



## 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

Our letters, procedures and reports are for the exclusive use of the customer to whom they are addressed and their communication or the use of the name of Retlif Testing Laboratories must receive our prior written approval. Our letters, procedures and reports apply only to the sample tested and are not necessarily indicative of the qualities of apparently identical or similar products. The letters, procedures and reports and the name of Retlif Testing Laboratories or insignia are not to be used under any circumstances in advertising to the general public. This test report shall not be reproduced, except in full, without the written approval of Retlif Testing Laboratories.

## 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.



Retlif Testing Laboratories

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.

<b>Revision</b>	<b>Date</b>	<b>Pages Affected</b>
-	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).



**Retlif Testing Laboratories**

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.



**Retlif Testing Laboratories**

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.

$$S = \frac{PG}{4\pi Dsq}$$

D = Minimum Separation Distance in cm

S = Max allowed Power Density in mW/cmsq

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

Power = Max Power Input to Antenna = 23.66mW

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

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

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

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

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	PASTERNACK	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



**Retlif Testing Laboratories**

Report No. R-2754P-1

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



**Retlif Testing Laboratories**

Report No. R-2754P-1

**Test Photograph  
Power Output**



**Test Setup**



**Retlif Testing Laboratories**

Report No. R-2754P-1

**Power Output  
Test Data**



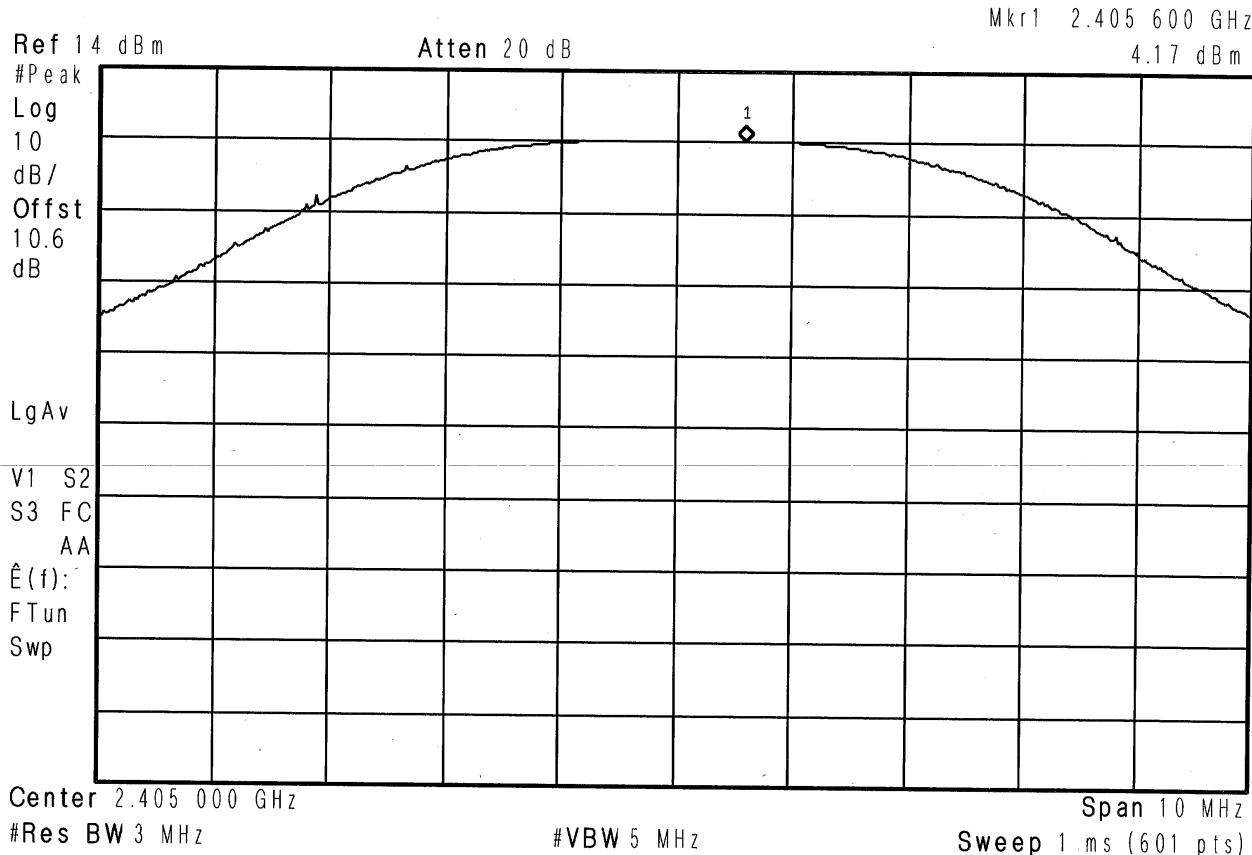
**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

Agilent



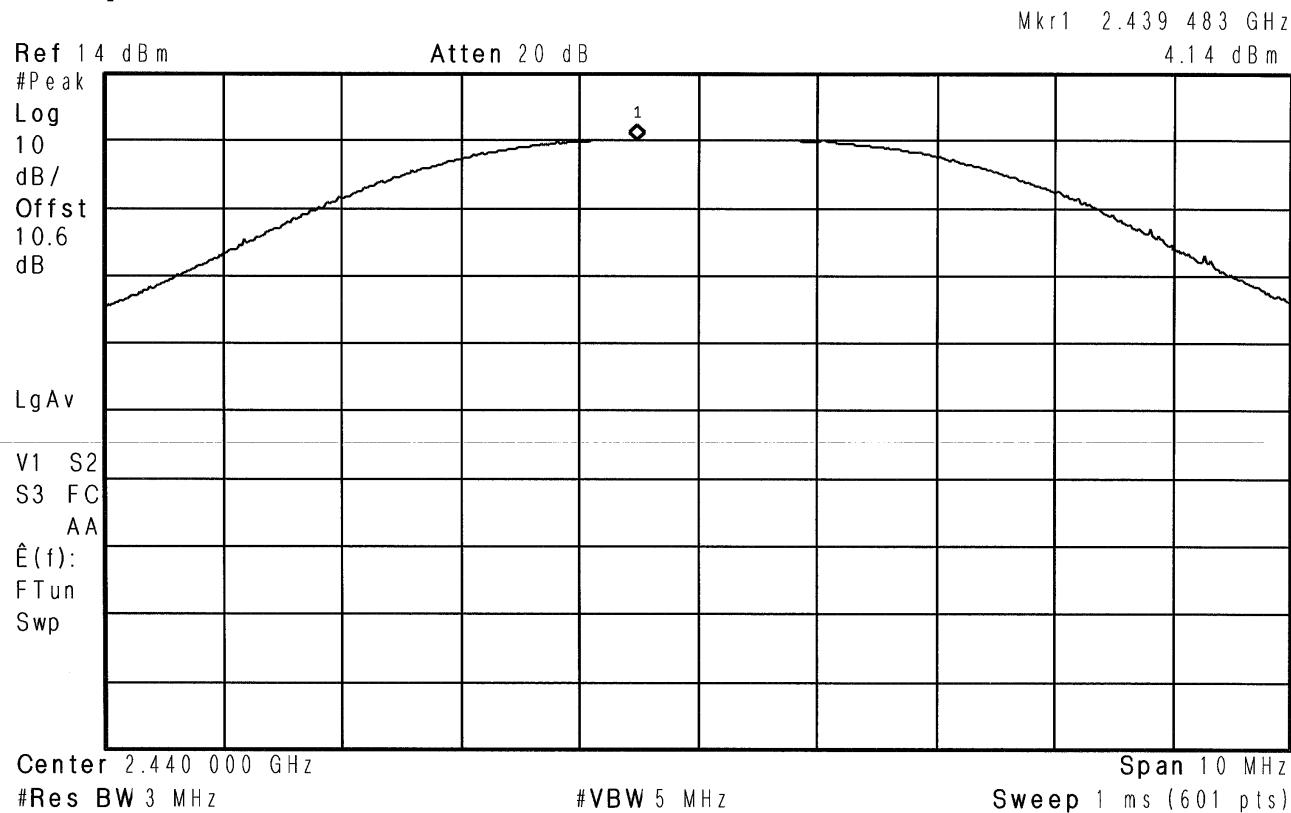
**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

Agilent



RF Port: Main PCB (Eterna Manager)

