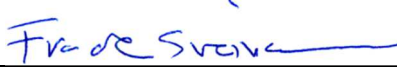


Test Report

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	100 – 240 V _{AC}
Trademark	Cisco
Serial number	FOC2528NJ5W
Additional information	WiFi, BT Classic, BLE
Tested according to	Parts of FCC Part 15.247 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	437731
Tested in period	2021-08-25 to 2021-08-27
Issue date	2021-09-27
Name and address of the testing laboratory	 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   An accredited technical test executed under the Norwegian accreditation scheme
 Prepared by [Frode Sveinsen]  Approved by [G.Suhanthakumar]	
This report shall not be reproduced except in full without the written approval of Nemko. Opinions and interpretations expressed within this report are not part of the current accreditation. This report was originally distributed electronically with digital signatures. For more information contact Nemko.	

CONTENTS

1	INFORMATION	3
1.1	Test Item	3
1.2	Normal test condition	4
1.3	Test Engineer(s)	4
1.4	Antenna Requirement	4
1.5	EUT Operating Modes	4
1.6	Power Levels	4
1.7	Comments	4
2	TEST REPORT SUMMARY	5
2.1	General	5
2.2	Test Summary	6
3	TEST RESULTS	7
3.1	Peak Power Output	7
3.2	Restricted Bands of operation	13
3.3	Radiated Emissions, Band Edge	14
3.4	Radiated Emissions, 30 -1000 MHz	23
3.5	Radiated Emissions, 1 -26 GHz	25
4	Measurement Uncertainty	31
5	LIST OF TEST EQUIPMENT	32
6	BLOCK DIAGRAM	33
6.1	Test Site Radiated Emission	33

1 INFORMATION

1.1 Test Item

Name	Cisco
Model Number	07-100577
FCC ID	LDK073002357
ISED ID	2461N-073002357
Serial number	FOC2528NJ5W
Hardware identity and/or version	DV1
Software identity and/or version	Room OS 10.6.0
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	802.11b: 0.167 W 802.11g: 0.370 W 802.11n: 0.676 W (MIMO)
Antenna Connector	None
Number of Antennas	2
Diversity or Smart Antennas	Yes
Power Supply	Mains Powered (100-240 V _{AC})

Description of Test Item

The EUT is a radio module with WiFi and BT/BLE module in a collaboration end-point system.

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

The radio is a certified radio module. This test report only covers additional tests for use with new antennas.

Data for the original radio module				
Brand Name	FCC ID	IC ID	Original Test Report No	Radio Technology
muRata	VPYLBEE5XV1XA	772C-LBEE5XV1XA	ER-2020-90106	BT Classic
			ER-2020-90107	BT Low Energy
			ER-2020-90108	WLAN
			ER-2020-90109	UNII 2TX
			ER-2020-90110	DFS

1.2 Normal test condition

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

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)

Frode Sveinsen

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 : 11 Mbps 802.11g mode : 6 Mbps 802.11n HT20 SISO : MCS0 802.11n HT20 MIMO : MCS8

1.6 Power Levels

The default power levels from the module manufacturer Murata were used for all tests.

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

1.7 Comments

The measurements were done with the EUT powered by 120V 60Hz from the power source.

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 selected tests for new antennas, all other tests are covered by the original SGS Test Report.

2 TEST REPORT SUMMARY

2.1 General

All measurements are traceable to national standards.

The tests were conducted for demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.247 and ISSED 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 ISSED.

☐ 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".

Nemko Group authorizes the above named entity to reproduce this report provided it is reproduced in its entirety and for use by the entity's employees only. Any reproduction of parts of this report requires approval in writing from Nemko Group.

Any use that a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Group accepts no responsibility for damages suffered by any third party caused by decisions made or actions based on this report.

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	Complies
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	2021-09-01	First edition	FS

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 11M	802.11g 6M	802.11n HT20 SISO	802.11n HT20 MIMO
2412 MHz	117.1	117.5	116.3	116.9
2417 MHz	117.9	119.0	118.3	119.5
2422 MHz				120.1
2437 MHz	120.7	120.6	121.0	123.0
2447 MHz				121.9
2452 MHz		120.4	120.1	120.9
2457 MHz	118.6	119.5	118.4	119.6
2462 MHz	119.0	118.3	117.5	119.2

Carrier Frequency	Peak EIRP, dBm			
	802.11b 11M	802.11g 6M	802.11n HT20 SISO	802.11n HT20 MIMO
2412 MHz	21.9	22.3	21.1	21.7
2417 MHz	22.7	23.8	23.1	24.3
2422 MHz				24.9
2437 MHz	25.5	25.4	25.8	27.8
2447 MHz				26.7
2452 MHz		25.2	24.9	25.7
2457 MHz	23.4	23.1	22.3	24.0
2462 MHz	23.8	23.1	22.3	24.0

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.

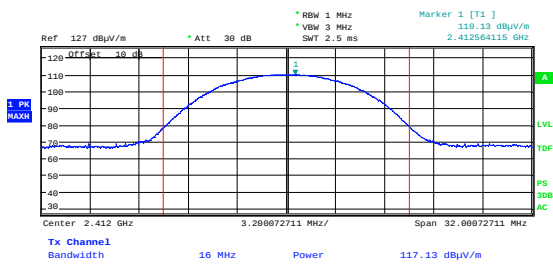
See attached plots.

Requirements:

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

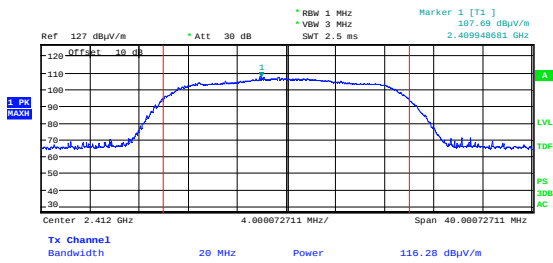
For Digital Transmission Systems in the 2400 - 2483.5 MHz band: 1 Watt (30 dBm)

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.



