**MET Laboratories, Inc.** ***Safety Certification - EMI - Telecom Environmental Simulation***
**914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313**
**33439 WESTERN AVENUE • UNION CITY, CALIFORNIA 94587 • PHONE (510) 489-6300 • FAX (510) 489-6372**
**3162 BELICK STREET • SANTA CLARA, CALIFORNIA 95054 • PHONE (408) 748-3585 • FAX (510) 489-6372**
**13501 MCCALLEN PASS • AUSTIN, TEXAS 78753 • PHONE (512) 287-2500 • FAX (512) 287-2513**

November 28, 2018

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

Dear Mr. William Holt,

Enclosed is the EMC test report for compliance testing of the Dakota Ultrasonics, CMX USB family, tested to the requirements of EN 61326-1: 2013.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Rheine Nguyen
Documentation Department

Reference: (\Dakota Ultrasonics\EMCS101405-EURO)

**MET Laboratories, Inc.** *Safety Certification - EMI - Telecom Environmental Simulation*
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# Electromagnetic Compatibility
# Test Report

for the

**Dakota Ultrasonics**
**CMX USB family**

Tested under

**EN 61326-1: 2013**

**MET Report: EMCS101405-EURO**
**November 28, 2018**

**Prepared for:**
**Dakota Ultrasonics**
**1500 Green Hills Road #107**
**Scotts Valley, CA 95066**

ACCREDITED
TESTINGCERT #0591.02

**Prepared by:**
**MET Laboratories, Inc.**
3162 Belick Street
Santa Clara, CA 95054

# Electromagnetic Compatibility
# Test Report

For the

**Dakota Ultrasonics**
**CMX USB family**

Tested under

**EN 61326-1: 2013**

**MET Report: EMCS101405-EURO**

Marcus Meyer
Project Engineer, Electromagnetic Compatibility Lab

Rheine Nguyen
Documentation Department

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the applicable limits. 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 per Test Summary (Section 1.0).

John Mason
Director, Electromagnetic Compatibility Lab

# Report Status Sheet

| Revision | Report Date | Reason for Revision |
|---|---|---|
| Ø | November 28, 2018 | Initial Issue. |

  

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# List of Terms and Abbreviations

| | | | |
|---|---|---|---|
| **AC** | **A**lternating **C**urrent | **FOKI** | **F**requency **o**f **K**ey **I**nterest |
| **µF** | **microf**arad | **GRP** | **G**round **R**eference **P**lane |
| **µH** | **microh**enry | **H** | Magnetic Field |
| **µs** | **micros**econds | **HCP** | **H**orizontal **C**oupling **P**lane |
| **ACF** | **A**ntenna **C**orrection **F**actor | **Hz** | **H**er**z** |
| **AV** | **Av**erage | **IEC** | **I**nternational **E**lectrotechnical **C**ommission |
| **Cal** | **Cal**ibration | **kHz** | **k**ilo**h**er**z** |
| **CE** | **C**onducted **E**missions | **kPa** | **k**ilo**pa**scal |
| **CI** | **C**onducted **I**mmunity | **kV** | **k**ilo**v**olt |
| **CISPR** | **C**omite **I**nternational **S**pecial des **P**erturbations **R**adioelectriques (International Special Committee on Radio Interference) | **LISN** | **L**ine **I**mpedance **S**tabilization **N**etwork |
| ***d*** | **M**easurement **D**istance | **MHz** | **M**ega**h**ertz |
| **dB** | **D**eci**b**els | **MI** | **M**agnetic **I**mmunity |
| **dBµA** | **D**eci**b**els above one **micro**amp | **PRF** | **P**ulse **R**epetition **F**requency |
| **dBµA/m** | **D**eci**b**els above one **micro**amp **per m**eter | **QP** | **Q**uasi **P**eak |
| **dBµV** | **D**eci**b**els above one **micro**volt | **RE** | **R**adiated **E**missions |
| **dBµV/m** | **D**eci**b**els above one **micro**volt **per m**eter | **RF** | **R**adio **F**requency |
| **DC** | **D**irect **C**urrent | **RI** | **R**adiated **I**mmunity |
| **E** | **E**lectric Field | **RMS** | **R**oot-**M**ean-**S**quare |
| **EFT/B** | **E**lectrical **F**ast **T**ransient/**B**urst | **V/m** | **V**olts **per m**eter |
| **ESD** | **E**lectro**s**tatic **D**ischarge | **VCP** | **V**ertical **C**oupling **P**lane |
| **EUT** | **E**quipment **U**nder **T**est | **VDI** | **V**oltage **D**ips **I**nterruptions |
| ***f*** | **F**requency | **VF** | **V**oltage **F**luctuations |

# 1.0 Testing Summary

The following tests specified by EN 61326-1 were performed with the following results:

| Test Method | Test Description | Compliance |
|---|---|---|
| EN 55011: 2009 +A1: 2010 | Conducted Emissions - Voltage - Class A | **NA** |
| EN 55011: 2009 +A1: 2010 | Radiated Emissions - Class A | **Compliant** |
| EN 61000-3-2: 2006 +A2:2009 | Harmonic Current Emissions | **NA** |
| EN 61000-3-3: 2008 | Voltage Fluctuations/Flicker | **NA** |
| EN 61000-4-2: 2009 | Electrostatic Discharge Immunity | **Compliant** |
| EN 61000-4-3: 2006 +A1:2008 +A2:2010 | Radiated Electromagnetic Field Immunity | **Compliant** |
| EN 61000-4-4: 2012 | Electrical Fast Transient/Burst Immunity | **NA** |
| EN 61000-4-5: 2006 | Surge Immunity | **NA** |
| EN 61000-4-6: 2009 | Conducted Radio-Frequency Immunity | **NA** |
| EN 61000-4-8: 2010 | Magnetic Immunity | **NA** |
| EN 61000-4-11: 2004 | Voltage Dips, Interruptions and Variations | **NA** |

**Table 1: Executive Summary of EN 61326-1 Compliance Testing**

# 2.0 Equipment Configuration

## 2.1. Overview

MET Laboratories, Inc. was contracted by Dakota Ultrasonics to perform testing on the CMX USB family, under Dakota Ultrasonics quote number 1DAK2910.

