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FCC Part 15, Subpart C, Section 15.247

Test Report

On

Wireless Strain Sensor
FCC ID: XJQMSLINK0009

Customer Name: Lord Corporation

Customer P.O: 729750

Date of Report: May 15, 2018

Test Report No: R-6297N-1

Test Start Date: March 22, 2018

Test Finish Date: March 23, 2018

Test Technician: M. Seamans

Report Approved By: T. Hannemann

Report Prepared By: J. Ramsey

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Technical Information

Report Number:	R-6297N-1
Customer:	Lord Corporation
Address:	459 Hurricane Lane, Suite 102
	Williston, VT 05495
Manufacturer:	Lord Corporation
Manufacturer Address:	459 Hurricane Lane, Suite 102
	Williston, VT 05495
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Numbers:	3036-0116-72444 (Radiated), 3036-0116-00020 (Conducted)
FCC ID:	XJQMSLINK0009
Type:	Digital Transmission – Direct Sequence Spread Spectrum Transmitter
Power Requirements:	3.6 VDC via two (2) Lithium batteries
Frequency of Operation:	2402.0 to 2480.0 MHz
Equipment Class:	DTS
Antenna Type:	Patch Antenna, 2.0 dBi Gain
Equipment Use:	Wireless Data Module

Test Specification:
FCC Rules and Regulations Part 15, Subpart C, Section 15.247

Test Procedure:
ANSI C63.4: 2014
ANSI C63.10: 2013

Test Facility:
Retlif Testing Laboratories
101 New Boston Road
Goffstown, NH 03045

FCC Designation Number: US5327

Table 1 – Tests Performed

FCC Part 15, Subpart C	Test Method
15.247(b)(3)	Power Output
15.247(a)(2)	Occupied Bandwidth
15.247(d)	Antenna Terminal Out of Band/Band Edge Conducted Emissions
15.247(d)	Out of Band/Band Edge Radiated Emissions
15.247(e)	Power Density

EUT Operation:
The EUT was transmitting a modulating signal at 2.405 GHz (Channel 11), 2.440 GHz (Channel 18) and 2.480 GHz (Channel 26).

EUT Description:
The ILOX node is a custom wireless strain sensor used to measure conveyor belt wear in industrial applications. It is designed to work with Lord Sensing Base Stations and data acquisition software to acquire strain data in dispersed node networks. The node is powered by non-rechargeable batteries. The node electronics, including the antenna cable, and antenna are fully encapsulated within a metal, hermetically sealed enclosure.

Table 2 – EUT Configurations

System Component	Manufacturer	Model Number	Serial Number
Wireless Strain Sensor	Lord Corporation	ILOX	3036-0116-72444
Wireless Strain Sensor			3036-0116-00020

All equipment that was utilized to achieve the EUT operating state is specified in the table below:

Table 3 – Support Equipment

Description	Manufacturer	Model Number	Serial Number
Laptop PC	ASUS	K54C	C9N0ASKRR1SF39F
Base Station	Lord Corporation	WSDA-200-USB	6307-2040-00086

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
EMC Test Engineer
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.

Revision History

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

Revision	Date	Pages Affected
-	May 15, 2018	Original Release

Requirements and Test Results

FCC Section 15.247 (a)(2) – Bandwidth
For systems using digital modulation techniques operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725 – 5850 MHz bands the minimum 6 dB bandwidth shall be at least 500 kHz.

- **Results**:
  The minimum 6dB bandwidth measured while transmitting was 1.593 MHz. The device was found to meet the requirement of 15.247 (a)(2).

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

- **Results**:
  The maximum measured peak conducted output power when transmitting was 14.66 mW. The maximum antenna gain of the antennas is -0.9 dBi. The device was found to meet the power output requirements of 15.247 (b)(3) including de facto EIRP.

Requirements and Test Results (con't)

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).

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 4 - 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).

Requirements and Test Results (con't)

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

- **Results**:
  The power spectral density conducted from the intentional radiator to the antenna was not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density was determined in accordance with Section 15.247(b)(3), herein.

Field Strength Calculation/Conversion:

The maximized field strength of the emission was obtained as follows:

CR = MR + CF

Where:
CR = Corrected Reading in dBµV/m
MR = Uncorrected Meter Reading in dBµV
CF = Correction Factor in dB (Antenna Factor, Pre-amp + Cable Loss)

Example:
MR = 15.35 dBµV
CF = 16.85 dB
CR = 15.35 dBuV + 16.85 = 32.2 dBµV/m

dBµV/M is converted to uV/M for comparison to the specified limit using the formula:

invLog dBµV/M/20

32.2 dBuV/m = 40.74 uV/m

RF Power Conversion:

Power readings in dBm may be converted to mW using the formula:

InvLog dBm/10

Example: 20dBm = 100mW

FCC Section 15.247 (i)
RF Exposure Limits

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

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

D = Minimum Separation Distance in cm

S = Max allowed Power Density in mW/cmsq

Per 1.1310 For the Frequency of 2400 MHz S = 1 mW/cmsq

Power = Max Power Input to Antenna = 14.66mW

Gain = Max Power Gain of Antenna = 2 dBi = 1.58 numeric

$$1 \text{ mW/cmsq} = \frac{14.66 \times 1.58}{4 \times (3.14) \times D^2} = \frac{23.16}{12.56 \times D^2}$$

$$D^2 = \frac{23.16}{12.56 \text{ X } 1}$$

$$D = \sqrt{1.84} = 1.36 \text{ cm}$$

NOTE: The maximum measured RF power output and maximum antenna gain was utilized in the RF Exposure calculation.

Equipment List

FCC Section 15.247(a)(2)
Occupied 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

FCC Section 15.247 (d)
Band Edge Conducted Emissions

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

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

FCC Section 15.247 (d)
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	ANTENNA, DOUBLE RIDGED GUIDE	1 - 18 GHz	3115	10/13/2016	4/30/2018
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	OPEN AREA TEST SITE, ATTENUATION	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
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/17/2017	10/31/2018
5188	Cybertron	COMPUTER, CONTROL	N/A	TSVQJA2221	No Calibration Required	

FCC Section 15.247(e)
Power Density

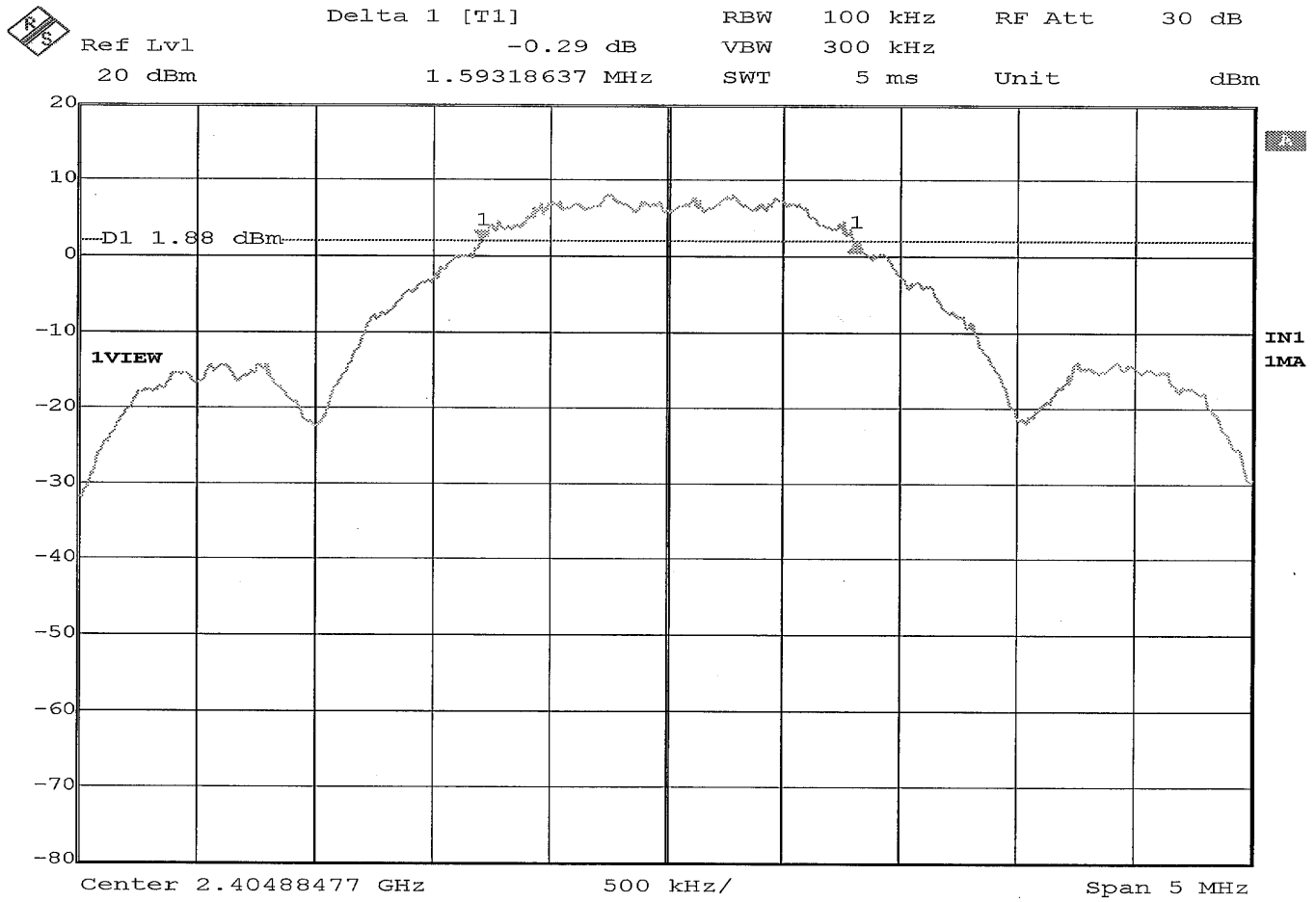
EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/17/2017	10/31/2018