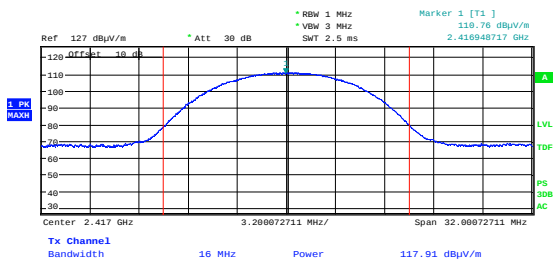
Date: 25.AUG.2021 13:49:35

Maximum EIRP, 2412 MHz, 802.11b 11M



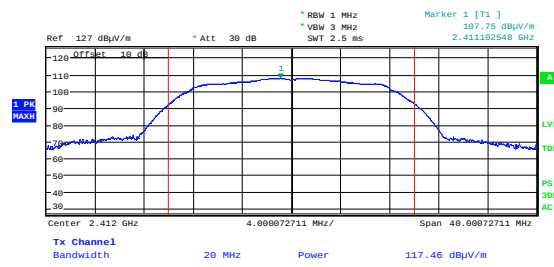
Date: 25.AUG.2021 14:02:05

Maximum EIRP, 2412 MHz, 802.11n MCS0, SISO



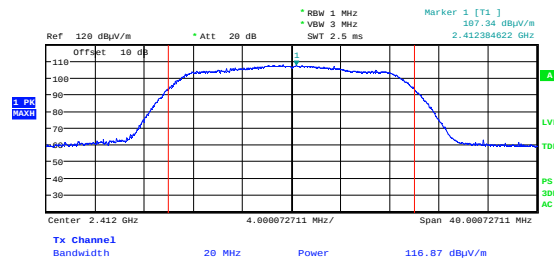
Date: 25.AUG.2021 13:56:03

Maximum EIRP, 2417 MHz, 802.11b 11M



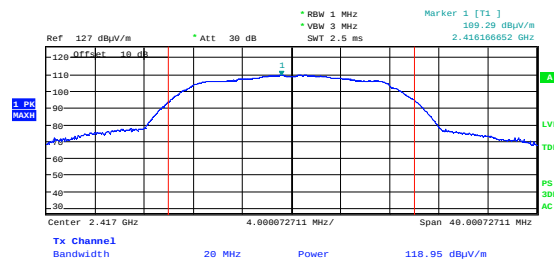
Date: 25.AUG.2021 13:27:37

Maximum EIRP, 2412 MHz, 802.11g 6M



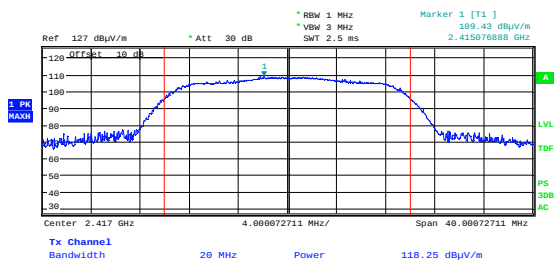
Date: 25.AUG.2021 15:01:20

Maximum EIRP, 2412 MHz, 802.11n MCS8, MIMO



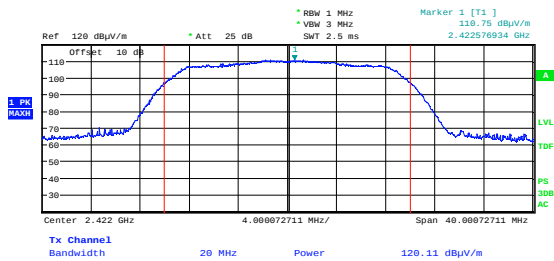
Date: 25.AUG.2021 13:31:58

Maximum EIRP, 2417 MHz, 802.11g 6M



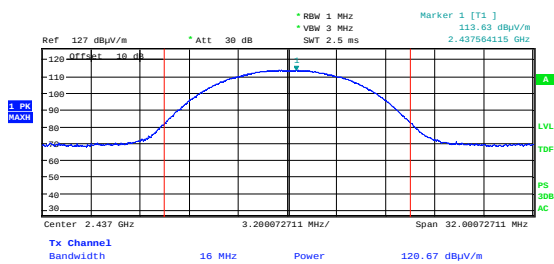
Date: 25.AUG.2021 14:10:16

Maximum EIRP, 2417 MHz, 802.11n MCS0, SISO



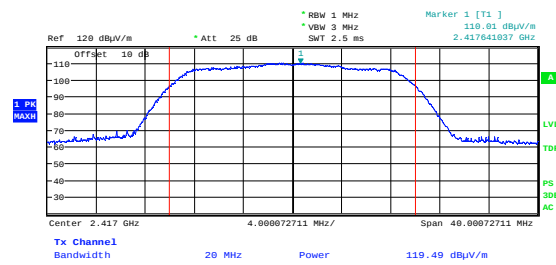
Date: 25.AUG.2021 15:07:20

Maximum EIRP, 2422 MHz, 802.11n MCS8, MIMO



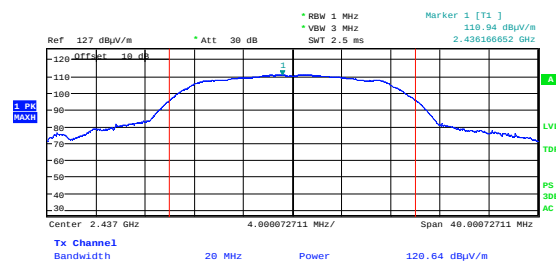
Date: 25.AUG.2021 14:29:27

Maximum EIRP, 2437 MHz, 802.11b 11M



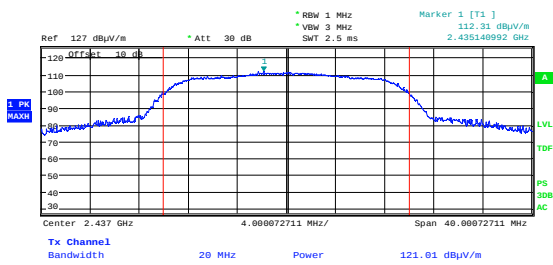
Date: 25.AUG.2021 15:04:33

Maximum EIRP, 2417 MHz, 802.11n MCS8, MIMO



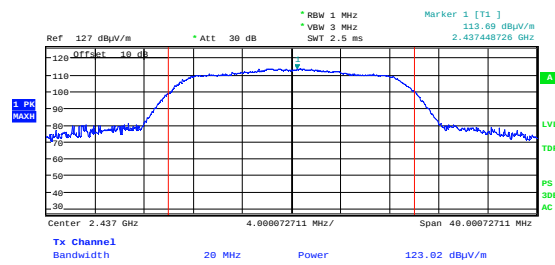
Date: 25.AUG.2021 13:00:29

Maximum EIRP, 2437 MHz, 802.11g 6M



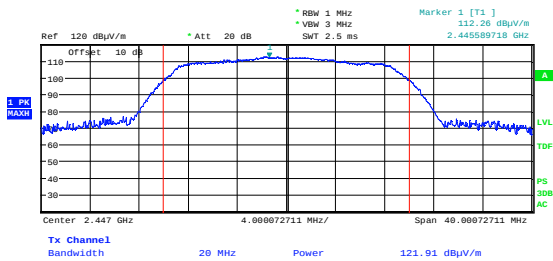
Date: 25.AUG.2021 14:23:52

Maximum EIRP, 2437 MHz, 802.11n MCS0, SISO



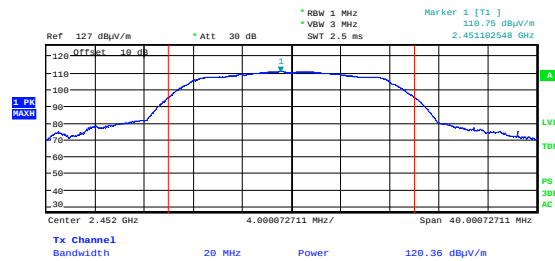
Date: 25.AUG.2021 14:49:50

Maximum EIRP, 2437 MHz, 802.11n MCS8, MIMO



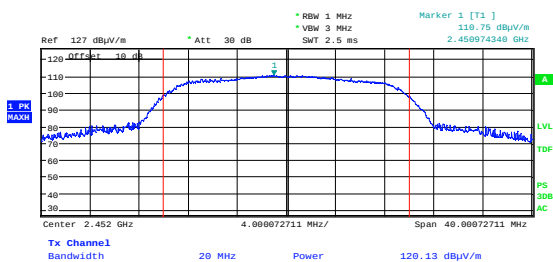
Date: 25.AUG.2021 15:12:41

Maximum EIRP, 2447 MHz, 802.11n MCS8, MIMO



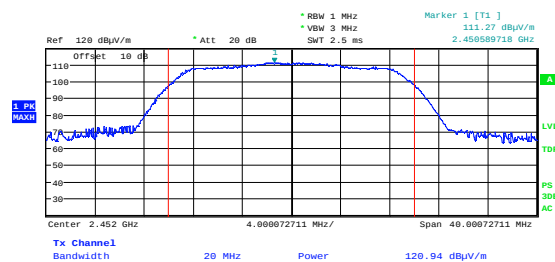
Date: 25.AUG.2021 13:36:01

Maximum EIRP, 2452 MHz, 802.11g 6M



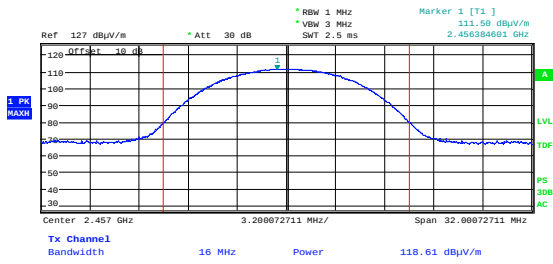
Date: 25.AUG.2021 14:20:24

Maximum EIRP, 2452 MHz, 802.11n MCS0, SISO



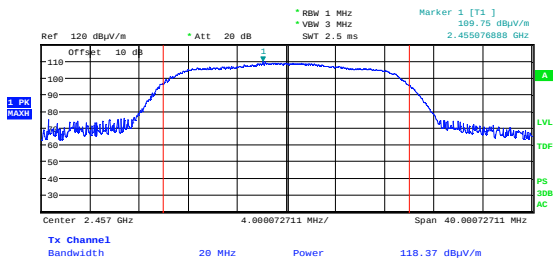
Date: 25.AUG.2021 14:58:28

Maximum EIRP, 2452 MHz, 802.11n MCS8, MIMO



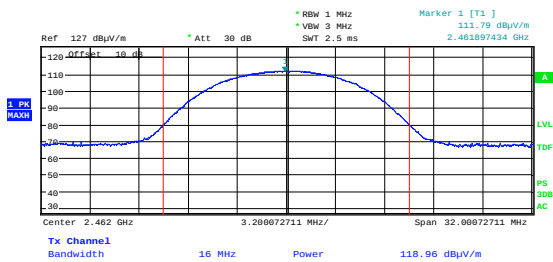
Date: 25.AUG.2021 13:46:14

Maximum EIRP, 2457 MHz, 802.11b 11M



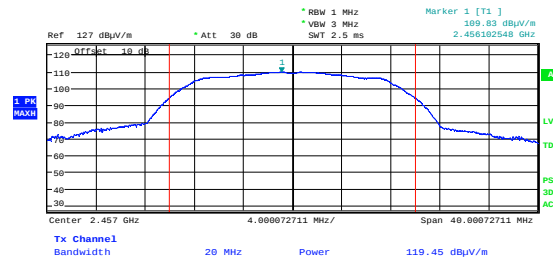
Date: 25.AUG.2021 14:17:29

Maximum EIRP, 2457 MHz, 802.11n MCS0, SISO



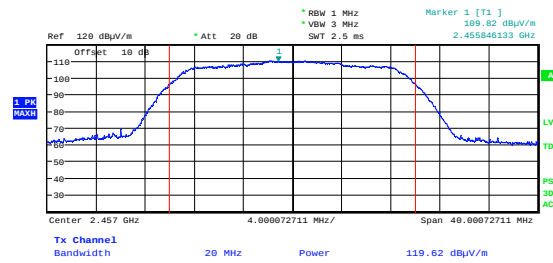
Date: 25.AUG.2021 13:42:28

Maximum EIRP, 2462 MHz, 802.11b 11M



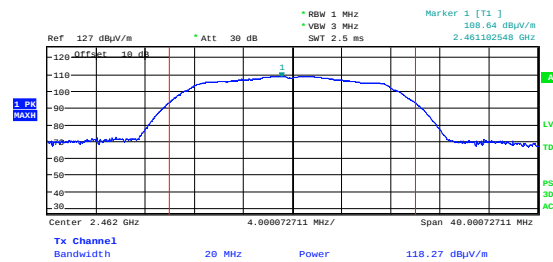
Date: 25.AUG.2021 13:21:29

Maximum EIRP, 2457 MHz, 802.11g 6M



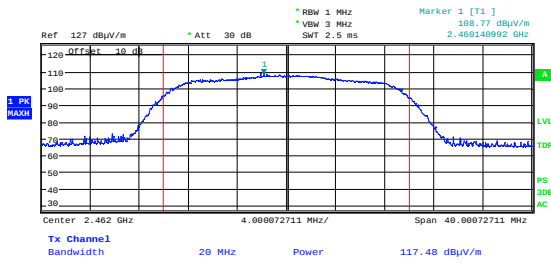
Date: 25.AUG.2021 14:55:43

Maximum EIRP, 2457 MHz, 802.11n MCS8, MIMO



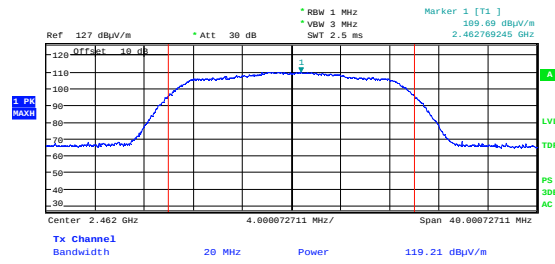
Date: 25.AUG.2021 13:16:12

Maximum EIRP, 2462 MHz, 802.11g 6M



Date: 25.AUG.2021 14:13:35

Maximum EIRP, 2462 MHz, 802.11n MCS0, SISO



Date: 25.AUG.2021 14:52:59

Maximum EIRP, 2462 MHz, 802.11n MCS8, MIMO

3.2 Restricted Bands of operation

Restricted Bands of operation for FCC and ISSED are defined in FCC Part 15.205 and ISSED 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 ISSED, 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

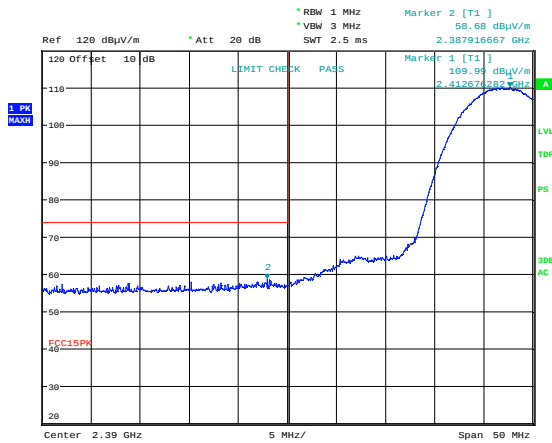
Test Results: Complies

Measurement Data:

Carrier Freq. (MHz)	Modulation and Bitrate	Measured field strength (dBμV/m)		Limit (dB)		Margin (dB)	
		Peak	Average	Pk	Av	Pk	Av
2412	11b, 11 Mbps	58.7	46.5	74	54	15.3	7.5
	11g, 6 Mbps	61.6	47.7	74	54	12.4	6.3
	11n, MCS0, SISO	63.9	46.4	74	54	10.1	7.6
	11n, MCS8, MIMO	59.2	45.7	74	54	14.8	8.3
2417	11b, 11 Mbps	57.8	46.2	74	54	16.2	7.8
	11g, 6 Mbps	63.5	47.1	74	54	10.5	6.9
	11n, MCS0, SISO	64.0	46.5	74	54	10.0	7.5
	11n, MCS8, MIMO	60.0	47.6	74	54	14.0	6.4
2422	11n, MCS8, MIMO	60.3	47.6	74	54	13.7	6.4
2427	11n, MCS8, MIMO	61.0	47.9	74	54	13.0	6.1
2447	11n, MCS8, MIMO	60.0	45.9	74	54	14.0	8.1
2452	11g, 6 Mbps	61.5	47.1	74	54	12.5	6.9
	11n, MCS0, SISO	62.0	46.7	74	54	12.0	7.3
	11n, MCS8, MIMO	60.4	46.6	74	54	13.6	7.4
	11b, 11 Mbps	58.5	46.5	74	54	15.5	7.5
2457	11g, 6 Mbps	63.5	48.1	74	54	10.5	5.9
	11n, MCS0, SISO	62.4	45.5	74	54	11.6	8.5
	11n, MCS8, MIMO	60.0	46.3	74	54	14.0	7.7
	11b, 11 Mbps	61.2	47.7	74	54	12.8	6.3
2462	11g, 6 Mbps	65.1	46.3	74	54	8.9	7.7
	11n, MCS0, SISO	63.3	46.8	74	54	10.7	7.2
	11n, MCS8, MIMO	60.3	46.2	74	54	13.7	7.8

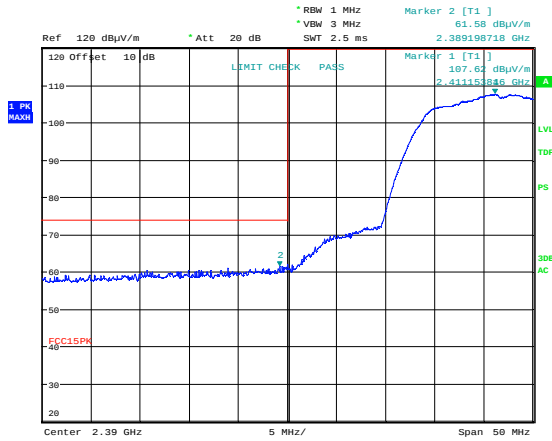
Average values were measured using trace averaging as described in ANSI C63.10-2013 clause 11.12.2.5.1 (Duty Cycle ≈100%).

