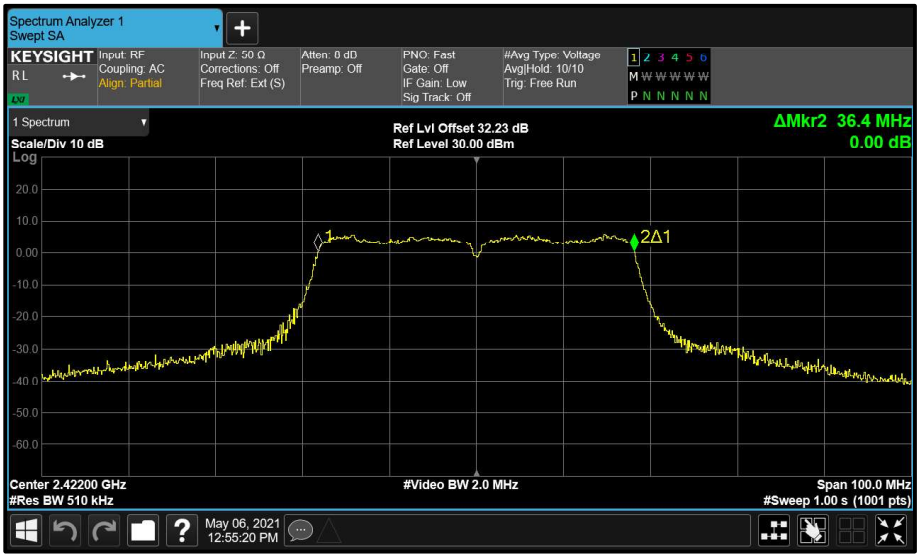

Figure 74 - Aux (B) 2422 MHz (CH3) 99% Bandwidth

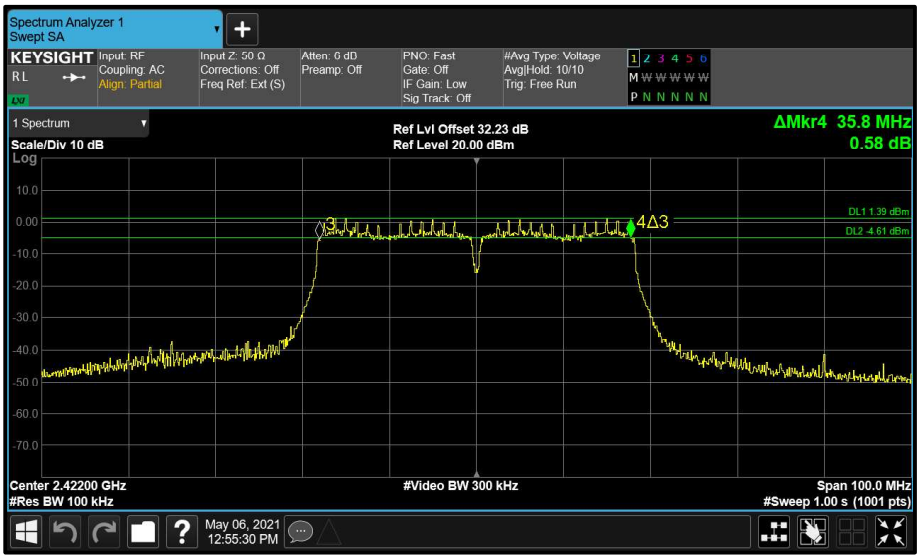

Figure 75 - Aux (B) 2422 MHz (CH3) 6 dB Bandwidth

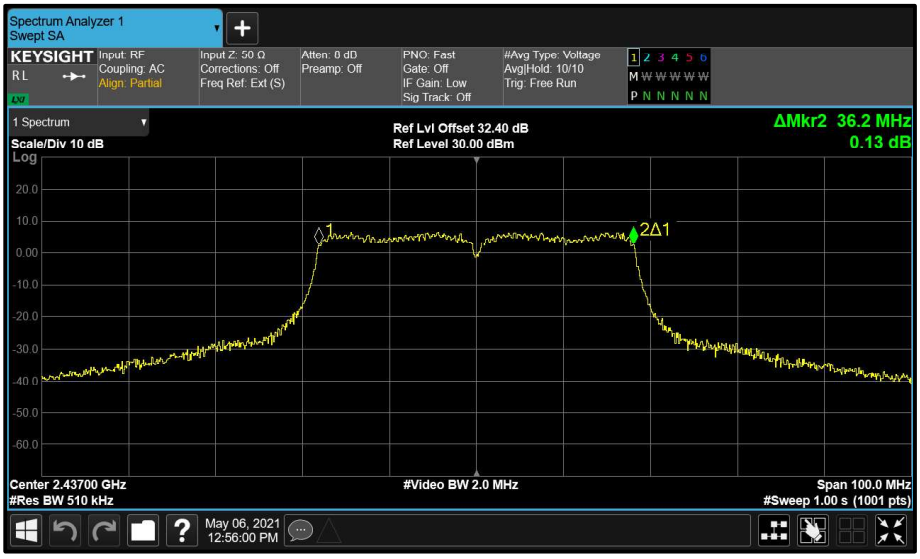

Figure 76 - Main (A) 2437 MHz (CH6) 99% Bandwidth

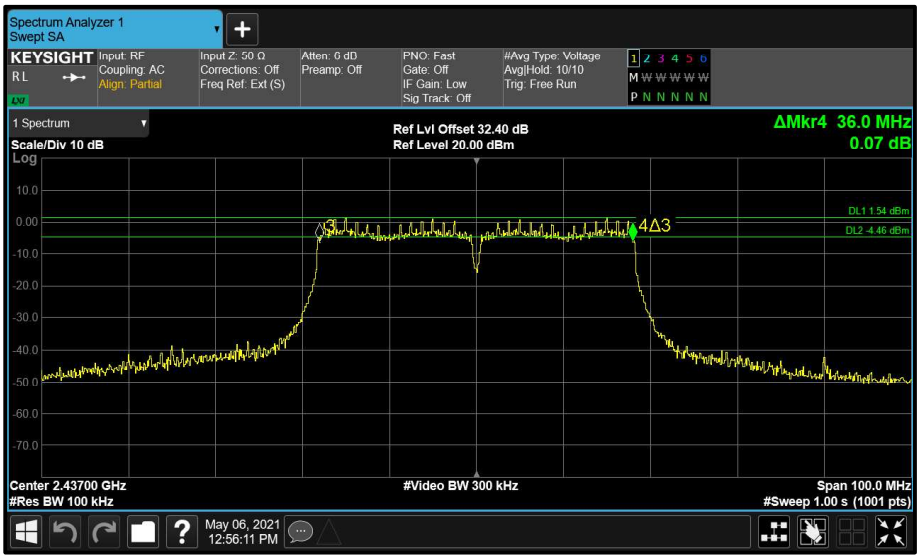

Figure 77 - Main (A) 2437 MHz (CH6) 6 dB Bandwidth

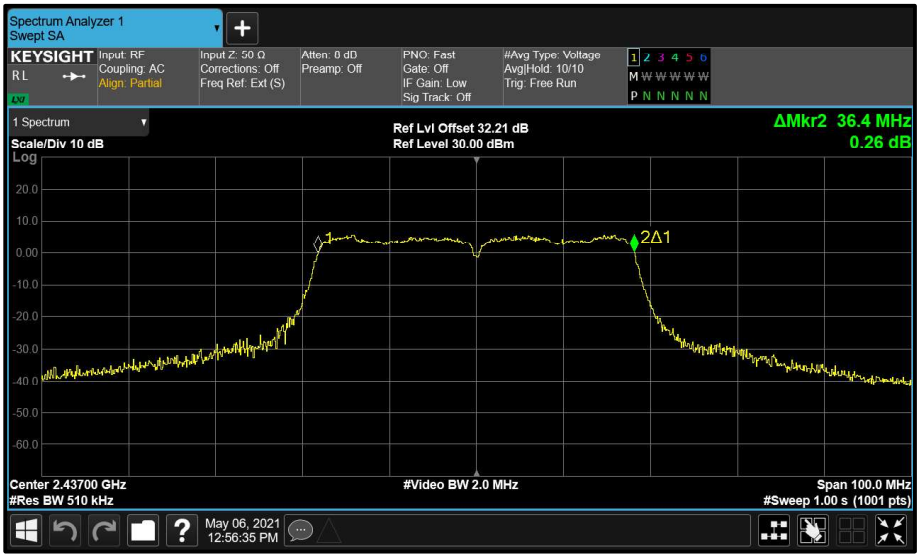

Figure 78 - Aux (B) 2437 MHz (CH6) 99% Bandwidth

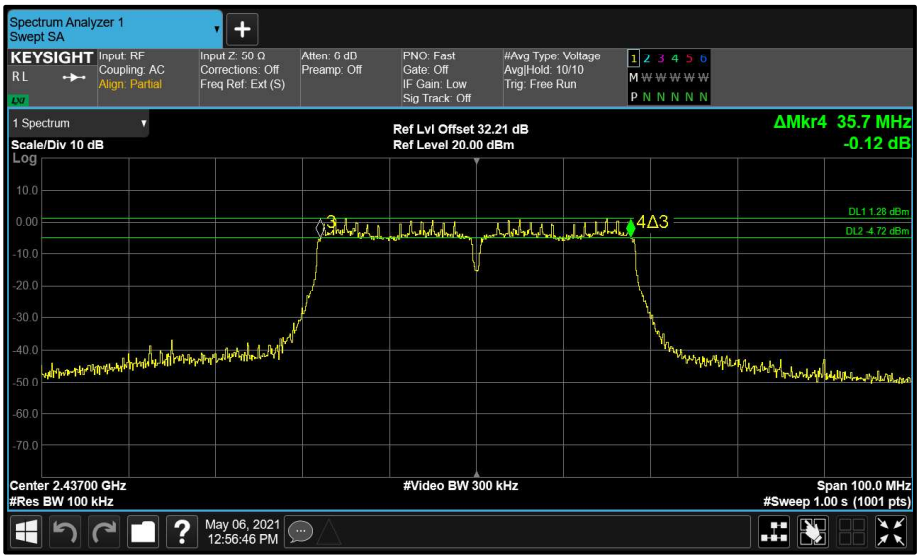

Figure 79 - Aux (B) 2437 MHz (CH6) 6 dB Bandwidth

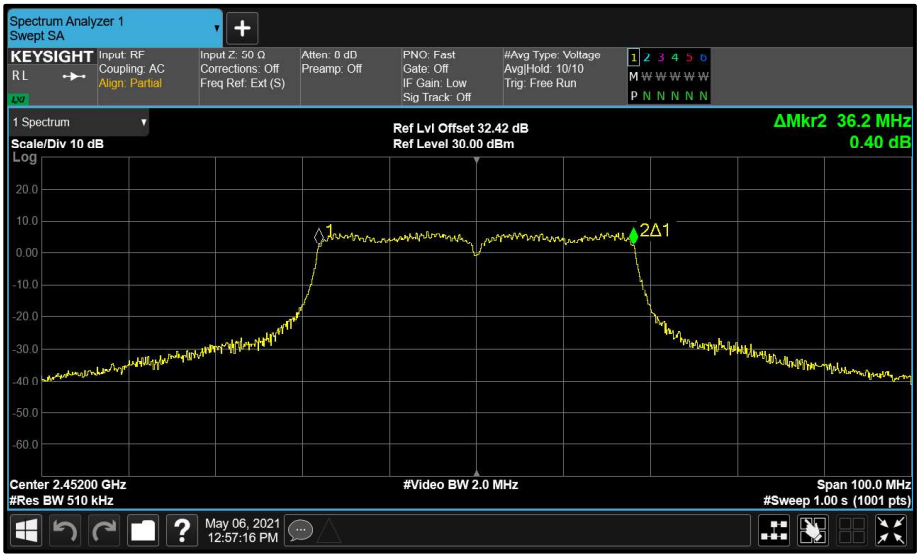

Figure 80 - Main (A) 2452 MHz (CH9) 99% Bandwidth

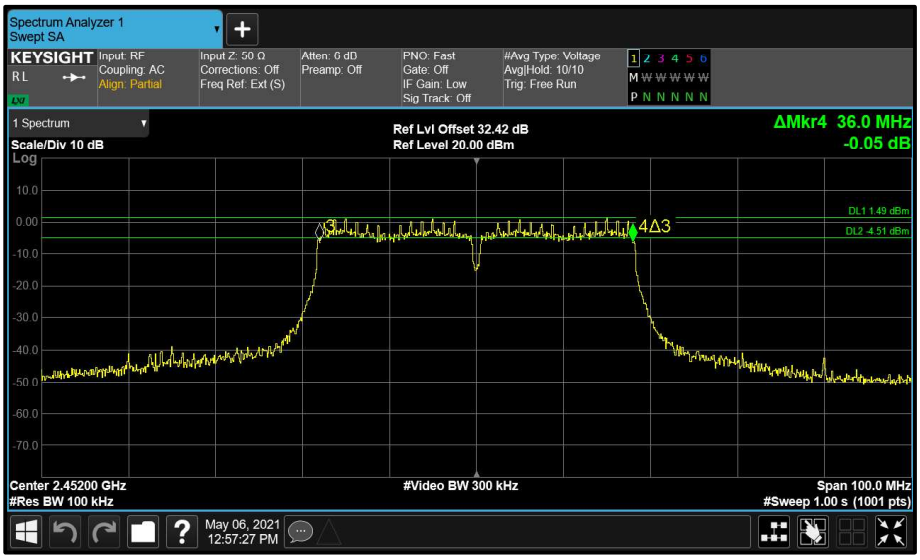

Figure 81 - Main (A) 2452 MHz (CH9) 6 dB Bandwidth

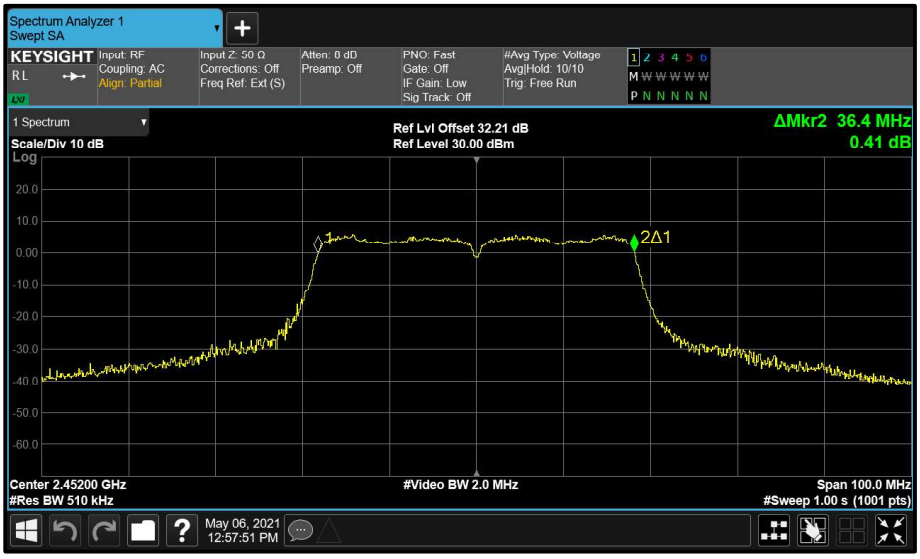

Figure 82 - Aux (B) 2452 MHz (CH9) 99% Bandwidth

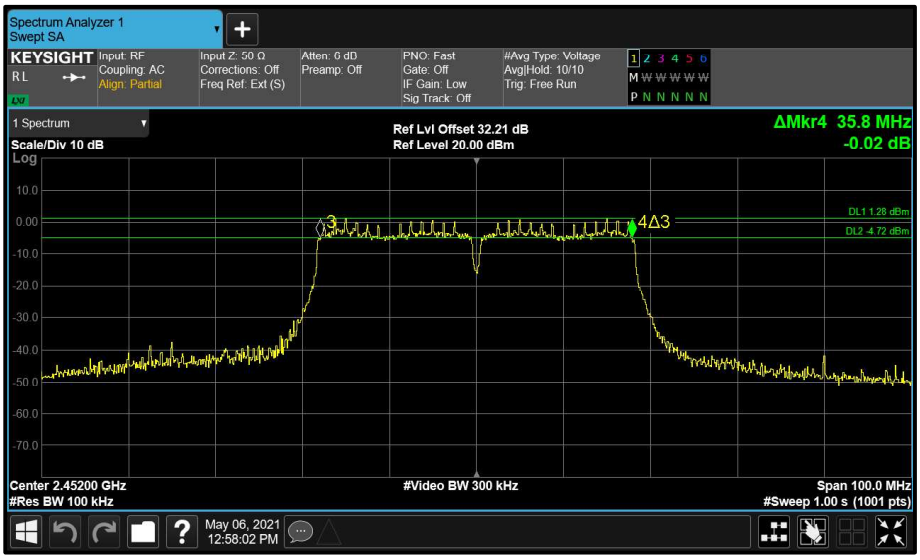

Figure 83 - Aux (B) 2452 MHz (CH9) 6 dB Bandwidth

<u>FCC 47 CFR Part 15, Limit Clause 15.247(a)(2) and ISED RSS-247, Clause 5.2(a)</u>

The minimum 6 dB Bandwidth shall be at least 500 kHz.

2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	17-May-2021
Multimeter	Iso-tech	IDM101	2421	12	30-Oct-2021
Hygrometer	Rotronic	I-1000	3220	12	16-Oct-2021
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	17-May-2021
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	04-Mar-2022
Signal Commissioning Unit	TUV SUD	SCU001	5546	12	16-Apr-2022

Table 39

2.4 Maximum Conducted Output Power

2.4.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (b)
ISED RSS-247, Clause 5.4
ISED RSS-GEN, Clause 6.12

2.4.2 Equipment Under Test and Modification State

RB03, S/N: H8U-JP-FJN0002X - Modification State 0

2.4.3 Date of Test

06-May-2021 to 23-June-2021

2.4.4 Test Method

The test was performed in accordance with ANSI C63.10 clause 11.9.2.3.2 Method AVGPM-G

MIMO output port summing was performed in accordance with KDB 662911 D01, clause F)2)c)(i) for cross-polarized antennas with the same individual gain.

2.4.5 Environmental Conditions

Ambient Temperature	22.3 - 23.2 °C
Relative Humidity	24.1 - 42.5 %

2.4.6 Test Results

2.4 GHz WLAN

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)c), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11b	Duty Cycle (%):	99.3
Data Rate:	1 Mbps	DCCF (dB):	-
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	4.08
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	∑		
2412	13.83	13.73	-	-	16.79	30.00	-13.21
2437	13.72	13.63	-	-	16.68	30.00	-13.32
2462	13.61	13.64	-	-	16.63	30.00	-13.37

Table 40 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	∑					
2412	13.83	13.73	-	-	16.79	30.00	-13.21	20.56	36.00	-15.44
2437	13.72	13.63	-	-	16.68	30.00	-13.32	20.76	36.00	-15.24
2462	13.61	13.64	-	-	16.63	30.00	-13.37	20.62	36.00	-15.38

Table 41 - ISED Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)c), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11g	Duty Cycle (%):	98.3
Data Rate:	6 Mbps	DCCF (dB):	-
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	4.08
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	∑		
2412	14.72	14.65	-	-	17.69	30.00	-12.31
2437	14.63	14.56	-	-	17.60	30.00	-12.40
2462	14.52	14.56	-	-	17.55	30.00	-12.45

Table 42 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	∑					
2412	14.72	14.65	-	-	17.69	30.00	-12.31	21.46	36.00	-14.54
2437	14.63	14.56	-	-	17.60	30.00	-12.40	21.68	36.00	-14.32
2462	14.52	14.56	-	-	17.55	30.00	-12.45	21.54	36.00	-14.46

Table 43 - ISED Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)c), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11n HT20	Duty Cycle (%):	97.1
Modulation Coding Scheme:	MCS8	DCCF (dB):	-
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	4.08
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	∑		
2412	14.93	14.81	-	-	17.88	30.00	-12.12
2437	14.82	14.73	-	-	17.78	30.00	-12.22
2462	14.71	14.74	-	-	17.73	30.00	-12.27

Table 44 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	∑					
2412	14.93	14.81	-	-	17.88	30.00	-12.12	21.65	36.00	-14.35
2437	14.82	14.73	-	-	17.78	30.00	-12.22	21.86	36.00	-14.14
2462	14.71	14.74	-	-	17.73	30.00	-12.27	21.72	36.00	-14.28

Table 45 - ISED Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)c), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11n HT20	Duty Cycle (%):	98.3
Modulation Coding Scheme:	MCS0	DCCF (dB):	-
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	4.08
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	∑		
2412	14.89	14.82	-	-	17.86	30.00	-12.14
2437	14.81	14.73	-	-	17.78	30.00	-12.22
2462	14.70	14.73	-	-	17.73	30.00	-12.27

Table 46 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	∑					
2412	14.89	14.82	-	-	17.86	30.00	-12.14	21.63	36.00	-14.37
2437	14.81	14.73	-	-	17.78	30.00	-12.22	21.86	36.00	-14.14
2462	14.70	14.73	-	-	17.73	30.00	-12.27	21.72	36.00	-14.28

Table 47 - ISED Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)c), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11n HT40	Duty Cycle (%):	94.9
Modulation Coding Scheme:	MCS8	DCCF (dB):	-
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	4.08
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	∑		
2422	12.79	12.72	-	-	15.76	30.00	-14.24
2437	13.78	13.70	-	-	16.75	30.00	-13.25
2452	13.72	13.64	-	-	16.68	30.00	-13.32

Table 48 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	∑					
2422	12.79	12.72	-	-	15.76	30.00	-14.24	19.22	36.00	-16.78
2437	13.78	13.70	-	-	16.75	30.00	-13.25	20.83	36.00	-15.17
2452	13.72	13.64	-	-	16.68	30.00	-13.32	20.60	36.00	-15.40

Table 49 - ISED Maximum Conducted (average) Output Power Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (b)(3) RSS-247 5.4 d)	Test Method(s):	C63.10 11.9.2.3.2
Additional Reference(s):	662911 D01 v02r01 F)2)c), 662911 D01 v02r01 E)1)		

DUT Configuration			
Mode:	802.11n HT40	Duty Cycle (%):	97.0
Modulation Coding Scheme:	MCS0	DCCF (dB):	-
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	4.08
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)
	A	B	C	D	∑		
2422	12.76	12.69	-	-	15.73	30.00	-14.27
2437	13.77	13.69	-	-	16.74	30.00	-13.26
2452	13.70	13.65	-	-	16.68	30.00	-13.32

Table 50 - FCC Maximum Conducted (average) Output Power Results

Test Frequency (MHz)	Maximum Conducted Output Power (dBm)					Limit (dBm)	Margin (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
	A	B	C	D	∑					
2422	12.76	12.69	-	-	15.73	30.00	-14.27	19.19	36.00	-16.81
2437	13.77	13.69	-	-	16.74	30.00	-13.26	20.82	36.00	-15.18
2452	13.70	13.65	-	-	16.68	30.00	-13.32	20.60	36.00	-15.40

Table 51 - ISED Maximum Conducted (average) Output Power Results

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

ISED RSS-247, Limit Clause 5.4 (b)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e) of the specification.

