



FCC Part 15, Subpart C, Section 15.247

Test Report

On

Communications Management Unit Model: CMU-E6X

Customer Name: IONX, LLC

Customer P.O.: 4500515712

Date of Report: September 21, 2018

Test Report No.: R-2754P-1

Test Start Date: January 9, 2018

Test Finish Date: September 20, 2018

Test Technician: M. Seamans, T. Hannemann

Report Approved By: T. Hannemann

Report Prepared By: M. Chambers

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Technical Information

Report Number:	R-2754P-1
Customer:	IONX, LLC
Address:	515 S. Franklin St. West Chester, PA 19382
Test Sample:	Communications Management Unit
Brand Name:	IONX
Model Number:	CMU-E6X
Serial Number:	FTA7D
Manufactured By:	IONX, LLC
Power Requirements:	7.2 VDC via internal battery pack
Frequency Band of Operation:	2.405 GHz – 2.480 GHz
Frequencies Tested (Low, Mid and High):	2.405 GHz, 2.440 GHz, 2.480 GHz
Antenna Type:	PCB Antenna, 3.4 dBi and Ceramic Patch Antenna, 4.5 dBi
Equipment Use:	Mobile
FCC ID:	2ADEPCMUE6-A

Test Specification:

FCC Rules and Regulations Part 15, Subpart C, Section 15.247

Test Procedure:

ANSI C63.4:2014

ANSI C63.10:2013

FCC DA 00-705, Released March 30, 2000, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

Test Facility:

Retlif Testing Laboratories
101 New Boston Road
Goffstown, NH 03045

FCC Accreditation Designation Number: US5327



Retlif Testing Laboratories

Report No. R-2754P-1

EUT Description:

The CMU-E6X is a low-power communication management unit for remote unpowered mobile assets. It provides asset and condition monitoring information to shippers, fleet owners, and railroads that need near real-time information about asset status and condition.

Table 1 - Support Equipment

Description	Manufacturer	Part Number	Model Number	Serial Number
Laptop	Lenovo	N/A	T450s	PC0A94LB

The test methods performed on the EUT are shown below. Testing was performed in accordance with the applicable FCC requirements for FHSS transmitters.

Table 2 – Test Methods Performed

FCC Part 15, Subpart C	Test Method
15.247(a)(1)	20 dB Bandwidth
15.247(a)(1) (iii)	Number of Hopping Channels and Time of Occupancy
15.247(a)(1)	Channel Separation
15.247(b)(3)	Power Output
15.247(d)	Antenna Terminal Out of Band/ Band Edge Conducted Emissions
15.247(d)	Out of Band/Band Edge Radiated Emissions
15.209(a)	Radiated Spurious Emissions (Co-Location)

The design of the test sample has not changed since the date of testing and the EUT meets the requirements of the test specifications listed herein.

This test report is for certification of the CMU-E6 family of products consisting of model numbers CMU-E6S and CMU-E6X. The only difference between the two models is the enclosure size and number of batteries in the battery pack for longer product life. The X in the model number CMU-E6X is not used as a wild card character.



Retlif Testing Laboratories

Report No. R-2754P-1

Certification and Signatures

We certify that this report is a true representation of the results obtained from the tests of the equipment stated. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.



Scott Wentworth
Branch Manager
NVLAP Approved Signatory



Todd Hannemann
Laboratory Supervisor
iNARTE Certified Technician ATL-0255-T

Non-Warranty Provision

The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

Non-Endorsement

This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.



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Report No. R-2754P-1

Revision History

Revisions to this document are listed below; the latest revised document supersedes all previous issues of this document.

Revision	Date	Pages Affected
-	September 21, 2018	Original Release



Retlif Testing Laboratories

Report No. R-2754P-1

Requirements and Test Results

FCC Section 15.247 (b)(1) - Power Output

For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Results:

The maximum measured peak conducted output power was 23.66 mW. The maximum antenna gain of the antennas is 4.5 dBi. The device was found to meet the power output requirements of 15.247 (b)(3) including de facto EIRP.

FCC Section 15.247(d) – Unwanted Emissions

Antenna Terminal Out of Band/Band Edge Conducted Emissions

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 Section 15.247, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Results:

All measured out of band/band edge conducted emissions were below the specified limits and the device was found to meet the requirements of 15.247 (d).



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Report No. R-2754P-1

Requirements and Test Results (con't)

FCC Section 15.247(d) – Unwanted Emissions

Radiated Spurious Emissions/Restricted Bands/Band Edge

Emissions which fall into restricted bands, as defined in 15.205(a) must comply with the radiated emissions limits specified in 15.209(a) and shown below in Table 3. Emissions emanating from the EUT cabinet and cables must also comply with the radiated emissions limits. Radiated emissions measurements were also performed at the band edges to ensure band edge compliance.

Table 3 - Radiated Emission Limits

Frequency of Emission (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 to 88	100	3
88 to 216	150	3
216 to 960	200	3
Above 960	500	3

Results:

All spurious emissions were measured and found to be in compliance with the limits specified in 15.209(a). Band edge emissions were also found to be in compliance with the limits specified in 15.209(a).

FCC Section 15.247 (a)(1)

Channel Separation and 20 dB Bandwidth

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Results:

The maximum 20 dB bandwidth of the hopping channel was 2.631 MHz. The carrier frequencies were separated by 5.01 MHz which exceeds the 20 dB bandwidth and complies with the requirements specified above.



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Report No. R-2754P-1

Requirements and Test Results (con't)

FCC Section 15.247 (a)(1)(iii)

Number of Channels and Occupancy Time

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Results:

The frequency hopping system uses 15 Channels. The average time of occupancy did not exceed 0.4 seconds in a 6 second period which meets the above requirements.



Retlif Testing Laboratories

Report No. R-2754P-1

Requirements and Test Results (con't)

FCC Section 15.247(i) – RF Exposure

Transmitters operating under 15.247 must be operated in a manner that ensures the public is not exposed to RF energy levels in excess of the commission's guidelines. Based on the transmitter power and maximum antenna gain the separation distance for acceptable MPE power density levels to meet both the Occupational/Controlled Exposure and the General Population/Uncontrolled Exposure requirements of 1.1310 was calculated. The calculation below uses the more stringent General Population MPE Limits.

$$S = \frac{PG}{4\pi D^2}$$

D = Minimum Separation Distance in cm

S = Max allowed Power Density in mW/cm²

Per 1.1310 For the Frequency of 2405 MHz S = 1 mW/cm²

Power = Max Power Input to Antenna = 23.66mW

Gain = Max Power Gain of Antenna = 4.5 dBi = 2.82 numeric

$$1 \text{ mW/cm}^2 = \frac{23.66 \times 2.82}{4 \times (3.14)^2 \times D^2} = \frac{66.72}{12.56 \times D^2}$$

$$D^2 = \frac{66.72}{12.56 \times 1}$$

$$D = \sqrt{5.31} = 2.3 \text{ cm}$$

The unit has an internal antenna and the minimum separation distance will always be maintained.



Retlif Testing Laboratories

Report No. R-2754P-1

EQUIPMENT LISTS

FCC Section 15.247(b)(3) – Power Output

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/17/2017	10/31/2018
5134	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	12/6/2017	12/31/2018
5231	AGILENT / HP	ANALYZER, SPECTRUM	3 Hz - 26.5 GHz	E4440A	5/24/2017	5/31/2018

FCC Section 15.247(d) – Antenna Terminal Out of Band/ Band Edge Conducted Emissions, 30 MHz to 25 GHz

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/17/2017	10/31/2018
5134	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	12/6/2017	12/31/2018
5231	AGILENT / HP	ANALYZER, SPECTRUM	3 Hz - 26.5 GHz	E4440A	5/24/2017	5/31/2018

FCC Section 15.207/15.247(d) – Radiated Spurious Emissions / Out of Band/Band Edge Radiated Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1232	AGILENT / HP	PRE-AMPLIFIER	1 - 26.5 GHz	8449B	5/23/2017	5/31/2018
3258	ETS / EMCO RIDGED GUIDE	ANTENNA, DOUBLE	1 - 18 GHz	3115	10/13/2016	4/30/2018
3430	MCS	ANTENNA, HORN	18 - 26.5 GHz	K-5039	No Calibration Required	
4029B	RETLIF ATTENUATION	OPEN AREA TEST SITE,	3 / 10 Meters	RNH	4/13/2016	4/30/2018
443	ELECTRO-METRICS	ANTENNA, LOG PERIODIC	200 MHz - 1000 MHz	LPA-25	10/6/2016	4/30/2018
5231	AGILENT / HP	ANALYZER, SPECTRUM	3 Hz - 26.5 GHz	E4440A	5/24/2017	5/31/2018
5234	PASTERNAK	CABLE, COAXIAL	10 kHz - 18 GHz	PE302-230	7/24/2017	7/31/2018
8550	EMCO	ANTENNA, BICONICAL	30 - 300 MHz	3110B	5/31/2016	5/31/2019
1232	AGILENT / HP	PRE-AMPLIFIER	1 - 26.5 GHz	8449B	5/25/2018	5/31/2019
3258	ETS / EMCO RIDGED GUIDE	ANTENNA, DOUBLE	1 - 18 GHz	3115	5/10/2018	11/30/2019
3427B	ETS / EMCO	ANTENNA, BICONICAL	20 - 200 MHz	3104	9/21/2017	3/31/2019
3430	MCS	ANTENNA, HORN	18 - 26.5 GHz	K-5039	No Calibration Required	
4029B	RETLIF ATTENUATION	OPEN AREA TEST SITE,	3 / 10 Meters	RNH	8/16/2017	8/31/2019
443	ELECTRO-METRICS	ANTENNA, LOG PERIODIC	200 MHz - 1000 MHz	LPA-25	5/21/2018	11/30/2019
5231	AGILENT / HP	ANALYZER, SPECTRUM	3 Hz - 26.5 GHz	E4440A	4/12/2018	4/30/2019



Retlif Testing Laboratories

Report No. R-2754P-1

EQUIPMENT LISTS (con't)
FCC Section 15.247(a)(1) – 20 dB Bandwidth

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/17/2017	10/31/2018
5134	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	12/6/2017	12/31/2018
5231	AGILENT / HP	ANALYZER, SPECTRUM	3 Hz - 26.5 GHz	E4440A	5/24/2017	5/31/2018

FCC Section 15.247(a)(1) -- Channel Separation

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/17/2017	10/31/2018
5134	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	12/6/2017	12/31/2018
5231	AGILENT / HP	ANALYZER, SPECTRUM	3 Hz - 26.5 GHz	E4440A	5/24/2017	5/31/2018

FCC Section 15.247(a)(1)(iii) – Number of Hopping Channels and Time Occupancy

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/17/2017	10/31/2018
5134	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	12/6/2017	12/31/2018
5231	AGILENT / HP	ANALYZER, SPECTRUM	3 Hz - 26.5 GHz	E4440A	5/24/2017	5/31/2018



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Report No. R-2754P-1

**FCC Section 15.247(b)(3),
Power Output
Test Photograph**



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Report No. R-2754P-1

**Test Photograph
Power Output**



Test Setup



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Report No. R-2754P-1

**Power Output
Test Data**

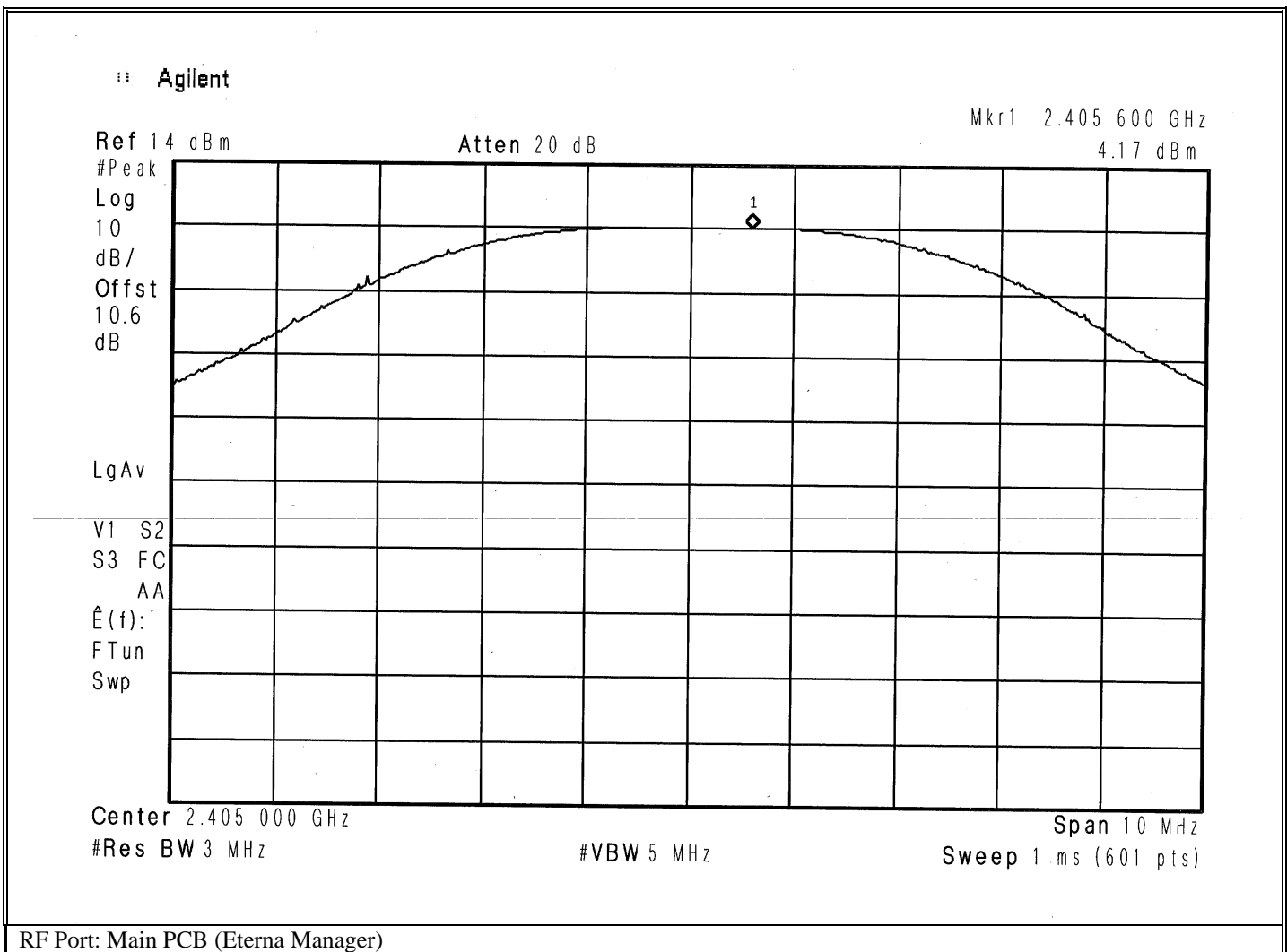


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Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Peak Power Output
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Output: 4.17 dBm

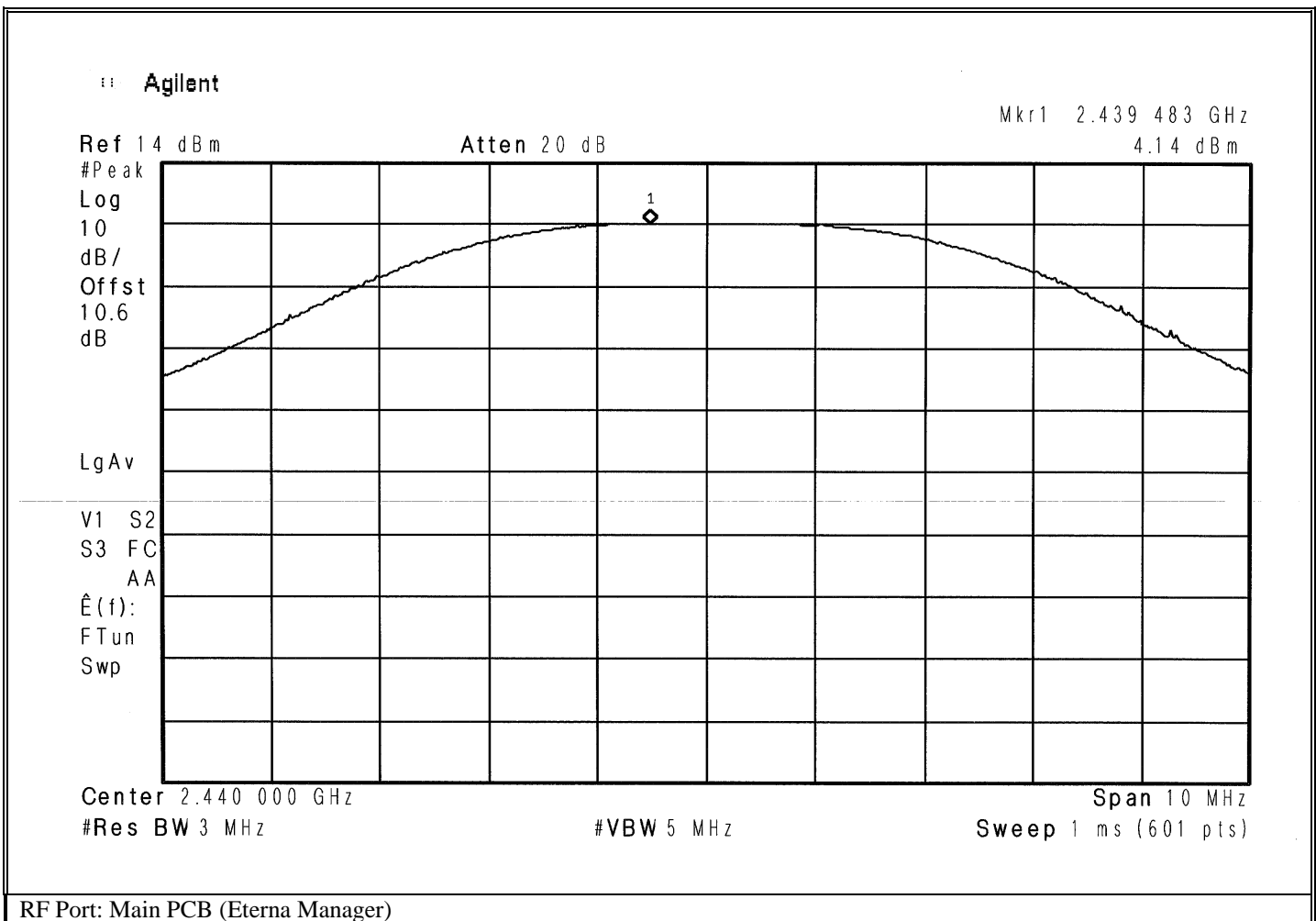


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Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Peak Power Output
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Peak Power Output: 4.14 dBm

