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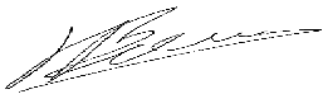
Test Report for the FCC and ISED Testing of a Varjo XR-3 Headset for Varjo Technologies Oy

Test Report number 14046TR5

Project number C5908

Author: ....
M Render BSc(Hons), PhD, MIET
Senior Engineer



Checked: ....
J Beevers MPhys(Hons), PhD
Test Engineer

Approved: .....
Mr C W Greenfield, BEng (Hons)

Issue	Description						Issue by	Date
5	Copy 1		Copy 2		PDF	X	CG	13th April 2021

Registered Address:
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Registered in England and Wales
Company Reg. No. 6048589
VAT Reg. No. GB 887 1276 83

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Test Report Change History

Issue	Date	Modification Details
1	5th March 2021	First Issue
2	29th March 2021	Second issue to include ISED references
3	31st March 2021	Amendments following comments from TCB
4	9th April 2021	Amendments following comments from TCB
5	13th April 2021	Firmware and Software information added
6		
7		
8		
9		
10		

Section 1Test Location

All testing was performed at;

Eurofins York	Unit 5
	Speedwell Road
	Castleford
	WF10 5PY
Tel:	01977 731173
Website	http://www.yorkemc.co.uk
UKAS Testing No.	1574

1.1 UKAS Accreditation

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Eurofins York latest accreditation schedule can be found at:
http://www.ukas.org/testing/lab_detail.asp?lab_id=989&location_id=&vMenuOption=3

Eurofins York Castleford Laboratory, is an Accredited facility recognised by the Federal Communications Commission (FCC) for certification testing. The appropriate FCC Designation Number is number is UK02013, dated 1st March 2021.

Eurofins York Castleford Laboratory is recognised by ISED for certification testing.
ISED Assigned Code: 22959

Section 2Customer Information

Company name	Varjo Technologies Oy
Address	Vuorikatu 20
	00100 Helsinki
	Finland
Contact	Martti Timonen
Email	Martti@varjo.com

Section 3Equipment Details

3.1 Equipment Under Test (EUT)

Date received:	20th November 2020		
EUT name:	Varjo XR-3 Mixed Reality Headset		
PMN:	XR-3		
HVIN:	3006		
FVIN:	0.11.0.372		
FCC ID:	2AROD-004		
ISED number:	IC: 24483-004		
Serial no/s:	X0022C925AE1190170, X0022C925AE1190255 and X0022C925AE1190161		
EUT description:	The XR-3 is a photorealistic mixed reality headset. The headset has forward facing cameras, a time of flight module and two internal Bluetooth modules, with integral antennas, operating at 2.4 GHz. The headset is a class III construction, powered by 12 V DC from two pre-approved power supplies. The power supplies power two adapter units which in turn interface with a control PC and the headset via USB.		
Antenna	Integral Manufacturer: PulseLarsen Antennas Type: W3008 featuring 2400-2483.5MHz.		
Transmission	Proprietary Digital Transmission System (DTS) Channelisation declared by manufacturer		
Modulation scheme	GFSK		
Number of antennas	Varjo headsets can connect two SteamVR supported controllers through integrated SteamVR radio sub-systems, using Steam proprietary protocol. One radio sub-system exists for each controller, thereby there are also two antennas in Varjo headsets		
Operating frequency band	2400MHz to 2483.5MHz		
No of units tested:	Three		
EUT power:	100 -240 V, 50 – 60 Hz mains supply		
Highest internal frequency:	2.480GHz		
Size of EUT (m)	Width: 200 mm	Depth: 290 mm	Height: 170 mm
Mode/s of operation	Continuous transmit of packetised data at top, middle and bottom channels. For spurious emissions testing, both antennas transmitted simultaneously at the same frequency. Channels used: 2402MHz, 2440MHz and 2480MHz		
Modifications incorporated during testing:	None		

Ports and Cables	Cable Length	Screened/ unscreened	Connected to
USB-C to Focus adapter	4m	unscreened	Focus adapter
USB-C to CNTXT adapter	4m	unscreened	CNTXT adapter
Focus USB-A	1m	unscreened	PC
CNTXT USB-A	1m	unscreened	PC
Focus display cable	1m	unscreened	PC
CNTXT display cable	1m	unscreened	PC

3.2 EUT Photographs

Photographs are supplied separately.

3.3 Configuration of EUT

The apparatus was supplied in one single possible configuration.

3.4 EUT Monitoring/Auxiliary Equipment

None.

3.5 Monitoring Software

None. The channel required was selected via software prior to the testing.

Section 4Test Specifications

For USA:

Regulation / Test Standard	Regulation: Title 47 of the Code of Federal Regulations (CFR) Part 15 (47CFR15) Subpart C – Intentional Radiators Measurement standard: ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

Requirement	FCC Rule Part	Comments	Result Summary
6 dB Bandwidth	FCC § 15.247(a)(2)	Applies	Pass
Maximum peak conducted power	FCC § 15.247(b)(3)	Applies	Pass
Power spectral density	FCC § 15.247(e)	Applies	Pass
AC power line conducted emissions	FCC § 15.207	Applies	Pass
Band edge compliance	FCC § 15.247(d)	Applies	Pass
Conducted spurious emissions	FCC § 15.247(d)	Applies	Pass
Transmitter radiated spurious emissions	FCC § 15.247(d) FCC § 15.209	Applies	Pass

For Canada

Regulation / Test Standard	RSS-247 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices Issue 2 February 2017 And, RSS-Gen — General Requirements for Compliance of Radio Apparatus Issue 5 April 2018 +A1 March 2019 +A2 February 2021

Requirement	ISED Ragulation	Comments	Results Summary
Occupied Bandwidth	RSS-Gen 6.6	Applies	Pass
6 dB Bandwidth	ISED RSS-247 § 5.2	Applies	Pass
Maximum peak conducted power	ISED RSS-247 § 5.4	Applies	Pass
Power spectral density	ISED RSS-247 § 5.2	Applies	Pass
AC power line conducted emissions	ISED RSS-247 § 3.1	Applies	Pass
Band edge compliance	ISED RSS-247 § 3.3 and 5.5 RSS-GEN Issue 5 Section 8.10	Applies	Pass
Conducted spurious emissions	ISED RSS-247 § 5.5	Applies	Pass
Transmitter radiated spurious emissions	ISED RSS-GEN § 8.9	Applies	Pass
Receiver radiated spurious emissions	ISED RSS-247 § 3.1	Applies	Pass

4.1 Knowledge Database References

The following KDBs were referenced during the testing.
The latest knowledge database references are available via the FCC KDB website at:

https://apps.fcc.gov/kdb

4.1.1 Radiated Emissions (30MHz to 1000MHz)

Publication Number	Keyword	Publication Date
913591	Measurement of radiated emissions at the band-edge for a Part 15 RF Device	04/05/2017

4.1.2 Radiated Emissions (1GHz to 40GHz)

Publication Number	Keyword	Publication Date
704992	Test Site Validation Requirements above 1 GHz.	12/06/2015
149045	Comparison Noise Emitter (CNE), reference noise source, .pdf	05/04/2007
913591	Measurement of radiated emissions at the band-edge for a Part 15 RF Device	04/05/2017
934285	Comparison Noise Emitters (CNE), test equipment, Broadband.pdf	05/04/2007

4.2 Compliance Statement

The Varjo XR-3 Headset, as tested, was shown to meet requirements of the standards listed in Section 4 of this report.

Section 5 Spurious Emission Results – Radiated and Conducted

5.1 Test Specification

FCC Rule Part	47CFR 15.247 (d)
Standard	ANSI C63.10:2013
Measurement Uncertainty Radiated tests	The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95% is +/- 5.85dB for the frequency range 30MHz to 1GHz +/- 4.64dB for the frequency range from 1GHz to 6GHz +/- 4.96dB for the frequency range from 6GHz to 18GHz
Measurement Uncertainty Conducted tests	±1.4dB

5.2 Procedure and Test Software Version

Radiated tests:- 47CFR15.205 and 47CFR15.209

Eurofins York test procedure (30MHz to 1GHz)	CEP23b Issue 8
Eurofins York test procedure (1GHz to 40GHz)	CEP64b Issue 8
Test software	RadiMation Version 2016.2.8

Conducted Tests 47CFR 15.247(d)

ANSi C63.10-2013 Clause reference:	11.11.2 and 11.11.3
Test software	Keysight Connection Expert

5.3 Radiated Emissions (30MHz to 1GHz)

Radiated electric field emission measurements are applied as defined in 47CFR15.205 and 47CFR15.209.

5.3.1 Limits at 3m

Frequency (MHz)	Limit (dBµV/m)
	Quasi Peak
30 - 88	40.0
88 -216	43.5
216 - 960	46.0
960- 1000	54.0

Note: FCC 47 CFR Part 15 Section 15.209 and 15.205 specifies test limits at 3m

Receiver Settings

Receiver Parameters	Setting
Detector Function	Quasi Peak
Start Frequency	30MHz
Stop Frequency	1000MHz
Resolution Bandwidth	120kHz
Video Bandwidth	Auto

5.3.2 Emissions measurements

5.3.3 Date of Test

29th January 2021

5.3.4 Test Area

LAB 1 (SAC)

5.3.5 Tested by

M Render

5.3.6 Test Setup

The EUT was configured in the SAC on an 80cm high polystyrene table.

The measurement was performed with an antenna to EUT separation distance of 3m. The results were maximised in orientation 0-360 degrees and height 1-4m.

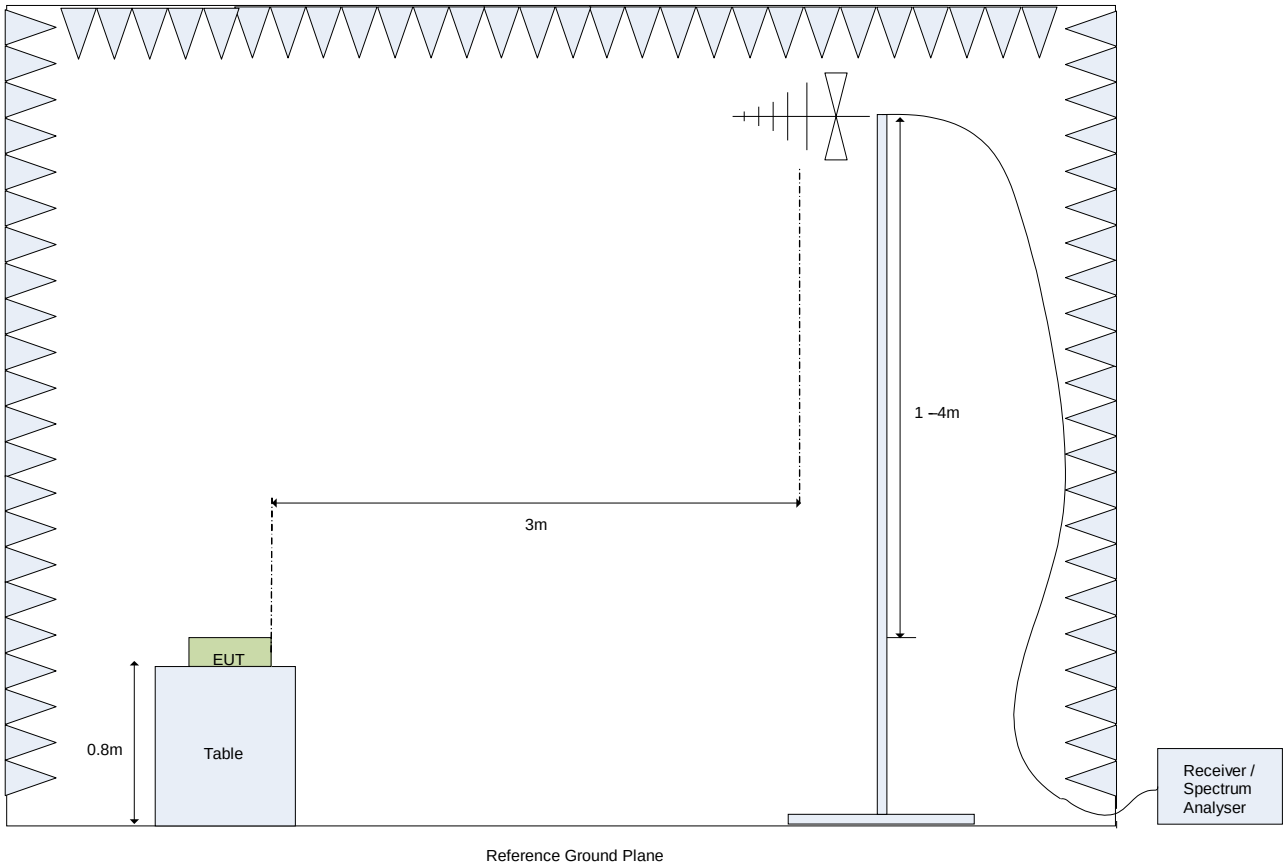


Figure 5.3.6.1: Test Setup for E-Field Measurements from 30MHz to 1GHz

Note 1 : With the EUT de-energized the ambient radio noise and signals met the 6dB peak detection requirement of ANSI C63.10-2013.

Note 2 : There were no significant environmental temperature changes during the test duration and hence it was not considered necessary to consider any variation in cable loss.

Operating Mode During testing

During spurious emission testing both antennas were set to transmit at the same frequency on the following channels: 2402MHz, 2440MHz and 2480MHz

5.3.7 Electric field emissions, 30MHz to 1GHz

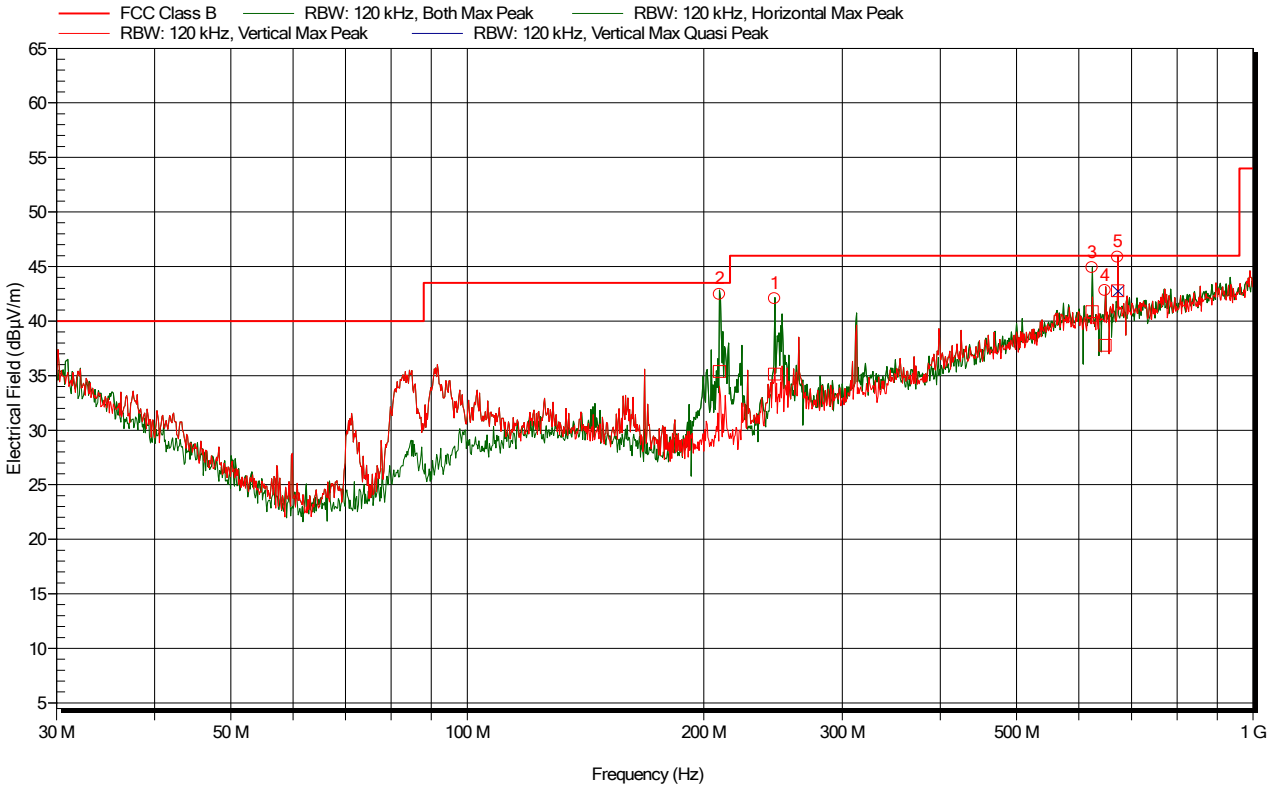


Figure 5.3.7.1: Electric field emissions Plot, 30MHz to 1GHz, 2402MHz Operation

Frequency	Quasi-Peak	Quasi Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height	Polarization
MHz	dBµV/m	dBµV/m	dB		degrees	m	
209.307	35.4	43.5	-8.13	Pass	0	1.5	Horizontal
246.040	35.1	46	-10.85	Pass	0	1.5	Horizontal
624.000	40.9	46	-5.14	Pass	270	1.5	Horizontal
648.021	37.8	46	-8.22	Pass	180	1.5	Horizontal
671.994	42.8	46	-3.21	Pass	0	1.5	Vertical

Electric Field Emissions Peaks, 30MHz to 1GHz. 2402MHz Operation

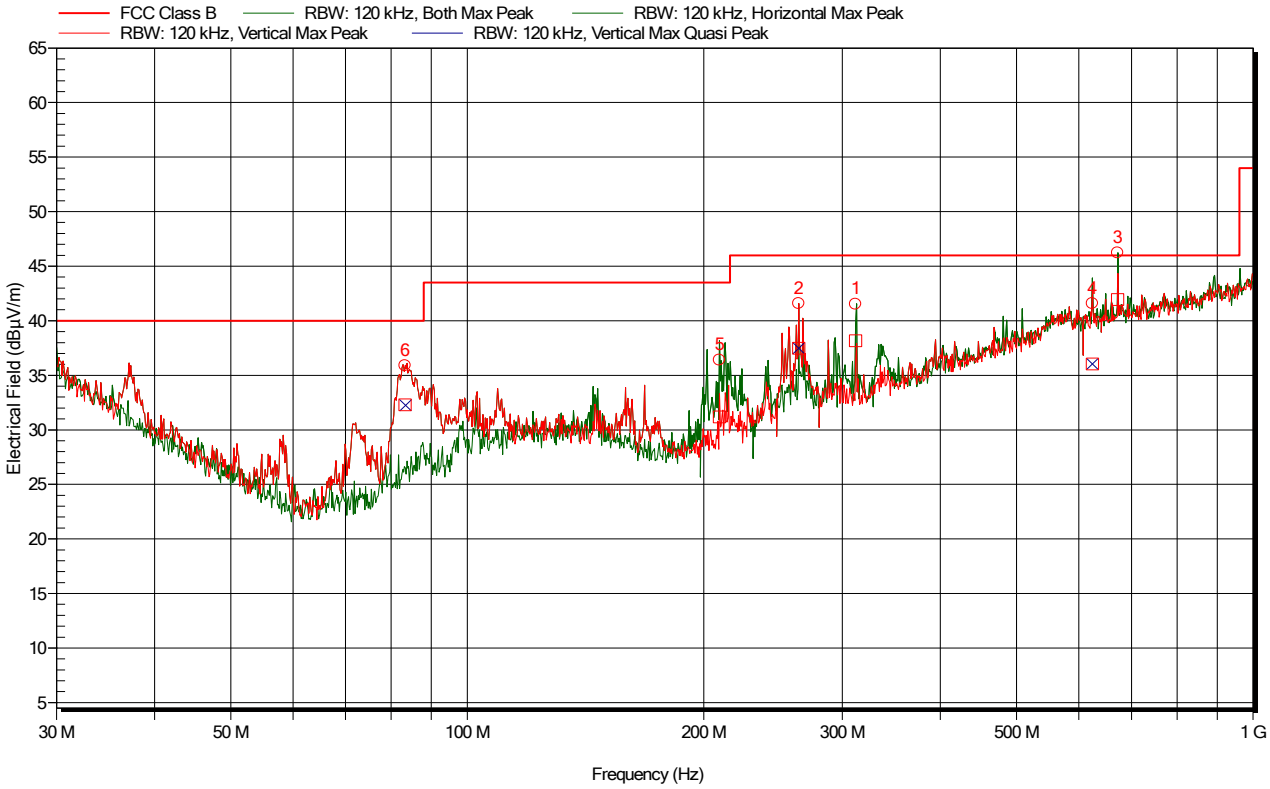


Figure 3: Electric field emissions Plot, 30MHz to 1GHz, Operation on 2440MHz

Frequency	Quasi-Peak	Quasi Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height	Polarization
MHz	dBµV/m	dBµV/m	dB		degrees	m	
83.312	32.3	40	-7.71	Pass	0	1.5	Vertical
209.346	31.2	43.5	-12.31	Pass	90	1.5	Horizontal
263.981	37.5	46	-8.53	Pass	90	1.5	Vertical
311.999	38.2	46	-7.85	Pass	180	1.5	Horizontal
624.017	36	46	-9.96	Pass	360	1.5	Vertical
671.994	42	46	-4.05	Pass	270	1.5	Horizontal

Electric Field Emissions Peaks, 30MHz to 1GHz. 2440MHz Operation

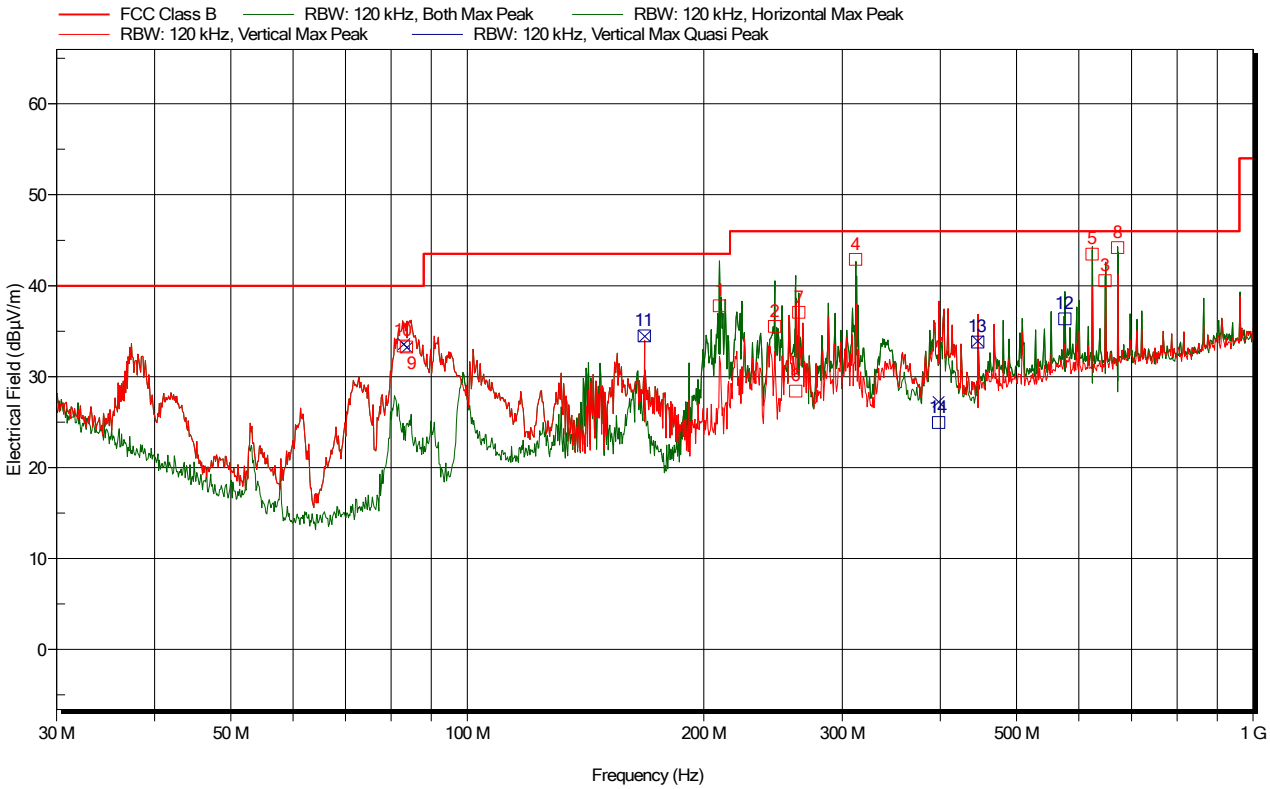


Figure 4: Electric field emissions Plot, 30MHz to 1GHz Operation on 2480MHz

Frequency	Quasi-Peak	Quasi Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height	Polarization
MHz	dBµV/m	dBµV/m	dB		degrees	m	
82.920	33.4	40	-6.6	Pass	35	1.1	Vertical
83.640	33.2	40	-6.8	Pass	50	1.2	Vertical
209.298	37.8	43.5	-5.7	Pass	320	1.4	Horizontal
209.298	37.8	43.5	-5.7	Pass	320	1.4	Horizontal
245.946	35.5	46	-10.5	Pass	335	1	Horizontal
261.618	28.4	46	-17.6	Pass	305	1.2	Horizontal
264.006	37.1	46	-8.9	Pass	300	1.1	Horizontal
624.000	43.5	46	-2.5	Pass	290	1.5	Horizontal
648.000	40.6	46	-5.4	Pass	315	1.4	Horizontal
672.000	44.2	46	-1.8	Pass	300	1.3	Horizontal

Electric Field Emissions Peaks, 30MHz to 1GHz Operation on 2480MHz.

