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Date: 23 October 2022

I.T.L. Product Testing Ltd.
FCC/IC Radio Test Report

for

AeroScout Inc.

Equipment under test:

Battery-operated, Wall Mounted Tag

Aerial ECall

Tested by: _____
M. Zohar

Approved by: I. Mansky

pp. I. Cohen: _____

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Measurement/Technical Report for

AeroScout Inc.

Battery-operated, Wall Mounted Tag

Aerial ECall

FCC ID: Q3HCSK200W

IC: 5115A-CSK200W

This report concerns: Original Grant

Equipment type: FCC: (DTS) Digital Transmission System

IC: Spread Spectrum Digital Device (2400-2483.5)

Limits used: 47 CFR, Section 15.247

RSS 247, Issue 2, February 2017, Section 5

RSS-Gen, Issue 5, April 2018, AMD1, March 2019, AMD2, February 2021

Measurement procedures used: KDB 558074 D01 v05r02, ANSI C63.10:2013, and RSS-Gen, Issue 5, April 2018, AMD1, March 2019, AMD2, February 2021

Prepared by:

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1. General Information

1.1 Administrative Information

Manufacturer:	AeroScout Inc.
Manufacturer's Address:	2 Ilan Ramon St., Ness-Ziona 7403635, Israel
Manufacturer's Representative:	Yossi Shoshani Tel: +972-8-936-9342 Fax: +972-8-936-5977 e-mail: yossi.shoshani@sbdinc.com
Equipment Under Test (E.U.T):	Battery-operated, Wall Mounted Tag
Equipment PMN:	Aerial ECall
Equipment Serial No.:	Not designated
Equipment HVIN:	CSK200W
Date of Receipt of E.U.T:	3 Jul. 2022
Start of Test:	4 Jul. 2022
End of Test:	26 Jul. 2022
Test Laboratory Location:	I.T.L. (Product Testing) Ltd. 1 Bat Sheva St., Lod 7120101 ISRAEL
Test Specifications:	FCC, 47 CFR, Subpart C RSS 247, Issue 2, February 2017, Section 5 RSS-Gen, Issue 5, April 2018, AMD1, March 2019, AMD2, February 2021

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. 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

The E.U.T. is a battery-operated, wall mounted, fixed tag. The battery (CR123A 3V 1500mAh) is not rechargeable. There is an option for a 5VDC supply from an external AC/DC power supply, through a USB connector.

The E.U.T. can appear in following radio configurations:

1) BLE and WIFI 2.4GHz- model A
2) BLE and Sub-Giga- model B

Type of Equipment							
☒	Stand Alone (Equipment with/without its own control provisions)						
☐	Combined (Equipment where radio part is fully integrated with another type of equipment)						
☐	Plug in card (Equipment intended for a variety of host systems)						
Intended Use		Condition of use					
☒	Fixed	Always of distance >25mm from the people					
☐	Mobile	Always of distance >20cm from the people					
☐	Portable	Always of distance <20cm to human body					
Assigned frequency band		2.4GHz					
Operational frequencies		BLE: 2402,2462,2480MHz Wi-Fi: 2412-2462MHz					
Maximum rated output power		At transmitter 50Ω RF output connector [dBm]	Wi-Fi: +18dBm				
			BLE: +1dBm				
		Effective Radiated Power (for equipment without RF connector)					
Antenna Connection							
☐	Unique Coupling	☐	Standard Connection	☒	Integral	☒	With temporary RF connector
						☐	Without temporary RF connector
Antenna Gain(peak)		+5.1dBi					
Operating channel bandwidth		Wi-Fi: 20MHz BLE: 1,2MHz					
Type of modulation		802.11b, g, n (MCS0-7), BLE					
Bit rate		MCS7- 65MBPs					
Maximum transmitter duty cycle		≥98%					
Transmitter power source							
☐	AC	Nominal rated voltage					
☐	DC	Nominal rated voltage					
☒	Battery	Nominal rated voltage	3V				

1.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in KDB 558074 D01 v05r01, ANSI C63.10: 2013, RSS-Gen, Issue 5, April 2018. 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 two transceivers: IEEE 802.15.1 (BLE), and IEEE 802.11b/g/n (Wi-Fi b/g/n), with 20MHz CBW(not transmitting continuously)
2. For BLE - The unit was evaluated while transmitting at the low channel (2402MHz), the mid channel (2426MHz) and the high channel (2480MHz).
3. For Wi-Fi b/g/n - The unit was evaluated while transmitting at the low channel (2412MHz), the mid channel (2437MHz), and the high channel (2462MHz).
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 b/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/b	1,11 Mbit/s
Wi-Fi/g	6,54 Mbit/s

Wi-Fi/n	6.5,65 Mbit/s (MCS0,MCS7)

6. Final radiated emission tests were performed when the E.U.T was at orientation install position, as defined by the customer

2.2 EUT Exercise Software

No special exercise software was used.

2.3 Special Accessories

No special accessory was used.

2.4 Equipment Modifications

No modifications were necessary in order to achieve compliance.

2.5 Configuration of Tested System

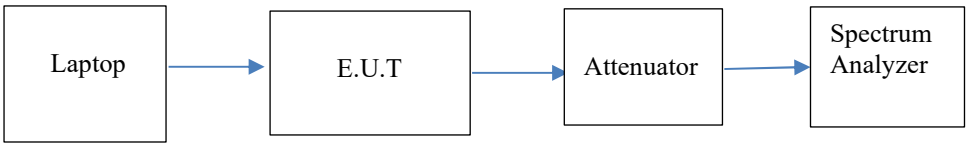


Figure 1. Configuration of Tested System Conducted

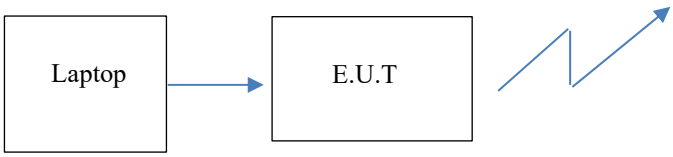


Figure 2. Configuration of Tested System Radiated

3. Test Setup Photographs

See a separate file.

4. 6 dB Minimum Bandwidth

4.1 Test Specification

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

RSS 247, Issue 2, Section 5.2(a)

4.2 Test Procedure

(Temperature (20°C)/ Humidity (63%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 (total loss=32.0 dB). 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.

4.3 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.

4.4 Test Results

Protocol Type	Operation Frequency (MHz)	Reading (MHz)	Limit (kHz)
BLE	2402.0	1.178	>500.0
	2426.0	1.198	>500.0
	2480.0	1.178	>500.0
Wi-fi/b(1Mbit/s)	2412.0	10.06	>500.0
	2437.0	9.97	>500.0
	2462.0	9.98	>500.0
Wi-fi/b(11Mbit/s)	2412.0	8.623	>500.0
	2437.0	8.543	>500.0
	2462.0	10.7	>500.0
Wi-fi/g(6Mbit/s)	2412.0	12.614	>500.0
	2437.0	9.651	>500.0
	2462.0	11.417	>500.0

Protocol Type	Operation Frequency	Reading	Limit
	(MHz)	(MHz)	(kHz)
Wi-fi/g(54Mbit/s)	2412.0	16.507	>500.0
	2437.0	16.517	>500.0
	2462.0	16.527	>500.0
Wi-fi/n(6.5Mbit/s)	2412.0	11.557	>500.0
	2437.0	11.008	>500.0
	2462.0	11.557	>500.0
Wi-fi/n(65Mbit/s)	2412.0	17.705	>500.0
	2437.0	17.715	>500.0
	2462.0	17.705	>500.0

Figure 3 6 dB Minimum Bandwidth

JUDGEMENT: Passed

For additional information see *Figure 4* to *Figure 24.*

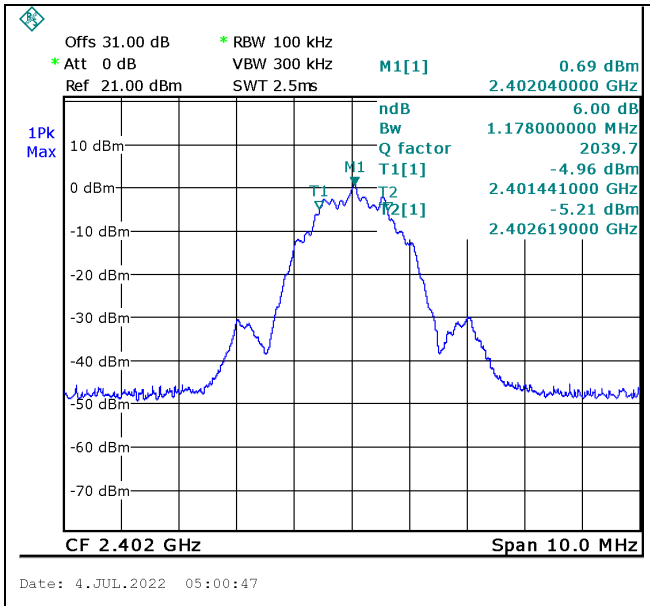


Figure 4. 2402.0 MHz, BLE

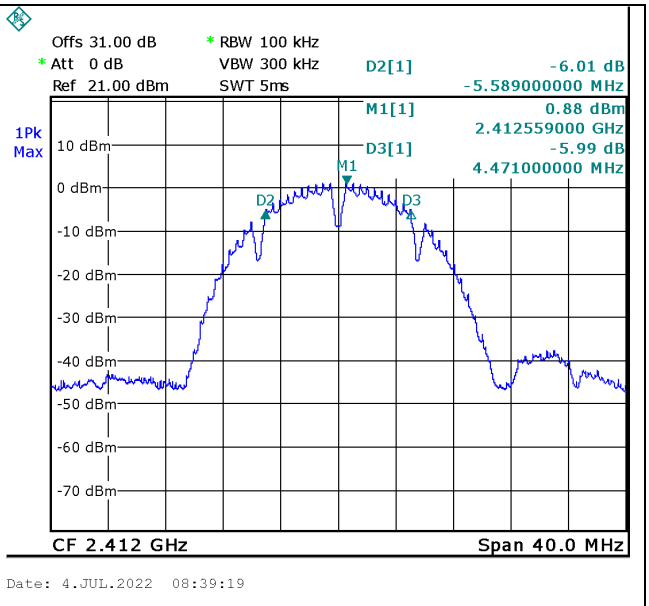


Figure 5. 2412.0 MHz, Wi-fi/b(1Mbit/s)

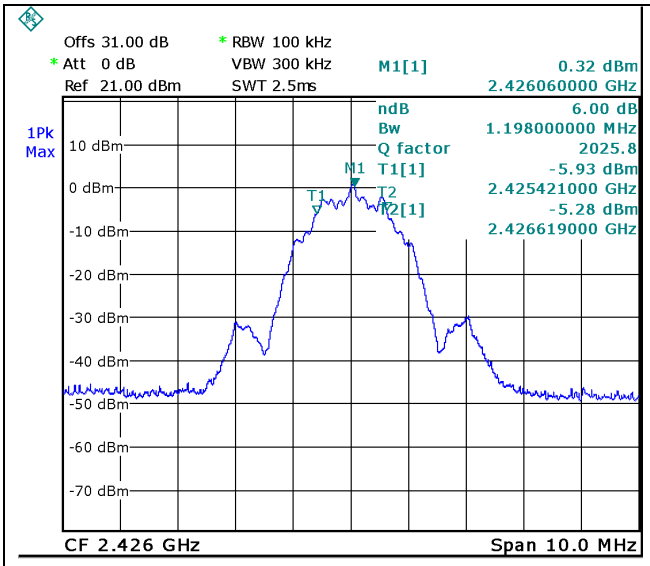


Figure 6. 2426.0 MHz, BLE

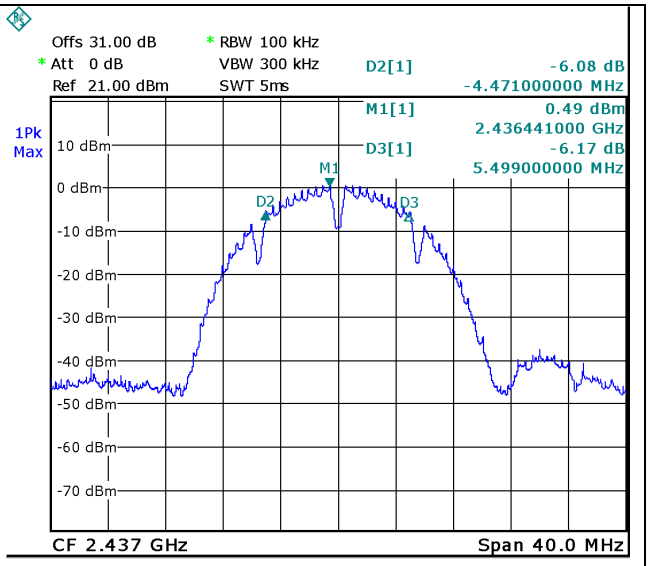


Figure 7. 2437.0 MHz, Wi-fi/b(1Mbit/s)

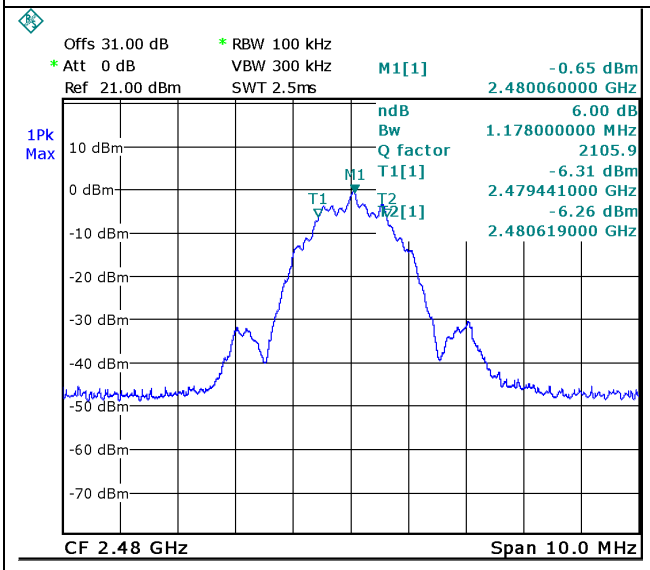


Figure 8. 2480.0 MHz, BLE

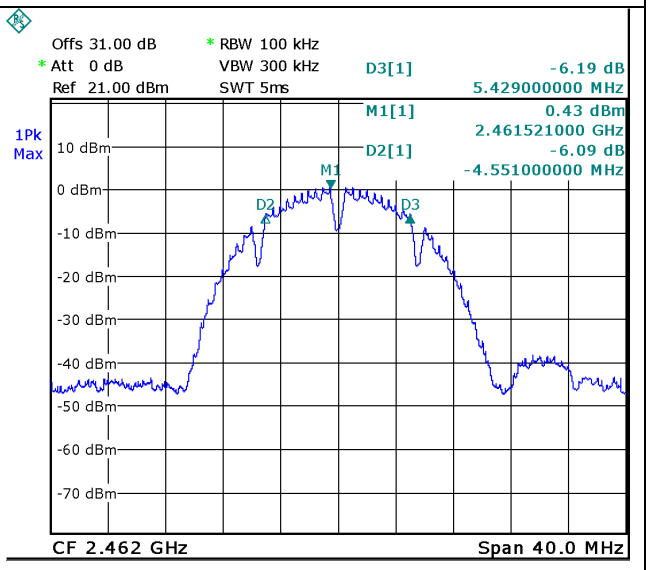


Figure 9. 2462.0 MHz, Wi-fi/b(1Mbit/s)

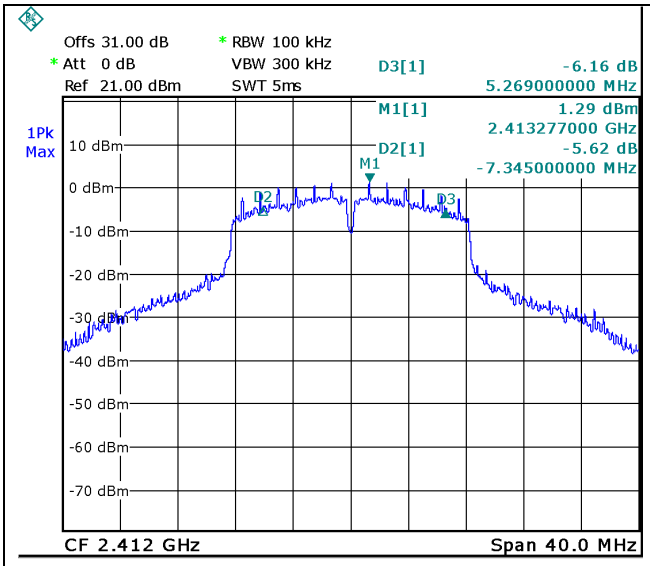


Figure 10. 2412.0 MHz, Wi-fi/g(6Mbit/s)

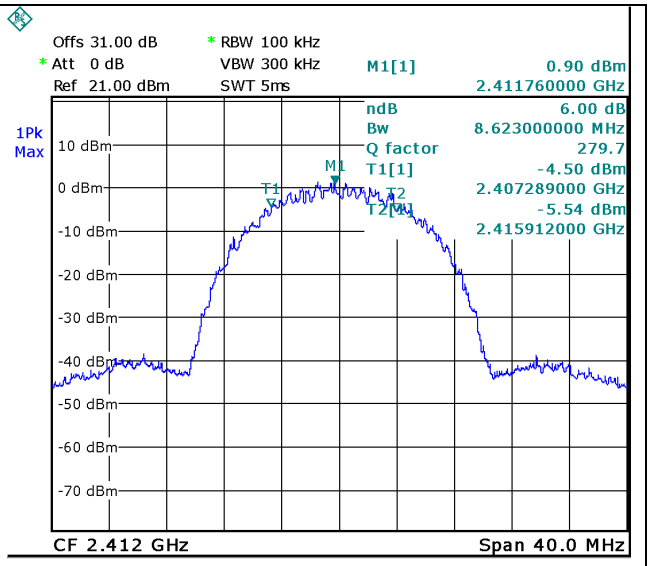


Figure 11. 2412.0 MHz, Wi-fi/b(11Mbit/s)

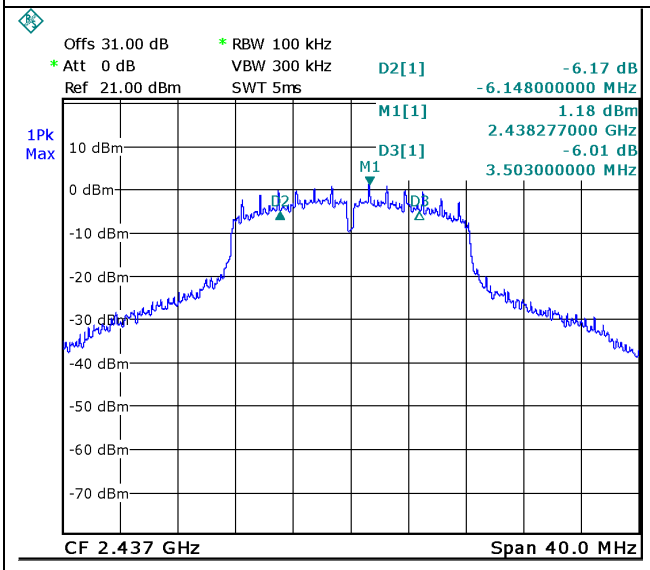


Figure 12. 2437.0 MHz, Wi-fi/g(6Mbit/s)

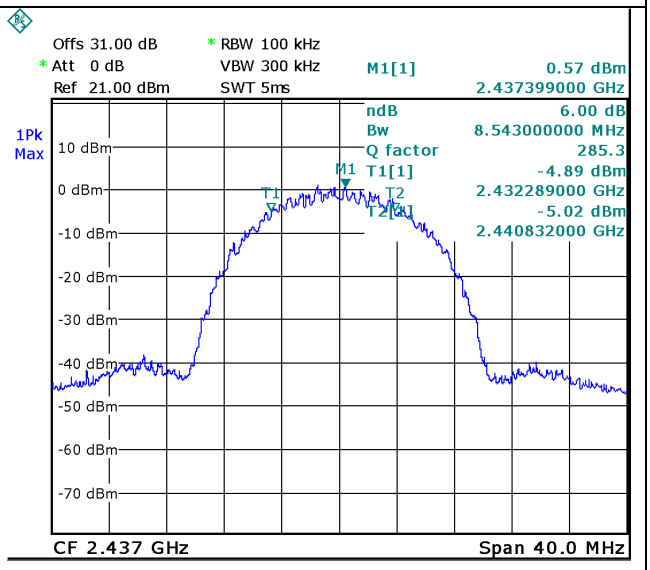


Figure 13. 2437.0 MHz, Wi-fi/b(11Mbit/s)

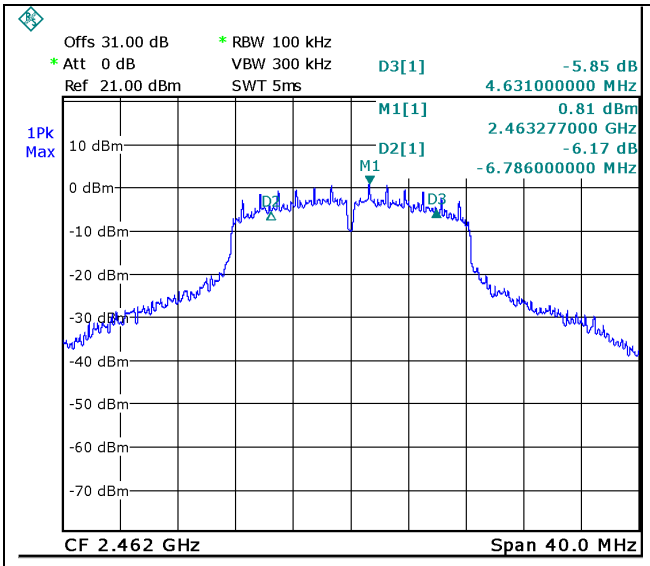


Figure 14. 2462.0 MHz, Wi-fi/g(6Mbit/s)

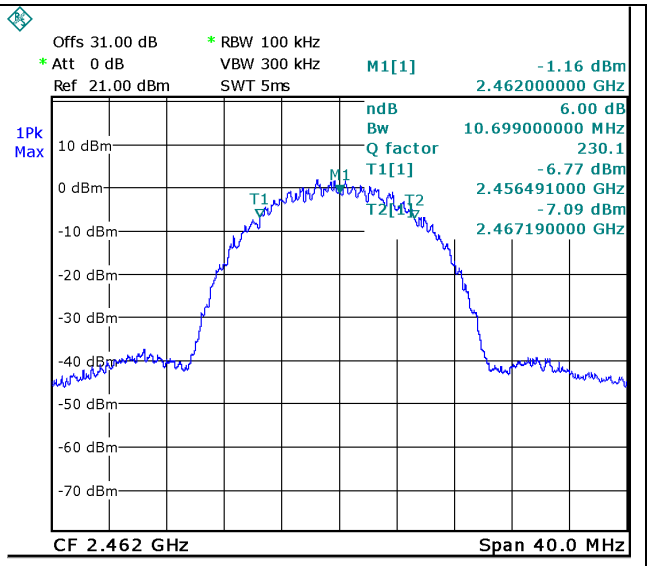


Figure 15. 2462.0 MHz, Wi-fi/b(11Mbit/s)

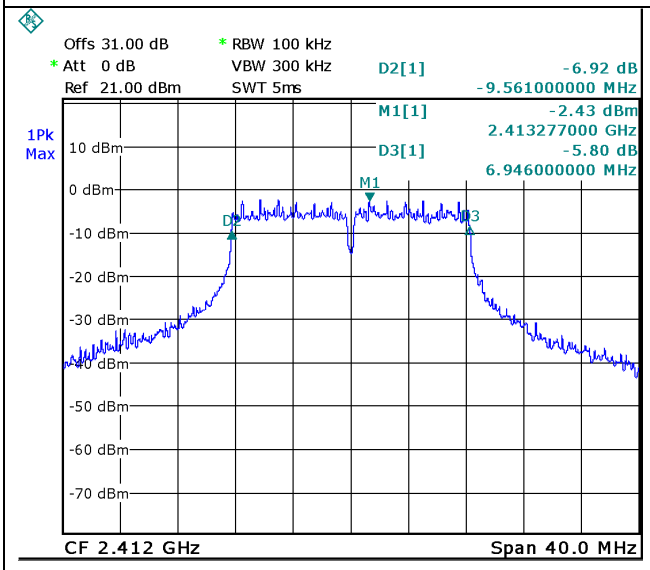


Figure 16. 2412.0 MHz, Wi-fi/g(54Mbit/s)

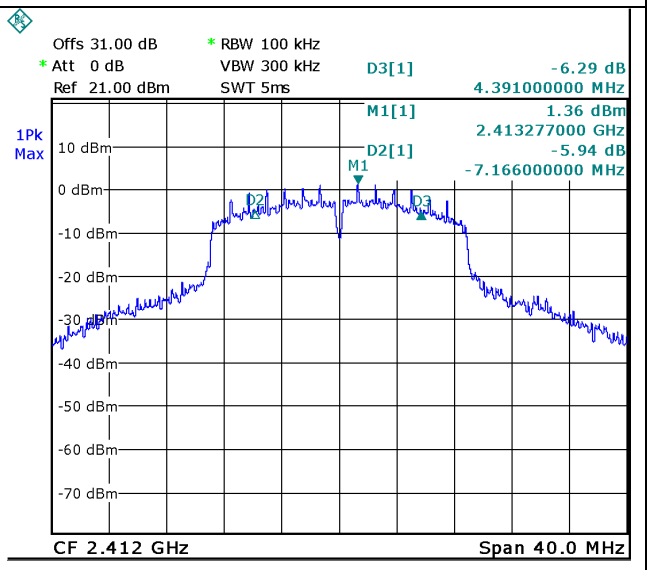


Figure 17. 2412.0 MHz, Wi-fi/n(6.5Mbit/s)

