

Test Report

Product	2.4GHz Smart Mesh Node
Name and address of the applicant	Siemens AS, PD SLN OEC PEC Bratbergveien 5, 7037 Trondheim NORWAY
Name and address of the manufacturer	Siemens AS, PD SLN OEC PEC Bratbergveien 5, 7037 Trondheim NORWAY
Model	2.4GHz Smart Mesh Node
Rating	3.3 V _{DC} (Max. 1 W)
Trademark	SIEMENS
Serial number	See clause 1.1
Additional information	802.15.4
Tested according to	FCC Part 15.247 Frequency Hopping Transmitters / Digital Transmission Systems Industry Canada RSS-247, Issue 2 Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
Order number	392545
Tested in period	2020-03-05 to 2020-03-06
Issue date	2020-04-02
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   NORWEGIAN ACCREDITATION TEST 033 An accredited technical test executed under the Norwegian accreditation scheme
 Prepared by [Frode Sveinsen]  Approved by [G.Suhantakumar]	
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1 INFORMATION

1.1 Test Item

Name	Smart Mesh
Model/version	2.4GHz Mesh Node
FCC ID	2AVWG9436110001
ISED ID	25945-9436110001
Serial number	Conducted Sample: 1 Radiated Sample: 3
Hardware identity and/or version	943.6110.001A
Software identity and/or version	Rev 1.4.2.4002
Frequency Range	2405 – 2470 MHz
Number of Channels	14 Channels
Operating Modes	5 MHz
Type of Modulation	IEEE 802.15.4 FHSS
Conducted Output Power	0.0018 W
Type of Power Supply	DC-DC Converter (3.3V, Max 1 W)
Antenna Connector	None (Integral Antenna)
Number of Antennas	1
Interfaces	None

Description of Test Item

The EUT is a 2.4GHz Smart Mesh Node that uses IEEE 802.15.4.

Description	Manufacturer	Type
Wireless Module	Siemens Energy AS	943.6110.001A

1.2 Normal test condition

Temperature:	20 - 24 °C
Relative humidity:	20 - 50 %
Normal test voltage:	3.3 V _{DC} (Nominal voltage) 5.0 V _{DC} (Nominal USB Voltage to test-jig)

The values are the limit registered during the test period.

1.3 Test Engineer(s)

Frode Sveinsen / Tore Løvlien

1.4 Antenna Requirement

Is the antenna detachable? ☐ Yes ☒ No

If detachable, is the antenna connector non-standard? ☐ Yes ☐ No

Type of antenna connector: N/A

Ref. FCC §15.203

1.5 Worst-Case Configuration and Mode

Radiated Emissions was performed with the EUT set to transmit continuously at the highest output power as worst-case scenario.

A test-jig was used for all tests. The test-jig was powered from a USB connector and the EUT was powered from the test-jig.

1.6 Comments

All measurements were done with the EUT powered from the test-jig, except voltage variation check.

It was checked that voltage variations of $\pm 15\%$ on the direct input of the EUT did not change the output power or frequency.

Power Line Conducted Emissions was tested with the EUT powered from a generic USB AC Adaptor (Apple Model A1400)

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 Industry Canada 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 made in a semi-anechoic chamber at measuring distances of 1m and 3m.

A description of the test facility is on file with 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".

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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	Complies
DTS Bandwidth	15.247(a)(2)	5.2 (1) (RSS-247)	11.8 Option 2	Complies
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)	Complies
Spurious Emissions (Antenna Conducted)	15.247(c)	5.5 (RSS-247)	6.7 11.11 (DTS)	Complies
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

3 TEST RESULTS

3.1 Power Line Conducted Emissions

FCC Part 15.207

ISED RSS-213 Issue 3, Clause 6.3

RSS-GEN Issue 5, Clause 7.2 / 8.8

Measurement procedure: ANSI C63.4-2014 using 50 μ H/50 ohms LISN

Test Results: Complies

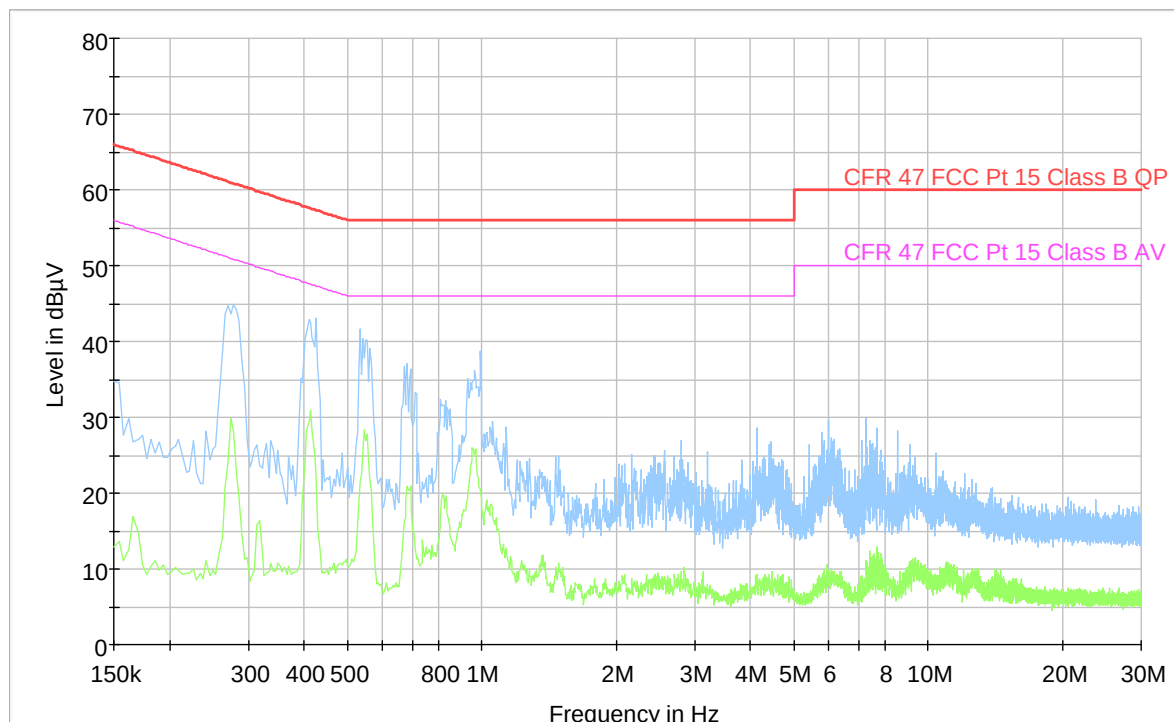
Measurement Data: See attached plots

Highest measured value (L1 and N):

Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
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AC Adaptor, 120V 60Hz:

Full Spectrum



3.2 Occupied Bandwidth (99% BW)

ISED Canada RSS-GEN Issue 5, Clause 6.7

Measurement procedure: ANSI C63.10-2013 Clause 6.9.3 / 7.8.3

Test Results: Complies

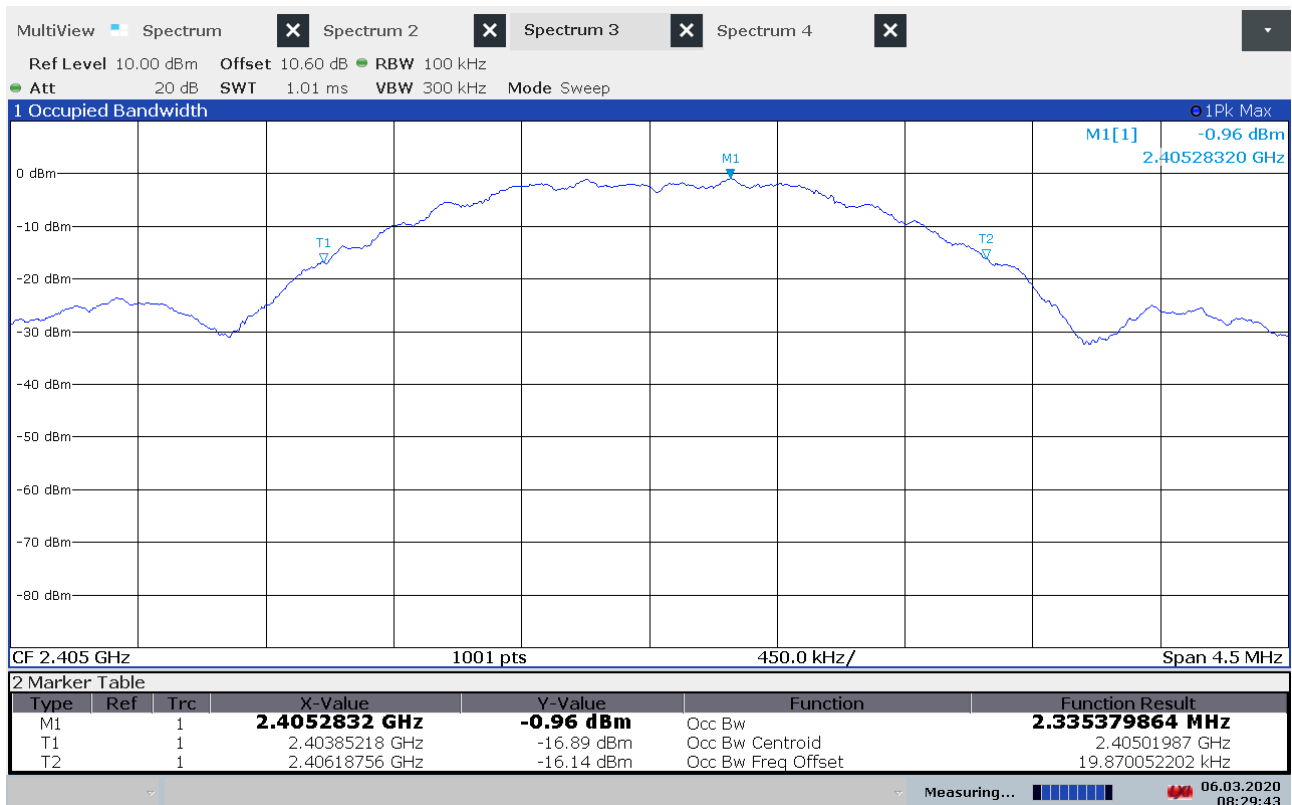
Measurement Data:

Measured 99% Bandwidth (MHz)		
2405 MHz	2440 MHz	2470 MHz
2.34	2.36	2.37

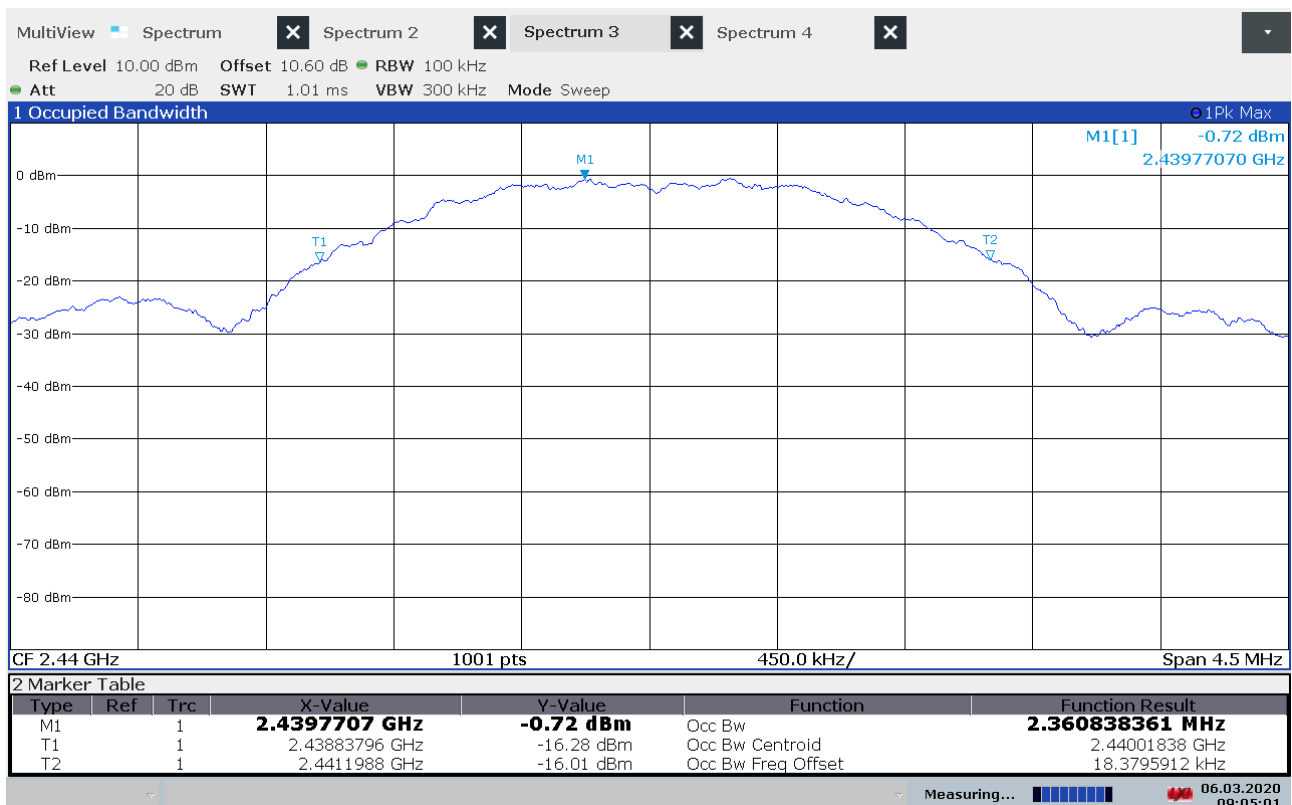
See attached plots.

Requirements:

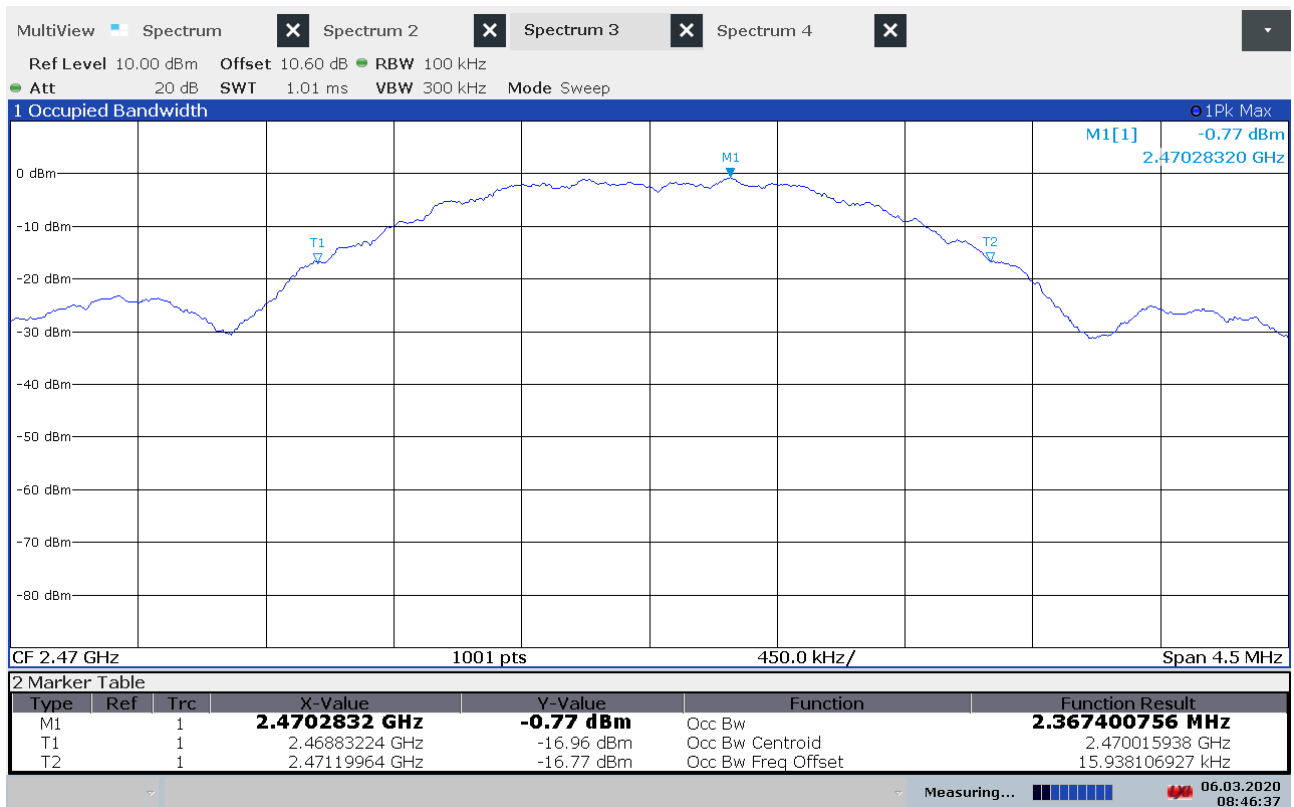
No requirement.



99% Bandwidth, 2405 MHz



99% Bandwidth, 2440 MHz



99% Bandwidth, 2470 MHz

3.3 DTS Bandwidth

FCC Part 15.247 (a)(2)

ISED Canada RSS-247 Issue 2, Clause 5.2 (a)

Measurement procedure: ANSI C63.10-2013 Clause 11.8

Test Results: Complies

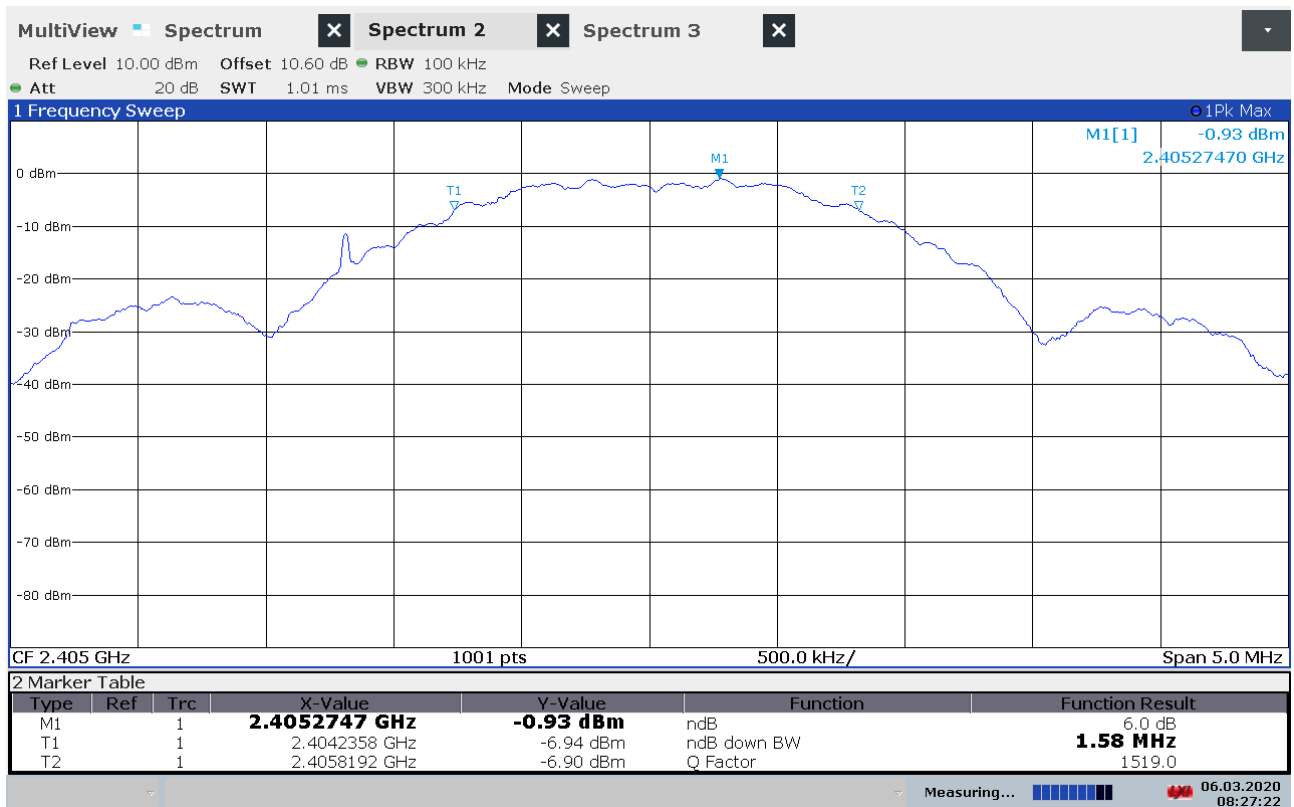
Measurement Data:

Measured DTS Bandwidth (kHz)		
2405 MHz	2440 MHz	2470 MHz
1.58	1.61	1.59

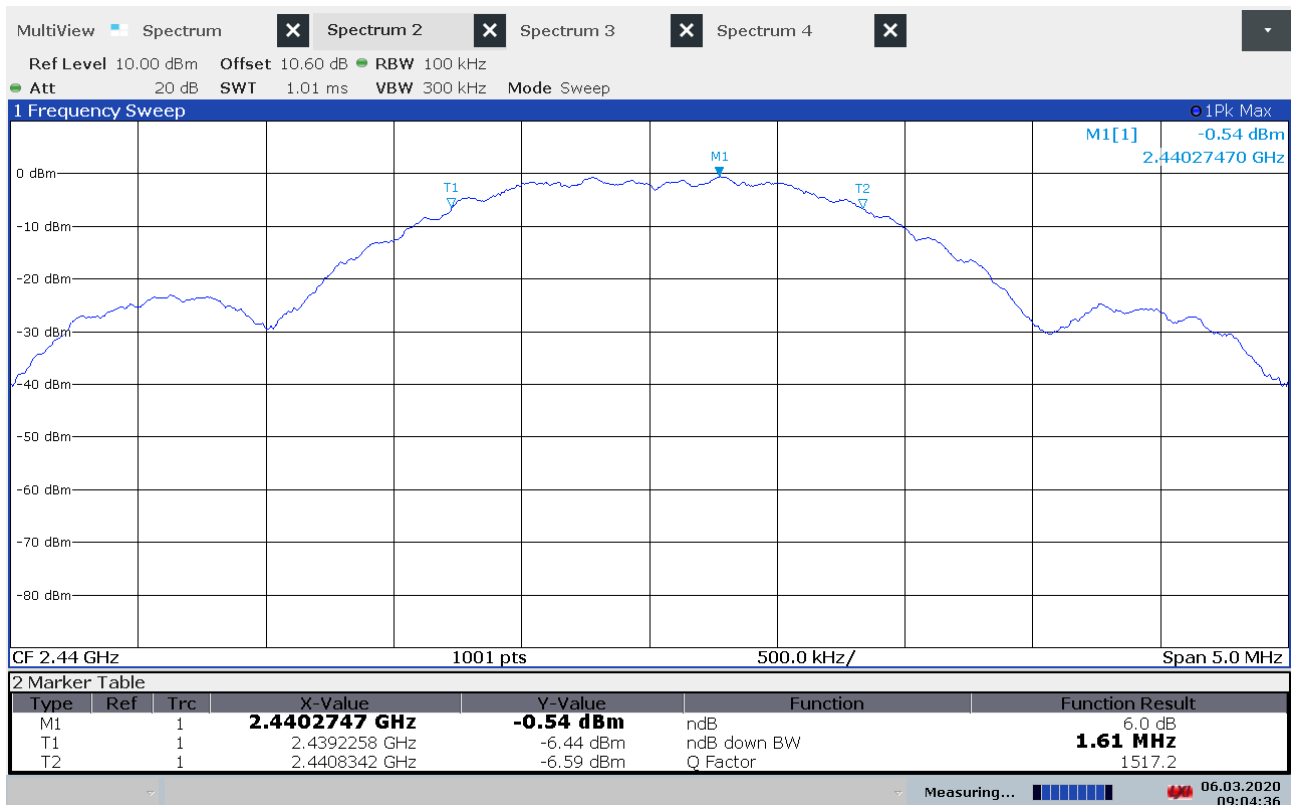
Requirements:

For Digital Transmission Systems in the 2400-2483.5 MHz band the minimum 6 dB bandwidth shall be at least 500 KHz.