5.3.8 Example field strength calculation

Field strength (FS) is calculated as follows:

FS (dBµV/m) = Indicated Signal Level (dBµV) + AF (dB/m) + CL (dB)

5.3.9 Sample Data

From Figure 2, table 1, the Quasi-Peak level at MHz is calculated as follows:

FS (dBµV/m) = 16.4(dBµV) + 24.6(dB/m) + 2.5 (dB) = 43.5 dBµV/m

5.4 Radiated Emissions (1GHz to 18GHz)

5.4.1 Limits

Frequency (GHz)	Limit (dBµV/m)	Limit (dBµV/m)
	Peak	Average
1-18	74.0	54.0

5.4.2 Receiver Settings

Receiver Parameters	Setting
Detector Function	Average and Peak
Start Frequency	1GHz
Stop Frequency	18GHz
Resolution Bandwidth	1MHz
Video Bandwidth	Auto

5.4.3 Emissions measurements

5.4.4 Date of Test

11th February 2021

5.4.5 Test Area

LAB 1 (SAC)

5.4.6 Tested by

M Render

5.4.7 Test Setup

The EUT was configured in the SAC on an 80cm high table Exploratory measurements on the EUT were carried out to identify suspect frequencies and worst case orientations, see Section 5.4.8.

The measurement was then performed with an antenna to EUT separation distance of 3m.

The antenna was kept in the “cone of radiation” from the EUT and pointed at the area both in azimuth and elevation using the tilt mechanism on the antenna mast.

The results were maximised in orientation 0-360 degrees and height 1-4m.

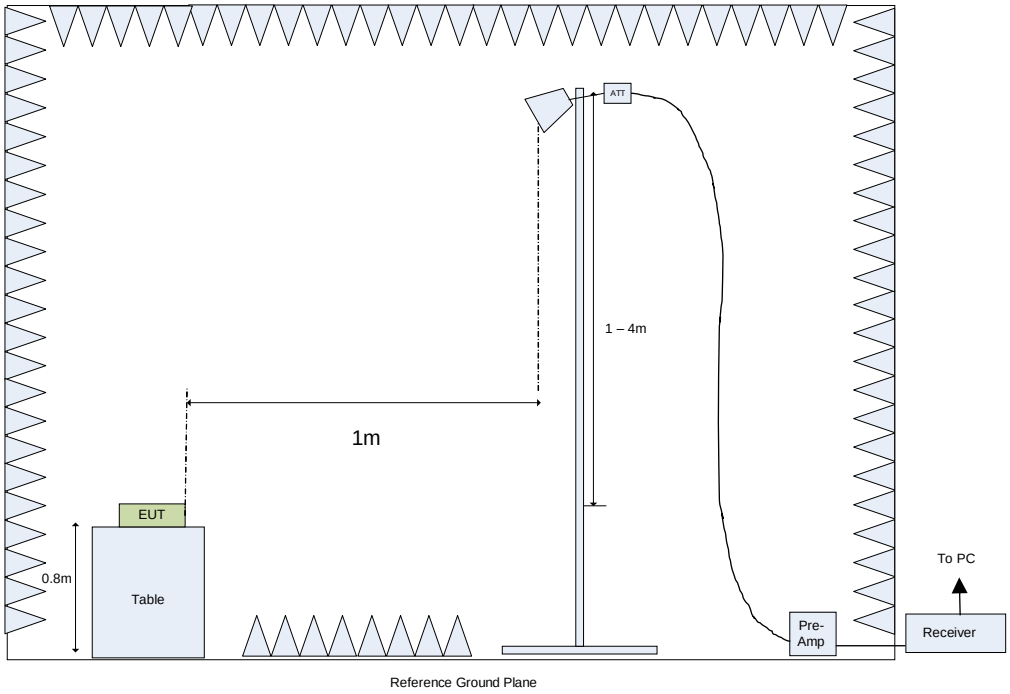


Figure 5.4.7.1: Test Setup for Final E-Field Measurements from 1GHz to 18GHz

Note 1 : With the EUT de-energized the ambient radio noise and signals met the 6dB peak detection requirement of ANSI C63.4-2010.

Note 2 : There were no significant environmental temperature changes during the test duration and hence it was not considered necessary to consider any variation in cable loss.

5.4.8 Exploratory Radiated Emission Maximization

During exploratory testing, suspect emissions from the EUT were identified both in terms of the frequency and directionality. This was achieved by manually positioning the antenna close to the EUT and also by scanning it over all sides of the EUT whilst observing a spectral display. The typical distance between the surface of the EUT and the scanning antenna was circa 30cm.

Frequency (GHz)	Mode of operation	EUT face *	Emissions Angle (w.r.t. turntable)	Height	Polarization
None	Transmitting on channel 2402MHz	-	-	-	-
None	Transmitting on channel 2440MHz	-	-	-	-
None	Transmitting on channel 2480MHz	-	-	-	-

Frequencies identified during Exploratory Radiated Emission maximization

Note 1 : The front face of the EUT is deemed to be 0°, which is then turned in a clockwise direction through 360°.

5.4.9 Electric field emissions, 1GHz to 18GHz

The equipment under test was pre-scanned using peak detection when operating on all three channels. Final measurements were performed with the equipment under test operating on channel 2

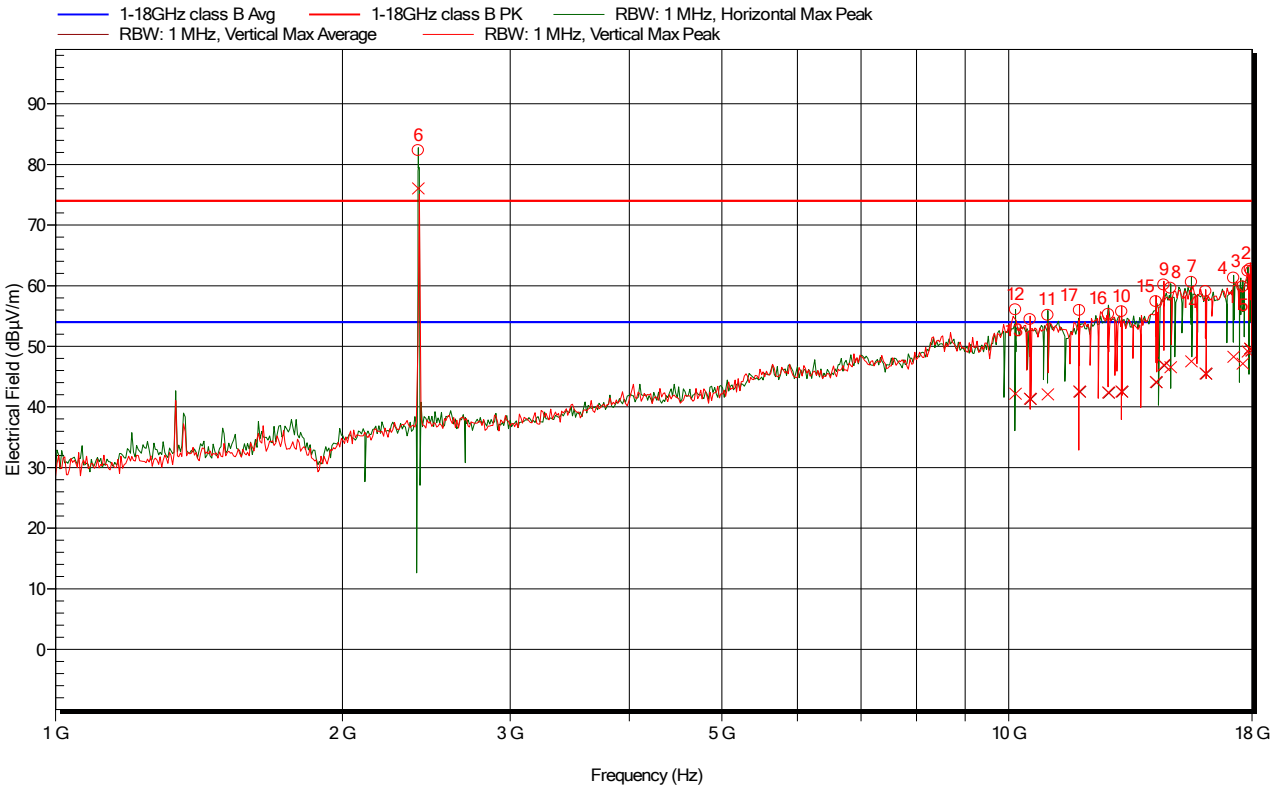


Figure 6: Electric field emissions Plot, 1GHz to 18GHz. Operation on 2402MHz

Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height	Polarization
GHz	dBµV/m	dBµV/m	dB		degrees	m	
10.165	42.18	54	-11.82	Pass	150	3.9	Horizontal
10.53	41.37	54	-12.63	Pass	140	2.4	Vertical
11.859	42.54	54	-11.46	Pass	195	3.4	Vertical
12.719	42.38	54	-11.62	Pass	135	2.7	Vertical
14.273	44.11	54	-9.89	Pass	195	2.1	Vertical
14.547	46.91	54	-7.09	Pass	105	2.4	Vertical
14.790	46.52	54	-7.48	Pass	265	1.6	Horizontal
15.539	47.5	54	-6.50	Pass	140	3.6	Horizontal
16.084	45.5	54	-8.50	Pass	160	1.9	Vertical
17.206	48.25	54	-5.75	Pass	275	2.7	Horizontal
17.811	49.15	54	-4.85	Pass	205	3.7	Horizontal
17.914	49.63	54	-4.37	Pass	265	3.6	Vertical
17.981	49.31	54	-4.69	Pass	175	2.7	Vertical

Table 5: Electric Field Emissions Peaks, 1GHz to 18GHz – Operation on 2402MHz

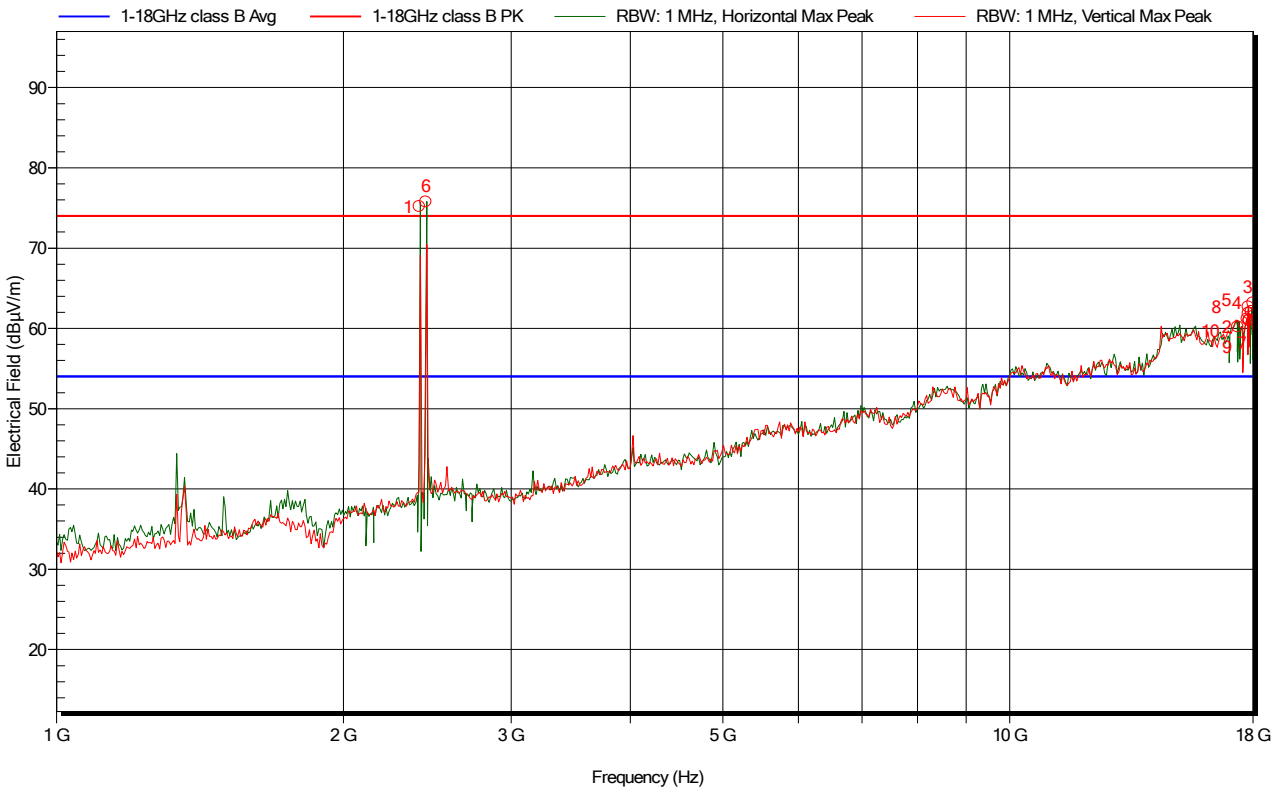


Figure 7: Electric field emissions Plot, 1GHz to 18GHz, Operation on 2440MHz - Peak detector scan

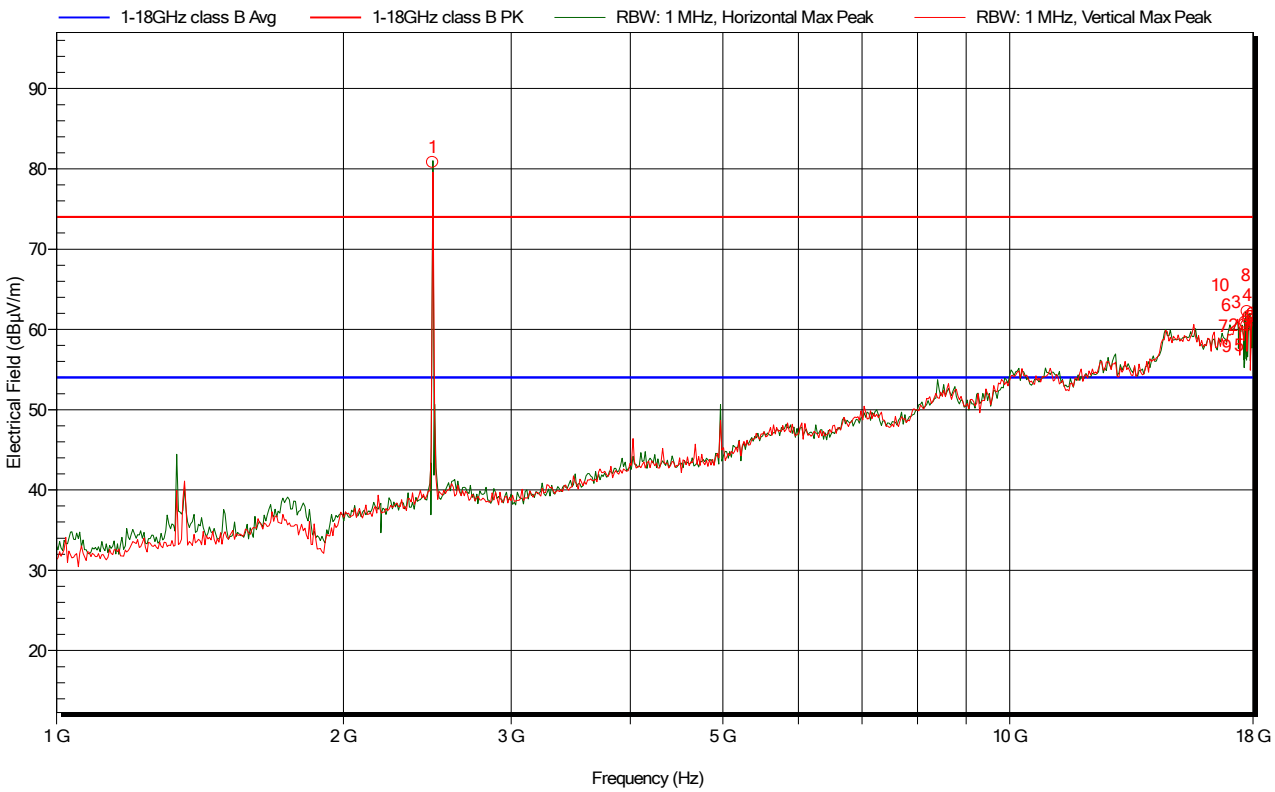


Figure 8: Electric field emissions Plot, 1GHz to 18GHz, Operation on 2480MHz – Peak detector scan

5.4.10 Example field strength calculation

The total average corrections are shown in the above table. This correction figure consists of Preamplifier gain (PG), Antenna factor (AF); Attenuator loss (AL) and Cable loss (CL).

Field strength (FS) is calculated as follows:

FS (dBµV/m) = Indicated Signal Level (dBµV) - PG (dB) + AF (dB) + AL (dB) + CL (dB)

5.4.11 Sample Data

From Figure 5 and table 5, The Average level at 3.6121GHz is calculated as follows:

FS (dBµV/m) = = 39.85(dBµV) -51.48(dB) +41.45(dB/m) +12.36 (dB) = 42.18BµV/m

5.5 Radiated Emissions (18GHz to 26GHz)

5.5.1 Limits

Frequency (GHz)	Limit (dBµV/m)	Limit (dBµV/m)
	Peak	Average
18-26	74.0	54.0

5.5.2 Receiver Settings

Receiver Parameters	Setting
Detector Function	Average and Peak
Start Frequency	1GHz
Stop Frequency	18GHz
Resolution Bandwidth	1MHz
Video Bandwidth	Auto

5.5.3 Emissions measurements

5.5.4 Date of Test

12th February 2021

5.5.5 Test Area

LAB 1 (SAC)

5.5.6 Tested by

M Render

5.5.7 Test Setup

This is the same as for the 1-18GHz range for final measurements, except with a measurement distance of 1m.

5.5.8 Exploratory Radiated Emission Maximization

During exploratory testing, suspect emissions from the EUT were identified both in terms of the frequency and directionality. This was achieved by manually positioning the antenna close to the EUT and also by scanning it over all sides of the EUT whilst observing a spectral display. The typical distance between the surface of the EUT and the scanning antenna was circa 30cm.

Frequency (GHz)	Mode of operation	EUT face *	Emissions Angle (w.r.t. turntable)	Height	Polarization
-	Tx on channels 2402MHz, 2440MHz and 2480MHz.	-	-	-	-

Table 4: Frequencies identified during Exploratory Radiated Emission maximization

Note 2 : The front face of the EUT is deemed to be 0°, which is then turned in a clockwise direction through 360°.

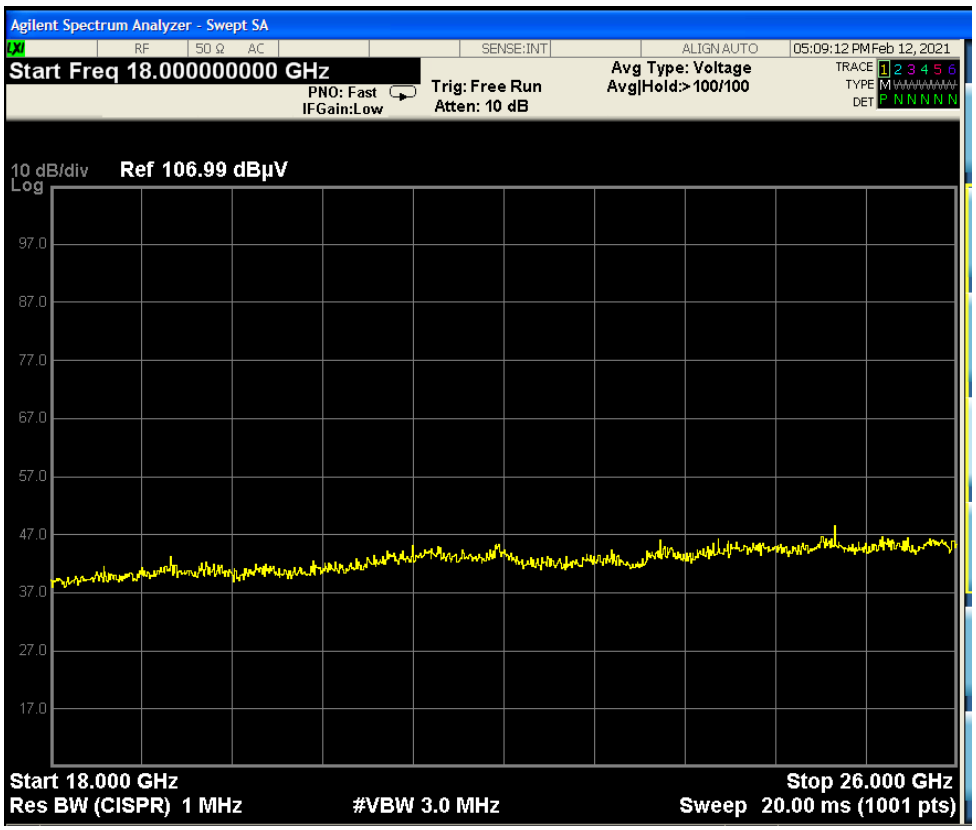


Figure 5.5.8.1 – manual investigation – Operating on channel 2402MHz

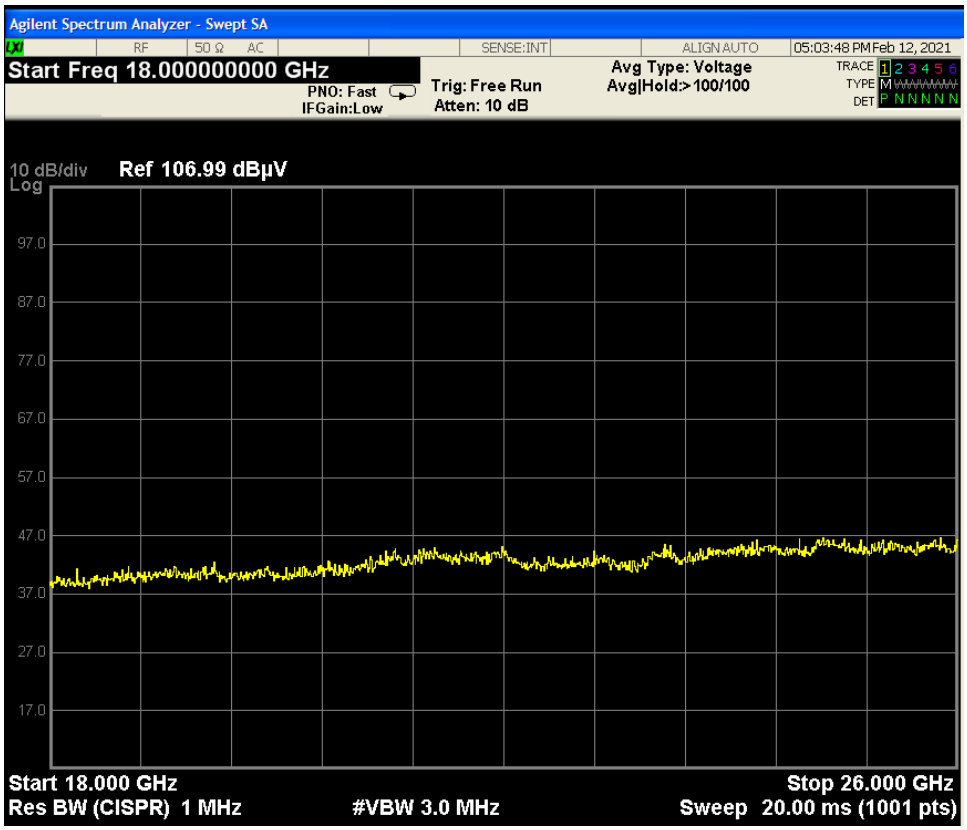


Figure 5.5.8.2 – manual investigation – Operating on channel 2440MHz

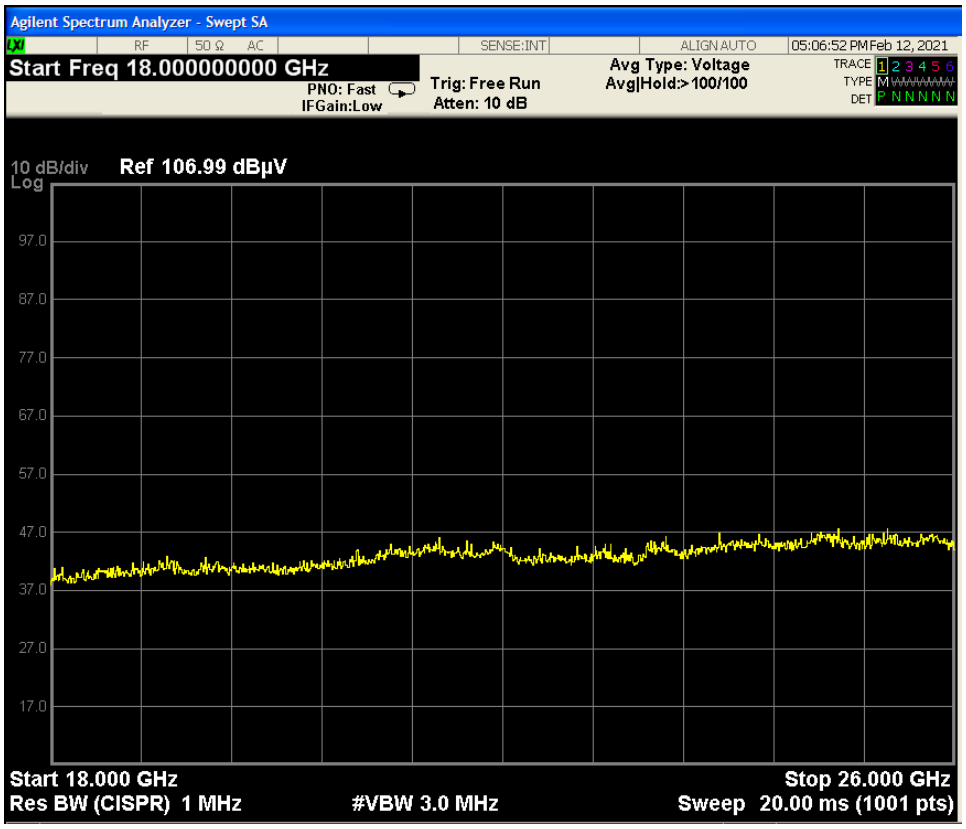


Figure 5.5.8.3 – manual investigation – Operating on channel 2480MHz

5.6 Conducted Spurious Emissions 30MHz to 26GHz

5.6.1 Limits

Frequency (MHz)	Limit, 47CFR 15.247(d)
	Peak
30 – 26000	-20dBc

Spectrum analyser settings as specified by ANSI C63.10-2013 Clause 11.11.2

Receiver Parameters	Setting
Detector Function	Peak
Start Frequency	30MHz
Stop Frequency	1000MHz
Start Frequency	1000MHz
Stop Frequency	26000MHz
Resolution Bandwidth	100kHz
Video Bandwidth	300kHz
Sweep rate	Auto couple
Trace mode	Max hold