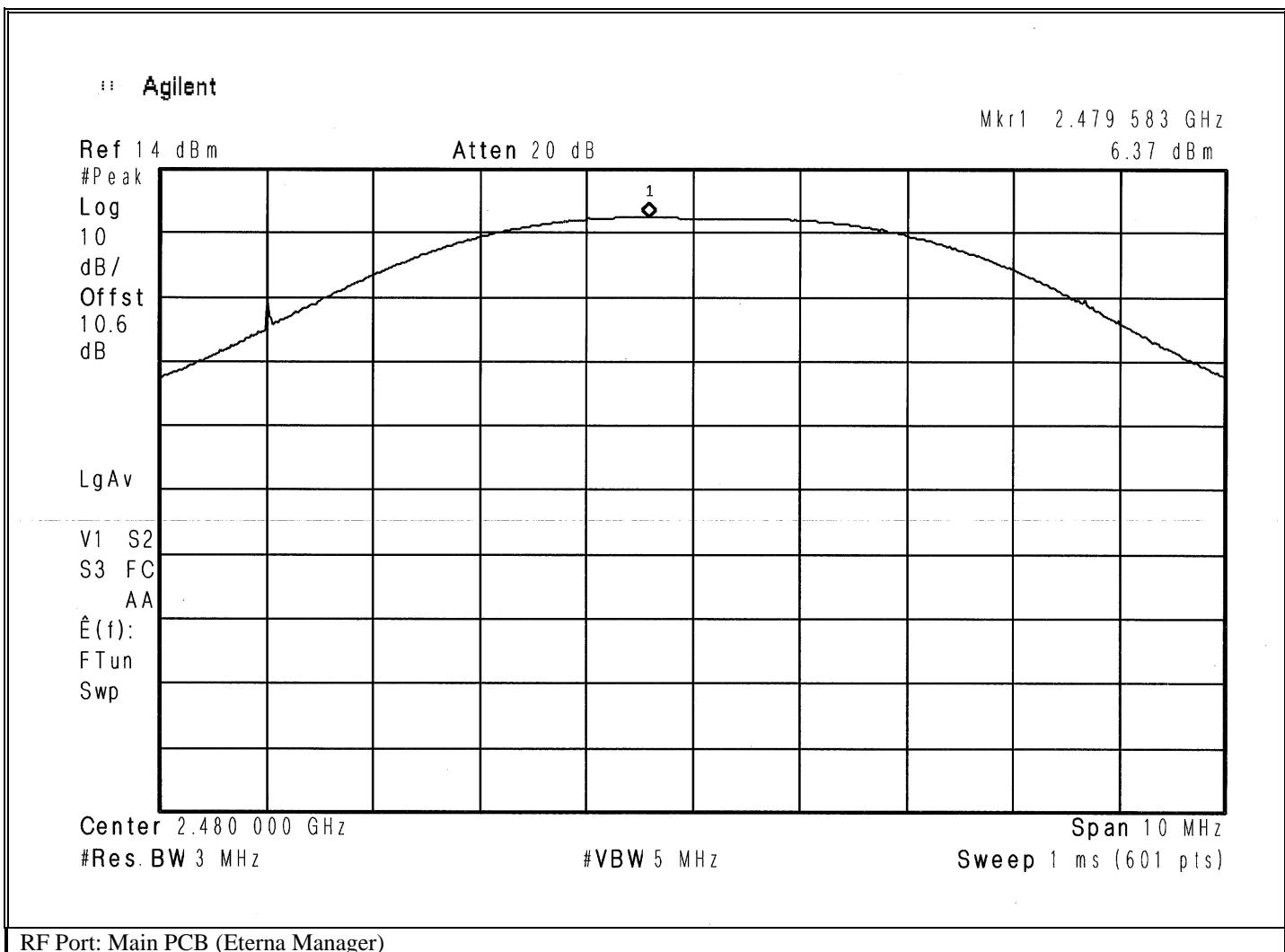


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

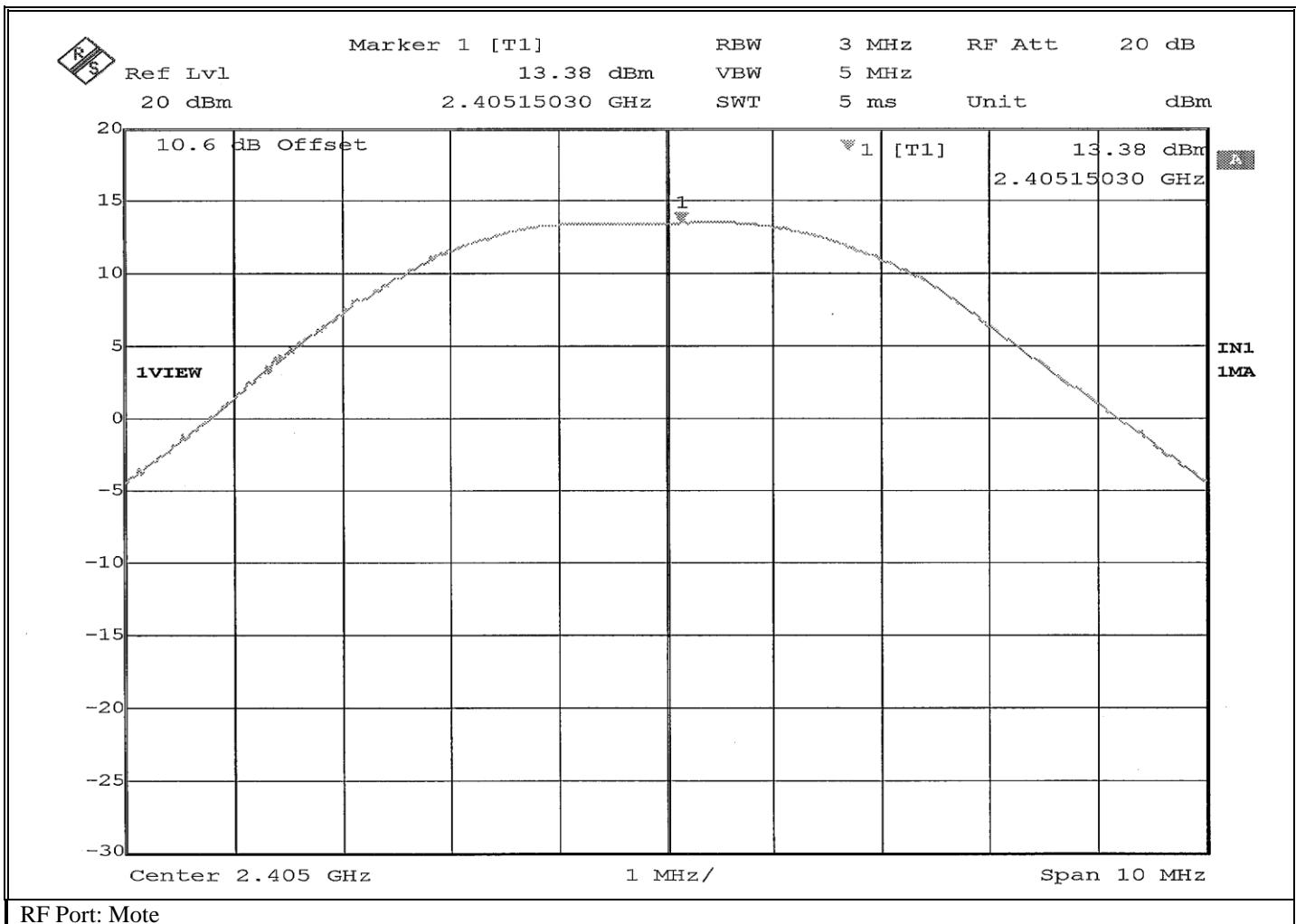


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

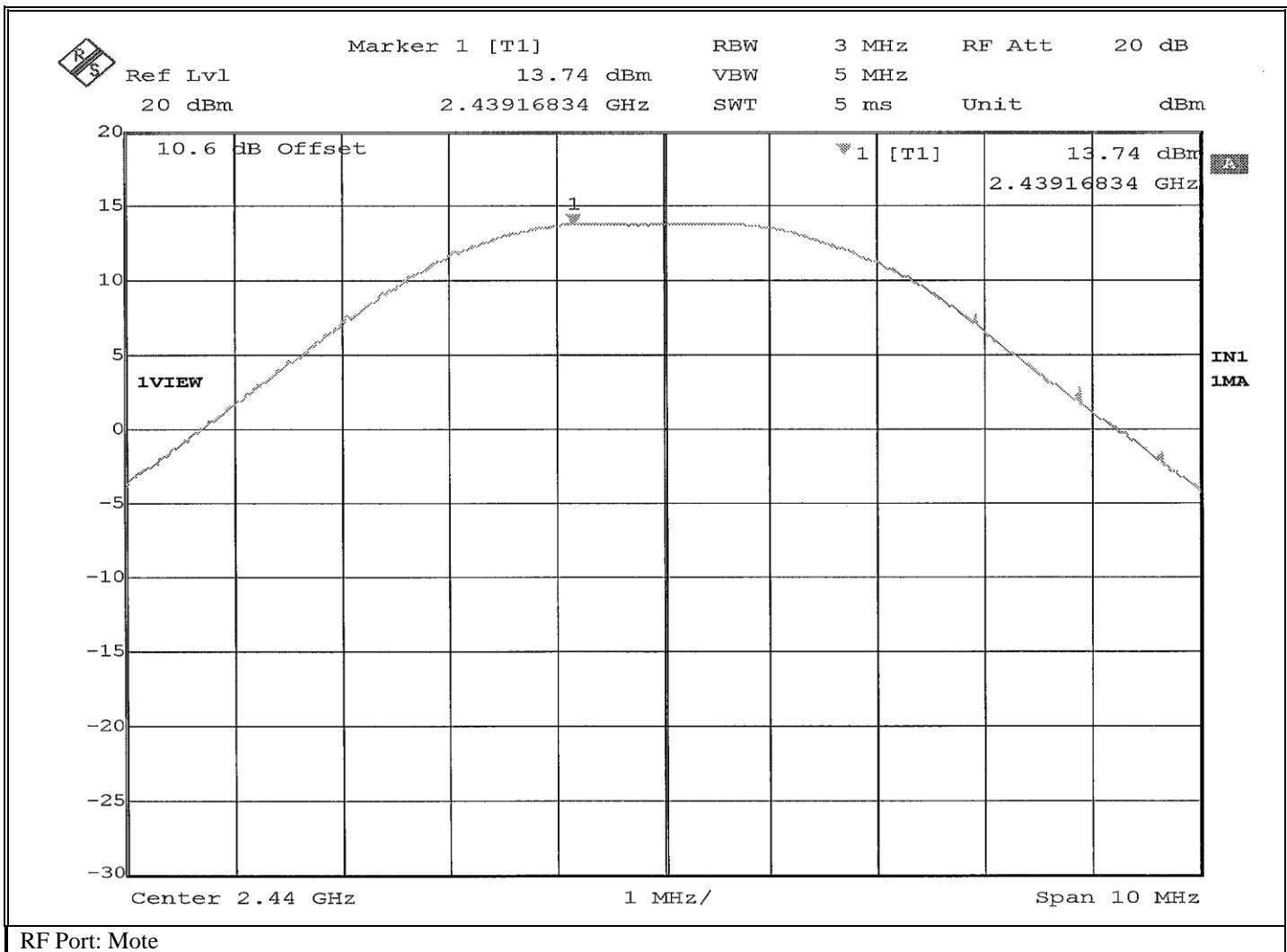


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

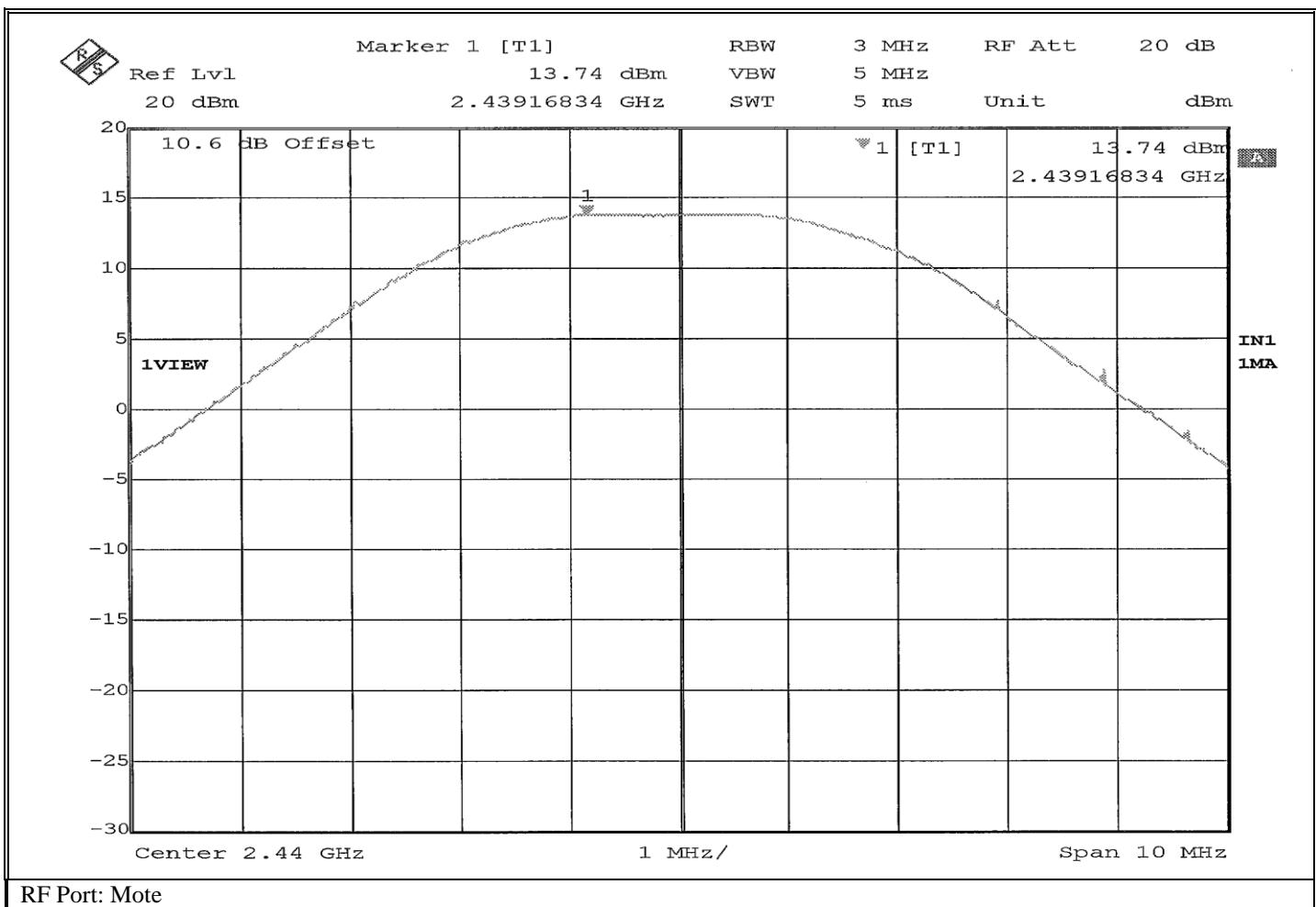


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

<b>Method:</b>	<b>Peak Power Output</b>
<b>Test Specification:</b>	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
<b>Job Number:</b>	R-2754P-1
<b>Customer:</b>	IONX LLC
<b>Test Sample:</b>	Communications Management Unit
<b>Model Number:</b>	CMU-E6X
<b>Serial Number:</b>	FTA7D
<b>Operating Mode:</b>	Transmitting modulated signal at 2.480 GHz
<b>Technician:</b>	M.Seamans
<b>Date(s):</b>	January 9 <sup>th</sup> , 2018
<b>Temp/ Relative Humidity:</b>	23.0 °C / 17.6 %
<b>Notes:</b>	Peak Power Output: 13.74 dBm



**Retlif Testing Laboratories**

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**



**Retlif Testing Laboratories**

Report No. R-2754P-1

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



Test Setup



**Retlif Testing Laboratories**

Report No. R-2754P-1

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



**Retlif Testing Laboratories**

Report No. R-2754P-1

**Band Edge  
Test Data**



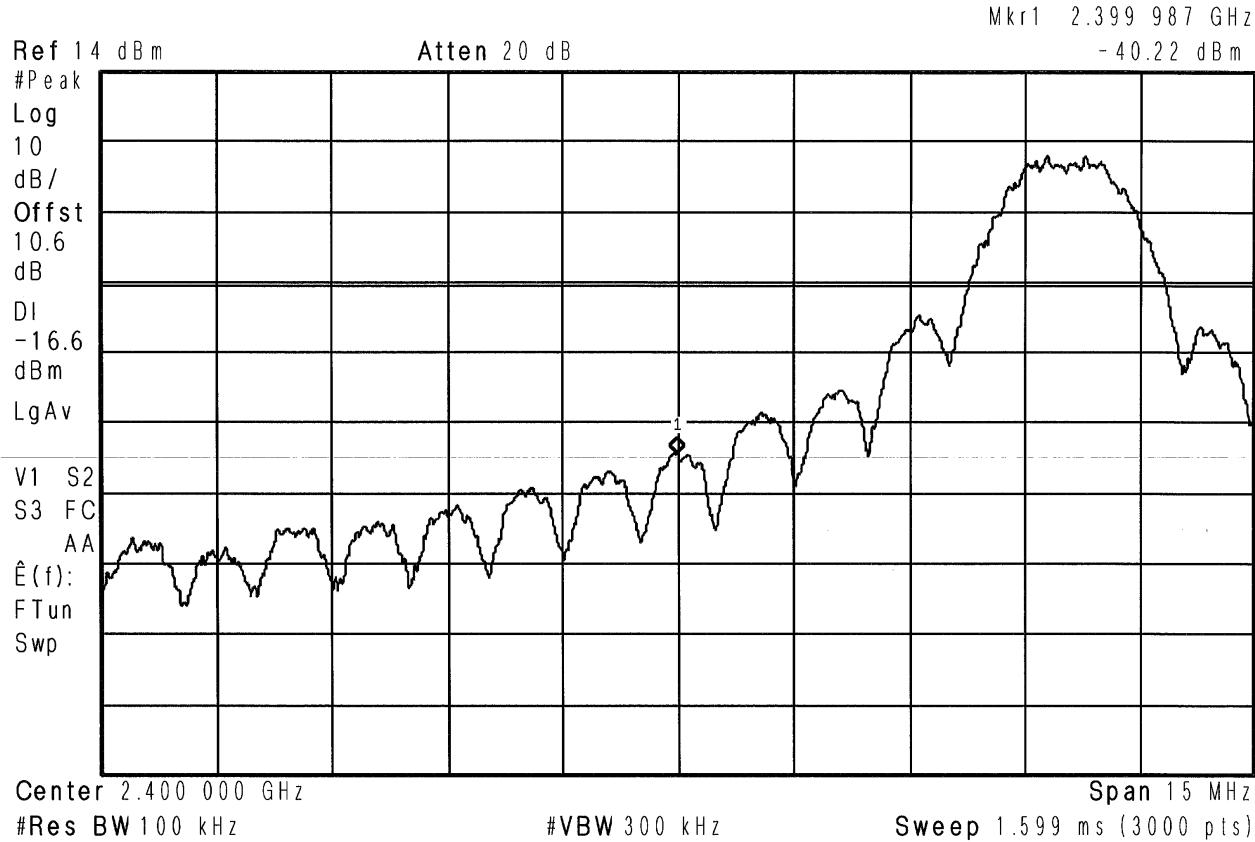
**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

Agilent



RF Port: Main PCB (Eterna Manager)