2.4.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Jun-2021
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	03-Dec-2021
Multimeter	Iso-tech	IDM101	2421	12	30-Oct-2021
Hygrometer	Rotronic	I-1000	3220	12	16-Oct-2021
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	16-Jun-2021
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	03-Dec-2021
USB Power Sensor	Boonton	RTP5006	5184	12	19-Apr-2022
Signal Commissioning Unit	TUV SUD	SCU001	5546	12	16-Apr-2022

Table 52

2.5 Authorised Band Edges

2.5.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d)
ISED RSS-247, Clause 5.5

2.5.2 Equipment Under Test and Modification State

RB03, S/N: H8U-JP-FJN0002X - Modification State 0

2.5.3 Date of Test

23-April-2021 to 01-June-2021

2.5.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.10.4.

2.5.5 Environmental Conditions

Ambient Temperature	16.9 - 23.3 °C
Relative Humidity	23.4 - 56.3 %

2.5.6 Test Results

2.4 GHz WLAN

Mode	Data Rate /MCS	TX Frequency (MHz)	Band Edge Frequency (MHz)	Level (dBc)
802.11b (Main + Aux)	1 Mbps	2412	2400	-45.16

Table 53 - 802.11b Authorised Band Edge Results

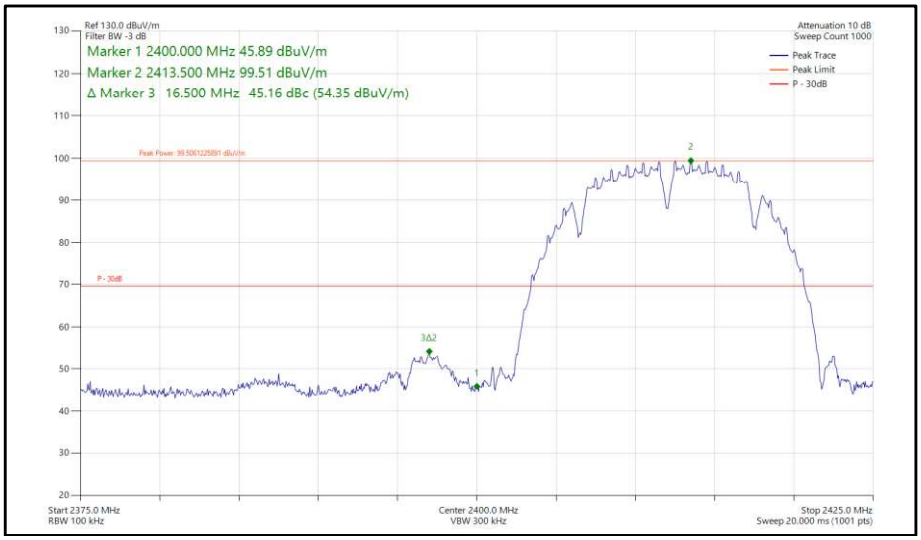

Figure 84 - 802.11b, 2412 MHz, Band Edge Frequency 2400 MHz

Mode	Data Rate /MCS	TX Frequency (MHz)	Band Edge Frequency (MHz)	Level (dBc)
802.11g (Main + Aux)	6 Mbps	2412	2400	-40.33

Table 54 - 802.11g Authorised Band Edge Results

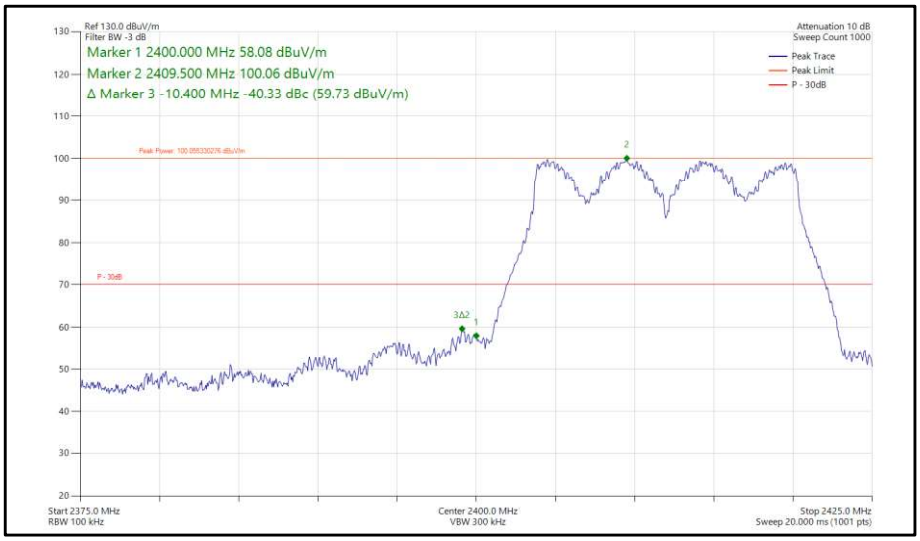

Figure 85- 802.11g, 2412 MHz, Band Edge Frequency 2400 MHz

Mode	Data Rate /MCS	TX Frequency (MHz)	Band Edge Frequency (MHz)	Level (dBc)
802.11HT20 (Main + Aux)	MCS0	2412	2400	-39.45

Table 55 - 802.11 HT20 Authorised Band Edge Results

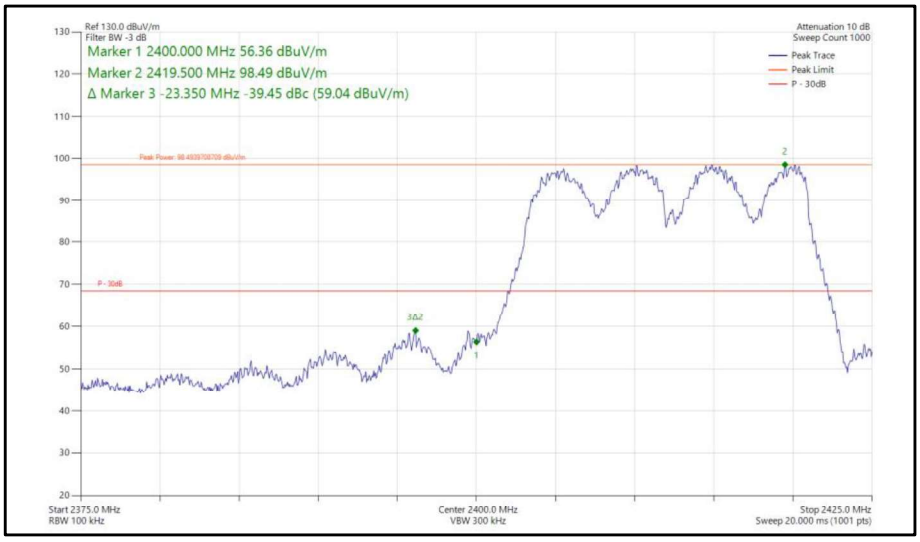

Figure 86- 802.11 HT20, 2412 MHz, Band Edge Frequency 2400 MHz

Mode	Data Rate /MCS	TX Frequency (MHz)	Band Edge Frequency (MHz)	Level (dBc)
802.11HT40 (Main + Aux)	MCS0	2422	2400	-41.62
802.11HT40 (Main + Aux)	MCS0	2427	2400	-42.89

Table 56 - 802.11HT40 Authorised Band Edge Results

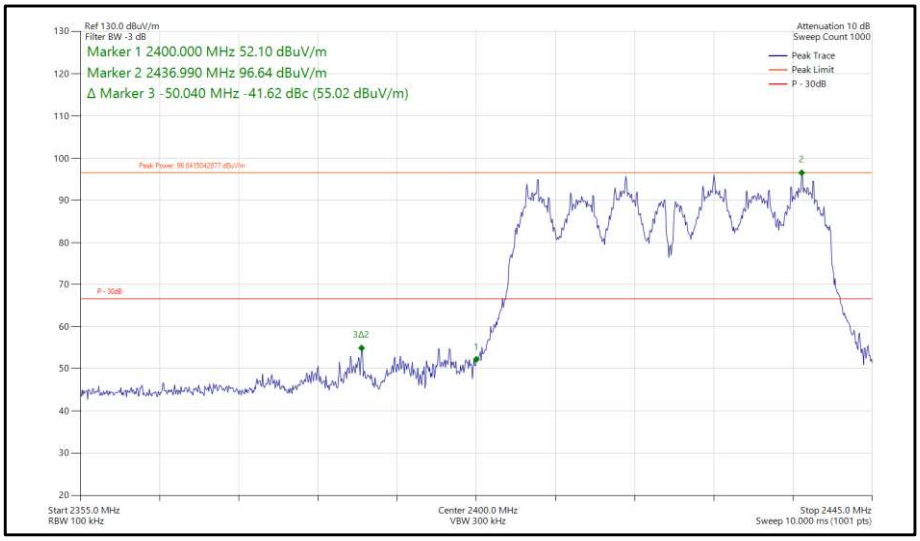

Figure 87- 802.11HT40, 2422 MHz, Band Edge Frequency 2400 MHz

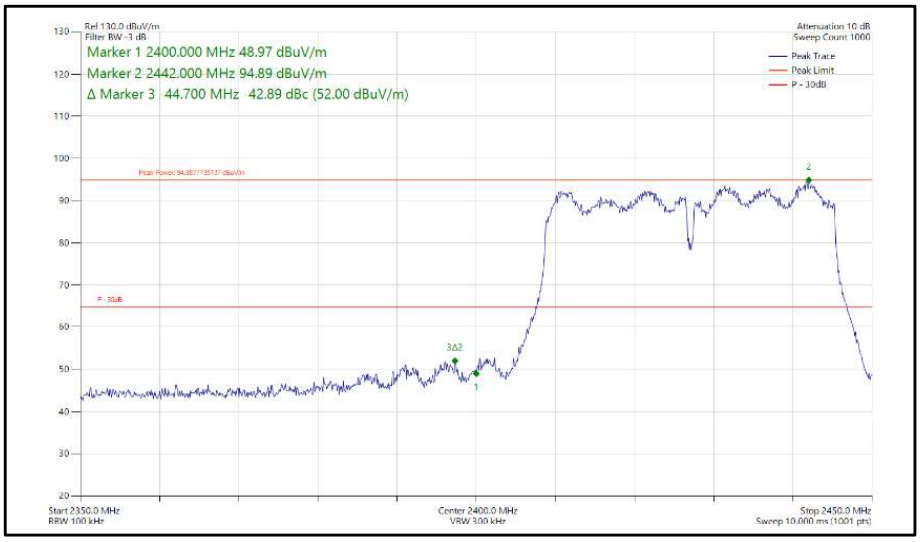

Figure 88- 802.11HT40, 2427 MHz, Band Edge Frequency 2400 MHz

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

ISED RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

2.5.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 12.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Test Receiver	Rohde & Schwarz	ESU40	3506	12	18-Mar-2022
EmX Emissions Software	TUV SUD		5125	-	Software
Cable (sma-sma, 2 m)	Junkosha	MWX221-02000DMS	5428	12	15-Oct-2021
Cable (N-Type to N-Type, 8 m)	Teledyne	PR90-088-8MTR	5450	6	08-Mar-2022
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5473	12	01-Apr-2022
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5481	12	31-Mar-2022
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB 40	5604	12	08-Sep-2021
Broadband Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA 9120 B	5611	12	22-Sep-2021
Turntable & Mast Controller	Maturo Gmbh	NCD/498/2799.01	5612	-	TU
Tilt Antenna Mast TAM 4.0-P	Maturo Gmbh	TAM 4.0-P	5613	-	TU
Turntable	Maturo Gmbh	Turntable 1.5 SI-2t	5614	-	TU
Screened Room (12)	MVG	EMC-3	5621	36	11-Aug-2023
Cable Assembly - 18GHz 8m	Junkosha	MWX221-08000NMSNMS/B	5732	6	05-Aug-2021

Table 57

TU - Traceability Unscheduled

2.6 Spurious Radiated Emissions

2.6.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d) and 15.205
ISED RSS-247, Clause 3.3 and 5.5
ISED RSS-GEN, Clause 6.13

2.6.2 Equipment Under Test and Modification State

RB03, S/N: H9C-UK-PCA0009A - Modification State 0

2.6.3 Date of Test

04-October-2021 to 25-October-2021

2.6.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.3, 6.5 and 6.6.

The EUT was placed on the non-conducting platform in a manner typical of a normal installation.

For frequencies > 1 GHz, plots for average measurements were taken in accordance with ANSI C63.10, clause 4.1.4.2.5 to characterize the EUT. Where emissions were detected, final average measurements were taken in accordance with ANSI C63.10, clause 4.1.4.2.2.

The plots shown are the characterisation of the EUT. The limits on the plots represent the most stringent case for restricted bands, (74/54 dBuV/m) when compared to 20 dBc outside restricted bands. The limits shown have been used as a threshold to determine where further measurements are necessary. Where results are within 10 dB of the limits shown on the plots, further investigation was carried out and reported in results tables.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

At a measurement distance of 1 meter the limit line was increased by 20*LOG(3/1) = 9.54 dB.

Where formal measurements have been necessary, the results have been presented in the emissions table.

2.6.5 Test Setup Diagram – Radiated Emissions

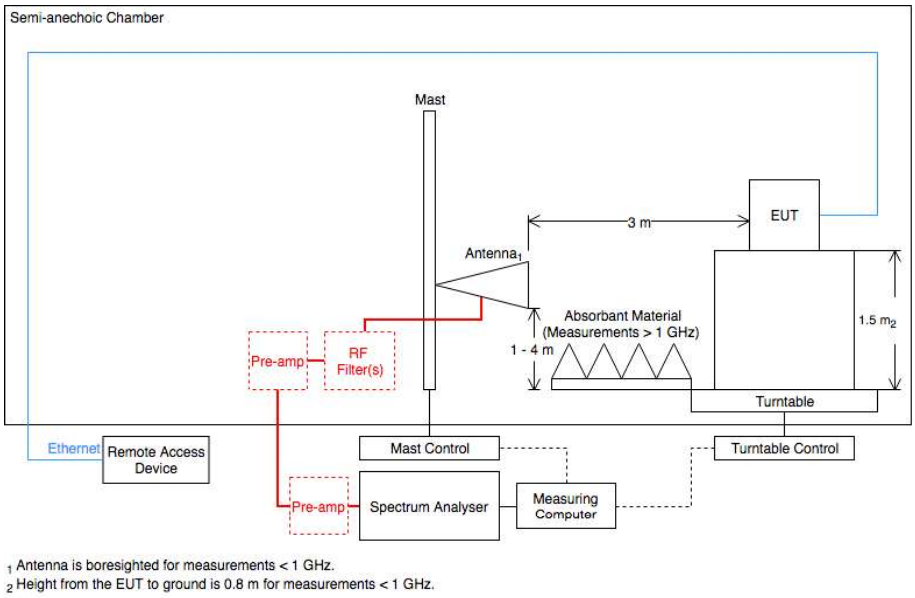

Figure 89 - Radiated Emissions Test Setup Diagram

2.6.6 Environmental Conditions

Ambient Temperature	17.8 - 26.3 °C
Relative Humidity	37.8 - 68.9 %

2.6.7 Test Results

2.4 GHz WLAN

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2386.388	53.2	54.0	-0.8	RMS	3	282	Horizontal
2386.580	53.9	54.0	-0.1	RMS	274	177	Vertical
2491.749	45.0	54.0	-9.0	RMS	93	239	Horizontal
3617.315	46.1	54.0	-7.9	RMS	11	190	Horizontal
4823.959	48.8	54.0	-5.2	RMS	341	184	Horizontal
4823.970	49.2	54.0	-4.8	RMS	343	244	Vertical
7237.160	45.1	54.0	-8.9	RMS	27	334	Vertical
12055.811	48.8	54.0	-5.1	RMS	226	186	Horizontal
12060.435	49.7	54.0	-4.3	RMS	177	100	Vertical

Table 58 - 802.11B, 2412 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

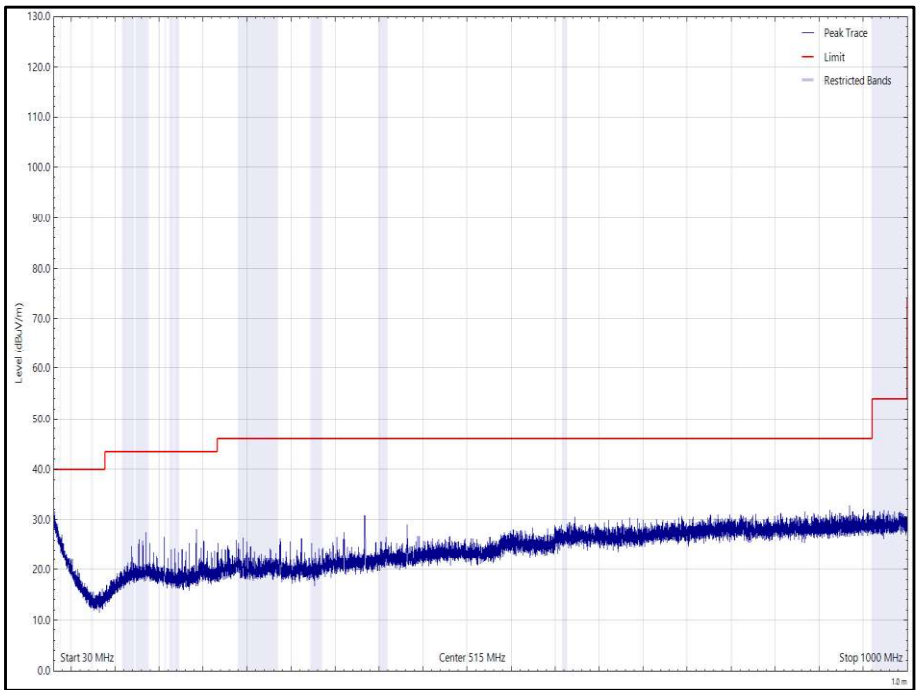

Figure 90 - 802.11B, 2412 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

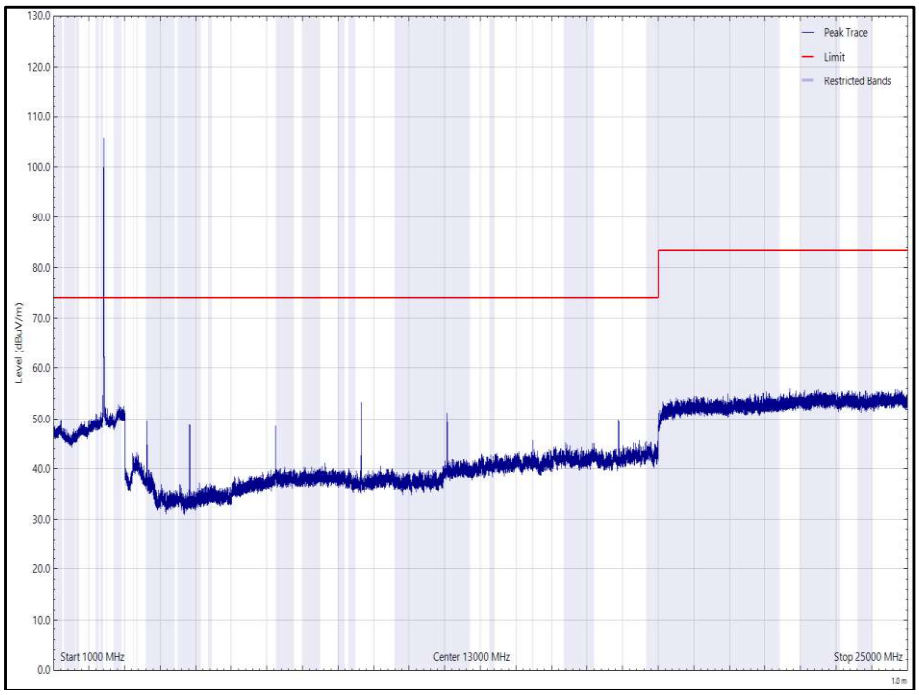

Figure 91 - 802.11B, 2412 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

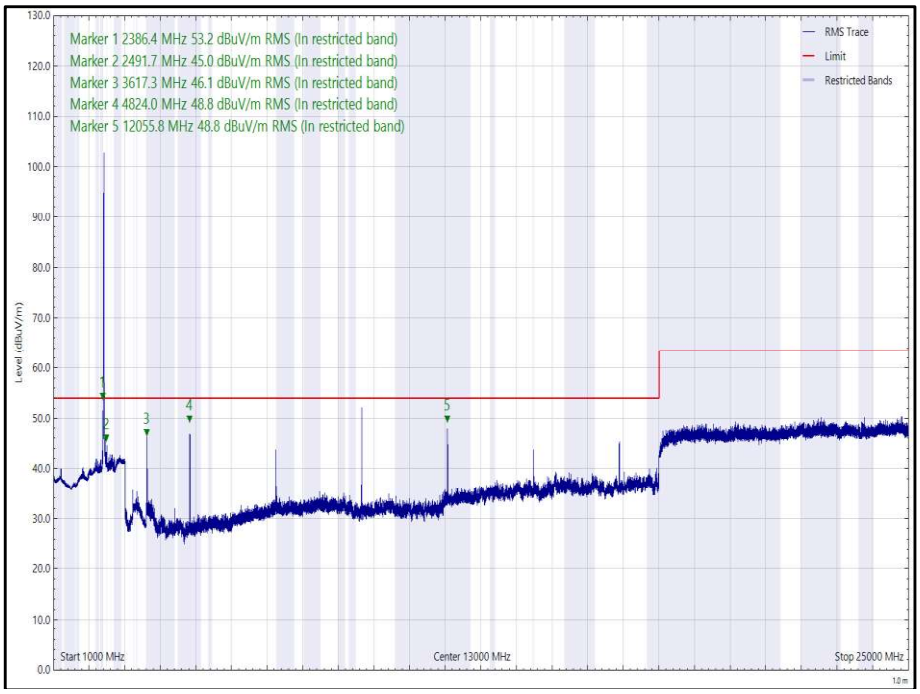

Figure 92 - 802.11B, 2412 MHz, 1 GHz to 25 GHz, Horizontal (rms)

