Report No. 427974-09-R01

Test Report

Product	Desktop Collaboration Unit
Name and address of the applicant	Cisco Systems Norway AS Philip Pedersens vei 1 1366 Lysaker, Norway
Name and address of the manufacturer	Cisco Systems, Inc. 170 West Tasman Drive San Jose CA 95134, USA
Model	07-100577
Rating	12VDC,5.8A (Supplied from AC/DC adapter, Input:100-240VAC, otutput:12VDC)
Trademark	Cisco
Serial number	See page 3
Additional information	This test report covers only 2.4GHz wi-fi.
Tested according to	**Parts of FCC Part 15.247** Frequency Hopping Transmitters / Digital Transmission Systems **Parts of ISED Canada RSS-247, Issue 2** Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
Order number	427974
Tested in period	2021-06-14 to 2021-06-25
Issue date	2021-10-29
Name and address of the testing laboratory	Nemko Instituttveien 6 Kjeller, Norway www.nemko.com CAB Number: FCC: NO0001 ISED: NO0470 TEL: +47 22 96 03 30 FAX: +47 22 96 05 50 ilac-MRA NORWEGIAN ACCREDITATION TEST 033 **An accredited technical test executed under the Norwegian accreditation scheme**

Prepared by [G.Suhanthakumar]	Approved by [Frode Sveinsen]

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ENTERPRISE NUMBER NO974404532

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1 INFORMATION

1.1 Test Item

Name	**Cisco**
Model Number	**07-100577**
Model Number (Host)	**TTC7-30**
Marketing Name (Host)	**Cisco Webex Desk**
FCC ID	**LDK073002357**
ISED ID	**246IN-073002357**
Serial number	**FOC2512N0AC**
Hardware identity and/or version	**DV1**
Software identity and/or version	**RoomOS 10.5x**
Frequency Range	**2412 – 2462 MHz**
Number of Channels	**11**
Operating Modes	**802.11 b/g/n (only 20 MHz Mode)**
Type of Modulation	**DSSS / OFDM**
Conducted Output Power	**0.68 W(peak)**
Antenna Connector	**None**
Number of Antennas	**2**
Diversity or Smart Antennas	**Yes**
Power Supply	**Mains Powered (uses external AC/DC adapter)**

Description of Test Item

The EUT is a radio module with WiFi and BT/BLE module in a desktop collaboration unit.

This 2.4GHz WiFi part has been tested as a DTS system and fulfils all requirements for DTS systems.

The radio is a certified module LBEE5XV1XA (Cisco FCC ID: LDK073002357, Murata FCC ID: VPYLBEE5XV1XA).

The module is identical, but the antennas are changed, and power levels are reduced for some channels.

1.2 Normal test condition

Temperature:	20 - 24 °C
Relative humidity:	20 - 50 %
Normal test voltage:	120VAC, 60Hz

The EUT was powered from a regulated Power Source during all tests.

The values are the limit registered during the test period.

1.3 Test Engineer(s)

G.Suhanthakumar

1.4 Antenna Requirement

Does the EUT have detachable antenna(s)?	**☐ YES**	**☒ NO**
If detachable, is the antenna connector(s) non-standard?	**☐ YES**	**☐ NO**
The tested equipment has only integral antennas. Conducted tests were performed with a temporary antenna connector.		

Requirement: FCC 15.203, 15.204

1.5 EUT Operating Modes

Description of operating modes	Radiated Emissions and Power Line Conducted Emissions were performed with the EUT set to transmit at the channel with the highest output power as worst-case scenario.
Additional information	The worst case data rates were: 802.11b mode : 1 Mbps 802.11g mode : 6 Mbps 802.11n HT20 mode : MCS0

1.6 Power Levels

Power levels below were used for all tests.

Channel	802.11b	802.11g	802.11n
01	14.5	12.5	8
02	15	14.0	11
03	17	13.5	11.5
04	17	14.5	13
05	17	14.5	13
06	17	15.5	14
07	17	16.5	14
08	17	15.5	13
09	17	15	12
10	15	14	10.5
11	15.5	12.5	10

1.7 Comments

The measurements were done with the EUT powered by 115 V AC. It was checked that power variations between 85% and 115% did not have any influence on the measurements.

All ports were populated during spurious emission measurements.

This test report covers only radiated emissions tests. All other tests are covered by murata report no: ER/2020/90108.

2 TEST REPORT SUMMARY

2.1 General

All measurements are tracable to national standards.

The tests were conducted for demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.247 and ISED RSS-247 Issue 2 and RSS-GEN Issue 5.

Tests were performed in accordance with ANSI C63.4-2014 and ANSI C63.10-2013.

Radiated tests were performed in a semi-anechoic chamber at measuring distances of 3m.

A description of the test facility is on file with the FCC and ISED.

☐ New Submission	☒ Production Unit
☒ Class II Permissive Change	☐ Pre-production Unit
DTS Equipment Code	☐ Family Listing

THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

Deviations from, additions to, or exclusions from the test specifications are described in “Summary of Test Data”.

2.2 Test Summary

Name of test	FCC Part 15 reference	RSS-247 Issue 2, RSS-GEN Issue 5 reference	ANSI C63.10-2013 Reference	Result
Supply Voltage Variations	15.31(e)	6.11 (RSS-GEN)	5.13	Complies
Antenna Requirement	15.203	6.8 (RSS-GEN)	5.8	Complies
Power Line Conducted Emission	15.107(a) 15.207(a)	7.2 / 8.8 (RSS-GEN)	6.2	N/T
Occupied Bandwidth (99% BW)	N/A	6.7 (RSS-GEN)	6.9.3	N/T
DTS Bandwidth	15.247(a)(2)	5.2 (1) (RSS-247)	11.8 Option 2	N/T
Peak Power Output	15.247(b)	5.4 (RSS-247)	11.9.1.1	Complies
Power Spectral Density	15.247(d)	5.2 (2) (RSS-247)	11.10.2 PKPSD (DTS)	N/T
Spurious Emissions (Antenna Conducted)	15.247(c)	5.5 (RSS-247)	6.7 11.11 (DTS)	N/T
Spurious Emissions (Radiated)	15.247(c) 15.109(a) 15.209(a)	5.5 (RSS-247) 7.3 (RSS-GEN) 8.9 (RSS-GEN)	6.3, 6.5, 6.6, 6.10 11.12, 11.13 (DTS)	Complies

Revision history

Revision	Date	Comment	Sign
00	2021-08-16	First edition	gns
01	2021-10-29	Model references updated in page 1 and 3	gns

3 TEST RESULTS

3.1 Peak Power Output

FCC Part 15.247 (b)

ISED Canada RSS-247 Issue 2, Clause 5.4

Measurement procedure: ANSI C63.10-2013 Clause 11.9.1.2

Test Results: Complies

Measurement Data:

Carrier Frequency	Field Strength, dBµV/m @3m			
	802.11b 1M	802.11g 6M	802.11n HT20 SISO	802.11n HT20 MIMO
2412 MHz	114.79	116.80	118.92	113.29
2437 MHz	116.46	119.72	119.50	117.58
2462 MHz	114.23	116.52	115.29	114.66

Carrier Frequency	Peak EIRP, dBm			
	802.11b 1M	802.11g 6M	802.11n HT20 SISO	802.11n HT20 MIMO
2412 MHz	19.6	21.6	23.7	18.1
2437 MHz	21.2	24.5	24.3	22.4
2462 MHz	19.0	21.3	20.1	19.4

Output Power reported is Maximum Peak Power.

