


Produkte
Products

Prüfbericht - Nr.: 19660137 001		Seite 1 von 119	
<i>Test Report No.:</i>		<i>Page 1 of 119</i>	
Auftraggeber: <i>Client:</i>		Redpine Signals Inc 2107 N.First Street, Suite 680, San Jose, CA 95131-2019 United States	
Gegenstand der Prüfung: <i>Test item:</i>		Single Band Combo Module	
Bezeichnung: <i>Identification:</i>	RS9113SB	Serien-Nr.: <i>Serial No.</i>	Engineering Sample
Wareneingangs-Nr.: <i>Receipt No.:</i>	1803050028	Eingangsdatum: <i>Date of receipt:</i>	08.09.2014
Prüfart: <i>Testing location:</i>		Refer Page 4 of 119 for test facilities	
Prüfgrundlage: <i>Test specification:</i>		RSS-Gen Issue 4, Nov 2014 RSS-210 Issue 8, Dec 2010 ANSI C63.4-2009	
Prüfresultat: <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 FCC Registration No.: 176555	
geprüft / tested by:		kontrolliert / reviewed by:	
<div style="text-align: center;">  08.12.2014 Vinay N Test Engineer </div>		<div style="text-align: center;">  12.12.2014 Raghavendra Kulkarni Manager </div>	
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Unterschrift <i>Signature</i>
Sonstiges / Other Aspects: IC ID:8407A- RS9113SB			
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	
<p>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.</p> <p><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></p>			

Test Result Summary

Clause	Test Item	Result
RSS-210 Issue 8, A8.4(4)	Maximum Peak Conducted Output Power	Pass
RSS-210 Issue 8, A8.2(b)	Maximum Power Spectral Density	Pass
RSS-210 Issue 8, A8.2(a)	6dB Bandwidth	Pass
RSS-210 Issue 8, A8.5	Band-edge compliance	Pass
RSS-Gen Issue 4 , 8.9 & RSS-Gen Issue 5, 8.10	Spurious Radiated Emissions and Restricted Bands of Operation – Transmitter Mode	Pass
RSS-Gen Issue 4, 8.8	Conducted Emissions on a.c Power line	Pass

Note: Conducted measurements are done according to the procedure given in KDB No. **558074**
D01 DTS Meas Guidance v03r02

Content

List of Test and Measurement Instruments	4
General Product Information	5
Product Function and Intended Use	5
Ratings and System Details.....	5
Test Set-up and Operation Mode	6
Principle of Configuration Selection	6
Test Operation and Test Software	6
Test Modes – Data Rates and Modulations	6
Test Methodology	7
Radiated Emission Test	7
Test Results.....	8
Maximum Average Conducted Output Power	Section A8.4 (4)8
Maximum Power Spectral Density	Section A8.2 (b).....26
6 dB Bandwidth	Section A8.2 (a).....44
Band-edge Compliance	Section A8.576
Spurious Radiated Emissions and.....	106
Restricted Bands of Operation	Section 8.9 & Section 8.10 ..106
Conducted Emission Test on A.C. Power Line	Section 8.8.....114
Appendix 1: Test Setup Photo	
Appendix 2: EUT External Photo	
Appendix 3: EUT Internal Photo	
Appendix 4: FCC Label and Label Location	
Appendix 5: Block Diagram	
Appendix 6: Specification of EUT	
Appendix 7: Schematic Diagrams	
Appendix 8: Bill of Material	
Appendix 9: User Manual	
Appendix 10: Maximum Permissible Exposure Calculation	

www.tuv.com

List of Test and Measurement Instruments

TUV Rheinland (India) Pvt. Ltd. , Bangalore

Equipment	Manufacturer	Model	S/N	Calibration Due Date
EMI Test Receiver	Rohde &Schwarz	ESU 40	100288	04.10.2015
Hybrid Log Periodic antenna	ETS Lindgren	3142D	00081354	26.07.2015
Broadband Horn Antenna	Frankonia	HAX-18	HAX18-802	23.03.2015
Double-Ridged Waveguide Horn Antenna	ETS Lindgren	116794	00133356	01.09.2015
Emission Horn Antenna	ETS Lindgren	116706	00107323	24.08.2015
Active Loop Antenna	Frankonia	LAX-10	LAX-10-800	11.04.2015
Spectrum Analyser	Agilent Technologies	E4407B	US41192772	27.03.2015

Testing Facilities:

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

General Product Information

Product Function and Intended Use

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

Ratings and System Details

Operating Frequency Range	2400MHz – 2483.50MHz	
No. of channel	11 – Wi-Fi 15 – Zigbee 79 - BT Classic 40 – BT LE	
Channel Spacing	5MHz – Wi-Fi, Zigbee 1MHz – BT Classic 2MHz – BT LE	
Transmitted Power	802.11b	16.62 dBm
	802.11g	16.47 dBm
	802.11n	16.72 dBm
	Bluetooth LE	16.11 dBm
	Zigbee	13.07 dBm
Data Rate	802.11b: 1,2, 5.5,11 Mbps 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: 6.5, 14.4, 21.7, 28.9, 39, 57.8, 65Mbps Bluetooth – 1,2,3 Mbps Zigbee – 250Kbps	
Number of antenna	One	
Antenna Gain and Antenna type	PCB Trace Antenna, 0.5dBi	
Supply Voltage to Module	3.1V – 3.6V DC from Host device	
Environmental	Operational Temperature: -40°C to 85° C	

Test Conditions:

Supply Voltage: 5V DC from USB

Environmental conditions:

Temperature: +24 °C RH: 62%

www.tuv.com

Test Set-up and Operation Mode

Principle of Configuration Selection

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

Test Operation and Test Software

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

Special Accessories and Auxiliary Equipment

- None

Countermeasures to achieve EMC Compliance

- None

Test Modes – Data Rates and Modulations

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

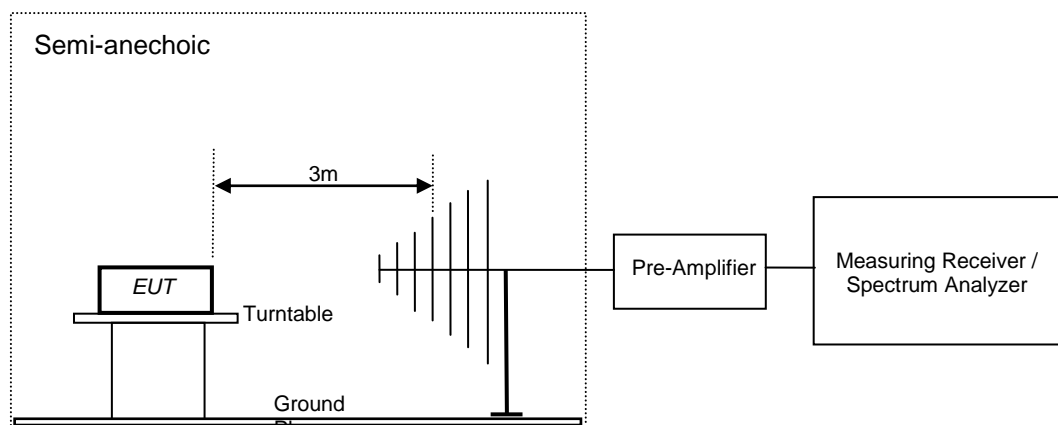
Table of frequencies

www.tuv.com

Test Methodology

Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.4-2009. 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.



www.tuv.com

Test Results

Maximum Average Conducted Output Power

Section A8.4 (4)

Result

Pass

Test Specification RSS – 210 Issue 8,
December 2010
Measurement Bandwidth (RBW) 300 kHz/1MHz
Requirement <1 watt (30dBm).

Test Method:

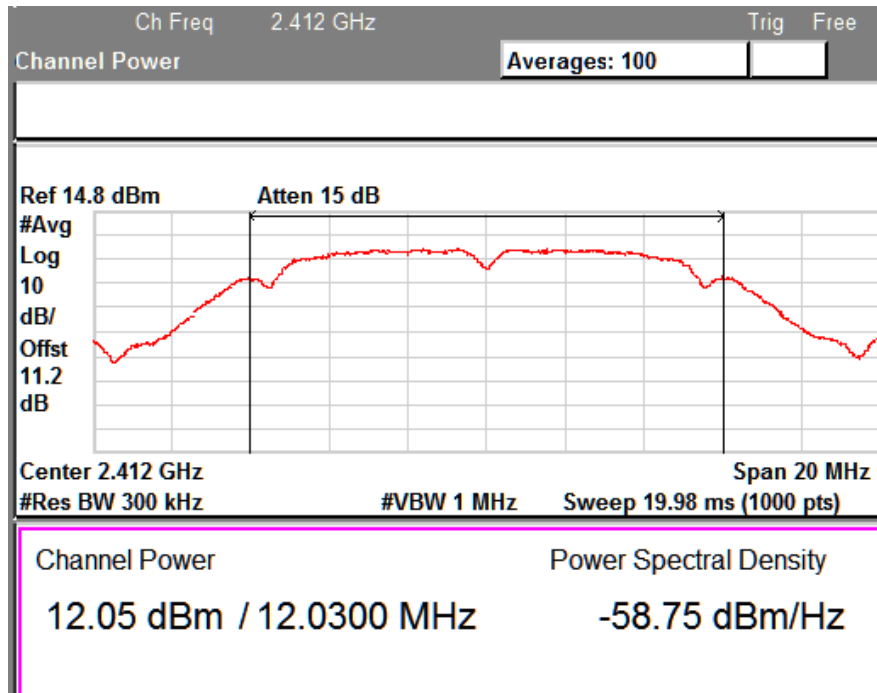


Note: For measurement of Maximum Average conducted output power method AVGSA-1 was used

Test Result: Wi-Fi

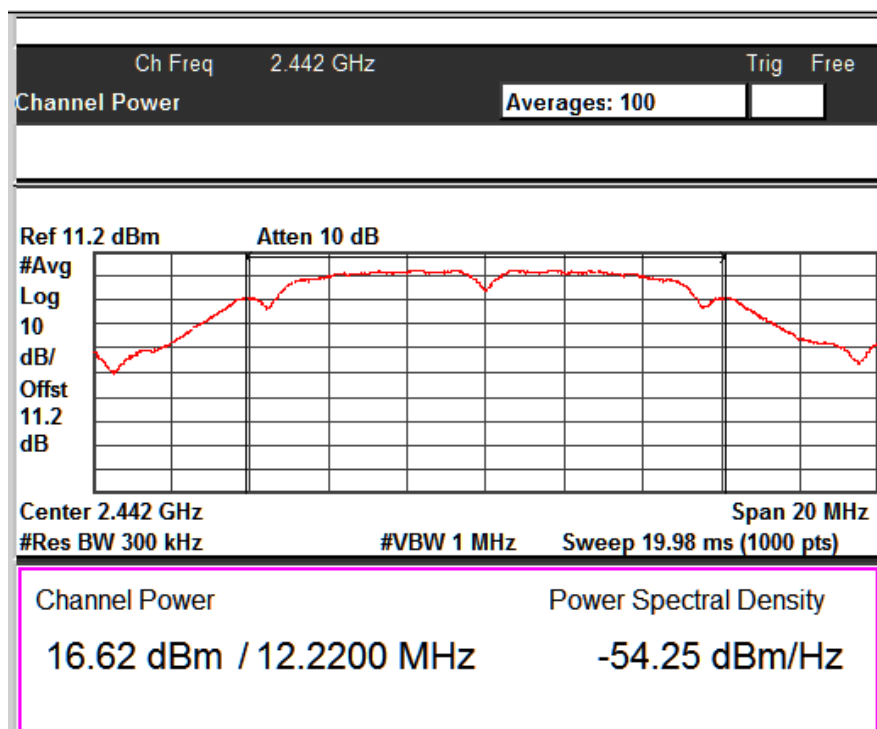
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total Power (dBm)	Limit (dBm)	Margin (dB)
b	1	2412.00	12.05	30.00	-17.95
		2442.00	16.62	30.00	-13.38
		2462.00	12.25	30.00	-17.75
	11	2412.00	12.20	30.00	-17.80
		2442.00	16.47	30.00	-13.53
		2462.00	14.89	30.00	-15.11

www.tuv.com



Data rate: 1 Mbps

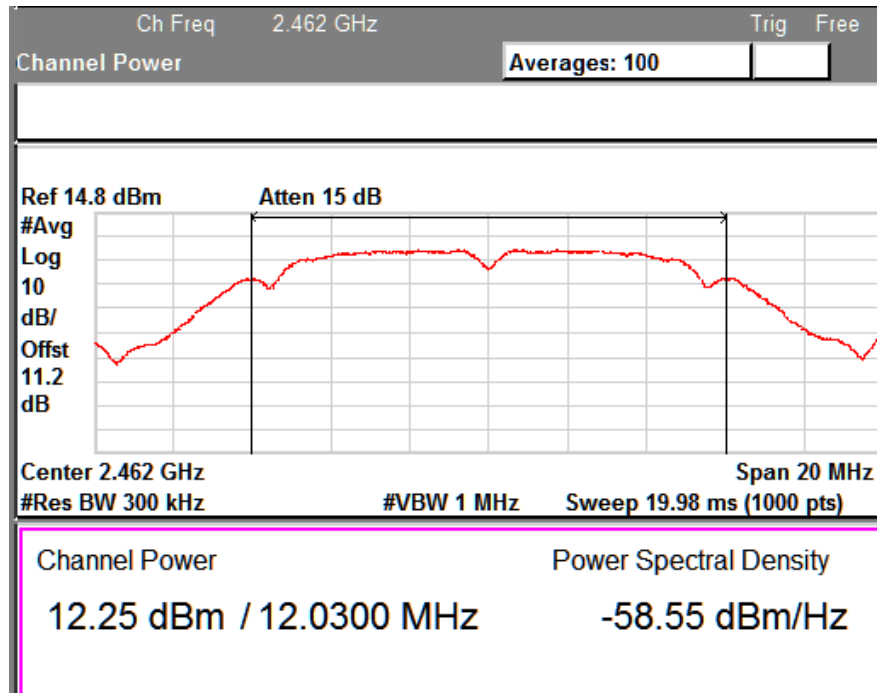
Channel Frequency: 2412 MHz



Data rate: 1 Mbps

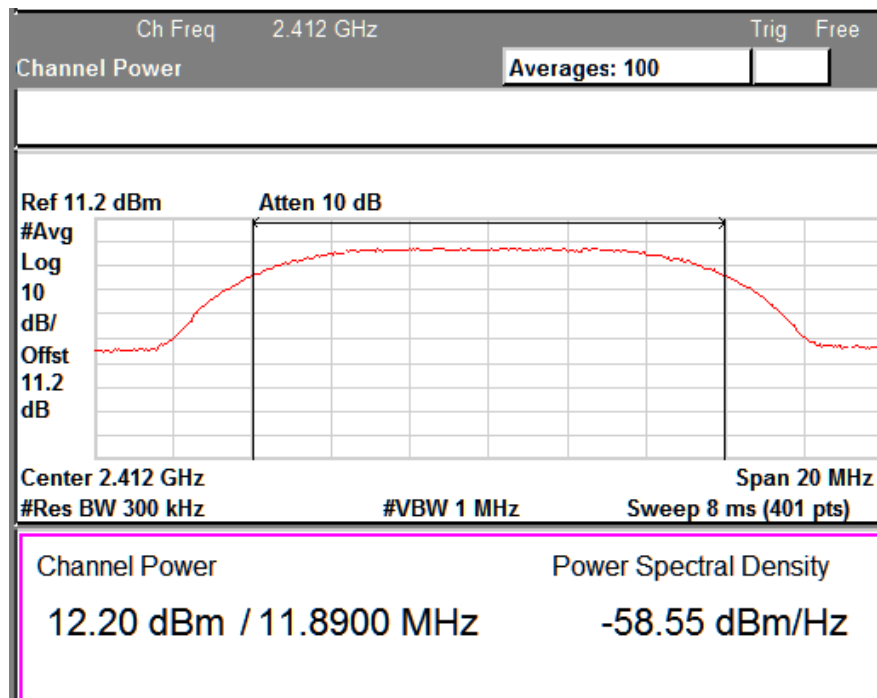
Channel Frequency: 2442 MHz

www.tuv.com



Data rate: 1 Mbps

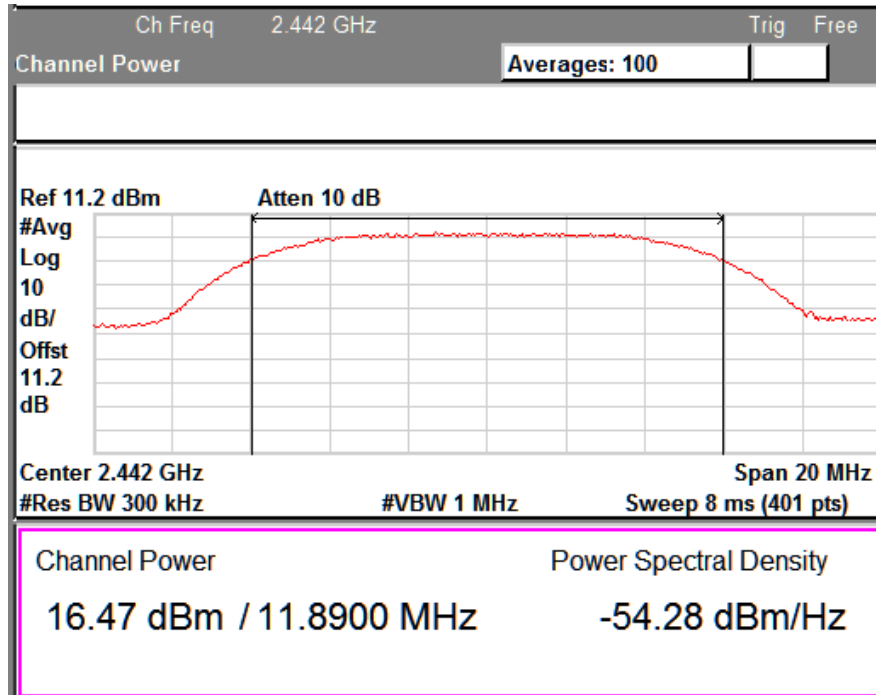
Channel Frequency: 2462 MHz



Data rate: 11 Mbps

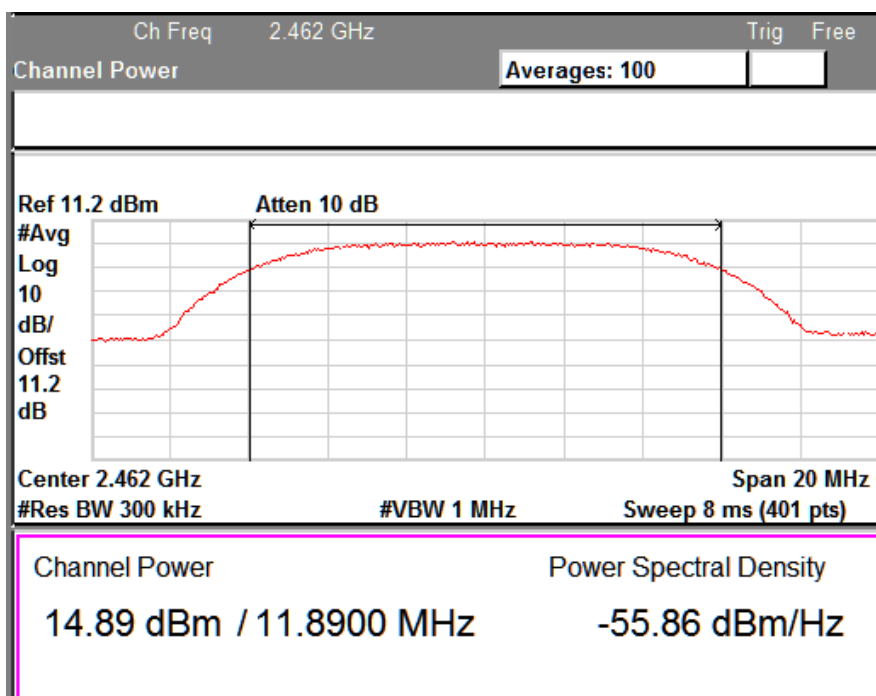
Channel Frequency: 2412 MHz

www.tuv.com



Data rate: 11 Mbps

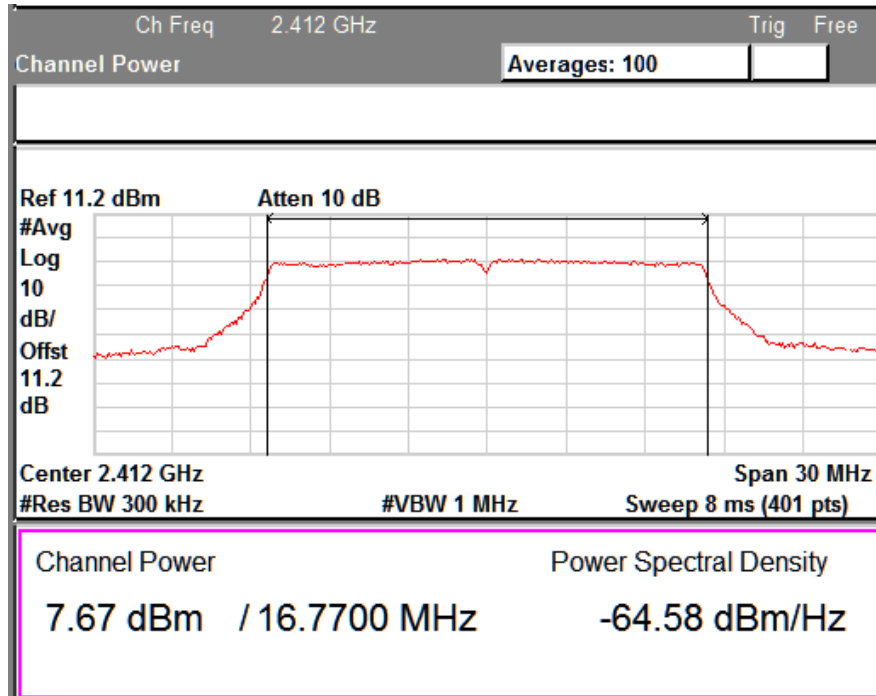
Channel Frequency: 2442 MHz



Data rate: 11 Mbps

Channel Frequency: 2462 MHz

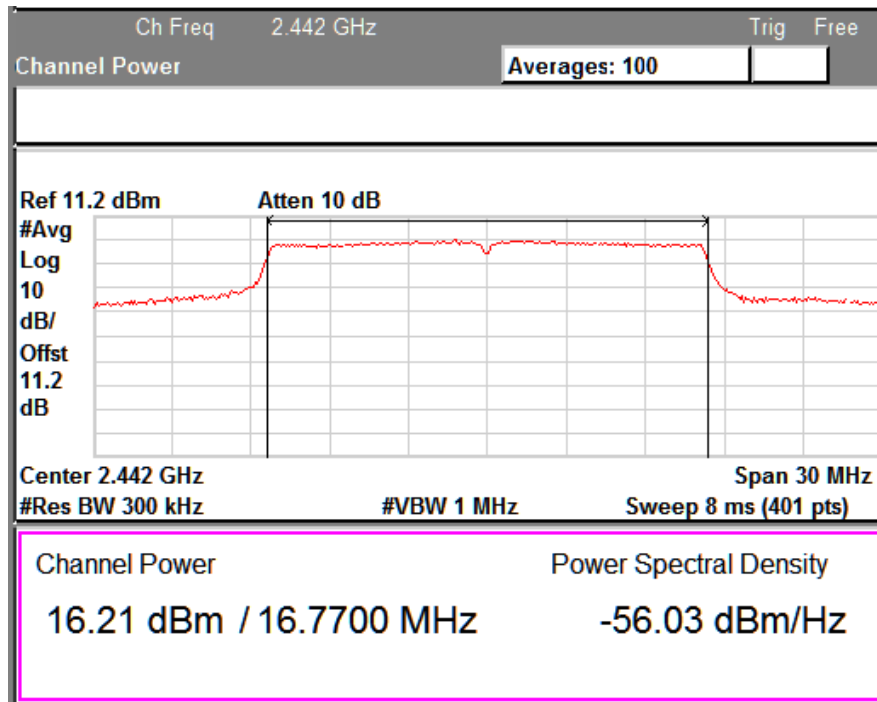
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total Power (dBm)	Limit (dBm)	Margin (dB)
g	6	2412.00	7.67	30.00	-22.33
		2442.00	16.21	30.00	-13.79
		2462.00	7.48	30.00	-22.52
	24	2412.00	7.62	30.00	-22.38
		2442.00	16.33	30.00	-13.67
		2462.00	7.50	30.00	-22.50
	54	2412.00	7.68	30.00	-22.32
		2442.00	16.47	30.00	-13.53
		2462.00	7.58	30.00	-22.42



Data rate: 6 Mbps

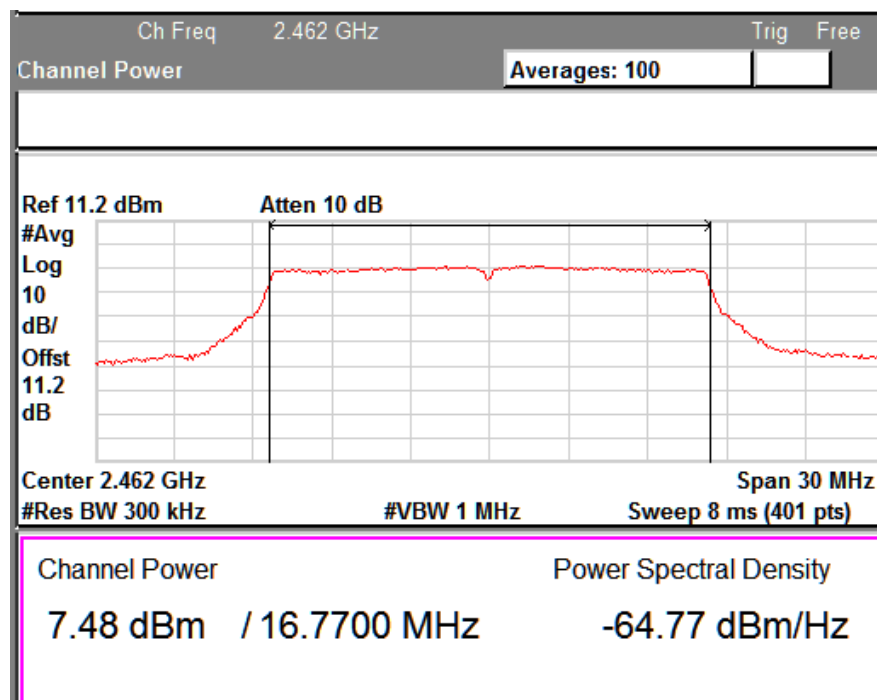
Channel Frequency: 2412 MHz

www.tuv.com



Data rate: 6 Mbps

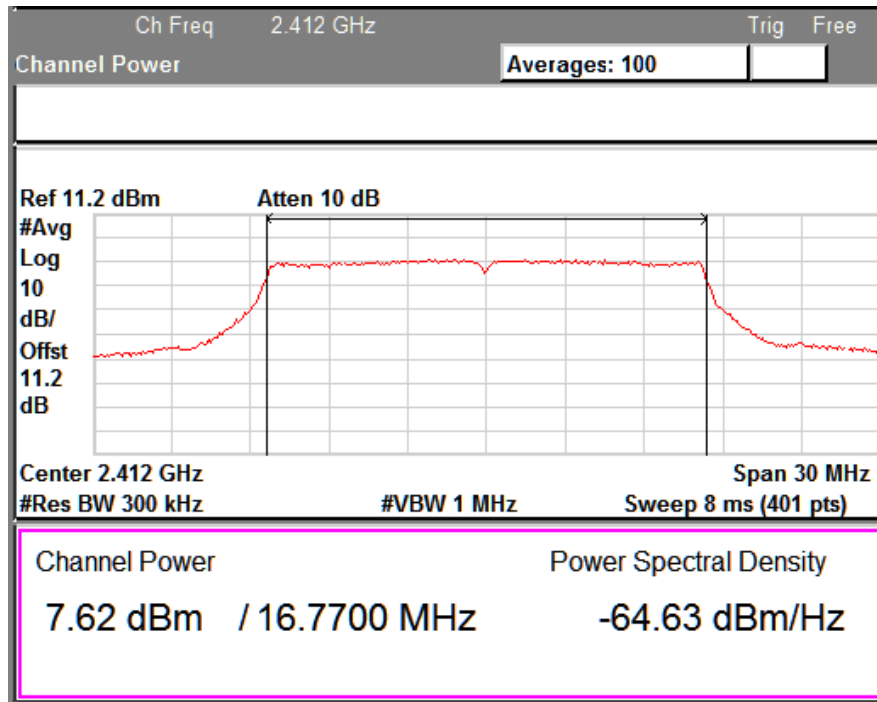
Channel Frequency: 2442 MHz



Data rate: 6 Mbps

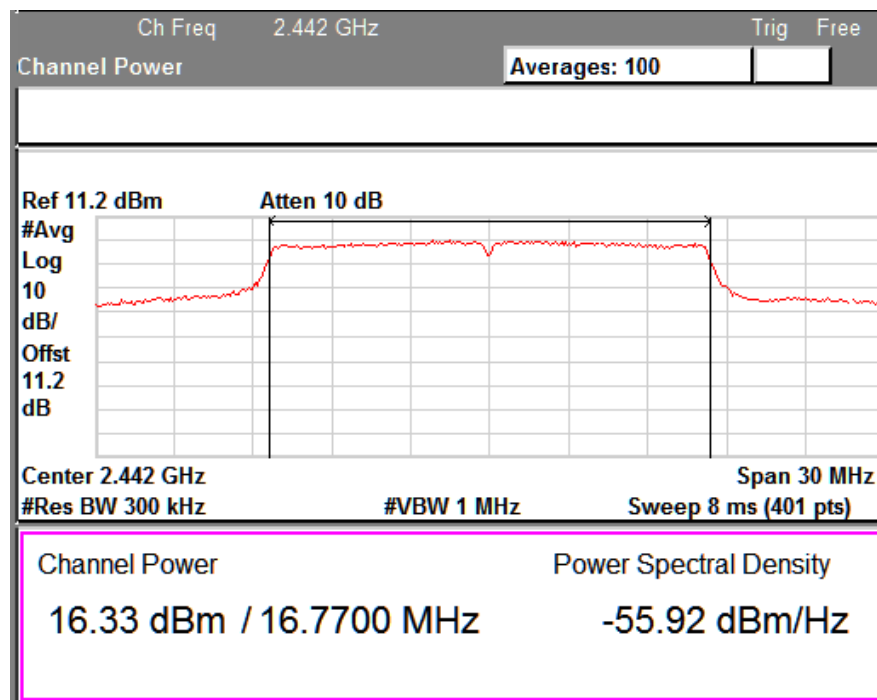
Channel Frequency: 2462 MHz

www.tuv.com



Data rate: 24 Mbps

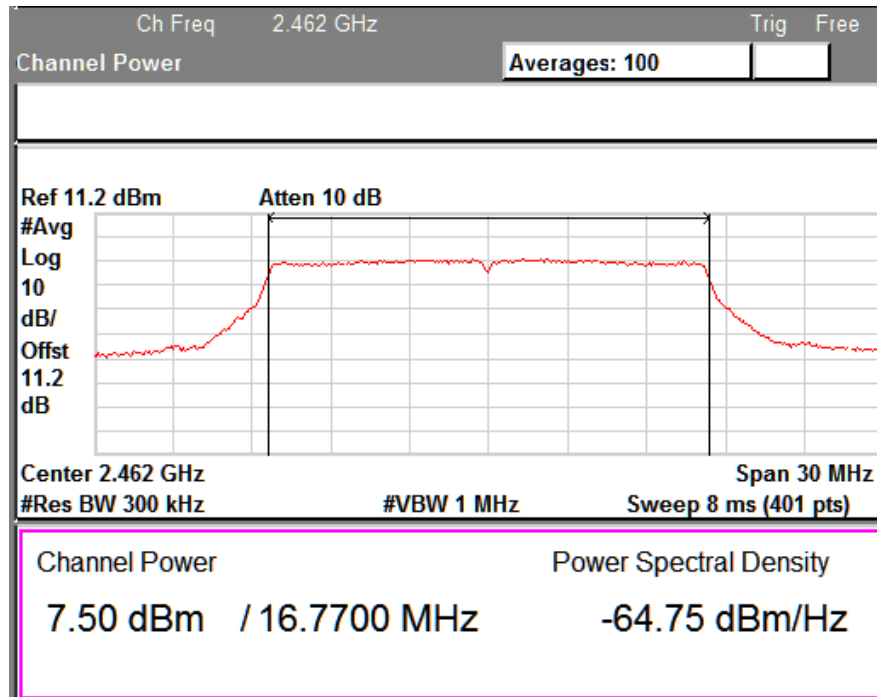
Channel Frequency: 2412 MHz



Data rate: 24 Mbps

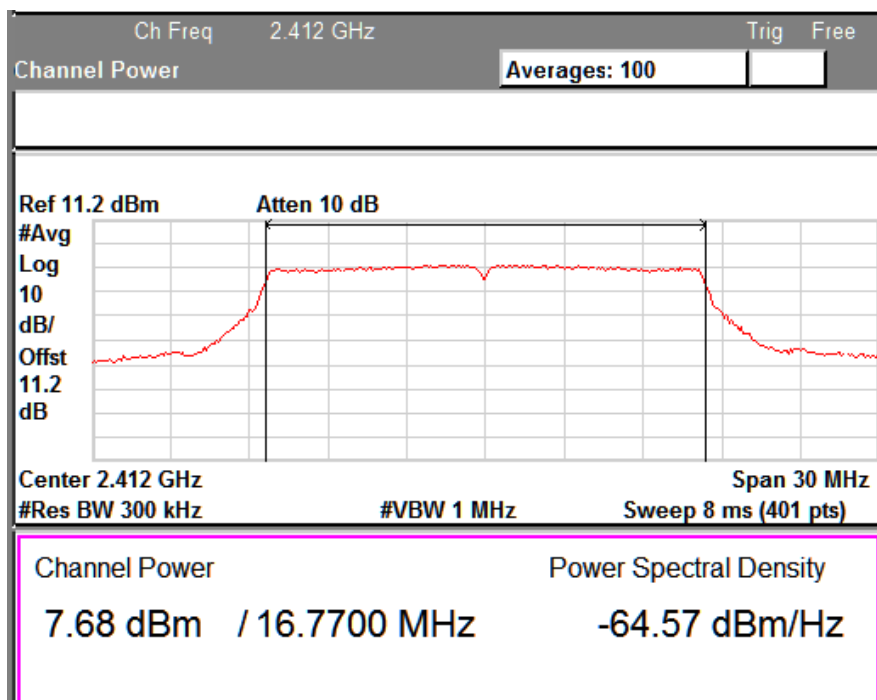
Channel Frequency: 2442 MHz

www.tuv.com



Data rate: 24 Mbps

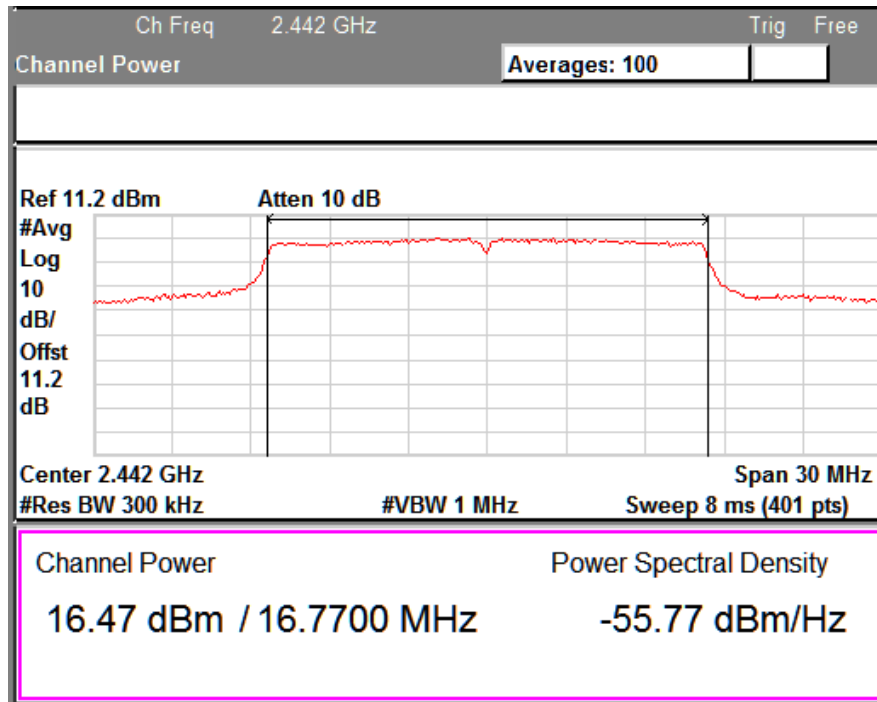
Channel Frequency: 2462 MHz



Data rate: 54 Mbps

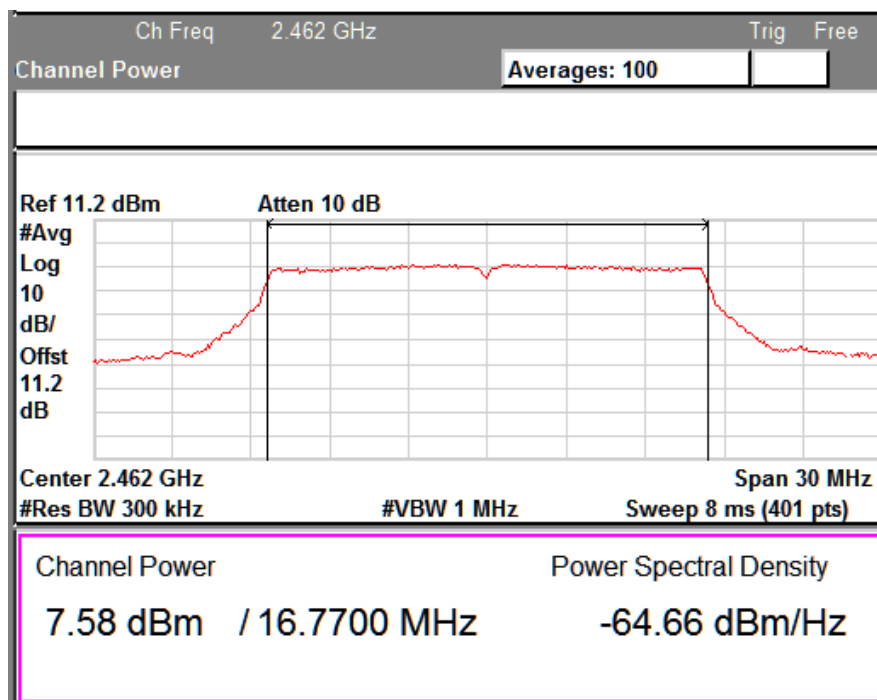
Channel Frequency: 2412 MHz

www.tuv.com



Data rate: 54 Mbps

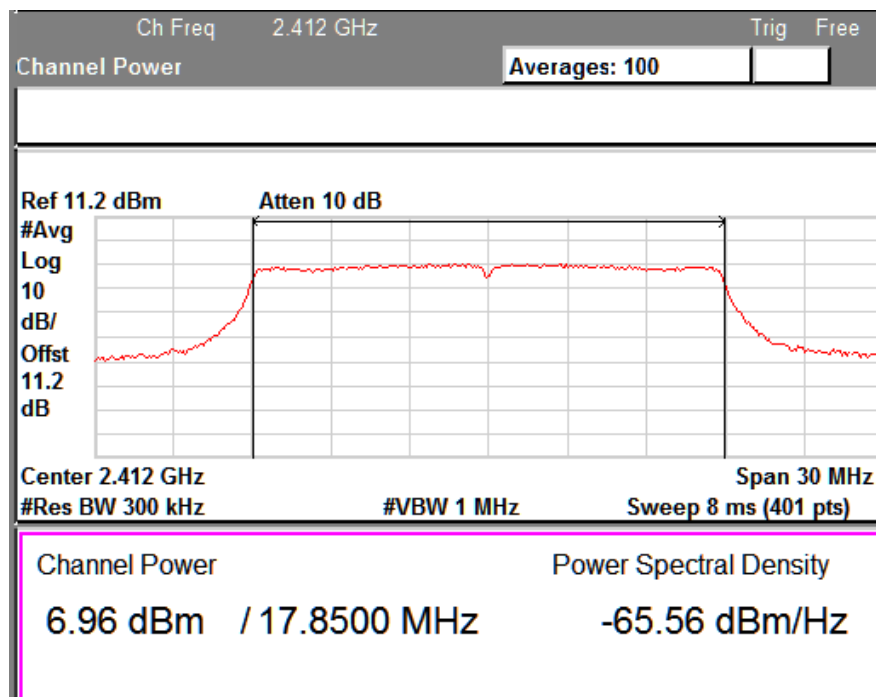
Channel Frequency: 2442 MHz



Data rate: 54 Mbps

Channel Frequency: 2462 MHz

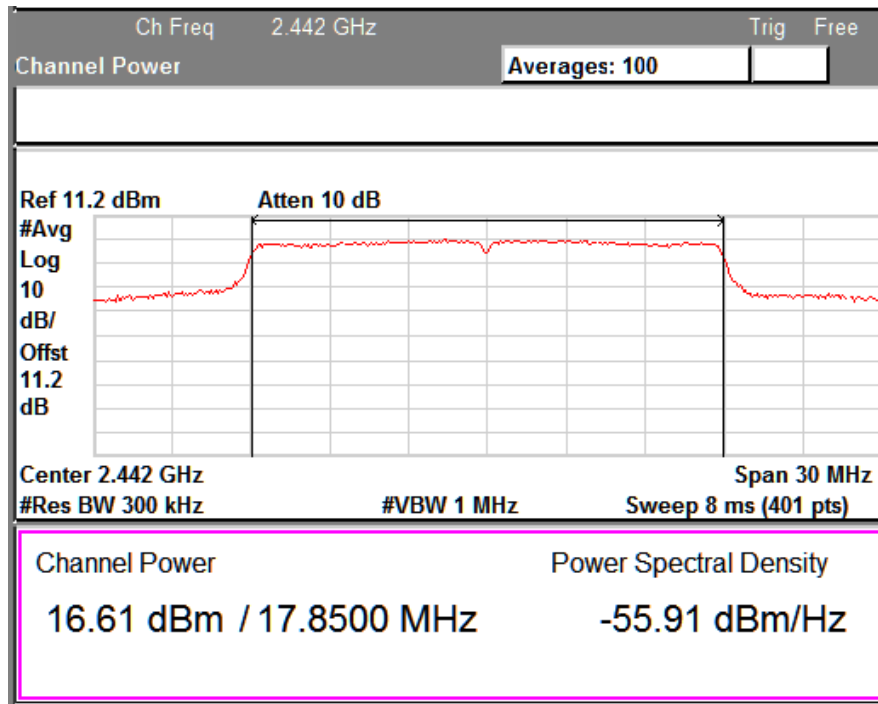
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total Power (dBm)	Limit (dBm)	Margin (dB)
n	6.5	2412.00	6.96	30.00	-23.04
		2442.00	16.61	30.00	-13.39
		2462.00	6.91	30.00	-23.09
	39	2412.00	6.82	30.00	-23.18
		2442.00	16.72	30.00	-13.28
		2462.00	6.93	30.00	-23.07
	65	2412.00	6.82	30.00	-23.18
		2442.00	16.47	30.00	-13.53
		2462.00	6.66	30.00	-23.34