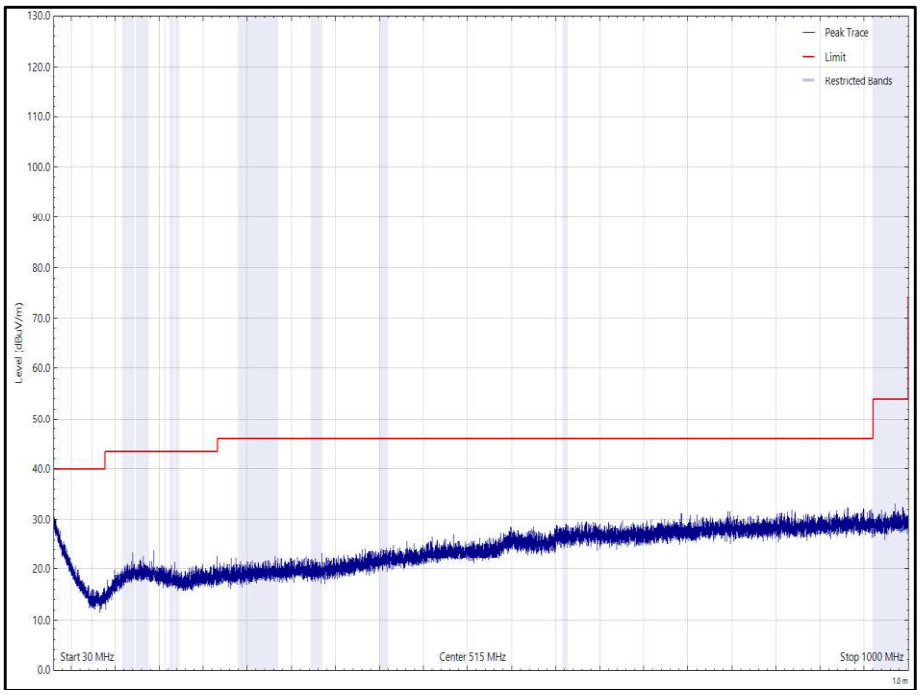

Figure 93 - 802.11B, 2412 MHz, 30 MHz to 1 GHz, Vertical (Peak)

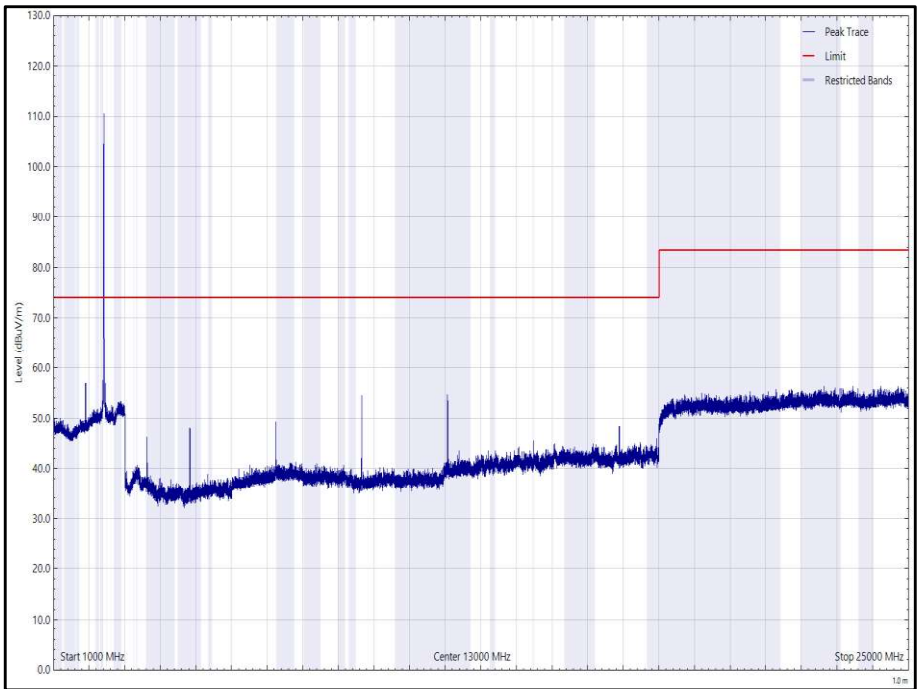

Figure 94 - 802.11B, 2412 MHz, 1 GHz to 25 GHz, Vertical (Peak)

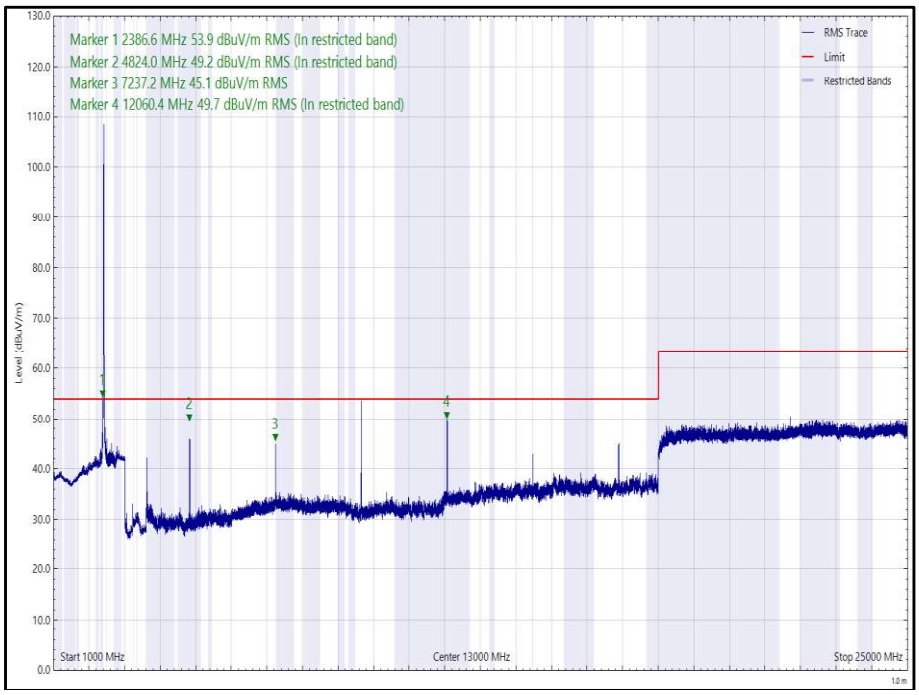

Figure 95 - 802.11B, 2412 MHz, 1 GHz to 25 GHz, Vertical (rms)

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2389.868	46.0	54.0	-8.0	RMS	284	100	Vertical
3652.530	48.5	54.0	-5.5	RMS	12	155	Horizontal
3652.660	46.2	54.0	-7.8	RMS	24	227	Vertical
4872.593	51.6	54.0	-2.3	RMS	342	155	Horizontal
4872.875	53.6	54.0	-0.3	RMS	327	165	Vertical
7310.835	48.4	54.0	-5.6	RMS	26	330	Vertical
7310.965	48.7	54.0	-5.2	RMS	332	156	Horizontal
12186.555	48.5	54.0	-5.5	RMS	177	100	Vertical
12186.593	48.3	54.0	-5.6	RMS	190	219	Horizontal

Table 59 - 802.11B, 2437 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

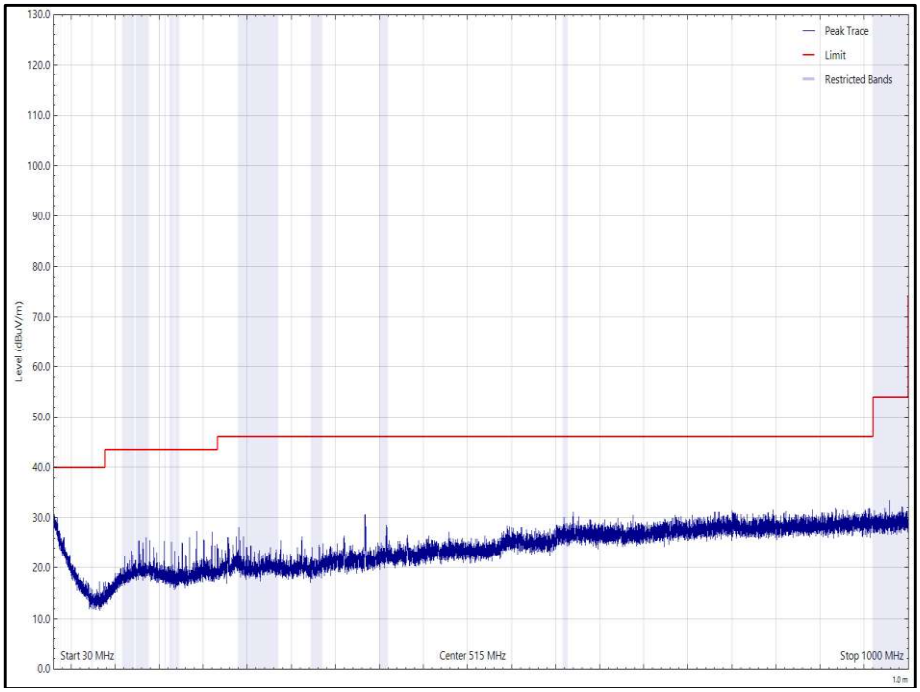

Figure 96 - 802.11B, 2437 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

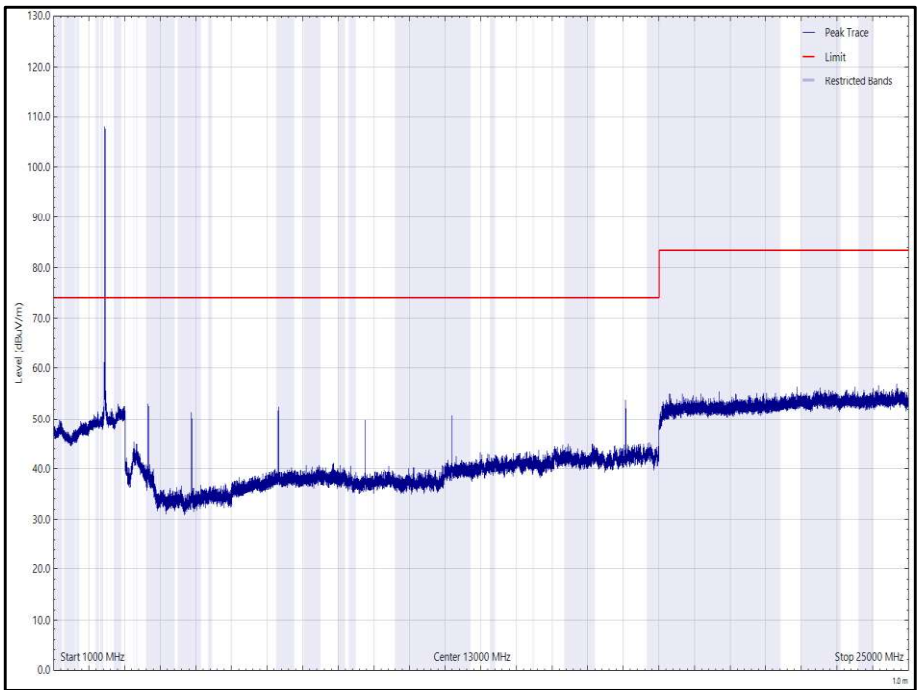

Figure 97 - 802.11B, 2437 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

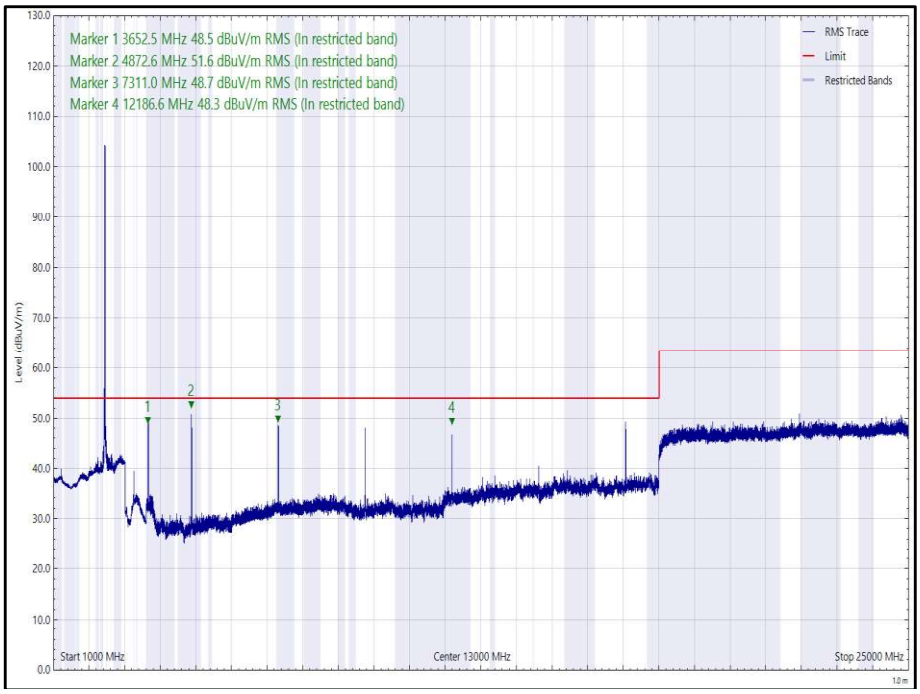

Figure 98 - 802.11B, 2437 MHz, 1 GHz to 25 GHz, Horizontal (rms)

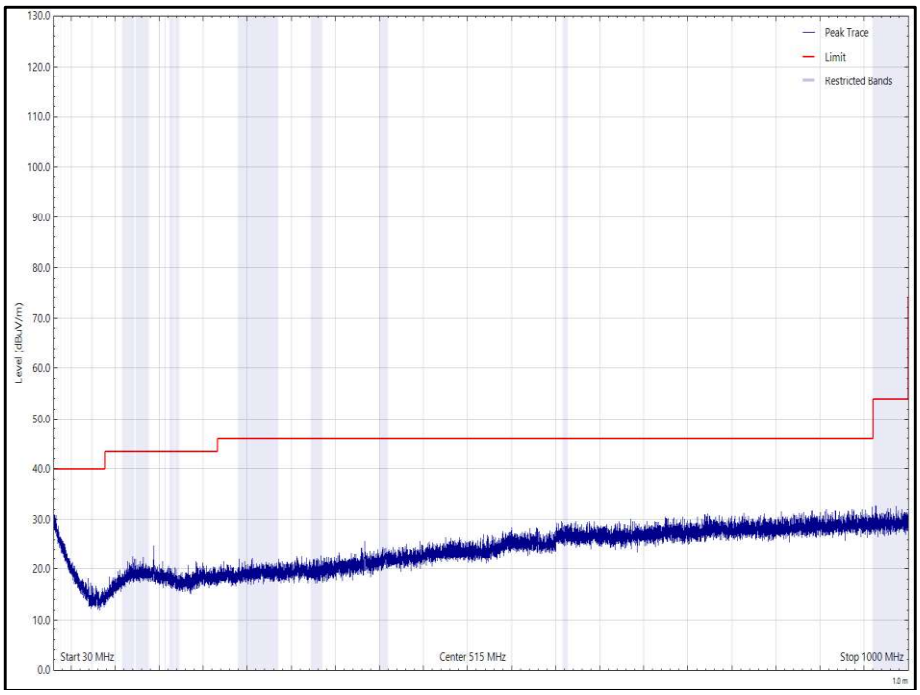

Figure 99 - 802.11B, 2437 MHz, 30 MHz to 1 GHz, Vertical (Peak)

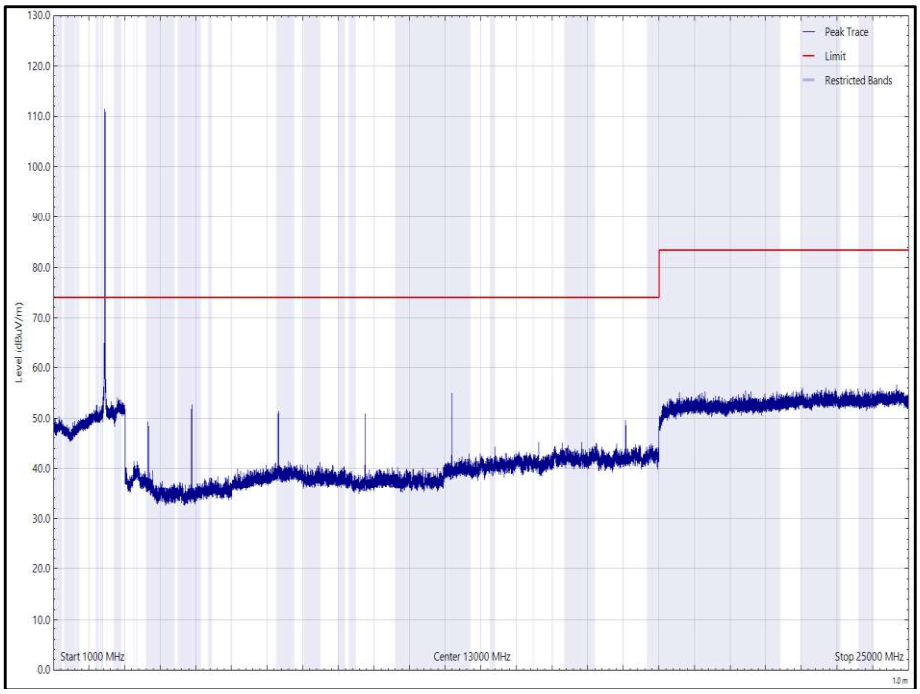

Figure 100 - 802.11B, 2437 MHz, 1 GHz to 25 GHz, Vertical (Peak)