See attached plots.



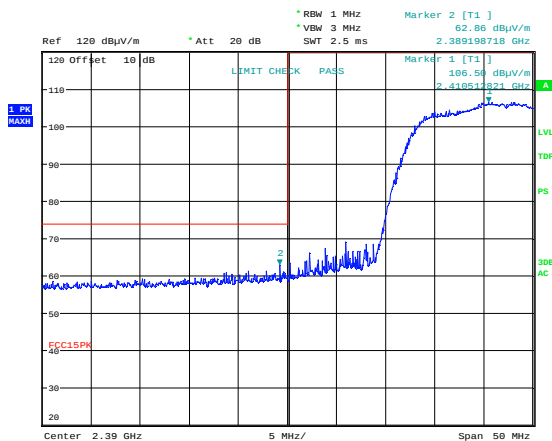
Date: 25.AUG.2021 13:51:48

Lower Band Edge, 2412 MHz, 802.11b 11M, Peak



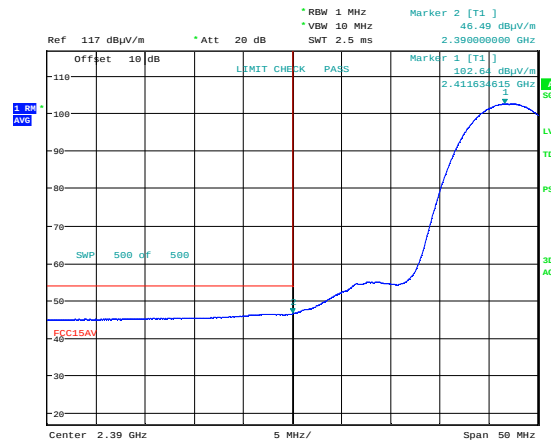
Date: 25.AUG.2021 13:28:33

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



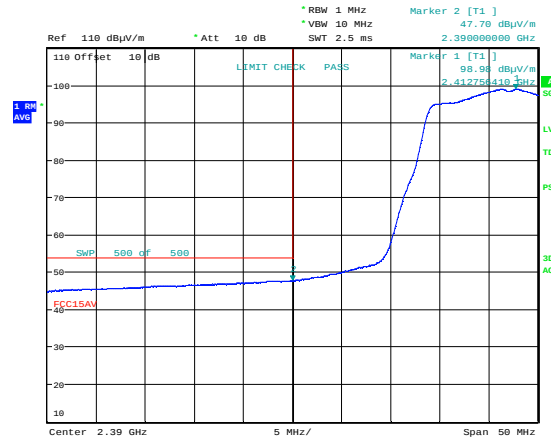
Date: 25.AUG.2021 14:03:06

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



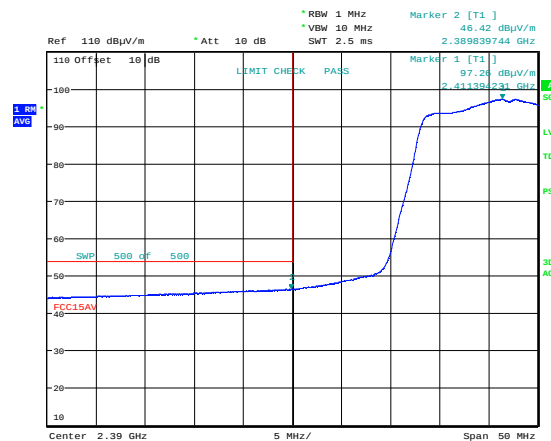
Date: 25.AUG.2021 13:50:27

Lower Band Edge, 2412 MHz, 802.11b 11M, Average



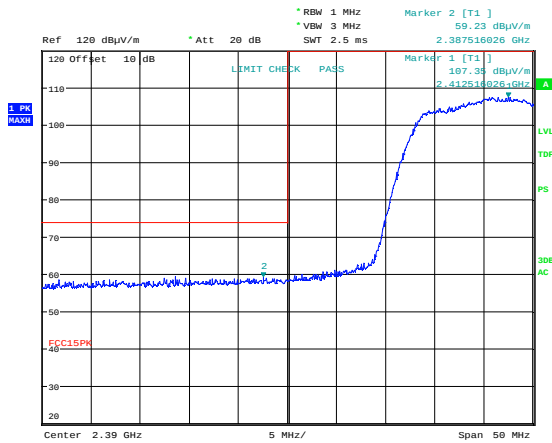
Date: 25.AUG.2021 13:29:13

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



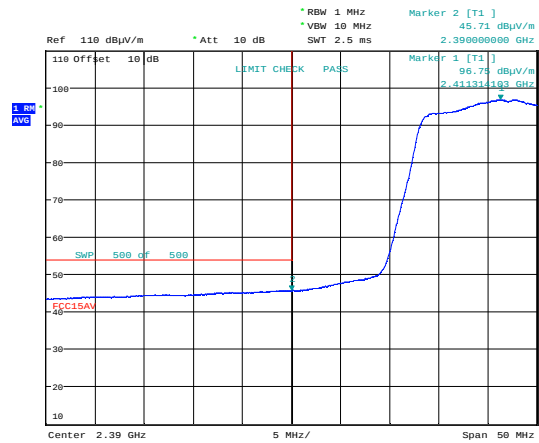
Date: 25.AUG.2021 14:03:48

Lower Band Edge, 2412 MHz, 802.11n SISO, Average



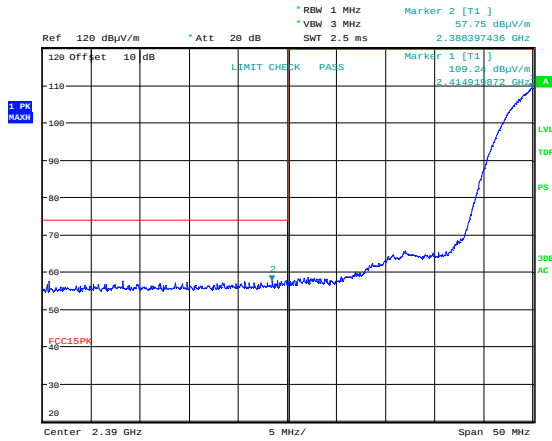
Date: 25.AUG.2021 15:02:16

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



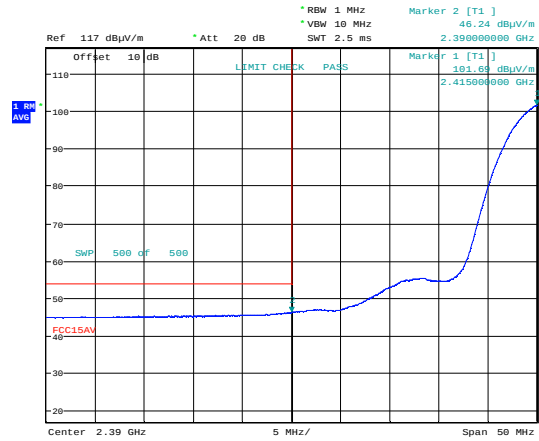
Date: 25.AUG.2021 15:02:50

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



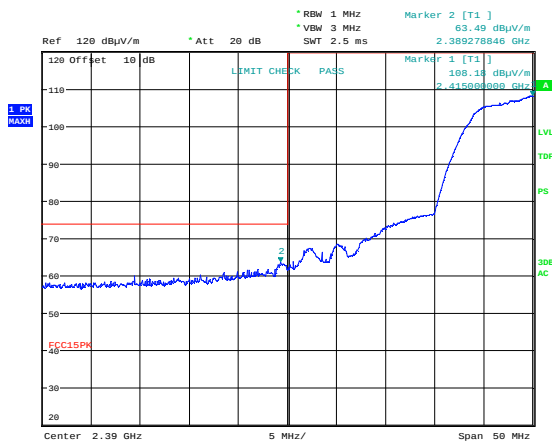
Date: 25.AUG.2021 13:59:21

Lower Band Edge, 2417 MHz, 802.11b 11M, Peak



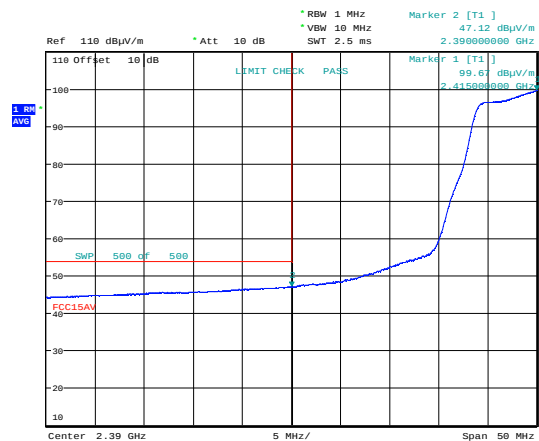
Date: 25.AUG.2021 13:58:20

Lower Band Edge, 2417 MHz, 802.11b 11M, Average



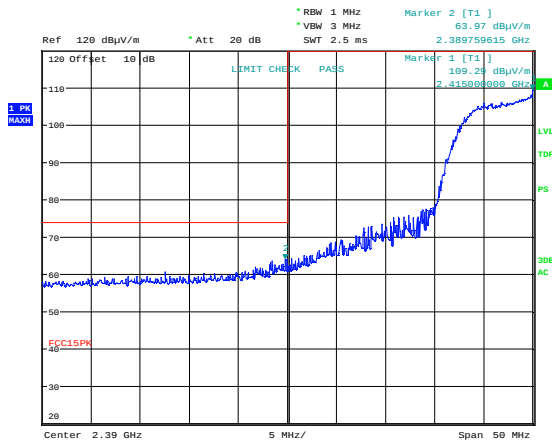
Date: 25.AUG.2021 13:34:16

Lower Band Edge, 2417 MHz, 802.11g 6M, Peak



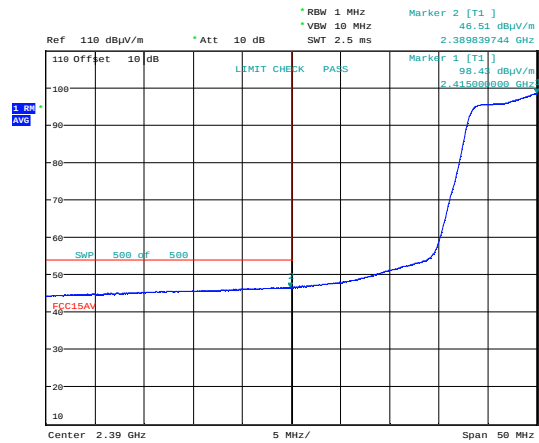
Date: 25.AUG.2021 13:34:53

Lower Band Edge, 2417 MHz, 802.11g 6M, Average



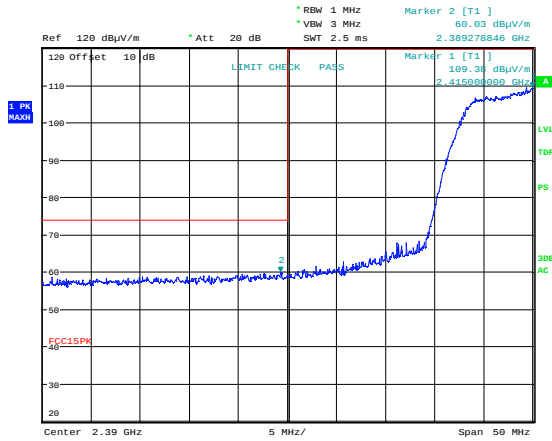
Date: 25.AUG.2021 14:11:13

Lower Band Edge, 2417 MHz, 802.11n SISO, Peak



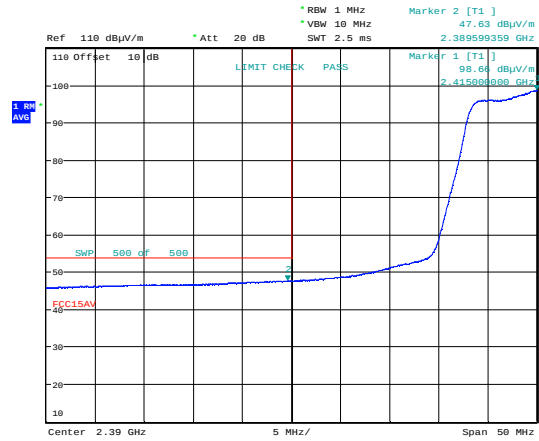
Date: 25.AUG.2021 14:11:57