This document describes the test setups, test methods, required test equipment, and the test limit used to perform compliance testing of the CMX USB family with the requirements of EN 61326-1: 2013, Electrical Equipment for Measurement, Control and Laboratory Use. .

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

| | |
|---|---|
| **Model(s) Tested:** | CMX USB family |
| **Model(s) Covered:** | CMX USB family |
| **Primary Power as Tested:** | 4.5 VDC |
| **Equipment Emissions Class:** | A |
| **Evaluated by:** | Marcus Meyer |
| **Report Date:** | November 28, 2018 |

### 2.1.1. Test Site

All testing was performed at MET Laboratories, 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.

MET Laboratories is a ISO/IEC 17025 accredited site by A2LA, California #0591.02.

### 2.1.2. Measurement Uncertainty

| Test Method | Typical Expanded Uncertainty (dB) | K | Confidence Level |
|---|---|---|---|
| **Radiated Emissions, (30 MHz – 1 GHz)** | ±3.24 | 2 | 95% |

**Table 2: Uncertainty Calculations Summary**

## 2.2. Detailed EUT Description and Test Setup

### 2.2.1. Description of Test Sample

The CMX USB family, Equipment Under Test (EUT), consists of multiple versions of the same circuit board with various features enabled or disabled. CMX DL PLUS is the fully loaded version which has waveform display and data logging. CMX DL does not have the waveform display. CMX does not have waveform display or data logging.

All these gauges are used to measure thickness by transit time of ultrasonic wave through the material to be tested. Thickness of piping, tanks, and bottles can be measured in various materials including steel, aluminum, glass, and some plastics.

### 2.2.2. Photograph(s) of Test Sample


**Photograph 1. CMX USB family**

### 2.2.3. Block Diagram

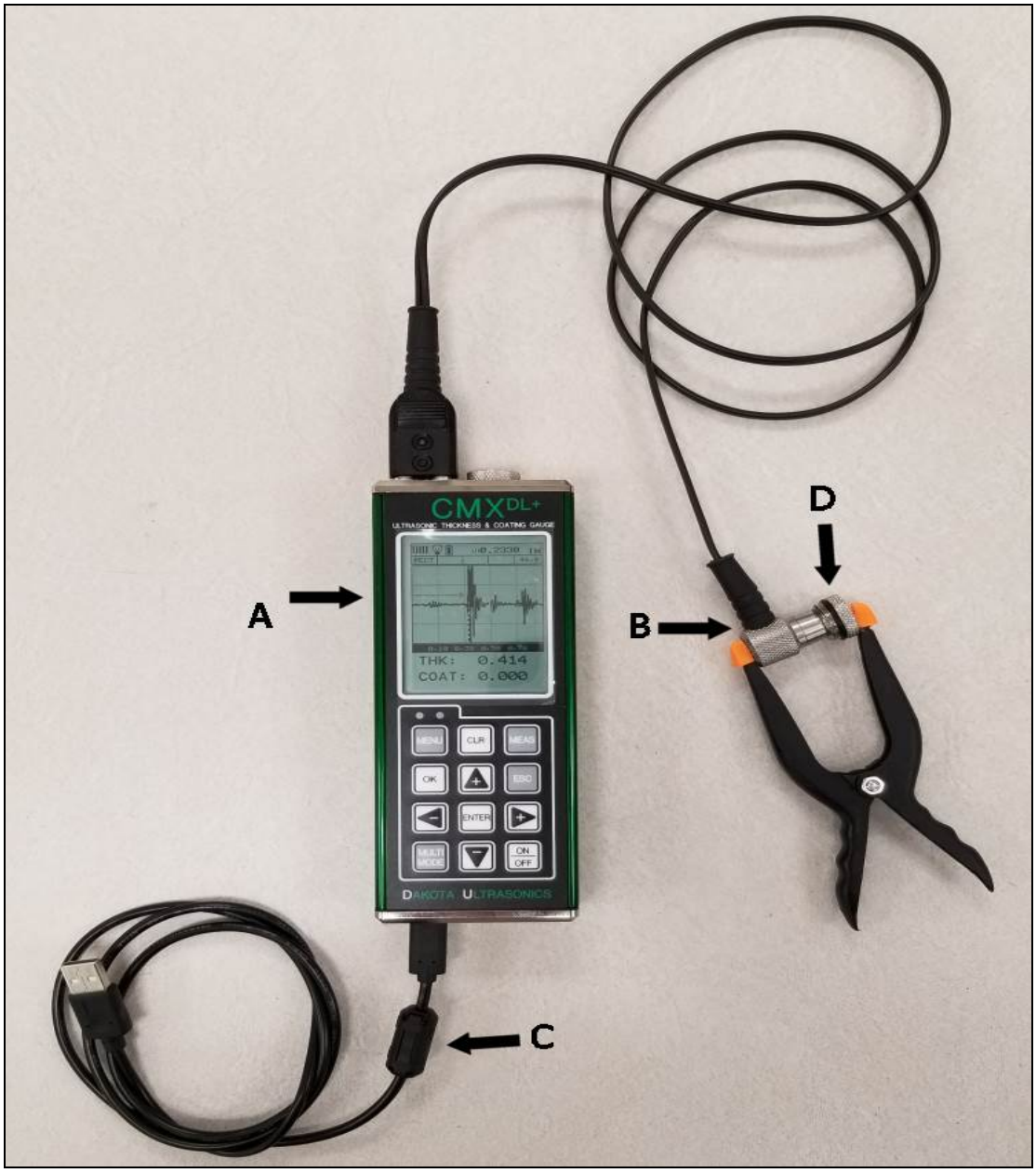



**Figure 1. Block Diagram of Test Configuration**

### 2.2.4. Equipment Configuration

The EUT was setup as outlined in Figure 1. All equipment incorporated as part of the EUT is included in the following list.

| Ref. ID | Slot # | Name / Description | Model Number | Part Number | Serial Number | Rev. # |
|---|---|---|---|---|---|---|
| A | -- | CMX thickness gauge | CMX DL + | -- | 9735 | pcb C |
| A | -- | CMX thickness gauge | CMX DL + | -- | 9736 | pcb C |

**Table 3. Equipment Configuration**

### 2.2.5. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

| Ref. ID | Name / Description | Manufacturer | Model Number | *Customer Supplied Calibration Data |
|---|---|---|---|---|
| B | Transducer | Dakota Ultrasonics | T-102-2900 | NA |
| B | Transducer | Dakota Ultrasonics | T-102-2900 | NA |
| D | Zero Block | Dakota Ultrasonics | NA | NA |
| D | Zero Block | Dakota Ultrasonics | NA | NA |

**Table 4. Support Equipment**

* All 'customer supplied' support equipment will include the equipments calibration data. This column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.