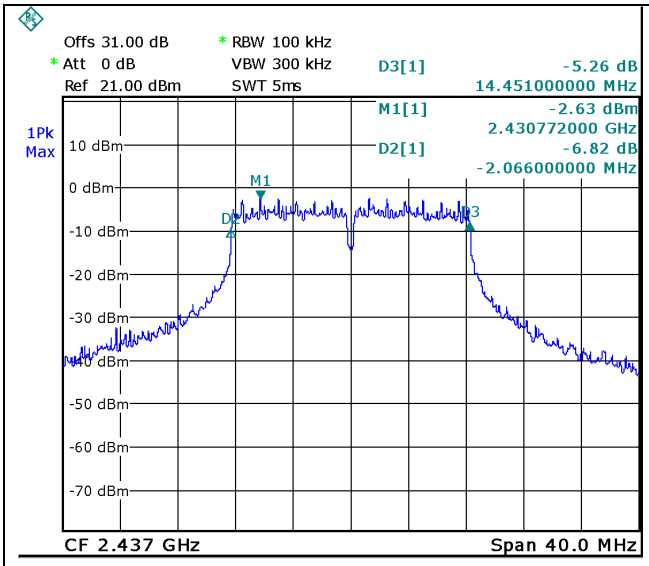


Figure 18. 2437.0 MHz, Wi-fi/g(54Mbit/s)

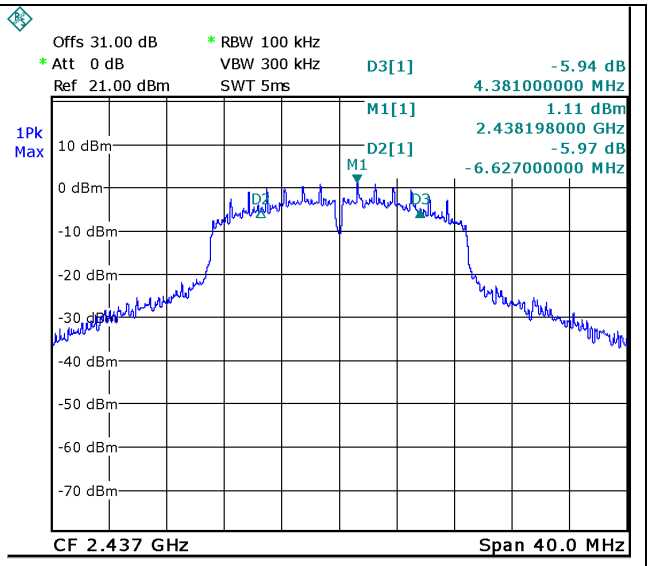


Figure 19. 2437.0 MHz, Wi-fi/n(6.5Mbit/s)

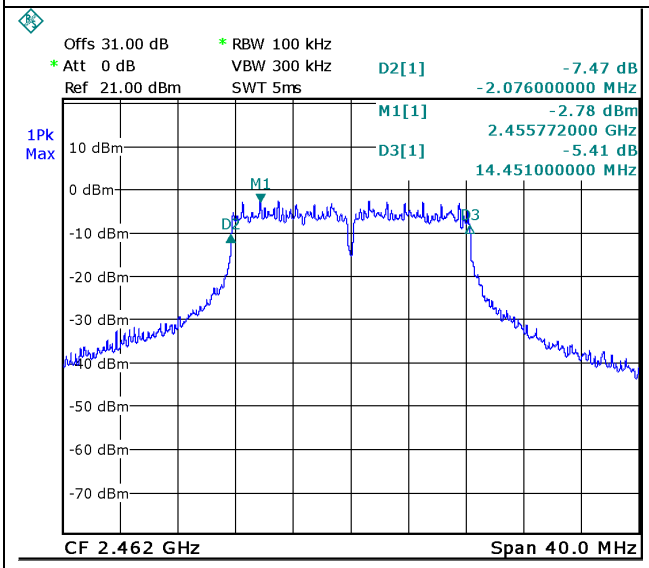


Figure 20. 2462.0 MHz, Wi-fi/g(54Mbit/s)

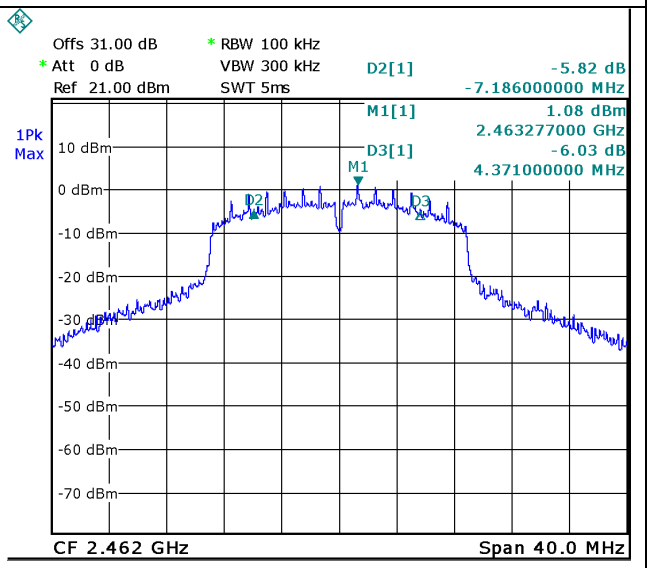


Figure 21. 2462.0 MHz, Wi-fi/n(6.5Mbit/s)

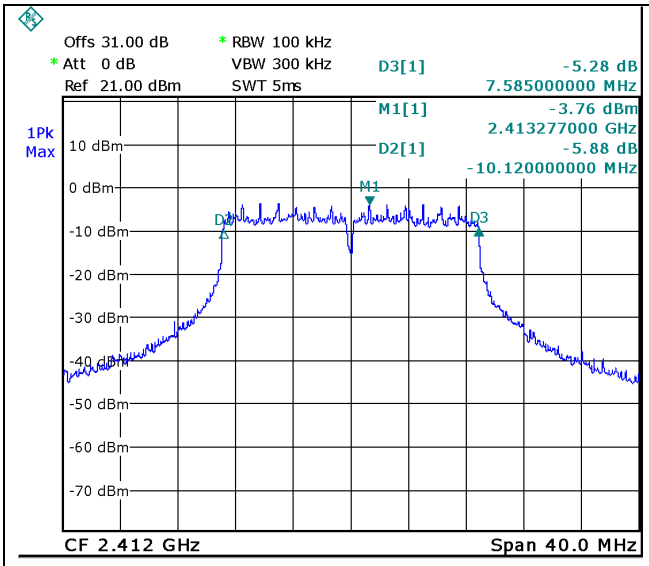


Figure 22. 2412.0 MHz, Wi-fi/n(65Mbit/s)

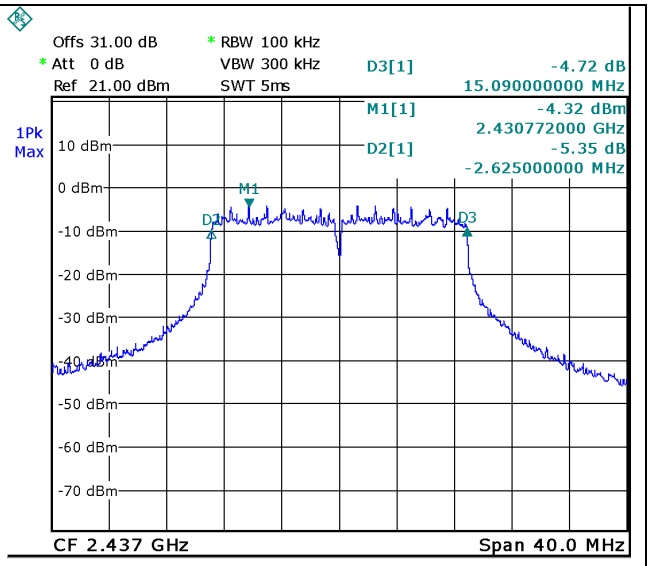


Figure 23. 2437.0 MHz, Wi-fi/n(65Mbit/s)

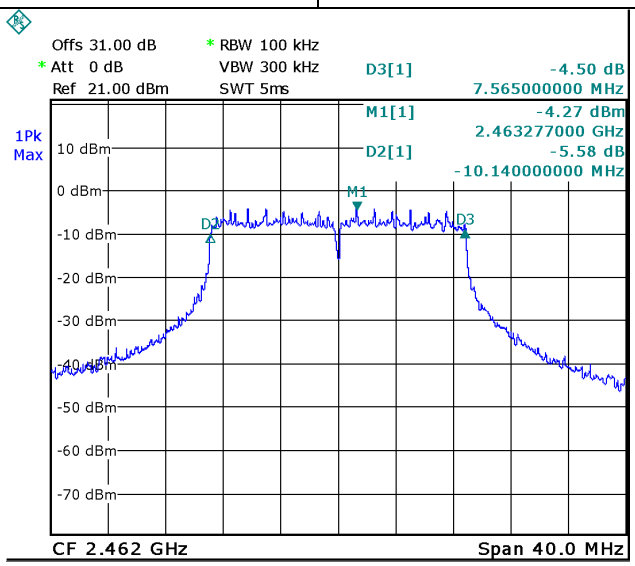


Figure 24. 2462.0 MHz, Wi-fi/n(65Mbit/s)

4.5 Test Equipment Used; 6dB Bandwidth

Instrument	ITL #	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	1499	R&S	FSL6	100194	20/2/2022	20/2/2023
30dB Attenuator	1776	MCL	BW-S30W5	533	16/5/2022	16/5/2023
RF Cable	1844	EIM	705A009301EIM	-	16/5/2022	16/5/2023

Figure 25 Test Equipment Used

5. Maximum Conducted Output Power

5.1 Test Specification

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

RSS 247, Issue 2, Section 5.4(d)

5.2 Test Procedure

(Temperature (20°C)/ Humidity (63%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 (total loss=31.0 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

5.3 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.

5.4 Test Results

Protocol Type	Operation Frequency	Power	Power	Limit	Margin
	(MHz)	(dBm)	(mW)	(mW)	(mW)
BLE	2402.0	0.87	1.222	1000.0	-998.778
	2426.0	0.67	1.167	1000.0	-998.833
	2480.0	-0.25	0.944	1000.0	-999.056
Wi-fi/b(1Mbit/s)	2412.0	15.41	34.754	1000.0	-965.246
	2437.0	15.09	32.285	1000.0	-967.715
	2462.0	14.64	29.107	1000.0	-970.893
Wi-fi/b(11Mbit/s)	2412.0	18.21	66.222	1000.0	-933.778
	2437.0	17.77	59.841	1000.0	-940.159
	2462.0	17.62	57.810	1000.0	-942.190
Wi-fi/g(6Mbit/s)	2412.0	18.98	79.068	1000.0	-920.932
	2437.0	18.59	72.277	1000.0	-927.723
	2462.0	18.54	71.450	1000.0	-928.550
Wi-fi/g(54Mbit/s)	2412.0	17.13	51.642	1000.0	-948.358
	2437.0	16.63	46.026	1000.0	-953.974
	2462.0	16.65	46.238	1000.0	-953.762
Wi-fi/n(6.5Mbit/s)	2412.0	19	79.433	1000.0	-920.567
	2437.0	18.6	72.444	1000.0	-927.556
	2462.0	18.45	69.984	1000.0	-930.016

Protocol Type	Operation Frequency	Power	Power	Limit	Margin
	(MHz)	(dBm)	(mW)	(mW)	(mW)
Wi-fi/n(65Mbit/s)	2412.0	15.89	38.815	1000.0	-961.185
	2437.0	15.48	35.318	1000.0	-964.682
	2462.0	15.31	33.963	1000.0	-966.037

Figure 26 Maximum Peak Power Output

JUDGEMENT: Passed

For additional information see Figure 27 to Figure 47.

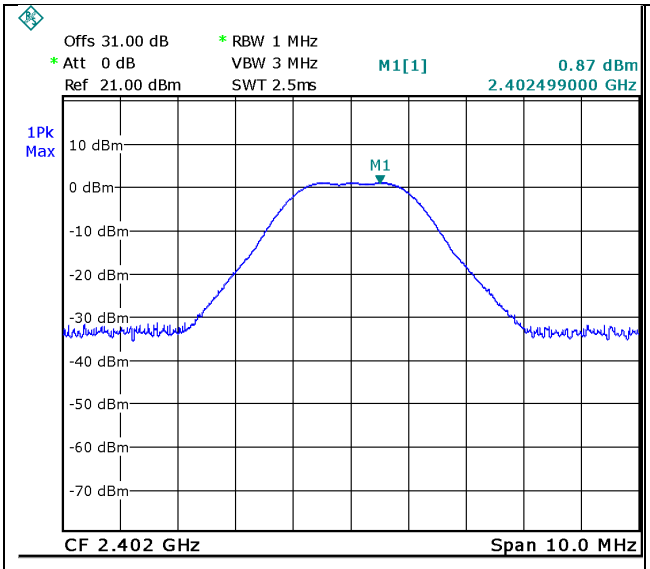


Figure 27. 2402.0 MHz, BLE

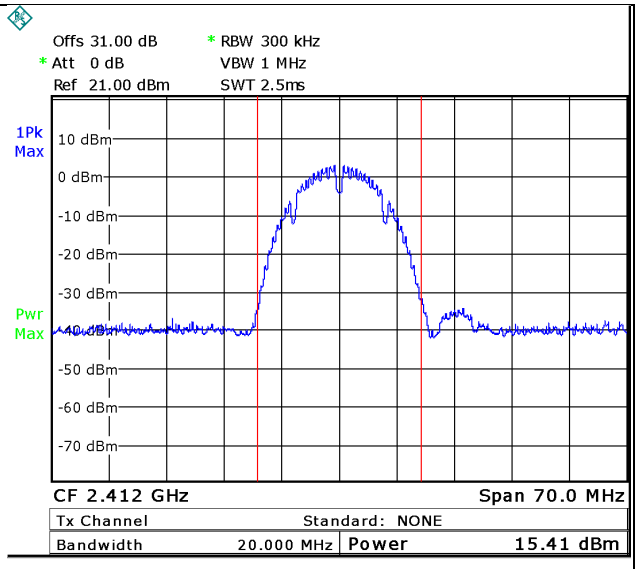


Figure 28. 2412.0 MHz, Wi-fi/b(1Mbit/s)

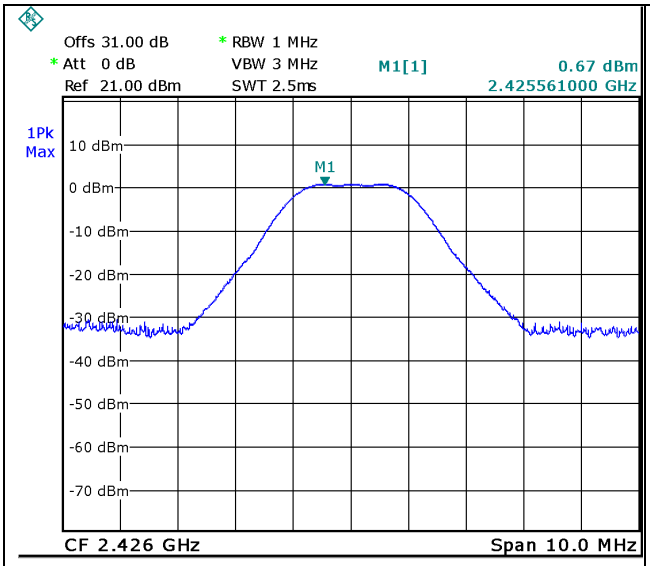


Figure 29. 2426.0 MHz, BLE

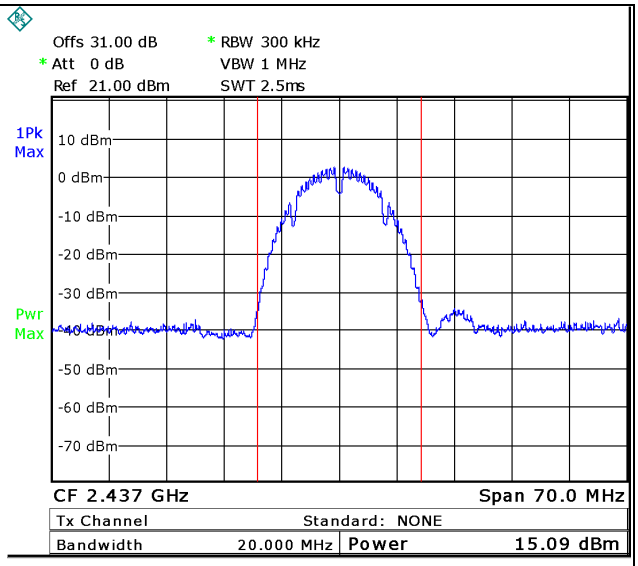


Figure 30. 2437.0 MHz, Wi-fi/b(1Mbit/s)

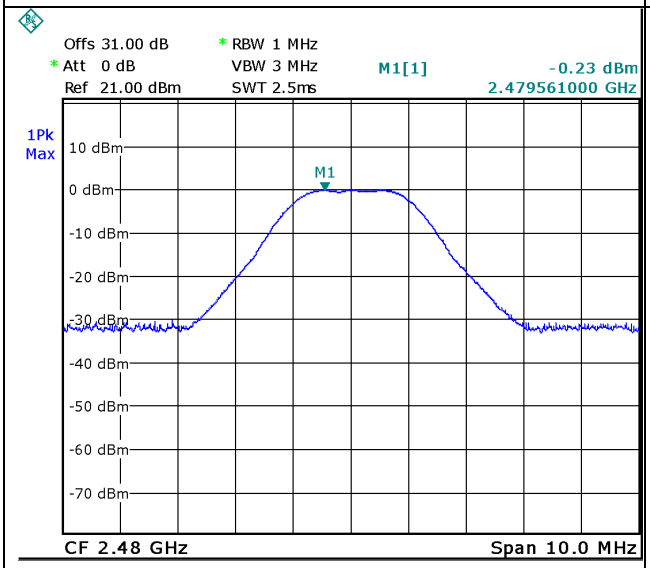


Figure 31. 2480.0 MHz, BLE

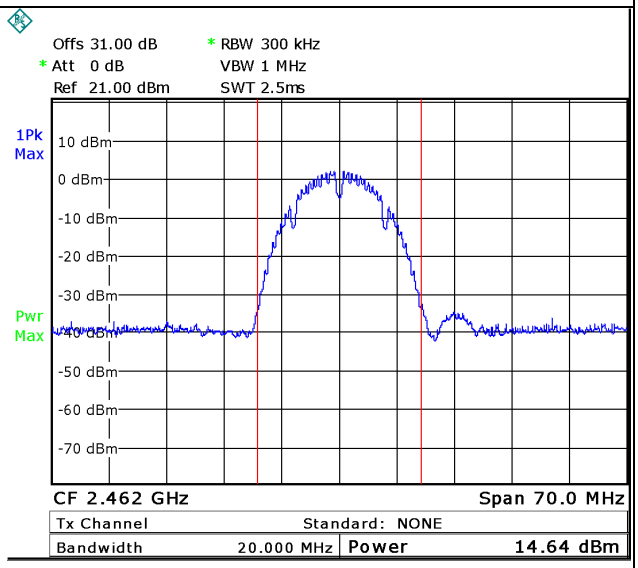


Figure 32. 2462.0 MHz, Wi-fi/b(1Mbit/s)

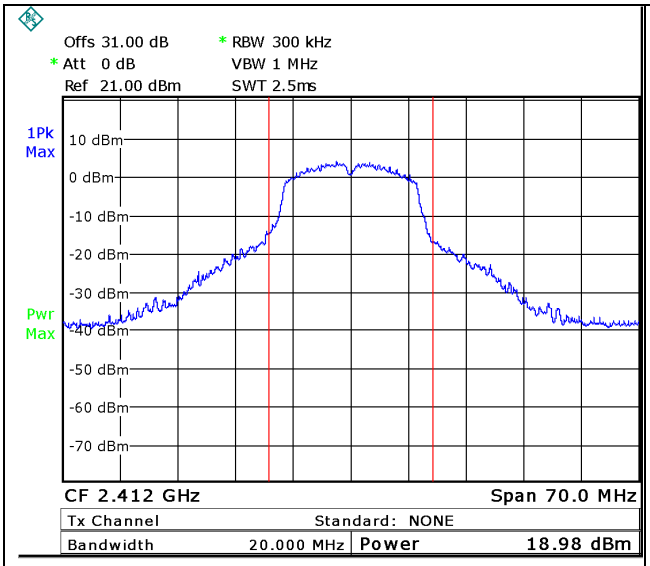


Figure 33. 2412.0 MHz, Wi-fi/g(6Mbit/s)

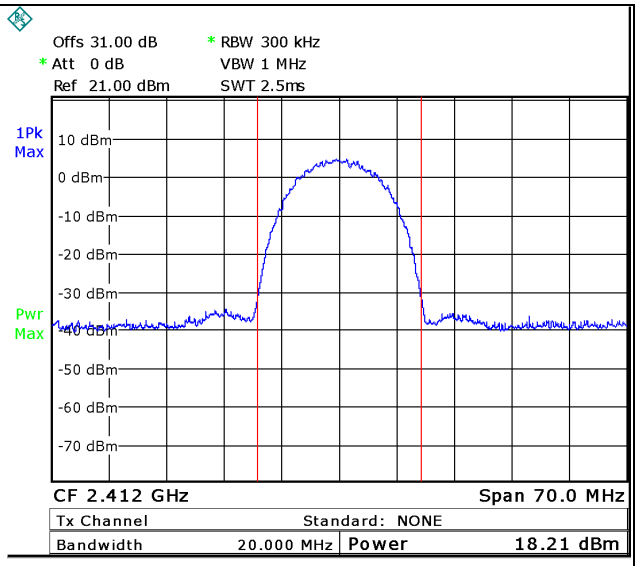


Figure 34. 2412.0 MHz, Wi-fi/b(11Mbit/s)

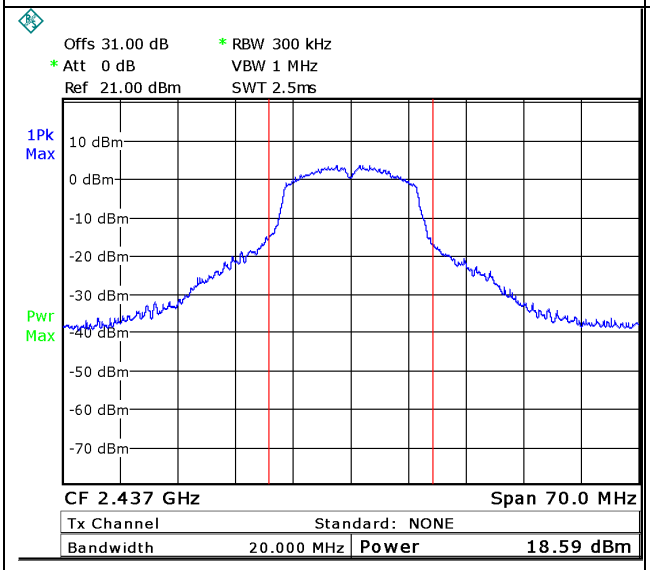


Figure 35. 2437.0 MHz, Wi-fi/g(6Mbit/s)

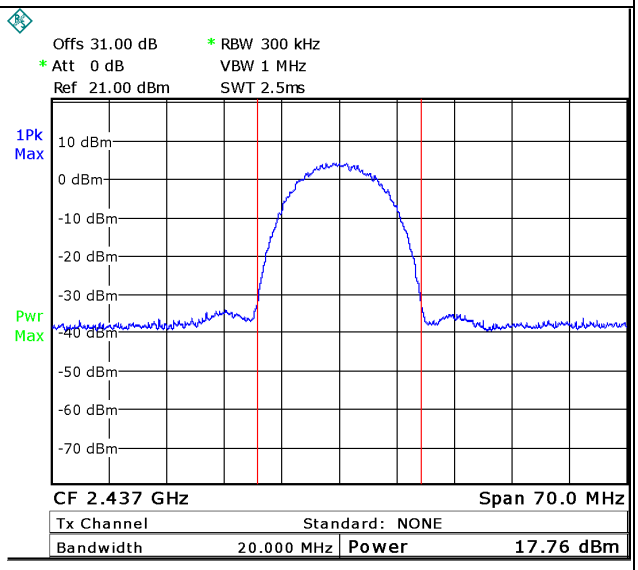


Figure 36. 2437.0 MHz, Wi-fi/b(11Mbit/s)

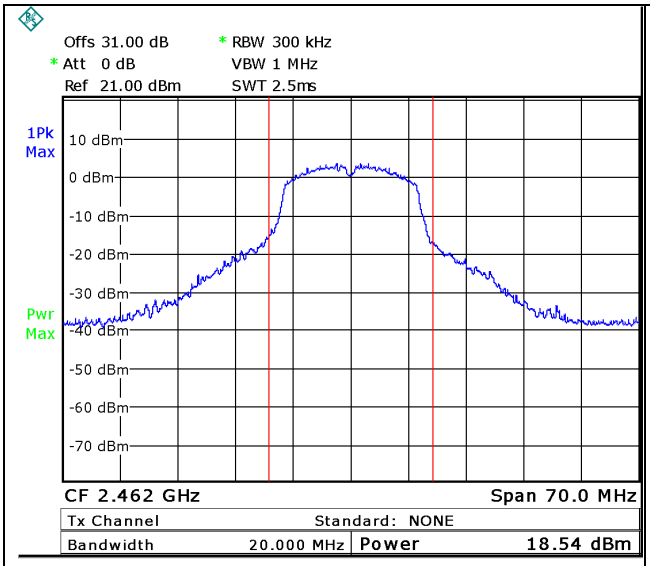


Figure 37. 2462.0 MHz, Wi-fi/g(6Mbit/s)

