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FCC Part 15, Subpart C, Section 15.247

Test Report

On

Temperature and Humidity Sensor

Customer Name: nke Watteco

Customer P.O: C146509

Date of Report Revision: March 11, 2016

Test Report No: R-6046N-3, Rev. A

Test Start Date: January 15, 2016

Test Finish Date: January 19, 2016

Test Technician: M. Seamans

Revision Approved By: T. Hannemann

Report Revision Prepared By: J. Ramsey

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Technical Information

Report Number:	R-6046N-3, Rev. A
Customer:	nke Watteco
Address:	6 Rue Gutenberg
	Z.I. Kerandre
	Hennebont, France 56700
Test Sample:	Temperature and Humidity Sensor
Brand Name:	nke Watteco
Part Number:	50-70-006-001
Model Number:	THr
Serial Number:	2100547930001
Manufactured By:	nke Watteco
Power Requirements:	3.6 VDC via one disposable lithium battery
FHSS Frequency Band of Operation:	902.3 MHz to 914.9 MHz
DTS Frequency Band of Operation:	903.0 MHz to 914.2 MHz
Antenna Type:	84 mm long copper wire brazed on the PCB, Gain – 2.15dBi
Equipment Use:	Home Automation - Measures temperature/humidity and sends data
FCC ID:	2AGTV50-70-006

Test Specification:
FCC Rules and Regulations, Telecommunications, Part 15 Radio Frequency Devices, Subpart C, Intentional Radiators

Test Procedure:
ANSI C63.4:2009, Methods of Measurement of Radio Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

558074 D01, FCC Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247, v03 r04, January 7, 2016

DA 00-705, FCC Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems (FHSS) Operating Under 15.247, March 30, 2000

EUT Description:

The Temperature and Humidity Sensor is used in the home automation industry to monitor temperature & humidity and transmit data to a receiver. The EUT has two transmission modes as described below:

FHSS:
IN FHSS operation data is transmitted over a 125 KHz channel selected randomly from 64 possible channels in the frequency range of 902.3 to 914.9 MHz. The duration of the transmission is limited to a maximum of 400 milliseconds.

DTS:
In DTS operation data is transmitted over a 500 kHz channel selected randomly from 8 possible channels in the 903.0 to 914.2 MHz. The duration of the transmission is limited to a maximum of 400 milliseconds.

Tests Performed

The test methods performed on the EUT are shown below. Testing was performed in accordance with the applicable FCC requirements for each of the two transmission modes (DTS & FHSS).

Table 1 - Support Equipment

FCC Part 15, Subpart C	Test Method
DTS Test Methods Performed	
15.247(a)(2)	6 dB Bandwidth
15.247(b)(3)	Power Output
15.247(d)	Antenna Terminal Out of Band/ Band Edge Conducted Emissions (25 MHz – 10 GHz)
15.247(d)	Out of Band/Band Edge Radiated Emissions (30 MHz to 10 GHz)
15.247(e)	Power Density
FHSS Test Methods Performed	
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 (25 MHz – 10 GHz)
15.247(d)	Out of Band/Band Edge Radiated Emissions (30 MHz to 10 GHz)

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

Table 2 - Support Equipment

Description	Manufacturer	Model Number	Serial Number
Laptop PC	ASUS	Eee PC	8BOAAQ486781
MSP-GANG Programmer	Texas Instruments Elprotronic	MSP-GANG	1110-1497
USB Dongle	nKe Watteco	Test FCC	70:83:D5:E7:5F:00:00:65

General Test Requirements

The measurement procedures of ANSI C63.4:2009 as specified in FCC Part 15, Subpart C, Section 15.31(a)(3) and FCC Guidance for Performing Compliance Measurements on Digital Transmission Systems, v03 r04, January 7, 2016 and FCC Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems (FHSS) Operating Under 15.247, March 30, 2000.

1. All radiated emissions measurements were performed on an Open Area Test Site (OATS), listed with the FCC, in accordance with FCC Section 15.31(d).
2. All measurements were performed at the specified 3 meter test distance as required by FCC Section 15.31(f).
3. The EUT was rotated throughout 360 degrees for all radiated emissions measurements as specified in FCC Section 15.31(f)(5).
4. All readily accessible EUT controls were adjusted in such a manner as to maximize the level of emissions in accordance with FCC Section 15.31(g).
5. Appropriate accessories were attached to all EUT ports during the performance of radiated emissions measurements as required by FCC Section 15.31(i).
6. The EUT operated over the frequency range of 902.3 MHz to 914.9 MHz for FHSS operation and 903.0 to 914.2 MHz for DTS operation. Testing was performed with the device operating at 3 frequencies, 1 at the top, 1 in the middle and 1 at the bottom of the range of operation in accordance with FCC Section 15.31(m).
7. The frequency spectrum was investigated from the lowest frequency generated in the device up to the 10th harmonic of the highest fundamental frequency in accordance with FCC Section 15.33(a)(1).
8. The EUT utilizes an internal copper wire antenna and does not have an external antenna connector½ wave antenna and does not have an external antenna connector/external antenna and is therefore in compliance with 15.203. For testing purposes a temporary antenna connector was installed. For Radiated Spurious testing, the EUT was tested with the internal copper wire antenna.

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.

Revision History

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

Revision	Date	Pages Affected
-	March 7, 2016	Original Release
A	March 11, 2016	Global Changes: • Document changed from: R-6046N-3 to R-6046N-3, Rev. A 2 & 4: • Revised FCC Guidance for Performing Compliance Measurements on Digital Transmissions Systems (DTS) Operating Under 15.247 53 & 55: • Revised Out of Band/Band Edge Radiated Emissions photographs

Requirements and Test Results

FCC Section 15.247 (a)(2) - DTS 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 was 725.45 kHz and the device was found to meet the requirement of 15.247 (a)(2).

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

For frequency hopping systems operating in the 902-928 MHz; 1 Watt for systems employing at least 50 hopping frequencies.

- **Results**: The maximum measured peak conducted output power was 18.62 mW. The maximum antenna gain of the copper wire antenna is 2.15 dBi. The device was found to meet the power output requirements of 15.247 (b)(3) including de facto EIRP.

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 was 17.78 mW. The maximum antenna gain of the copper wire antenna is 2.15 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 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).

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 measured power spectral density complied with the specified power density limit and the device was found to meet the requirements of 15.247(e).

Requirement:
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 167.3 kHz. The carrier frequencies were separated by 198.39 kHz which exceeds the 20 dB bandwidth and complies with the requirements specified above.

FCC Section 15.247 (a)(1)
Number of Channels and Occupancy Time
Frequency hopping systems operating in the 902 – 928 MHz band: If the 20dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

- **Results**:
  The frequency hopping system uses 64 Channels. The average time of occupancy did not exceed 0.4 seconds in a 20 second period which meets the above requirements.

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 access 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 Frequency of 900 MHz = 0.6mW/cmsq

DTS Transmission Mode:

Power = Max Power Input to Antenna = 17.78 mW

Gain = Max Power Gain of Antenna = 2.15 dBi = 1.64 numeric

$$0.6\text{mW/cmsq} = \frac{17.78 \times 1.64}{4\ (3.14) \times Dsq} = \frac{29.16}{12.56 \times Dsq}$$

$$Dsq = \frac{29.16}{12.56 \times 0.6} = 3.87$$

D = sq. root 3.87 = 1.97 cm

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

FHSS Transmission Mode:

Power = Max Power Input to Antenna = 18.62 mW

Gain = Max Power Gain of Antenna = 2.15 dBi = 1.64 numeric

$$0.6\text{mW/cmsq} = \frac{18.62 \times 1.64}{4\ (3.14) \times Dsq} = \frac{30.54}{12.56 \times Dsq}$$

Requirements and Test Results (con't)

FCC Section 15.247(i) – RF Exposure

$$Dsq = \frac{30.54}{12.56 \times 0.6} = 4.05$$

D = sq. root 4.05 = 2.01cm

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

EQUIPMENT LISTS

FCC Section 15.247(a)(2) – DTS 6 dB Bandwidth

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
4962	NARDA MICROWAVE	ATTENUATOR, COAXIAL	20 dB, DC - 18 GHz	757C-20DB	11/24/2015	11/30/2016
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/29/2014	10/31/2016

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

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
4962	NARDA MICROWAVE	ATTENUATOR, COAXIAL	20 dB, DC - 18 GHz	757C-20DB	11/24/2015	11/30/2016
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/29/2014	10/31/2016

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
4962	NARDA MICROWAVE	ATTENUATOR, COAXIAL	20 dB, DC - 18 GHz	757C-20DB	11/24/2015	11/30/2016
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/29/2014	10/31/2016

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	6/17/2015	6/30/2016
3258	ETS / EMCO	ANTENNA, DOUBLE RIDGED GUIDE	1 - 18 GHz	3115	3/24/2015	9/30/2016
4029	RETLIF	OPEN AREA TEST SITE, FILING	3 / 10 Meters	RNH	5/15/2013	5/31/2016
5053	ETS / EMCO	ANTENNA, BICONILOG	26 MHz - 3 GHz	3142C	2/24/2015	8/31/2016
R462	AGILENT / HP	ANALYZER, SPECTRUM	9 kHz - 26.5 GHz	E7405A	1/8/2015	1/31/2016

FCC Section 15.247(e) – Power Density

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
4962	NARDA MICROWAVE	ATTENUATOR, COAXIAL	20 dB, DC - 18 GHz	757C-20DB	11/24/2015	11/30/2016
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/29/2014	10/31/2016

EQUIPMENT LISTS (continued)

FCC Section 15.247(a)(1) – 20 dB Bandwidth

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
4962	NARDA MICROWAVE	ATTENUATOR, COAXIAL	20 dB, DC - 18 GHz	757C-20DB	11/24/2015	11/30/2016
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/29/2014	10/31/2016

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

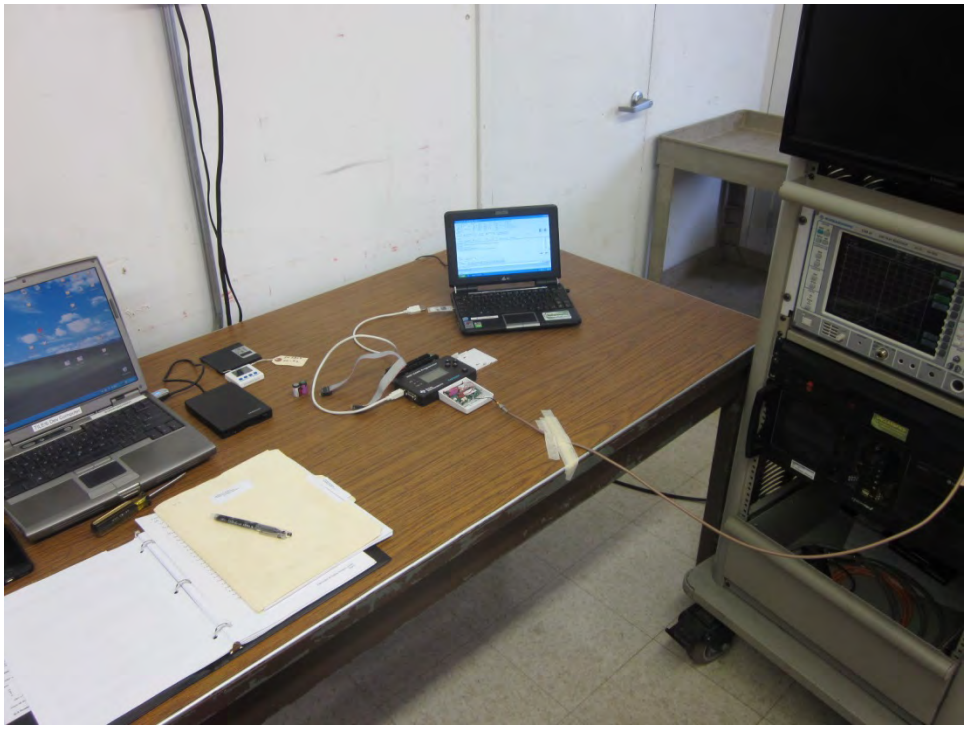
EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
4962	NARDA MICROWAVE	ATTENUATOR, COAXIAL	20 dB, DC - 18 GHz	757C-20DB	11/24/2015	11/30/2016
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/29/2014	10/31/2016

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

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
4962	NARDA MICROWAVE	ATTENUATOR, COAXIAL	20 dB, DC - 18 GHz	757C-20DB	11/24/2015	11/30/2016
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/29/2014	10/31/2016

Test Photograph(s)
DTS Bandwidth
6 dB Bandwidth
FCC Section 15.247(a)(2)

Test Photograph(s)
DTS Bandwidth
6 dB Bandwidth

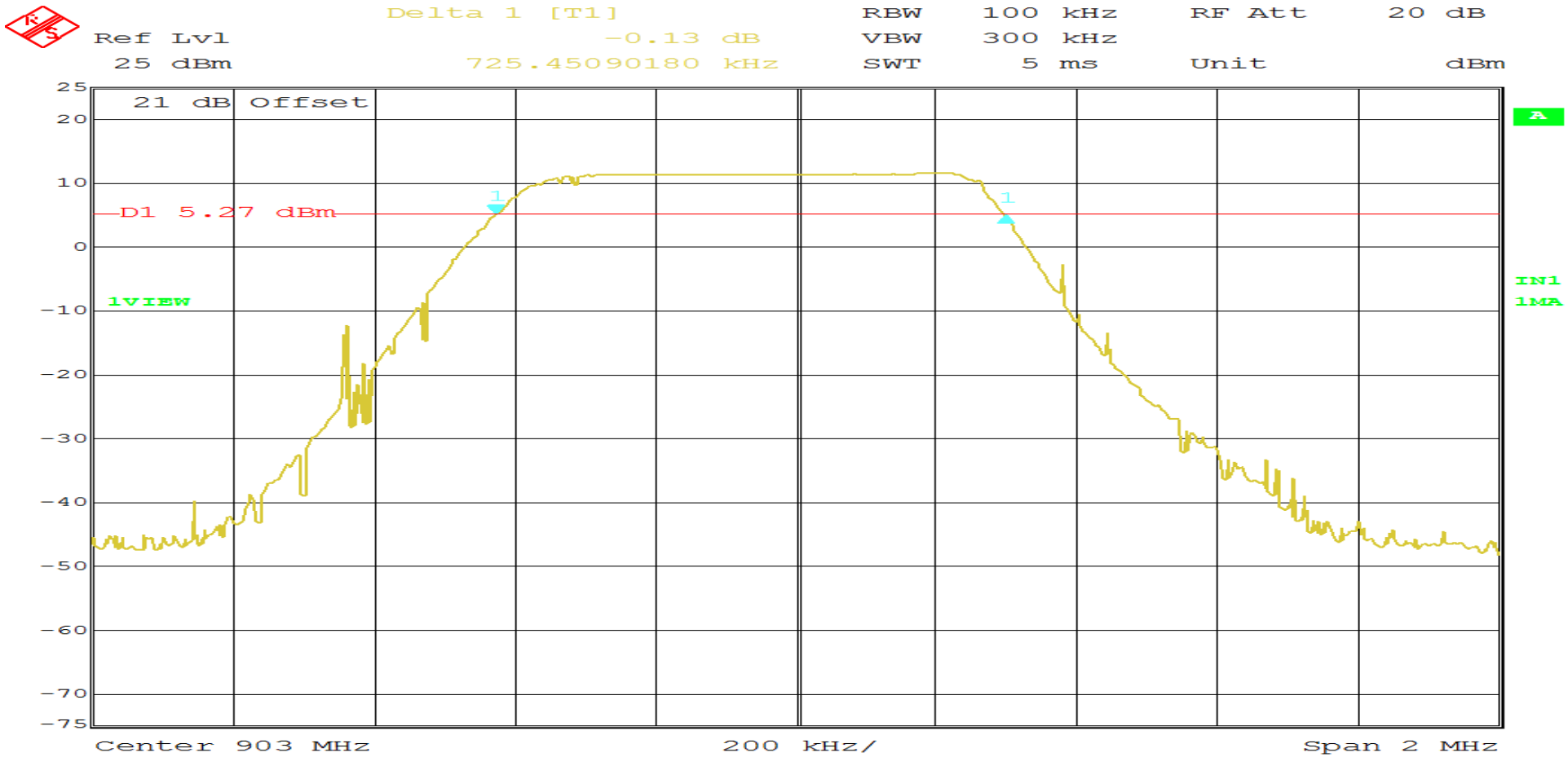


Test Setup

DTS Bandwidth
6 dB Bandwidth
Test Data

RETLIF TESTING LABORATORIES

Test Method:	6dB Bandwidth		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 903 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(2)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 18.2 °C Relative Humidity: 22.0 %		
Notes	Occupied Bandwidth: 725.45 kHz		



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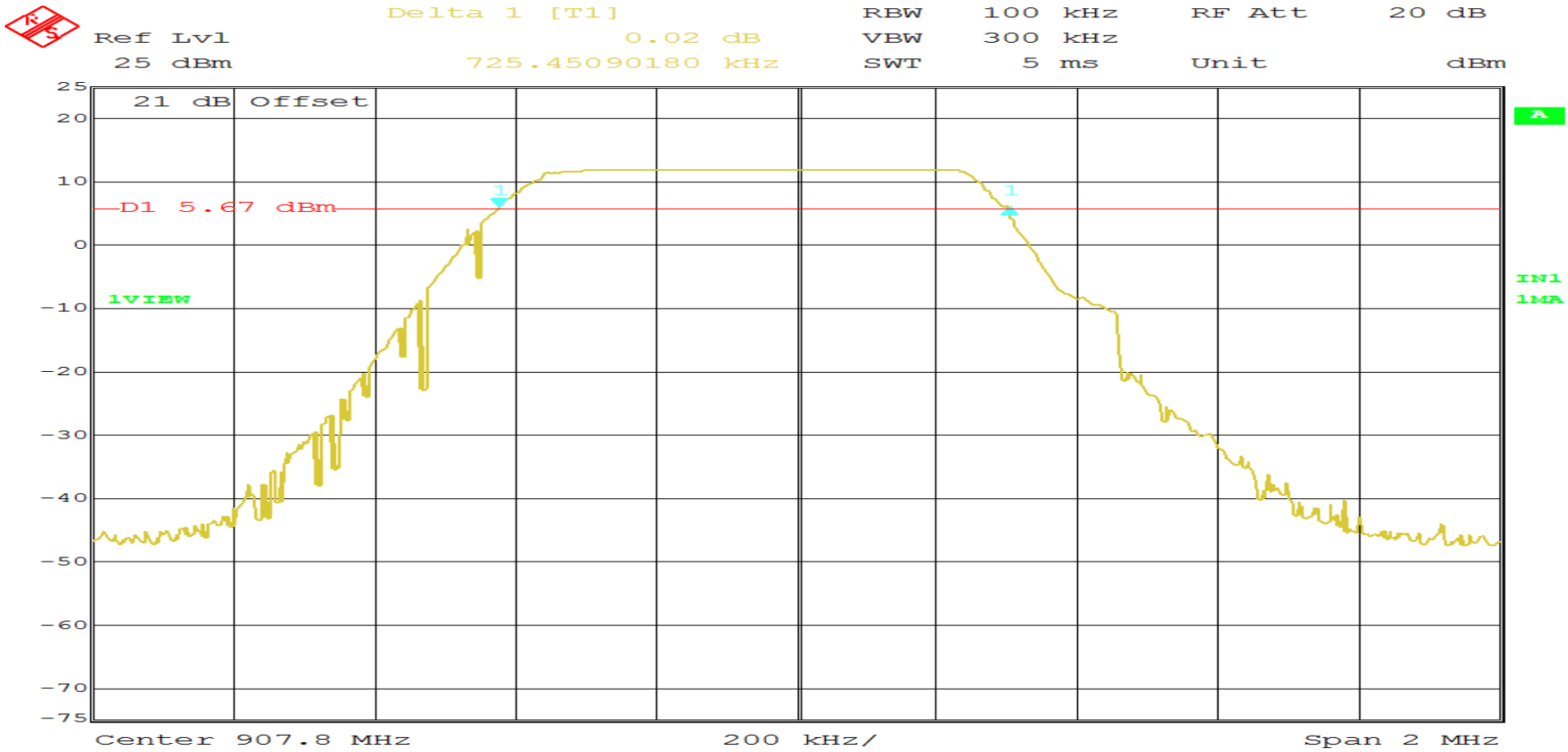
Page 1 of 3

RETLIF TESTING LABORATORIES

Test Method:	6dB Bandwidth		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 907.8 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(2)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 18.2 °C Relative Humidity: 22.0 %		
Notes	Occupied Bandwidth: 725.45 kHz		



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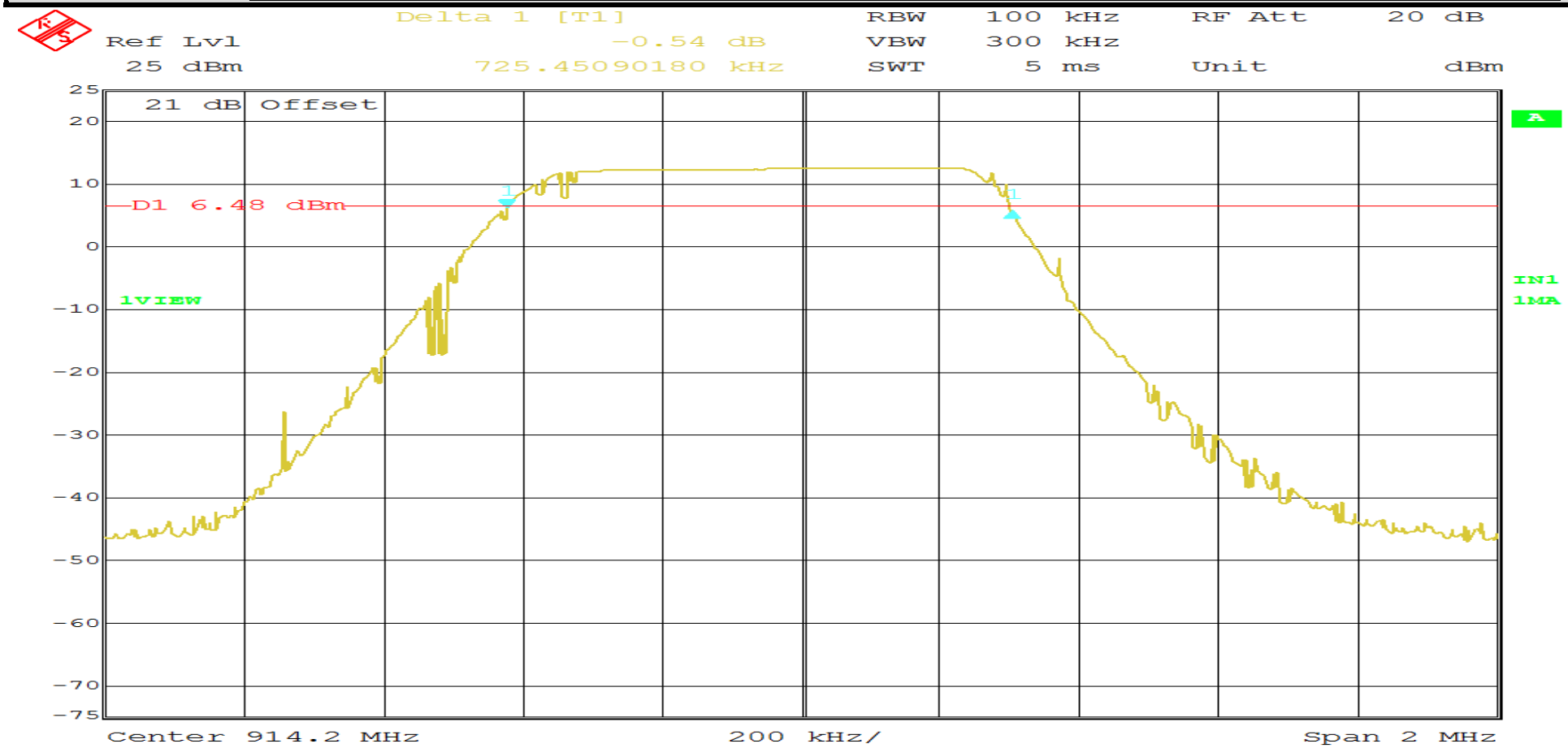
Page 2 of 3