Data Rate: 6.5 Mbps

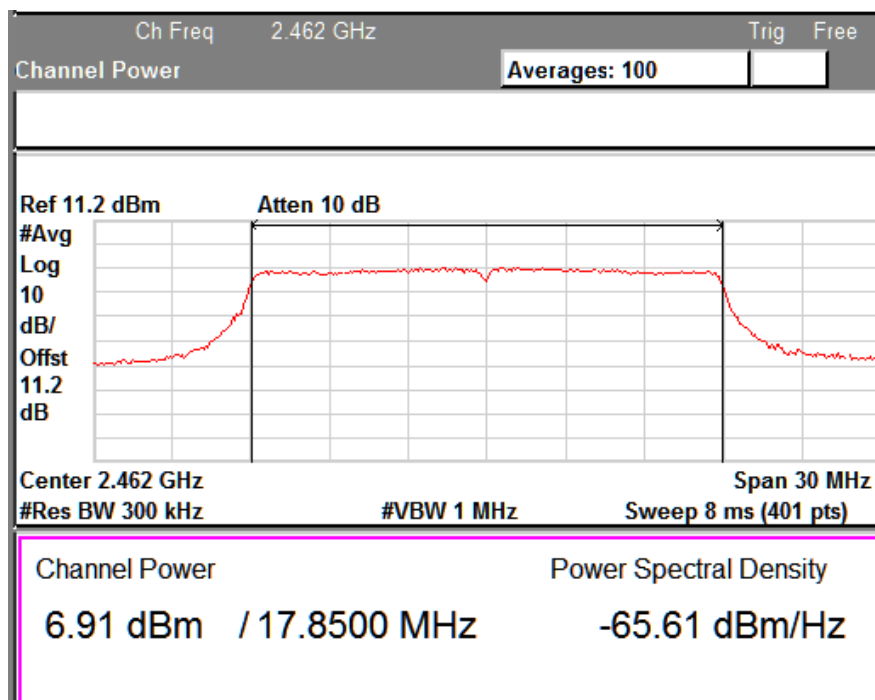
Channel Frequency: 2412 MHz

www.tuv.com



Data Rate: 6.5 Mbps

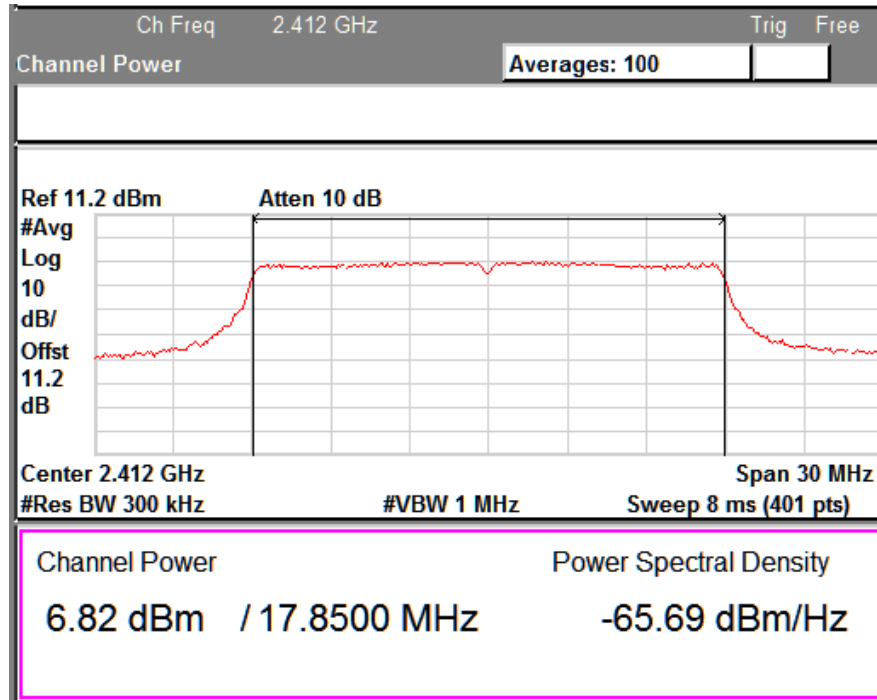
Channel Frequency: 2442 MHz



Data Rate: 6.5 Mbps

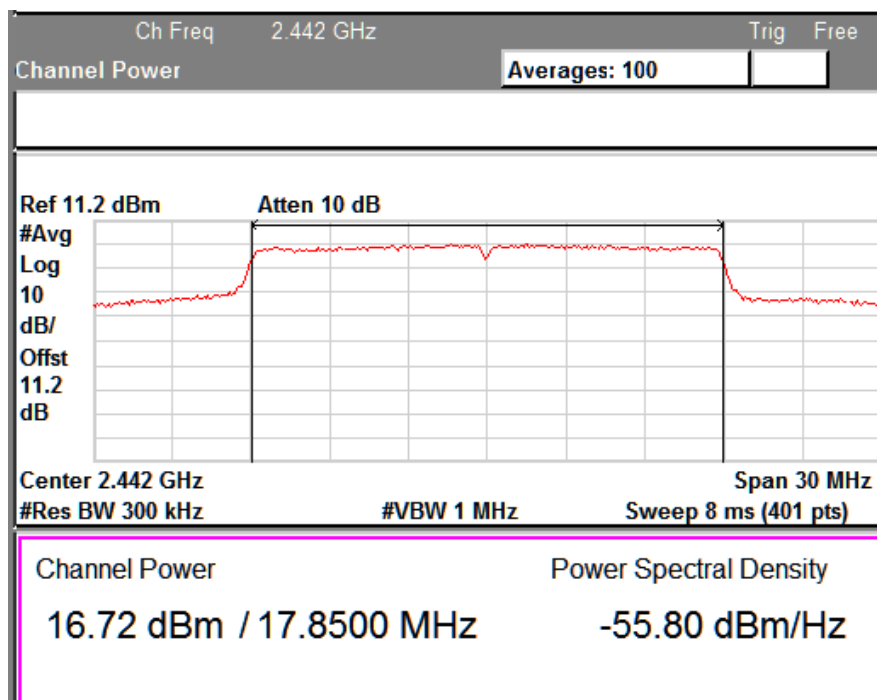
Channel Frequency: 2462 MHz

www.tuv.com



Data Rate: 39 Mbps

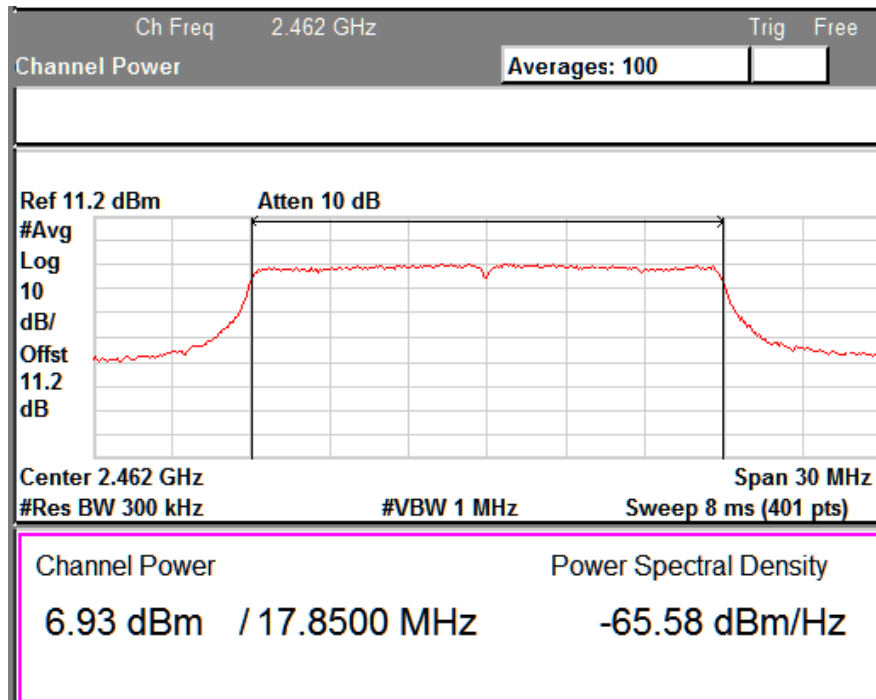
Channel Frequency: 2412 MHz



Data Rate: 39 Mbps

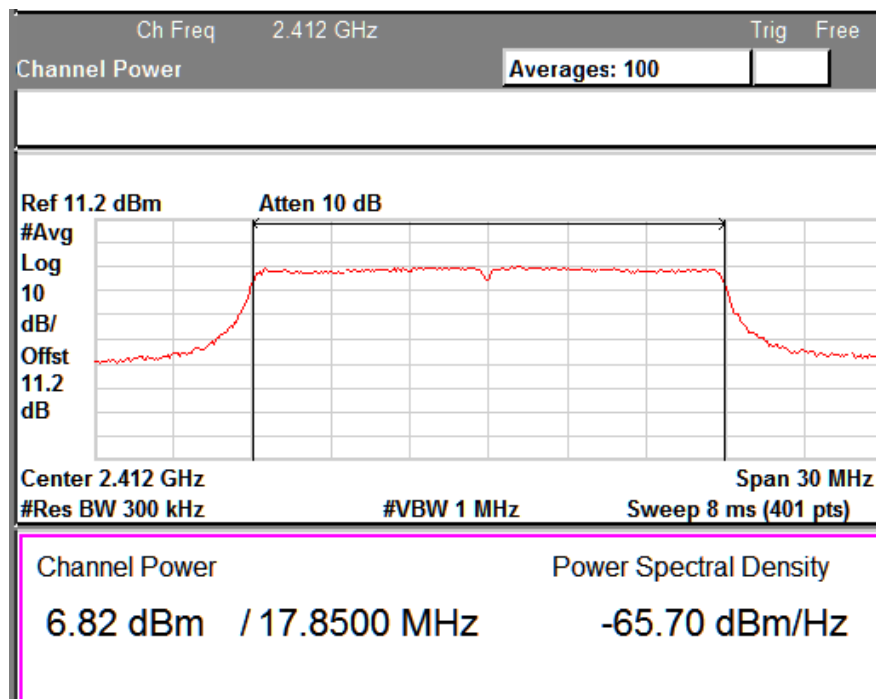
Channel Frequency: 2442 MHz

www.tuv.com



Data Rate: 39 Mbps

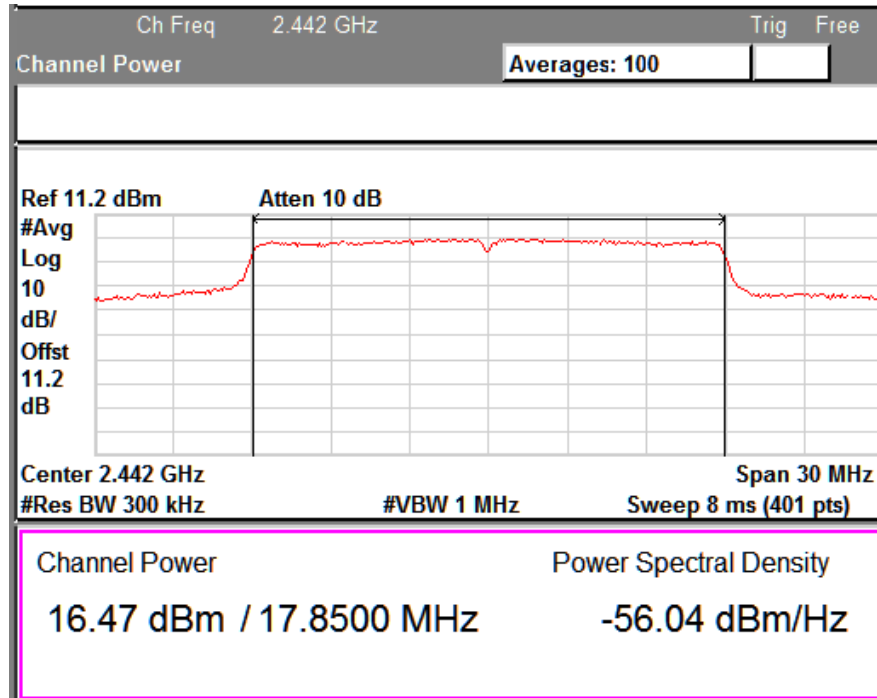
Channel Frequency: 2462 MHz



Data Rate: 65 Mbps

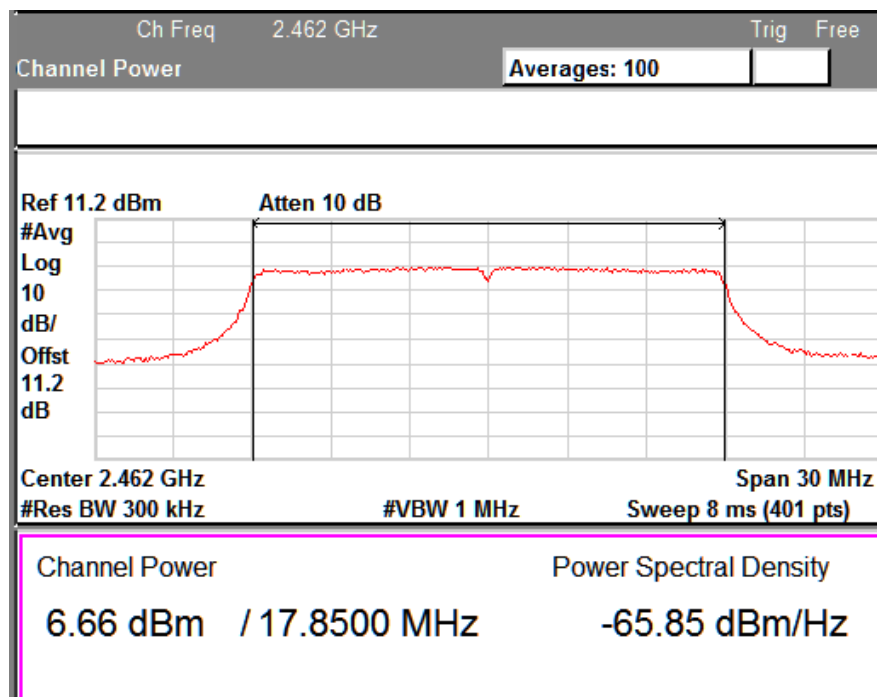
Channel Frequency: 2412 MHz

www.tuv.com



Data Rate: 65 Mbps

Channel Frequency: 2442 MHz



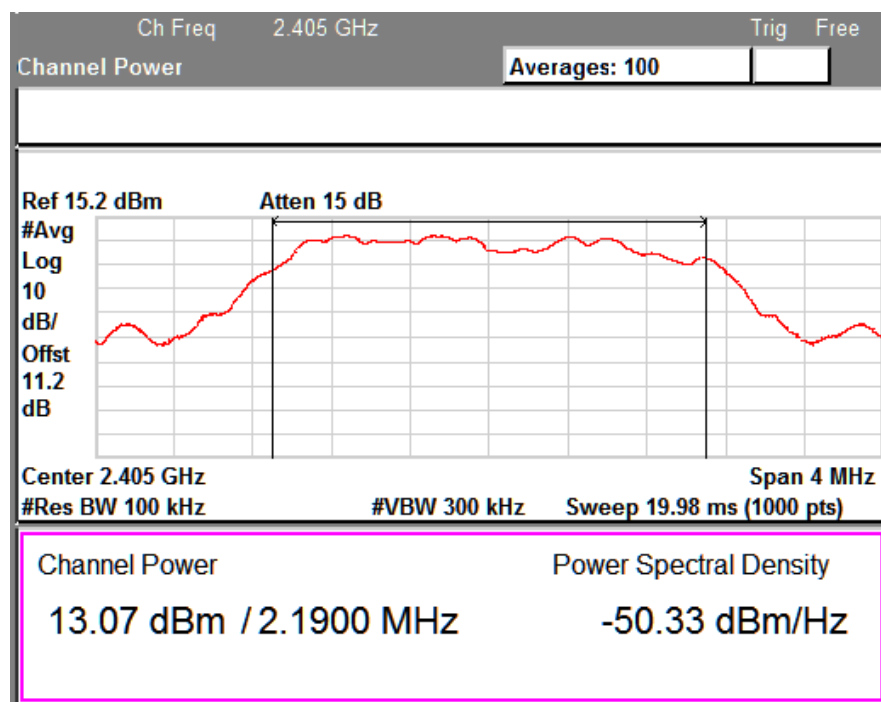
Data Rate: 65 Mbps

Channel Frequency: 2462 MHz

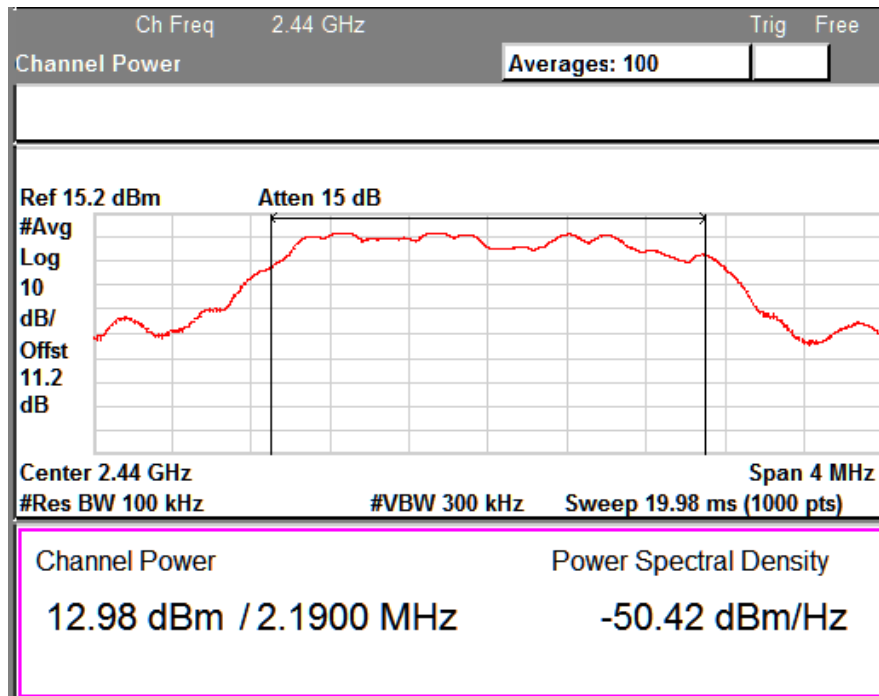
www.tuv.com

Test Result: ZigBee

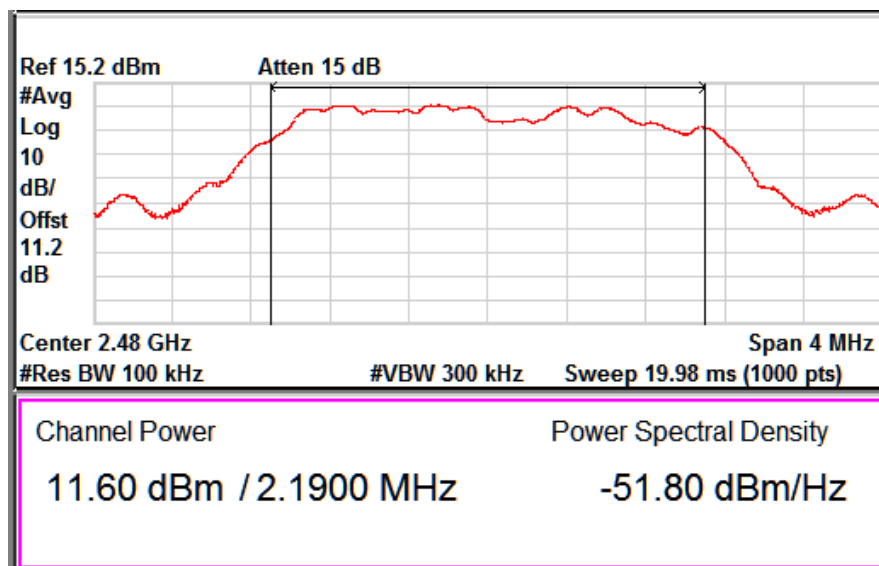
Channel Frequency (MHz)	Total Power (dBm)	Limit (dBm)	Margin (dB)
2405.00	13.07	30.00	-16.93
2440.00	12.98	30.00	-17.02
2480.00	11.60	30.00	-18.40



Channel Frequency: 2405 MHz



Channel Frequency: 2440 MHz

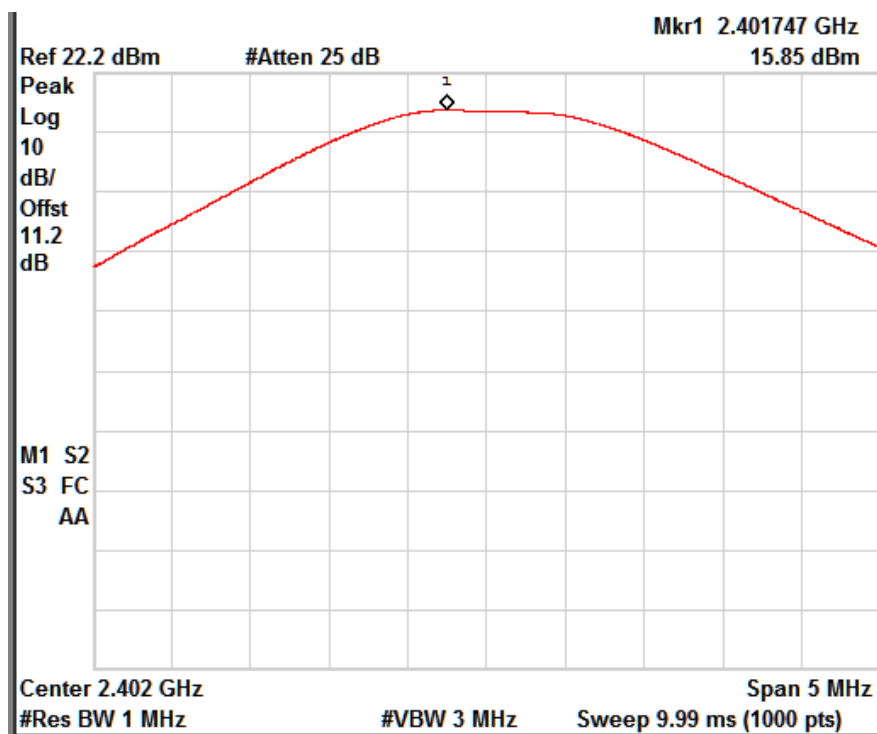


Channel Frequency: 2480 MHz

www.tuv.com

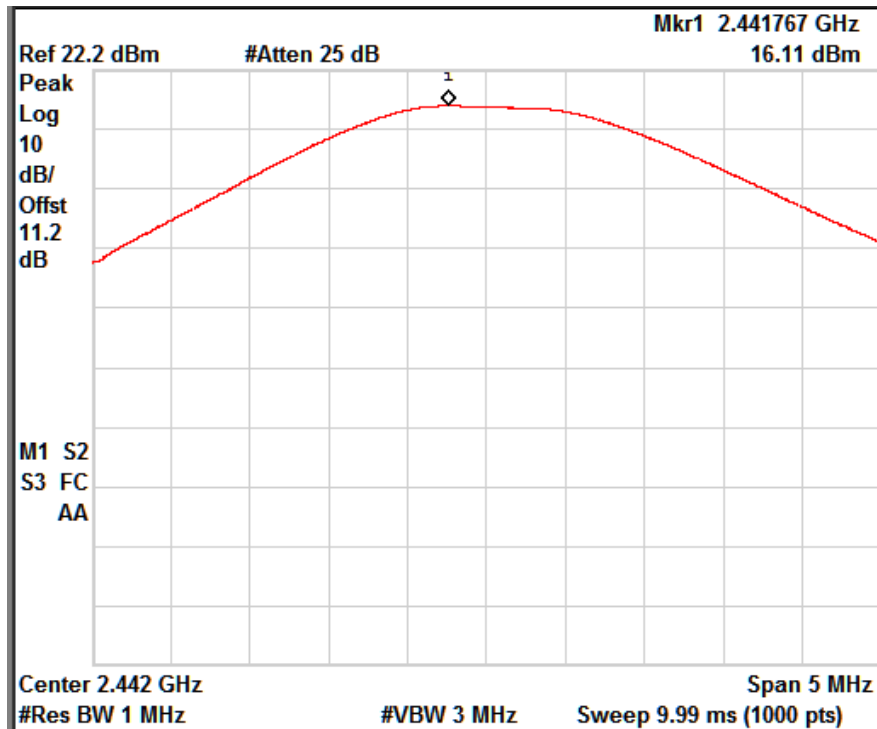
Test Result: Bluetooth LE

Channel Frequency (MHz)	Total Power (dBm)	Limit (dBm)	Margin (dB)
2402.00	15.85	30.00	-14.15
2442.00	16.11	30.00	-13.89
2480.00	15.17	30.00	-14.83

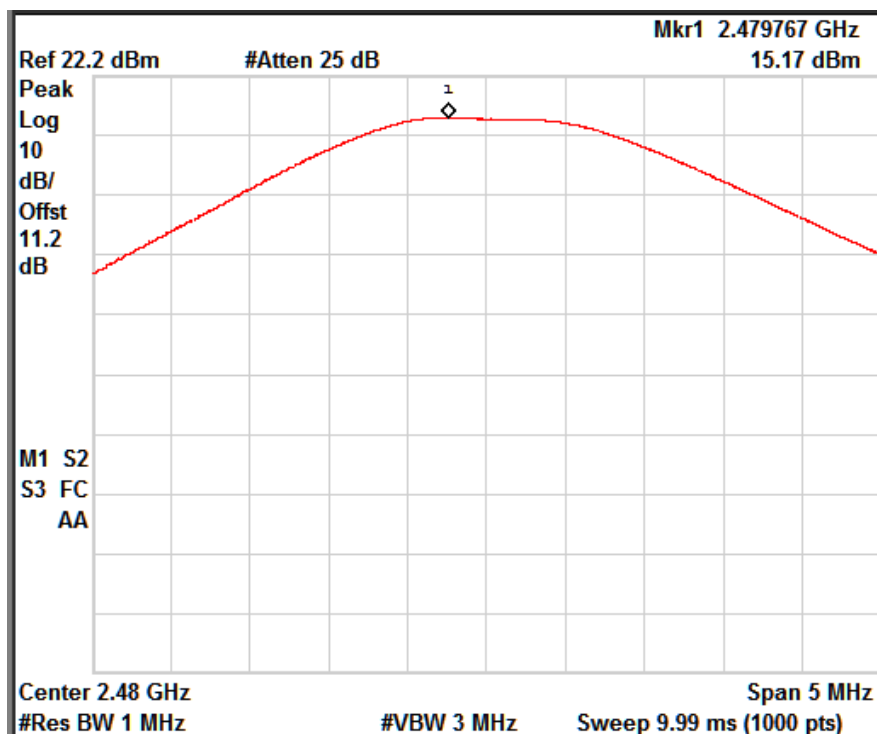


Channel Frequency: 2402 MHz

www.tuv.com



Channel Frequency: 2440 MHz



Channel Frequency: 2480 MHz

www.tuv.com

Maximum Power Spectral Density

Section A8.2 (b)

Result

Pass

Test Specification RSS – 210 Issue 8, December 2010

Detector Function Peak

Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm.

Note: For measurement of Maximum power spectral density option 1 was used

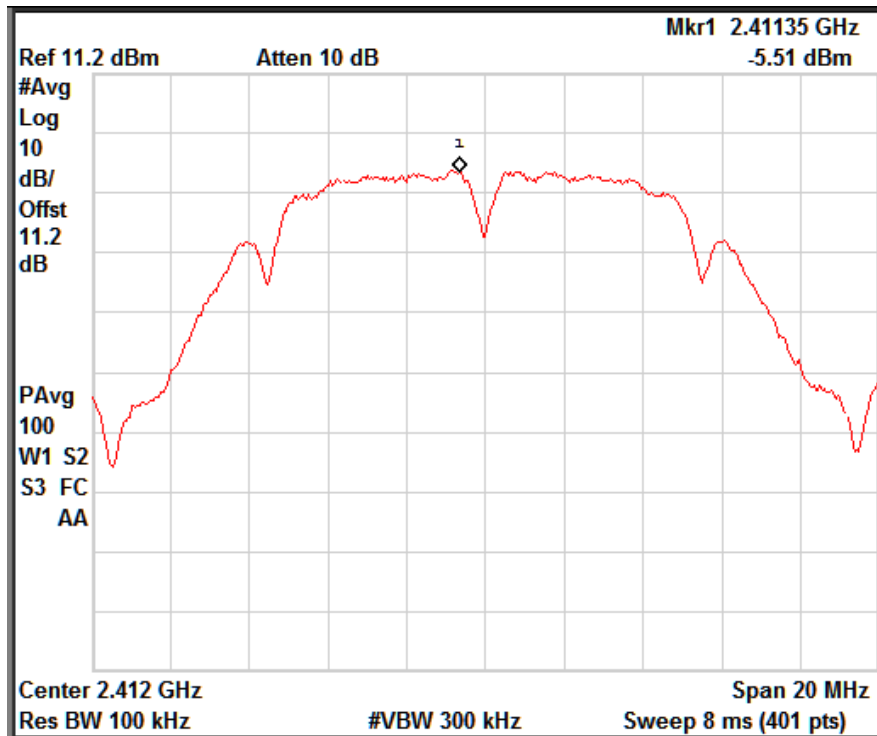
Test Method:



Test Result: Wi-Fi

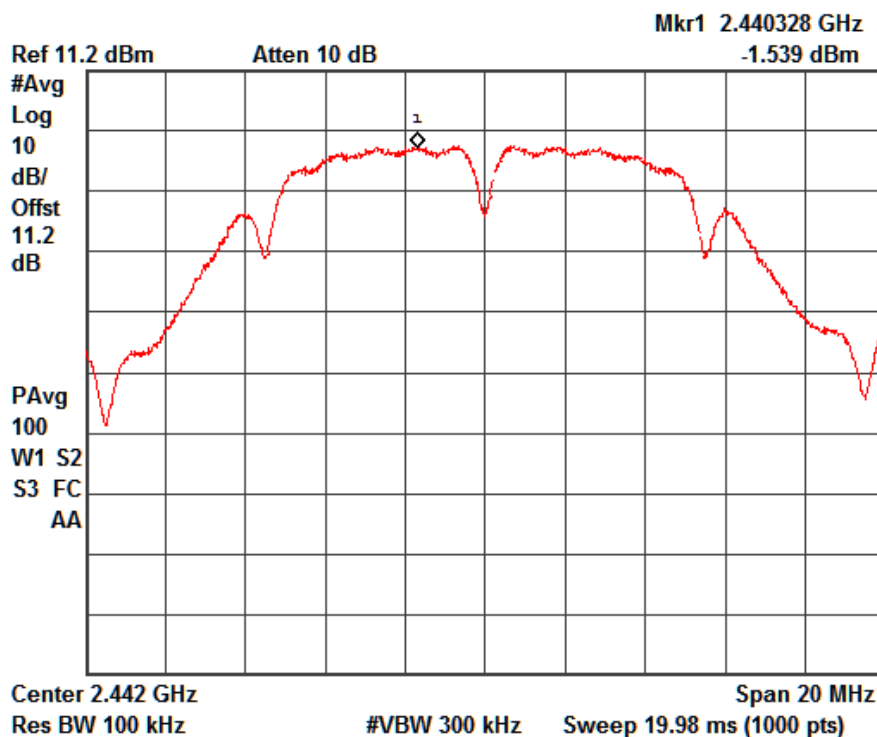
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
b	1	2412.00	-5.51	8.00	-13.51
		2442.00	-5.82	8.00	-13.82
		2462.00	-5.92	8.00	-13.92
	11	2412.00	-5.82	8.00	-13.82
		2442.00	-2.94	8.00	-10.94
		2462.00	-3.37	8.00	-11.37

www.tuv.com



Data rate: 1 Mbps

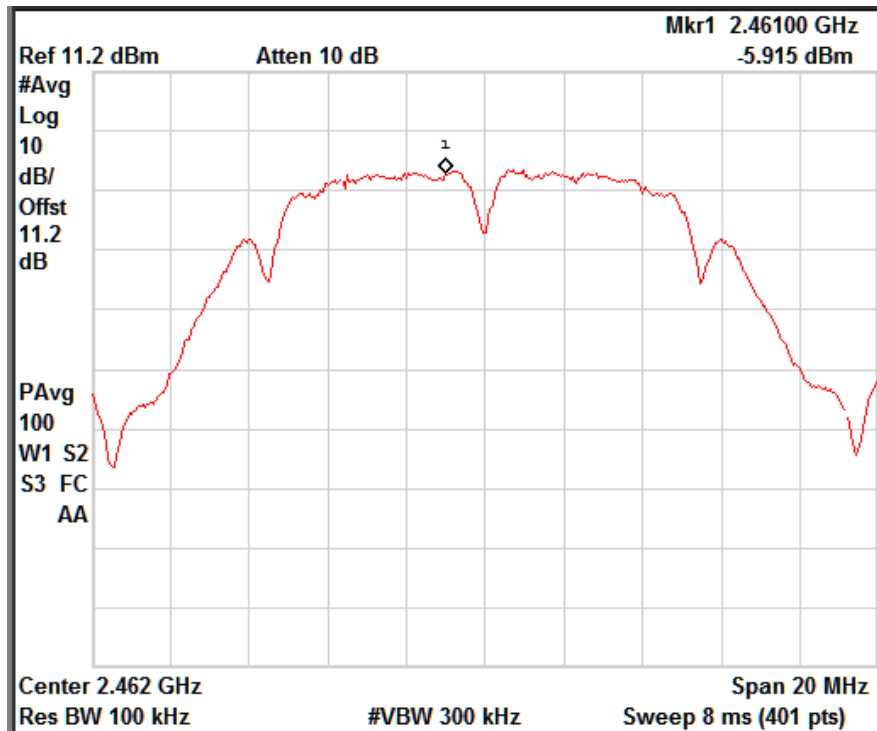
Channel Frequency: 2412 MHz



Data rate: 1 Mbps

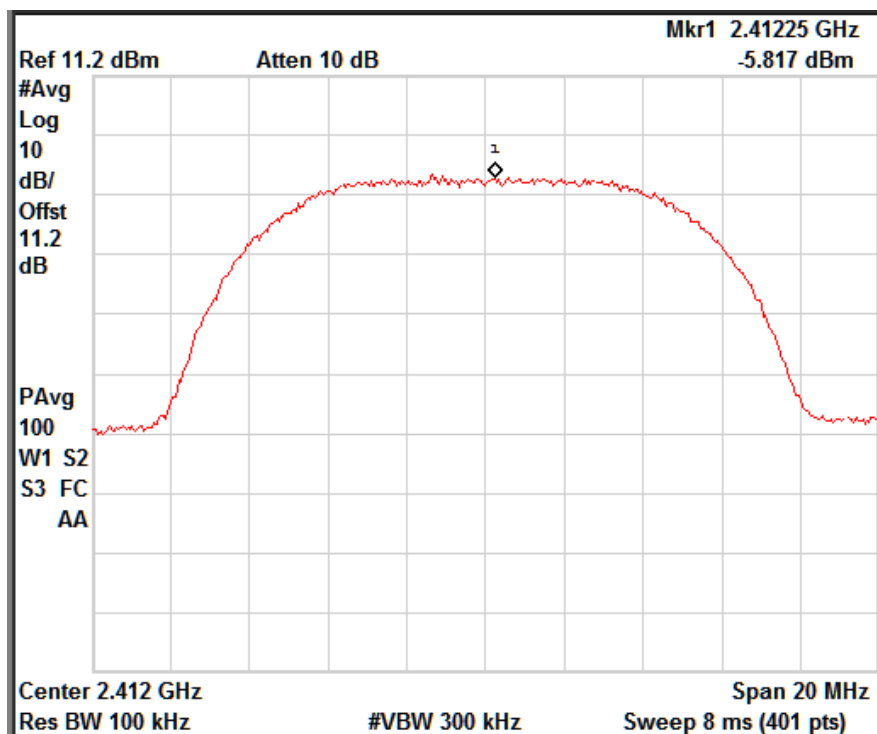
Channel Frequency: 2442 MHz

www.tuv.com



Data rate: 1 Mbps

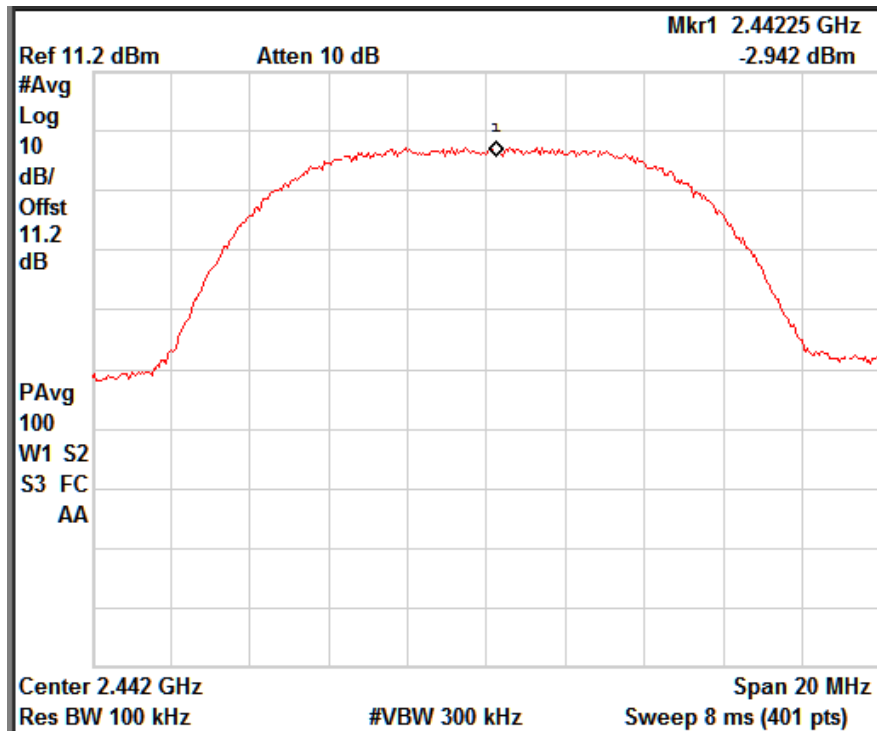
Channel Frequency: 2462 MHz



Data rate: 11 Mbps

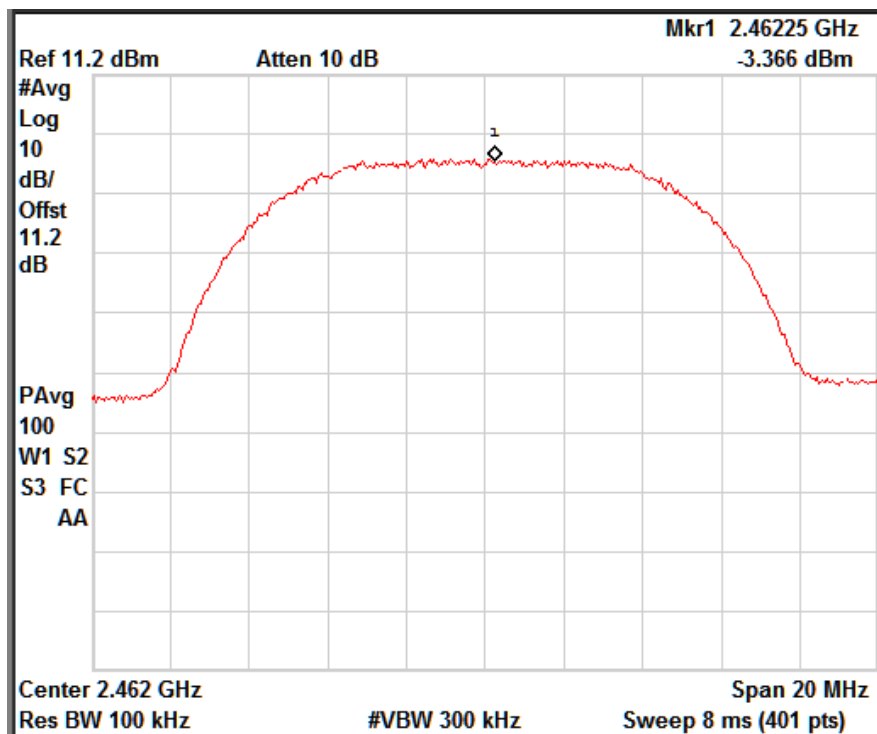
Channel Frequency: 2412 MHz

www.tuv.com



Data rate: 11 Mbps

Channel Frequency: 2442 MHz

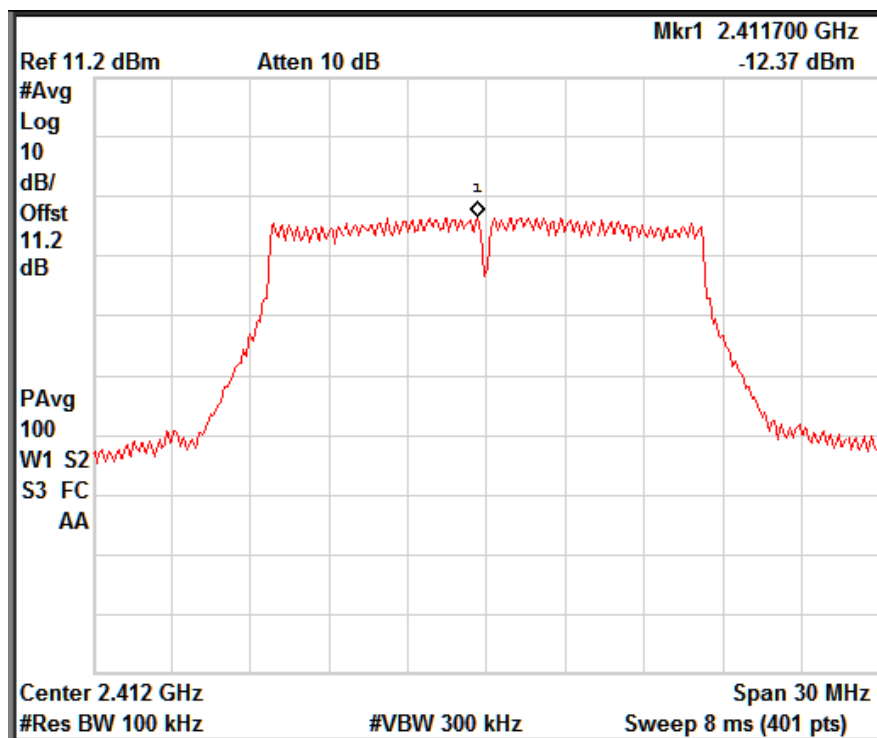


Data rate: 11 Mbps

Channel Frequency: 2462 MHz

www.tuv.com

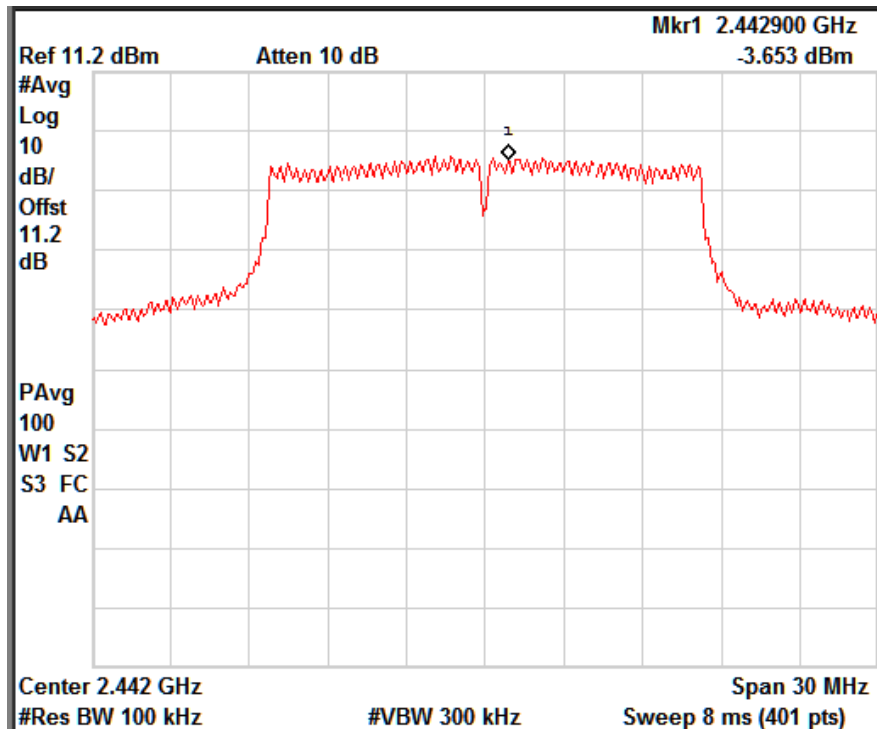
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
g	6	2412.00	-12.37	8.00	-20.37
		2442.00	-3.65	8.00	-11.65
		2462.00	-11.95	8.00	-19.95
	24	2412.00	-11.85	8.00	-19.85
		2442.00	-3.30	8.00	-11.30
		2462.00	-12.93	8.00	-20.93
	54	2412.00	-12.31	8.00	-20.31
		2442.00	-2.68	8.00	-10.68
		2462.00	-12.20	8.00	-20.20