Test Photographs
Occupied Bandwidth

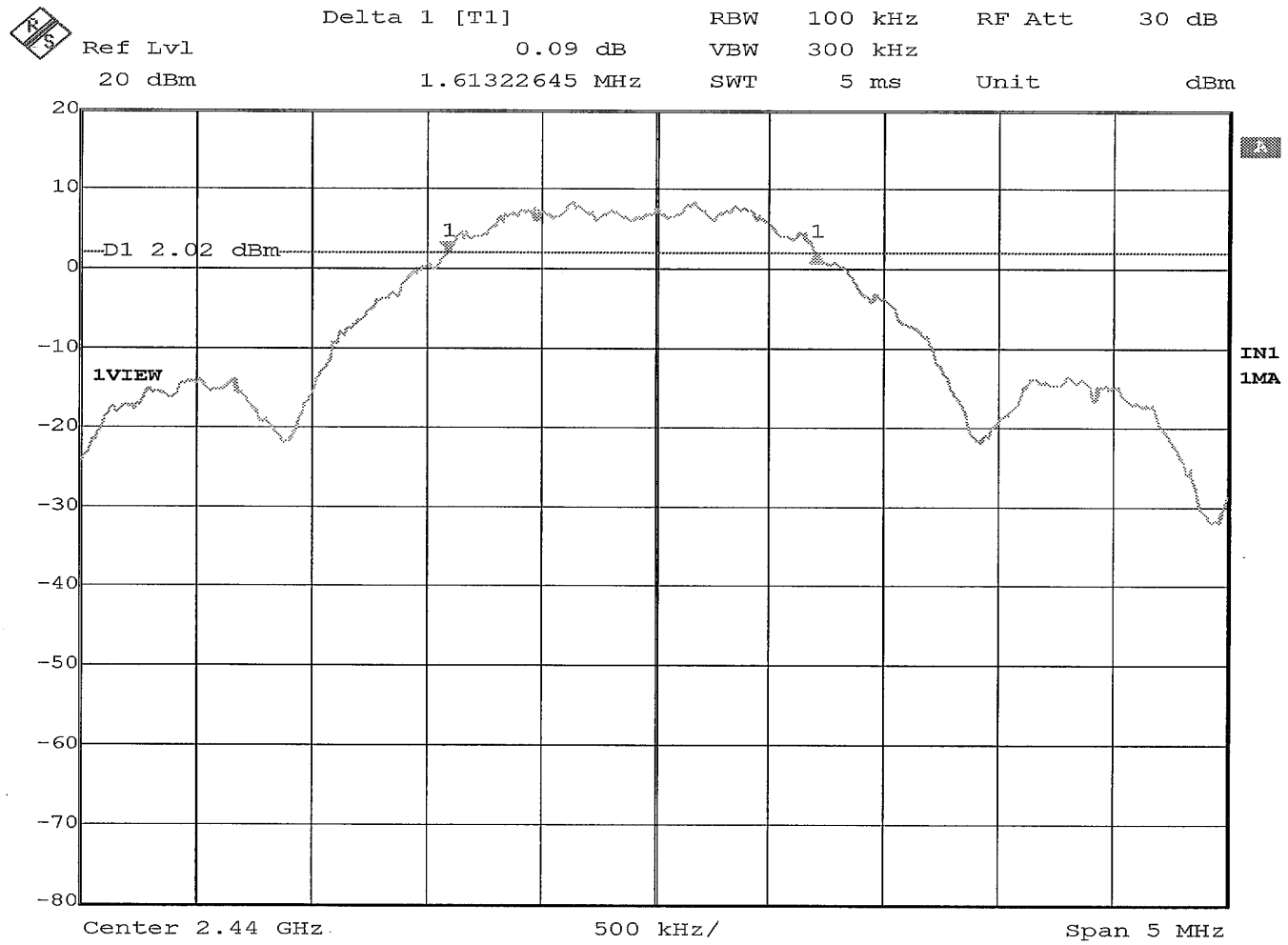
Test Setup

FCC Section 15.247(a)(2)
Occupied Bandwidth
Test Data

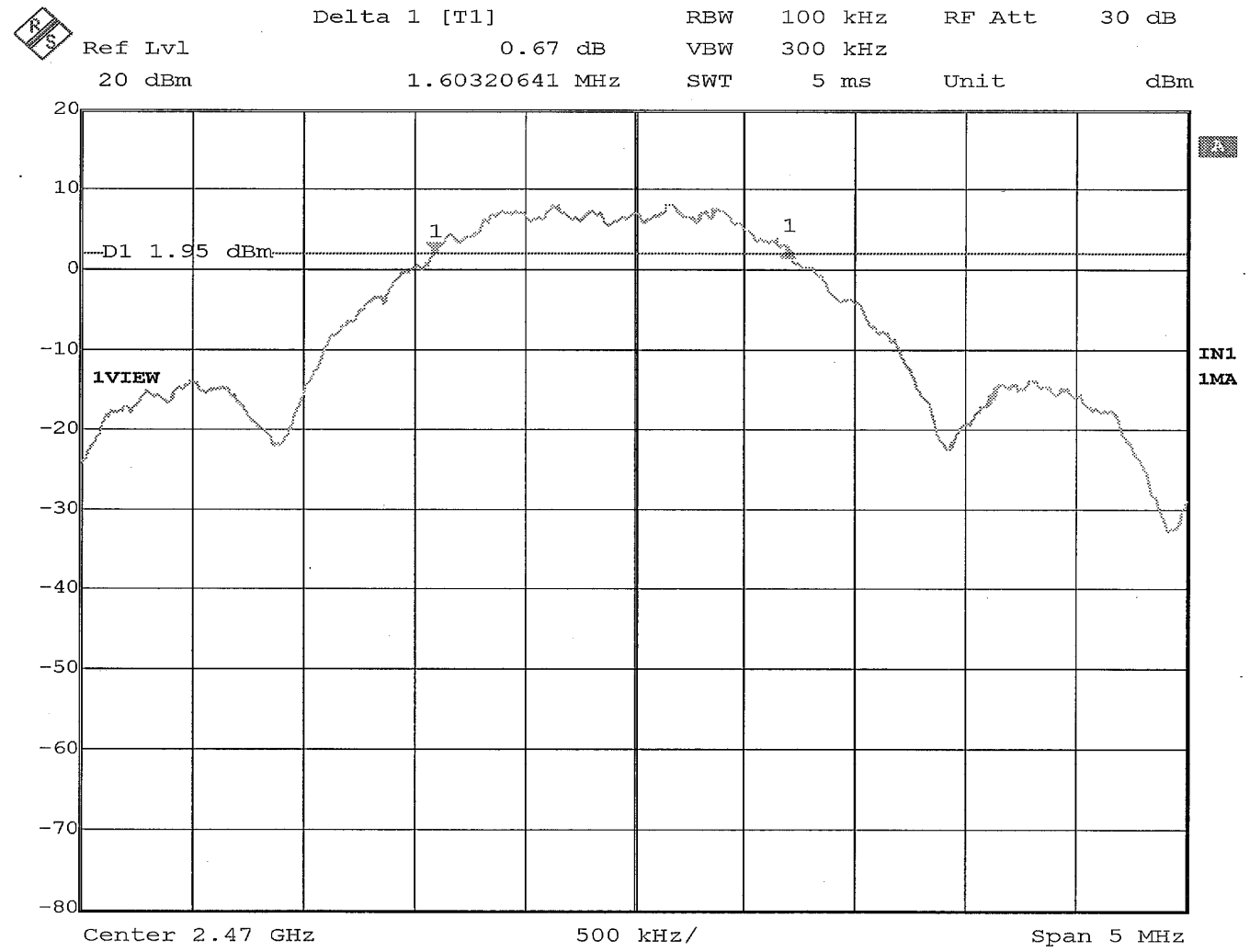
EMISSIONS TEST DATA SHEET	
Method:	**Occupied Bandwidth**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(2)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	21.3 °C / 22.1 %
Notes:	6dB Bandwidth: 1.5931 MHz



EMISSIONS TEST DATA SHEET	
Method:	**Occupied Bandwidth**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(2)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	21.3 °C / 22.1 %
Notes:	6dB Bandwidth: 1.6132 MHz



EMISSIONS TEST DATA SHEET	
Method:	**Occupied Bandwidth**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(2)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.470 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	21.3 °C / 22.1 %
Notes:	6dB Bandwidth: 1.6032 MHz