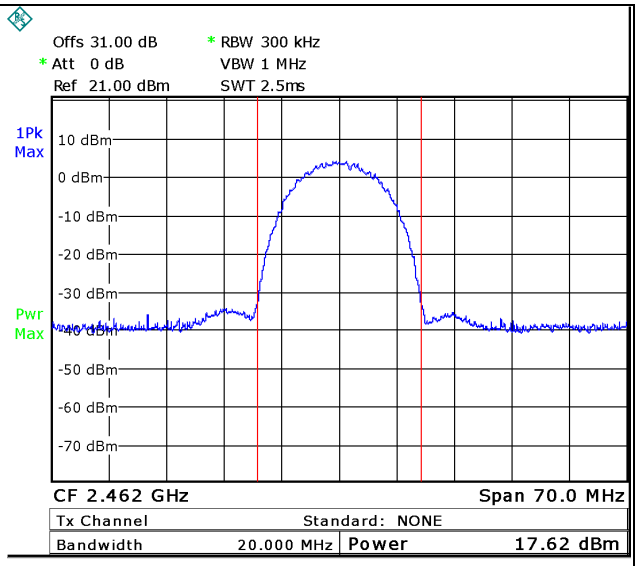


Figure 38. 2462.0 MHz, Wi-fi/b(11Mbit/s)

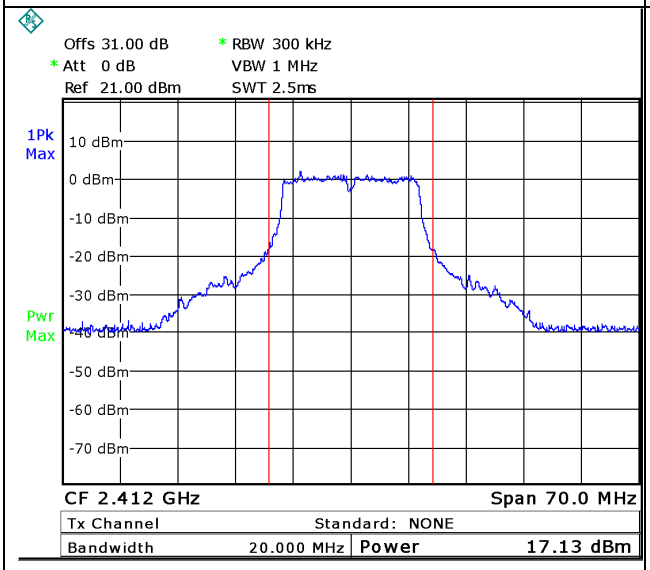


Figure 39. 2412.0 MHz, Wi-fi/g(54Mbit/s)

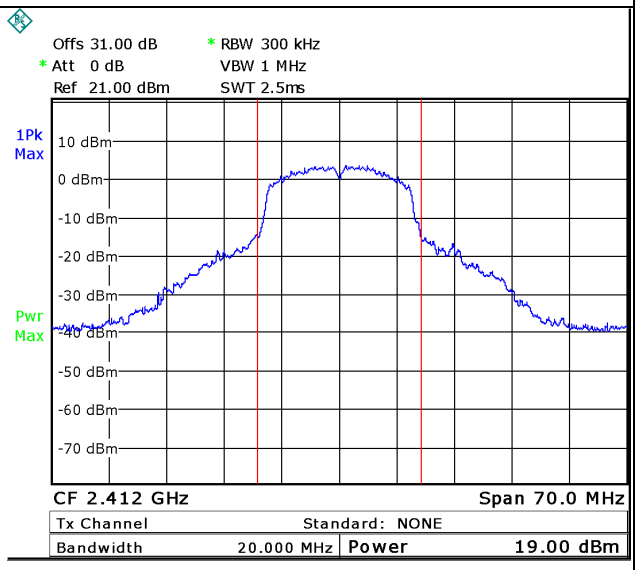


Figure 40. 2412.0 MHz, Wi-fi/n(6.5Mbit/s)

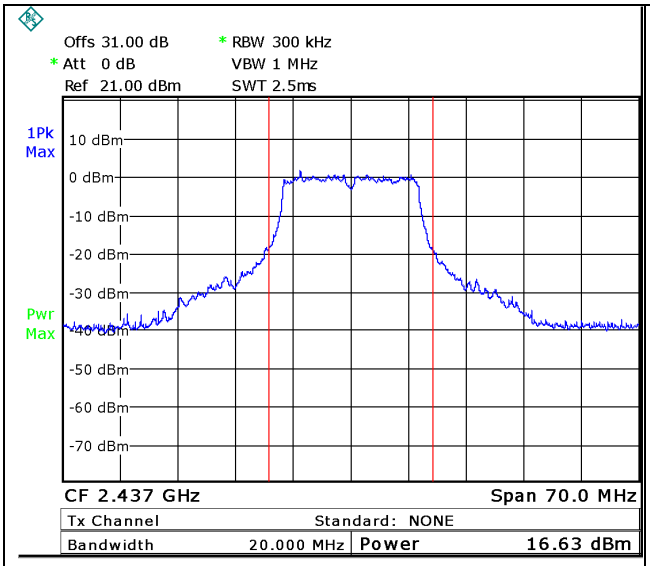


Figure 41. 2437.0 MHz, Wi-fi/g(54Mbit/s)

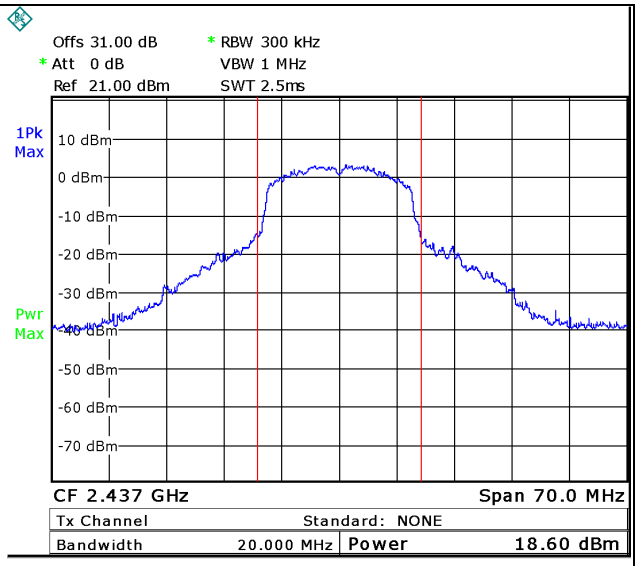


Figure 42. 2437.0 MHz, Wi-fi/n(6.5Mbit/s)

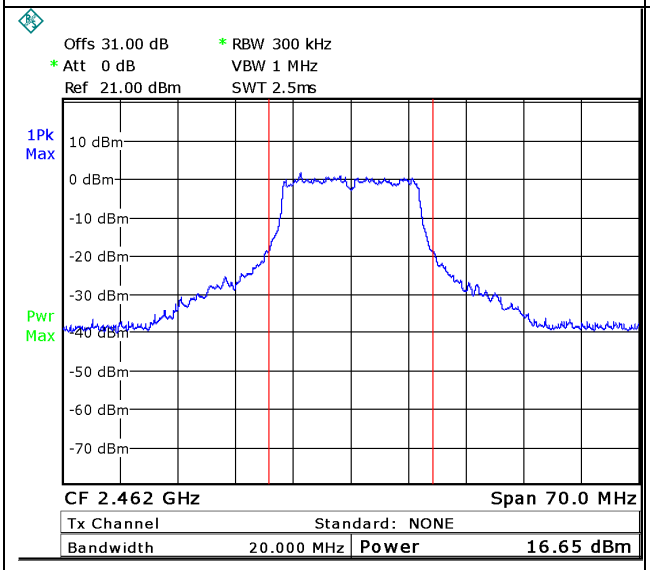


Figure 43. 2462.0 MHz, Wi-fi/g(54Mbit/s)

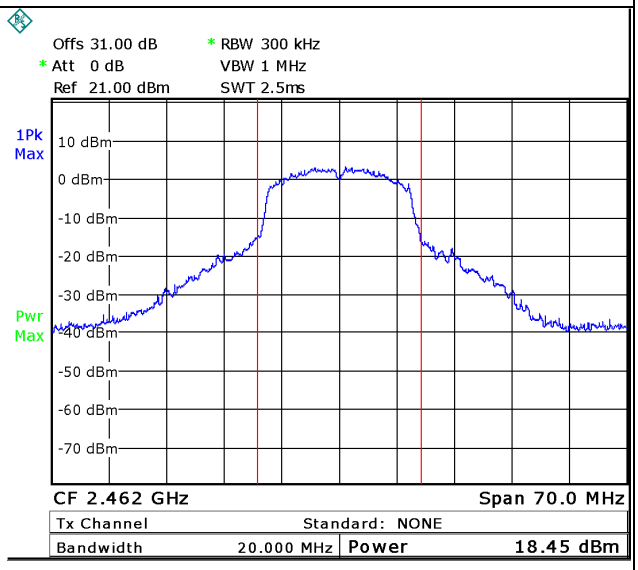


Figure 44. 2462.0 MHz, Wi-fi/n(6.5Mbit/s)

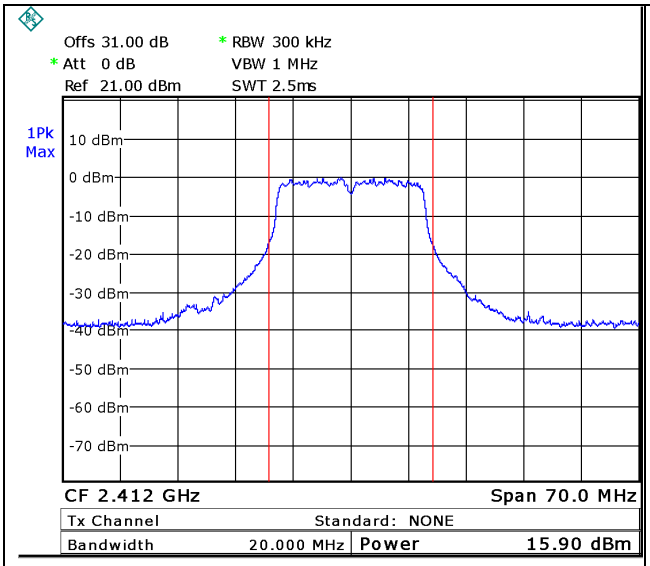


Figure 45. 2412.0 MHz, Wi-fi/n(65Mbit/s)

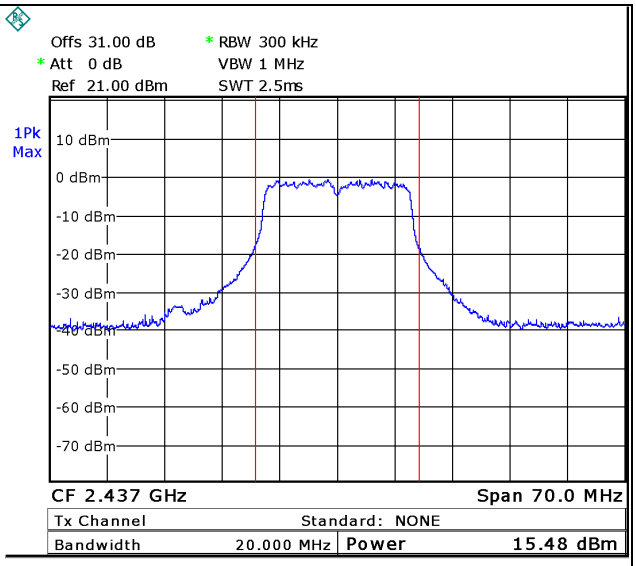


Figure 46. 2437.0 MHz, Wi-fi/n(65Mbit/s)

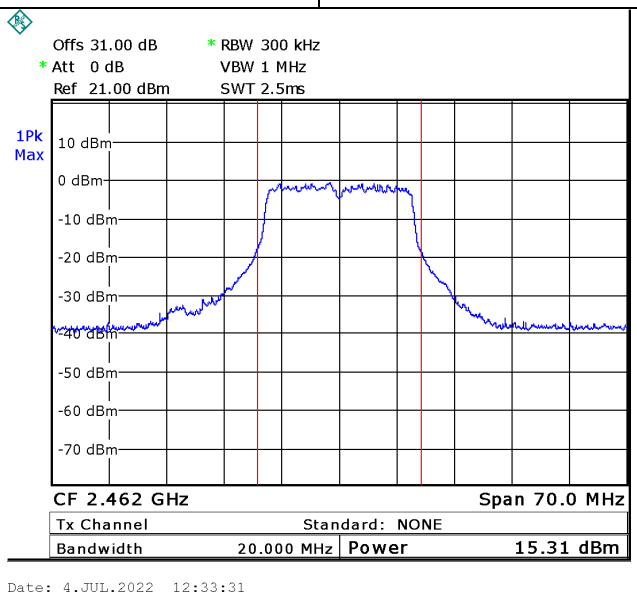


Figure 47. 2462.0 MHz, Wi-fi/n(65Mbit/s)

5.5 Test Equipment Used; Maximum Peak Power Output

Instrument	ITL #	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	1499	R&S	FSL6	100194	20/2/2022	20/2/2023
30dB Attenuator	1776	MCL	BW-S30W5	533	16/5/2022	16/5/2023
RF Cable	1844	EIM	705A009301EIM	-	16/5/2022	16/5/2023

Figure 48 Test Equipment Used

6. Band Edge Spectrum

6.1 Test Specification

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

RSS 247, Issue 2, Section 5.5

6.2 Test Procedure

(Temperature (20°C)/ Humidity (63%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 (loss=31.0 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The RBW was set to 100 kHz.

6.3 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.

6.4 Test Results

Protocol Type	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBm)	Limit (dBm)	Margin (dB)
BLE	2402.0	2400.0	-31.06	-19.14	-11.92
	2480.0	2483.5	-46.25	-19.9	-26.35
Wi-fi/b(1Mbit/s)	2412.0	2400.0	-45.66	-18.6	-27.06
	2462.0	2483.5	-44.99	-19.26	-25.73
Wi-fi/b(11Mbit/s)	2412.0	2400.0	-41.69	-18.12	-23.57
	2462.0	2483.5	-45.25	-18.72	-26.53
Wi-fi/g(6Mbit/s)	2412.0	2400.0	-25.39	-18.23	-7.16
	2462.0	2483.5	-40.98	-18.8	-22.18
Wi-Fi/g(54Mbit/s)	2412.0	2400.0	-31.07	-21.85	-9.22
	2462.0	2483.5	-44.97	-22.7	-22.27
Wi-Fi/n(6.5Mbit/s)	2412.0	2400.0	-25.62	-18.09	-7.53
	2462.0	2483.5	-39.36	-18.7	-20.66
Wi-fi/n(65Mbit/s)	2412.0	2400.0	-33.29	-23.55	-9.74
	2462.0	2483.5	-44.69	-24.25	-20.44

Figure 49 Band Edge Spectrum

JUDGEMENT: Passed

For additional information see Figure 50 to Figure 63.

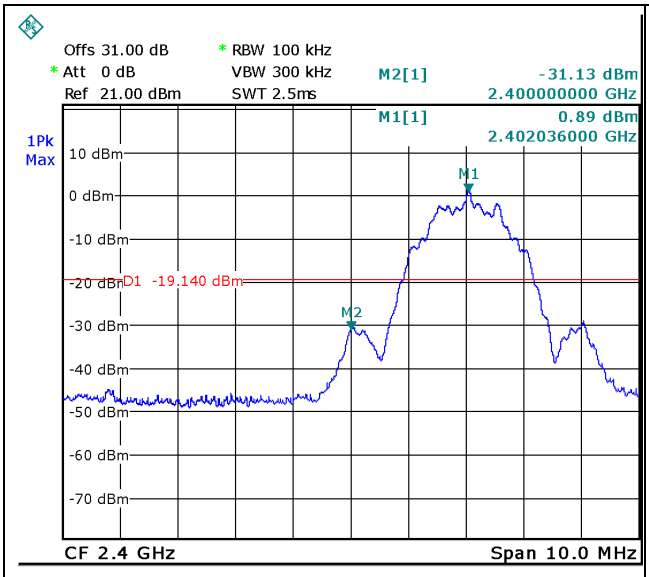


Figure 50. 2402.0 MHz, BLE

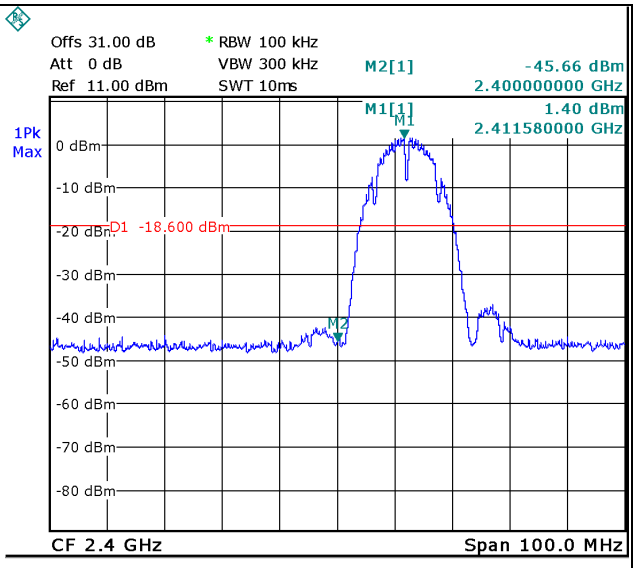


Figure 51. 2412.0 MHz, Wi-fi/b(1Mbit/s)

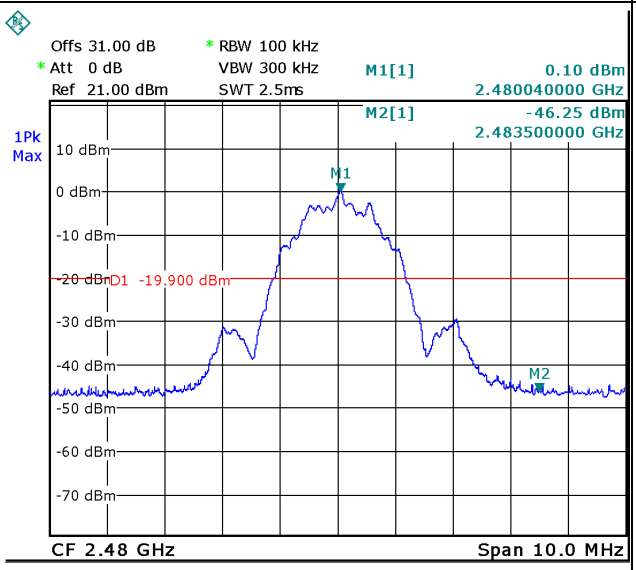


Figure 52. 2480.0 MHz, BLE

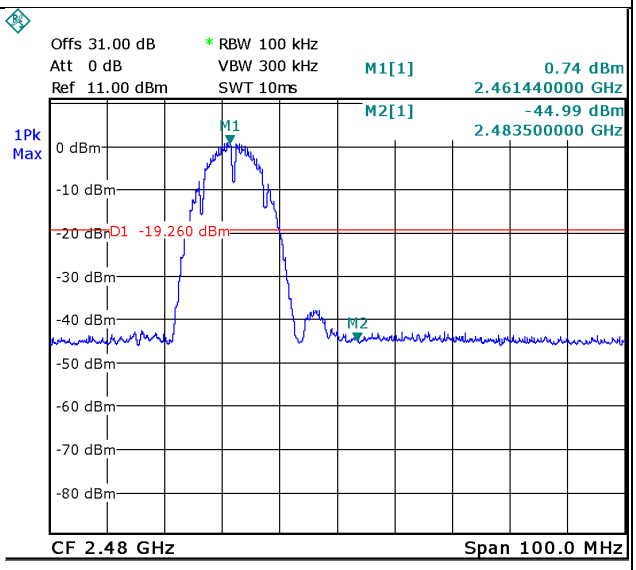


Figure 53. 2462.0 MHz, Wi-fi/b(1Mbit/s)

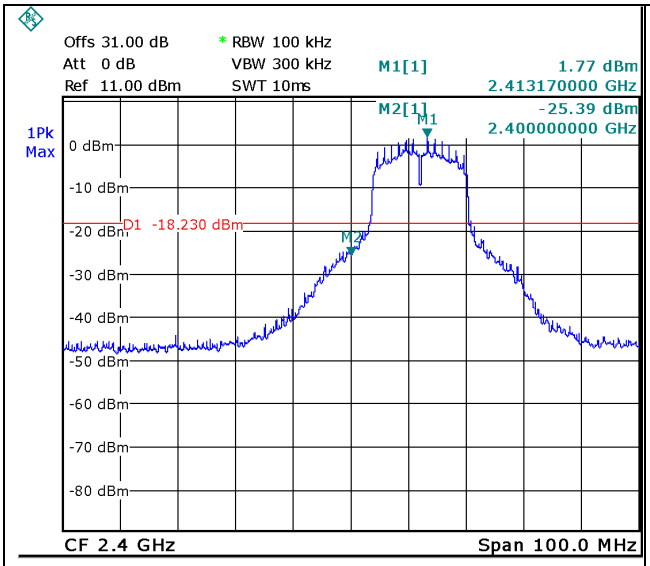


Figure 54. 2412.0 MHz, Wi-fi/g(6Mbit/s)

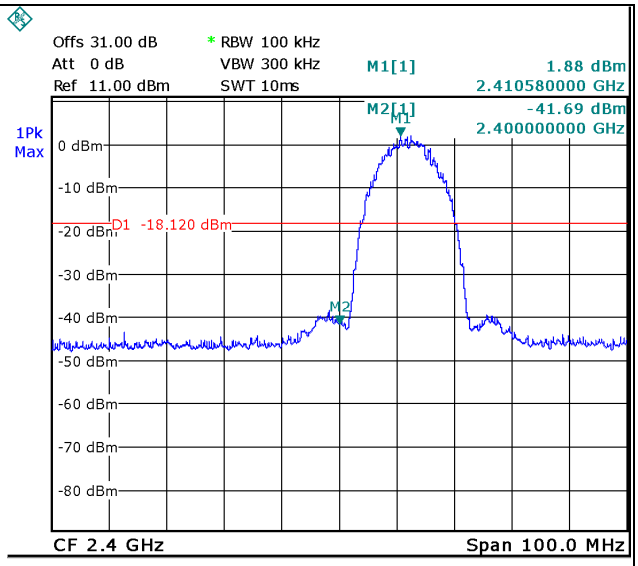


Figure 55. 2412.0 MHz, Wi-fi/b(11Mbit/s)

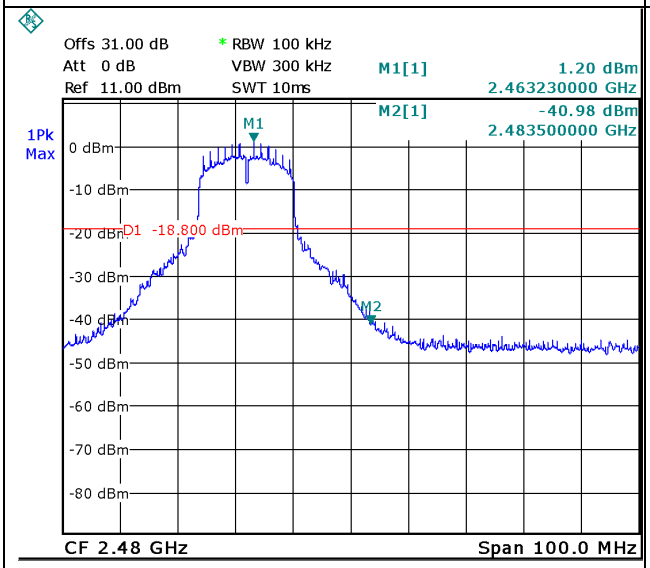


Figure 56. 2462.0 MHz, Wi-fi/g(6Mbit/s)

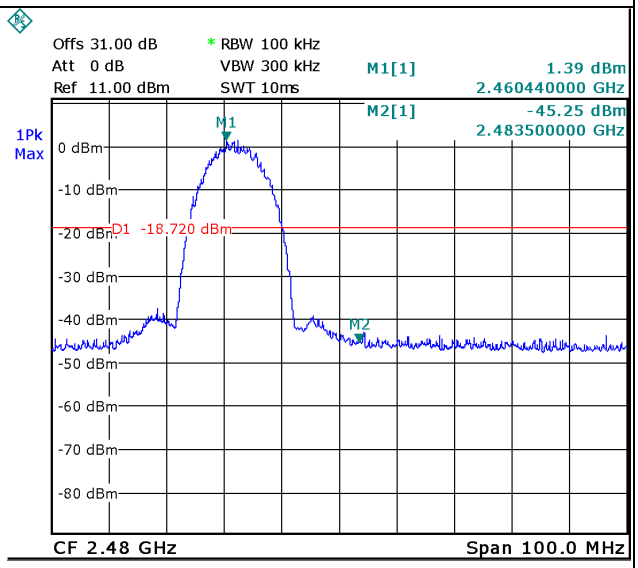


Figure 57. 2462.0 MHz, Wi-fi/b(11Mbit/s)

