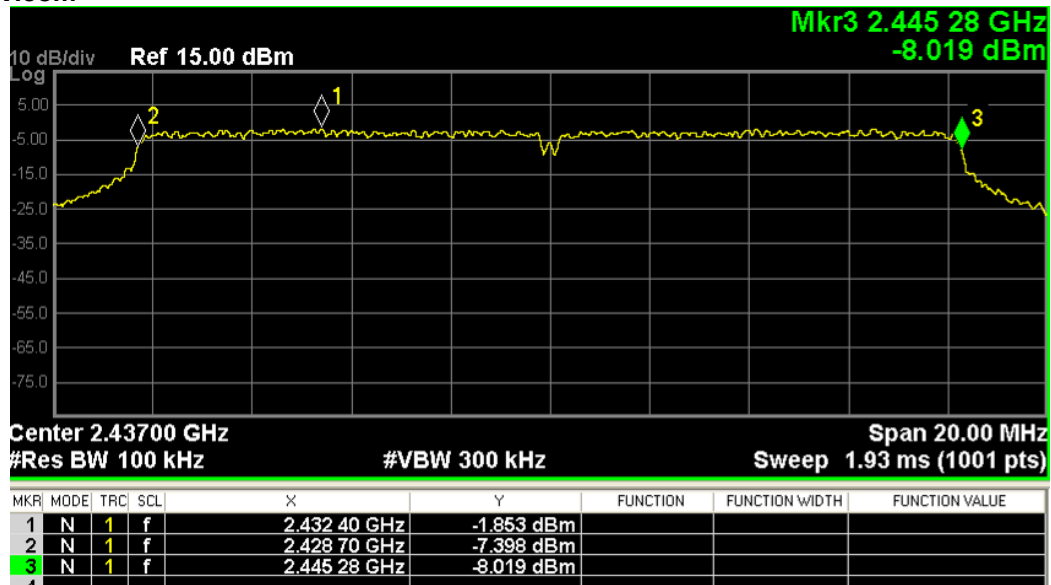
Data Rate (Mbps)	Carrier Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
6	2412	2403.7	2420.28	16.58	16.49
	2437	2428.7	2445.78	17.08	16.48
	2462	2453.7	2470.28	16.58	16.48
24	2412	2403.72	2420.26	16.54	16.44
	2437	2428.72	2445.26	16.54	16.44
	2462	2453.72	2470.26	16.54	16.44
54	2412	2403.72	2420.26	16.54	16.47
	2437	2428.7	2445.26	16.56	16.46
	2462	2453.72	2470.26	16.54	16.47



