



DATE: 17 December 2019

I.T.L. (PRODUCT TESTING) LTD.
FCC Radio Test Report
for
Orcam Technologies Ltd.

Equipment under test:
Portable, Pocket- Sized Smart Pen
Scanner

Orcam Read

Tested by: 
M. Zohar

Approved by: 
D. Shidlowsky

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This report relates only to items tested.



Measurement/Technical Report for Orcam Technologies Ltd.

Portable, Pocket- Sized Smart Pen Scanner

Orcam Read

FCC ID: 2AAWI-READ

This report concerns:	Original Grant: X Class I Change: Class II Change:
Equipment type:	FCC: (DTS) Digital Transmission System
Limits used:	47CFR15 Section 15.247

Measurement procedure used is KDB 558074 D01 v05r02 and ANSI C63.10:2013

Application for Certification
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1. General Information

1.1 Administrative Information

Manufacturer: Orcam Technologies Ltd.

Manufacturer's Address: 3 Kiryat Mada St.
P.O. Box 45157
Jerusalem, 9777603, Israel
Tel: +972-2-591-7805
Fax: +972-2-586-0121

Manufacturer's Representative: Ram Ben-Yehuda

Equipment Under Test (E.U.T): Portable, Pocket- Sized Smart Pen Scanner

Equipment PMN: Orcam Read

Equipment Serial No.: 19350053

Date of Receipt of E.U.T: November 10, 2019

Start of Test: November 10, 2019

End of Test: November 28, 2019

Test Laboratory Location: I.T.L (Product Testing) Ltd.
1 Batsheva St.,
Lod
ISRAEL 7120101

Test Specifications: FCC Part 15, Subpart C, Section 15.247



1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation No. IL1005.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. Department of Innovation, Science and Economic Development (ISED) Canada, CAB identifier: IL1002

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

Orcam Read is a portable, pocket- sized smart pen scanner.
Orcam Read provides the most advanced solution for those who suffer from reading difficulties such as dyslexia.

Working voltage	5.0VDC Rechargeable battery
Mode of operation	Transceiver
Modulations	For Wi-Fi/g: OFDM(BPSK,QPSK,16QAM ,64QAM) For Wi-Fi/n: OFDM(BPSK,QPSK,16QAM ,64QAM) For BLE: GFSK
Assigned Frequency Range	2400.0-2483.5MHz
Operating Frequency Range	For Wi-Fi/g/n: 2412.0-2462.0MHz For BLE: 2402.0-2480.0MHz
Conducted power	~ 15dBm
Antenna Gain	-0.87dBi
Modulation BW	For Wi-Fi/g/n: 20MHz For BLE: 2MHz
Bit rate (Mbit/s)	For Wi-Fi/g: 6, 9, 12, 18, 24, 36, 48, 54 For Wi-Fi/n: 6.5,13,19.5,26,39,52,58.5,65 For BLE: 1,2,3

1.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in KDB 558074 D01 v05 r02 and ANSI C63.10: 2013. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

Emissions tests were performed at I.T.L.'s testing facility in Lod, Israel. I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and its FCC Designation Number is IL1005.



1.6 Measurement Uncertainty

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)

0.15 – 30 MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 3.44 dB

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site:

30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.96 dB

1 GHz to 6 GHz

Expanded Uncertainty (95% Confidence, K=2):

±5.19 dB

>6 GHz

Expanded Uncertainty (95% Confidence, K=2):

±5.51 dB

2. System Test Configuration

2.1 Justification

1. The E.U.T contains 2 optional transceivers: IEEE 802.15.1 standard (BLE) or IEEE 802.11g/n standard (Wi-Fi/g/n) with only 20MHz CBW.
2. For BLE - The unit was evaluated while transmitting at the low channel (2402MHz), the mid channel (2440MHz) and the high channel (2480MHz).
For Wi-Fi /g/n - The unit was evaluated while transmitting at the low channel (2412MHz), the mid channel (2437MHz) and the high channel (2462MHz).
3. The evaluation was performed while the E.U.T was connected to an AC/DC power supply in charge mode as the “worst case”.
4. Conducted emission tests were performed with the E.U.T. antenna terminal connected by a RF cable to the Spectrum Analyzer through a 30dB external attenuator.
5. Final radiated emission for Wi-Fi g/n modes tests were performed using the lowest and highest bit rates for each different protocol type. The bit rates for each protocol are shown in the table below:

Protocol Type	“Worst Case” Bit Rate
Wi-Fi/g	6,54 Mbit/s
Wi-Fi/n	6.5,65 Mbit/s (MCS0,MCS7)

7. Final radiated emission tests was performed after exploratory emission testing that was performed in 3 orthogonal polarities to determine the “worst case” radiation. According to below results the worst case was at the X axis

Orientation	Frequency (MHz)	2 nd Harmonic (dBuV/m)	3 rd Harmonic (dBuV/m)	Band Edge (dBuV/m)
X axis	2412.0	47.4	55.2	61.2
	2437.0	48.0	55.9	-
	2462.0	47.1	55.6	73.8
Y axis	2412.0	47.0	53.8	59.8
	2437.0	47.1	54.2	-
	2462.0	46.9	54.0	73.5
Z axis	2412.0	45.2	47.6	57.4
	2437.0	45.1	48.0-	-
	2462.0	45.5	50.0	71.3

Figure 1. Screening Results

2.2 EUT Exercise Software

No special exercise software was used.

2.3 Special Accessories

Equipment	Manufacturer	Part Number	Serial Number
AC/DC power supply	Shenzhen Super Eagle Technology Co. Ltd	CH06-050200-EU	N/A

2.4 Equipment Modifications

Initially the E.U.T failed in the high band edge testing at the high channel (2462MHz).

The customer reduced the fundamental power until the E.U.T passed the specified limit. Power was reduced by using the value code 8 for the power configuration script.

2.5 Configuration of Tested System

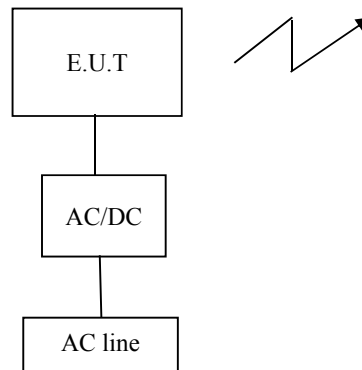


Figure 2. Configuration of Tested System – Radiated

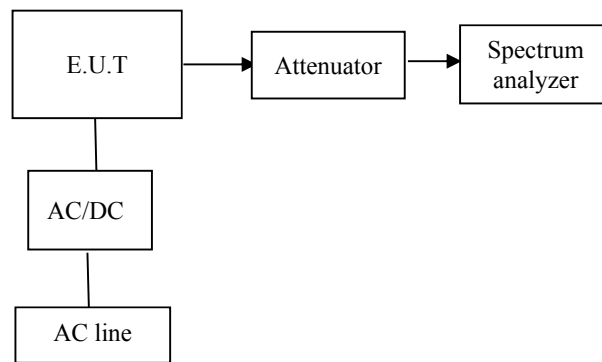


Figure 3. Configuration of Tested System - Conducted



3. Conducted & Radiated Measurement Test Set-Up Photos



Figure 4. Conducted Emission Test from AC Line Test

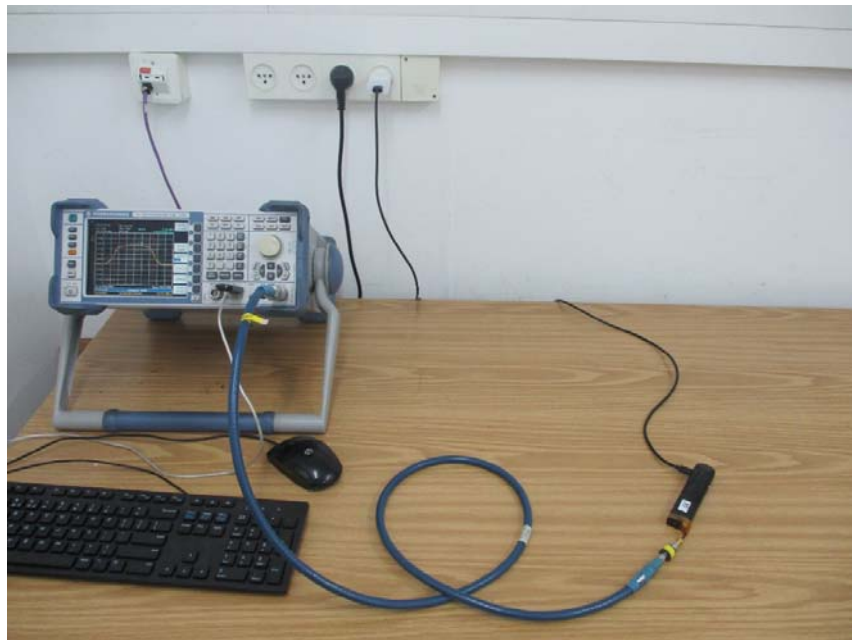


Figure 5. Conducted Emission Test



Figure 6. Radiated Emission Test, 0.009-30MHz



Figure 7. Radiated Emission Test, 30-200MHz



Figure 8. Radiated Emission Test, 200-1000MHz



Figure 9. Radiated Emission Test, 1-18GHz



Figure 10. Radiated Emission Test, 18-26.5GHz

4. Conducted Emission From AC Mains

4.1 Test Specification

FCC Part 15, Subpart C, Section 15.207

4.2 Test Procedure

(Temperature (20°C)/ Humidity (45%RH))

