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

For

CARBON MONOXIDE ALARM
Model: 2GIG-CO8E-345

Prepared for

NORTEK SECURITY & CONTROL
5919 SEA OTTER PL #100
CARLSBAD, CA 92010

Prepared by: _____

HOWARD HUANG

Approved by: _____

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DATE: FEBRUARY 28, 2020

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NVLAP TESTING
NVLAP LAB CODE 200527-0

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1	RADIATED EMISSIONS 3-METER SEMI -ANECHOIC TEST CHAMBER

GENERAL REPORT SUMMARY

This electromagnetic emission 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 except in full, without the written permission of Compatible Electronics.

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

Device Tested:	Carbon Monoxide Alarm Model: 2GIG-CO8E-345
Product Description:	The model 2GIG-CO8E-345 is a low power, microprocessor controlled, alarm sensor, and transmitter operating at a frequency of 345 MHz. Power is supplied by two replaceable Alkaline AAA 1.5V batteries in series to supply 3.0V to the circuit. (Dimensions: Radius 5" & 2.5" height).
Modifications:	The EUT was modified during the testing. Please see the list of modifications located in Appendix B.
Manufacturer:	Nortek Security & Control. 5919 Sea Otter #100 Carlsbad, CA 92010
Test Dates:	November 28 & December 16, 2018 and November 21 & December 1, 2019 and February 28, 2020.

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Test Specifications Covered by Accreditation:

EMI requirements:

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

Test Procedure:

ANSI C63.4: 2014 & ANSI C63.10: 2013.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz - 30 MHz	The EUT is battery powered; therefore, this test was deemed unnecessary and thus was not performed.
2	Radiated RF Emissions, 9 kHz – 3450 MHz	Complies with the limits of CFR Title 47, Part 15, Subpart B & C Section 15.209, 15.231 & RSS GEN
3	-20 dB and 99% Occupied Bandwidth of the Emission	Complies with the limits of CFR Title 47, Part 15, Subpart C Section 15.231 & RSS 210.
4	Peak Radiated EMI	Complies with the limits of CFR Title 47, Part 15, Subpart C Section 15.231 & RSS 210.
5	Transmit Timeout	Complies with the limits of CFR Title 47, Part 15, Subpart C Section 15.231 & RSS 210.

TABLE 1
SIX HIGHEST RADIATED EMISSIONS READINGS

	Reading Type (PK / QP / AV)	Polarization (Vert / Horz)	Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Delta (dB)	Test Distance
1	AV	H	345.00	74.92	77.26	-2.34	3-Meter
2	AV	V	345.00	73.55	77.26	-3.71	3-Meter
3	PK	H	345.00	92.32	97.26	-4.94	3-Meter
4	PK	V	345.00	90.95	97.26	-6.31	3-Meter
5	AV	V	345.00	69.83	77.26	-7.43	3-Meter
6	PK	V	345.00	87.23	97.26	-10.03	3-Meter

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Carbon Monoxide Alarm Model: 2GIG-CO8E-345. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 2014. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by FCC Code of Federal Regulations Title 47, part 15 Subpart B. section 15.109, Subpart C sections 15.205, 15.209 15.231, RSS GEN & RSS 210.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The emissions 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	Regulatory & Compliance Engineering Manager
David Shephard	Regulatory Compliance Engineer

Compatible Electronics, Inc.

Sam Kerckhoff	Test Technician
Howard Huang	Test Technician
Torey Oliver	Sr. Test Engineer
Joey Madlangbayan	Product Safety Manager

2.4 Date Test Sample was Received

The test sample was received on November 28, 2018.

2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics, Inc.

2.6 Abbreviations and Acronyms

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

EUT	Equipment Under Test	HP	Hewlett Packard
ESD	Electrostatic Discharge	ITE	Information Technology Equipment
EMI	Electromagnetic Interference	PE	Protective Earth
EMC	Electromagnetic Compatibility	NCR	No Calibration Required
VCP	Vertical Coupling Plane	EFT	Electrical Fast Transients
HCP	Horizontal Coupling Plane	Inc.	Incorporated
HF	High Frequency	AC	Alternating Current
VAC	Voltage Alternating Current	N/A	Not Applicable
DC	Direct Current	PFM	Power Frequency Magnetic
PC	Personal Computer	LED	Light Emitting Diode
PQF	Voltage Dips and Interrupts	RJ	Registered Jack
DoC	Declaration of Conformity	USB	Universal Serial Bus
S/N	Serial Number		

3. APPLICABLE DOCUMENTS

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

SPEC	TITLE
FCC CFR Title 47, Subpart B	FCC Rules Part 15 - Radio frequency devices (including digital devices). Subpart B – Unintentional Radiators.
FCC CFR Title 47, Subpart C	FCC Rules Part 15 - Radio frequency devices (including digital devices). Subpart C – Intentional Radiators.
ANSI C63.4: 2014	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	Procedures for Compliance Testing of Unlicensed Wireless Devices.
RSS GEN	General Requirements for Compliance of Radio Apparatus
RSS 210	License-exempt Radio Apparatus: Category I Equipment

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

The EUT was set up in a tabletop configuration. The EUT was checked in all 3 axes. The worst case was found to be in the X-Axis. The EUT was continuously transmitting during the transmit tests and in standby mode for standby tests.

The final radiated data was taken in the aforementioned configuration and mode of operation. All initial investigations were performed with the EMI Receiver in manual mode scanning the frequency range continuously.

4.1.1 Photograph of Test Configuration - EMI

4.1.2 Cable Construction and Termination

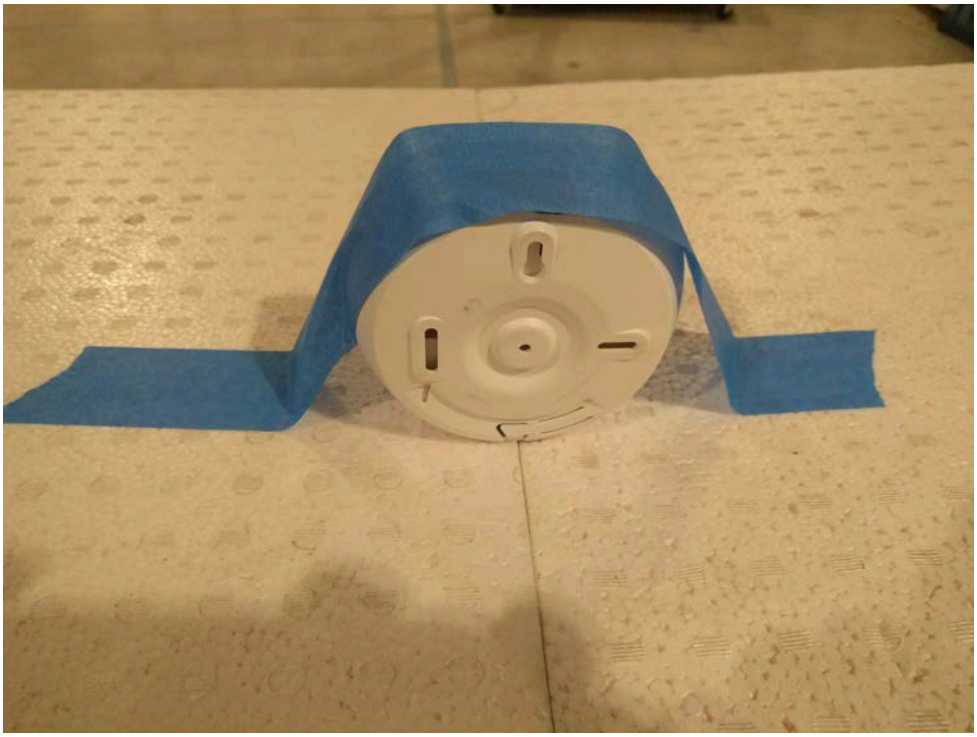
The EUT had no interconnecting cables.