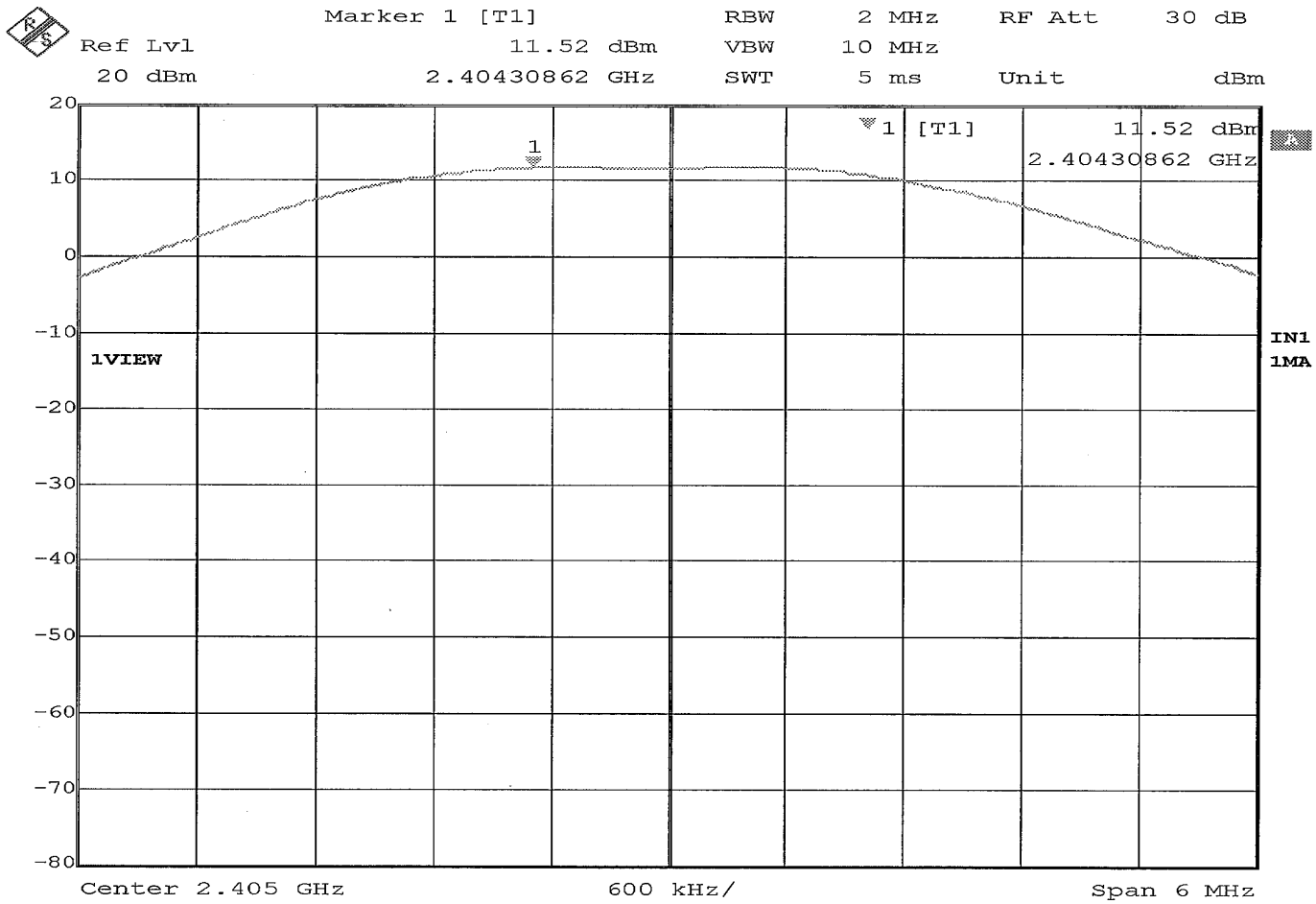


Test Photographs
Power Output

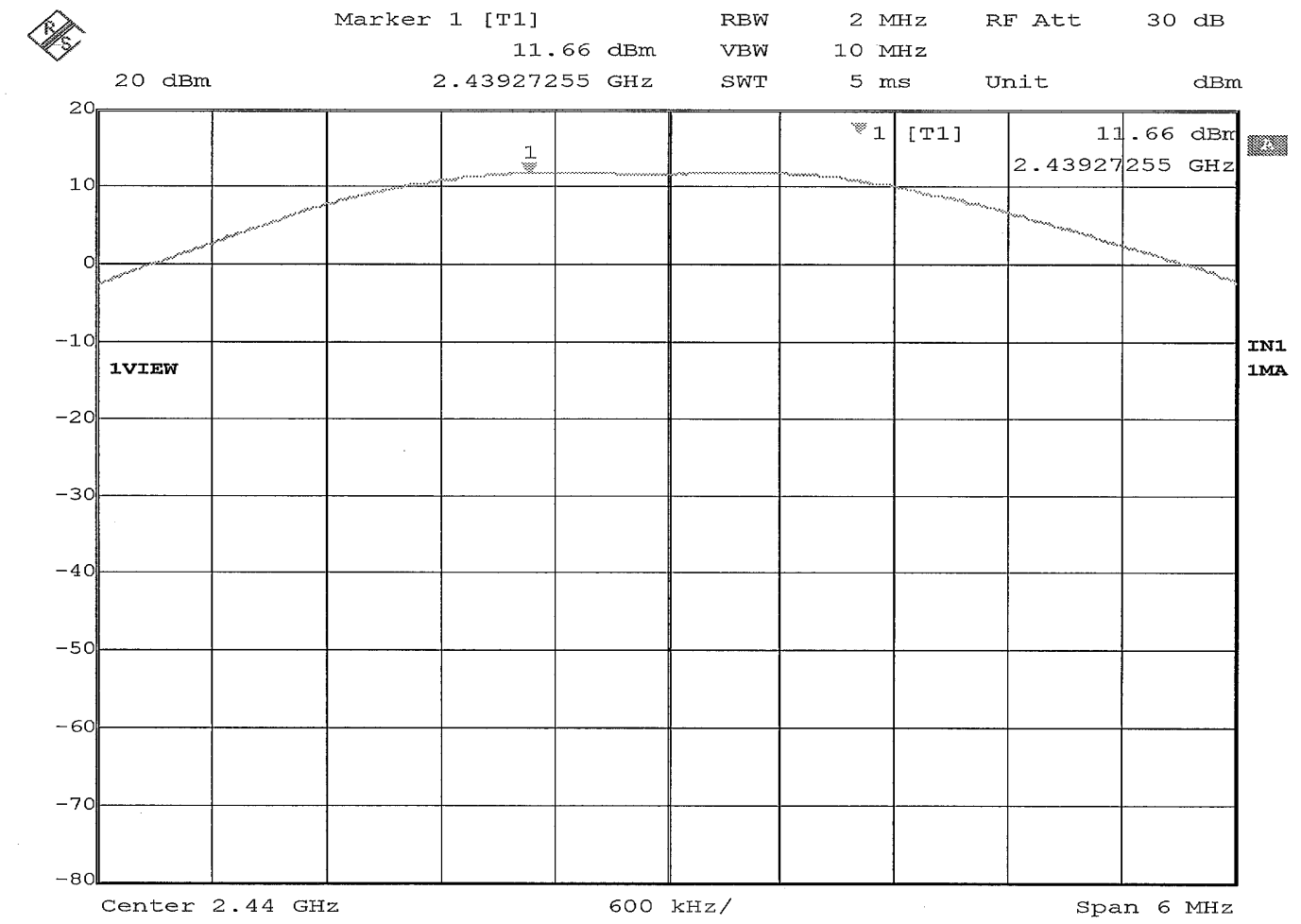
Test Setup

FCC Section 15.247 (b)(3)
Power Output
Test Data

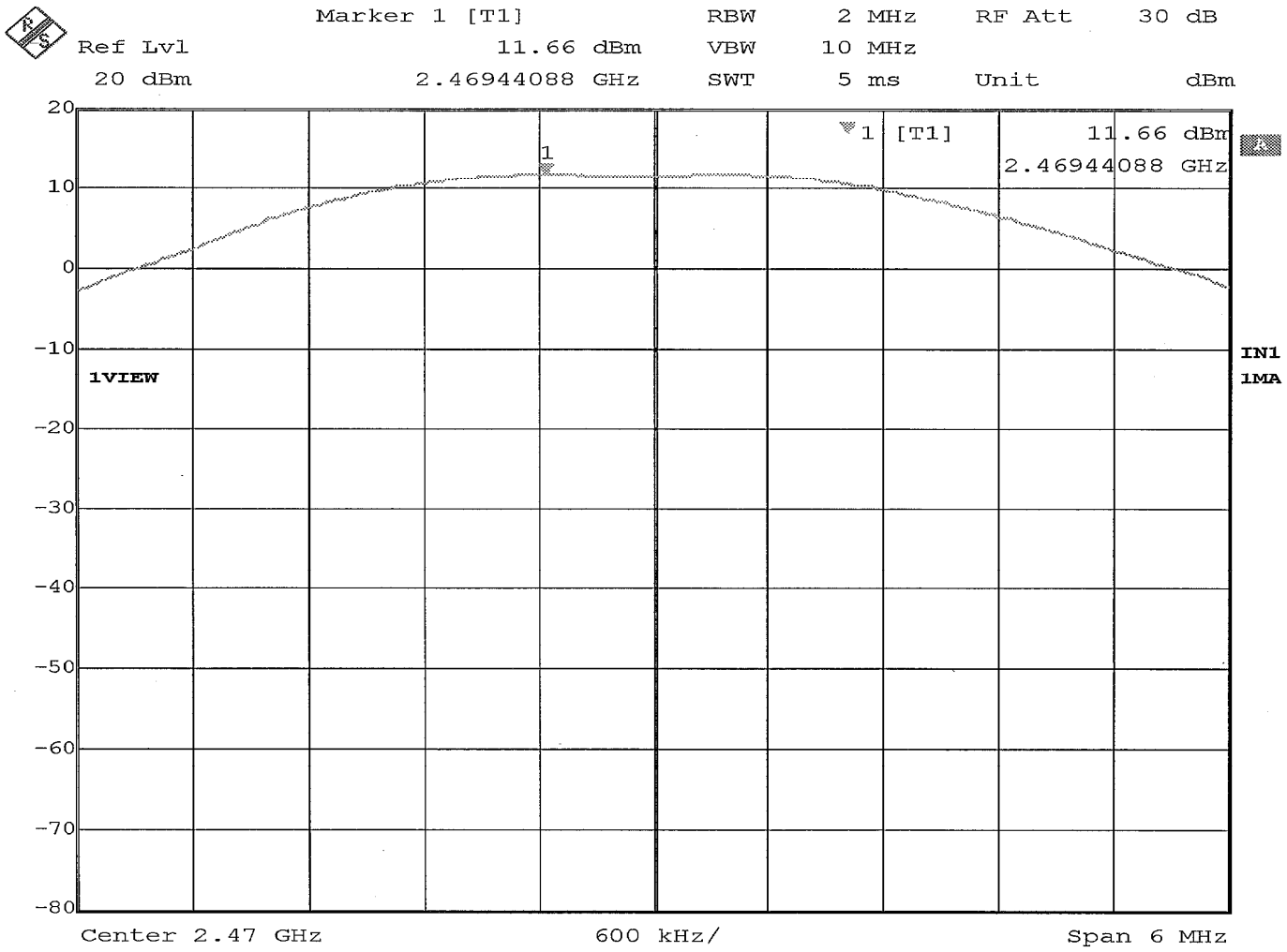
EMISSIONS TEST DATA SHEET	
Method:	**Power Output**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	21.8 °C / 21.9 %
Notes:	KDB Method: 9.1.1 Power Output: 11.52 dBm



EMISSIONS TEST DATA SHEET	
Method:	**Peak Power Output**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	21.8 °C / 21.9 %
Notes:	KDB Method: 9.1.1 Power Output: 11.66 dBm



EMISSIONS TEST DATA SHEET	
Method:	**Peak Power Output**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.470 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	21.8 °C / 21.9 %
Notes:	KDB Method: 9.1.1 Power Output: 11.66 dBm