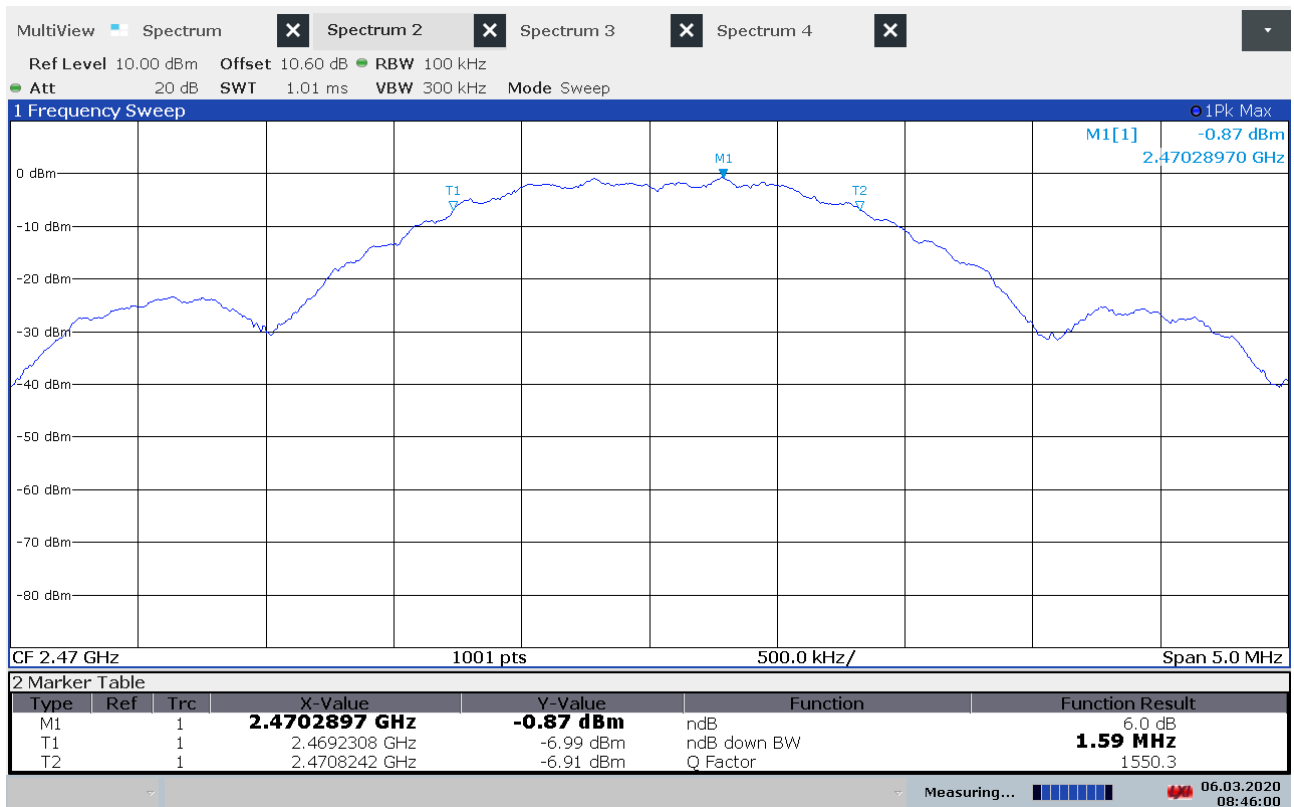
No requirements for Frequency Hopping Systems.



DTS Bandwidth, 2405 MHz



DTS Bandwidth, 2440 MHz



DTS Bandwidth, 2470 MHz

3.4 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:

	2405 MHz	2440 MHz	2470 MHz
Conducted Power (dBm)	1.69	2.50	1.84
Conducted Power (mW)	1.5	1.8	1.5
Field Strength (dBµV/m)	99.8	100.8	100.6
Calculated EIRP (dBm)	4.52	5.57	5.40
Antenna gain (dBi)	2.8	3.1	3.6

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.

Antenna Gain is less than 6 dBi.

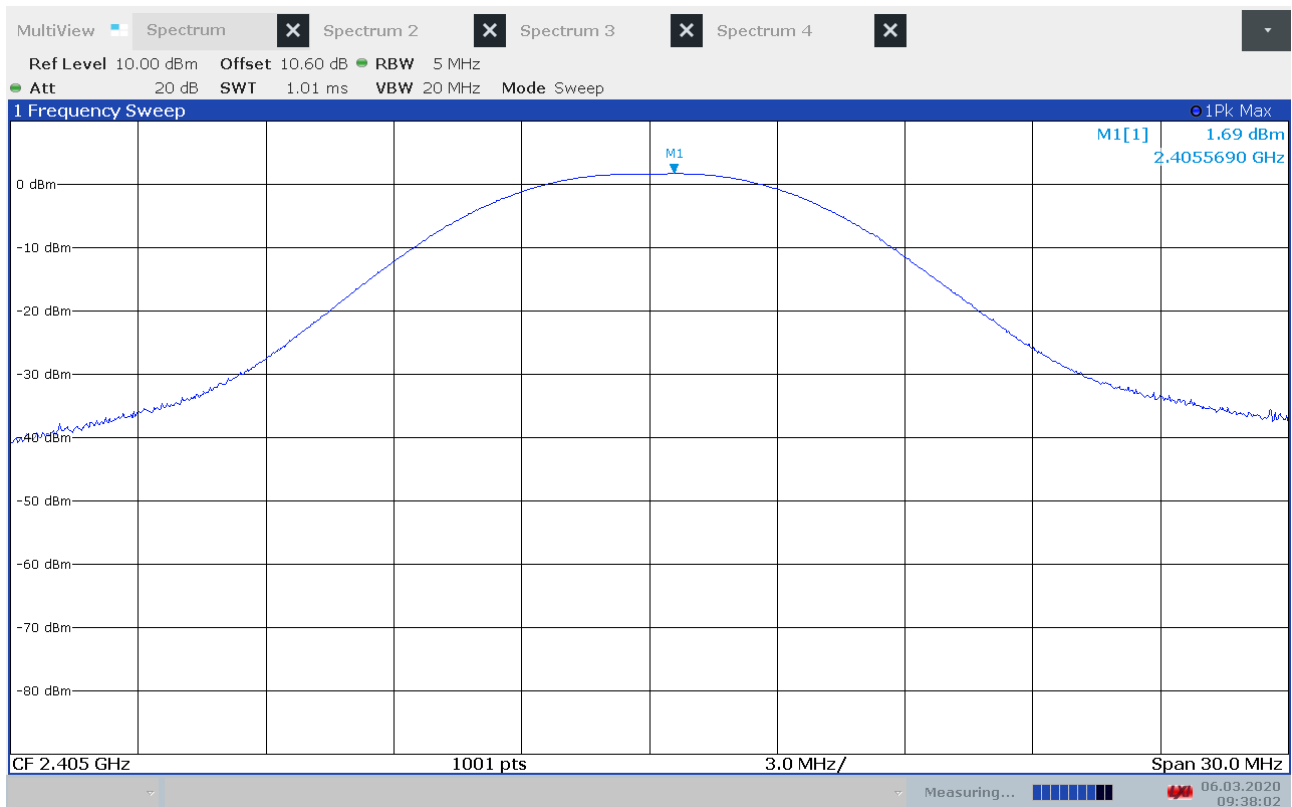
See attached plots.

Requirements:

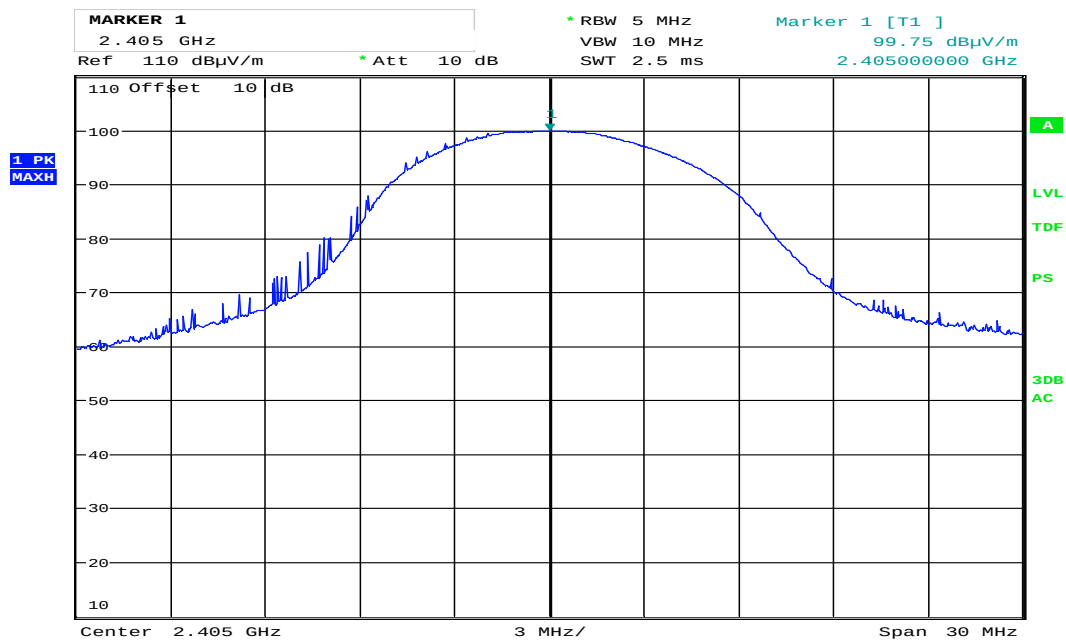
The maximum peak output power shall not exceed the following limits:

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.

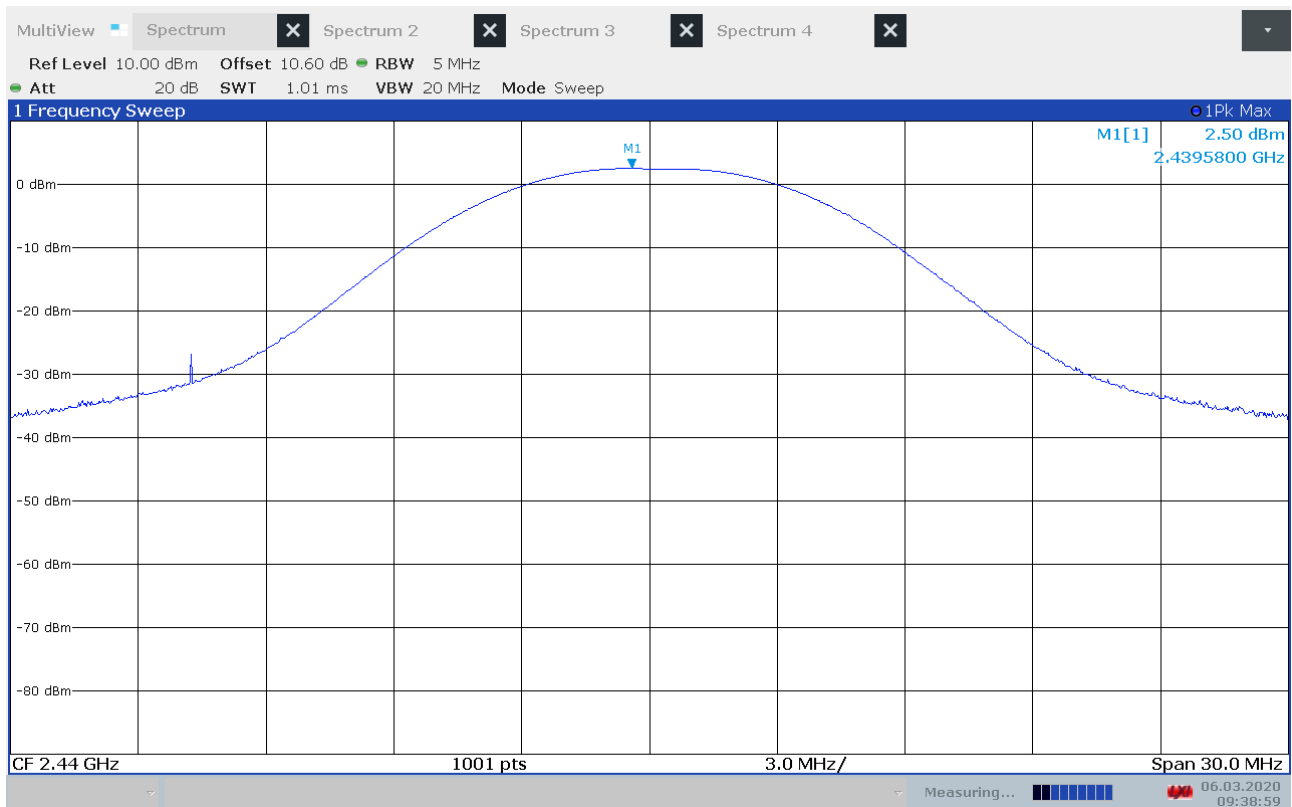


Output Power, 2405 MHz

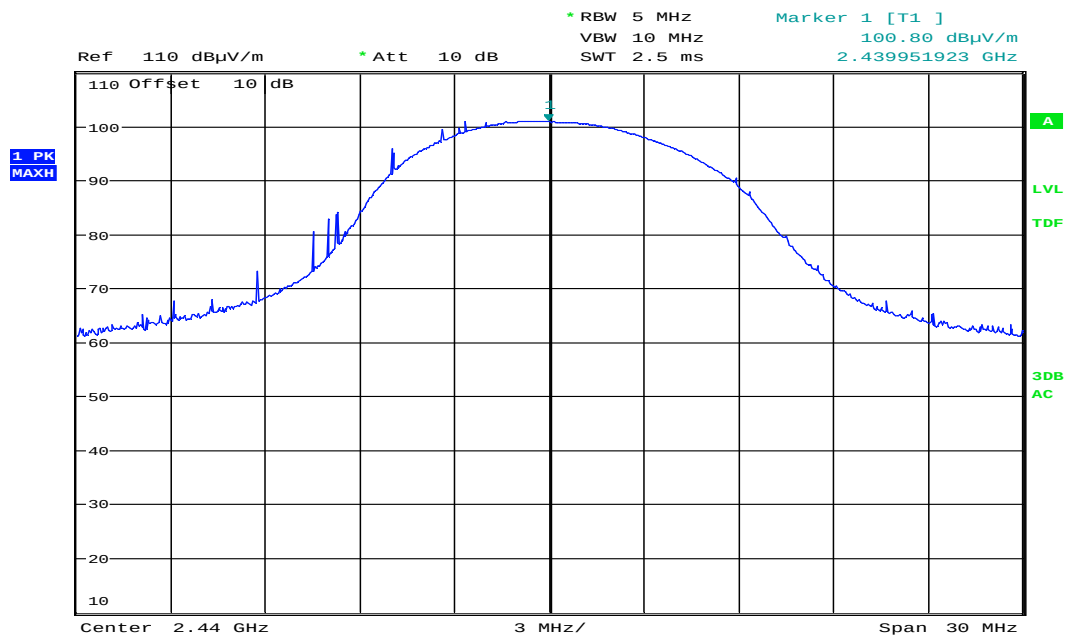


Date: 5. MAR. 2020 14:34:51

Field Strength, 2405 MHz

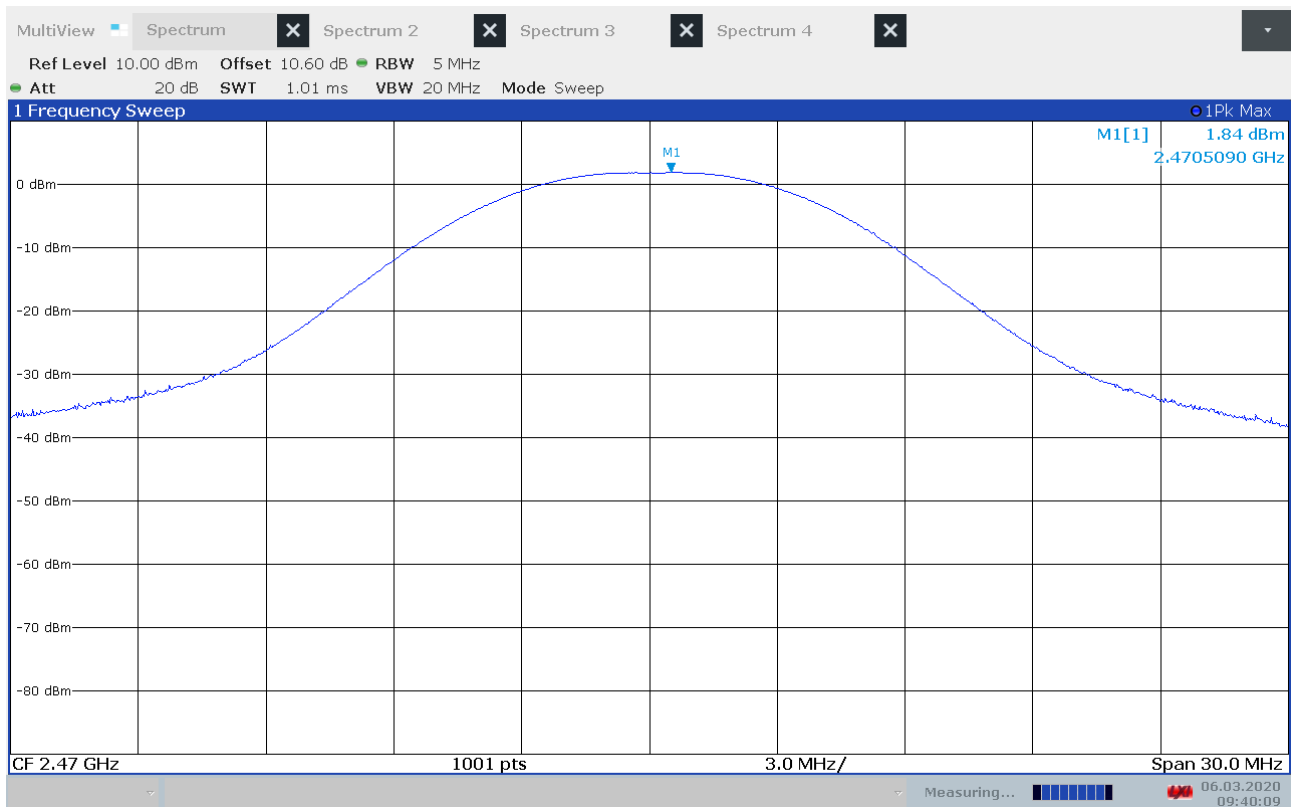


Output Power, 2440 MHz

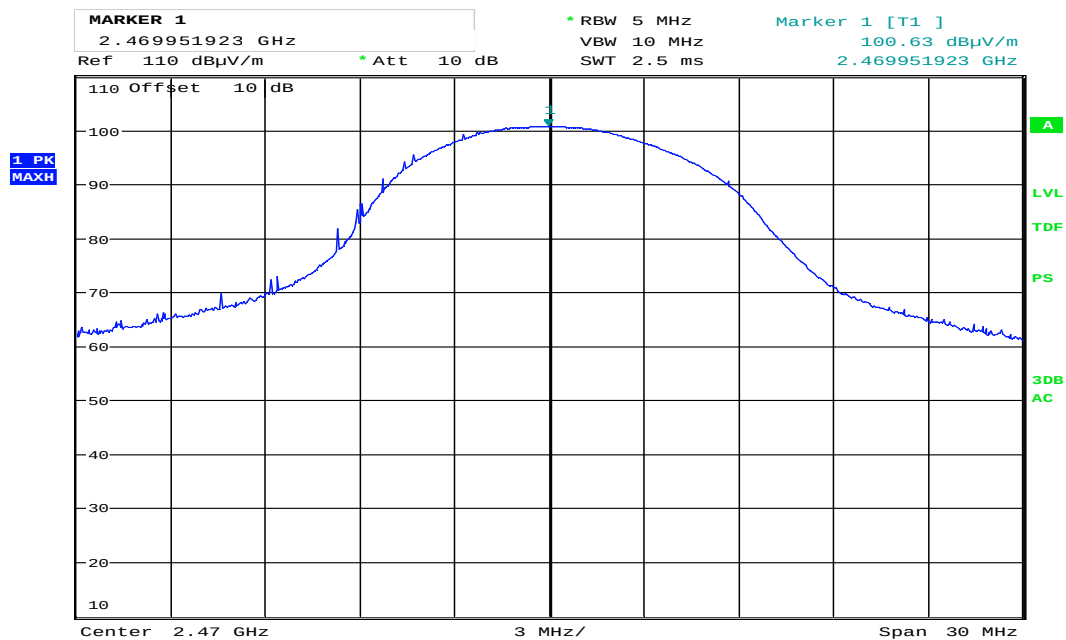


Date: 5. MAR. 2020 14:07:31

Field Strength, 2440 MHz



Output Power, 2470 MHz



Date: 5.MAR.2020 14:28:19

Field Strength, 2470 MHz

3.5 Conducted Emissions at Antenna Connector

FCC Part 15.247 (d)

