

RF Test Report

As per

FCC Part 15 Subpart 15.247

Unlicensed Intentional Radiators

on the

Inmedix CloudHRV



Canada

Issued by:

TÜV SÜD Canada Inc.
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A handwritten signature in black ink, appearing to read "Bull", written over a horizontal line.

Reviewed by:

Sanjiv Vyas,
EMC Lab Manager

A handwritten signature in black ink, appearing to read "Sanjiv", written over a horizontal line.

Testing produced for

The logo for StarFish Medical, featuring a stylized blue star above the word "StarFish" in a large, bold, sans-serif font, and "MEDICAL" in a smaller, bold, sans-serif font below it.

See Appendix A for full client &
EUT details.



Registration #
6844A-3



Testing Laboratory
Certificate #2955.02



R-14023, G-20072
C-14498, T-20060



Registration #
CA6844

Page 1 of 92

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Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Table of Contents

Table of Contents	2
Report Scope	3
Summary	4
Test Results Summary	5
Notes, Justifications, or Deviations	6
Sample Calculation(s)	7
Applicable Standards, Specifications and Methods	8
Document Revision Status	9
Definitions and Acronyms	10
Testing Facility	11
Calibrations and Accreditations	11
Testing Environmental Conditions and Dates	12
Detailed Test Results Section	13
6dB Bandwidth of Digitally Modulated Systems	14
Maximum Peak Envelope Conducted Power	28
Antenna Spurious Conducted Emissions (-20 dBc Requirement)	36
Transmitter Spurious Radiated Emissions	54
Power Spectral Density	76
Power Line Conducted Emissions	84
Appendix A – EUT Summary	89
Appendix B – EUT and Test Setup Photos	92

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Report Scope


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

FCC Part 15 Subpart C 15.247

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.


Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Summary

The results contained in this report relate only to the item(s) tested.

EUT:	Inmedix CloudHRV
FCC Certification #, FCC ID:	2BCGD-CLDHRBV
EUT passed all tests performed	Yes
Tests conducted by	Jadon Bull
Report reviewed by	Sanjiv Vyas


For testing dates, see "Testing Environmental Conditions and Dates".

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Test Results Summary

Standard/Method	Description	Class/Limit	Result
FCC 15.203	Antenna Requirement	Unique	Pass See Justification
FCC 15.205	Restricted Bands for Intentional Operation	QuasiPeak Average	Pass
FCC 15.207	Power Line Conducted Emissions	QuasiPeak Average	Pass
FCC 15.209	Spurious Radiated Emissions	QuasiPeak Average	Pass
FCC 15.247(a)2	6 dB Bandwidth	> 500 kHz	Pass
FCC 15.247(b)2	Max Output Power	< 1 Watt	Pass
FCC 15.247(b)4	Antenna Gain	< 6 dBi	Pass See Justifications
FCC 15.247(d)	Antenna Conducted Spurious	< 20 dBc	Pass
FCC 15.247(e)	Spectral Density	< 8 dBm (3 kHz BW)	Pass
Overall Result			Pass

If the product as tested or otherwise complies with the specification, the EUT is deemed to comply with the requirement and is deemed a 'PASS' grade. If not 'FAIL' grade will be issued. Note that 'PASS' / 'FAIL' grade is independent of any measurement uncertainties. A 'PASS' / 'FAIL' grade within measurement uncertainty is marked with a '*'.

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Notes, Justifications, or Deviations

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


The EUT used for testing was modified to connect to a computer for control over the transmitter parameters. This modification represents a worst-case scenario where the EUT enclosure is not fully sealed, and an additional USB cable is connected to the main PCB.

For the Antenna requirement specified in FCC 15.203, the unit uses a chip antenna (maximum 2.5 dBi gain – TDK ANT016008LCS2442MA2) with less than 6 dBi gain.

For the Restricted Bands of operation, the EUT is designed to only operate 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.

The EUT was mounted in three orthogonal axes. Worst case results were obtained with the EUT in the Z-axis, which is also the typical orientation of the EUT during normal table-top use. Worst case results are presented. See Appendix B for axis details.

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Sample Calculation(s)

Radiated Emission Test

E-Field Level = Received Signal + Antenna Factor + Cable Loss – Pre-Amp Gain

E-Field Level = 50dB μ V + 10dB/m + 2dB – 20dB

E-Field Level = 42dB μ V/m

Margin = Limit – E-Field Level

Margin = 50dB μ V/m – 42dB μ V/m

Margin = 8.0 dB (pass)

Power Line Conducted Emission Test

E-Field Level = Received Signal + Attenuation Factor + Cable Loss + LISN Factor


E-Field Level = 50dB μ V + 10dB + 2.5dB + 0.5dB

E-Field Level = 63dB μ V

Margin = Limit – E-Field Level


Margin = 73dB μ V – 63dB μ V

Margin = 10.0 dB (pass)

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	


Applicable Standards, Specifications and Methods

ANSI C63.4:2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10:2013	American National Standard For Testing Unlicensed Wireless Devices
CFR 47 FCC 15 Subpart C	Code of Federal Regulations – Radio Frequency Devices, Intentional Radiators
FCC KDB 558074: 2019	FCC KDB 558074 Digital Transmission Systems, measurements and procedures
FCC KDB 447498: 2015	RF exposure procedures and equipment authorization policies for mobile and portable devices
ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Document Revision Status

Revision	Date	Description	Initials
000	November 15 th , 2023	Initial Release	JB

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Definitions and Acronyms

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

DTS – Digital Transmission System

LISN – Line Impedance Stabilization Network

NCR – No Calibration Required

NSA – Normalized Site Attenuation

N/A – Not Applicable

RF – Radio Frequency

AE – Auxiliary Equipment. A digital accessory that feeds data into or receives data from another device (host) that in turn, controls its operation.

Antenna Port – Port, other than a broadcast receiver tuner port, for connection of an antenna used for intentional transmission and/or reception of radiated RF energy.


BW – Bandwidth. Unless otherwise stated, this refers to the 6 dB bandwidth.

EMC – Electro-Magnetic Compatibility. The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

EMI – Electro-Magnetic Immunity. The ability to maintain a specified performance when the equipment is subjected to disturbance (unwanted) signals of specified levels.

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

ITE – Information Technology Equipment. Has a primary function of entry, storage, display, retrieval, transmission, processing, switching, or control of data and/or telecommunication messages and which may be equipped with one or more ports typically for information transfer.


Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Testing Facility

Testing for EMC on the EUT was carried out at TÜV SÜD Canada testing lab near Toronto, Ontario. The testing lab has calibrated 3m semi-anechoic chambers which allow measurements on a EUT that has a maximum width or length of up to 2m and a height of up to 3m. The testing lab also has a calibrated 10m Open Area Test Site (OATS). The chambers are equipped with a turntable that is capable of testing devices up to 5000lb in weight and are equipped with a mast that controls the polarization and height of the antenna. Control of the mast occurs in the control room adjoining the shielded chamber. This facility is capable of testing products that are rated for single phase or 3-phase AC input and DC capability is also available. Radiated emission measurements are performed using a BiLog antenna and a Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN and using the vertical ground plane if applicable.

Calibrations and Accreditations


The 3m semi-anechoic chamber is registered with Federal Communications Commission (FCC, CA6844), Innovation, Science and Economic Development Canada (ISED, 6844A-3) and Voluntary Control Council for Interference (VCCI, R-14023, G-20072, C-14498, and T-20060). This chamber was calibrated for Normalized Site Attenuation (NSA) using test procedures outlined in ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. The NSA data is kept on file at TÜV SÜD Canada. For radiated susceptibility testing, a 16 point field calibration has been performed on the chamber. The field uniformity data is kept on file at TÜV SÜD Canada. TÜV SÜD Canada Inc. is accredited to ISO 17025 by A2LA with Testing Certificate #2955.02. The laboratory's current scope of accreditation listing can be found as listed on the A2LA website. All measuring equipment is calibrated on an annual or biennial basis as listed for each respective test.

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	


Testing Environmental Conditions and Dates

Following environmental conditions were recorded in the facility during time of testing

Date	Test	Initials	Temperature (°C)	Humidity (%)	Pressure (kPa)
7/20/2023	Radiated Emissions	JB	25.1	53.5	101.6
7/19/2023	Antenna Conducted Emissions	JB	23.7	51.9	101.8
7/31/2023	Power Line Conducted Emissions	JB	24.4	48.8	101.7

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Detailed Test Results Section

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

6dB Bandwidth of Digitally Modulated Systems

Purpose

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.

Limits and Method

The limit is as specified in FCC 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. This should be measured with a 100 kHz RBW and a 300 kHz VBW.

The method is given in FCC KDB 558074 Section 8.1 and ANSI C63.10.

Results


The EUT passed.

The minimum 6 dB Bandwidth measured was 696 kHz at the 1MBPS data rate, and 1.156MHz at the 2MBPS data rate on the low channel of 2402MHz.

The maximum 99% Occupied Bandwidth was 1.056 MHz at the 1MBPS data rate, and 2.060MHz at the 2MBPS data rate on the mid channel of 2440MHz.

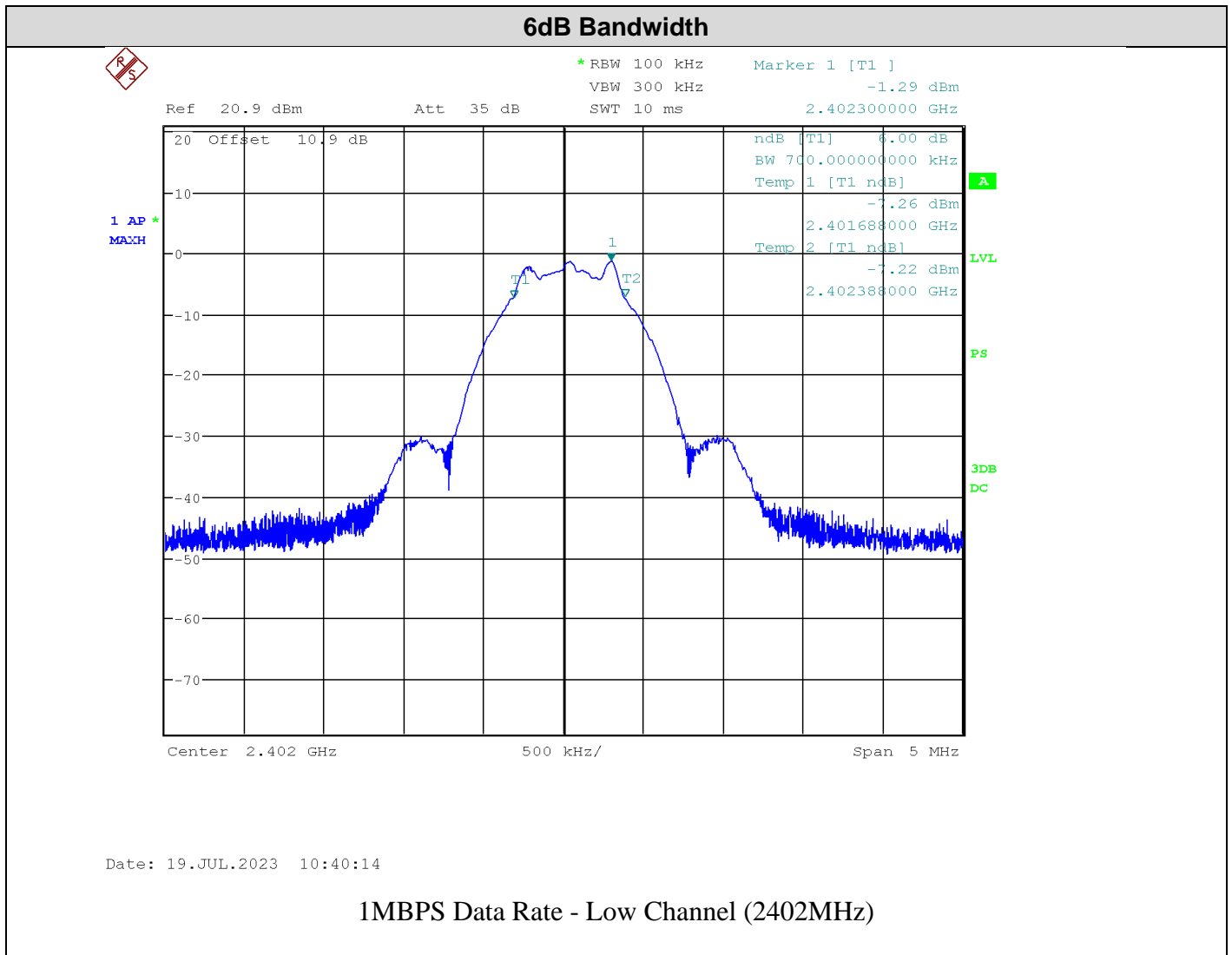
This is more than the requirement of 500kHz minimum 6dB Bandwidth.


Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)
1MBPS Data Rate			
Low	2402	0.696	1.052
Mid	2440	0.700	1.056
High	2480	0.700	1.056
2MBPS Data Rate			
Low	2402	1.156	2.052
Mid	2440	1.156	2.060
High	2480	1.160	2.056

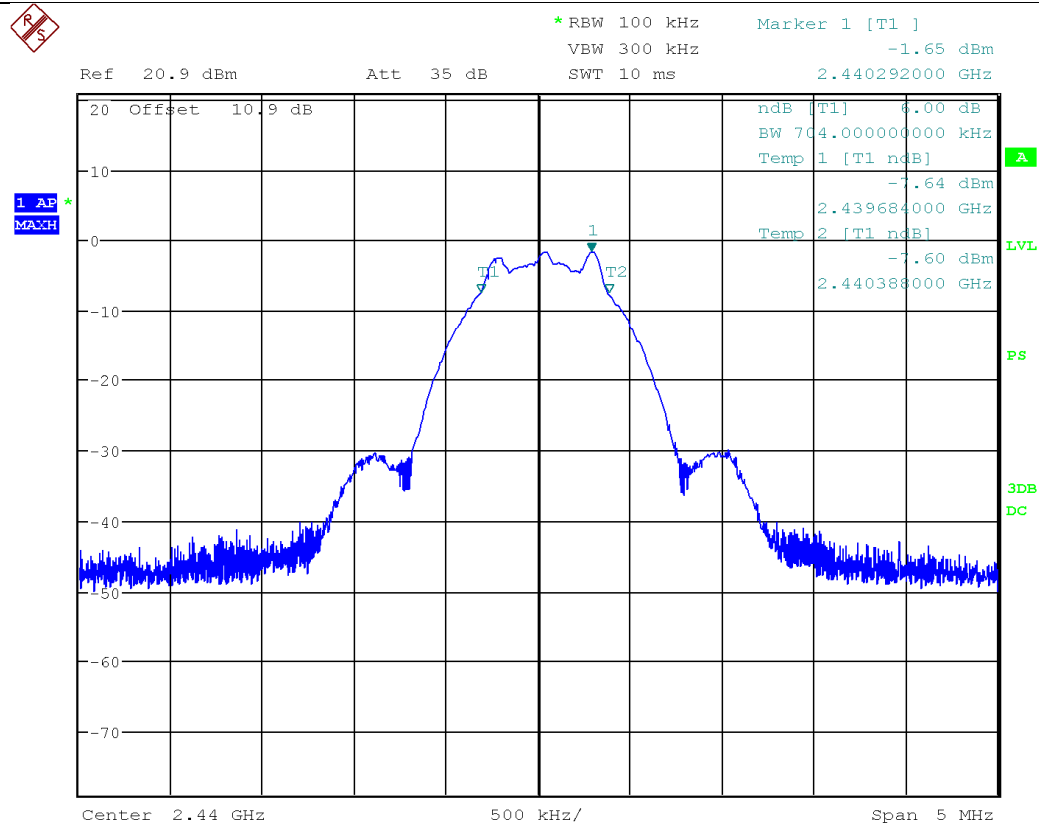
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Graphs

The graphs shown below show the OBW of the device during the conducted measurement operation of the EUT. This is measured by a max hold on the spectrum analyzer.




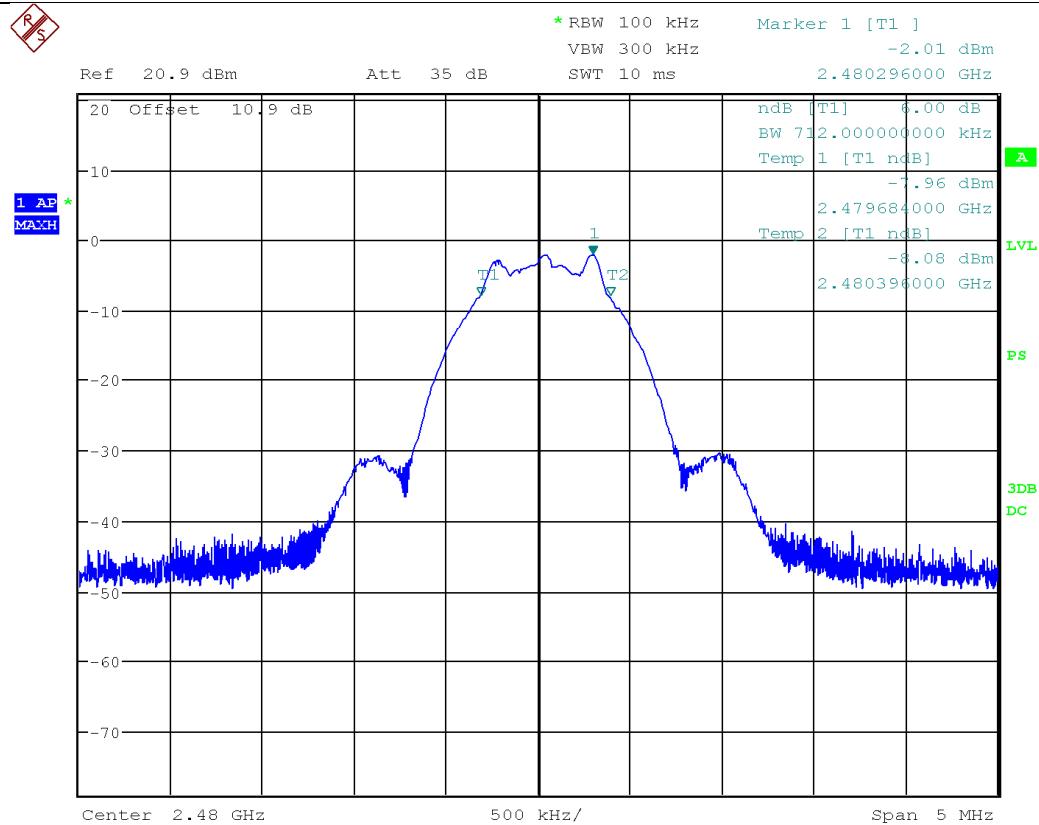
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Date: 19.JUL.2023 10:55:36


1MBPS Data Rate - Mid Channel (2440MHz)

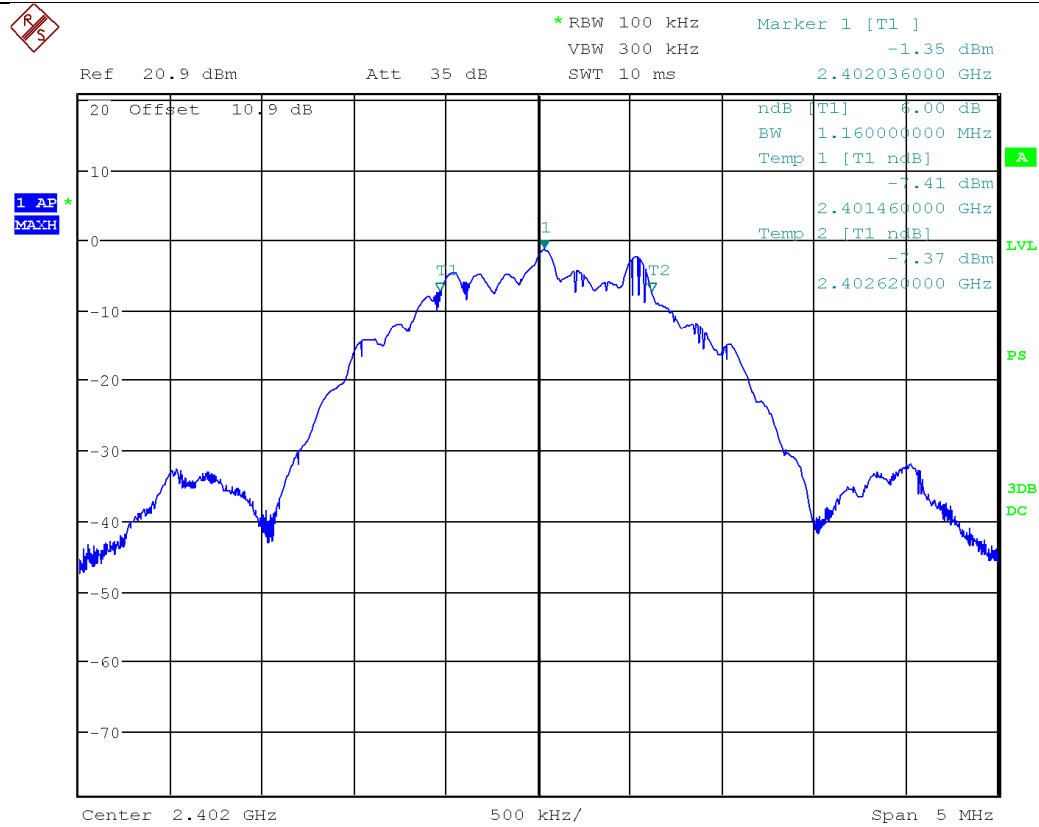
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



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1MBPS Data Rate - High Channel (2480MHz)

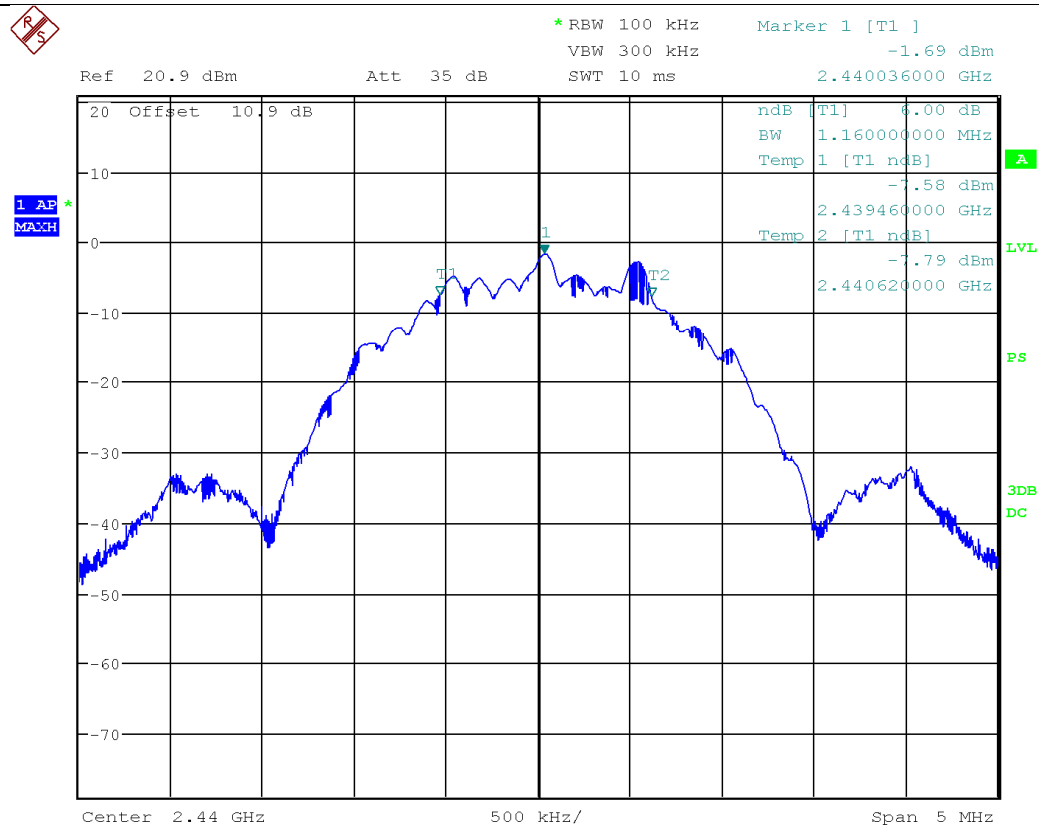
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Date: 19.JUL.2023 10:43:16


2MBPS Data Rate - Low Channel (2402MHz)

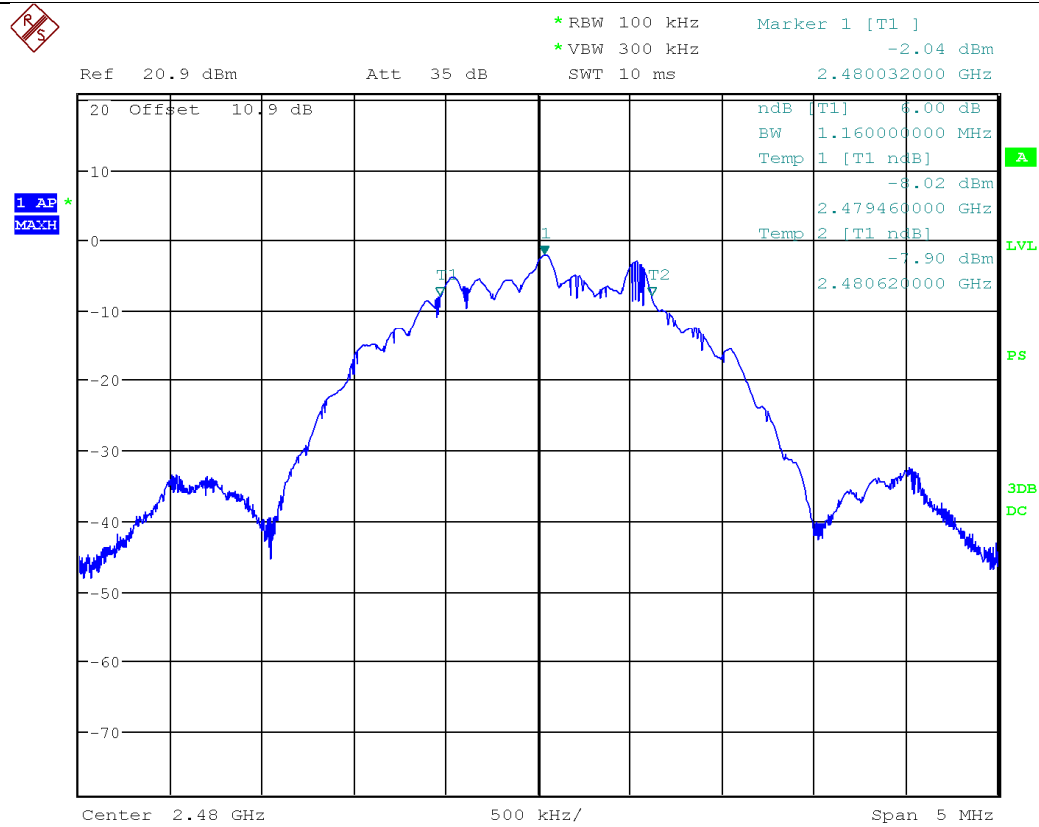
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



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2MBPS Data Rate - Mid Channel (2440MHz)

