

**FCC PART 15 SUBPART B & SUBPART C SECTION 15.249, RSS 210 and RSS GEN
TEST REPORT***for***500 SERIES Z-WAVE OUTLET
Model: WO15EMZ5-1**

Prepared for

NORTEK SECURITY & CONTROL LLC
1950 CAMINO VIDA ROBLE, SUITE 150
CARLSBAD, CA 92008

Prepared by: _____

TOREY OLIVER

Approved by: _____

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(949) 587-0400DATE: JULY 20th, 2017

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
PAGES	17	2	2	2	14	19	56

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1	Plot Map and Layout of Test Site Below 1GHz
2	Plot Map and Layout of Test Site Above 1GHz
3	Conducted Emissions Test Setup



GENERAL REPORT SUMMARY

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: 500 Series Z-wave Outlet
Model: WO15EMZ5-1
S/N: None

Product Description: The WO15EMZ5-1 contains a Z-Wave 500 Series Module that supports Z-Wave Plus® features. A Z-Wave certified portable or stationary Controller can communicate with the Z-Wave 500 Series Module. Depending on the capability of the Controller or gateway software, the following operations can be performed with the WO15EMZ5-1.

Modifications: The EUT was not modified in order to comply with specifications.

Manufacturer: Nortek Security & Control LLC
1950 Camino Vida Roble, Suite 150
Carlsbad, CA 92008

Test Date: July 19th & 20th, 2017

Test Specifications Covered by Accreditation:



EMI requirements

CFR Title 47, Part 15 Subpart B Sections 15.107, 15.109, Subpart C Sections 15.205, 15.207, 15.209, 15.249, RSS 210, and RSS Gen

Test Procedure: ANSI C63.4 & C63.10



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SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz - 30 MHz.	Complies with the limits of RSS-210, RSS-GEN, CFR Title 47 Part 15 Subpart B, Section 15.107 and Subpart C Sections 15.207
2	Radiated RF Emissions & Harmonics, 9 kHz – 10,000 MHz.	Complies with the limits of RSS-210, RSS-GEN, CFR Title 47 Part 15 Subpart B Section 15.109 & Subpart C Section 15.205, 15.209, & 15.249



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1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the 500 Series Z-wave Outlet Model: WO15EMZ5-1. The EMI measurements were performed according to the measurement procedure described in ANSI C63.10. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT (equipment under test) hereafter, are within the specification limits defined by RSS-210, RSS-GEN, and the Code of Federal Regulations Title 47, Part 15 Subpart B sections 15.107, 15.109, & Part 15 Subpart C sections 15.205, 15.207, 15.209 and 15.249.



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

Josh Hansen Engineering Manager, Regulatory

Compatible Electronics, Inc.

Matt Harrison Lab Manager
Torey Oliver Test Engineer

2.4 Date Test Sample was Received

The test sample was received on July 20th, 2017.

2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics, Inc. as of the date of this test report.

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
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
RSS 210	License-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
RSS GEN	General Requirements for Compliance of Radio Apparatus
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
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	American National Standard for Testing Unlicensed Wireless Devices



4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration

The 500 Series Z-wave Outlet Model: WO15EMZ5-1 (EUT) was setup in a tabletop configuration. The EUT was test in three configurations.

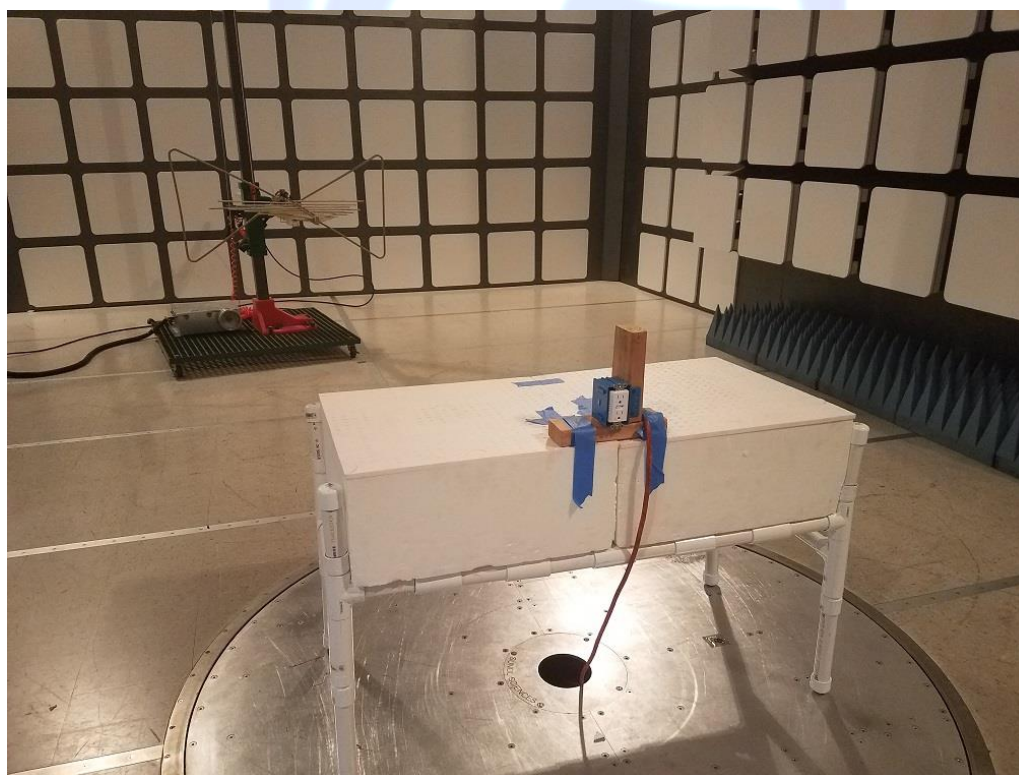
1. No cables connected to the outlets.
2. Cables connected to the outlets but not terminated
3. Outlets connected to loads

For all fundamental related emissions, the 1st configuration was found to be the worst case. For all spurious emissions, the 3rd configuration was found to be the worst case. The EUT was checked in only the x-axis as this is the only way it would be installed. The EUT was continuously transmitting a data stream during transmit tests and checked continuously receiving on both channels during the receive tests.

The voltage was varied $\pm 15\%$; the transmitting signal amplitude and frequency did not vary.

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



4.1.2 *Cable Construction and Termination*

Cable 1

This is a 2-meter, un-shielded power cable. It is connecting the EUT to the load fixture. It has a 3-prong power plug at the EUT end and is hardwired into the fixture. The cable was bundled to a length of 1 meter.



5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT**5.1 EUT and Accessory List**

#	EQUIPMENT TYPE	MANU-FACTURER	MODEL	SERIAL NUMBER
1	500 SERIES Z-WAVE OUTLET (EUT)	NORTEK	WO15EMZ5-1	NONE
2	LOAD FIXTURE	GENERIC	GENERIC	NONE
3	RESISTIVE LOADS (X3)	GENERIC	500W (AT 120V)	NONE
4	LIGHT BULB	GENERAL ELECTRIC	300W	NONE



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5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Computer	Compatible Electronics	NONE	NONE	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100128	03/14/2017	03/14/2018
Antenna, Loop	Com Power	AL-130	121049	02/09/2017	02/09/2018
Antenna, CombiLog	Com Power	AC-220	25857	05/19/2016	05/19/2018
Antenna, Horn 1-18GHz	Com Power	AH-118	071225	05/17/2016	05/17/2018
Pre-Amp, 1-18GHz	Com Power	PAM-118A	443011	04/18/2016	04/18/2018
Notch Filter	AMTI Microwave Circuits	N03019-01	3709-01 DC0415	03/01/2016	03/01/2018
Mast, Antenna Positioner	Sunol Science Corporation	TWR 95-4	020808-3	N/A	N/A
Antenna Mast	Sunol Science Corporation	TWR 95-4	020808-3	N/A	N/A
Turntable	Sunol Science Corporation	FM 2001	N/A	N/A	N/A
Mast and Turntable Controller	Sunol Science Corporation	SC104V	020808-1	N/A	N/A
LISN	Com-Power	LI-150	191937	05/09/2016	05/09/2018



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.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 by 0.8-meter-high non-conductive table for below 1GHz which was placed on the ground plane. For above 1 GHz the EUT was mounted 1.5 meters high.

The EUT was grounded thru the power cord.

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}	$U_{lab} = 2 u_c(y)$
Conducted disturbance (mains port)	(150 kHz – 30 MHz)	4,0 dB	2.88
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30 MHz – 1 000 MHz)	5,2 dB	4.04



7. CHARACTERISTICS OF THE TRANSMITTER

7.1 Channel Number and Frequencies

The EUT was programmed to be in the Z-Wave mode. There are 2 operating channels and the EUT uses FSK modulation for 908.4 MHz and 2GFSK for 916 MHz.