4.1.3 Axis Orientation

X-Axis

4.1.3 Axis Orientation Continued

Y-Axis



4.1.3 Axis Orientation Continued

Z-Axis

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

#	EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID & IC ID
1	CARBON MONOXIDE ALARM (EUT)	NORTEK SECURITY & CONTROL	2GIG-CO8E-345	S/N: NONE	FCC ID: EF400180 IC ID: 1078-00180
2	BATTERY	DURACELL	LR03	S/N: NONE	NONE

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	ASSET NUMBER	CAL. DATE	CAL. DUE DATE
Barometer & Thermometer	Davis Instruments	6312C	5459	09/20/2018	09/20/2021
Computer	Dell	Inspiron	NONE	NCR	NCR
EMI Receiver	Rohde & Schwarz	ESIB40	3500	03/05/2018	03/05/2019
EMI Receiver	Rohde & Schwarz	ESIB40	5050	09/25/2019	09/25/2020
EMI Receiver	Keysight	N9038A	5551	02/05/2019	02/05/2020
EMI Receiver	Keysight	N9038A	5551	01/21/2020	01/21/2021
Antenna, Loop	Com Power	AL-130	5496	02/09/2017	02/09/2019
Antenna, Loop	Com Power	AL-130	5496	03/21/2019	03/21/2021
Antenna, Combilog	Com-Power	AC-220	5510	03/12/2018	03/12/2019
Antenna, Combilog	Com-Power	AC-220	5556	04/05/2019	04/05/2021
Antenna, Horn	Com-Power	AH-118	5028	07/05/2018	07/05/2019
Antenna, Horn	Com-Power	AH-118	5559	07/19/2019	07/19/2021
Mast, Antenna Positioner	Sunol Science Corporation	SC104V	5197	NCR	NCR
Antenna Mast	Sunol Science Corporation	TWR 95-4	NONE	NCR	NCR
Turntable	Sunol Science Corporation	FM2	NONE	NCR	NCR

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 of this report.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 0.6 by 1.2-meter non-conductive table 0.8 meters above the ground plane.

The EUT was raised to 1.5-meters above the ground place for frequencies above 1 GHz.

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

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

Measurement		U_{cispr}	$U_{lab} = 2\,uc\,(y)$
Conducted disturbance (mains port)	(150 kHz – 30 MHz)	3,6 dB	2.88
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30 MHz – 1000 MHz)	5,2 dB	3.53
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(1000 MHz – 3450 MHz)	5,5dB	3.59

7. CHARACTERISTICS OF THE TRANSMITTER

7.1 Channel Number and Frequencies

The EUT has one operating channel and uses ASK-OOK modulation. The EUT has fixed output power.

1 == 345 MHz

7.2 Antenna

The antenna is made up of an etched trace on the PCB.

7.3 EUT Test Software

Firmware V1.1.2

Location: 5919 Sea Otter Pl #100, Carlsbad, CA 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 EUT was battery operated; therefore, this test was deemed unnecessary and not performed. If this test had been performed it would have been as below.

The EMI Receiver was used as a measuring meter. A 10-dB attenuation pad was used for the protection of the EMI Receiver input stage. All factors associated with attenuator and cables were recorded into the EMI Software Program accordingly to display the actual corrected measured level. The LISN output was connected to the input of the EMI Receiver. The output of the second LISN was terminated with 50-ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4: 2014. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequency ranges of 0.15 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the spectrum analyzer span adjusted to 1 MHz.

The final data was collected under program control by the computer in several overlapping sweeps by running the EMI Receiver at a minimum scan rate of 10 seconds per octave.

8.1.2 Radiated Emissions (Spurious 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: 2014 & ANSI C63.10: 2013. 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 EUT complies with the limits of CFR Title 47 Part 15 Subpart B section 15.109, Subpart C sections 15.205, 15.209, 15.231, RSS GEN & RSS 210.

8.1.3 Duty Cycle

The EUT was tested at a 3-meter test distance to obtain the final test data. The final qualification data sheets are located in Appendix E.

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

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 = 52 * 156.4µs = 8,132.8µs

Pulse Type 2 = 18 * 297.8µs = 5,361.2µs

5,360.4µs + 8,132.8µs = 13,494µs

Total On Time = 13.4941ms

13.4941ms / 100ms = 0.134941

20log(0.13494) = -17.40dB

Duty Cycle Correction Factor Used = -17.40 dB

8.1.4 Bandwidth of the Fundamental

The -20 dB bandwidth was checked using the EMI Receiver in the spectrum analyzer mode to see that the emissions were wholly within the 0.25% of the operating frequency centered on the fundamental frequency. 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 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 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 to between 1.5-5 times the occupied bandwidth. A plot of the Occupied Bandwidth is located in Appendix E.

Test Results:

The EUT complies with the requirements of RSS GEN for the 99% occupied bandwidth of the fundamental.

8.1.6 Transmit Timeout

The Transmit Timeout test was performed using the EMI Receiver to make sure the transmission coming from the transmitter would cease within 5 seconds after the activation. A Plot of the transmission duration is located in Appendix E.

Test Results:

The EUT complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.231 (a) or transmission times out within 5 seconds after activation.

8.1.6 Sample Calculations

A correction factor for the antenna, cable and a distance factor (if any) must be applied to the meter reading before a true field strength reading can be obtained. This Corrected Meter Reading is then compared to the specification limit in order to determine compliance with the limits.

The equation can be derived in the following manner:

Specification limit (µV/m) log x 20 = Specification Limit in dBuV

(Specification distance / test distance) log x 40 = distance factor

Note: When using an Active Antenna, the Antenna factor shall be subtracted due to the combination of the internal amplification and antenna loss. At lower frequencies the cable loss is negligible.

OR

Corrected Meter Reading = meter reading + F – A + C

where:

F = antenna factor

A= amplifier gain

C = cable loss

The correction factors for the antenna and the amplifier gain are attached in Appendix D of this report. The data sheets are attached in Appendix E.

The distance factor D is 0 when the test is performed at the required specification distance.

9. TEST PROCEDURE DEVIATIONS

There were no deviations from the test procedures.

10. CONCLUSIONS

The Carbon Monoxide Alarm Model: 2GIG-CO8E-345 as tested meets all of the relevant specification requirements defined in the Code of Federal Regulations Title 47, Part 15 Subpart B and C sections 15.205, 15.207, 15.209, 15.231, RSS GEN & RSS 210.

APPENDIX A

LABORATORY ACCREDITATIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP TESTING
NVLAP LAB CODE 200527-0

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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."

Innovation, Science and Economic Development Canada Lab Code: 2154C

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass the FCC, RSS-Gen and RSS-210 specifications.

All the rework described below are implemented during the test in a method that could be reproduced in all the units by the manufacturer.

Modifications:

1) Changed R9 to 68 Ohms

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST — Carbon Monoxide Alarm
Model: 2GIG-CO8E-345

There are no additional models covered under this report.