The Integrated Band Power Method was used to measure Output Power.

Radiated Power was calculated from measured Field Strength using the method described in FCC KDB 412172 D01.

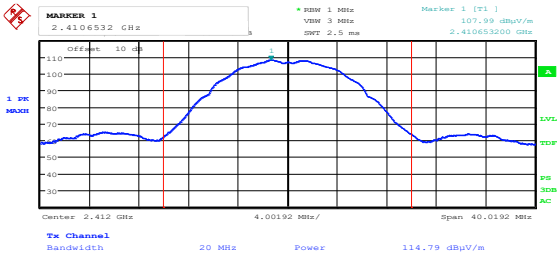
See attached plots.

Requirements:

The maximum peak output power shall not exceed the following limits:

For Digital Transmission Systems in the 2400 - 2483.5 MHz band: 1 Watt

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced below the stated value above by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



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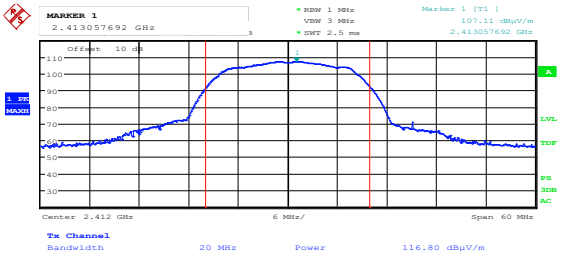

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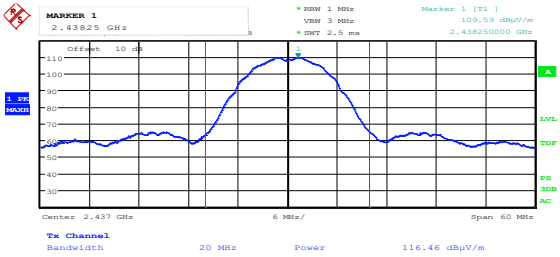
EIRP, 2412 MHz, 802.11b 1M, HP, Ant 1

EIRP, 2412 MHz, 802.11g 6M, HP, Ant 1



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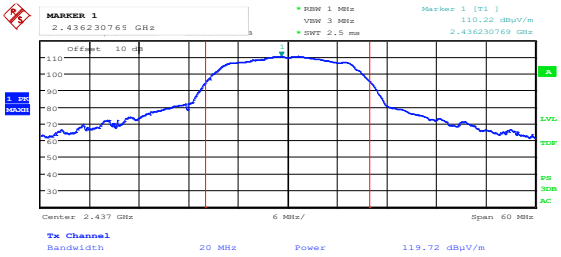

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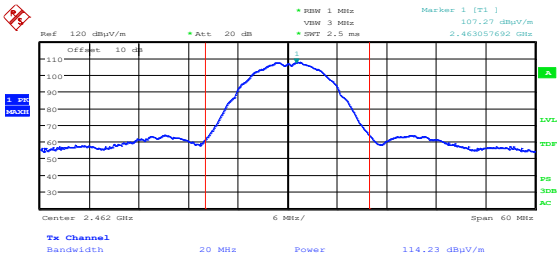
EIRP, 2437 MHz, 802.11g 6M, HP, Ant 1



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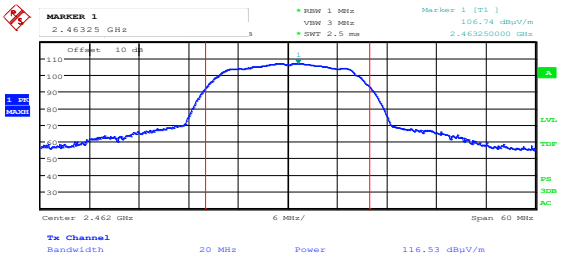

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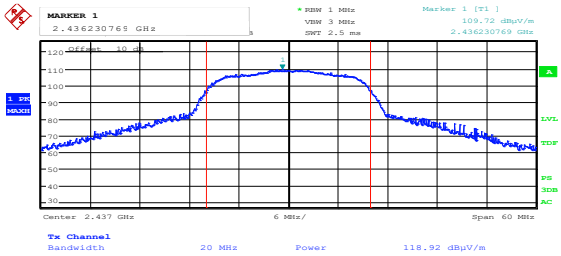
EIRP, 2462 MHz, 802.11b 1M, HP, Ant 1

EIRP, 2462 MHz, 802.11g 6M, HP, Ant 1



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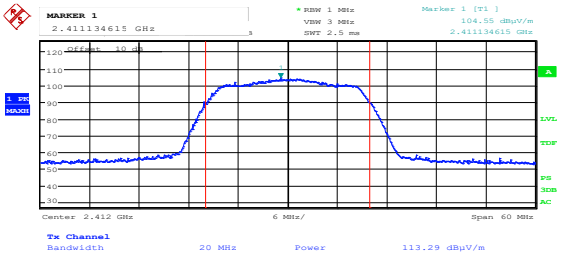
EIRP, 2412 MHz, 802.11n HT20, HP, Ant 1



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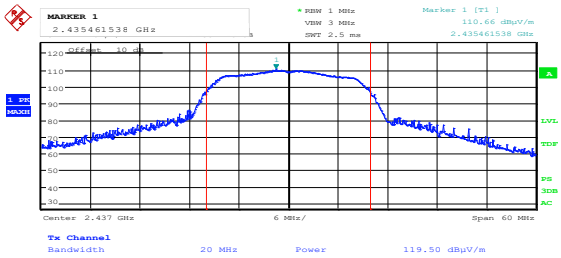
EIRP, 2412 MHz, 802.11n HT20, HP, MIMO



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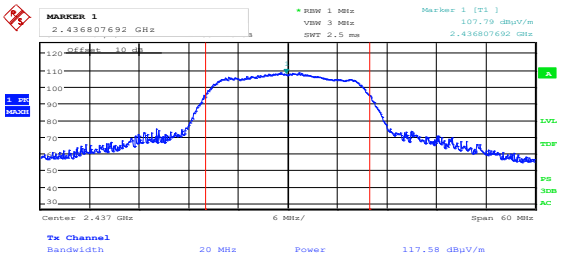
EIRP, 2437 MHz, 802.11n HT20, VP, Ant 1



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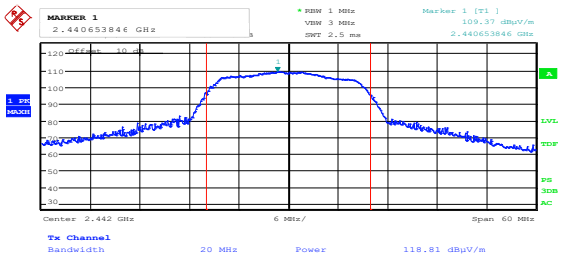
EIRP, 2437 MHz, 802.11n HT20, HP, MIMO