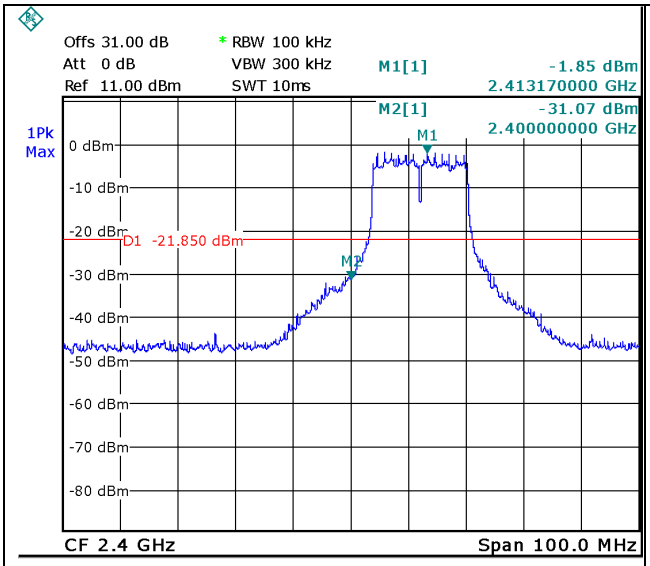


Figure 58. 2412.0 MHz, Wi-fi/g(54Mbit/s)

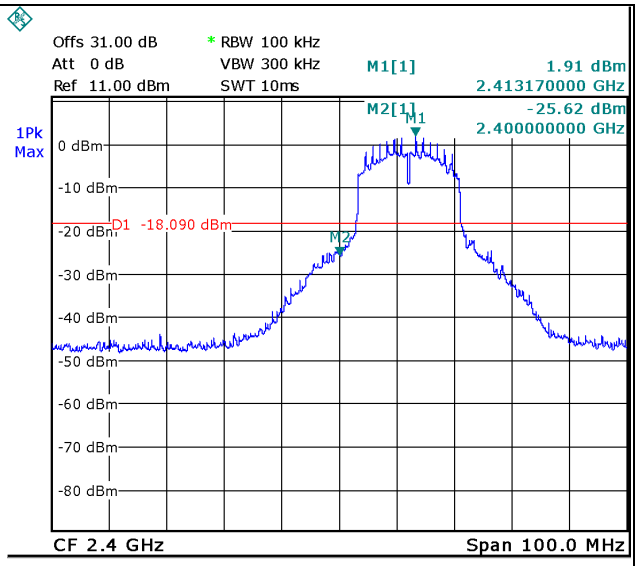


Figure 59. 2412.0 MHz, Wi-fi/n(6.5Mbit/s)

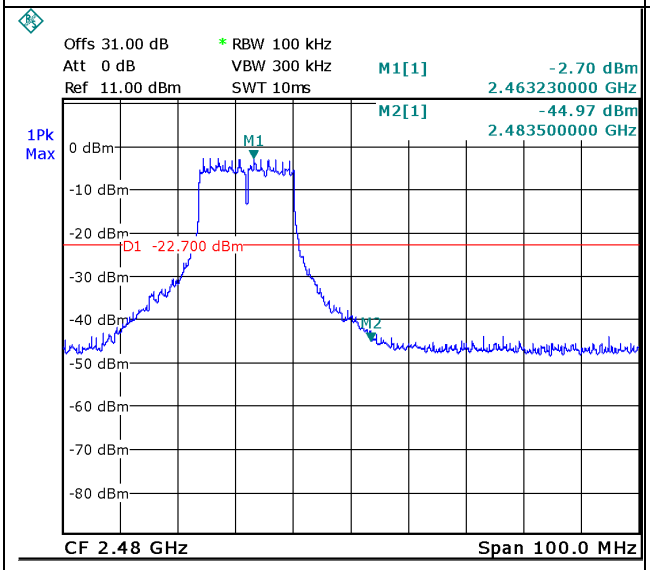


Figure 60. 2462.0 MHz, Wi-fi/g(54Mbit/s)

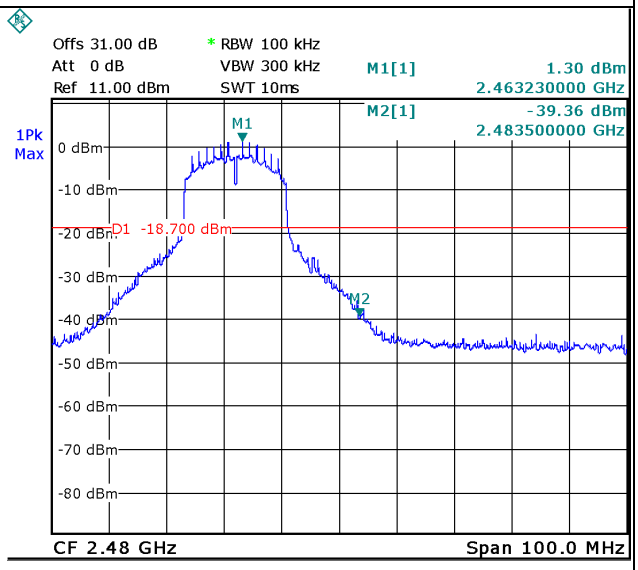


Figure 61. 2462.0 MHz, Wi-fi/n(6.5Mbit/s)

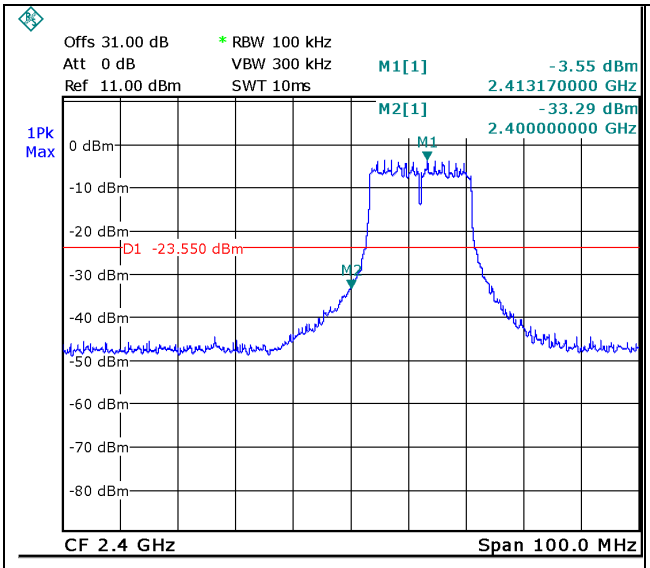


Figure 62. 2412.0 MHz, Wi-fi/n(65Mbit/s)

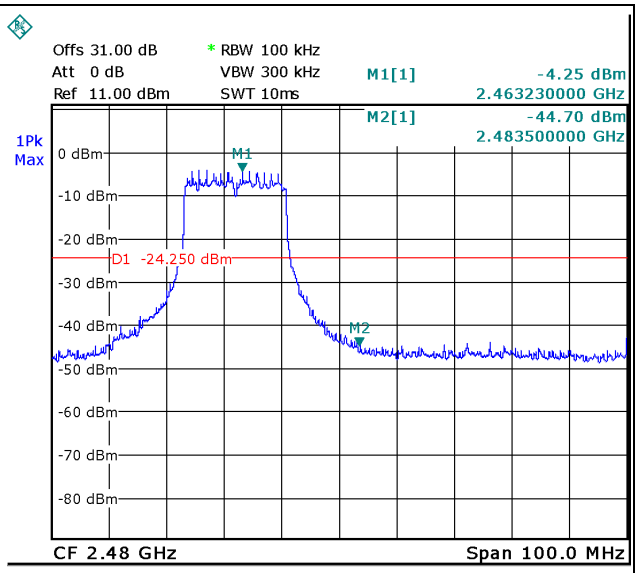


Figure 63. 2462.0 MHz, Wi-fi/n(65Mbit/s)

6.5 Test Equipment Used; Band Edge

Instrument	ITL #	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	1499	R&S	FSL6	100194	20/2/2022	20/2/2023
30dB Attenuator	1776	MCL	BW-S30W5	533	16/5/2022	16/5/2023
RF Cable	1844	EIM	705A009301EIM		16/5/2022	16/5/2023

Figure 64 Test Equipment Used

7. Transmitted Power Density

7.1 Test Specification

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

RSS 247, Issue 2, Section 5.2(b)

7.2 Test Procedure

(Temperature (20°C)/ Humidity (63%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 (total loss= 31.0dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The spectrum analyzer was set to 3 kHz RBW.

7.3 Test Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.4 Test Results

Protocol Type	Operation Frequency	PSD Reading	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
BLE	2402.0	-17.13	8.0	-25.13
	2426.0	-16.96	8.0	-24.96
	2480.0	-17.56	8.0	-25.56
Wi-fi/b(1Mbit/s)	2412.0	-12.59	8.0	-20.59
	2437.0	-13.47	8.0	-21.47
	2462.0	-13.44	8.0	-21.44
Wi-fi/b(11Mbit/s)	2412.0	-11.43	8.0	-19.43
	2437.0	-11.74	8.0	-19.74
	2462.0	-11.98	8.0	-19.98
Wi-fi/g(6Mbit/s)	2412.0	-14.07	8.0	-22.07
	2437.0	-13.91	8.0	-21.91
	2462.0	-15.38	8.0	-23.38
Wi-fi/g(54Mbit/s)	2412.0	-16.46	8.0	-24.46
	2437.0	-18.38	8.0	-26.38
	2462.0	-18.49	8.0	-26.49

Protocol Type	Operation Frequency	PSD Reading	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
Wi-fi/n(6.5Mbit/s)	2412.0	-13.73	8.0	21.73
	2437.0	-14.5	8.0	22.5
	2462.0	-15.06	8.0	23.06
Wi-fi/n(65Mbit/s)	2412.0	-18.99	8.0	26.99
	2437.0	-20.49	8.0	28.49
	2462.0	-20.28	8.0	28.28

Figure 65 Test Results

JUDGEMENT: Passed

For additional information see Figure 66 to Figure 86.

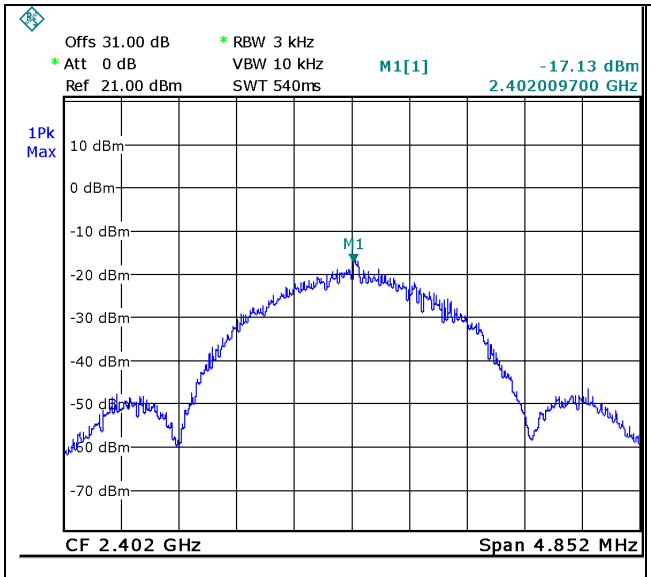


Figure 66. 2402.0 MHz, BLE

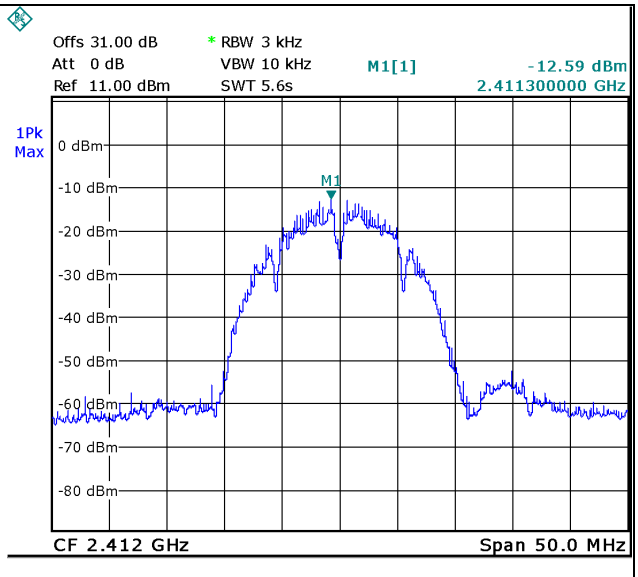


Figure 67. 2412.0 MHz, Wi-fi/b(1Mbit/s)

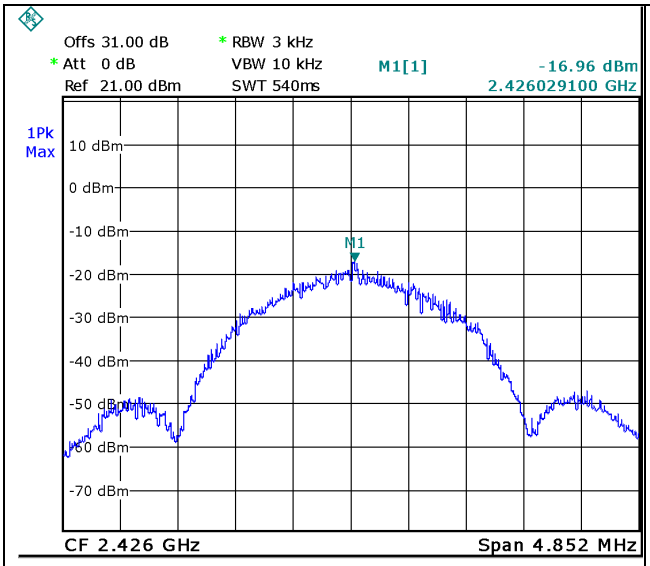


Figure 68. 2426.0 MHz, BLE

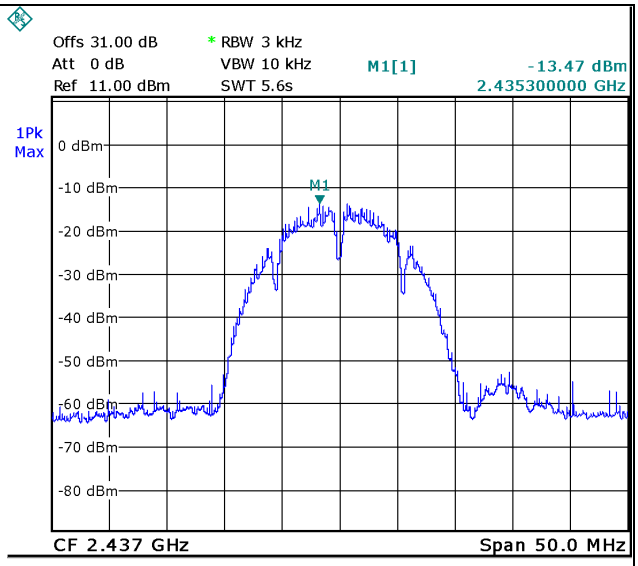


Figure 69. 2437.0 MHz, Wi-fi/b(1Mbit/s)

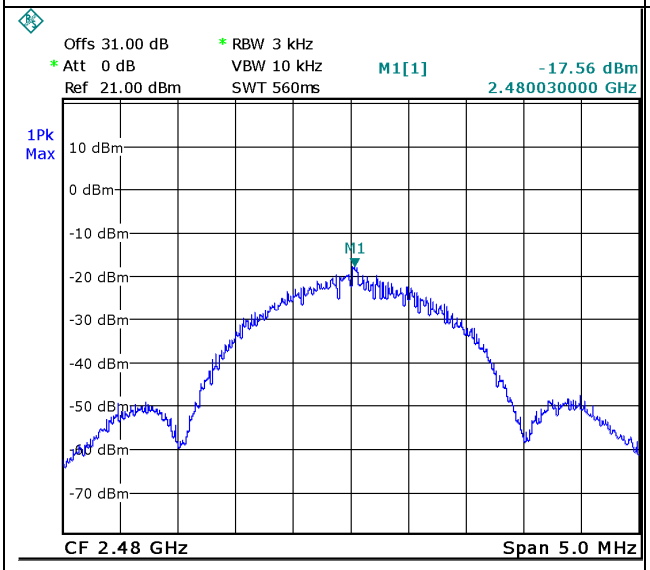


Figure 70. 2480.0 MHz, BLE

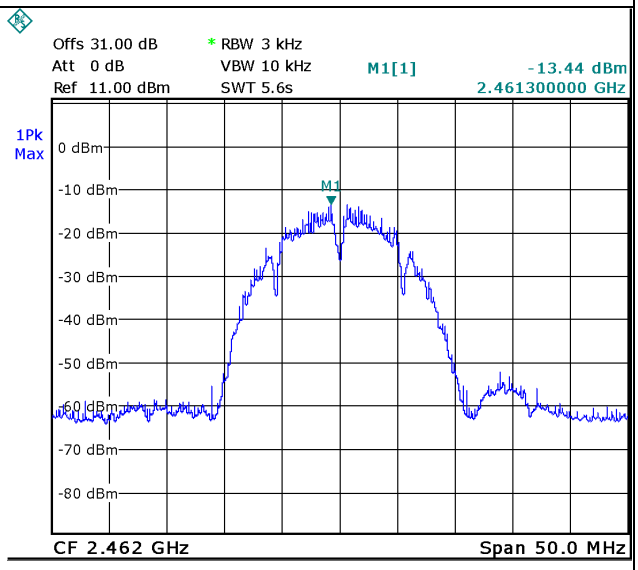


Figure 71. 2462.0 MHz, Wi-fi/b(1Mbit/s)

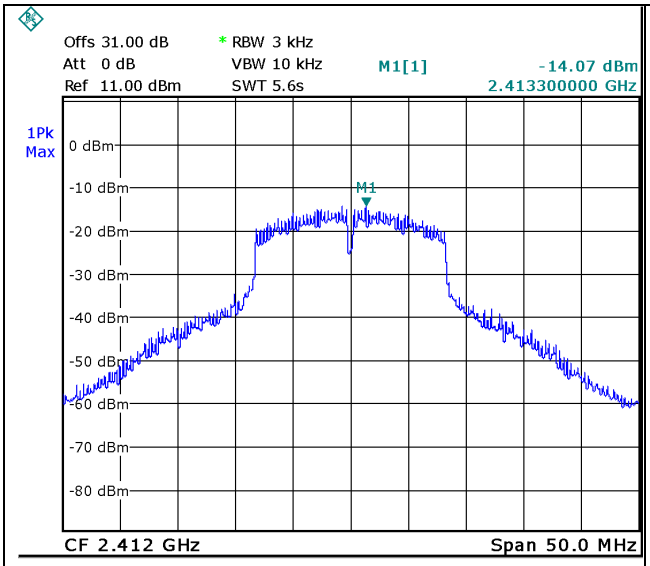


Figure 72. 2412.0 MHz, Wi-fi/g(6Mbit/s)

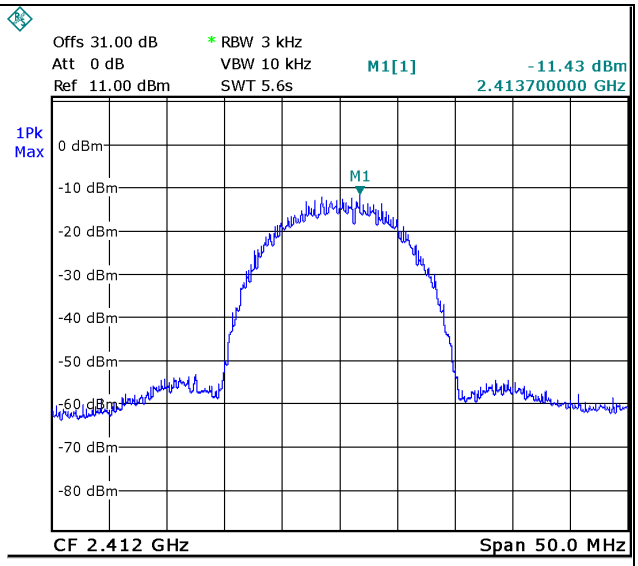


Figure 73. 2412.0 MHz, Wi-fi/b(11Mbit/s)

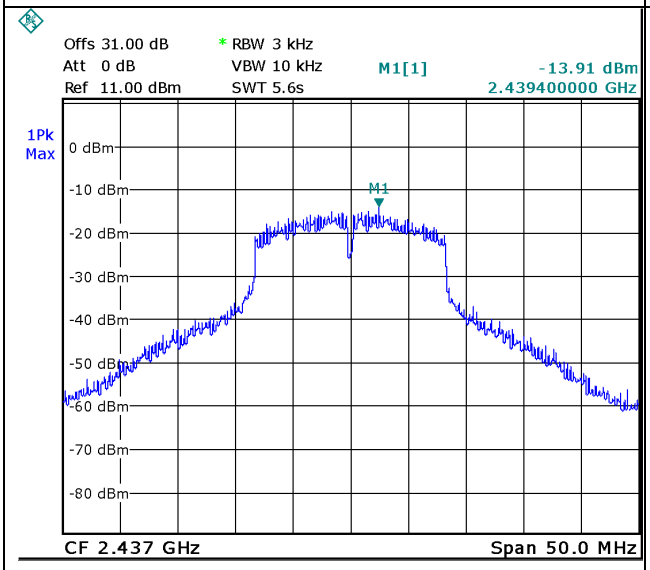


Figure 74. 2437.0 MHz, Wi-fi/g(6Mbit/s)

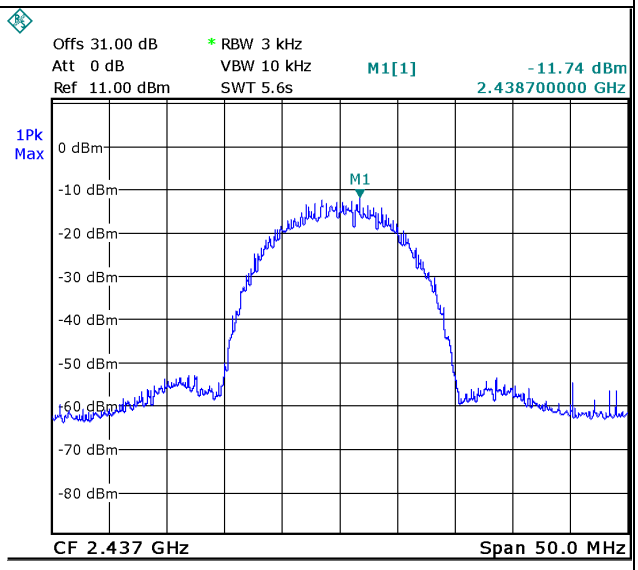


Figure 75. 2437.0 MHz, Wi-fi/b(11Mbit/s)

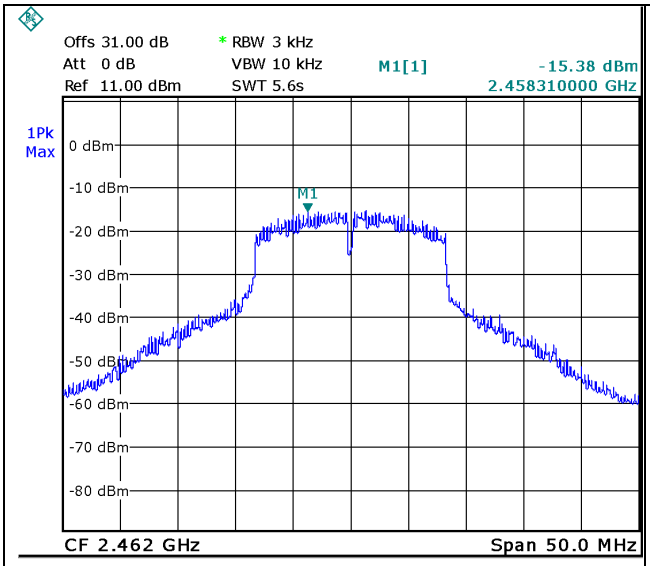


Figure 76. 2462.0 MHz, Wi-fi/g(6Mbit/s)

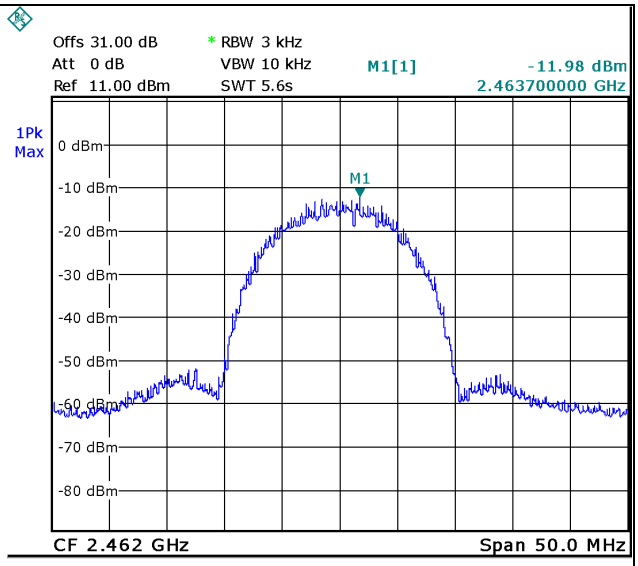


Figure 77. 2462.0 MHz, Wi-fi/b(11Mbit/s)