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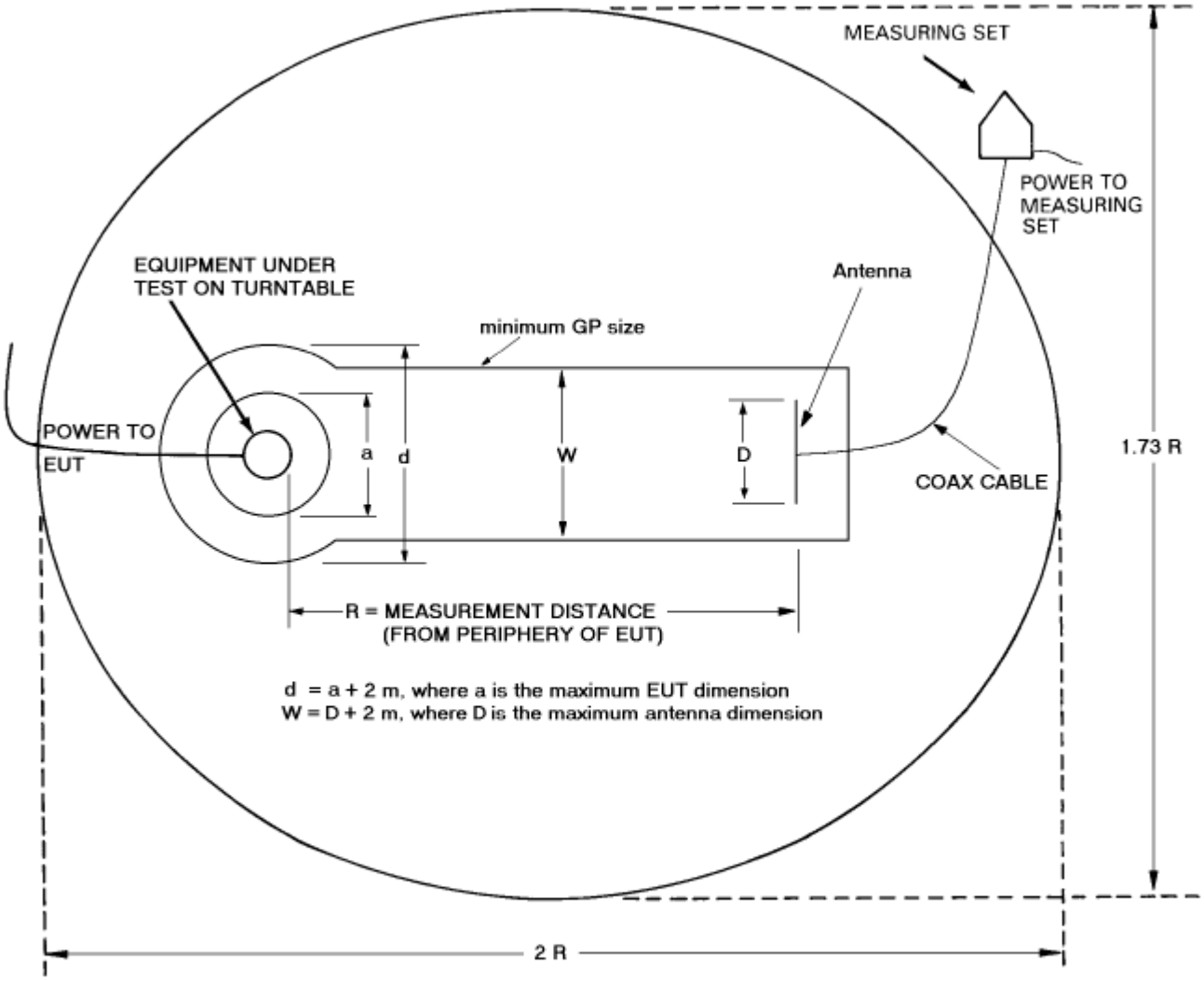
APPENDIX D

DIAGRAMS, CHARTS AND PHOTOS

FIGURE 1: RADIATED EMISSIONS 3-METER SEMI -ANECHOIC TEST CHAMBER



AREA DIMENSIONS =

R = 3m	R = 10 m	R = 30 m
6 m x 5.2 m	20 m x 17.3 m	60 m x 52 m

COM-POWER AL-130

LOOP ANTENNA

A/N: 5496

CALIBRATION DATE: FEBRUARY 9, 2017

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)	FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-34.68	16.82	**0.8**	-37.44	14.06
0.01	-35.54	15.96	**0.9**	-37.34	14.16
0.02	-37.22	14.28	**1.0**	-37.34	14.16
0.03	-36.44	15.06	**2.0**	-37.03	14.47
0.04	-36.90	14.60	**3.0**	-37.02	14.48
0.05	-37.56	13.94	**4.0**	-37.12	14.38
0.06	-37.45	14.05	**5.0**	-36.92	14.58
0.07	-37.55	13.95	**6.0**	-37.12	14.38
0.08	-37.46	14.04	**7.0**	-37.02	14.48
0.09	-37.56	13.94	**8.0**	-36.81	14.69
0.1	-37.56	13.94	**9.0**	-36.81	14.69
0.2	-37.75	13.75	**10.0**	-36.70	14.80
0.3	-37.75	13.75	**15.0**	-37.08	14.42
0.4	-37.65	13.85	**20.0**	-36.60	14.90
0.5	-37.75	13.75	**25.0**	-38.62	12.88
0.6	-37.75	13.75	**30.0**	-38.92	12.58
0.7	-37.64	13.86			

COM-POWER AL-130

LOOP ANTENNA

A/N: 5496

CALIBRATION DATE: 03/21/2019

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)	FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-35.2	16.3	**7.0**	-36.9	14.6
0.01	-35.7	15.7	**8.0**	-36.8	14.6
0.02	-36.6	14.8	**9.0**	-36.9	14.6
0.03	-35.8	15.6	**10.0**	-36.6	14.9
0.04	-36.4	15.1	**11.0**	-36.5	14.9
0.05	-37.0	14.5	**12.0**	-36.5	14.9
0.06	-36.8	14.7	**13.0**	-36.7	14.8
0.07	-37.0	14.4	**14.0**	-36.8	14.7
0.08	-37.1	14.4	**15.0**	-36.9	14.6
0.09	-36.9	14.5	**16.0**	-36.9	14.6
0.1	-37.3	14.1	**17.0**	-36.8	14.6
0.2	-37.3	14.1	**18.0**	-36.7	14.8
0.3	-37.4	14.0	**19.0**	-36.5	14.9
0.4	-37.4	14.0	**20.0**	-36.5	14.9
0.5	-37.2	14.2	**21.0**	-36.8	14.7
0.6	-37.2	14.2	**22.0**	-37.2	14.3
0.7	-37.2	14.2	**23.0**	-37.6	13.8
0.8	-37.2	14.2	**24.0**	-38.1	13.4
0.9	-37.2	14.3	**25.0**	-38.4	13.1
1.0	-36.9	14.5	**26.0**	-38.5	13.0
2.0	-36.9	14.6	**27.0**	-38.4	13.1
3.0	-36.9	14.6	**28.0**	-38.3	13.2
4.0	-36.8	14.7	**29.0**	-38.3	13.2
5.0	-36.8	14.6	**30.0**	-38.4	13.0
6.0	-36.9	14.6			

COM-POWER AC-220

LAB P - COMBILOG ANTENNA

S/N: 061105

CALIBRATION DATE: MARCH 12, 2018

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	24.05	**160**	13.57
35	22.46	**180**	14.07
40	19.36	**200**	14.72
45	17.42	**250**	18.27
50	15.77	**300**	20.95
60	12.86	**400**	23.16
70	11.22	**500**	21.86
80	11.84	**600**	23.54
90	13.48	**700**	23.85
100	14.80	**800**	25.91
120	16.38	**900**	26.71
140	14.41	**1000**	27.60

COM-POWER AC-220

LAB R - COMBILOG ANTENNA

A/N: 5556

CALIBRATION DATE: APRIL 5, 2019

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	22.00	**160**	14.00
35	21.00	**180**	14.70
40	20.40	**200**	15.10
45	19.60	**250**	16.70
50	18.40	**300**	18.20
60	14.90	**400**	20.70
70	11.70	**500**	22.00
80	11.60	**600**	24.50
90	13.20	**700**	24.50
100	14.30	**800**	26.10
120	15.60	**900**	27.00
140	14.30	**1000**	27.60

COM-POWER AH-118

HORN ANTENNA

A/N: 5028

CALIBRATION DATE: JULY 5, 2018

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1000	24.45	**9500**	38.91
1500	25.34	**10000**	39.38
2000	28.06	**10500**	39.64
2500	28.82	**11000**	39.42
3000	29.80	**11500**	39.84
3500	30.65	**12000**	39.66
4000	31.28	**12500**	40.12
4500	32.24	**13000**	40.27
5000	33.09	**13500**	40.42
5500	33.55	**14000**	40.85
6000	34.45	**14500**	42.06
6500	35.37	**15000**	42.33
7000	36.91	**15500**	39.45
7500	37.39	**16000**	39.54
8000	37.62	**16500**	39.57
8500	37.40	**17000**	41.79
9000	37.39	**17500**	43.87
		18000	44.53