1 == 908.4 MHz = Power Level set to 55

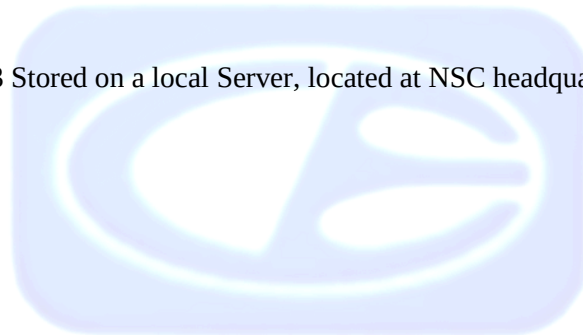
2 == 916.0 MHz = Power Level set to 31

7.2 Antenna

The antenna is made up of a wire located on the PCB.

7.3 Software

10016717 Ver. F013 Stored on a local Server, located at NSC headquarters.



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*

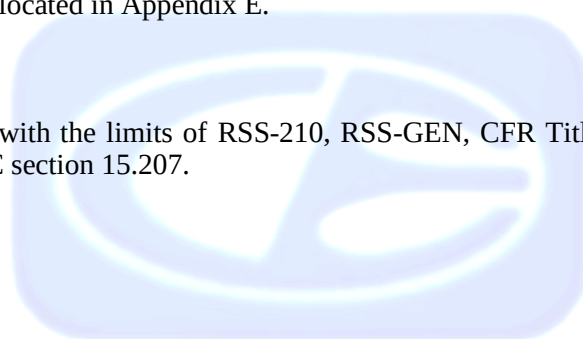
The EMI receiver was used as a measuring meter. A quasi-peak and/or average reading was taken only where indicated in the data sheets. The LISN output was measured using the EMI receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for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

Test Results:

The EUT complies with the limits of RSS-210, RSS-GEN, CFR Title 47 Part 15 Subpart B section 15.107, & Subpart C section 15.207.



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. Amplifiers were used to increase the sensitivity of the instrument. There was one Microwave Preamplifier used for frequencies above 1 GHz.

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 Harmonic emissions, a linear average detector 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 10000	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 EUT complies with the limits of RSS-210, RSS-GEN, CFR Title 47 Part 15 Subpart B section 15.109, & Part 15 Subpart C sections 15.205, 15.209 and 15.249.



8.1.3 *Fundamental Field Strength*

The Peak Transmit Radiated Field Strength was measured at a 3-meter test distance. The EMI Receiver was used to obtain the final test data. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with RSS-210 & Part 15 Subpart C, Section 15.249.

8.1.4 *Emissions Radiated Outside of the Fundamental Frequency Band*

The Band Edge measurement was measured using the EMI Receiver at a 3-meter test distance to obtain the final test data. The lower and upper channels were tuned during the low and high band edge tests. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with RSS-210 & Part 15 Subpart C, Section 15.205 & 15.249.

9. TEST PROCEDURE DEVIATIONS

The test procedures were not deviated from throughout all tests.

10. CONCLUSIONS

The 500 Series Z-wave Outlet Model: WO15EMZ5-1 meets all of the relevant specification requirements defined in RSS-210, RSS-GEN, and the Code of Federal Regulations Title 47, Part 15 Subpart B section 15.107, 15.109, & Subpart C sections 15.205, 15.207, 15.209 and 15.249.



APPENDIX A**LABORATORY ACCREDITATIONS AND
RECOGNITIONS**

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LABORATORY ACCREDITATIONS AND RECOGNITIONS



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."

IC OAT's Test Site Registration Number: 2154C-1



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APPENDIX B***MODIFICATIONS TO THE EUT***

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MODIFICATIONS TO THE EUT

There were no modifications were made during testing.





APPENDIX C

***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***



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ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

500 Series Z-wave Outlet
Model: WO15EMZ5-1
S/N: NONE

No additional models were tested.