ISED Canada RSS-247 Issue 2, Clause 5.5

Measurement procedure: ANSI C63.10-2013 Clause 11.11

Test Results: Complies

Measurement Data:

Carrier Frequency	Highest Value (dBc)	Margin (dB)	Verdict
2402 MHz	> 40	> 20	Pass
2440 MHz	> 40	> 20	Pass
2480 MHz	> 40	> 20	Pass

Measured with Peak Detector

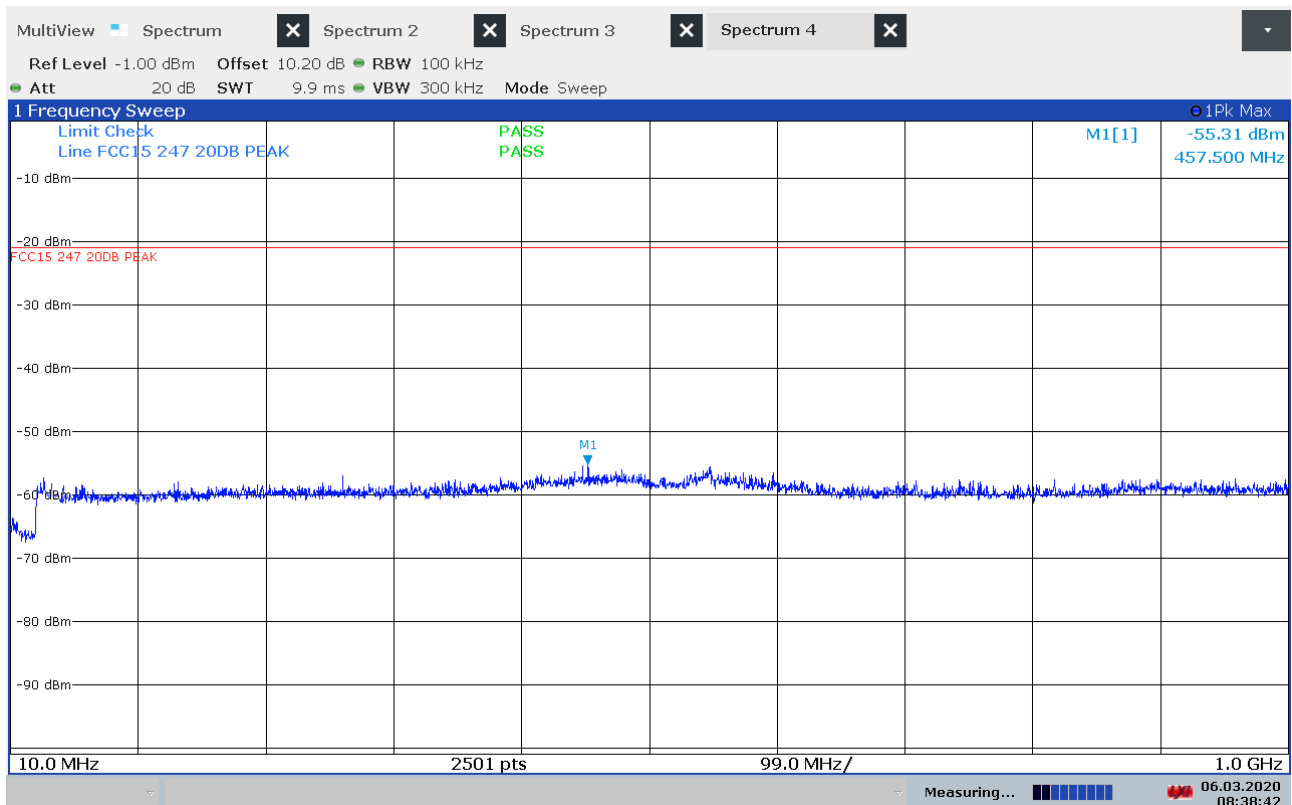
RF conducted power to 25 GHz: see attached plots.

Limit

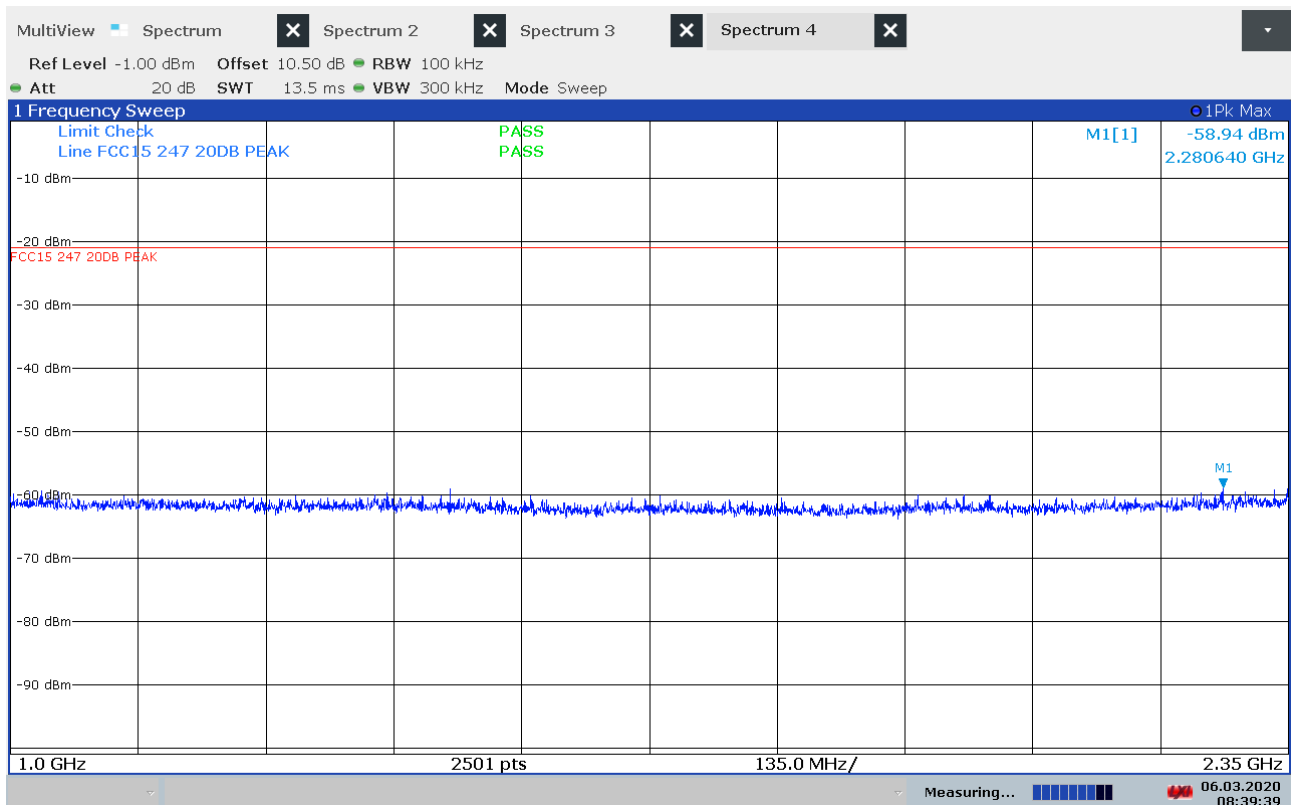
Peak measurement	RMS averaging
20 dBc or more in 100 kHz bandwidth	30 dBc or more in 100 kHz bandwidth

Detector type shall be the same as used for measuring Output Power.

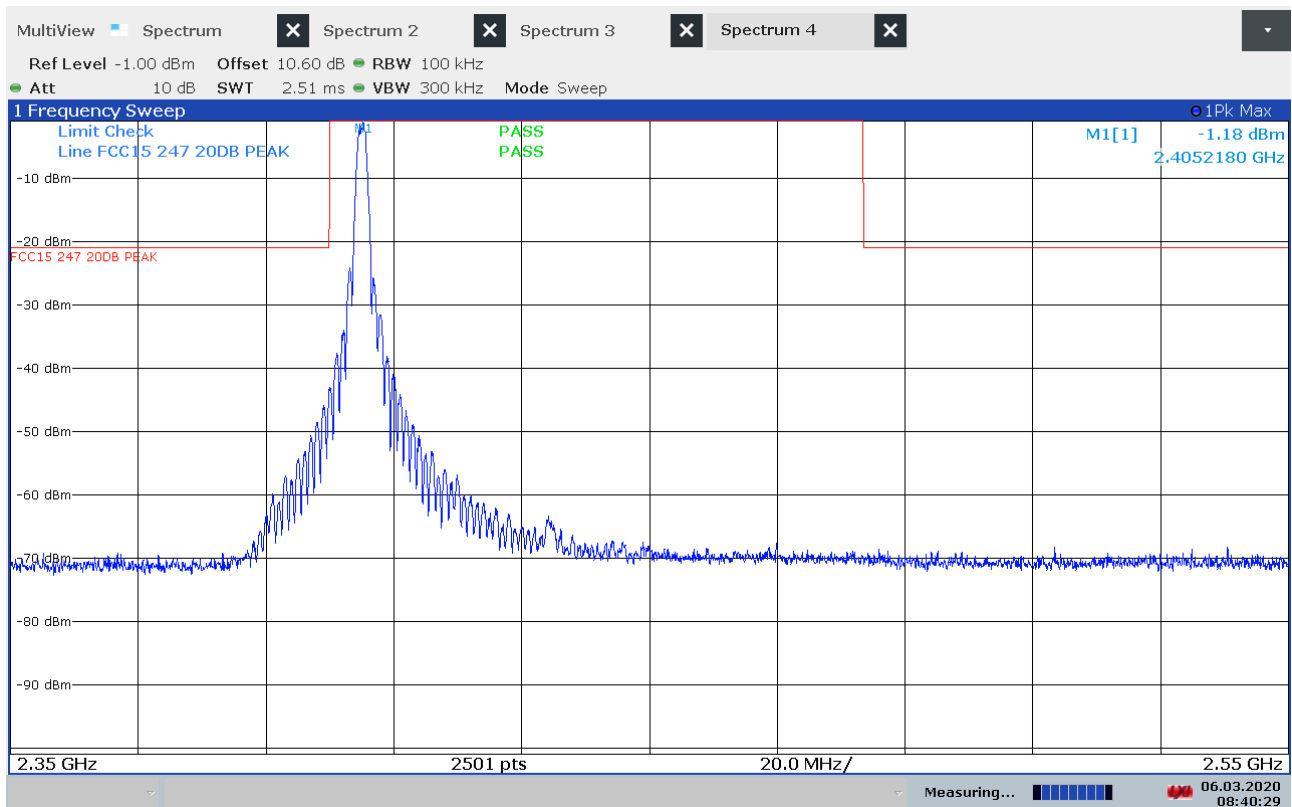
Attenuation below the general limits specified in part 15.209(a) is not required.



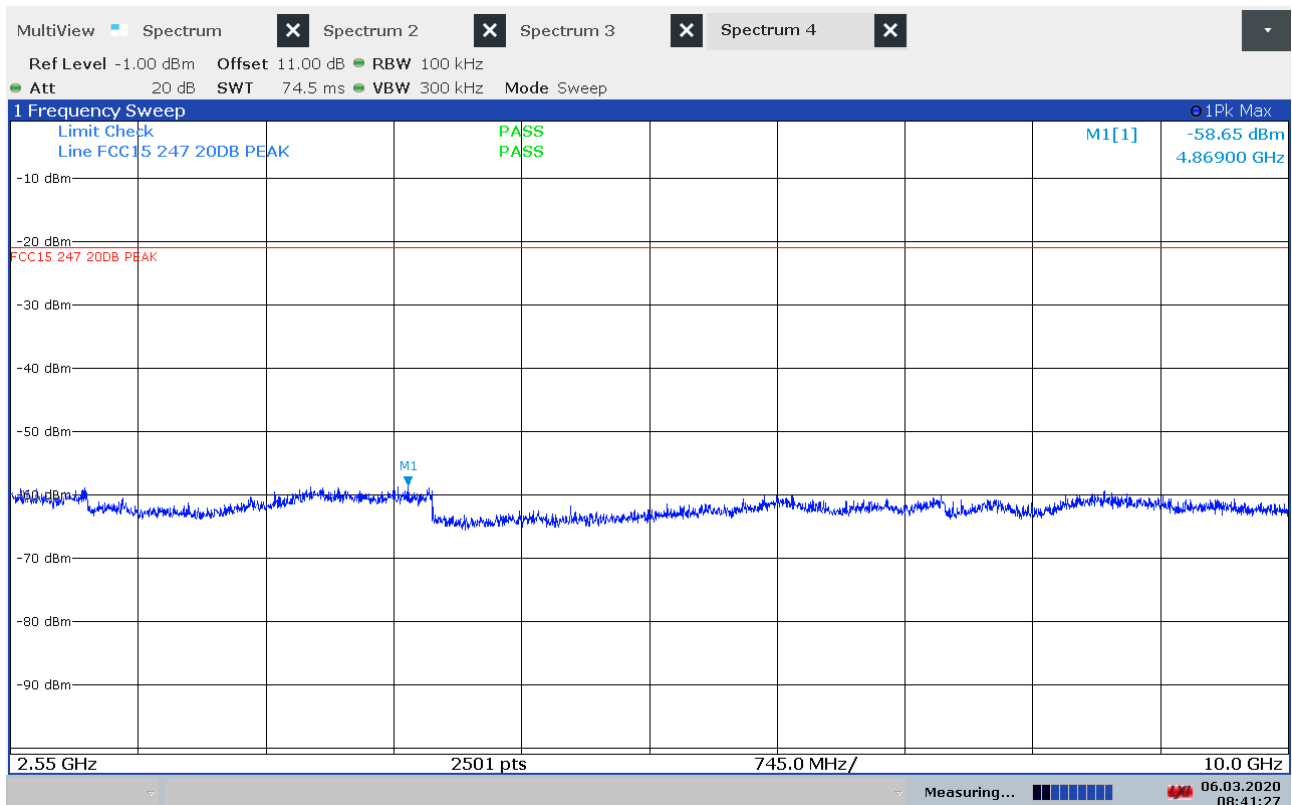
Spurious Emissions, Conducted 10 -1000 MHz, 2405 MHz



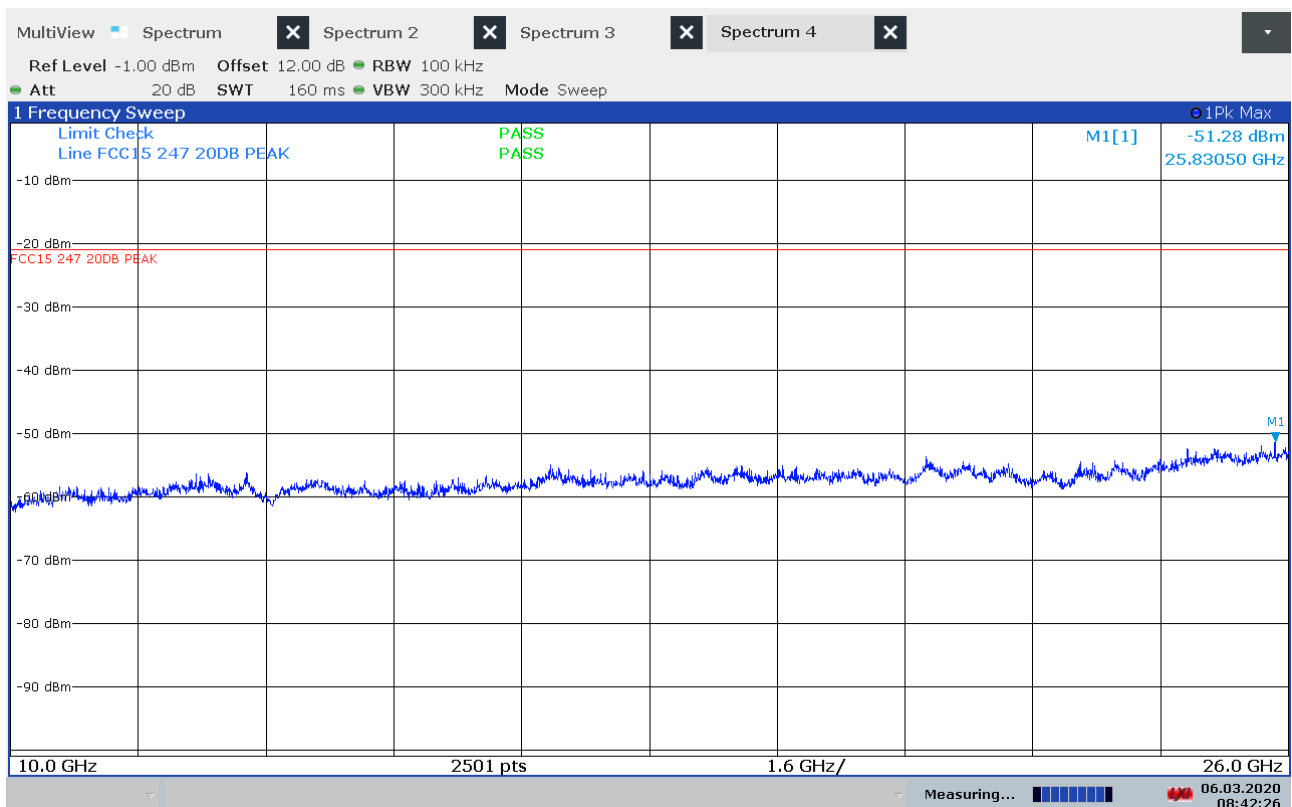
Spurious Emissions, Conducted 1000 -2350 MHz, 2405 MHz



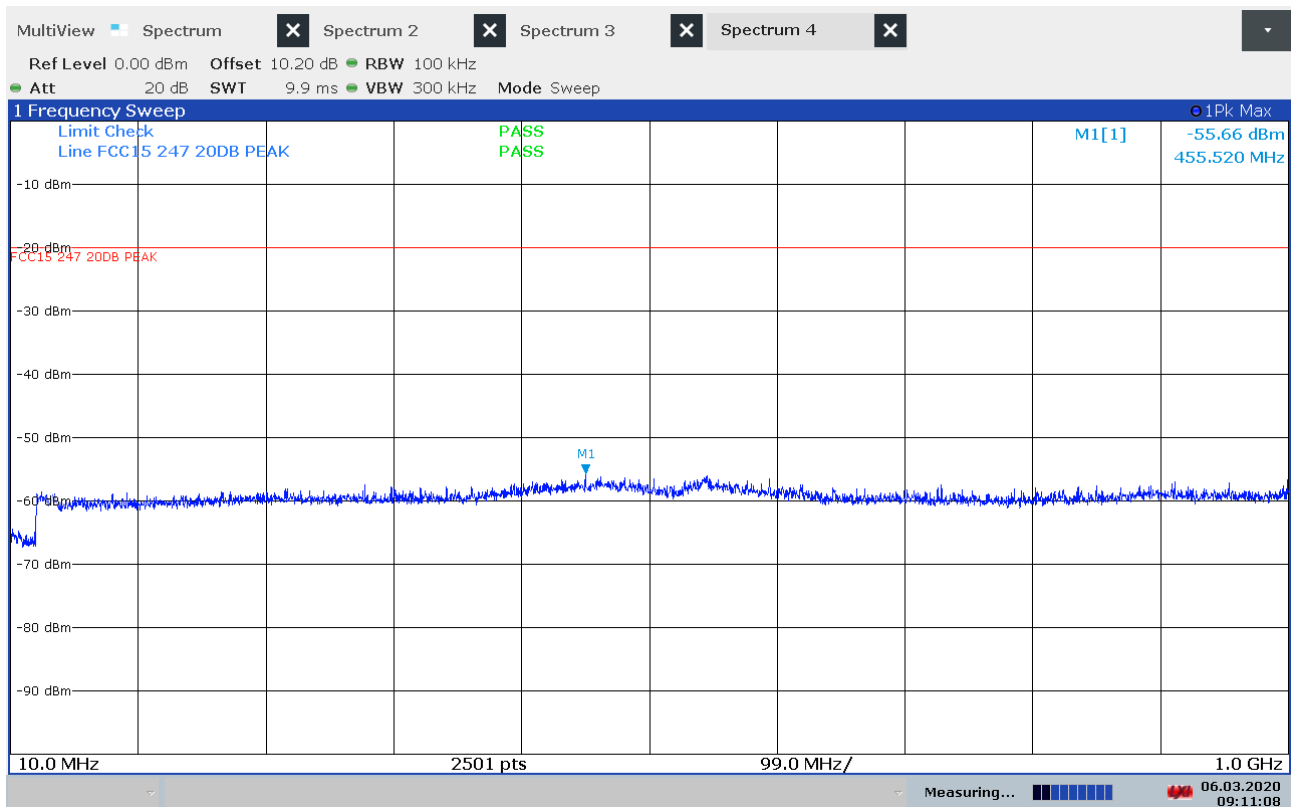
Spurious Emissions, Conducted 2350 -2550 MHz, 2405 MHz



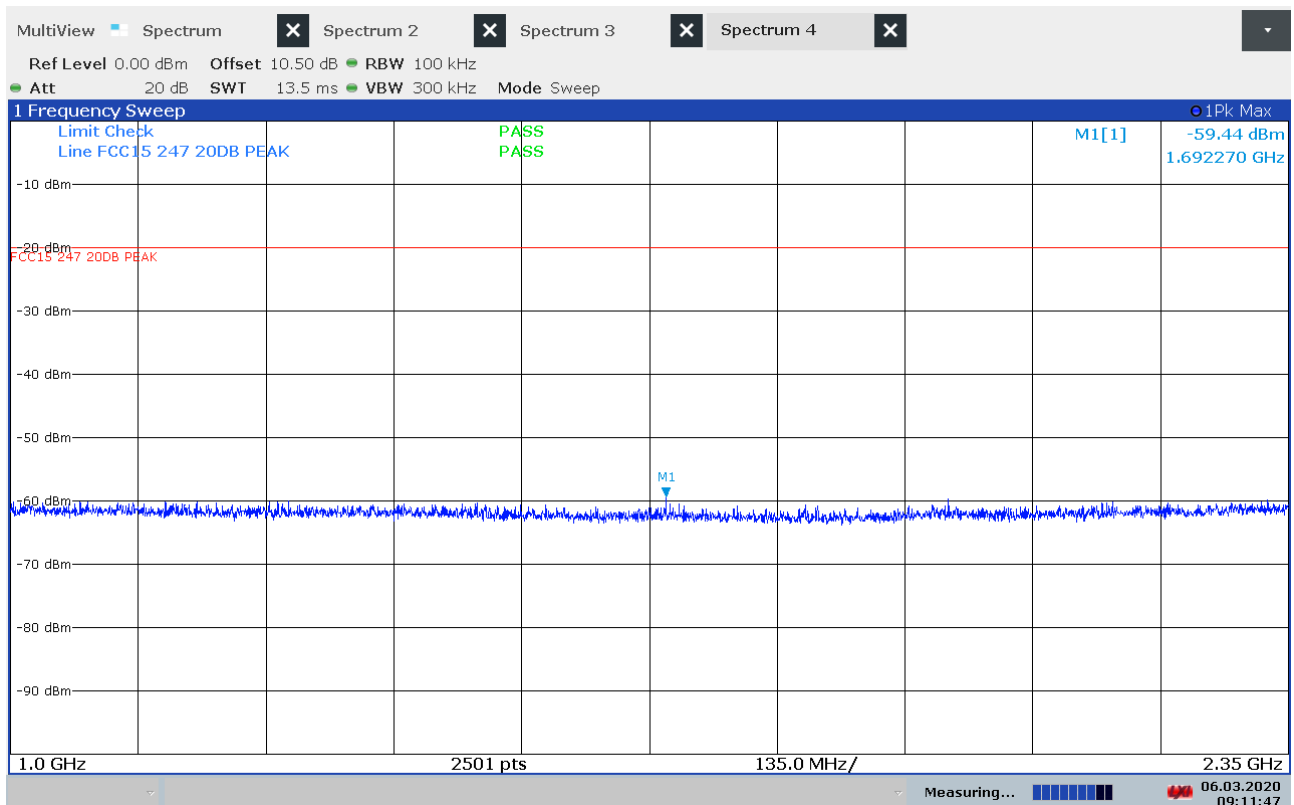
Spurious Emissions, Conducted 2550 -10000 MHz, 2405 MHz