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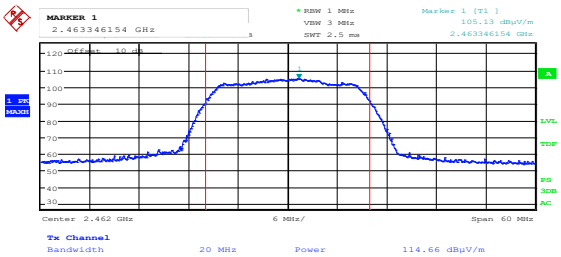

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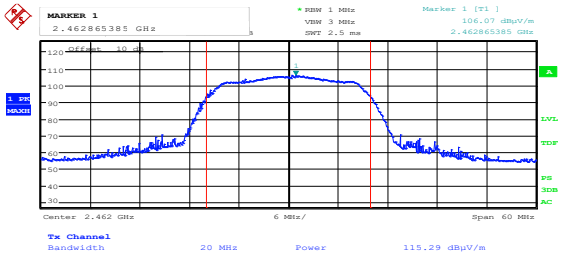
EIRP, 2462 MHz, 802.11n HT20, HP, MIMO



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EIRP, 2462 MHz, 802.11g 6M, HP, Ant 1

3.2 Restricted Bands of operation

Restricted Bands of operation for FCC and ISED are defined in FCC Part 15.205 and ISED RSS-GEN, Issue 5 clause 8.10.

Generally, no fundamentals are allowed in the restricted bands and all emissions must comply with the limits in FCC 15.209 or RSS-GEN, Issue 5, clause 8.9.

FCC (MHz)	ISED (MHz)	FCC (GHz)	ISED (GHz)
0.090-0.110		**0.96-1.24** **1.3-1.427**	**0.96-1.427**
0.495-0.505		1.435-1.6265	
2.1735-2.1905		1.6455-1.6465	
	3.020-3.026	1.660-1.710	
4.125-4.128		1.7188-1.7222	
4.17725-4.17775		2.2-2.3	
4.20725-4.20775		2.31-2.39	
	5.677-5.683	2.4835-2.5	
6.215-6.218		**2.69-2.9**	**2.655-2.9**
6.26775-6.26825		3.26-3.267	
6.31175-6.31225		3.332-3.339	
8.291-8.294		3.3458-3.358	
8.362-8.366		**3.6-4.4**	**3.5-4.4**
8.37625-8.38675		4.5-5.15	
8.41425-8.41475		5.35-5.46	
12.29-12.293		7.25-7.75	
12.51975-12.52025		8.025-8.5	
12.57675-12.57725		9.0-9.2	
13.36-13.41		9.3-9.5	
16.42-16.423		10.6-12.7	
16.69475-16.69525		13.25-13.4	
16.80425-16.80475		14.47-14.5	
25.5-25.67		15.35-16.2	
37.5-38.25		17.7-21.4	
73-74.6		22.01-23.12	
74.8-75.2		23.6-24.0	
108-121.94 **123-138**	**108-138**	31.2-31.8	
149.9-150.05		36.43-36.5	
156.52475-156.52525		Above 38.6	
156.7-156.9			
162.0125-167.17			
167.72-173.2			
240-285			
322-335.4			
399.9-410			
608-614			

Frequencies in **Bold** text are specific for FCC or ISED, all other frequencies are common.

3.3 Radiated Emissions, Band Edge

FCC Part 15.209 (a)

ISED Canada RSS-GEN Issue 5, Clause 7.3 / 8.9

Measurement procedure: **ANSI C63.10-2013 Clause 11.12**

Test Results: Complies

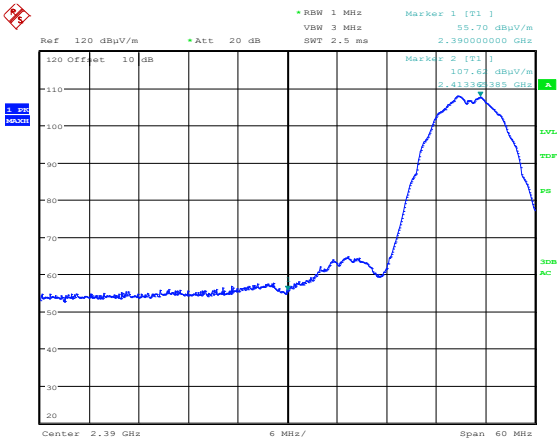
Measurement Data:

Peak Detector					
Modulation and Bitrate	Measured field strength (dBµV/m)		Limit	Margin	
	2390 MHz	2483.5 MHz	dB	dB	
802.11b, 11 Mbps	55.70	56.91	74	18.3	17.1
802.11g, 6 Mbps	60.30	59.78	74	13.7	14.2
802.11n, HT20, SISO	59.02	59.54	74	14.9	14.5
802.11n, HT20, MIMO	55.17	53.36	74	18.8	20.6

Average Detector					
Modulation and Bitrate	Measured field strength (dBµV/m)		Limit	Margin	
	2390 MHz	2483.5 MHz	dB	dB	
802.11b, 11 Mbps	44.90	47.05	54	9.1	7.0
802.11g, 6 Mbps	46.76	45.43	54	7.2	8.6
802.11n, HT20, SISO	45.91	43.74	54	8.1	10.3
802.11n, HT20, MIMO	42.97	42.85	54	11.0	11.2

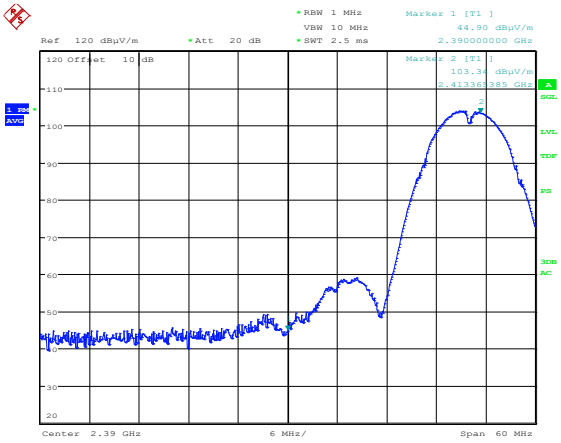
Average values were measured using trace averaging as described in ANSI C63.10-2013 clause 11.12.2.5.1 (Duty Cycle ≈100%).

See attached plots.



