



FCC LISTED, REGISTRATION
NUMBER: 2764.01

Test report No:

ISED LISTED REGISTRATION
NUMBER: 23595-1

NIE: 2106ERM.004

Test report

USA FCC Part 15.247, 15.209 CANADA RSS-247, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

General Requirements and Information for the Certification of Radio Apparatus.

Identification of item tested.....:	OURA Wellness ring with Bluetooth Low Energy
Trademark	ÖURA
Model and /or type reference	OURA
Other identification of the product	FCC ID: 2AD7V-OURA1801 IC: 20635-OURA1801
Final HW version	GPS_02
Final SW version	0.12.6
Features	Bluetooth Low Energy, Sleep Analysis, Activity Monitoring, Readiness Score
Manufacturer	OURA HEALTH OY Elektroniikkatie 3,90590 Oulu, Finland
Test method requested, standard.....:	USA FCC Part 15.247, 10-1-17 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 4 (November 2014). Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC & RF Lab. Manager
Date of issue.....:	27/04/2018
Report template No.....:	FDT08_20



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Date: 2018.05.14 08:15:57 -0400

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Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01.

DEKRA Certification Inc. is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 2764.01.

DEKRA Certification Inc. is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number:23595-1.

In order to assure the traceability to other national and international laboratories, DEKRA Certification Inc. has a calibration and maintenance program for its measurement equipment.

DEKRA Certification Inc. Guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Certification Inc. at the time of performance of the test.

DEKRA Certification Inc. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Certification Inc. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Certification Inc. internal document PODT000.

Usage of samples

Samples undergoing test have been selected by: **the client**

Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
2106.026	Wellness ring with antenna connector (Continuous TX/RX sample)	OURA	X4Y80762598	04/03/2018

1. Sample S/01 has undergone following test(s).
All Conducted tests indicated in appendix A.

Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
2106.024	Wellness ring with integral antenna (GB 12)	OURA	---	04/03/2018
2106.014	Wireless Charger	OURA	--	04/03/2018

1. Sample S/02 has undergone following test(s).
All Radiated tests indicated in appendix A.

Test sample description

ÖURA is a revolutionary wellness ring and app, designed to help user gets more restful sleep and performs better. It enables user to learn how the lifestyle choices affect user's sleep, and how the quality of the sleep affects user's ability to perform.

The ÖURA ring can automatically tell when user is sleeping. When user goes to sleep, the ÖURA ring analyzes the quality of the rest and recovery by measuring the heart rate (optically), respiration rate, body temperature, and movement. While user is awake, it monitors the duration and intensity of the activities, and the time user spends sitting.

The ÖURA app integrates and visualizes this data to identify patterns between the sleep quality and daily activities. By understanding how well user slept and recharged, it can determine the readiness to perform and help user adjust the intensity and duration of the day's activities. It can also uncover actionable insights for changes to the daily activities that can help user sleep better.

Identification of the client

OURA HEALTH OY

Elektroniikkatie 3, 90590 Oulu, Finland

Testing period

The performed test started on 04/15/2018 and finished on 05/03/2018.

The tests have been performed at DEKRA Testing and Certification.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

- 1; The tests have been performed by the technical personnel: Divya Adusumilli and Koji Nishimoto.
- 2: The model tested has eight possible variants depending on Ring size and Antenna version. This test report includes the results of the worst case measured in a preliminary scan of the eight variants.
- 3: Used instrumentation:

Conducted Measurements

Test system Rohde & Schwarz TS 8997:

No.	Description	Last Cal. Date	Cal. Due date
1.	Signal analyzer Rohde & Schwarz FSV40	2017/03	2019/03
2.	Switch unit Rohde & Schwarz with power detector OSP120 / OSP-B157	2017/03	2019/03
3.	RF generator Rohde & Schwarz SMB100A	2017/04	2019/04
4.	RF generator Rohde & Schwarz SMBV100A	2018/01	2019/01
5.	Climatic chamber Espec	2017/12	2018/12

Radiated Measurements

No.	Description	Last Cal. date	Cal. due date
1.	Semi anechoic Absorber Lined Chamber Frankonia SAC 3 plus "L"	N/A	N/A
2.	BiconicalLog antenna ETS LINDGREN 3142E	2017/03	2020/03
3.	Double-ridge Waveguide Horn antenna 1-18 GHz	2017/03	2019/03
4.	Spectrum analyzer Rohde & Schwarz FSV40	2017/03	2019/03
5.	RF pre-amplifier 30 MHz-6 GHz Bonn Elektronik BLMA 0360-01N	2017/05	2019/05
6.	RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-2A	2017/05	2019/05
7.	Rohde & Schwarz EMC32 software	N/A	N/A

Testing verdicts

Not applicable	N/A
Pass	P
Fail	F
Not measured	N/M

1. BTLE

FCC PART 15 PARAGRAPH / RSS-247		VERDICT			
		NA	P	F	NM
Section 15.247 Subclause (a) (2) / RSS-247 5.2. (a)	6 dB Bandwidth		P		
Section 15.247 Subclause (b) / RSS-247 5.4. (d)	Maximum output power and antenna gain		P		
Section 15.247 Subclause (d) / RSS-247 5.5	Emission limitations conducted (Transmitter)		P		
Section 15.247 Subclause (d) / RSS-247 5.5. ...	Band-edge emissions compliance (Transmitter)		P		
Section 15.247 Subclause (e) / RSS-247 5.2. (b)	Power spectral density		P		
Section 15.247 Subclause (d) / RSS-247 5.5. ...	Emission limitations radiated (Transmitter)		P		

Appendix A – Test result (Bluetooth Low Energy)

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TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 3.7 \text{ Vdc}$$

Type of power supply = DC voltage from internal battery.

Type of antenna = Integral antenna

Declared Gain for antenna (maximum) = -24.9 dBi

Temperature (°C):

$$T_n = +15 \text{ to } +35$$

$$T_{\text{min}} = -10 (*)$$

$$T_{\text{max}} = +54 (*)$$

The subscript n indicates normal test conditions.

The subscripts min and max indicates extreme test conditions (minimum and maximum respectively).

(*): Declared by applicant.

TEST FREQUENCIES:

Lowest channel: 2402 MHz

Middle channel: 2440 MHz

Highest channel: 2480 MHz

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is directly connected to the Test System TS8997.