The E.U.T operation mode and test setup are as described in Section 2 of this report. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on a 0.8 meter high wooden table, 0.4 meter from the room's vertical wall. In the case of a floor-standing E.U.T., it was placed on the horizontal ground plane.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 μ Hn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T.

The center of the E.U.T.'s AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission. The configurations tested are shown in the photographs, *Figure 4* and *Figure 5*.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver and are displayed on the receiver's spectrum display.

The E.U.T was evaluated in TX operation mode (WI-FI/g 6Mbps)

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 Test Limit

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.



4.4 **Test Results**

JUDGEMENT: Passed by 4.94 dB

The margin between the emission levels and the specification limit is, in the worst case, -19.06 dB for the phase line at 0.578 MHz and -4.94 dB at 0.578 MHz for the neutral line.

The EUT met the F.C.C. Part 15, Subpart C specification requirements.

The details of the highest emissions are given in *Figure 11* to **Error! Reference source not found..**

Conducted Emission

E.U.T Description Portable, Pocket- Sized Smart Pen Scanner
Type Orcam Read
Serial Number: 19350053

Specification: FCC Part 15, Subpart C
Lead: Phase
Detectors: : Peak, Quasi-peak, Average
Power Operation AC/DC power supply

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CE22BQP			
Trace2:	CE22BAP			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA	LIMIT dB
1 Quasi Peak	182 kHz	39.89	-24.49	
2 Average	242 kHz	19.49	-32.53	
1 Quasi Peak	402 kHz	37.42	-20.38	
2 Average	426 kHz	24.20	-23.12	
2 Average	578 kHz	26.93	-19.06	
1 Quasi Peak	582 kHz	35.75	-20.24	
1 Quasi Peak	886 kHz	33.52	-22.47	
2 Average	1.042 MHz	25.76	-20.23	
1 Quasi Peak	1.382 MHz	21.92	-34.07	
2 Average	1.582 MHz	18.49	-27.50	
1 Quasi Peak	2.51 MHz	27.88	-28.11	
2 Average	2.51 MHz	18.59	-27.41	
1 Quasi Peak	4.01 MHz	22.23	-33.76	
2 Average	4.45 MHz	12.22	-33.77	
2 Average	9.126 MHz	17.23	-32.76	
1 Quasi Peak	9.166 MHz	27.16	-32.83	
2 Average	13.418 MHz	21.10	-28.89	
1 Quasi Peak	17.378 MHz	26.79	-33.20	
1 Quasi Peak	17.694 MHz	30.71	-29.28	
2 Average	17.694 MHz	24.80	-25.19	

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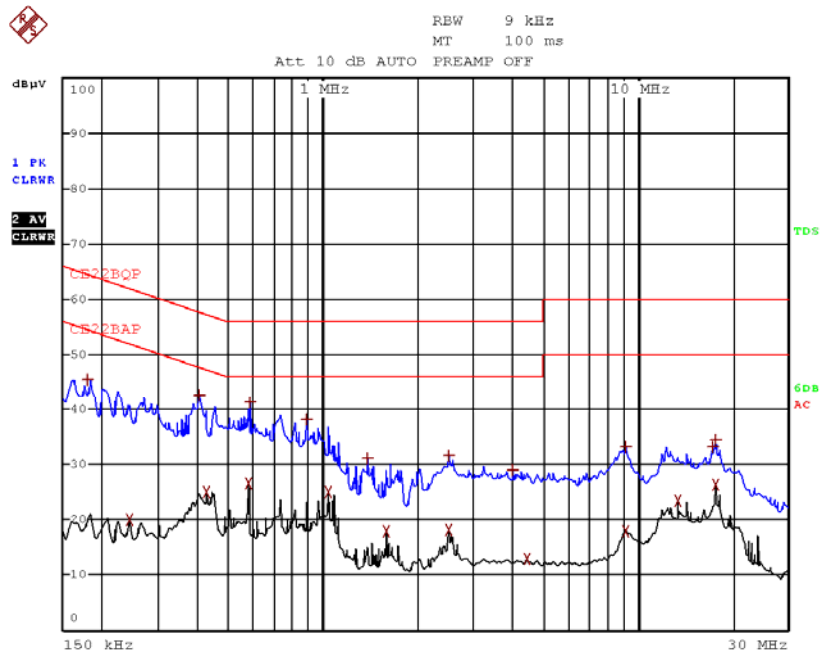
Figure 11. Detectors: Peak, Quasi-peak, Average

Note: QP Delta/Av Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description Portable, Pocket- Sized Smart Pen Scanner
Type Orcam Read
Serial Number: 19350053

Specification: FCC Part 15, Subpart C
Lead: Phase
Detectors: Peak, Quasi-peak, Average
Power Operation AC/DC power supply



Date: 24.NOV.2019 15:58:24

Figure 12. Detectors: Peak, Quasi-peak, Average

Conducted Emission

E.U.T Description	Portable, Pocket- Sized Smart Pen Scanner
Type	Orcam Read
Serial Number:	19350053
Specification:	FCC Part 15, Subpart C
Lead:	Neutral
Detectors:	Peak, Quasi-peak, Average
Power Operation	AC/DC power supply

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CE22BQP			
Trace2:	CE22BAP			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA	LIMIT dB
2 Average	194 kHz	32.55	-21.30	
1 Quasi Peak	198 kHz	38.07	-25.62	
1 Quasi Peak	426 kHz	39.94	-17.38	
2 Average	426 kHz	32.05	-15.27	
1 Quasi Peak	578 kHz	50.75	-5.24	
2 Average	578 kHz	41.05	-4.94	
1 Quasi Peak	1.042 MHz	50.33	-5.66	
2 Average	1.042 MHz	34.78	-11.21	
1 Quasi Peak	1.582 MHz	41.55	-14.44	
2 Average	1.582 MHz	26.15	-19.85	
1 Quasi Peak	2.51 MHz	39.40	-16.59	
2 Average	2.51 MHz	26.52	-19.47	
2 Average	4.014 MHz	14.18	-31.81	
1 Quasi Peak	4.03 MHz	23.76	-32.23	
2 Average	9.11 MHz	17.92	-32.08	
1 Quasi Peak	9.158 MHz	26.48	-33.51	
1 Quasi Peak	12.438 MHz	27.70	-32.29	
2 Average	13.358 MHz	22.64	-27.35	
1 Quasi Peak	17.694 MHz	29.66	-30.33	
2 Average	17.694 MHz	24.79	-25.20	