Lower Band Edge, 2417 MHz, 802.11n SISO, Average



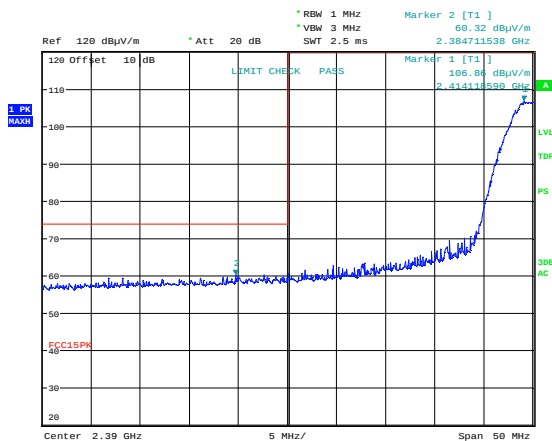
Date: 25.AUG.2021 15:05:24

Lower Band Edge, 2417 MHz, 802.11n MIMO, Peak



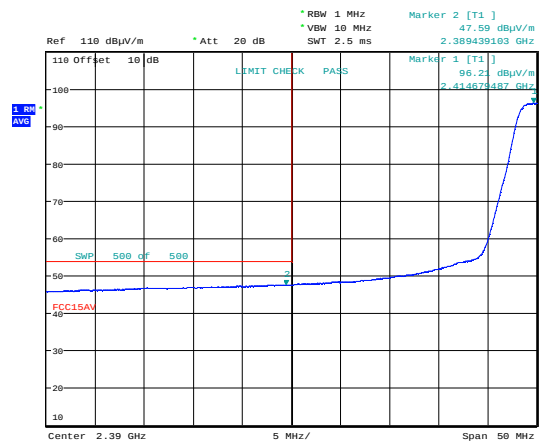
Date: 25.AUG.2021 15:05:56

Lower Band Edge, 2417 MHz, 802.11n MIMO, Average



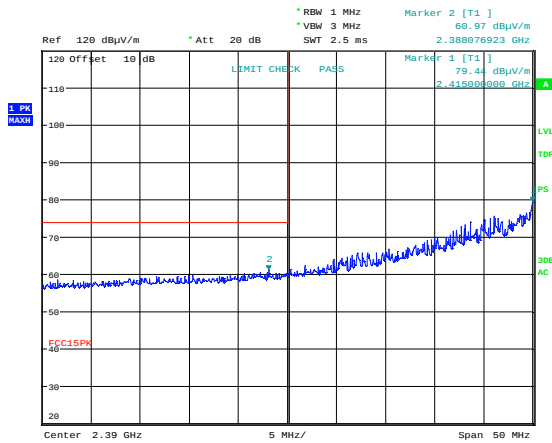
Date: 25.AUG.2021 15:08:11

Lower Band Edge, 2422 MHz, 802.11n MIMO, Peak



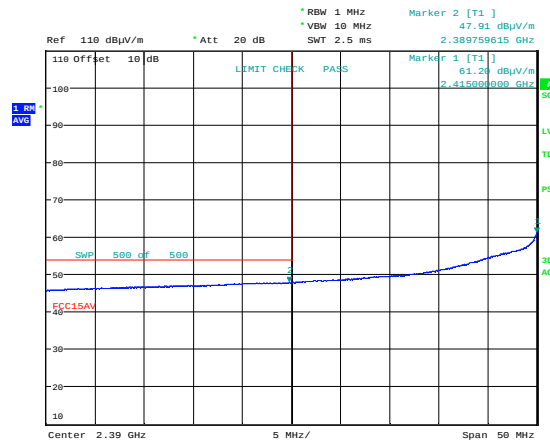
Date: 25.AUG.2021 15:08:44

Lower Band Edge, 2422 MHz, 802.11n MIMO, Average



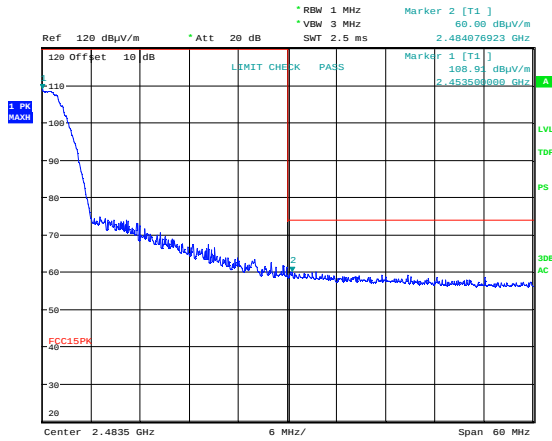
Date: 25.AUG.2021 15:10:50

Upper Band Edge, 2427 MHz, 802.11n MIMO, Peak



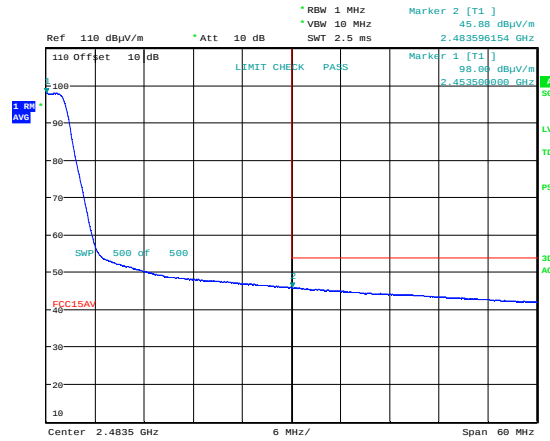
Date: 25.AUG.2021 15:11:22

Upper Band Edge, 2427 MHz, 802.11n MIMO, Average



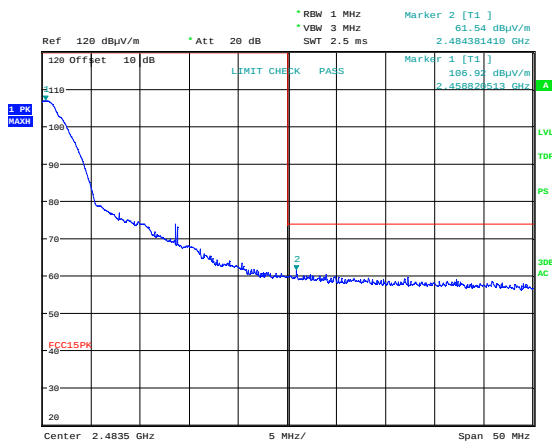
Date: 25.AUG.2021 15:13:34

Upper Band Edge, 2447 MHz, 802.11n MIMO, Peak



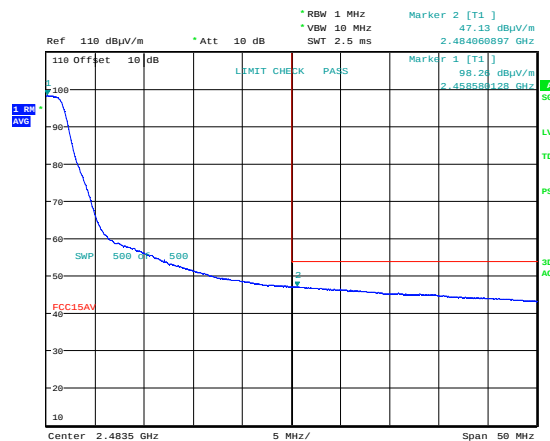
Date: 25.AUG.2021 15:14:11

Upper Band Edge, 2447 MHz, 802.11n MIMO, Average



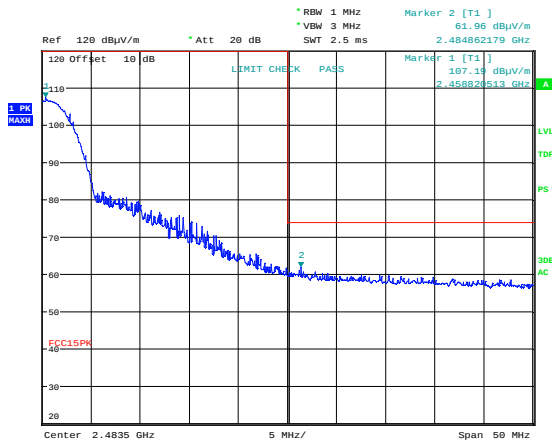
Date: 25.AUG.2021 13:37:05

Upper Band Edge, 2452 MHz, 802.11g 6M, Peak



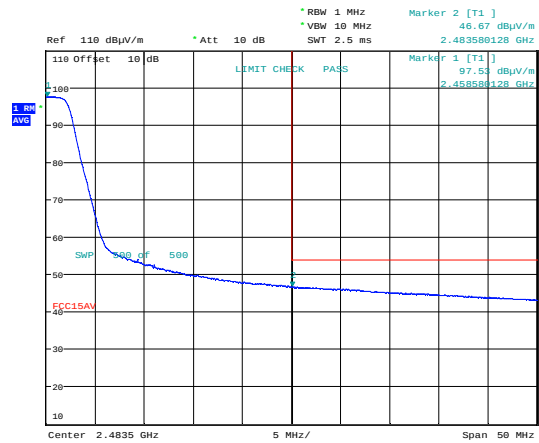
Date: 25.AUG.2021 13:37:40

Upper Band Edge, 2452 MHz, 802.11g 6M, Average



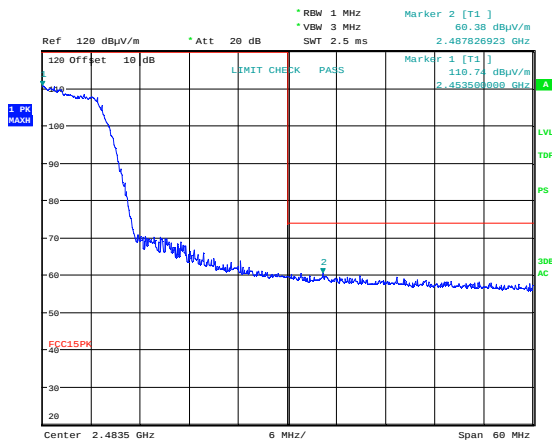
Date: 25.AUG.2021 14:21:21

Upper Band Edge, 2452 MHz, 802.11n SISO, Peak



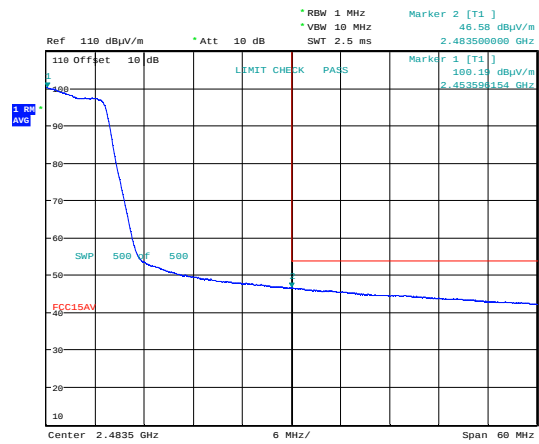
Date: 25.AUG.2021 14:21:58

Upper Band Edge, 2452 MHz, 802.11n SISO, Average



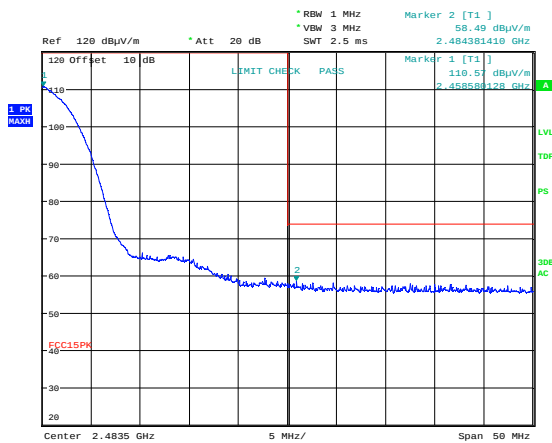
Date: 25.AUG.2021 14:59:23

Upper Band Edge, 2452 MHz, 802.11n MIMO, Peak



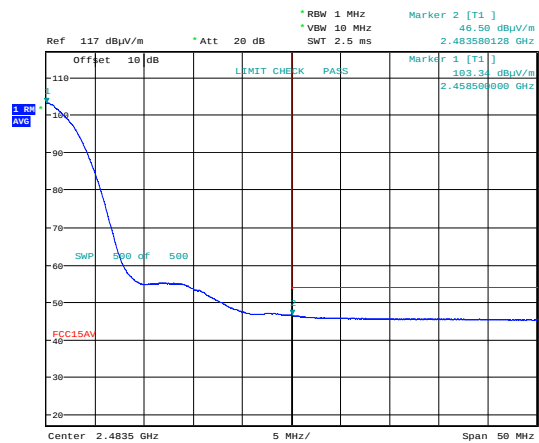
Date: 25.AUG.2021 14:59:57

Upper Band Edge, 2452 MHz, 802.11n MIMO, Average