Date: 14.JUN.2021 12:34:44

Lower Band Edge, 2412 MHz, 802.11b 1M, Peak



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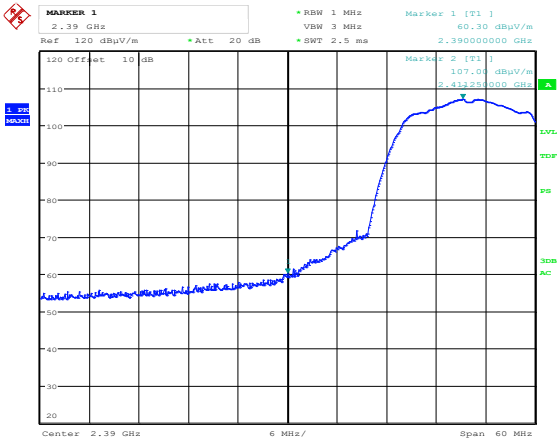

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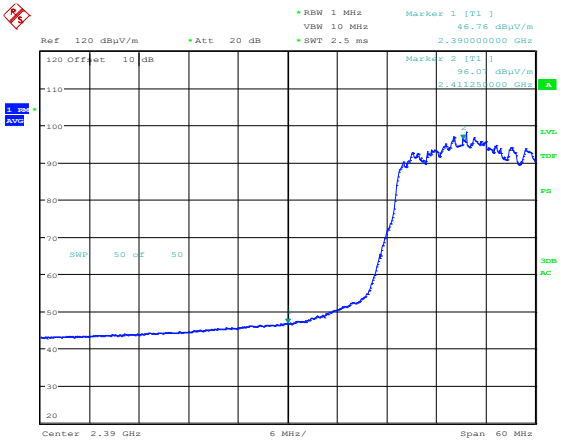
Lower Band Edge, 2412 MHz, 802.11g 6M, Peak



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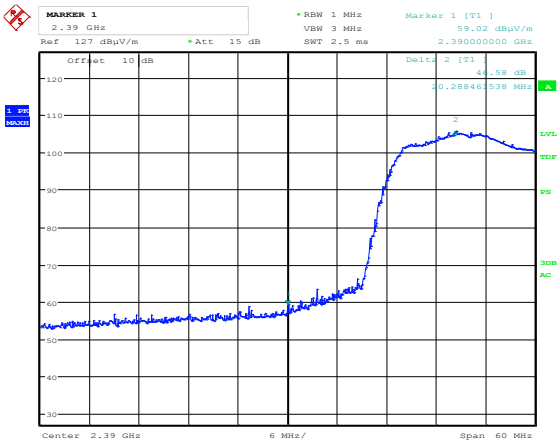

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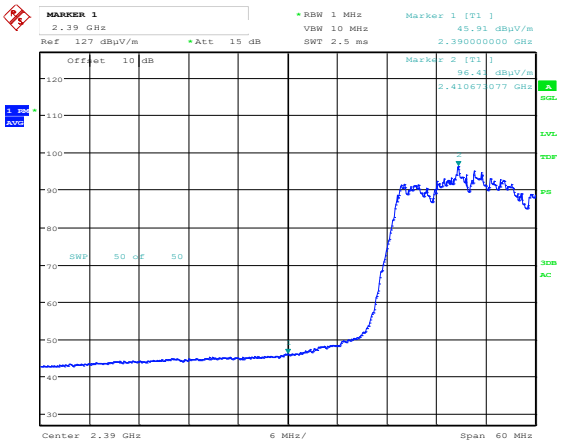
Lower Band Edge, 2412 MHz, 802.11n MCS0, Peak



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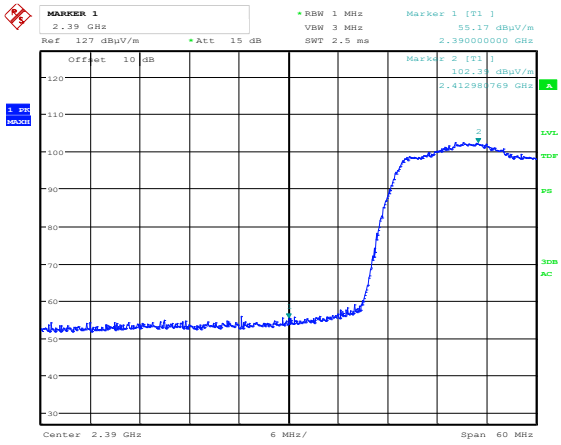

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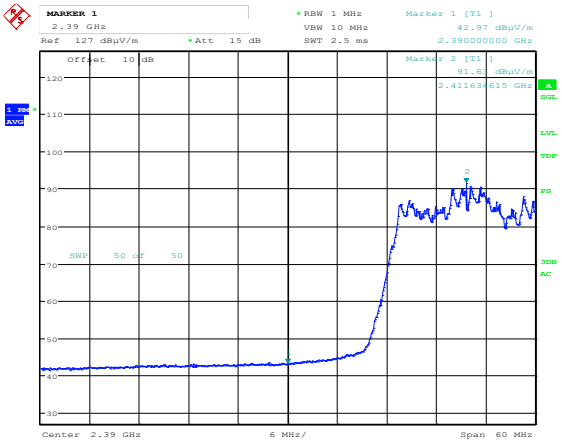
Lower Band Edge, 2412 MHz, 802.11n MIMO, Peak



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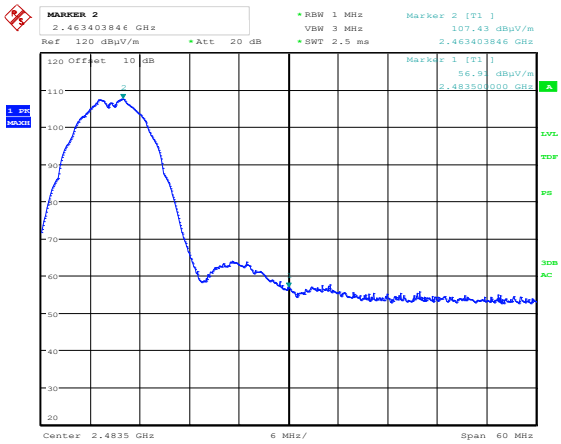
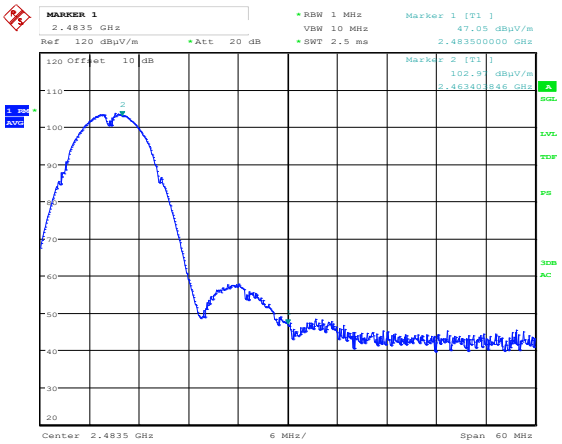


