TEST REPORT

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ACCREDITED
CERT #3657.02

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Manufacturer:	**Orca Water Solutions**
Address:	Suite 107 - 4288 Lozells Ave Burnaby, British Columbia, V5A 0C7
Equipment Tested:	**Orca Ocean**
Model Number(s):	RCA-OCN-LWHBLV1
FCC ID:	2BUOSOCN-LWHBLV1
ISED ID:	34745-OCN-LWHBLV1
FVIN:	RCA-OCN-LWHBLV1

orca
Water is life.

REVISION HISTORY

Date	Report Number	Details	Author's Initials
July 29, 2026	QA-2797-1	Final	JS
All previous versions of this report have been superseded by the latest dated revision as listed in the above table. Please dispose of all previous electronic and paper printed revisions accordingly.			

REPORT AUTHORIZATION

The data documented in this report is for the test equipment provided by the manufacturer and the results relate only to the item tested. The tests were conducted on the sample equipment as requested by the manufacturer for the purpose of demonstrating compliance with the standards outlined in Section I of this report as agreed upon by the Manufacturer under the quote QAI-1649.

The Manufacturer is responsible for the tested product configurations, continued product compliance, and for the appropriate auditing of subsequent products as required.

This report may comprise a partial list of tests that are required for FCC and ISED. A Declaration of Conformity can only be produced by the manufacturer. This is to certify that the following report is true and correct to the best of our knowledge.

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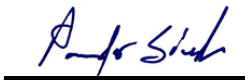
Testing Performed and
Report Prepared by
Jeffrey Simon P.Eng
RF/EMC Project specialist II



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QAI EMC ACCREDITATION

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EMC Laboratory Location	FCC Designation (3m SAC)	IC Registration (3m SAC)	A2LA Certificate
Burnaby, BC, Canada	CA9543 Lab Reg# 669742	9543A	3657.02

EMC Facility Burnaby BC, Canada

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1.1 Purpose

The purpose of this report is to demonstrate and document the compliance of Orca Ocean as per Sections 1.2 and 1.3.

1.2 Scope

The information documented in this report is based on the test methods and levels as per Quote QAI-1649:

CFR Title 47 FCC Part 15.247 – Radio Frequency Devices, Subpart C – Intentional Radiators Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ISED RSS-247 Issue 4: Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

RSS-Gen Issue 5 – General Requirements and Information for the Certification of Radio Apparatus

RSS-102 Issue 6 – Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus

ICES-003 Issue 7 – Information Technology Equipment (Including Digital Apparatus)

ICES-Gen Issue 2 – General Requirements for Compliance of Interference-Causing Equipment

FCC KDB 558074 D01 V05R02 - 15.247 Meas Guidance

ANSI C63.10-2020 - Procedures for Compliance Testing of Unlicensed Wireless Devices.

1.3 Summary of Results

The following testing was performed pursuant to FCC Title 47 Part 15 and Industry Canada ICES-003 to demonstrate the testimony to "FCC, IC, & CE" mark Electromagnetic Compatibility testing for the product.

No.	Test	Applicable Standard	Requirement	Result
1	Antenna Requirement	FCC 47 CFR Part C 15.203 RSS-Gen	No user access to antenna after professional installation.	Complies
2	6 dB Bandwidth	FCC 47 CFR Part C 15.247(a)(2) RSS-247 (6.3.1)(a)	Maximum allowed 6 dB bandwidth of the hopping channel is 500 kHz.	Complies
3	99% Occupied Bandwidth	RSS-Gen	The 99% emission bandwidth is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.	Complies
4	Peak Output Power (Conducted & Radiated)	FCC 47 CFR Part C 15.247(b)(3) RSS-247 (6.3.2)	Maximum peak conducted output power shall not exceed 1 W	Complies
5	Peak Power Spectral Density	FCC 47 CFR Part 15.247 (e) RSS-247 (6.3.1) (b) RSS-Gen (6.7)	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	Complies
5	Band Edge	FCC 47 CFR Part C 15.247 (d) RSS-247 (6.6)	In any 100 kHz bandwidth outside the frequency band in which the device is operating, the RF power shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.	Complies
6	Frequency Stability	FCC 47 CFR Part C 15.215 (c) RSS Gen (8.11)	The requirement to contain the designated bandwidth of the emission within the specified frequency band and to have frequency stability of the transmitter over expected variations in temperature and supply voltage.	Complies
6	Intentional Radiated Emissions	FCC 47 CFR Part A 15.33 FCC 47 CFR Part B 15.109 FCC 47 CFR Part C 15.209 ICES-003 RSS-247	Radiated emissions requirements as stated in the standards.	Complies
7	Radiated Spurious Emissions	FCC 47 CFR Part A 15.33 FCC 47 CFR Part C 15.205 FCC 47 CFR Part C 15.209 FCC 47 CFR Part C 15.247 RSS-Gen RSS-247	Radiated emissions requirements as stated in the standards.	Complies
8	RF Exposure	FCC 47 CFR 1.1310 RSS-102	RF exposure measurements	Complies

Table 1: Applicable test standards and descriptions

Test Equipment List

The tables below contain all the equipment used by 'QAI Laboratories' in conducting all tests on the Equipment Under Test (EUT) as per Section I.

Emissions Test Equipment

	Manufacturer	Model	Description	Serial No.	S/W Version	Calibration Due Date
1	Com-Power Corporation	LI-220C	Line Impedance Stabilization Network (9kHz-30MHz)	20070020	N/A	2028-Dec-5
2	Sunol Sciences	SC 104V	Turntable Controller	042506-1	N/A	Indication Only
3	Sunol Sciences	SM46C	Turntable	071705-2	N/A	Indication Only
4	Maturo GmbH	BAM 4.0-P	Boresight Antenna Mast	365	3382.01	Indication Only
5	ETS Lindgren	S201	7-meter Semi-Anechoic Chamber	1030	N/A	Indication Only
6	Hewlett Packard	8447F	Amplifier (0.1-1300MHz)	1726A00566	N/A	Indication Only
7	Hewlett Packard	8449B	Preamplifier (1-26.5 GHz)	3008A00982	N/A	Indication Only
8	Microwave Lab	USMC10180	Low Noise Amplifier (0.1-18GHz)	001303JR0802A2729	N/A	Indication Only
9	Keysight Technologies	N9038B	MXE EMI Receiver, Multi-touch	MY60180014	N/A	2026-Aug-22
10	ETS-Lindgren	3117	Horn, Double-Ridge Guide Ant, 1.0 - 18 GHz	75944	N/A	2029-Mar-11
11	Sunol Sciences	JB3	Biconilog Antenna (30MHz – 3GHz)	A042004	N/A	2028-Mar-18
12	California Instruments	PACS-1	Test System - H&F	72569	N/A	2028-Apr-2
13	California Instruments	OMNI 1-18i	CDN - H&F	7127	N/A	2028-Apr-2
14	California Instruments	3001i	Power Supply - H&F	52117	CTS3.0 v3.2.0.35	2028-Apr-2
15	TESEQ	ISN T800	Impedance Stabilization Network (150kHz – 30MHz)	27133	N/A	2029-Mar-10
16	Rohde & Schwarz	FSU 67	EMI Receiver	101388	N/A	Indication only

Measurement Software List

	Manufacturer	Model	Version	Description
1	Rohde & Schwarz	EMC 32	10.35.10	Emissions Test Software

GENERAL INFORMATION

2.1 Product Description

The information provided in this section is for the Equipment Under Test (EUT) and the corresponding Auxiliary Equipment needed to perform the tests as a complete system.

Figure 1: Orca Ocean

Equipment Under Test (EUT)

Equipment	Orca Ocean
Description	LoRaWAN Wireless Hub
Manufacturer	Altimus Design Inc. dba Orca Water Solutions
Model No.	RCA-OCN-LWHBLV1
Serial No.	OCN26063000001
Clock frequencies tuned upon within the EUT:	915 MHz (LoRaWAN), 2.4 GHz (Thread)
Highest frequency generated within the EUT:	2.48 GHz

Equipment Under Test (EUT) – RF Information

RF device type	2.4 GHz IEEE 802.15.4 / Thread DTS
Model No. (HVIN)	RCA-OCN-LWHBLV1
Operating frequency	2405 MHz – 2480 MHz
Number of available	15 Channels
Channel separation	5MHz
Channel bandwidth	1.2 MHz
Output Power/Transmitter (conducted)	4.44 dBm
Modulation type	O-QPSK DSSS, IEEE 802.15.4 / Thread
Test Channels (L, M, H)	2405 MHz, 2445 MHz, 2480 MHz
Data Rate	250 kbps
Adaptive	No
Geo-location-capable	No
Number of antennas	1
Antenna type	PCB Trace
Antenna gain	0.0dBi (estimated Reference design)

Notes: EUT also contains a pre-certified RAK3172 US915 LoRaWAN module with a separate antenna. The LoRaWAN module is evaluated for radio collocation and module spurious emissions.

Notes: The gain of the antenna(s) is provided by the client to measure or calculate test results and is not independently measured by QAI.

Equipment Under Test (EUT) – General Information

Tested as	Tabletop
Dimensions	60mm (W) x 100mm (L) x 20mm (H), excluding external
Declared operating temperature range:	0 – 40C
Input power	5 VDC USB power
Grounded	No
Device use	Fixed Location – Physically secured & not easily moved.

Test Modes

Test	Transmitter State	Power
1	2.4 GHz Thread Radio ON – Continuous Transmit Test Mode	5 VDC via USB-C

Auxiliary Manufacturer Supplied Equipment

Equipment	Manufacturer	Product Description	Model No.
Cell Signal Booster	Wilson Electronics	Cell Booster	460020
LoRaWAN	RAK	LoRaWAN Gateway	RAK7268CV2
Orca Ocean	Orca Ocean	HUB	RCA-OCN-BLSV001
Laptop	Microsoft	Laptop with Tera Term Software	Model: 1769

2.2 Environmental Conditions

The equipment under test was operated and tested under the following environmental conditions:

Parameter	Conditions
Location	QAI – Burnaby
Temperature	26.0 C
Relative Humidity	55.7 %

2.3 Measurement Uncertainty

Parameter	Uncertainty
Radiated Emissions, 30MHz-1GHz	± 2.40 dB
Radiated Emissions, 1GHz-40GHz	± 2.48 dB
Radio Frequency	±1.5 x 10-5 MHz
Total RF Power Conducted	±1.36 dB
Spurious Emissions, Conducted	±1.36 dB
RF Power Density, Conducted	±1.36 dB
Temperature	±1ºC
Humidity	±5 %
DC and low frequency voltages	±3 %

2.4 Worst Test Case

Worst-case orientation was determined during the preliminary testing. The final radiated emissions were performed in the worst-case orientation.

2.5 Sample Calculations of Emissions Data

Radiated and conducted emissions were performed using EMC32 software developed by Rohde & Schwarz. Transducer factors such as antenna factors, cable losses and amplifier gains were stored in the test templates which are used to perform the emissions measurements. After the test is finished, data is generated from the EMC32 consisting of product details, emission plots and final data tables as shown below.

Frequency (MHz)	Q-Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Ant. Ht. (cm)	Pol	Turntable Position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
42.663900	33.0	1000.000	120.000	100.0	H	70.0	13.2	7.5	40.5

Table 2: Sample Quasi-Peak Correction Data – Radiated

Quasi-Peak reading shown in the table above is already corrected by the software using the correction factor shown in column "Corr." The correction factor listed under "Corr." table calculated as:

Corr.(dB) = Antenna factor + Cable loss

Or

Corr.(dB) = Antenna factor + Cable Loss - Amp gain (if pre-amplifier was used)

The final Quasi peak reading shown in the data is calculated by the software using following equation:

Corrected Quasi-Peak (dBµV/m) = Raw Quasi-Peak Reading + Antenna factor + Cable loss

To obtain the final Quasi-Peak or Average reading during power line conducted emissions, transducer factors are included in the final measurement as shown below.

Frequency (MHz)	Q-Peak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150	44.3	1000.000	9.000	GND	0.6	21.7	66.0

Table 3: Sample Quasi-Peak Correction Data - Conducted Emissions

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150	27.2	1000.000	9.000	GND	0.6	28.8	56.0

Table 4: Sample Average Correction Data- Conducted Emissions

Quasi Peak or Average reading shown in the preceding table is already corrected by the software using the correction factor shown in column “Corr.” The correction factor listed under “Corr.” table calculated as:

Corr.(dB) = Antenna factor + Cable loss

The final Quasi-peak or Average reading shown in the data is calculated by the software using following equation:

Corr. Quasi-Peak/Average Reading (dBµV) = Raw Quasi-Peak/Average Reading + Antenna factor + Cable loss

The allowable margin from the limits, as per the standards, were calculated for both radiated and conducted emissions:

Margin(dB) = Limit – Quasi-Peak or Average reading

DATA & TEST RESULTS

3.1 6 dB Bandwidth

Date Performed: July 21, 2026

Test Standard: FCC 47 CFR Part 15.247 (a)(2)
RSS-247 Issue 4 (6.3.1)(a)

Test Method: FCC KDB 558074 D01
ANSI C63.10
Relative Measurement Procedure

Modifications: None

Final Result: Complies

Applicable Regulations:

FCC 47 CFR Part 15.247 (a)(2)
Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

RSS-247 Issue 4 (6.3.1)(a)
The minimum 6 dB bandwidth shall be 500 kHz.

Test Setup:

The EUT was tested inside the SAC via output radiated measurements per ANSI C63.10: 2013, 7.4.

A spectrum analyzer or other instrument providing a spectral display is recommended for these measurements. When using a spectrum analyzer or other instrument providing a spectral display, the video bandwidth shall be set to a value at least three times greater than the IF bandwidth of the measuring instrument to avoid the introduction of unwanted amplitude smoothing. Video filtering is not used during occupied bandwidth tests.

Spectrum Analyzer method performing OBW measurements per ANSI C63.10 11.8 and FCC KDB 558074 D01
Spectrum Analyzer settings: Span = 3MHz, RBW = 100kHz, VBW = 300 kHz Trace stabilization time: 10 minutes.

Measurement Data and Plots:

Channels	Carrier Frequency (MHz)	6dB Bandwidth (kHz)	Limit minimum (kHz)	Result
Low	2405	1235	500	Complies
Middle	2440	1237	500	Complies
High	2480	1237	500	Complies

