July 12, 2021

Dakota Ultrasonics
Jason Treon
1500 Green Hills Road #107
Scotts Valley, CA 95066

Dear Jason Treon,

Enclosed is the Electromagnetic Compatibility for the Dakota Ultrasonics, HPX, tested to the requirements of:

- FCC Part 15 Subpart B
- Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 6

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. Please contact me if you have any questions regarding these results or if Eurofins E&E can be of further service to you.

Sincerely,

Rheine Nguyen

Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: EMC112824-FCC-IC

A2LA ACCREDITED
TESTING CERT #0591.02

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	07/12/2021	Initial Issue.

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1.0 Testing Summary

The Dakota Ultrasonics, HPX was found to be compliant to the following specification(s).

- FCC Part 15 Subpart B
- Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 6

Alex Chen
EMC Laboratory Engineer

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements.

Joe Vang
EMC Laboratory Manager, California

2.0 Overview

Eurofins Electrical and Electronic Testing NA, Inc. was contracted by Dakota Ultrasonics to perform testing on the HPX, under purchase order number 9056.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of Dakota Ultrasonics, HPX.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	HPX
Equipment Emissions Class:	A

2.1 Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 3162 Belick St. Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology. Eurofins Electrical and Electronic Testing NA, Inc. has been accredited by the American Association for Laboratory Accreditation (A2LA) (Certificate #: 0591.02) in accordance with ISO/IEC 17025:2017.

2.2 Measurement Uncertainty

Measurement uncertainty calculated as per NIST Technical Note (TN) 1297 and ANSI / NCSL Z540-2, as equivalent to EN 55016-4-2 / IEC CISPR 16-4-2.

Test Method	Typical Expanded Uncertainty (dB)	K	Confidence Level
Radiated Emissions, (30 MHz – 1 GHz)	±3.24	2	95%
Radiated Emissions, (1 GHz – 6 GHz)	±3.92	2	95%
Conducted Emission Voltage	±2.44	2	95%
Conducted Emission Telecom	±3.53	2	95%

Measurement Uncertainty

2.3 Equipment Overview and Test Configuration

Name of EUT/Model:	HPX
Description of EUT and Intended Use:	The HPX measures the thickness of material by means of an ultrasonic pulse created and measured by a piezoelectric transducer. The handheld device is intended for use by trained technicians in construction sites and metal structures.
Selected Operation Mode(s):	The HPX will measure thickness in Pulse-Echo mode. The transducer will be attached to the provided sample material. Thickness of the material will be displayed on screen. The transducer should be plugged into the unit. A drop of couplant is placed on the head of the transducer and the transducer is placed on the sample material. Turn on the unit by pressing the on/off button. The unit will display a thickness reading and will continue to do so during normal operations. If no reading appears initially, apply more couplant and press the transducer down firmly.
Rational for the selection of the Operation Mode(s):	All functions of the gauge rely on measuring thickness.
Monitoring Method(s):	1) Unit should legibly display material thickness to within 0.01 inches. 2) Unit display should not be illegible or fail to display a reading . Momentary flickers are acceptable.
Emissions Class Declaration:	Class A
Immunity Table Declaration:	Table A.1 – Immunity test requirements for portable test and measurement equipment
Manufacturer's specified environmental operating conditions	
Temperature Range (Ex: 0c - 100c):	10C to 60C
Humidity Range (Ex: 15% - 80% RH):	15% - 80% RH
Atmospheric Pressure (Ex: 90-110 kPa):	90-110 kPa
Cabling and earthing.(grounding):	Internal components are grounded to the aluminum case. This is a handheld device and is not normally connected to earth ground.
Configuration(s):	EUT consists of the handheld unit itself, transducer with 3ft cable, and 3ft USB-C data cable. Also to be provided are a sample block and couplant gel. Unit is to be configured with all the cables plunged into it. The transducer is to be placed on the test block with a drop of couplant between the transducer and the sample material.
EUT Power Requirement	
Voltage:	4.5V DC (AA Batteries)
AC or DC:	DC
Voltage Frequency:	N.A.
Phases:	1
Current:	500mA
Uses an external AC/DC Adapter:	False
Physical Description	

