FCC RF Test Report
as per

RSS-247 Issue 2
&
FCC Part 15 Subpart 15.247
on the

JUJU Joints device
FCC ID: 2AUM6J001
IC: 25443-420JJ001

Prepared for:
JuJu Joints Canada Corp
555 Legget Dr, Suite 920
Kanata, ON Canada K2K 2X3

Add value.
Inspire trust.

RESPONSIBLE FOR	NAME	SIGNED ON	SIGNATURE
Test Specialist	Glen Westwell	Jan 14, 2020	
Authorised Signatory	Scott Drysdale	Jan 14, 2020	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

EXECUTIVE SUMMARY
A sample of this product was tested and found to be in compliance with FCC Part 15 Subpart 15.247 and RSS-247 Issue 2.

A2LA Cert. No. 2955.19

DISCLAIMER AND COPYRIGHT
This non-binding report has been prepared by TÜV SÜD Canada with all reasonable skill and care. The document is confidential to the potential Client and TÜV SÜD Canada. No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada.
© TÜV SÜD.

ACCREDITATION
Our A2LA Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our A2LA Accreditation.

TÜV SÜD Canada.
1280 Teron Rd
Kanata, ON K2K 2C1, Canada

Report Issued: Jan 14, 2020

Phone: 613-668-5149
www.tuv-sud.ca

Contents

1 Report Summary 3
2 Introduction 5
3 EUT: JuJu Joints Device 8
4 Deviations from the Standard 8
5 Measurement Uncertainty 9
6 Test Location and Personnel 10
7 Radiated Spurious Emission 11
8 6dB Bandwidth of Digitally Modulated Systems 21
9 Maximum Peak Envelope Conducted Power – Digital Modulated 28
10 Power Spectral Density 30
11 Band-Edge Compliance of RF Conducted Emissions 31

COMMERCIAL-IN-CONFIDENCE
No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

1 Report Summary

1.1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
000	First Issue	Nov 5, 2019
001	Second Issue – Minor modifications and typographical error fixes as per TCB request	Jan 14, 2020

Table 1 – Modification Records

1.1.2 Acronyms & Definitions

The following definitions and acronyms are applicable in this report. See also See also ANSI C63.14.

Acronyms

AM	Amplitude Modulation
ASCE	Antenna Spurious Conducted Emissions
EIRP	Equivalent Isotopical Radiated Power
ETSI	European Telecommunications Standards Institute
EUT	Equipment Under Test
N/A	Not Applicable
OOB	Out of Band
OQPSK	Offset Quadrature Phase-Shift Keying
OSDI	Open Smart Device Interface
PKPSD	Peak Power Spectrum Density
QP	Quasi-Peak
RBW	Reading Bandwidth
RF	Radio Frequency of oscillation rate of electromagnetic fields (e.g. radio waves: 9kHz to 300GHz)
RMS	Root mean square, i.e., $V_p/\sqrt{2}$
Rx	Referred as antennae for receiving RF signals
SD	Spurious Domain
TR	Technical Report
Tx	Referred as antennae for transmitting RF signals

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

VBW	Visual Bandwidth
Vp	Peak Voltage

EUT – Equipment Under Test. A device or system being evaluated for compliance that is representative of a product to be marketed.

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

2 Introduction

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations Section 15.247 and Innovation Science and Economic Development Canada's Radio Standards Specification RSS-247 for the test documented herein.

Manufacturer:	**JuJu Joints Canada Corp**
Name:	**JuJu Joints Device**
Number of Samples Tested:	1
Test Specification/Issue/Date:	RSS-247 Issue 2: February 2017 FCC Part 15 Subpart 15.247
Test Plan/Issue/Date:	N/A
Model Number(s):	JJ001; JJ002; JJ003;JJ004;JJ005 Note: Different model numbers represent non-electrical changes, and a representative model was tested.
Order Number:	7169006548
Name of Tester(s):	Scott Drysdale
Related Documents:	ANSI C63.10:2013 ISO/IEC 17025:2005

Note: The EUT is considered received the date of the initial test.

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

2.1.1 Brief Summary of Results

A brief summary of the tests carried out in accordance with RSS-247 Issue 2 & FCC Part 15 Subpart 15.247 is summarized in Table 2.

Report Section	FCC 47 CFR Rule Part	ISED Canada's Rule	Description	Class/Limit/ Detector	Result	Remark
-	§15.203 & §15.204	-----	Antenna Requirement	N/A	N/A	See Note 1
-	§15.207	RSS-GEN 8.8	AC- Power Conducted Emissions	N/A	N/A	See Note 2
6	§ 15.205. § 15 209(a)	§RSS-GEN 8.9,8.10	Radiated Spurious Emission	QP	Pass	Worst-case scenario
7	§15.247(a)(2)	§RSS-247 5.2(a)	6dB Bandwidth	>500kHz	Select	Pass
8	§15.247(b)(3)	§RSS-247 5.4(d)	Peak Output Power	< 1W	Select	Pass
9	15.247(e)	§RSS-247 5.2(2)	Power Spectral Density	< 8 dBm (3 kHz BW)	Select	Pass
10	§15.247(d)	§RSS-247 5.5	Band-Edge Compliance of RF Conducted Emissions	≤ 20dBc	Select	Pass

Note 1: Manufacture uses a permanently attached antenna
Note 2: EUT contains no means for connection directly or indirectly to AC mains and it is powered by battery only.

Table 2 – Test Summary Table

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

2.1.2 Declaration of Build Status

This report addresses the EMC verification testing and test results of the JuJu Joints Device and is herein referred to as EUT (Equipment Under Test). The EUT was tested for compliance against the following standards:

RSS-247 Issue 2:2017
FCC Part 15 Subpart C 15.247:2018

Test procedures, results, justifications, and engineering considerations, if any, follow later in this report.

This report does not imply product endorsement by any government, accreditation agency, or TÜV SÜD Canada Inc.

Opinions or interpretations expressed in this report, if any, are outside the scope of TÜV SÜD Canada Inc accreditations. Any opinions expressed do not necessarily reflect the opinions of TÜV SÜD Canada Inc, unless otherwise stated.

For a more detailed list of the standards and the revision used, see the "Applicable Standards, Specifications and Methods" section of this report.

2.1.3 Notes, Justification

The following justifications for tests not performed or deviations from the above listed specifications apply:

The following notes, justifications for tests not performed or deviations from the above listed specifications apply:

For the Antenna requirement specified in FCC 15.203 (RSS-247 section 5.5), the unit uses a chip antenna, with an estimated 0 dBi gain.

For the Restricted Bands of operation, the EUT is designed to operate only between: 2400 – 2483.5 MHz.

The EUT is not a hybrid system and FCC 15.247 (f) does not apply to it. However, the 15.247 (d) requirement of power density were met and are detailed later in this test report.

For the scope of this test report, the EUT was mounted in three orthogonal axes to maximize emissions. Worst case results are presented.

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

3 EUT: JuJu Joints Device

3.1.1 Specifications:

PRODUCT NAME:	JuJu Joints Device
MANUFACTURER:	JuJu Joints Canada
TUV NUMBER:	7169006548
PART NUMBER:	N/A
Frequency Range (MHz)	2402-2480
Channel Numbers	0-39
Hardware Version Identification Number(s) (HVIN):	**JJ001; JJ002; JJ003**

3.1.2 Modes of Operation

The JuJu Joints device is a electronic vapor delivery system operating in the 2.4 GHz band with frequencies in the range of 2402 to 2480. For operation it uses the Bluetooth™ LE protocol.

4 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

5 Measurement Uncertainty

The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2. For instance, for the range of 30MHz – 1GHz and 1GHz – 18GHz is ±4.25dB and ±4.93dB, respectively with a 'k=2' coverage factor and a 95% confidence level.

Uncertainties on quantities measured shall be according to Table 5

Parameter	Uncertainty
Occupied channel Bandwidth	± 5%
RF output power, conducted	± 1.5dB
Power Spectral Density, conducted	± 3dB
Unwanted Emission, conducted	± 3dB
All emission, radiated	± 6dB
Temperature	± 3°C
Supply Voltages	± 3%
Time	± 3%

Table 3 Acceptable Uncertainties

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

6 Test Location and Personnel

TÜV SÜD Product Service conducted the following tests at our Ottawa Test Laboratory.