Date: 14.JUN.2021 12:46:37

Upper Band Edge, 2462 MHz, 802.11b 1M, Peak



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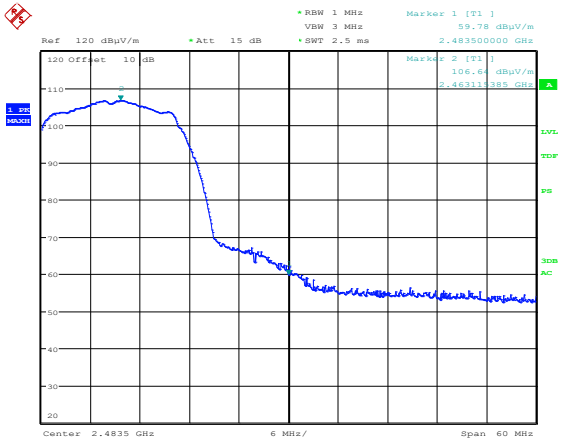
Upper Band Edge, 2462 MHz, 802.11b 1M, Average



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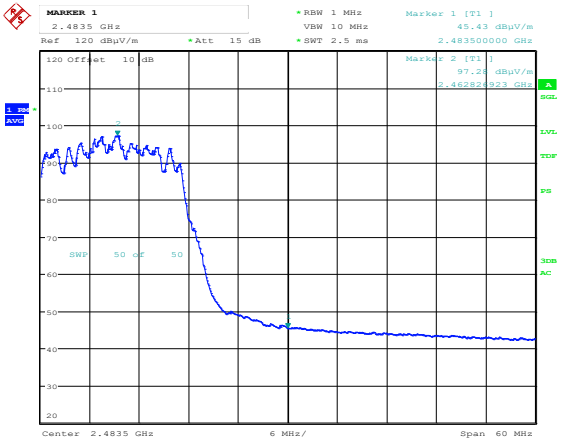

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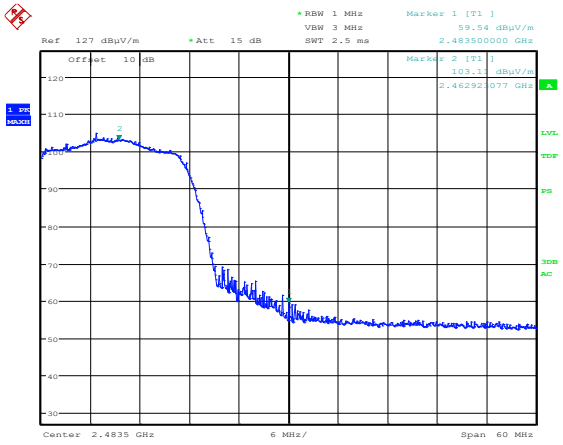
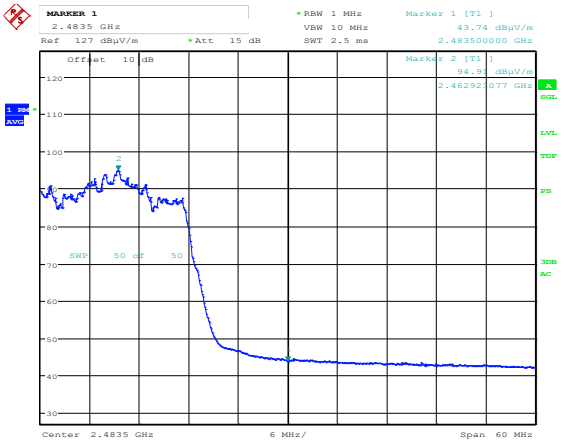
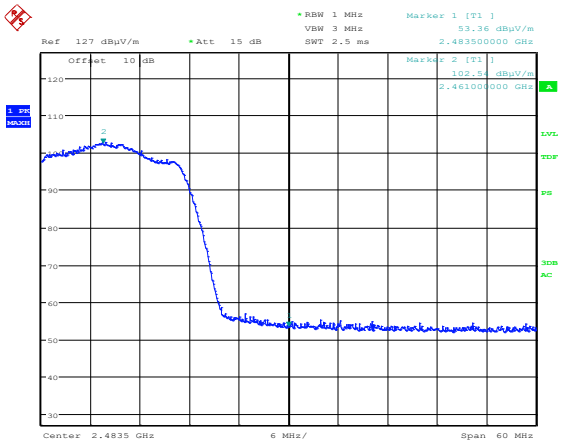


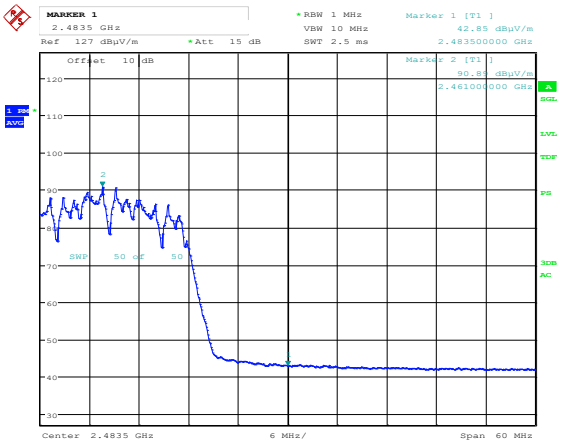
Upper Band Edge, 2462 MHz, 802.11n MCS0, Peak



Upper Band Edge, 2462 MHz, 802.11n MCS0, Average



Upper Band Edge, 2462 MHz, 802.11n MIMO, Peak



Upper Band Edge, 2462 MHz, 802.11n MIMO, Average

3.4 Radiated Emissions, 30 -1000 MHz

FCC Part 15.209 (a)

ISED Canada RSS-GEN Issue 5, Clause 7.3/8.9

Measurement procedure: ANSI C63.10-2013 Clause 11.12

Test Results: Complies

Measurement Data:

Detector: Peak Detector for Pre-scan (Measurements with Quasi-Peak Detector)

