

FCC and ISED Test Report

Apple Inc

Model: A3137

In accordance with FCC 47 CFR Part 15, ISED RSS-247, ISED RSS-248 and ISED RSS-GEN (2.4 GHz Bluetooth, 2.4 GHz WLAN, 5 GHz WLAN, 6 GHz WLAN, Narrowband and Thread)



Prepared for: Apple Inc
One Apple Park Way
Cupertino
California
95014
USA

TUV
SUD
Limited

Digitally signed
by TUV SUD
Limited
Date: 2024.10.14
15:08:19 +01'00'

FCC ID: BCGA3137

IC: 579C-A3137

COMMERCIAL-IN-CONFIDENCE

Document 75960487-20 Issue 01

SIGNATURE

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Stephen Marshall	Senior Engineer	Authorised Signatory	20 August 2024

Signatures in this approval box have checked this document in line with the requirements of TUV SUD document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15, ISED RSS-247, ISED RSS-248 and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Report Generation	Lauren Walters	20 August 2024	

FCC Accreditation
553713/UK2026 Concorde Park, Fareham Test Laboratory

ISED Accreditation
28798/UK0003 Concorde Park, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15: 2023, ISED RSS-247: Issue 3 (2023-08), ISED RSS-248: Issue 2 (2022-12) and ISED RSS-GEN: Issue 5 (2018-04) + A2 (2021-02) for the tests detailed in section 1.3.



DISCLAIMER AND COPYRIGHT

This non-binding report has been prepared by TUV SUD with all reasonable skill and care. The document is confidential to the potential Client and TUV SUD. No part of this document may be reproduced without the prior written approval of TUV SUD. © 2024 TUV SUD. This report relates only to the actual item/items tested.

ACCREDITATION

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation. Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited). Results of tests covered by our Flexible UKAS Accreditation Schedule are marked FS (Flexible Scope).

TUV SUD
is a trading name of TUV SUD Ltd
Registered in Scotland at East Kilbride,
Glasgow G75 0QF, United Kingdom
Registered number: SC215164

TUV SUD Ltd is a
TUV SUD Group Company

Phone: +44 (0) 1489 558100
Fax: +44 (0) 1489 558101
www.tuvsud.com/en

TUV SUD
Octagon House
Concorde Way
Fareham
Hampshire PO15 5RL
United Kingdom



Contents

1 Report Summary2

1.1 Report Modification Record.....2

1.2 Introduction.....2

1.3 Brief Summary of Results3

1.4 Product Information4

1.5 Deviations from the Standard.....4

1.6 Identification of the EUT4

1.7 EUT Modification Record4

1.8 Test Location5

2 Test Details6

2.1 Radiated Spurious Emissions (Simultaneous Transmission)6

3 Measurement Uncertainty 89



1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	20-August-2024

Table 1

1.2 Introduction

Applicant	Apple Inc
Manufacturer	Apple Inc
EUT/Sample Identification	Refer to section 1.6
Test Specification/Issue/Date	FCC 47 CFR Part 15: 2023 ISED RSS-247: Issue 3 (2023-08) ISED RSS-248: Issue 2 (2022-12) ISED RSS-GEN: Issue 5 (2018-04) + A2 (2021-02)
Start of Test	01-July-2024
Finish of Test	19-July-2024
Name of Engineer(s)	Ahmed Al Derdiri, Elliot Callender, Ian Hart, Manohar Thota, Morsalin Hossain, Thomas Randall and Vineeth Nagaraj
Related Document(s)	ANSI C63.4 (2014) ANSI C63.10 (2020) KDB 789033 D02 v02r01 KDB 987594 D02 v01r01



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15, ISED RSS-247, ISED RSS-248 and ISED RSS-GEN is shown below.

Section	Specification Clause				Test Description	Result	Comments/Base Standard
	Part 15	RSS-247	RSS-248	RSS-GEN			
Configuration and Mode: 5 GHz WLAN and 2.4 GHz Bluetooth							
2.1	15.209, 15.247(d) and 15.407(b)	5.5 and 6.2	-	6.13 and 8.9	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	ANSI C63.4 (2014) ANSI C63.10 (2020) KDB 789033 D02 v02r01 KDB 987594 D02 v01r01
Configuration and Mode: 6 GHz WLAN and 2.4 GHz Bluetooth							
2.1	15.209, 15.247(d) and 15.407(b)	5.5	4.6	6.13 and 8.9	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	ANSI C63.4 (2014) ANSI C63.10 (2020) KDB 789033 D02 v02r01 KDB 987594 D02 v01r01
Configuration and Mode: 2.4 GHz WLAN and Narrowband							
2.1	15.209, 15.247(d) and 15.407(b)	5.5 and 6.2	-	6.13 and 8.9	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	ANSI C63.4 (2014) ANSI C63.10 (2020) KDB 789033 D02 v02r01 KDB 987594 D02 v01r01
Configuration and Mode: 5 GHz WLAN and Thread							
2.1	15.209, 15.247(d) and 15.407(b)	5.5 and 6.2	-	6.13 and 8.9	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	ANSI C63.4 (2014) ANSI C63.10 (2020) KDB 789033 D02 v02r01 KDB 987594 D02 v01r01
Configuration and Mode: 6 GHz WLAN and Thread							
2.1	15.209, 15.247(d) and 15.407(b)	5.5	4.6	6.13 and 8.9	Radiated Spurious Emissions (Simultaneous Transmission)	Pass	ANSI C63.4 (2014) ANSI C63.10 (2020) KDB 789033 D02 v02r01 KDB 987594 D02 v01r01

Table 2



1.4 Product Information

1.4.1 Technical Description

The equipment under test (EUT) was a desktop computer.

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.6 Identification of the EUT

The table below details identification of the EUT(s) that have been used to carry out the testing within this report.

Model: A3137			
Serial Number	Hardware Version	Software Version	Firmware
FV5VYV72RL	REV1.0	24A81452a	WLAN: 23.30.16 Bluetooth: 22.1.65.459 Thread: 22.1.65.459 Narrowband: 22.1.65.459
G63HC93373	REV1.0	24A81452a	WLAN: 23.30.16 Bluetooth: 22.1.65.459 Thread: 22.1.65.459 Narrowband: 22.1.65.459

Table 3

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Model: A3137, Serial Number: FV5VYV72RL			
0	As supplied by the customer	Not Applicable	Not Applicable
Model: A3137, Serial Number: G63HC93373			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 4



1.8 Test Location

TÜV SÜD conducted the following tests at our Concorde Park Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 5 GHz WLAN and 2.4 GHz Bluetooth		
Radiated Spurious Emissions (Simultaneous Transmission)	Ian Hart, Manohar Thota and Thomas Randall	UKAS
Configuration and Mode: 6 GHz WLAN and 2.4 GHz Bluetooth		
Radiated Spurious Emissions (Simultaneous Transmission)	Ian Hart, Manohar Thota, Morsalin Hossain and Thomas Randall	UKAS
Configuration and Mode: 2.4 GHz WLAN and Narrowband		
Radiated Spurious Emissions (Simultaneous Transmission)	Ahmed Al Derdiri, Elliot Callender, Ian Hart and Morsalin Hossain	UKAS
Configuration and Mode: 5 GHz WLAN and Thread		
Radiated Spurious Emissions (Simultaneous Transmission)	Ahmed Al Derdiri, Elliot Callender, Ian Hart and Morsalin Hossain	UKAS
Configuration and Mode: 6 GHz WLAN and Thread		
Radiated Spurious Emissions (Simultaneous Transmission)	Elliot Callender, Manohar Thota and Vineeth Nagaraj	UKAS

Table 5

Office Address:

TÜV SÜD
Concorde Park
Concorde Way
Fareham
Hampshire
PO15 5FG
United Kingdom



2 Test Details

2.1 Radiated Spurious Emissions (Simultaneous Transmission)

2.1.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.209, 15.247(d) and 15.407(b)
ISED RSS-247, Clause 5.5 and 6.2
ISED RSS-248, Clause 4.6
ISED RSS-GEN, Clause 6.13 and 8.9

2.1.2 Equipment Under Test and Modification State

A3137, S/N: FV5VYV72RL - Modification State 0
A3137, S/N: G63HC93373 - Modification State 0

2.1.3 Date of Test

01-July-2024 to 19-July-2024

2.1.4 Test Method

Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

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

Ports on the EUT were terminated with loads as described in ANSI C63.4 clause 6.2.4 for each type of port on the EUT.

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, 11.11, 11.12, 12.7.2 or 12.7.3 depending on the nature of the emission measured.

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 non-restricted band limits. 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:
 $10^{(\text{Field Strength in dB}\mu\text{V/m}/20)}$

To determine the emission characteristic of the EUT above 18 GHz, the test antenna was swept over all faces of the EUT whilst observing a spectral display. The frequency of any emissions of interest was noted for formal measurement at the correct measurement distance of 1m. This procedure was repeated for all relevant transmit operating channels.

At a measurement distance of 1 meter the limit line was increased by $20 \cdot \text{LOG}(3/1) = 9.54$ dB.

2.1.5 Example Test Setup Diagram

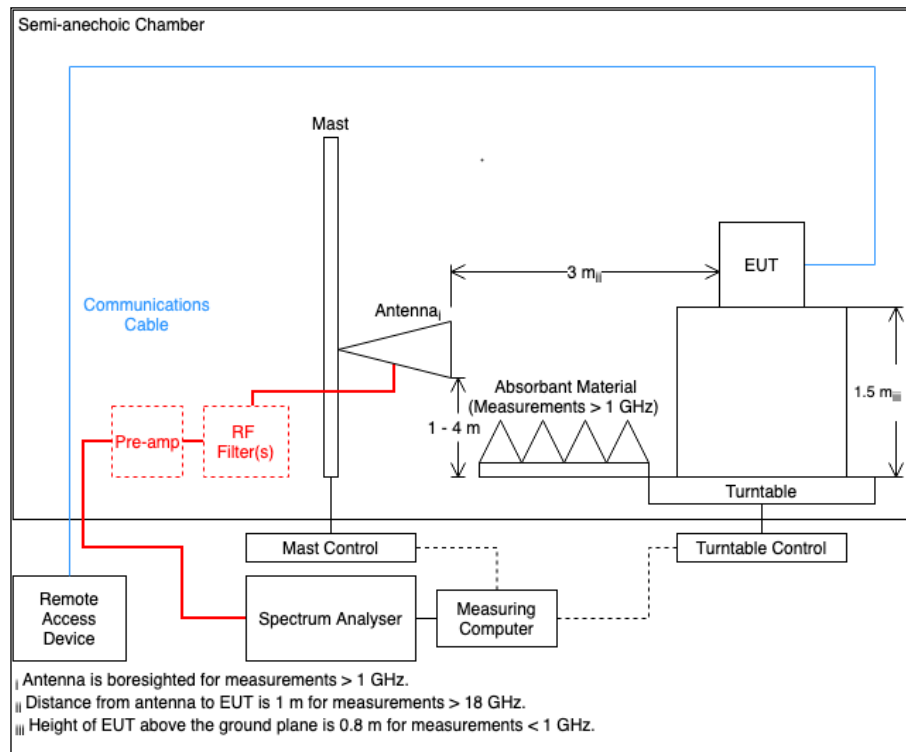


Figure 1

2.1.6 Environmental Conditions

Ambient Temperature	20.9 - 23.8 °C
Relative Humidity	39.6 - 58.0 %

2.1.7 Test Results

5 GHz WLAN and 2.4 GHz Bluetooth

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
276.014	25.08	46.00	-20.92	Q-Peak	13	240	Vertical
4881.888	42.12	54.00	-11.88	CISPR Avg	168	126	Horizontal
5113.350	55.45	74.00	-18.55	Peak	195	119	Horizontal
5144.496	43.35	54.00	-10.65	RMS	18	179	Vertical
5147.135	43.62	54.00	-10.38	RMS	197	197	Horizontal
5371.235	56.83	74.00	-17.17	Peak	179	229	Horizontal
5371.560	44.44	54.00	-9.56	RMS	179	229	Horizontal
5391.744	43.06	54.00	-10.94	RMS	19	199	Vertical

Table 6 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz

No other emissions found within 10 dB of the limit.

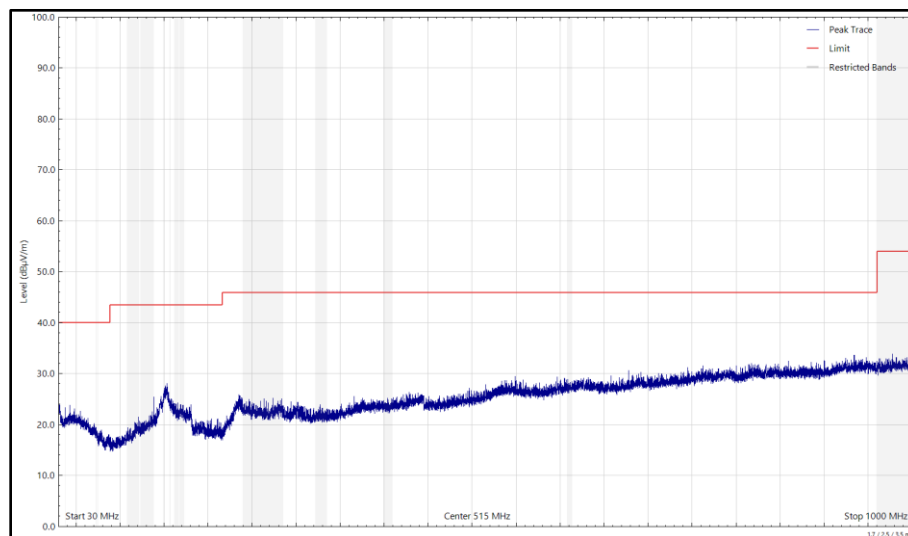


Figure 2 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 1 GHz, Horizontal (Peak)

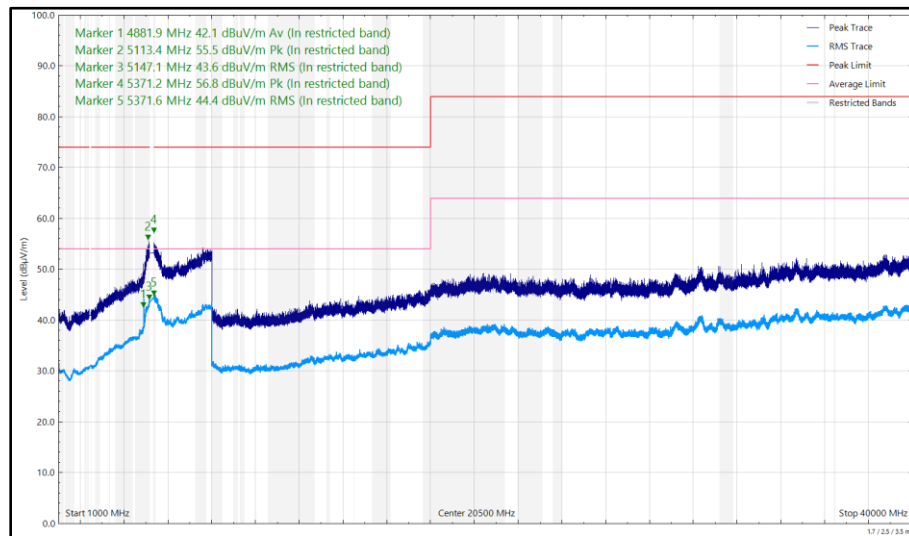


Figure 3 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz, Horizontal

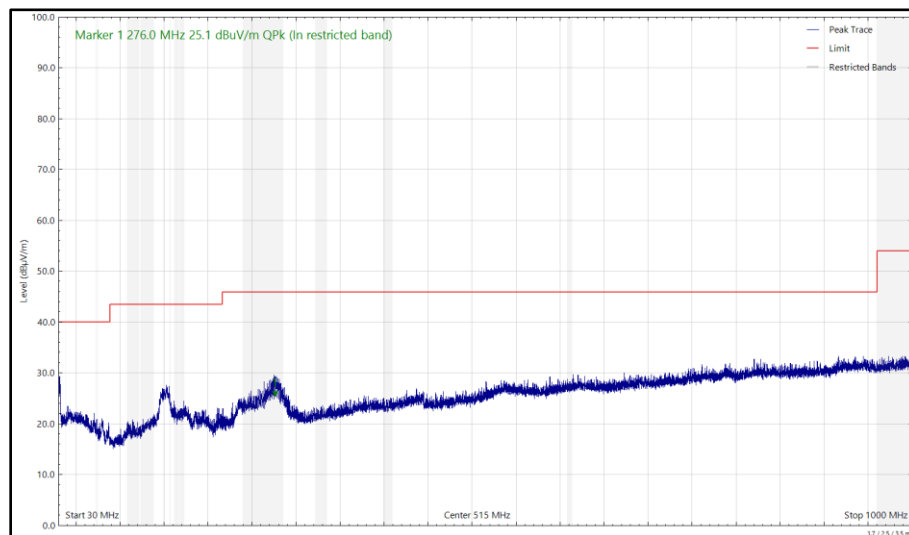


Figure 4 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 1 GHz, Vertical (Peak)

