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FCC Part 15, Subpart C, Section 15.247

Test Report

On

reSeal / safeTstrap Bluetooth Low Energy Radio Device
FCC ID: 2ALIWVP820

Customer Name:	Vypin LLC
Customer P.O:	1008
Date of Report:	June 14, 2018
Test Report No:	R-6285N-1
Test Start Date:	December 11, 2017
Test Finish Date:	December 13, 2017
Test Technician:	M. Seamans
Report Approved By:	T. Hannemann
Report Prepared By:	J. Ramsey

Technical Information

Report Number:	R-6285N-1
Customer:	Vypin, LLC
Address:	21 Continental Blvd.
	Merrimack, NH 03054
Manufacturer:	Vypin, LLC
Manufacturer Address:	4080 McGinnis Ferry Road
	Alpharetta, GA 30005
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP800
Serial Number:	0280e1506408
FCC ID:	2ALIWVP820
Type:	Digital Transmission – Direct Sequence Spread Spectrum Transmitter
Power Requirements:	3.0 VDC via one Internal Battery
Frequency of Operation:	2.402 – 2.480 GHz
Equipment Class:	DTS
Antenna Type:	Inverted F, Antenna Gain 3.3 dBi
Equipment Use:	Bluetooth Beacon

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 modulated signal at 2.405 GHz (Low), 2.426 GHz (Mid) and 2.480 GHz (High).

EUT Description:
The reSeal / safeTstrap Bluetooth Low Energy Radio Device is a reusable electronic seal solution that provides real-time visibility. It can provide notification when seal is compromised, location-based management and a date/time stamp for audit support.

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.

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
-	June 14, 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 677.354 kHz. 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 6.08 mW. The maximum antenna gain of the antenna is 3.3 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 Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. When conducted measurements are performed in the restricted frequency bands the conducted output power (in dBm) plus the maximum transmit antenna gain (in dBi) must be converted to equivalent electric field strength to be compared to the limits. 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 2 - 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).

Conducted Restricted Bands Field Strength Conversion:

The Conducted Restricted Band Emissions were converted to field strength of the emission as follows:

EIRP = CO + AG

Where:
CO = Conducted Output Power in dBm
AG = Maximum Transmit Antenna Gain in dBi

E = EIRP – 20log D + 104.8

Where:
E = electric field strength in dBµV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.

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

invLog dBµV/M/20

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.

Requirements and Test Results (con't)

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 = 4.06mW

Gain = Max Power Gain of Antenna = 3.3 dBi = 2.14 numeric

$$1 \text{ mW/cmsq} = \frac{4.06 \times 2.14}{4 \times (3.14) \times D^2} = \frac{8.69}{12.56 \times D^2}$$

$$D^2 = \frac{8.69}{12.56 \times 1}$$

$$D = \sqrt{0.69} = 0.83 \text{ cm}$$

Equipment List

FCC Section 15.247(a)(2)
Occupied Bandwidth

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5030B	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	3/7/2017	3/31/2018
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/17/2017	10/31/2018

FCC Section 15.247 (d)
Antenna Terminal Out of Band / Band Edge Conducted Emissions / Restricted Band / Duty Cycle

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5030B	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	3/7/2017	3/31/2018
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
5030B	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	3/7/2017	3/31/2018
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

Equipment List (continued)

FCC Section 15.247(e)
Power Density

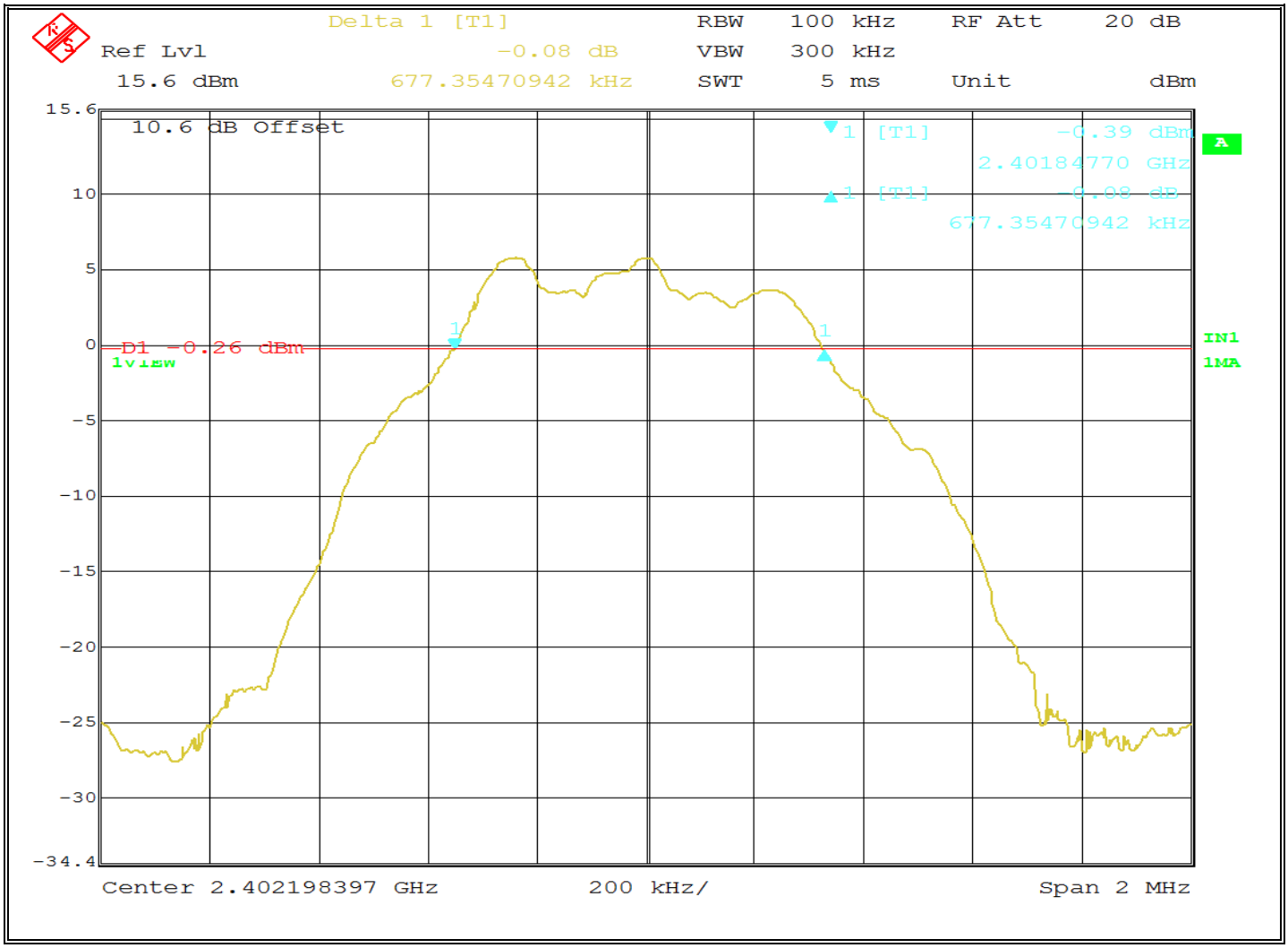
EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5030B	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	3/7/2017	3/31/2018
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/17/2017	10/31/2018