5.6.2 Emissions measurements

5.6.3 Date of Test

28th January 2021

5.6.4 Test Area

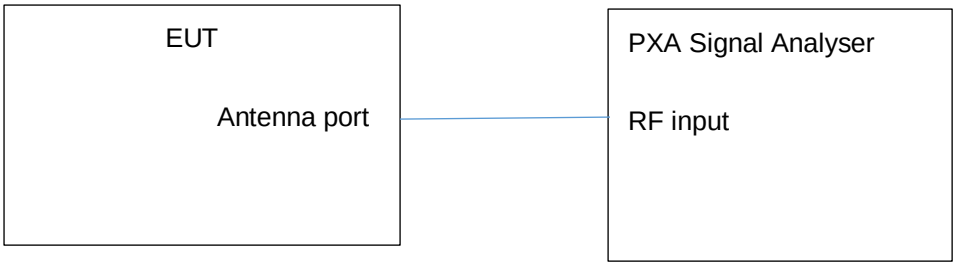
LAB 1

5.6.5 Tested by

M Render

5.6.6 Test Setup

The antenna port was connected directly to the signal analyser.

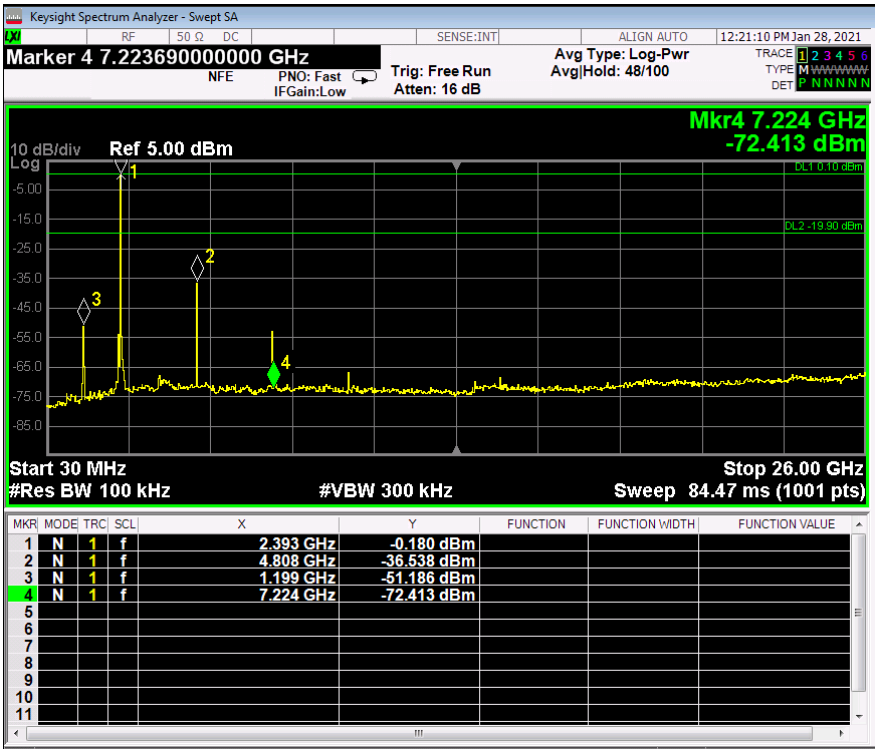


5.6.7 Test Results

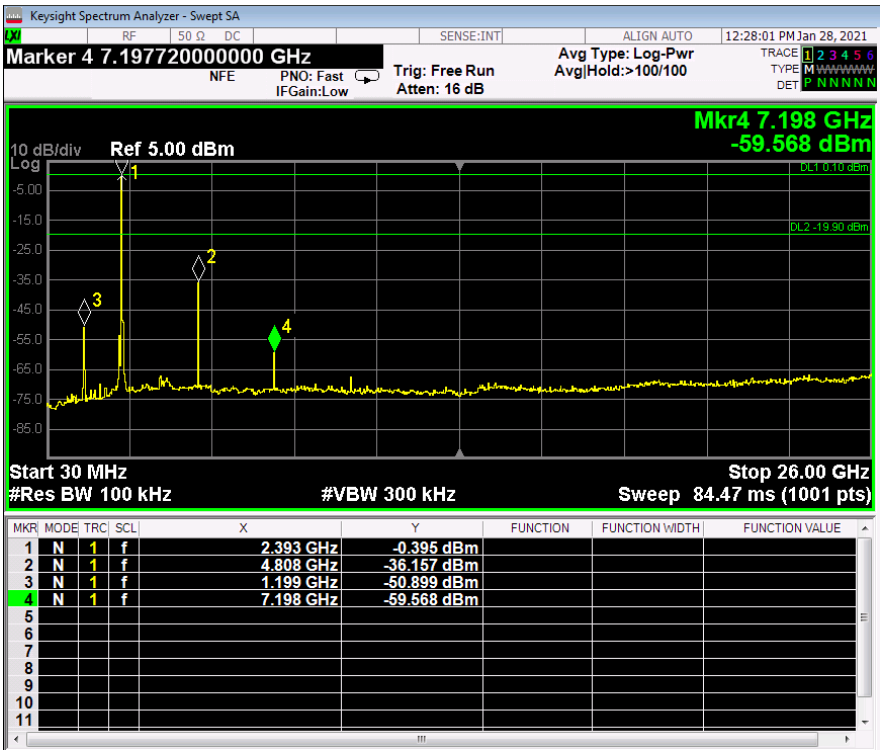
The results of the conducted spurious emissions are stated below and by the signal analyser images.

All disturbances detected were > 20dB below the carrier.

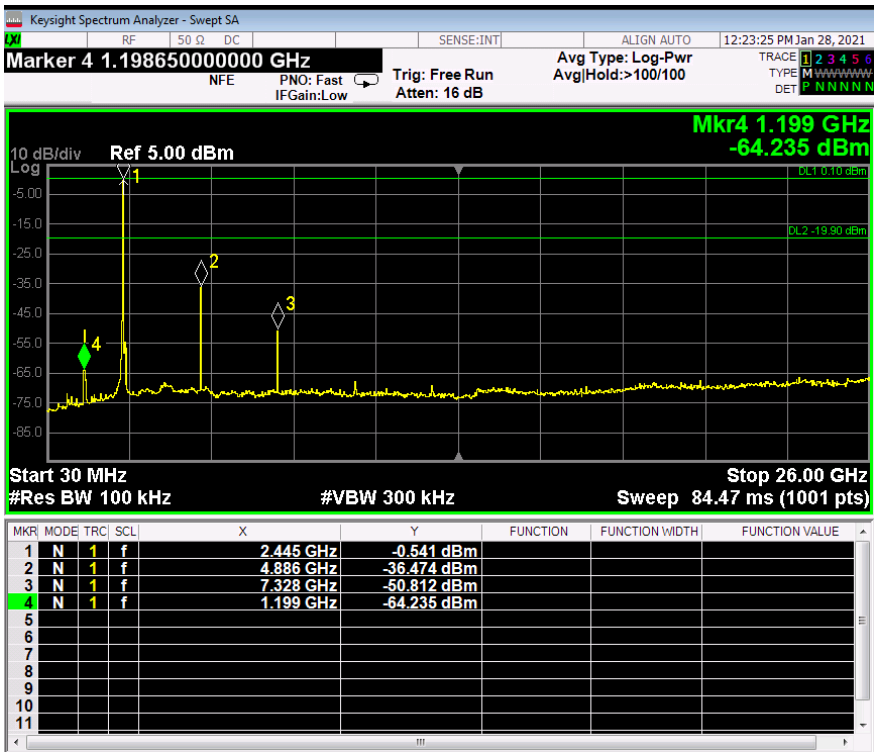
5.6.8 Antenna port conducted emissions 30MHz to 26GHz



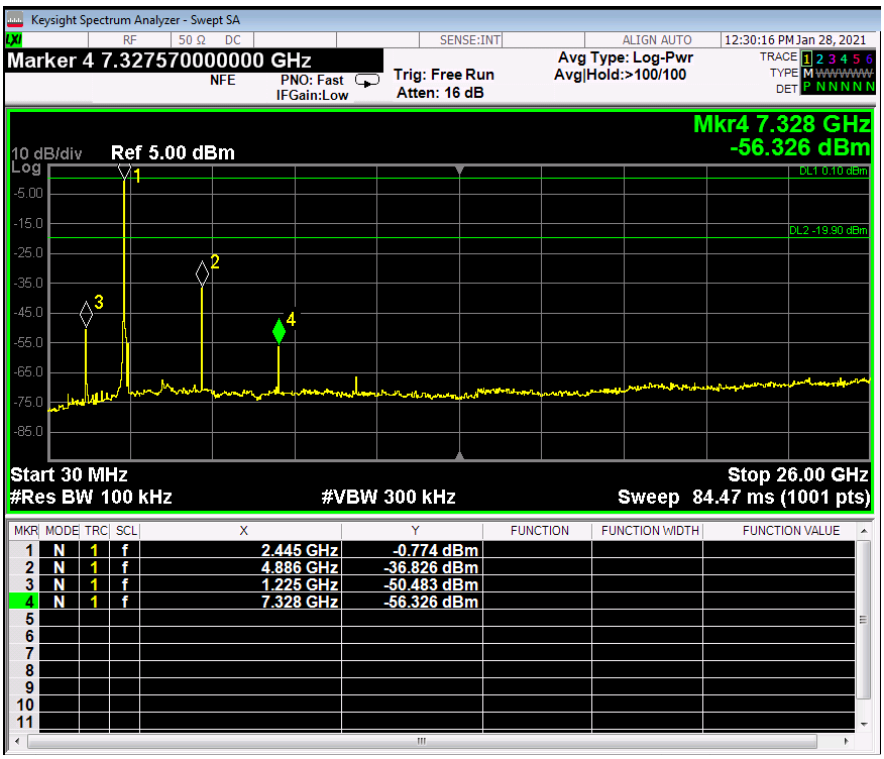
Conducted emissions 30MHz to 26GHz. Operation on channel 2402MHz. Antenna 1



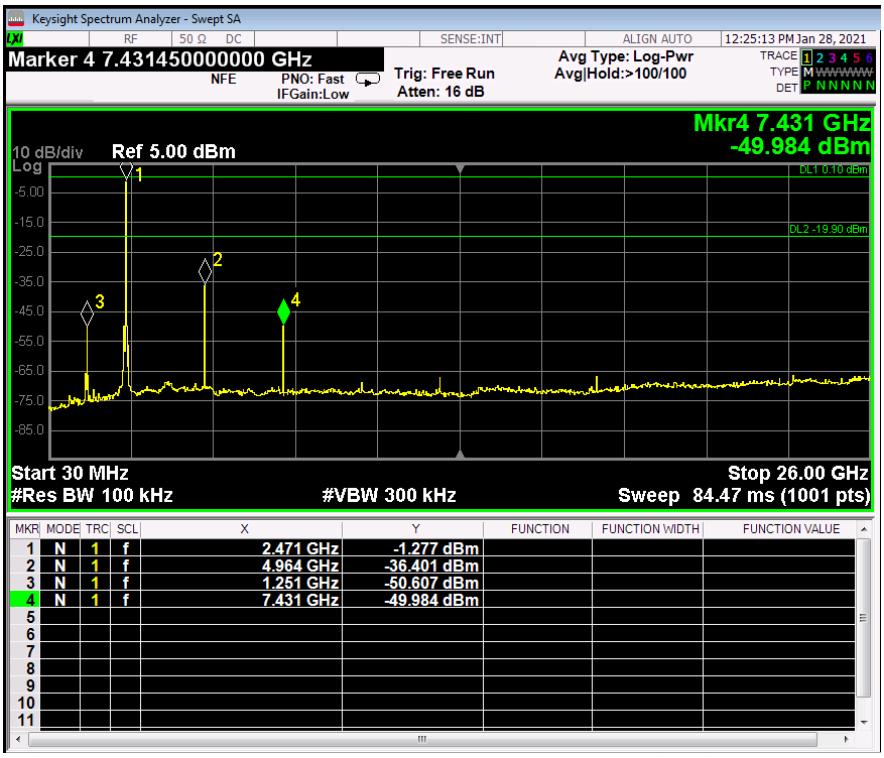
Conducted emissions 30MHz to 26GHz. Operation on channel 2402MHz. Antenna 2



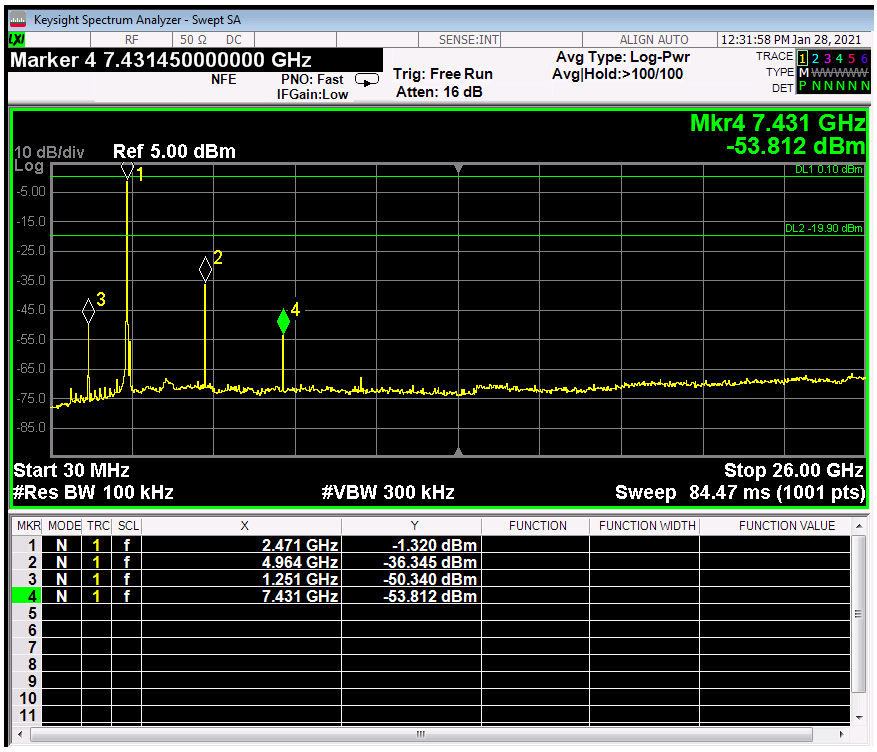
Conducted emissions 30MHz to 26GHz. Operation on channel 2440MHz. Antenna 1



Conducted emissions 30MHz to 26GHz. Operation on channel 2440MHz. Antenna 1



Conducted emissions 30MHz to 26GHz. Operation on channel 2480MHz. Antenna 1



Conducted emissions 30MHz to 26GHz. Operation on channel 2480MHz Antenna 2

Section 6 6dB Bandwidth and 99% Occupied Bandwidth

6.1 Test Specification

FCC Rule Part	46CFR 15.247 (b)(2)
Standard	ANSI C63.10:2013

6.2 Procedure and Test Software Version

Conducted Tests

ANSi C63.10-2013 Clause reference:	11.9.1.1 (RBW>DTS bandwidth)
Test software	Keysight Connection Expert

Frequency (MHz)	Limit, 47CFR 15.247(a)(2)
	Peak
2400MHz to 2483.5MHz	At least 500kHz

Spectrum analyser settings as specified by ANSI C63.10-2013 Clause 11.8.1

Receiver Parameters	Setting
Detector Function	Peak
Span	3 x RBW
Resolution Bandwidth	100kHz
Video Bandwidth	300kHz
Sweep rate	Auto couple
Trace mode	Max hold

6.2.1 Emissions measurements

6.2.2 Date of Test

27th January 2021

6.2.3 Test Area

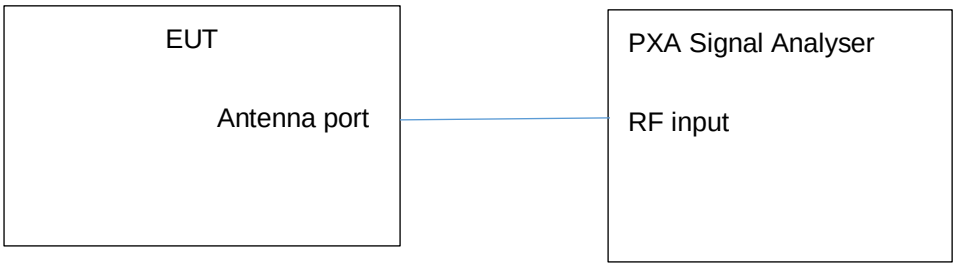
LAB 1

6.2.4 Tested by

M Render

6.2.5 Test Setup

The antenna port was connected directly to the signal analyser.



6.2.6 Test Results

The results of the 6dB bandwidth measurements are stated in the table below and by the signal analyser images.

Channel (MHz)	Antenna port	Measured 6dB bandwidth (kHz)	Minimum requirement (kHz)	Figure	Result
2402.0	1	810.3	500.0	6.2.6.1	Pass
2402.0	2	743.7	500.0	6.2.6.2	Pass
2440.0	1	762.2	500.0	6.2.6.3	Pass
2440.0	2	748.5	500.0	6.2.6.4	Pass
2480.0	1	762.4	500.0	6.2.6.5	Pass
2480.0	2	727.3	500.0	6.2.6.6	Pass