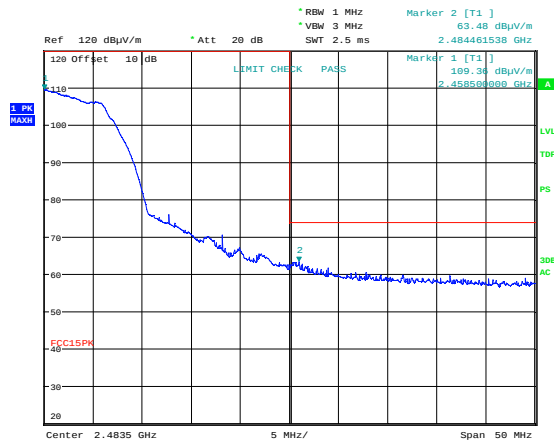
Date: 25.AUG.2021 13:47:50

Lower Band Edge, 2457 MHz, 802.11b 11M, Peak



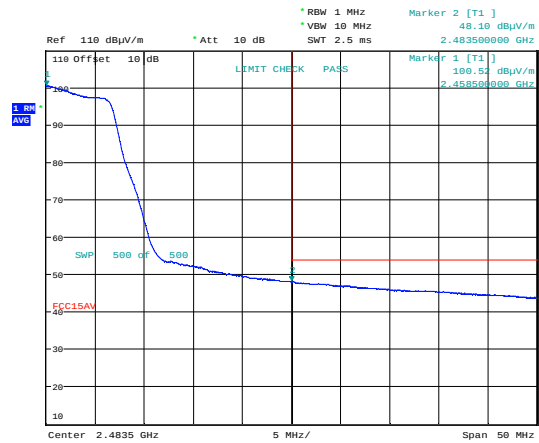
Date: 25.AUG.2021 13:46:55

Lower Band Edge, 2457 MHz, 802.11b 11M, Average



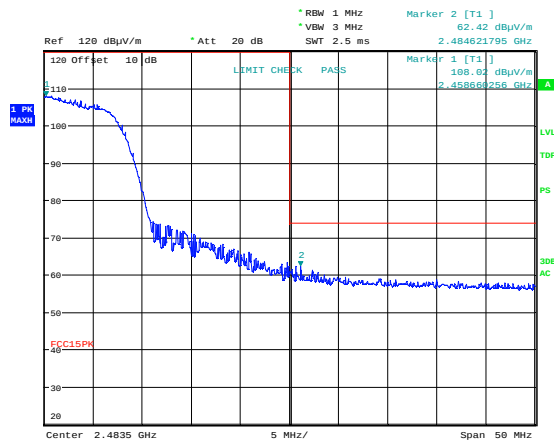
Date: 25.AUG.2021 13:22:29

Upper Band Edge, 2457 MHz, 802.11g 6M, Peak



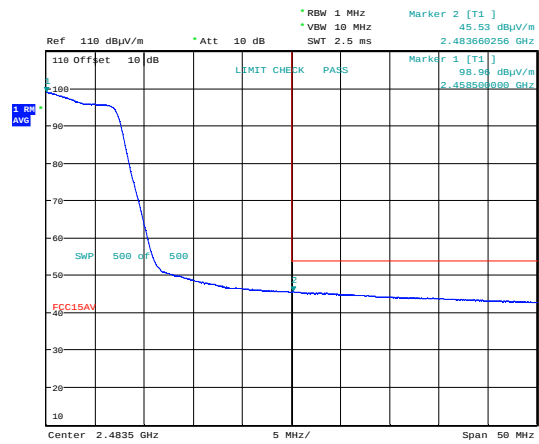
Date: 25.AUG.2021 13:23:08

Upper Band Edge, 2457 MHz, 802.11g 6M, Average



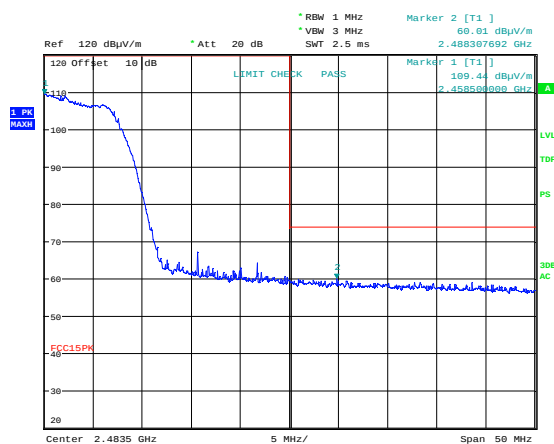
Date: 25.AUG.2021 14:18:23

Upper Band Edge, 2457 MHz, 802.11n SISO, Peak



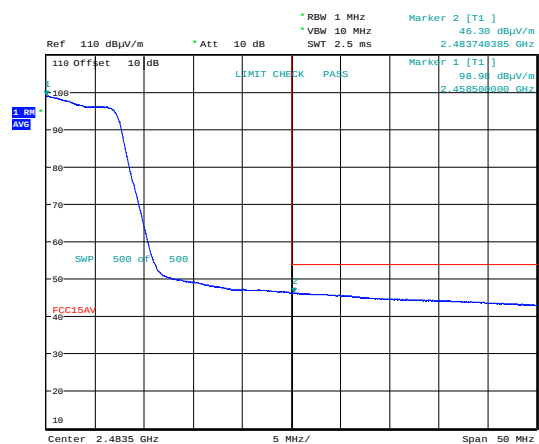
Date: 25.AUG.2021 14:18:57

Upper Band Edge, 2457 MHz, 802.11n SISO, Average



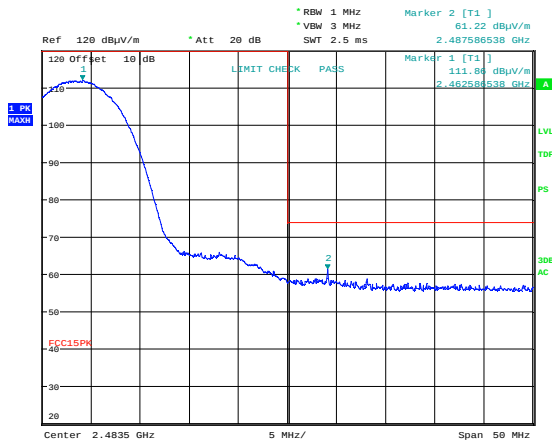
Date: 25.AUG.2021 14:56:35

Upper Band Edge, 2457 MHz, 802.11n MIMO, Peak



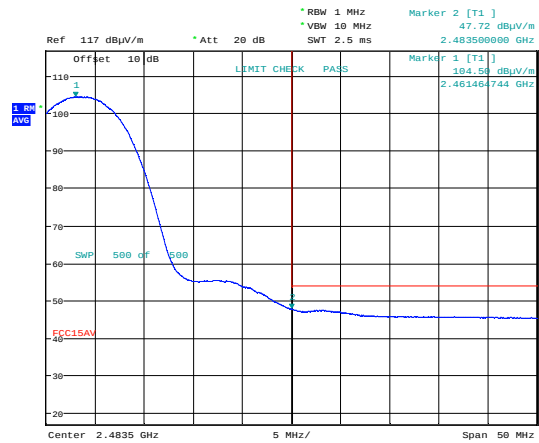
Date: 25.AUG.2021 14:57:12

Upper Band Edge, 2457 MHz, 802.11n MIMO, Average



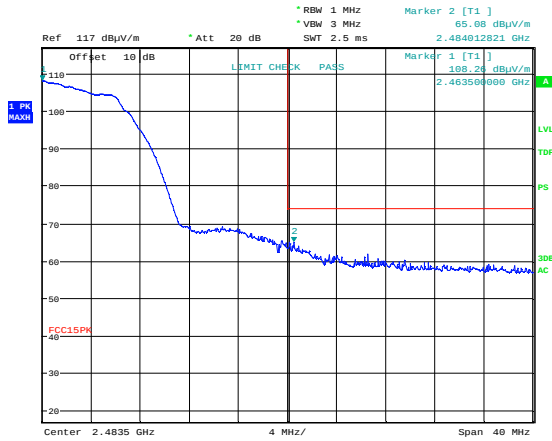
Date: 25.AUG.2021 13:43:33

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



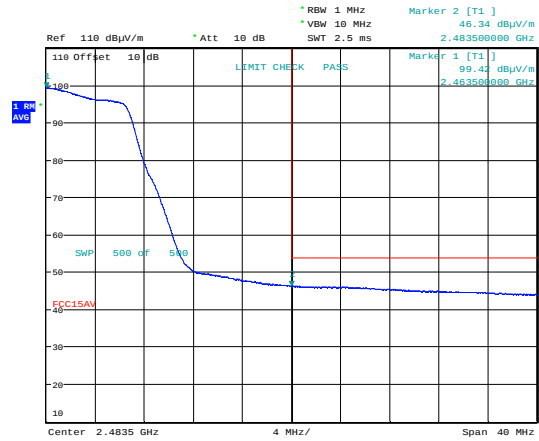
Date: 25.AUG.2021 13:44:49

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



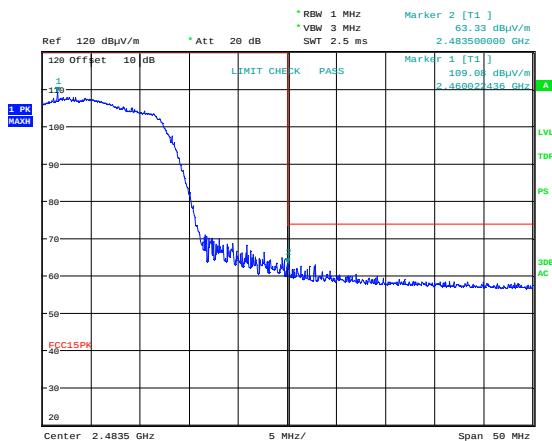
Date: 25.AUG.2021 13:18:02

Upper Band Edge, 2462 MHz, 802.11g 6M, Peak



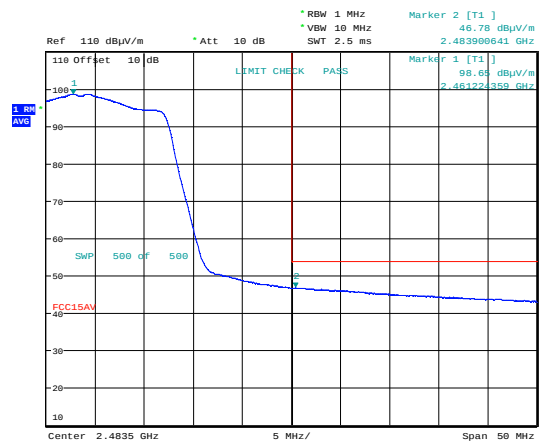
Date: 25.AUG.2021 13:20:14

Upper Band Edge, 2462 MHz, 802.11g 6M, Average



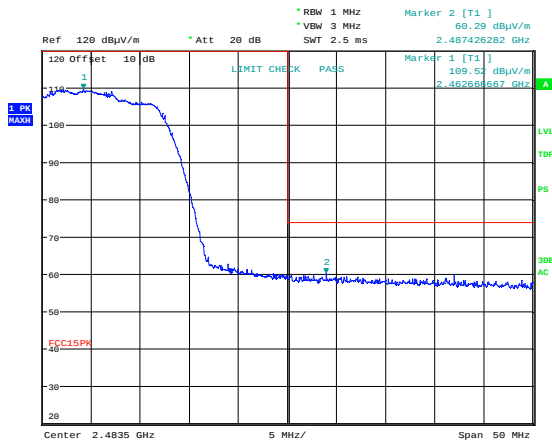
Date: 25.AUG.2021 14:14:32

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



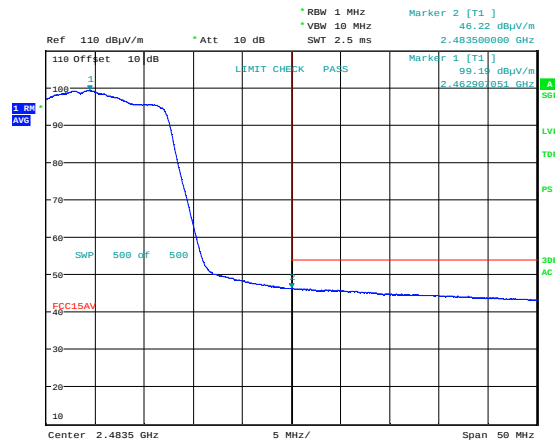
Date: 25.AUG.2021 14:15:07

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