### 2.2.6. Ports and Cabling Information

| Ref. ID | Port name on EUT | Cable Description or reason for no cable | Qty | Length as tested (m) | Max Length (m) | Shielded (Y/N) | Termination Box ID & Port Name |
|---|---|---|---|---|---|---|---|
| C | USB Cable | Power and data | 1 | 1 | -- | Yes | NA |
| C | USB Cable | Power and data | 1 | 1 | -- | Yes | NA |

**Table 5. Ports and Cabling Information**

## 2.2.7. Mode of Operation & Method of Monitoring EUT Operation

**The EUT was operated in the following manner:**
CMX DL PLUS gauge has all the features of the family and therefore represents worst case of the family. Gauge is to be tested in normal measure mode with the transducer clamped to a test block. Backlight should be set to ON and the alarm beeper activated.

**Performance of the EUT was monitored in the following manner:**
A thickness reading with stability display (in upper left corner of display similar to cell phone signal strength bars) of at least 4 bars indicates proper operation. Thickness display (once calibrated to material) may vary +/- 0.002 inch. Note that temperature change in the transducer may require recalibration. The best mode to view operation is the RF display with the OK pressed which will show both.

## 2.2.8. Overall Immunity Performance Criteria

In accordance with EN 61326-1, the EUT was evaluated according to the following performance criteria where specified:

**EN 61326-1 Sub-clause**
**6.4.1 General**

The general principles (performance criteria) for the evaluation of the immunity test results are the following.

**6.4.2 Performance Criterion A**

The equipment shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

**6.4.3 Performance Criterion B**

The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

**6.4.4 Performance Criterion C**

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

| Reference | Descriptive Name | EN 61326-1: 2013, Table 1 Performance Criteria Required | EN 61326-1: 2013, Table 1 Performance Criteria Achieved |
|---|---|---|---|
| EN 61000-4-2: 2009 | Electrostatic Discharge Immunity | B | A |
| EN 61000-4-3: 2006 +A1:2008 +A2:2010 | Radiated Electromagnetic Field Immunity | A | A |

**Table 6. Performance Criteria Summary**

## 2.2.9. Modifications to EUT

No modifications were made to the EUT.

## 2.2.10. Disposition of EUT

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

# 3.0 Electromagnetic Compatibility Emission Criteria

## 3.1. Radiated Emission: Limits of Electromagnetic Radiation Disturbance

### 3.1.1. Test Method, Test Requirements, and Test Procedures

#### 3.1.1.1. Test Method

**EN 55011: 2009 +A1: 2010**
Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and Methods of Measurement

#### 3.1.1.2. Test Requirements

In accordance with EN 61326-1, Section 7.2 Emission Limits, the EUT shall meet the Class A radiated emission limits shown in Table 7.

| Frequency Band (MHz) | Class A Quasi-Peak limits 10 m measurement distance (dBµV/m) |
|---|---|
| 30 to 230 | 40 |
| 230 to 1000 | 47 |

**Table 7. Radiated Emission Limits for Class A Equipment from EN 61326-1**

#### 3.1.1.3. Test Procedure

The EUT was placed on a wooden table 80 cm above a GRP located inside a semi-anechoic chamber. The method of testing, test conditions, and test procedures of CISPR 11: 2009 were used. An antenna was located 3 m 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 bandwidth.

Emissions measured at 3 m were normalized using an inverse proportionality factor of 20dB per decade for comparison to the 10 m limit. The physical size of the EUT was taken into account as to avoid near-field effects, which could occur near 30 MHz.

### 3.1.2. Test Results, Test Data, and Test Setup

#### 3.1.2.1. Test Result

The EUT was **compliant** with the Class A requirement(s) of this section. Measured emissions were below applicable limits.

| Environmental Conditions for Radiated Emission | |
|---|---|
| **Ambient Temperature:** | 18.5°C |
| **Relative Humidity:** | 47% |
| **Atmospheric Pressure:** | 102.1 kPa |