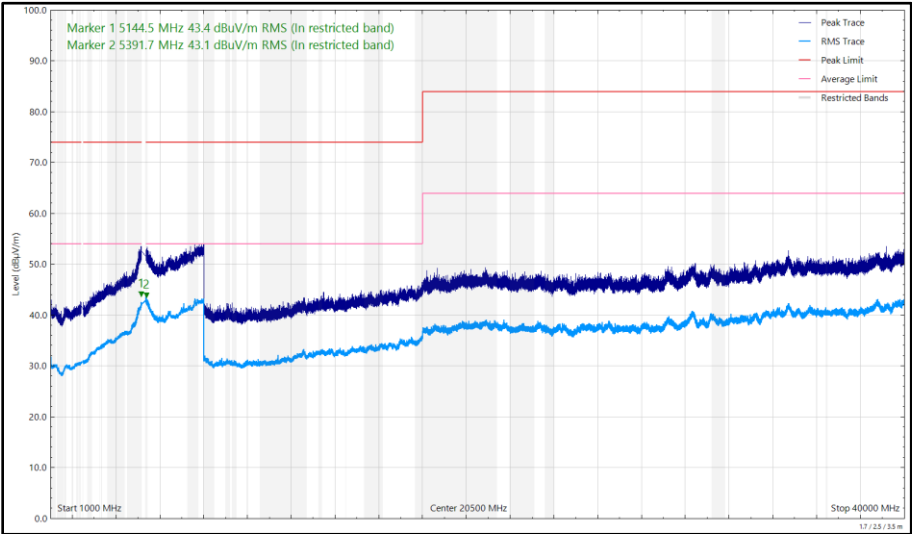


Figure 5 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
170.232	16.22	43.50	-27.28	Q-Peak	156	248	Horizontal
277.598	24.11	46.00	-21.89	Q-Peak	0	256	Vertical
4881.898	40.74	54.00	-13.26	CISPR Avg	186	344	Horizontal
5443.426	41.12	54.00	-12.88	RMS	13	220	Vertical
5452.142	43.07	54.00	-10.93	RMS	196	154	Horizontal
5455.598	55.66	74.00	-18.34	Peak	196	154	Horizontal

Table 7 - U-NII-2C - 5640 MHz (CH128), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz

No other emissions found within 10 dB of the limit.

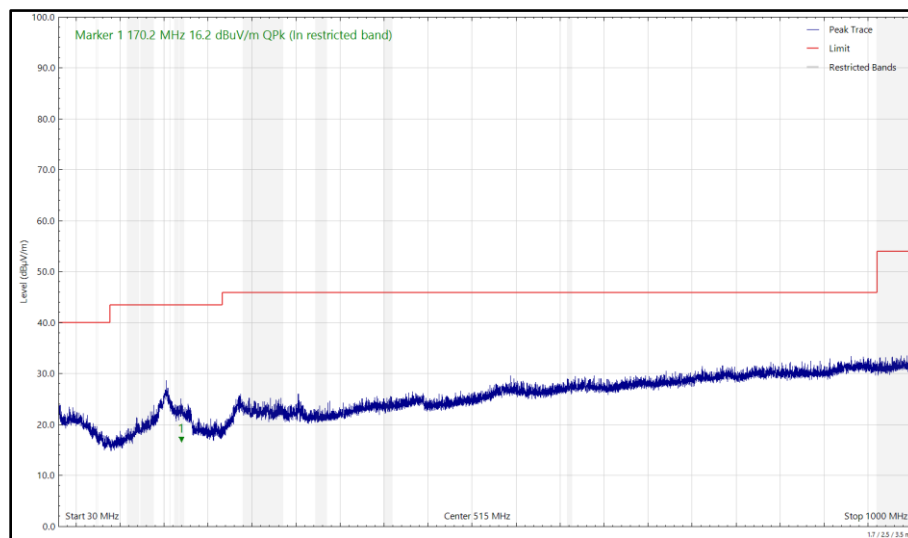


Figure 6 - U-NII-2C - 5640 MHz (CH128), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 1 GHz, Horizontal (Peak)

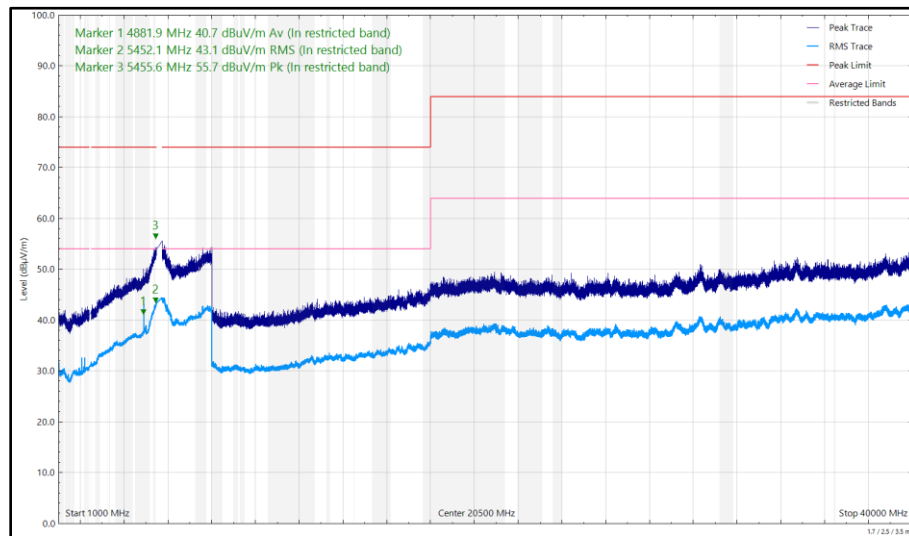


Figure 7 - U-NII-2C - 5640 MHz (CH128), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz, Horizontal

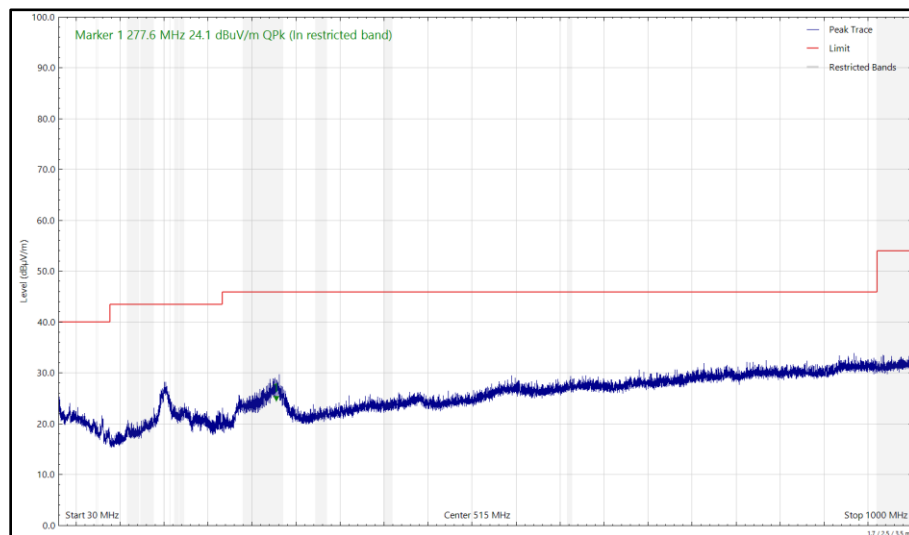


Figure 8 - U-NII-2C - 5640 MHz (CH128), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 1 GHz, Vertical (Peak)

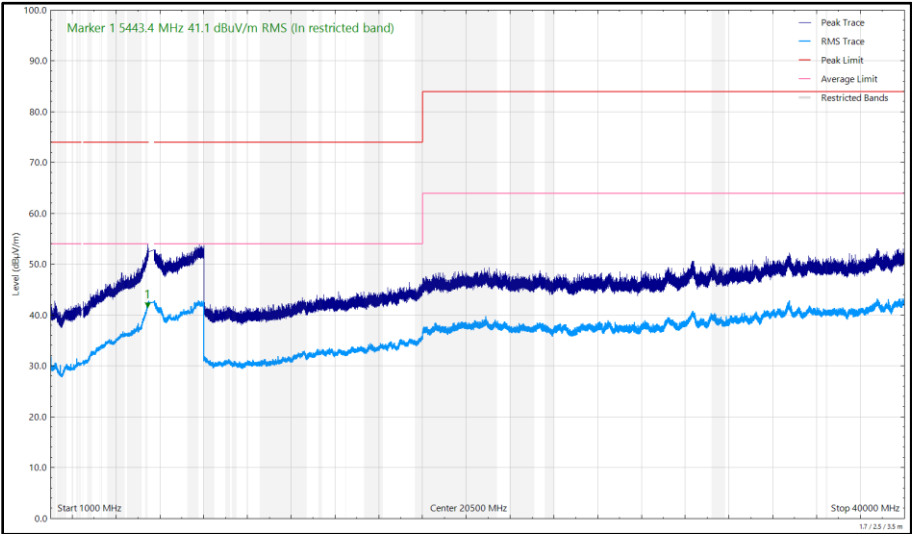


Figure 9 - U-NII-2C - 5640 MHz (CH128), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
276.135	25.35	46.00	-20.65	Q-Peak	12	244	Vertical
4882.372	39.82	54.00	-14.18	CISPR Avg	178	136	Horizontal
5449.721	40.51	54.00	-13.49	RMS	30	216	Vertical
5453.707	41.09	54.00	-12.91	RMS	200	300	Horizontal

Table 8 - U-NII-3 - 5785 MHz (CH157), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz

No other emissions found within 10 dB of the limit.

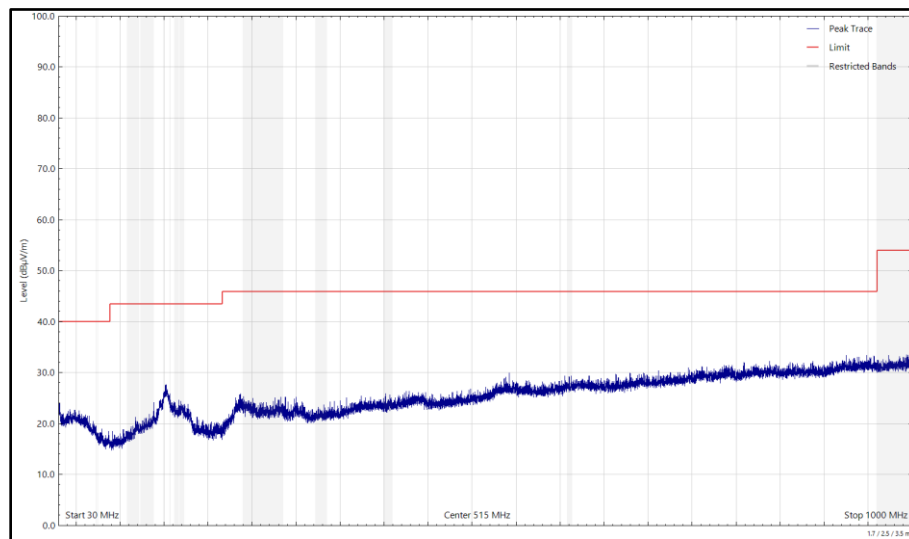


Figure 10 - U-NII-3 - 5785 MHz (CH157), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 1 GHz, Horizontal (Peak)

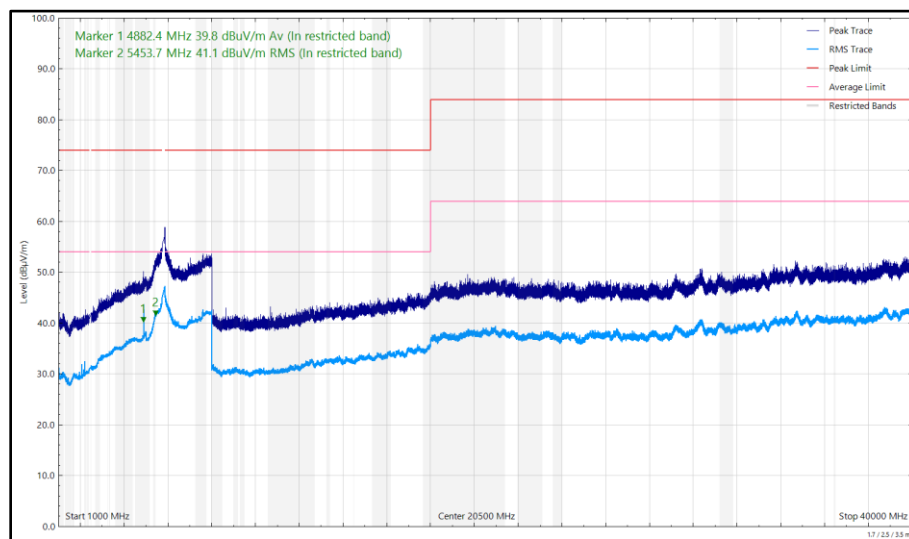


Figure 11 - U-NII-3 - 5785 MHz (CH157), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz, Horizontal

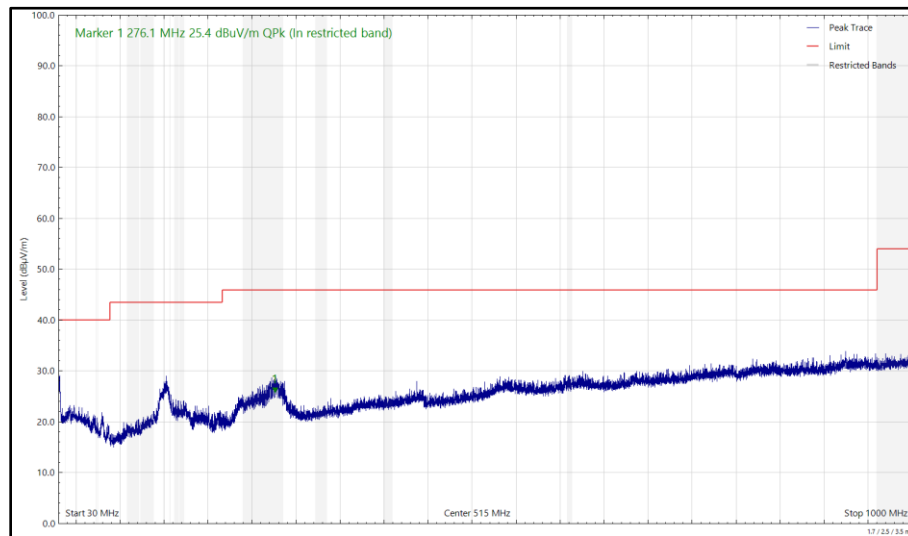


Figure 12 - U-NII-3 - 5785 MHz (CH157), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 1 GHz, Vertical (Peak)

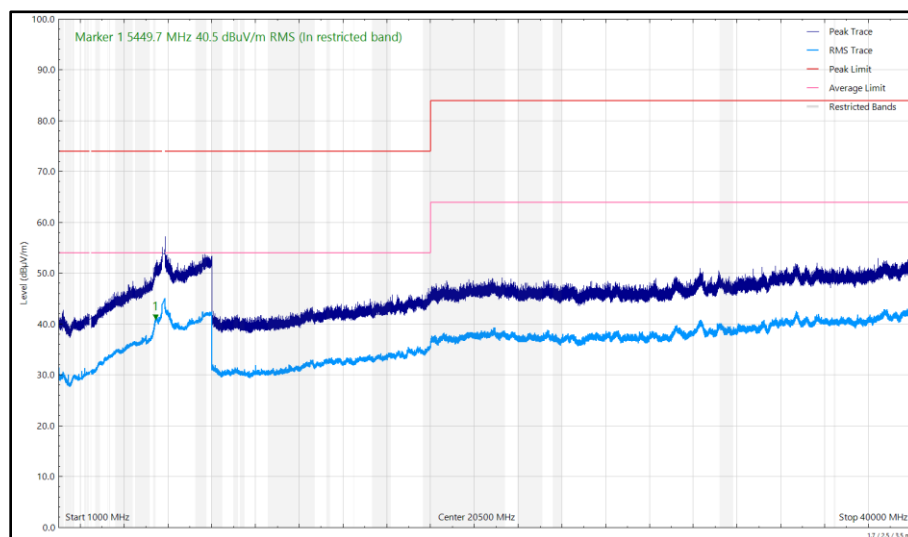


Figure 13 - U-NII-3 - 5785 MHz (CH157), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2483.738	35.45	54.00	-18.55	RMS	194	171	Vertical
4881.628	39.22	54.00	-14.78	CISPR Avg	182	285	Horizontal
4881.698	42.29	54.00	-11.71	CISPR Avg	15	160	Vertical
5146.866	42.40	54.00	-11.60	RMS	24	171	Vertical
5146.951	55.67	74.00	-18.33	Peak	188	216	Horizontal
5149.610	43.49	54.00	-10.51	RMS	195	110	Horizontal
5351.541	44.52	54.00	-9.48	RMS	191	142	Horizontal
5354.921	56.38	74.00	-17.62	Peak	191	142	Horizontal
5398.322	54.50	74.00	-19.50	Peak	28	178	Vertical
5415.059	42.75	54.00	-11.25	RMS	28	178	Vertical
7323.115	37.54	54.00	-16.46	CISPR Avg	297	218	Vertical

Table 9 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz

No other emissions found within 10 dB of the limit.

