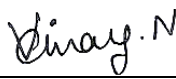


Produkte
Products

Prüfbericht - Nr.: 01200038 001		Seite 1 von 34	
<i>Test Report No.:</i>		<i>Page 1 of 34</i>	
Auftraggeber: <i>Client:</i>		Matsunichi, Inc. 47745 Fremont Blvd Fremont, California 94538 United States	
Gegenstand der Prüfung: <i>Test item:</i>		Android Tablet PC	
Bezeichnung: <i>Identification:</i>	MP977	Serien-Nr.: <i>Serial No.</i>	Engineering Sample
Wareneingangs-Nr.: <i>Receipt No.:</i>	1403019767	Eingangsdatum: <i>Date of receipt:</i>	14.05.2012
Prüfort: <i>Testing location:</i>		Refer Page 4 of 34 for test facilities	
Prüfgrundlage: <i>Test specification:</i>		FCC Part 15: Subpart C Section 15.247 ANSI C63.4-2003	
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 FCC Registration No.: 176555	
geprüft / tested by:		kontrolliert / reviewed by:	
14.06.2012	Vinay N Test Engineer	15.06.2012	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 : OC5-FTC97700 This ID also contains Wi-Fi Transmitter with test report number 01200051 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
15.247(b)(1)	Maximum Conducted Peak Output Power	Pass
15.247(a)(1)	20 dB Bandwidth	Pass
15.247(a)(1)	Channel Separation	Pass
15.247(a)(1)(iii)	Number of Hopping Channel	Pass
15.247(a)(1)(iii)	Time of Occupancy	Pass
15.247(d)	Band-edge compliance	Pass
FCC 15.205	Restricted Bands of Operation	Pass
FCC 15.209	Spurious Radiated Emissions	Pass

Content

List of Test and Measurement Instruments.....	4
General Product Information	5
Product Function and Intended Use	5
Ratings and System Details.....	5
Operation Descriptions	6
Test Set-up and Operation Mode.....	7
Principle of Configuration Selection	7
Test Operation and Test Software	7
Special Accessories and Auxiliary Equipment	7
Countermeasures to achieve EMC Compliance	7
Test Modes – Data Rates and Modulations	7
Table of carrier frequencies.....	7
Test Methodology	8
Radiated Emission Test	8
Test Results	9
Maximum Conducted Peak Output Power	Section 15.247(b) (1)9
Bandwidth	Section 15.247(a) (1)15
Channel Separation	Section 15.247(a) (1)25
Number of Hopping Channel	Section 15.247(a) (1) (iii).....26
Time of Occupancy	Section 15.247(a) (1) (iii)28
Band-edge compliance	Section 15.247 (d).....29
Spurious Radiated Emissions and Restricted Bands of Operation	Section 15.209 and 15.20533
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: SAR Test Report	

www.tuv.com

List of Test and Measurement Instruments

TUV Rheinland (India) Pvt. Ltd. , Bangalore

List of Test and Measurement Instruments

Equipment	Manufacturer	Type	S/N	Calibration Due Date
EMI Test Receiver	Rohde &Schwarz	ESU 40	100288	21.07.2012
Hybrid Log Periodic antenna	ETS Lindgren	3142D	00081354	26.07.2013
Hybrid Log Periodic antenna	Frankonia	ALX-4000	ALX4000-806	07.04.2013
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

Testing Facilities:

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

www.tuv.com

General Product Information

Product Function and Intended Use

Tablet PC is a handheld multimedia entertainment unit used for below functions

1. Browsing the web
2. Audio/Video Playback
3. Personal Digital assistant
4. Playing 2D/3D games
5. Teleconferencing
6. GPS Navigation

Ratings and System Details

Operating Frequency	2400MHz – 2483.5MHz	
No. of channel	Please refer Table of Carrier Frequencies	
Channel Spacing	1MHz for Bluetooth	
Transmitted Power	GFSK	09.64 dBm
	$\pi/4$ -DPSK	09.57 dBm
	8-DFSK	10.36 dBm
Data Rate	GFSK	1Mbps
	$\pi/4$ -DPSK	2Mbps
	8-DFSK	3Mbps
Antenna Type	Multilayer Chip Antenna	
Number of antenna	One	
Antenna Gain	1.5 dBi	
Supply Voltage to Module	3.3V and +1.8V for Digital Interface	
Dimensions of Product	241.3mm x 190.5mm x 12.446mm	
Environmental	Environmental (Storage):-40°C to 85°C Operational conditions: -30°C to 75° C	

Test Conditions:

Supply Voltage: 110V AC, 60Hz

Environmental conditions:

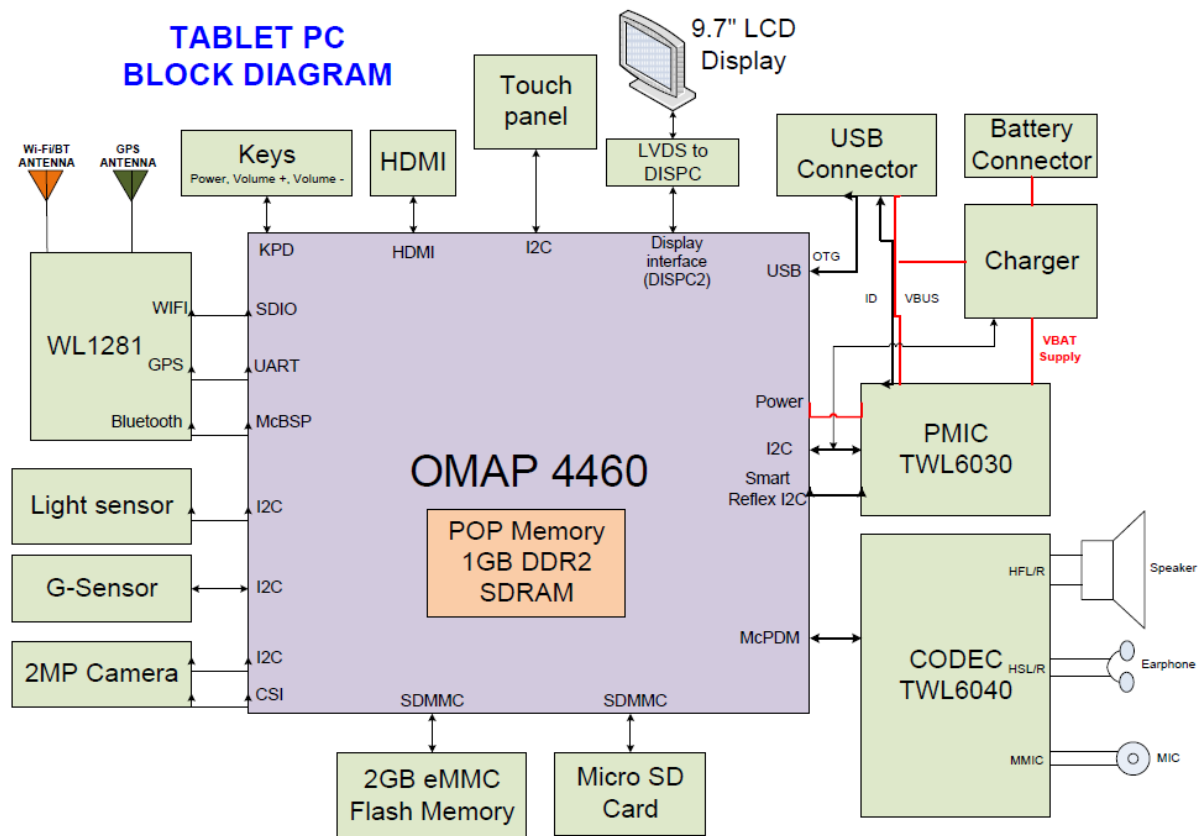
Temperature: +23 °C RH: 62%

www.tuv.com

Operation Descriptions

Tablet PC runs on Android 4.0.3 operating system(Ice cream sandwich),It has a 9.7 inch LED backlit LCD display and primarily operated by Touch screen interface which has Multi-touch capabilities for recognizing multiple simultaneous finger touches. In addition to this, dedicated hardware keys are provided for Power On/Off and Volume Increase/Decrease functionality; the device has Wifi and Bluetooth capabilities that allow it to connect wirelessly to the internet and transfer data to other compatible devices. The Device also has a GPS receiver that can be used for personal navigation when used with appropriate software. The Tablet is powered by a Li-Polymer rechargeable battery. The Battery can be charged using the provided Wall mount charger.

Block Diagram



www.tuv.com

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

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.

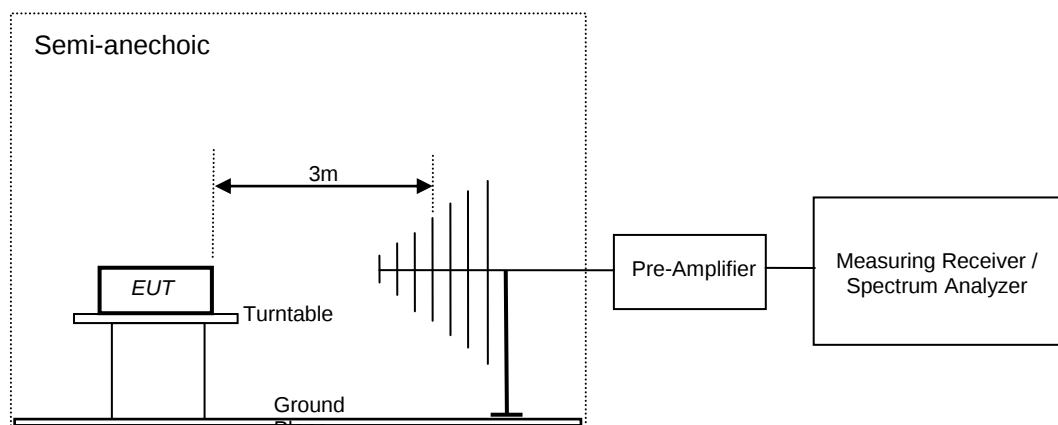
Table of carrier frequencies

Frequency Band	Channel No.	Frequency (MHz)
2400-2483.5MHz	1	2402
	:	
	40	2441
	:	
	79	2480

Test Methodology

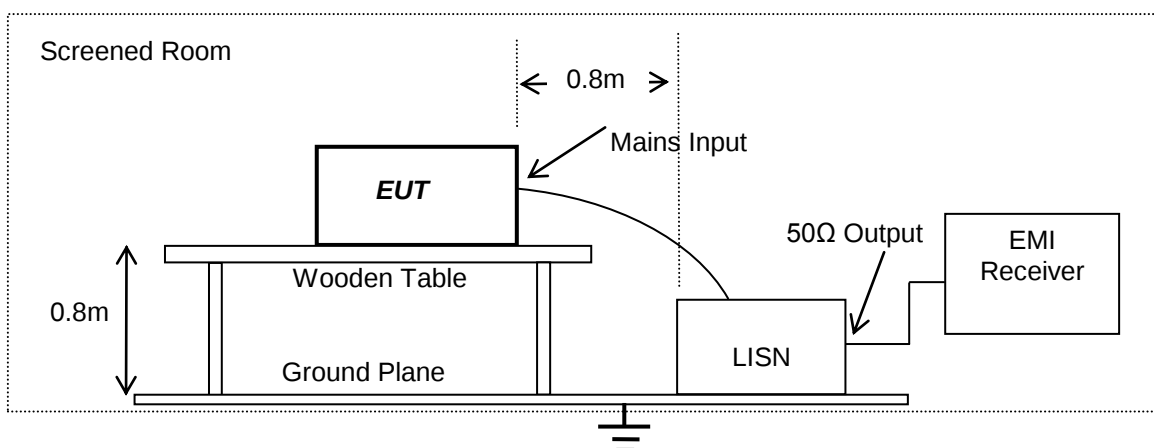
Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.4-2003. 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.