RADIATED MEASUREMENTS

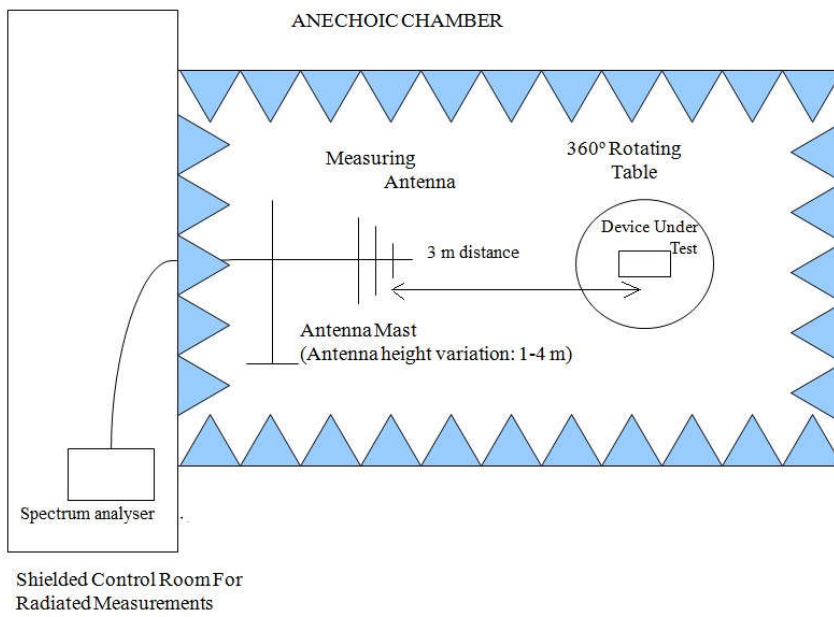
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-25 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-25 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

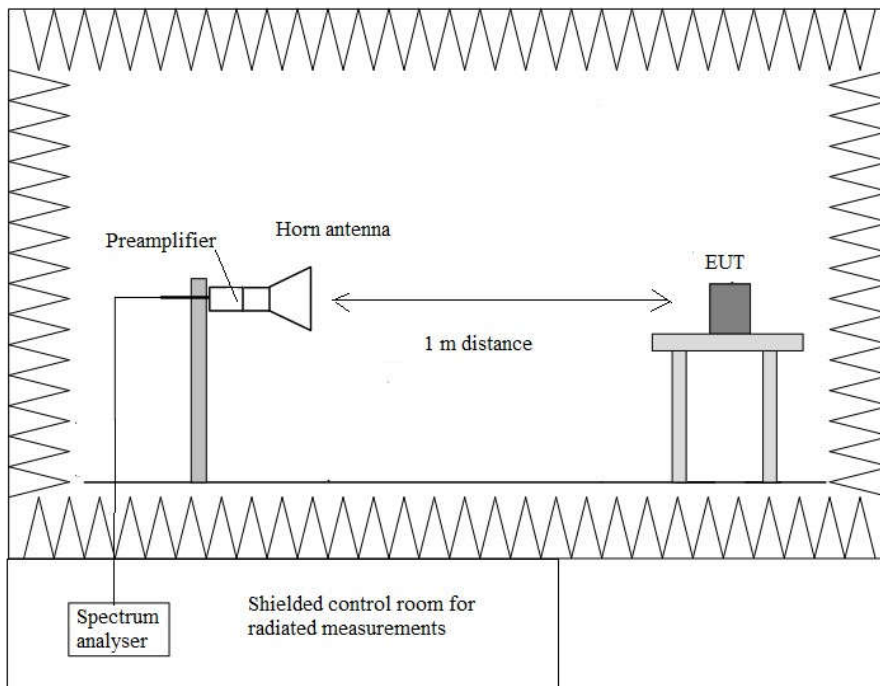
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

Radiated measurements setup $f < 1 \text{ GHz}$



Radiated measurements setup $f > 1$ GHz



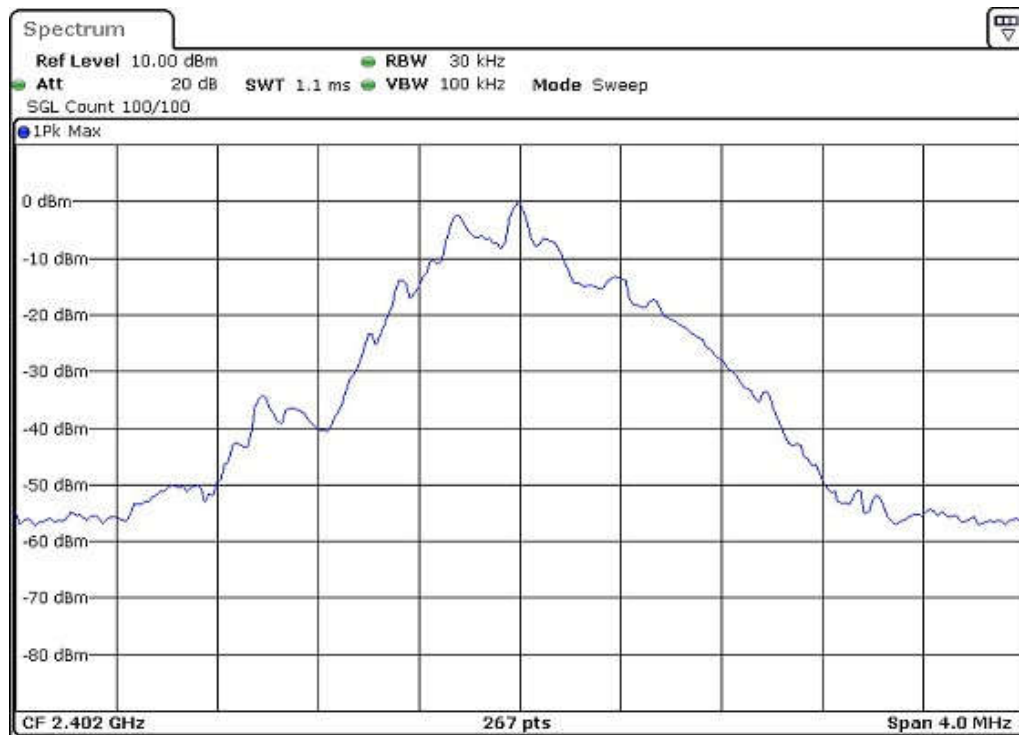
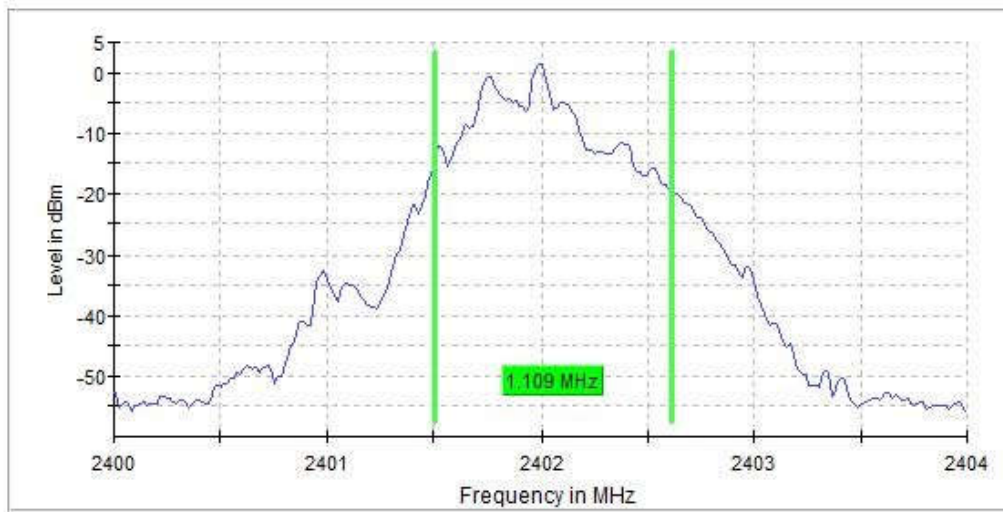
Occupied Bandwidth