Test Name	Name of Test Personnel
Radiated Spurious Emission	Scott Drysdale
6dB Bandwidth	Scott Drysdale
Peak Output Power	Scott Drysdale
Power Spectral Density	Scott Drysdale
Band-Edge Compliance of RF Conducted Emissions	Scott Drysdale

Table 4 Tests Personnel

Office Address:

TÜV SÜD Canada
1280 Teron Road
Ottawa, ON K2K 2C1
Canada

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

7 Radiated Spurious Emission

7.1.1 Purpose & Method

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT does not exceed the limits listed below as defined in the applicable test standard, as measured from a receiving antenna. This helps protect broadcast radio services such as television, FM radio, pagers, cellular telephones, emergency services, and so on, from unwanted interference. The method is as defined in Section 12.2 of FCC KDB 558074 and ANSI C63.10.

The limits, as defined in 15.247(d) for unintentional radiated emissions, apply for those emissions that fall in the restricted bands, as defined in Section 15.205(a). These emissions must comply with the radiated emission limits specified in Section 15.209(a).

All unintentional emissions must also meet the 'Spurious Conducted Emissions' requirements of -20 dBc or greater. See also 'Antenna Spurious Conducted Emissions' for further details.

Frequency	Limit
0.009 MHz – 0.490 MHz	2400/F(kHz) uV/m at 300m[1]
0.490 MHz – 1.705 MHz	24000/F(kHz) uV/m at 30m[1]
1.705 MHz – 30 MHz	30 uV/m at 30m[1]
30 MHz – 88 MHz	100 uV/m (40.0 dBuV/m) at 3m ([1])
88 MHz – 216 MHz	150 uV/m (43.5 dBuV/m) at 3m ([1])
216 MHz – 960 MHz	200 uV/m (46.0 dBuV/m) at 3m ([1])
Above 960 MHz	500 uV/m (54.0 dBuV/m) at 3m ([1])
Above 1000 MHz	500 uV/m (54 dBuV/m) at 3m ([2])
Above 1000 MHz	500 uV/m (74 dBuV/m) at 3m ([3])
[1]Limit is with Quasi Peak detector with bandwidths as defined in CISPR-16-1-1 [2]Limit is with 1 MHz measurement bandwidth and using an Average detector [3]Limit is with 1 MHz measurement bandwidth and using a Peak detector	

Table 5 Limits – Radiated Spurious Emission

Based on ANSI C63.10, clause 11.11, if the Peak detector measurements do not exceed the Quasi-Peak limits, where defined, then the EUT is deemed to have passed the requirements.

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

7.1.2 Test Specifications

REFERENCE STANDARD	FCC Section : §15.205 FCC Section : §15.209 ISED Canada : RSS-GEN 8.9. 8.10 ANSI C63.10 Clause 5.5, 5.6 and 11.11
SPECIFICATIONS	
Limit (dB)	<20
Frequencies (MHz)	2402 2440 2480
RBW (kHz):	As per requirement
VBW (kHz)	As per requirement
EUT	
Identification	Name
Voltage Input	Voltage
ENVIROMENTAL & TEST INFO	
Temperature (°C)	22 ± 2
Humidity (%)	50 ± 5
Atmospheric Pressure kPa (For Info Only)	98-102
Tester	Scott Drysdale
Client Witness	No witness

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

7.1.3 Test Setup

The EUT was configured to transmit at 100% duty cycle during testing. No duty cycle correction was applied to the average measurements for the correct average results.
As per ANSI C63.10 Clause 6.3.1, below 1GHz, the height of the EUT was set to 80cm. Above 1GHz, the height was raised to 1.5m.

7.1.4 Results

The EUT passed. Low, medium, and high bands were tested. The worst-case results are presented.

7.1.4.1 Graphs

The graphs shown below are maximized peak measurement graphs measured with a resolution bandwidth greater than or equal to the final required detector over a full 0-360°. This peaking process is done as a worst-case measurement and enables the detection of frequencies of concern for final measurement. For final measurements with the appropriate detector, where applicable, please refer to the tables under Final Measurements.

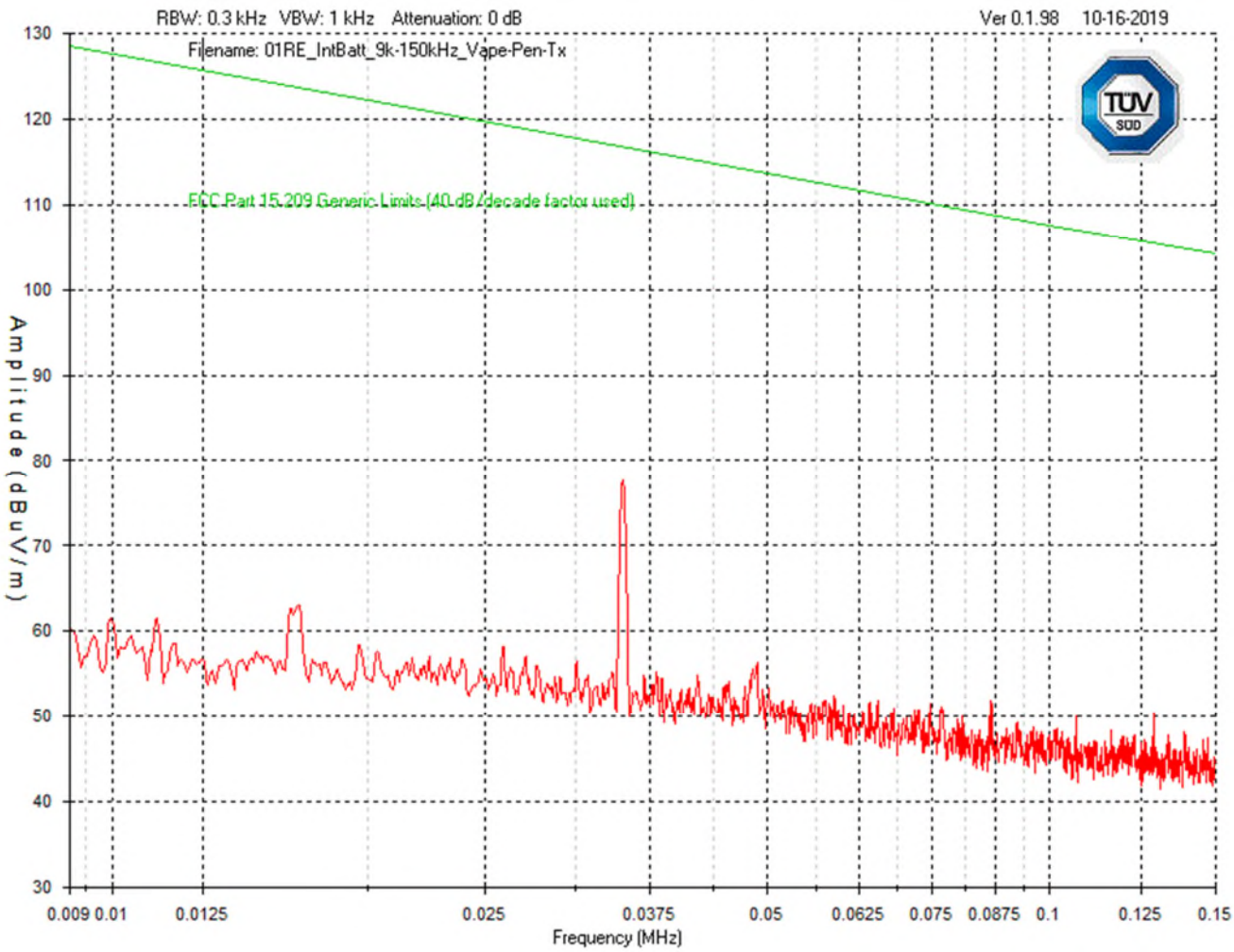
In accordance with FCC Part 15, Subpart A, Section 15.33, the device was scanned to the 10th harmonic (a minimum of 24.835 GHz).

Devices scanned may be scanned at alternate test distances and in accordance with FCC Part 15, Subpart A, Section 15.31, an extrapolation factor of 20 dB/decade was used above 30 MHz and 40 dB/decade below 30 MHz. For example, for 1-meter measurements, an extrapolation factor 9.5 dB from 20 Log (1m / 3m) is applied.

Low, middle and high channels, each in three orthogonal axes were tested. However, the worst-case graphs are presented.