Date: 25.AUG.2021 14:53:56

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



Date: 25.AUG.2021 14:54:32

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

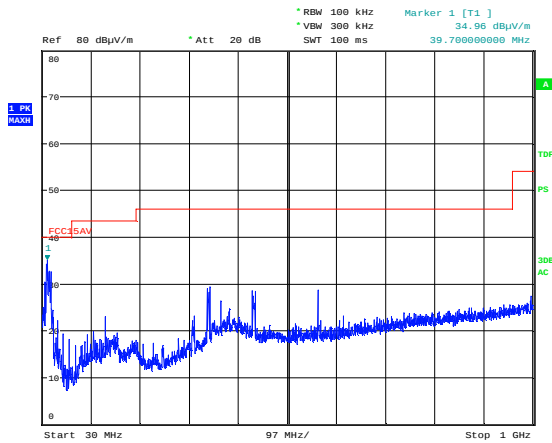
Tested in test mode with EUT transmitting on ch06.

Measured Frequency (MHz)	Carrier Frequency (MHz)	Modulation	Measured Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30 – 88	2440	Any	< 30	40.0	> 10
88 – 216	2440	Any	< 30	43.5	> 13.5
216 – 960	2440	Any	< 30	46.0	> 16
960 – 1000	2440	Any	< 30	54.0	> 24
39.93	Any	Any	27.6	40.0	12.4
576.02	Any	Any	34.1	43.5	9.4

See attached plots.

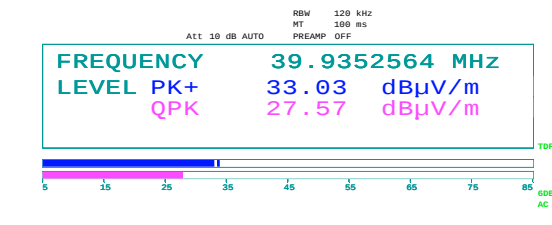
Requirements/Limit

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		



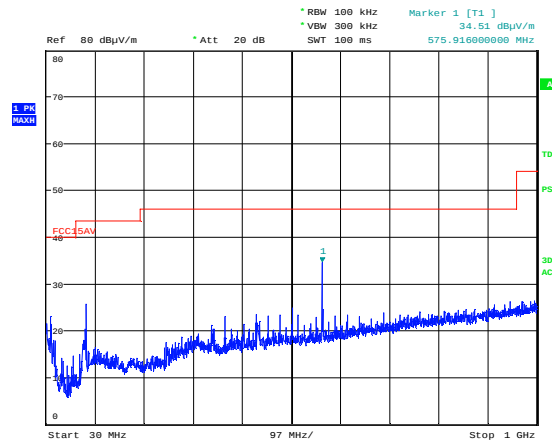
Date: 25.AUG.2021 10:02:01

Radiated Emissions 30 - 1000 MHz, 802.11n MCS8 MIMO, VP



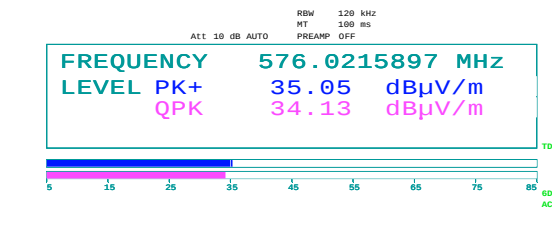
Date: 25.AUG.2021 10:30:52

Radiated Emissions 39.93 MHz, VP



Date: 25.AUG.2021 10:04:12

Radiated Emissions 30 - 1000 MHz, 802.11n MCS8 MIMO, HP



Date: 25.AUG.2021 10:15:59

Radiated Emissions 576.02 MHz, VP

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 Frequency (MHz)	Measured Frequency (GHz)	Modulation and Bitrate	Measured Emissions (dBμV/m)		Limit (dBμV/m)		Margin (dB)	
			Peak	Average	Peak	Average	Peak	Average
2437	4874	11b 1Mb	53.3	49.4	74	54	20.7	4.6
	4874	11g 6Mb	51.0	42.2	74	54	23.0	11.8
Any	Any	Any	< 56	< 46	74	54	> 18	> 8

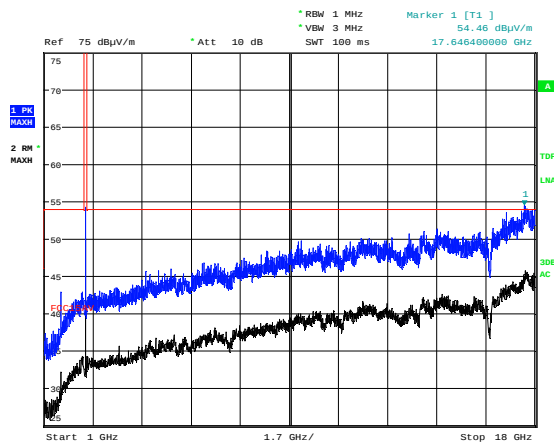
A Band Reject Filter was used for measurements from 1 GHz to 18 GHz

Antenna factor, PreAmp Gain and Cable Loss are included in spectrum analyzer "Transducer factor".

See plots.

