



**FCC Part 15, Subpart C, Section 15.231
Test Report**

On

**Hand Held Pendant Access Control Transmitter
FCC ID: PFO018-4**

Customer Name: Trine Access Technology

Customer P.O.: 0012714

Date of Report: December 21, 2016

Test Report No: R-6149N

Test Start Date: November 2, 2016

Test Finish Date: December 9, 2016

Test Technician: M. Seamans

EMC Test Engineer: T. Hannemann

Approved By: S. Wentworth

Report Prepared By: J. Ramsey

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Technical Information

Report Number: R-6149N

Customer: Trine Access Technology

Address: 2 Parklawn Dr., Suite F
Bethel, CT 06801

Manufacturer: Trine Access Technology

Manufacturer Address: 2 Parklawn Dr., Suite F
Bethel, CT 06801

Test Sample: Hand Held Pendant Access Control Transmitter

Model Number: 018-4

FCC ID: PFO018-4

Type: RF Transmitter

Power Requirements: 3 VDC via one (1) internal lithium battery

Frequency of Operation: 433.92 MHz

Test Specification:

FCC Rules and Regulations Part 15, Subpart C, Section 15.231

Test Procedure:

ANSI C63.10:2013

Test Site:

ANSI C63.4:2014

Test Facility:

Retlif Testing Laboratories
101 New Boston Road
Goffstown, NH 03045

FCC Registered Test Site Number: 90899



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Tests Performed

The test methods performed on the EUT are shown below:

FCC Part 15, Subpart C	Test Method
15.231(b)	Field Strength of Emissions
15.231(b)(2)	Duty Cycle Determination
15.231(b)(3)	Field Strength of Spurious Emissions
15.231(c)	Bandwidth of Emission

General Test Requirements

1. The measurement procedures of ANSI C63.10:2013 were utilized as specified in FCC Part 15, Subpart C, Section 15.31(a)(3).
2. 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).
3. The level of the fundamental field strength was recorded with a new battery installed in the EUT, in accordance with FCC Section 15.231(e).
4. All measurements were performed at the specified 3 meter test distance as required by FCC Section 15.31(f).
5. The EUT was rotated throughout 360 degrees for all radiated emissions measurements as specified in FCC Section 15.31(f)(5).
6. 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).
7. Appropriate accessories were attached to all EUT ports during the performance of radiated emissions measurements as required by FCC Section 15.31(i).
8. 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).
9. All measurements were taken with a peak detector function as specified in FCC Section 15.35(a). The duty cycle, calculated in accordance with FCC Section 15.35(c), was applied to the peak readings in order to obtain the average value of emissions. The peak value of emissions was verified to meet the 20 dB requirement of FCC Section 15.35(b).



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Certification and Signatures

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



Scott Wentworth
Branch Manager
NVLAP Approved Signatory



Todd Hannemann
EMC Test Engineer
iNARTE Certified Technician ATL-0255-T

Non-Warranty Provision

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

Non-Endorsement

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



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Requirements and Test Results

FCC Section 15.231(b) - Field Strength of Emissions

In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the limits specified in Table 1.

Table 1 - Test Limits, Field Strength of Emissions

Fundamental Frequency (MHz)	Field Strength of Fundamental microvolts/meter @3 meters (watts, e.i.r.p.) Quasi Peak or Average	Field Strength of Spurious Emissions microvolts/meter @3 meters Quasi Peak or Average
40.66 to 40.70	2,250	225
70 to 130	1,250 (470 nW)	125
130 to 174	1,250 to 3,750**	125 to 375**
174 to 260	3,750 (4.2 µW)	375
260 to 470	3,750 to 12,500**	375 to 1,250**
Above 470	12,500 (47 µW)	1,250

**Linear Interpolations

For 130-174 MHz: FS (microvolts/m) = (56.82 x F) - 6,136

For 260-470 MHz: FS (microvolts/m) = (41.67 x F) - 7,083

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

The Fundamental and Harmonic Emissions limits for a device operating at 433.92 MHz are listed in Table 2.

Table 2 - Fundamental and Harmonic Limits

Frequency of Operation MHz	Fundamental µV/m	Harmonics µV/m
433.92	10998.44	1099.8

- Results:**

The Fundamental and Harmonics field strengths did not exceed the limits specified in Table 2 at a test distance of 3 meters, taken with an Average Detector. See Table 3 for the Fundamental and Harmonic emissions test results.

Table 3 - Fundamental and Harmonics Test Results

Fundamental Frequency MHz	Maximum Fundamental µV/m	Maximum Harmonics µV/m
433.92	1729.82	421.21



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Requirements and Test Results (con't)

Requirement:

FCC Section 15.231(b)(2) - Duty Cycle Determination-Pulsed Operation

Intentional radiators operating under the provisions of the Section shall demonstrate compliance with the limits on the field strength emissions, as shown in Table 1, based on the average value of the measured emissions. As an alternative, compliance with the limits in the Table 1 may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in Section 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of Section 15.205 shall be demonstrated using the measurement instrumentation specified in that Section.

- **Results:**

The emissions did not exceed the limits specified in Table 1. See below for the exact method of calculating the average field strength.

$$\begin{aligned}\text{Transmitter On Time} &= \underline{48.28} \text{ milliseconds (maximum per cycle)} \\ \text{Transmitter Cycle Time} &= \underline{100} \text{ milliseconds (100 ms maximum)} \\ \text{Transmitter Duty Cycle} &= \underline{48.28} \%\end{aligned}$$

CALCULATION

$$12 \times 432.4 \mu\text{s Pulse} = 5.19 \text{ Milliseconds}$$

$$21 \times 425.4 \mu\text{s Pulse} = 8.93 \text{ Milliseconds}$$

$$39 \times 875.9 \mu\text{s Pulse} = 34.16 \text{ Milliseconds}$$

$$5.19 \times 8.93 + 34.16 \mu\text{s Pulse} = 48.28 \text{ Milliseconds}$$

$$\text{Duty Cycle } (48.28/100) = 48.28\%$$

$$\text{Correction Factor} = 20 \text{ Log } (0.4828) = 6.32 \text{ dB}$$



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Requirements and Test Results (con't)

Requirement:

FCC Section 15.231(b)(3) - Field Strength of Spurious Emissions

The limits on the field strength of the spurious emissions specified in Table 1 are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in Table 1 or to the general limits shown in Section 15.209, whichever limit permits a higher field strength.

- **Results:**

No spurious emissions were observed within 10 dB of the specified limit.

Requirement:

FCC Section 15.231(c) - Bandwidth of Emissions

The bandwidth of the emissions shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

- **Results:**

The bandwidth was measured and found to be 362.6 kHz, 0.083% of the center frequency.



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Requirements and Test Results (con't)

General Requirements FCC and IC

Spectrum Analyzer Desensitization Considerations

Due to the nature of the emissions being measured, care was taken to ensure that the resolution bandwidth of the spectrum analyzer was adequate to provide accurate measurements. The following formula was utilized:

$$\text{minimum bandwidth} = 1 / \{\text{minimum pulse width (in seconds)} \times 1.5\} = \text{Hz}$$

Setting pulse desensitization equal to zero and utilizing the minimum observed pulse width of 425.4 μs yields a minimum required bandwidth of 3526 Hz. FCC specified bandwidths of 100 kHz and 1 MHz were utilized below and above 1GHz, respectively.

Open Area Test Site

For testing radiated measurements from 1 GHz to 40 GHz, a test site must satisfy either option in Section 5.5 of ANSI C63.4:2014.

First Option: Section 5.5.1 a) 1) of ANSI C63.4:2014, requires compliance with the site validation criterion called out in CISPR 16-1-4: 2010-04, which is the site validation by means of SVSWR measurements.

Second Option: Section 5.5.1 a) 2) of ANSI C63.4:2014, alternative site validation without SVSWR measurements – test site shall have a minimum area of the ground plane covered with RF absorbing material as specified in this clause and as shown in Figure 6 of ANSI C63.4:2014.

The Open Area Test Site used within this test program utilized the second option, with the RF Absorber placed directly on the ground plane. The RF Absorber had a maximum thickness of 30 cm and a minimum rated attenuation of 20 dB at all frequencies from 1 GHz to 18 GHz.