Data Rate: 6 Mbps

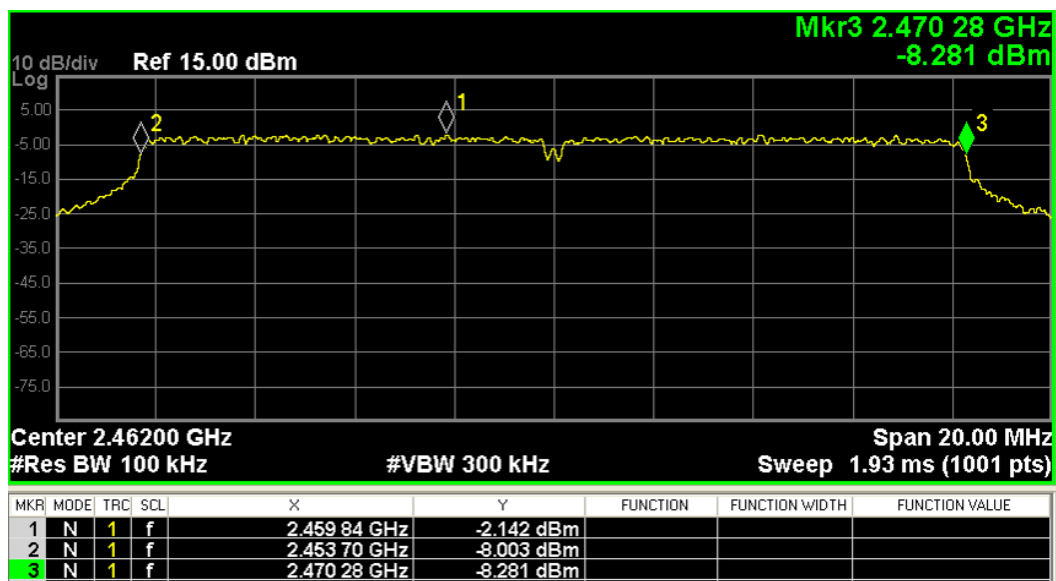
Channel frequencies: 2412 MHz

www.tuv.com



Data Rate: 6 Mbps

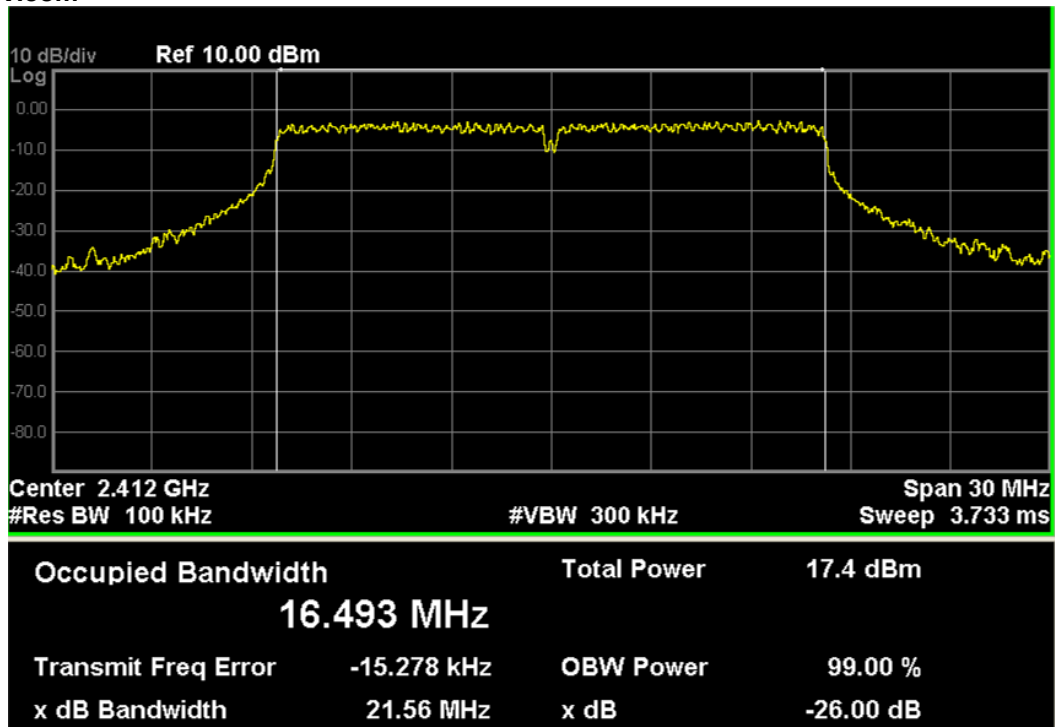
Channel frequencies: 2437 MHz



Data Rate: 6 Mbps

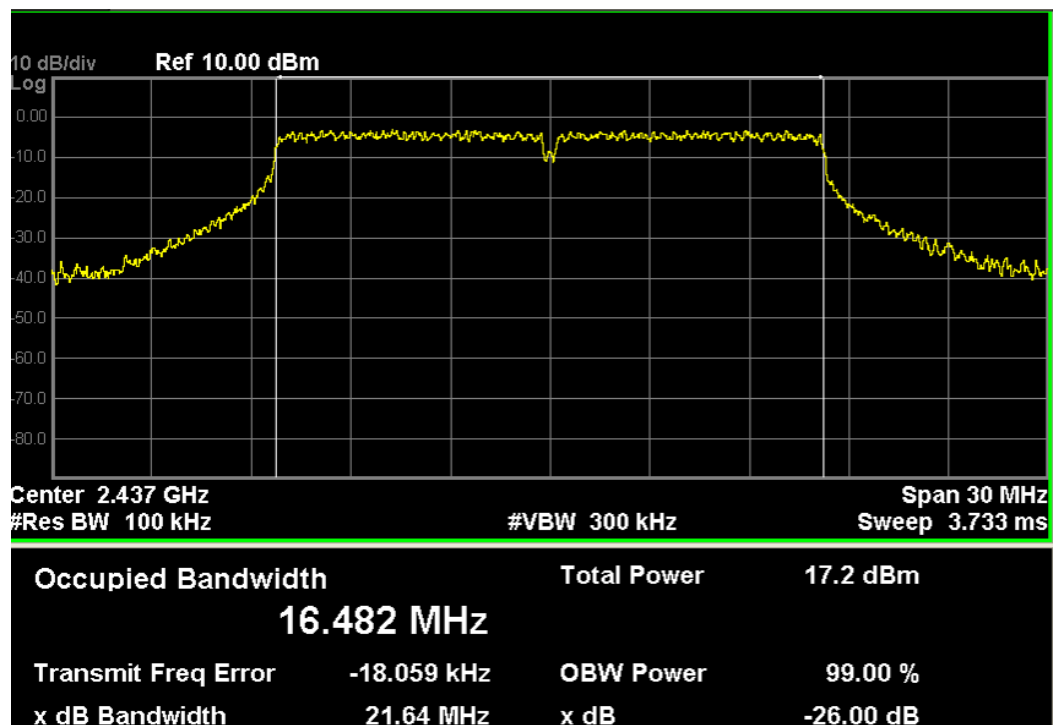
Channel frequencies: 2462 MHz

www.tuv.com



Data Rate: 6 Mbps

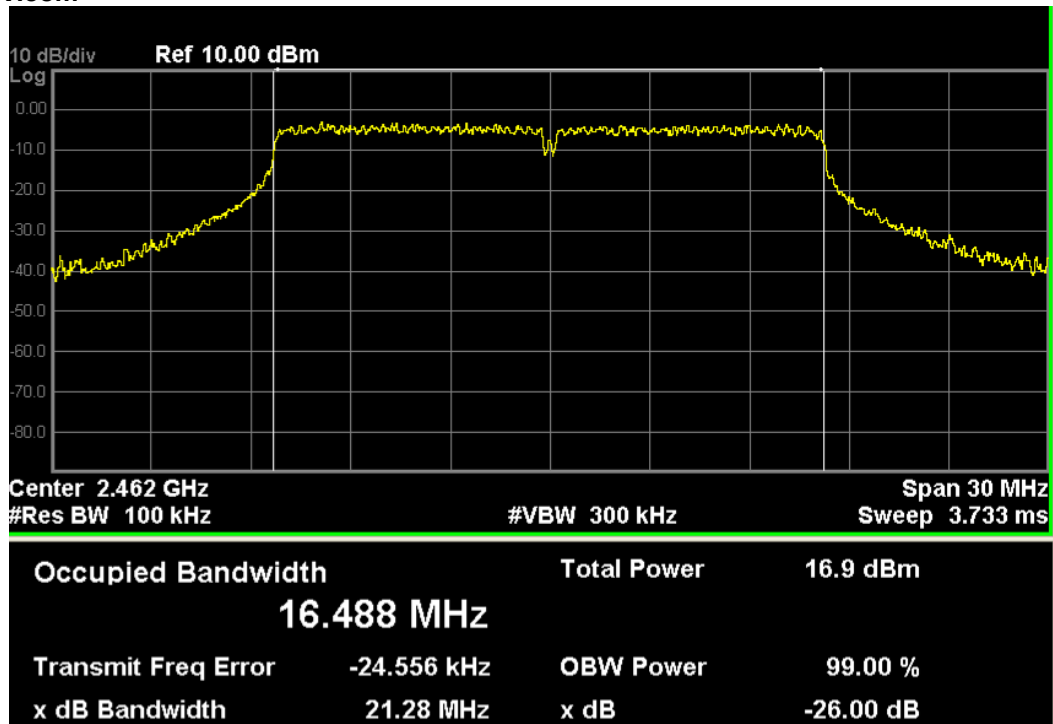
99% Occupied Bandwidth: Channel 2412MHz



Data Rate: 6 Mbps

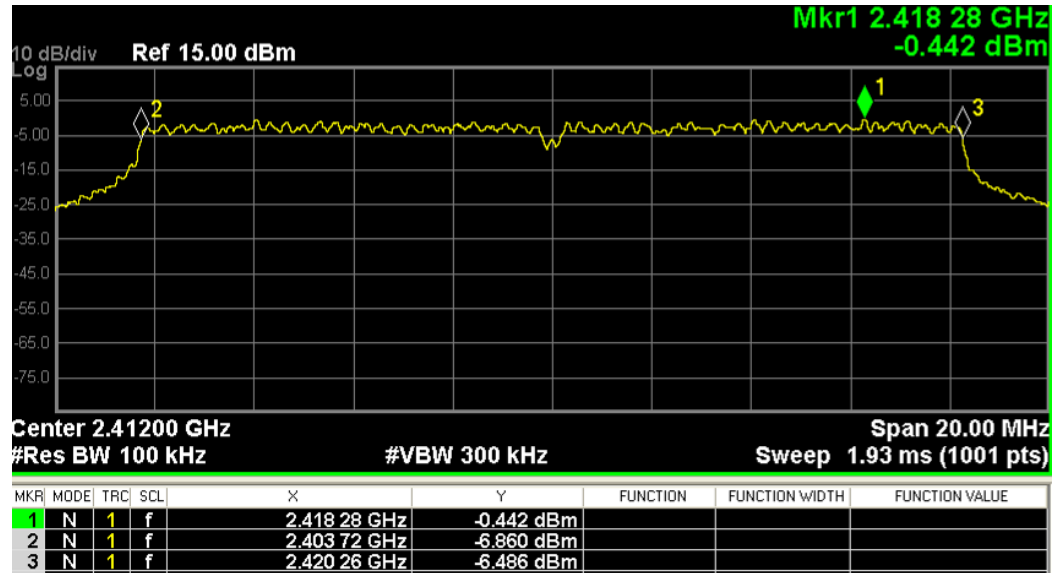
99% Occupied Bandwidth: Channel 2437MHz

www.tuv.com



Data Rate: 6 Mbps

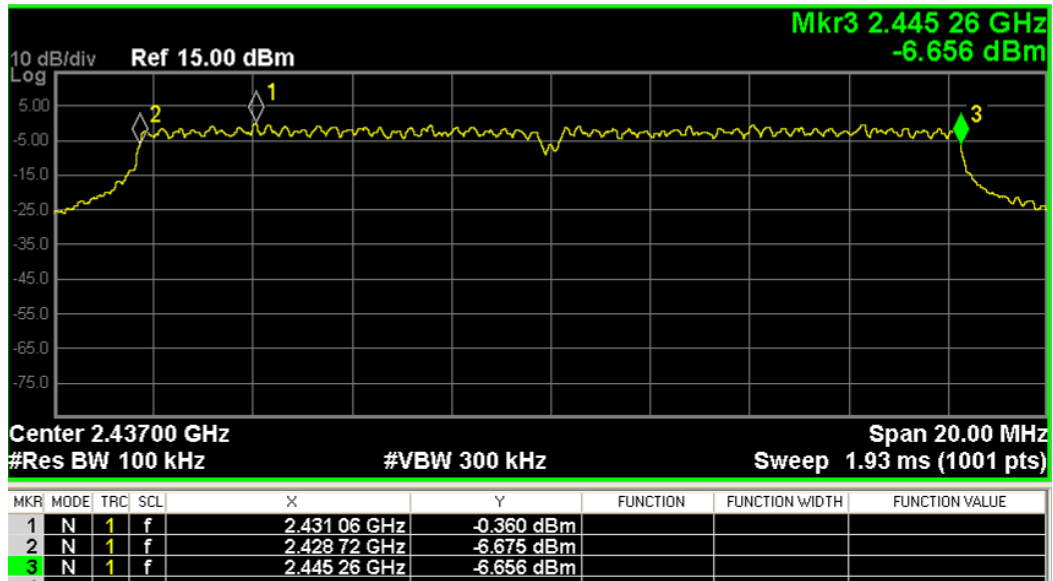
99% Occupied Bandwidth: Channel 2462MHz



Data Rate: 24 Mbps

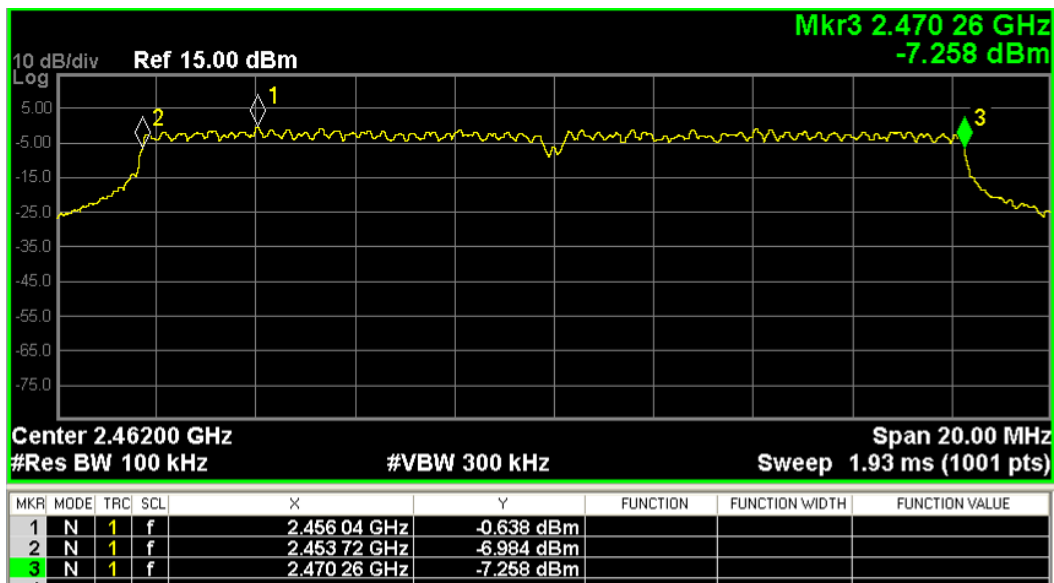
Channel frequencies: 2412 MHz

www.tuv.com



Data Rate: 24 Mbps

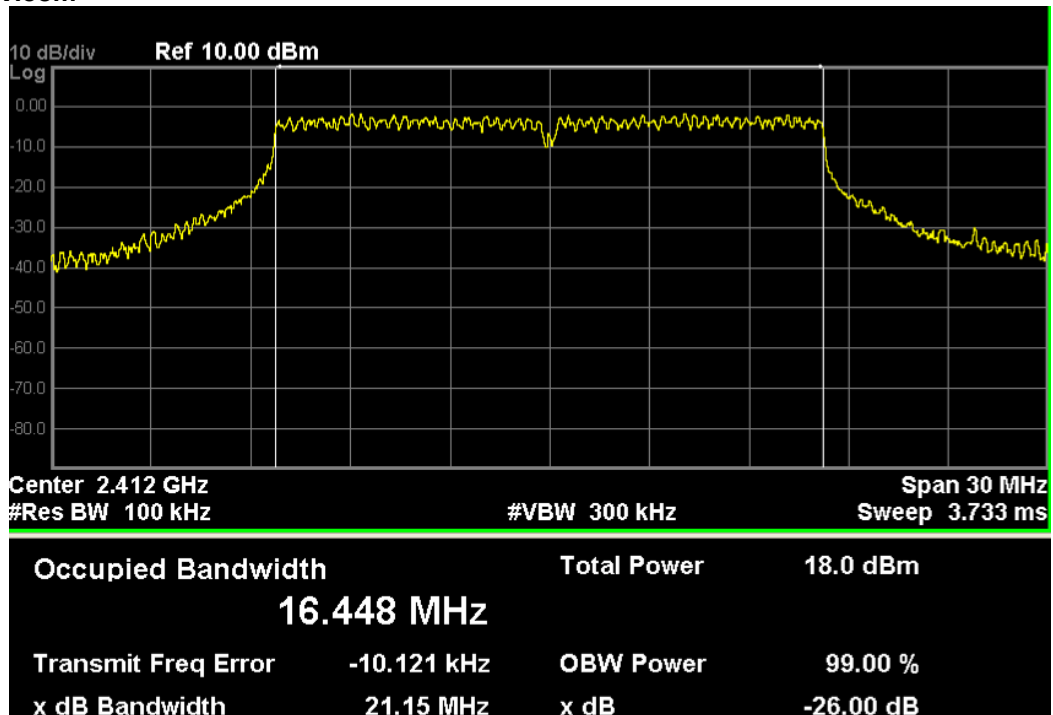
Channel frequencies: 2437 MHz



Data Rate: 24 Mbps

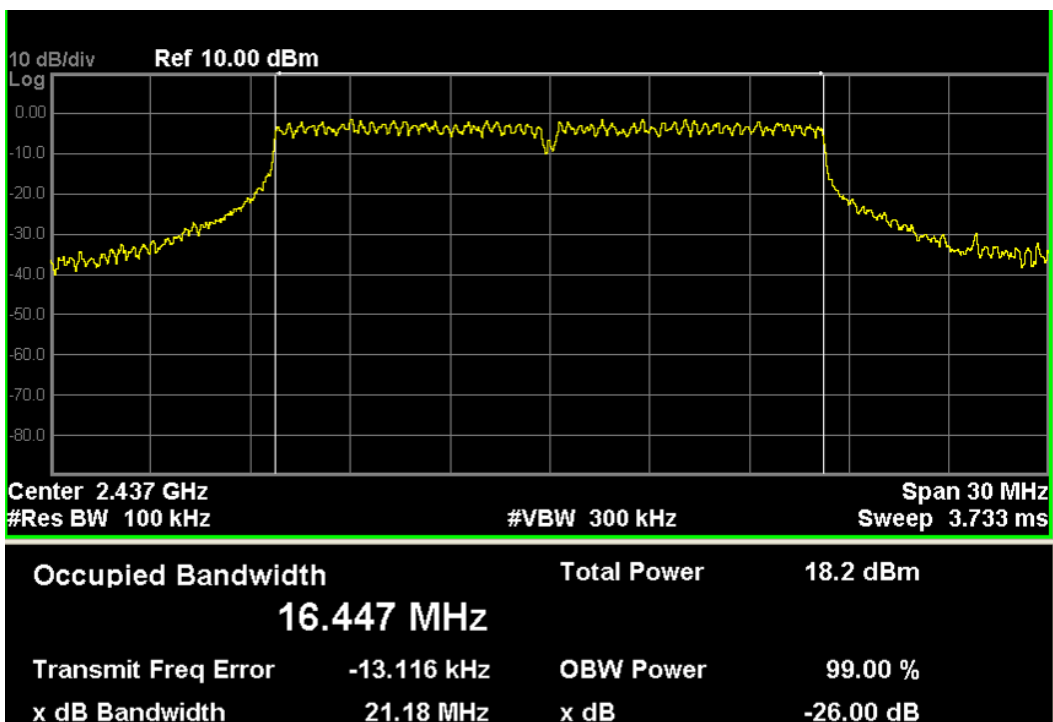
Channel frequencies: 2462MHz

www.tuv.com



Data Rate: 24 Mbps

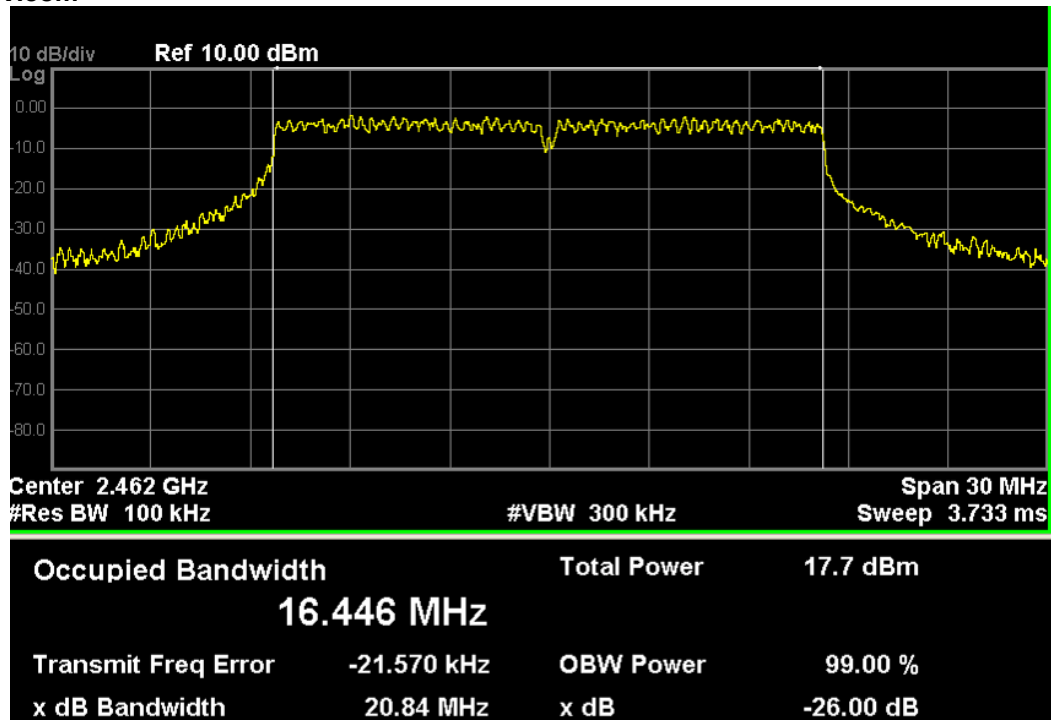
99% Occupied Bandwidth: Channel 2412MHz



Data Rate: 24 Mbps

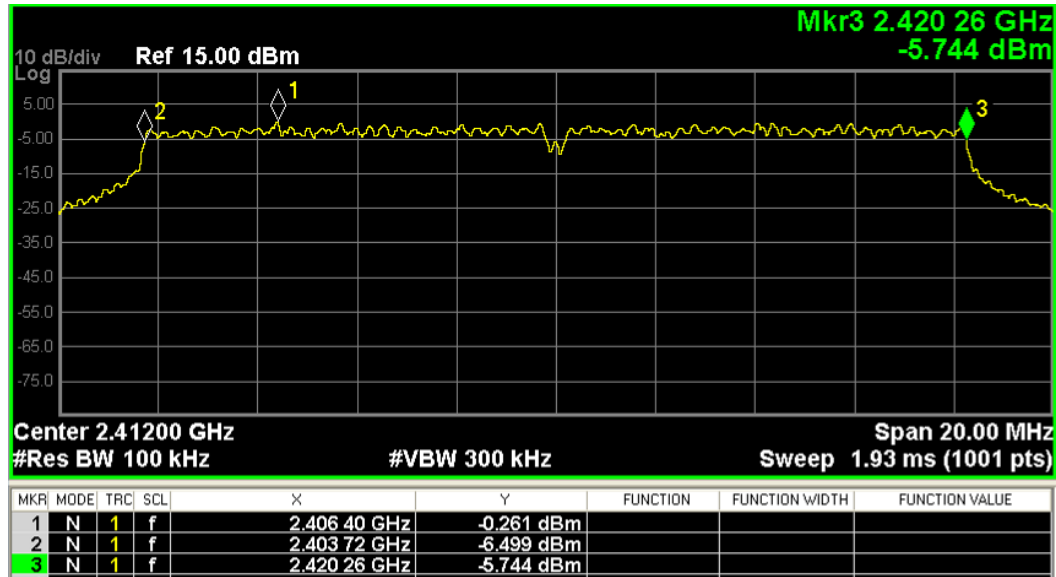
99% Occupied Bandwidth: Channel 2437MHz

www.tuv.com



Data Rate: 24 Mbps

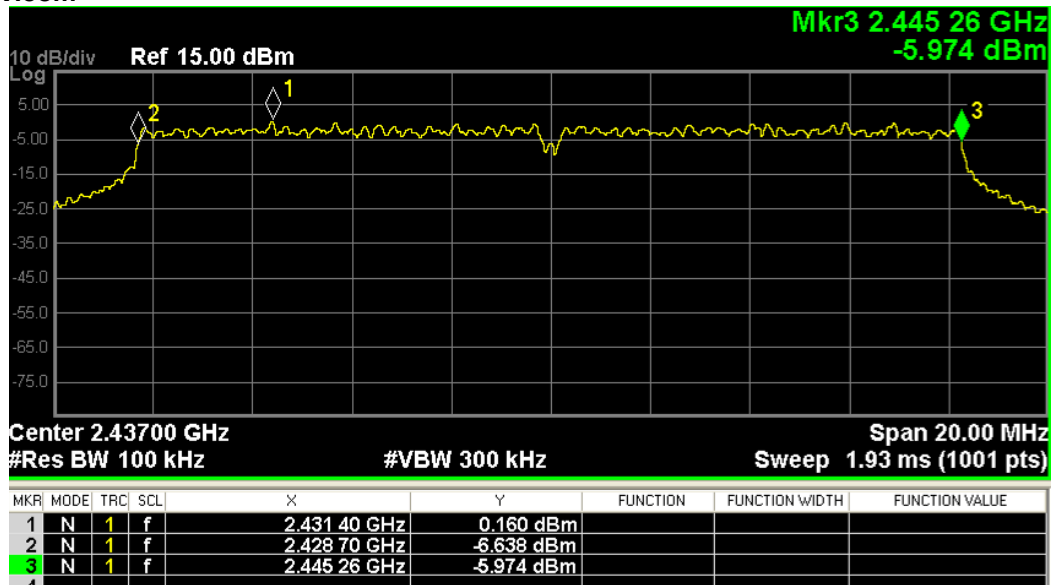
99% Occupied Bandwidth: Channel 2462MHz



Data Rate: 54 Mbps

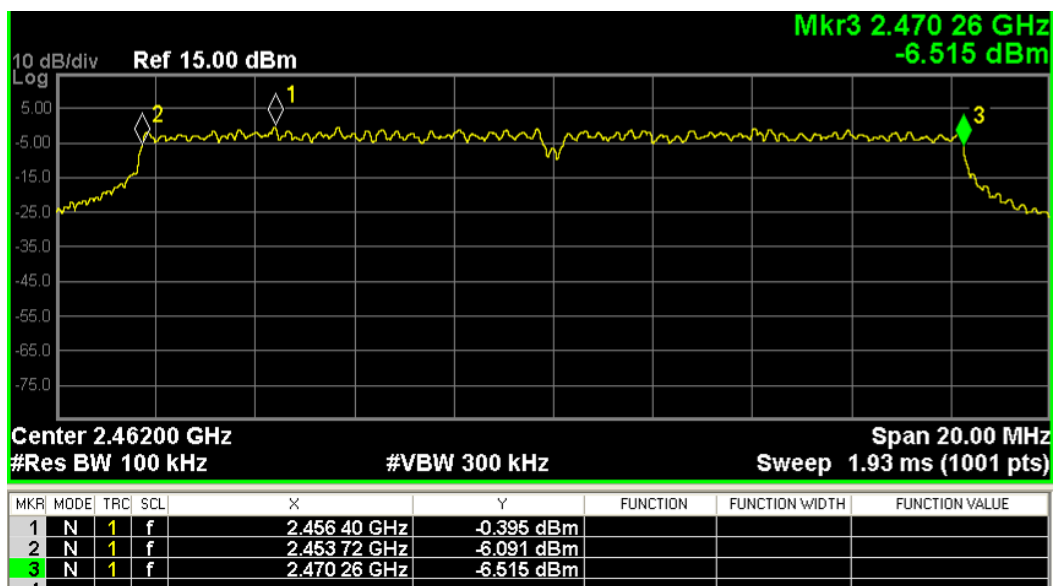
Channel frequencies: 2412 MHz

www.tuv.com



Data Rate: 54 Mbps

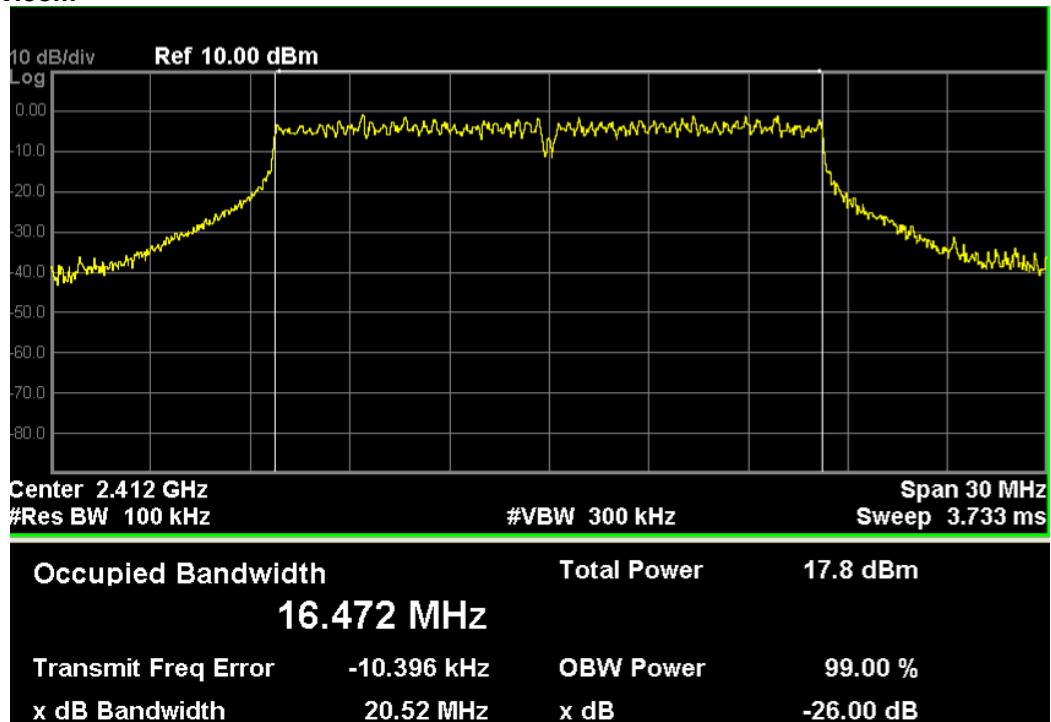
Channel frequencies: 2437MHz



Data Rate: 54 Mbps

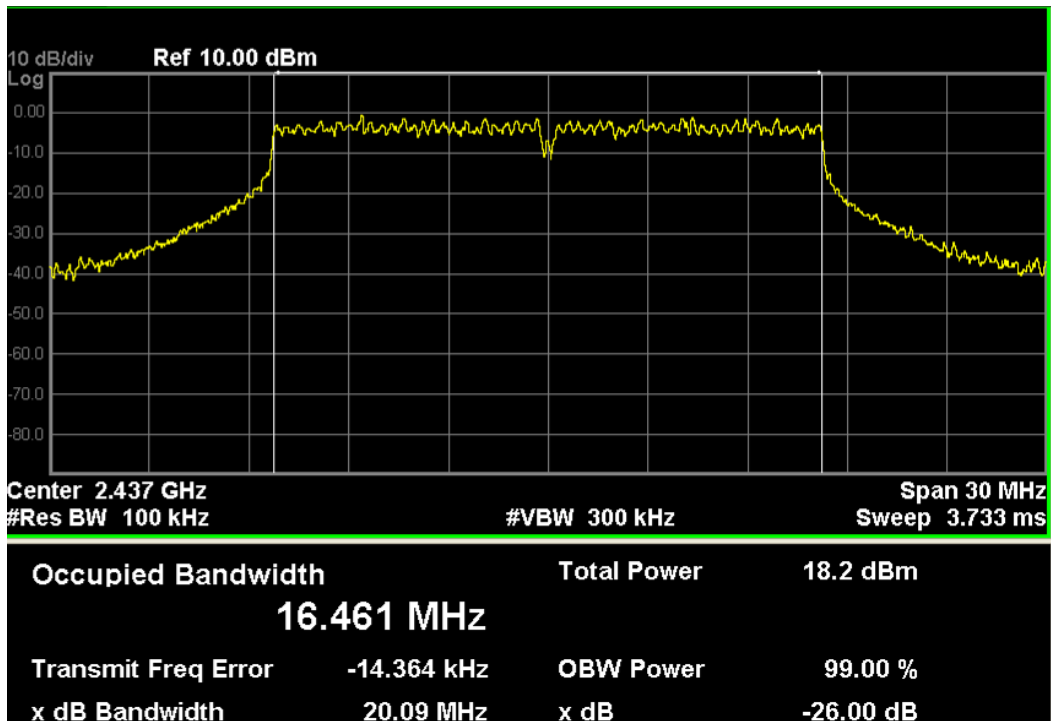
Channel frequencies: 2462 MHz

www.tuv.com



Data Rate: 54 Mbps

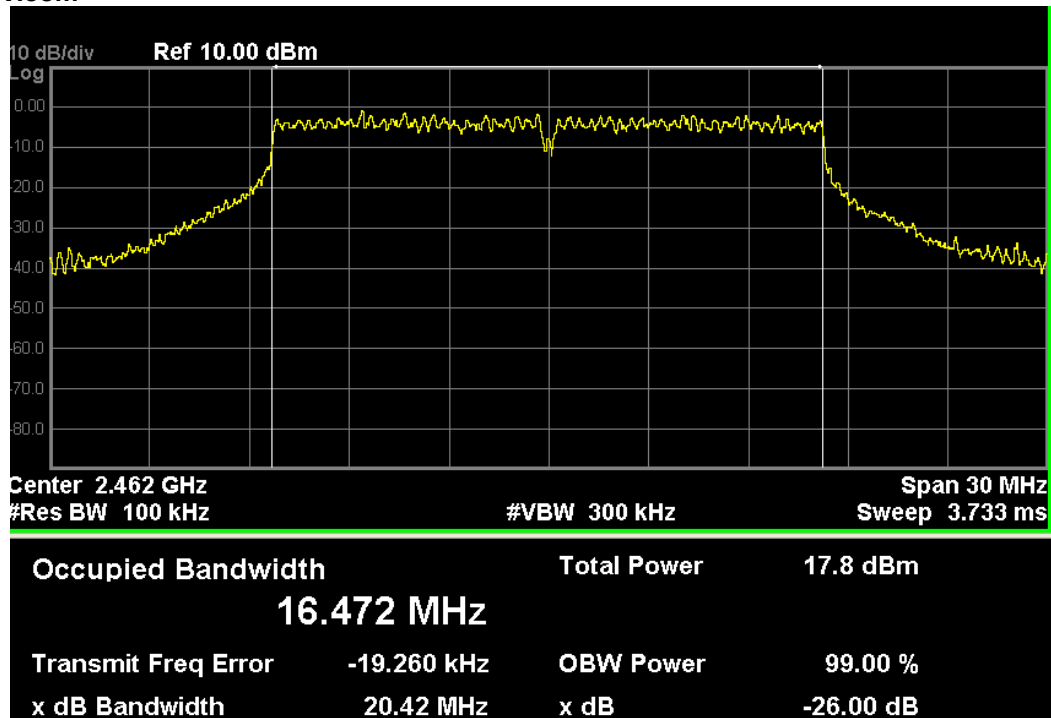
99% Occupied Bandwidth: Channel 2412MHz



Data Rate: 54 Mbps

99% Occupied Bandwidth: Channel 2437MHz

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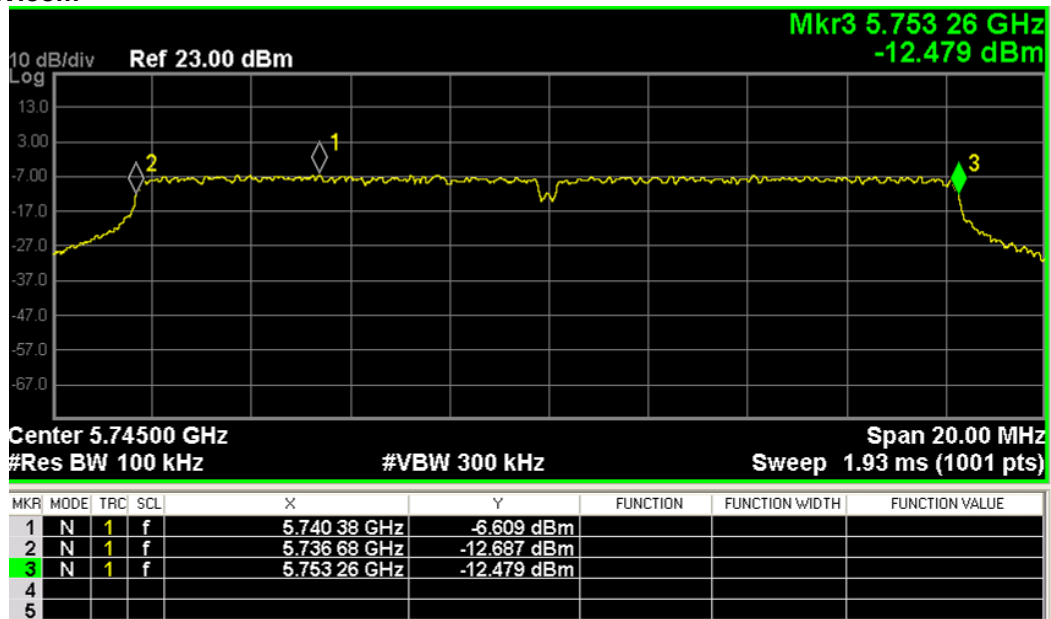
Data Rate: 54 Mbps

