***FCC PART 15 SUBPART C SECTION 15.231,***
***RSS-GEN, & RSS-210***
***TEST REPORT***

*for*

# WIRELESS 345MHZ REPEATER
# Model: 2GIG-RPTR1e-345

Prepared for

NORTEK SECURITY & CONTROL LLC
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Carlsbad, California 92010

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DATE: July 12th, 2019

| | REPORT BODY | APPENDICES | | | | | TOTAL |
|---|---|---|---|---|---|---|---|
| | | *A* | *B* | *C* | *D* | *E* | |
| PAGES | 18 | 2 | 2 | 2 | 9 | 8 | **41** |

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| FIGURE | TITLE |
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| 1 | Plot Map and Layout of Test Site Below 1GHz |
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# GENERAL REPORT SUMMARY

This test report is pursuant to a class 2 permissive change on the subject device. Full re-testing was not performed, only those tests that were impacted by the change have been run in their entirety. See C2PC request exhibit regarding the details of the change.

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form unless done so in full with the written permission of Compatible Electronics.

This report must not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.

| | |
|---|---|
| Device Tested: | Wireless 345MHz Repeater<br>Model: 2GIG-RPTR1e-345<br>S/N: None |
| Product Description: | The 2GIG 345MHz Repeater is designed to work with 2GIG security systems providing more flexibility in where wireless sensors can be installed. The 2GIG Repeater can be installed in the optimal location to extend the range of 2GIG panels for large jobs. The 2GIG 345MHz Repeater will repeat 2GIG and Honeywell sensor signals to 2GIG panels. The Repeater is a plug and play device that will immediately start repeating signals when powered on. The rechargeable battery provides backup power in case of AC power loss. |
| Modifications: | The EUT was not modified to comply with specifications. |
| Manufacturer: | Nortek Security & Control LLC<br>5919 Sea Otter Place<br>Carlsbad, California 92010 |
| Test Dates: | April 3, June 14, 19 and 20, 2019 |

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Test Specifications Covered by Accreditation:
EMI requirements

CFR Title 47, Part 15 Subpart C Sections 15.205, 15.207, 15.209 and 15.231
RSS-GEN & RSS-210

Test Procedure: ANSI C63.4 & C63.10

# SUMMARY OF TEST RESULTS

| TEST | DESCRIPTION | RESULTS |
|---|---|---|
| 1 | Duty Cycle | Recorded |
| 2 | Fundamental and harmonics, field strength measurements. | Complies with the limits of CFR Title 47, Part 15 Subpart C Section 15.209, 15.231, & RSS-GEN. |
| 3 | -20 dB Occupied Bandwidth of the Emission | Complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.231 & RSS-210. |

# 1. PURPOSE

This document is a qualification test report based on the tests performed on the Wireless 345MHz Repeater Model: 2GIG-RPTR1e-345. The measurements were performed according to the measurement procedure described in ANSI C63.10. The tests were performed in order to determine whether the results from the equipment under test, referred to as EUT (equipment under test) hereafter, are within the specification limits defined by the Code of Federal Regulations Title 47, Part 15 Subpart C sections 15.205, 15.209. 15.231, RSS-GEN, & RSS-210.

# 2. ADMINISTRATIVE DATA

## 2.1 Location of Testing

The tests described herein were performed at the test facility of Compatible Electronics, 20621 Pascal Way Lake Forest, California 92630.

## 2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

## 2.3 Cognizant Personnel

Nortek Security & Control LLC

| | |
|---|---|
| Josh Hansen | Engineering Manager, Regulatory |

Compatible Electronics, Inc.

| | |
|---|---|
| Sam Kerckhoff | Test Engineer |
| Joey Madlangbayan | Product Safety Manager |

## 2.4 Date Test Sample was Received

The test sample was received on March 22, 2019.

## 2.5 Disposition of the Test Sample

The test sample remains at the location of testing listed above.

## 2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

| | |
|---|---|
| RF | Radio Frequency |
| EMI | Electromagnetic Interference |
| EUT | Equipment Under Test |
| FAR | Fully Anechoic Room |
| SAC | Semi-Anechoic Chamber |
| P/N | Part Number |
| S/N | Serial Number |
| HP | Hewlett Packard |
| ITE | Information Technology Equipment |
| CML | Corrected Meter Limit |
| LISN | Line Impedance Stabilization Network |
| NVLAP | National Voluntary Laboratory Accreditation Program |
| CFR | Code of Federal Regulations |
| PCB | Printed Circuit Board |
| TX | Transmit |
| RX | Receive |

# 3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this Test Report.

| SPEC | TITLE |
|---|---|
| CFR Title 47, Part 15 | FCC Rules – Radio frequency devices (including digital devices) |
| ANSI C63.4 2014 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |
| ANSI C63.10: 2013 | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |
| RSS-GEN, Issue 5 | General Requirements for Compliance of Radio Apparatus |
| RSS-210, Issue 9 | Licence-Exempt Radio Apparatus: Category I Equipment |