Test Photographs
Occupied Bandwidth

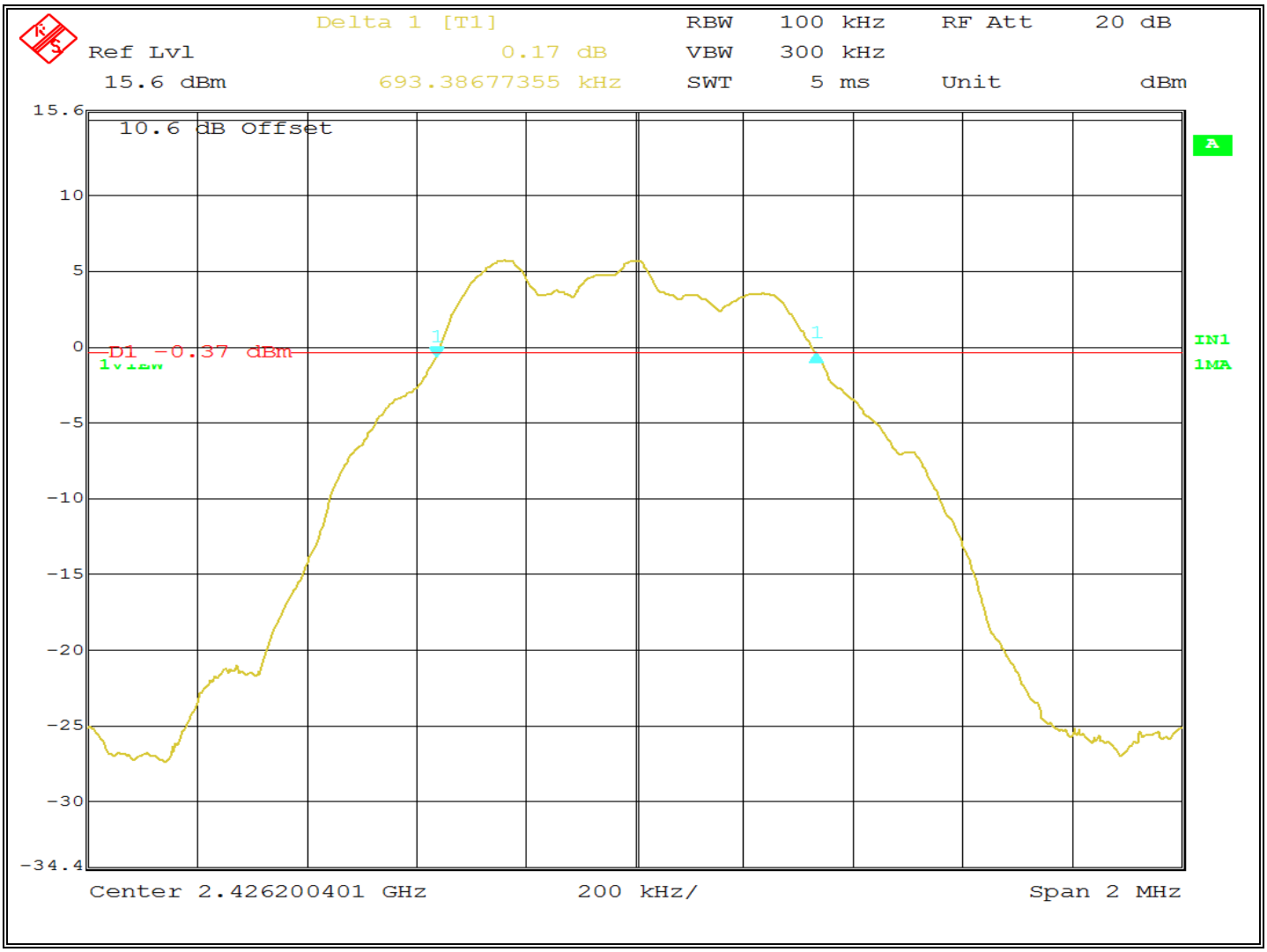
Test Setup

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

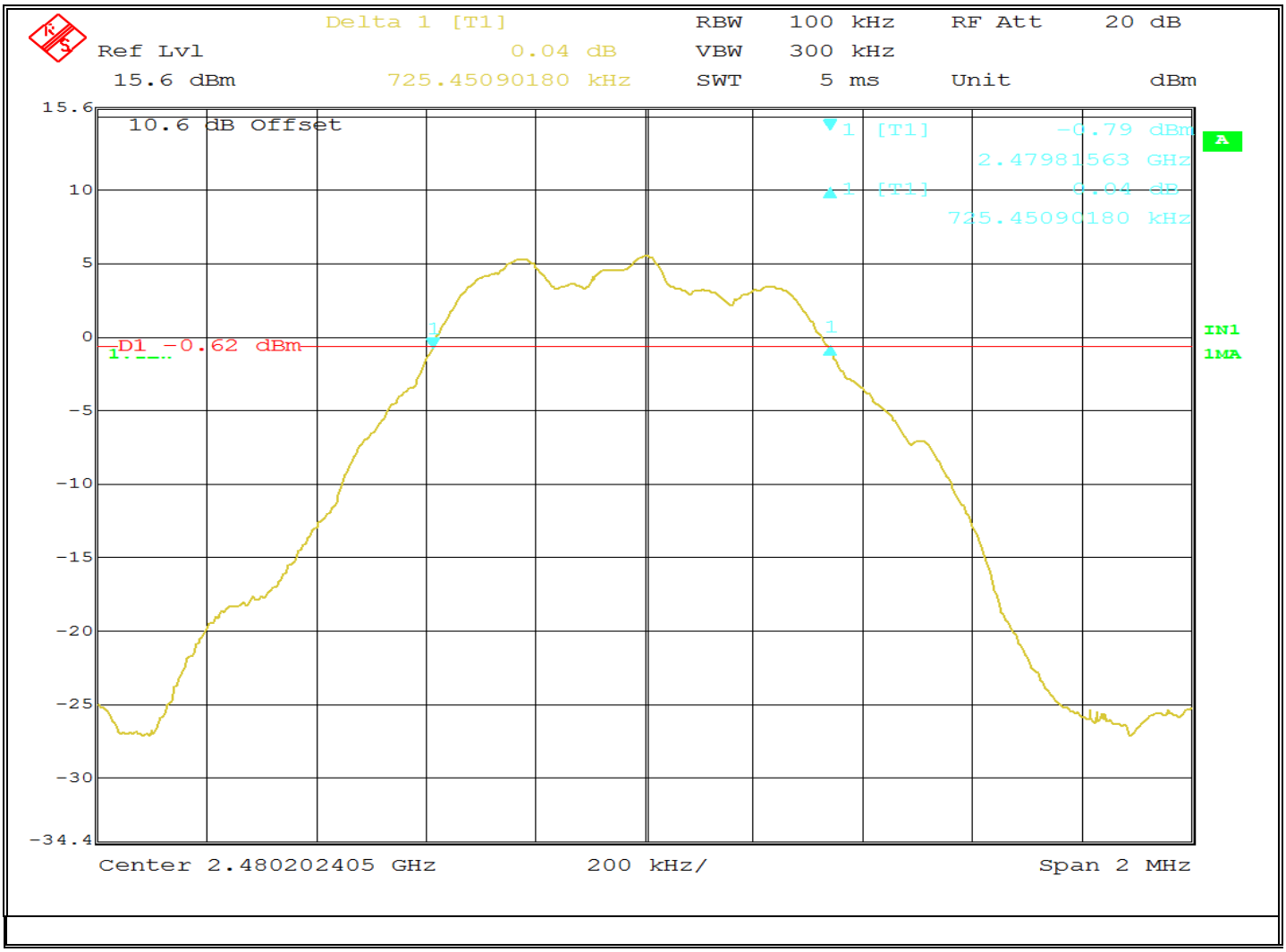
EMISSIONS TEST DATA SHEET	
Method:	**Occupied Bandwidth**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(2)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.402 GHz
Technician:	M.Seamans
Date(s):	December 11th, 2017
Temp/ Relative Humidity:	19.8 °C / 34.5 %
Result:	6dB Bandwidth: 677.354 kHz



EMISSIONS TEST DATA SHEET	
Method:	**Occupied Bandwidth**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(2)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.426 GHz
Technician:	M.Seamans
Date(s):	December 11th, 2017
Temp/ Relative Humidity:	19.8 °C / 34.5 %
Result:	6dB Bandwidth: 693.386 kHz



EMISSIONS TEST DATA SHEET	
Method:	**Occupied Bandwidth**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (a)(2)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	December 11th, 2017
Temp/ Relative Humidity:	19.8 °C / 34.5 %
Result:	6dB Bandwidth: 725.450 kHz