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Equipment Lists

FCC Section 15.231(b) - Field Strength of Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
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
R469	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 26.5 GHz	E7405A;A	12/1/2016	12/31/2016

FCC Section 15.231(b)(2) - Duty Cycle Determination - Pulsed Operation

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5030B	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	3/16/2016	3/31/2017
R469	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 26.5 GHz	E7405A;A	11/17/2015	11/30/2016

FCC Section 15.231(b)(3) - Field Strength of Spurious Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1232	AGILENT / HP	PRE-AMPLIFIER	1 - 26.5 GHz	8449B	6/16/2016	6/30/2017
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	2/5/2016	8/31/2017
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
R469	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 26.5 GHz	E7405A;A	12/1/2016	12/31/2016

FCC Section 15.231(c) - Bandwidth of Emission

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5030B	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 12.4 GHz	757C-10	3/16/2016	3/31/2017
R469	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 26.5 GHz	E7405A;A	11/17/2015	11/30/2016



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Test Photographs Field Strength of Emissions



Log Periodic, Horizontal Polarization



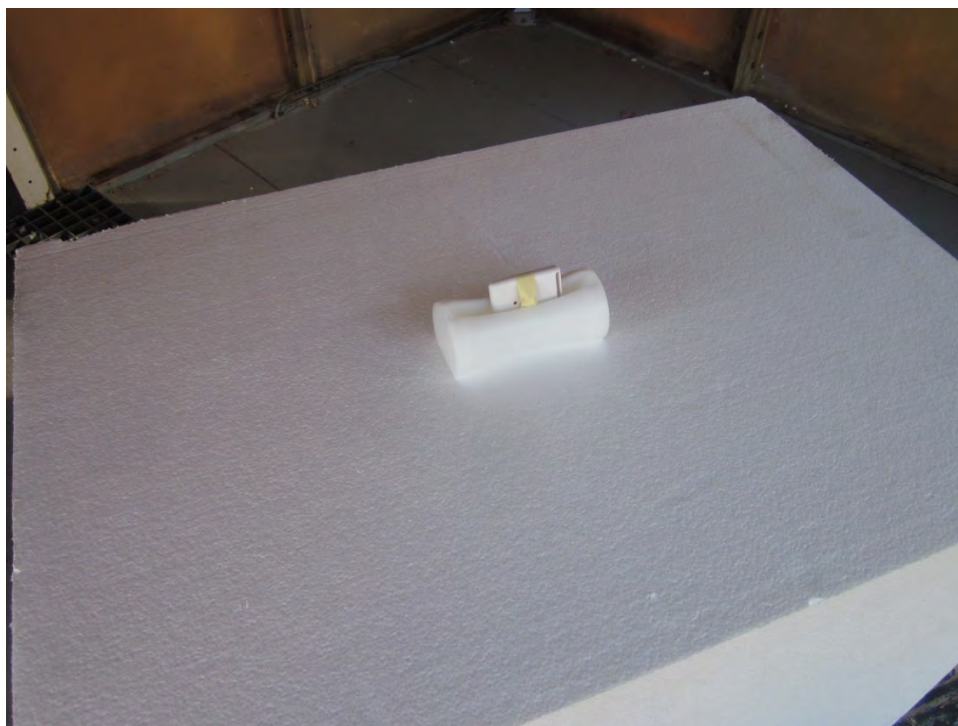
Log Periodic, Vertical Polarization



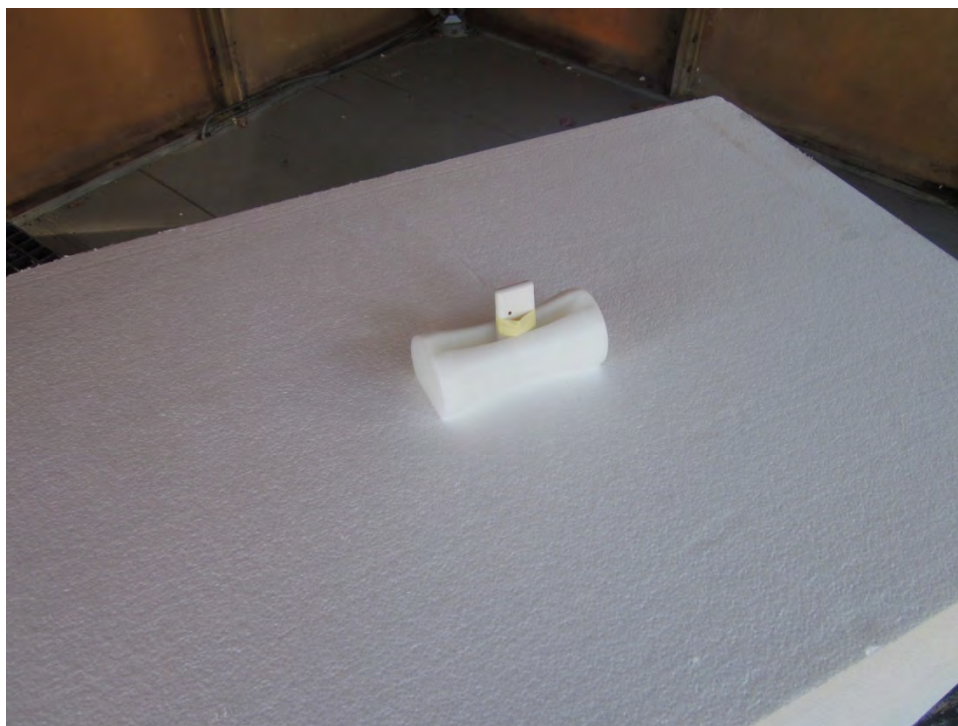
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Test Photographs
Field Strength of Emissions



X Axis



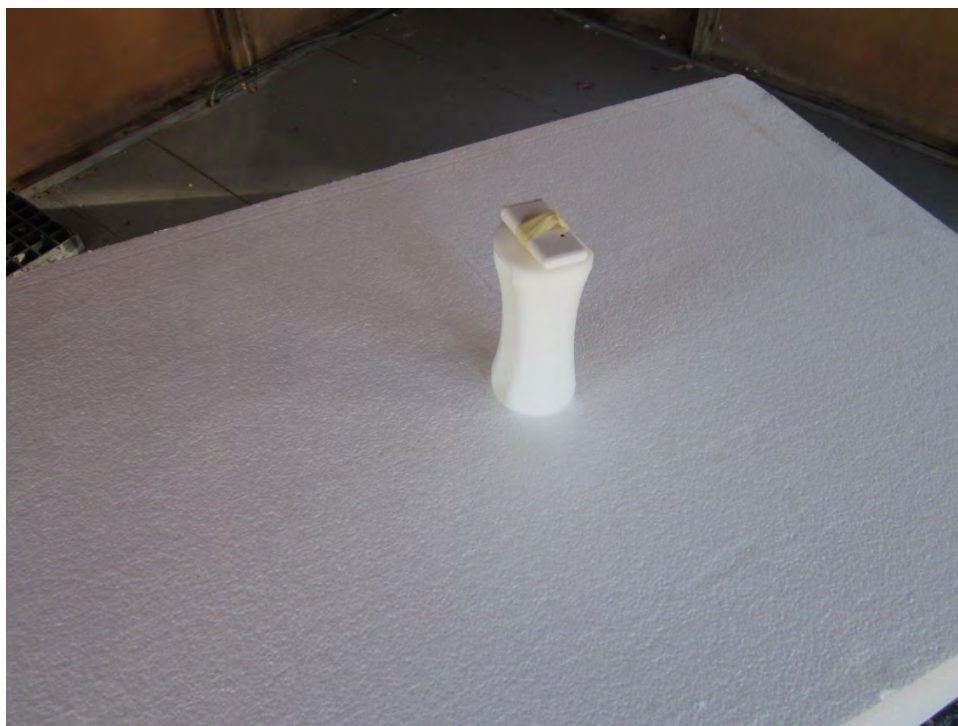
Y Axis



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Test Photographs
Field Strength of Emissions



Z Axis



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**FCC Section 15.231(b) - Field Strength of Emissions
Test Data**



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RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Field Strength of Emissions - Fundamental Field Strength	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15, Subpart C	Paragraph: 15.231(b)
Operating Mode	Transmitting modulated signal	
Technician	M. Seamans	
Date	December 9 th , 2016	

Notes: Test Distance: 3 meters Detector: Peak Resolution BW: 100 kHz

TEST PARAMETERS

Frequency	Antenna Position/ Axis	Measured level	Correction Factor	Corrected Peak Reading	Duty Cycle Factor	Corrected Average Reading	Converted Average Reading	Average Limit at 3m
MHz	(H/V)/(X/Y/Z)	dBuV	dB	dBuV/m	dB	dBuV/m	uV/m	uV/m
433.92	V/Y	49.05	22.03	71.08	-6.32	64.76	1729.82	10998.44

TEST PARAMETERS

Frequency	Antenna Position/ Axis	Measured level	Correction Factor	Corrected Peak Reading			Converted Peak Reading	Peak Limit at 3m
MHz	(H/V)/(X/Y/Z)	dBuV	dB	dBuV/m			uV/m	uV/m
433.92	H/Z	49.05	22.03	71.08			3580.96	109984.40

Peak Limit is 20dB higher than the Average limit.