Conducted Emission Test on a.c. mains line

The equipment under test (EUT) was placed on a wooden table 80cm above the ground plane, the LISN was placed 80cm away from the EUT. The test was performed in accordance with ANSI C63.4: 2003, with the following: an initial measurement was performed in peak and average detection mode on the live and neutral lines. The pre-scan was performed by peak detection on both live and neutral conductors. Any emissions recorded within 20dB of the relevant limit line were re-measured using quasi-peak and average detections, the 6 worst cases were recorded in the table of results.



www.tuv.com

Test Results

Maximum Conducted Peak Output Power

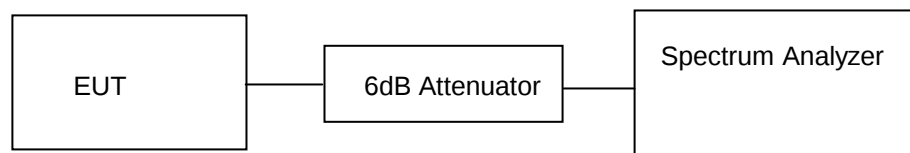
Section 15.247(b) (1)

Result

Pass

Test Specification	FCC Part 15 Subpart C
Measurement Bandwidth (RBW)	1 MHz
Requirement	<125 mW

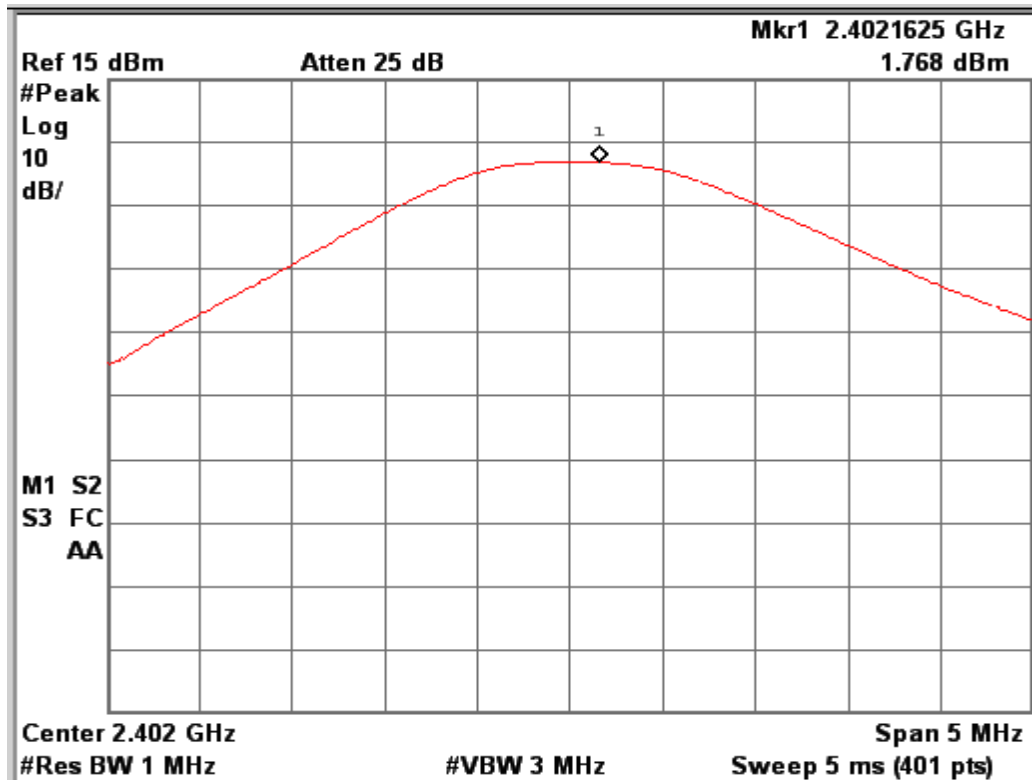
Test Method:



Test Result:

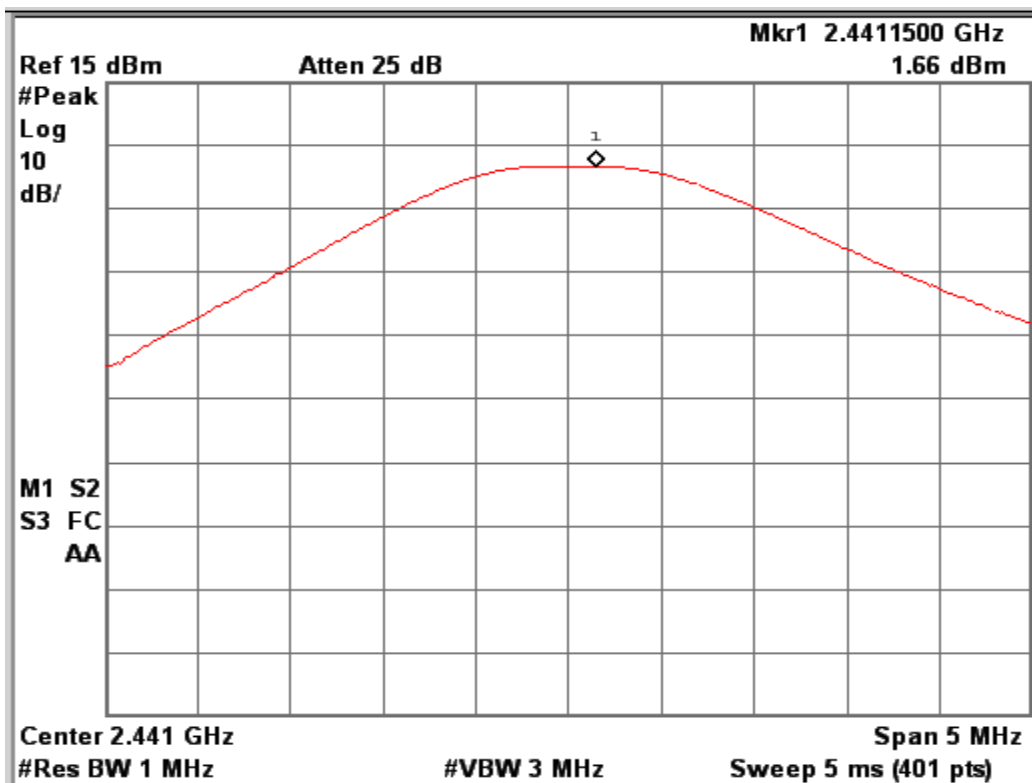
Cable Loss: 0.68 dB +1.2dB

Data Rate (Mbps)	Frequency (MHz)	Measured Power (dBm)	Attenuator (dB) + Cable Loss (dB)	Total Power (dBm)	Limit (dBm)	Margin (dB)
1	2402	1.76	07.88	09.64	20.96	-11.32
	2441	1.66	07.88	09.54	20.96	-11.42
	2480	1.46	07.88	09.34	20.96	-11.62
2	2402	1.69	07.88	09.57	20.96	-11.39
	2441	1.65	07.88	09.53	20.96	-11.43
	2480	1.44	07.88	09.32	20.96	-11.64
3	2402	2.48	07.88	10.36	20.96	-10.60
	2441	2.40	07.88	10.28	20.96	-10.68
	2480	2.04	07.88	09.92	20.96	-11.04