**Test Engineer(s):** Marcus Meyer

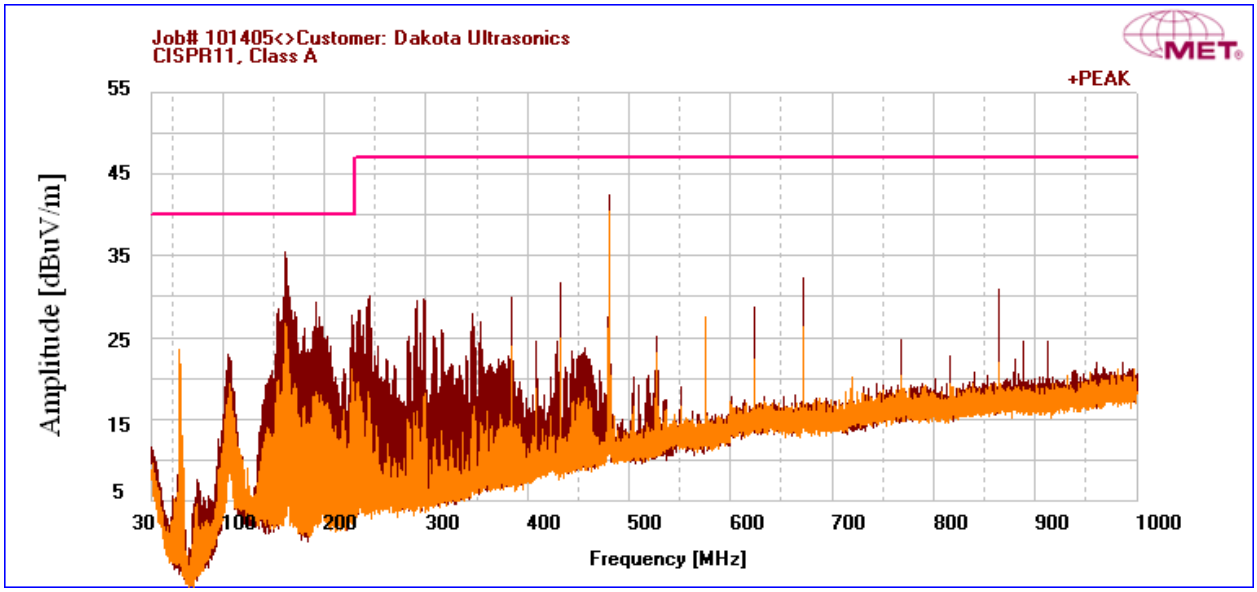
**Test Date(s):** 10/31/2018

### 3.1.2.2. 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 162.84 | H | 360 | 196.76 | 25.88 | 10.316 | 0 | 2 | -10.46 | 27.736 | 40 | -12.264 |
| 384 | H | 327 | 261.76 | 20.8 | 16.04 | 0 | 2.68 | -10.46 | 29.06 | 47 | -17.94 |
| 432 | H | 328 | 218.58 | 23.38 | 17.24 | 0 | 3.158 | -10.46 | 33.318 | 47 | -13.682 |
| 480 | H | 312 | 188.70 | 32.3 | 17.8 | 0 | 3.35 | -10.46 | 42.99 | 47 | -4.01 |
| 672 | H | 301 | 118.64 | 19.01 | 19.8 | 0 | 3.916 | -10.46 | 32.266 | 47 | -14.734 |
| 864 | H | 335 | 100 | 15.48 | 21.18 | 0 | 4.856 | -10.46 | 31.056 | 47 | -15.944 |

**Table 8. RE - (30 MHz – 1 GHz) Test Results**

Note: 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.

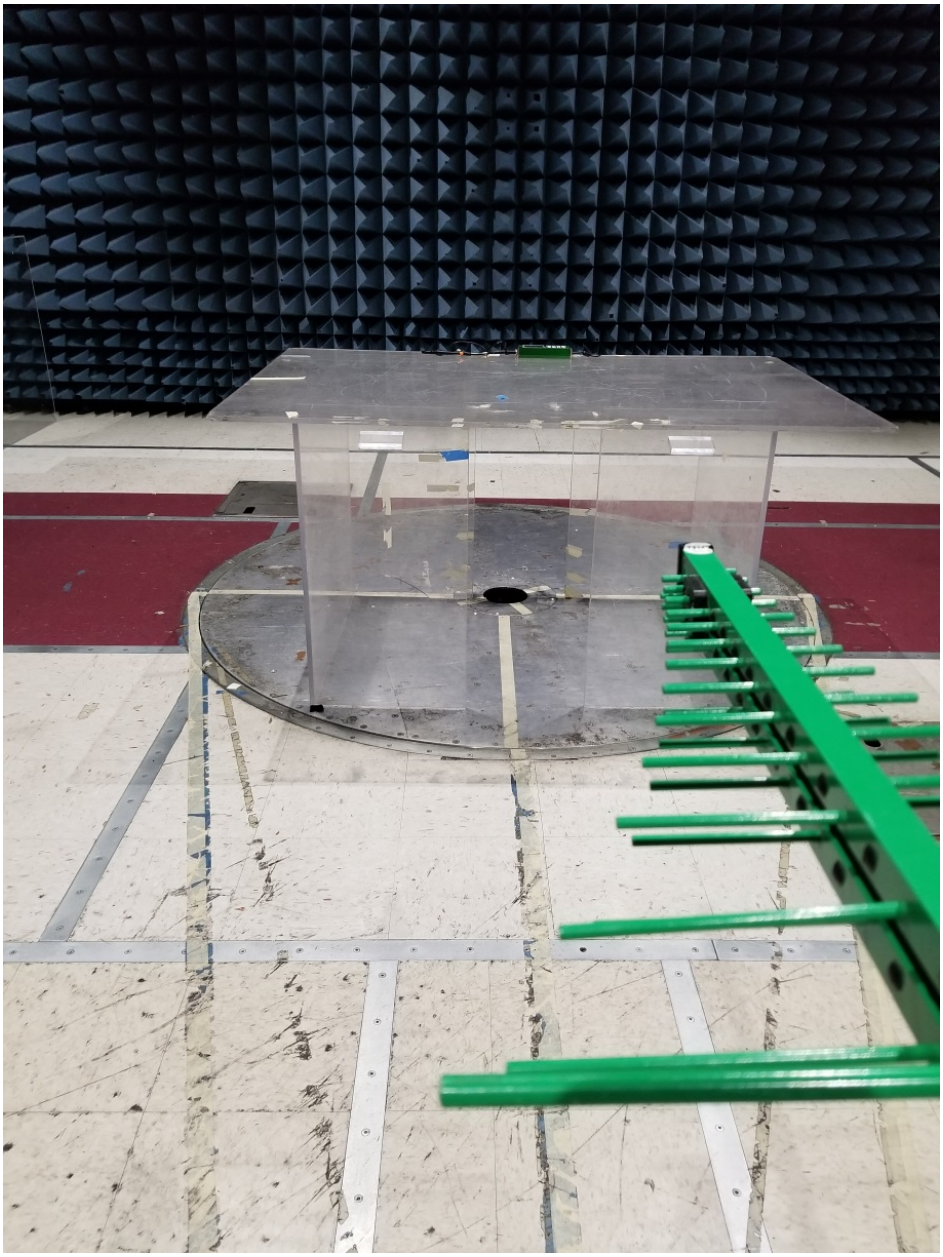



**Plot 1. RE - (30 MHz – 1 GHz), Plot**

= Vertical Polarization
= Horizontal Polarization

### 3.1.2.3. Test Setup Photograph



**Photograph 2. RE (30 MHz – 1 GHz) Test Setup**

### 3.1.2.4. Test Setup Photograph

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

| **Test Name:** Radiated Emissions Electric Field | | | **Test Date(s):** 10/31/2018 | | |
|---|---|---|---|---|---|
| **MET Asset #** | **Equipment** | **Manufacturer** | **Model** | **Last Cal Date** | **Cal Due Date** |
| 1S2399 | Turntable Controller | SUNOL SCIENCE | SC99V | See Note | See Note |
| 1S2501 | EMI Test Receiver 20 Hz-40 GHz | Rohde & Schwarz | ESU40 | 02/16/2018 | 02/16/2019 |
| 1S2482 | 5 Meter Chamber (NSA) | Panashield | 5 Meter Semi-Anechoic Chamber | See Note | See Note |
| 1S2600 | Bilog Antenna | Teseq | CBL6112D | 11/28/2016 | 11/28/2018 |
| Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing. | | | | | |