COM-POWER AH-118

HORN ANTENNA

A/N: 5559

CALIBRATION DUE: JULY 19, 2021

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
700	25.84	**7500**	37.73
750	25.46	**8000**	38.05
800	24.96	**8500**	38.29
850	24.51	**9000**	38.93
900	24.01	**9500**	39.64
950	23.73	**10000**	39.12
1000	23.83	**10500**	39.16
1250	24.81	**11000**	39.18
1500	25.32	**11500**	39.85
1750	26.30	**12000**	40.27
2000	27.94	**12500**	40.91
2250	28.16	**13000**	40.50
2500	29.07	**13500**	40.59
3000	30.07	**14000**	40.44
3500	30.81	**14500**	40.62
4000	31.68	**15000**	43.35
4500	32.64	**15500**	40.76
5000	33.79	**16000**	41.61
5500	34.20	**16500**	40.38
6000	35.24	**17000**	40.88
6500	35.74	**17500**	42.79
7000	37.17	**18000**	43.86

FRONT VIEW

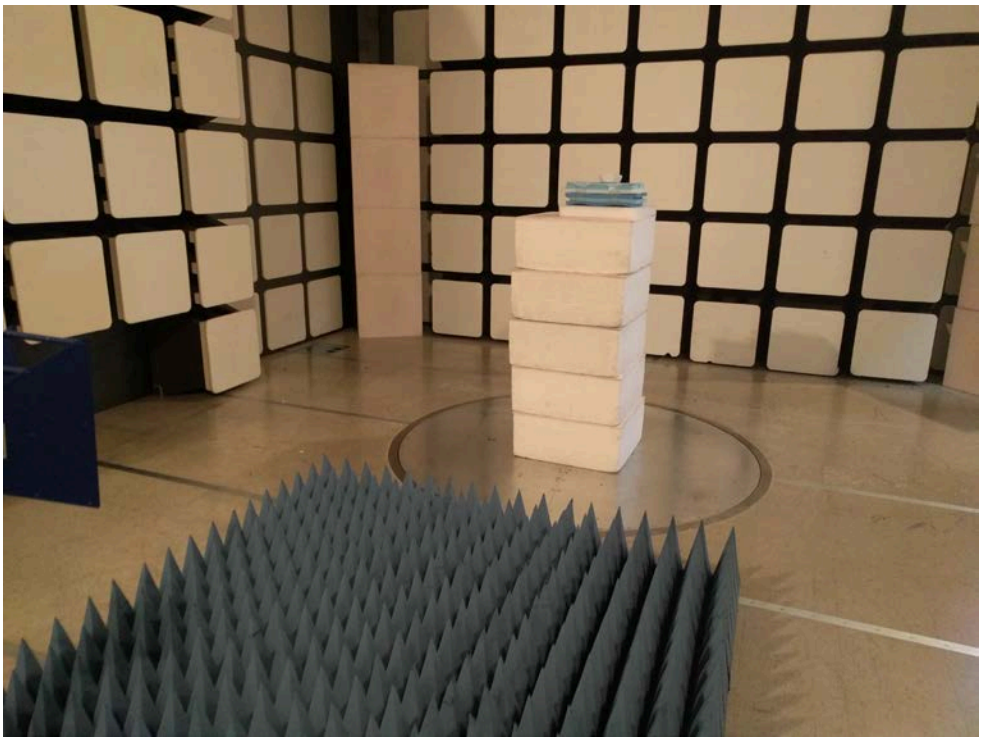
NORTEK SECURITY & CONTROL
CARBON MONOXIDE ALARM
MODEL: 2GIG-CO8E-345
FCC PART 15 SUBPART C - 30-1000 MHz RADIATED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

NORTEK SECURITY & CONTROL
CARBON MONOXIDE ALARM
MODEL: 2GIG-CO8E-345
FCC PART 15 SUBPART C – 30-1000 MHz RADIATED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

NORTEK SECURITY & CONTROL
CARBON MONOXIDE ALARM
MODEL: 2GIG-CO8E-345
FCC PART 15 SUBPART C - 1000 – 3450 MHz RADIATED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

NORTEK SECURITY & CONTROL
CARBON MONOXIDE ALARM
MODEL: 2GIG-CO8E-345
FCC PART 15 SUBPART C – 1000 – 3450 MHz RADIATED EMISSIONS

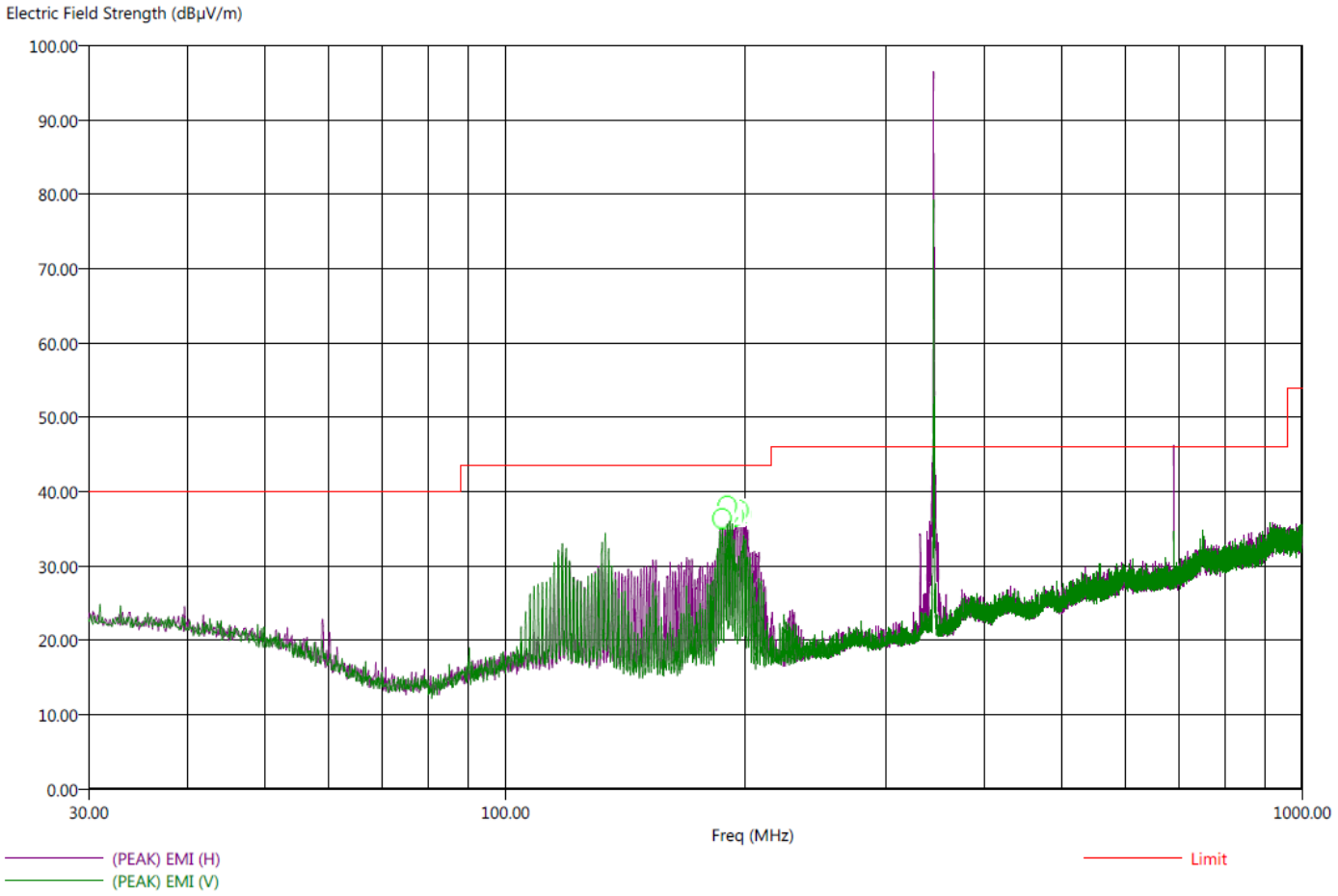
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

APPENDIX E

RADIATED EMISSIONS DATA SHEETS

Title: FCC 15.209 12/1/2019 5:14:33 PM
File: Radiated Pre-Scan 30-1000Mhz Sequence: Preliminary Scan
Operator: Sam Kerckhoff
EUT Type: Carbon MONOXIDE Alarm / 2GIG-CO8E-345
EUT Condition: The EUT is constantly transmitting 345 MHz.
Comments: Standalone Device
Temp: 76f
Hum: 37%
Battery Powered

Compatible Electronics, Inc. FAC-3 (Lab R)



There were no spurious radiated emissions found below 30Mhz and above 1GHz.
The two over-the-limit emissions are the fundamental of the intentional radiator and its 2nd harmonic and are not subject to spurious emission limits. Refer to the harmonics data sheet for these results.
No additional emissions were found in standby mode.