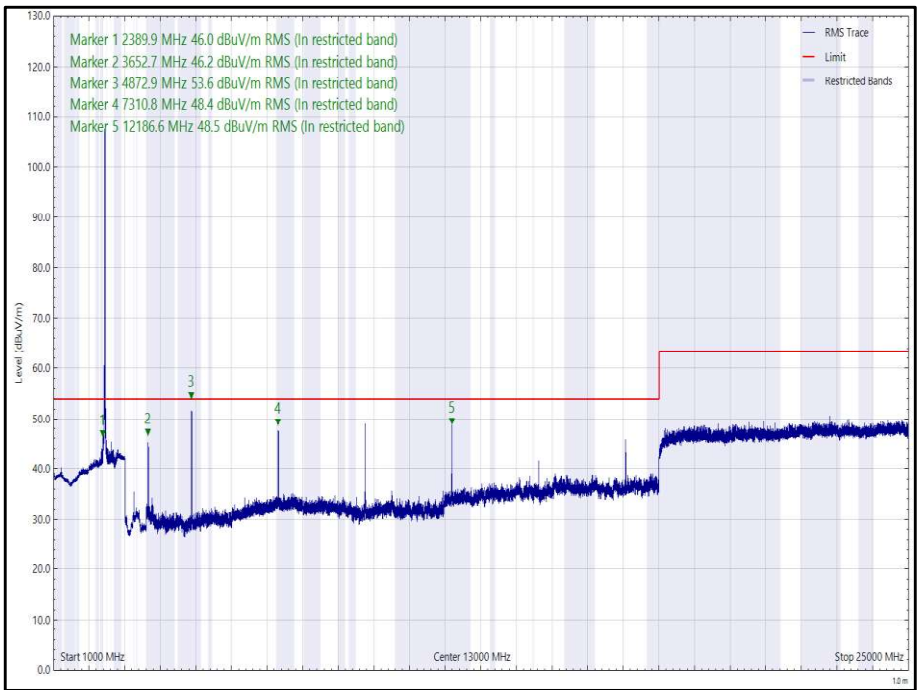

Figure 101 - 802.11B, 2437 MHz, 1 GHz to 25 GHz, Vertical (rms)

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2486.396	46.5	54.0	-7.5	RMS	171	139	Horizontal
2486.434	49.3	54.0	-4.7	RMS	40	161	Vertical
3692.950	48.0	54.0	-6.0	RMS	10	158	Horizontal
3692.960	45.0	54.0	-9.0	RMS	24	216	Vertical
4923.955	51.9	54.0	-2.1	RMS	344	155	Vertical
4923.976	50.4	54.0	-3.6	RMS	326	194	Horizontal
7387.000	49.9	54.0	-4.1	RMS	82	212	Vertical
7387.500	49.9	54.0	-4.1	RMS	140	213	Horizontal
12311.554	49.1	54.0	-4.9	RMS	131	174	Horizontal
12311.588	50.2	54.0	-3.8	RMS	184	100	Vertical

Table 60 - 802.11B, 2462 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

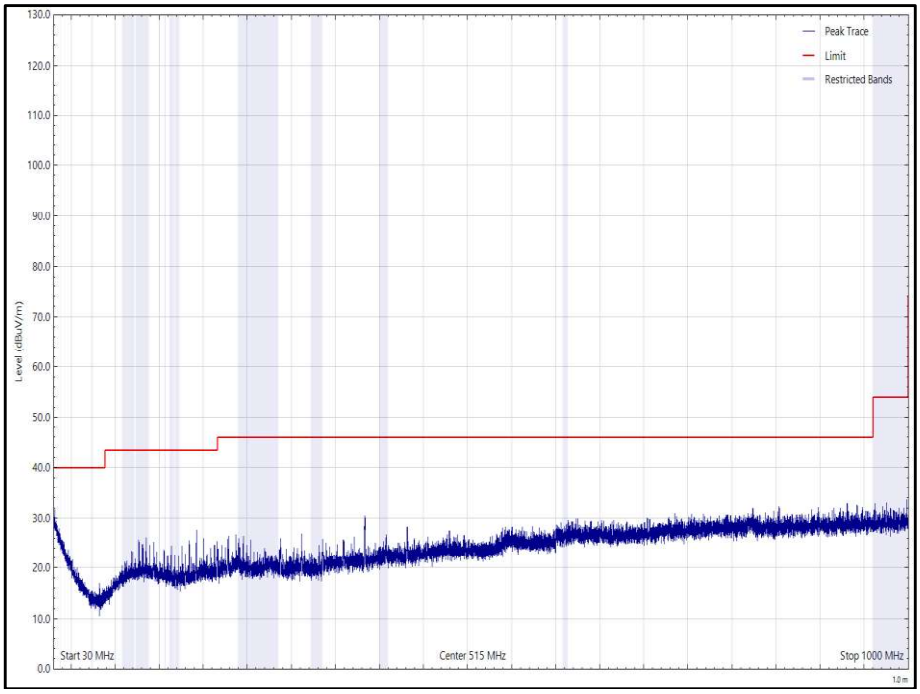

Figure 102 - 802.11B, 2462 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

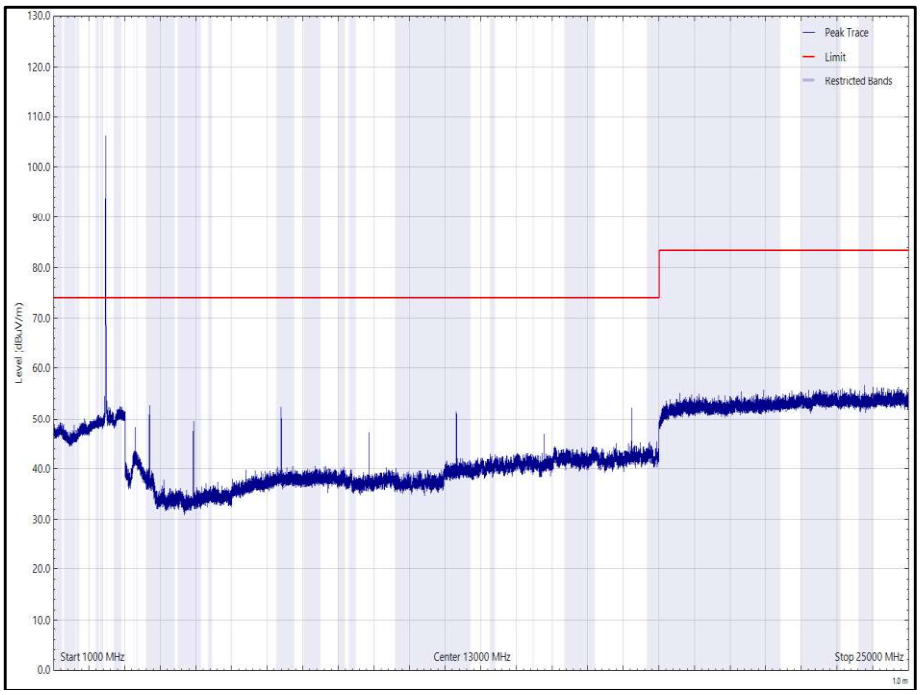

Figure 103 - 802.11B, 2462 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

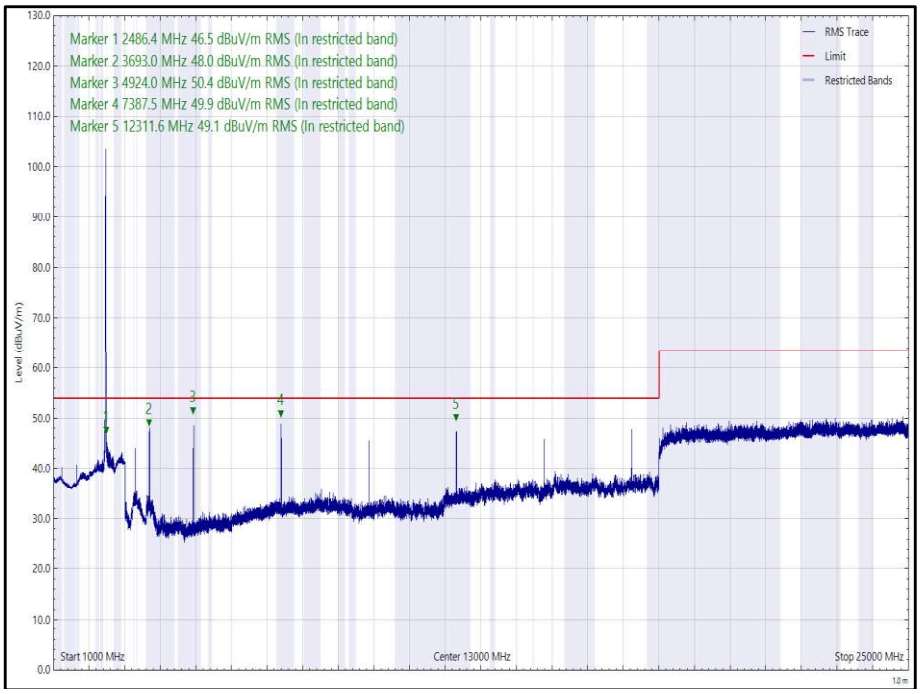

Figure 104 - 802.11B, 2462 MHz, 1 GHz to 25 GHz, Horizontal (rms)

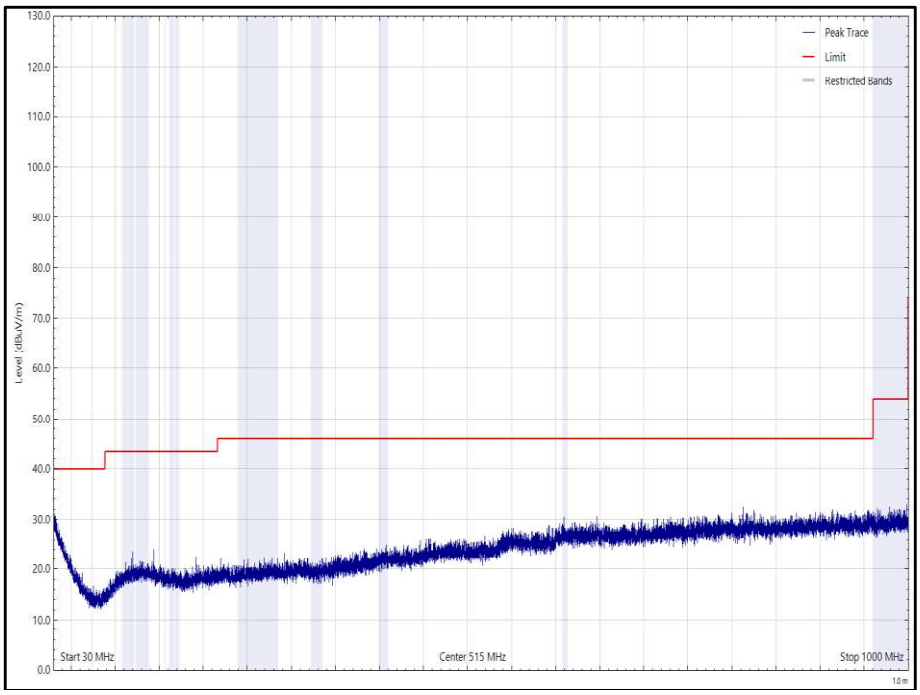

Figure 105 - 802.11B, 2462 MHz, 30 MHz to 1 GHz, Vertical (Peak)

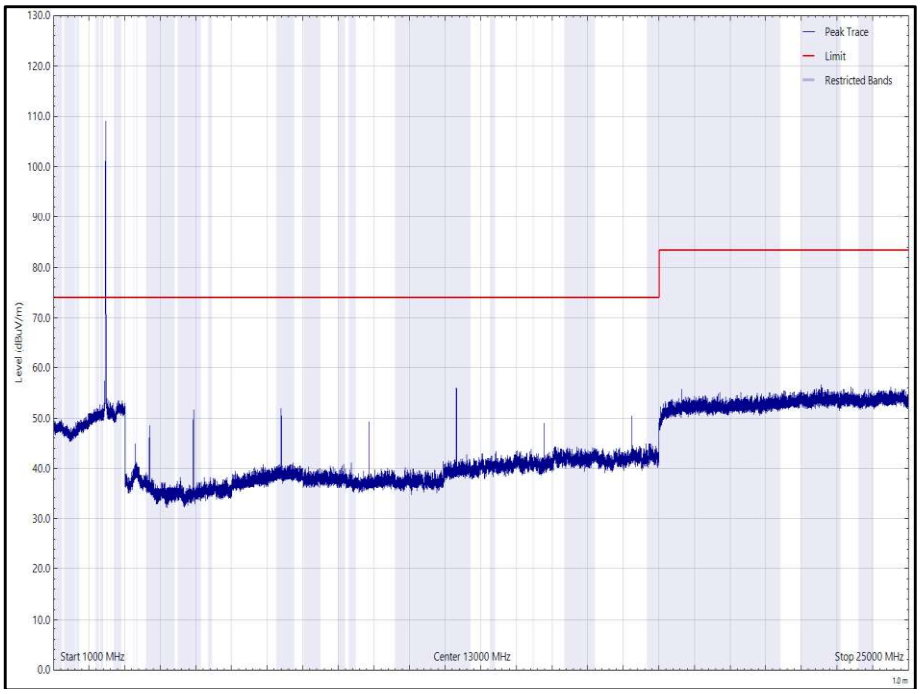

Figure 106 - 802.11B, 2462 MHz, 1 GHz to 25 GHz, Vertical (Peak)

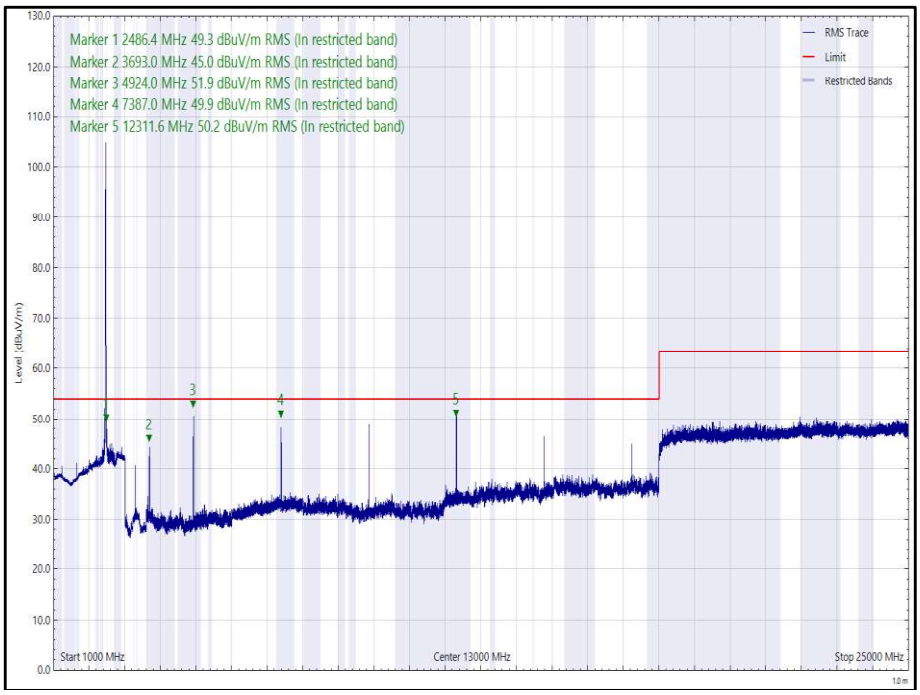

Figure 107 - 802.11B, 2462 MHz, 1 GHz to 25 GHz, Vertical (rms)

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2388.803	51.7	54.0	-2.2	RMS	360	261	Horizontal
2389.749	71.5	74.0	-2.5	Peak	274	192	Vertical
2389.856	66.5	74.0	-7.5	Peak	153	271	Horizontal
2389.860	53.8	54.0	-0.2	RMS	279	200	Vertical
12062.974	45.4	54.0	-8.6	RMS	173	113	Vertical

Table 61 - 802.11G, 2412 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

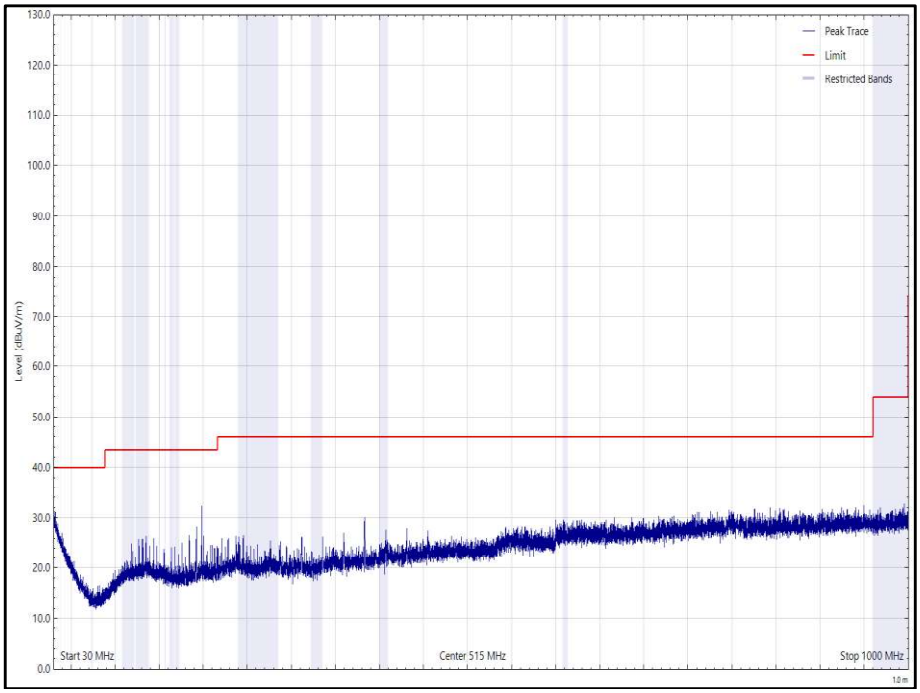

Figure 108 - 802.11G, 2412 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

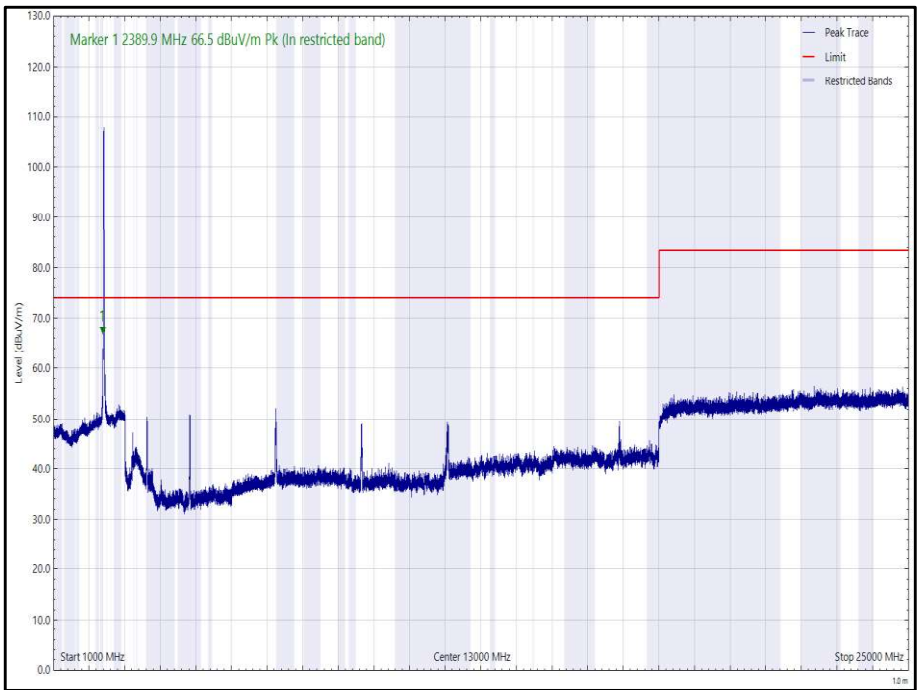

Figure 109 - 802.11G, 2412 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

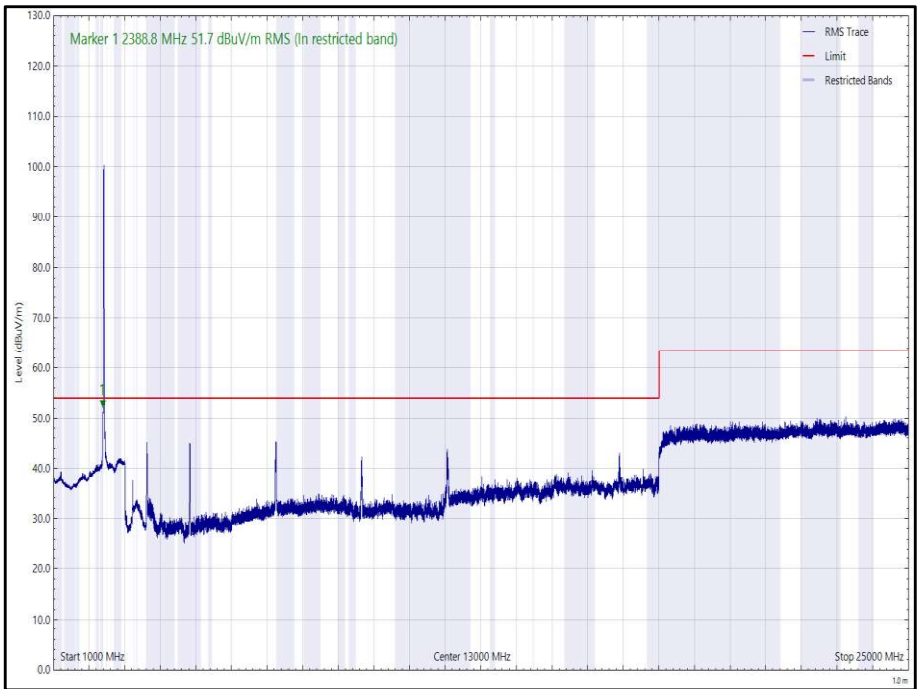

Figure 110 - 802.11G, 2412 MHz, 1 GHz to 25 GHz, Horizontal (rms)