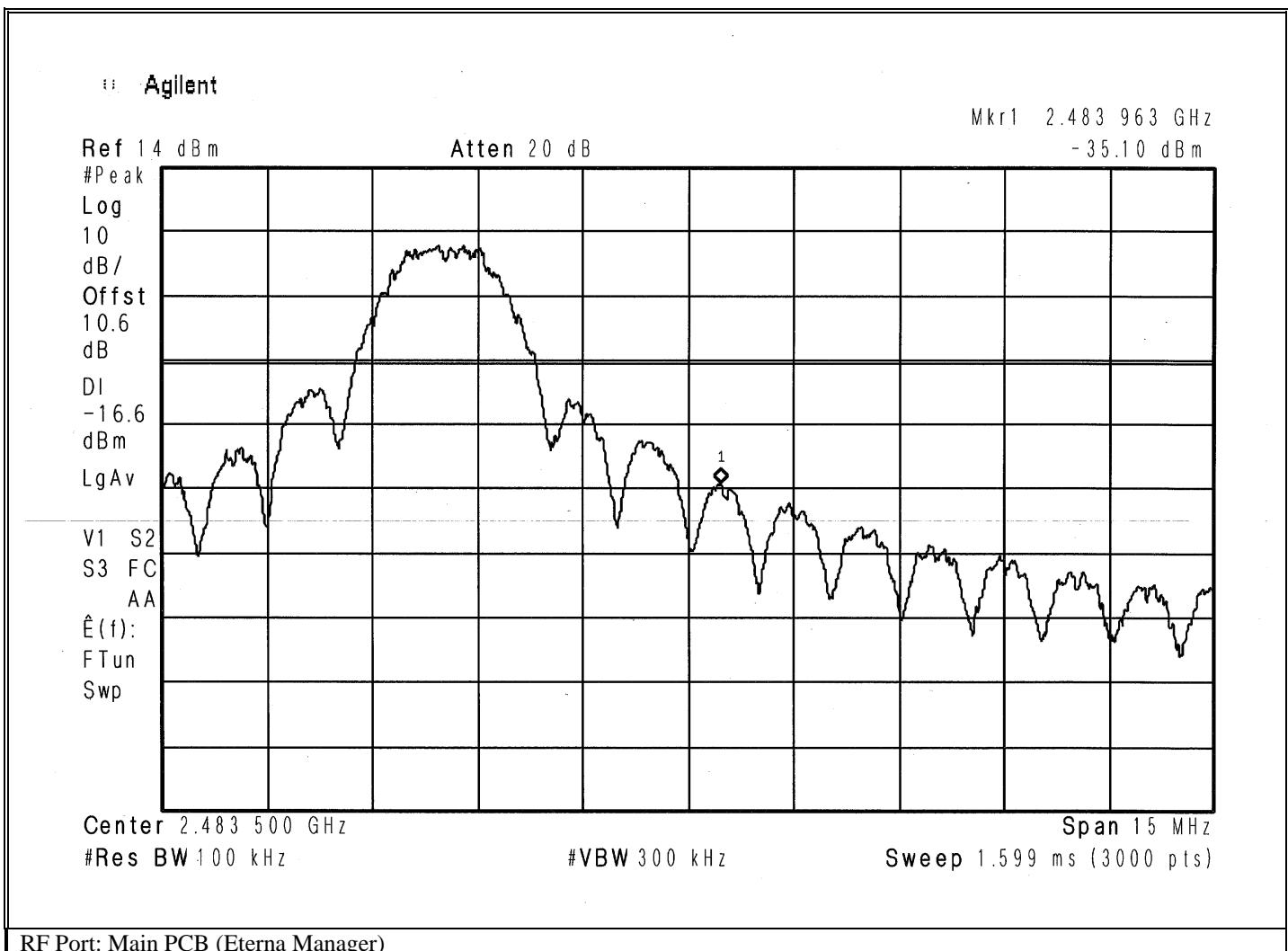


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

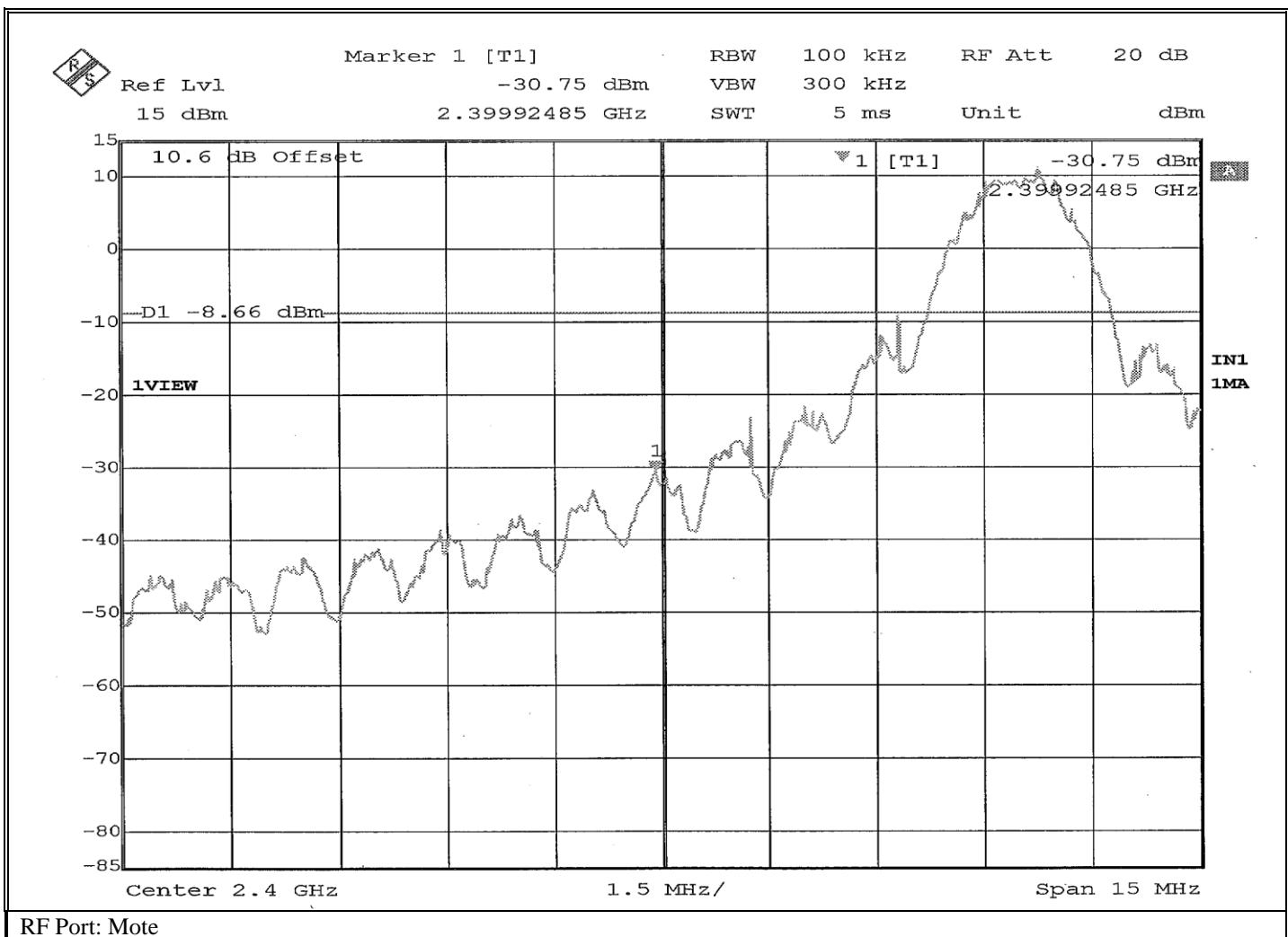


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

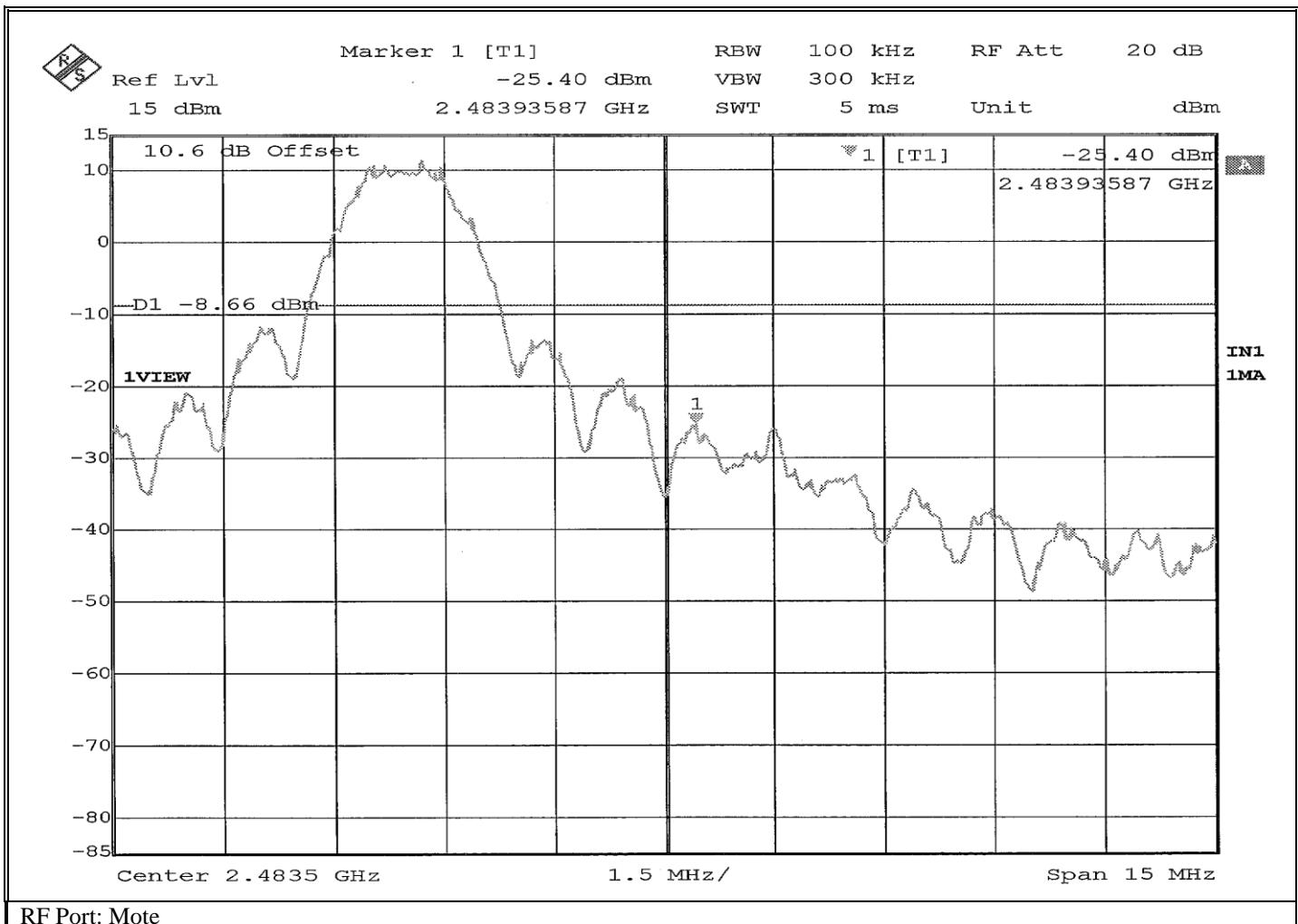


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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



**Retlif Testing Laboratories**

Report No. R-2754P-1

**Out of Band Conducted Emissions  
Test Data**



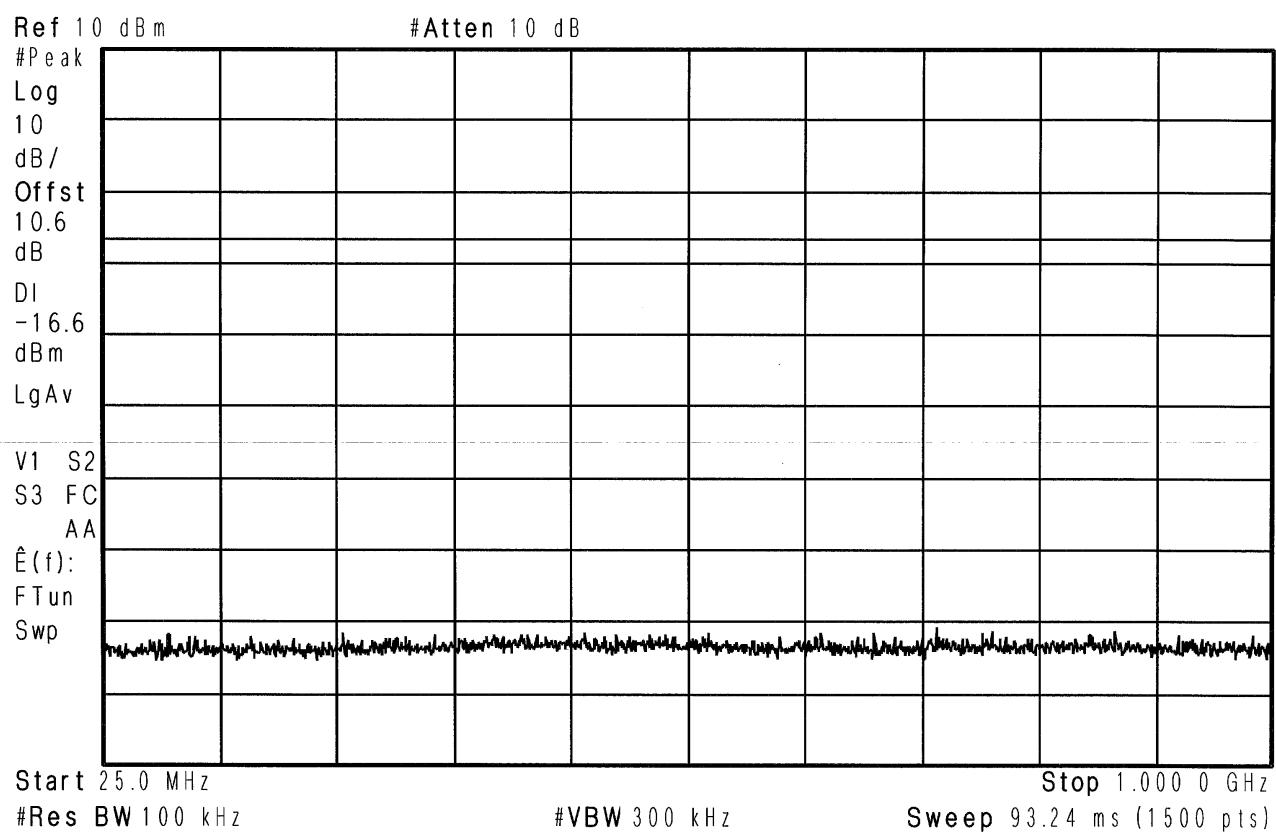
**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

Agilent



### RF Port: Main PCB (Eterna Manager)

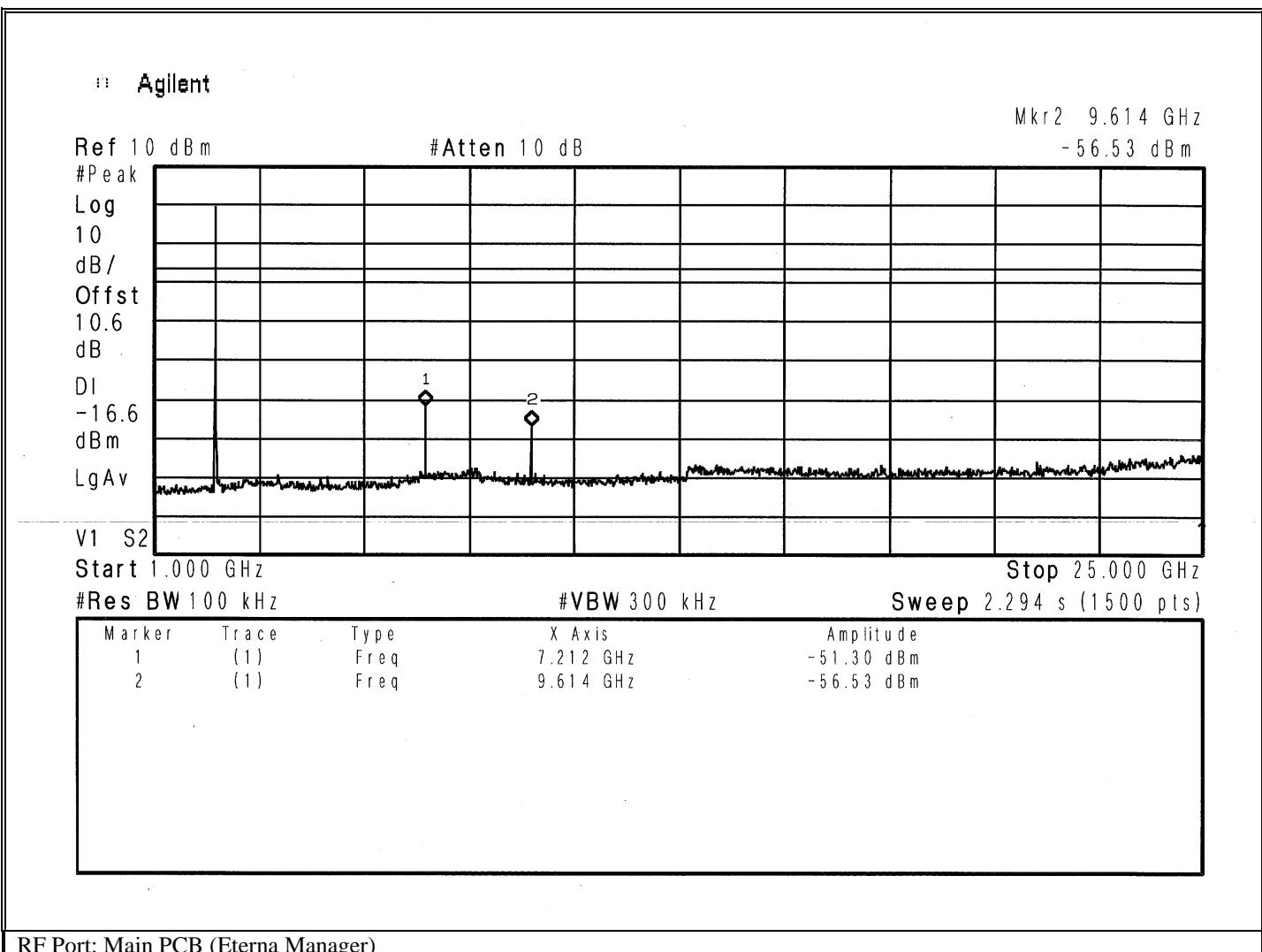


## Retlif Testing Laboratories

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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



### RF Port: Main PCB (Eterna Manager)



## Retlif Testing Laboratories

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

<b>Method:</b>	Conducted Out of Band
<b>Test Specification:</b>	FCC Part 15, Subpart C Paragraph: 15.247 (d)
<b>Job Number:</b>	R-2754P-1
<b>Customer:</b>	IONX LLC
<b>Test Sample:</b>	Communications Management Unit
<b>Model Number:</b>	CMU-E6X
<b>Serial Number:</b>	FTA7D
<b>Operating Mode:</b>	Transmitting modulated signal at 2.440 GHz
<b>Technician:</b>	M.Seamans
<b>Date(s):</b>	January 9 <sup>th</sup> , 2018
<b>Temp/ Relative Humidity:</b>	23.0 °C / 17.6 %
<b>Notes:</b>	Limit: -16.6 dBm

Agilent

Ref 10 dBm

#Atten 10 dB

#Peak

Log

10

dB /

Offst

10.6

dB

DI

-16.6

dBm

LgAv

V1 S2

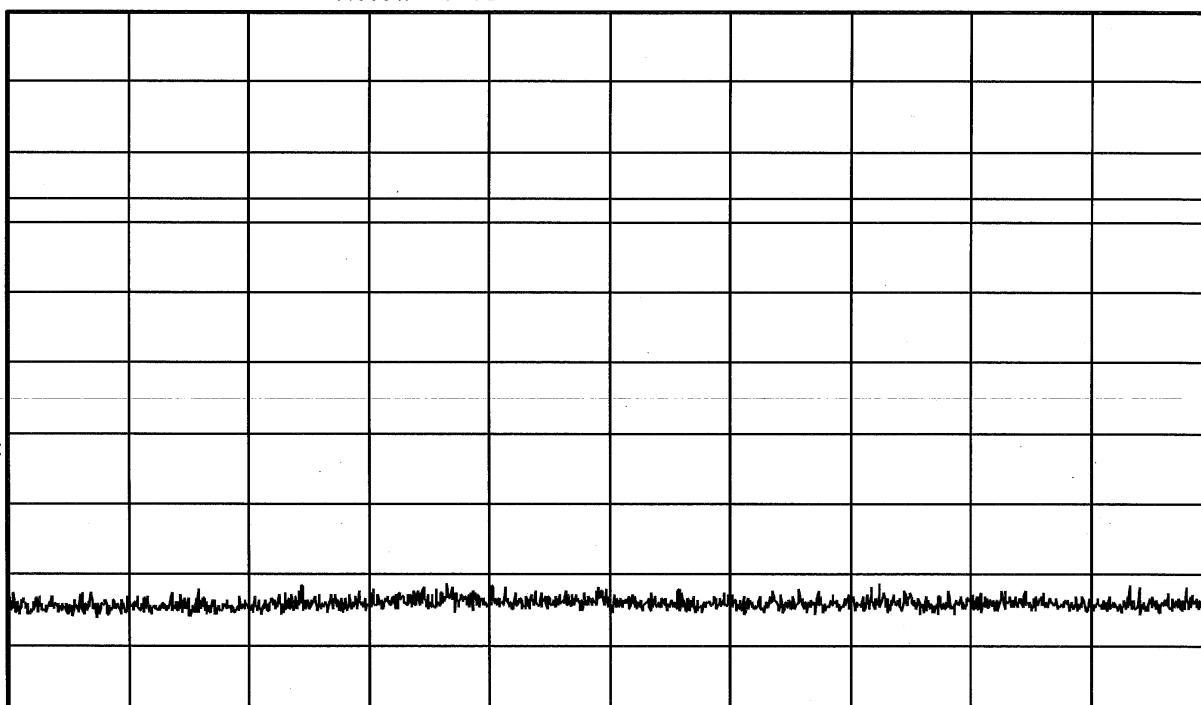
S3 FC

AA

Ê(f):