Table 5: 6 dB Bandwidth Results

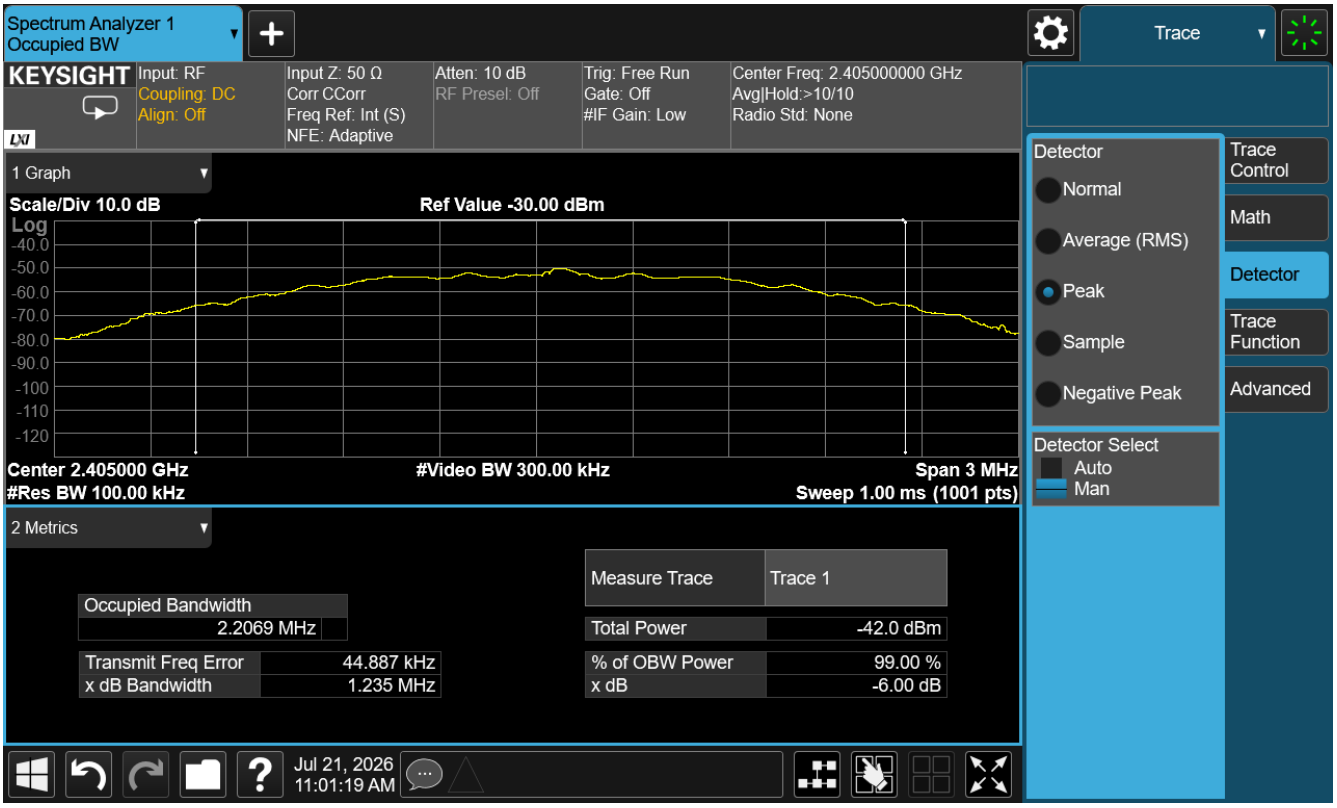


Figure 3: 6 dB Bandwidth – Low Channel

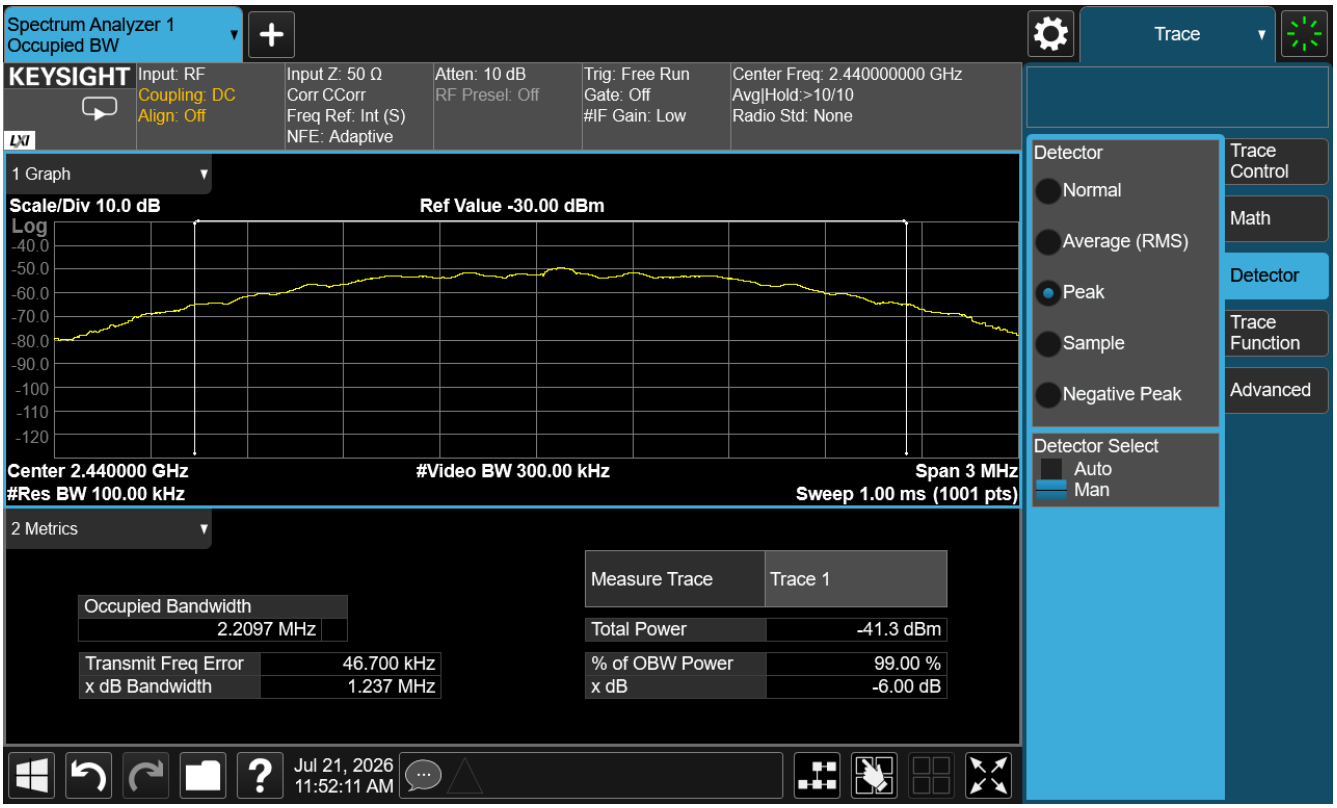


Figure 4: 6 dB Bandwidth - Middle Channel

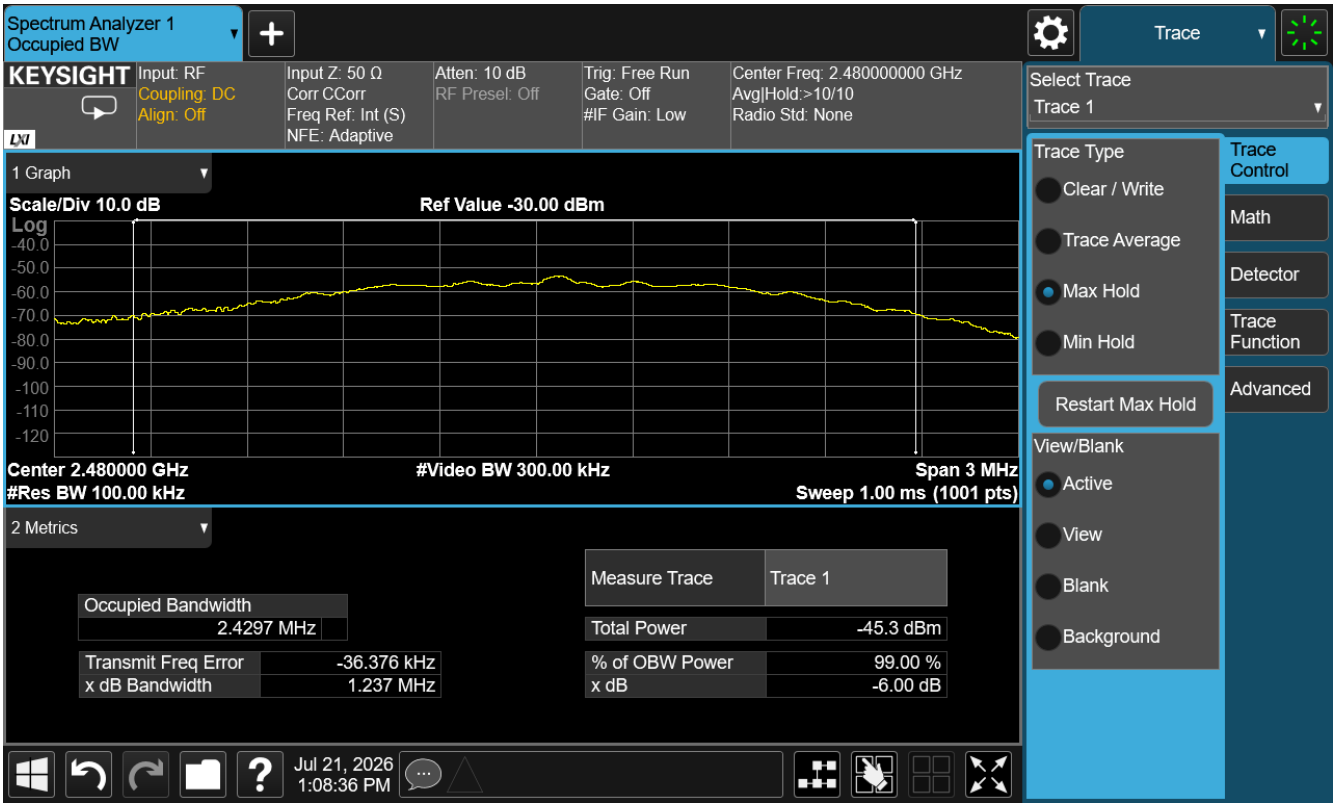


Figure 5: 6 dB Bandwidth - High Channel

3.2 99% dB Bandwidth

Date Performed: July 21, 2026

Test Standard: FCC 47 CFR Part 15.247 (a)(2)
RSS-247 (6.3.1)(a)
RSS-Gen (6.7)

Test Method: FCC KDB 558074 D01
ANSI C63.10
Relative Measurement Procedure

Modifications: None

Final Result: Complies

Applicable Regulations:

The "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

Test Setup:

The EUT was tested outside the SAC via output conducted measurements per ANSI C63.10

A spectrum analyzer or other instrument providing a spectral display is recommended for these measurements. When using a spectrum analyzer or other instrument providing a spectral display, the video bandwidth shall be set to a value at least three times greater than the IF bandwidth of the measuring instrument to avoid the introduction of unwanted amplitude smoothing. Video filtering is not used during occupied bandwidth tests.

Spectrum Analyzer method performing OBW measurements per ANSI c63.10 and FCC KDB 558074 D01
Spectrum Analyzer settings: (Automatic Setting) Span = 3MHz, RBW = 100kHz, VBW = 300kHz Trace stabilization time: 10 minutes.

Measurement Data and Plots:

Channels	Carrier Frequency (MHz)	99% Bandwidth (kHz)	Limit minimum (kHz)	Result
Low	2405	2206	500	Complies
Middle	2440	2209	500	Complies
High	2480	2429	500	Complies