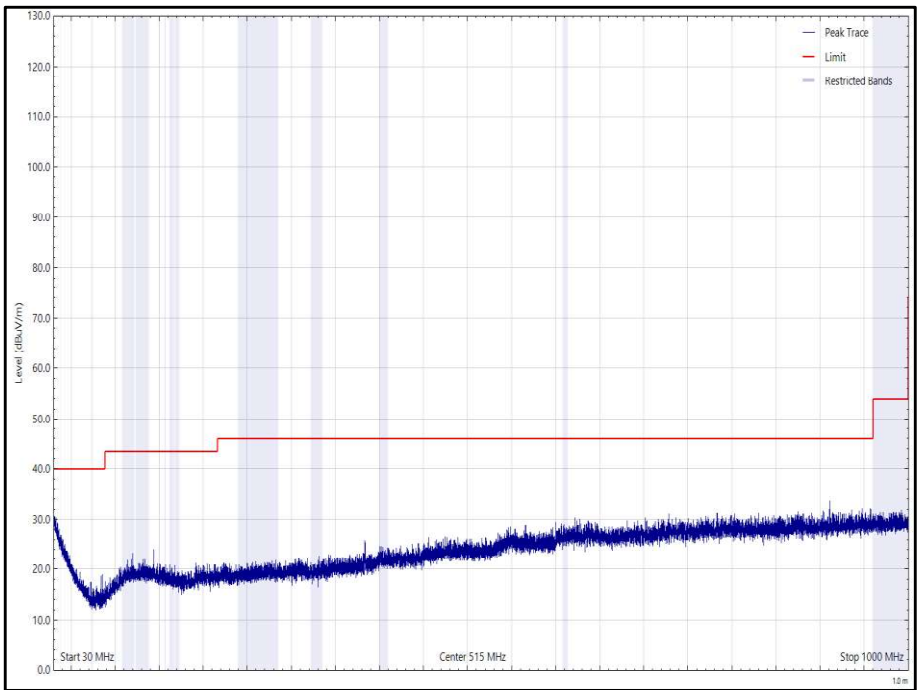

Figure 111 - 802.11G, 2412 MHz, 30 MHz to 1 GHz, Vertical (Peak)

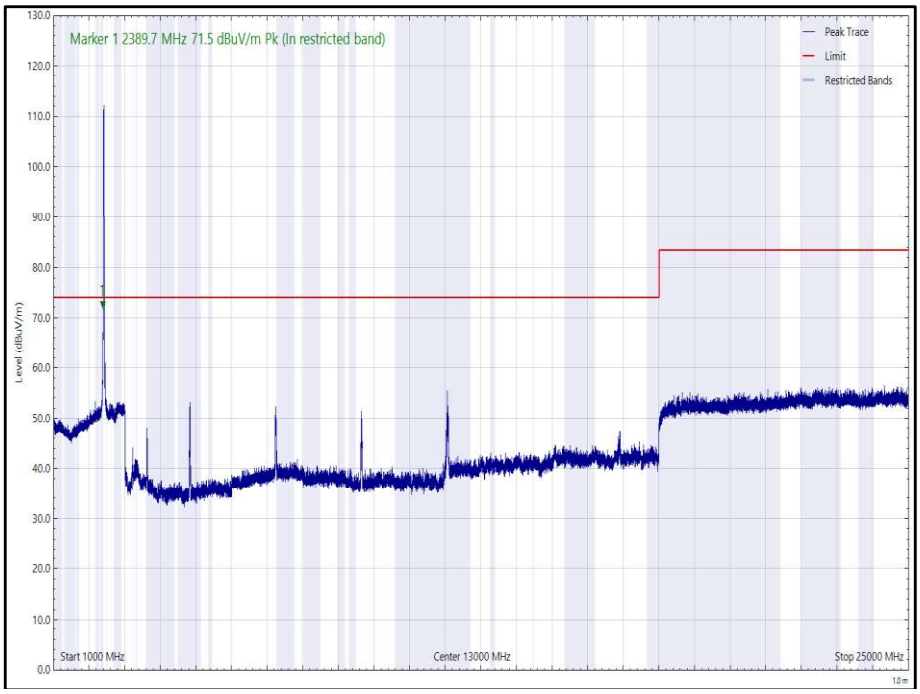

Figure 112 - 802.11G, 2412 MHz, 1 GHz to 25 GHz, Vertical (Peak)

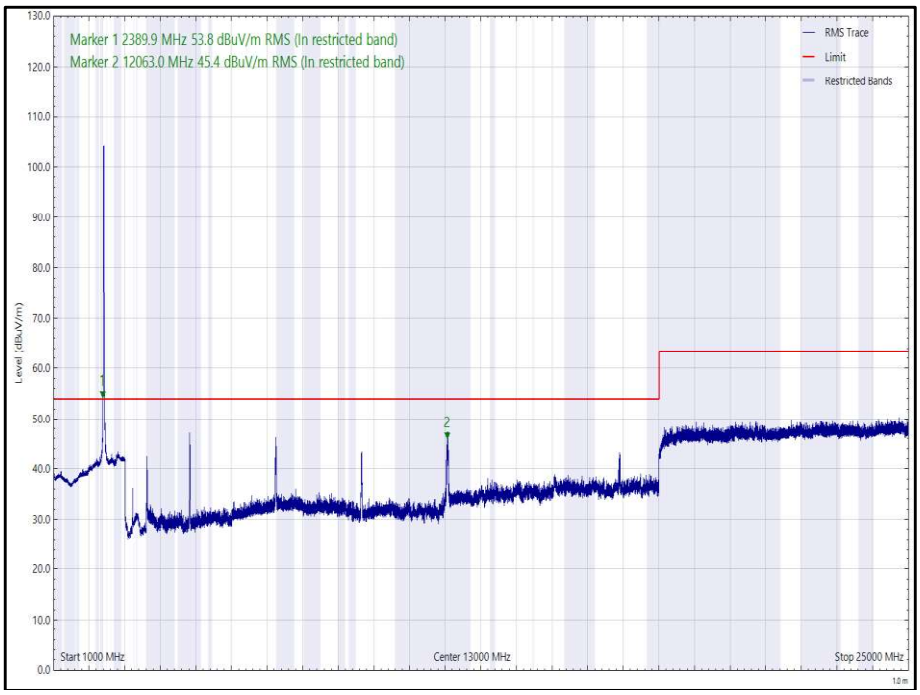

Figure 113 - 802.11G, 2412 MHz, 1 GHz to 25 GHz, Vertical (rms)

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
4874.761	45.0	54.0	-9.0	RMS	151	179	Vertical
7310.586	44.8	54.0	-9.2	RMS	153	100	Horizontal

Table 62 - 802.11G, 2437 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

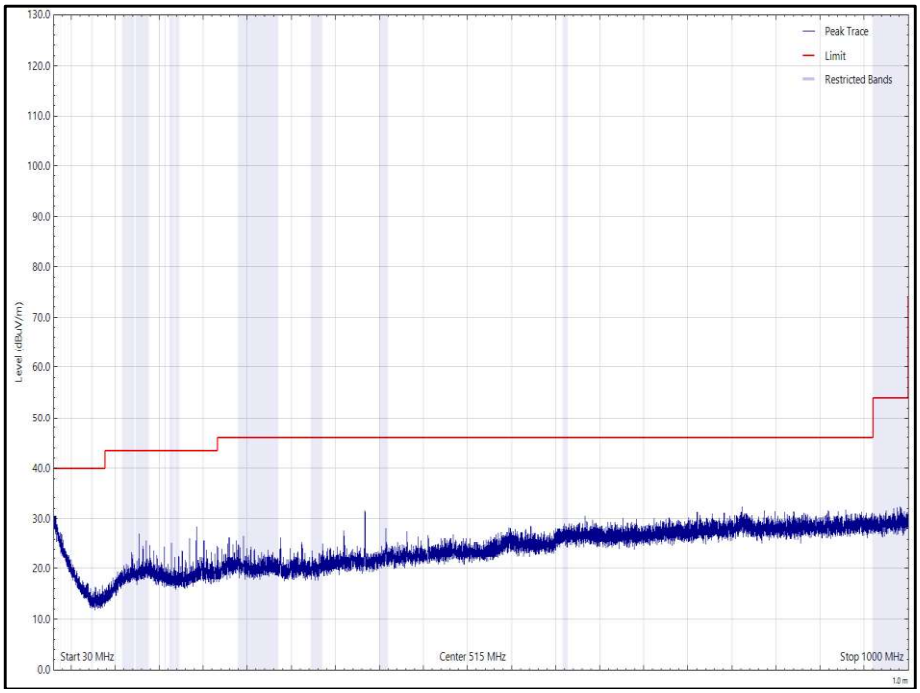

Figure 114 - 802.11G, 2437 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

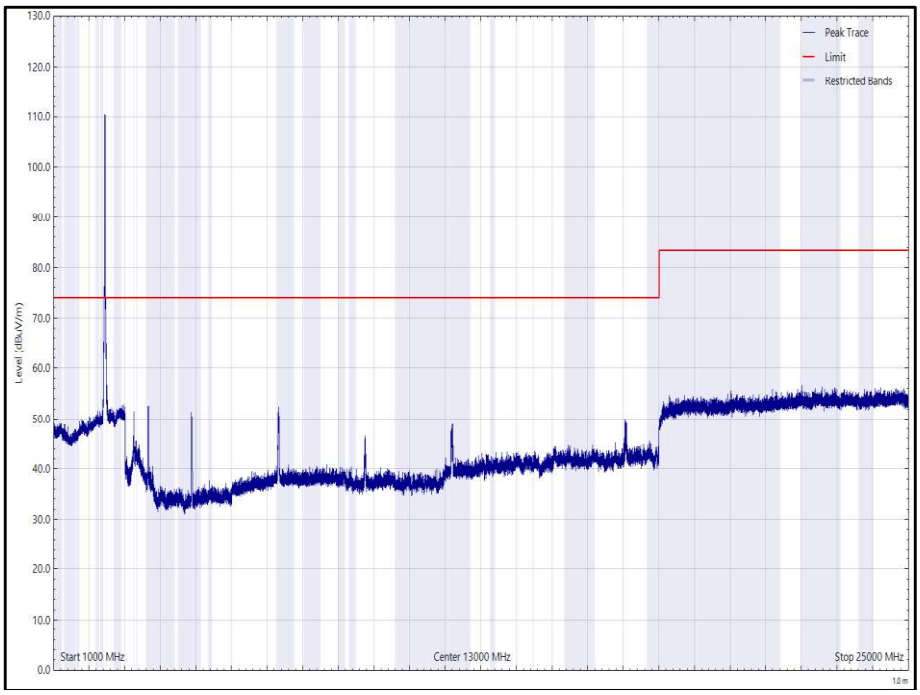

Figure 115 - 802.11G, 2437 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

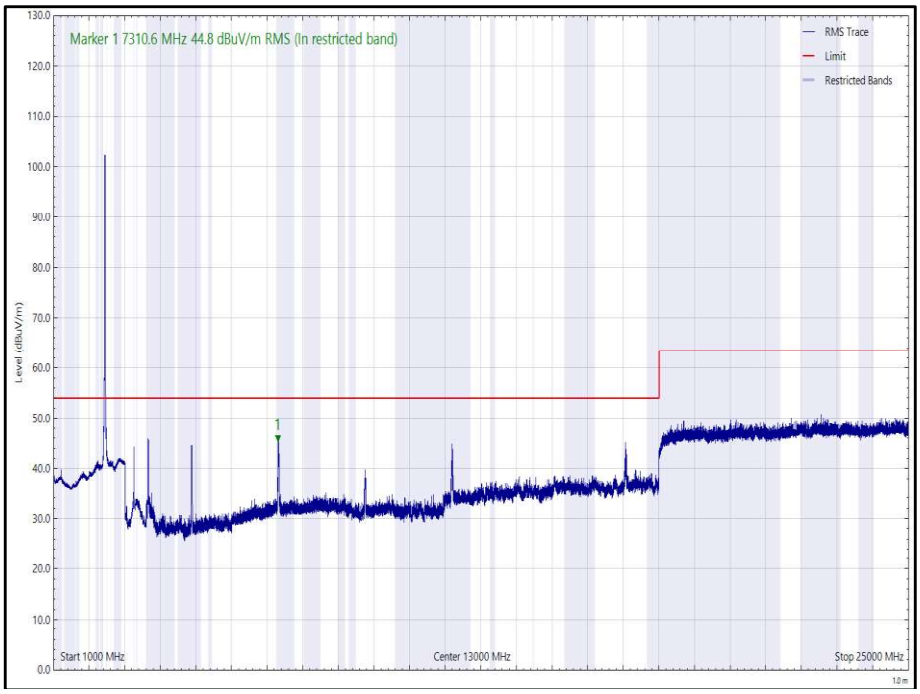

Figure 116 - 802.11G, 2437 MHz, 1 GHz to 25 GHz, Horizontal (rms)

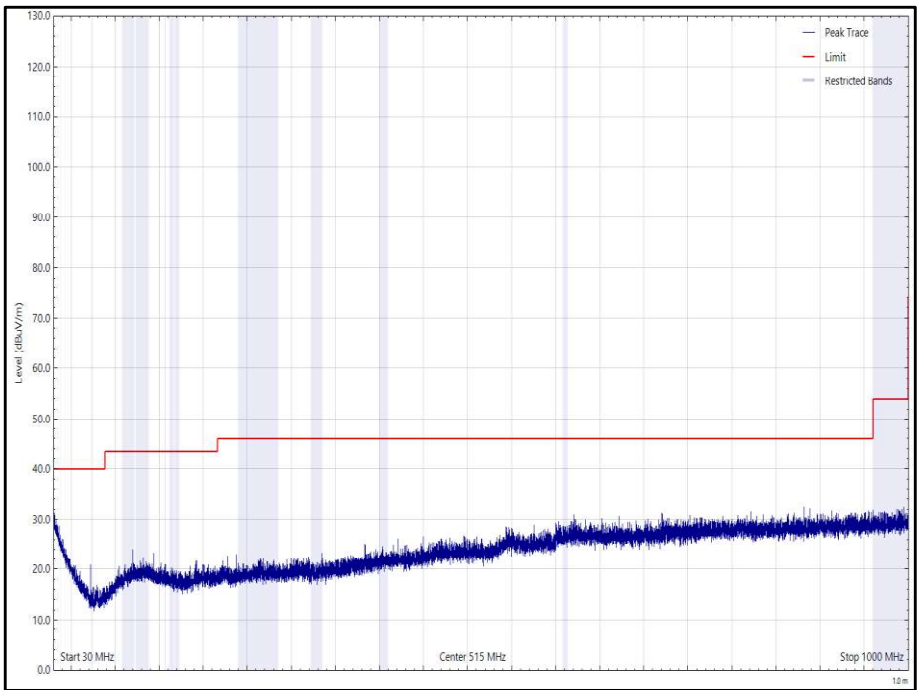

Figure 117 - 802.11G, 2437 MHz, 30 MHz to 1 GHz, Vertical (Peak)

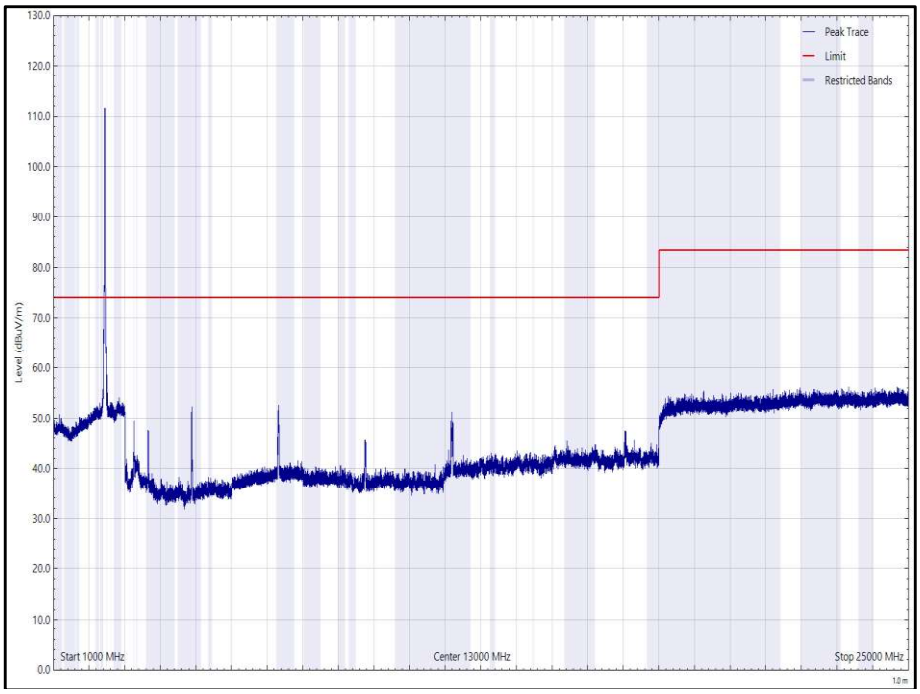

Figure 118 - 802.11G, 2437 MHz, 1 GHz to 25 GHz, Vertical (Peak)

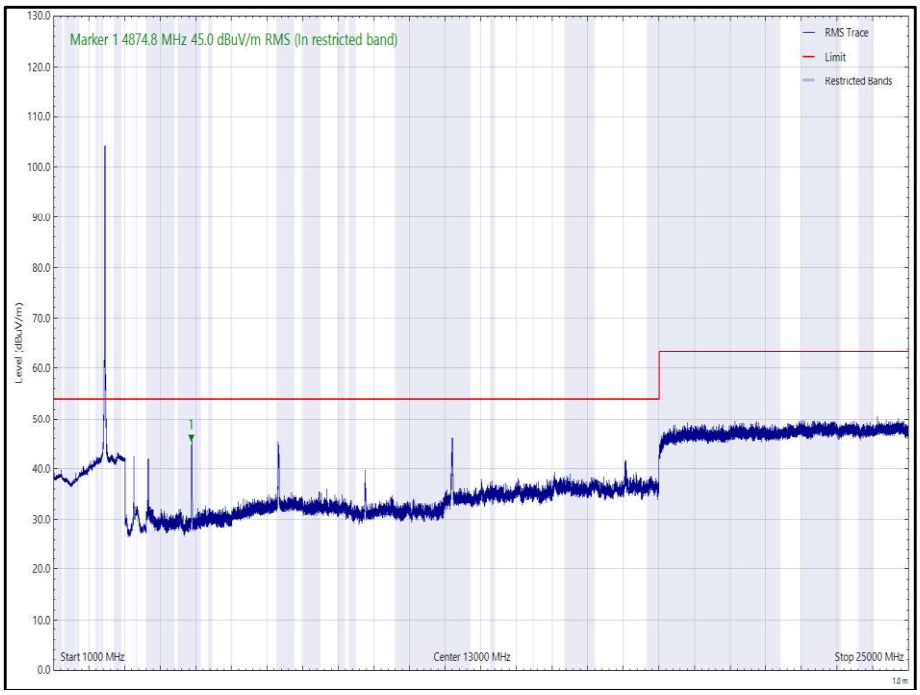

Figure 119 - 802.11G, 2437 MHz, 1 GHz to 25 GHz, Vertical (rms)

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2483.500	50.5	54.0	-3.5	RMS	192	178	Vertical
2483.500	49.4	54.0	-4.6	RMS	92	100	Horizontal
3695.819	44.2	54.0	-9.8	RMS	191	100	Horizontal
4925.916	44.1	54.0	-9.9	RMS	148	240	Horizontal
7386.625	47.3	54.0	-6.6	RMS	224	192	Vertical
12321.540	46.1	54.0	-7.9	RMS	129	164	Vertical