RETLIF TESTING LABORATORIES

Test Method:	6dB Bandwidth		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 914.2 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(2)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 18.2 °C Relative Humidity: 22.0 %		
Notes	Occupied Bandwidth: 725.45 kHz		



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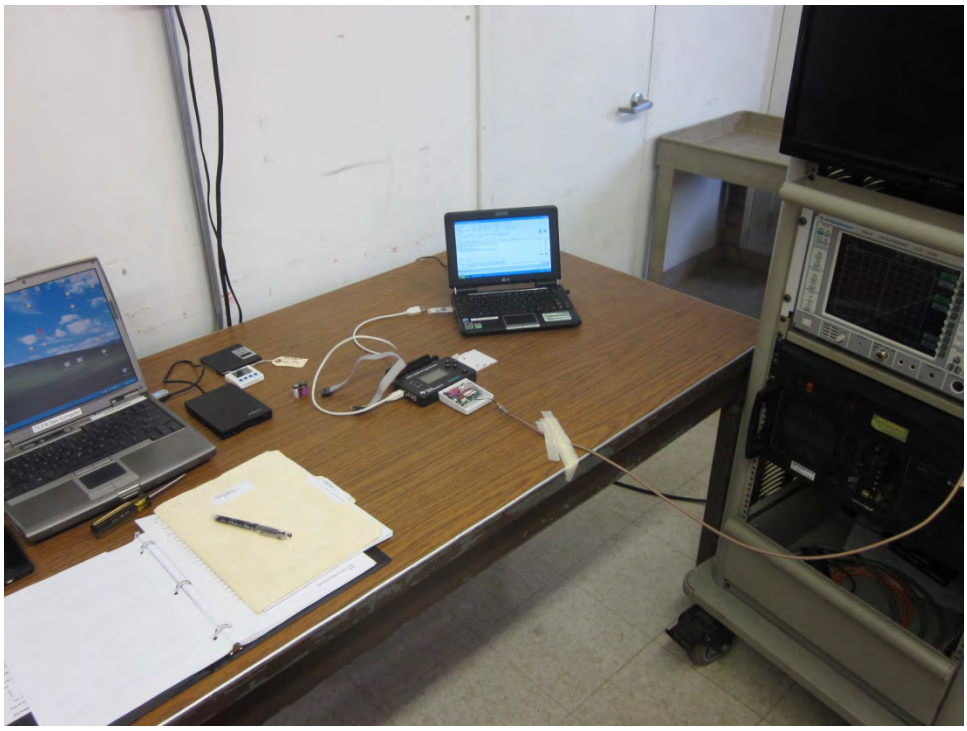
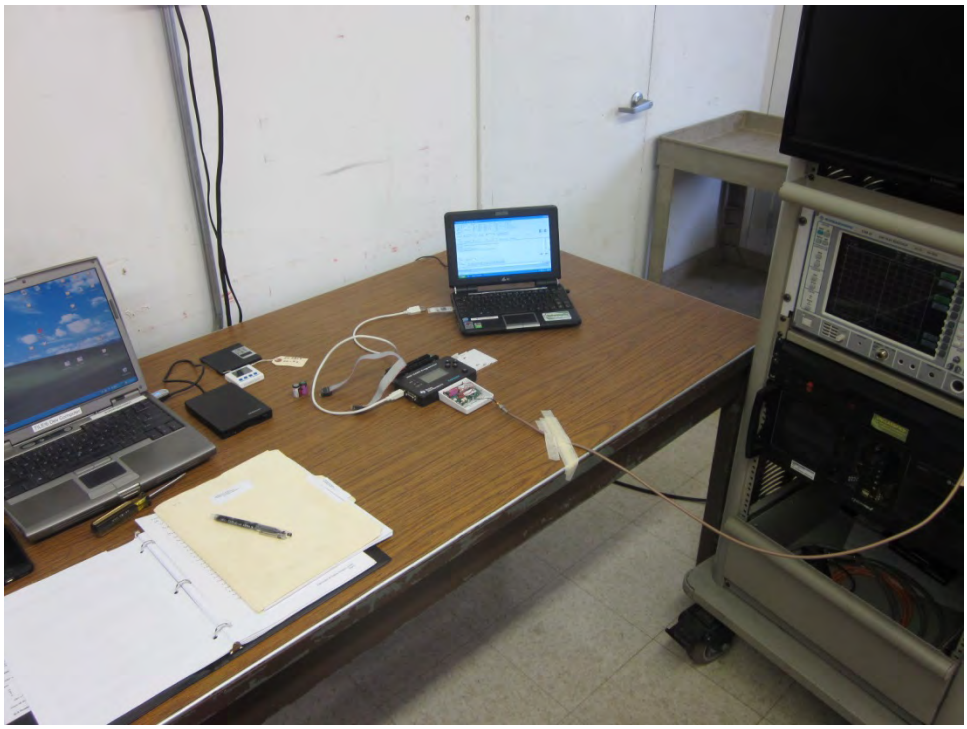
Page 3 of 3

Test Photograph(s)
Power Output
FCC Section 15.247(b)(3)

Test Photograph(s)
Power Output



Test Setup, DTS

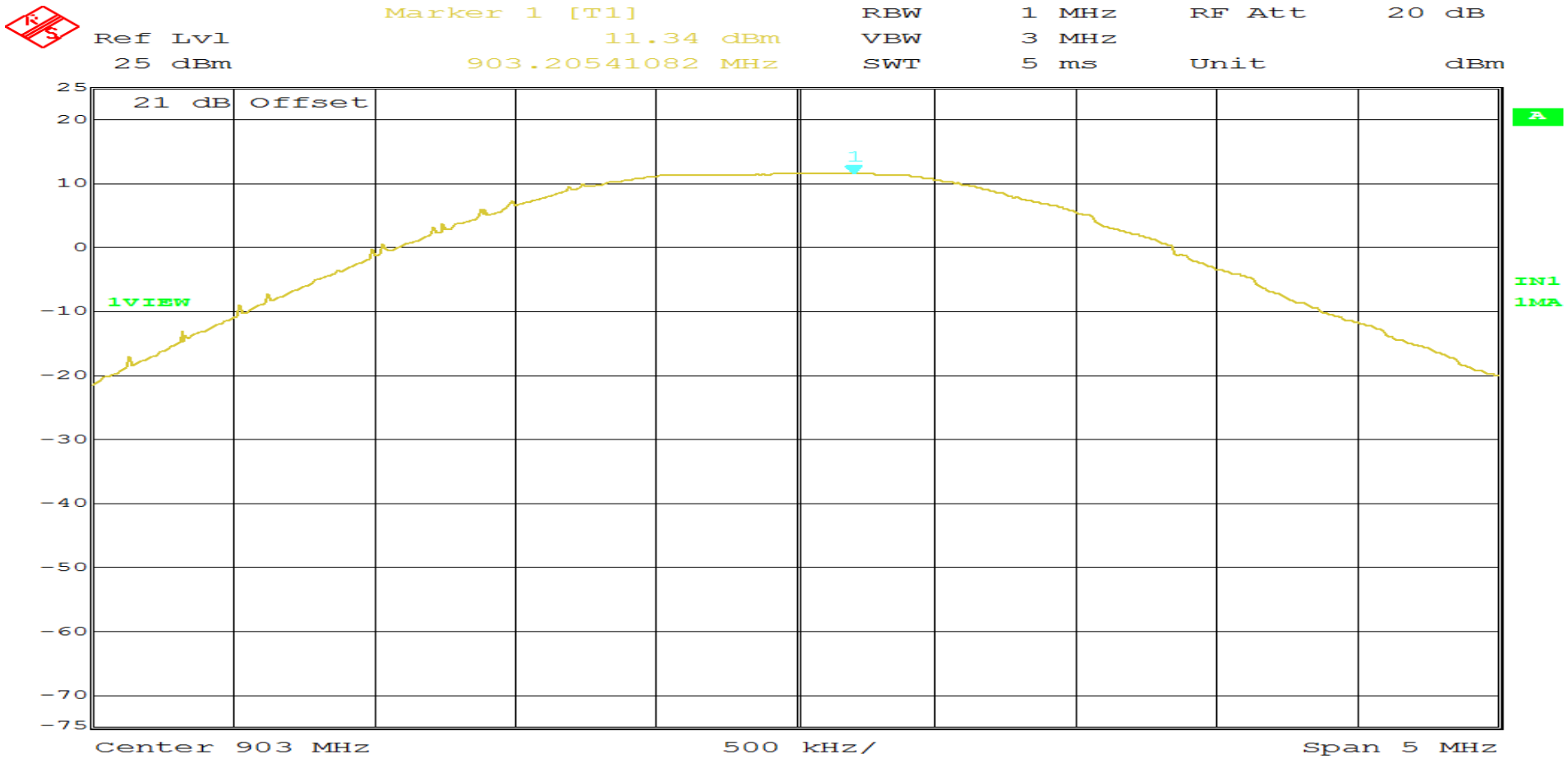


Test Setup, FHSS

Power Output
DTS Test Data

RETLIF TESTING LABORATORIES

Test Method:	Conducted Peak Power Output		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 903 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.6 °C Relative Humidity: 20.3 %		
Notes	Peak Power Output: 11.34 dBm		



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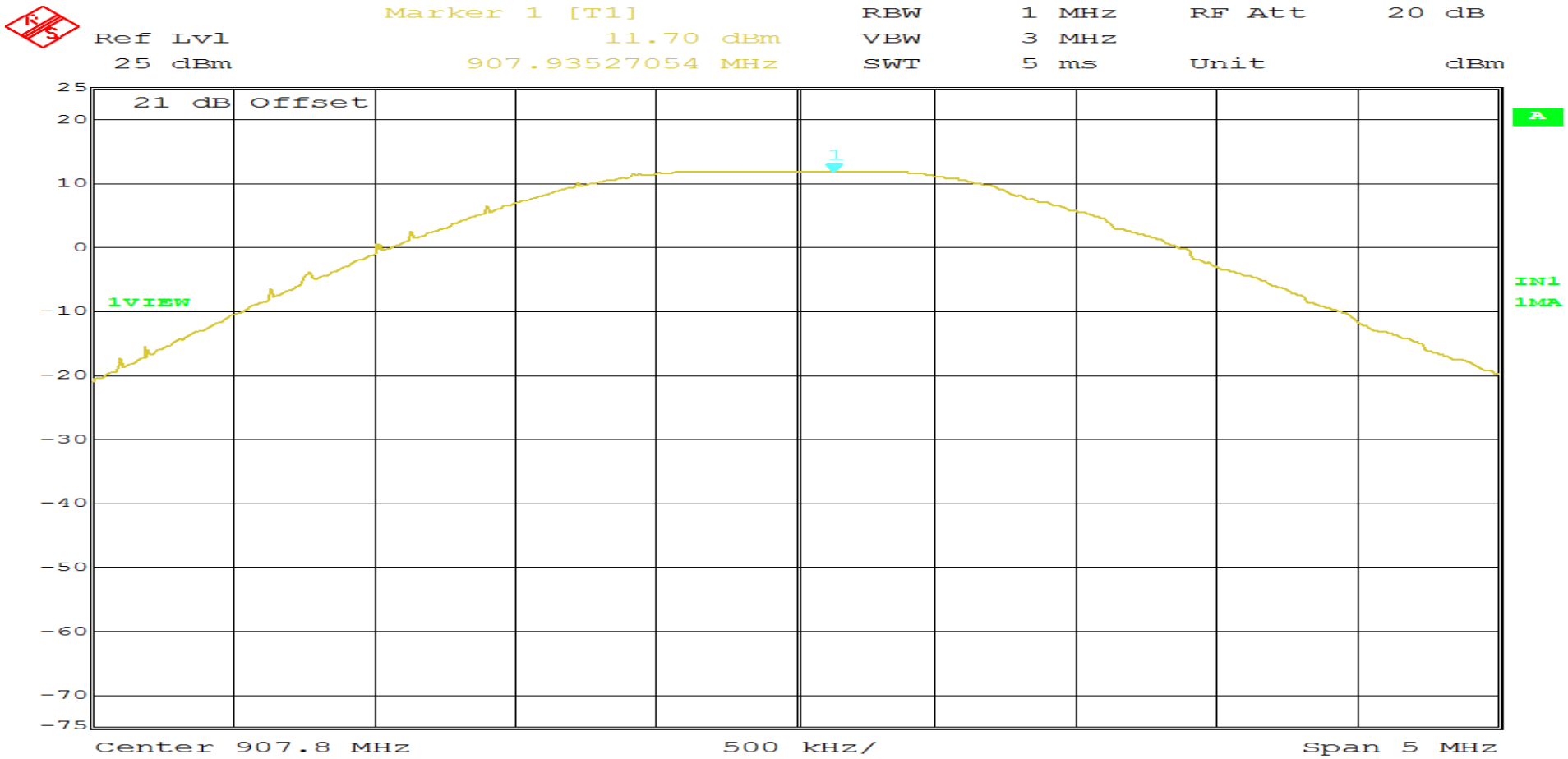
Page 1 of 3

RETLIF TESTING LABORATORIES

Test Method:	Conducted Peak Power Output		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 907.8 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.6 °C Relative Humidity: 20.3 %		
Notes	Peak Power Output: 11.70 dBm		



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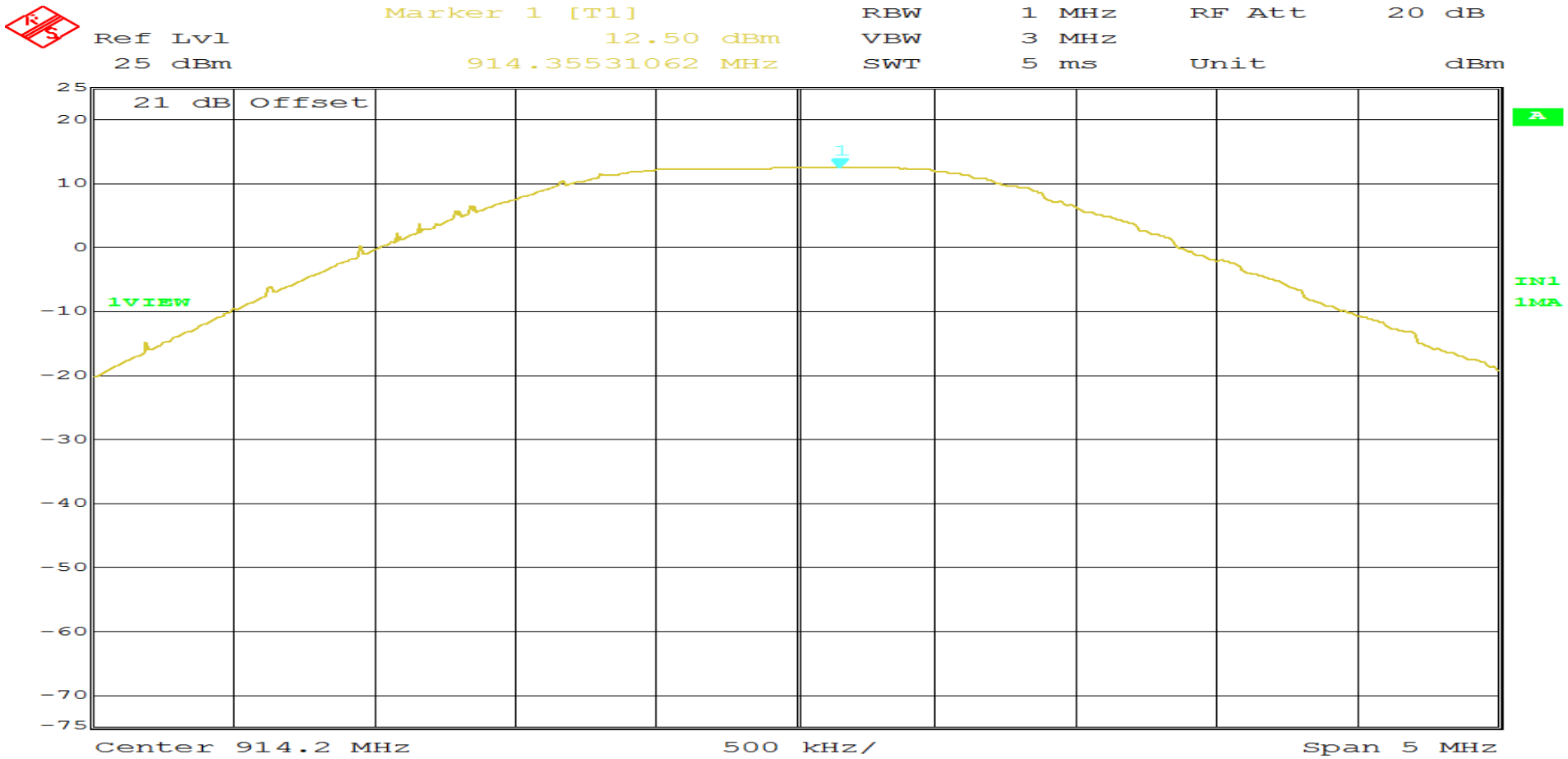
Page 2 of 3

RETLIF TESTING LABORATORIES

Test Method:	Conducted Peak Power Output		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 914.2 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (b)(3)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.6 °C Relative Humidity: 20.3 %		
Notes	Peak Power Output: 12.50 dBm		



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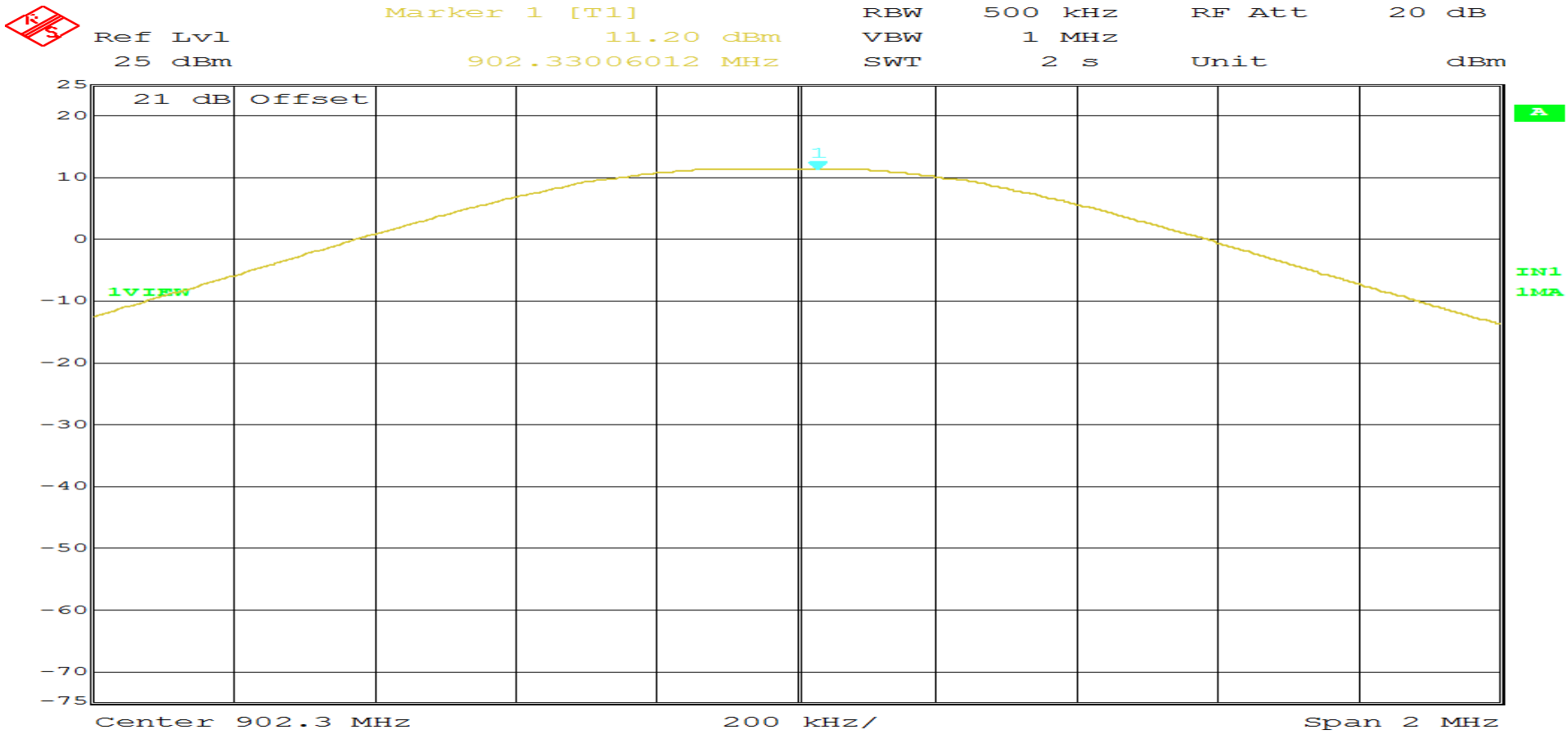
Page 3 of 3

Power Output

FHSS Test Data

RETLIF TESTING LABORATORIES

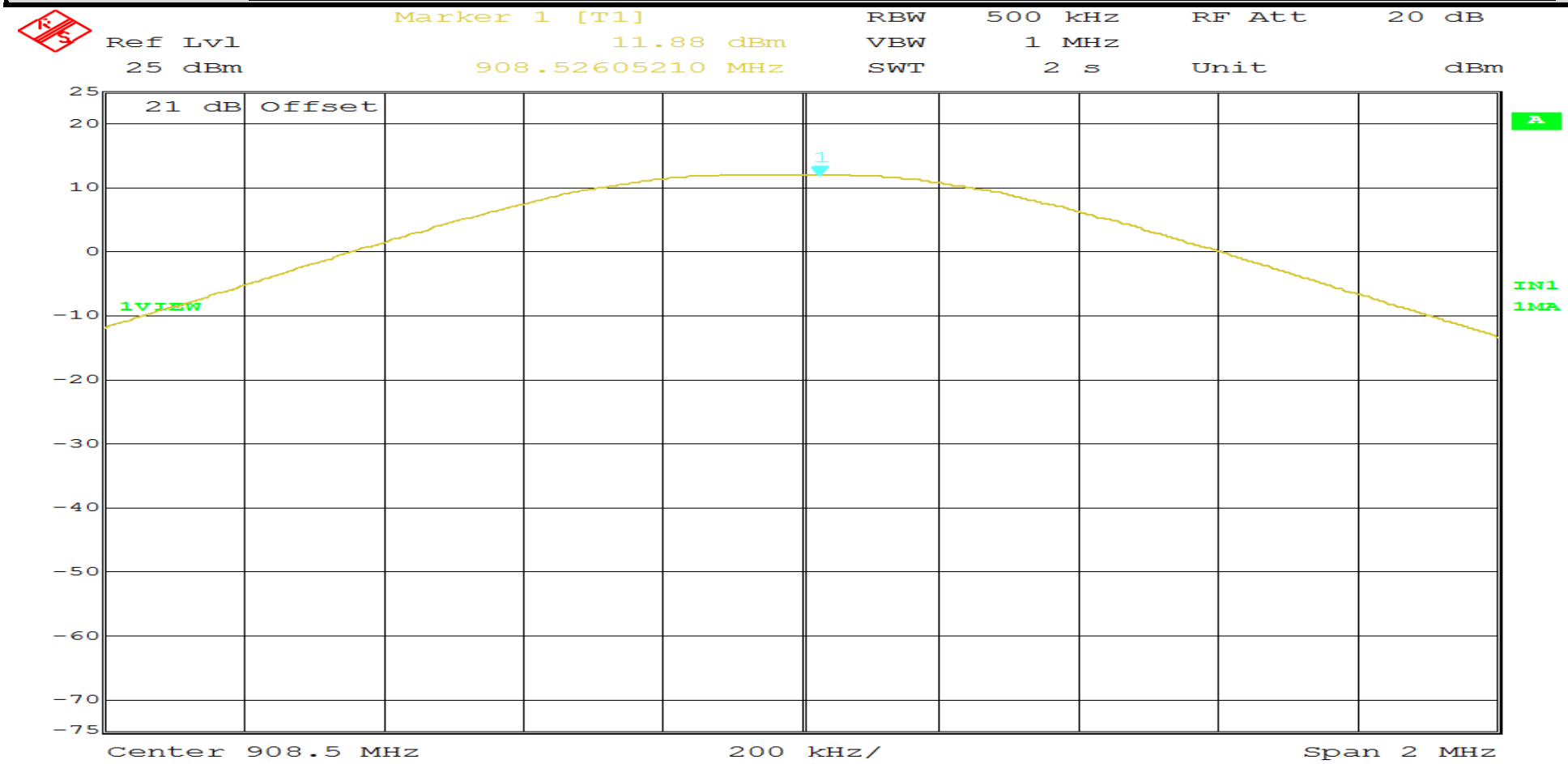
Test Method:	Conducted Peak Power Output		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 902.3 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (b)(2)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 22.3 °C Relative Humidity: 19.1 %		
Notes	Peak Power Output: 11.20 dBm		