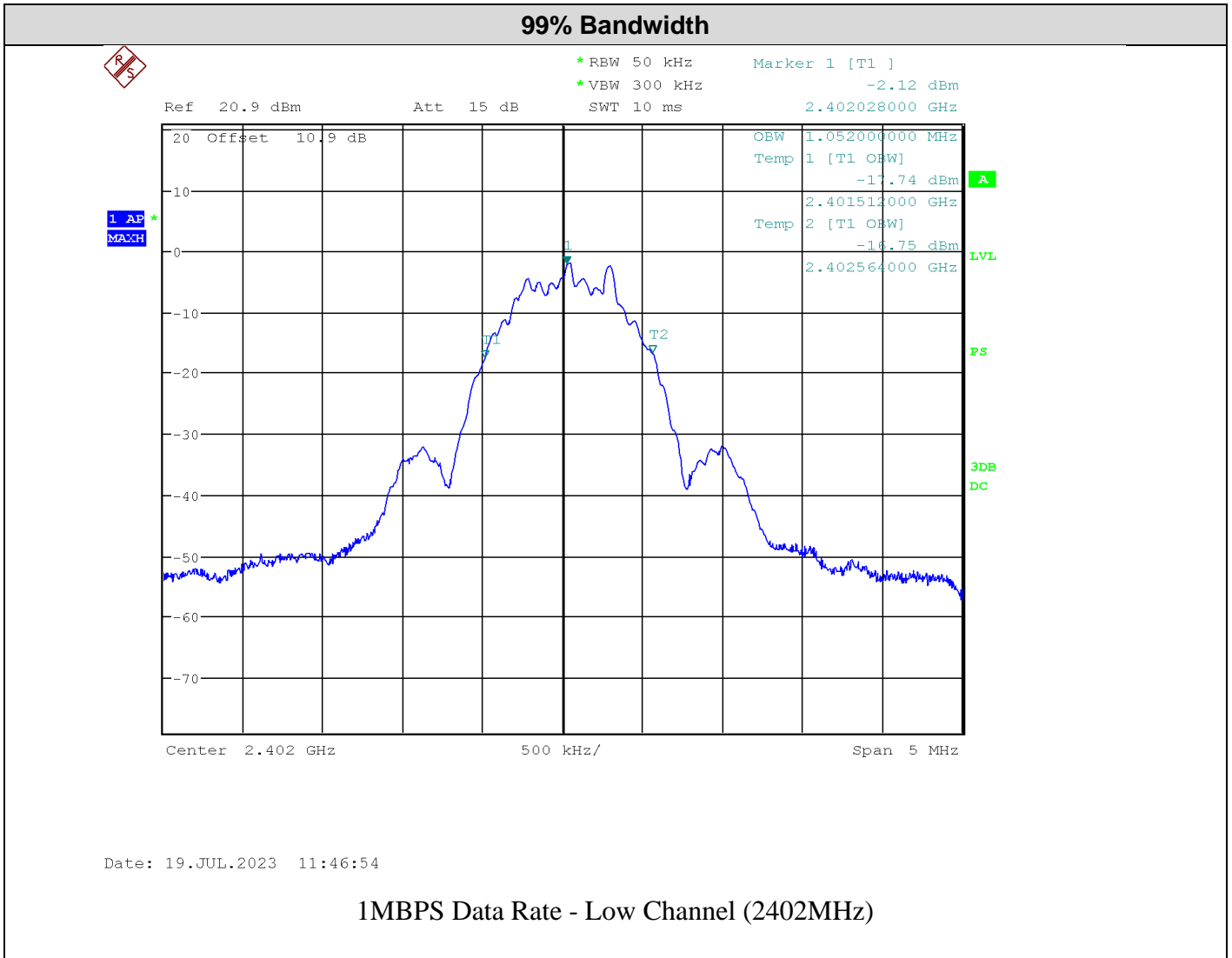
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




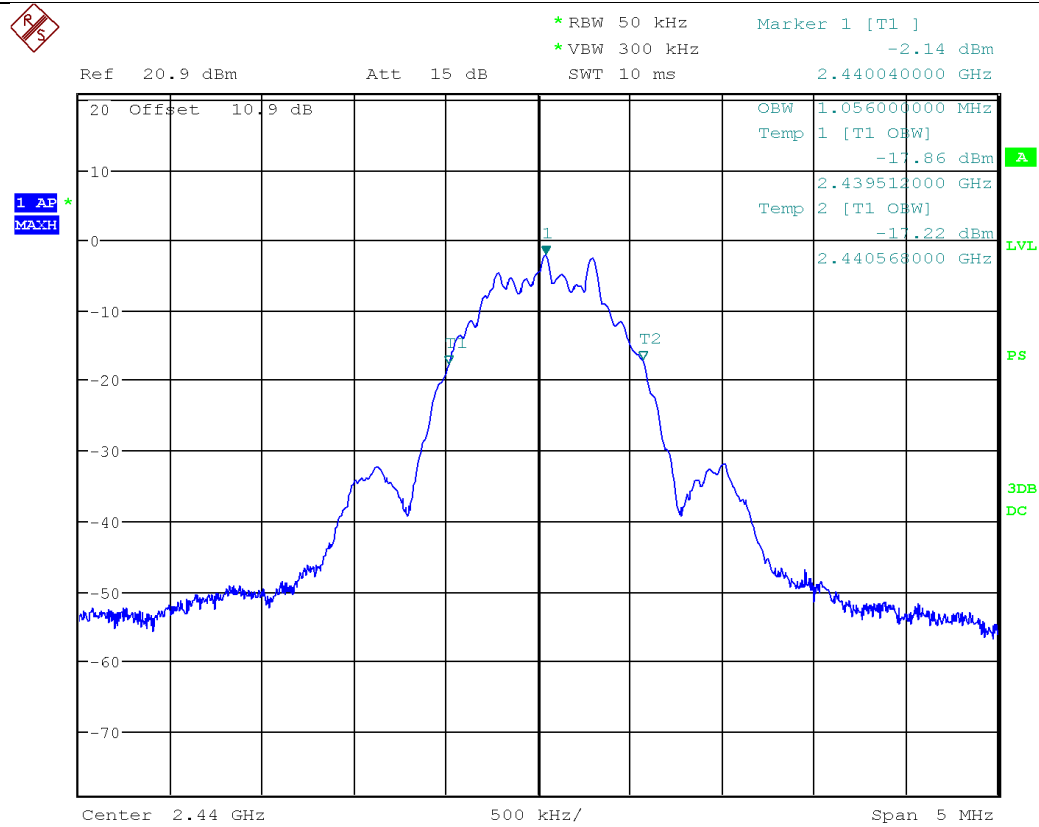
Date: 19.JUL.2023 11:58:42

2MBPS Data Rate - High Channel (2480MHz)

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




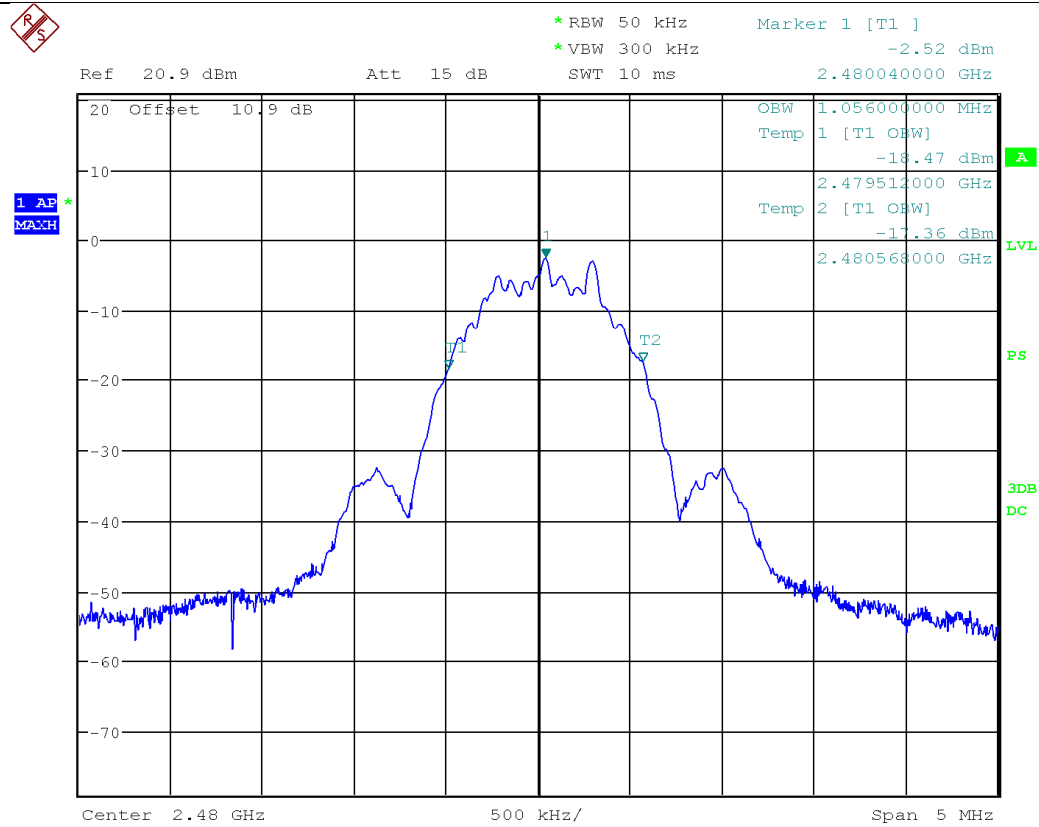
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Date: 19.JUL.2023 11:32:12


1MBPS Data Rate - Mid Channel (2440MHz)

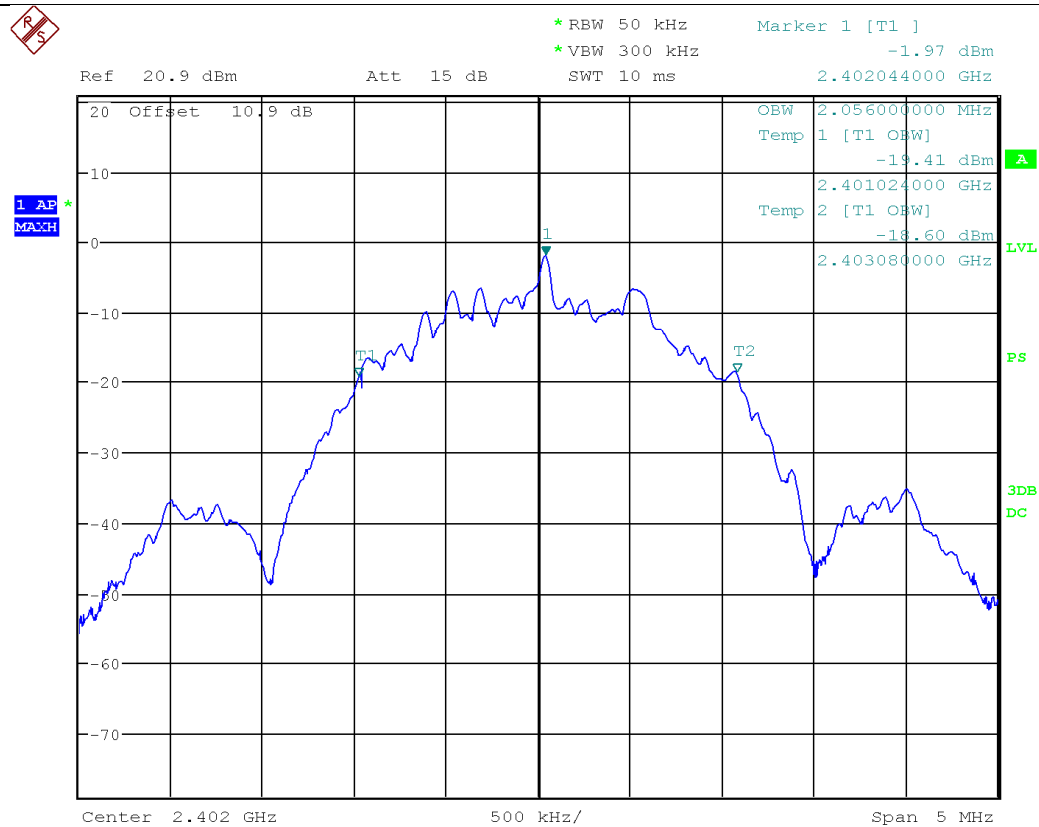
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Date: 19.JUL.2023 11:51:24


1MBPS Data Rate - High Channel (2480MHz)

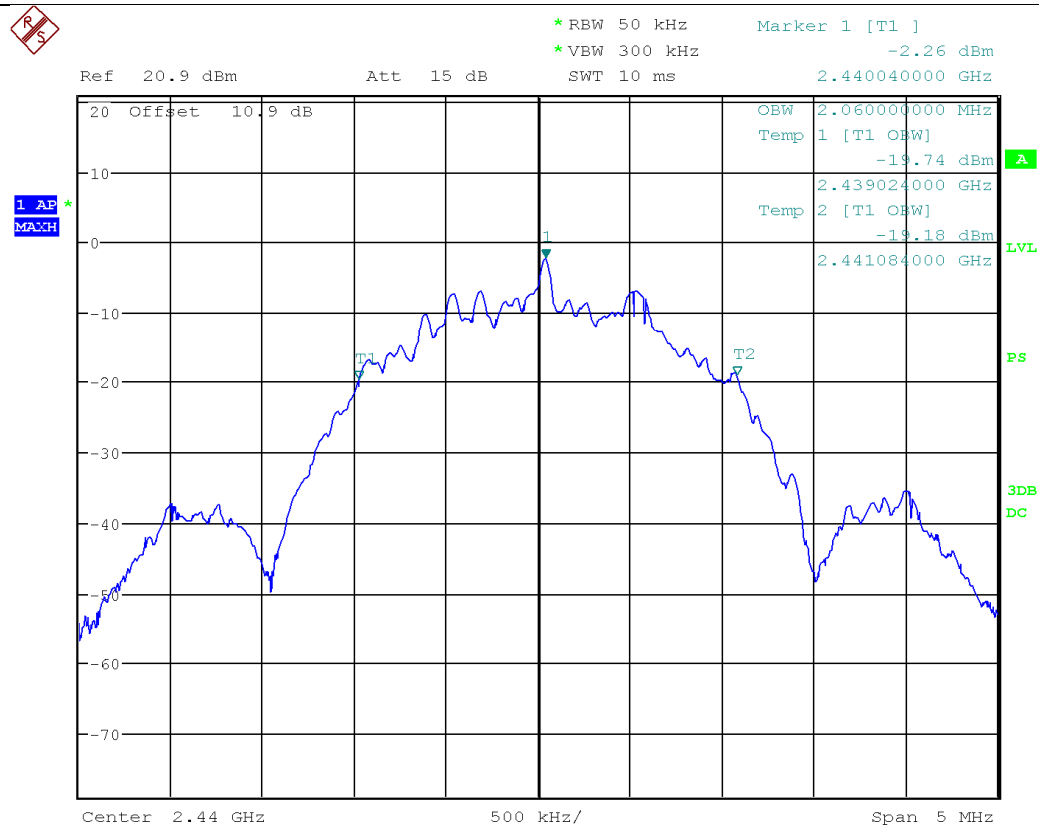
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Date: 19.JUL.2023 11:25:40

2MBPS Data Rate - Low Channel (2402MHz)

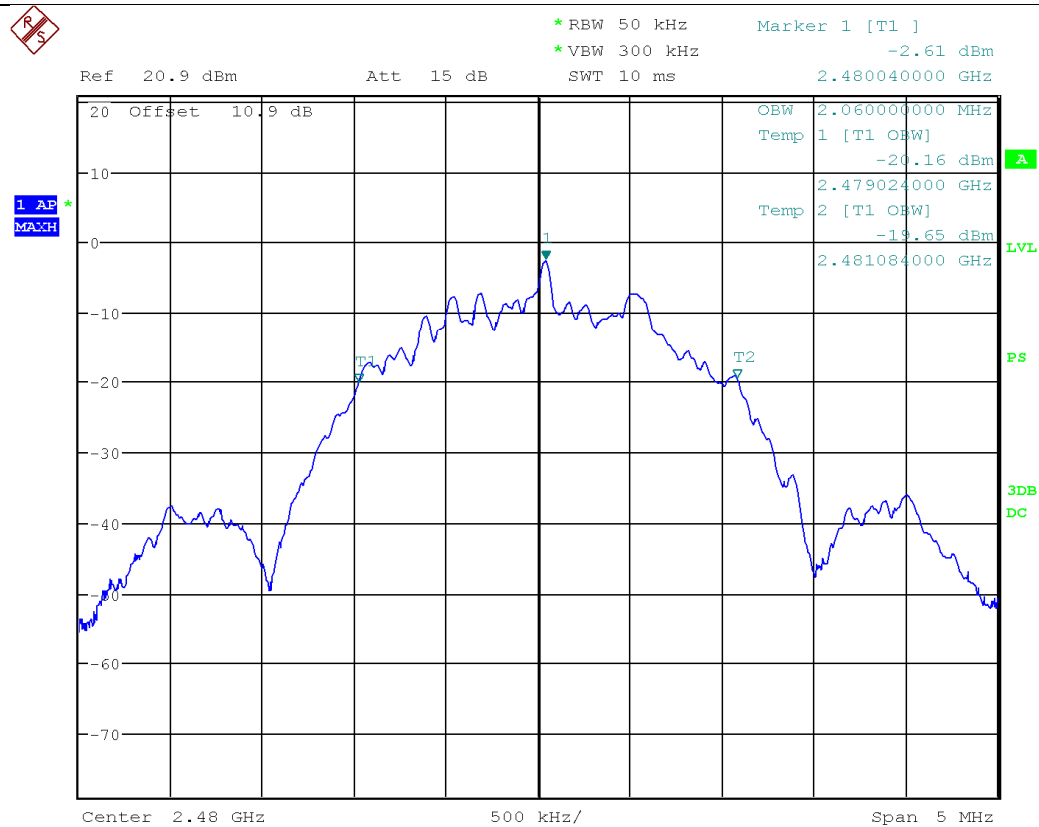
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Date: 19.JUL.2023 11:26:20

2MBPS Data Rate - Mid Channel (2440MHz)


Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Date: 19.JUL.2023 11:19:25


2MBPS Data Rate - High Channel (2480MHz)

Note: See 'Appendix B – EUT & Test Setup Photos' for photos showing the test set-up.

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
EMI Receiver	ESU 40	Rohde & Schwarz	Feb. 11, 2022	Feb. 11, 2024	GEMC 233
Attenuator 10 dB	8493B	Agilent	NCR	NCR	GEMC 133

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Maximum Peak Envelope Conducted Power

Purpose

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.

Limits and Method

The limits are defined in FCC Part 15.247(b).

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands, the peak limit is 1 watt (30 dBm).

The method is given in FCC KDB 558074 Section 9.1.2 and ANSI C63.10.

Results

The EUT passed.

The maximum peak envelope conducted power was measured to be -0.70dBm or 0.851mW at the 1MBPS data rate and -0.60dBm or 0.871mW at the 2MBPS, on the low channel of 2402MHz.

This is less than the limit of 1W or 30dBm.

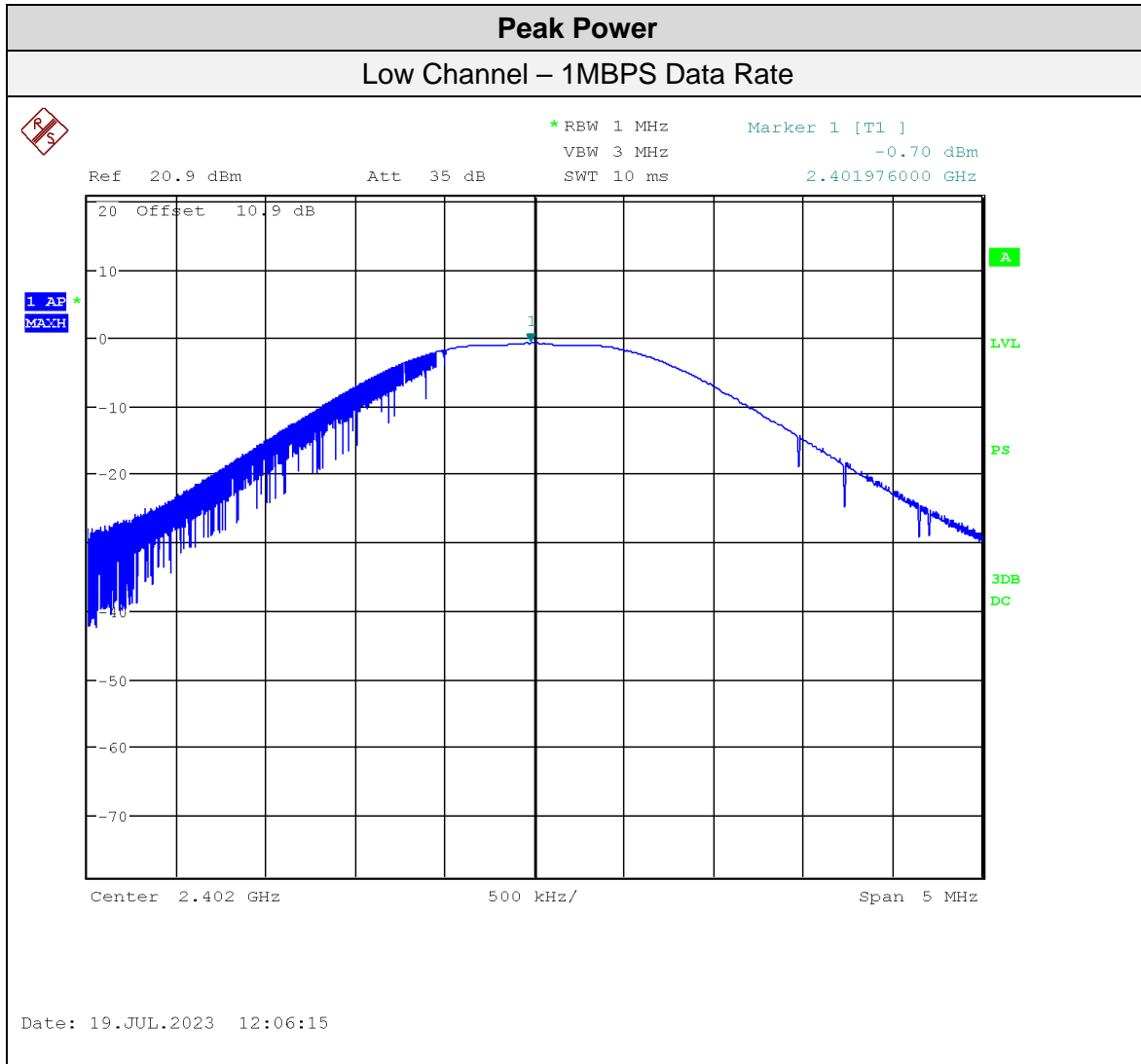
Channel	Frequency (MHz)	Peak Power (dBm)	Peak Power (mW)
1MBPS Data Rate			
Low	2402	-0.70	0.851
Mid	2440	-1.02	0.791
High	2480	-1.38	0.728
2MBPS Data Rate			
Low	2402	-0.60	0.871
Mid	2440	-0.92	0.809
High	2480	-1.23	0.753

Note: The external attenuator and cable loss are accounted for as reference offset in the spectrum analyzer

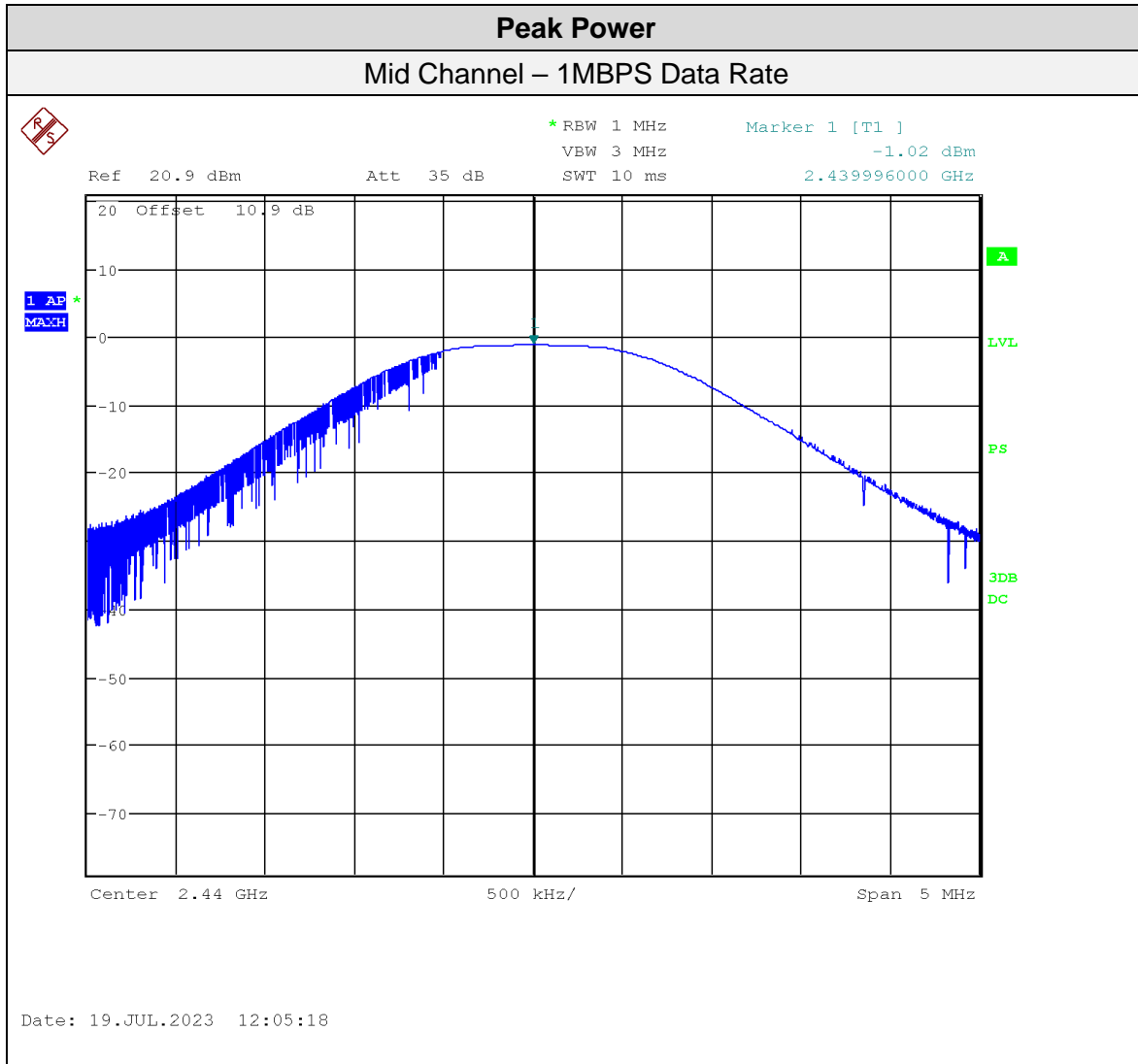
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	


Graphs

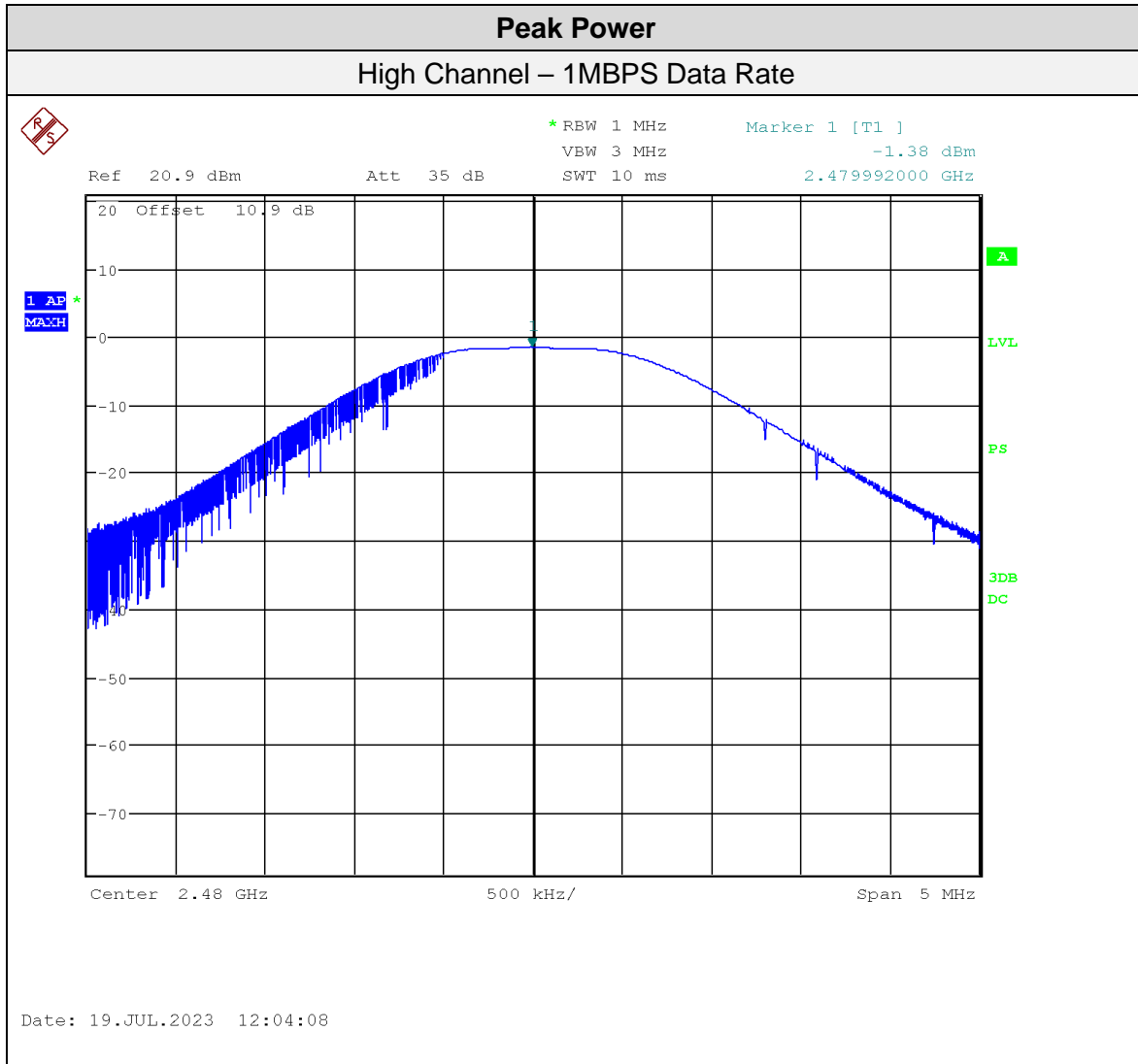
The graphs shown below show the peak power output of the device during the conducted measurement operation of the EUT. The measurement RBW is \geq than the DTS bandwidth.