Table 63 - 802.11G, 2462 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

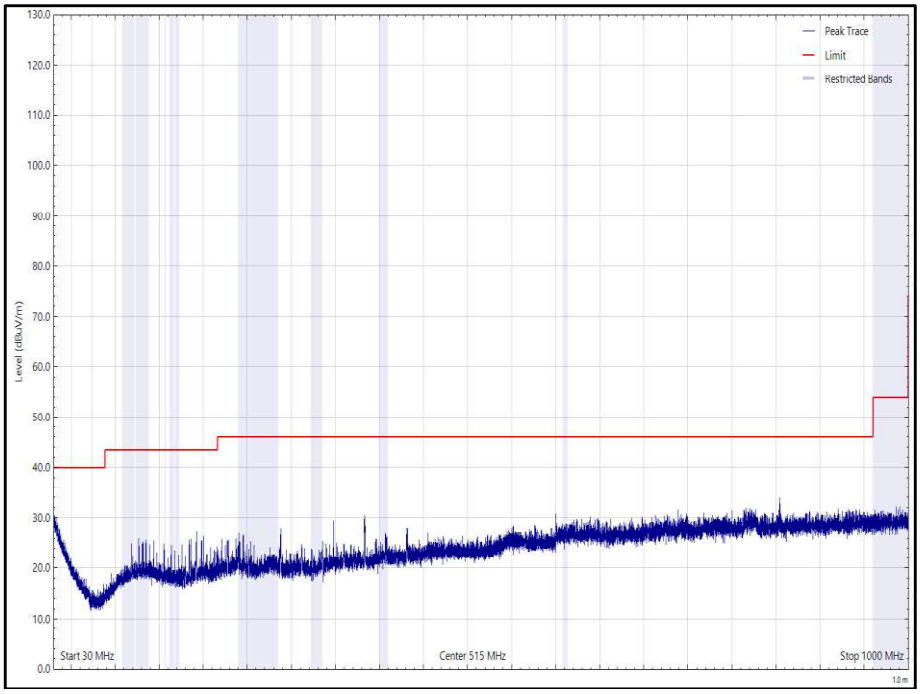

Figure 120 - 802.11G, 2462 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

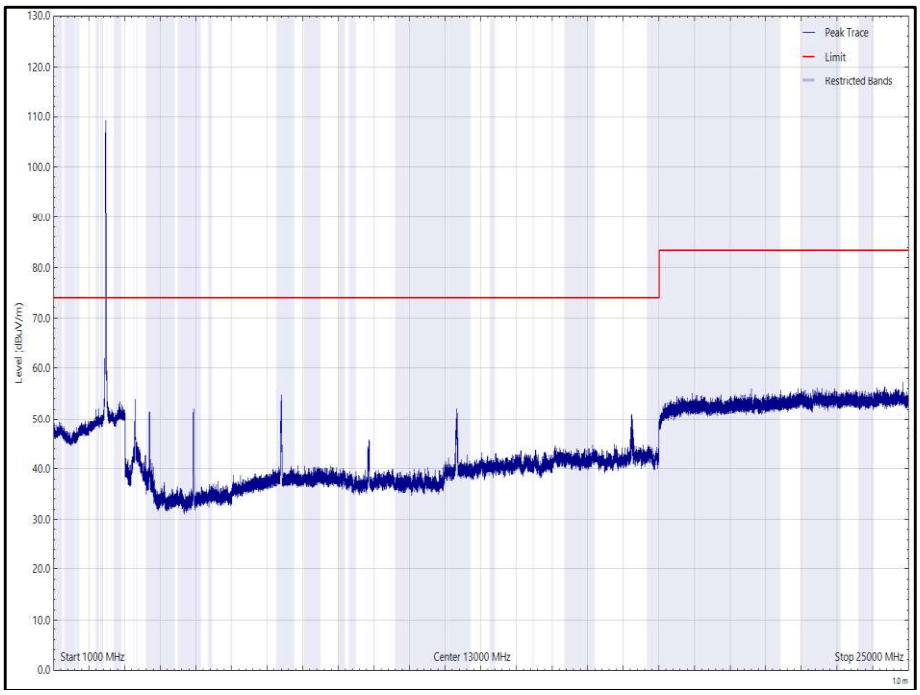

Figure 121 - 802.11G, 2462 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

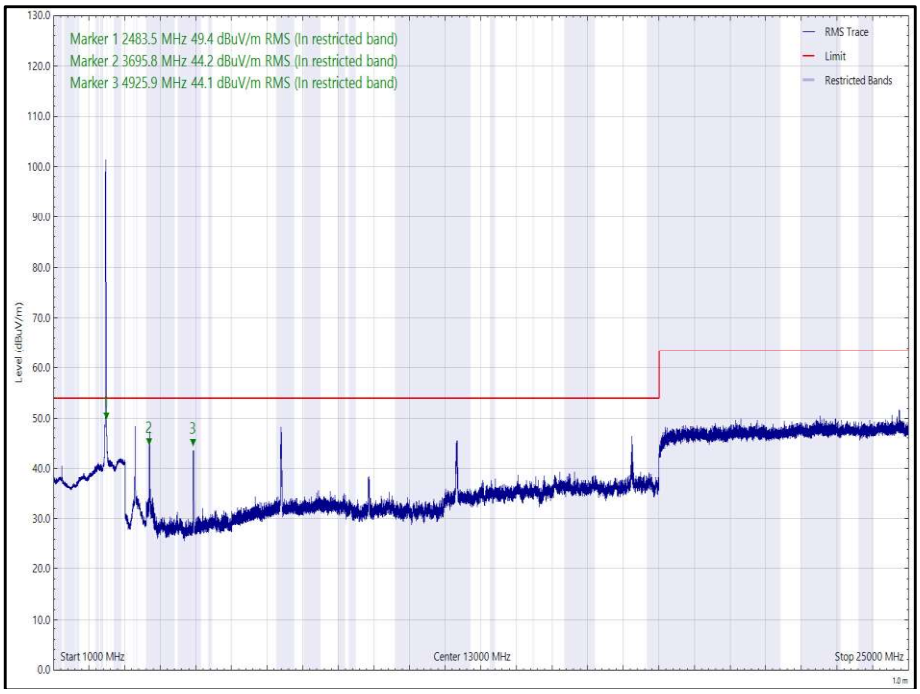

Figure 122 - 802.11G, 2462 MHz, 1 GHz to 25 GHz, Horizontal (rms)

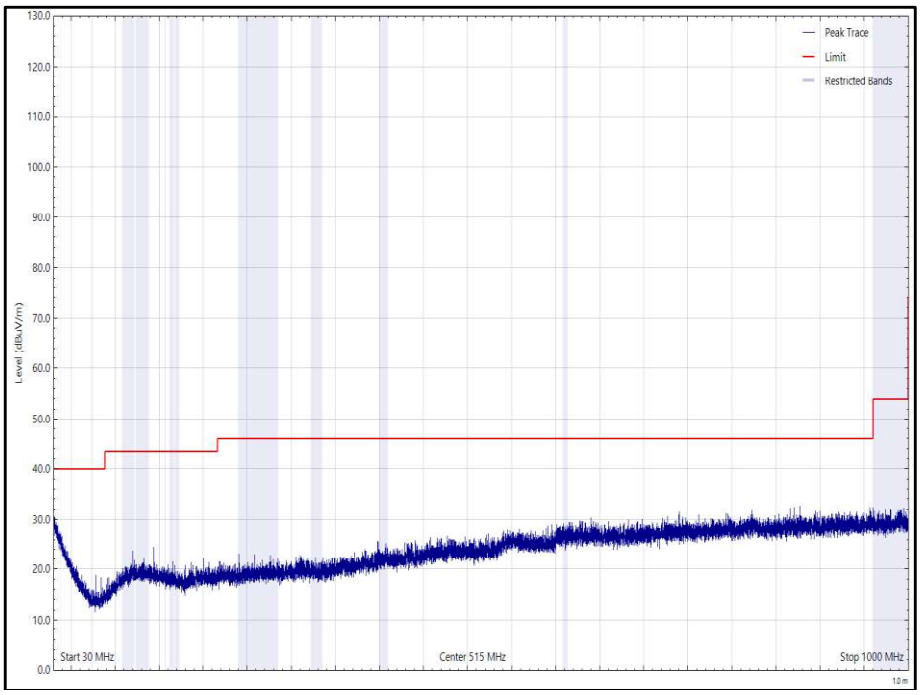

Figure 123 - 802.11G, 2462 MHz, 30 MHz to 1 GHz, Vertical (Peak)

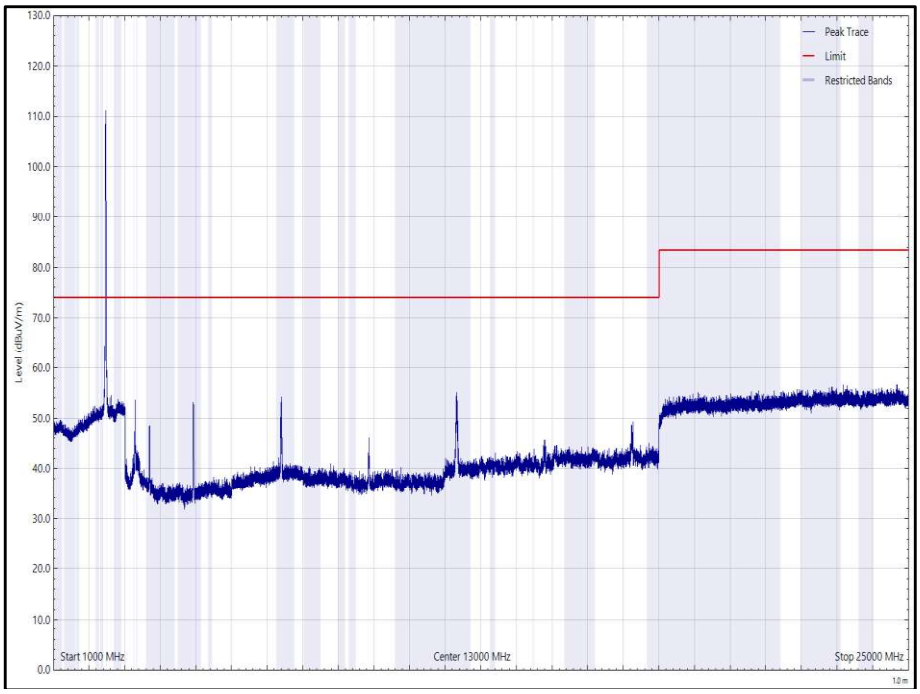

Figure 124 - 802.11G, 2462 MHz, 1 GHz to 25 GHz, Vertical (Peak)

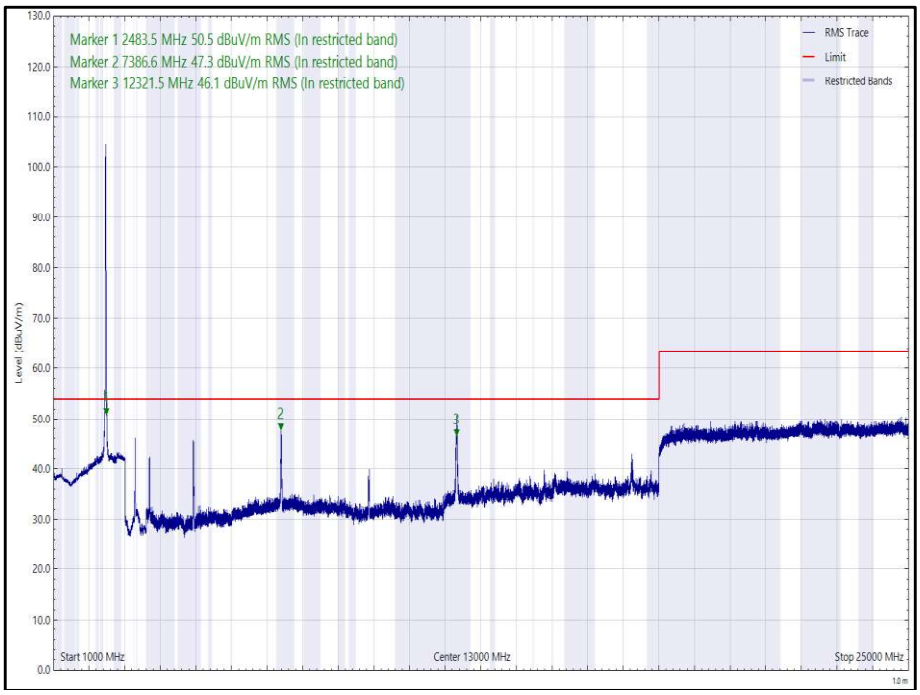

Figure 125 - 802.11G, 2462 MHz, 1 GHz to 25 GHz, Vertical (rms)

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2389.650	68.4	74.0	-5.6	Peak	106	180	Vertical
2390.000	52.2	54.0	-1.8	RMS	356	234	Horizontal
2390.000	52.9	54.0	-1.0	RMS	110	180	Vertical
12052.041	44.6	54.0	-9.4	RMS	177	100	Vertical

Table 64 - 802.11N, 2412 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

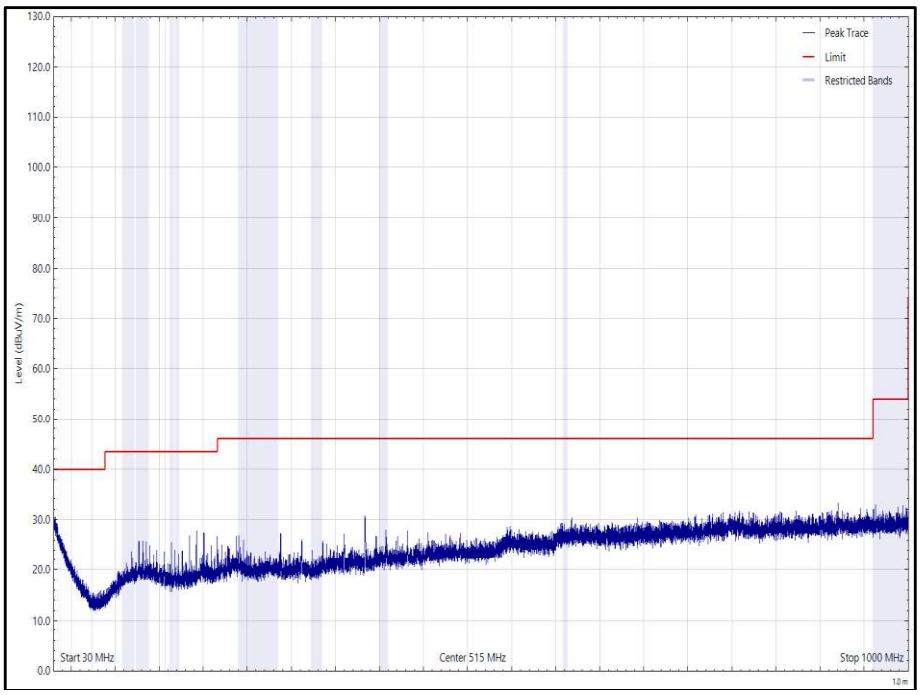

Figure 126 - 802.11N, 2412 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

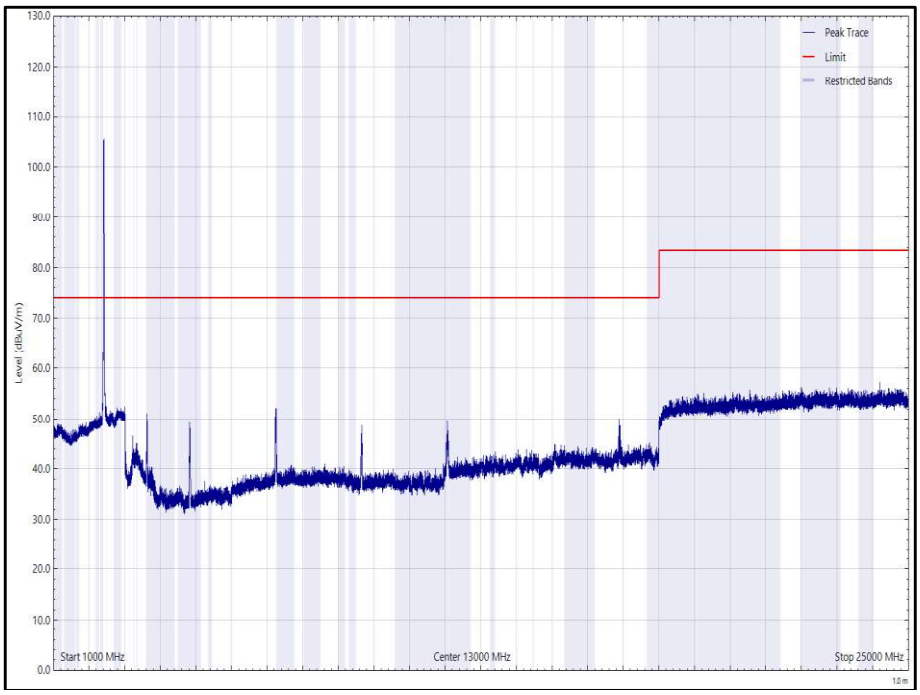

Figure 127 - 802.11N, 2412 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

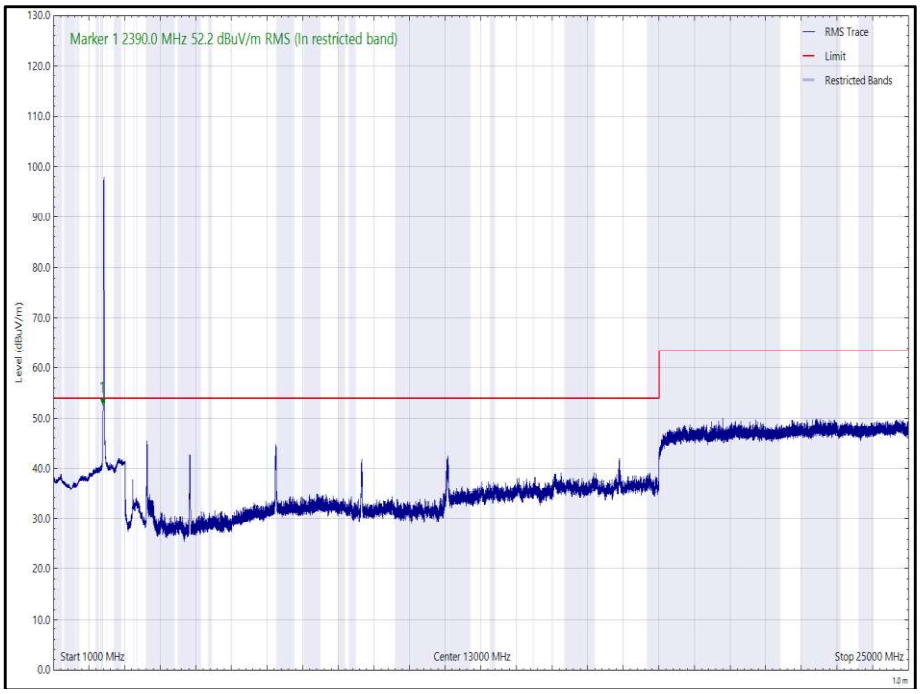

Figure 128 - 802.11N, 2412 MHz, 1 GHz to 25 GHz, Horizontal (rms)

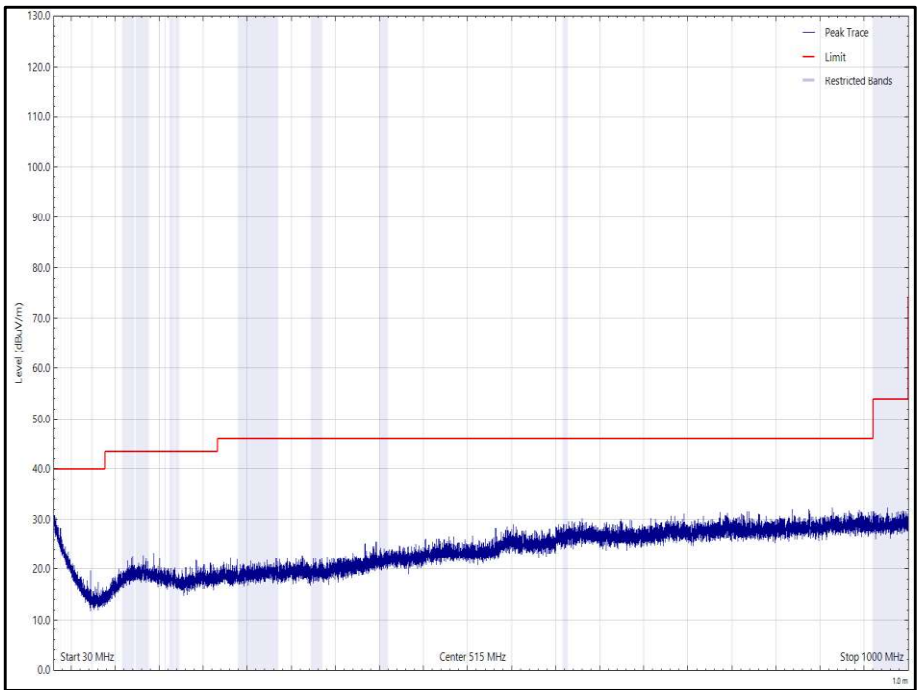

Figure 129 - 802.11N, 2412 MHz, 30 MHz to 1 GHz, Vertical (Peak)

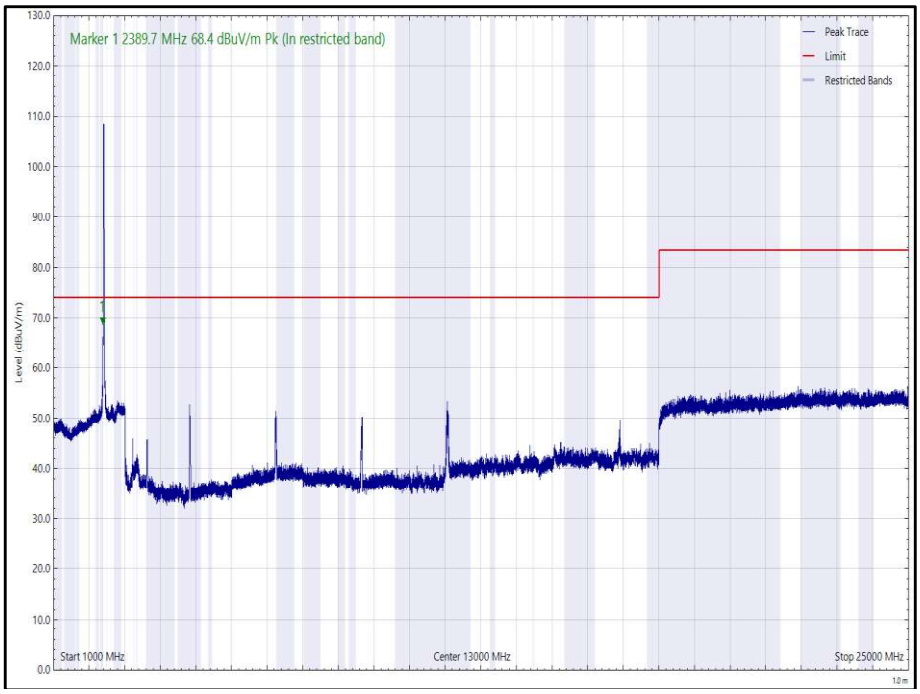

Figure 130 - 802.11N, 2412 MHz, 1 GHz to 25 GHz, Vertical (Peak)