Date: 15.JAN.2016 13:00:57
Page 1 of 3

RETLIF TESTING LABORATORIES

Test Method:	Conducted Peak Power Output		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 908.5 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (b)(2)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 22.3 °C Relative Humidity: 19.1 %		
Notes	Peak Power Output: 11.88 dBm		

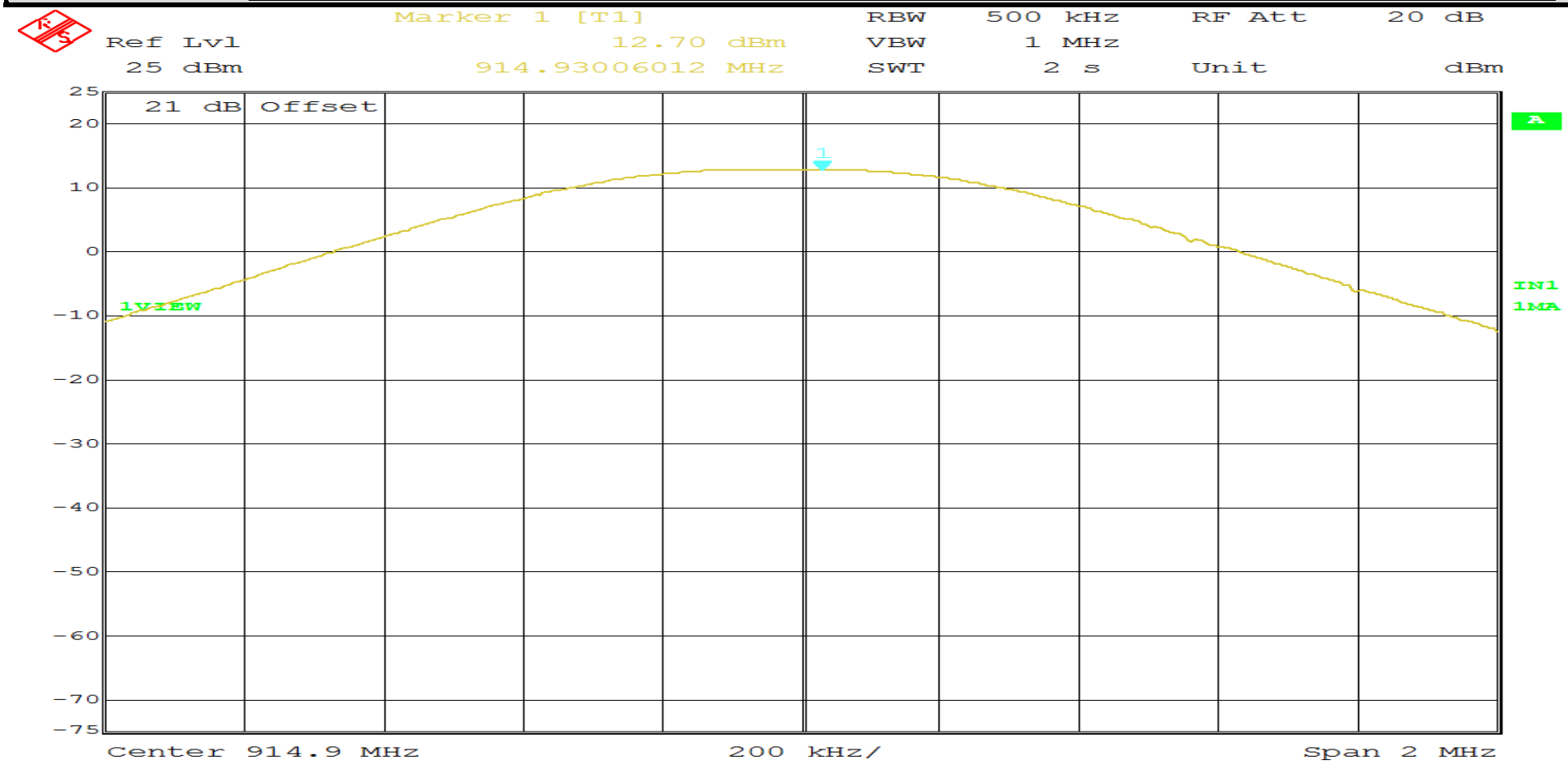


Date: 15.JAN.2016 13:02:58

Page 2 of 3

RETLIF TESTING LABORATORIES

Test Method:	Conducted Peak Power Output		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 914.9 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (b)(2)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 22.3 °C Relative Humidity: 19.1 %		
Notes	Peak Power Output: 12.70 dBm		

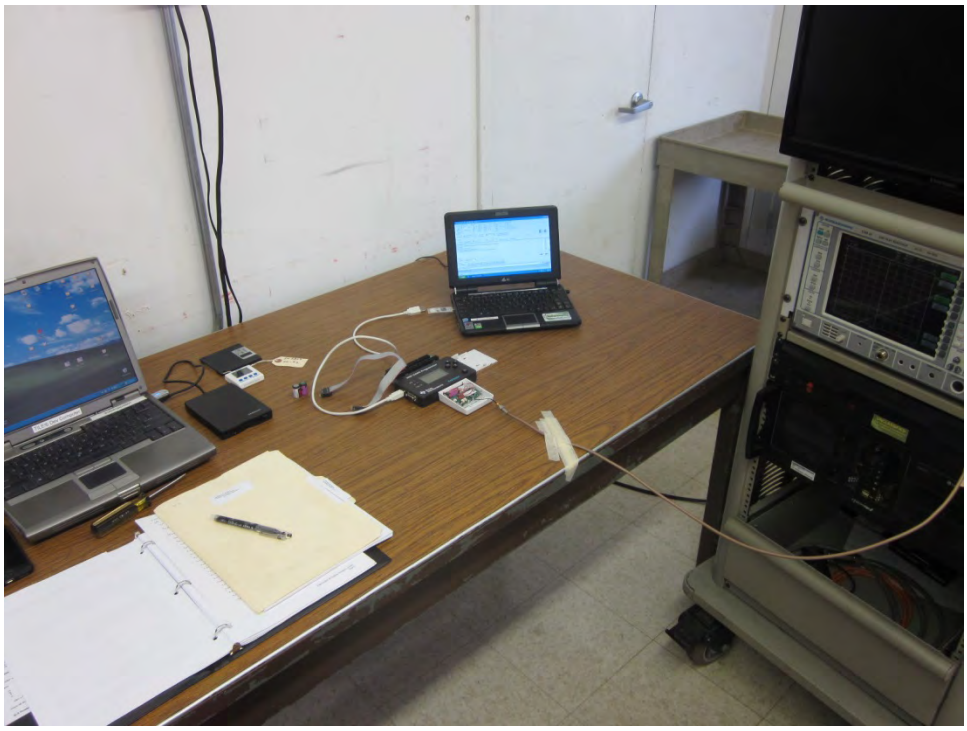


Date: 15.JAN.2016 13:06:29

Page 3 of 3

Test Photograph(s)
Antenna Terminal Out of Band/Band Edge Conducted Emissions, 25 MHz to 10 GHz
FCC Section 15.247(d)

Test Photograph(s)
Antenna Terminal Out of Band/Band Edge Conducted Emissions, 25 MHz to 10 GHz

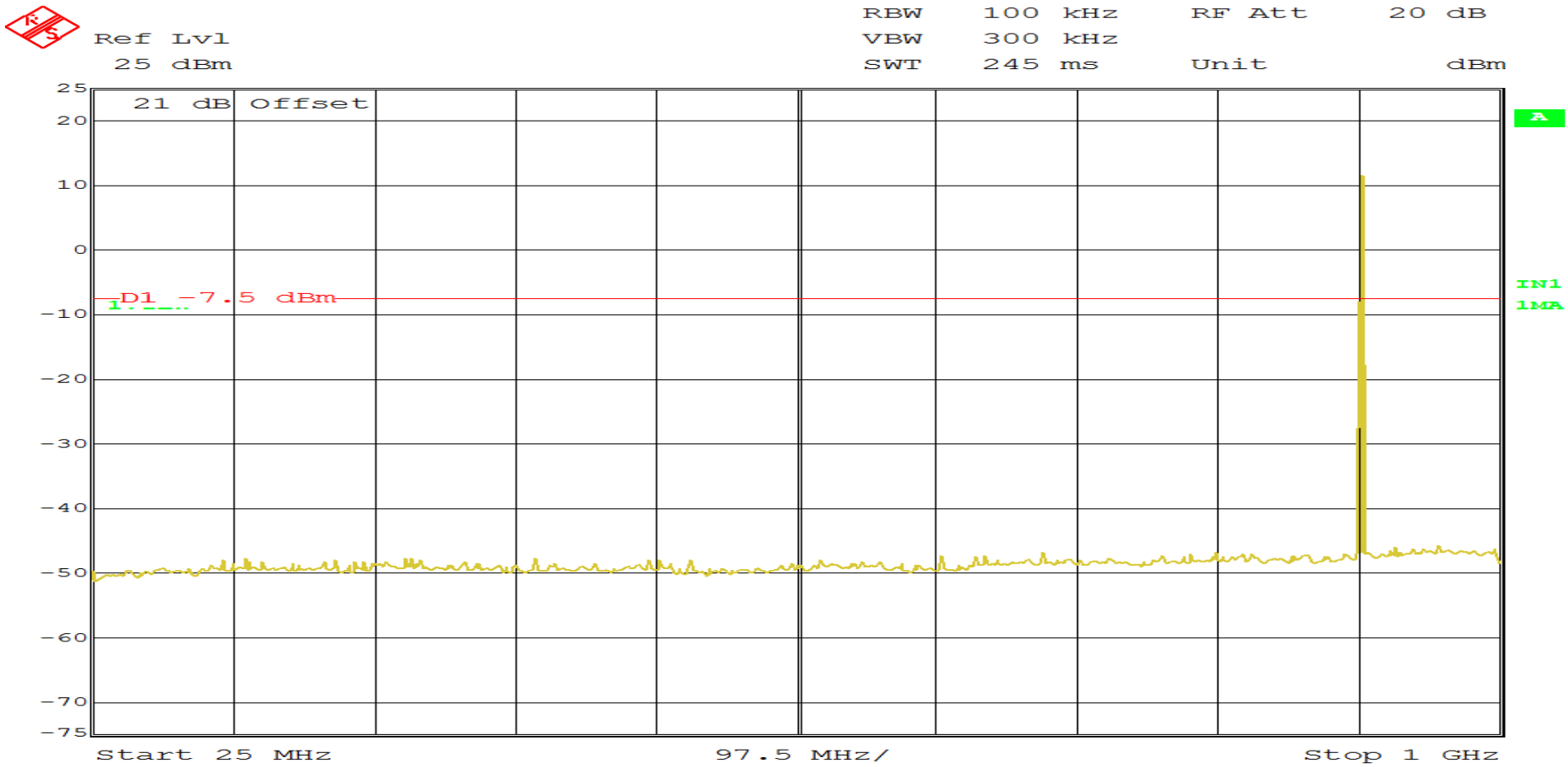


Test Setup

Antenna Terminal Out of Band/Band Edge Conducted Emissions, 25 MHz to 10 GHz
Test Data

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 903 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.0 °C Relative Humidity: 20.3 %		
Notes	Limit: -7.50 dBm		

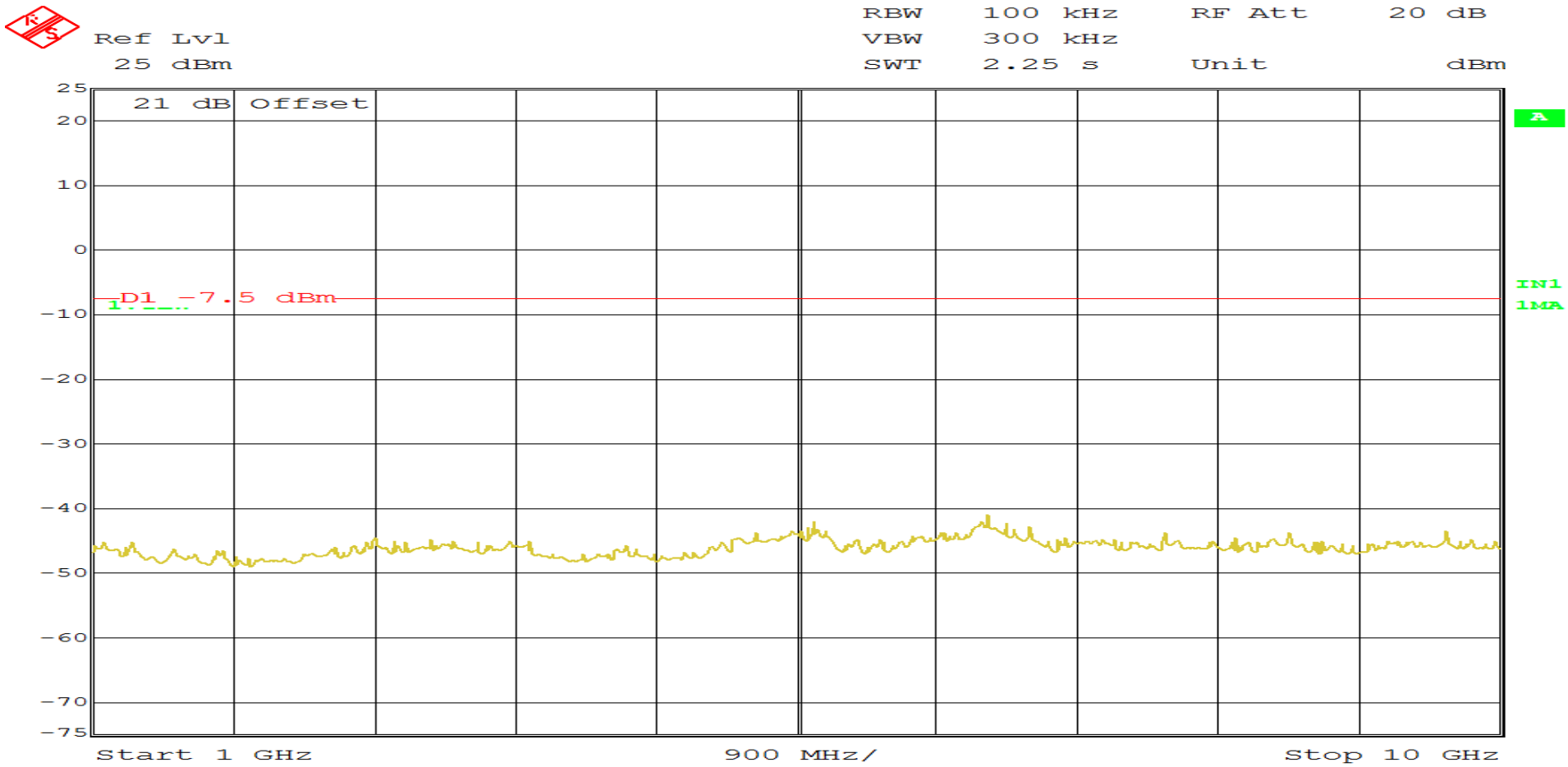


Date: 15.JAN.2016 14:32:01

Page 1 of 6

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 903 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.0 °C Relative Humidity: 20.3 %		
Notes	Limit: -7.50 dBm		

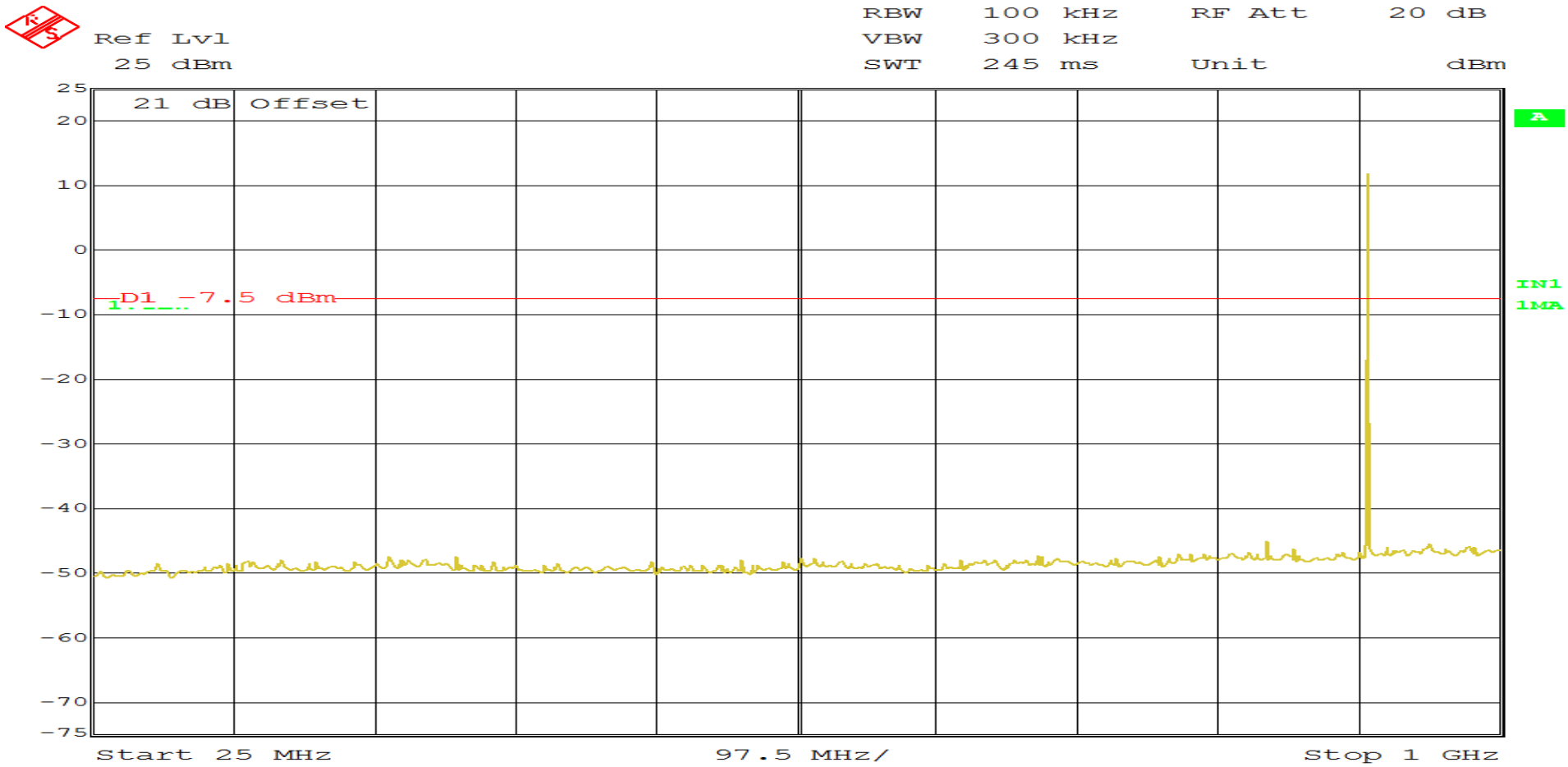


Date: 15.JAN.2016 14:34:10

Page 2 of 6

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 907.8 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.0 °C Relative Humidity: 20.3 %		
Notes	Limit: -7.50 dBm		

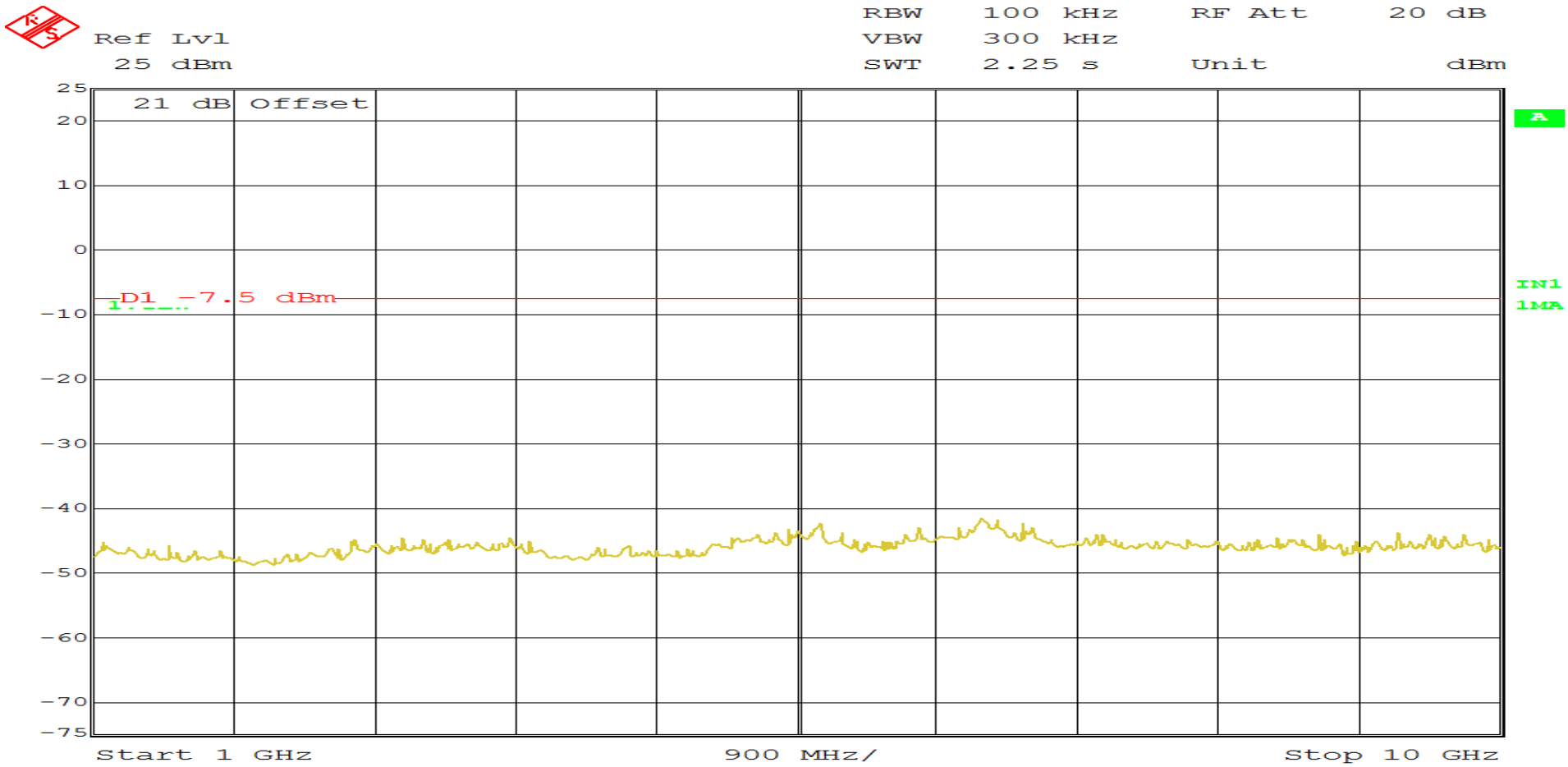


Date: 15.JAN.2016 14:38:31

Page 3 of 6

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 907.8 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.0 °C Relative Humidity: 20.3 %		
Notes	Limit: -7.50 dBm		

