Report Number: **B10813D3** **Page 1 of 22**

FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

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FCC PART 15, SUBPART B and C; FCC 15.231; and RSS-210 & RSS GEN TEST REPORT

for

Z-WAVE GARAGE DOOR CONTROLLER

Model: GDZW7-ECO

Prepared for

ECOLINK INTELLIGENT TECHNOLOGY, INC.
2055 CORTE DEL NOGAL
CARLSBAD, CALIFORNIA 92011

Prepared by:_____

KYLE FUJIMOTO

Approved by:_____

JAMES ROSS

COMPATIBLE ELECTRONICS INC.
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DATE: NOVEMBER 24, 2021

	REPORT	APPENDICES					TOTAL
	BODY	A	B	C	D	E	
PAGES	22	2	2	2	15	37	**80**

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FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report

Z-Wave Garage Door Controller
Model: GDZW7-ECO

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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

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Report Number: **B10813D3** **Page 4 of 22**

FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

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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 without the written permission of Compatible Electronics, unless done so in full.

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

Device Tested:	Z-Wave Garage Door Controller Model: GDZW7-ECO S/N: N/A
Product Description:	The equipment under test is a Z-Wave Garage Door Controller that uses Z-Wave technology. The transmit frequency is 345 MHz. The clock oscillator is 39 MHz. Dimensions: 2.3 cm (L) x 9.2 cm (W) x 13.7 cm (H).
Modifications:	The EUT was not modified to meet the specifications.
Customer:	Ecolink Intelligent Technology, Inc. 2055 Corte Del Nogal Carlsbad, California 92011
Test Dates:	August 6, 7, and 13, 2021; and November 24, 2021

Test Specifications covered by accreditation:

Test Specifications:	Emissions requirements CFR Title 47, Part 15, Subpart B; CFR Title 47, Part 15, Subpart C, sections 15.205, 15.207, 15.209, and 15.231; RSS-210 and RSS-Gen

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Test Procedures:	ANSI C63.4 and ANSI C63.10
Test Deviations:	The test procedure was not deviated from during the testing.

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SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz	Complies with the **Class B** limits of CFR Title 47, Part 15 Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, section 15.207; and the limits of RSS-210 and RSS-Gen Highest reading in relation to spec limit 39.36 dBuV/m (AVG) @ 0.278 MHz (*U = 2.73 dB)
2	Spurious Radiated RF Emissions, 9 kHz – 3.45 GHz (Transmitter and Digital portion)	Complies with the **Class B** limits of CFR Title 47, Part 15 Subpart B; the limits of CFR Title 47, Part 15 Subpart C, sections 15.205, 15.209, and 15.231; and the limits of RSS-210 and RSS-Gen Highest reading in relation to spec limit 76.21 dBuV/m (AVG) @ 345 MHz (*U = 3.19 dB)
3	-20 dB Bandwidth	Complies with limits of CFR Title 47, Part 15 Subpart C, section 15.231 (c); and the limits of RSS-210
4	Transmission Time	Complies with limits of CFR Title 47, Part 15 Subpart C, section 15.231 (a)(1) and (a)(2); and the limits of RSS-210

*U = Expanded Uncertainty with a coverage factor of k=2

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Report Number: **B10813D3**   **Page 6 of 22**

FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

1.   PURPOSE

This document is a qualification test report based on the emissions tests performed on the Z-Wave Garage Door Controller, Model: GDZW7-ECO.   The emissions measurements were performed according to the measurement procedure described in ANSI C63.4 and ANSI C63.10. The tests were performed to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the **Class B** specification limits defined by CFR Title 47, Part 15 Subpart B section, 15.109; the specification limits defined by CFR Title 47, Part 15 Subpart C sections 15.205, 15.207, 15.209 and 15.231; and the specifications limits defined by RSS-210 and RSS-Gen.

This test report covers the FCC 15.231 portion of the EUT. The FCC 15.249 portion is covered under the Compatible Electronics, Inc. test report **B10813D1**, and the FCC 15.247 portion is covered under the Compatible Electronics, Inc. test report **B10813D2**.

1.1   Decision Rule & Risk

If a measured value exceeds a specification limit it implies non-compliance. If the value is below a specification limit it implies compliance. Measurement uncertainty of the laboratory is reported with all measurement results but generally not taken into consideration unless a standard, rule or law requires it to be considered.

Qualification test reports are only produced for products that are in compliance with the test requirements, therefore results are always in conformity. Otherwise, an engineering report or just the data is provided to the customer.

When performing a measurement and making a statement of conformity, in or out-of-specification to manufacturer's specifications or Pass/Fail against a requirement, there are two possible outcomes:

- The result is reported as conforming with the specification
- The result is reported as not conforming with the specification

The decision rule is defined below.

When the test result is found to be below the limit but within our measurement uncertainty of the limit, it is our policy that the final acceptance decision is left to the customer, after discussing the implications and potential risks of the decision.

When the test result is found to be exactly on the specification, it is our policy, in the case of unwanted emissions measurements to consider the result non-compliant, however, the final decision is left to the customer, after discussing the implications and potential risks of the decision.

When the test result is found to be over the specification limit under any condition, it is our policy to consider the result non-compliant.

In terms of uncertainty of measurement, the laboratory is a calibrated and tightly controlled environment and generally exceptionally stable, the measurement uncertainties are evaluated without the considering of the test sample. When it comes to the test sample however, as most testing is performed on a single sample rather than a sample population, and that sample is often a pre-production representation of the final product, that test sample represents a significantly higher source of measurement uncertainty. We advise our customers of this and that when in doubt (small test to limit margins), they may wish to perform statistical sampling on a population to gain a higher confidence in the results. All lab reported results are that of a single sample in any event.

2.   ADMINISTRATIVE DATA

2.1   Location of Testing

The emissions tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

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

Ecolink Intelligent Technology, Inc.

David Shepard   Product Compliance/QA Specialist
Jay Stone   Director of Engineering

Compatible Electronics Inc.

Kyle Fujimoto   Test Engineer
James Ross   Test Engineer

2.4   Date Test Sample was Received

The test sample was received prior to the date of this report.

2.5   Disposition of the Test Sample

The test sample has not been returned to Ecolink Intelligent Technology, Inc. as of the date of this report.

2.6   Abbreviations and Acronyms

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

EMI   Electromagnetic Interference
EUT   Equipment Under Test
P/N   Part Number
S/N   Serial Number
FCC   Federal Communications Commission
DoC   Declaration of Conformity
N/A   Not Applicable
Tx   Transmit
Rx   Receive
Inc.   Incorporated
LLC   Limited Liability Company
RF   Radio Frequency
BLE   Bluetooth Low Energy
CFR   Code of Federal Regulations
PCB   Printed Circuit Board
DC   Direct Current
LED   Light Emitting Diode

3. APPLICABLE DOCUMENTS

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

SPEC	TITLE
FCC Title 47, Part 15 Subpart B	FCC Rules – Radio frequency devices (including digital devices) – Unintentional Radiators
FCC Title 47, Part 15 Subpart C	FCC Rules – Radio frequency devices (including digital devices) – Intentional Radiators
RSS-210 Issue 10: 2019 + Amendment (April 2020)	License-exempt Radio Apparatus: Category I Equipment
RSS-Gen Issue 5: 2018 + Amendment 1: 2019 + Amendment 2: 2021	General Requirements for Compliance of Radio Apparatus
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 procedure for compliance testing of unlicensed wireless devices

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4.   DESCRIPTION OF TEST CONFIGURATION

4.1   Description of Test Configuration – Emissions

The Z-Wave Garage Door Controller, Model: GDZW7-ECO (EUT) was connected to unterminated cables on its J3 and J4 ports. A switching adapter was also connected to its DC IN port. The EUT was transmtting and/or receiving at 345 MHz on a continuous basis.

The EUT was tested for emissions while in the X, Y and Z axis. The X orientation is when the EUT is parallel to the ground. The Y orientation is when the EUT is perpendicular to the ground mounted vertically. The Z orientation is when the EUT is perpendicular to the ground mounted horizontally.

The firmware inside the EUT allowed the EUT to continuously transmit or receive at 345 MHz.

The firmware is stored on the company's servers.

The final radiated emissions data for the EUT was taken in the configuration described above. Please see Appendix E for the data sheets.

4.1.1   Cable Construction and Termination

Cable 1   This is a 1.5-meter unshielded, unterminated cable connecting the EUT's J3 port. The cable was bundled to 40 centimeters above the ground plane.

Cable 2   This is a 1.5-meter unshielded, unterminated cable connecting the EUT's J4 port. The cable was bundled to 40 centimeters above the ground plane.

Cable 3   This is a 1.5-meter unshielded cable connecting the EUT to the switching adapter. The cable has a 1/8 inch power adapter at the EUT end and is hard wired into the switching adapter. The cable was bundled to a length of 1-meter.

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5.   LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1   EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
Z-WAVE GARAGE DOOR CONTROLLER (EUT)	ECOLINK INTELLIGENT TECHNOLOGY, INC.	GDZW7-ECO	N/A	XQC-GDZW7 IC: 9863B-GDZW7
FIRMWARE	ECOLINK INTELLIGENT TECHNOLOGY, INC.	1.0	N/A	N/A
SWITCHING ADAPTER	AMIGO	AMS135-1201000FU	N/A	N/A

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FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DATE	CAL. CYCLE
RADIATED AND CONDUCTED EMISSIONS; AND VARIATION OF THE INPUT POWER TEST EQUIPMENT					
TDK TestLab	TDK RF Solutions, Inc.	9.22	700145	N/A	N/A
MXE EMI Receiver, 3 Hz – 44 GHz	Keysight Technologies, Inc.	N9038A	MY59050117	October 5, 2020	1 Year
MXE EMI Receiver, 20 Hz – 26.5 GHz	Keysight Technologies, Inc.	N9038A	MY51210150	September 17, 2021	1 Year
Loop Antenna	Com-Power	AL-130R	121090	February 5, 2019	3 Year
CombiLog Antenna	Com-Power	AC-220	10030004	January 14, 2020	2 Year
Horn Antenna	Com-Power	AH-118	10050113	February 4, 2020	2 Year
Preamplifier	Com-Power	PA-118	181653	March 3, 2021	1 Year
System Controller	Sunol Sciences Corporation	SC110V	112213-1	N/A	N/A
Turntable	Sunol Sciences Corporation	2011VS	N/A	N/A	N/A
Antenna-Mast	Sunol Sciences Corporation	TWR95-4	112213-3	N/A	N/A
Computer	Hewlett Packard	p6716f	MXX1030PX0	N/A	N/A
LCD Monitor	Hewlett Packard	52031a	3CQ046N3MG	N/A	N/A
Multimeter	Fluke	115	36601149WS	November 20, 2019	2 Year
Variable Autotransformer	Staco Energy Products	3PN2210	003	N/A	N/A
LISN	Com-Power	LI-215A	191951	August 4, 2021	2 Year
Attenuator 10 dB	Surecall	SC-ATT-10	17100025	November 20, 2020	1 Year

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6.   TEST SITE DESCRIPTION

6.1   Test Facility Description

Please refer to section 2.1 of this report for emissions test location.

6.2   EUT Mounting, Bonding and Grounding

For frequencies 1 GHz and below: The EUT was mounted on a 0.6 by 1.2 meter non-conductive table 0.8 meters above the ground plane.

For frequencies above 1 GHz: The EUT was mounted on a 0.6 by 1.2 meter non-conductive table 1.5 meters above the ground plane.

The EUT was not grounded.

6.3   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)	3.4 dB	2.73 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30 MHz – 1 000 MHz)	6.3 dB	3.27 dB (Vertical) 3.19 dB (Horizontal)
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(1 GHz - 6 GHz)	5.2 dB	3.95 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(6 GHz – 18 GHz)	5.5 dB	3.95 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(18 GHz – 26.5 GHz)	N/A	4.69 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(26.5 GHz – 40 GHz)	N/A	4.55 dB

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7.   TEST PROCEDURES

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

7.1   RF Emissions

7.1.1   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. A 10 dB attenuator was used for the protection of the EMI Receiver input stage, and the offset was adjusted accordingly to read the actual data measured. 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 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 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 computer software. The final qualification data is located in Appendix E.

The six highest emissions are listed in Table 1.

Test Results:

The EUT complies with the **Class B** limits of CFR Title 47, Part 15 Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, Section 15.207 for conducted emissions.

7.1.2   **Radiated Emissions Test**

The EMI Receiver was used as the measuring meter. An internal preamplifier was used to increase the sensitivity of the instrument during emissions tests up to 1000 MHz, and an external preamplifier was used to increase the sensitivity of the instrument during emissions tests above 1 GHz. The EMI Receiver was initially used with the Analyzer mode feature activated. In this mode, the EMI receiver can then record the actual frequency to be measured. This final reading is then taken accurately in the EMI Receiver mode, which considers the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. The effective measurement bandwidth used for the radiated emissions test was according to the frequency measured.

The frequencies below 1 GHz, except for the fundamental frequency and the 2nd harmonic of the fundamental frequency, were quasi-peaked using the quasi-peak detector of the EMI Receiver.

The harmonic frequencies above 1 GHz, the fundamental frequency, and the 2nd harmonic were averaged using the duty cycle correction calculation.

All other frequencies above 1 GHz were averaged using the average detector of the EMI Receiver.

The EMI test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI C63.4. 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 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 (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna to ensure accurate results.

The EUT was tested at a 3-meter test distance. The six highest emissions are listed in Table 2.

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Radiated Emissions Test (Continued)

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

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
9 kHz to 150 kHz	200 Hz	Loop Antenna
150 kHz to 30 MHz	9 kHz	Loop Antenna
30 MHz to 1 GHz	120 kHz	CombiLog Antenna
1 GHz to 3.45 GHz	1 MHz	Horn Antenna

Test Results:

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; the limits of CFR Title 47, Part 15, Subpart C sections 15.205, 15.209 and 15.231; and the limits of RSS-210 and RSS-Gen for radiated emissions.