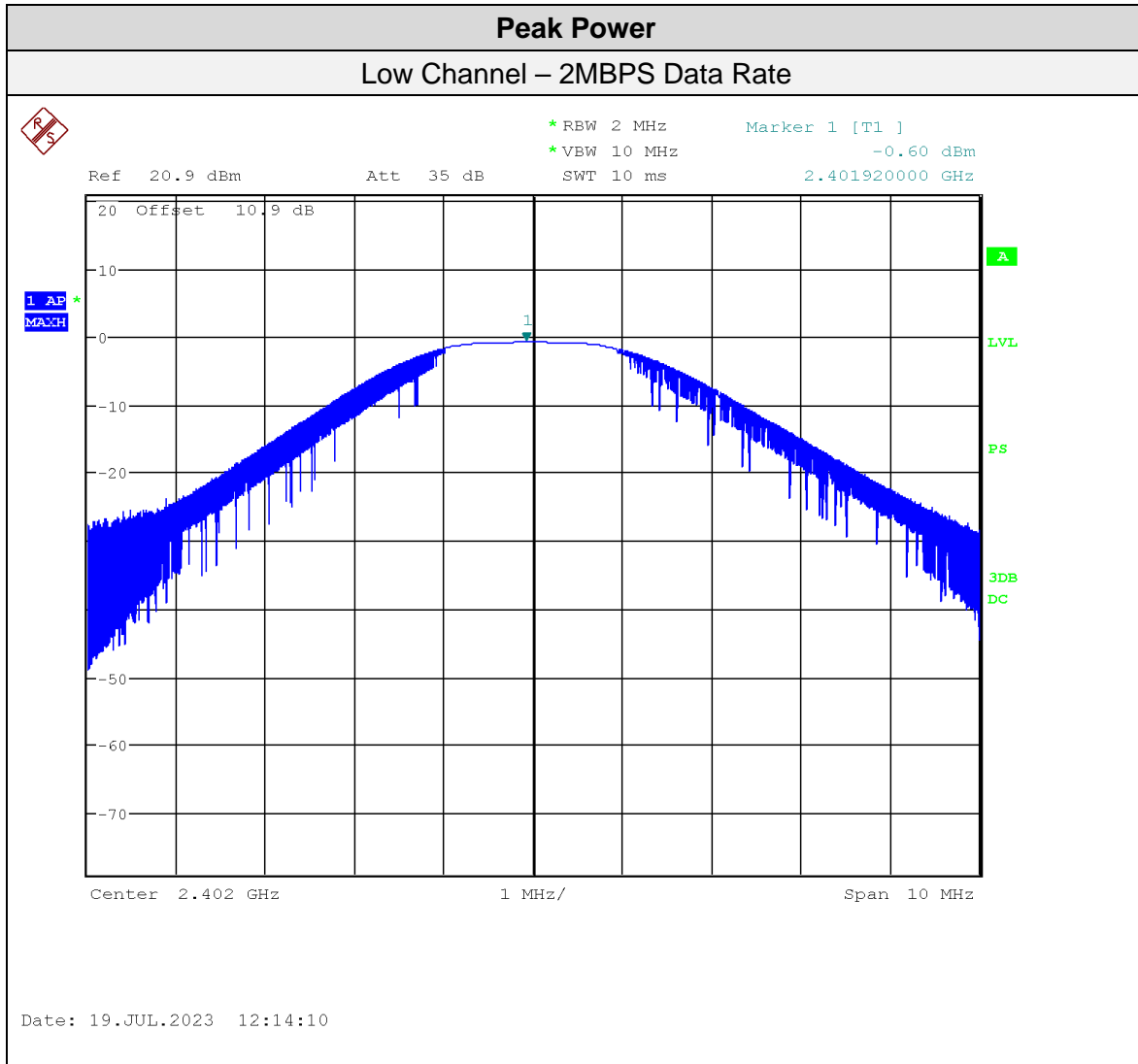
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




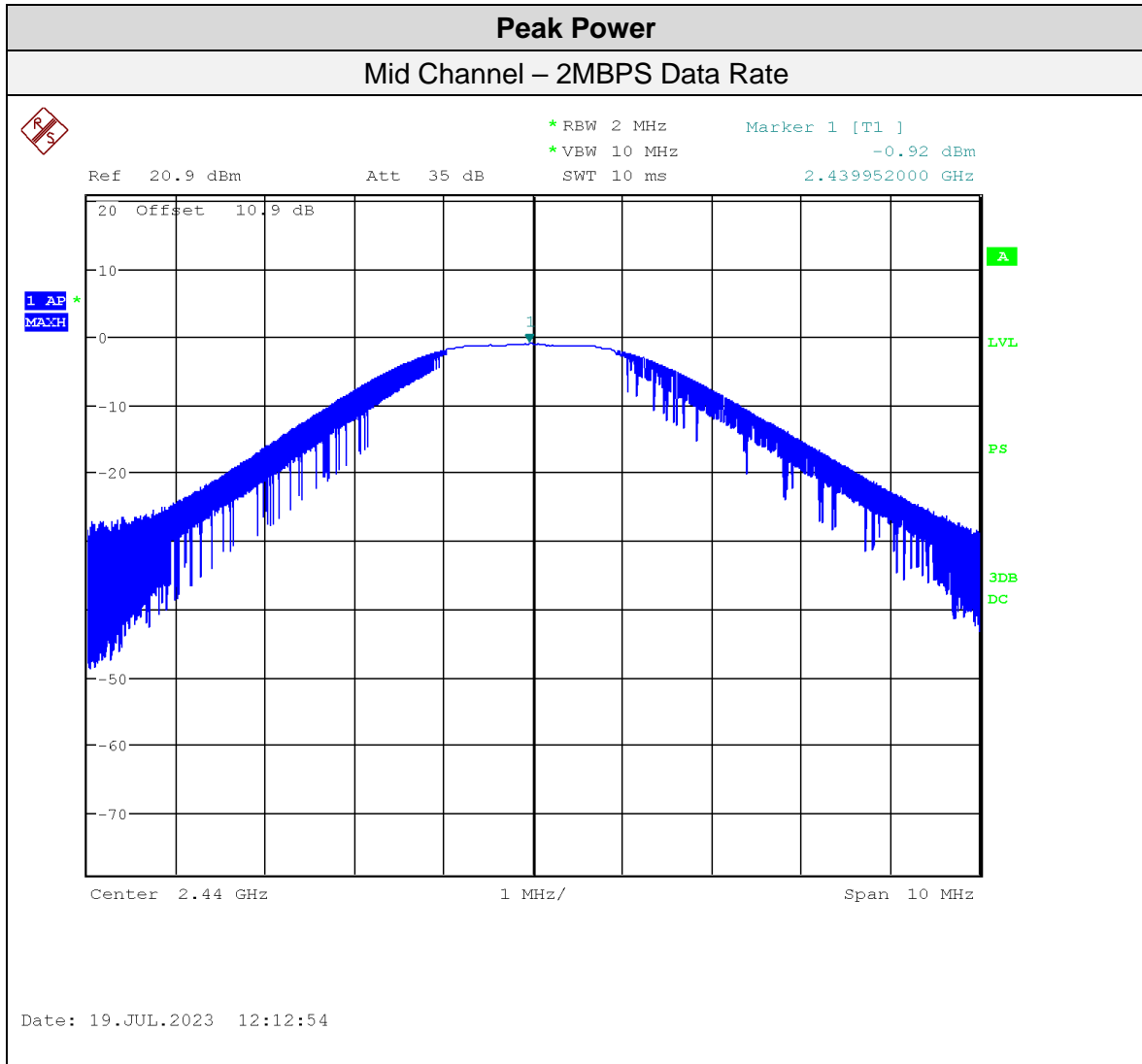
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



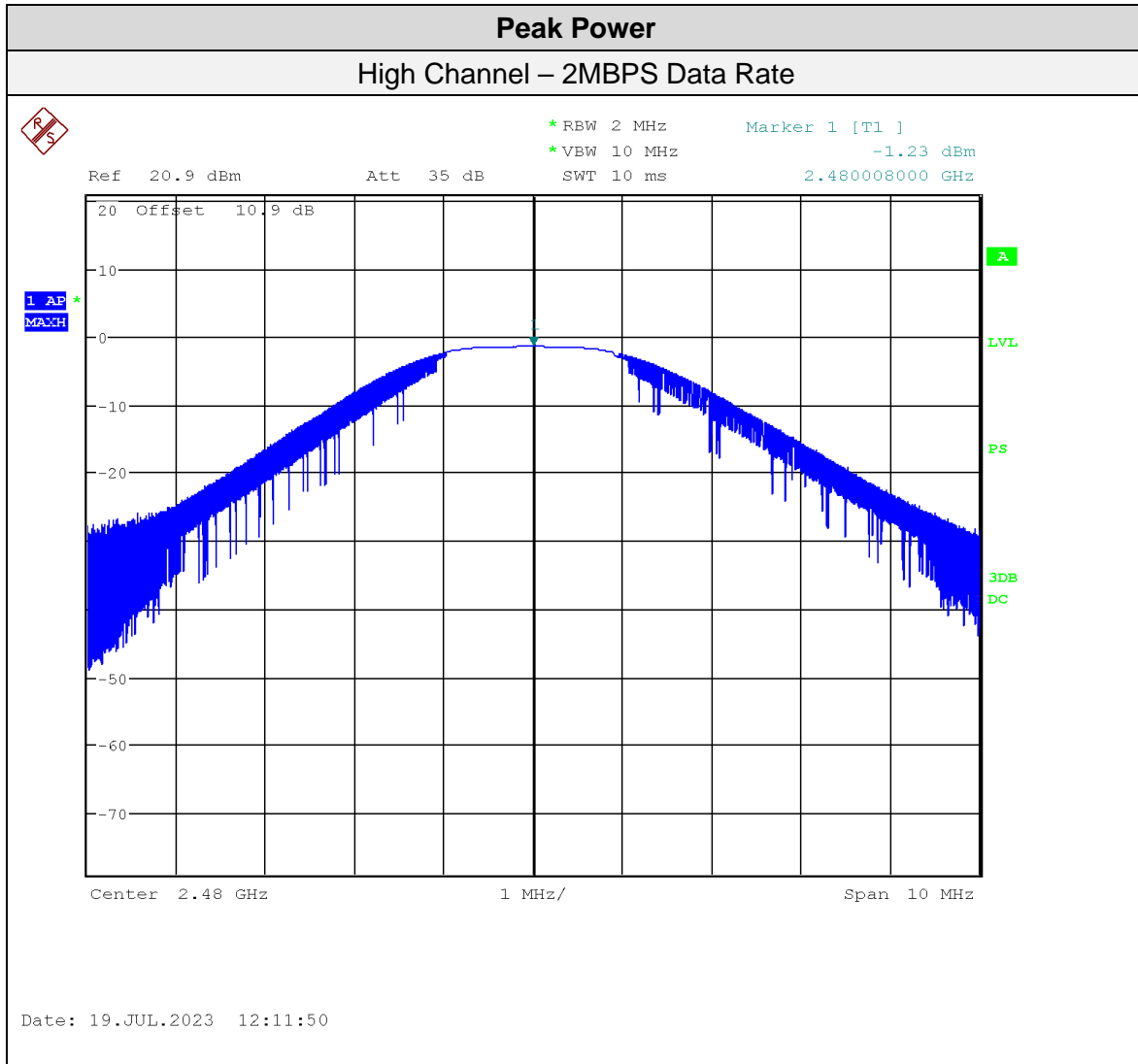
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



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See 'Appendix B – EUT and Test Setup Photos' for photos showing the test set-up.

Client	Starfish Medical	
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Attenuator 10 dB	8493B	Agilent	NCR	NCR	GEMC 133

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Antenna Spurious Conducted Emissions (-20 dBc Requirement)

Purpose

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.


Limits and Method

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.

The method is given in FCC KDB 558074 Section 11 and ANSI C63.10

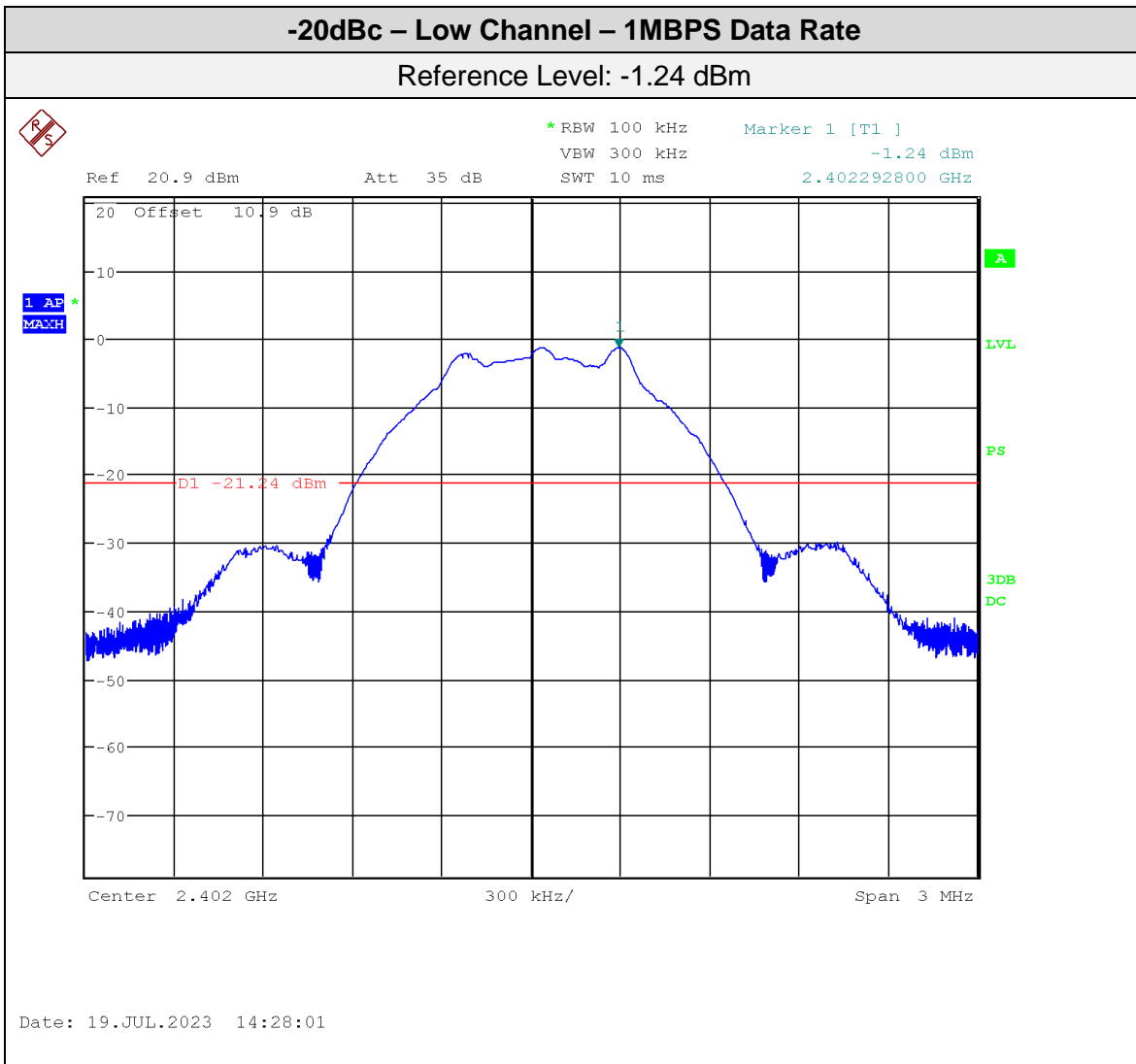
Results


The EUT passed. Low, middle and high bands were measured. The worst case is presented as a graph for the spectrum. The -20 dBc requirement is shown for the lower band edge at 2.4 GHz in the low band and for the higher band edge at 2.4835 GHz in the high band.

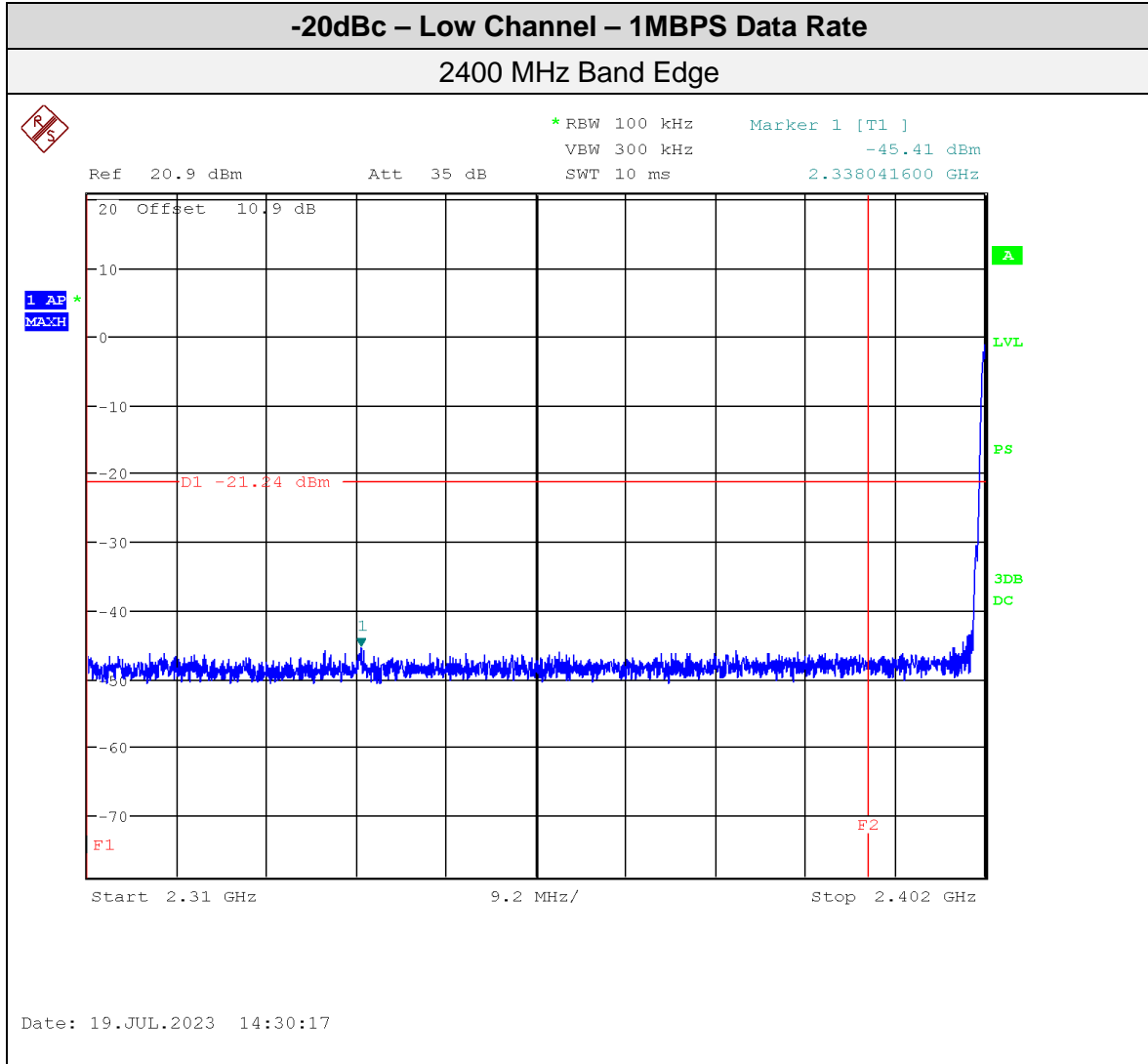
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	


Graphs

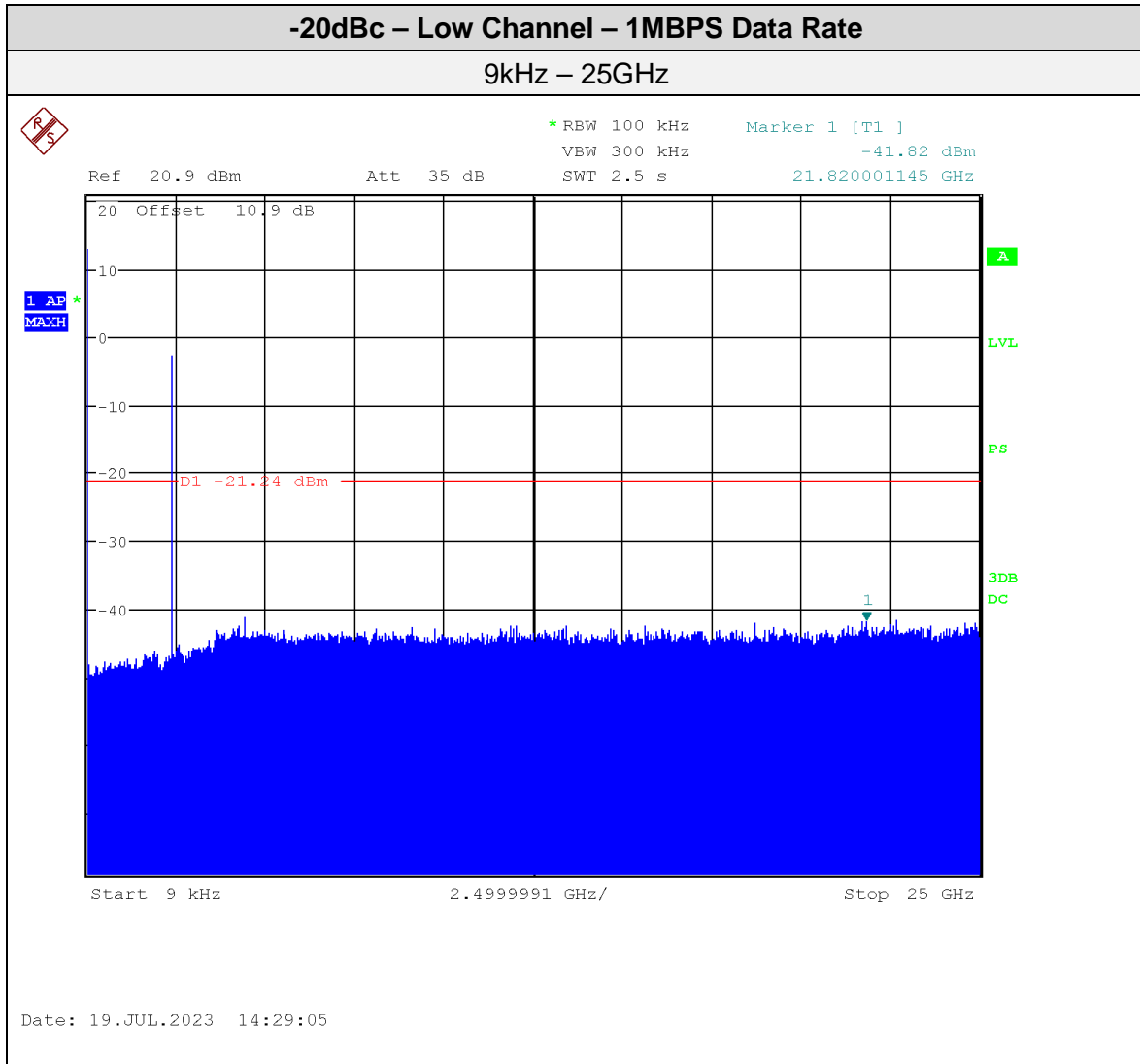
The graphs shown below show the power output of the device during the conducted measurement operation of the EUT.