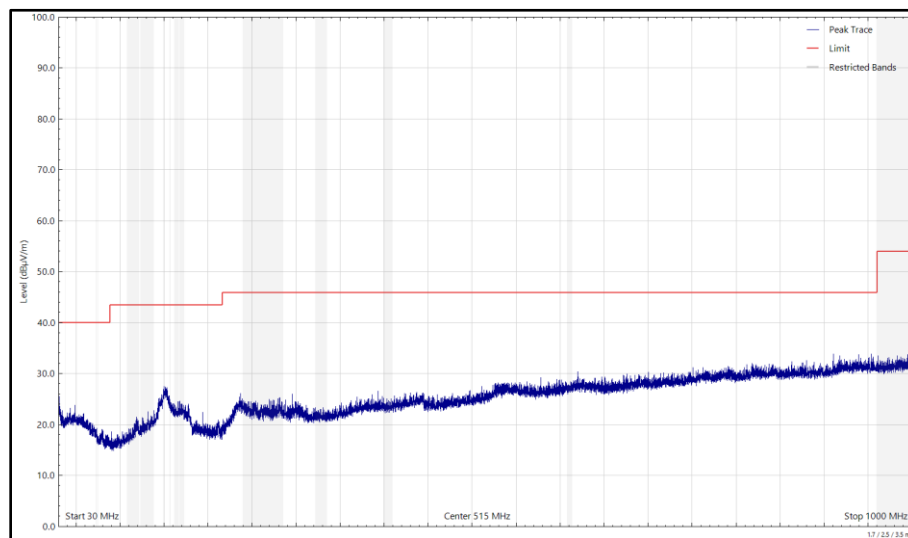


Figure 14 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 30 MHz to 1 GHz, Horizontal (Peak)

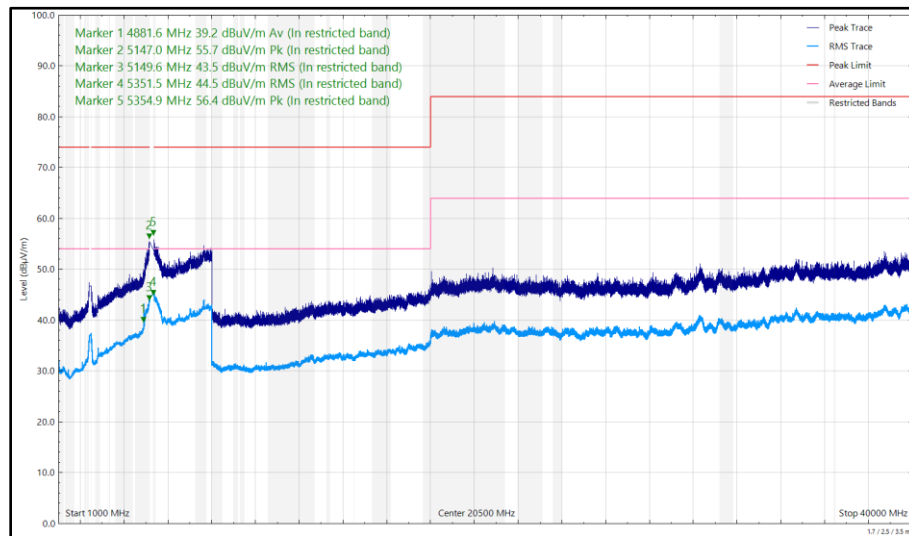


Figure 15 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz, Horizontal

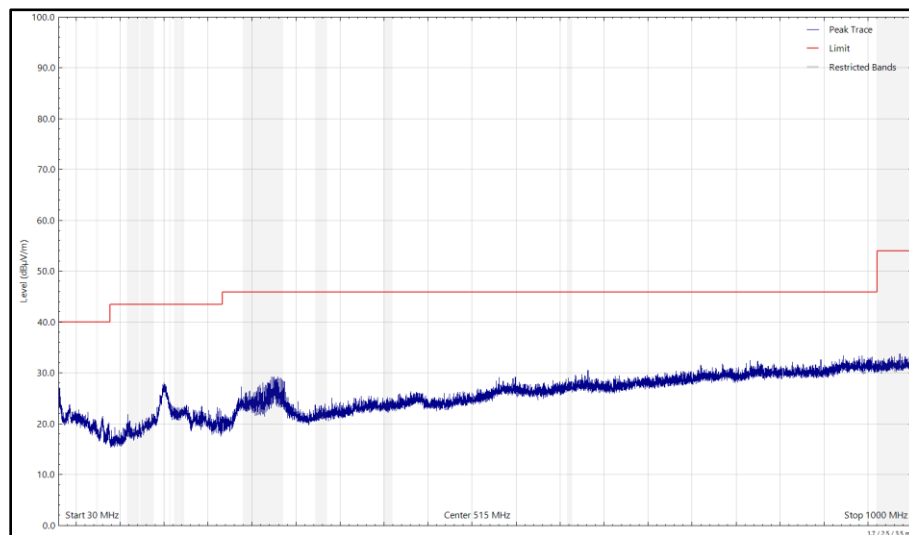


Figure 16 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 30 MHz to 1 GHz, Vertical (Peak)

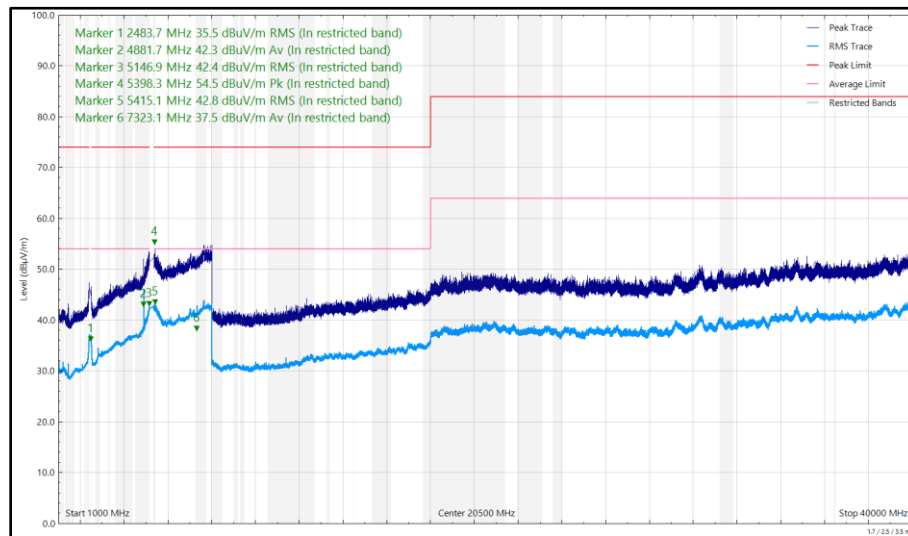


Figure 17 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2483.560	35.78	54.00	-18.22	RMS	72	158	Horizontal
4882.032	36.06	54.00	-17.94	CISPR Avg	111	386	Horizontal
4882.163	41.15	54.00	-12.85	CISPR Avg	20	134	Vertical
5451.771	42.50	54.00	-11.50	RMS	30	202	Vertical
5454.534	43.40	54.00	-10.60	RMS	192	187	Horizontal
5455.633	55.12	74.00	-18.88	Peak	192	187	Horizontal

Table 10 - U-NII-2C - 5640 MHz (CH128), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz

No other emissions found within 10 dB of the limit.

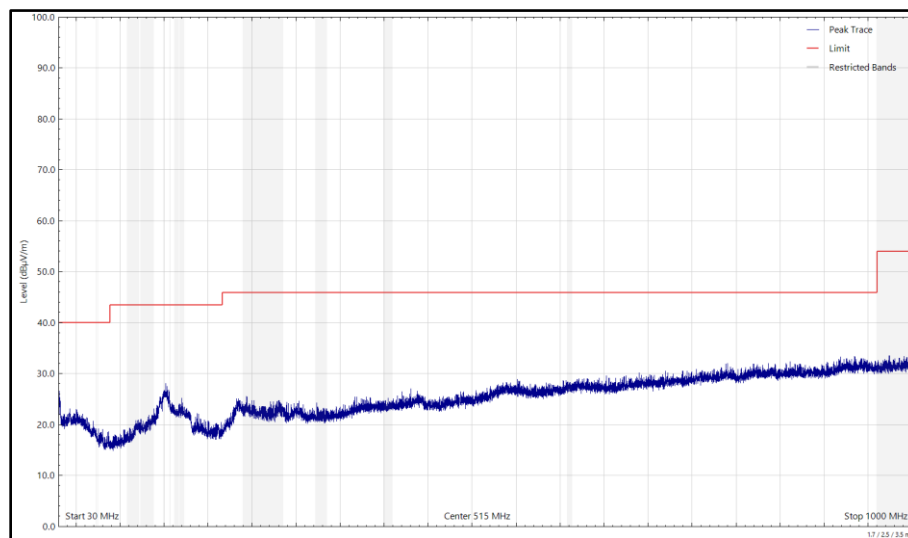


Figure 18 - U-NII-2C - 5640 MHz (CH128), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 30 MHz to 1 GHz, Horizontal (Peak)

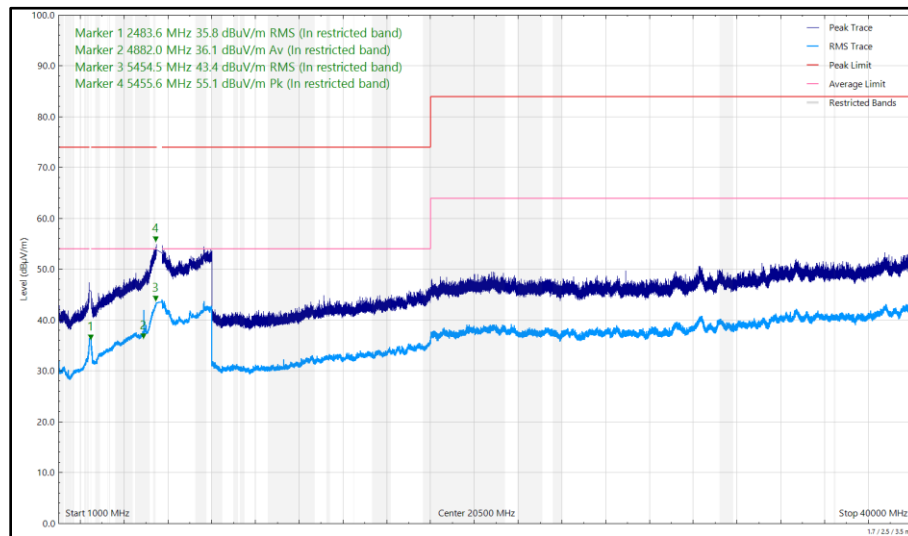


Figure 19 - U-NII-2C - 5640 MHz (CH128), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz, Horizontal

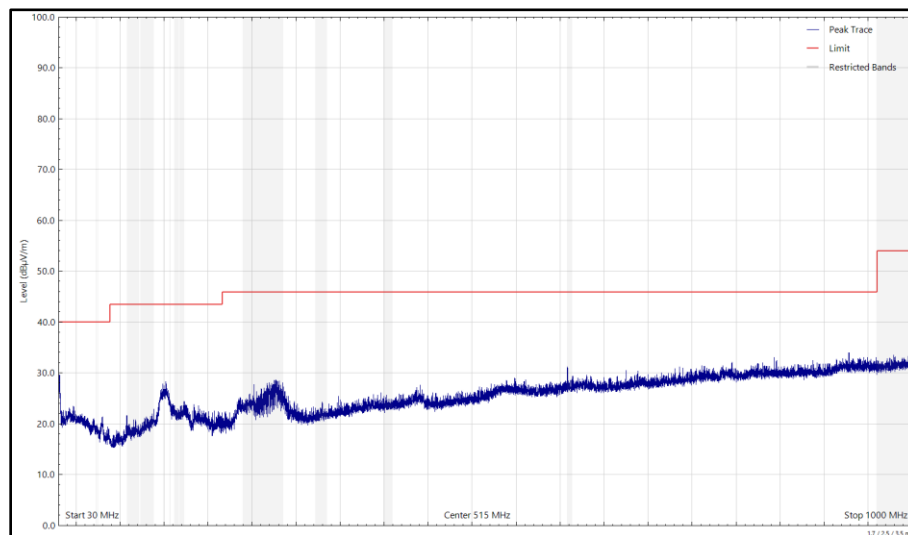


Figure 20 - U-NII-2C - 5640 MHz (CH128), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 30 MHz to 1 GHz, Vertical (Peak)

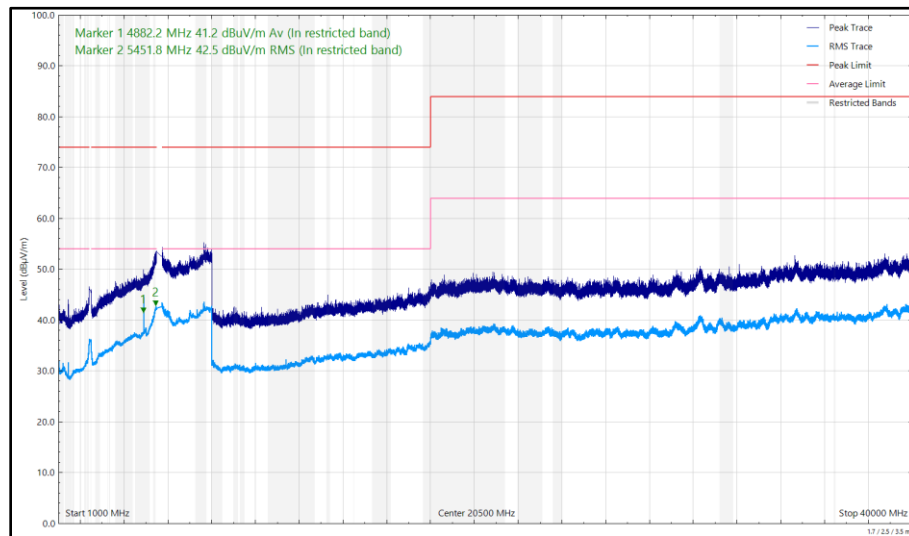


Figure 21 - U-NII-2C - 5640 MHz (CH128), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2389.878	34.45	54.00	-19.55	RMS	186	100	Vertical
2483.566	34.14	54.00	-19.86	RMS	43	110	Horizontal
4881.773	40.58	54.00	-13.42	CISPR Avg	16	202	Vertical
4881.907	36.39	54.00	-17.61	CISPR Avg	118	293	Horizontal
5448.222	41.06	54.00	-12.94	RMS	28	189	Vertical
5456.539	41.27	54.00	-12.73	RMS	191	107	Horizontal
7328.594	37.21	54.00	-16.79	CISPR Avg	116	354	Vertical

Table 11 - U-NII-3 - 5785 MHz (CH157), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz

No other emissions found within 10 dB of the limit.