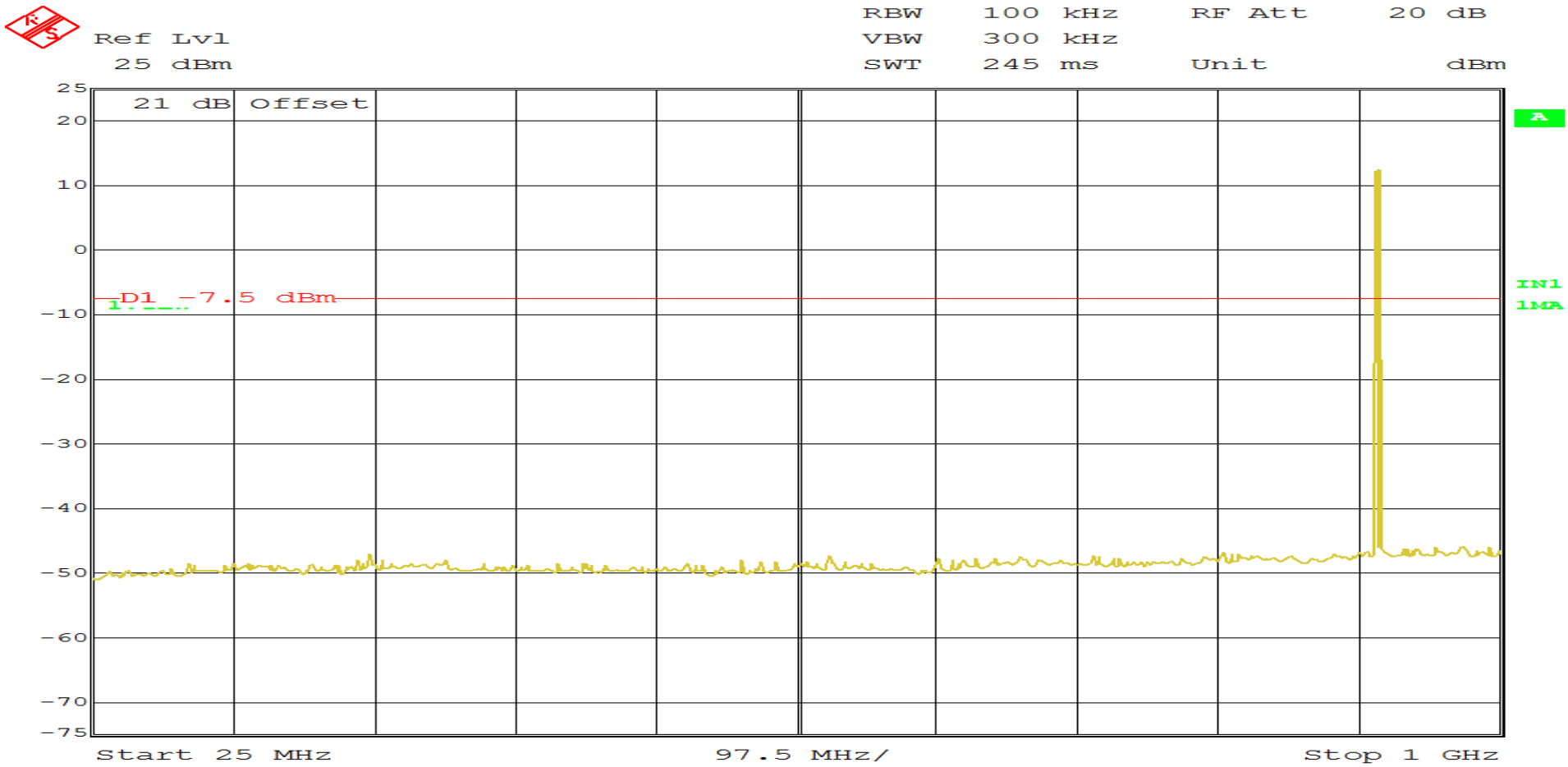


Date: 15.JAN.2016 14:36:12

Page 4 of 6

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 914.2 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.0 °C Relative Humidity: 20.3 %		
Notes	Limit: -7.50 dBm		

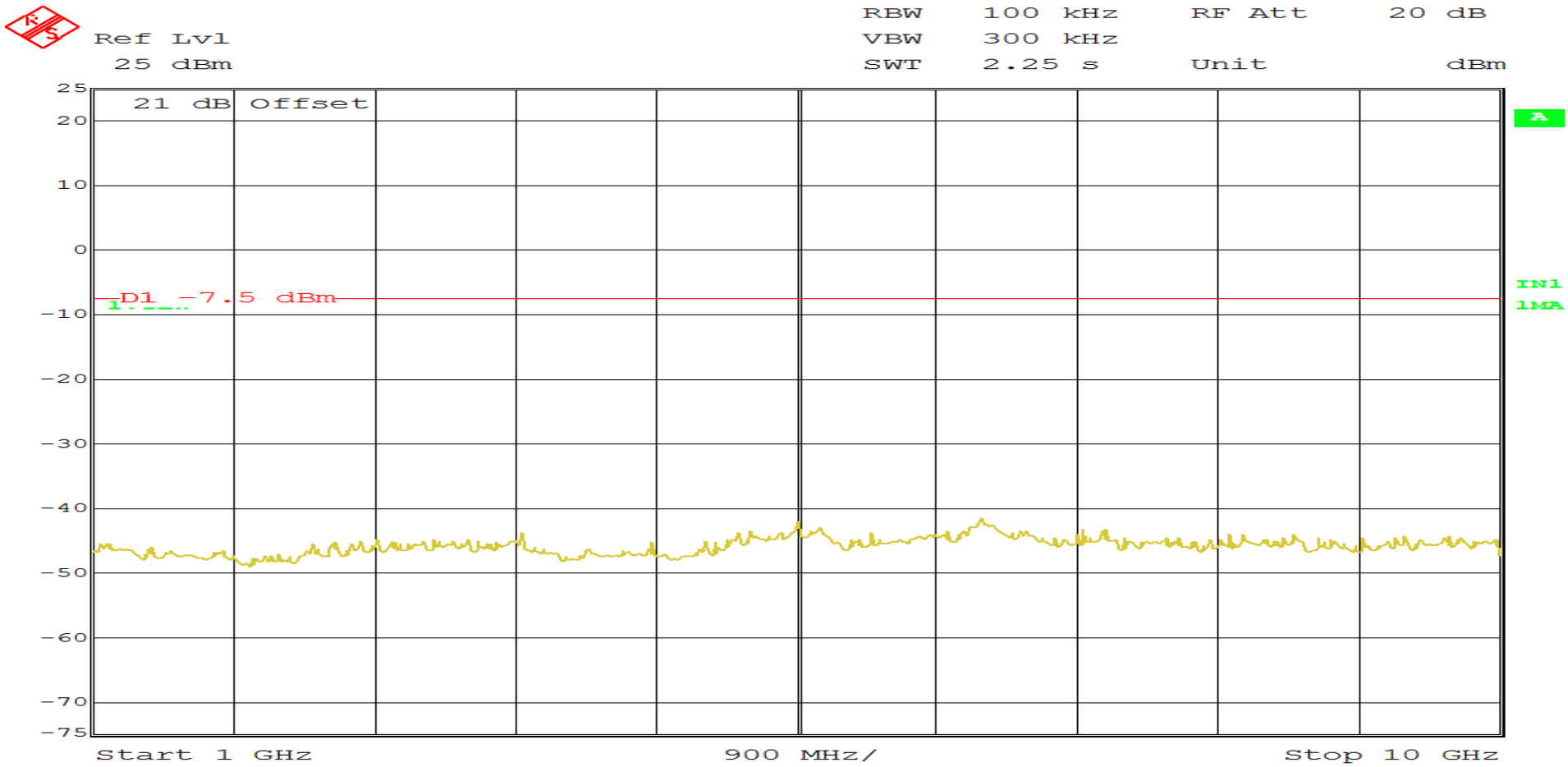


Date: 15.JAN.2016 14:40:45

Page 5 of 6

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 914.2 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.0 °C Relative Humidity: 20.3 %		
Notes	Limit: -7.50 dBm		



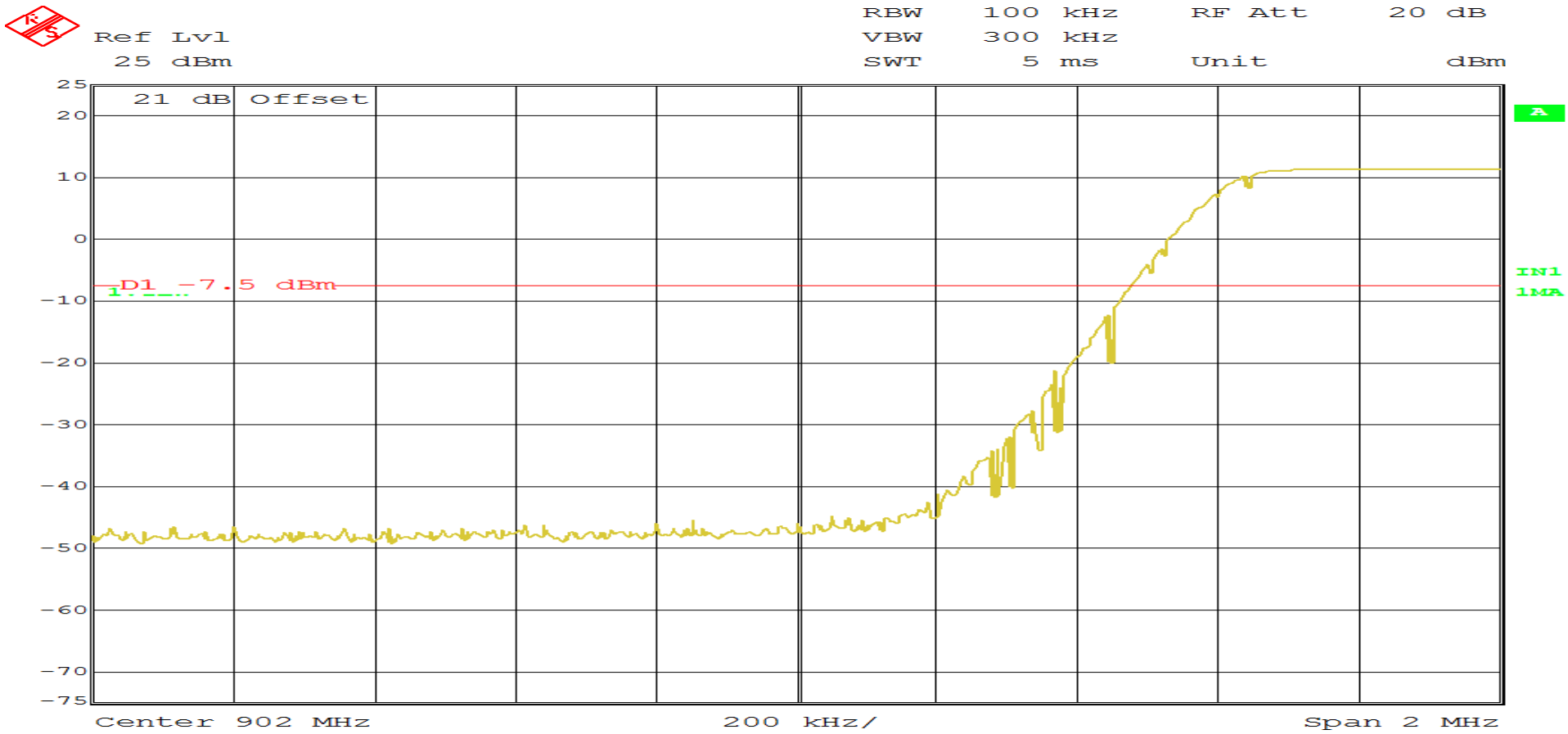
Date: 15.JAN.2016 14:43:10

Page 6 of 6

Band Edge Conducted
Test Data

RETLIF TESTING LABORATORIES

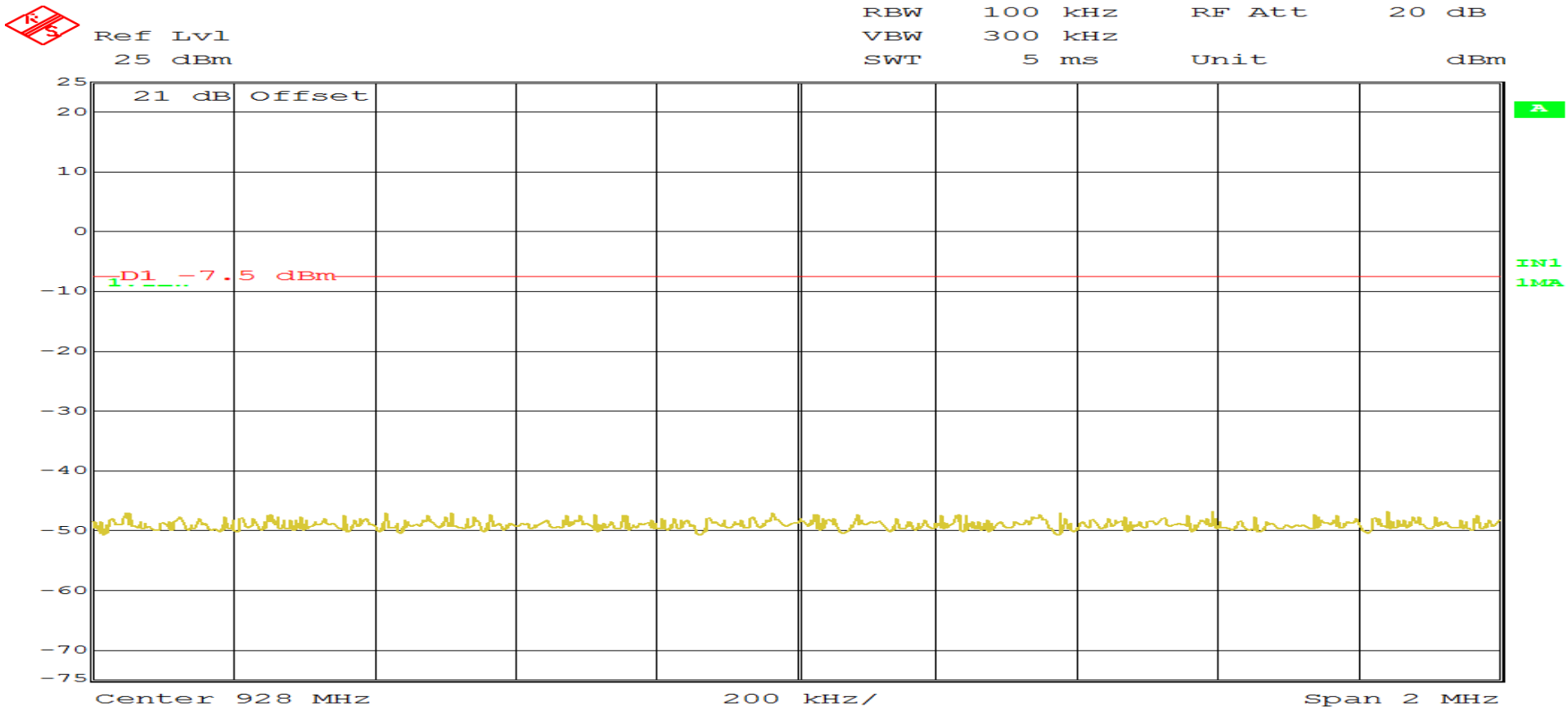
Test Method:	Band Edge Conducted		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 903 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.0 °C Relative Humidity: 20.3 %		
Notes	Limit: -7.50 dBm		



Date: 15.JAN.2016 14:48:56
Page 1 of 2

RETLIF TESTING LABORATORIES

Test Method:	Band Edge Conducted		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 914.2 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.8 °C Relative Humidity: 23.8 %		
Notes	Limit: -7.50 dBm		



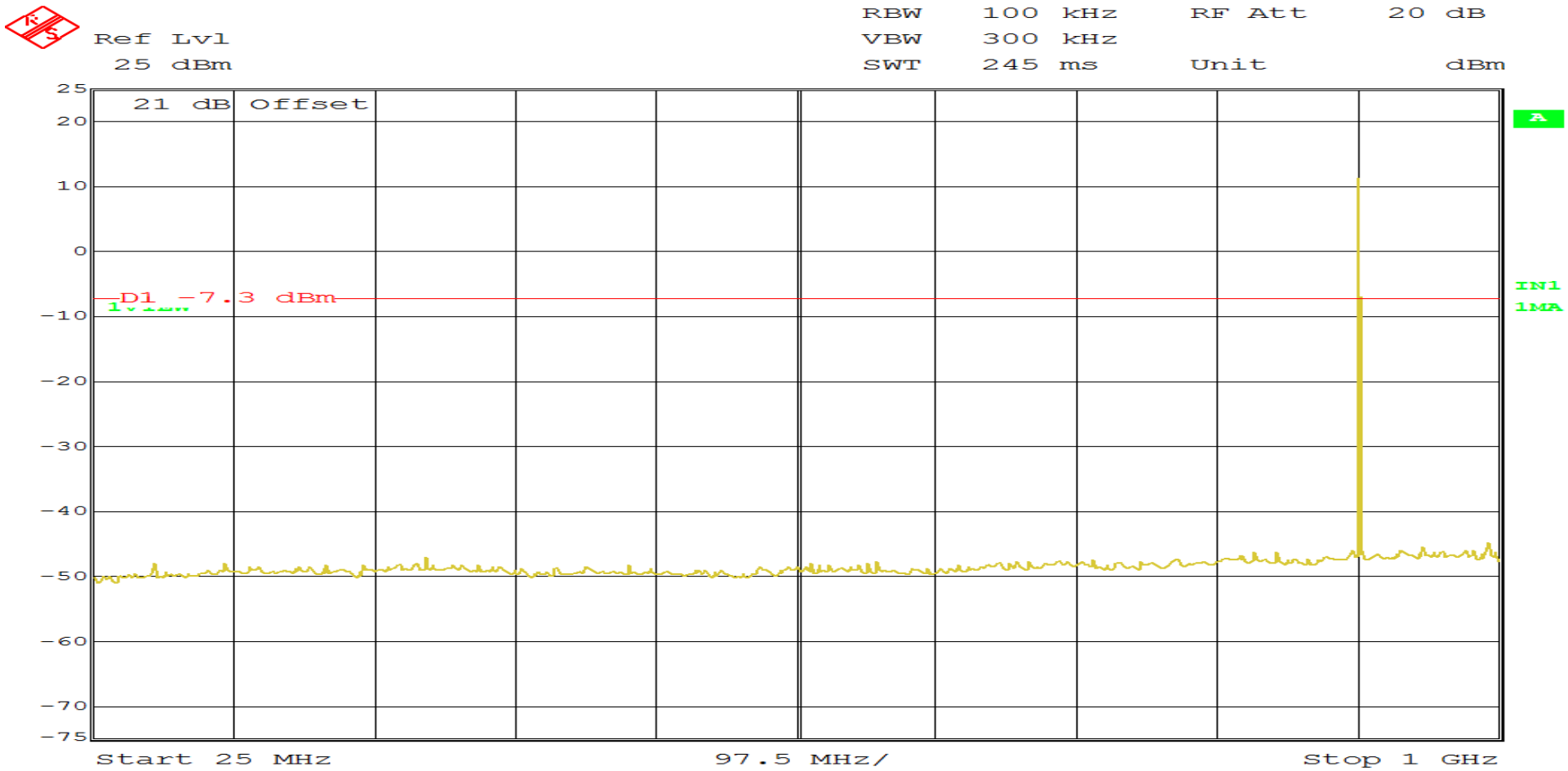
Date: 15.JAN.2016 14:45:03

Page 2 of 2

Antenna Terminal Out of Band/Band Edge Conducted Emissions, 25 MHz to 10 GHz
Test Data

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 902.3 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.8 °C Relative Humidity: 20.7 %		
Notes	Limit: -7.3 dBm		

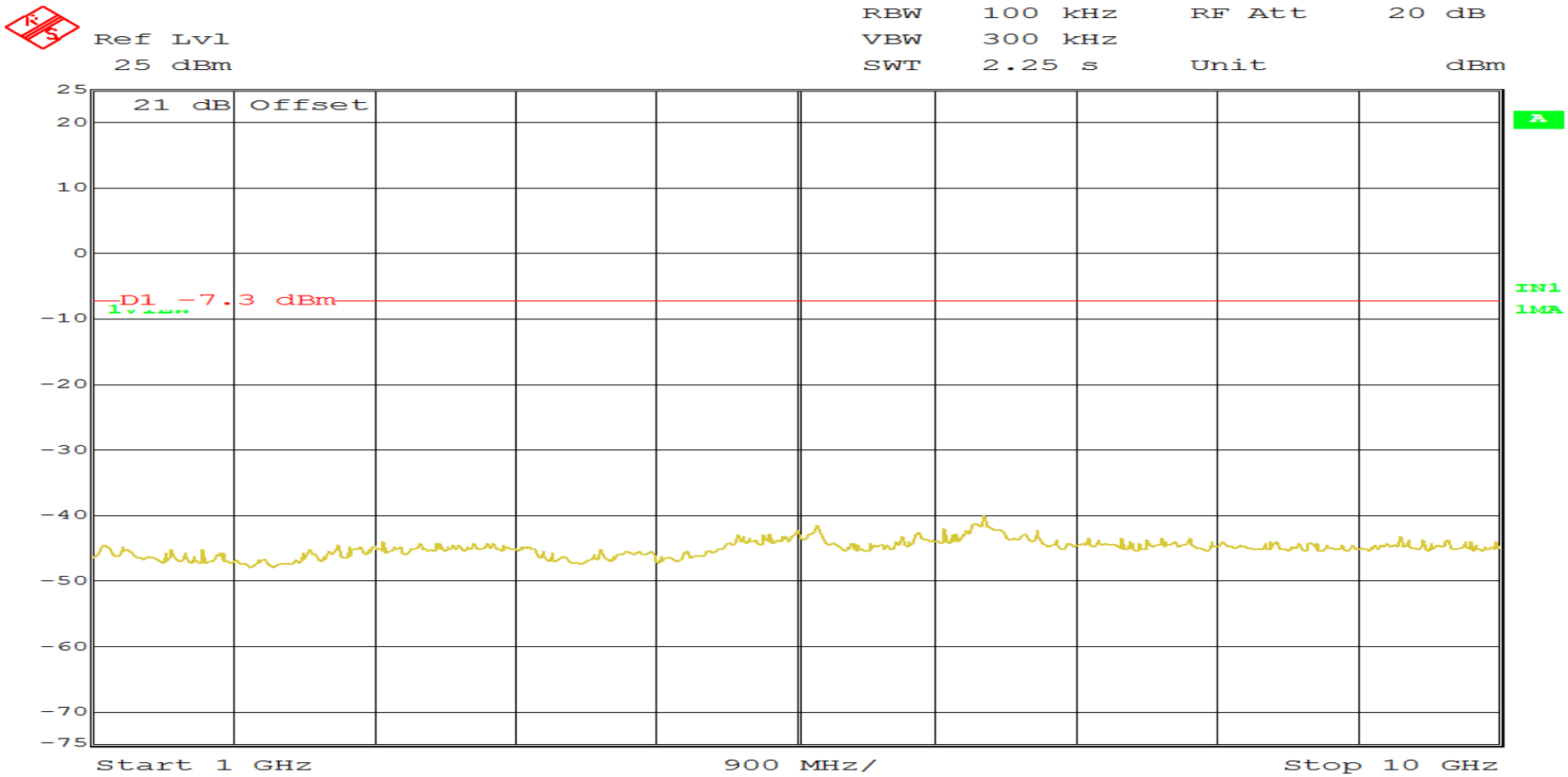


Date: 15.JAN.2016 13:17:33

Page 1 of 6

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 902.3 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.8 °C Relative Humidity: 20.7 %		
Notes	Limit: -7.3 dBm		