99% Occupied Bandwidth: Channel 2462MHz

Modulation: 802.11a

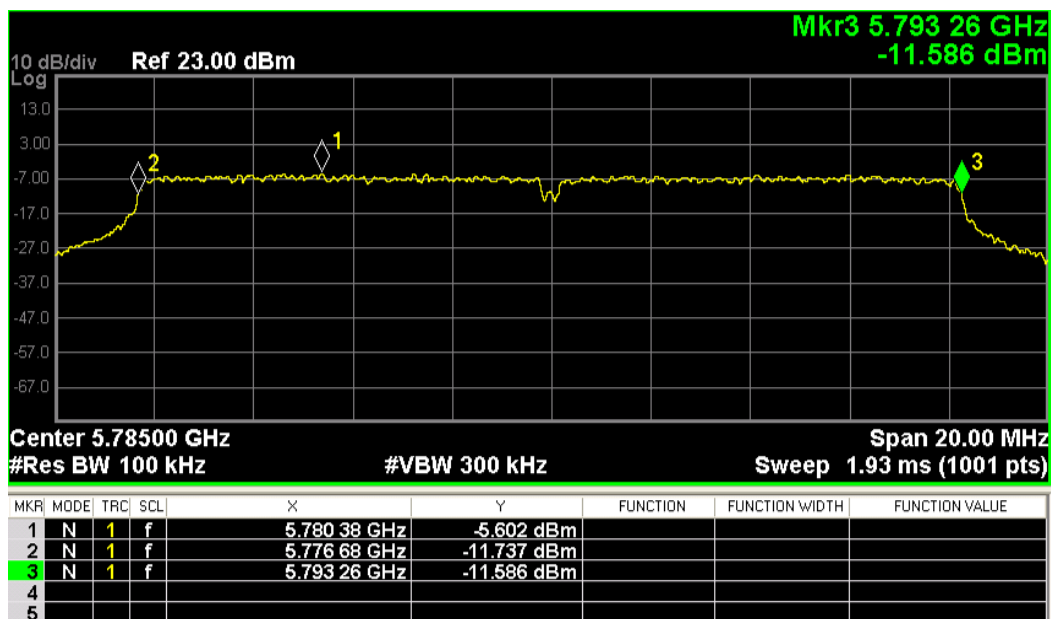
Data Rate (Mbps)	Carrier Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
6	5745	5736.68	5753.26	16.58	16.51
	5785	5776.68	5793.26	16.58	16.51
	5825	5816.68	5833.26	16.58	16.50
24	5745	5736.70	5753.24	16.54	16.45
	5785	5776.70	5793.24	16.54	16.45
	5825	5816.70	5833.24	16.54	16.47
54	5745	5736.70	5753.24	16.54	16.49
	5785	5776.70	5793.24	16.54	16.47
	5825	5816.72	5833.24	16.52	16.47