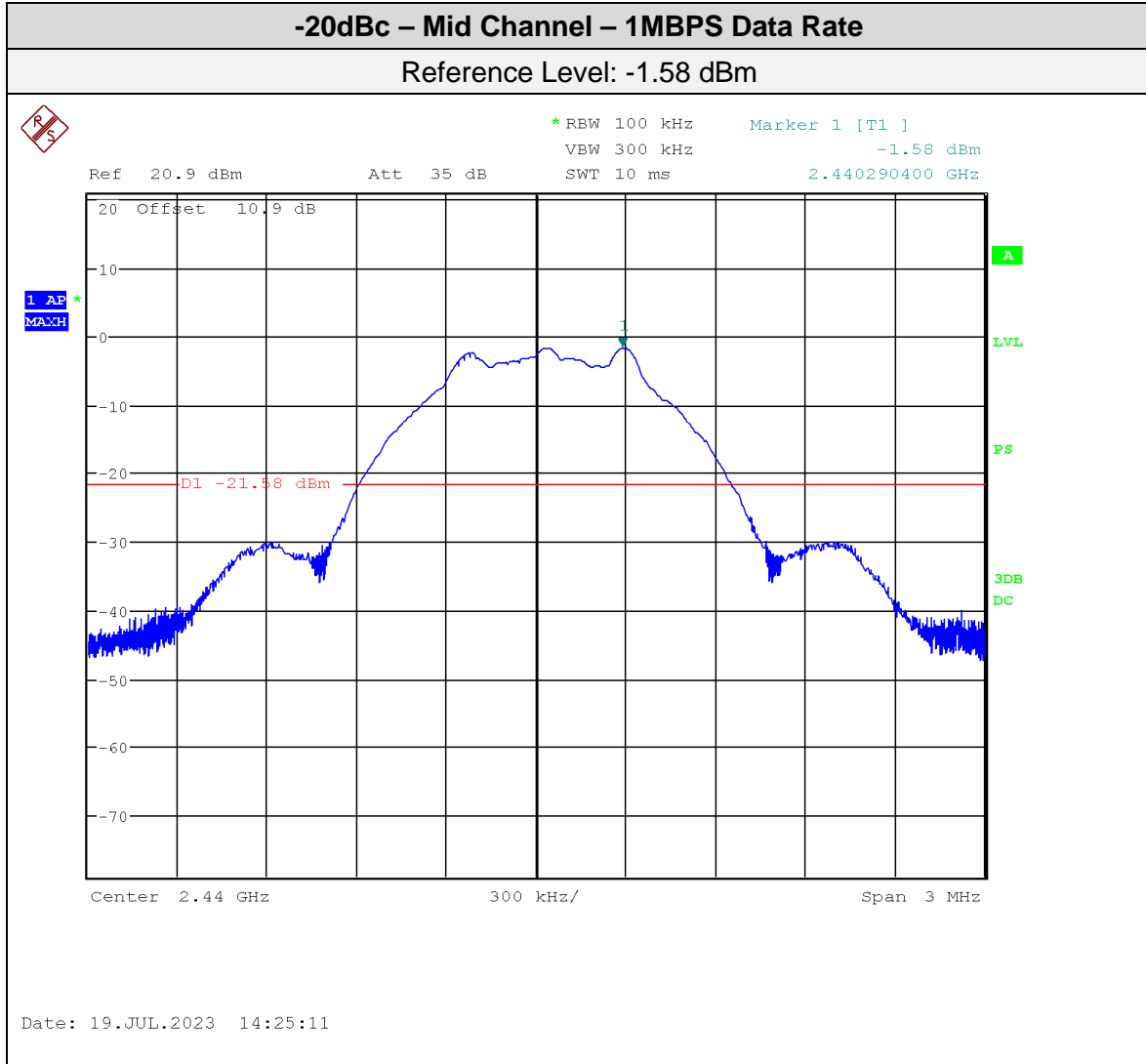
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




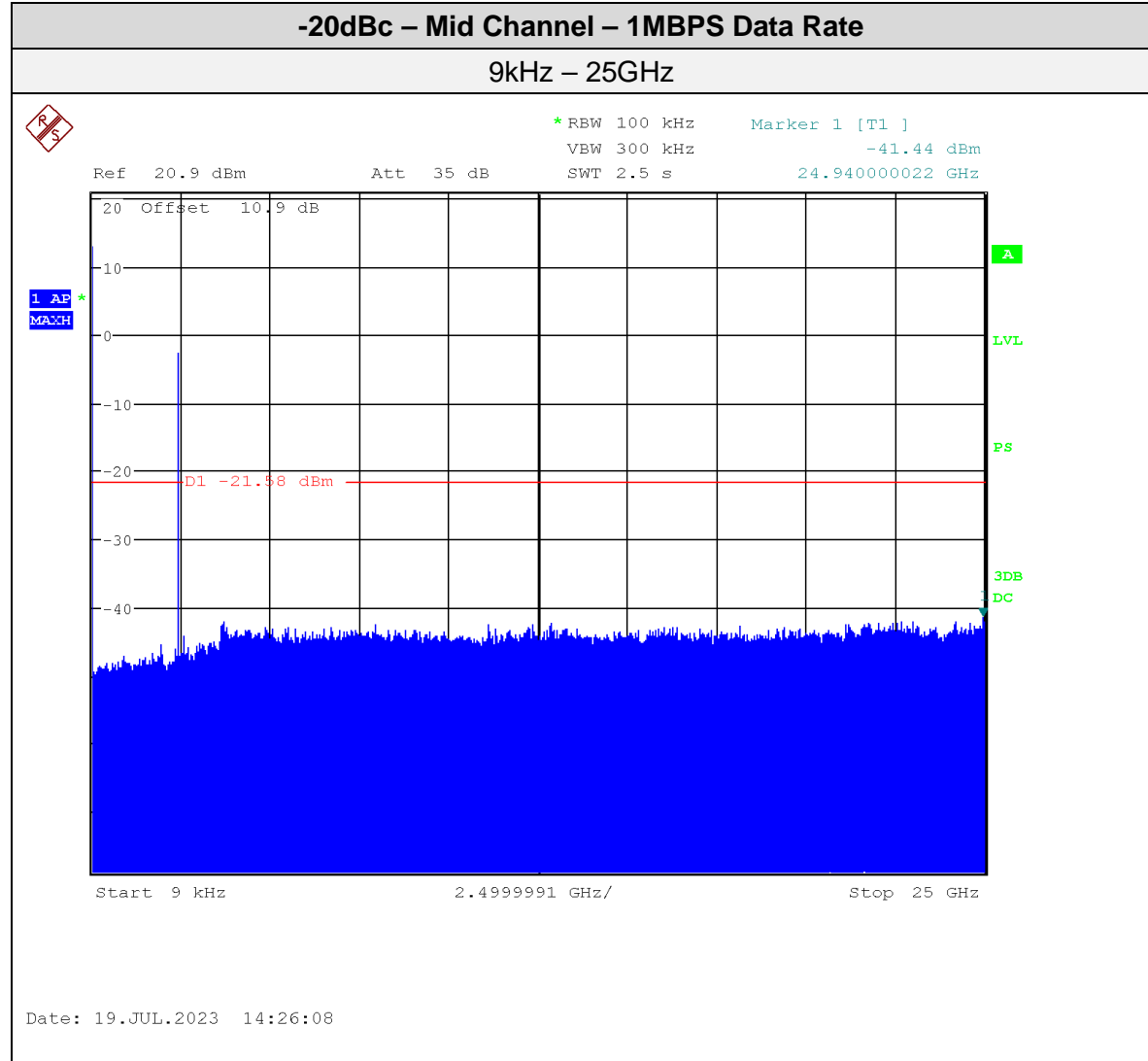
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Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




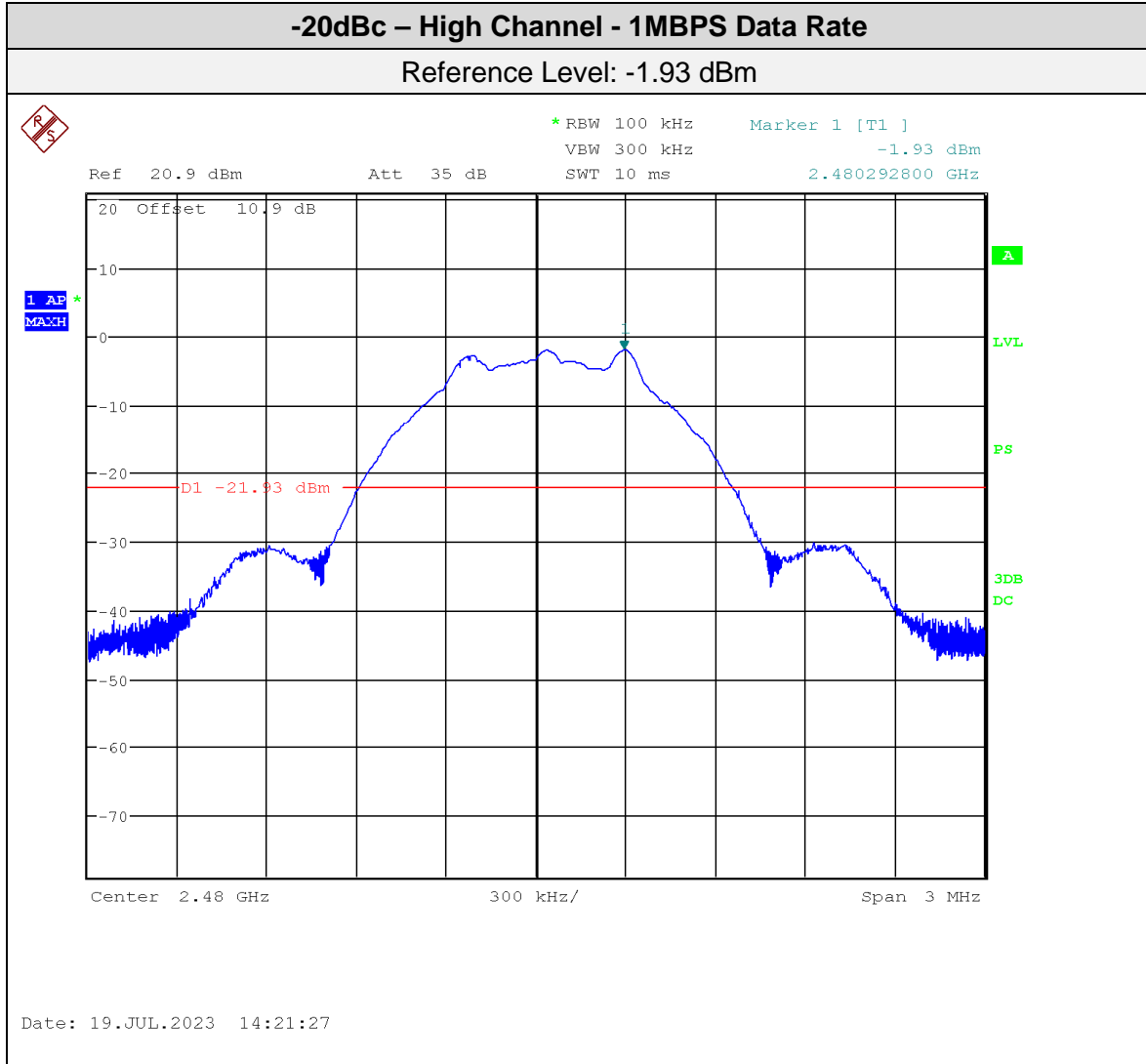
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




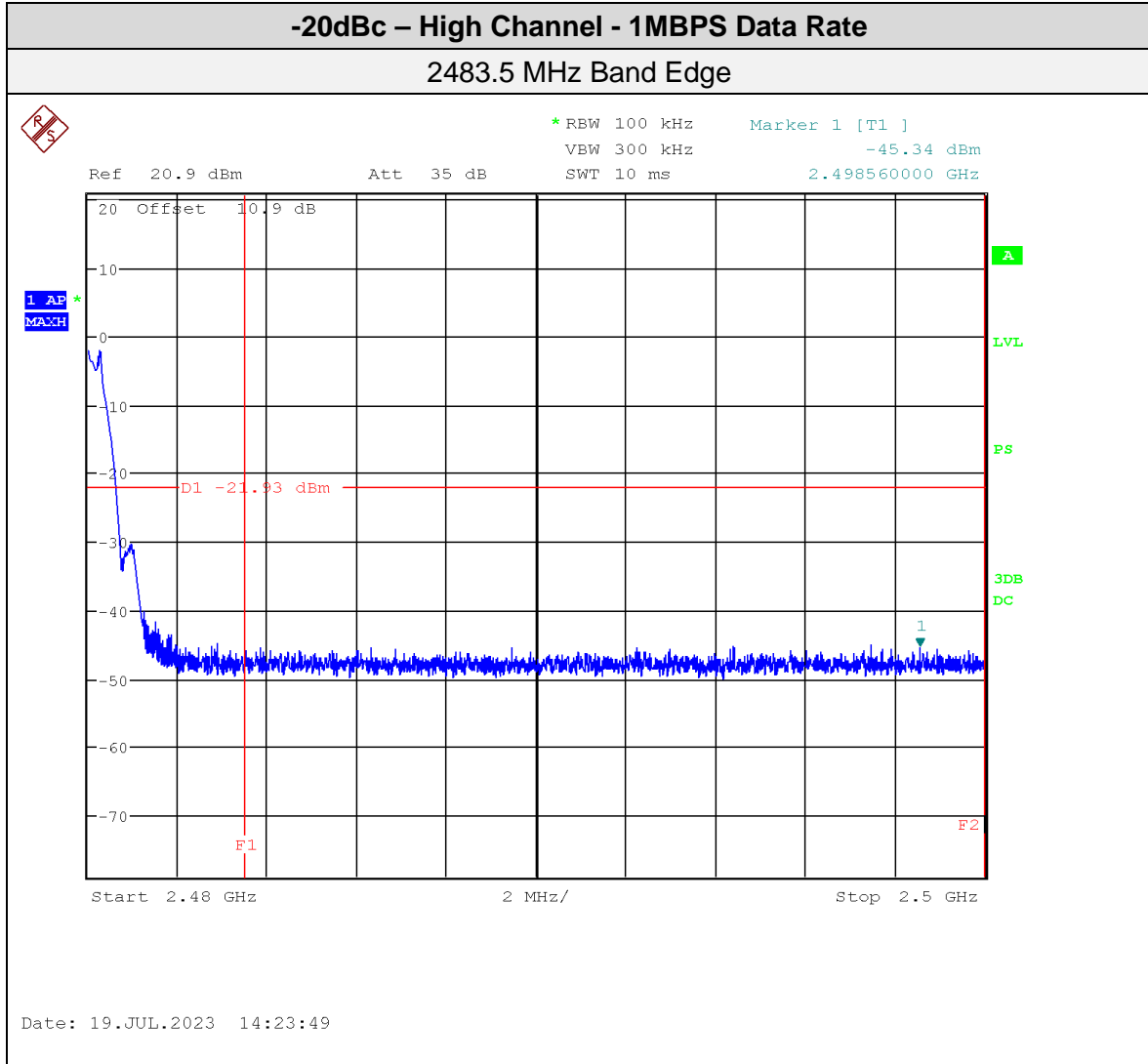
Client	Starfish Medical	 Canada
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Standard(s)	FCC Part 15 Subpart 15.247	



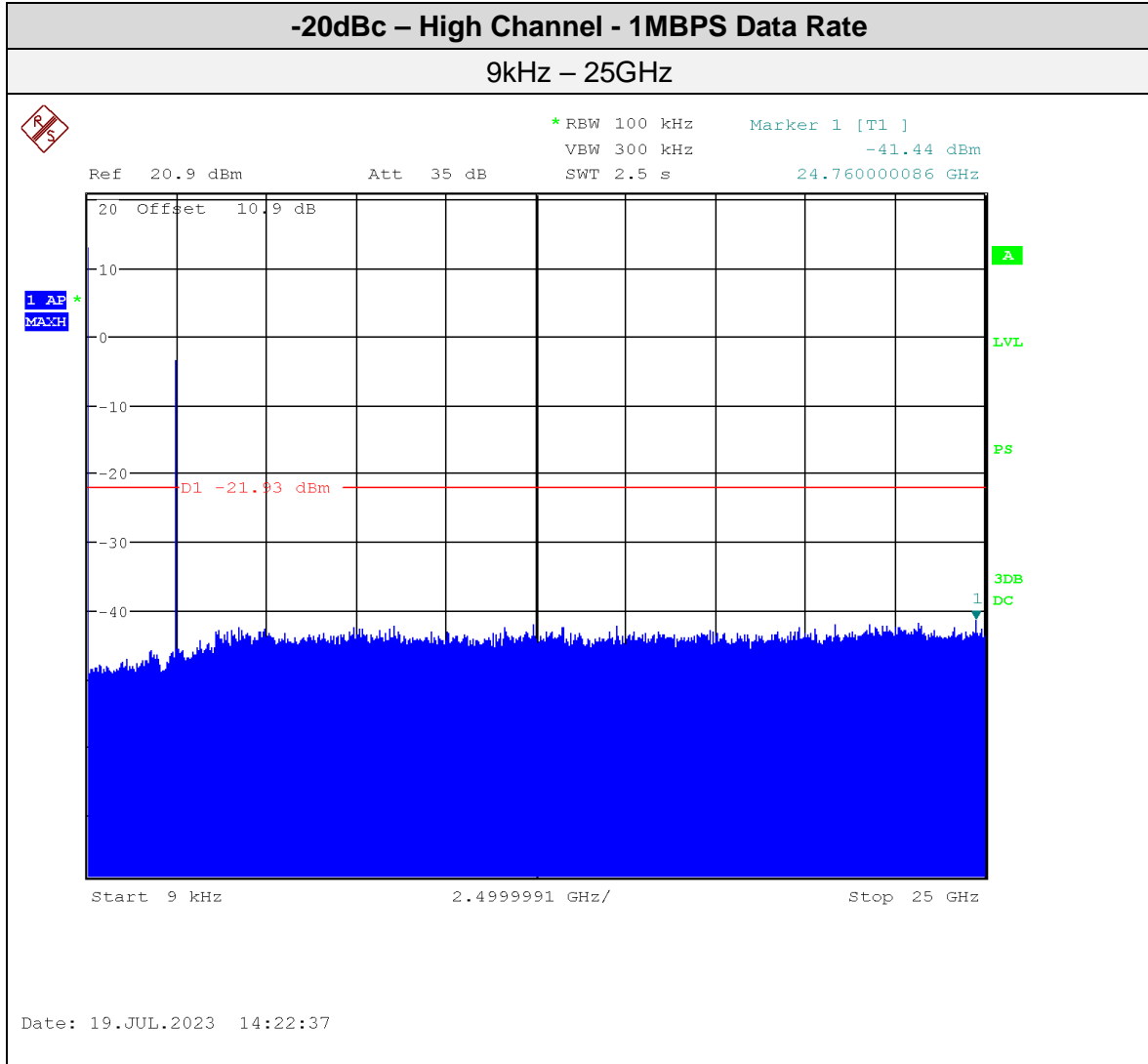
Client	Starfish Medical	 TÜV SÜD Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




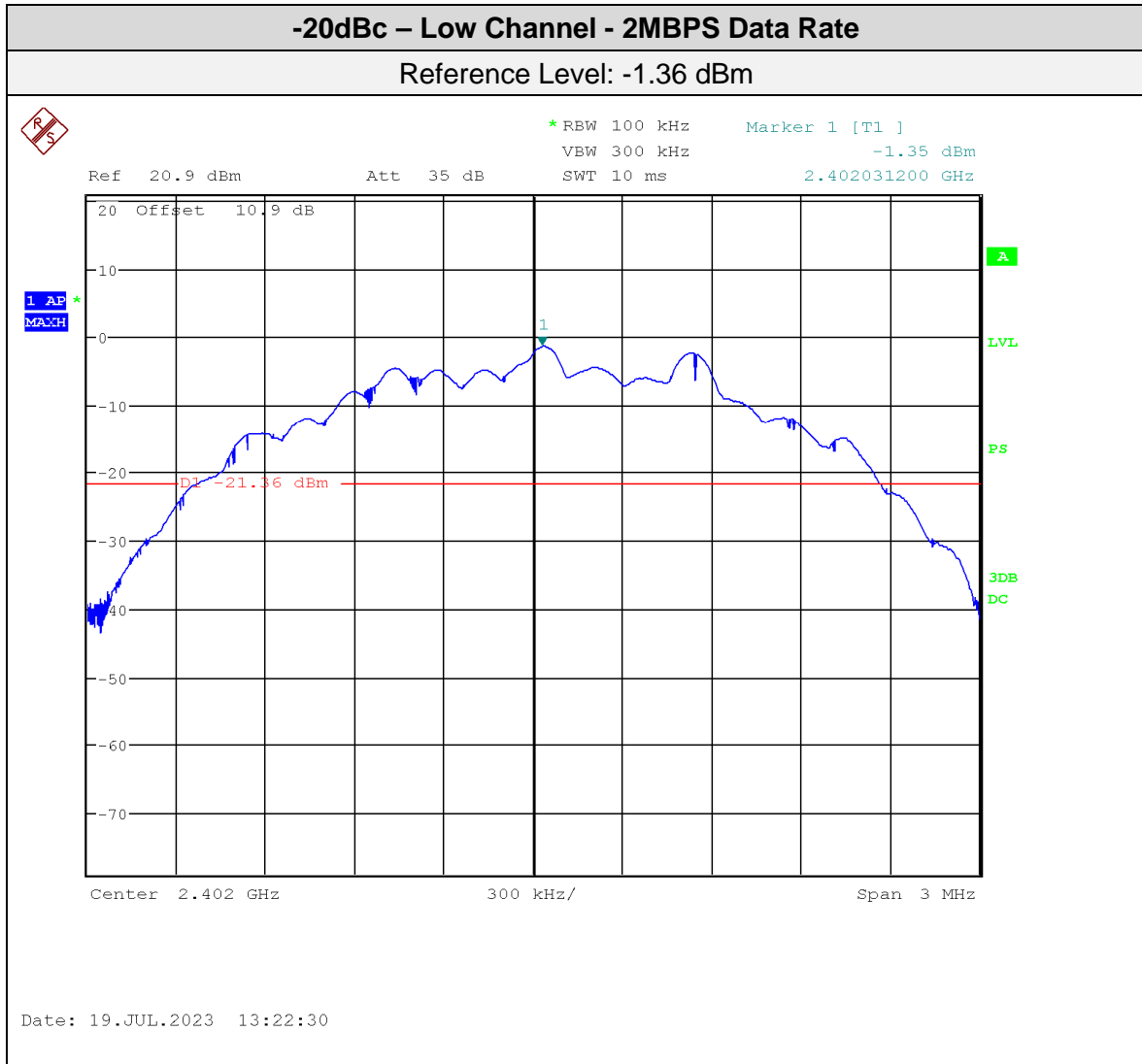
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




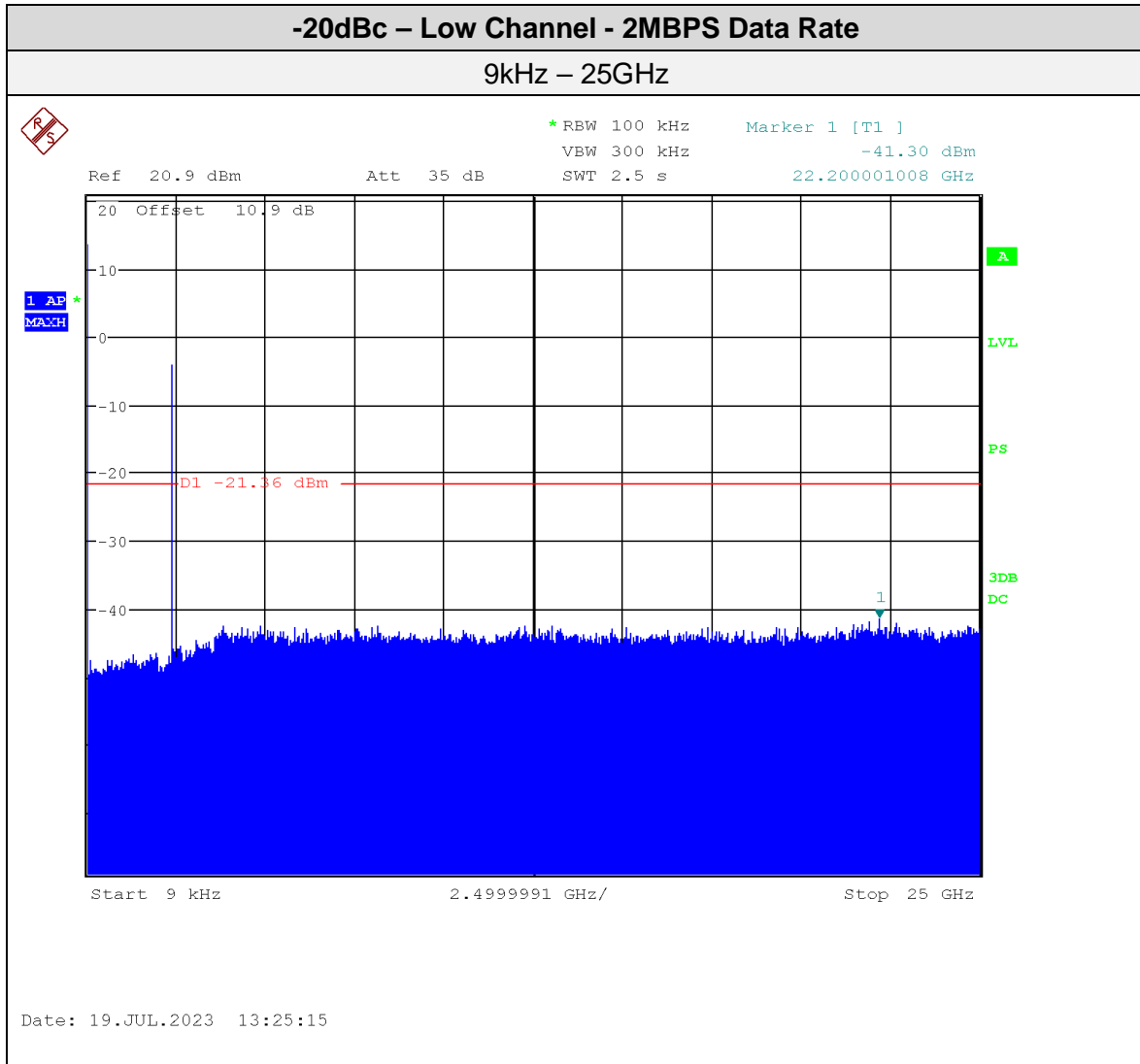
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




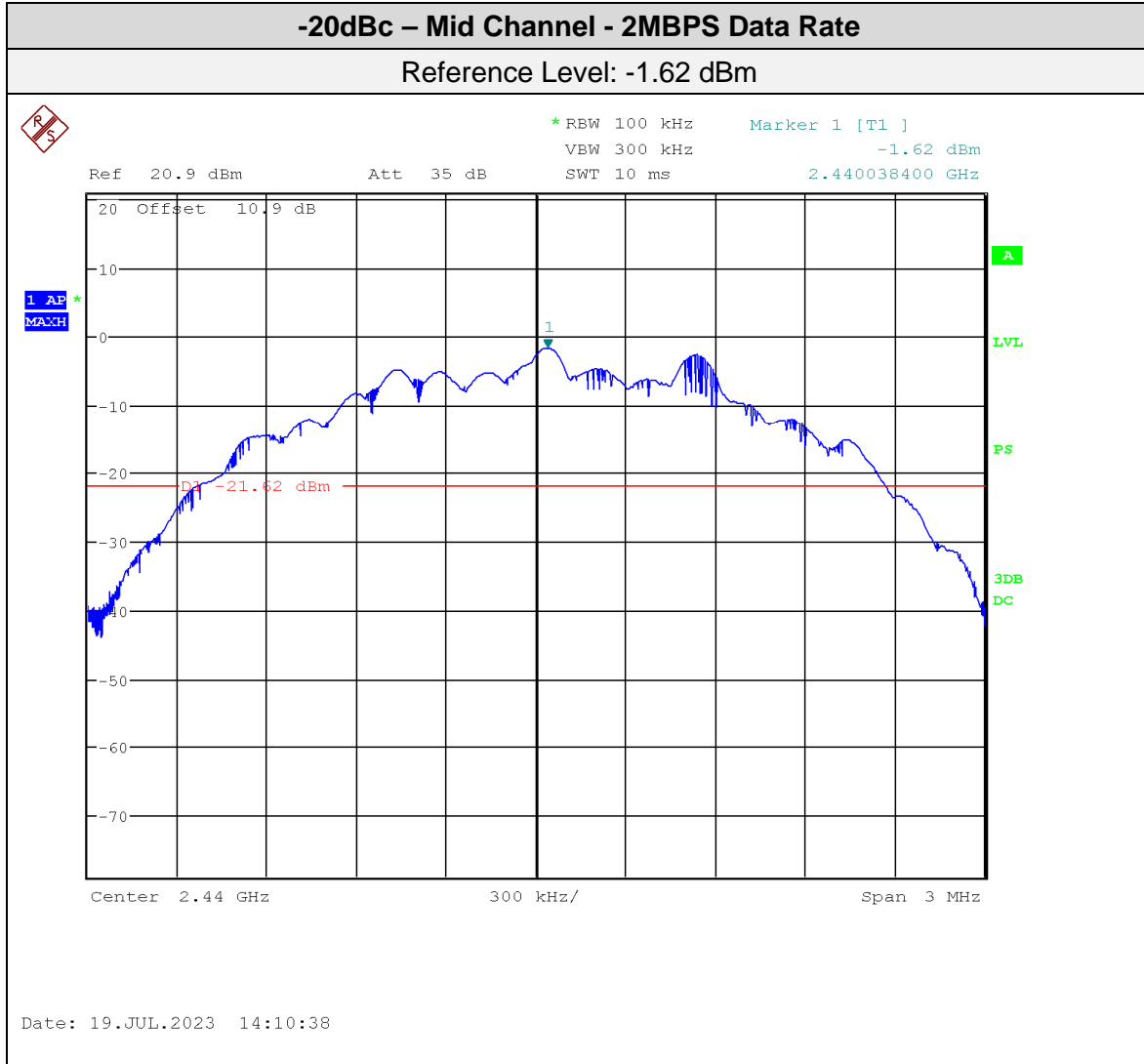
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