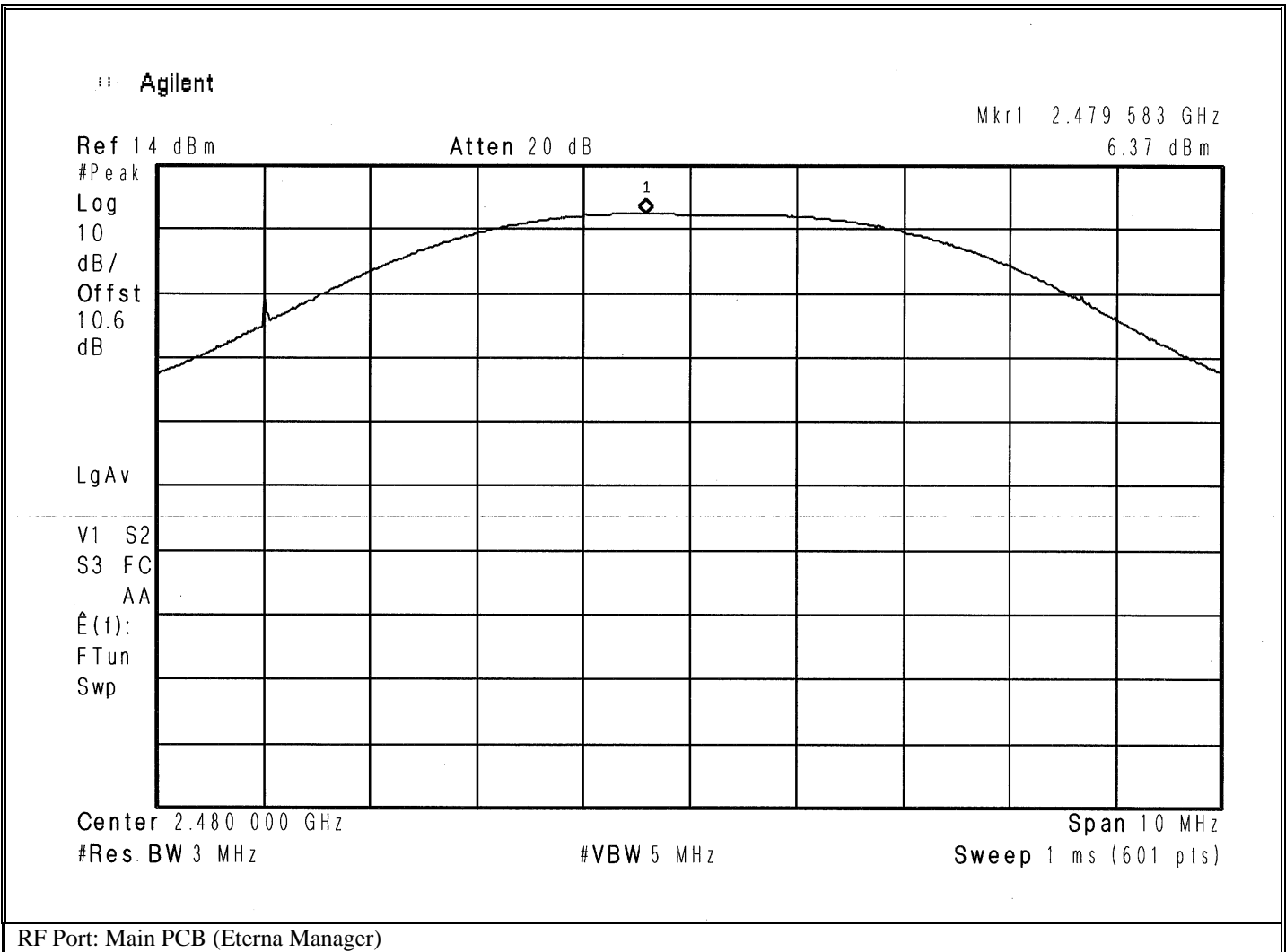


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Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Peak Power Output
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Peak Power Output: 6.37 dBm

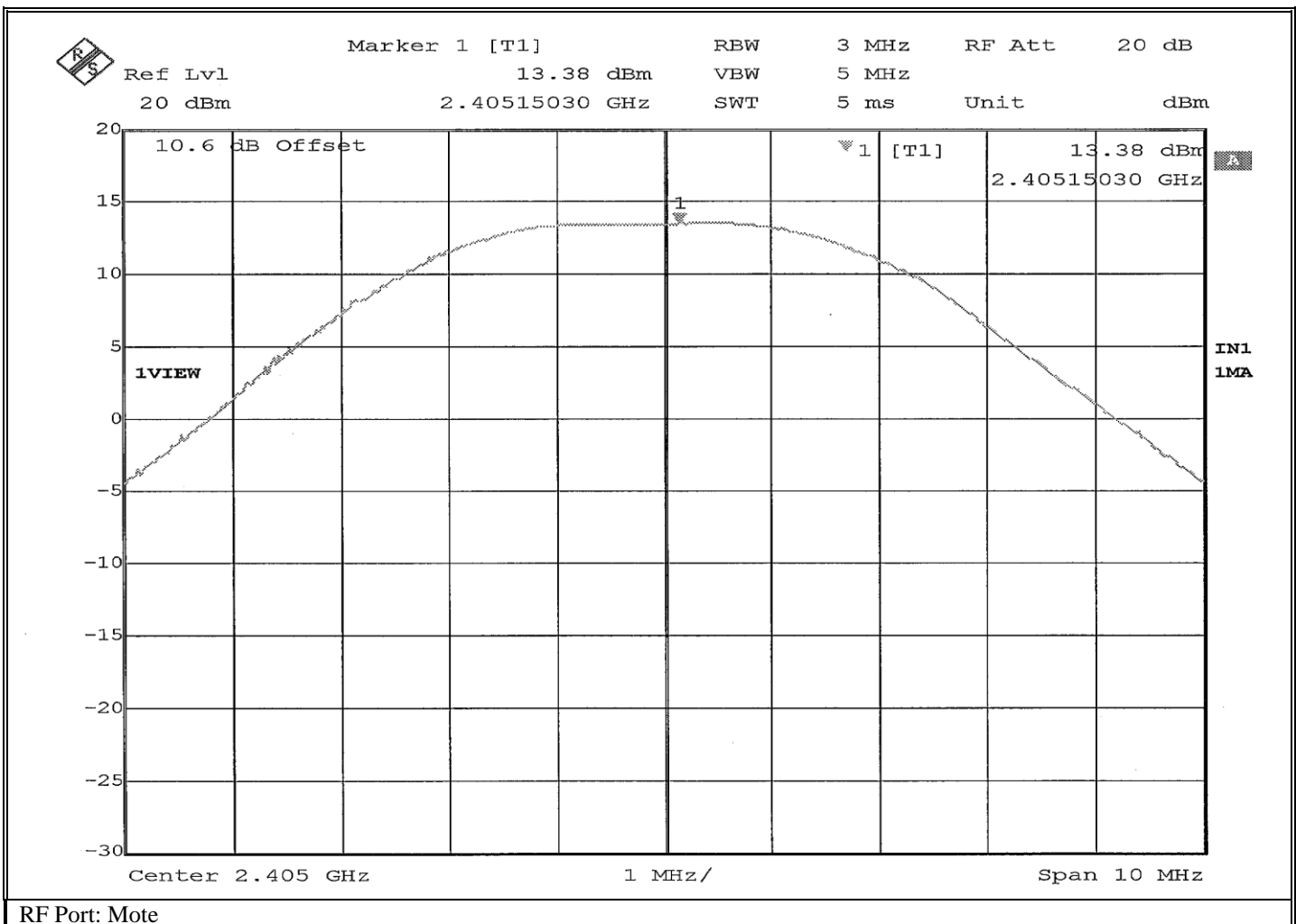


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Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Peak Power Output
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Output: 13.38 dBm

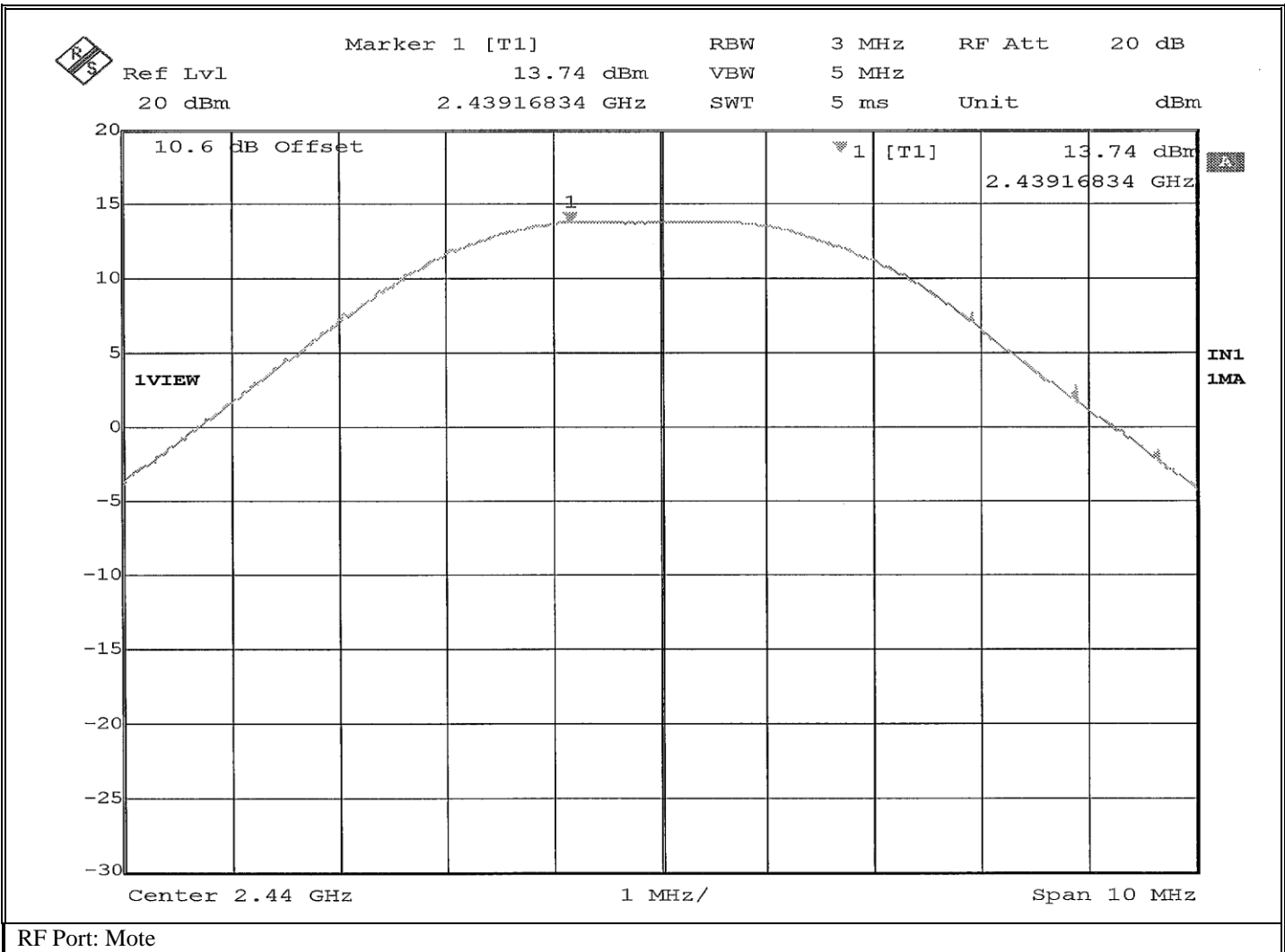


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Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Peak Power Output
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Output: 13.74 dBm



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Report No. R-2754P-1	

**FCC Section 15.247(d)
Antenna Terminal Out of Band/Band Edge Conducted Emissions,
30 MHz to 25 GHz
Test Photograph**



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Report No. R-2754P-1

**Antenna Terminal Out of Band/Band Edge Conducted Emissions, 30 MHz to 25 GHz
Test Photograph**



Test Setup



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Report No. R-2754P-1

**Antenna Terminal Out of Band/Band Edge Conducted Emissions
Test Data**



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Report No. R-2754P-1

**Band Edge
Test Data**

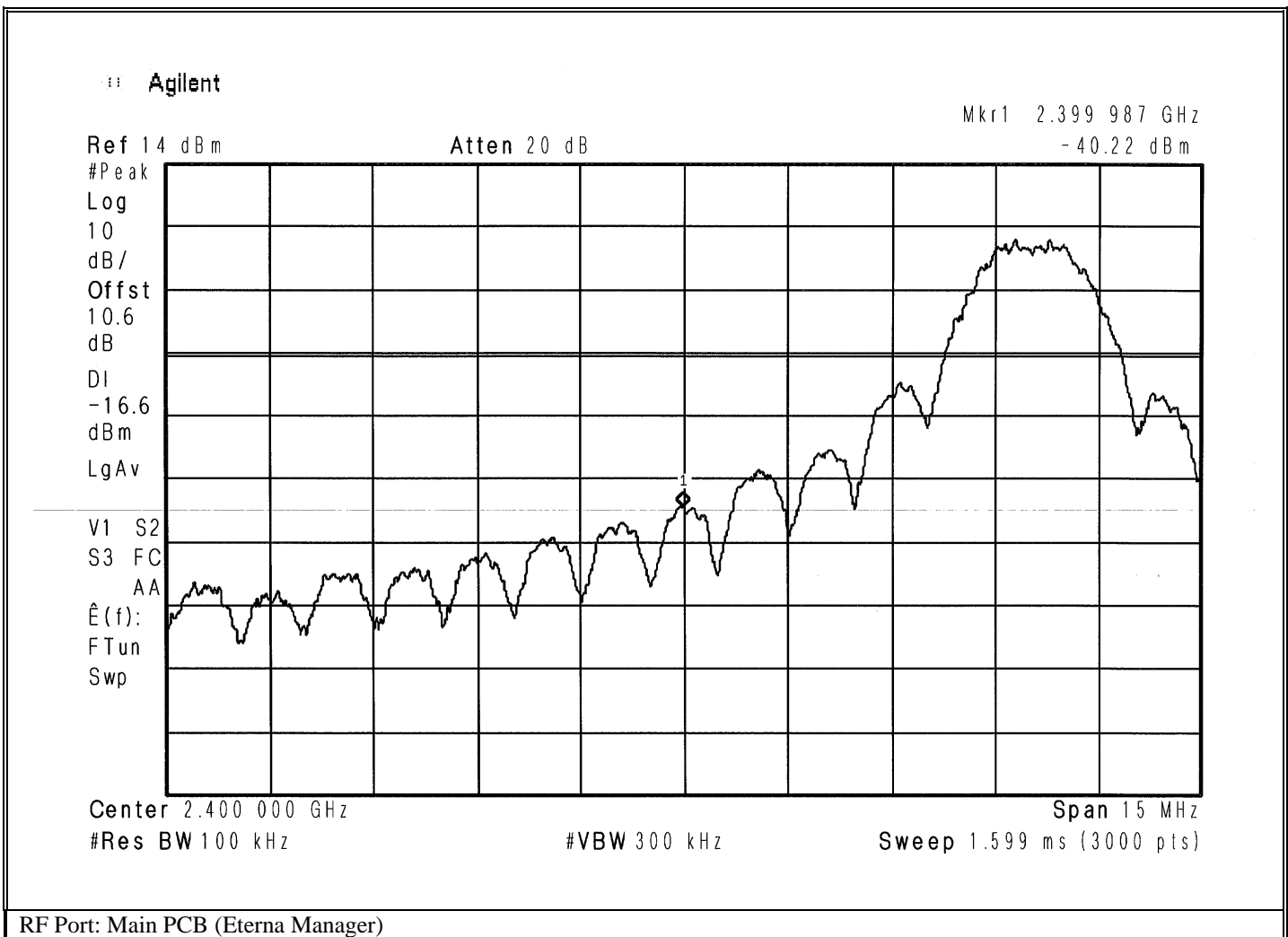


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Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Band Edge
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -16.6 dBm