FTun

Swp



Start 25.0 MHz

#Res BW 100 kHz

#VBW 300 kHz

Stop 1.000 0 GHz

Sweep 93.24 ms (1500 pts)

RF Port: Main PCB (Eterna Manager)

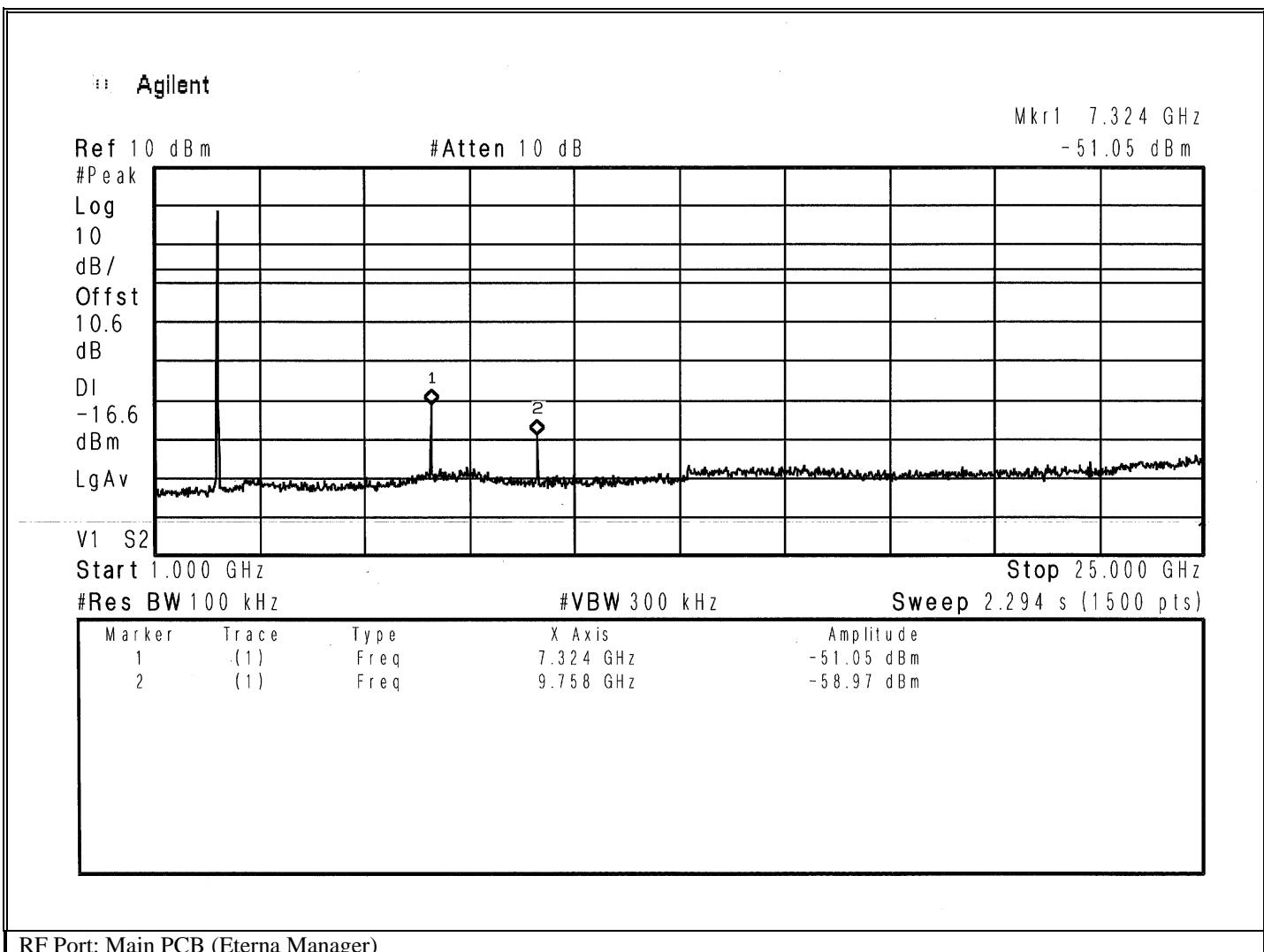


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

<b>Method:</b>	<b>Conducted Out of Band</b>
<b>Test Specification:</b>	FCC Part 15, Subpart C Paragraph: 15.247 (d)
<b>Job Number:</b>	R-2754P-1
<b>Customer:</b>	IONX LLC
<b>Test Sample:</b>	Communications Management Unit
<b>Model Number:</b>	CMU-E6X
<b>Serial Number:</b>	FTA7D
<b>Operating Mode:</b>	Transmitting modulated signal at 2.440 GHz
<b>Technician:</b>	M.Seamans
<b>Date(s):</b>	January 9 <sup>th</sup> , 2018
<b>Temp/ Relative Humidity:</b>	23.0 °C / 17.6 %
<b>Notes:</b>	Limit: -16.6 dBm



### RF Port: Main PCB (Eterna Manager)



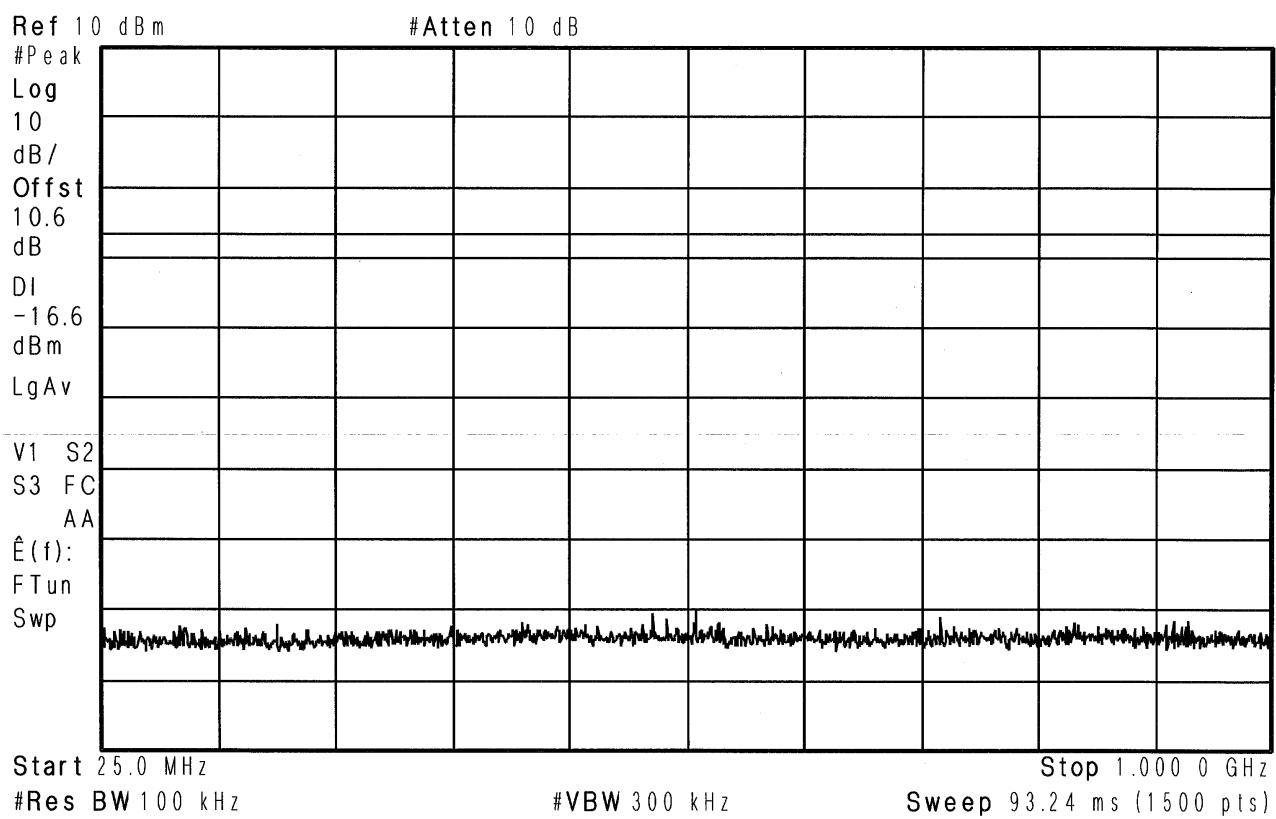
## Retlif Testing Laboratories

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

© Agilent



## RF Port: Main PCB (Eterna Manager)

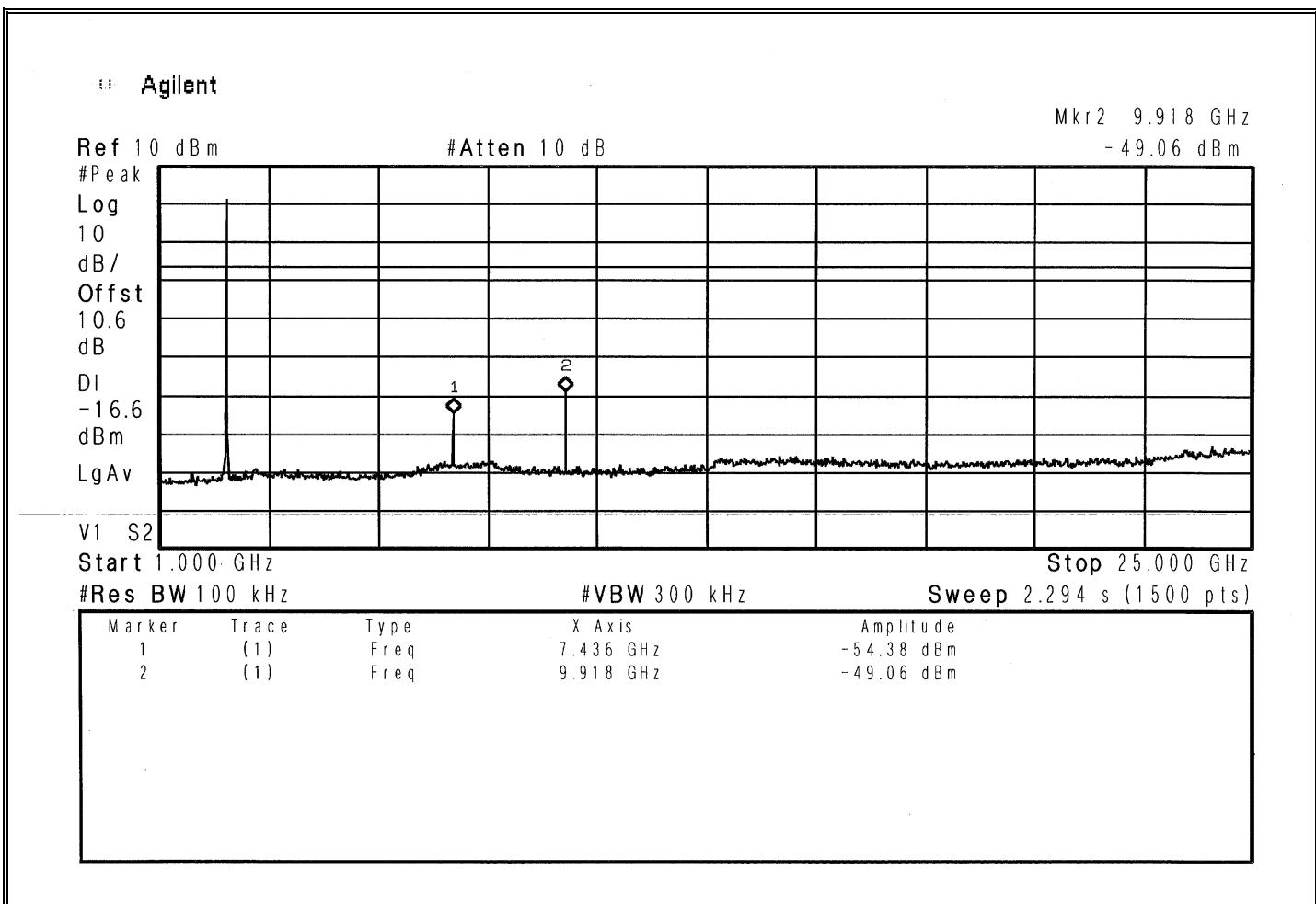


## Retlif Testing Laboratories

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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