**Table 9. RE Test Equipment List**

# 4.0 Electromagnetic Compatibility Immunity Criteria

## 4.1. Electrostatic Discharge

### 4.1.1. Test Method, Test Requirements, and Test Procedures

#### 4.1.1.1. Test Method

**EN 61000-4-2: 2009**
Electromagnetic Discharge Immunity Test

#### 4.1.1.2. Test Requirements

**EN 61326-1, Section 6.2, Immunity Requirements**
Per EN 61000-4-2, the EUT shall be tested with air discharges of up to ±8 kV applied to non-conductive surfaces, and to contact discharges of up to ±4 kV, applied to conductive surfaces of the EUT, HCP and the VCP.

#### 4.1.1.3. Test Procedure

The EUT and cables were isolated from the ground reference plane by an insulating support approximately **0.5 mm** thick. Air discharges of up to ±8 kV were applied to non-conductive surfaces. Contact discharges of up to ±4 kV were applied to conductive surfaces of the EUT and the HCP and VCP. Discharges were applied at least ten times to each selected discharge point at each polarity with a minimum time between discharges of 1s. The functionality of the EUT was determined during and after each discharge.

## 4.1.2. Test Results, Test Data, and Test Setup

### 4.1.2.1. Test Results

The EUT was **compliant** with the requirement(s) of this section. No anomalies observed.

| Environmental Conditions for Electrostatic Discharge | |
|---|---|
| **Ambient Temperature:** | 19.3°C |
| **Relative Humidity:** | 48% |
| **Atmospheric Pressure:** | 102.0 kPa |