Spurious Emissions, Conducted 10000 -26000 MHz, 2405 MHz

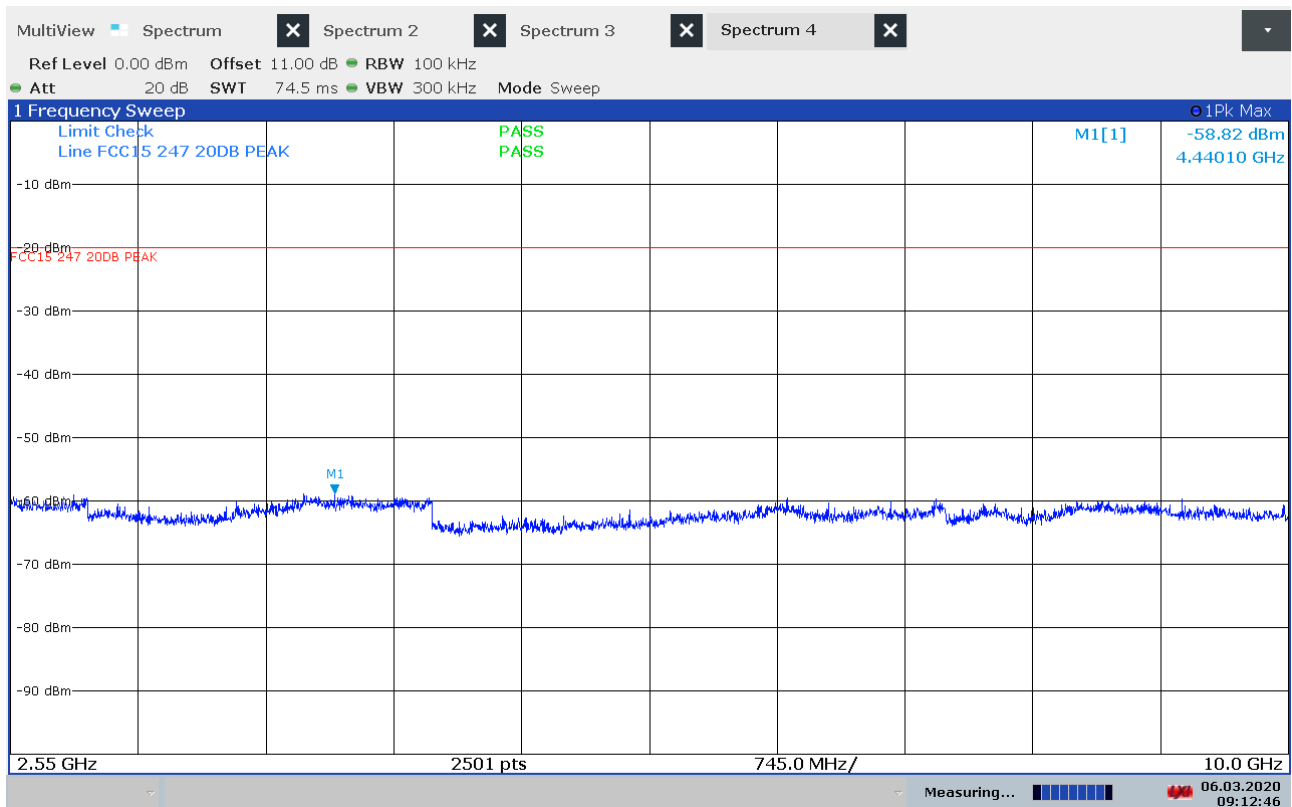


Spurious Emissions, Conducted 10 -1000 MHz, 2440 MHz

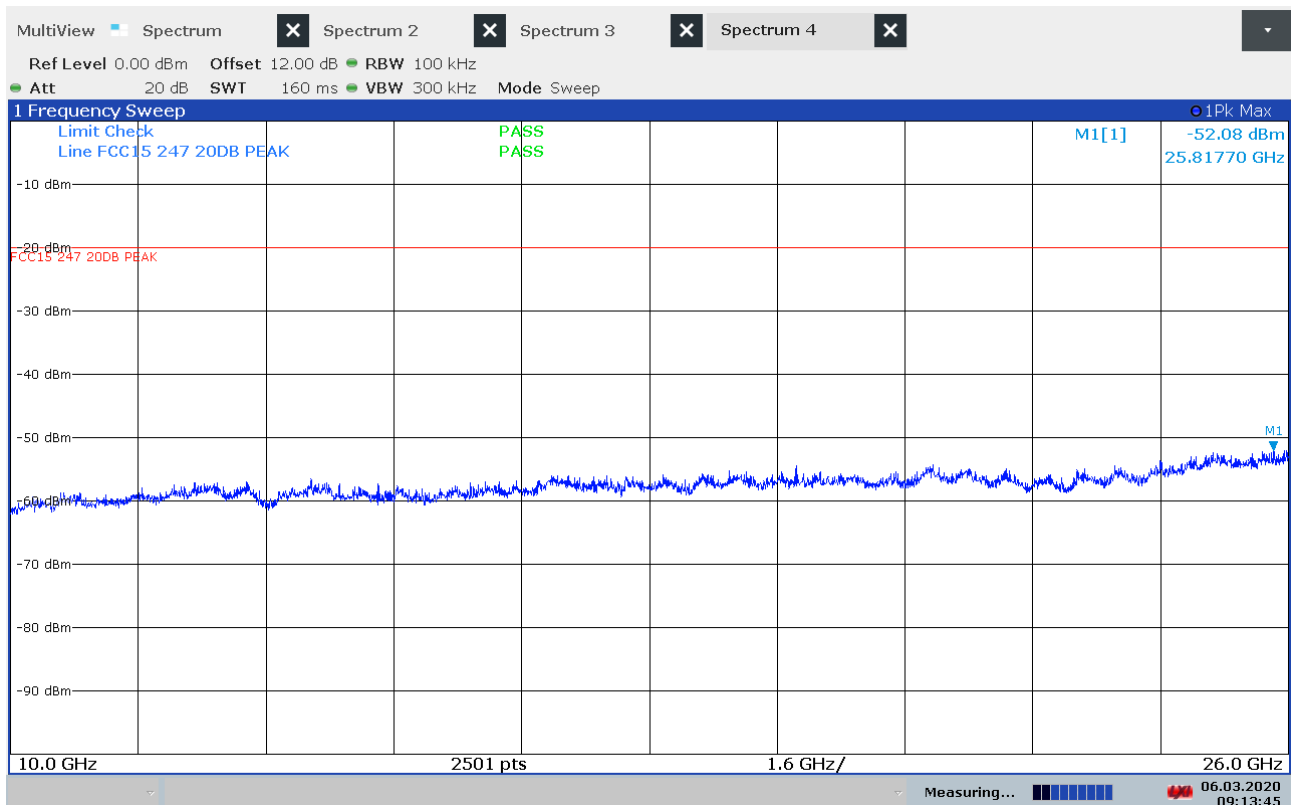


Spurious Emissions, Conducted 1000 -2350 MHz, 2440 MHz

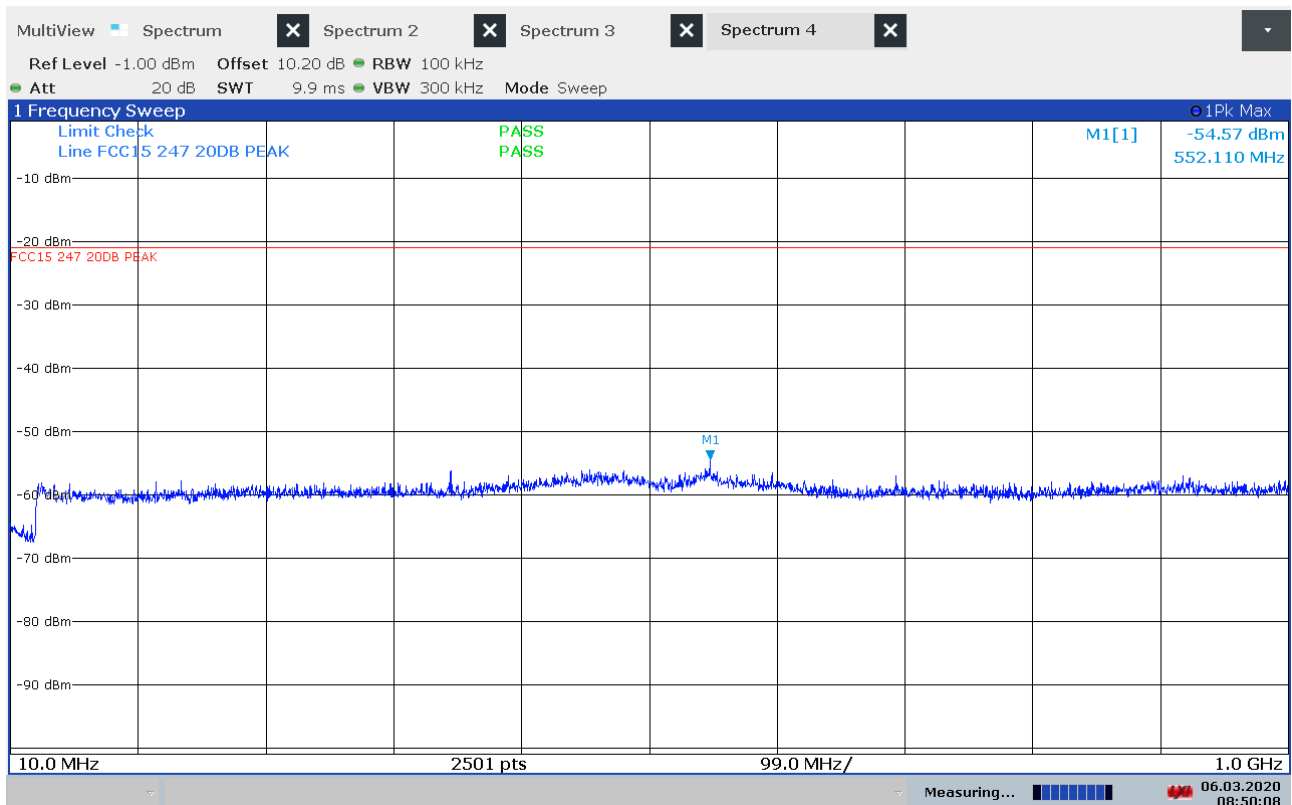




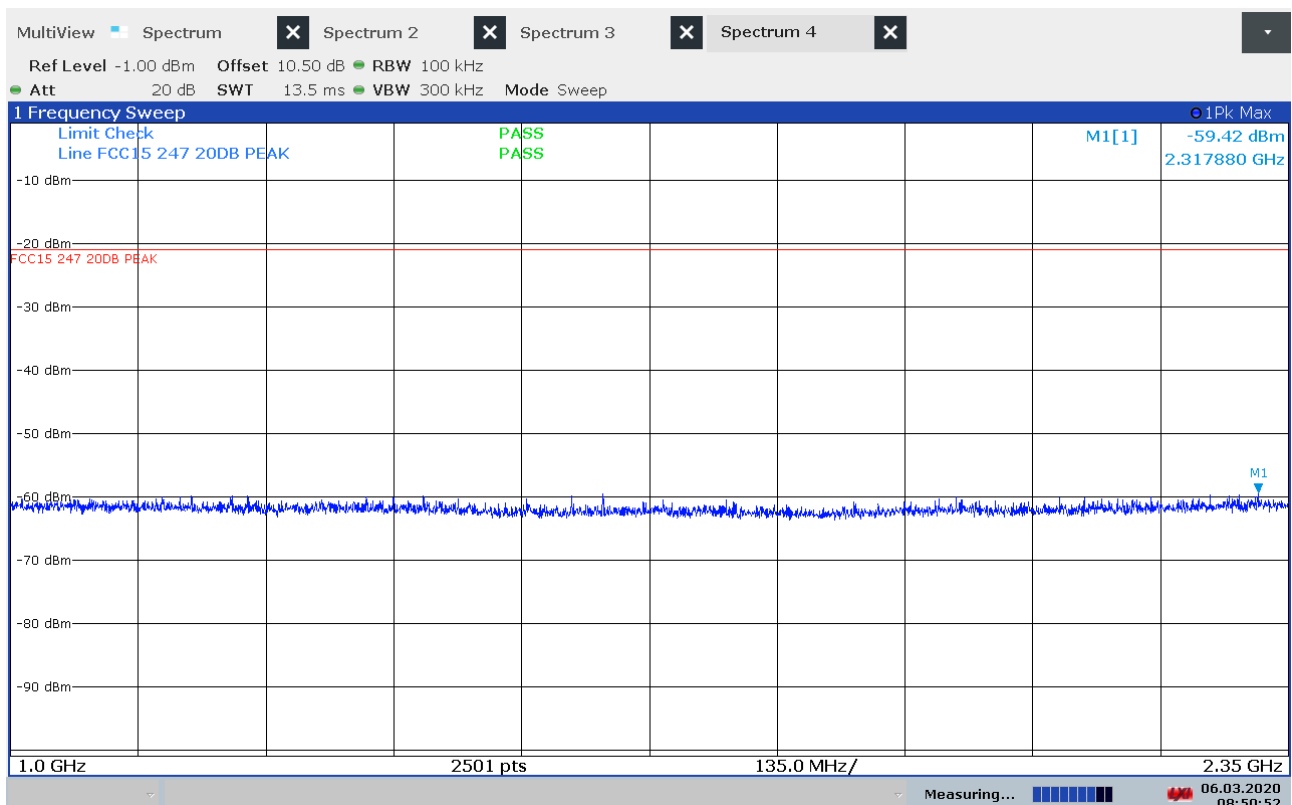
Spurious Emissions, Conducted 2550 -10000 MHz, 2440 MHz



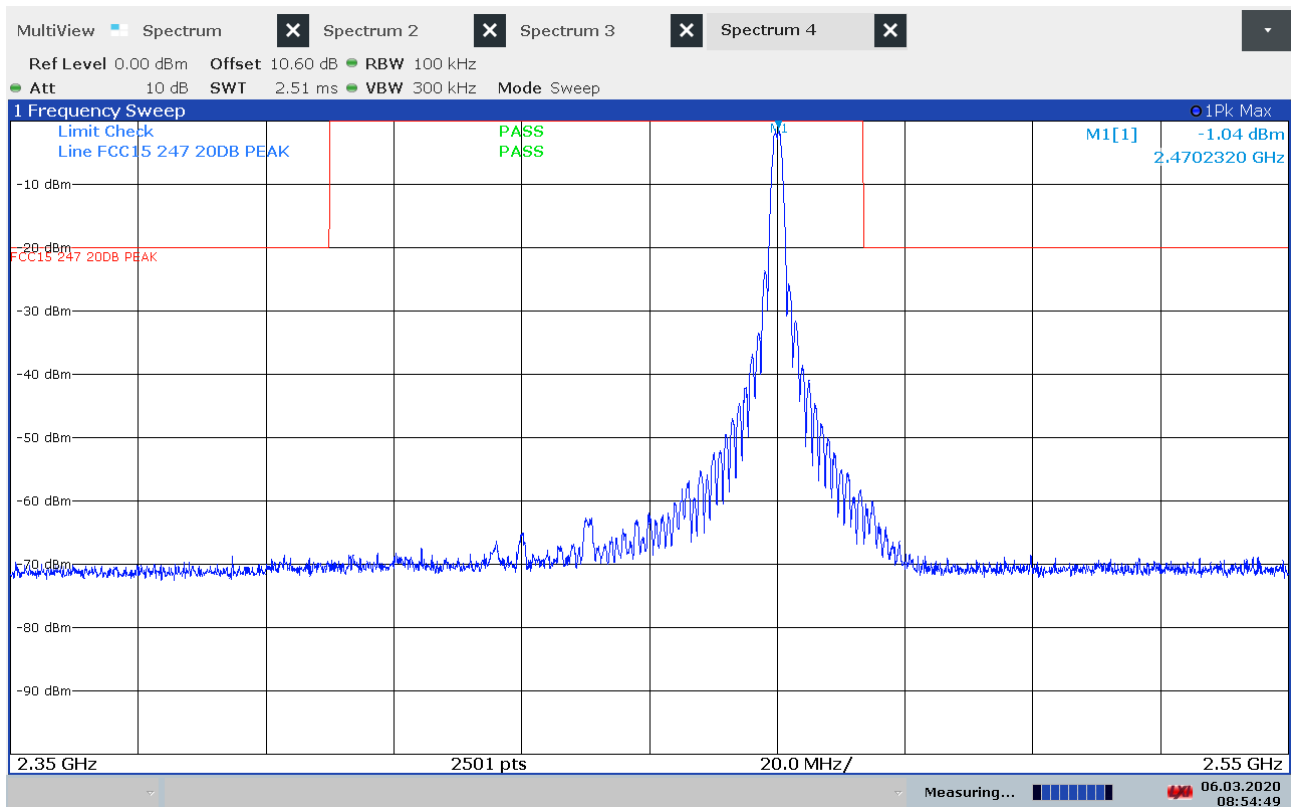
Spurious Emissions, Conducted 10000 -26000 MHz, 2440 MHz



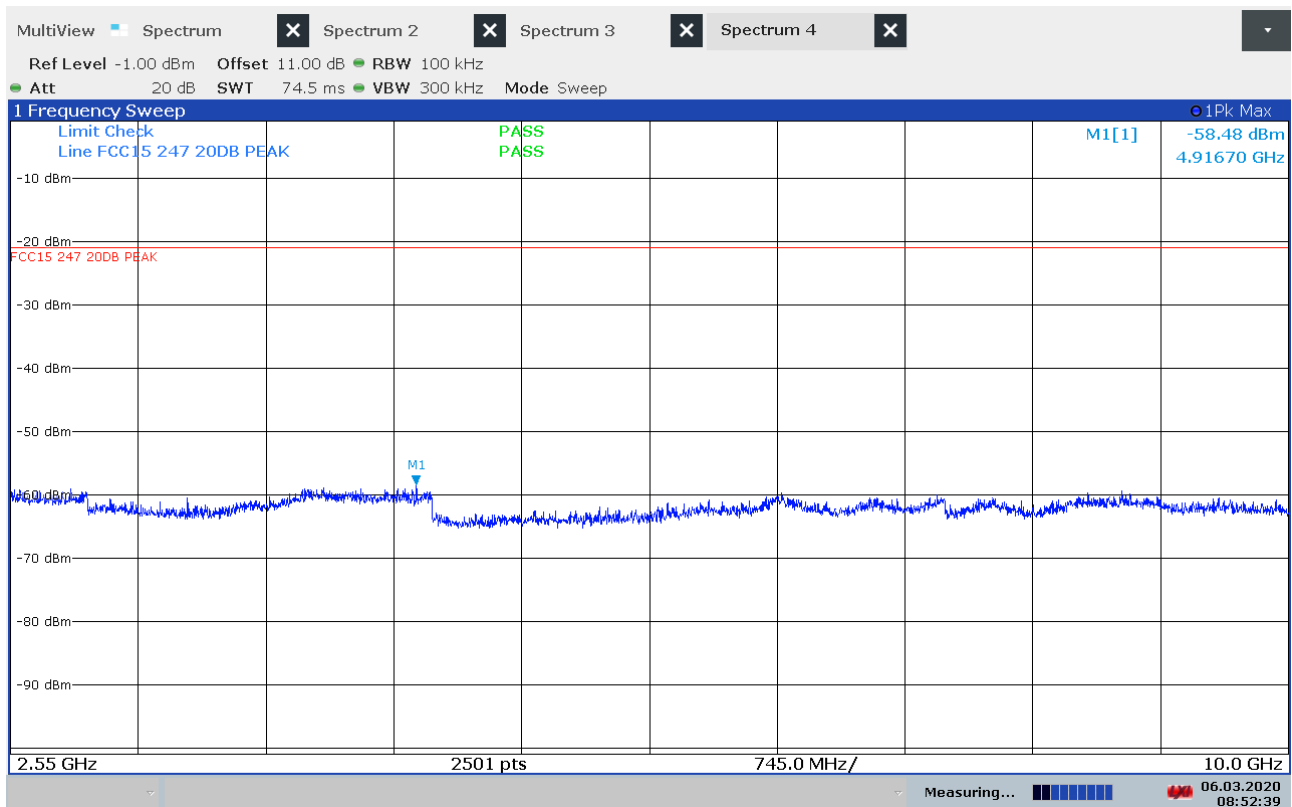
Spurious Emissions, Conducted 10 -1000 MHz, 2470 MHz



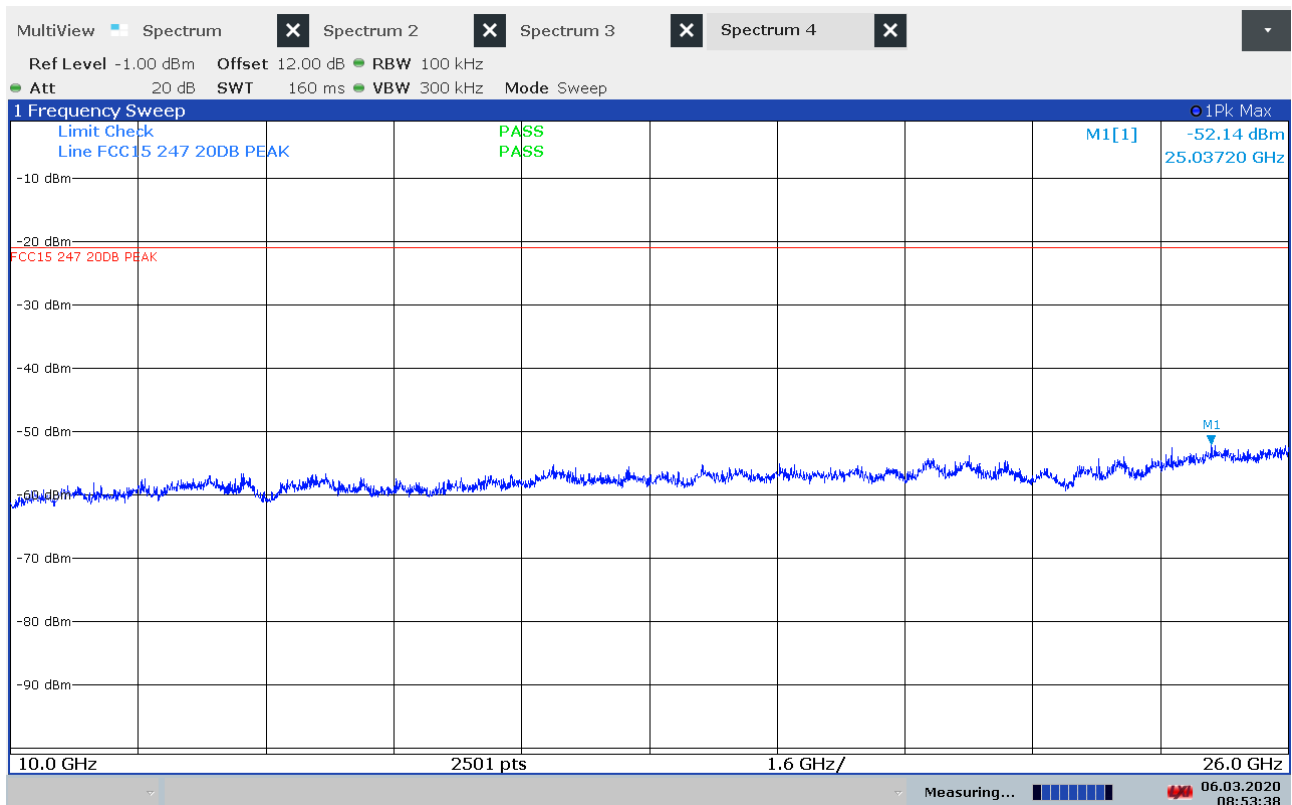
Spurious Emissions, Conducted 1000 -2350 MHz, 2470 MHz



Spurious Emissions, Conducted 2350 -2550 MHz, 2470 MHz



Spurious Emissions, Conducted 2550 -10000 MHz, 2470 MHz



Spurious Emissions, Conducted 10000 -26000 MHz, 2470 MHz

3.6 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)	ISSED (MHz)	FCC (GHz)	ISSED (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.