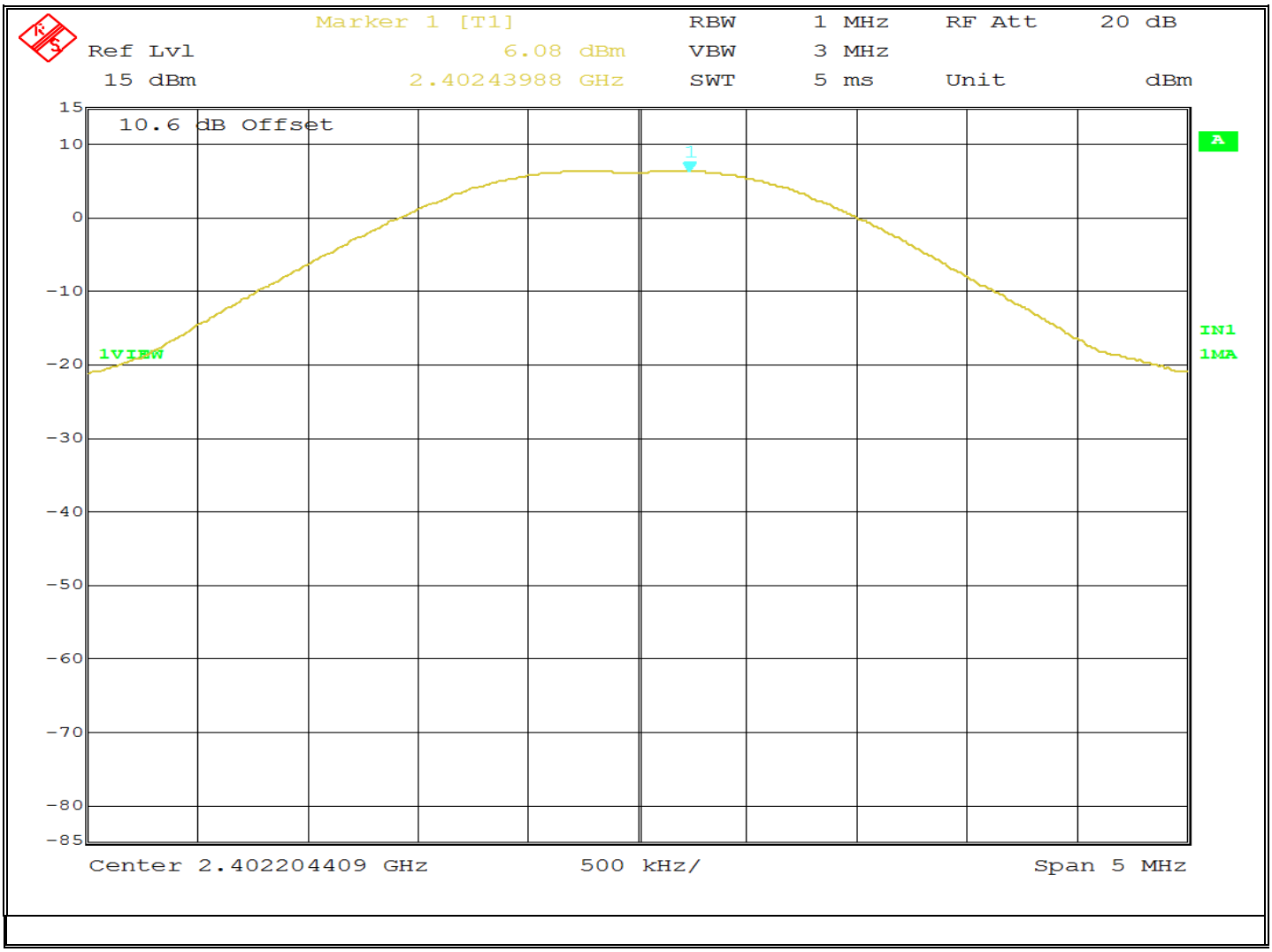


Test Photographs
Power Output

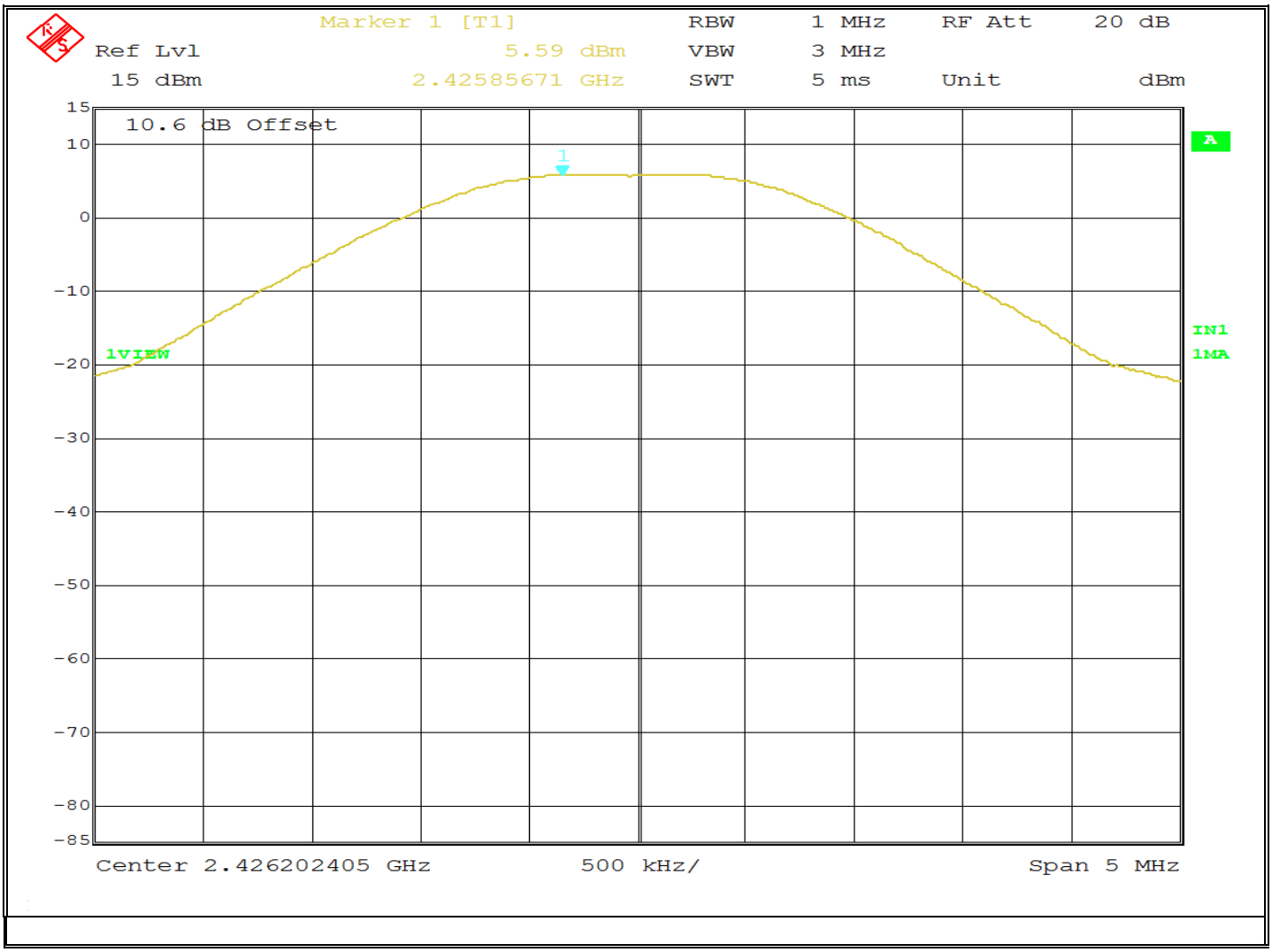
Test Setup

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

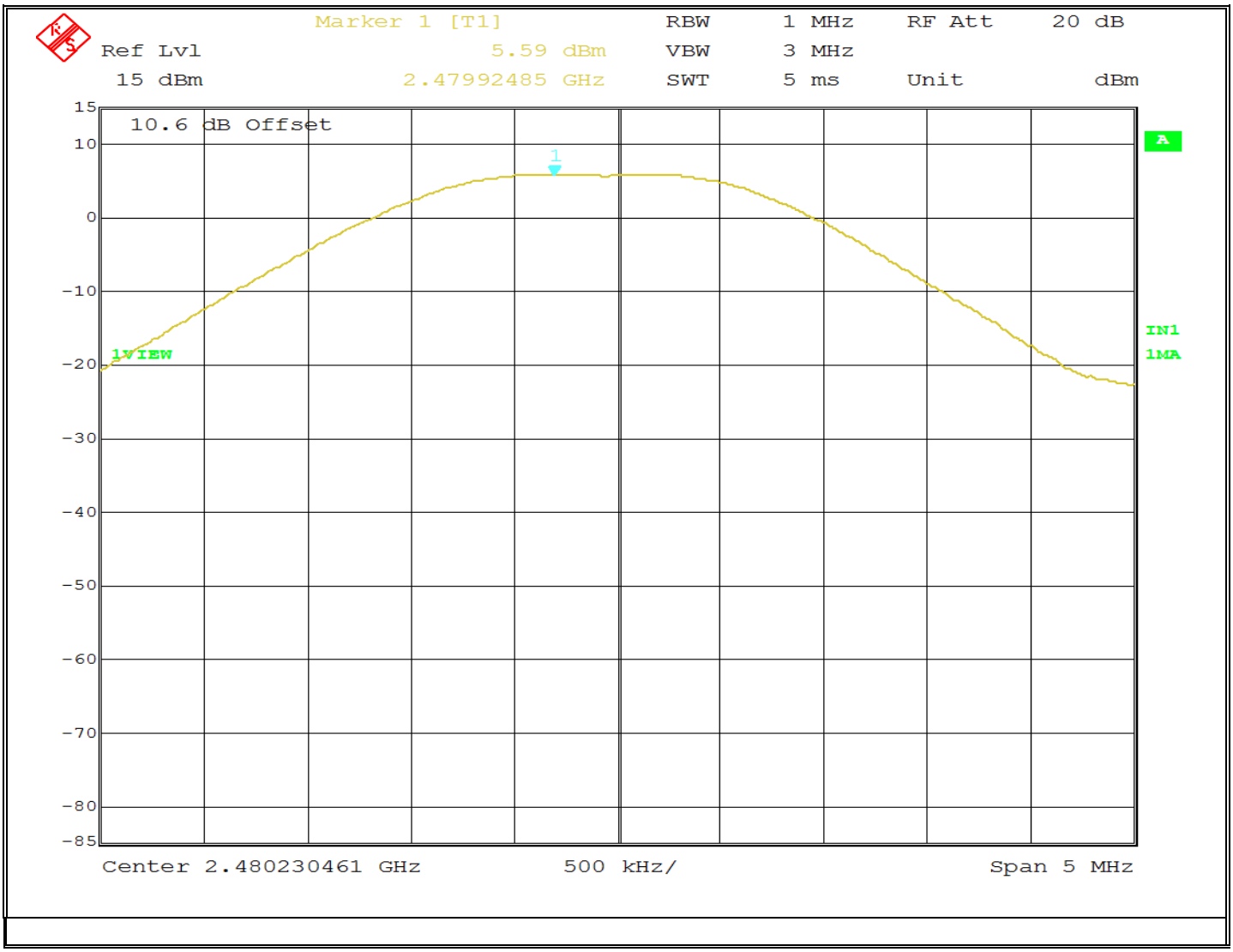
EMISSIONS TEST DATA SHEET	
Method:	**Power Output**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.402 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	18.3 °C / 31.1 %
Result:	Power Output: 6.08 dBm



EMISSIONS TEST DATA SHEET	
Method:	**Power Output**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.426 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	18.3 °C / 31.1 %
Result:	Power Output: 5.59 dBm



EMISSIONS TEST DATA SHEET	
Method:	**Power Output**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	18.3 °C / 31.1 %
Result:	Power Output: 5.59 dBm



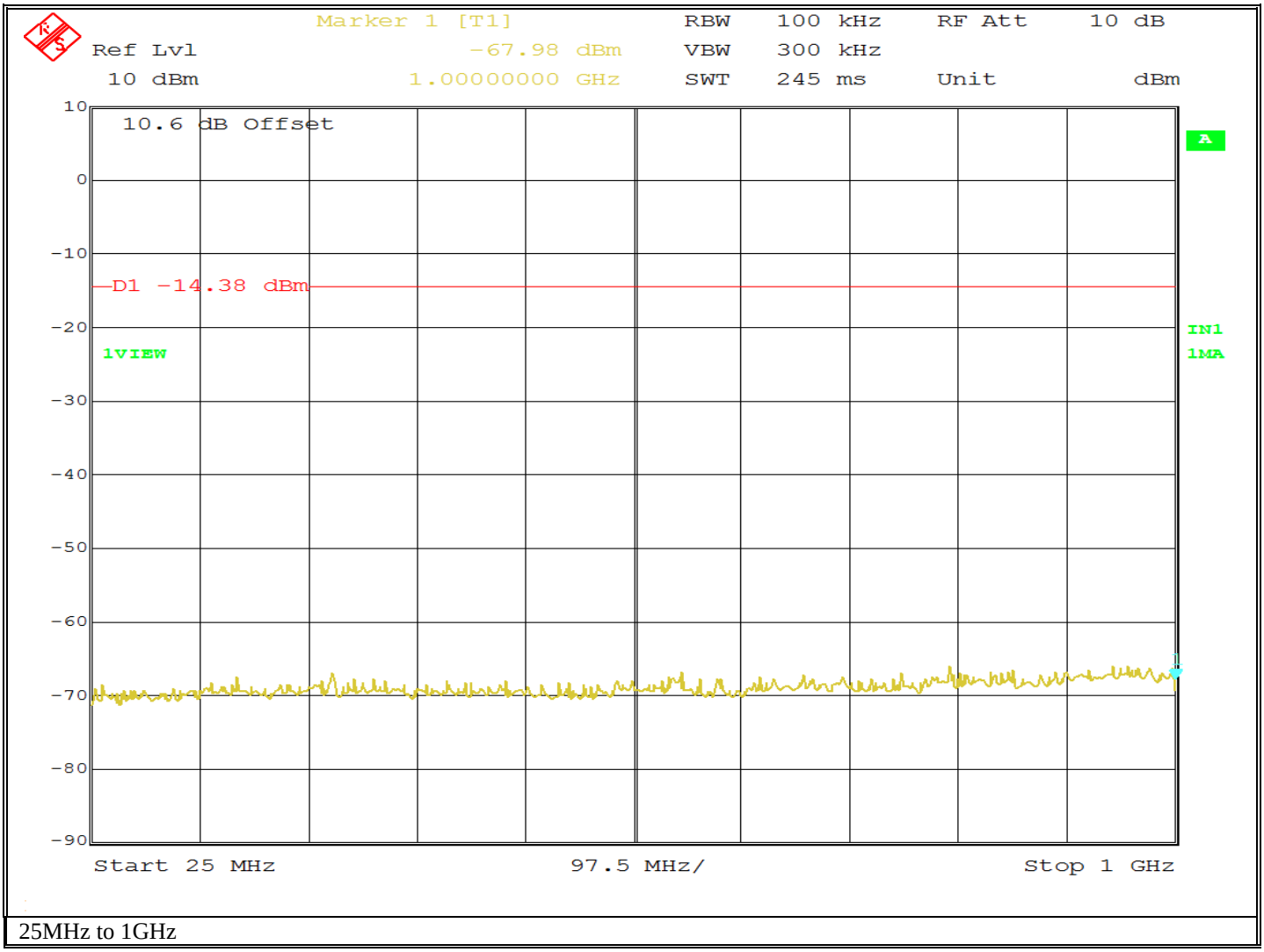
Test Photographs
Antenna Terminal Out of Band/Band Edge Conducted Emissions

Test Setup

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

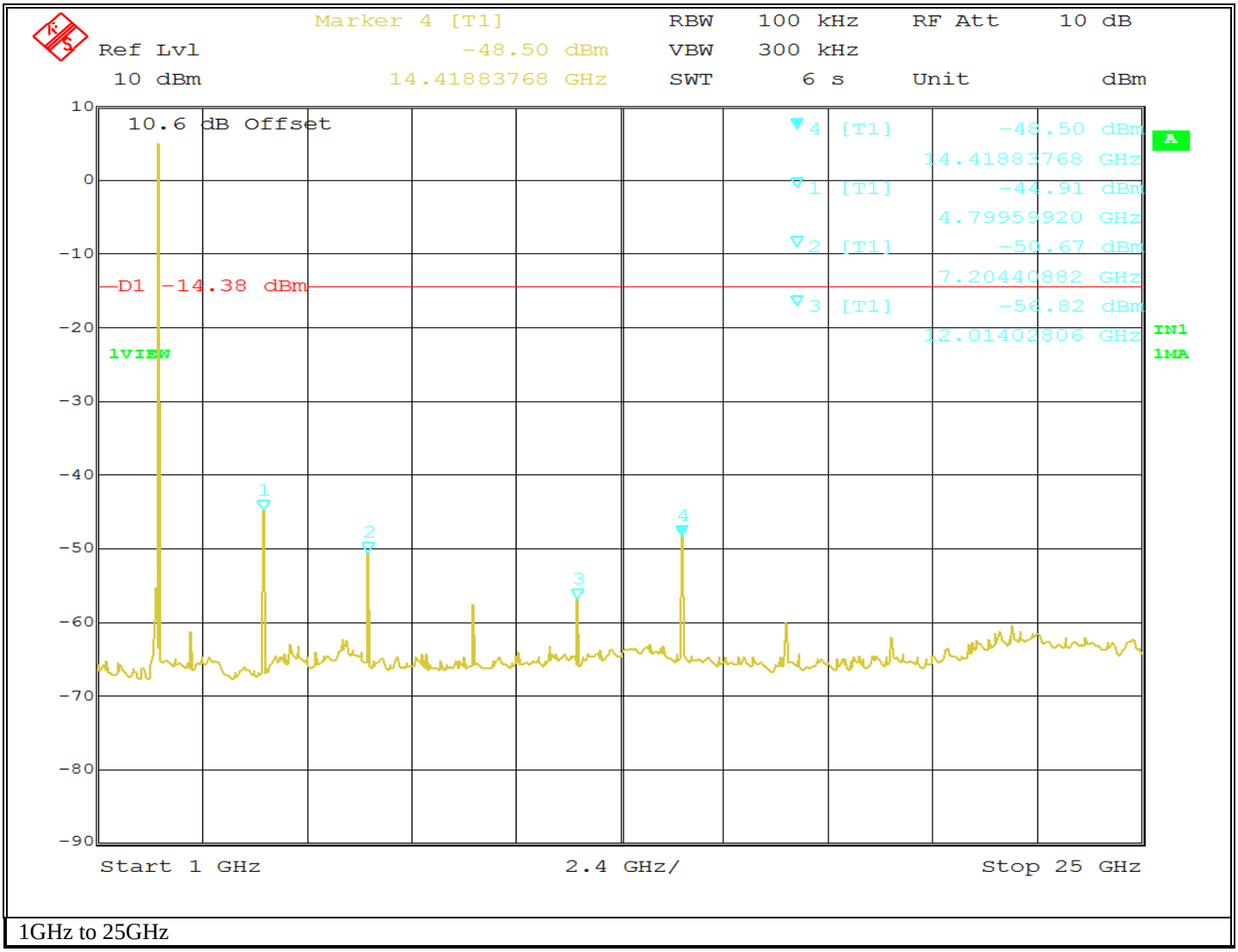
Out of Band Conducted Emissions
Test Data

EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.402 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	19.6 °C / 29.4 %
Notes:	Limit: -14.38 dBm



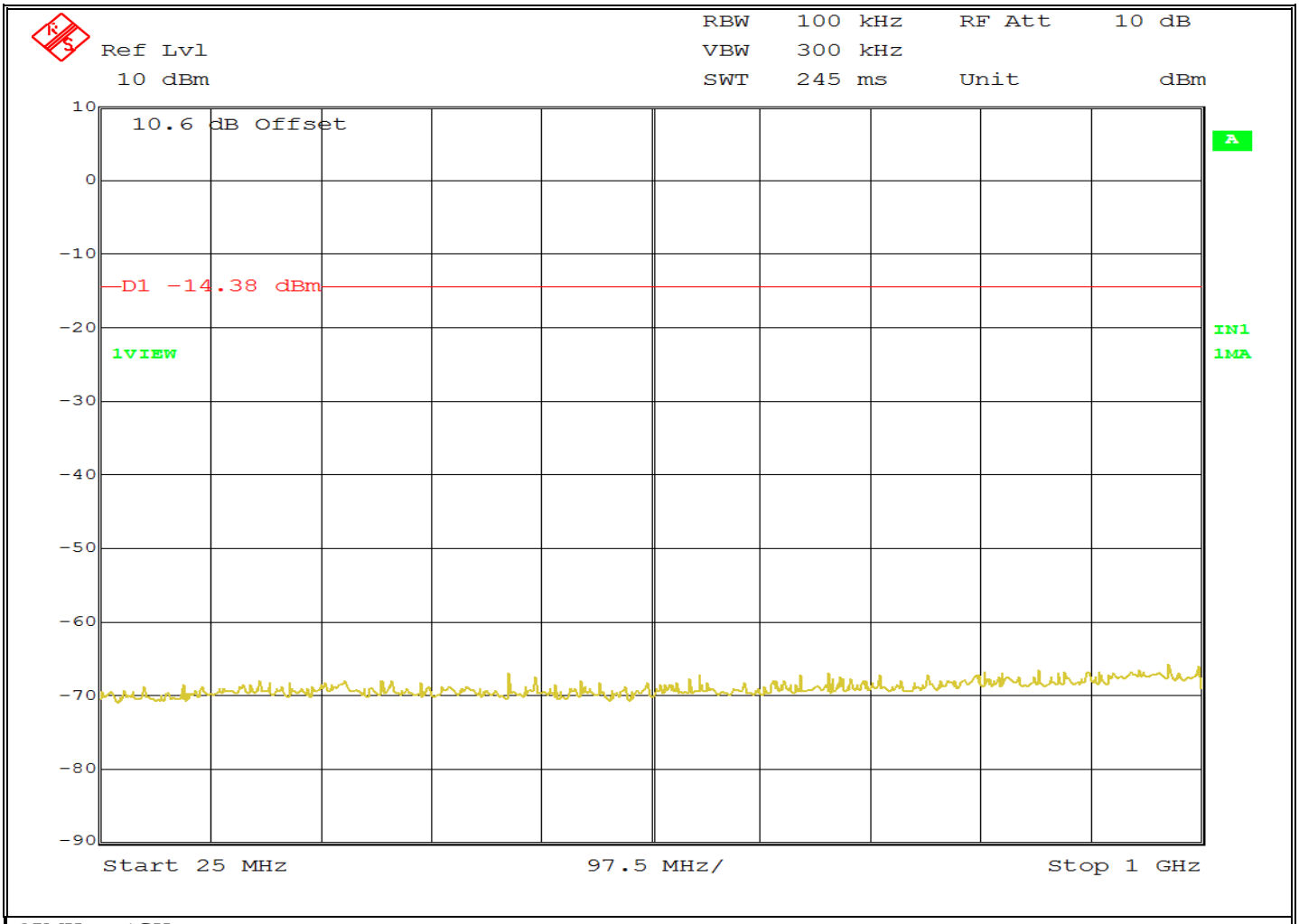
25MHz to 1GHz

EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.402 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	19.6 °C / 29.4 %
Notes:	Limit: -14.38 dBm



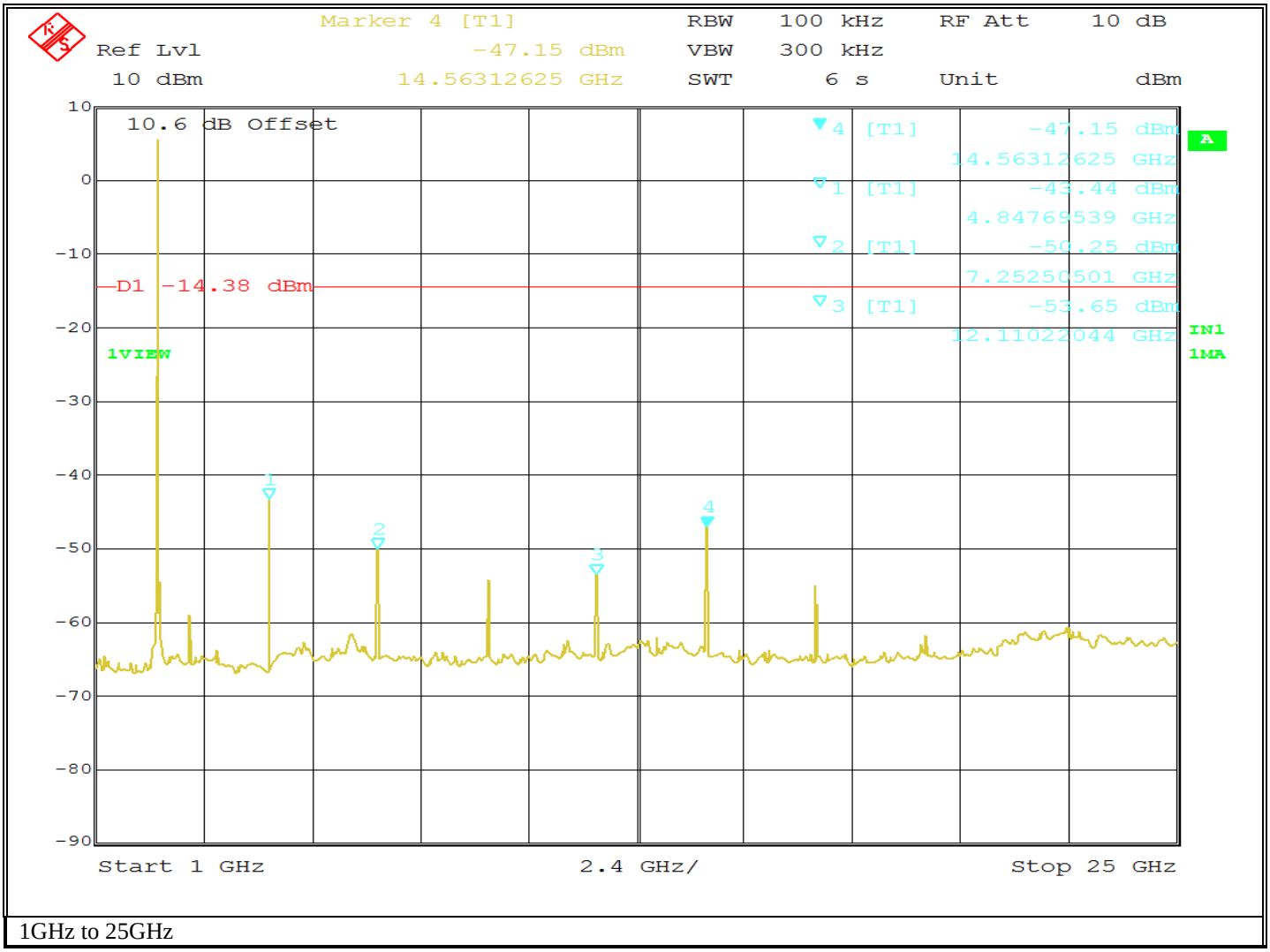
1GHz to 25GHz

EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.426 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	19.6 °C / 29.4 %
Notes:	Limit: -14.38 dBm