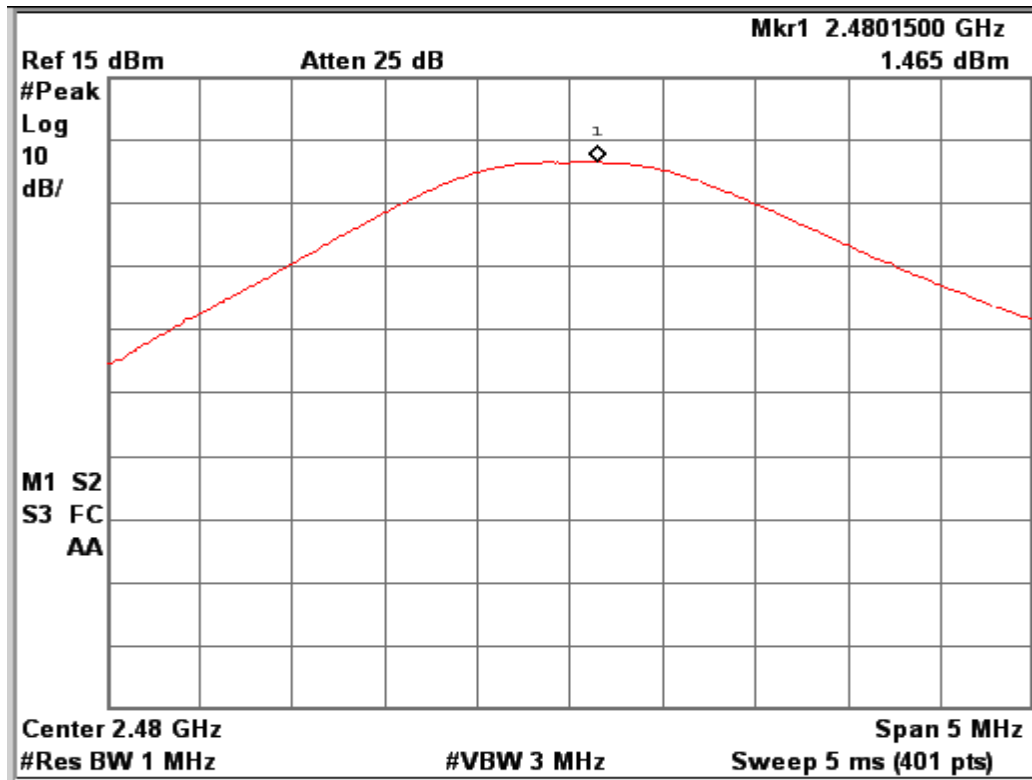
Data rate: 1 Mbps

Channel Frequency: 2402 MHz



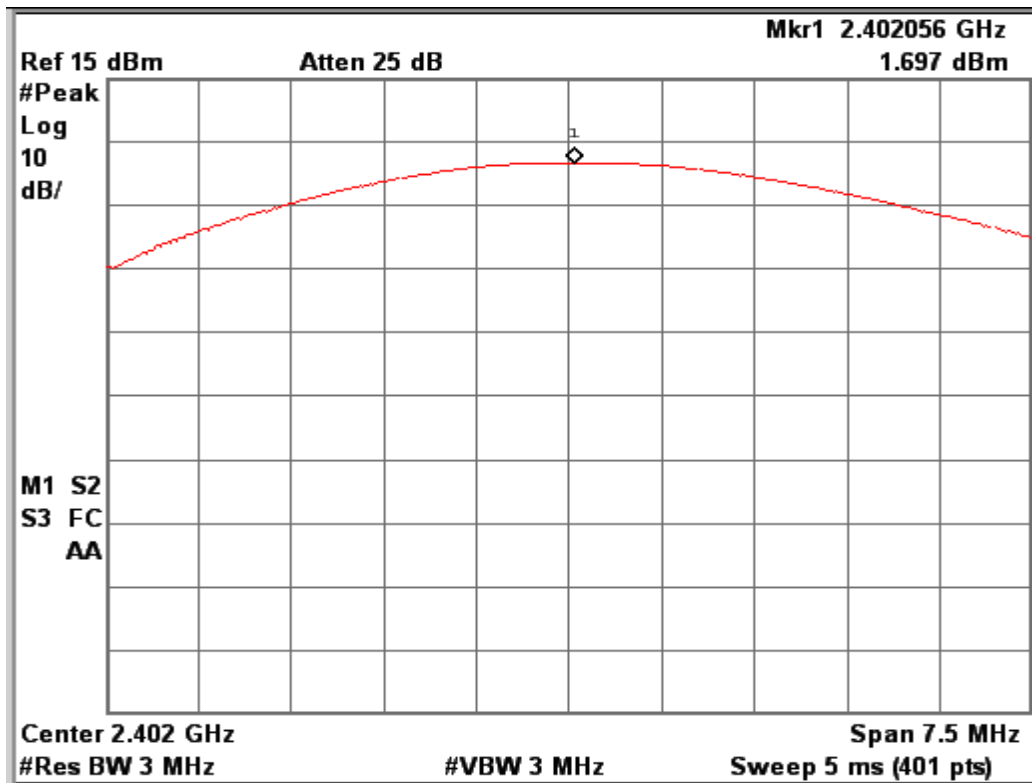
Data rate: 1 Mbps

Channel Frequency: 2441 MHz



Data rate: 1 Mbps

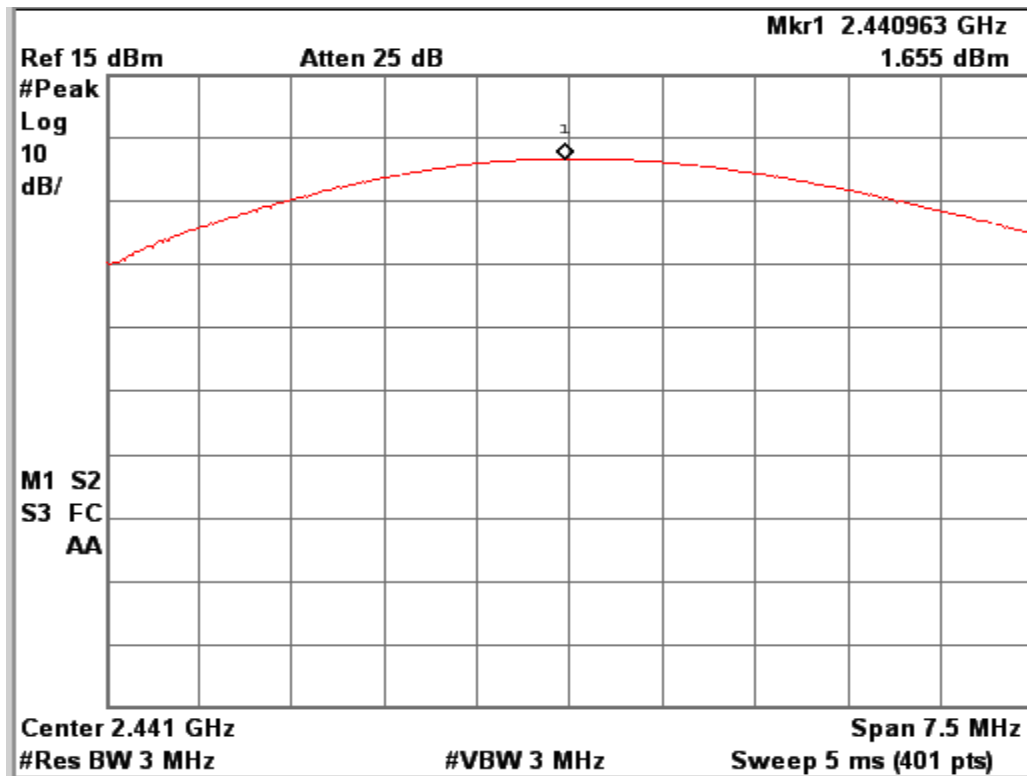
Channel Frequency: 2480 MHz



www.tuv.com

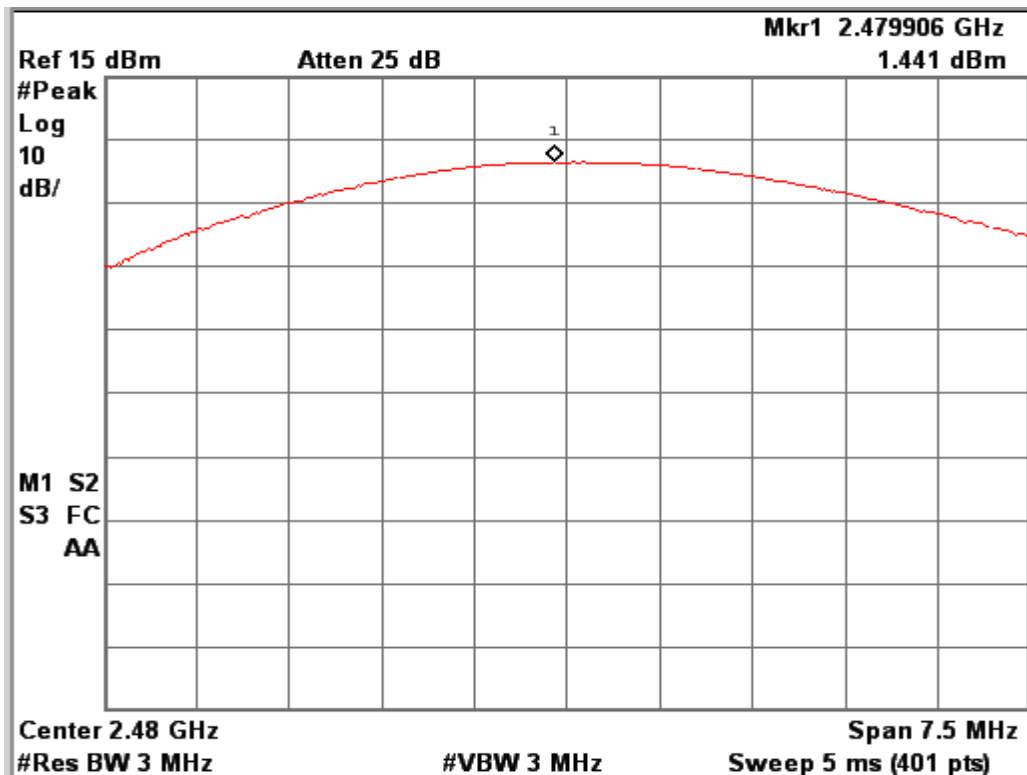
Data rate: 2 Mbps

Channel Frequency: 2402 MHz



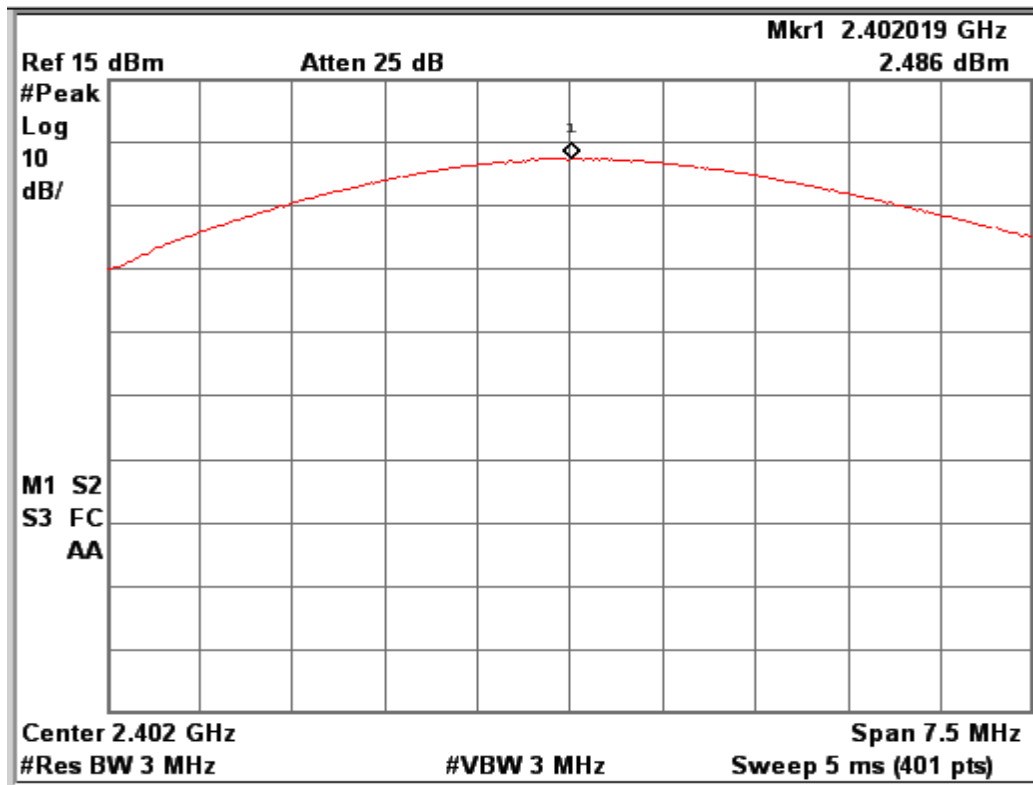
Data rate: 2 Mbps

Channel Frequency: 2441 MHz



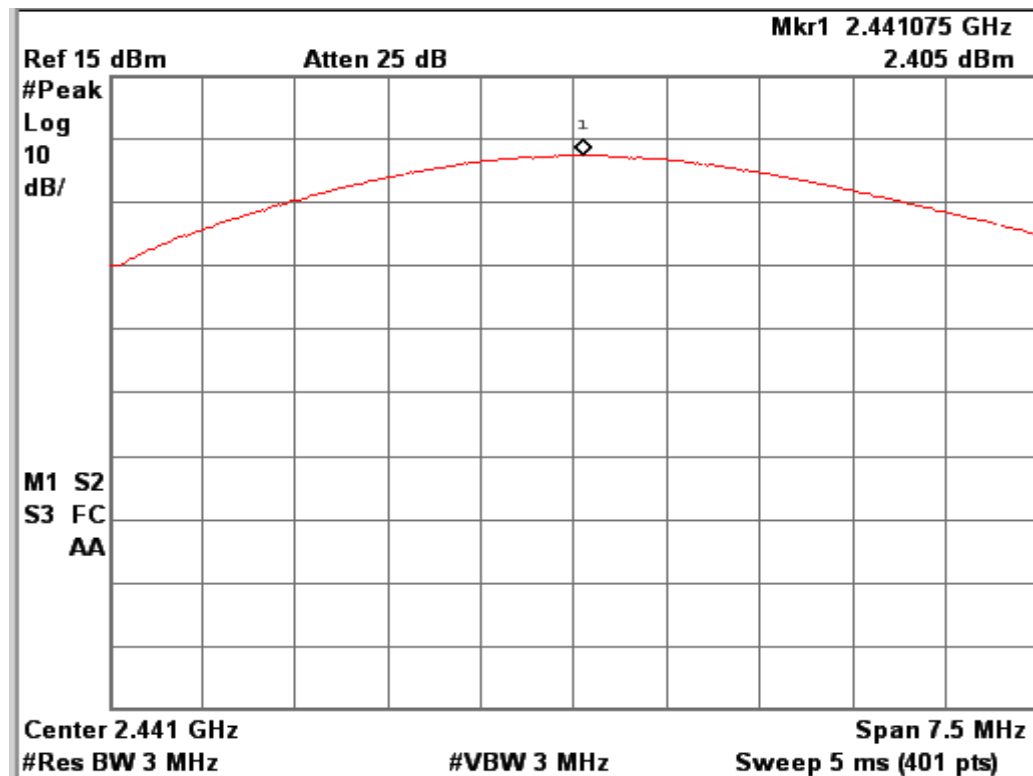
Data rate: 2 Mbps

Channel Frequency: 2480 MHz



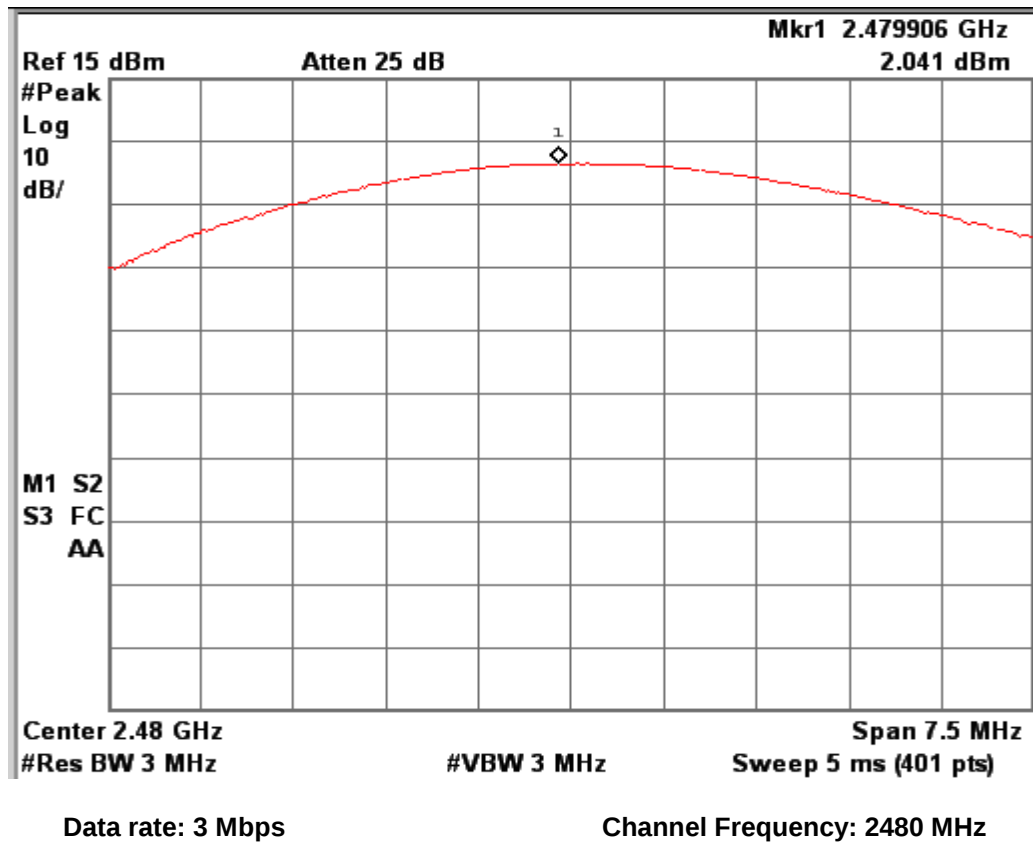
Data rate: 3 Mbps

Channel Frequency: 2402 MHz



Data rate: 3 Mbps

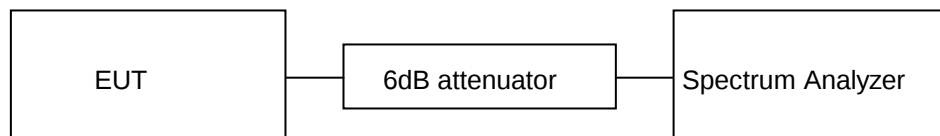
Channel Frequency: 2441 MHz



20 dB Bandwidth
Section 15.247(a) (1)
Result
Pass

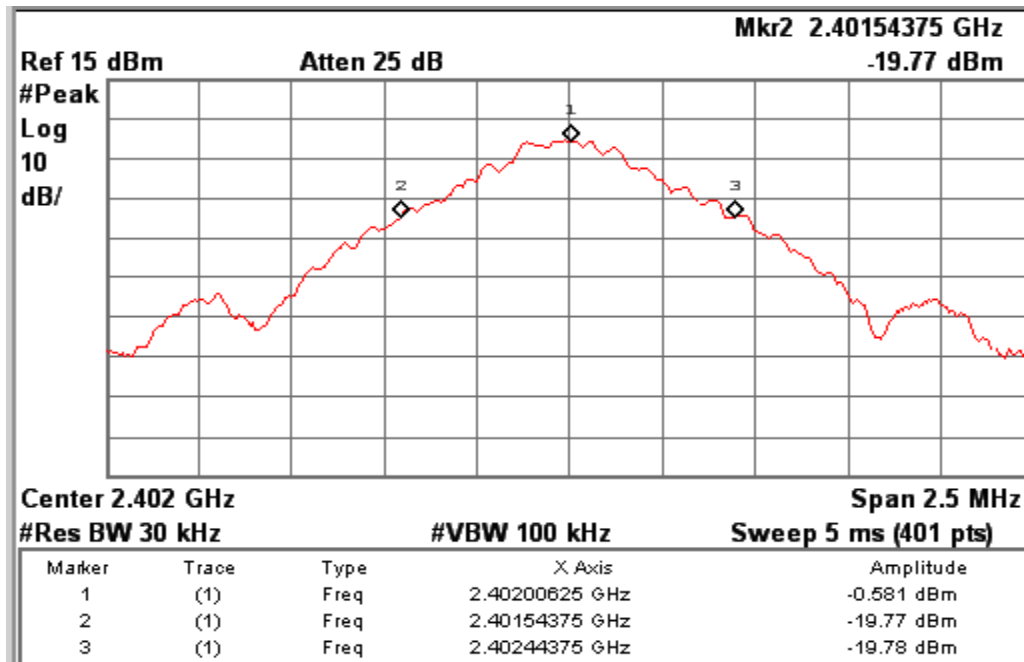
Test Specification FCC Part 15 Section 15.247 (a) (2)

Detector Peak

Test Method:

Test Result:

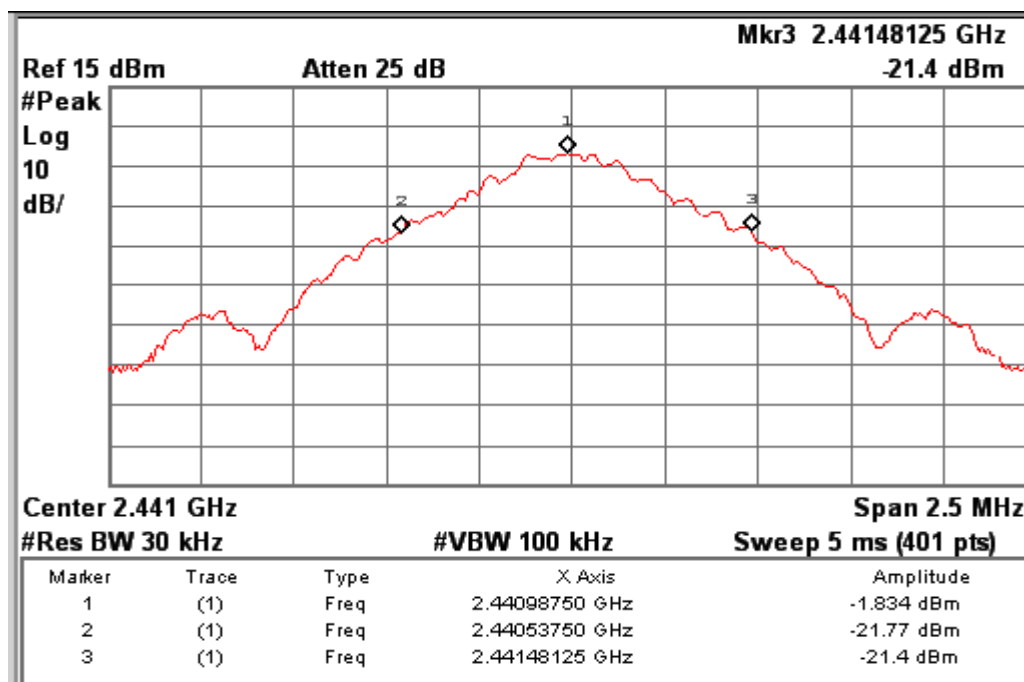
Cable Loss: 0.68 dB +1.2dB

Data Rate (Mbps)	Carrier Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	20 dB Bandwidth (MHz)	99% OBW (MHz)
1	2402	2401.5437	2402.4437	0.9000	0.902
	2441	2440.5375	2441.4812	0.9437	0.906
	2480	2479.5312	2480.4875	0.9563	0.936
2	2402	2401.2950	2402.6900	1.3950	1.236
	2441	2440.2900	2441.6900	1.4000	1.213
	2480	2479.2950	2480.6900	1.3950	1.221
3	2402	2401.2950	2402.6900	1.3950	1.246
	2441	2440.2950	2441.6900	1.3950	1.244
	2480	2479.3100	2480.6750	1.3650	1.241