APPENDIX D***DIAGRAMS, CHARTS, AND PHOTOS***

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

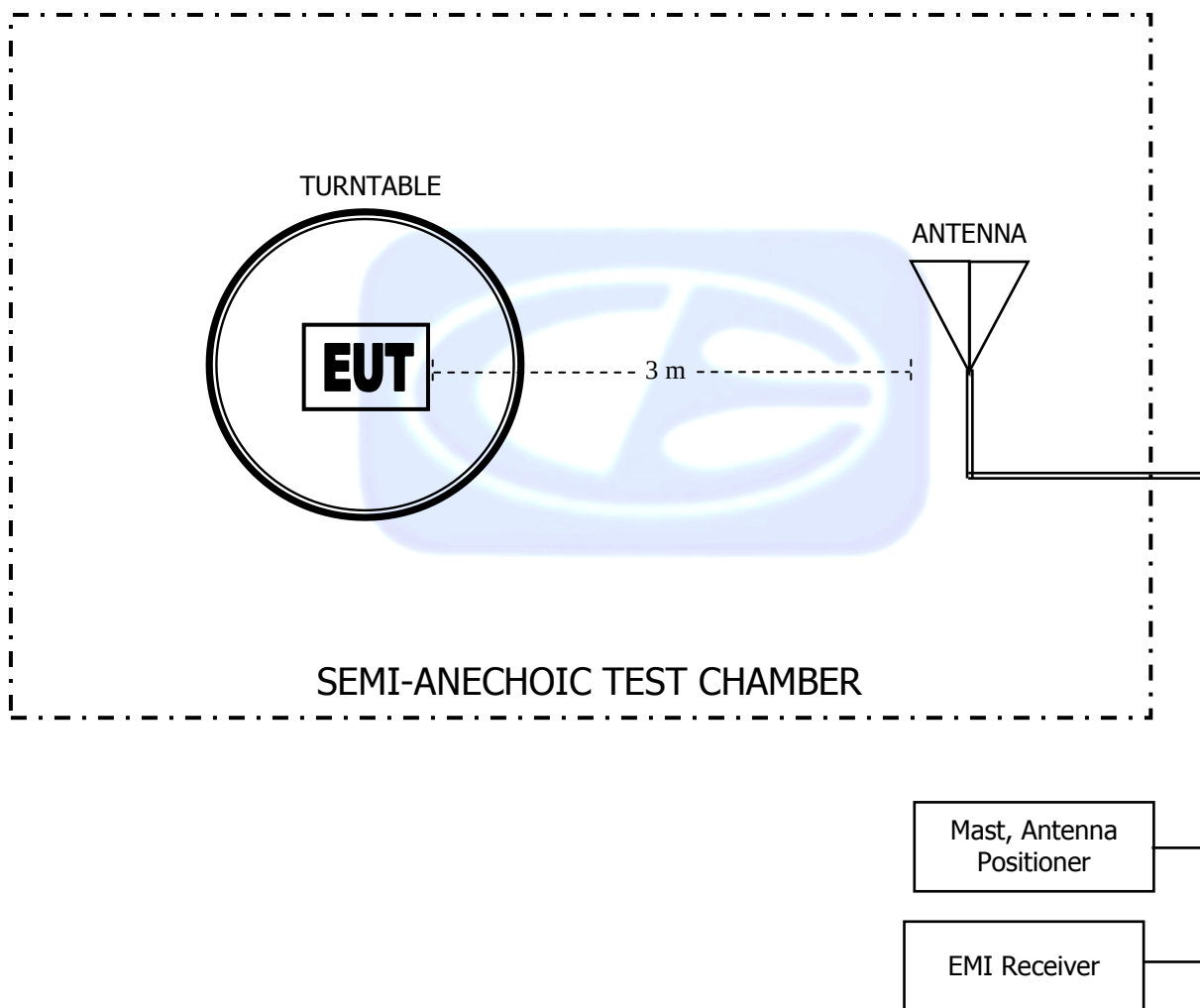


FIGURE 2: PLOT MAP AND LAYOUT OF TEST SITE ABOVE 1GHZ

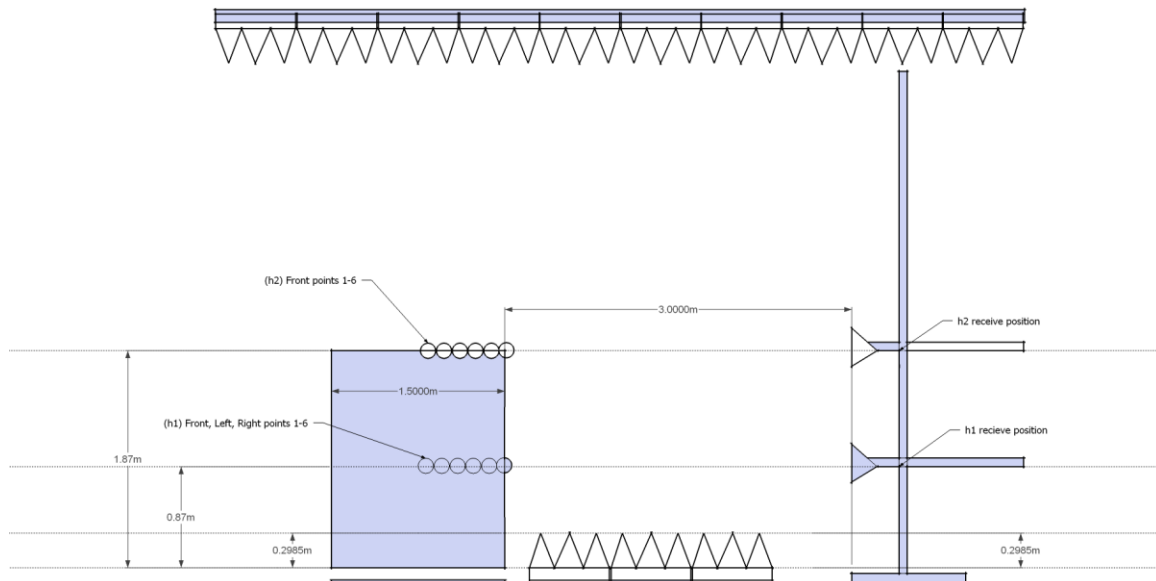
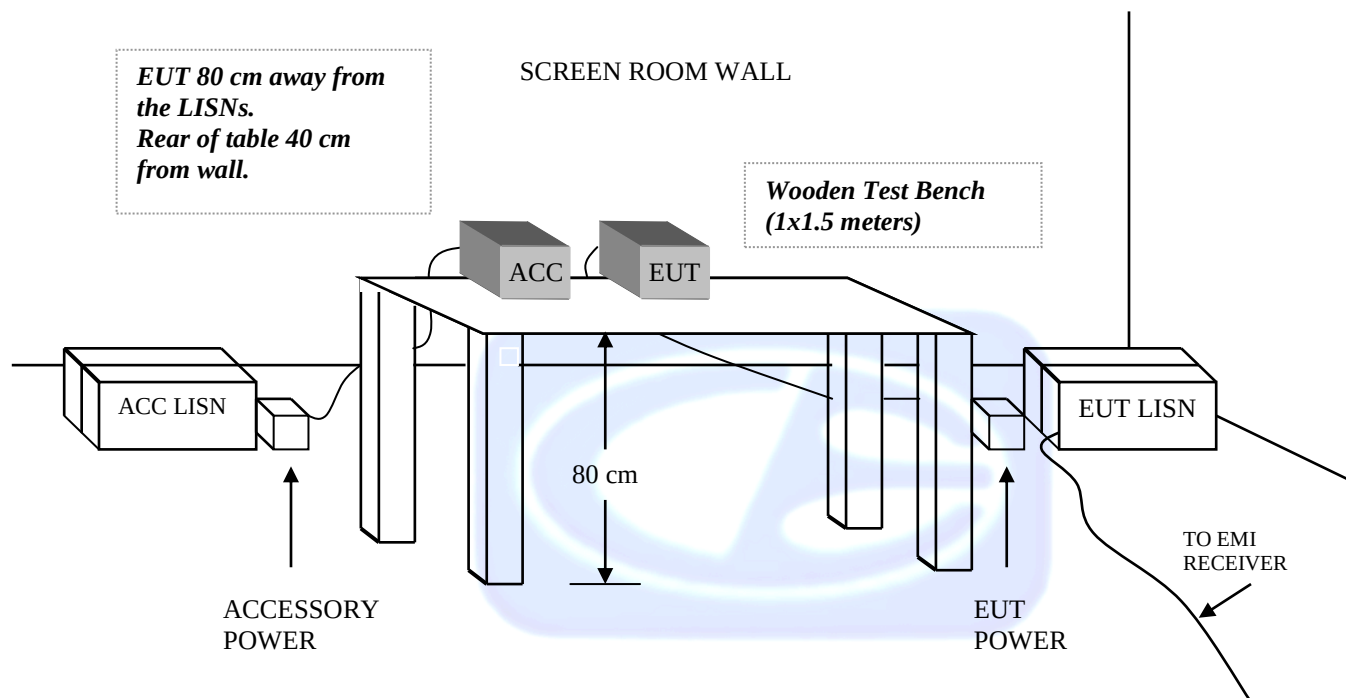


FIGURE 3: CONDUCTED EMISSIONS TEST SETUP



COM-POWER AL-130

LOOP ANTENNA

S/N: 121049

CALIBRATION DUE: FEBRUARY 9, 2018

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 AC-220**LAB R - COMBILOG ANTENNA****S/N: 25857****CALIBRATION DUE: MAY 19, 2018**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	22.5	160	13.3
35	22.5	180	15.0
40	23.0	200	14.6
45	21.5	250	16.5
50	21.3	300	18.1
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



COM-POWER AH-118**HORN ANTENNA**

S/N: 071225

CALIBRATION DUE: MAY 17, 2018

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1000	24.40	9500	39.11
1500	25.61	10000	39.38
2000	28.71	10500	39.55
2500	29.09	11000	39.66
3000	30.24	11500	40.28
3500	30.94	12000	40.26
4000	31.77	12500	40.64
4500	32.29	13000	41.33
5000	33.70	13500	41.74
5500	34.28	14000	41.52
6000	34.83	14500	41.80
6500	35.07	15000	43.51
7000	36.79	15500	41.03
7500	37.45	16000	40.88
8000	37.67	16500	40.18
8500	37.75	17000	42.59
9000	38.15	17500	44.49
		18000	45.27



COM-POWER PAM-118**1-18GHz - PREAMPLIFIER****S/N: 443011****CALIBRATION DUE: April 18, 2018**

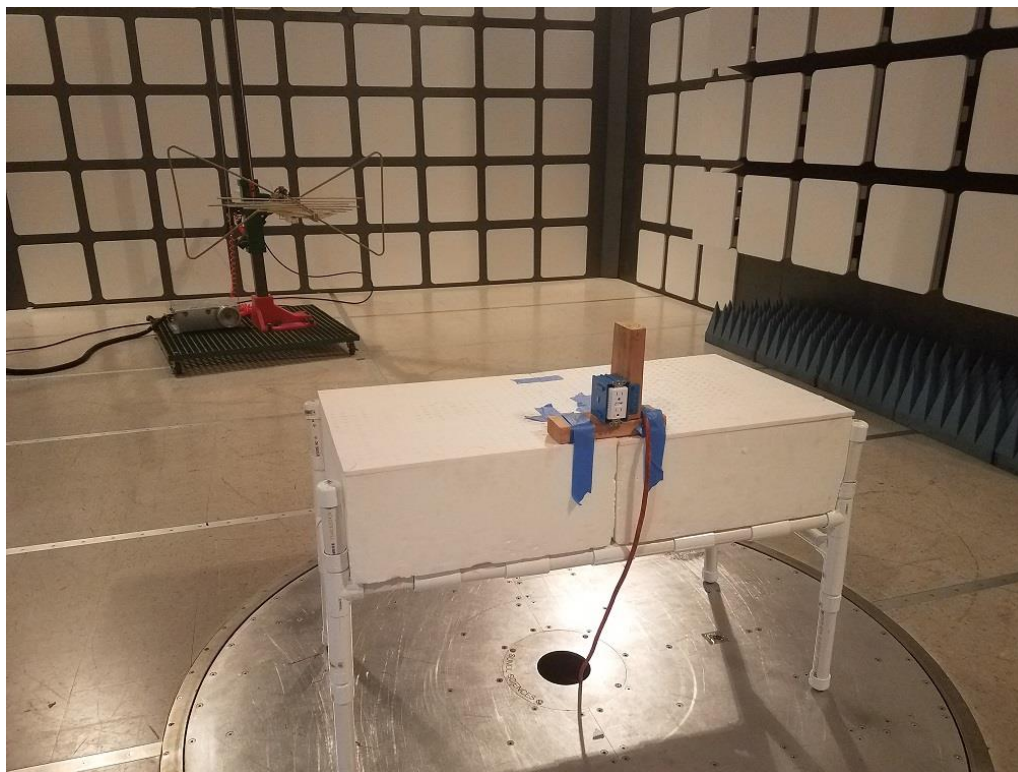
FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
0.500	39.74	7.000	35.31
1.000	40.74	7.500	35.9
1.500	38.4	8.000	34.08
2.000	40.64	8.500	34.37
2.500	39.71	9.500	34.45
3.000	39.39	10.000	34.23
3.500	41.05	11.000	35.23
4.000	38.74	12.000	33.36
4.500	39.95	13.000	33.27
5.000	39.88	14.000	34.84
5.500	39.32	15.000	33.19
6.000	40.83	16.000	36.25
6.500	41.14	17.000	32.33
		18.000	34.1