Measuring distance 3m

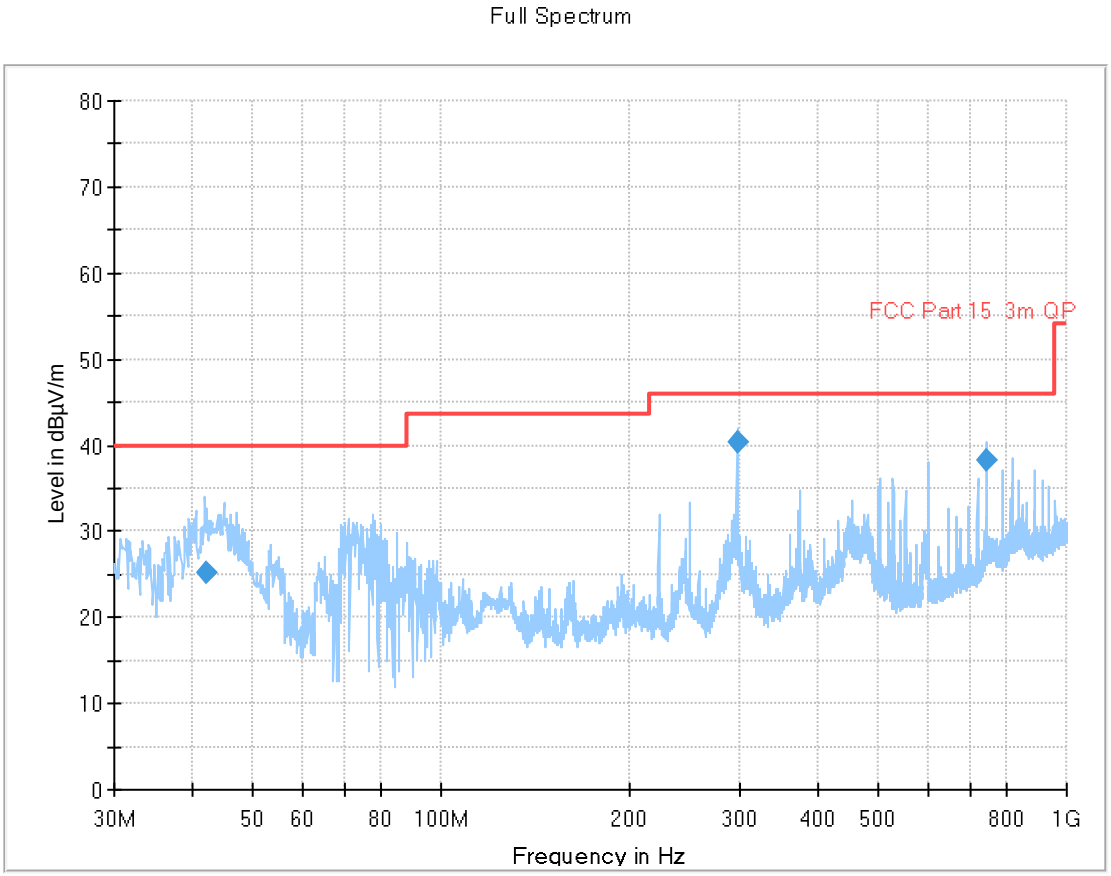
Tested in test mode with EUT transmitting.

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
42.171100	25.10	40.00	14.90	1000.0	120.000	102.0	V	4.0
296.999200	40.24	46.00	5.76	1000.0	120.000	100.0	H	3.0
742.490250	38.34	46.00	7.66	1000.0	120.000	100.0	H	145.0

See attached plots.

Requirements/Limit

FCC	Part 15.209 @ frequencies defined in §15.205	
ISED	RSS-GEN Issue 5, Clause 8.9 @ frequencies defined in clause 8.10	
Frequency	Radiated emission limit @3 meters	
30 – 88 MHz	100 µV/m	40.0 dBµV/m
88 – 216 MHz	150 µV/m	43.5 dBµV/m
216 – 960 MHz	200 µV/m	46.0 dBµV/m
960 – 1000 MHz	500 µV/m	54.0 dBµV/m
	Limits above are with Quasi Peak Detector	



Radiated Emissions 30 - 1000 MHz, 802.11g 6M

3.5 Radiated Emissions, 1 -26 GHz

FCC Part 15.209 (a)

ISED Canada RSS-GEN Issue 5, Clause 7.3/8.9

Measurement procedure: **ANSI C63.10-2013 Clause 11.12**

Test Results: Complies

Measurement Data:

Measuring distance: 3m (1 – 18 GHz)
1m (18 – 26 GHz)

RBW/VBW = 1MHz/3MHz

Carrier freq. (MHz)	Measured Frequency (GHz)	Measured Emissions (dBµV/m)		Limit (dBµV/m)		Margin (dB)	
		Peak Det.	Average Det.	Peak	Average	Peak	Average
Any	Non detected	/	/	74	54	/	/
Any	Non detected	/	/	74	54	/	/
Any	Non detected	/	/	74	54	/	/
Any	Non detected	/	/	74	54	/	/
Any	1 - 26	/	/	74	54	/	/

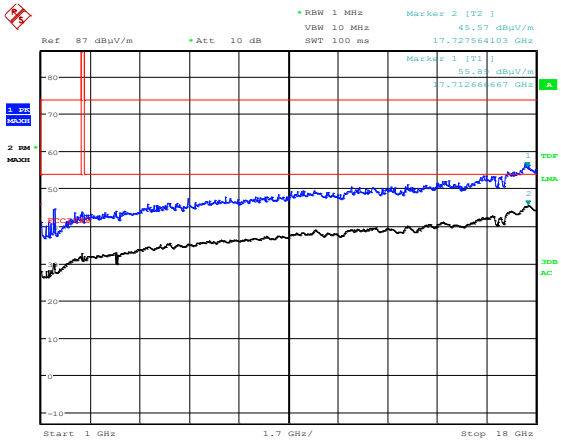
A Band Reject Filter was used for measurements from 1 GHz to 18 GHz

Antenna factor, amplifier gain and cable loss are included in spectrum analyzer “Transducer factor”.

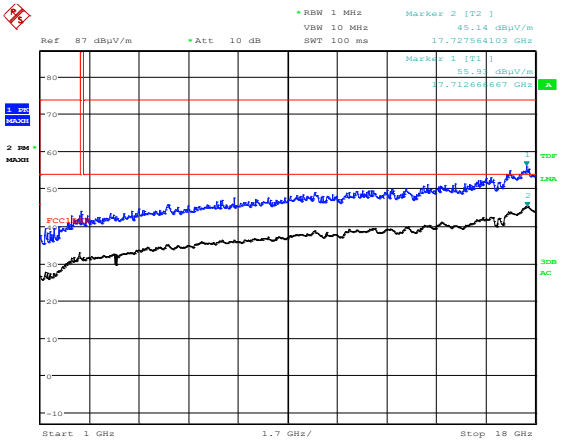
See plots.

Requirements/Limit

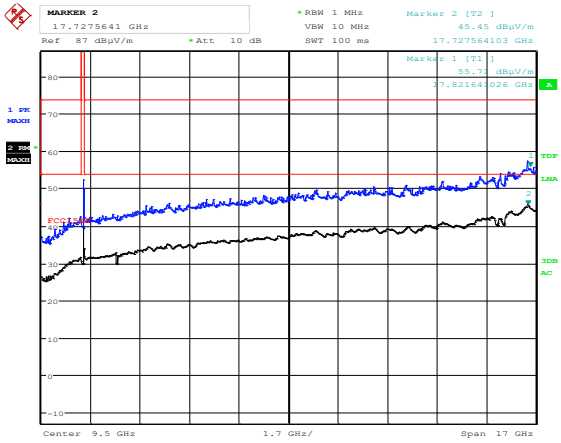
FCC	Part 15.209 @ frequencies defined in §15.205	
ISED	RSS-GEN Issue 5, clause 8.9 @ frequencies defined in clause 8.10	
	Radiated emission limit @3 meters	
Frequency	Average Detector	Peak Detector
1 – 26 GHz	54.0 dBµV/m	74.0 dBµV/m