# 4. DESCRIPTION OF TEST CONFIGURATION

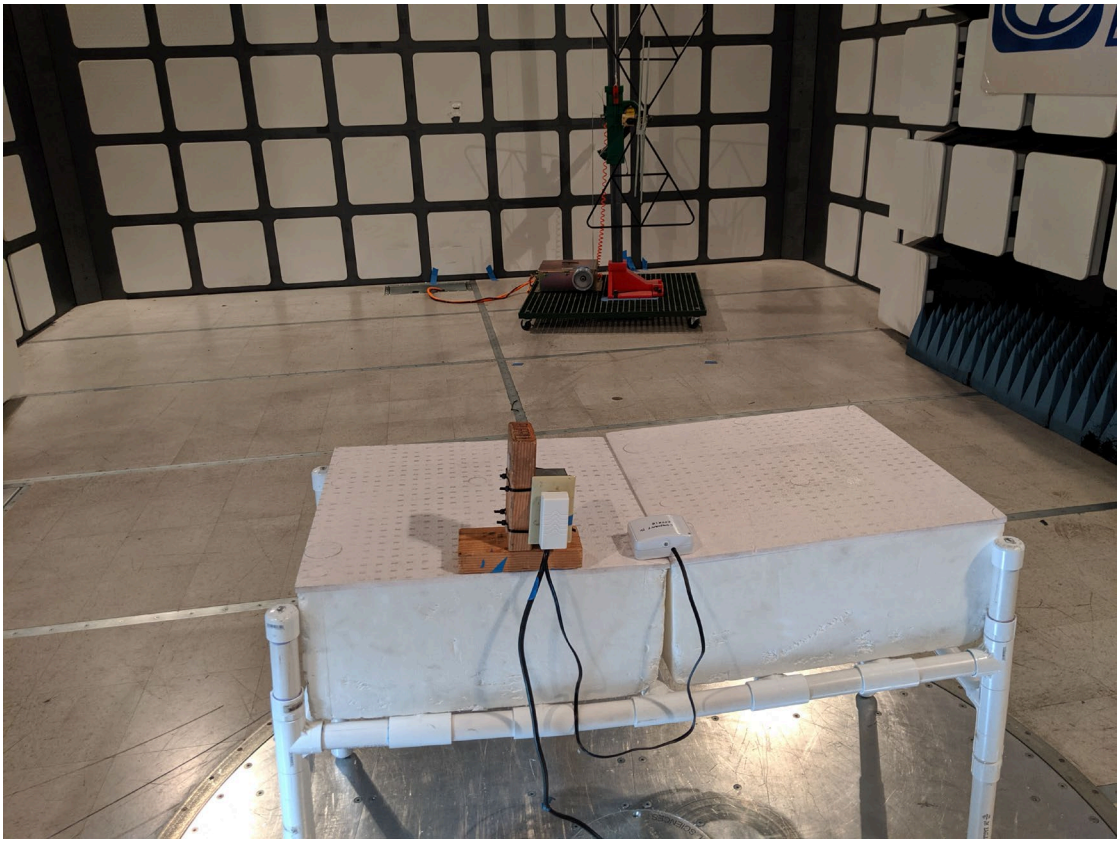
## 4.1 Description of Test Configuration

The Wireless 345MHz Repeater Model: 2GIG-RPTR1e-345 (EUT) was setup in a standalone tabletop configuration. The EUT was checked in all 3 axes. The worst case was found to be the X-axis. The EUT was continuously transmitting during the transmit tests.

The EUT was tested with new batteries.

It was determined that the emissions were at their highest level when the EUT was transmitting in the configuration described above for Radiated Emissions. The final radiated data was taken in the above configuration. Please see Appendix E for the test data.

### *4.1.1 Photograph Test Configuration (X-axis Shown)*

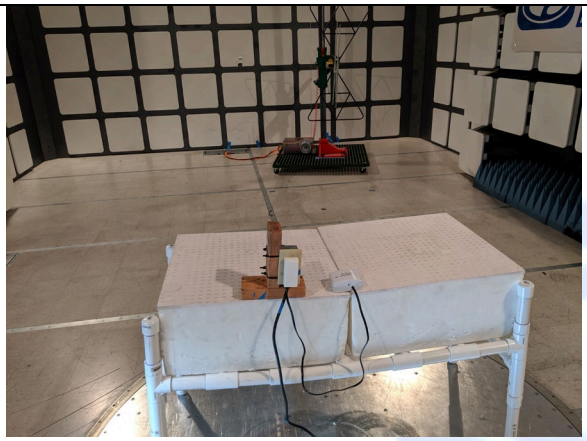
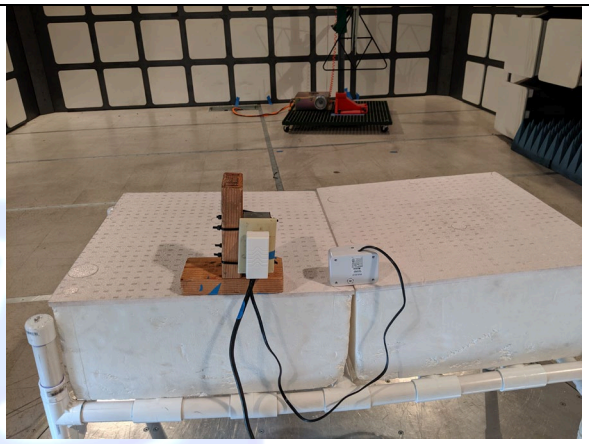
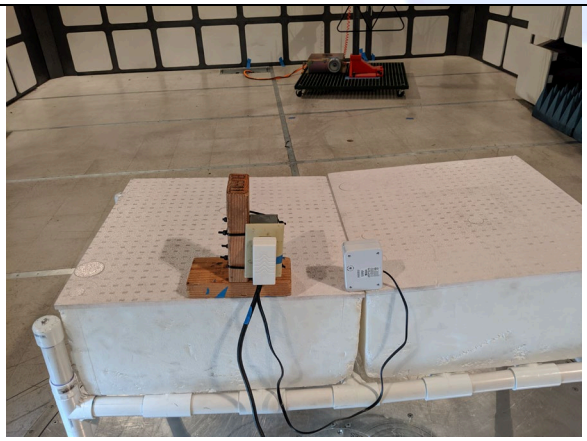


### *4.1.2 Cable Construction and Termination*

Cable 1 This is a 1 meter, unshielded two wire cable connecting the EUT to the AC/DC adaptor. The cable is connected to terminal posts at the AC/DC adaptor and is hardwired into the EUT.