Data rate: 6 Mbps

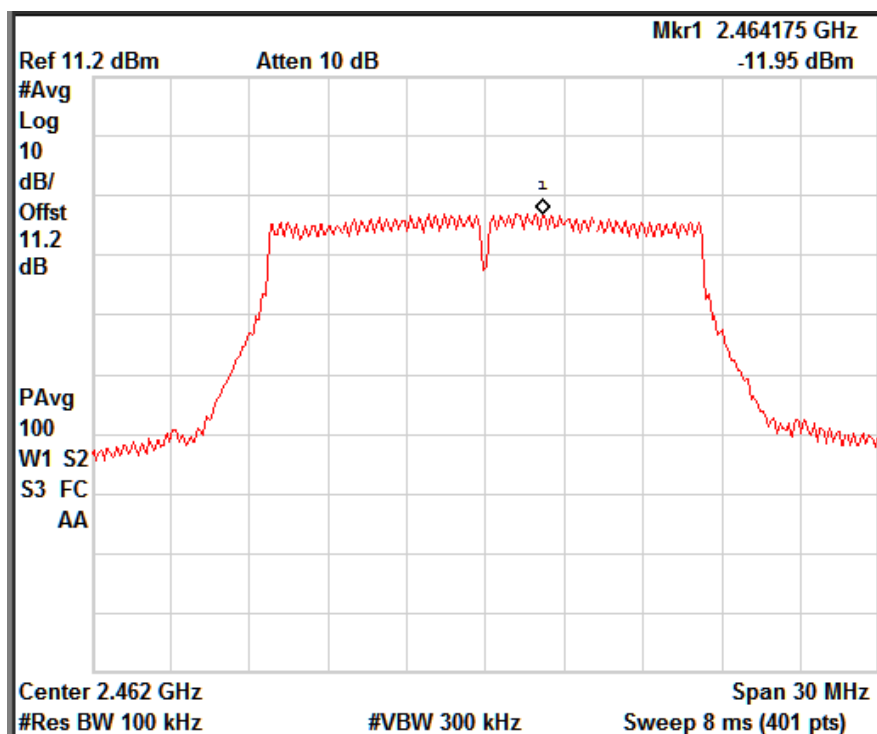
Channel Frequency: 2412 MHz

www.tuv.com



Data rate: 6 Mbps

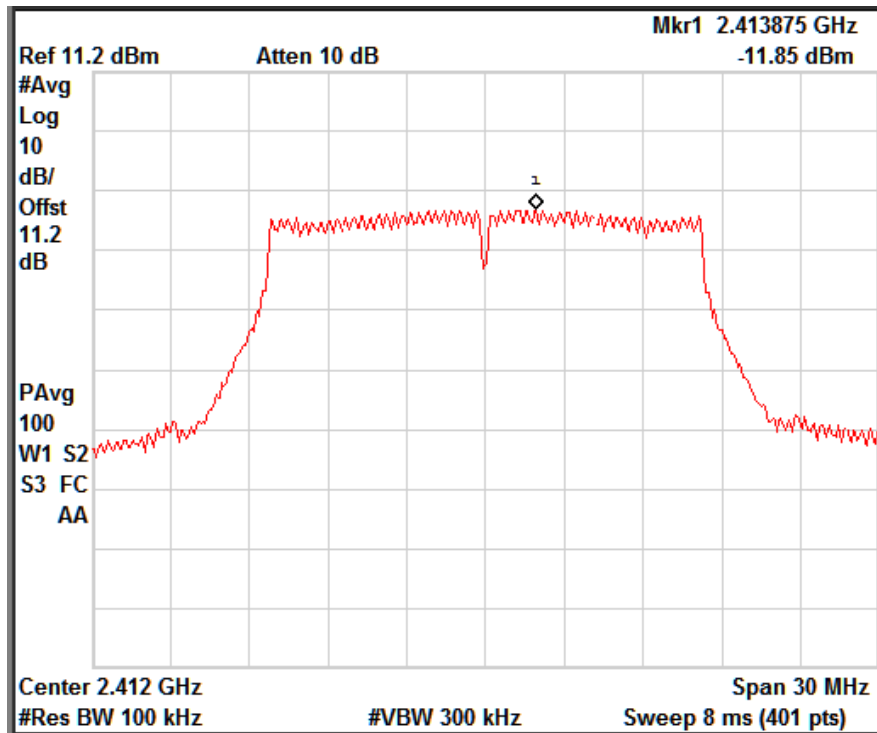
Channel Frequency: 2442 MHz



Data rate: 6 Mbps

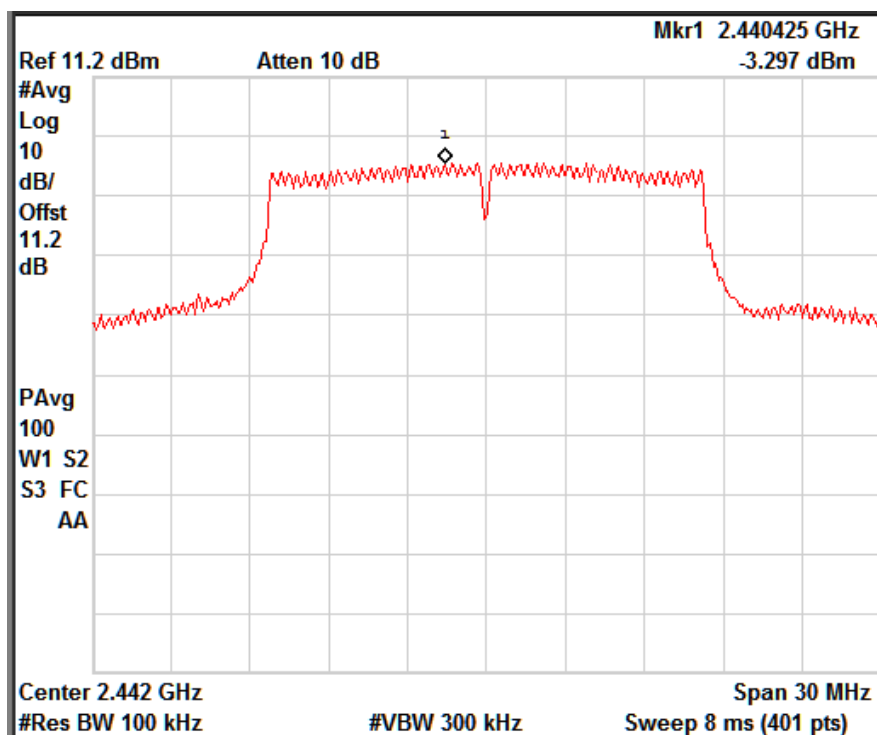
Channel Frequency: 2462 MHz

www.tuv.com



Data rate: 24 Mbps

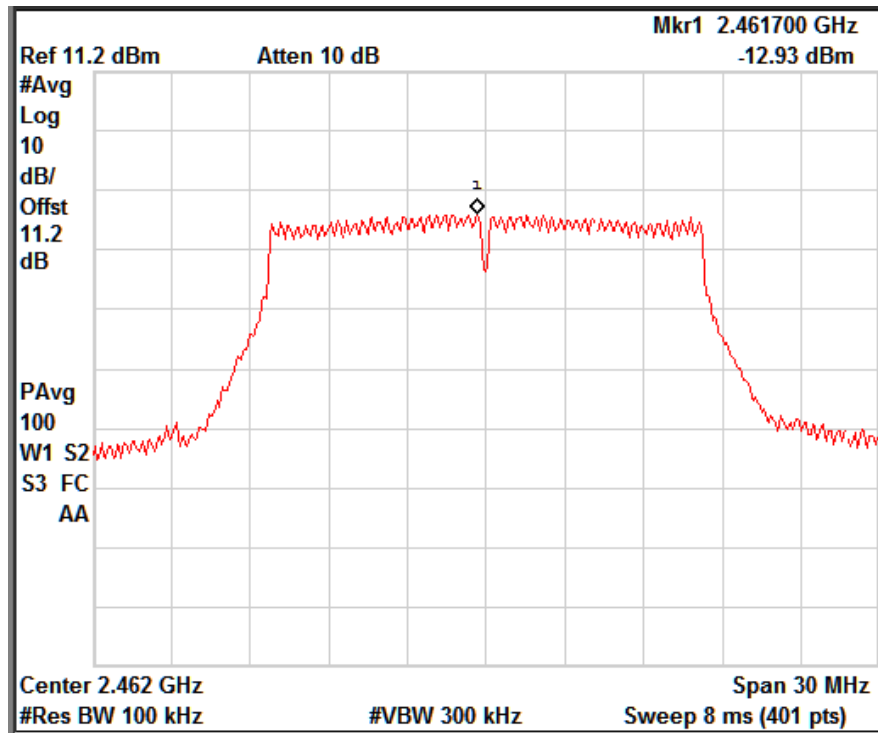
Channel Frequency: 2412 MHz



Data rate: 24 Mbps

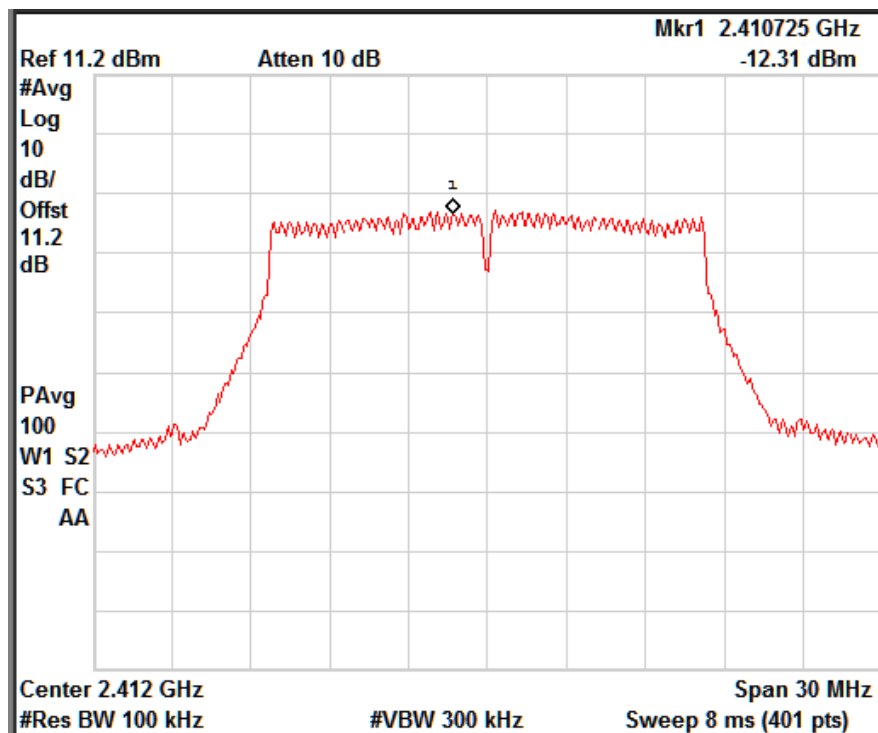
Channel Frequency: 2442 MHz

www.tuv.com



Data rate: 24 Mbps

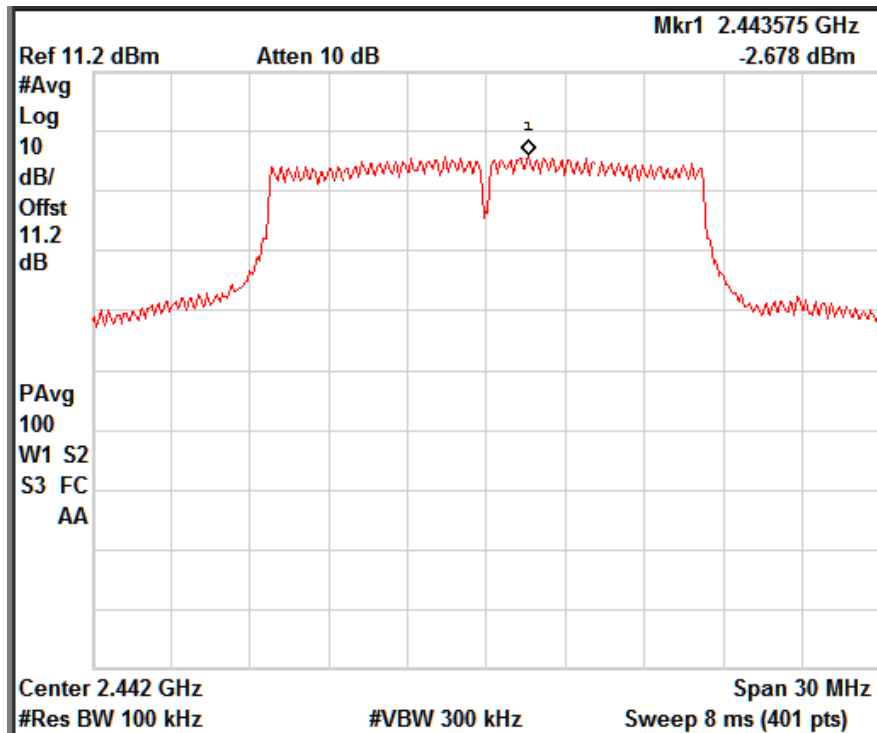
Channel Frequency: 2462 MHz



Data rate: 54 Mbps

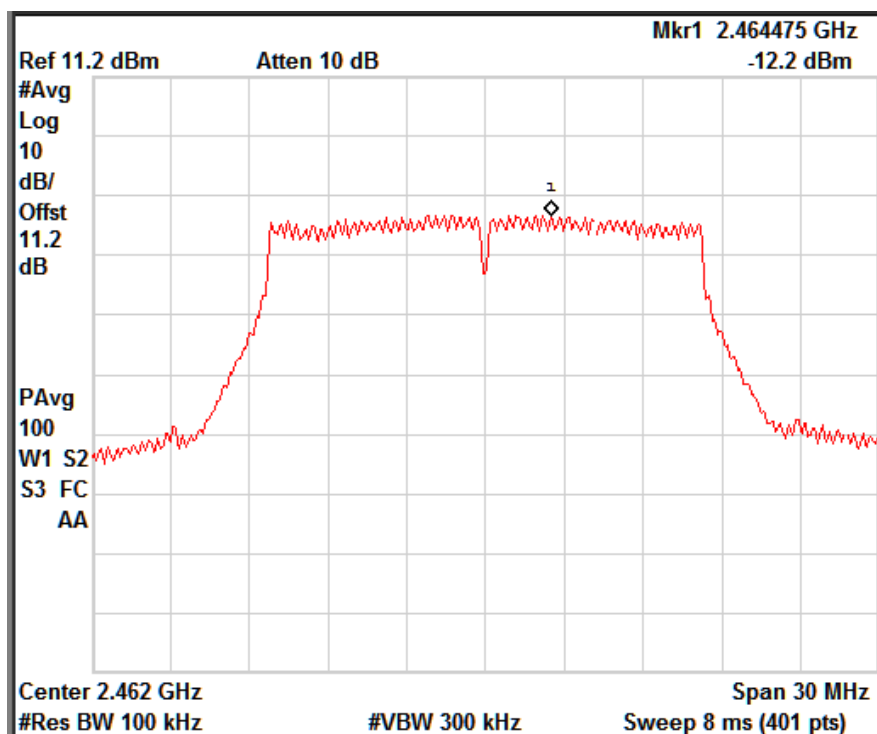
Channel Frequency: 2412 MHz

www.tuv.com



Data rate: 54 Mbps

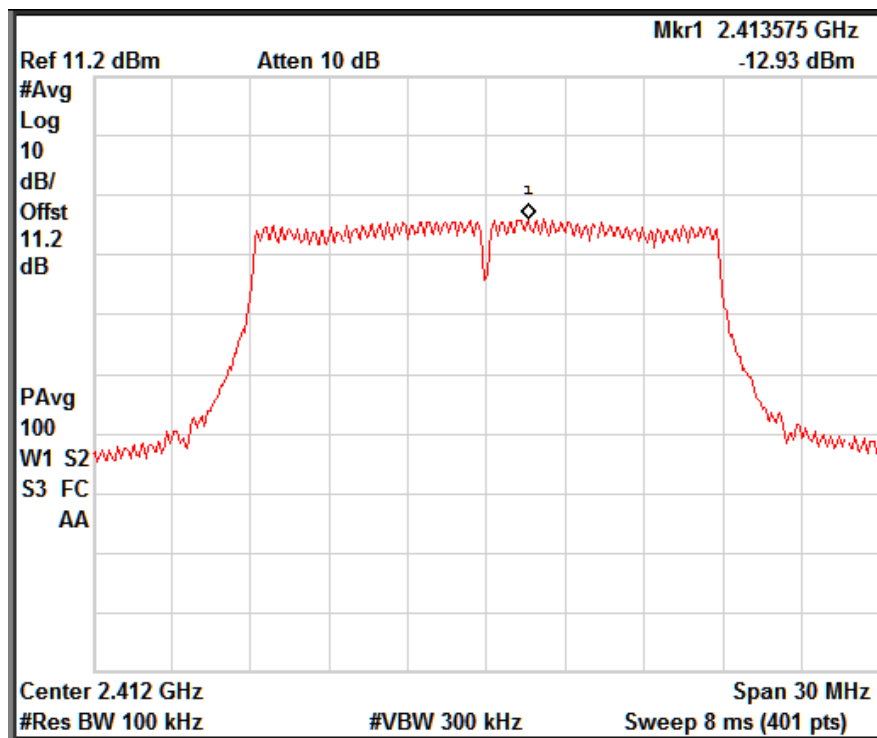
Channel Frequency: 2442 MHz



Data rate: 54 Mbps

Channel Frequency: 2462 MHz

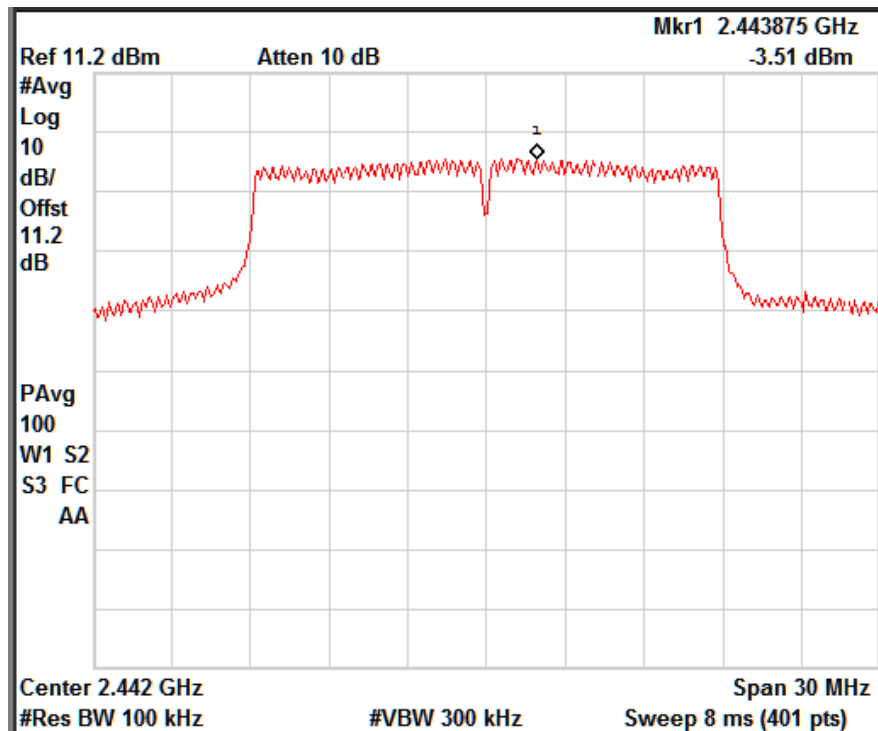
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
n	6.5	2412.00	-12.93	8.00	-20.93
		2442.00	-3.51	8.00	-11.51
		2462.00	-13.27	8.00	-21.27
	39	2412.00	-13.30	8.00	-21.30
		2442.00	-3.57	8.00	-11.57
		2462.00	-12.78	8.00	-20.78
	65	2412.00	-12.58	8.00	-20.58
		2442.00	-3.24	8.00	-11.24
		2462.00	-13.23	8.00	-21.23



Data rate: 6.5 Mbps

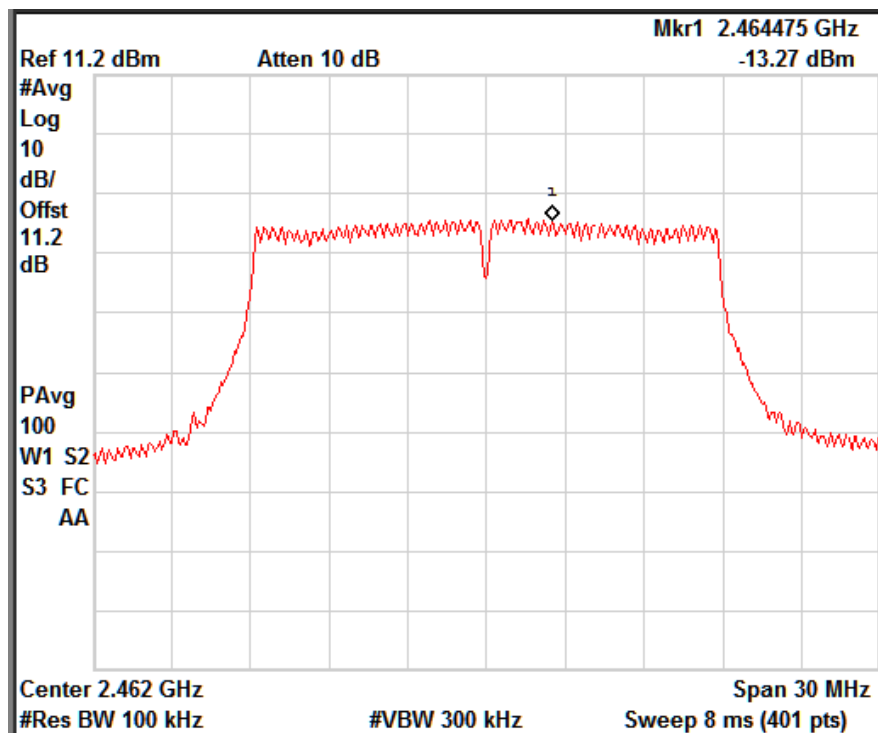
Channel Frequency: 2412 MHz

www.tuv.com



Data rate: 6.5 Mbps

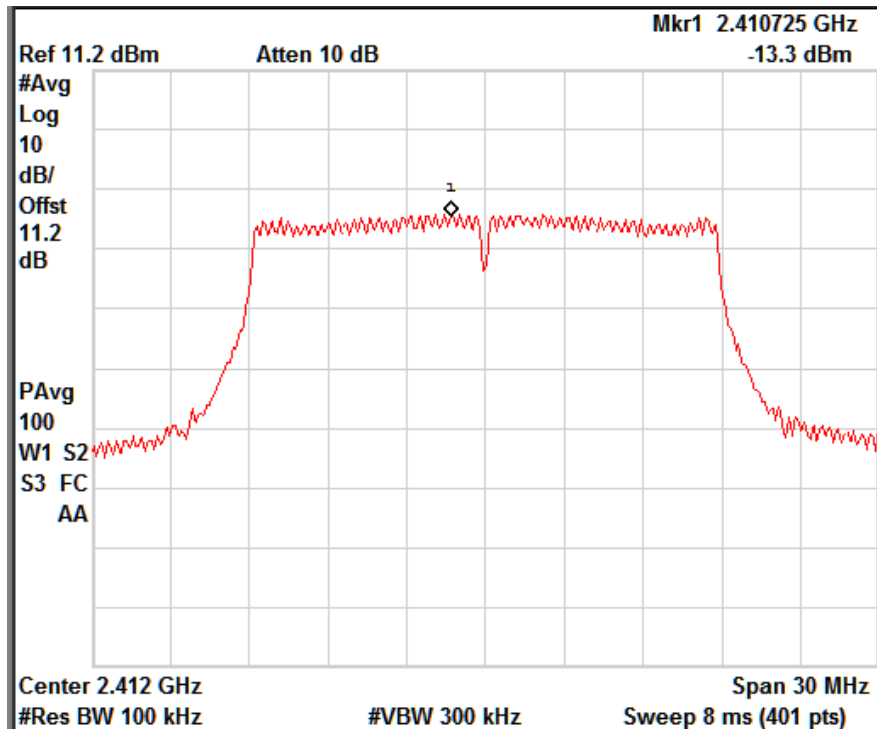
Channel Frequency: 2442 MHz



Data rate: 6.5 Mbps

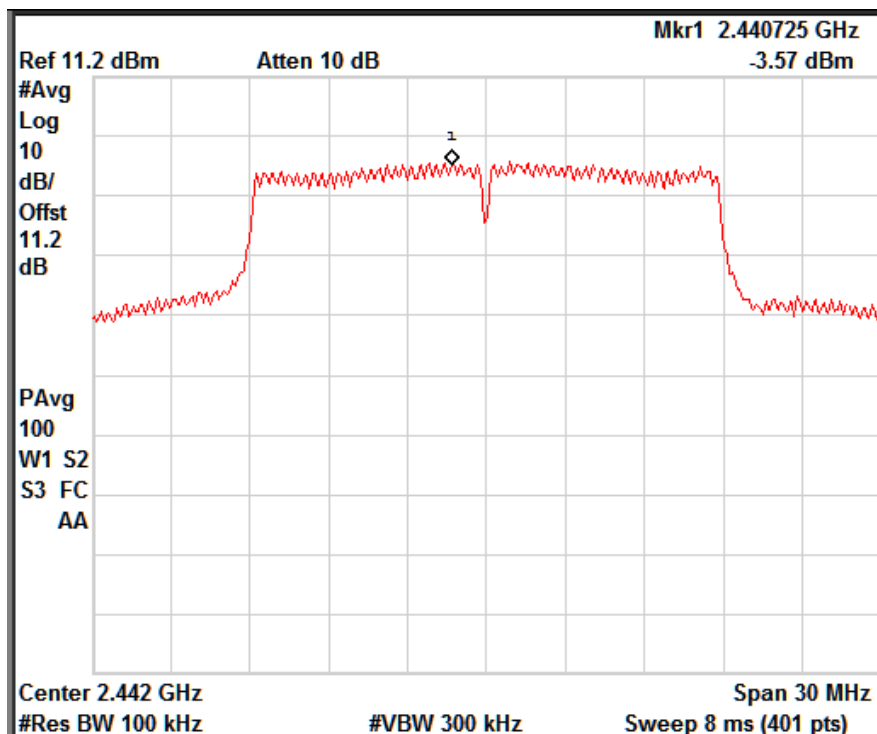
Channel Frequency: 2462 MHz

www.tuv.com



Data rate: 39 Mbps

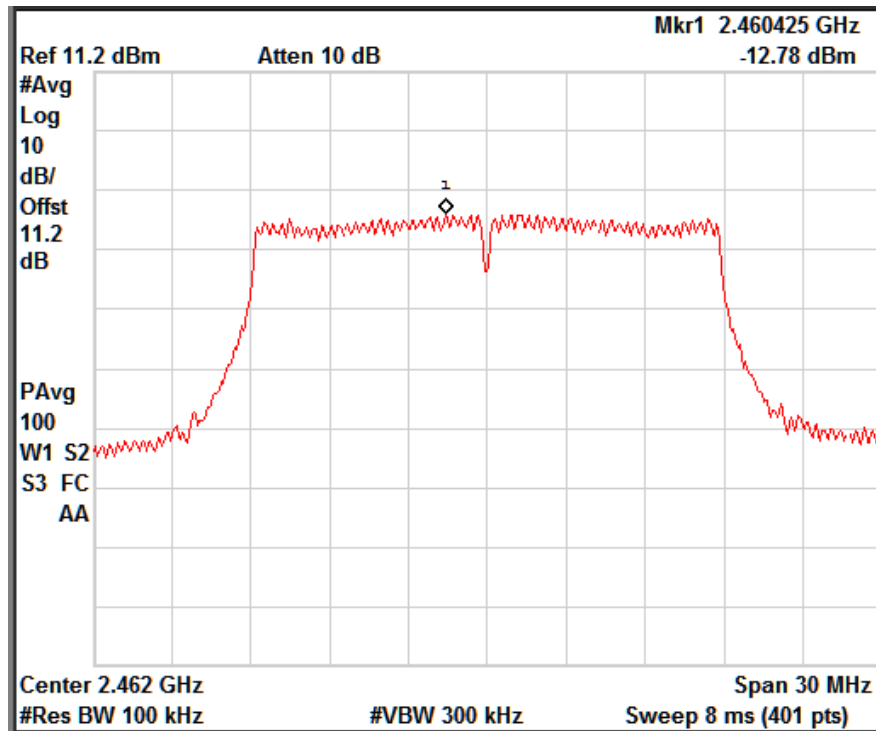
Channel Frequency: 2412 MHz



Data rate: 39 Mbps

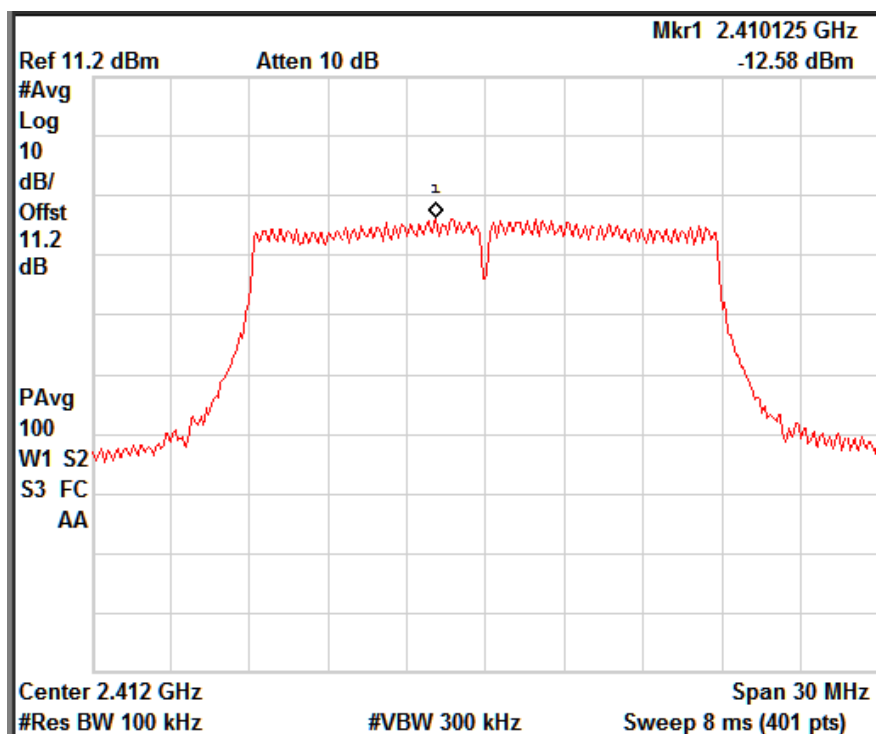
Channel Frequency: 2442 MHz

www.tuv.com



Data rate: 39 Mbps

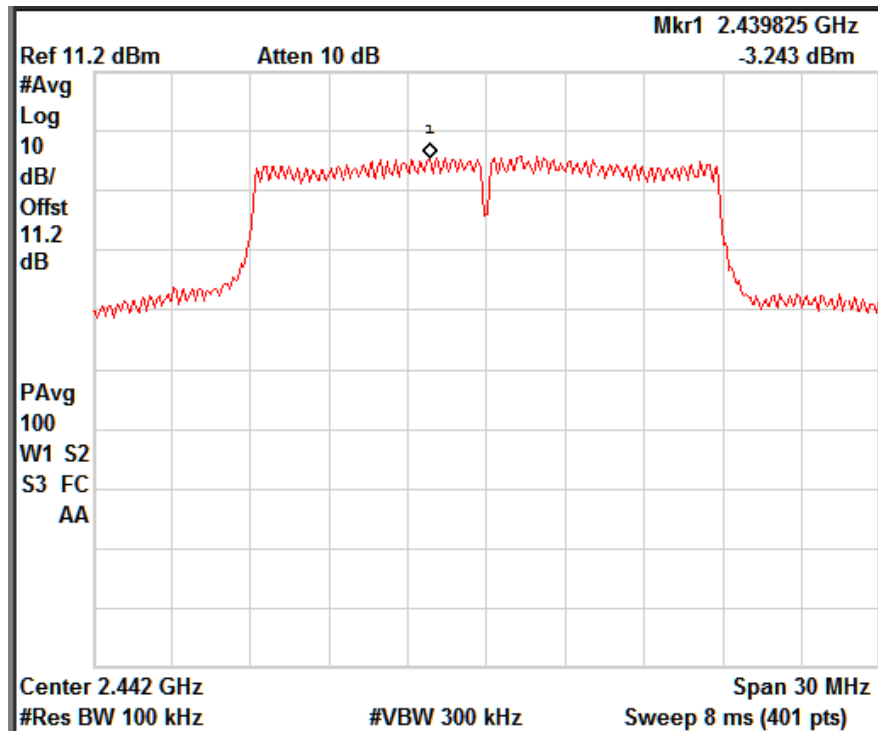
Channel Frequency: 2462 MHz



Data rate: 65 Mbps

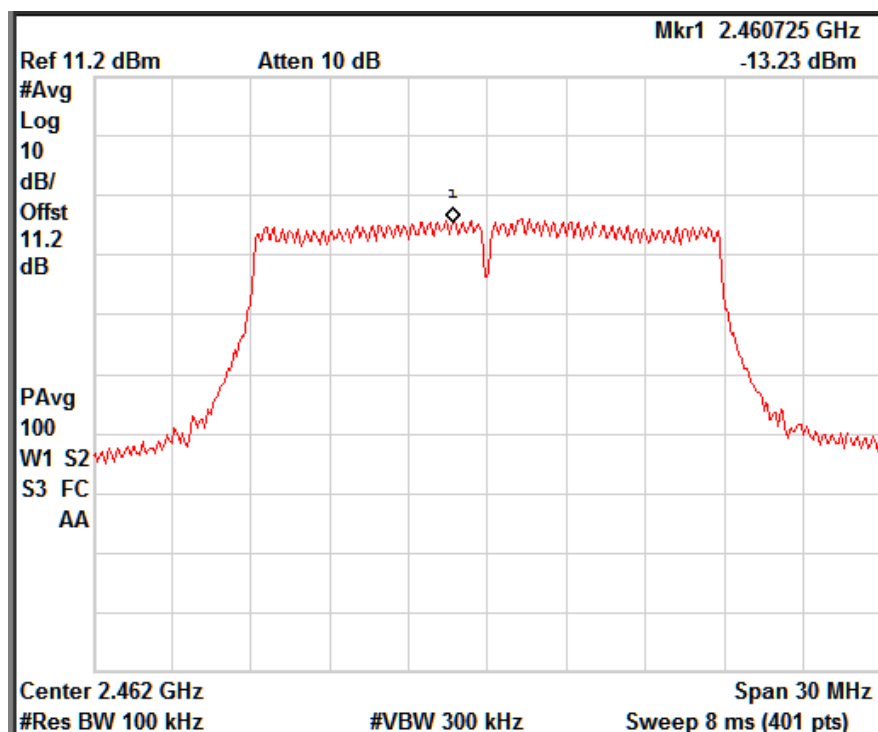
Channel Frequency: 2412 MHz

www.tuv.com



Data rate: 65 Mbps

Channel Frequency: 2442 MHz

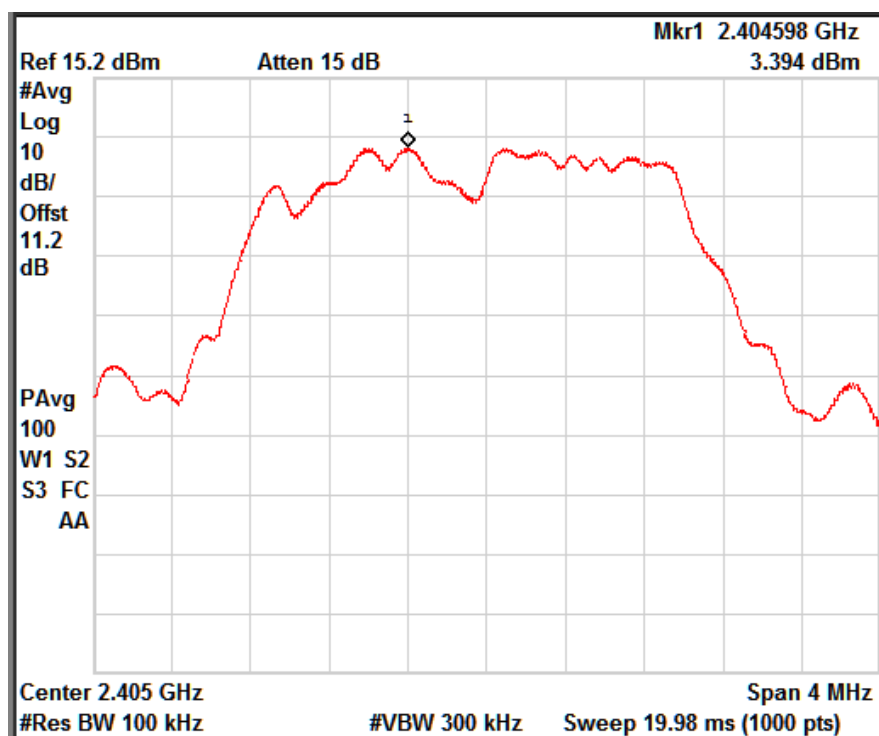


Data rate: 65 Mbps

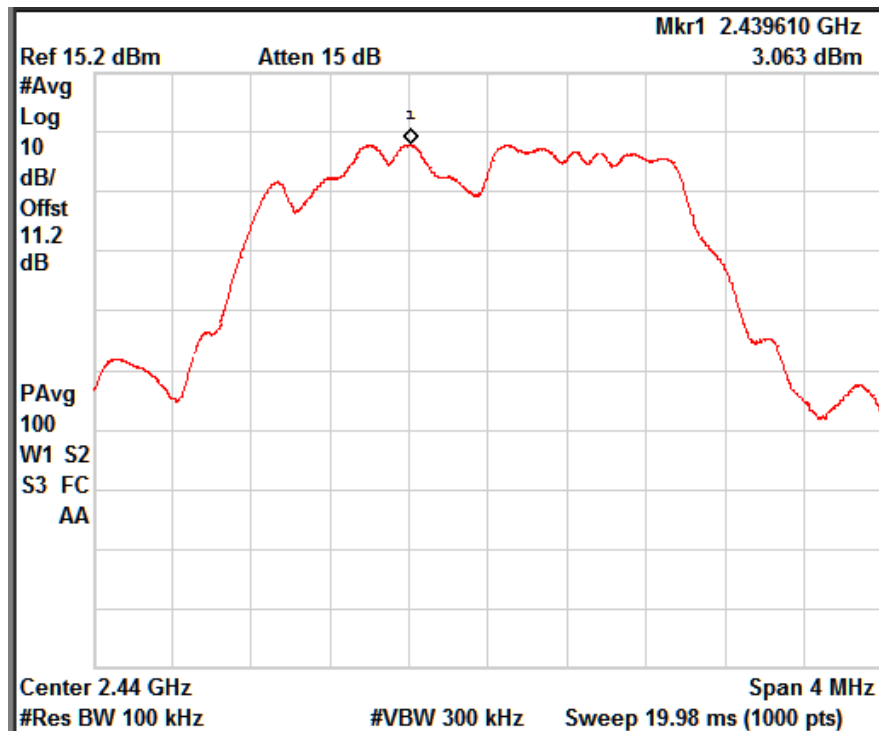
Channel Frequency: 2462 MHz

www.tuv.com
 Test Result: ZigBee

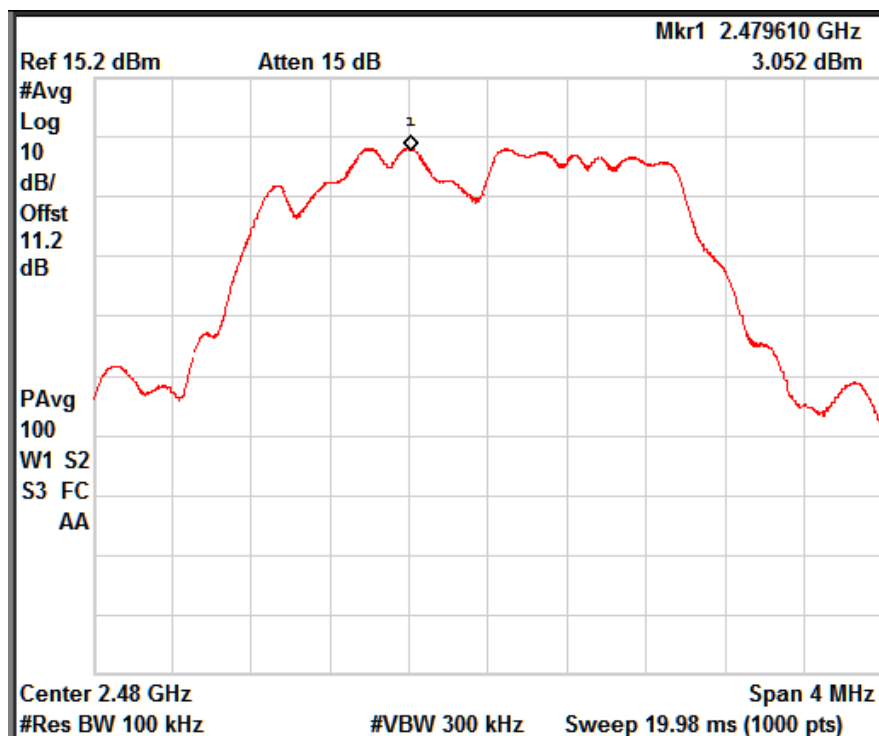
Channel Frequency (MHz)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
2405.00	3.39	8.00	-4.61
2440.00	3.06	8.00	-4.94
2480.00	3.05	8.00	-4.95



Channel Frequency: 2405 MHz



Channel Frequency: 2440 MHz

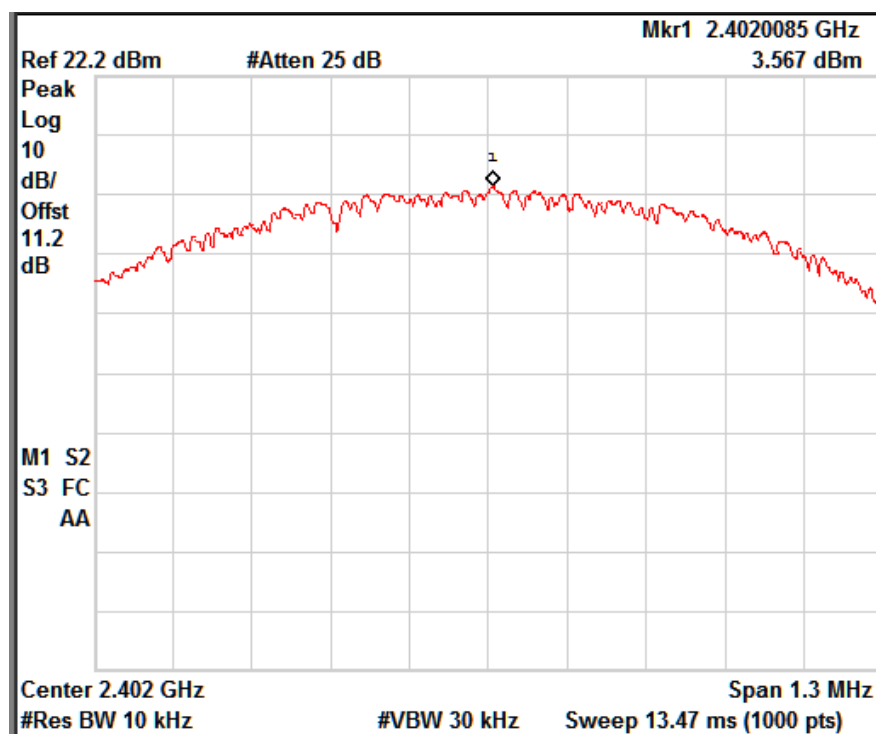


Channel Frequency: 2480 MHz

www.tuv.com

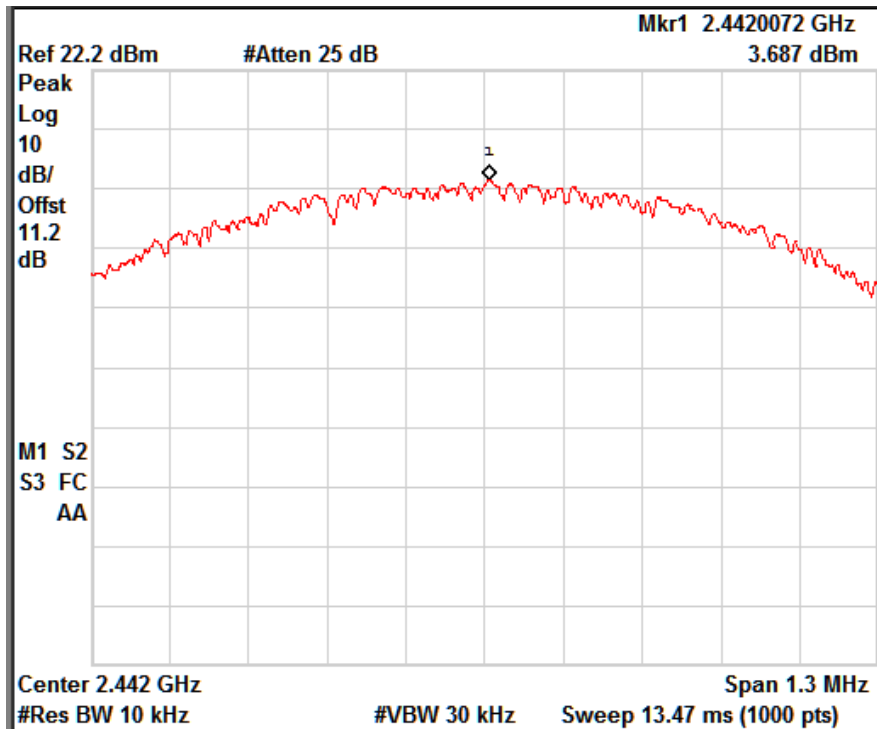
Test Result: Bluetooth LE

Channel Frequency (MHz)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
2402.00	3.57	8.00	-4.43
2442.00	3.69	8.00	-4.31
2480.00	3.17	8.00	-4.83

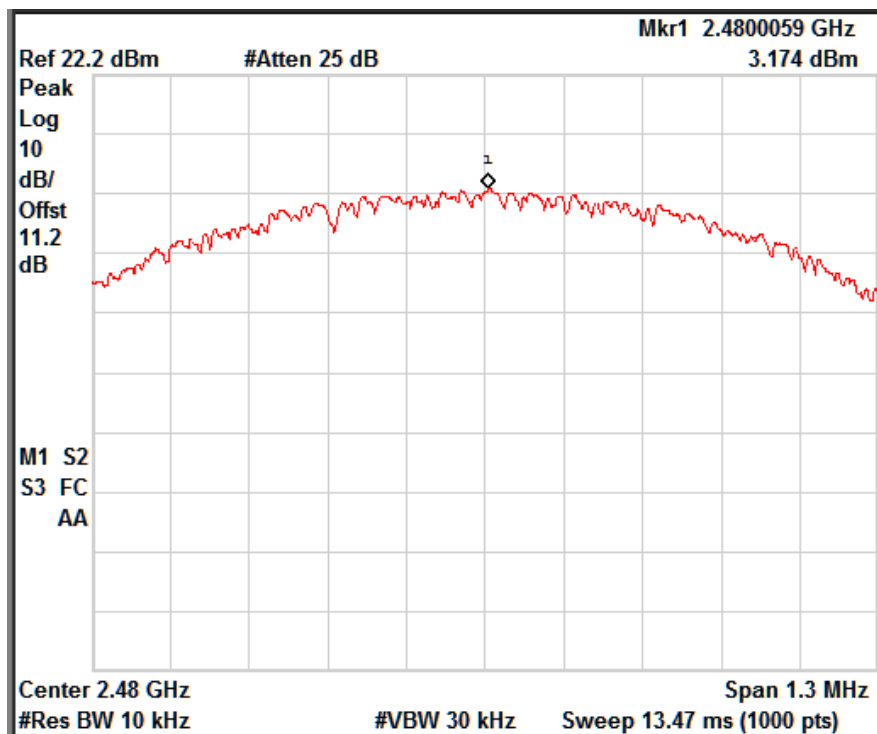


Channel Frequency: 2402 MHz

www.tuv.com



Channel Frequency: 2442 MHz



Channel Frequency: 2480 MHz

www.tuv.com
6 dB Bandwidth

Section A8.2 (a)

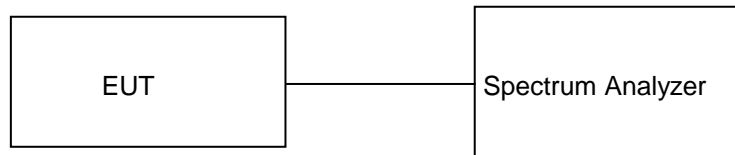
Result

Pass

Test Specification
Requirement

RSS – 210 Issue 8, December 2010
The minimum 6 dB bandwidth shall be at least 500 kHz.

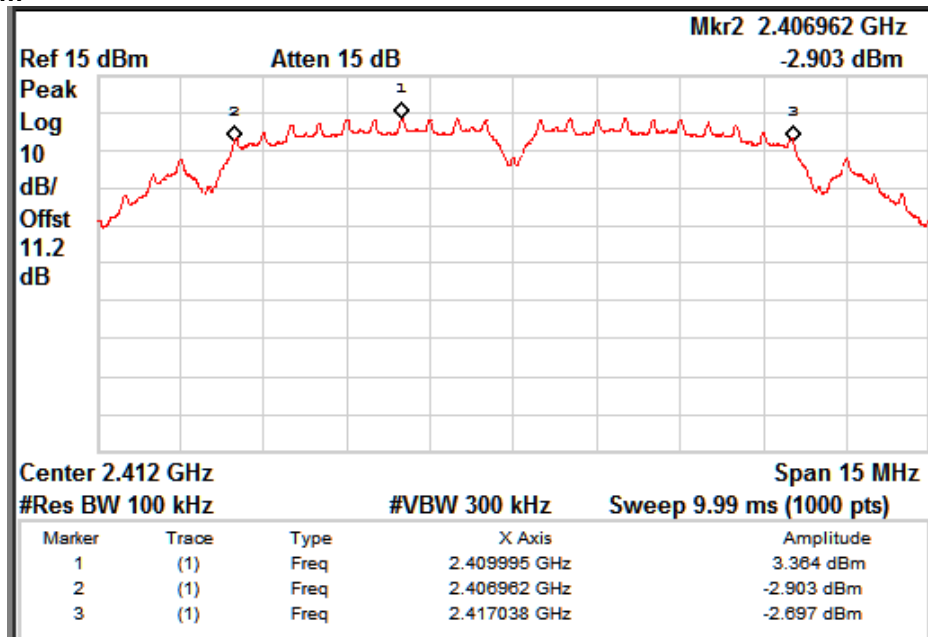
Test Method:



Test Result:

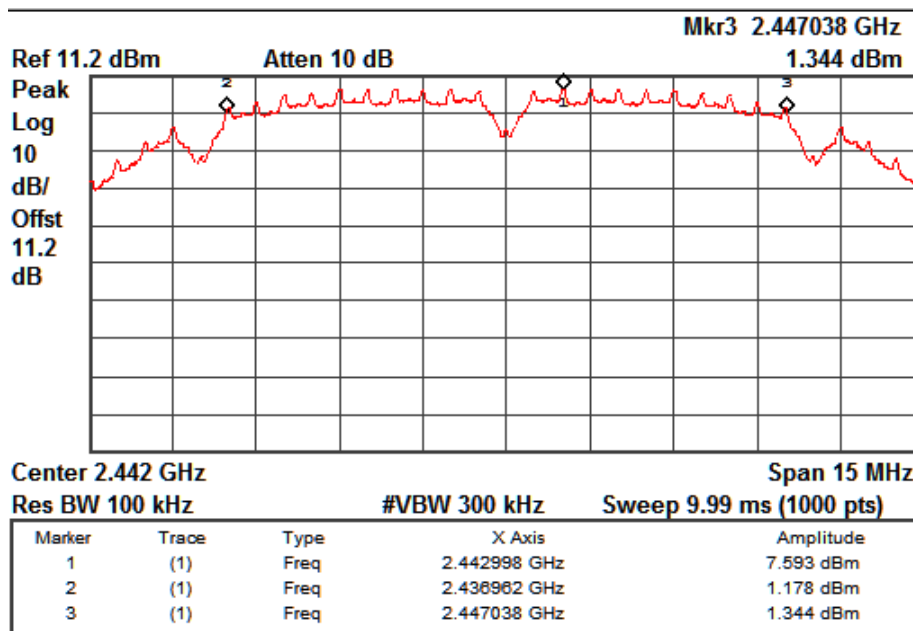
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
b	1	2412.00	2406.962	2417.038	10.076	12.034
		2442.00	2436.962	2447.038	10.076	12.038
		2462.00	2456.962	2467.038	10.076	12.025
	11	2412.00	2407.203	2416.812	9.609	11.822
		2442.00	2437.293	2446.782	9.489	11.899
		2462.00	2457.173	2466.797	9.624	11.809

www.tuv.com



Data Rate: 1 Mbps

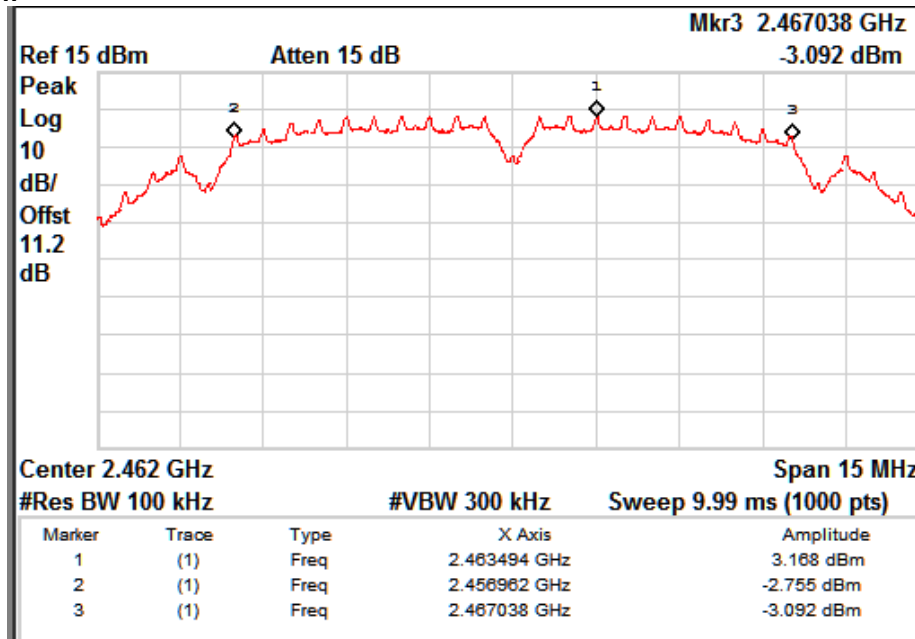
Channel frequency: 2412 MHz



Data Rate: 1 Mbps

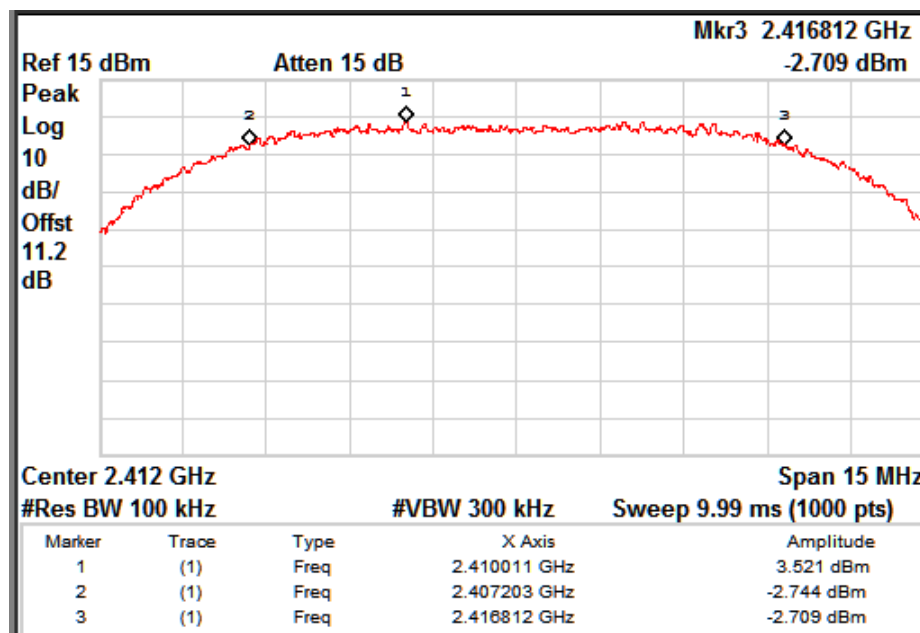
Channel frequency: 2442 MHz

www.tuv.com



Data Rate: 1 Mbps

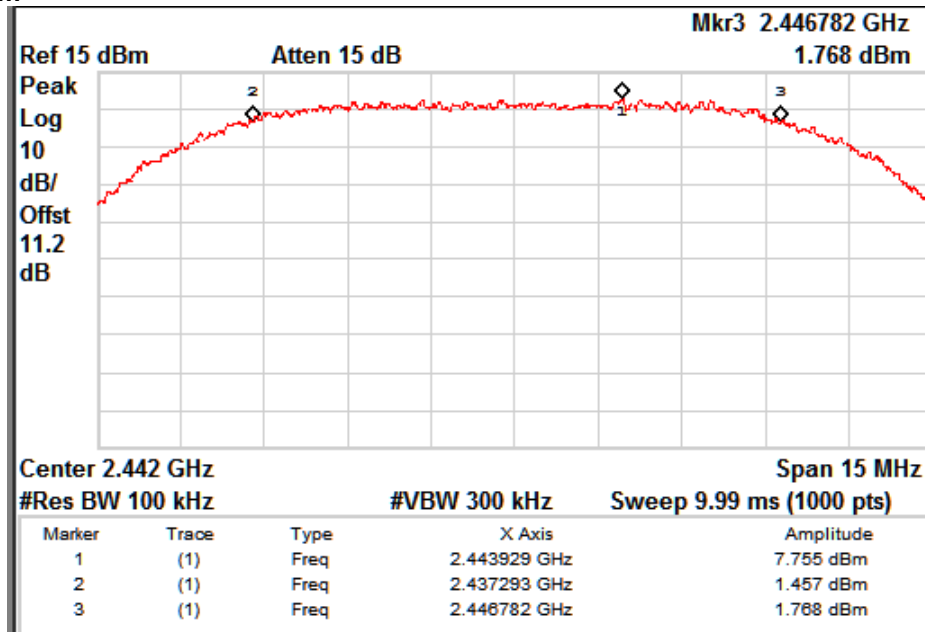
Channel frequency: 2462 MHz



Data Rate: 11 Mbps

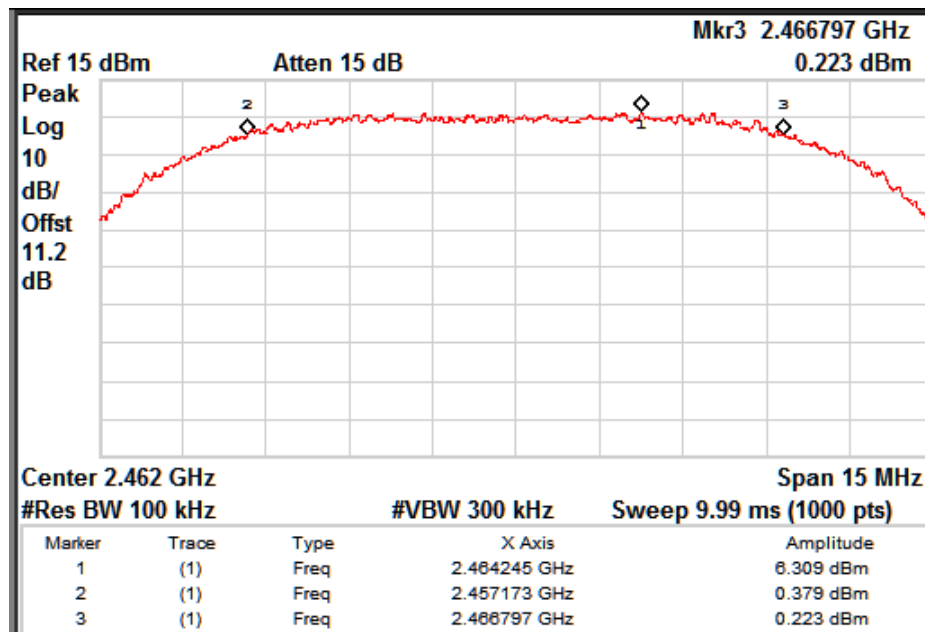
Channel frequencies: 2412 MHz

www.tuv.com



Data Rate: 11 Mbps

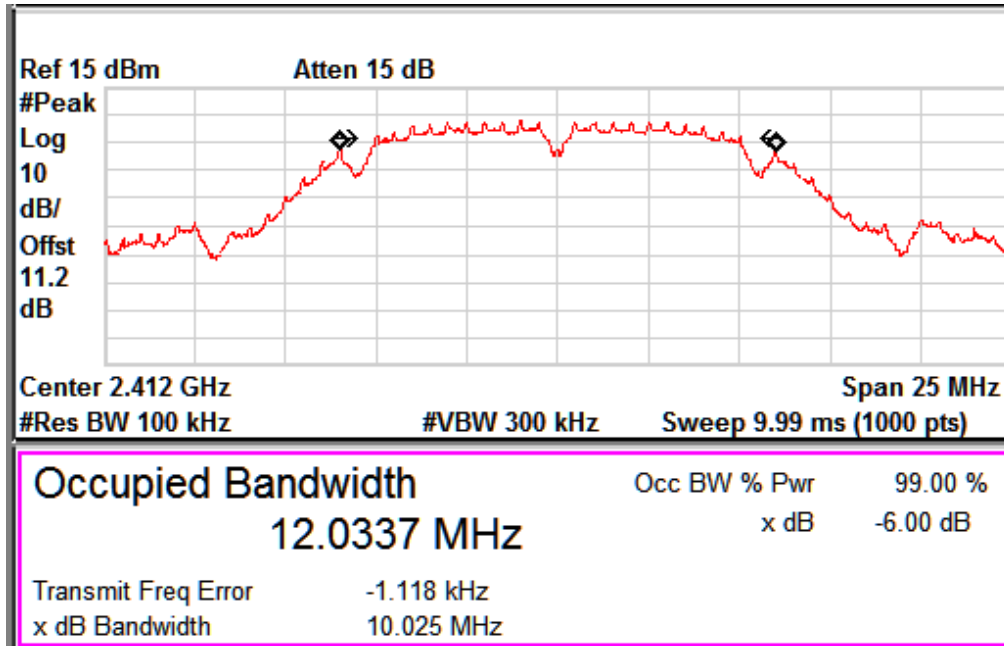
Channel frequency: 2442 MHz



Data Rate: 11 Mbps

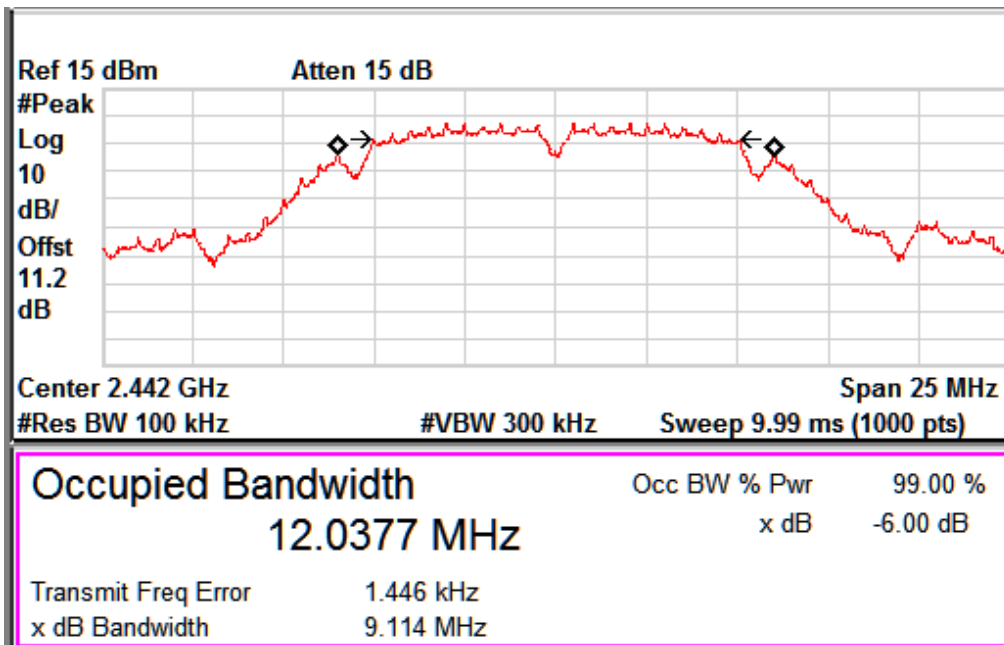
Channel frequency: 2462 MHz

www.tuv.com



Data rate: 1 Mbps

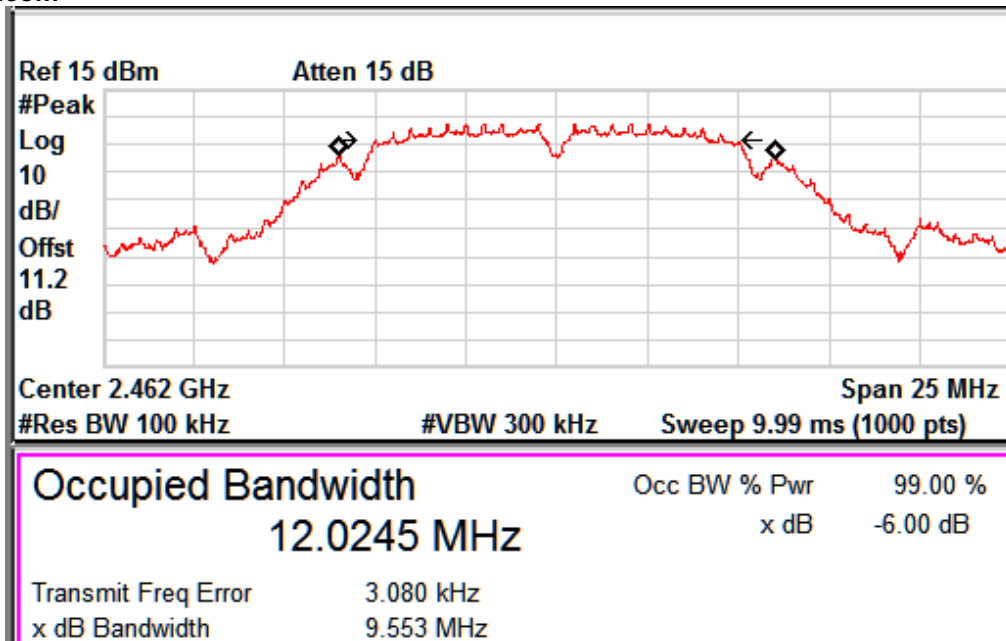
99% Occupied Bandwidth: Channel 2412MHz



Data rate: 1 Mbps

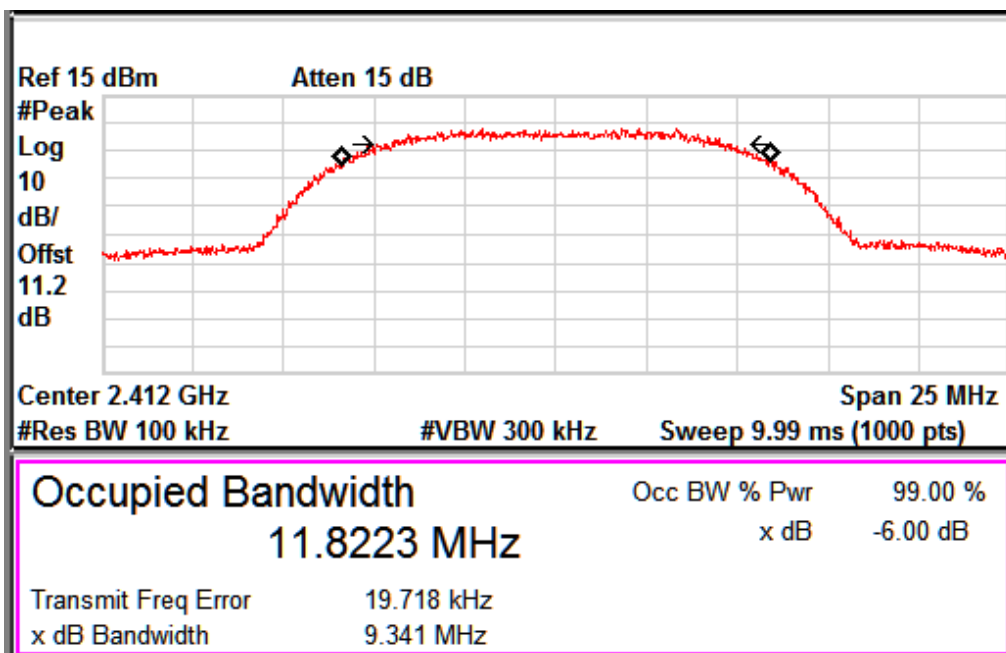
99% Occupied Bandwidth: Channel 2442MHz

www.tuv.com



Data rate: 1 Mbps

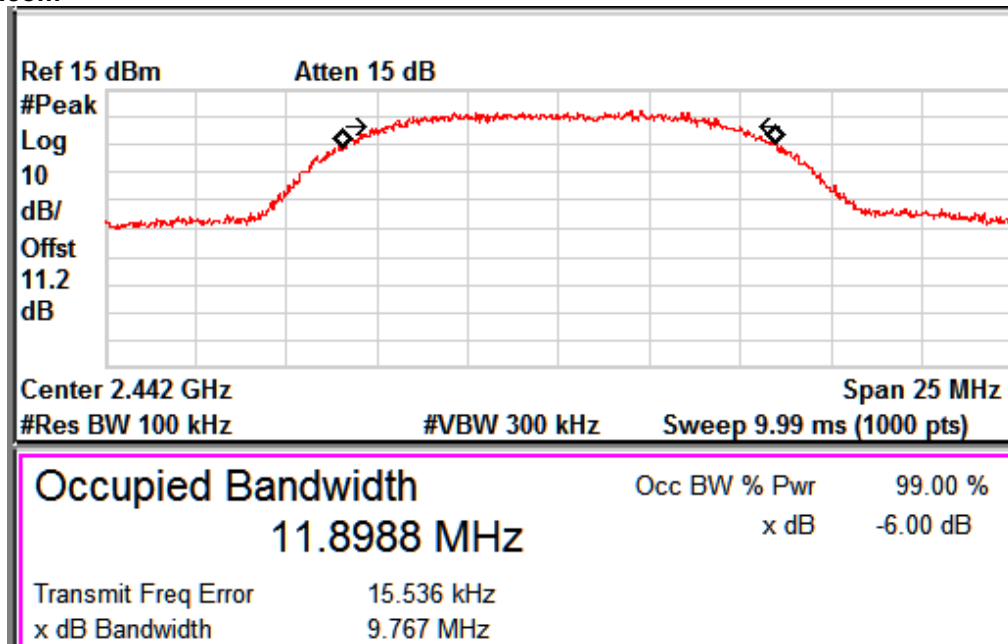
99% Occupied Bandwidth: Channel 2462MHz



Data rate: 11 Mbps

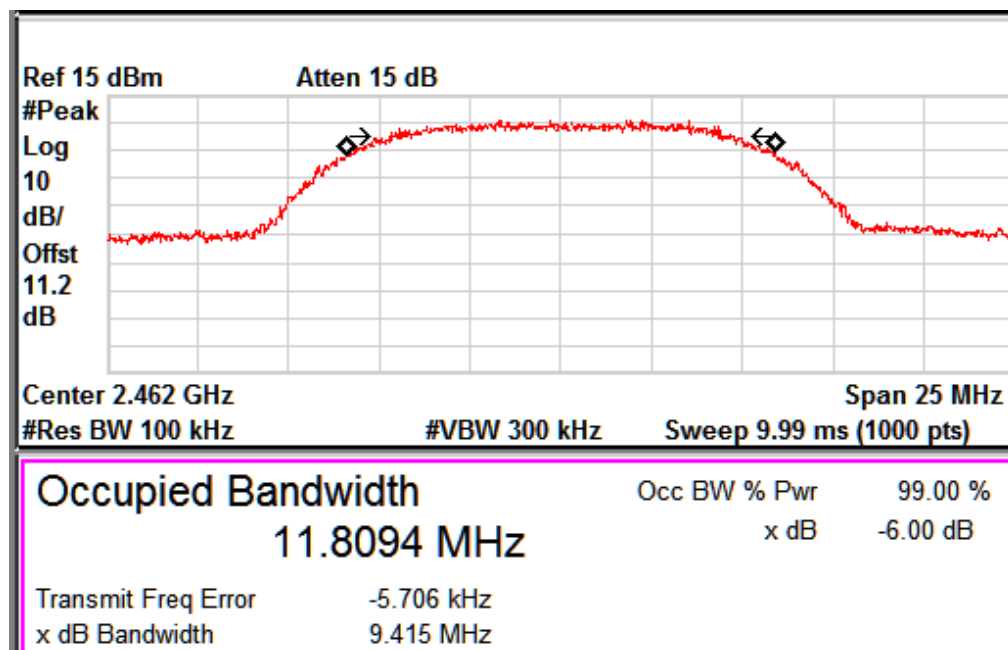
99% Occupied Bandwidth: Channel 2412MHz

www.tuv.com



Data rate: 11 Mbps

99% Occupied Bandwidth: Channel 2442MHz

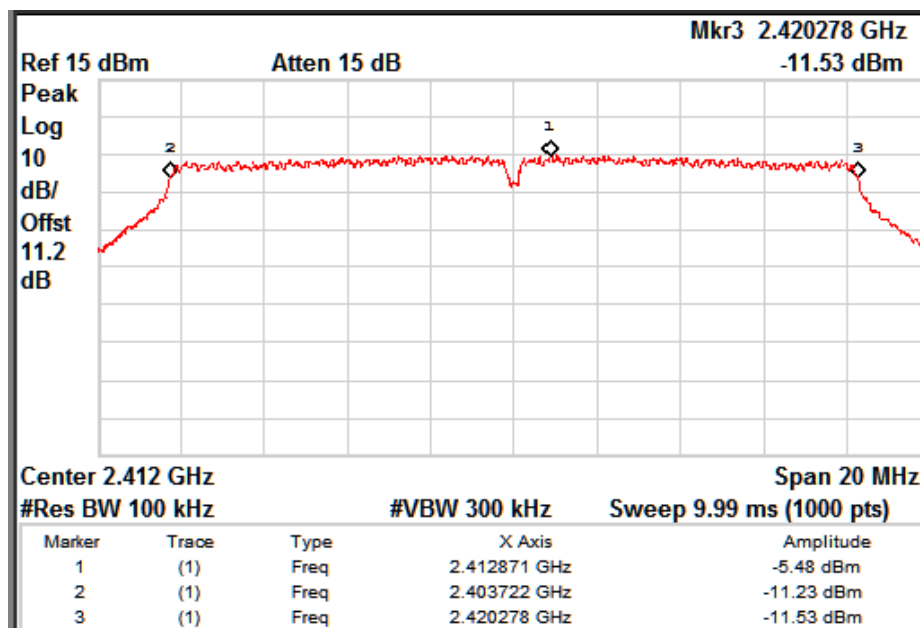


Data rate: 11 Mbps

99% Occupied Bandwidth: Channel 2462MHz

www.tuv.com

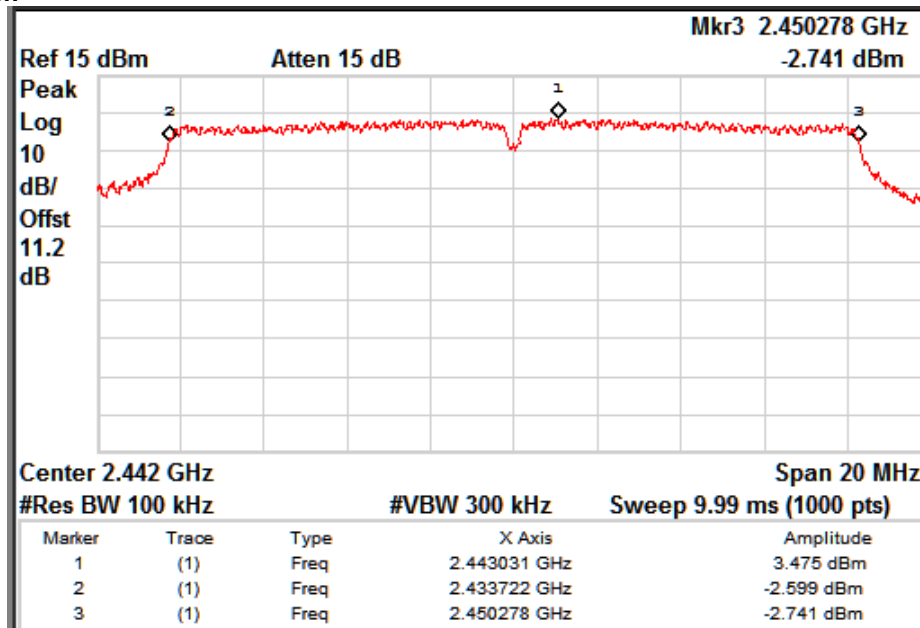
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
g	6	2412.00	2403.722	2420.278	16.556	16.468
		2442.00	2433.722	2450.278	16.556	16.774
		2462.00	2453.742	2470.278	16.536	16.497
	24	2412.00	2403.722	2420.278	16.556	16.443
		2442.00	2433.702	2450.278	16.576	16.539
		2462.00	2453.722	2470.258	16.536	16.439
	54	2412.00	2403.722	2420.278	16.556	16.451
		2442.00	2433.702	2450.278	16.576	16.561
		2462.00	2453.722	2470.278	16.556	16.452