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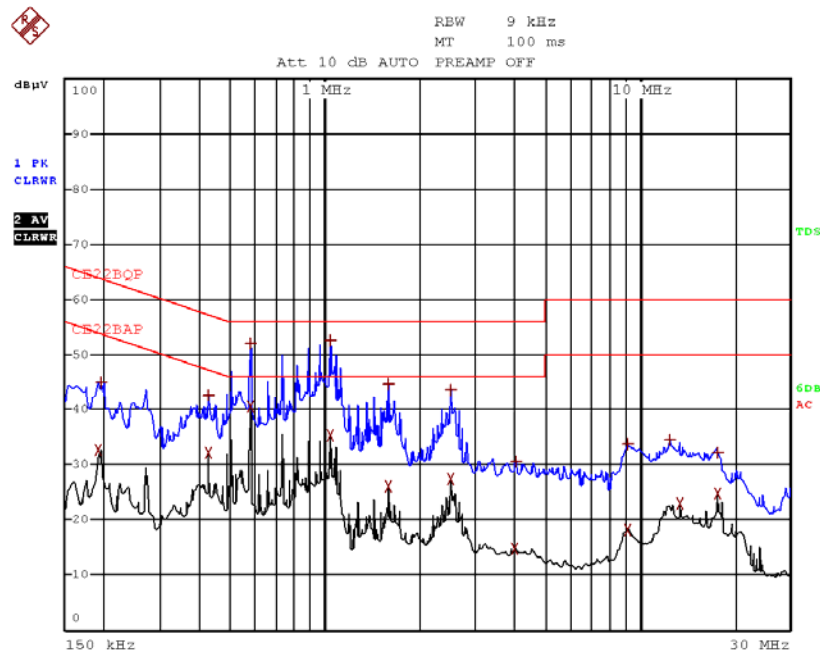
Figure 13. Detectors: Peak, Quasi-peak, Average

Note: QP Delta/Av Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description Portable, Pocket- Sized Smart Pen Scanner
Type Orcam Read
Serial Number: 19350053

Specification: FCC Part 15, Subpart C
Lead: Neutral
Detectors: Peak, Quasi-peak, Average
Power Operation AC/DC power supply



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Figure 14 Detectors: Peak, Quasi-peak, Average



4.5 *Test Equipment Used; Conducted Emission from AC Mains*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
LISN	Fischer	FCC-LISN-25A	127	September 8, 2019	September 30, 2020
Transient Limiter	HP	11947A	3107A03041	September 16, 2019	September 30, 2020
EMI Receiver	Rohde & Schwarz	ESCI7	100724	February 27, 2019	February 28, 2020
Cable CE Chamber 3M + 3M	Testline 18 + RJ214	11556	-	March 31, 2019	March 31, 2020

Figure 15 Test Equipment Used



5. 6 dB Minimum Bandwidth

5.1 Test Specification

FCC Part 15, Subpart C, Section 247(a)(2)

5.2 Test Procedure

(Temperature (20°C)/ Humidity (52%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable. Special attention was taken to prevent Spectrum Analyzer RF input overload.

The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded. The RBW was set to 100 kHz.

5.3 Test Limit

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.4 Test Results

Protocol Type	Operation Frequency	Reading	Limit
	(MHz)	(kHz)	(kHz)
BLE	2402.0	719.0	>500.0
	2440.0	719.0	>500.0
	2480.0	709.0	>500.0
Wi-fi/g(6Mbit/s)	2412.0	15,729.0	>500.0
	2437.0	16,208.0	>500.0
	2462.0	15,649.0	>500.0
Wi-fi/g(54Mbit/s)	2412.0	15,968.0	>500.0
	2437.0	16,457.0	>500.0
	2462.0	16,208.0	>500.0
Wi-fi/n(6.5Mbit/s)	2412.0	16,926.0	>500.0
	2437.0	16,607.0	>500.0
	2462.0	15,888.0	>500.0
Wi-fi/n(65Mbit/s)	2412.0	17,405.0	>500.0
	2437.0	17,166.0	>500.0
	2462.0	16,926.0	>500.0

Figure 16 6 dB Minimum Bandwidth

JUDGEMENT: Passed

For additional information see *Figure 17* to *Figure 31*.

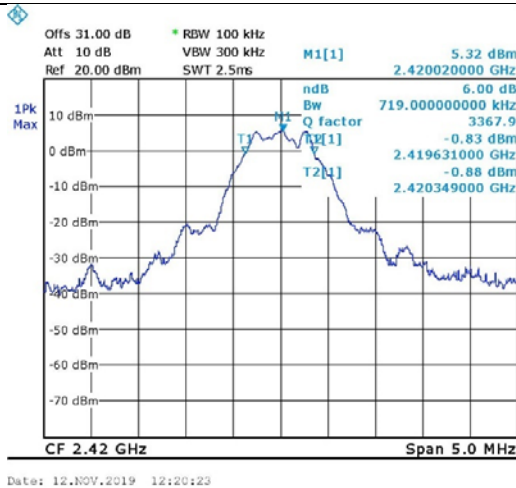


Figure 17. 2402.0 MHz, BLE

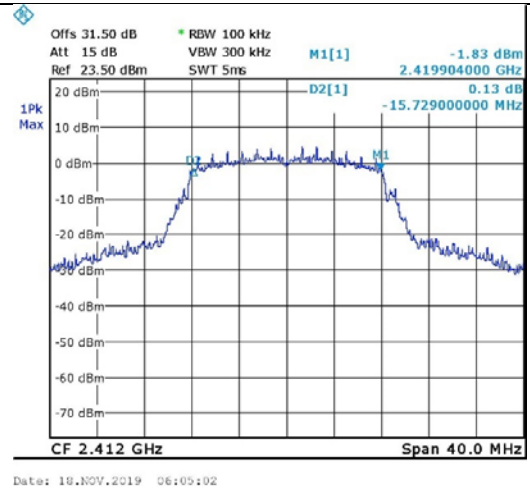


Figure 18. 2412.0 MHz, Wi-fi/g(6Mbit/s)

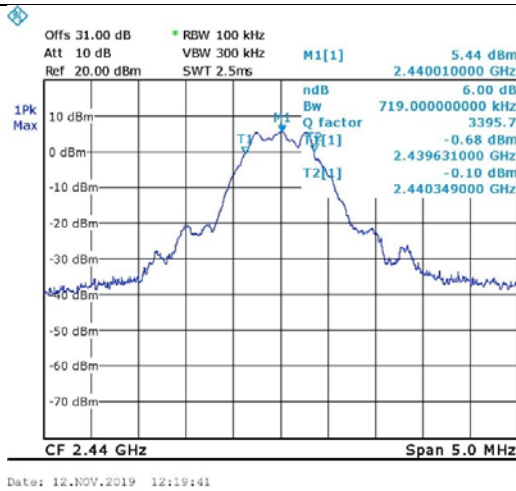


Figure 19. 2440.0 MHz, BLE

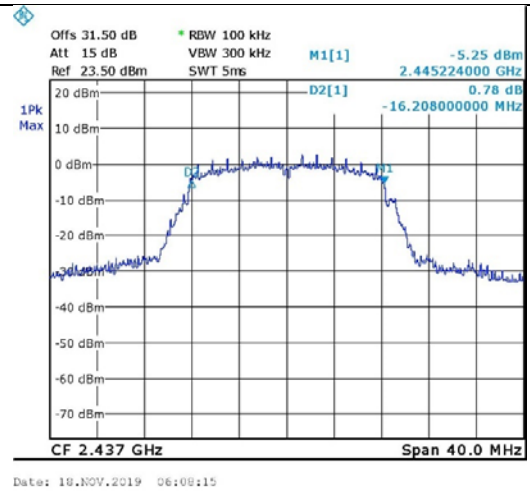


Figure 20. 2437.0 MHz, Wi-fi/g(6Mbit/s)