### *4.1.3 Axis Orientation*

*A check was made to confirm that the emissions are at the highest when oriented in the X axis. Final data was taken in the X axis.*

| | |
|---|---|
|  X |  Y |
|  Z | |

# 5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

## 5.1 EUT and Accessory List

| # | EQUIPMENT TYPE | MANU-FACTURER | MODEL | S/N |
|---|---|---|---|---|
| 1 | WIRELESS 345MHZ REPEATER (EUT) | Nortek Security & Control LLC | 2GIG-RPTR1e-345 | None |
| 2 | AC to 14V DC power supply | ZBPOWER | ZB-H140017 | 080618-LA |

## 5.2 EMI Test Equipment

| INSTRUMENTS USED | MANUFACTURER | MODEL NUMBER | ASSET# | CALIBRATION DATE | CALIBRATION CYCLE |
|---|---|---|---|---|---|
| Thermometer & Hygrometer | Control Company | 4088 | 2741 | 2/20/2019 | 1 YEAR |
| Receiver, 20hz-40ghz | Rohde & Schwarz | ESIB40 | 5050 | 09/20/2018 | 1 YEAR |
| EMI Receiver | Keysight | N9038A | 5551 | 02/05/2019 | 1 YEAR |
| Controller, Mast and Turntable | Sunol Sciences Corporation | SC104V | 5032 | N.C.R. | |
| Mast, Antenna Positioner | Sunol Sciences Corporation | TWR95.4 | 5033 | N.C.R. | |
| Turntable | Sunol Sciences Corporation | FM2011VS | 5034 | N.C.R. | |
| Antenna, Active Loop | Com-Power | AL-130 | 5496 | 03/21/2019 | 2 YEARS |
| Antenna, CombiLog | Com-Power | AC-220 | 5511 | 03/12/2018 | 2 YEARS |
| Antenna, Horn Double Ridge | Com-Power | AH-118 | 5561 | 01/25/2019 | 2 YEARS |
| Pre-amp, Hi-Frequency | Com-Power | PAM-118A | 5466 | 01/28/2019 | 1 YEAR |
| LISN, 15A 10kHz-30MHz | Com-Power | LI-215 | 5494 | 06/26/2018 | 1 YEAR |
| LISN, 15A, 10kHz-30MHz | Com-Power | LI-215 | 5554 | 06/26/2018 | 1 YEAR |
| Attenuator | Aeroflex/Weinschel | 2-10 | 5211 | 10/03/2018 | 1 YEAR |

## 5.3 Test Software

| LAB(S) | SOFTWARE TITLE | MANUFACTURER | VERSION |
|---|---|---|---|
| P, R | Measurement and Automation Software | TDK TestLab | 5.53 |

# 6. TEST SITE DESCRIPTION

## 6.1 Test Facility Description

Please refer to section 2.1 and the figures in Appendix D of this report for test location and facility diagrams.

## 6.2 EUT Mounting, Bonding and Grounding

For measurements up to 1GHz the EUT was mounted on a non-conductive surface 80 cm above the ground plane.

For above 1GHz the EUT was mounted on a 1.5-meter-high non-conductive tabletop, which was placed on the ground plane.

The EUT was not grounded.

## 6.3 Facility Environmental Characteristics

When applicable refer to the data sheets in Appendix E for the relative humidity, air temperature, and barometric pressure.

## 6.4 Measurement Uncertainty

"Compatible Electronics' $U_{lab}$ value is less than $U_{cispr}$, thus based on this − compliance is deemed to occur if no measured disturbance exceeds the disturbance limit. For FCC compliance the uncertainty is not considered only reported. $U_{lab}$ is the expanded uncertainty of the lab

$$u_c(y) = \sqrt{\sum_i c_i^2 \; u^2(x_i)}$$

| Measurement | | $U_{cispr}$ | $U_{lab} = 2\,uc\,(y)$ |
|---|---|---|---|
| Conducted disturbance (mains port) | (150 kHz – 30 MHz) | 3.4 dB | 2.88 |
| Radiated disturbance (electric field strength on an open area test site or SAC) | (30 MHz – 1 000 MHz) | 6.3 dB | 4.04 |
| Radiated disturbance (electric field strength in a FAR) | (1 GHz – 6 GHz) | 5.2 | 3.67 |
| Radiated disturbance (electric field strength in a FAR) | (6 GHz – 18 GHz) | 5.5 | 3.67 |

# 7. CHARACTERISTICS OF THE TRANSMITTER

## 7.1 Channel Number and Frequencies

The EUT has one operating channel and the EUT has OOK modulation. The EUT has a fixed output power.

1 == 345 MHz

## 7.2 Antenna

The antenna is a wire antenna soldered to the PCB.

## 7.3 EUT Test Software

PN: unspecified

Date: 09/07/2016

Location: Nortek Security & Control LLC5919 Sea Otter Place, Carlsbad, California 92010.

# 8. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

## 8.1 RF Emissions

### *8.1.1 Conducted Emissions Test*

**Test Results:** *The test was not performed, the nature of the change is unlikely to affect conducted emissions..*

The EMI receiver was used as a measuring meter. A quasi-peak and/or average reading was taken only where indicated in the data sheets. The LISN output was measured using the EMI receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding, and grounding of the EUT. The EUT received its power through the LISN, which was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI 63.4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the computer software.

### *8.1.2 Radiated Emissions (Fundamental and Harmonics) Test*

The EMI receiver was used as a measuring meter. The receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the receiver records the highest measured reading over all the sweeps.

For spurious emissions the quasi-peak detector was used for frequencies below 1GHz and the average detector was used for frequencies above 1 GHz.

For the Fundamental & Harmonic emissions a duty cycle average was used.

The measurement bandwidths and transducers used for the radiated emissions test were:

| FREQUENCY RANGE (MHz) | TRANSDUCER | EFFECTIVE MEASUREMENT BANDWIDTH |
|---|---|---|
| .009 to .150 | Active Loop Antenna | 200 Hz |
| .150 to 30 | Active Loop Antenna | 9 kHz |
| 30 to 1000 | Combilog Antenna | 100 kHz (120kHz for QP Measurements) |
| 1000 to 3450 | Horn Antenna | 1 MHz |

The TDK FAC-3 shielded test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI C63.4 & ANSI C63.10. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters in both vertical and horizontal polarizations (for E field radiated field strength).

**Test Results:**

The change in duty cycle does not affect the radiated spurious emissions thus radiated emissions were only performed on the fundamental and harmonics.

### *8.1.3 Peak radiated EMI*

The EUT was tested at a 3-meter test distance to obtain the final test data. The final qualification data sheets are in Appendix E. This data also shows compliance at the band edges. A duty cycle correction factor was applied to the fundamental and any harmonic above 1 GHz, see Appendix E for plots.