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Data Rate: 6 Mbps

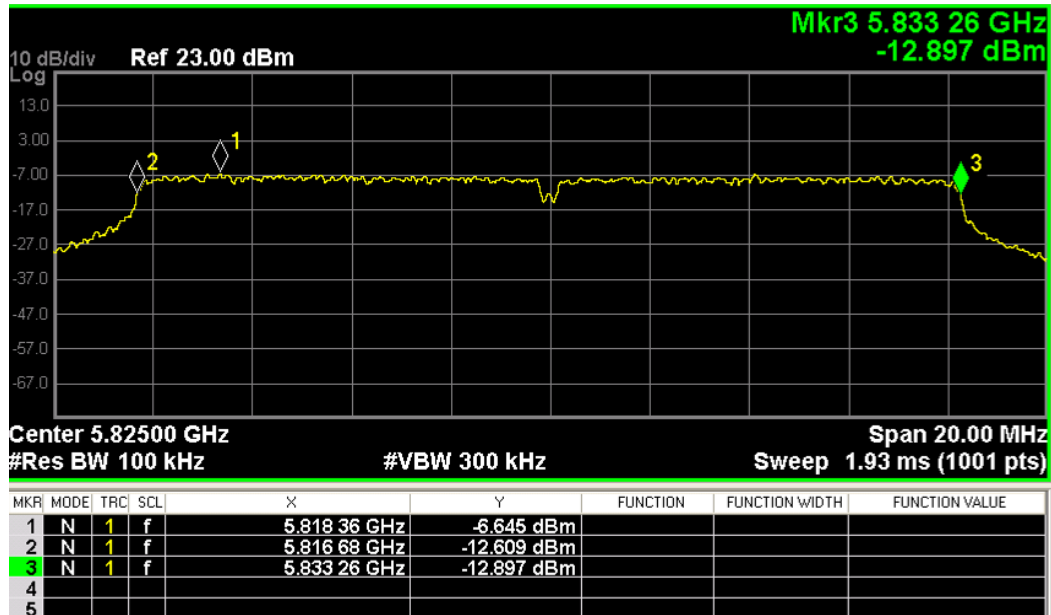
Channel frequency: 5745 MHz



Data Rate: 6 Mbps

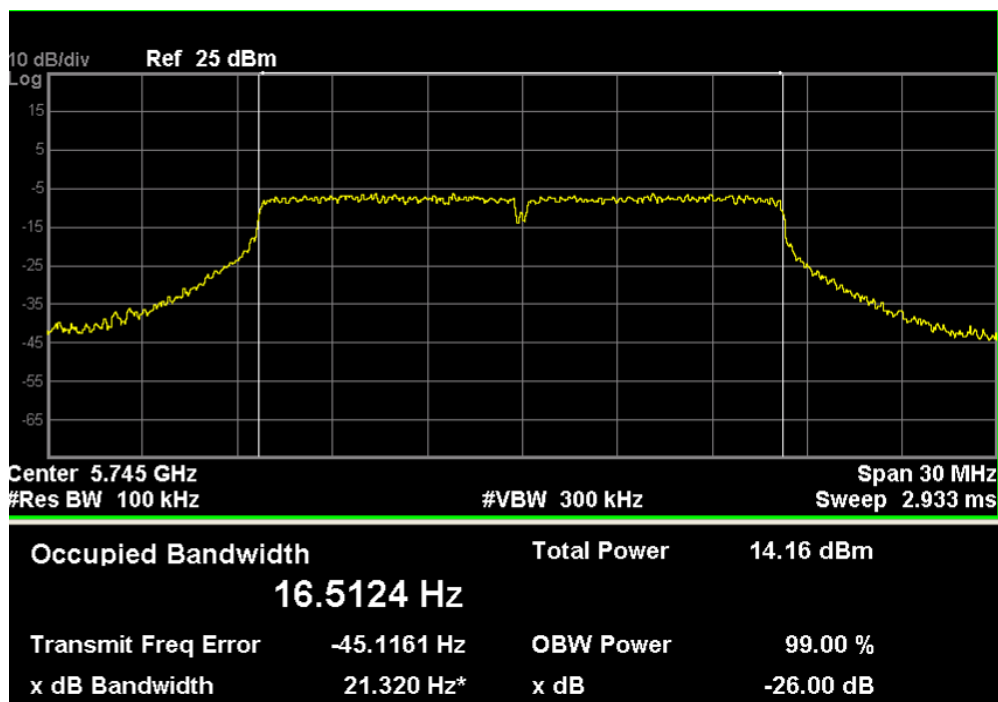
Channel frequency: 5785 MHz

www.tuv.com



Data Rate: 6 Mbps

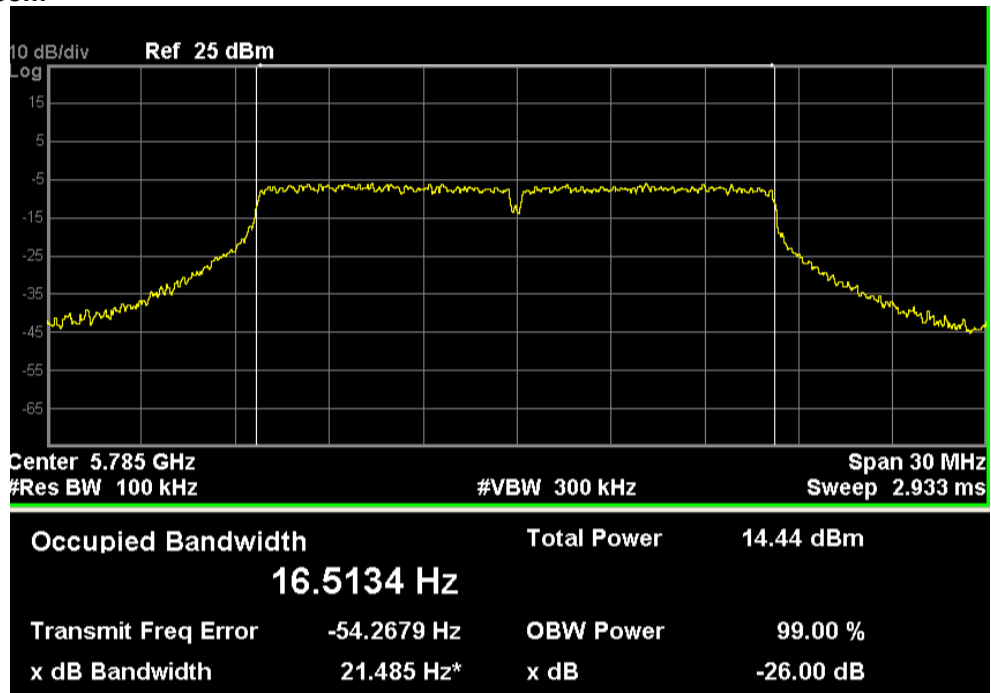
Channel frequency: 5825 MHz



Data Rate: 6 Mbps

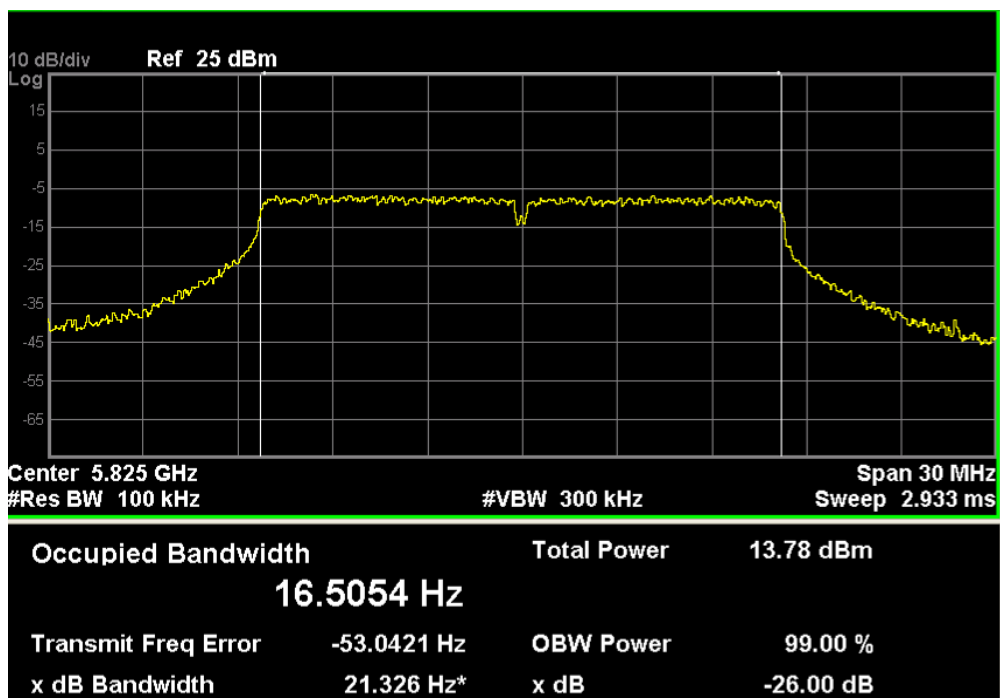
99% Occupied Bandwidth: Channel 5745MHz

www.tuv.com



Data Rate: 6 Mbps

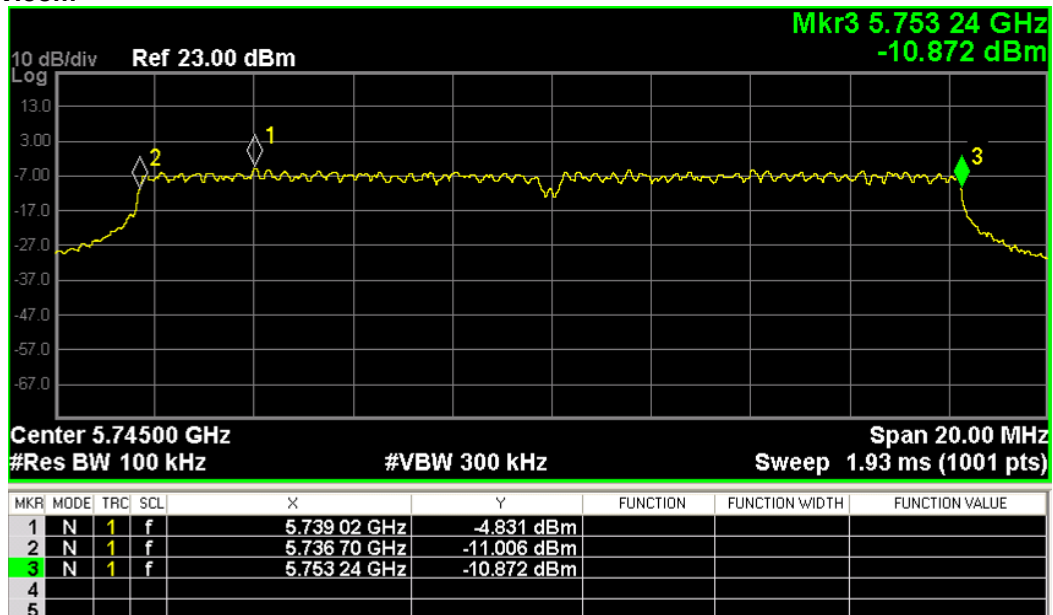
99% Occupied Bandwidth: Channel 5785MHz



Data Rate: 6 Mbps

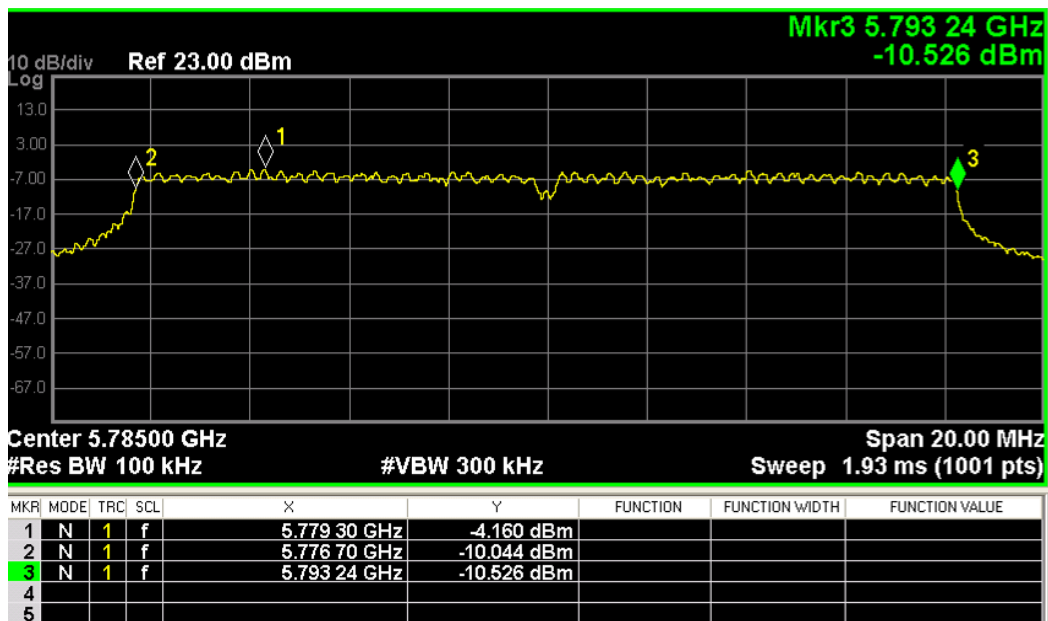
99% Occupied Bandwidth: Channel 5825MHz

www.tuv.com



Data Rate: 24 Mbps

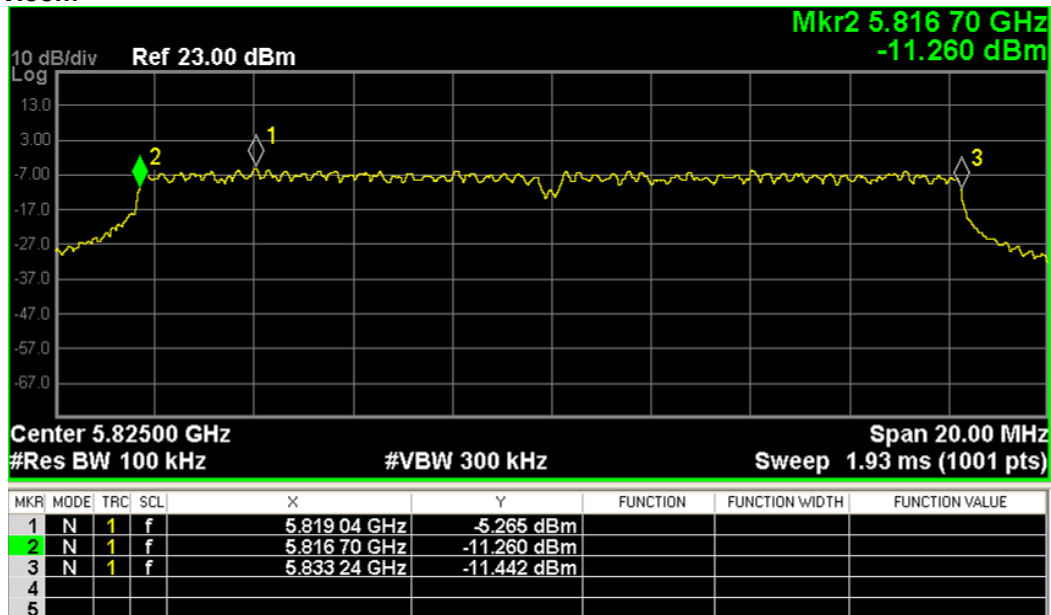
Channel frequency: 5745 MHz



Data Rate: 24 Mbps

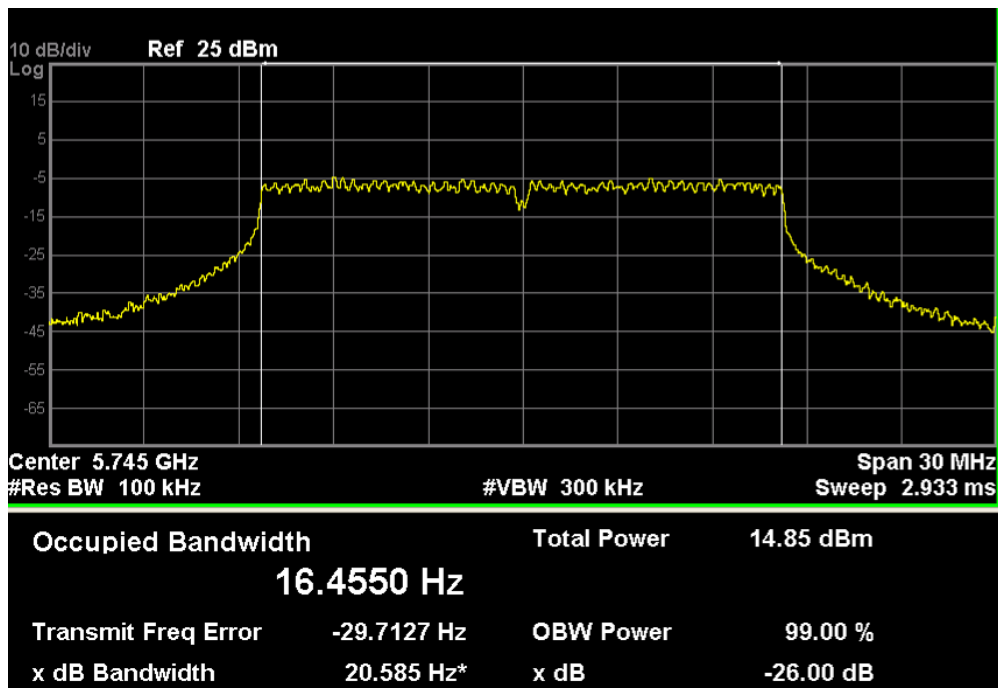
Channel frequency: 5785 MHz

www.tuv.com



Data Rate: 24 Mbps

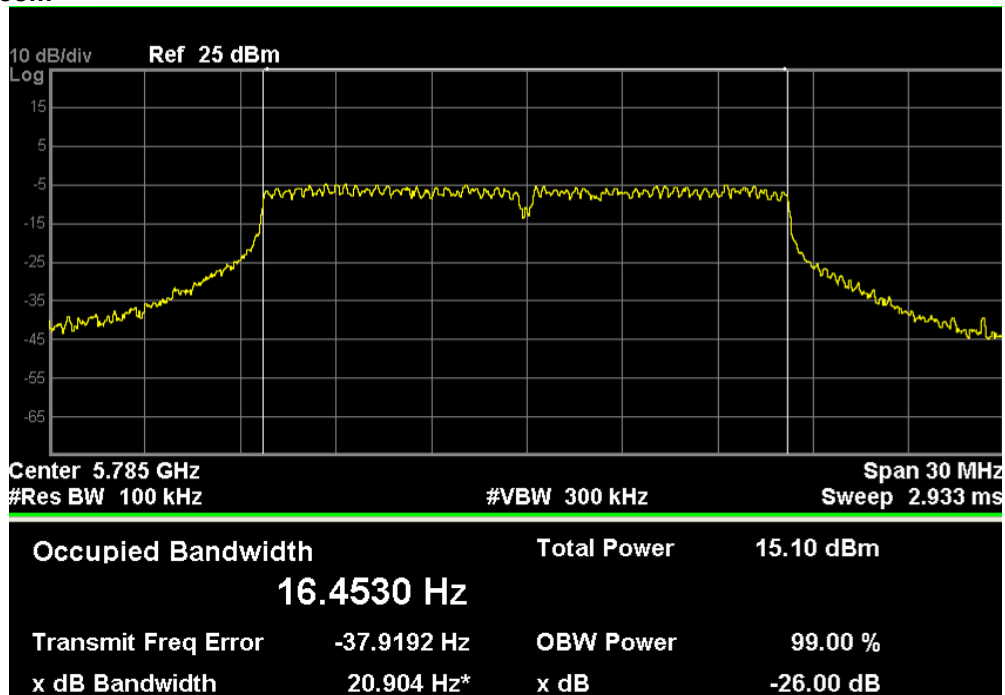
Channel frequency: 5825 MHz



Data Rate: 24 Mbps

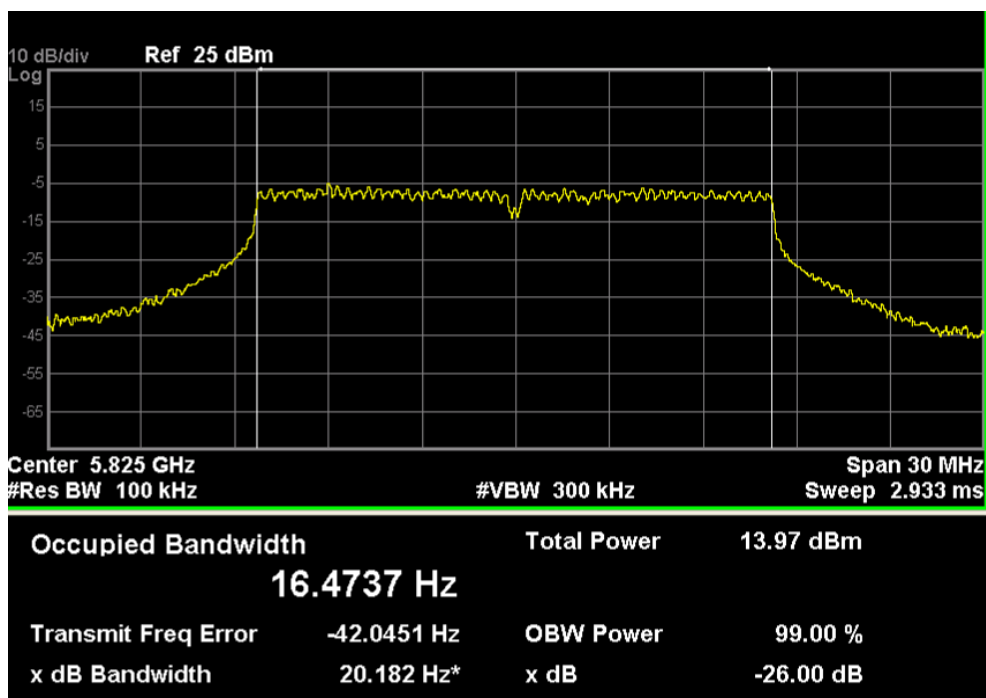
99% Occupied Bandwidth: Channel 5745MHz

www.tuv.com



Data Rate: 24 Mbps

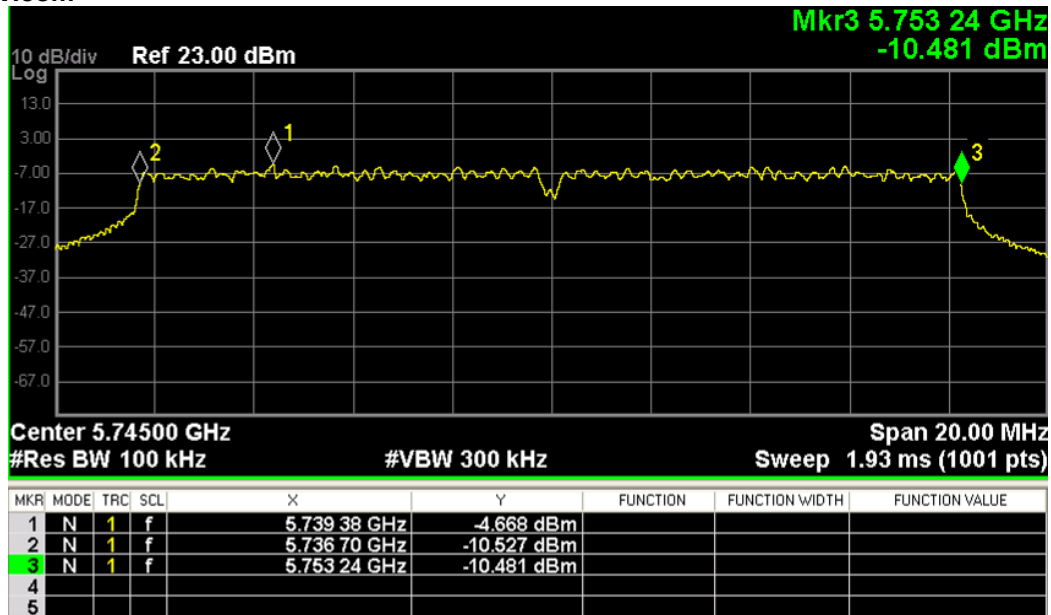
99% Occupied Bandwidth: Channel 5785MHz



Data Rate: 24 Mbps

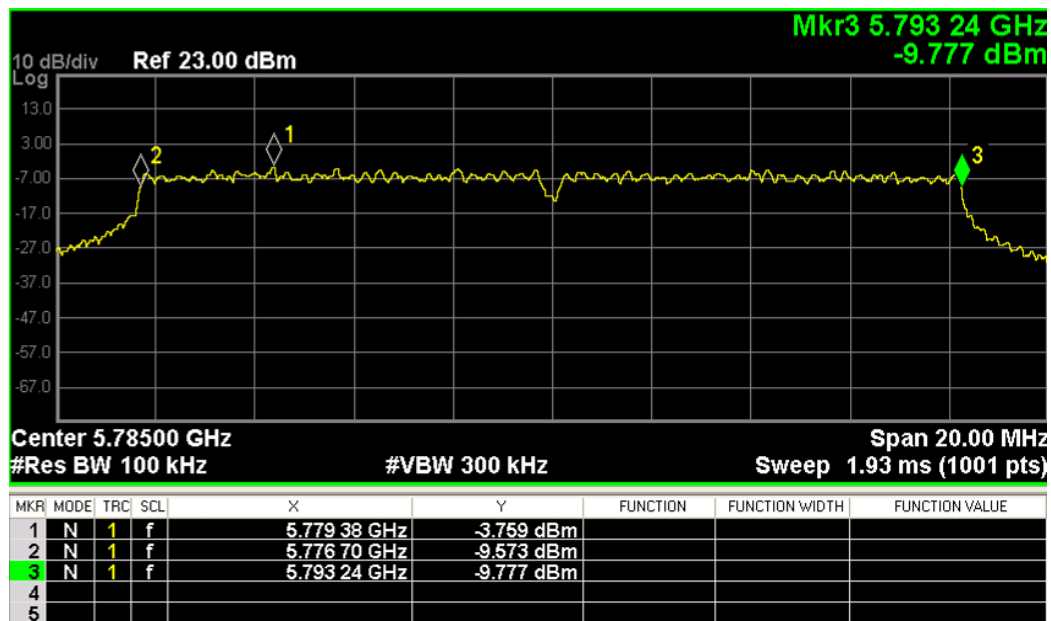
99% Occupied Bandwidth: Channel 5825MHz

www.tuv.com



Data Rate: 54 Mbps

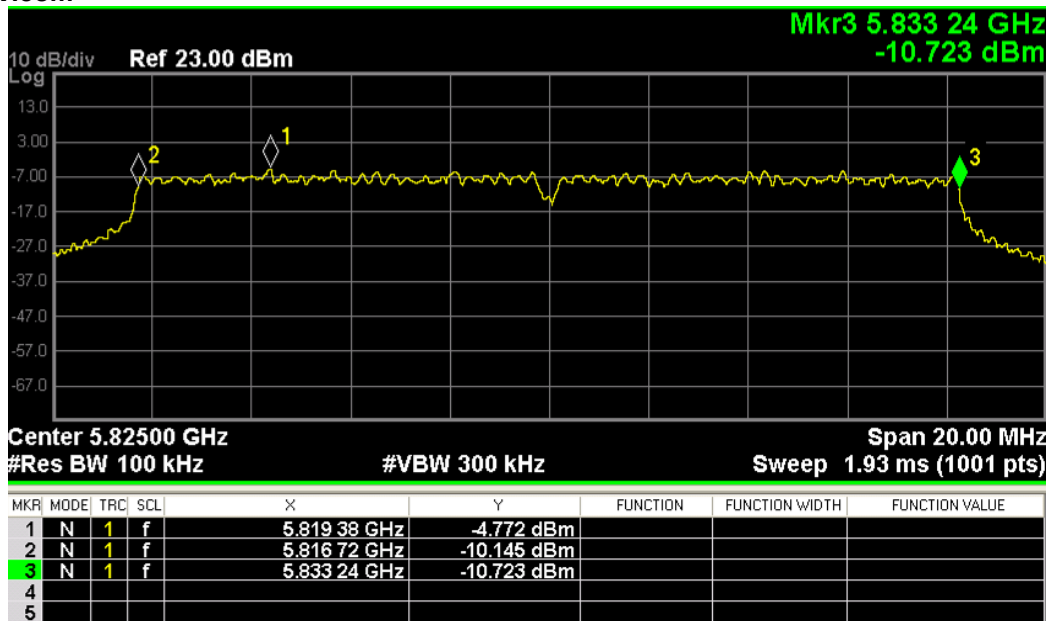
Channel frequency: 5745 MHz



Data Rate: 54 Mbps

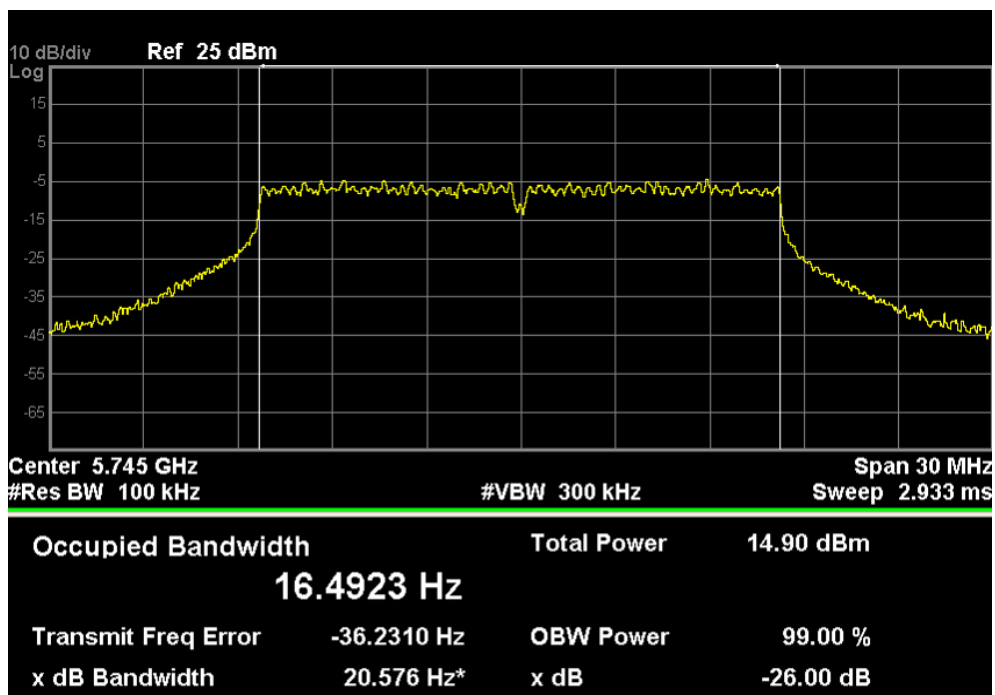
Channel frequency: 5785 MHz

www.tuv.com



Data Rate: 54 Mbps

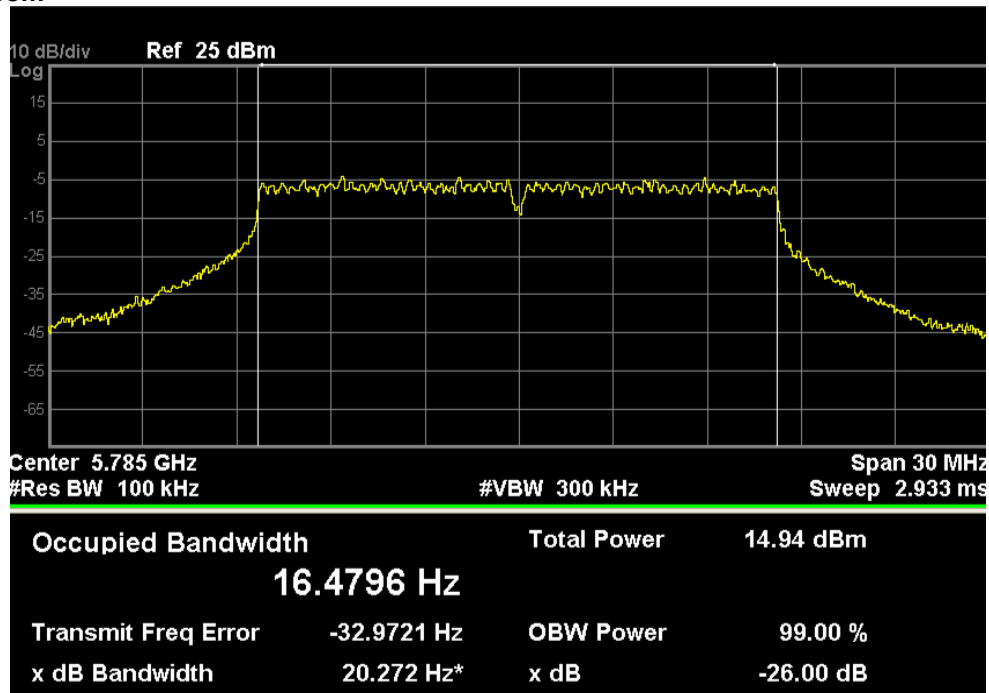
Channel frequency: 5825 MHz



Data Rate: 54 Mbps

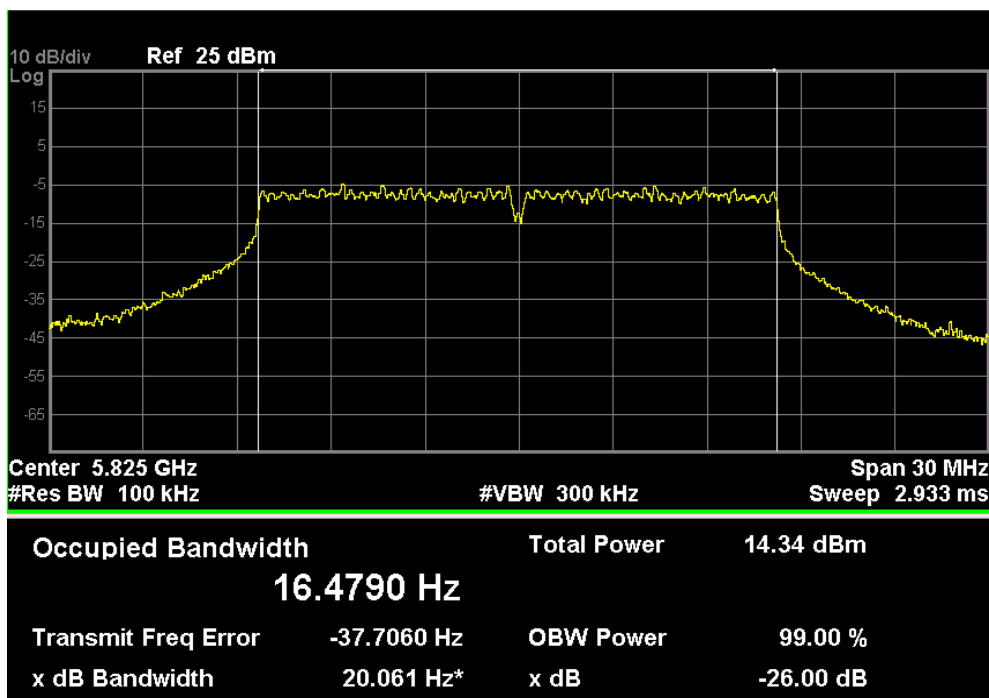
99% Occupied Bandwidth: Channel 5745MHz

www.tuv.com



Data Rate: 54 Mbps

99% Occupied Bandwidth: Channel 5785MHz



Data Rate: 54 Mbps

99% Occupied Bandwidth: Channel 5825MHz

Band-edge Compliance

Section 15.247(d)

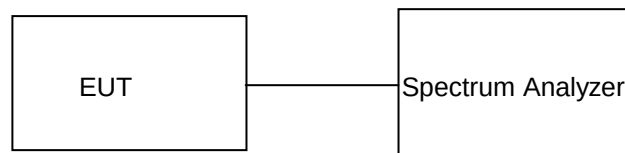
Result
Pass

Test Specification
Detector Function
Requirement

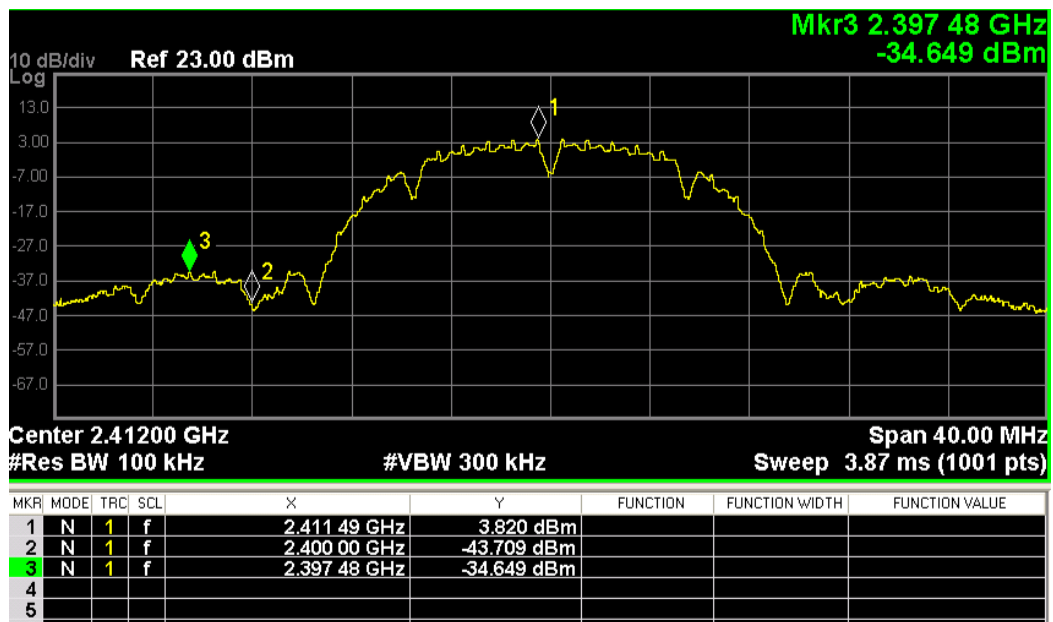
FCC Part 15 Section 15.247(d)

Peak

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, and provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

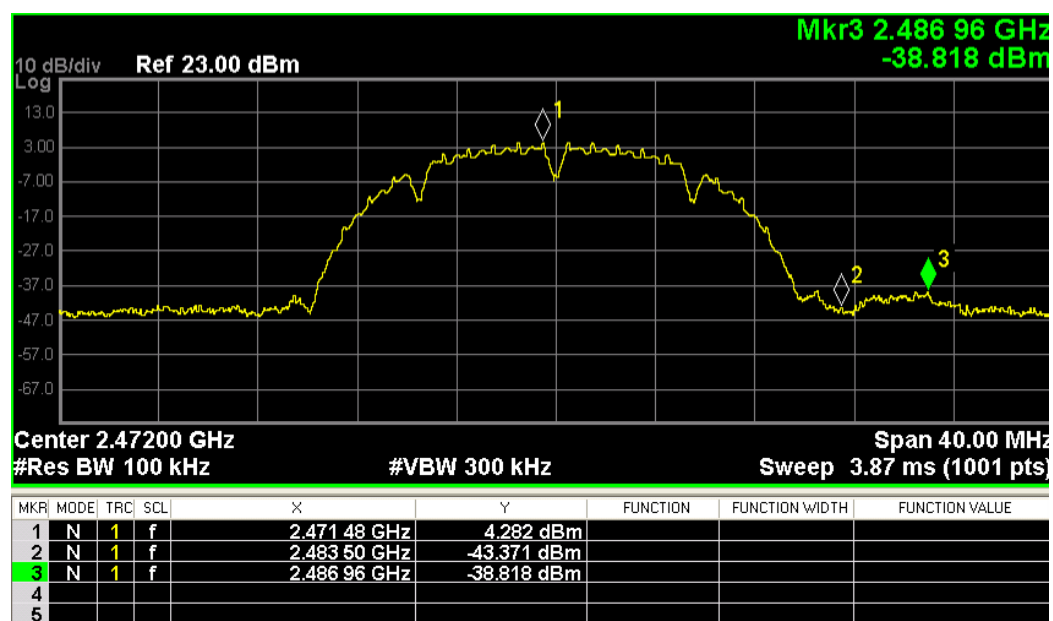
Test Method:

Test Result:
Modulation: 802.11b

Data Rate (Mbps)	Channel	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dB)
			Frequency (MHz)	Value (dB)	
1	Low	2412	2400.00	-38.46	-30.00
	High	2472	2483.50	-43.09	-30.00
11	Low	2412	2400.00	-40.95	-30.00
	High	2472	2483.50	-46.41	-30.00