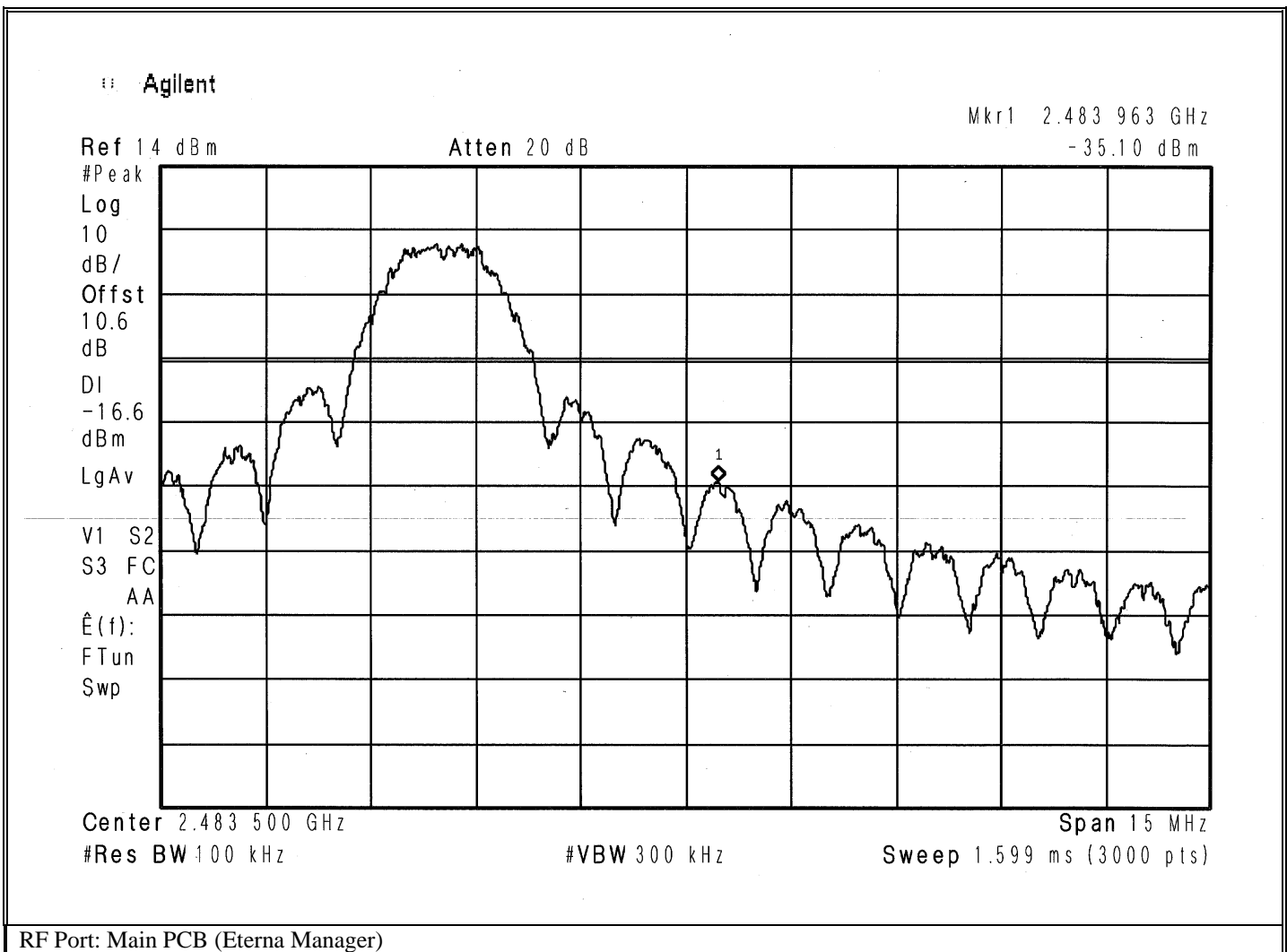


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EMISSIONS TEST DATA SHEET

Method:	Band Edge
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -16.6 dBm

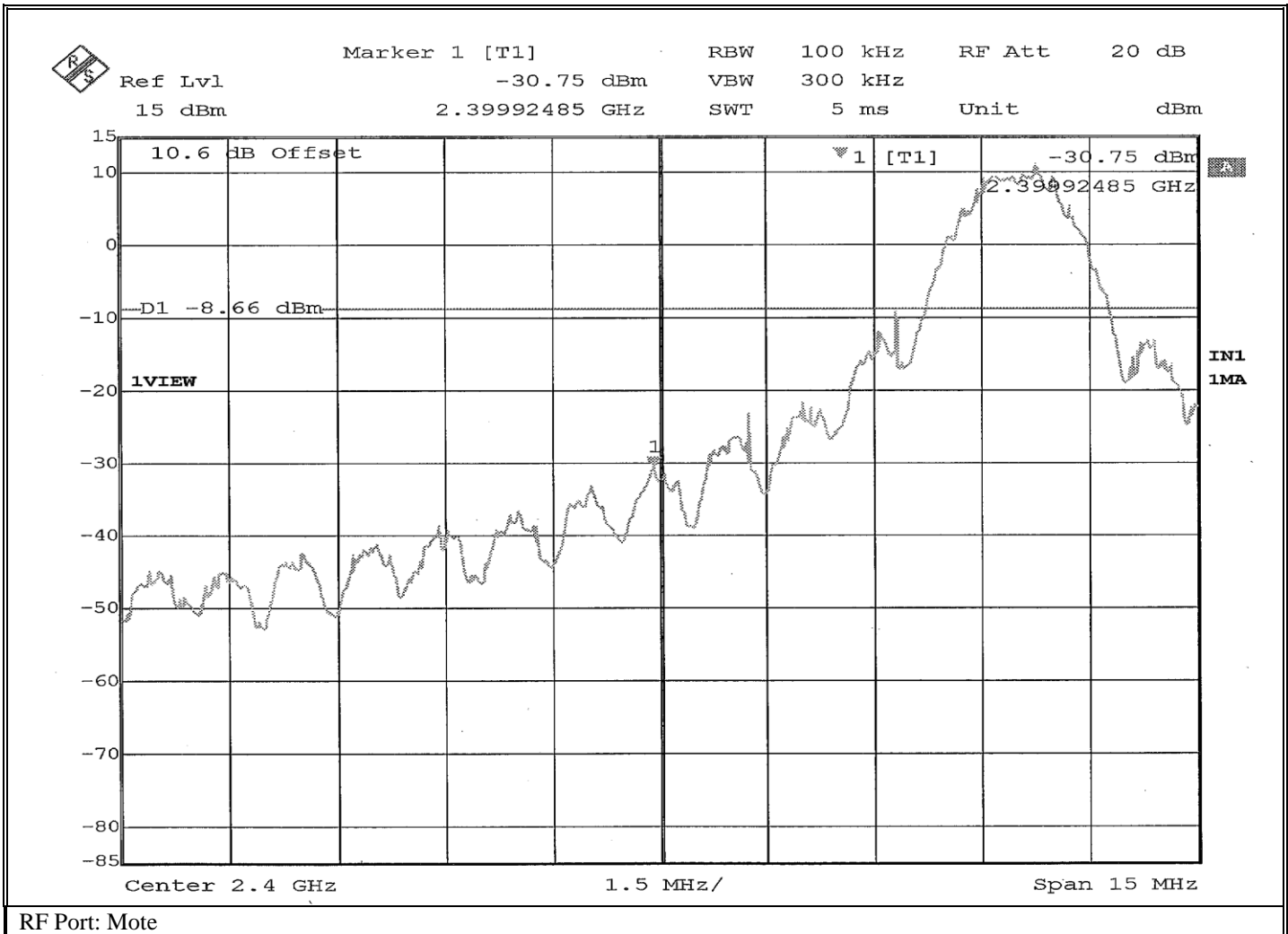


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Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Band Edge
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -8.66 dBm

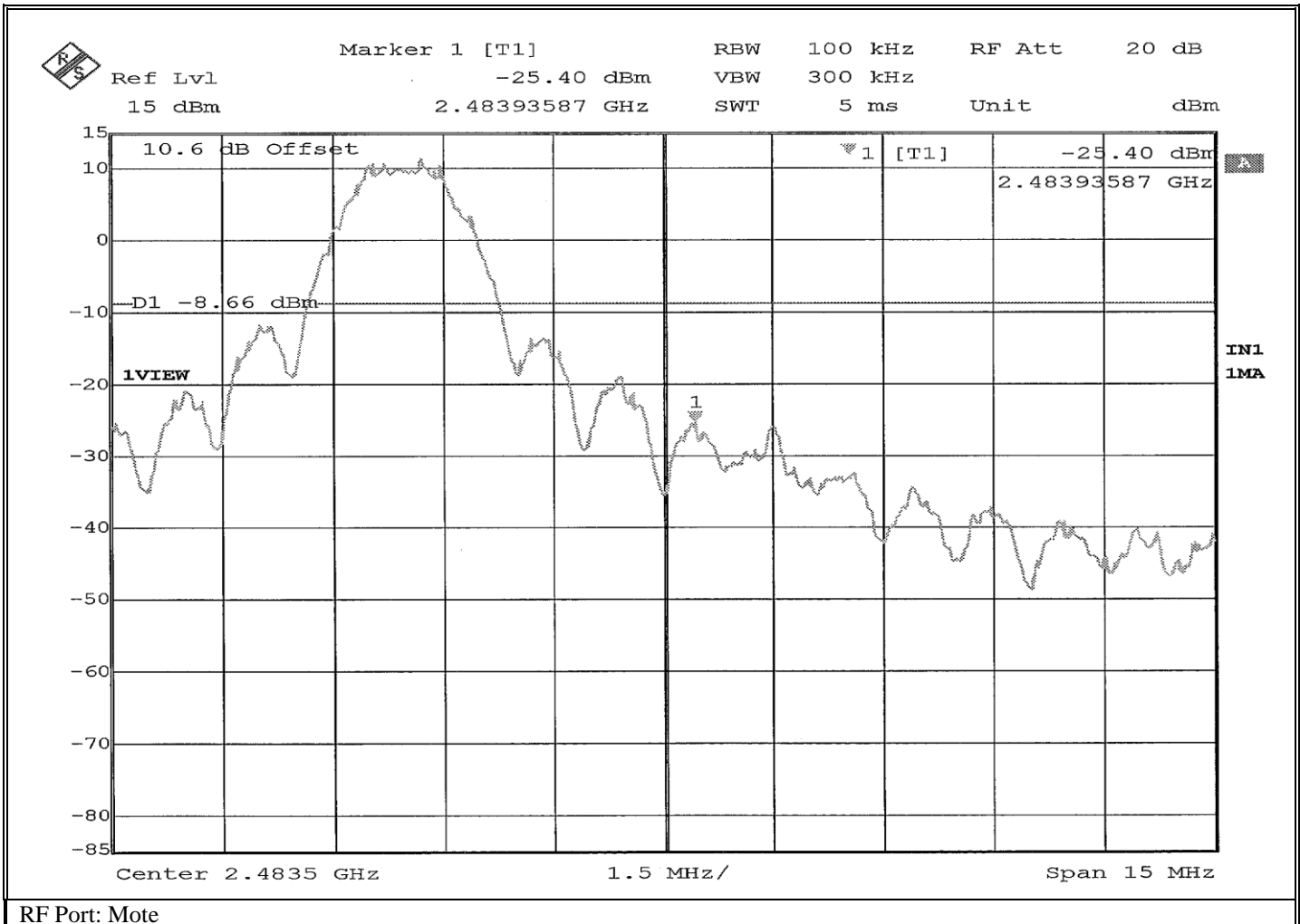


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Report No. R-2754P-1

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Method:	Band Edge
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
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Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -8.66 dBm



Retlif Testing Laboratories

Report No. R-2754P-1

**Out of Band Conducted Emissions
Test Data**

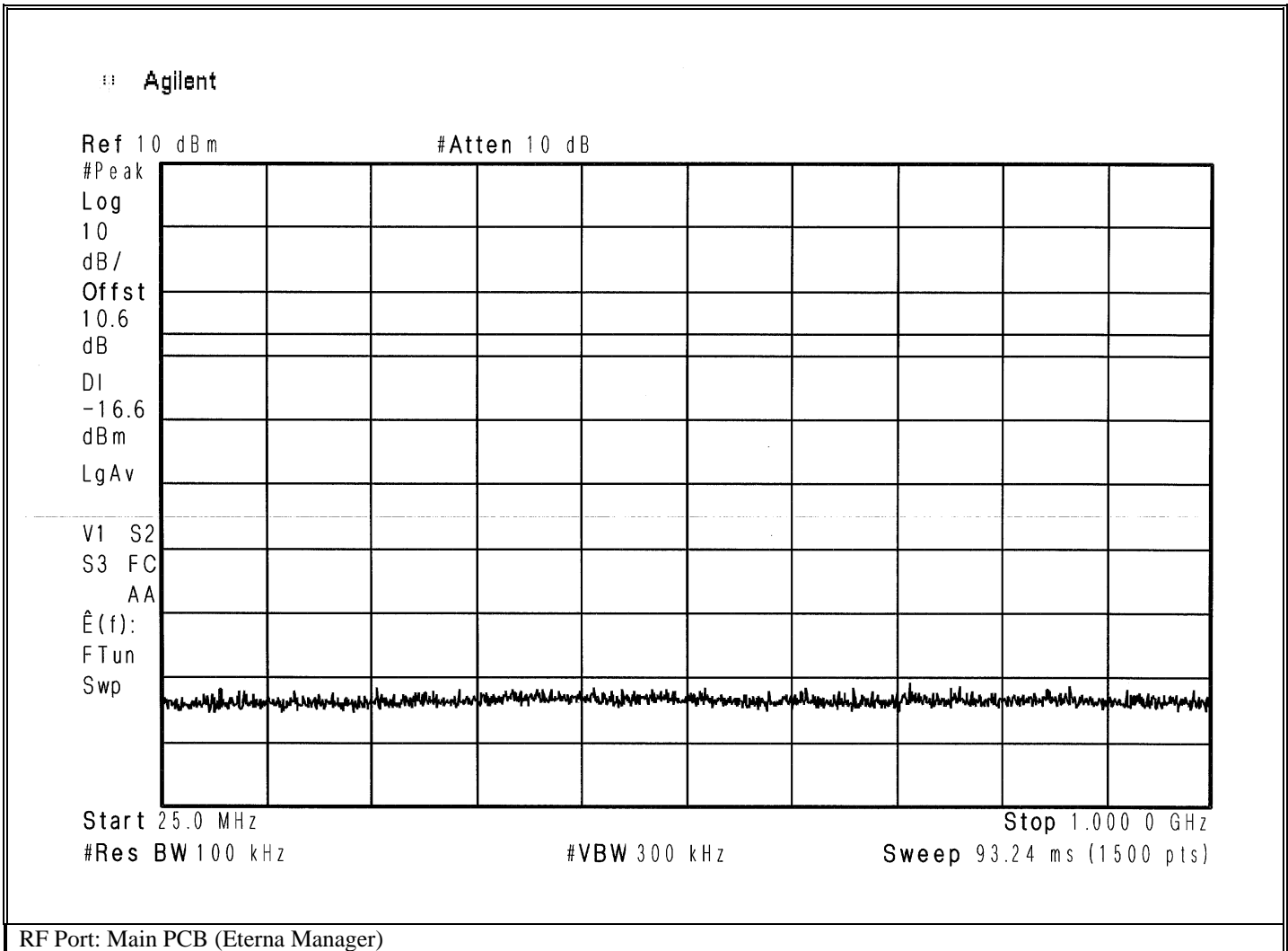


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Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Conducted Out of Band
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Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -16.6 dBm

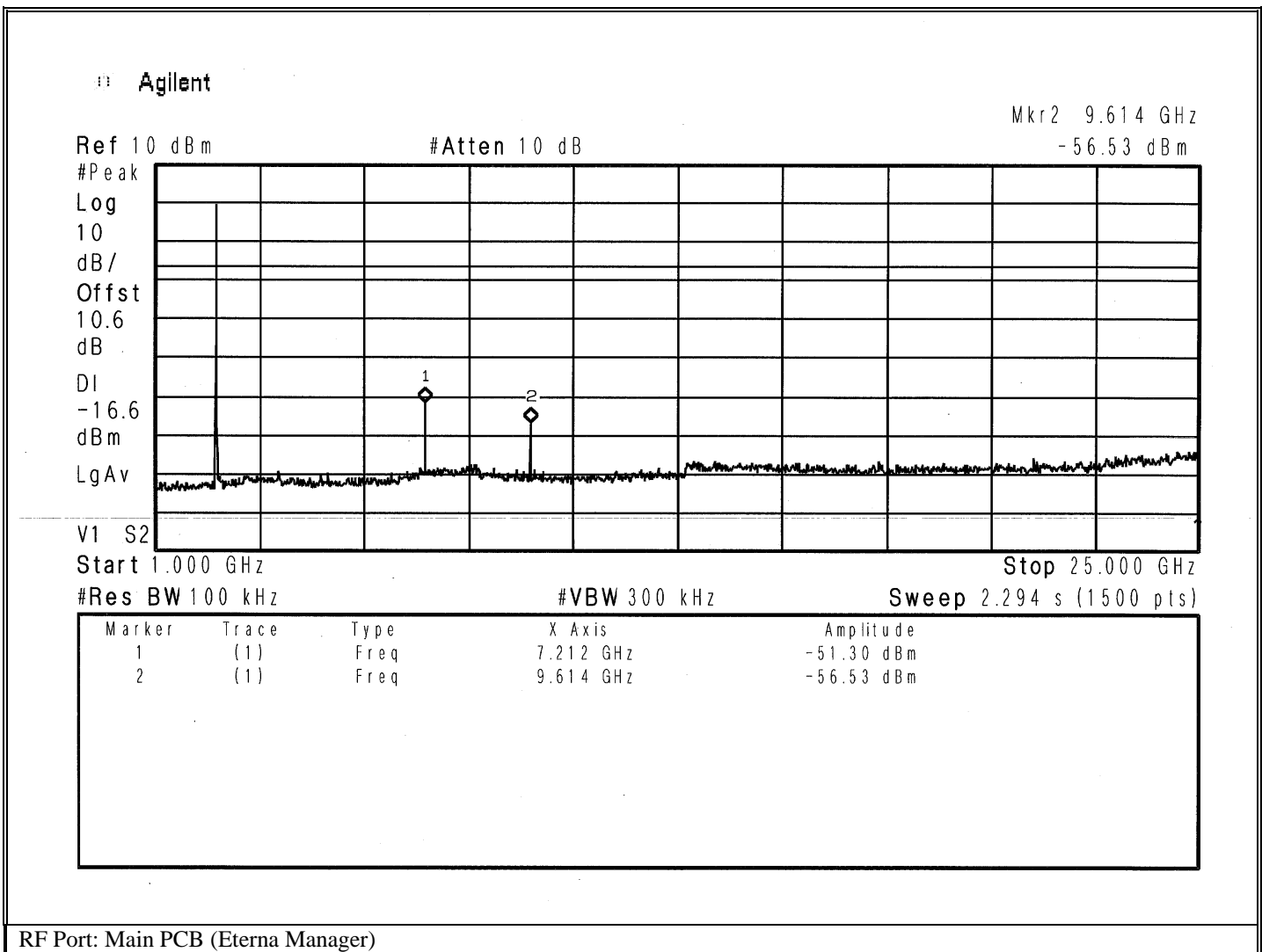


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Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -16.6 dBm