**Test Engineer(s):** Marcus Meyer

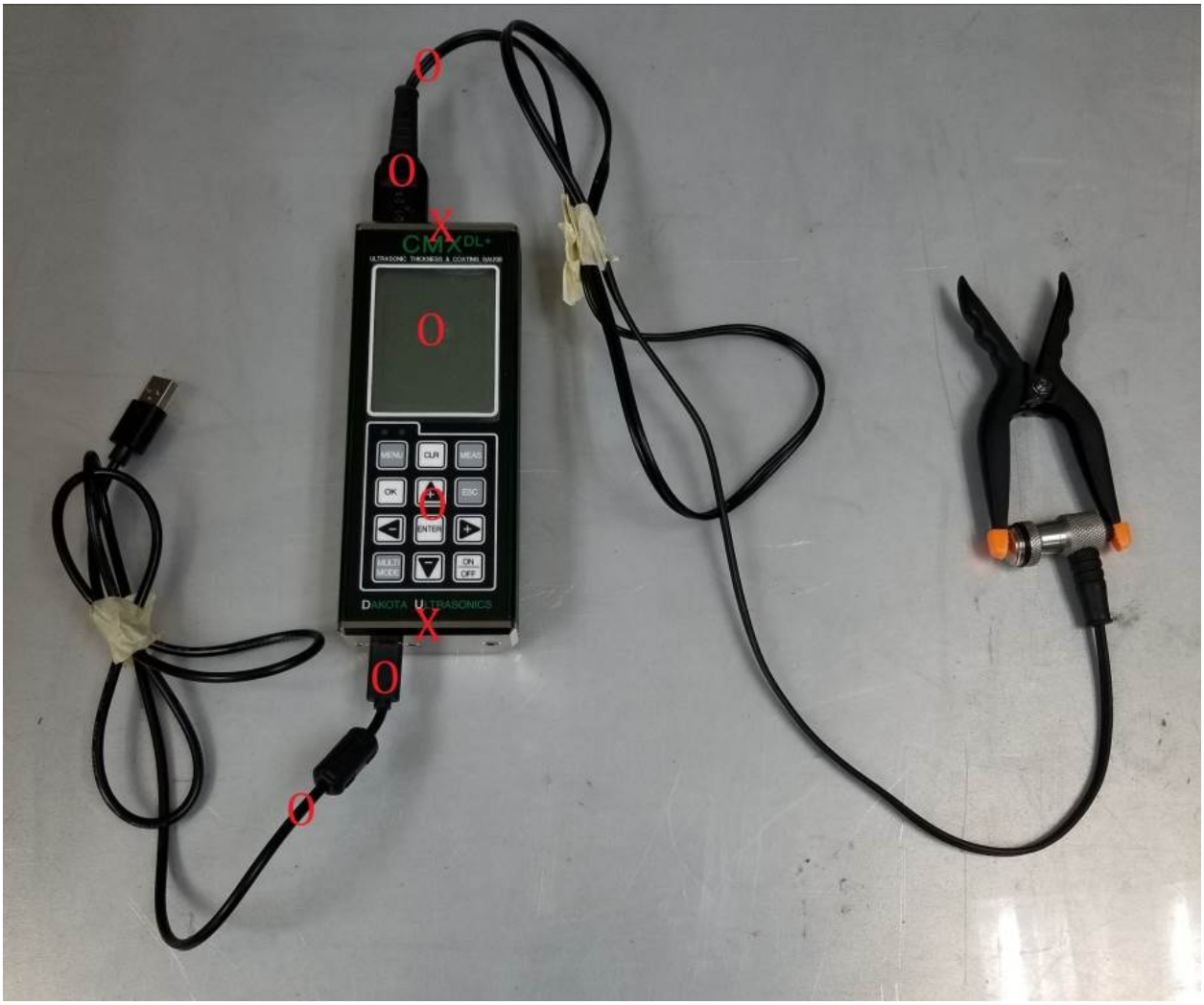
**Test Date(s):** 10/31/2018

### 4.1.2.2. Test Data

| Discharge Type | Test Voltage (±kV) | Results | | | | | | Anomalies |
|---|---|---|---|---|---|---|---|---|
| | | Front | Rear | Left | Right | Top | Bottom | |
| **HCP** | 4 | Pass | Pass | Pass | Pass | Pass | Pass | None |
| **VCP** | 4 | Pass | Pass | Pass | Pass | Pass | Pass | None |
| **Contact Discharge** | 2 | Pass | Pass | Pass | Pass | Pass | Pass | None |
| | 4 | Pass | Pass | Pass | Pass | Pass | Pass | None |
| **Air Discharge** | 2 | Pass | Pass | Pass | Pass | Pass | Pass | None |
| | 4 | Pass | Pass | Pass | Pass | Pass | Pass | None |
| | 6 | Pass | Pass | Pass | Pass | Pass | Pass | None |
| | 8 | Pass | Pass | Pass | Pass | Pass | Pass | None |

