

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

for

WEARABLE ACTION BUTTON

Model (HVIN): WST-132

Prepared for

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

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DATE: FEBRUARY 3, 2024

	REPORT BODY	APPENDICES					TOTAL
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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: Wearable Action Button
Model (HVIN): WST-132
S/N: 1

Product Description: The equipment under test is a battery powered (a single CR2032 Lithium battery) wireless transmitter for home automation/security application.
The transmit frequency is 345 MHz.
The crystal oscillators are 4 MHz and 10.78125 MHz.
Dimensions: 3.2 cm (W) x 1.5 cm (L) x 5.5 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: January 29 and 30, 2024

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, 15.209, and 15.231;
RSS-210 and RSS-Gen



Test Procedures: ANSI C63.4 and ANSI C63.10

Test Deviations: The test procedure was not deviated from during the testing.

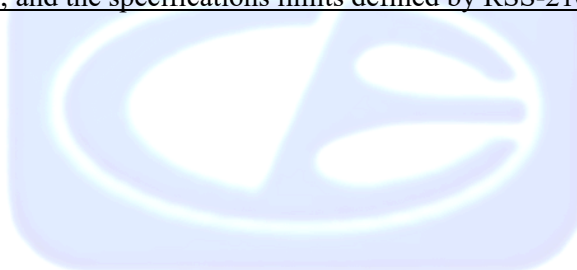
SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz	This test was not performed because the EUT operates on battery power only and cannot be plugged into the AC public mains.
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. See section 6.3 for Measurement Uncertainty.
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

1. PURPOSE

This document is a qualification test report based on the emissions tests performed on the Wearable Action Button, Model (HVIN): WST-132. 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, 15.209 and 15.231; and the specifications limits defined by RSS-210 and RSS-Gen.



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 J. Shepard	Product Compliance/QA Specialist
Jay Stone	Director of Engineering

Compatible Electronics Inc.

Kyle Fujimoto	Senior Test Engineer
James Ross	Senior Test Engineer

2.4 Date Test Sample was Received

The test sample was received prior to the initial test date in 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
RSS	Radio Standards Specification
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 C63.4a: 2017	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 Amendment 1: Test Site Validation
ANSI C63.10: 2013	American National Standard of procedure for compliance testing of unlicensed wireless devices

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration – Emissions

The Wearable Action Button, Model: WST-132 (EUT) tested as a standalone device and placed in the center of the test table.

The EUT was transmitting 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 mounted horizontally. 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 EUT had a fresh battery installed prior to the testing.

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

The firmware was set to the maximum power setting.

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

The EUT contained no external cables.

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

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	ID
WEARABLE ACTION BUTTON (EUT)	ECOLINK INTELLIGENT TECHNOLOGY, INC.	WST-132	1	FCC: XQC-WST132 IC: 9863B-WST132
FIRMWARE	ECOLINK INTELLIGENT TECHNOLOGY, INC.	Version: 1.0	N/A	N/A

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
RF RADIATED AND AC CONDUCTED EMISSIONS TEST EQUIPMENT					
TDK TestLab	TDK RF Solutions, Inc.	9.22	700145	N/A	N/A
EMI Receiver, 3 Hz – 44 GHz	Keysight Technologies, Inc.	N9038A	MY59050117	July 14, 2023	July 14, 2024
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
Loop Antenna	Com-Power	AL-130R	121090	February 10, 2022	February 10, 2025
CombiLog Antenna	Com-Power	AC-220	10030004	November 22, 2023	November 22, 2025
Horn Antenna	Com-Power	AH-118	10050192	November 30, 2023	November 30, 2025
Preamplifier	Com-Power	PA-118	181653	March 7, 2022	March 7, 2024
Computer	Hewlett Packard	p6716f	MXX1030PX0	N/A	N/A
LCD Monitor	Hewlett Packard	52031a	3CQ046N3MG	N/A	N/A

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	2.72 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30 MHz – 1 000 MHz)	6.3 dB	3.32 dB (Vertical) 3.30 dB (Horizontal)
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(1 GHz - 6 GHz)	5.2 dB	3.98 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(6 GHz – 18 GHz)	5.5 dB	3.98 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(18 GHz – 26.5 GHz)	N/A	4.43 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(26.5 GHz – 40 GHz)	N/A	4.57 dB

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.

Test Results:

This test was not performed because the EUT operates on battery power only and cannot be plugged into the AC public mains.

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 fundamental and harmonic frequencies were averaged using the duty cycle correction calculation, see section 7.1.5 of this report.

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 1.

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.

7.1.3 RF Emissions Test Results

Table 1 RADIATED EMISSION RESULTS
Wearable Action Button, Model: WST-132

Frequency (MHz)	Corrected Reading* (dBμV/m)	Specification Limit (dBμV/m)	Delta (Cor. Reading – Spec. Limit) (dB)
345.00 (H) (X-Axis)	67.64 (AV)	77.26 (AV)	-9.62
345.00 (V) (Y-Axis)	65.81 (AV)	77.26 (AV)	-11.45
345.00 (V) (Z-Axis)	65.66 (AV)	77.26 (AV)	-11.60
910.00 (H) (Y-Axis)	33.69 (QP)	46.00 (QP)	-12.31
930.40 (H) (Y-Axis)	29.86 (QP)	46.00 (QP)	-16.14
345.00 (H) (Z-Axis)	61.07 (AV)	77.26 (AV)	-16.19

Notes:

- * The complete emissions data is given in Appendix E of this report.
- (V) Vertical
- (H) Horizontal
- (AV) Average
- (QP) Quasi-Peak

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 ($\mu\text{V/m}$) $\log \times 20$ = 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) $\log \times 40$ = distance factor

For measurements above 30 MHz: (Specification distance / test distance) $\log \times 20$ = 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

where: F = antenna factor
A = amplifier gain
C = cable loss

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

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

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

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

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:

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

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:

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

or, if the magnetic antenna factor is used:

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

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

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

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

n is the number of pulses of duration t_1

m is the number of pulses of duration t_2

ξ is the number of pulses of duration t_x

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 = -20.00 dB

Time of One Small Pulse = 160 μs

Time of One Large Pulse = 300 μs

Number of Small Pulses = 38

Number of Large Pulses = 13

Total On Time = 9980 μs = 9.980 ms

The time between pulses is greater than 100.00 ms

Duty Cycle = 9.980 ms / 100.00 ms = 9.98 %

The maximum peak to average ratio of -20.00 dB can be utilized.

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 from 1% to 5% of the Occupied Bandwidth
2. Set the span to two to five times the Occupied Bandwidth
3. Set VBW to greater than 3 times the RBW.
4. Set the peak detector to max hold.
5. Set the sweep time to auto
6. Allow the trace to stabilize
7. 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 and release, 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 to the end of the transmission
9. Verify the transmission does not go beyond 5 seconds

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:

This test was not performed because the EUT is battery power only.



8. CONCLUSIONS

The Wearable Action Button, Model (HVIN): WST-132 (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, 15.209 and 15.231.





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 the Management Systems Requirements of ISO/IEC 17025, General Requirements for the competence of testing and calibration laboratories:

"A laboratory's fulfilment of the requirements of ISO/IEC 17025 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 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001"

Innovation, Science and Economic Development Canada
Lab Code 2154A



APPENDIX B

MODIFICATIONS TO THE EUT



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.





APPENDIX C

MODELS COVERED UNDER THIS REPORT

MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Wearable Action Button
Model (HVIN): WST-132
S/N: 1

ADDITIONAL MODELS COVERED:

The following model is considered by the manufacturer to be similar to the sample tested, however the test results contained in this report relate only to the sample tested.

Wearable Action Button
Model (HVIN): RE203P

Differences between the two Model Numbers (HVIN) WST-132 and the RE203P:

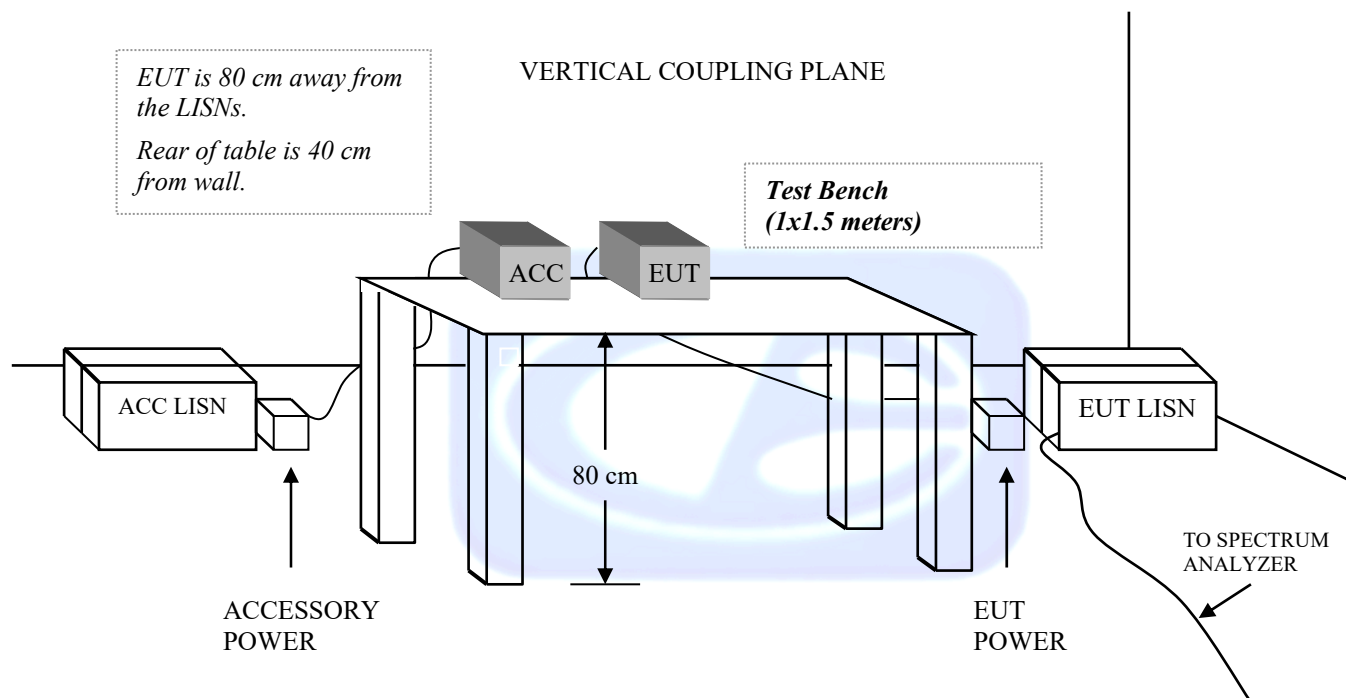
Model (HVIN):	Features
WST-132	Identical to the RE203P in power output, hardware, and firmware. Model option is for marketing purposes only.
RE203P	Identical to the WST-132 in power output, hardware, and firmware. Model option is for marketing purposes only.