EUT Arrangement:	Table Top
System with Multiple Chassis:	False
Size (HxWxD) inches:	Width (2.5in/63.5 mm) Height (6.5 in/165 mm) Depth
Weight (lbs):	13.5 ounces (with batteries).
Other Info	
Highest Internal Frequency (MHz) used:	96
Magnetic Sensitivity:	False
EUT Software (internal to EUT):	CMXUv3_04r.bch
Support Software (used by support PC to exercise EUT):	NA

EUT List

Ref.ID	Slot#	Name/Description	Model Number	Part Number	Serial Number	Rev. #
A		HPX Gauge	1	Z-225-0001		1
B		Transducer	500kHz	T-857-8608		1

Ports and Cabling

Ref.ID	Port Name on EUT	Cable Desc. or reason for none	QTY	Length as tested (m)	Max Length (m)	Shielded?	Termination Box ID & Port Name
1	Transducer	RG-174A/U Lemo00 to BNC	1	1	1	Yes	Transducer
2	USB-C	USB-C	2	1	1	No	USB

Support Equipment List

Ref.ID	Name/Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
C	Couplant Gel	Ultrasonix	V-000-0001	NA
D	Test Block			NA

2.4 Modifications to the EUT

No modifications were made to the EUT.

2.5 Modifications to the Standard

No modifications were made to the Test Standard.

2.6 Disposition of EUT

The test sample including all support equipment (if any), submitted to the Electromagnetic Compatibility Lab for testing was returned to Dakota Ultrasonics upon completion of testing.

3.0 Electromagnetic Compatibility Emission Criteria

3.3 Radiated Emissions: Limits of Electromagnetic Radiation Disturbance

Test Method: ANSI C63.4-2014

Test Requirement(s): The following standards specified below are covered in the scope of this section of the test report:

- FCC Part 15 Subpart B
- Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 6

§15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Frequency (MHz)	Field Strength (dBµV/m)
30 - 88	39.00
88 - 216	43.50
216 - 960	46.40
Above 960	49.50

Sample Calculation for Distance Correction factor (DCF) measurement:

$F_d = 20*LOG_{10}(D_m/D_s)$

where:

F_d = Distance Factor in dB
D_m = Measurement Distance in meters
D_s = Specification Distance in meters

Sample formula for calculating the Corrected Data for the Radiated Emissions Measurements:

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBµV)	ACF (dB/m) (+)	Pre Amp Gain (dB)(-)	CBL (dB) (+)	DCF (dB) (+)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
249.99	V	359.9	240.7	55.46	11.4	28.335	0	0	***38.505***	47	-8.495

Corrected Amplitude (dBµV/m) = Uncorrected Amplitude (dBµV) +ACF (dB/m) - Preamp Gain (dB) + CBL (dB) +DCF (dB) = 55.46 + 11.4 - 28.355 + 0 + 0 = ***38.505***

Test Procedure: The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. The method of testing, test conditions, and test procedures of ANSI C63.4-2014 were used. Any measured frequency that exhibits a margin of compliance

that is less than 3 dB below the specification limit is marked. MET recommends that every emission measured, has at least a 3 dB margin to allow for deviations in the emission characteristics that may occur during the production process.

For emissions between 30 MHz and 1000 MHz, a biconilog antenna was located 3m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz resolution bandwidth.

Test Software Used: Jamila RE Rev 4.0 was used to perform this test.

Test Results:

Test Standard:	FCC Part 15 Subpart B Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 6 Class A
Test Name	Radiated Emissions
Test Dates:	07/08/2021
Laboratory	Eurofins Electrical and Electronic Testing NA, Inc.
Test Engineer:	Alex Chen
Test Results:	Compliant

Test Summary

Frequency Range	Specification	Measurement (MHz)	Margin (dBµV)	Class	Compliance
30 MHz – 1 GHz	FCC Part 15 Subpart B (per ANSI C63.4: 2014), ICES-003 Issue 7, October 2020	480	-9.9	A	**Compliant**

Test Data

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
36.24	H	326	100	-0.26	20.156	0	1.315	-10.46	10.751	39	-28.249
64.48	V	0	100	23.61	10.452	0	1.671	-10.46	25.273	39	-13.727
360	H	342	100	16.23	19.9	0	3.454	-10.46	29.124	46.4	-17.276
480	V	300	100	21.38	21.5	0	4.08	-10.46	36.5	46.4	-9.9
528	V	0	100	14.39	22.4	0	4.214	-10.46	30.544	46.4	-15.856
672	V	291	100	10.02	23.6	0	4.615	-10.46	27.775	46.4	-18.625

Note(s): * - At this frequency, the measured electric-field strength exhibits a margin of compliance that is less than 3 dB below the specification limit. We recommend that every emission measured, have at least a 3 dB margin to allow for deviations in the emission characteristics that may occur during the production process.