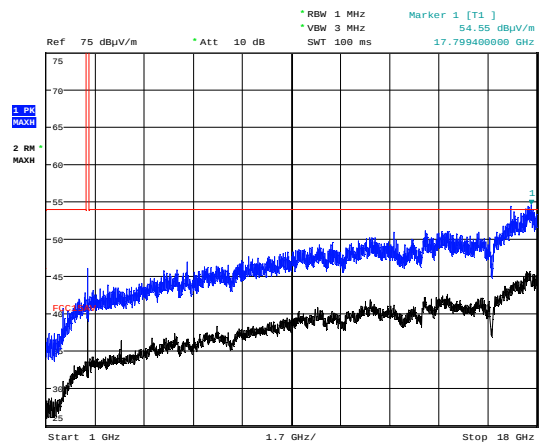
Requirements/Limit

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



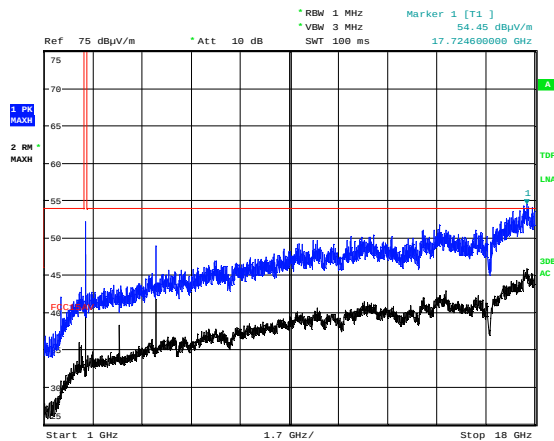
Date: 25.AUG.2021 16:06:55

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11b 1M, HP, Ant1



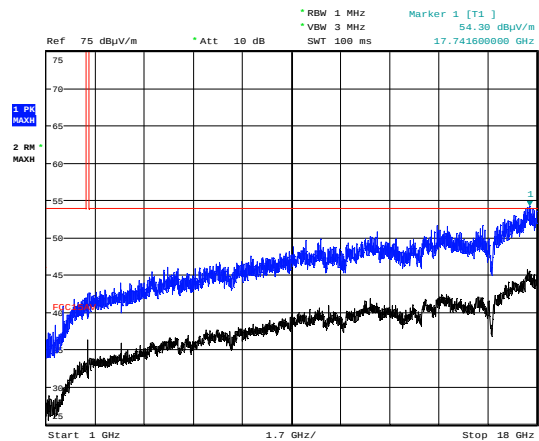
Date: 25.AUG.2021 16:04:50

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11b 1M, VP, Ant1



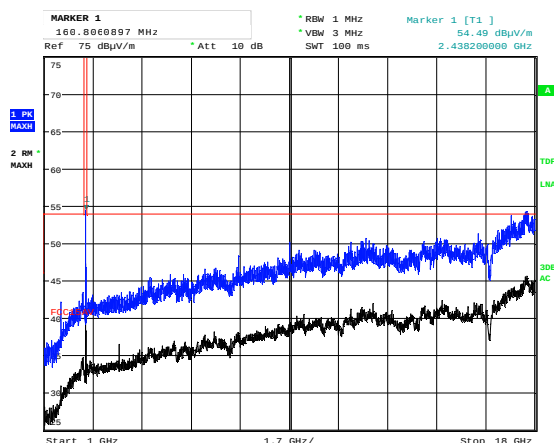
Date: 25.AUG.2021 16:15:54

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11b 1M, HP, Ant2



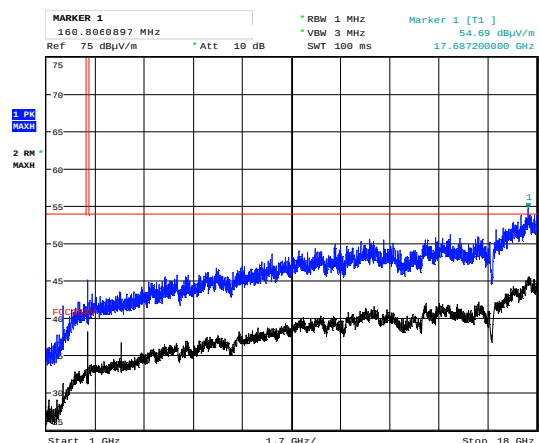
Date: 25.AUG.2021 16:13:42

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11b 1M, VP, Ant2



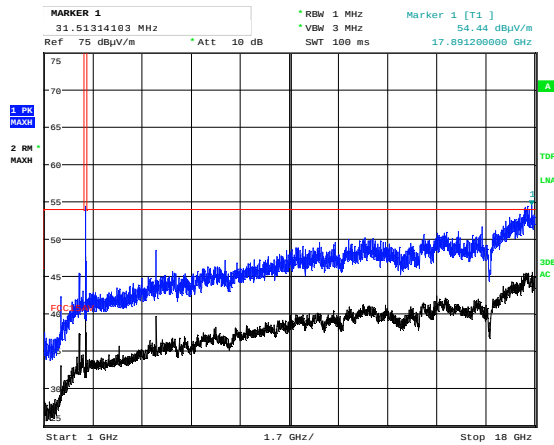
Date: 25.AUG.2021 16:44:02

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11g 6M, HP, Ant1



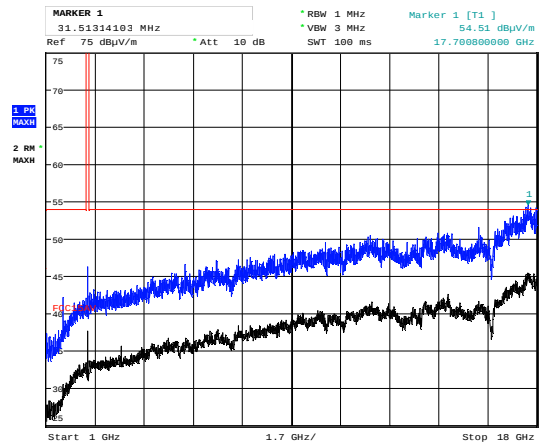
Date: 25.AUG.2021 16:41:47

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11g 6M, VP, Ant1



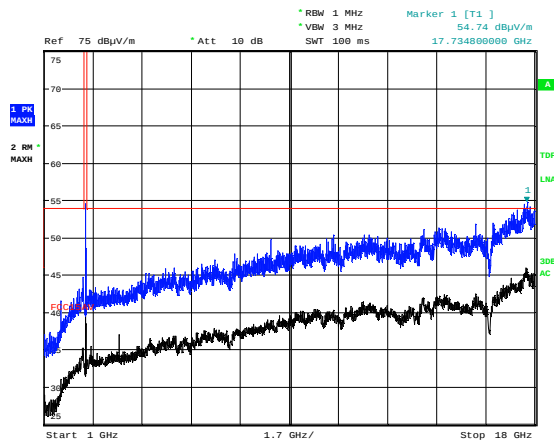
Date: 25.AUG.2021 16:48:46

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11g 6M, HP, Ant2



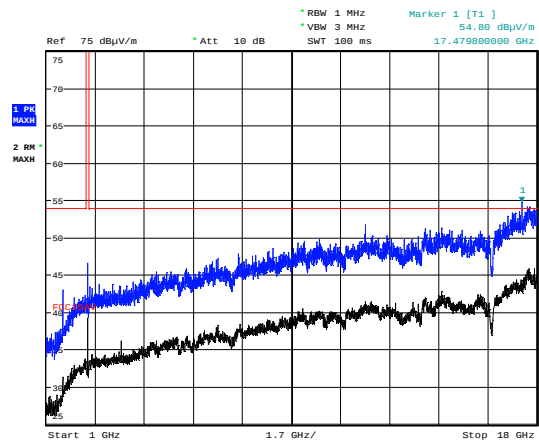
Date: 25.AUG.2021 16:46:45

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11g 6M, VP, Ant2



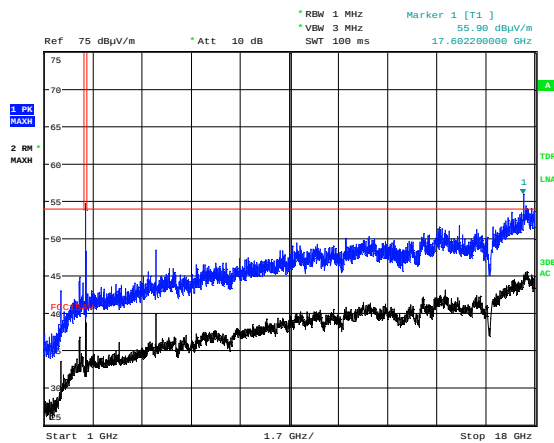
Date: 25.AUG.2021 15:51:51

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11n SISO, HP, Ant1



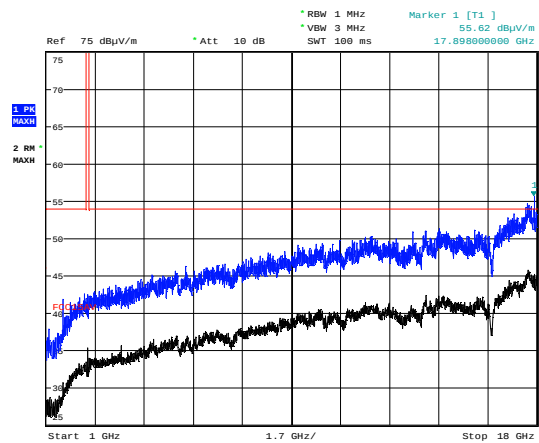
Date: 25.AUG.2021 15:54:24

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11n SISO, VP, Ant1



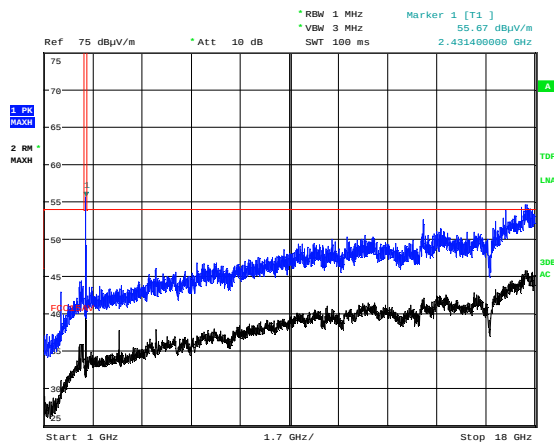
Date: 25.AUG.2021 16:01:29

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11n SISO, HP, Ant2



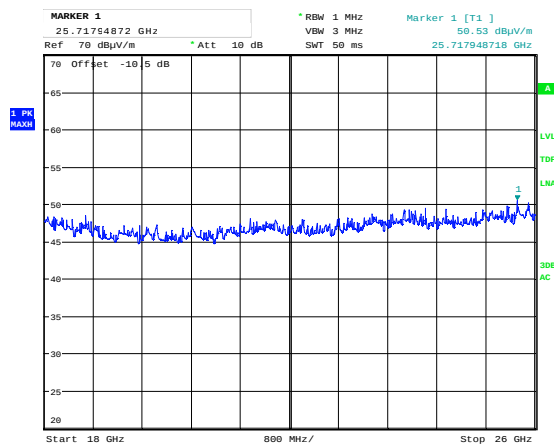
Date: 25.AUG.2021 15:59:23

Radiated Emissions 1 - 18 GHz, 2437 MHz, 802.11n SISO, VP, Ant2



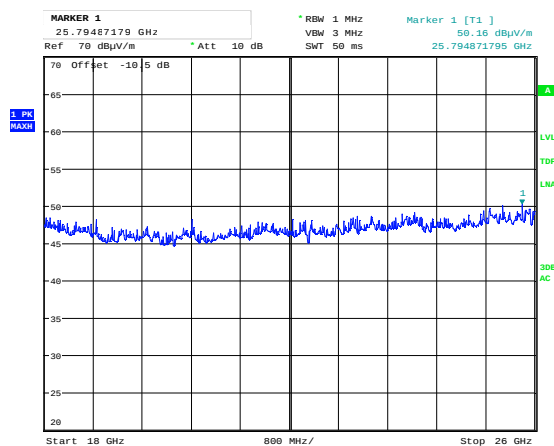
Date: 25.AUG.2021 15:40:38

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



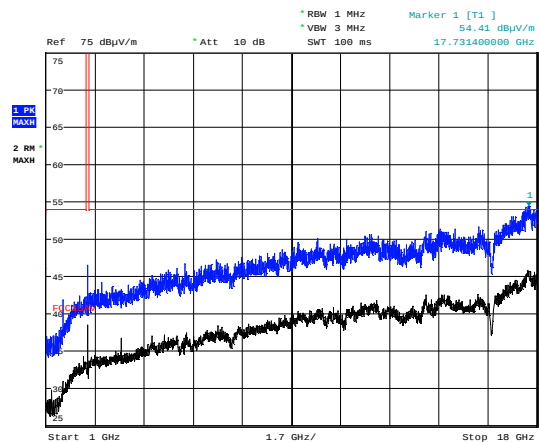
Date: 27.AUG.2021 13:06:27

Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11b 1M, HP, Ant1



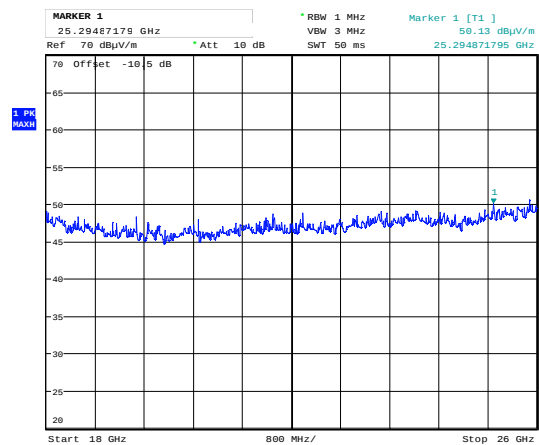
Date: 27.AUG.2021 13:07:25

Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11b 1M, HP, Ant2



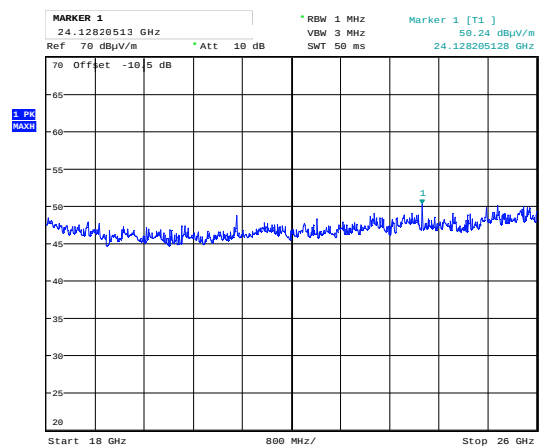
Date: 25.AUG.2021 15:38:26

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



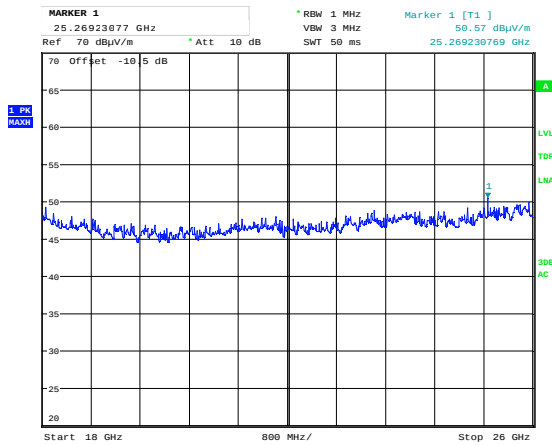
Date: 27.AUG.2021 13:05:37

Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11b 1M, VP, Ant1