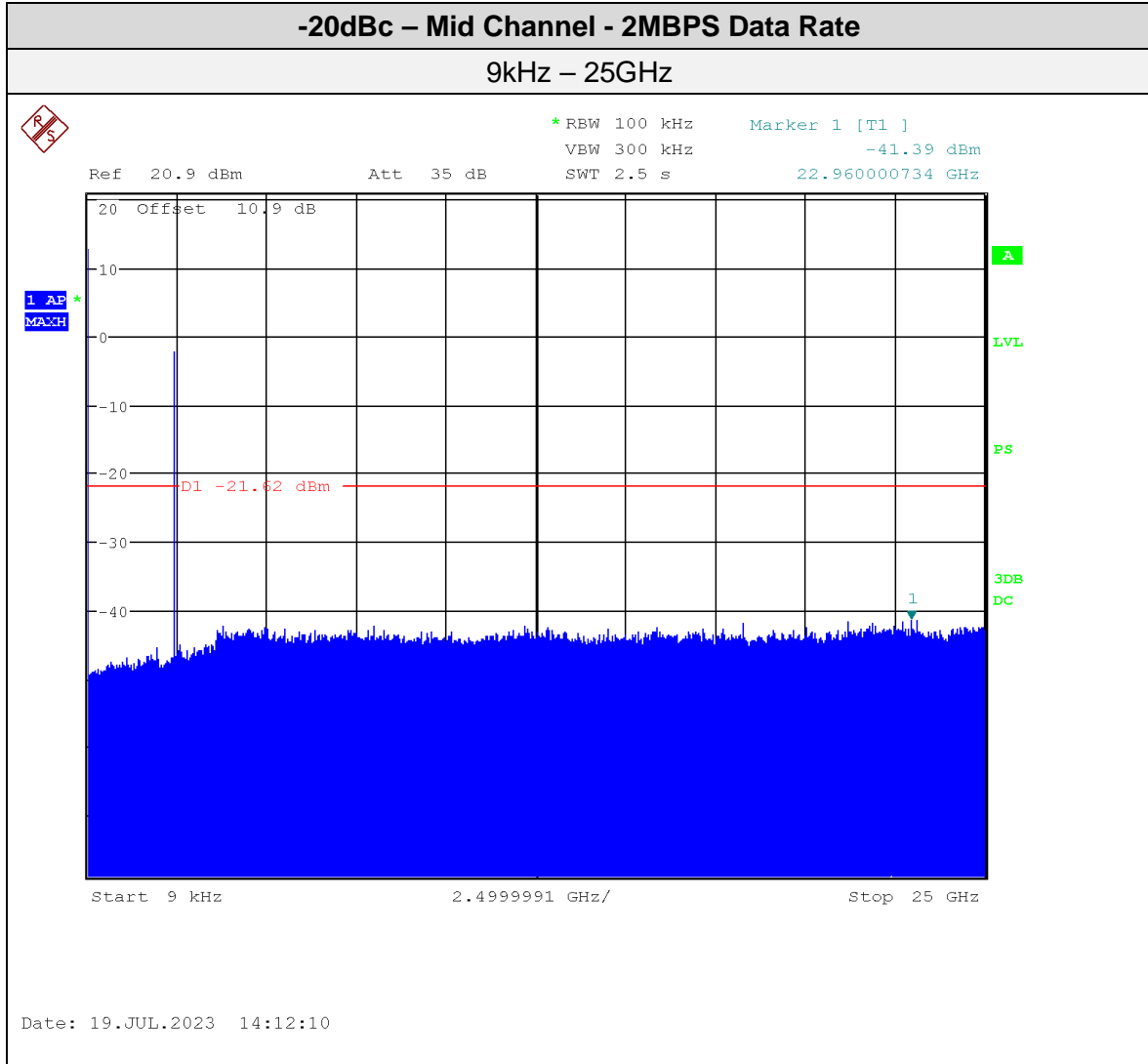
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




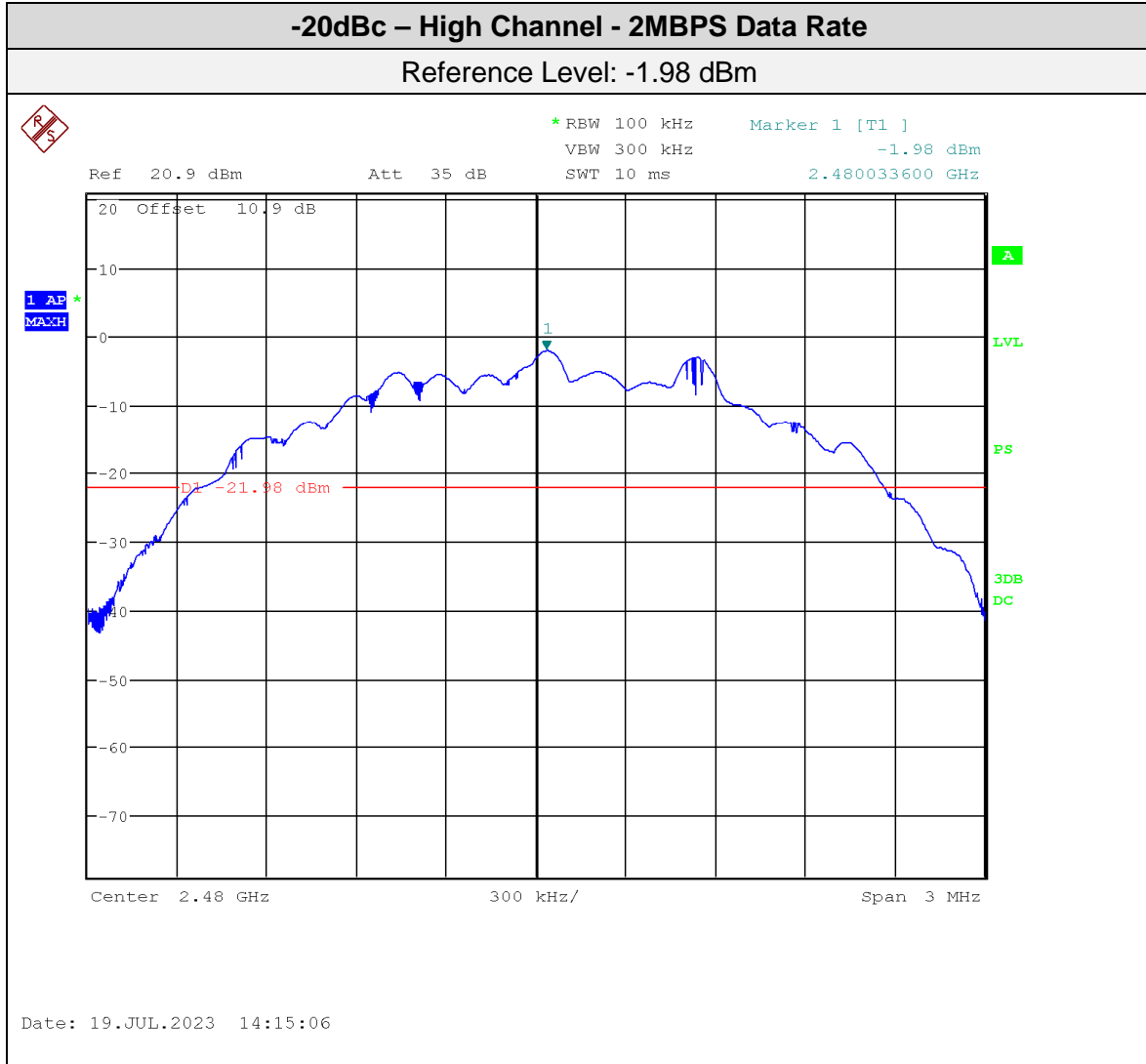
Client	Starfish Medical	 TÜV SÜD Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




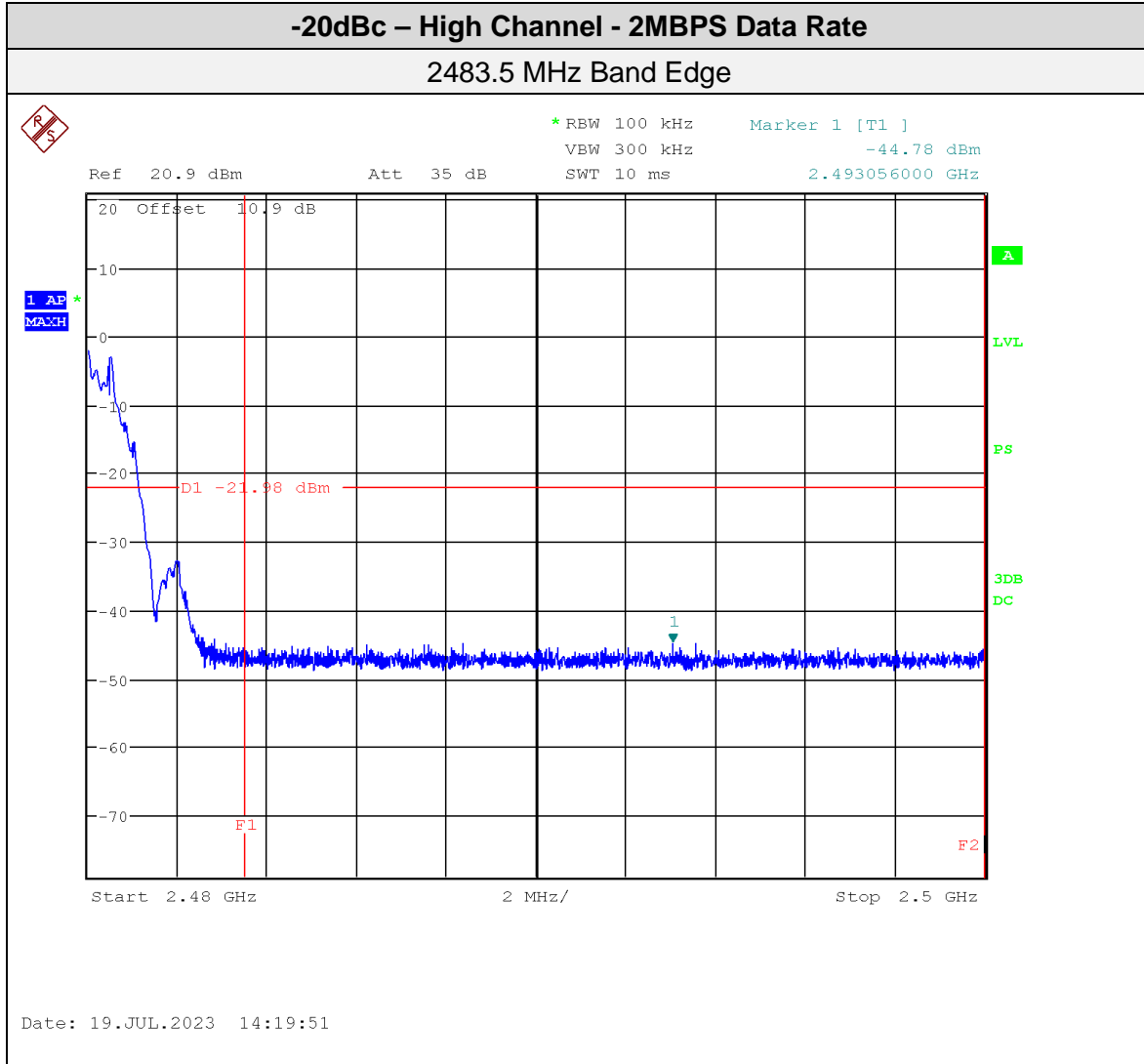
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




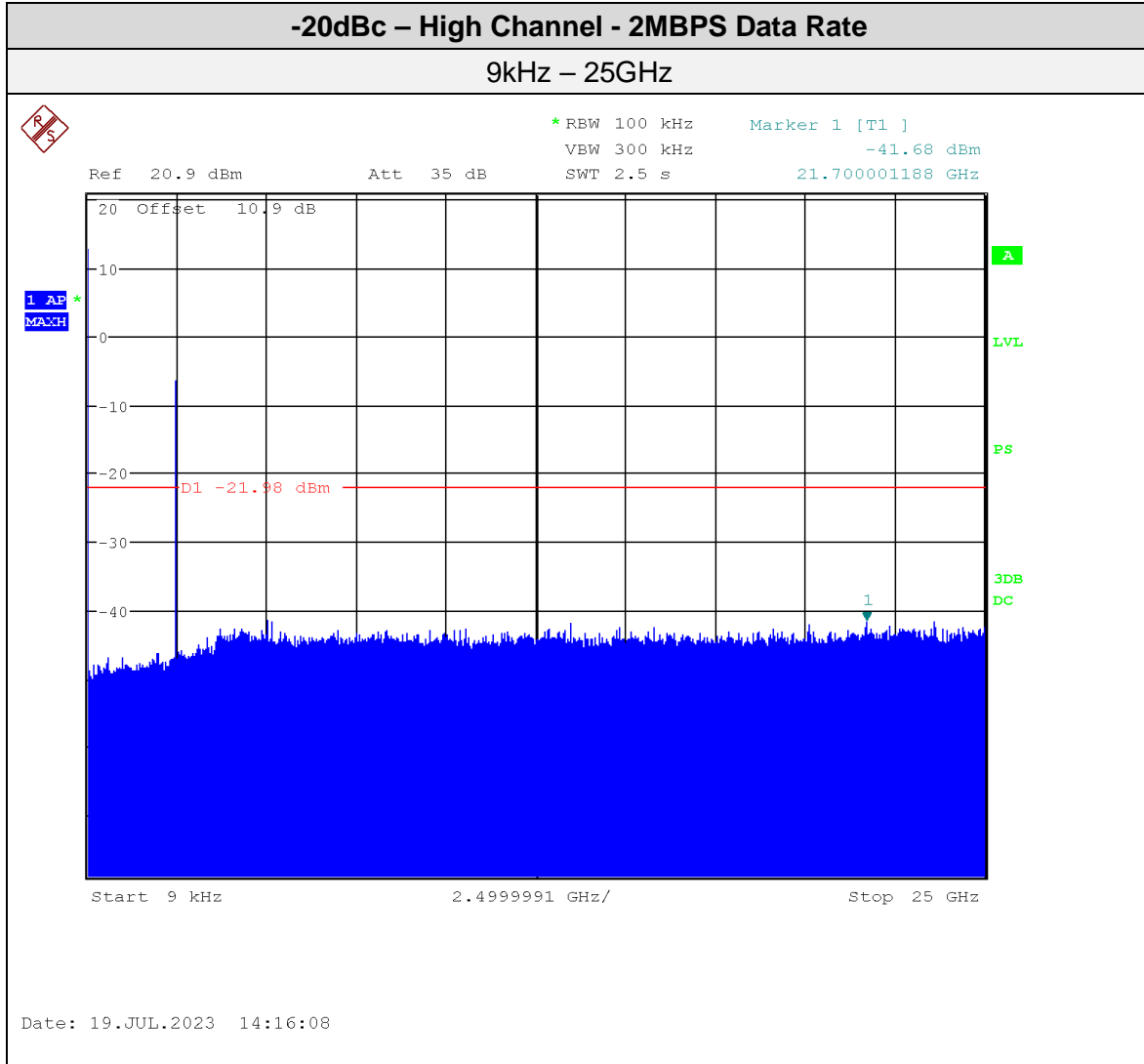
Client	Starfish Medical	 TÜV SÜD Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




See 'Appendix B – EUT and Test Setup Photos' for photos showing the test set-up.

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
EMI Receiver	ESU 40	Rohde & Schwarz	Feb. 11, 2022	Feb. 11, 2024	GEMC 233
Attenuator 10 dB	8493B	Agilent	NCR	NCR	GEMC 133

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Transmitter Spurious Radiated Emissions

Purpose

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.

Limits and Method

The method is as defined in FCC KDB 558074 Section 8.5 and ANSI C63.10 Section 6.10 and 11.11.

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 (-20dBc)’ for further details.


Frequency	Field Strength Limit ($\mu\text{V/m}$)	Field Strength at 3m (dB $\mu\text{V/m}$)
0.009 MHz – 0.490 MHz	2400/F(kHz) ^a (at 300m)	128.5 to 93.8 ^a
0.490 MHz – 1.705 MHz	24000/F(kHz) ^a (at 30m)	73.8 to 63.0 ^a
1.705 MHz – 30 MHz	30 ^a (at 30m)	69.5 ^a
30 MHz – 88 MHz	100 ^a (at 3m)	40.0 ^a
88 MHz – 216 MHz	150 ^a (at 3m)	43.5 ^a
216 MHz – 960 MHz	200 ^a (at 3m)	46.0 ^a
Above 960 MHz	500 ^a (at 3m)	54.0 ^a
Above 1000 MHz	500 ^b (at 3m)	54.0 ^b
Above 1000 MHz	5 mV/m ^c (at 3m)	74.0 ^c

^aLimit is with Quasi Peak detector with bandwidths as defined in CISPR-16-1-1

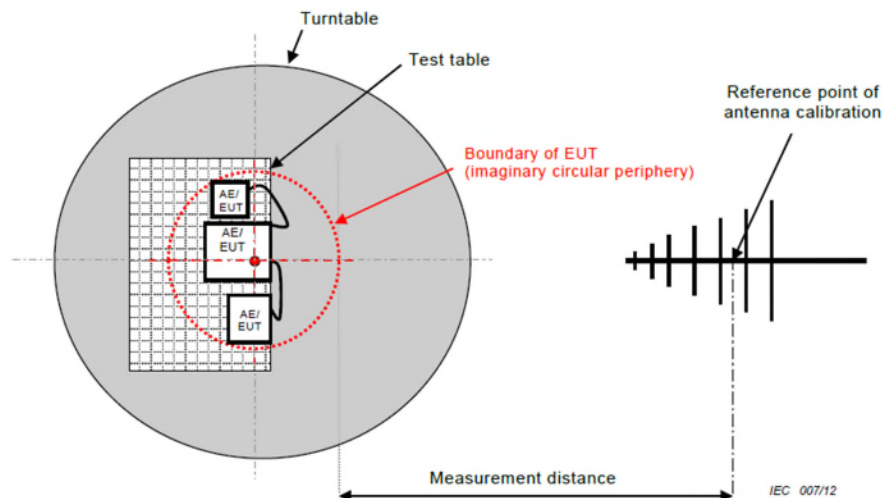
^bLimit is with 1 MHz measurement bandwidth and using an Average detector

^cLimit is with 1 MHz measurement bandwidth and using a Peak detector

Based on ANSI C63.4 Section 4.2, if the Peak detector measurements do not exceed the Quasi-Peak limits, where defined, then the EUT is deemed to have passed the requirements.

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Typical Radiated Emissions Setup



Measurement Uncertainty

The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is $\pm 5.68\text{dB}$ for 30MHz – 1GHz and $\pm 4.66\text{dB}$ for 1GHz – 18GHz with a 'k=2' coverage factor and a 95% confidence level.


Preliminary 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.

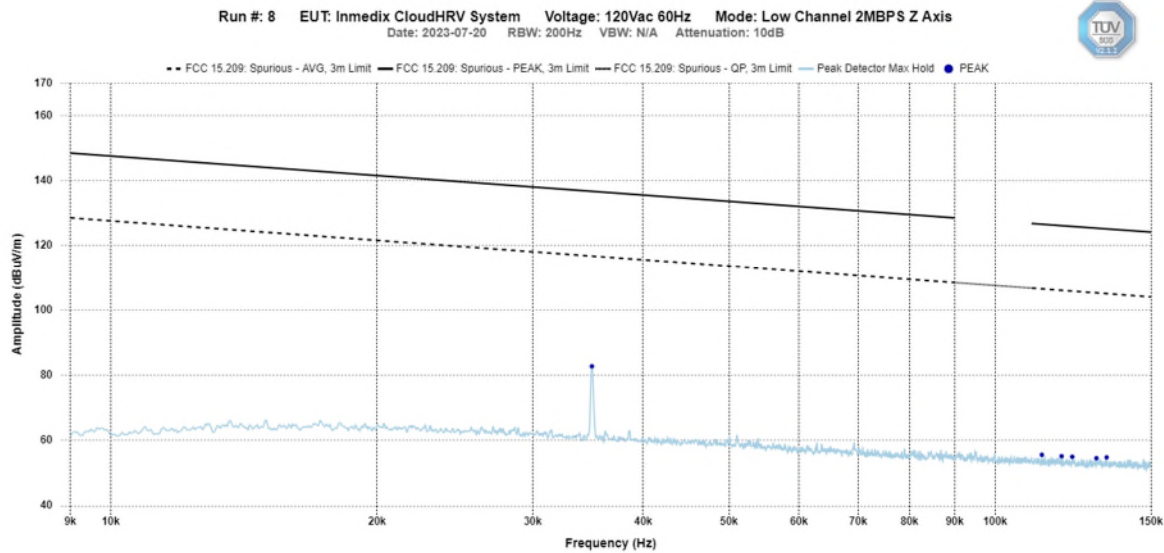
In accordance with FCC Part 15, Subpart A, Section 15.33, the device was scanned to the 10th harmonic (a minimum of 24.835 GHz).

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.

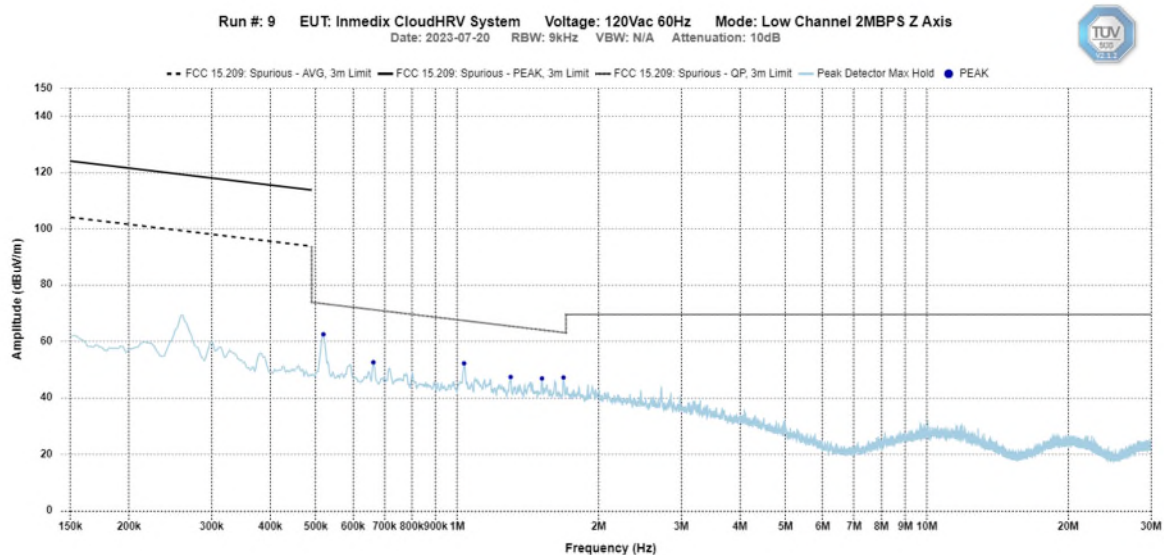
Peak output power for low, middle and high channels and each in three orthogonal axes were checked. The worst case was used for the spurious emissions which was the 2MBPS data rate on the low channel and in the Z-axis. Band-edge measurement graphs are shown for illustration purposes. See final measurement section for all measurements. Graphs for the worst-case, Z-axis, are presented.

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	


Spurious Emissions

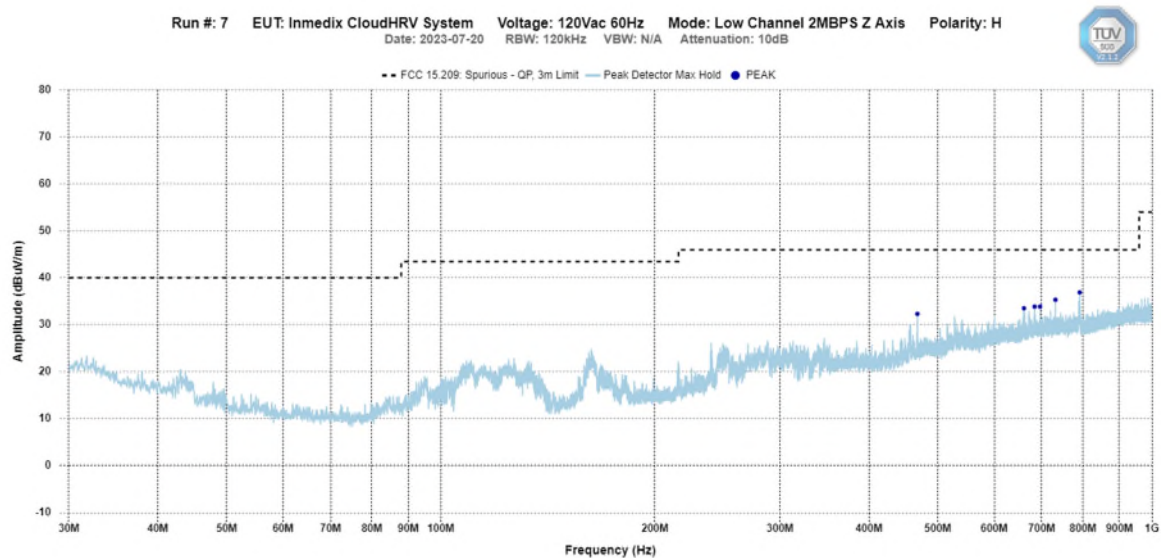


Low Channel
9 kHz – 150 kHz
Peak Emission Graph

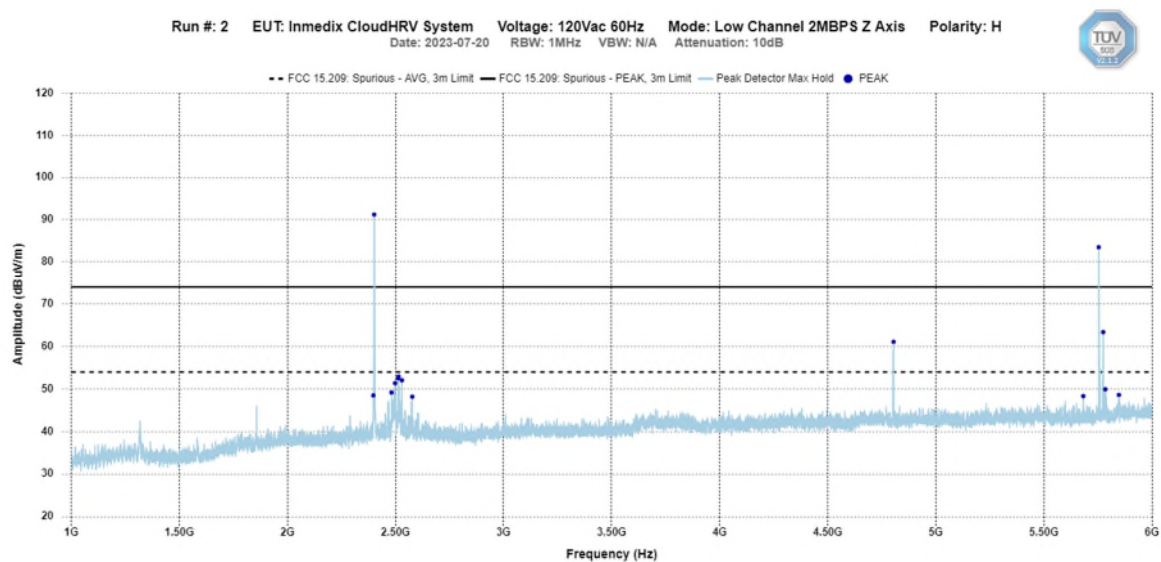


Low Channel
150 kHz – 30 MHz
Peak Emission Graph

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




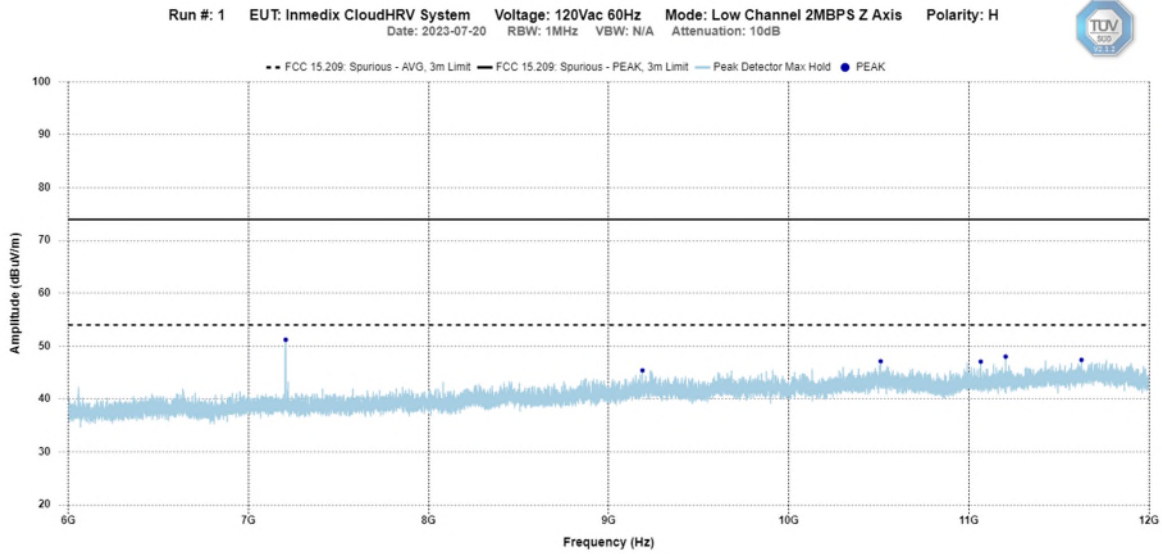
Low Channel – 30 MHz – 1 GHz
Horizontal - Peak Emission Graph



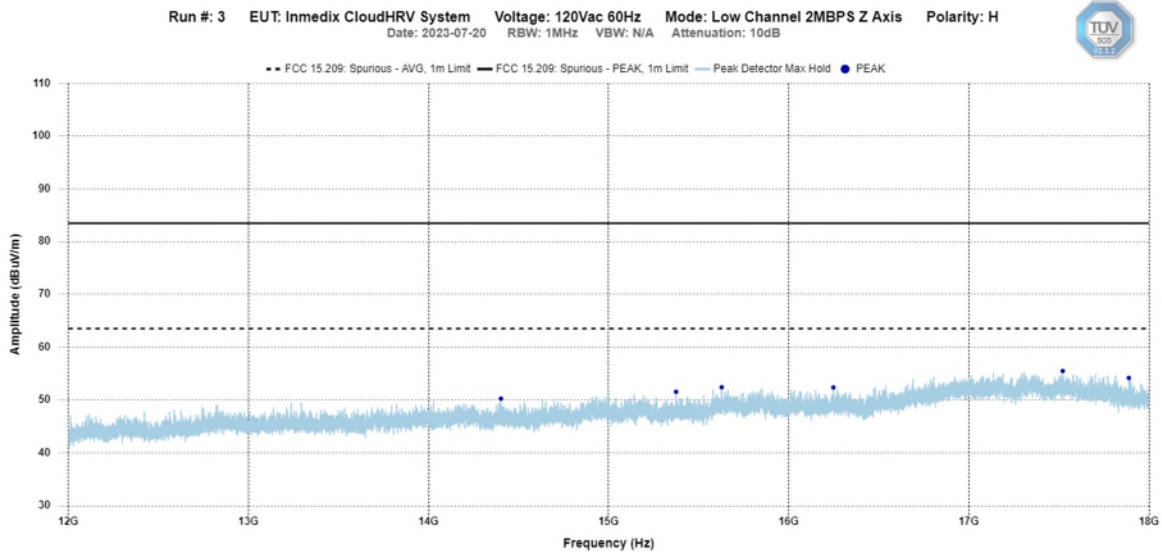
Low Channel – 1 GHz – 6 GHz
Horizontal - Peak Emission Graph

NOTE: The emissions at 2.4GHz and 5.8GHz are from the intentional BLE radiator and the iPad's intentional WiFi transmitter, respectively. Therefore, these emissions are not considered during the final measurements of spurious emissions.