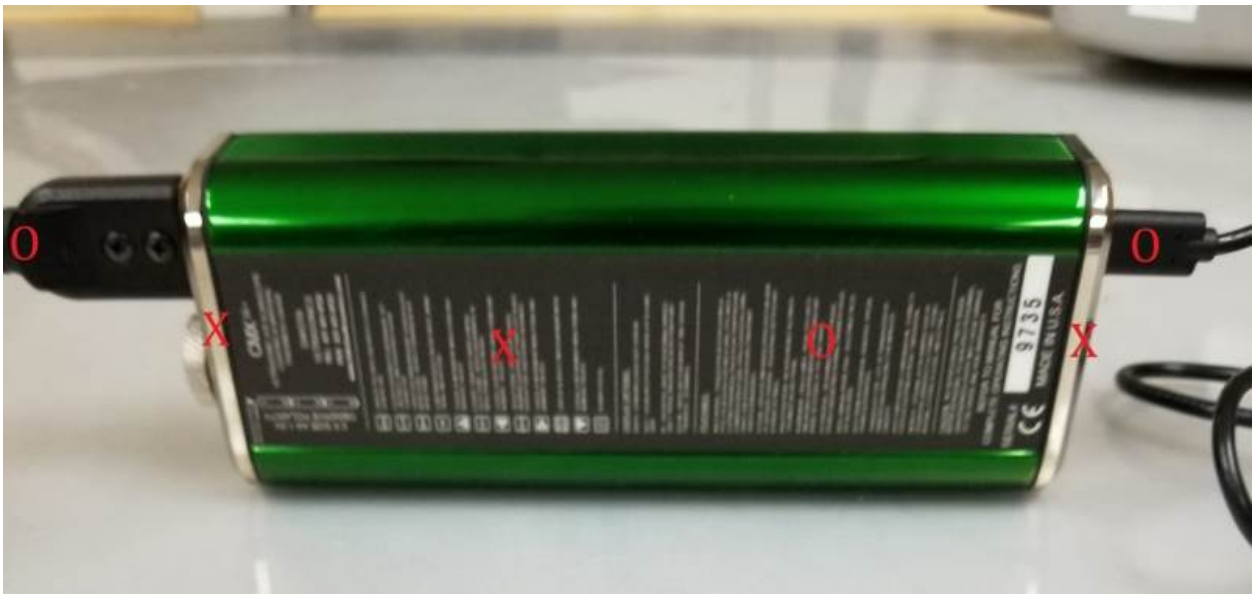
**Table 10. ESD Test Results**

### 4.1.2.3. ESD Test Point Photographs




**Photograph 3. ESD Test Points – Front of EUT**

X = Contact Discharge Test Points
O = Air Discharge Test Points




**Photograph 4. ESD Test Points – Rear of EUT**


**Photograph 5. ESD Test Points – Right of EUT**

X = Contact Discharge Test Points
O = Air Discharge Test Points


**Photograph 6. ESD Test Points – Left of EUT**

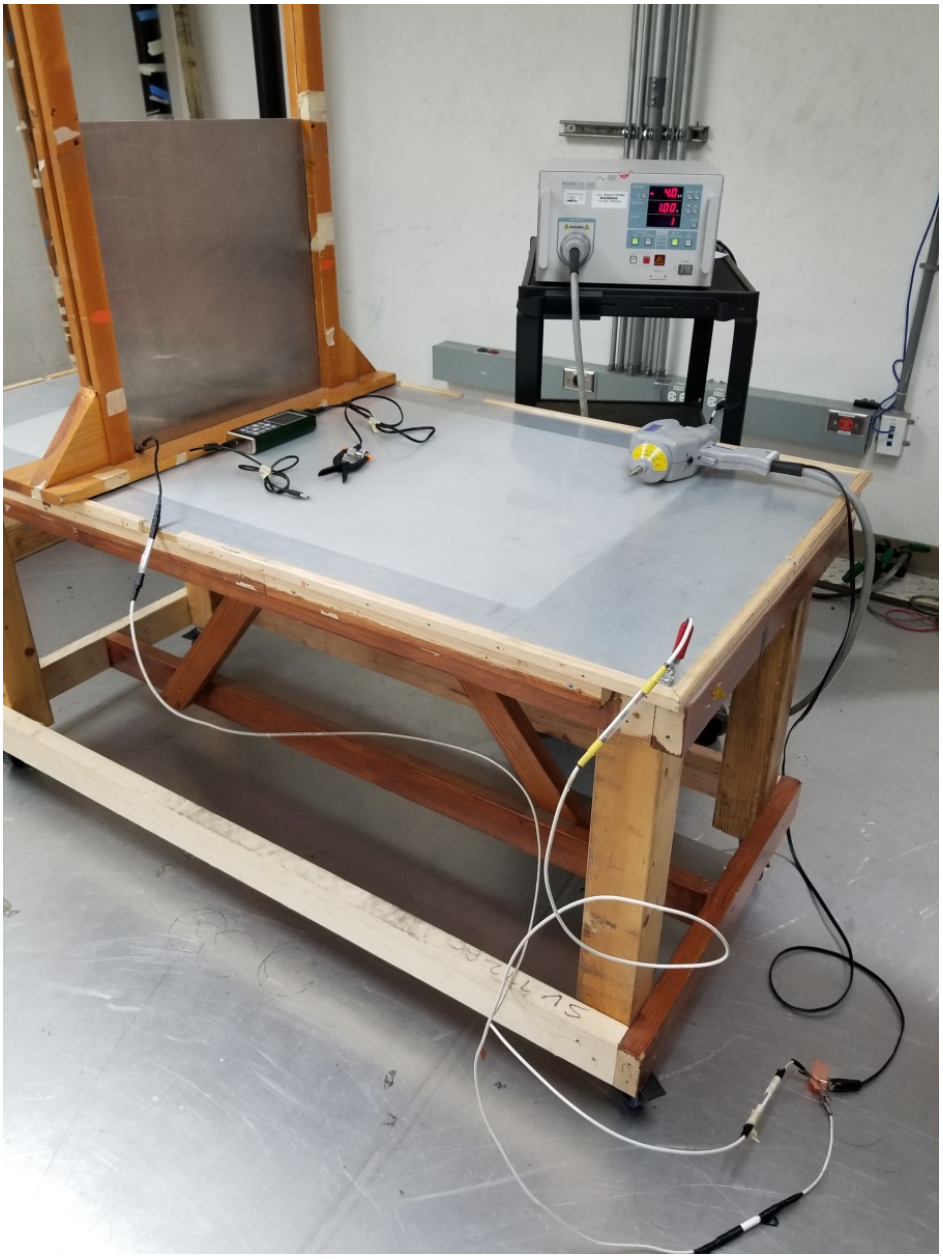

**Photograph 7. ESD Test Points – Top of EUT**

X = Contact Discharge Test Points
O = Air Discharge Test Points


**Photograph 8. ESD Test Points – Bottom of EUT**

X = Contact Discharge Test Points
O = Air Discharge Test Points

### 4.1.2.4. Test Setup Photograph



**Photograph 9. ESD Test Setup**

### 4.1.2.5. Test Equipment List

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

| **Test Name:** Electrostatic Discharge | | | **Test Date(s):** 10/31/2018 | | |
|---|---|---|---|---|---|
| **MET Asset #** | **Equipment** | **Manufacturer** | **Model** | **Last Cal Date** | **Cal Due Date** |
| 1S2491 | Ground Plane 3 | MET LABS | N/A | See Note | See Note |
| 1U0264 | Electrostatic Discharge Simulator | NoiseKen | ESS-2002 | 02/16/2018 | 02/16/2019 |
| 1U0265 | Discharge Gun | NoiseKen | TC-815R | See Note | See Note |
| Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing. | | | | | |

**Table 11. ESD Test Equipment List**

## 4.2. Radio Frequency Electromagnetic Field

### 4.2.1. Test Method, Test Requirements, and Test Procedures

#### 4.2.1.1. Test Method

**EN 61000-4-3: 2006 +A1:2008 +A2:2010**
Radiated, Radio-Frequency, Electromagnetic Field Immunity Test

#### 4.2.1.2. Test Requirements

**EN 61326-1, Section 6.2, Immunity Requirements**
The EUT must not be susceptible to a radiated electromagnetic field of 10 V/m, 3 V/m, and 1 V/m, 80% amplitude modulated 1 kHz, in the frequency range 80 MHz to 2.7 GHz.

#### 4.2.1.3. Test Procedure

Testing was performed in a semi-anechoic chamber as recommended by IEC 61000-4-3. The radiating antenna was placed 2.2 m in front of the EUT Support equipment for the EUT was located outside of the test room. The amplitude, frequency, and dwell time of the radiated interference was controlled by an automated, computer-controlled system.

The signal source was stepped through the applicable frequency range at a rate no faster than 1% of the fundamental. The signal was amplitude modulated 80% over the frequency range 80 MHz to 2.7 GHz at a level of 10 V/m, 3 V/m, and 1 V/m. The dwell time was set at 1 s. Field presence was monitored during testing via a field probe placed in close proximity to the EUT. Throughout testing, the EUT was closely monitored for signs of susceptibility. The test was performed with the antennae oriented in both a horizontal and vertical polarization.

### 4.2.2. Test Results, Test Data, and Test Setup

#### 4.2.2.1. Test Result

The EUT was **compliant** with the requirement(s) of this section. No anomalies observed.

| Environmental Conditions for Radio Frequency Electromagnetic Field | |
|---|---|
| **Ambient Temperature:** | 22.6°C |
| **Relative Humidity:** | 45% |
| **Atmospheric Pressure:** | 102.9 kPa |

**Test Engineer(s):** Marcus Meyer

**Test Date(s):** 11/02/2018

### 4.2.2.2. Test Data

| Start Frequency (MHz) | Stop Frequency (MHz) | Severity (V/m) | Polarity (H/V) | Modulation (Freq & Type) | Results | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Front | Back | Left | Right |
| 80 | 1000 | 10 | V | 1 kHz, 80% AM | Pass | Pass | Pass | Pass |
| 80 | 1000 | 10 | H | 1 kHz, 80% AM | Pass | Pass | Pass | Pass |
| 1400 | 2000 | 3 | V | 1 kHz, 80% AM | Pass | Pass | Pass | Pass |
| 1400 | 2000 | 3 | H | 1 kHz, 80% AM | Pass | Pass | Pass | Pass |
| 2000 | 2700 | 3 | V | 1 kHz, 80% AM | Pass | Pass | Pass | Pass |
| 2000 | 2700 | 3 | H | 1 kHz, 80% AM | Pass | Pass | Pass | Pass |