APPENDIX D

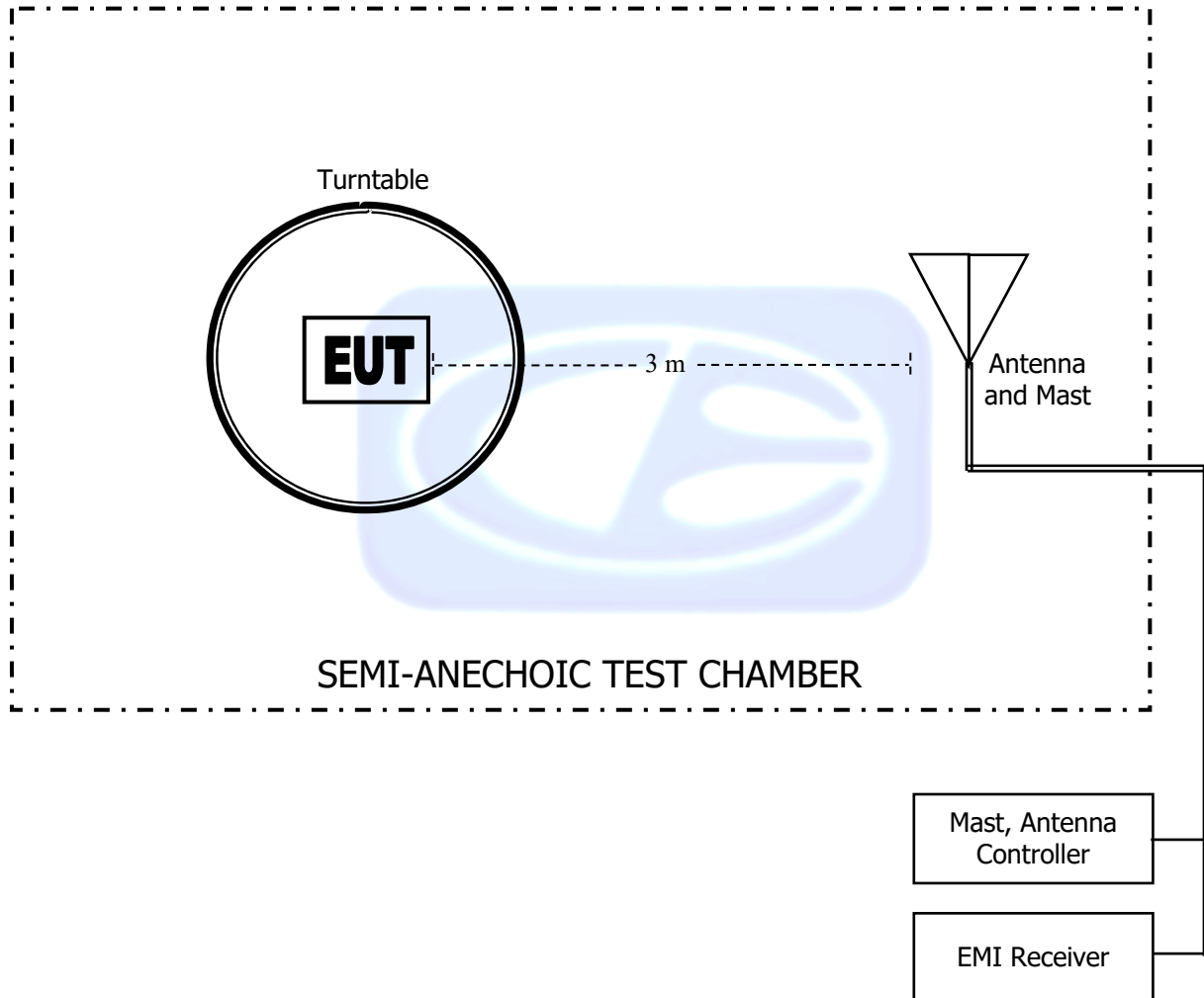
DIAGRAMS, CHARTS, AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP





***FIGURE 2: LAYOUT OF THE SEMI-ANECHOIC
TEST CHAMBER***





COM-POWER AL-130R

LOOP ANTENNA

S/N: 121090

CALIBRATION DATE: FEBRUARY 10, 2022

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	15.6	-35.8
0.01	15.8	-35.6
0.02	14.8	-36.6
0.03	15.6	-35.9
0.04	15.0	-36.5
0.05	14.4	-37.1
0.06	14.6	-36.9
0.07	14.3	-37.2
0.08	14.3	-37.2
0.09	14.4	-37.0
0.10	14.1	-37.4
0.20	14.1	-37.4
0.30	14.0	-37.5
0.40	13.9	-37.6
0.50	14.1	-37.3
0.60	14.1	-37.3
0.70	14.2	-37.3
0.80	14.2	-37.3
0.90	14.2	-37.2
1.00	14.4	-37.0
2.00	14.6	-36.9
3.00	14.6	-36.8
4.00	14.9	-36.6
5.00	14.9	-36.7
6.00	14.8	-36.7
7.00	14.6	-36.8
8.00	14.5	-37.0
9.00	14.3	-37.2
10.00	14.5	-37.0
11.00	14.6	-36.9
12.00	14.7	-36.7
13.00	14.9	-36.6
14.00	15.0	-36.5
15.00	14.9	-36.6
16.00	14.9	-36.6
17.00	14.6	-36.8
18.00	14.4	-37.1
19.00	14.5	-37.0
20.00	14.5	-37.0
21.00	14.2	-37.3
22.00	13.9	-37.5
23.00	13.9	-37.5
24.00	13.8	-37.7
25.00	13.4	-38.0
26.00	13.2	-38.2
27.00	13.2	-38.3
28.00	12.7	-38.7
29.00	12.7	-38.8
30.00	12.4	-39.0

COM-POWER AC-220

COMBILOG ANTENNA

S/N: 10030004

CALIBRATION DATE: NOVEMBER 22, 2023

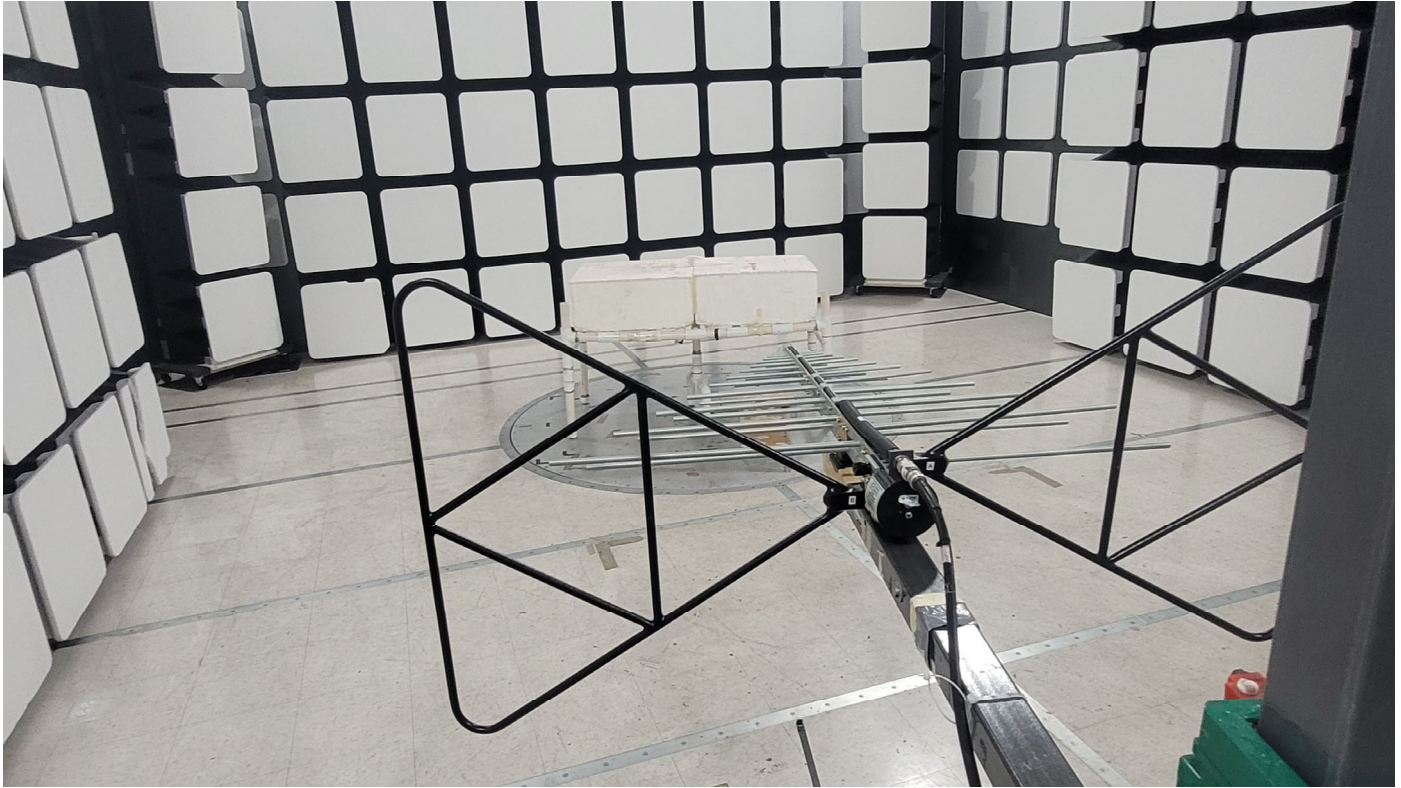
FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	23.10	200	16.10
35	22.00	250	17.90
40	41.30	300	19.10
45	20.50	350	20.30
50	19.30	400	21.60
60	15.40	450	22.20
70	12.40	500	23.20
80	12.40	550	23.70
90	14.10	600	25.10
100	15.50	650	25.30
120	15.90	700	25.10
125	15.90	750	26.70
140	14.80	800	26.60
150	14.60	850	27.20
160	14.80	900	28.00
175	15.90	950	29.10
180	15.50	1000	28.90