Retlif Testing Laboratories

Report No. R-6297N-1

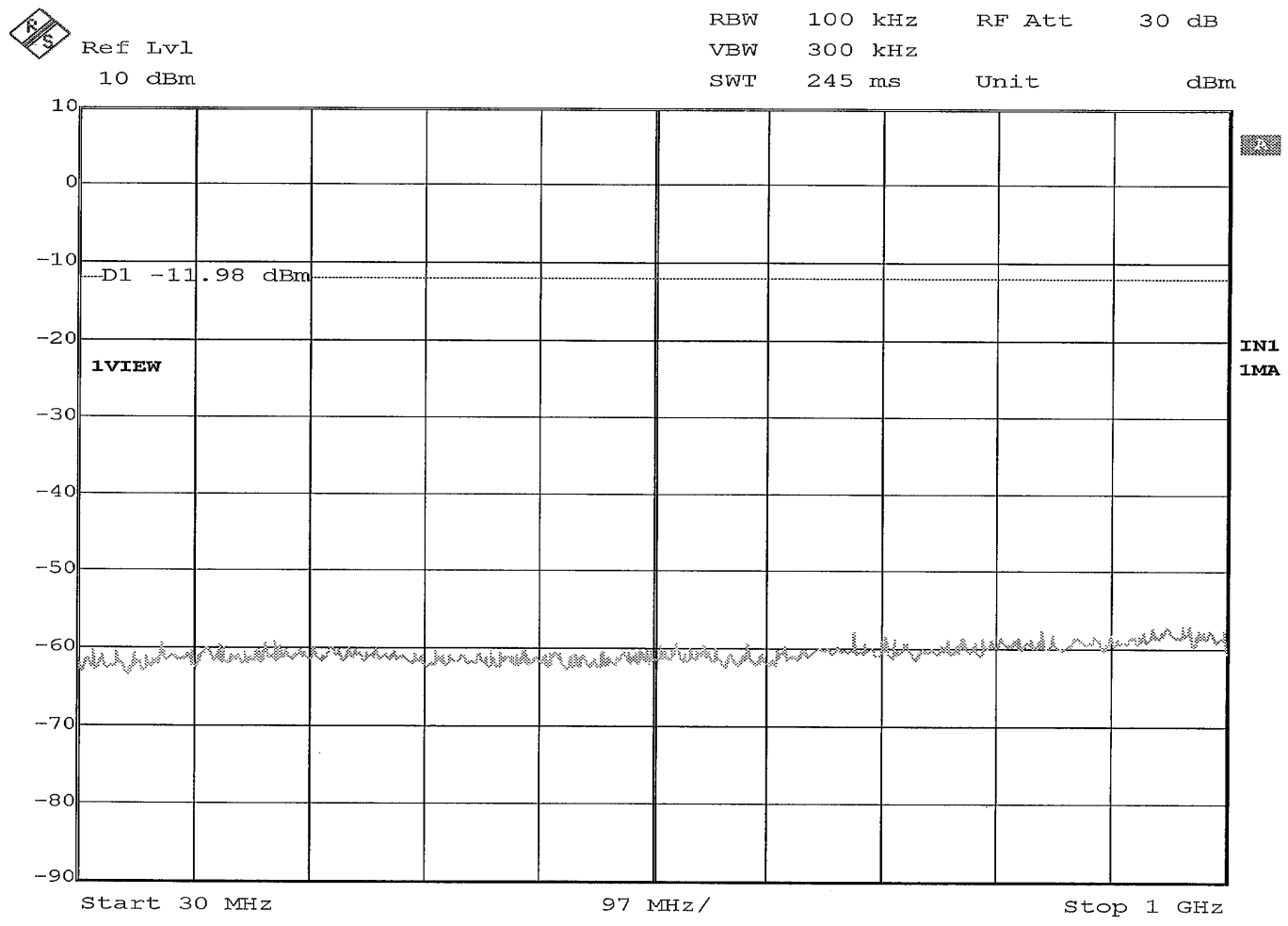
Test Photographs
Antenna Terminal Out of Band/Band Edge Conducted Emissions

Test Setup

FCC Section 15.247 (d)
Antenna Terminal Out of Band/Band Edge Conducted Emissions
Test Data

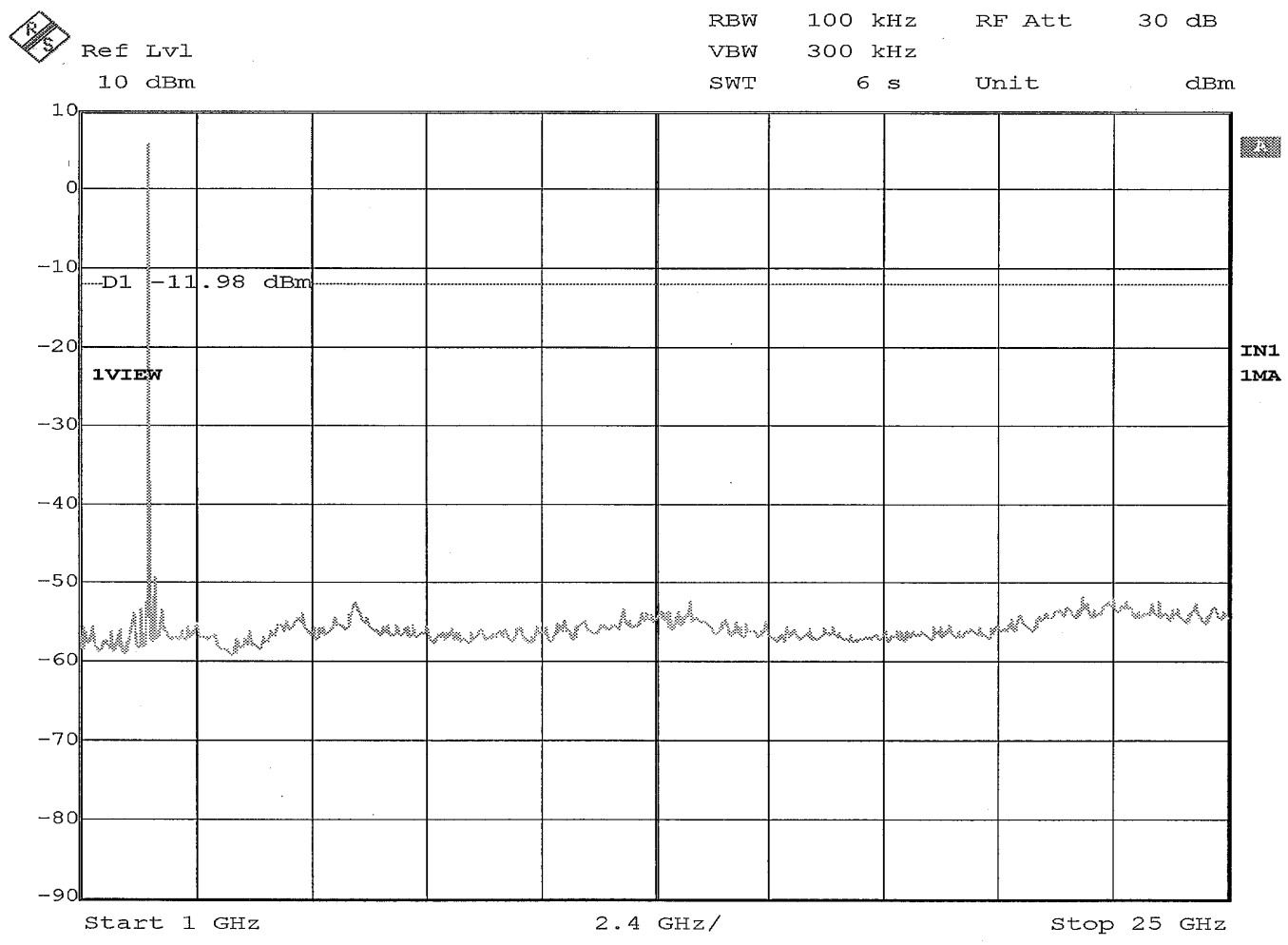
Out of Band Conducted Emissions
Test Data

EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.0 °C / 20.9 %
Notes:	Limit: -11.98 dBm



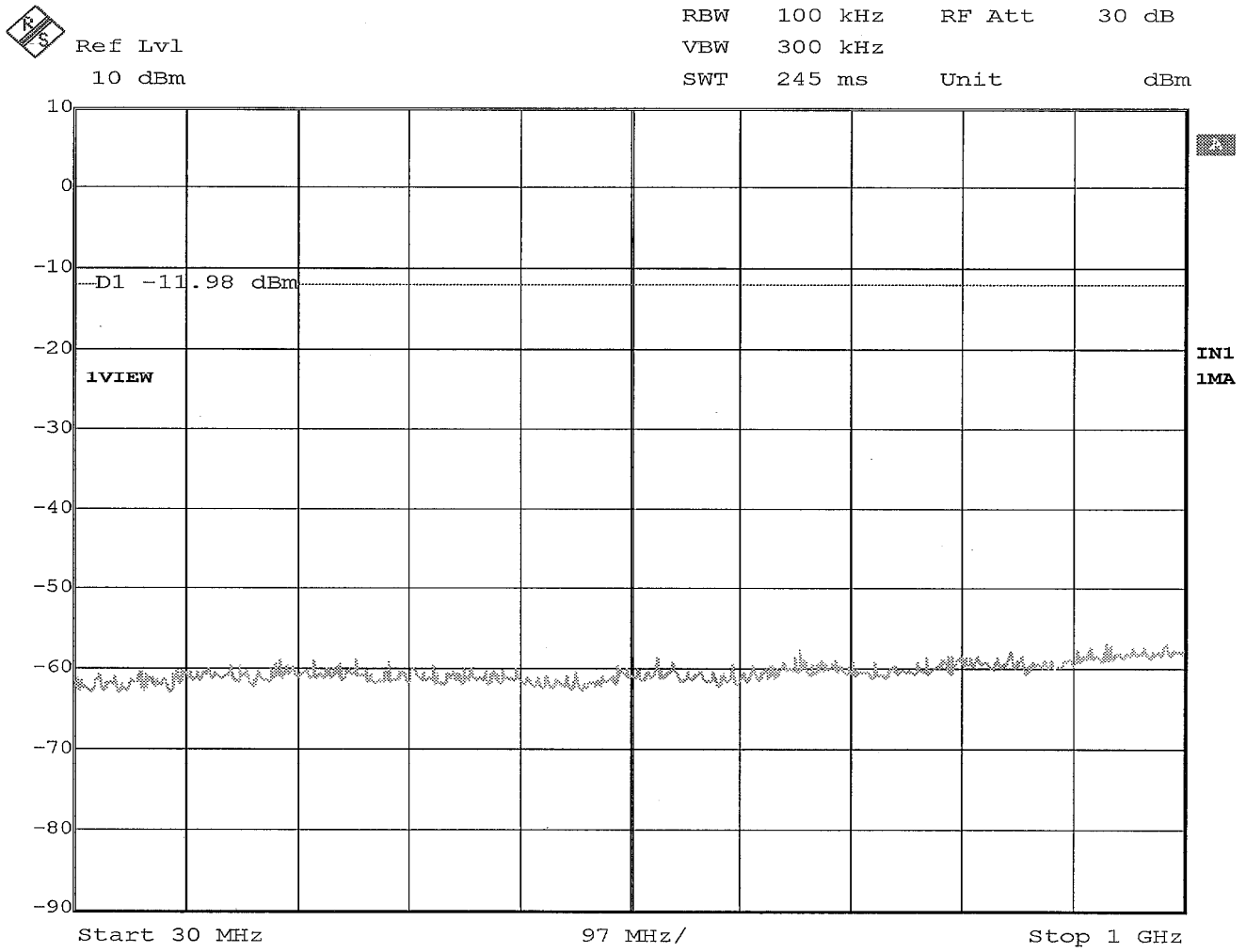
25MHz to 1GHz

EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.0 °C / 20.9 %
Notes:	Limit: -11.98 dBm