Data Rate: 6 Mbps

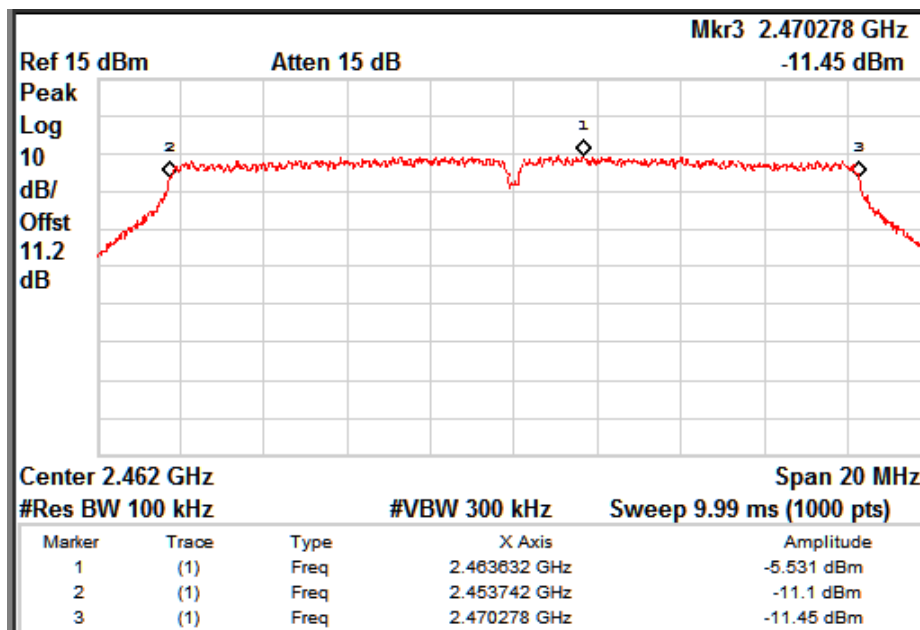
Channel frequencies: 2412 MHz

www.tuv.com



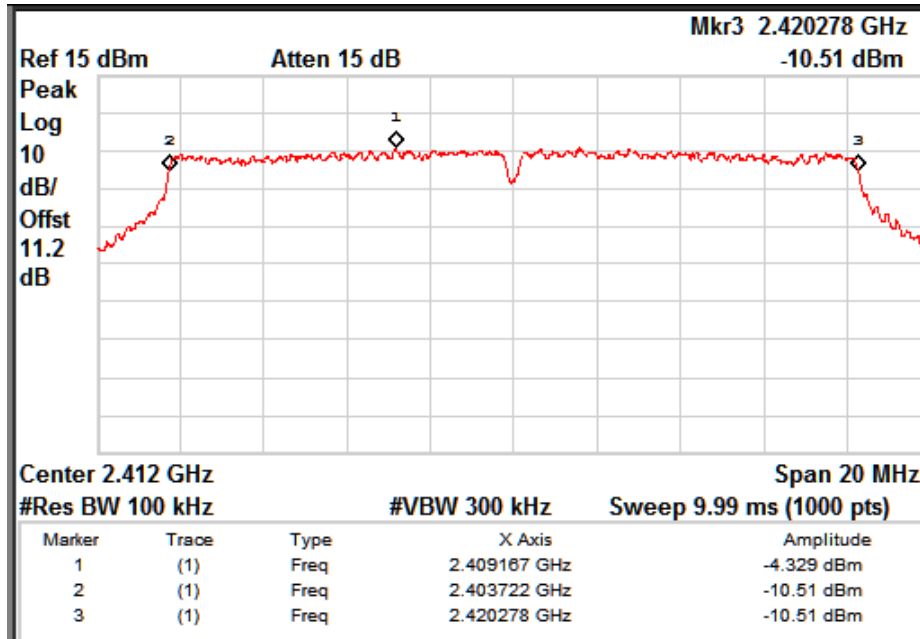
Data Rate: 6 Mbps

Channel frequencies: 2442 MHz



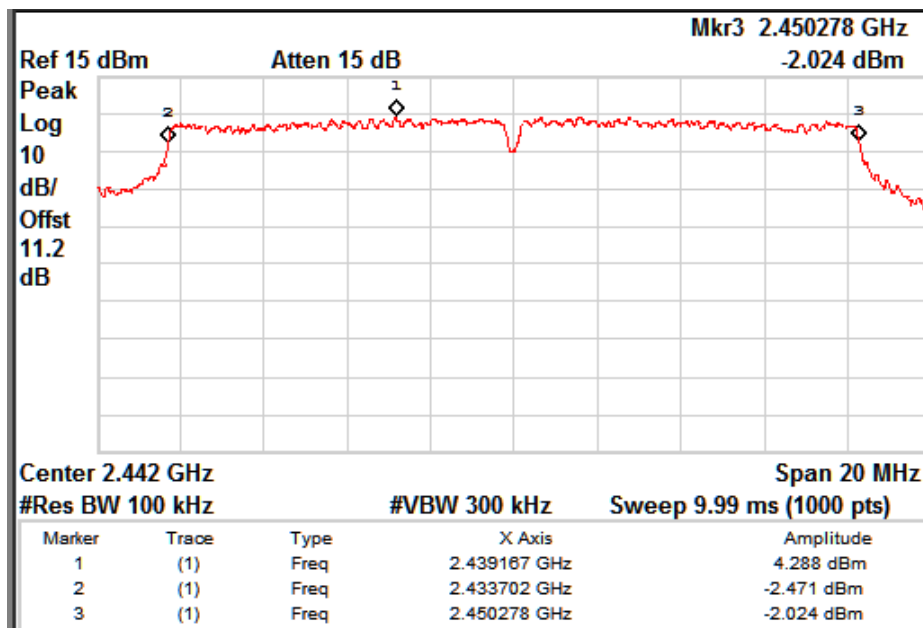
Data Rate: 6 Mbps

Channel frequencies: 2462 MHz



Data Rate: 24 Mbps

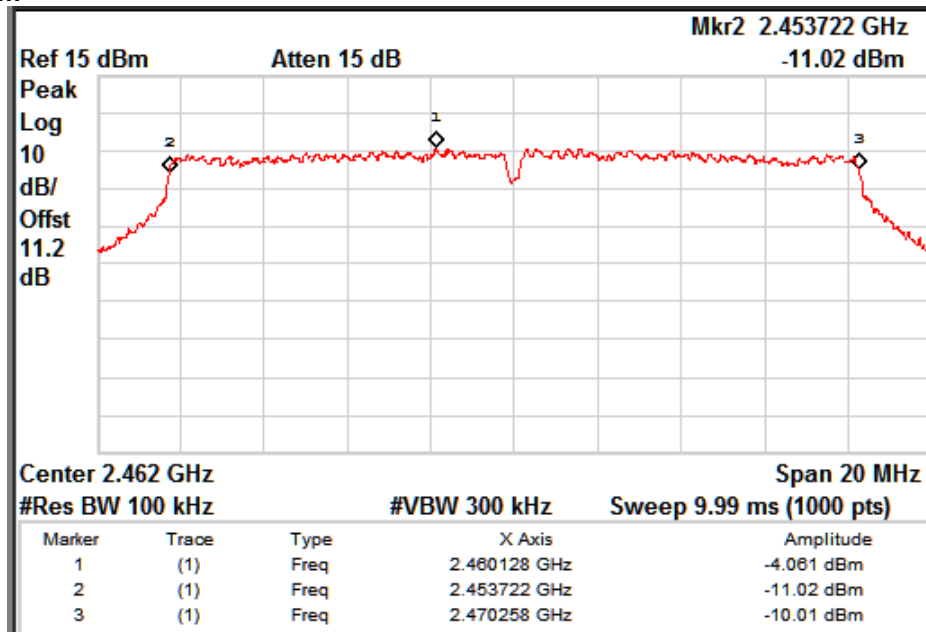
Channel frequencies: 2412 MHz



Data Rate: 24 Mbps

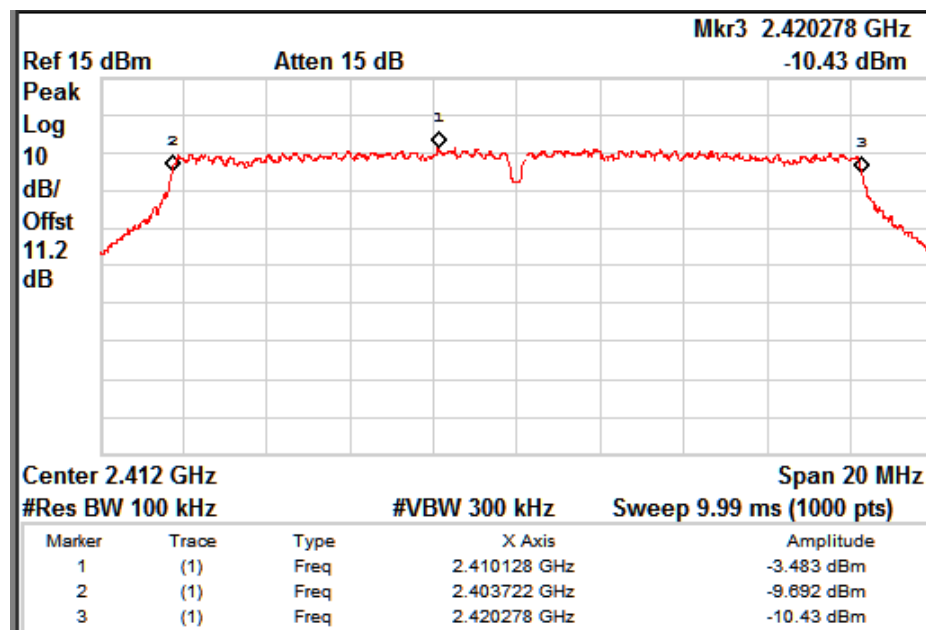
Channel frequencies: 2442 MHz

www.tuv.com



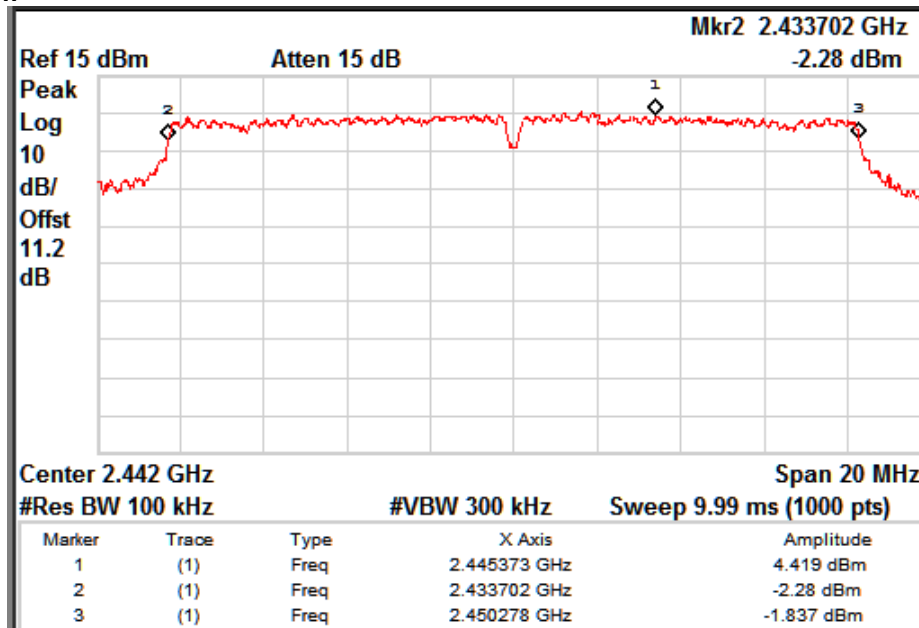
Data Rate: 24 Mbps

Channel frequencies: 2462 MHz



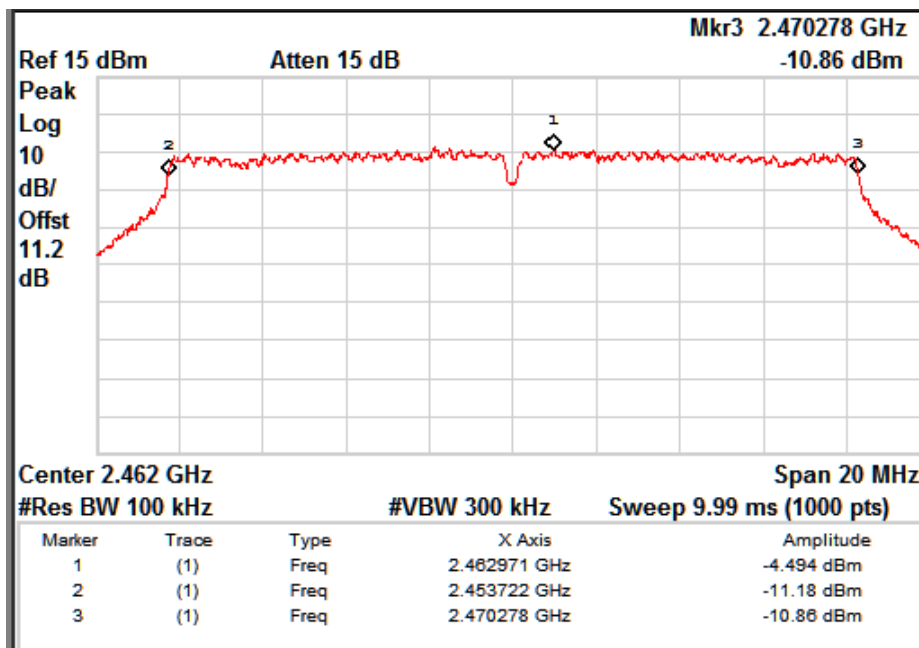
Data Rate: 54 Mbps

Channel frequencies: 2412 MHz



Data Rate: 54 Mbps

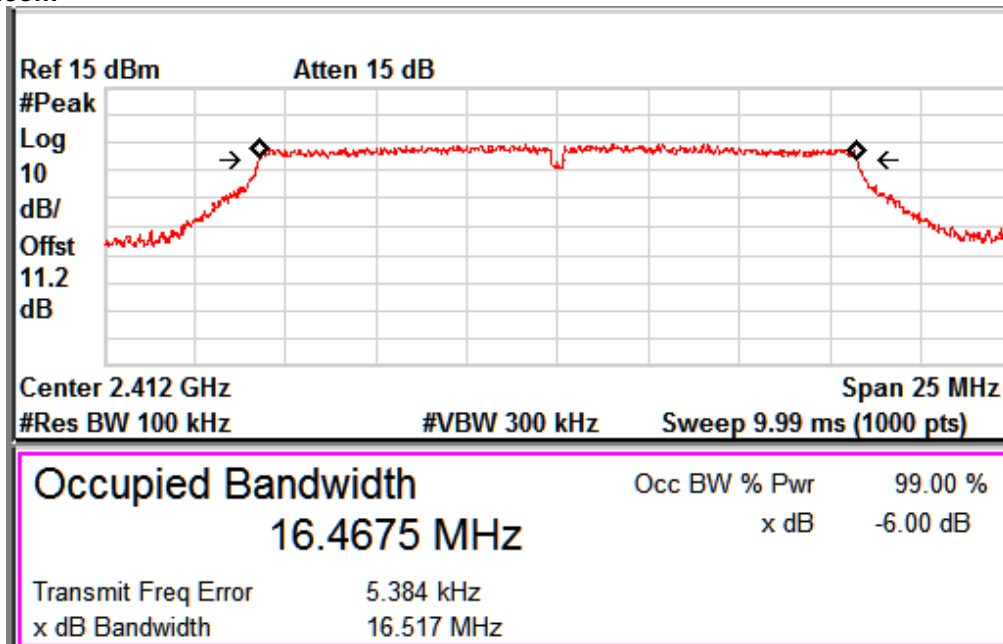
Channel frequencies: 2442MHz



Data Rate: 54 Mbps

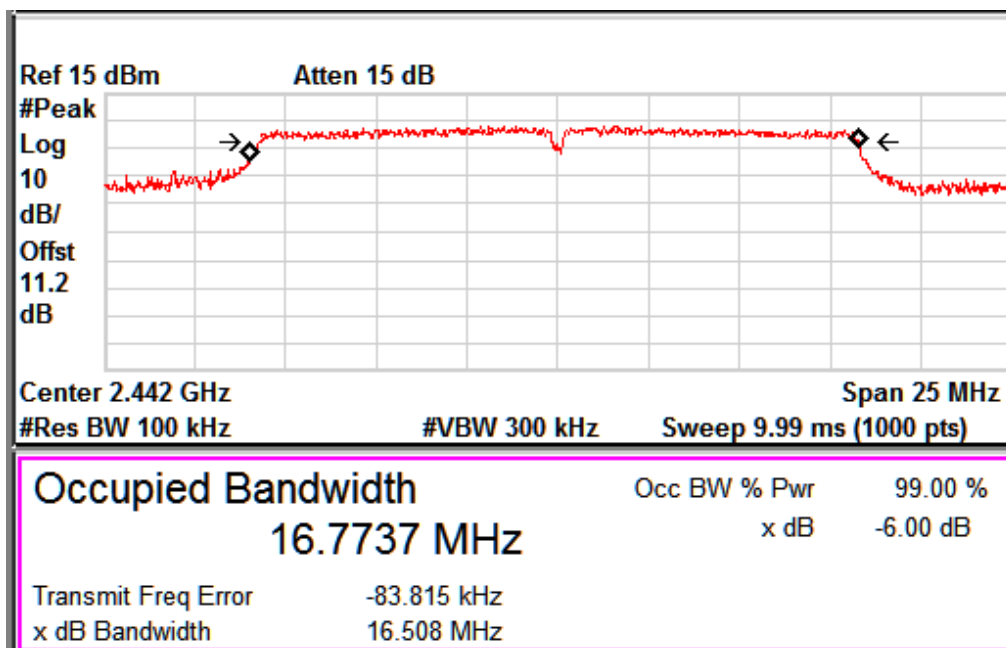
Channel frequencies: 2472 MHz

www.tuv.com



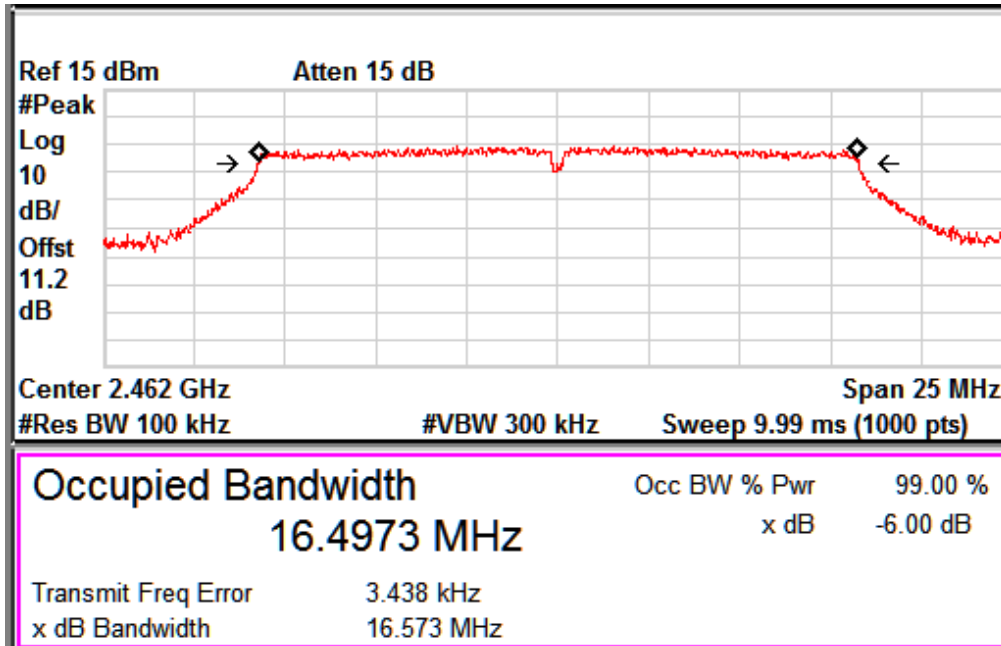
Data Rate: 6 Mbps

99% Occupied Bandwidth: Channel 2412MHz



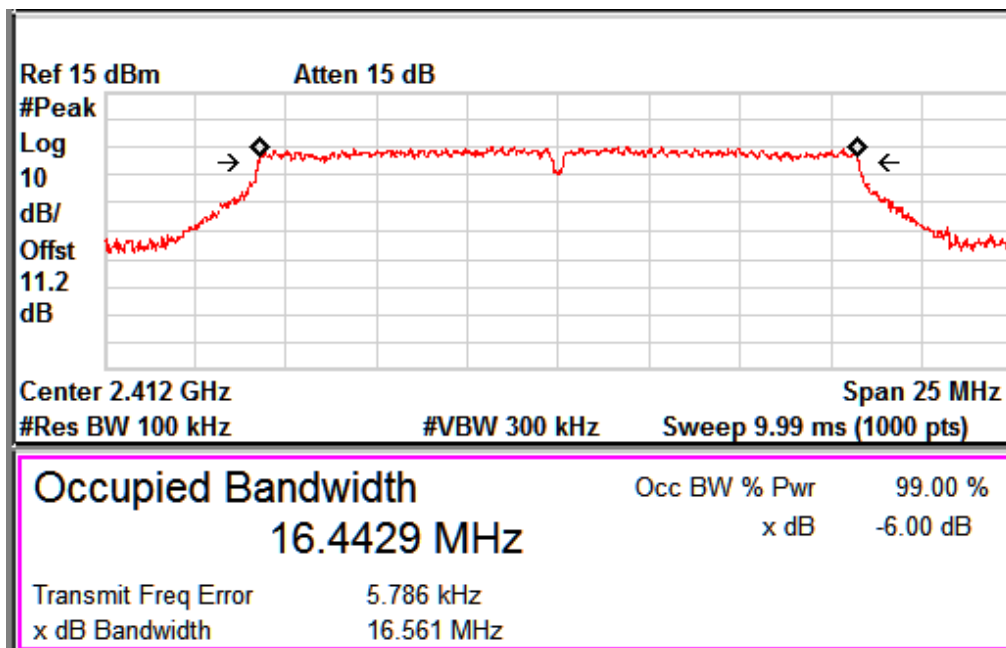
Data Rate: 6 Mbps

99% Occupied Bandwidth: Channel 2442MHz



Data Rate: 6 Mbps

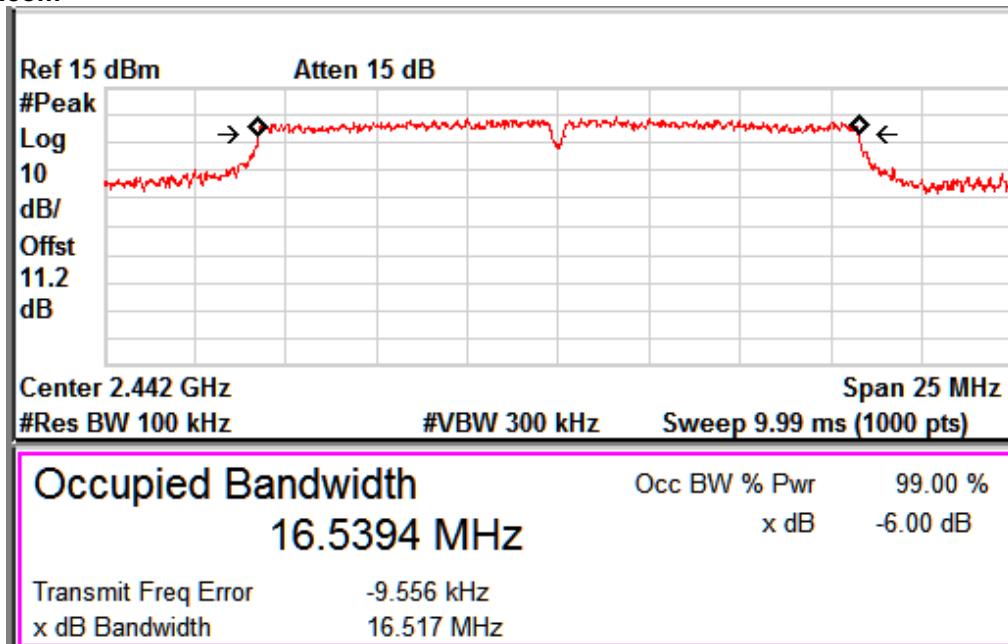
99% Occupied Bandwidth: Channel 2462MHz



Data Rate: 24 Mbps

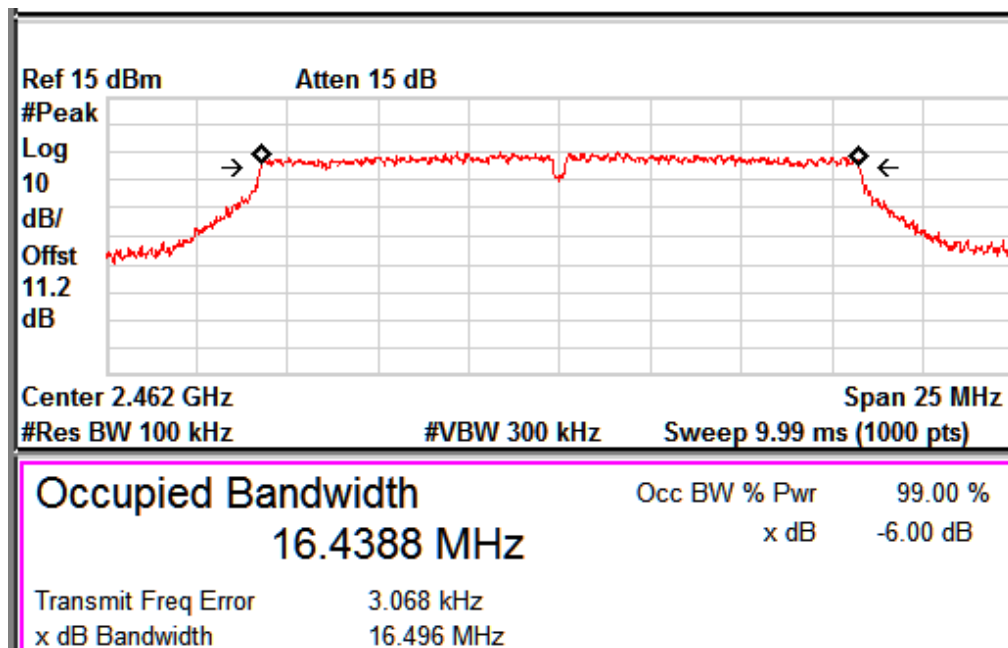
99% Occupied Bandwidth: Channel 2412MHz

www.tuv.com



Data Rate: 24 Mbps

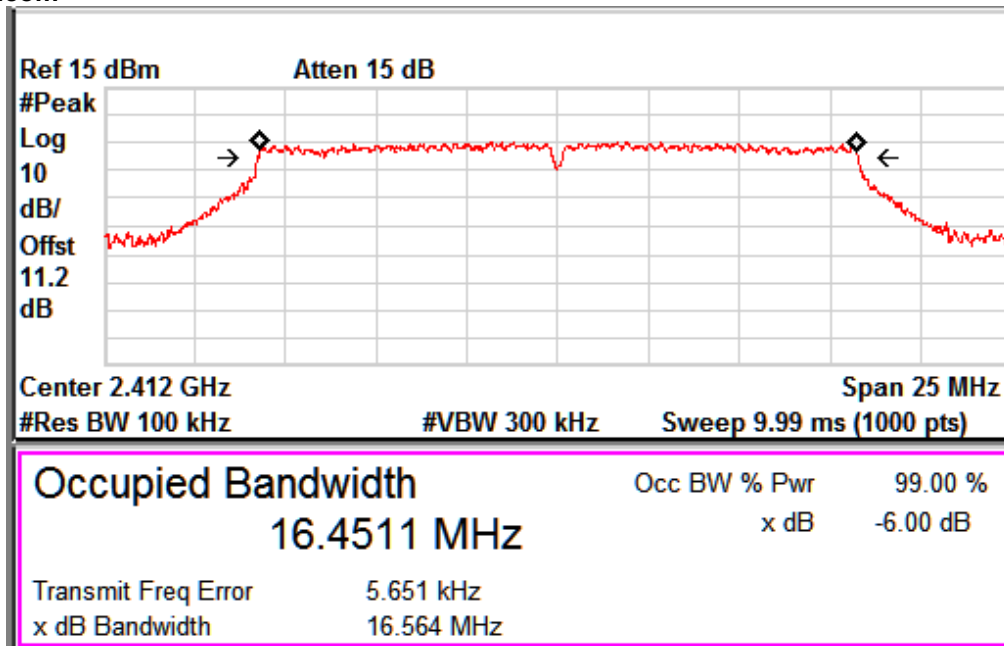
99% Occupied Bandwidth: Channel 2442MHz



Data Rate: 24 Mbps

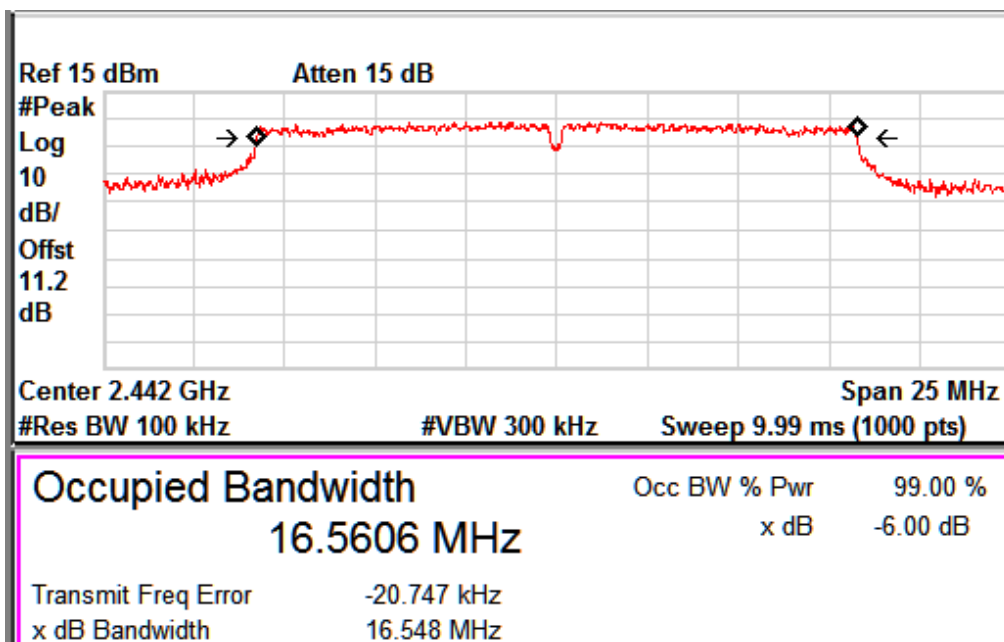
99% Occupied Bandwidth: Channel 2462MHz

www.tuv.com



Data Rate: 54 Mbps

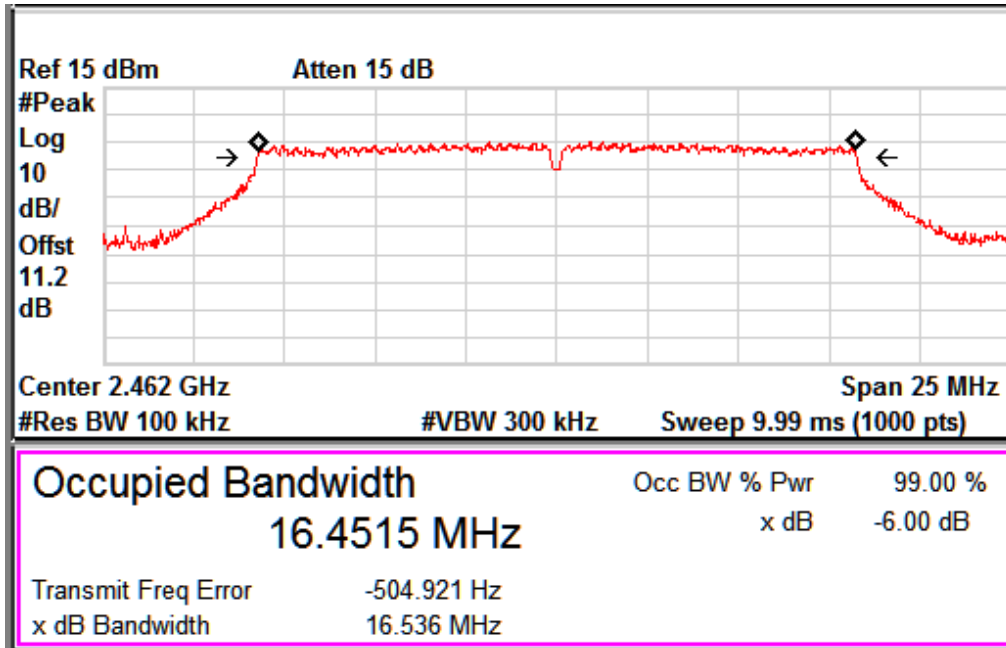
99% Occupied Bandwidth: Channel 2412MHz



Data Rate: 54 Mbps

99% Occupied Bandwidth: Channel 2442MHz

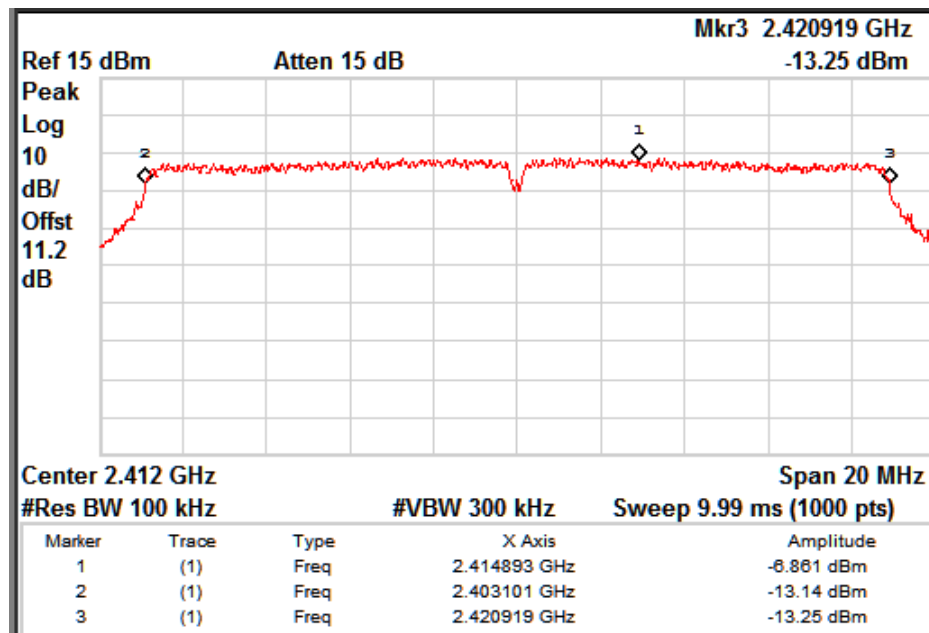
www.tuv.com



Data Rate: 54 Mbps

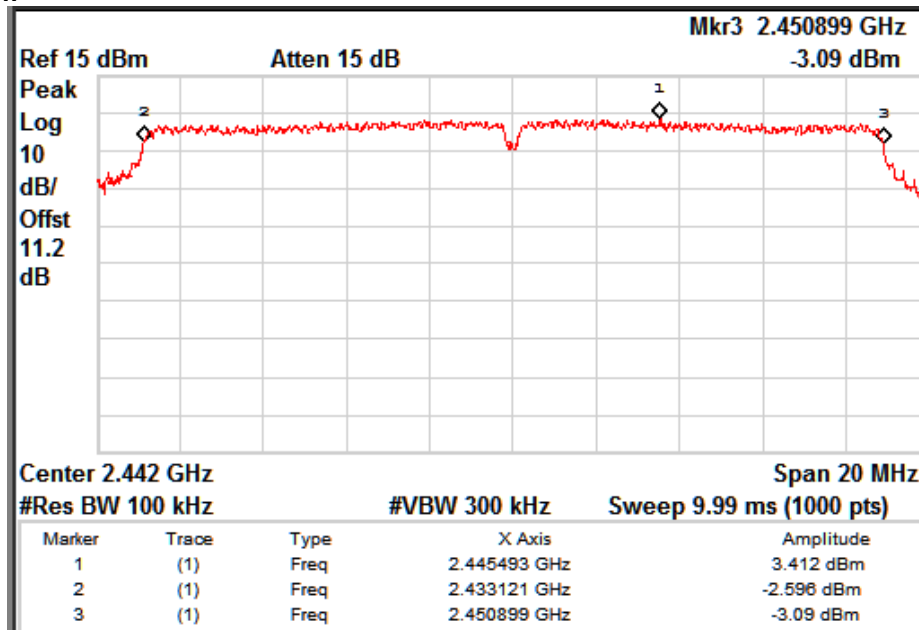
99% Occupied Bandwidth: Channel 2462MHz

802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
n	6.5	2412.00	2403.101	2420.919	17.818	17.622
		2442.00	2433.121	2450.899	17.778	17.852
		2462.00	2453.101	2470.899	17.798	17.624
	39	2412.00	2403.121	2420.879	17.758	17.613
		2442.00	2433.121	2450.899	17.778	17.727
		2462.00	2453.121	2470.899	17.778	17.617
	65	2412.00	2403.101	2420.899	17.798	17.624
		2442.00	2433.121	2450.899	17.778	17.706
		2462.00	2453.121	2470.879	17.758	17.629



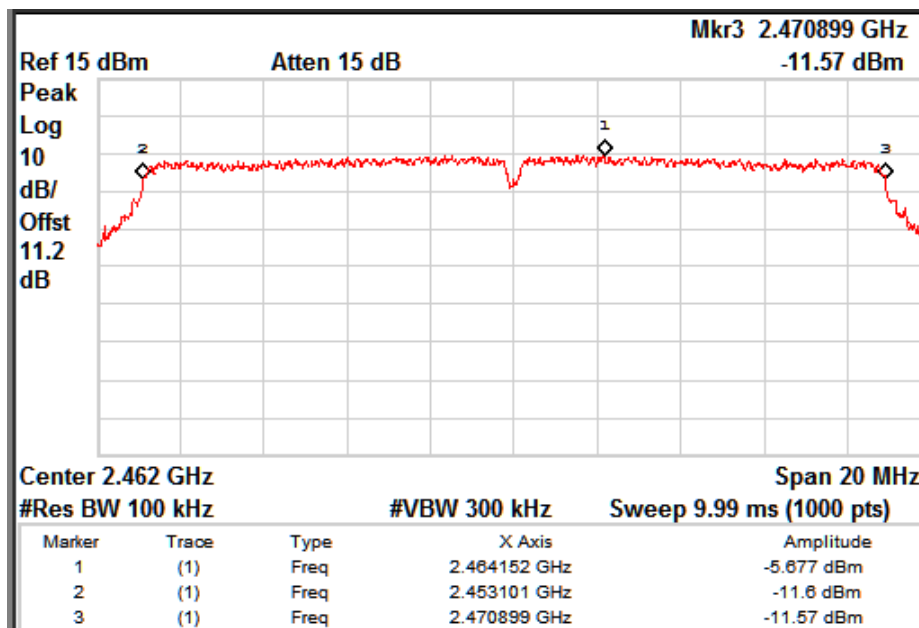
Data Rate: 6.5 Mbps

Channel: 2412 MHz



Data Rate: 6.5 Mbps

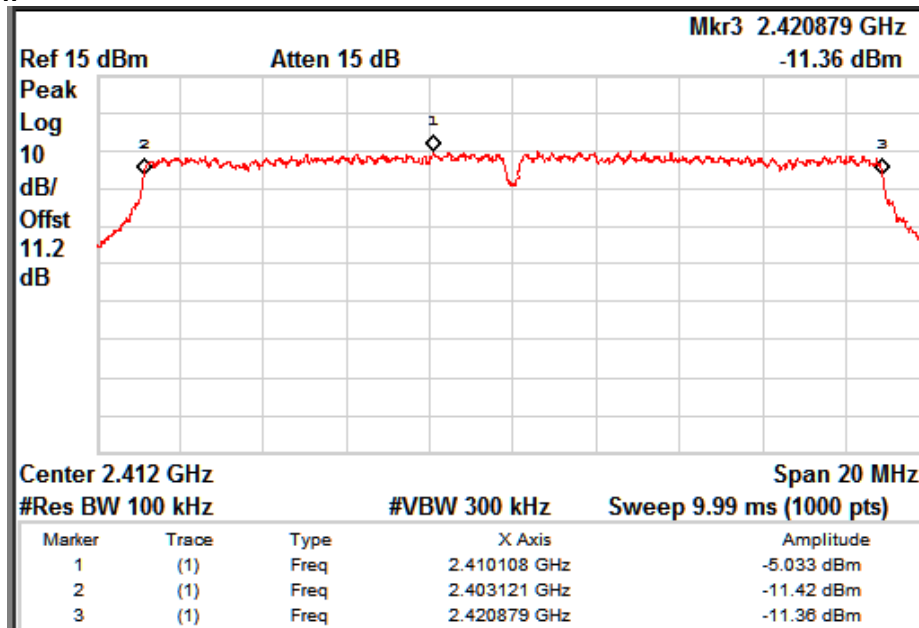
Channel: 2442 MHz



Data Rate: 6.5 Mbps

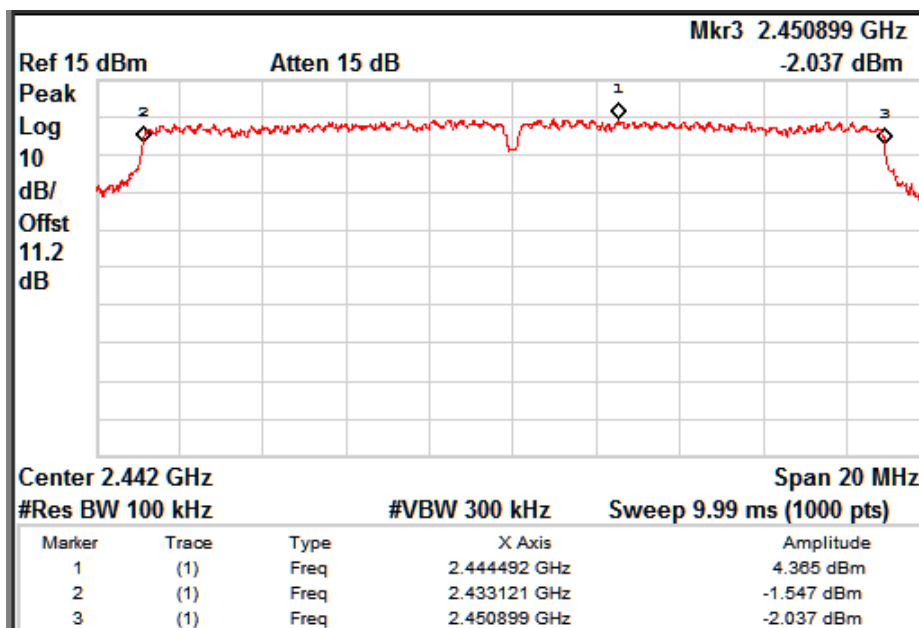
Channel: 2462 MHz

www.tuv.com



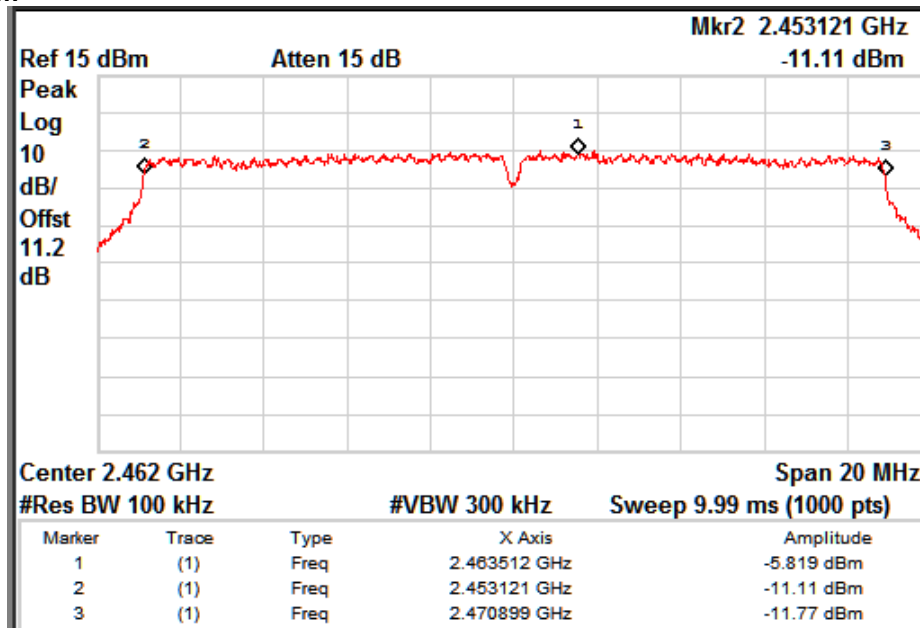
Data Rate: 39 Mbps

Channel: 2412 MHz



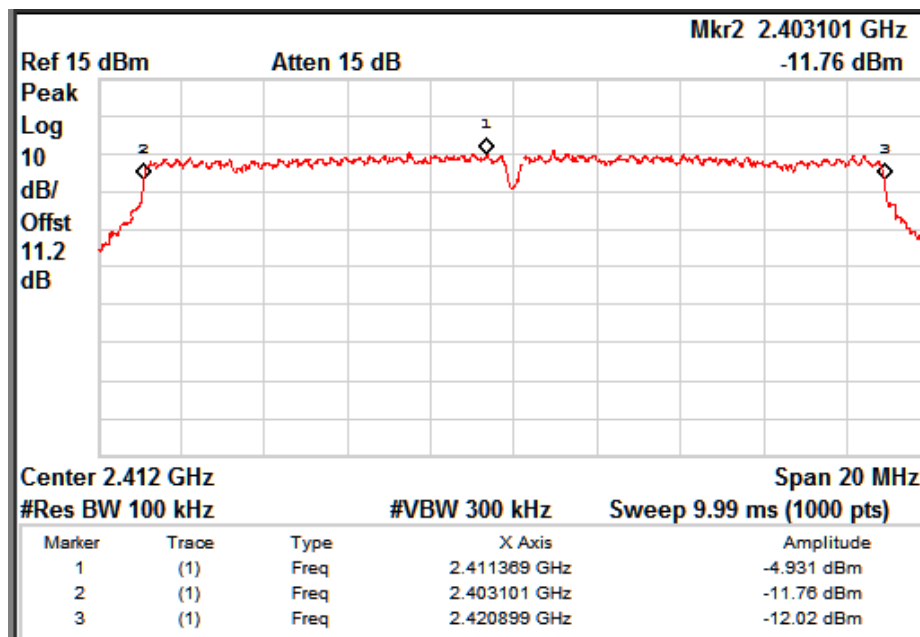
Data Rate: 39 Mbps

Channel: 2442 MHz



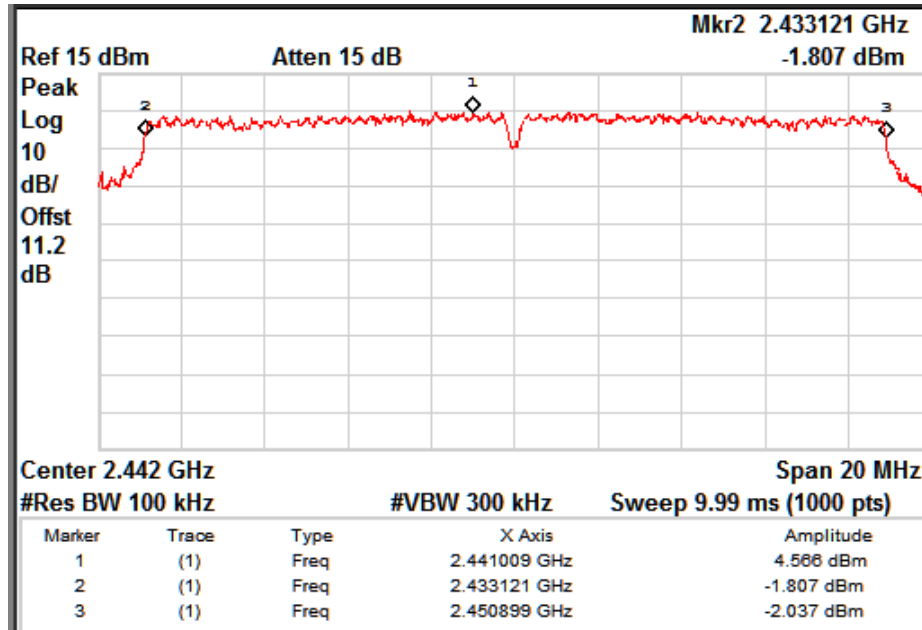
Data Rate: 39 Mbps

Channel: 2462 MHz



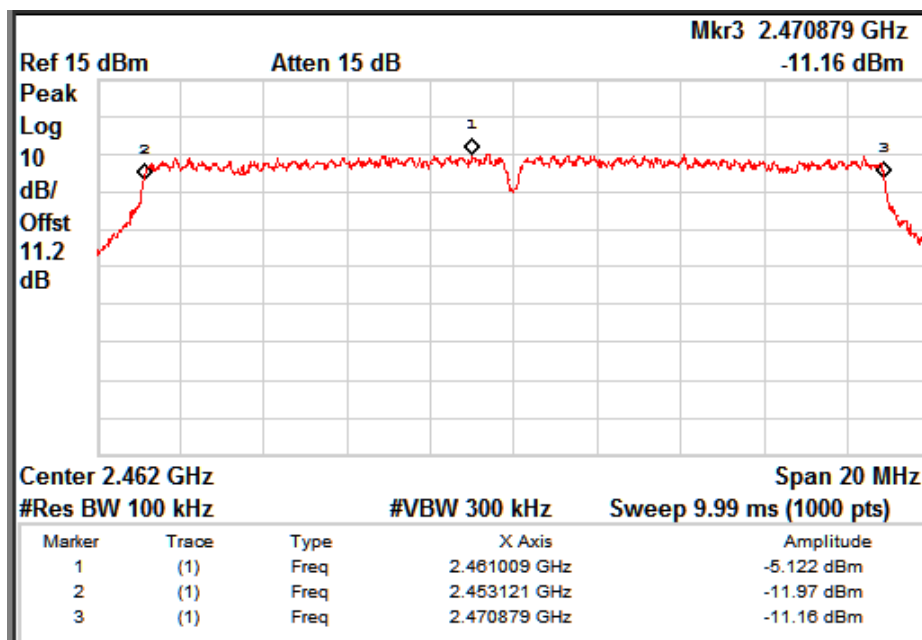
Data Rate: 65 Mbps

Channel: 2412 MHz



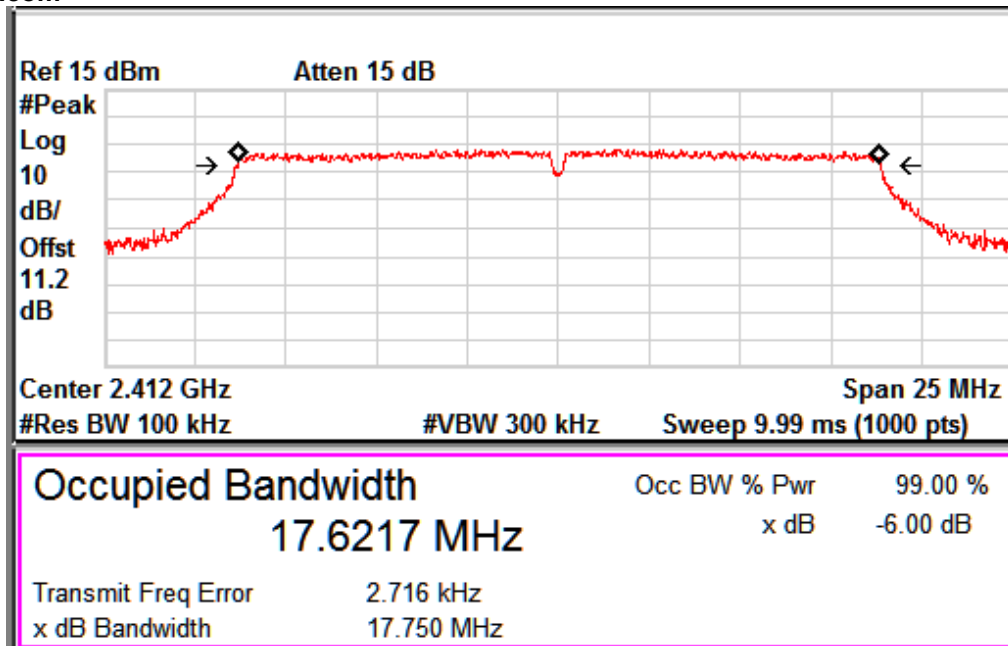
Data Rate: 65 Mbps

Channel: 2442MHz



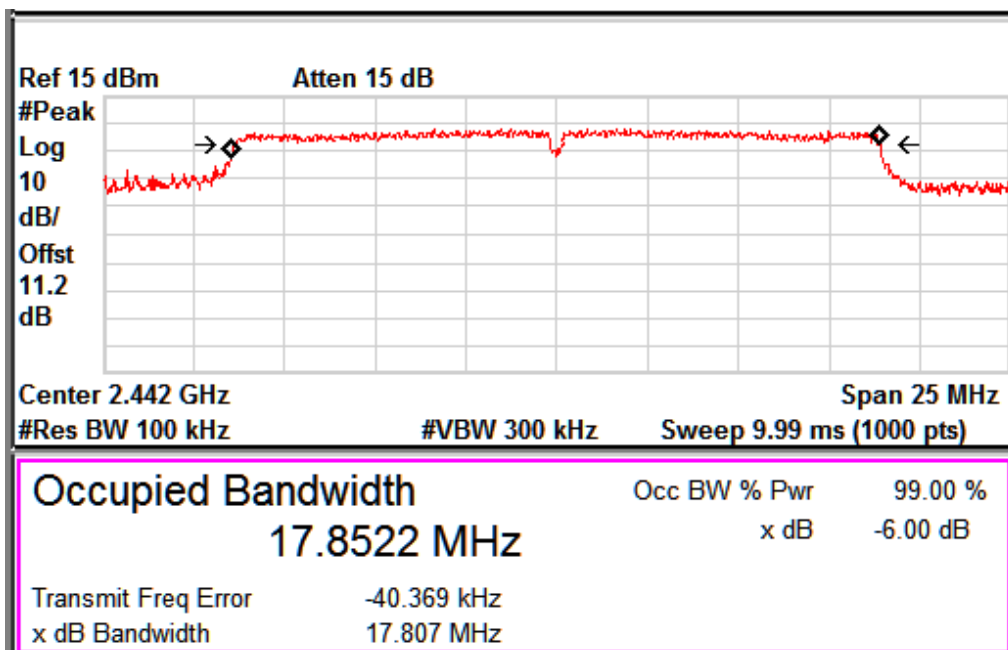
Data Rate: 65 Mbps

Channel: 2462 MHz



Data Rate: 6.5 Mbps

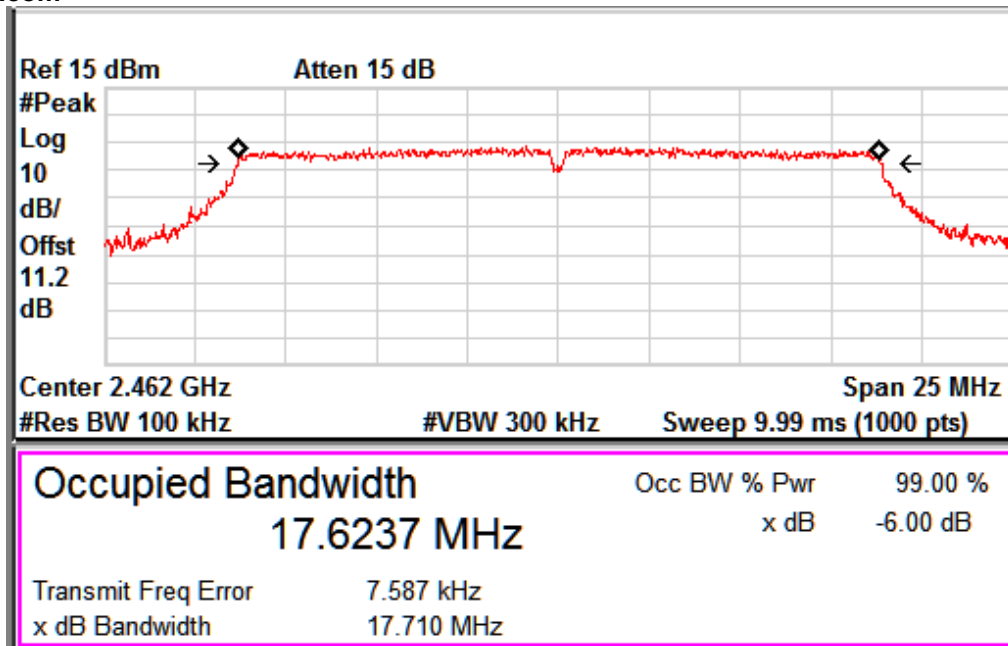
99% Occupied Bandwidth: Channel 2412MHz



Data Rate: 6.5 Mbps

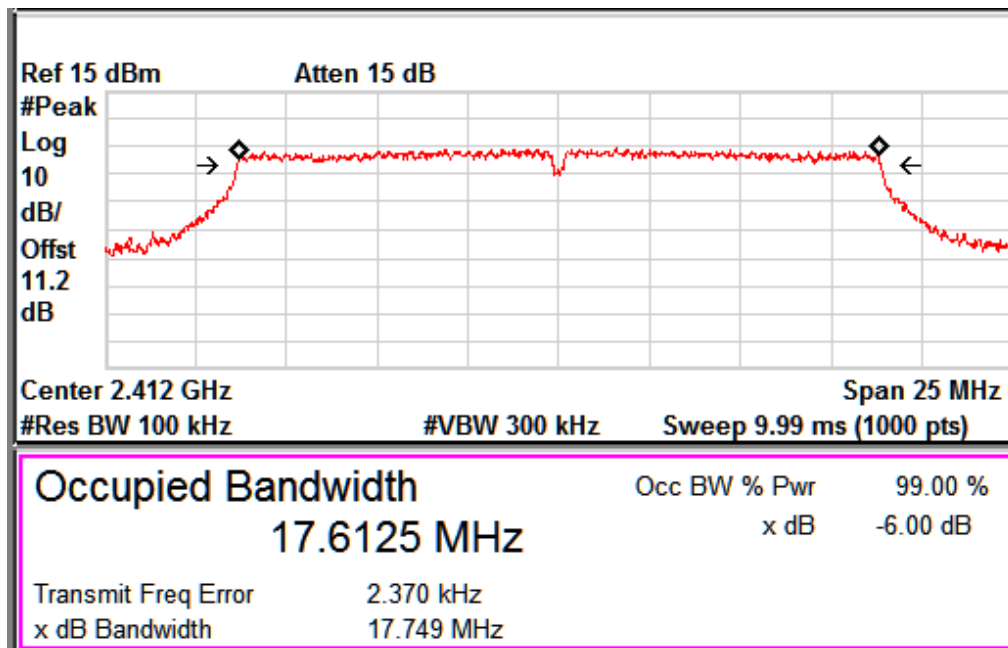
99% Occupied Bandwidth: Channel 2442MHz

www.tuv.com



Data Rate: 6.5 Mbps

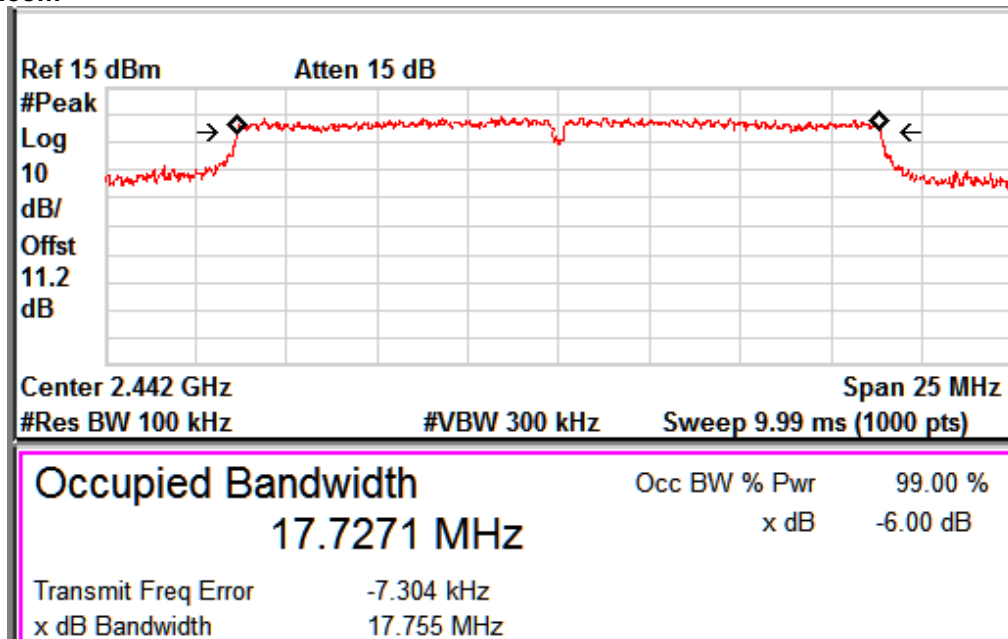
99% Occupied Bandwidth: Channel 2462MHz



Data Rate: 39 Mbps

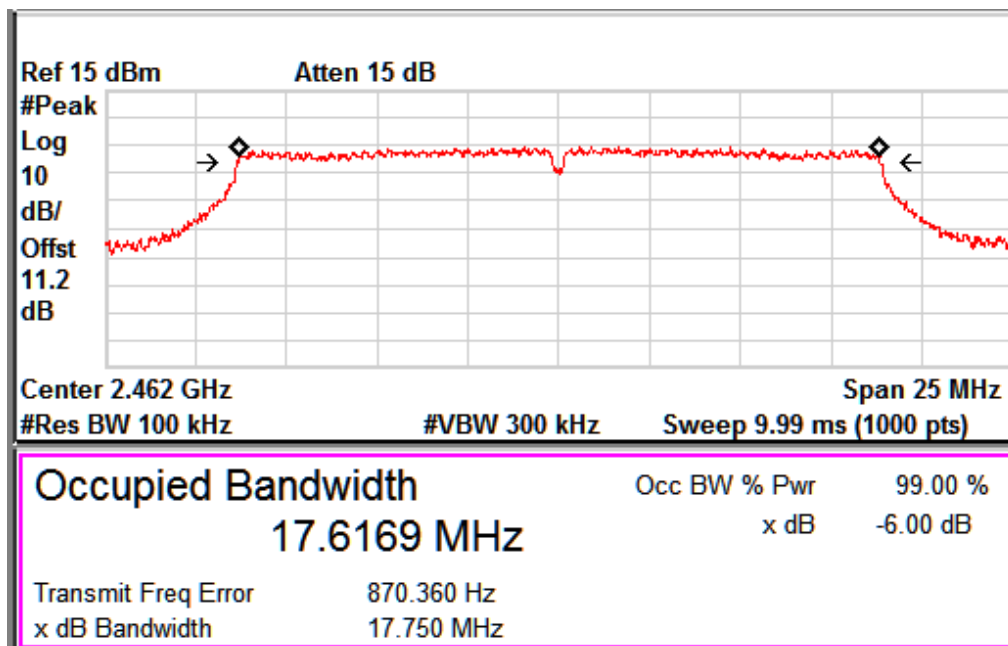
99% Occupied Bandwidth: Channel 2412MHz

www.tuv.com



Data Rate: 39 Mbps

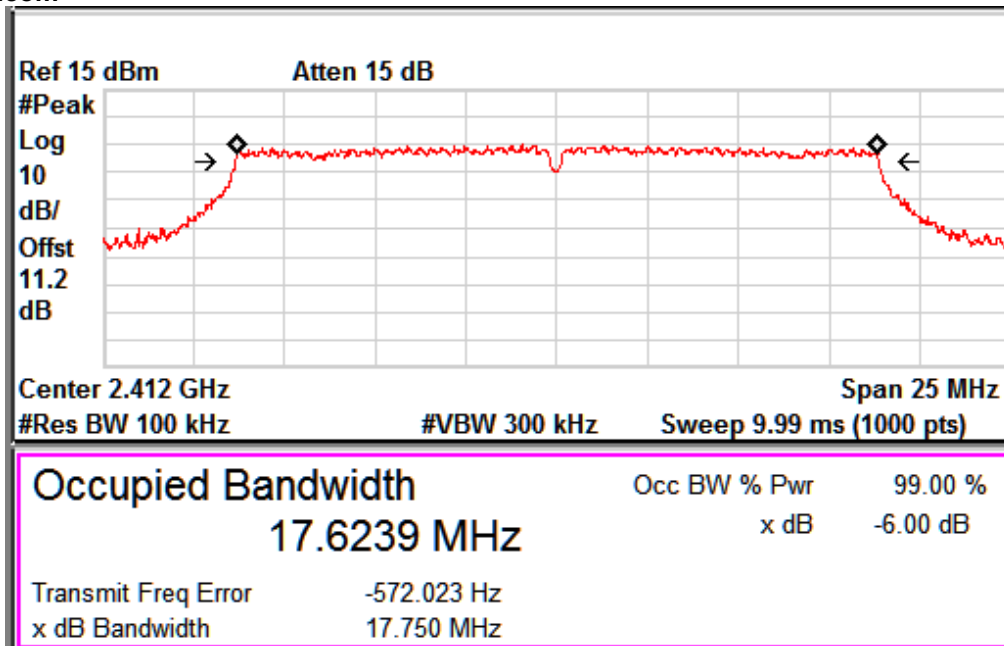
99% Occupied Bandwidth: Channel 2442MHz



Data Rate: 39 Mbps

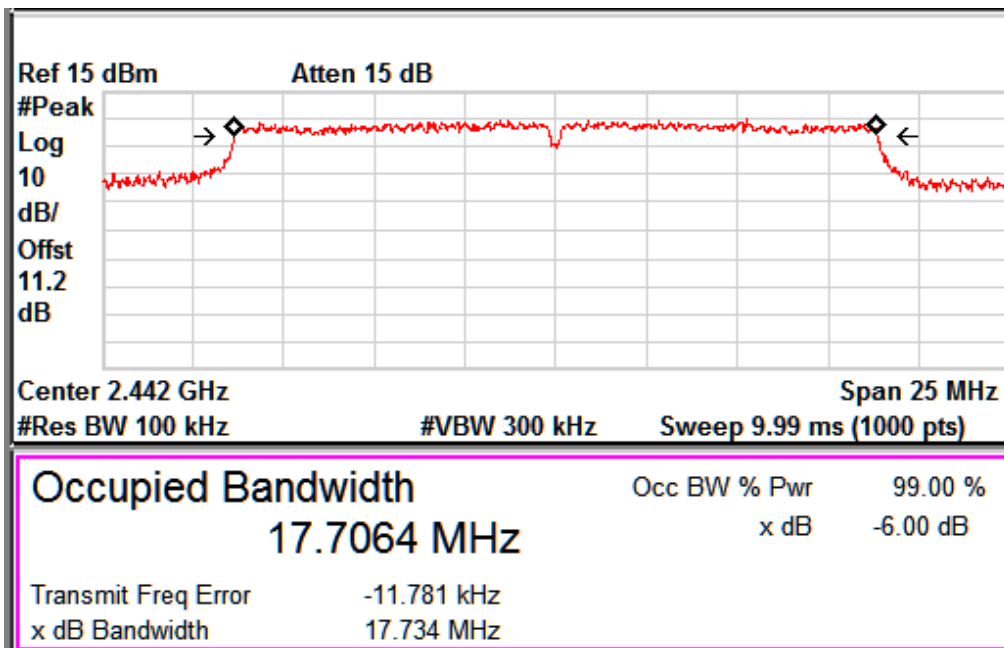
99% Occupied Bandwidth: Channel 2462MHz

www.tuv.com



Data Rate: 65 Mbps

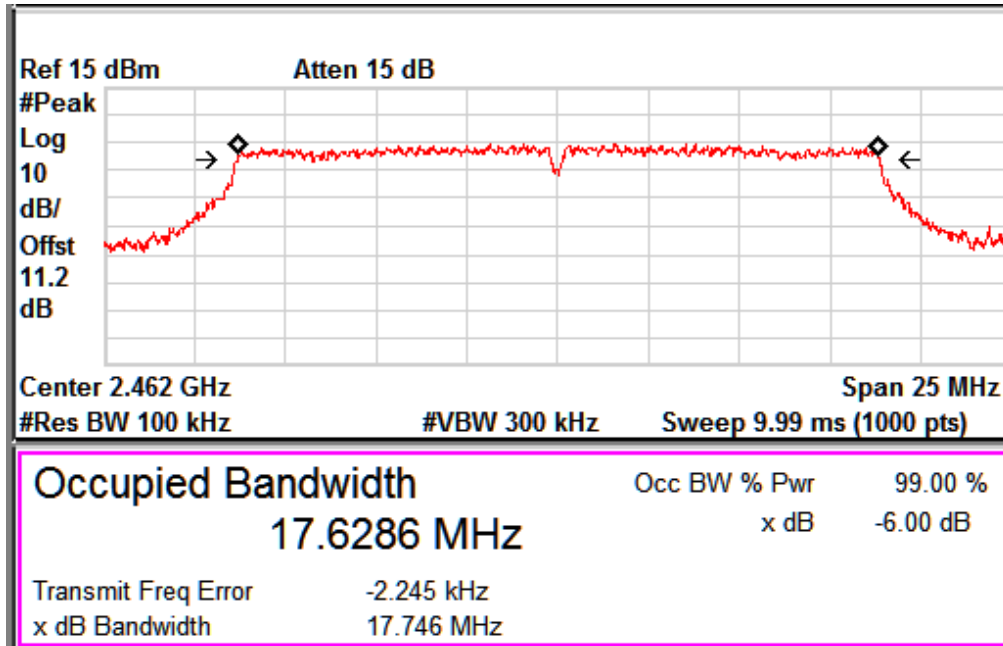
99% Occupied Bandwidth: Channel 2412MHz



Data Rate: 65 Mbps

99% Occupied Bandwidth: Channel 2442MHz

www.tuv.com

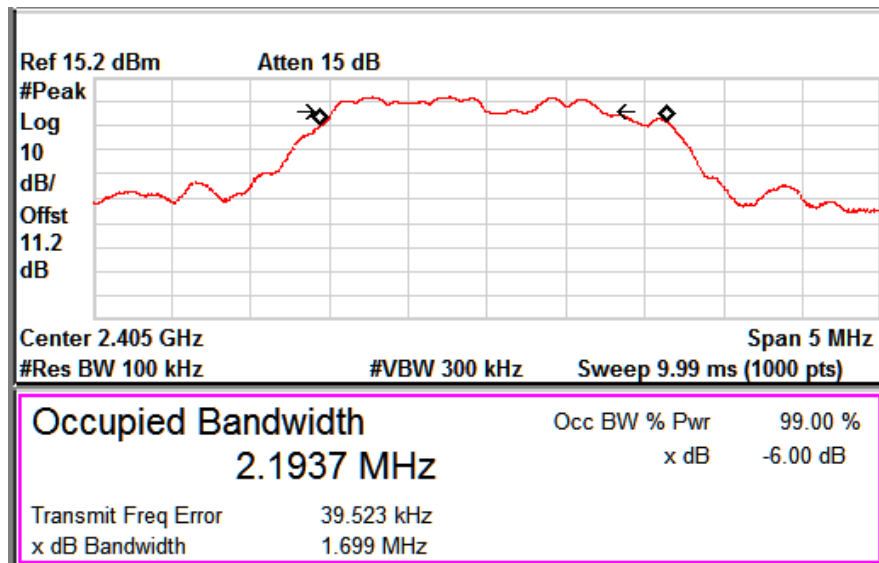
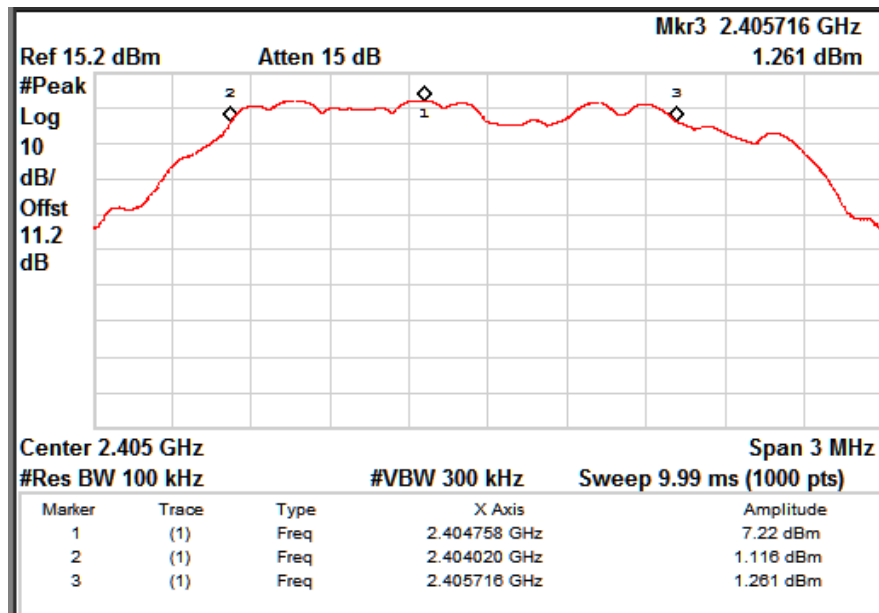


Data Rate: 65 Mbps

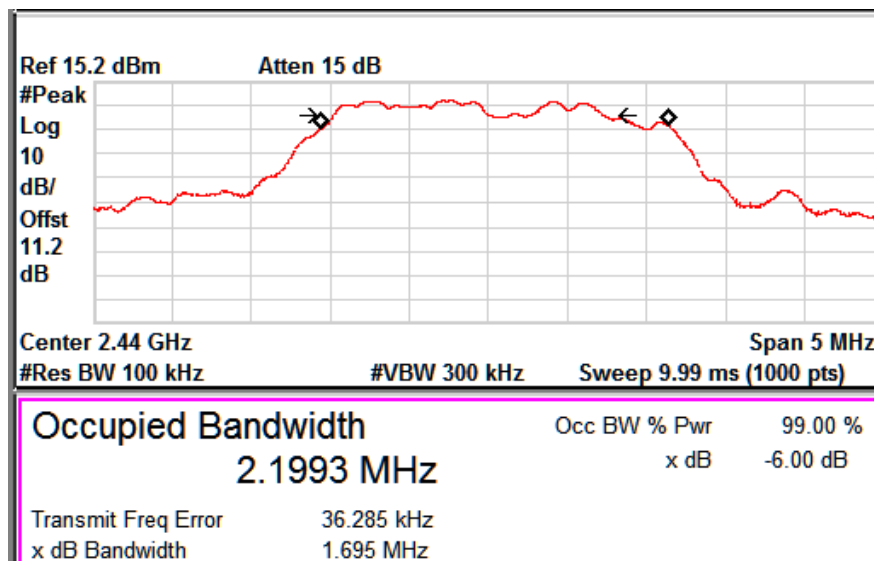
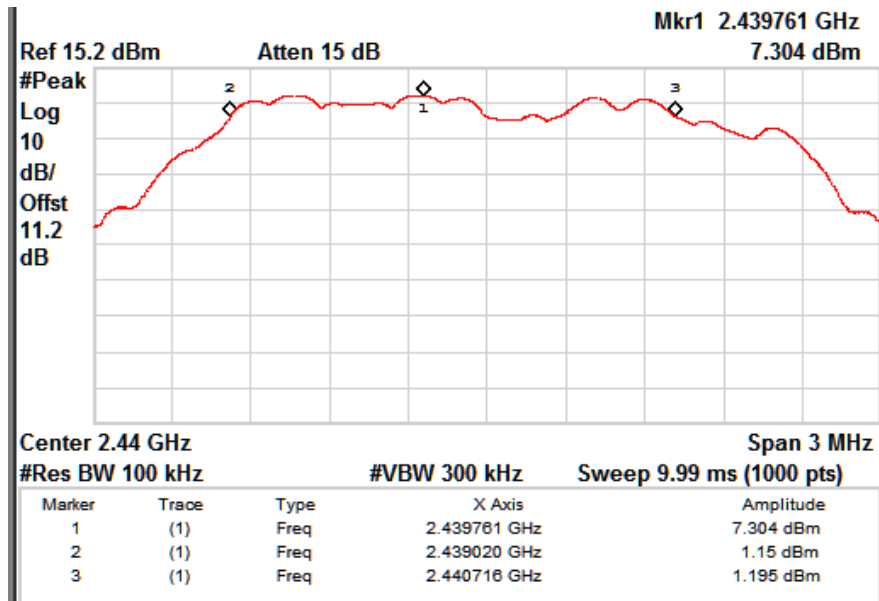
99% Occupied Bandwidth: Channel 2462MHz