RESULTS

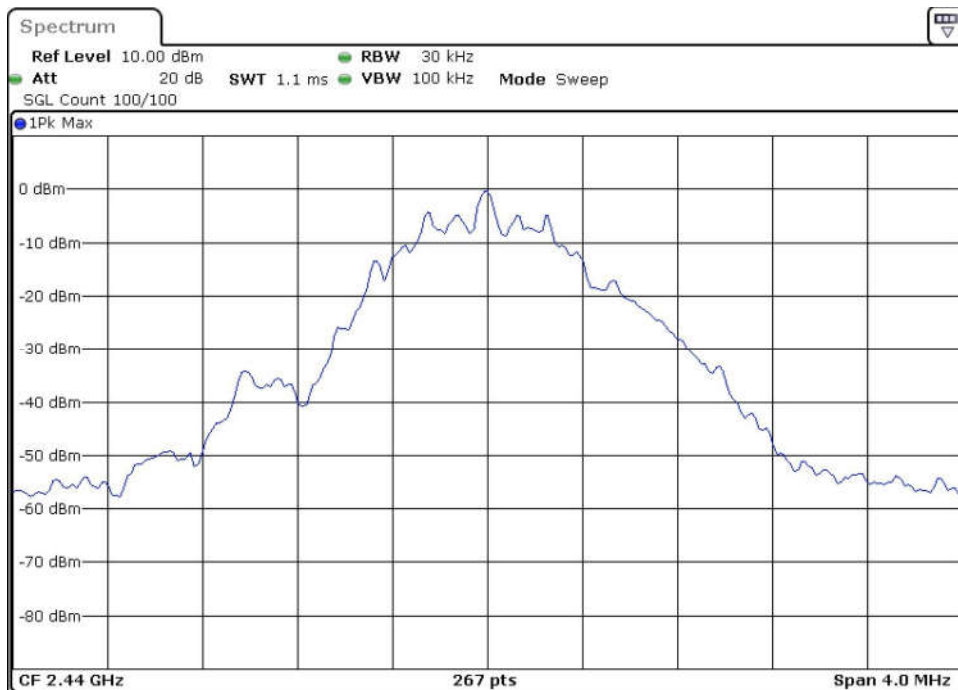
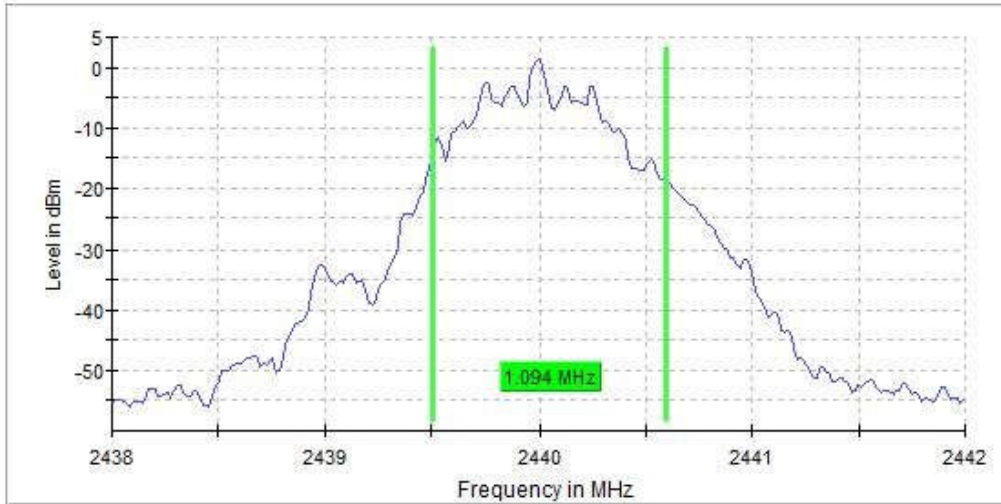
(see next plots).

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
20 dB bandwidth (MHz)	1.124	1.124	1.213
99% bandwidth (MHz)	1.109	1.094	1.199
Measurement uncertainty (kHz)	<± 8.33		

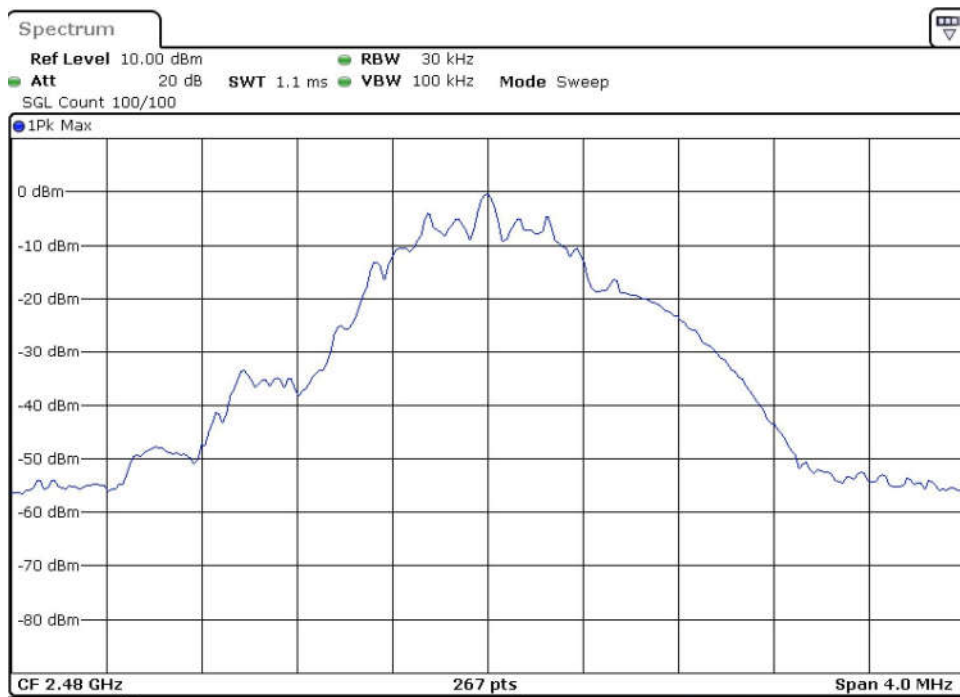
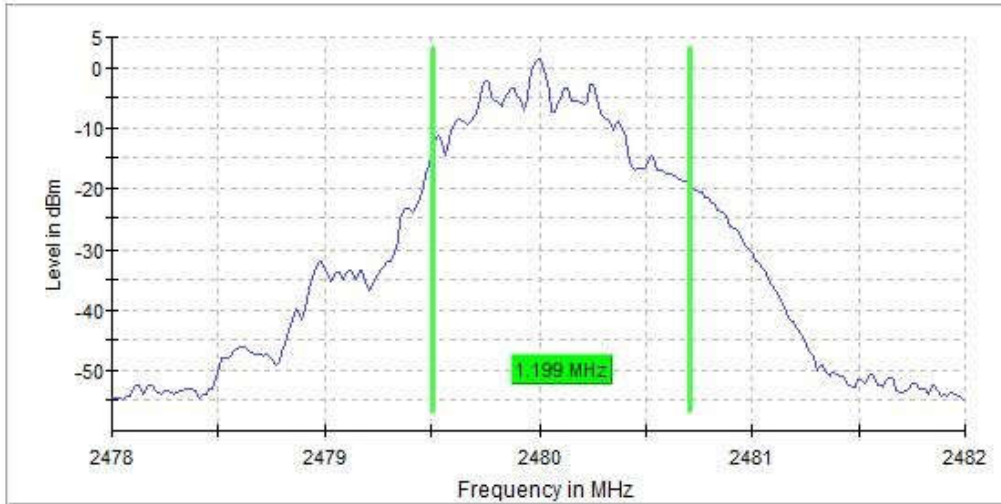
Lowest Channel (99% Bandwidth)