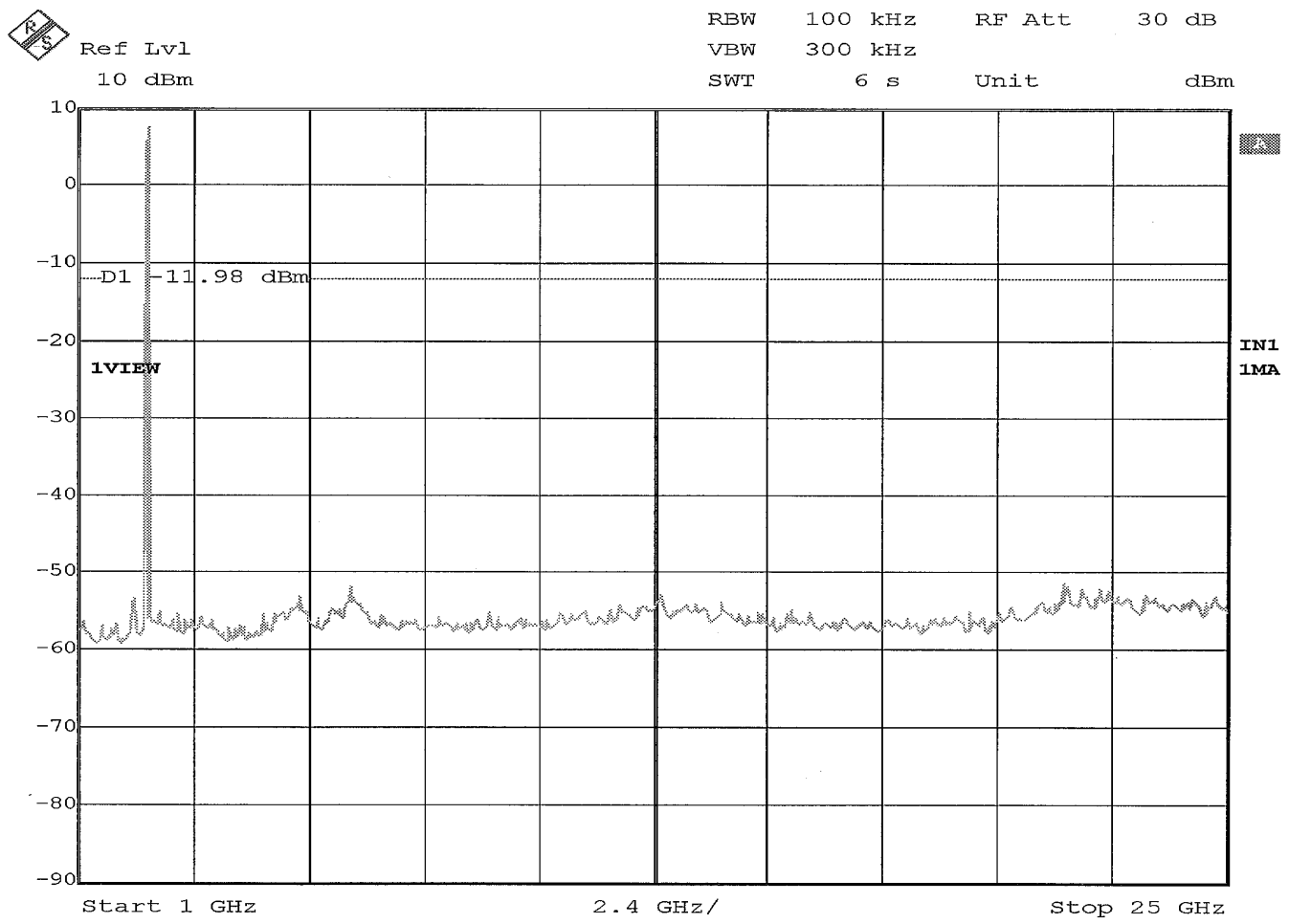
1GHz to 25GHz

EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.0 °C / 20.9 %
Notes:	Limit: -11.98 dBm



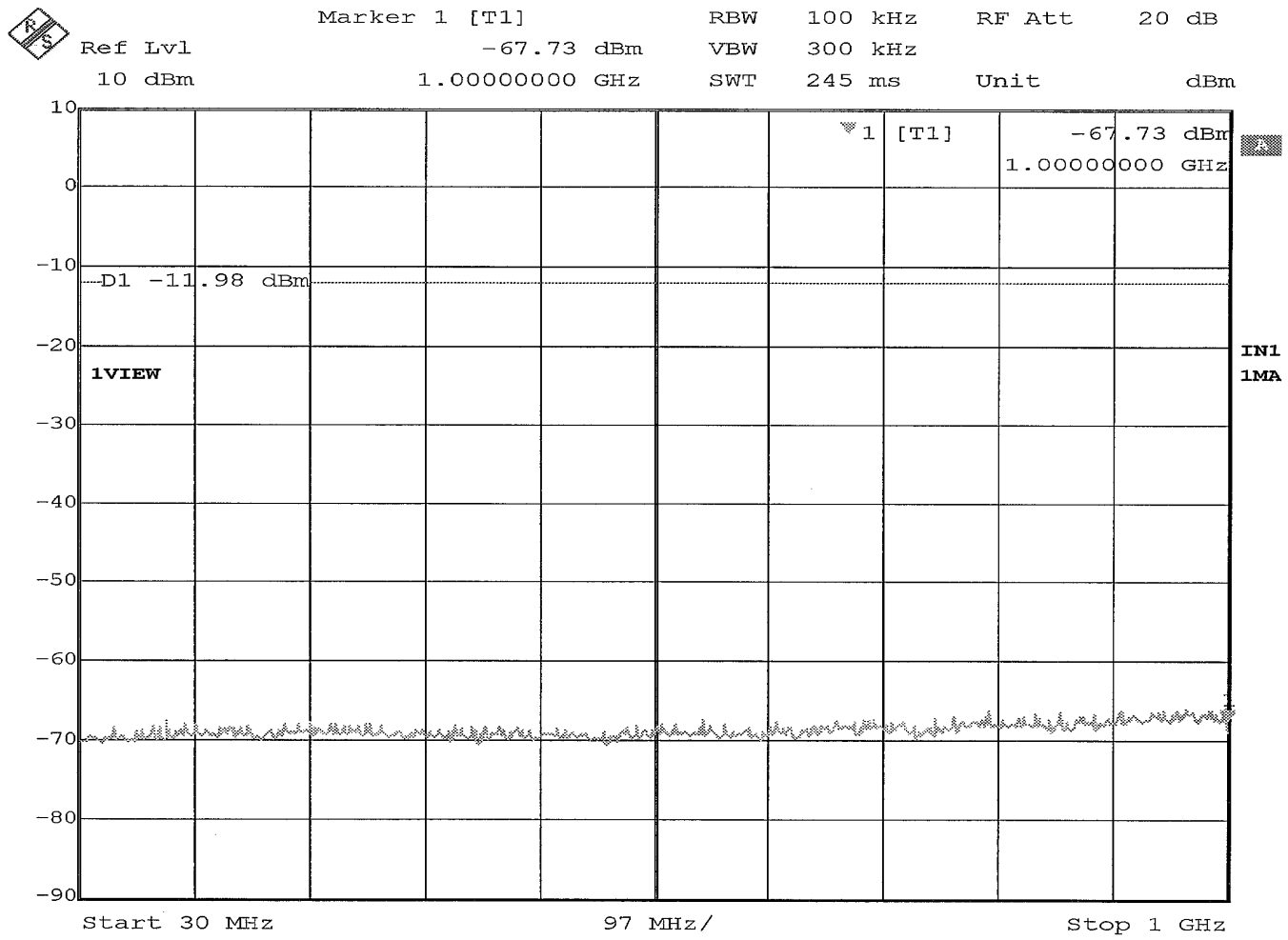
25MHz to 1GHz

EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.0 °C / 20.9 %
Notes:	Limit: -11.98 dBm



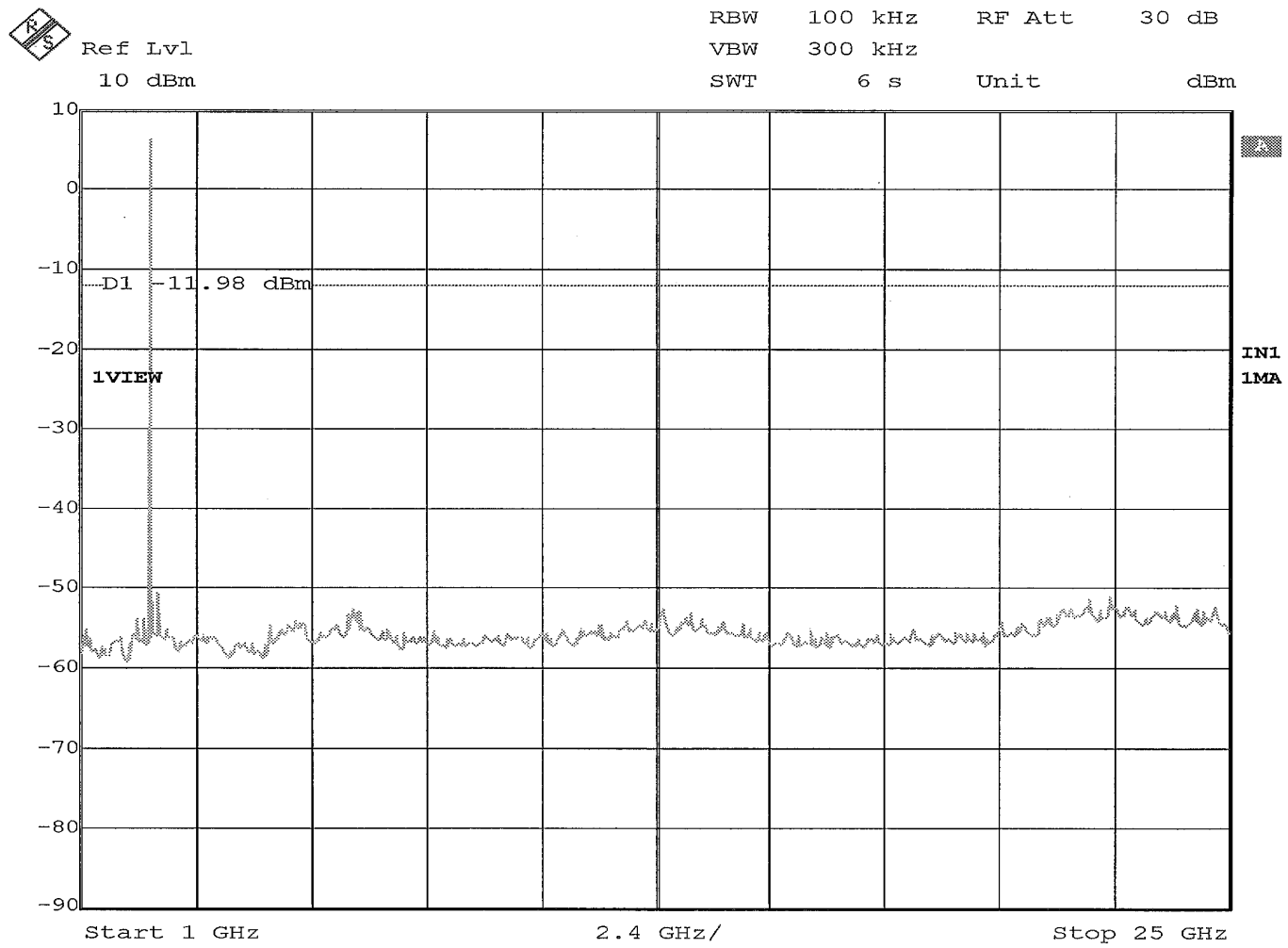
1GHz to 25GHz

EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.0 °C / 20.9 %
Notes:	Limit: -11.98 dBm