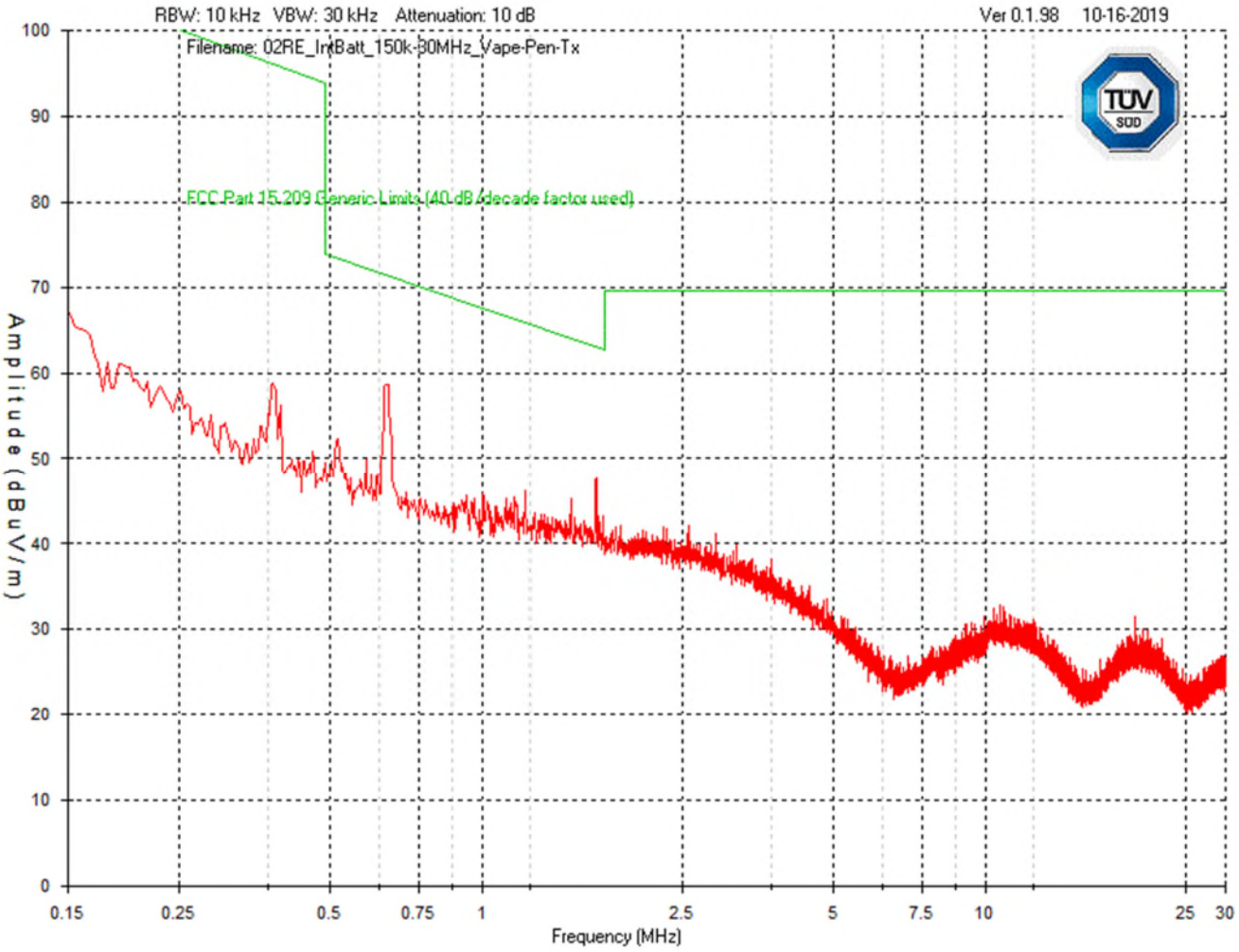
No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

7.1.4.1.1 Frequency range from 9kHz to 30MHz



Graph 1: Radiated Spurious emission 9kHz – 150 kHz

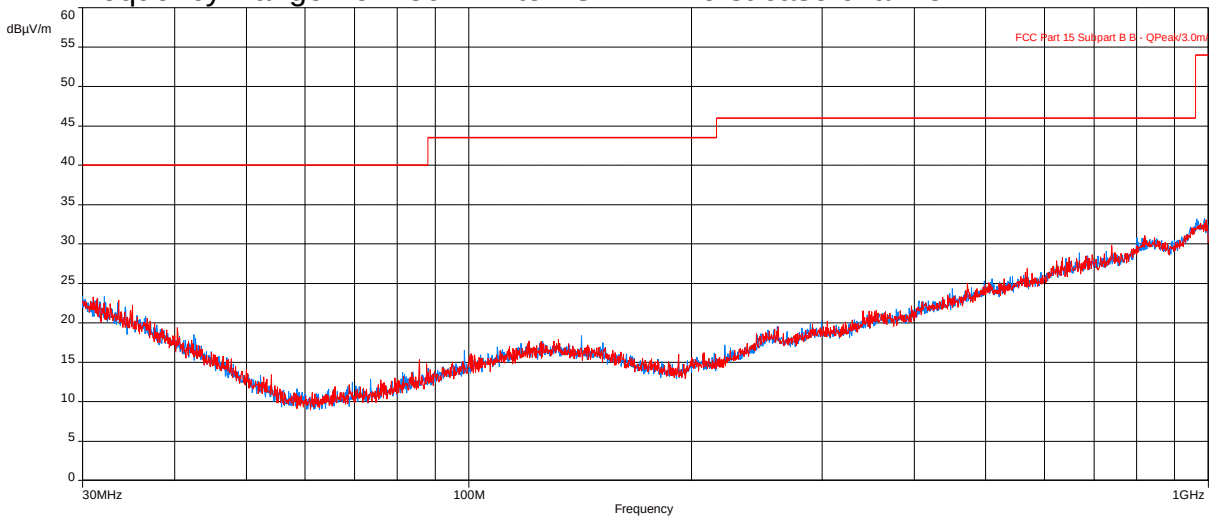
No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.