**FRONT VIEW**

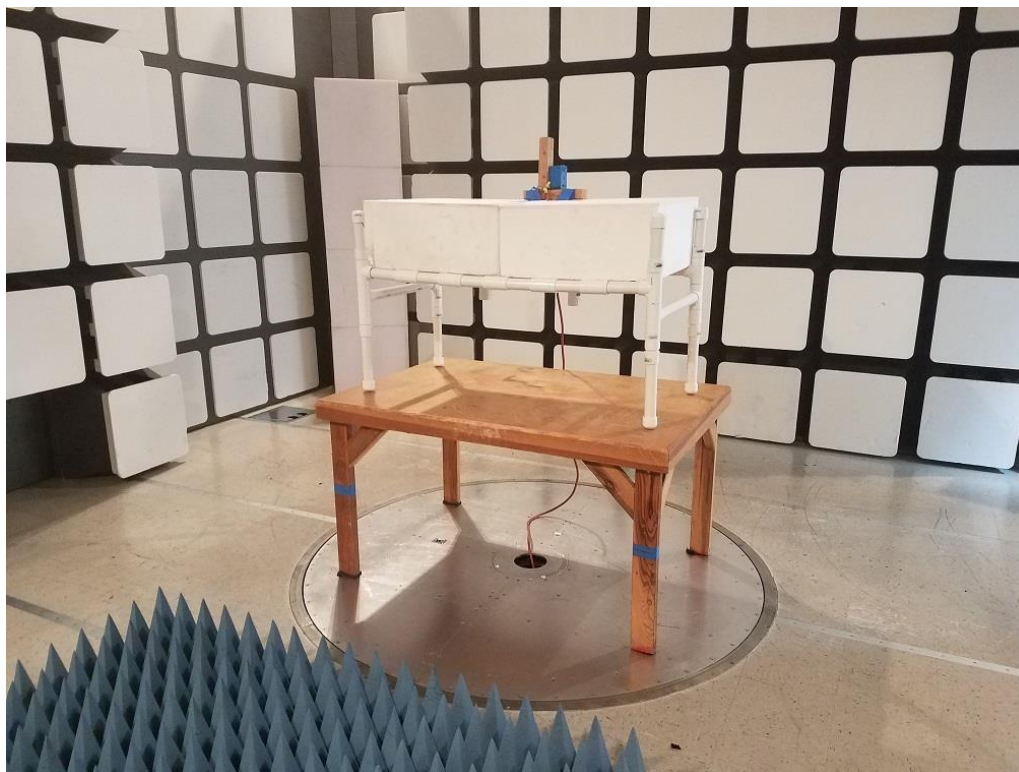
NORTEK
500 SERIES Z-WAVE OUTLET
Model: WO15EMZ5-1
FCC SUBPART C - RADIATED EMISSIONS < 1GHz

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

**REAR VIEW**

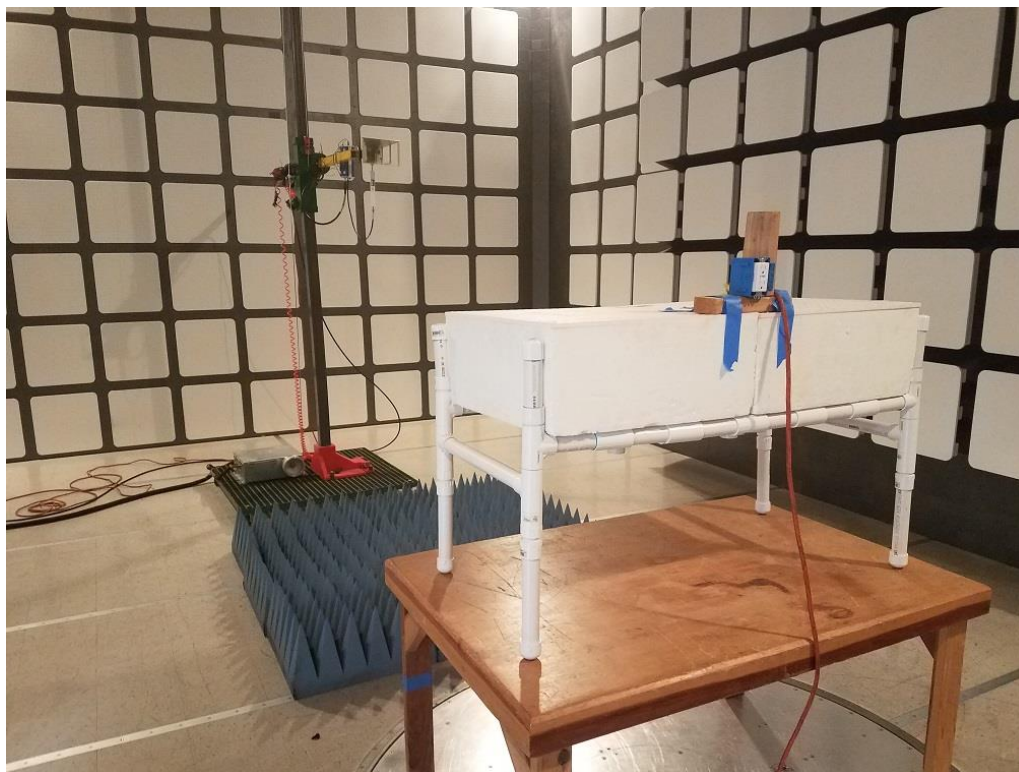
NORTEK
500 SERIES Z-WAVE OUTLET
Model: WO15EMZ5-1
FCC SUBPART C - RADIATED EMISSIONS < 1GHz

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

**FRONT VIEW**

NORTEK
500 SERIES Z-WAVE OUTLET
Model: WO15EMZ5-1
FCC SUBPART C - RADIATED EMISSIONS > 1GHz

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

**REAR VIEW**

NORTEK
500 SERIES Z-WAVE OUTLET
Model: WO15EMZ5-1
FCC SUBPART C - RADIATED EMISSIONS > 1GHz

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

**FRONT VIEW**

NORTEK
500 SERIES Z-WAVE OUTLET
Model: WO15EMZ5-1
FCC SUBPART B & C - CONDUCTED EMISSIONS

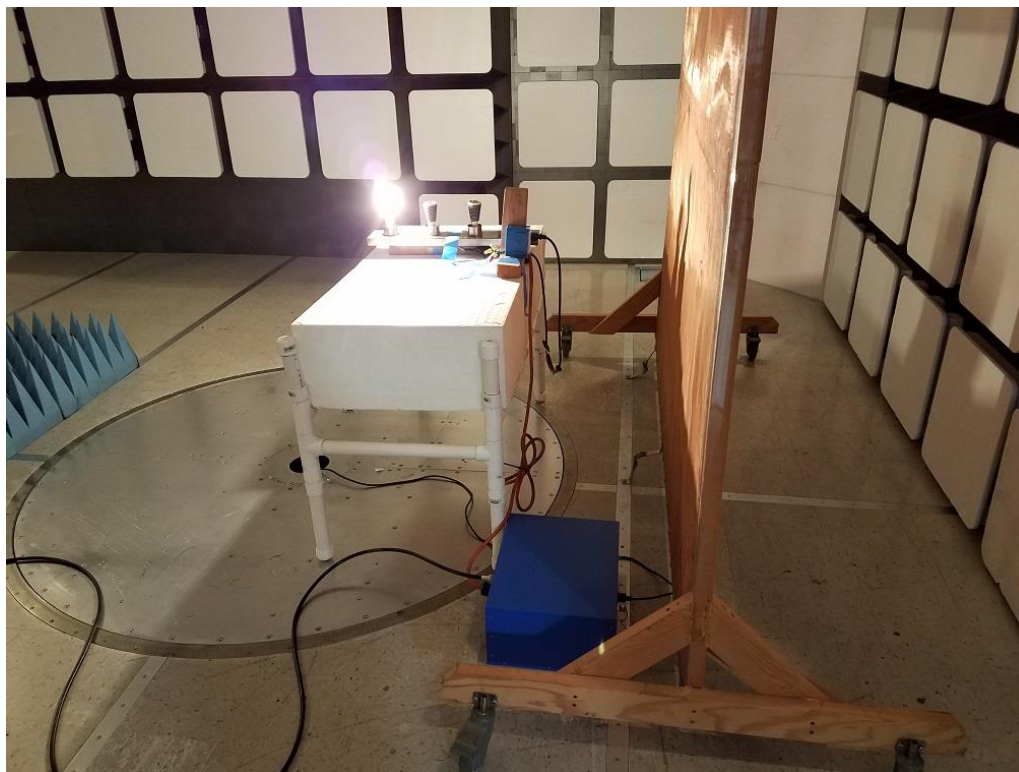
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

**REAR VIEW**

NORTEK
500 SERIES Z-WAVE OUTLET
Model: WO15EMZ5-1
FCC SUBPART B & C - CONDUCTED EMISSIONS

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

Brea Division
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2337 Troutdale Drive
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19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

APPENDIX E***RADIATED EMISSIONS DATA SHEETS***

Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
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Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400