Test Result: ZigBee

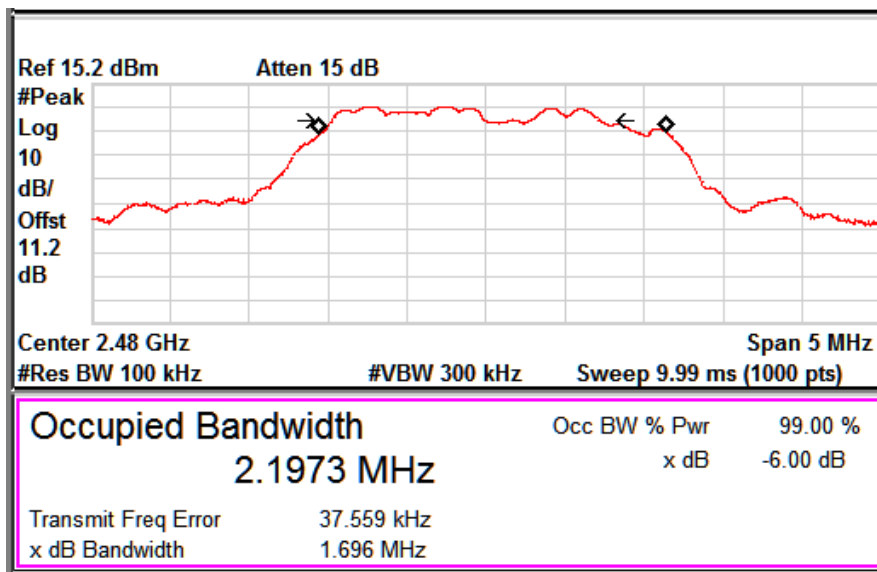
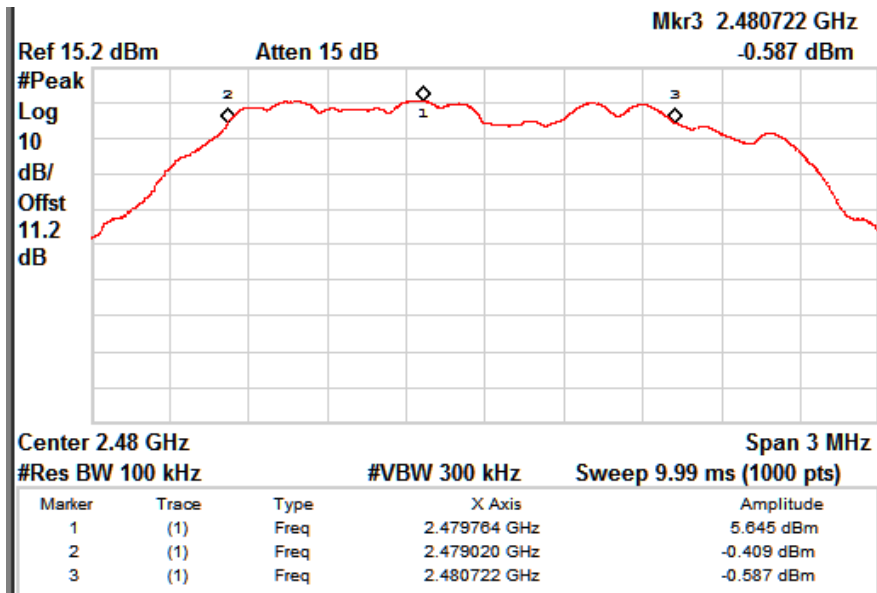
Channel Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
2405.00	2404.020	2405.716	1.696	2.194
2440.00	2439.020	2440.716	1.696	2.199
2480.00	2479.020	2480.722	1.702	2.197



Channel Frequency: 2405 MHz



Channel Frequency: 2440 MHz

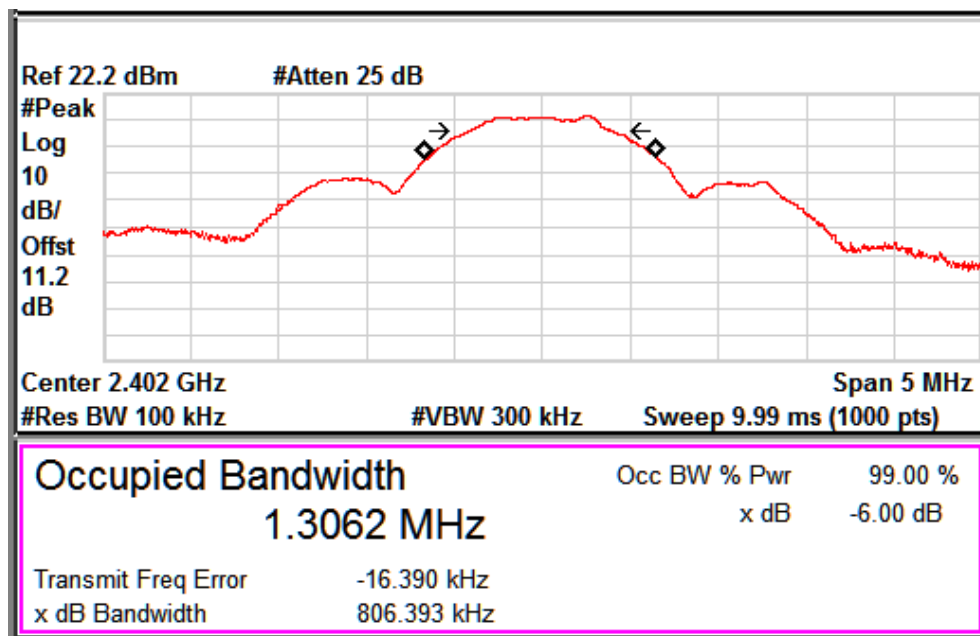


Channel Frequency: 2480 MHz

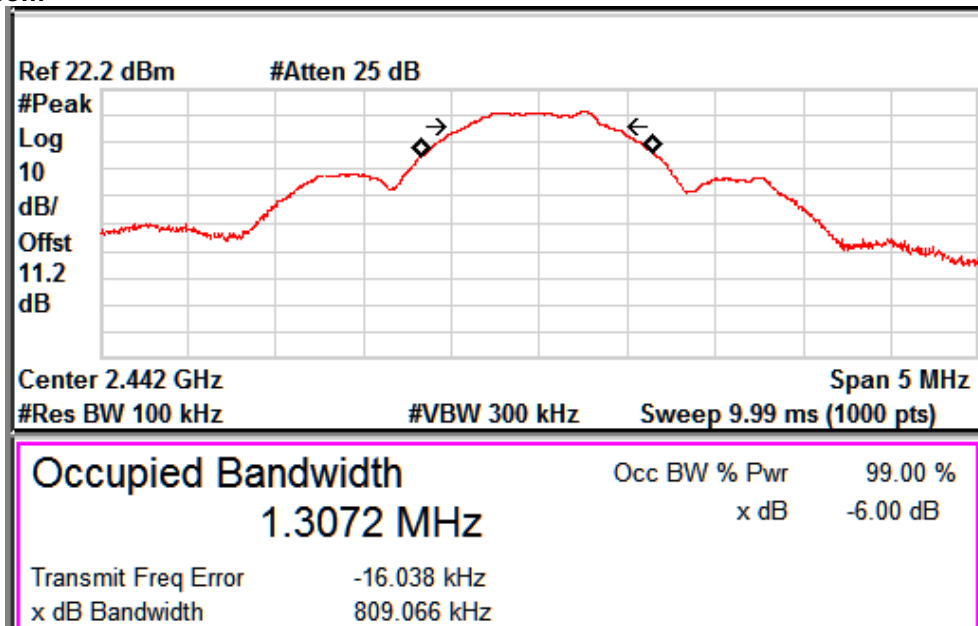
www.tuv.com

Test Result: Bluetooth LE

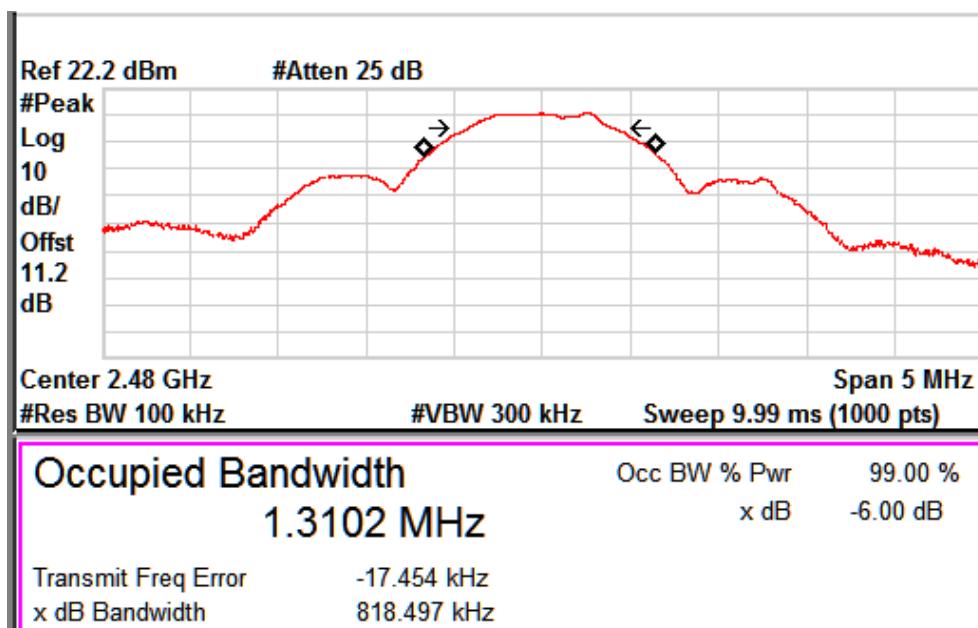
Channel Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
2402.00	0.806	1.306
2442.00	0.809	1.307
2480.00	0.818	1.310



Channel Frequency: 2402 MHz



Channel Frequency: 2442 MHz



Channel Frequency: 2480 MHz

www.tuv.com
Band-edge Compliance

Section A8.5

Result

Pass

Test Specification
 Detector Function
 Requirement

RSS – 210 Issue 8, December 2010

Peak

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 20dB 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.

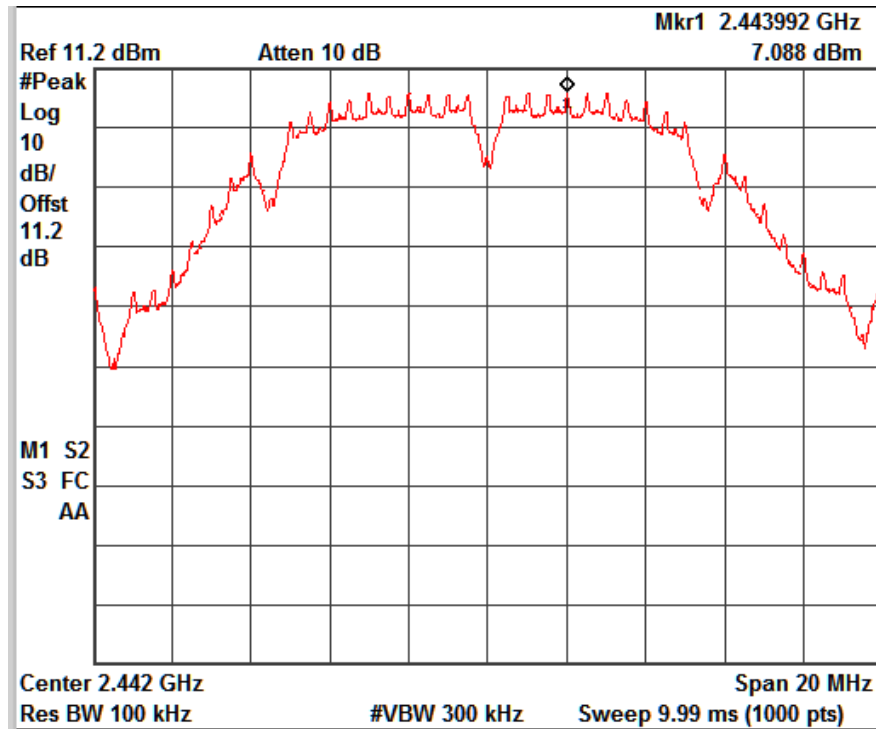
Test Method:



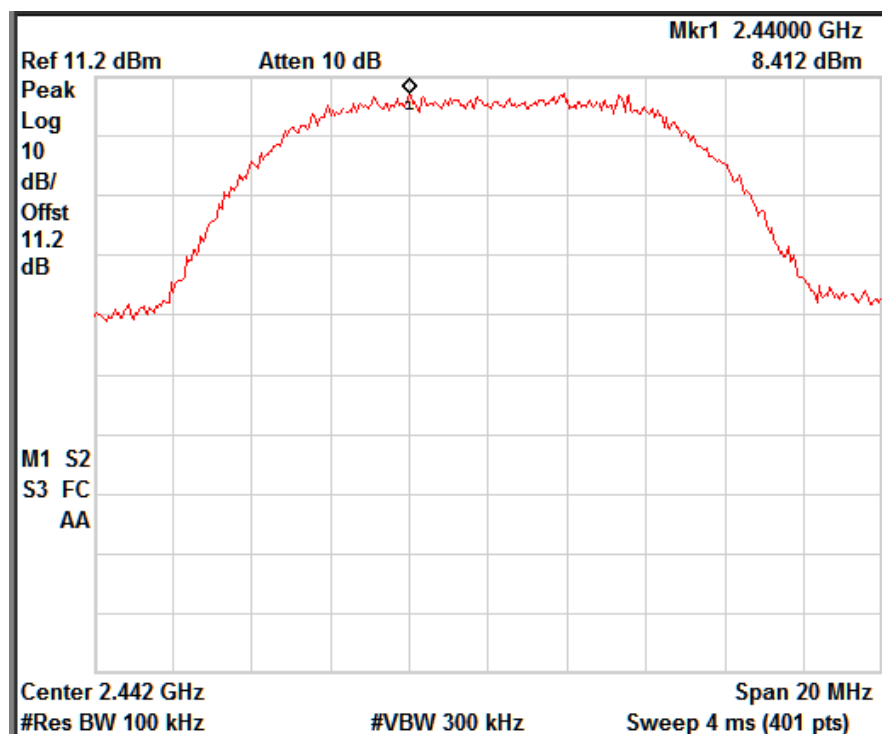
Test Result: Wi-Fi

802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Value at Band Edge		Reference Value B (dBm)	Band Edge Value A-B (dBc)	Limit (dBc)
			Frequency (MHz)	Value A (dBm)			
b	1	2412	2400	-37.87	7.09	-44.96	-30.00
		2462	2483.5	-53.33	7.09	-60.42	-30.00
	11	2412	2400	-39.67	8.41	-48.08	-30.00
		2462	2483.5	-49.76	8.41	-58.17	-30.00

Note: The channel no. 7 (2442 MHz) found to contain the maximum PSD level and is used to establish the reference level.

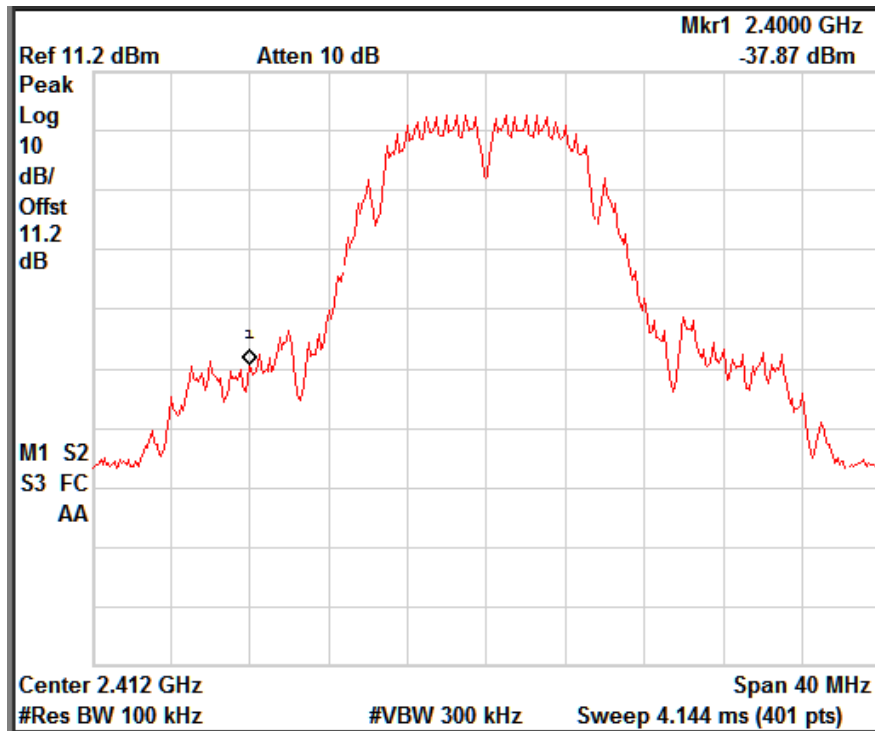


Reference Level Plot: 1Mbps



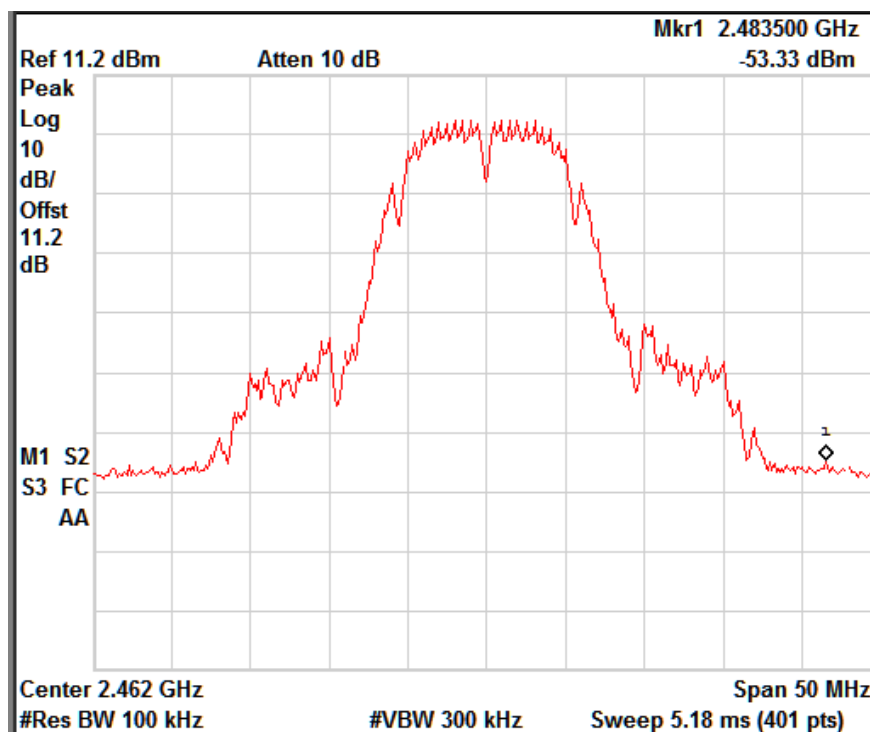
Reference Level Plot: 11Mbps

www.tuv.com



Data Rate: 1 Mbps

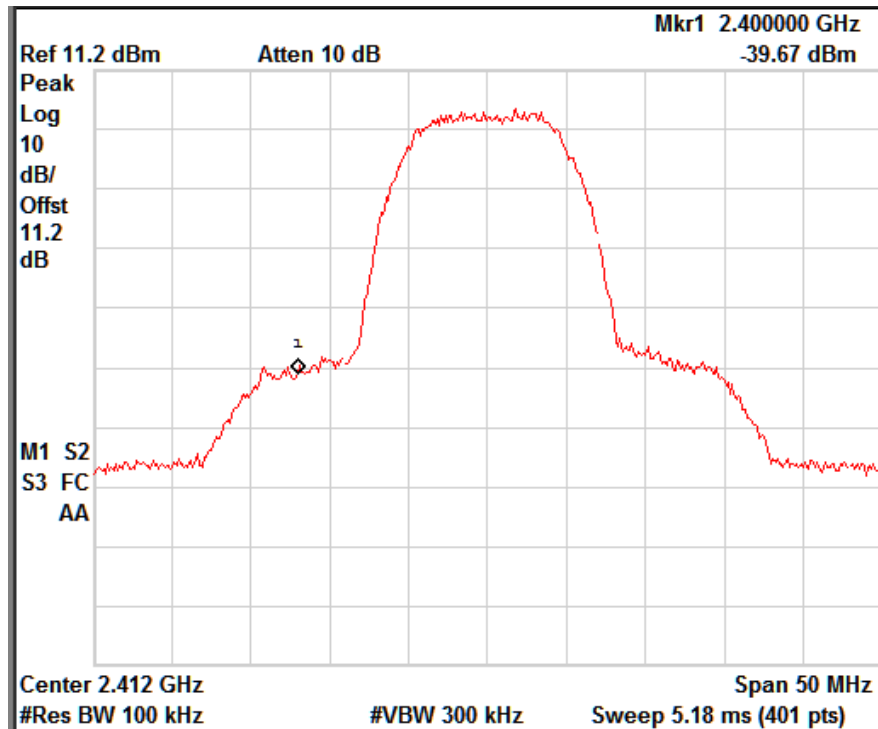
Channel frequency: 2412 MHz



Data Rate: 1 Mbps

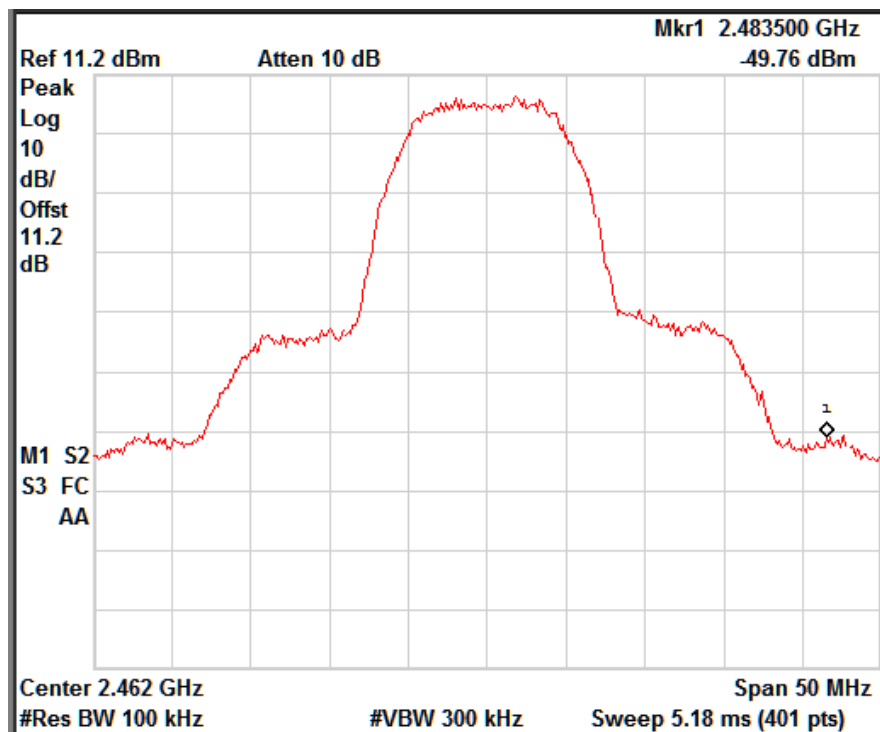
Channel frequency: 2462 MHz

www.tuv.com



Data Rate: 11 Mbps

Channel frequency: 2412 MHz

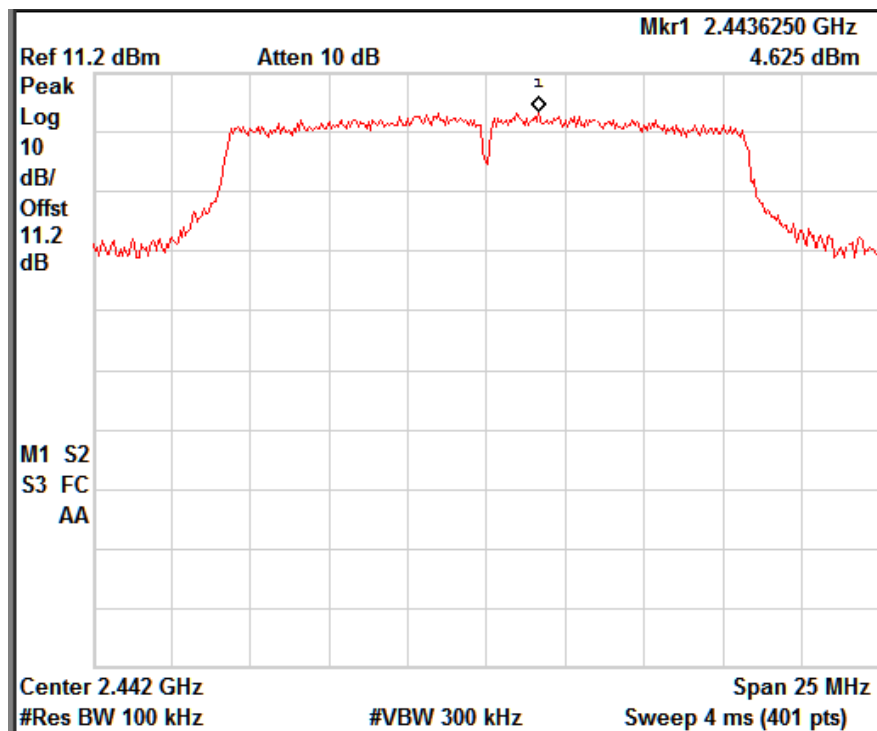


Data Rate: 11 Mbps

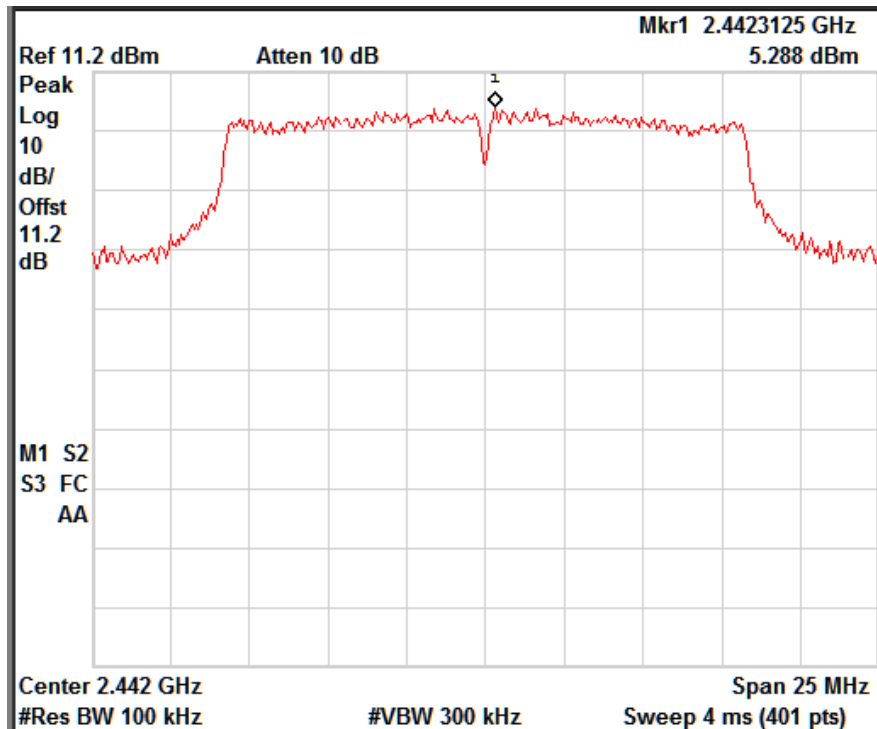
Channel frequency: 2462 MHz

802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Value at Band Edge		Reference Value B (dBm)	Band Edge Value A-B (dBc)	Limit (dBc)
			Frequency (MHz)	Value A (dBm)			
g	6	2412	2400	-39.49	4.63	-44.12	-30.00
		2462	2483.5	-45.10	4.63	-49.73	-30.00
	24	2412	2400	-39.54	5.29	-44.83	-30.00
		2462	2483.5	-47.54	5.29	-52.83	-30.00
	54	2412	2400	-39.84	5.25	-45.09	-30.00
		2462	2483.5	-44.96	5.25	-50.21	-30.00

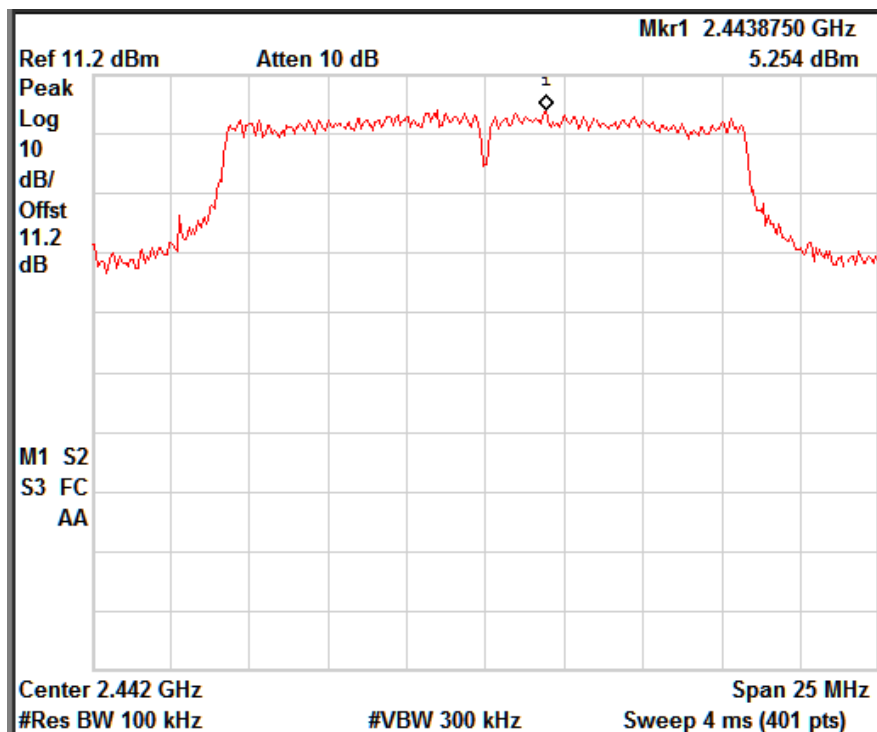
Note: The channel no. 7 (2442 MHz) found to contain the maximum PSD level and is used to establish the reference level.



Reference Level Plot: 6 Mbps

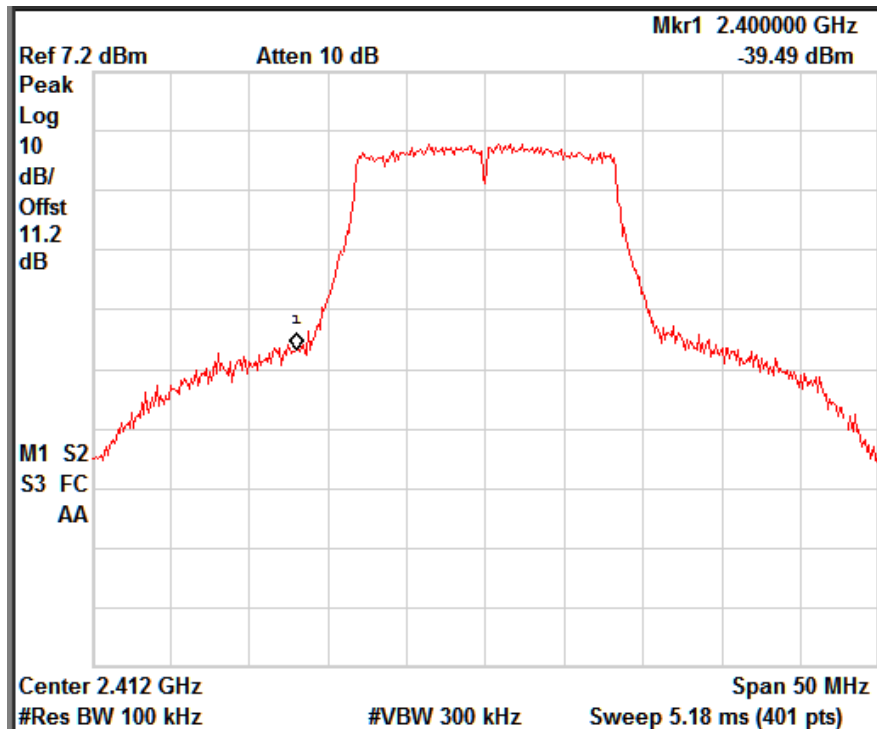


Reference Level Plot: 24 Mbps

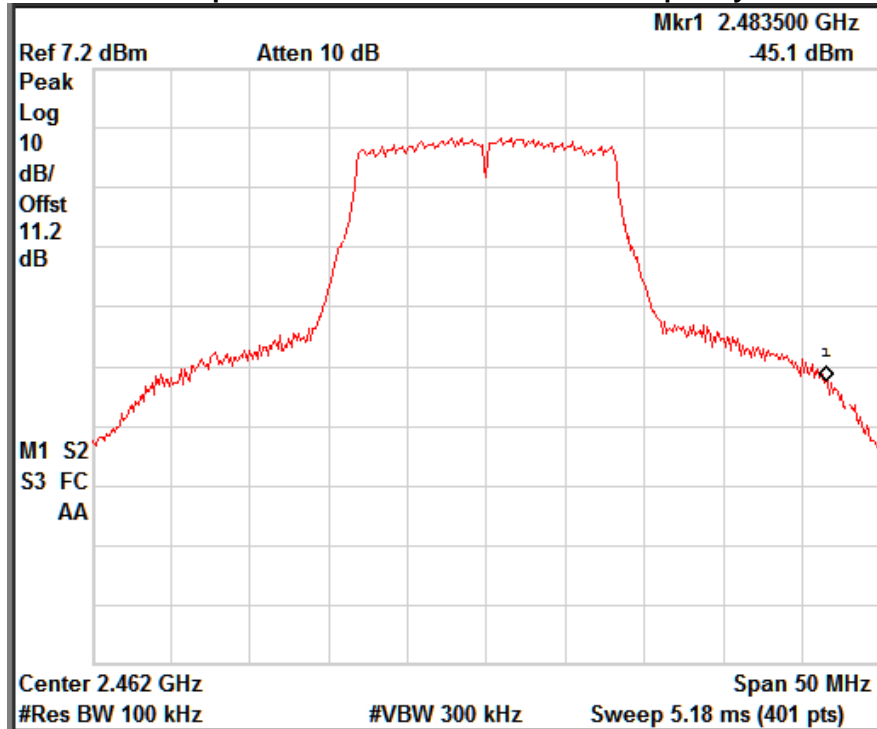


Reference Level Plot: 54 Mbps

www.tuv.com



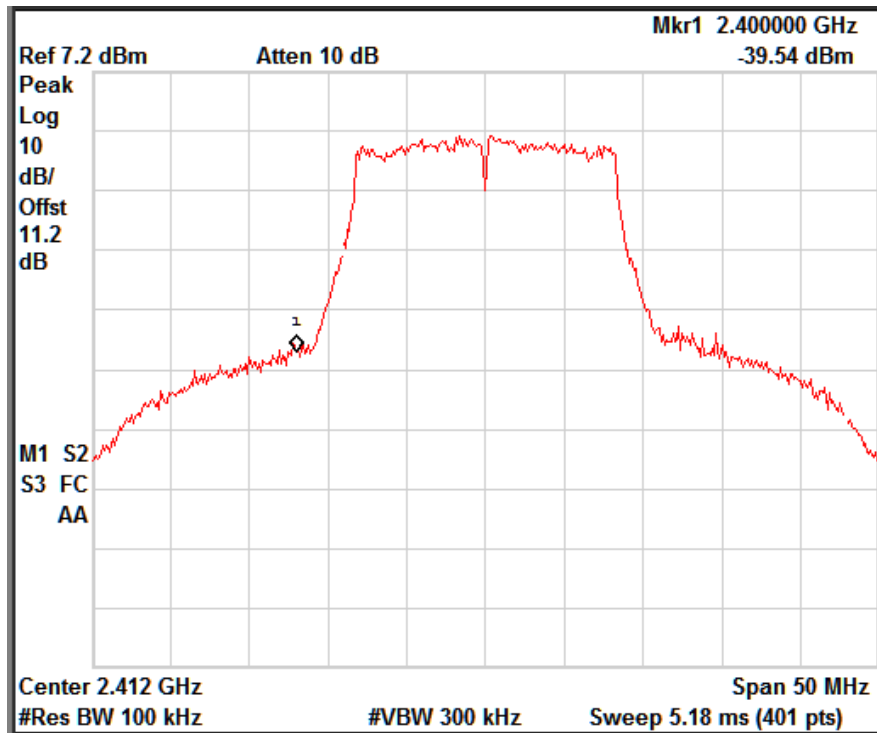
Data Rate: 6 Mbps Channel frequency: 2412 MHz



Data Rate: 6 Mbps

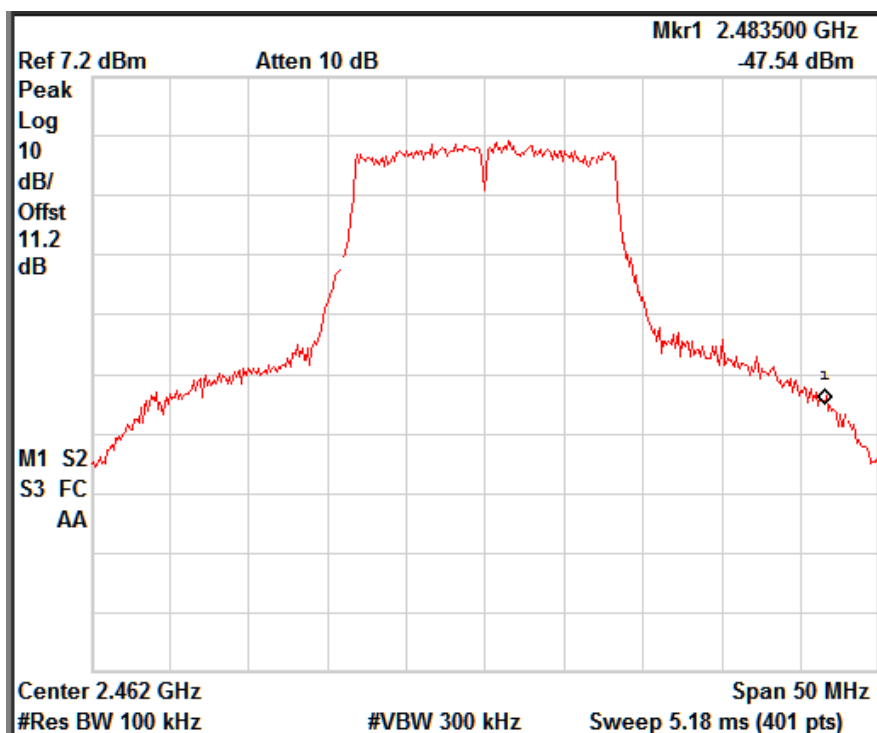
Channel frequency: 2462 MHz

www.tuv.com



Data Rate: 24 Mbps

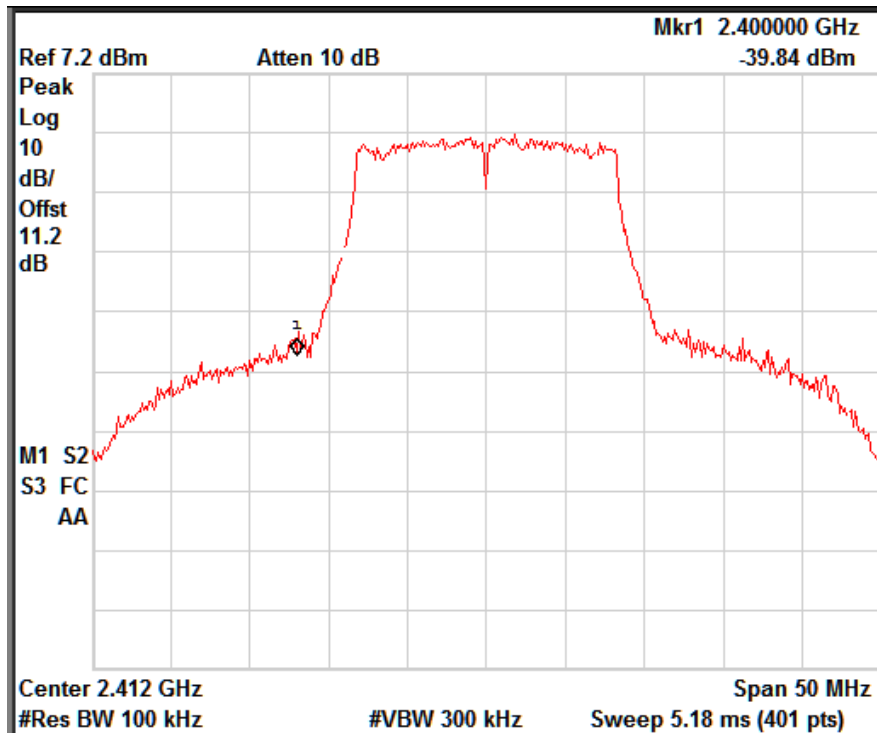
Channel frequency: 2412 MHz



Data Rate: 24 Mbps

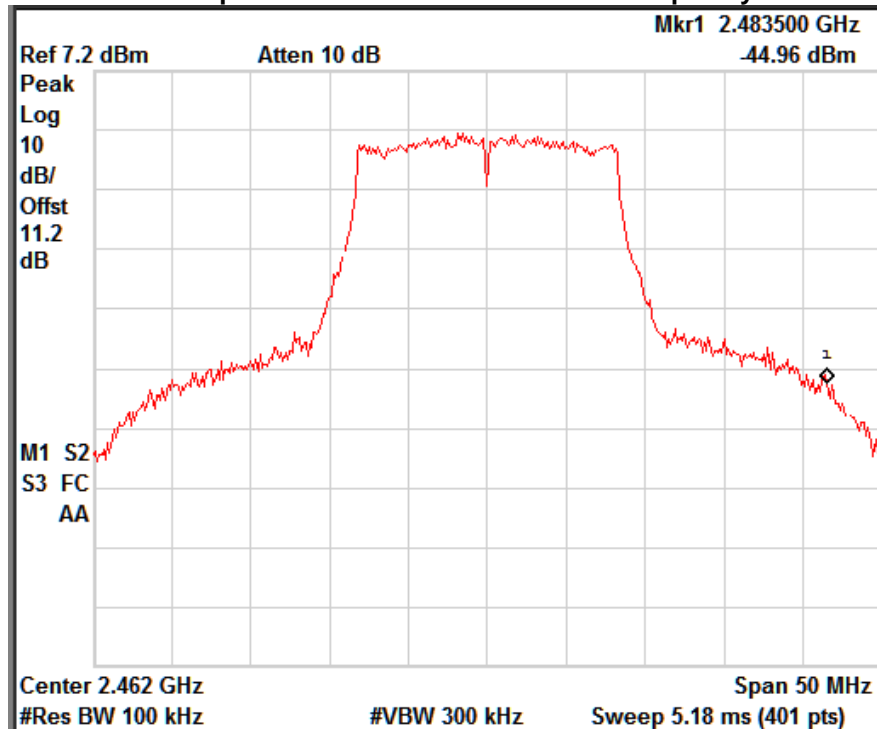
Channel frequency: 2462 MHz

www.tuv.com



Data Rate: 54 Mbps

Channel frequency: 2412 MHz

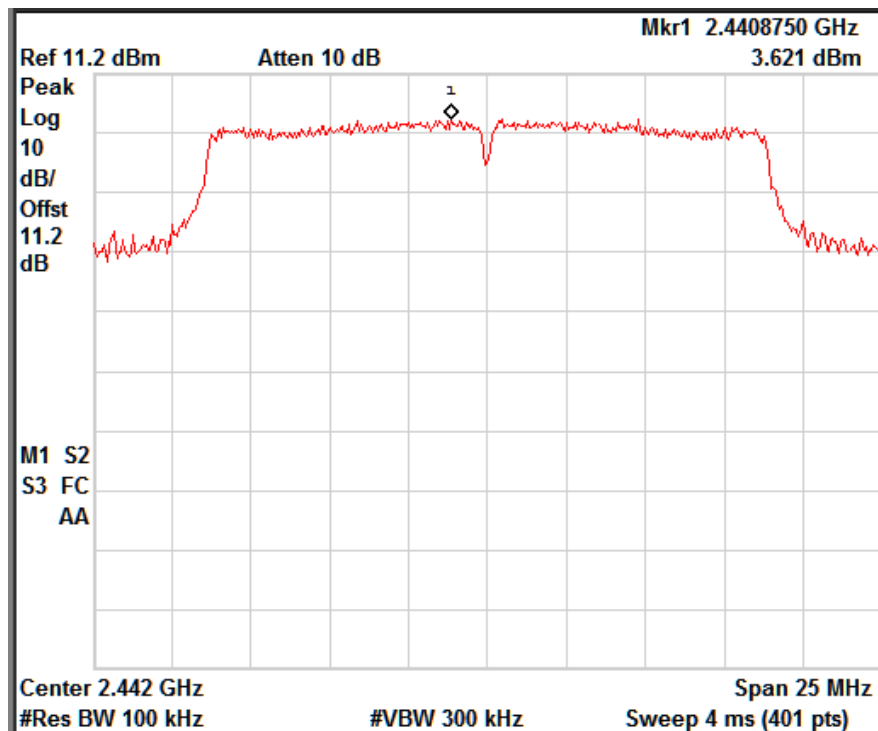


Data Rate: 54 Mbps

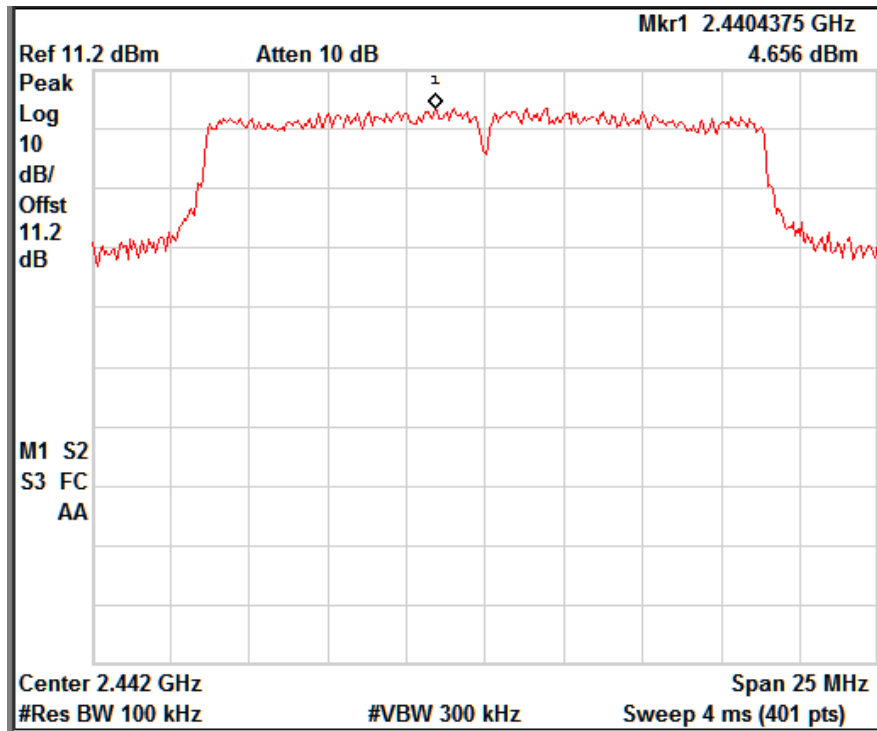
Channel frequency: 2462 MHz

802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Value at Band Edge		Reference Value B (dBm)	Band Edge Value A-B (dBc)	Limit (dBc)
			Frequency (MHz)	Value A (dBm)			
n	MCS0 (6.5)	2412	2400	-40.12	3.62	-43.74	-30.00
		2462	2483.5	-44.08	3.62	-47.70	-30.00
	MCS4 (39)	2412	2400	-39.98	4.66	-44.64	-30.00
		2462	2483.5	-46.18	4.66	-50.84	-30.00
	MCS7 (65)	2412	2400	-40.06	5.56	-45.62	-30.00
		2462	2483.5	-45.16	5.56	-50.72	-30.00

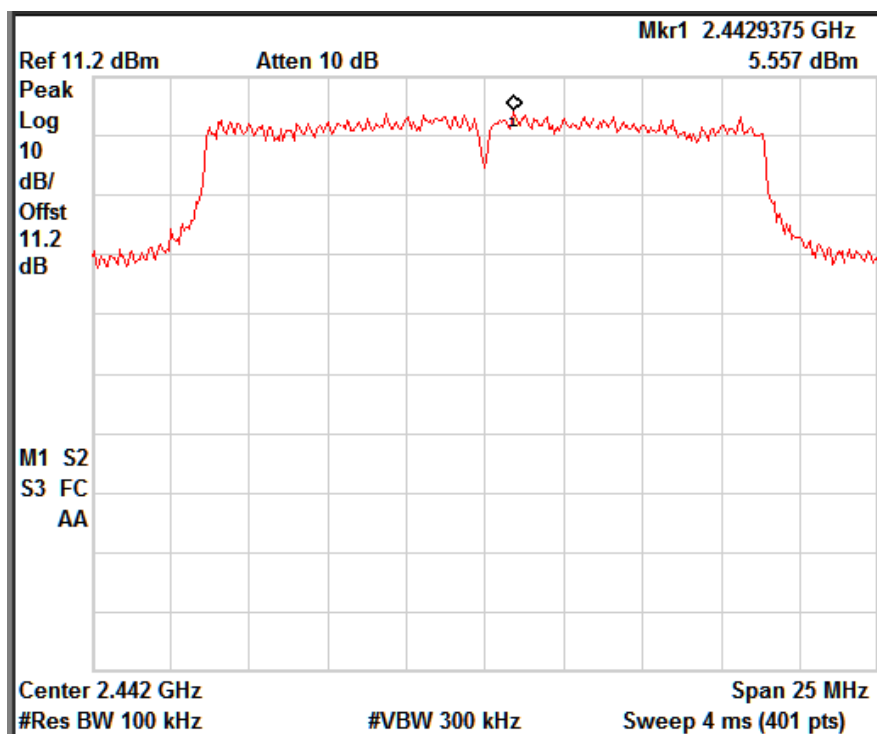
Note: The channel no. 7 (2442 MHz) found to contain the maximum PSD level and is used to establish the reference level.