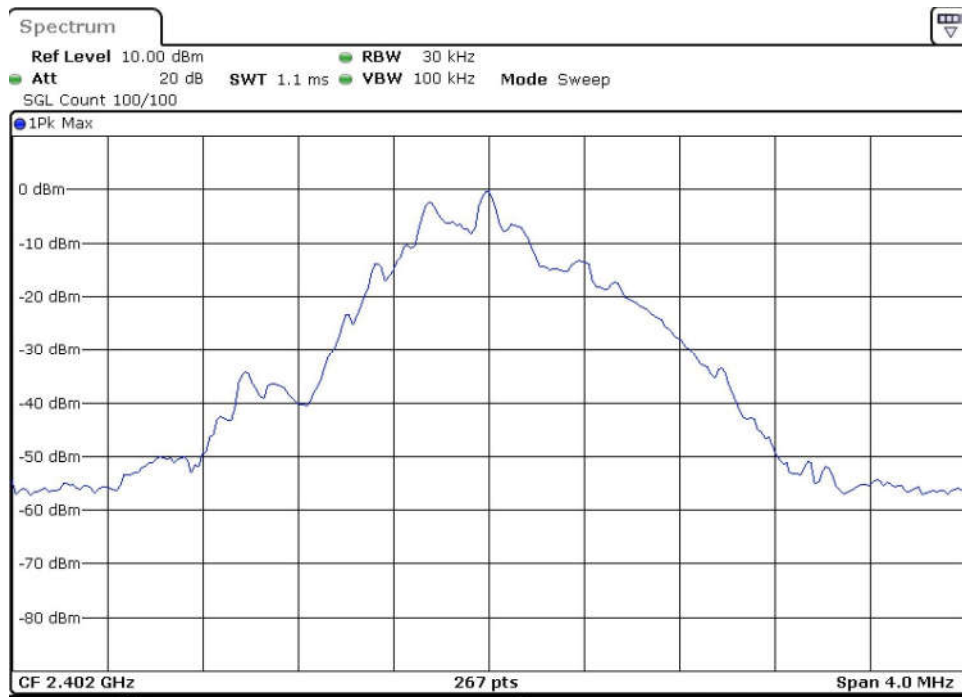
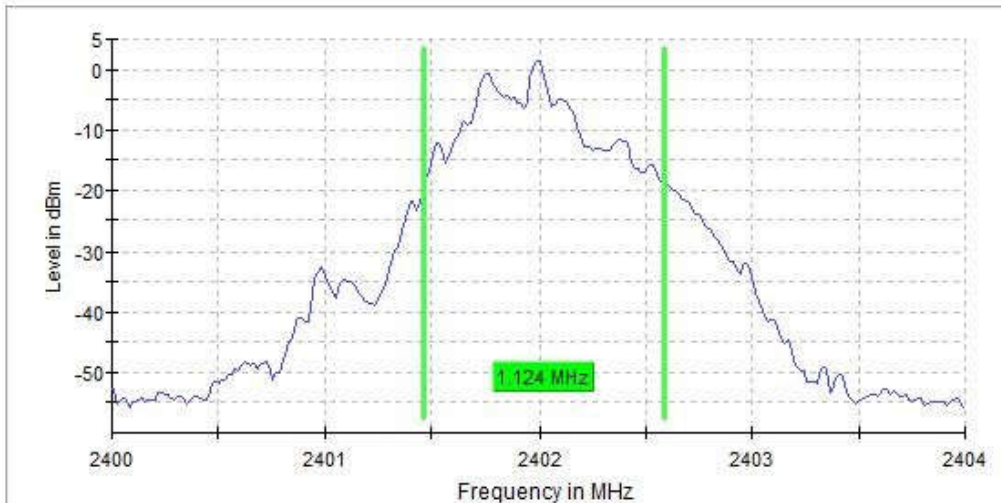
Middle Channel (99% Bandwidth)



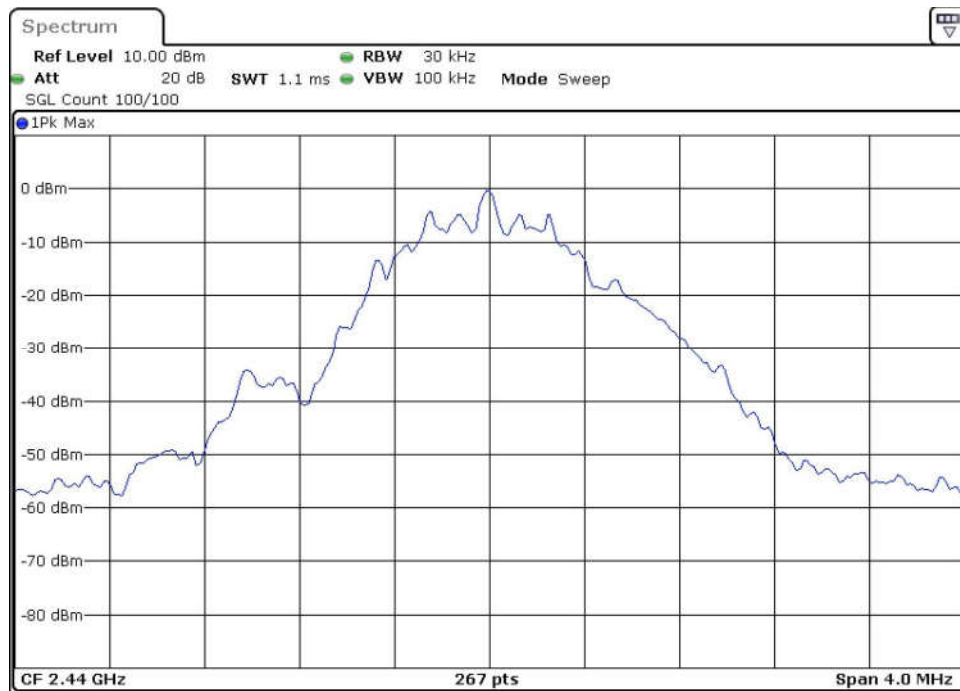
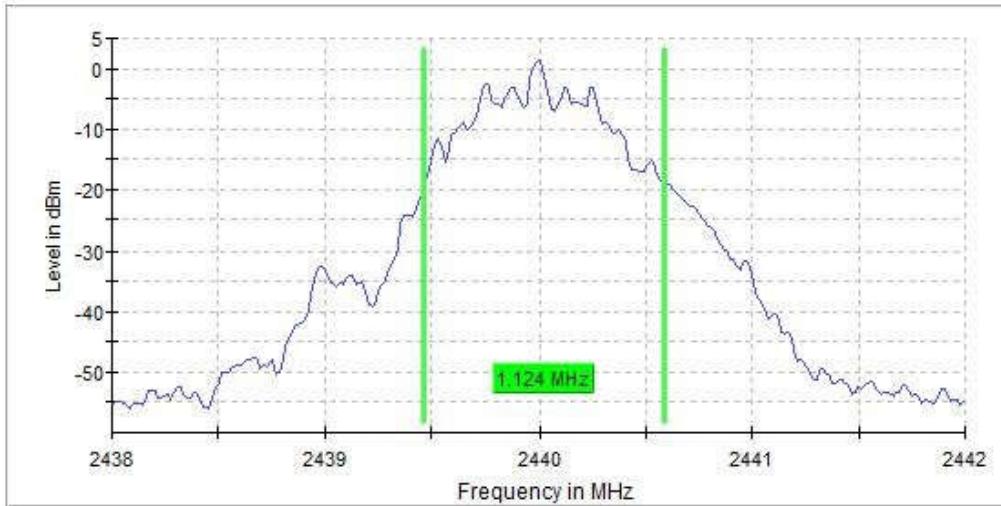
Highest channel (99% Bandwidth)