Title: FCC 15.209

7/19/2017 2:09:43 PM

File: Radiated Pre-Scan 30-1000Mhz.set

Sequence: Preliminary Scan

Operator: Torey Oliver

EUT Type: In Wall Outlet / WO15EMZ5-1

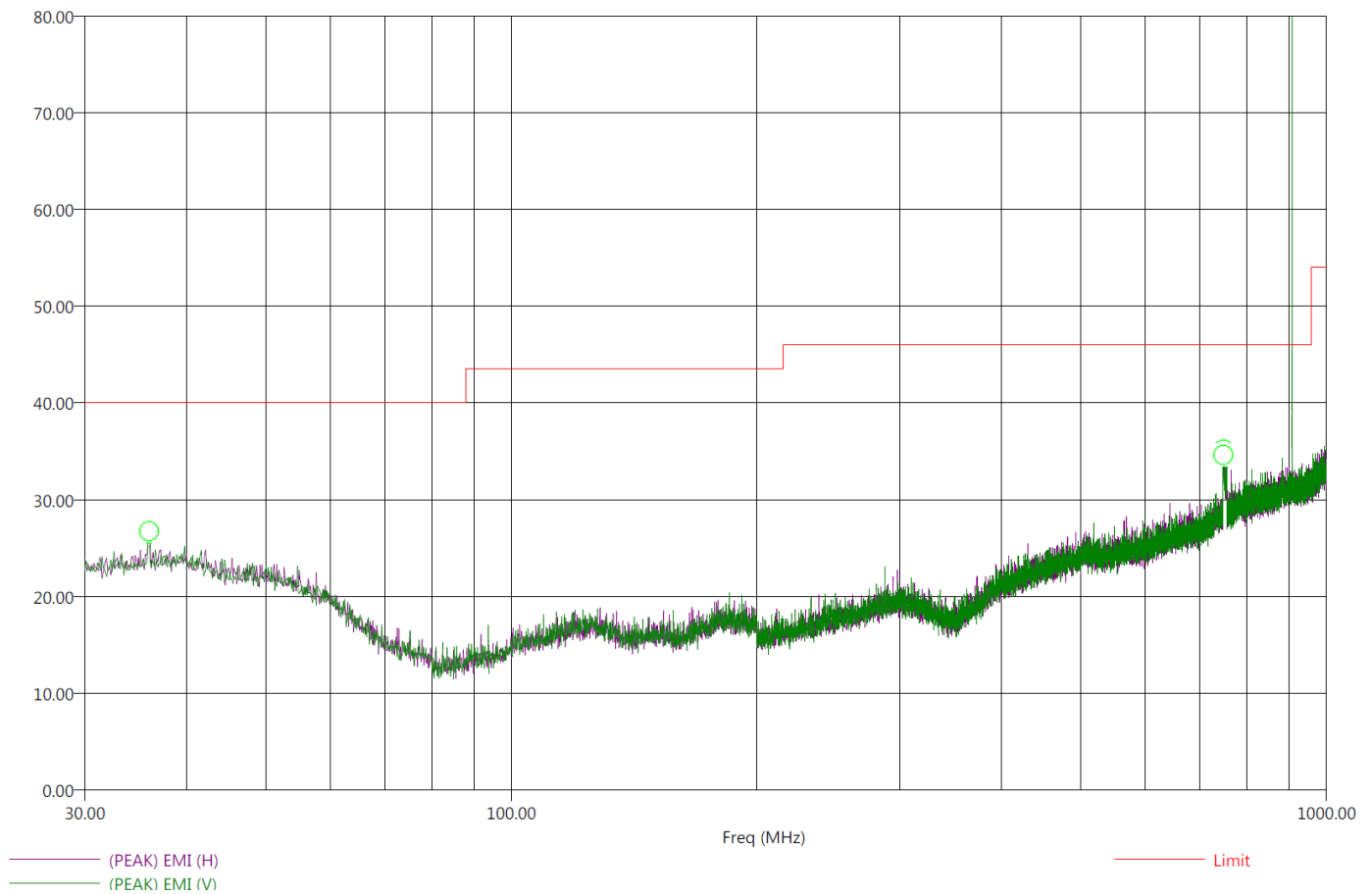
EUT Condition: The EUT is constantly transmitting 908.4MHz.

Comments: Connected to an 1800 Watt Load Bank.

Temp: 73f

Hum: 43%

120V 60Hz

Compatible Electronics, Inc. FAC-3 (Lab R)Electric Field Strength (dB μ V/m)

There were no radiated emissions other than harmonics found below 30 MHz or above 1GHz.

This is worst case channel.

The EUT was also tested in a receive mode for both channels but this was found to be the worst-case mode.



Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

Title: FCC 15.209

7/19/2017 2:59:25 PM

File: Radiated Final 30-1000Mhz.set

Sequence: Final Measurements

Operator: Torey Oliver

EUT Type: In Wall Outlet / WO15EMZ5-1

EUT Condition: The EUT is constantly transmitting 908.4MHz.

Comments: Connected to an 1800 Watt Load Bank.

Temp: 73f

Hum: 43%

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)
36.00	-15.59	24.41	27.80	40.00	H	281.00	369.79	22.60	0.37
36.00	-15.59	24.41	28.12	40.00	V	162.75	144.53	22.60	0.37
748.20	-15.19	30.81	34.89	46.00	V	110.25	208.35	24.86	2.48
748.30	-16.27	29.73	34.91	46.00	H	122.00	231.04	24.86	2.48
748.70	-15.85	30.15	35.34	46.00	V	158.75	295.16	24.87	2.48
748.90	-15.11	30.89	36.11	46.00	H	360.00	378.20	24.88	2.48

*There were no radiated emissions other than harmonics found below 30 MHz or above 1GHz.**This is worst case channel.**The EUT was also tested in a receive mode for both channels but this was found to be the worst case mode.*

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CONDUCTED EMISSIONS
DATA SHEETS

Brea Division
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Lake Forest Division
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Lake Forest, CA 92630
(949) 587-0400



Title: FCC 15.207

File: Conducted Pre-Line_916.set

Operator: Torey Oliver

EUT Type: In Wall Outlet / WO15EMZ5-1

EUT Condition: The EUT is constantly transmitting 916MHz.

Comments: Connected to an 1800 Watt Load.

Temp: 73f

Hum: 44%

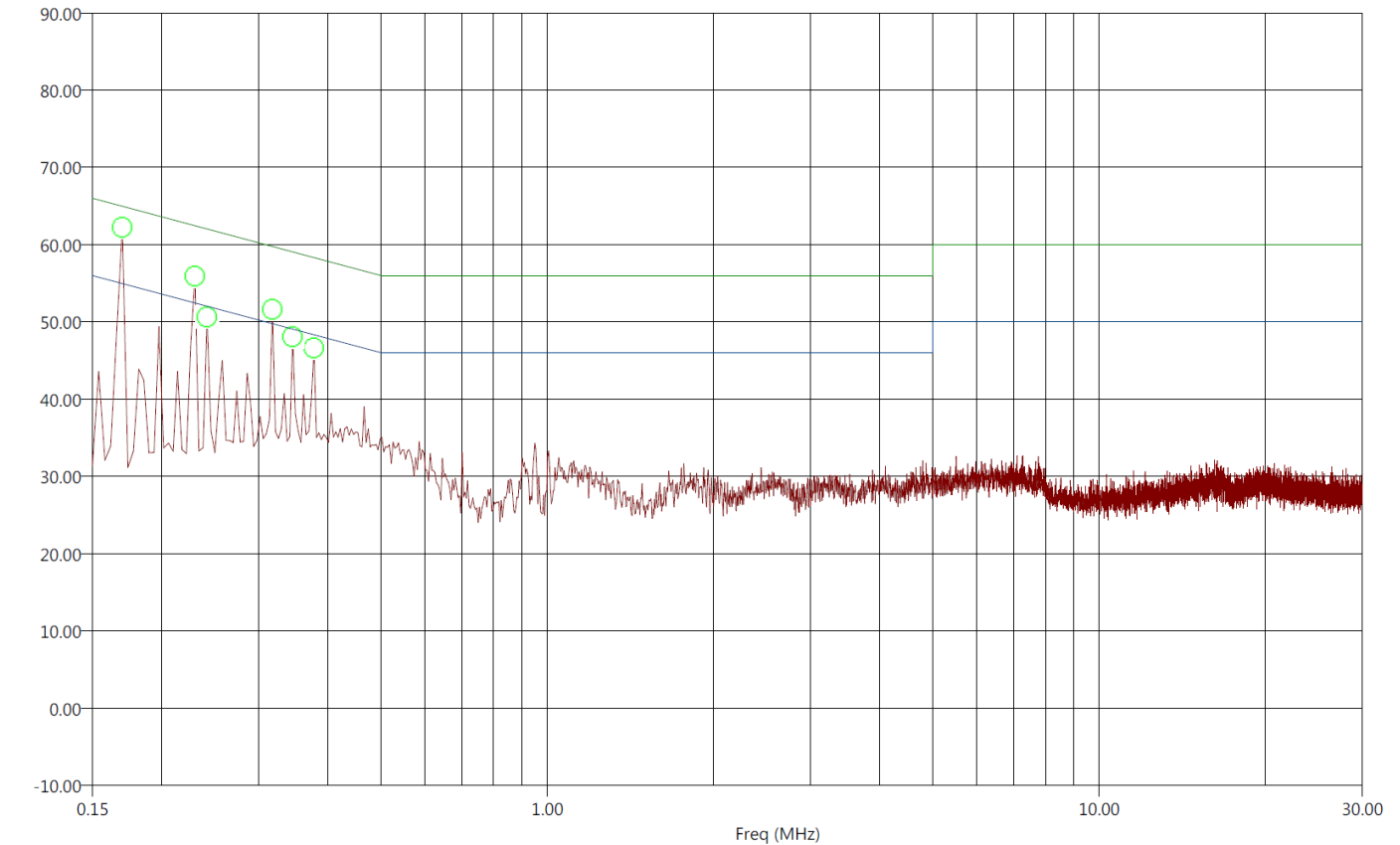
120V 60Hz

7/19/2017 9:50:39 AM

Sequence: Preliminary Scan

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

Voltage (dBμV)



— (PEAK) EMI (L1)

— (AVG) Limit

— (QP) Limit

This is the worst case channel and configuration.