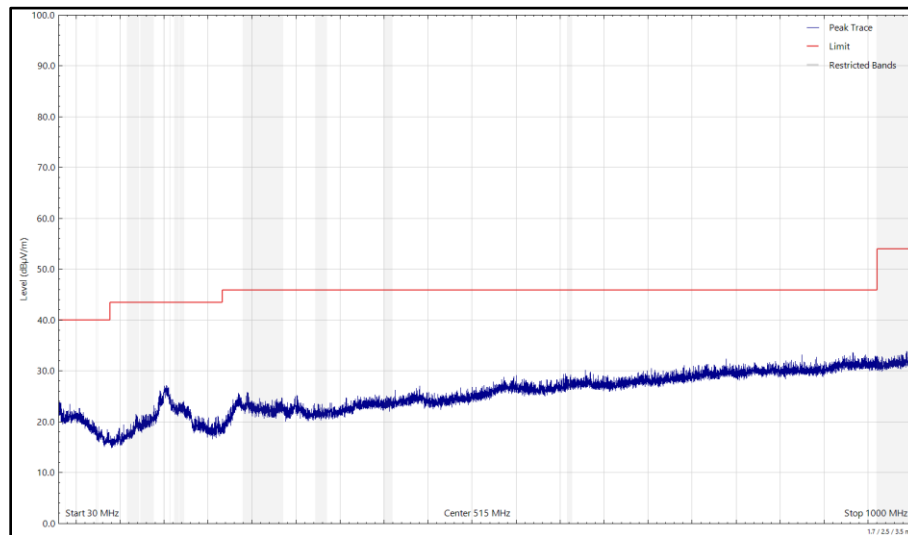


Figure 22 - U-NII-3 - 5785 MHz (CH157), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 30 MHz to 1 GHz, Horizontal (Peak)

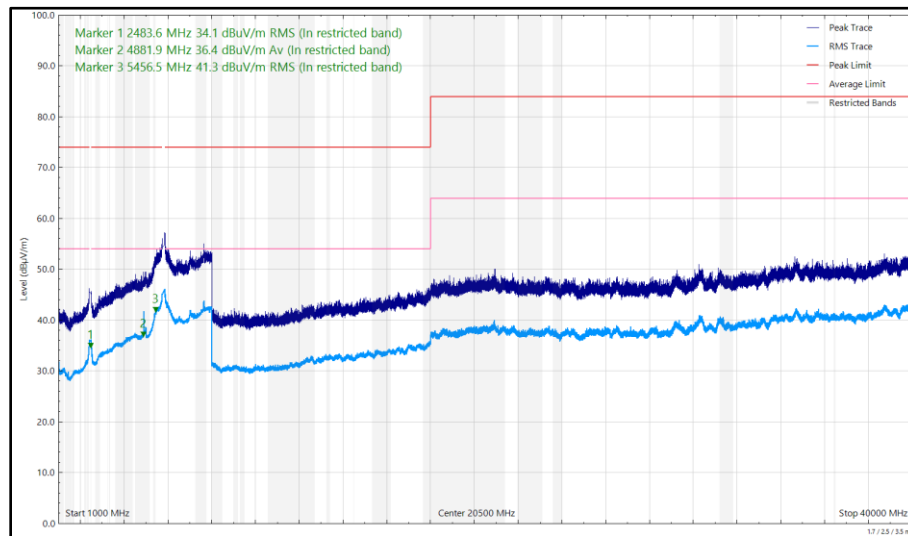


Figure 23 - U-NII-3 - 5785 MHz (CH157), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz, Horizontal

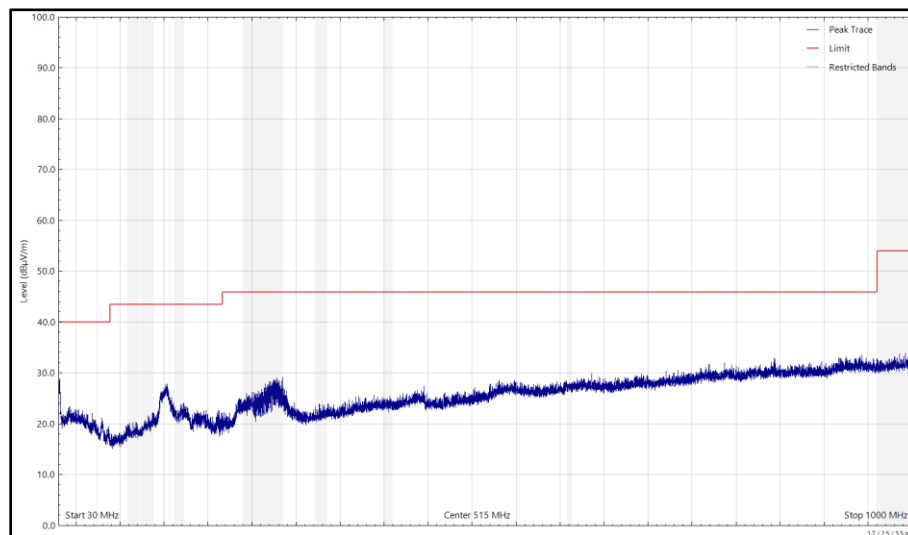


Figure 24 - U-NII-3 - 5785 MHz (CH157), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 30 MHz to 1 GHz, Vertical (Peak)

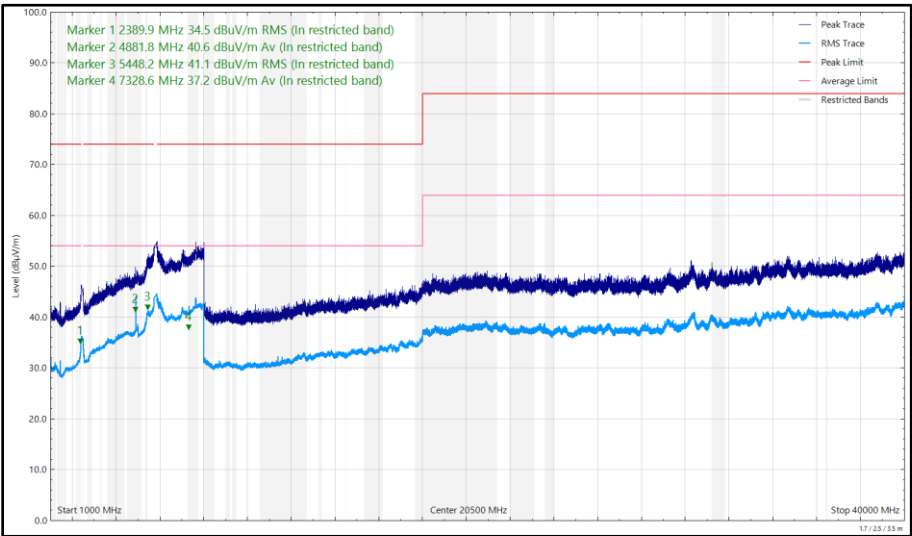


Figure 25 - U-NII-3 - 5785 MHz (CH157), HT20, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz, Vertical

FCC 47 CFR Part 15, ISSED RSS-247 and ISSED RSS-GEN

The least stringent limit from the applicable rule parts was used to determine compliance for Radiated Emissions testing of multiple transmission sources.

The least stringent applicable limit was:

Clause	Limit
Part 15 247 (d) / RSS-247 Clause 5.5	-20 dBc
Part 15.407 (b) / RSS-247 Clause 6.2	-27 dBm e.i.r.p
Part 15.209 / RSS-GEN Clause 8.9	Peak: 74 dBμV/m at 3m, Average 54 dBμV/m at 3m (Restricted bands > 1 GHz)

Table 12

6 GHz WLAN and 2.4 GHz Bluetooth

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
7322.338	39.04	54.00	-14.96	CISPR Avg	253	120	Horizontal
7322.640	37.71	54.00	-16.29	CISPR Avg	40	253	Vertical

Table 13 - U-NII-5 - 6175 MHz (CH45), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), 2-DH5, ePA, Core 0 + Core 1, 30 MHz to 40 GHz

No other emissions found within 10 dB of the limit.

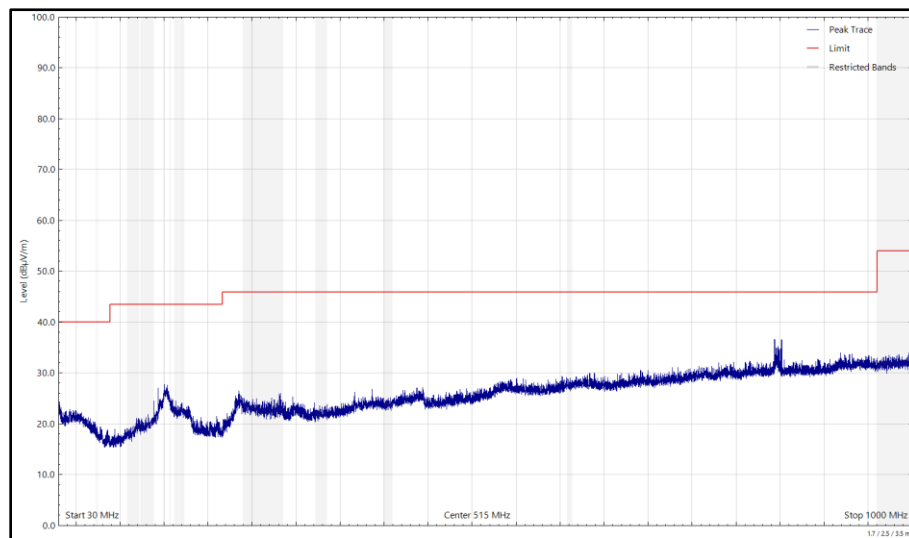


Figure 26 - U-NII-5 - 6175 MHz (CH45), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), 2-DH5, ePA, Core 0 + Core 1, 30 MHz to 1 GHz, Horizontal (Peak)

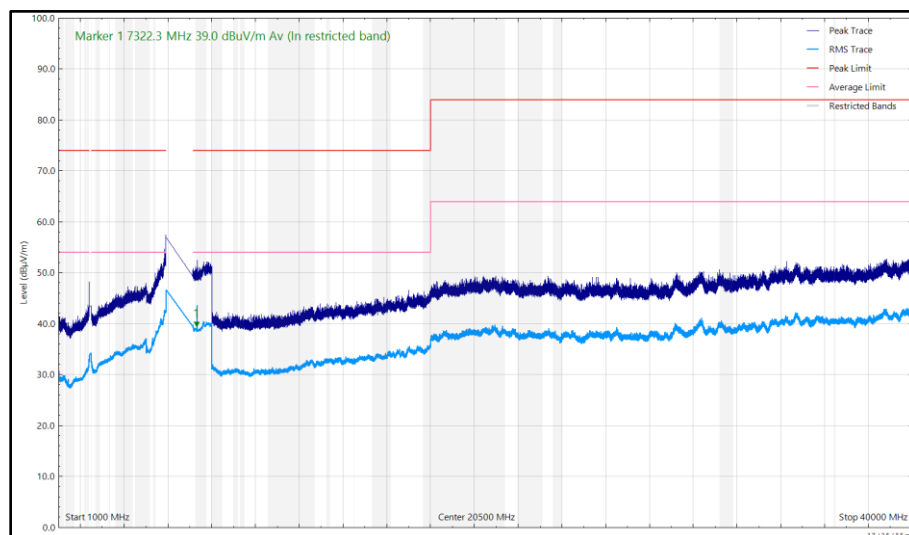


Figure 27 - U-NII-5 - 6175 MHz (CH45), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), 2-DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz, Horizontal

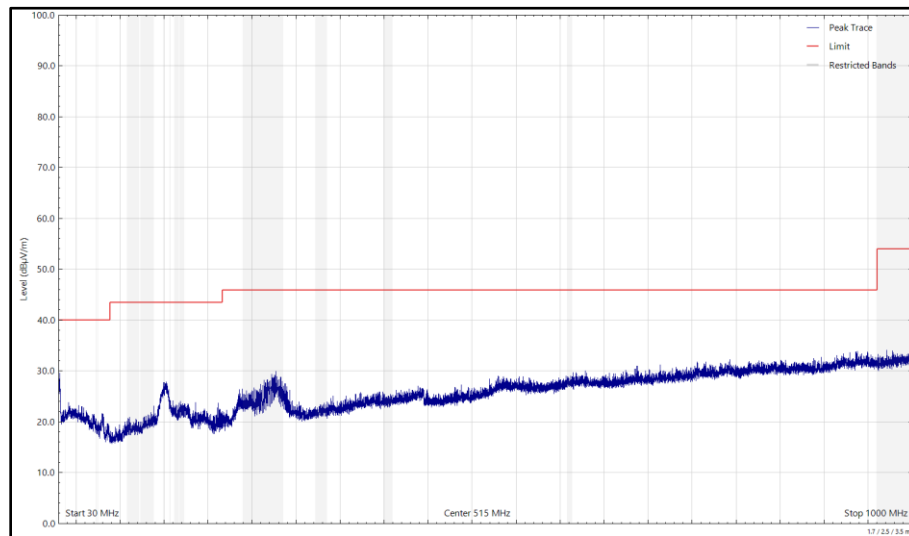


Figure 28 - U-NII-5 - 6175 MHz (CH45), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), 2-DH5, ePA, Core 0 + Core 1, 30 MHz to 1 GHz, Vertical (Peak)

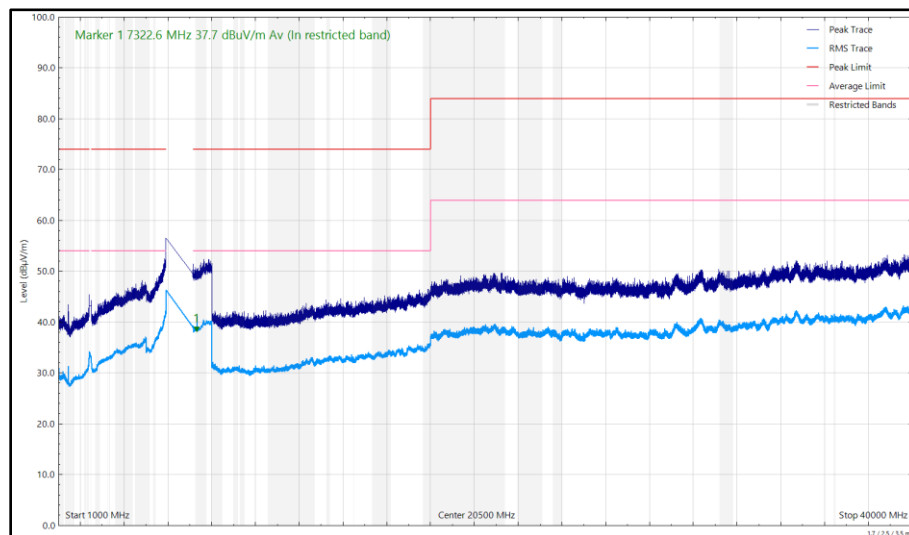


Figure 29 - U-NII-5 - 6175 MHz (CH45), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), 2-DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
7322.639	41.25	54.00	-12.75	CISPR Avg	255	196	Horizontal
7322.864	38.86	54.00	-15.14	CISPR Avg	34	127	Vertical

Table 14 - U-NII-8 - 6995 MHz (CH209), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), 2-DH5, ePA, Core 0 + Core 1, 30 MHz to 40 GHz

No other emissions found within 10 dB of the limit.