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7.1.3 RF Emissions Test Results

Table 1   CONDUCTED EMISSION RESULTS
            Z-Wave Garage Door Controller, Model: GDZW7-ECO

Frequency MHz	Average Corrected Reading* dBµV/m	Average Specification Limit dBµV/m	Delta (Cor. Reading – Spec. Limit) dB
0.278 (WL) (Rx)	39.36	50.87	-11.51
0.286 (WL) (Tx)	36.83	50.80	-13.97
0.262 (BL) (Rx)	36.28	50.83	-14.55
0.262 (BL) (Tx)	36.09	50.97	-14.88
0.282 (BL) (Tx)	33.65	50.47	-16.83
0.338 (BL) (Rx)	32.25	49.18	-16.93

Table 2   RADIATED EMISSION RESULTS
            Z-Wave Garage Door Controller, Model: GDZW7-ECO

Frequency MHz	Corrected Reading* dBµV/m	Specification Limit dBµV/m	Delta (Cor. Reading – Spec. Limit) dB
345.00 (H) (X-Axis)	76.21 (AV)	77.26	-1.05
345.00 (H) (Y-Axis)	75.99 (AV)	77.26	-1.27
345.00 (V) (Z-Axis)	70.47 (AV)	77.26	-6.79
345.00 (V) (Y-Axis)	69.31 (AV)	77.26	-7.95
345.00 (H) (Z-Axis)	69.15 (AV)	77.26	-8.11
345.00 (V) (X-Axis)	66.89 (AV)	77.26	-10.38

Notes:

*   The complete emissions data is given in Appendix E of this report.
(V)   Vertical
(H)   Horizontal
(BL)   Black Lead
(WL)   White Lead
(Rx)   Receiving
(Tx)   Transmitting
(AV)   Average
(QP)   Quasi-Peak

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7.1.4 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.

Conversion to logarithmic terms: Specification limit (μV/m) log x 20 = Specification Limit in dBuV/m

To correct for distance when measuring at a distance other than the specification

For measurements below 30 MHz: (Specification distance / test distance) log x 40 = distance factor

For measurements above 30 MHz: (Specification distance / test distance) log x 20 = 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.

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

$$\begin{aligned} \text{where:} \quad & F = \text{antenna factor} \\ & A = \text{amplifier gain} \\ & C = \text{cable loss} \end{aligned}$$

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.

When the limit is in terms of magnetic field, the following equation applies:

$$H[dB(\mu A/m)] = V[dB(\mu V)] + L_C [dB] - G_{PA} [dB] + AF^H [dB(S/m)]$$

where:
H is the magnetic field strength (to be compared with the limit),
V is the voltage level measured by the receiver or spectrum analyzer,
L_C is the cable loss,
G_{PA} is the gain of the preamplifier (if used), and
AF^H is the magnetic antenna factor.

The G_{PA} term is only included in the equation when an external preamplifier is used in the measurement chain, in front of the receiver or spectrum analyzer. An external preamplifier is not usually necessary (or even advisable, due to risk of saturating the input mixer of the receiver) when an active loop antenna is used. In that case, the antenna factor of the loop already includes the gain of its built-in preamplifier.

If the "electrical" antenna factor is used instead, the above equation becomes:

$$H[dB(\mu A/m)] = V[dB(\mu V)] + L_C [dB] - G_{PA}[dB] + AF^E [dB(m^{-1})] - 51.5 [dB\Omega]$$

where:
AF^E is the "electric" antenna factor, as provided by the antenna calibration laboratory.

When the limit is in terms of electric field, the following equation applies:

$$E[dB(\mu V/m)] = V[dB(\mu V)] + L_C[dB] - G_{PA}[dB] + AF^E [dB(m^{-1})]$$
or, if the magnetic antenna factor is used:

$$E[dB(\mu V/m)] = V[dB(\mu V)] + L_C[dB] - G_{PA}[dB] + AF^H [dB(S/m)] + 51.5[dB\Omega]$$

The display of the receiver (or spectrum analyzer) **shall not** be configured in units of current, e.g. μA or dB(μA). That conversion is calculated inside the receiver (or spectrum analyzer) using its input impedance, which is 50 Ω, while the magnetic field calculation is based on the free-space impedance of 377 Ω.

7.1.5   Duty Cycle Calculation

The fundamental and harmonics were measured at a 3-meter test distance. The EMI Receiver was used to obtain the final test data. The final qualification data sheets are in Appendix E.

Where

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

n is the number of pulses of duration $t1$
m is the number of pulses of duration $t2$
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

Duty Cycle Correction Factor = -18.17 dB

Time of One Small Pulse = 160 µs

Time of One Large Pulse = 293 µs

Number of Small Pulses = 46

Number of Large Pulses = 17

Total On Time = 12341 µs = 12.341 ms

The time between pulses is greater than 100 ms

Duty Cycle = 12.341 ms / 100 ms = 12.341 %

7.1.6   99 % Bandwidth

The 99 % bandwidth was measured using an EMI Receiver.

The following steps were performed for measuring the 99 % bandwidth per RSS-GEN, Issue 5, clause 6.7:

1. Set RBW to 1 % to 5 % of the actual occupied bandwidth.
2. Set VBW to greater than 3 times the RBW.
3. Set the EMI Receiver to the occupied bandwidth Function set at 99 %
4. Set the peak detector to max hold.
5. Set the sweep time to auto
6. Allow the trace to stabilize.

Please note that this was only used to determine the emission bandwidth and that there are no limits or pass/fail criteria for this test. Please see the data sheets located in Appendix E.

7.1.7   -20 dB Bandwidth

The -20 dB bandwidth was measured using an EMI Receiver.

The following steps were performed for measuring the -20 dB bandwidth:

1. Set RBW to at least 1% of the Occupied Bandwidth.
2. Set the span between two times and five times the Occupied Bandwidth
2. Set VBW to greater than 3 times the RBW.
3. Set the peak detector to max hold.
4. Set the sweep time to auto
5. Allow the trace to stabilize.
6. Set the markers to -20 dB of the peak fundamental emission

Test Results:

The EUT complies with limits of CFR Title 47, Part 15, Subpart C section 15.231 (c); and the limits of RSS-210.

7.1.8   **Transmission Time**

The transmission time was measured using an EMI Receiver.

The following steps were performed for measuring transmission time:

1. Set RBW = 100 kHz.
2. Set VBW = 300 kHz
3. Span = 0 Hz
4. Set the sweep time to 10 seconds
5. Push a button on the EUT, which automatically activated the transmitter.
6. Allow the trace to stabilize.
7. Set the 1st marker to start of the transmission
8. Set the 2nd marker for 5 seconds after the start of the transmission
9. Verify the transmission does not go beyond the 2nd marker.

Test Results:

The EUT complies with limits of CFR Title 47, Part 15, Subpart C section 15.231 (a)(1) and (a)(2); and the limits of RSS-210.

7.1.9   **Variation of the Input Power**

The variation of the input power test was performed using the EMI Receiver. The EUT input power was varied between 85% and 115% of the nominal rated supply voltage. The carrier frequency was monitored for any change in amplitude.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.31 (e); and RSS-247.

COMPATIBLE ELECTRONICS

8. CONCLUSIONS

The Z-Wave Garage Door Controller, Model: GDZW7-ECO (EUT), as tested, meets all the specification limits defined in RSS-210, RSS-Gen, the **Class B** specification limits defined in CFR Title 47, Part 15, Subpart B; and the specification limits defined in CFR Title 47, Part, 15, Subpart C, sections 15.205, 15.207, 15.209 and 15.231.

COMPATIBLE ELECTRONICS

APPENDIX A

LABORATORY ACCREDITATIONS AND RECOGNITIONS

Report Number: **B10813D3**   **Page A2**

FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

COMPATIBLE ELECTRONICS

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/**

NVLAP TESTING
NVLAP LAB CODE 200528-0

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 2154A

COMPATIBLE ELECTRONICS

APPENDIX B

MODIFICATIONS TO THE EUT

COMPATIBLE
ELECTRONICS

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B, FCC 15.231, RSS-210, and RSS-Gen specifications.

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

No modifications were made to the EUT during the testing.

COMPATIBLE ELECTRONICS

APPENDIX C

MODELS COVERED UNDER THIS REPORT

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

Newbury Park Division
1050 Lawrence Drive
Newbury Park, CA 91320
(805) 480-4044

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

MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST   Z-Wave Garage Door Controller
                                    Model: GDZW7-ECO
                                    S/N: N/A

There are no additional models or part numbers covered under this report.

COMPATIBLE ELECTRONICS

APPENDIX D

DIAGRAMS, CHARTS, AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

EUT is 80 cm away from the LISNs.

Rear of table is 40 cm from wall.

VERTICAL COUPLING PLANE

Test Bench
(1x1.5 meters)

ACC   EUT

ACC LISN

EUT LISN

80 cm

ACCESSORY POWER

EUT POWER

TO SPECTRUM ANALYZER
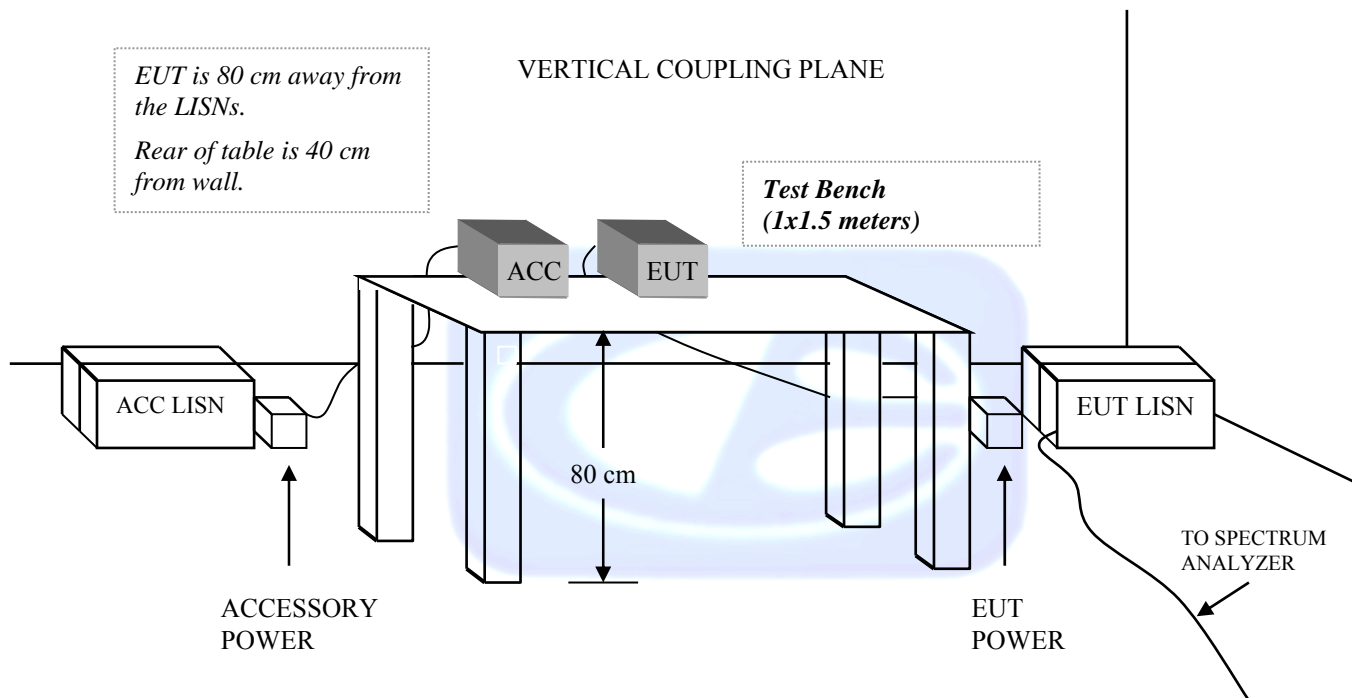
FIGURE 2: LAYOUT OF THE SEMI -ANECHOIC TEST CHAMBER

Turntable

EUT

---- 3 m ----

Antenna and Mast

SEMI-ANECHOIC TEST CHAMBER

Mast, Antenna Controller

EMI Receiver

COMPATIBLE ELECTRONICS
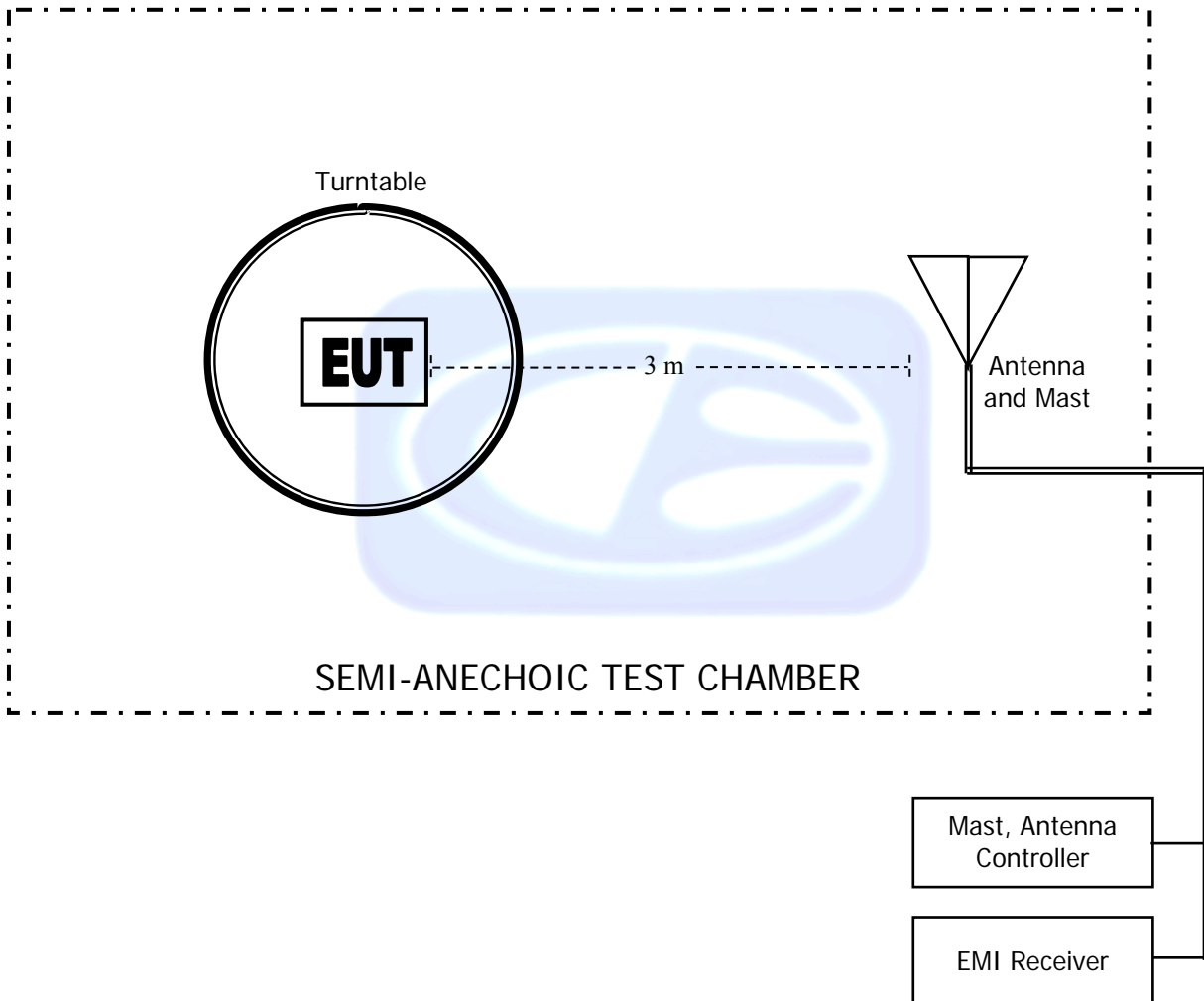
COM-POWER AL-130R