Title: FCC 15.209 12/1/2019 5:40:08 PM
File: Radiated Final-Scan 30-1000Mhz Sequence: Final Measurements
Operator: Sam Kerckhoff
EUT Type: Carbon MONOXIDE Alarm / 2GIG-CO8E-345
EUT Condition: The EUT is constantly transmitting 345MHz.
Comments: Temp: 76f
Hum: 37%
Battery Powered

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq (MHz)	(QP) Margin (dB)	(QP) EMI (dBµV/m)	(PEAK) EMI (dBµV/m)	Limit (dBµV/m)	Pol	Ttbl Agl (deg)	Twr Ht (cm)	Transducer (dB)	Cable (dB)
187.30	-4.03	39.49	41.60	43.52	H	60.25	175.94	14.76	1.18
190.10	-5.69	37.83	42.68	43.52	H	262.75	183.40	15.58	1.19
191.30	-3.46	40.06	42.61	43.52	H	37.00	189.25	15.94	1.19
193.90	-4.55	38.97	41.58	43.52	H	125.25	213.67	15.82	1.20
196.50	-4.12	39.40	41.60	43.52	H	156.25	212.65	15.45	1.21
197.70	-6.86	36.66	38.73	43.52	H	222.00	228.29	15.33	1.21

There were no radiated emissions found below 30Mhz and above 1GHz.
No additional emissions were found in standby mode.

FUNDAMENTAL & HARMONICS

DATA SHEETS

FUNDAMENTAL FIELD STRENGTH

FCC 15.231

Company: Nortek Security & Control, LLC
EUT: Carbon Monoxide Alarm
Model: 2GIG-CO8E-345
Duty Cycle Correction Factor: -17.40

Date: 11/28/2018
Lab: R
Tested By: Sam K.

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table	Tower	Comments
345.00	92.32	H	97.26	-4.94	Peak	105.00	1.01	X-Axis
345.00	74.92	H	77.26	-2.34	Avg	105.00	1.01	X-Axis
345.00	74.58	V	97.26	-22.68	Peak	68.00	1.40	X-Axis
345.00	57.18	V	77.26	-20.08	Avg	68.00	1.40	X-Axis
345.00	85.27	H	97.26	-11.99	Peak	163.00	1.45	Z-Axis
345.00	67.87	H	77.26	-9.39	Avg	163.00	1.45	Z-Axis
345.00	87.23	V	97.26	-10.03	Peak	148.00	1.75	Z-Axis
345.00	69.83	V	77.26	-7.43	Avg	148.00	1.75	Z-Axis
345.00	85.44	H	97.26	-11.82	Peak	0.00	2.42	Y-Axis
345.00	68.04	H	77.26	-9.22	Avg	0.00	2.42	Y-Axis
345.00	90.95	V	97.26	-6.31	Peak	260.00	1.60	Y-Axis
345.00	73.55	V	77.26	-3.71	Avg	260.00	1.60	Y-Axis

HARMONICS - HORIZONTAL

FCC 15.231

Company: Nortek Security & Control, LLC
EUT: Carbon Monoxide Alarm
Model: 2GIG-CO8E-345
Duty Cycle Correction Factor: -17.40

Date: 11/28/2018
Lab: R
Tested By: Sam K.

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
690.00	54.85	H	77.26	-22.44	Peak	1.27	276.00	X-Axis
690.00	37.45	H	57.26	-19.81	Avg	1.27	276.00	X-Axis
1035.00	41.40	H	73.98	-32.58	Peak	1.70	60.00	X-Axis
1035.00	24.00	H	53.98	-29.98	Avg	1.70	60.00	X-Axis
1380.00	34.79	H	73.98	-39.19	Peak	1.63	343.00	X-Axis
1380.00	17.39	H	53.98	-36.59	Avg	1.63	343.00	X-Axis
1725.00	41.41	H	77.26	-35.85	Peak	1.20	20.00	X-Axis
1725.00	24.01	H	57.26	-33.25	Avg	1.20	20.00	X-Axis
2070.00	46.45	H	77.26	-30.81	Peak	1.00	15.00	X-Axis
2070.00	29.05	H	57.26	-28.21	Avg	1.00	15.00	X-Axis
2415.00	50.33	H	77.26	-26.93	Peak	1.05	0.00	X-Axis
2415.00	32.93	H	57.26	-24.33	Avg	1.05	0.00	X-Axis
2760.00	45.37	H	73.98	-28.61	Peak	1.10	94.00	X-Axis
2760.00	27.97	H	53.98	-26.01	Avg	1.10	94.00	X-Axis
3105.00	59.13	H	77.26	-18.13	Peak	1.03	150.00	X-Axis
3105.00	41.73	H	57.26	-15.53	Avg	1.03	150.00	X-Axis
3450.00	43.07	H	77.26	-34.19	Peak	1.05	195.00	X-Axis
3450.00	25.67	H	57.26	-31.59	Avg	1.05	195.00	X-Axis

Test distance
3 meter

HARMONICS - VERTICAL

FCC 15.231

Company: Nortek Security & Control, LLC
EUT: Carbon Monoxide Alarm
Model: 2GIG-CO8E-345
Duty Cycle Correction Factor: -17.40

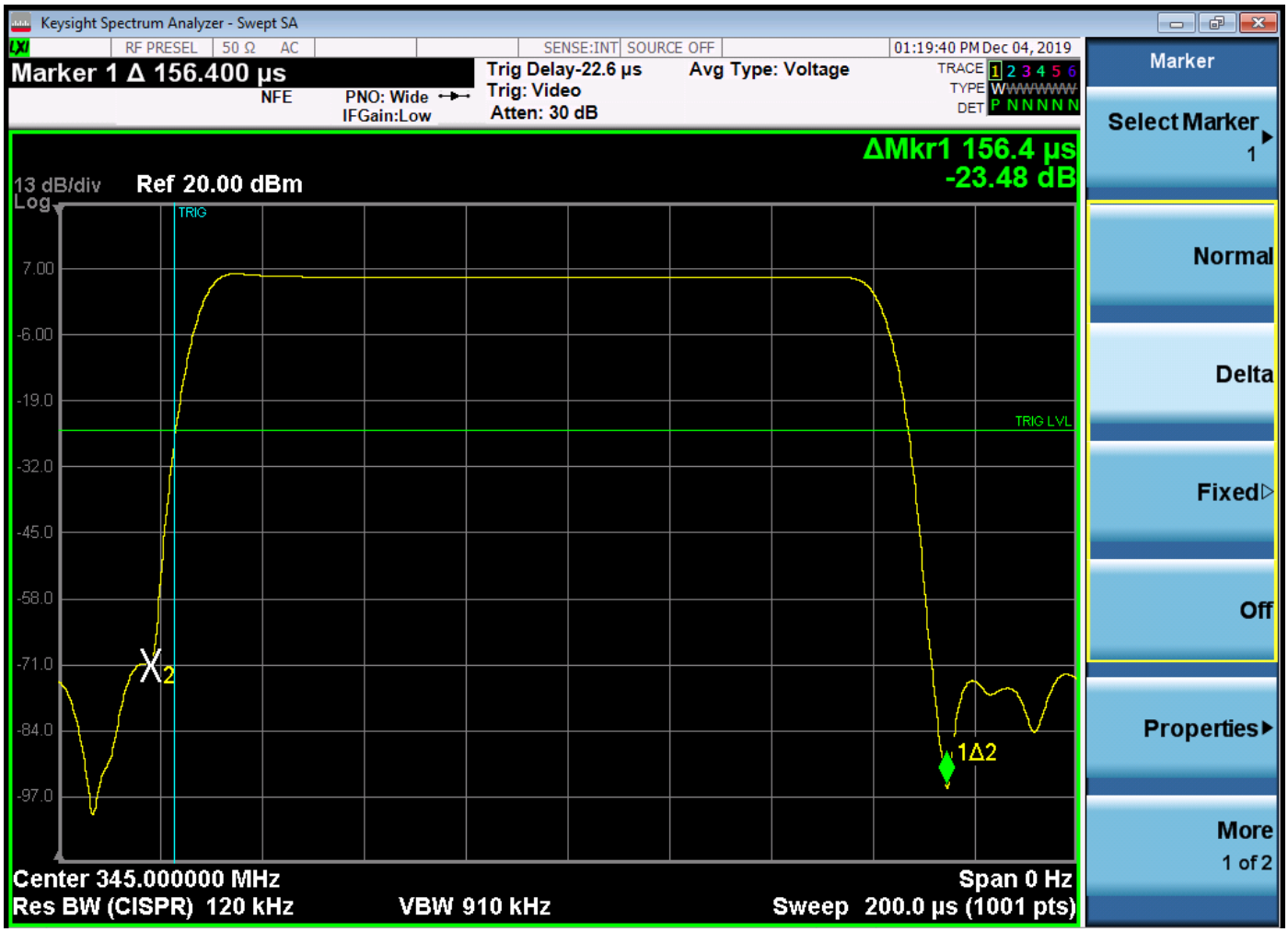
Date: 11/28/2018
Lab: R
Tested By: Sam K.