3.7 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

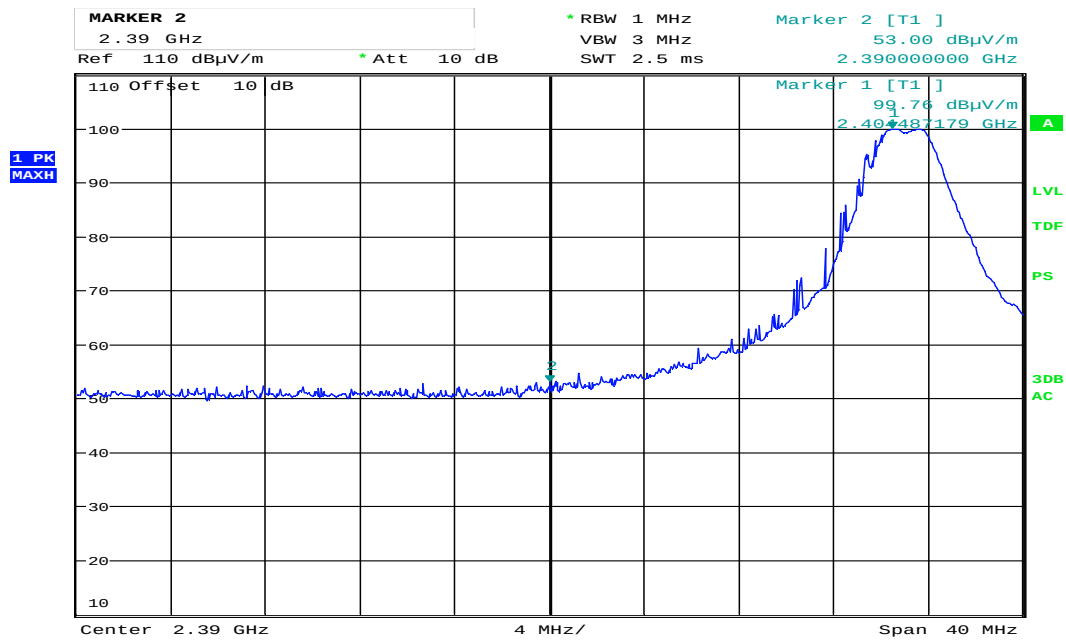
Test Results: Complies

Measurement Data:

	Measured field strength (dB μ V/m)		Limit	Margin	
	2390 MHz	2483.5 MHz	dB μ V/m	dB	
Peak Detector	53.0	54.6	74	21.0	19.4
Average Detector	45.1	47.8	54	8.9	6.2

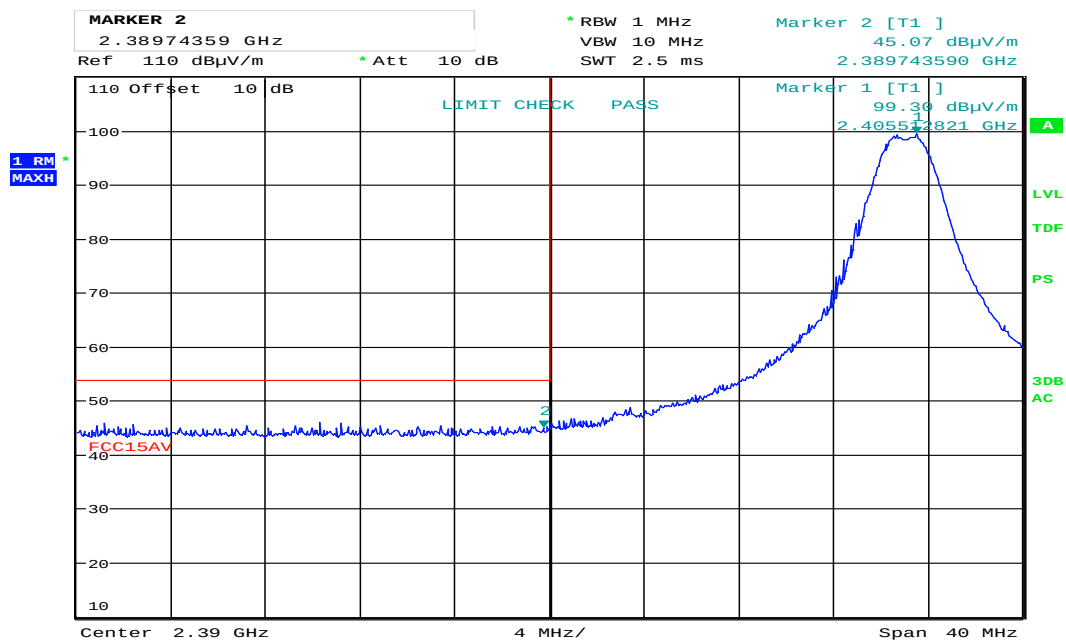
Average Values are measured with RMS Detector and method SA-3.

See attached plots.



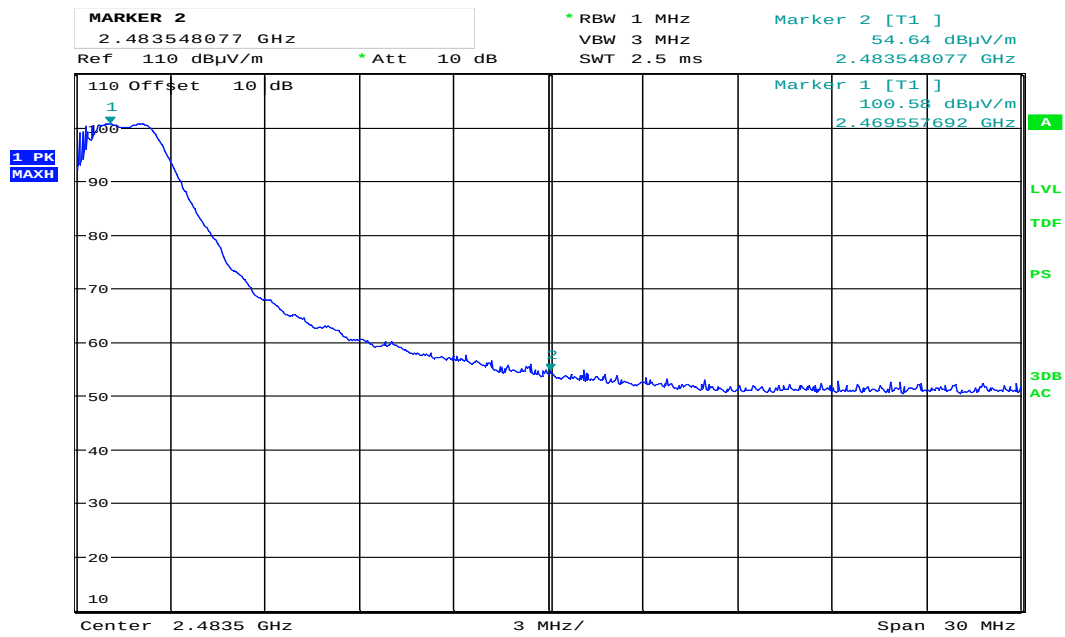
Date: 5.MAR.2020 14:33:34

Band Edge, 2405 MHz, Peak



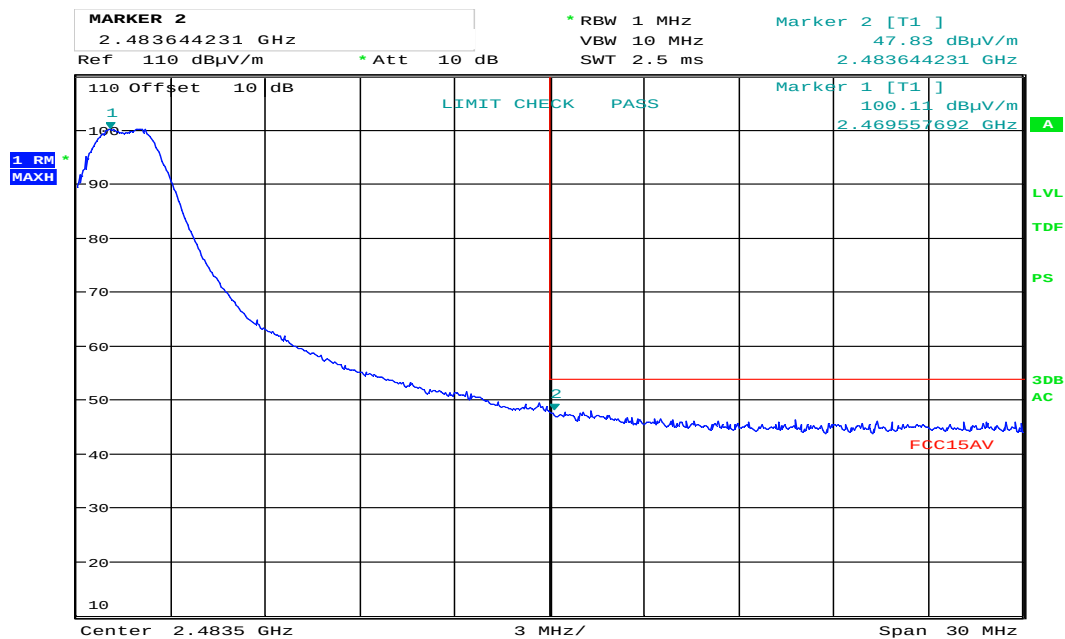
Date: 5.MAR.2020 14:32:47

Band Edge, 2405 MHz, Average



Date: 5.MAR.2020 14:29:51

Band Edge, 2470 MHz, Peak



Date: 5.MAR.2020 14:31:02

Band Edge, 2470 MHz, Average

3.8 Radiated Emission, 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: QuasiPeak

Measuring distance 3m

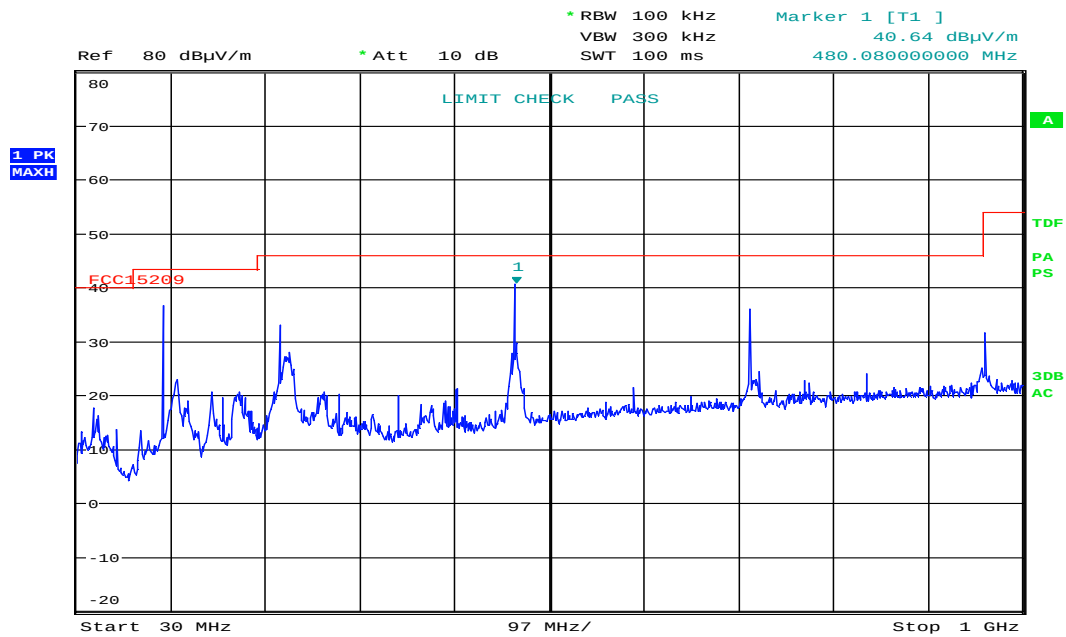
Frequency MHz	Dist. corr. Factor dB	Field strength @3m QP Det., dB μ V/m	Limit dB μ V/m	Margin dB
120	0	37.2	43.5	6.3
240	0	23.9	46	22.1
360	0	14.7	46	31.3
480	0	43.8	46	2.2
720	0	22.2	46	23.8
960	0	32.8	54	21.2

A Low Pass filter was used for these measurements.

See attached plots

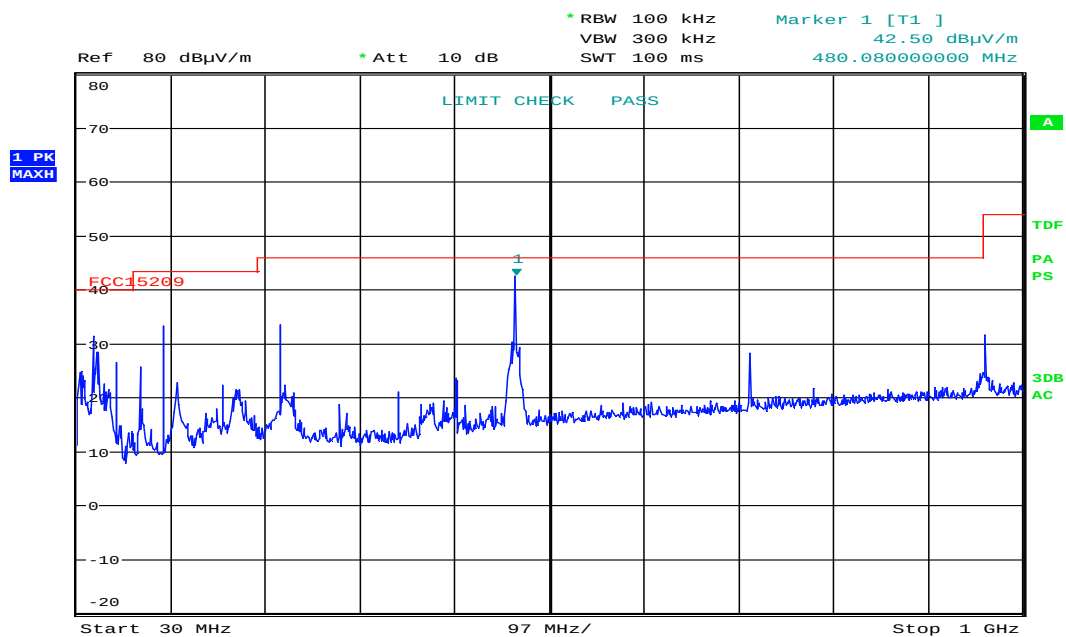
Requirements/Limit

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 μ V/m	40.0 dB μ V/m
88 – 216 MHz	150 μ V/m	43.5 dB μ V/m
216 – 960 MHz	200 μ V/m	46.0 dB μ V/m
960 – 1000 MHz	500 μ V/m	54.0 dB μ V/m
	Limits above are with Quasi Peak Detector	



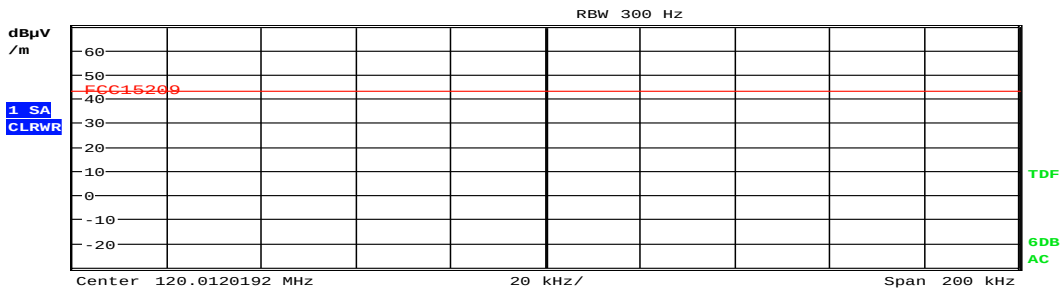
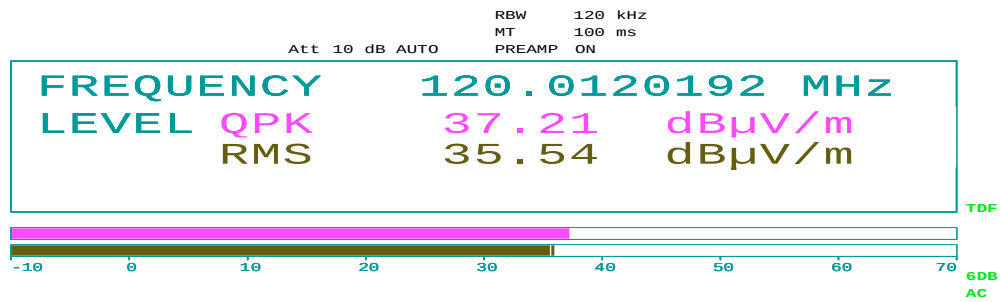
Date: 5.MAR.2020 16:04:11

Radiated Emissions, 30 -1000 MHz, EUT V, HP



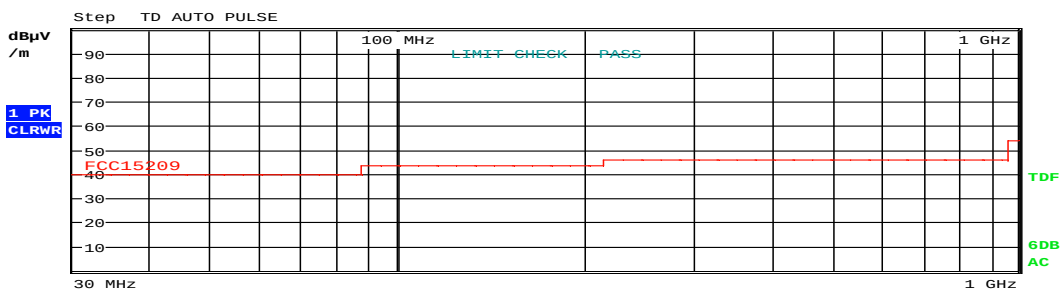
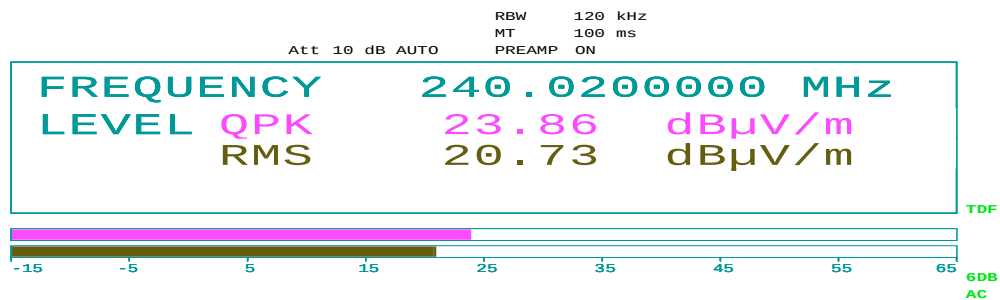
Date: 5.MAR.2020 16:02:16