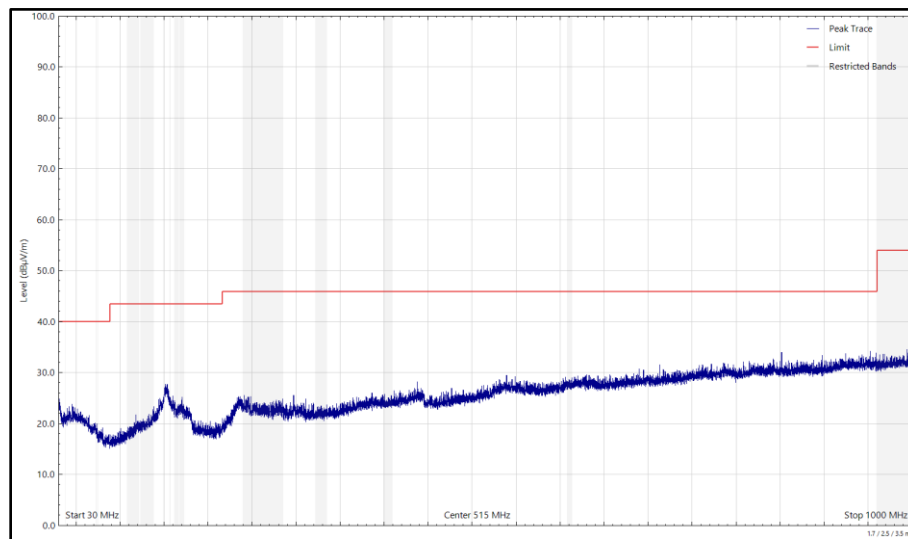


Figure 30 - U-NII-8 - 6995 MHz (CH209), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), 2-DH5, ePA, Core 0 + Core 1, 30 MHz to 1 GHz, Horizontal (Peak)

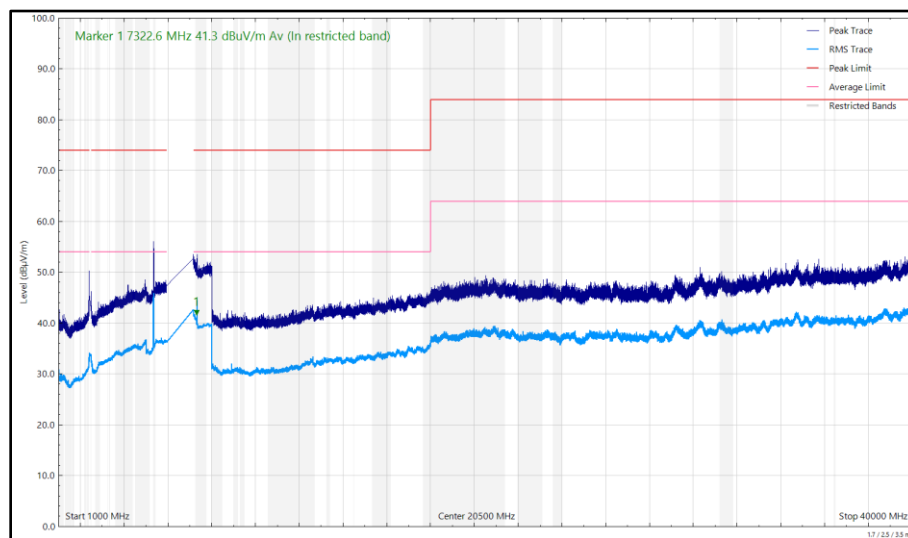


Figure 31 - U-NII-8 - 6995 MHz (CH209), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), 2-DH5, ePA, Core 0 + Core 1, 1 GHz to 40 GHz, Horizontal

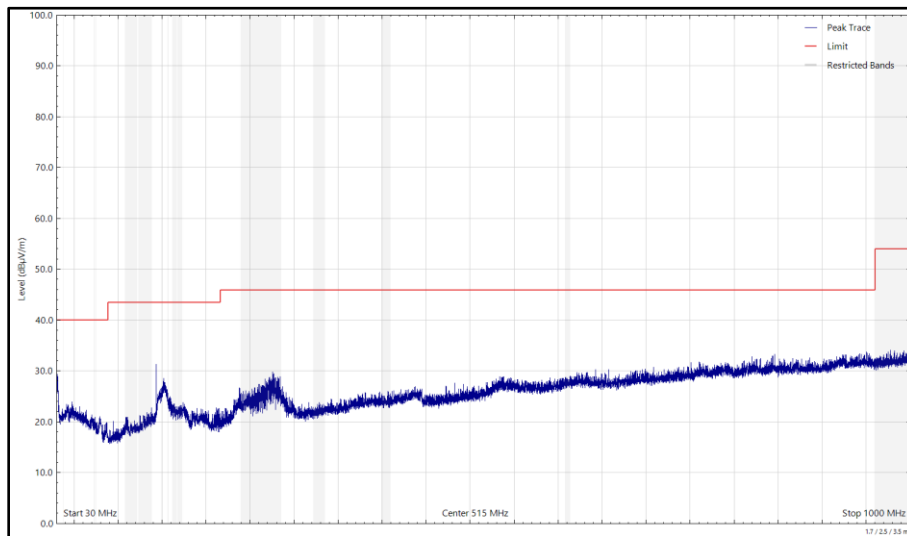


Figure 32 - U-NII-8 - 6995 MHz (CH209), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), 2-DH5, ePA, Core 0 + Core 1, 30 MHz to 1 GHz, Vertical (Peak)

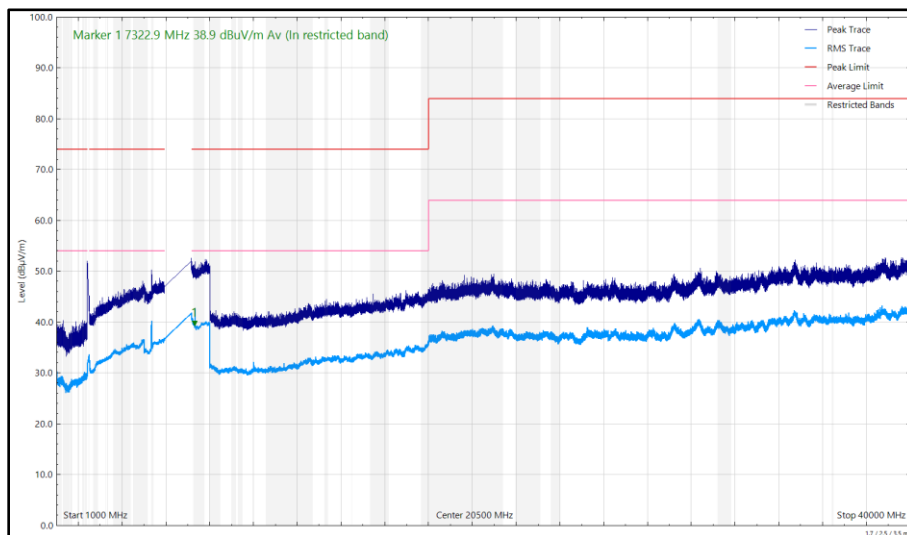


Figure 33 - U-NII-8 - 6995 MHz (CH209), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
4881.503	34.20	54.00	-19.80	CISPR Avg	160	107	Horizontal
7322.943	37.58	54.00	-16.42	CISPR Avg	24	236	Vertical
7323.348	40.18	54.00	-13.82	CISPR Avg	252	229	Horizontal

Table 15 - U-NII-5 - 6175 MHz (CH45), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 40 GHz

No other emissions found within 10 dB of the limit.

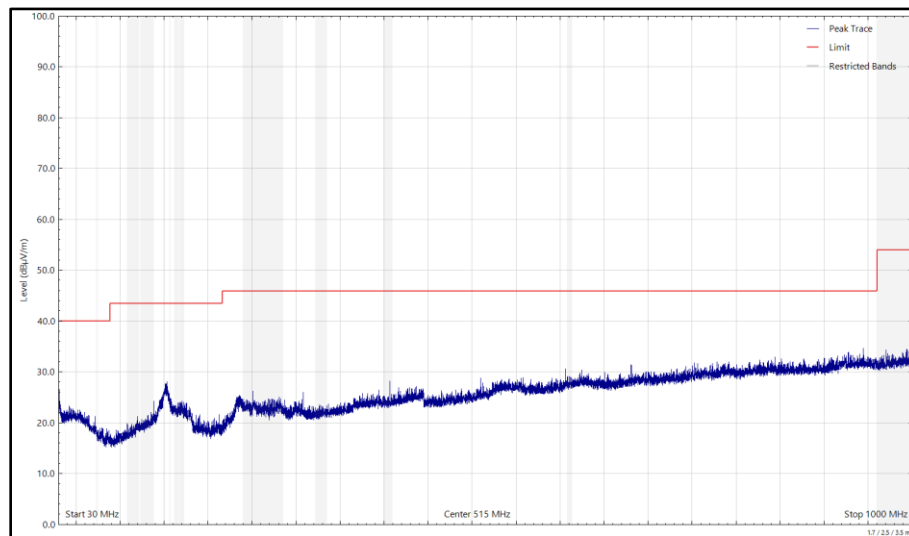


Figure 34 - U-NII-5 - 6175 MHz (CH45), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 1 GHz, Horizontal (Peak)

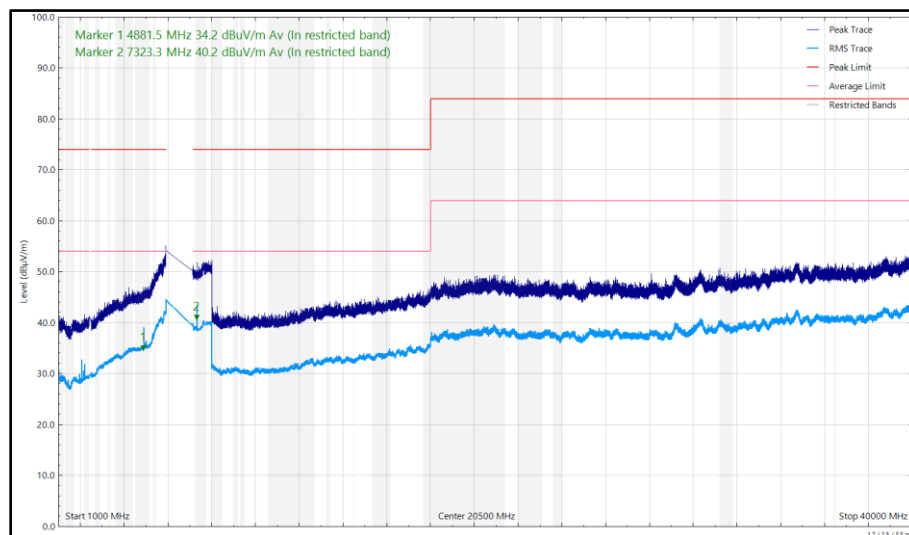


Figure 35 - U-NII-5 - 6175 MHz (CH45), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz, Horizontal

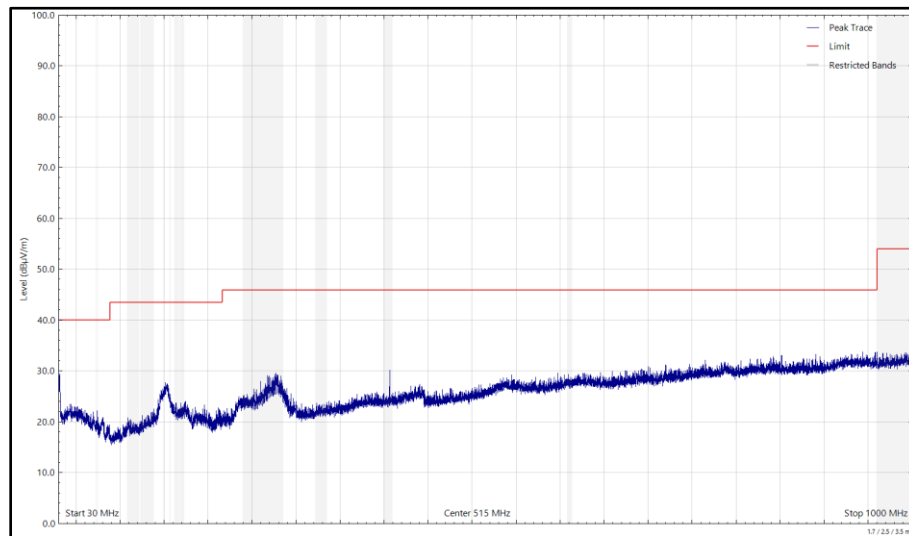


Figure 36 - U-NII-5 - 6175 MHz (CH45), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 1 GHz, Vertical (Peak)

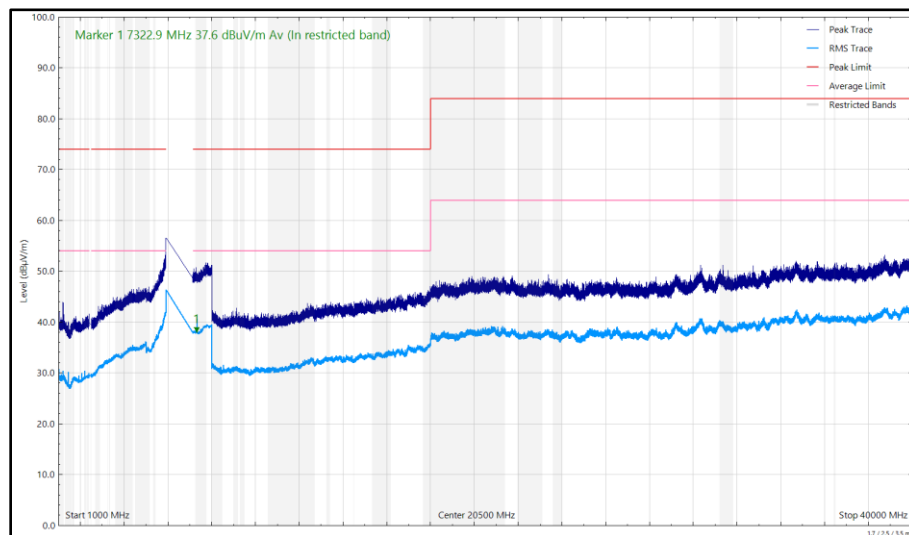


Figure 37 - U-NII-5 - 6175 MHz (CH45), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
4881.888	39.53	54.00	-14.47	CISPR Avg	183	340	Horizontal
7322.988	39.63	54.00	-14.37	CISPR Avg	233	196	Horizontal

Table 16 - U-NII-8 - 6995 MHz (CH209), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 40 GHz

No other emissions found within 10 dB of the limit.

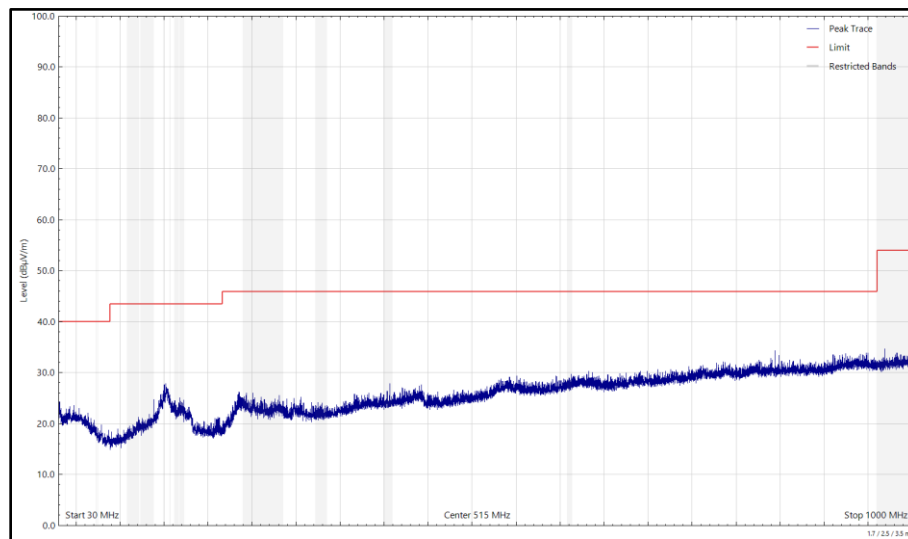


Figure 38 - U-NII-8 - 6995 MHz (CH209), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 1 GHz, Horizontal (Peak)

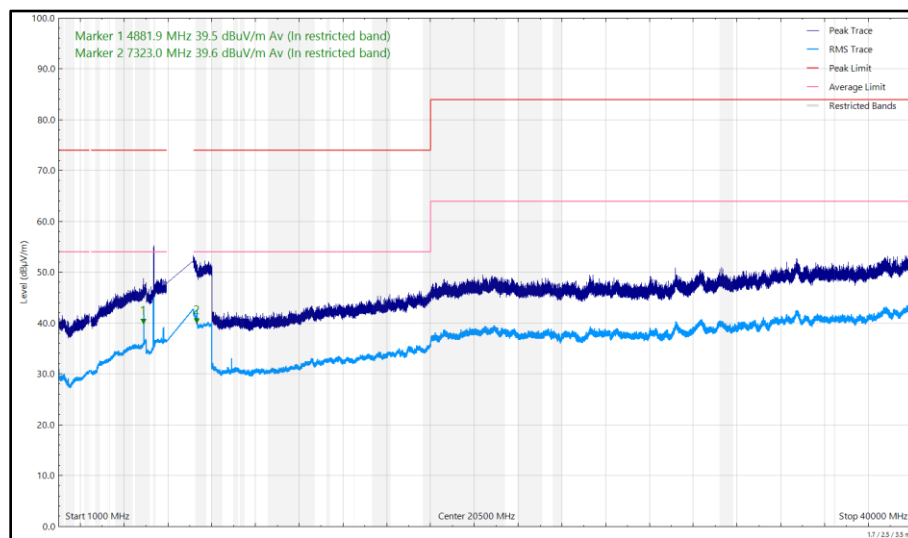


Figure 39 - U-NII-8 - 6995 MHz (CH209), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz, Horizontal