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Test Photograph
Duty Cycle Determination - Pulsed Operation



Test Setup



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**FCC Section 15.231(b)(2) - Duty Cycle Determination - Pulsed Operation
Test Data**



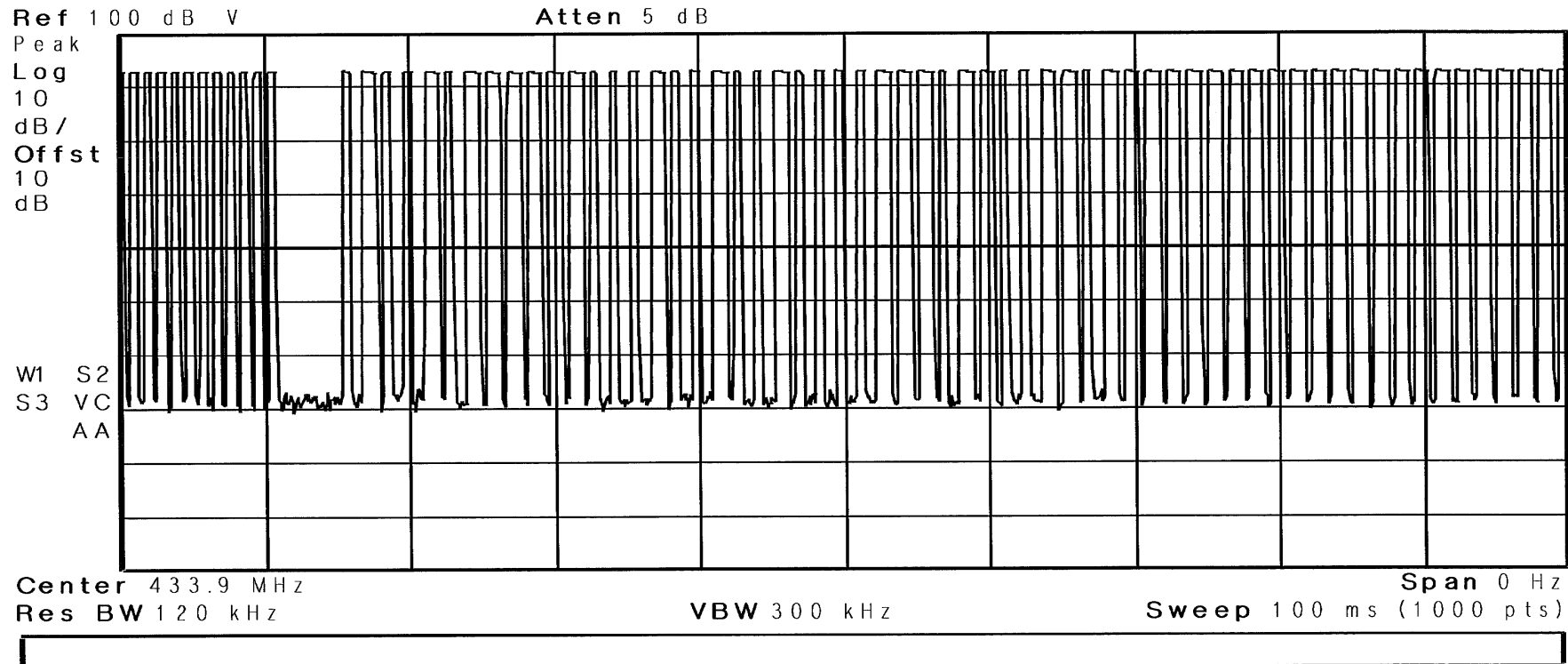
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RETLIF TESTING LABORATORIES

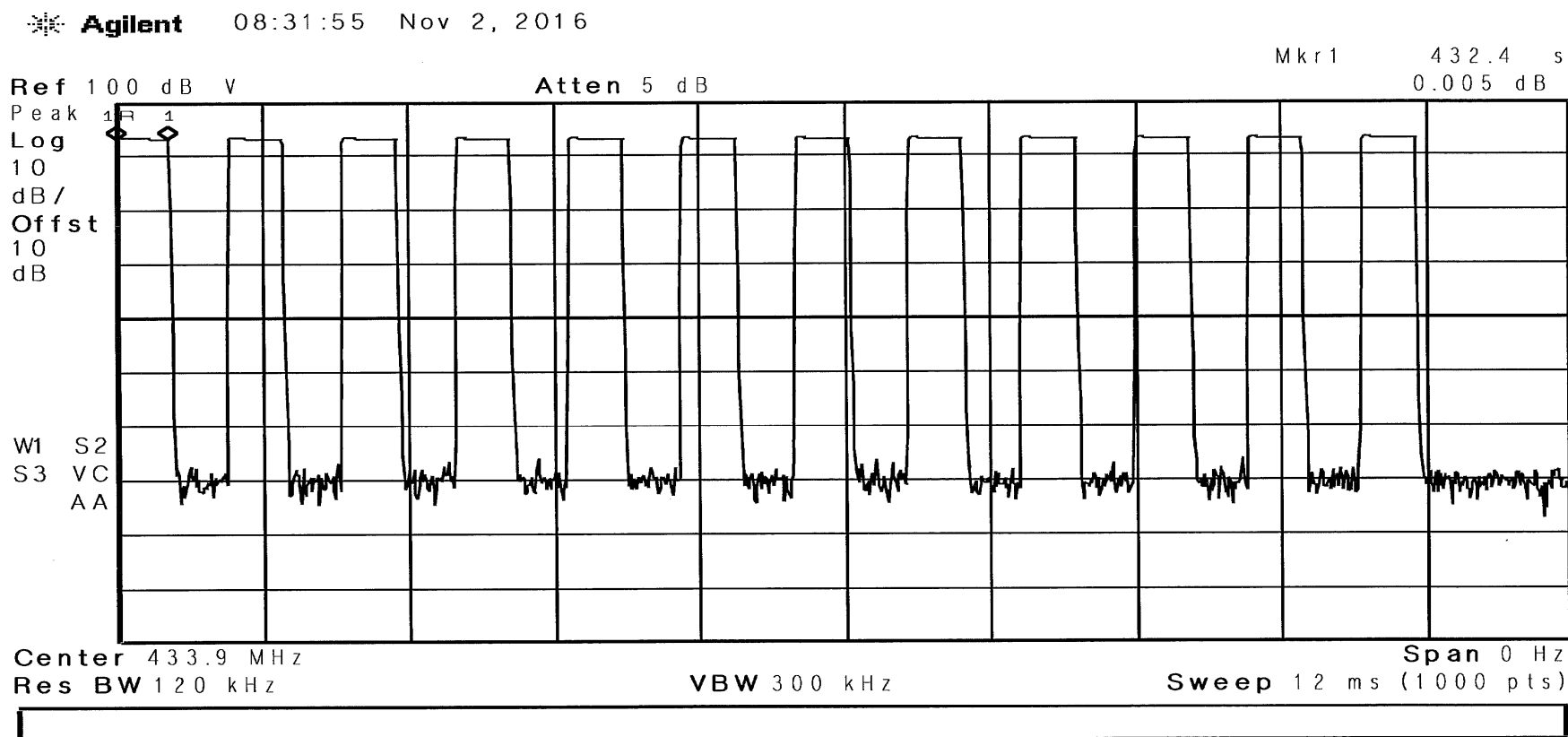
Test Method:	Duty Cycle Determination		
Customer	Trine Access Technology	Job No.	R-6149N
Test Sample	Hand Held Pendant Access Control Transmitter		
Model Number	018-4	Serial No.	018-4
Operating Mode	Transmitting modulated signal at 433.92 MHz		
Test Specification	FCC part 15.35		
Technician	M. Seamans	Date	November 2 nd , 2016
Climatic Conditions	Temp: 23.1 °C Relative Humidity: 36.6 %		
Notes	Measured maximum transmit time: 48.2823 mS		