COM POWER AH-118**HORN ANTENNA****S/N: 10050192****CALIBRATION DATE: NOVEMBER 30, 2023**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	24.01	10.0	38.78
1.5	25.25	10.5	39.29
2.0	27.21	11.0	39.30
2.5	27.42	11.5	39.87
3.0	28.89	12.0	39.77
3.5	30.58	12.5	40.21
4.0	31.78	13.0	40.01
4.5	32.48	13.5	40.06
5.0	33.13	14.0	40.63
5.5	34.27	14.5	41.41
6.0	34.92	15.0	41.53
6.5	35.58	15.5	40.59
7.0	36.83	16.0	41.63
7.5	37.02	16.5	40.93
8.0	36.93	17.0	41.27
8.5	37.67	17.5	41.69
9.0	37.53	18.0	44.00
9.5	38.76		

COM-POWER PAM-118**PREAMPLIFIER****S/N: 181653****CALIBRATION DATE: MARCH 7, 2022**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	40.02	6.0	38.84
1.1	39.72	6.5	39.20
1.2	39.93	7.0	39.46
1.3	39.98	7.5	39.67
1.4	39.99	8.0	39.28
1.5	40.20	8.5	38.63
1.6	40.05	9.0	38.96
1.7	40.15	9.5	39.33
1.8	40.20	10.0	39.58
1.9	40.33	11.0	38.25
2.0	40.33	12.0	40.03
2.5	40.60	13.0	40.55
3.0	40.76	14.0	40.36
3.5	40.87	15.0	39.34
4.0	40.39	16.0	37.34
4.5	39.55	17.0	42.14
5.0	40.34	18.0	42.54
5.5	39.45		



FRONT VIEW

ECOLINK INTELLIGENT TECHNOLOGY, INC.

WEARABLE ACTION BUTTON

MODEL: WST-132

FCC SUBPART B AND C; RSS-210 AND RSS-GEN – RADIATED EMISSIONS – BELOW 1 GHz

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



REAR VIEW

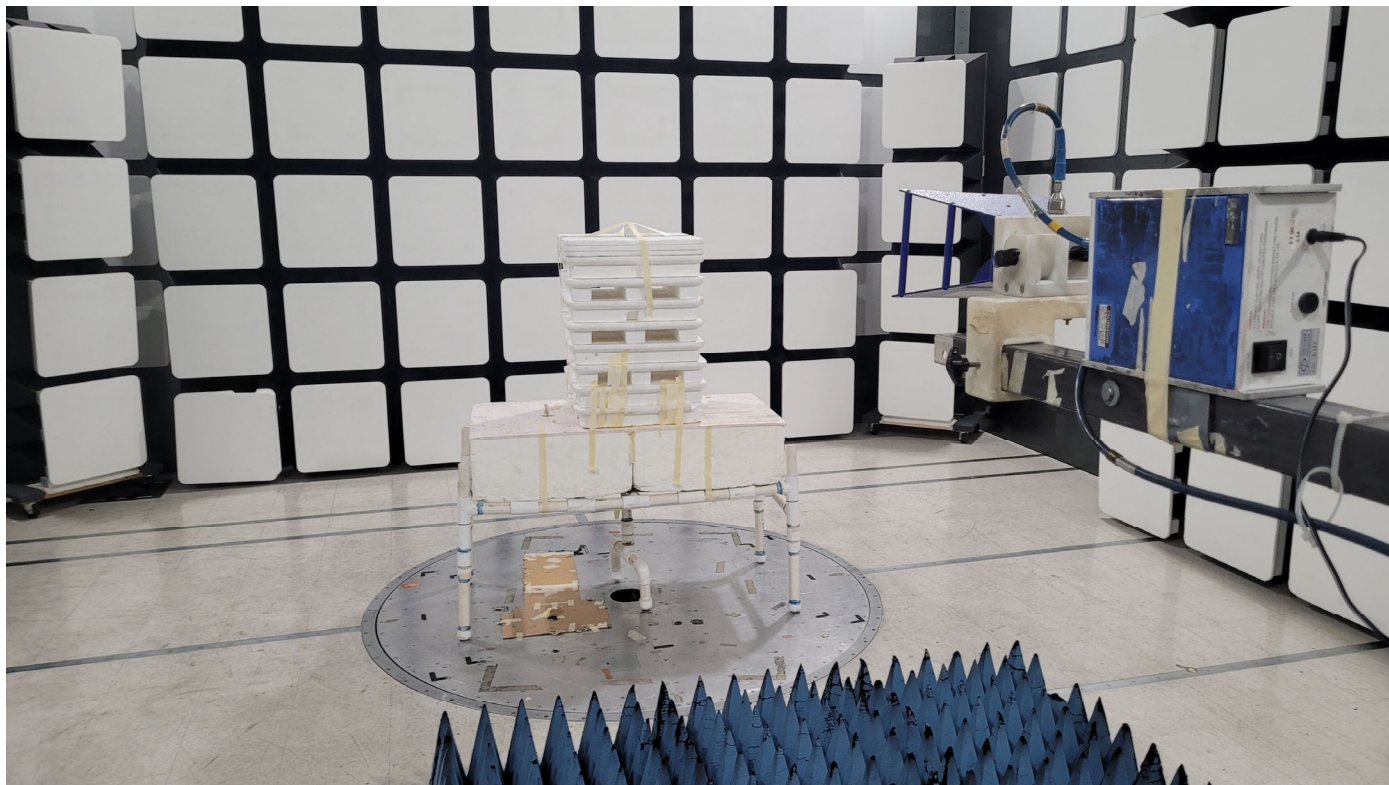
ECOLINK INTELLIGENT TECHNOLOGY, INC.

WEARABLE ACTION BUTTON

MODEL: WST-132

FCC SUBPART B AND C; RSS-210 AND RSS-GEN – RADIATED EMISSIONS – BELOW 1 GHz

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



FRONT VIEW

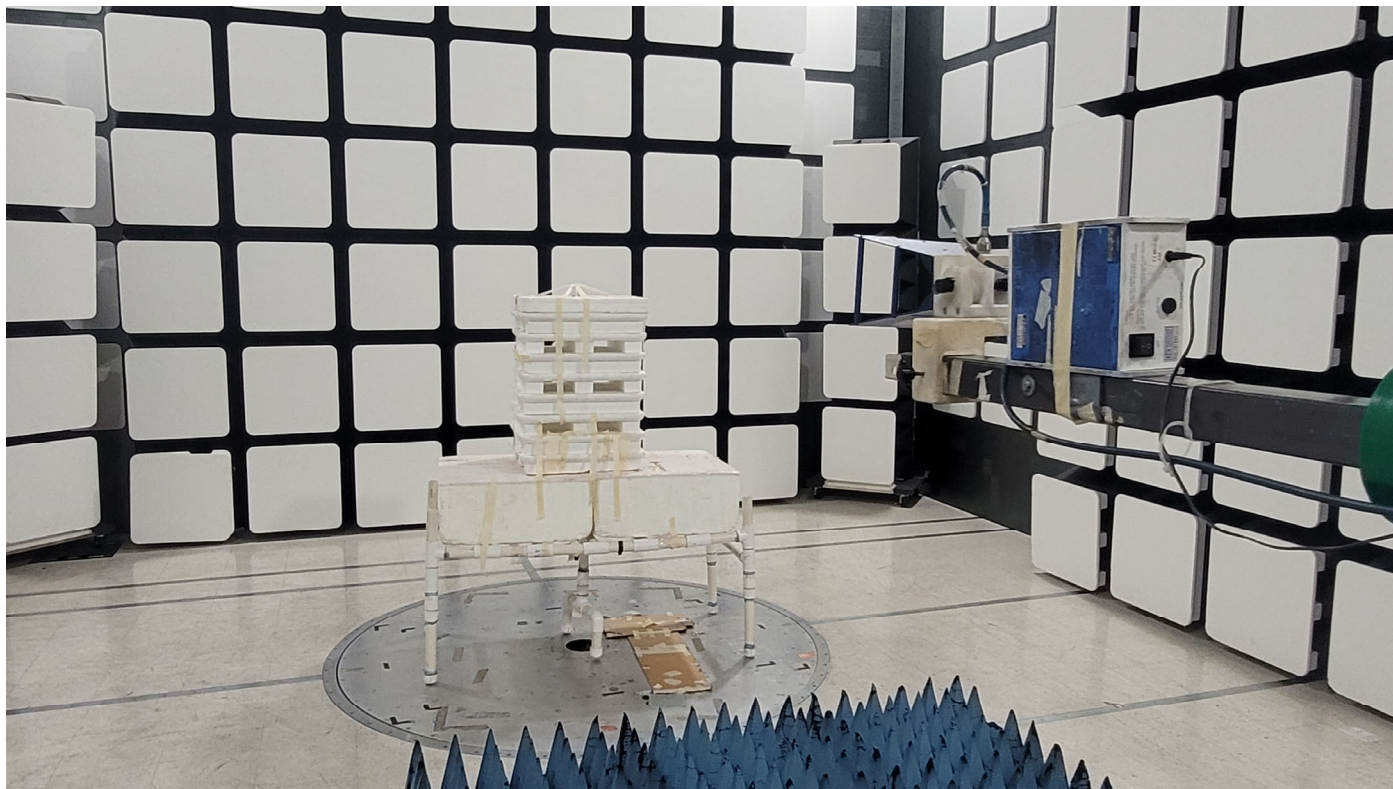
ECOLINK INTELLIGENT TECHNOLOGY, INC.