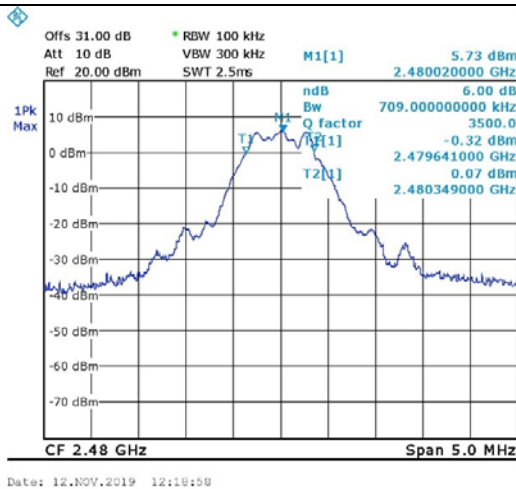


Figure 21. 2480.0 MHz, BLE

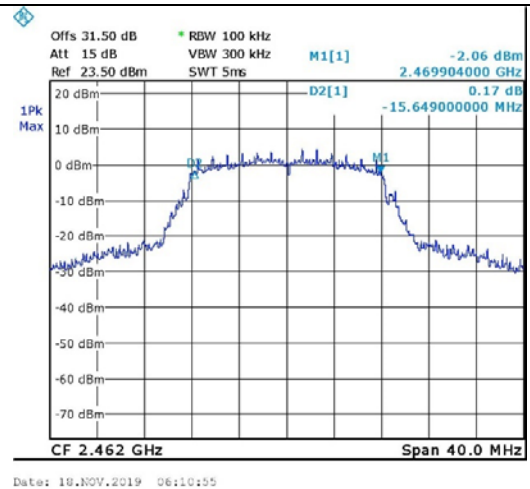
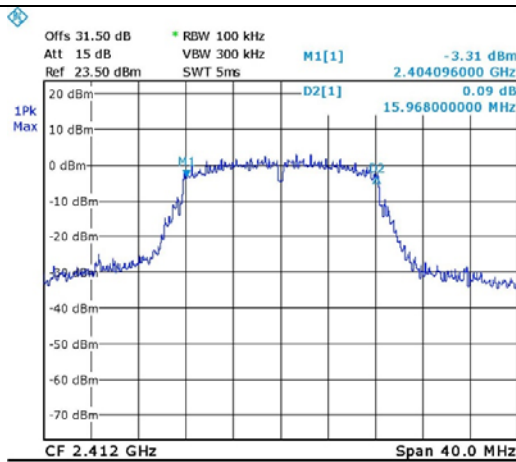
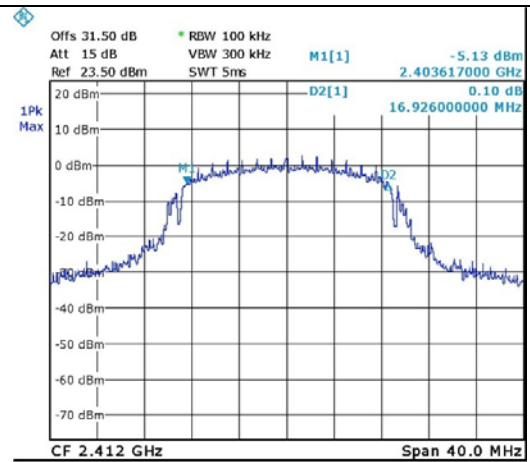


Figure 22. 2462.0 MHz, Wi-fi/g(6Mbit/s)



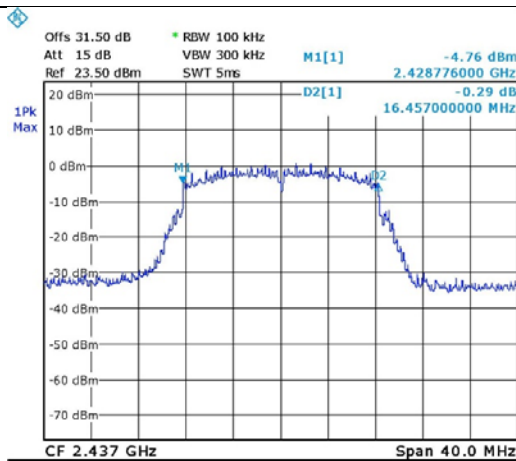
Date: 10.NOV.2019 06:19:47

Figure 23. 2412.0 MHz, Wi-fi/g(54Mbit/s)



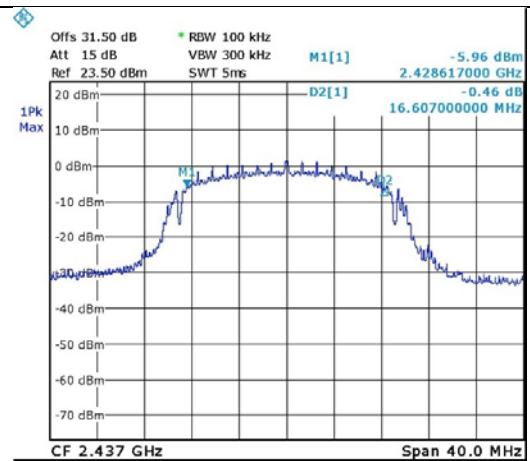
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Figure 24. 2412.0 MHz, Wi-fi/n(6.5Mbit/s)



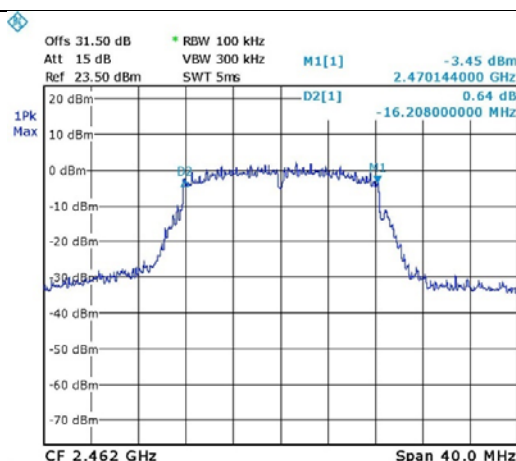
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Figure 25. 2437.0 MHz, Wi-fi/g(54Mbit/s)



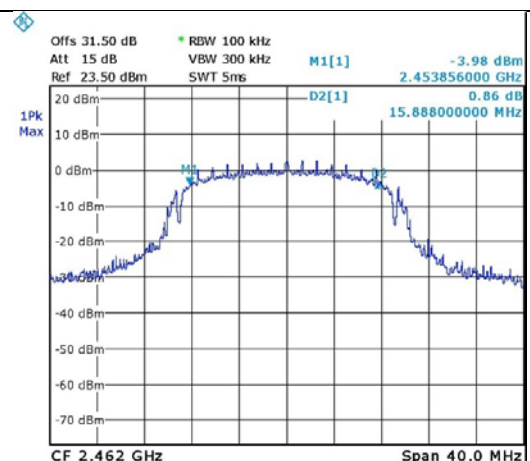
Date: 17.NOV.2019 13:12:07

Figure 26. 2437.0 MHz, Wi-fi/n(6.5Mbit/s)



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Figure 27. 2462.0 MHz, Wi-fi/g(54Mbit/s)



Date: 17.NOV.2019 12:52:48

Figure 28. 2462.0 MHz, Wi-fi/n(6.5Mbit/s)

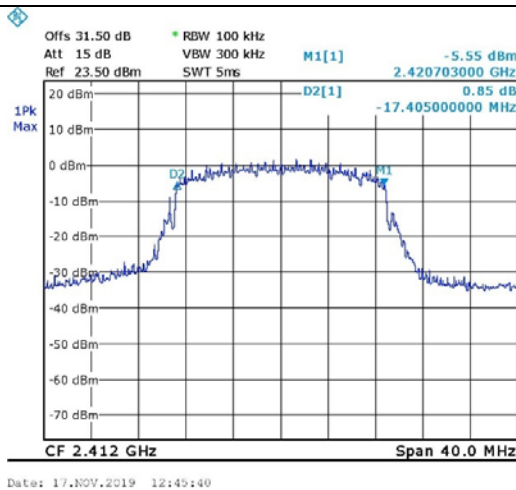


Figure 29. 2412.0 MHz, Wi-fi/n(65Mbit/s)

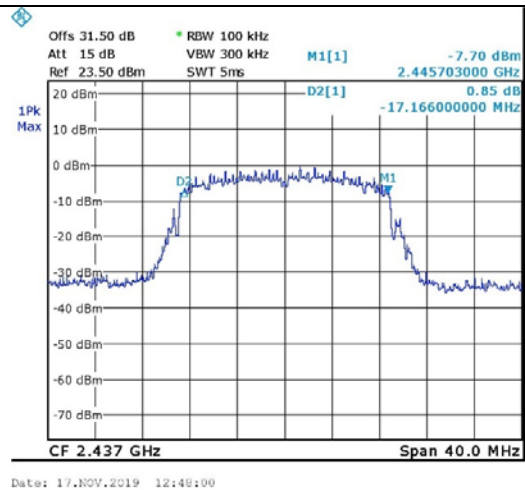


Figure 30. 2437.0 MHz, Wi-fi/n(65Mbit/s)

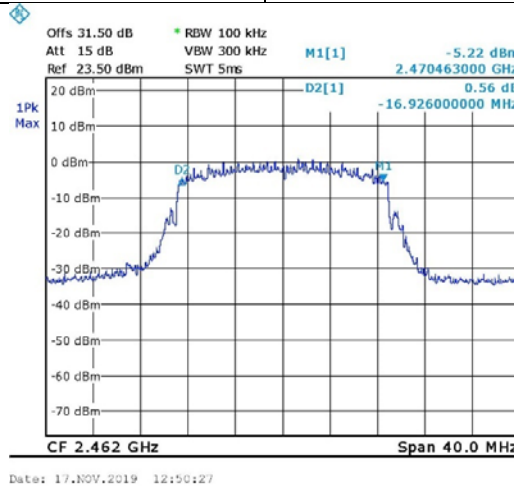


Figure 31. 2462.0 MHz, Wi-fi/n(65Mbit/s)

5.5 Test Equipment Used; 6dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	March 24, 2019	March 31, 2020
30dB Attenuator	MCL	BW-S30W5	533	December 24, 2018	December 31, 2019
RF Cable	Huber Suner	Sucofelex	27502/4PEA	December 24, 2018	December 31, 2019
RF Cable	Itl 1846				

Figure 32 Test Equipment Used

6. Maximum Conducted Output Power

6.1 Test Specification

FCC, Part 15, Subpart C, Section 247(b)(3)

6.2 Test Procedure

(Temperature (20°C)/ Humidity (58%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable. Special attention was taken to prevent Spectrum Analyzer RF input overload.