Radiated Emissions, 30 -1000 MHz, EUT V, VP



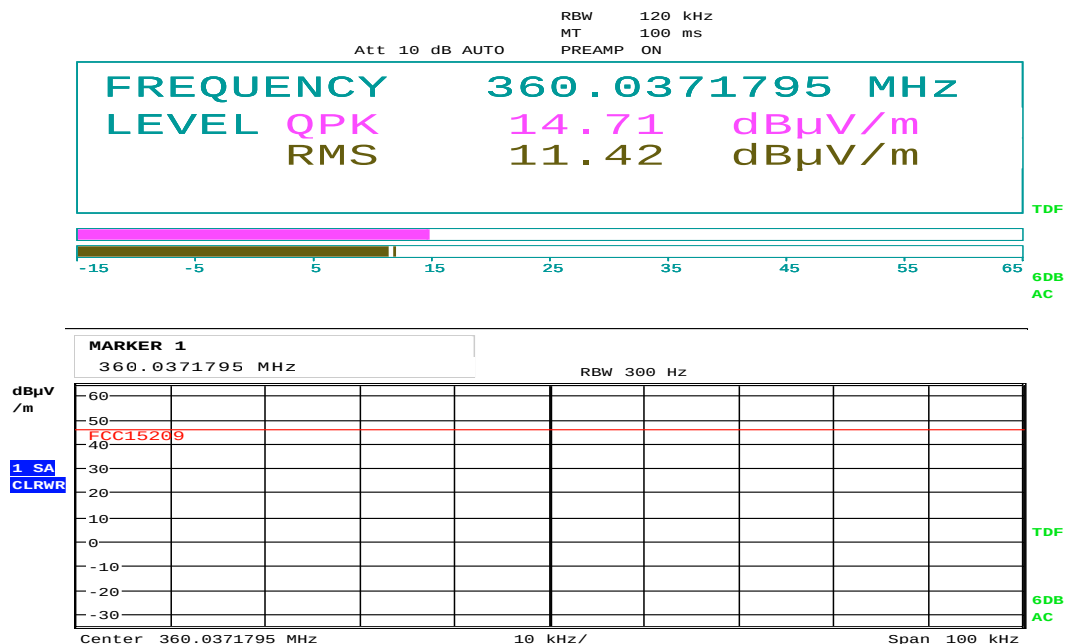
Date: 5.MAR.2020 16:39:31

Radiated Emissions, 120 MHz (Max: HP)



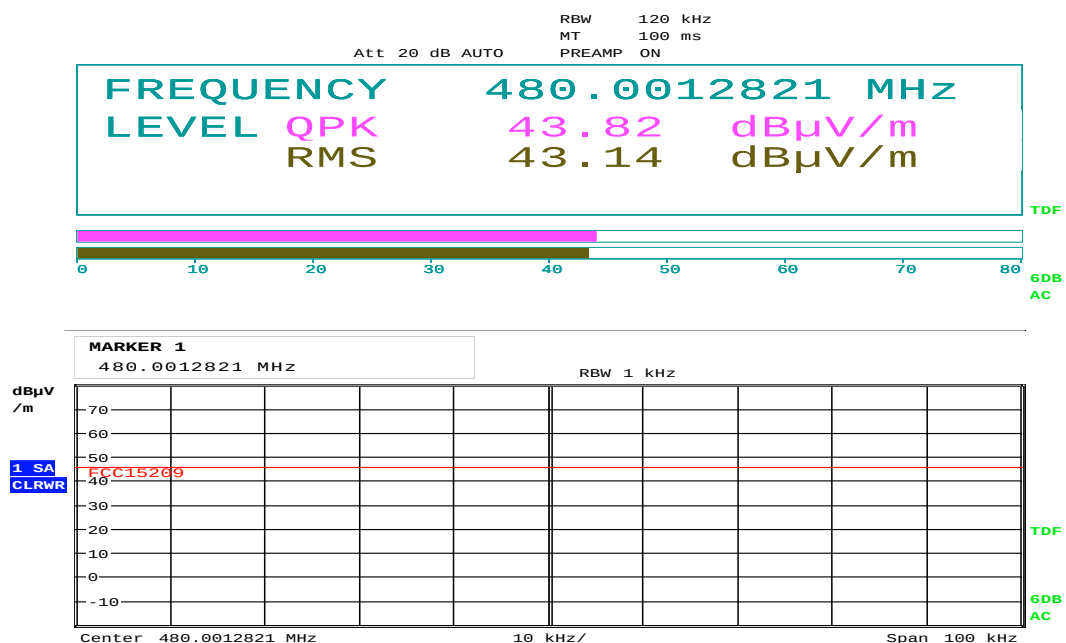
Date: 5.MAR.2020 16:34:58

Radiated Emissions, 240 MHz (Max: HP)



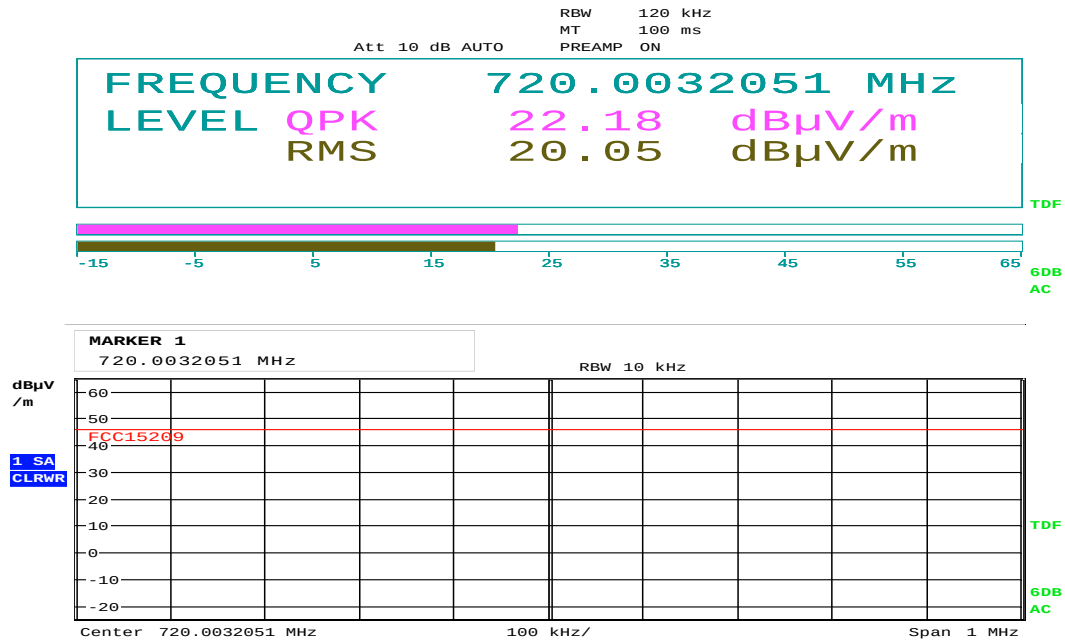
Date: 5.MAR.2020 16:38:14

Radiated Emissions, 360 MHz (Max: HP)



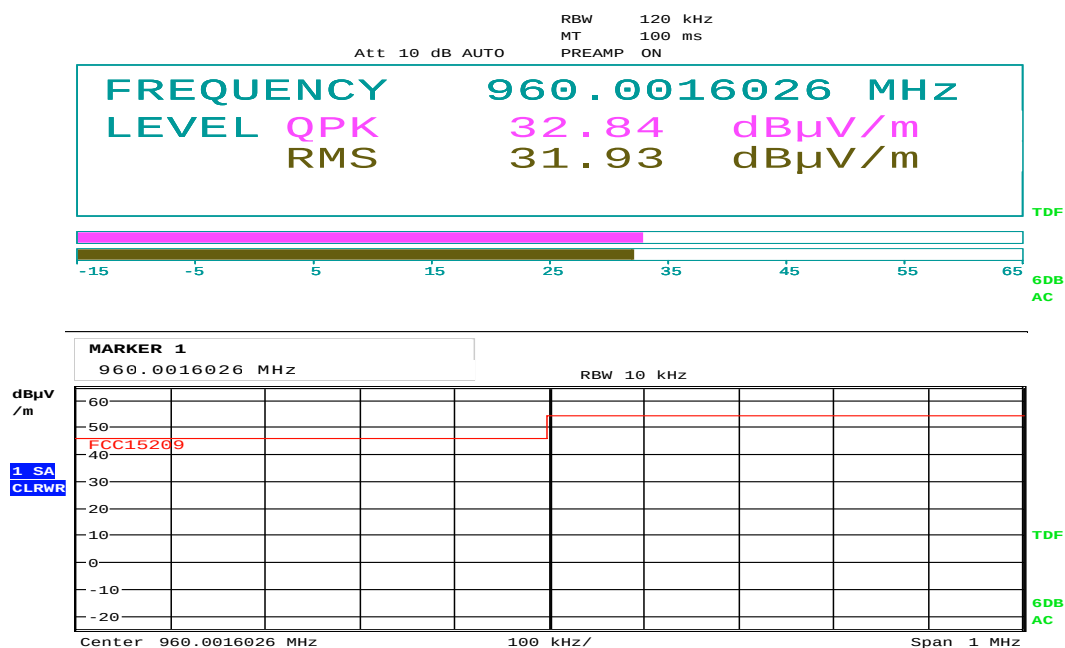
Date: 5.MAR.2020 16:37:37

Radiated Emissions, 480 MHz (Max: HP)



Date: 5.MAR.2020 16:37:05

Radiated Emissions, 720 MHz (Max: HP)



Date: 5.MAR.2020 16:36:39

Radiated Emissions, 960 MHz (Max: HP)

3.9 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)

Peak Detector:

Frequency (MHz)	RF channel	Dist. corr. Factor (dB)	Field strength, Peak Detector, 3m (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1727	7	0	51.8	74	22.2
Other freqs	all	0	None detected	74	>20

Peak values are below the Average Limit.

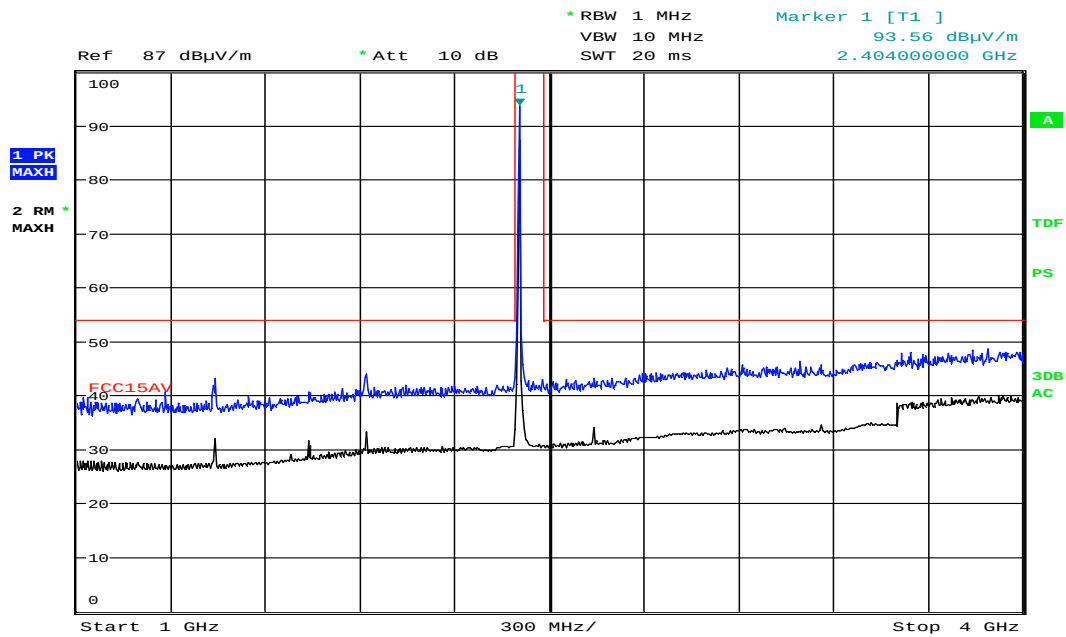
A Band Stop Filter was used for measurements above 4 GHz.

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

See plots.