### RF Port: Main PCB (Eterna Manager)

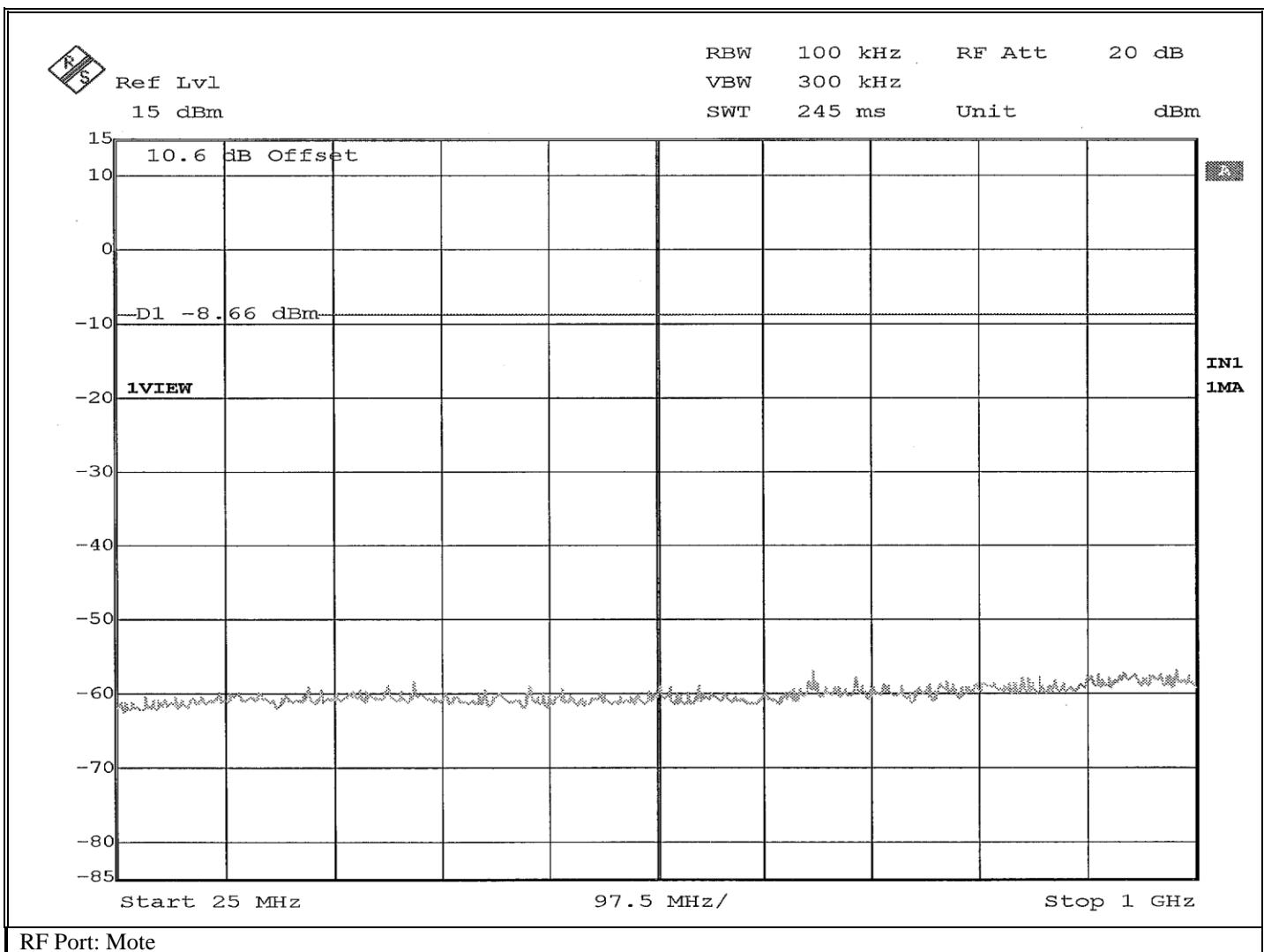


## Retlif Testing Laboratories

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

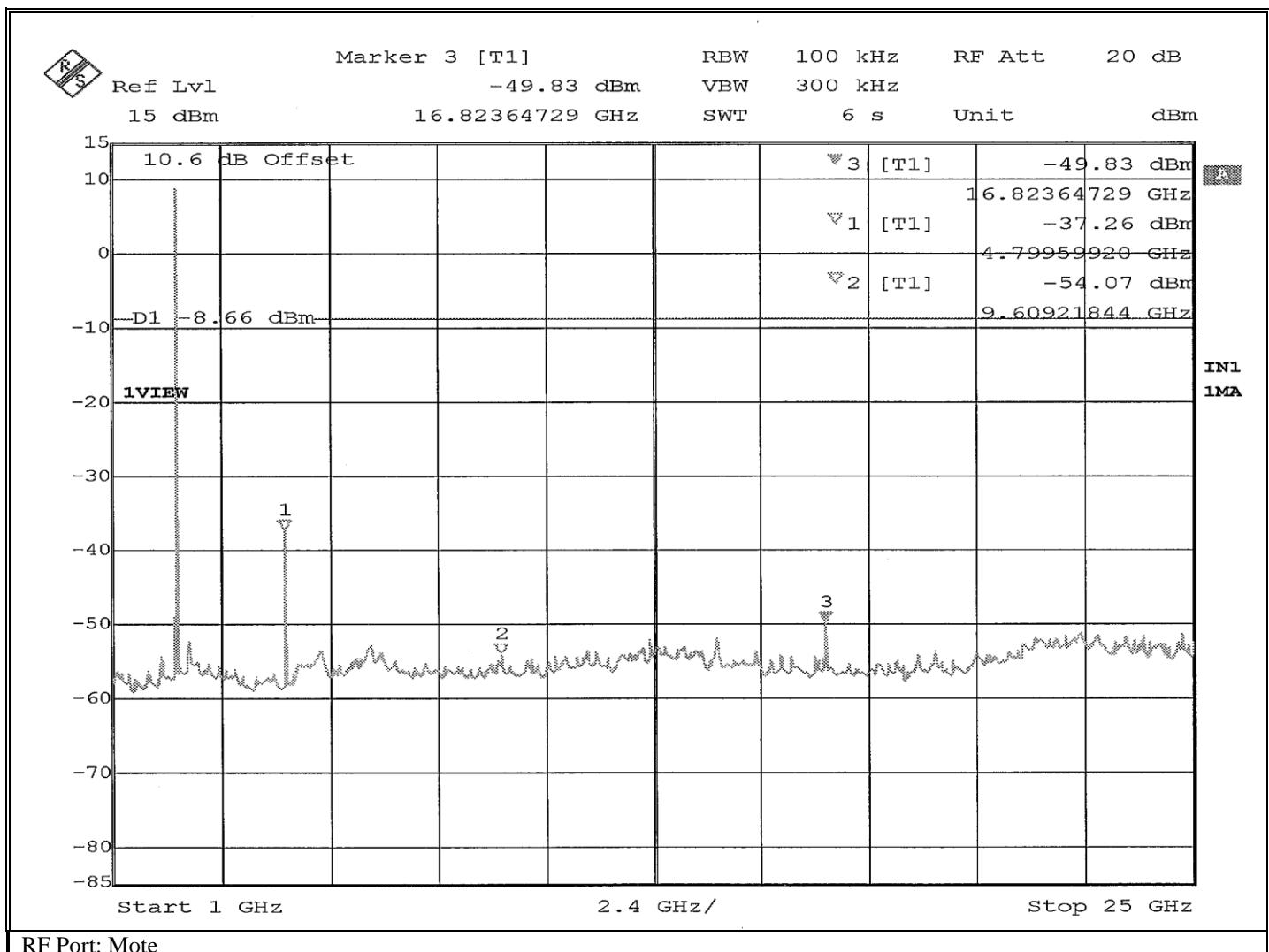


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

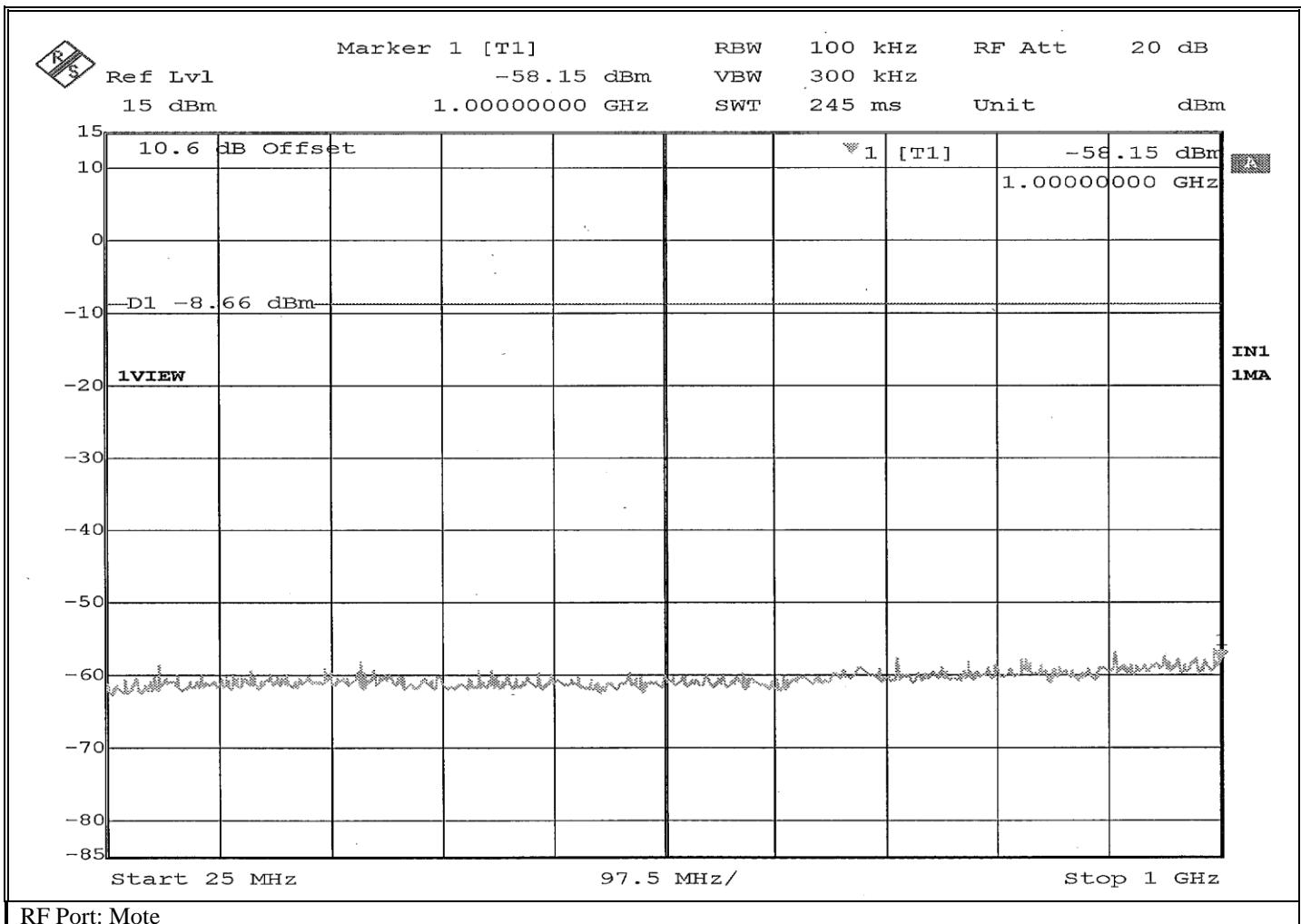


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

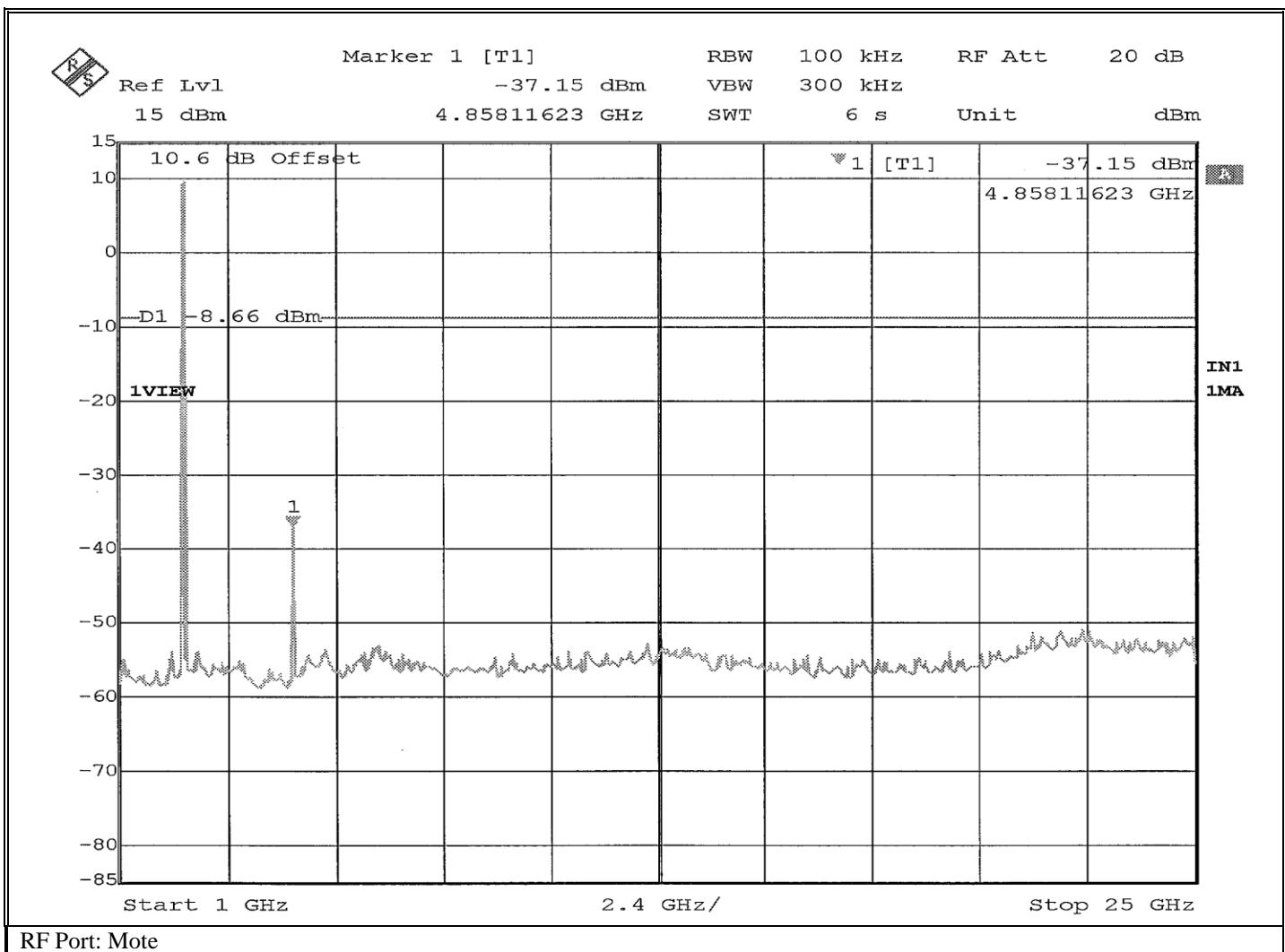


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

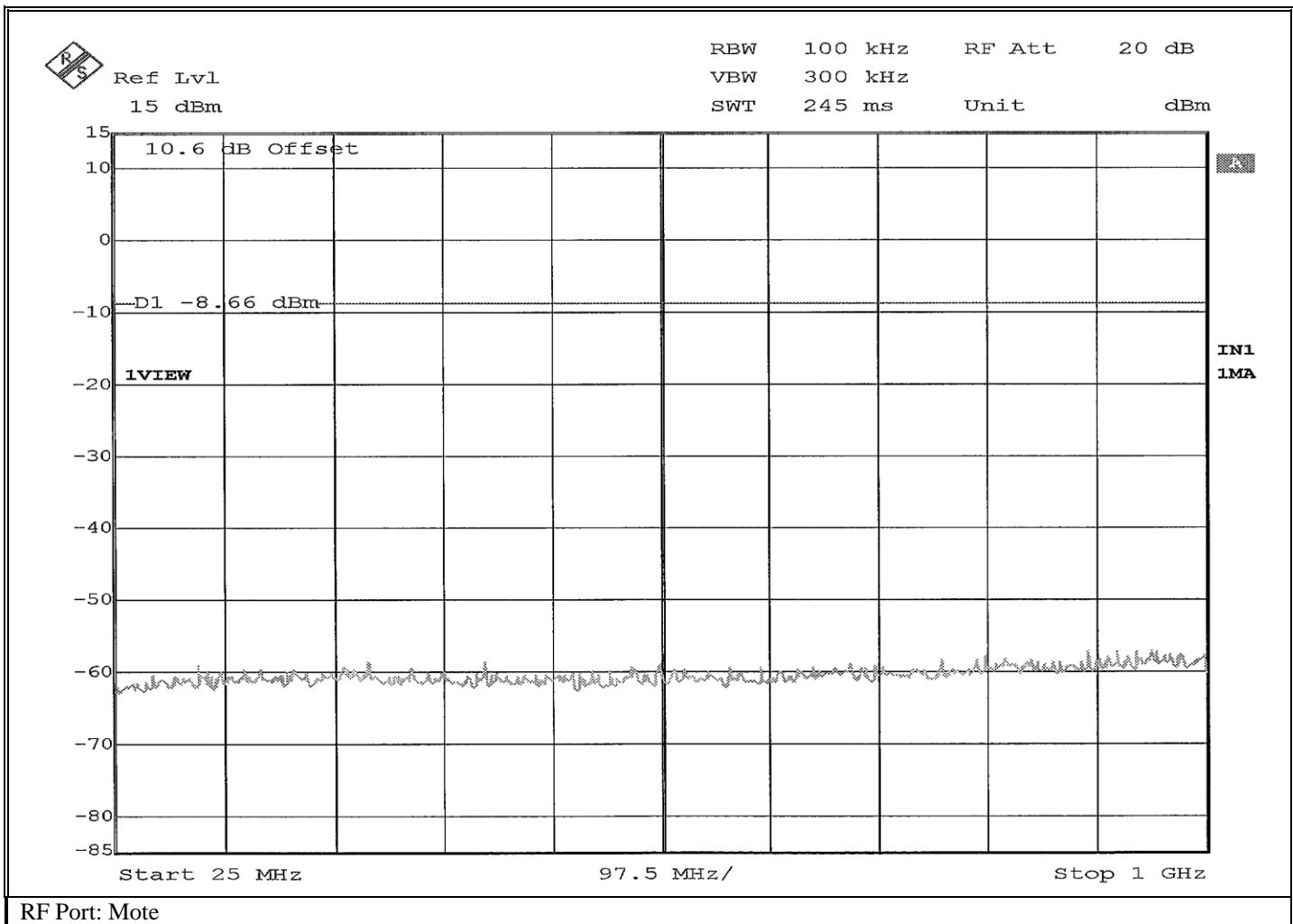


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

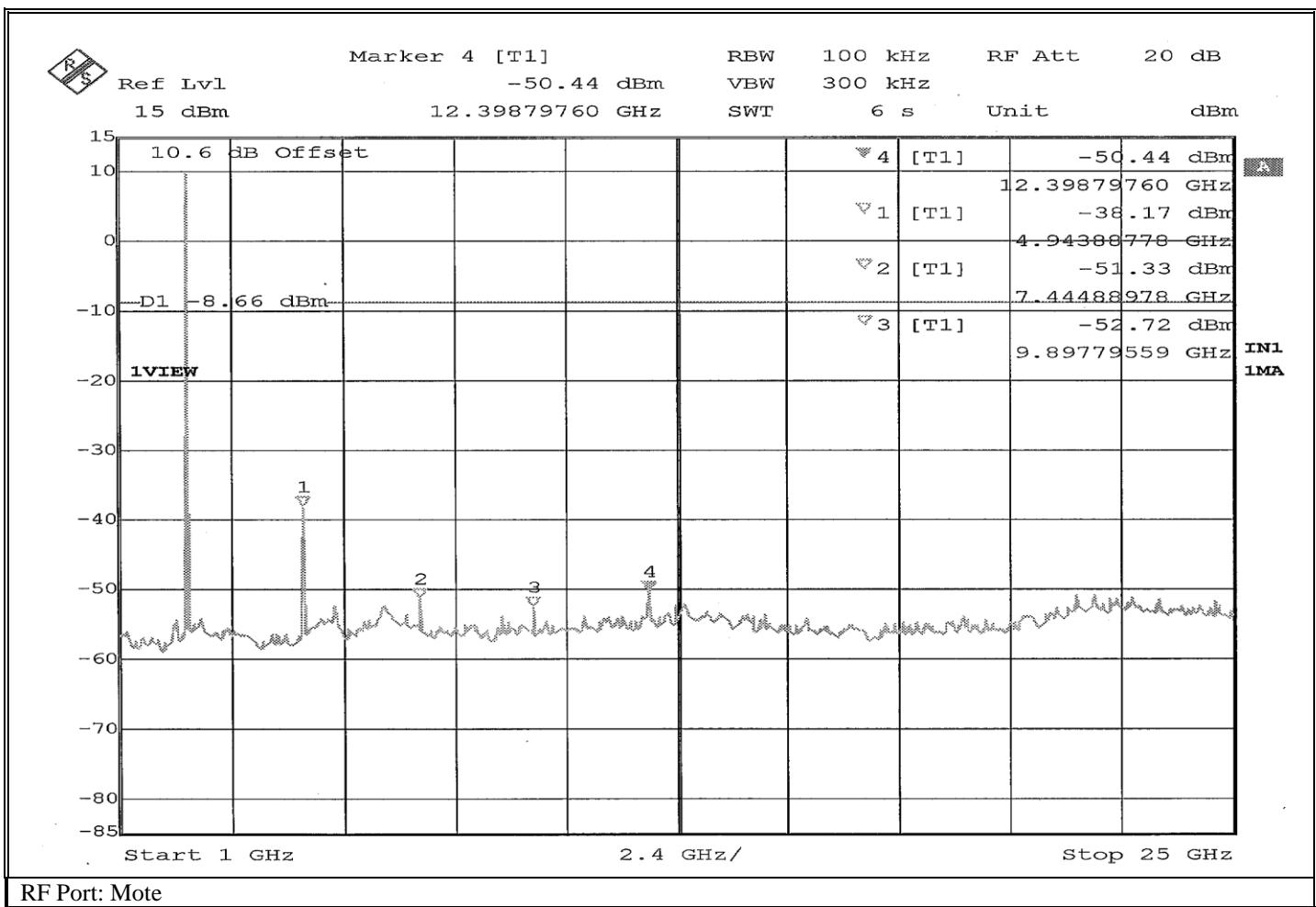


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

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