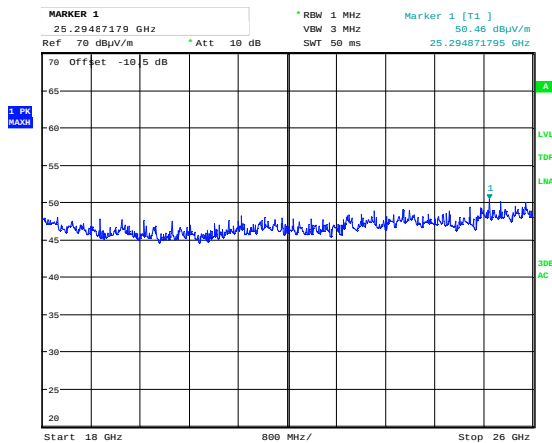
Date: 27.AUG.2021 13:08:13

Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11b 1M, VP, Ant2



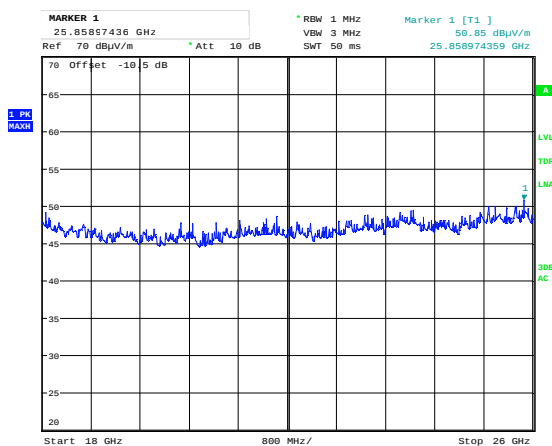
Date: 27.AUG.2021 13:11:04

Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11g 6M, HP, Ant1



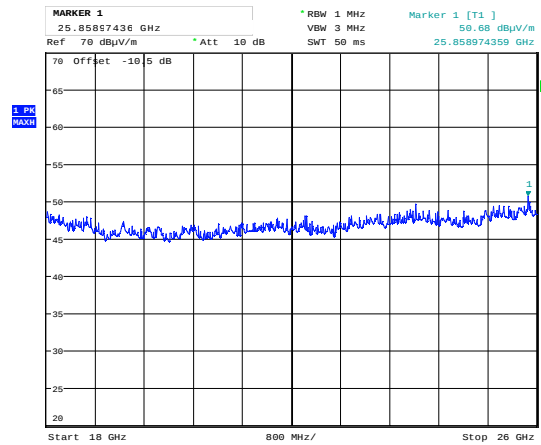
Date: 27.AUG.2021 13:11:54

Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11g 6M, HP, Ant2



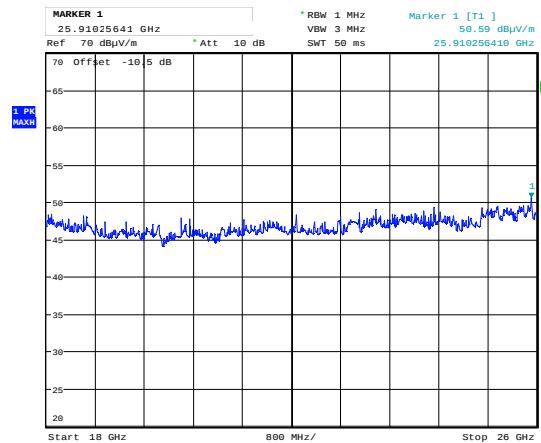
Date: 27.AUG.2021 13:15:06

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



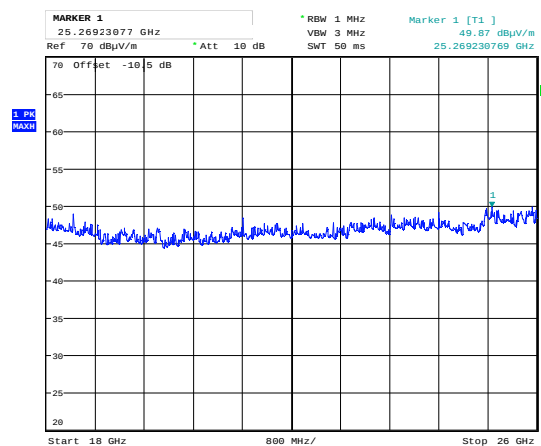
Date: 27.AUG.2021 13:10:10

Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11g 6M, VP, Ant1



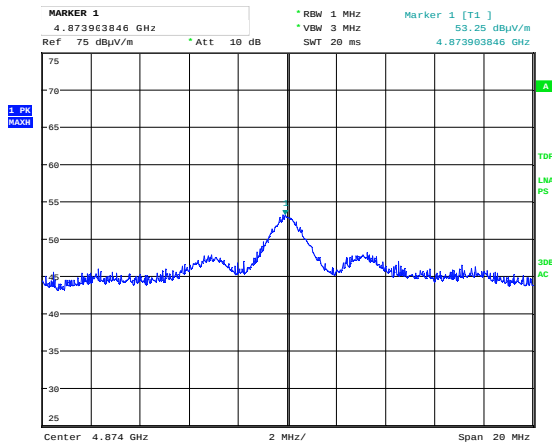
Date: 27.AUG.2021 13:12:43

Radiated Emissions 18 - 26 GHz, 2437 MHz, 802.11g 6M, VP, Ant2



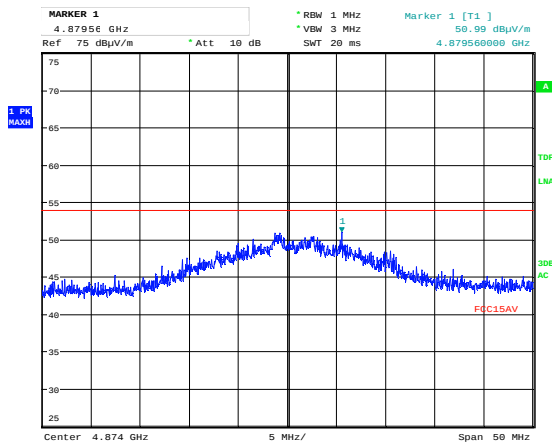
Date: 27.AUG.2021 13:14:14

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



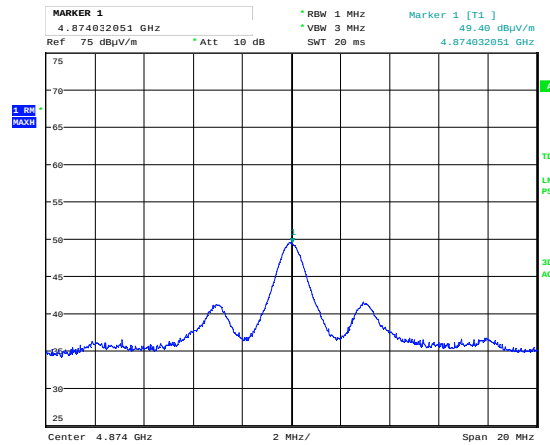
Date: 25.AUG.2021 16:34:02

Radiated Emissions 4874 MHz, 2437 MHz, 802.11b 1Mb, Pk, Max



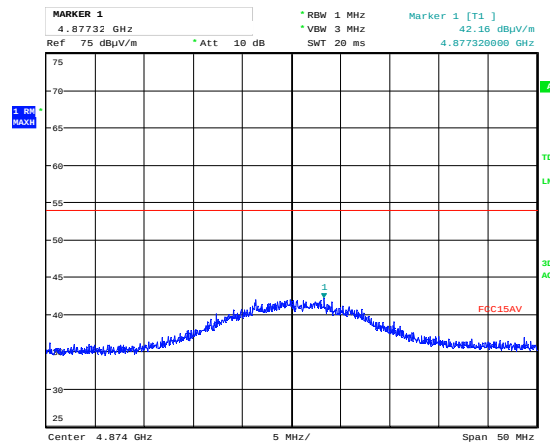
Date: 25.AUG.2021 16:51:20

Radiated Emissions 4874 MHz, 2437 MHz, 802.11g 6Mb, Pk, Max



Date: 25.AUG.2021 16:33:21

Radiated Emissions 4874 MHz, 2437 MHz, 802.11b 1Mb, Av, Max



Date: 25.AUG.2021 16:51:44

Radiated Emissions 4874 MHz, 2437 MHz, 802.11g 6Mb, Av, Max

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	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2021-02	2022-02
2	6810-17B	Attenuator	Suhner	LR 1669	COU	
3	N0324415	BandStop Filter	Microwave Circuits	LR 1760	COU	
4	WLK5-1100-1485-7000-40SS	Low Pass Filter	Wainwright Inst.	LR 1761	COU	
5	317	Preamplifier	Sonoma Inst.	LR 1687	2021-08	2022-08
6	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2021-08	2022-08
7	3115	Horn Antenna	EMCO	LR 1330	2016-10	2021-10
8	3117-PA	Horn Antenna +PreAmp	EMCO	LR 1717	2021-08	2022-08
9	Model 638	Antenna Horn	Narda	LR 1480	N/A	
10	Model 87 V	Multimeter	Fluke	LR 1599	2021-01	2023-01
11	6812B	AC Power Source	Agilent	LR 1515	COU	
12	ENV216	Two Line V-Network	Rohde & Schwarz	LR 1665	2019-11	2021-11
14	ESCI3	Measuring Receiver	Rohde & Schwarz	N-4259	2019-10	2021-10
21	ST18/SMA/N/36	RF Cable	Suhner	LR 1627	COU	

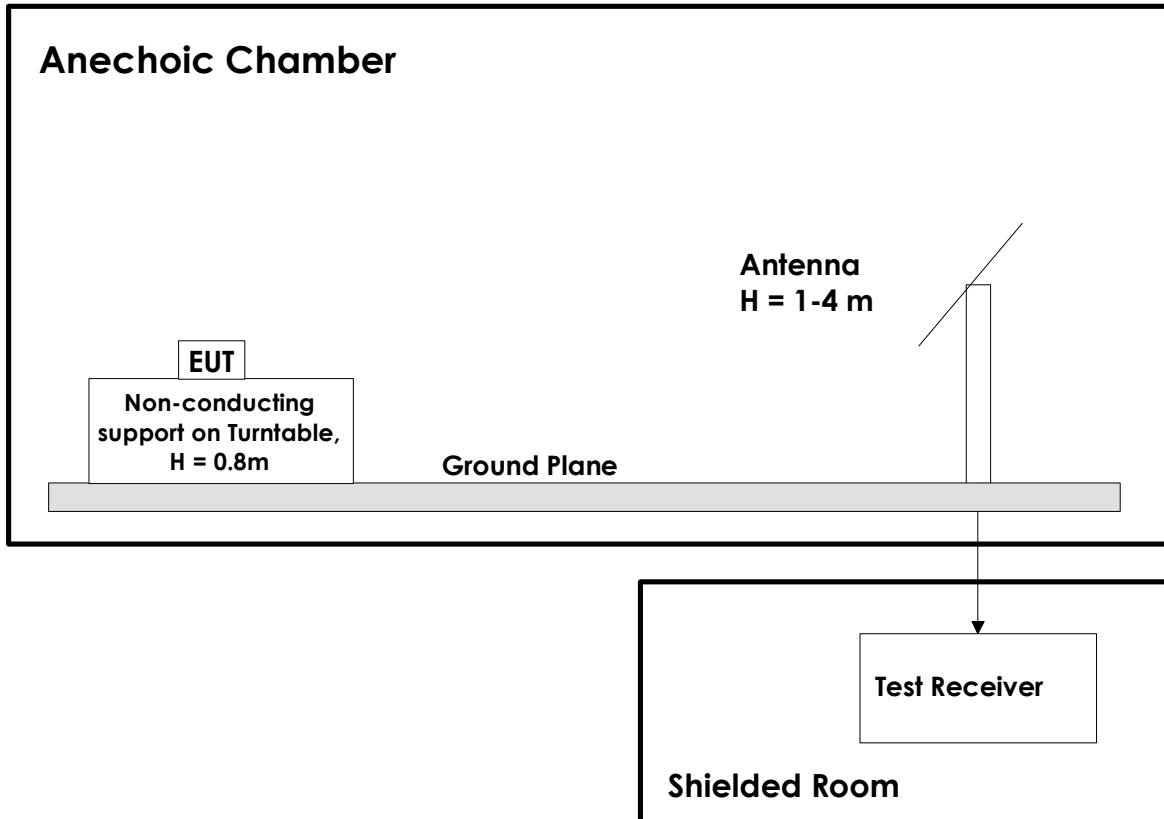
Note: COU – calibrate on use; N/A – Not Applicable

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

No.	Manufacturer	Name	Version	Comment
1	Rohde & Schwarz	EMC32	10.50.10	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.