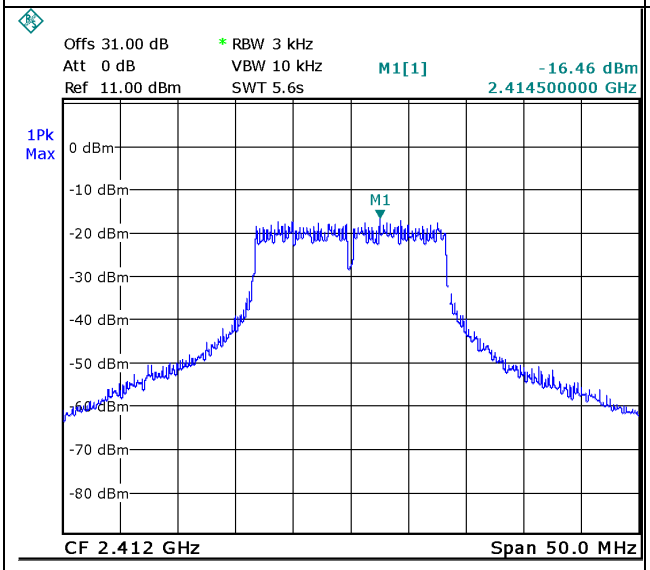


Figure 78. 2412.0 MHz, Wi-fi/g(54Mbit/s)

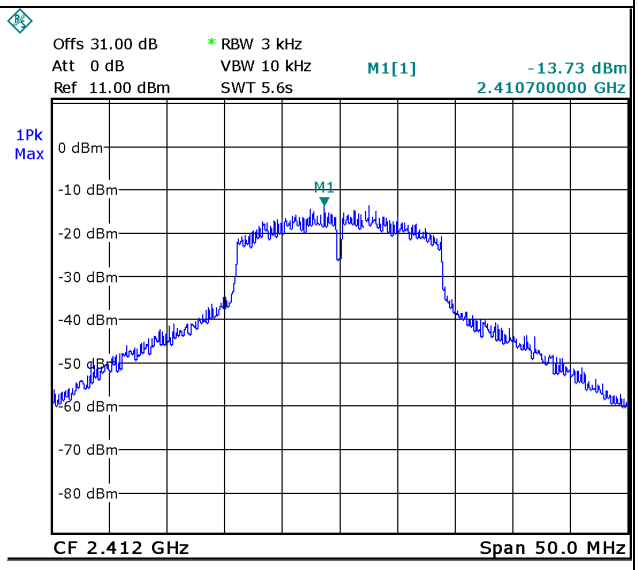


Figure 79. 2412.0 MHz, Wi-fi/n(6.5Mbit/s)

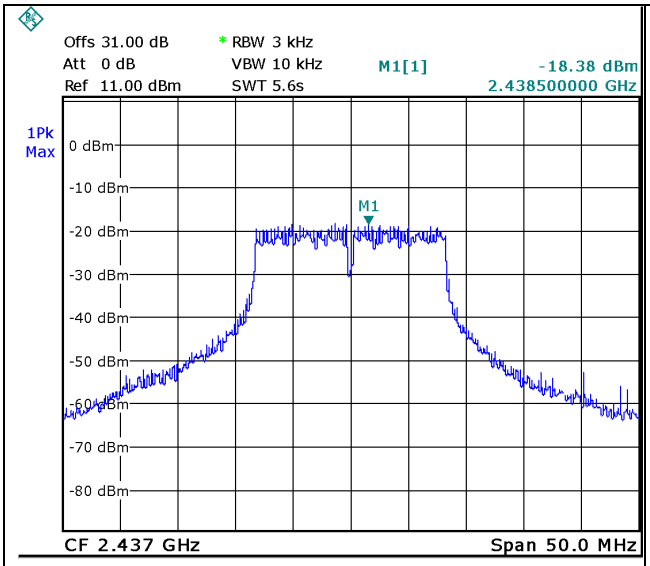


Figure 80. 2437.0 MHz, Wi-fi/g(54Mbit/s)

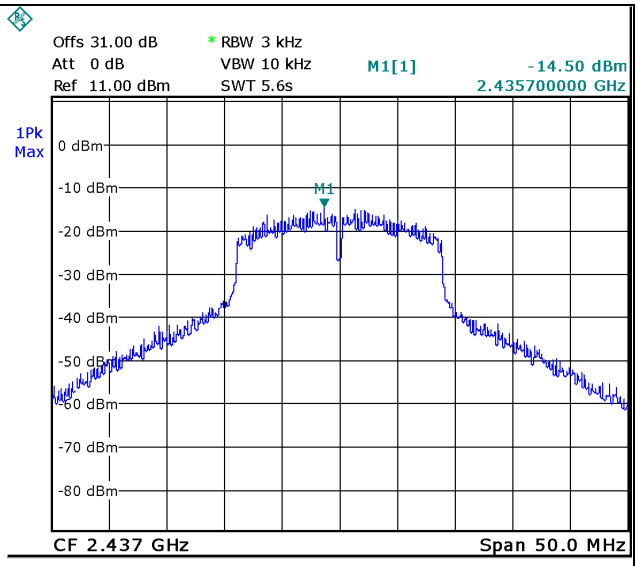


Figure 81. 2437.0 MHz, Wi-fi/n(6.5Mbit/s)

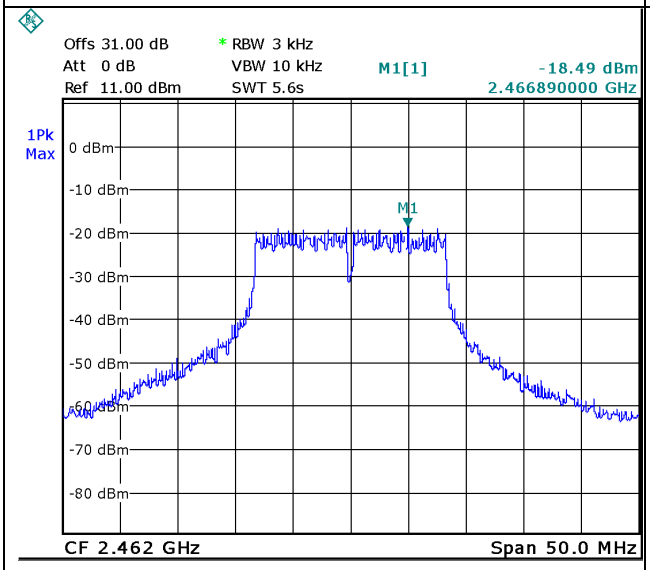


Figure 82. 2462.0 MHz, Wi-fi/g(54Mbit/s)

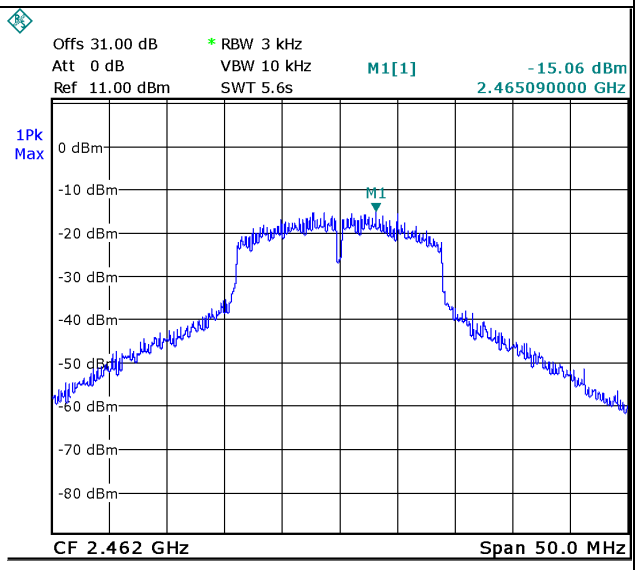


Figure 83. 2462.0 MHz, Wi-fi/n(6.5Mbit/s)

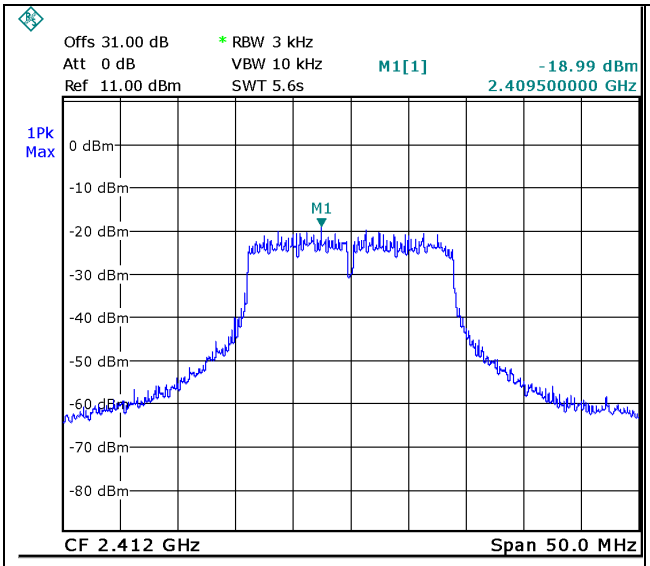


Figure 84. 2412.0 MHz, Wi-fi/n(65Mbit/s)

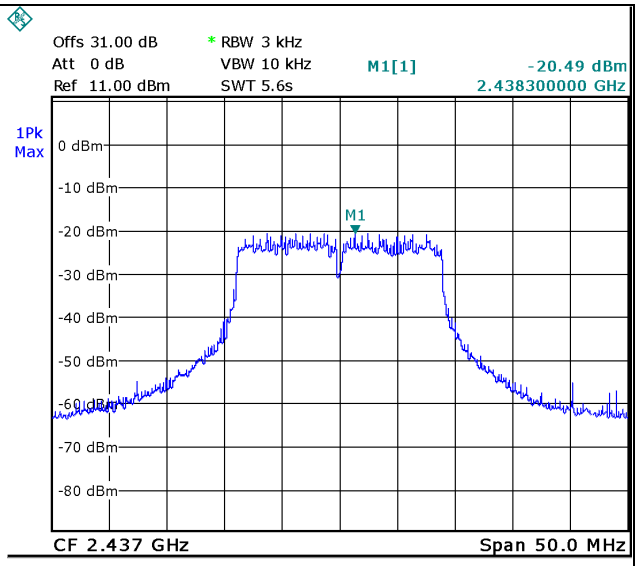


Figure 85. 2437.0 MHz, Wi-fi/n(65Mbit/s)

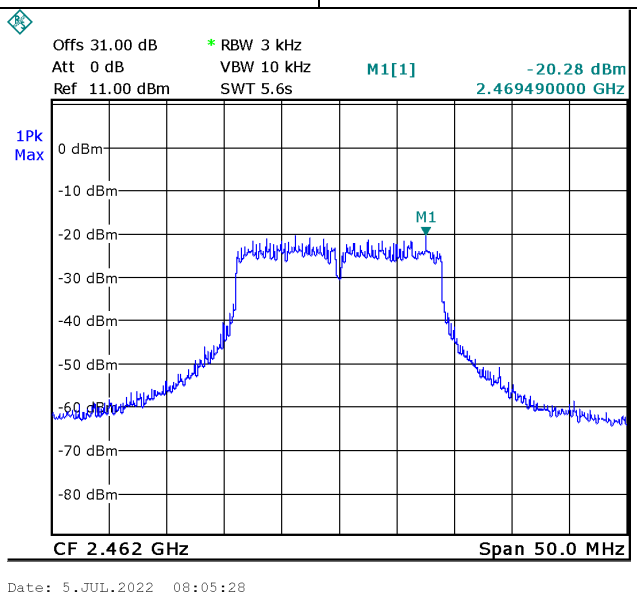


Figure 86. 2462.0 MHz, Wi-fi/n(65Mbit/s)

7.5 Test Equipment Used; Transmitted Power Density

Instrument	ITL #	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	1499	R&S	FSL6	100194	20/2/2022	20/2/2023
30dB Attenuator	1776	MCL	BW-S30W5	533	16/5/2022	16/5/2023
RF Cable	1844	EIM	705A009301EIM	-	16/5/2022	16/5/2023

Figure 87 Test Equipment Used

8. Occupied Bandwidth

8.1 Test Specification

FCC, Part 2, Subpart J, Section 2.1049

RSS-Gen, Issue 5, April 2018, Section 6.7

8.2 Test Procedure

(Temperature (20°C)/ Humidity (63%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 (total loss= 32.0dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The RBW set to the range of 1% to 5% of the OBW.

The span was set between 1.5 to 5 times of the OBW.
99% occupied bandwidth function was set on.

8.3 Test Limit

N/A

Occupied Bandwidth

E.U.T Description	Battery-operated, Wall Mounted Tag
Model Number	Aerial ECall
Part Number:	Not designated

8.4 Test Results

Protocol Type	Operation Frequency (MHz)	Reading (MHz)
BLE	2402.0	2.056
	2426.0	2.056
	2480.0	2.066
Wi-fi/b(1Mbit/s)	2412.0	14.17
	2437.0	14.07
	2462.0	14.07
Wi-fi/b(11Mbit/s)	2412.0	14.37
	2437.0	14.47
	2462.0	14.47
Wi-fi/g(6Mbit/s)	2412.0	17.86
	2437.0	17.76
	2462.0	17.76
Wi-fi/g(54Mbit/s)	2412.0	17.16
	2437.0	17.16
	2462.0	17.26
Wi-fi/n(6.5Mbit/s)	2412.0	18.86
	2437.0	18.56
	2462.0	18.56
Wi-fi/n(65Mbit/s)	2412.0	18.16
	2437.0	18.16
	2462.0	18.06

Figure 88. Bandwidth Test Results

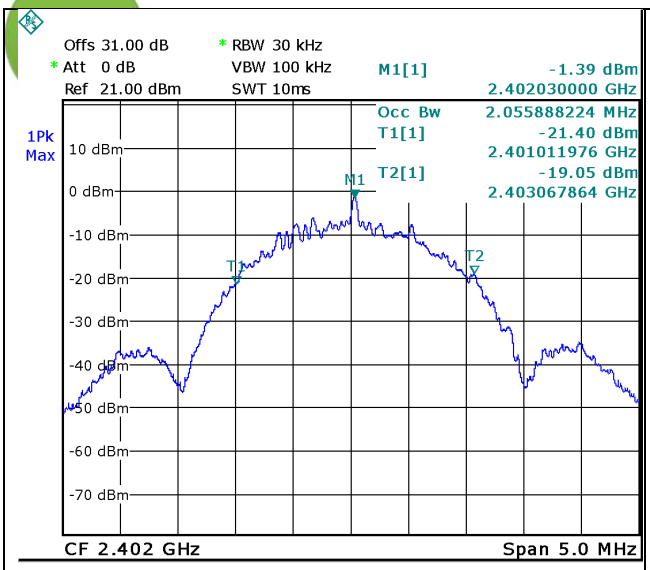


Figure 89. 2402.0 MHz, BLE

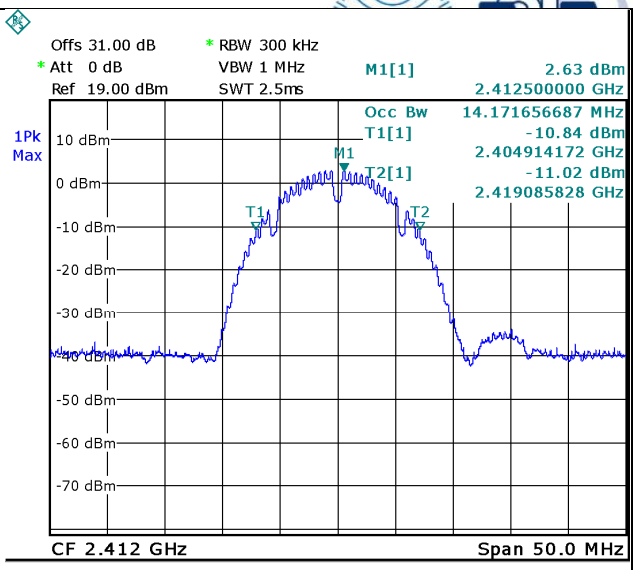


Figure 90. 2412.0 MHz, Wi-fi/b(1Mbit/s)

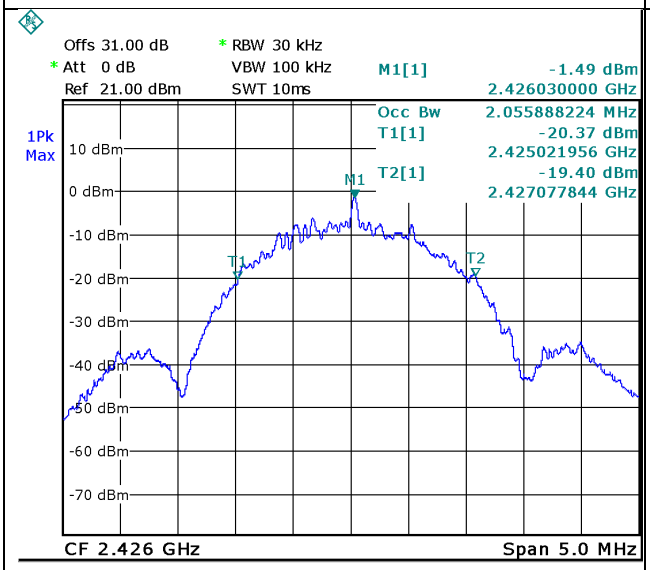


Figure 91. 2426.0 MHz, BLE

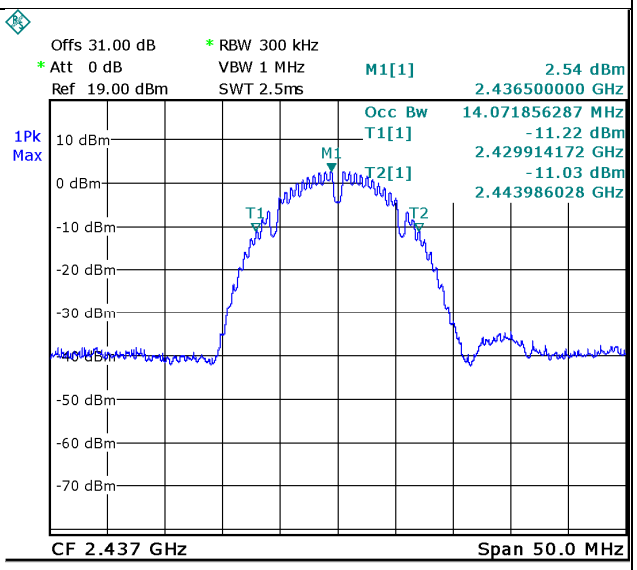


Figure 92. 2437.0 MHz, Wi-fi/b(1Mbit/s)

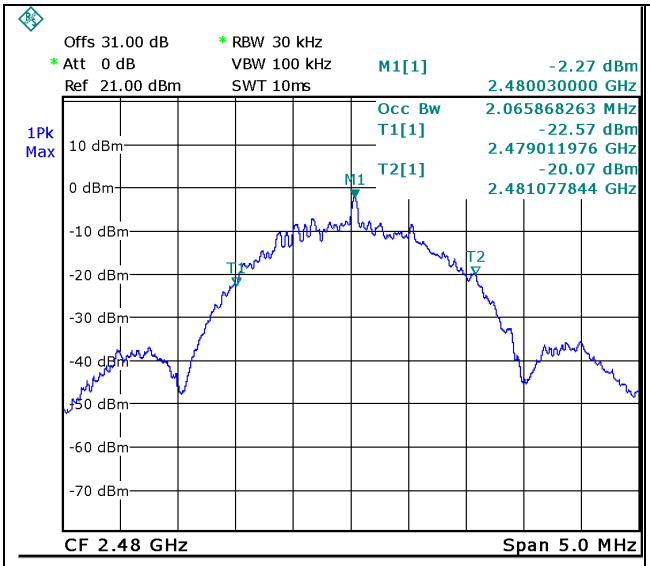


Figure 93. 2480.0 MHz, BLE

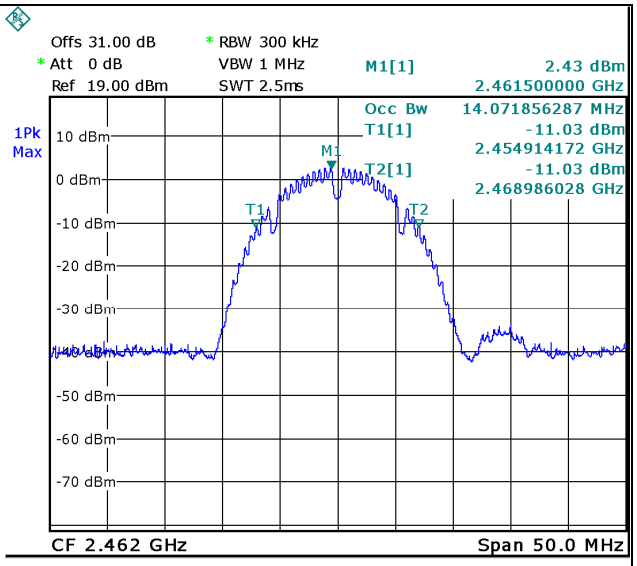


Figure 94. 2462.0 MHz, Wi-fi/b(1Mbit/s)

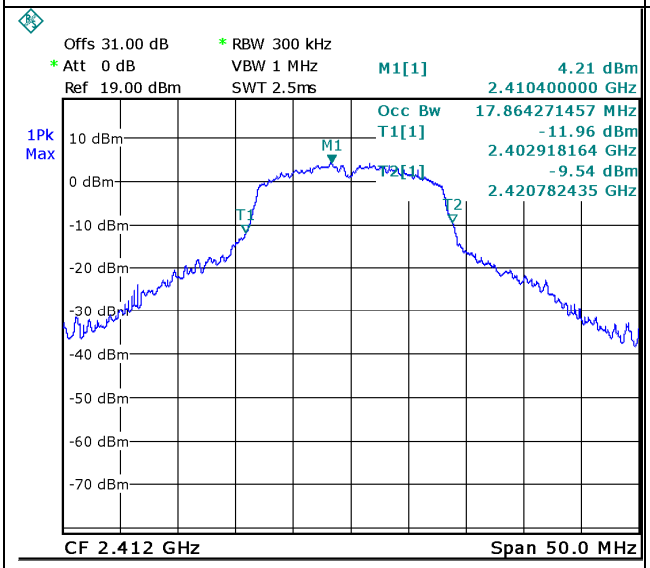


Figure 95. 2412.0 MHz, Wi-fi/g(6Mbit/s)

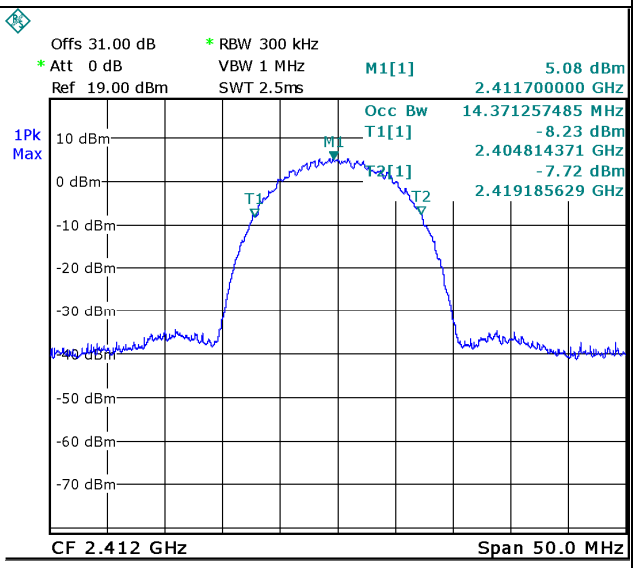


Figure 96. 2412.0 MHz, Wi-fi/b(11Mbit/s)

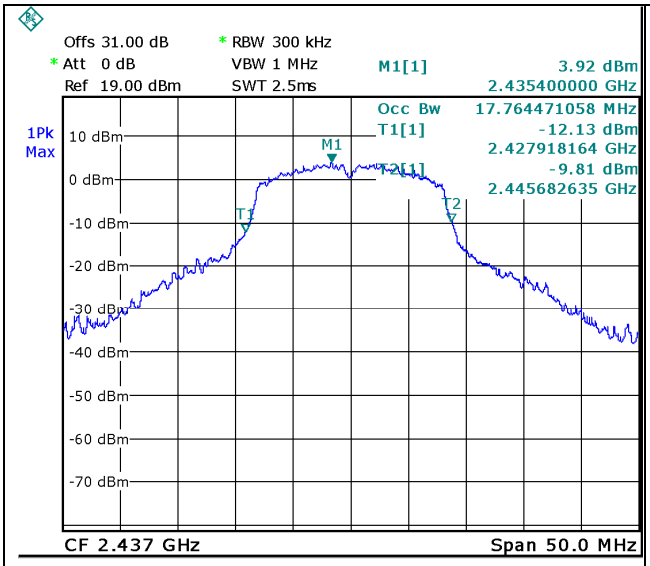


Figure 97. 2437.0 MHz, Wi-fi/g(6Mbit/s)

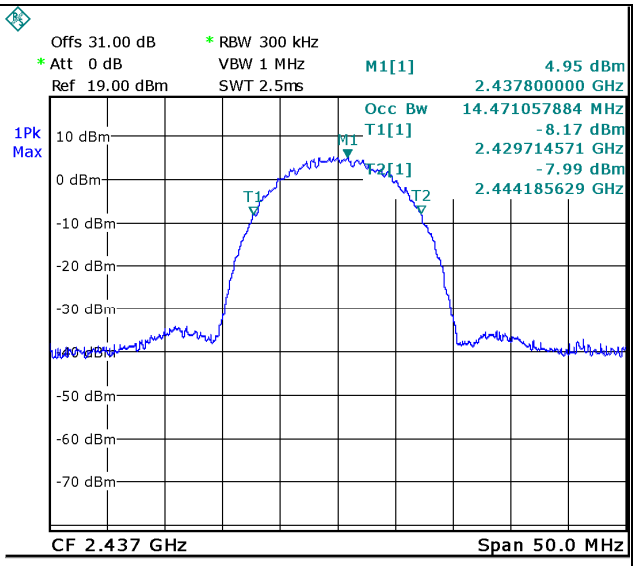


Figure 98. 2437.0 MHz, Wi-fi/b(11Mbit/s)