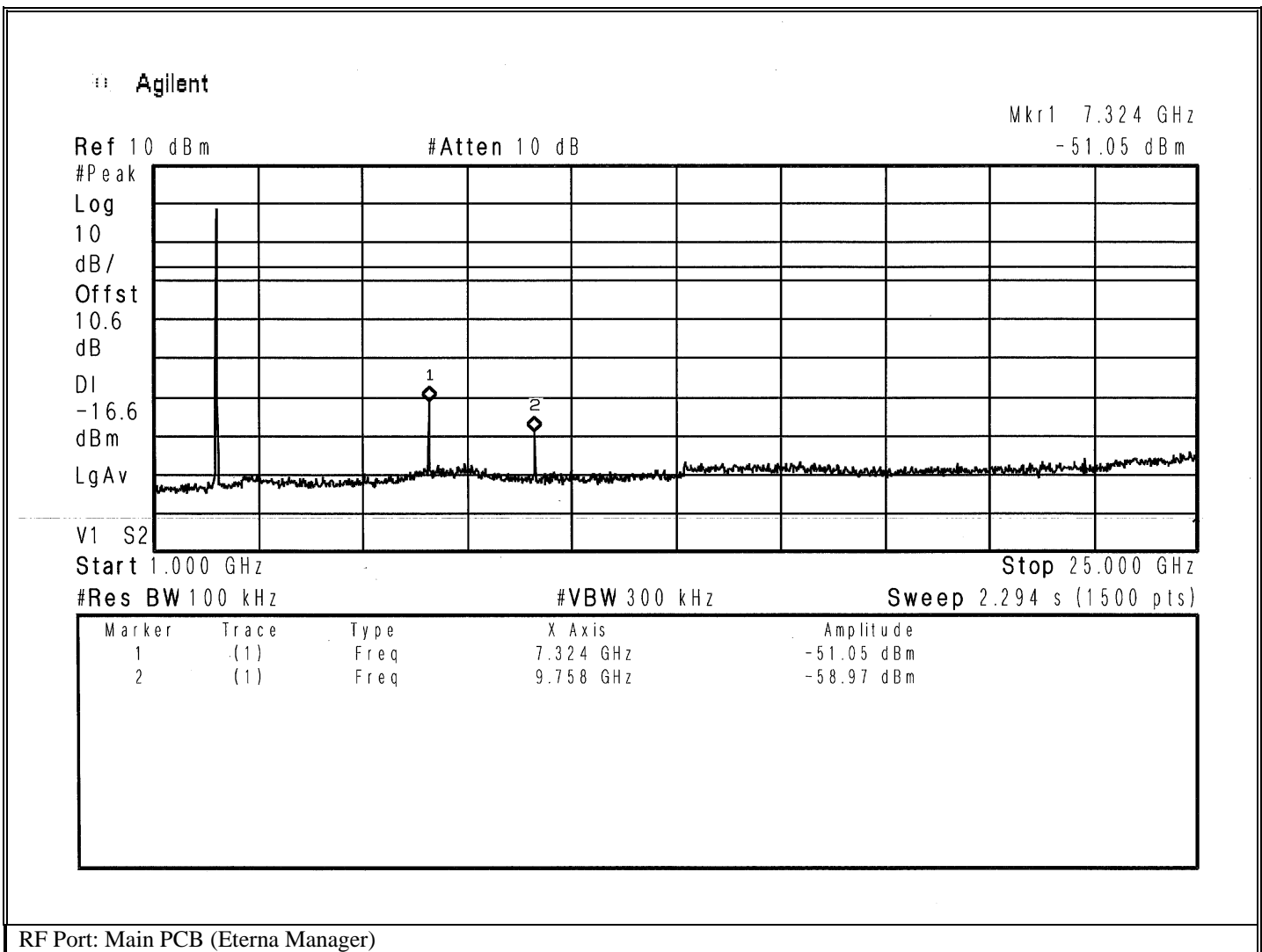


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Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
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Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -16.6 dBm

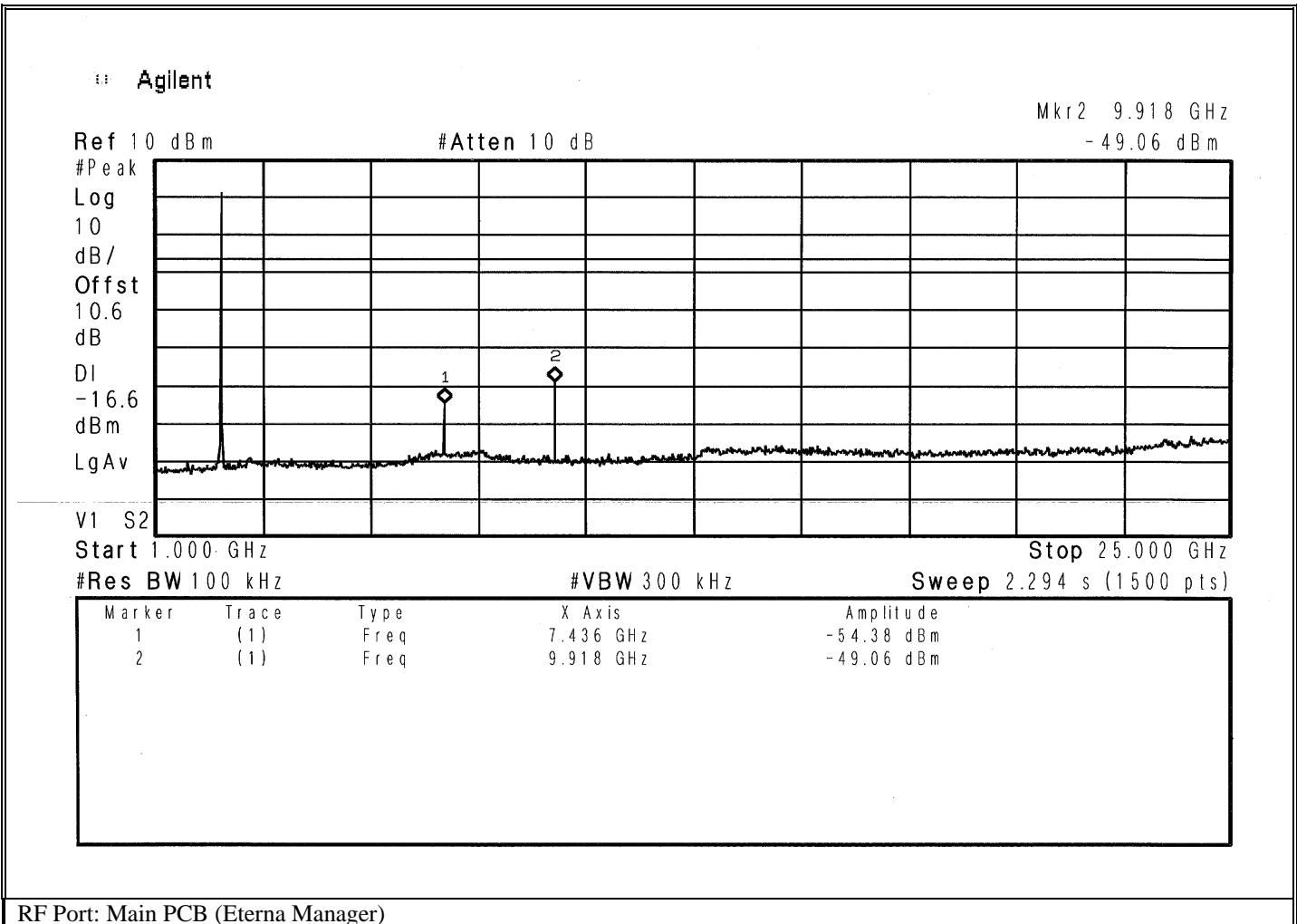


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EMISSIONS TEST DATA SHEET

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Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
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Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -16.6 dBm

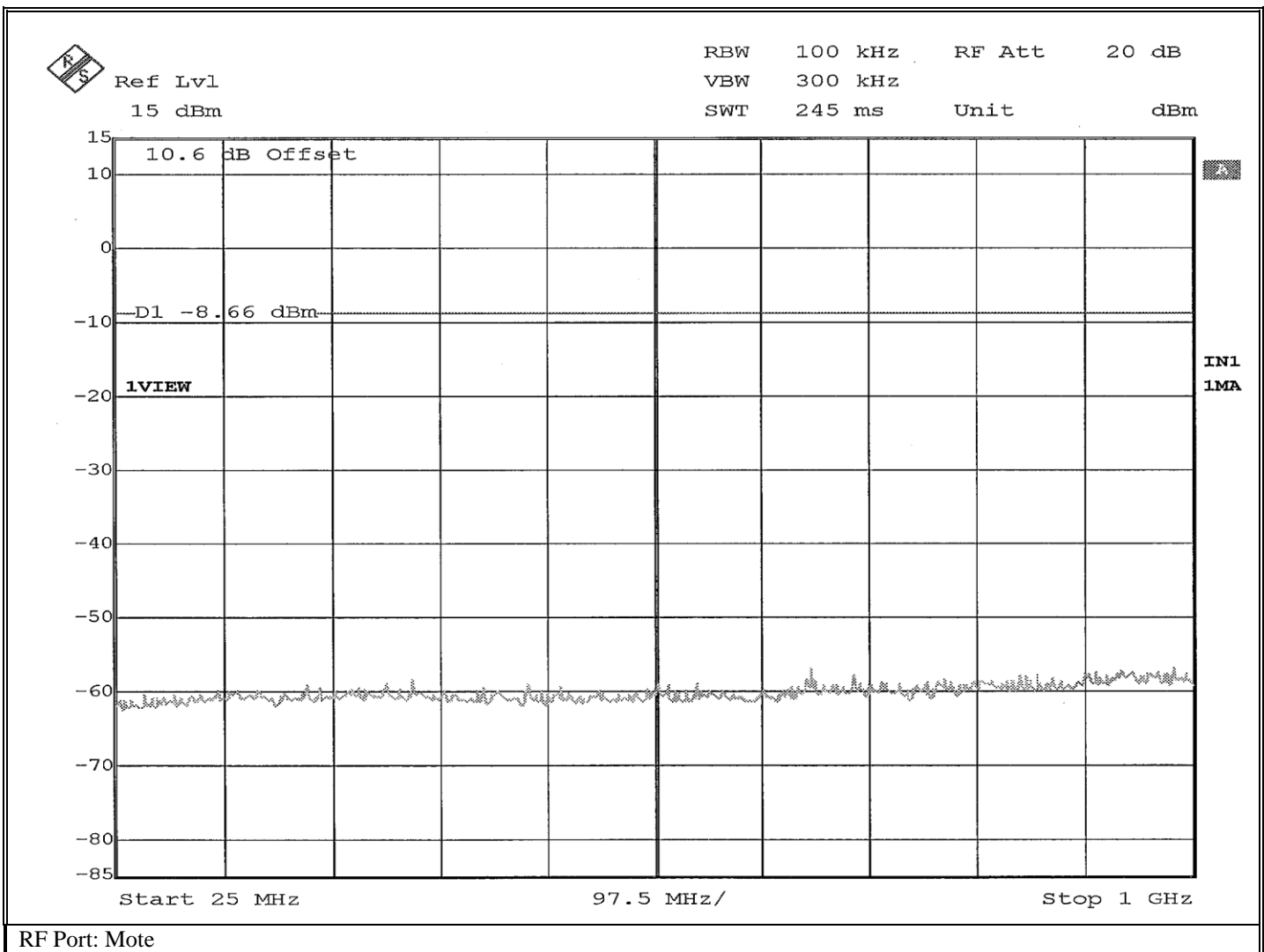


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Conducted Out of Band
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -8.66 dBm

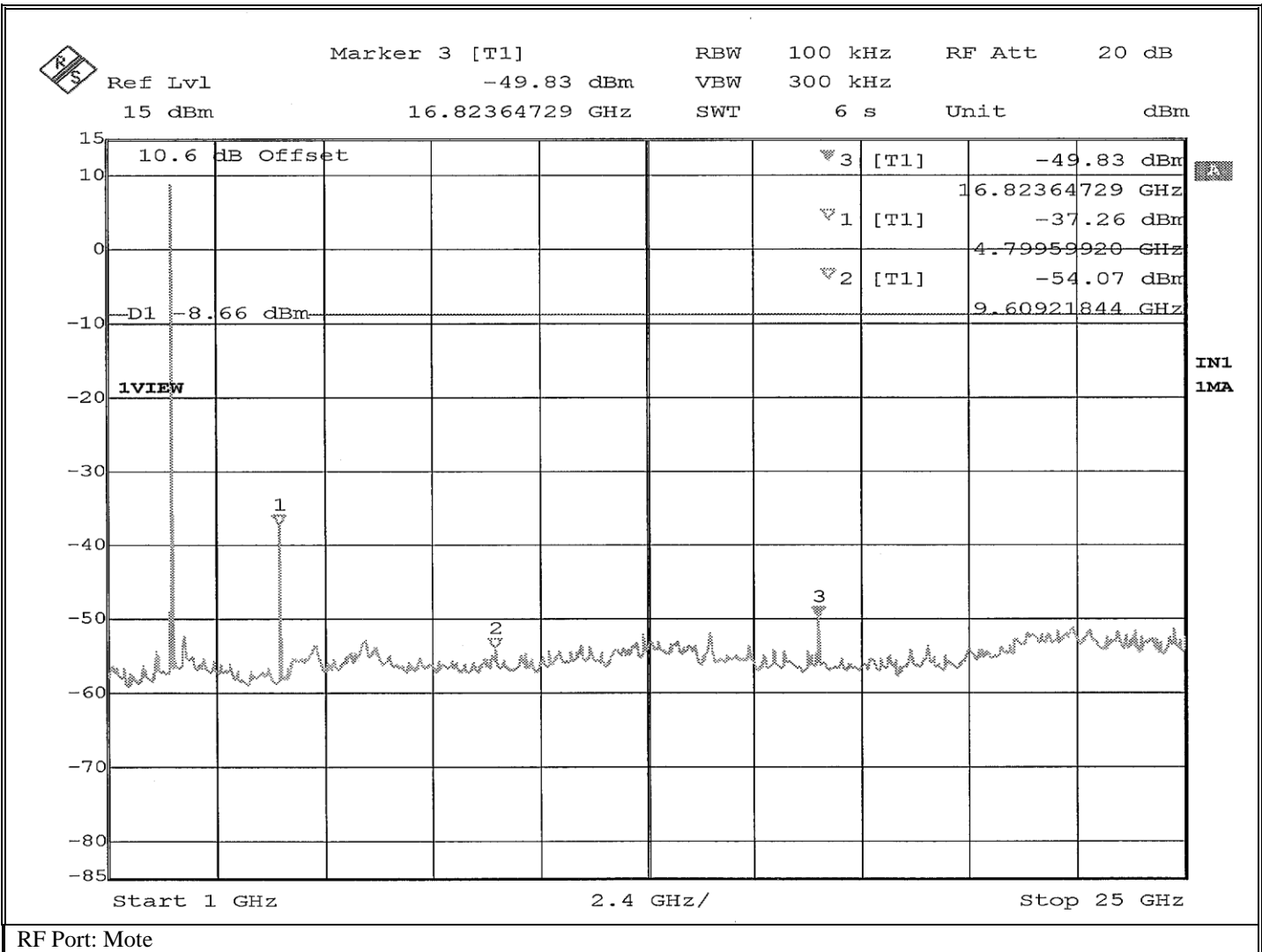


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Conducted Out of Band
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -8.66 dBm