Duty Cycle Correction Factor = -18.95

$$\delta(\text{dB}) = 20\log\left[\sum\left(nt_1 + mt_2 + \ldots + \xi t_x\right)/T\right]$$

*where*

*n* is the number of pulses of duration *t*1
*m* is the number of pulses of duration *t*2
ξ is the number of pulses of duration *tx*
*T* is the period of the pulse train or 100 ms if the pulse train length is greater than 100 ms

Pulse Type 1 = 15 * 0.2662 mS = 3.993 mS

Pulse Type 2 = 57 * 0.128 mS = 7.296 mS

7.296 mS + 3.993 mS = 11.29 mS

Total on Time = 11.29 mS

11.29 / 100 mS = 0.1129

20 log (0.1129) = **-18.95 dB correction factor**

**Test Results:**

The EUT complies with Part 15, Subpart C, section 15.231 & RSS-210.

### *8.1.4 Bandwidth of the Fundamental*

The -20 dB (Occupied) bandwidth was checked using the EMI Receiver in the spectrum analyzer mode to see that the emissions were wholly within 0.25% of the operating frequency centered on the fundamental frequency. The RBW was set to 1-5% of the -20dB bandwidth and the VBW was set to approximately three times the RBW. The span was set to between two and five times the occupied bandwidth. A Plot of the -20 dB bandwidth is located in Appendix E.

**Test Results:**

The EUT complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.231 (c) for the -20 dB bandwidth of the fundamental. The EUT has a -20 dB bandwidth that is lies wholly within the 0.25% of the operating frequency centered on the fundamental frequency.

### *8.1.5 Occupied Bandwidth*

The 99% occupied bandwidth was checked using the EMI Receiver. The RBW was set to 1-5% of the occupied bandwidth and the VBW was set to approximately three times the RBW. The span was set to between two and five times the occupied bandwidth. A Plot of the Occupied Bandwidth is in Appendix E.

**Test Results:**

The EUT complies with the requirements of RSS-210 for the 99% bandwidth of the fundamental. The EUT has a 99% bandwidth that is wholly within the 0.25% of the operating frequency centered on the fundamental frequency.

## 9. TEST PROCEDURE DEVIATIONS

The test procedures were not deviated from the standards throughout all tests.

## 10. CONCLUSIONS

The Wireless 345MHz Repeater Model: 2GIG-RPTR1e-345 meets all of the relevant specification requirements defined in the Code of Federal Regulations Title 47, Part 15 Subpart C sections 15.205, 15.207, 15.209, 15.231, RSS-GEN, & RSS-210.

# APPENDIX A

# *LABORATORY ACCREDITATIONS AND RECOGNITIONS*

# LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP TESTING
NVLAP LAB CODE 200527-0

For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025.

**For the most up-to-date version of our scopes and certificates please visit**

**http://celectronics.com/quality/scope/**

Quote from ISO-ILAC-IAF Communiqué on 17025:

"A laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems — Requirements."

ISED# 2154C

# APPENDIX B

# *MODIFICATIONS TO THE EUT*

# MODIFICATIONS TO THE EUT

No modifications were made during testing.

# APPENDIX C

## *ADDITIONAL MODELS COVERED UNDER THIS REPORT*

# ADDITIONAL MODELS COVERED UNDER THIS REPORT

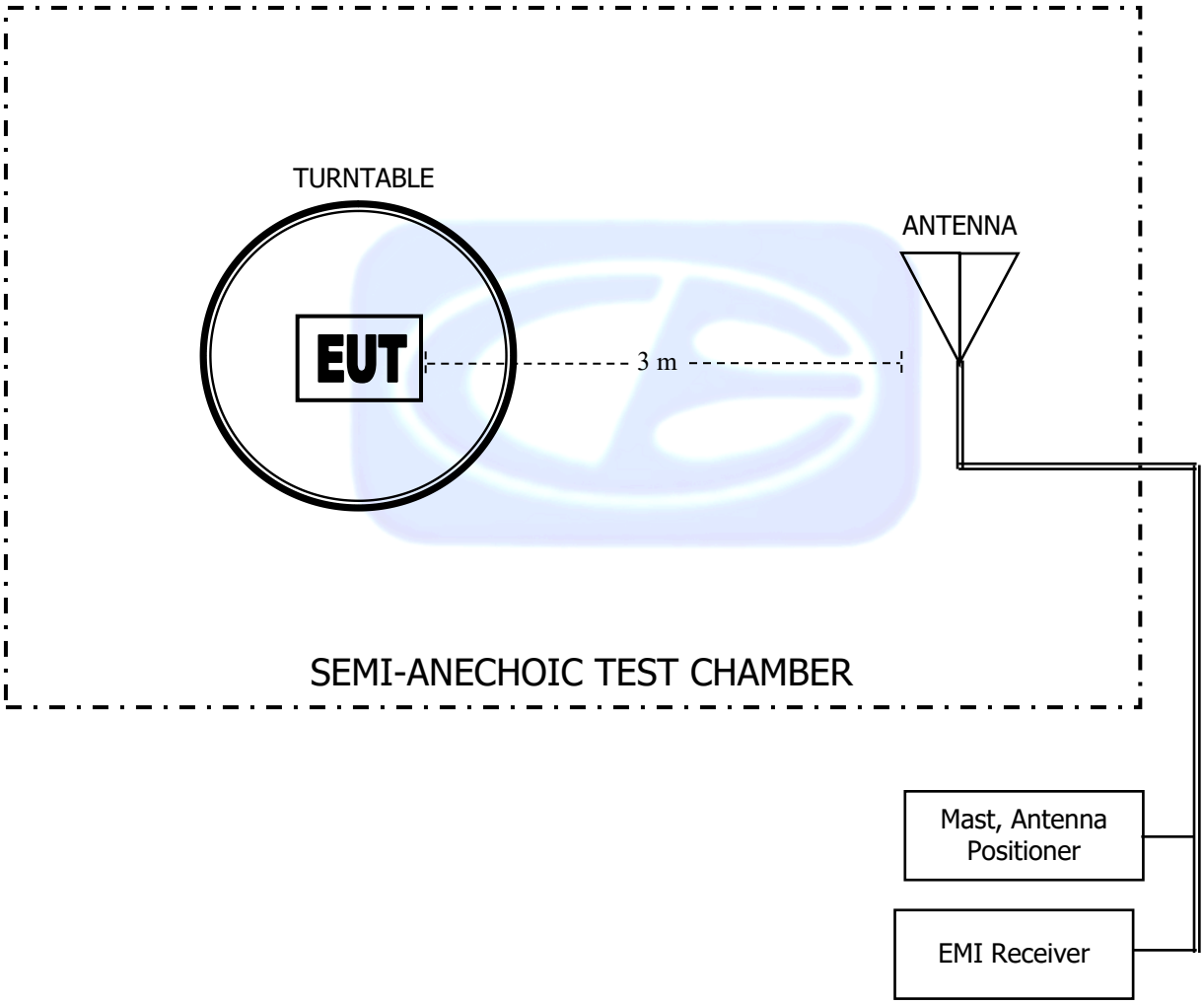
| | |
|---|---|
| USED FOR THE PRIMARY TEST | WIRELESS 345MHZ REPEATER<br>MODEL: 2GIG-RPTR1e-345<br>FCC ID: WDQ-RPTR1345 |