Table 6: 99% Bandwidth Results

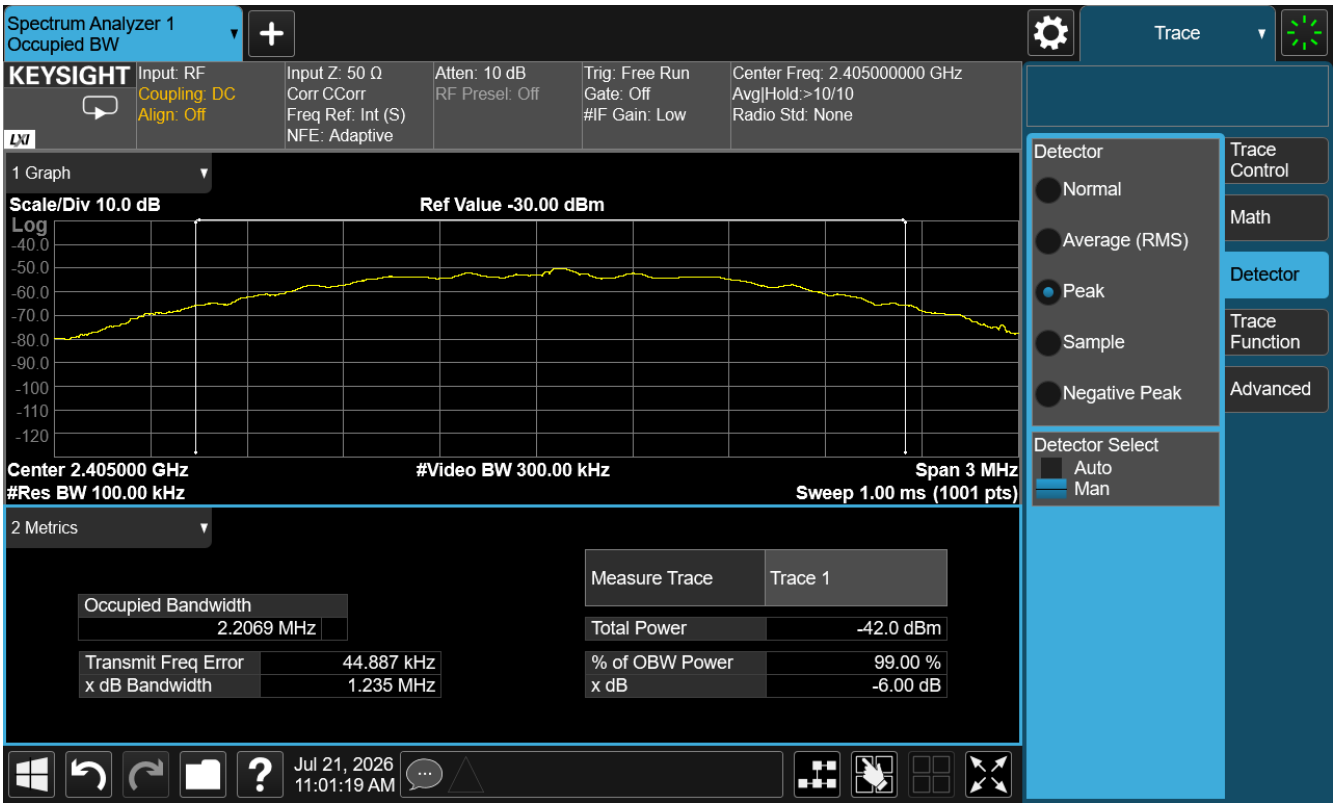


Figure 6: 99% Bandwidth – Low Channel

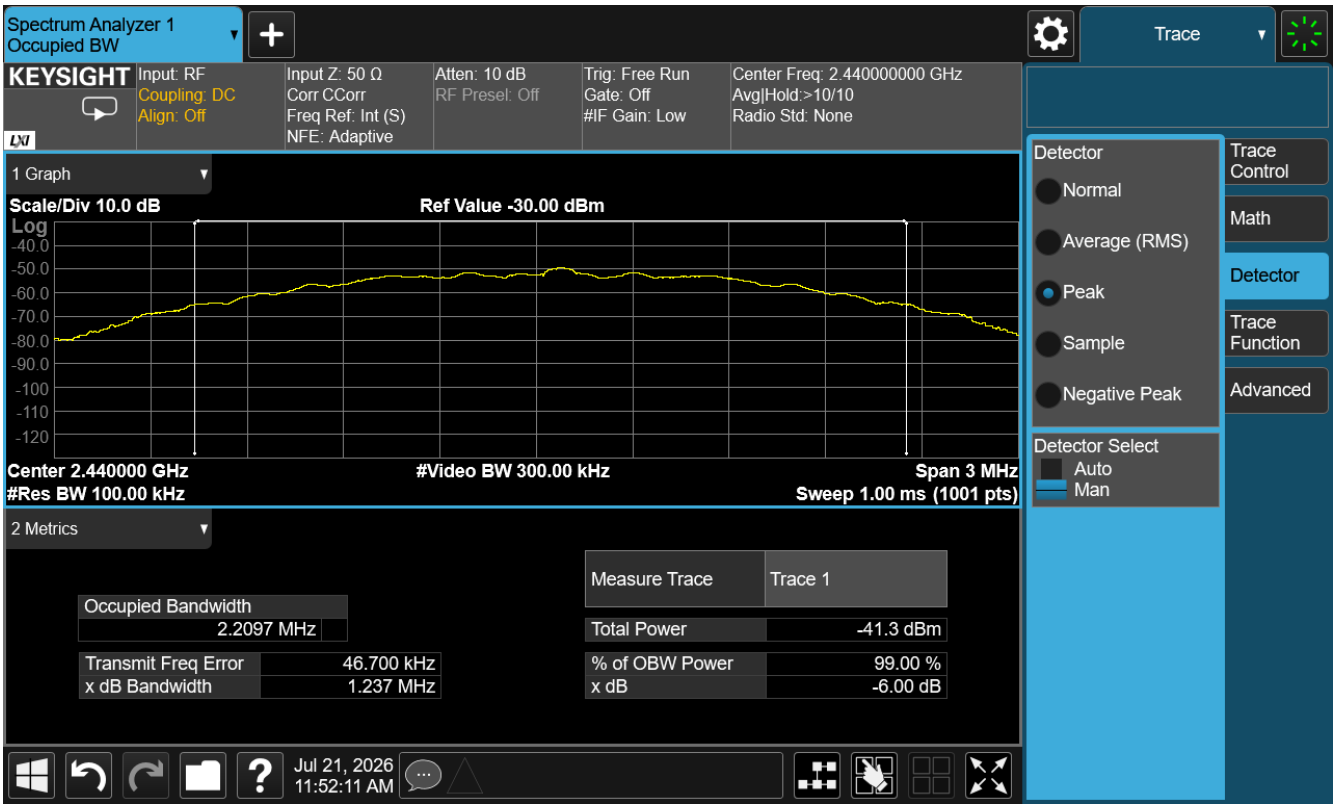


Figure 7: 99% Bandwidth - Middle Channel

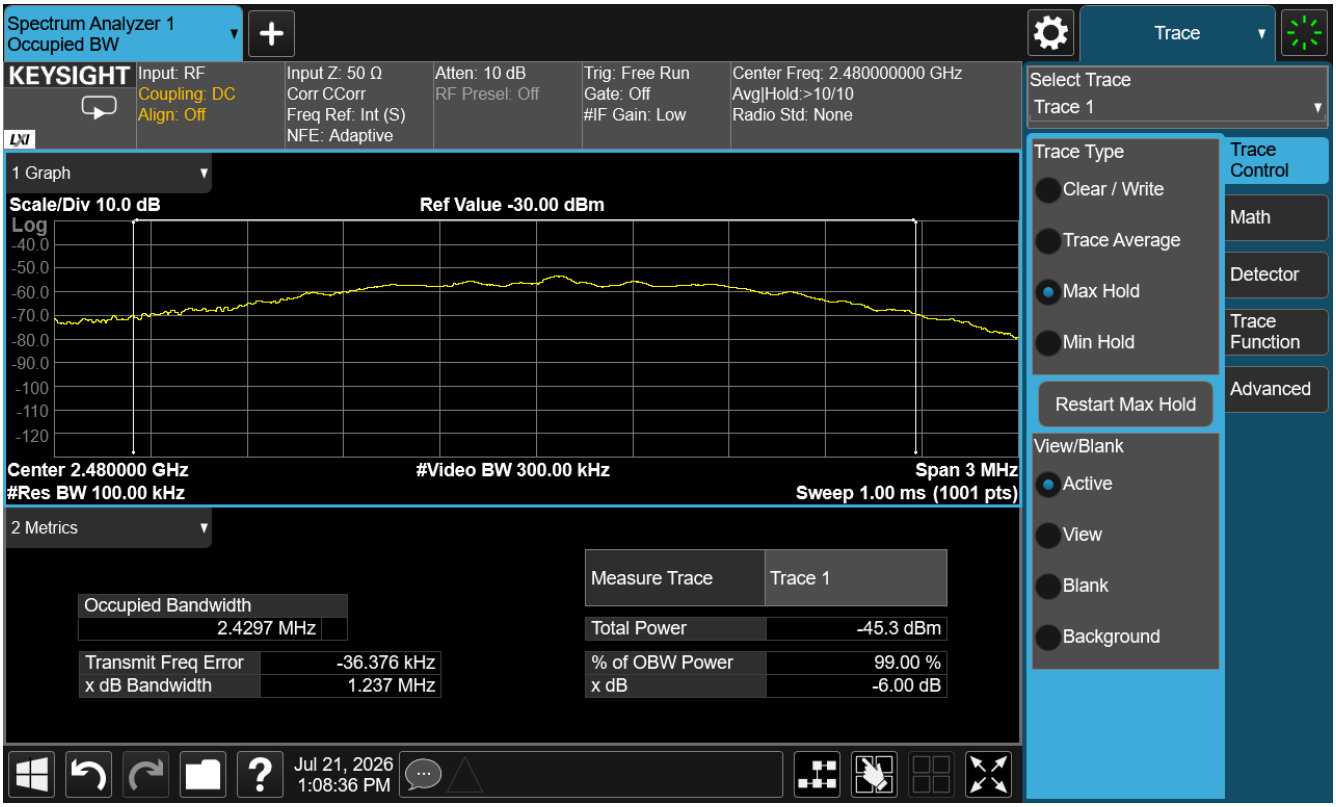


Figure 8: 99% Bandwidth - High Channel

3.3 RF Maximum Peak Output Power

Date Performed: July 21, 2026

Test Standard: FCC CFR 47 Part 15.247 (b)(3)
IC RSS-247 Issue 2 (6.3.2)

Test Method: FCC KDB 558074 D01
ANSI C63.10

Modifications: None.

Final Result: Complies

Applicable Regulation:

FCC CFR 47 Part 15.247 (b)(3)
For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

IC RSS-247 Issue 2 (6.3.2)
For DTS operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W, and the e.i.r.p. shall not exceed 4 W, except as provided in section 6.5 a) and b).

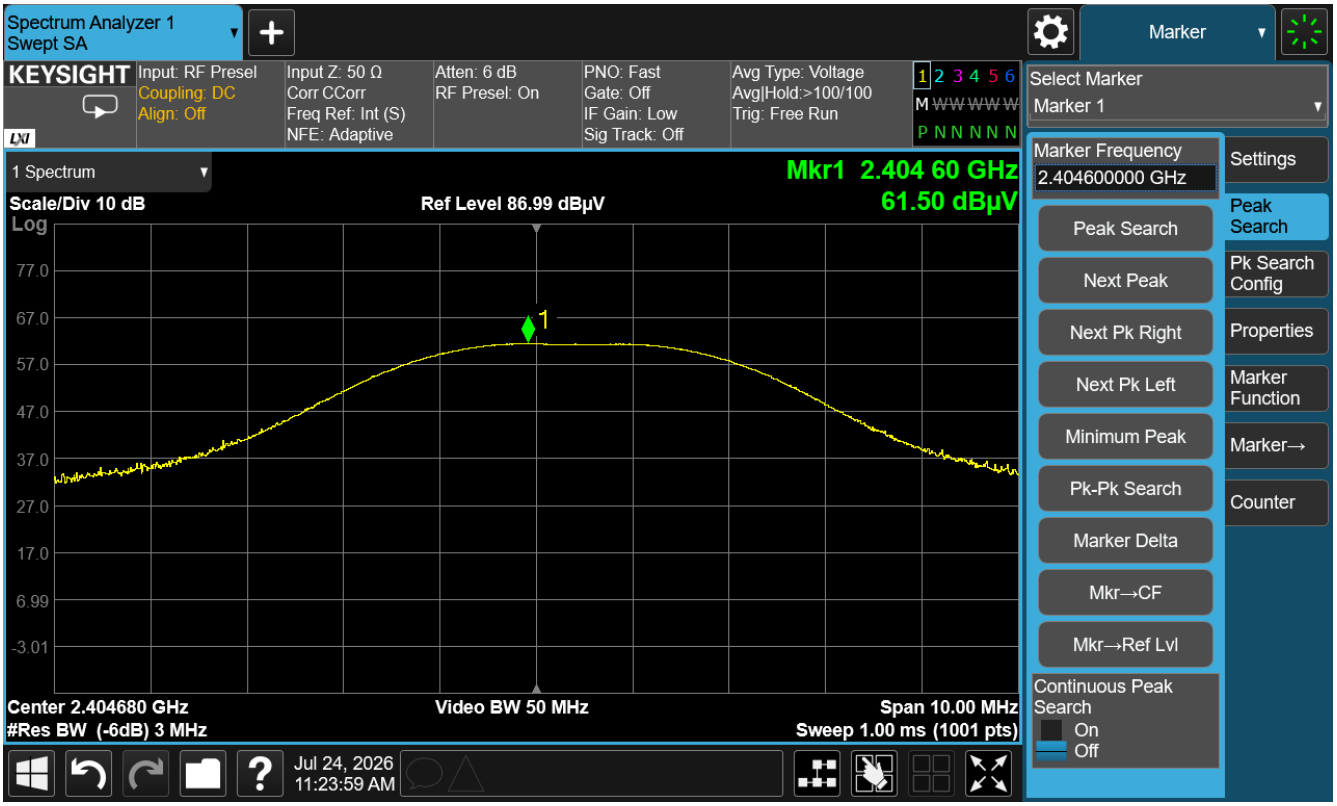
Test Setup:
The EUT was tested on a test bench with fundamental Modulated and continuous transmission
Spectrum Analyzer method performing conducted measurements per ANSI C63.10 11.9.1.1 and FCC KDB 558074 D01
Spectrum Analyzer settings: Span = 100 MHz, RBW = 1MHz, VBW = 3MHz Trace stabilization time: 10 minutes.
Receiver RBW, VBW & Span adjusted to obtain worst case radiated power. Used the following equation to calculate conducted output power, EIRP (dBm) = -104.8 + E_0 (dBmV/m) + 20 log D_0 (m),

Measurement Data:

Carrier Frequency (MHz)	Raw Peak @ 3m (dBuV)	Correction Factor[1] (dBuV)	Corrected Radiated Peak Output Power (dBuV)	Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)	Results
2405	61.50	38.2	99.7	4.44	30.0	25.56	Complies
2440	61.02	38.2	99.2	3.96	30.0	26.04	Complies
2480	59.95	38.3	98.2	2.99	30.0	27.01	Complies

[1] Correction factor consists of cable loss, external attenuator, and adapter(s)

Table 7: RF Peak Output Power



Note: Radiated Peak output power measured is -44.76 dBm, upon converting it is 62.28 dBuV

Figure 9: Peak Output Power – Low Channel

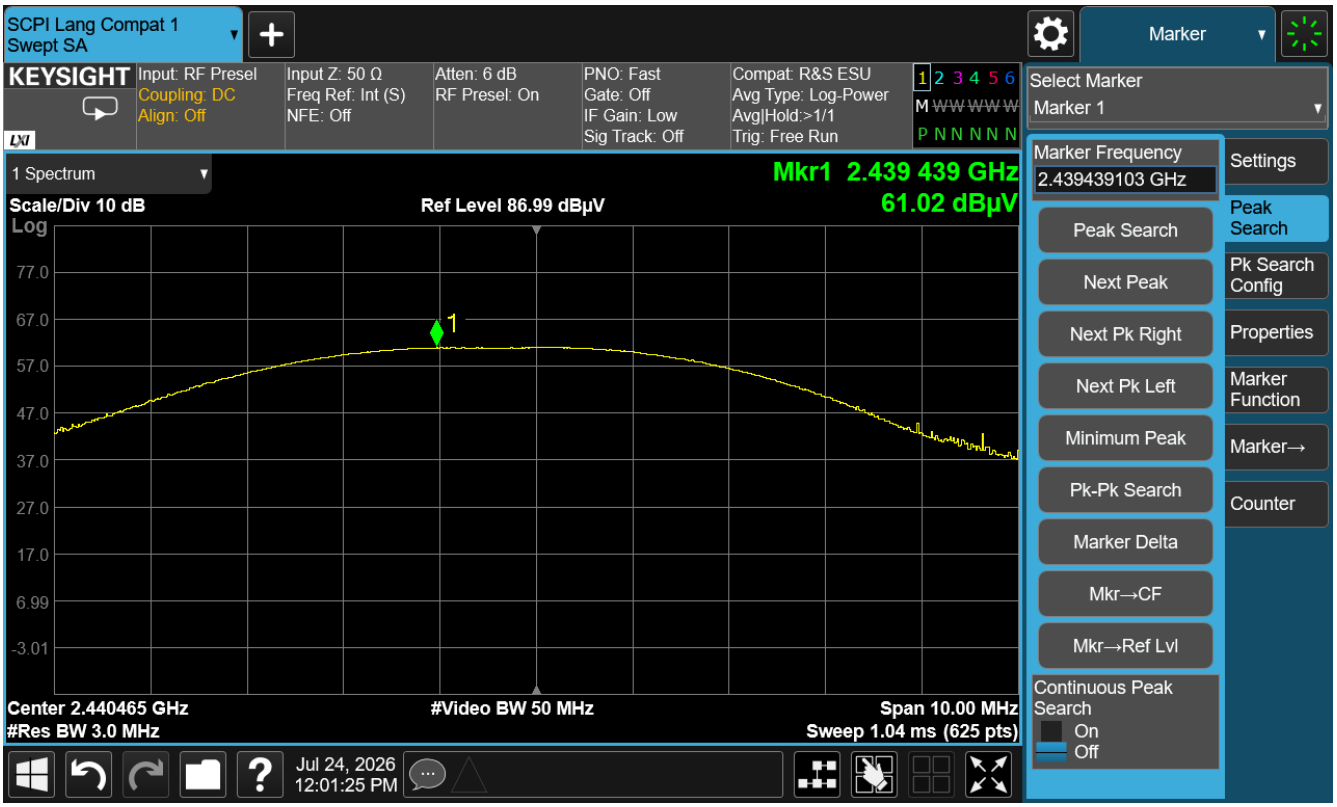


Figure 10: Peak Output Power - Middle Channel

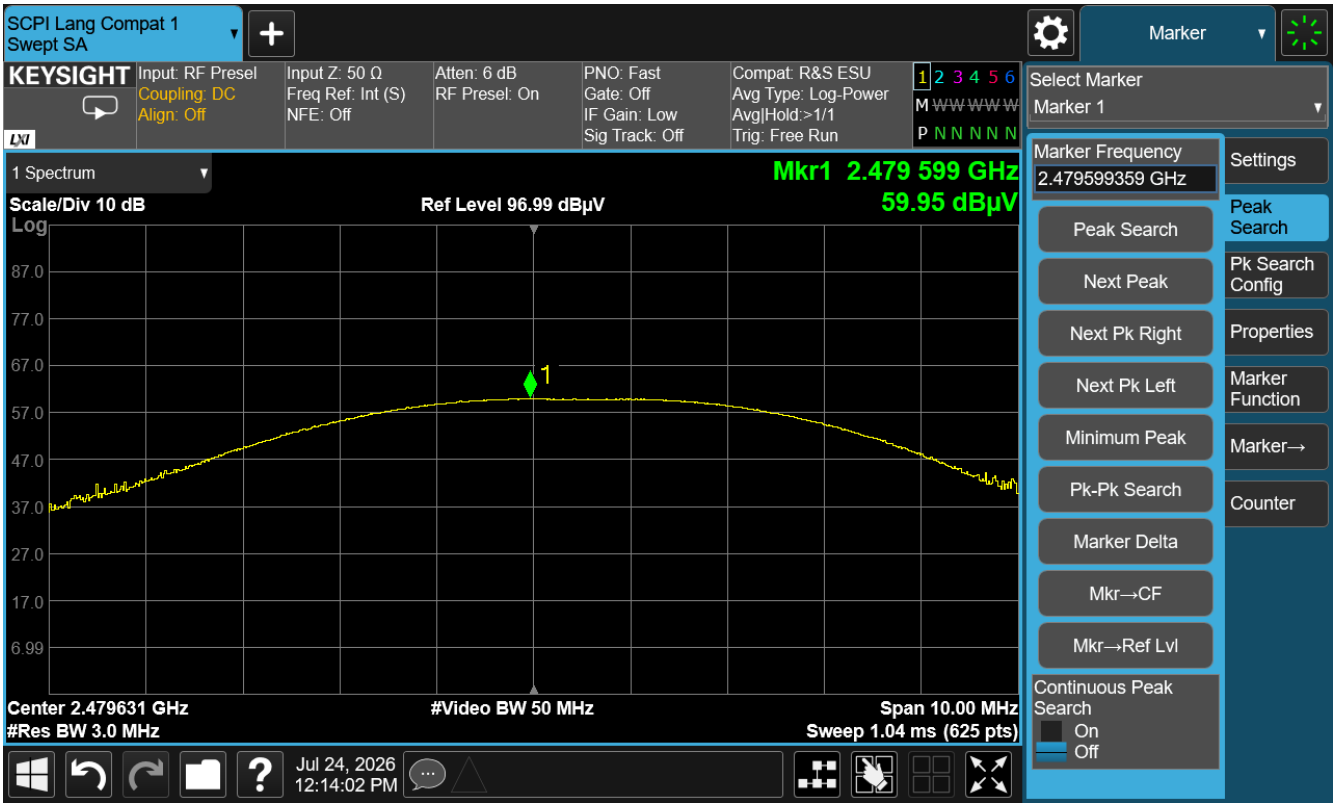


Figure 11: Peak Output Power - High Channel

3.4 Peak Power Spectral Density

Date Performed: July 21, 2026

Test Standard: FCC 47 CFR Part 15.247 (e)
RSS-247 (6.3.1)(b)
RSS-Gen (6.7)

Test Method: FCC KDB 558074 D01
ANSI C63.10 (11.10.2)

Modifications: None

Final Result: Complies

Applicable Regulations:

FCC 47 CFR Part 15.247 (e)
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

RSS-247 (6.3.1)(b)
The transmitter power spectral density conducted from the transmitter to the antenna(s) shall not be greater than 8 dBm/3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of section 6.3.2 The power spectral density shall be determined using the same method as is used to determine the maximum conducted output power.

Test Setup:

The EUT was tested inside the SAC via Radiated peak output measurements per ANSI C63.10

A spectrum analyzer or other instrument providing a spectral display is recommended for these measurements. When using a spectrum analyzer or other instrument providing a spectral display, the video bandwidth shall be set to a value at least three times greater than the IF bandwidth of the measuring instrument to avoid the introduction of unwanted amplitude smoothing. Video filtering is not used during occupied bandwidth tests.