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




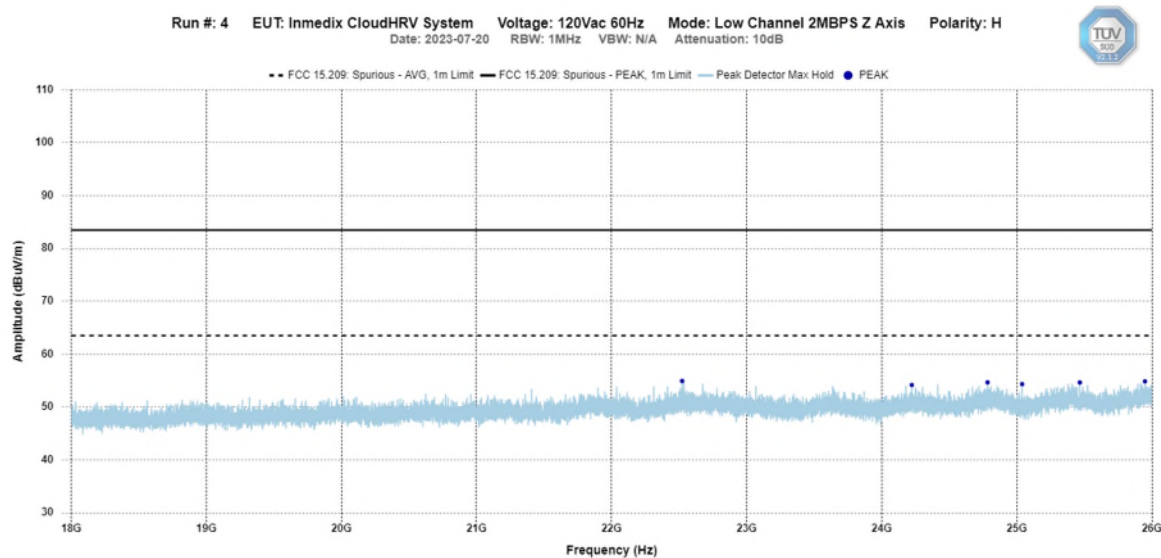
Low Channel – 6 GHz – 12 GHz
Horizontal - Peak Emission Graph



Low Channel – 12 GHz – 18 GHz
Horizontal - Peak Emission Graph

Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. No emissions were found in this frequency range.

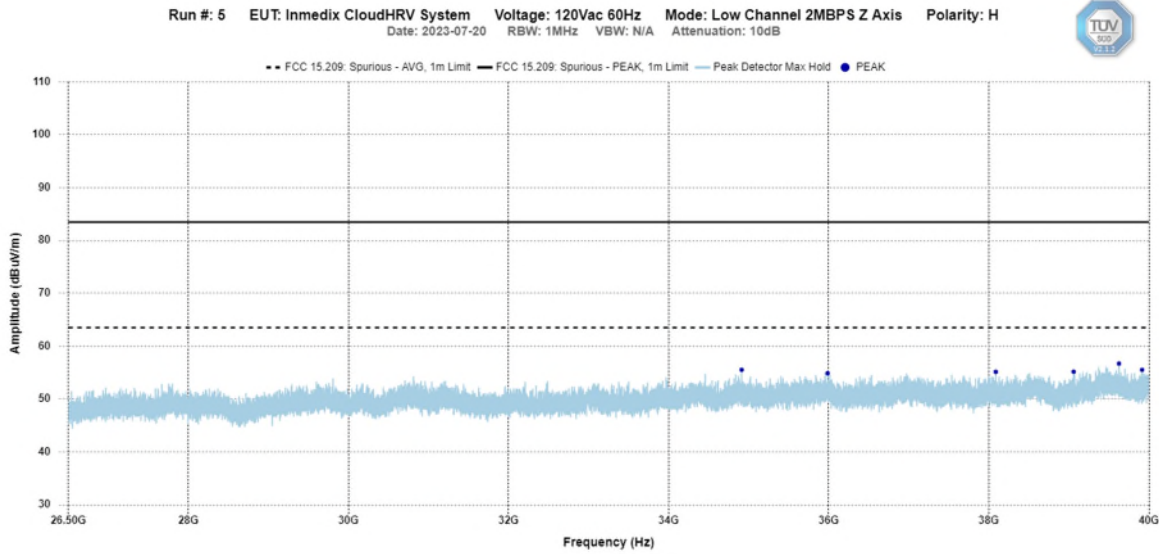
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Low Channel – 18 GHz – 26 GHz
Horizontal - Peak Emission Graph

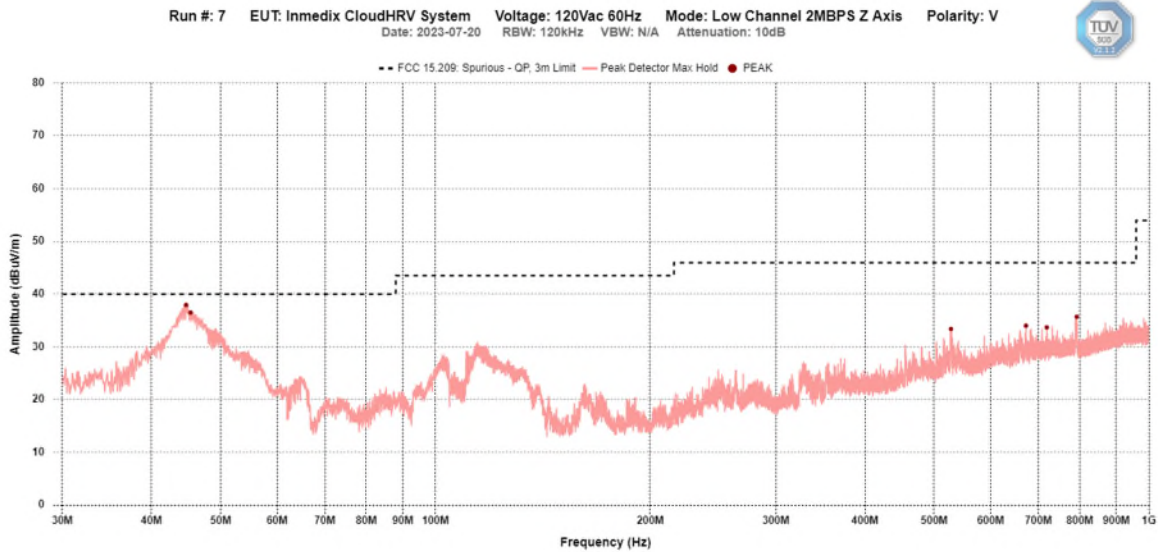
Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. No emissions were found in this frequency range.

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




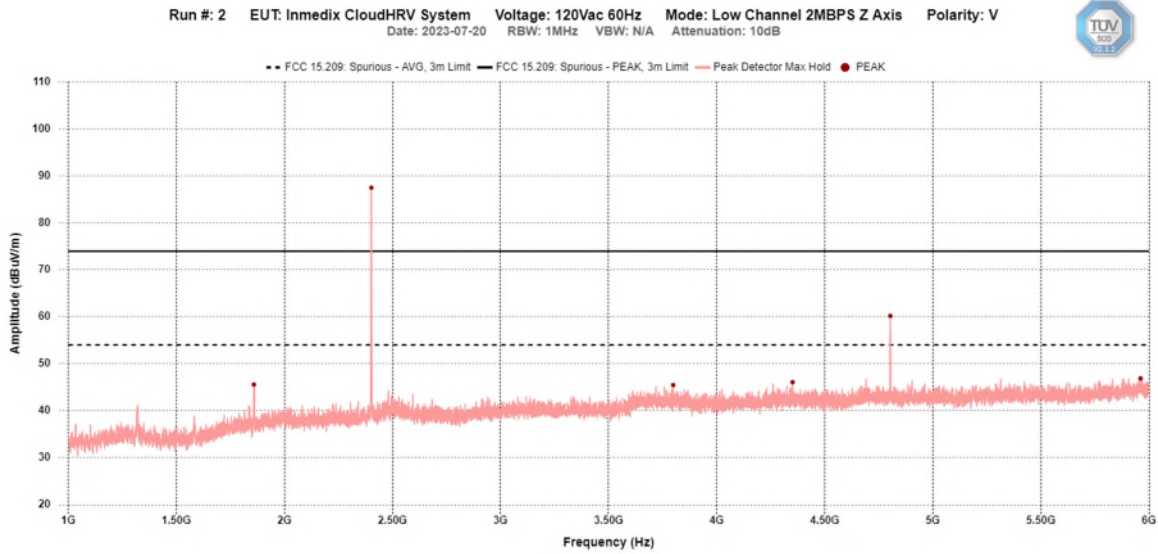
Low Channel – 26 GHz – 40 GHz
Horizontal - Peak Emission Graph

Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. No emissions were found in this frequency range.



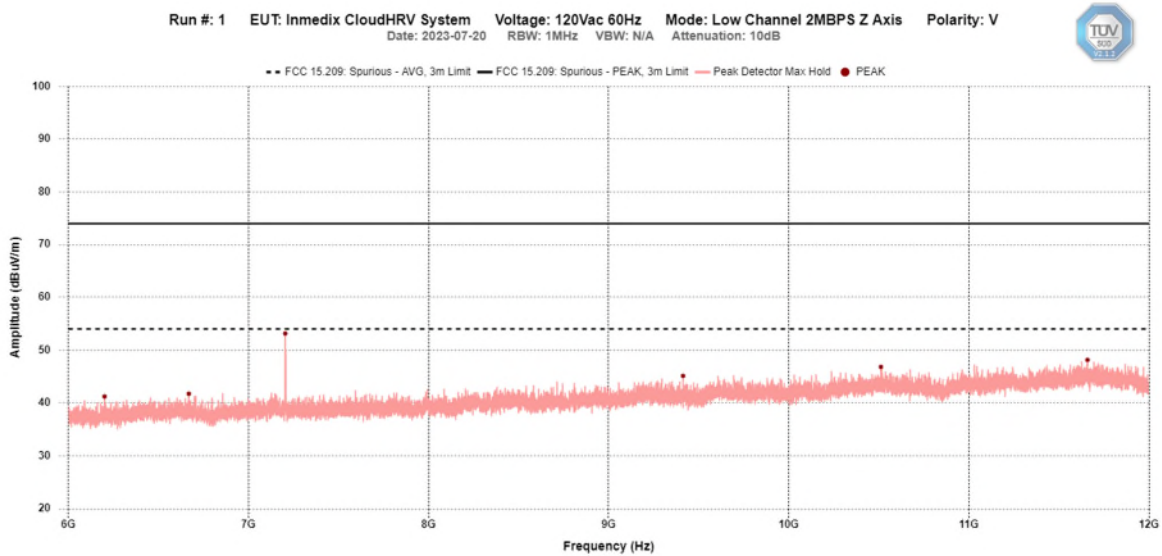
Low Channel – 30 MHz – 1 GHz
Vertical - Peak Emission Graph

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




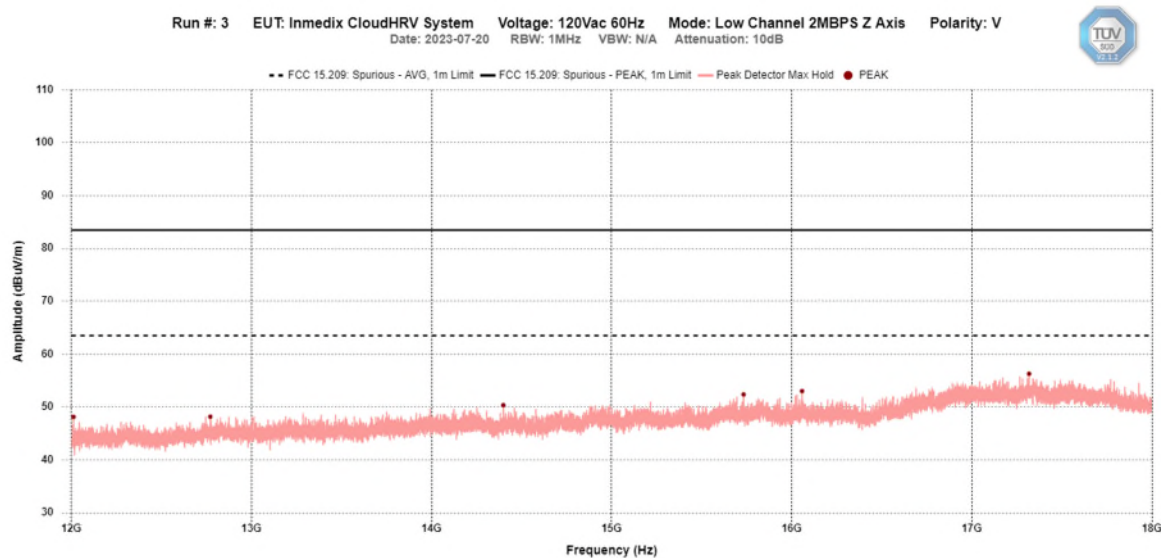
Low Channel – 1 GHz – 6 GHz
Vertical - Peak Emission Graph

NOTE: The emissions at 2.4GHz and 5.8GHz are from the intentional BLE radiator and the iPad's intentional WiFi transmitter, respectively. Therefore, these emissions are not considered during the final measurements of spurious emissions.




Low Channel – 6 GHz – 12 GHz
Vertical - Peak Emission Graph

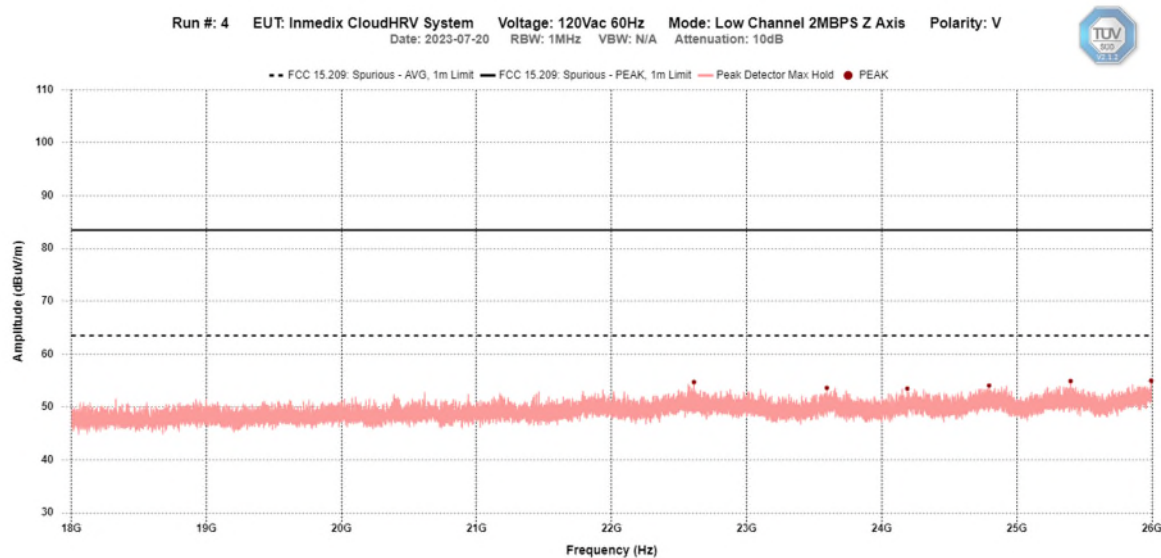
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Low Channel – 12 GHz – 18 GHz
Vertical - Peak Emission Graph


Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. No emissions were found in this frequency range.

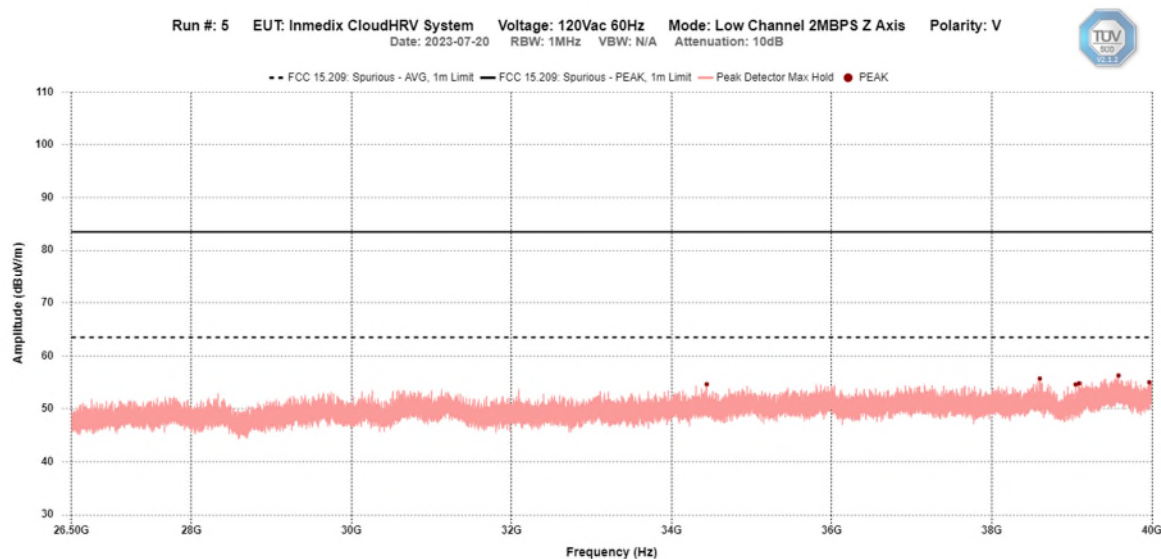
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Low Channel – 18 GHz – 26 GHz
Vertical - Peak Emission Graph

Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. No emissions were found in this frequency range.

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

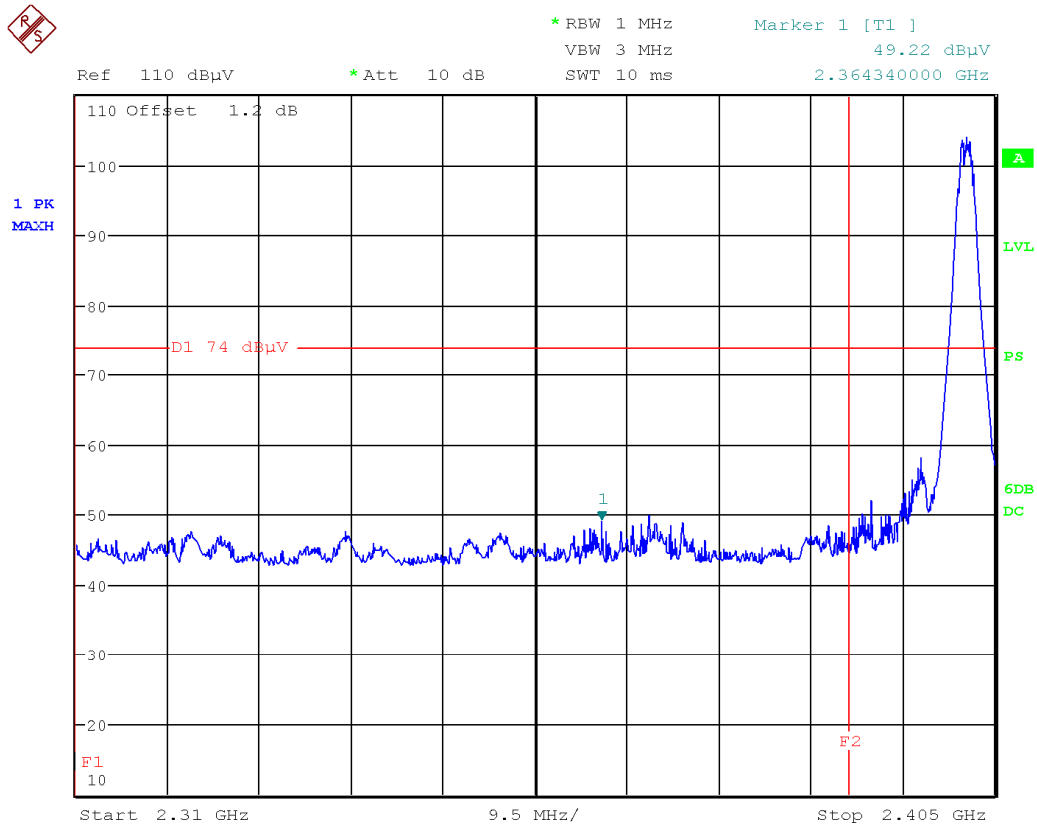


Low Channel – 26 GHz – 40 GHz
Vertical - Peak Emission Graph

Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. No emissions were found in this frequency range.