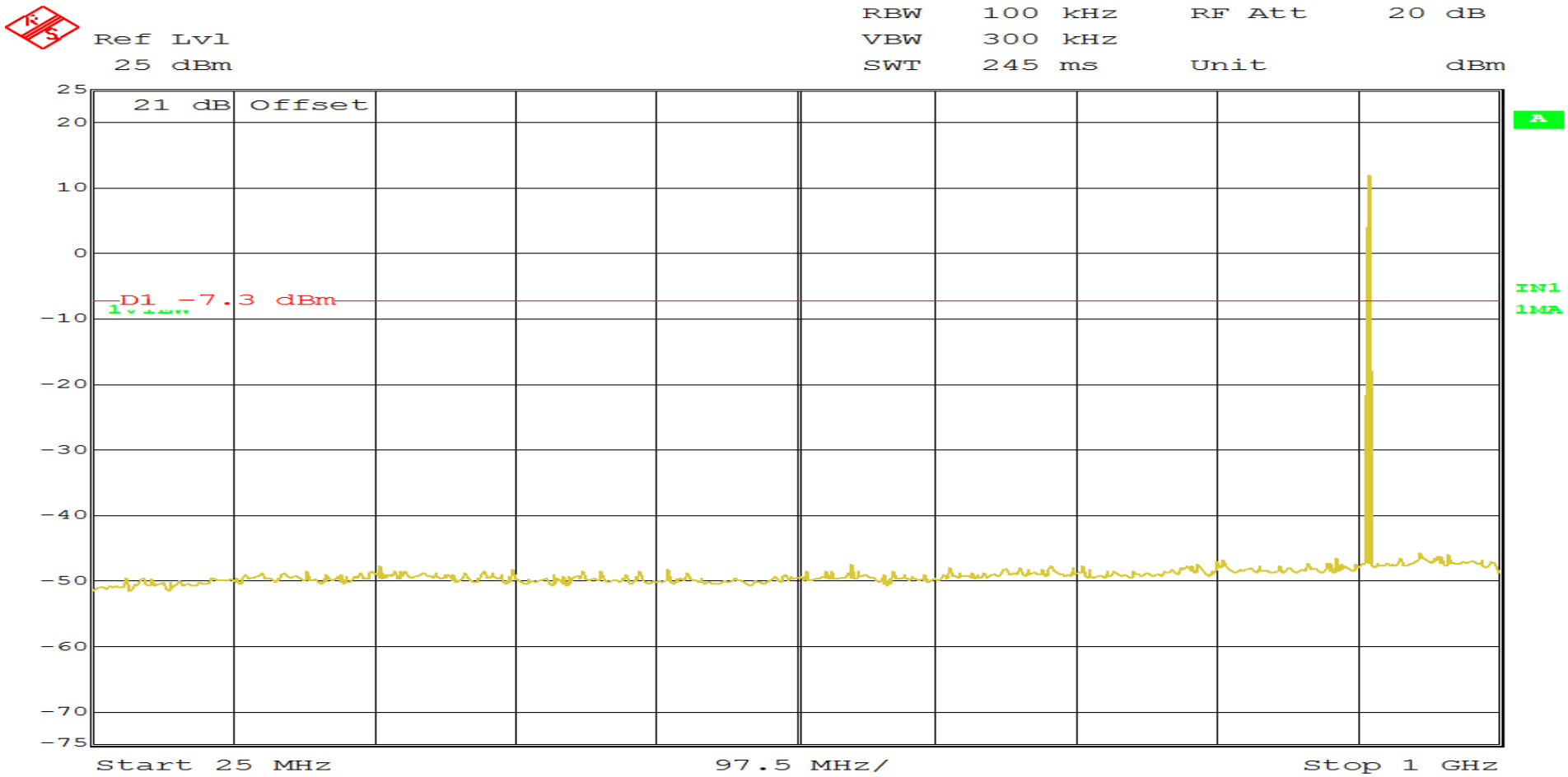


Date: 15.JAN.2016 13:24:04

Page 2 of 6

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 908.5 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.8 °C Relative Humidity: 20.7 %		
Notes	Limit: -7.3 dBm		

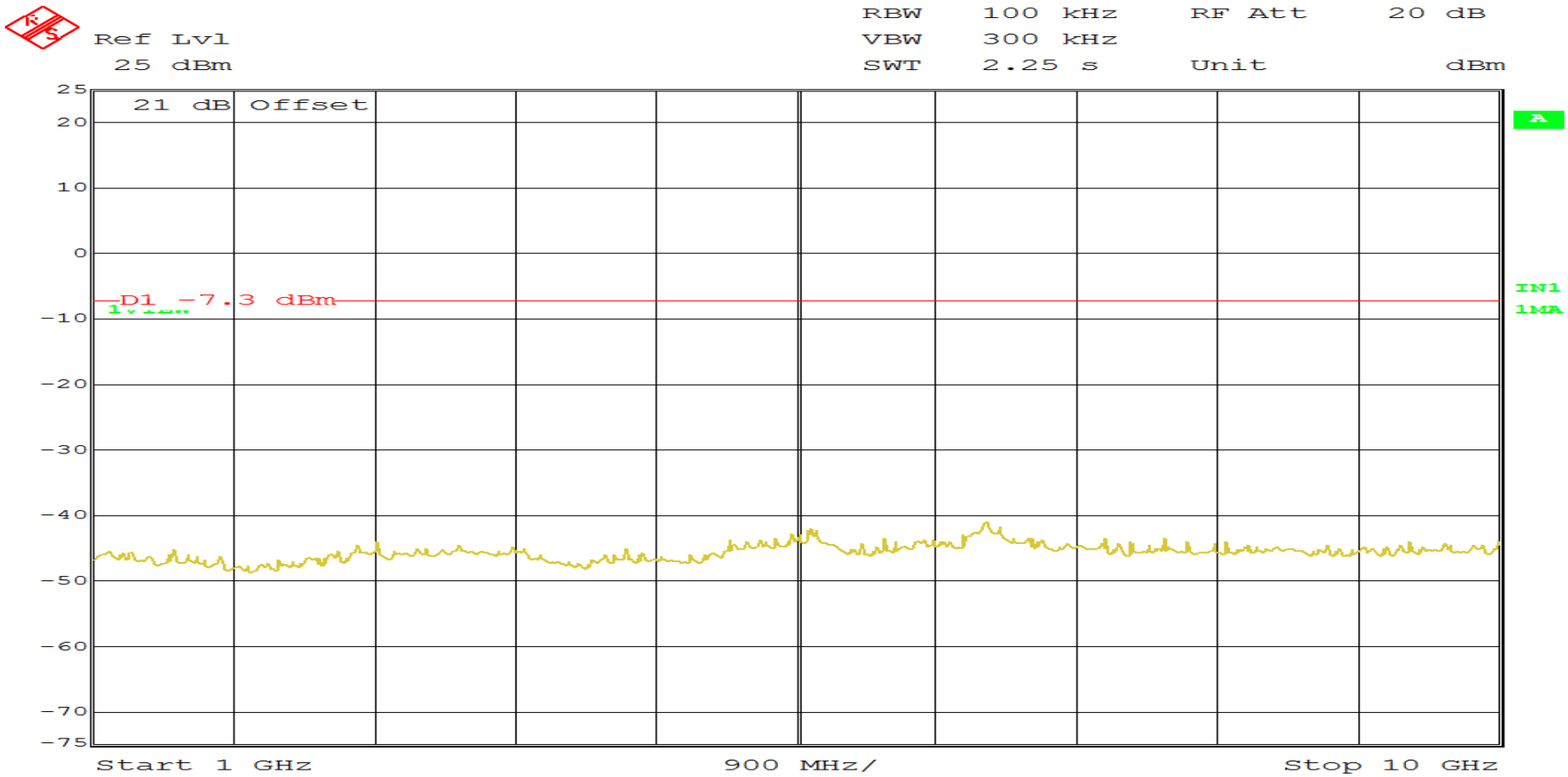


Date: 15.JAN.2016 13:28:30

Page 3 of 8

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 908.5 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.8 °C Relative Humidity: 20.7 %		
Notes	Limit: -7.3 dBm		

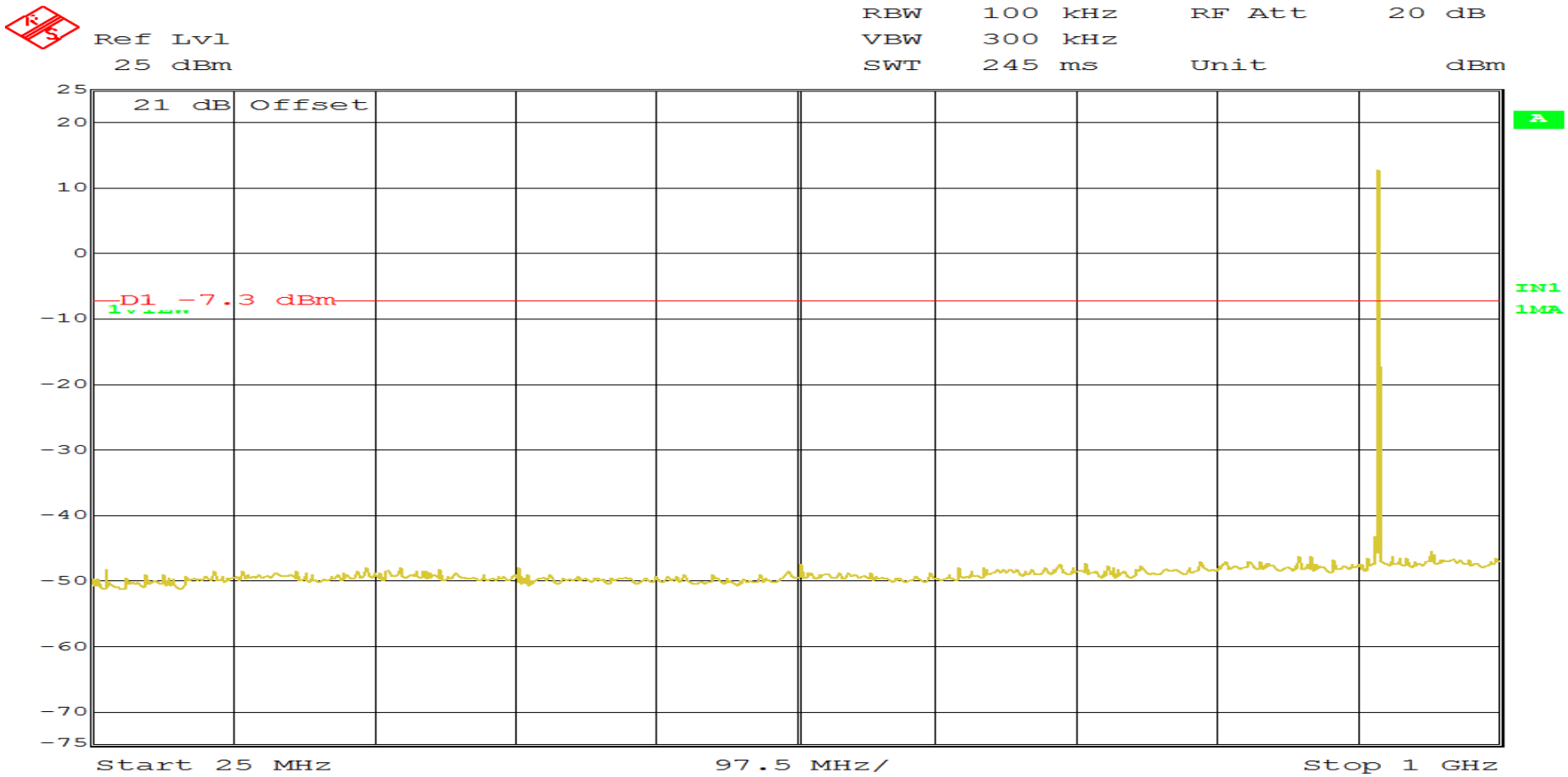


Date: 15.JAN.2016 13:26:39

Page 4 of 6

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 914.9 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.8 °C Relative Humidity: 20.7 %		
Notes	Limit: -7.3 dBm		

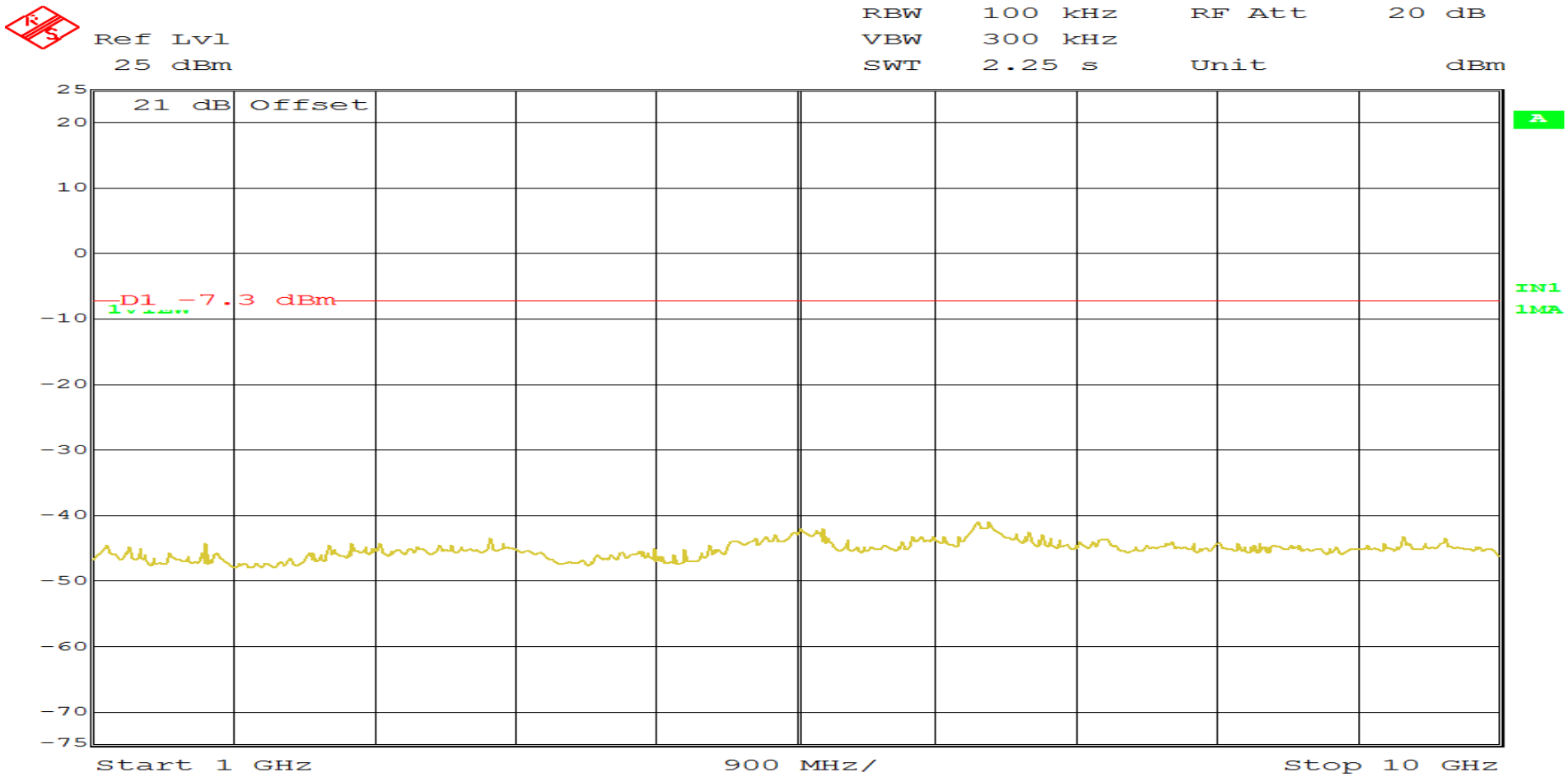


Date: 15.JAN.2016 13:30:55

Page 5 of 6

RETLIF TESTING LABORATORIES

Test Method:	Out of Band Conducted Emissions 25 MHz to 10 GHz		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 914.9 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.8 °C Relative Humidity: 20.7 %		
Notes	Limit: -7.3 dBm		



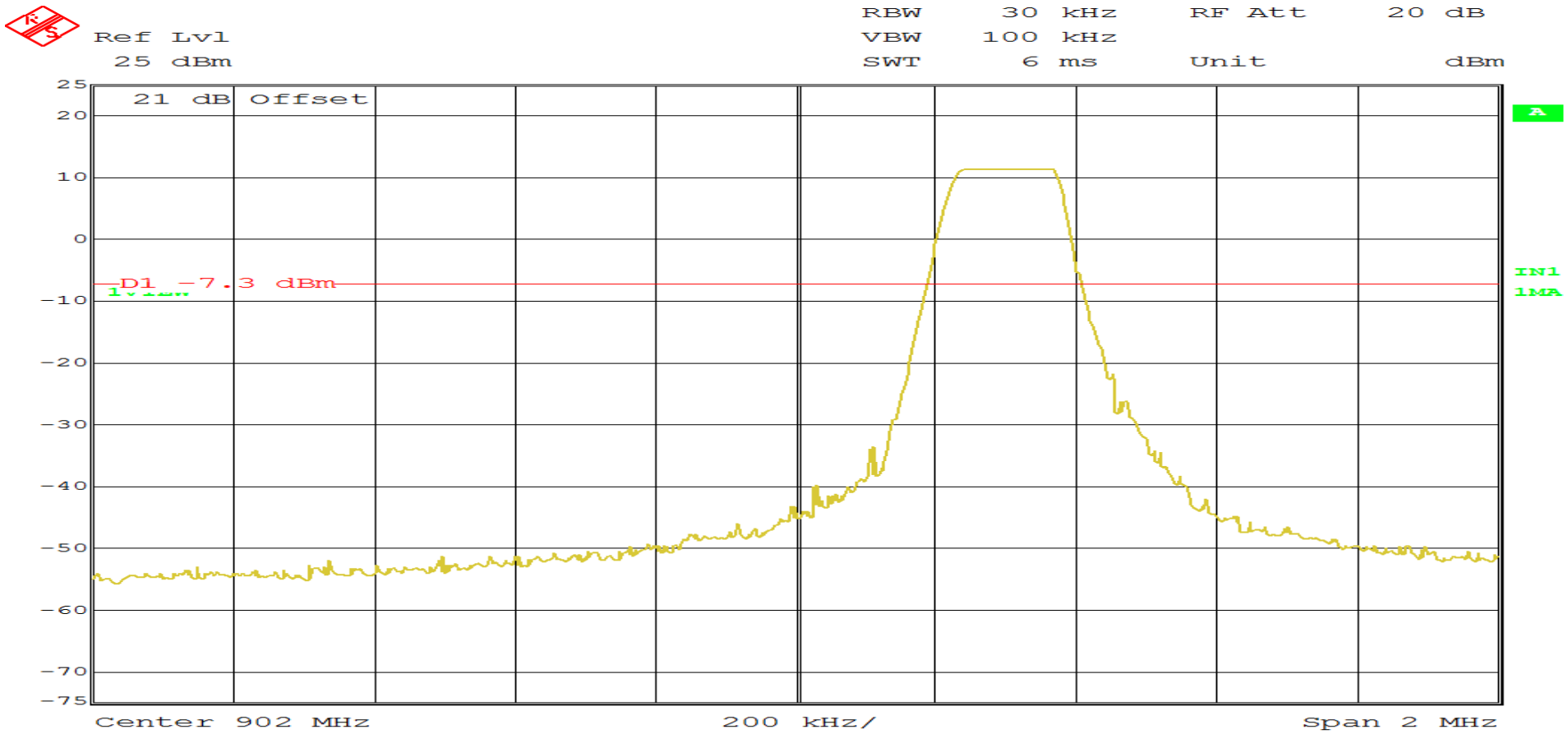
Date: 15.JAN.2016 13:34:45

Page 6 of 6

Band Edge Conducted
Test Data

RETLIF TESTING LABORATORIES

Test Method:	Band Edge Conducted		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 902.3 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.6 °C Relative Humidity: 19.5 %		
Notes	Limit: -7.3 dBm		

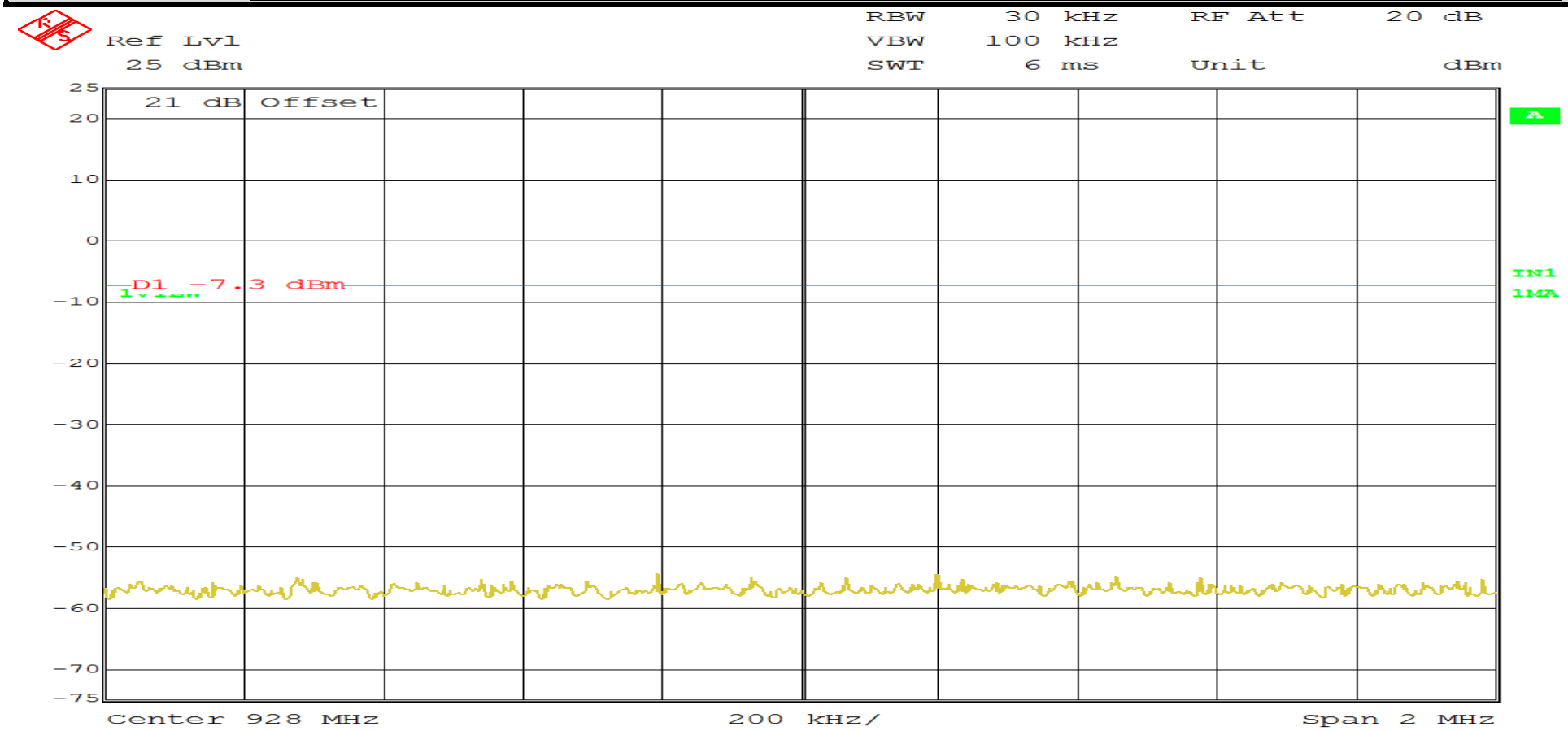


Date: 15.JAN.2016 13:39:57

Page 1 of 2

RETLIF TESTING LABORATORIES

Test Method:	Band Edge Conducted		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547920001
Operating Mode	Transmitting modulated(FHSS) signal at 914.9 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (d)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.6 °C Relative Humidity: 19.5 %		
Notes	Limit: -7.3 dBm		