Spectrum Analyzer method performing OBW measurements per ANSI C63.10 and FCC KDB 558074 D01
Spectrum Analyzer settings: Automatic Setting Span = 3MHz, RBW = 3kHz, VBW = 10kHz Trace stabilization time: 10 minutes. Equation used are EIRP (dBm/3kHz)=E(dBµV/m)+20log10(R)−104.77
Measurement Data and Plots:

Channels	Carrier Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit Maximum (dBm/3kHz)	Result
Low	2405	-7.55	8	Complies
Middle	2440	-8.15	8	Complies
High	2480	-10.64	8	Complies

Table 8: 99% Bandwidth Results

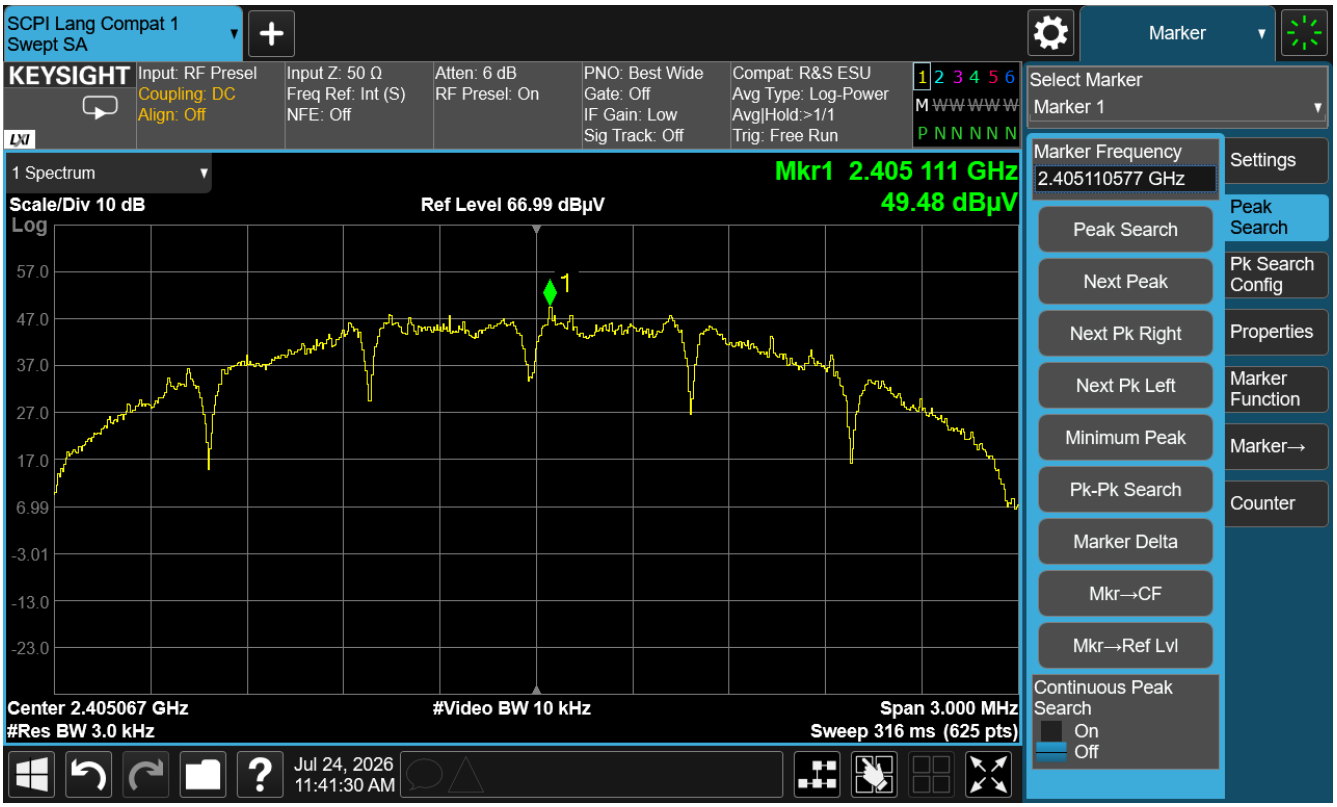


Figure 12: Power spectral Density – Low Channel

Figure 13: Power spectral Density - Middle Channel

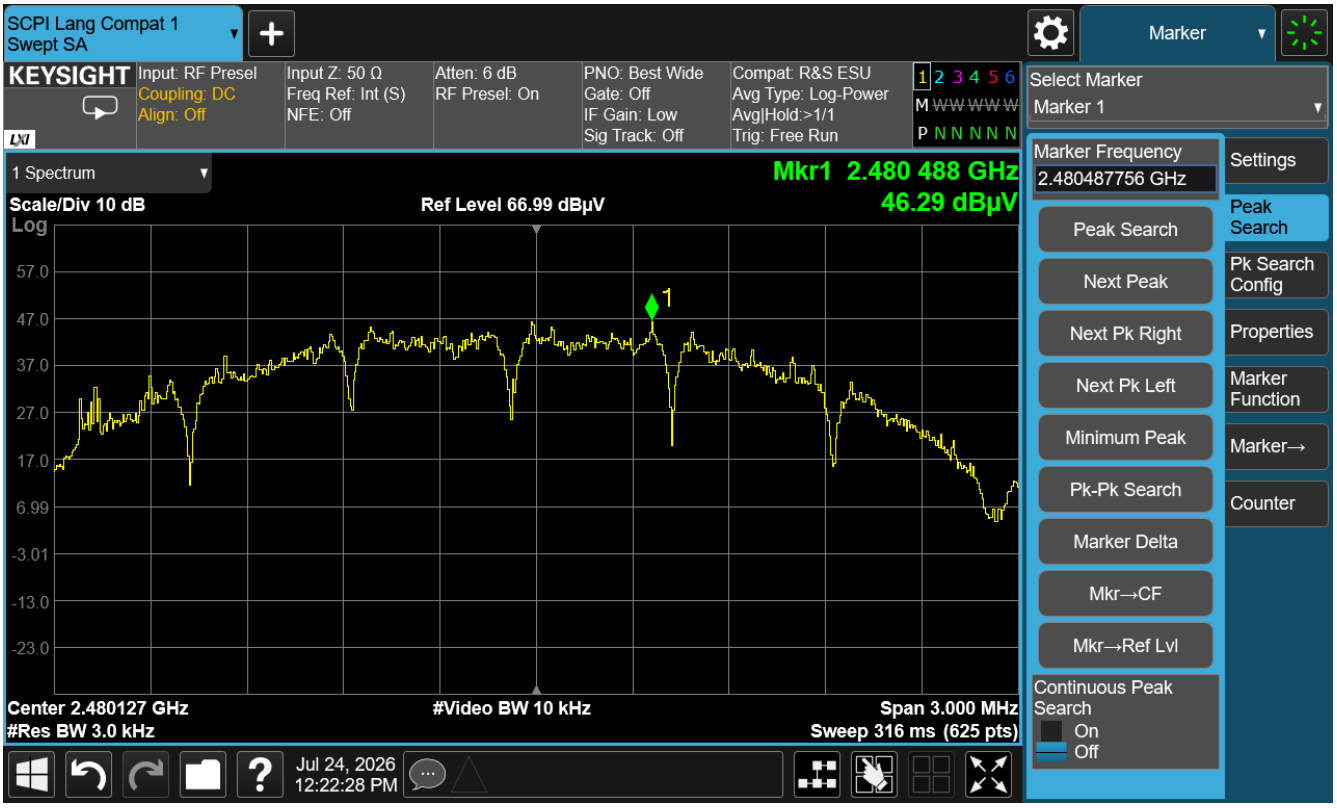


Figure 14: 99% Bandwidth - High Channel

3.5 Out-Of-Band Emissions (Band Edge)

Date Performed: July 21, 2026

Test Standard: FCC 47 CFR Part 15.247 (d)
RSS-247 (6.6)

Test Method: FCC KDB 558074 D01
ANSI C63.10:2013 Relative Method
Span = Wide enough to capture the peak level of the emission closest to the band edge, as well as any modulation products that fall outside of the band.
Ref Level = High enough to keep the signal from overdriving the input mixer
RBW = 100 kHz, VBW = 300 kHz
Trace Detector: Peak, Trace: Max Hold

Modifications: None

Final Result: Complies

Applicable Regulation:

FCC 47 CFR Part 15.247 (d)
In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, shall be at least 20 dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, the attenuation required shall be 30 dB instead of 20dB.

RSS-247 (6.6)
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum device, digitally modulated device, or hybrid system is operating, the RF power that is produced 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 – based on either an RF conducted or a radiated measurement – provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 6.3.2, the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Equation used here is as follows, EIRP (dBm) = -104.8 + E_0 (dBmV/m) + 20 log D_0 (m),

Test Setup:
The EUT was tested inside the SAC via Radiated Emissions measurements per ANSI C63.10:2013.

Measurement Data and Plots:

Band Edge	Highest Out of Band Emission	Limit	Result
Low	-45.25	-15.56dB	Complies
High	-44.13	-15.56dB	Complies

Note: Highest conducted output power is 4.44, 20 dB lower will result in -15.56dB

Table 9: Band Edge Results

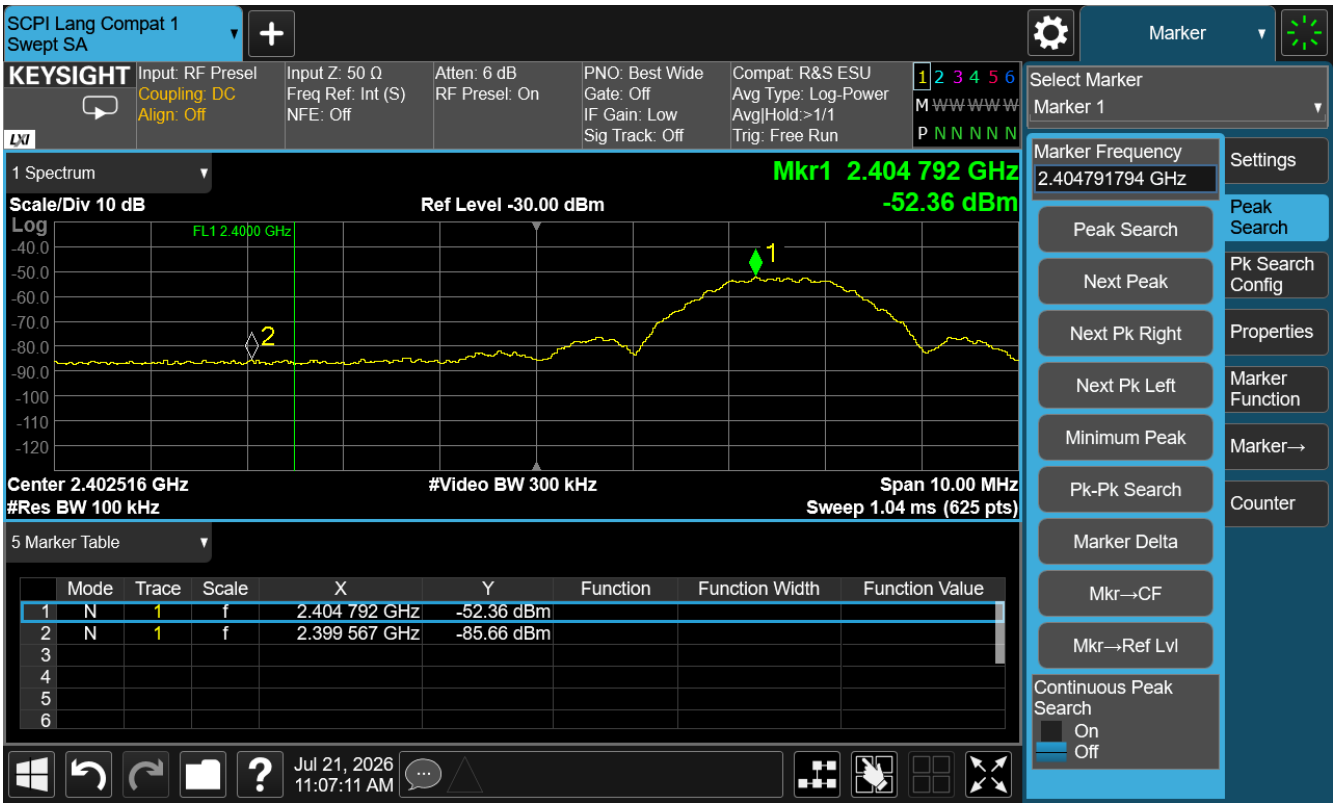


Figure 15: Band Edge - Low Channel

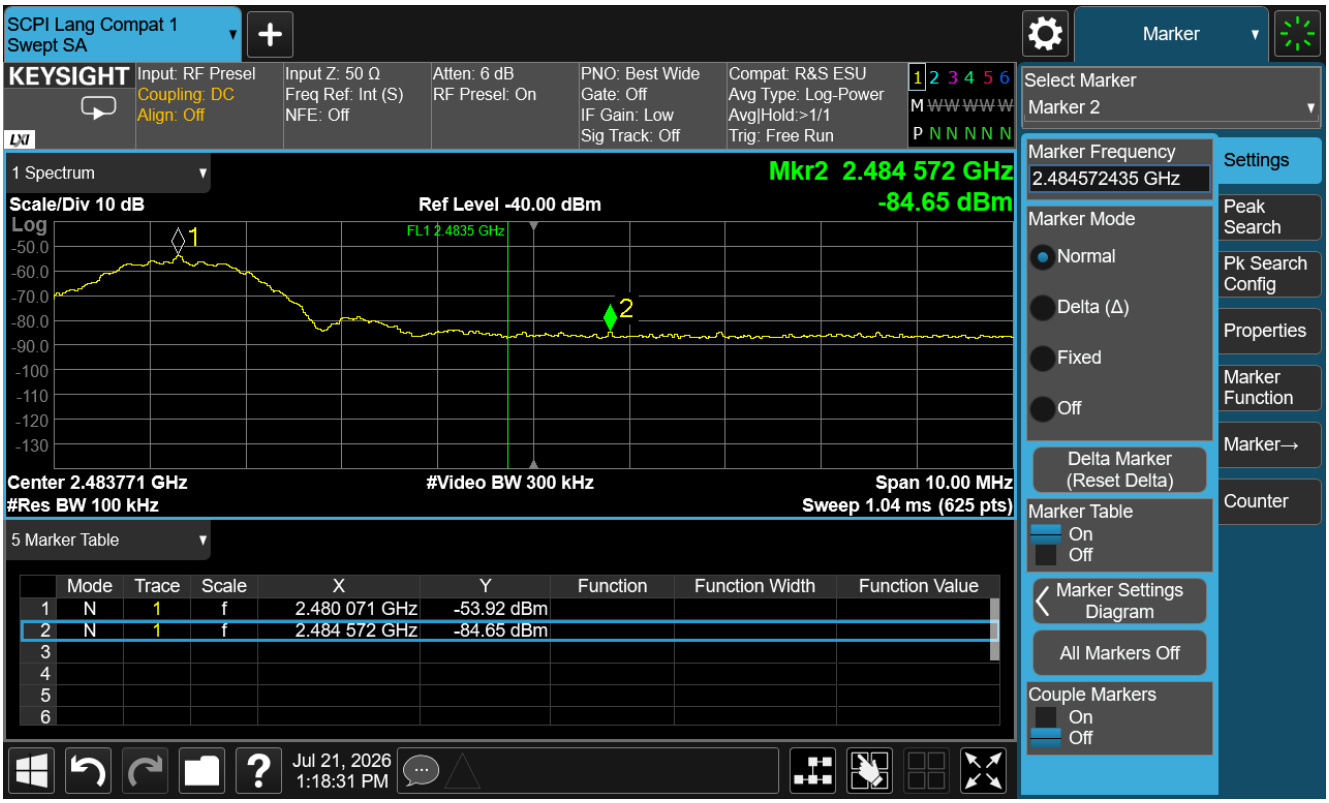


Figure 16: Band Edge - High Channel

3.6 Frequency Stability

Date Performed: July 28, 2026

Test Standard: FCC CFR 47 Part 15.215 (C):
RSS-Gen Issue 5 (8.11)

Test Method: ANSI C63.10:2013
RSS-Gen Issue 5

Modifications: The EUT was unable to produce an unmodulated CW signal, therefor the LO bleed through was used to monitor the EUT frequency.

Final Result: Complies

Applicable Regulation:

FCC CFR 47 Part 15.215 (C):

The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

RSS-Gen Issue 05 (8.11):

If the frequency stability of the licence-exempt radio apparatus is not specified in the applicable RSS, the fundamental emissions of the radio apparatus should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation.

Test Setup:

The EUT was tested in an environmental chamber per RSS-Gen and ANSI C63.26:2015.