No additional models were tested.

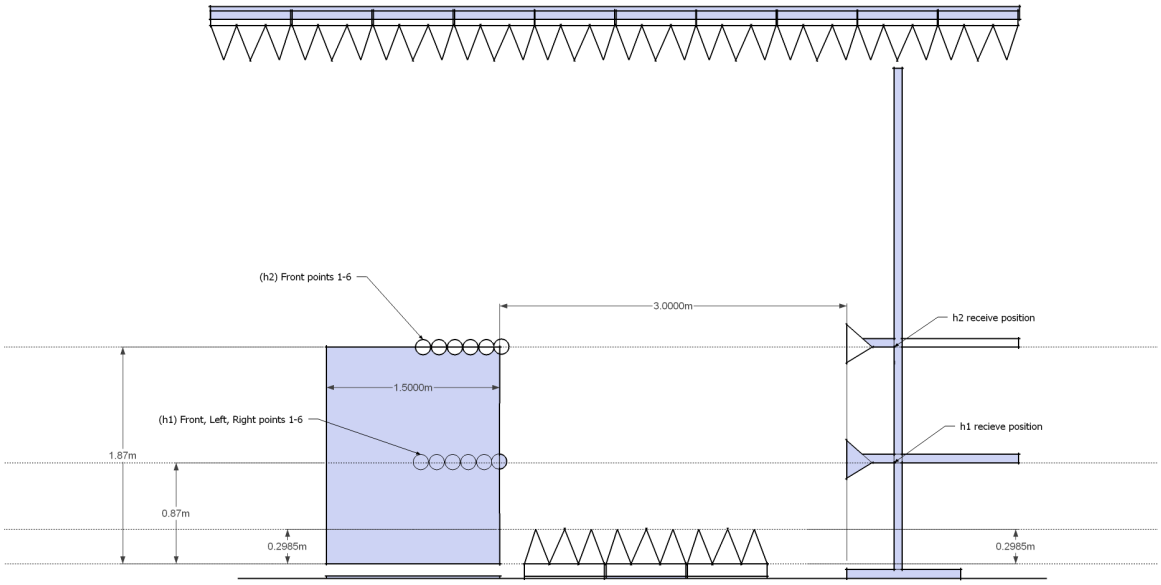
# APPENDIX D

## *DIAGRAMS, CHARTS, AND PHOTOS*

# *FIGURE 1:* PLOT MAP AND LAYOUT OF TEST SITE BELOW 1GHZ



# *FIGURE 2:* PLOT MAP AND LAYOUT OF TEST SITE ABOVE 1GHZ



# COM-POWER AL-130

# ACTIVE LOOP ANTENNA

# ASSET# 5496

# CALIBRATION DUE: MARCH 21, 2021

| FREQUENCY (MHz) | FACTOR E FIELD (dB) | FACTOR H FIELD (dB) | FREQUENCY (MHz) | FACTOR E FIELD (dB) | FACTOR H FIELD (dB) |
|---|---|---|---|---|---|
| 0.10 | 14.1 | -37.3 | 11.00 | 14.9 | -36.5 |
| 0.20 | 14.1 | -37.3 | 12.00 | 14.9 | -36.5 |
| 0.30 | 14.0 | -37.4 | 13.00 | 14.8 | -36.7 |
| 0.40 | 14.0 | -37.4 | 14.00 | 14.7 | -36.8 |
| 0.50 | 14.2 | -37.2 | 15.00 | 14.6 | -36.9 |
| 0.60 | 14.2 | -37.2 | 16.00 | 14.6 | -36.9 |
| 0.70 | 14.2 | -37.2 | 17.00 | 14.6 | -36.8 |
| 0.80 | 14.2 | -37.2 | 18.00 | 14.8 | -36.7 |
| 0.90 | 14.3 | -37.2 | 19.00 | 14.9 | -36.5 |
| 1.00 | 14.5 | -36.9 | 20.00 | 14.9 | -36.5 |
| 2.00 | 14.6 | -36.9 | 21.00 | 14.7 | -36.8 |
| 3.00 | 14.6 | -36.9 | 22.00 | 14.3 | -37.2 |
| 4.00 | 14.7 | -36.8 | 23.00 | 13.8 | -37.6 |
| 5.00 | 14.6 | -36.8 | 24.00 | 13.4 | -38.1 |
| 6.00 | 14.6 | -36.9 | 25.00 | 13.1 | -38.4 |
| 7.00 | 14.6 | -36.9 | 26.00 | 13.0 | -38.5 |
| 8.00 | 14.6 | -36.8 | 27.00 | 13.1 | -38.4 |
| 9.00 | 14.6 | -36.9 | 28.00 | 13.2 | -38.3 |
| 10.00 | 14.9 | -36.6 | 30.00 | 13.0 | -38.4 |