6dB Bandwidth Measurement

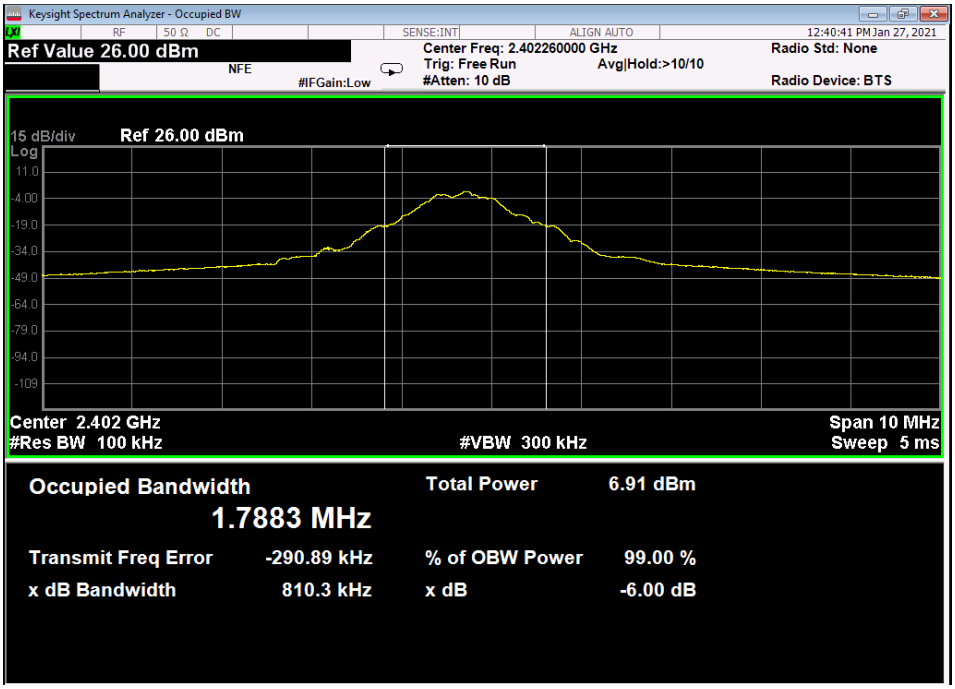


Figure 6.2.6.1 Bandwidth at 6dB Point. Operation on 2402MHz Port 1

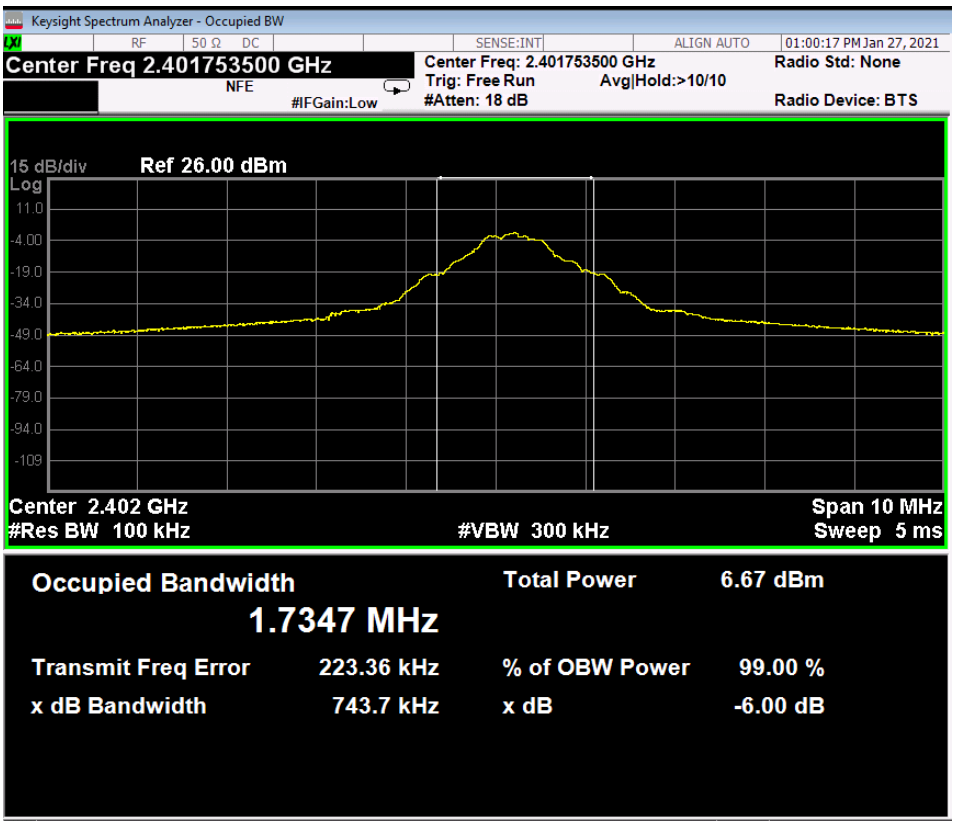


Figure 6.2.6.2 Bandwidth at 6dB Point. Operation on 2402MHz Port 2

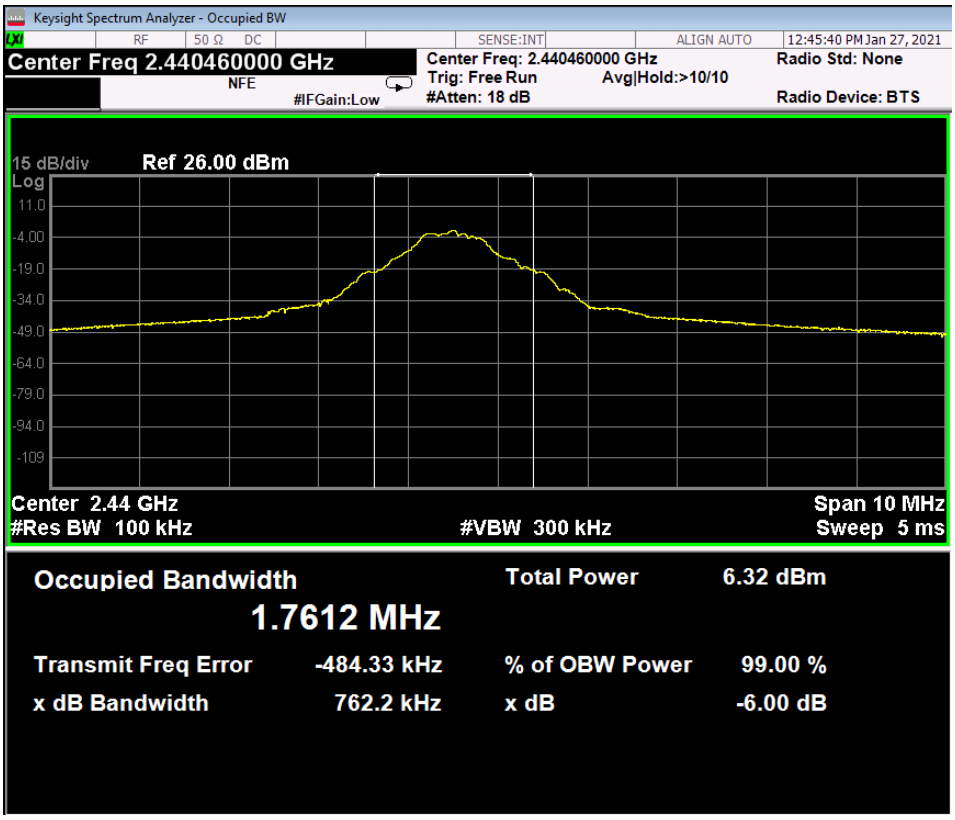


Figure 6.2.6.3 Bandwidth at 6dB Point. Operation on 2440MHz Port 1

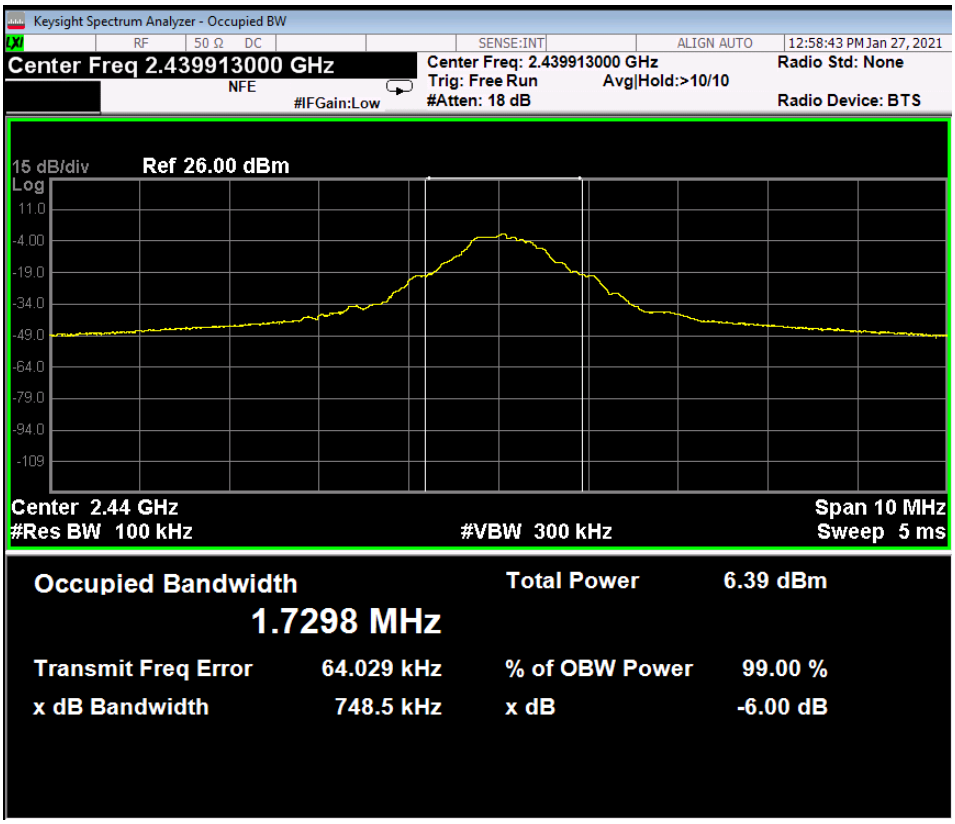


Figure 6.2.6.34Bandwidth at 6dB Point. Operation on 2440MHz Port 2

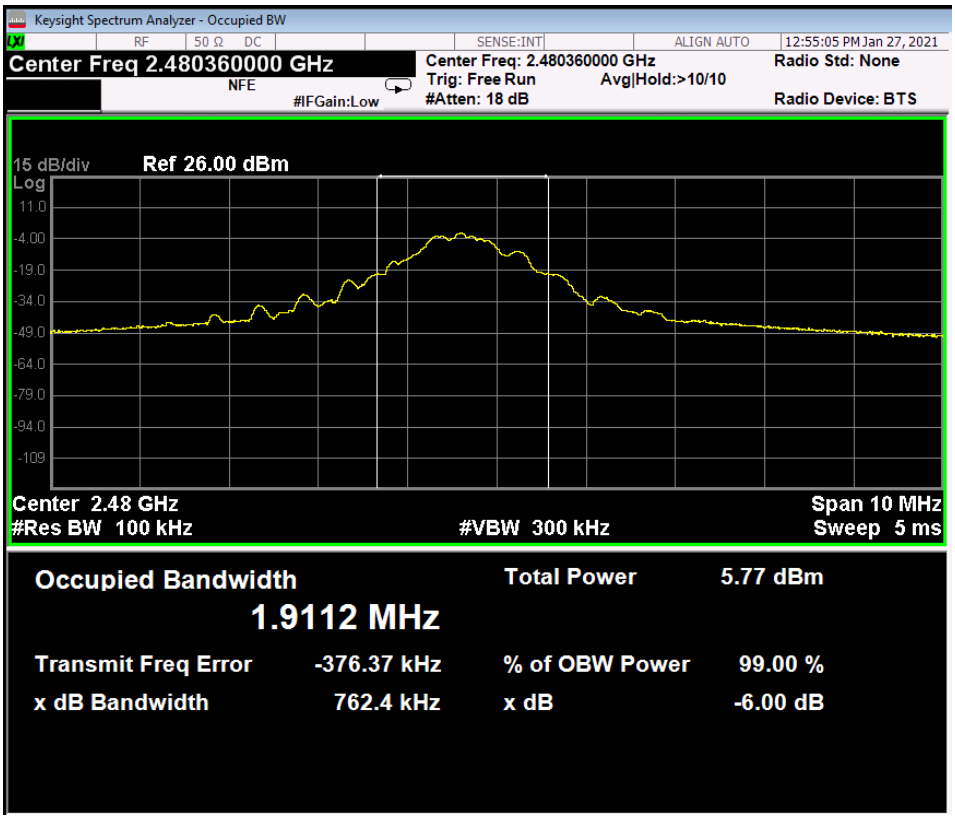


Figure 6.2.6.5 Bandwidth at 6dB Point. Operation on 2480MHz Port 1

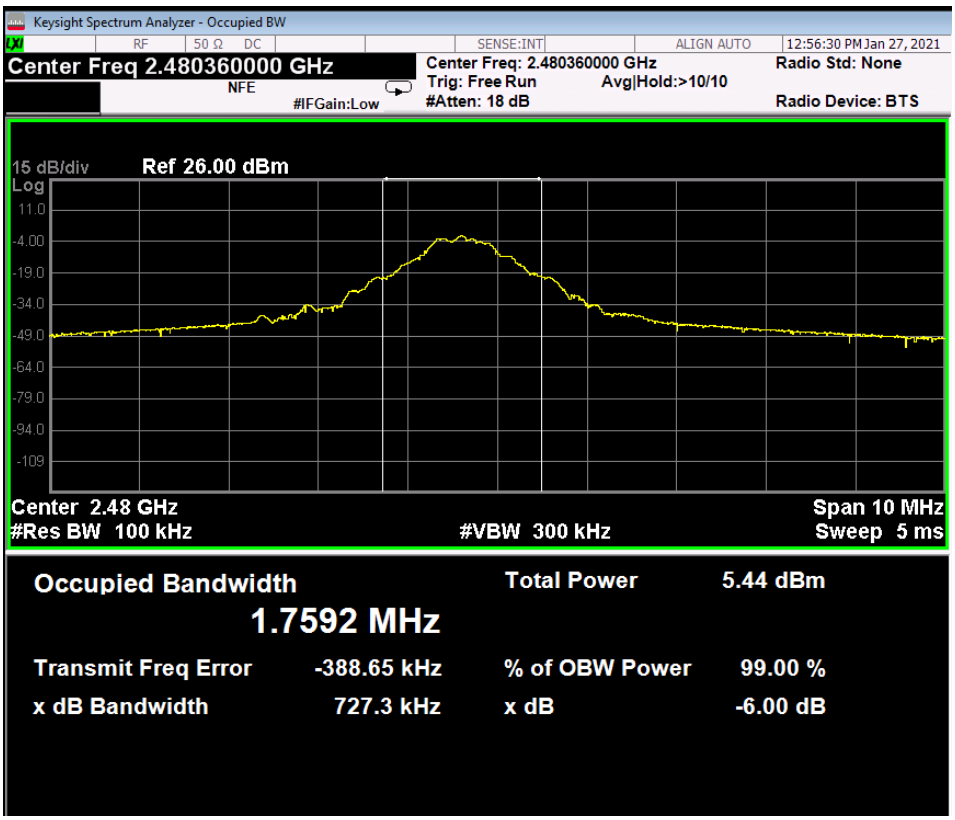


Figure 6.2.6.6 Bandwidth at 6dB Point. Operation on 2480MHz Port 2

Section 7 Peak Output Power

7.1 Test Specification

FCC Rule Part	46CFR 15.247 (b)(3)
Standard	ANSI C63.10:2013

7.2 Procedure and Test Software Version

Conducted Tests

ANSi C63.10-2013 Clause reference:	11.9.1.1 (RBS>DTS bandwidth)
Test software	Keysight Connection Expert

Frequency (MHz)	Limit, 47CFR 15.247(b)(2)
	Peak
2400MHz to 2483.5MHz	1 watt

Spectrum analyser settings as specified by ANSI C63.10-2013 Clause 11.11.2

Receiver Parameters	Setting
Detector Function	Peak
Span	3 x RBW
Resolution Bandwidth	1MHz (>DTS Bandwidth)
Video Bandwidth	3MHz
Sweep rate	Auto couple
Trace mode	Max hold

7.2.1 Emissions measurements

7.2.2 Date of Test

27th January 2021

7.2.3 Test Area

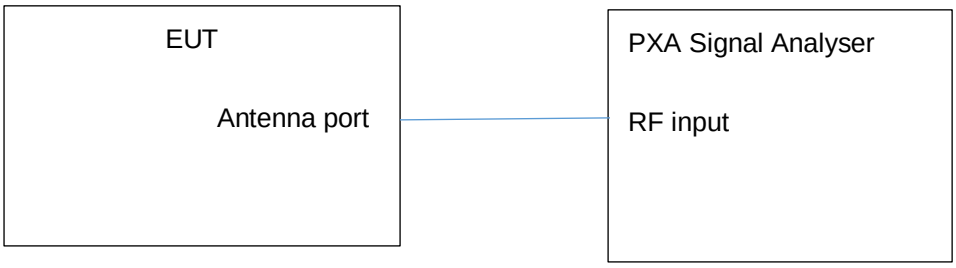
LAB 1

7.2.4 Tested by

M Render

7.2.5 Test Setup

The antenna port was connected directly to the signal analyser.



7.2.6 Test Result

The results of the peak output power measurements are stated in the table below and by the signal analyser images.

Channel (MHz)	Antenna 1 (dBm)	Antenna 2 (dBm)	Antenna 1 (Watts)	Antenna 2 (Watts)	Antenna 1+2 (Watts)	Limit (Watts)	Figure
2402	-0.187	-0.252	0.001	0.0009	0.0019	1	7.2.6.1 and 7.2.6.2
2440	-0.572	-0.705	0.0009	0.0009	0.0018	1	7.2.6.3 and 7.2.6.4
2480	-1.229	-1.282	0.0008	0.0007	0.0015	1	2.2.6.5 and 7.2.6.6