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

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

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

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

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

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

## EMISSIONS TEST DATA SHEET

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

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

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

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



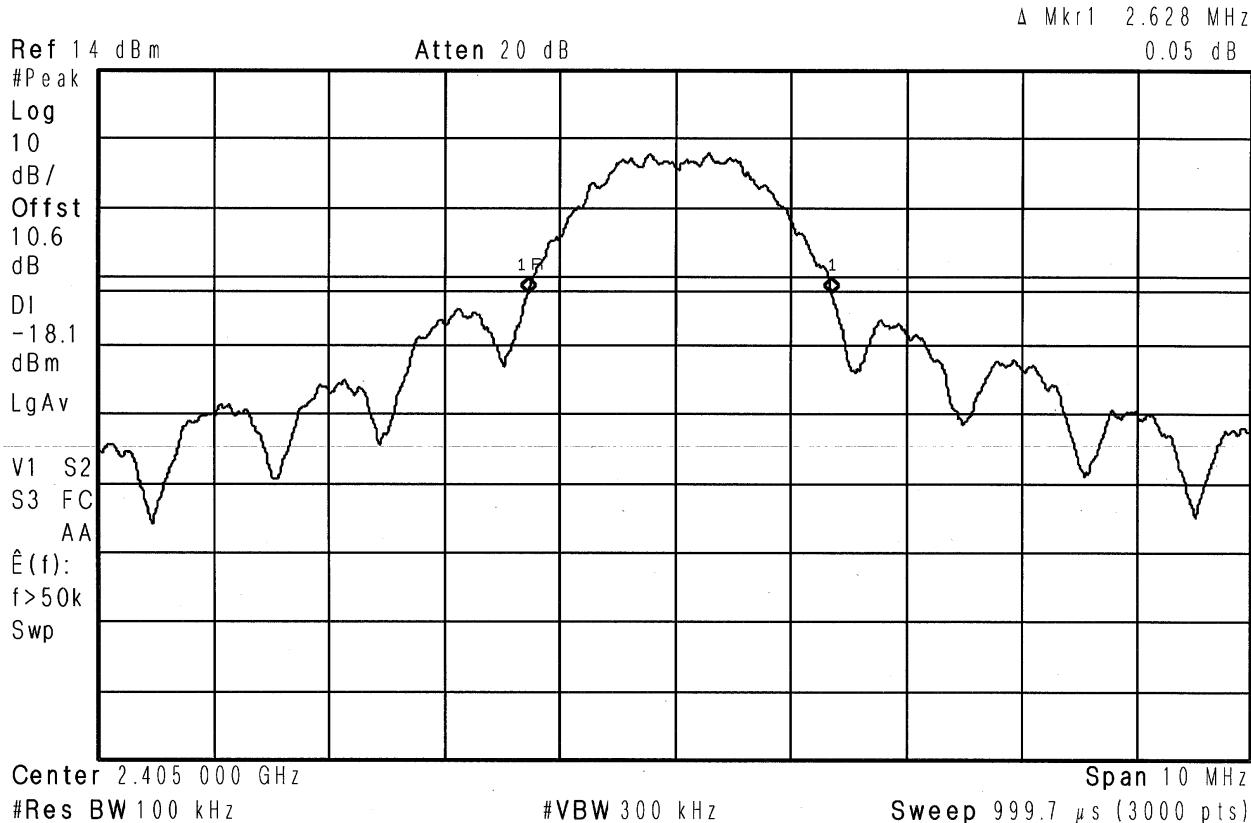
**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

Agilent



RF Port: Main PCB (Eterna Manager)