Graph 2: Radiated Spurious emission 150 kHz – 30MHz

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

7.1.4.1.2 Frequency Range from 30MHz to 1GHz – Worst case channel

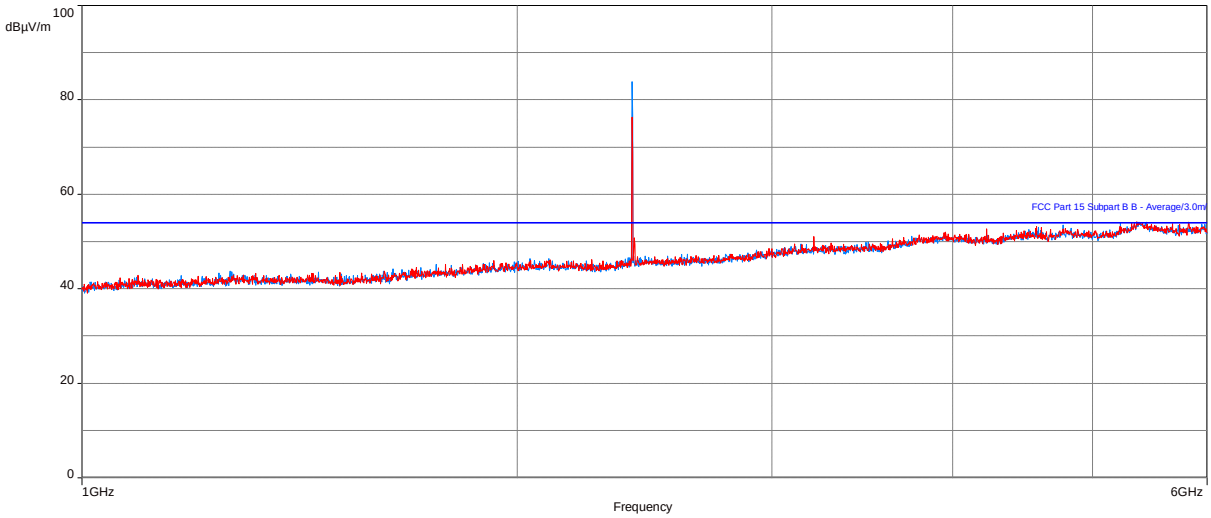


Graph 3: Radiated Spurious emission 30 MHz to 1 GHz

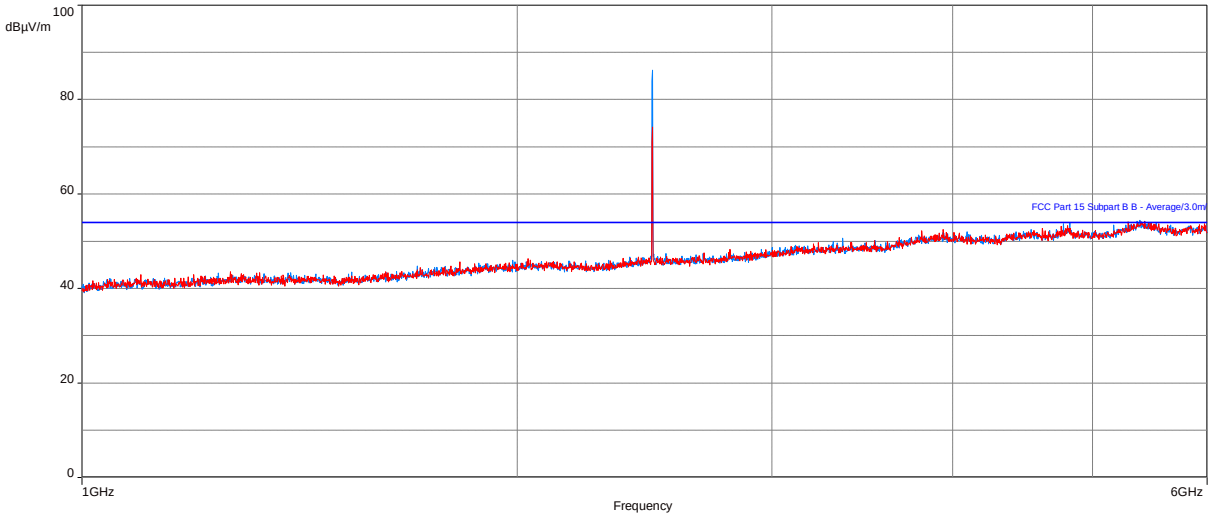
Note: Vertical Polarization is Red, Horizontal Polarization is Blue.
No emissions were detected.

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

7.1.4.1.3 Frequency Range from 1GHz to 10 GHz – Worst case

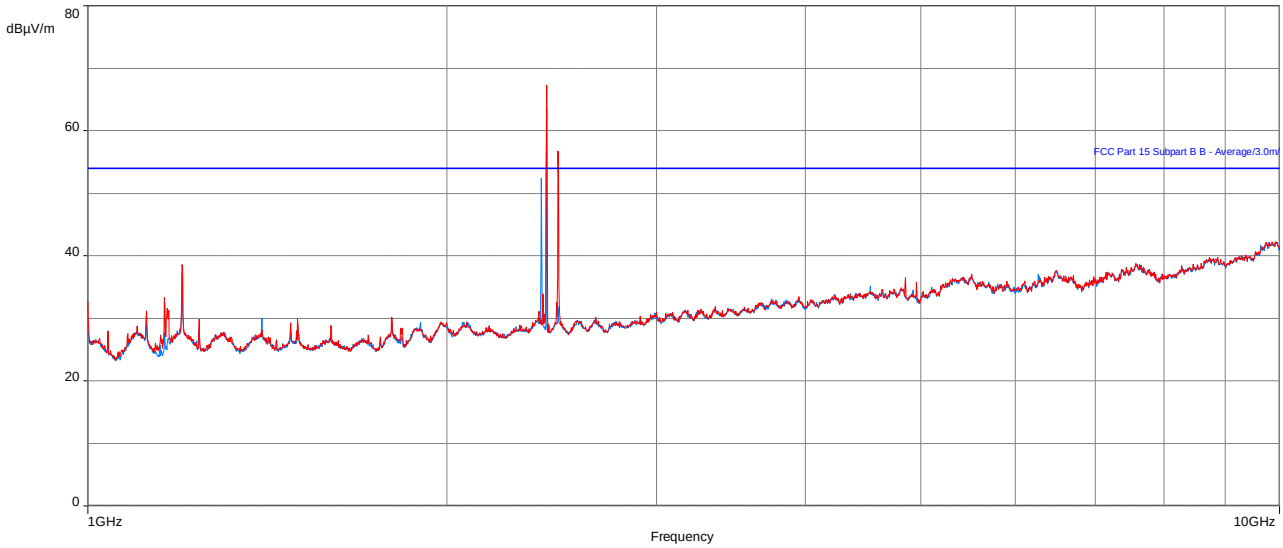


Fixed Low channel



Fixed High Channel

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

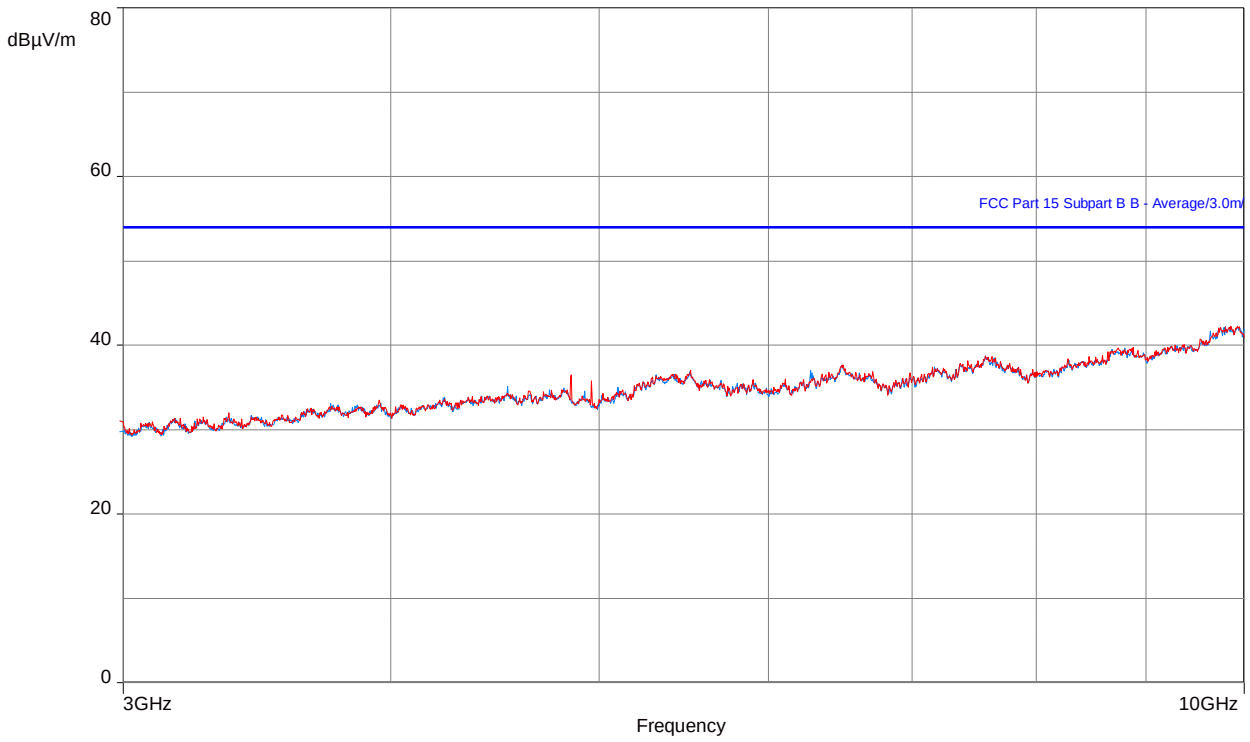


Device in Normal mode, for information purposes.

Frequency (MHz)	Setting	Meas.Peak (dBµV/m)	Angle (°)	Position	RBW	Attenuation (dB)	Pass/Fail
2400	Low	43.6	173.3	Vertical	1MHz	0	Pass
2400	Low	45.5	306.8	Horizontal	1MHz	0	Pass
2402	Low	76.4	330.5	Vertical	1MHz	0	N/A
2402	Low	83.9	51.75	Horizontal	1MHz	0	N/A
2440	Mid	75.2	345.5	Vertical	1MHz	0	N/A
2440	Mid	85.1	305.1	Horizontal	1MHz	0	N/A
2480	Top	73.9	356.8	Vertical	1MHz	0	N/A
2480	Top	86.2	307.5	Horizontal	1MHz	0	N/A
2483.5	Top	45.42	19.75	Vertical	1MHz	0	Pass
2483.5	Top	46.74	282.8	Horizontal	1MHz	0	Pass

Note: In all cases, the peak readings did not exceed the averageDevice in Normal mode, for information purposes

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.