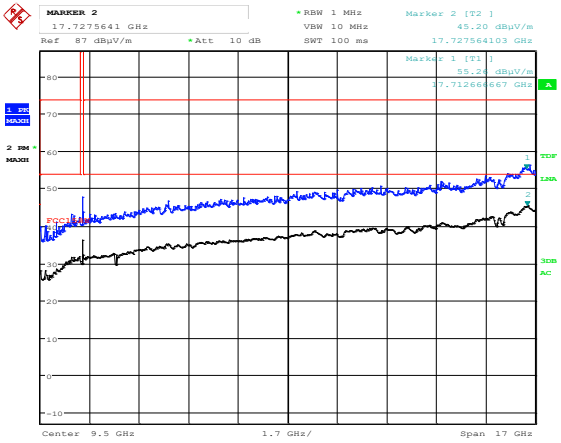
Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11b 1M, HP



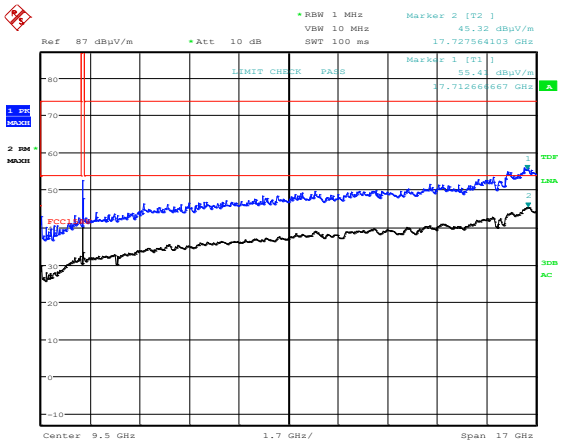
Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11b 1M, VP



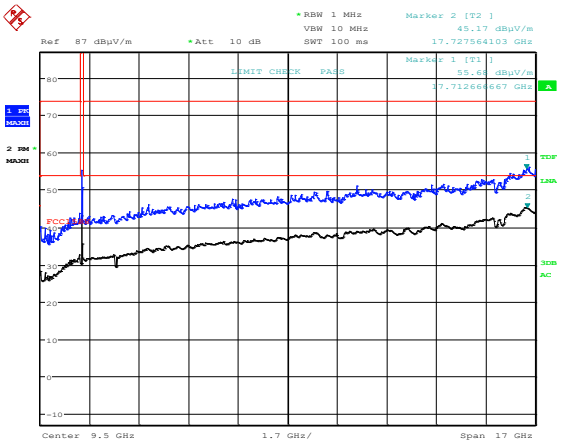
Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11g 6M, HP



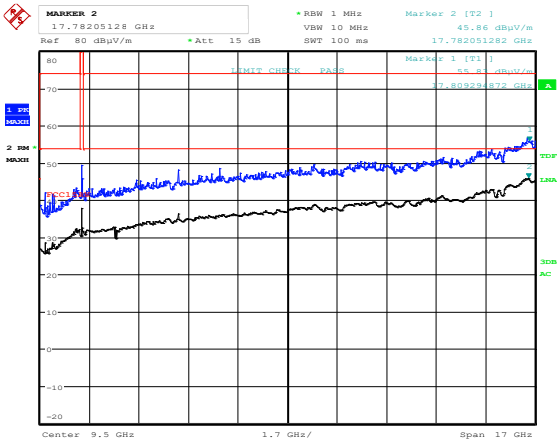
Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11g 6M, VP



Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11n MCS0, HP

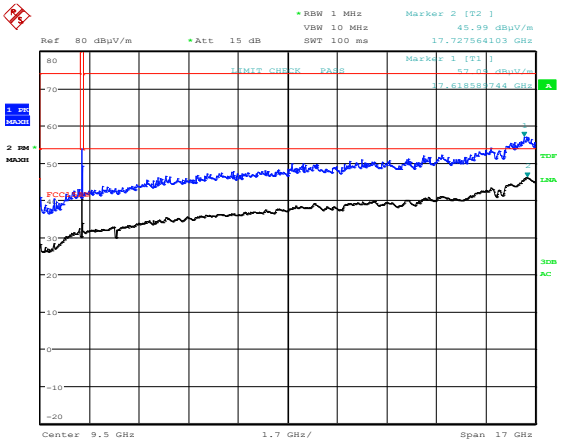


Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11n MCS0, VP



Date: 14.JUN.2021 13:59:29

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11n MIMO, HP



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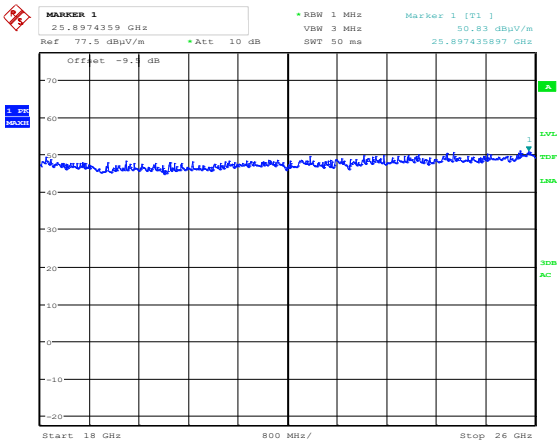
Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11n MIMO, VP



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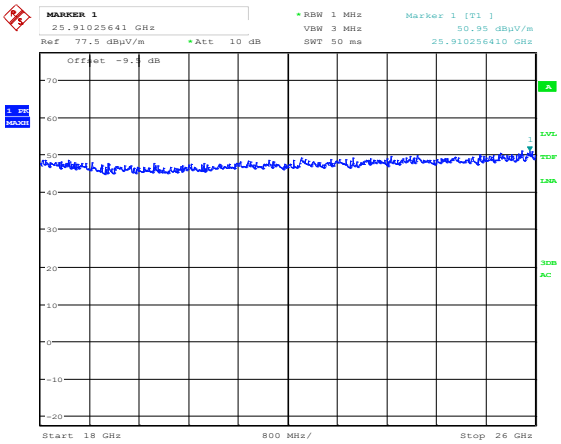
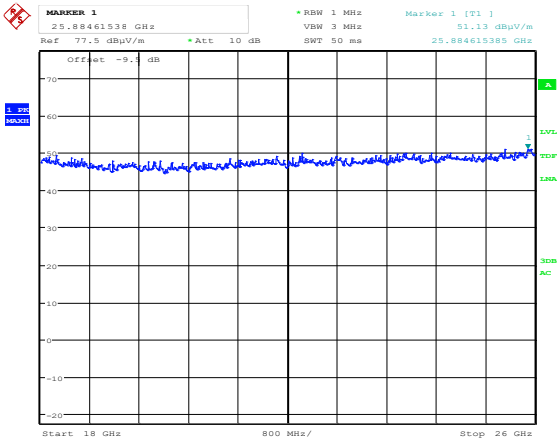
Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11g 6M, HP