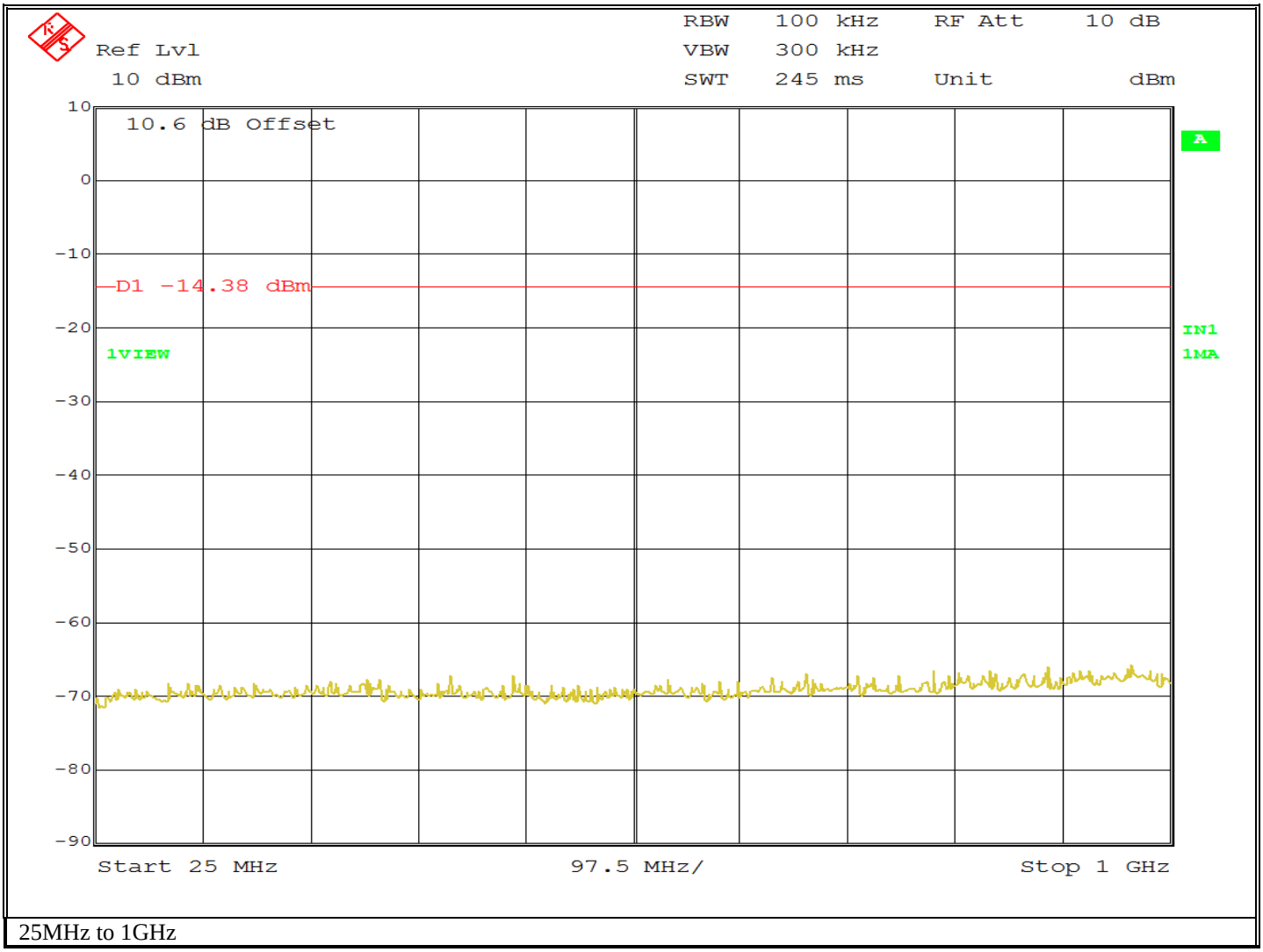
25MHz to 1GHz

EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.426 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	19.6 °C / 29.4 %
Notes:	Limit: -14.38 dBm



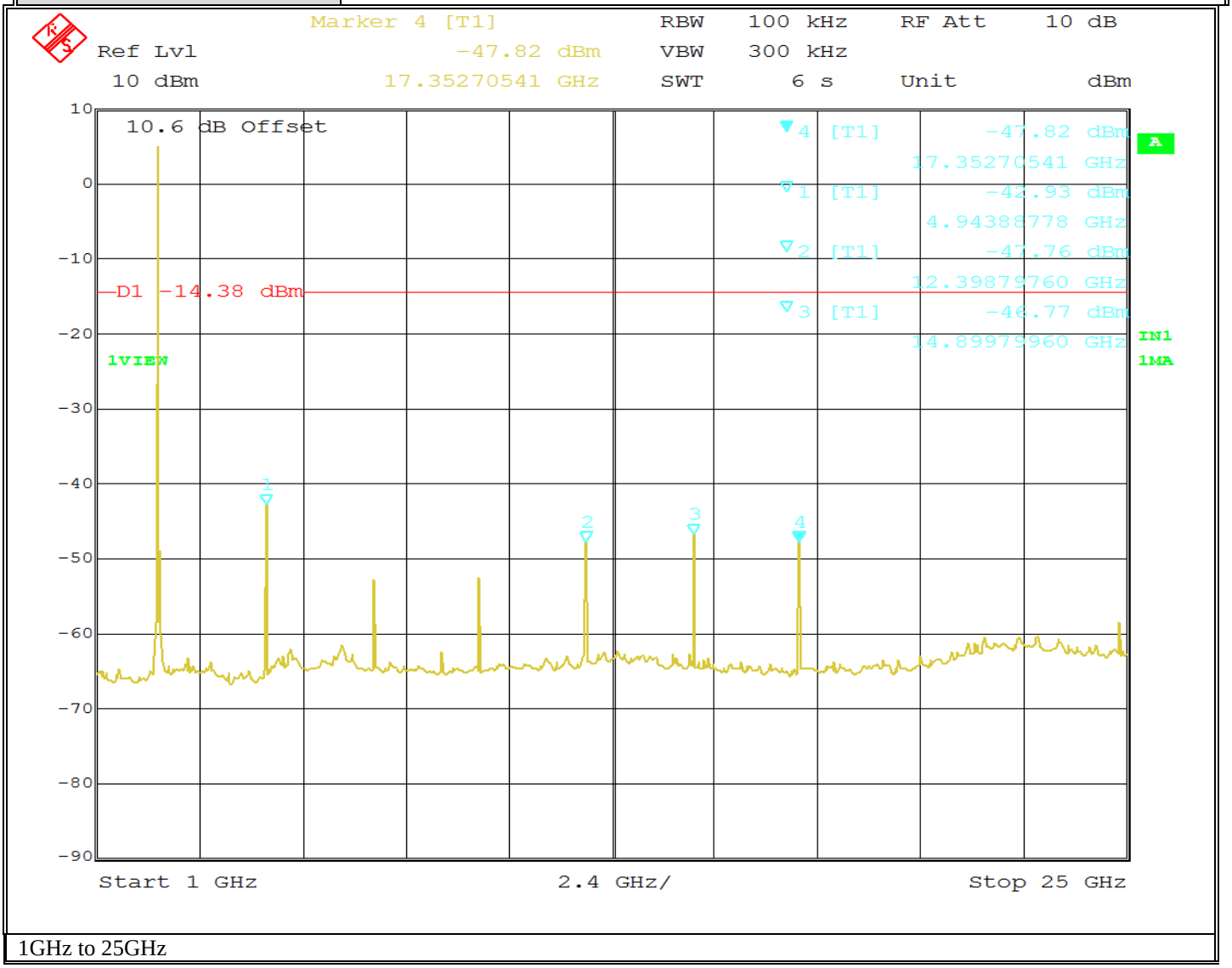
1GHz to 25GHz

EMISSIONS TEST DATA SHEET	
Method:	**Conducted Out of Band**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	19.6 °C / 29.4 %
Notes:	Limit: -14.38 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-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	19.6 °C / 29.4 %
Notes:	Limit: -14.38 dBm



1GHz to 25GHz

Unwanted Emissions into Restricted Frequency Bands
25 MHz to 25 GHz
Test Data

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET		
Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Vypin LLC	
Job Number	R-6285N-1	
Test Sample	reSeal / safeTstrap Bluetooth Low Energy Radio Device	
Model Number	VP800	
Serial Number	0280e1506408	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated signal at 2402 MHz, 2426 MHz and 2480 MHz consecutively.	
Technician	M. Seamans	
Date	December 12th, 2017	

Notes: Detector: Quasi-Peak <1GHz, Average >1GHz X=0.56112

TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Antenna Gain	Duty Cycle Factor 10log(1/x)	Duty Cycle Factor 20log(x)	Corrected Reading	Converted Field Strength	Converted Reading	Limit
MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
37.50	-	-	-	-	-	-	-	-	100.00
|	38.00*	-90.45	-	-	-	-90.45	4.807	1.739	I
38.25	-	-	-	-	-	-	-	-	100.00
73.00	-	-	-	-	-	-	-	-	100.00
|	74.00*	-89.31	-	-	-	-89.31	5.947	1.983	I
74.60	-	-	-	-	-	-	-	-	100.00
74.80	-	-	-	-	-	-	-	-	100.00
|	75.00*	-89.44	-	-	-	-89.44	5.817	1.953	|
75.20	-	-	-	-	-	-	-	-	100.00
108.00	-	-	-	-	-	-	-	-	100.00
|	115.00*	-89.04	-	-	-	-89.04	6.217	2.045	|
121.94	-	-	-	-	-	-	-	-	100.00
123.00	-	-	-	-	-	-	-	-	100.00
|	130.00*	-88.92	-	-	-	-88.92	6.337	2.074	|
138.00	-	-	-	-	-	-	-	-	100.00

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

EMISSIONS TEST DATA SHEET		
Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Vypin LLC	
Job Number	R-6285N-1	
Test Sample	reSeal / safeTstrap Bluetooth Low Energy Radio Device	
Model Number	VP800	
Serial Number	0280e1506408	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated signal at 2402 MHz, 2426 MHz and 2480 MHz consecutively.	
Technician	M. Seamans	
Date	December 12th, 2017	

Notes: Detector: Quasi-Peak <1GHz, Average >1GHz X=0.56112

TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Antenna Gain	Duty Cycle Factor 10log(1/x)	Duty Cycle Factor 20log(x)	Corrected Reading	Converted Field Strength	Converted Reading	Limit at 3M
MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
149.90	-	-	-	-	-	-	-	-	100.00
|	150.00*	-88.66	-	-	-	-88.66	6.597	2.137	I
150.05	-	-	-	-	-	-	-	-	100.00
156.52	-	-	-	-	-	-	-	-	100.00
|	156.52*	-88.54	-	-	-	-88.54	6.717	2.167	I
156.52	-	-	-	-	-	-	-	-	100.00
156.70	-	-	-	-	-	-	-	-	100.00
|	156.80*	-88.66	-	-	-	-88.66	6.597	2.137	|
156.90	-	-	-	-	-	-	-	-	100.00
162.01	-	-	-	-	-	-	-	-	150.00
|	165.00*	-88.66	-	-	-	-88.66	6.597	2.137	|
167.17	-	-	-	-	-	-	-	-	150.00
167.72	-	-	-	-	-	-	-	-	150.00
|	170.00*	-88.66	-	-	-	-88.66	6.597	2.137	|
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).

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TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Antenna Gain	Duty Cycle Factor 10log(1/x)	Duty Cycle Factor 20log(x)	Corrected Reading	Converted Field Strength	Converted Reading	Limit at 3M
MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
240.00	-	-	-	-	-	-	-	-	200.00
|	260.00*	-91.08	-	-	-	-91.08	4.177	1.617	|
285.00	-	-	-	-	-	-	-	-	200.00
322.80	-	-	-	-	-	-	-	-	200.00
|	330.00*	-91.76	-	-	-	-91.76	3.497	1.495	|
335.40	-	-	-	-	-	-	-	-	200.00
399.90	-	-	-	-	-	-	-	-	200.00
|	405.00*	-91.59	-	-	-	-91.59	3.667	1.525	|
410.00	-	-	-	-	-	-	-	-	200.00
608.00	-	-	-	-	-	-	-	-	200.00
|	611.00*	-89.44	-	-	-	-89.44	5.817	1.953	|
614.00	-	-	-	-	-	-	-	-	200.00
960.00	-	-	-	-	-	-	-	-	500.00
|	975.00*	-86.20	-	-	-	-86.20	9.057	2.837	|
1240.00	-	-	-	-	-	-	-	-	500.00
1300.00	-	-	-	-	-	-	-	-	500.00
|	1350.00*	-72.22	-	-	-	-72.22			|
1427.00	-	-	-	-	-	-	-	-	500.00

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MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
1435.00	-	-	-	-	-	-	-	-	500.00
|	1500.00*	-71.90	-	-	-	-71.90	23.357	14.719	|
1646.50	-	-	-	-	-	-	-	-	500.00
1660.00	-	-	-	-	-	-	-	-	500.00
|	1680.00*	-72.59	-	-	-	-72.59	22.667	13.595	|
1710.00	-	-	-	-	-	-	-	-	500.00
1718.80	-	-	-	-	-	-	-	-	500.00
|	1720.00*	-72.91	-	-	-	-72.91	22.347	13.103	|
1722.20	-	-	-	-	-	-	-	-	500.00
2200.00	-	-	-	-	-	-	-	-	500.00
|	2250.00*	-73.07	-	-	-	-73.07	22.187	12.864	|
2300.00	-	-	-	-	-	-	-	-	500.00
2310.00	-	-	-	-	-	-	-	-	500.00
|	2389.96	-65.35	3.00	2.509	-	-59.84	35.417	58.999	|
2390.00	-	-	-	-	-	-	-	-	500.00
2483.50	-	-	-	-	-	-	-	-	500.00
|	2483.57	-54.74	3.00	2.509	-5.018	-54.25	41.008	112.307	|
2500.00	-	-	-	-	-	-	-	-	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).