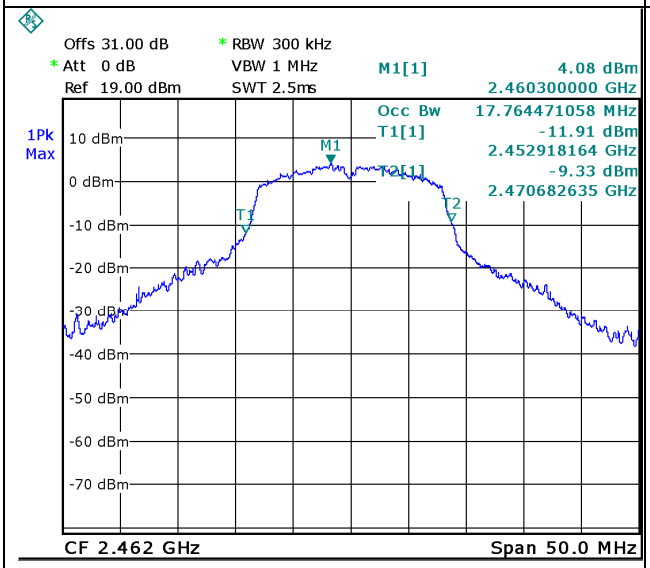


Figure 99. 2462.0 MHz, Wi-fi/g(6Mbit/s)

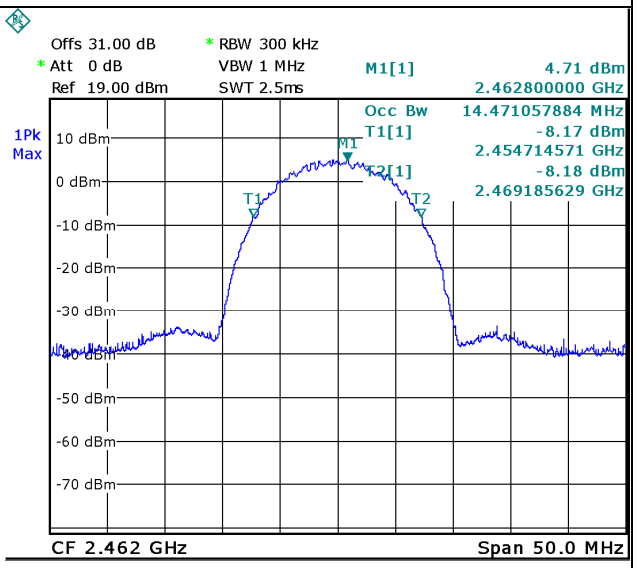


Figure 100. 2462.0 MHz, Wi-fi/b(11Mbit/s)

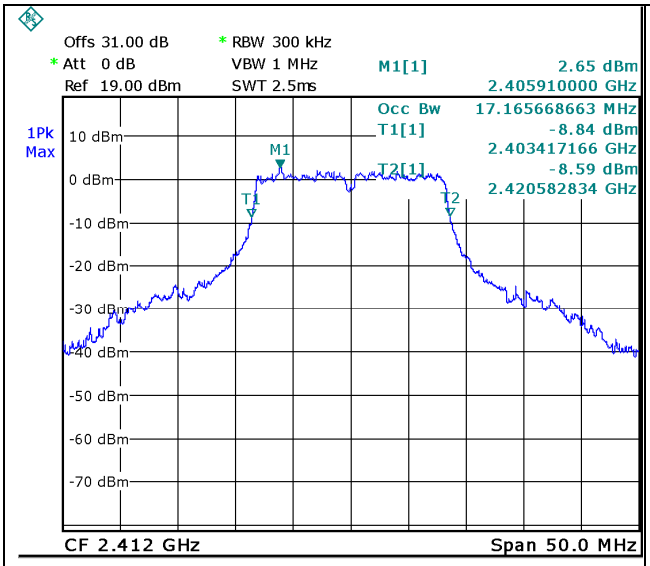


Figure 101. 2412.0 MHz, Wi-fi/g(54Mbit/s)

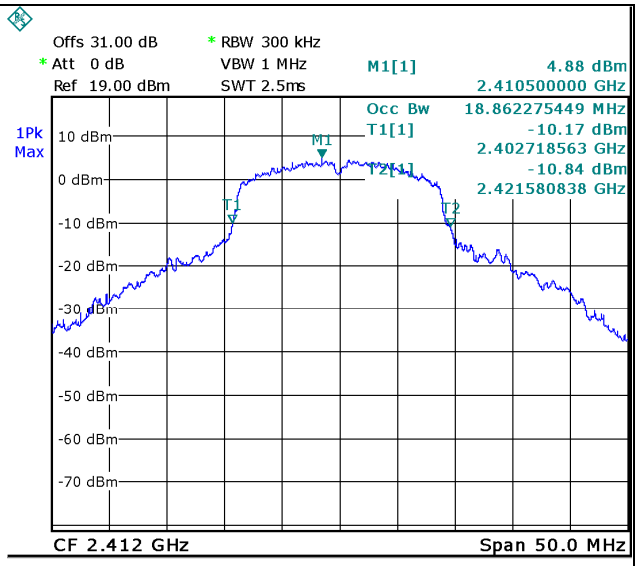


Figure 102. 2412.0 MHz, Wi-fi/n(6.5Mbit/s)

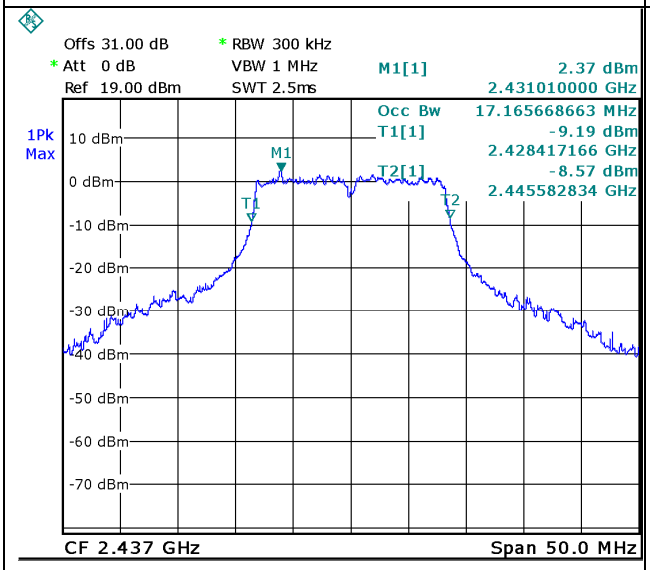


Figure 103. 2437.0 MHz, Wi-fi/g(54Mbit/s)

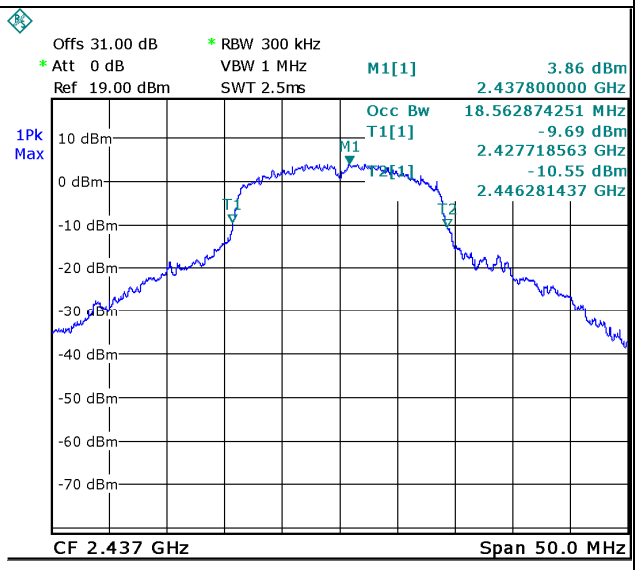


Figure 104. 2437.0 MHz, Wi-fi/n(6.5Mbit/s)

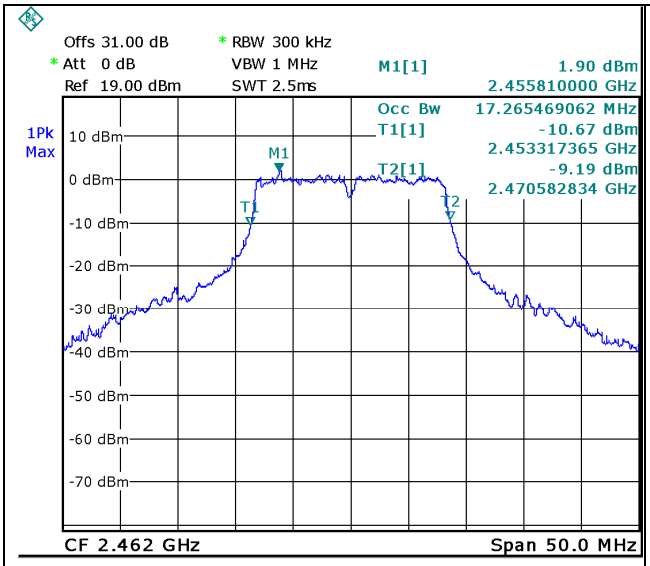


Figure 105. 2462.0 MHz, Wi-fi/g(54Mbit/s)

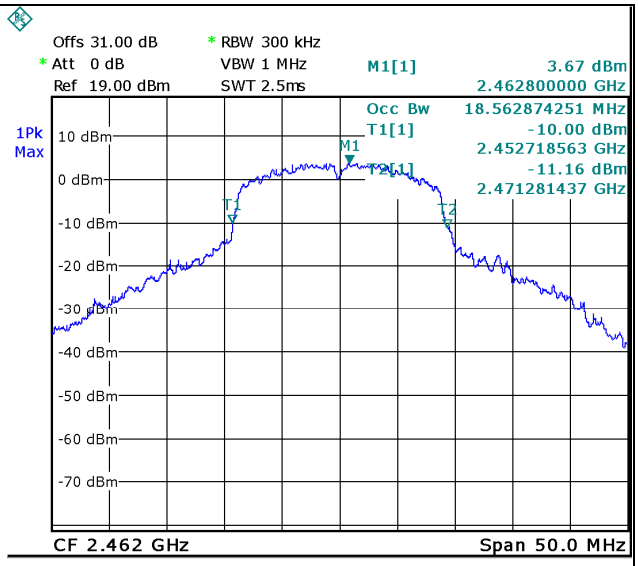


Figure 106. 2462.0 MHz, Wi-fi/n(6.5Mbit/s)

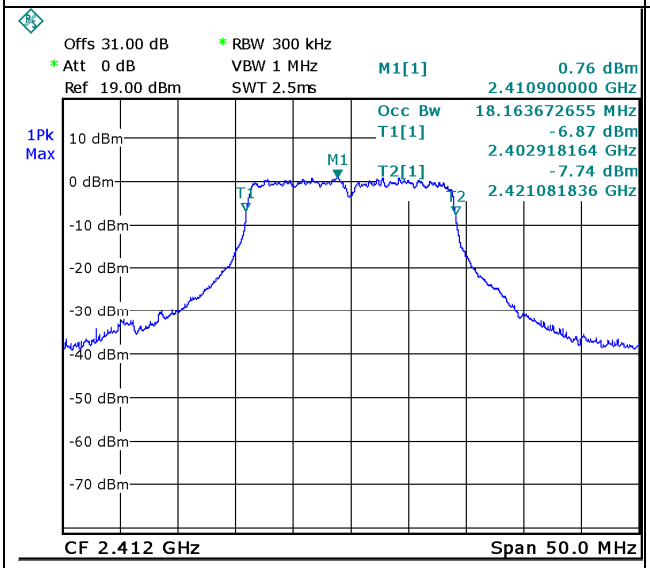


Figure 107. 2412.0 MHz, Wi-fi/n(65Mbit/s)

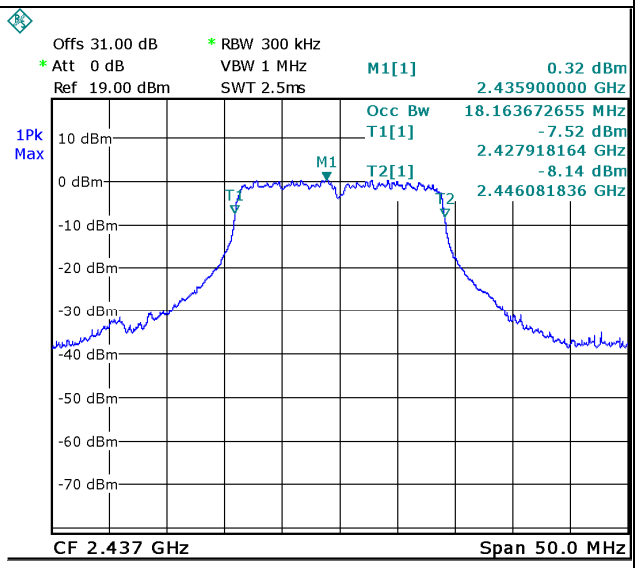


Figure 108. 2437.0 MHz, Wi-fi/n(65Mbit/s)

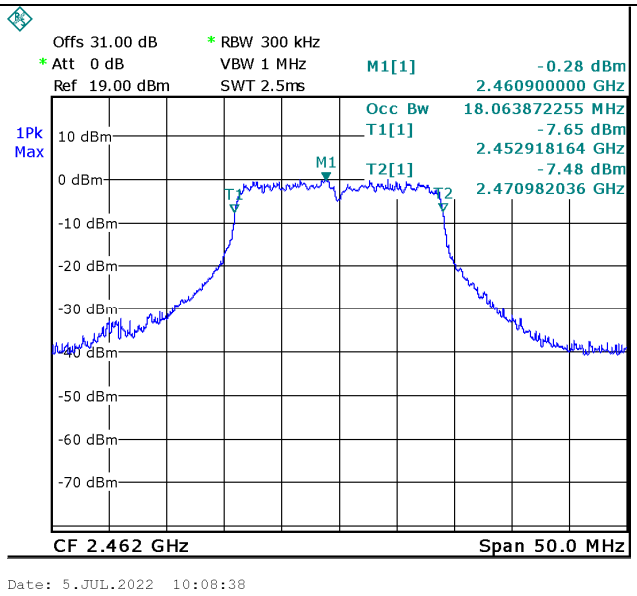


Figure 109. 2462.0 MHz, Wi-fi/n(65Mbit/s)

8.5 Test Equipment Used; Bandwidth

Instrument	ITL #	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	1499	R&S	FSL6	100194	20/2/2022	20/2/2023
30dB Attenuator	1776	MCL	BW-S30W5	533	16/5/2022	16/5/2023
RF Cable	1844	EIM	705A009301EIM	-	16/5/2022	16/5/2023

Figure 110 Test Equipment Used

9. Emissions in non-Restricted Frequency Bands

9.1 Test Specification

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

RSS 247, Issue 2, Section 5.5

9.2 Test Procedure

(Temperature (20°C)/ Humidity (63%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 (max total loss=34.0 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.
RBW was set to 100kHz, detector set to max peak and trace to "max hold".

9.3 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.

9.4 Test Results

JUDGEMENT: Passed

The EUT met the requirements of the FCC, Part 15, Subpart C, Section 247(d) specification.

For additional information see *Figure 111* to *Figure 131.*

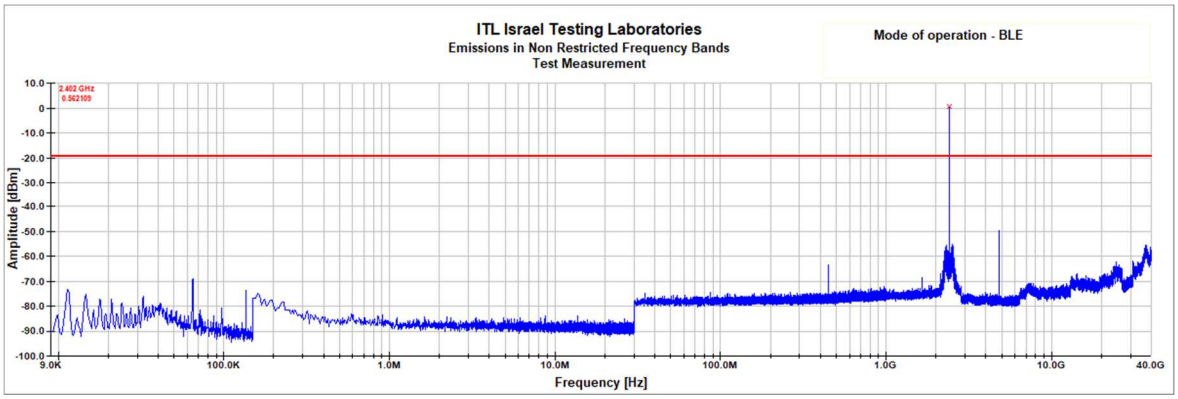


Figure 111 2402.0 MHz, BLE

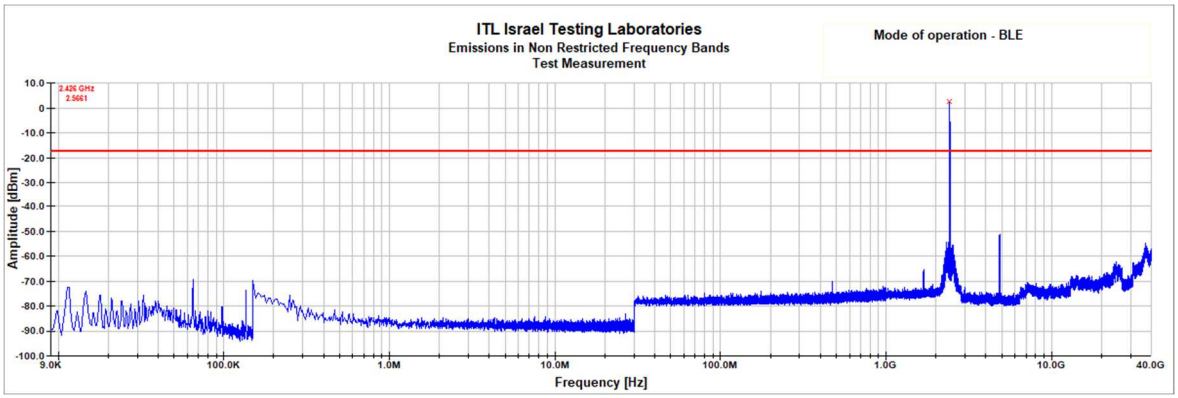


Figure 112 2426.0 MHz, BLE

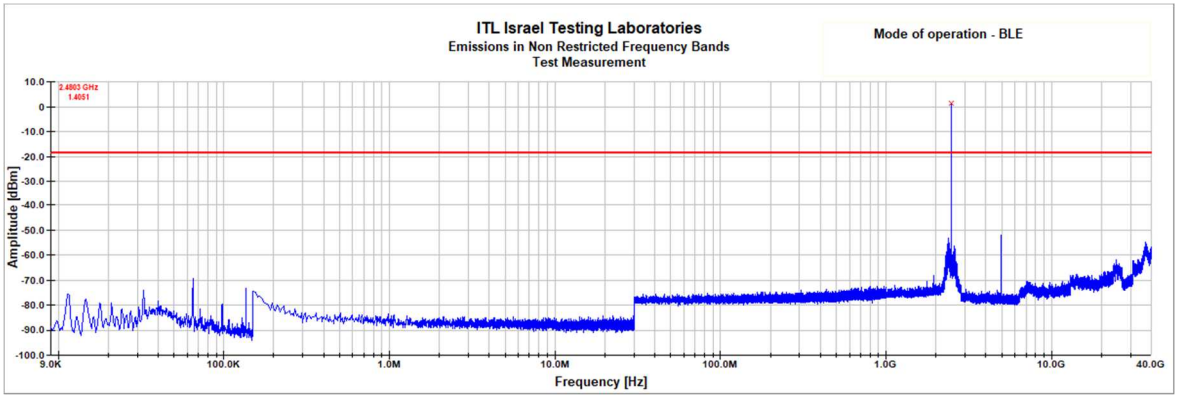


Figure 113 2480.0 MHz, BLE

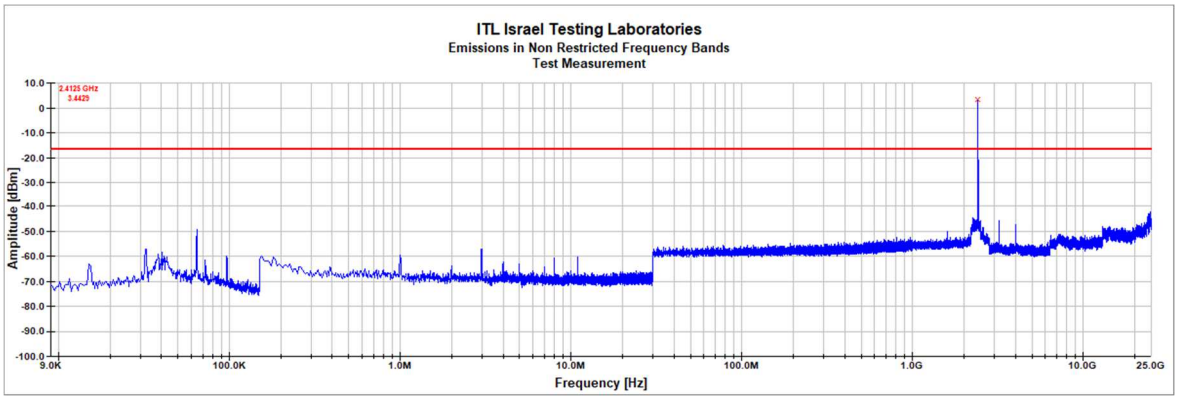


Figure 114 2412.0 MHz, WI-FI/b(1Mbit/s)

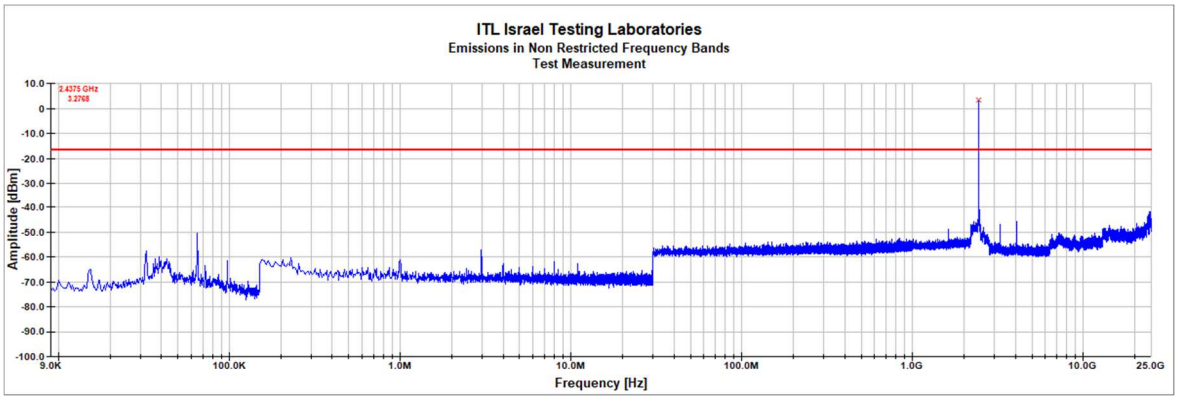


Figure 115 2437.0 MHz, WI-FI/b(1Mbit/s)

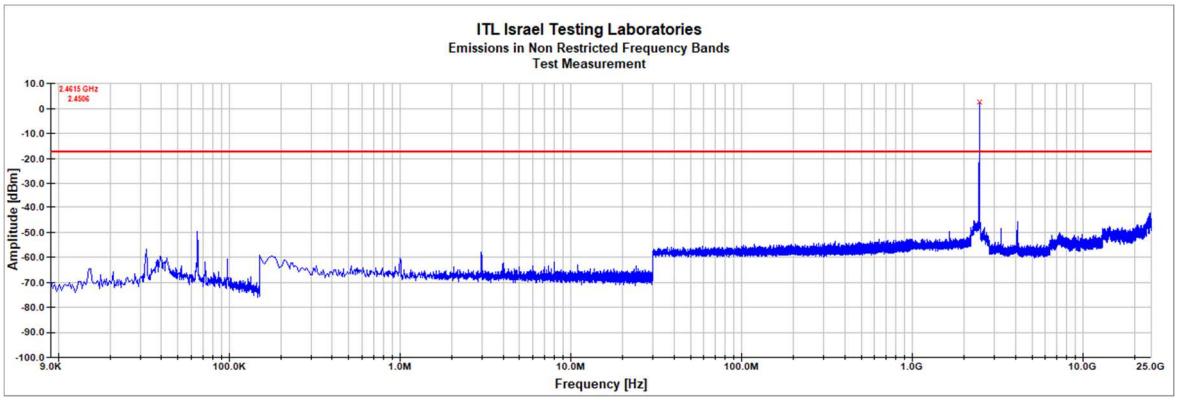


Figure 116 2462.0 MHz, WI-FI/b(1Mbit/s)