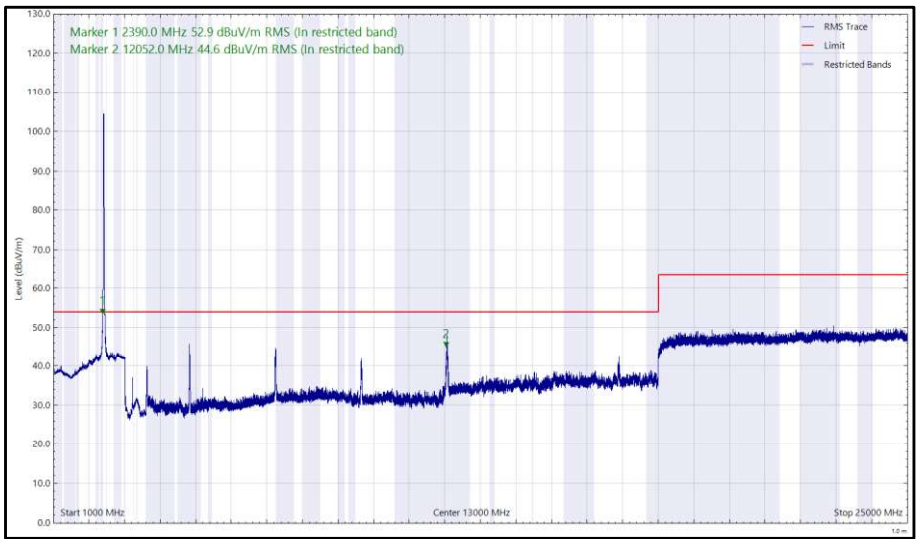

Figure 131 - 802.11N, 2412 MHz, 1 GHz to 25 GHz, Vertical (rms)

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
3649.944	44.1	54.0	-9.9	RMS	8	155	Horizontal
3662.427	44.6	54.0	-9.4	RMS	196	137	Horizontal
4874.578	44.4	54.0	-9.6	RMS	329	167	Vertical
7309.093	44.2	54.0	-9.8	RMS	160	187	Horizontal
7309.167	44.8	54.0	-9.2	RMS	182	194	Vertical
7314.591	44.2	54.0	-9.8	RMS	330	185	Horizontal

Table 65 - 802.11N, 2437 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

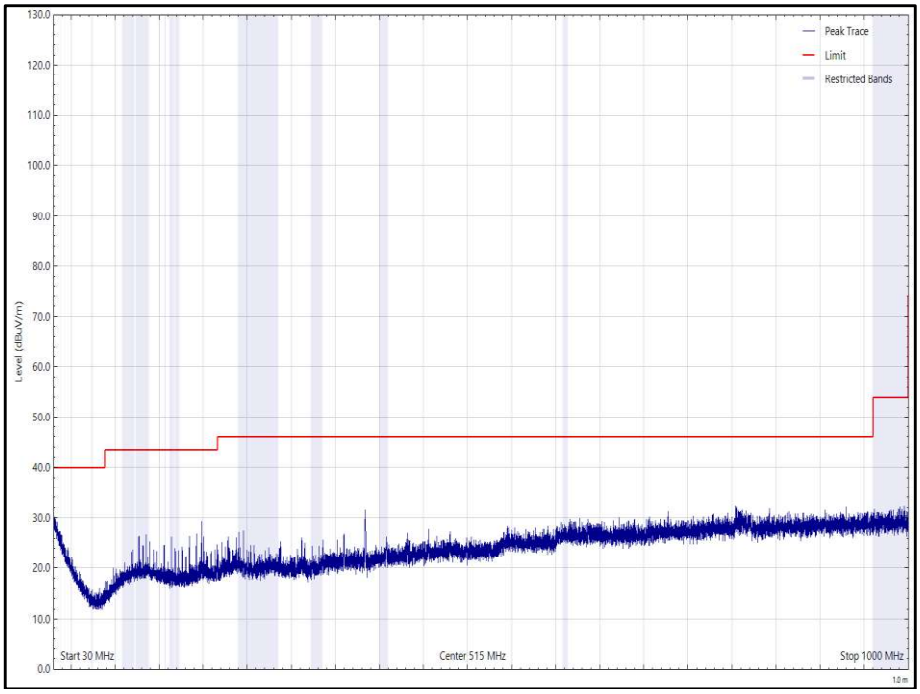

Figure 132 - 802.11N, 2437 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

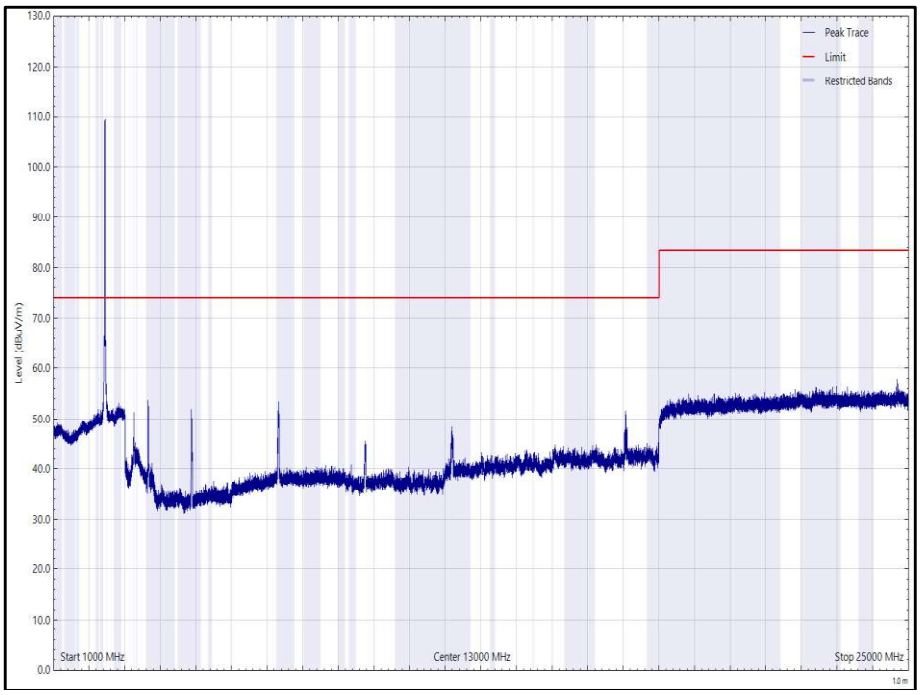

Figure 133 - 802.11N, 2437 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

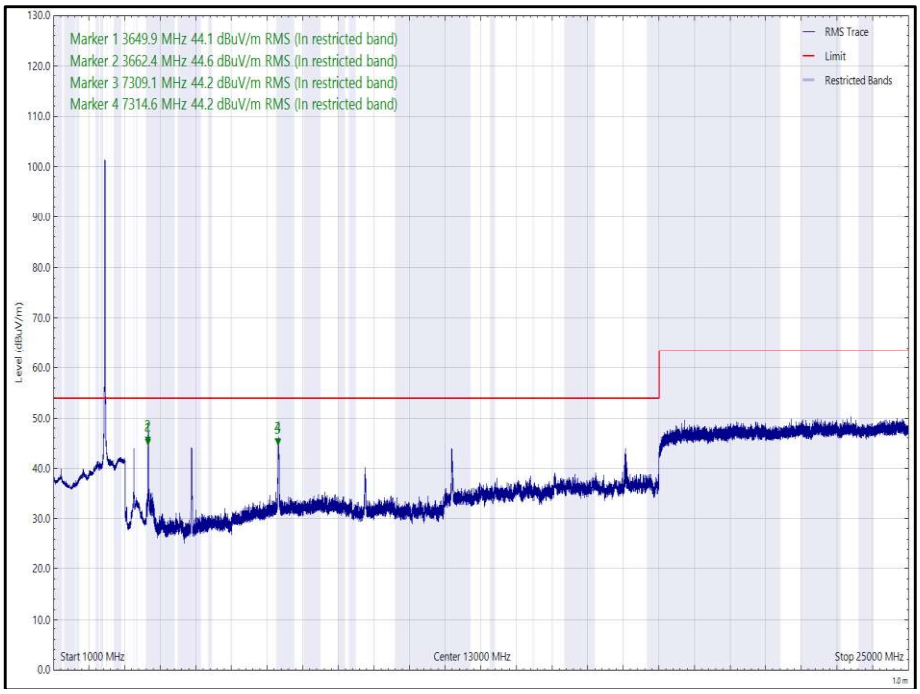

Figure 134 - 802.11N, 2437 MHz, 1 GHz to 25 GHz, Horizontal (rms)

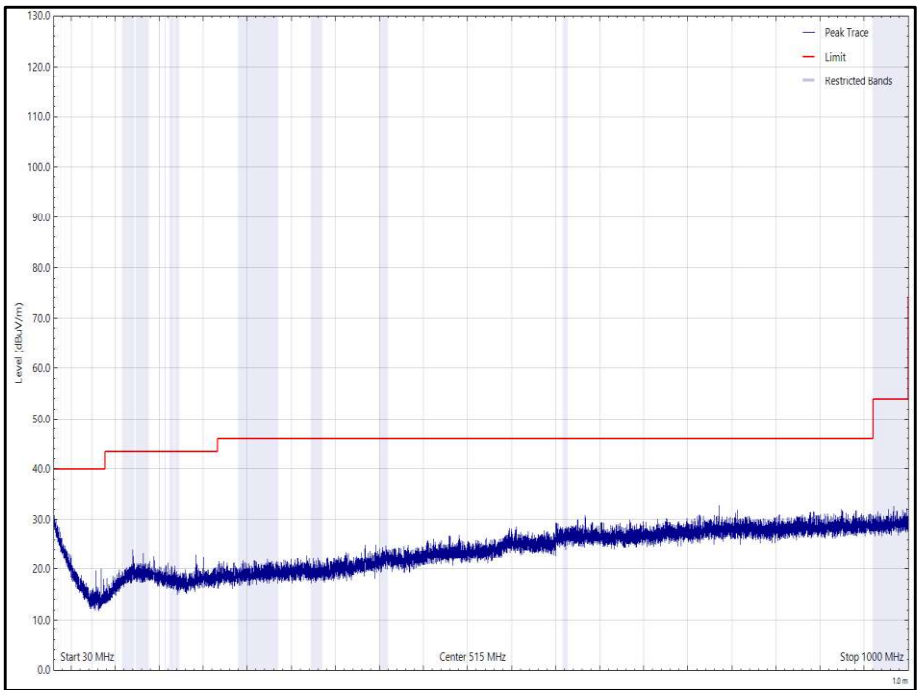

Figure 135 - 802.11N, 2437 MHz, 30 MHz to 1 GHz, Vertical (Peak)

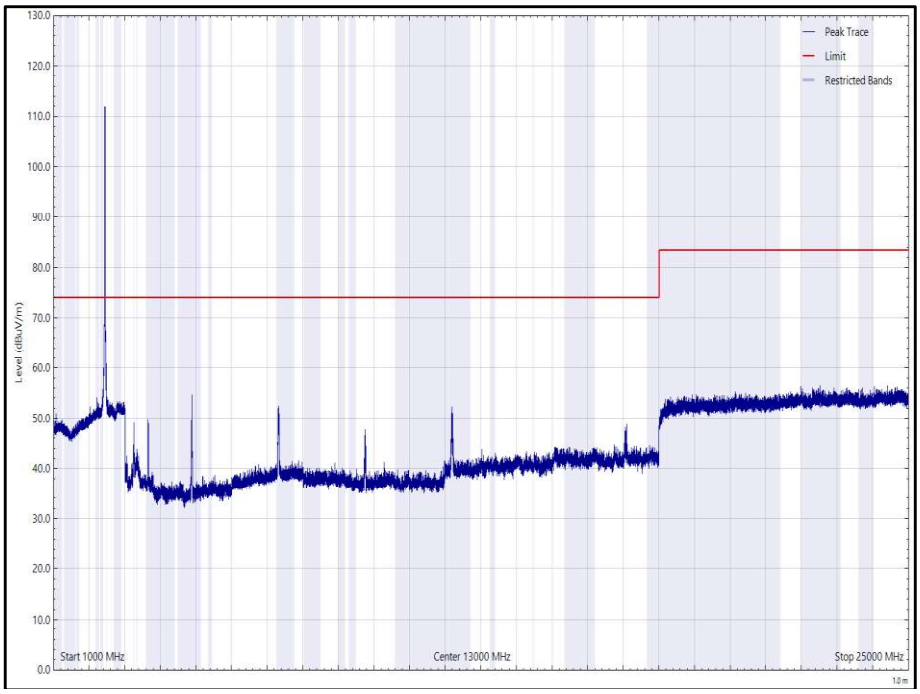

Figure 136 - 802.11N, 2437 MHz, 1 GHz to 25 GHz, Vertical (Peak)

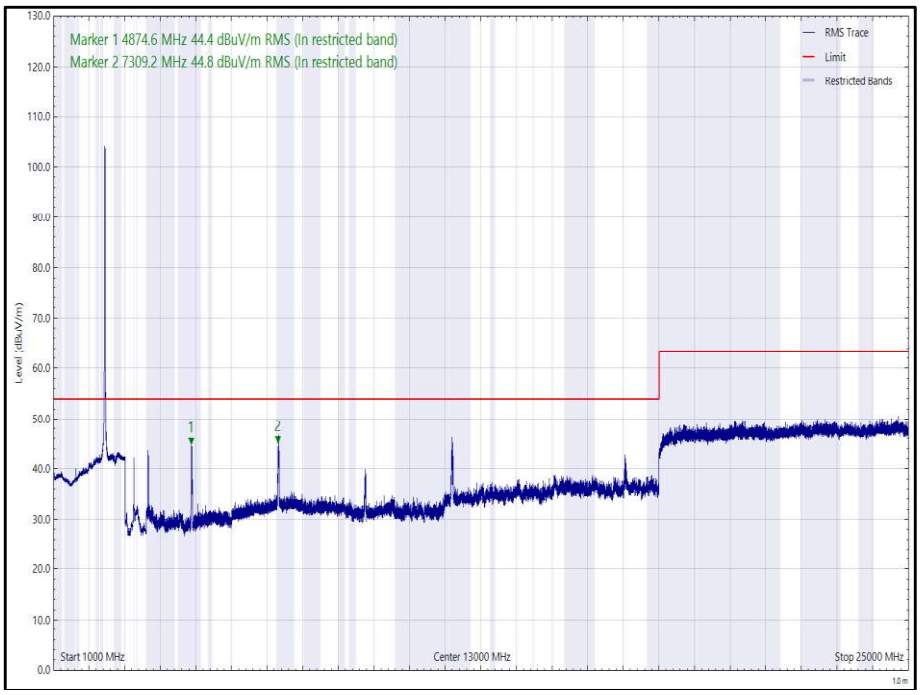

Figure 137 - 802.11N, 2437 MHz, 1 GHz to 25 GHz, Vertical (rms)

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2482.249	71.5	74.0	-2.5	Peak	90	179	Horizontal
2482.783	69.1	74.0	-4.9	Peak	191	270	Vertical
2483.536	53.1	54.0	-0.9	RMS	94	211	Horizontal
2483.599	51.7	54.0	-2.3	RMS	188	139	Vertical
3685.195	44.2	54.0	-9.8	RMS	93	206	Horizontal
3691.478	44.3	54.0	-9.7	RMS	194	100	Horizontal
4925.140	44.3	54.0	-9.7	RMS	332	167	Vertical
7380.721	44.7	54.0	-9.3	RMS	342	175	Horizontal
7382.286	45.0	54.0	-9.0	RMS	281	153	Horizontal
7384.200	47.9	54.0	-6.1	RMS	42	213	Vertical
7392.416	47.1	54.0	-6.9	RMS	226	213	Vertical
12313.522	46.7	54.0	-7.2	RMS	177	100	Vertical

Table 66 - 802.11N, 2462 MHz, 30 MHz to 25 GHz

No other emissions found within 10 dB of the limit.

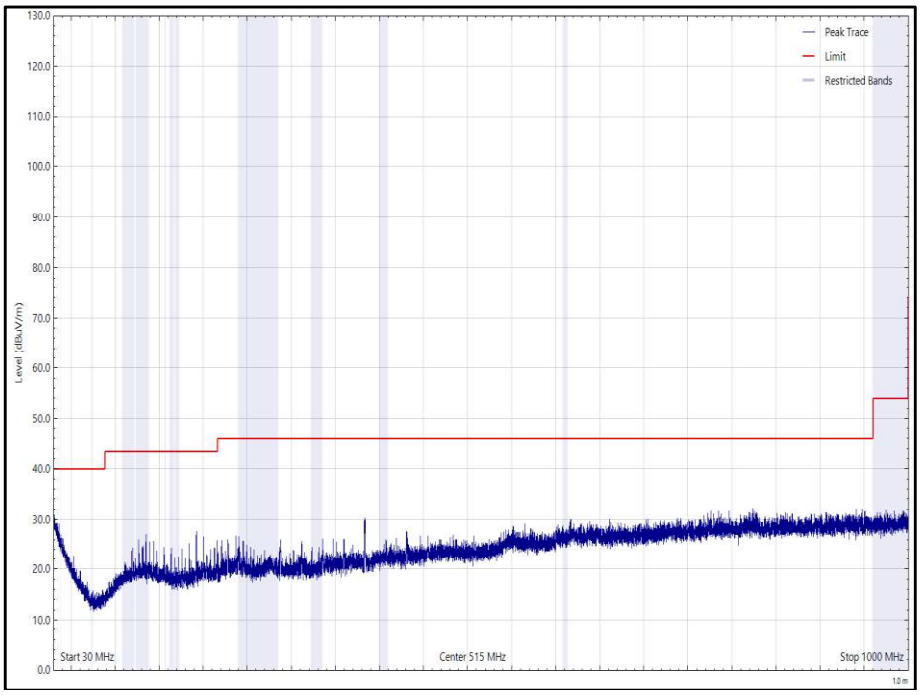

Figure 138 - 802.11N, 2462 MHz, 30 MHz to 1 GHz, Horizontal (Peak)

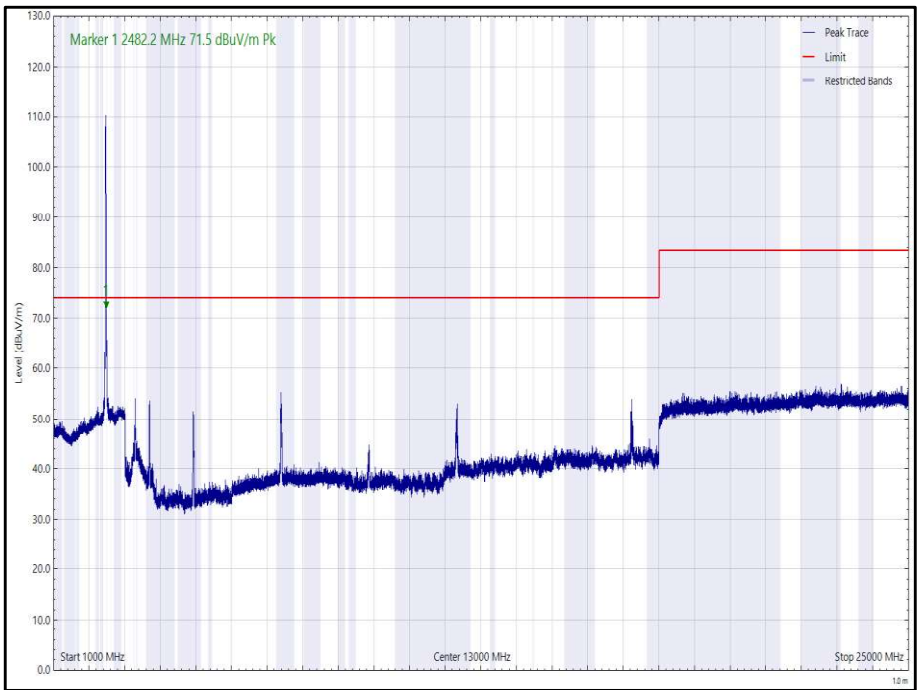

Figure 139 - 802.11N, 2462 MHz, 1 GHz to 25 GHz, Horizontal (Peak)