WEARABLE ACTION BUTTON

MODEL: WST-132

FCC SUBPART B AND C; RSS-210 AND RSS-GEN – RADIATED EMISSIONS – ABOVE 1 GHz

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



REAR VIEW

ECOLINK INTELLIGENT TECHNOLOGY, INC.

WEARABLE ACTION BUTTON

MODEL: WST-132

FCC SUBPART B AND C; RSS-210 AND RSS-GEN – RADIATED EMISSIONS – ABOVE 1 GHz

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



APPENDIX E

DATA SHEETS

RADIATED EMISSIONS

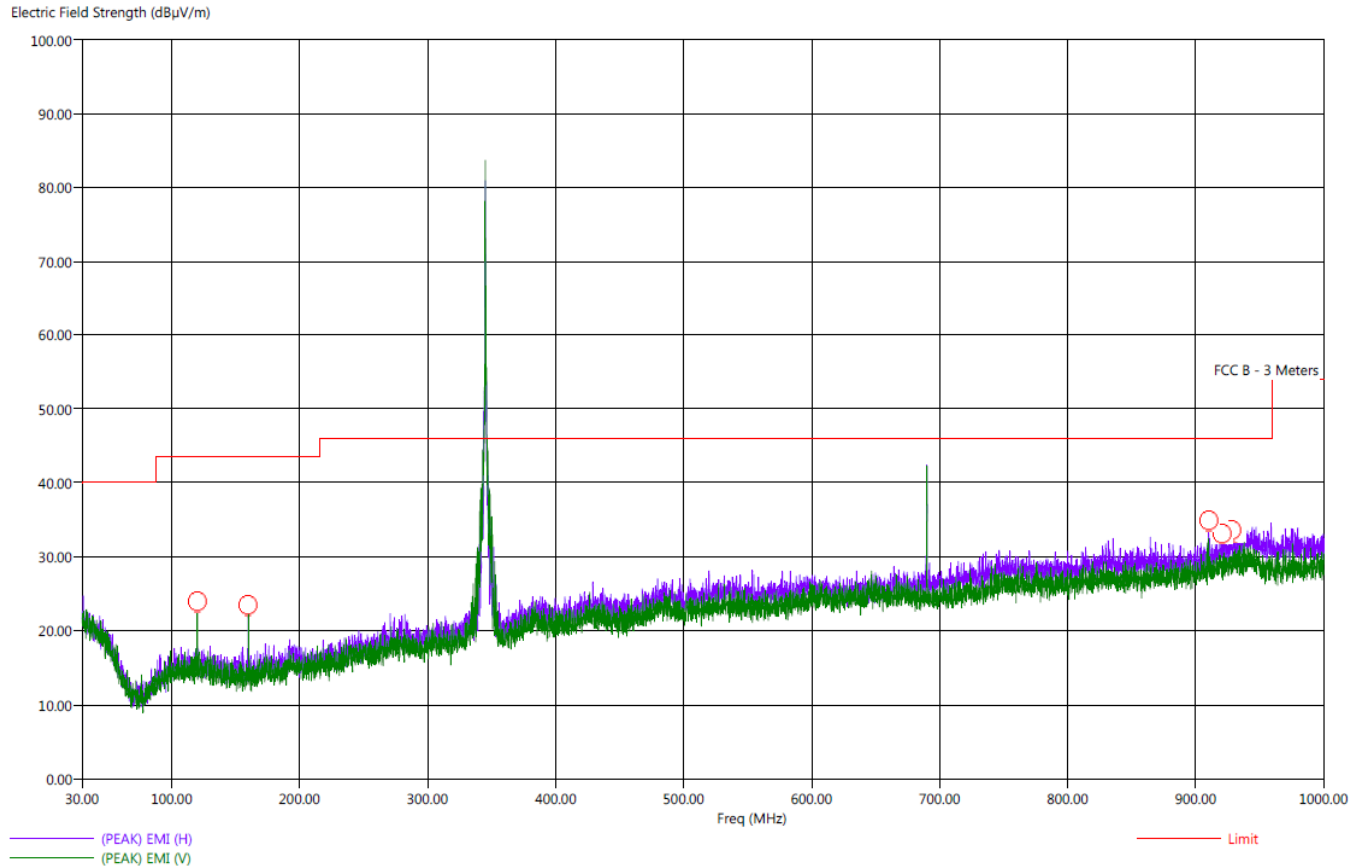
DATA SHEETS



Title: Pre-Scan - FCC Class B
File: 1 - Pre-Scan - 345 MHz - Y-Axis - 01-29-2024.set
Operator: Kyle Fujimoto
EUT Type: Wearable Action Button
EUT Condition: The EUT is continuously transmitting at 345 MHz
Customer: Ecolink Intelligent Technology, Inc.
Model: WST-132
S/N: Unit 1
Y-Axis - Worst Case
Note: The Frequencies at 345 MHz and 690 MHz are subject to the limits of FCC 15.231 instead

1/29/2024 10:49:02 AM
Sequence: Preliminary Scan

Pre-Scan - FCC Class B





Title: Radiated Final - 30-1000 MHz - FCC Class B
File: 1 - Final Scan - 345 MHz - Y-Axis - 01-29-2024.set
Operator: Kyle Fujimoto
EUT Type: Wearable Action Button
EUT Condition: The EUT is continuously transmitting at 345 MHz
Customer: Ecolink Intelligent Technology, Inc.
Model: WST-132
S/N: Unit 1
Y-Axis

1/29/2024 11:05:04 AM
Sequence: Final Measurements

Final Scan - 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 Aql (deg)	Twr Ht (cm)
120.00	V	26.34	24.09	-17.16	-19.41	43.50	15.90	0.70	287.00	127.26
160.00	H	23.86	19.53	-19.64	-23.97	43.50	14.80	0.76	304.50	127.08
910.00	H	37.08	33.69	-8.92	-12.31	46.00	28.50	1.80	51.50	351.44
920.50	H	33.61	29.08	-12.39	-16.92	46.00	28.80	2.09	203.50	254.97
928.30	H	33.72	29.68	-12.28	-16.32	46.00	29.15	2.30	218.50	175.38
930.40	H	34.11	29.86	-11.89	-16.14	46.00	29.20	2.35	301.25	238.85





FUNDAMENTAL AND HARMONICS

DATA SHEETS



FCC 15.231

Ecolink Intelligent Technology, Inc.

Wearable Action Button

Model: WST-132

Date: 01/29/2024

Lab: D

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	72.62	V	97.26	-24.64	Peak	256.00	171.38	X-Axis
345.00	52.62	V	77.26	-24.64	Avg	256.00	171.38	Vertical Polarization
345.00	85.81	V	97.26	-11.45	Peak	255.00	172.16	Y-Axis
345.00	65.81	V	77.26	-11.45	Avg	255.00	172.16	Vertical Polarization
345.00	85.66	V	97.26	-11.60	Peak	266.75	180.82	Z-Axis
345.00	65.66	V	77.26	-11.60	Avg	266.75	180.82	Vertical Polarization
345.00	87.64	H	97.26	-9.62	Peak	71.75	100.88	X-Axis
345.00	67.64	H	77.26	-9.62	Avg	71.75	100.88	Horizontal Polarization
345.00	80.78	H	97.26	-16.48	Peak	196.50	231.80	Y-Axis
345.00	60.78	H	77.26	-16.48	Avg	196.50	231.80	Horizontal Polarization
345.00	81.07	H	97.26	-16.19	Peak	160.00	101.95	Z-Axis
345.00	61.07	H	77.26	-16.19	Avg	160.00	101.95	Horizontal Polarization



FCC 15.231

Ecolink Intelligent Technology, Inc.
Wearable Action Button
Model: WST-132

Date: 01/29/2024
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	42.42	V	77.26	-34.84	Peak	236.50	133.35	
690.00	22.42	V	57.26	-34.84	Avg	236.50	133.35	
1035.00	30.47	V	73.97	-43.50	Peak	184.75	126.97	
1035.00	10.47	V	53.97	-43.50	Avg	184.75	126.97	
1380.00	40.01	V	73.97	-33.96	Peak	296.25	207.26	
1380.00	20.01	V	53.97	-33.96	Avg	296.25	207.26	
1725.00	32.76	V	77.26	-44.50	Peak	209.00	143.14	
1725.00	12.76	V	57.26	-44.50	Avg	209.00	143.14	
2070.00	36.44	V	77.26	-40.82	Peak	140.50	223.32	
2070.00	16.44	V	57.26	-40.82	Avg	140.50	223.32	
2415.00	34.95	V	77.26	-42.31	Peak	269.50	223.26	
2415.00	14.95	V	57.26	-42.31	Avg	269.50	223.26	
2760.00	39.00	V	73.97	-34.97	Peak	143.75	175.08	
2760.00	19.00	V	53.97	-34.97	Avg	143.75	175.08	
3105.00	43.54	V	77.26	-33.72	Peak	146.75	111.38	
3105.00	23.54	V	57.26	-33.72	Avg	146.75	111.38	
3450.00	38.98	V	77.26	-38.28	Peak	172.25	143.20	
3450.00	18.98	V	57.26	-38.28	Avg	172.25	143.20	



FCC 15.231

Ecolink Intelligent Technology, Inc.