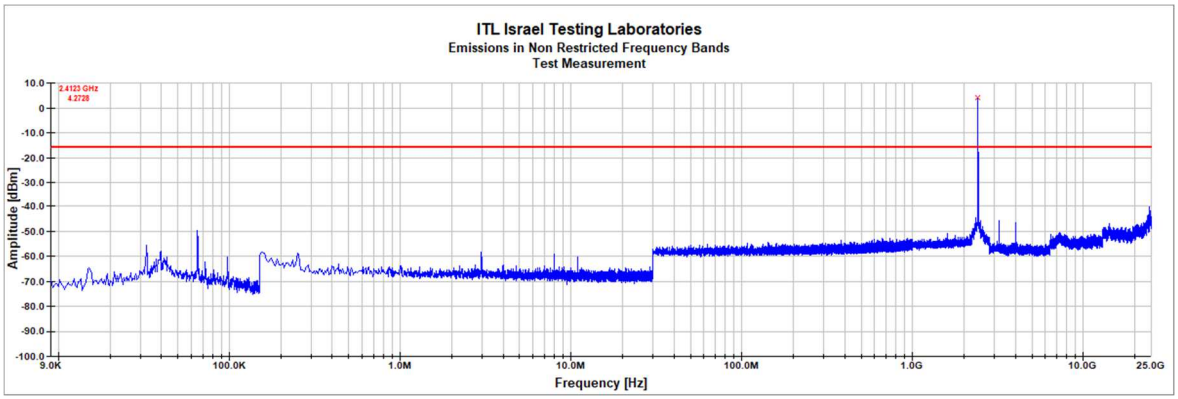


Figure 117 2412.0 MHz, WI-FI/b(11Mbit/s)

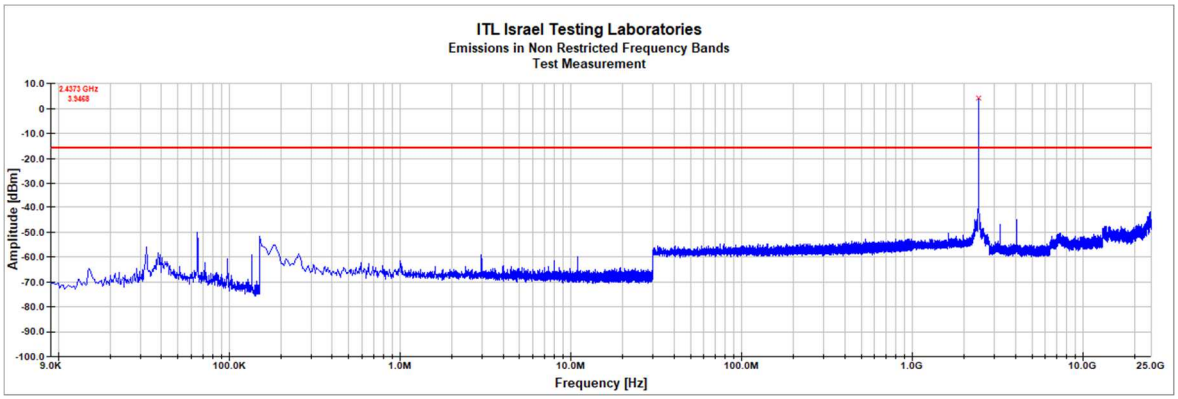


Figure 118 2437.0 MHz, WI-FI/b(11Mbit/s)

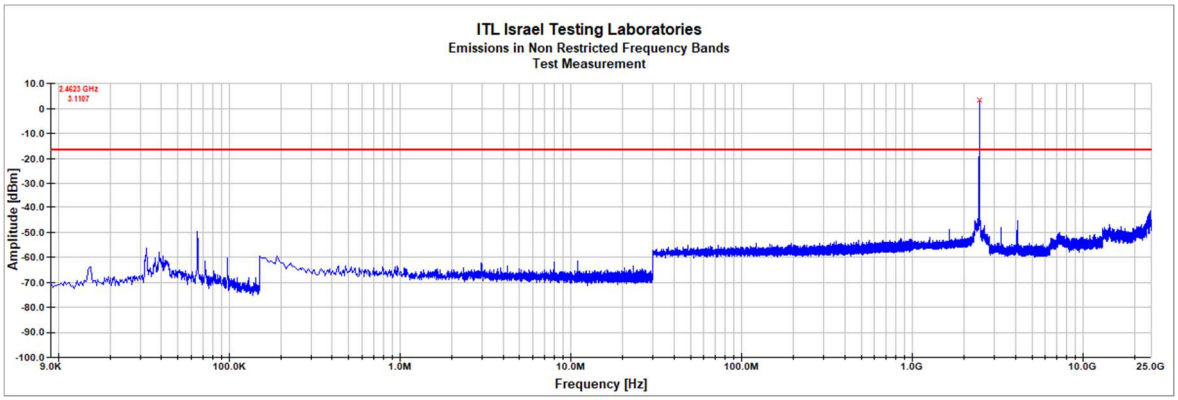


Figure 119 2462.0 MHz, WI-FI/b(11Mbit/s)

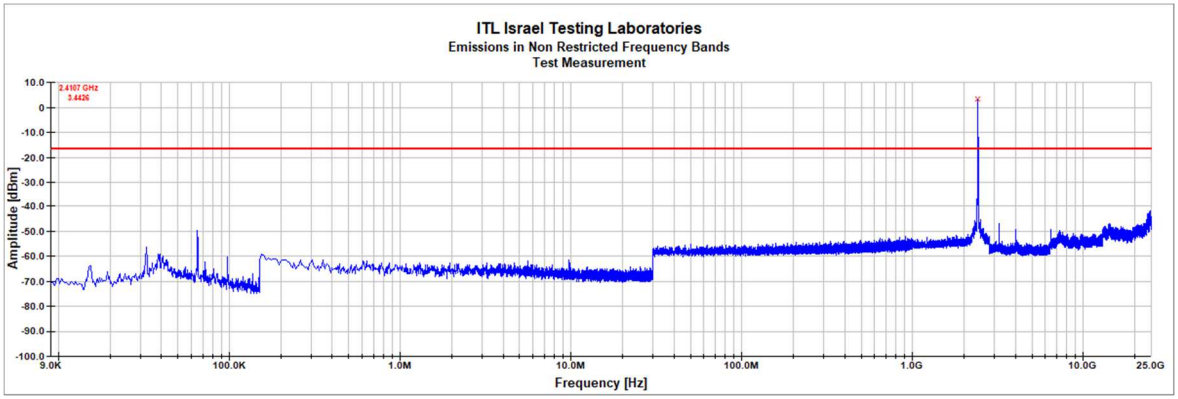


Figure 120 2412.0 MHz, WI-FI/g(6Mbit/s)

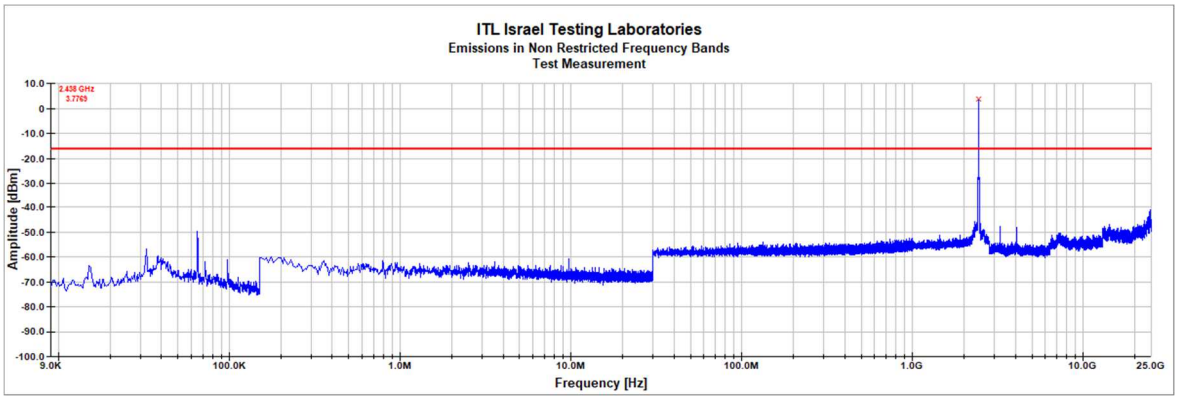


Figure 121 2437.0 MHz, WI-FI/g(6Mbit/s)

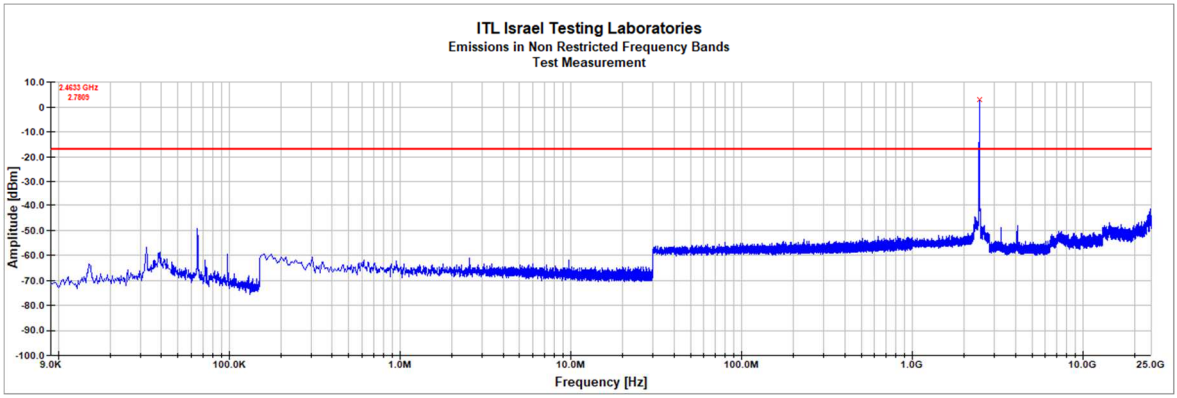


Figure 122 2462.0 MHz, WI-FI/g(6Mbit/s)

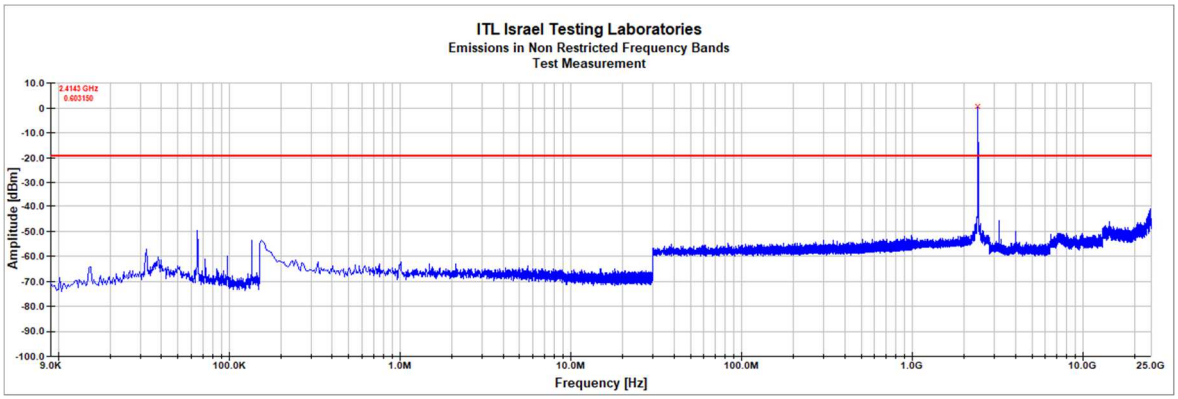


Figure 123 2412.0 MHz, WI-FI/g(54Mbit/s)

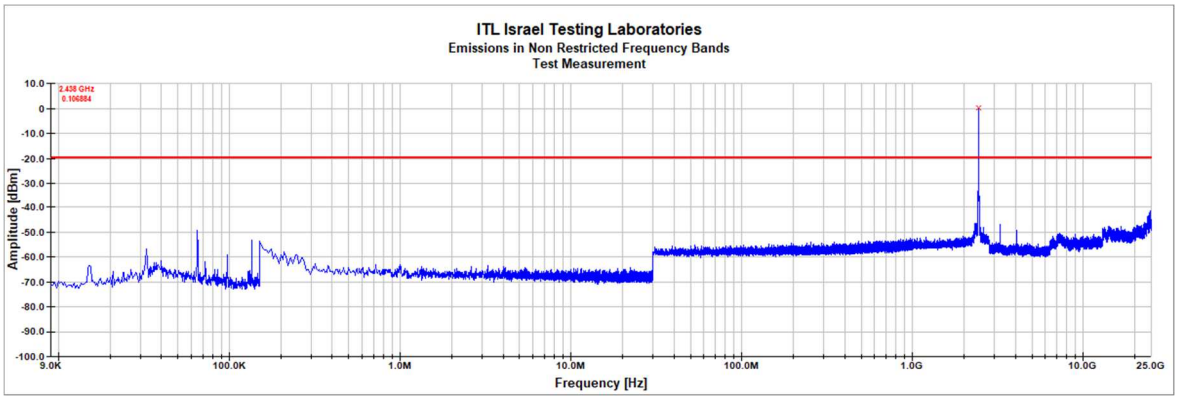


Figure 124 2437.0 MHz, WI-FI/g(54Mbit/s)

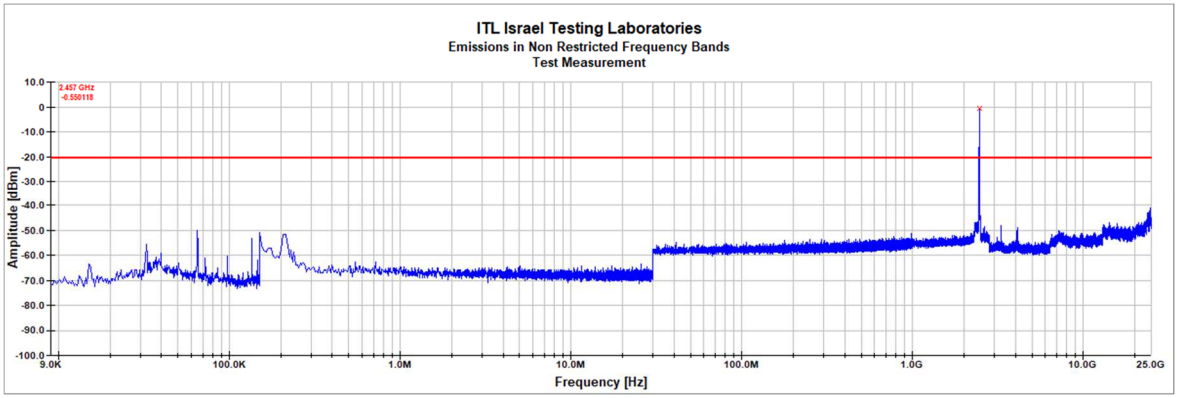


Figure 125 2462.0 MHz, WI-FI/g(54Mbit/s)

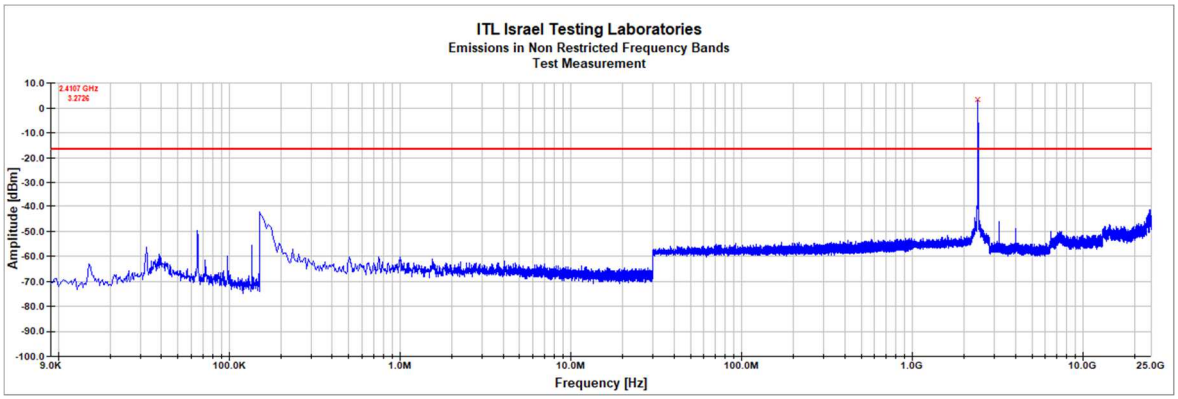


Figure 126 2412.0 MHz, WI-FI/n(6.5Mbit/s)

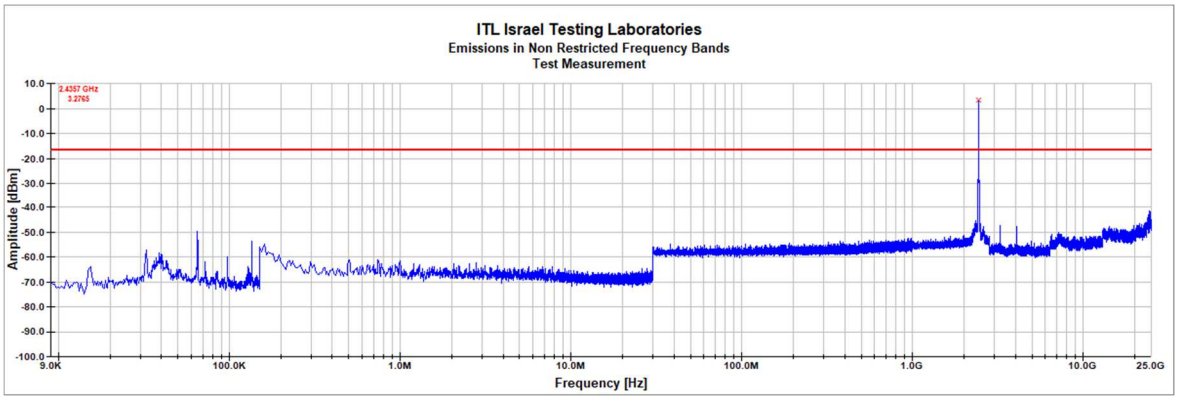


Figure 127 2437.0 MHz, WI-FI/n(6.5Mbit/s)

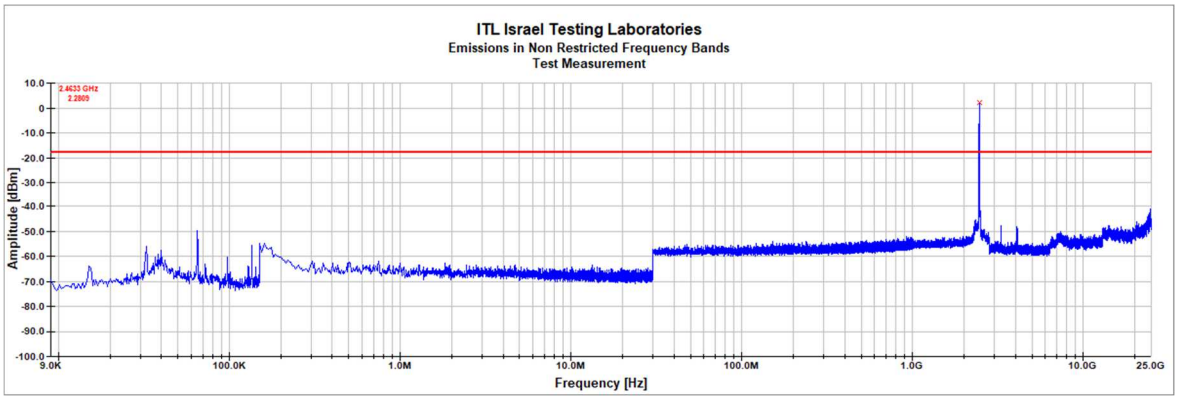


Figure 128 2462.0 MHz, WI-FI/n(6.5Mbit/s)

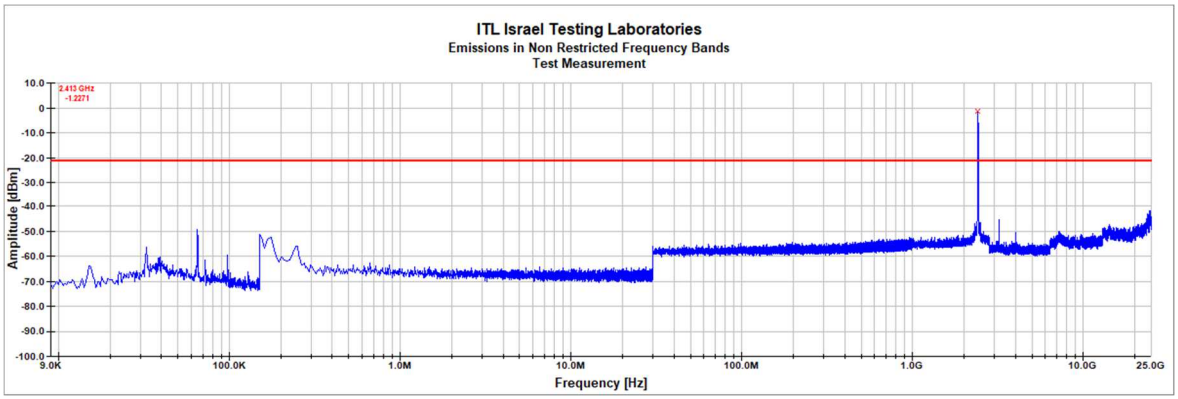


Figure 129 2412.0 MHz, WI-FI/n(65Mbit/s)

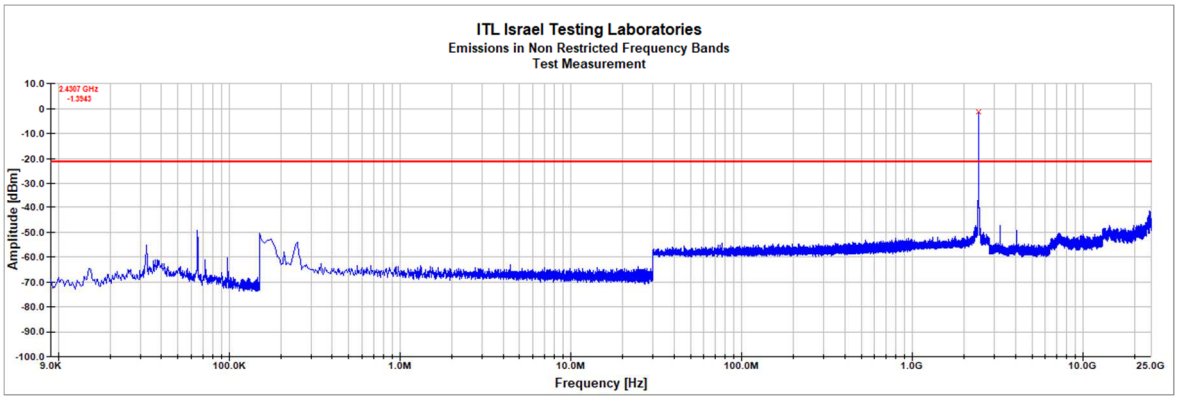


Figure 130 2437.0 MHz, WI-FI/n(65Mbit/s)

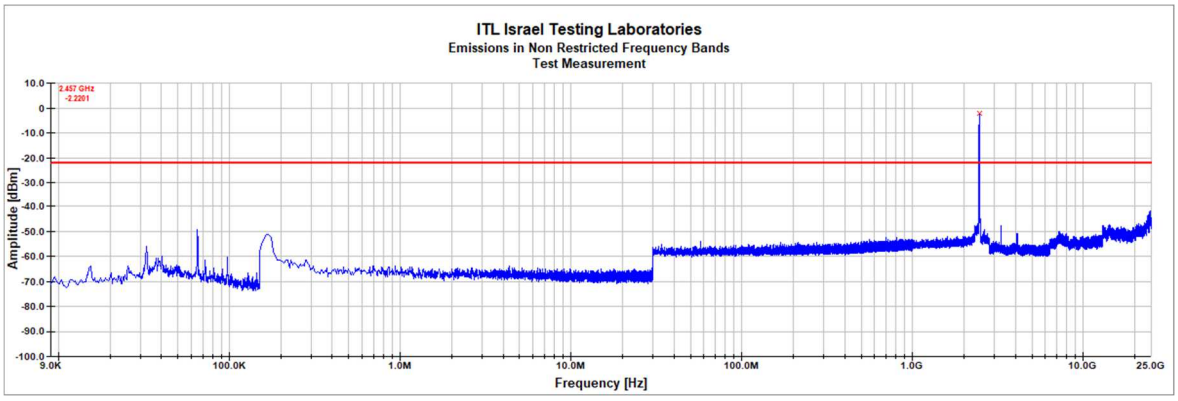


Figure 131 2462.0 MHz, WI-FI/n(65Mbit/s)

Note: All peaks in plots are the fundamental transmission frequency.

9.1 Test Instrumentation Used, Emission in non-Restricted Frequency Bands

Instrument	ITL #	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	1175	HP	8564E	3442A00275	20/2/2022	20/2/2023
30dB Attenuator	1776	MCL	BW-S30W5	533	16/5/2022	16/5/2023
RF Cable	1844	EIM	705A009301EIM	-	16/5/2022	16/5/2023

Figure 132 Test Equipment Used

10. Emissions in Restricted Frequency Bands

10.1 Test Specification

FCC Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)

RSS 247, Issue 2, Section 3.3

RSS Gen, Issue 5, Section 8.10

10.2 *Test Procedure*

(Temperature (23°C)/ Humidity (65%RH))
The E.U.T. operation mode and test set-up are as described in Section 2 of this report.