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Band Edges

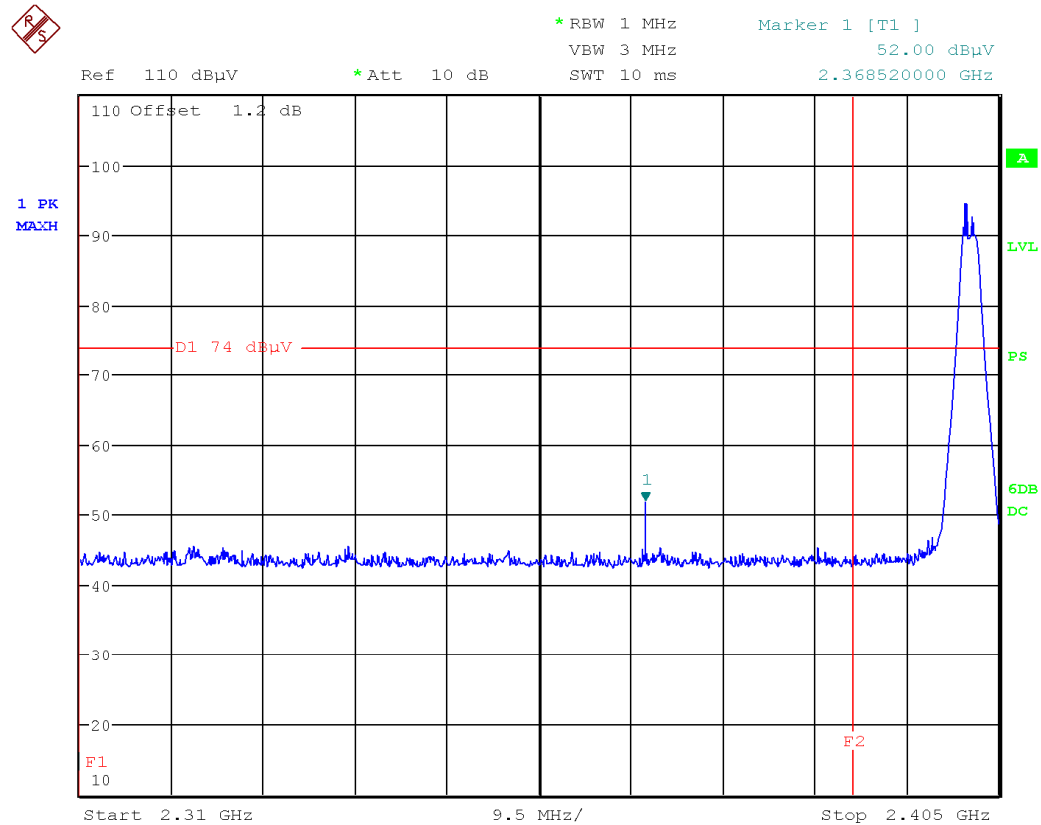


Date: 20.JUL.2023 15:11:54

Band Edge – Low Channel Horizontal - Peak Emission

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

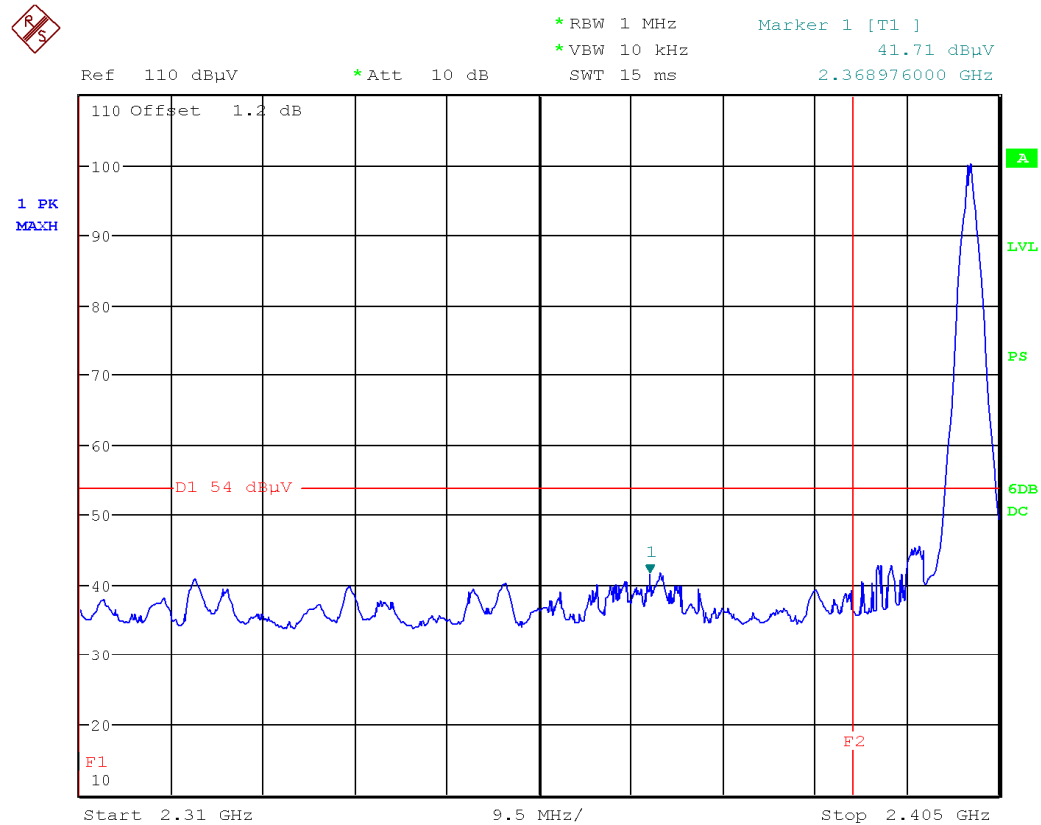


Date: 20.JUL.2023 15:16:29

Band Edge – Low Channel Vertical - Peak Emission

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

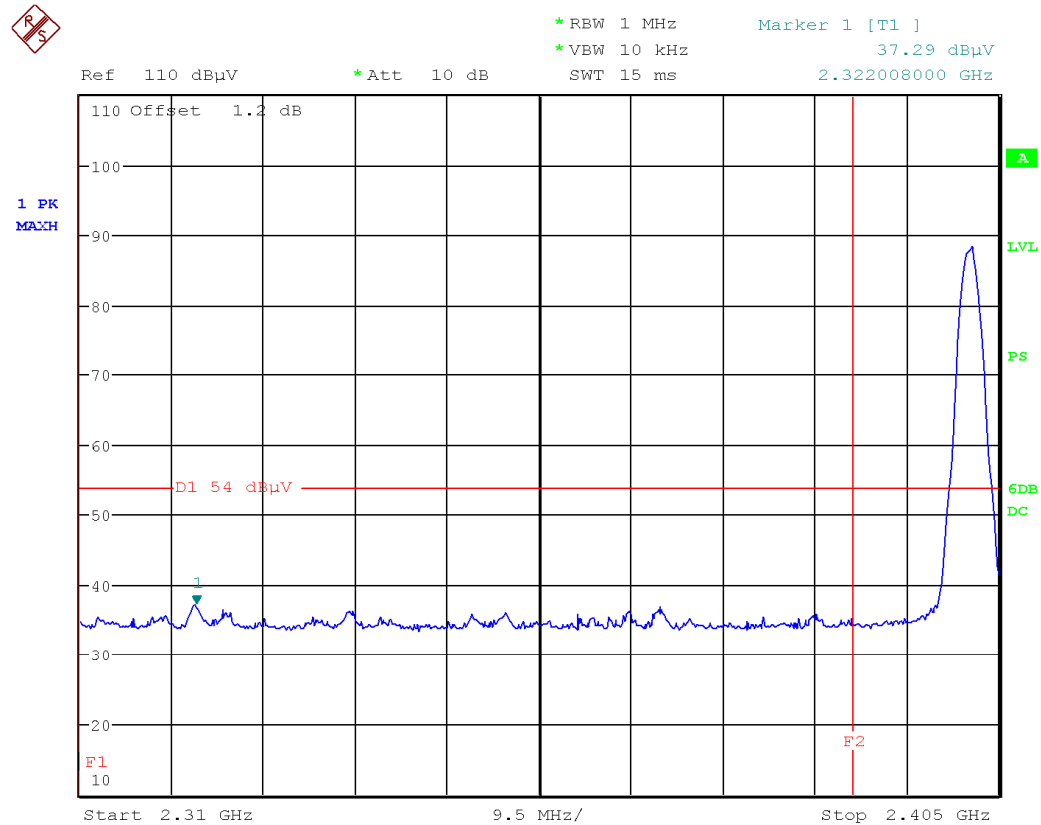


Date: 20.JUL.2023 15:14:11

Band Edge – Low Channel Horizontal - Average Emission

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

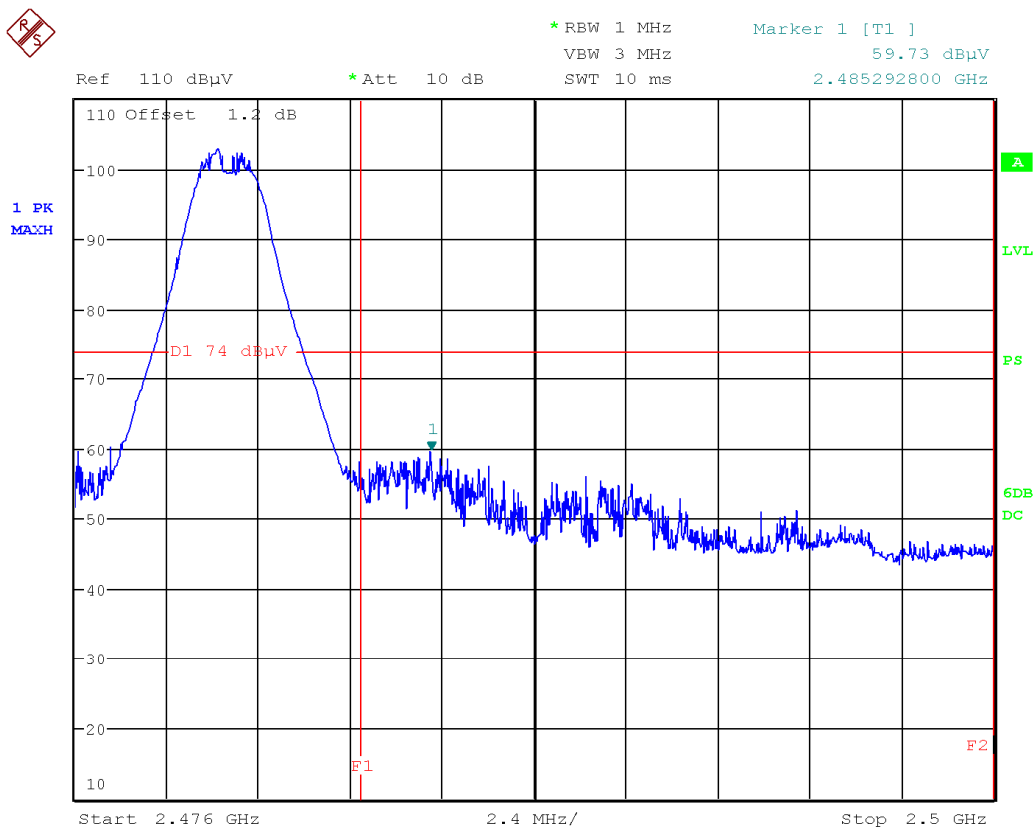


Date: 20.JUL.2023 15:17:41

Band Edge – Low Channel Vertical – Average Emission

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

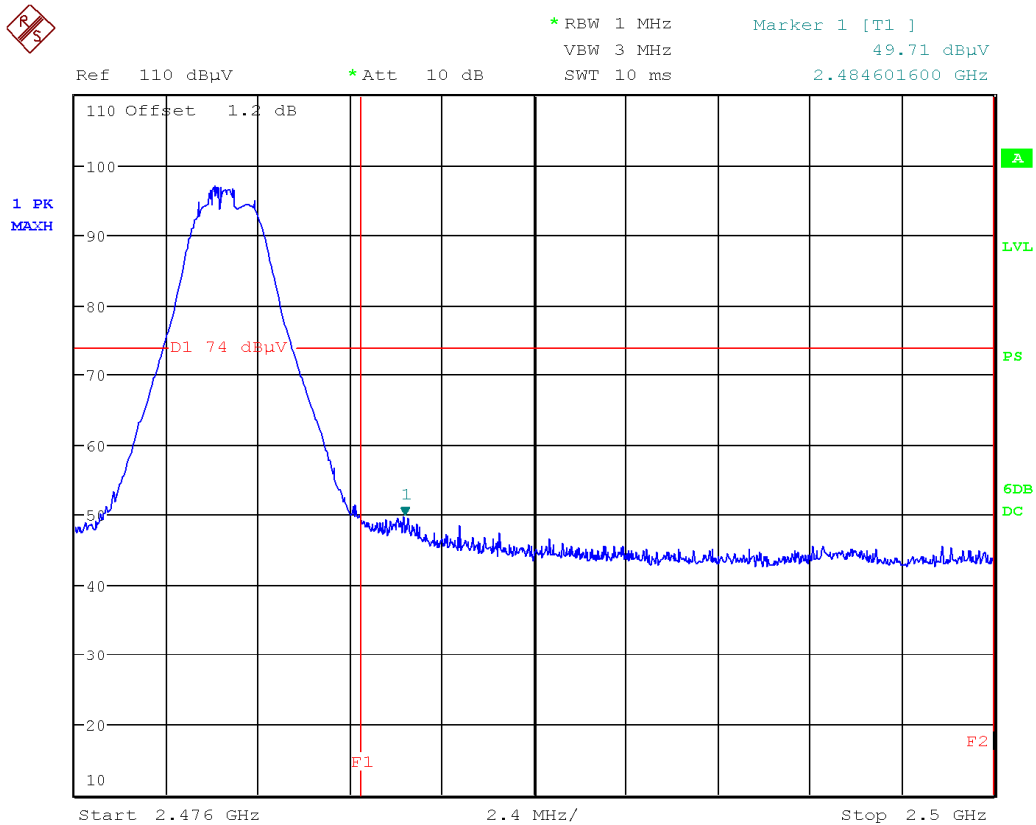


Date: 20.JUL.2023 15:27:44

Band Edge – High Channel Horizontal - Peak Emission

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

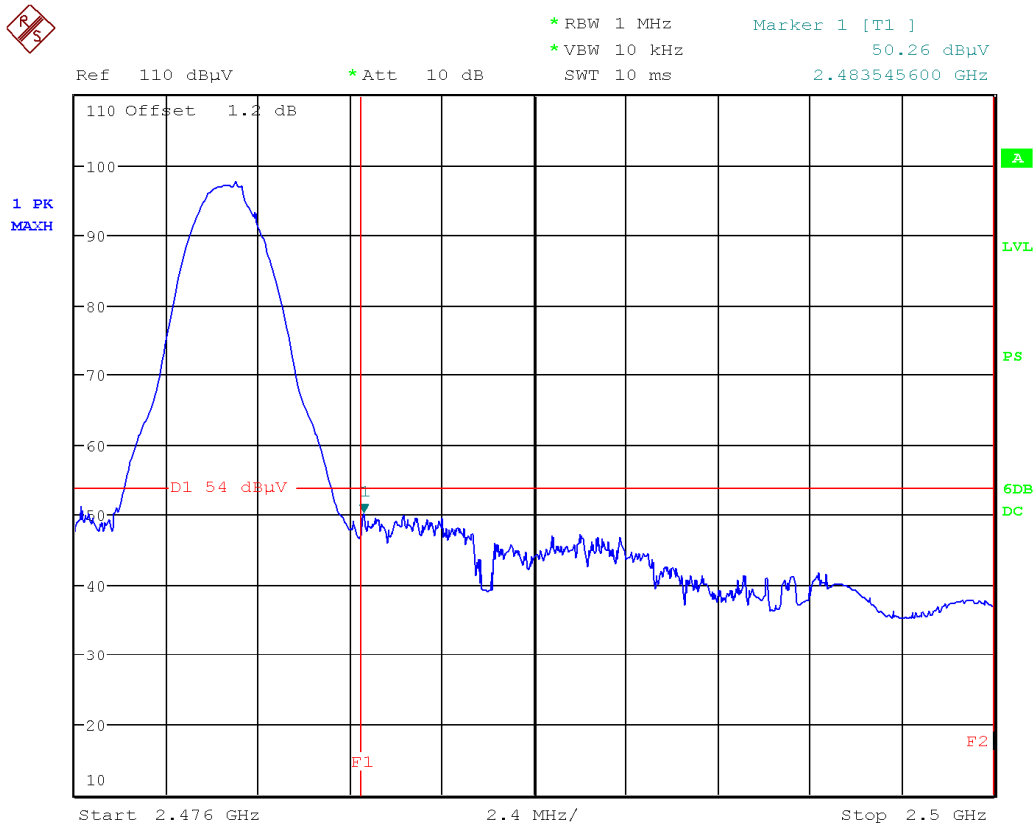


Date: 20.JUL.2023 15:24:14

Band Edge – High Channel Vertical - Peak Emission

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

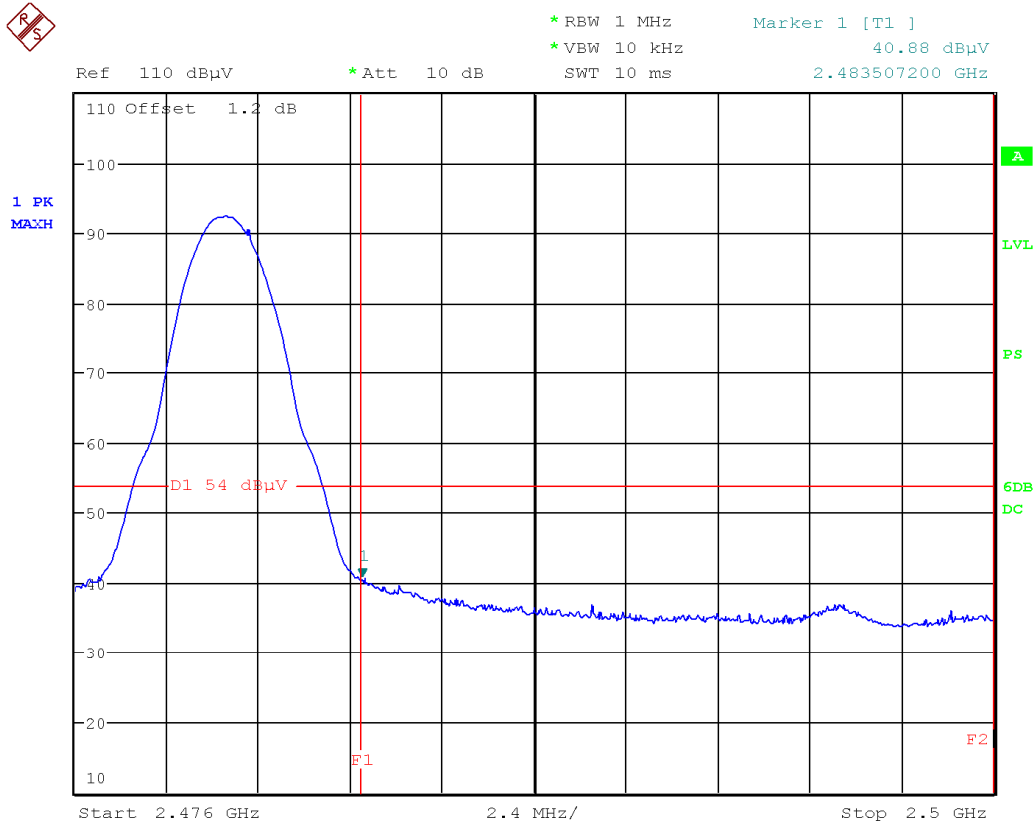


Date: 20.JUL.2023 15:29:25

Band Edge – High Channel Horizontal - Average Emission

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.


Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Date: 20.JUL.2023 15:24:57

Band Edge – High Channel Vertical – Average Emission

Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Final Measurements and Results

The EUT passed. Low, middle, and high bands were measured.


In accordance with 15.247(d), only frequencies exceeding the 15.209 limit that occur within the bands listed in 15.205 need to be verified with a final detector.

The measurements were maximized by rotating the turn table over a full 0-360 rotation and the antenna height was varied from 1 m to 4 m.

All spurious emissions are below peak limits where peak limits are specified.


EUT Name		Inmedix CloudHRV System						
Limit		FCC 15.209, Spurious						
Power Supply		120Vac 60Hz						
Frequency (Hz)	Detector	Correction Factor (dB/m)	Level (dBuV/m)	AVG Limit (dBuV/m)	AVG Margin (dB)	Table Azimuth (Degrees)	Mast Height (cm)	Test Result
Horizontal								
4.805G	CAVG	6.0	47.1	54.0	6.9	0.0	100.0	Pass
2.5145G	CAVG	1.7	40.5	54.0	13.5	224.0	150.0	Pass
2.512G	CAVG	1.7	32.3	54.0	21.7	224.0	150.0	Pass
2.5297G	CAVG	1.7	39.7	54.0	14.3	224.0	150.0	Pass
2.4983G	CAVG	1.7	39.1	54.0	14.9	224.0	150.0	Pass
2.482G	CAVG	1.7	39.5	54.0	14.5	224.0	150.0	Pass
2.3977G	CAVG	1.2	33.3	54.0	20.7	224.0	150.0	Pass
2.5777G	CAVG	1.5	35.1	54.0	18.9	224.0	150.0	Pass
7.2075G	CAVG	2.1	39.4	54.0	14.6	294.0	166.0	Pass
Vertical								
4.804G	CAVG	6.0	47.7	54.0	6.3	276.0	127.0	Pass
7.2047G	CAVG	2.2	44.1	54.0	9.9	190.0	150.0	Pass

Spurious Emissions – Average Measurements Table

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	


EUT Name		Inmedix CloudHRV System				
Limit		FCC 15.209, Spurious				
Power Supply		120Vac 60Hz				
Frequency (Hz)	Detector	Correction Factor (dB/m)	Level (dBuV/m)	AVG Limit (dBuV/m)	AVG Margin (dB)	Test Result
Horizontal						
2.368976G	AVG	1.2	41.7	54.0	12.3	Pass
2.483546G	AVG	1.2	50.3	54.0	3.7	Pass
Vertical						
2.322008G	AVG	1.2	37.3	54.0	16.7	Pass
2.483507G	AVG	1.2	40.9	54.0	13.1	Pass

Band Edge Measurements – Average Measurements Table

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration / Verification Date	Next Calibration / Verification Date	Asset #
EMI Receiver	ESU 40	Rohde & Schwarz	Feb. 11, 2022	Feb. 11, 2024	GEMC 233
Loop Antenna	EM 6871	Electro-Metrics	Mar 13, 2023	Mar 13, 2025	GEMC 70
Loop Antenna	EM 6872	Electro-Metrics	Mar 13, 2023	Mar 13, 2025	GEMC 71
BiLog Antenna	3142-C	ETS-Lindgren	Dec. 7, 2022	Dec. 7, 2024	GEMC 8
Horn Antenna 1 – 18 GHz	3117	ETS-Lindgren	Mar. 11, 2022	Mar. 11, 2024	GEMC 340
Horn Antenna 18 - 26.5 GHz	SAS-572	A.H. Systems	Jan. 17, 2023	Jan. 17, 2025	GEMC 6371
Horn Antenna 26.5 - 40 GHz	QSH22F20S	Q-par	Mar. 11, 2022	Mar. 11, 2024	GEMC 6376
Attenuator 6 dB	612-6-1	Meca Electronics, Inc	NCR	NCR	GEMC 287
Pre-Amp 9 kHz – 1 GHz	CPA9230	Chase	Sept. 16, 2022	Sept 16, 2024	GEMC 301
Pre-Amp 1 – 26.5 GHz	HP 8449B	HP	Mar. 11, 2022	Mar. 11, 2024	GEMC 189
Pre-Amp 18 – 40 GHz	PAM-840A	Com-Power Corporation	Jun. 20, 2023	Jun. 20, 2025	GEMC 252
RF Cable <1GHz	LMR-400	LexTec	NCR	NCR	GEMC 274
RF Cable <1GHz	Sucoflex 104A	Huber+Suhner	NCR	NCR	GEMC 271
RF Cable >1GHz	EMC2	MegaPhase	NCR	NCR	GEMC 369
Emissions Software	V2.1.2	TUV SUD Canada, Inc.	NCR	NCR	GEMC 361

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Power Spectral Density

Purpose

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.

Limits and Method

The limits are defined in 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.

The method is given in FCC KDB 558074 Section 10.2.

Results

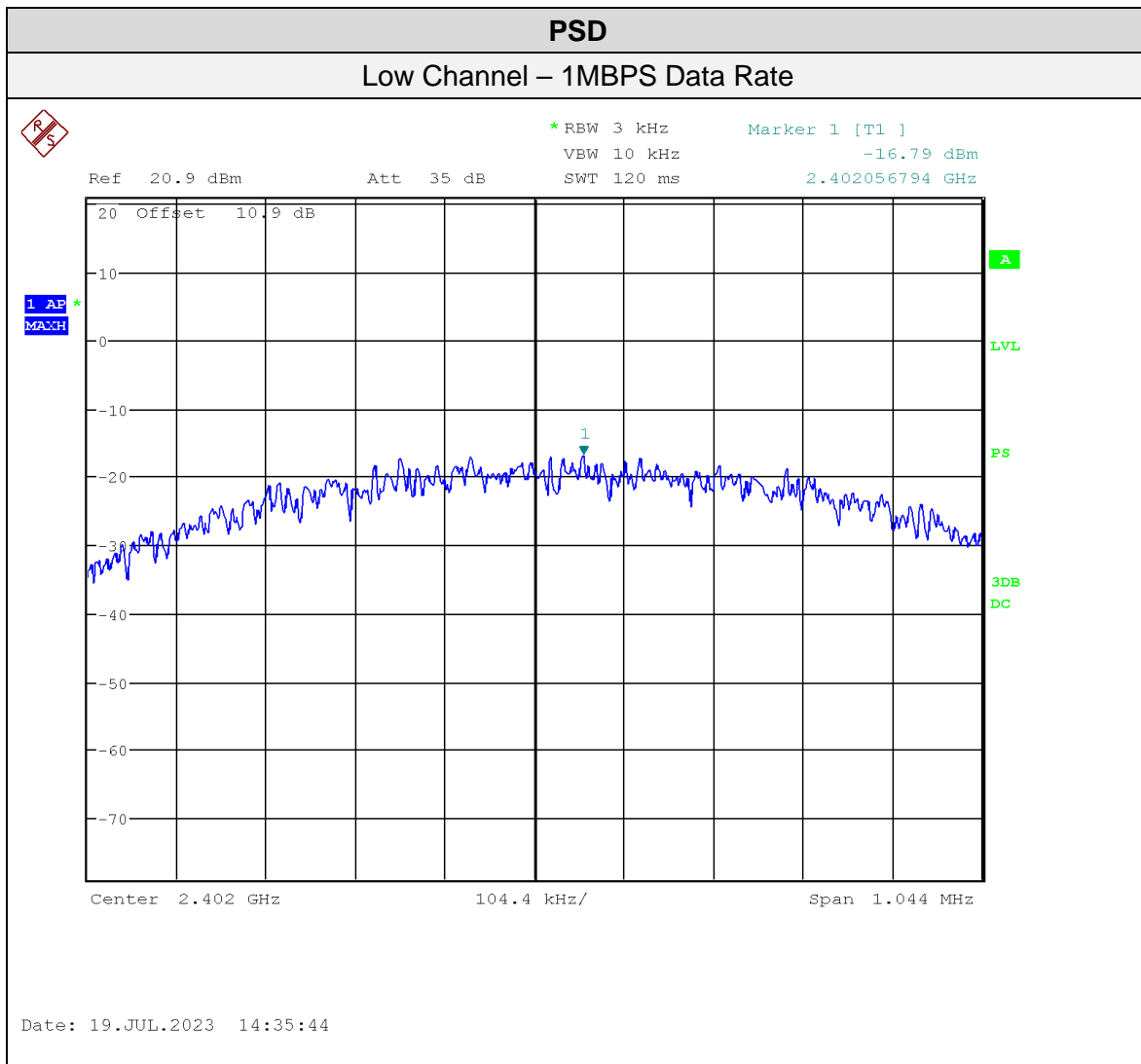
The EUT passed. Low, middle and high bands were measured. The maximum PSD in any 3kHz band was -16.79 at the 1MBPS data rate on the low channel, and -18.83 at the 2MBPS data rate on the low channel. This is lower than the requirement of 8dBm PSD in any 3kHz band.


Channel	Frequency (MHz)	PSD (dBm)
1MBPS Data Rate		
Low	2402	-16.79
Mid	2442	-17.13
High	2480	-17.60
2MBPS Data Rate		
Low	2402	-18.83
Mid	2442	-19.16
High	2480	-19.53

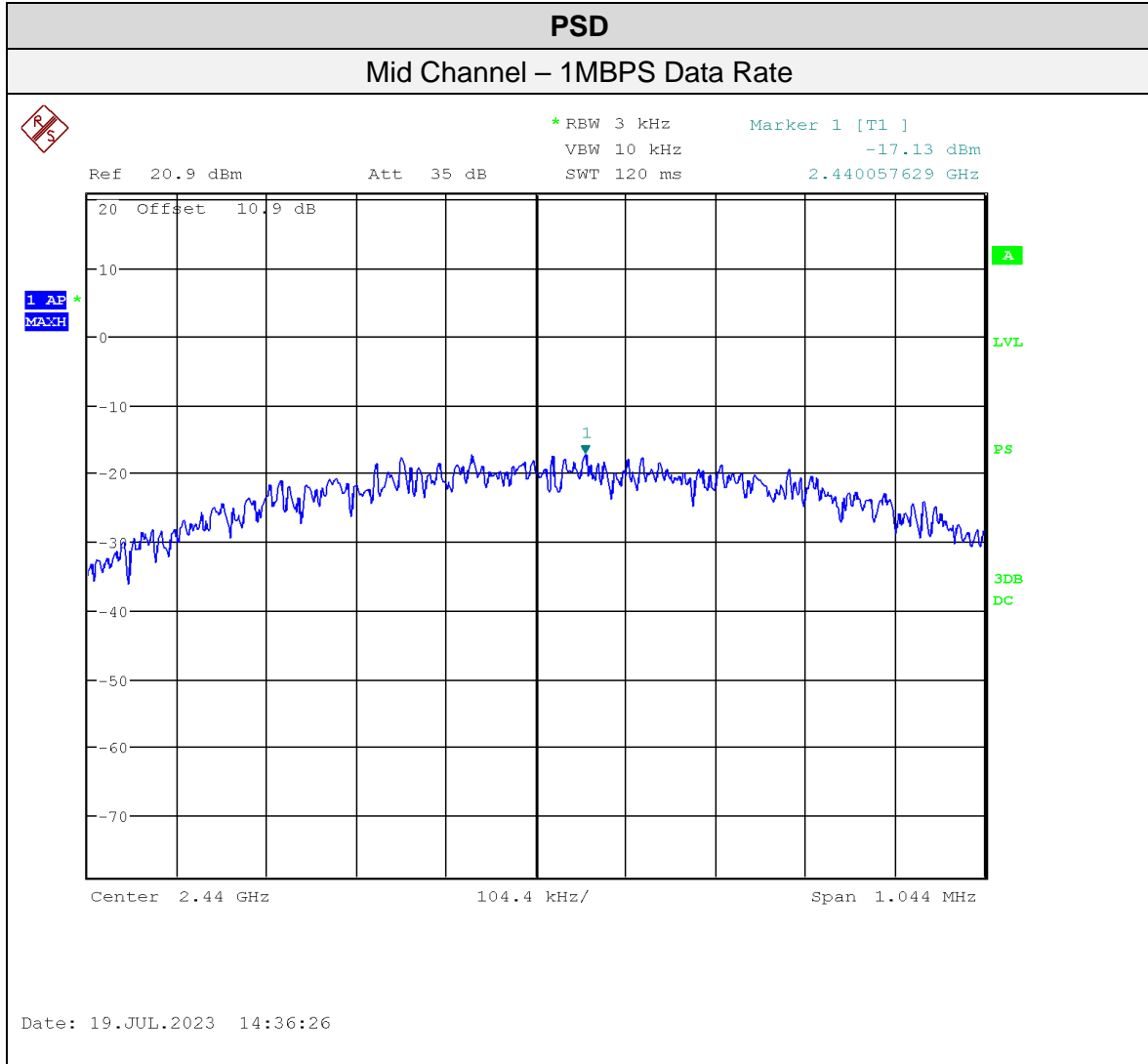
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	


Graphs

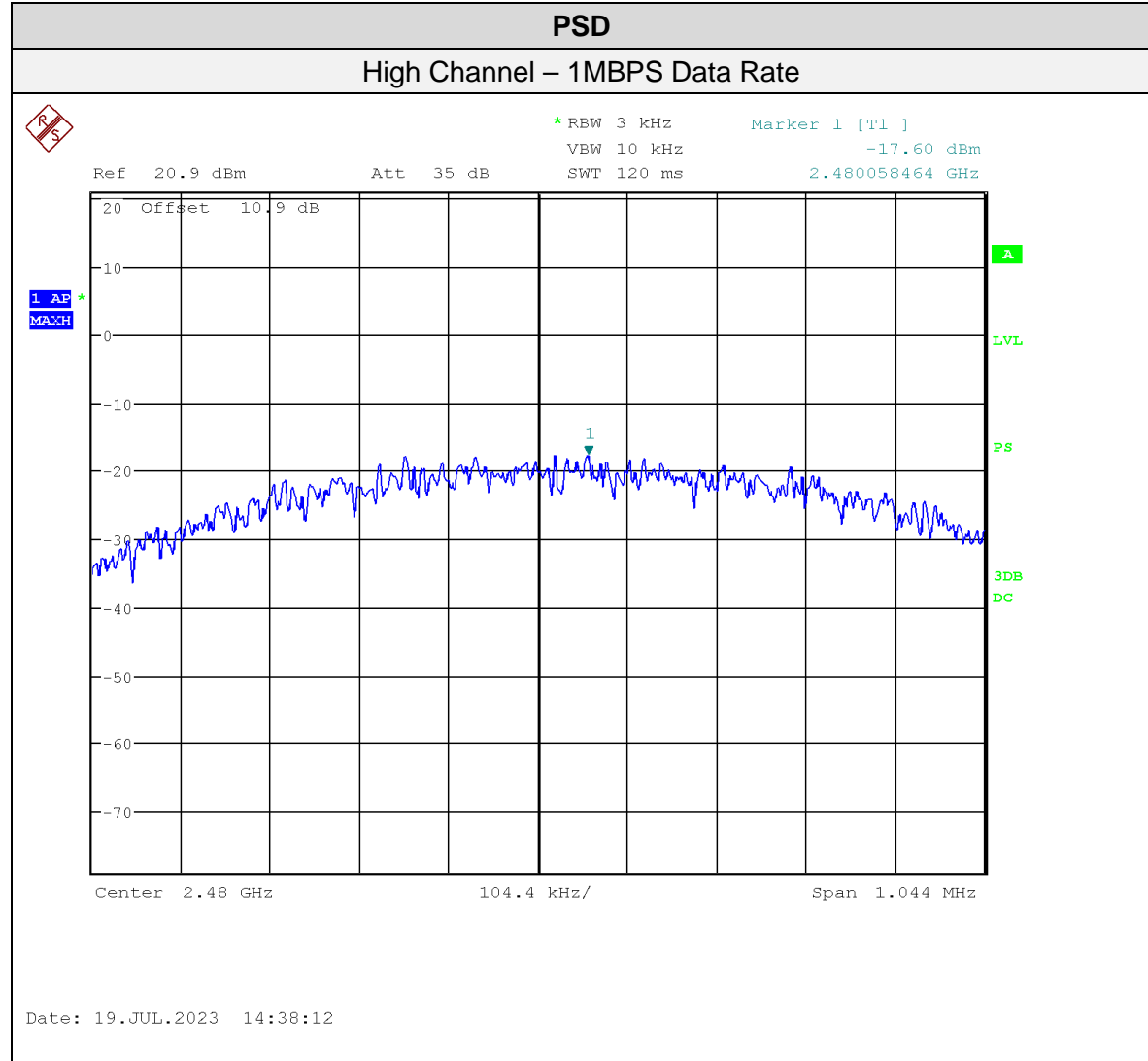
The graphs shown below show the power spectral density of the device during the conducted measurement operation of the EUT. The external attenuator and cable loss are accounted for as reference offset in the spectrum analyzer.