✱ **Agilent** 08:27:02 Nov 2, 2016



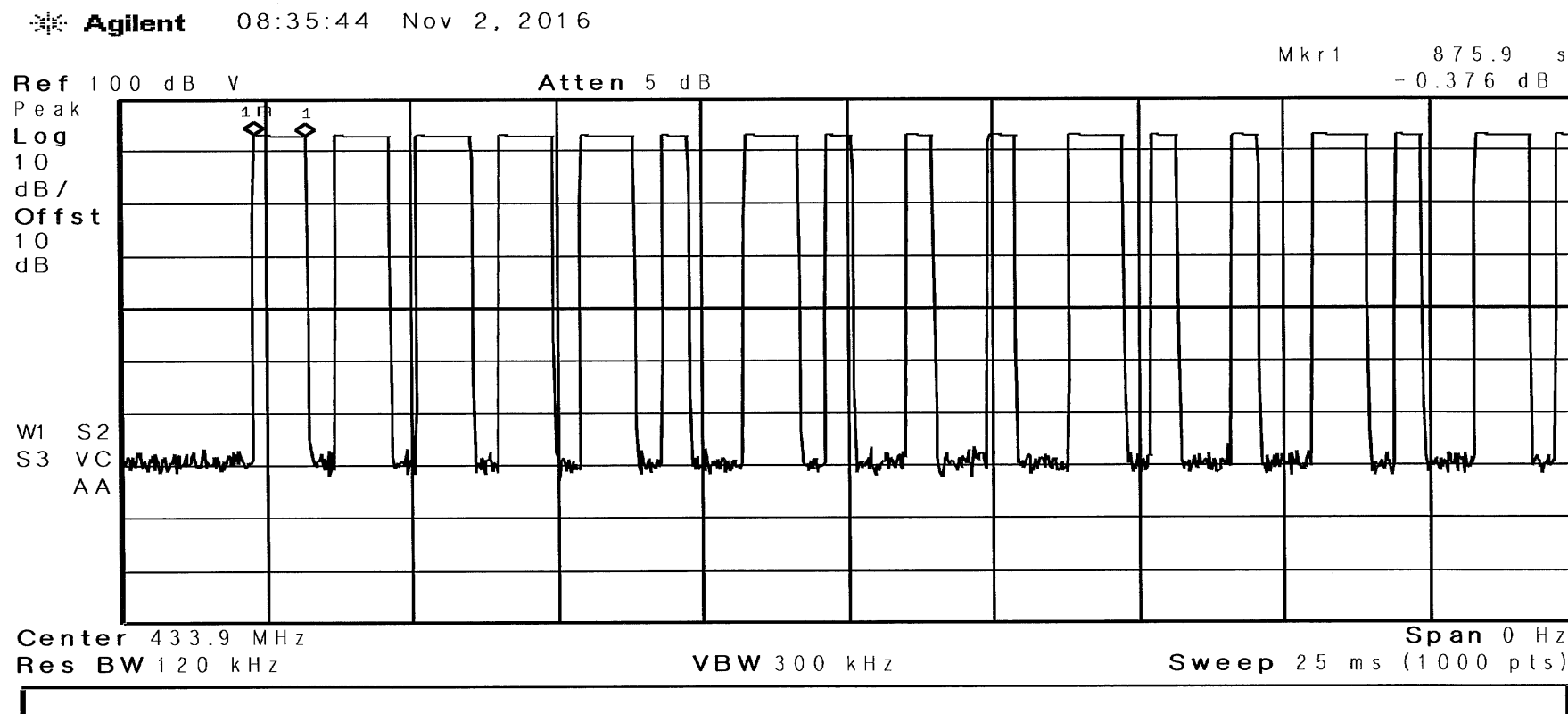
RETLIF TESTING LABORATORIES

Test Method:	Duty Cycle Determination		
Customer	Trine Access Technology	Job No.	R-6149N
Test Sample	Hand Held Pendant Access Control Transmitter		
Model Number	018-4	Serial No.	018-4
Operating Mode	Transmitting modulated signal at 433.92 MHz		
Test Specification	FCC part 15.35		
Technician	M. Seamans	Date	November 2 nd , 2016
Climatic Conditions	Temp: 23.1 °C Relative Humidity: 36.6 %		
Notes	12 pulses at 432.4uS		



RETLIF TESTING LABORATORIES

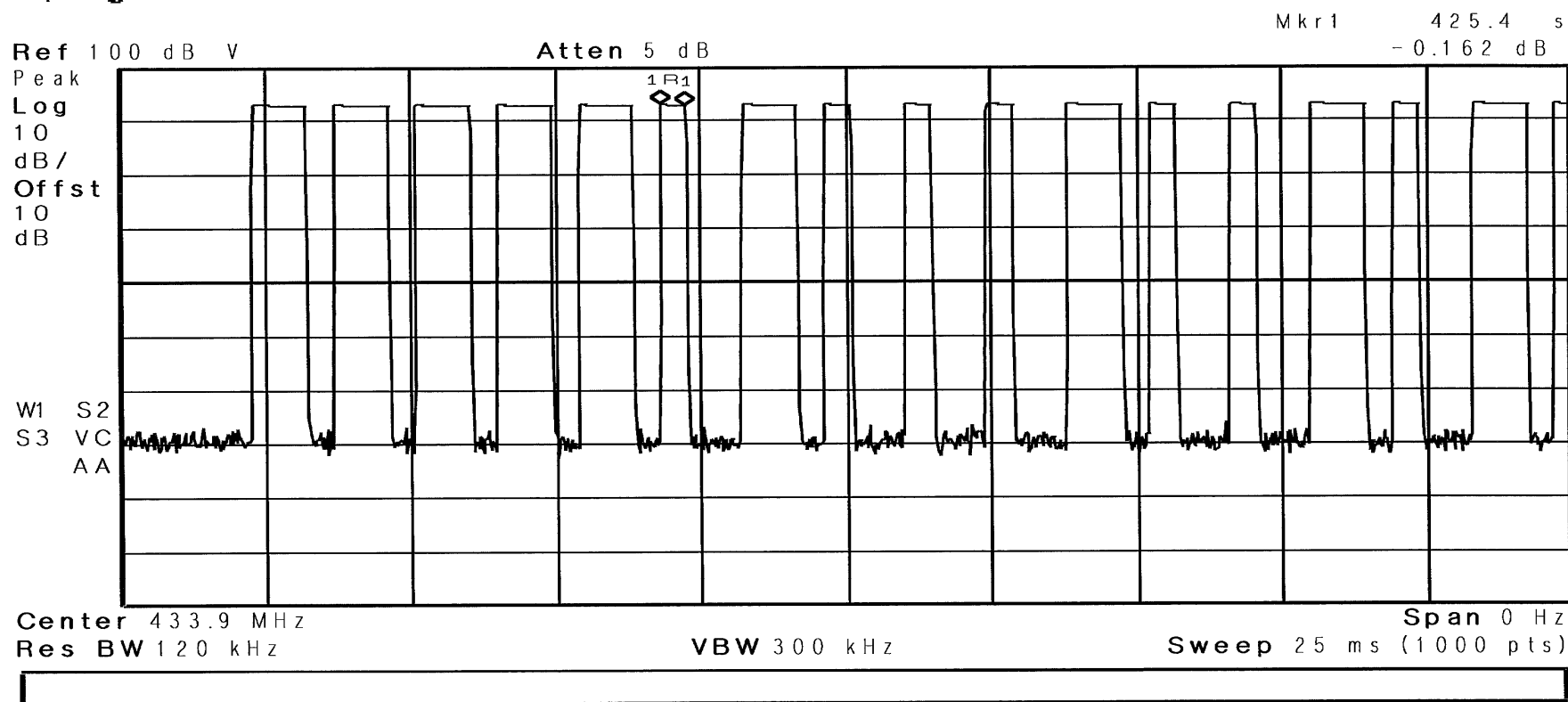
Test Method:	Duty Cycle Determination		
Customer	Trine Access Technology	Job No.	R-6149N
Test Sample	Hand Held Pendant Access Control Transmitter		
Model Number	018-4	Serial No.	018-4
Operating Mode	Transmitting modulated signal at 433.92 MHz		
Test Specification	FCC part 15.35		
Technician	M. Seamans	Date	November 2 nd , 2016
Climatic Conditions	Temp: 23.1 °C Relative Humidity: 36.6 %		
Notes	39 pulses at 875.9uS		