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TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Antenna Gain	Duty Cycle Factor 10log(1/x)	Duty Cycle Factor 20log(x)	Corrected Reading	Converted Field Strength	Converted Reading	Limit at 3M
MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
2690.00	-	-	-	-	-	-	-	-	500.00
|	2750.00*	-71.43	-	-	-	-71.43	23.827	15.537	|
2900.00	-	-	-	-	-	-	-	-	500.00
3260.00	-	-	-	-	-	-	-	-	500.00
|	3263.00*	-70.82	-	-	-	-70.82	24.437	16.667	|
3267.00	-	-	-	-	-	-	-	-	500.00
3332.00	-	-	-	-	-	-	-	-	500.00
|	3336.00*	-71.01	-	-	-	-71.01	24.247	16.307	|
3339.00	-	-	-	-	-	-	-	-	500.00
3345.00	-	-	-	-	-	-	-	-	500.00
|	3350.00*	-70.95	-	-	-	-70.95	24.307	16.420	|
3358.00	-	-	-	-	-	-	-	-	500.00
3600.00	-	-	-	-	-	-	-	-	500.00
|	3700.00*	-71.02	-	-	-	-71.02	24.237	16.288	|
4400.00	-	-	-	-	-	-	-	-	500.00
4500.00	-	-	-	-	-	-	-	-	500.00
|	4852.00	-51.60	3.00	2.509	-	-46.09	49.167	287.310	|
5150.00	-	-	-	-	-	-	-	-	500.00

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TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Antenna Gain	Duty Cycle Factor 10log(1/x)	Duty Cycle Factor 20log(x)	Corrected Reading	Converted Field Strength	Converted Reading	Limit at 3M
MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
5350.00	-	-	-	-	-	-	-	-	500.00
|	5400.00*	-69.62	-	-	-	-69.62	25.637	19.137	|
5460.00	-	-	-	-	-	-	-	-	500.00
7250.00	-	-	-	-	-	-	-	-	500.00
|	7278.00	-57.19	3.00	2.509	-	-51.680	43.577	150.956	|
7750.00	-	-	-	-	-	-	-	-	500.00
8025.00	-	-	-	-	-	-	-	-	500.00
|	8300.00*	-68.72	-	-	-	-68.72	26.537	21.226	|
8500.00	-	-	-	-	-	-	-	-	500.00
9000.00	-	-	-	-	-	-	-	-	500.00
|	9100.00*	-68.81	-	-	-	-68.81	26.447	21.007	|
9200.00	-	-	-	-	-	-	-	-	500.00
9300.00	-	-	-	-	-	-	-	-	500.00
|	9400.00*	-68.41	-	-	-	-68.41	26.847	21.997	|
9500.00	-	-	-	-	-	-	-	-	500.00
10600.00	-	-	-	-	-	-	-	-	500.00
|	12400.00	-55.79	3.00	2.509	-	-50.280	44.977	177.358	|
12700.00	-	-	-	-	-	-	-	-	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

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TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Antenna Gain	Duty Cycle Factor 10log(1/x)	Duty Cycle Factor 20log(x)	Corrected Reading	Converted Field Strength	Converted Reading	Limit at 3M
MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
13250.00	-	-	-	-	-	-	-	-	500.00
|	15800.00*	-67.56	-	-	-	-67.56	27.697	24.259	|
16200.00	-	-	-	-	-	-	-	-	500.00
17700.00	-	-	-	-	-	-	-	-	500.00
|	19240.00*	-67.68	-	-	-	-67.68	27.577	23.926	|
21400.00	-	-	-	-	-	-	-	-	500.00
22010.00	-	-	-	-	-	-	-	-	500.00
|	22320.00*	-66.52	-	-	-	-66.52	28.737	27.345	|
23120.00	-	-	-	-	-	-	-	-	500.00
23000.00	-	-	-	-	-	-	-	-	500.00
|	23800.00*	-65.32	-	-	-	-65.32	29.937	31.396	|
24000.00	-	-	-	-	-	-	-	-	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).

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Notes: Detector: Peak X=0.56112		

TEST PARAMETERS

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MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
1300.00	-	-	-	-	-	-	-	-	5000.00
|	1350.00*	-60.29	-	-	-	-60.29	34.967	56.024	|
1427.00	-	-	-	-	-	-	-	-	5000.00
1435.00	-	-	-	-	-	-	-	-	5000.00
|	1500.00*	-59.80	-	-	-	-59.80	35.457	59.276	|
1646.50	-	-	-	-	-	-	-	-	5000.00
1660.00	-	-	-	-	-	-	-	-	5000.00
|	1680.00*	-60.62	-	-	-	-60.62	34.637	53.936	|
1710.00	-	-	-	-	-	-	-	-	5000.00
1718.80	-	-	-	-	-	-	-	-	5000.00
|	1720.00*	-60.75	-	-	-	-60.75	34.507	53.134	|
1722.20	-	-	-	-	-	-	-	-	5000.00
2200.00	-	-	-	-	-	-	-	-	5000.00
|	2250.00*	-60.58	-	-	-	-60.58	34.677	54.185	|
2300.00	-	-	-	-	-	-	-	-	5000.00
2310.00	-	-	-	-	-	-	-	-	5000.00
|	2389.96	-36.09	3.00	2.509	-	-30.580	64.677	1713.37	|
2390.00	-	-	-	-	-	-	-	-	5000.00

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MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
2483.50	-	-	-	-	-	-	-	-	5000.00
|	2483.57	-26.18	3.00	2.509	-5.018	-25.689	69.568	3008.89	|
2500.00	-	-	-	-	-	-	-	-	5000.00
2690.00	-	-	-	-	-	-	-	-	5000.00
|	2750.00*	-58.85	-	-	-	-58.85	36.407	66.127	|
2900.00	-	-	-	-	-	-	-	-	5000.00
3260.00	-	-	-	-	-	-	-	-	5000.00
|	3263.00*	-58.49	-	-	-	-58.49	36.767	68.925	|
3267.00	-	-	-	-	-	-	-	-	5000.00
3332.00	-	-	-	-	-	-	-	-	5000.00
|	3336.00*	-58.87	-	-	-	-58.87	36.387	65.974	|
3339.00	-	-	-	-	-	-	-	-	5000.00
3345.00	-	-	-	-	-	-	-	-	5000.00
|	3350.00*	-58.42	-	-	-	-58.42	36.837	69.974	|
3358.00	-	-	-	-	-	-	-	-	5000.00
3600.00	-	-	-	-	-	-	-	-	5000.00
|	3700.00*	-57.80	-	-	-	-57.80	37.457	74.624	|
4400.00	-	-	-	-	-	-	-	-	5000.00

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MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
4500.00	-	-	-	-	-	-	-	-	5000.00
|	4960.00	-40.04	3.00	2.509	-	-34.530	60.727	1087.3	|
5150.00	-	-	-	-	-	-	-	-	5000.00
5350.00	-	-	-	-	-	-	-	-	5000.00
|	5400.00*	-57.16	-	-	-	-57.16	38.097	80.330	|
5460.00	-	-	-	-	-	-	-	-	5000.00
7250.00	-	-	-	-	-	-	-	-	5000.00
|	7278.00	-48.35	3.00	2.509	-	-42.840	52.417	417.687	|
7750.00	-	-	-	-	-	-	-	-	5000.00
8025.00	-	-	-	-	-	-	-	-	5000.00
|	8300.00*	-56.42	-	-	-	-56.42	38.837	87.474	|
8500.00	-	-	-	-	-	-	-	-	5000.00
9000.00	-	-	-	-	-	-	-	-	5000.00
|	9100.00*	-56.76	-	-	-	-56.76	38.497	84.116	|
9200.00	-	-	-	-	-	-	-	-	5000.00
9300.00	-	-	-	-	-	-	-	-	5000.00
|	9400.00*	-56.29	-	-	-	-56.29	38.967	88.793	|
9500.00	-	-	-	-	-	-	-	-	5000.00

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MHz	MHz	dBm	dB	dB	dBm	dBm	dBuV/m	uV/m	uV/m
10600.00	-	-	-	-	-	-	-	-	5000.00
|	12400.00	-43.93	3.00	2.509	-	-38.420	56.837	694.786	|
12700.00	-	-	-	-	-	-	-	-	5000.00
13250.00	-	-	-	-	-	-	-	-	5000.00
|	15800.00*	-56.11	-	-	-	-56.11	39.147	90.652	|
16200.00	-	-	-	-	-	-	-	-	5000.00
17700.00	-	-	-	-	-	-	-	-	5000.00
|	19240.00*	-56.02	-	-	-	-56.02	39.237	91.592	|
21400.00	-	-	-	-	-	-	-	-	5000.00
22010.00	-	-	-	-	-	-	-	-	5000.00
|	22320.00*	-55.86	-	-	-	-55.86	39.397	93.299	|
23120.00	-	-	-	-	-	-	-	-	5000.00
23000.00	-	-	-	-	-	-	-	-	5000.00
|	23800.00*	-52.92	-	-	-	-52.92	42.337	130.882	|
24000.00	-	-	-	-	-	-	-	-	5000.00

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).