LOOP ANTENNA

S/N: 121090

CALIBRATION DATE: FEBRUARY 5, 2019

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.01	15.6	-35.9
0.02	14.8	-36.7
0.03	15.6	-35.9
0.04	15.1	-36.4
0.05	14.4	-37.0
0.06	14.6	-36.9
0.07	14.4	-37.1
0.08	14.3	-37.1
0.09	14.5	-36.9
0.10	14.1	-37.3
0.20	14.1	-37.3
0.30	14.0	-37.4
0.40	14.0	-37.4
0.50	14.2	-37.2
0.60	14.2	-37.2
0.70	14.2	-37.2
0.80	14.2	-37.3
0.90	14.3	-37.2
1.00	14.5	-37.0
2.00	14.5	-36.9
3.00	14.5	-36.9
4.00	14.7	-36.8
5.00	14.6	-36.9
6.00	14.6	-36.9
7.00	14.6	-36.9
8.00	14.6	-36.9
9.00	14.6	-36.9
10.00	14.8	-36.6
11.00	14.9	-36.6
12.00	14.8	-36.6
13.00	14.8	-36.7
14.00	14.6	-36.8
15.00	14.5	-36.9
16.00	14.5	-37.0
17.00	14.6	-36.9
18.00	14.7	-36.7
19.00	14.8	-36.6
20.00	14.9	-36.6
21.00	14.6	-36.8
22.00	14.2	-37.2
23.00	13.7	-37.7
24.00	13.3	-38.2
25.00	13.0	-38.5
26.00	12.9	-38.6
27.00	13.0	-38.5
28.00	13.1	-38.4
29.00	13.1	-38.4
30.00	12.9	-38.5

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

COMPATIBLE ELECTRONICS

COM-POWER AC-220

COMBILOG ANTENNA

S/N: 10030004

CALIBRATION DATE: JANAURY 14, 2020

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	22.5	200	15.1
35	21.2	250	16.7
40	20.2	300	18.2
45	19.2	350	19.2
50	18.1	400	20.7
60	14.5	450	21.2
70	11.7	500	22.0
80	11.5	550	22.6
90	13.2	600	24.1
100	14.3	650	24.2
120	15.1	700	24.3
125	15.0	750	25.6
140	13.6	800	25.9
150	13.6	850	26.1
160	13.9	900	27.0
175	14.8	950	28.0
180	14.5	1000	27.6

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

COM POWER AH-118

HORN ANTENNA

S/N: 10050113

CALIBRATION DATE: FEBRUARY 4, 2020

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	24.343	10.0	38.826
1.5	25.419	10.5	39.102
2.0	28.838	11.0	39.259
2.5	28.971	11.5	39.920
3.0	29.919	12.0	40.149
3.5	30.674	12.5	40.576
4.0	31.670	13.0	40.264
4.5	32.437	13.5	40.364
5.0	33.414	14.0	40.424
5.5	34.003	14.5	41.677
6.0	34.799	15.0	43.010
6.5	35.381	15.5	39.799
7.0	37.024	16.0	40.187
7.5	34.403	16.5	40.155
8.0	37.445	17.0	40.507
8.5	37.390	17.5	41.963
9.0	38.076	18.0	43.196
9.5	38.809		

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(949) 587-0400

COMPATIBLE ELECTRONICS

COM-POWER PA-118

PREAMPLIFIER

S/N: 181653

CALIBRATION DATE: MARCH 3, 2021

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	40.18	6.0	39.04
1.1	39.92	6.5	39.16
1.2	39.99	7.0	39.70
1.3	40.19	7.5	39.70
1.4	40.07	8.0	39.56
1.5	40.22	8.5	38.69
1.6	40.23	9.0	39.16
1.7	40.35	9.5	39.70
1.8	40.24	10.0	39.69
1.9	40.29	11.0	38.64
2.0	40.31	12.0	40.41
2.5	40.41	13.0	39.49
3.0	40.59	14.0	39.46
3.5	40.91	15.0	40.38
4.0	40.42	16.0	38.02
4.5	39.92	17.0	39.34
5.0	40.35	18.0	39.86
5.5	39.13		

COMPATIBLE ELECTRONICS

FRONT VIEW

ECOLINK INTELLIGENT TECHNOLOGY, INC.
Z-WAVE GARAGE DOOR CONTROLLER
MODEL: GDZW7-ECO
FCC SUBPART B AND C; RSS-210 AND RSS-GEN – RADIATED EMISSIONS – BELOW 1 GHz

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

COMPATIBLE ELECTRONICS

REAR VIEW

ECOLINK INTELLIGENT TECHNOLOGY, INC.
Z-WAVE GARAGE DOOR CONTROLLER
MODEL: GDZW7-ECO
FCC SUBPART B AND C; RSS-210 AND RSS-GEN – RADIATED EMISSIONS – BELOW 1 GHz

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

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

COMPATIBLE ELECTRONICS

FRONT VIEW

ECOLINK INTELLIGENT TECHNOLOGY, INC.
Z-WAVE GARAGE DOOR CONTROLLER
MODEL: GDZW7-ECO
FCC SUBPART B AND C; RSS-210 AND RSS-GEN – RADIATED EMISSIONS – ABOVE 1 GHz
TRANSMIT MODE

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

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COMPATIBLE ELECTRONICS

REAR VIEW

ECOLINK INTELLIGENT TECHNOLOGY, INC.
Z-WAVE GARAGE DOOR CONTROLLER
MODEL: GDZW7-ECO
FCC SUBPART B AND C; RSS-210 AND RSS-GEN – RADIATED EMISSIONS – ABOVE 1 GHz
TRANSMIT MODE

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

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FRONT VIEW

ECOLINK INTELLIGENT TECHNOLOGY, INC.
Z-WAVE GARAGE DOOR CONTROLLER
MODEL: GDZW7-ECO
FCC SUBPART B AND C; RSS-210 AND RSS-GEN – RADIATED EMISSIONS – ABOVE 1 GHz
RECEIVE MODE

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

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COMPATIBLE ELECTRONICS

REAR VIEW

ECOLINK INTELLIGENT TECHNOLOGY, INC.
Z-WAVE GARAGE DOOR CONTROLLER
MODEL: GDZW7-ECO
FCC SUBPART B AND C; RSS-210 AND RSS-GEN – RADIATED EMISSIONS – ABOVE 1 GHz
RECEIVE MODE

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

COMPATIBLE ELECTRONICS

FRONT VIEW

ECOLINK INTELLIGENT TECHNOLOGY, INC.
Z-WAVE GARAGE DOOR CONTROLLER
MODEL: GDZW7-ECO
FCC SUBPART B AND C; AND RSS-GEN – CONDUCTED EMISSIONS

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

COMPATIBLE ELECTRONICS

REAR VIEW

ECOLINK INTELLIGENT TECHNOLOGY, INC.
Z-WAVE GARAGE DOOR CONTROLLER
MODEL: GDZW7-ECO
FCC SUBPART B AND C; AND RSS-GEN – CONDUCTED EMISSIONS

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

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COMPATIBLE ELECTRONICS

APPENDIX E

DATA SHEETS

COMPATIBLE ELECTRONICS

CONDUCTED EMISSIONS

DATA SHEETS

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FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

Title: FCC Class B - Black Lead
File: 17 - Pre-Scan - Black Lead - Tx Mode - 345.00 MHz - FCC Class B - 08-13-2021.set
Operator: Kyle Fujimoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously transmitting at 345.00 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A

8/13/2021 10:07:19 AM
Sequence: Preliminary Scan

Black Lead

Voltage (dBµV)

FCC Conducted EMI Class B QP

FCC Conducted EMI Class B AVG

Freq (MHz)

(PEAK) EMI (L1)
(1) Limit
(2) Limit

Brea Division
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Brea, CA 92823
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Newbury Park Division
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Newbury Park, CA 91320
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Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

COMPATIBLE ELECTRONICS
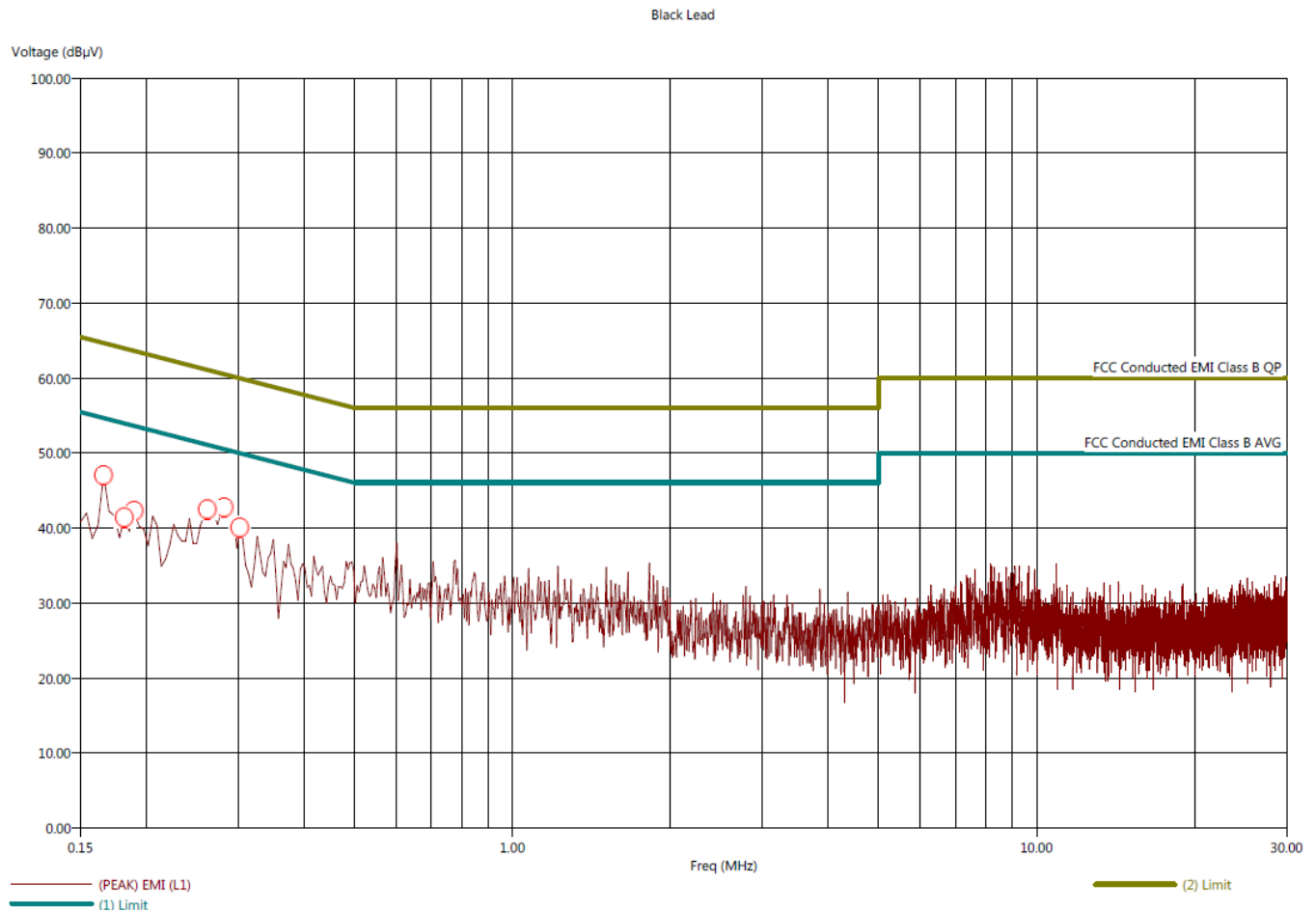
Title: FCC Class B - Black Lead
File: 17 - Final Scan - Black Lead - Tx Mode - 345.00 MHz - FCC Class B - 08-13-2021.set
Operator: Kyle Fujmoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously transmitting at 345.00 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A

8/13/2021 10:08:14 AM
Sequence: Final Measurements

Black Lead

Freq (MHz)	(PEAK) EMI (dBμV)	(AVG) EMI (dBμV)	(PEAK) Margin (AVG) (dB)	(AVG) Margin (AVG) (dB)	(AVG) Limit (dBμV)	Cable (dB)	Transducer (dB)	Filter (dB)
0.166	47.53	35.84	-7.71	-19.40	55.24	0.13	0.17	9.70
0.182	45.88	34.22	-8.03	-19.69	53.91	0.12	0.15	9.70
0.190	46.91	34.34	-7.00	-19.57	53.91	0.12	0.15	9.70
0.262	46.39	36.09	-4.58	-14.88	50.97	0.13	0.13	9.70
0.282	45.37	33.65	-5.11	-16.83	50.47	0.13	0.13	9.70
0.302	41.21	31.51	-8.94	-18.64	50.15	0.13	0.13	9.70

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FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

Title: FCC Class B - White Lead
File: 18 - Pre-Scan - White Lead - Tx Mode - 345.00 MHz - FCC Class B - 08-13-2021.set
Operator: Kyle Fujimoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously transmitting at 345.00 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A

8/13/2021 10:10:49 AM
Sequence: Preliminary Scan

White Lead

Brea Division
114 Olinda Drive
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20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report

Z-Wave Garage Door Controller
Model: GDZW7-ECO

Title: FCC Class B - White Lead
File: 18 - Final Scan - White Lead - Tx Mode - 345.00 MHz - FCC Class B - 08-13-2021.set
Operator: Kyle Fujimoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously transmitting at 345.00 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A