# COM-POWER AC-220

# LAB R - COMBILOG ANTENNA

# ASSET#: 5511

# CALIBRATION DUE: MARCH 12, 2020

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| **30** | 22.5 | **180** | 15.0 |
| **35** | 22.5 | **200** | 14.6 |
| **40** | 23.0 | **250** | 16.5 |
| **45** | 21.5 | **300** | 18.1 |
| **50** | 21.3 | **350** | 15.6 |
| **60** | 18.2 | **400** | 19.4 |
| **70** | 13.2 | **500** | 20.6 |
| **80** | 11.6 | **600** | 21.6 |
| **90** | 11.9 | **700** | 23.7 |
| **100** | 12.6 | **800** | 26.0 |
| **120** | 15.1 | **900** | 26.6 |
| **140** | 15.2 | **1000** | 28.5 |
| **160** | 13.3 | | |

# COM-POWER AH-118

# HORN ANTENNA

# ASSET #: 5561

# CALIBRATION DUE JANUARY 25, 2021

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| **1000** | 23.85 | **9500** | 38.75 |
| **1500** | 25.34 | **10000** | 38.85 |
| **2000** | 28.02 | **10500** | 38.84 |
| **2500** | 28.87 | **11000** | 39.05 |
| **3000** | 30.01 | **11500** | 39.60 |
| **3500** | 30.70 | **12000** | 39.87 |
| **4000** | 31.64 | **12500** | 40.16 |
| **4500** | 32.85 | **13000** | 40.17 |
| **5000** | 34.25 | **13500** | 40.59 |
| **5500** | 34.61 | **14000** | 40.63 |
| **6000** | 35.02 | **14500** | 40.55 |
| **6500** | 35.43 | **15000** | 42.53 |
| **7000** | 36.68 | **15500** | 40.85 |
| **7500** | 37.52 | **16000** | 41.28 |
| **8000** | 37.91 | **16500** | 41.35 |
| **8500** | 37.60 | **17000** | 41.43 |
| **9000** | 37.91 | **17500** | 42.50 |
| | | **18000** | 43.51 |