Duty Cycle Determination
Test Data

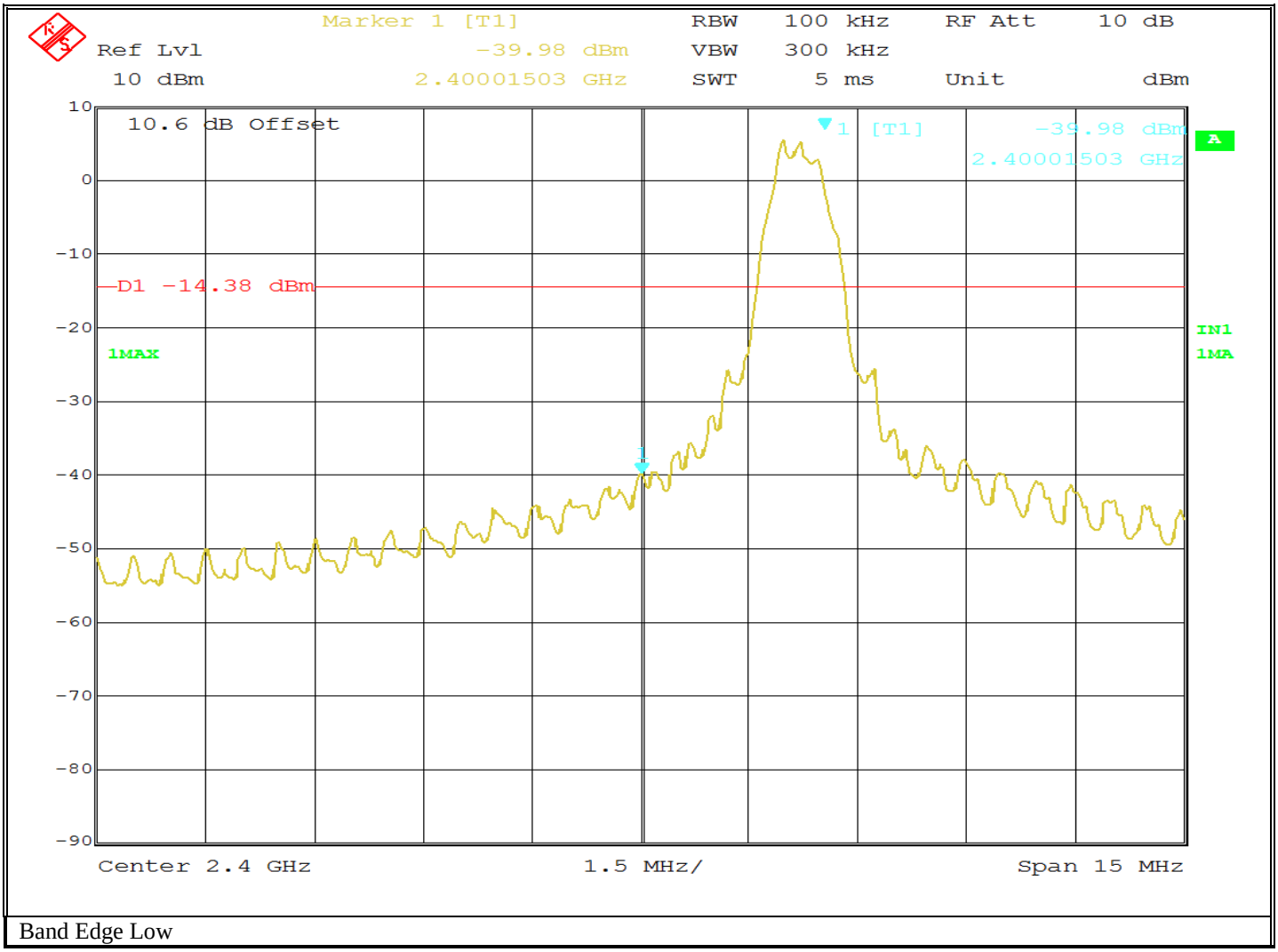
RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET	
Test Method	**Duty Cycle Determination**
Customer	Vypin LLC
Job Number	R-6285N-1
Test Sample	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number	VP800
Serial Number	0280e1506408
Test Specification	FCC part 15.35
Operating Mode	Transmitting modulated signal
Technician	M. Seamans
Date	December 12th, 2017
Notes: 160 pulses at 350.701403uS (56.1122245ms total) within 100ms observation time	

TEST PARAMETERS				
Measured on time	**Measured time interval**	**Duty Cycle Factor Calculation**	**Result**	**Duty Cycle Factor Allowed**
msec	**msec**		**dB**	**dB**
56.1122245	100	= 20*Log_{10} (56.1122245 ms/ 100 ms)	-5.018850278	-5.018

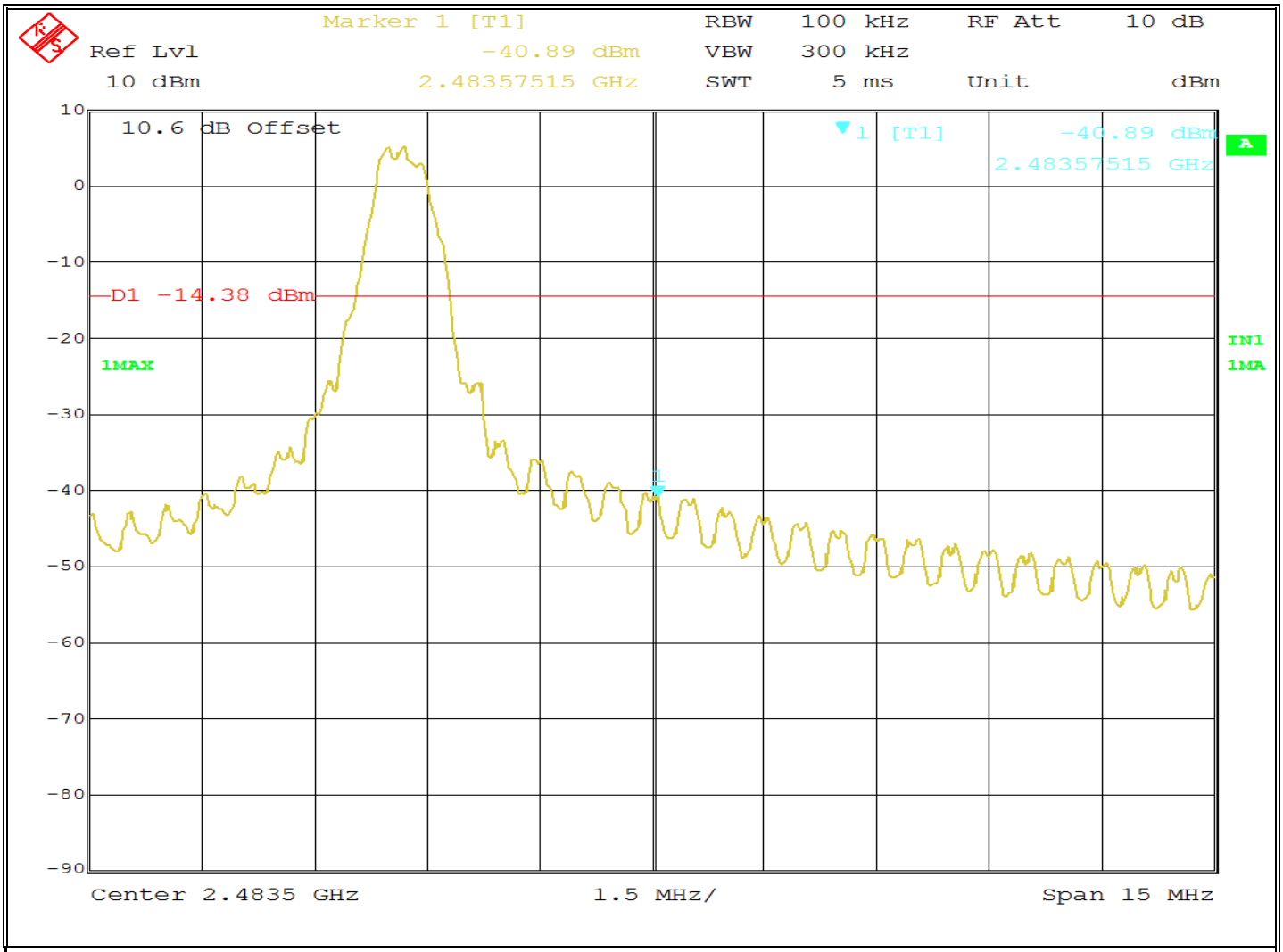
Band Edge Conducted
Test Data

EMISSIONS TEST DATA SHEET	
Method:	**Band Edge**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (d)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.402 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	19.6 °C / 29.4 %
Notes:	Limit: -14.38 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-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP820
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	19.6 °C / 29.4 %
Notes:	Limit: -14.38 dBm

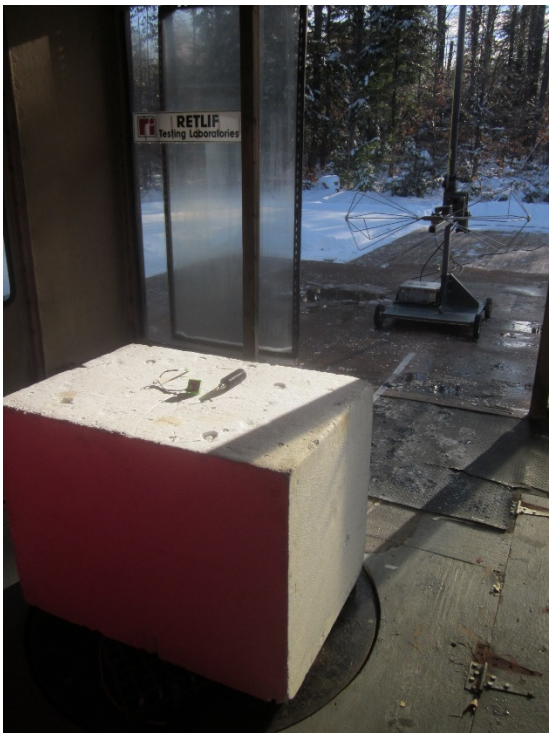


Band Edge High

Test Photographs
Spurious Radiated Emissions

Test Setup

Test Photographs
Spurious Radiated Emissions



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

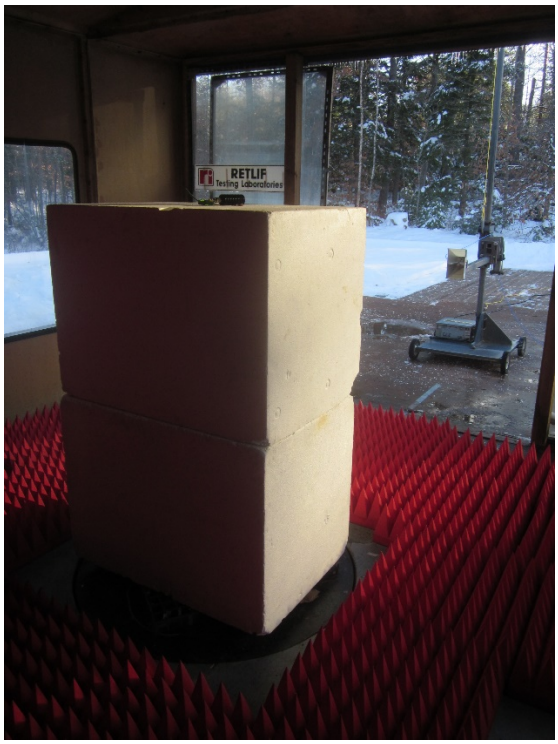
Vertical Antenna Polarization, 30 MHz to 200 MHz, Biconical Antenna