25MHz to 1GHz

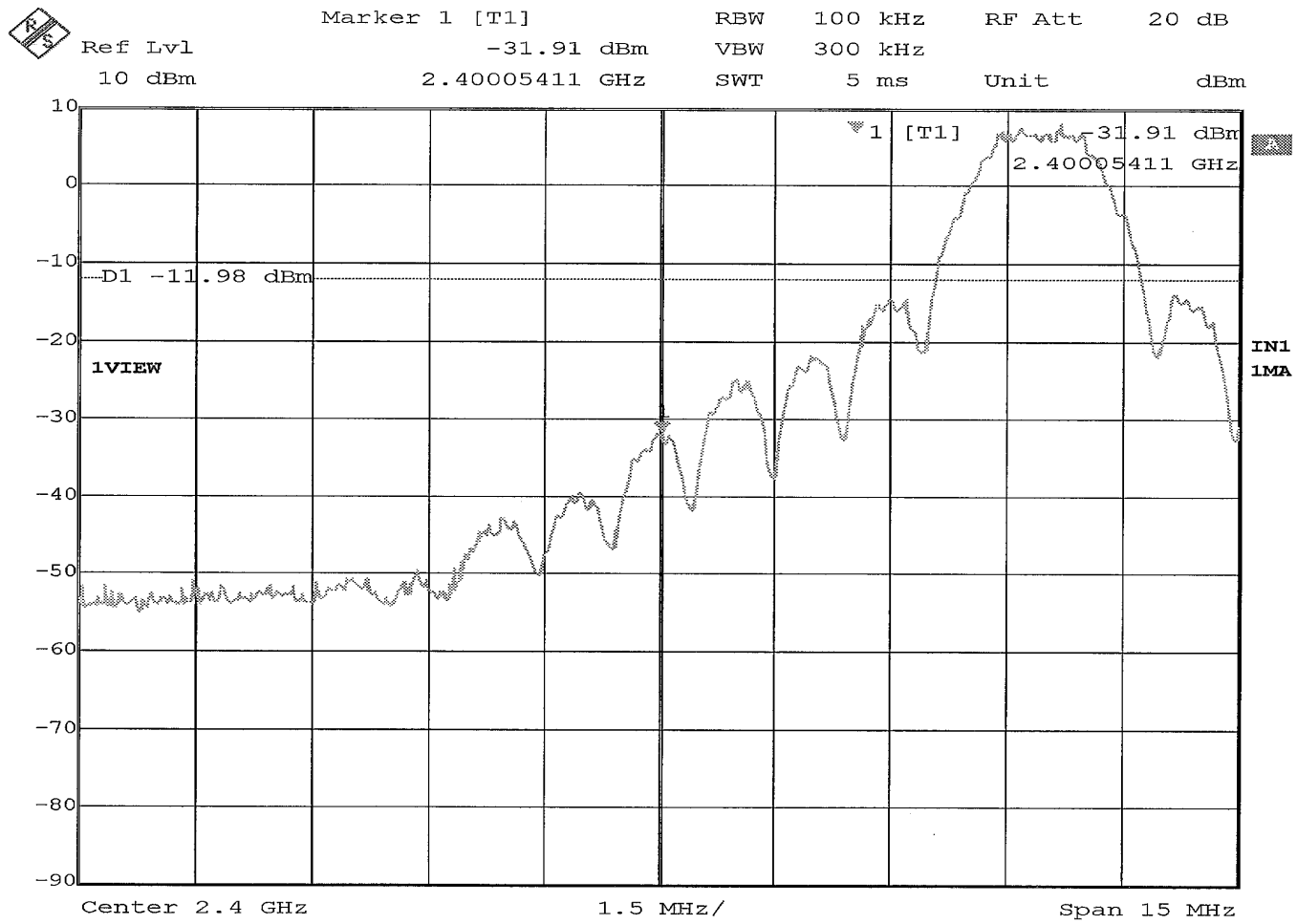
EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.0 °C / 20.9 %
Notes:	Limit: -11.98 dBm



1GHz to 25GHz

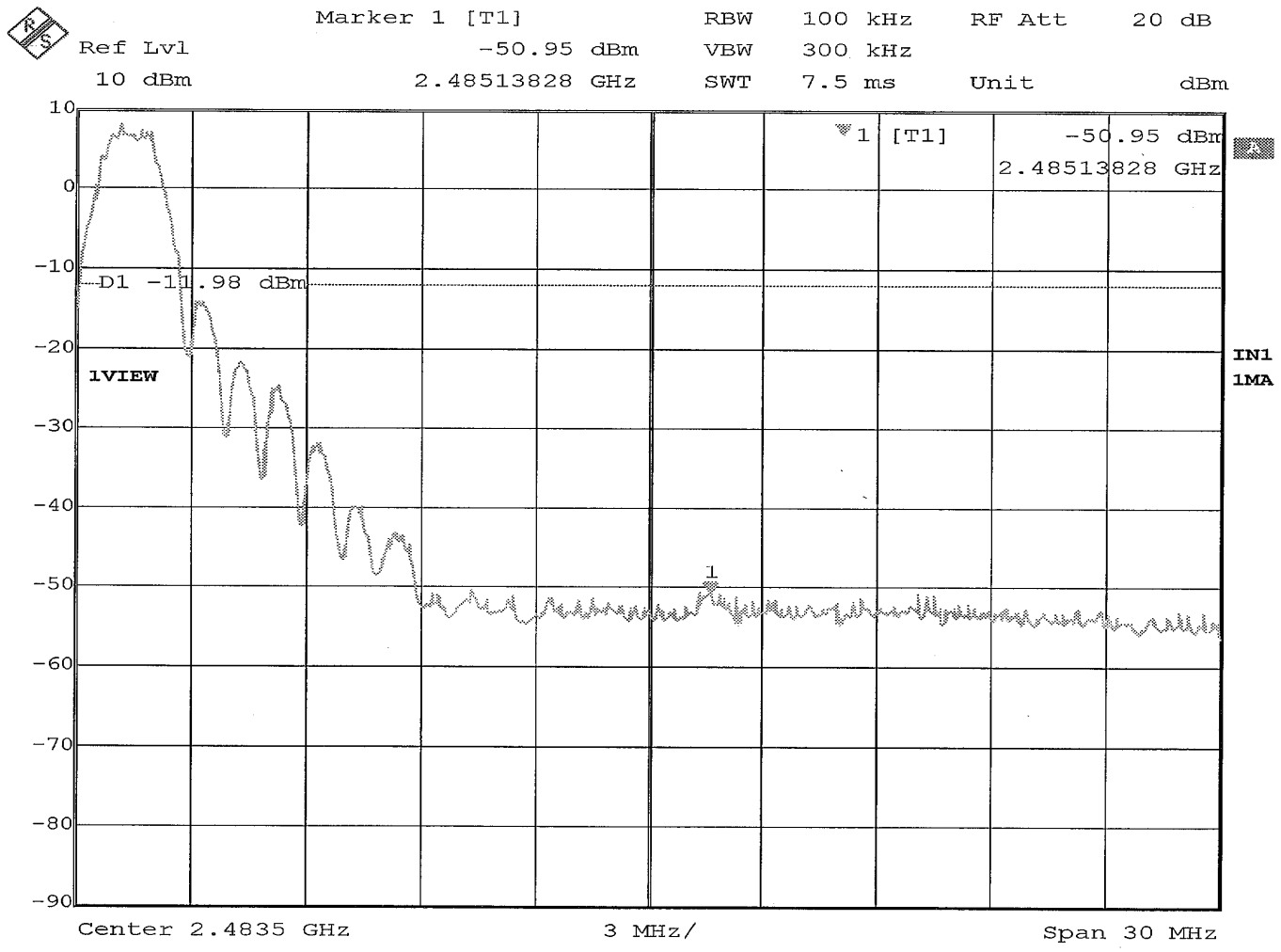
Band Edge Conducted
Test Data

EMISSIONS TEST DATA SHEET	
Method:	**Band Edge**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.0 °C / 20.9 %
Notes:	Limit: -11.98 dBm



Band Edge Low

EMISSIONS TEST DATA SHEET	
Method:	**Band Edge**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.470 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.0 °C / 20.9 %
Notes:	Limit: -11.98 dBm



Band Edge High

Test Photographs
Spurious Radiated Emissions

Horizontal Antenna Polarization, 30 MHz to 200 MHz, Biconical Antenna

Vertical Antenna Polarization, 30 MHz to 200 MHz, Biconical Antenna

Test Photographs
Spurious Radiated Emissions

Horizontal Antenna Polarization, 200 MHz to 1 GHz, Log Periodic

Vertical Antenna Polarization, 200 MHz to 1 GHz, Log Periodic

Test Photographs
Spurious Radiated Emissions

1 to 18 GHz, Horizontal Antenna Polarization

1 to 18 GHz, Vertical Antenna Polarization

Test Photographs
Spurious Radiated Emissions

18 to 25 GHz, Horizontal Antenna Polarization

18 to 25 GHz, Vertical Antenna Polarization

FCC Section 15.247 (d)
Out of Band/Band Edge Radiated Emissions
Test Data

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Lord Corporation	
Job Number	R-6297N-1	
Test Sample	Wireless Strain Sensor	
Model Number	ILOX	
Serial Number	3036-0116-72444	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated signal at 2405 MHz, 2440 MHz and 2470 MHz consecutively.	
Technician	M. Seamans	
Date	March 23rd, 2018	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz

TEST PARAMETERS

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	14.40	14.20	28.60	*		26.92	I
38.25	-	-	-	-			-	100.00
73.00	-	-	-	-			-	100.00
|	74.00	18.84	8.36	27.20	*		22.91	I
74.60	-	-	-	-			-	100.00
74.80	-	-	-	-			-	100.00
|	75.00	13.64	8.36	22.00	*		12.59	|
75.20	-	-	-	-			-	100.00
108.00	-	-	-	-			-	150.00
|	115.00	7.28	10.02	17.30	*		7.33	|
|	-	-	-	-			-	|
121.94	-	-	-	-			-	150.00
123.00	-	-	-	-			-	150.00
|	130.00	4.46	9.44	13.90	*		4.95	|
|	-	-	-	-			-	|
138.00	-	-	-	-			-	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).