Reference Level Plot: 6.5 Mbps

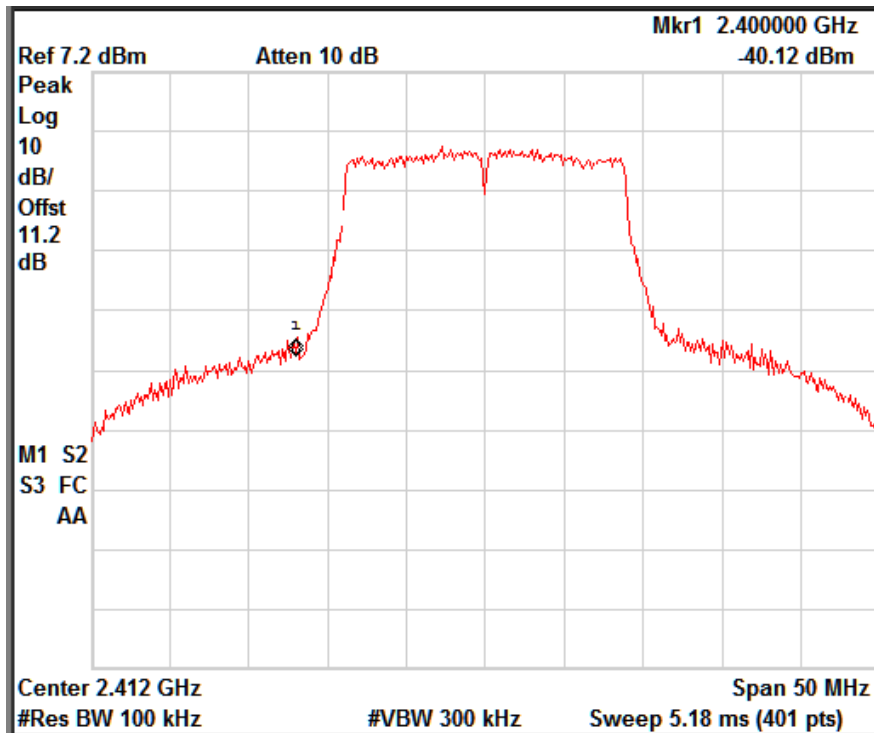


Reference Level Plot: 39 Mbps



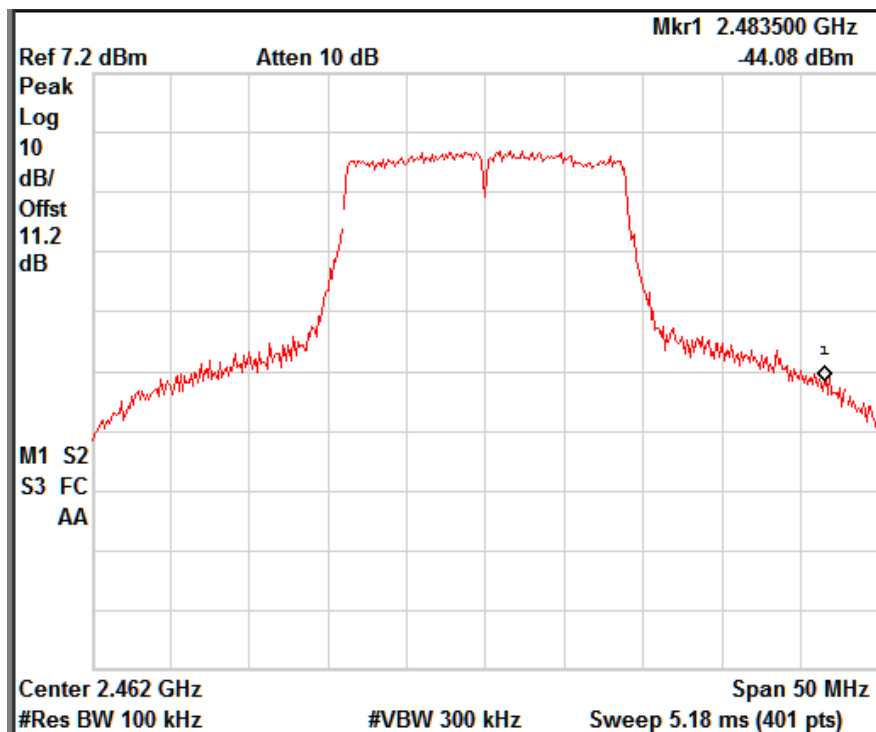
Reference Level Plot: 65 Mbps

www.tuv.com



Data Rate: 6.5 Mbps

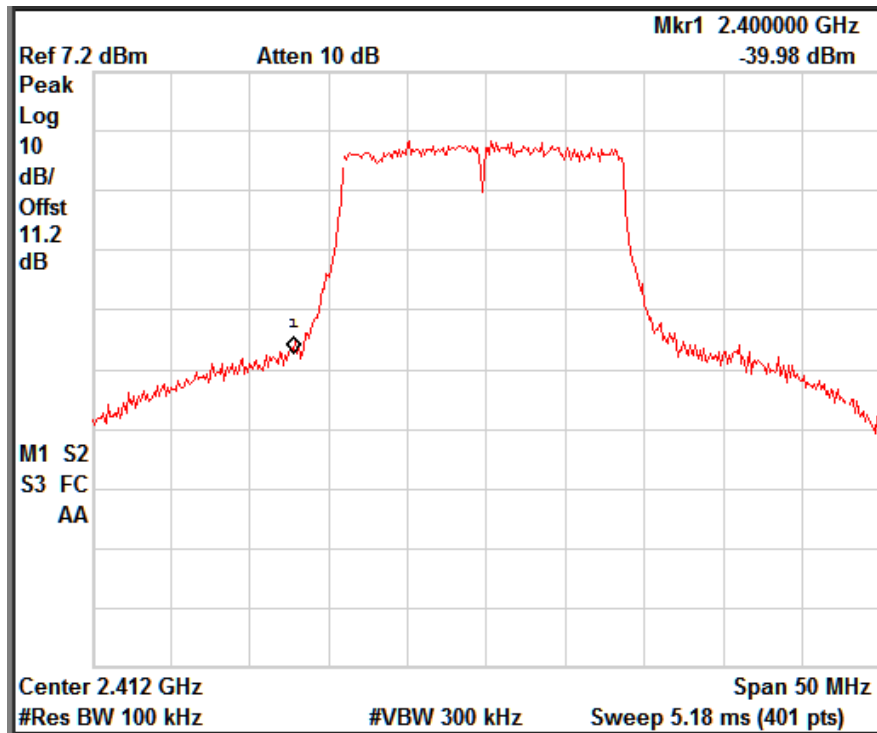
Channel frequency: 2412 MHz



Data Rate: 6.5 Mbps

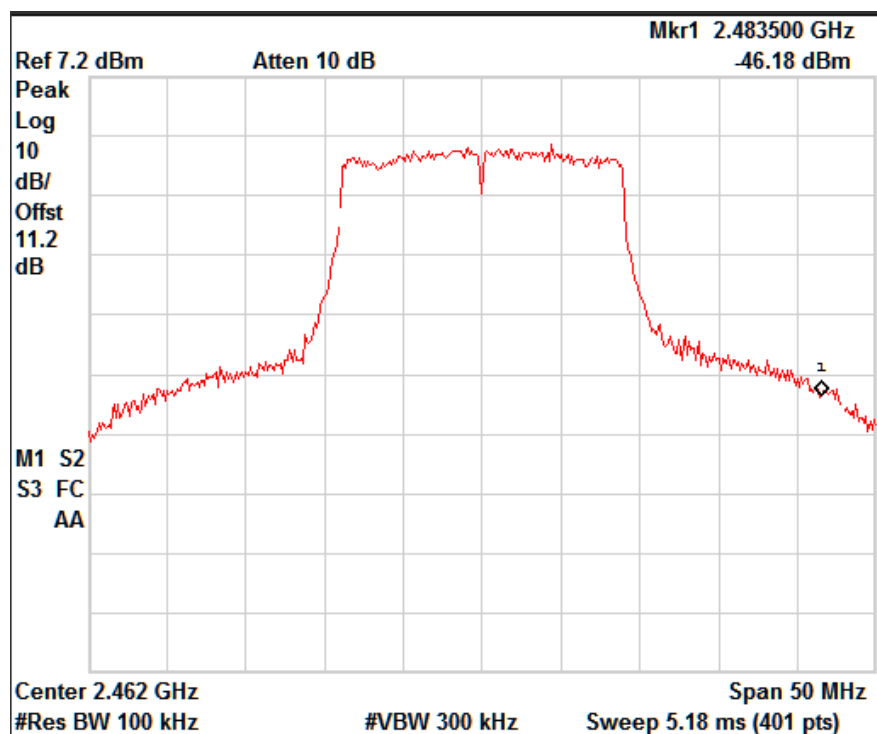
Channel frequency: 2462 MHz

www.tuv.com



Data Rate: 39 Mbps

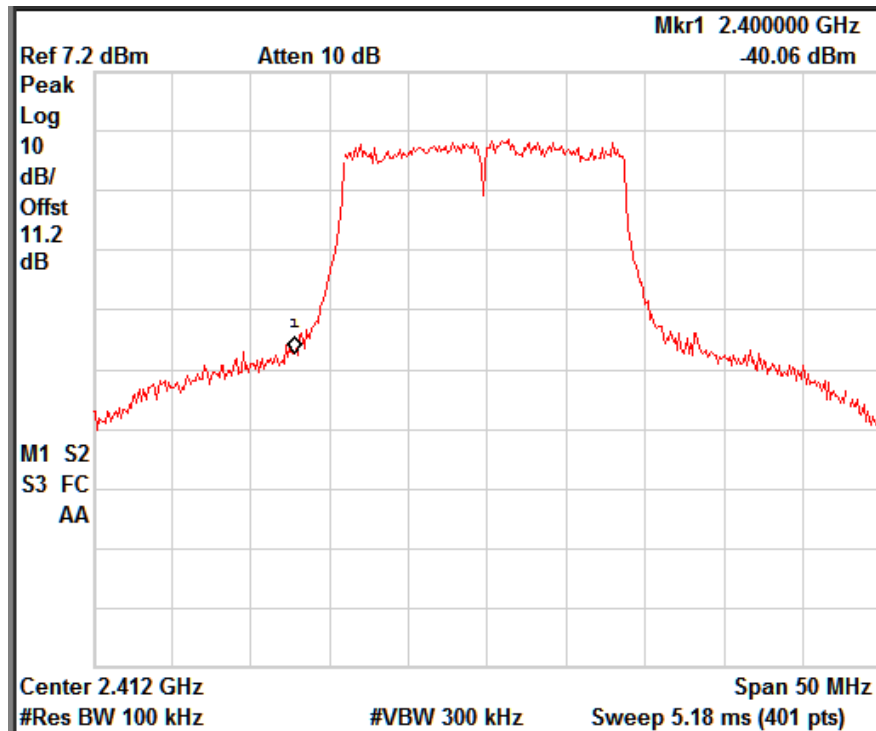
Channel frequency: 2412 MHz



Data Rate: 39 Mbps

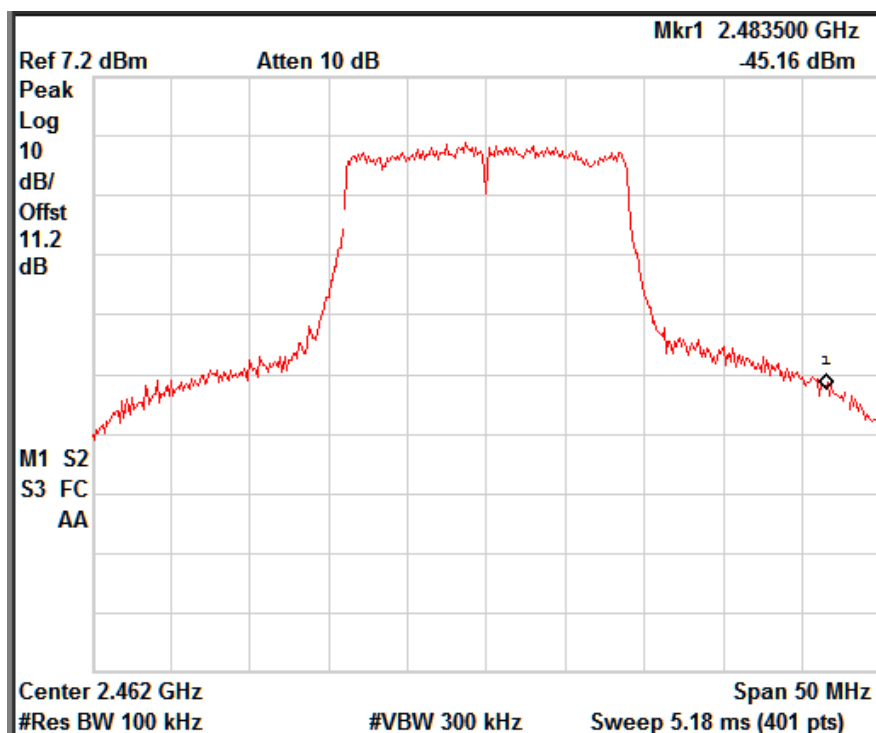
Channel frequency: 2462 MHz

www.tuv.com



Data Rate: 65 Mbps

Channel frequency: 2412 MHz



Data Rate: 65 Mbps

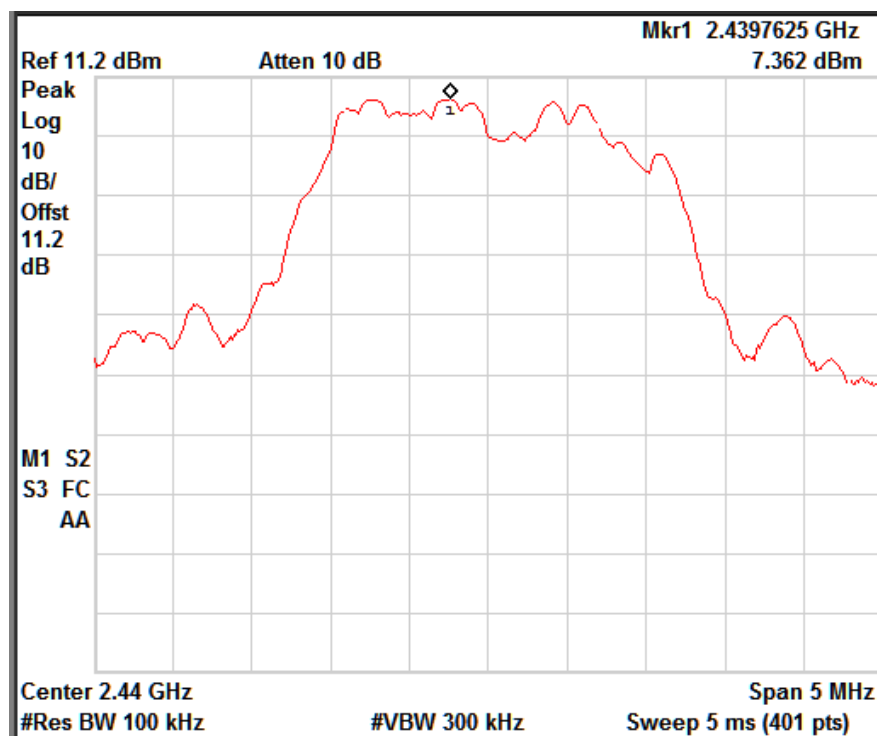
Channel frequency: 2462 MHz

www.tuv.com

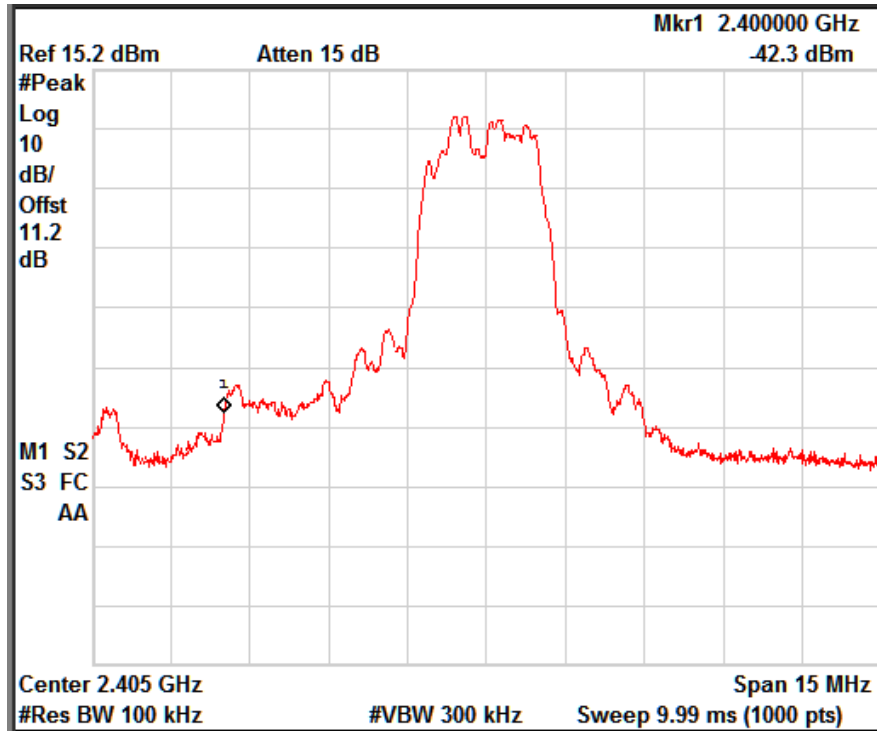
Test Result: ZigBee

Channel Frequency (MHz)	Value at Band Edge		Reference PSD Value B (dBm)	Band Edge Value A-B (dBc)	Limit (dBc)
	Frequency (MHz)	Value A (dBm)			
2405	2400.00	-42.30	7.36	-49.66	-30.00
2480	2483.50	-47.86	7.36	-55.22	-30.00

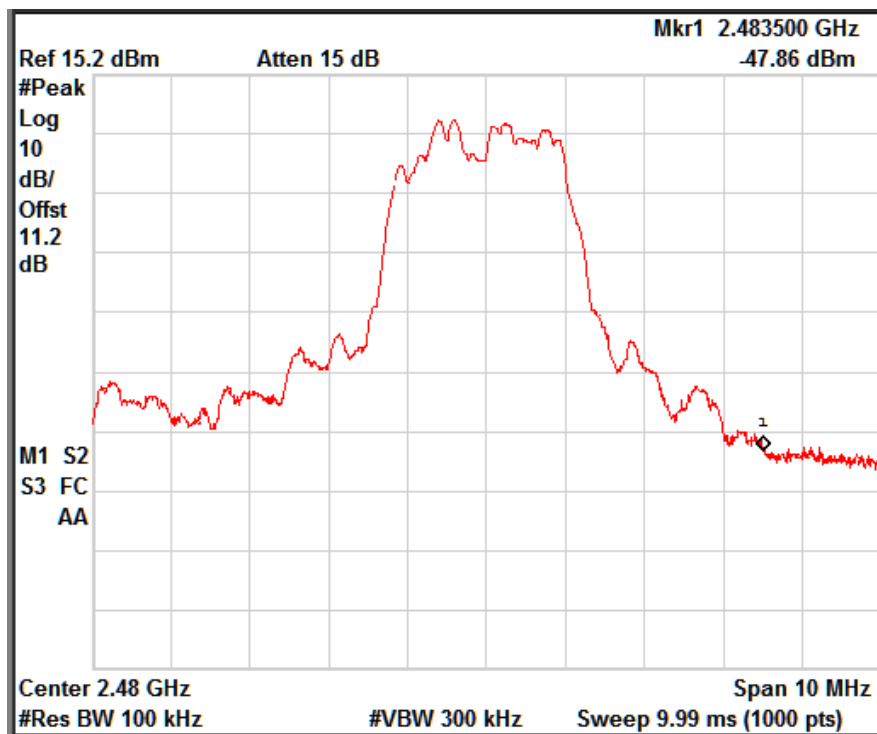
Note: The channel no.18 (2440 MHz) found to contain the maximum PSD level and is used to establish the reference level.



Reference Level Plot



Channel Frequency 2405 MHz

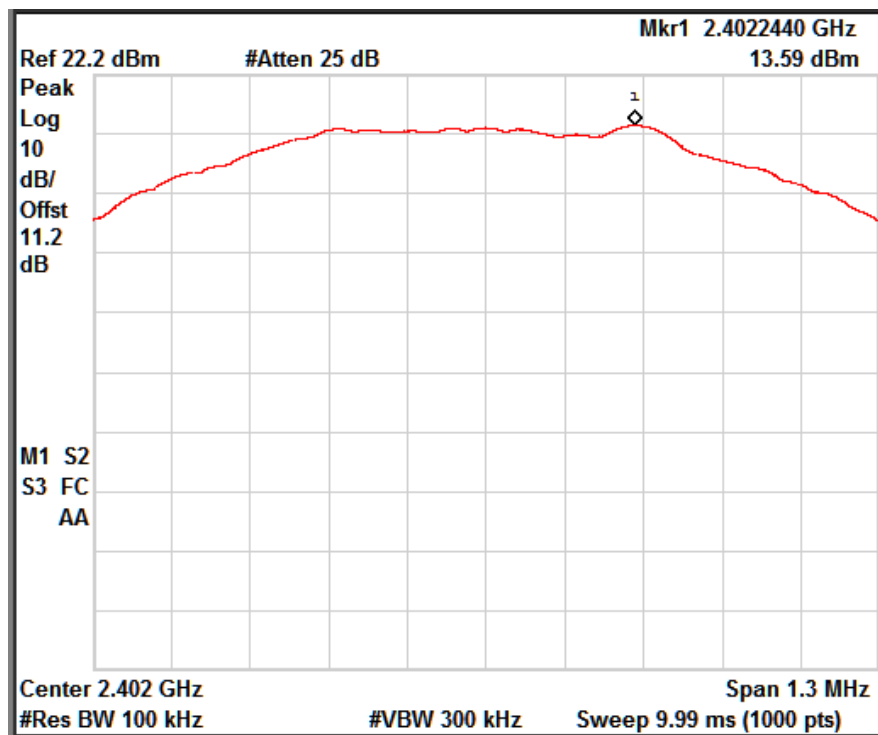


Channel Frequency 2480 MHz

www.tuv.com

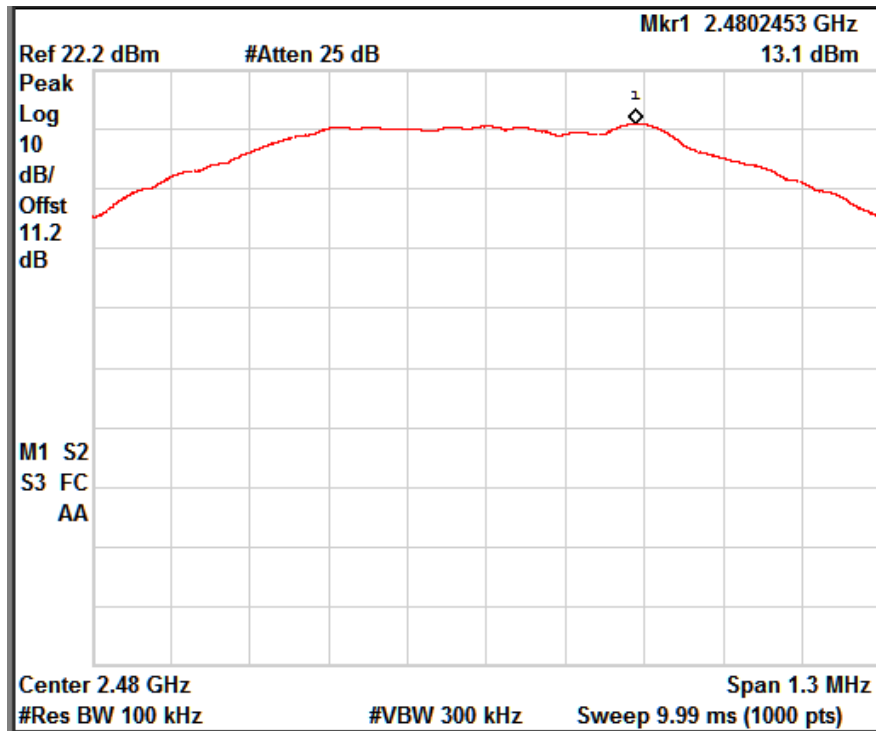
Test Result: Bluetooth LE

Channel Frequency (MHz)	Value at Band Edge		Reference PSD Value B (dBm)	Band Edge Value A-B (dBc)	Limit (dBc)
	Frequency (MHz)	Value A (dBm)			
2405	2399.72	-26.99	13.59	-40.58	-30.00
2480	2483.50	-44.51	13.10	-57.61	-30.00