Date: 14.JUN.2021 14:14:29

Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11g 6M, VP



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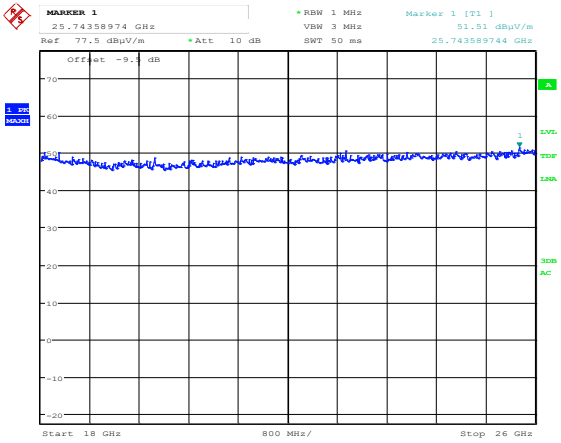
Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11n MIMO, HP



Date: 14.JUN.2021 14:11:17

Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11n MIMO, VP

4 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item		**Uncertainty**
Output Power		±0.5 dB
Power Spectral Density		±0.5 dB
Out of Band Emissions, Conducted	**< 3.6 GHz**	±0.6 dB
	> 3.6 GHz	±0.9 dB
Spurious Emissions, Radiated	**< 1 GHz**	±2.5 dB
	> 1 GHz	±2.2 dB
Emission Bandwidth		±4 %
Power Line Conducted Emissions		+2.9 / -4.1 dB
Spectrum Mask Measurements	**Frequency**	±5 %
	Amplitude	±1.0 dB
Frequency Error		±0.6 ppm
Temperature Uncertainty		±1 °C

All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2

5 LIST OF TEST EQUIPMENT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1	FSW43	Spectrum Analyzer	Rohde & Schwarz	LR 1690	2020-10	2021-10
2	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2021-03	2022-03
3	6810-17B	Attenuator	Suhner	LR 1669	2020-08	2021-08
4	N0324415	BandStop Filter	Microwave Circuits	LR 1760	COU	
5	WLK5-1100-1485-7000-40SS	Low Pass Filter	Wainwright Inst.	LR 1761	COU	
6	VULB 9163	BiLog Antenna	Schwarzbeck	LR 1616	2020-01	2023-01
7	317	Preamplifier	Sonoma Inst.	LR 1687	2020-08	2021-08
8	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2020-08	2021-08
9	3115	Horn Antenna	EMCO	LR 1330	2016-10	2021-10
10	3117-PA	Horn Antenna +PreAmp	EMCO	LR 1717	2020-08	2021-08
11	Model 638	Antenna Horn	Narda	LR 1480	N/A	
12	Model 87 V	Multimeter	Fluke	LR 1599	2021-02	2023-02
14	6812B	AC Power Source	Agilent	LR 1515	COU	
15	ENV216	Two Line V-Network	Rohde & Schwarz	LR 1665	2019-11	2021-11
16	ESCI3	Measuring Receiver	Rohde & Schwarz	N-4259	2019-10	2021-10
19	ST18/SMA/N/36	RF Cable	Suhner	LR 1627	COU	
20	SF102/1000MM	RF Cable	Suhner	SN 50113/2	COU	
21	SF102/2000MM	RF Cable	Suhner	SN 500100/2	COU	

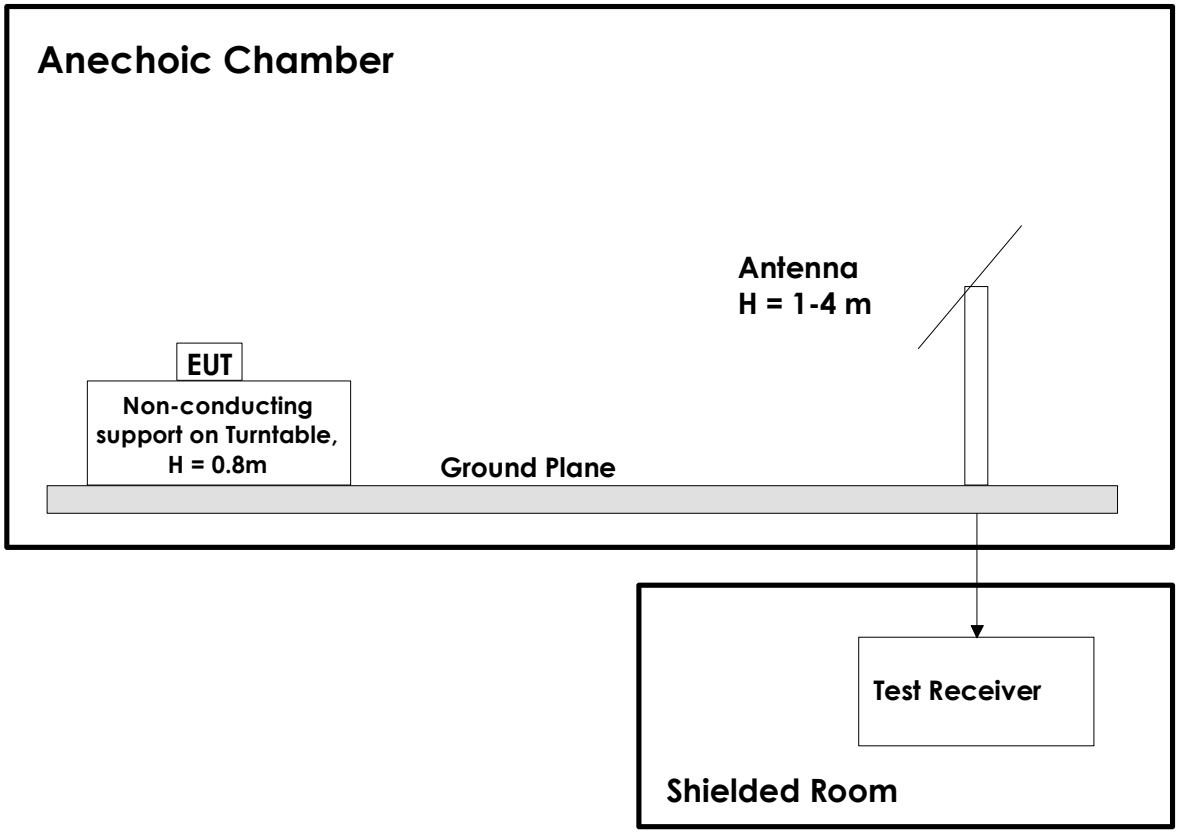
Note: COU – calibrate on use; N/A – Not Applicable

The software listed below has been used for one or more tests.

No.	Manufacturer	Name	Version	Comment
1	Rohde & Schwarz	EMC32	10.40.10	Power Line Conducted test software
2	Nemko AS	RSPlot	1.0.8.0	Screenshots from R&S Spectrum Analyzers

6 BLOCK DIAGRAM

6.1 Test Site Radiated Emission



This test setup is used for all radiated emissions tests. For frequencies below 30 MHz the measuring distance is 10m, for all other frequencies it is 3m or 1m. Emissions above 1 GHz are measured with a Spectrum Analyzer and Horn Antenna. For measurements above 18 GHz the test receiver is moved inside the anechoic chamber and located next to the antenna to minimize the cable loss. All measurements at 1GHz and above were performed with turntable height 1.5m and with the ground plane covered by absorbers. A pre-amplifier is used for all measurements above 30 MHz, and High-Pass or Band-Pass filter is used for all harmonics.