Date: 15.JAN.2016 13:42:49

Page 2 of 2

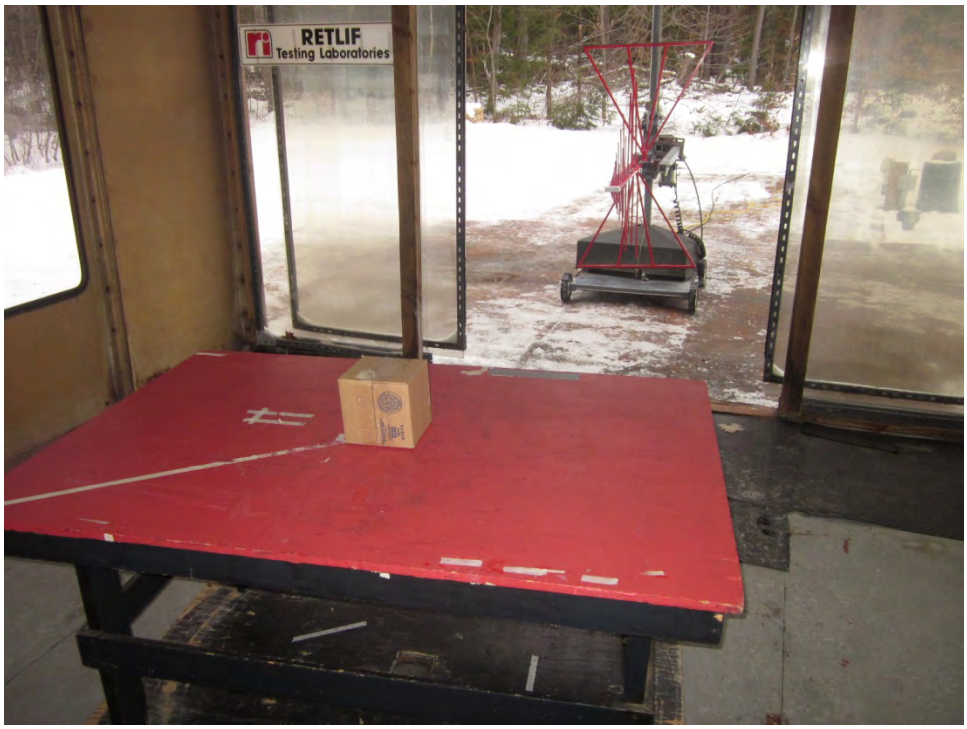
Test Photograph(s)
Out of Band/Band Edge Radiated Emissions, 30 MHz to 10 GHz
FCC Section 15.247(d)

Test Photograph(s)
Out of Band/Band Edge Radiated Emissions

Test Setup

Test Photograph(s)
Out of Band/Band Edge Radiated Emissions

30 MHz – 1 GHz, Horizontal Polarization



30 MHz – 1 GHz, Vertical Polarization

Test Photograph(s)
Out of Band/Band Edge Radiated Emissions

1 GHz – 10 GHz, Horizontal Polarization

1 GHz – 10 GHz, Vertical Polarization

Unwanted Emissions into Restricted Frequency Bands
30 MHz to 10 GHz
DTS Test Data

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated(DTS) signal	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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	12.83	14.20	27.03	*		22.46	I
38.25	-	-	-	-			-	100.00
73.00	-	-	-	-			-	100.00
|	74.00	13.31	8.36	21.67	*		12.12	I
74.60	-	-	-	-			-	100.00
74.80	-	-	-	-			-	100.00
|	75.00	14.39	8.36	22.75	*		13.72	|
75.20	-	-	-	-			-	100.00
108.00	-	-	-	-			-	150.00
|	115.00	4.42	10.02	14.44	*		5.27	|
|	-	-	-	-			-	|
121.94	-	-	-	-			-	150.00
123.00	-	-	-	-			-	150.00
|	132.00	2.98	9.44	12.42	*		4.18	|
|	-	-	-	-			-	|
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 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated(DTS) signal	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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	9.12	11.17	20.29	*		10.34	|
150.05	-	-	-	-			-	150.00
156.52	-	-	-	-			-	150.00
|	156.52	2.35	12.08	14.43	*		5.27	|
156.52	-	-	-	-			-	150.00
156.70	-	-	-	-			-	150.00
|	156.80	2.19	12.12	14.31	*		5.19	|
156.90	-	-	-	-			-	150.00
162.01	-	-	-	-			-	150.00
|	165.00	3.31	12.68	15.99	*		6.30	|
167.17	-	-	-	-			-	150.00
167.72	-	-	-	-			-	150.00
|	170.00	6.84	12.80	19.64	*		9.59	|
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 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated(DTS) signal	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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
|	260.00	-0.02	16.85	16.83	*		6.94	|
285.00	-	-	-	-			-	200.00
322.80	-	-	-	-			-	200.00
|	330.00	0.47	18.91	19.38	*		9.31	|
335.40	-	-	-	-			-	200.00
399.90	-	-	-	-			-	200.00
|	405.00	2.24	21.49	23.73	*		15.36	|
410.00	-	-	-	-			-	200.00
608.00	-	-	-	-			-	200.00
|	611.00	1.45	27.34	28.79	*		27.51	|
614.00	-	-	-	-			-	200.00
960.00	-	-	-	-			-	500.00
|	975.00	1.38	32.10	33.48	*		47.21	|
1240.00	-	-	-	-			-	500.00
1300.00	-	-	-	-			-	500.00
|	1350.00	32.27	-9.50	22.77	*		13.76	|
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 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated(DTS) signal	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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	33.11	-9.4	23.71	*		15.33	|
1646.50	-	-	-	-			-	500.00
1660.00	-	-	-	-			-	500.00
|	1680.00	31.27	-9.04	22.23	*		12.93	|
1710.00	-	-	-	-			-	500.00
1718.80	-	-	-	-			-	500.00
|	1720.00	31.24	-8.64	22.60	*		13.49	|
1722.20	-	-	-	-			-	500.00
2200.00	-	-	-	-			-	500.00
|	2250.00	32.32	-6.76	25.56	*		18.97	|
2300.00	-	-	-	-			-	500.00
2310.00	-	-	-	-			-	500.00
|	2360.00	31.06	-6.51	24.55	*		16.88	|
2390.00	-	-	-	-			-	500.00
2483.50	-	-	-	-			-	500.00
|	2490.00	32.05	-6.11	25.94	*		19.82	|
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 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated(DTS) signal	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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
|	2709.00	57.28	-5.4	51.88			392.64	|
|	2723.40	57.45	-5.4	52.05			400.41	|
|	2742.60	57.79	-5.4	52.39			416.39	|
2900.00	-	-	-	-			-	500.00
3260.00	-	-	-	-			-	500.00
|	3263.00	30.55	-3.4	27.15	*		22.78	|
3267.00	-	-	-	-			-	500.00
3332.00	-	-	-	-			-	500.00
|	3336.00	31.41	-3.1	28.31	*		26.03	|
3339.00	-	-	-	-			-	500.00
3345.00	-	-	-	-			-	500.00
|	3350.00	30.94	-3.1	27.84	*		24.66	|
3358.00	-	-	-	-			-	500.00
3600.00	-	-	-	-			-	500.00
|	3612.00	35.39	-2.4	32.99			44.62	|
|	3631.20	35.45	-2.4	33.05			44.93	|
|	3656.80	36.19	-2.4	33.79			48.92	|

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 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated(DTS) signal	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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
|	4515.00	41.95	-1.16	40.79			109.52	|
|	4539.00	42.05	-1.16	40.89			110.79	|
|	4571.00	42.35	-0.91	41.44			118.03	|
|	-	-	-	-			-	|
5150.00	-	-	-	-			-	500.00
5350.00	-	-	-	-			-	500.00
|	5400.00	40.19	0.89	39.30	*		92.26	|
5460.00	-	-	-	-			-	500.00
7250.00	-	-	-	-			-	500.00
|	7500.00	40.17	2.87	37.30	*		73.28	|
7750.00	-	-	-	-			-	500.00
8025.00	-	-	-	-			-	500.00
|	8127.00	38.88	3.20	35.68			60.81	|
|	8170.20	39.05	3.30	35.75			61.31	|
|	8227.80	39.05	3.50	35.55			59.31	|
|	-	-	-	-			-	|
8500.00	-	-	-	-			-	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 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting modulated(DTS) signal	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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
9000.00	-	-	-	-			-	500.00
|	9085.00	32.27	4.72	36.99	*		70.71	|
9200.00	-	-	-	-			-	500.00
9300.00	-	-	-	-			-	500.00
|	9400.00	32.25	4.56	36.81	*		69.26	|
9500.00	-	-	-	-			-	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 7 of 7

Unwanted Emissions into Restricted Frequency Bands
25 MHz to 10 GHz
FHSS Test Data

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting hopping frequency data	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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	12.83	14.20	27.03	*		22.46	I
38.25	-	-	-	-			-	100.00
73.00	-	-	-	-			-	100.00
|	74.00	13.31	8.36	21.67	*		12.12	I
74.60	-	-	-	-			-	100.00
74.80	-	-	-	-			-	100.00
|	75.00	14.39	8.36	22.75	*		13.72	|
75.20	-	-	-	-			-	100.00
108.00	-	-	-	-			-	150.00
|	115.00	4.42	10.02	14.44	*		5.27	|
|	-	-	-	-			-	|
121.94	-	-	-	-			-	150.00
123.00	-	-	-	-			-	150.00
|	132.00	2.98	9.44	12.42	*		4.18	|
|	-	-	-	-			-	|
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 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting hopping frequency data	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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	9.12	11.17	20.29	*		10.34	|
150.05	-	-	-	-			-	150.00
156.52	-	-	-	-			-	150.00
|	156.52	2.35	12.08	14.43	*		5.27	|
156.52	-	-	-	-			-	150.00
156.70	-	-	-	-			-	150.00
|	156.80	2.19	12.12	14.31	*		5.19	|
156.90	-	-	-	-			-	150.00
162.01	-	-	-	-			-	150.00
|	165.00	3.31	12.68	15.99	*		6.30	|
167.17	-	-	-	-			-	150.00
167.72	-	-	-	-			-	150.00
|	170.00	6.84	12.80	19.64	*		9.59	|
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 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting hopping frequency data	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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
|	260.00	-0.02	16.85	16.83	*		6.94	|
285.00	-	-	-	-			-	200.00
322.80	-	-	-	-			-	200.00
|	330.00	0.47	18.91	19.38	*		9.31	|
335.40	-	-	-	-			-	200.00
399.90	-	-	-	-			-	200.00
|	405.00	2.24	21.49	23.73	*		15.36	|
410.00	-	-	-	-			-	200.00
608.00	-	-	-	-			-	200.00
|	611.00	1.45	27.34	28.79	*		27.51	|
614.00	-	-	-	-			-	200.00
960.00	-	-	-	-			-	500.00
|	975.00	1.38	32.10	33.48	*		47.21	|
1240.00	-	-	-	-			-	500.00
1300.00	-	-	-	-			-	500.00
|	1350.00	32.27	-9.50	22.77	*		13.76	|
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 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting hopping frequency data	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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	33.11	-9.4	23.71	*		15.33	|
1646.50	-	-	-	-			-	500.00
1660.00	-	-	-	-			-	500.00
|	1680.00	31.27	-9.04	22.23	*		12.93	|
1710.00	-	-	-	-			-	500.00
1718.80	-	-	-	-			-	500.00
|	1720.00	31.24	-8.64	22.60	*		13.49	|
1722.20	-	-	-	-			-	500.00
2200.00	-	-	-	-			-	500.00
|	2250.00	32.32	-6.76	25.56	*		18.97	|
2300.00	-	-	-	-			-	500.00
2310.00	-	-	-	-			-	500.00
|	2360.00	31.06	-6.51	24.55	*		16.88	|
2390.00	-	-	-	-			-	500.00
2483.50	-	-	-	-			-	500.00
|	2490.00	32.05	-6.11	25.94	*		19.82	|
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 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting hopping frequency data	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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
|	2706.90	32.14	-5.4	26.74	*		21.73	|
|	2725.50	32.17	-5.4	26.77	*		21.80	|
|	2744.70	32.19	-5.4	26.79	*		21.85	|
2900.00	-	-	-	-			-	500.00
3260.00	-	-	-	-			-	500.00
|	3263.00	30.55	-3.4	27.15	*		22.78	|
3267.00	-	-	-	-			-	500.00
3332.00	-	-	-	-			-	500.00
|	3336.00	31.41	-3.1	28.31	*		26.03	|
3339.00	-	-	-	-			-	500.00
3345.00	-	-	-	-			-	500.00
|	3350.00	30.94	-3.1	27.84	*		24.66	|
3358.00	-	-	-	-			-	500.00
3600.00	-	-	-	-			-	500.00
|	3609.20	30.96	-2.4	28.56	*		26.79	|
|	3659.60	30.99	-2.4	28.59	*		26.88	|
|	3634.00	31.05	-2.4	28.65	*		27.07	|

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 5 of 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting hopping frequency data	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

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
|	4511.50	32.01	-1.16	30.85	*		34.87	|
|	4574.50	31.05	-1.16	29.89	*		31.22	|
|	4542.50	30.16	-0.91	29.25	*		29.01	|
|	-	-	-	-			-	|
5150.00	-	-	-	-			-	500.00
5350.00	-	-	-	-			-	500.00
|	5400.00	30.98	0.89	31.87	*		39.22	|
5460.00	-	-	-	-			-	500.00
7250.00	-	-	-	-			-	500.00
|	7500.00	32.75	2.87	35.62	*		60.39	|
7750.00	-	-	-	-			-	500.00
8025.00	-	-	-	-			-	500.00
|	8120.70	32.45	3.20	35.65	*		60.60	|
|	8176.50	31.69	3.30	34.99	*		56.17	|
|	8234.10	31.91	3.50	35.41	*		58.95	|
|	-	-	-	-			-	|
8500.00	-	-	-	-			-	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 6 of 8

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Nke Watteco	
Job Number	R-6046N-3	
Test Sample	Temperature and Humidity Sensor	
Model Number	THr	
Serial Number	2100547920001	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.247(d)
Operating Mode	Transmitting hopping frequency data	
Technician	M. Seamans	
Date	January 19th, 2016	

Notes: Antenna Test Distance: 3 meters Detector: Quasi-Peak <1GHz, Average >1GHz
Corrected Reading(dBuV/M) = Meter Reading (dBuV)+Correction Factor (dB) Converted Reading (uV/M) = 10^{ Corrected Reading /20}

TEST PARAMETERS

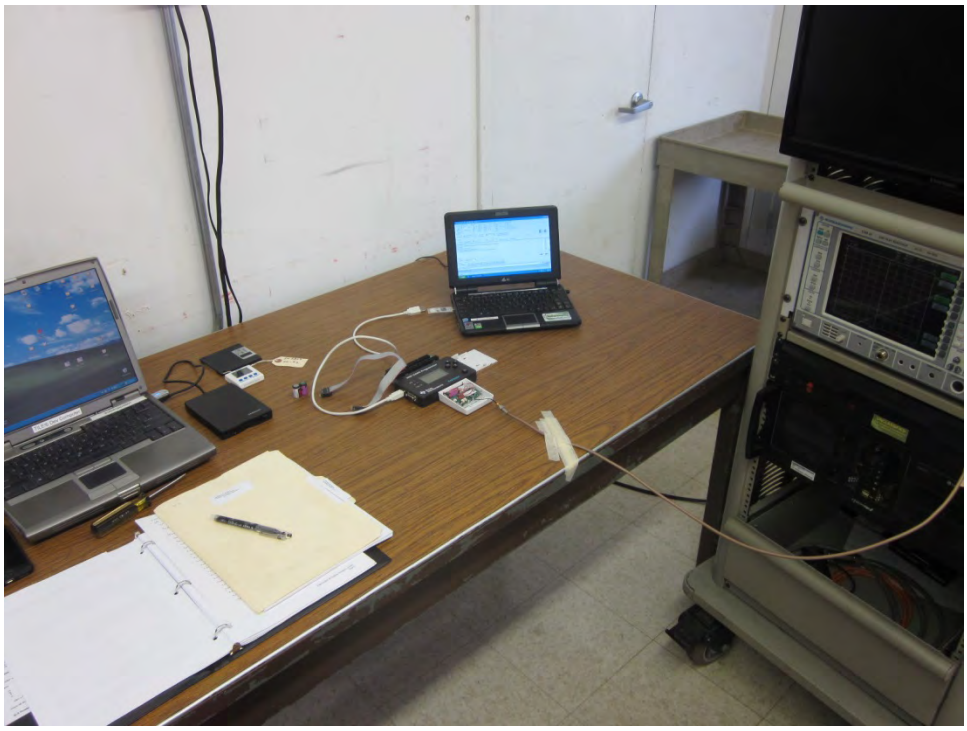
Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
9000.00	-	-	-	-			-	500.00
|	9085.00	32.27	4.72	36.99	*		70.71	|
9200.00	-	-	-	-			-	500.00
9300.00	-	-	-	-			-	500.00
|	9400.00	32.25	4.56	36.81	*		69.26	|
9500.00	-	-	-	-			-	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 7 of 7

Test Photograph(s)
Power Density
FCC Section 15.247(e)

Test Photograph(s)
Power Density

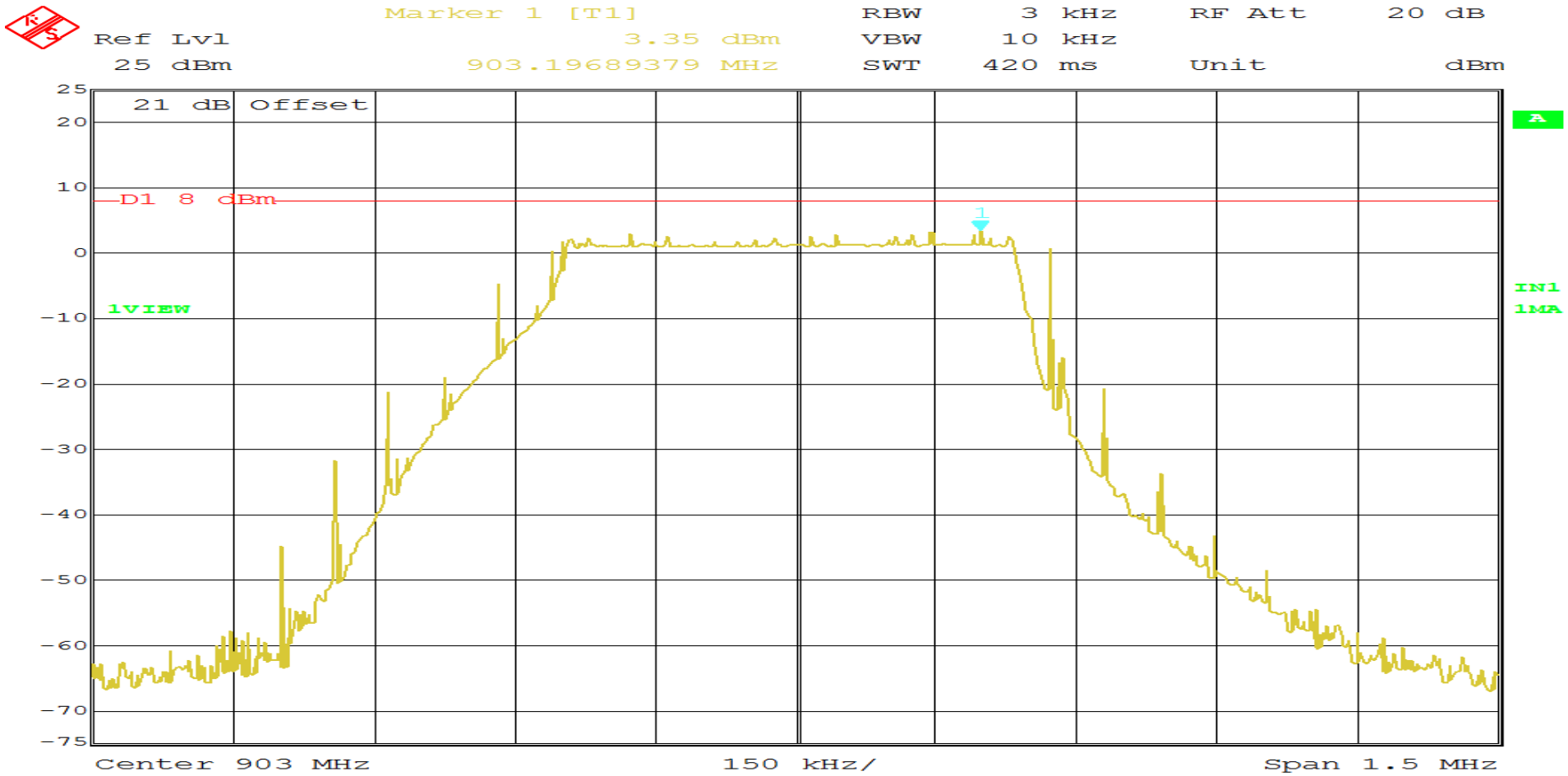


Test Configuration

Power Spectral Density
Test Data

RETLIF TESTING LABORATORIES

Test Method:	Power Spectral Density		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 903 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (e)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 22.0 °C Relative Humidity: 20.2 %		
Notes	Power Spectral Density: 3.35 dBm Limit: 8 dBm		