8/13/2021 10:12:04 AM
Sequence: Final Measurements

White Lead

Freq (MHz)	(PEAK) EMI (dBµV)	(AVG) EMI (dBµV)	(PEAK) Margin (AVG) (dB)	(AVG) Margin (AVG) (dB)	(AVG) Limit (dBµV)	Cable (dB)	Transducer (dB)	Filter (dB)
0.162	44.76	31.85	-10.43	-23.34	55.19	0.13	0.17	9.70
0.174	43.27	31.07	-11.40	-23.60	54.67	0.13	0.16	9.70
0.182	40.71	30.23	-12.91	-23.39	53.62	0.12	0.15	9.70
0.190	41.91	30.51	-12.01	-23.41	53.92	0.12	0.15	9.70
0.218	42.73	30.22	-9.61	-22.12	52.33	0.12	0.13	9.70
0.238	43.83	32.10	-7.92	-19.65	51.76	0.12	0.13	9.70
0.286	47.95	36.83	-2.85	-13.97	50.80	0.13	0.12	9.70

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(949) 587-0400

COMPATIBLE ELECTRONICS

Title: FCC Class B - Black Lead
File: 19 - Pre-Scan - Black Lead - Rx Mode - 345.00 MHz - FCC Class B - 08-13-2021.set
Operator: Kyle Fujimoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously receiving at 345.00 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A

8/13/2021 10:16:31 AM
Sequence: Preliminary Scan

Black Lead

Brea Division
114 Olinda Drive
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Newbury Park, CA 91320
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COMPATIBLE ELECTRONICS

Title: FCC Class B - Black Lead
File: 19 - Final Scan - Black Lead - Rx Mode - 345.00 MHz - FCC Class B - 08-13-2021.set
Operator: Kyle Fujmoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously receiving at 345.00 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A

8/13/2021 10:17:27 AM
Sequence: Final Measurements

Black Lead

Freq (MHz)	(PEAK) EMI (dBµV)	(AVG) EMI (dBµV)	(PEAK) Margin (AVG) (dB)	(AVG) Margin (AVG) (dB)	(AVG) Limit (dBµV)	Cable (dB)	Transducer (dB)	Filter (dB)
0.234	45.46	33.77	-6.26	-17.95	51.72	0.12	0.14	9.70
0.246	43.32	33.24	-8.08	-18.16	51.40	0.12	0.13	9.70
0.262	46.64	36.28	-4.19	-14.55	50.83	0.13	0.13	9.70
0.274	44.73	33.60	-5.95	-17.08	50.68	0.13	0.13	9.70
0.282	45.61	33.59	-4.95	-16.97	50.56	0.13	0.13	9.70
0.338	41.78	32.25	-7.40	-16.93	49.18	0.13	0.13	9.70

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FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

COMPATIBLE ELECTRONICS

Title: FCC Class B - White Lead
File: 20 - Pre-Scan - White Lead - Rx Mode - 345.00 MHz - FCC Class B - 08-13-2021.set
Operator: Kyle Fujimoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously receiving at 345.00 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A

8/13/2021 10:26:09 AM
Sequence: Preliminary Scan

White Lead

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

Newbury Park Division
1050 Lawrence Drive
Newbury Park, CA 91320
(805) 480-4044

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400
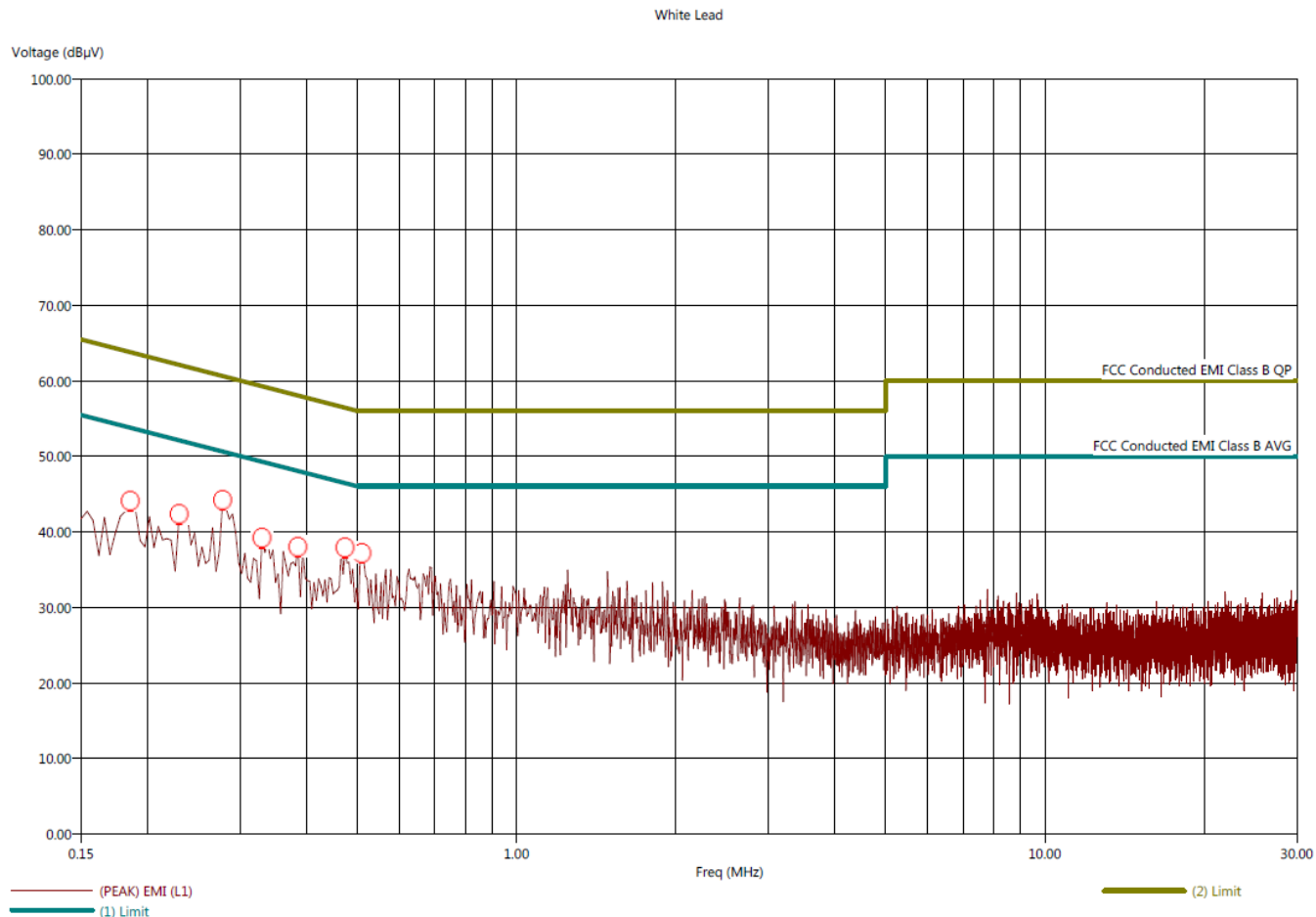
Title: FCC Class B - White Lead
File: 20 - Final Scan - White Lead - Rx Mode - 345.00 MHz - FCC Class B - 08-13-2021.set
Operator: Kyle Fujimoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously receiving at 345.00 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A
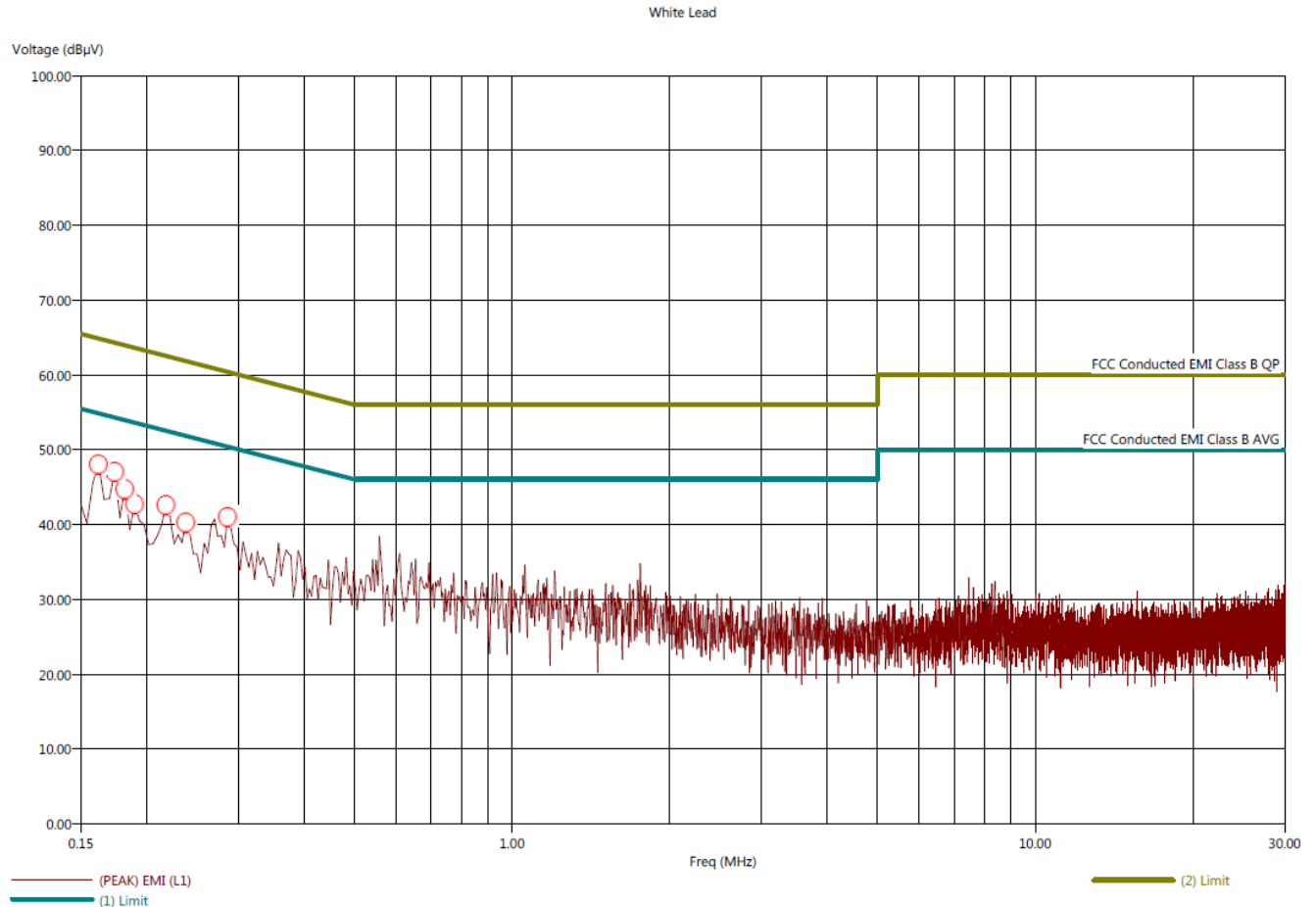
8/13/2021 10:27:26 AM
Sequence: Final Measurements

White Lead

Freq (MHz)	(PEAK) EMI (dBµV)	(AVG) EMI (dBµV)	(PEAK) Margin (AVG) (dB)	(AVG) Margin (AVG) (dB)	(AVG) Limit (dBµV)	Cable (dB)	Transducer (dB)	Filter (dB)
0.186	40.74	30.24	-12.65	-23.15	53.40	0.12	0.14	9.70
0.230	43.60	31.42	-8.32	-20.50	51.91	0.12	0.13	9.70
0.278	49.32	39.36	-1.55	-11.51	50.87	0.13	0.13	9.70
0.330	41.58	30.96	-7.73	-18.35	49.31	0.13	0.12	9.70
0.386	39.93	29.80	-8.22	-18.35	48.15	0.13	0.12	9.70
0.474	38.88	28.62	-7.59	-17.85	46.47	0.14	0.12	9.70
0.510	37.73	27.70	-8.27	-18.30	46.00	0.14	0.12	9.70

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COMPATIBLE ELECTRONICS

RADIATED EMISSIONS

DATA SHEETS

COMPATIBLE ELECTRONICS

FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

Title: Pre-Scan - FCC Class B
File: 10 - Pre-Scan - 345.00 MHz - Tx Mode - Y-Axis - GDZW70-ECO - FCC Class B - 08-06-2021.set
Operator: Kyle Fujimoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously transmitting at 345.00 MHz and 908.42 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A
Y-Axis
Note: The emissions at 345 MHz and 908.42 MHz are from the fundamental of the transmitter and are subject to the limits of FCC 15.231 and FCC 15.249 respectively.
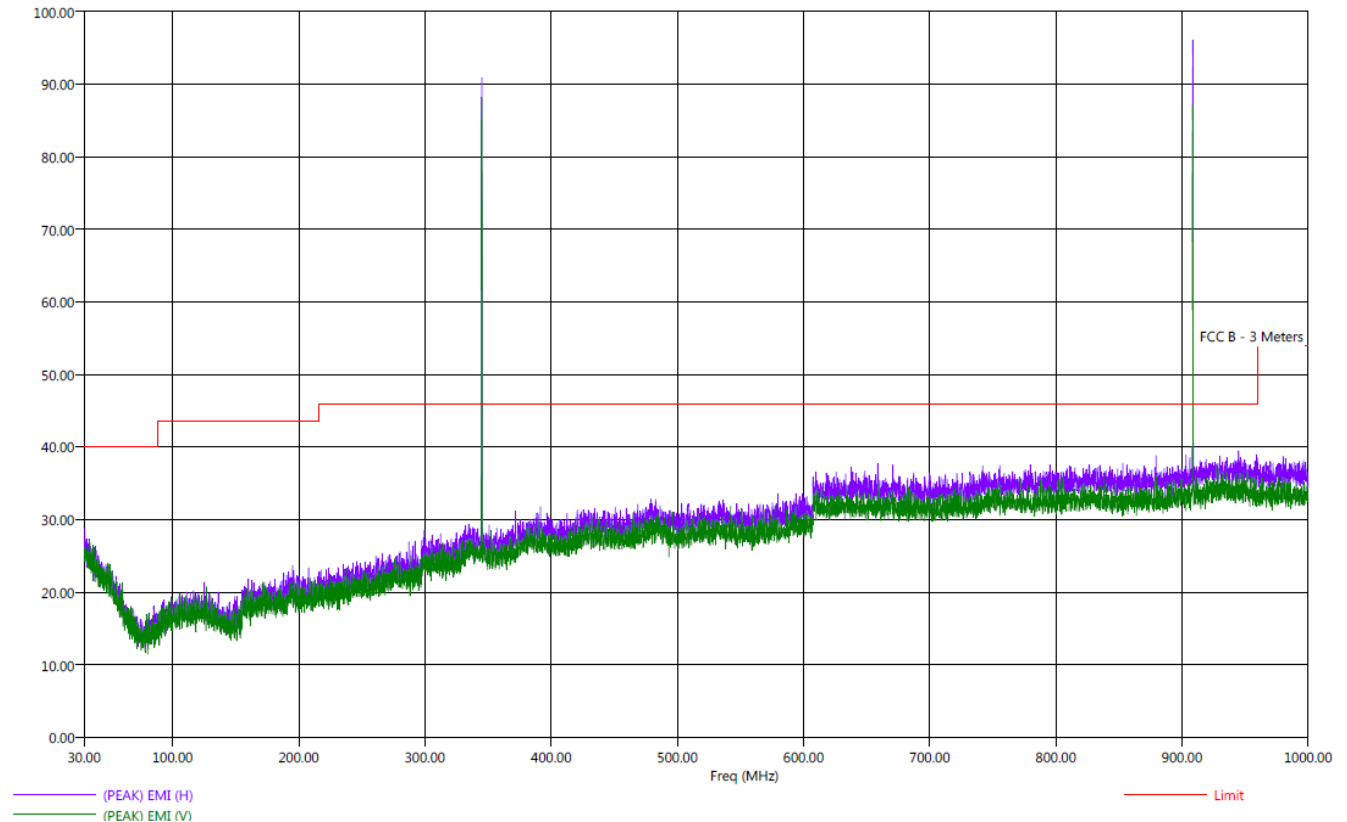
8/9/2021 9:40:32 AM
Sequence: Preliminary Scan