Wearable Action Button

Model: WST-132

Date: 01/29/2024

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	48.14	V	77.26	-29.12	Peak	253.25	179.80	
690.00	28.14	V	57.26	-29.12	Avg	253.25	179.80	
1035.00	30.65	V	73.97	-43.32	Peak	301.00	175.20	
1035.00	10.65	V	53.97	-43.32	Avg	301.00	175.20	
1380.00	47.63	V	73.97	-26.34	Peak	179.25	111.50	
1380.00	27.63	V	53.97	-26.34	Avg	179.25	111.50	
1725.00	36.66	V	77.26	-40.60	Peak	147.00	143.44	
1725.00	16.66	V	57.26	-40.60	Avg	147.00	143.44	
2070.00	40.34	V	77.26	-36.92	Peak	343.00	159.44	
2070.00	20.34	V	57.26	-36.92	Avg	343.00	159.44	
2415.00	34.67	V	77.26	-42.59	Peak	296.00	159.38	
2415.00	14.67	V	57.26	-42.59	Avg	296.00	159.38	
2760.00	40.40	V	73.97	-33.57	Peak	111.00	207.44	
2760.00	20.40	V	53.97	-33.57	Avg	111.00	207.44	
3105.00	46.06	V	77.26	-31.20	Peak	129.75	143.50	
3105.00	26.06	V	57.26	-31.20	Avg	129.75	143.50	
3450.00	43.27	V	77.26	-33.99	Peak	149.50	175.08	
3450.00	23.27	V	57.26	-33.99	Avg	149.50	175.08	



FCC 15.231

Ecolink Intelligent Technology, Inc.

Wearable Action Button

Model: WST-132

Date: 01/29/2024

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	47.83	V	77.26	-29.43	Peak	270.75	171.02	
690.00	27.83	V	57.26	-29.43	Avg	270.75	171.02	
1035.00	30.50	V	73.97	-43.47	Peak	127.75	126.85	
1035.00	10.50	V	53.97	-43.47	Avg	127.75	126.85	
1380.00	43.34	V	73.97	-30.63	Peak	176.50	111.50	
1380.00	23.34	V	53.97	-30.63	Avg	176.50	111.50	
1725.00	33.69	V	77.26	-43.57	Peak	293.00	111.62	
1725.00	13.69	V	57.26	-43.57	Avg	293.00	111.62	
2070.00	36.84	V	77.26	-40.42	Peak	324.75	175.26	
2070.00	16.84	V	57.26	-40.42	Avg	324.75	175.26	
2415.00	36.87	V	77.26	-40.39	Peak	264.25	127.32	
2415.00	16.87	V	57.26	-40.39	Avg	264.25	127.32	
2760.00	38.87	V	73.97	-35.10	Peak	91.25	111.32	
2760.00	18.87	V	53.97	-35.10	Avg	91.25	111.32	
3105.00	44.49	V	77.26	-32.77	Peak	110.75	127.38	
3105.00	24.49	V	57.26	-32.77	Avg	110.75	127.38	
3450.00	42.37	V	77.26	-34.89	Peak	134.50	111.26	
3450.00	22.37	V	57.26	-34.89	Avg	134.50	111.26	

FCC 15.231

Ecolink Intelligent Technology, Inc.

Wearable Action Button

Model: WST-132

Date: 01/29/2024

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	49.42	H	77.26	-27.84	Peak	231.50	126.37	
690.00	29.42	H	57.26	-27.84	Avg	231.50	126.37	
1035.00	30.79	H	73.97	-43.18	Peak	356.25	238.97	
1035.00	10.79	H	53.97	-43.18	Avg	356.25	238.97	
1380.00	47.46	H	73.97	-26.51	Peak	73.25	223.02	
1380.00	27.46	H	53.97	-26.51	Avg	73.25	223.02	
1725.00	38.11	H	77.26	-39.15	Peak	68.75	143.26	
1725.00	18.11	H	57.26	-39.15	Avg	68.75	143.26	
2070.00	39.87	H	77.26	-37.39	Peak	231.75	175.32	
2070.00	19.87	H	57.26	-37.39	Avg	231.75	175.32	
2415.00	35.95	H	77.26	-41.31	Peak	254.75	143.26	
2415.00	15.95	H	57.26	-41.31	Avg	254.75	143.26	
2760.00	38.76	H	73.97	-35.21	Peak	32.75	111.26	
2760.00	18.76	H	53.97	-35.21	Avg	32.75	111.26	
3105.00	43.17	H	77.26	-34.09	Peak	62.50	175.50	
3105.00	23.17	H	57.26	-34.09	Avg	62.50	175.50	
3450.00	43.77	H	77.26	-33.49	Peak	42.25	111.36	
3450.00	23.77	H	57.26	-33.49	Avg	42.50	111.36	

FCC 15.231

Ecolink Intelligent Technology, Inc.

Wearable Action Button

Model: WST-132

Date: 01/29/2024

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	45.78	H	77.26	-31.48	Peak	141.25	105.95	
690.00	25.78	H	57.26	-31.48	Avg	141.25	105.95	
1035.00	31.36	H	73.97	-42.61	Peak	27.50	223.26	
1035.00	11.36	H	53.97	-42.61	Avg	27.50	223.26	
1380.00	45.51	H	73.97	-28.46	Peak	207.00	159.26	
1380.00	25.51	H	53.97	-28.46	Avg	207.00	159.26	
1725.00	33.76	H	77.26	-43.50	Peak	2.50	143.38	
1725.00	13.76	H	57.26	-43.50	Avg	2.50	143.38	
2070.00	37.25	H	77.26	-40.01	Peak	56.00	191.38	
2070.00	17.25	H	57.26	-40.01	Avg	56.00	191.38	
2415.00	35.27	H	77.26	-41.99	Peak	289.25	111.50	
2415.00	15.27	H	57.26	-41.99	Avg	289.25	111.50	
2760.00	38.95	H	73.97	-35.02	Peak	165.00	159.32	
2760.00	18.95	H	53.97	-35.02	Avg	165.00	159.32	
3105.00	42.50	H	77.26	-34.76	Peak	130.50	111.50	
3105.00	22.50	H	57.26	-34.76	Avg	130.50	111.50	
3450.00	41.80	H	77.26	-35.46	Peak	142.25	127.44	
3450.00	21.80	H	57.26	-35.46	Avg	142.25	127.44	

FCC 15.231

Ecolink Intelligent Technology, Inc.

Wearable Action Button

Model: WST-132

Date: 01/29/2024

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	43.54	H	77.26	-33.72	Peak	282.25	111.92	
690.00	23.54	H	57.26	-33.72	Avg	282.25	111.92	
1035.00	29.96	H	73.97	-44.01	Peak	84.50	111.62	
1035.00	9.96	H	53.97	-44.01	Avg	84.50	111.62	
1380.00	47.38	H	73.97	-26.59	Peak	300.75	143.56	
1380.00	27.38	H	53.97	-26.59	Avg	300.75	143.56	
1725.00	36.40	H	77.26	-40.86	Peak	183.50	207.26	
1725.00	16.40	H	57.26	-40.86	Avg	183.50	207.26	
2070.00	39.15	H	77.26	-38.11	Peak	159.75	175.26	
2070.00	19.15	H	57.26	-38.11	Avg	159.75	175.26	
2415.00	36.50	H	77.26	-40.76	Peak	65.75	143.26	
2415.00	16.50	H	57.26	-40.76	Avg	65.75	143.26	
2760.00	37.45	H	73.97	-36.52	Peak	203.75	127.26	
2760.00	17.45	H	53.97	-36.52	Avg	203.75	127.26	
3105.00	44.02	H	77.26	-33.24	Peak	192.00	111.50	
3105.00	24.02	H	57.26	-33.24	Avg	192.00	111.50	
3450.00	42.12	H	77.26	-35.14	Peak	182.25	111.14	
3450.00	22.12	H	57.26	-35.14	Avg	182.25	111.14	



FCC 15.231

Ecolink Intelligent Technology, Inc.
Wearable Action Button
Model: WST-132

Date: 01/30/2024
Lab: D
Tested By: Kyle Fujimoto

Non Harmonic Emissions from the Tx and Digital Portion - 9 kHz to 30 MHz

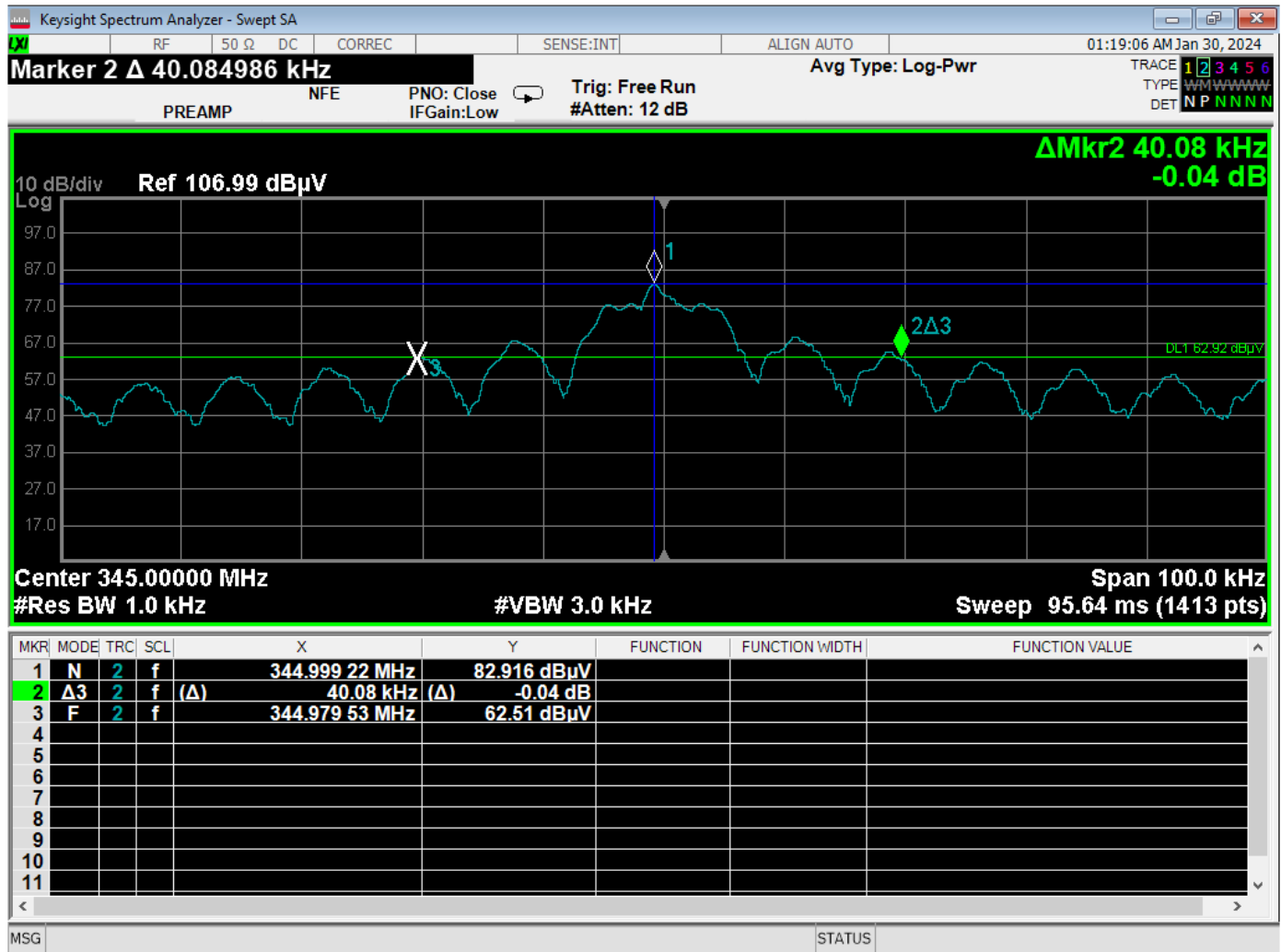
Non Harmonic Emissions from the Tx and Digital Portion - 1 GHz To 3.45 GHz