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
690.00	45.85	V	77.26	-31.41	Peak	1.20	145.00	X-Axis
690.00	28.45	V	57.26	-28.81	Avg	1.20	145.00	X-Axis
1035.00	33.91	V	73.98	-40.07	Peak	1.71	300.00	X-Axis
1035.00	16.51	V	53.98	-37.47	Avg	1.71	300.00	X-Axis
1380.00	34.79	V	73.98	-39.91	Peak	1.40	202.00	X-Axis
1380.00	17.39	V	53.98	-36.59	Avg	1.40	202.00	X-Axis
1725.00	41.41	V	77.26	-35.85	Peak	1.15	180.00	X-Axis
1725.00	24.01	V	57.26	-33.25	Avg	1.15	180.00	X-Axis
2070.00	46.45	V	77.26	-30.81	Peak	1.65	163.00	X-Axis
2070.00	29.05	V	57.26	-28.21	Avg	1.65	163.00	X-Axis
2415.00	48.59	V	77.26	-28.67	Peak	1.25	217.00	X-Axis
2415.00	31.19	V	57.26	-26.07	Avg	1.25	217.00	X-Axis
2760.00	48.95	V	73.98	-25.03	Peak	1.05	200.00	X-Axis
2760.00	31.55	V	53.98	-22.43	Avg	1.05	200.00	X-Axis
3105.00	55.32	V	77.26	-21.94	Peak	1.30	215.00	X-Axis
3105.00	37.92	V	57.26	-19.34	Avg	1.30	215.00	X-Axis
3450.00	42.95	V	77.26	-34.31	Peak	1.45	250.00	X-Axis
3450.00	25.55	V	57.26	-31.71	Avg	1.45	250.00	X-Axis