FCC Class B

Electric Field Strength (dBµV/m)

FCC Class B

FCC B - 3 Meters

Freq (MHz)

(PEAK) EMI (H)
(PEAK) EMI (V)
Limit

Title: Radiated Final - FCC Class B
File: 10 - Final Scan - 345.00 MHz - Tx Mode - Y-Axis - GDZW70-ECO - FCC Class B - 08-06-2021.set
Operator: Kyle Fujimoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously transmitting at 345 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A
Y-Axis

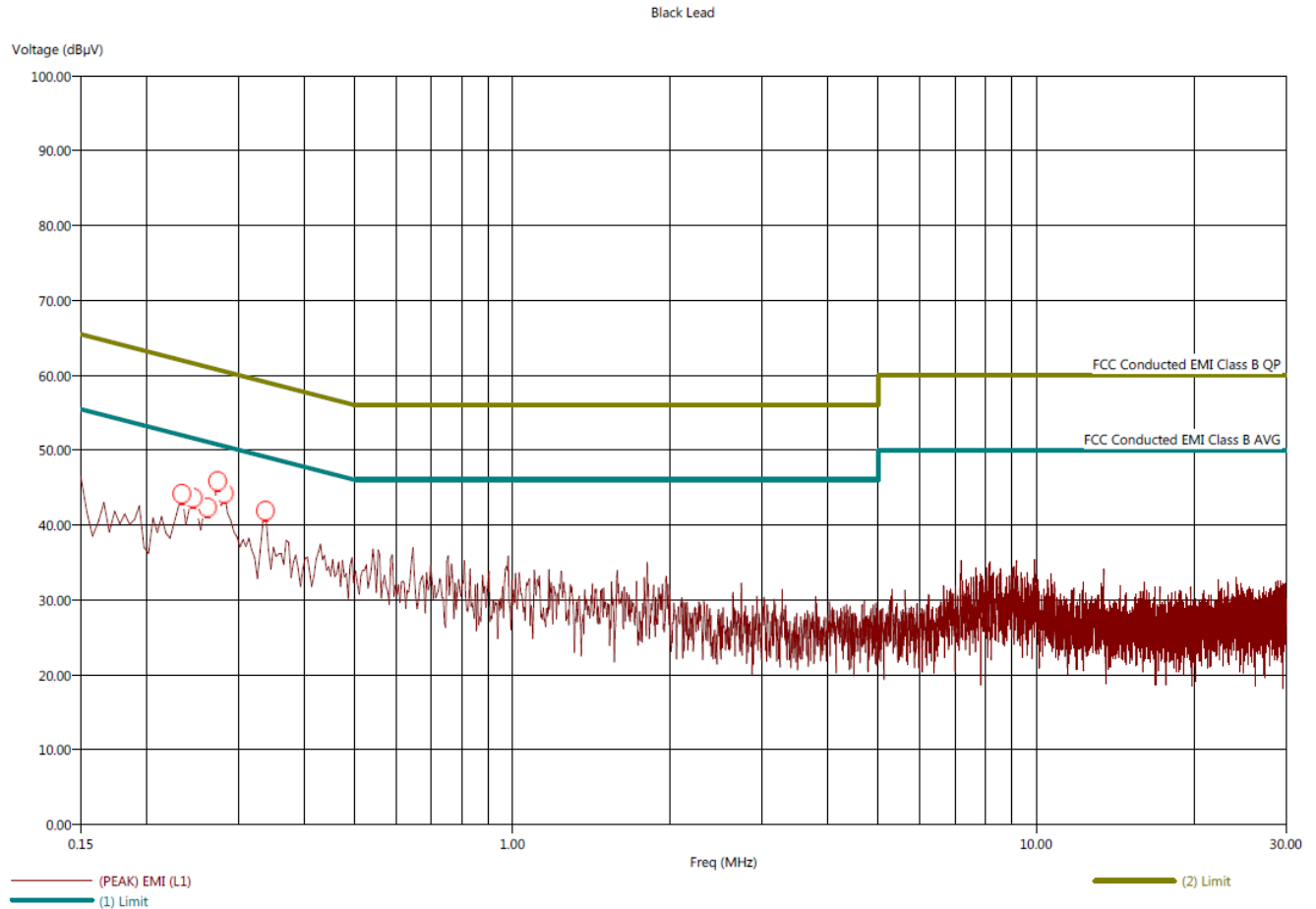8/9/2021 10:10:18 AM
Sequence: Final Measurements

FCC Class B

Freq (MHz)	Pol	(PEAK) EMI (dBµV/m)	(OP) EMI (dBµV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBµV/m)	Transducer (dB)	Cable (dB)	Ttbl Agl (deg)	Twr Ht (cm)
289.00	H	26.52	21.31	-19.48	-24.69	46.00	18.00	1.44	123.25	296.29
333.30	H	29.91	24.80	-16.09	-21.20	46.00	19.89	1.52	157.25	111.46
787.10	H	37.18	32.52	-8.82	-13.48	46.00	25.70	2.48	74.25	367.52
799.90	H	37.60	32.66	-8.40	-13.34	46.00	25.90	2.53	251.75	192.00
851.60	H	37.95	32.60	-8.05	-13.40	46.00	26.10	2.57	103.50	384.53
854.80	H	38.02	32.65	-7.98	-13.35	46.00	26.20	2.57	211.75	335.94

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FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

Title: Pre-Scan - FCC Class B
File: 9 - Pre-Scan - 345.00 MHz - Rx Mode - Y-Axis - KP01 - FCC Class B - 08-06-2021.set
Operator: Kyle Fujimoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously receiving at 345.00 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A
Y-Axis

8/6/2021 8:28:23 AM
Sequence: Preliminary Scan

FCC Class B

Electric Field Strength (dBµV/m)

(PEAK) EMI (H)
(PEAK) EMI (V)
Limit

Report Number: **B10813D3**   **Page E15**

FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

COMPATIBLE ELECTRONICS
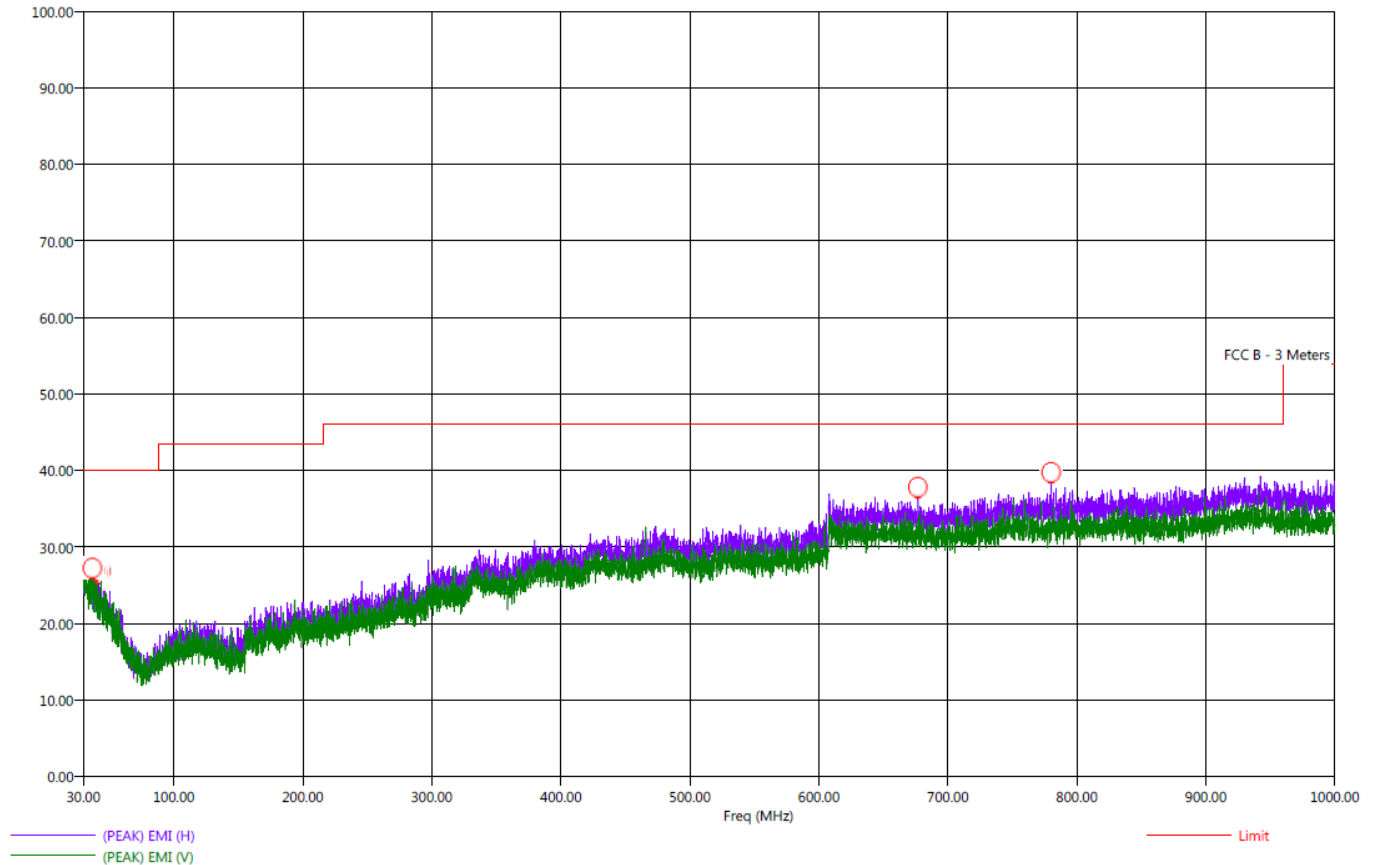
Title: Radiated Final - FCC Class B
File: 9 - Final Scan - 345.00 MHz - Rx Mode - Y-Axis - KP01 - FCC Class B - 08-06-2021.set
Operator: Kyle Fujimoto
EUT Type: Z-Wave Garage Door Controller
EUT Condition: The EUT is continuously receiving at 345 MHz
Comments: Company: Ecolink Intelligent Technology, Inc.
Model: GDZW7-ECO
S/N: N/A
Y-Axis

8/6/2021 8:37:16 AM
Sequence: Final Measurements

FCC Class B

Freq (MHz)	Pol	(PEAK) EMI (dBμV/m)	(QP) EMI (dBμV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBμV/m)	Transducer (dB)	Cable (dB)	Ttbl Agl (deg)	Twr Ht (cm)
37.00	V	27.18	22.44	-12.82	-17.56	40.00	20.82	0.45	231.75	143.22
38.90	H	26.90	21.80	-13.10	-18.20	40.00	20.29	0.46	52.25	320.11
40.70	H	27.39	22.07	-12.61	-17.93	40.00	20.05	0.47	320.25	287.16
43.50	H	26.42	20.84	-13.58	-19.16	40.00	19.49	0.49	256.75	381.73
676.70	H	36.11	31.30	-9.89	-14.70	46.00	24.23	2.17	146.25	367.22
780.10	H	37.81	32.33	-8.19	-13.67	46.00	25.60	2.46	288.25	194.02

FUNDAMENTAL AND HARMONICS

DATA SHEETS

FCC 15.231

Ecolink Intelligent Technology, Inc.   Date: 08/06/2021
Z-Wave Garage Door Controller   Lab: D
Model: GDZW7-ECO   Tested By: Kyle Fujimoto

Fundamental

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
345.00	85.06	V	97.26	-12.21	Peak	351.25	178.98	**X-Axis**
345.00	66.89	V	77.26	-10.38	Avg	351.25	178.98	**Vertical Polarization**
345.00	87.48	V	97.26	-9.78	Peak	60.75	166.32	**Y-Axis**
345.00	69.31	V	77.26	-7.95	Avg	60.75	166.32	**Vertical Polarization**
345.00	88.64	V	97.26	-8.62	Peak	217.00	188.29	**Z-Axis**
345.00	70.47	V	77.26	-6.79	Avg	217.00	188.29	**Vertical Polarization**
345.00	94.38	H	97.26	-2.88	Peak	299.25	100.00	**X-Axis**
345.00	76.21	H	77.26	-1.05	Avg	299.25	100.00	**Horizontal Polarization**
345.00	94.16	H	97.26	-3.10	Peak	359.50	102.02	**Y-Axis**
345.00	75.99	H	77.26	-1.27	Avg	359.50	102.02	**Horizontal Polarization**
345.00	87.32	H	97.26	-9.94	Peak	0.50	106.26	**Z-Axis**
345.00	69.15	H	77.26	-8.11	Avg	0.50	106.26	**Horizontal Polarization**

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COMPATIBLE ELECTRONICS

FCC 15.231

Ecolink Intelligent Technology, Inc.
Z-Wave Garage Door Controller
Model: GDZW7-ECO