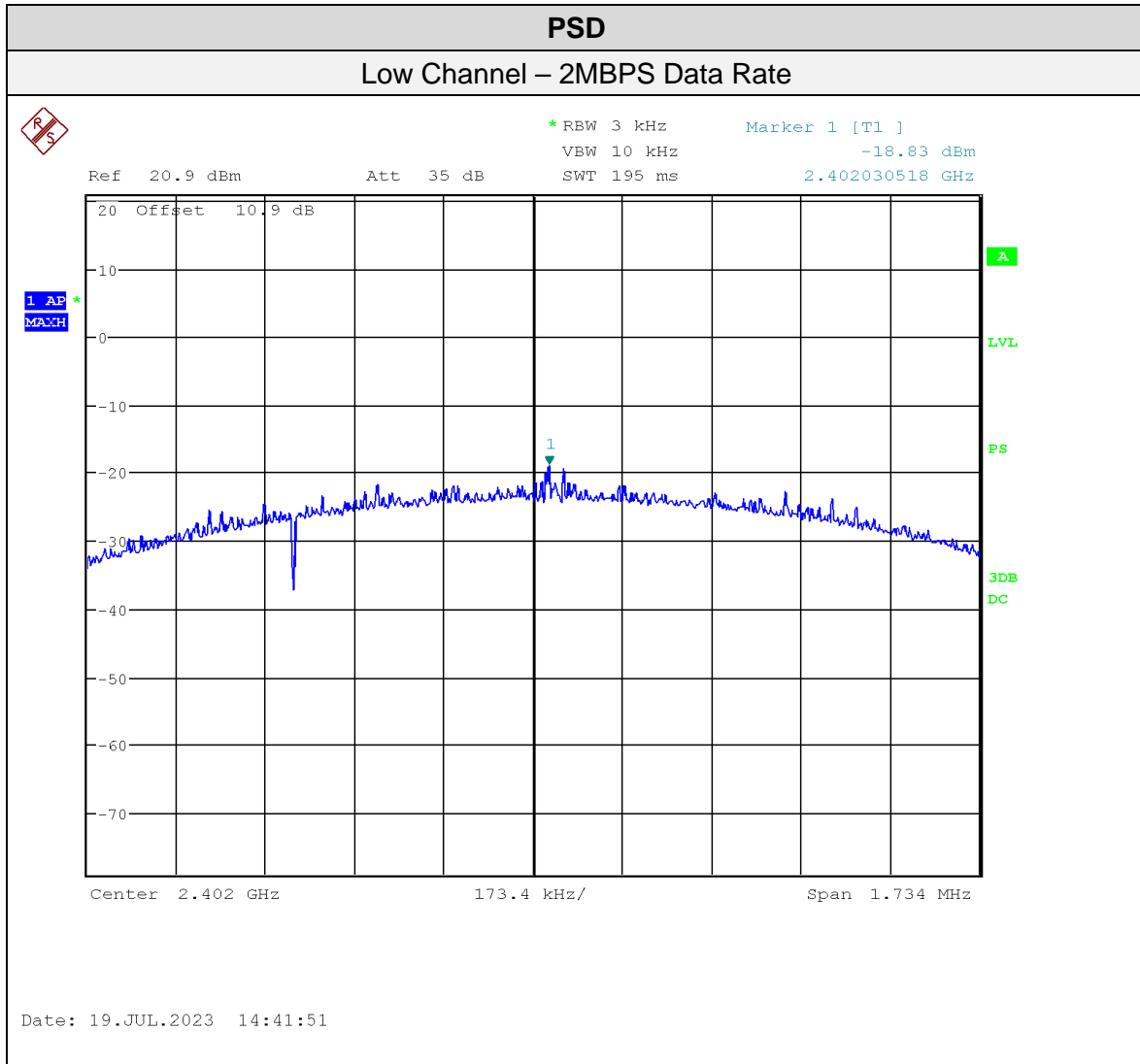
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



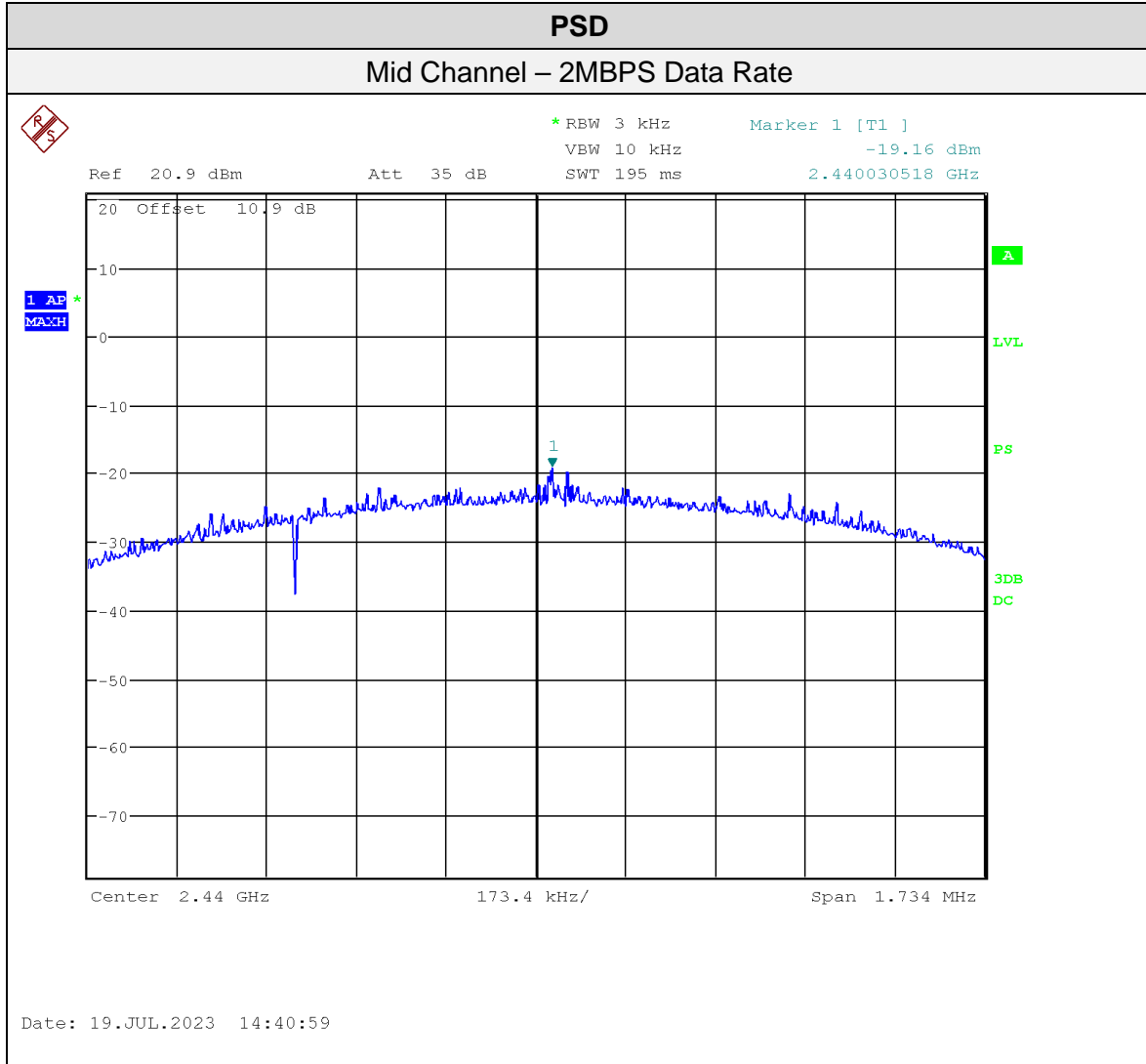
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



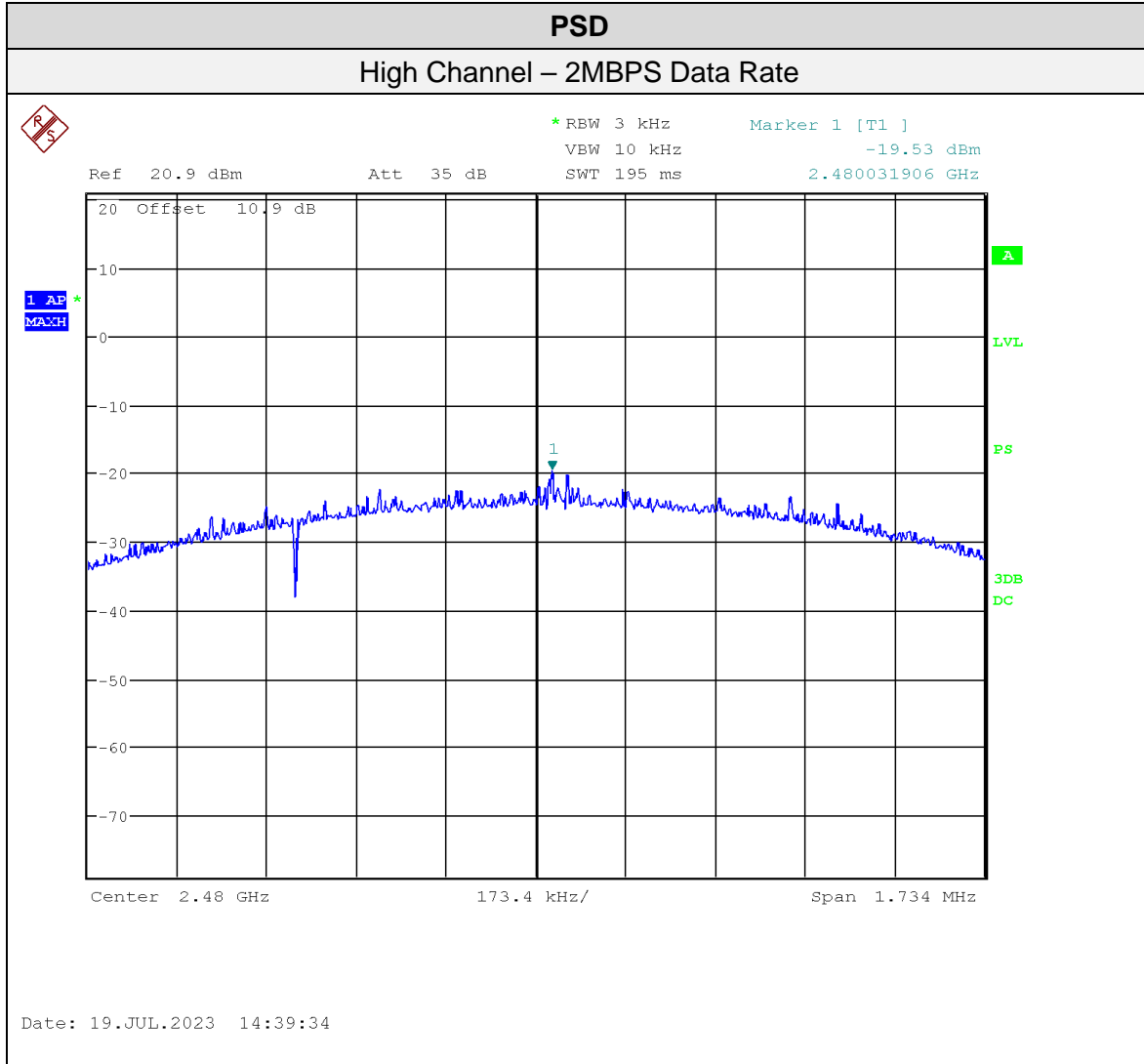
Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




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Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	




See 'Appendix B – EUT and Test Setup Photos' for photos showing the test set-up.

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
EMI Receiver	ESU 40	Rohde & Schwarz	Feb. 11, 2022	Feb. 11, 2024	GEMC 233
Attenuator 10 dB	8493B	Agilent	NCR	NCR	GEMC 133

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Power Line Conducted Emissions

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT's power line does not exceed the limits listed below as defined in the applicable test standard, as measured from a LISN. This helps protect lower frequency radio services such as AM radio, shortwave radio, amateur radio operators, maritime radio, CB radio, and so on, from unwanted interference.

Limits and Method

The limits are as defined in 47 CFR FCC Part 15 Section 15.207


Method is as defined in ANSI C63.4

Average Limits		Quasi-Peak Limits	
150 kHz – 500 kHz	56 to 46* dBµV	150 kHz – 500 kHz	66 to 56* dBµV
500 kHz – 5 MHz	46 dBµV	500 kHz – 5 MHz	56 dBµV
5 MHz – 30 MHz	50 dBµV	5 MHz – 30 MHz	60 dBµV

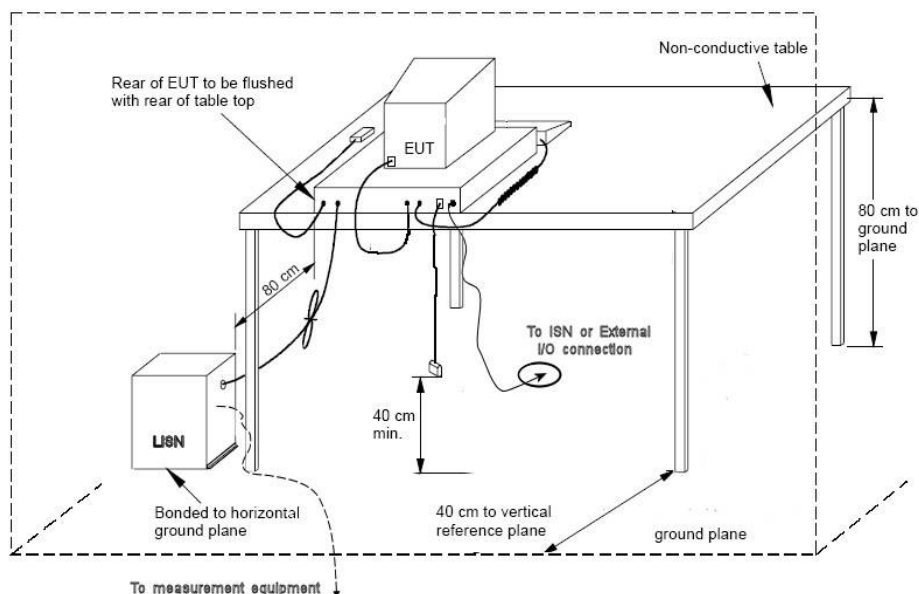
* Decreases linearly with the logarithm of the frequency

Both Quasi-Peak and Average limits are applicable and each is specified as being measured with a resolution bandwidth of 9 kHz. For Quasi-Peak, a video bandwidth at least three times greater than the resolution bandwidth is used.

Based on ANSI C63.4 Section 4.2, if the Peak or Quasi-Peak detector measurements do not exceed the Average limits, then the EUT is deemed to have passed the requirements.

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Typical Setup Diagram




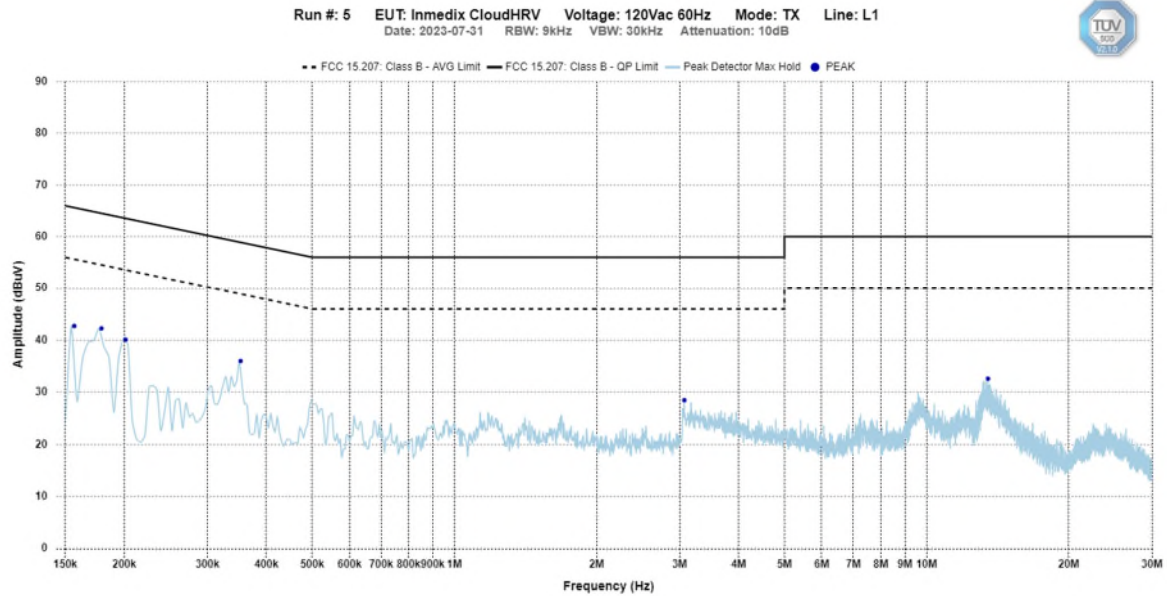
Measurement Uncertainty

The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is $\pm 2.27\text{dB}$ with a 'k=2' coverage factor and a 95% confidence level.

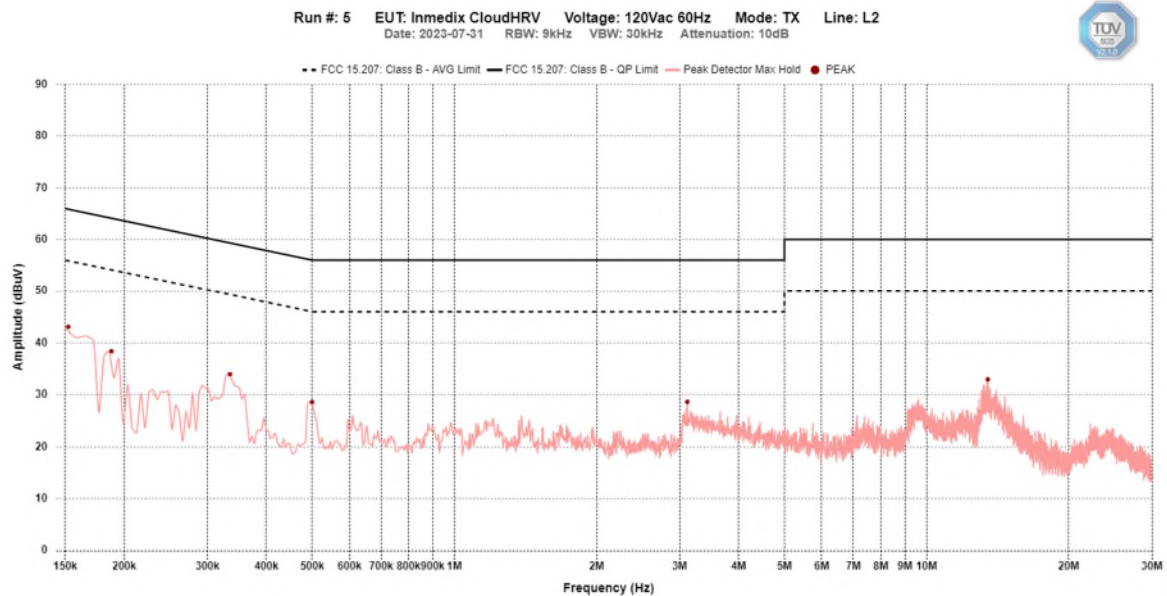
Preliminary Graphs

The graphs shown below are maximized peak measurement graphs measured with a resolution bandwidth greater than or equal to the final required detector. 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.


Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	



Line 1 (L1) – 120Vac 60Hz



Line 2 (L2) – 120Vac 60Hz

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Final Measurements


EUT Name		Inmedix CloudHRV						
Limit		FCC 15.207, Class B						
Power Supply		120Vac 60Hz						
Frequency (Hz)	Detector	Correction Factor (dB)	Level (dBuV)	QP Limit (dBuV)	AVG Limit (dBuV)	QP Margin (dB)	AVG Margin (dB)	Test Result
Line 1								
179.0k	PEAK	9.9	42.3	65.2	55.2	22.9	12.9	Pass
352.7k	PEAK	9.9	36.0	60.2	50.2	24.2	14.2	Pass
156.7k	PEAK	9.9	42.7	65.8	55.8	23.1	13.1	Pass
201.2k	PEAK	9.9	40.1	64.5	54.5	24.4	14.4	Pass
13.4936M	PEAK	10.2	32.6	60.0	50.0	27.4	17.4	Pass
3.07M	PEAK	10.0	28.5	56.0	46.0	27.5	17.5	Pass
Line 2								
152.2k	PEAK	9.9	43.1	65.9	55.9	22.9	12.9	Pass
334.9k	PEAK	9.9	34.0	60.7	50.7	26.8	16.8	Pass
187.9k	PEAK	9.9	38.4	64.9	54.9	26.5	16.5	Pass
13.4803M	PEAK	10.3	33.0	60.0	50.0	27.0	17.0	Pass
3.1145M	PEAK	10.0	28.6	56.0	46.0	27.4	17.4	Pass
499.7k	PEAK	9.8	28.6	56.0	46.0	27.4	17.4	Pass

Average and Quasi-Peak Emissions Table

Note:

Peak = Peak measurement


See 'Appendix B – EUT, Peripherals and Test Setup Photos' for photos showing the test set-up for the highest line conducted emission

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	


Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
EMI Receiver	ESL 6	Rohde & Schwarz	Feb. 17, 2023	Feb. 17, 2025	GEMC 160
LISN	FCC-LISN-50/250-16-2-01	FCC	Feb. 23, 2023	Feb. 23, 2025	GEMC 303
RF Cable 3m	LMR-400-3M-50Ω-MN-MN	LexTec	NCR	NCR	GEMC 276
Attenuator 10 dB	6N10W-10	Inmet	NCR	NCR	GEMC 349
Emissions Software	V2.1.2	TUV SUD Canada, Inc.	NCR	NCR	GEMC 361

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Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	


Appendix A – EUT Summary

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

For further details for filing purposes, refer to filing package.


General EUT Description

Client Details	
Organization / Address	StarFish Medical 455 Boleskine Rd. Victoria, BC, Canada V8Z 1E7
Contact	Shalaka Maind/ Leo Lamwertz
Phone	(437) 216 7833
Email	smaind@starfishmedical.com LLamwertz@starfishmedical.com
EUT (Equipment Under Test) Details	
EUT Name	Inmedix CloudHRV
EUT Model / SN	CHRV-00003
EUT revision	New product
Software version	iPad: iOS 16.3.1 BLE Test App version: V1.1.0(45) iOS App, Clinician, version: V1.1(32) Cloud HRV Base/Sensor: FW: 2.7.1
Equipment category	Medical Device
EUT is powered using	Both AC/DC (pre certified adapter) and Battery
Input voltage range(s) (V)	Adapter capable of 90 to 264 VAC, marketed in North America only (120 VAC nominal)
Frequency range(s) (Hz)	47-63Hz, marketed in North America only (60Hz)
Rated input current (A)	0.5A
Nominal power consumption (W)	12W
Number of power supplies in EUT	1, external AC/DC Power Adapter
Transmits RF energy? (describe)	Yes Bluetooth low energy on base. Wifi and bluetooth on iPad
Basic EUT functionality description	Inmedix CloudHRV core algorithmic technology analyzes electrocardiogram (ECG) data to determine heart rate variability (HRV) and produce time-domain, frequency-domain, and geometric-time-domain HRV indices.
Modes of operation	Two Modes needed for testing: Data collection mode while on battery Data collection mode while not on battery

Client	Starfish Medical	
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

EUT (Equipment Under Test) Details - Continued	
EUT response time (ms)	Sampling transactions at 2ms. Rf transmission max 25ms period
EUT setup time (min)	5 minutes
Frequency of all clocks present in EUT	NRF 52. internal clock of 64MHz, PLL to achieve BLE communication (~2.4GHz, 2.048 MHz AFE reference clock + pre-marketed iPad.
I/O cable description Specify length and type	Patient/Applied parts: Custom 4 leadwires ECG cable (3 meters)
Available connectors on EUT	Barrel Jack connector (12V DC power) and Semi Custom ECG circular connector
Dimensions of product	L 283mm W 314mm H 70mm

Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated. For a close-up picture of the EUT, see ‘Appendix B – EUT and Test Setup Photos’.

Client	Starfish Medical	 Canada
Product	Inmedix CloudHRV	
Standard(s)	FCC Part 15 Subpart 15.247	

Appendix B – EUT and Test Setup Photos

Refer to the files separate from this test report