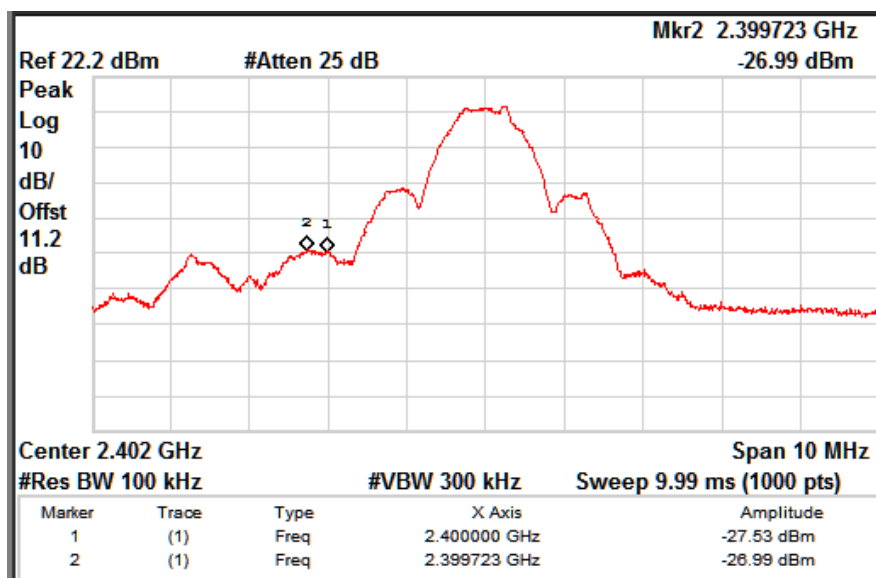
Reference Level Plot

Channel Frequency: 2402MHz



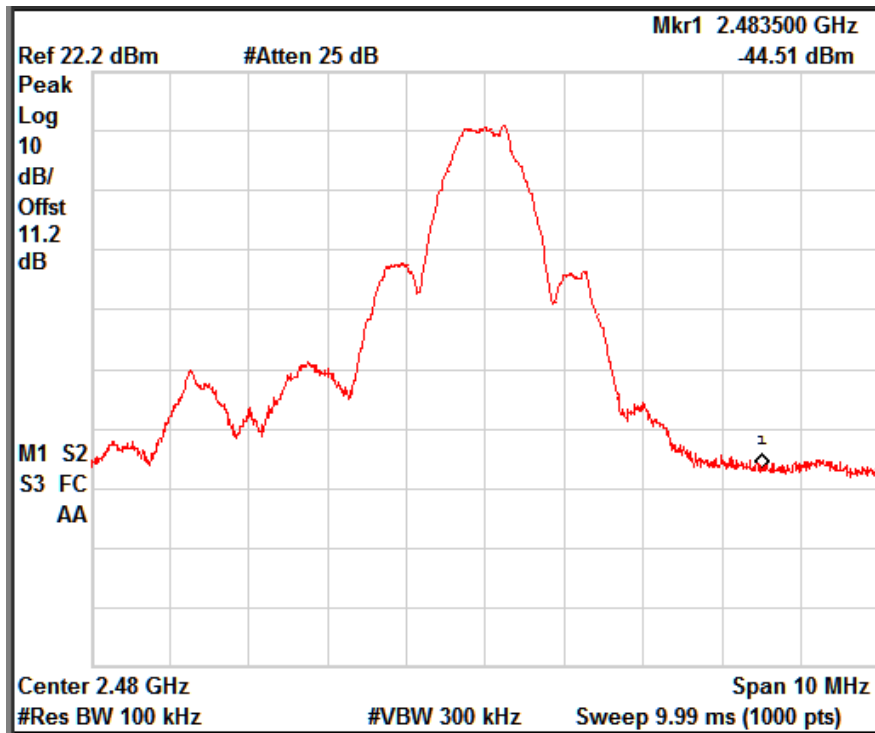
Reference Level Plot

Channel Frequency: 2480MHz



Channel Frequency 2402 MHz

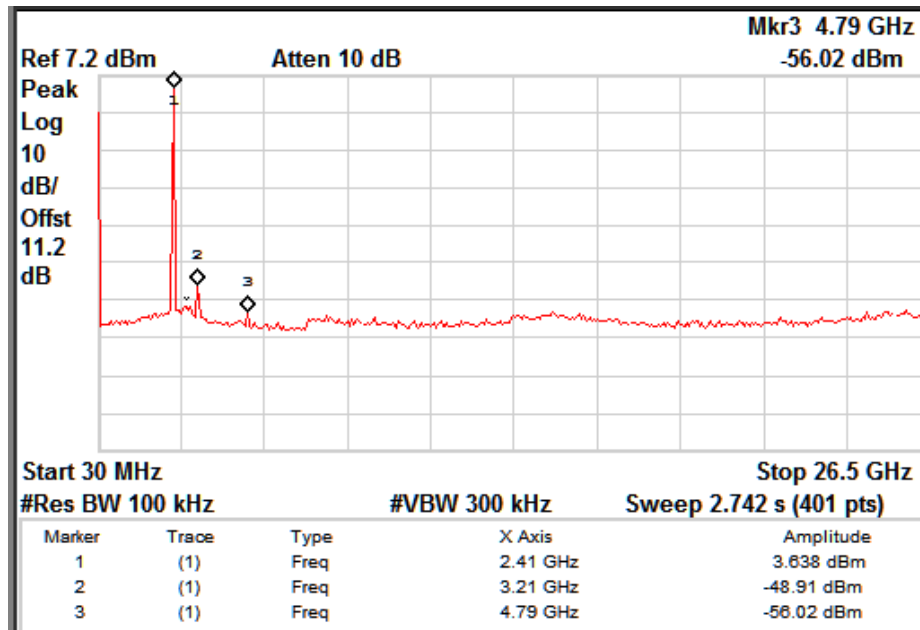
www.tuv.com



Channel Frequency 2480 MHz

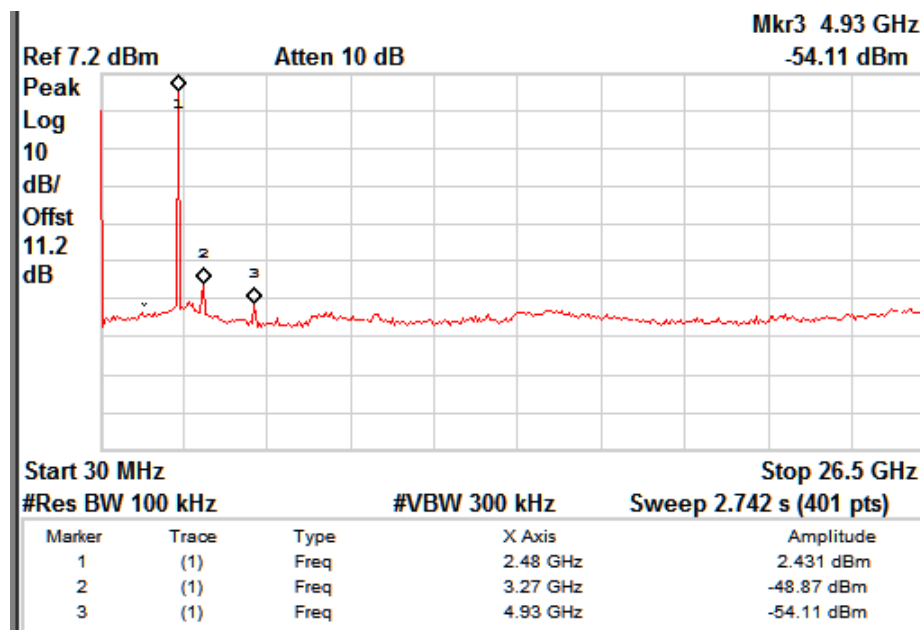
www.tuv.com

Conducted Spurious Emission



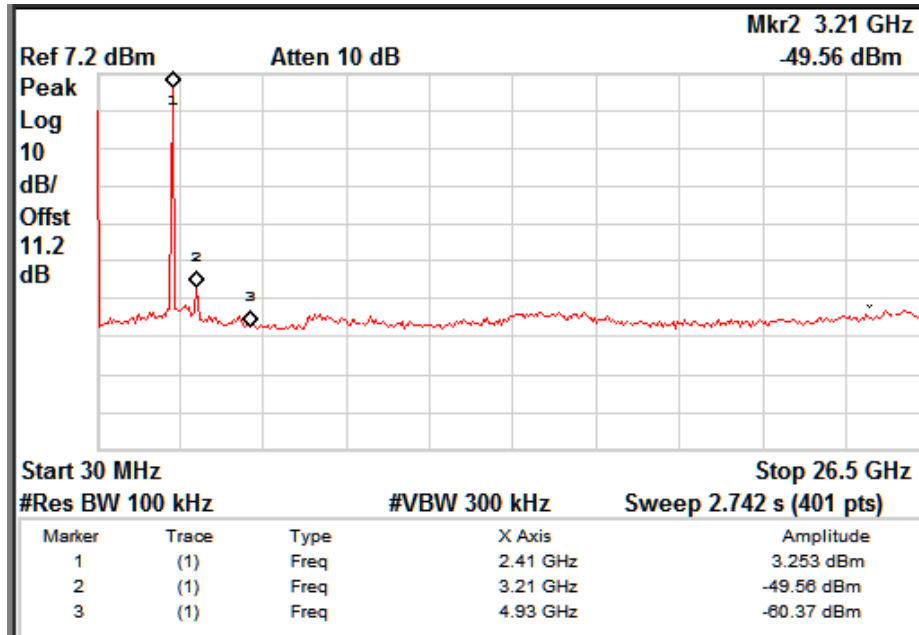
Data Rate: 1Mbps

Channel frequency: 2412 MHz



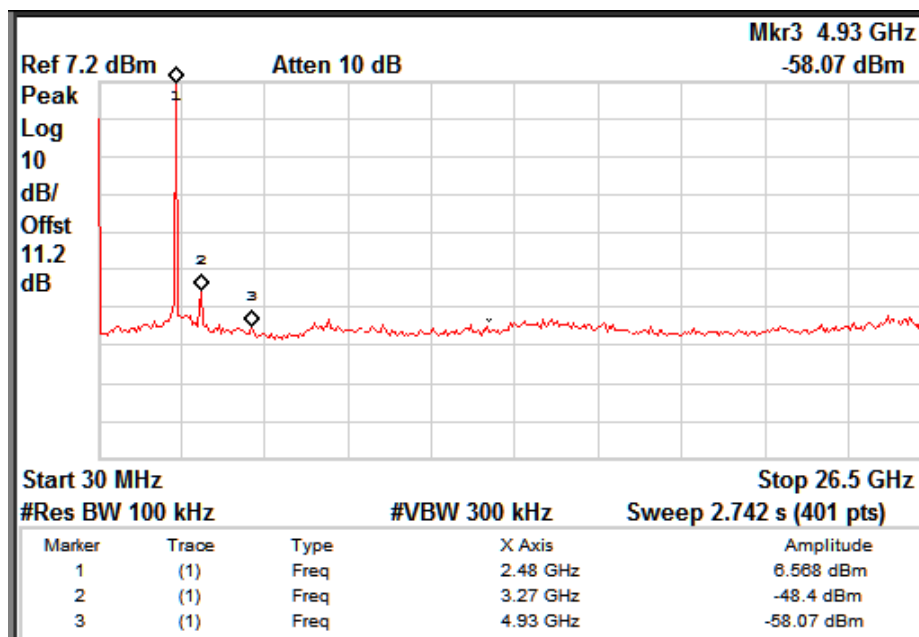
Data Rate: 1Mbps

Channel frequency: 2462 MHz



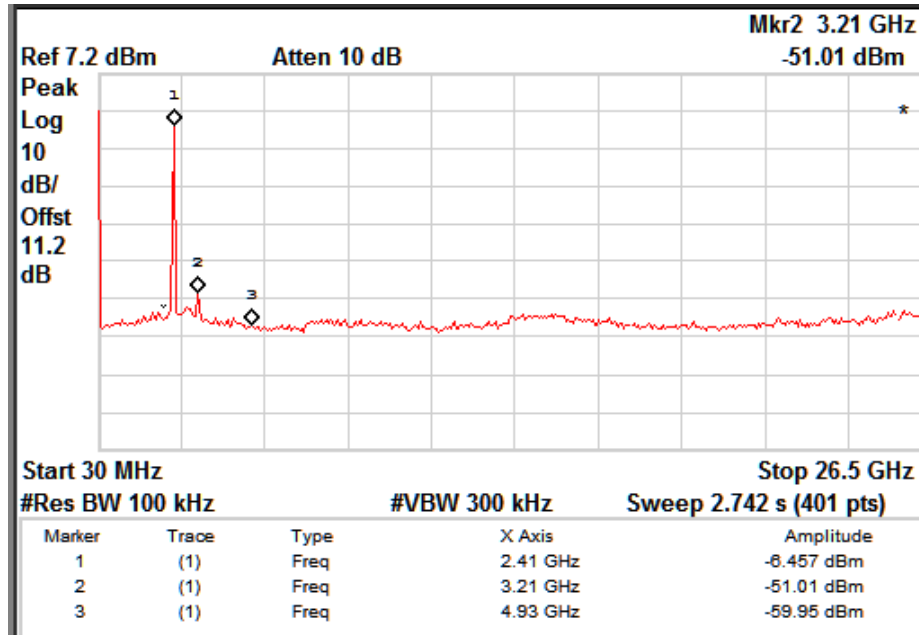
Data Rate: 11Mbps

Channel frequency: 2412 MHz



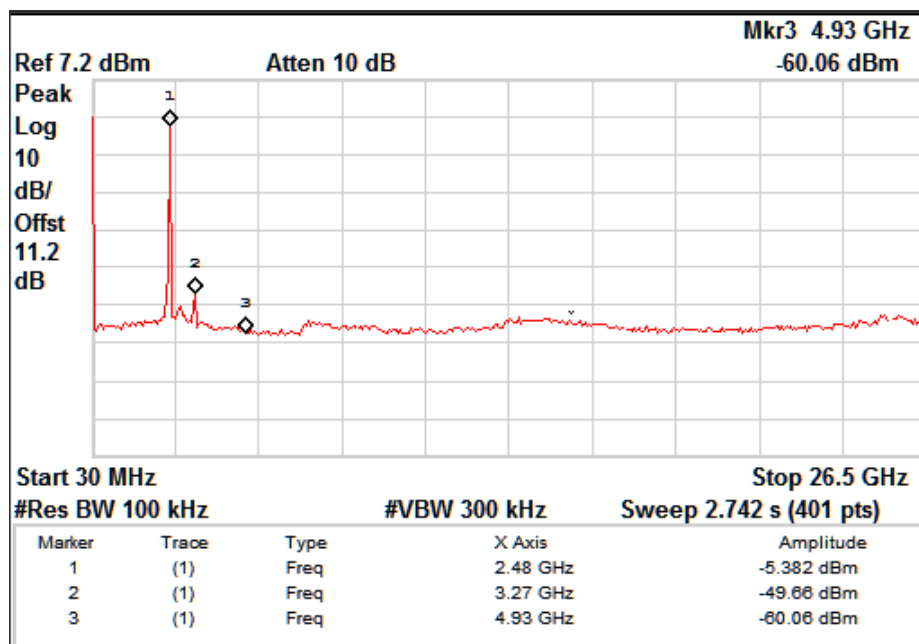
Data Rate: 11Mbps

Channel frequency: 2462 MHz



Data Rate: 6Mbps

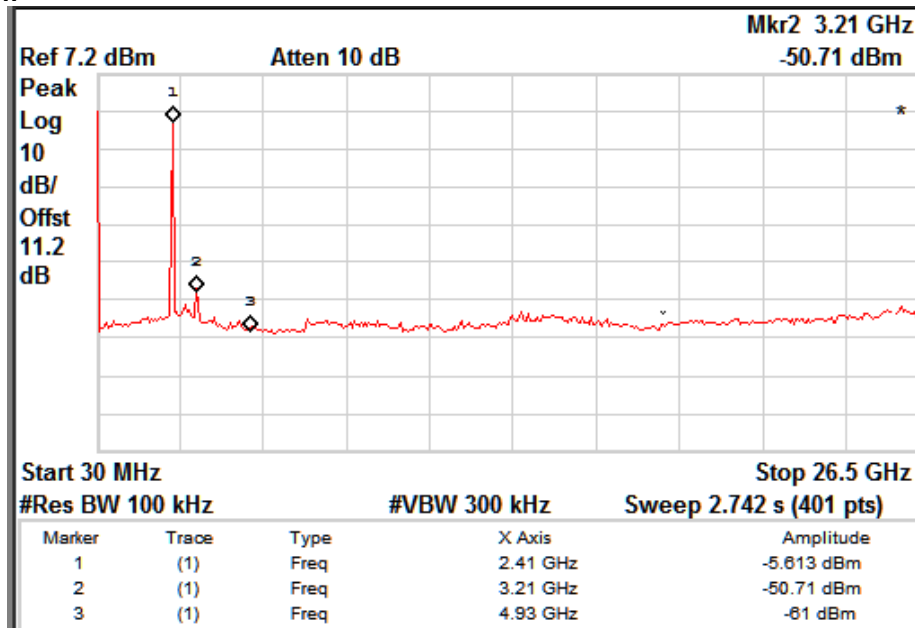
Channel frequency: 2412 MHz



Data Rate: 6Mbps

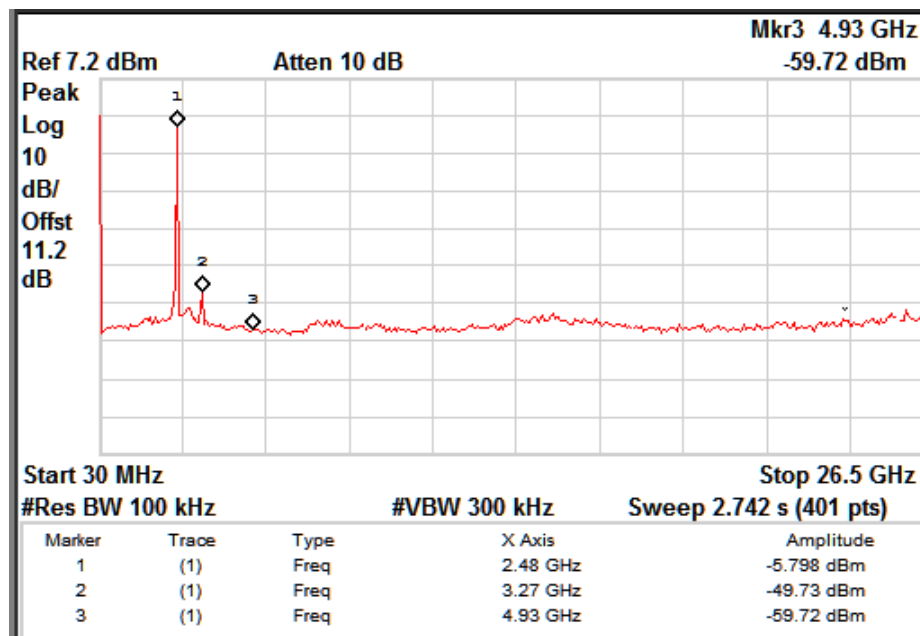
Channel frequency: 2462 MHz

www.tuv.com



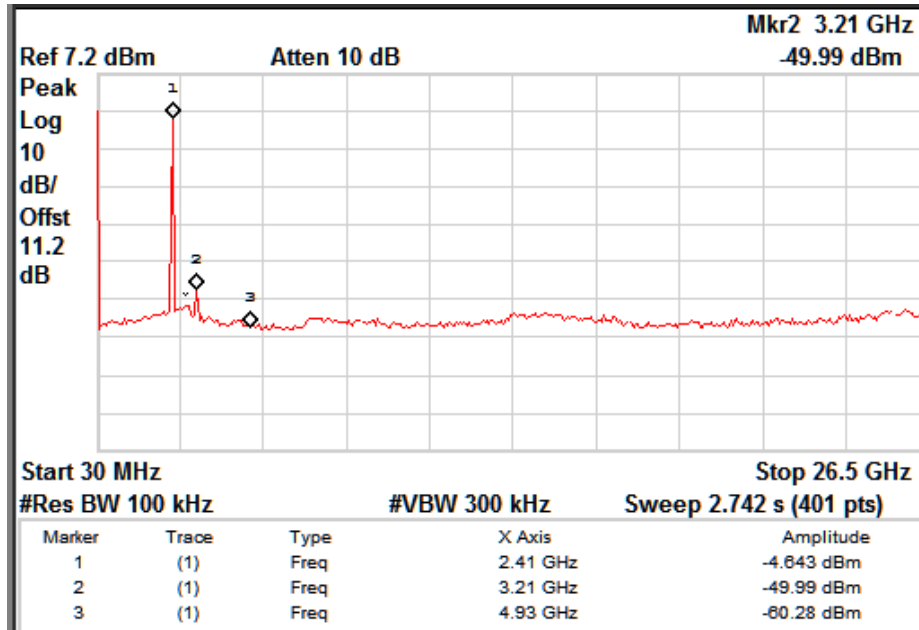
Data Rate: 24Mbps

Channel frequency: 2412 MHz



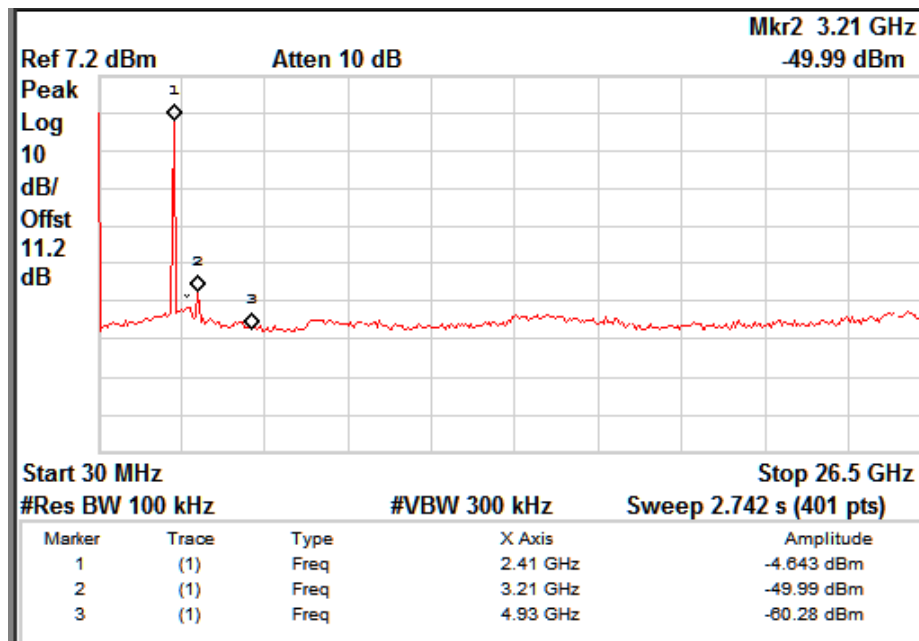
Data Rate: 24Mbps

Channel frequency: 2462 MHz



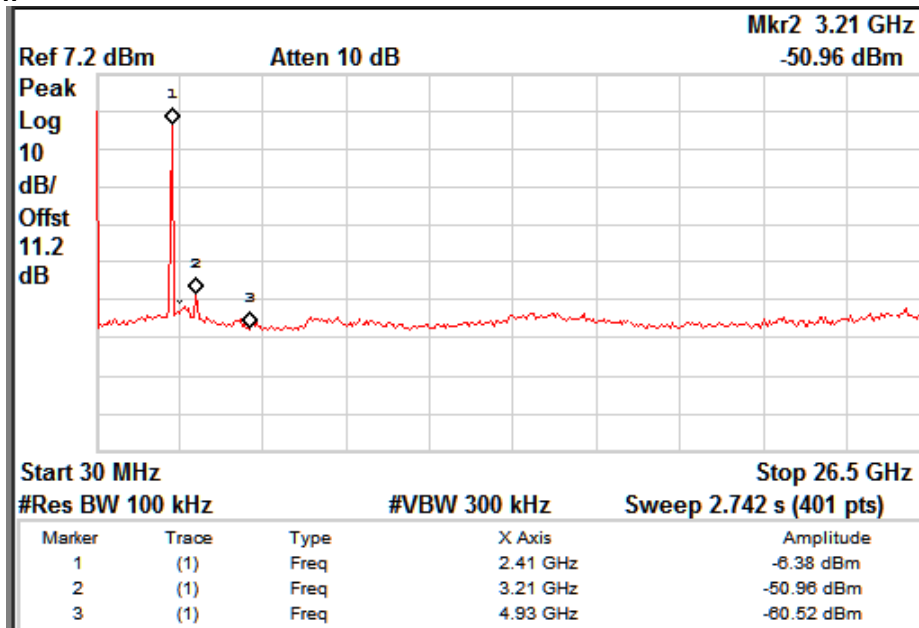
Data Rate: 54Mbps

Channel frequency: 2412 MHz



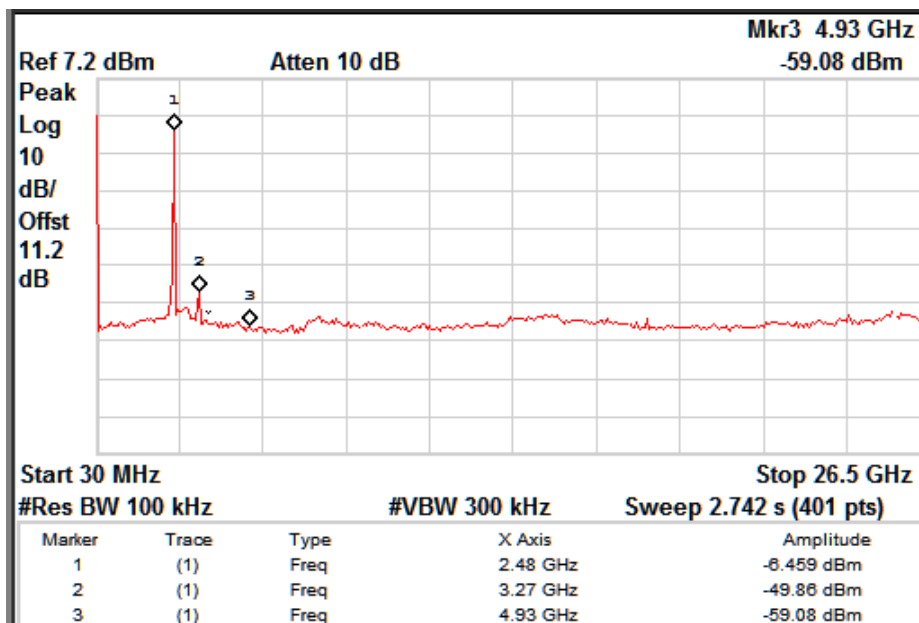
Data Rate: 54Mbps

Channel frequency: 2462 MHz



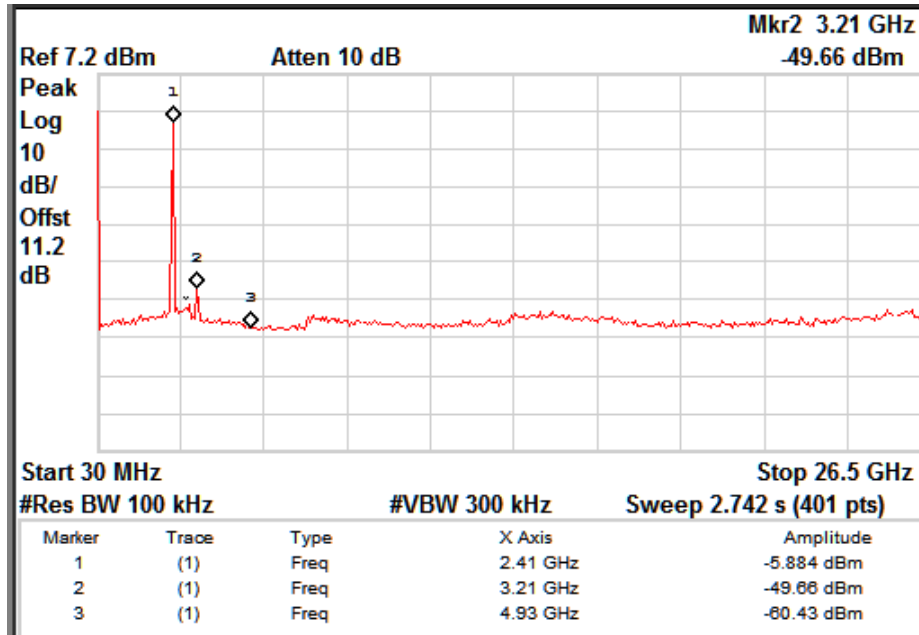
Data Rate: 6.5 Mbps

Channel frequency: 2412 MHz



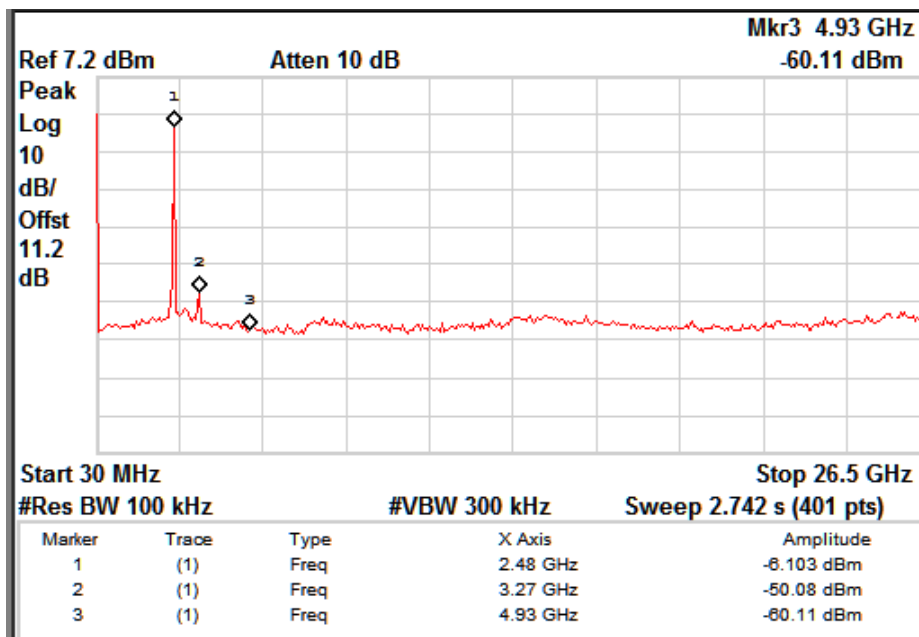
Data Rate: 6.5 Mbps

Channel frequency: 2462 MHz



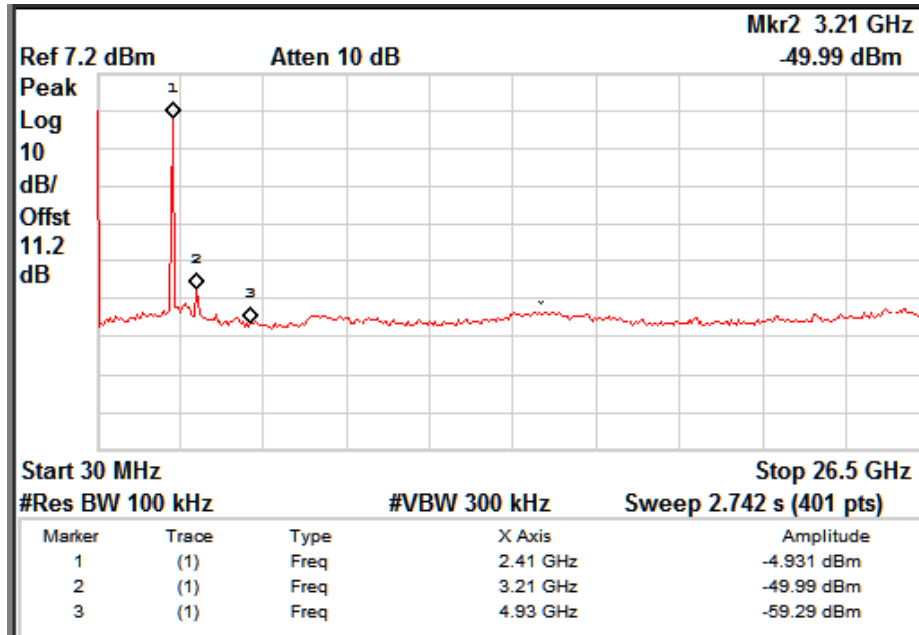
Data Rate: 39 Mbps

Channel frequency: 2412 MHz



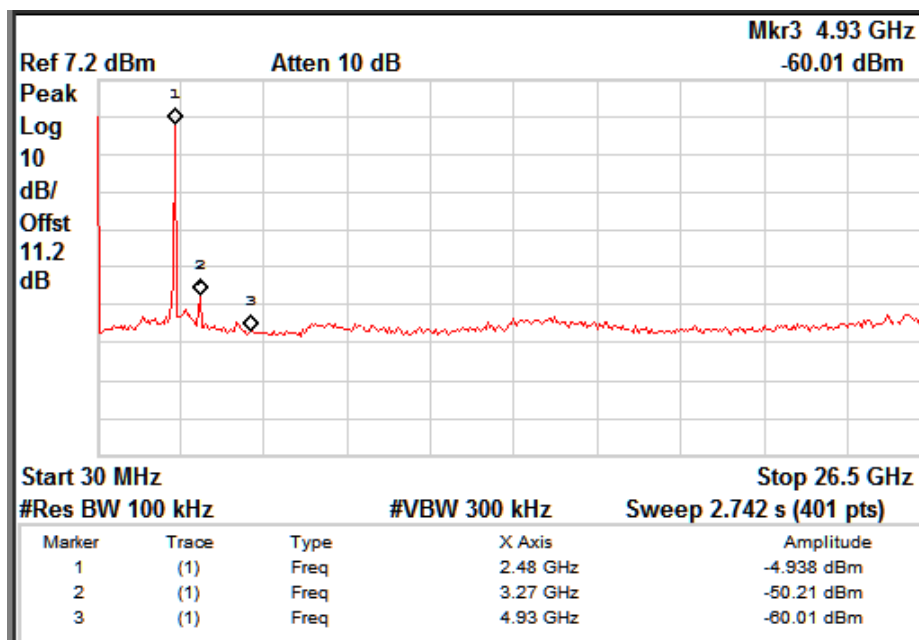
Data Rate: 39 Mbps

Channel frequency: 2462 MHz



Data Rate: 65 Mbps

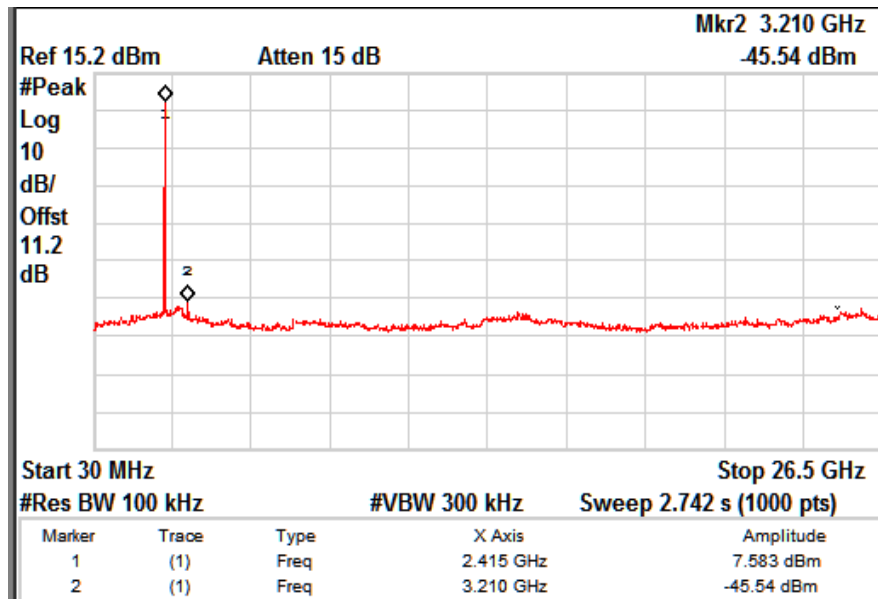
Channel frequency: 2412 MHz



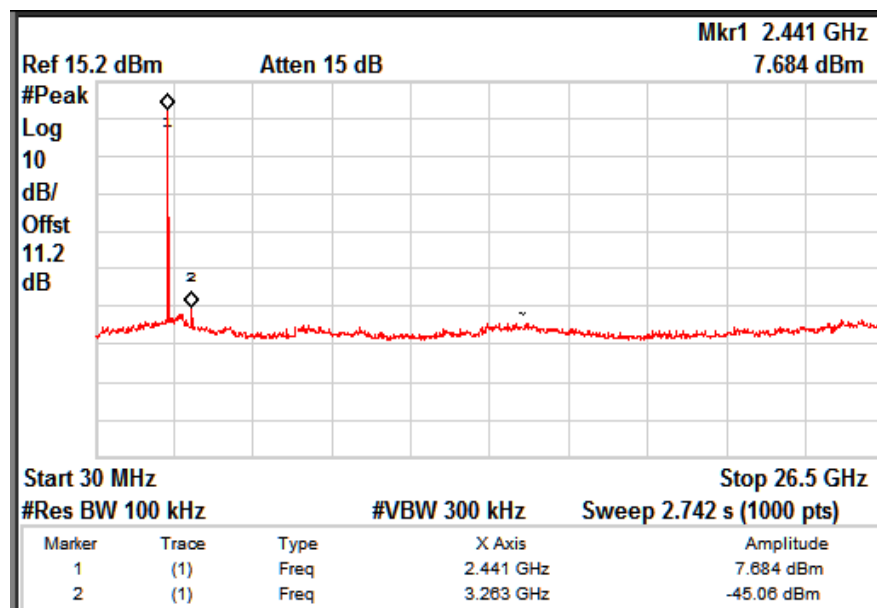
Data Rate: 65 Mbps

Channel frequency: 2462 MHz

www.tuv.com
ZigBee

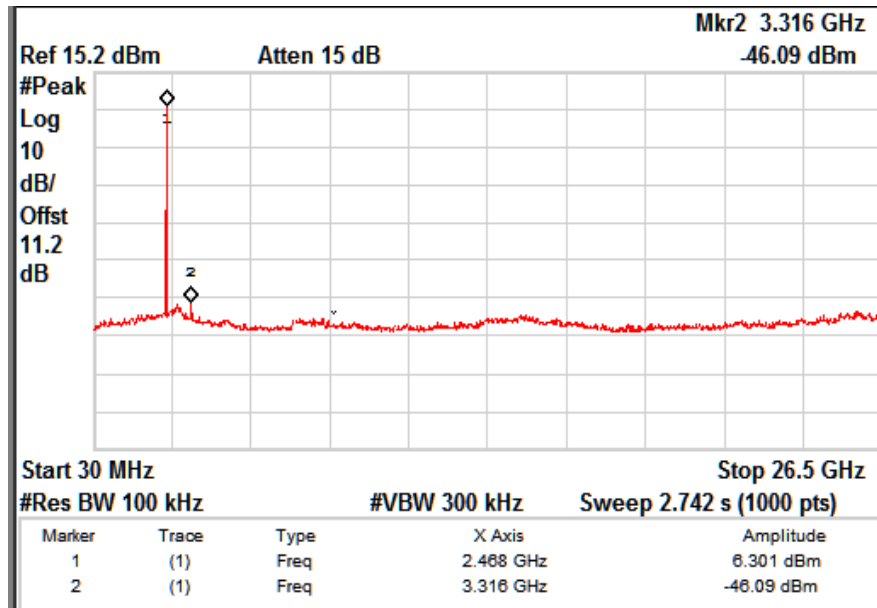


Channel Frequency 2405 MHz



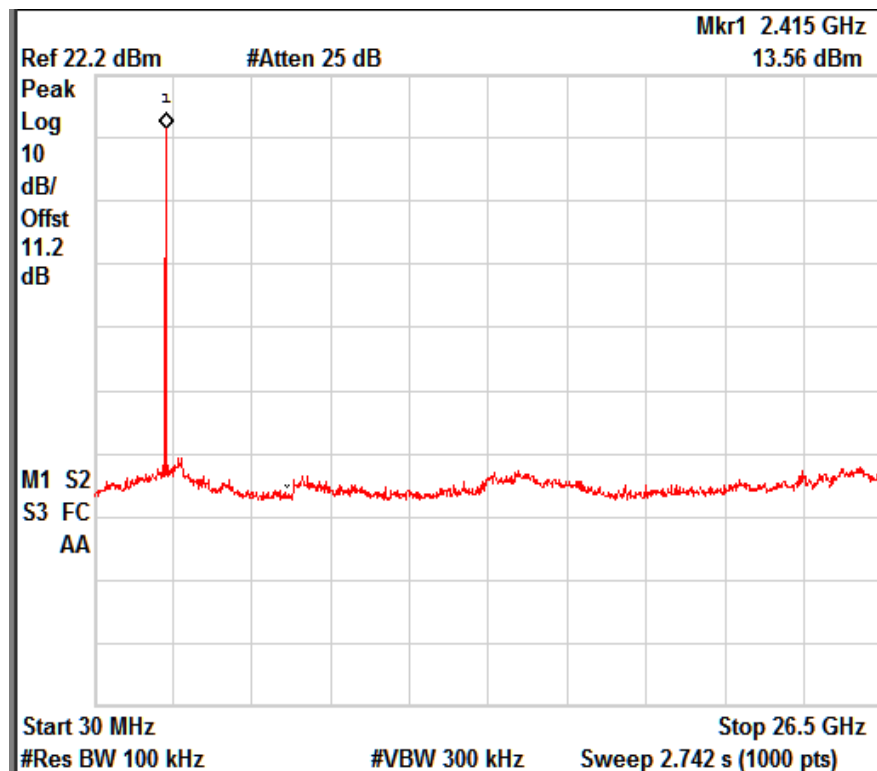
Channel Frequency 2440 MHz

www.tuv.com

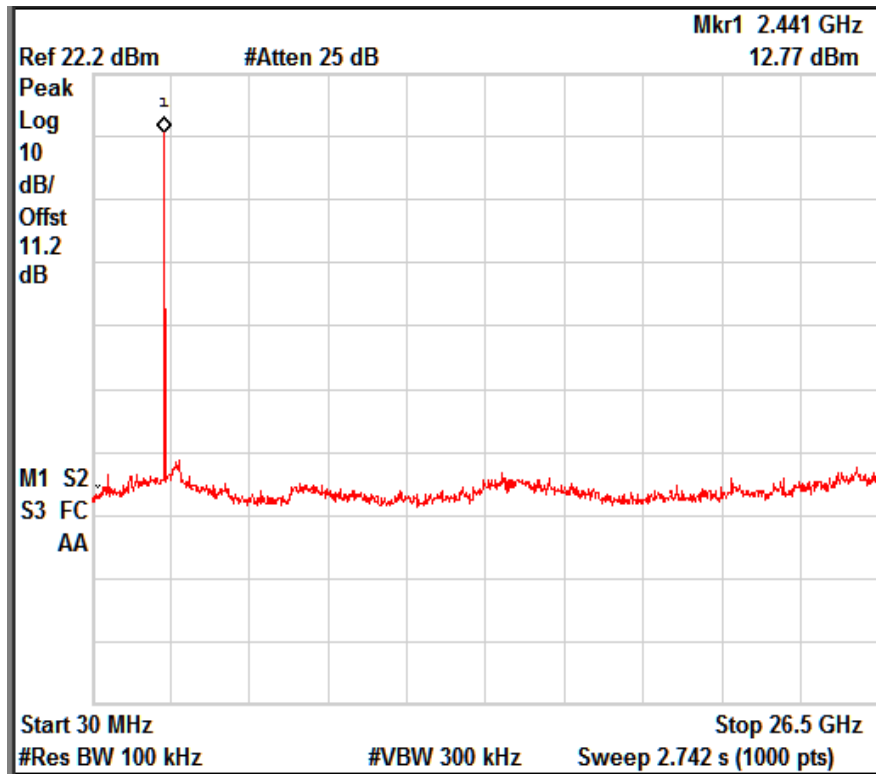


Channel Frequency 2480 MHz

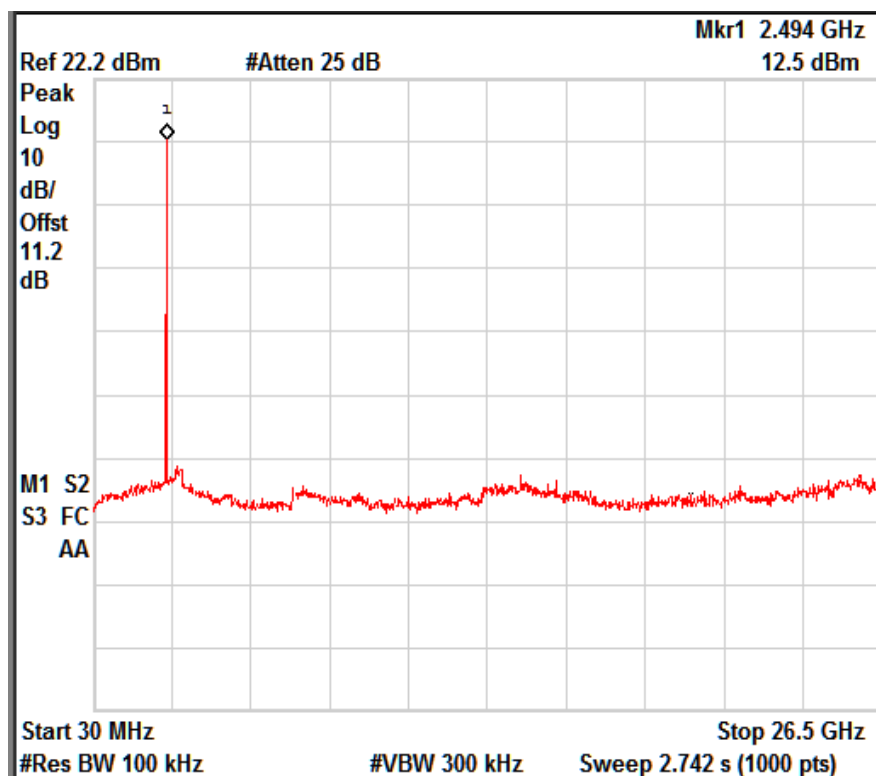
Bluetooth LE



Channel Frequency 2402 MHz



Channel Frequency 2442 MHz



Channel Frequency 2480 MHz

www.tuv.com

Spurious Radiated Emissions and

Restricted Bands of Operation

Section 8.9 & Section 8.10

Result

Pass

Test Specification	RSS - Gen Issue 4
Test Method	ANSI C63.4-2009
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 (μV/m)	Field strength (dBμV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 88.50 – 53.80, 53.80 – 43.00 and 49.5dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

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

www.tuv.com

Test results:

For frequency Range 9kHz - 1 GHz

No emissions found in this frequency range.

For frequency above 1GHz

Test results for worst case data rate are listed below.

WiFi:

B Mode: 1Mbps					
Channel	Polarization	Frequency (MHz)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	V	2390 (Pk)	47.21	74.00	-26.79
		2390 (Av)	40.08	54.00	-13.92
		2412 (Pk)	96.68	-	*
		2412 (Av)	93.89	-	*
		4824 (Pk)	53.29	74.00	-20.71
		4824 (Av)	47.88	54.00	-6.12
		7236 (Pk)	56.54	74.00	-17.46
		7236 (Av)	43.92	54.00	-10.08
	H	2390 (Pk)	53.66	74.00	-20.34
		2390 (Av)	47.54	54.00	-6.46
		2412 (Pk)	103.81	-	*
		2412 (Av)	100.95	-	*
		4824 (Pk)	57.33	74.00	-16.67
		4824 (Av)	53.01	54.00	-0.99
		7236 (Pk)	57.91	74.00	-16.09
		7236 (Av)	47.05	54.00	-6.95
Mid	V	2437 (Pk)	96.44	-	*
		2437 (Av)	93.12	-	*
		4874 (Pk)	53.50	74.00	-20.50
		4874 (Av)	48.26	54.00	-5.74
		7311 (Pk)	57.38	74.00	-16.62
		7311 (Av)	44.61	54.00	-9.39
	H	2437 (Pk)	103.21	-	*
		2437 (Av)	100.87	-	*
		4874 (Pk)	57.03	74.00	-16.97
		4874 (Av)	53.60	54.00	-0.40
		7311 (Pk)	57.51	74.00	-16.49
		7311 (Av)	47.49	54.00	-6.51
High	V	2462 (Pk)	95.67	-	*

		2462 (Av)	92.97	-	*
		2483.5 (Pk)	46.89	74.00	-27.11
		2483.5 (Av)	39.37	54.00	-14.63
		4924 (Pk)	53.29	74.00	-20.71
		4924 (Av)	47.92	54.00	-6.08
		7386 (Pk)	57.29	74.00	-16.71
		7386 (Av)	44.81	54.00	-9.19
	H	2462 (Pk)	103.83	-	*
		2462 (Av)	100.75	-	*
		2483.5 (Pk)	53.98	74.00	-20.02
		2483.5 (Av)	48.10	54.00	-5.90
		4924 (Pk)	57.21	74.00	-16.79
		4924 (Av)	53.28	54.00	-0.72
		7386 (Pk)	56.98	74.00	-17.02
		7386 (Av)	47.22	54.00	-6.78

B Mode: 11Mbps					
Channel	Polarization	Frequency (MHz)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	V	2390 (Pk)	48.50	74.00	-25.50
		2390 (Av)	36.40	54.00	-17.60
		2412 (Pk)	100.90	-	*
		2412 (Av)	93.09	-	*
		4824 (Pk)	51.47	74.00	-22.53
		4824 (Av)	38.64	54.00	-15.36
		7236 (Pk)	57.85	74.00	-16.15
		7236 (Av)	44.72	54.00	-9.28
	H	2390 (Pk)	55.08	74.00	-18.92
		2390 (Av)	44.03	54.00	-9.97
		2412 (Pk)	106.83	-	*
		2412 (Av)	99.69	-	*
		4824 (Pk)	56.73	74.00	-17.27
		4824 (Av)	43.55	54.00	-10.45
		7236 (Pk)	58.20	74.00	-15.80
		7236 (Av)	47.58	54.00	-6.42
Mid	V	2437 (Pk)	102.12	-	*
		2437 (Av)	96.29	-	*
		4874 (Pk)	55.07	74.00	-18.93
		4874 (Av)	41.16	54.00	-12.84
		7311 (Pk)	58.29	74.00	-15.71
		7311 (Av)	46.45	54.00	-7.55
	H	2437 (Pk)	107.89	-	*

High		2437 (Av)	102.21	-	*
		4874 (Pk)	60.69	74.00	-13.31
		4874 (Av)	47.83	54.00	-6.17
		7311 (Pk)	60.62	74.00	-13.38
		7311 (Av)	50.55	54.00	-3.45
	V	2462 (Pk)	102.47	-	*
		2462 (Av)	94.67	-	*
		2483.5 (Pk)	52.88	74.00	-21.12
		2483.5 (Av)	41.43	54.00	-12.57
		4924 (Pk)	54.37	74.00	-19.63
		4924 (Av)	40.76	54.00	-13.24
		7386 (Pk)	57.67	74.00	-16.33
		7386 (Av)	45.34	54.00	-8.66
	H	2462 (Pk)	106.62	-	*
		2462 (Av)	100.28	-	*
		2483.5 (Pk)	62.76	74.00	-11.24
		2483.5 (Av)	51.47	54.00	-2.53
		4924 (Pk)	59.56	74.00	-14.44
		4924 (Av)	46.55	54.00	-7.45
		7386 (Pk)	59.89	74.00	-14.11
		7386 (Av)	49.57	54.00	-4.43

G Mode: 6Mbps					
Channel	Polarization	Frequency (MHz)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	V	2390 (Pk)	60.76	74.00	-13.24
		2390 (Av)	42.74	54.00	-11.26
		2412 (Pk)	95.48	-	*
		2412 (Av)	86.58	-	*
		4824 (Pk)	50.15	74.00	-23.85
		4824 (Av)	36.21	54.00	-17.79
		7236 (Pk)	55.21	74.00	-18.79
		7236 (Av)	42.98	54.00	-11.02
	H	2390 (Pk)	70.12	74.00	-3.88
		2390 (Av)	51.14	54.00	-2.86
		2412 (Pk)	104.40	-	*
		2412 (Av)	96.38	-	*
		4824 (Pk)	59.68	74.00	-14.32
		4824 (Av)	45.22	54.00	-8.78
		7236 (Pk)	60.21	74.00	-13.79
		7236 (Av)	46.89	54.00	-7.11
Mid	V	2437 (Pk)	100.25	-	*

High			2437 (Av)	91.89	-	*
			4874 (Pk)	50.93	74.00	-23.07
			4874 (Av)	37.98	54.00	-16.02
			7311 (Pk)	57.28	74.00	-16.72
			7311 (Av)	44.98	54.00	-9.02
		H	2437 (Pk)	108.52	-	*
			2437 (Av)	99.78	-	*
			4874 (Pk)	61.22	74.00	-12.78
			4874 (Av)	46.89	54.00	-7.11
			7311 (Pk)	61.78	74.00	-12.22
			7311 (Av)	48.84	54.00	-5.16
	V		2462 (Pk)	95.24	-	*
			2462 (Av)	85.59	-	*
			2483.5 (Pk)	62.37	74.00	-11.63
			2483.5 (Av)	44.10	54.00	-9.90
			4924 (Pk)	48.38	74.00	-25.62
			4924 (Av)	36.58	54.00	-17.42
			7386 (Pk)	56.88	74.00	-17.12
			7386 (Av)	42.69	54.00	-11.31
		H	2462 (Pk)	104.23	-	*
			2462 (Av)	95.46	-	*
			2483.5 (Pk)	71.17	74.00	-2.83
			2483.5 (Av)	53.17	54.00	-0.83
			4924 (Pk)	58.59	74.00	-15.41
			4924 (Av)	44.58	54.00	-9.42
			7386 (Pk)	59.89	74.00	-14.11
			7386 (Av)	46.58	54.00	-7.42

N Mode: MCS0					
Channel	Polarization	Frequency (MHz)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	V	2390 (Pk)	62.50	74.00	-11.50
		2390 (Av)	43.26	54.00	-10.74
		2412 (Pk)	94.20	-	*
		2412 (Av)	85.56	-	*
		4824 (Pk)	50.10	74.00	-23.90
		4824 (Av)	37.89	54.00	-16.11
	H	2390 (Pk)	70.91	74.00	-3.09
		2390 (Av)	51.09	54.00	-2.91
		2412 (Pk)	103.63	-	*
		2412 (Av)	95.11	-	*
		4824 (Pk)	55.69	74.00	-18.31

www.tuv.com

			4824 (Av)	44.58	54.00	-9.42
Mid	V		2437 (Pk)	100.26	-	*
			2437 (Av)	91.56	-	*
			4874 (Pk)	53.42	74.00	-20.58
			4874 (Av)	41.03	54.00	-12.97
	H		2437 (Pk)	108.49	-	*
			2437 (Av)	99.51	-	*
			4874 (Pk)	60.68	74.00	-13.32
			4874 (Av)	47.68	54.00	-6.32
High	V		2462 (Pk)	92.44	-	*
			2462 (Av)	83.22	-	*
			2483.5 (Pk)	61.37	74.00	-12.63
			2483.5 (Av)	42.84	54.00	-11.16
			4924 (Pk)	50.29	74.00	-23.71
			4924 (Av)	37.89	54.00	-16.11
	H		2462 (Pk)	102.71	-	*
			2462 (Av)	93.75	-	*
			2483.5 (Pk)	70.95	74.00	-3.05
			2483.5 (Av)	52.96	54.00	-1.04
			4924 (Pk)	57.45	74.00	-16.55
			4924 (Av)	44.69	54.00	-9.31

ZigBee:

Channel	Polarization	Frequency (MHz)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	V	2390 (Pk)	52.34	74	-21.66
		2390 (Av)	31.06	54	-22.94
		2405 (Pk)	104.41	*	-
		2405 (Av)	99.61	*	-
		4810 (Pk)	55.09	74	-18.91
		4810 (Av)	47.98	54	-6.02
		7215 (Pk)	58.45	74	-15.55
		7215 (Av)	47.44	54	-6.56
	H	2390 (Pk)	52.51	74	-21.49
		2390 (Av)	40.72	54	-13.28
		2405 (Pk)	107.6	*	-
		2405 (Av)	103.85	*	-
		4810 (Pk)	58.74	74	-15.26
		4810 (Av)	53.34	54	-0.66
		7215 (Pk)	57.82	74	-16.18
		7215 (Av)	46.37	54	-7.63

www.tuv.com

Mid	V	4880 (Pk)	54.39	74	-19.61
		4880 (Av)	46.78	54	-7.22
		7320 (Pk)	58.49	74	-15.51
		7320 (Av)	46.7	54	-7.3
	H	4880 (Pk)	58.22	74	-15.78
		4880 (Av)	51.39	54	-2.61
		7320 (Pk)	61.78	74	-12.22
		7320 (Av)	51.86	54	-2.14
High	V	2480 (Pk)	103.67	*	-
		2480 (Av)	98.95	*	-
		2483.5 (Pk)	55.1	74	-18.9
		2483.5 (Av)	41.45	54	-12.55
		4960 (Pk)	54.99	74	-19.01
		4960 (Av)	47.81	54	-6.19
		7440 (Pk)	59.54	74	-14.46
		7440 (Av)	49.08	54	-4.92
	H	2480 (Pk)	107.53	*	-
		2480 (Av)	103.63	*	-
		2483.5 (Pk)	61.92	74	-12.08
		2483.5 (Av)	50.17	54	-3.83
		4960 (Pk)	58.87	74	-15.13
		4960 (Av)	52.15	54	-1.85
		7440 (Pk)	60.02	74	-13.98
		7440 (Av)	49.59	54	-4.41

Bluetooth LE:

Channel	Polarization	Frequency (MHz)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	V	2390 (Pk)	42.98	74	-31.02
		2390 (Av)	29.38	54	-24.62
		2402 (Pk)	102.03	*	-
		2402 (Av)	93.81	*	-
		4804 (Pk)	52.00	74	-22.00
		4804 (Av)	39.52	54	-14.48
	H	2390 (Pk)	48.37	74	-25.63
		2390 (Av)	33.15	54	-20.85
		2402 (Pk)	107.47	*	-
		2402 (Av)	99.97	*	-
		4804 (Pk)	54.04	74	-19.96
		4804 (Av)	42.24	54	-11.76

www.tuv.com

Mid	V	4884 (Pk)	50.54	74	-23.46
		4884 (Av)	36.37	54	-17.63
	H	4884 (Pk)	50.41	74	-23.59
		4884 (Av)	36.35	54	-17.65
High	V	2480 (Pk)	101.47	*	-
		2480 (Av)	93.29	*	-
		2483.5 (Pk)	49.34	74	-24.66
		2483.5 (Av)	33.37	54	-20.63
		4960 (Pk)	51.49	74	-22.51
		4960 (Av)	38.53	54	-15.47
		7440 (Pk)	57.75	74	-16.25
		7440 (Av)	45.28	54	-8.72
	H	2480 (Pk)	107.51	*	-
		2480 (Av)	100.06	*	-
		2483.5 (Pk)	50.4	74	-23.6
		2483.5 (Av)	35.31	54	-18.69
		4960 (Pk)	54.98	74	-19.02
		4960 (Av)	43.03	54	-10.97
		7440 (Pk)	60.64	74	-13.36
		7440 (Av)	48.28	54	-5.72

www.tuv.com

Conducted Emission Test on A.C. Power Line

Section 8.8

Result

Pass

Test Specification : RSS - Gen Issue 4, Nov 2014
Test Method : ANSI C63.4-2009
Testing Location : Screened room
Measurement Bandwidth : 9kHz
Frequency Range : 150kHz – 30MHz
Supply Voltage : 120VAC,60Hz

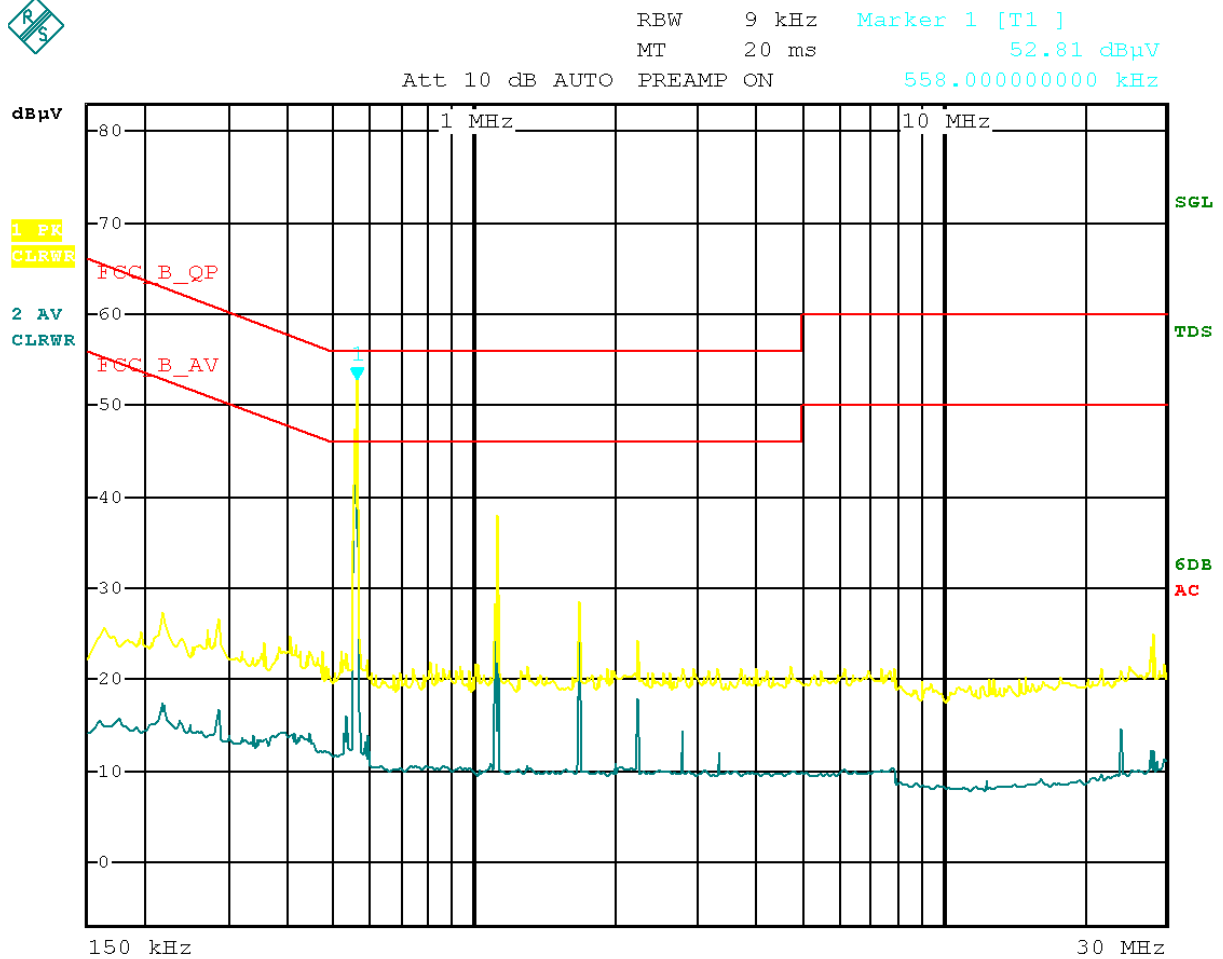
AC Power Line Conducted Emissions Limits

Frequency of emission (MHz)	QP Limit (dBμV)	AV Limit (dBμV/m)
0.15 – 0.5	66 – 56*	56 – 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency

www.tuv.com

Test Result:



Line Graph

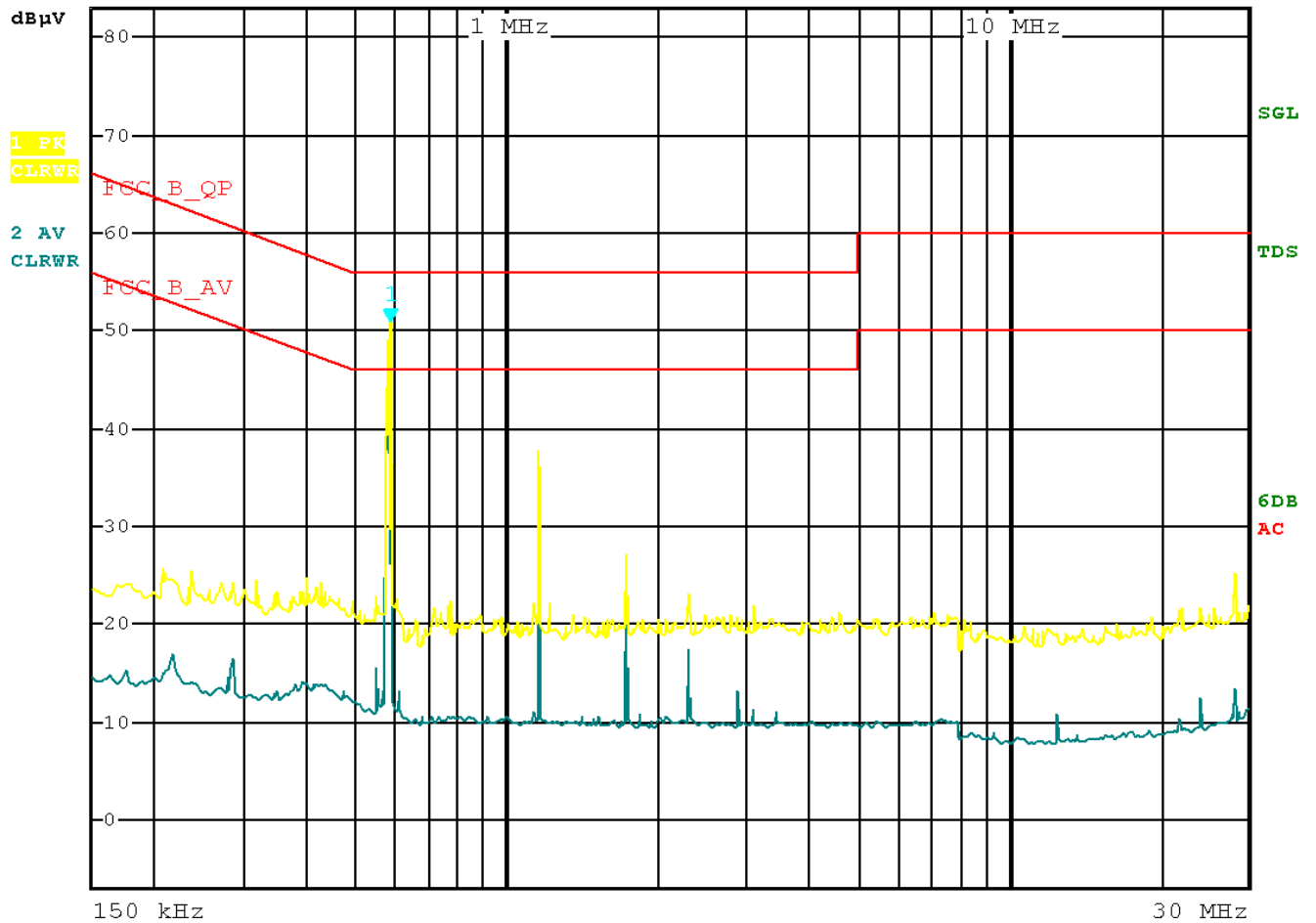
EDIT PEAK LIST (Final Measurement Results)			
Trace1:	FCC_B_QP		
Trace2:	FCC_B_AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	558 kHz	31.15 L1	-14.84
1 Quasi Peak	558 kHz	31.08 L1	-24.91
2 Average	1.118 MHz	9.66 L1	-36.33
2 Average	1.674 MHz	9.56 L1	-36.43
1 Quasi Peak	1.118 MHz	14.63 L1	-41.37
1 Quasi Peak	1.674 MHz	14.57 L1	-41.42

Line: Table

www.tuv.com



RBW 9 kHz Marker 1 [T1]
 MT 20 ms 50.88 dBμV
 Att 10 dB AUTO PREAMP ON 582.000000000 kHz



Neutral: Graph

www.tuv.com

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC_B_QP			
Trace2:	FCC_B_AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2 Average	582 kHz	11.15	N	-34.84
2 Average	1.158 MHz	9.77	N	-36.22
2 Average	1.738 MHz	9.41	N	-36.58
1 Quasi Peak	582 kHz	16.28	N	-39.72
1 Quasi Peak	1.158 MHz	14.69	N	-41.30
1 Quasi Peak	1.738 MHz	14.61	N	-41.39

Neutral: Line

www.tuv.com

Power level Settings used during testing:

		Channels		
Mode	Data Rate (Mbps)	Low	Mid	High
802.11 b	1	14	19	14
	11	14	19	17
802.11 g	6	10	19	10
	24	10	19	10
	54	10	19	10
802.11 n	MCS0	9	19	9
	MCS4	9	19	9
	MCS7	9	19	9
Bluetooth	1	15	15	15
	2	15	15	15
	3	15	15	15
	LE	15	15	15
Zigbee	250kbps	14	14	12