Graph 4 – Radiated Emissions 3 to 10 GHz

Note: Above 3 GHz was performed using a band reject filter. The device was scanned up to 26 GHz, and no emissions was detected above 3 GHz and the peak noise floor was below the average limit.

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

7.1.5 Test Instruments

Equipment	Model No.	Manufacturer	Calibration Period (months)	Calibration Due (YYY-MM-DD)	Asset No LAV0
Spectrum Analyzer	ESU-40	Rohde & Schwarz	24	2021-04-20	4092
BiLog Antenna	3142-E	ETS	24	2021-11-29	4002
Attenuator 4 dB	20181128A	KLP	24	2021-11-29	4300
Horn Antenna	ATH1G18G	AR	24	2021-04-25	4005
Attenuator 6 dB	FP-50-3	Trilithic	NCR	NCR	4125
LNA pre-amp	LNA-1450	RF Bay Inc.	24	2020-12-22	4089
1-26.5GHz preamp	8449B	Agilent	24	2019-09-09	6351
RF Cable 10m	LMR-400-10M-50OHM-MN-MN	LexTec	NCR	NCR	4025
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	NCR	NCR	4026
Emission software	0.1.94	Global EMC	NCR	NCR	4058

Table 6 – Test Instrumentation – Radiated Spurious Emission

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

8 6dB Bandwidth of Digitally Modulated Systems

8.1.1 Purpose & Method

The purpose of this test is to ensure that the maximum power conducted to the radiating element does not exceed the limits specified. This ensures that if the end-user replaces the antenna, the maximum power does not exceed an amount which may create an excessive power level.
The method is given in Section 8.1 of FCC KDB 558074 and ANSI C63.10.

8.1.2 Test Specifications

REFERENCE STANDARD	FCC Section : §15.247(a)2 ISED Canada : §247 5.2(a)
SPECIFICATIONS	
Limit – 6dB Bandwidth	≥500kHz
Frequency range (GHz)	2402 2440 2480
RBW (kHz):	100
VBW (kHz)	300
ENVIROMENTAL & TEST INFO	
Temperature (°C)	22 ± 2
Humidity (%)	32 ± 5
Atmospheric Pressure kPa (For Info Only)	98-102
Tester	Scott Drysdale
Client Witness	No witness

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

8.1.3 Results

The minimum 6 dB BW measured was 0.7598 MHz there was a maximum of 1.136 MHz for 99% BW.

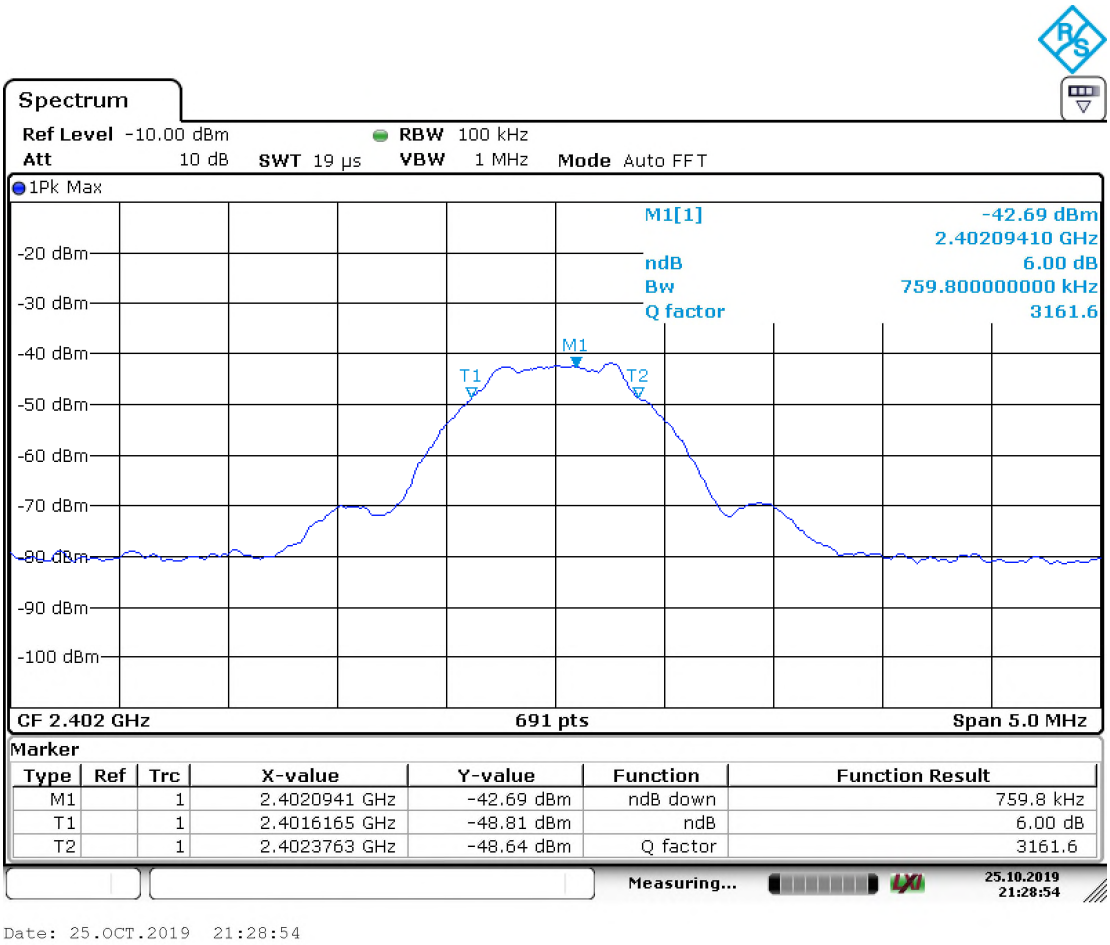
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Results
Low	2402	0.7598	1.078	Pass
Mid	2440	0.7601	1.094	Pass
Top	2480	0.7598	1.136	Pass

Table 7 –Bandwidth Results

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

8.1.3.1 Graphs

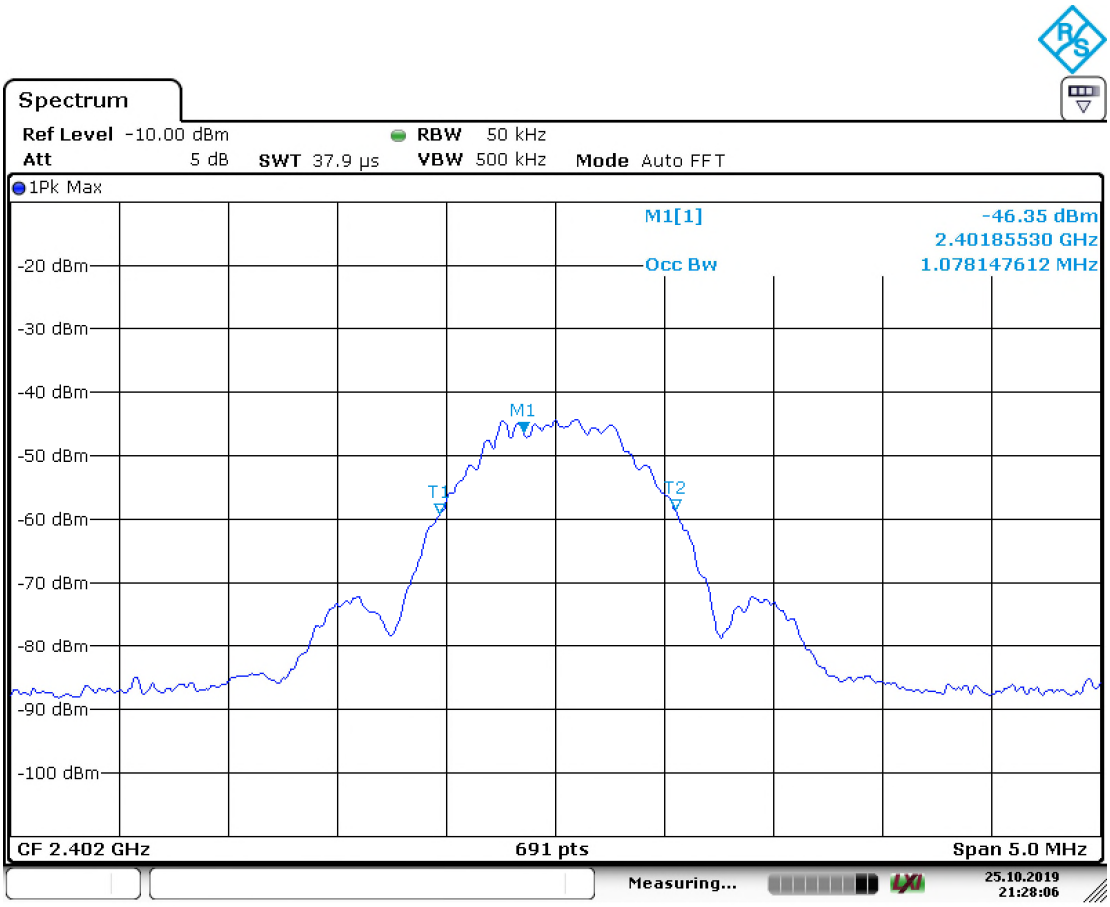
The graphs showed below show the OBW during the operation of the device. This is measured by a max hold on the spectrum analyzer and the highest resolution bandwidth that is sufficiently low to exhibit the 6dB bandwidth of a channel during operation of the EUT. Max hold is performed for a duration of not less than 1 minute. Note that a 20dB attenuator was used between the EUT and the Spectrum Analyzer.