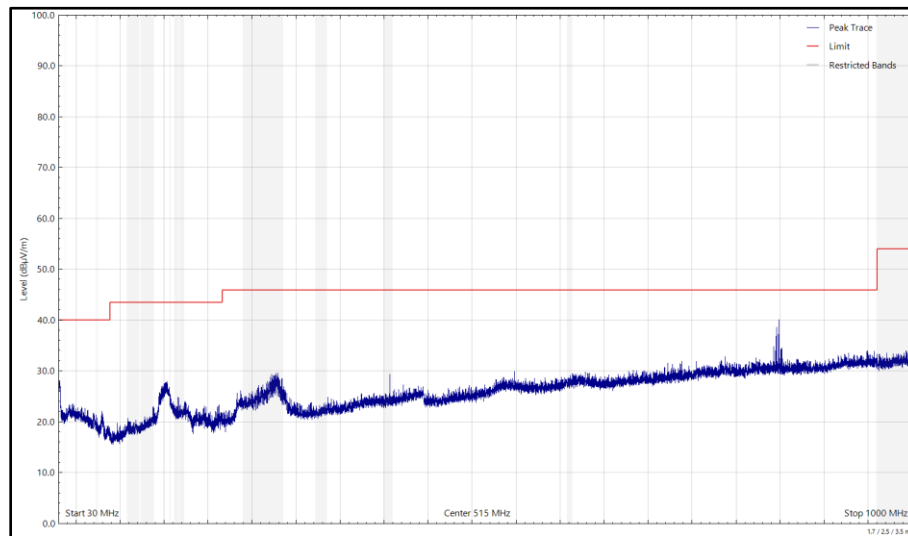


Figure 40 - U-NII-8 - 6995 MHz (CH209), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 30 MHz to 1 GHz, Vertical (Peak)

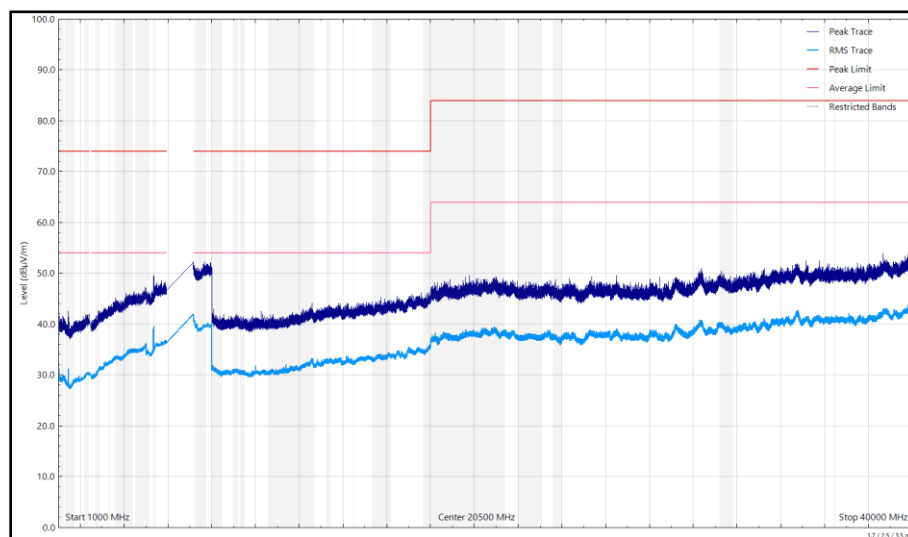


Figure 41 - U-NII-8 - 6995 MHz (CH209), HE20, SU, CDD, Core 0 + Core 1 and 2441 MHz (CH39), DH5, iPA, Core 2, 1 GHz to 40 GHz, Vertical



FCC 47 CFR Part 15, ISED RSS-247, ISED RSS-248 and ISED RSS-GEN

The least stringent limit from the applicable rule parts was used to determine compliance for Radiated Emissions testing of multiple transmission sources.

The least stringent applicable limit was:

Clause	Limit
Part 15 247 (d) / RSS-247 Clause 5.5	-20 dBc
Part 15.407 (b) / RSS-248 Clause 4.7.2	Peak: -7 dBm/MHz e.i.r.p, Average: -27 dBm/MHz e.i.r.p.
Part 15.209 / RSS-GEN Clause 8.9	Peak: 74 dB μ V/m at 3m, Average 54 dB μ V/m at 3m (Restricted bands > 1 GHz)

Table 17

2.4 GHz WLAN and Narrowband

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
408.313	13.95	46.00	-32.05	Q-Peak	149	374	Vertical
2389.839	39.07	54.00	-14.93	RMS	64	248	Horizontal
2389.971	34.82	54.00	-19.18	RMS	146	164	Vertical
2483.564	39.37	54.00	-14.63	RMS	23	400	Vertical
2483.661	45.01	54.00	-8.99	RMS	70	265	Horizontal
2484.450	60.73	74.00	-13.27	Peak	70	265	Horizontal

Table 18 - 2442 MHz (CH7), HT20, Core 0 and 5204 MHz, HDR4, ePA, Core 1, 30 MHz to 40 GHz

No other emissions found within 10 dB of the limit.

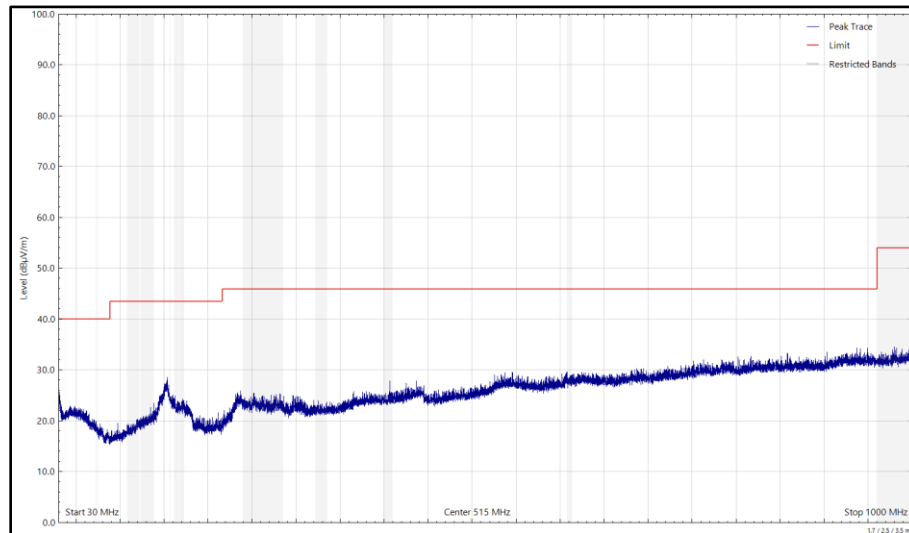


Figure 42 - 2442 MHz (CH7), HT20, Core 0 and 5204 MHz, HDR4, ePA, Core 1, 30 MHz to 1 GHz, Horizontal (Peak)

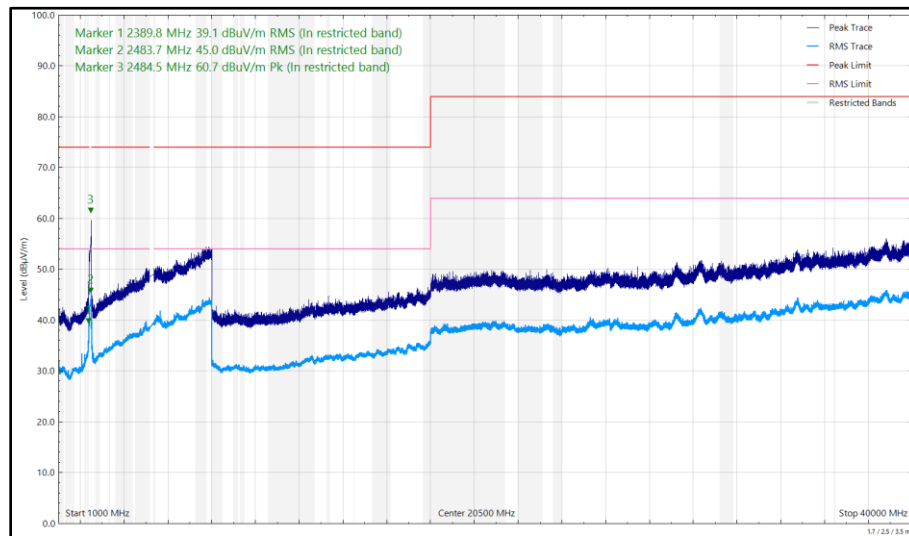


Figure 43 - 2442 MHz (CH7), HT20, Core 0 and 5204 MHz, HDR4, ePA, Core 1, 1 GHz to 40 GHz, Horizontal

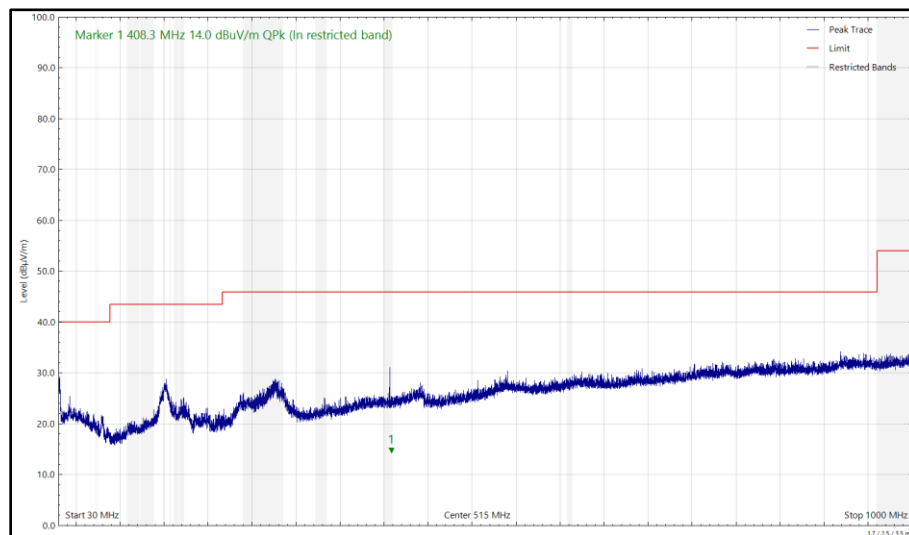


Figure 44 - 2442 MHz (CH7), HT20, Core 0 and 5204 MHz, HDR4, ePA, Core 1, 30 MHz to 1 GHz, Vertical (Peak)

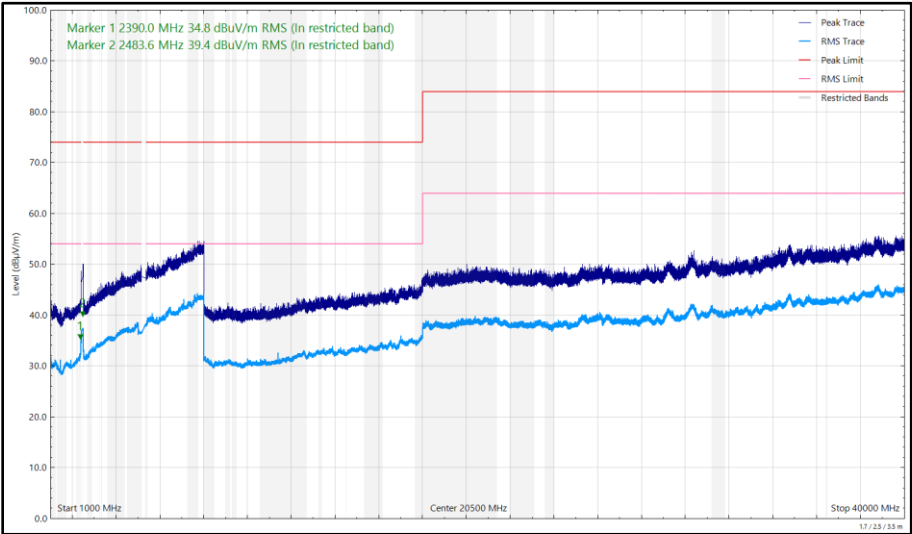


Figure 45 - 2442 MHz (CH7), HT20, Core 0 and 5204 MHz, HDR4, ePA, Core 1, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2389.904	39.07	54.00	-14.93	RMS	67	275	Horizontal
2389.989	34.91	54.00	-19.09	RMS	147	170	Vertical
2483.502	45.08	54.00	-8.92	RMS	71	268	Horizontal
2484.011	39.74	54.00	-14.26	RMS	25	395	Vertical
2484.796	61.83	74.00	-12.17	Peak	71	268	Horizontal
5374.583	43.32	54.00	-10.68	RMS	184	226	Horizontal
5374.645	39.34	54.00	-14.66	RMS	178	118	Vertical

Table 19 - 2442 MHz (CH7), HT20, Core 0 and 5788 MHz, HDR4, ePA, Core 1, 30 MHz to 40 GHz

No other emissions found within 10 dB of the limit.

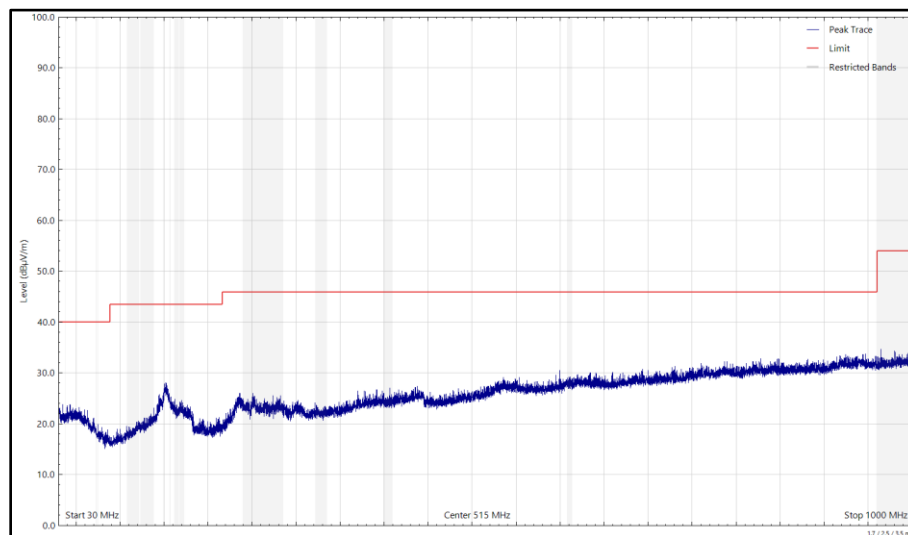


Figure 46 - 2442 MHz (CH7), HT20, Core 0 and 5788 MHz, HDR4, ePA, Core 1, 30 MHz to 1 GHz, Horizontal (Peak)

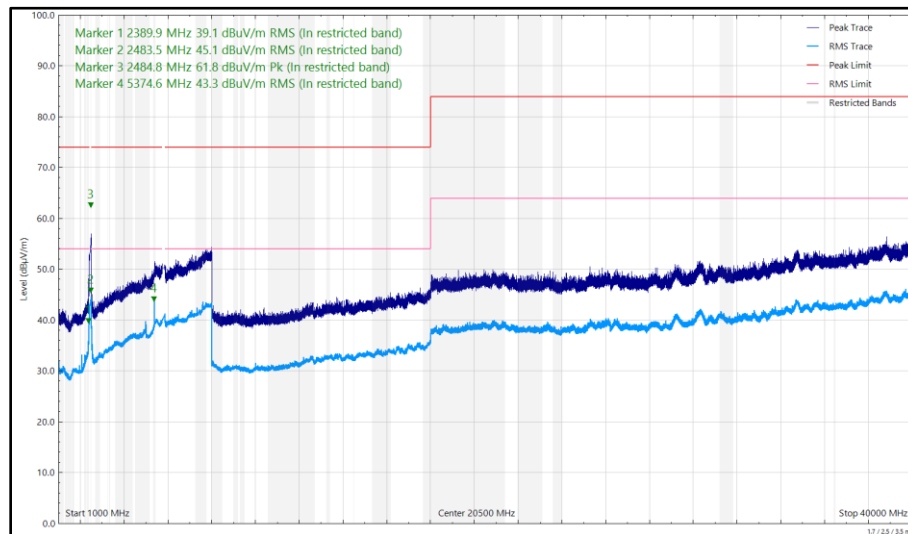


Figure 47 - 2442 MHz (CH7), HT20, Core 0 and 5788 MHz, HDR4, ePA, Core 1, 1 GHz to 40 GHz, Horizontal