[illegible]



-20 dB BANDWIDTH PLOT

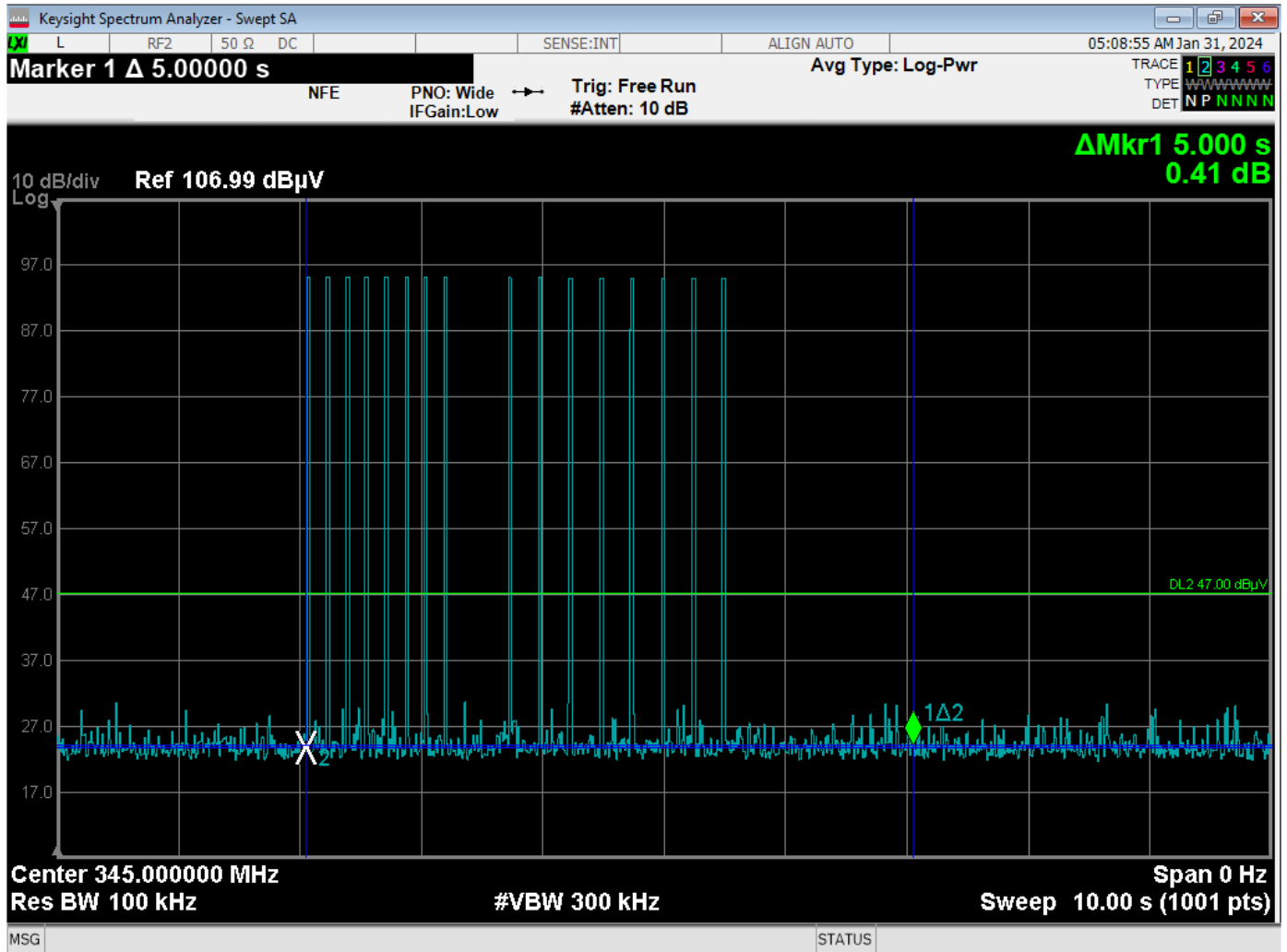
DATA SHEET



-20 dB Bandwidth Plot



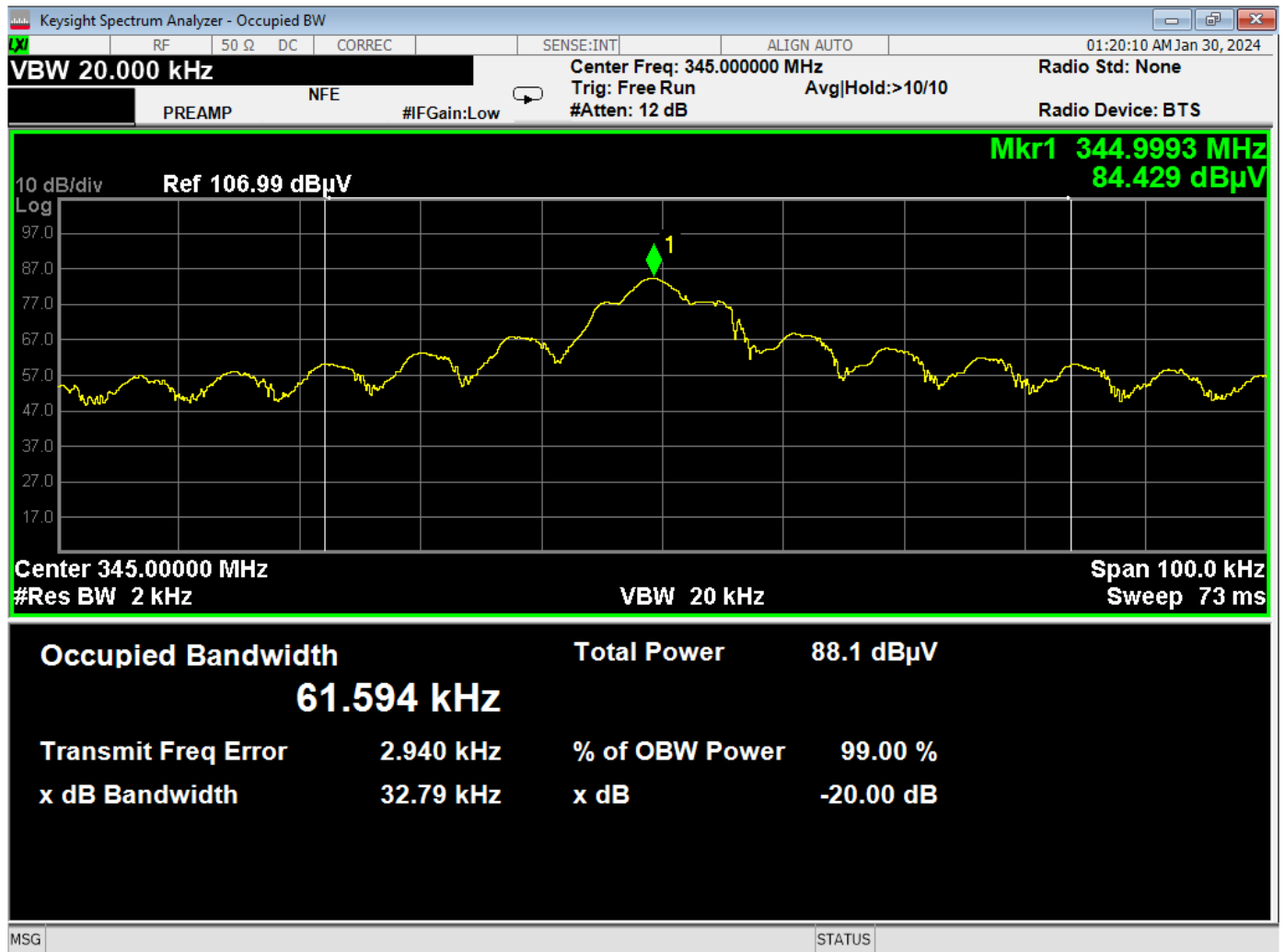
***TRANSMISSION TIME
DATA SHEET***



Plot Showing Actual Time of Transmission less than 5 seconds



***99 % BANDWIDTH
DATA SHEET***

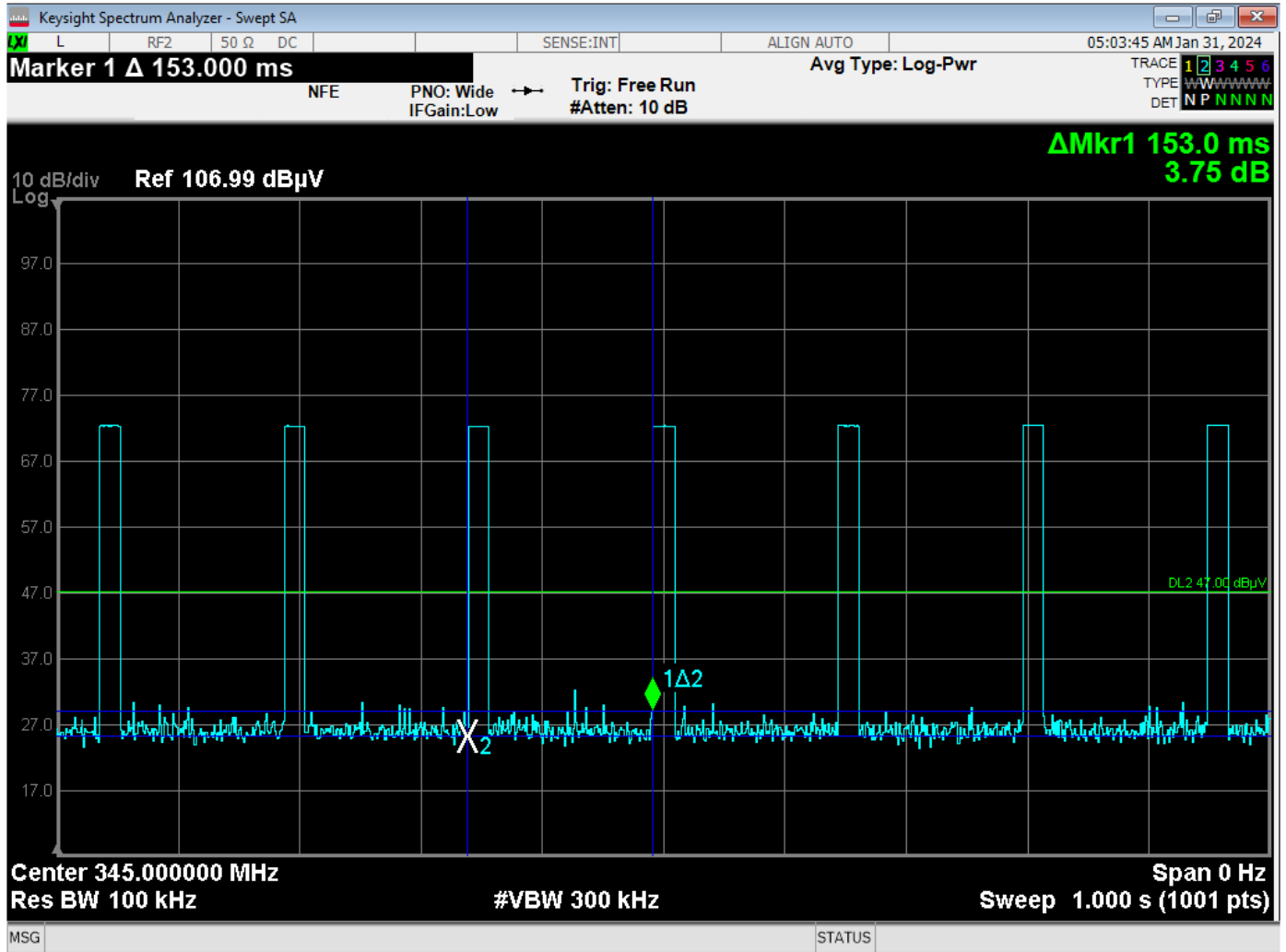


99 % Bandwidth Plot

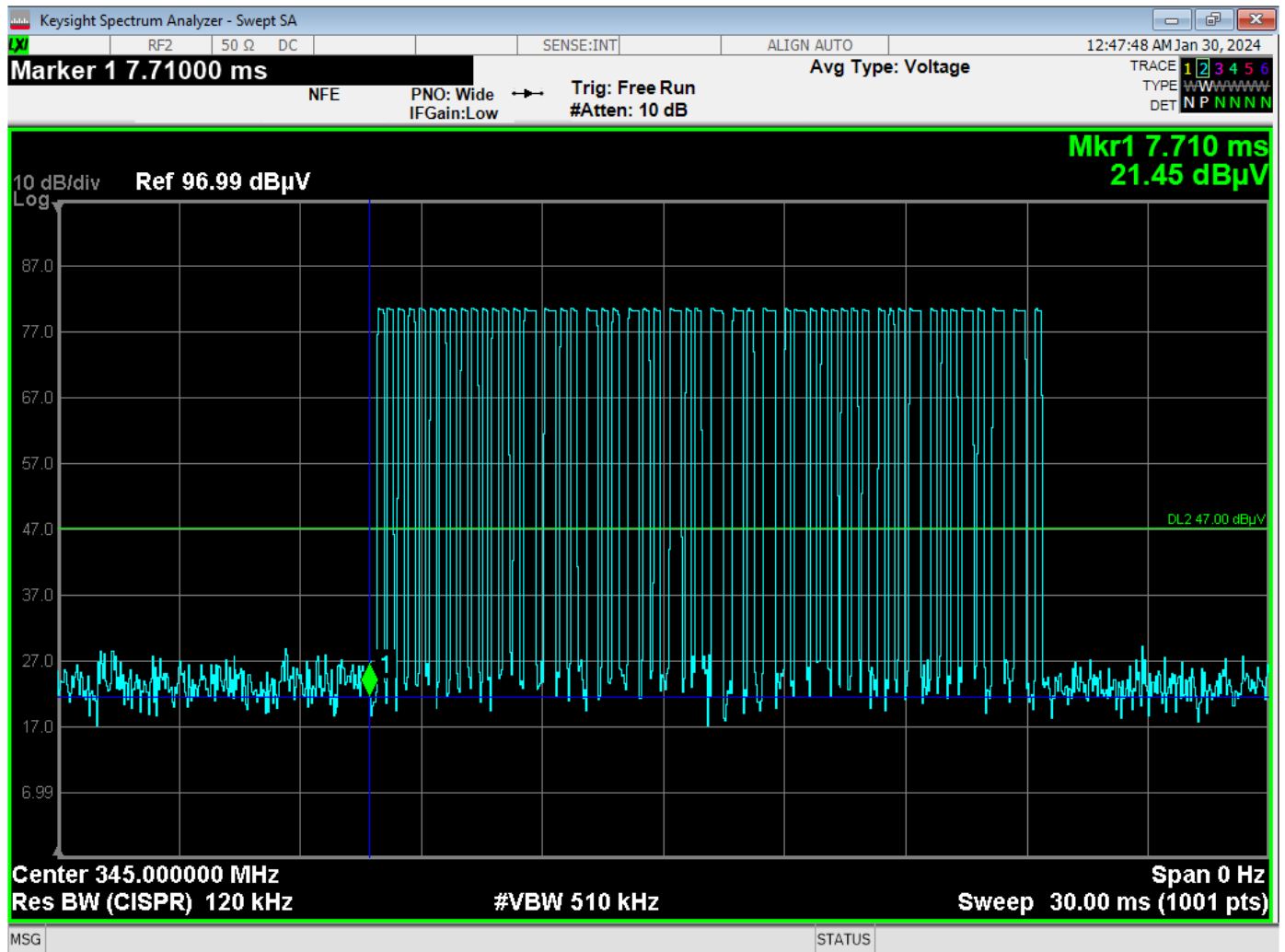