RETLIF TESTING LABORATORIES

Test Method:	Duty Cycle Determination		
Customer	Trine Access Technology	Job No.	R-6149N
Test Sample	Hand Held Pendant Access Control Transmitter		
Model Number	018-4	Serial No.	018-4
Operating Mode	Transmitting modulated signal at 433.92 MHz		
Test Specification	FCC part 15.35		
Technician	M. Seamans	Date	November 2 nd , 2016
Climatic Conditions	Temp: 23.1 °C Relative Humidity: 36.6 %		
Notes	21 pulses at 425.4uS		

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RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Duty Cycle Determination
Customer	Trine Access Technology
Job Number	R-6149N
Test Sample	Hand Held Pendant Access Control Transmitter
Model Number	018-4
Serial Number	018-4
Test Specification	FCC part 15.35
Operating Mode	Transmitting modulated signal at 433.92 MHz
Technician	M. Seamans
Date	November 2 nd , 2016

Notes: Measured maximum transmit time: 48.2823mS

TEST PARAMETERS

Measured on time	Measured time interval	Duty Cycle Factor Calculation	Result	Duty Cycle Factor Allowed
msec	msec		dB	dB
48.2823	100	$= 20 * \text{Log}_{10} (48.2823 \text{ ms} / 100 \text{ ms})$	-6.32424	-6.32424

Data Sheet 5 of 5



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Test Photographs

Field Strength of Spurious Emissions



Biconical Antenna, Horizontal Polarization



Biconical Antenna, Vertical Polarization



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Test Photographs

Field Strength of Spurious Emissions



Log Antenna, Horizontal Polarization



Log Antenna, Vertical Polarization



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Test Photographs Field Strength of Spurious Emissions



Double Ridge Guide, Horizontal Polarization, 1 to 5 GHz



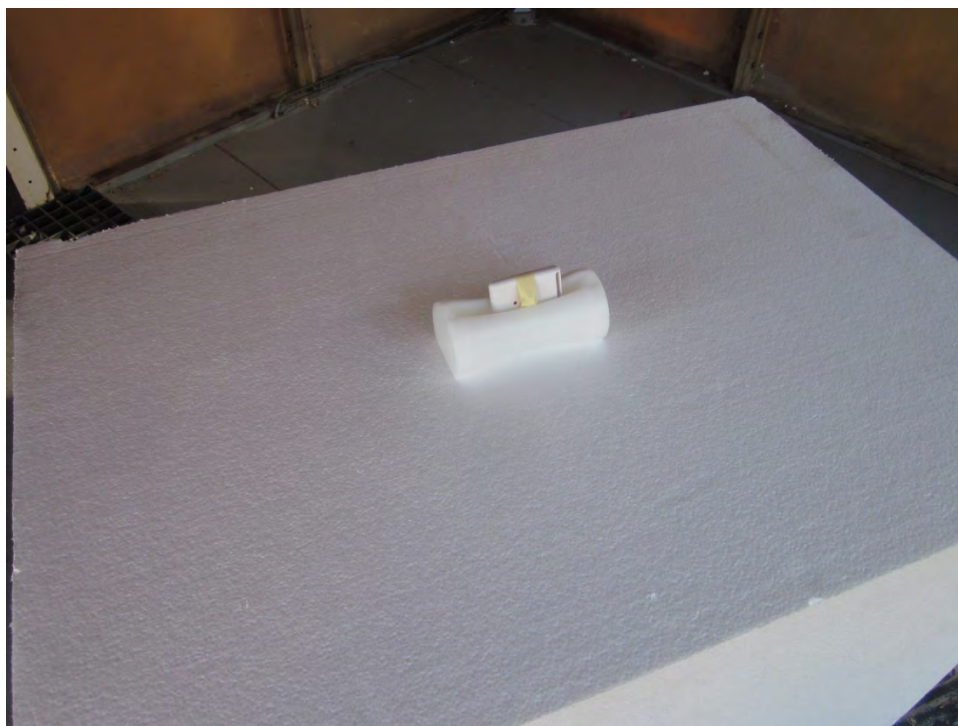
Double Ridge Guide, Vertical Polarization, 1 to 5 GHz



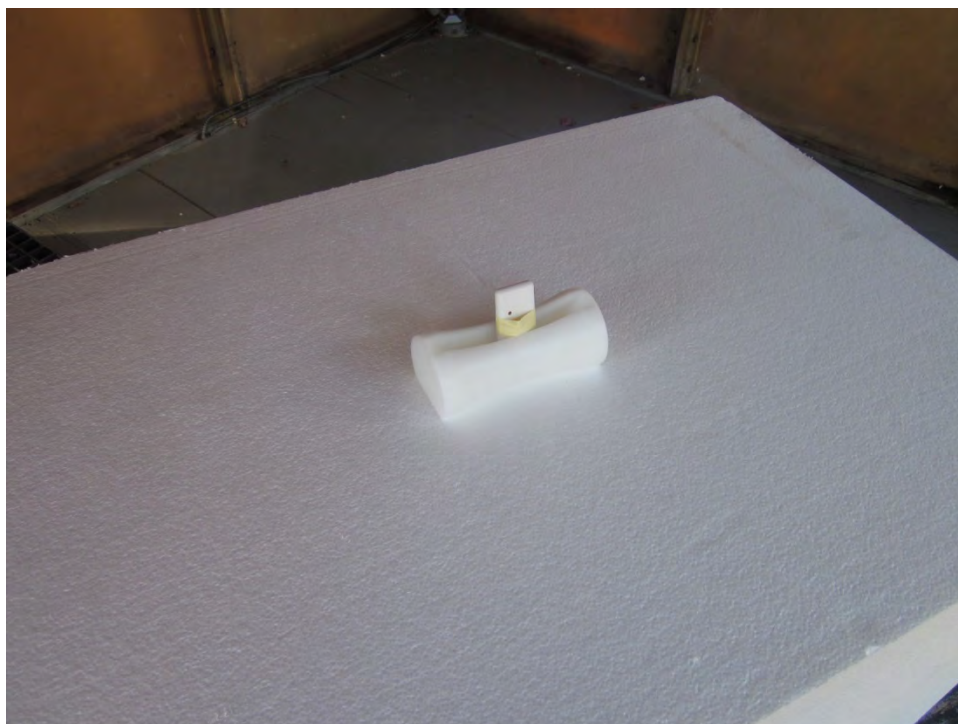
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Report No. R-6149N

Test Photographs
Field Strength of Spurious Emissions



X Axis



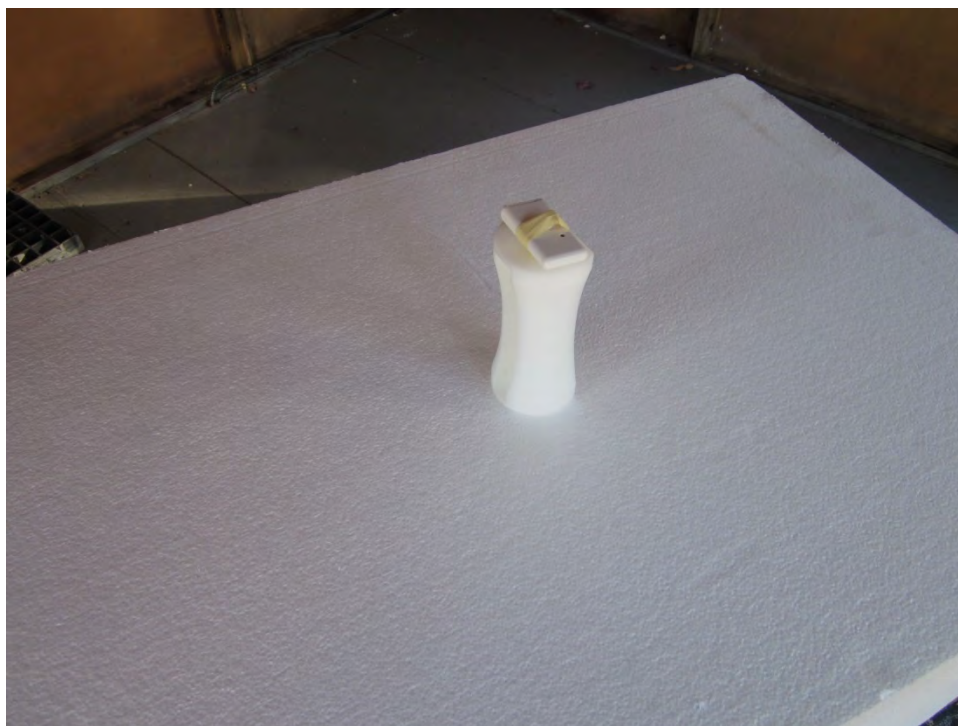
Y Axis



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Test Photographs
Field Strength of Spurious Emissions