Measurement Data and Plots:

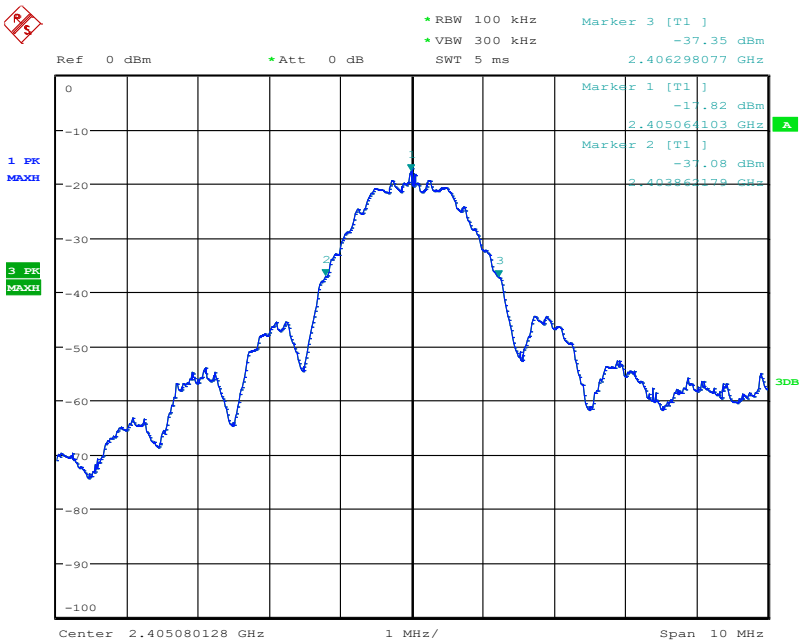


Figure 17: Frequency stability - Low Channel at 0°C

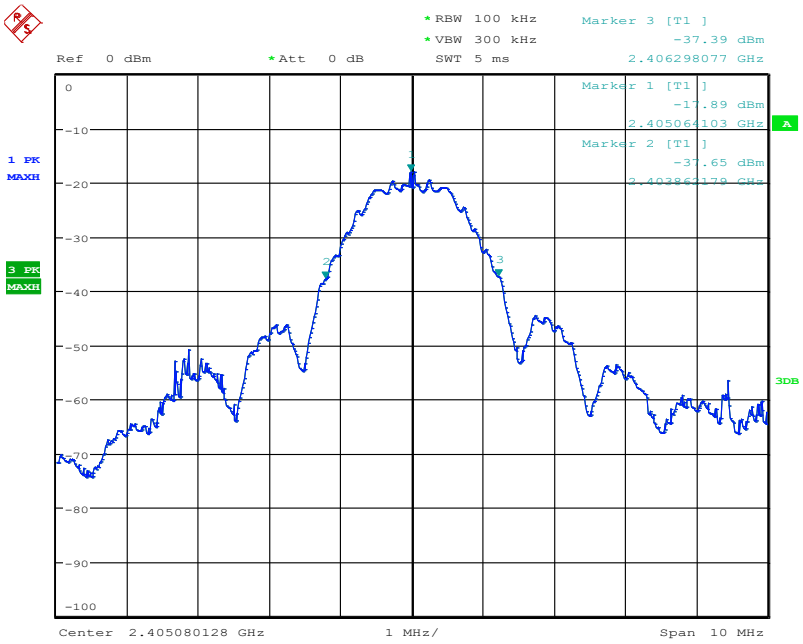


Figure 18: Frequency stability - Low Channel at 10°C

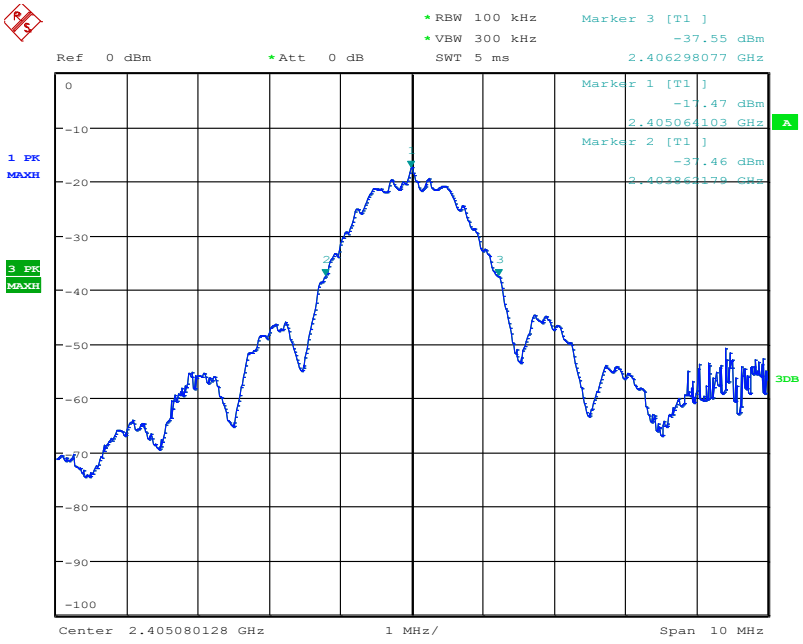


Figure 19: Frequency stability - Low Channel at 20°C

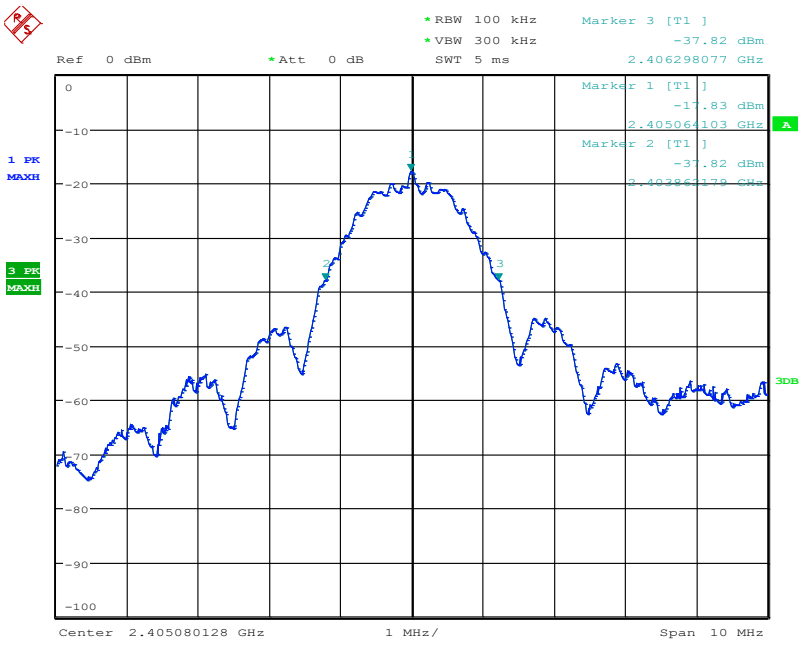


Figure 20: Frequency stability - Low Channel at 25°C

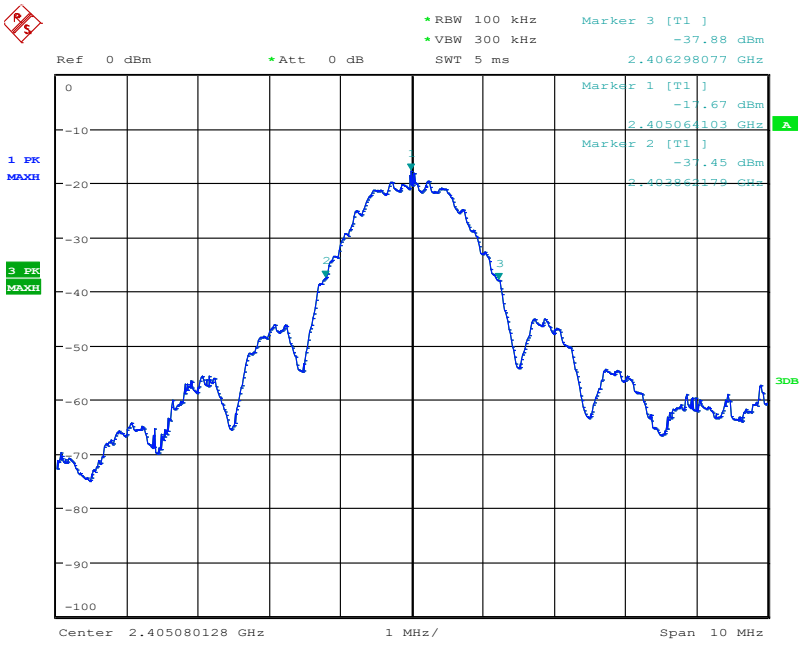


Figure 21: Frequency stability - Low Channel at 30°C

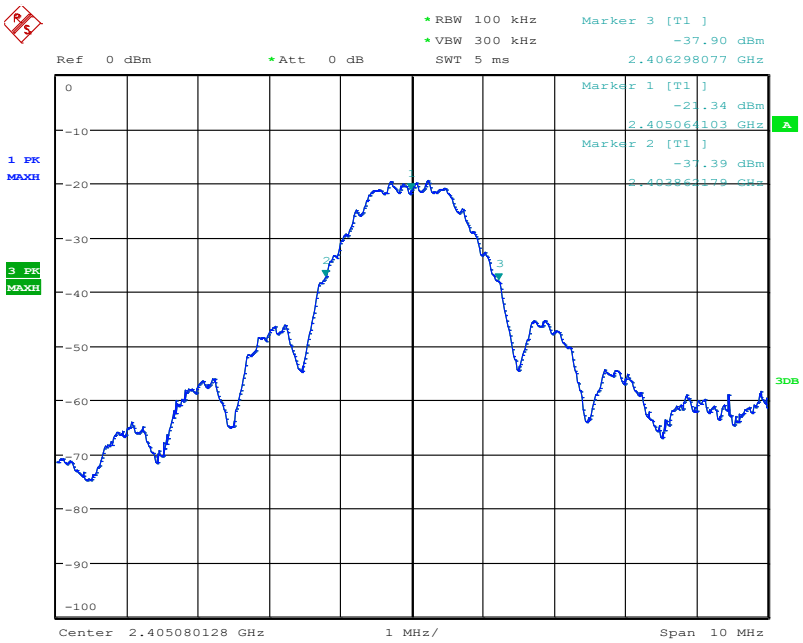


Figure 22: Frequency stability - Low Channel at 40°C

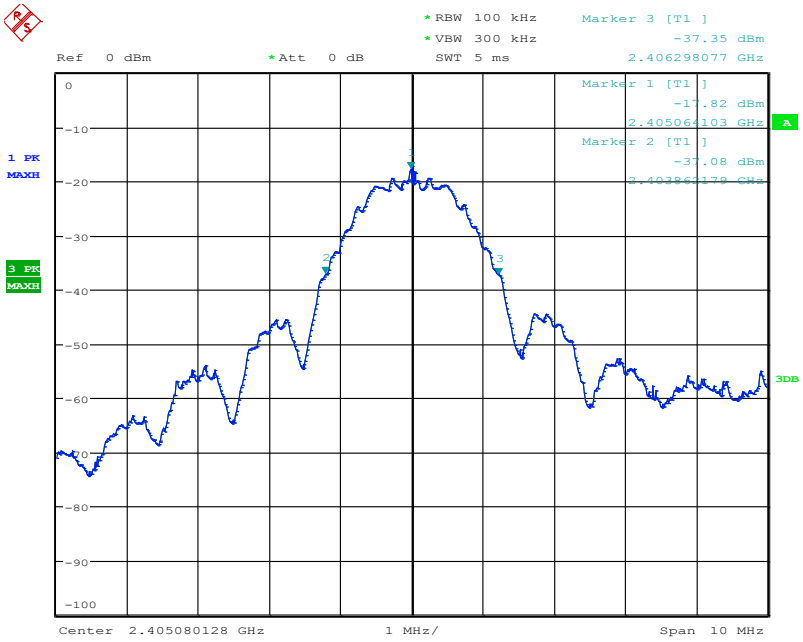


Figure 23: Frequency stability - Low Channel at 102V

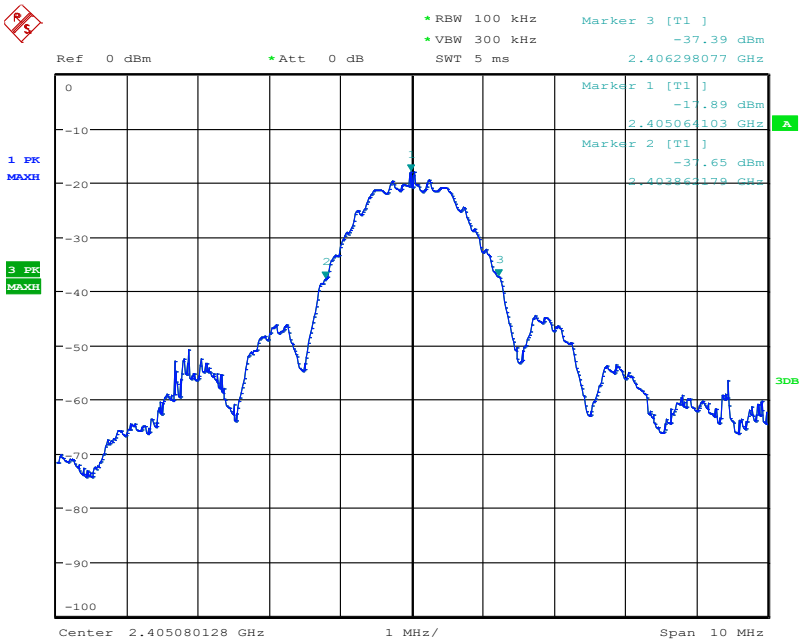


Figure 24: Frequency stability - Low Channel at 120V

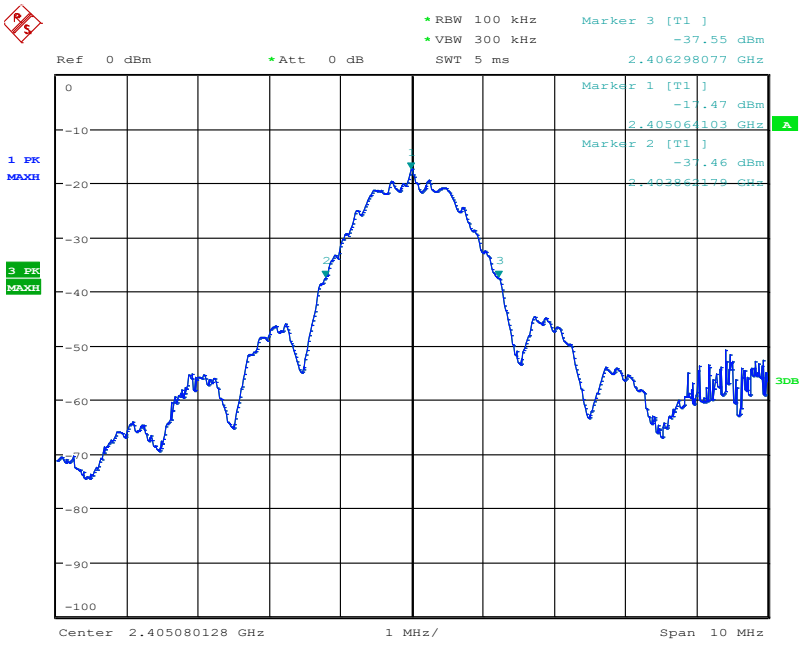


Figure 25: Frequency stability - Low Channel at 138V

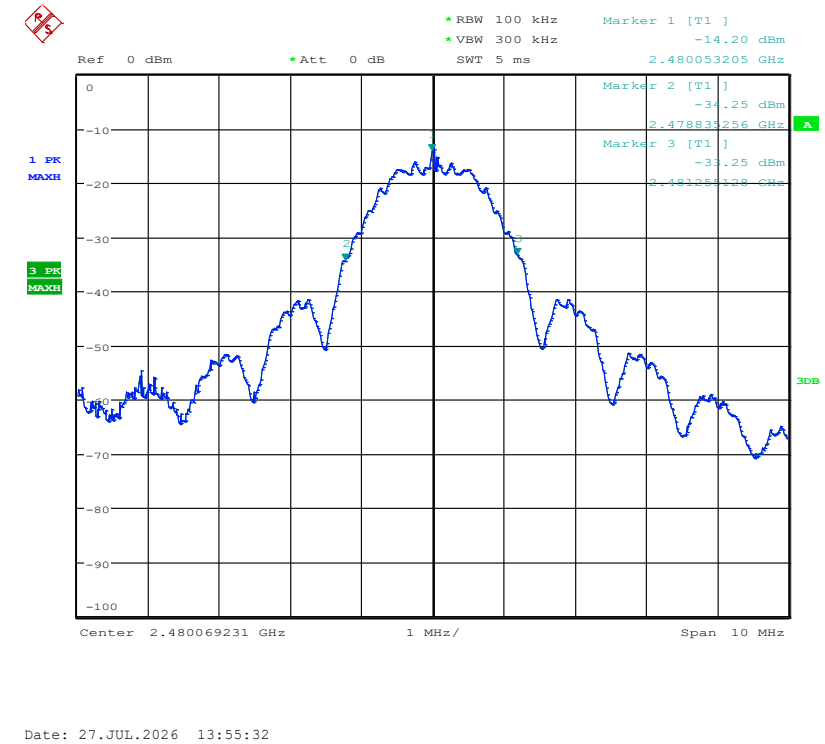


Figure 26: Frequency stability - High Channel at 0°C

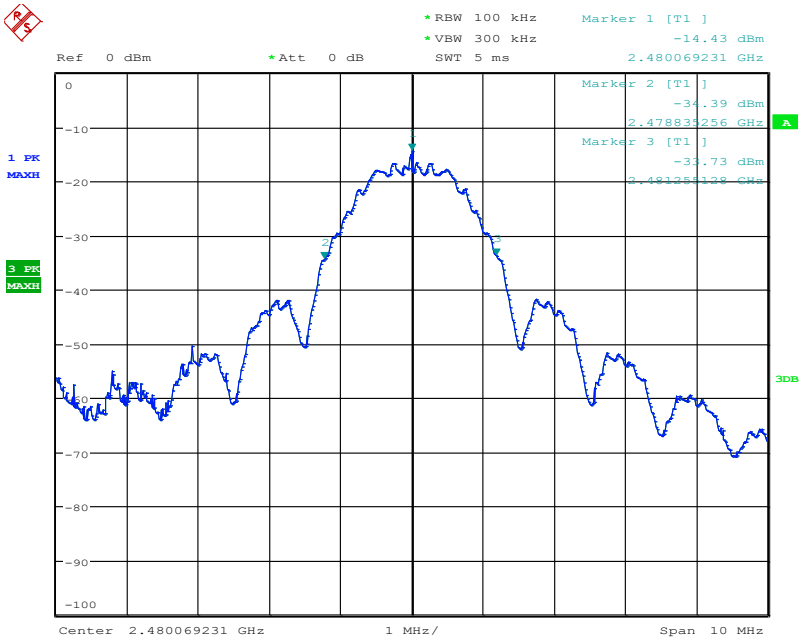


Figure 27: Frequency stability - High Channel at 10°C

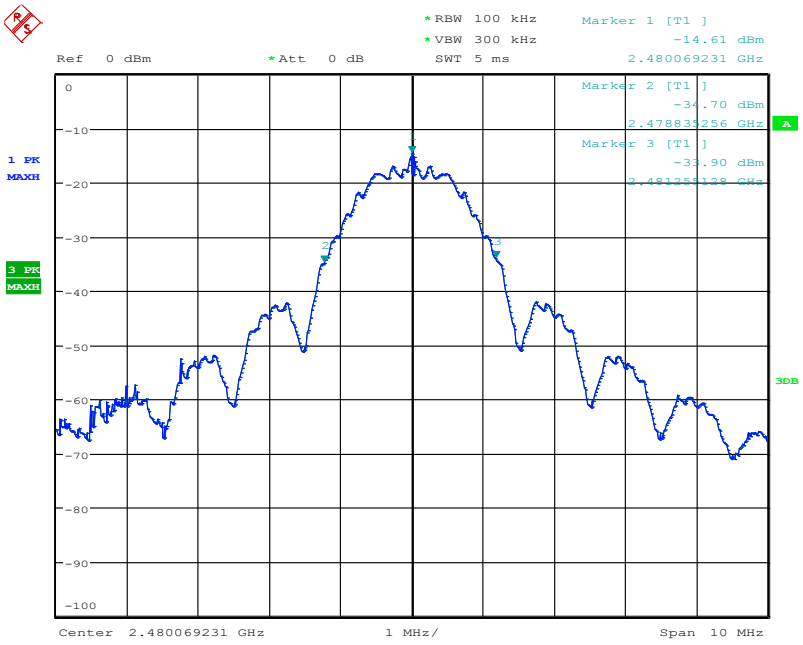


Figure 28: Frequency stability - High Channel at 20°C

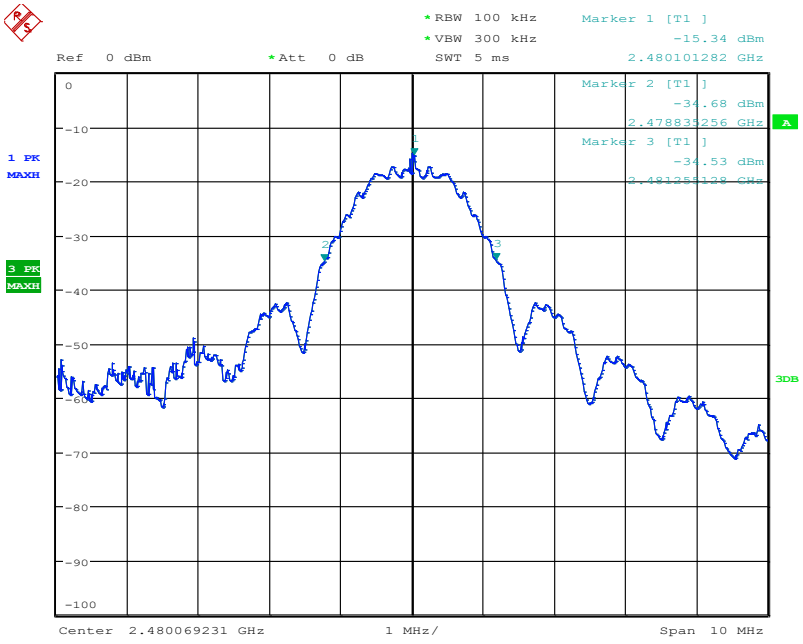


Figure 29: Frequency stability - High Channel at 25°C

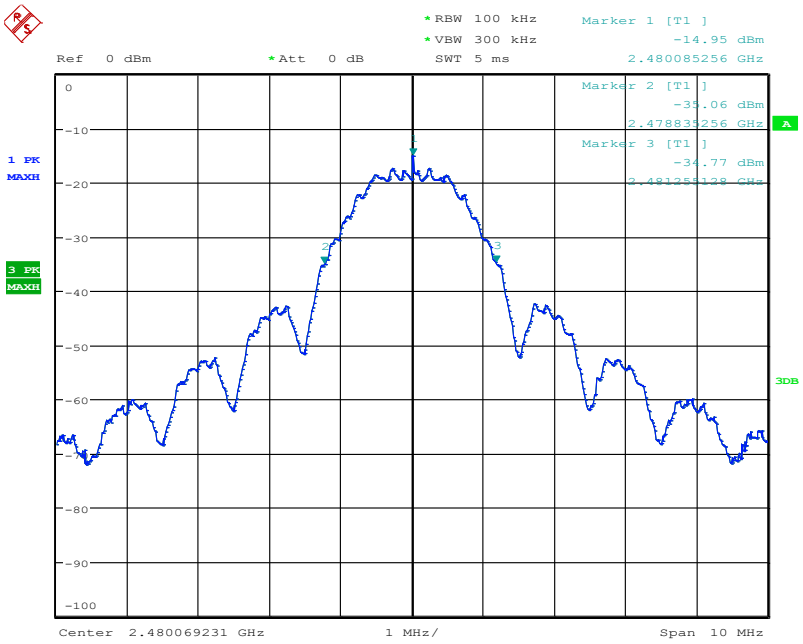


Figure 30: Frequency stability - High Channel at 30°C

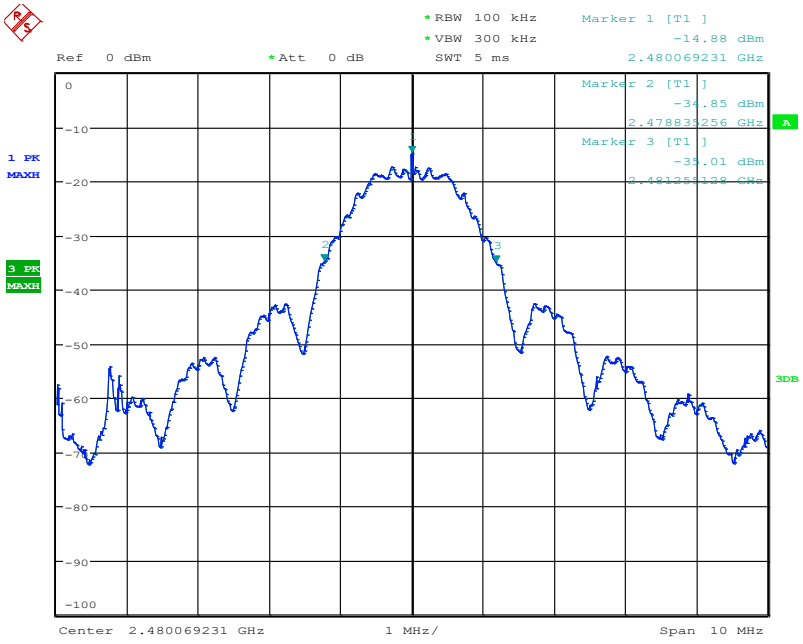


Figure 31: Frequency stability - High Channel at 40°C

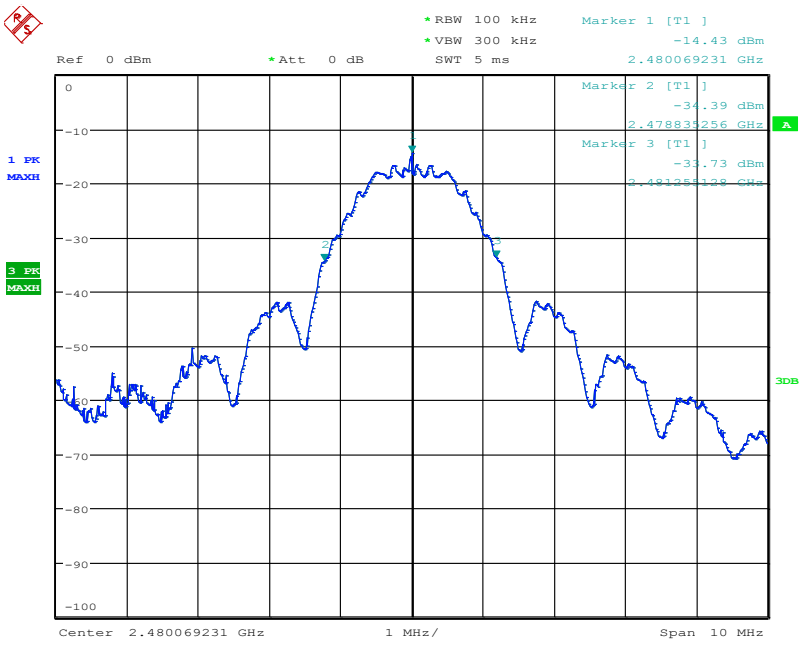


Figure 32: Frequency stability - High Channel at 102V

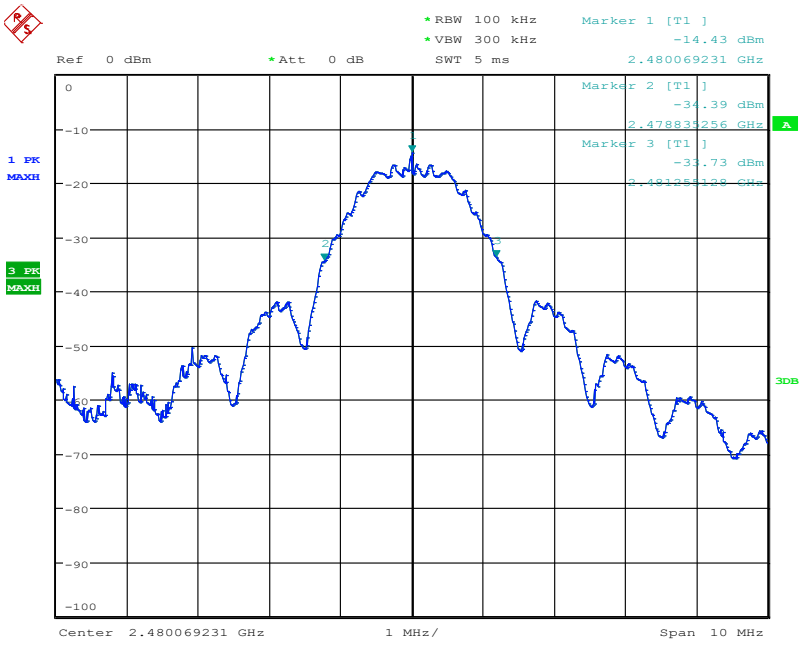


Figure 33: Frequency stability - High Channel at 120V

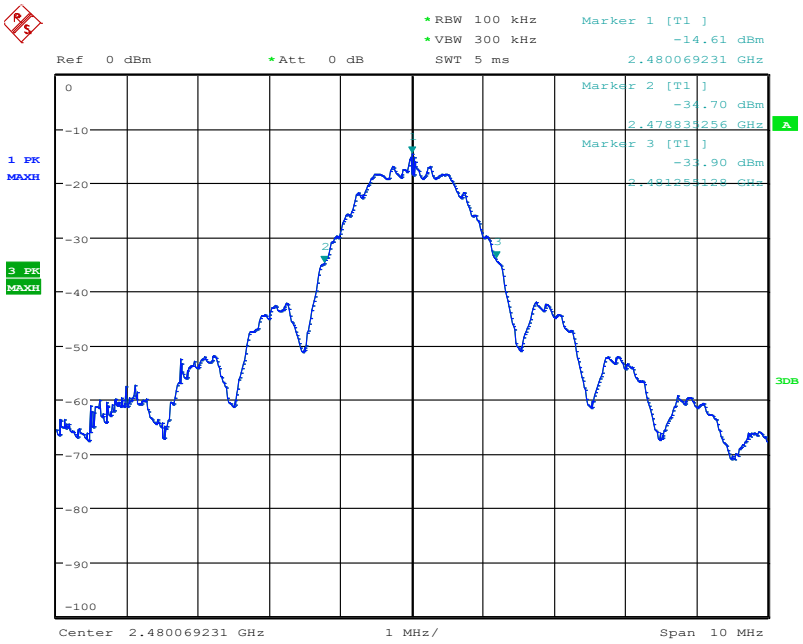


Figure 34: Frequency stability - High Channel at 138V

3.7 Radiated Emissions – Out of Band 30MHz to 18GHz

Date Performed: August 12 & 13, 2025

Test Standard: FCC 47 CFR Part 15.33 (a)(1), (5)