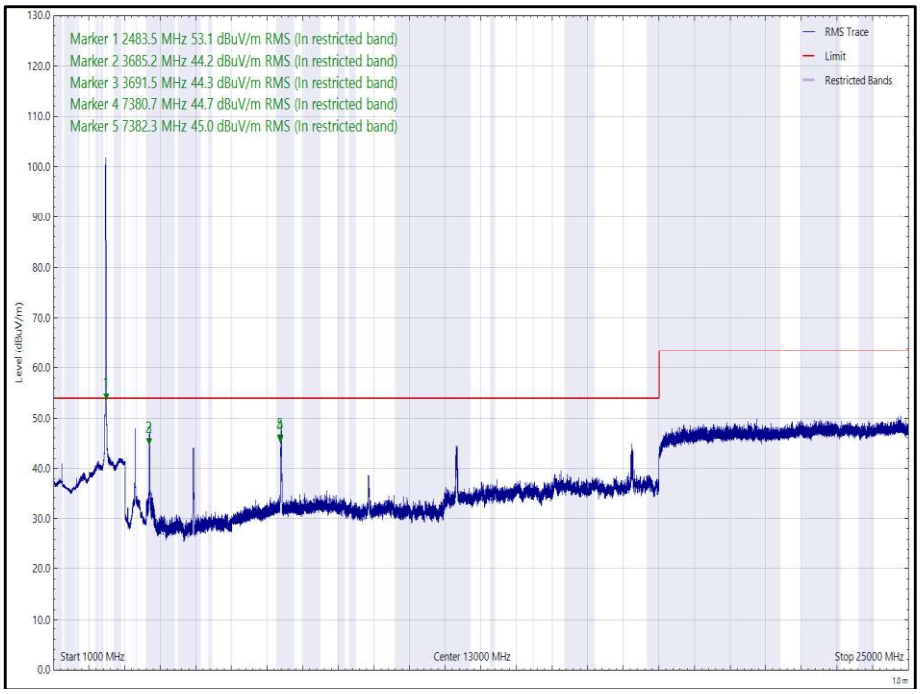

Figure 140 - 802.11N, 2462 MHz, 1 GHz to 25 GHz, Horizontal (rms)

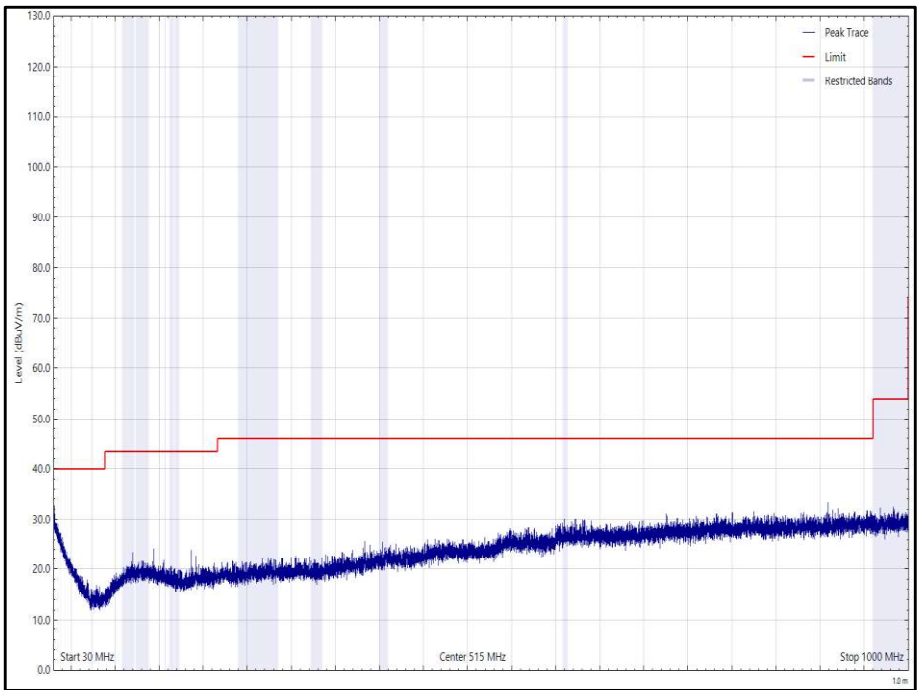

Figure 141 - 802.11N, 2462 MHz, 30 MHz to 1 GHz, Vertical (Peak)

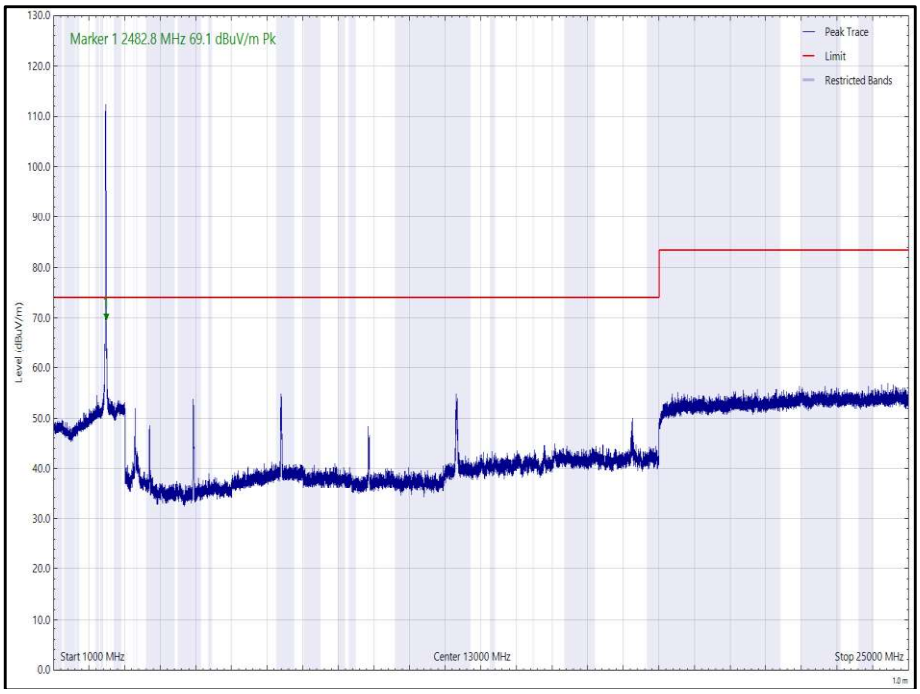

Figure 142 - 802.11N, 2462 MHz, 1 GHz to 25 GHz, Vertical (Peak)

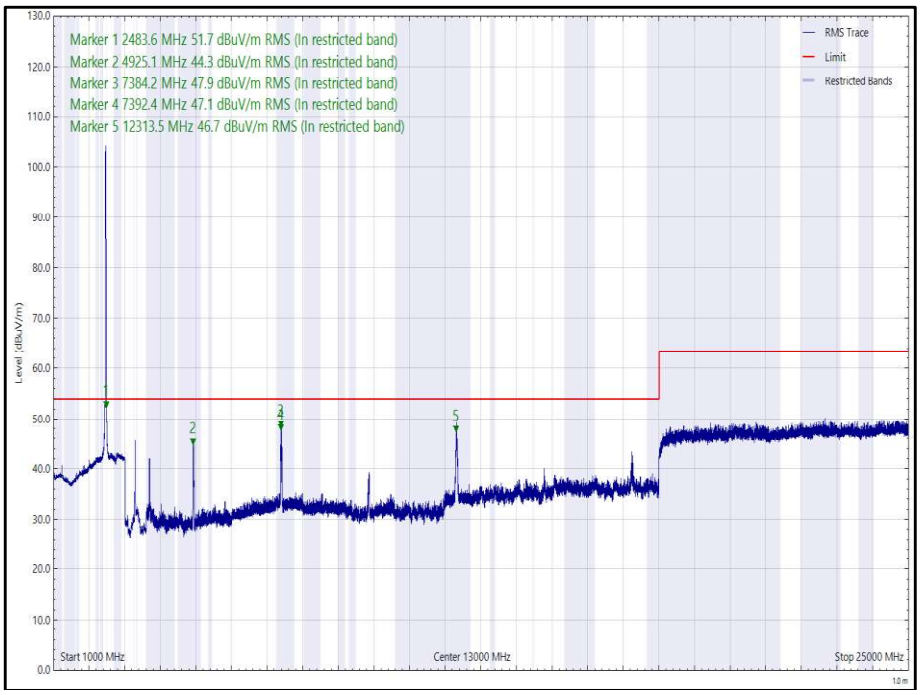

Figure 143 - 802.11N, 2462 MHz, 1 GHz to 25 GHz, Vertical (rms)

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

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

Attenuation below the general limits specified in § 15.209(a) is not required. In addition, 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)

ISED RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in RSS-GEN, clause 8.10, must also comply with the radiated emission limits specified in RSS-GEN clause 8.9.

2.6.8 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 12.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Antenna 18-40GHz (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	27-Jul-2022
Antenna with permanent attenuator (Bilog)	Schaffner	CBL6143	287	24	14-Oct-2022
Pre-Amplifier, (8 GHz to 18 GHz)	Phase One	PS04-0086	1533	12	05-Feb-2022
18GHz - 40GHz Pre-Amplifier	Phase One	PSO4-0087	1534	12	02-Aug-2022
Multimeter	Fluke	79 Series II	3057	12	23-Aug-2022
Test Receiver	Rohde & Schwarz	ESU40	3506	12	18-Mar-2022
Cable (K-Type to K-Type, 2 m)	Scott Cables	KPS-1501-2000-KPS	4526	6	06-Mar-2022
Cable (18 GHz)	Rosenberger	LU7-036-1000	5031	12	23-Jul-2022
EmX Emissions Software	TUV SUD	V2.1.11	5125	-	Software
DRG Horn Antenna (7.5-18GHz)	Schwarzbeck	HWRD750	5216	12	01-Apr-2022
3 GHz High pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	5219	12	22-Feb-2022
Preamplifier (30dB 1GHz to 18GHz)	Schwarzbeck	BBV 9718 C	5350	12	22-Sep-2022
Cable (sma-sma, 2 m)	Junkosha	MWX221-02000DMS	5428	12	20-Oct-2022
Cable (N-Type to N-Type, 8 m)	Teledyne	PR90-088-8MTR	5450	6	08-Mar-2022
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5481	12	31-Mar-2022
1m K-Type Cable	Junkosha	MWX241-01000KMSKMS/A	5512	12	09-Apr-2022
2m K Type Cable	Junkosha	MWX241-02000KMSKMS/A	5524	12	24-Mar-2022
DRG Horn Antenna (7.5-18GHz)	Schwarzbeck	HWRD750	5610	12	15-Oct-2022
Broadband Horn Antenna (1-10 GHz)	Schwarzbeck	BBHA 9120 B	5611	12	15-Oct-2022
Turntable & Mast Controller	Maturo Gmbh	NCD/498/2799.01	5612	-	TU
Tilt Antenna Mast TAM 4.0-P	Maturo Gmbh	TAM 4.0-P	5613	-	TU
Screened Room (12)	MVG	EMC-3	5621	36	11-Aug-2023

Table 67

TU - Traceability Unscheduled

2.7 Power Spectral Density

2.7.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (e)
ISED RSS-247, Clause 5.2
ISED RSS-GEN, Clause 6.12

2.7.2 Equipment Under Test and Modification State

RB03, S/N: H8U-JP-FJN0002X - Modification State 0

2.7.3 Date of Test

06-May-2021 to 23-June-2021

2.7.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.10.5 (AVGPSD-2).

Where the EUT duty cycle was < 98 % and repeatable within 2%, the spectrum analyser was set to trace (power) averaging and a duty cycle correction was added as calculated in the result tables below (Method AVGPSD-2).

MIMO output port summing was performed in accordance with KDB 662911 D01, clause F)2)c)(i) for cross-polarized antennas with the same individual gain.

2.7.5 Environmental Conditions

Ambient Temperature	22.3 - 23.2 °C
Relative Humidity	24.1 - 42.5 %

2.7.6 Test Results

2.4 GHz WLAN

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e) RSS-247 5.2 b)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	662911 D01 v02r01 E)2)b)		
Note{s}:	DCCF was added to the spectrum analyser reference level offset.		

DUT Configuration			
Mode:	802.11b	Duty Cycle (%):	99.3
Data Rate:	1 Mbps	DCCF (dB):	0.03
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	-
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	∑		
2412	30.0	-7.98	-7.89	-	-	-4.92	8.00	-12.92
2437	30.0	-8.03	-7.75	-	-	-4.88	8.00	-12.88
2462	30.0	-8.14	-7.74	-	-	-4.93	8.00	-12.93

Table 68 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e) RSS-247 5.2 b)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	662911 D01 v02r01 E)2)b)		
Note{s}:	DCCF was added to the spectrum analyser reference level offset.		

DUT Configuration			
Mode:	802.11g	Duty Cycle (%):	98.3
Data Rate:	6 Mbps	DCCF (dB):	0.07
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	-
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	∑		
2412	30.0	-8.58	-8.23	-	-	-5.39	8.00	-13.39
2437	30.0	-8.67	-8.49	-	-	-5.57	8.00	-13.57
2462	30.0	-8.61	-8.51	-	-	-5.55	8.00	-13.55

Table 69 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e) RSS-247 5.2 b)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	662911 D01 v02r01 E)2)b)		
Note{s}:	DCCF was added to the spectrum analyser reference level offset.		

DUT Configuration			
Mode:	802.11n HT20	Duty Cycle (%):	97.1
Modulation Coding Scheme:	MCS8	DCCF (dB):	0.13
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	-
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	∑		
2412	30.0	-7.75	-7.79	-	-	-4.76	8.00	-12.76
2437	30.0	-8.55	-8.79	-	-	-5.66	8.00	-13.66
2462	30.0	-8.23	-7.97	-	-	-5.09	8.00	-13.09

Table 70 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e) RSS-247 5.2 b)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	662911 D01 v02r01 E)2)b)		
Note{s}:	DCCF was added to the spectrum analyser reference level offset.		

DUT Configuration			
Mode:	802.11n HT20	Duty Cycle (%):	98.3
Modulation Coding Scheme:	MCS0	DCCF (dB):	0.07
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	-
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	∑		
2412	30.0	-8.55	-8.58	-	-	-5.55	8.00	-13.55
2437	30.0	-8.60	-8.49	-	-	-5.53	8.00	-13.53
2462	30.0	-8.73	-8.73	-	-	-5.72	8.00	-13.72

Table 71 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e) RSS-247 5.2 b)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	662911 D01 v02r01 E)2)b)		
Note{s}:	DCCF was added to the spectrum analyser reference level offset.		

DUT Configuration			
Mode:	802.11n HT40	Duty Cycle (%):	94.9
Modulation Coding Scheme:	MCS8	DCCF (dB):	0.23
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	-
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2422	30.0	-13.08	-13.57	-	-	-10.30	8.00	-18.30
2437	30.0	-11.50	-11.44	-	-	-8.46	8.00	-16.46
2452	30.0	-11.63	-11.70	-	-	-8.66	8.00	-16.66

Table 72 - Maximum Power Spectral Density Results

Test Configuration			
Frequency Range:	2400-2483.5 MHz	Band:	2.4 GHz
Limit Clause(s):	15.247 (e) RSS-247 5.2 b)	Test Method(s):	C63.10 11.10.5
Additional Reference(s):	662911 D01 v02r01 E)2)b)		
Note{s}:	DCCF was added to the spectrum analyser reference level offset.		

DUT Configuration			
Mode:	802.11n HT40	Duty Cycle (%):	97.0
Modulation Coding Scheme:	MCS0	DCCF (dB):	0.13
Antenna Configuration:	Spatial Diversity	Peak Antenna Gain (dBi):	-
Active Port(s):	A+B (Main + Aux)	Active Chain(s):	1+2

Test Frequency (MHz)	RBW (kHz)	PSD (dBm/RBW)					Limit (dBm/3 kHz)	Margin (dB)
		A	B	C	D	Σ		
2422	30.0	-13.86	-13.68	-	-	-10.76	8.00	-18.76
2437	30.0	-12.13	-12.46	-	-	-9.28	8.00	-17.28
2452	30.0	-12.47	-12.12	-	-	-9.28	8.00	-17.28

Table 73 - Maximum Power Spectral Density Results

FCC 47 CFR Part 15, Limit Clause 15.247 (e)

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.

ISED RSS-247, Limit Clause 5.2(b)

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

2.7.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-June-2021
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	03-Dec-2021
Multimeter	Iso-tech	IDM101	2421	12	30-Oct-2021
Hygrometer	Rotronic	I-1000	3220	12	16-Oct-2021
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	16-Jun-2021
Frequency Standard	Spectracom	SecureSync 1200-0408-0601	4393	6	03-Dec-2021
Climatic Chamber	Aralab	FitoTerm 300E45	4823	12	12-Apr-2022
MXA Signal Analyser	Keysight Technologies	N9020B	5528	24	04-Mar-2022
Signal Commissioning Unit	TUV SUD	SCU001	5546	12	16-Apr-2022

Table 74

3 Photographs

3.1 Test Setup Photographs

Figure 144 - Test Setup - AC Line Conducted Emissions

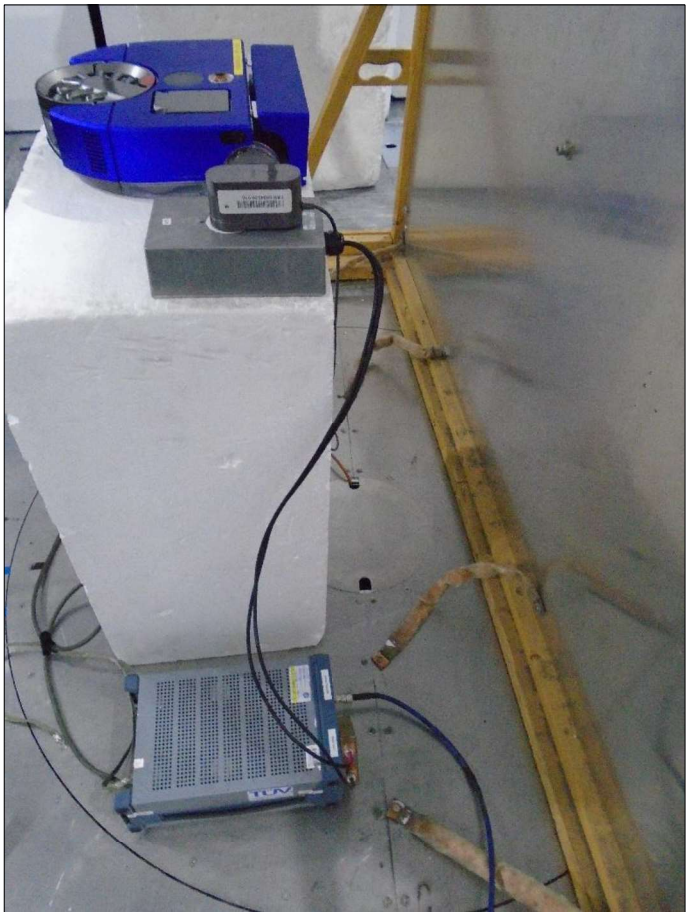

Figure 145 - Test Setup - AC Line Conducted Emissions

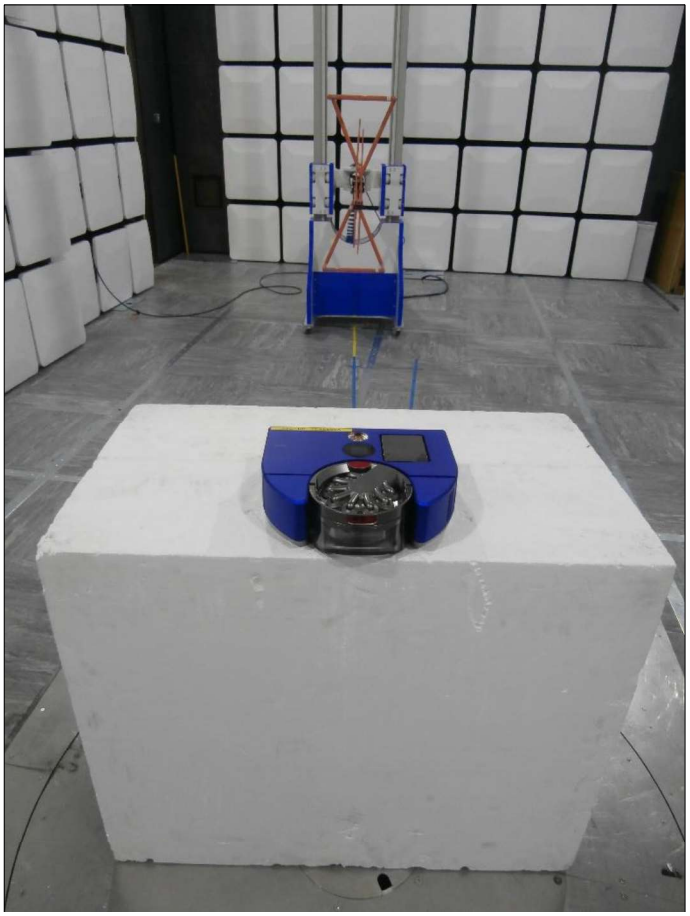

Figure 146 - Test Setup - 30 MHz to 1 GHz

Figure 147 - Test Setup - 1 GHz to 18 GHz

Figure 148 - Test Setup - 18 GHz to 25 GHz

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Restricted Band Edges	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB
AC Power Line Conducted Emissions	150 kHz to 30 MHz, LISN, ± 3.7 dB
Emission Bandwidth	± 478.613 kHz
Maximum Conducted Output Power	± 3.2 dB
Authorised Band Edges	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB
Spurious Radiated Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB
Power Spectral Density	± 3.2 dB

Table 75

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.