6.3 Test Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

6.4 Test Results

Protocol Type	Operation Frequency	Power	Power	Limit	Margin
	(MHz)	(dBm)	(mW)	(mW)	(mW)
BLE	2402.0	6.7	4.7	1000.0	-995.3
	2440.0	6.5	4.5	1000.0	-995.5
	2480.0	6.8	4.8	1000.0	-995.2
Wi-fi/g(6Mbit/s)	2412.0	15.6	36.3	1000.0	-963.7
	2437.0	13.9	24.5	1000.0	-975.5
	2462.0	14.9	30.9	1000.0	-969.1
Wi-fi/g(54Mbit/s)	2412.0	15.2	33.1	1000.0	-966.9
	2437.0	13.5	22.4	1000.0	-977.6
	2462.0	14.7	29.5	1000.0	-970.5
Wi-fi/n(6.5Mbit/s)	2412.0	14.9	30.9	1000.0	-969.1
	2437.0	13.3	21.3	1000.0	-978.7
	2462.0	14.3	26.9	1000.0	-973.1
Wi-fi/n(65Mbit/s)	2412.0	14.9	30.9	1000.0	-969.1
	2437.0	12.5	17.8	1000.0	-982.2
	2462.0	13.5	22.4	1000.0	-977.6

Figure 33 Maximum Peak Power Output

JUDGEMENT: Passed by 963.7 mW

For additional information see *Figure 34* to *Figure 48*.

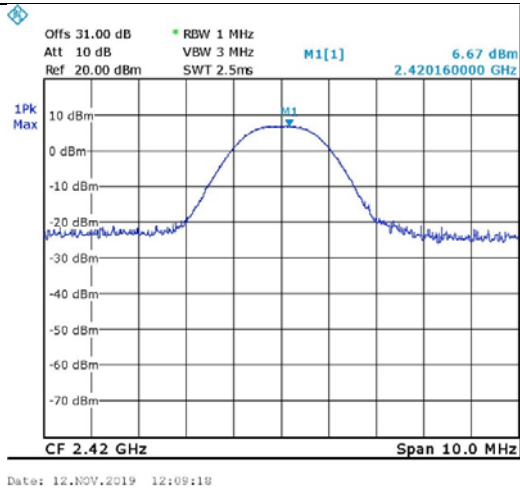


Figure 34. 2402.0 MHz, BLE

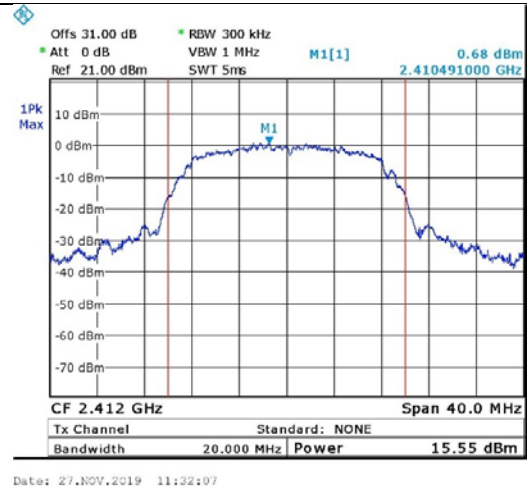


Figure 35. 2412.0 MHz, Wi-fi/g(6Mbit/s)

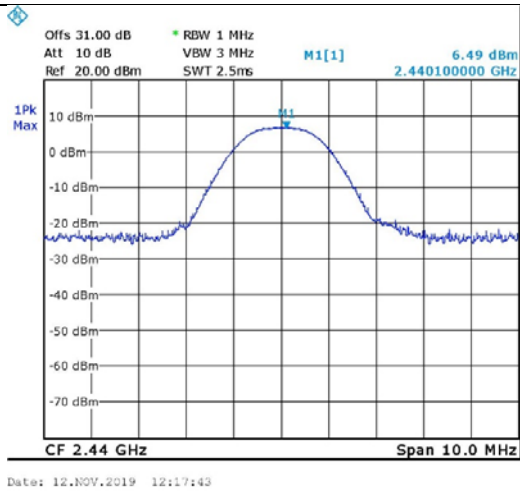


Figure 36. 2440.0 MHz, BLE

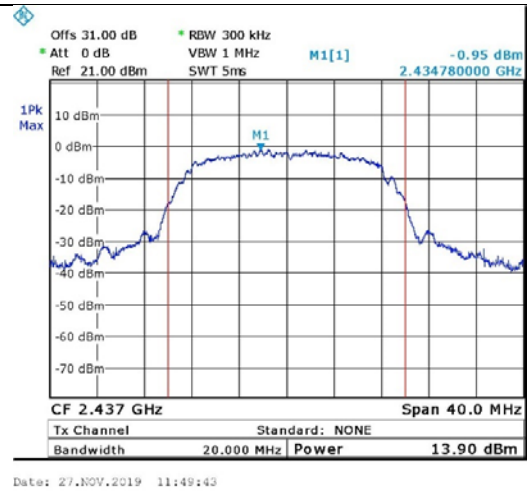


Figure 37. 2437.0 MHz, Wi-fi/g(6Mbit/s)

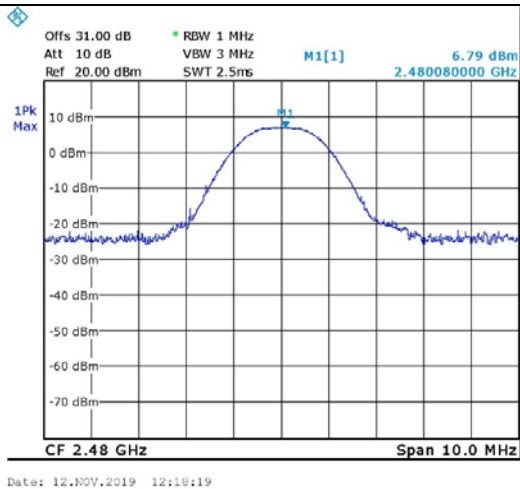


Figure 38. 2480.0 MHz, BLE

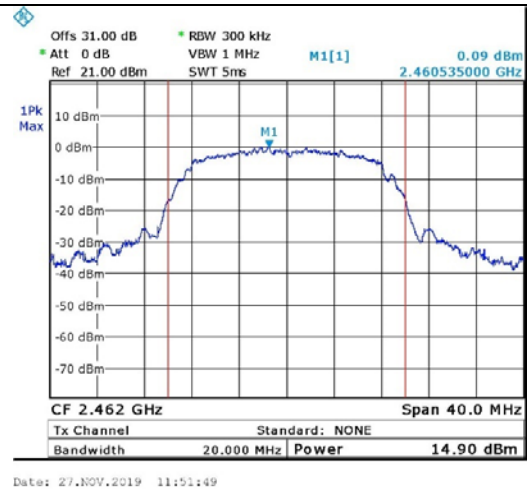
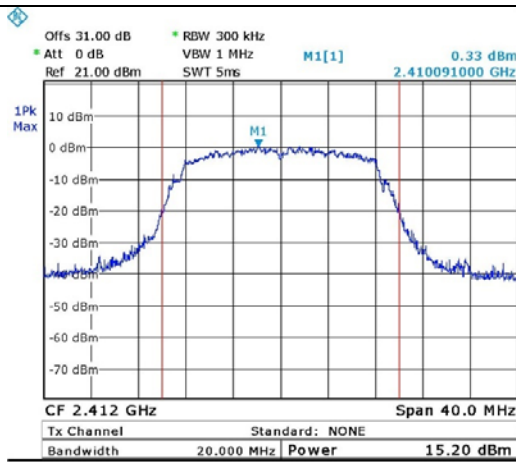
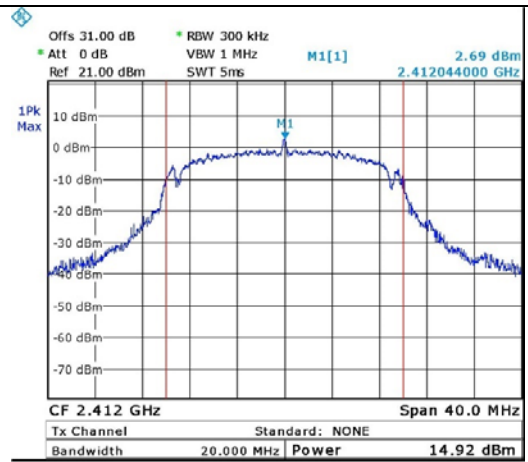