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

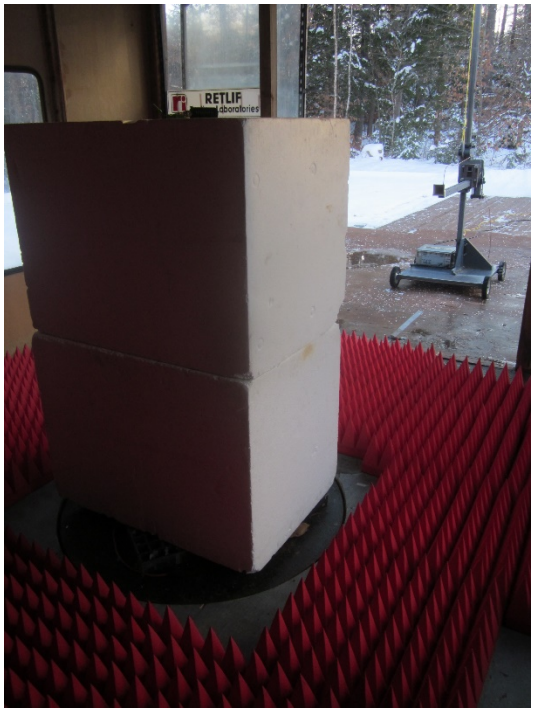


Horizontal Antenna Polarization, 1 GHz to 18 GHz

Vertical Antenna Polarization, 1 GHz to 18 GHz

Test Photographs
Spurious Radiated Emissions

Horizontal Antenna Polarization, 18 GHz to 25 GHz



Vertical Antenna Polarization, 18 GHz to 25 GHz

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

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET	
Test Method	**Spurious Emissions 30 MHz to 25 GHz**
Customer	Vypin LLC
Job Number	R-6285N-1
Test Sample	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number	VP800
Serial Number	0280e1506408
Test Specification	FCC 15.247(d)
Operating Mode	Transmitting modulated signal
Technician	M. Seamans
Date	December 13th, 2017

Notes: EUT Antenna replaced with Dummy Load
Test Antenna Distance: 3 meters Detector: Quasi-Peak < 1GHz; Average > 1GHz

TEST PARAMETERS

Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading			Limit at 3M
MHz	(H/V) / Height	Degrees	dBuV	dB	dBuV/m			dBuV/m
30.00	-	-	-	-	-			40.0
|	-	-	-	-	-			|
38.00	V-1m	0.0	9.10	14.20	23.30	*		|
|	-	-	-	-	-			|
88.00	-	-	-	-	-			40.0
88.00	-	-	-	-	-			43.5
|	-	-	-	-	-			|
115.00	V-1m	0.0	7.28	10.02	17.30	*		|
175.00	V-1m	0.0	5.10	12.80	17.90	*		|
|	-	-	-	-	-			|
216.00	-	-	-	-	-			43.5
216.00	-	-	-	-	-			46.0
|	-	-	-	-	-			|
|	-	-	-	-	-			|
|	-	-	-	-	-			|
960.00	-	-	-	-	-			46.0
960.00	-	-	-	-	-			54.0
|	-	-	-	-	-			|
5400.00	V-1m	0.0	31.40	0.92	32.32	*		|
12200.00	V-1m	0.0	33.46	8.37	41.83	*		|
22320.00	V-1m	0.0	34.50	-5.30	29.20	*		|
|	-	-	-	-	-			|
25000.00	-	-	-	-	-			54.0

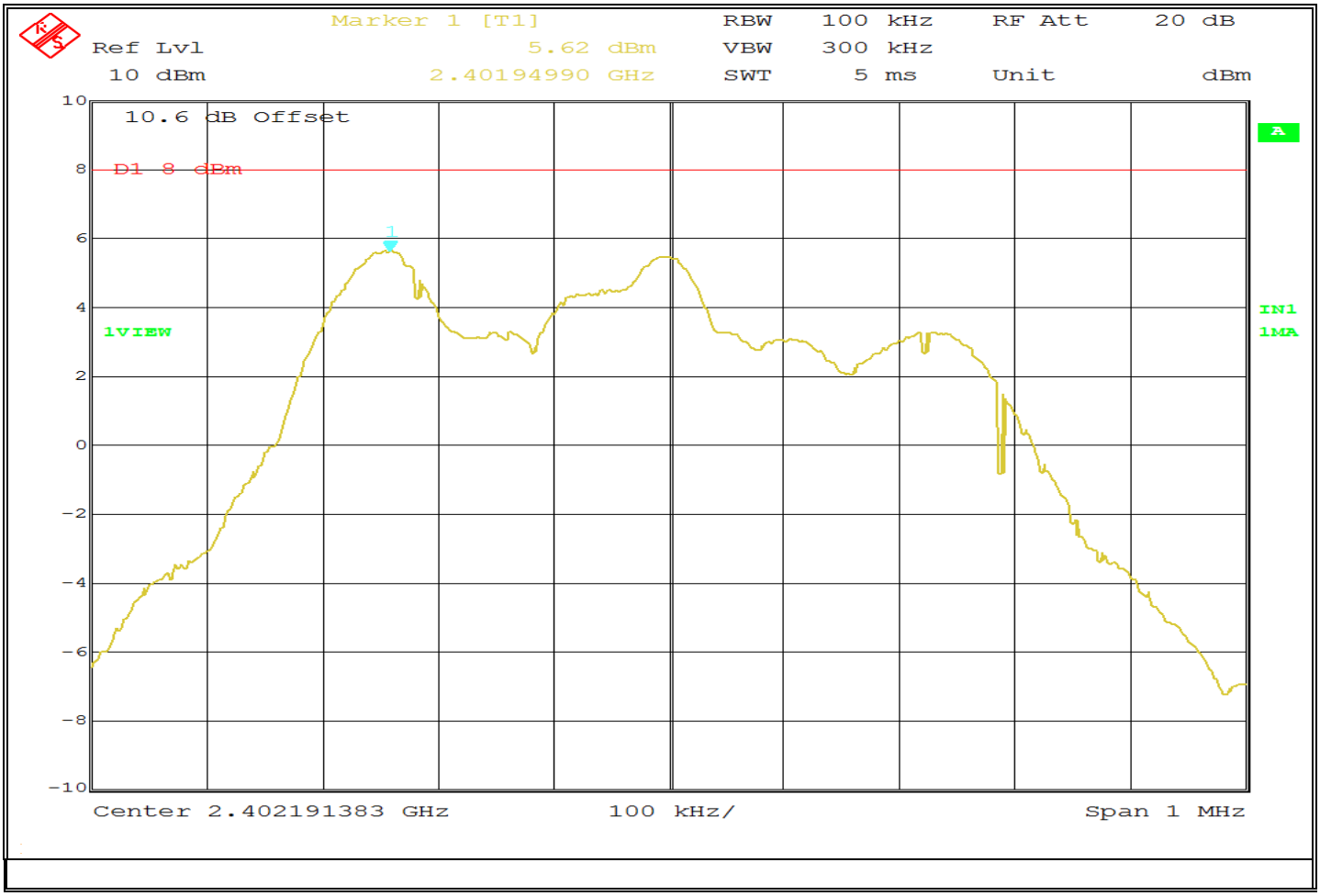
No EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * This emission is not from the EUT. It is a measurement of minimum measurement system sensitivity (Noise Floor).

Test Photographs
Power Density

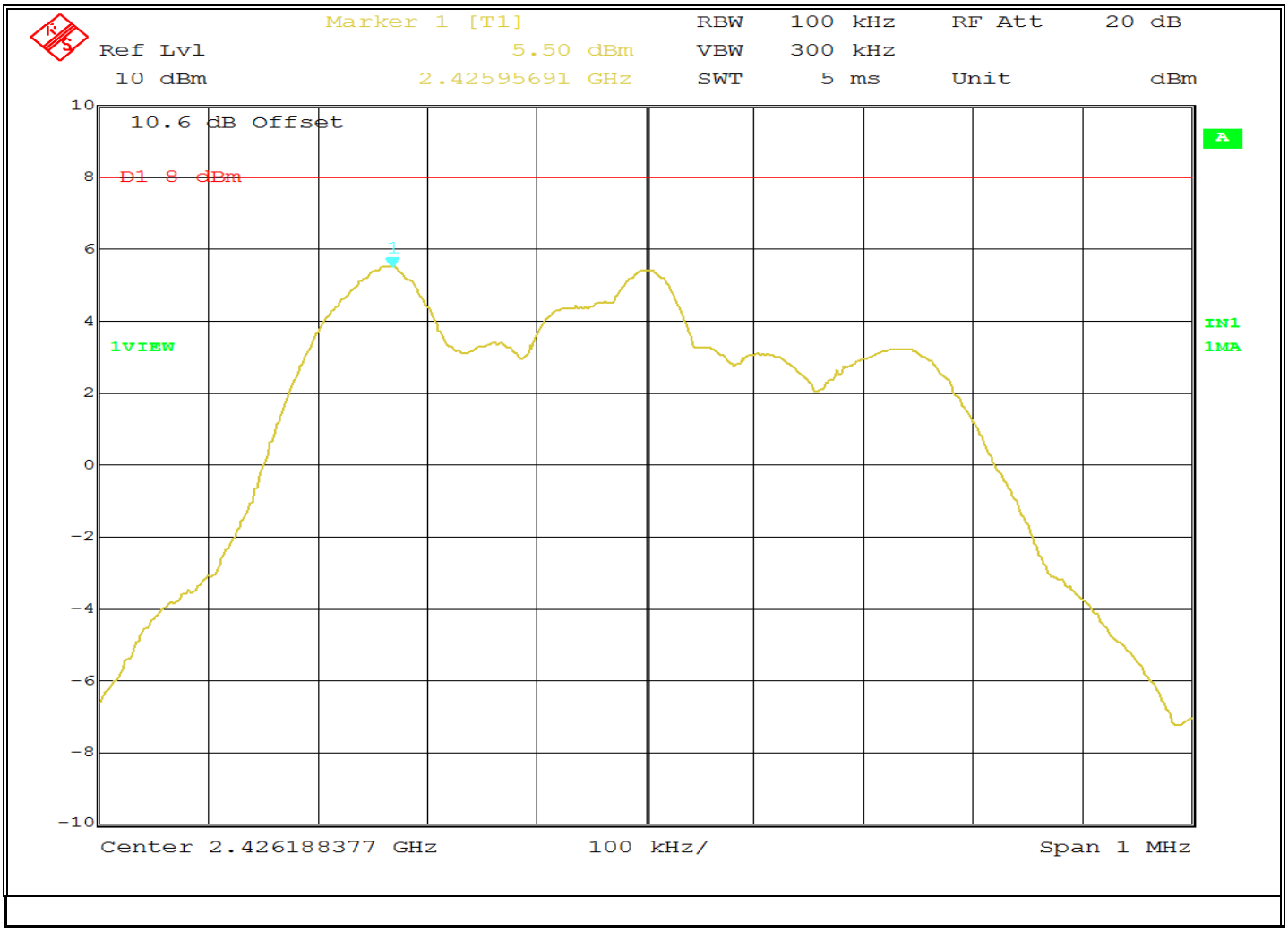
Test Configuration

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-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP800
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.402 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	18.8 °C / 29.9 %
Results:	Power Spectral Density: 5.62 dBm



EMISSIONS TEST DATA SHEET	
Method:	**Power Spectral Density**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (e)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP800
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.426 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	18.8 °C / 29.9 %
Results:	Power Spectral Density: 5.50 dBm



EMISSIONS TEST DATA SHEET	
Method:	**Power Spectral Density**
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.247 (e)
Job Number:	R-6285N-1
Customer:	Vypin LLC
Test Sample:	reSeal / safeTstrap Bluetooth Low Energy Radio Device
Model Number:	VP800
Serial Number:	0280e1506408
Operating Mode:	Transmitting modulated signal at 2.480 GHz
Technician:	M.Seamans
Date(s):	December 12th, 2017
Temp/ Relative Humidity:	18.8 °C / 29.9 %
Results:	Power Spectral Density: 5.20 dBm