DUTY CYCLE

DATA SHEETS



The worst case where the pulse train repeats itself is more than 100 ms

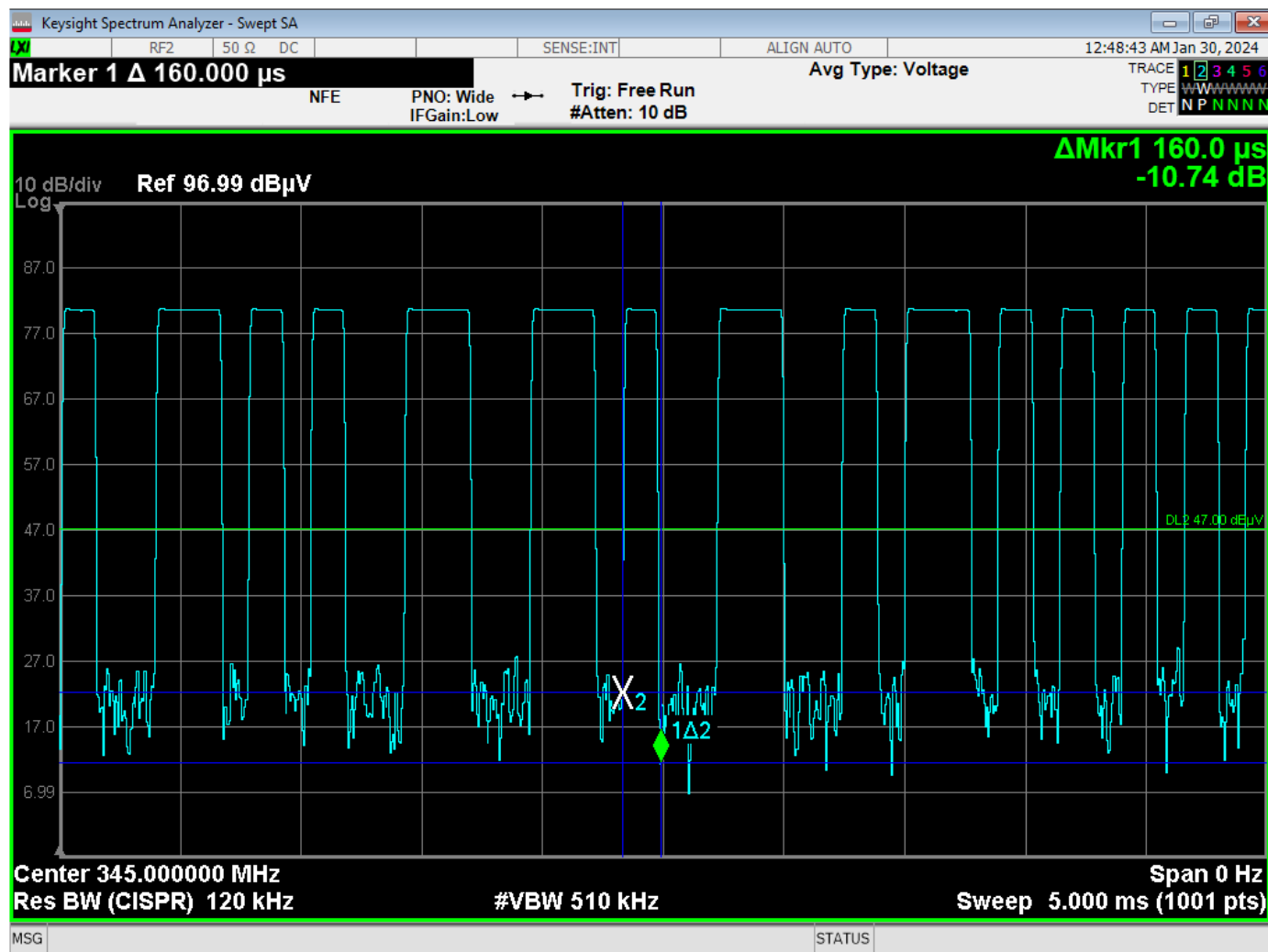


Number of Pulses

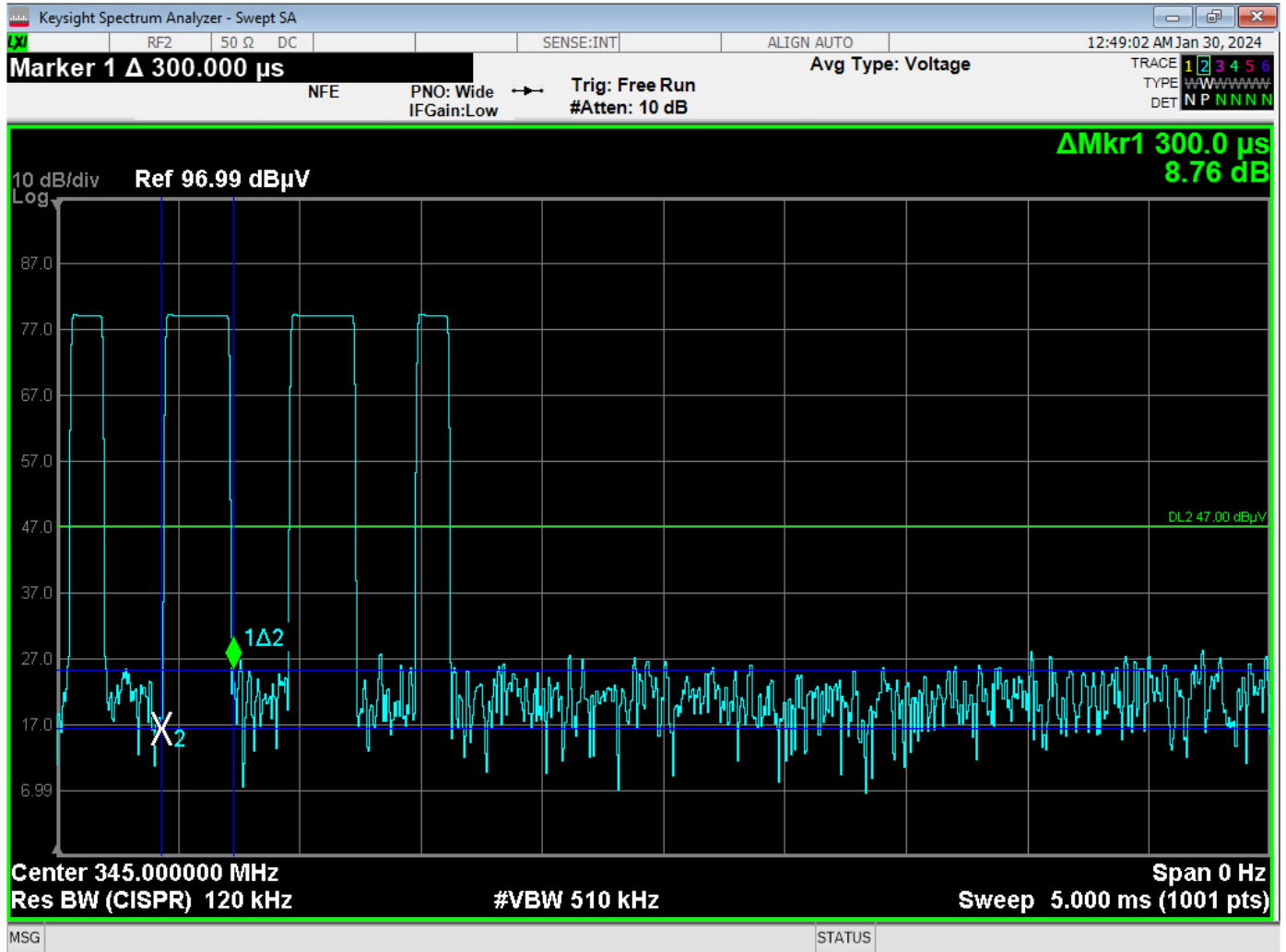
Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

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

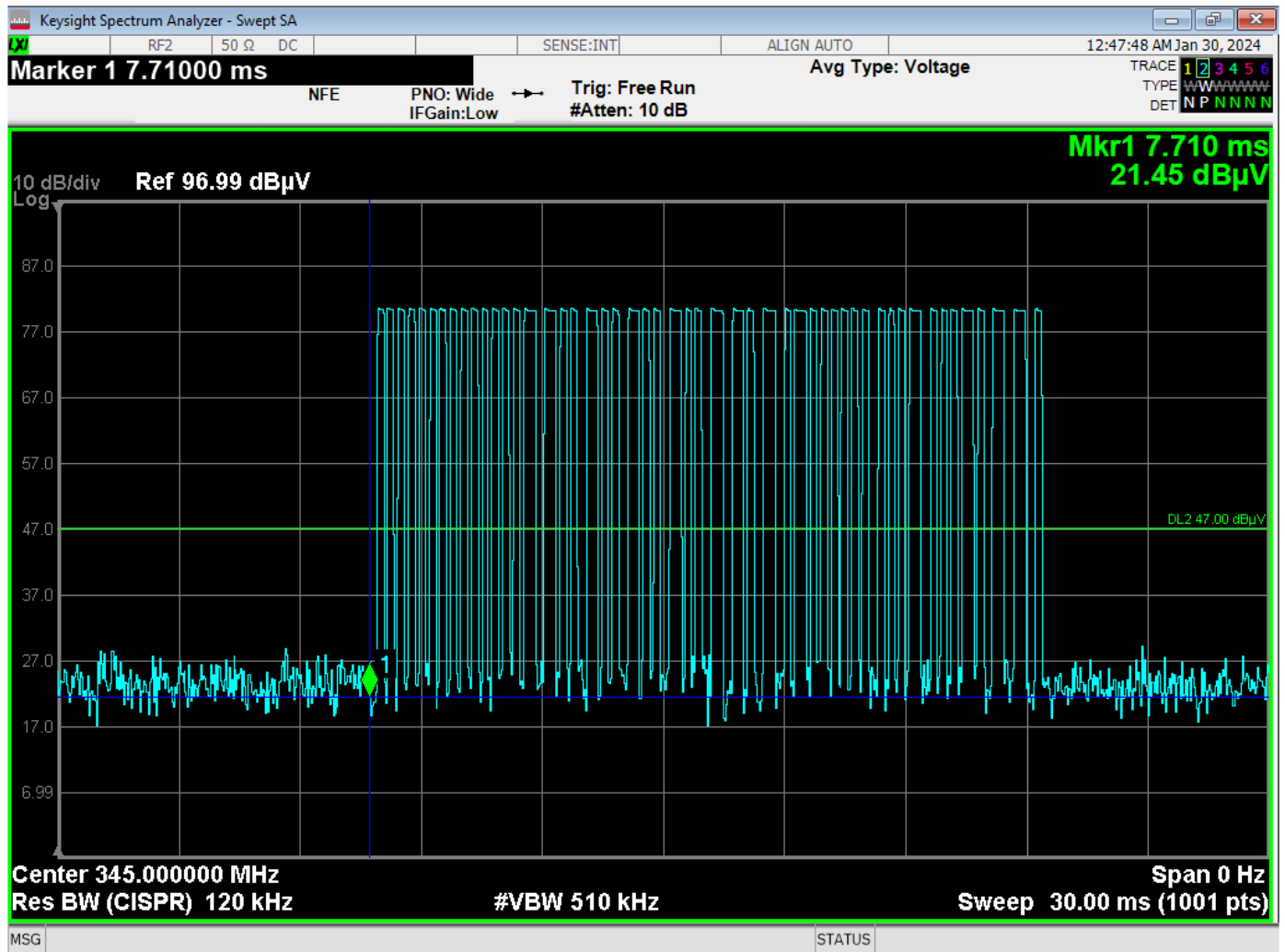
Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400



Time of Small Pulse = 160 us



Time of One Large Pulse = 300 us



Number of Small Pulses = 38 = (38*160 us) = 6080 us

Number of Large Pulses = 13 = (13*300 us) = 3900 us

Total On Time = 9980 us = 9.980 ms

Duty Cycle = 9.980 ms / 100 ms = 9.98%

The maximum peak to average ratio of -20.00 dB can be utilized.

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