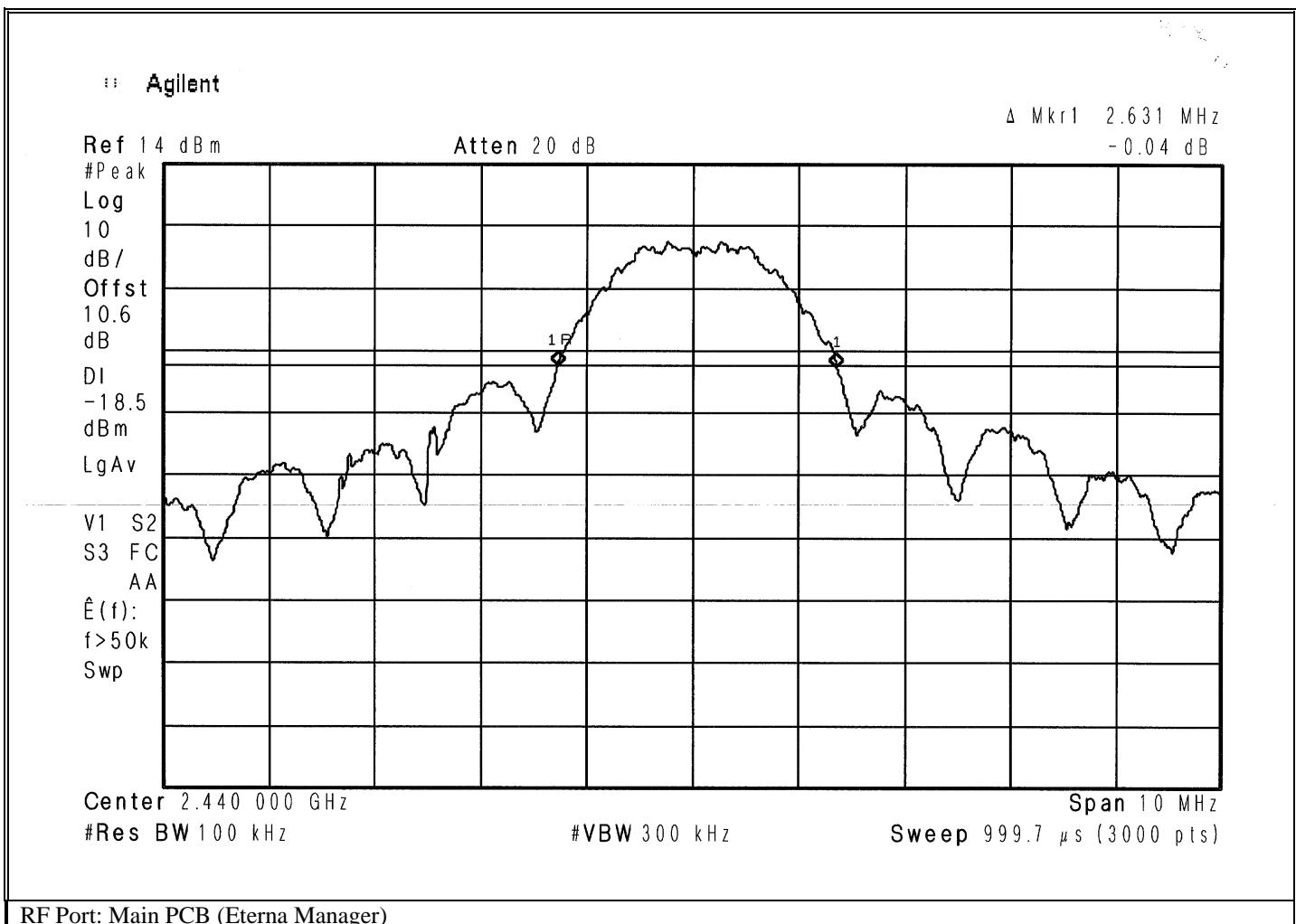


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

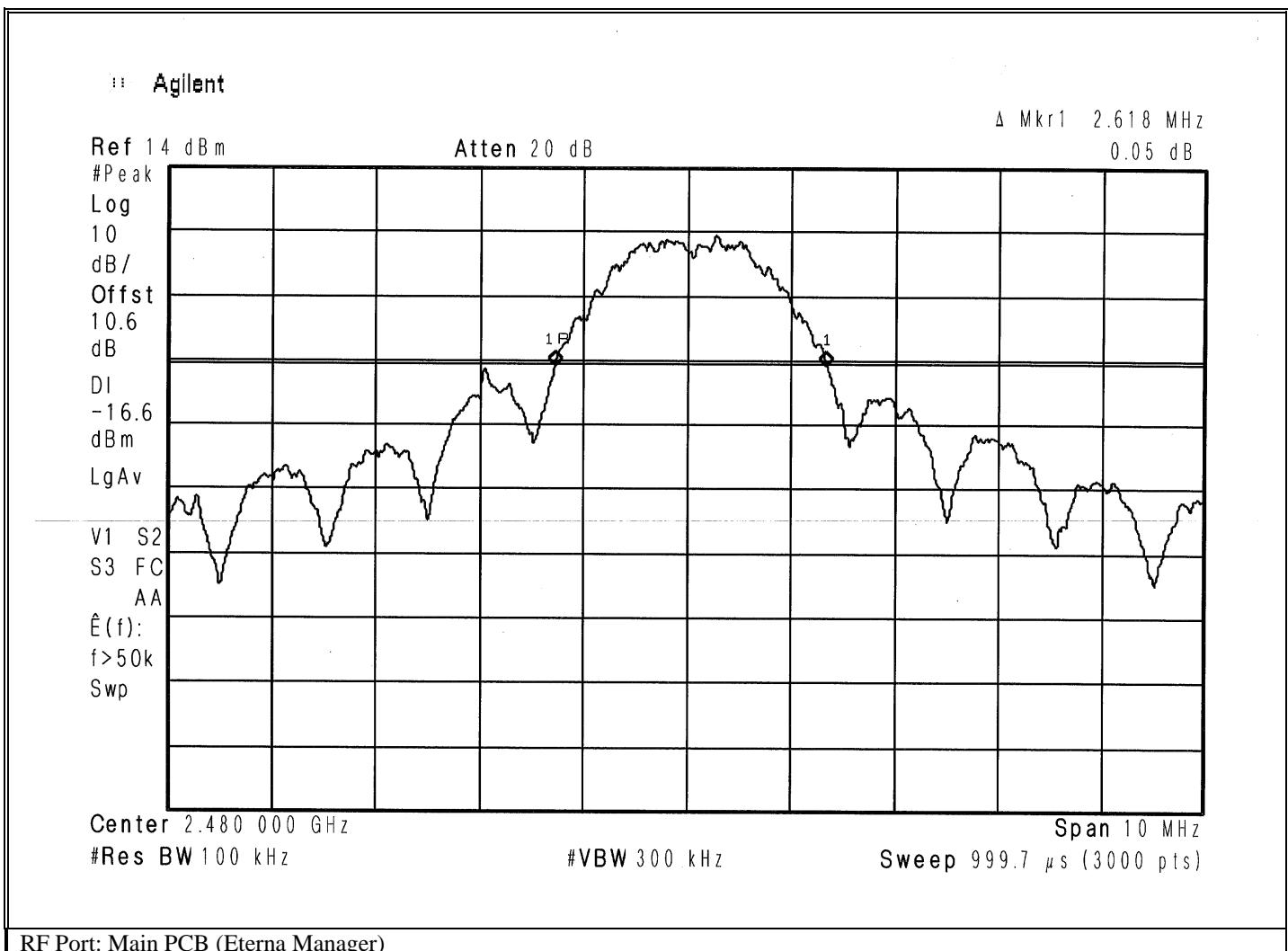


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

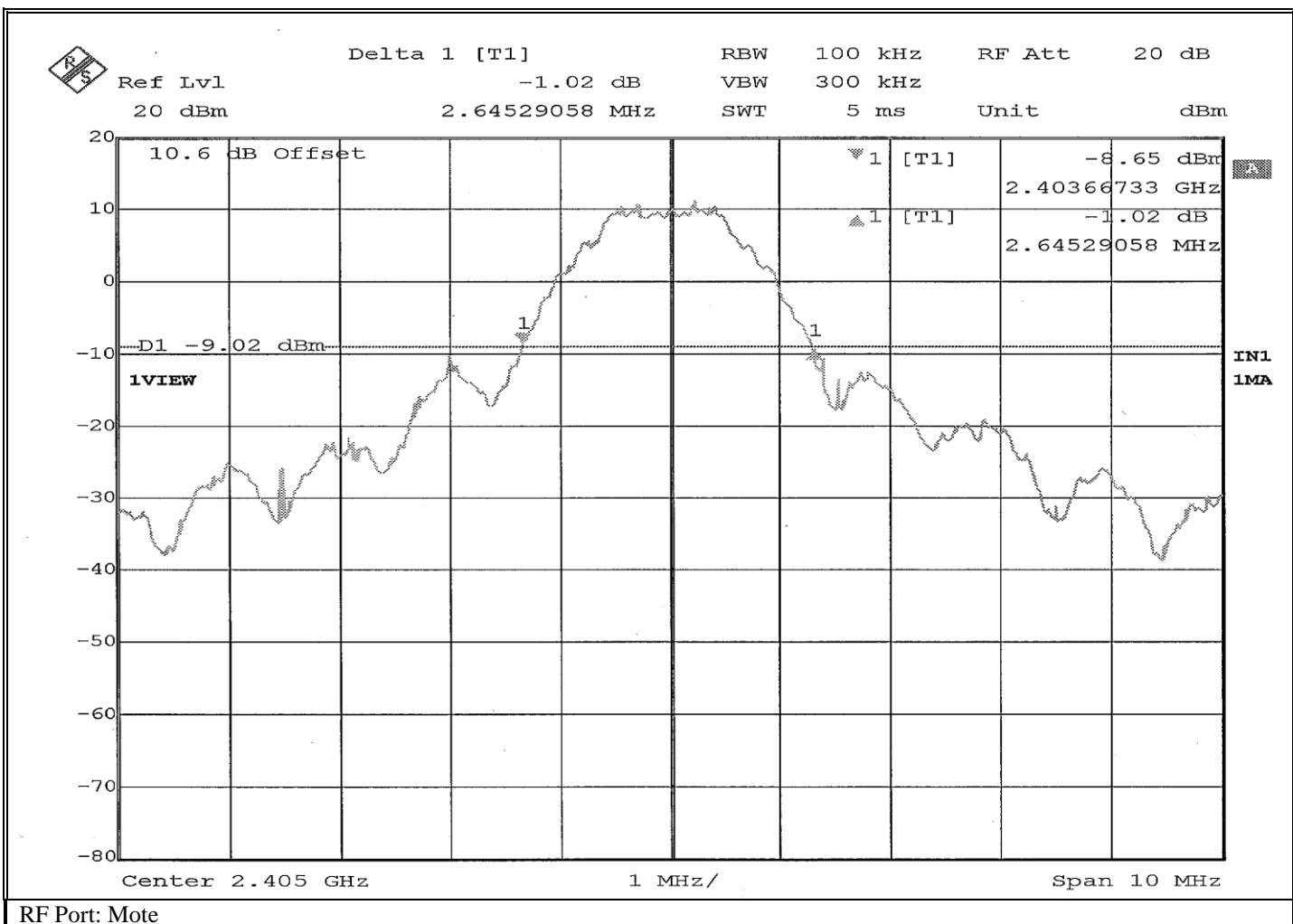


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

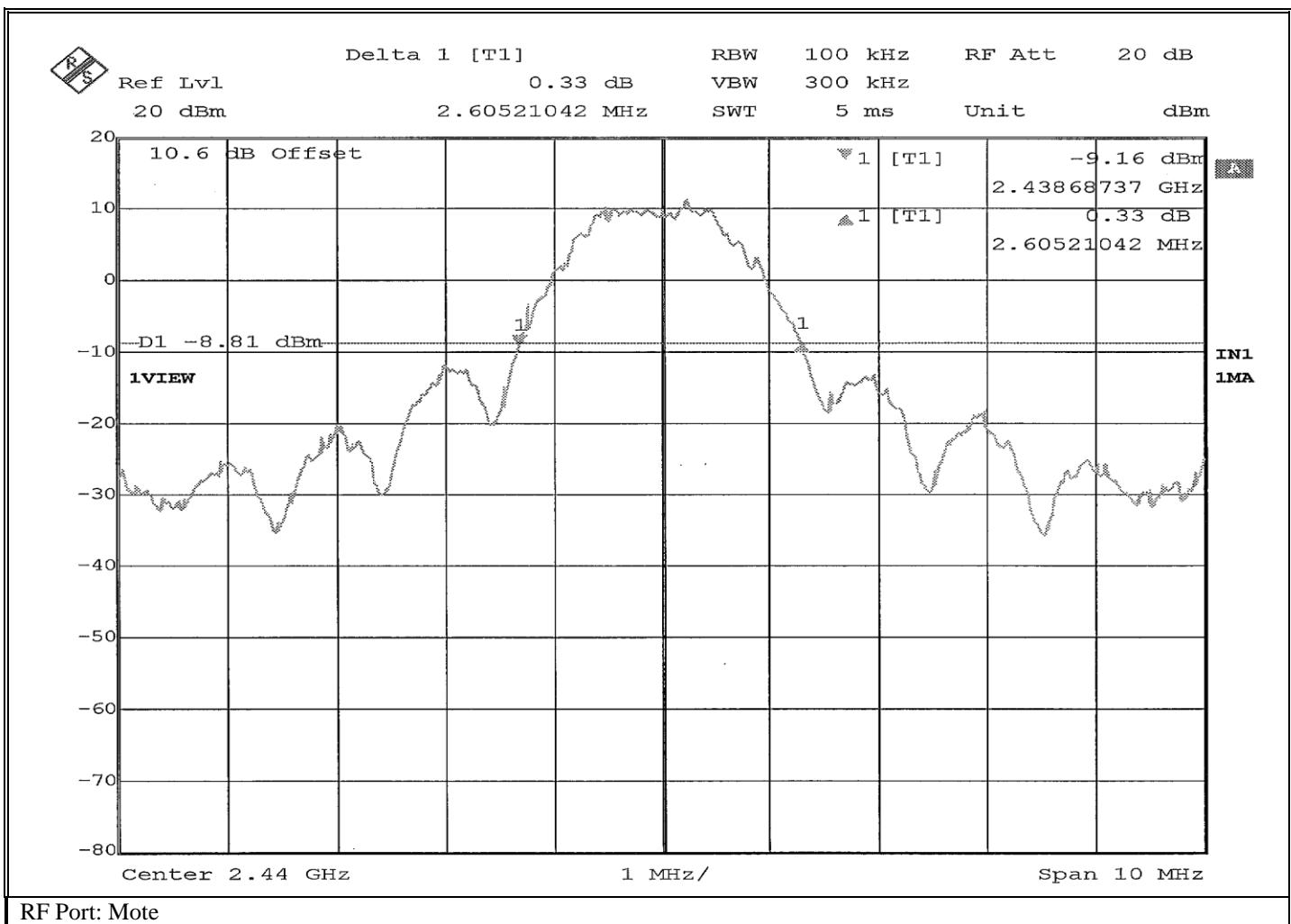


## Retlif Testing Laboratories

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

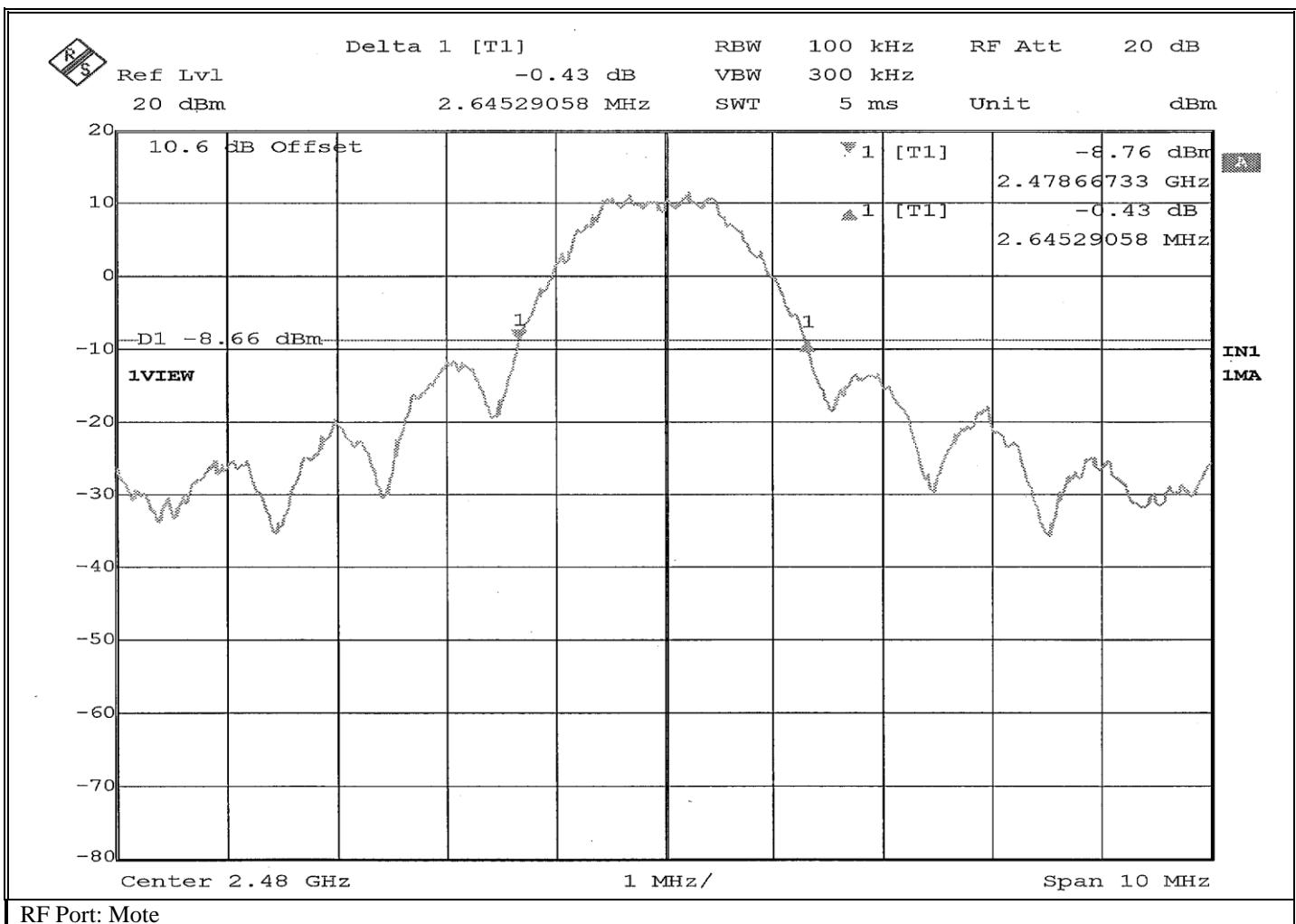


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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



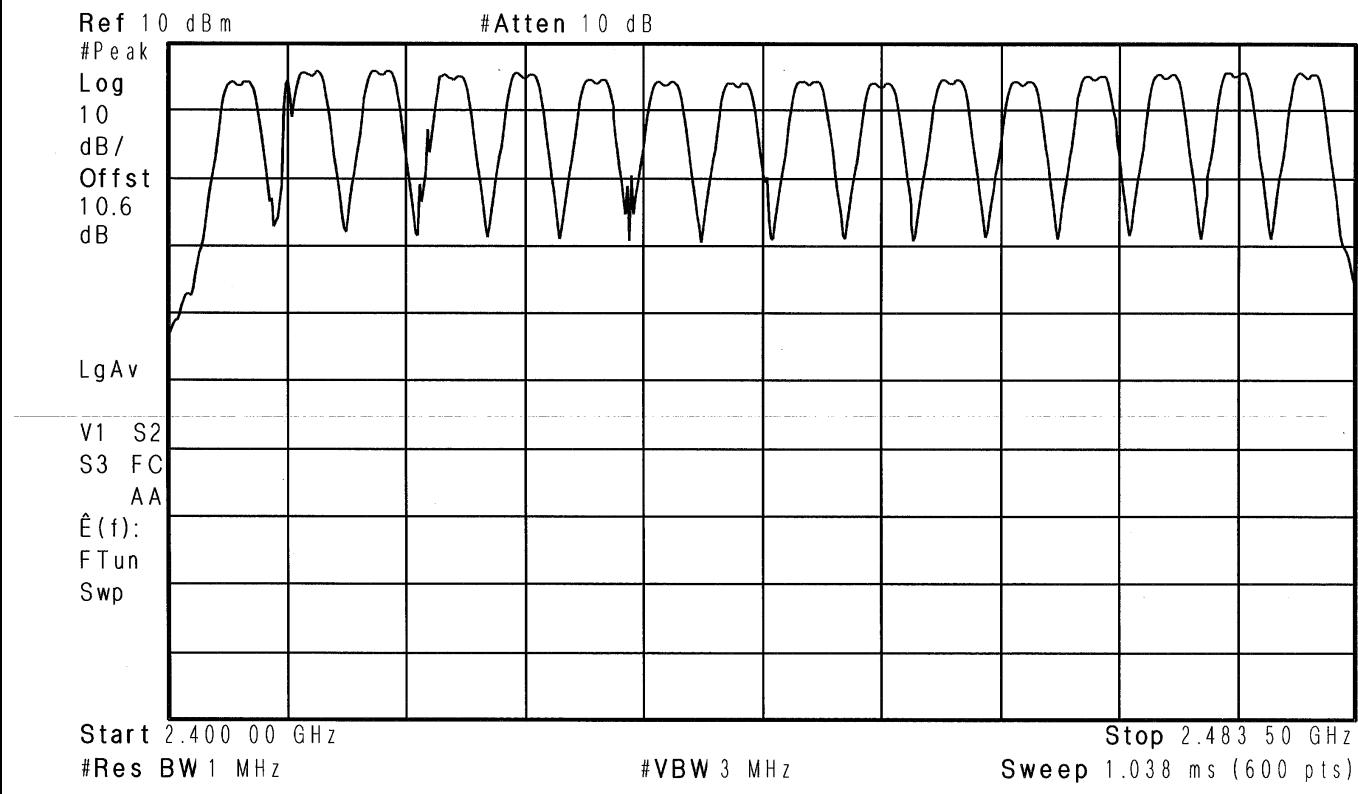
**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

Agilent



RF Port: Main PCB (Eterna Manager)

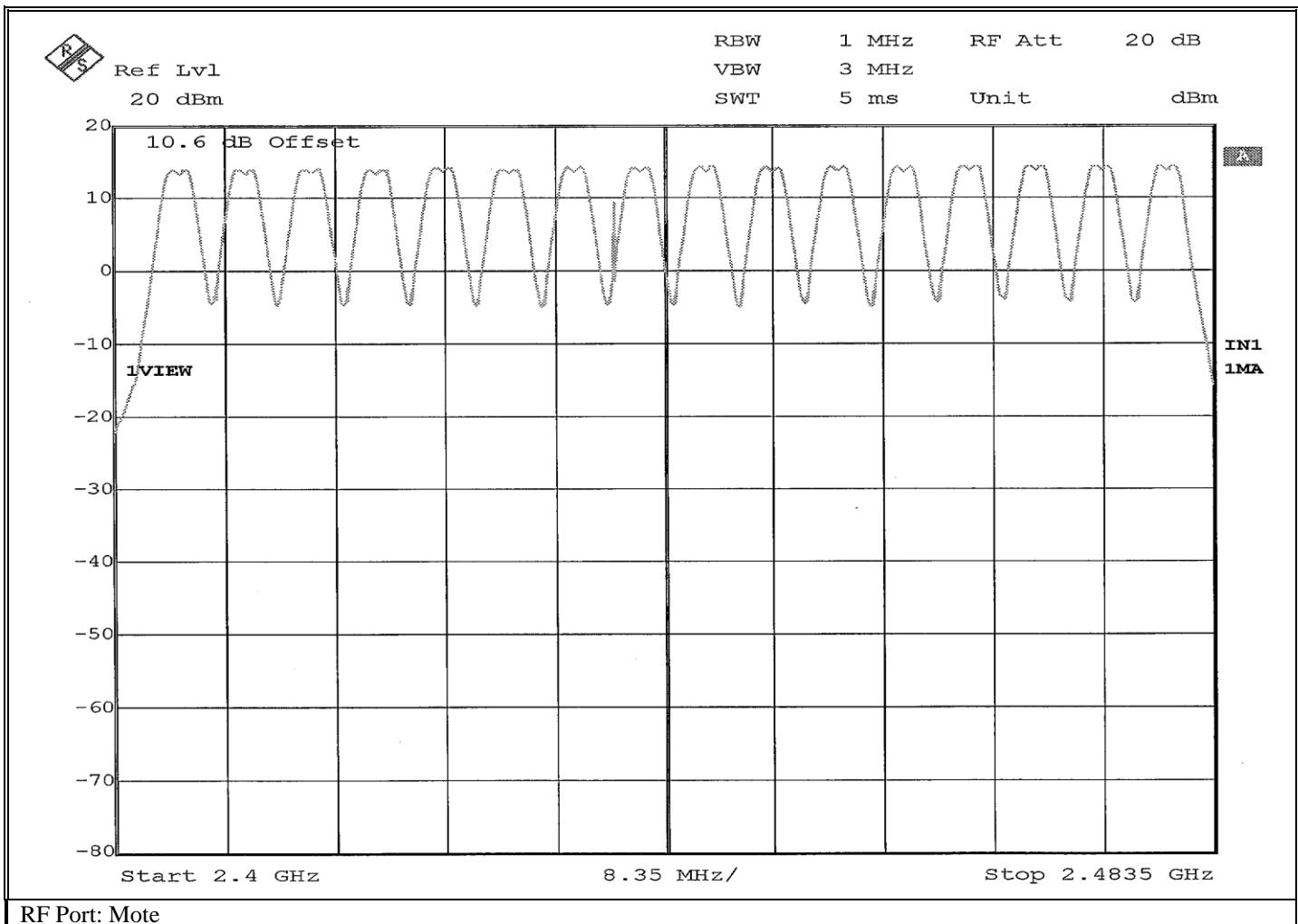


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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