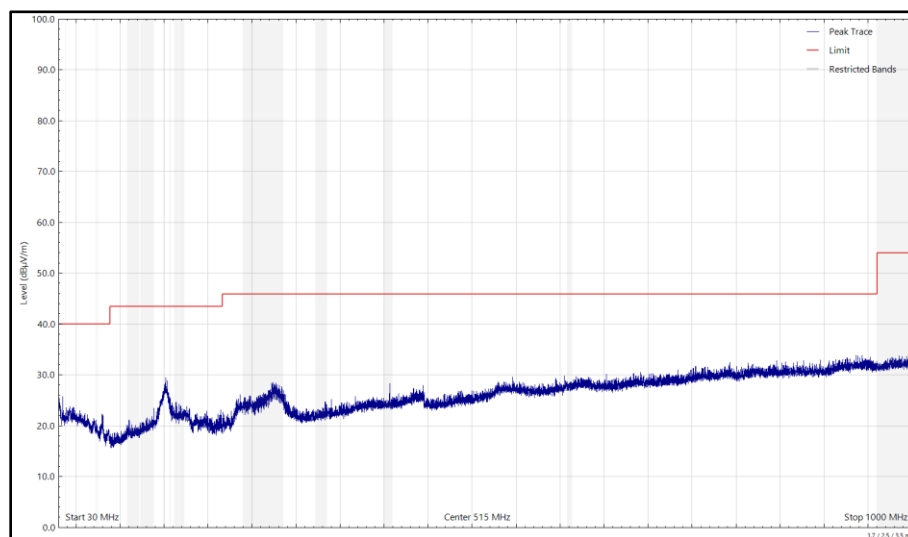


Figure 48 - 2442 MHz (CH7), HT20, Core 0 and 5788 MHz, HDR4, ePA, Core 1, 30 MHz to 1 GHz, Vertical (Peak)

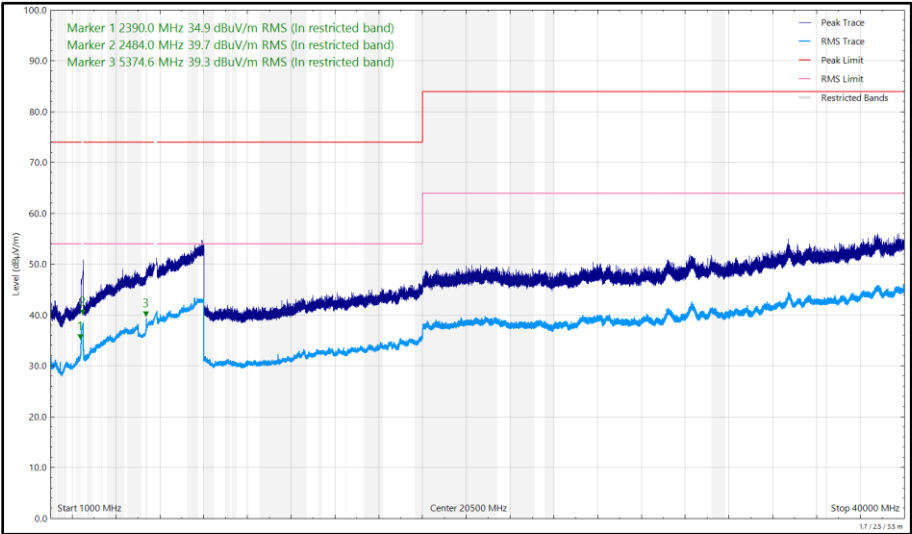


Figure 49 - 2442 MHz (CH7), HT20, Core 0 and 5788 MHz, HDR4, ePA, Core 1, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
409.856	14.14	46.00	-31.86	Q-Peak	243	248	Vertical
2384.873	36.78	54.00	-17.22	RMS	187	187	Vertical
2389.981	39.67	54.00	-14.33	RMS	123	101	Horizontal
2483.524	41.12	54.00	-12.88	RMS	117	100	Horizontal
2483.535	38.07	54.00	-15.93	RMS	154	178	Vertical

Table 20 - 2442 MHz (CH7), HT20, Core 1 and 5204 MHz, HDR4, ePA, Core 0, 30 MHz to 40 GHz

No other emissions found within 10 dB of the limit.

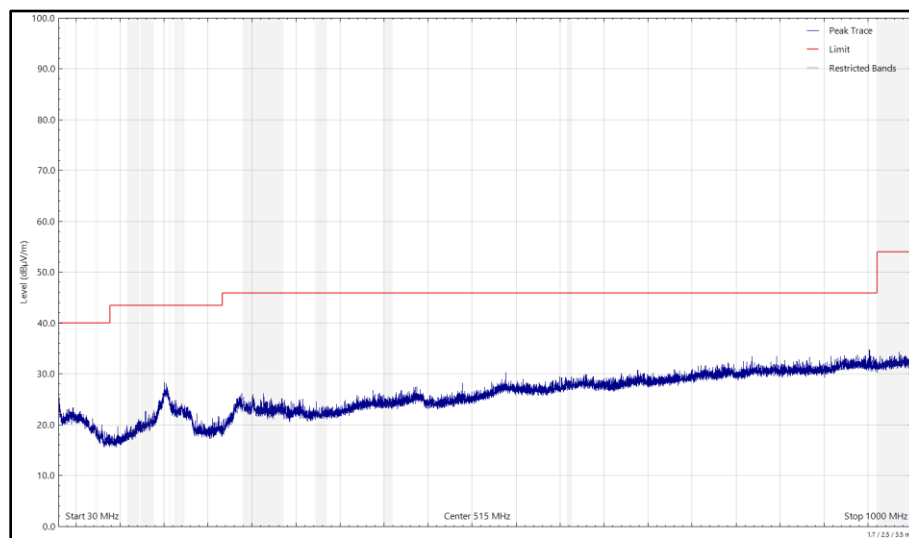


Figure 50 - 2442 MHz (CH7), HT20, Core 1 and 5204 MHz, HDR4, ePA, Core 0, 30 MHz to 1 GHz, Horizontal (Peak)

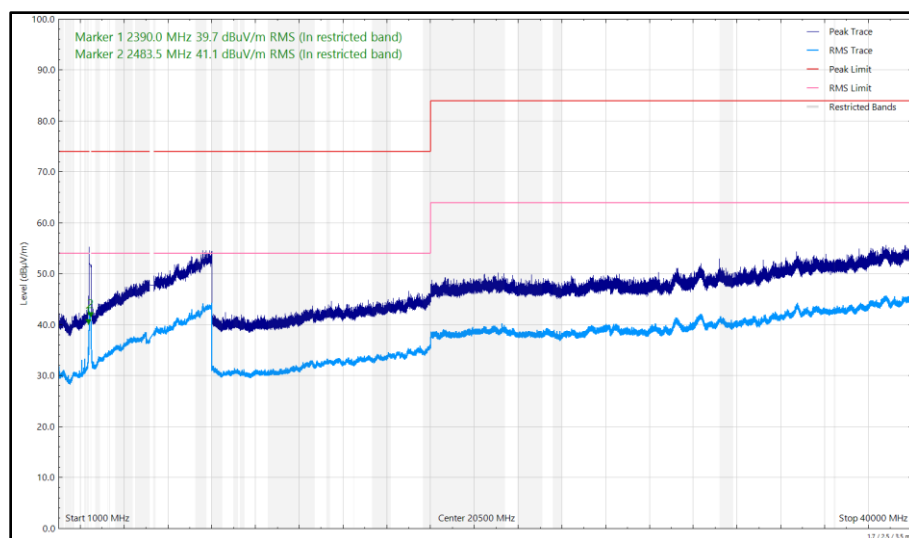


Figure 51 - 2442 MHz (CH7), HT20, Core 1 and 5204 MHz, HDR4, ePA, Core 0, 1 GHz to 40 GHz, Horizontal

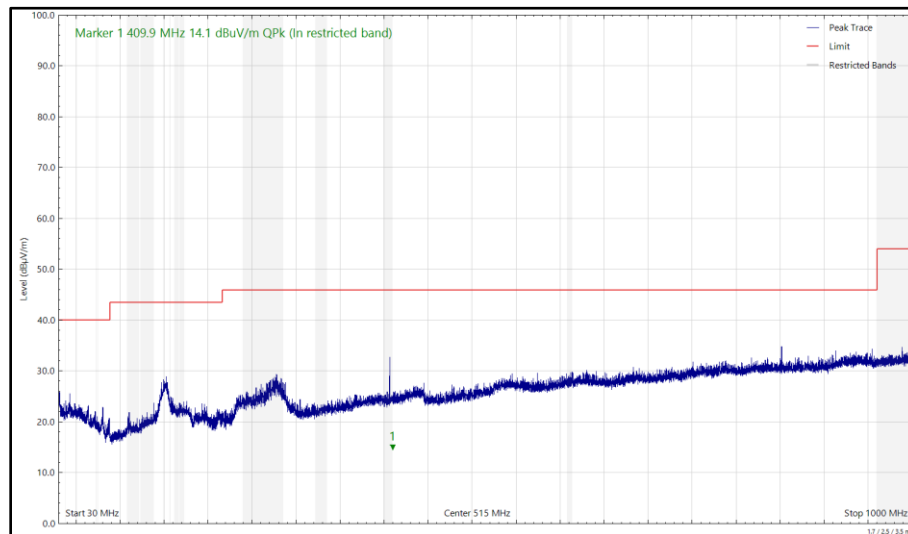


Figure 52 - 2442 MHz (CH7), HT20, Core 1 and 5204 MHz, HDR4, ePA, Core 0, 30 MHz to 1 GHz, Vertical (Peak)

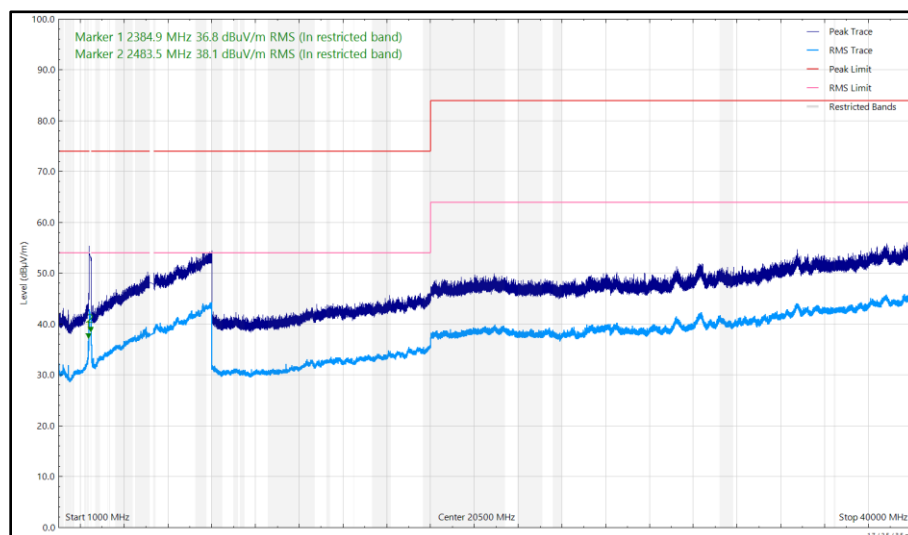


Figure 53 - 2442 MHz (CH7), HT20, Core 1 and 5204 MHz, HDR4, ePA, Core 0, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
275.287	24.71	46.00	-21.29	Q-Peak	0	243	Vertical
2389.570	37.50	54.00	-16.50	RMS	242	100	Horizontal
2389.959	39.19	54.00	-14.81	RMS	174	133	Vertical
2483.514	41.43	54.00	-12.57	RMS	115	130	Horizontal
2483.649	41.51	54.00	-12.49	RMS	186	128	Vertical
5374.569	41.42	54.00	-12.58	RMS	16	217	Vertical
5374.610	39.39	54.00	-14.61	RMS	80	273	Horizontal

Table 21 - 2442 MHz (CH7), HT20, Core 1 and 5788 MHz, HDR4, ePA, Core 0, 30 MHz to 40 GHz

No other emissions found within 10 dB of the limit.

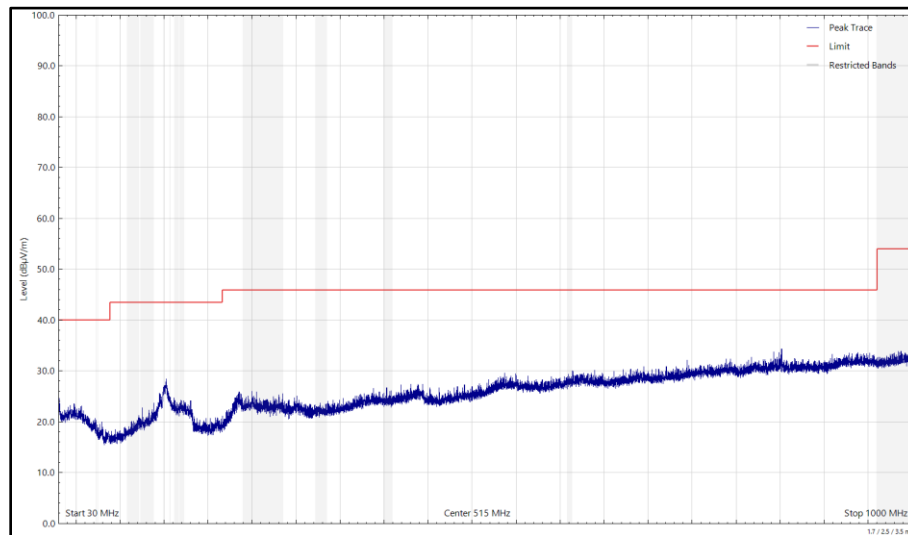


Figure 54 - 2442 MHz (CH7), HT20, Core 1 and 5788 MHz, HDR4, ePA, Core 0, 30 MHz to 1 GHz, Horizontal (Peak)

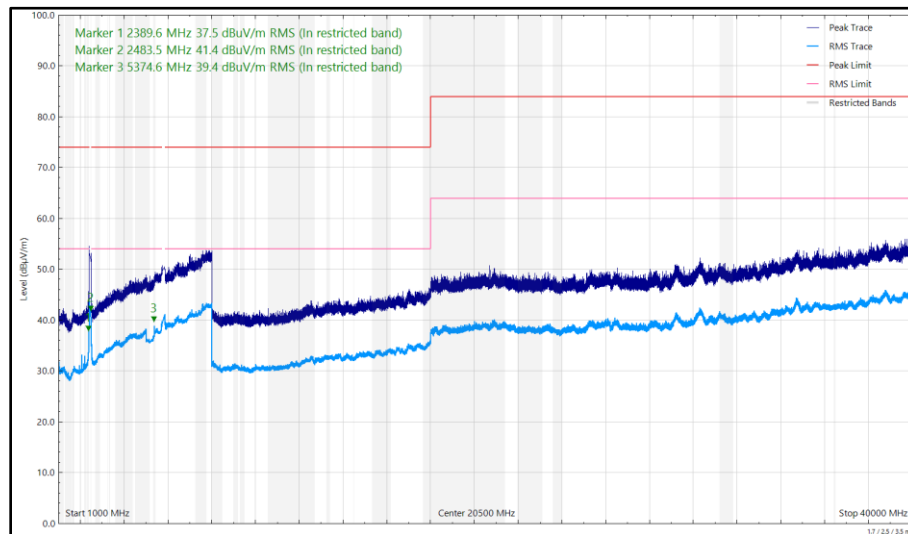


Figure 55 - 2442 MHz (CH7), HT20, Core 1 and 5788 MHz, HDR4, ePA, Core 0, 1 GHz to 40 GHz, Horizontal

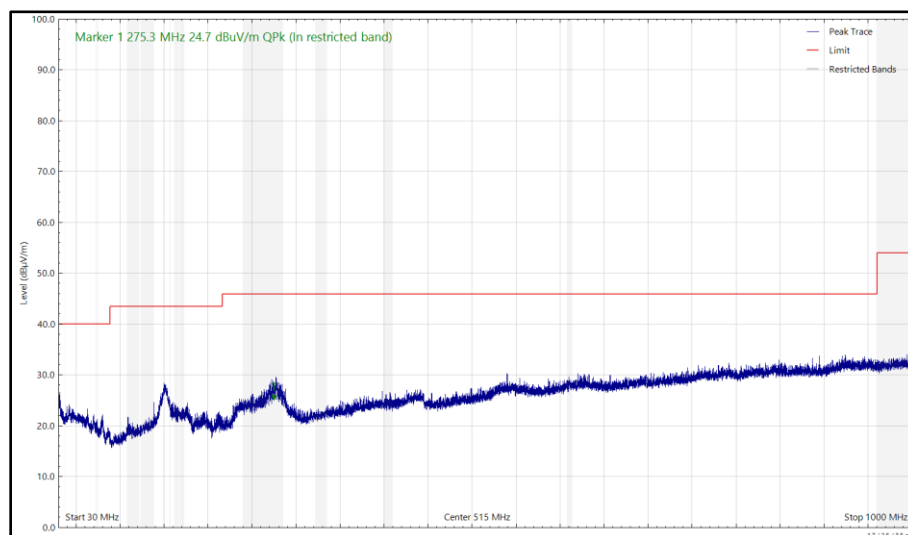


Figure 56 - 2442 MHz (CH7), HT20, Core 1 and 5788 MHz, HDR4, ePA, Core 0, 30 MHz to 1 GHz, Vertical (Peak)

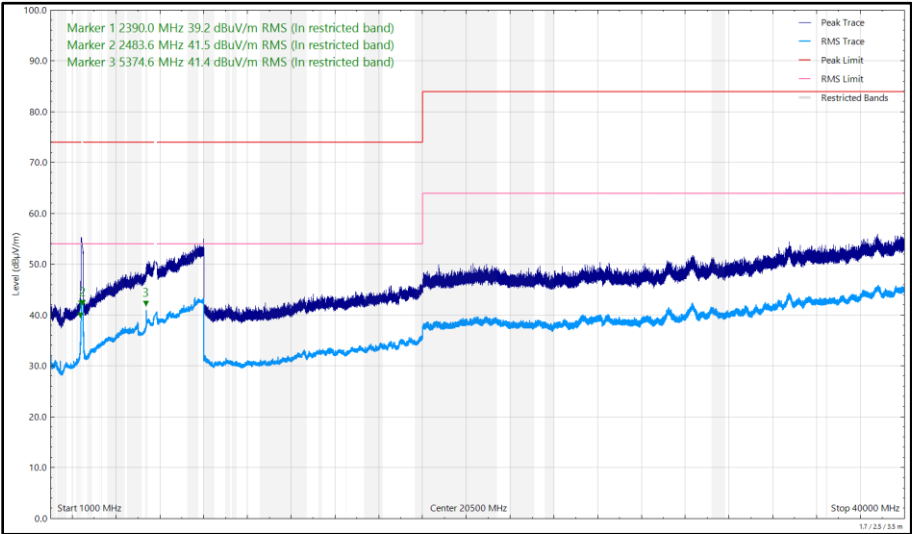


Figure 57 - 2442 MHz (CH7), HT20, Core 1 and 5788 MHz, HDR4, ePA, Core 0, 1 GHz to 40 GHz, Vertical

FCC 47 CFR Part 15, ISED RSS-247 and ISED RSS-GEN

The least stringent limit from the applicable rule parts was used to determine compliance for Radiated Emissions testing of multiple transmission sources.