Data Rate: 1 Mbps

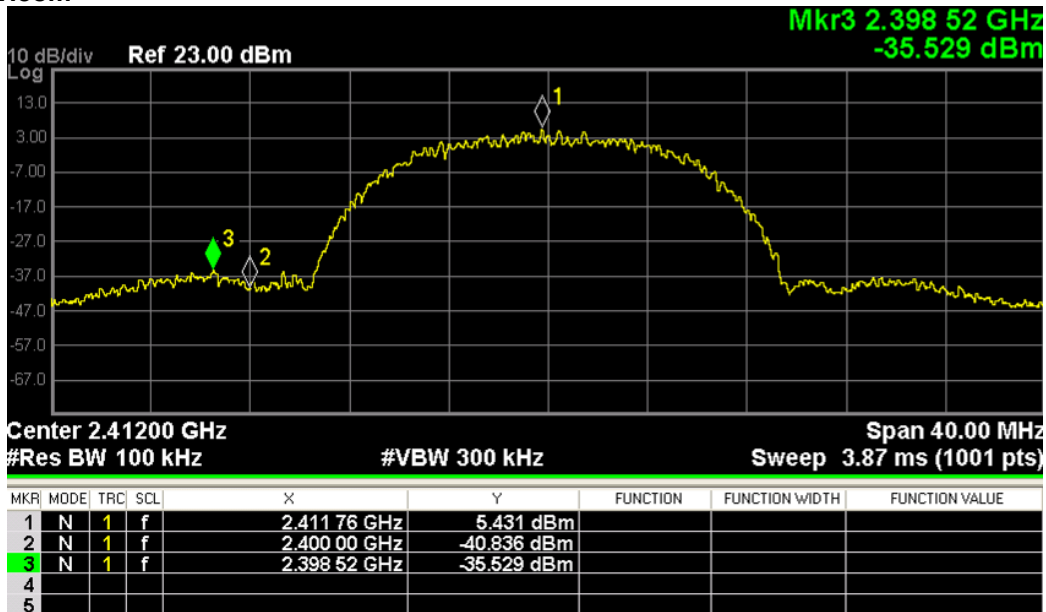
Channel frequency: 2412 MHz



Data Rate: 1 Mbps

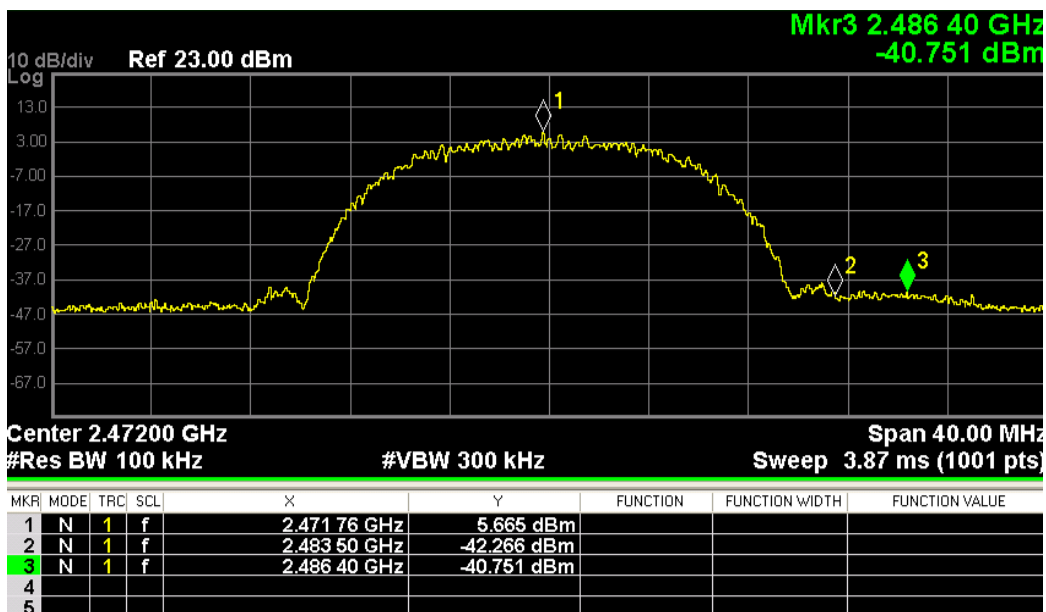
Channel frequency: 2472 MHz

www.tuv.com



Data Rate: 11 Mbps

Channel frequency: 2412 MHz



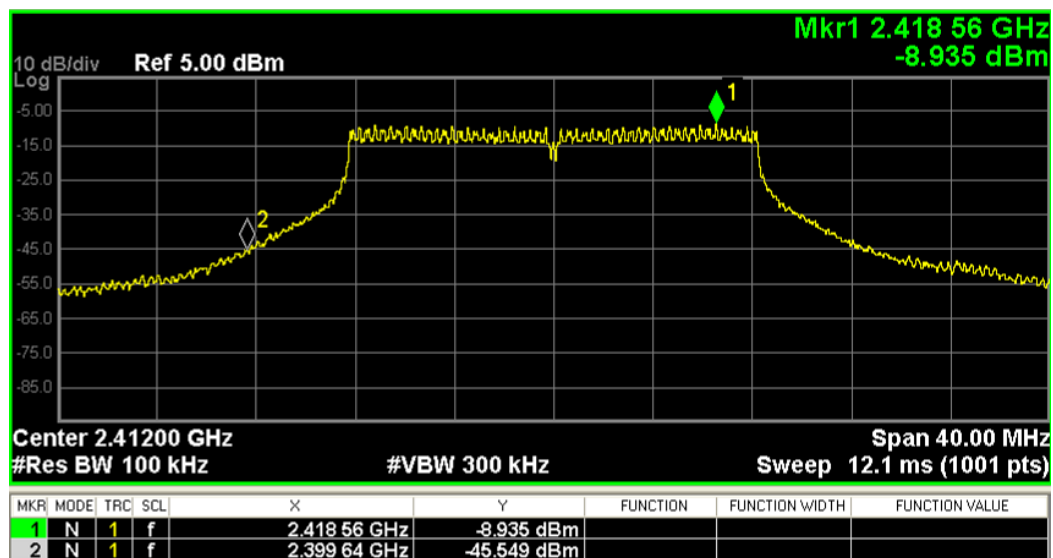
Data Rate: 11 Mbps

Channel frequency: 2472 MHz

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Test Results:
Modulation: 802.11g

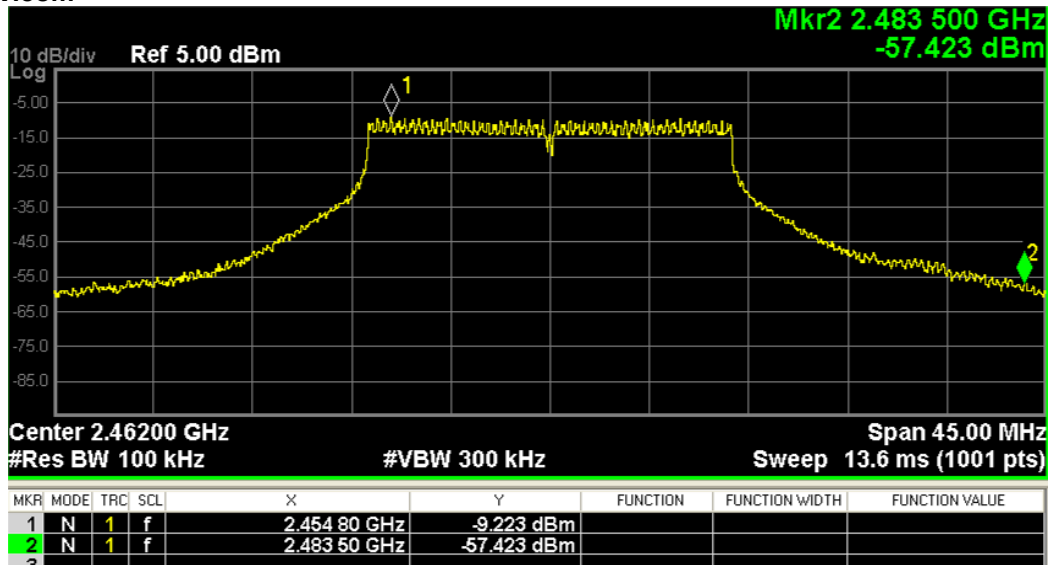
Data Rate (Mbps)	Channel	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dB)
			Frequency (MHz)	Value (dB)	
6	Low	2412	2400.00	-36.61	-30.00
	High	2462	2483.50	-48.20	-30.00
24	Low	2412	2400.00	-34.86	-30.00
	High	2462	2483.50	-47.36	-30.00
54	Low	2412	2400.00	-34.71	-30.00
	High	2462	2483.50	-49.14	-30.00



Data Rate: 6 Mbps

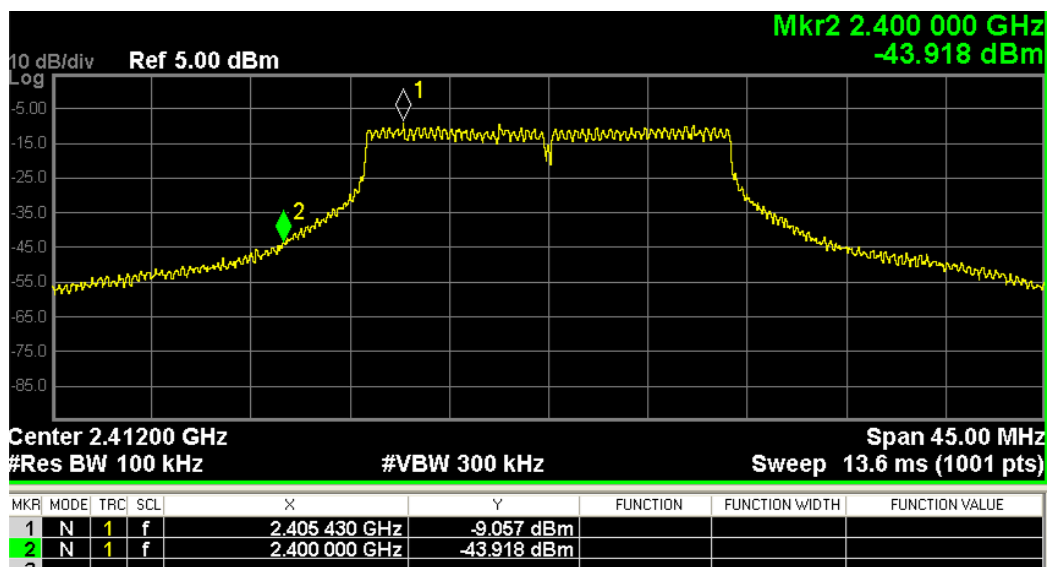
Channel frequency: 2412 MHz

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Data Rate: 6 Mbps

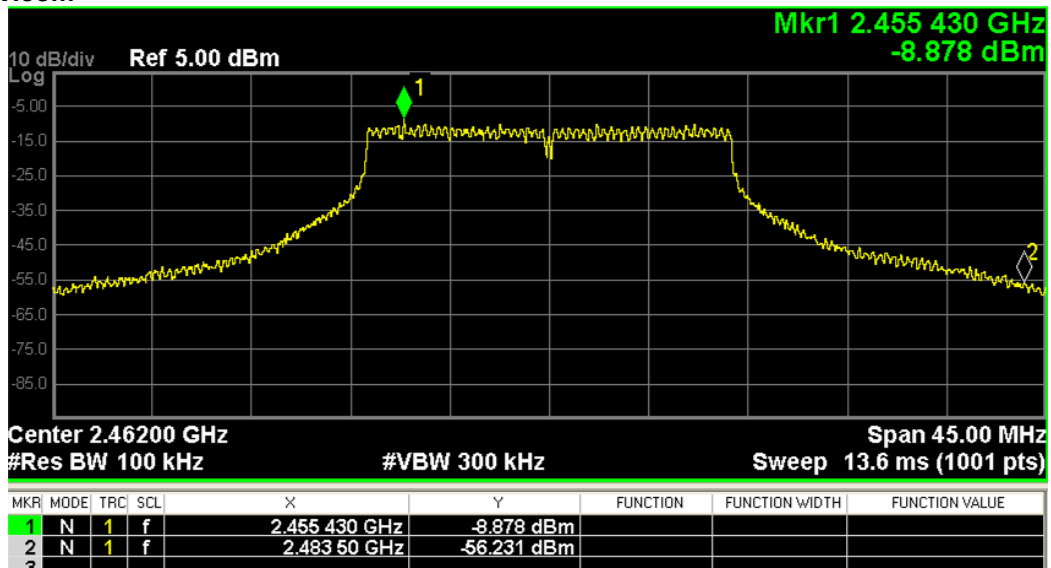
Channel frequency: 2462 MHz



Data Rate: 24 Mbps

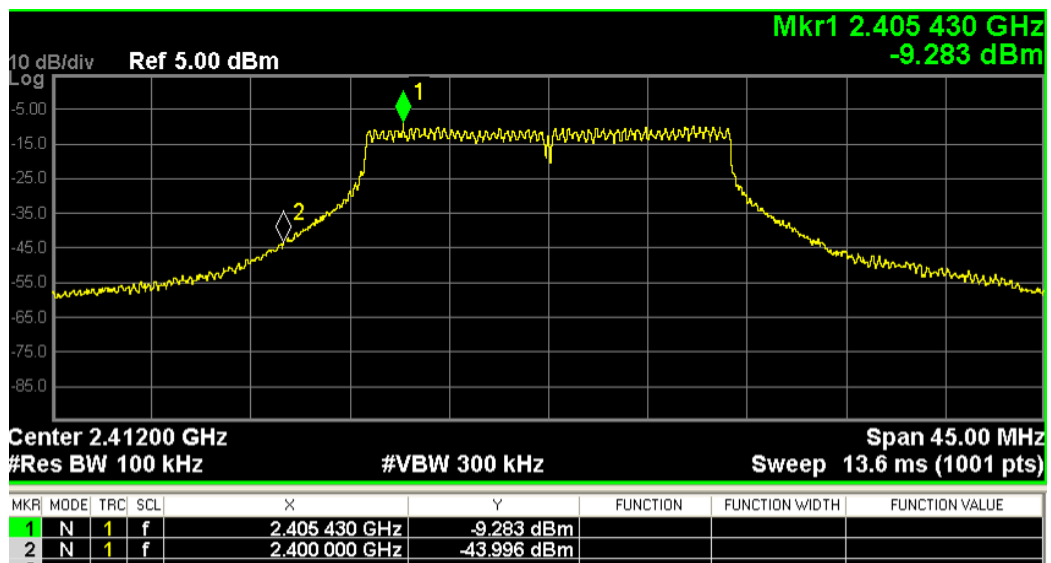
Channel frequency: 2412 MHz

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Data Rate: 24 Mbps

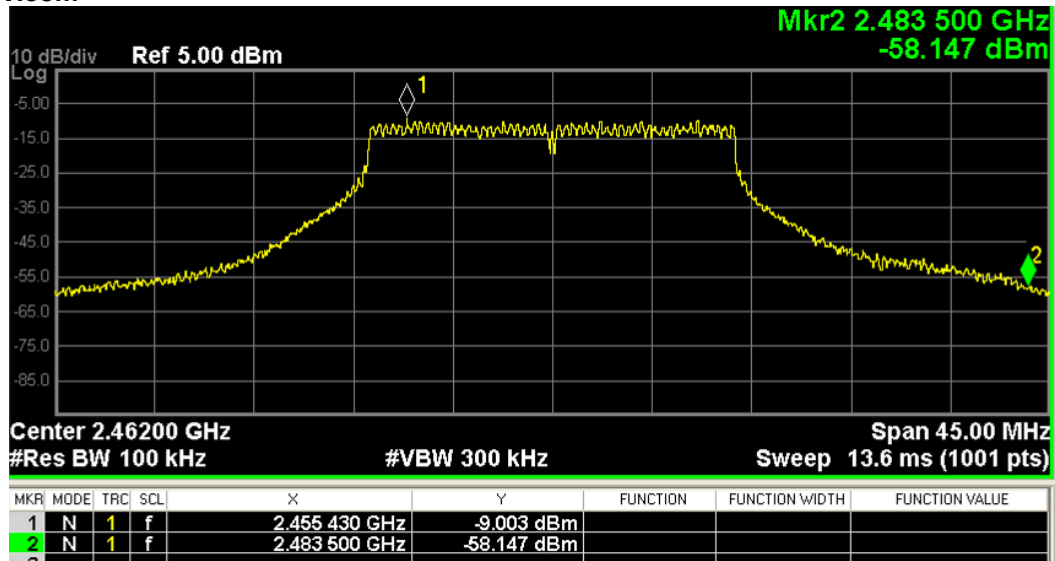
Channel frequency: 2462 MHz



Data Rate: 54 Mbps

Channel frequency: 2412 MHz

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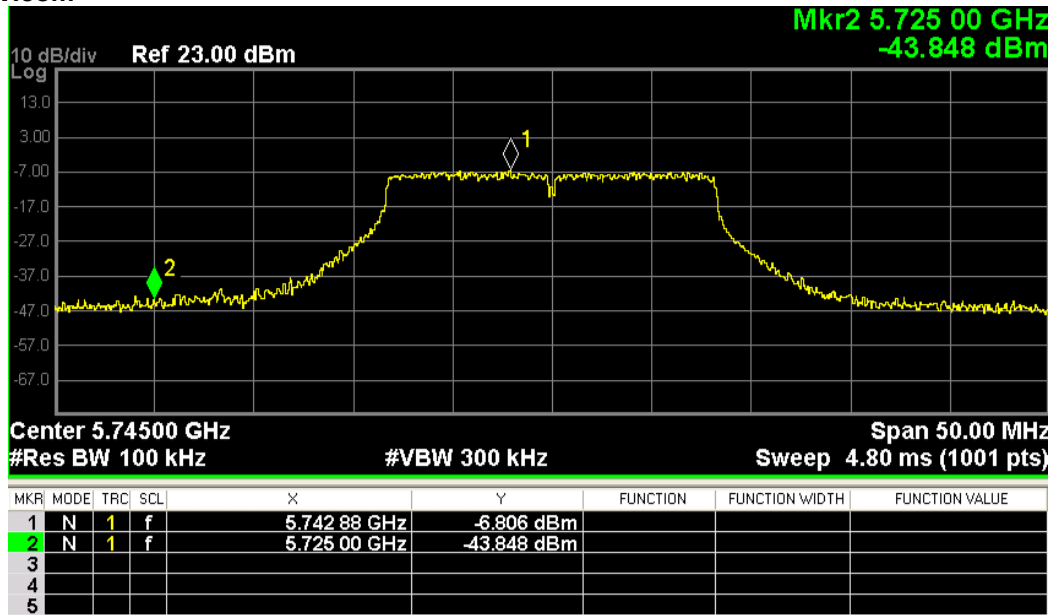
Data Rate: 54 Mbps

Channel frequency: 2462 MHz

Modulation: 802.11a

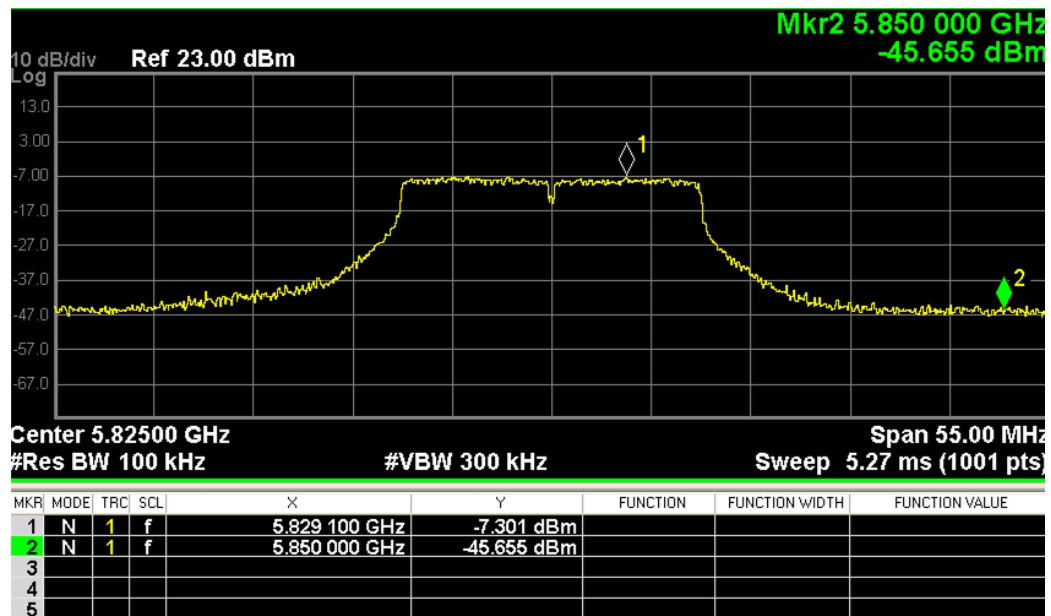
Data Rate (Mbps)	Channel	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dB)
			Frequency (MHz)	Value (dB)	
6	Low	5745	5725	-37.04	-30.00
	High	5825	5850	-38.35	-30.00
24	Low	5745	5725	-37.49	-30.00
	High	5825	5850	-38.99	-30.00
54	Low	5745	5725	-39.46	-30.00
	High	5825	5850	-39.83	-30.00