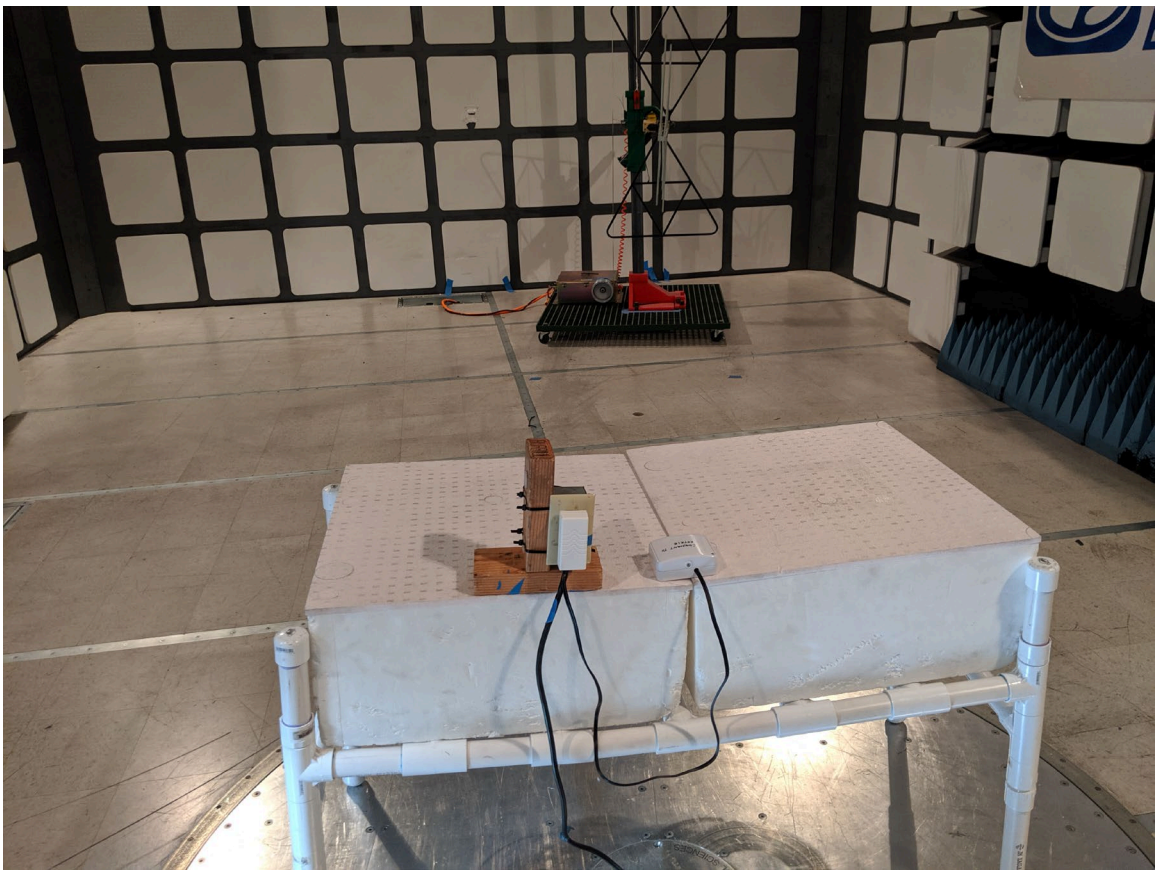
# COM-POWER PAM-118A

# 1-18GHz - PREAMPLIFIER

# Asset# 5466

# CALIBRATION DUE: JANUARY 28, 2020

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| **500** | 39.72 | **6000** | 41.30 |
| **600** | 39.79 | **6500** | 41.26 |
| **700** | 40.15 | **7000** | 41.64 |
| **800** | 40.21 | **7500** | 42.12 |
| **900** | 39.96 | **8000** | 42.05 |
| **1000** | 40.36 | **8500** | 41.23 |
| **1250** | 40.62 | **9000** | 41.24 |
| **1500** | 40.79 | **9500** | 42.67 |
| **1750** | 41.02 | **10000** | 42.51 |
| **2000** | 41.33 | **10500** | 41.48 |
| **2250** | 41.51 | **11000** | 41.26 |
| **2500** | 41.72 | **11500** | 41.37 |
| **2750** | 42.00 | **12000** | 41.45 |
| **3000** | 42.29 | **12500** | 40.97 |
| **3250** | 42.47 | **13000** | 40.60 |
| **3500** | 42.58 | **13500** | 40.32 |
| **3750** | 42.65 | **14000** | 40.44 |
| **4000** | 42.66 | **14500** | 40.79 |
| **4250** | 42.51 | **15000** | 40.89 |
| **4500** | 42.31 | **15500** | 41.36 |
| **4750** | 42.16 | **16000** | 41.39 |
| **5000** | 42.01 | **16500** | 41.09 |
| **5250** | 41.84 | **17000** | 40.37 |
| **5500** | 41.72 | **17500** | 39.70 |
| **5750** | 41.53 | **18000** | 39.63 |



NORTEK SECURITY & CONTROL LLC
WIRELESS 345MHZ REPEATER
MODEL: 2GIG-RPTR1e-345
FCC SUBPART C - RADIATED EMISSIONS < 1GHZ

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS**

NORTEK SECURITY & CONTROL LLC
WIRELESS 345MHZ REPEATER
MODEL: 2GIG-RPTR1e-345
FCC SUBPART C - RADIATED EMISSIONS > 1GHZ

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS**

# APPENDIX E

# *RADIATED EMISSIONS DATA SHEETS*

# *FUNDAMENTAL & HARMONICS*

# *DATA SHEETS*

# FUNDAMENTAL & HARMONIC FIELD STRENGTH

**FCC 15.231**

Date: 6/19/19

Wireless Sensor

Model: 2GIG-RPTR1e-345 — DC % 11.29%

**FCC ID: WDQ-RPTR1345** — DC Correction -18.95

**Fundamental / Harmonics - Low Channel**

**Transmit Mode**

| Freq. (MHz) | pk Level (dBuV/m) | Avg. Level (dBuV/m) | Pol (v/h) | pk Limit | Avg. Limit | pk Margin | Avg. Margin | Tower Height (cm) | Table Angle (degrees) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 345.00 | 93.85 | 74.90 | V | 97.26 | 77.26 | -3.41 | -2.36 | 100.00 | 50.00 | **X-axis (worst case)** |
| 345.00 | 93.40 | 74.45 | H | 97.26 | 77.26 | -3.86 | -2.81 | 113.00 | 48.00 | **(dBuV/m original peak)** |
| | | | | | | | | | | |
| | | | | | | | | | | **(dBuV/m original peak)** |
| 690.00 | 40.52 | 21.57 | V | 77.26 | 57.26 | -36.74 | -35.69 | | | **Floor** |
| 690.00 | 49.26 | 30.31 | H | 77.26 | 57.26 | -28.00 | -26.95 | 130.00 | 35.50 | |
| | | | | | | | | | | **No emissions found** |
| | | | | | | | | | | **above 1 GHz** |

# *DUTY CYCLE PLOTS*

# *DUTY CYCLE*

**FCC 15.231**

| | | | |
|---|---|---|---|
| Company: | Nortek Security & Control | Date: | 6/14/2019 |
| EUT: | 2GIG-RPTR1e-345 | Lab: | R |
| FCC ID: | WDQ-RPTR1345 | Test ENG: | Sam Kerckhoff |

| One Period (ms) | Pulse 1 (ms) | Pulse 1 (count) | Pulse 2 (ms) | Pulse 2 (count) | Duty Cycle | correction |
|---|---|---|---|---|---|---|
| 100 | 0.2662 | 15 | 0.128 | 57 | 11.29% | -18.95 |