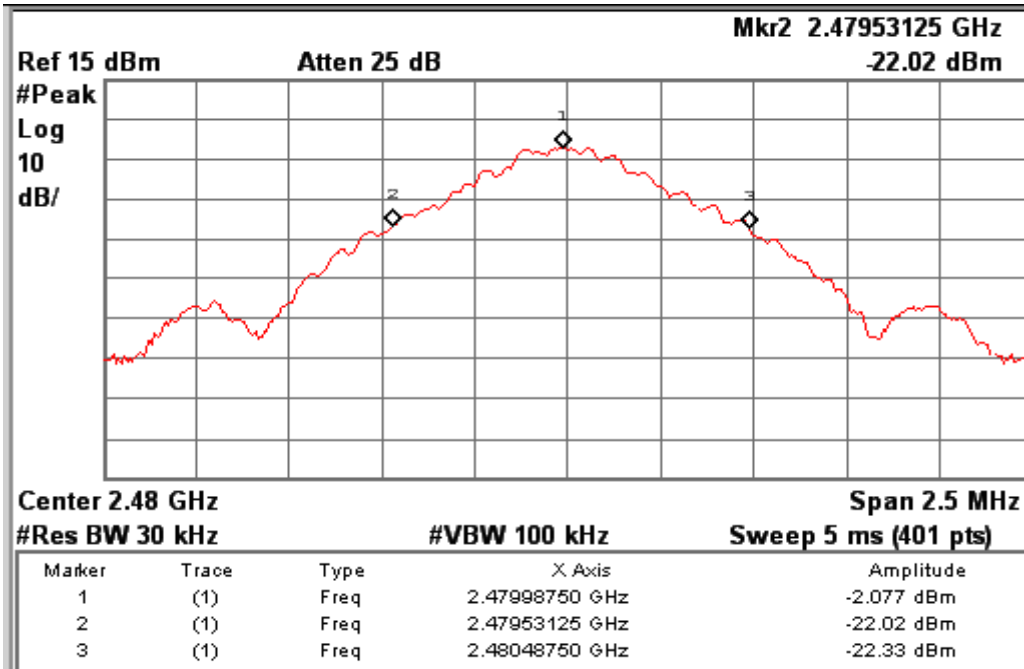
Data rate: 1 Mbps

Channel Frequency: 2402 MHz



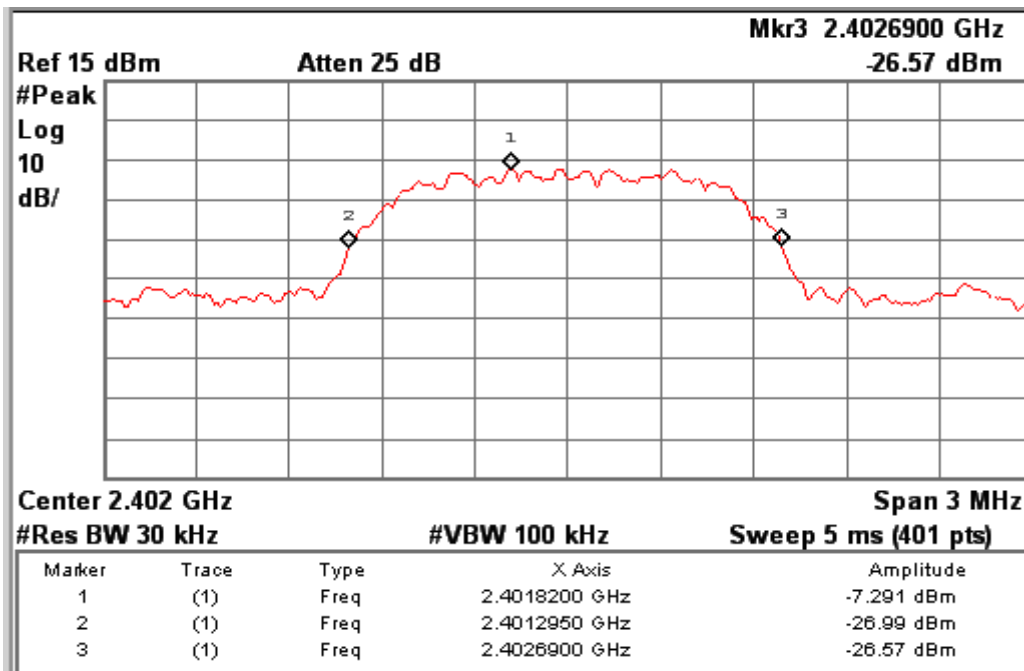
Data rate: 1 Mbps

Channel Frequency: 2441 MHz



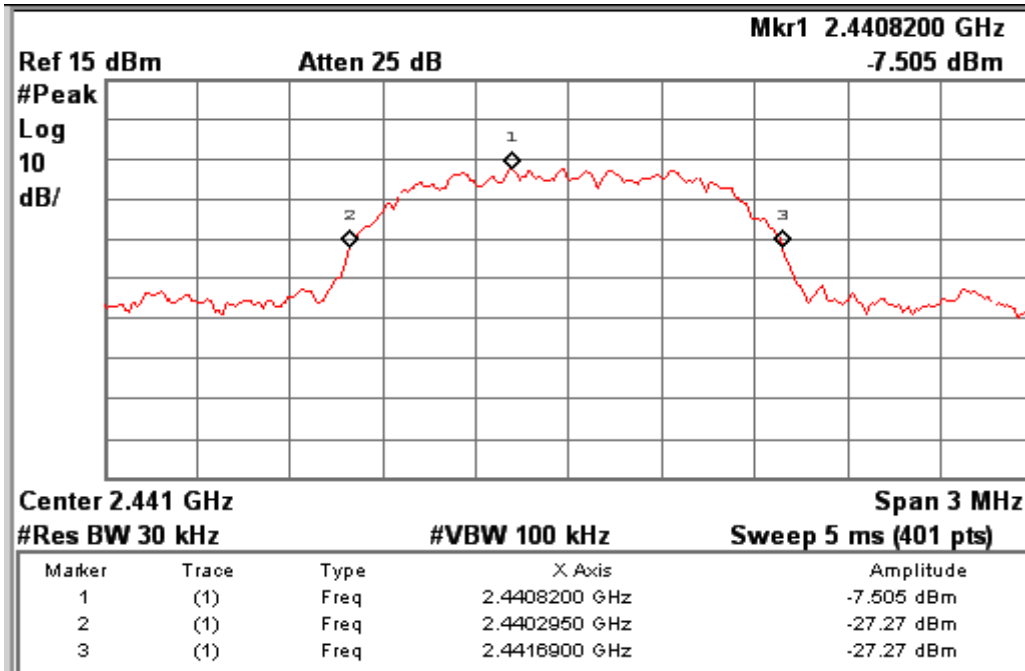
Data rate: 1 Mbps

Channel Frequency: 2480 MHz



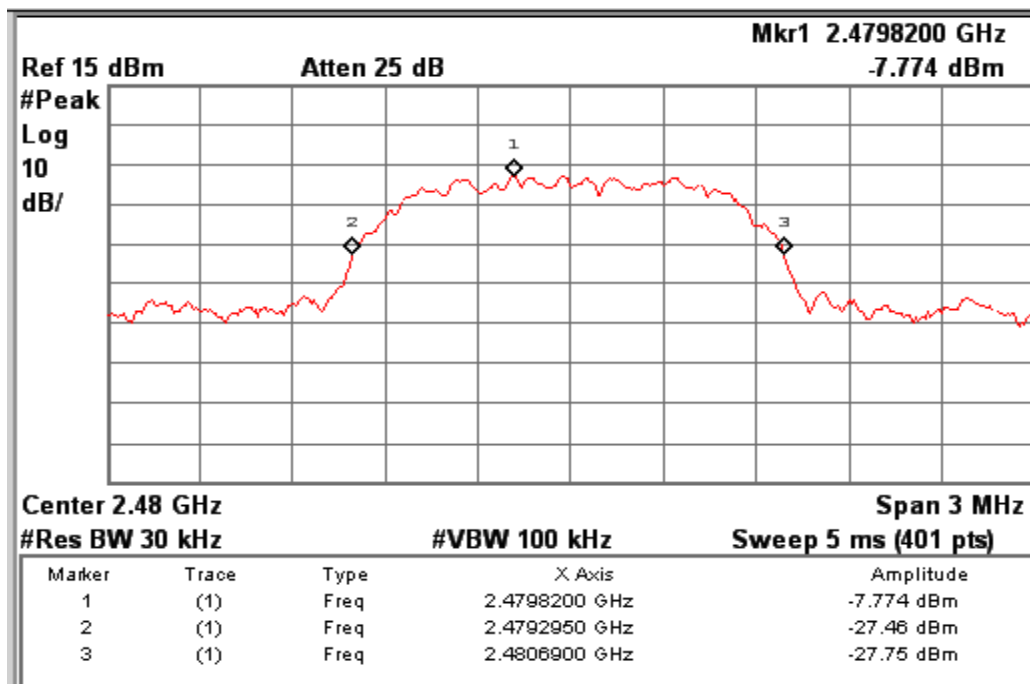
Data rate: 2 Mbps

Channel Frequency: 2402 MHz



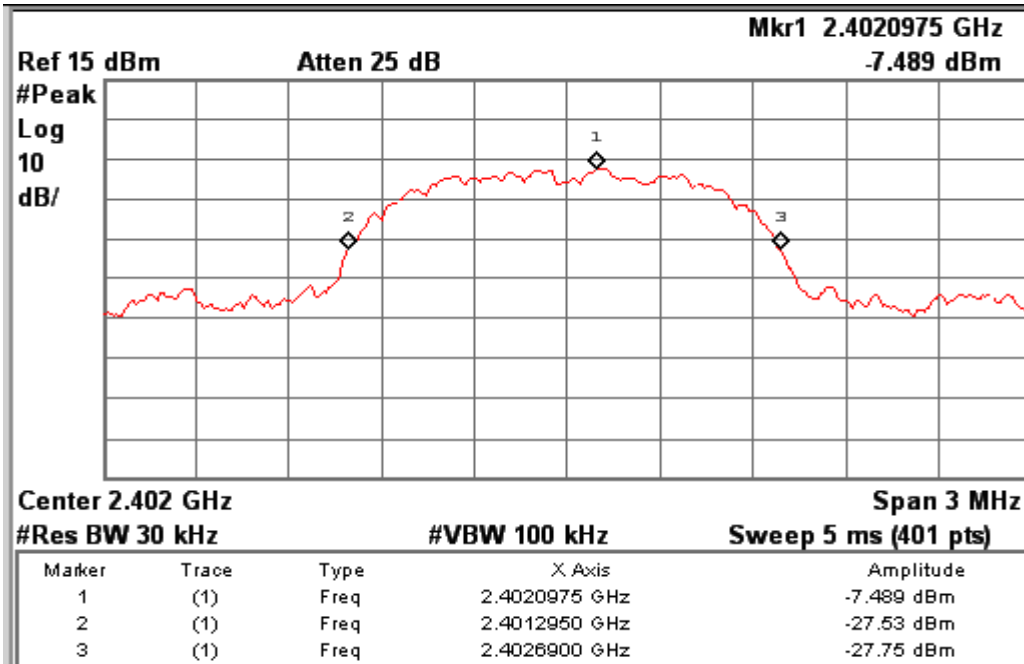
Data rate: 2 Mbps

Channel Frequency: 2441 MHz



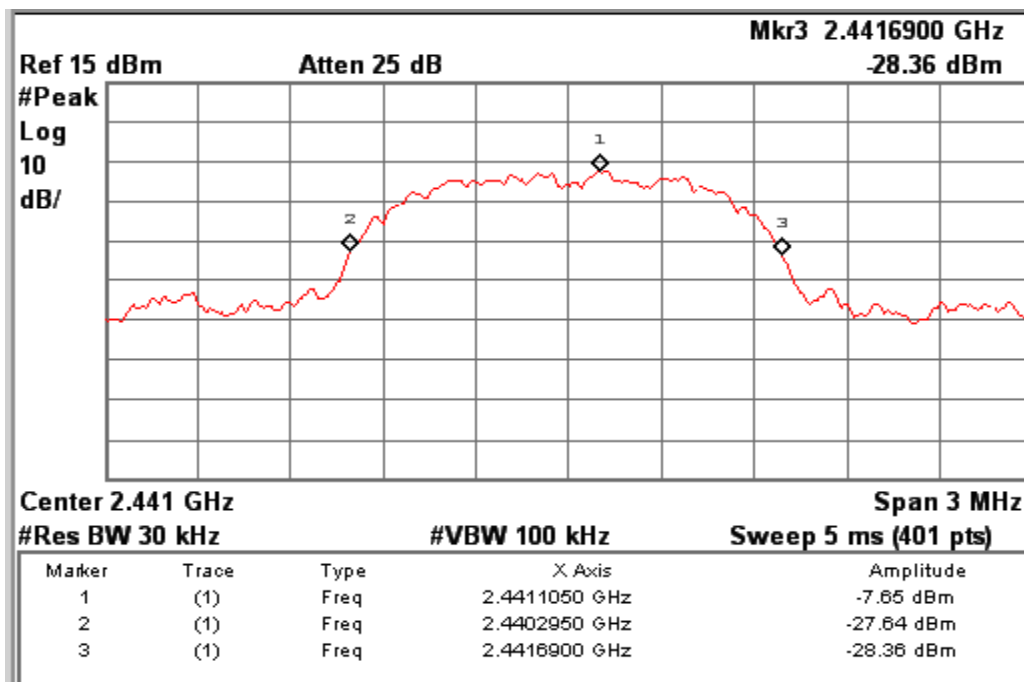
Data rate: 2 Mbps

Channel Frequency: 2480 MHz



Data rate: 3 Mbps

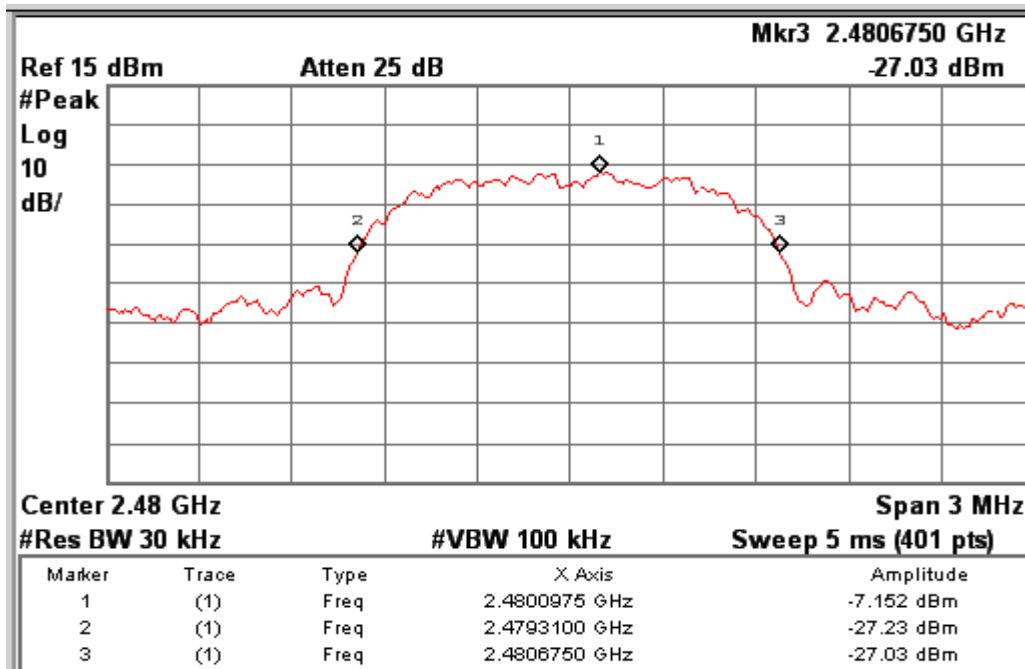
Channel Frequency: 2402 MHz



Data rate: 3 Mbps

Channel Frequency: 2441 MHz

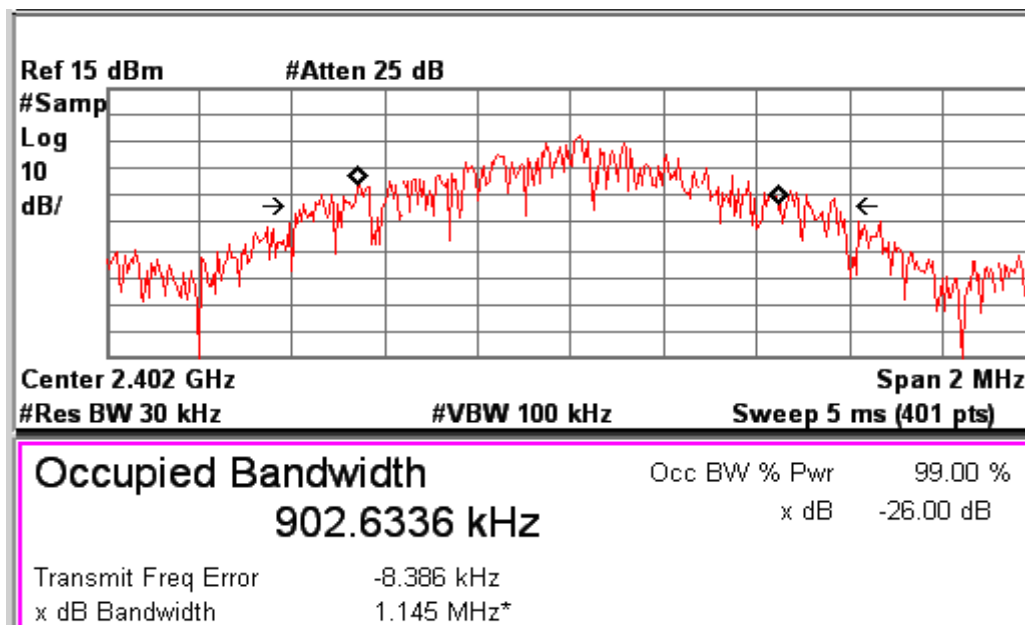
www.tuv.com



Data rate: 3 Mbps

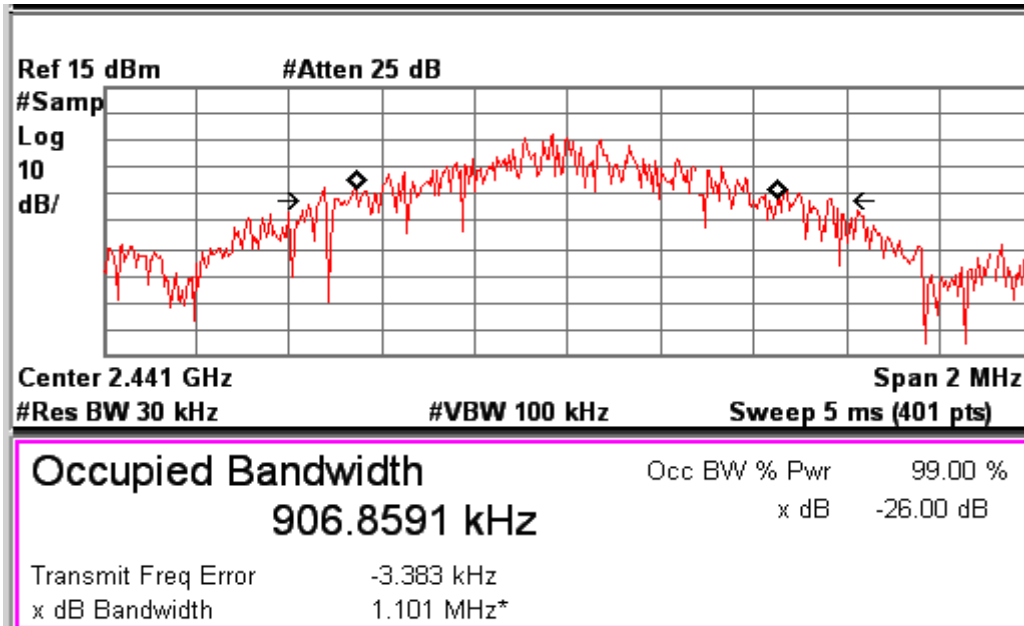
Channel Frequency: 2480 MHz

Data Rate 1Mbps



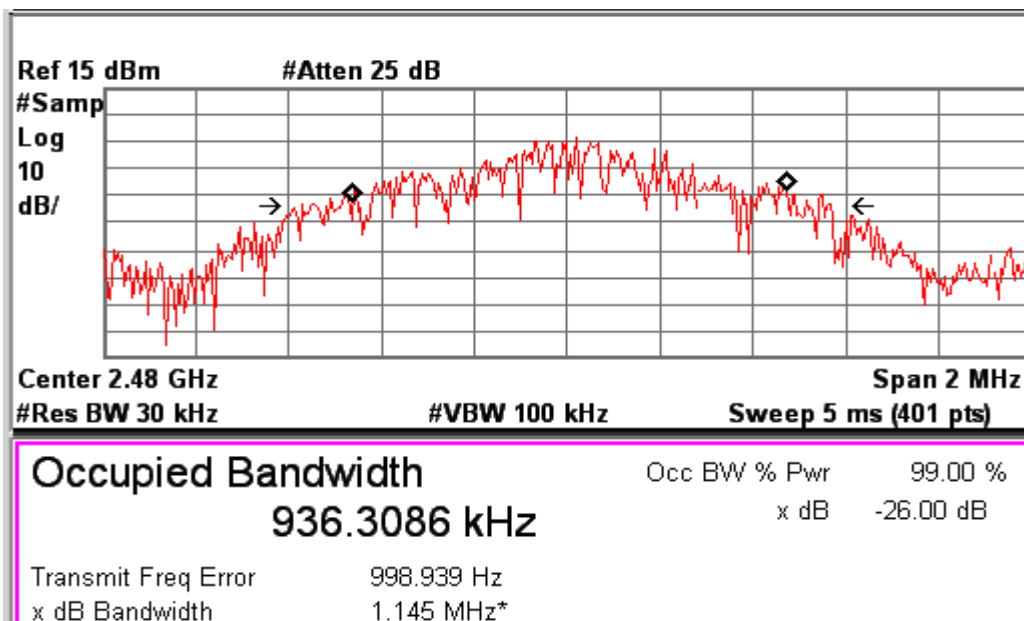
Occupied Bandwidth

Channel Frequency: 2402 MHz



Occupied Bandwidth

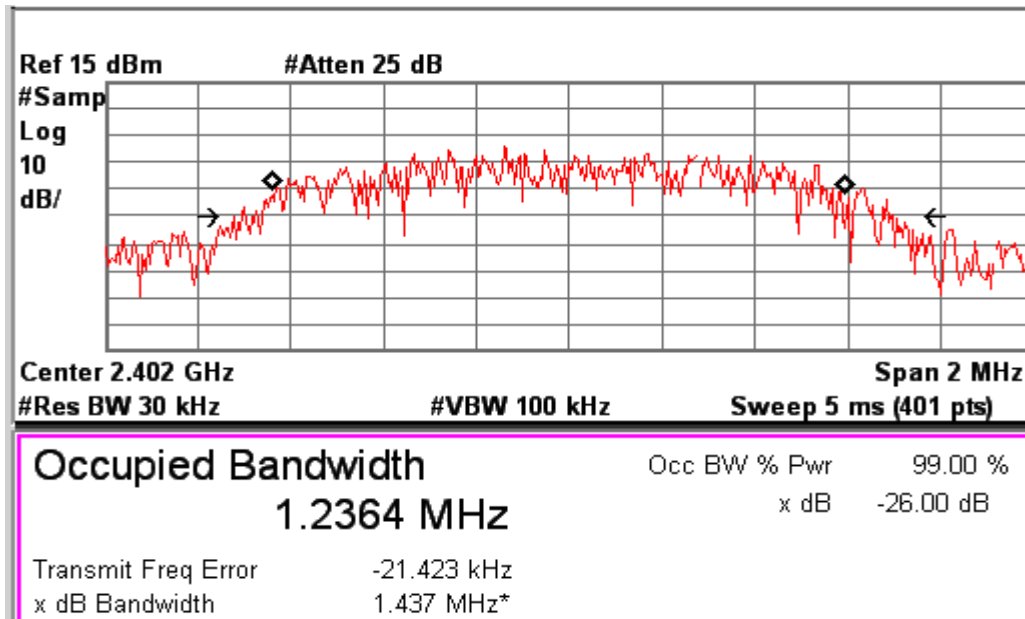
Channel Frequency: 2441 MHz



Occupied Bandwidth