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(949) 589-0700

Lake Forest Division
20621 Pascal Way
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(949) 587-0400

Title: FCC 15.207

7/19/2017 10:01:09 AM

File: Conducted Final-Line_916.set

Sequence: Final Measurements

Operator: Torey Oliver

EUT Type: In Wall Outlet / WO15EMZ5-1

EUT Condition: The EUT is constantly transmitting 916MHz.

Comments: Connected to an 1800 Watt Load.

Temp: 73f

Hum: 44%

120V 60Hz

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

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dB V)	(QP) EMI (dB V)	(PEAK) EMI (dB V)	(AVG) Limit (dB V)	(QP) Limit (dB V)	Transducer (dB)	Cable (dB)
0.17	-27.95	-18.99	27.01	45.97	64.90	54.96	64.96	0.38	0.03
0.23	-24.36	-16.56	28.09	45.89	57.38	52.45	62.45	0.24	0.04
0.24	-24.50	-15.08	27.53	46.95	63.40	52.03	62.03	0.22	0.03
0.32	-20.94	-23.37	28.82	36.39	57.22	49.76	59.76	0.09	0.02
0.35	-20.58	-20.33	28.47	38.72	58.33	49.06	59.06	0.05	0.02
0.38	-19.30	-24.08	29.02	34.25	39.64	48.32	58.32	0.04	0.02

This is the worst case channel and configuration.**Brea Division**
114 Olinda Drive
Brea, CA 92823
(714) 579-0500**Agoura Division**
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600**Silverado Division**
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700**Lake Forest Division**
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400



Title: FCC 15.207

7/19/2017 10:04:46 AM

File: Conducted Pre-Neutral_916.set

Sequence: Preliminary Scan

Operator: Torey Oliver

EUT Type: In Wall Outlet / WO15EMZ5-1

EUT Condition: The EUT is constantly transmitting 916MHz.

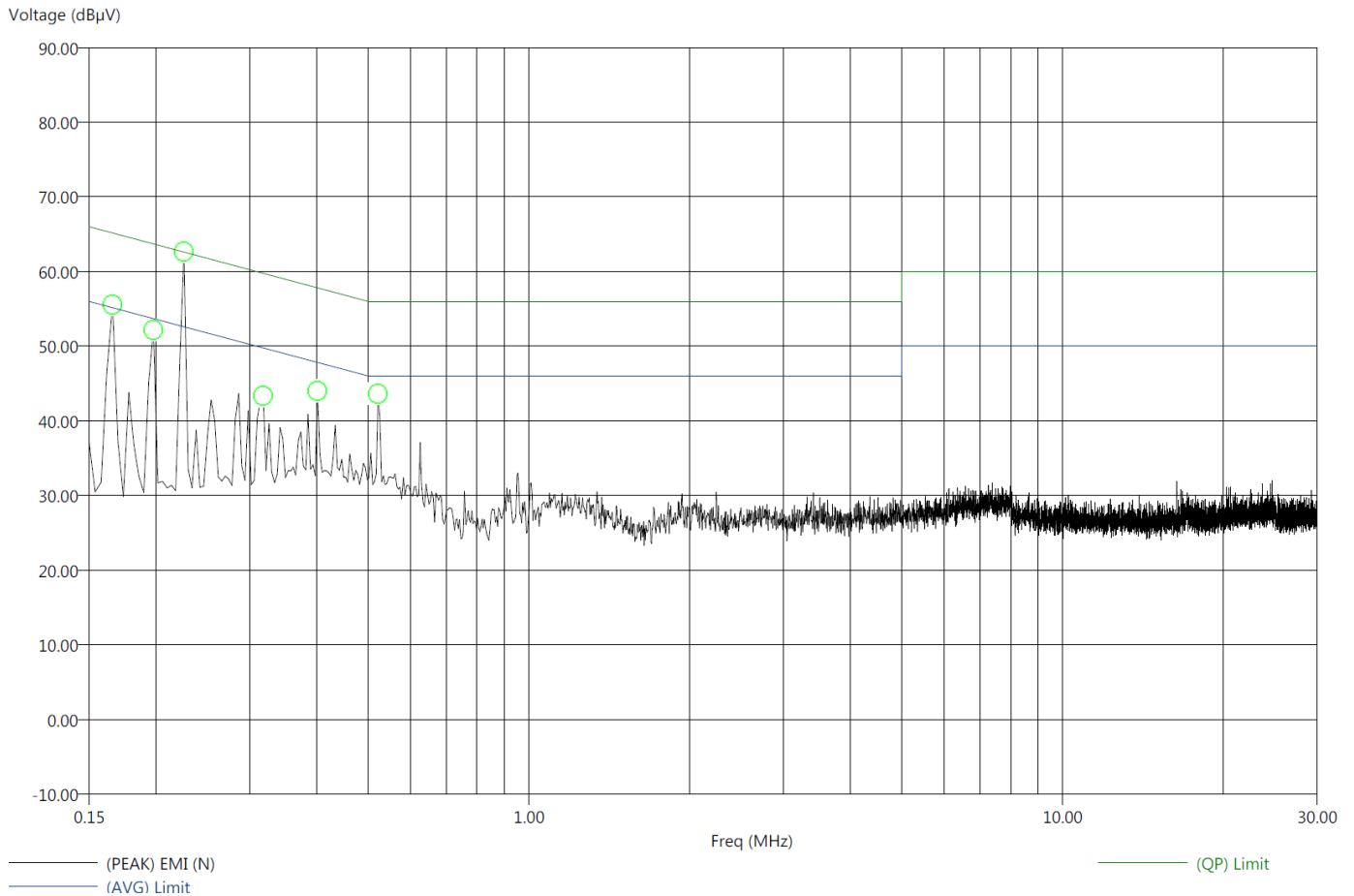
Comments: Connected to an 1800 Watt Load.

Temp: 73f

Hum: 44%

120V 60Hz

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



This is the worst case channel and configuration.



Brea Division
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Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

Title: FCC 15.207

7/19/2017 10:07:52 AM

File: Conducted Final-Neutral_916.set

Sequence: Final Measurements

Operator: Torey Oliver

EUT Type: In Wall Outlet / WO15EMZ5-1

EUT Condition: The EUT is constantly transmitting 916MHz.

Comments: Connected to an 1800 Watt Load.

Temp: 73f

Hum: 44%

120V 60Hz

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

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dB V)	(QP) EMI (dB V)	(PEAK) EMI (dB V)	(AVG) Limit (dB V)	(QP) Limit (dB V)	Transducer (dB)	Cable (dB)
0.17	-29.24	-23.78	25.92	41.38	49.01	55.16	65.16	0.40	0.03
0.20	-28.88	-21.79	24.82	41.90	48.79	53.69	63.69	0.31	0.04
0.23	-26.99	-24.05	25.61	38.54	46.24	52.60	62.60	0.25	0.04
0.32	-23.57	-24.19	26.19	35.57	41.60	49.76	59.76	0.08	0.02
0.40	-21.93	-23.22	25.88	34.59	37.47	47.81	57.81	0.04	0.02
0.52	-21.51	-26.37	24.49	29.63	46.00	46.00	56.00	0.03	0.01

This is the worst case channel and configuration.