FCC 47 CFR Part 15.109
FCC 47 CFR Part 15.205 (a), (b)
FCC 47 CFR Part 15.209 (a)
FCC 47 CFR Part 15.247 (d)
ICES-003 Issue 7
RSS-247

Test Method: ANSI C63.4:2014

Modifications: None

Final Result: Complies

Applicable Standard:

FCC 47 CFR Part 15.33 (a)(1), (5): Frequency range of radiated measurements

For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.075	30
1.075 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

FCC 47 CFR Part 15.109: Radiated emission limits

a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength (microvolts/meter)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

e) Carrier current systems used as unintentional radiator or other unintentional radiators that are designed to conduct their radio frequency emissions via connecting wires or cables and that operate in the frequency range of 9 kHz to 30 MHz, including devices that deliver the radio frequency energy to transducers, such as ultrasonic devices not covered under

Part 18, shall comply with the radiated emission limits for intentional radiators provided in 15.209 for the frequency range of 9 kHz to 30 MHz.

FCC 47 CFR Part 15.205 (a), (b): Restricted bands of operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	
13.36-13.41			

The field strength of emissions appearing within these frequency bands shall not exceed the limits show in § 15.209

FCC 47 CFR Part 15.209 (a): Radiated emission limits; general requirements

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency, *f* (MHz)	Maximum Field strength Quasi-peak (dBµV/m at 3 m)
0.009 – 0.490	20*log(2400/F(kHz)) + 40 dB
0.490 – 1.705	20*log(24000/F(kHz)) + 20 dB
1.705 – 30.0	49.5
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
above 960	54.0

Note 1: The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

Note 2: The emissions limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz., 110-490 kHz. and above 1000 MHz.