Test distance
3 meter

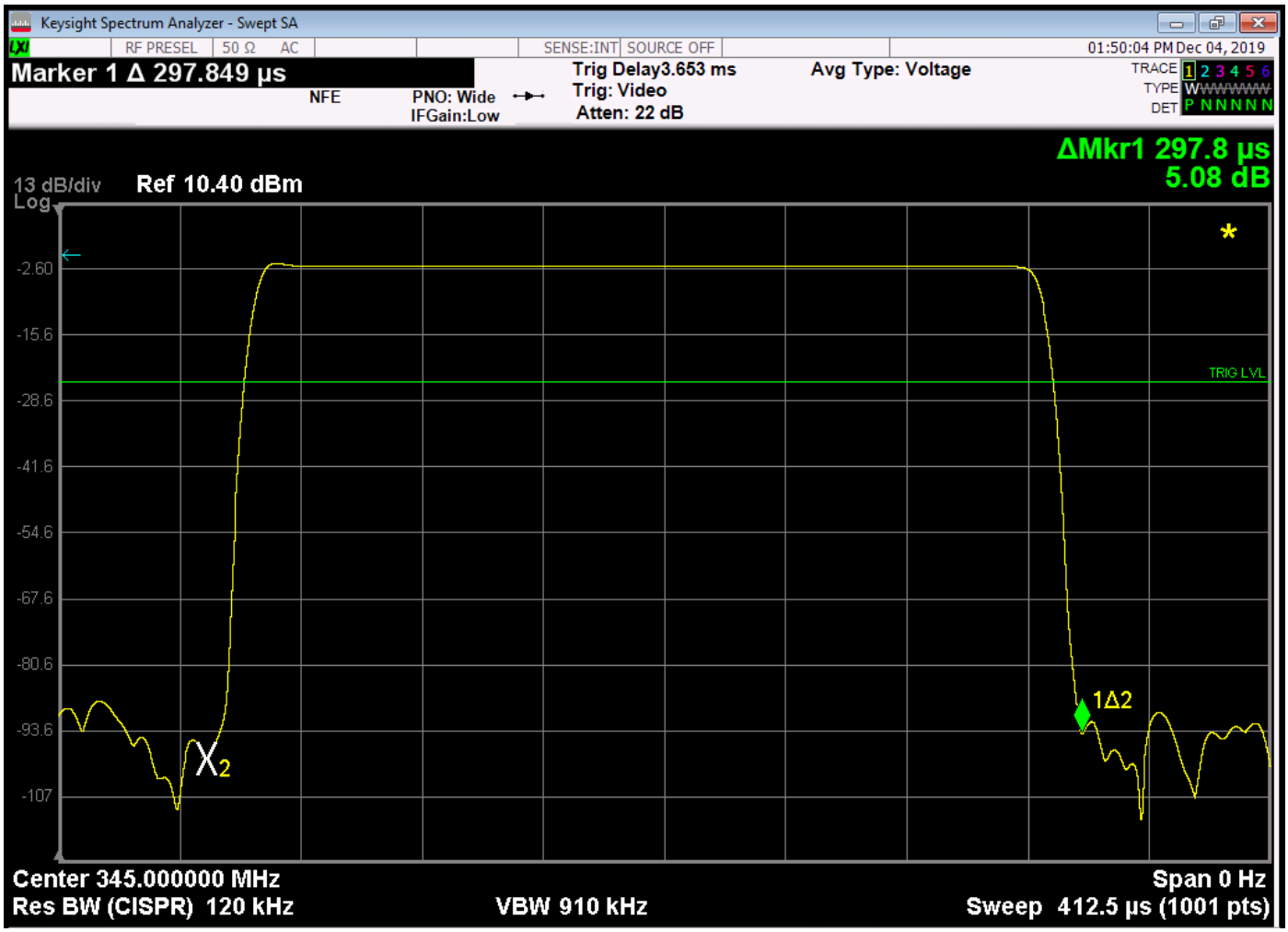
DUTY CYCLE PLOTS

DUTY CYCLE



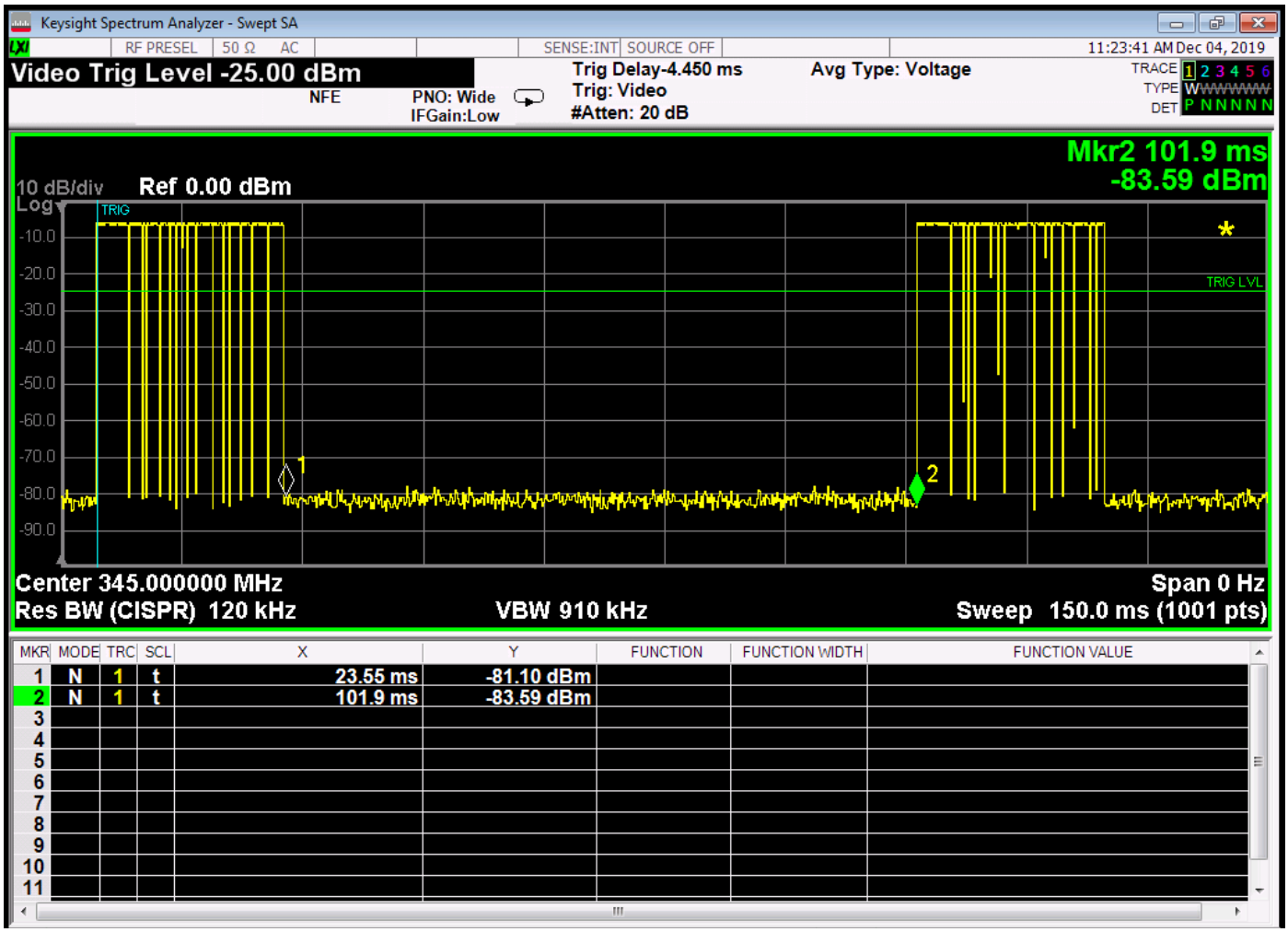
Time of Pulse Type 1=156.4 µs

DUTY CYCLE



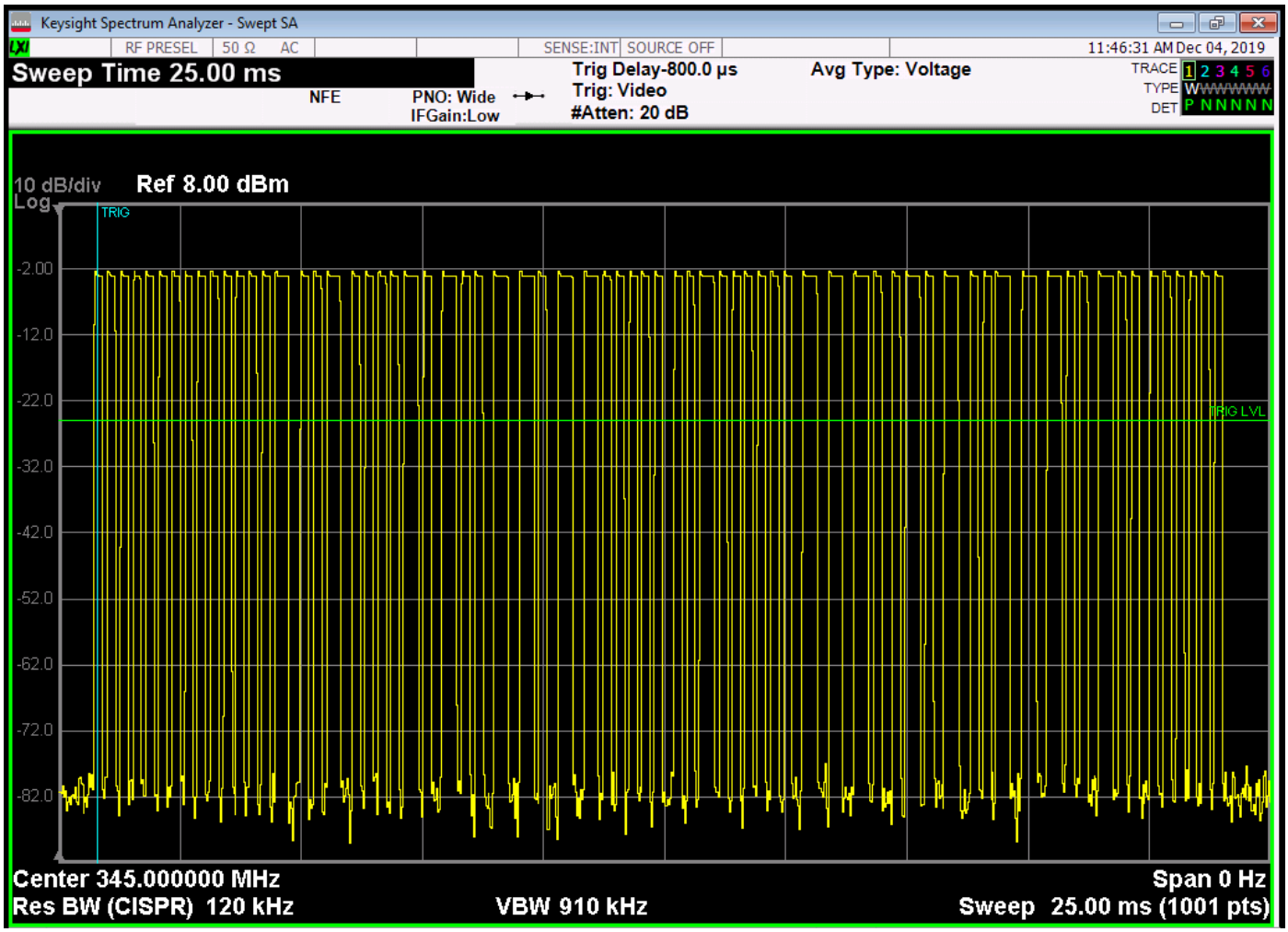
Time of Pulse Type 2=297.849 µs

DUTY CYCLE



Total On Time in a 100ms Span=23.55ms

DUTY CYCLE



Number of Pulses in Worst Case 100ms=70
Pulse Type 1 On Time=156.4µs*52=8,132.8µs
Pulse Type 2 On Time=297.849µs*18=5361.28µs
5,361.28µs+8,132.8µs=13.494ms
Duty Cycle=13.4941ms/100ms=0.134941
The Peak to Average Duty Cycle Correction= -17.40dB