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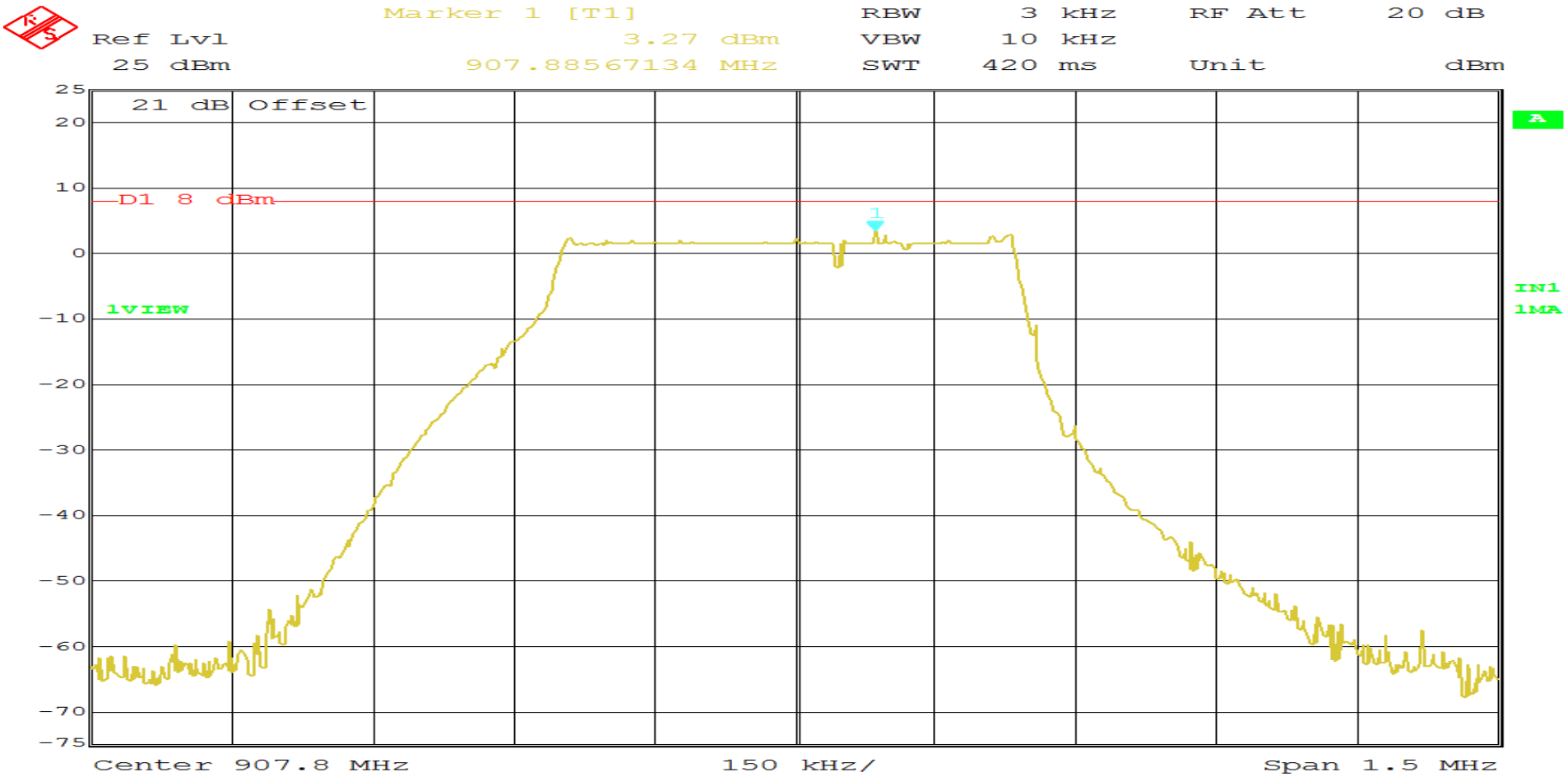
Page 1 of 3

RETLIF TESTING LABORATORIES

Test Method:	Power Spectral Density		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 907.8 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (e)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 22.0 °C Relative Humidity: 20.2 %		
Notes	Power Spectral Density: 3.27 dBm Limit: 8 dBm		



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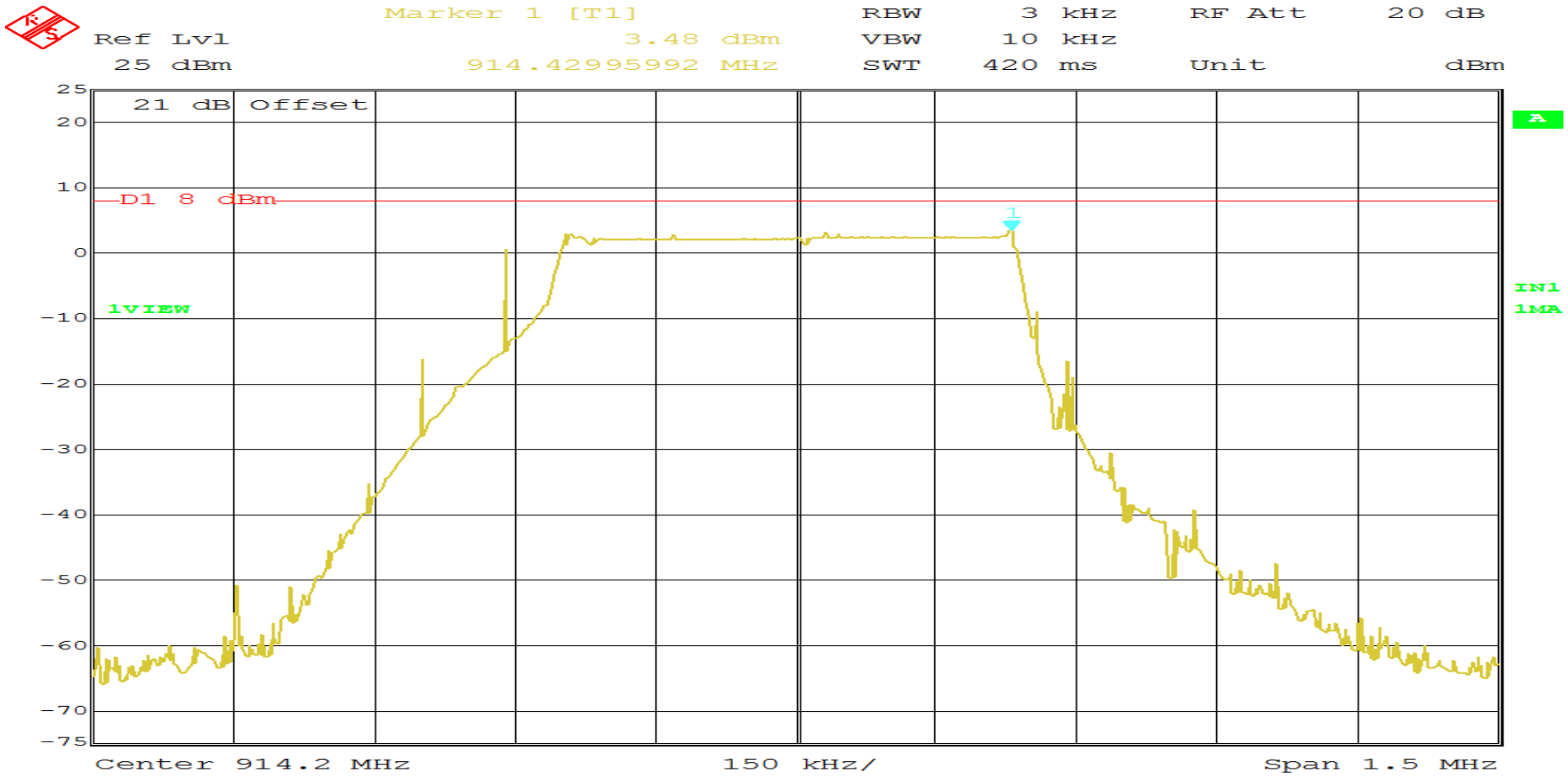
Page 2 of 3

RETLIF TESTING LABORATORIES

Test Method:	Power Spectral Density		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(DTS) signal at 914.2 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (e)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 22.0 °C Relative Humidity: 20.2 %		
Notes	Power Spectral Density: 3.48 dBm Limit: 8 dBm		



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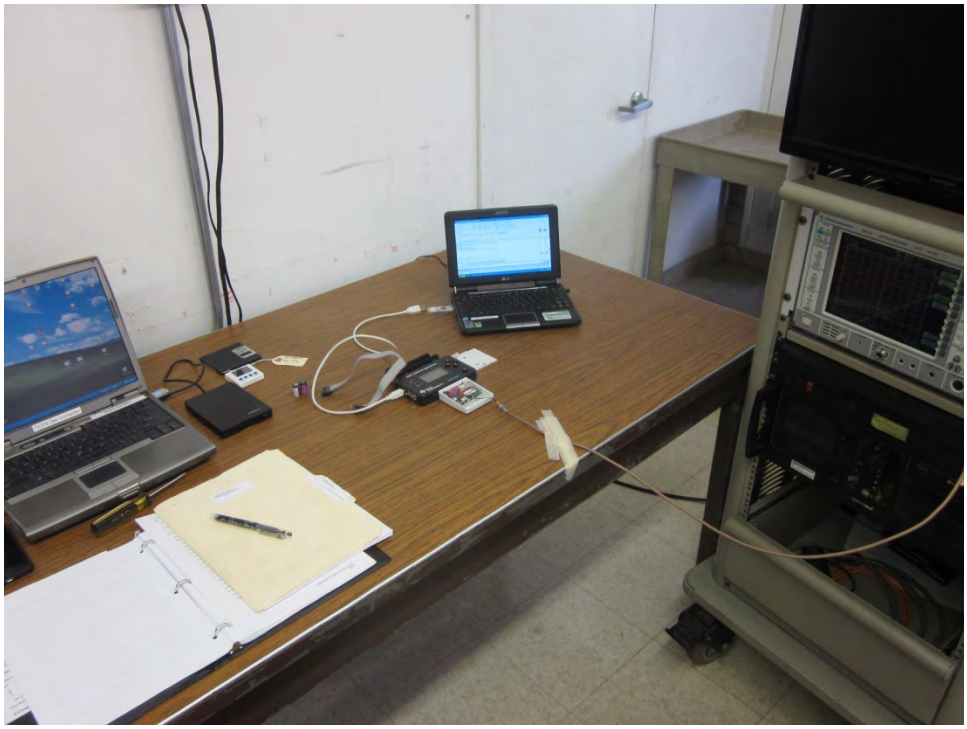
Page 3 of 3

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

Test Photograph(s)
FHSS Bandwidth
20 dB Bandwidth

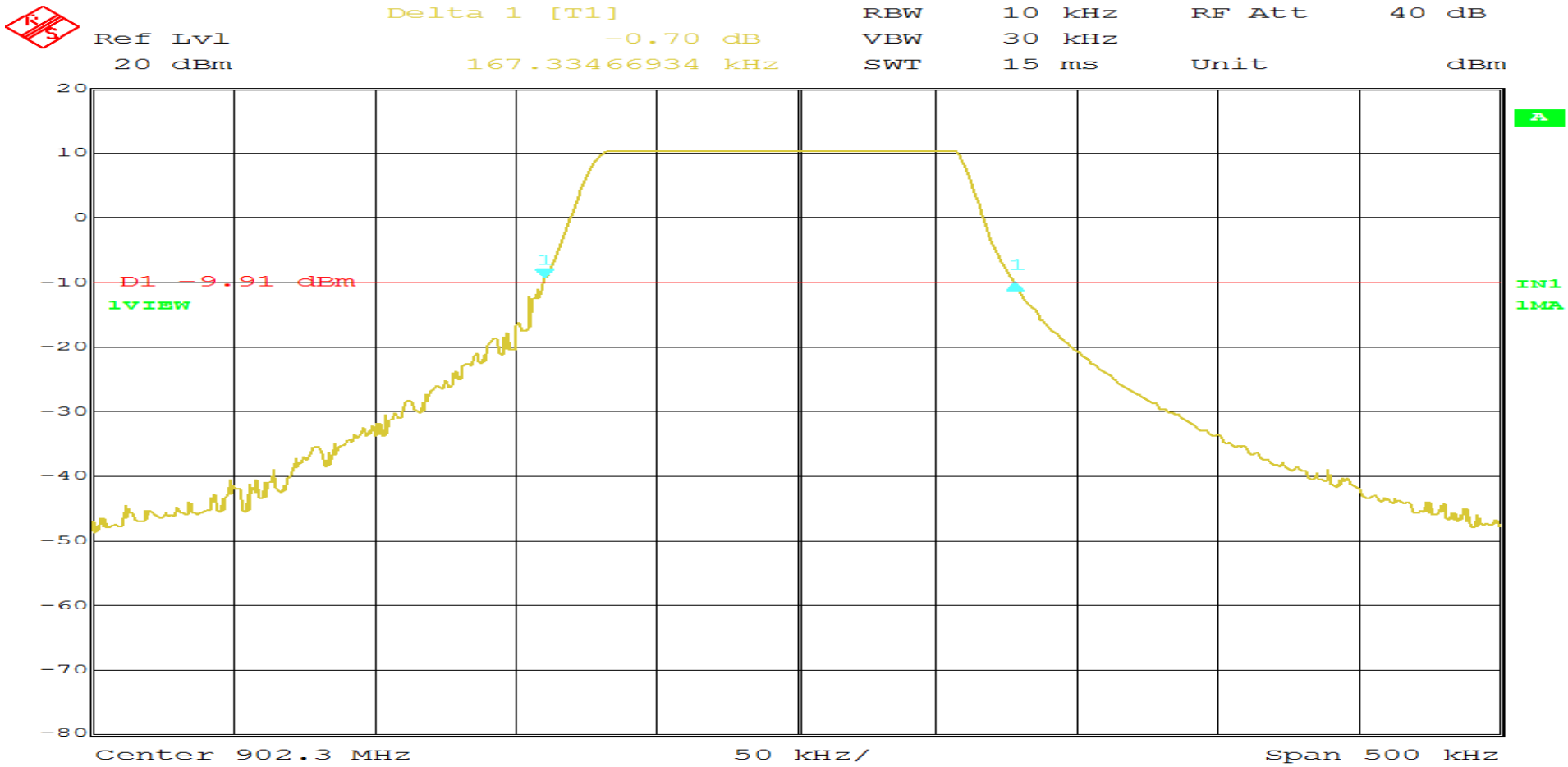


Test Setup

FHSS Bandwidth
20 dB Bandwidth
Test Data

RETLIF TESTING LABORATORIES

Test Method:	20dB Bandwidth		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(FHSS) signal at 902.3 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 18.8 °C Relative Humidity: 21.9 %		
Notes	Occupied Bandwidth: 167.33 kHz		



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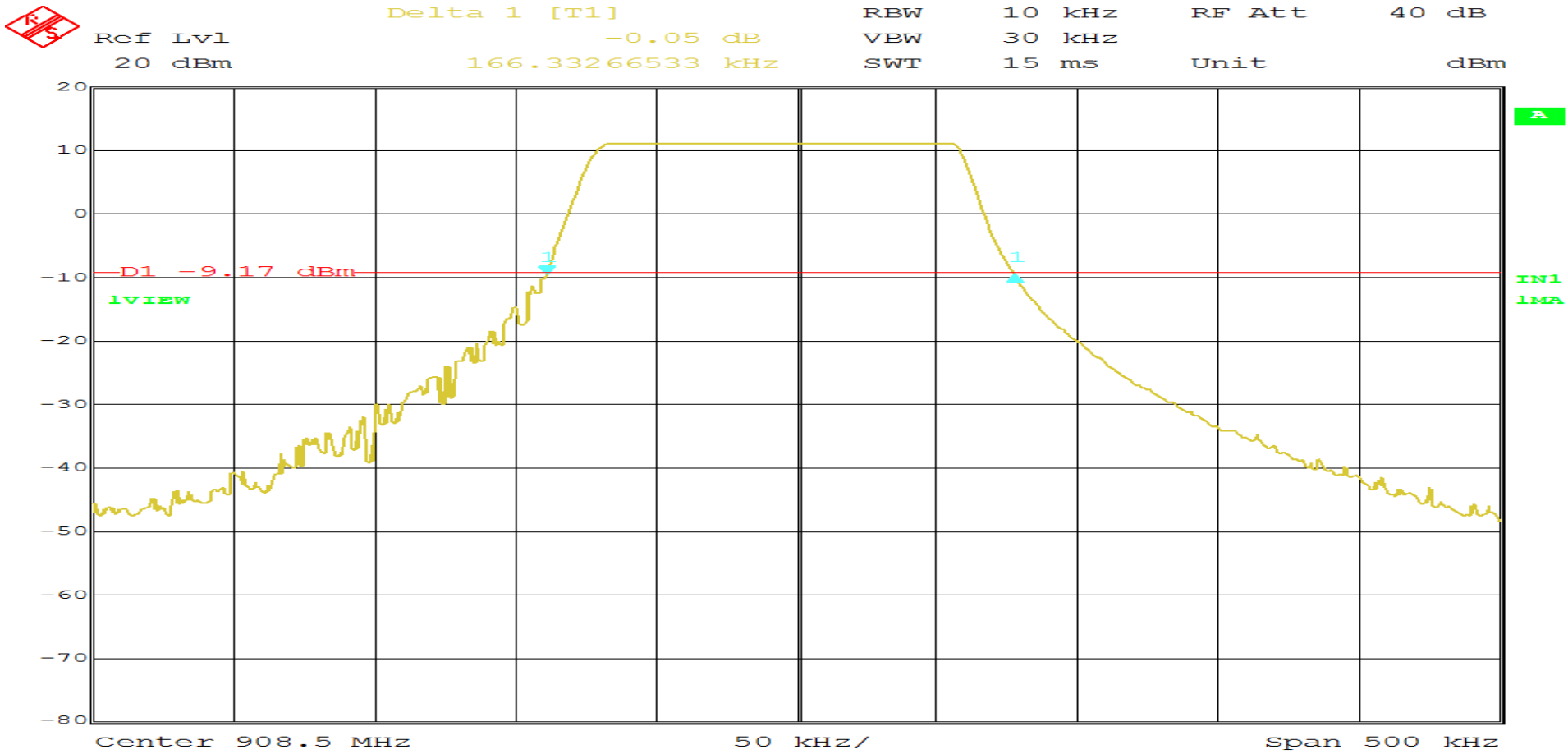
Page 1 of 3

RETLIF TESTING LABORATORIES

Test Method:	20dB Bandwidth		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(FHSS) signal at 908.5 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 18.8 °C Relative Humidity: 21.9 %		
Notes	Occupied Bandwidth: 166.33 kHz		



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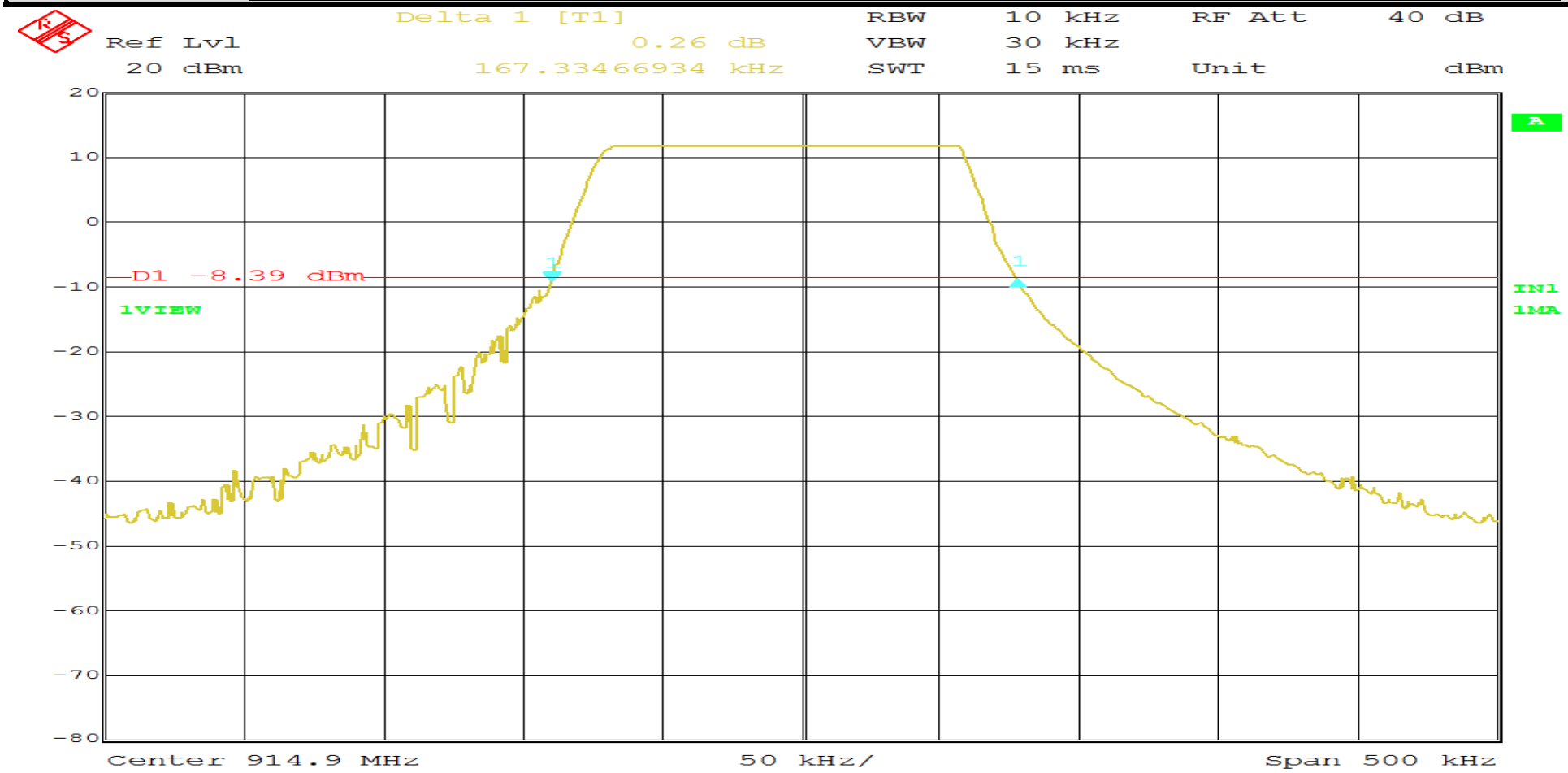
Page 2 of 3

RETLIF TESTING LABORATORIES

Test Method:	20dB Bandwidth		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting modulated(FHSS) signal at 914.9 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 18.8 °C Relative Humidity: 21.9 %		
Notes	Occupied Bandwidth: 167.33 kHz		



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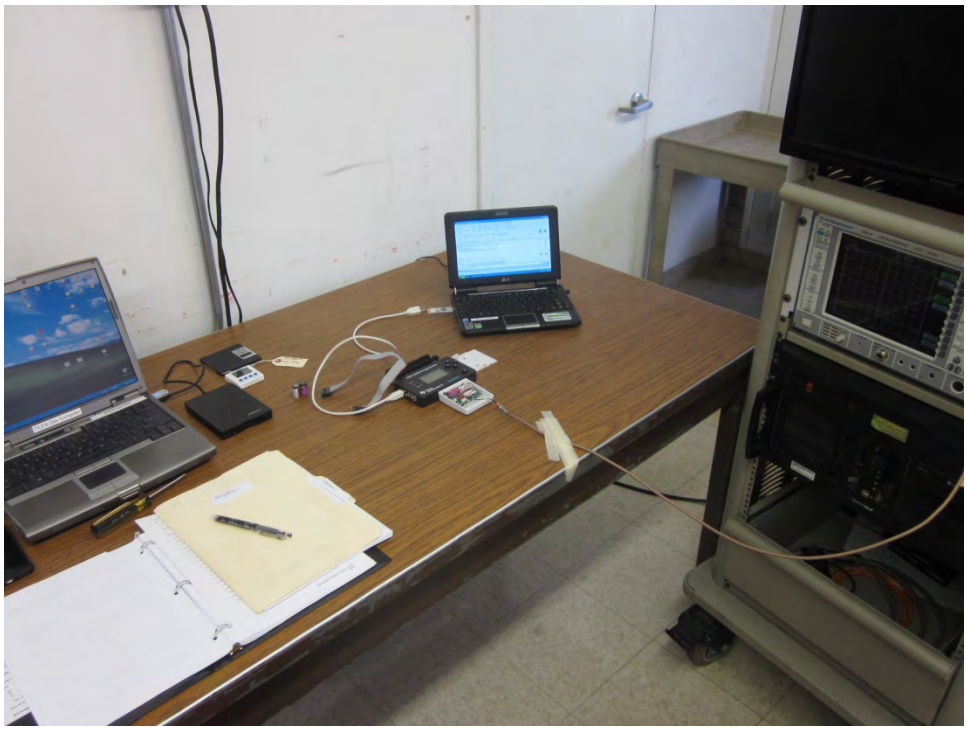
Page 3 of 3