Data Sheet 1 of 7

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Lord Corporation	
Job Number	R-6297N-1	
Test Sample	Wireless Strain Sensor	
Model Number	ILOX	
Serial Number	3036-0116-72444	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated signal at 2405 MHz, 2440 MHz and 2470 MHz consecutively.	
Technician	M. Seamans	
Date	March 23rd, 2018	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz

TEST PARAMETERS

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
149.90	-	-	-	-			-	150.00
|	150.00	3.53	11.17	14.70	*		5.43	|
150.05	-	-	-	-			-	150.00
156.52	-	-	-	-			-	150.00
|	156.52	3.62	12.08	15.70	*		6.10	|
156.52	-	-	-	-			-	150.00
156.70	-	-	-	-			-	150.00
|	156.80	3.58	12.12	15.70	*		6.10	|
156.90	-	-	-	-			-	150.00
162.01	-	-	-	-			-	150.00
|	165.00	4.82	12.68	17.50	*		7.50	|
167.17	-	-	-	-			-	150.00
167.72	-	-	-	-			-	150.00
|	170.00	4.60	12.80	17.40	*		7.41	|
173.20	-	-	-	-			-	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).

Data Sheet 2 of 7

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Lord Corporation	
Job Number	R-6297N-1	
Test Sample	Wireless Strain Sensor	
Model Number	ILOX	
Serial Number	3036-0116-72444	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated signal at 2405 MHz, 2440 MHz and 2470 MHz consecutively.	
Technician	M. Seamans	
Date	March 23rd, 2018	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz

TEST PARAMETERS

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
240.00	-	-	-	-			-	200.00
|	240.000	4.26	14.24	18.50	*		8.41	|
285.00	-	-	-				-	200.00
322.80	-	-	-				-	200.00
|	330.00	3.99	18.91	22.9	*		13.96	|
335.40	-	-	-				-	200.00
399.90	-	-	-				-	200.00
|	405.00	-2.99	21.49	18.50	*		8.41	|
410.00	-	-	-				-	200.00
608.00	-	-	-				-	200.00
|	611.00	-3.74	27.34	23.60	*		15.14	|
614.00	-	-	-				-	200.00
960.00	-	-	-				-	500.00
|	975.00	-0.70	32.10	31.40	*		37.15	|
1240.00	-	-	-				-	500.00
1300.00	-	-	-	-			-	500.00
|	1350.00	30.88	-9.40	21.48	*		11.86	|
1427.00	-	-	-	-			-	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).

Data Sheet 3 of 7

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Lord Corporation	
Job Number	R-6297N-1	
Test Sample	Wireless Strain Sensor	
Model Number	ILOX	
Serial Number	3036-0116-72444	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated signal at 2405 MHz, 2440 MHz and 2470 MHz consecutively.	
Technician	M. Seamans	
Date	March 23rd, 2018	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz

TEST PARAMETERS

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
1435.00	-	-	-	-			-	500.00
|	1500.00	31.47	-8.64	22.83	*		13.85	|
1646.50	-	-	-	-			-	500.00
1660.00	-	-	-	-			-	500.00
|	1680.00	30.98	-7.65	23.33	*		14.67	|
1710.00	-	-	-	-			-	500.00
1718.80	-	-	-	-			-	500.00
|	1720.00	31.18	-5.78	25.40	*		18.62	|
1722.20	-	-	-	-			-	500.00
2200.00	-	-	-	-			-	500.00
|	2250.00	30.61	-5.46	25.15	*		18.09	|
2300.00	-	-	-	-			-	500.00
2310.00	-	-	-	-			-	500.00
|	2360.00	30.52	-5.46	25.06	*		17.91	|
2390.00	-	-	-	-			-	500.00
2483.50	-	-	-	-			-	500.00
|	2483.50	30.64	-5.11	25.53	*		18.90	|
2500.00	-	-	-	-			-	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).

Data Sheet 4 of 7

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Lord Corporation	
Job Number	R-6297N-1	
Test Sample	Wireless Strain Sensor	
Model Number	ILOX	
Serial Number	3036-0116-72444	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated signal at 2405 MHz, 2440 MHz and 2470 MHz consecutively.	
Technician	M. Seamans	
Date	March 23rd, 2018	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz

TEST PARAMETERS

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
2690.00	-	-	-	-			-	500.00
|	-	-	-	-			-	|
|	2750.00	30.27	-4.45	25.82	*		19.54	|
|	-	-	-	-			-	|
2900.00	-	-	-	-			-	500.00
3260.00	-	-	-	-			-	500.00
|	3263.00	30.03	-2.88	27.15	*		22.78	|
3267.00	-	-	-	-			-	500.00
3332.00	-	-	-	-			-	500.00
|	3336.00	30.10	-2.62	27.48	*		23.66	|
3339.00	-	-	-	-			-	500.00
3345.00	-	-	-	-			-	500.00
|	3350.00	30.49	-2.57	27.92	*		24.89	|
3358.00	-	-	-	-			-	500.00
3600.00	-	-	-	-			-	500.00
|	-	-	-	-			-	|
|	3700.00	30.22	-1.40	28.82	*		27.61	|
|	-	-	-	-			-	|

EUT emissions observed throughout the given frequency spectrum were recorded and evaluated. Emission levels closest to the limit are listed on this data sheet. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).

Data Sheet 5 of 7

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Lord Corporation	
Job Number	R-6297N-1	
Test Sample	Wireless Strain Sensor	
Model Number	ILOX	
Serial Number	3036-0116-72444	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated signal at 2405 MHz, 2440 MHz and 2470 MHz consecutively.	
Technician	M. Seamans	
Date	March 23rd, 2018	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz

TEST PARAMETERS

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
|	-	-	-	-			-	|
4400.00	-	-	-	-			-	500.00
4500.00	-	-	-	-			-	500.00
|	4800.00	28.71	0.29	29.00	*		28.18	|
|	-	-	-	-			-	|
5150.00	-	-	-	-			-	500.00
5350.00	-	-	-	-			-	500.00
|	5400.00	29.01	0.92	29.93	*		31.37	|
5460.00	-	-	-	-			-	500.00
7250.00	-	-	-	-			-	500.00
|	7440.00	30.60	3.65	34.65	*		54.01	|
7750.00	-	-	-	-			-	500.00
8025.00	-	-	-	-			-	500.00
|	8300.00	29.60	4.43	34.03	*		50.29	|
8500.00	-	-	-	-			-	500.00
9000.00	-	-	-	-			-	500.00
|	9100.00	29.87	5.10	34.97	*		56.04	|
9200.00	-	-	-	-			-	500.00

EUT emissions observed throughout the given frequency spectrum were recorded and evaluated. Emission levels closest to the limit are listed on this data sheet. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).

Data Sheet 6 of 7

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Lord Corporation	
Job Number	R-6297N-1	
Test Sample	Wireless Strain Sensor	
Model Number	ILOX	
Serial Number	3036-0116-72444	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated signal at 2405 MHz, 2440 MHz and 2470 MHz consecutively.	
Technician	M. Seamans	
Date	March 23rd, 2018	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz

TEST PARAMETERS

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
9300.00	-	-	-	-			-	500.00
|	9400.00	30.01	5.38	35.39	*		58.82	|
9500.00	-	-	-	-			-	500.00
10600.00	-	-	-	-			-	500.00
|	12200.00	31.17	8.37	39.54	*		94.84	|
12700.00	-	-	-	-			-	500.00
13250.00	-	-	-	-			-	500.00
|	15800.00	31.74	8.84	40.58	*		106.91	|
16200.00	-	-	-	-			-	500.00
17700.00	-	-	-	-			-	500.00
|	19240.00	27.25	-6.52	20.73	*		10.94	|
21400.00	-		-	-			-	500.00
22010.00	-	-	-	-			-	500.00
|	22320.00	31.45	-5.30	26.15	*		20.30	|
23120.00	-	-	-	-			-	500.00
23600.00	-	-	-	-			-	500.00
|	23800.00	34.18	-4.17	30.01	*		31.66	|
24000.00	-	-	-	-			-	500.00

EUT emissions observed throughout the given frequency spectrum were recorded and evaluated. Emission levels closest to the limit are listed on this data sheet. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).