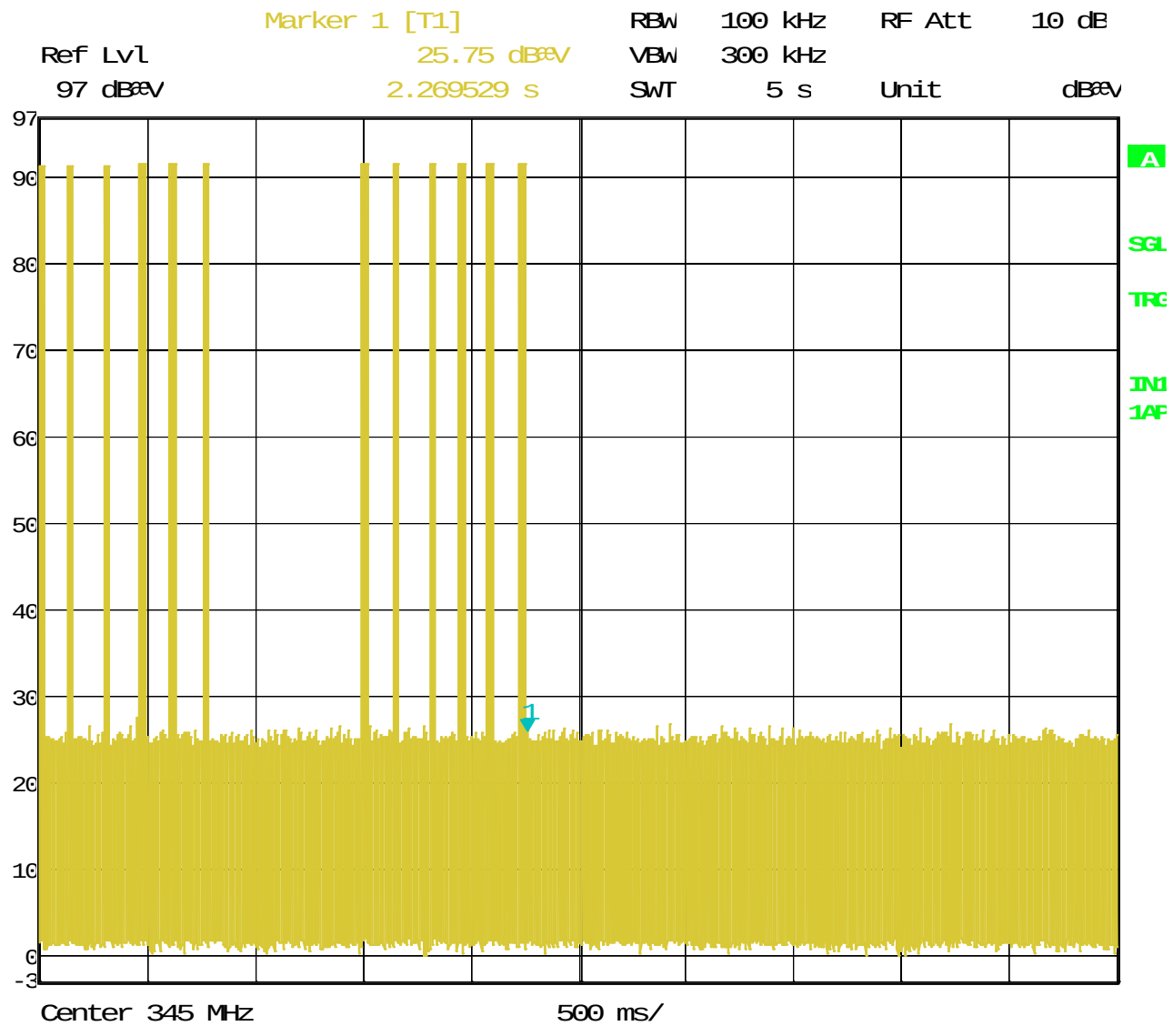
TRANSMIT TIMEOUT DATA

TRANSMIT TIMEOUT

FCC 15.231

Company:	Nortek Security & Control, LLC	Date:	12/16/2018
EUT:	Carbon Monoxide Alarm	Lab:	R
Model:	2GIG-CO8E-345	Tested By:	Sam K.

Freq. (MHz)	Time (s)	Limit (s)	Margin	Comments
345.00	2.27	5	-2.73	N/A



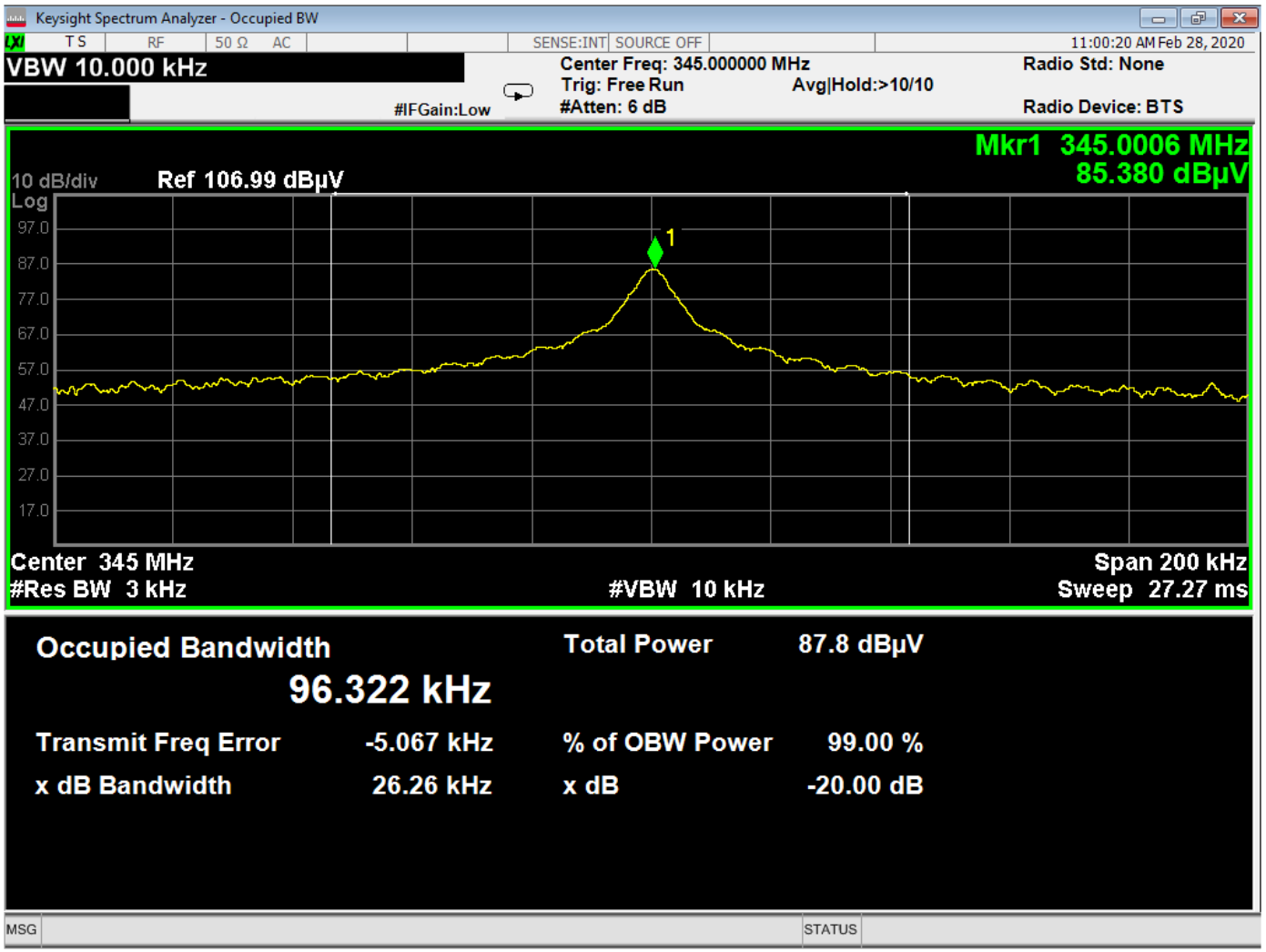
-20 dB & Occupied Bandwidth DATA

-20dB & 99% BANDWIDTH

FCC 15.231

Company:	Nortek Security & Control, LLC	Date:	02/28/2020
EUT:	Carbon Monoxide Alarm	Lab:	R
Model:	2GIG-CO8E-345	Tested By:	Sam K.

Freq. (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin	Comments
345.00	96.32	N/A	N/A	99%
345.00	26.26	862.50	-836.240000	-20dB



-20dB BANDWIDTH