Date: 08/06/2021
Lab: D
Tested By: Kyle Fujimoto

Harmonics
Transmit Mode - X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
690.00	41.26	V	77.26	-36.00	Peak	180.25	221.97	
690.00	23.09	V	57.26	-34.17	Avg	180.25	221.97	
1035.00	32.78	V	73.97	-41.19	Peak	275.25	127.10	
1035.00	14.61	V	53.97	-39.36	Avg	275.25	127.10	
1380.00	31.66	V	73.97	-42.31	Peak	197.00	249.99	
1380.00	13.49	V	53.97	-40.48	Avg	197.00	249.99	
1725.00	33.04	V	77.26	-44.22	Peak	236.75	111.04	
1725.00	14.87	V	57.26	-42.39	Avg	236.75	111.04	
2070.00	34.94	V	77.26	-42.32	Peak	141.75	111.28	
2070.00	16.77	V	57.26	-40.49	Avg	141.75	111.28	
2415.00	36.05	V	77.26	-41.21	Peak	144.00	159.04	
2415.00	17.88	V	57.26	-39.38	Avg	144.00	159.04	
2760.00	36.28	V	73.97	-37.69	Peak	345.50	191.04	
2760.00	18.11	V	53.97	-35.86	Avg	345.50	191.04	
3105.00	36.09	V	77.26	-41.17	Peak	36.00	111.22	
3105.00	17.92	V	57.26	-39.34	Avg	36.00	111.22	
3450.00	37.09	V	77.26	-40.17	Peak	179.25	159.10	
3450.00	18.92	V	57.26	-38.34	Avg	179.25	159.10	

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Report Number: **B10813D3**   **Page E19**

FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

COMPATIBLE ELECTRONICS

FCC 15.231

Ecolink Intelligent Technology, Inc.
Z-Wave Garage Door Controller
Model: GDZW7-ECO

Date: 08/06/2021
Lab: D
Tested By: Kyle Fujimoto

Harmonics
Transmit Mode - Y-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
690.00	41.46	V	77.26	-35.80	Peak	196.25	142.86	
690.00	23.29	V	57.26	-33.97	Avg	196.25	142.86	
1035.00	41.87	V	73.97	-32.10	Peak	170.50	158.14	
1035.00	23.70	V	53.97	-30.27	Avg	170.50	158.14	
1380.00	31.66	V	73.97	-42.31	Peak	264.75	174.86	
1380.00	13.49	V	53.97	-40.48	Avg	264.75	174.86	
1725.00	32.08	V	77.26	-45.18	Peak	32.75	127.04	
1725.00	13.91	V	57.26	-43.35	Avg	32.75	127.04	
2070.00	37.85	V	77.26	-39.41	Peak	326.50	142.74	
2070.00	19.68	V	57.26	-37.58	Avg	326.50	142.74	
2415.00	34.98	V	77.26	-42.28	Peak	81.00	159.10	
2415.00	16.81	V	57.26	-40.45	Avg	81.00	159.10	
2760.00	35.78	V	73.97	-38.19	Peak	64.00	159.10	
2760.00	17.61	V	53.97	-36.36	Avg	64.00	159.10	
3105.00	36.36	V	77.26	-40.90	Peak	109.50	190.98	
3105.00	18.19	V	57.26	-39.07	Avg	109.50	190.98	
3450.00	37.33	V	77.26	-39.93	Peak	183.25	206.80	
3450.00	19.16	V	57.26	-38.10	Avg	183.25	206.80	

FCC 15.231

Ecolink Intelligent Technology, Inc.   Date: 08/06/2021

Z-Wave Garage Door Controller   Lab: D

Model: GDZW7-ECO   Tested By: Kyle Fujimoto

Harmonics
Transmit Mode - Z-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
690.00	41.71	V	77.26	-35.55	Peak	25.75	205.79	
690.00	23.54	V	57.26	-33.72	Avg	25.75	205.79	
1035.00	38.72	V	73.97	-35.25	Peak	163.50	111.04	
1035.00	20.55	V	53.97	-33.42	Avg	163.50	111.04	
1380.00	31.60	V	73.97	-42.37	Peak	258.75	100.88	
1380.00	13.43	V	53.97	-40.54	Avg	258.75	100.88	
1725.00	32.95	V	77.26	-44.31	Peak	194.25	143.04	
1725.00	14.78	V	57.26	-42.48	Avg	194.25	143.04	
2070.00	36.75	V	77.26	-40.51	Peak	262.25	111.16	
2070.00	18.58	V	57.26	-38.68	Avg	262.25	111.16	
2415.00	34.63	V	77.26	-42.63	Peak	81.25	238.80	
2415.00	16.46	V	57.26	-40.80	Avg	81.25	238.80	
2760.00	36.27	V	73.97	-37.70	Peak	251.00	159.04	
2760.00	18.10	V	53.97	-35.87	Avg	251.00	159.04	
3105.00	36.50	V	77.26	-40.76	Peak	16.25	249.91	
3105.00	18.33	V	57.26	-38.93	Avg	16.25	249.91	
3450.00	41.76	V	77.26	-35.50	Peak	251.25	110.86	
3450.00	23.59	V	57.26	-33.67	Avg	251.25	110.86	

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(714) 579-0500   **(805) 480-4044**   **(949) 587-0400**

COMPATIBLE ELECTRONICS

FCC 15.231

Ecolink Intelligent Technology, Inc.
Z-Wave Garage Door Controller
Model: GDZW7-ECO

Date: 08/06/2021
Lab: D
Tested By: Kyle Fujimoto

Harmonics
Transmit Mode - X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
690.00	40.58	H	77.26	-36.68	Peak	267.50	144.29	
690.00	22.41	H	57.26	-34.85	Avg	267.50	144.29	
1035.00	37.75	H	73.97	-36.22	Peak	285.00	159.10	
1035.00	19.58	H	53.97	-34.39	Avg	285.00	159.10	
1380.00	31.98	H	73.97	-41.99	Peak	196.25	249.91	
1380.00	13.81	H	53.97	-40.16	Avg	196.25	249.91	
1725.00	34.63	H	77.26	-42.63	Peak	179.75	175.04	
1725.00	16.46	H	57.26	-40.80	Avg	179.75	175.04	
2070.00	38.01	H	77.26	-39.25	Peak	173.00	111.28	
2070.00	19.84	H	57.26	-37.42	Avg	173.00	111.28	
2415.00	35.62	H	77.26	-41.64	Peak	53.75	207.22	
2415.00	17.45	H	57.26	-39.81	Avg	53.75	207.22	
2760.00	35.62	H	73.97	-38.35	Peak	324.25	143.28	
2760.00	17.45	H	53.97	-36.52	Avg	324.25	143.28	
3105.00	35.90	H	77.26	-41.36	Peak	257.75	249.98	
3105.00	17.73	H	57.26	-39.53	Avg	257.75	249.98	
3450.00	39.80	H	77.26	-37.46	Peak	176.50	206.38	
3450.00	21.63	H	57.26	-35.63	Avg	176.50	206.38	

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FCC 15.231

Ecolink Intelligent Technology, Inc.
Z-Wave Garage Door Controller
Model: GDZW7-ECO

Date: 08/06/2021
Lab: D
Tested By: Kyle Fujimoto

Harmonics
Transmit Mode - Y-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
690.00	40.67	H	77.26	-36.59	Peak	116.00	217.97	
690.00	22.50	H	57.26	-34.76	Avg	116.00	217.97	
1035.00	37.66	H	73.97	-36.31	Peak	54.25	127.04	
1035.00	19.49	H	53.97	-34.48	Avg	54.25	127.04	
1380.00	31.44	H	73.97	-42.53	Peak	235.75	238.86	
1380.00	13.27	H	53.97	-40.70	Avg	235.75	238.86	
1725.00	32.69	H	77.26	-44.57	Peak	26.50	206.80	
1725.00	14.52	H	57.26	-42.74	Avg	26.50	206.80	
2070.00	36.26	H	77.26	-41.00	Peak	66.75	126.98	
2070.00	18.09	H	57.26	-39.17	Avg	66.75	126.98	
2415.00	34.60	H	77.26	-42.66	Peak	87.00	238.68	
2415.00	16.43	H	57.26	-40.83	Avg	87.00	238.68	
2760.00	35.53	H	73.97	-38.44	Peak	206.75	206.80	
2760.00	17.36	H	53.97	-36.61	Avg	206.75	206.80	
3105.00	36.12	H	77.26	-41.14	Peak	152.75	174.80	
3105.00	17.95	H	57.26	-39.31	Avg	152.75	174.80	
3450.00	39.76	H	77.26	-37.50	Peak	61.25	126.92	
3450.00	21.59	H	57.26	-35.67	Avg	61.25	126.92	

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FCC 15.231

Ecolink Intelligent Technology, Inc.
Z-Wave Garage Door Controller
Model: GDZW7-ECO

Date: 08/06/2021
Lab: D
Tested By: Kyle Fujimoto

Harmonics
Transmit Mode - Z-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
690.00	42.91	H	77.26	-34.35	Peak	207.25	237.79	
690.00	24.74	H	57.26	-32.52	Avg	207.25	237.79	
1035.00	38.81	H	73.97	-35.16	Peak	75.00	127.28	
1035.00	20.64	H	53.97	-33.33	Avg	75.00	127.28	
1380.00	32.37	H	73.97	-41.60	Peak	124.00	206.86	
1380.00	14.20	H	53.97	-39.77	Avg	124.00	206.86	
1725.00	33.64	H	77.26	-43.62	Peak	328.50	111.04	
1725.00	15.47	H	57.26	-41.79	Avg	328.50	111.04	
2070.00	37.67	H	77.26	-39.59	Peak	217.75	104.00	
2070.00	19.50	H	57.26	-37.76	Avg	217.75	104.00	
2415.00	36.75	H	77.26	-40.51	Peak	212.50	143.16	
2415.00	18.58	H	57.26	-38.68	Avg	212.50	143.16	
2760.00	35.54	H	73.97	-38.43	Peak	159.50	223.40	
2760.00	17.37	H	53.97	-36.60	Avg	159.50	223.40	
3105.00	35.72	H	77.26	-41.54	Peak	298.50	126.98	
3105.00	17.55	H	57.26	-39.71	Avg	298.50	126.98	
3450.00	38.14	H	77.26	-39.12	Peak	147.50	158.86	
3450.00	19.97	H	57.26	-37.29	Avg	147.50	158.86	

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

**COMPATIBLE
ELECTRONICS**

FCC 15.231

Ecolink Intelligent Technology, Inc.   Date: 08/06/2021
Z-Wave Garage Door Controller   Lab: D
Model: GDZW7-ECO   Tested By: Kyle Fujimoto

Non Harmonic Emissions from the Tx and Digital Portion - 9 kHz to 30 MHz
Non Harmonic Emissions from the Tx and Digital Portion - 1 GHz To 3.45 GHz

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
								No Emissions Detected
								from 9 kHz to 30 MHz
								for the digital portion
								of the EUT
								No Emissions Detected
								from 1 GHz to 3.45 GHz
								for the digital portion
								of the EUT
								No Emissions Detected
								from 9 kHz to 30 MHz
								for the Non-Harmonic Emissions
								of the Transmitter for the EUT
								No Emissions Detected
								from 1 GHz to 3.45 GHz
								for the Non-Harmonic Emissions
								of the Transmitter for the EUT
								Investigated in the X-Axis,
								Y-Axis, and Z-Axis

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FCC Class B

Ecolink Intelligent Technology, Inc.

Z-Wave Garage Door Controller

Model: GDZW7-ECO

Date: 08/06/2021

Lab: D

Tested By: Kyle Fujimoto

Receive Mode - 1 GHz to 3.45 GHz

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
								No Emissions Detected
								from 1 GHz to 3.45 GHz
								for the Receive Mode of the
								345 MHz transmitter
								of the EUT
								Investigated in the X-Axis,
								Y-Axis, and Z-Axis

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COMPATIBLE ELECTRONICS

-20 dB BANDWIDTH PLOT

DATA SHEET

COMPATIBLE ELECTRONICS

-20 dB Bandwidth Plot

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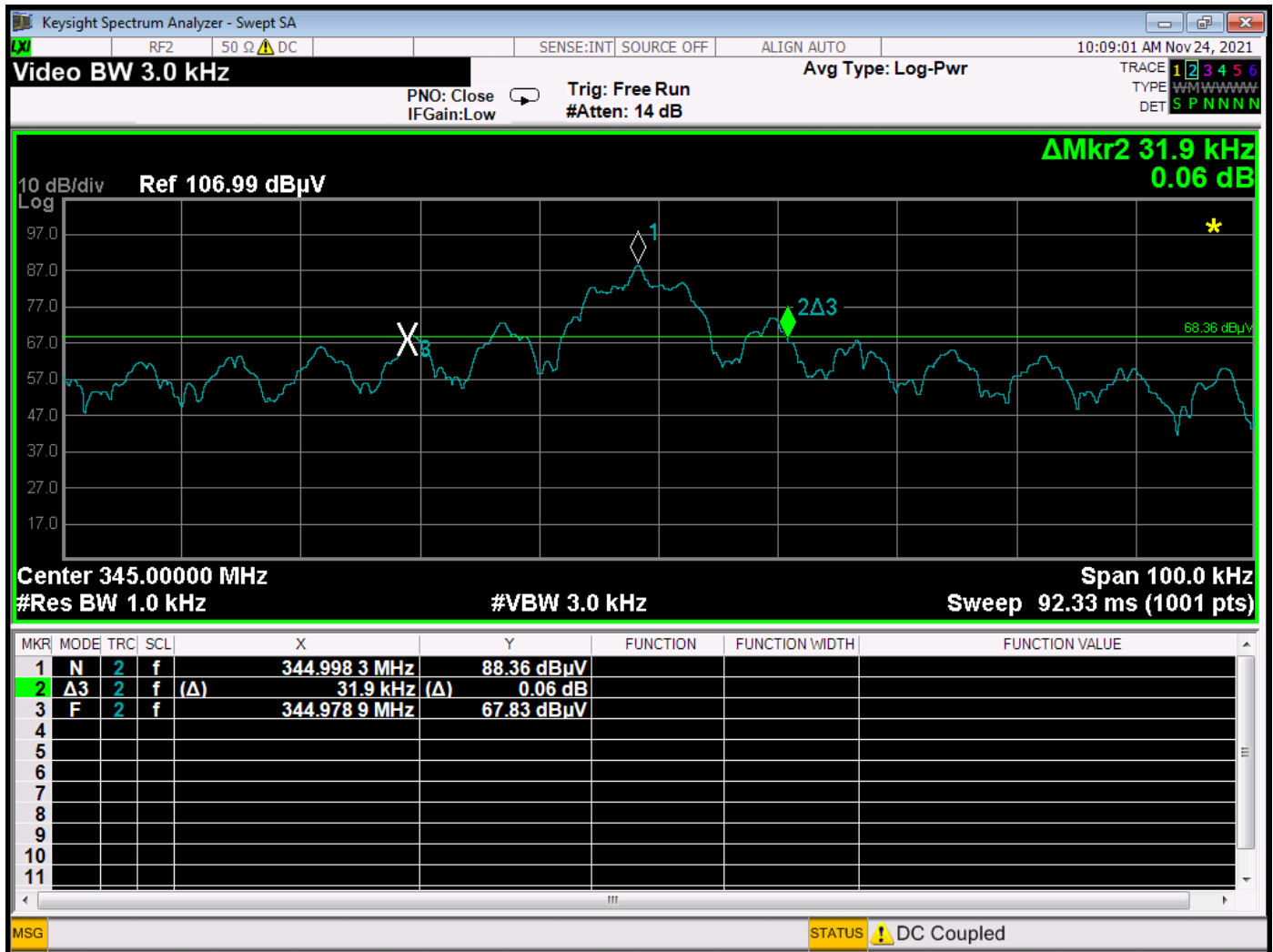
TRANSMISSION TIME