Z Axis



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**FCC Section 15.231(b)(3) - Field Strength of Spurious Emissions
Test Data**



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RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Field Strength of Spurious Emissions	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15, Subpart C	Paragraph: 15.231(b), 15.205, 15.209
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	December 9 th , 2016	

Notes: Test Distance: 3 meters Detector: Peak
Average values calculated from Peak readings Duty Cycle: 48.28ms Correction: -6.32 dB

TEST PARAMETERS

Test Frequency	Antenna Position	EUT Orientation	Peak Reading	Duty Cycle Correction	Corrected Reading		Converted Reading	Limit at 3M
MHz		X/Y/Z	dBuV/m	dB	dBuV/m		uV/m	uV/m
867.84	V	X	50.70	-6.32	44.38		165.58	1099.67
867.84	V	Y	58.81	-6.32	52.49		421.21	
867.84	V	Z	49.55	-6.32	43.23		145.04	
867.84	H	X	56.82	-6.32	50.50		334.97	
867.84	H	Y	51.46	-6.32	45.14		180.72	
867.84	H	Z	58.07	-6.32	51.75		386.81	1099.67
1301.76	V	X	41.00	-6.32	34.68		54.20	500.00
1301.76	V	Y	49.24	-6.32	42.92		139.96	
1301.76	V	Z	38.79	-6.32	32.47		42.02	
1301.76	H	X	49.59	-6.32	43.27		145.71	
1301.76	H	Y	43.88	-6.32	37.56		75.51	
1301.76	H	Z	47.30	-6.32	40.98		111.94	500.00
1735.68	V	X	41.61	-6.32	35.29		58.14	1099.67
1735.68	V	Y	48.89	-6.32	42.57		134.43	
1735.68	V	Z	45.82	-6.32	39.50		94.41	
1735.68	H	X	50.74	-6.32	44.42		166.34	
1735.68	H	Y	41.56	-6.32	35.24		57.81	
1735.68	H	Z	37.51	-6.32	31.19	*	36.27	1099.67

EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * Indicates Ambient Reading

Data Sheet 1 of 6



Retlif Testing Laboratories

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RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Field Strength of Spurious Emissions	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15, Subpart C	Paragraph: 15.231(b), 15.205, 15.209
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	November 10 th , 2016	

Notes: Test Distance: 3 meters Detector: Peak
Average values calculated from Peak readings Duty Cycle: 48.28ms Correction: -6.32 dB

TEST PARAMETERS

Test Frequency	Antenna Position	EUT Orientation	Peak Reading	Duty Cycle Correction	Corrected Reading		Converted Reading	Limit at 3M
MHz		X/Y/Z	dBuV/m	dB	dBuV/m		uV/m	uV/m
2169.60	V	X	37.90	-6.32	31.58	*	37.93	1099.67
2169.60	V	Y	46.09	-6.32	39.77		97.39	
2169.60	V	Z	43.21	-6.32	36.89		69.90	
2169.60	H	X	44.81	-6.32	38.49		84.04	
2169.60	H	Y	37.86	-6.32	31.54	*	37.76	
2169.60	H	Z	38.82	-6.32	32.50	*	42.17	1099.67
2603.52	V	X	39.55	-6.32	33.23	*	45.87	1099.67
2603.52	V	Y	41.79	-6.32	35.47	*	59.36	
2603.52	V	Z	40.70	-6.32	34.38	*	52.36	
2603.52	H	X	41.29	-6.32	34.97	*	56.04	
2603.52	H	Y	41.05	-6.32	34.73	*	54.51	
2603.52	H	Z	40.79	-6.32	34.47	*	52.91	1099.67
3037.44	V	X	39.86	-6.32	33.54	*	47.53	1099.67
3037.44	V	Y	40.98	-6.32	34.66	*	54.08	
3037.44	V	Z	40.14	-6.32	33.82	*	49.09	
3037.44	H	X	39.86	-6.32	33.54	*	47.53	
3037.44	H	Y	39.98	-6.32	33.66	*	48.19	
3037.44	H	Z	40.96	-6.32	34.64	*	53.95	1099.67

EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * Indicates Ambient Reading

Data Sheet 2 of 6



Retlif Testing Laboratories

Report No. R-6149N

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Field Strength of Spurious Emissions	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15, Subpart C	Paragraph: 15.231(b), 15.205, 15.209
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	November 10 th , 2016	

Notes: Test Distance: 3 meters Detector: Peak
Average values calculated from Peak readings Duty Cycle: 48.28ms Correction: -6.32 dB

TEST PARAMETERS

Test Frequency	Antenna Position	EUT Orientation	Peak Reading	Duty Cycle Correction	Corrected Reading		Converted Reading	Limit at 3M
MHz		X/Y/Z	dBuV/m	dB	dBuV/m		uV/m	uV/m
3471.36	V	X	40.61	-6.32	34.29	*	51.82	1099.67
3471.36	V	Y	40.99	-6.32	34.67	*	54.14	
3471.36	V	Z	39.93	-6.32	33.61	*	47.92	
3471.36	H	X	39.67	-6.32	33.35	*	46.51	
3471.36	H	Y	40.21	-6.32	33.89	*	49.49	
3471.36	H	Z	39.71	-6.32	33.39	*	46.72	1099.67
3905.28	V	X	40.98	-6.32	34.66	*	54.08	500.00
3905.28	V	Y	40.62	-6.32	34.30	*	51.88	
3905.28	V	Z	40.95	-6.32	34.63	*	53.89	
3905.28	H	X	40.74	-6.32	34.42	*	52.60	
3905.28	H	Y	40.98	-6.32	34.66	*	54.08	
3905.28	H	Z	40.85	-6.32	34.53	*	53.27	500.00
4339.20	V	X	42.11	-6.32	35.79	*	61.59	1099.67
4339.20	V	Y	42.54	-6.32	36.22	*	64.71	
4339.20	V	Z	41.38	-6.32	35.06	*	56.62	
4339.20	H	X	39.85	-6.32	33.53	*	47.48	
4339.20	H	Y	40.83	-6.32	34.51	*	53.15	
4339.20	H	Z	41.35	-6.32	35.03	*	56.43	1099.67

EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * Indicates Ambient Reading

Data Sheet 3 of 6



Retlif Testing Laboratories

Report No. R-6149N

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Field Strength of Spurious Emissions	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15, Subpart C	Paragraph: 15.231(b), 15.205, 15.209
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	December 9 th , 2016	

Notes: Test Distance: 3 meters Detector: Peak

TEST PARAMETERS

Test Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading		Converted Reading	Limit at 3M
MHz		X/Y/Z	dBuV/m	dB	dBuV/m		uV/m	uV/m
867.84	V	X	19.73	30.97	50.70		342.77	10998.44
867.84	V	Y	27.84	30.97	58.81		871.97	
867.84	V	Z	18.58	30.97	49.55		300.26	
867.84	H	X	25.85	30.97	56.82		693.43	
867.84	H	Y	20.49	30.97	51.46		374.11	
867.84	H	Z	27.10	30.97	58.07		800.76	10998.44
1301.76	V	X	46.82	-5.82	41.00		112.20	5000.00
1301.76	V	Y	55.06	-5.82	49.24		289.73	
1301.76	V	Z	44.61	-5.82	38.79		87.00	
1301.76	H	X	55.41	-5.82	49.59		301.65	
1301.76	H	Y	49.70	-5.82	43.88		156.31	
1301.76	H	Z	53.12	-5.82	47.30		231.74	5000.00
1735.68	V	X	45.39	-3.78	41.61		120.36	10998.44
1735.68	V	Y	52.67	-3.78	48.89		278.29	
1735.68	V	Z	49.60	-3.78	45.82		195.43	
1735.68	H	X	54.52	-3.78	50.74		344.35	
1735.68	H	Y	45.34	-3.78	41.56		119.67	
1735.68	H	Z	41.29	-3.78	37.51	*	75.08	10998.44

EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * Indicates Ambient Reading

Data Sheet 4 of 6



Retlif Testing Laboratories

Report No. R-6149N

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Field Strength of Spurious Emissions	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15, Subpart C	Paragraph: 15.231(b), 15.205, 15.209
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	November 10 th , 2016	

Notes: Test Distance: 3 meters Detector: Peak

TEST PARAMETERS

Test Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading		Converted Reading	Limit at 3M
MHz		X/Y/Z	dBuV/m	dB	dBuV/m		uV/m	uV/m
2169.60	V	X	40.19	-2.29	37.90	*	78.52	10998.44
2169.60	V	Y	48.38	-2.29	46.09		201.60	
2169.60	V	Z	45.50	-2.29	43.21		144.71	
2169.60	H	X	47.10	-2.29	44.81		173.98	
2169.60	H	Y	40.15	-2.29	37.86	*	78.16	
2169.60	H	Z	41.11	-2.29	38.82	*	87.30	10998.44
2603.52	V	X	40.75	-1.20	39.55	*	94.95	10998.44
2603.52	V	Y	42.99	-1.20	41.79	*	122.89	
2603.52	V	Z	41.90	-1.20	40.70	*	108.39	
2603.52	H	X	42.49	-1.20	41.29	*	116.01	
2603.52	H	Y	42.25	-1.20	41.05	*	112.85	
2603.52	H	Z	41.99	-1.20	40.79	*	109.52	10998.44
3037.44	V	X	40.16	-0.30	39.86	*	98.40	10998.44
3037.44	V	Y	41.28	-0.30	40.98	*	111.94	
3037.44	V	Z	40.44	-0.30	40.14	*	101.62	
3037.44	H	X	40.16	-0.30	39.86	*	98.40	
3037.44	H	Y	40.28	-0.30	39.98	*	99.77	
3037.44	H	Z	41.26	-0.30	40.96	*	111.69	10998.44

EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * Indicates Ambient Reading

Data Sheet 5 of 6



Retlif Testing Laboratories

Report No. R-6149N

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Field Strength of Spurious Emissions	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15, Subpart C	Paragraph: 15.231(b), 15.205, 15.209
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	November 10 th , 2016	

Notes: Test Distance: 3 meters Detector: Peak

TEST PARAMETERS

Test Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading		Converted Reading	Limit at 3M
MHz		X/Y/Z	dBuV/m	dB	dBuV/m		uV/m	uV/m
3471.36	V	X	39.85	0.76	40.61	*	107.28	10998.44
3471.36	V	Y	40.23	0.76	40.99	*	112.07	
3471.36	V	Z	39.17	0.76	39.93	*	99.20	
3471.36	H	X	38.91	0.76	39.67	*	96.27	
3471.36	H	Y	39.45	0.76	40.21	*	102.45	
3471.36	H	Z	38.95	0.76	39.71	*	96.72	10998.44
3905.28	V	X	39.78	1.20	40.98	*	111.94	5000.00
3905.28	V	Y	39.42	1.20	40.62	*	107.40	
3905.28	V	Z	39.75	1.20	40.95	*	111.56	
3905.28	H	X	39.54	1.20	40.74	*	108.89	
3905.28	H	Y	39.78	1.20	40.98	*	111.94	
3905.28	H	Z	39.65	1.20	40.85	*	110.28	5000.00
4339.20	V	X	40.54	1.57	42.11	*	127.50	5000.00
4339.20	V	Y	40.97	1.57	42.54	*	133.97	
4339.20	V	Z	39.81	1.57	41.38	*	117.22	
4339.20	H	X	38.28	1.57	39.85	*	98.29	
4339.20	H	Y	39.26	1.57	40.83	*	110.03	
4339.20	H	Z	39.78	1.57	41.35	*	116.82	5000.00

EUT emissions within 10 dB of the specified test limit were observed at the specified test distance throughout the given frequency spectrum. * Indicates Ambient Reading

Data Sheet 6 of 6



Retlif Testing Laboratories

Report No. R-6149N

**Unwanted Emissions into Restricted Frequency Bands
30 MHz to 4.4 GHz
Test Data**



Retlif Testing Laboratories

Report No. R-6149N

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.231(b), 15.205
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	December 9 th , 2016	

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

TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
37.50	-	-	-	-			-	100.00
	38.00	18.91	14.20	33.11	*		45.24	I
38.25	-	-	-	-			-	100.00
73.00	-	-	-	-			-	100.00
	74.00	17.71	8.36	26.07	*		20.11	I
74.60	-	-	-	-			-	100.00
74.80	-	-	-	-			-	100.00
	75.00	14.09	8.36	22.45	*		13.26	
75.20	-	-	-	-			-	100.00
108.00	-	-	-	-			-	150.00
	115.00	9.59	10.02	19.61	*		9.56	
	-	-	-	-			-	
121.94	-	-	-	-			-	150.00
123.00	-	-	-	-			-	150.00
	130.00	11.04	9.44	20.48	*		10.57	
	-	-	-	-			-	
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 5



Retlif Testing Laboratories

Report No. R-6149N

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.231(b), 15.205
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	December 9 th , 2016	

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

TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
149.90	-	-	-	-			-	150.00
	150.00	7.88	11.17	19.05	*		8.96	
150.05	-	-	-	-			-	150.00
156.52	-	-	-	-			-	150.00
	156.52	4.56	12.08	16.64	*		6.79	
156.52	-	-	-	-			-	150.00
156.70	-	-	-	-			-	150.00
	156.80	4.71	12.12	16.83	*		6.94	
156.90	-	-	-	-			-	150.00
162.01	-	-	-	-			-	150.00
	165.00	6.83	12.68	19.51	*		9.45	
167.17	-	-	-	-			-	150.00
167.72	-	-	-	-			-	150.00
	170.00	7.05	12.80	19.85	*		9.83	
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 5



Retlif Testing Laboratories

Report No. R-6149N

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.231(b), 15.205
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	December 9 th , 2016	

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

TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
240.00	-	-	-	-			-	200.00
	260.00	0.18	16.85	17.03	*		7.10	
285.00	-	-	-	-			-	200.00
322.80	-	-	-	-			-	200.00
	330.00	0.53	18.91	19.44	*		9.38	
335.40	-	-	-	-			-	200.00
399.90	-	-	-	-			-	200.00
	405.00	-2.15	21.49	19.34	*		9.27	
410.00	-	-	-	-			-	200.00
608.00	-	-	-	-			-	200.00
	611.00	-2.55	27.34	24.79	*		17.36	
614.00	-	-	-	-			-	200.00
960.00	-	-	-	-			-	500.00
	975.00	0.34	32.10	32.44	*		41.88	
1240.00	-	-	-	-			-	500.00
1300.00	-	-	-	-			-	500.00
	1301.76	49.59	-6.32	43.27			145.71	
1427.00	-	-	-	-			-	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 3 of 5



Retlif Testing Laboratories

Report No. R-6149N

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.231(b), 15.205
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	December 9 th , 2016	

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

TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
1435.00	-	-	-	-			-	500.00
	1500.00	32.51	-4.81	27.70	*		24.27	
1646.50	-	-	-	-			-	500.00
1660.00	-	-	-	-			-	500.00
	1680.00	31.67	-4.01	27.66	*		24.15	
1710.00	-	-	-	-			-	500.00
1718.80	-	-	-	-			-	500.00
	1720.00	32.03	-3.84	28.19	*		25.67	
1722.20	-	-	-	-			-	500.00
2200.00	-	-	-	-			-	500.00
	2250.00	31.43	-2.07	29.36	*		29.38	
2300.00	-	-	-	-			-	500.00
2310.00	-	-	-	-			-	500.00
	2360.00	31.38	-1.79	29.59	*		30.16	
2390.00	-	-	-	-			-	500.00
2483.50	-	-	-	-			-	500.00
	2490.00	31.07	-1.47	29.60	*		30.20	
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 5