Figure 39. 2462.0 MHz, Wi-fi/g(6Mbit/s)



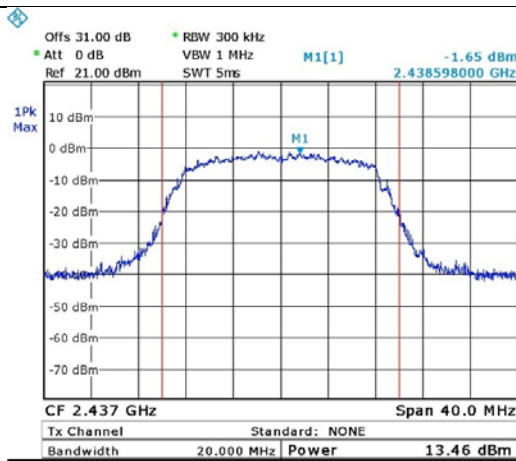
Date: 27.NOV.2019 11:33:52

Figure 40. 2412.0 MHz, Wi-fi/g(54Mbit/s)



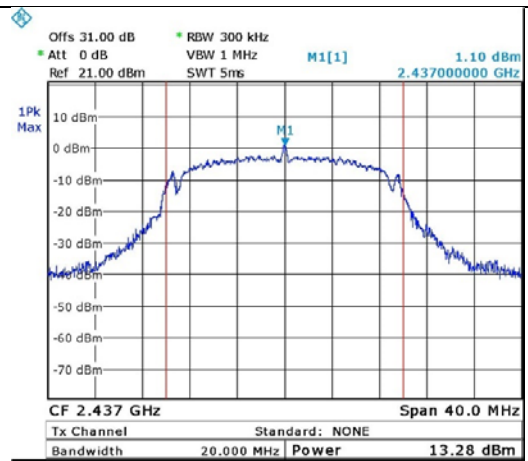
Date: 27.NOV.2019 11:37:42

Figure 41. 2412.0 MHz, Wi-fi/n(6.5Mbit/s)



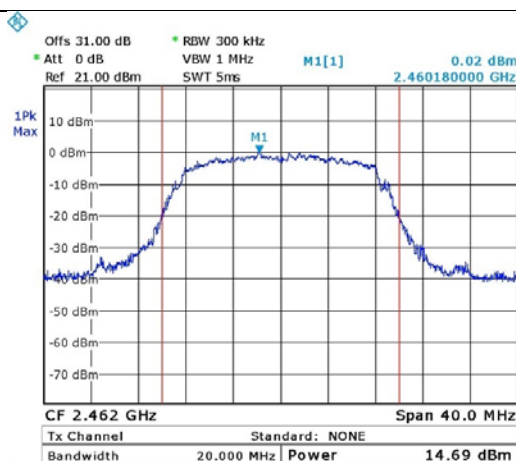
Date: 27.NOV.2019 11:47:20

Figure 42. 2437.0 MHz, Wi-fi/g(54Mbit/s)



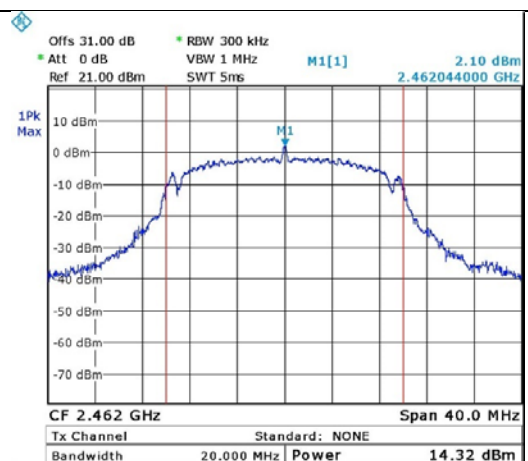
Date: 27.NOV.2019 11:45:06

Figure 43. 2437.0 MHz, Wi-fi/n(6.5Mbit/s)



Date: 27.NOV.2019 11:55:17

Figure 44. 2462.0 MHz, Wi-fi/g(54Mbit/s)



Date: 27.NOV.2019 11:57:45

Figure 45. 2462.0 MHz, Wi-fi/n(6.5Mbit/s)

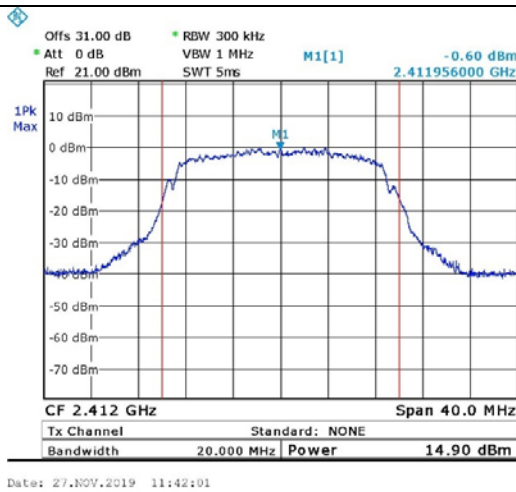


Figure 46. 2412.0 MHz, Wi-fi/n(65Mbit/s)

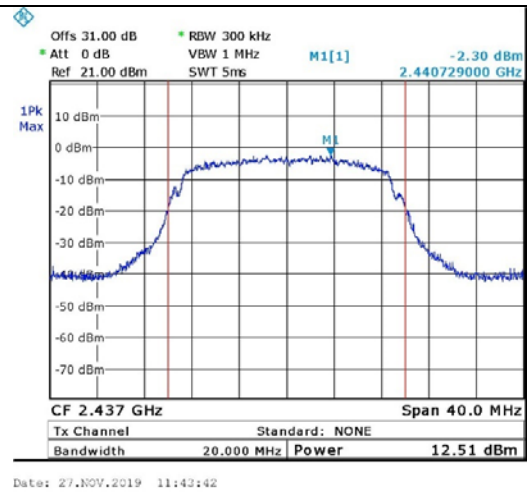


Figure 47. 2437.0 MHz, Wi-fi/n(65Mbit/s)

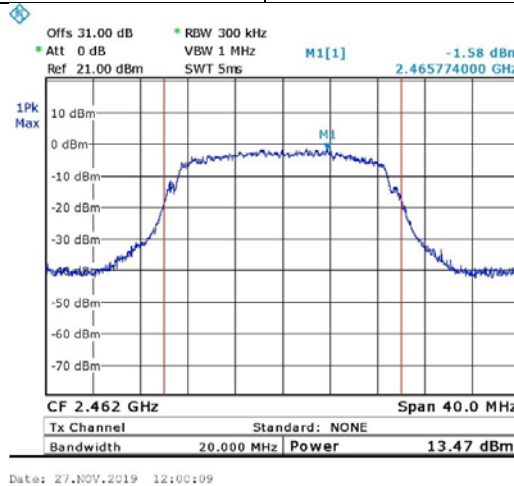


Figure 48. 2462.0 MHz, Wi-fi/n(65Mbit/s)

6.5 Test Equipment Used; Maximum Peak Power Output

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	March 24, 2019	March 31, 2020
30dB Attenuator	MCL	BW-S30W5	533	December 24, 2018	December 31, 2019
RF Cable	Huber Suner	Sucoflex	27502/4PEA	December 24, 2018	December 31, 2019
RF Cable	EIM	705A009301 EIM	-	December 24, 2018	December 31, 2019

Figure 49 Test Equipment Used

7. Band Edge Spectrum

7.1 Test Specification

FCC, Part 15, Subpart C, Section 247(d)

7.2 Test Procedure

(Temperature (20°C)/ Humidity (62%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable. Special attention was taken to prevent Spectrum Analyzer RF input overload.