**Table 12. RI Test Results**

### 4.2.2.3. Test Setup Photograph

**Photograph 10. RI (80 MHz – 1 GHz) Test Setup**


**Photograph 11. RI (Above 1 GHz) Test Setup**

### 4.2.2.4. Test Equipment List

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

| **Test Name:** Radio Frequency Electromagnetic Field | | | **Test Date(s):** 11/02/2018 | | |
|---|---|---|---|---|---|
| **MET Asset #** | **Equipment** | **Manufacturer** | **Model** | **Last Cal Date** | **Cal Due Date** |
| 1S2264 | Radiated Immunity Chamber | LINDGREN | N/A | See Note | See Note |
| 1S2401 | Bilog Antenna | Schaffner | CBL6140A | See Note | See Note |
| 1S2198 | Horn Antenna | EMCO | 3115 | See Note | See Note |
| 1S3872 | Amplifier | Amplifier Research | 80/20S1G8 | See Note | See Note |
| 1S2643 | Signal Generator 40 GHz | Anritsu | MG3694B | 09/11/2018 | 09/11/2019 |
| 1S2576 | Amplifier (80-1000 MHz) | Amplifier Research | 500W1000A | See Note | See Note |
| 1S3929 | E-Field Probe | Narda | PMM EP-601 | 02/05/2018 | 02/05/2019 |
| Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing. | | | | | |

**Table 13. RI Test Equipment List**

# 5.0 CE Conformity Marketing

In order to place the CE marking on your product, it must meet all the requirements of all applicable directives.

**The CE conformity marking shall consist of the initial "CE" taking the following form:**

If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected. The various components of the CE marking must have substantially the same vertical dimension, which may not be less than 5 mm.

Declaration of Conformity -

The Declaration must identify the manufacturer or its authorized representative established within the 15 nation European Union (EU). The Declaration must be signed by the party empowered to enter into commitments on behalf of the manufacturer or its authorized representative established within the EU.

User's Manual -

The User's Manual which accompanies the equipment must indicate the Directive(s) to which the CE Mark indicates compliance.

Disposition of Documents -

The technical documentation package and the Declaration of Conformity must be kept within the EU at the disposal of relevant national authorities for inspection. The information must be maintained for a period ending at least 10 years after the last product has been manufactured.

Internal Production Control -

The manufacturer shall take all measures necessary in order that the manufacturing process shall ensure compliance of the manufactured products with the technical documentation and with the requirements of the Directives that apply to them.

**Example of a DoC:**

# DECLARATION OF CONFORMITY

Application of Council Directive(s)**: EU/EMC Directive 2014/30/EU**

Standards to which Conformity is Declared: **EN 61326-1: 2013**

**Class A/B**

Declarer's Name: **Dakota Ultrasonics**

Declarer's Address: **1500 Green Hills Road #107, Scotts Valley, CA 95066**

Type of Equipment: **CMX USB family**

*I the undersigned, hereby declare under my sole responsibility that the equipment specified above conforms to the above Directive(s) and Standard(s).*

(Signature) (Date)

(Printed name) (Title)

To be completed by Dakota Ultrasonics personnel.

# 6.0 Test Plan

## EMC Test Plan for the Dakota Ultrasonics, CMX USB family

(Please refer to the following section numbers of EN 61326-1 for more detailed information)

**EN 61326**
**Subclause:**
**5.2.2 COMPOSITION OF EUT**

| | |
|---|---|
| Manufacturer: | Dakota Ultrasonics |
| Model: | CMX USB family |
| Serial Number: | 9735 |
| Size (inches): | Height – 2.5 inches<br>Width – 6.5 inches<br>Length – 1.24 inches |
| Electrical Ratings: | 4.5 VDC |
| Installation: | Table top |
| Description: | The CMX family consists of multiple versions of the same circuit board with various features enabled or disabled. CMX DL PLUS is the fully loaded version which has waveform display and data logging. CMX DL does not have the waveform display. CMX does not have waveform display or data logging.<br><br>All these gauges are used to measure thickness by transit time of ultrasonic wave through the material to be tested. Thickness of piping, tanks, and bottles can be measured in various materials including steel, aluminum, glass, and some plastics. |

**5.2.3 ASSEMBLY of EUT**

| Ref. ID | Slot # | Name / Description | Model Number | Part Number | Serial Number | Rev. # |
|---|---|---|---|---|---|---|
| A | -- | CMX thickness gauge | CMX DL + | -- | 9735 | pcb C |
| A | -- | CMX thickness gauge | CMX DL + | -- | 9736 | pcb C |

**5.2.4 I/O PORTS**

| Ref. ID | Name / Description | Manufacturer | Model Number | Customer Supplied Calibration Data |
|---|---|---|---|---|
| B | Transducer | Dakota Ultrasonics | T-102-2900 | NA |
| B | Transducer | Dakota Ultrasonics | T-102-2900 | NA |
| D | Zero Block | Dakota Ultrasonics | NA | NA |
| D | Zero Block | Dakota Ultrasonics | NA | NA |

### 5.2.5 AUXILLARY EQUIPMENT

| Ref. ID | Port name on EUT | Cable Description or reason for no cable | Qty | Length as tested (m) | Max Length (m) | Shielded (Y/N) | Termination Box ID & Port Name |
|---|---|---|---|---|---|---|---|
| C | USB Cable | Power and data | 1 | 1 | -- | Yes | NA |
| C | USB Cable | Power and data | 1 | 1 | -- | Yes | NA |

### 5.2.6 CABLING AND EARTHING

The EUT is a battery operated device with no external grounding connections.

### 5.3.1 OPERATION MODES

CMX DL PLUS gauge has all the features of the family and therefore represents worst case of the family. Gauge is to be tested in normal measure mode with the transducer clamped to a test block. Backlight should be set to ON and the alarm beeper activated.

### 5.3.2 ENVIRONMENTAL CONDITIONS

**Temperature Range: -20 to 50C**
**Humidity Range: Not specified**
**Atmospheric pressure: Not specified**

### 5.3.3 EUT SOFTWARE DURING TEST

DEV 3.00I

### 5.4 TEST DESCRIPTION

Tests shall be performed as per EN 61326-1, Table 2.

Is the product Class A or Class B in nature (Commercial or Residential)? Class A

Is the product used in Industrial locations? Yes

Is the product used in Controlled Electromagnetic environments (i.e. MRI areas)? No

Is the product battery operated Portable T&M equipment? Yes

Emissions tests shall be performed as per:
**1) Class A (commercial equipment)**
Immunity tests shall be performed as per:
**1) EN 61326-1: 2013, Table 2 – Immunity test requirements for equipment intended for use in industrial locations**