Peak Output Power Measurement

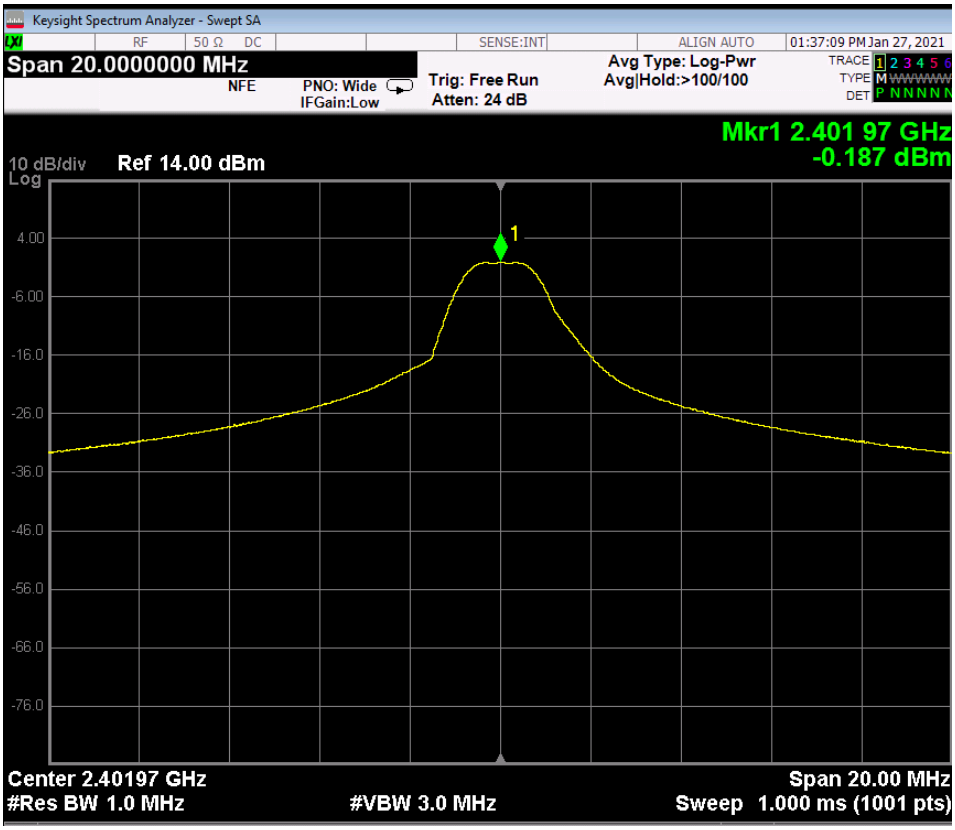


Figure 7.2.6.1 Peak output power, Operation on 2402MHz antenna 1

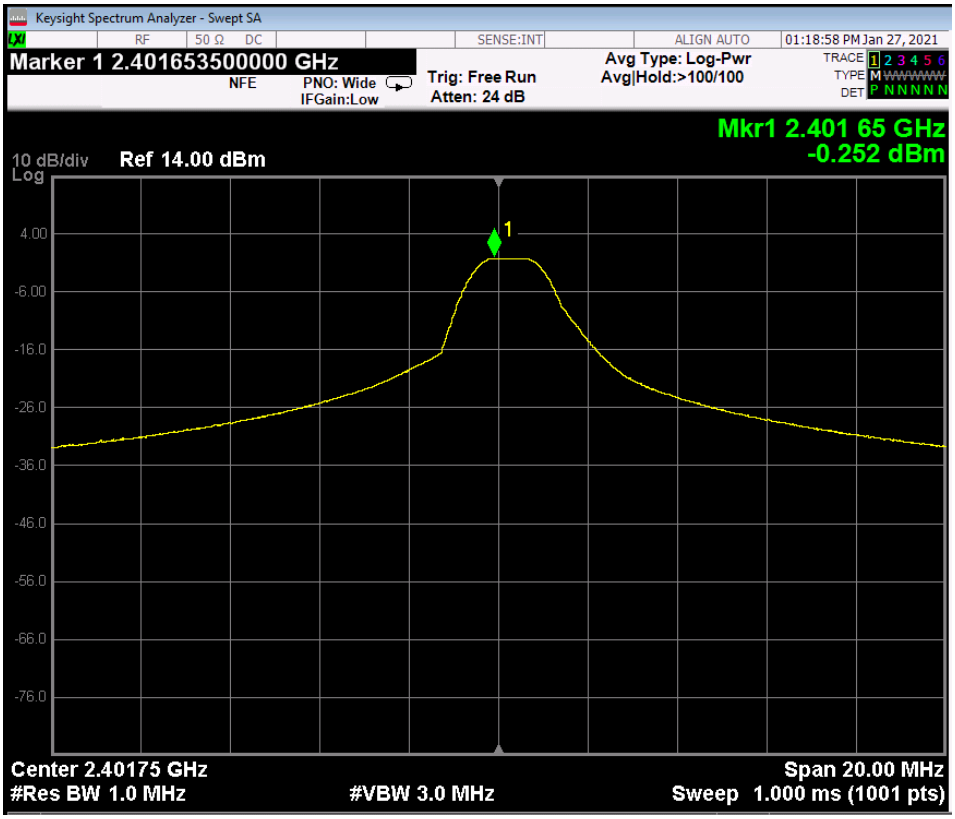


Figure 7.2.6.2 Peak output power, Operation on 2402MHz antenna 2

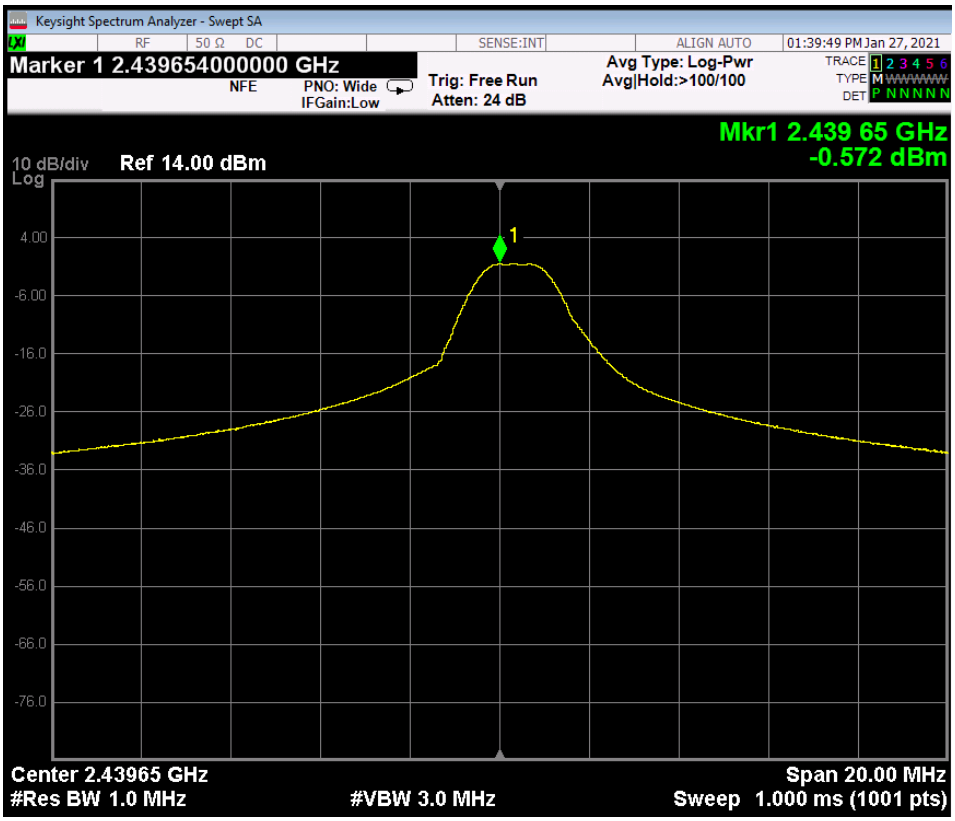


Figure 7.2.6.3 Peak output power, Operation on 2440MHz antenna 1

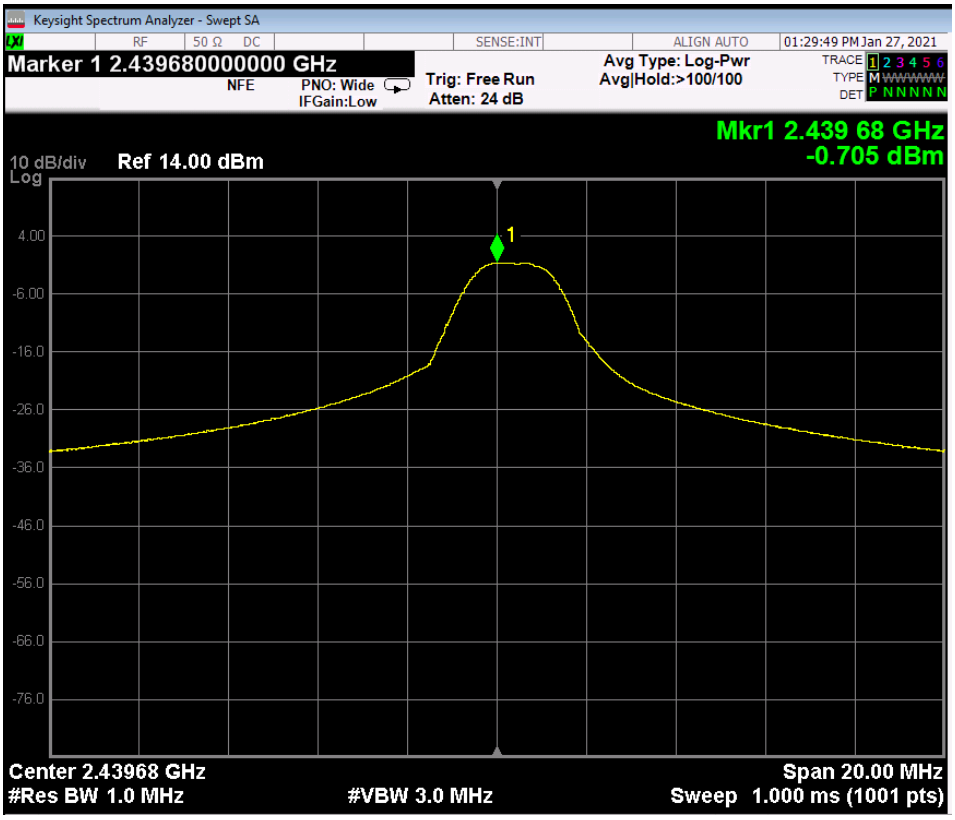


Figure 7.2.6.4 Peak output power, Operation on 2440MHz antenna 2

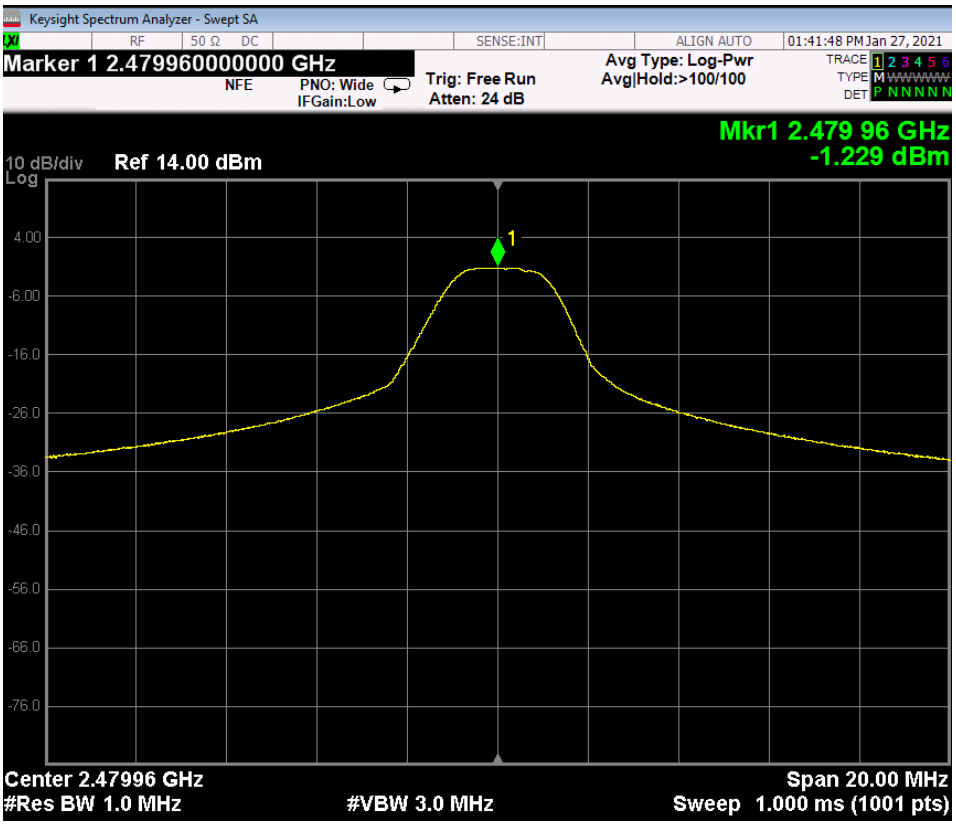


Figure 7.2.6.5 Peak output power, Operation on 2480MHz antenna 1

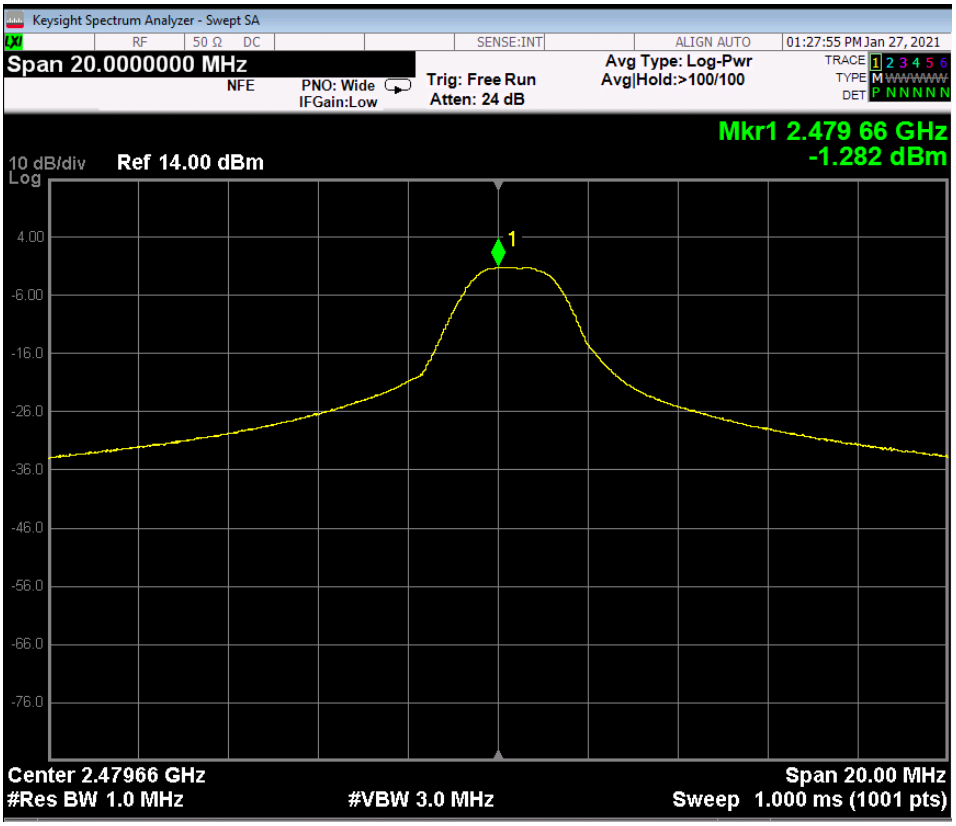


Figure 7.2.6.6 Peak output power, Operation on 2480MHz antenna 2

Section 8 Power Spectral Density

8.1 Test Specification

FCC Rule Part	46CFR 15.247 (e)
Standard	ANSI C63.10:2013

8.2 Procedure and Test Software Version

Conducted Tests

ANSi C63.10-2013 Clause reference:	Clause 11.10.2
Test software	Keysight Connection Expert

Frequency (MHz)	Limit, 47CFR 15.247(e)
	Peak
2400MHz to 2483.5MHz	<8dBm in any 3kHz band during any time interval of complete transmission

Spectrum analyser settings as specified by ANSI C63.10-2013 Clause 11.10.2

Receiver Parameters	Setting
Detector Function	Peak
Span	1.5xDTS bandwidth
Resolution Bandwidth	3kHz ≤RBW ≤100kHz
Video Bandwidth	3 x RBW
Sweep rate	Auto couple
Trace mode	Max hold

8.2.1 Emissions measurements

8.2.2 Date of Test

27th January 2021

8.2.3 Test Area

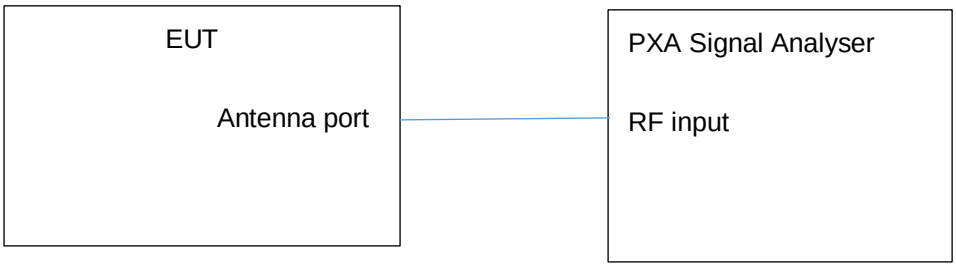
LAB 1

8.2.4 Tested by

M Render

8.2.5 Test Setup

The antenna port was connected directly to the signal analyser.



8.2.6 Test Results

Channel (MHz)	Antenna	Power in 3kHz RBW (dBm)	Limit (dBm)	Figure	Result
2402	1	-11.8	8.0	8.2.6.1	Pass
2402	2	-13.8	8.0	8.2.6.2	Pass
2440	1	-13.7	8.0	8.2.6.3	Pass
2440	2	-13.9	8.0	8.2.6.4	Pass
2480	1	-14.7	8.0	8.2.6.5	Pass
2480	2	-14.5	8.0	8.2.6.6	Pass

Peak Spectral Density Measurement

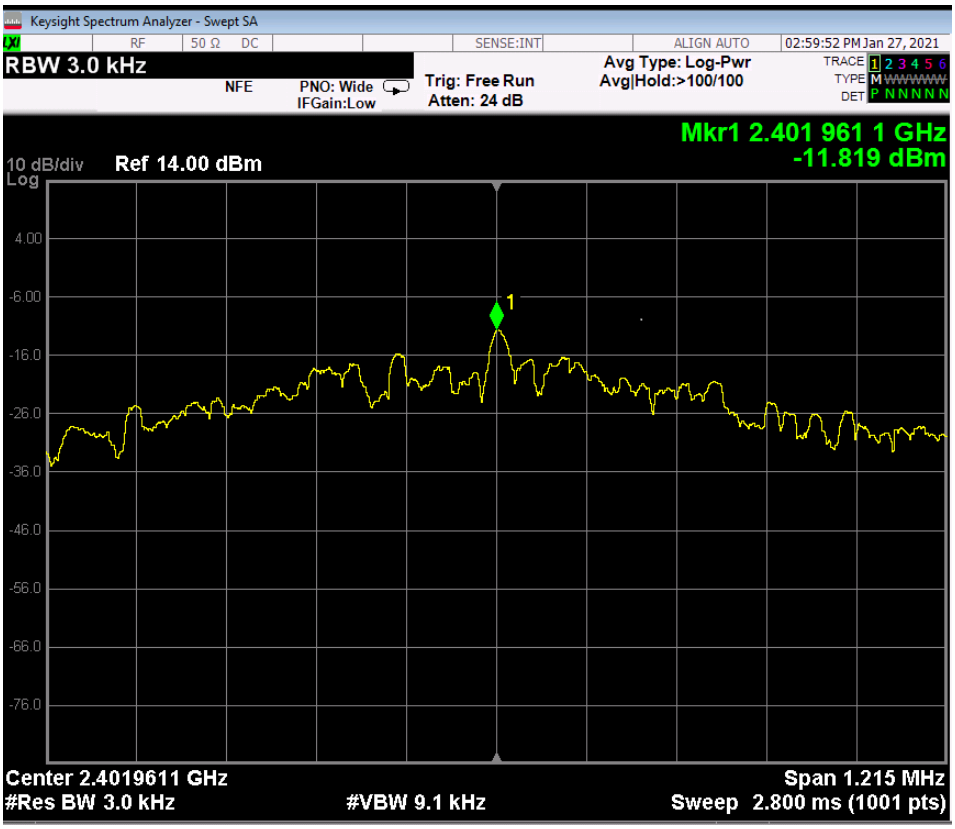


Figure 8.2.6.1 Power spectral density, operation on channel 2402MHz, antenna 1

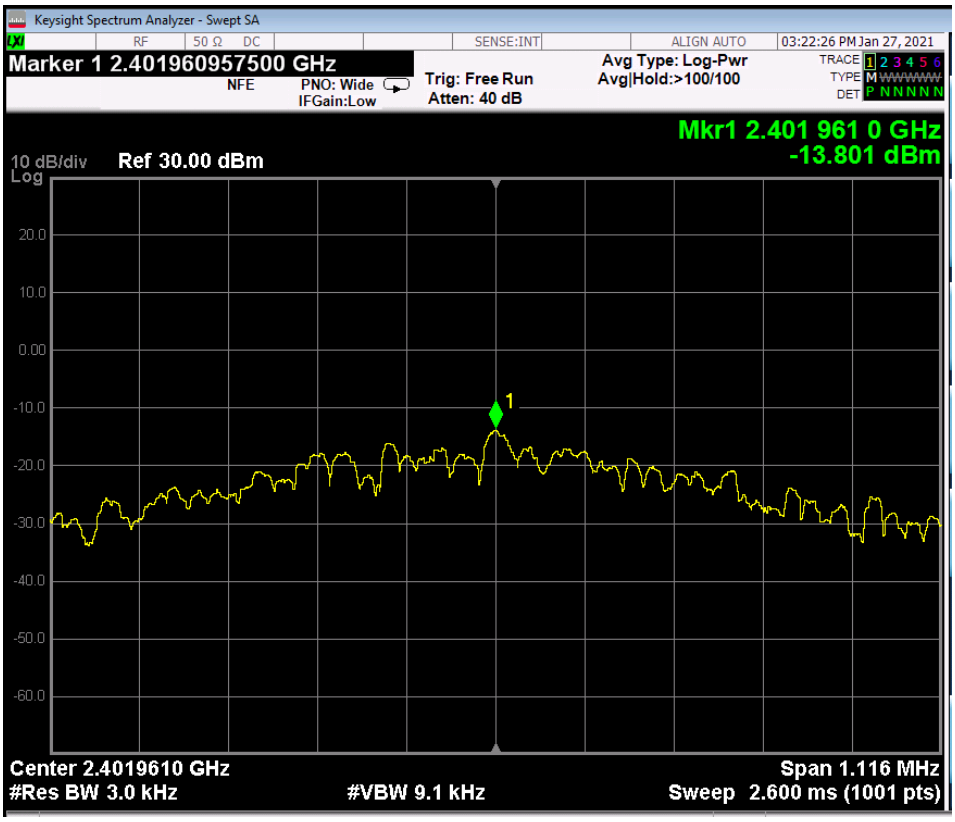


Figure 8.2.6 2 Power spectral density, operation on channel 2402MHz, antenna 2

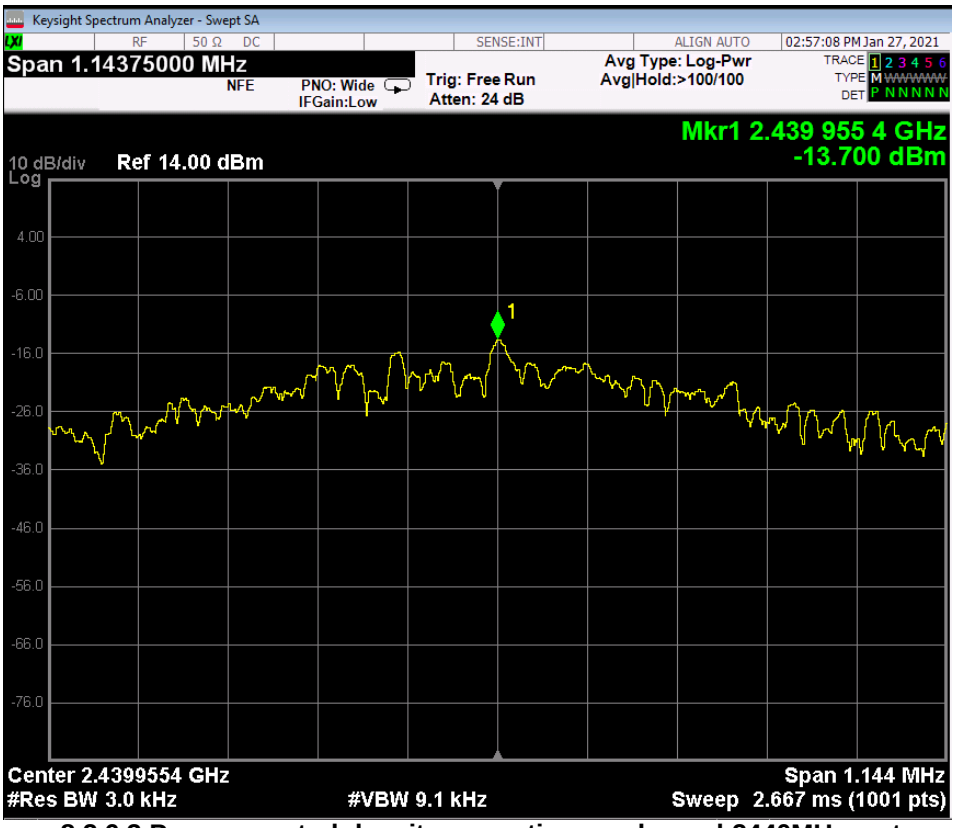


Figure 8.2.6.3 Power spectral density, operation on channel 2440MHz, antenna 1

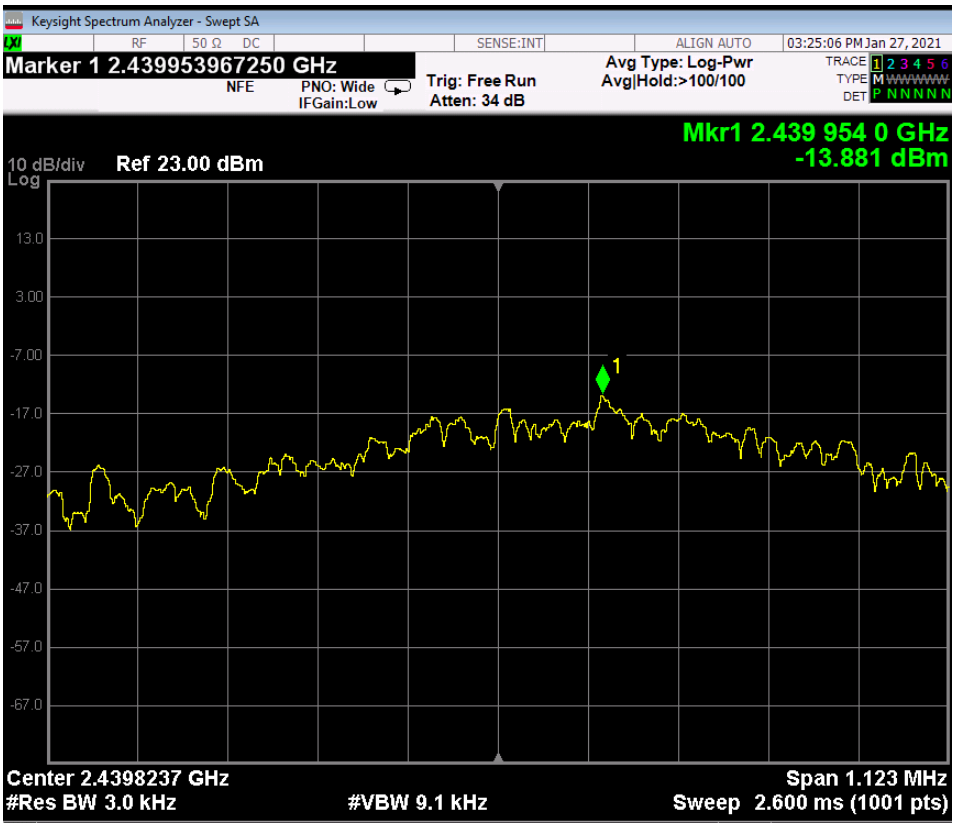


Figure 8.2.6.4 Power spectral density, operation on channel 2440MHz, antenna 2

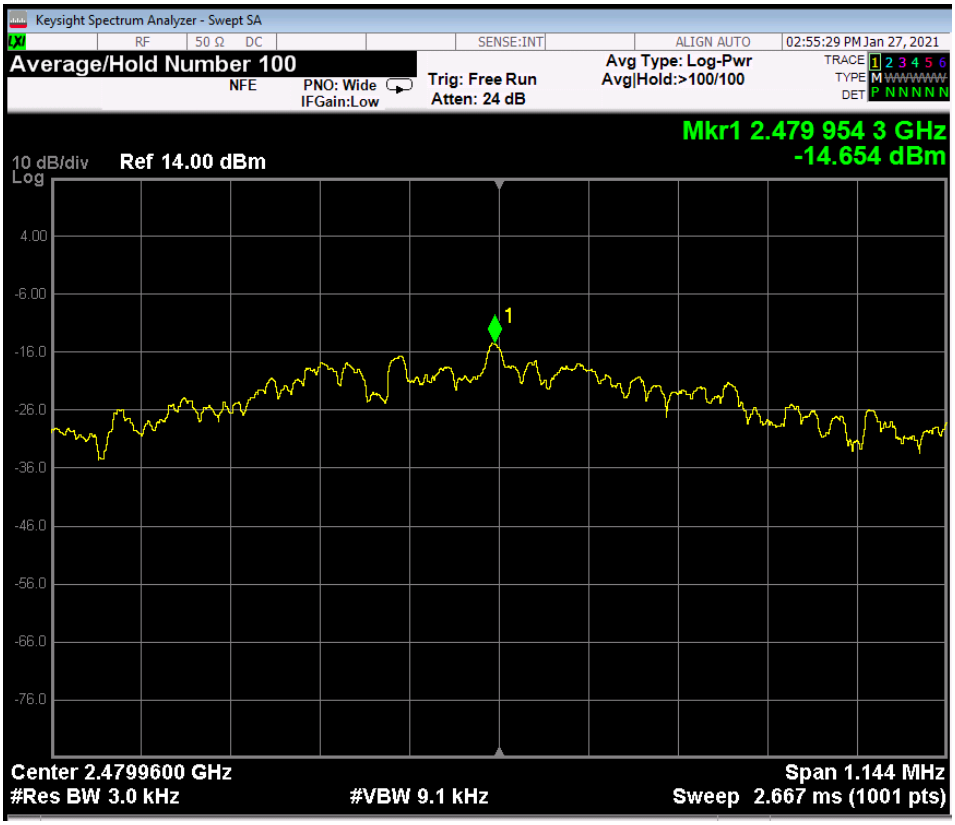


Figure 8.2.6.5 Power spectral density, operation on channel 2480MHz, antenna 1

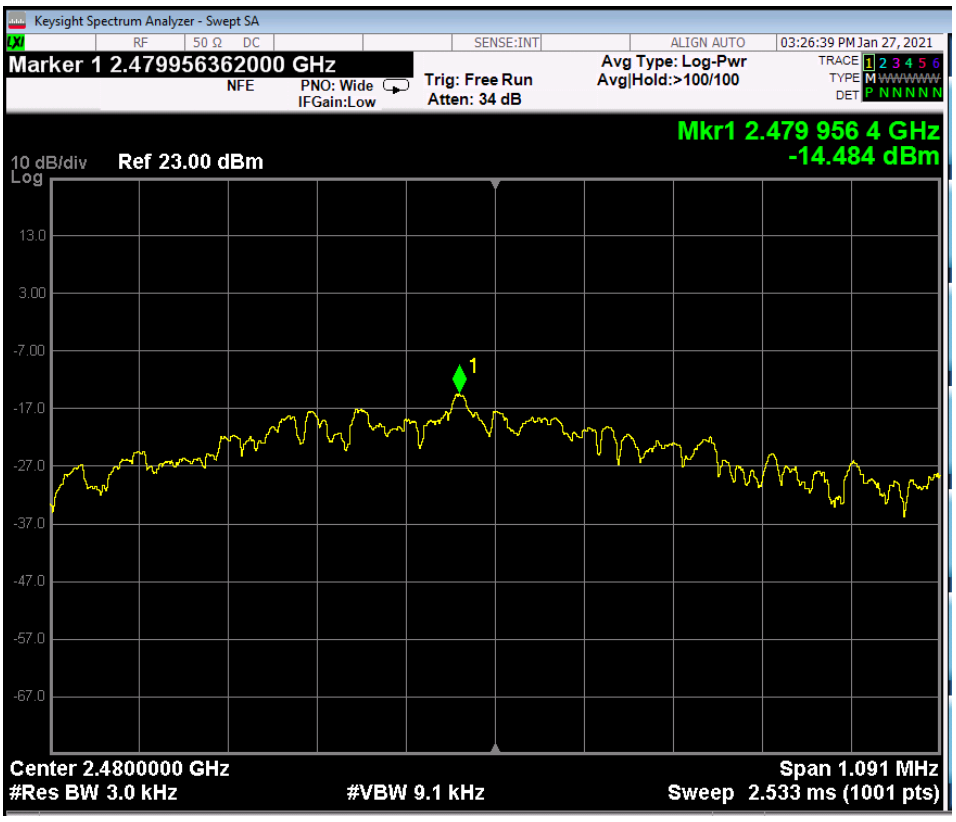


Figure 8.2.6.6 Power spectral density, operation on channel 2480MHz, antenna 1

Section 9 Band Edge Compliance

9.1 Test Specification

FCC Rule Part	46CFR 15.205 and 47CFR15.209
Standard	ANSI C63.10:2013

9.2 Procedure and Test Software Version

Conducted Tests

ANSi C63.10-2013 Clause reference:	Clause 6.10.4 Authorised band-edge measurements
Test software	Keysight Connection Expert

Frequency (MHz)	Limit, 47CFR 15.247(e)
	Peak
2400MHz to 2483.5MHz	Measured signal at the band edge must be below the radiated emission limits of 47CFR15.209

Spectrum analyser settings as specified by ANSI C63.10-2013 Clause 6.10.5 “Restricted band-edge measurements”

Receiver Parameters	Setting
Detector Function	Peak
Span	As necessary
Resolution Bandwidth	1MHz
Video Bandwidth	3 x RBW
Sweep rate	Auto couple
Trace mode	Max hold

9.2.1 Emissions measurements

9.2.2 Date of Test

12th February 2021

9.2.3 Test Area

LAB 1

9.2.4 Tested by

M Render

9.2.5 Test Setup

The test setup was identical to radiated emissions testing 1-18GHz.