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Lake Forest Division
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FUNDAMENTAL & HARMONICS
DATA SHEETS



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Agoura, CA 91301
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Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

FUNDAMENTAL FIELD STRENGTH

FCC 15.249

Company: Nortek
EUT: Wall Switch
Model: WO15EMZ5-1

Date: 7/19/2017
Lab: R
Tested By: Torey Oliver

Compatible Electronics, Inc. FAC-3

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table	Tower	Comments
908.40	93.52	H	113.97	-20.45	Peak	126	1.00	
908.40	90.90	H	93.97	-3.07	QP	126	1.00	
908.40	95.18	V	113.97	-18.79	Peak	167	1.08	
908.40	92.68	V	93.97	-1.29	QP	167	1.08	
916.00	92.10	H	113.97	-21.87	Peak	275	1.00	
916.00	88.78	H	93.97	-5.19	QP	275	1.00	
916.00	94.35	V	113.97	-19.62	Peak	40	1.23	
916.00	91.78	V	93.97	-2.19	QP	40	1.23	

Test distance
3 meter



HARMONICS LOW CHANNEL HORIZONTAL

FCC 15.249

Company: Nortek
EUT: Wall Switch
Model: WO15EMZ5-1

Date: 7/20/2017
Lab: R
Tested By: Torey Oliver

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1816.8	--	H	73.98	--	Peak	--	--	No Emissions Found
1816.8	--	H	53.98	--	Avg	--	--	No Emissions Found
2725.2	24.01	H	73.98	-49.97	Peak	1.25	183	
2725.2	10.83	H	53.98	-43.15	Avg	1.25	183	
3633.6	37.91	H	73.98	-36.07	Peak	1.67	171	
3633.6	19.49	H	53.98	-34.49	Avg	1.67	171	
4542.0	31.89	H	73.98	-42.09	Peak	1.40	308	
4542.0	19.02	H	53.98	-34.96	Avg	1.40	308	
5450.4	--	H	73.98	--	Peak	--	--	No Emissions Found
5450.4	--	H	53.98	--	Avg	--	--	No Emissions Found
6358.8	42.04	H	73.98	-31.94	Peak	1.00	177	
6358.8	29.34	H	53.98	-24.64	Avg	1.00	177	
7267.2	--	H	73.98	--	Peak	--	--	No Emissions Found
7267.2	--	H	53.98	--	Avg	--	--	No Emissions Found
8175.6	44.00	H	73.98	-29.98	Peak	2.06	54	
8175.6	31.46	H	53.98	-22.52	Avg	2.06	54	
9084.0	--	H	73.98	--	Peak	--	--	No Emissions Found
9084.0	--	H	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



HARMONICS LOW CHANNEL VERTICAL

FCC 15.249

Company: Nortek
EUT: Wall Switch
Model: WO15EMZ5-1

Date: 7/20/2017
Lab: R
Tested By: Torey Oliver

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1816.8	--	V	73.98	--	Peak	--	--	No Emissions Found
1816.8	--	V	53.98	--	Avg	--	--	No Emissions Found
2725.2	30.80	V	73.98	-43.18	Peak	1.04	360	
2725.2	11.75	V	53.98	-42.23	Avg	1.04	360	
3633.6	26.79	V	73.98	-47.19	Peak	1.82	3	
3633.6	13.91	V	53.98	-40.07	Avg	1.82	3	
4542.0	31.39	V	73.98	-42.59	Peak	1.65	62	
4542.0	18.82	V	53.98	-35.16	Avg	1.65	62	
5450.4	--	V	73.98	--	Peak	--	--	No Emissions Found
5450.4	--	V	53.98	--	Avg	--	--	No Emissions Found
6358.8	44.90	V	73.98	-29.08	Peak	1.57	214	
6358.8	29.11	V	53.98	-24.87	Avg	1.57	214	
7267.2	--	V	73.98	--	Peak	--	--	No Emissions Found
7267.2	--	V	53.98	--	Avg	--	--	No Emissions Found
8175.6	47.38	V	73.98	-26.60	Peak	2.55	177	
8175.6	31.77	V	53.98	-22.21	Avg	2.55	177	
9084.0	--	V	73.98	--	Peak	--	--	No Emissions Found
9084.0	--	V	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



Brea Division
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Brea, CA 92823
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Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
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(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

HARMONICS HIGH CHANNEL HORIZONTAL

FCC 15.249

Company: Nortek
EUT: Wall Switch
Model: WO15EMZ5-1

Date: 7/20/2017
Lab: R
Tested By: Torey Oliver

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1832.00	--	H	73.98	--	Peak	--	--	No Emissions Found
1832.00	--	H	53.98	--	Peak	--	--	No Emissions Found
2748.00	23.22	H	73.98	-50.76	Peak	1.42	180	
2748.00	10.94	H	53.98	-43.04	Peak	1.42	180	
3664.00	--	H	73.98	--	Peak	--	--	No Emissions Found
3664.00	--	H	53.98	--	Avg	--	--	No Emissions Found
4580.00	--	H	73.98	--	Peak	--	--	No Emissions Found
4580.00	--	H	53.98	--	Avg	--	--	No Emissions Found
5496.00	--	H	73.98	--	Peak	--	--	No Emissions Found
5496.00	--	H	53.98	--	Avg	--	--	No Emissions Found
6412.00	43.50	H	73.98	-30.48	Peak	1.46	183	
6412.00	29.71	H	53.98	-24.27	Avg	1.46	183	
7328.00	--	H	73.98	--	Peak	--	--	No Emissions Found
7328.00	--	H	53.98	--	Avg	--	--	No Emissions Found
8244.00	46.34	H	73.98	-27.64	Peak	1.20	66	
8244.00	33.60	H	53.98	-20.38	Avg	1.20	66	
9160.00	--	H	73.98	--	Peak	--	--	No Emissions Found
9160.00	--	H	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



HARMONICS HIGH CHANNEL VERTICAL

FCC 15.249

Company: Nortek
EUT: Wall Switch
Model: WO15EMZ5-1

Date: 7/20/2017
Lab: R
Tested By: Torey Oliver

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1832.00	--	V	73.98	--	Peak	--	--	No Emissions Found
1832.00	--	V	53.98	--	Avg	--	--	No Emissions Found
2748.00	23.10	V	73.98	-50.88	Peak	1.21	46	
2748.00	9.91	V	53.98	-44.07	Avg	1.21	46	
3664.00	--	V	73.98	--	Peak	--	--	No Emissions Found
3664.00	--	V	53.98	--	Avg	--	--	No Emissions Found
4580.00	--	V	73.98	--	Peak	--	--	No Emissions Found
4580.00	--	V	53.98	--	Avg	--	--	No Emissions Found
5496.00	--	V	73.98	--	Peak	--	--	No Emissions Found
5496.00	--	V	53.98	--	Avg	--	--	No Emissions Found
6412.00	44.71	V	73.98	-29.27	Peak	1.81	227	
6412.00	29.69	V	53.98	-24.29	Avg	1.81	227	
7328.00	--	V	73.98	--	Peak	--	--	No Emissions Found
7328.00	--	V	53.98	--	Avg	--	--	No Emissions Found
8244.00	46.08	V	73.98	-27.90	Peak	2.38	168	
8244.00	33.41	V	53.98	-20.57	Avg	2.38	168	
9160.00	--	V	73.98	--	Peak	--	--	No Emissions Found
9160.00	--	V	53.98	--	Avg	--	--	No Emissions Found

Test distance
3 meter



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Lake Forest Division
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(949) 587-0400

EMISSIONS RADIATED OUTSIDE OF THE FUNDAMENTAL FREQUENCY BAND

DATA SHEETS



Brea Division
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Lake Forest Division
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BAND EDGES LOW CHANNEL

FCC 15.249

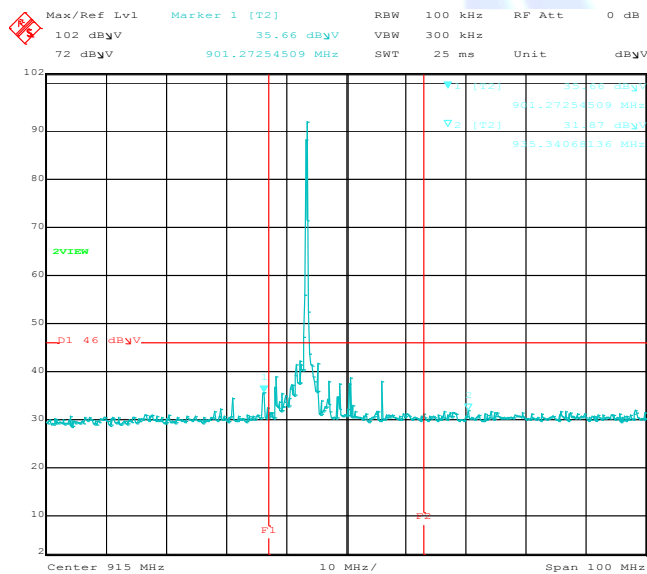
Company: Nortek
EUT: Wall Switch
Model: WO15EMZ5-1