Radiated emission limits in these three bands are based on measurements employing an average detector

FCC 47 CFR Part 15.247 (d): Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or 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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

ICES-003 3.2.2 Radiated emission limits
The quasi-peak limits for the electric component of the radiated field strength emitted from ITE or digital apparatus, within 30 MHz to 1 GHz, for a measurement distance of 3 m or 10 m, are:

Frequency Range (MHz)	Class A (3 m) Quasi-peak (dBµV/m)	Class A (10 m) Quasi-peak (dBµV/m)	Class B (3 m) Quasi-peak (dBµV/m)	Class B (10 m) Quasi-peak (dBµV/m)
30 – 88	50.0	40.0	40.0	30.0
88 – 216	54.0	43.5	43.5	33.1
216 – 230	56.9	46.4	46.0	35.6
230 – 960	57.0	47.0	47.0	37.0
960 - 1000	60.0	49.5	54.0	43.5

At and above 1 GHz, except for outdoor units of home satellite receiving systems, the ITE or digital apparatus shall comply with:

Frequency Range (MHz)	Class A Average (dBµV/m)	Class A Peak (dBµV/m)	Class B Average (dBµV/m)	Class B Peak (dBµV/m)
1 - F_M	60	80	54	74

F_M is determined by:

Highest internal frequency (F_X)	Highest measurement frequency (F_M)
$F_X \leq 108$ MHz	1 GHz
108 MHz $\leq F_X \leq$ 500 MHz	2 GHz
500 MHz $\leq F_X \leq$ 1 GHz	5 GHz
$F_X >$ 1 GHz	5 x F_X up to a maximum of 40 GHz

Test Setup:

The EUT was tested in a 3 m SAC and was positioned on the front of the turntable and the radiated output of the device was measured for all emissions up to 18 GHz.

Measurement Data and Plots:

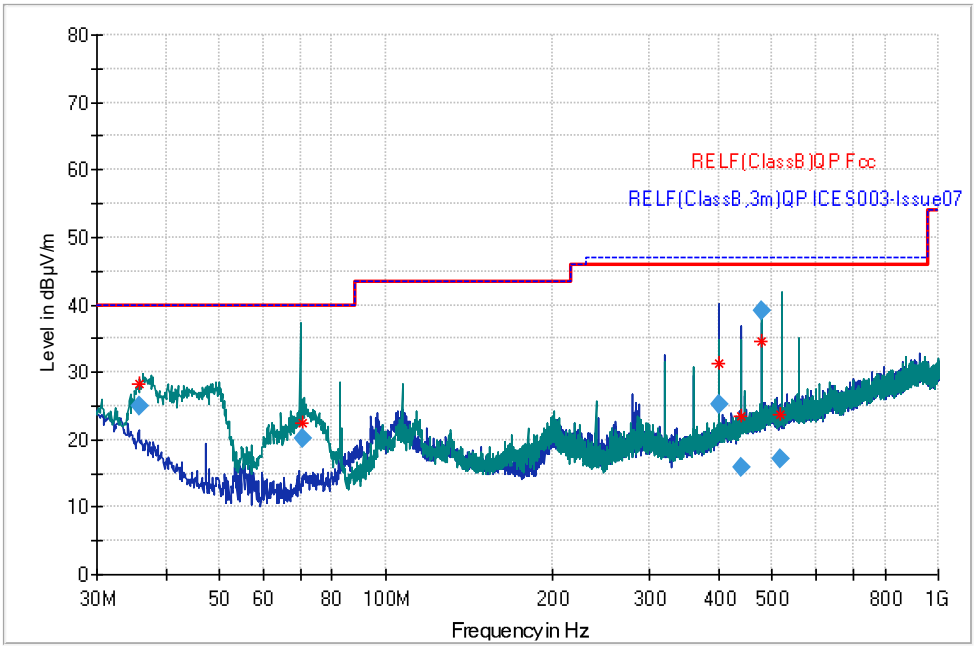


Figure 35: Radiated Emissions, Factory mode from 30MHz to 1GHz

Measurement Data and Plots:

Frequency MHz	QuasiPeak (dBuV/m)	Height (cm)	Pol	Azimuth (°)	Corr. (dB/m)	Limit (dBuV/m)	Margin (dB)	Result
35.8581	25.02	105.0	V	310	-13.4	40.00	14.98	Complies
70.5054	20.06	171.0	V	21	-21.8	40.00	19.94	Complies
399.8707	25.19	310.0	H	243	-12.5	46.00	20.81	Complies
439.0106	15.99	130.0	H	71	-11.0	46.00	30.01	Complies
479.9830	39.01	100.0	V	291	-10.2	46.00	6.99	Complies
518.2042	17.12	169.0	V	159	-9.8	46.00	28.88	Complies

Table 10: Radiated Emissions, Factory mode from 30MHz to 1GHz

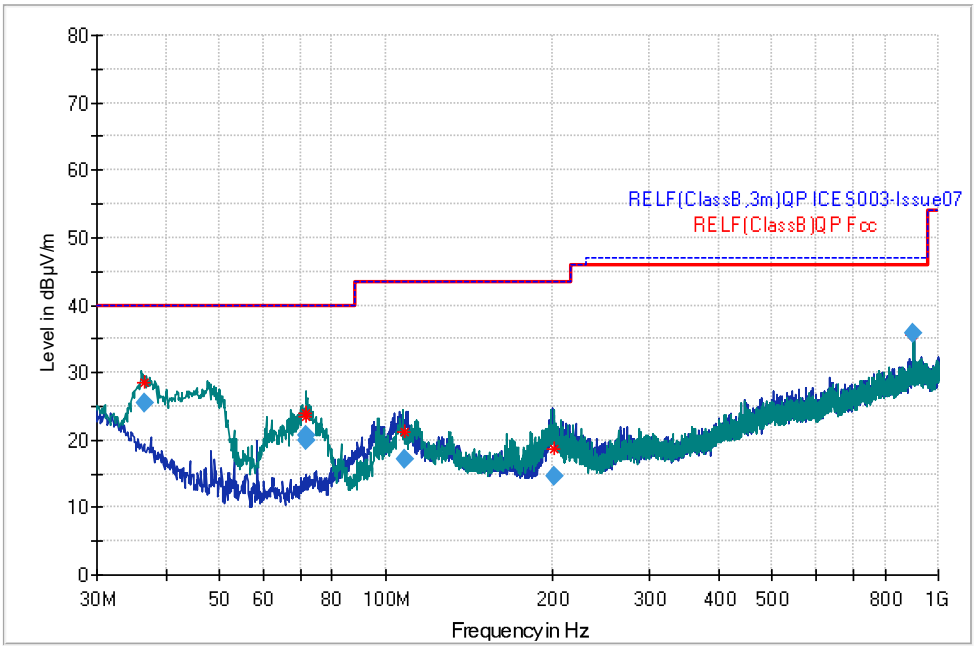


Figure 36: Radiated Emissions, Low Channel from 30MHz to 1GHz

Measurement Data and Plots:

Frequency MHz	QuasiPeak (dBuV/m)	Height (cm)	Pol	Azimuth (°)	Corr. (dB/m)	Limit (dBuV/m)	Margin (dB)	Result
36.6212	25.50	114.0	V	206	-14.0	40.00	14.50	Complies
71.6127	20.63	100.0	V	0	-21.8	40.00	19.37	Complies
71.6476	19.98	176.0	V	73	-21.8	40.00	20.02	Complies
108.0032	17.19	223.0	V	144	-17.2	43.50	26.31	Complies
201.3172	14.64	252.0	H	128	-16.7	43.50	28.86	Complies
902.3263	35.92	138.0	V	236	-2.7	46.00	10.08	Complies

Note: This scan is done in worst case mode with both transmitter on with highest possible power, Notch filter is used

Table 11: Radiated Emissions, Low Channel from 30MHz to 1GHz

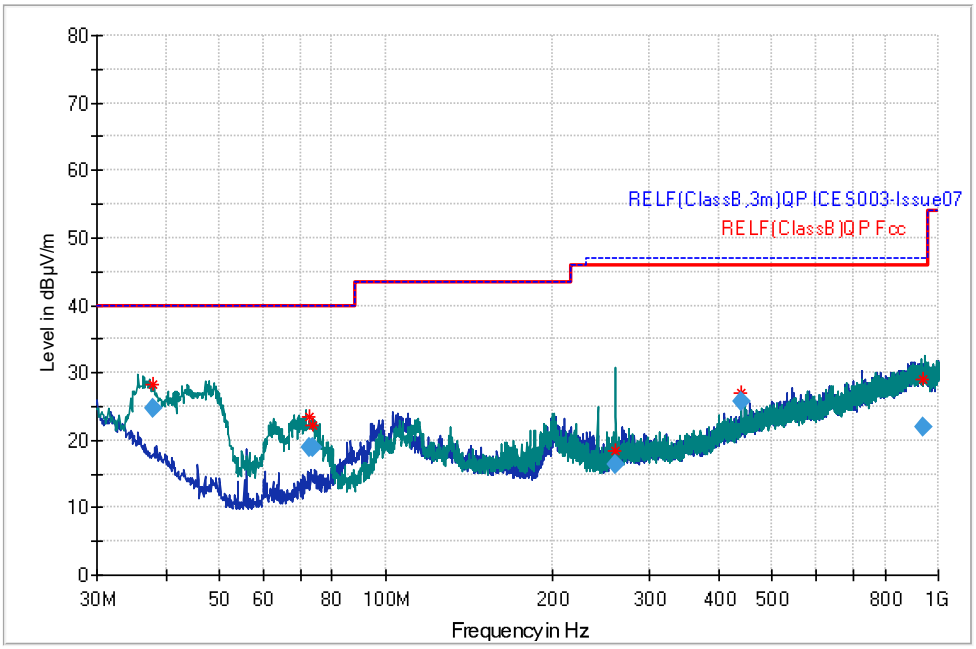


Figure 37: Radiated Emissions, Mid Channel from 30MHz to 1GHz

Measurement Data and Plots:

Frequency MHz	QuasiPeak (dBuV/m)	Height (cm)	Pol	Azimuth (°)	Corr. (dB/m)	Limit (dBuV/m)	Margin (dB)	Result
37.7774	24.85	105.0	V	303	-14.9	40.00	15.15	Complies
72.9122	18.97	158.0	V	306	-21.8	40.00	21.03	Complies
73.6213	18.81	143.0	V	0	-21.8	40.00	21.19	Complies
260.2682	16.36	105.0	V	210	-16.6	46.00	29.64	Complies
440.0036	25.79	105.0	V	339	-11.0	46.00	20.21	Complies
941.0398	22.07	341.0	V	299	-2.0	46.00	23.93	Complies

Note: This scan is done in worst case mode with both transmitter on with highest possible power, Notch filter is used

Table 12: Radiated Emissions, Mid Channel from 30MHz to 1GHz

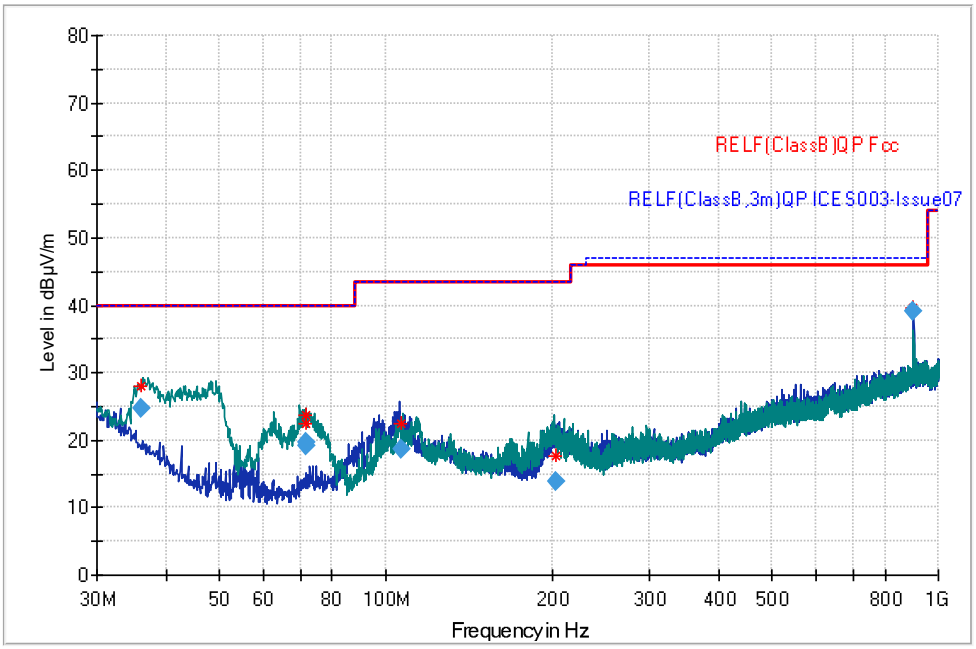


Figure 38: Radiated Emissions, High Channel from 30MHz to 1GHz

Measurement Data and Plots:

Frequency MHz	QuasiPeak (dBuV/m)	Height (cm)	Pol	Azimuth (°)	Corr. (dB/m)	Limit (dBuV/m)	Margin (dB)	Result
36.1672	24.78	141.0	V	0	-13.7	40.00	15.22	Complies
71.6985	19.76	141.0	V	49	-21.8	40.00	20.24	Complies
71.9281	19.08	151.0	V	112	-21.8	40.00	20.92	Complies
106.9421	18.76	112.0	H	189	-17.4	43.50	24.74	Complies
203.7328	13.99	252.0	V	0	-17.6	43.50	29.51	Complies
902.3004	39.03	103.0	H	117	-2.7	46.00	6.97	Complies

Note: This scan is done in worst case mode with both transmitter on with highest possible power, Notch filter is used
(1) At 902 MHz the Max RF Output measured which is at 3 m distance is -56.17 dBm lower that the original grantee

Table 13: Radiated Emissions, High Channel from 30MHz to 1GHz

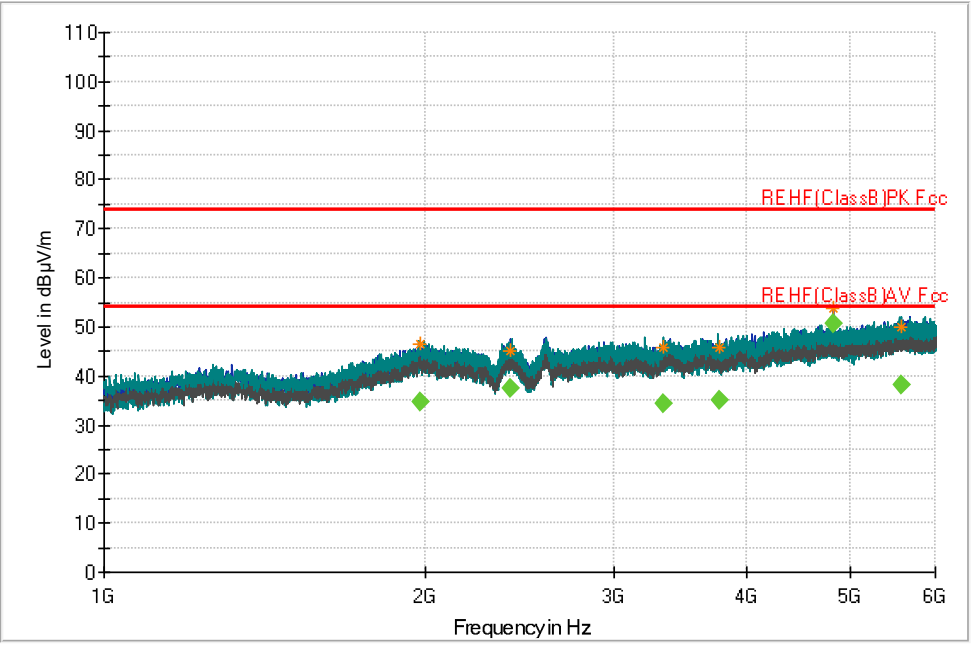


Figure 39: Radiated Emissions, Low Channel from 1GHz – 6GHz

Measurement Data and Plots:

Frequency MHz	QuasiPeak (dBuV/m)	Average (dBuV/m)	Height (cm)	Pol	Azimuth (°)	Corr. (dB/m)	Limit (dBuV/m)	Margin (dB)	Result
1979.5580	---	34.55	196.0	V	274	1.9	54.00	19.45	Complies
2404.9080	---	37.40	315.0	V	311	1.0	54.00	16.60	Complies
3336.2380	---	34.41	236.0	V	159	3.4	54.00	19.59	Complies
3766.3320	---	35.16	265.0	V	105	5.1	54.00	18.84	Complies
4810.1380	---	50.58	103.0	H	91	7.9	54.00	3.42	Complies
5582.6060	---	38.31	199.0	V	46	9.2	54.00	15.69	Complies