9.2.6 Test Results

Results are presented in two formats:

Tabular results of measurements at the band edges. Manual measurements were performed to measure the maximum value of signal at the band edge. The tabular data includes the following:

1. Polarity of the measurement antenna
2. Frequency at the band edge
3. Amplitude of signal at the input of the test receiver
4. Pre-amplifier gain
5. Cable loss
6. Antenna factor
7. Resultant Electric field strength = 3-4+5+6

Spectrum analyser screen displays are also included. Please note that the screen displays do not include losses or antenna factor.

Tabular Data

The following radiated measurements were made at the band edges:

Upper band edge

Polarity	frequency (MHz)	Amplitude (dBuV)	Preamp (dB)	Cable loss (dB)	AF(dB/m)	E dBuV/m	Limit (dBuV/m)	Margin (dB)
H	2483.5	57.64	50.99	4.77	29.89	41.31	74	-32.69
V	2483.5	70.97	50.99	4.77	29.89	54.64	74	-19.36

Operation on 2480MGz Channel, Peak detector measurements

Polarity	frequency (MHz)	Amplitude (dBuV)	Preamp (dB)	Cable loss (dB)	AF(dB/m)	E dBuV/m	Limit (dBuV/m)	Margin (dB)
H	2483.5	42.17	50.99	4.77	29.89	25.84	54	-28.16
V	2483.5	44.45	50.99	4.77	29.89	28.12	54	-25.88

Operation on Channel 2480MHz, average detector measurements

Lower band edge

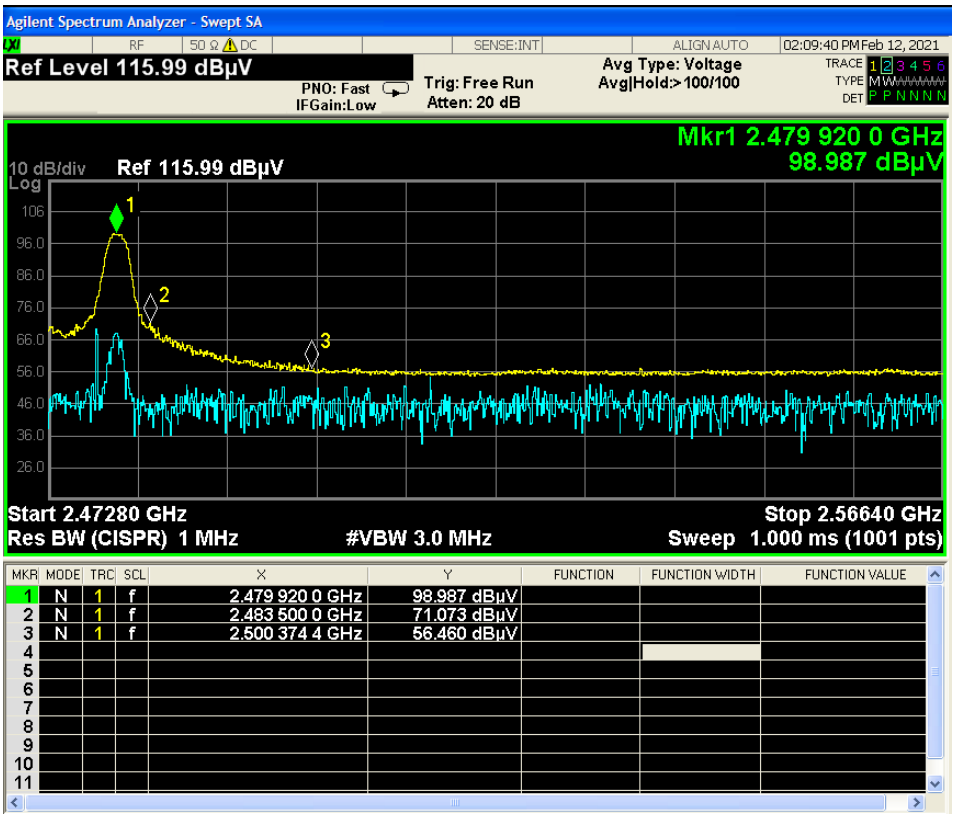
Polarity	frequency (MHz)	Amplitude (dBuV)	Preamp (dB)	Cable loss (dB)	AF(dB/m)	E dBuV/m	Limit (dBuV/m)	Margin (dB)
H	2400	64.2	50.97	4.64	29.67	47.54	74	-26.46
V	2400	78.7	50.97	4.64	29.67	62.04	74	-11.96

Operation on 2402MHz Peak detector measurements

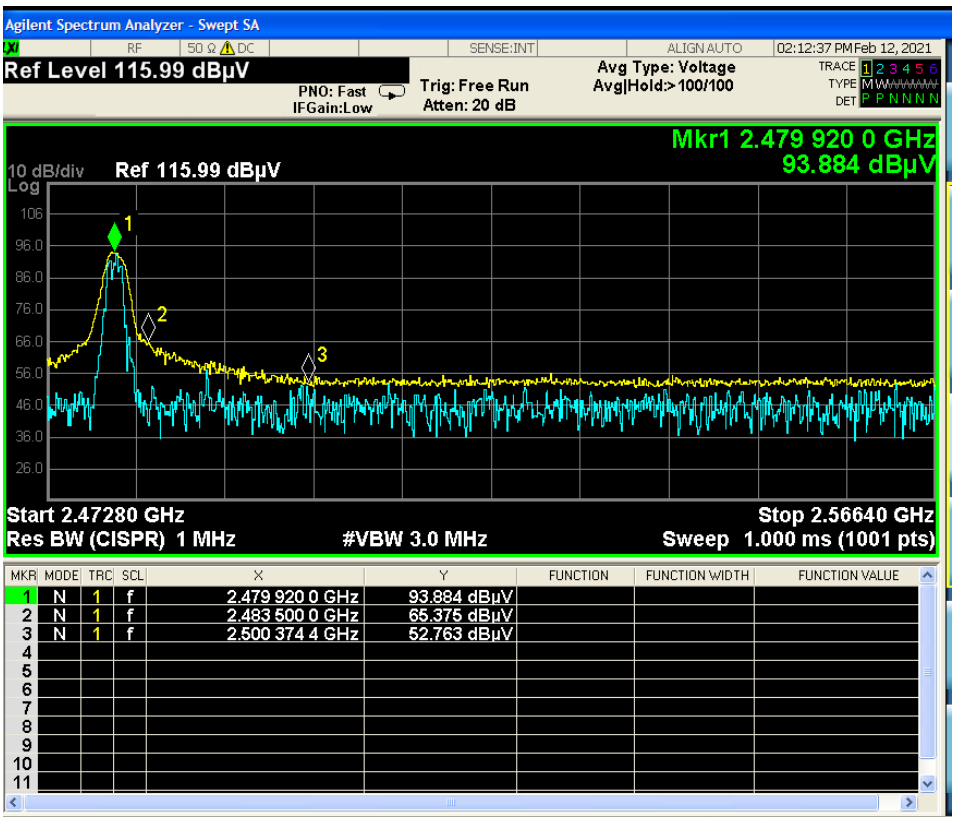
Polarity	frequency (MHz)	Amplitude (dBuV)	Preamp (dB)	Cable loss (dB)	AF(dB/m)	E dBuV/m	Limit (dBuV/m)	Margin (dB)
H	2400	44.5	50.97	4.64	29.67	27.84	54	-26.16
V	2400	55.35	50.97	4.64	29.67	38.69	54	-25.32

Operation on 2402MHz average detector measurements

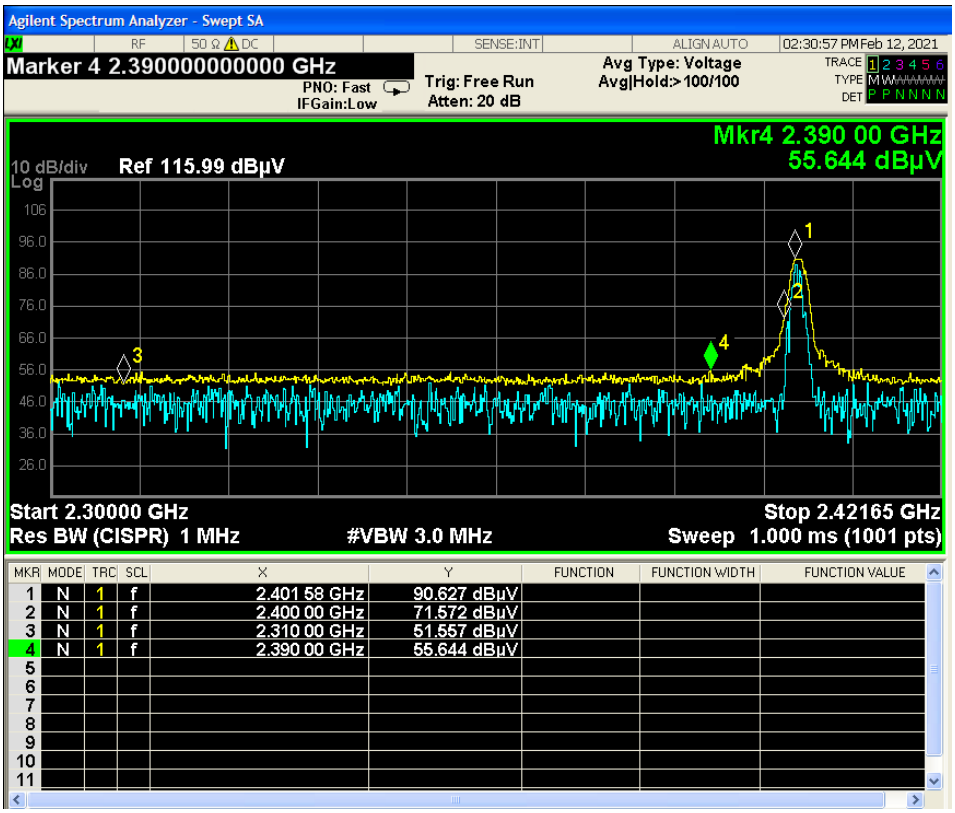
Spectrum analyser displays



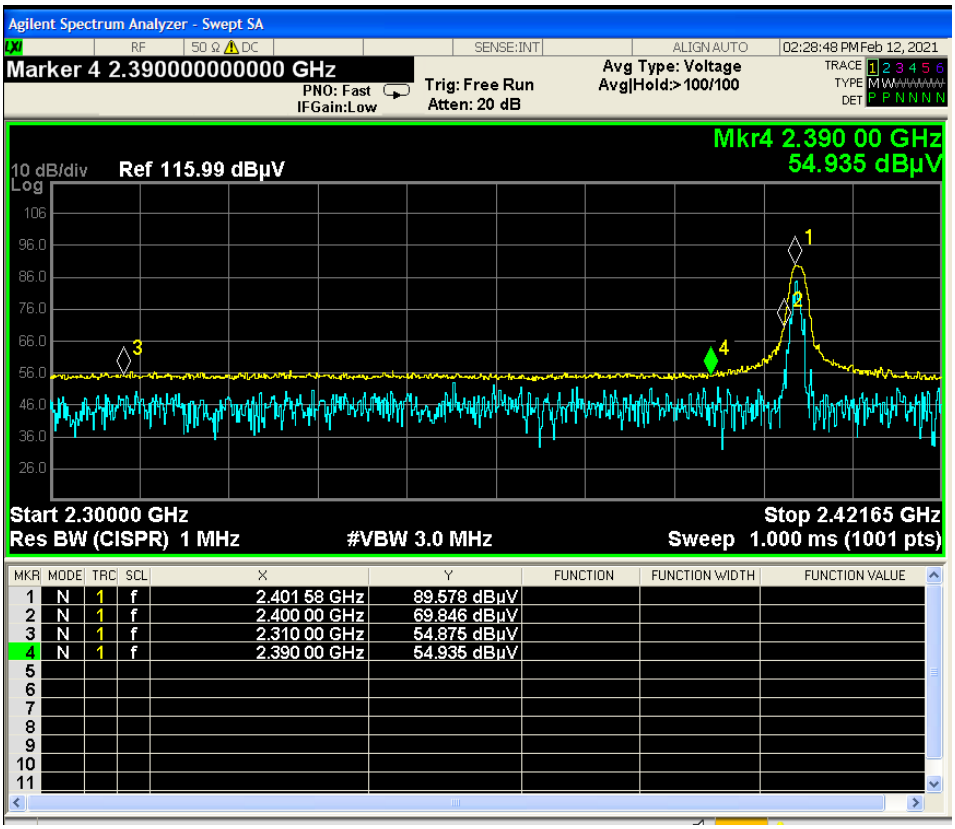
Band Edge Measurement – upper band edge - horizontal polarity



Band Edge Measurement – upper band edge - vertical polarity



Band Edge Measurement – lower band edge - horizontal polarity



Band Edge Measurement – lower band edge - vertical polarity

Section 10 AC Mains Conducted Emissions

10.1 Test Specification

FCC Rule Part	47CFR 15.207
Standard	ANSI C63.10:2013
Measurement Uncertainty	The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 % is +/- 3.45dB

10.2 Power Line Emission Limits

Frequency (MHz)	Class A (dBµV)		Class B (dBµV)	
	Quasi Peak	Average	Quasi Peak	Average
0.15 – 0.5	79.0	66.0	66 – 56*	56 – 46*
0.5 – 5.0	73.0	60.0	56.0	46.0
5.0 - 30	73.0	60.0	60.0	50.0

Note: * The limit decreases linearly with the logarithm of the frequency in the range

10.3 Receiver Settings

Receiver Parameters	Setting
Detector Function	Quasi Peak and Average
Start Frequency	150kHz
Stop Frequency	30MHz
Resolution Bandwidth	10kHz
Video Bandwidth	Auto

10.4 Procedure and Test Software Version

Eurofins York test procedure		CEP19 Issue 5
Test software		RadiMation Version 2016.1.6

10.4.1 Date of Test

3rd and 4th March 2021

10.4.2 Test Area

LAB 2

10.4.3 Tested by

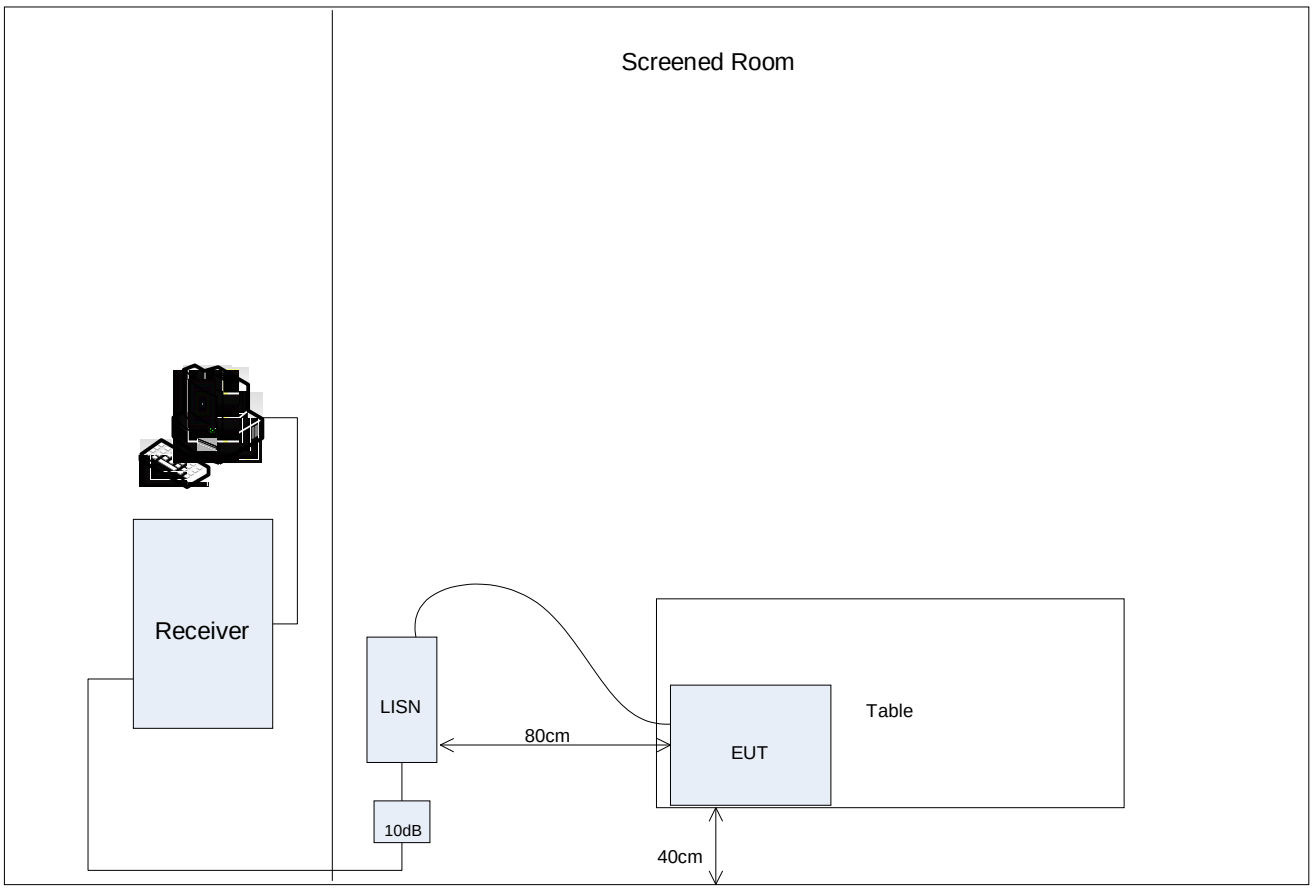
S Brennan

10.4.4 Test Setup

This test was applied to the EUT's Live and Neutral lines. The EUT was configured in the screened room on an 80cm high table was positioned 40cm from the room wall.

A calibrated mains extension lead was used to ensure a known impedance was presented to the EUT

The EUT was then powered from the mains supply via a Line Impedance Stabilisation Network (LISN).

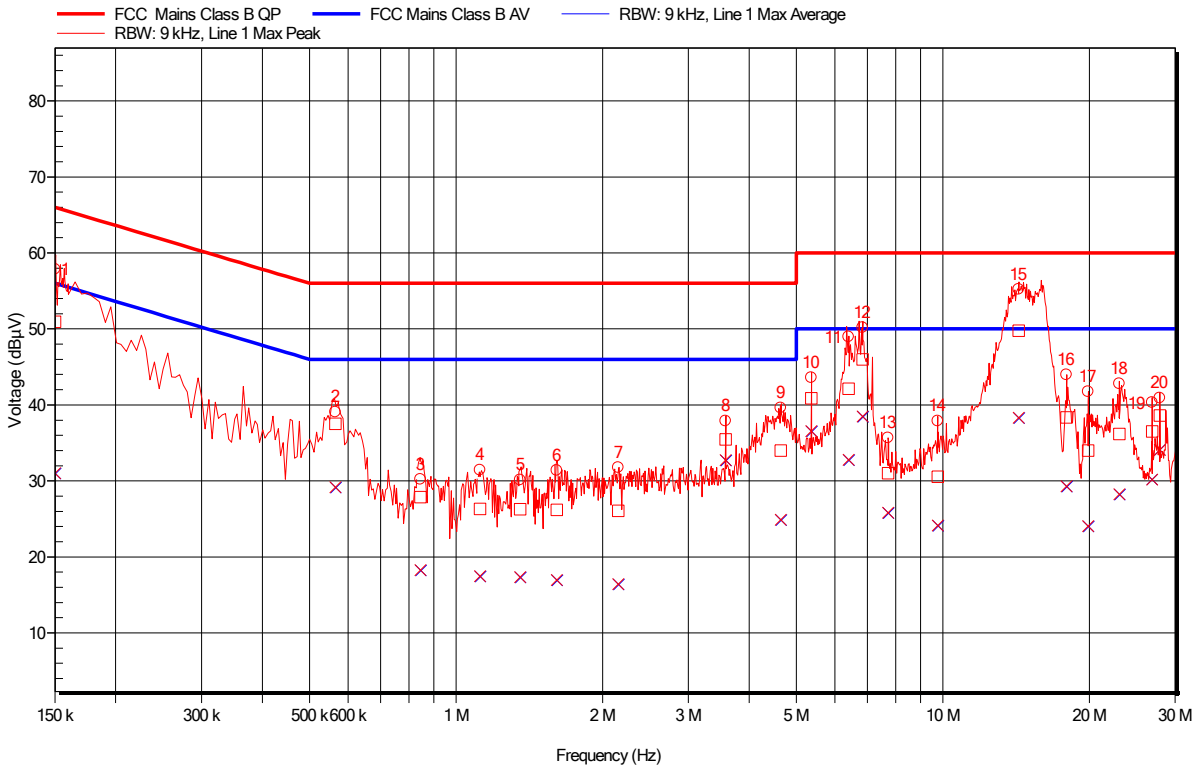


10.4.5 Plots

This section contains graphical and tabulated data. The following data is presented

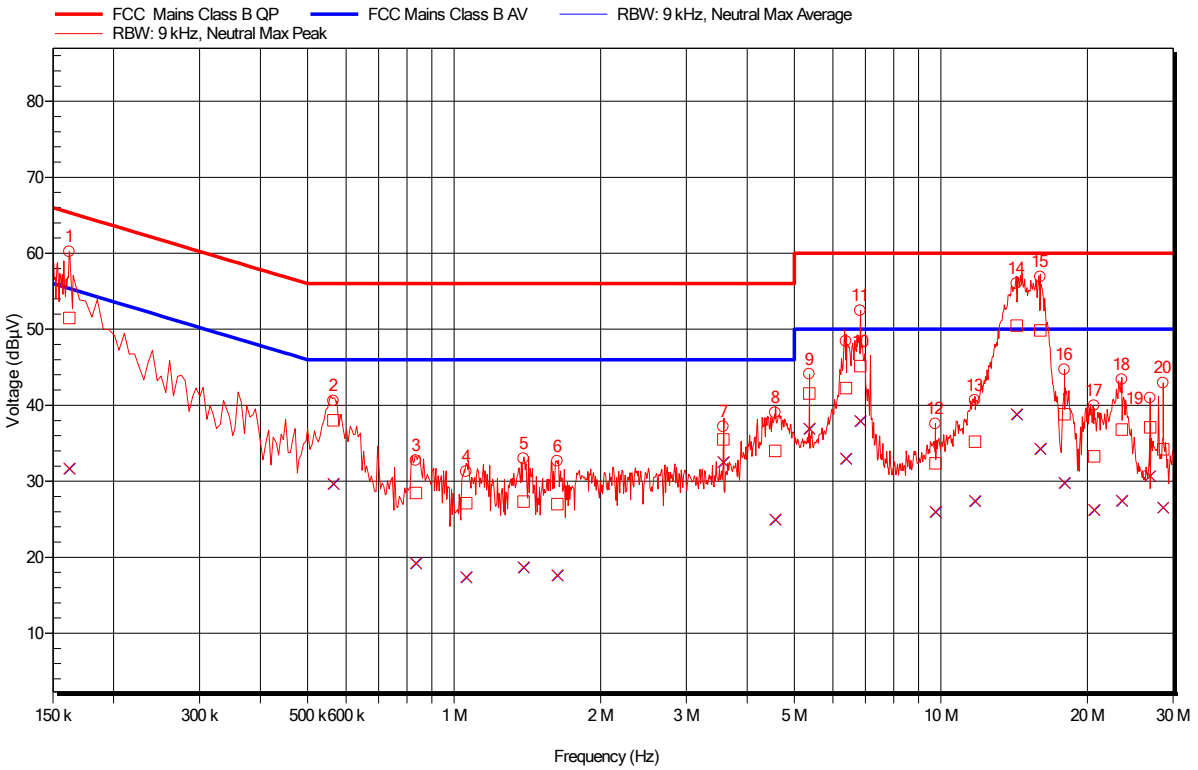
Power supply	Channel (MHz)	Conductor	Result summary
Context	2402	Live	Pass
Context	2402	Neutral	Pass
Context	2440	Live	Pass
Context	2440	Neutral	Pass
Context	2480	Live	Pass
Context	2480	Neutral	Pass
Focus	2402	Live	Pass
Focus	2402	Neutral	Pass
Focus	2440	Live	Pass
Focus	2440	Neutral	Pass
Focus	2480	Live	Pass
Focus	2480	Neutral	Pass