DATA SHEET

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COMPATIBLE ELECTRONICS
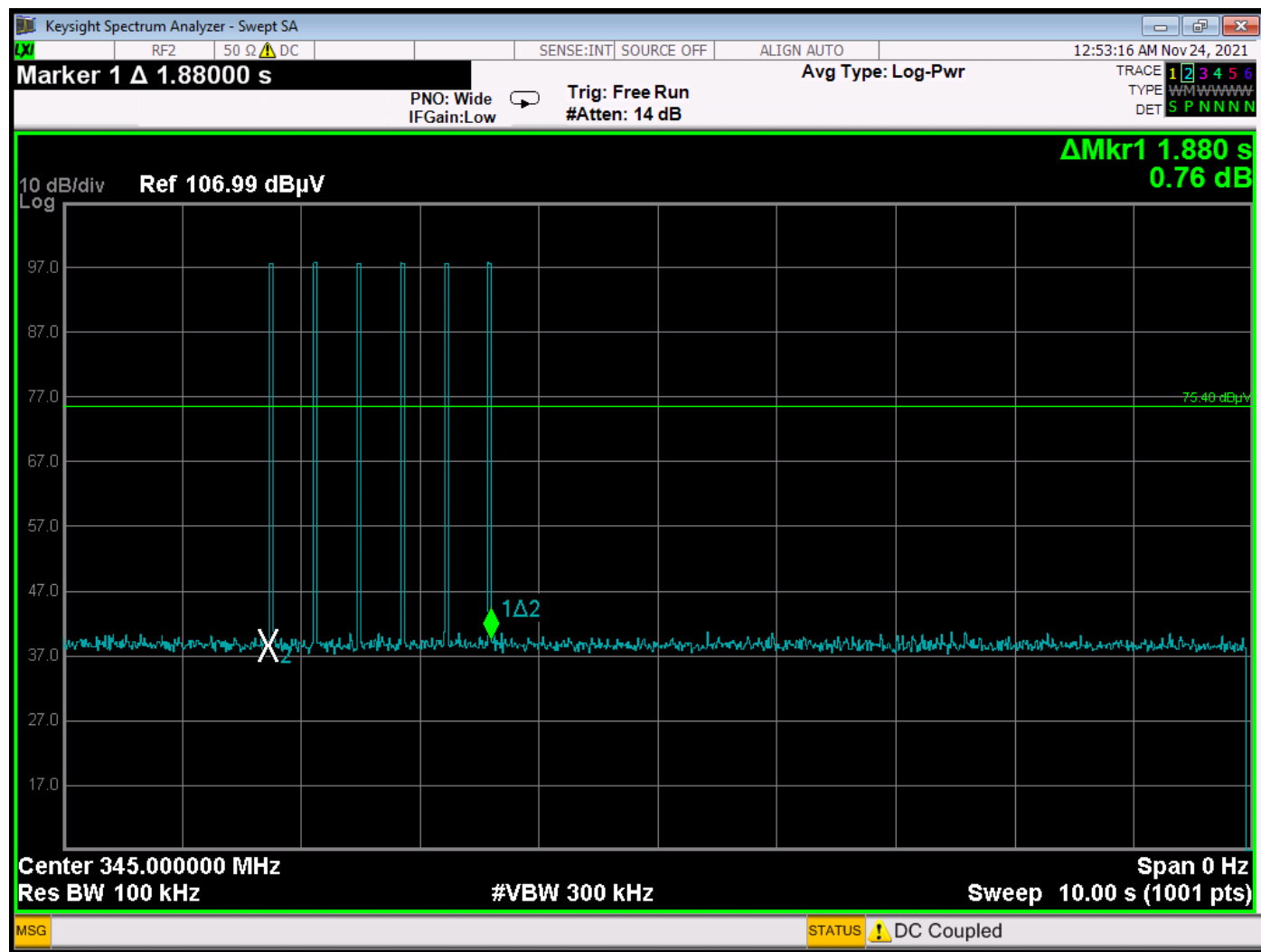
The total on time of the transmission is 1.880 seconds.

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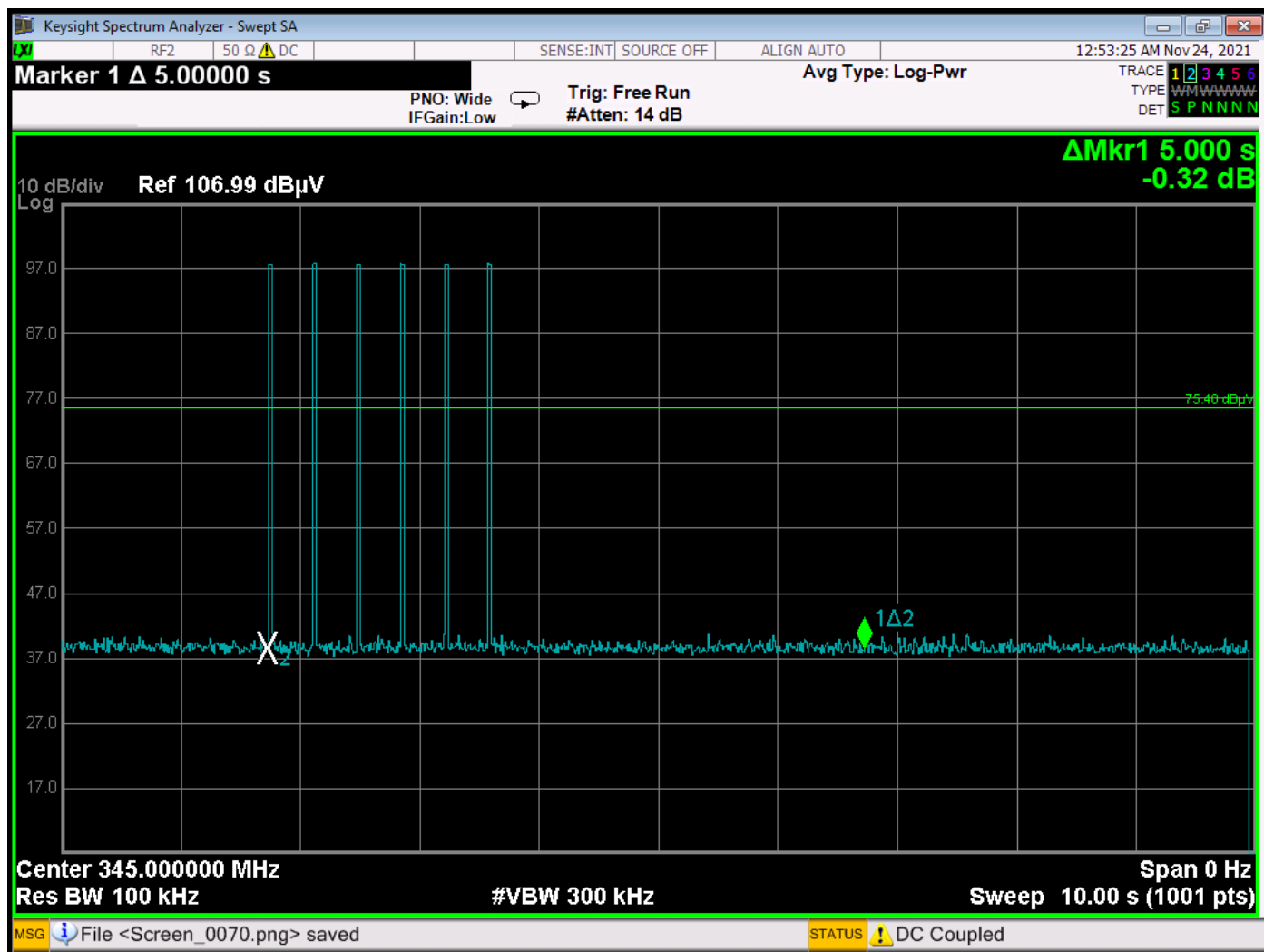
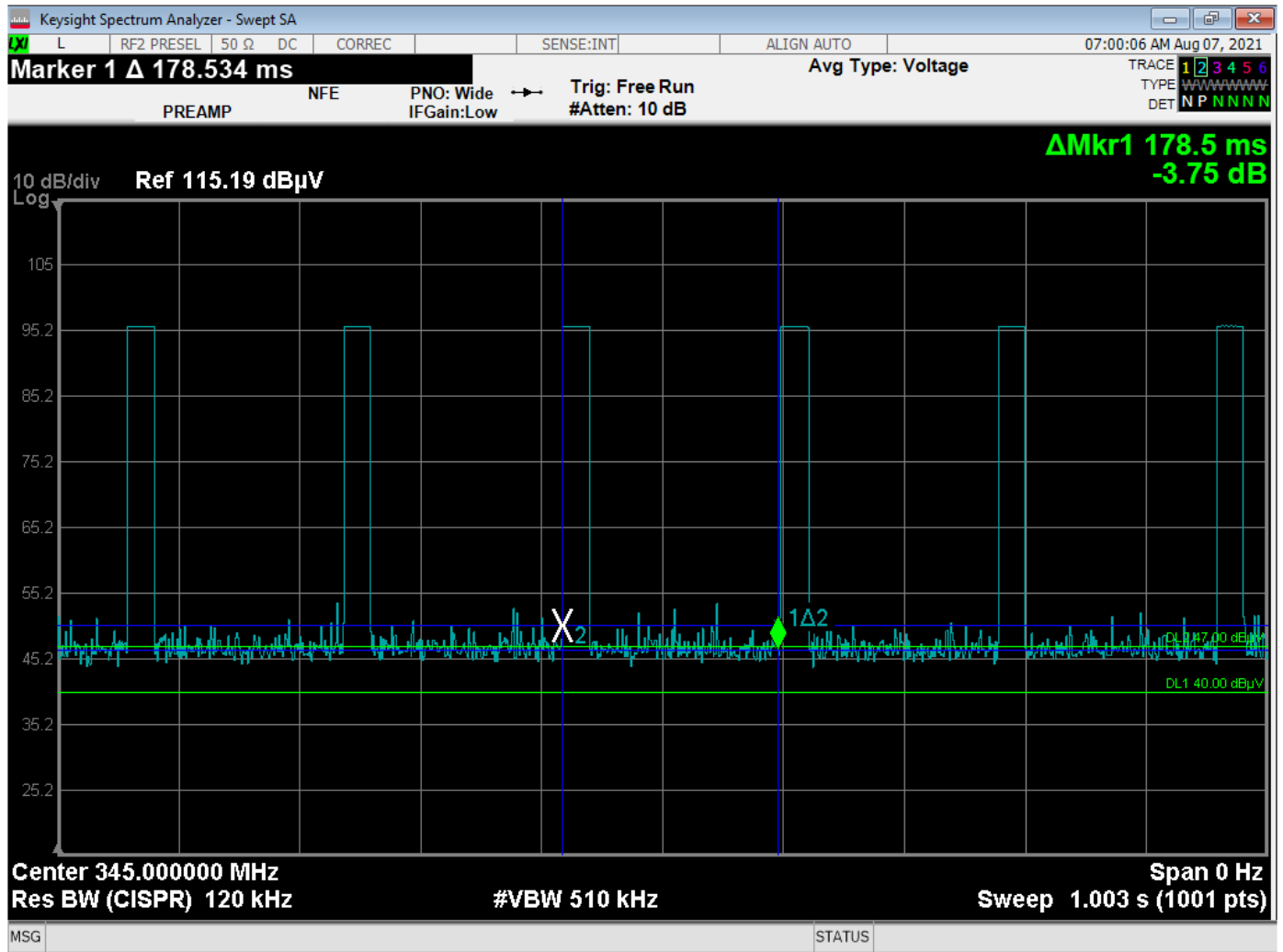Plot showing the transmission time is less than 5 seconds

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FCC Part 15 Subpart B and C; FCC Section 15.231; and RSS-210 and RSS-GEN Test Report
Z-Wave Garage Door Controller
Model: GDZW7-ECO