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

Test Photograph(s)
Number of Hopping Channels and Time of Occupancy

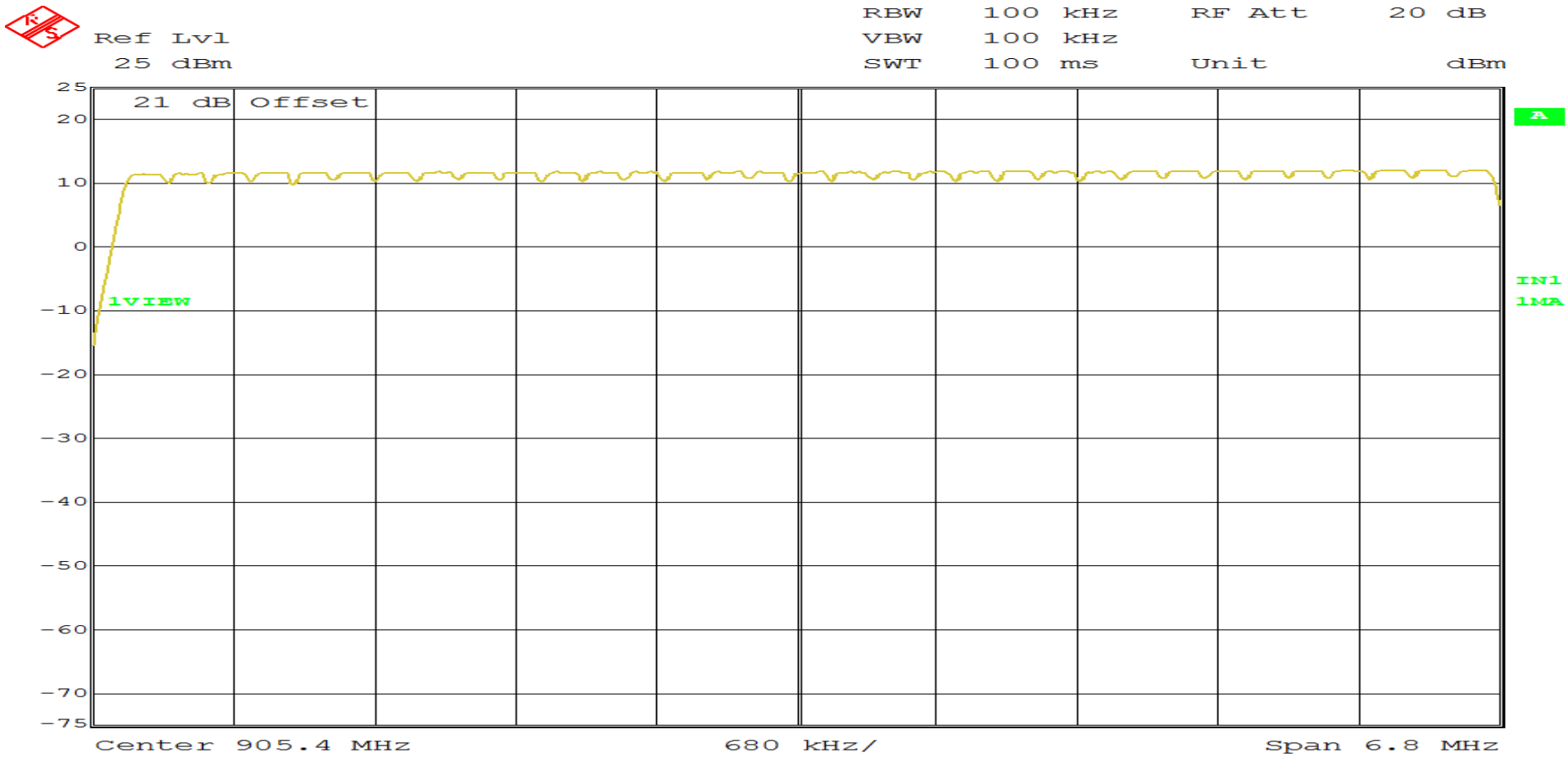


Test Setup

Number of Hopping Channels and Time of Occupancy
Test Data

RETLIF TESTING LABORATORIES

Test Method:	Number of Hopping Frequencies		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting hopping frequency data		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.9 °C Relative Humidity: 18.3 %		
Notes	Total Number of Hopping Frequencies: 64		



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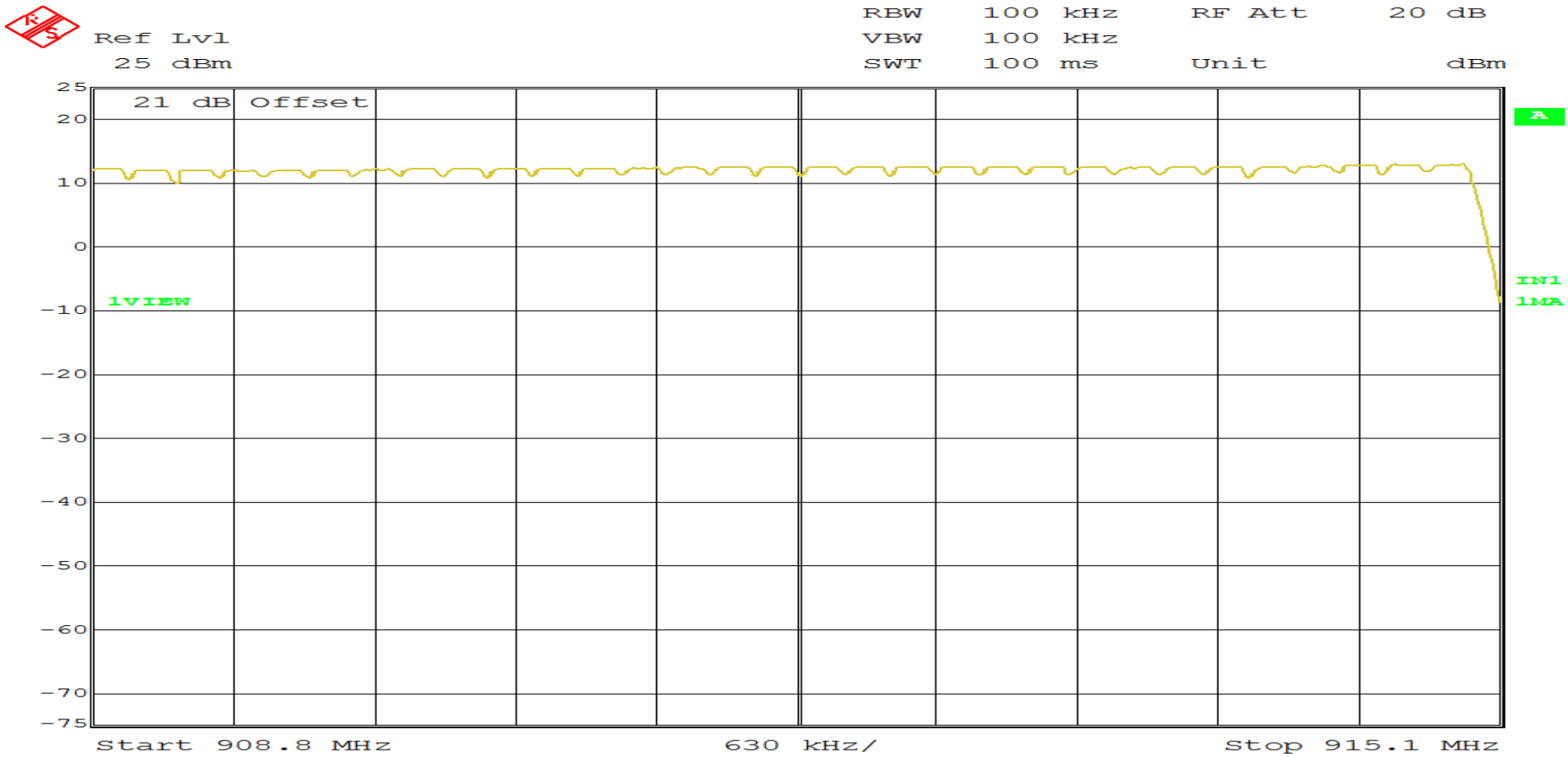
Page 1 of 2

RETLIF TESTING LABORATORIES

Test Method:	Number of Hopping Frequencies		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting hopping frequency data		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.9 °C Relative Humidity: 18.3 %		
Notes	Total Number of Hopping Frequencies: 64		



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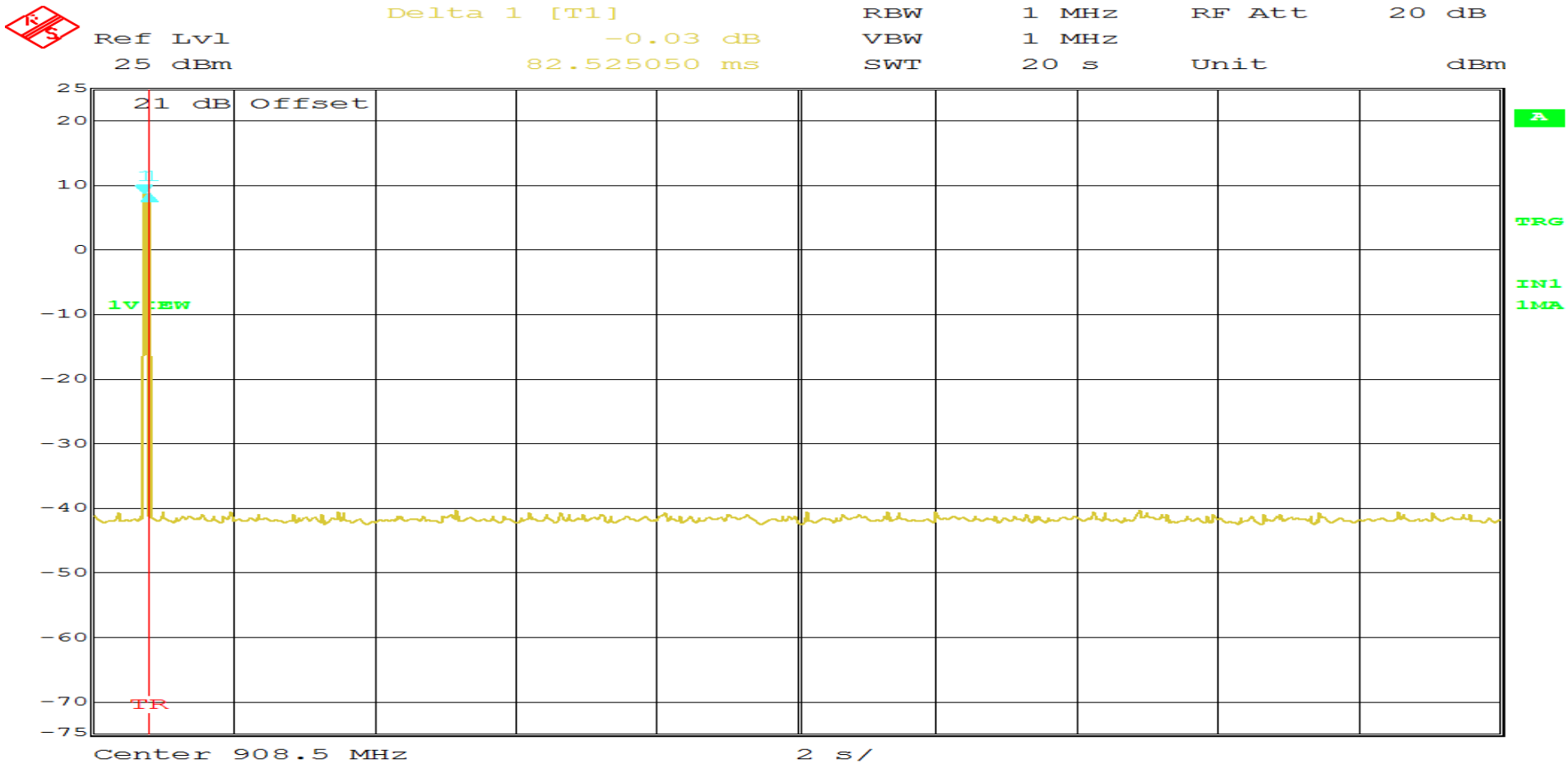
Page 2 of 2

Time of Occupancy
Test Data

RETLIF TESTING LABORATORIES

Test Method:	Time of Occupancy		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting hopping frequency data		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 22.3 °C Relative Humidity: 19.4 %		
Notes	Test Frequency: 908.5 MHz Pulse Width: 82.565 ms		



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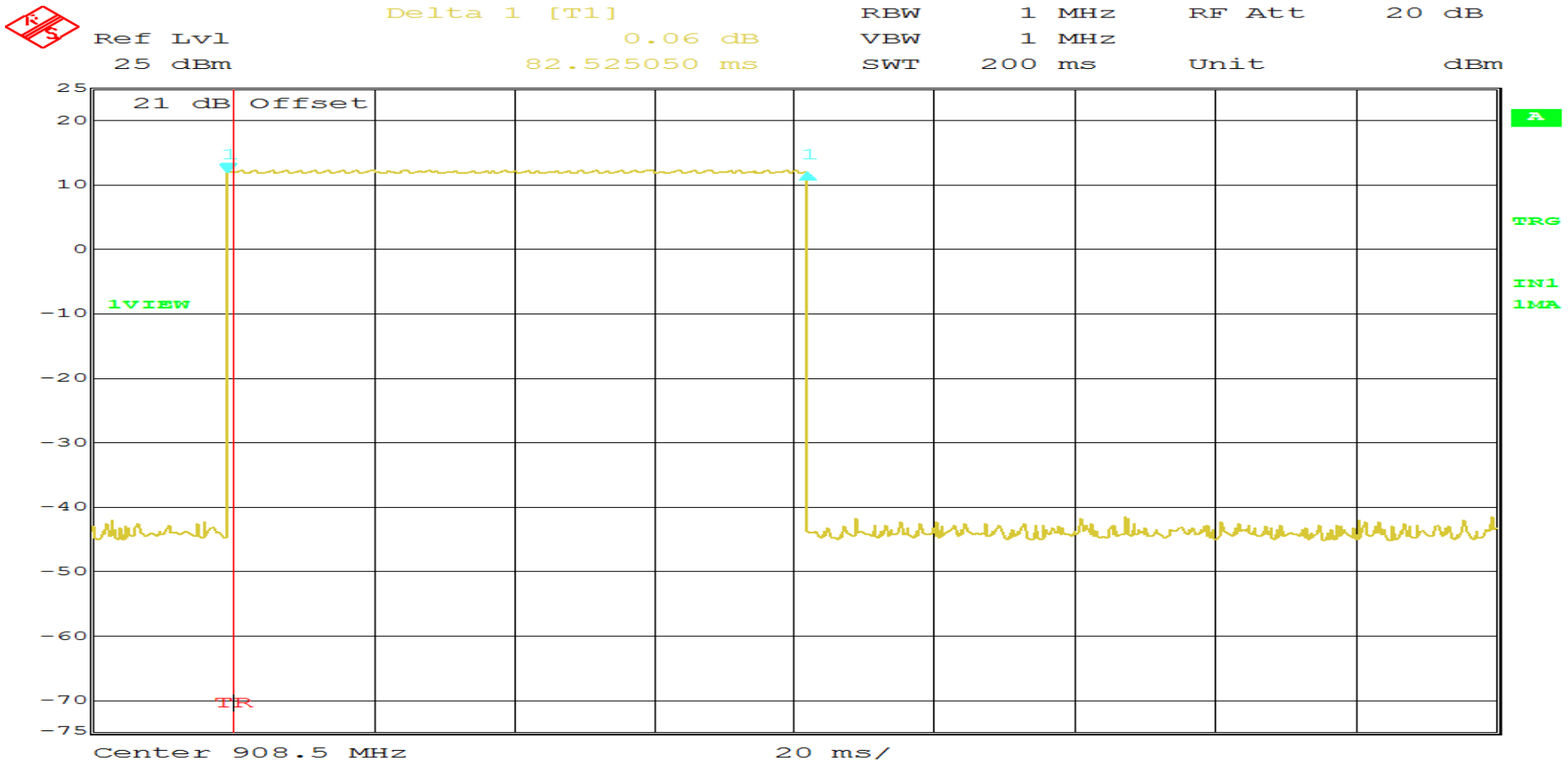
Page 1 of 2

RETLIF TESTING LABORATORIES

Test Method:	Time of Occupancy		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting hopping frequency data		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)(i)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 22.3 °C Relative Humidity: 19.4 %		
Notes	Test Frequency: 908.5 MHz Pulse Width: 82.565 ms		



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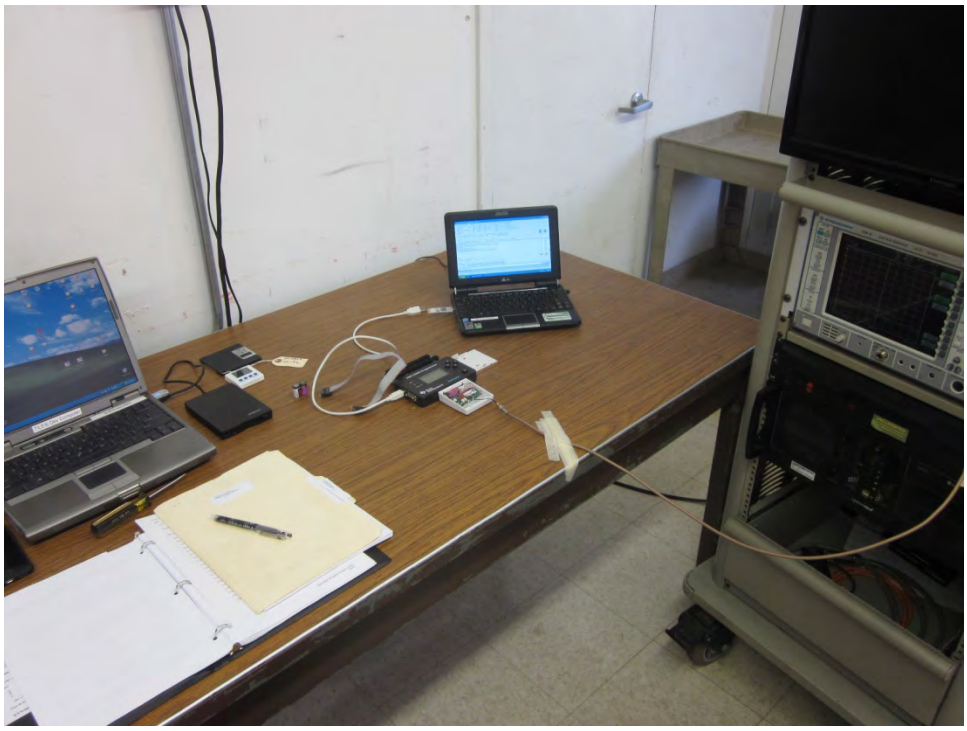
Page 2 of 2

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

Test Photograph(s)
Channel Separation

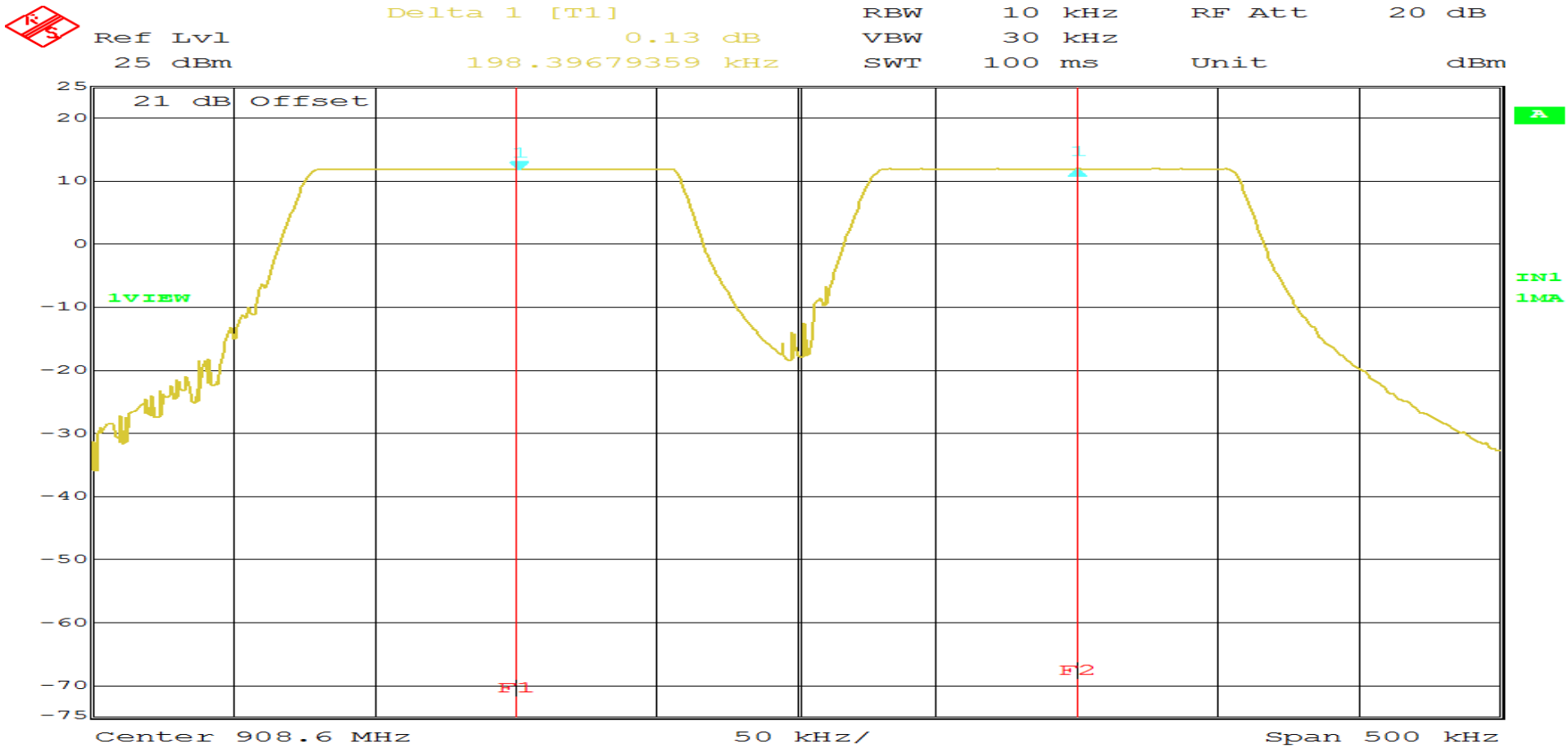


Test Setup

Channel Separation
Test Data

RETLIF TESTING LABORATORIES

Test Method:	Channel Carrier Frequency Separation		
Customer	Nke Watteco	**Job No.**	R-6046N-3
Test Sample	Temperature and Humidity Sensor		
Model Number	THr	**Serial No.**	2100547930001
Operating Mode	Transmitting hopping frequency data		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.247 (a)(1)		
Technician	M. Seamans	**Date**	January 15th, 2016
Climatic Conditions	Temp: 21.6 °C Relative Humidity: 19.5 %		
Notes	Channel Carrier Frequency Separation: 198.39 kHz		



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Page 1 of 1