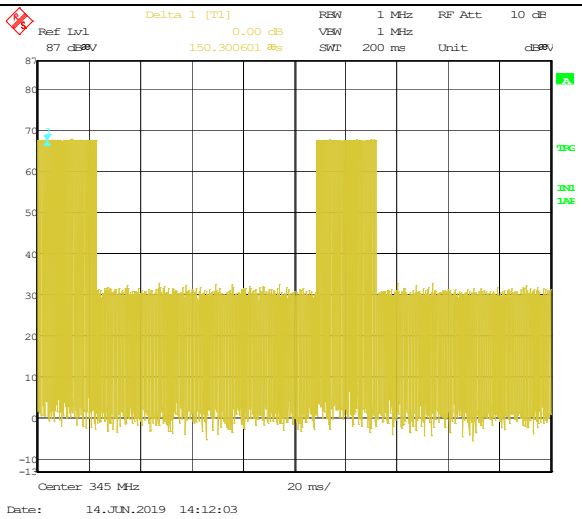



*Figure 1 Pulse Train >100ms*

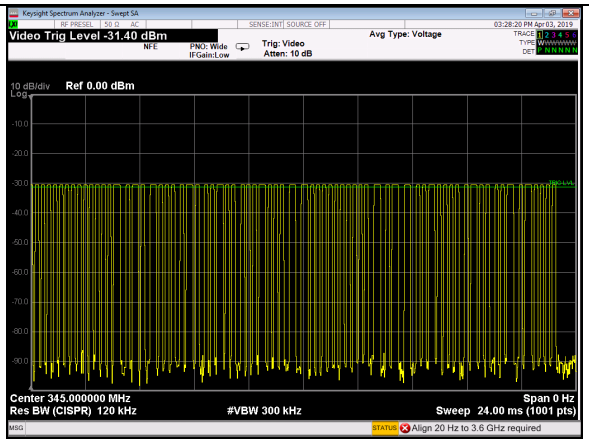



*Figure 2 Sum by Pulse Type*

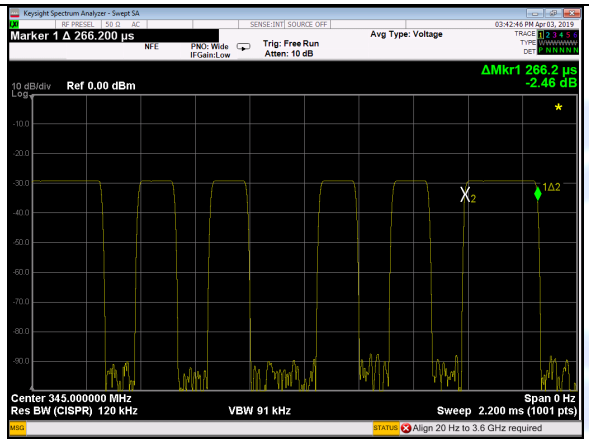



*Figure 3 Large Pulse Duration*

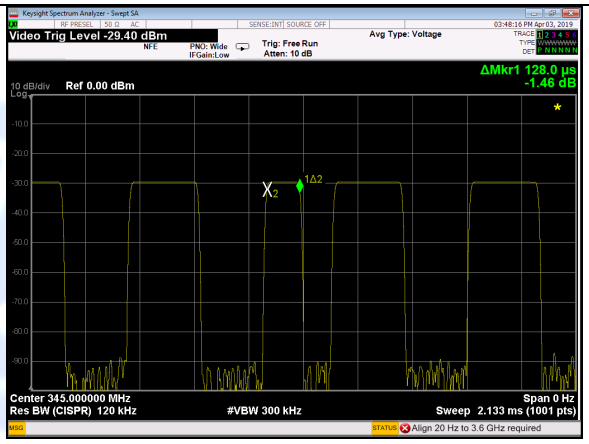
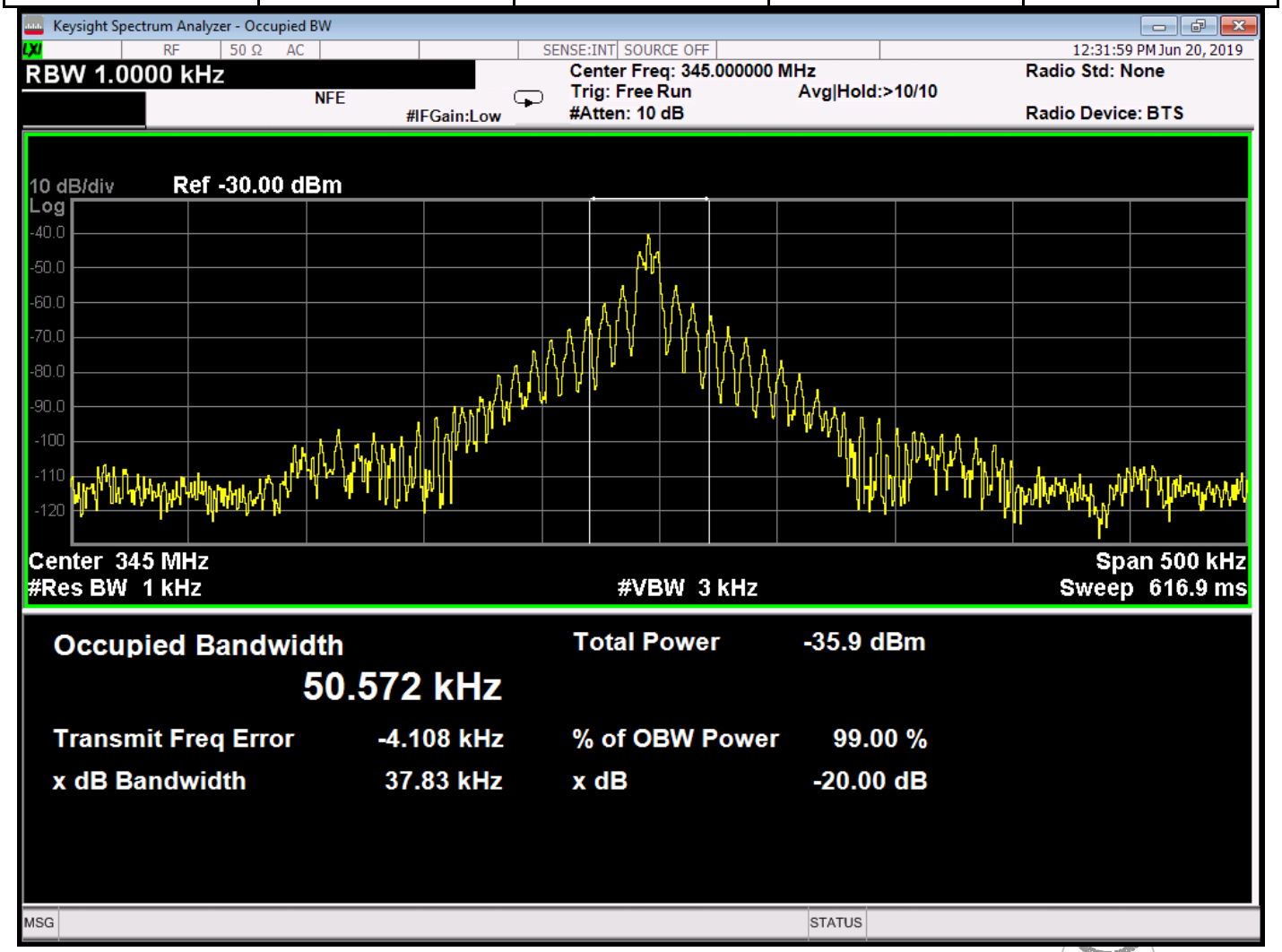



*Figure 4 Small Pulse Duration*

# *-20 dB & Occupied Bandwidth DATA*

# -20dB & 99% BANDWIDTHS

**FCC 15.231**

| | | | |
|---|---|---|---|
| Company: | Nortek | Date: | 6/20/19 |
| EUT: | Wireless 345MHz Repeater | Lab: | R |
| Model: | 2GIG-RPTR1e-345 | Tested By: | Sam Kerckhoff |

| Freq. (MHz) | Bandwidth (kHz) | Limit (kHz) | | Comments |
|---|---|---|---|---|
| 345.00 | 37.83 | 862.50 | | -20dB |
| 345.00 | 50.57 | 862.50 | | 99% |