10.4.5.1 Context power supply



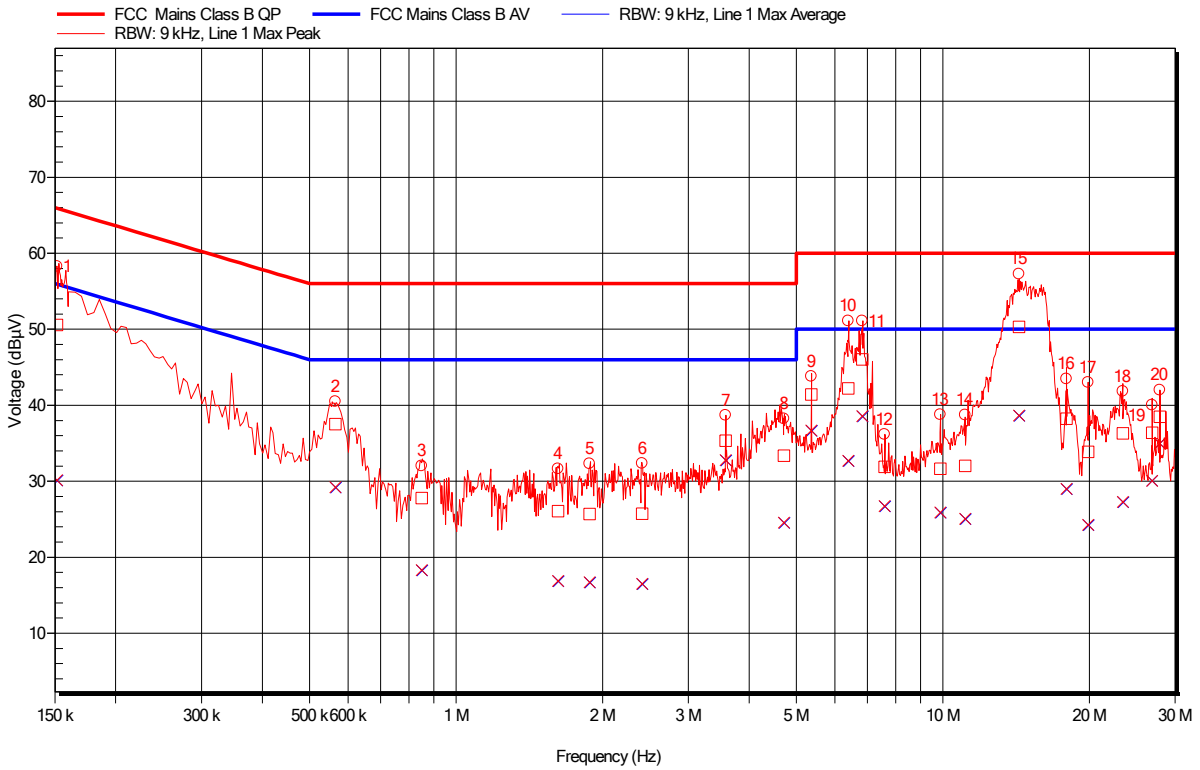
Context power supply. Operating on channel 2402MH – Live

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.15	31	56	-24.97	Pass	50.9	66	-15.06	Pass
0.565	29.2	46	-16.85	Pass	37.5	56	-18.47	Pass
0.845	18.3	46	-27.73	Pass	27.9	56	-28.14	Pass
3.576	32.8	46	-13.24	Pass	35.5	56	-20.54	Pass
4.645	24.9	46	-21.1	Pass	34	56	-22.02	Pass
5.365	36.6	50	-13.45	Pass	40.9	60	-19.13	Pass
6.4	32.8	50	-17.23	Pass	42.1	60	-17.87	Pass
6.835	38.5	50	-11.52	Pass	46	60	-14.01	Pass
7.72	25.8	50	-24.2	Pass	31	60	-28.99	Pass
9.753	24.2	50	-25.85	Pass	30.6	60	-29.44	Pass
14.315	38.3	50	-11.69	Pass	49.8	60	-10.23	Pass
17.934	29.3	50	-20.72	Pass	38.4	60	-21.64	Pass
19.874	24	50	-25.96	Pass	34	60	-26.03	Pass
23.031	28.3	50	-21.74	Pass	36.2	60	-23.81	Pass
26.897	30.2	50	-19.81	Pass	36.5	60	-23.5	Pass
27.893	34.1	50	-15.94	Pass	38.6	60	-21.4	Pass



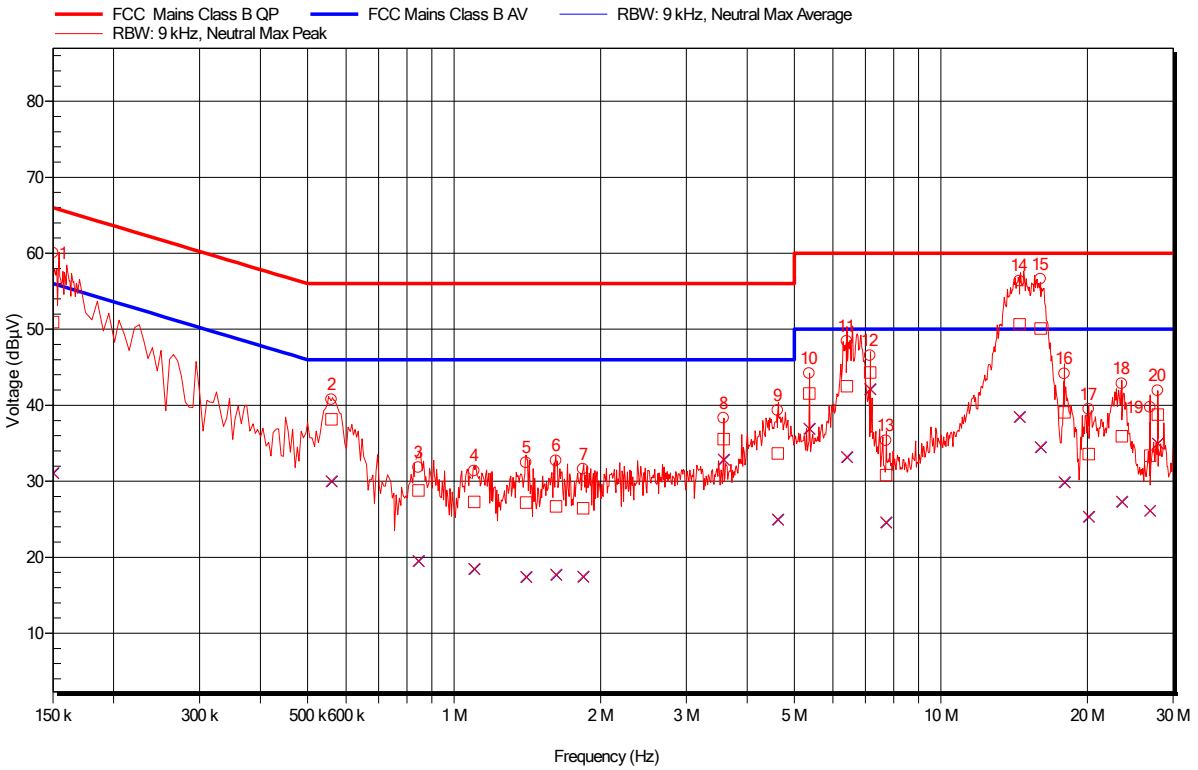
Context power supply. Operating on channel 2402MHz – Neutral

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.162	31.7	55.4	-23.68	Pass	51.5	65.4	-13.88	Pass
0.565	29.7	46	-16.34	Pass	38	56	-17.96	Pass
0.835	19.2	46	-26.78	Pass	28.5	56	-27.53	Pass
1.06	17.4	46	-28.63	Pass	27.1	56	-28.9	Pass
1.39	18.7	46	-27.33	Pass	27.3	56	-28.67	Pass
1.63	17.6	46	-28.37	Pass	27	56	-28.99	Pass
3.574	32.5	46	-13.45	Pass	35.5	56	-20.51	Pass
9.743	26	50	-24.02	Pass	32.4	60	-27.63	Pass
11.74	27.4	50	-22.59	Pass	35.2	60	-24.79	Pass
14.315	38.8	50	-11.2	Pass	50.5	60	-9.5	Pass
16	34.3	50	-15.69	Pass	49.8	60	-10.15	Pass
17.934	29.8	50	-20.21	Pass	38.8	60	-21.17	Pass
20.62	26.2	50	-23.76	Pass	33.3	60	-26.71	Pass
23.515	27.4	50	-22.55	Pass	36.8	60	-23.18	Pass
26.896	30.7	50	-19.33	Pass	37.1	60	-22.91	Pass
28.613	26.5	50	-23.49	Pass	34.2	60	-25.8	Pass



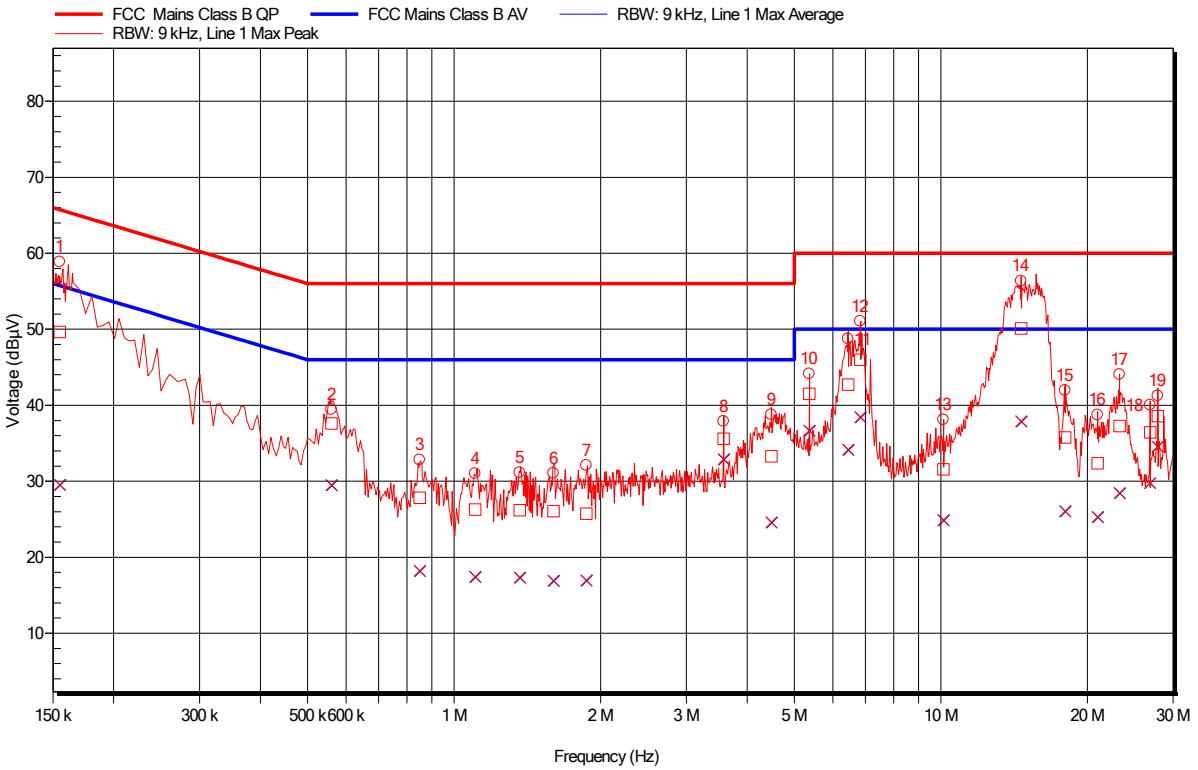
Context power supply. Operating on channel 2440MHz – Live

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.1515	30.1	55.9	-25.8	Pass	50.6	65.9	-15.34	Pass
0.565	29.2	46	-16.79	Pass	37.5	56	-18.5	Pass
0.89	18.3	46	-27.71	Pass	27.8	56	-28.2	Pass
1.62	16.9	46	-29.12	Pass	26.1	56	-29.91	Pass
5.367	36.7	50	-13.32	Pass	41.4	60	-18.56	Pass
6.394	32.7	50	-17.31	Pass	42.2	60	-17.78	Pass
6.831	38.6	50	-11.42	Pass	46	60	-13.96	Pass
7.592	26.8	50	-23.24	Pass	31.9	60	-28.1	Pass
9.873	25.9	50	-24.1	Pass	31.7	60	-28.34	Pass
11.105	25	50	-24.96	Pass	32	60	-27.96	Pass
14.33	38.6	50	-11.37	Pass	50.3	60	-9.69	Pass
17.934	29	50	-21	Pass	38.2	60	-21.75	Pass
19.862	24.3	50	-25.72	Pass	33.9	60	-26.15	Pass
23.4	27.3	50	-22.73	Pass	36.3	60	-23.69	Pass
26.901	30	50	-19.96	Pass	36.4	60	-23.6	Pass
27.895	35	50	-15.05	Pass	38.5	60	-21.5	Pass



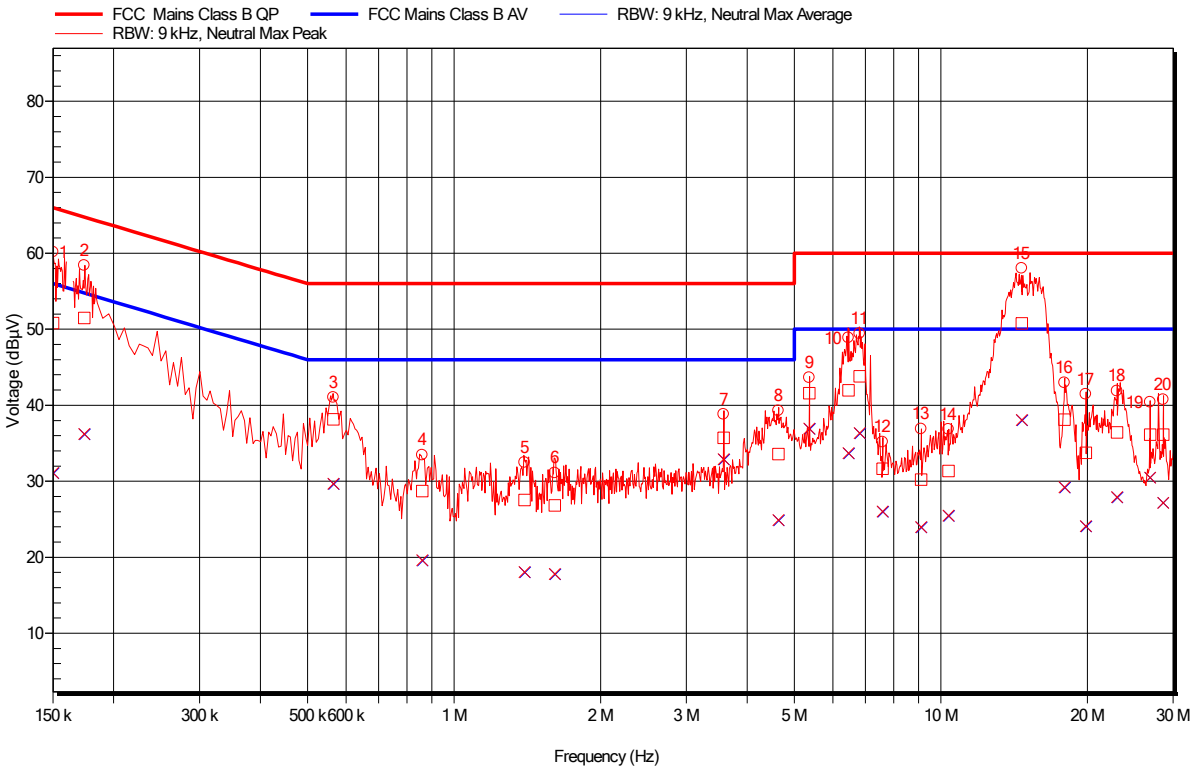
Context power supply. Operating on channel 2440MHz – Neutral

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.845	19.5	46	-26.46	Pass	28.8	56	-27.22	Pass
1.405	17.4	46	-28.59	Pass	27.2	56	-28.82	Pass
3.577	32.9	46	-13.15	Pass	35.5	56	-20.46	Pass
4.625	25	46	-21.03	Pass	33.7	56	-22.34	Pass
5.367	36.9	50	-13.05	Pass	41.6	60	-18.45	Pass
7.155	42.2	50	-7.85	Pass	44.3	60	-15.7	Pass
23.517	27.3	50	-22.7	Pass	35.9	60	-24.1	Pass
26.905	26.1	50	-23.91	Pass	33.4	60	-26.62	Pass
27.897	34.9	50	-15.06	Pass	38.8	60	-21.23	Pass
1.62	17.7	46	-28.26	Pass	26.7	56	-29.32	Pass
1.84	17.5	46	-28.54	Pass	26.5	56	-29.55	Pass
0.15	31.1	56	-24.9	Pass	50.9	66	-15.07	Pass
0.56	30	46	-15.99	Pass	38.2	56	-17.85	Pass
1.1	18.5	46	-27.54	Pass	27.3	56	-28.72	Pass
6.41	33.2	50	-16.79	Pass	42.5	60	-17.47	Pass
14.51	38.5	50	-11.51	Pass	50.6	60	-9.36	Pass
16.01	34.5	50	-15.5	Pass	50.1	60	-9.88	Pass



Context power supply. Operating on channel 2480MHz – Live

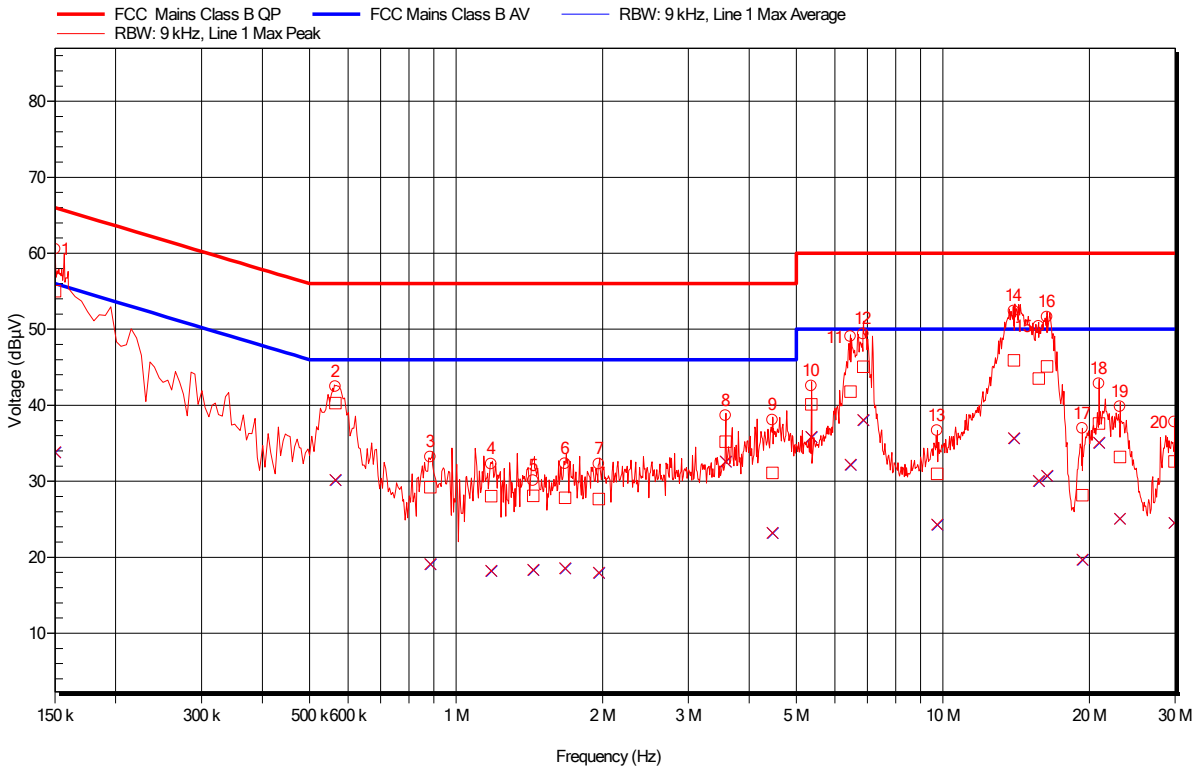
Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.155	29.5	55.7	-26.19	Pass	49.7	65.7	-16.07	Pass
0.56	29.5	46	-16.51	Pass	37.6	56	-18.38	Pass
0.85	18.2	46	-27.77	Pass	27.8	56	-28.17	Pass
1.105	17.4	46	-28.56	Pass	26.3	56	-29.71	Pass
1.365	17.3	46	-28.66	Pass	26.2	56	-29.82	Pass
1.6	16.9	46	-29.08	Pass	26.1	56	-29.94	Pass
1.87	17	46	-29.03	Pass	25.7	56	-30.28	Pass
3.578	32.9	46	-13.1	Pass	35.6	56	-20.43	Pass
4.485	24.6	46	-21.39	Pass	33.3	56	-22.72	Pass
5.367	36.7	50	-13.34	Pass	41.5	60	-18.5	Pass
6.445	34.2	50	-15.85	Pass	42.7	60	-17.28	Pass
6.829	38.5	50	-11.54	Pass	46	60	-14.02	Pass
10.122	24.9	50	-25.13	Pass	31.6	60	-28.42	Pass
14.61	37.9	50	-12.09	Pass	50.1	60	-9.9	Pass
17.99	26.1	50	-23.94	Pass	35.8	60	-24.24	Pass
20.98	25.3	50	-24.7	Pass	32.4	60	-27.64	Pass
23.259	28.5	50	-21.53	Pass	37.2	60	-22.75	Pass
26.9	29.7	50	-20.25	Pass	36.4	60	-23.59	Pass
27.896	34.6	50	-15.44	Pass	38.6	60	-21.43	Pass



Context power supply. Operating on channel 2480MHz – Neutral

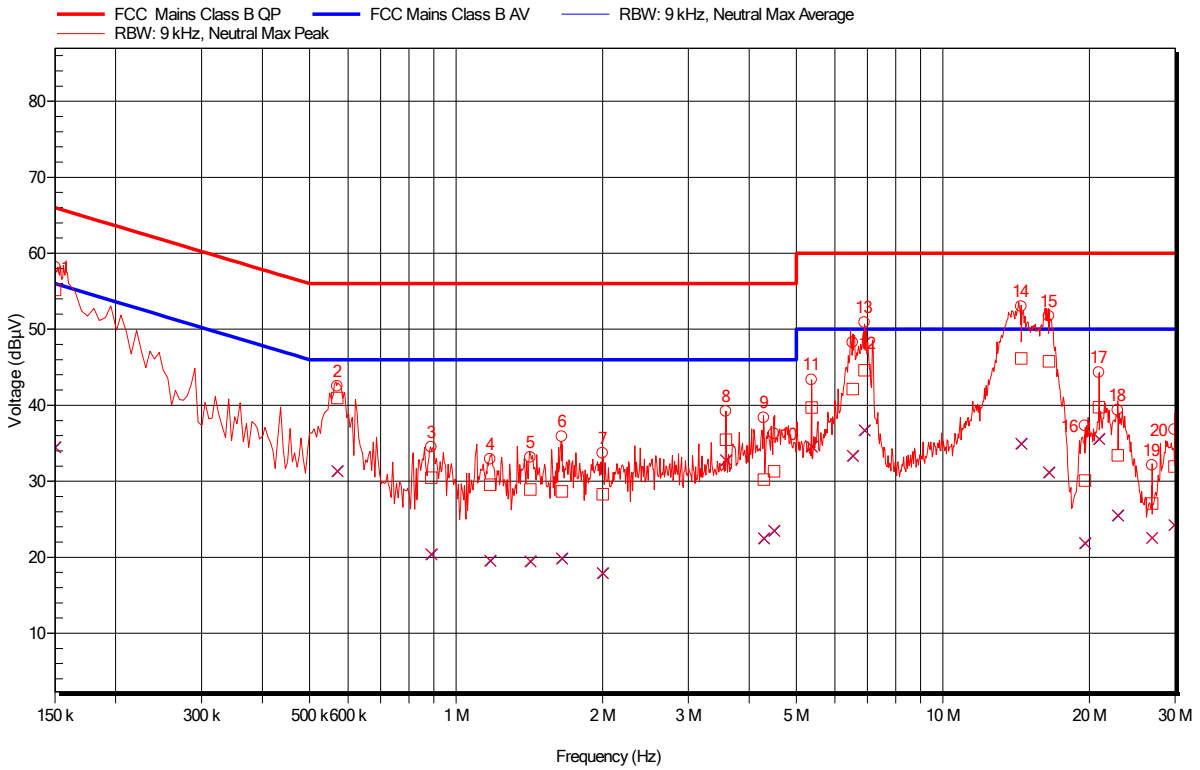
Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.15	31.1	56	-24.88	Pass	50.8	66	-15.17	Pass
0.174	36.2	54.8	-18.55	Pass	51.5	64.8	-13.28	Pass
0.565	29.7	46	-16.33	Pass	38.2	56	-17.83	Pass
0.86	19.6	46	-26.38	Pass	28.7	56	-27.29	Pass
1.395	18.1	46	-27.94	Pass	27.5	56	-28.45	Pass
1.61	17.8	46	-28.21	Pass	26.8	56	-29.18	Pass
3.578	32.9	46	-13.09	Pass	35.7	56	-20.27	Pass
4.635	24.9	46	-21.13	Pass	33.6	56	-22.4	Pass
5.368	36.9	50	-13.06	Pass	41.6	60	-18.41	Pass
6.46	33.7	50	-16.29	Pass	41.9	60	-18.05	Pass
6.81	36.3	50	-13.66	Pass	43.8	60	-16.19	Pass
7.587	26	50	-23.96	Pass	31.7	60	-28.33	Pass
9.104	24	50	-26.02	Pass	30.2	60	-29.76	Pass
10.367	25.5	50	-24.54	Pass	31.3	60	-28.66	Pass
14.66	38.1	50	-11.94	Pass	50.8	60	-9.24	Pass
17.93	29.2	50	-20.78	Pass	38.1	60	-21.89	Pass
19.844	24.1	50	-25.89	Pass	33.8	60	-26.24	Pass
22.995	27.9	50	-22.11	Pass	36.4	60	-23.59	Pass
26.897	30.5	50	-19.53	Pass	36.2	60	-23.85	Pass
28.628	27.2	50	-22.84	Pass	36.1	60	-23.88	Pass