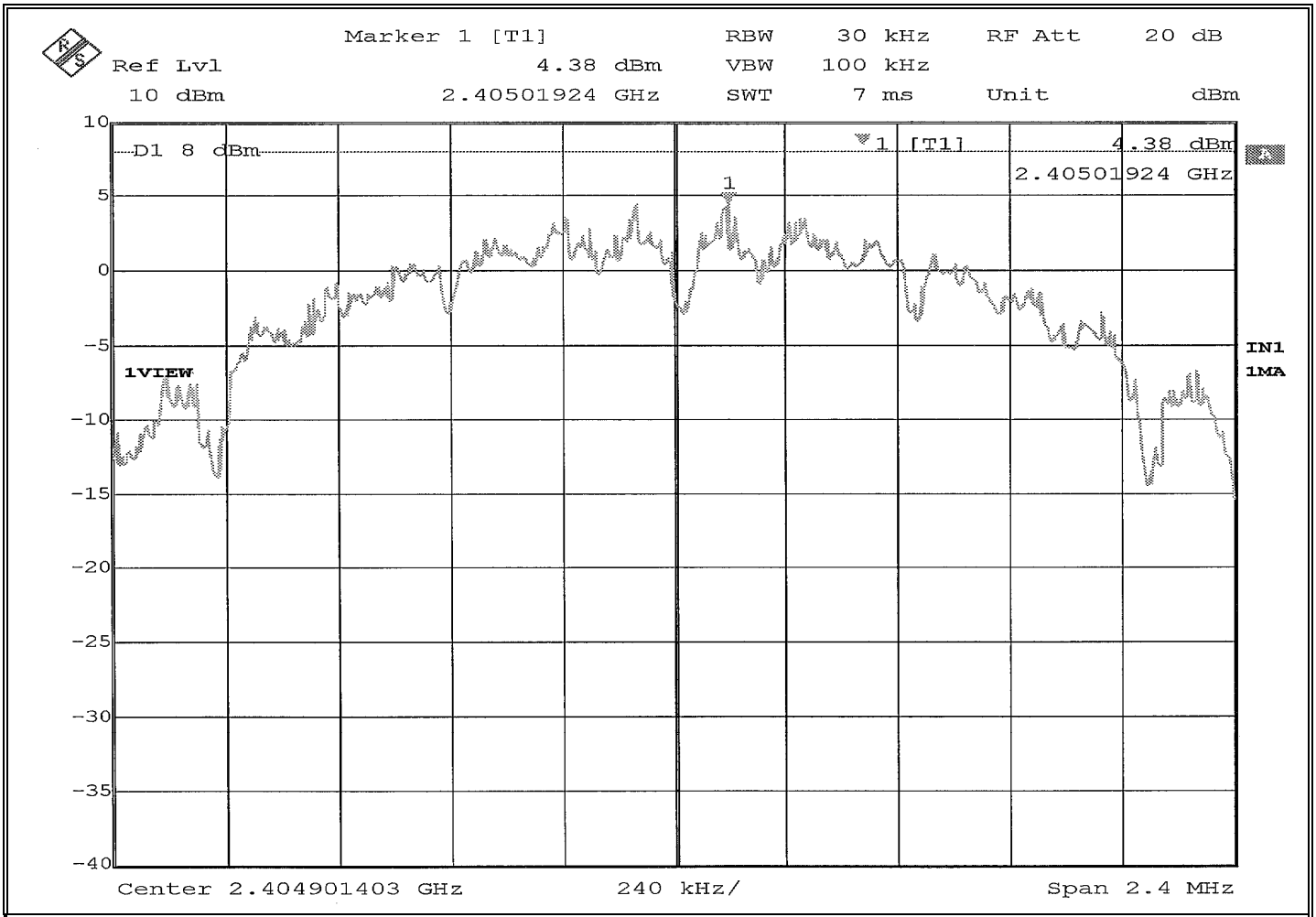
Data Sheet 7 of 7

Test Photographs
Power Density

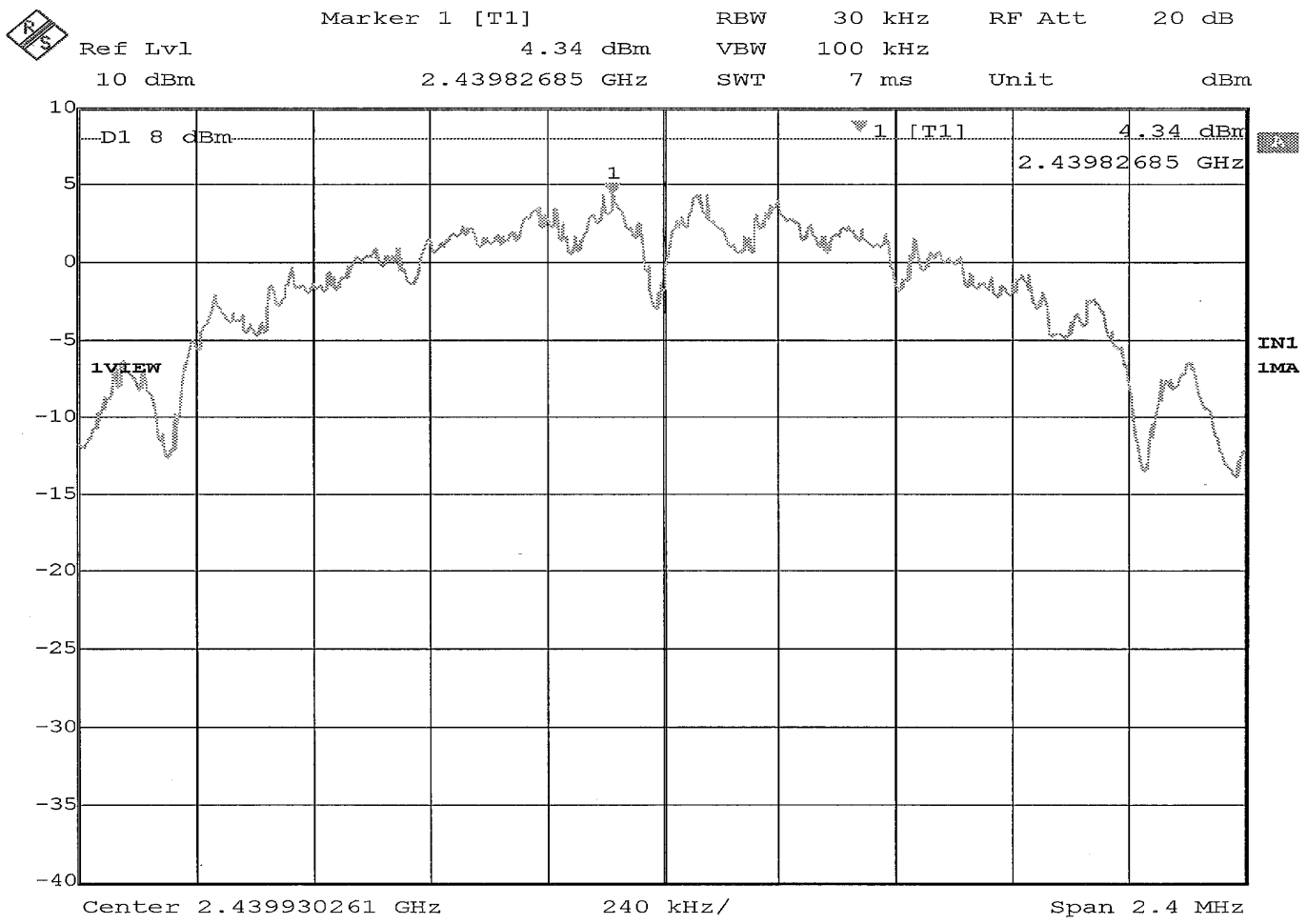
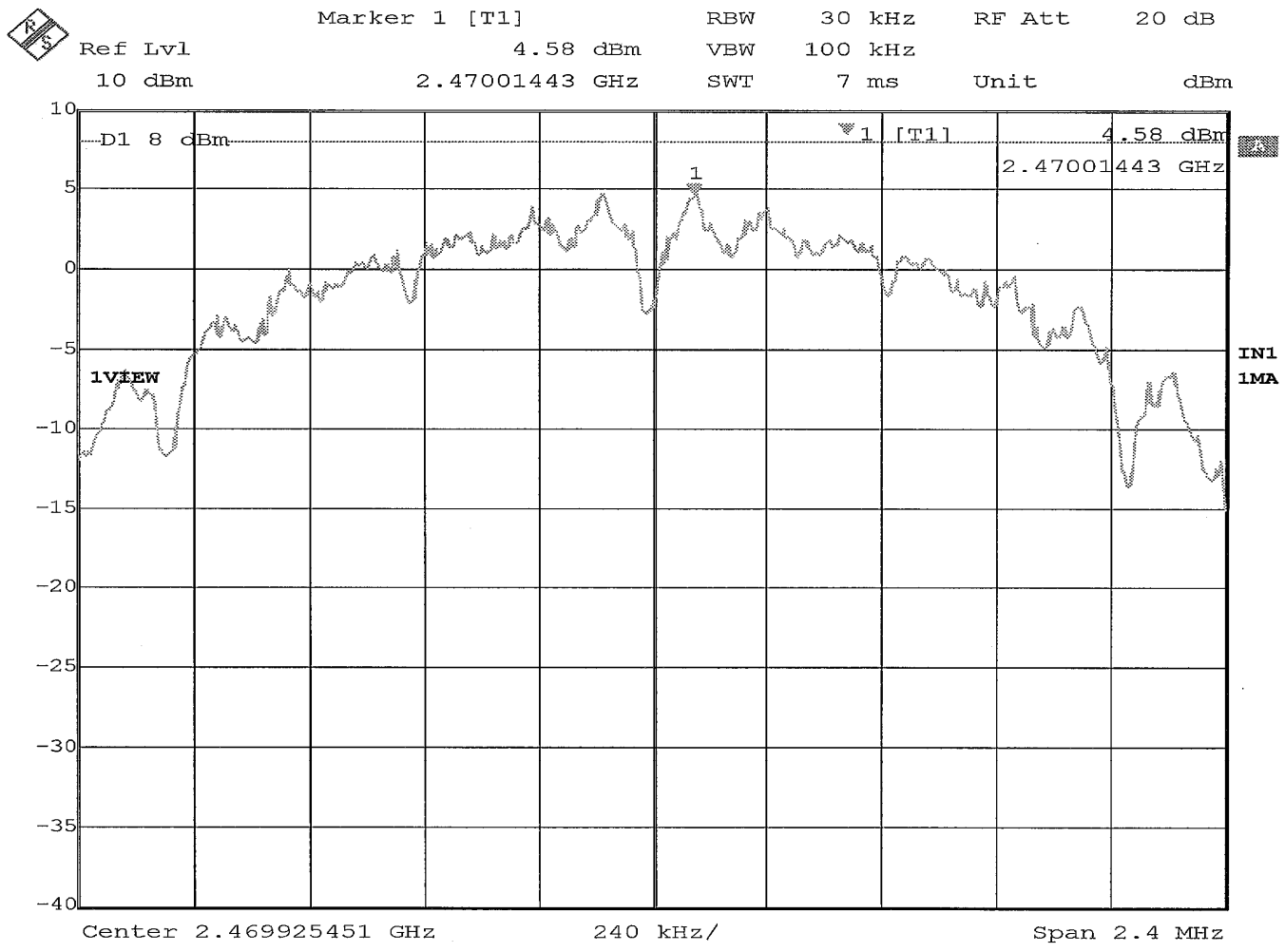
Test Configuration

FCC Section 15.247(e)
Power Density
Test Data

EMISSIONS TEST DATA SHEET	
Method:	**Power Spectral Density**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (e)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.405 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.5 °C / 20.9 %
Notes:	KDB Method: 10.2 Power Spectral Density: 4.38 dBm



EMISSIONS TEST DATA SHEET	
Method:	**Power Spectral Density**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (e)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.440 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.5 °C / 20.9 %
Notes:	KDB Method: 10.2 Power Spectral Density: 4.34 dBm



EMISSIONS TEST DATA SHEET	
Method:	**Power Spectral Density**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (e)
Job Number:	R-6297N-1
Customer:	Lord Corporation
Test Sample:	Wireless Strain Sensor
Model Number:	ILOX
Serial Number:	3036-0116-00020
Operating Mode:	Transmitting modulated signal at 2.470 GHz
Technician:	M.Seamans
Date(s):	March 22nd, 2018
Temp/ Relative Humidity:	22.5 °C / 20.9 %
Notes:	KDB Method: 10.2 Power Spectral Density: 4.58 dBm