Date: 7/19/2017
Lab: R
Test ENG: Torey Oliver

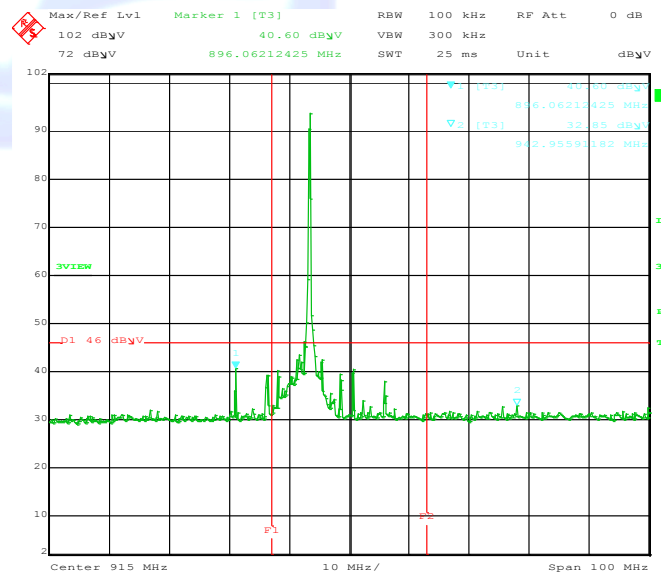
Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Level (dBμV/m)	Pol	Limit (dBμV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (Deg)	Tower Height (m)	Comments
901.27	35.66	H	46.00	-10.34	Peak	126	1.00	No Marker Delta
935.34	31.87	H	46.00	-14.13	Peak	126	1.00	Method Used
896.06	40.60	V	46.00	-5.40	Peak	167	1.08	No Marker Delta
942.96	32.85	V	46.00	-13.15	Peak	167	1.08	Method Used

Test distance
3 meter



Comment A: Band Edge Horizontal 908.42MHz



Comment A: Band Edge Vertical 908.42MHz



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Agoura Division
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Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

BAND EDGES HIGH CHANNEL

FCC 15.249

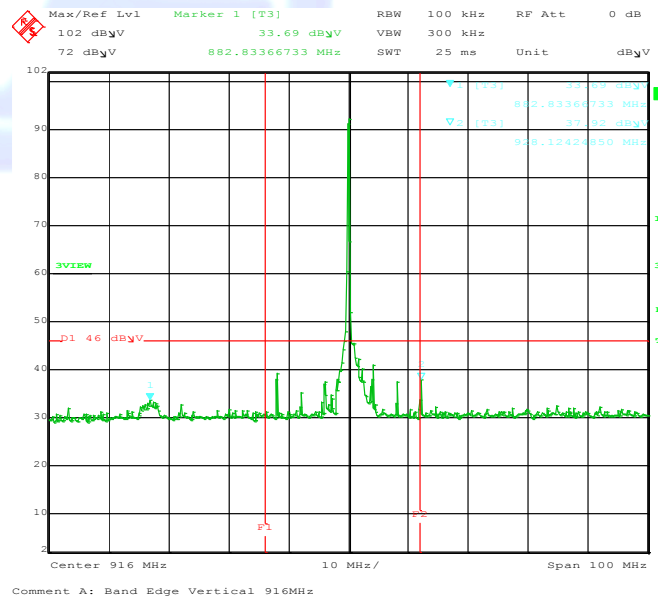
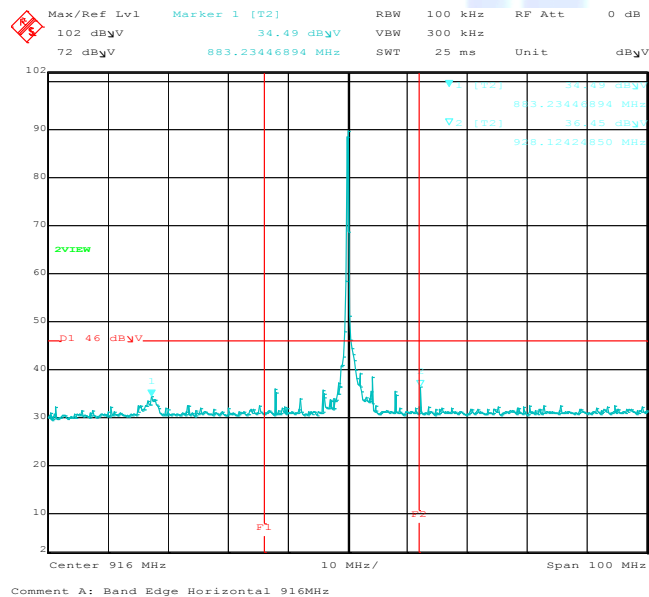
Company: Nortek
EUT: Wall Switch
Model: WO15EMZ5-1

Date: 7/19/2017
Lab: R
Test ENG: Torey Oliver

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

Freq. (MHz)	Level (dBμV/m)	Pol	Limit (dBμV)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
883.23	34.49	H	46.00	-11.51	Peak	1.00	275	No Marker Delta
928.12	36.45	H	46.00	-9.55	Peak	1.00	275	Method Used
882.83	33.69	V	46.00	-12.31	Peak	1.23	40	No Marker Delta
928.12	37.92	V	46.00	-8.08	Peak	1.23	40	Method Used

Test distance
3 meter



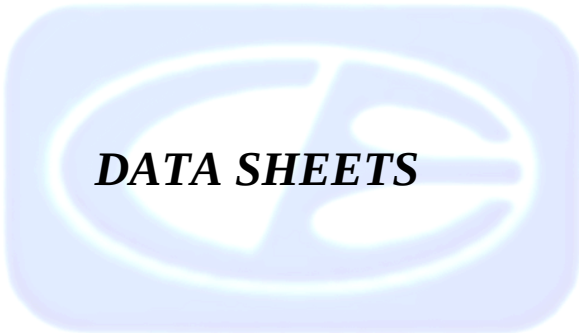
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99% OCCUPIED BANDWIDTH



DATA SHEETS



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OCCUPIED BANDWIDTH

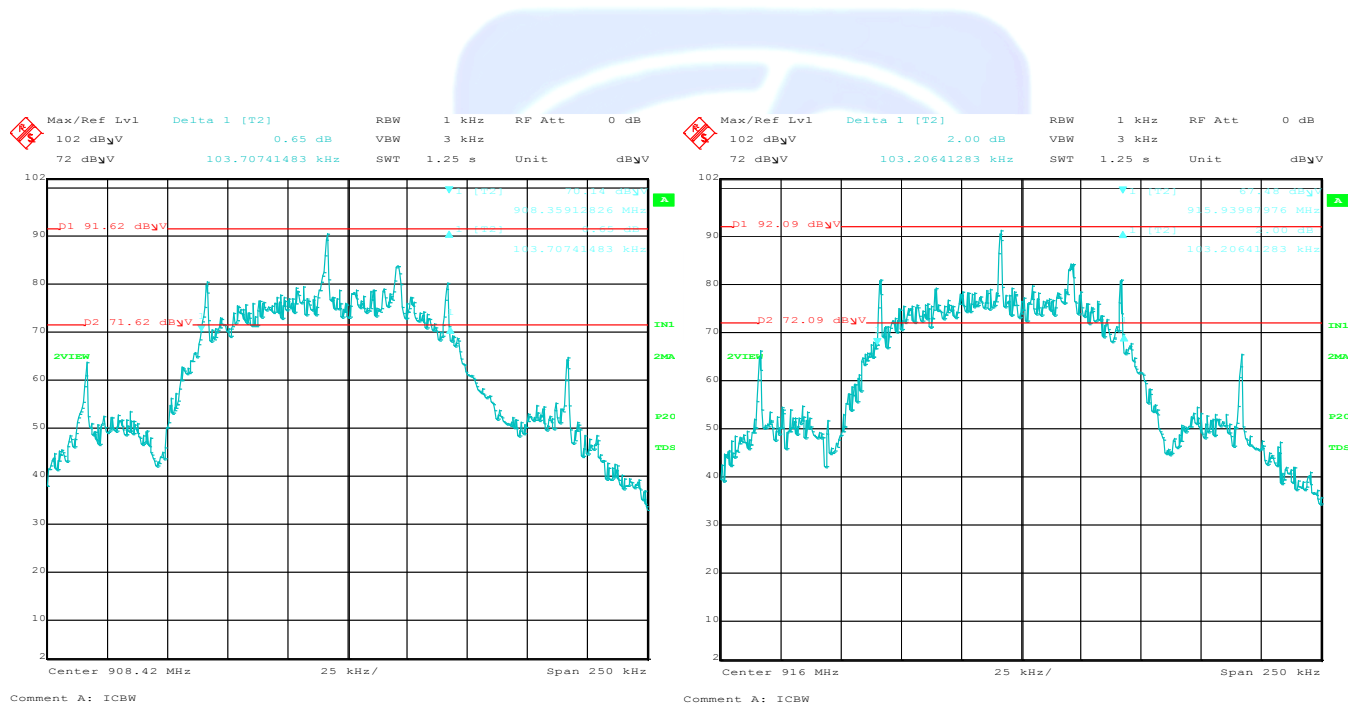
RSS-GEN & RSS210

Company: Nortek
EUT: Wall Switch
Model: WO15EMZ5-1

Date: 7/19/2017
Lab: R
Tested By: Torey Oliver

Compatible Electronics, Inc. FAC-3

Freq. (MHz)	Bandwidth (kHz)	Comments
908.40	103.71	99% Bandwidth
916.00	103.21	99% Bandwidth



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