99% BANDWIDTH

DATA SHEET

COMPATIBLE ELECTRONICS
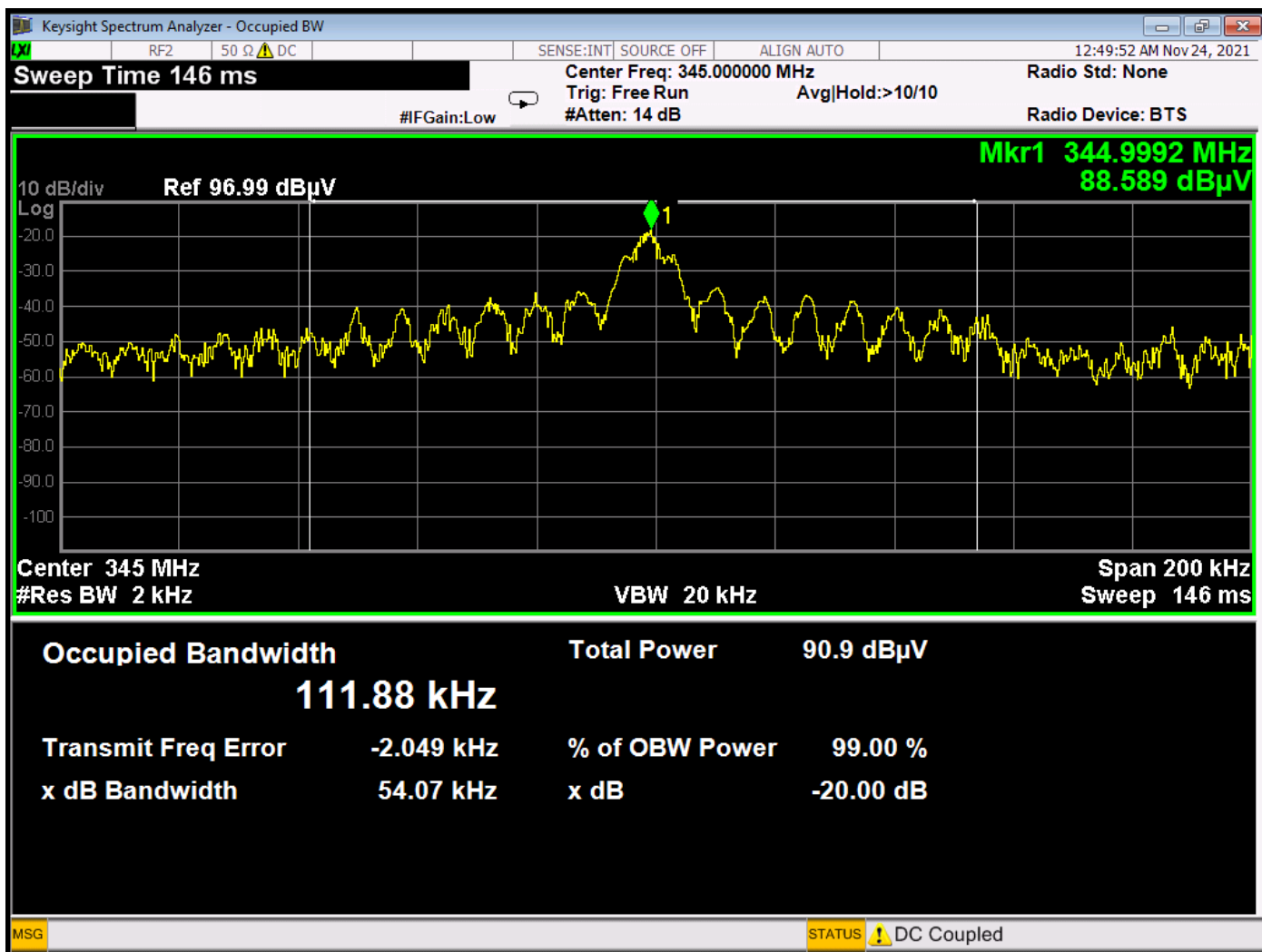
99% Bandwidth Plot

DUTY CYCLE

DATA SHEETS

COMPATIBLE ELECTRONICS

The pulse train only appears once every 100 ms

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COMPATIBLE ELECTRONICS
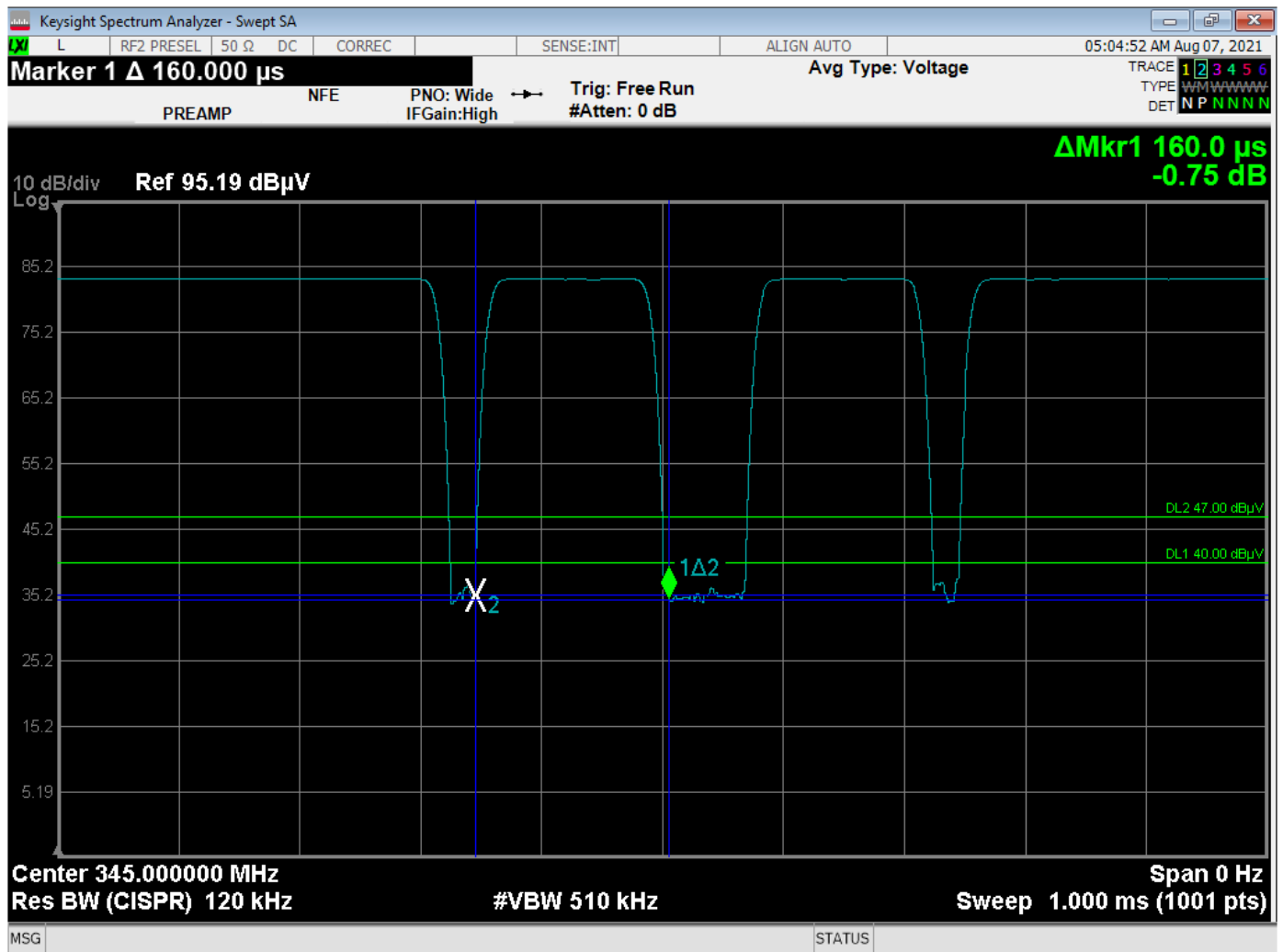
Time of Small Pulse = 160 us

COMPATIBLE ELECTRONICS
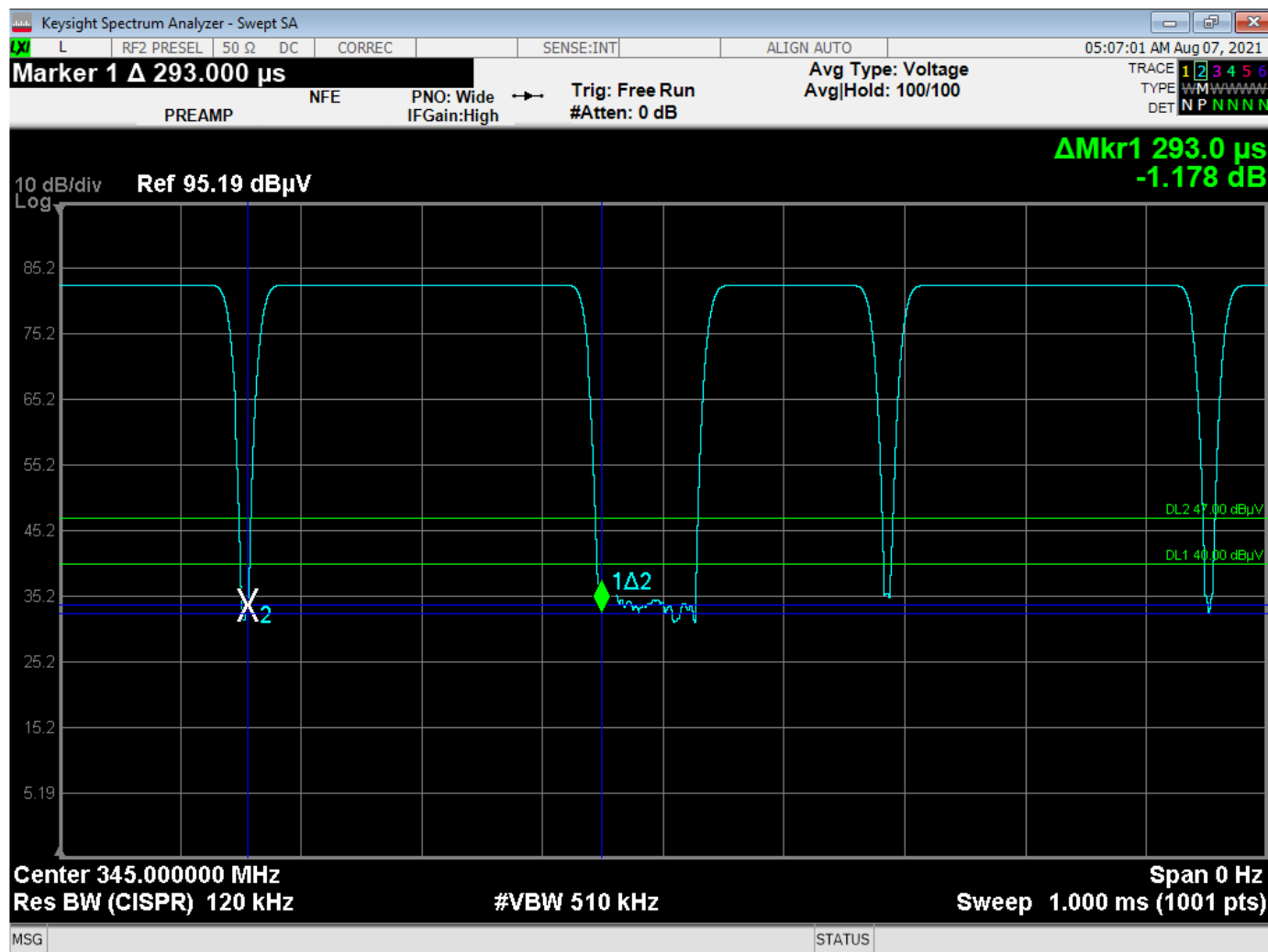
Time of Large Pulse = 293 us

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COMPATIBLE ELECTRONICS
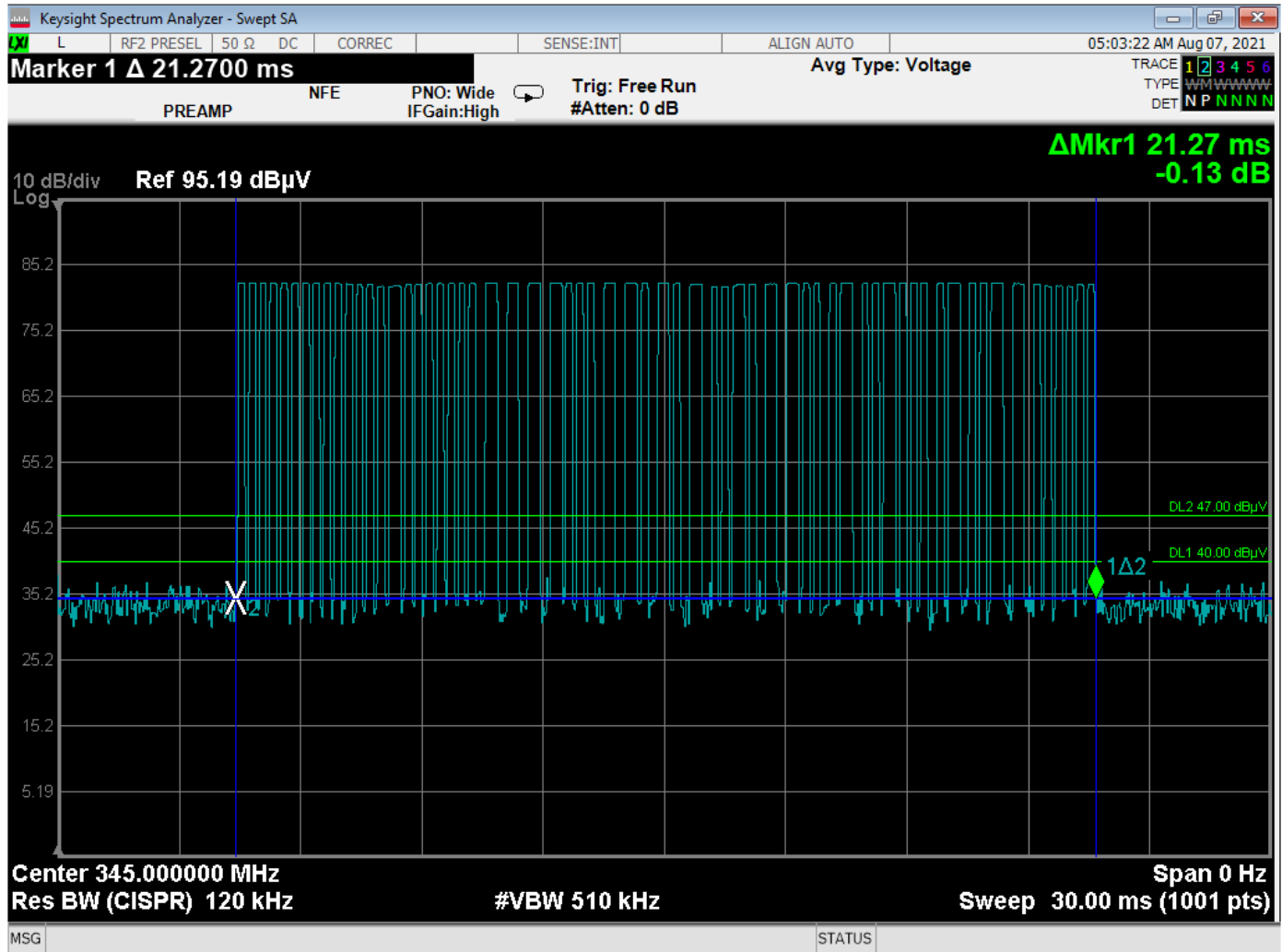
Number of Small Pulses = 46 = (46*160 us) = 7360 us
Number of Large Pulses = 17 = (17*293 us) = 4981 us

Total On Time = 12341 us = 12.341 ms

Duty Cycle = 12.341 ms / 100 ms = 12.341%

The peak to average ratio is -18.17 dB