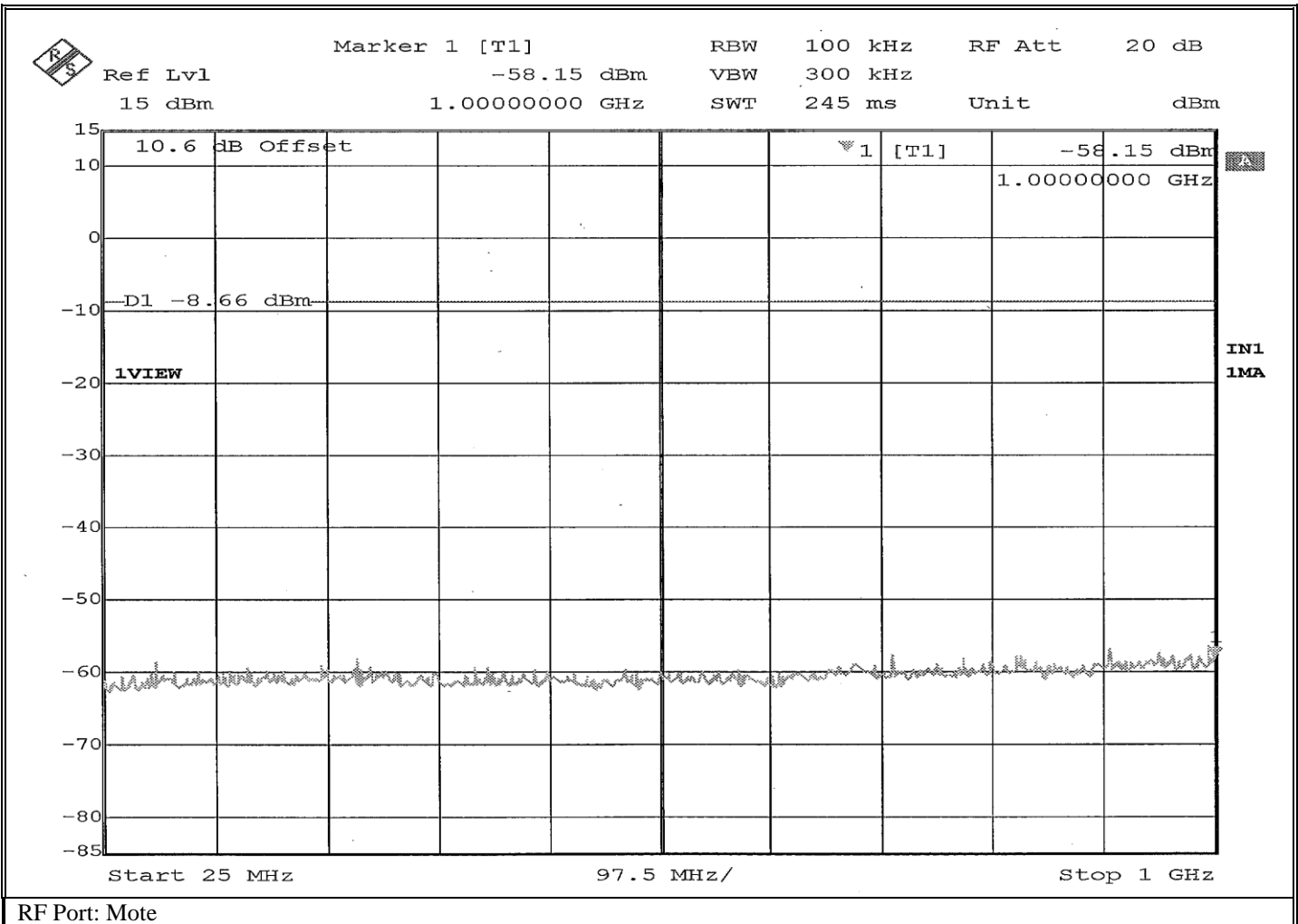


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Conducted Out of Band
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -8.66 dBm

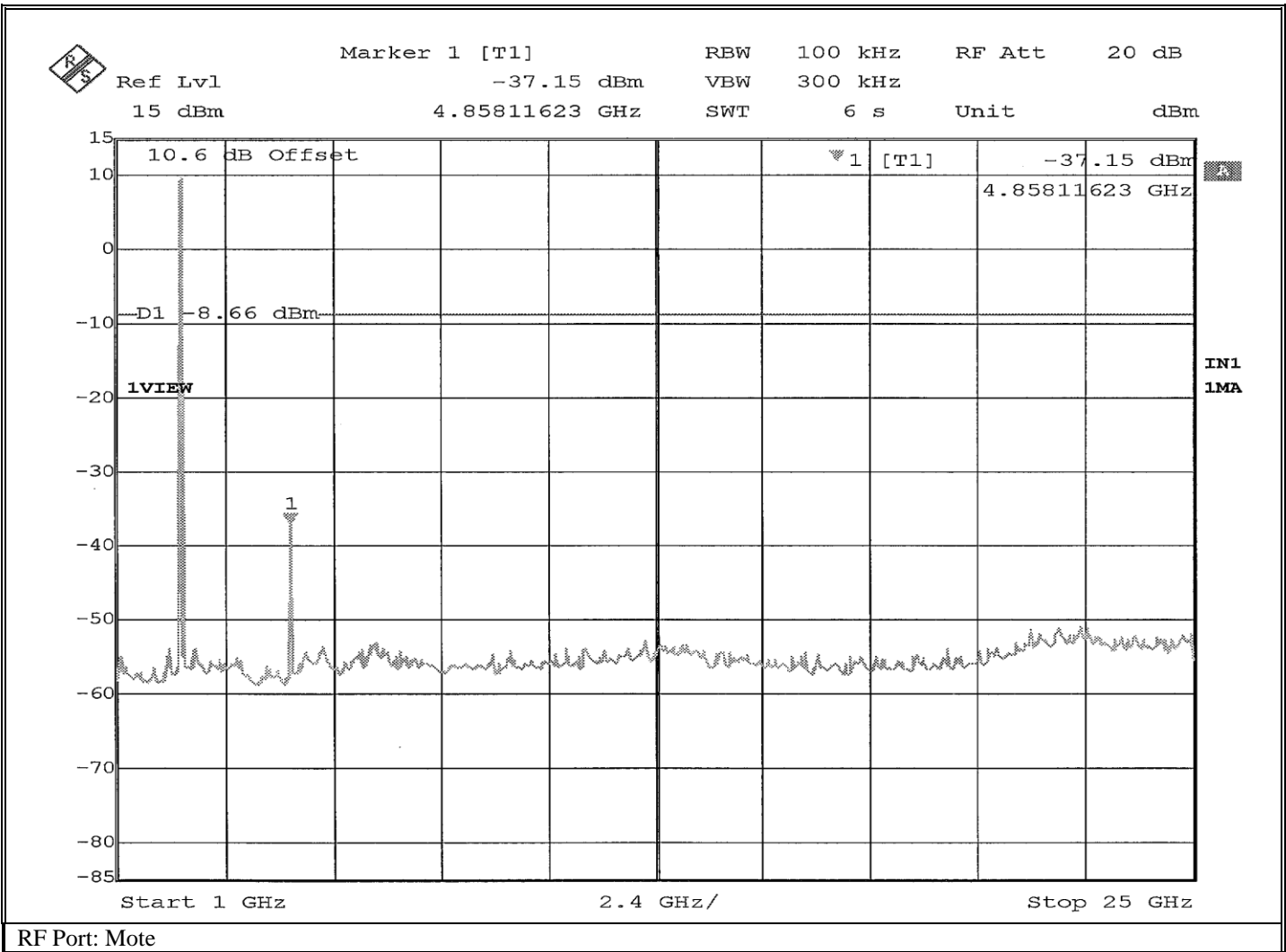


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Conducted Out of Band
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -8.66 dBm



RF Port: Mote

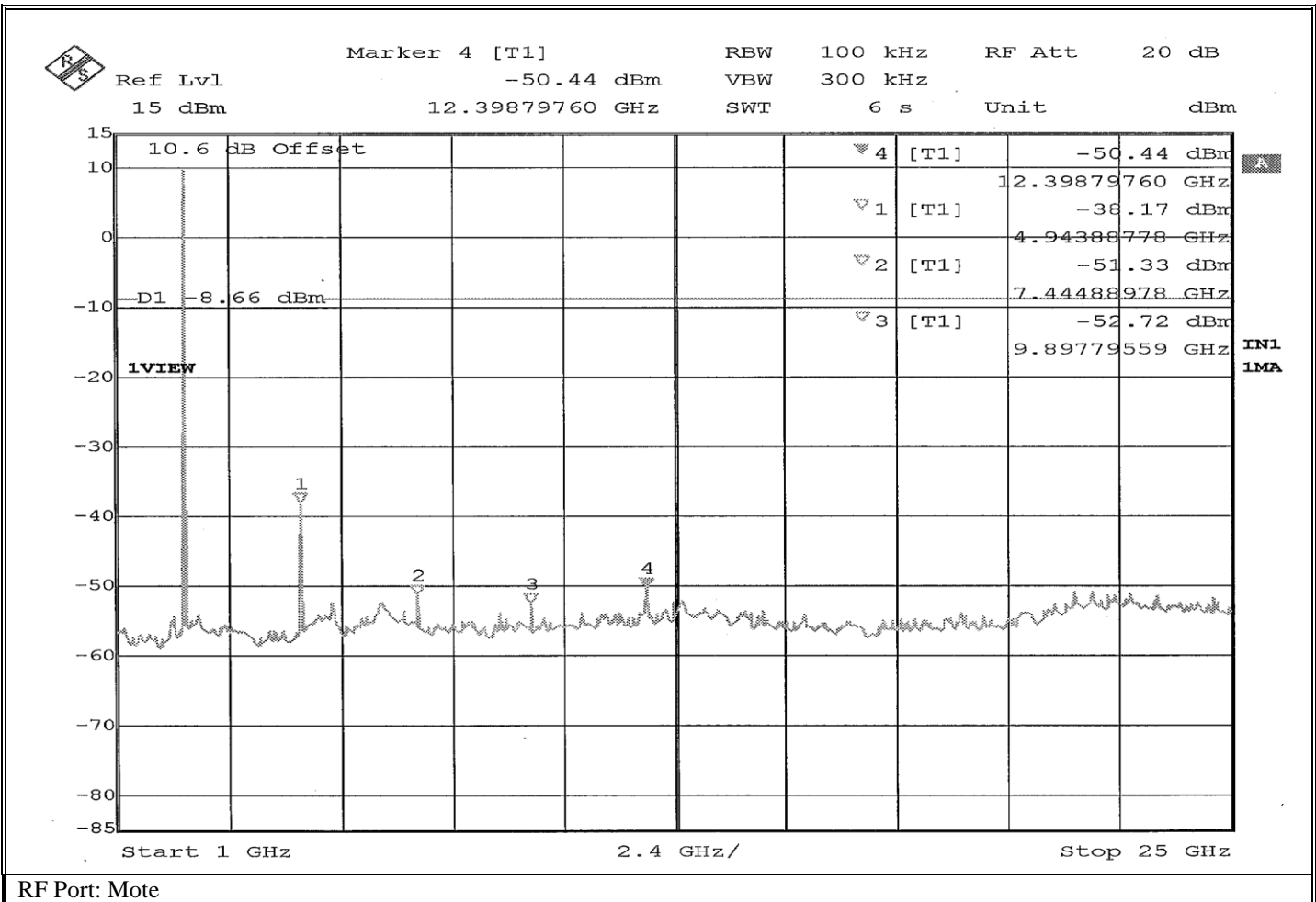


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Conducted Out of Band
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Limit: -8.66 dBm



	Retlif Testing Laboratories
Report No. R-2754P-1	

**FCC Section 15.209(a)/15.247(d)
Radiated Spurious Emissions/Out of Band/Band Edge Radiated Emissions
Test Photograph(s)**



Retlif Testing Laboratories

Report No. R-2754P-1

**Radiated Spurious Emissions/Out of Band/Band Edge Radiated Emissions
Test Photographs**



Loop Antenna - Planer



Loop Antenna – Coplaner



Retlif Testing Laboratories

Report No. R-2754P-1

Radiated Spurious Emissions/Out of Band/Band Edge Radiated Emissions Test Photographs



30 MHz – 200 MHz, Horizontal Polarization



30 MHz – 200 MHz, Vertical Polarization



Retlif Testing Laboratories

Report No. R-2754P-1

Radiated Spurious Emissions/Out of Band/Band Edge Radiated Emissions Test Photographs



200 MHz to 1 GHz, Horizontal Polarization



200 MHz to 1 GHz, Vertical Polarization



Retlif Testing Laboratories

Report No. R-2754P-1

**Radiated Spurious Emissions/Out of Band/Band Edge Radiated Emissions
Test Photographs**



1 to 18 GHz, Horizontal Polarization



1 to 18 GHz, Vertical Polarization



Retlif Testing Laboratories

Report No. R-2754P-1

**Radiated Spurious Emissions/Out of Band/Band Edge Radiated Emissions
Test Photographs**



18 to 25 GHz, Horizontal Polarization



18 to 25 GHz, Vertical Polarization



Retlif Testing Laboratories

Report No. R-2754P-1

**Unwanted Emissions into Restricted Frequency Bands
Test Data**



Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Restricted Band Emissions 25 MHz to 25 GHz
Test Specification:	FCC Part. 15.247(d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Maintaining an NFC connection while cell modem and 2.4GHz band transmit.
Technician:	M.Seamans / T. Hannemann
Date(s):	January 29 th , 2018 & September 21, 2018
Temp/ Relative Humidity:	-1 °C / 17.8 % / 18.3 °C / 37.0 %
Notes:	Antenna Test Distance: 3 meters Detector: Quasi-Peak < 1GHz; Average > 1GHz

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
37.50	-	-	-	-			-	100.00
	38.00*	10.38	14.42	24.80			17.38	I
38.25	-	-	-	-			-	100.00
73.00	-	-	-	-			-	100.00
	74.00*	17.37	8.73	26.10			20.18	I
75.20	-	-	-	-			-	100.00
108.00	-	-	-	-			-	150.00
	115.00*	16.23	9.87	26.10			20.18	I
121.94	-	-	-	-			-	150.00
123.00	-	-	-	-			-	150.00
	130.00*	10.58	9.72	20.30			10.35	
138.00	-	-	-	-			-	150.00
149.90	-	-	-	-			-	150.00
	150.00*	8.03	11.97	20.00			10.00	I
150.05	-	-	-	-			-	150.00
156.52475	-	-	-	-			-	150.00

No EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).



Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Restricted Band Emissions 25 MHz to 25 GHz
Test Specification:	FCC Part. 15.247(d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Maintaining an NFC connection while cell modem and 2.4GHz band transmit.
Technician:	M.Seamans / T. Hannemann
Date(s):	January 29 th , 2018 & September 21, 2018
Temp/ Relative Humidity:	-1 °C / 17.8 % / 18.3 °C / 37.0 %
Notes:	Antenna Test Distance: 3 meters Detector: Quasi-Peak < 1GHz; Average > 1GHz

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
	156.52500*	3.26	12.84	16.10			6.38	
156.52525	-	-	-	-			-	150.00
156.70	-	-	-	-			-	150.00
	156.80*	6.33	12.87	19.20			9.12	
156.90	-	-	-	-			-	150.00
162.0125	-	-	-	-			-	150.00
	165.00*	7.83	13.57	21.40			11.75	
167.1700	-	-	-	-			-	150.00
167.72	-	-	-	-			-	150.00
	170.00*	4.43	13.97	18.40			8.32	
173.20	-	-	-	-			-	150.00
240.00	-	-	-	-			-	200.00
	260.00*	-0.92	18.92	18.00			7.94	
285.00	-	-	-	-			-	200.00
322.00	-	-	-	-			-	200.00
	330.00*	-2.75	22.05	19.30			9.23	

No EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).



Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Restricted Band Emissions 25 MHz to 25 GHz
Test Specification:	FCC Part. 15.247(d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Maintaining an NFC connection while cell modem and 2.4GHz band transmit.
Technician:	M.Seamans / T. Hannemann
Date(s):	January 29 th , 2018 & September 21, 2018
Temp/ Relative Humidity:	-1 °C / 17.8 % / 18.3 °C / 37.0 %
Notes:	Antenna Test Distance: 3 meters Detector: Quasi-Peak < 1GHz; Average > 1GHz

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
335.40	-	-	-	-			-	200.00
399.90	-	-	-	-			-	200.00
	405.00*	-2.90	24.70	21.80			12.30	
410.00	-	-	-	-			-	200.00
608.00	-	-	-	-			-	200.00
	611.00*	-6.47	30.97	24.50			16.79	
614.00	-	-	-	-			-	200.00
960.00	-	-	-	-			-	500.00
	975.00*	-4.59	36.79	32.20			40.74	
1240.00	-	-	-	-			-	500.00
1300.00	-	-	-	-			-	500.00
	1350.00*	33.09	-7.85	25.24			18.28	
1427.00	-	-	-	-			-	500.00
1435.00	-	-	-	-			-	500.00
	1500.00*	33.13	-7.00	26.13			20.25	
1646.50	-	-	-	-			-	500.00

No EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).



Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Restricted Band Emissions 25 MHz to 25 GHz
Test Specification:	FCC Part. 15.247(d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Maintaining an NFC connection while cell modem and 2.4GHz band transmit.
Technician:	M.Seamans / T. Hannemann
Date(s):	January 29 th , 2018 & September 21, 2018
Temp/ Relative Humidity:	-1 °C / 17.8 % / 18.3 °C / 37.0 %
Notes:	Antenna Test Distance: 3 meters Detector: Quasi-Peak < 1GHz; Average > 1GHz

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading	Duty Cycle Factor		Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m	dB		uV/m	uV/m
1660.00	-	-	-	-	-		-	500.00
	1680.00*	33.17	-6.09	27.08	-		22.59	
1710.00	-	-	-	-	-		-	500.00
1718.80	-	-	-	-	-		-	500.00
	1720.00*	32.54	-5.90	26.64	-		21.48	
1722.20	-	-	-	-	-		-	500.00
2200.00	-	-	-	-	-		-	500.00
	2250.00*	31.79	-3.79	28.00	-		25.12	
2300.00	-	-	-	-	-		-	500.00
2310.00	-	-	-	-	-		-	500.00
	2390.00	59.75	-3.43	56.32	-20		65.46	
2390.00	-	-	-	-	-		-	500.00
2483.50	-	-	-	-	-		-	500.00
	2483.50	64.75	-3.02	61.73	-20		121.90	
2500.00	-	-	-	-	-		-	500.00
2690.00	-	-	-	-	-		-	500.00

EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).



Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Restricted Band Emissions 25 MHz to 25 GHz
Test Specification:	FCC Part. 15.247(d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Maintaining an NFC connection while cell modem and 2.4GHz band transmit.
Technician:	M.Seamans / T. Hannemann
Date(s):	January 29 th , 2018 & September 21, 2018
Temp/ Relative Humidity:	-1 °C / 17.8 % / 18.3 °C / 37.0 %
Notes:	Antenna Test Distance: 3 meters Detector: Quasi-Peak < 1GHz; Average > 1GHz

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
	-	-	-	-			-	
	2750.00*	32.25	-2.26	29.99			31.59	
	-	-	-	-			-	
2900.00	-	-	-	-			-	500.00
	-	-	-	-			-	
3260.00	-	-	-	-			-	500.00
	3263.00*	32.32	-0.50	31.82			38.99	
3267.00	-	-	-	-			-	500.00
	-	-	-	-			-	
3332.00	-	-	-	-			-	500.00
	3336.00*	32.01	-0.20	31.81			38.95	
3339.00	-	-	-	-			-	500.00
	-	-	-	-			-	
3345.80	-	-	-	-			-	500.00
	3350.00*	32.30	-0.15	32.15			40.50	
3358.00	-	-	-	-			-	500.00
	-	-	-	-			-	
3600.00	-	-	-	-			-	500.00
	-	-	-	-			-	
	3700.00*	31.51	1.16	32.67			43.00	
	-	-	-	-			-	

No EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).



Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Restricted Band Emissions 25 MHz to 25 GHz
Test Specification:	FCC Part. 15.247(d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Maintaining an NFC connection while cell modem and 2.4GHz band transmit.
Technician:	M.Seamans / T. Hannemann
Date(s):	January 29 th , 2018 & September 21, 2018
Temp/ Relative Humidity:	-1 °C / 17.8 % / 18.3 °C / 37.0 %
Notes:	Antenna Test Distance: 3 meters Detector: Quasi-Peak < 1GHz; Average > 1GHz

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading	Duty Cycle Factor		Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m	dB		uV/m	uV/m
4400.00	-	-	-	-	-		-	500.00
4500.00	-	-	-	-	-		-	500.00
	-	-	-	-	-		-	
	4880.00	62.30	3.32	65.62	-20		190.99	
	-	-	-	-	-		-	
5150.00	-	-	-	-	-		-	500.00
5350.00	-	-	-	-	-		-	500.00
	5400.00*	31.40	4.21	35.61	-		60.33	
	-	-	-	-	-		-	
5460.00	-	--	-	-	-		-	500.00
7250.00	-	-	-	-	-		-	500.00
	7440.00	46.70	7.79	54.49	-20		53.03	
	-	-	-	-	-		-	
7750.00	-	-	-	-	-		-	500.00
8025.00	-	-	-	-	-		-	500.00
	8300.00*	32.50	8.87	32.37	-		41.54	
	-	-	-	-	-		-	

EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).



Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Restricted Band Emissions 25 MHz to 25 GHz
Test Specification:	FCC Part. 15.247(d)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Maintaining an NFC connection while cell modem and 2.4GHz band transmit.
Technician:	M.Seamans / T. Hannemann
Date(s):	January 29 th , 2018 & September 21, 2018
Temp/ Relative Humidity:	-1 °C / 17.8 % / 18.3 °C / 37.0 %
Notes:	Antenna Test Distance: 3 meters Detector: Quasi-Peak < 1GHz; Average > 1GHz

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
	8500.00	-	-	-			-	500.00
	9000.00	-	-	-			-	500.00
	9100.00*	32.40	9.70	42.10			127.35	
	9200.00	-	-	-			-	500.00
	9300.00	-	-	-			-	500.00
	9400.00*	33.02	10.05	43.07			142.40	
	9500.00	-	-	-			-	500.00
	10600.00	-	-	-			-	500.00
	12200.00*	33.74	13.97	47.71			243.78	
	12700.00	-	-	-			-	500.00
	13250.00	-	-	-			-	500.00
	13400.00	-	-	-			-	500.00
	14470.00	-	-	-			-	500.00
	14500.00	-	-	-			-	500.00

No EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).



Retlif Testing Laboratories

Report No. R-2754P-1

**Radiated Spurious Emissions
Test Data**



Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Radiated Spurious Emissions 9 kHz to 25 GHz
Test Specification:	FCC Part 15, Subpart C, Section 15.209(a)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Maintaining an NFC connection while cell modem and 2.4GHz band transmit
Technician:	M.Seamans / T. Hannemann
Date(s):	January 29 th , 2018 & September 21, 2018
Temp/ Relative Humidity:	-1 °C / 17.8 % / 18.3 °C / 37.0 %
Notes:	Antenna Test Distance: 3 meters Detector: Quasi-Peak < 1GHz; Average > 1GHz

Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted to 300M	Converted Reading	Limit at 300M
MHz	(H/V) / Height	Degrees	dBuV	dB	dBuV/m	dBuV/m	uV/m	uV/m
0.009	-	-	-	-	-	-	-	266.67
	-	-	-	-	-	-	-	I
	-	-	-	-	-	-	-	I
	-	-	-	-	-	-	-	I
0.490	-	-	-	-	-	-	-	4.89

No EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum.

Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted to 30M	Converted Reading	Limit at 30M
MHz	(H/V) / Height	Degrees	dBuV	dB	dBuV/m	dBuV/m	uV/m	uV/m
0.490	-	-	-	-	-	-	-	48.98
	-	-	-	-	-	-	-	I
1.705	-	-	-	-	-	-	-	14.08
1.705	-	-	-	-	-	-	-	30.00
	-	-	-	-	-	-	-	
30.00	-	-	-	-	-	-	-	30.00

No EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum.



Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Radiated Spurious Emissions 9 kHz to 25 GHz
Test Specification:	FCC Part 15, Subpart C, Section 15.209(a)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Maintaining an NFC connection while cell modem and 2.4GHz band transmit
Technician:	M.Seamans
Date(s):	January 29 th , 2018
Temp/ Relative Humidity:	-1 °C / 17.8 % / 18.3 °C / 37.0 %
Notes:	Antenna Test Distance: 3 meters Detector: Quasi-Peak < 1GHz; Average > 1GHz

Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit at 3M
MHz	(H/V) / Height	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
30.00	-	-	-	-	-		100
	-	-	-	-	-		
38.00*	V / 1m	0.0	10.38	14.42	24.80	17.38	
	-	-	-	-	-		
88.00	-	-	-	-	-		100
88.00	-	-	-	-	-		150
	-	-	-	-	-		
115.00*	V / 1m	0.0	16.23	9.87	26.10	20.18	
170.00*	V / 1m	0.0	4.43	13.97	18.40	8.32	
	-	-	-	-	-		
216.00	-	-	-	-	-		150
216.00	-	-	-	-	-		200
	-	-	-	-	-		
611.00*	V / 1m	0.0	-0.64	30.97	38.01	79.52	
	-	-	-	-	-		
960.00	-	-	-	-	-		200
960.00	-	-	-	-	-		500
	-	-	-	-	-		
975.00*	V / 1m	0.0	-4.59	36.79	32.20	40.74	
3350.00*	V / 1m	0.0	32.30	-0.15	32.15	40.50	
	-	-	-	-	-		
	-	-	-	-	-		
25000.00	-	-	-	-	-		500

No EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).



Retlif Testing Laboratories

Report No. R-2754P-1

**FCC Section 15.247(a)(1)
20 dB Bandwidth
Test Photograph**



Retlif Testing Laboratories

Report No. R-2754P-1

**Test Photograph
20 dB Bandwidth**



Test Setup



Retlif Testing Laboratories

Report No. R-2754P-1

**20 dB Bandwidth
Test Data**

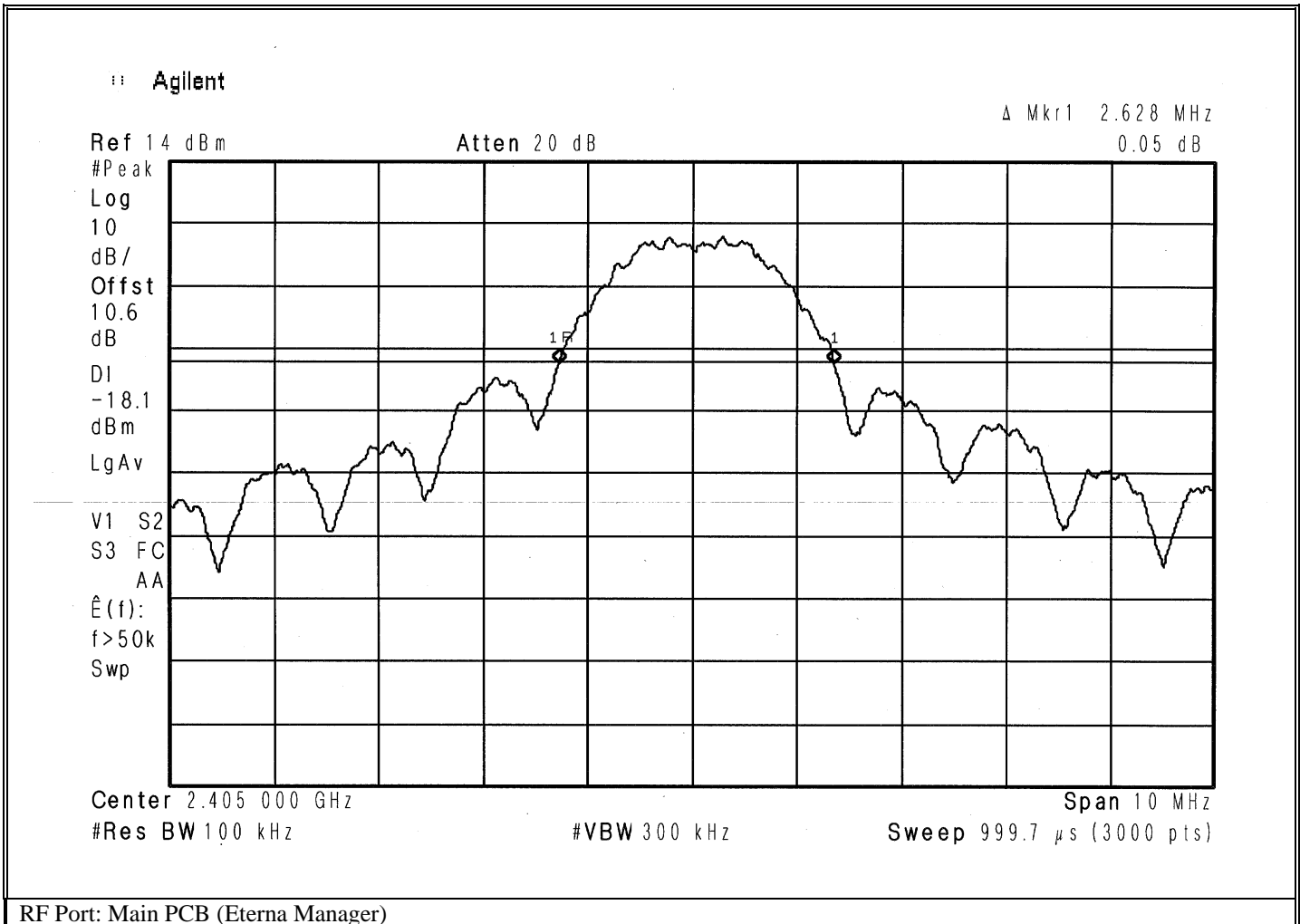


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Occupied Bandwidth
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(iii)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	20dB Bandwidth: 2.628 MHz

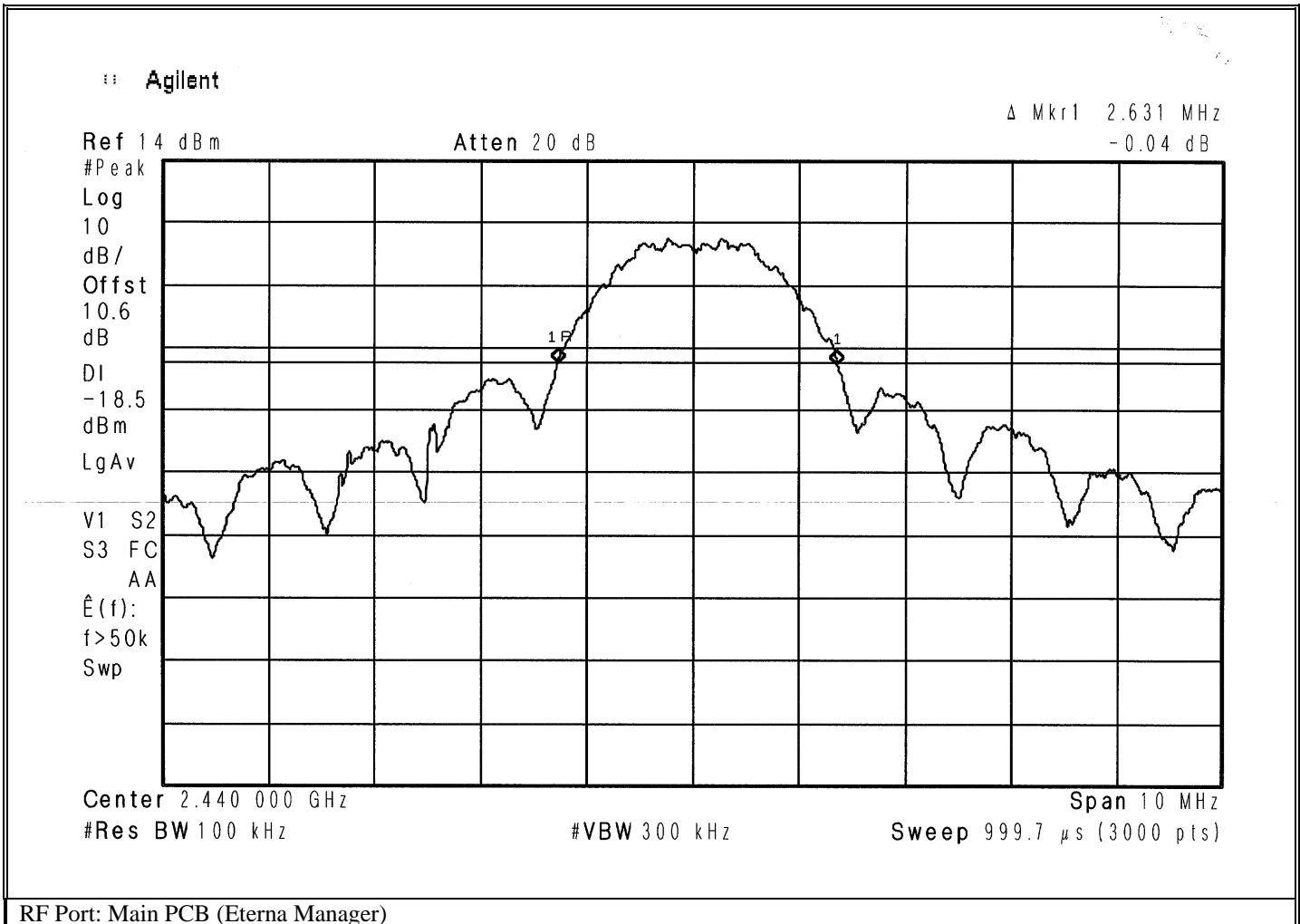


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Occupied Bandwidth
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	20dB Bandwidth: 2.631 MHz