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Data Rate: 6 Mbps

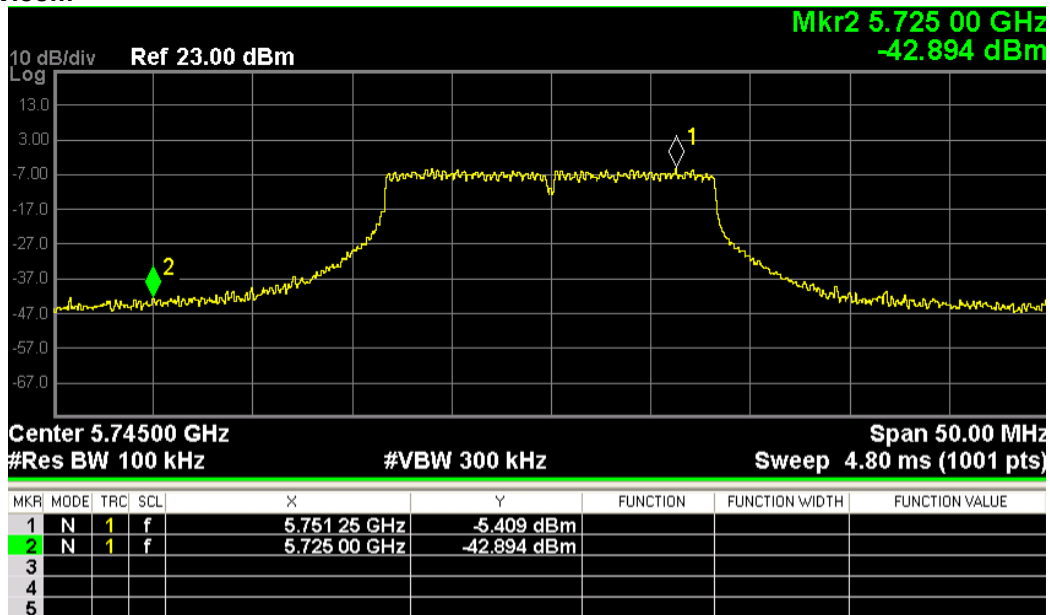
Channel frequency: 5745 MHz



Data Rate: 6 Mbps

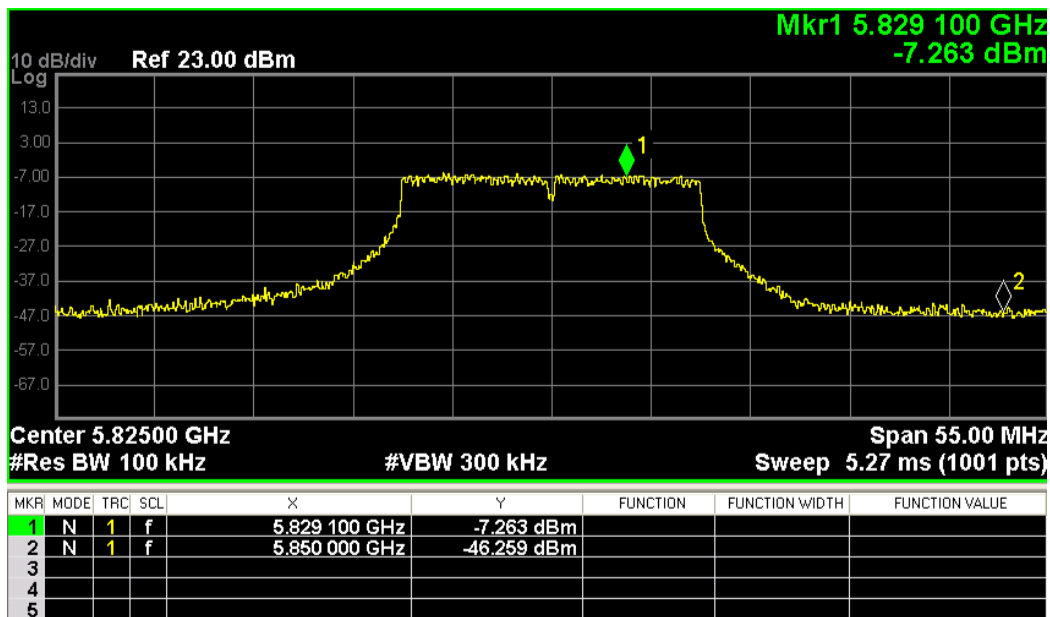
Channel frequency: 5825 MHz

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Data Rate: 24 Mbps

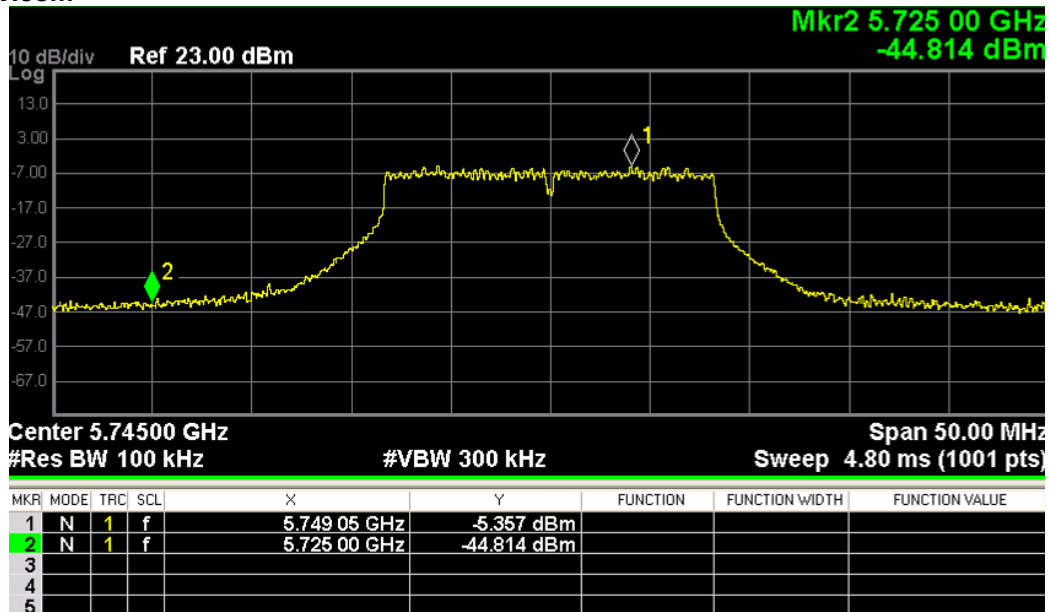
Channel frequency: 5745 MHz



Data Rate: 24 Mbps

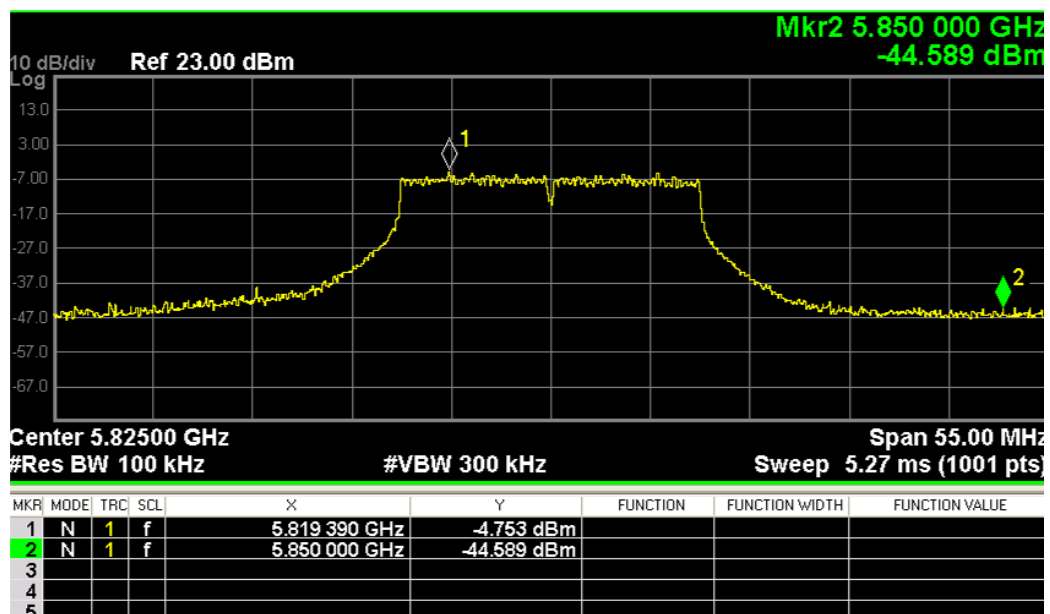
Channel frequency: 5825 MHz

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Data Rate: 54 Mbps

Channel frequency: 5745 MHz



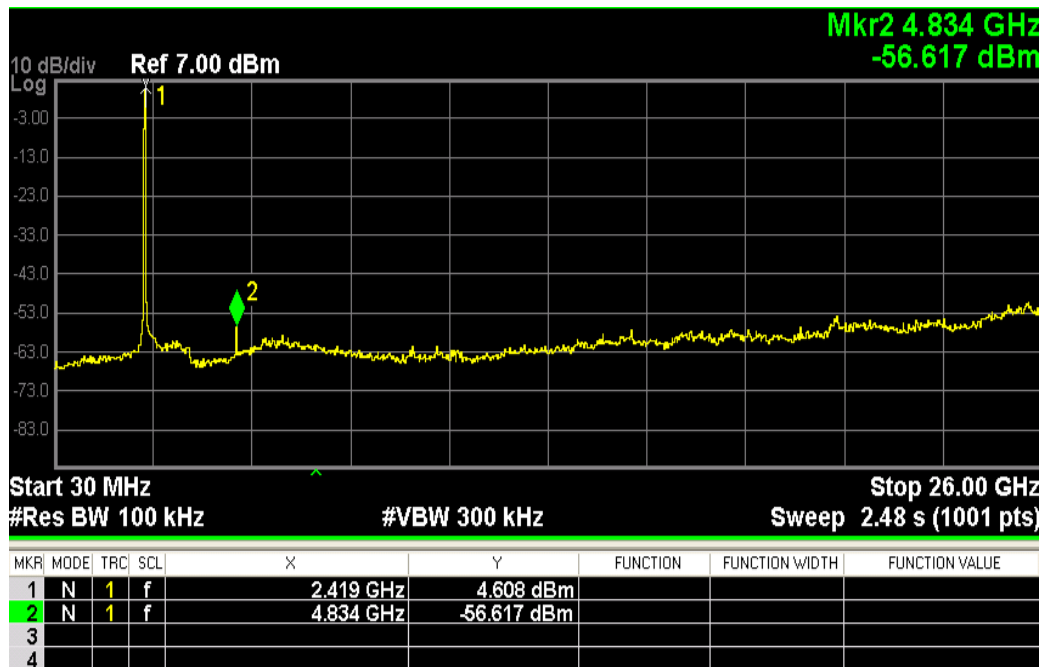
Data Rate: 54 Mbps

Channel frequency: 5825 MHz

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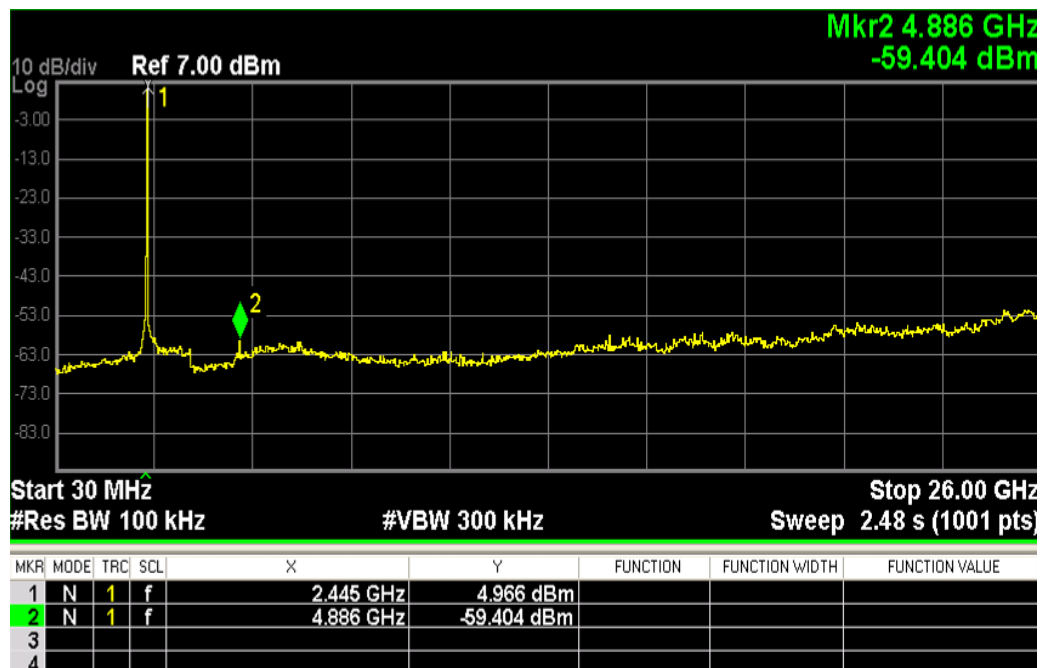
Conducted Spurious Emission

Modulation: 802.11b



Data Rate: 1 Mbps

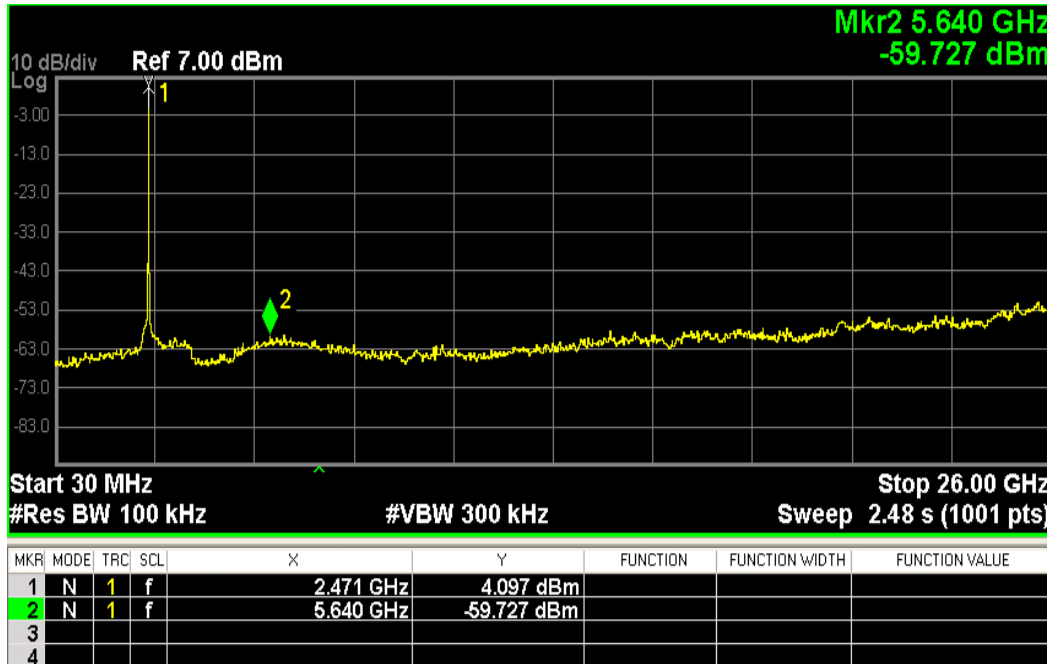
Channel frequency: 2412 MHz



Data Rate: 1 Mbps

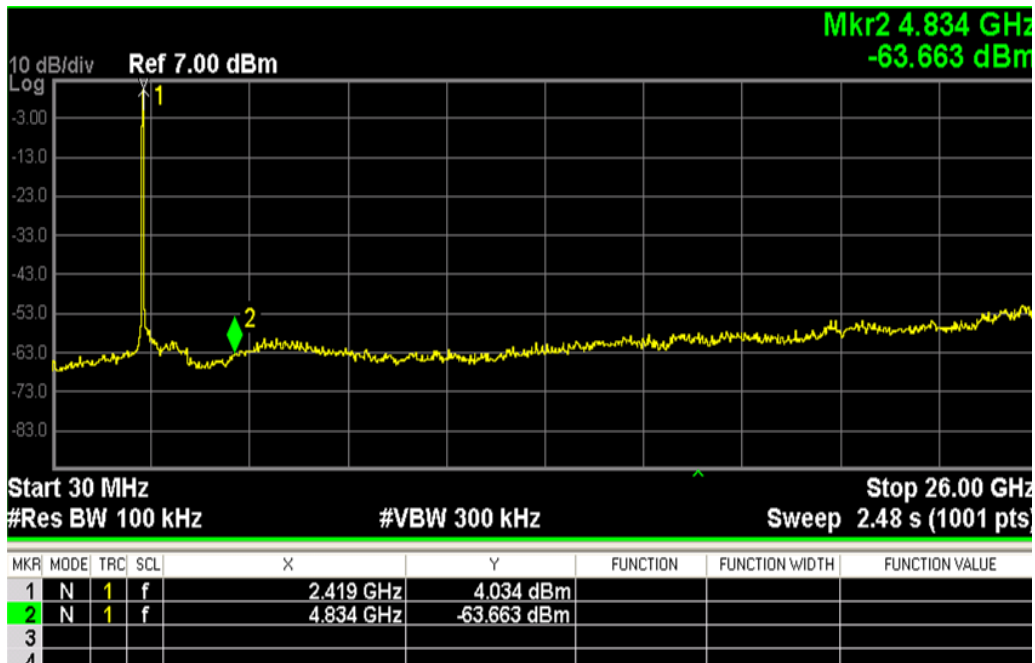
Channel frequency: 2442 MHz

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Data Rate: 1 Mbps

Channel frequency: 2472 MHz



Data Rate: 11 Mbps

Channel frequency: 2412 MHz

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Data Rate: 11 Mbps

Channel frequency: 2442 MHz

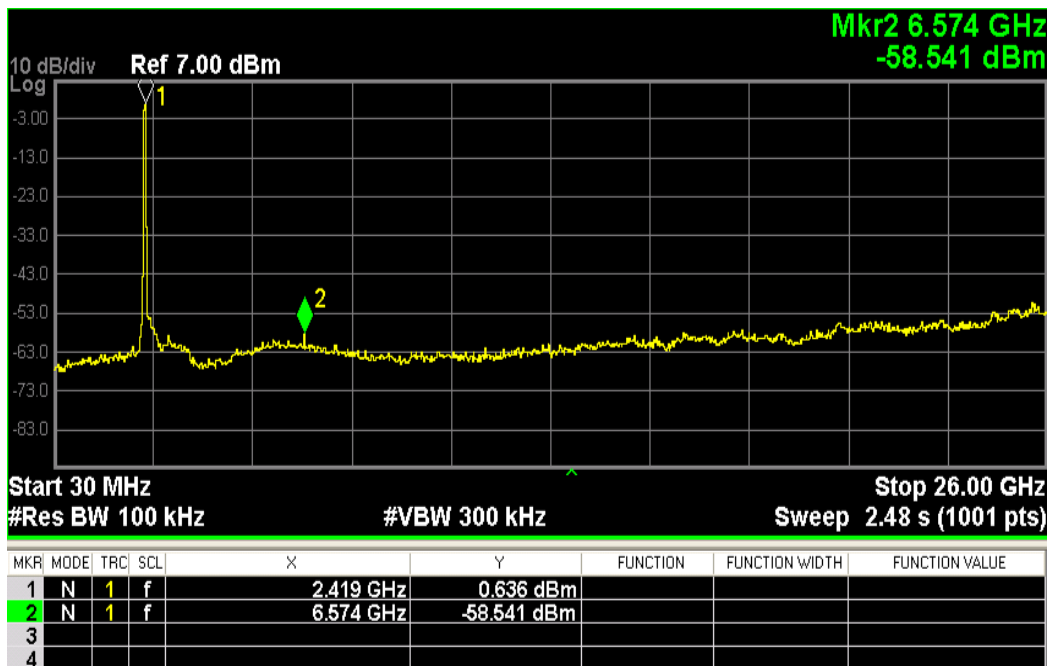


Data Rate: 11 Mbps

Channel frequency: 2472 MHz

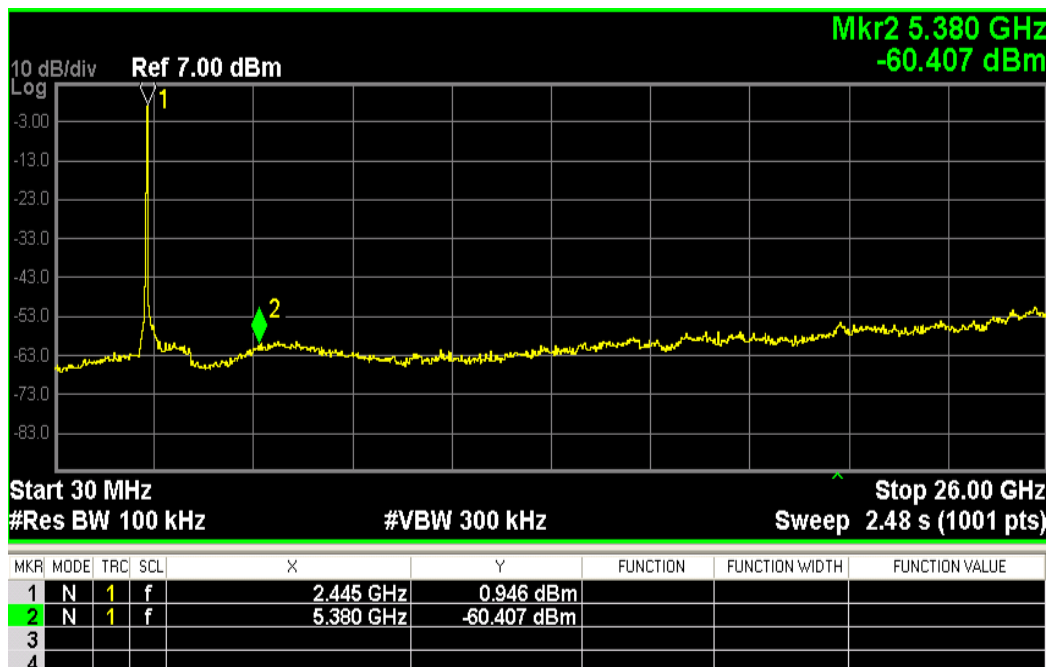
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Modulation: 802.11g