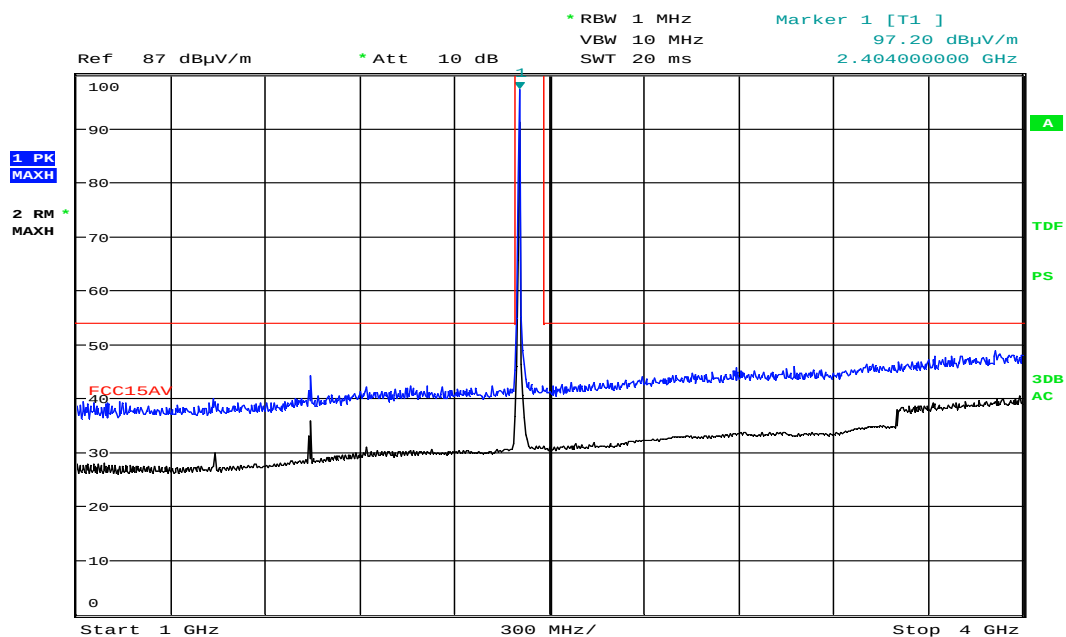
Requirements/Limit

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



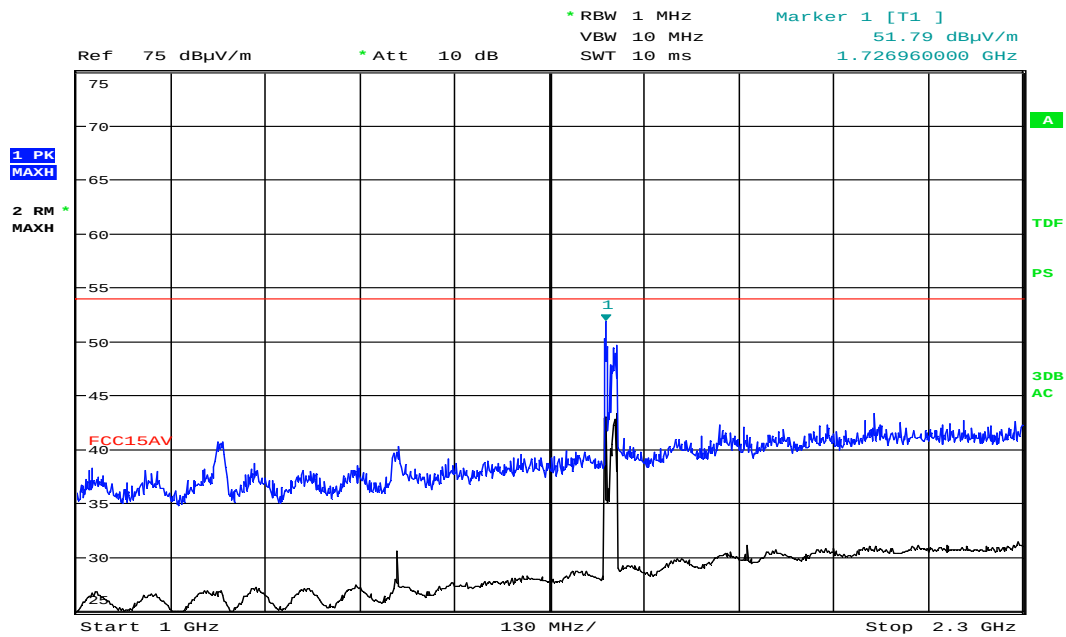
Date: 5.MAR.2020 11:21:06

Radiated Emissions, 1000 -4000 MHz, 2405MHz, EUT V, HP



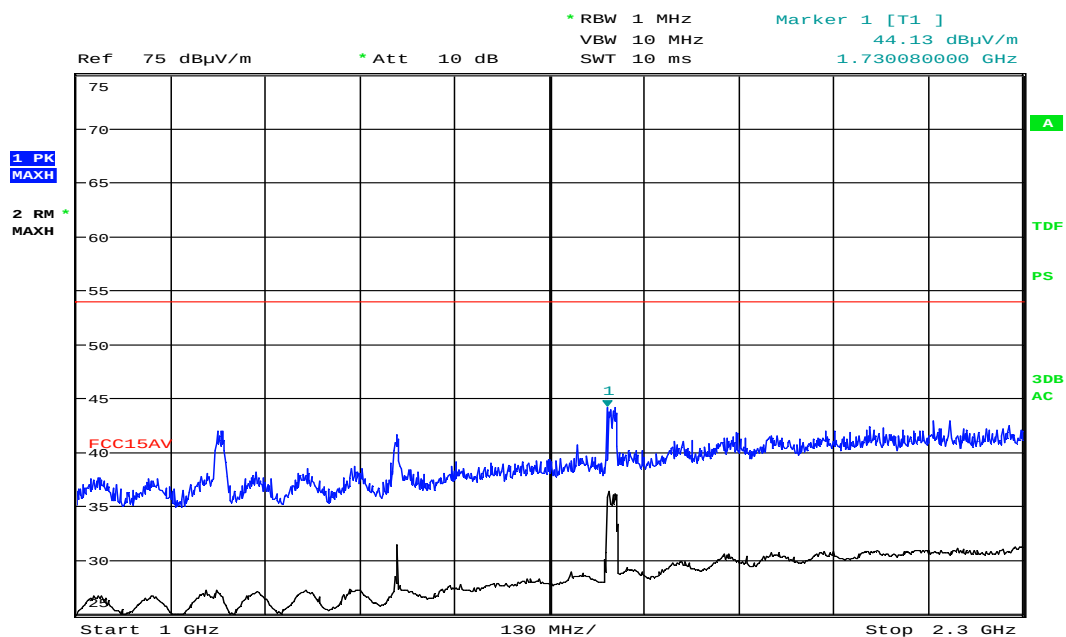
Date: 5.MAR.2020 11:19:02

Radiated Emissions, 1000 -4000 MHz, 2405MHz, EUT V, VP



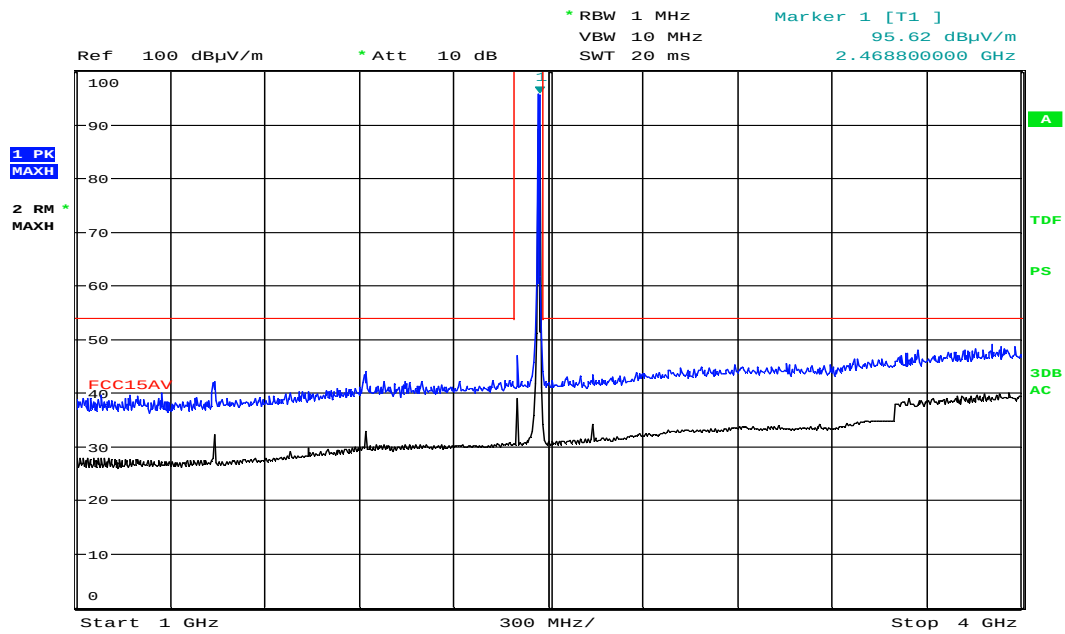
Date: 5.MAR.2020 13:26:14

Radiated Emissions, 1000 -2300 MHz, 2440MHz, EUT V, HP



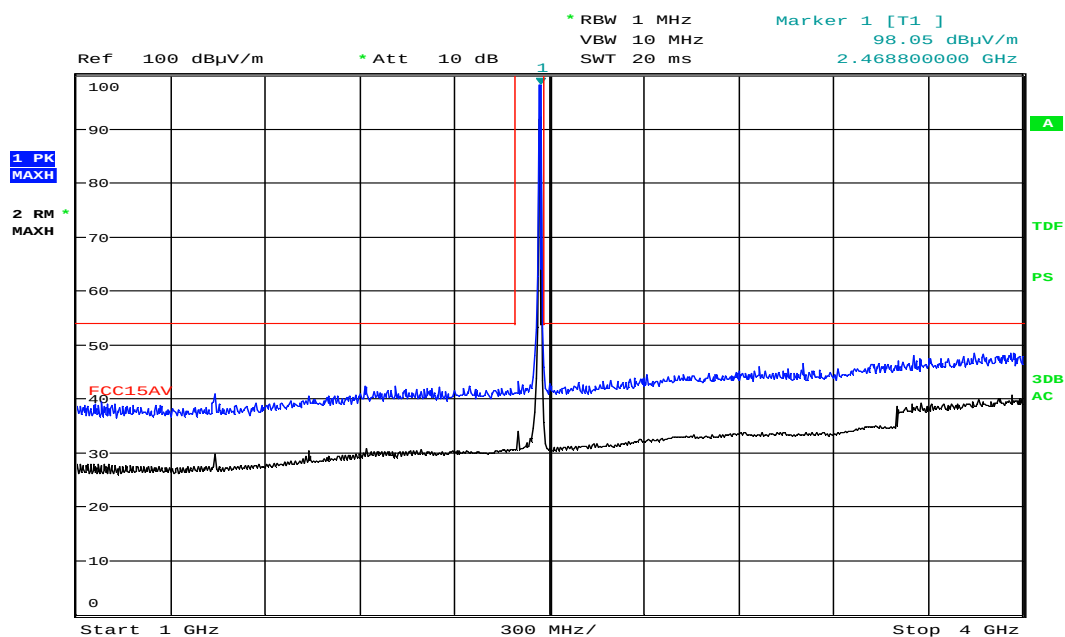
Date: 5.MAR.2020 13:24:00

Radiated Emissions, 1000 -2300 MHz, 2440MHz, EUT V, VP



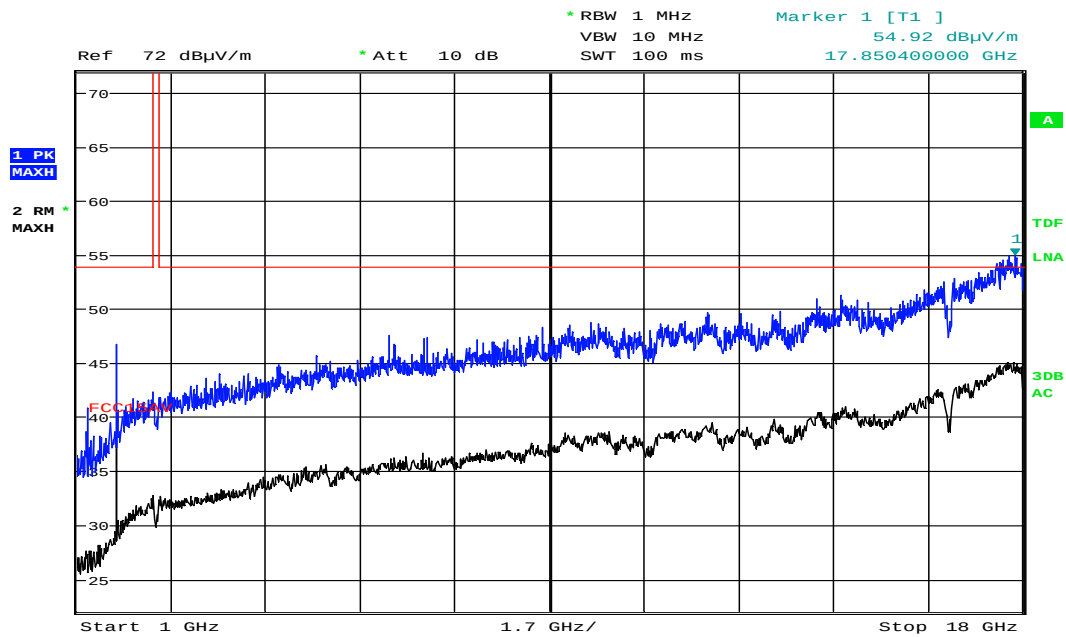
Date: 5.MAR.2020 11:13:00

Radiated Emissions, 1000 -4000 MHz, 2470MHz, EUT V, HP



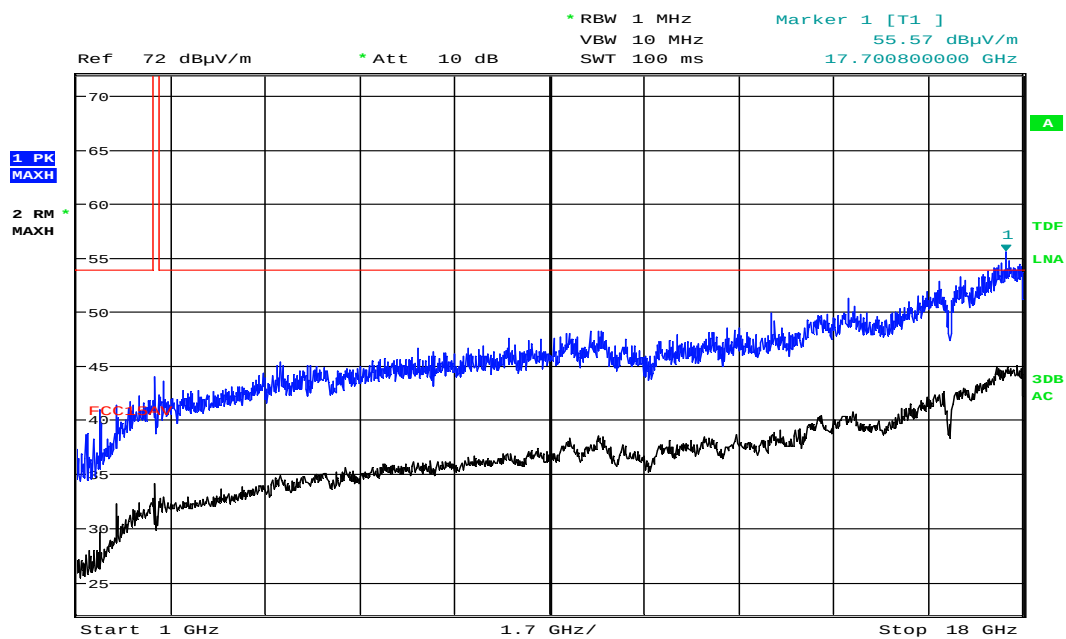
Date: 5.MAR.2020 11:10:58

Radiated Emissions, 1000 -4000 MHz, 2470MHz, EUT V, VP



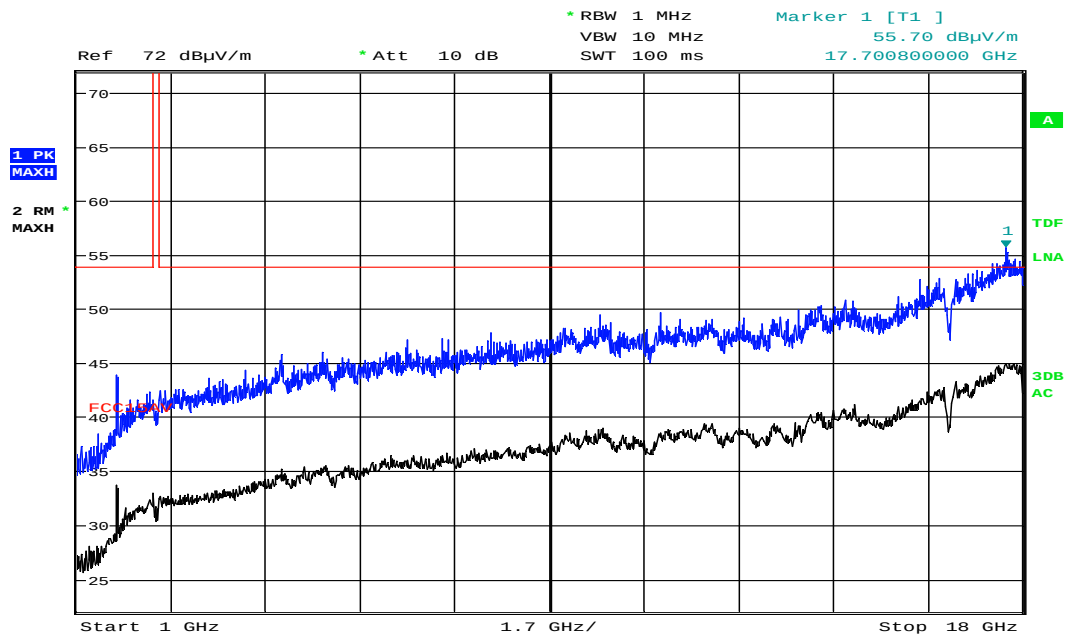
Date: 5.MAR.2020 12:54:29

Radiated Emissions, 1000 -18000 MHz, 2405MHz, EUT V, HP



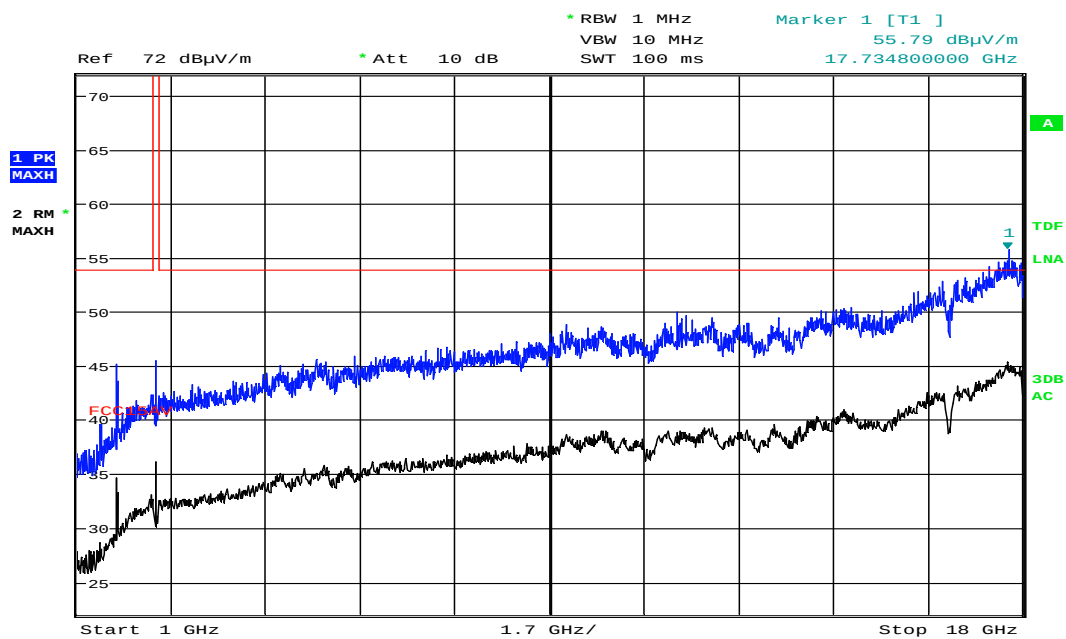
Date: 5.MAR.2020 12:44:17

Radiated Emissions, 1000 -18000 MHz, 2405MHz, EUT V, VP



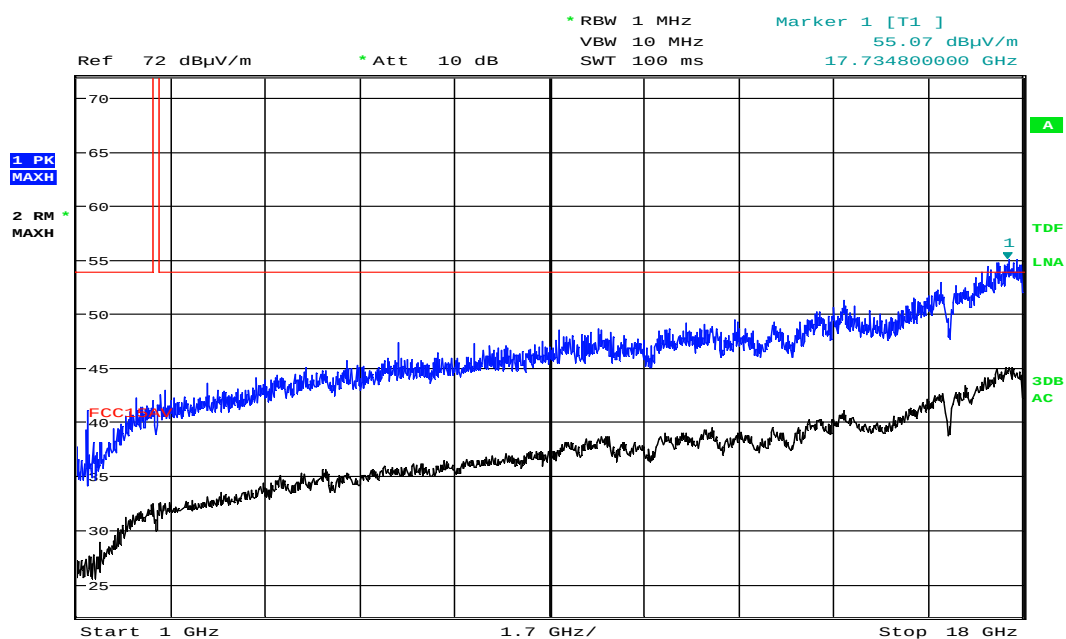
Date: 5.MAR.2020 12:18:18

Radiated Emissions, 1000 -18000 MHz, 2440MHz, EUT V, HP



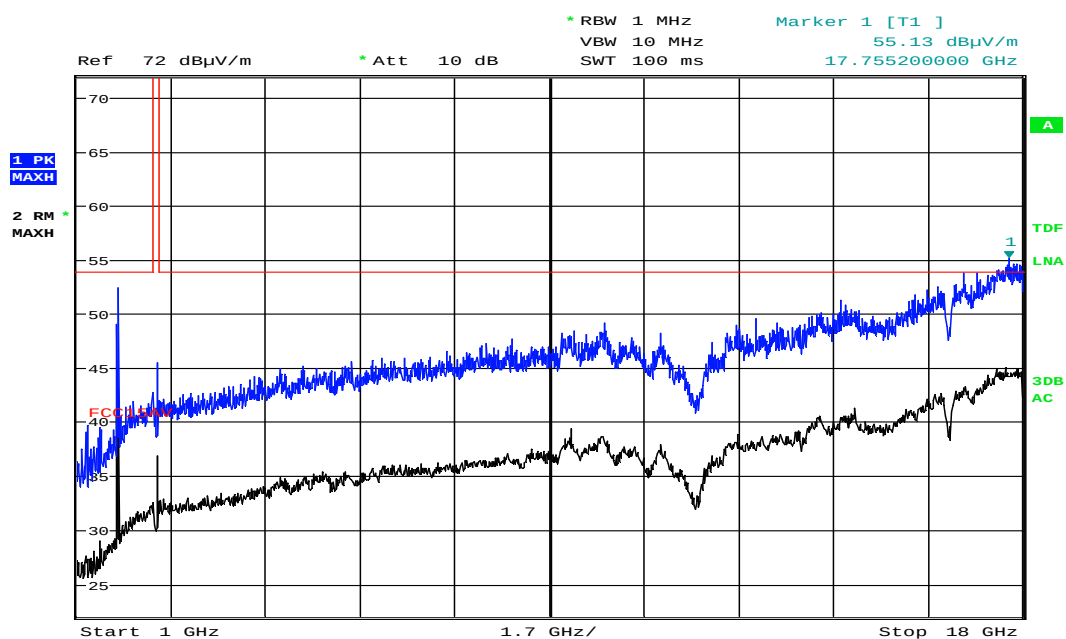
Date: 5.MAR.2020 12:11:20

Radiated Emissions, 1000 -18000 MHz, 2440MHz, EUT V, VP



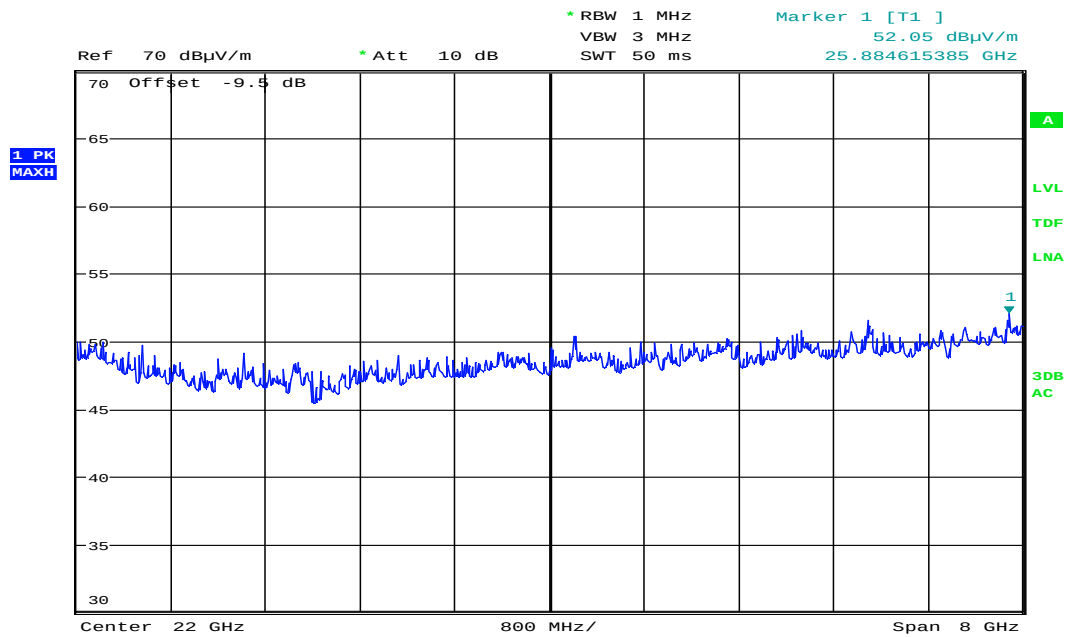
Date: 5.MAR.2020 13:01:34

Radiated Emissions, 1000 -18000 MHz, 2470MHz, EUT V, HP



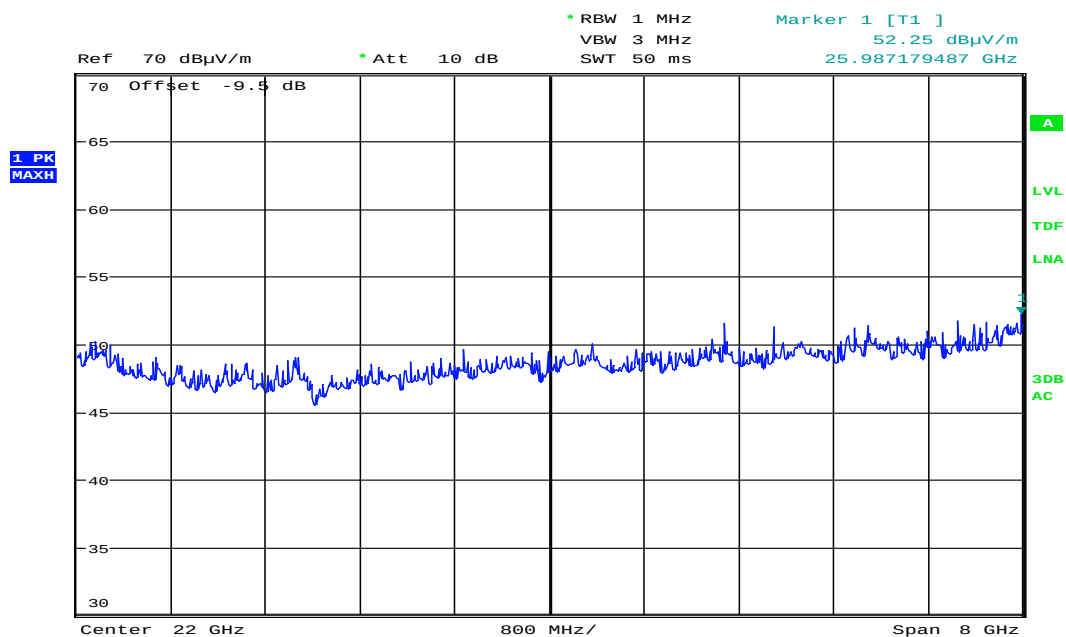
Date: 5.MAR.2020 12:59:15

Radiated Emissions, 1000 -18000 MHz, 2470MHz, EUT V, VP



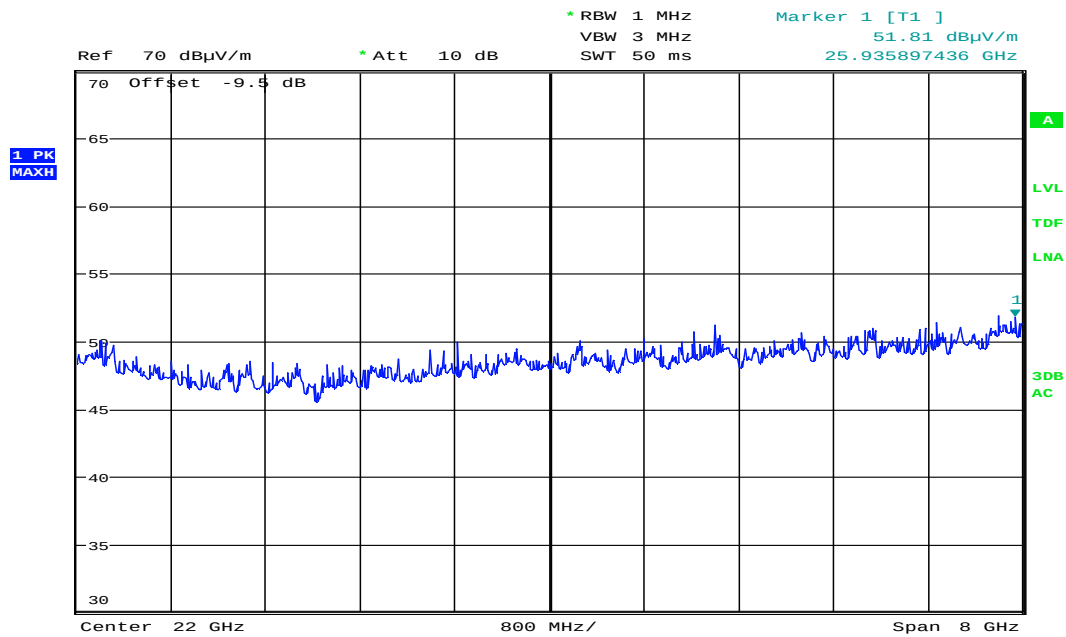
Date: 5.MAR.2020 15:27:22

Radiated Emissions, 18000 -26000 MHz, 2405MHz, EUT V, HP, @1m



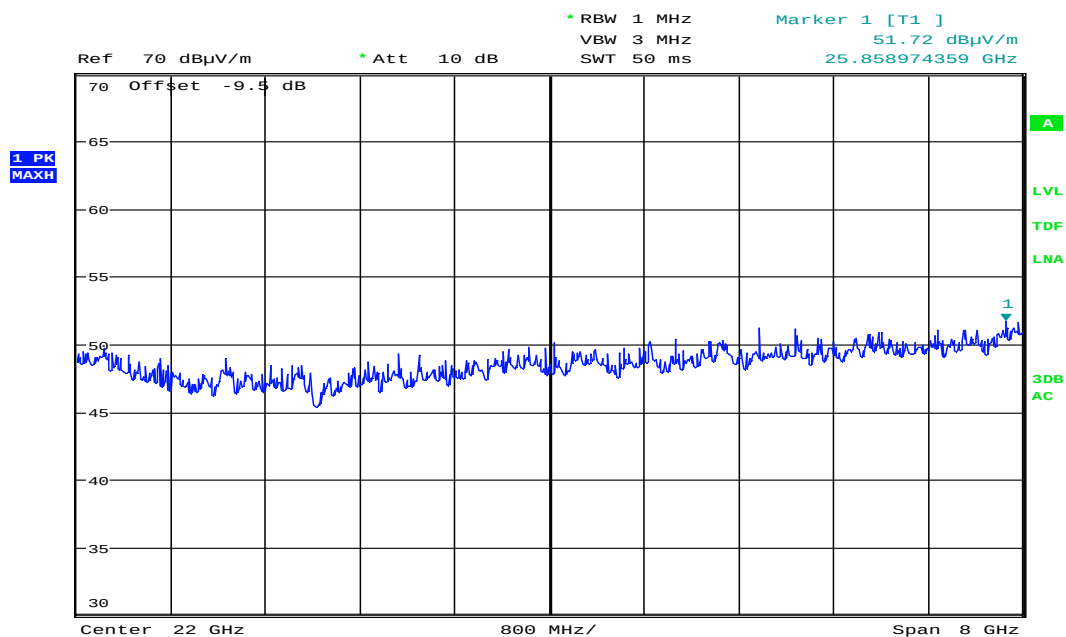
Date: 5.MAR.2020 15:26:14

Radiated Emissions, 18000 -26000 MHz, 2405MHz, EUT V, VP, @1m



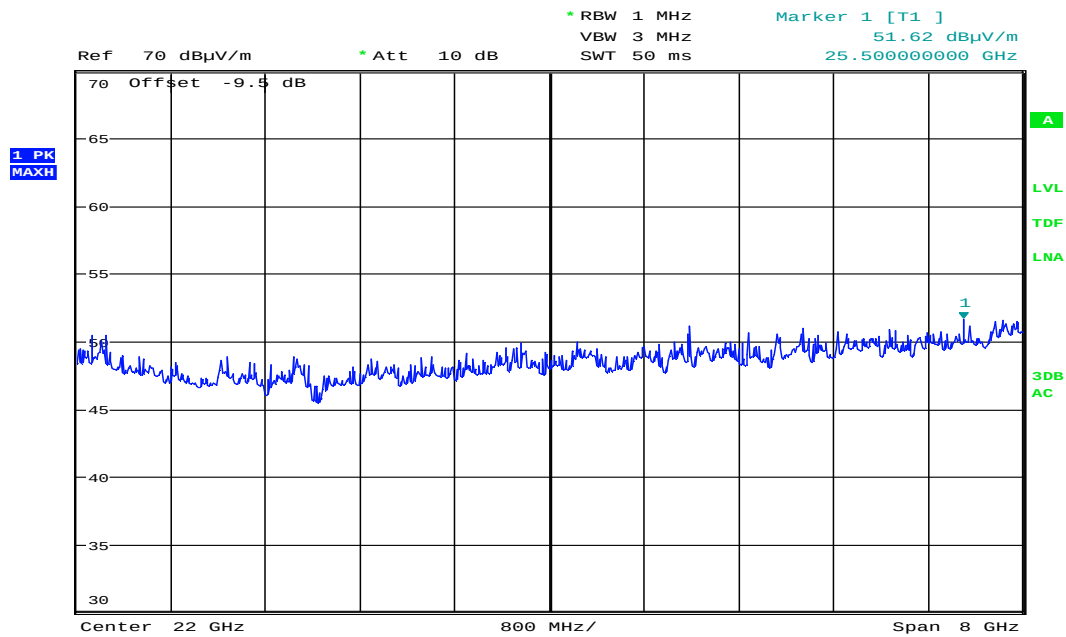
Date: 5.MAR.2020 15:17:51

Radiated Emissions, 18000 -26000 MHz, 2440MHz, EUT V, HP, @1m



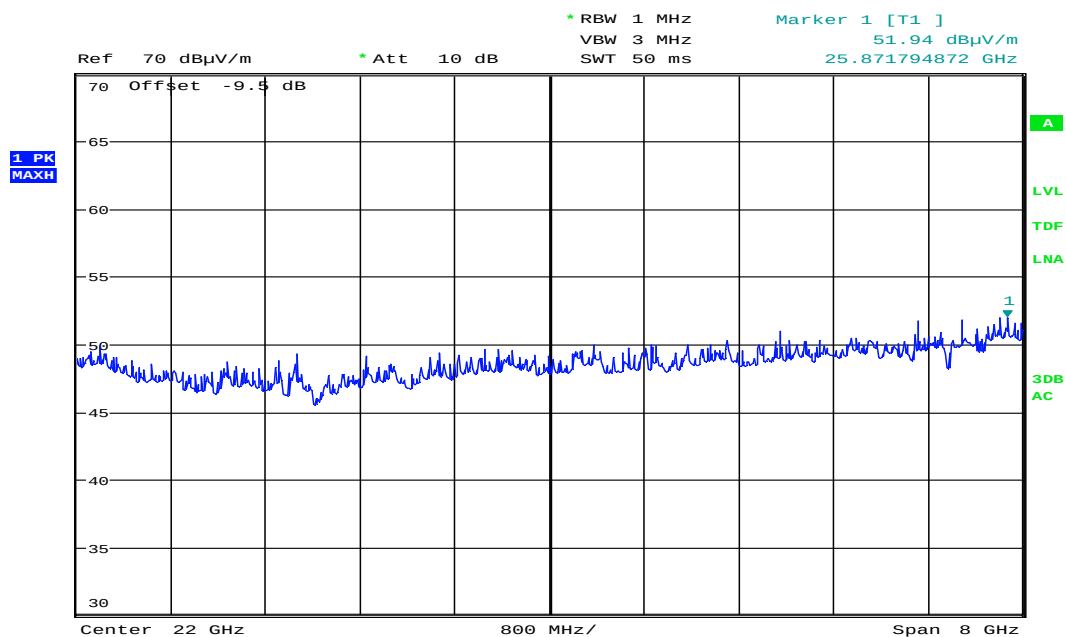
Date: 5.MAR.2020 15:18:49

Radiated Emissions, 18000 -26000 MHz, 2440MHz, EUT V, VP, @1m



Date: 5.MAR.2020 15:23:39

Radiated Emissions, 18000 -26000 MHz, 2470MHz, EUT V, HP, @1m



Date: 5.MAR.2020 15:24:45