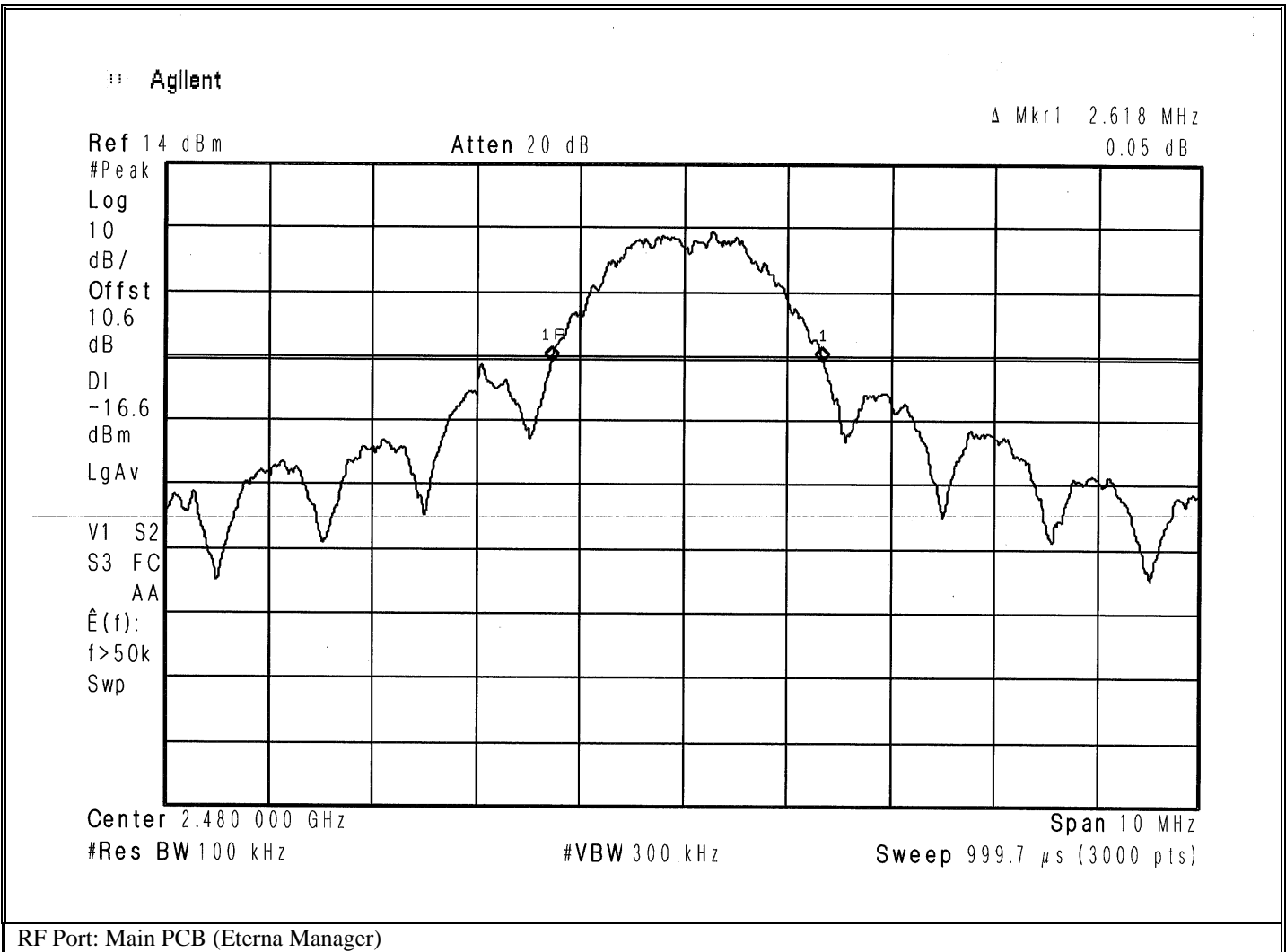


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Occupied Bandwidth
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	20dB Bandwidth: 2.618 MHz

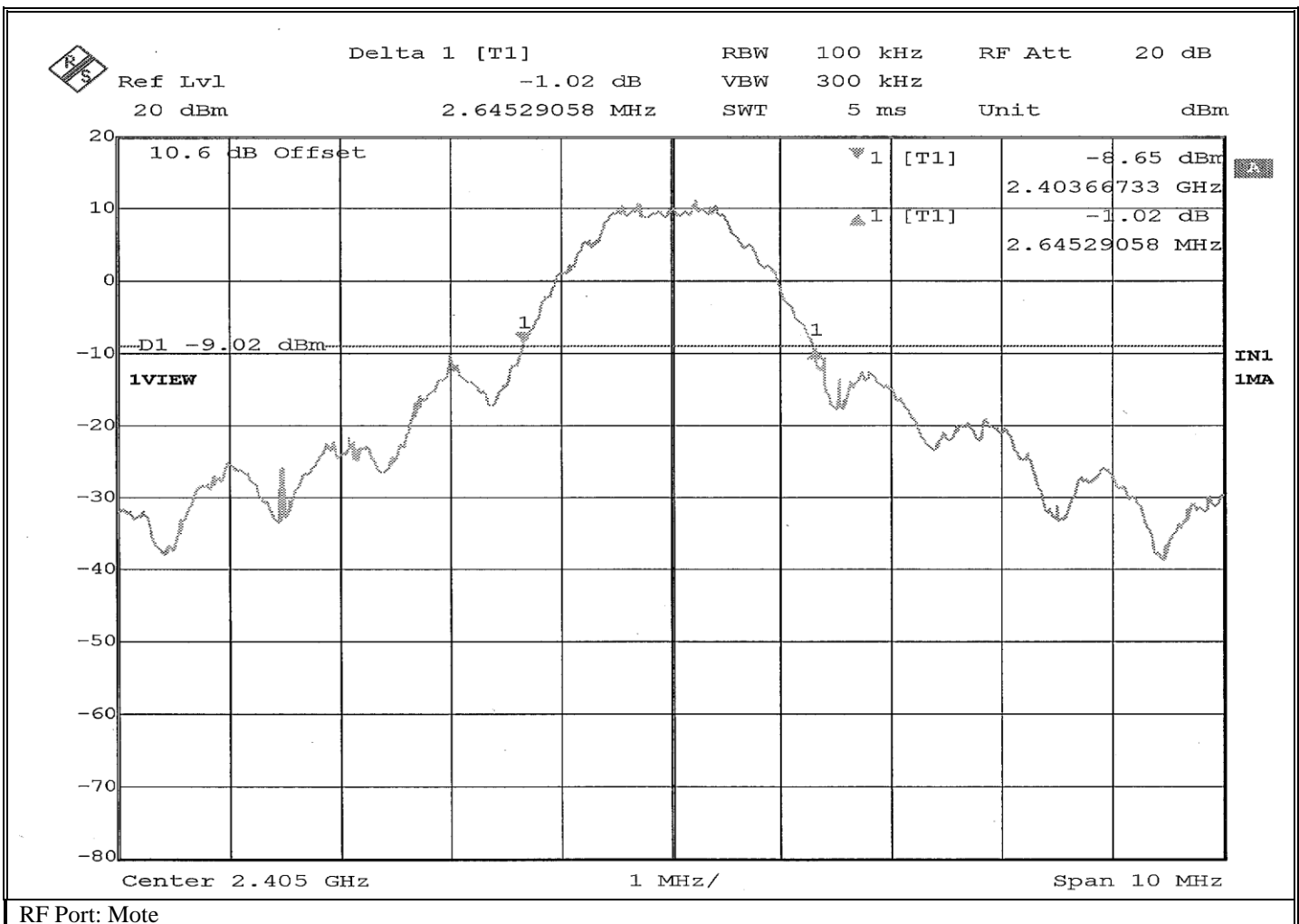


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Occupied Bandwidth
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(iii)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	20dB Bandwidth: 2.403 MHz

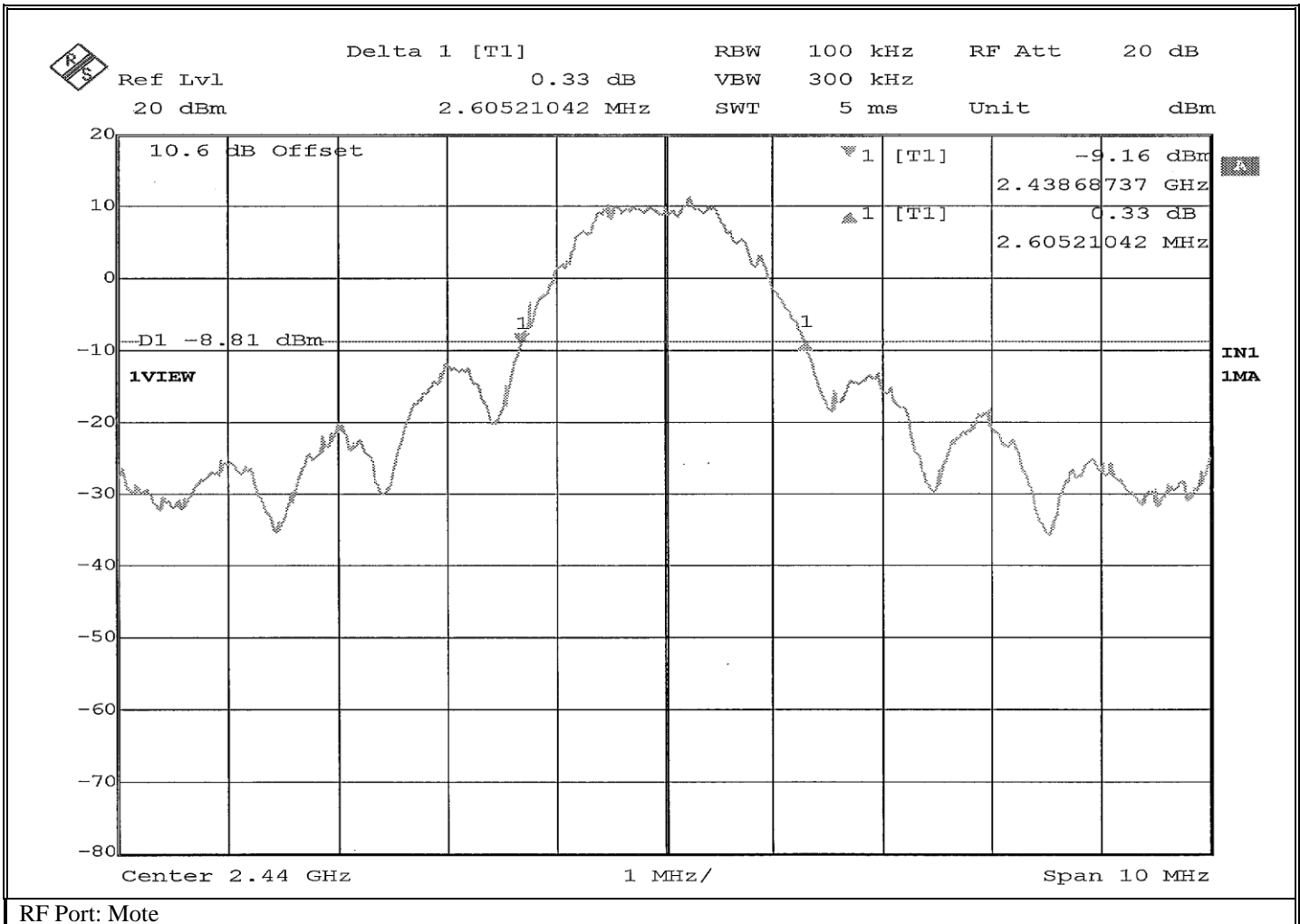


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Occupied Bandwidth
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	20dB Bandwidth: 2.438 MHz

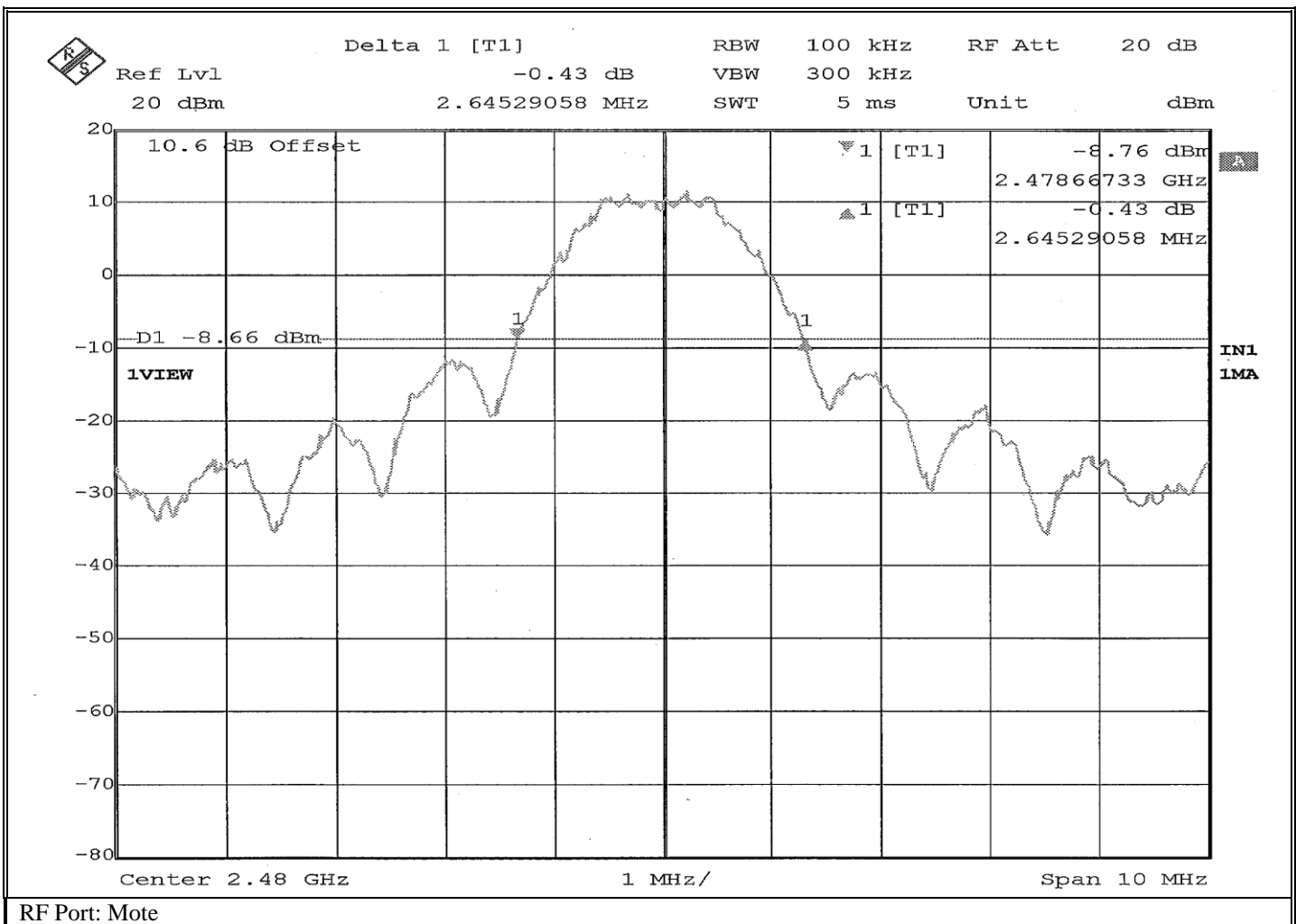


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Occupied Bandwidth
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	20dB Bandwidth: 2.478 MHz



Retlif Testing Laboratories

Report No. R-2754P-1

**FCC Section 15.247(a)(1)(iii)
Number of Hopping Channels and Time of Occupancy
Test Photograph**



Retlif Testing Laboratories

Report No. R-2754P-1

Number of Hopping Channels and Time of Occupancy Test Photograph



Test Setup



Retlif Testing Laboratories

Report No. R-2754P-1

**Number of Hopping Channels and Time of Occupancy
Test Data**

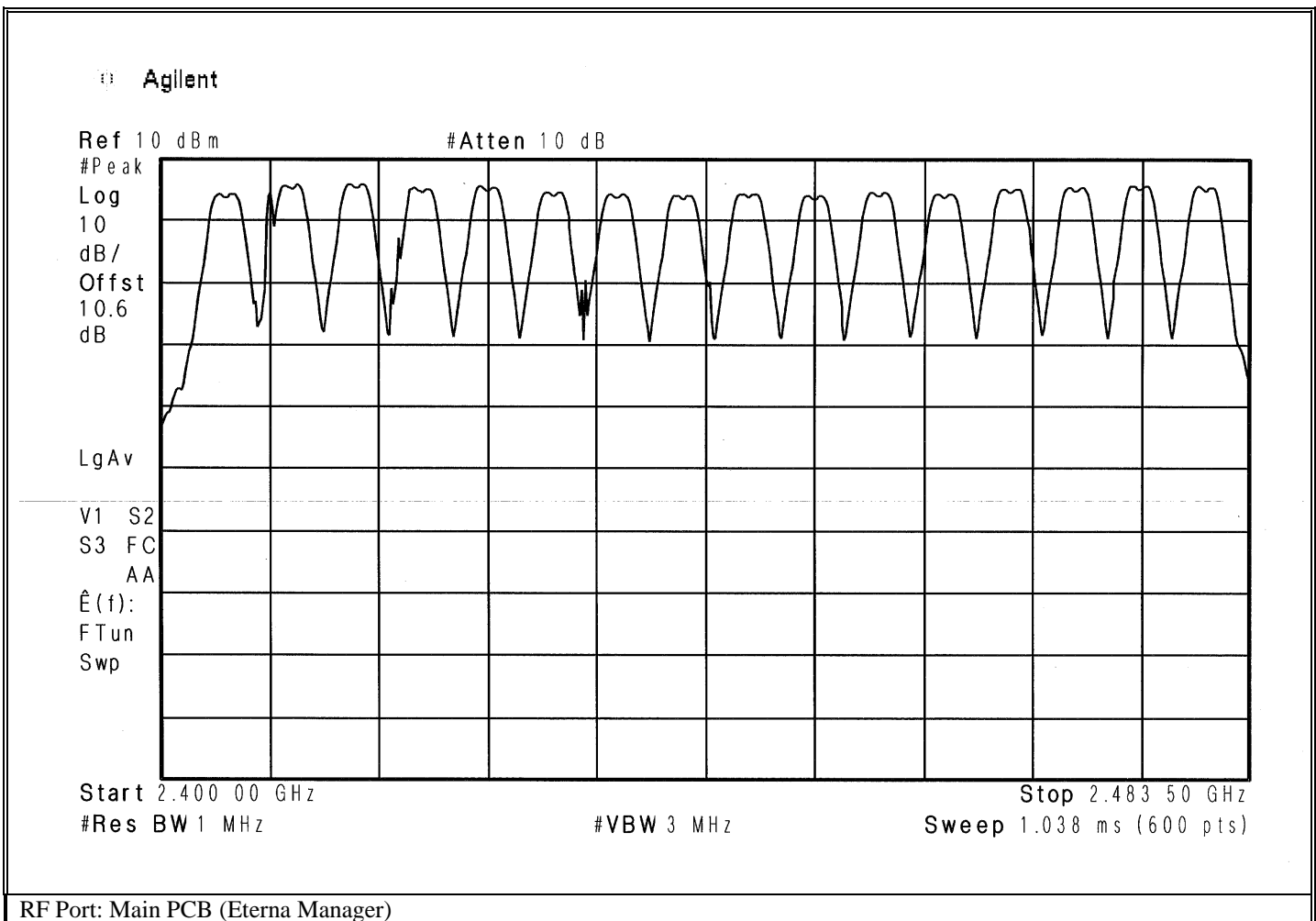


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Number of Hopping Frequencies
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(iii)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Number of Hopping Frequencies: 15