10.4.5.2 Focus power supply



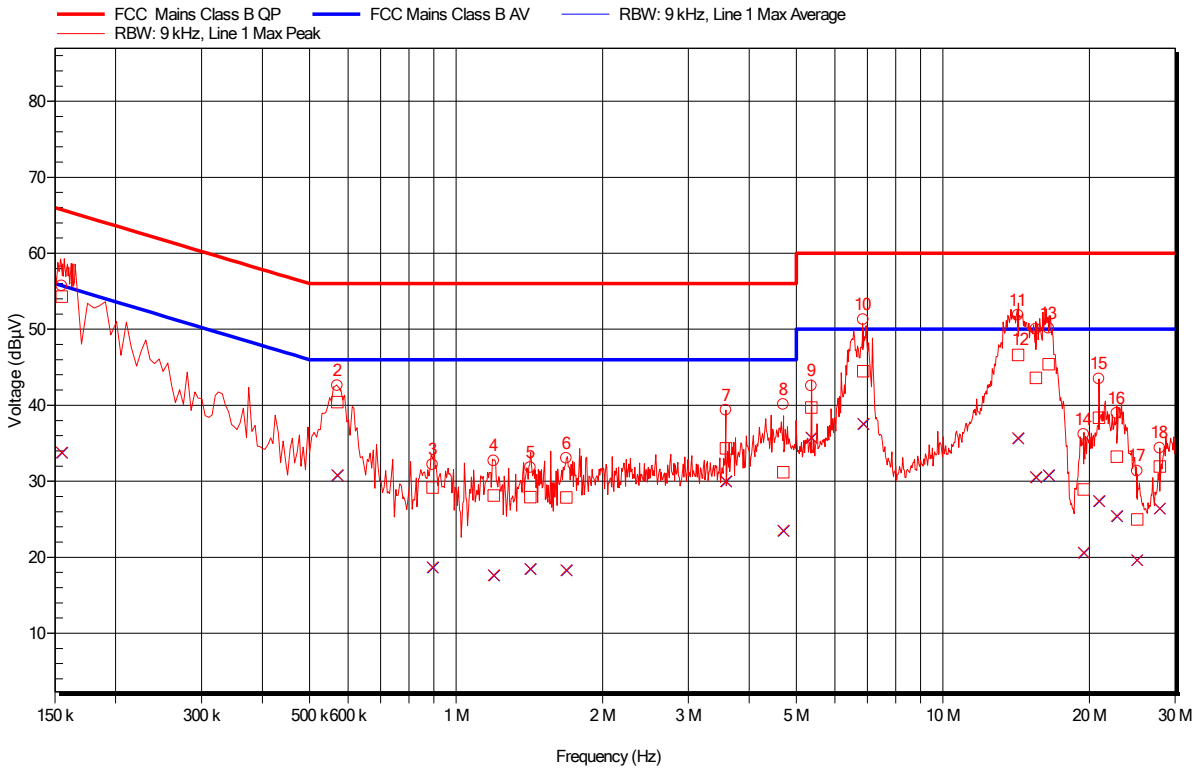
Focus power supply. Operating on channel 2402MHz – Live

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.15	33.8	56	-22.18	Pass	55	66	-11	Pass
0.565	30.2	46	-15.83	Pass	40.3	56	-15.72	Pass
0.885	19.1	46	-26.92	Pass	29.2	56	-26.79	Pass
1.18	18.2	46	-27.76	Pass	28.1	56	-27.94	Pass
1.44	18.3	46	-27.66	Pass	28.1	56	-27.93	Pass
1.675	18.5	46	-27.46	Pass	27.8	56	-28.17	Pass
1.965	18	46	-28.03	Pass	27.6	56	-28.36	Pass
3.578	32.6	46	-13.41	Pass	35.2	56	-20.77	Pass
6.86	38.1	50	-11.92	Pass	45.1	60	-14.93	Pass
9.732	24.3	50	-25.69	Pass	31	60	-29.01	Pass
13.99	35.7	50	-14.33	Pass	45.9	60	-14.09	Pass
15.74	30.1	50	-19.95	Pass	43.5	60	-16.49	Pass
16.36	30.7	50	-19.28	Pass	45.1	60	-14.89	Pass
19.334	19.7	50	-30.3	Pass	28.2	60	-31.83	Pass
20.92	35.1	50	-14.93	Pass	37.6	60	-22.41	Pass
23.115	25	50	-24.96	Pass	33.2	60	-26.79	Pass
29.885	24.5	50	-25.51	Pass	32.6	60	-27.37	Pass



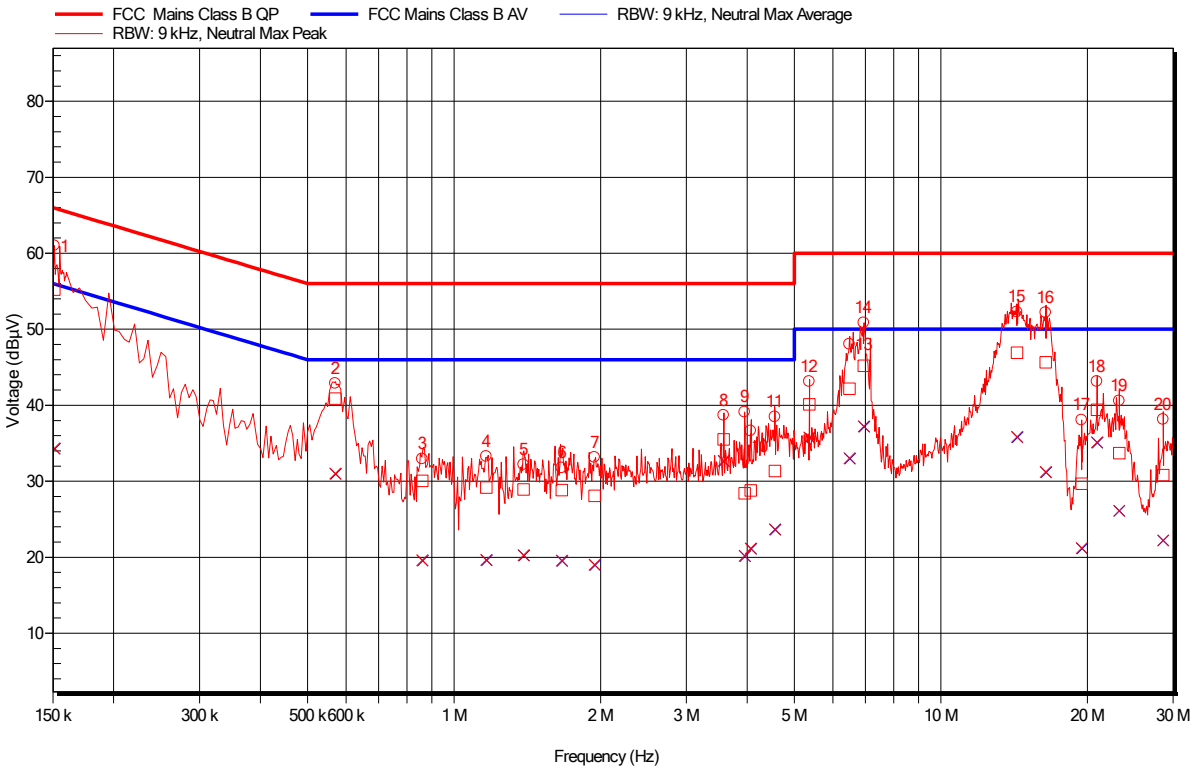
Focus power supply. Operating on channel 2402MH – Neutral

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.89	20.4	46	-25.61	Pass	30.5	56	-25.55	Pass
1.175	19.6	46	-26.44	Pass	29.5	56	-26.46	Pass
2	17.9	46	-28.07	Pass	28.3	56	-27.73	Pass
3.583	32.8	46	-13.23	Pass	35.5	56	-20.54	Pass
4.285	22.5	46	-23.51	Pass	30.2	56	-25.8	Pass
5.371	34.6	50	-15.43	Pass	39.7	60	-20.3	Pass
6.525	33.4	50	-16.63	Pass	42.1	60	-17.86	Pass
20.917	35.6	50	-14.39	Pass	39.7	60	-20.26	Pass
22.854	25.5	50	-24.48	Pass	33.4	60	-26.58	Pass
26.89	22.5	50	-27.47	Pass	27.1	60	-32.91	Pass
29.885	24.2	50	-25.79	Pass	32	60	-28.05	Pass
1.65	19.9	46	-26.13	Pass	28.7	56	-27.32	Pass
0.15	34.5	56	-21.51	Pass	55.2	66	-10.82	Pass
0.57	31.3	46	-14.66	Pass	41	56	-15.04	Pass
1.42	19.5	46	-26.54	Pass	28.9	56	-27.09	Pass
4.5	23.5	46	-22.49	Pass	31.3	56	-24.69	Pass
19.58	21.9	50	-28.14	Pass	30.1	60	-29.91	Pass



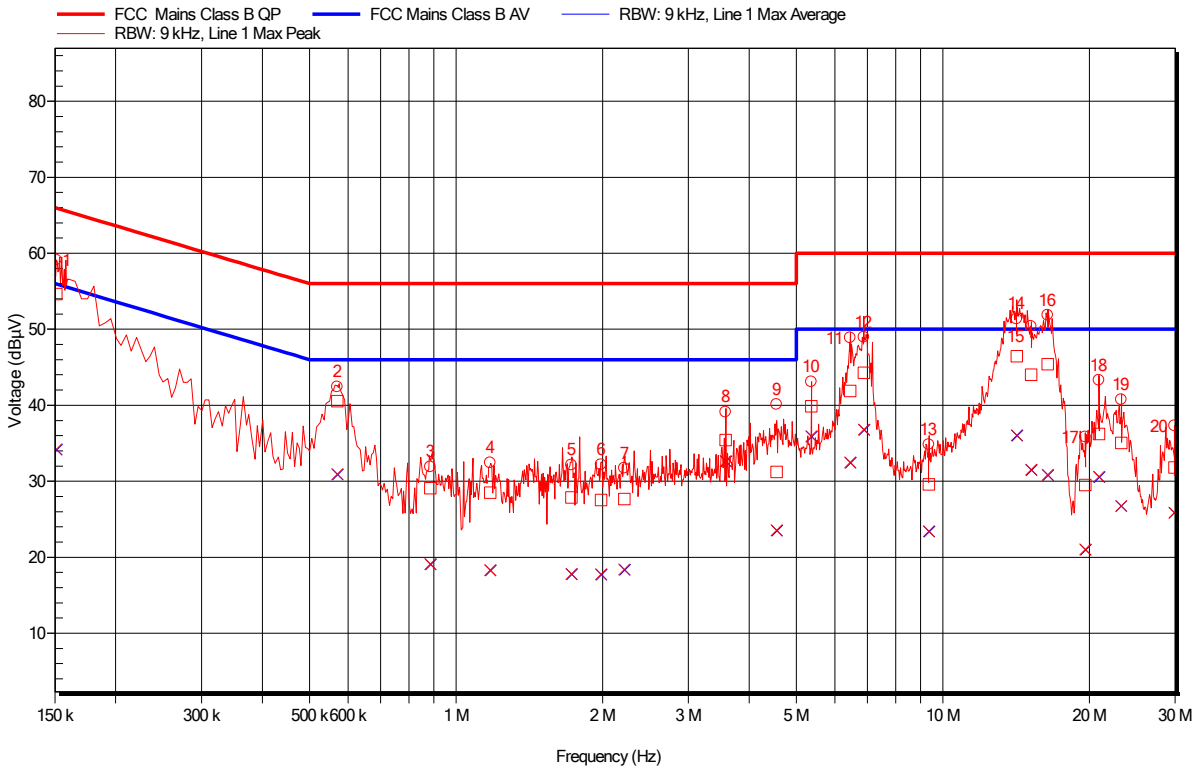
Focus power supply. Operating on channel 2440MHz – Live

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.155	33.8	55.7	-21.95	Pass	54.3	65.7	-11.42	Pass
0.895	18.7	46	-27.33	Pass	29.2	56	-26.82	Pass
1.195	17.6	46	-28.37	Pass	28.1	56	-27.89	Pass
1.685	18.3	46	-27.68	Pass	27.9	56	-28.12	Pass
3.581	30	46	-16	Pass	34.3	56	-21.67	Pass
5.368	35.8	50	-14.24	Pass	39.7	60	-20.31	Pass
6.855	37.6	50	-12.42	Pass	44.5	60	-15.54	Pass
14.265	35.7	50	-14.31	Pass	46.6	60	-13.39	Pass
16.495	30.8	50	-19.18	Pass	45.4	60	-14.59	Pass
19.465	20.6	50	-29.37	Pass	28.9	60	-31.08	Pass
20.925	27.4	50	-22.59	Pass	38.3	60	-21.66	Pass
22.74	25.4	50	-24.56	Pass	33.2	60	-26.76	Pass
25.045	19.6	50	-30.37	Pass	25	60	-35.04	Pass
27.892	26.4	50	-23.59	Pass	31.9	60	-28.07	Pass
0.57	30.8	46	-15.18	Pass	40.4	56	-15.58	Pass
1.42	18.5	46	-27.51	Pass	27.9	56	-28.1	Pass
4.7	23.5	46	-22.5	Pass	31.2	56	-24.8	Pass
15.51	30.5	50	-19.46	Pass	43.6	60	-16.4	Pass



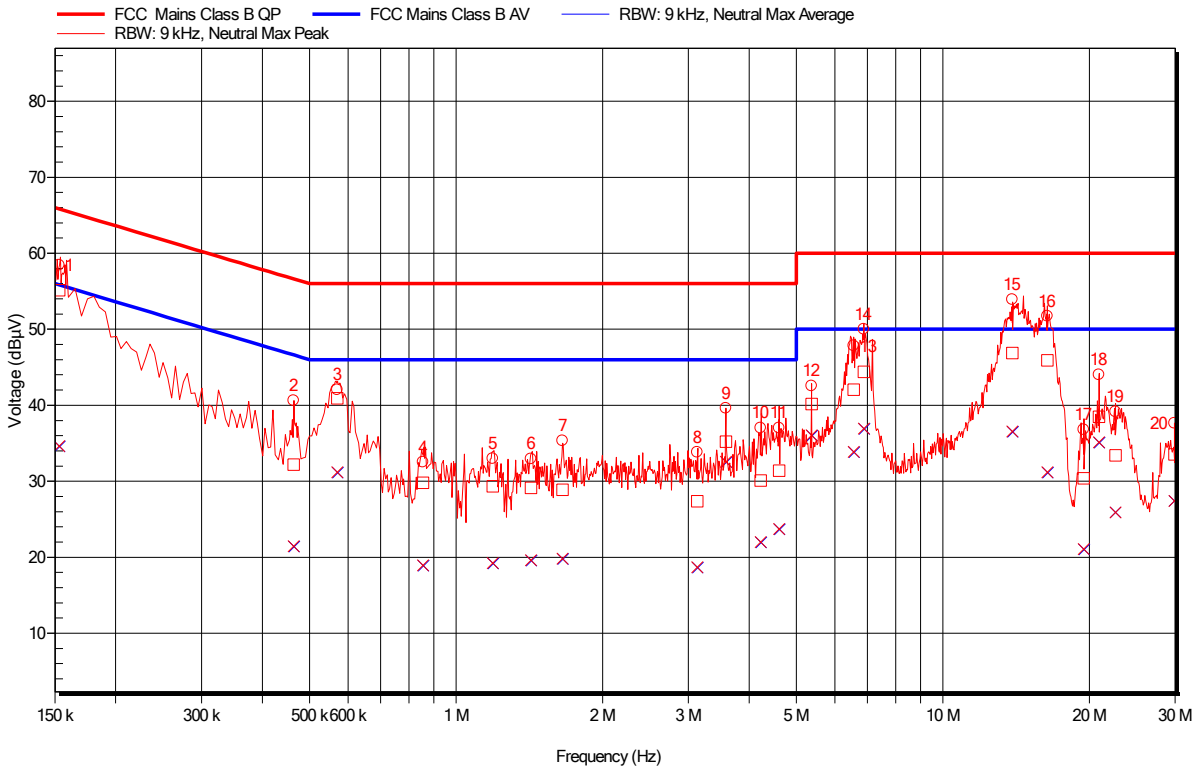
Focus power supply. Operating on channel 2440MHz – Neutral

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.151	34.3	55.9	-21.62	Pass	55.2	65.9	-10.73	Pass
0.57	31	46	-15	Pass	40.9	56	-15.14	Pass
0.86	19.6	46	-26.4	Pass	30.1	56	-25.94	Pass
1.165	19.7	46	-26.34	Pass	29.2	56	-26.85	Pass
1.39	20.3	46	-25.73	Pass	28.9	56	-27.07	Pass
1.665	19.6	46	-26.45	Pass	28.8	56	-27.16	Pass
1.945	19	46	-26.99	Pass	28.1	56	-27.91	Pass
3.577	32.7	46	-13.32	Pass	35.5	56	-20.49	Pass
3.95	20.2	46	-25.79	Pass	28.4	56	-27.58	Pass
4.069	21.1	46	-24.86	Pass	28.8	56	-27.22	Pass
4.56	23.7	46	-22.33	Pass	31.3	56	-24.66	Pass
5.365	35.8	50	-14.24	Pass	40.1	60	-19.89	Pass
6.49	33	50	-16.97	Pass	42.2	60	-17.83	Pass
6.947	37.2	50	-12.79	Pass	45.2	60	-14.81	Pass
14.33	35.8	50	-14.15	Pass	46.9	60	-13.11	Pass
16.415	31.2	50	-18.76	Pass	45.7	60	-14.34	Pass
19.457	21.2	50	-28.81	Pass	29.7	60	-30.34	Pass
20.914	35.1	50	-14.87	Pass	39.4	60	-20.6	Pass
23.245	26.1	50	-23.88	Pass	33.7	60	-26.29	Pass
28.628	22.2	50	-27.81	Pass	30.8	60	-29.2	Pass



Focus power supply. Operating on channel 2480MHz – Live

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.151	34.2	55.9	-21.73	Pass	54.6	65.9	-11.32	Pass
0.57	30.9	46	-15.06	Pass	40.5	56	-15.48	Pass
0.885	19.1	46	-26.9	Pass	29.1	56	-26.9	Pass
1.175	18.3	46	-27.68	Pass	28.5	56	-27.5	Pass
1.725	17.8	46	-28.2	Pass	27.9	56	-28.12	Pass
1.985	17.8	46	-28.22	Pass	27.5	56	-28.46	Pass
2.215	18.4	46	-27.6	Pass	27.7	56	-28.34	Pass
6.45	32.5	50	-17.51	Pass	41.9	60	-18.11	Pass
6.875	36.8	50	-13.18	Pass	44.3	60	-15.73	Pass
9.354	23.4	50	-26.6	Pass	29.6	60	-30.43	Pass
14.175	36.1	50	-13.93	Pass	46.4	60	-13.55	Pass
15.18	31.5	50	-18.46	Pass	44	60	-15.97	Pass
16.415	30.9	50	-19.15	Pass	45.4	60	-14.6	Pass
19.597	21	50	-28.99	Pass	29.5	60	-30.49	Pass
20.916	30.6	50	-19.39	Pass	36.2	60	-23.78	Pass
23.25	26.7	50	-23.26	Pass	35	60	-24.97	Pass
29.88	25.9	50	-24.14	Pass	31.8	60	-28.18	Pass



Focus power supply. Operating on channel 2480MHz – Neutral

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBmV)	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.153	34.6	55.8	-21.23	Pass	55.1	65.8	-10.72	Pass
0.464	21.5	46.6	-25.17	Pass	32.2	56.6	-24.44	Pass
0.57	31.2	46	-14.81	Pass	40.9	56	-15.09	Pass
0.855	18.9	46	-27.05	Pass	29.8	56	-26.2	Pass
1.19	19.2	46	-26.78	Pass	29.3	56	-26.66	Pass
1.425	19.6	46	-26.37	Pass	29.1	56	-26.88	Pass
1.655	19.8	46	-26.18	Pass	28.9	56	-27.11	Pass
3.13	18.7	46	-27.31	Pass	27.4	56	-28.63	Pass
3.581	32.6	46	-13.42	Pass	35.2	56	-20.8	Pass
4.225	22	46	-24.01	Pass	30.1	56	-25.89	Pass
4.61	23.7	46	-22.28	Pass	31.4	56	-24.59	Pass
5.37	36.1	50	-13.95	Pass	40.2	60	-19.82	Pass
6.56	33.9	50	-16.13	Pass	42.1	60	-17.94	Pass
6.875	36.9	50	-13.07	Pass	44.4	60	-15.61	Pass
13.89	36.6	50	-13.43	Pass	46.9	60	-13.12	Pass
16.375	31.2	50	-18.82	Pass	45.9	60	-14.09	Pass
19.457	21.1	50	-28.95	Pass	30.4	60	-29.6	Pass
20.921	35.1	50	-14.87	Pass	38.5	60	-21.5	Pass
22.615	25.9	50	-24.11	Pass	33.4	60	-26.58	Pass
29.882	27.4	50	-22.6	Pass	33.5	60	-26.49	Pass

10.4.6 Example calculation

This correction factors required consists of LISN Insertion loss (IL), Cable loss (CL) and Transient Limiter Loss (TL)

The Actual Signal Level (ASL) is calculated as follows:

ASL (dBµV) = Indicated Signal Level (dBµV) + IL (dB) + CL (dB) + TL (dB)

10.4.7 Sample Data

The Quasi-Peak level at 17.34 MHz

ASL (dBµV) = 36.6dBµV = 25.15BµV + 1.15dB + 0..29dB + 10.01dB

Appendix A EUT Test Photos

Test set up photographs are supplied separately.

Appendix B Test Equipment List

Conducted Emissions from Antenna Port

Item	Serial No.	Last Calibration Date	Calibration Interval
RF Cable	Cable 9	January 2021	12 Months
Keysight PXA EMI Receiver	MY54170531	31st March 2020	12 Months

Radiated Emissions Equipment

Item	Serial No.	Last Calibration Date	Calibration Interval
Laboratory 1 Semi-Anechoic Chamber	Lab 1	28th January 2020	36 Months
ETS Lindgren 2017B Mast (1 – 4m) with tilting mechanism	--	N/A	N/A
R & S ESR		26th March 2020	12 Months
Chase CBL6112B Bilog Antenna, 78167	1503	13th December 2019	36 Months
6dB Attenuator (For use with Bilog Antenna)	78708B	13th December 2019	36 Months
HF26 Cable	167003-001	14th February 2020	12 Months
HF17 Cable	167002-001	14th February 2020	12 Months
HF27 Cable	-	14th February 2020	12 Months
EMCO 3115 Horn Antenna 78347	9712-5380	25th May 2020	24 Months
BONN BLMA 0118-5A Preamplifier	149759	3rd March 2020	12 Months

Mains conducted emissions equipment

Item	Serial No.	Last Calibration Date	Calibration Interval
Rohde & Schwarz ESR7 Test receiver	-	26th January 2021	12 Months
Cables J7, J9 and LF3	-	19th February 2020	12 Months
Rohde & Schwarz ESH3-Z5 LISN 78119	-	25th January 2021	12 Months
Teseq CFL 9206A transient limiter 10dB 9kHz - 30MHz	-	6th January 2021	12 Months
Kikusui PCR2000M power supply	-	-	-