The RBW was set to 100 kHz.

7.3 Test Limit

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.

7.4 Test Results

Protocol Type	Operation Frequency	Band Edge Frequency	Spectrum Level	Limit	Margin
	(MHz)	(MHz)	(dBm)	(dBm)	(dB)
BLE	2402.0	2400.0	-38.0	-14.9	-23.1
	2480.0	2483.5	-38.9	-14.3	-24.6
Wi-fi/g(6Mbit/s)	2412.0	2400.0	-23.7	-15.5	-8.2
	2462.0	2483.5	-34.5	-16.4	-18.1
Wi-Fi/g(54Mbit/s)	2412.0	2400.0	-27.6	-17.0	-10.6
	2462.0	2483.5	-37.1	-18.5	-18.6
Wi-Fi/n(6.5Mbit/s)	2412.0	2400.0	-22.6	-17.2	-5.4
	2462.0	2483.5	-35.2	-16.9	-18.3
Wi-fi/n(65Mbit/s)	2412.0	2400.0	-29.5	-18.2	-11.3
	2462.0	2483.5	-44.1	-19.2	-24.9

Figure 50 Band Edge Spectrum

JUDGEMENT: Passed by 5.4 dB

For additional information see *Figure 51* and *Figure 60*.

Band Edge Spectrum

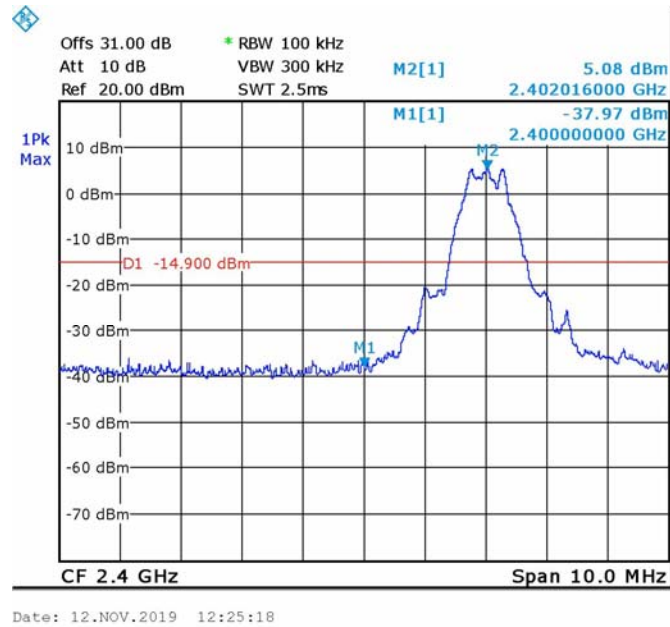


Figure 51 Band Edge Low, BLE

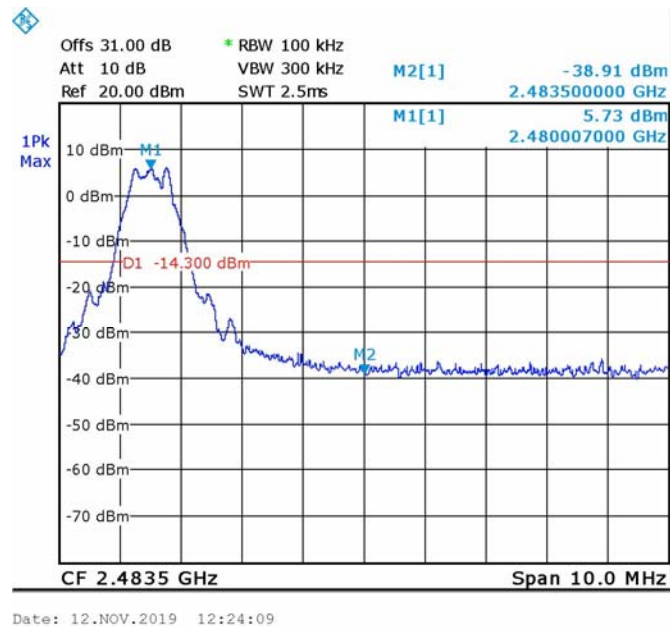


Figure 52 Band Edge High, BLE

Band Edge Spectrum

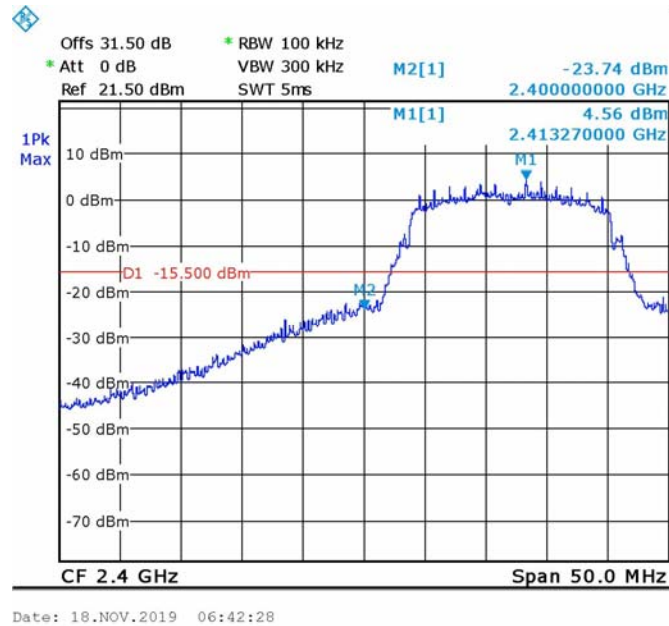


Figure 53 Band Edge Low, Wi-fi/g(6Mbit/s)

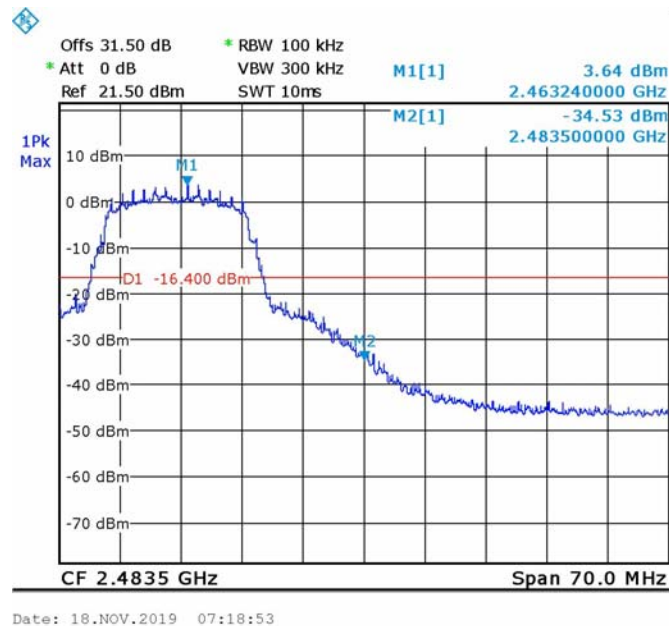


Figure 54 Band Edge High, Wi-fi/g(6Mbit/s)

Band Edge Spectrum

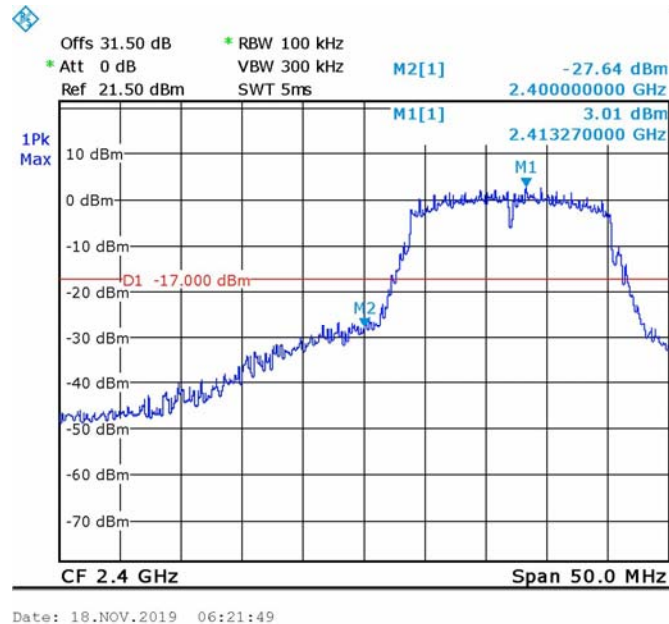


Figure 55 Band Edge Low, Wi-fi/g(54Mbit/s)