Retlif Testing Laboratories

Report No. R-2754P-1

**Time of Occupancy
Test Data**

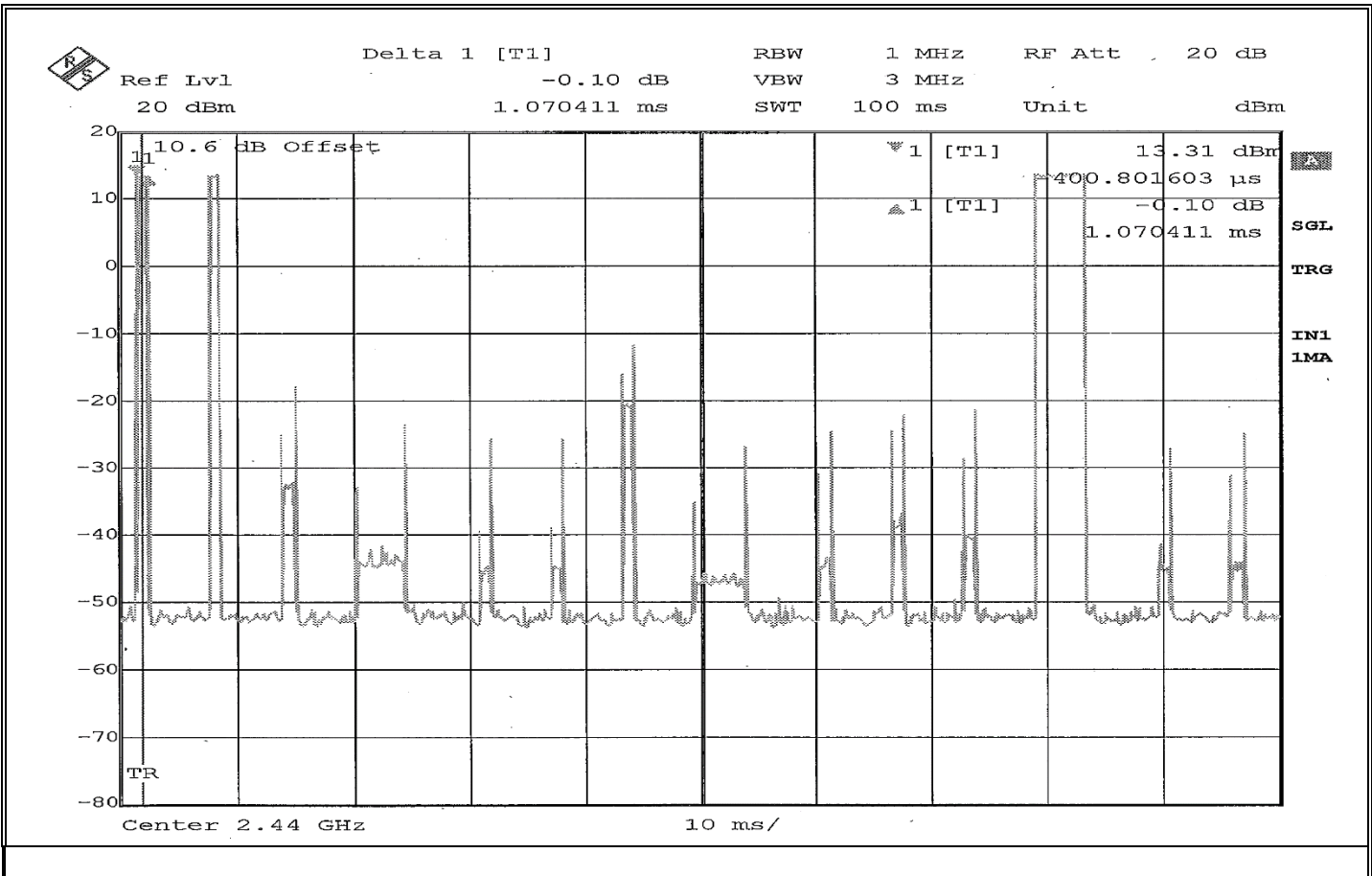


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Time of Occupancy
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Test Frequency: 2.440MHz Pulses: 3(100ms window) Pulses and Width(s): (2*1.070411ms), (1*4.477225ms) Time of Occupancy: 397.082ms (6 second window, Limit 400ms)

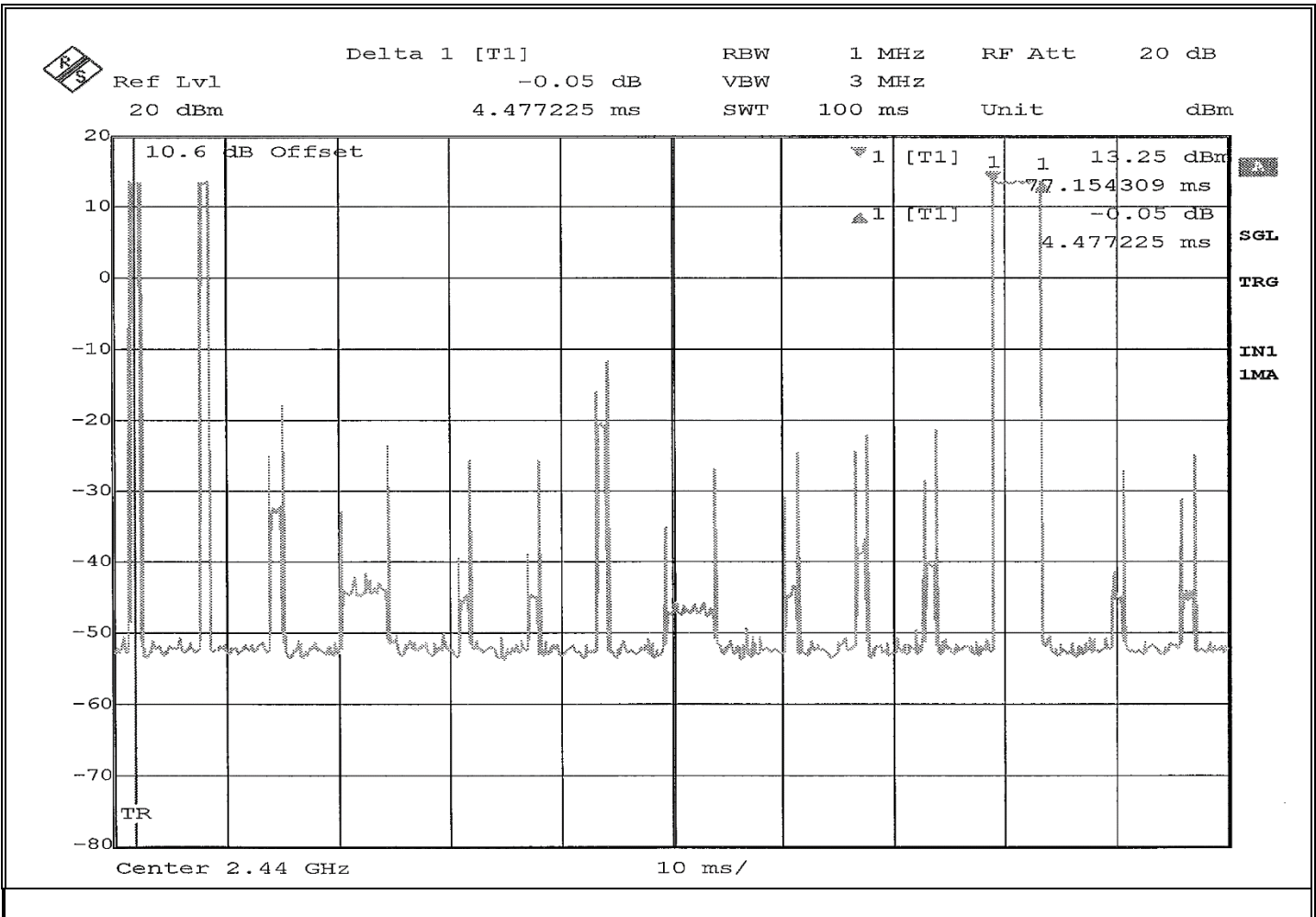


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

Method:	Time of Occupancy
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Test Frequency: 2.440MHz Pulses: 3(100ms window) Pulses and Width(s): (2*1.070411ms), (1*4.477225ms) Time of Occupancy: 397.082ms (6 second window, Limit 400ms)



Retlif Testing Laboratories

Report No. R-2754P-1

**FCC Section 15.247(a)(1)
Channel Separation
Test Photograph**



Retlif Testing Laboratories

Report No. R-2754P-1

Channel Separation Test Photograph



Test Setup



Retlif Testing Laboratories

Report No. R-2754P-1

**Channel Separation
Test Data**

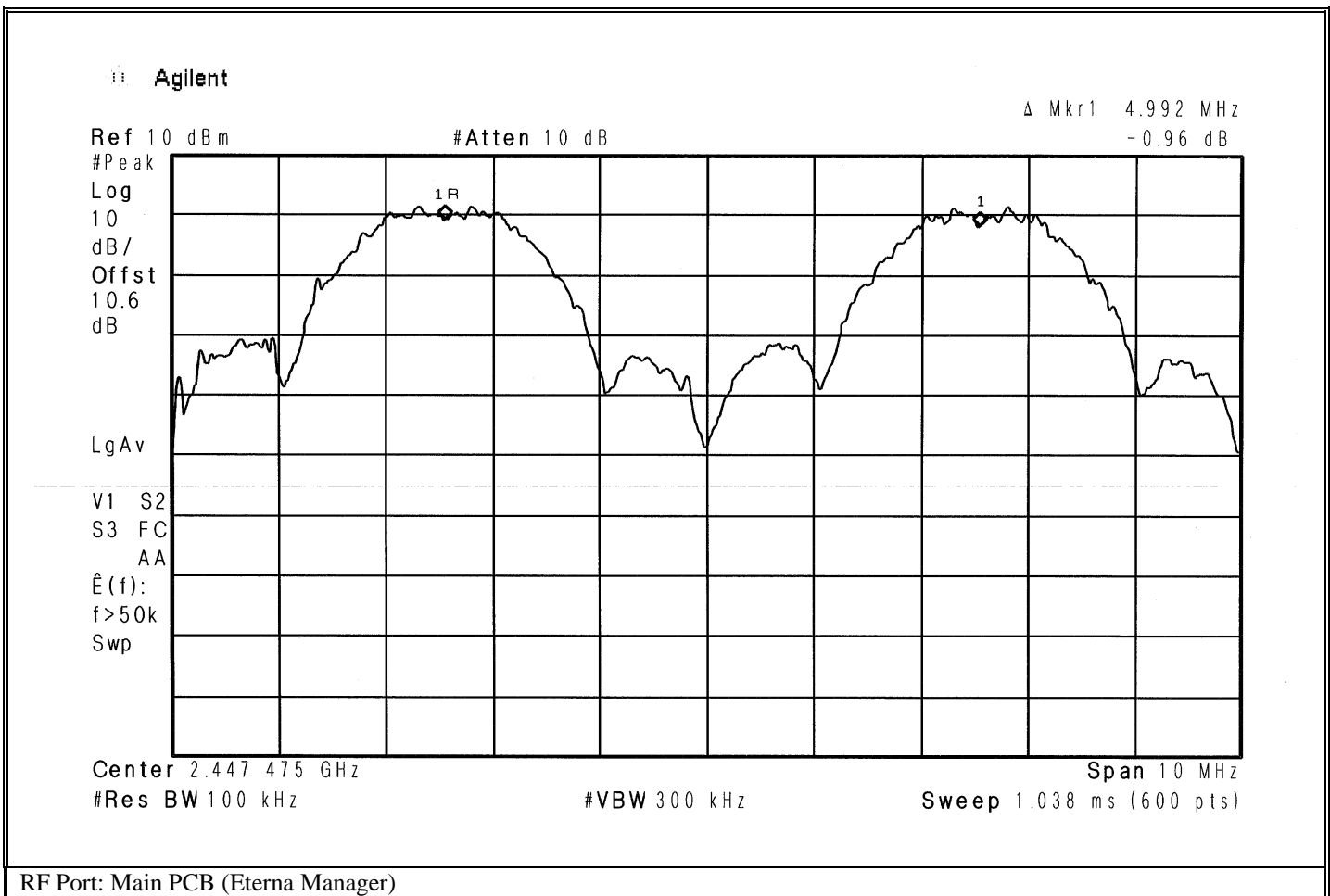


Retlif Testing Laboratories

Report No. R-2754P-1

EMISSIONS TEST DATA SHEET

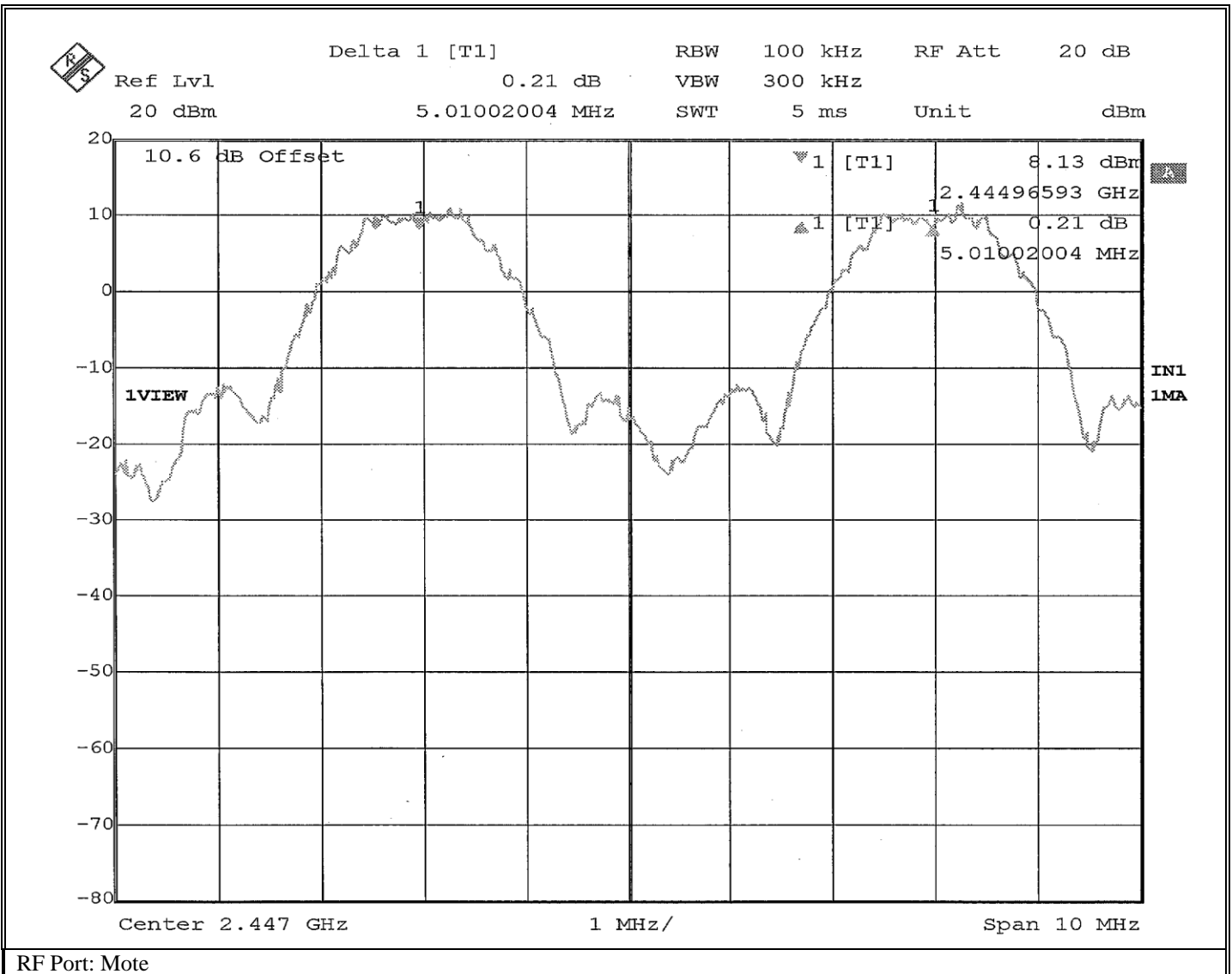
Method:	Channel Carrier Frequency Separation
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal
Technician:	M.Seamans
Date(s):	January 9 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Channel Carrier Frequency Separation: 4.992 MHz



Retlif Testing Laboratories

Report No. R-2754P-1

Method:	Channel Carrier Frequency Separation
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)
Job Number:	R-2754P-1
Customer:	IONX LLC
Test Sample:	Communications Management Unit
Model Number:	CMU-E6X
Serial Number:	FTA7D
Operating Mode:	Transmitting modulated signal
Technician:	M.Seamans
Date(s):	January 26 th , 2018
Temp/ Relative Humidity:	23.0 °C / 17.6 %
Notes:	Channel Carrier Frequency Separation: 5.010 MHz



Retlif Testing Laboratories

Report No. R-2754P-1