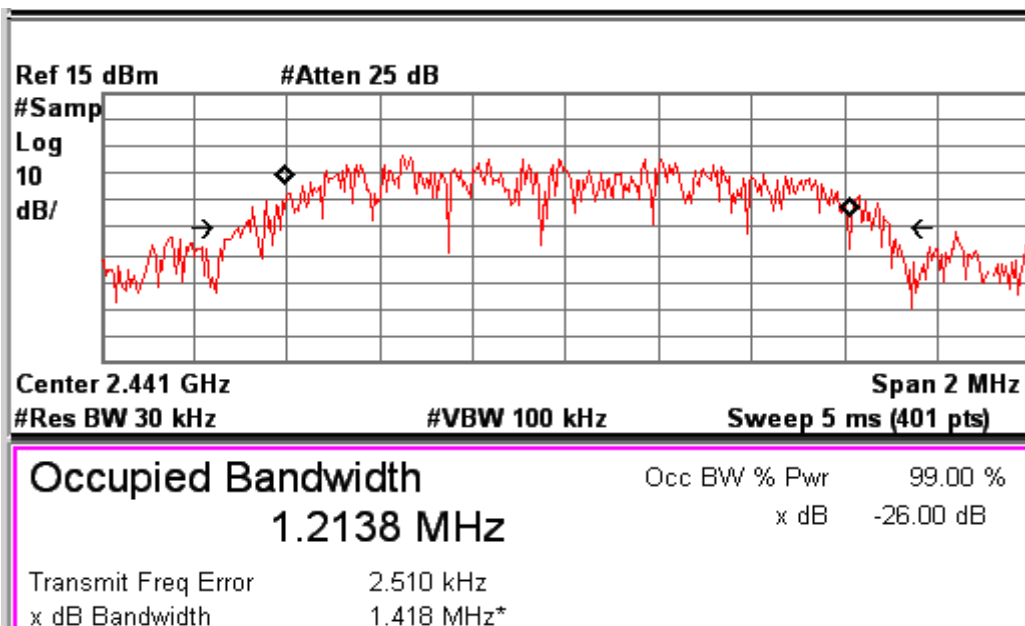
Channel Frequency: 2480 MHz

www.tuv.com
2 Mbps



Occupied Bandwidth

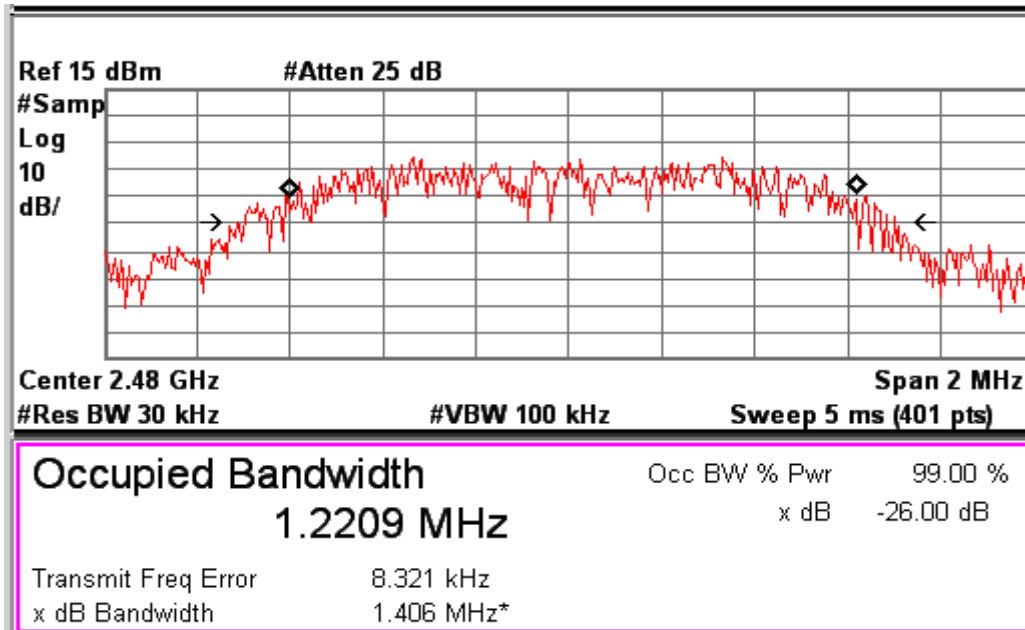
Channel Frequency: 2402 MHz



Occupied Bandwidth

Channel Frequency: 2441 MHz

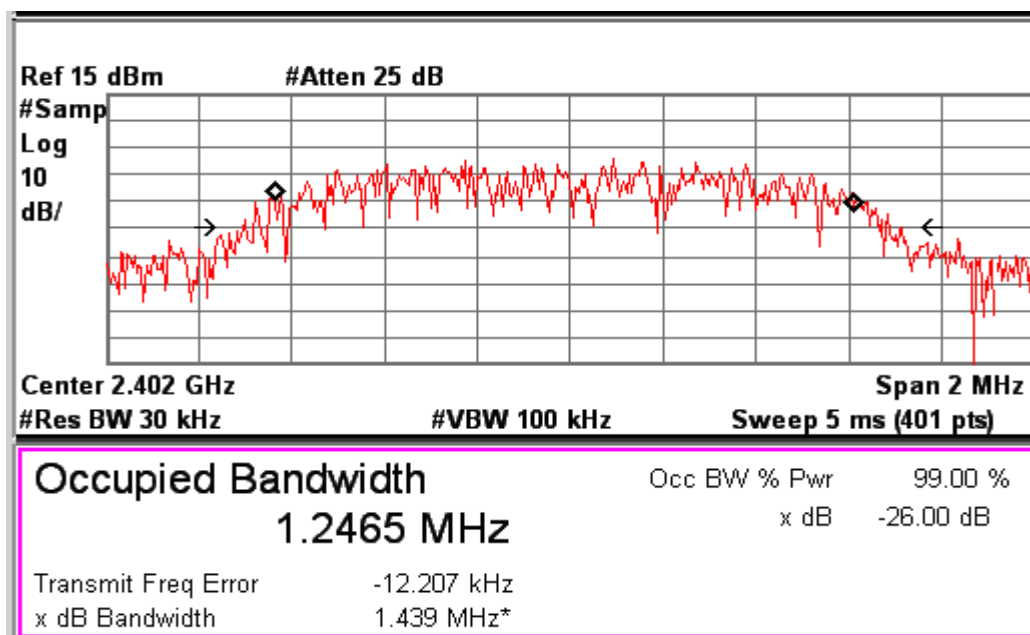
www.tuv.com



Occupied Bandwidth

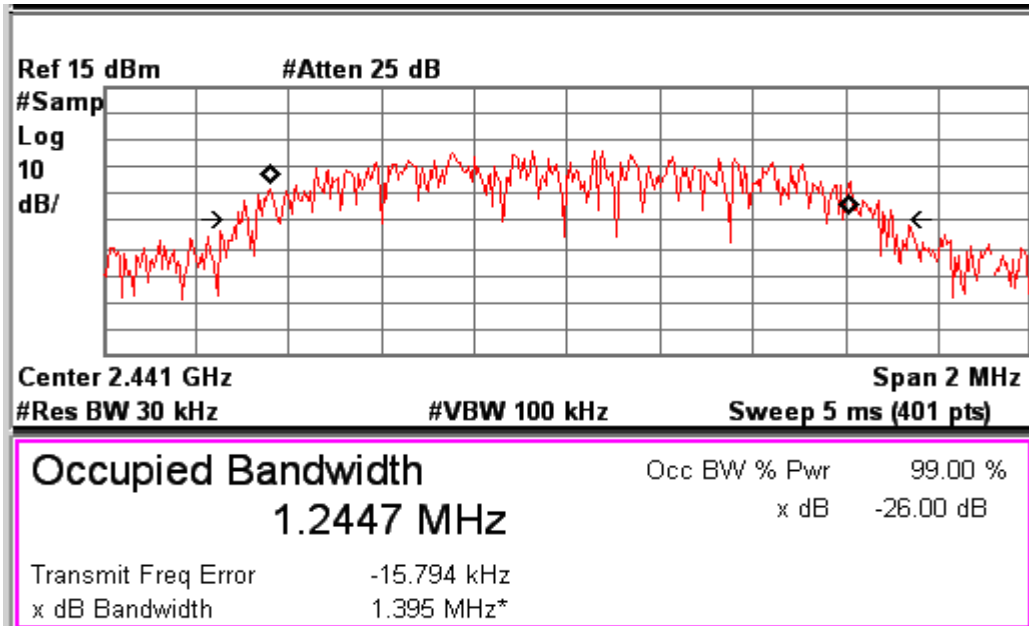
Channel Frequency: 2480 MHz

3 Mbps



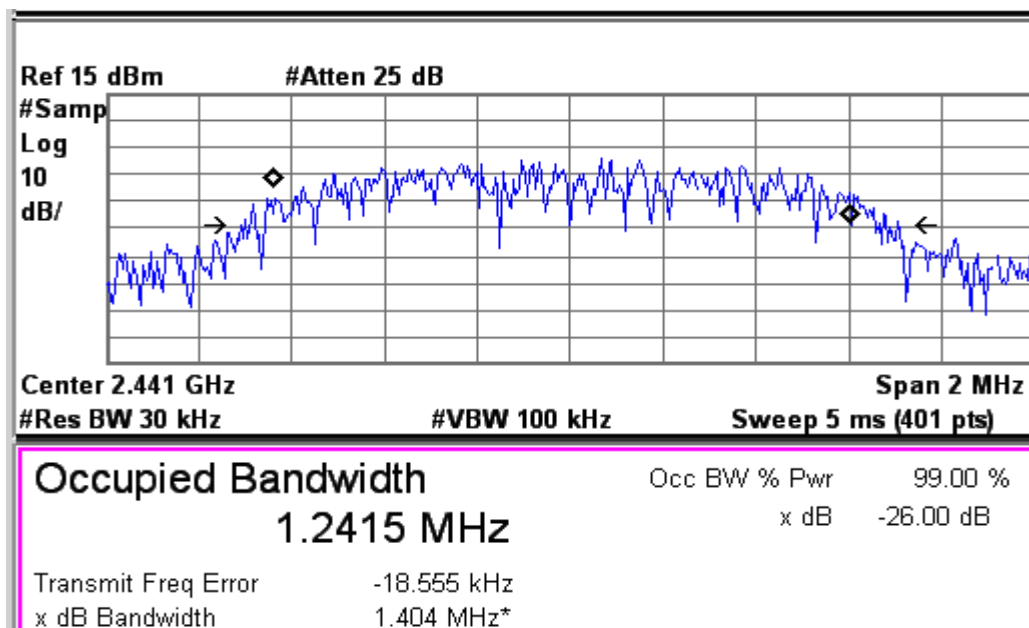
Occupied Bandwidth

Channel Frequency: 2402 MHz



Occupied Bandwidth

Channel Frequency: 2441 MHz



Occupied Bandwidth

Channel Frequency: 2480 MHz

www.tuv.com

Channel Separation

Section 15.247(a) (1)

Result

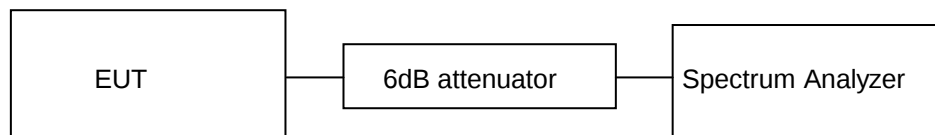
Pass

Test Specification FCC Part 15 Section 15.247(a)(1)

Detector Function Peak

Requirement Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Test Method:

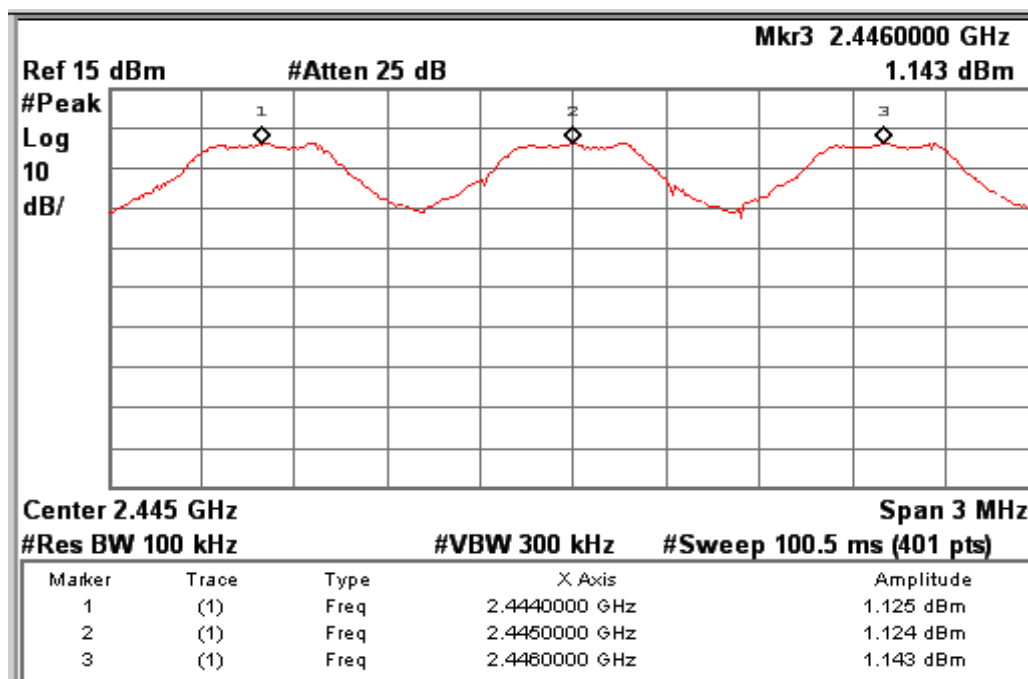


Test Result:

Cable Loss: 0.68 dB +1.2dB

Calculation: The Channel separation for this system is 2/3 the value of 20dB Bandwidth is equal to $(2/3) \times (1400 \text{ kHz})$ is 933.33 kHz.