The least stringent applicable limit was:

Clause	Limit
Part 15 247 (d) / RSS-247 Clause 5.5	30 dBc
Part 15.407 (b) / RSS-247 Clause 4.6.1.2	-27 dBm/MHz e.i.r.p.
Part 15.209 / RSS-GEN Clause 8.9	Peak: 74 dBµV/m at 3m, Average 54 dBµV/m at 3m (Restricted bands > 1 GHz)

Table 22

5 GHz WLAN and Thread

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2364.746	58.02	74.00	-15.98	Peak	316	318	Horizontal
2389.559	35.81	54.00	-18.19	RMS	70	255	Horizontal
2483.548	37.62	54.00	-16.38	RMS	71	242	Horizontal
2484.568	59.56	74.00	-14.44	Peak	350	299	Vertical
4881.002	43.88	54.00	-10.12	RMS	8	164	Vertical
5097.867	54.71	74.00	-19.29	Peak	18	187	Vertical
5107.862	43.49	54.00	-10.51	RMS	180	233	Horizontal
5119.521	42.55	54.00	-11.45	RMS	25	184	Vertical
5354.443	42.44	54.00	-11.56	RMS	18	147	Vertical
5357.743	45.49	54.00	-8.51	RMS	182	184	Horizontal
5358.502	57.66	74.00	-16.34	Peak	181	179	Horizontal

Table 23 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2440 MHz (CH18), Core 0, ePA, 30 MHz to 40 GHz

No other emissions found within 10 dB of the limit.

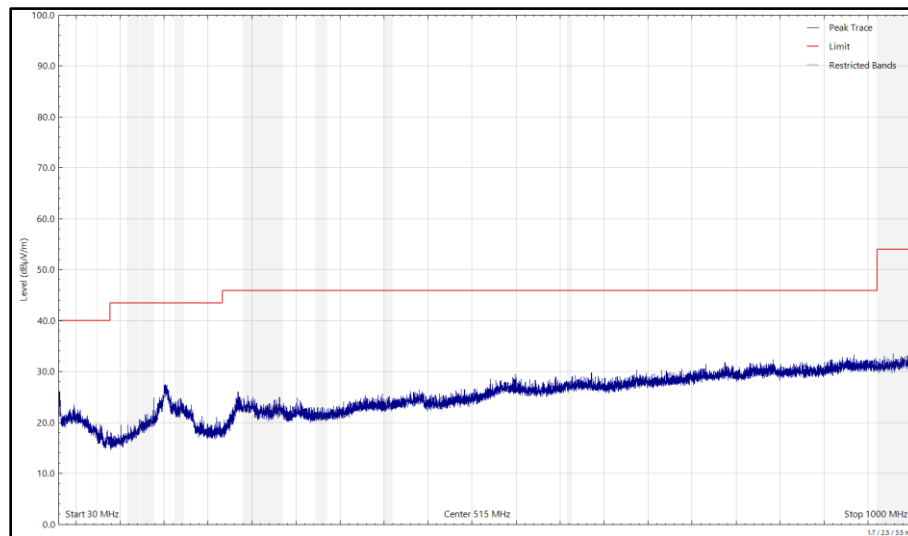


Figure 58 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2440 MHz (CH18), Core 0, ePA, 30 MHz to 1 GHz, Horizontal (Peak)

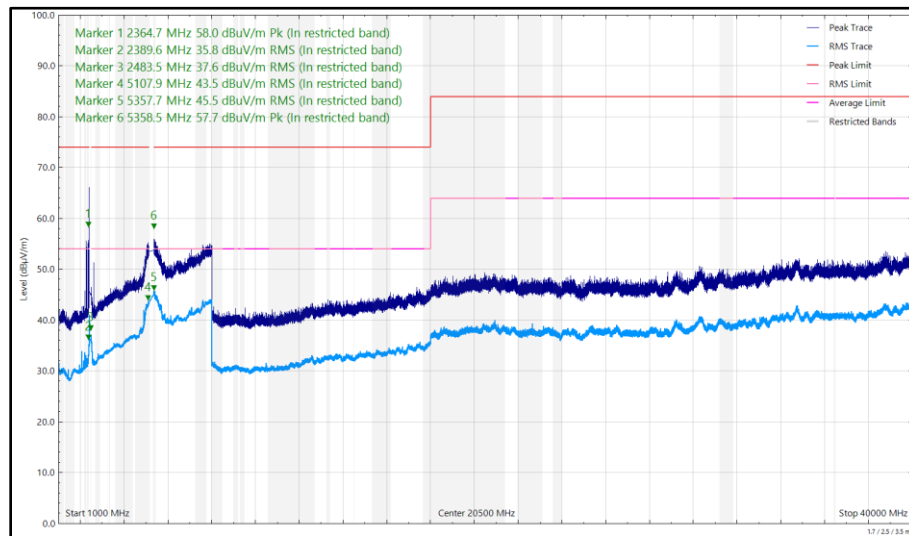


Figure 59 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2440 MHz (CH18), Core 0, ePA, 1 GHz to 40 GHz, Horizontal

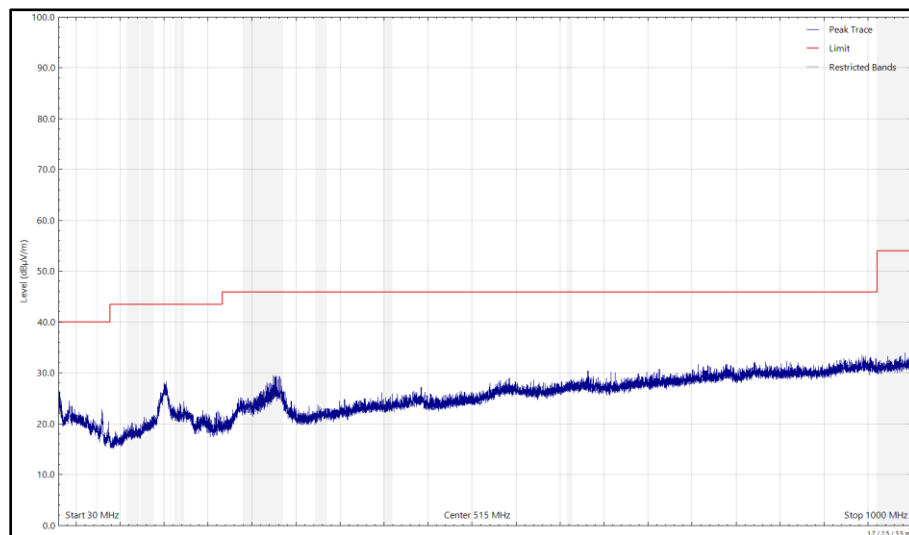


Figure 60 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2440 MHz (CH18), Core 0, ePA, 30 MHz to 1 GHz, Vertical (Peak)

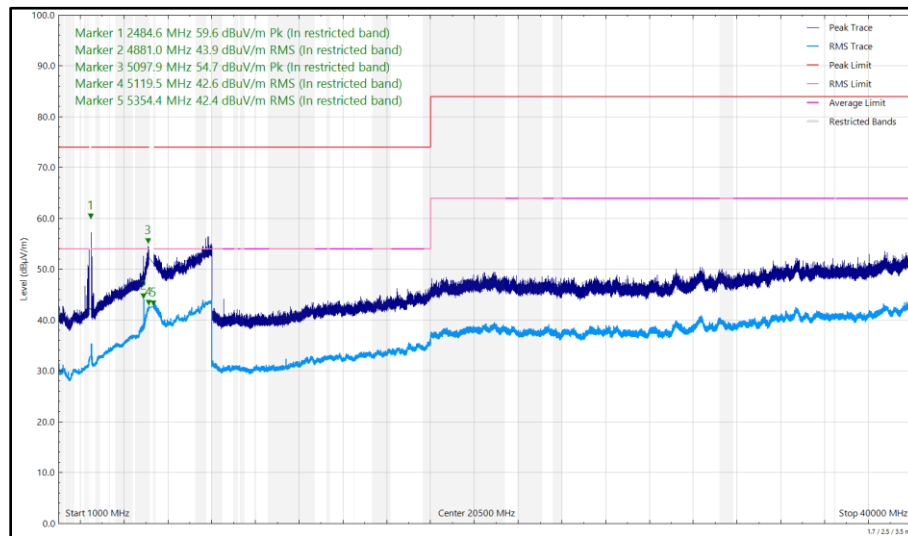


Figure 61 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2440 MHz (CH18), Core 0, ePA, 1 GHz to 40 GHz, Vertical

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
2366.519	61.61	74.00	-12.39	Peak	173	107	Vertical
2385.129	36.53	54.00	-17.47	RMS	124	106	Horizontal
2387.385	35.66	54.00	-18.34	RMS	199	336	Vertical
2388.477	67.16	74.00	-6.84	Peak	121	101	Horizontal
2484.876	34.70	54.00	-19.30	RMS	152	118	Vertical
2485.694	64.70	74.00	-9.30	Peak	117	284	Horizontal
2486.619	65.61	74.00	-8.39	Peak	156	353	Vertical
4881.042	42.54	54.00	-11.46	RMS	172	176	Horizontal
5358.607	55.39	74.00	-18.61	Peak	354	197	Vertical
5360.067	42.69	54.00	-11.31	RMS	354	197	Vertical
5386.196	56.02	74.00	-17.98	Peak	194	142	Horizontal
5386.531	44.14	54.00	-9.86	RMS	194	142	Horizontal

Table 24 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2440 MHz (CH18), Core 1, ePA, 30 MHz to 40 GHz

No other emissions found within 10 dB of the limit.

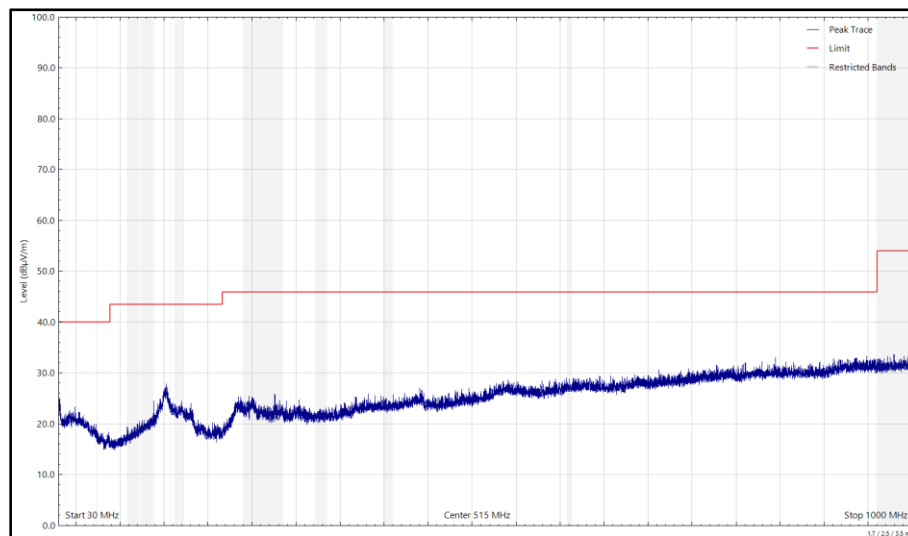


Figure 62 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2440 MHz (CH18), Core 1, ePA, 30 MHz to 1 GHz, Horizontal (Peak)

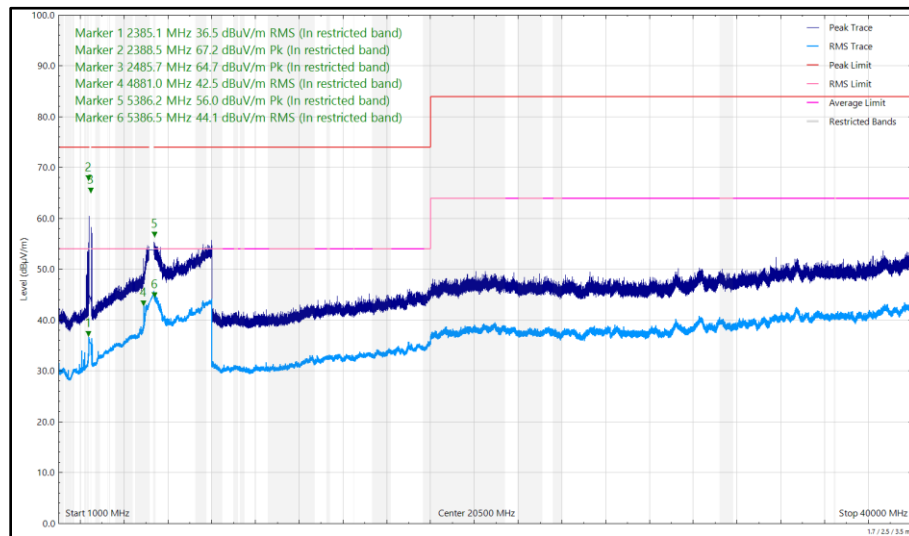


Figure 63 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2440 MHz (CH18), Core 1, ePA, 1 GHz to 40 GHz, Horizontal

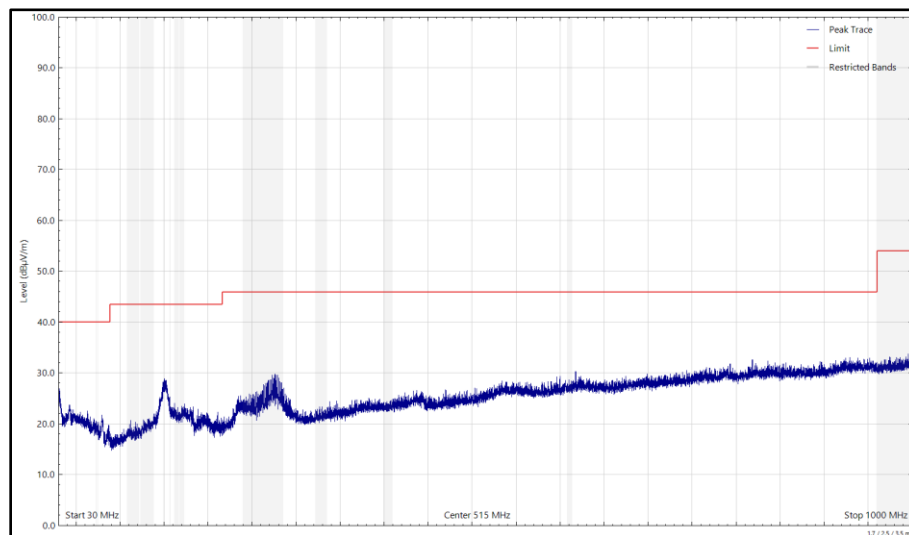


Figure 64 - U-NII-1 - 5240 MHz (CH48), HT20, CDD, Core 0 + Core 1 and 2440 MHz (CH18), Core 1, ePA, 30 MHz to 1 GHz, Vertical (Peak)