Retlif Testing Laboratories

Report No. R-6149N

RETLIF TESTING LABORATORIES

EMISSIONS TEST DATA SHEET

Test Method	Unwanted Emissions into Restricted Frequency Bands	
Customer	Trine Access Technology	
Job Number	R-6149N	
Test Sample	Hand Held Pendant Access Control Transmitter	
Model Number	018-4	
Serial Number	018-4	
Test Specification	FCC Part 15 Subpart C	Paragraph: 15.231(b), 15.205
Operating Mode	Transmitting modulated signal at 433.92 MHz	
Technician	M. Seamans	
Date	December 9 th , 2016	

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

TEST PARAMETERS

Restricted Band	Measured Frequency	Meter Reading	Correction Factor	Corrected Reading			Converted Reading	Limit at 3M
MHz	MHz	dBuV	dB	dBuV/m			uV/m	uV/m
2690.00	-	-	-	-			-	500.00
	-	-	-	-			-	
	2750.00	31.44	-0.88	30.56	*		33.73	
	-	-	-	-			-	
2900.00	-	-	-	-			-	500.00
3260.00	-	-	-	-			-	500.00
	3263.00	30.60	0.11	30.71	*		34.32	
3267.00	-	-	-	-			-	500.00
3332.00	-	-	-	-			-	500.00
	3336.00	30.43	0.23	30.66	*		34.12	
3339.00	-	-	-	-			-	500.00
3345.00	-	-	-	-			-	500.00
	3350.00	30.80	0.26	31.06	*		35.73	
3358.00	-	-	-	-			-	500.00
3600.00	-	-	-	-			-	500.00
	-	-	-	-			-	
	3700.00	29.94	0.81	30.75	*		34.47	
4400.00	-	-	-	-			-	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).

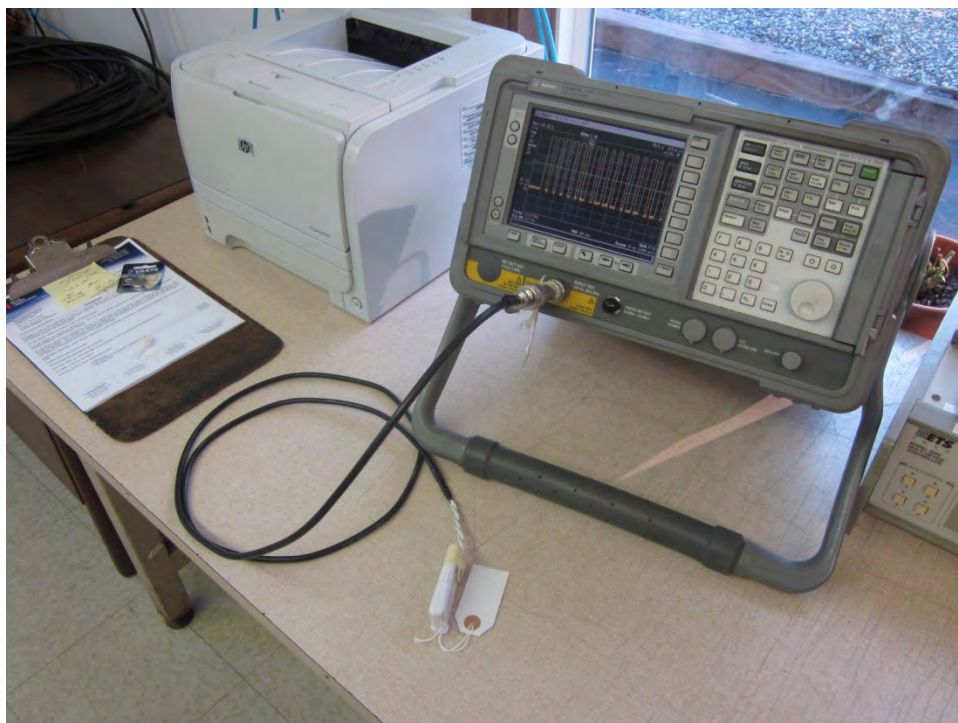
Data Sheet 5 of 5



Retlif Testing Laboratories

Report No. R-6149N

Test Photograph Bandwidth of Emission



Test Setup



Retlif Testing Laboratories

Report No. R-6149N

**FCC Section 15.231(c) - Bandwidth of Emission
Test Data**



Retlif Testing Laboratories

Report No. R-6149N

RETLIF TESTING LABORATORIES

Test Method:	Bandwidth		
Customer	Trine Access Technology	Job No.	R-6149N
Test Sample	Hand Held Pendant Access Control Transmitter		
Model Number	018-4	Serial No.	018-4
Operating Mode	Transmitting modulated signal at 433.92 MHz		
Test Specification	FCC Part 15, Subpart C Paragraph: 15.231 (c)		
Technician	M. Seamans	Date	November 2 nd , 2016
Climatic Conditions	Temp: 23.1 °C Relative Humidity: 36.6 %		
Notes	20dB Bandwidth: 362.6 kHz		

Agilent 08:22:44 Nov 2, 2016

Mkr1 362.6 kHz
0.025 dB

Ref 100 dB V

Atten 5 dB

Peak

Log

10

dB /

Offst

10

dB

DI

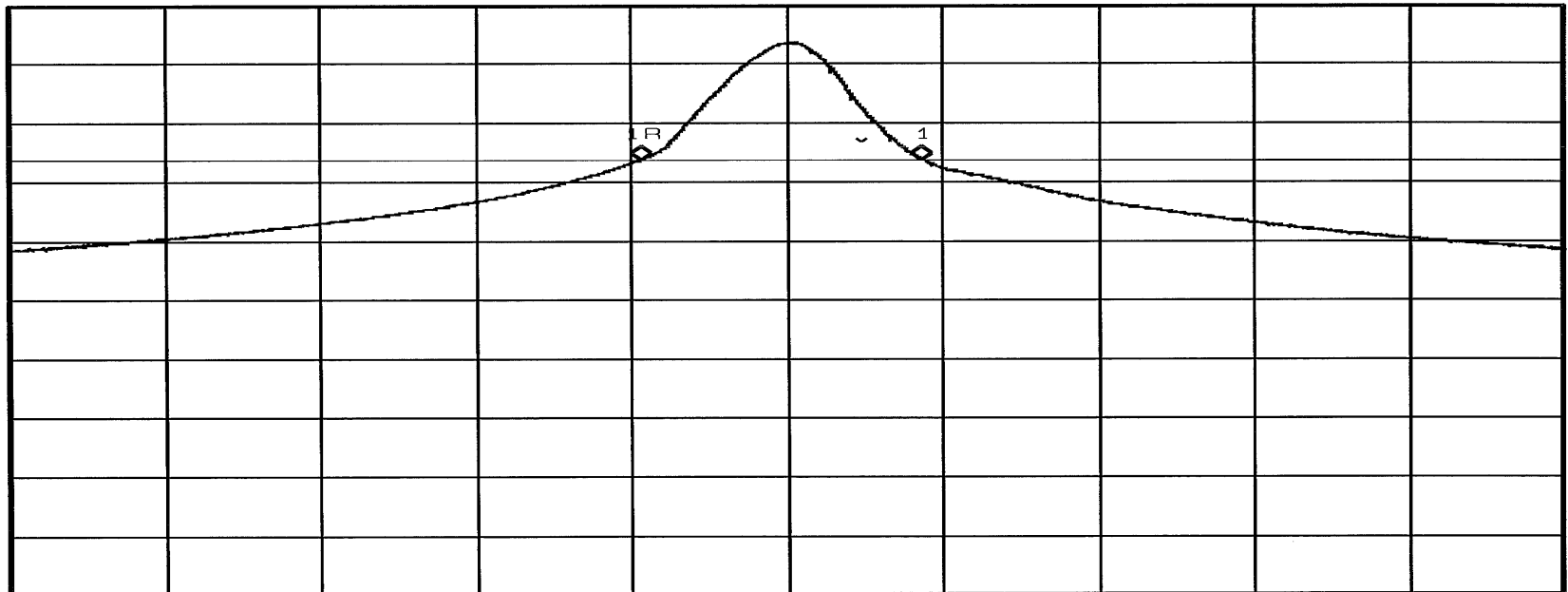
73.8

dB V

V1 S2

S3 FC

AA



Center 433.9 MHz

Res BW 120 kHz

VBW 300 kHz

Span 2 MHz
#Sweep 10 s (4000 pts)