So, the measured channel separation is 1MHz which is greater than 933.33 kHz



www.tuv.com

Number of Hopping Channel

Section 15.247(a) (1) (iii)

Result

Pass

Test Specification

FCC Part 15 Section 15.247(a)(1)(iii)

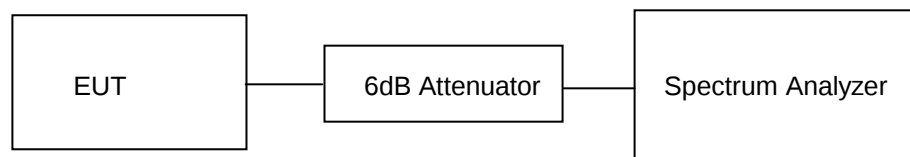
Detector Function

Peak

Requirement

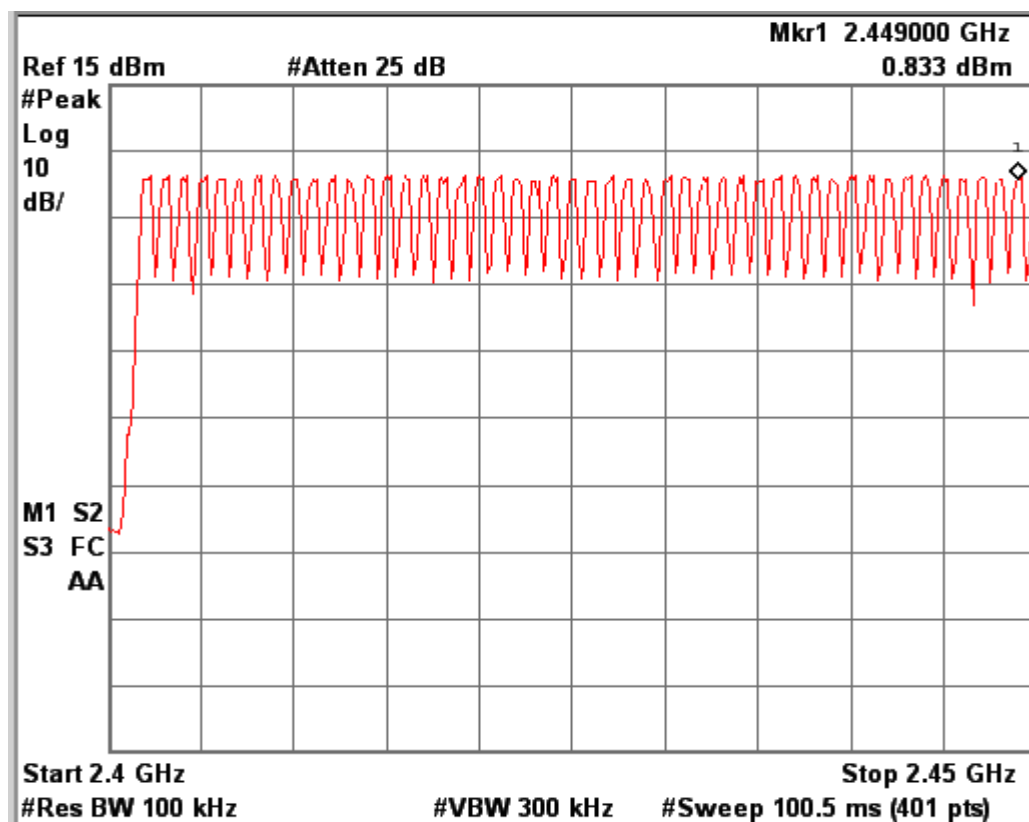
Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

Test Method:

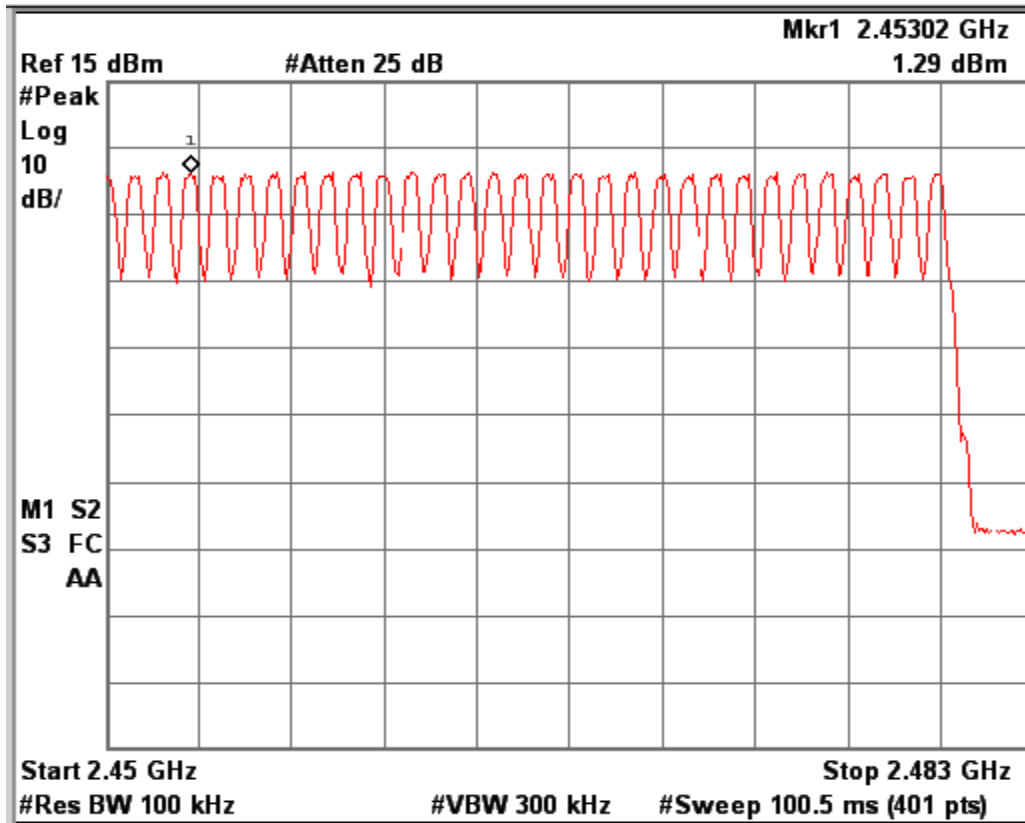


Test Result:

Cable Loss: 0.68 dB +1.2dB



Channel Hopping Plot (channel from 1 to 48)



Channel Hopping Plot (channel from 49 to 79)

www.tuv.com

Time of Occupancy

Section 15.247(a) (1) (iii)

Result

Pass

Test Specification

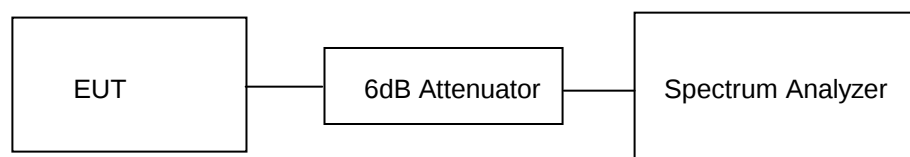
FCC Part 15 Section 15.247(a)(1)(iii)

Detector Function

Peak

Requirement

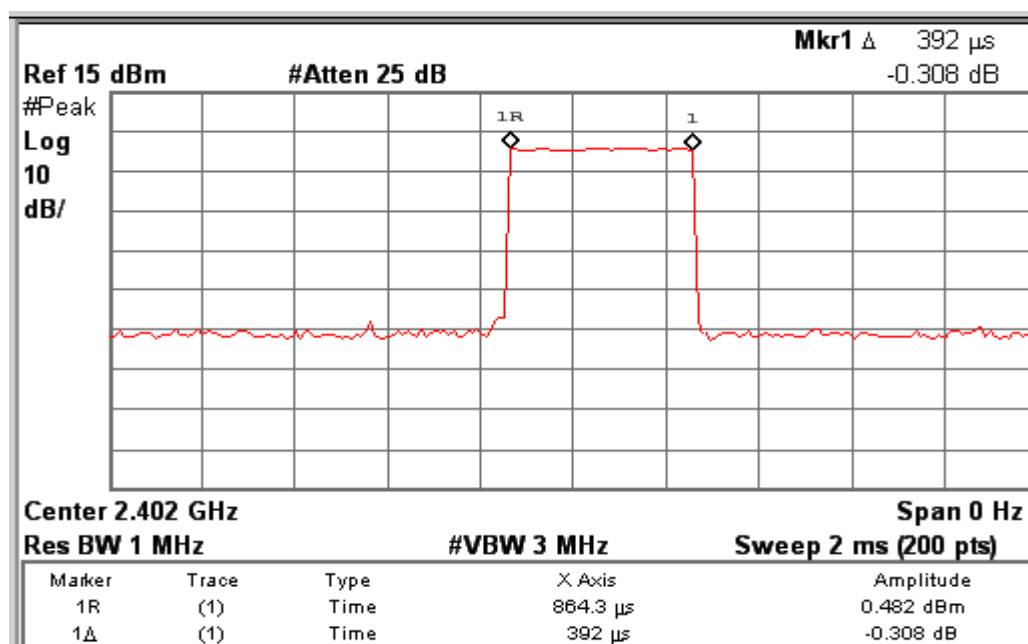
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.



Test Result:

Cable Loss: 0.68 dB +1.2dB

Measurement is made while EUT is operating in hopping mode with spectrum analyser set to zero span. The maximum permissible time of occupancy is 400ms within a period of 400ms multiplied by the number of hopping channel employed.



Time of Occupancy Plot

www.tuv.com

Band-edge compliance

Section 15.247 (d)

Result

Pass

Test Specification

FCC Part 15 Section 15.247(d)

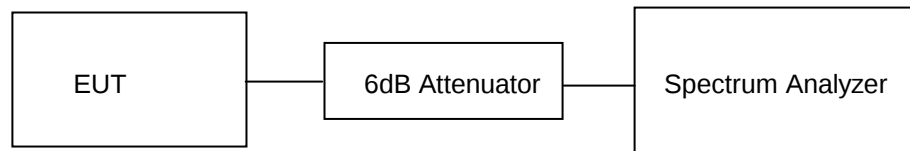
Detector Function

Peak

Requirement

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.

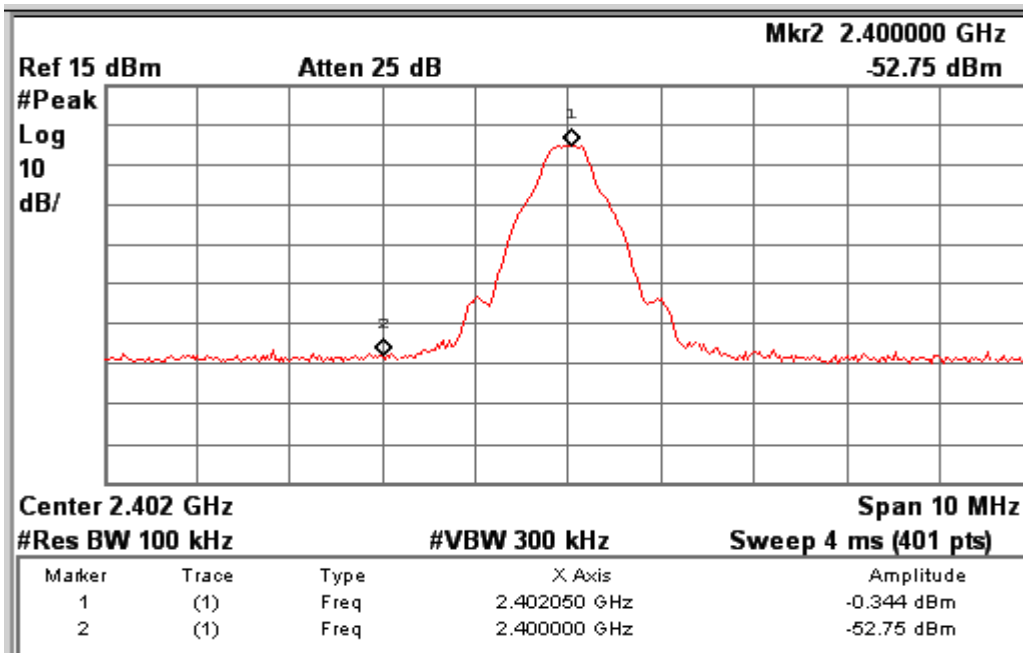
Test Method:



Test Result:

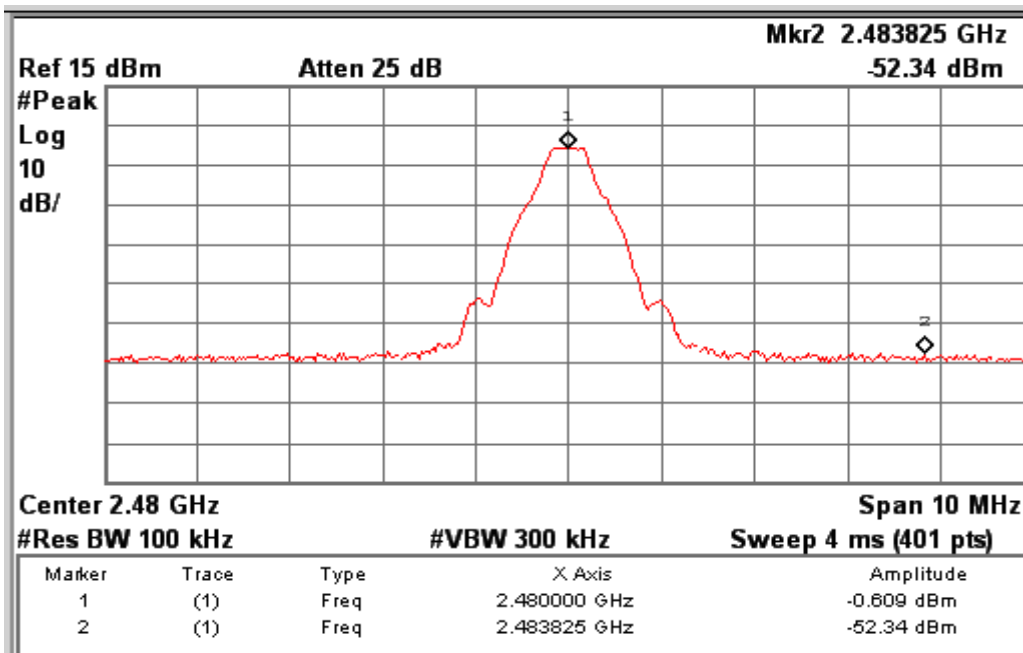
Cable Loss: 0.68 dB +1.2dB

Data Rate (Mbps)	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dBc)
		Frequency (MHz)	Value (dBc)	
1	2402	2400.00	-52.41	-20
	2480	2483.50	-51.73	-20
2	2402	2400.00	-48.30	-20
	2480	2483.50	-48.36	-20
3	2402	2400.00	-45.06	-20
	2480	2483.50	-47.68	-20



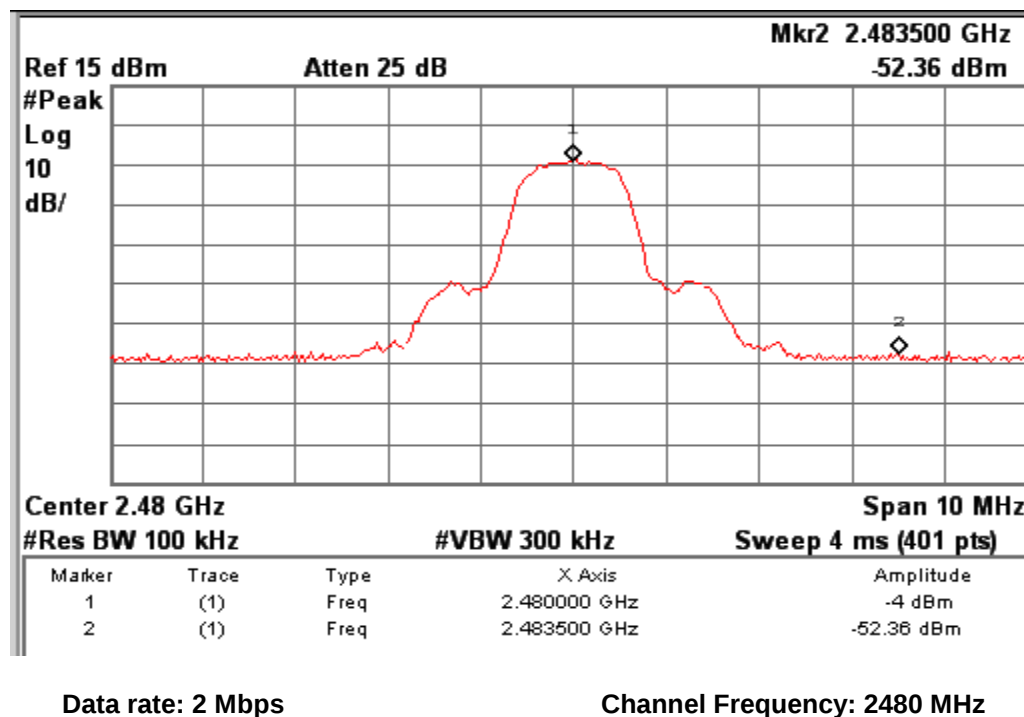
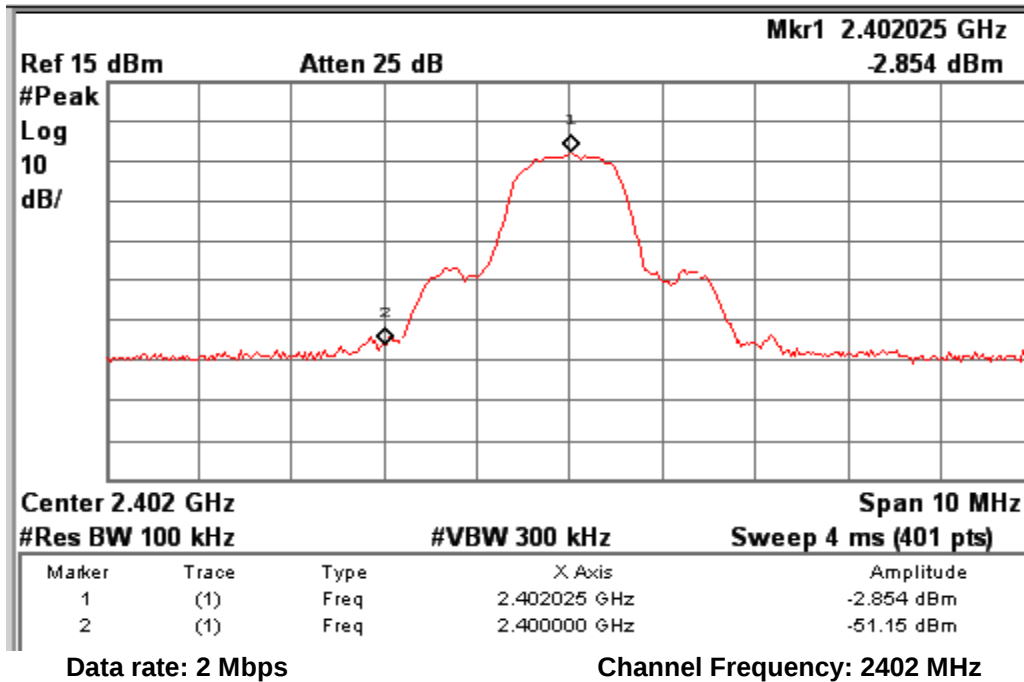
Data rate: 1 Mbps

Channel Frequency: 2402 MHz

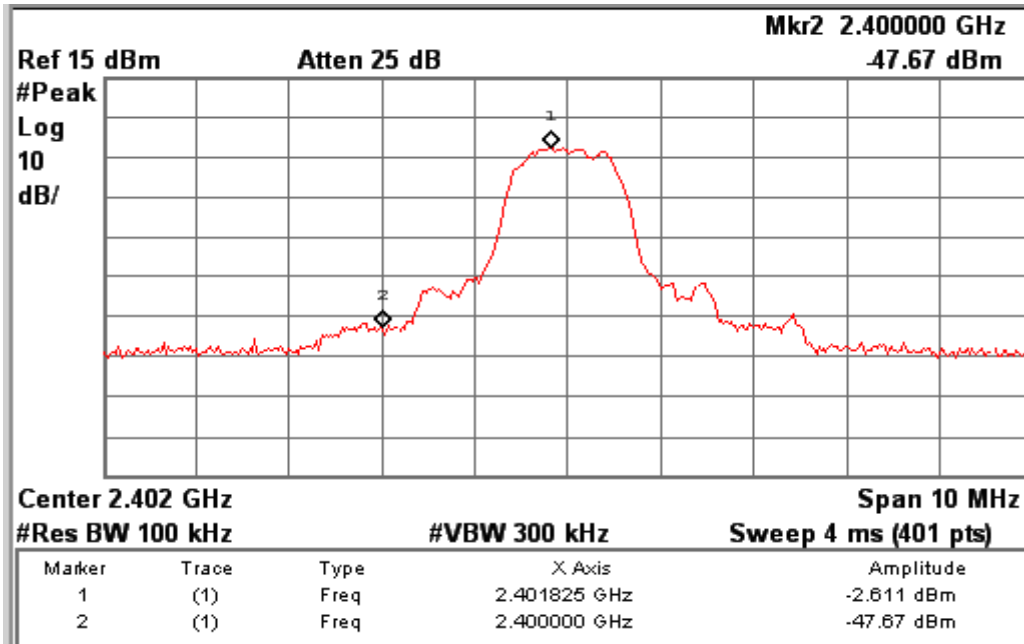


Data rate: 1 Mbps

Channel Frequency: 2480 MHz

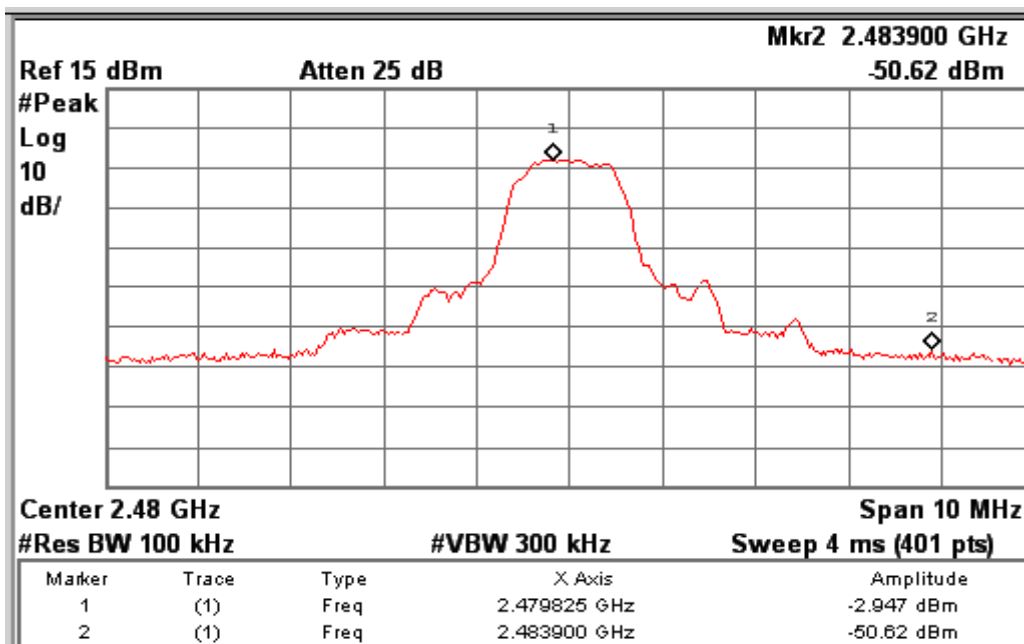


www.tuv.com



Data rate: 3 Mbps

Channel Frequency: 2402 MHz



Data rate: 3 Mbps

Channel Frequency: 2480 MHz

Note: There were no conducted spurious emission found above the noise floor level -54dBm and hence those plot are not reported.

Result
Pass

Test Specification	FCC Part 15 Section 15.209 & 15.205
Test Method	ANSI C63.4-2003
Measurement Location	Semi Anechoic Chamber
Measuring Frequency Range	9kHz to 26.5GHz (Up to 10 th harmonic of the highest fundamental frequency)
Measuring Distance	3m
Detection	QP for frequency below 1GHz, Peak and 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 result:

Data Rate (Mbps)	Channel	Polarization	Frequency (MHz)	Measured Value (dBμV/m)	Limit (dBμV/m)	Margin (dBμV/m)
3	Low	V	30.00	36.29	40.00	-3.71
			31.22	34.03	40.00	-5.97
			46.38	26.82	40.00	-13.18
			2390 Pk	45.52	74.00	-28.48
			2390Av	30.85	54.00	-23.15
			2402 Pk	94.25	*	-
			2402 Av	90.83	*	-
		H	No Harmonics Found		74.00	-74.00
					54.00	-54.00
			99.98	23.50	43.50	-20.00
			2390 Pk	46.78	74.00	-27.22
			2390Av	31.68	54.00	-22.32
			2402 Pk	95.55	*	-
			2402 Av	92.32	*	-
			No Harmonics Found		74.00	-
					54.00	-
	Mid	V	30.00	36.29	40.00	-3.71
			31.22	33.12	40.00	-6.88
			46.38	25.25	40.00	-14.75
			2441 Pk	95.03	*	-
			2441 Av	91.76	*	-
			No Harmonics Found		74.00	-74.00
					54.00	-54.00
		H	99.98	23.31	43.50	-20.19
			2441 Pk	96.40	*	-
			2441 Av	93.18	*	-
			No Harmonics Found		74.00	-
					54.00	-
	High	V	30.00	36.29	40.00	-3.71
			31.22	33.46	40.00	-6.54
			46.38	25.61	40.00	-14.39
			2480 Pk	97.08	*	-
			2480 Av	93.57	*	-
			2483.5 Pk	50.35	74.00	-23.65
			2483.5 Av	35.66	54.00	-18.34
			No Harmonics Found		74.00	-74.00
					54.00	-54.00
		H	99.98	24.62	43.50	-18.88
			2480 Pk	96.81	*	-
			2480 Av	93.41	*	-
			2483.5 Pk	53.26	74.00	-20.74
			2483.5 Av	36.59	54.00	-17.41
			No Harmonics Found		74.00	-
					54.00	-

* - --> Fundamental Frequency

Pk--> Peak Detector

Av--> Average Detector

Note: All other emissions were found to be 20dB below the limits