Radiated Emissions, 18000 -26000 MHz, 2470MHz, EUT V, VP, @1m

3.10 Power Spectral Density (PSD)

FCC part 15.247(d)

ISED Canada RSS-247 Issue 2, Clause 5.2 (2)

Measurement procedure: ANSI C63.10-2013 Clause 11.10

Test Results: Complies

Measurement Data:

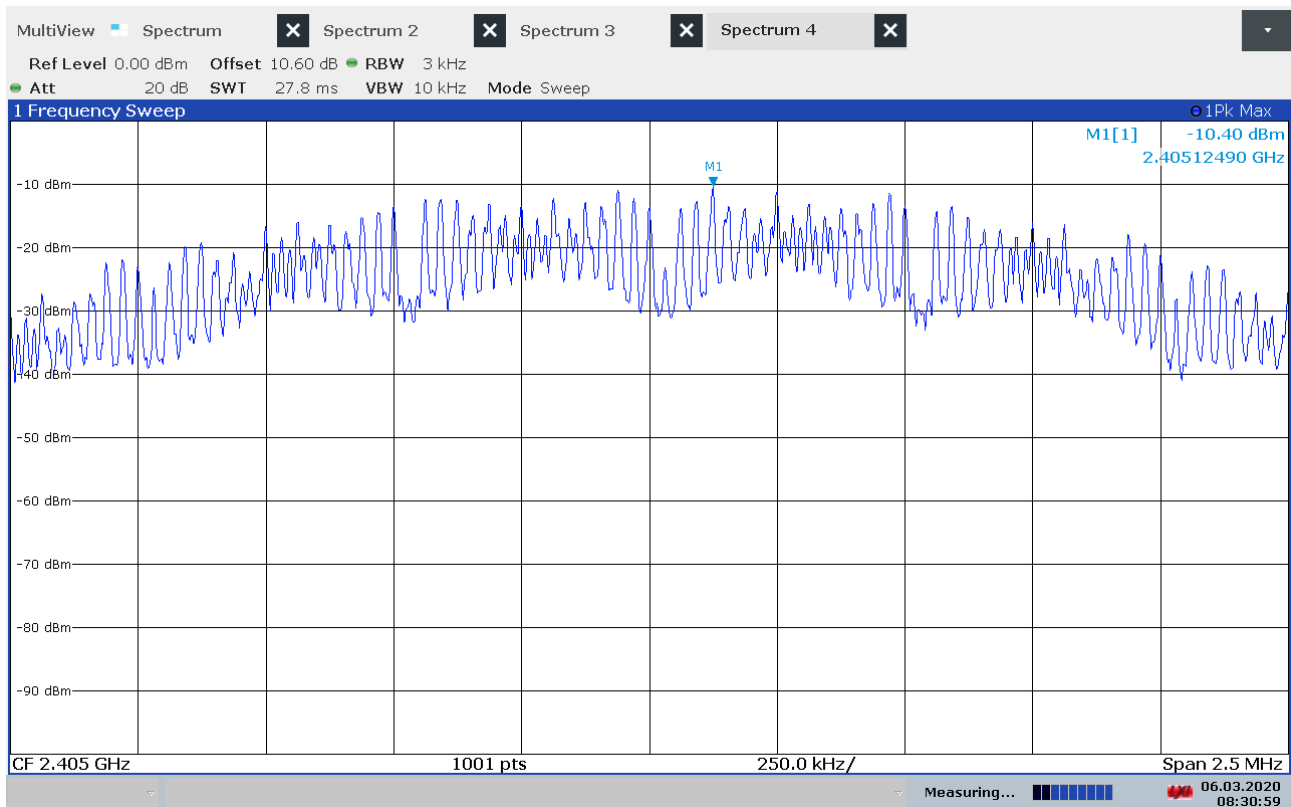
The measurement procedure PKPSD described in ANSI C63.10-2013 was used.

Carrier Frequency	Measured Power Spectral Density (dBm/3kHz)
2405 MHz	-10.4
2440 MHz	-9.6
2470 MHz	-10.3

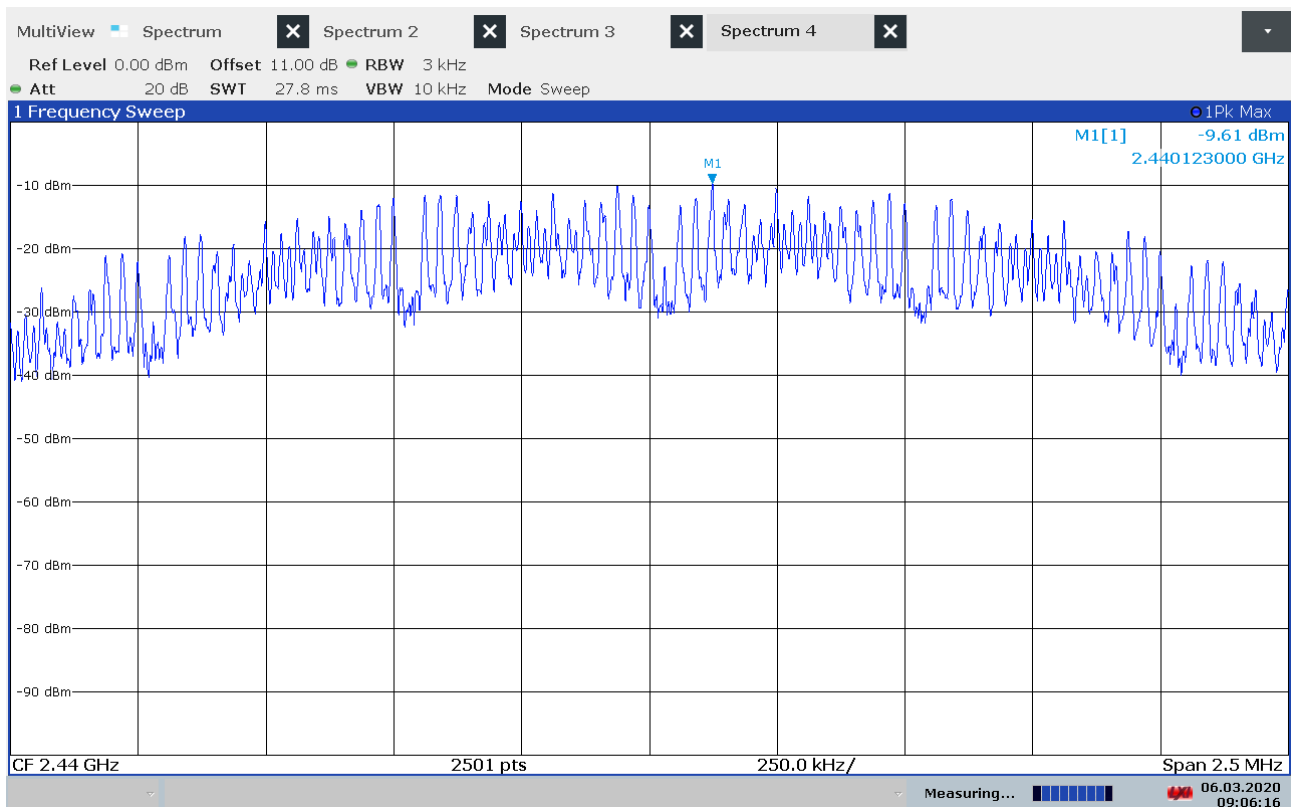
Requirements:

The Power Spectral Density of a Digital Transmission System shall be no greater than +8 dBm in any 3 kHz band

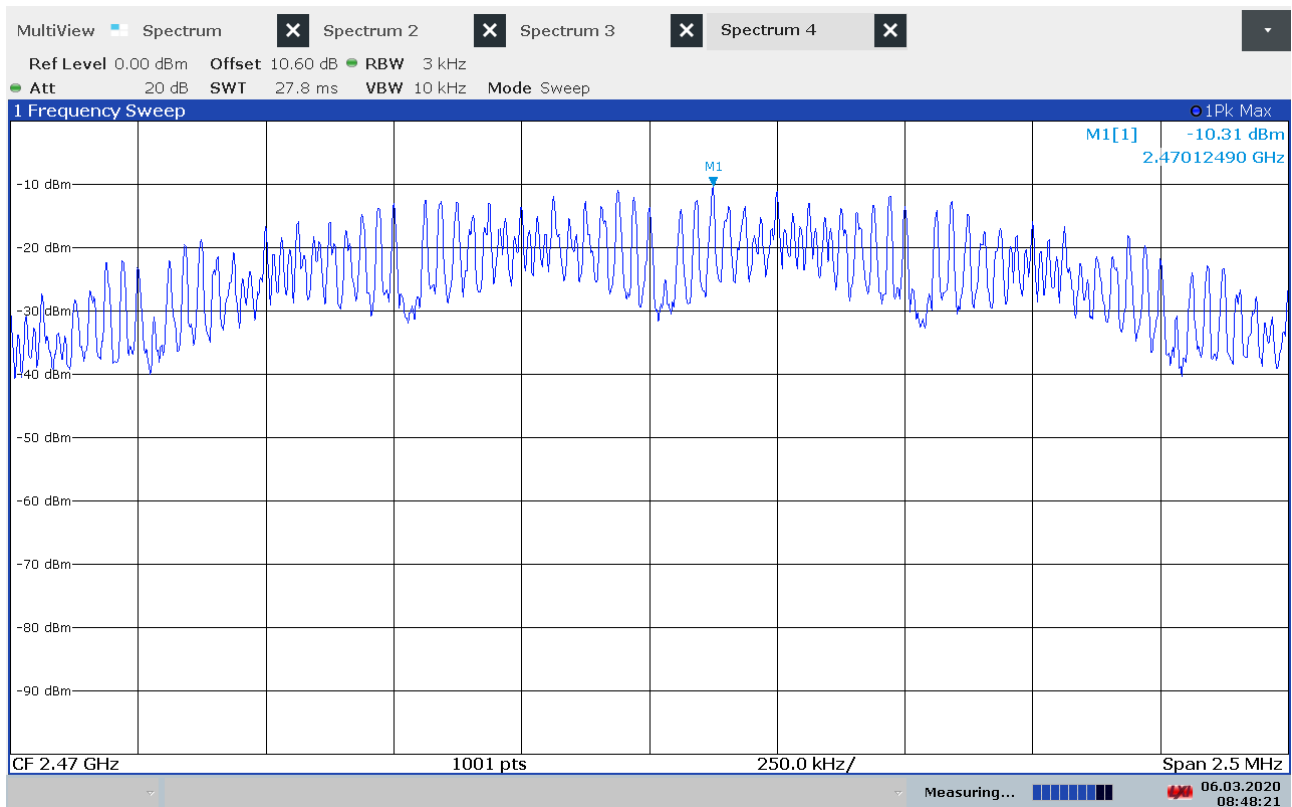
No requirements for Frequency Hopping Systems.



PSD, 2405 MHz



PSD, 2440 MHz



PSD, 2470 MHz

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	2020-01	2021-01
2	FSW43	Spectrum Analyzer	Rohde & Schwarz	LR 1690	2020-01	2021-01
3	6810.17B	Attenuator	Suhner	LR 1669	2019-07	2020-07
4	N0324415	BandStop Filter	Microwave Circ.	LR 1760	2020-03	2021-03
5	WLK5-1100-1485-7000-40SS	LowPass Filter	Wainwright Inst.	LR 1761	COU	
6	VULB 9163	BiLog Antenna	Schwarzbech	LR 1616	2020-01	2023-01
7	Model 317	PreAmplifier	Sonoma	LR 1687	2019-07	2020-07
8	3117-PA	Horn Antenna w. PreAmp	EMCO	LR 1717	2017-12	2020-12
9	3115	Horn Antenna	EMCO	LR 1330	2016-10	2021-10
10	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2019-07	2020-07
11	638	Antenna Horn	Narda	LR 1480	2010-06	2020-06
12	ESCI3	Measuring Receiver	Rohde & Schwarz	N-4259	2019.10	2020.10
13	ENV216	Two Line V-Network	Rohde & Schwarz	LR 1665	2019-11	2021-11
14	6812B	AC Power Source	Agilent	LR 1515	COU	
15	ST8/SMAm/Nm/36	RF Cable	Suhner	LR 1630	COU	

COU = Calibrate on Use

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

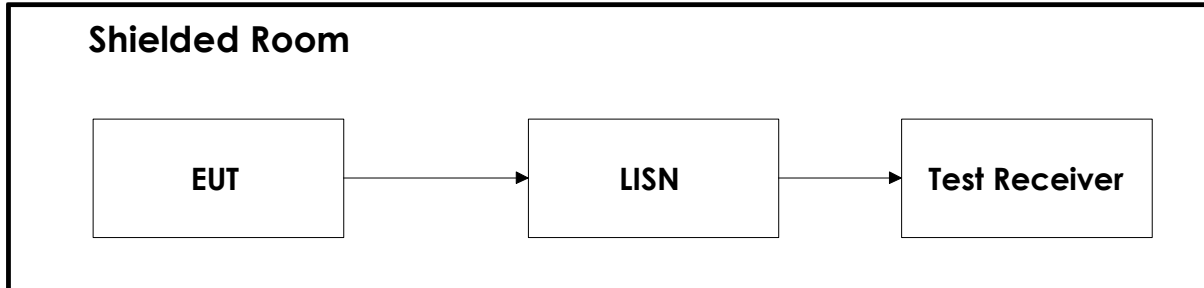
No.	Manufacturer	Name	Version	Comment
1	Rohde & Schwarz	EMC32	10.50.10	Radiated Emissions test software
2	Rohde & Schwarz	GPBShot	2.7	Screenshots from R&S Spectrum Analyzers

Revision history

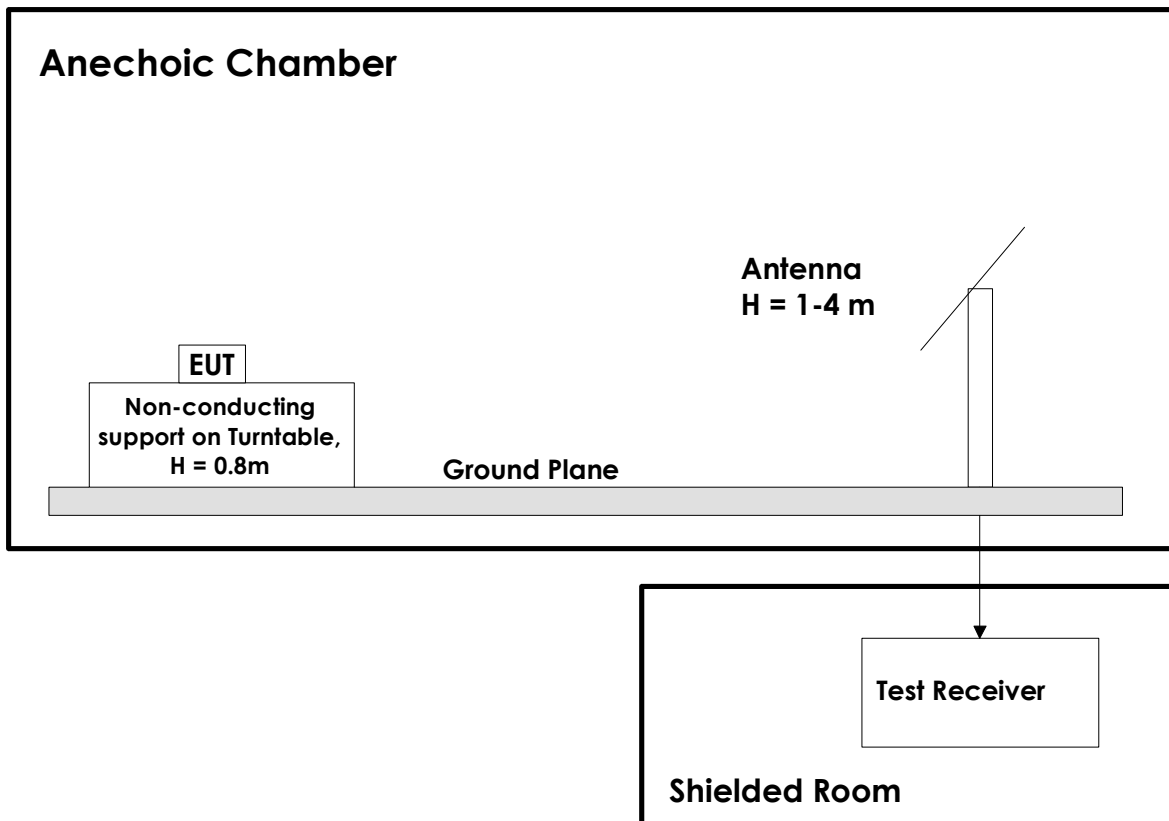
Revision	Date	Comment	Sign
00	2020-03-13	First edition	FS
01	2020-04-02	Updated instrument list	FS

6 BLOCK DIAGRAM

6.1 Power Line Conducted Emission



6.2 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.