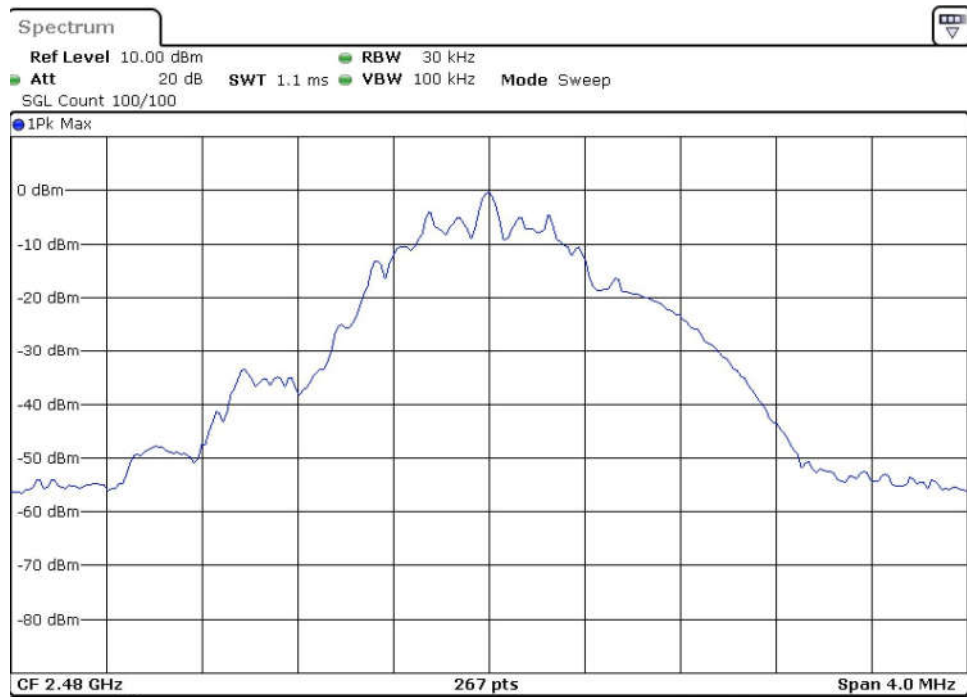
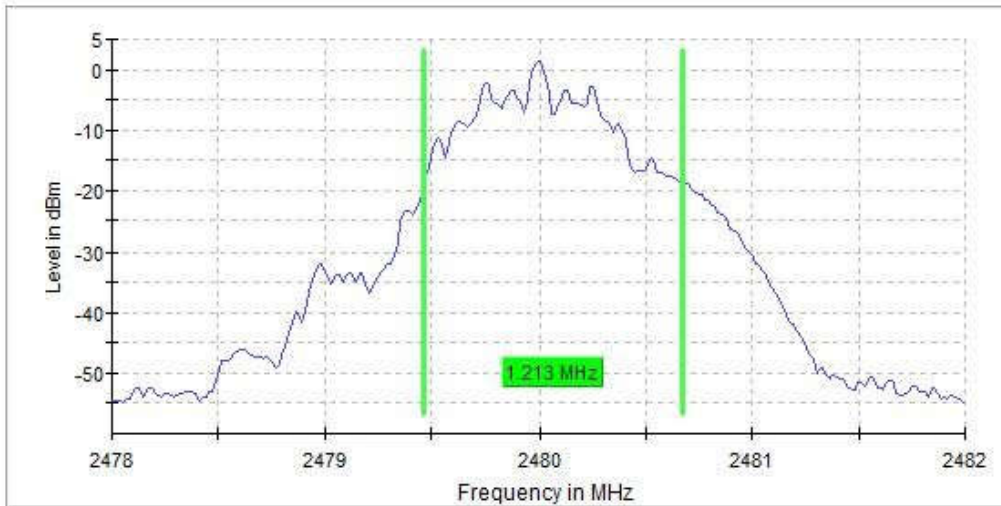
Lowest Channel (20dB Bandwidth)



Middle Channel (20dB Bandwidth)



Highest channel (20dB Bandwidth)



Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.43800 GHz	2.47800 GHz
Stop Frequency	2.40400 GHz	2.44200 GHz	2.48200 GHz
Span	4.000 MHz	4.000 MHz	4.000 MHz
RBW	30.000 kHz	30.000 kHz	30.000 kHz
VBW	100.000 kHz	100.000 kHz	100.000 kHz
SweepPoints	267	267	267
Sweeptime	1.050 ms	1.050 ms	1.050 ms
Reference Level	10.000 dBm	10.000 dBm	10.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
SweepCount	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	Sweep	Sweep	Sweep
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	10 / max. 150	11 / max. 150	17 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.05 dB	0.07 dB	0.22 dB