The EUT was tested at 3 m. The data has been corrected for comparison with the 10 m limit using the formula: 20log (3 m/10 m) as expressed in the 'Distance Correction' column.

Table 1. Radiated Emissions (30 MHz – 1 GHz), Test Results

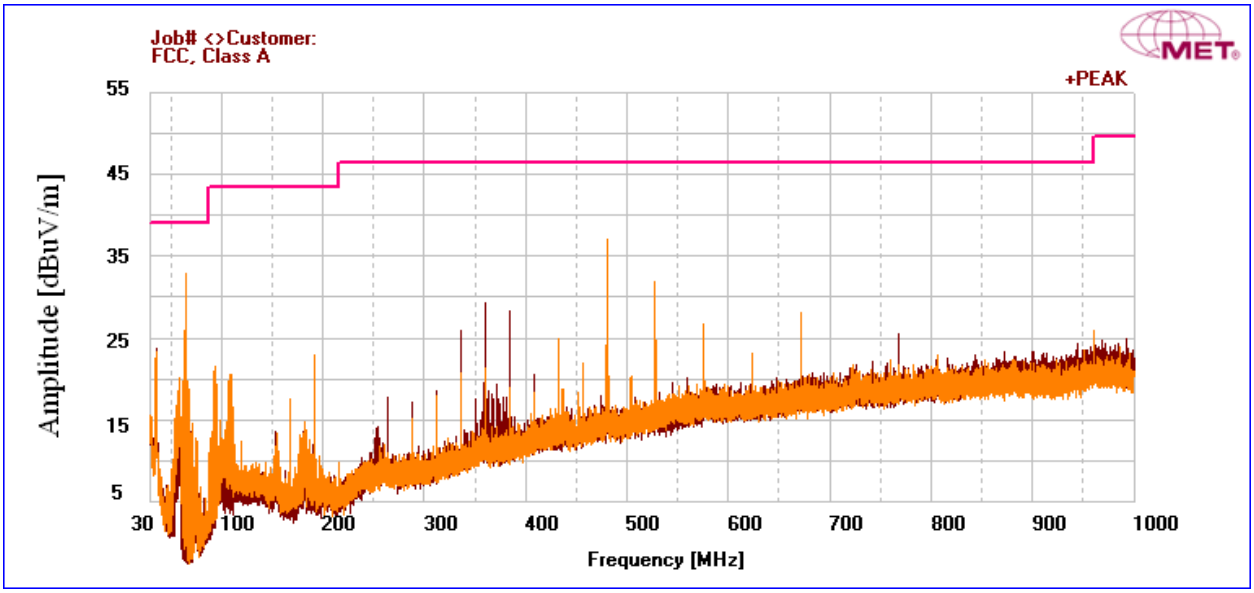

Figure 1. Radiated Emissions (30 MHz – 1 GHz), Plot

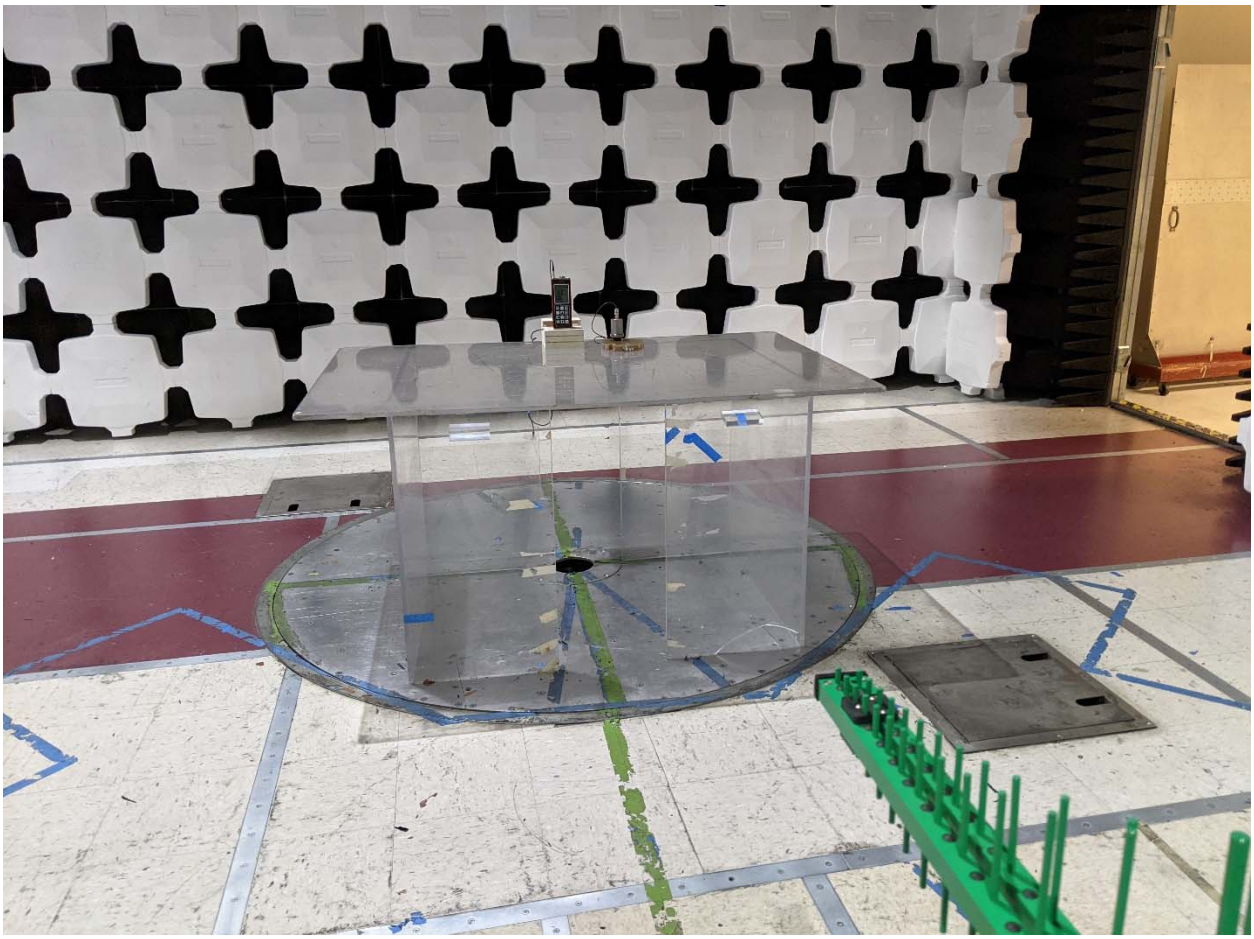

Figure 2. Radiated Emissions (30 MHz – 1 GHz), Test Setup

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Test Name: RE			**Test Date(s):** 07/08/2021		
MET Asset #	**Equipment**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1S2486	5 Meter Chamber Control Room	Panashield	5 Meter Control Room	See Note	See Note
1S4064	Digital Barometer	Control Co	6530	09/15/2020	09/15/2022
1S3926	1MHz step, 1GHz combo generator	Com-power Corp	CGO-501	See Note	See Note
1S3991	Comb Generator	Com-Power	CGO-51000	See Note	See Note
1S3928	EMI Tester Receiver	Rohde & Schwarz	ESR26	03/04/2021	03/04/2022
1S2399	Turntable Controller	SUNOL SCIENCE	SC99V	See Note	See Note
1S2600	Bilog Antenna	Teseq	CBL6112D	05/11/2021	05/11/2023
1U3962	Spectrum Analyzer (PSA)	Keysight/Agilent	E4448A	07/31/2020	07/31/2021
1S2435	Horn Antenna (Medium)	ETS-Lindgren	3117	03/09/2021	03/09/2023
1S2587	Preamplifier	AML Communications	AML0126L3801	See Note	See Note
Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.					

Table 2. Radiated Emissions, Test Equipment

END OF REPORT