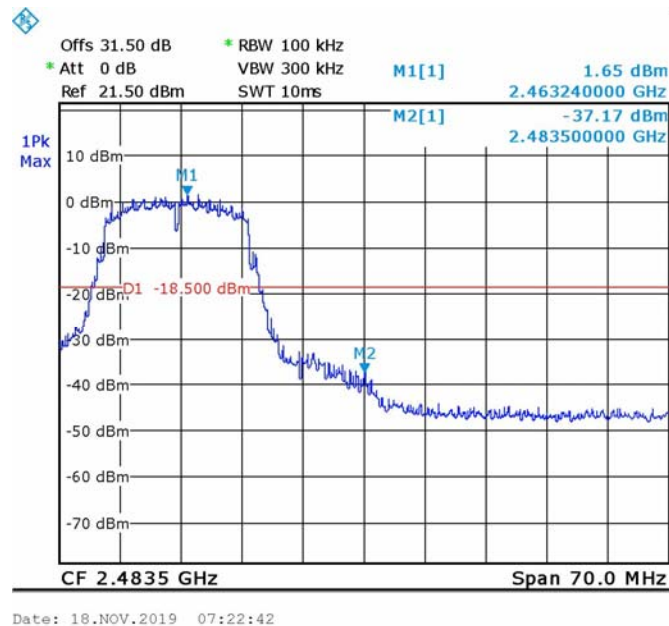


Figure 56 Band Edge High, Wi-fi/g(54Mbit/s)

Band Edge Spectrum

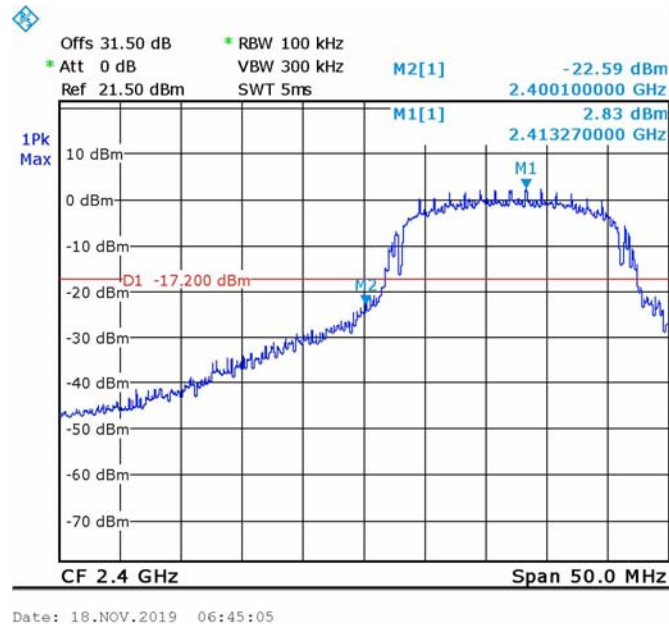


Figure 57 Band Edge Low, Wi-fi/n(6.5Mbit/s)

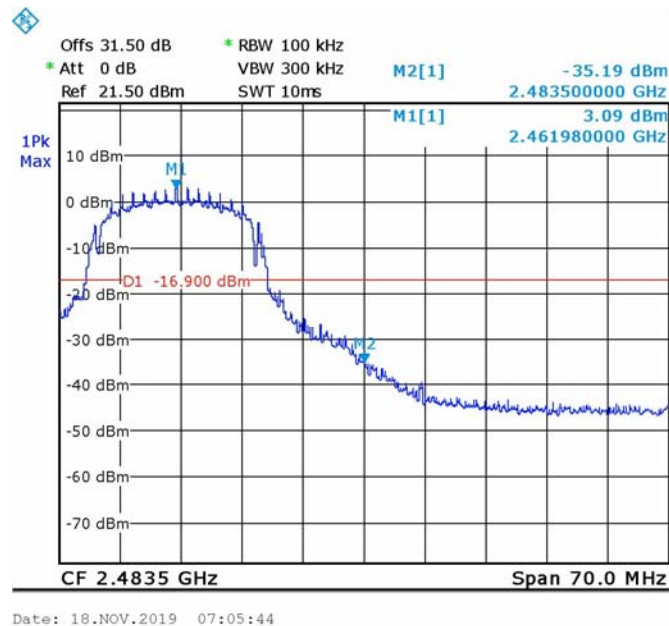


Figure 58 Band Edge High, Wi-fi/n(6.5Mbit/s)

Band Edge Spectrum

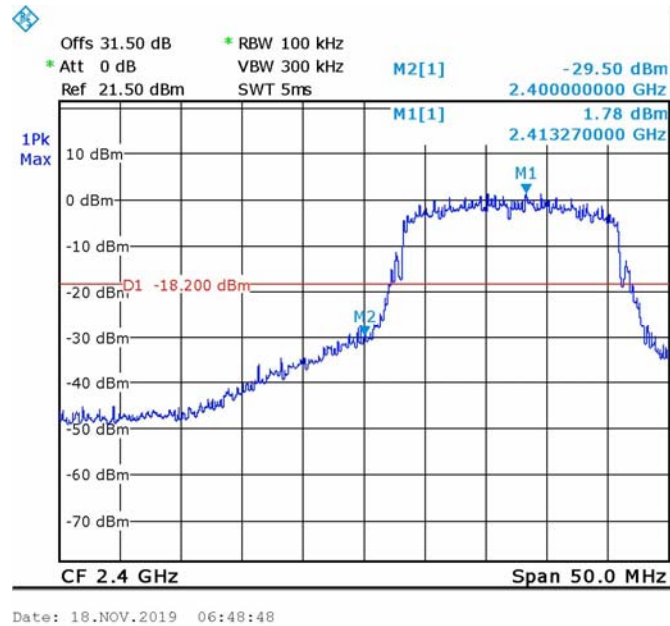


Figure 59 Band Edge Low, Wi-fi/n(65Mbit/s)

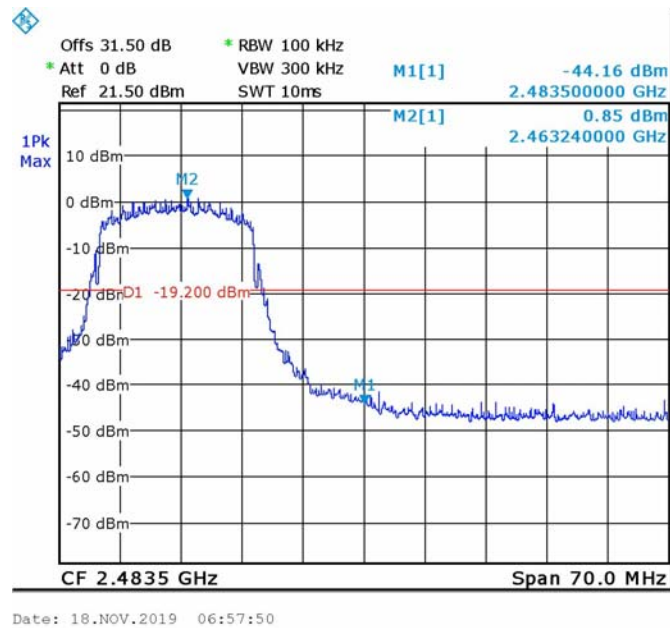


Figure 60 Band Edge High, Wi-fi/n(65Mbit/s)



7.5 Test Equipment Used; Band Edge

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	March 24, 2019	March 31, 2020
30dB Attenuator	MCL	BW-S30W5	533	December 24, 2018	December 31, 2019
RF Cable	Huber Suner	Sucofelex	27502/4PEA	December 24, 2018	December 31, 2019
RF Cable	EIM	705A00930 1EIM	-	December 24, 2018	December 31, 2019

Figure 61 Test Equipment Used