For measurements between 0.009-30MHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.
The frequency range 0.009MHz-30MHz was scanned.

For measurements between 30-1000MHz:
A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The frequency range 30MHz -1000MHz was scanned and the list of the highest emissions was verified and updated accordingly.

For measurements between 1GHz-25GHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 1.5 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.
The frequency range 1GHz -25GHz was scanned.

Tests done for all “worst case”, in each protocol type. The highest radiation is described in the tables below

10.3 FCC Test Limit

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement distance (meters)	Field Strength* (dBµV/m)	Field Strength* (dBµV/m)@3m
0.009-0.490	2400/F(kHz)	300	48.5-13.8	128.5-73.8
0.490-1.705	24000/F(kHz)	30	33.8-23.0	73.8-63.0
1.705-30.0	30	30	29.5	69.5
30-88	100	3	40.0	40.0
88-216	150	3	43.5	43.5
216-960	200	3	46.0	46.0
Above 960	500	3	54.0	54.0

*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. For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

Figure 133 FCC limits table

10.4 IC Test Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Magnetic Field strength (microampere/meter)	Measurement distance (meters)	Magnetic Field strength (dBµA/m)	Magnetic Field strength* (dBµA/m)@3m
0.009-0.490	6.37/F(kHz)	300	-3.0-(-37.7)	77.0-42.2
0.490-1.705	63.7/F(kHz)	30	-17.7-(-28.5)	22.3-11.4
1.705-30.0	0.08	30	-21.9	18.0
Frequency (MHz)	**Field strength (microvolts/meter)**	**Measurement distance (meters)**	**Field strength (dBµV/m)**	**Field strength* (dBµV/m)@3m**
30-88	100	3	40.0	40.0
88-216	150	3	43.5	43.5
216-960	200	3	46.0	46.0
Above 960	500	3	54.0	54.0

*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. For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

Figure 134 IC limits table

10.5 Test Results

JUDGEMENT: Passed by -8.0 dB

For the BLE, the margin between the emission level and the specification limit is in the worst case -13.2 dB at the frequency of 2402.0 MHz, horizontal polarization.

For the WI-FI/b, the margin between the emission level and the specification limit is in the worst case -8.0 dB at the frequency of 2412.0 MHz, vertical polarization.

For the WI-FI/g, the margin between the emission level and the specification limit is in the worst case -10.5 dB at the frequency of 2412.0 MHz, vertical polarization.

For the WI-FI/n, the margin between the emission level and the specification limit is in the worst case -12.2 dB at the frequency of 2412.0 MHz, vertical polarization.

The EUT met the requirements of FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d) specifications.

The details of the highest emissions are given in *Figure 136* to *Figure 142.*

Ant. Polarity	Protocol	Channel	Operation Freq. (GHz)	Detector	Measure (dBµV/m)	Limit (dBµV/m)	Margin (dB)
HOR	BLE	CH 37	2.402 GHz	Peak	52.46	74	-21.54
				Ave	41	54	-13
		CH 39	2.48 GHz	Peak	63.13	74	-10.87
				Ave	53.5	54	-0.5
VER		CH 37	2.402 GHz	Peak	51.67	74	-22.33
				Ave	41	54	-13
		CH 39	2.48 GHz	Peak	62.43	74	-11.57
				Ave	52	54	-2
HOR	Wi-Fi B (1Mbit/s)	CH 1	2.412 GHz	Peak	54.15	74	-19.85
				Ave	43.11	54	-10.89
		CH 11	2.462 GHz	Peak	54.53	74	-19.47
				Ave	44.2	54	-9.8
VER		CH 1	2.412 GHz	Peak	53.88	74	-20.12
				Ave	44	54	-10
		CH 11	2.462 GHz	Peak	54.5	74	-19.5
				Ave	43.7	54	-10.3

Ant. Polarity	Protocol	Channel	Operation Freq. (GHz)	Detector	Measure (dBµV/m)	Limit (dBµV/m)	Margin (dB)
HOR	Wi-Fi B (11Mbit/s)	CH 1	2.412 GHz	Peak	55.64	74	-18.36
				Ave	44.76	54	-9.24
		CH 11	2.462 GHz	Peak	55.14	74	-18.86
				Ave	44.3	54	-9.7
VER		CH 1	2.412 GHz	Peak	54.91	74	-19.09
				Ave	45	54	-9
		CH 11	2.462 GHz	Peak	55.68	74	-18.32
				Ave	44	54	-10
HOR	Wi-Fi G (6Mbit/s)	CH 1	2.412 GHz	Peak	70.94	74	-3.06
				Ave	53.2	54	-0.8
		CH 11	2.462 GHz	Peak	68.02	74	-5.98
				Ave	52.9	54	-1.1
VER		CH 1	2.412 GHz	Peak	70	74	-4
				Ave	53.5	54	-0.5
		CH 11	2.462 GHz	Peak	66.22	74	-7.78
				Ave	52	54	-2
HOR	Wi-Fi G (54Mbit/s)	CH 1	2.412 GHz	Peak	67.46	74	-6.54
				Ave	46.58	54	-7.42
		CH 11	2.462 GHz	Peak	66.67	74	-7.33
				Ave	46.5	54	-7.5
VER		CH 1	2.412 GHz	Peak	67.7	74	-6.3
				Ave	48	54	-6
		CH 11	2.462 GHz	Peak	68	74	-6
				Ave	46.5	54	-7.5
HOR	Wi-Fi N (6.5Mbit/s)	CH 1	2.412 GHz	Peak	70	74	-4
				Ave	53.5	54	-0.5
		CH 11	2.462 GHz	Peak	69.48	74	-4.52
				Ave	53.5	54	-0.5
VER		CH 1	2.412 GHz	Peak	73.41	74	-0.59
				Ave	53	54	-1
		CH 11	2.462 GHz	Peak	69	74	-5
				Ave	53.5	54	-0.5

Ant. Polarity	Protocol	Channel	Operation Freq. (GHz)	Detector	Measure (dBµV/m)	Limit (dBµV/m)	Margin (dB)
HOR	Wi-Fi N (65Mbit/s)	CH 1	2.412 GHz	Peak	65.3	74	-8.7
				Ave	45	54	-9
		CH 11	2.462 GHz	Peak	60.8	74	-13.2
				Ave	44	54	-10
VER		CH 1	2.412 GHz	Peak	64.4	74	-9.6
				Ave	46	54	-8
		CH 11	2.462 GHz	Peak	59.9	74	-14.1
				Ave	44	54	-10

Figure 135. Radiated Emission Band Edge Restricted Band Results

Radiated Emission

E.U.T Description	Battery-operated, Wall Mounted Tag
Type	Aerial ECall
Serial Number:	Not designated

Specifications: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)
RSS 247, Issue 2, Section 3.3; RSS Gen, Issue 5, Section 8.10

Antenna Polarization: Horizontal/Vertical
Frequency Range: 9kHz to 25.0 GHz
Protocol Type: BLE
Detector: Peak, Average

Ant. Polarity	Operation Freq.(GHz)	Freq. (GHz)	Detector	Measure (dBµV/m)	Limit (dBµV/m)	Margin (dB)
HOR	2.402	4.804	Peak	45.6	74.0	-28.4
			Ave.	36.5	54.0	-17.5
	2.48	4.96	Peak	48.5	74.0	-25.5
			Ave.	40.0	54.0	-14.0
VER	2.402	4.804	Peak	43.9	74.0	-30.1
			Ave.	35.7	54.0	-18.3
	2.48	4.96	Peak	47.2	74.0	-26.8
			Ave.	37.5	54.0	-16.5
HOR	2.402	7.206	Peak	51.2	74.0	-22.8
			Ave.	40.8	54.0	-13.2
	2.48	7.44	Peak	52.0	74.0	-22.0
			Ave.	39.0	54.0	-15.0

Figure 136. Radiated Emission Results

Measurement results includes correction factor.
Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description	Battery-operated, Wall Mounted Tag
Type	Aerial ECall
Serial Number:	Not designated

Specifications: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)
RSS 247, Issue 2, Section 3.3; RSS Gen, Issue 5, Section 8.10

Antenna Polarization: Horizontal/Vertical
Frequency Range: 9kHz to 25.0 GHz
Protocol Type: WI-FI/b (1Mbit/s)
Detector: Peak, Average

Ant. Polarity	Operation Freq.(GHz)	Freq. (GHz)	Detector	Measure (dBµV/m)	Limit (dBµV/m)	Margin (dB)
HOR	2.412	4.02	Peak	49.5	74	-24.5
			Ave.	40.5	54	-13.5
	2.462	4.1	Peak	45.9	74	-28.1
			Ave.	39.9	54	-14.1
VER	2.412	4.02	Peak	50.9	74	-23.1
			Ave.	45	54	-9.0
	2.462	4.1	Peak	48.3	74	-25.7
			Ave.	42.3	54	-11.7
HOR	2.412	4.824	Peak	46.7	74	-27.3
			Ave.	40	54	-14.0
	2.462	4.924	Peak	46.2	74	-27.8
			Ave.	38.6	54	-15.4
VER	2.412	4.824	Peak	43.7	74	-30.3
			Ave.	38.5	54	-15.5
	2.462	4.924	Peak	43.7	74	-30.3
			Ave.	36	54	-18.0

Figure 137. Radiated Emission Results

Measurement results includes correction factor.

Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description	Battery-operated, Wall Mounted Tag
Type	Aerial ECall
Serial Number:	Not designated

Specifications: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)
RSS 247, Issue 2, Section 3.3; RSS Gen, Issue 5, Section 8.10

Antenna Polarization: Horizontal/Vertical
Frequency Range: 9kHz to 25.0 GHz
Protocol Type: WI-FI/b (11Mbit/s)
Detector: Peak, Average

Ant. Polarity	Operation Freq.(GHz)	Freq. (GHz)	Detector	Measure (dBµV/m)	Limit (dBµV/m)	Margin (dB)
HOR	2.412	4.02	Peak	52.2	74	-21.8
			Ave.	41.4	54	-12.6
	2.462	4.1	Peak	48.4	74	-25.6
			Ave.	39.3	54	-14.7
VER	2.412	4.02	Peak	53.8	74	-20.2
			Ave.	46	54	-8.0
	2.462	4.1	Peak	49.9	74	-24.1
			Ave.	42.7	54	-11.3
HOR	2.412	4.824	Peak	45.3	74	-28.7
			Ave.	34.2	54	-19.8
	2.462	4.924	Peak	46.4	74	-27.6
			Ave.	34.6	54	-19.4
VER	2.412	4.824	Peak	44	74	-30.0
			Ave.	34	54	-20.0
	2.462	4.924	Peak	42.8	74	-31.2
			Ave.	32.6	54	-21.4

Figure 138. Radiated Emission Results

Measurement results includes correction factor.

Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description	Battery-operated, Wall Mounted Tag
Type	Aerial ECall
Serial Number:	Not designated

Specifications: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)
RSS 247, Issue 2, Section 3.3; RSS Gen, Issue 5, Section 8.10

Antenna Polarization: Horizontal/Vertical Frequency Range: 9kHz to 25.0 GHz
Protocol Type: WI-FI/g (6Mbit/s) Detector: Peak, Average

Ant. Polarity	Operation Freq.(GHz)	Freq. (GHz)	Detector	Measure (dBµV/m)	Limit (dBµV/m)	Margin (dB)
HOR	2.412	4.02	Peak	50	74	-24.0
			Ave.	39.6	54	-14.4
	2.462	4.1	Peak	47.1	74	-26.9
			Ave.	37	54	-17.0
VER	2.412	4.02	Peak	50.7	74	-23.3
			Ave.	43.5	54	-10.5
	2.462	4.1	Peak	49	74	-25.0
			Ave.	40	54	-14.0
HOR	2.412	4.824	Peak	48.4	74	-25.6
			Ave.	34.4	54	-19.6
	2.462	4.924	Peak	45.8	74	-28.2
			Ave.	35.7	54	-18.3
VER	2.412	4.824	Peak	44.5	74	-29.5
			Ave.	35.5	54	-18.5
	2.462	4.924	Peak	42.6	74	-31.4
			Ave.	33.2	54	-20.8
HOR	2.412	7.236	Peak	51	74	-23.0
			Ave.	37.5	54	-16.5
	2.462	7.386	Peak	47.5	74	-26.5
			Ave.	38.3	54	-15.7
VER	2.412	7.236	Peak	49	74	-25.0
			Ave.	38.8	54	-15.2
	2.462	7.386	Peak	46.3	74	-27.7
			Ave.	37.2	54	-16.8

Figure 139. Radiated Emission Results

Measurement results includes correction factor.

Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description	Battery-operated, Wall Mounted Tag
Type	Aerial ECall
Serial Number:	Not designated

Specifications: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)
RSS 247, Issue 2, Section 3.3; RSS Gen, Issue 5, Section 8.10

Antenna Polarization: Horizontal/Vertical
Frequency Range: 9kHz to 25.0 GHz
Protocol Type: WI-FI/g (54Mbit/s)
Detector: Peak, Average

Ant. Polarity	Operation Freq.(GHz)	Freq. (GHz)	Detector	Measure (dBµV/m)	Limit (dBµV/m)	Margin (dB)
HOR	2.412	4.02	Peak	47.2	74	-26.8
			Ave	33.3	54	-20.7
	2.462	4.1	Peak	45.3	74	-28.7
			Ave	34	54	-20.0
VER	2.412	4.02	Peak	47.7	74	-26.3
			Ave	35.7	54	-18.3
	2.462	4.1	Peak	47.4	74	-26.6
			Ave	35.5	54	-18.5

Figure 140. Radiated Emission Results

Measurement results includes correction factor.

Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description	Battery-operated, Wall Mounted Tag
Type	Aerial ECall
Serial Number:	Not designated

Specifications: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)
RSS 247, Issue 2, Section 3.3; RSS Gen, Issue 5, Section 8.10

Antenna Polarization: Horizontal/Vertical Frequency Range: 9kHz to 25.0 GHz
Protocol Type: WI-FI/n (6.5Mbit/s) Detector: Peak, Average

Ant. Polarity	Operation Freq.(GHz)	Freq. (GHz)	Detector	Measure (dBµV/m)	Limit (dBµV/m)	Margin (dB)
HOR	2.412	4.02	Peak	47.6	74	-26.4
			Ave	37.3	54	-16.7
	2.462	4.1	Peak	47.2	74	-26.8
			Ave	39.2	54	-14.8
VER	2.412	4.02	Peak	48.7	74	-25.3
			Ave	41.8	54	-12.2
	2.462	4.1	Peak	50	74	-24.0
			Ave	40.5	54	-13.5
HOR	2.412	4.824	Peak	45.5	74	-28.5
			Ave	33.8	54	-20.2
	2.462	4.924	Peak	48.1	74	-25.9
			Ave	35.1	54	-18.9
VER	2.412	4.824	Peak	43.9	74	-30.1
			Ave	34.3	54	-19.7
	2.462	4.924	Peak	45.8	74	-28.2
			Ave	32.9	54	-21.1
HOR	2.412	7.236	Peak	50.9	74	-23.1
			Ave	38.3	54	-15.7
	2.462	7.386	Peak	47.8	74	-26.2
			Ave	38	54	-16.0
VER	2.412	7.236	Peak	49.3	74	-24.7
			Ave	37.7	54	-16.3
	2.462	7.386	Peak	45.8	74	-28.2
			Ave	36.7	54	-17.3

Figure 141. Radiated Emission Results

Measurement results includes correction factor.

Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description	Battery-operated, Wall Mounted Tag
Type	Aerial ECall
Serial Number:	Not designated

Specifications: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)
RSS 247, Issue 2, Section 3.3; RSS Gen, Issue 5, Section 8.10

Antenna Polarization: Horizontal/Vertical
Frequency Range: 9kHz to 25.0 GHz
Protocol Type: WI-FI/n (65Mbit/s)
Detector: Peak, Average

Ant. Polarity	Operation Freq.(GHz)	Freq. (GHz)	Detector	Measure (dBµV/m)	Limit (dBµV/m)	Margin (dB)
HOR	2.412	4.02	Peak	44.4	74	-29.6
			Ave	32.9	54	-21.1
	2.462	4.1	Peak	43.2	74	-30.8
			Ave	33.9	54	-20.1
VER	2.412	4.02	Peak	47.6	74	-26.4
			Ave	34.3	54	-19.7
	2.462	4.1	Peak	46.4	74	-27.6
			Ave	34.4	54	-19.6

Figure 142. Radiated Emission Results

Measurement results includes correction factor.

Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

10.6 Test Instrumentation Used; Emissions in Restricted Frequency Bands

ITL #	Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
1507	EMI Test Receiver	Rohde & Schwarz	ESCI7	100724	February 20, 2022	February 20, 2023
1180	EMI Receiver	HP(Agilent)	8542E	3906A00276	February 22, 2022	February 22, 2023
1181	RF Filter	HP(Agilent)	85420E	3705A00248	February 22, 2022	February 22, 2023
1282	Spectrum Analyzer	HP	8593EM	3536A00120A DI	February 26, 2019	February 26, 2020
1075	Active Loop Antenna	EMCO	6502	2950	July 5, 2022	July 5, 2023
1356	Biconical Antenna	EMCO	3110B	9912-3337	January 18, 2022	January 18, 2024

ITL #	Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
1349	Log-periodic Antenna	EMCO	3146	9505-4081	April 27, 2021	April 27, 2024
1352	Horn Antenna	ETS	3115	29845	May 25, 2021	May 25, 2024
1353	Horn Antenna	ARA	SWH-28	1007	November 2, 2021	November 2, 2024
1284	MicroWave System Amplifier (LNA)	HP	83006A	3104A00589	August 23, 2020	August 23, 2021
1396	RF Amplifier	MIT	50-8P	AFSX4	NCR	NCR
1840	10 m RF cable	Commscope ORS (Serge)	0623 WBC-400	G020132	May 25, 2021	May 25, 2022
1911	35m coaxial cable for oats	EIM (Huber Suhner)	RG214-11N(X2) RG214/U	(blank)	June 22, 2022	June 22, 2023
1478	Pass Band Filter	Meuro	MFL040120H50	902252	May 16, 2022	May 16, 2023
1473	LOD Semi anechoic Civil Chamber	ETS	S81	SL 11643	NCR	NCR
1374	Multi device Controller		2090	9908-1456	NCR	NCR
-	Antenna Mast	EMCO	2070	9608-1497	NCR	NCR
-	Turntable	ETS	2087	-	NCR	NCR

Figure 143 Test Equipment Used

11. Antenna Gain/Information

The antenna gain is: 5.1 dBi, type: integral.

12. RF Exposure/Safety

See a separate file.

13. Appendix A - Correction Factors

13.1 ITL #1911: OATS RF Cable

Frequency (MHz)	Cable Loss (dB)		Frequency (MHz)	Cable Loss (dB)
1.00	0.50		450.00	5.83
10.00	1.00		500.00	6.33
20.00	1.34		550.00	6.67
30.00	1.50		600.00	6.83
50.00	1.83		650.00	7.17
100.00	2.67		700.00	7.66
150.00	3.17		750.00	7.83
200.00	3.83		800.00	8.16
250.00	4.17		850.00	8.50
300.00	4.50		900.00	8.83
350.00	5.17		950.00	8.84
400.00	5.50		1000.00	9.00

13.2 ITL #1840: Semi-Anechoic Chamber RF Cable

Frequency (MHz)	Cable Loss (dB)		Frequency (MHz)	Cable Loss (dB)
1,000.0	-1.40		10,000.0	-6.00
1,500.0	-1.70		10,500.0	-6.20
2,000.0	-2.00		11,000.0	-6.20
2,500.0	-2.30		11,500.0	-6.00
3,000.0	-2.60		12,000.0	-6.00
3,500.0	-2.80		12,500.0	-6.10
4,000.0	-3.10		13,000.0	-6.30
4,500.0	-3.30		13,500.0	-6.50
5,000.0	-3.60		14,000.0	-6.70
5,500.0	-3.70		14,500.0	-7.00
6,000.0	-4.00		15,000.0	-7.30
6,500.0	-4.40		15,500.0	-7.50
7,000.0	-4.7		16,000.0	-7.60
7,500.0	-4.80		16,500.0	-8.00
8,000.0	-5.00		17,000.0	-8.00
8,500.0	-5.10		17,500.0	-8.10
9,000.0	-5.60		18,000.0	-8.20
9,500.0	-5.80			

13.3 ITL # 1075: Active Loop Antenna

Frequency (MHz)	MAF (dBs/m)	AF (dB/m)		Frequency (MHz)	MAF (dBs/m)	AF (dB/m)
0.01	-33.10	18.40		3.00	-40.00	11.50
0.02	-37.20	14.30		4.00	-40.10	11.40
0.03	-38.20	13.30		5.00	-40.20	11.30
0.05	-39.80	11.70		6.00	-40.40	11.10
0.10	-40.10	11.40		7.00	-40.40	11.10
0.20	-40.30	11.20		8.00	-40.40	11.10

Frequency (MHz)	MAF (dBs/m)	AF (dB/m)	Frequency (MHz)	MAF (dBs/m)	AF (dB/m)
0.30	-40.30	11.20	9.00	-40.50	11.00
0.50	-40.30	11.20	10.00	-40.50	11.00
0.70	-40.30	11.20	20.00	-41.50	10.00
1.00	-40.10	11.40	30.00	-43.50	8.00
2.00	-40.00	11.50			

13.4 ITL #1356: Biconical Antenna

Frequency (MHz)	AF (dB/m)	Frequency (MHz)	AF (dB/m)
30.00	13.00	90.00	8.23
35.00	10.89	100.00	11.12
40.00	10.59	120.00	13.16
45.00	10.63	140.00	13.07
50.00	10.12	160.00	14.80
60.00	9.26	180.00	16.95
70.00	7.74	200.00	17.17
80.00	6.63		

13.5 ITL # 1349: Log Periodic Antenna

Frequency (MHz)	AF (dB/m)
200.00	11.58
250.00	12.04
300.00	14.76
400.00	15.55
500.00	17.85
600.00	18.66
700.00	20.87
800.00	21.15
900.00	22.32
1000.00	24.22

13.6 ITL # 1352: 1-18 GHz Horn Antenna

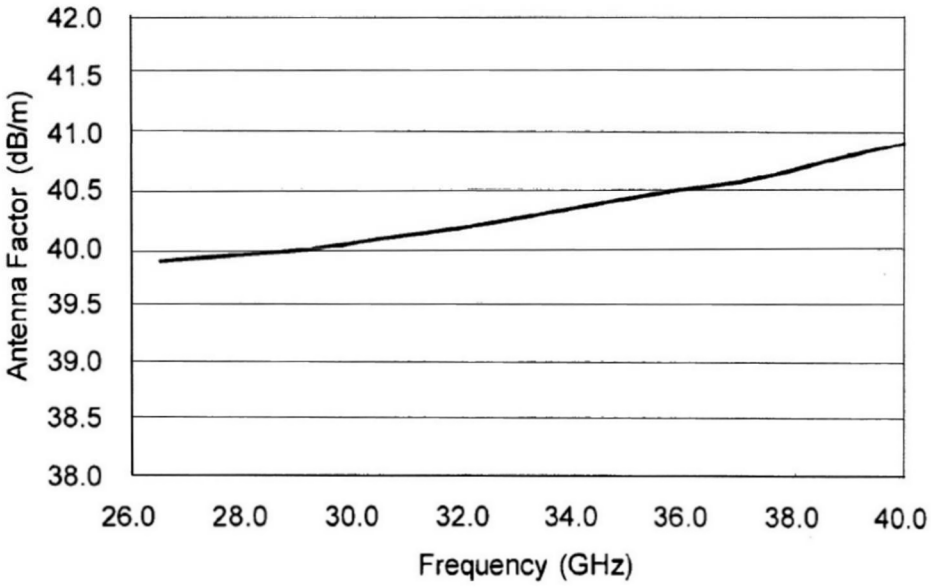
Frequency (GHz)	AF (dB/m)	Frequency (GHz)	AF (dB/m)
0.75	25.00	9.50	38.00
1.00	23.50	10.00	38.50
1.50	26.00	10.50	38.50
2.00	29.00	11.00	38.50
2.50	27.50	11.50	38.50
3.00	30.00	12.00	38.00
3.50	31.50	12.50	38.50
4.00	32.50	13.00	40.00
4.50	32.50	13.50	41.00
5.00	33.00	14.00	40.00
5.50	35.00	14.50	39.00
6.00	36.50	15.00	38.00
6.50	36.50	15.50	37.50
7.00	37.50	16.00	37.50
7.50	37.50	16.50	39.00

Frequency (GHz)	AF (dB/m)		Frequency (GHz)	AF (dB/m)
8.00	37.50		17.00	40.00
8.50	38.00		17.50	42.00
9.00	37.50		18.00	42.50

13.7 ITL # 1353: 18-26.5 GHz Horn Antenna

Frequency (MHz)	Measured antenna factor (dB/m)[1]		Frequency (MHz)	Measured antenna factor (dB/m)[1]
18,000.00	32.40		22,500.00	33.00
18,500.00	32.00		23,000.00	33.10
19,000.00	32.30		23,500.00	33.80
19,500.00	32.40		24,000.00	33.50
20,000.00	32.30		24,500.00	33.50
20,500.00	32.80		25,000.00	33.80
21,000.00	32.80		25,500.00	33.90
21,500.00	32.70		26,000.00	34.20
22,000.00	33.10		26,500.00	34.70

13.8 ITL # 1777: 26.5-40 GHz Horn Antenna



End of Test Report

[1] The antenna factor shall be added to the receiver's reading in dBµV, to obtain field strength in dBµ V/m