Section 15.247 Subclause (a) (2) / RSS-247 5.2. (a). 6 dB Bandwidth

SPECIFICATION

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

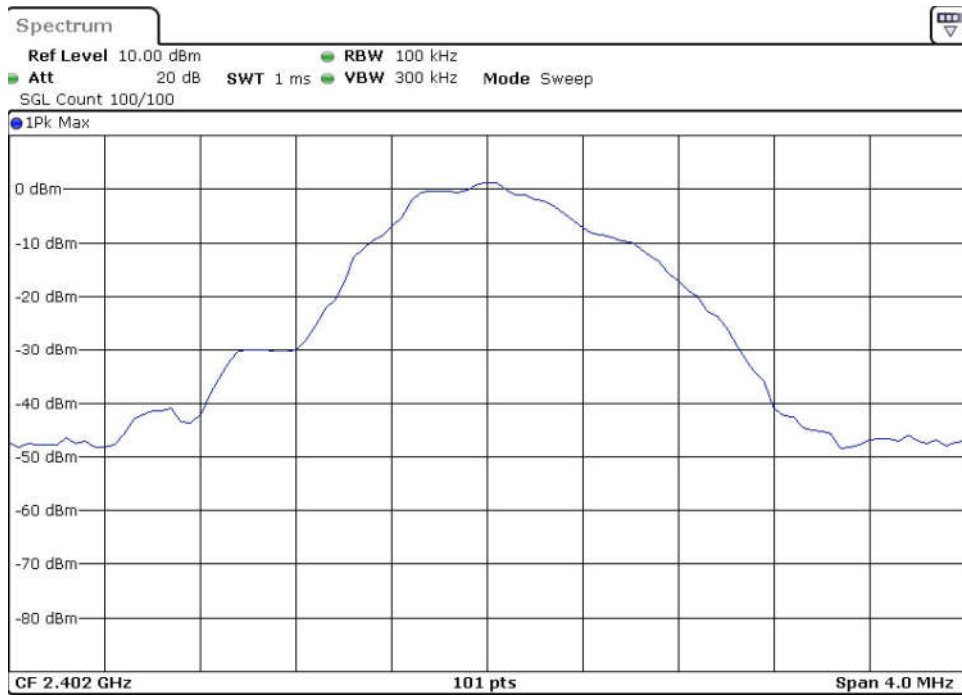
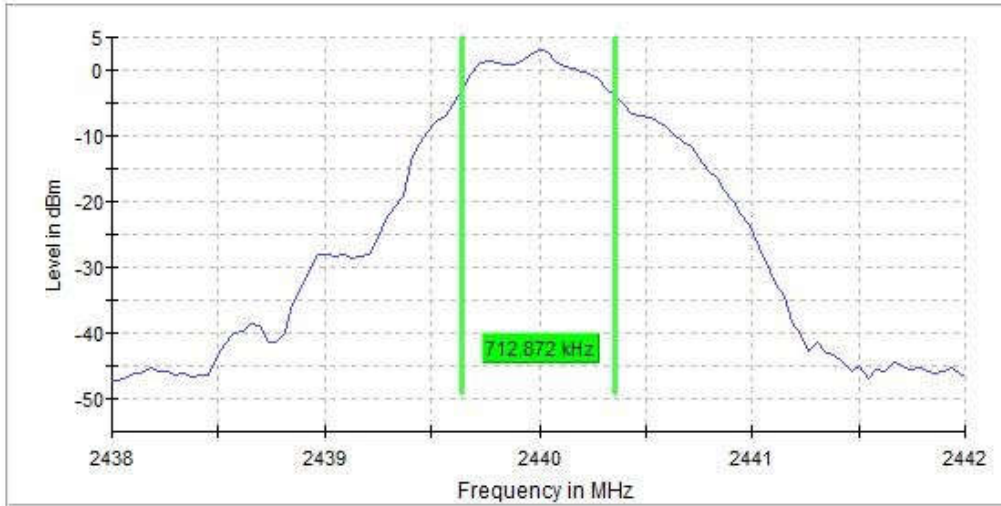
6 dB Bandwidth (see next plots).

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
6 dB Spectrum bandwidth (kHz)	712.872	712.872	752.476
Measurement uncertainty (kHz)	<±20.0		

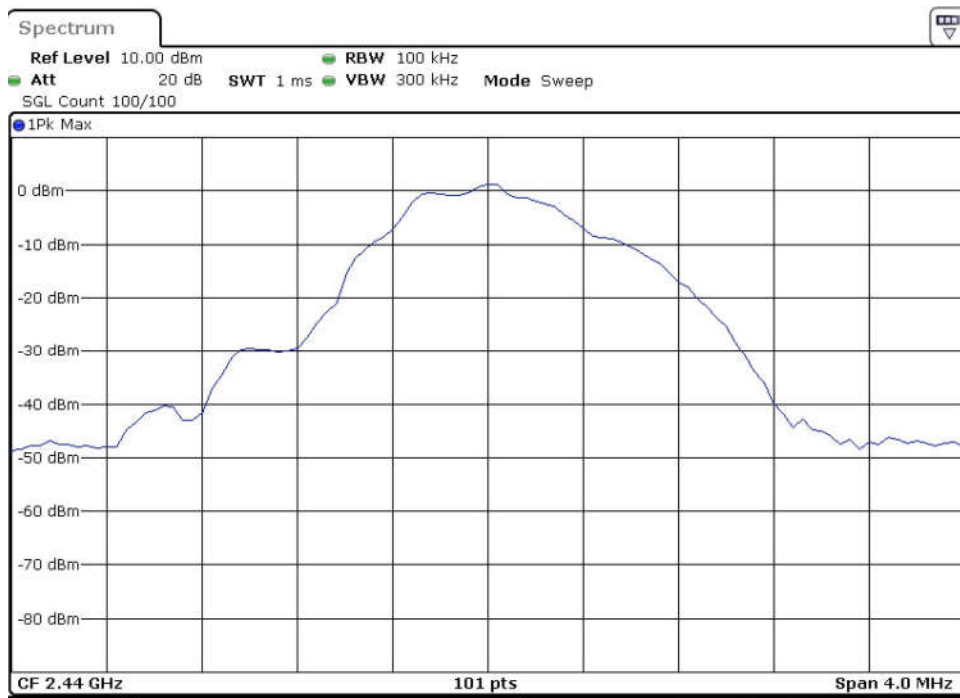
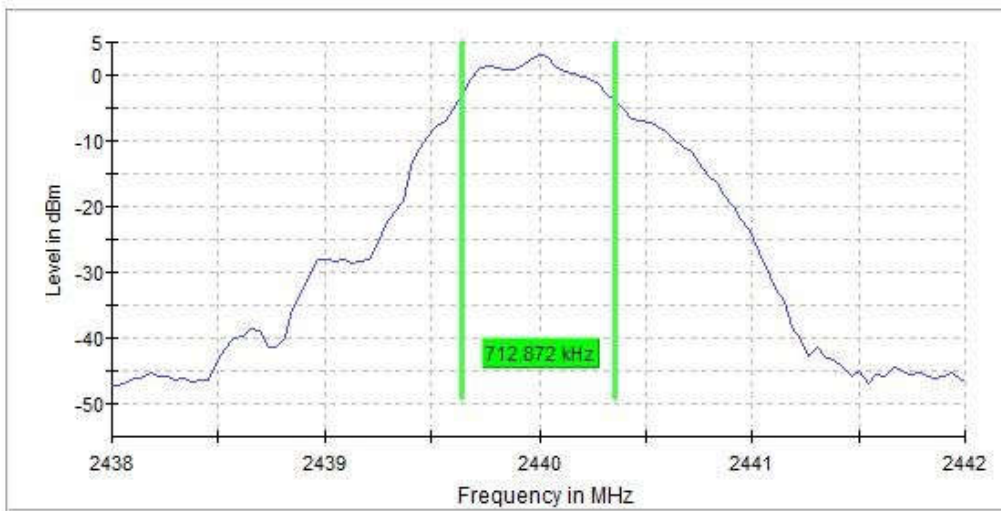
Verdict: PASS

6 dB BANDWIDTH.