**Retlif Testing Laboratories**

Report No. R-2754P-1

**Time of Occupancy  
Test Data**

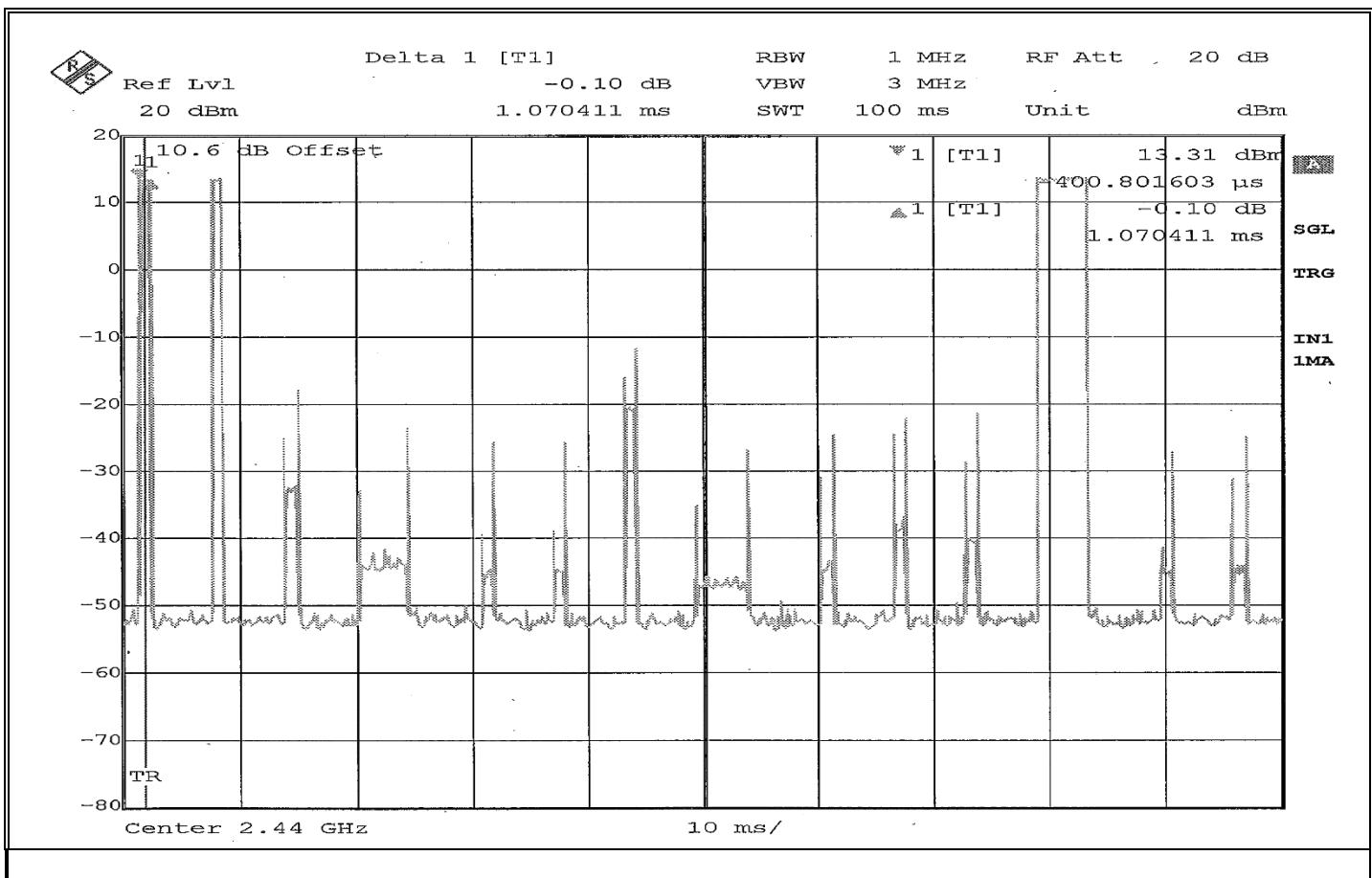


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

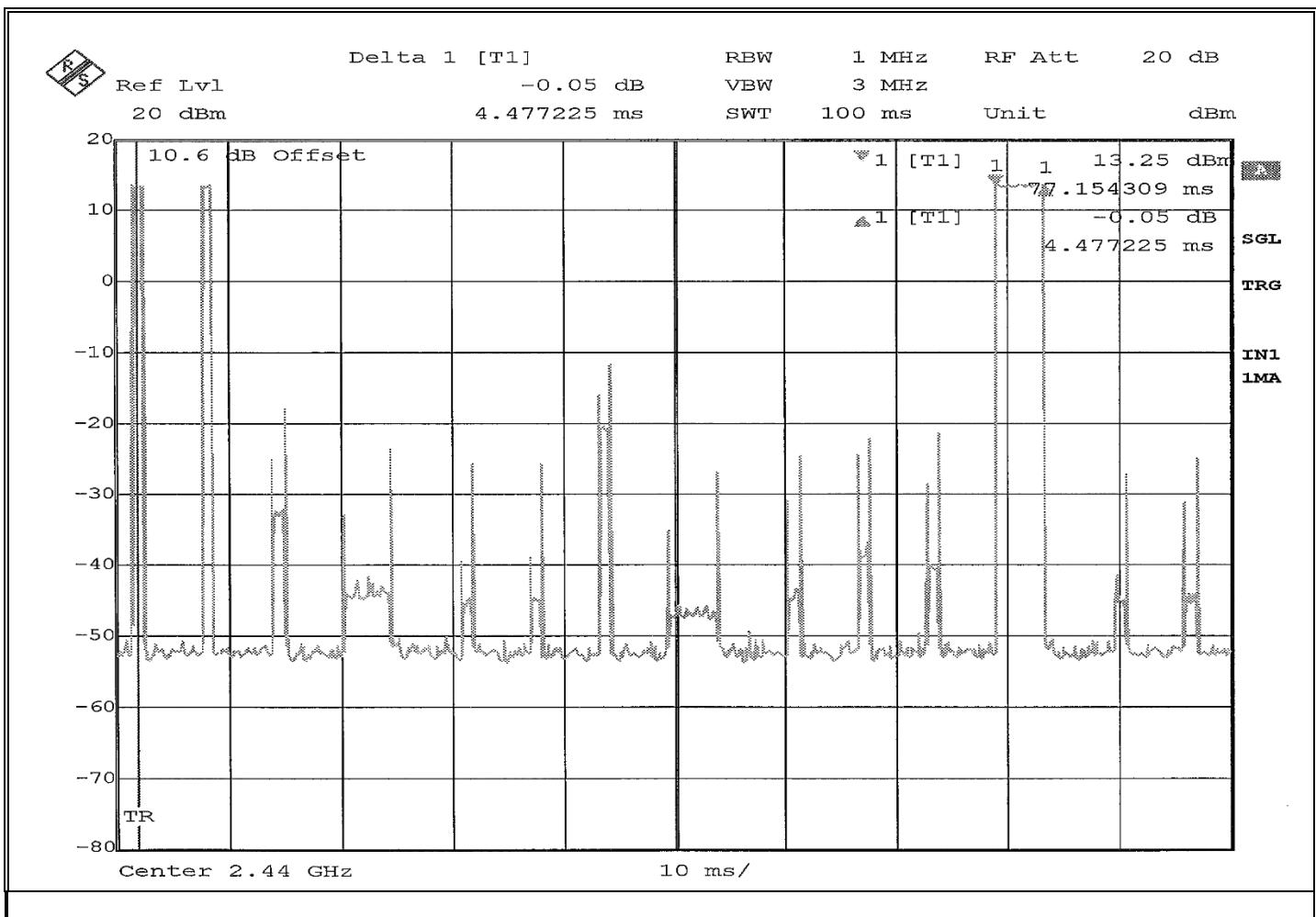


**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

<b>Method:</b>	Time of Occupancy
<b>Test Specification:</b>	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)
<b>Job Number:</b>	R-2754P-1
<b>Customer:</b>	IONX LLC
<b>Test Sample:</b>	Communications Management Unit
<b>Model Number:</b>	CMU-E6X
<b>Serial Number:</b>	FTA7D
<b>Operating Mode:</b>	Transmitting modulated signal
<b>Technician:</b>	M.Seamans
<b>Date(s):</b>	January 26 <sup>th</sup> , 2018
<b>Temp/ Relative Humidity:</b>	23.0 °C / 17.6 %
<b>Notes:</b>	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**



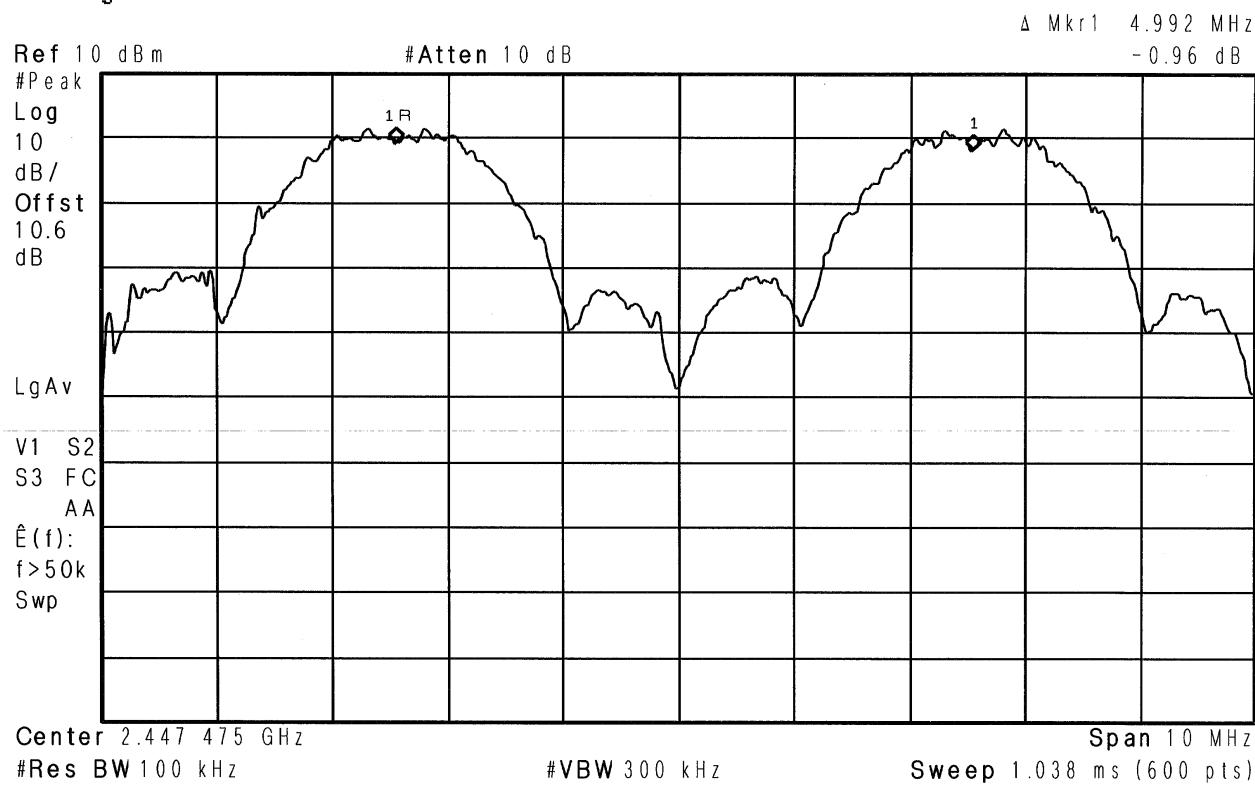
**Retlif Testing Laboratories**

Report No. R-2754P-1

## EMISSIONS TEST DATA SHEET

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

Agilent



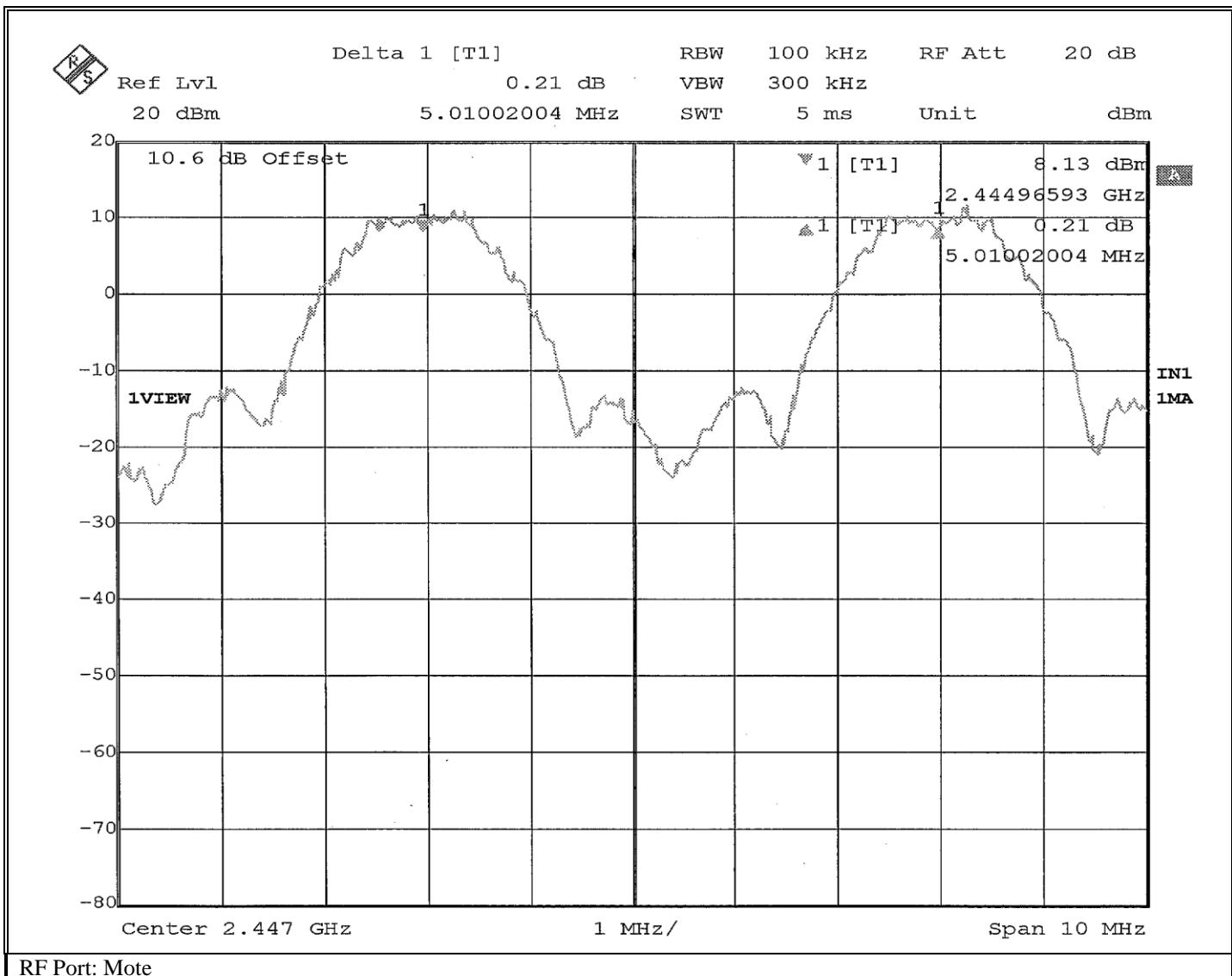
RF Port: Main PCB (Eterna Manager)



**Retlif Testing Laboratories**

Report No. R-2754P-1

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



Retlif Testing Laboratories

Report No. R-2754P-1