Note: This scan is done in worst case mode with both transmitter on with highest possible power, Notch filter is used

Table 14: Radiated Emissions, Low Channel from 1 GHz – 6GHz

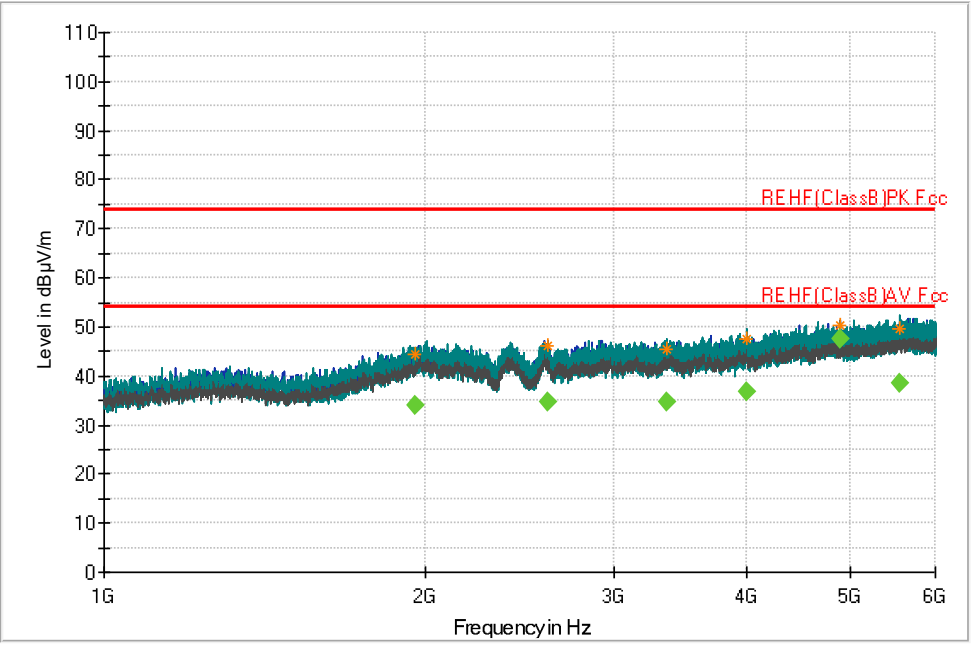


Figure 40: Radiated Emissions, Mid Channel from 1GHz – 6GHz

Measurement Data and Plots:

Frequency MHz	QuasiPeak (dBuV/m)	Average (dBuV/m)	Height (cm)	Pol	Azimuth (°)	Corr. (dB/m)	Limit (dBuV/m)	Margin (dB)	Result
1958.3100	---	33.98	105.0	V	92	1.5	54.00	20.02	Complies
2599.1220	---	34.68	145.0	H	299	1.6	54.00	19.32	Complies
3363.5780	---	34.63	257.0	V	192	3.5	54.00	19.37	Complies
3992.1780	---	36.72	151.0	V	215	6.5	54.00	17.28	Complies
4880.1260	---	47.57	103.0	H	104	8.1	54.00	6.43	Complies
5547.7320	---	38.63	216.0	V	149	9.2	54.00	15.37	Complies

Note: This scan is done in worst case mode with both transmitter on with highest possible power, Notch filter is used

Table 15: Radiated Emissions, Mid Channel from 1 GHz – 6GHz

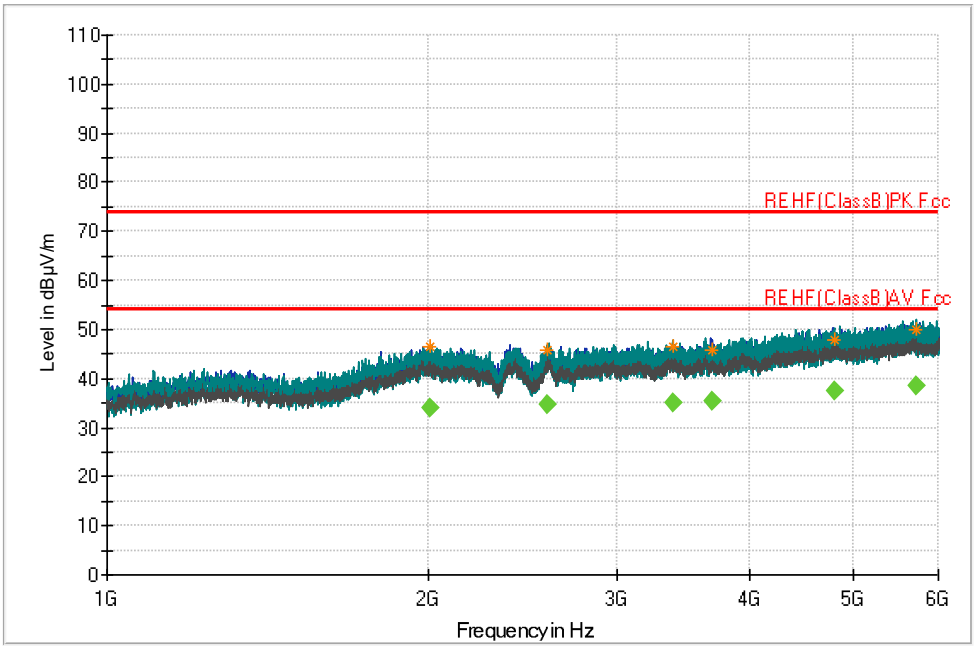


Figure 41: Radiated Emissions, High Channel from 1GHz – 6GHz

Measurement Data and Plots:

Frequency MHz	QuasiPeak (dBuV/m)	Average (dBuV/m)	Height (cm)	Pol	Azimuth (°)	Corr. (dB/m)	Limit (dBuV/m)	Margin (dB)	Result
2005.8940	---	34.00	201.0	V	296	2.1	54.00	20.00	Complies
2581.0680	---	34.77	235.0	V	325	1.5	54.00	19.23	Complies
3391.5040	---	35.12	258.0	V	322	3.6	54.00	18.88	Complies
3687.0040	---	35.52	242.0	H	65	4.6	54.00	18.48	Complies
4792.4580	---	37.47	345.0	V	0	8.5	54.00	16.53	Complies
5719.3360	---	38.58	357.0	V	155	9.5	54.00	15.42	Complies

Note: This scan is done in worst case mode with both transmitter on with highest possible power, Notch filter is used

Table 16: Radiated Emissions, High Channel from 1 GHz – 6GHz

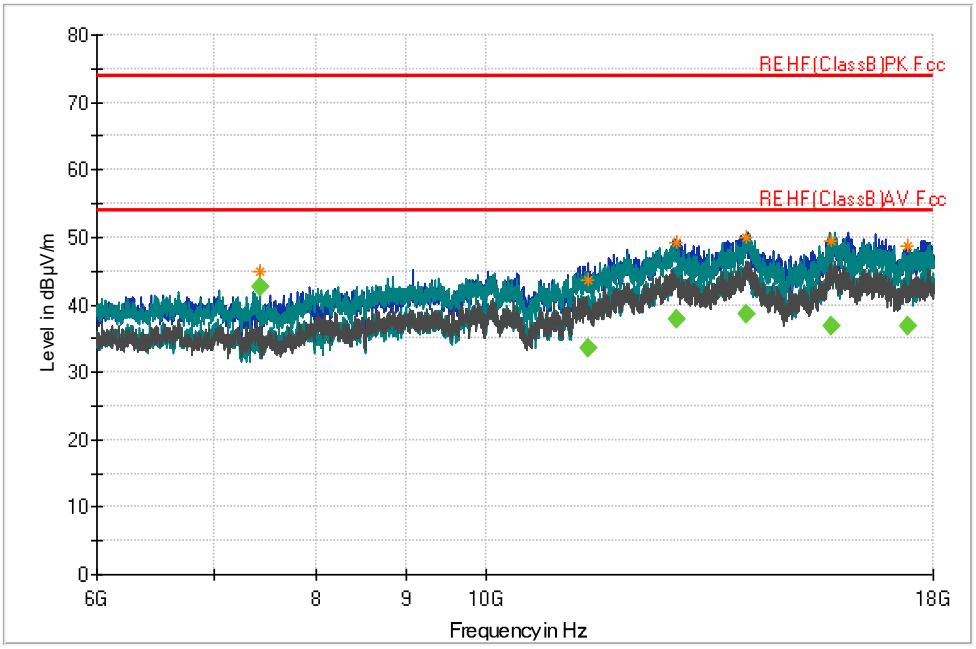


Figure 42: Radiated Emissions, High Channel from 6GHz – 18GHz

Measurement Data and Plots:

Frequency MHz	QuasiPeak (dBuV/m)	Average (dBuV/m)	Height (cm)	Pol	Azimuth (°)	Corr. (dB/m)	Limit (dBuV/m)	Margin (dB)	Result
7440.1820	---	42.66	122.0	V	154	-2.4	54.00	11.34	Complies
11451.4960	---	33.60	175.0	H	42	8.4	54.00	20.40	Complies
12836.9880	---	37.98	150.0	H	357	10.9	54.00	16.02	Complies
14091.5500	---	38.71	145.0	V	131	12.8	54.00	15.29	Complies
15737.3340	---	36.74	167.0	V	0	16.0	54.00	17.26	Complies
17393.2040	---	36.82	189.0	H	0	17.8	54.00	17.18	Complies

Note: This scan is done in worst case mode with both transmitter on with highest possible power, Notch filter is used

Table 17: Radiated Emissions, High Channel from 6GHz – 18GHz

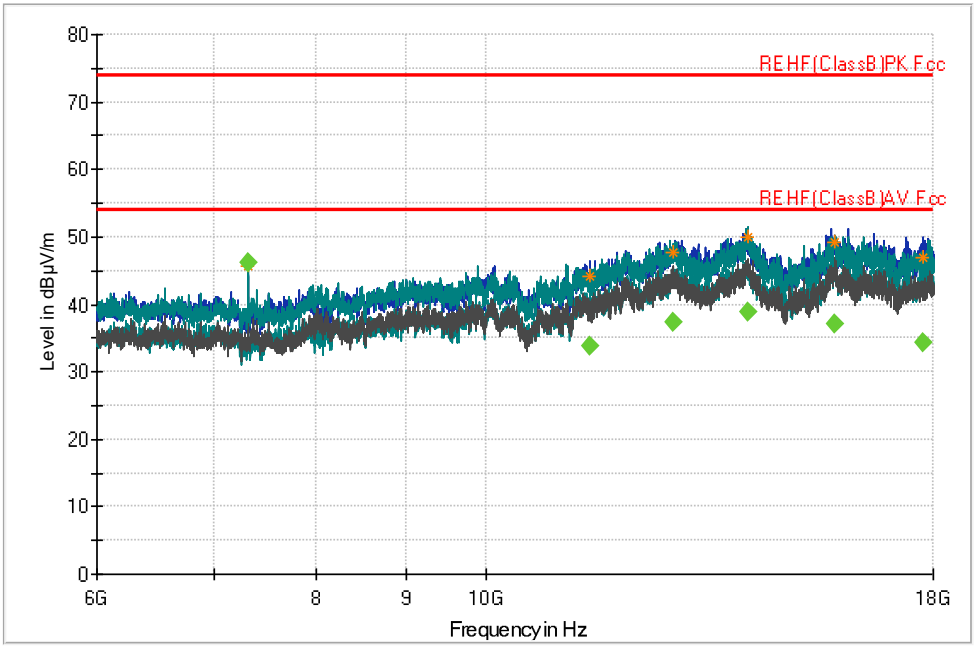


Figure 43: Radiated Emissions, Mid Channel from 6GHz – 18GHz

Measurement Data and Plots:

Frequency MHz	QuasiPeak (dBuV/m)	Average (dBuV/m)	Height (cm)	Pol	Azimuth (°)	Corr. (dB/m)	Limit (dBuV/m)	Margin (dB)	Result
7320.0260	---	46.25	247.0	V	275	-2.4	54.00	7.75	Complies
11454.1520	---	33.78	167.0	H	340	8.4	54.00	20.22	Complies
12792.6480	---	37.45	176.0	V	21	10.2	54.00	16.55	Complies
14116.1960	---	38.77	130.0	V	0	12.8	54.00	15.23	Complies
15809.8120	---	37.21	347.0	V	0	16.6	54.00	16.79	Complies
17772.9060	---	34.29	169.0	H	0	18.4	54.00	19.71	Complies

Note: This scan is done in worst case mode with both transmitter on with highest possible power, Notch filter is used

Table 18: Radiated Emissions, Mid Channel from 6GHz – 18GHz

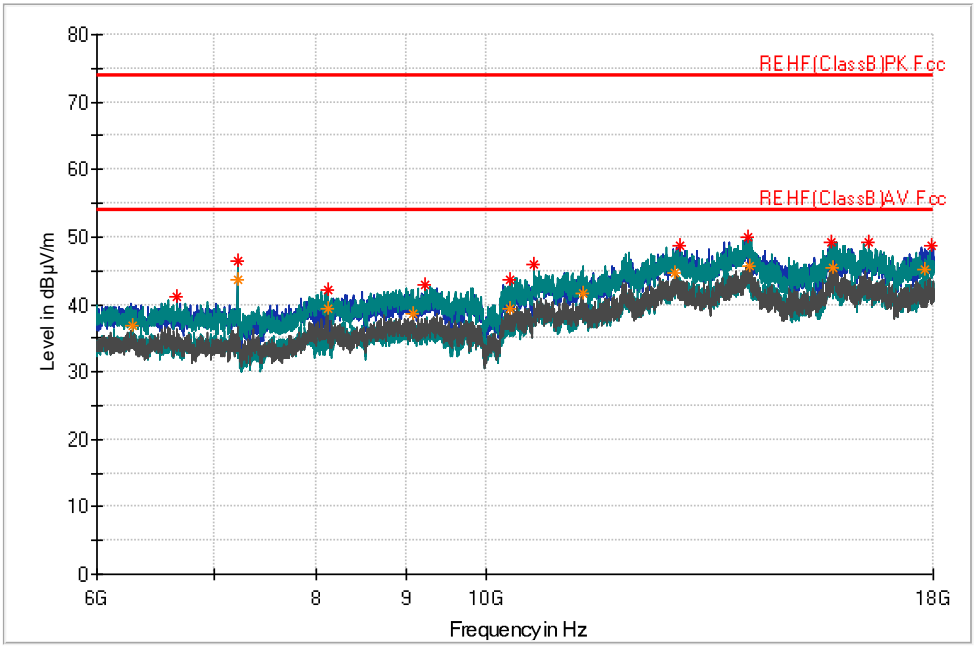


Figure 44: Radiated Emissions, Low Channel from 6GHz – 18GHz

Measurement Data and Plots:

Frequency MHz	QuasiPeak (dBuV/m)	Average (dBuV/m)	Height (cm)	Pol	Azimuth (°)	Corr. (dB/m)	Limit (dBuV/m)	Margin (dB)	Result
12824.4000	---	44.62	54.00	9.38	109	10.2	54.00	9.38	Complies
14139.6000	---	45.62	54.00	8.38	323	12.8	54.00	8.38	Complies
15794.4000	---	45.46	54.00	8.54	266	15.9	54.00	8.54	Complies
16534.8000	49.10	---	74.00	24.90	29	15.3	74.00	24.90	Complies
17788.8000	---	45.19	54.00	8.81	202	18.4	54.00	8.81	Complies
17966.4000	48.69	---	74.00	25.31	214	18.0	74.00	25.31	Complies

Note: This scan is done in worst case mode with both transmitter on with highest possible power, Notch filter is used. This table only shows the worst-case points alone, not the full set.

Table 19: Radiated Emissions, Low Channel from 6GHz – 18GHz

Appendix A: ABBREVIATIONS

Abbreviation	Definition
AC	Alternating Current
AM	Amplitude Modulation
ASW	Anti-Submarine Warfare
BIT	Built-in-Test
CE	European Conformity
CISPR	Comité International Spécial des Perturbations Radioélectriques (International Special Committee on Radio Interference)
DC	Direct Current
EFT	Electrical Fast Transient
EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
ERP	Effective Radiated Power
ESD	Electrostatic Discharge
EUT	Equipment Under Test
FCC	Federal Communications Commission
FVIN	Firmware Version Identification Number FVIN
GFE	Government Furnished Equipment
IC	Industry Canada
ICES	Interference Causing Equipment Standard
IEC	International Electrotechnical Commission
LISN	Line Impedance Stabilizing Network
OATS	Open Area Test Site
RF	Radio Frequency
RMS	Root-Mean-Square
SAC	Semi-Anechoic Chamber
TEM	Transverse Electromagnetic
TPD	Terminal Protection Device

END OF REPORT