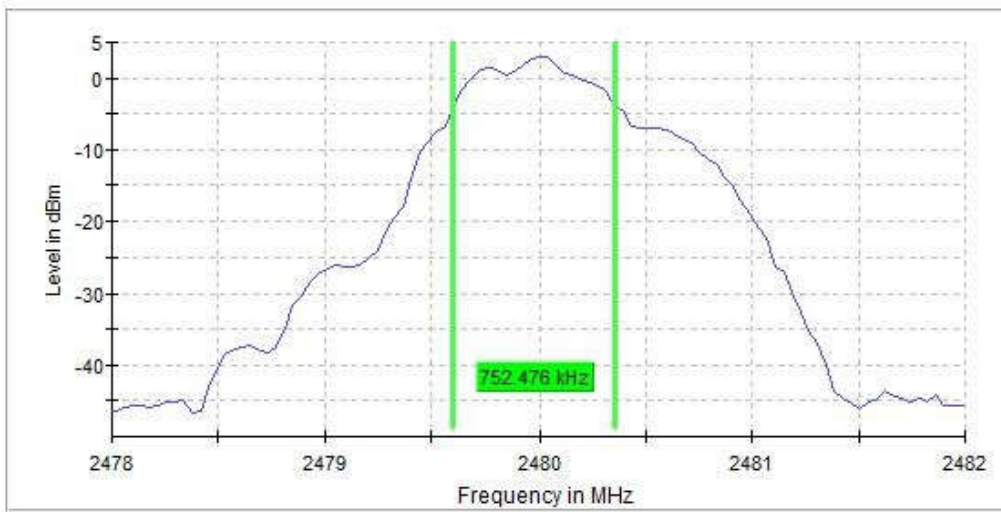
Lowest Channel



Middle Channel



Highest Channel



Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.43800 GHz	2.47800 GHz
Stop Frequency	2.40400 GHz	2.44200 GHz	2.48200 GHz
Span	4.000 MHz	4.000 MHz	4.000 MHz
RBW	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz
SweepPoints	101	101	101
Sweeptime	1.000 ms	1.000 ms	1.000 ms
Reference Level	10.000 dBm	10.000 dBm	10.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
SweepCount	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	Sweep	Sweep	Sweep
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	10 / max. 150	8 / max. 150	10 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.28 dB	0.20 dB	0.09 dB

Section 15.247 Subclause (b) / RSS-247 5.4. (d). Maximum output power and antenna gain

SPECIFICATION

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).
The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

RESULTS

The maximum peak conducted output power was measured using the method according to point 9.1.1. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

MAXIMUM OUTPUT POWER. See next plots.

Maximum declared antenna gain: -24.9 dBi.

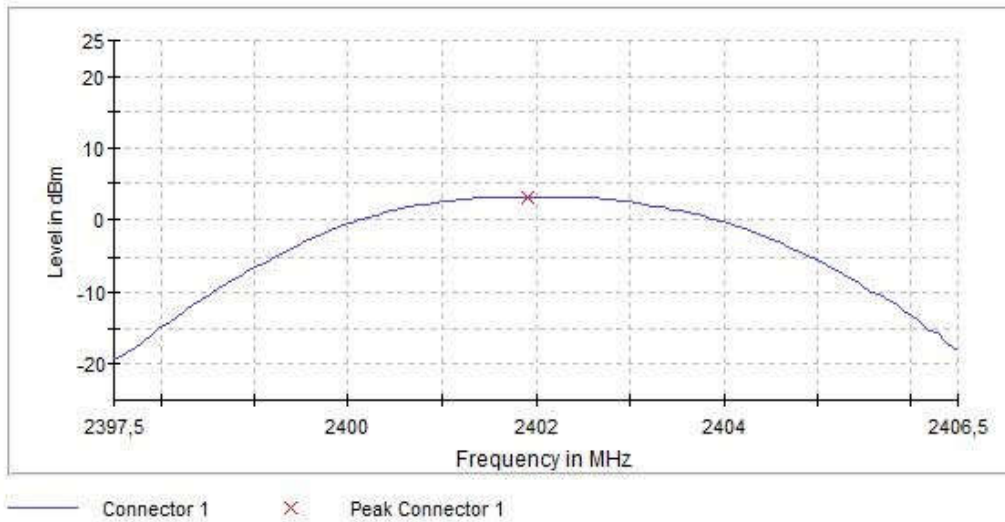
	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Maximum conducted power (dBm)	3.10	3.00	3.10
Maximum EIRP power (dBm)	-21.80	-21.90	-21.80
Measurement uncertainty (dB)	<±0.78		

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

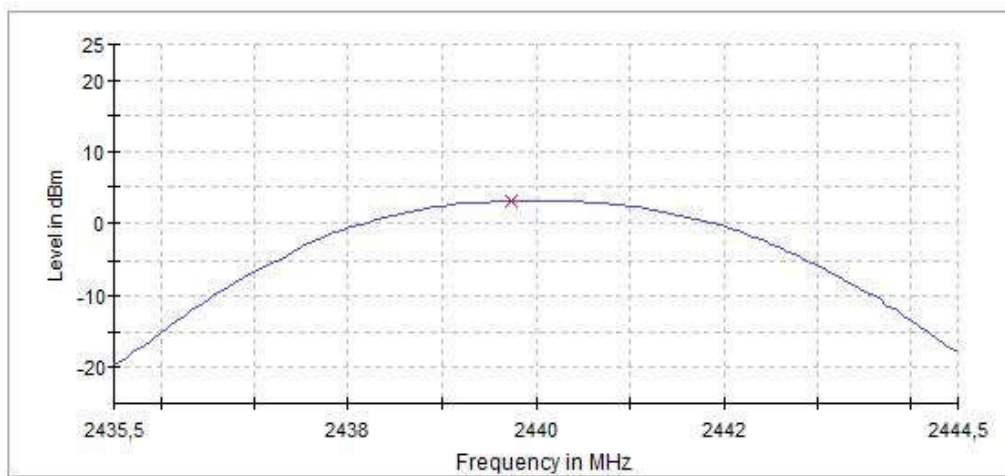
Verdict: PASS

CONDUCTED PEAK POWER.