Date: 25.OCT.2019 21:28:54

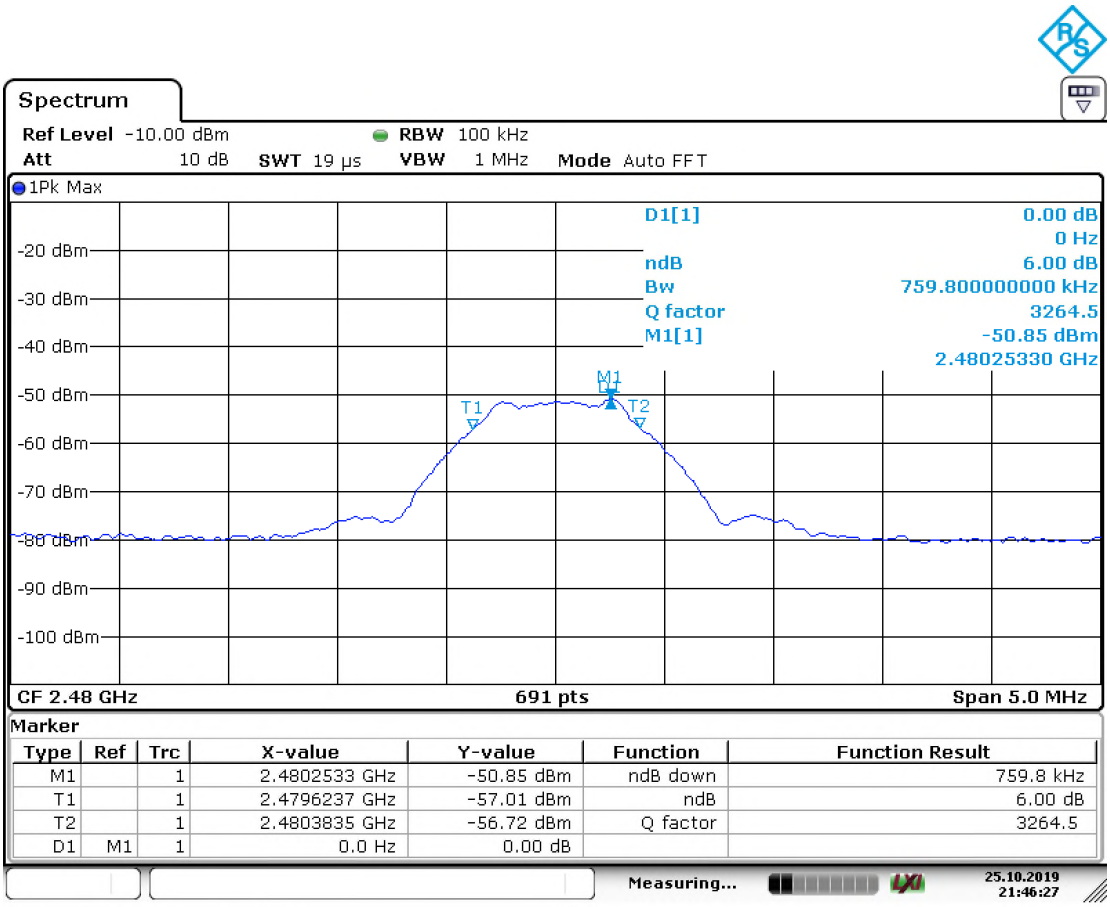
Graphs 5: 6dB Results – Low

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.



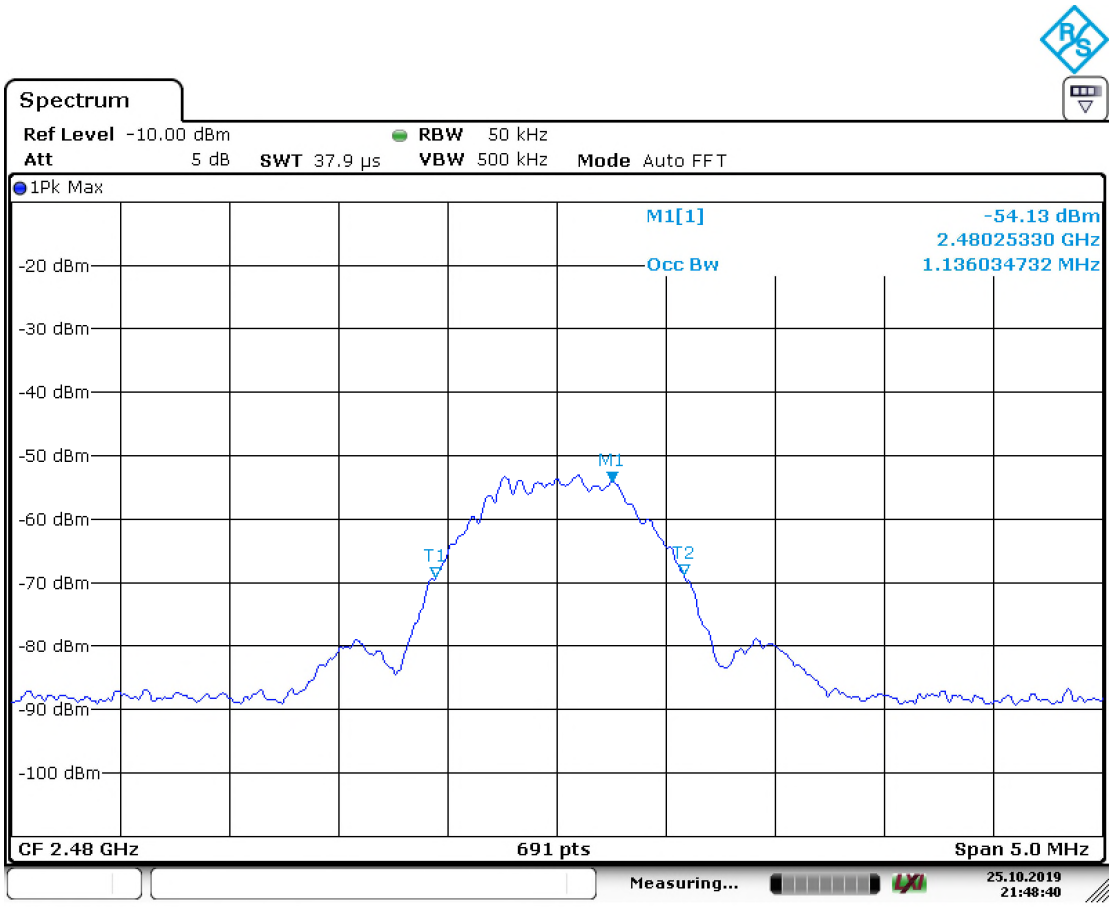
Graphs 6: OBW Results – Low

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.



Graphs 7: Results– 6dB Results – Top

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.



Date: 25.OCT.2019 21:48:40

f

Graphs 8: Results– OBW Results – Top

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

8.1.4 Test Instruments

Equipment	Model No.	Manufacturer	Calibration Period (months)	Calibration Due (YYY-MM-DD)	Asset No: LAVE
Spectrum Analyzer	ESU-40	Rohde & Schwarz	24	2021-04-20	4092
Attenuator 10 dB	4779-10	Narda	NCR	NCR	4096
Cable 254mm SMA	Minibend-10	Huber+ Suhner	NCR	NCR	4080
Signal generator	SMU100A	Rohde & Schwarz	24	2020-08-23	4135

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

9 Maximum Peak Envelope Conducted Power – Digital Modulated

9.1.1 Purpose & Method

The purpose of this test is to ensure that the bandwidth occupied exceeds a stated minimum. This helps ensure the utilization of the frequency allocation is sufficiently wide. This also helps prevent corruption of data by ensuring adequate data separation to distinguish the reception of the intended information. The method is given in Section 9.1.2 of FCC KDB 558074 and ANSI C63.10.

9.1.2 Test Specifications

REFERENCE STANDARD	FCC Section : §15.247(b)3 ISED Canada : RSS-247 §5.4(d) ANSI C63.10. Clause 10.3.7
SPECIFICATIONS	
Limit – Power (W)	<1
Frequencies (MHz)	2402 2440 2480
RBW (MHz):	3
VBW (MHz)	10
Span (MHz)	10
ENVIROMENTAL & TEST INFO	
Temperature (°C)	23 ± 2
Humidity (%)	30 ± 5
Atmospheric Pressure kPa (For Info Only)	102.3
Tester	Scott Drysdale
Client Witness	No witness

9.1.3 Results

The EUT was set to transmit at maximum power (20dBm) up to channel 24. Both channels 25 and 26 were set to lower power to comply with the band-edge limits. The peak power of channels tested are depicted in Table 10

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

Channel	Frequency (MHz)	Measured Peak Field strength (dBuV/m)	Factor for 3 m	EIRP (dBm)	Peak Power (mW)	Result
Low	2402	83.9	95.2	-11.3	0.07	Pass
Mid	2440	85.1	95.2	-10.1	0.1	Pass
High	2480	86.2	95.2	-9.0	0.13	Pass

Table 8 – Maximum Peak Power measured with 3 MHz RBW, peak.

Note, as a RF port was not available, the device was measured via the radiated method.

9.1.4 Test Instruments

Equipment	Model No.	Manufacturer	Calibration Period (months)	Calibration Due (YYY-MM-DD)	Asset No: LAVE
Spectrum Analyzer	ESU-40	Rohde & Schwarz	24	2021-04-20	4092
Attenuator 10 dB	4779-10	Narda	NCR	NCR	4096
Cable 254mm SMA	Minibend-10	Huber+ Suhner	NCR	NCR	4080
Signal generator	SMU100A	Rohde & Schwarz	24	2020-08-23	4135

Table 9 – Test Instrumentation – Maximum Peak Output Power

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

10 Power Spectral Density

10.1.1 Purpose & Method

The purpose of this test is to ensure that the maximum power spectral density to the radiating element does not exceed the limits specified. This ensures that the modulation is significantly wide enough, or low enough in power that it will allow for co-operation of other wireless devices operating within this frequency allocation. The method applied is the PKPSD described in ANSI C63.10-2013 in Clause 10.2.

10.1.2 Test Specifications

REFERENCE STANDARD	FCC Section : §5.247(e) ISED Canada : RSS-247 §5.2 (b) ANSI C63.10. Clause 11.10
SPECIFICATIONS	
Limit (dBm)	<8
Frequencies (MHz)	2402 2440 2480
RBW (kHz):	3
VBW (kHz)	10
Span (MHz)	4
ENVIROMENTAL & TEST INFO	
Temperature (°C)	22 ± 2
Humidity (%)	61 ± 5
Atmospheric Pressure kPa (For Info Only)	99.9
Tester	Scott Drysdale
Client Witness	No witness

10.1.3 Results

The EUT passed. Low, medium, and high bands were tested. As the device met the requirement of 8 dBm measured with peak power with a bandwidth exceeding the 20 dB bandwidth, it was deemed to have met the requirement.

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

11 Band-Edge Compliance of RF Conducted Emissions

11.1.1 Purpose & Method

The purpose of this test is to ensure that the maximum power conducted to the radiating element at frequencies outside of the authorized spectrum does not exceed the limits specified. This ensures that the only the intended signal is delivered to the radiating element.

The limits are defined in 15.247(d). In any 100 kHz band, the peak spurious harmonics emissions must be at least 20 dB below the fundamental. Spurious Conducted emissions are to be evaluated up to the 10th harmonic. This -20 dBc requirement also applies at the 'band edge' or 2.4 GHz and 2.4835 GHz

11.1.2 Test Specifications

REFERENCE STANDARD	FCC Section : §15.247(d) ISED Canada : RSS-247 §5.5 ANSI C63.10 Clause 11.11
SPECIFICATIONS	
Limit (dB)	<20
Frequencies (MHz)	2405 2440 2480
RBW (kHz):	100
VBW (kHz)	>= 300 kHz
ENVIROMENTAL & TEST INFO	
Test Date (YYYY-MM-DD)	2019-08-09
Temperature (°C)	22 ± 2
Humidity (%)	61 ± 5
Atmospheric Pressure kPa (For Info Only)	99.9
Tester	Scott Drysdale
Client Witness	No witness

11.1.3 Results

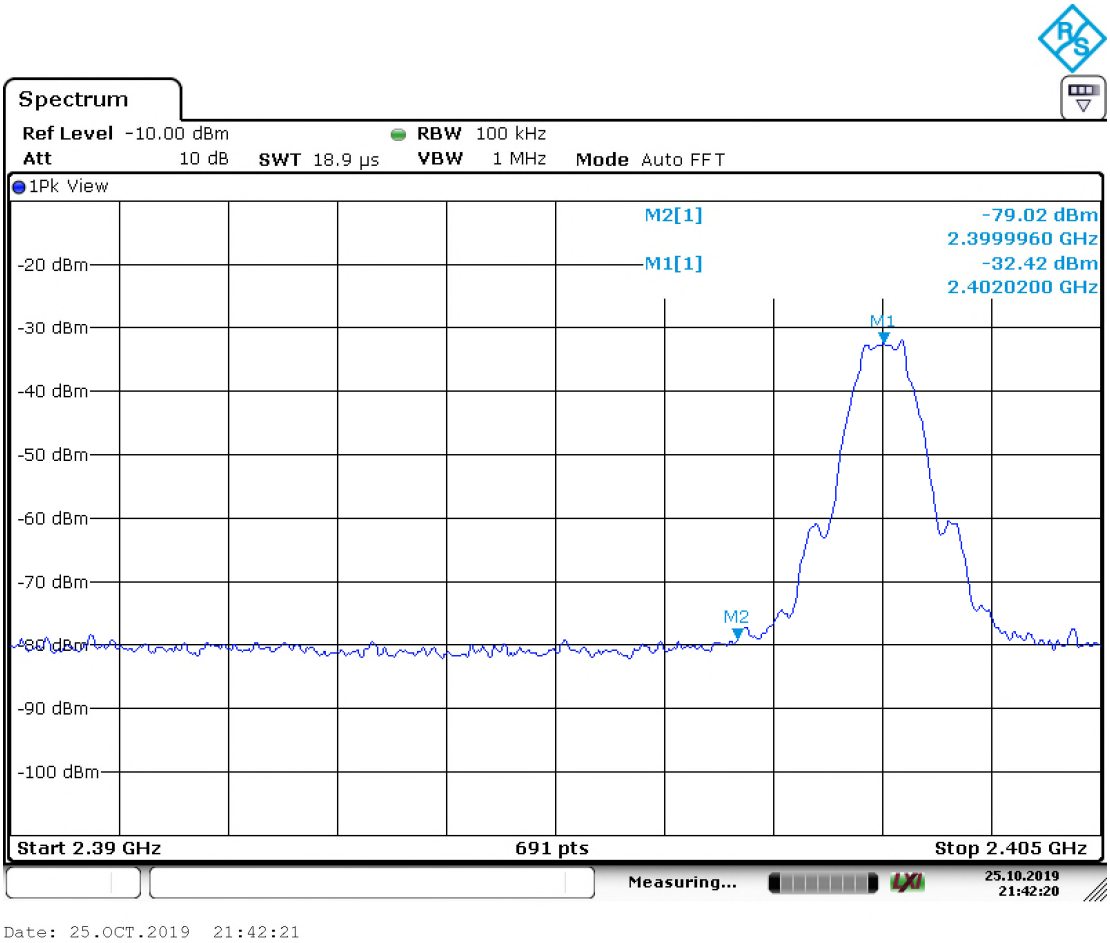
The EUT passed. Low, medium, and high bands were tested

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

11.1.3.1 Graphs

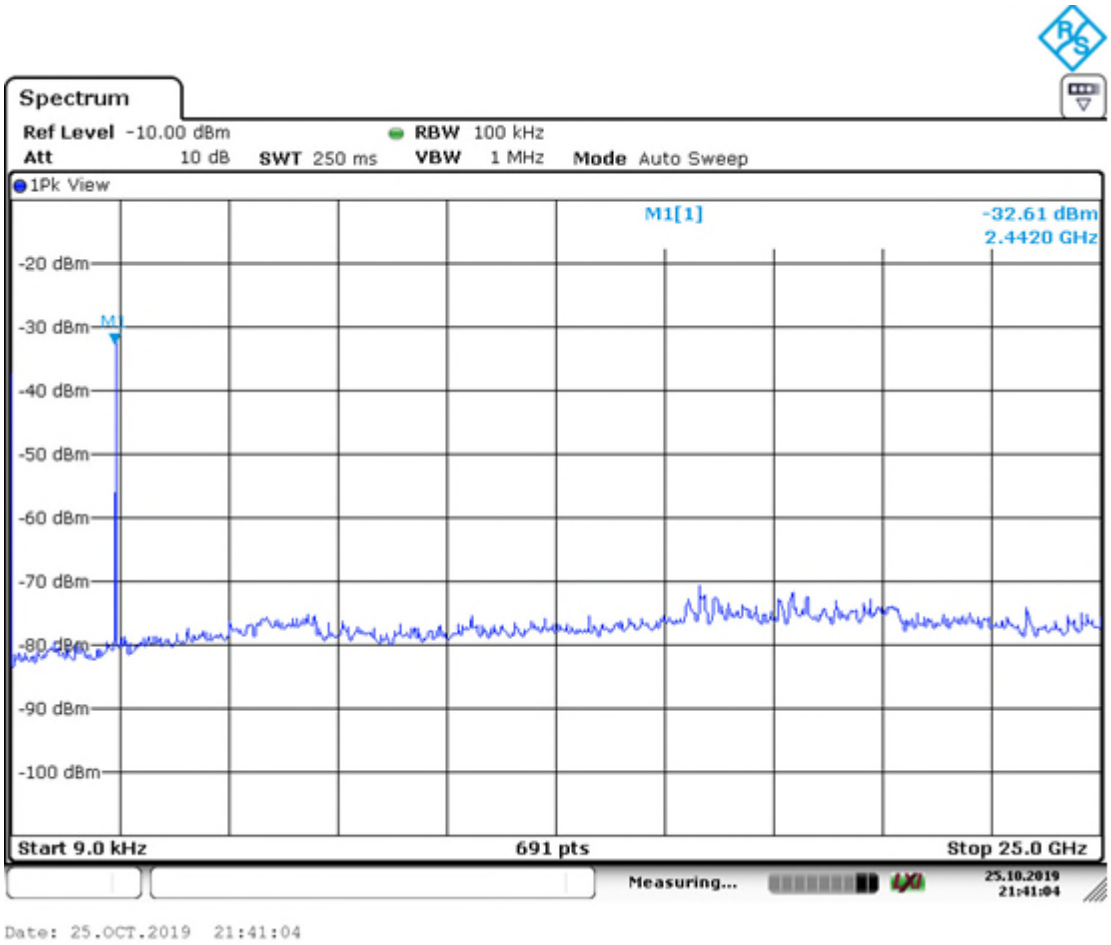
The graphs shown below show the worst-case peak power output of the device during measurement during transmit operation of the EUT.

11.1.3.1.1 Channel Low



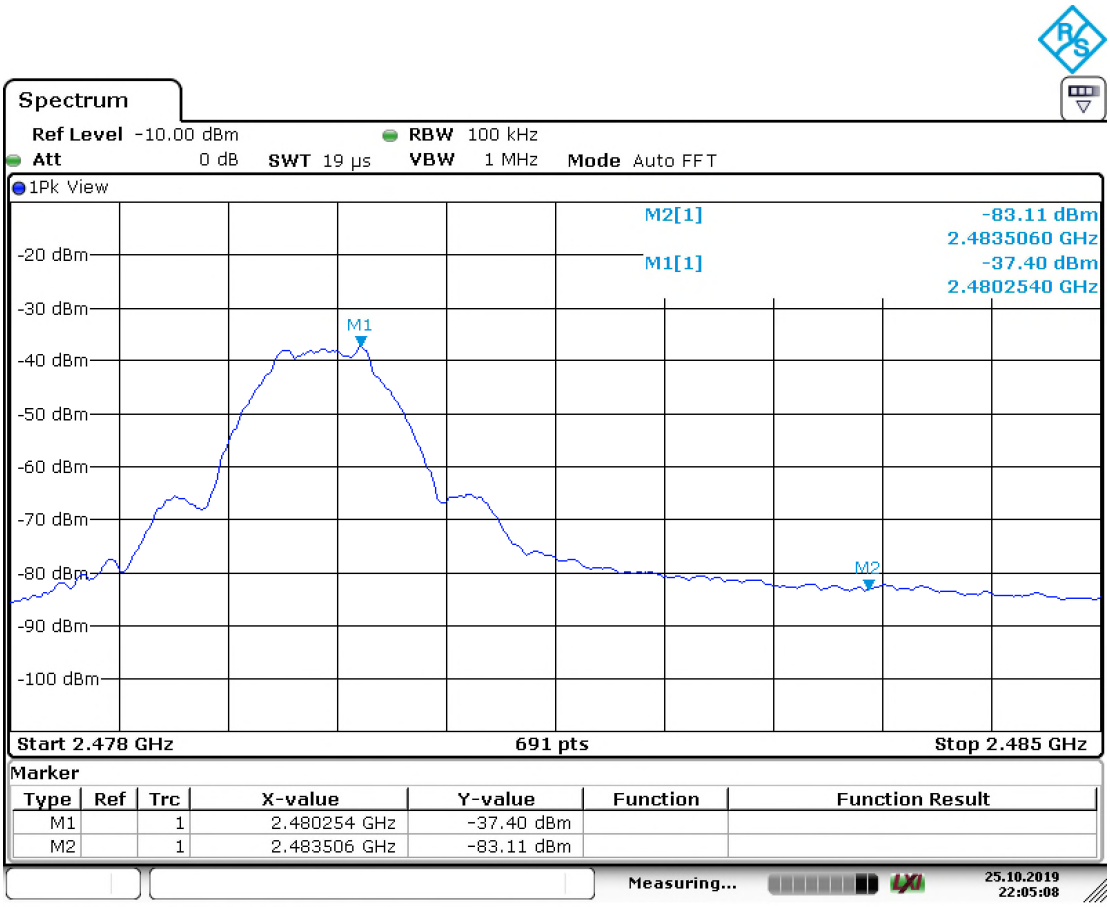
Graph 9: Results – 20 dBc Low channel

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.



Graph 10: Results – 9kHz to 25 GHz – 20 dBc Mid channel

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.



Date: 25.OCT.2019 22:05:09

Graph 11: Results – 20 dBc Top channel

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

11.1.4 Test Instruments

Equipment	Model No.	Manufacturer	Calibration Period (months)	Calibration Due (YYY-MM-DD)	Asset No: LAVE
Spectrum Analyzer	ESU-40	Rohde & Schwarz	24	2021-04-20	4092
Bilog Attenuator 10 dB	4779-10	Narda	NCR	NCR	4096
Cable 254mm SMA	Minibend-10	Huber+ Suhner	NCR	NCR	4080
Signal generator	SMU100A	Rohde & Schwarz	24	2020-08-23	4135

Table 10 – Test Instrumentation –Spurious Emission (20 dBc)

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.

No part of this document may be reproduced without the prior written approval of TÜV SÜD Canada. © TÜV SÜD.