Data Rate: 6 Mbps

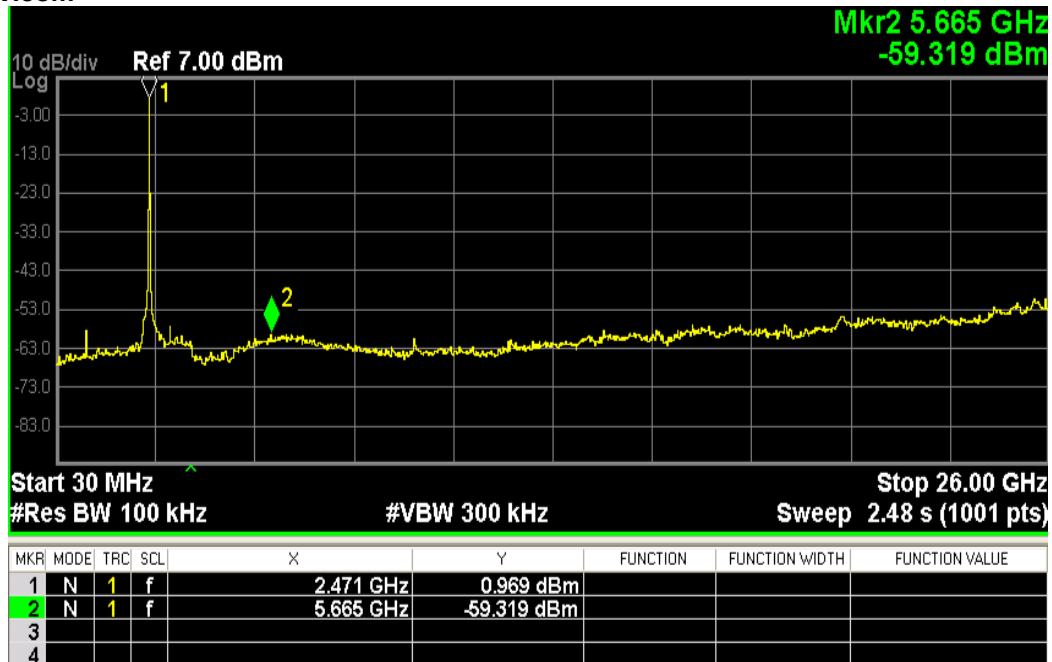
Channel frequency: 2412 MHz



Data Rate: 6 Mbps

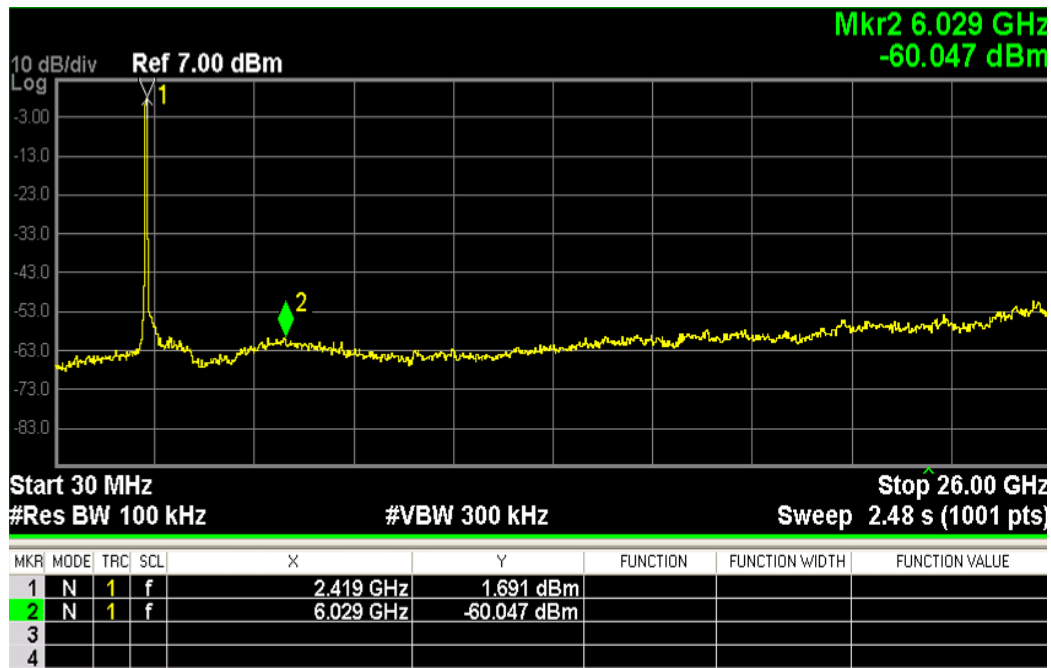
Channel frequency: 2437 MHz

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Data Rate: 6 Mbps

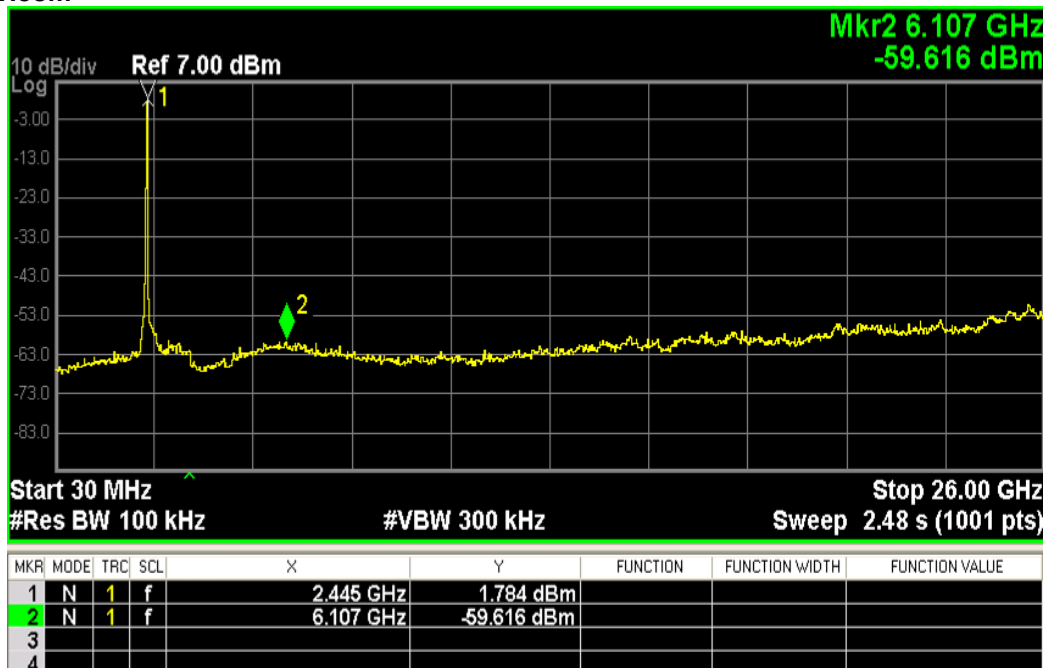
Channel frequency: 2462 MHz



Data Rate: 24 Mbps

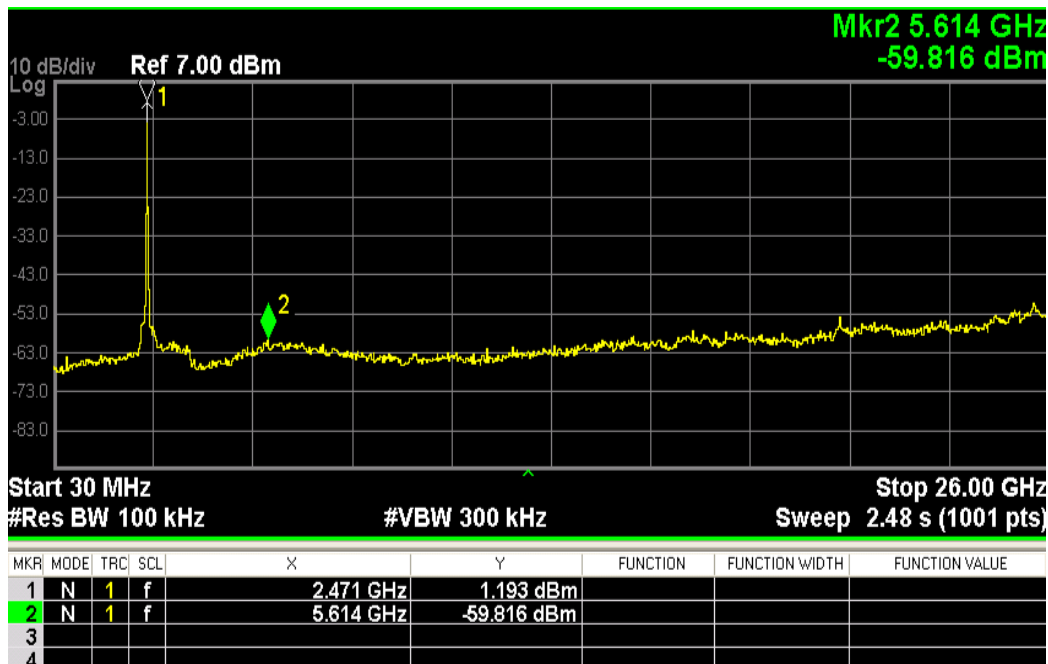
Channel frequency: 2412 MHz

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Data Rate: 24 Mbps

Channel frequency: 2437 MHz



Data Rate: 24 Mbps

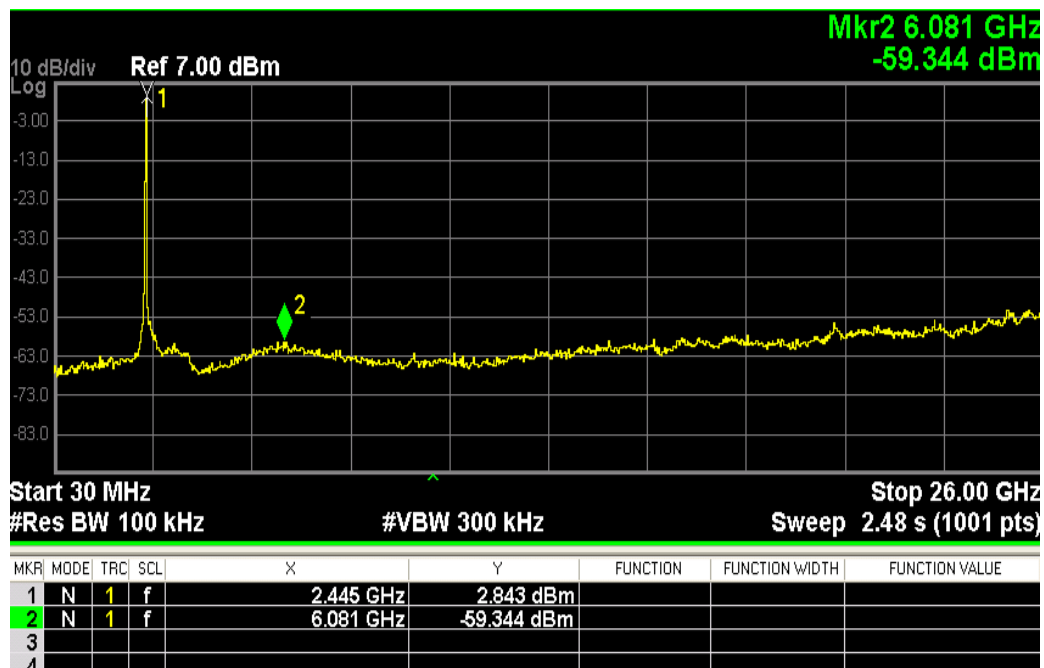
Channel frequency: 2472 MHz

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Data Rate: 54 Mbps

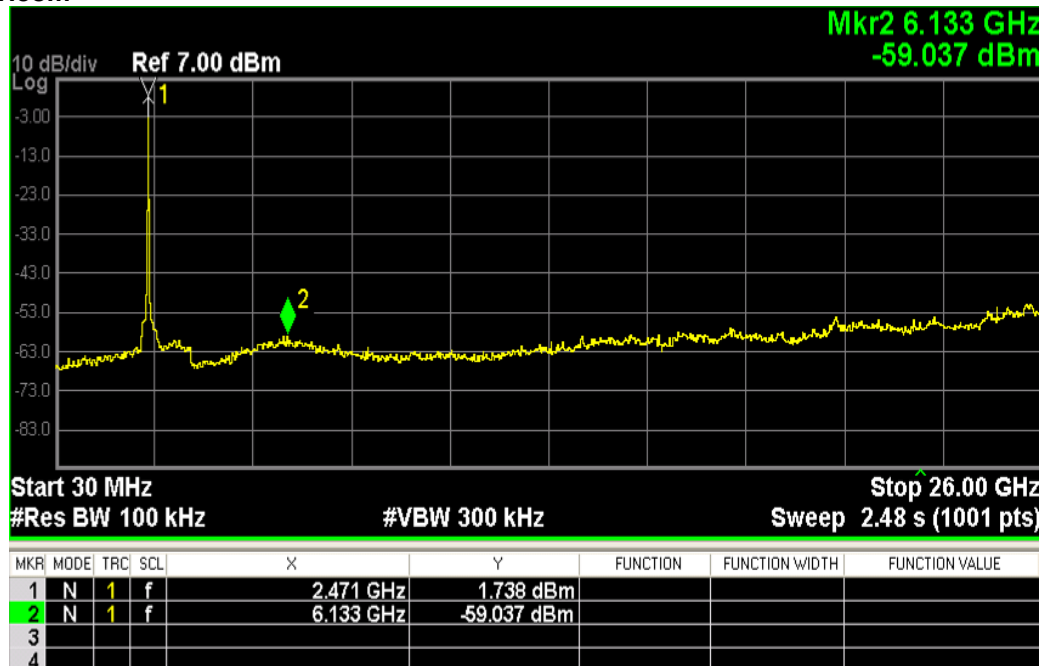
Channel frequency: 2412 MHz



Data Rate: 54 Mbps

Channel frequency: 2442 MHz

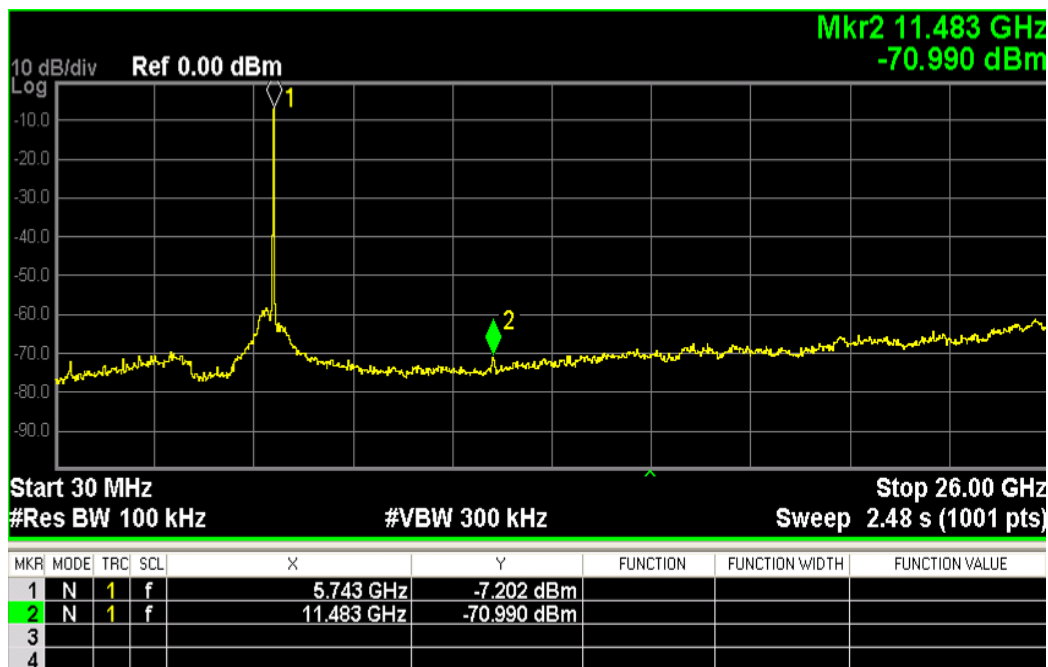
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Data Rate: 54 Mbps

Channel frequency: 2472 MHz

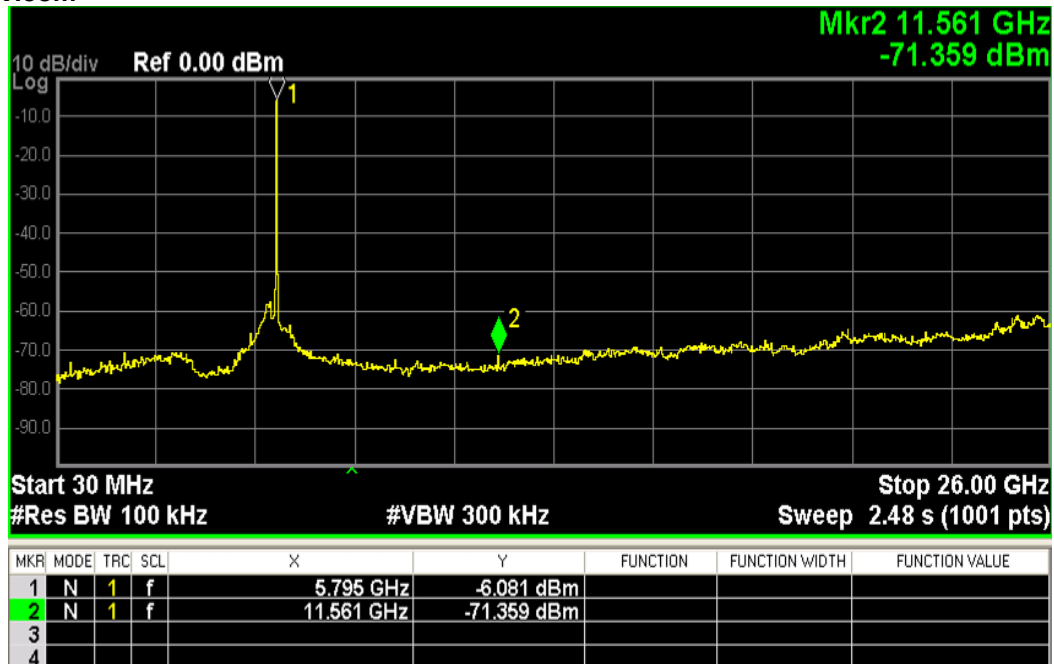
Modulation: 802.11a



Data Rate: 6 Mbps

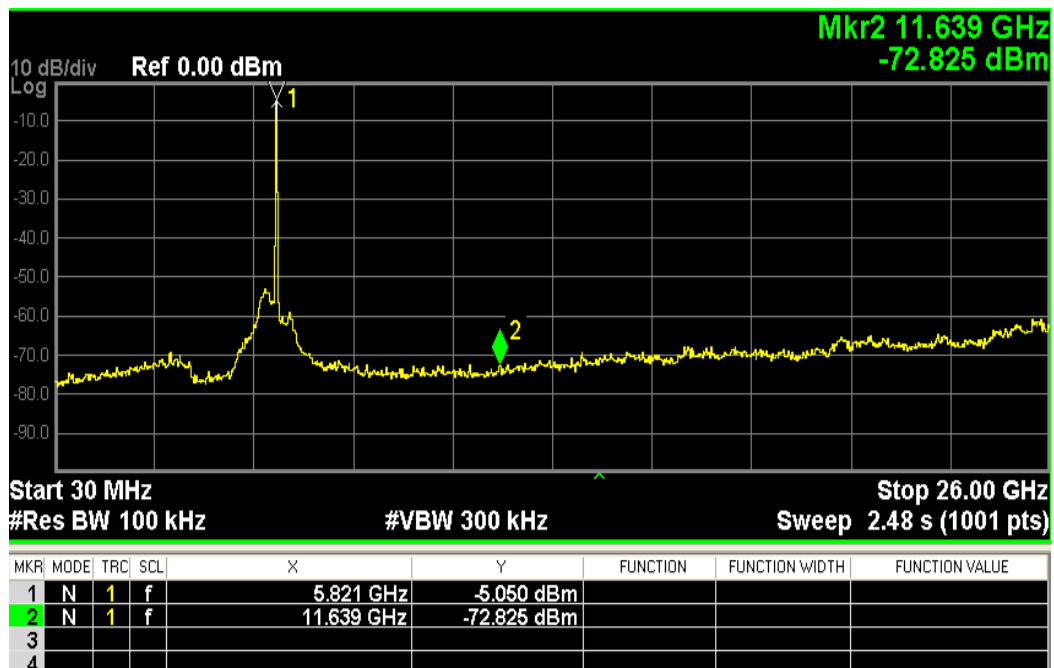
Channel frequency: 5745 MHz

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Data Rate: 6 Mbps

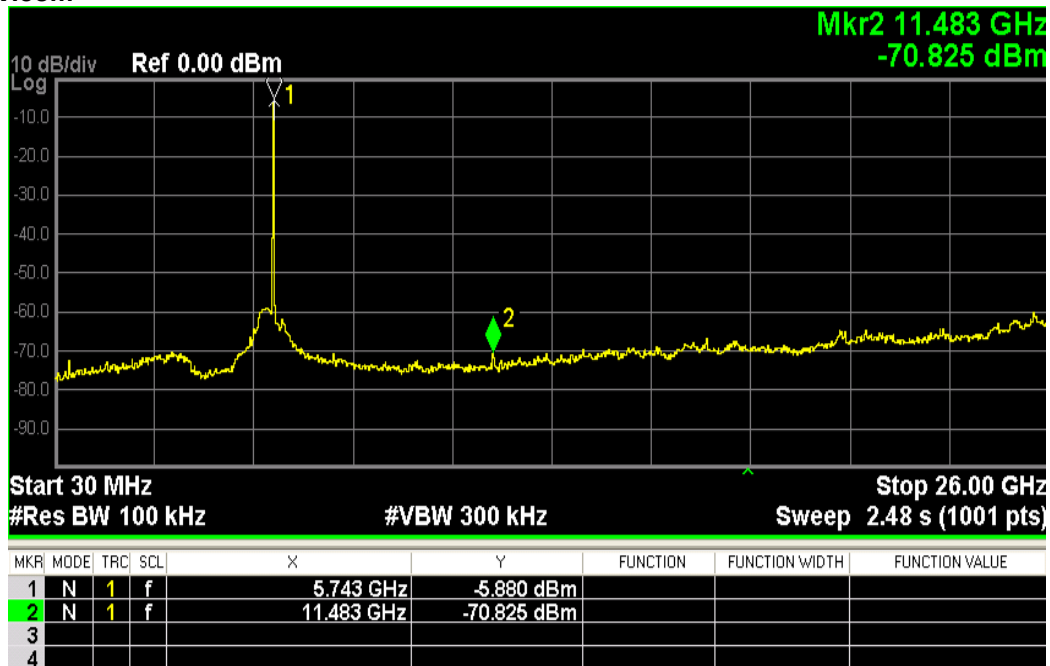
Channel frequency: 5785 MHz



Data Rate: 6 Mbps

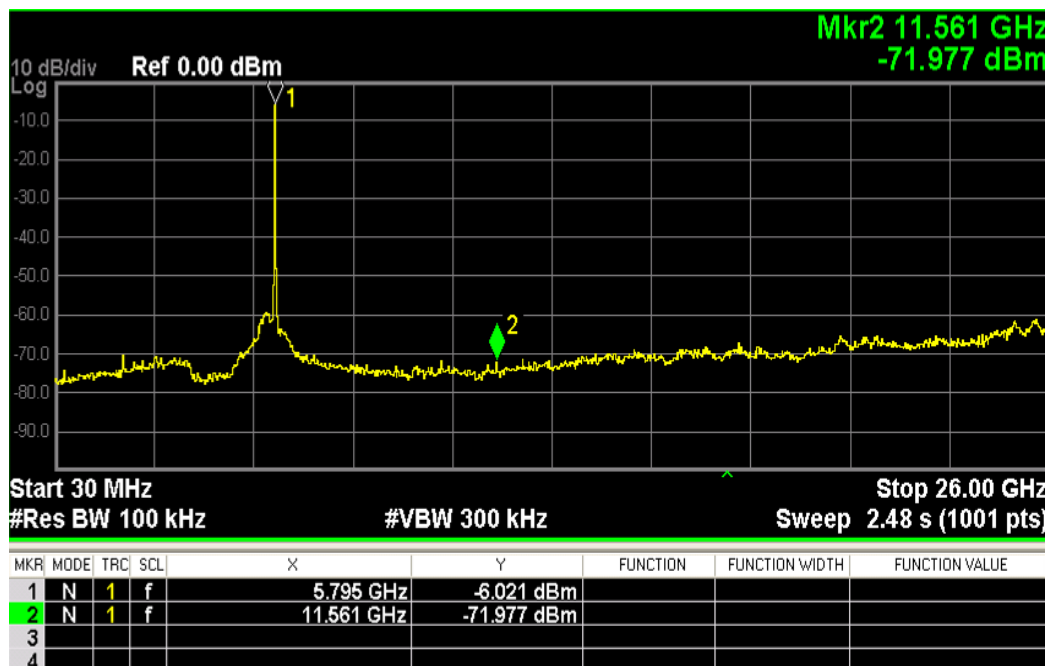
Channel frequency: 5825 MHz

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Data Rate: 24 Mbps

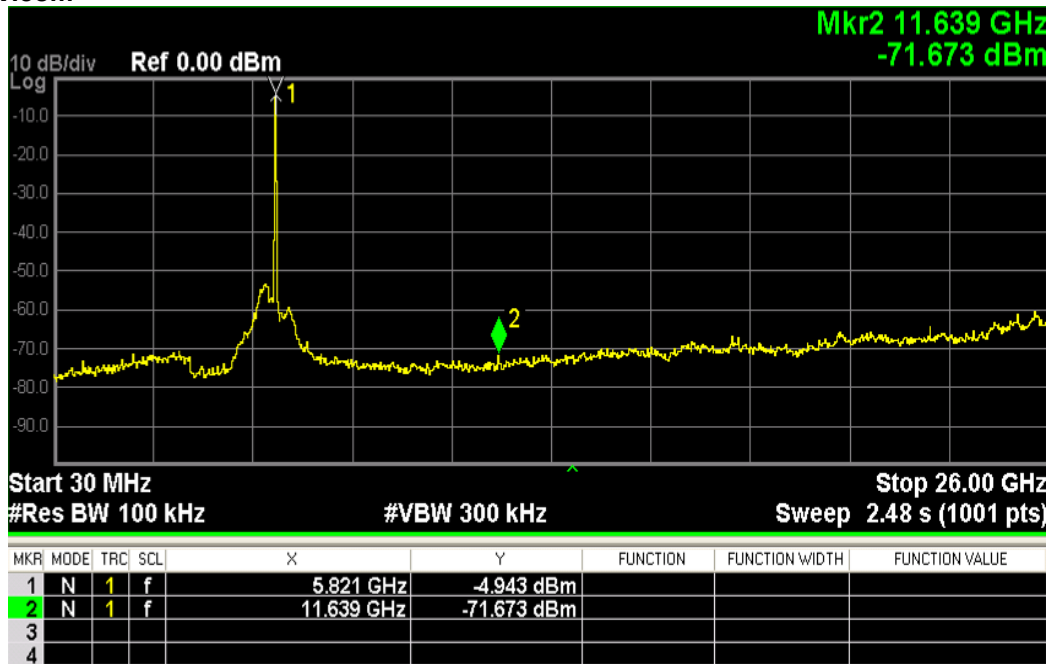
Channel frequency: 5745 MHz



Data Rate: 24 Mbps

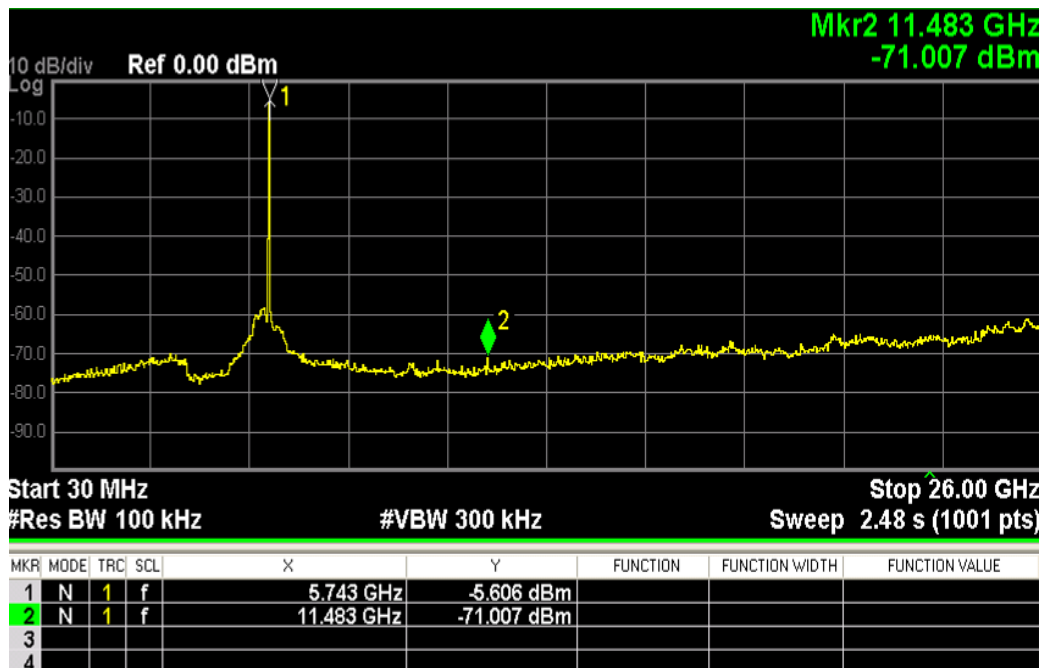
Channel frequency: 5785 MHz

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Data Rate: 24Mbps

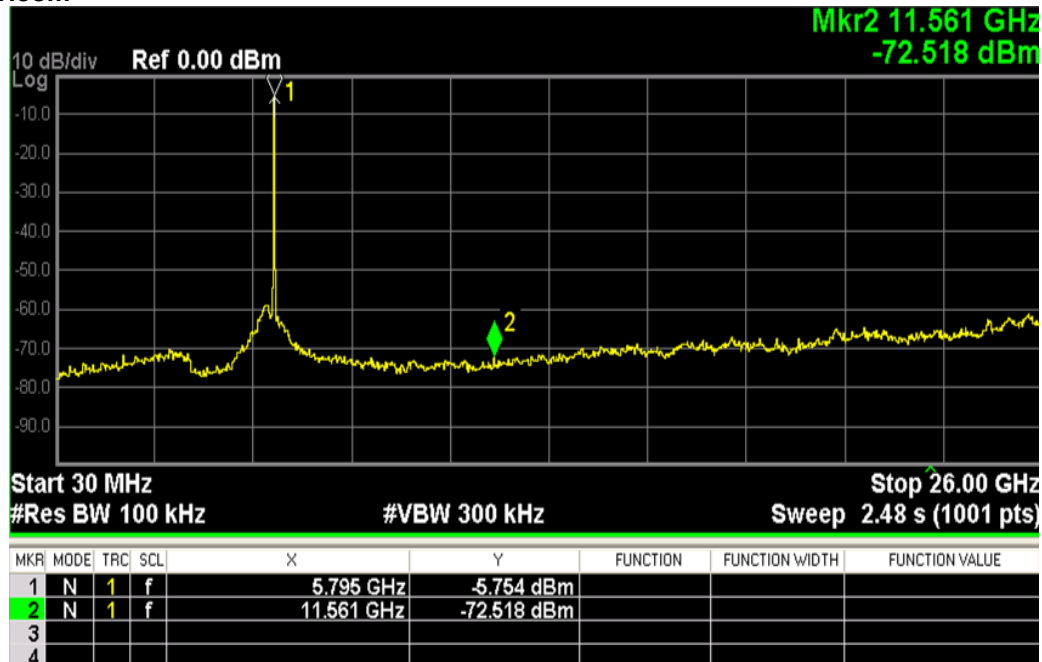
Channel frequency: 5825 MHz



Data Rate: 54 Mbps

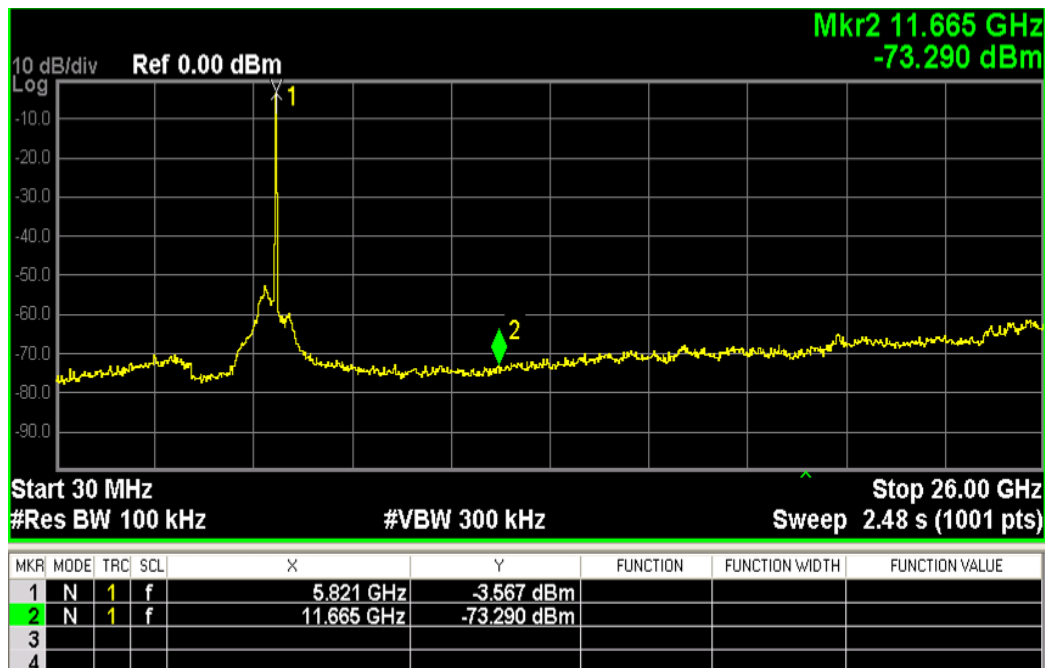
Channel frequency: 5745 MHz

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Data Rate: 54 Mbps

Channel frequency: 5785 MHz



Data Rate: 54 Mbps

Channel frequency: 5825 MHz

**Spurious Radiated Emissions and
Restricted Bands of Operation****Section 15.209 and 15.205****Result****Pass**

Test Specification	FCC Part 15 Section 15.209 & 15.205
Test Method	ANSI C63.10-2009
Measurement Location	Semi Anechoic Chamber
Measuring Distance	3m
Detection	QP for frequency below 1GHz, Average for frequency above 1GHz
Requirement	As per the limits mentioned in the below table

Limit for Radiated Emission of Section 15.209:

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	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 49.5dB $\mu\text{V/m}$ 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 result:

Polarization	Frequency (MHz)	Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
V	199.79	16.97	43.50	-26.53
	400.21	28.22	46.00	-17.78
H	199.99	32.67	43.50	-10.83
	349.99	40.85	46.00	-5.15
	383.36	40.58	46.00	-5.42
	400.01	42.70	46.00	-3.30

Modulation: 802.11b

Fundamental Frequency (MHz)	Antenna Polarization	Spurious Emission (MHz)	Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2412	H	2390.00 (Pk)	54.15	74.00	-19.85
		2390.00 (Av)	50.06	54.00	-03.94
		2412.00 (Pk)	97.89	-	*
		2412.00 (Av)	93.80	-	*
		No Harmonics Found		-	-
	V	2390.00(Pk)	56.47	74.00	-17.53
		2390.00(Av)	52.05	54.00	-1.95
		2412.00 (Pk)	101.69	-	*
		2412.00(Av)	97.60	-	*
		No Harmonics Found		-	
2442	H	2442.00 (Pk)	96.87	-	*
		2442.00 (Av)	92.88	-	*
		No Harmonics Found		-	
	V	2442.00 (Pk)	100.70	-	*
		2442.00(Av)	96.05	-	*
		No Harmonics Found		-	
2472	H	2472.00 (Pk)	96.79	-	*
		2472.00 (Av)	92.70	-	*
		2483.50 (Pk)	52.84	74.00	-21.16
		2483.50 (Av)	48.75	54.00	-05.25
		No Harmonics Found		-	
		2472.00 (Pk)	100.36	-	*
		2472.00 (Av)	96.25	-	*

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	V	2483.50 (Pk)	54.35	74.00	-19.65
		2483.50 (Av)	50.25	54.00	-03.75
		No Harmonics Found		-	

Modulation: 802.11g

Fundamental Frequency (MHz)	Antenna Polarization	Spurious Emission (MHz)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2412	H	2390.00 (Pk)	69.79	74.00	-04.21
		2390.00 (Av)	52.04	54.00	-01.96
		2412.00 (Pk)	103.25	-	*
		2412.00 (Av)	87.98	-	*
		No Harmonics Found		-	
	V	2390.00 (Pk)	70.67	74.00	-03.33
		2390.00 (Av)	51.48	54.00	-02.52
		2412.00 (Pk)	102.44	-	*
		2412.00 (Av)	88.31	-	*
		No Harmonics Found		-	
2437	H	2437.00 (Pk)	103.1	-	*
		2437.00 (Av)	88.32	-	*
		No Harmonics Found		-	
	V	2437.00 (Pk)	101.42	-	*
		2437.00 (Av)	87.79	-	*
		No Harmonics Found		-	
2462	H	2462.00 (Pk)	103.39	-	*
		2462.00 (Av)	88.69	-	*
		2483.50 (Pk)	73.64	74.00	-00.36
		2483.50 (Av)	51.48	54.00	-02.52
		No Harmonics Found		-	
	V	2462.00 (Pk)	99.59	-	*
		2462.00 (Av)	85.13	-	*
		2483.50 (Pk)	68.05	74.00	-05.95
		2483.50 (Av)	48.25	54.00	-05.75
		No Harmonics Found		-	-

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Modulation: 802.11a

Fundamental Frequency (MHz)	Antenna Polarization	Spurious Emission (MHz)	Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5745	H	5745.00 (Pk)	98.48	-	*
		5745.00(Av)	89.98	-	*
		11490.00(Pk)	58.60	74.00	-15.40
		11490.00(Av)	39.10	54.00	-14.90
	V	5745.00 (Pk)	102.87	-	*
		5745.00(Av)	94.37	-	*
		11490.00(Pk)	67.55	74.00	-06.45
		11490.00(Av)	48.05	54.00	-05.95
5785	H	5785.00(Pk)	98.19	-	*
		5785.00(Av)	89.69	-	*
		11570.00(Pk)	59.20	74.00	-14.80
		11570.00(Av)	39.70	54.00	-14.30
	V	5785.00(Pk)	102.20	-	*
		5785.00(Av)	93.70	-	*
		11570.00(Pk)	66.25	74.00	-07.75
		11570.00(Av)	46.75	54.00	-07.25
5825	H	5825.00(Pk)	98.07	-	*
		5825.00(Av)	89.57	-	*
		11650.00(Pk)	59.20	74.00	-14.80
		11650.00(Av)	39.70	54.00	-14.30
	V	5825.00(Pk)	102.73	-	*
		5825.00(Av)	94.23	-	*
		11650.00(Pk)	69.25	74.00	-04.75
		11650.00(Av)	49.75	54.00	-04.25

* - --> Fundamental Frequency
Pk--> Peak Detector
Av--> Average Detector

Version Details of EUT

Board Name	BOM No.	Schematics	PCB Versions
Main PCB Module	3101B2101_5	3101C0551_4	3101D0501_3
IX Top PCB Module	3101B2102_5	3101C0553_4	3101D0502_4
IX Top Radio PCB Module	3101B2103_5	3101C0553_4	3101D0503_4
IX Rechargeable Battery PCB Module	3101B2105_4	3101C0555_3	3101D0505_3
IX Cartridge PCB Module	3101B2106_4	3101C0556_4	3101D0506_2
IX O2 Sensor PCB Module	3101B2107_3	3101C0557_3	3101D0507_2
IX Toxic Sensor PCB Module	3101B2108_3	3101C0558_3	3101D0508_2
IX FL Sensor PCB Module	3101B2110_3	3101C0560_3	3101D0510_2
IX IR COM Sensor PCB Module	3101B2111_3	3101C0561_3	3101D0511_2
IX Terminal PCB Module	3101B2113_4	3101C0567_3	3101D0517_2
IX PID Sensor PCB Module	3101B2114_3	3101C0564_3	3101D0514_2
IX GPS PCB Module	3101B2116_1	3101C0566_1	3101D0516_1
IX Wi-Fi USI PCB Module	3101B2118_5	3101C0568_3	3101D0518_1
IX Wi-Fi Power PCB Module	3101B2119_4	3101C0569_3	3101D0519_4
IX Pump PCB Module	3101B2120_3	3101C0570_3	3101D0520_1
IX Maru PCB Module	3101B2121_4	3101C0571_3	3101D0521_3