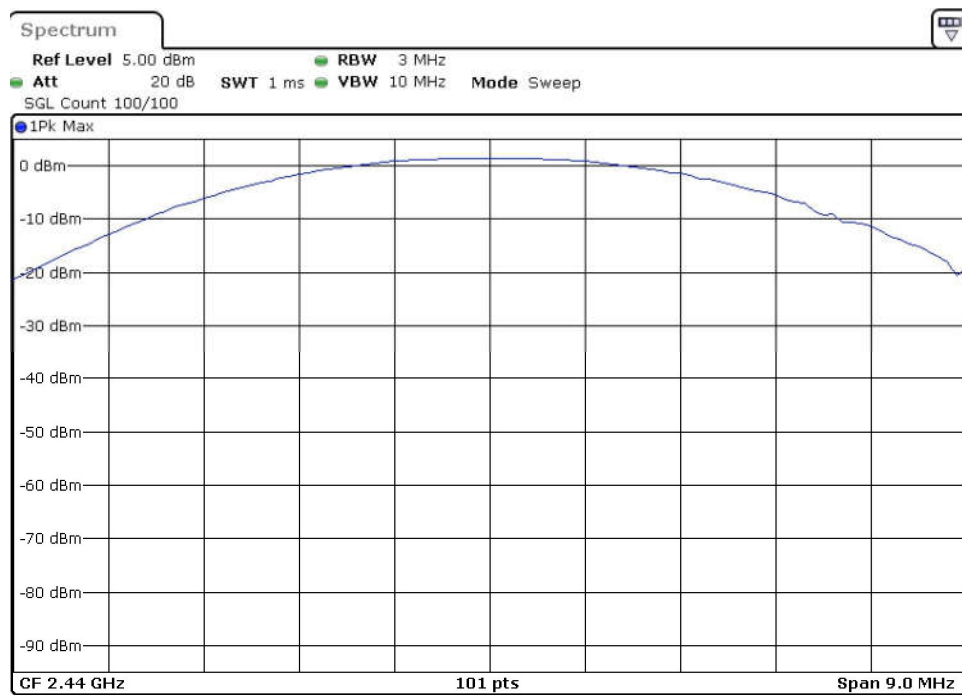
Lowest frequency



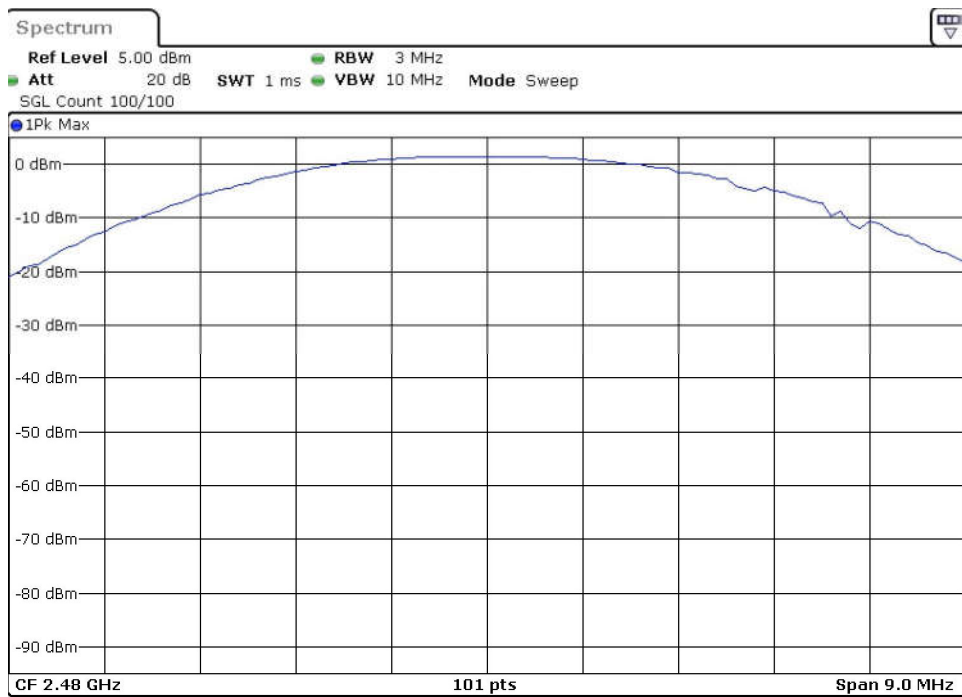
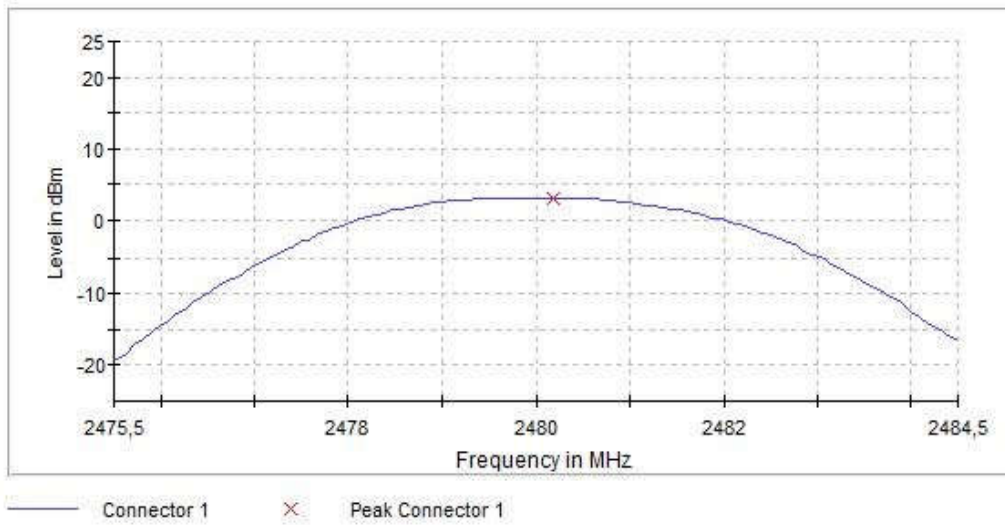
Middle frequency



Connector 1 × Peak Connector 1



Highest frequency



Measurement

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39750 GHz	2.43550 GHz	2.47550 GHz
Stop Frequency	2.40650 GHz	2.44450 GHz	2.48450 GHz
Span	9.000 MHz	9.000 MHz	9.000 MHz
RBW	3.000 MHz	3.000 MHz	3.000 MHz
VBW	10.000 MHz	10.000 MHz	10.000 MHz
SweepPoints	101	101	101
Sweeptime	1.000 ms	1.000 ms	1.000 ms
Reference Level	5.000 dBm	5.000 dBm	5.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
SweepCount	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	Sweep	Sweep	Sweep
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	4 / max. 150	4 / max. 150	5 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.10 dB	0.03 dB	0.08 dB

Section 15.247 Subclause (d) / RSS-247 5.5. Emission limitations conducted (Transmitter)

SPECIFICATION

In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

RESULTS:

Reference Level Measurement

	Lowest frequency 2402 MHz	Middle frequency 2440 MHz	Highest frequency 2480 MHz
Reference Level Measurement (dBm)	2.874	2.862	2.960
Measurement uncertainty (dB)	<±0.78		

Lowest frequency 2402 MHz:

Frequency (GHz)	Emission limitations conducted (dBm)	Limit (dBm)
2.39975	-35.6	-17.1

Middle frequency 2440 MHz:

All peaks are more than 20 dB below the limit.

Highest frequency 2480 MHz:

All peaks are more than 20 dB below the limit.

Lowest frequency 2402 MHz:

