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EMC Test Report

Application for FCC Grant of Equipment Authorization

FCC Part 15 Subpart C

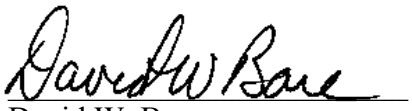
Model: Programmer Wand

FCC ID:	2AY43-INPW0
APPLICANT:	CCC del Uruguay Medical Devices General Paz 1371 Montevideo, MON 11400-UY
TEST SITE(S):	NTS Labs LLC 41039 Boyce Road. Fremont, CA. 94538-2435
PROJECT NUMBER:	PR136033
REPORT DATE:	December 15, 2021
REISSUE DATE:	December 8, 2022
FINAL TEST DATES:	April 14, 15, 16, 19 and 21, May 6 and October 13, 2021 and November 28, 2022
TOTAL NUMBER OF PAGES:	43

ACCREDITED
Testing Cert #0214.26

VALIDATING SIGNATORIES

PROGRAM MGR



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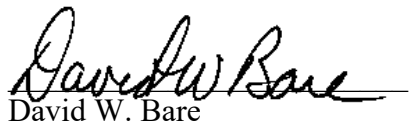

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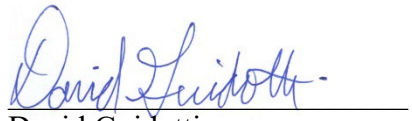

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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	December 15, 2021	First release	
1	December 8, 2022	Revised report to add additional Frequency Stability test data	David Guidotti

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SCOPE

An electromagnetic emissions test has been performed on the CCC del Uruguay Medical Devices model Programmer Wand, pursuant to the following rules:

FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in NTS Labs LLC test procedures:

ANSI C63.10-2013

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

NTS Labs LLC is accredited by the A2LA, certificate number 0214.26, to perform the test(s) listed in this report, except where noted otherwise.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of CCC del Uruguay Medical Devices model Programmer Wand complied with the requirements of the following regulations:

FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of CCC del Uruguay Medical Devices model Programmer Wand and therefore apply only to the tested sample. The sample was selected and prepared by Agustin Villavedra of CCC del Uruguay Medical Devices.

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS SUMMARY

FCC Rule Part		Description	Measured Value / Comments	Limit / Requirement	Result
15.225		Transmitter Fundamental Signal Emissions, 13.56 MHz	43.5 dBµV/m @ 13.560 MHz (margin: -7.0 dB)	50.5 dBµV/m (13.41 – 13.71 MHz)	Complies
15.209		Transmitter Radiated Spurious Emissions, 10 - 150 MHz	38.7 dBµV/m @ 108.48 MHz (margin: -4.8 dB)	Refer to table in limits section	Complies
15.225		Frequency Stability	9.2ppm	Less than 100 ppm	Complies
15.225		Frequency Stability - new	11.4ppm	Less than 100 ppm	Complies

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part		Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203		RF Connector	Integral Antenna	Unique or integral antenna required	Complies
15.207		AC Conducted Emissions	48.0 dBµV @ 0.386 MHz (-0.2 dB)	Refer to page 16	Complies
Note 1 Pass/Fail criteria defined by standards listed above.					

EXTREME CONDITIONS

Frequency stability is determined over extremes of temperature and voltage. As the device is USB powered equipment, the supply voltage was not reduced as specified by the manufacturer in 2021. Tests in 2022 added variation in supply voltage for 85% to 115% of nominal.

The extremes of temperature were -20°C to +50°C as specified in FCC §15.225(e).

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
Radiated emission (field strength)	dBµV/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dBµV	0.15 to 30 MHz	± 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The CCC del Uruguay Medical Devices model Programmer Wand is a programmer that is designed to interrogate and set parameters for implants. Since the EUT would be placed on a patient during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 5 Volts DC supplied from the USB port of the companion tablet.
The sample was received on April 13, 2021 and November 28, 2021 and tested on April 14, 15, 16, 19 and 21, May 6 and October 13, 2021 and November 28, 2022. The EUT consisted of the following component(s):

Original samples

Company	Model	Description	Serial Number	FCC ID
CCC Del Uruguay	13-100-008	Intellio Programming Wand	000081	2AY43-INPW0
CCC Del Uruguay	13-100-007	Intellio Programming Interface	000082	-
Getac	RX10	Tablet	RK703R0127	-

Samples in 2022

Company	Model	Description	Serial Number	FCC ID
Impulse Dynamics	13-100-007	Intelio Programming Interface	000206	
Impulse Dynamics	13-100-008	Intelio Programming Wand	000217	

OTHER EUT DETAILS

The following EUT details should be noted: The Programmer Wand transmits a wake-up signal at 13.56 MHz and then communicates with an implant using the MICS band.

ANTENNA SYSTEM

The antenna system consists of an integral loop.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 8 cm wide by 12 cm deep by 2.1 cm high.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at NTS Labs LLC.

SUPPORT EQUIPMENT

No support equipment was used during testing.

EUT INTERFACE PORTS

The I/O cabling configuration during testing was as follows:

2021

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Programmer	Programmer Wand	Multiwire	Shielded	3.0

2022 (EUT)

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Wand	USB	Multiwire	Unshielded	2.5
USB	Interface	Multiwire	Shielded	0.1

2022 (Additional on Support Equipment)

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
USB	External Power Supply	2 wire	Unshielded	1.0

EUT OPERATION

During emissions testing the EUT was commanded via the optimizer_emc test scripts on the tablet to operate in the desired mode for the particular test (i.e. Tx Modulated 400 MHz for continuous transmit on a channel in the 402-405 MHz band, Tx Modulated 13 MHz for continuous transmit at 13.56 and Rx Emissions, or Search Loop for continuous attempts to establish a link in the MICS band).

TEST SITE

GENERAL INFORMATION

Final test measurements were taken at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules, NTS Labs LLC has been recognized as an accredited test laboratory by the Commission. A description of the facilities employed for testing is maintained by NTS Labs LLC.

Site	Registration Number	Location
Chamber 4 & 5	US1031	41039 Boyce Road Fremont, CA 94538-2435

ANSI C63.4 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Results from testing performed in this chamber have been correlated with results from an open area test site above 30 MHz and with an open field site below 30 MHz. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.10. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

Software is used to view and convert receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers. The software used for radiated and conducted emissions measurements is NTS Labs LLC EMI Test Software (rev 2.10)

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.10 specifies that the test height above ground for table mounted devices shall be 80 centimeters for testing below 1 GHz and 1.5m for testing above 1 GHz. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor as specified in ANSI C63.4. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.10, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

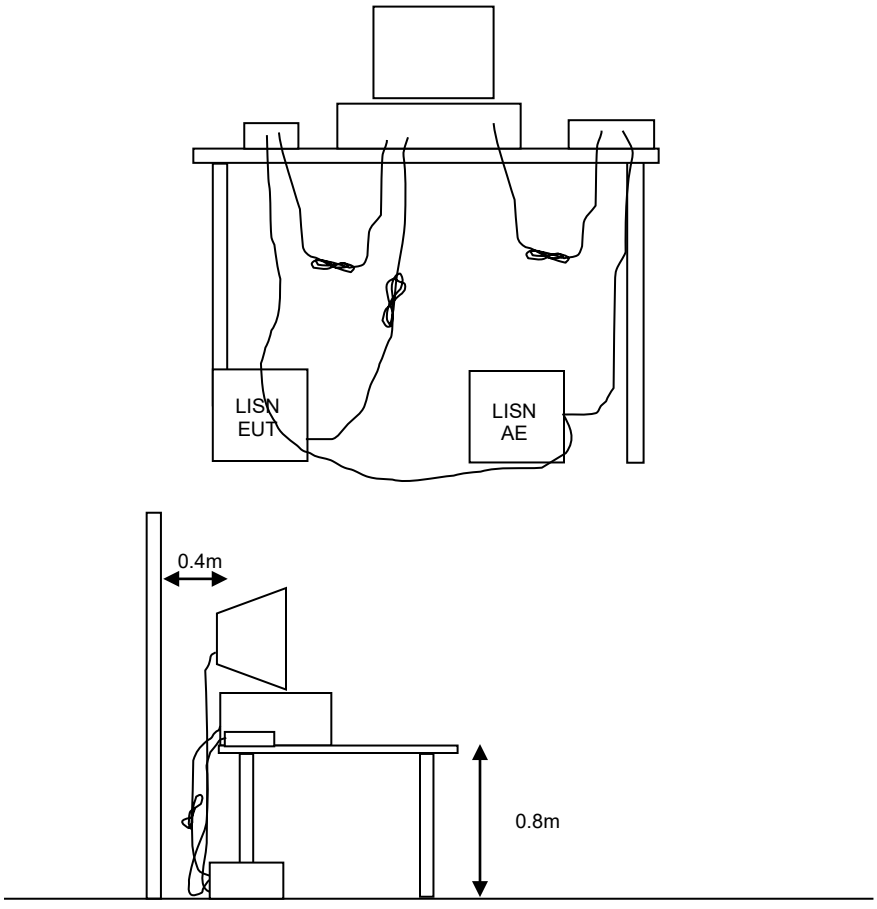


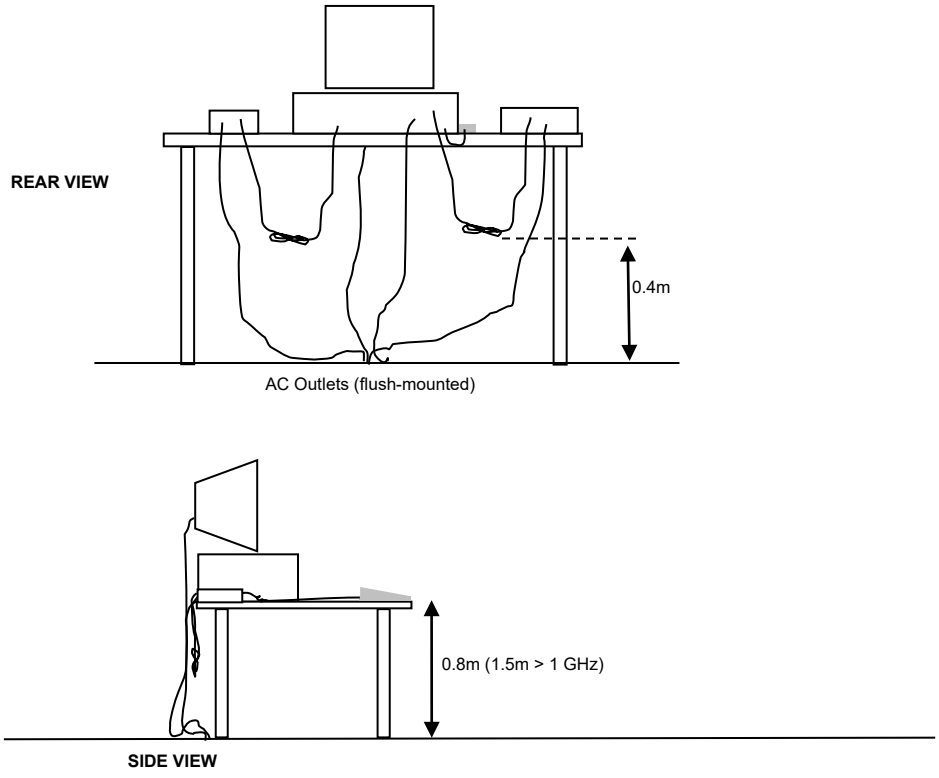
Figure 1 Typical Conducted Emissions Test Configuration

RADIATED EMISSIONS

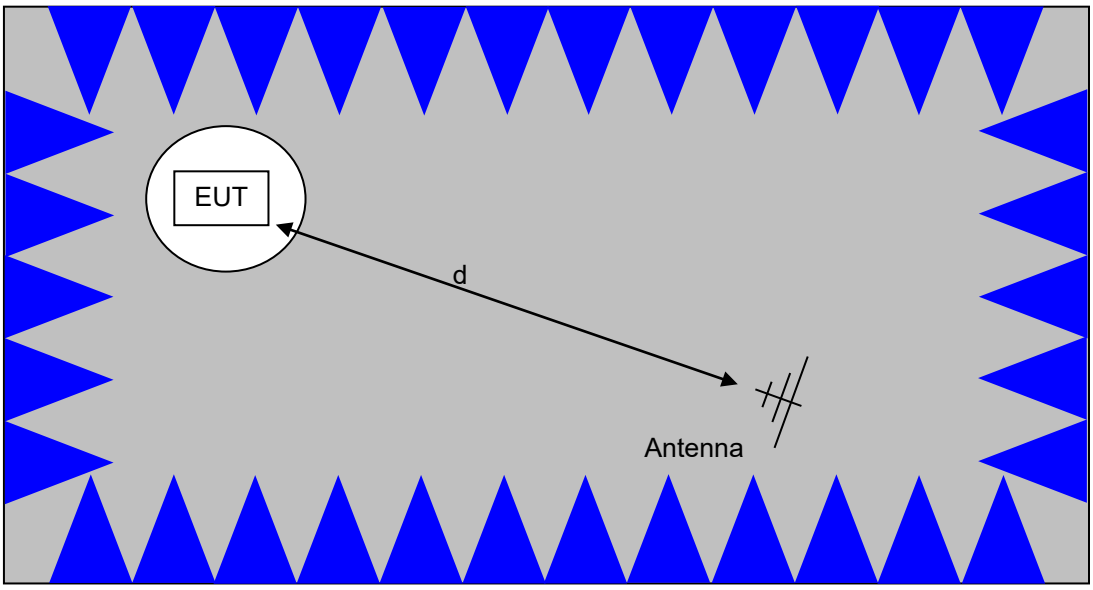
A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

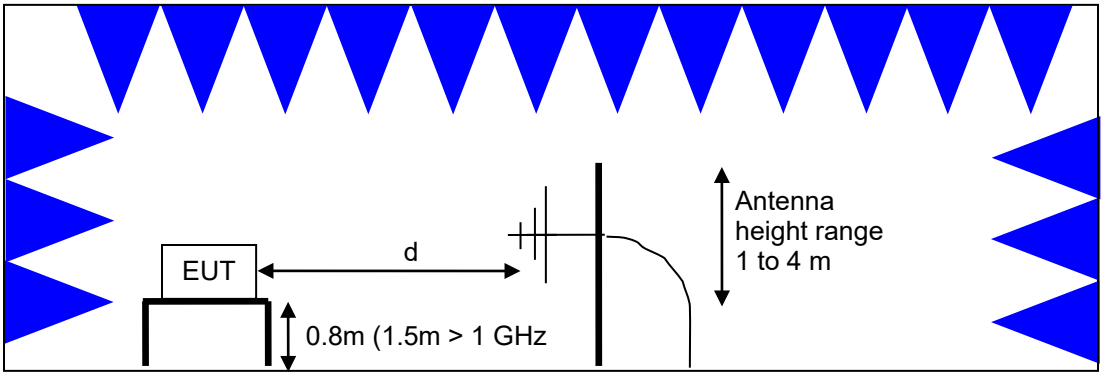


Typical Test Configuration for Radiated Field Strength Measurements



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

BANDWIDTH MEASUREMENTS

The 6dB, 20dB, 26dB and/or 99% signal bandwidth are measured using the bandwidths recommended by ANSI C63.10 and RSS GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1].

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

[1] The restricted bands are detailed in FCC 15.205 and RSS-Gen Table 7

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:
R_r = Receiver Reading in dBuV
S = Specification Limit in dBuV
M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

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

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

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:
R_r = Receiver Reading in dBuV/m
F_d = Distance Factor in dB
R_c = Corrected Reading in dBuV/m
L_s = Specification Limit in dBuV/m
M = Margin in dB Relative to Spec

Appendix A Test Equipment Calibration Data

Radiated Emissions, 0.009 - 1,000 MHz, 14-Apr-21

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
NTS Labs LLC	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Rhode & Schwarz	Loop Antenna	HFH2-Z2	WC062457	1/23/2020	1/23/2022
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	WC064536	1/29/2021	3/23/2023
Hewlett Packard	9KHz-1300MHz pre-amp	8447F	WC064718	12/7/2020	12/7/2021
Rhode & Schwarz	EMI Test Receiver 20Hz-26.5GHz	ESI	WC071498	5/4/2020	5/4/2021

Frequency Stability, 20-Apr-21

NTS Labs LLC	EMC Lab #4B	None	WC055575	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055650	8/20/2020	8/20/2021
Watlow	F4 watlow Controller	F4	WC064561	6/23/2020	6/23/2021
EMCO	Near Field Probe	7405-904	WC071474	N/A	

Conducted Emissions - AC Power Ports, 06-May-21

NTS Labs LLC	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Fischer Custom Communications	LISN, 25A, 150kHz to 30MHz, 25 Amp	FCC-LISN-50-25-2-09	WC064531	10/7/2020	10/7/2021
Rhode & Schwarz	EMI Test Receiver 20Hz-26.5GHz	ESI	WC071498	5/4/2020	6/4/2021
Rohde & Schwarz	Pulse Limiter	ESH3-Z2	WC072359	7/6/2020	7/6/2021

Conducted Emissions - AC Power Ports, 13-Oct-21

NTS Labs LLC	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	WC064445	7/9/2021	7/9/2022
Fischer Custom Communications	LISN, 25A, 150kHz to 30MHz, 25 Amp	FCC-LISN-50-25-2-09	WC064532	8/18/2021	8/31/2022
Rohde & Schwarz	EMI Test Receiver, 20Hz-7GHz	ESIB 7	WC064989	11/16/2020	11/16/2021

TL165669-RA

Frequency Stability, 28-Nov-22

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
National Technical Systems	EMC Lab #3	None	WC055573	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055650	8/30/2022	8/31/2023
Fluke	Fluke Multimeter, True RMS	175	WC064448	10/9/2022	10/31/2023
Watlow	Environmental Chamber Controller	F4	WC066185	6/2/2022	6/2/2023
Watlow	Limit Controller	Limit 97	WC071533	N/A	
Envirotronics	EMC Chamber #10 (Lab #3)	SH16C	WC071534	N/A	

Appendix B Test Data

TL136033-RA-PW Pages 20 – 38
TL165669-RA Pages 39 – 42

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Product	Programmer Wand	T-Log Number:	TL136033-RA-PW
System Configuration:	-	Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Emissions Standard(s):	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-
Immunity Standard(s):		Environment:	Radio

EMC Test Data

For The

CCC del Uruguay Medical Devices

Product

Programmer Wand

Date of Last Test: 11/18/2021

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Conducted Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 5/6 & 10/13/2021
Test Engineer: David Bare
Test Location: Fremont Chamber #5 & 7

Config. Used: 1
Config Change: None
EUT Voltage: Refer to individual run

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN.

Ambient Conditions:

	5/6/21	10/13/21	
Temperature:	23	22	°C
Rel. Humidity:	36	19	%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 230V/50Hz	CISPR 32, A.10	Pass	45.9 dBµV @ 0.857 MHz (-0.1 dB)
2	CE, AC Power,120V/60Hz	FCC §15.207	Pass	48.0 dBµV @ 0.386 MHz (-0.2 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing. Between testing on 5/6/2021 and 10/13/2021, the sample was modified to terminate the output of the 13.56 MHz transmitter.

Deviations From The Standard

No deviations were made from the requirements of the standard.

Test Note

The unit was transmitting at 13.56MHz.
An additional test performed at 13.56 MHz on 10/13/2021 with the output of the 13.56 MHz transmitter terminated.

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	AC	CISPR 32, A.10		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.173	55.9	Line 1	54.8	1.1	Peak	
0.377	58.5	Line 1	48.4	10.1	Peak	
0.396	58.0	Line 1	47.9	10.1	Peak	
0.407	57.5	Line 1	47.7	9.8	Peak	
0.451	54.6	Line 1	46.9	7.7	Peak	
0.580	49.0	Line 1	46.0	3.0	Peak	
0.857	53.1	Line 1	46.0	7.1	Peak	
0.914	52.7	Line 1	46.0	6.7	Peak	
1.172	53.5	Line 1	46.0	7.5	Peak	
1.290	53.1	Line 1	46.0	7.1	Peak	
1.599	51.7	Line 1	46.0	5.7	Peak	
2.042	49.8	Line 1	46.0	3.8	Peak	
6.660	42.4	Line 1	50.0	-7.6	Peak	
0.158	56.2	Neutral	55.5	0.7	Peak	
0.378	58.9	Neutral	48.3	10.6	Peak	
0.394	58.5	Neutral	48.0	10.5	Peak	
0.504	53.1	Neutral	46.0	7.1	Peak	
0.838	53.2	Neutral	46.0	7.2	Peak	
1.114	53.5	Neutral	46.0	7.5	Peak	
1.310	52.0	Neutral	46.0	6.0	Peak	
1.638	51.6	Neutral	46.0	5.6	Peak	

Final quasi-peak and average readings

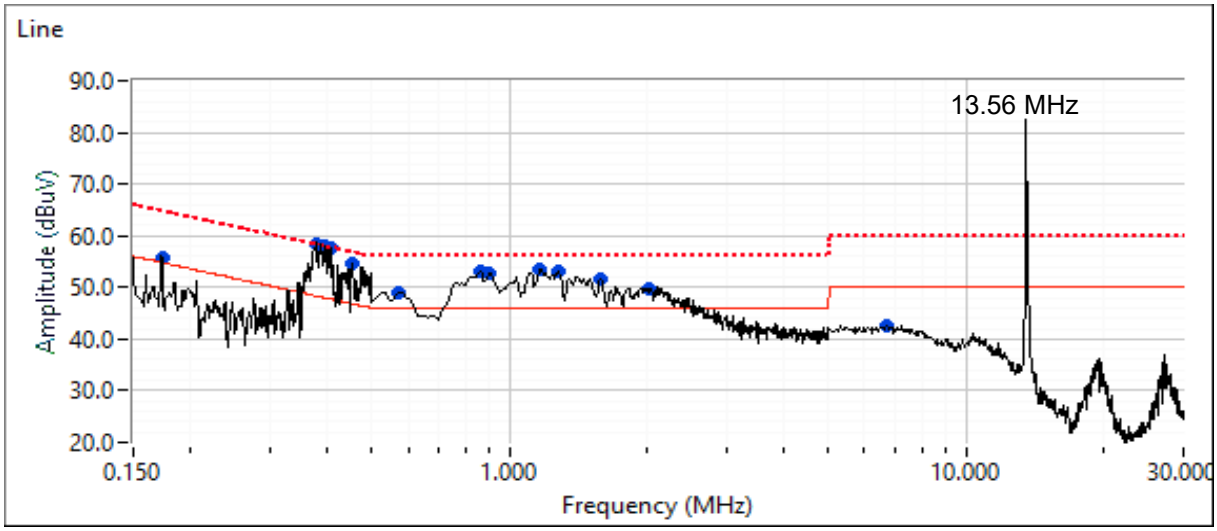
Frequency	Level	AC	CISPR 32, A.10		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.173	36.9	Line 1	54.8	-17.9	AVG	AVG (0.10s)
0.173	49.0	Line 1	64.8	-15.8	QP	QP (1.00s)
0.377	48.1	Line 1	48.3	-0.2	AVG	AVG (0.10s)
0.377	57.9	Line 1	58.3	-0.4	QP	QP (1.00s)

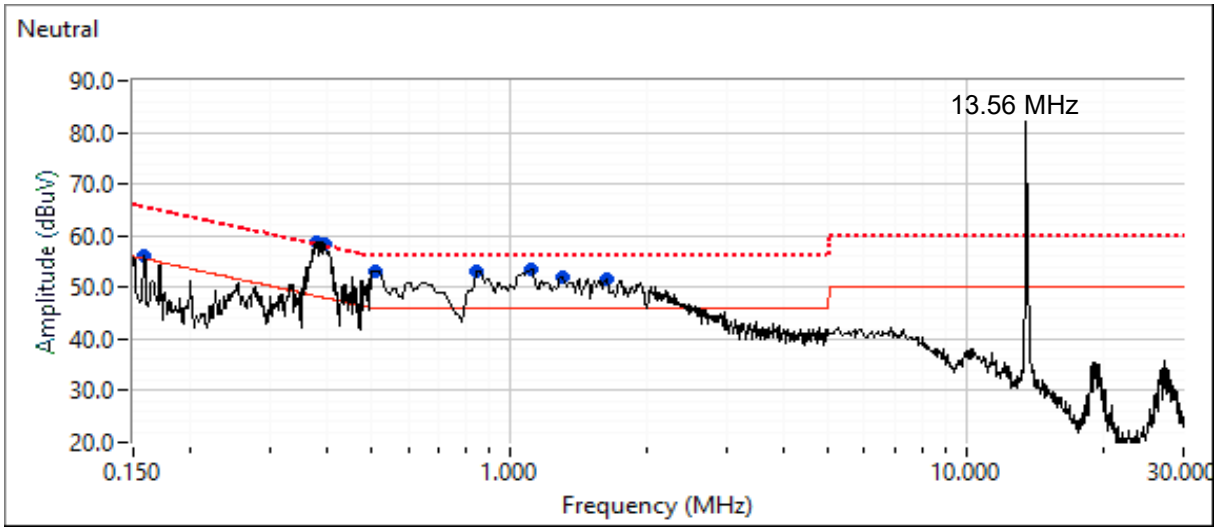
Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Final quasi-peak and average readings cont'

Frequency	Level	AC	CISPR 32, A.10		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.396	47.6	Line 1	47.9	-0.3	AVG	AVG (0.10s)
0.396	57.7	Line 1	57.9	-0.2	QP	QP (1.00s)
0.407	45.7	Line 1	47.7	-2.0	AVG	AVG (0.10s)
0.407	54.5	Line 1	57.7	-3.2	QP	QP (1.00s)
0.451	44.1	Line 1	46.9	-2.8	AVG	AVG (0.10s)
0.451	52.4	Line 1	56.9	-4.5	QP	QP (1.00s)
0.580	44.7	Line 1	46.0	-1.3	AVG	AVG (0.10s)
0.580	53.1	Line 1	56.0	-2.9	QP	QP (1.00s)
0.857	45.9	Line 1	46.0	-0.1	AVG	AVG (0.10s)
0.857	54.7	Line 1	56.0	-1.3	QP	QP (1.00s)
0.914	45.7	Line 1	46.0	-0.3	AVG	AVG (0.10s)
0.914	54.4	Line 1	56.0	-1.6	QP	QP (1.00s)
1.172	44.8	Line 1	46.0	-1.2	AVG	AVG (0.10s)
1.172	52.6	Line 1	56.0	-3.4	QP	QP (1.00s)
1.290	45.1	Line 1	46.0	-0.9	AVG	AVG (0.10s)
1.290	51.9	Line 1	56.0	-4.1	QP	QP (1.00s)
1.599	44.0	Line 1	46.0	-2.0	AVG	AVG (0.10s)
1.599	50.8	Line 1	56.0	-5.2	QP	QP (1.00s)
2.042	40.7	Line 1	46.0	-5.3	AVG	AVG (0.10s)
2.042	47.4	Line 1	56.0	-8.6	QP	QP (1.00s)
6.660	32.4	Line 1	50.0	-17.6	AVG	AVG (0.10s)
6.660	38.1	Line 1	60.0	-21.9	QP	QP (1.00s)
0.158	41.2	Neutral	55.6	-14.4	AVG	AVG (0.10s)
0.158	50.5	Neutral	65.6	-15.1	QP	QP (1.00s)
0.378	47.9	Neutral	48.3	-0.4	AVG	AVG (0.10s)
0.378	58.0	Neutral	58.3	-0.3	QP	QP (1.00s)
0.394	47.6	Neutral	48.0	-0.4	AVG	AVG (0.10s)
0.394	56.5	Neutral	58.0	-1.5	QP	QP (1.00s)
0.504	44.5	Neutral	46.0	-1.5	AVG	AVG (0.10s)
0.504	51.9	Neutral	56.0	-4.1	QP	QP (1.00s)
0.838	44.9	Neutral	46.0	-1.1	AVG	AVG (0.10s)
0.838	51.3	Neutral	56.0	-4.7	QP	QP (1.00s)
1.114	45.6	Neutral	46.0	-0.4	AVG	AVG (0.10s)
1.114	52.8	Neutral	56.0	-3.2	QP	QP (1.00s)
1.310	44.6	Neutral	46.0	-1.4	AVG	AVG (0.10s)
1.310	52.1	Neutral	56.0	-3.9	QP	QP (1.00s)
1.638	43.5	Neutral	46.0	-2.5	AVG	AVG (0.10s)
1.638	50.4	Neutral	56.0	-5.6	QP	QP (1.00s)

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-





Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	AC	FCC §15.207		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.176	54.5	Line 1	54.7	-0.2	Peak	
0.365	58.4	Line 1	48.6	9.8	Peak	
0.375	59.4	Line 1	48.4	11.0	Peak	
0.382	58.8	Line 1	48.2	10.6	Peak	
0.387	57.9	Line 1	48.1	9.8	Peak	
0.692	47.3	Line 1	46.0	1.3	Peak	
0.751	46.2	Line 1	46.0	0.2	Peak	
0.847	46.6	Line 1	46.0	0.6	Peak	
0.999	47.4	Line 1	46.0	1.4	Peak	
1.159	47.3	Line 1	46.0	1.3	Peak	
1.365	46.3	Line 1	46.0	0.3	Peak	
1.580	46.2	Line 1	46.0	0.2	Peak	
0.360	56.4	Neutral	48.7	7.7	Peak	
0.373	57.5	Neutral	48.4	9.1	Peak	
0.386	58.2	Neutral	48.1	10.1	Peak	
0.675	48.2	Neutral	46.0	2.2	Peak	
0.851	47.6	Neutral	46.0	1.6	Peak	
1.156	47.0	Neutral	46.0	1.0	Peak	
1.476	47.0	Neutral	46.0	1.0	Peak	
1.761	46.8	Neutral	46.0	0.8	Peak	
13.561	52.7	Line 1	50.0	2.7	Peak	sample modified with 13.56 output terminated

Final quasi-peak and average readings

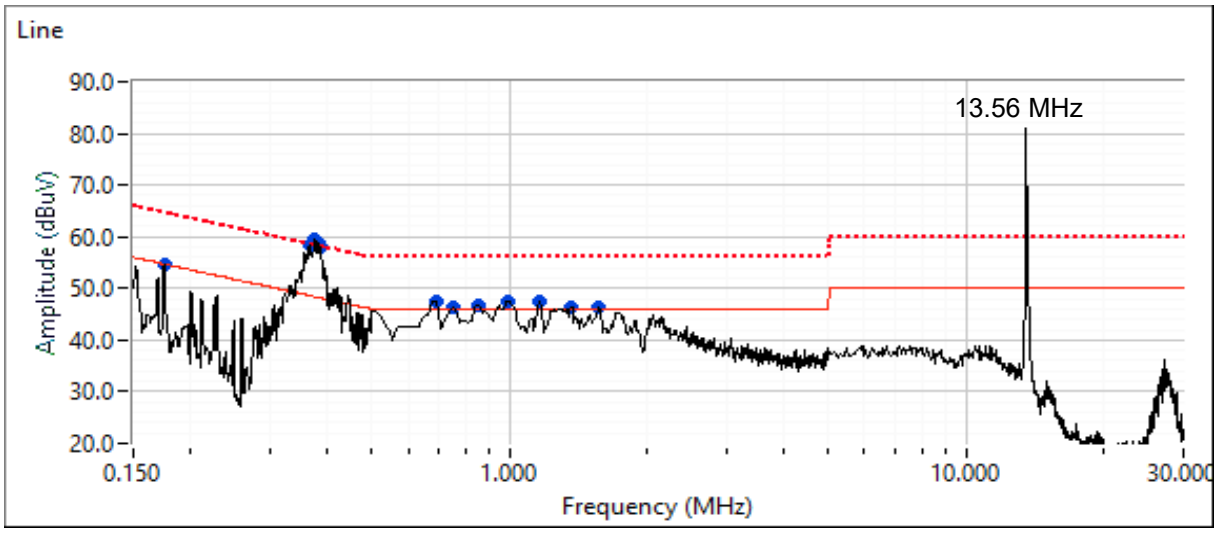
Frequency	Level	AC	FCC §15.207		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.176	34.4	Line 1	54.7	-20.3	AVG	AVG (0.10s)
0.176	46.5	Line 1	64.7	-18.2	QP	QP (1.00s)
0.365	48.2	Line 1	48.6	-0.4	AVG	AVG (0.10s)
0.365	56.8	Line 1	58.6	-1.8	QP	QP (1.00s)
0.375	48.0	Line 1	48.4	-0.4	AVG	AVG (0.10s)
0.375	56.8	Line 1	58.4	-1.6	QP	QP (1.00s)
0.382	47.9	Line 1	48.2	-0.3	AVG	AVG (0.10s)
0.382	56.0	Line 1	58.2	-2.2	QP	QP (1.00s)

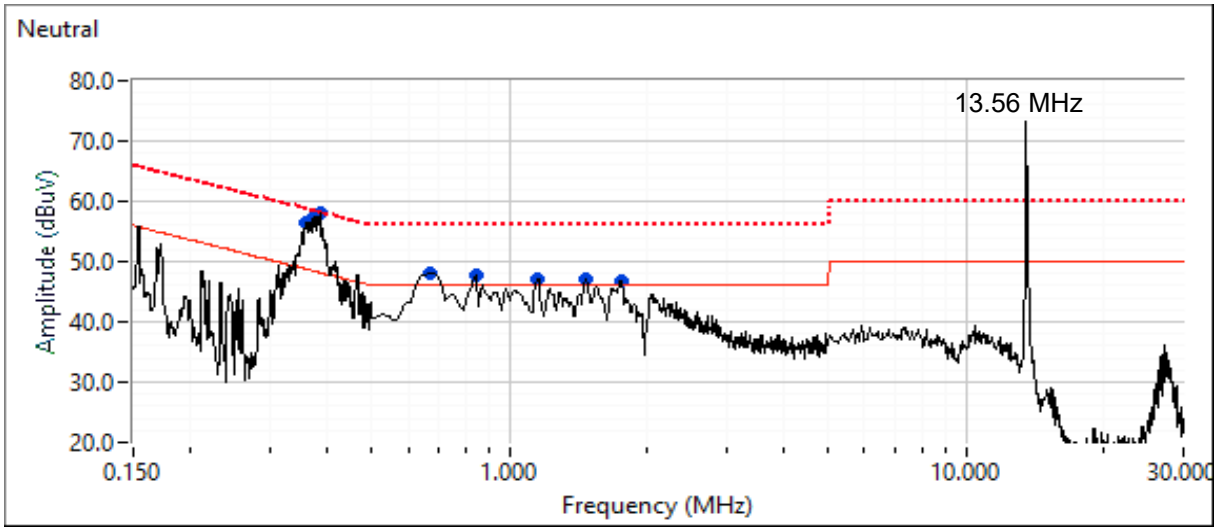
Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Final quasi-peak and average readings cont'

Frequency	Level	AC	FCC §15.207		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.387	47.8	Line 1	48.1	-0.3	AVG	AVG (0.10s)
0.387	55.3	Line 1	58.1	-2.8	QP	QP (1.00s)
0.692	41.6	Line 1	46.0	-4.4	AVG	AVG (0.10s)
0.692	46.6	Line 1	56.0	-9.4	QP	QP (1.00s)
0.751	39.2	Line 1	46.0	-6.8	AVG	AVG (0.10s)
0.751	46.0	Line 1	56.0	-10.0	QP	QP (1.00s)
0.847	37.8	Line 1	46.0	-8.2	AVG	AVG (0.10s)
0.847	46.5	Line 1	56.0	-9.5	QP	QP (1.00s)
0.999	40.6	Line 1	46.0	-5.4	AVG	AVG (0.10s)
0.999	47.0	Line 1	56.0	-9.0	QP	QP (1.00s)
1.159	39.6	Line 1	46.0	-6.4	AVG	AVG (0.10s)
1.159	46.7	Line 1	56.0	-9.3	QP	QP (1.00s)
1.365	38.2	Line 1	46.0	-7.8	AVG	AVG (0.10s)
1.365	44.9	Line 1	56.0	-11.1	QP	QP (1.00s)
1.580	38.3	Line 1	46.0	-7.7	AVG	AVG (0.10s)
1.580	44.0	Line 1	56.0	-12.0	QP	QP (1.00s)
0.360	48.3	Neutral	48.7	-0.4	AVG	AVG (0.10s)
0.360	57.2	Neutral	58.7	-1.5	QP	QP (1.00s)
0.373	48.1	Neutral	48.4	-0.3	AVG	AVG (0.10s)
0.373	58.0	Neutral	58.4	-0.4	QP	QP (1.00s)
0.386	48.0	Neutral	48.2	-0.2	AVG	AVG (0.10s)
0.386	55.6	Neutral	58.2	-2.6	QP	QP (1.00s)
0.675	42.0	Neutral	46.0	-4.0	AVG	AVG (0.10s)
0.675	47.3	Neutral	56.0	-8.7	QP	QP (1.00s)
0.850	37.5	Neutral	46.0	-8.5	AVG	AVG (0.10s)
0.850	46.5	Neutral	56.0	-9.5	QP	QP (1.00s)
1.156	39.1	Neutral	46.0	-6.9	AVG	AVG (0.10s)
1.156	46.6	Neutral	56.0	-9.4	QP	QP (1.00s)
1.476	39.1	Neutral	46.0	-6.9	AVG	AVG (0.10s)
1.476	45.2	Neutral	56.0	-10.8	QP	QP (1.00s)
1.761	37.4	Neutral	46.0	-8.6	AVG	AVG (0.10s)
1.761	43.6	Neutral	56.0	-12.4	QP	QP (1.00s)
13.561	38.8	Line 1	50.0	-11.2	AVG	AVG (0.10s), sample modified with 13.56 output terminated
13.561	51.5	Line 1	60.0	-8.5	QP	QP (1.00s), sample modified with 13.56 output terminated

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-





Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Test Configuration Photograph #1
(Conducted Emissions - Power Port)

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Test Configuration Photograph #2
(Conducted Emissions - Power Port)

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Radiated Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/14/2021
Test Engineer: David Bare
Test Location: Fremont Chamber #4

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if used) are detailed under each run description.
Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 30 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	0.030 - 30 MHz	FCC 15.209/15.225	Pass	43.5 dBµV/m @ 13.560 MHz (margin: -7.0 dB)
2	30 - 140 MHz, Maximized Emissions	FCC 15.209	Pass	38.7 dBµV/m @ 108.48 MHz (margin: -4.8 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

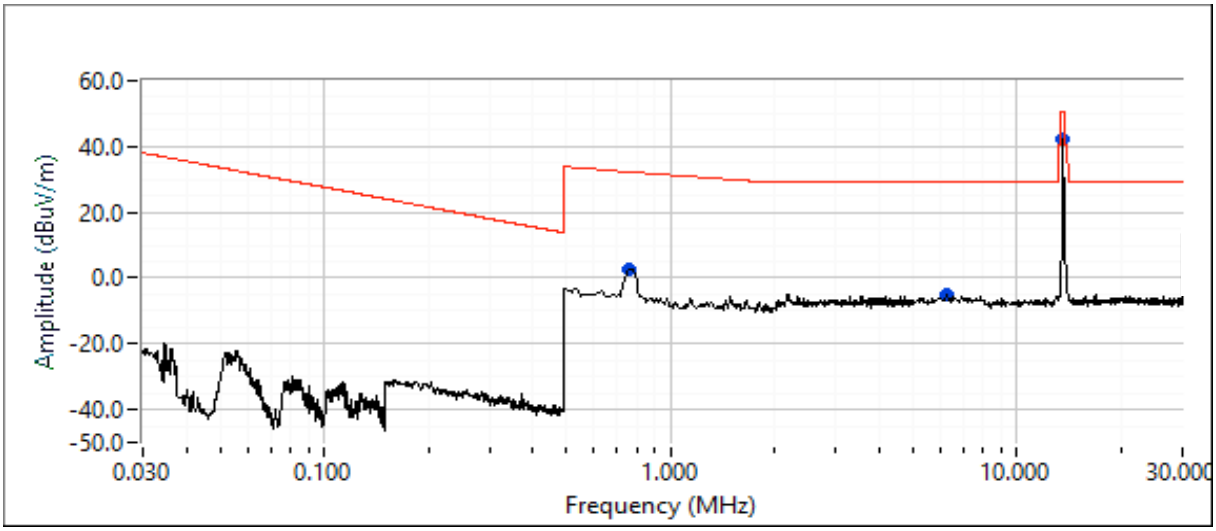
No deviations were made from the requirements of the standard.

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

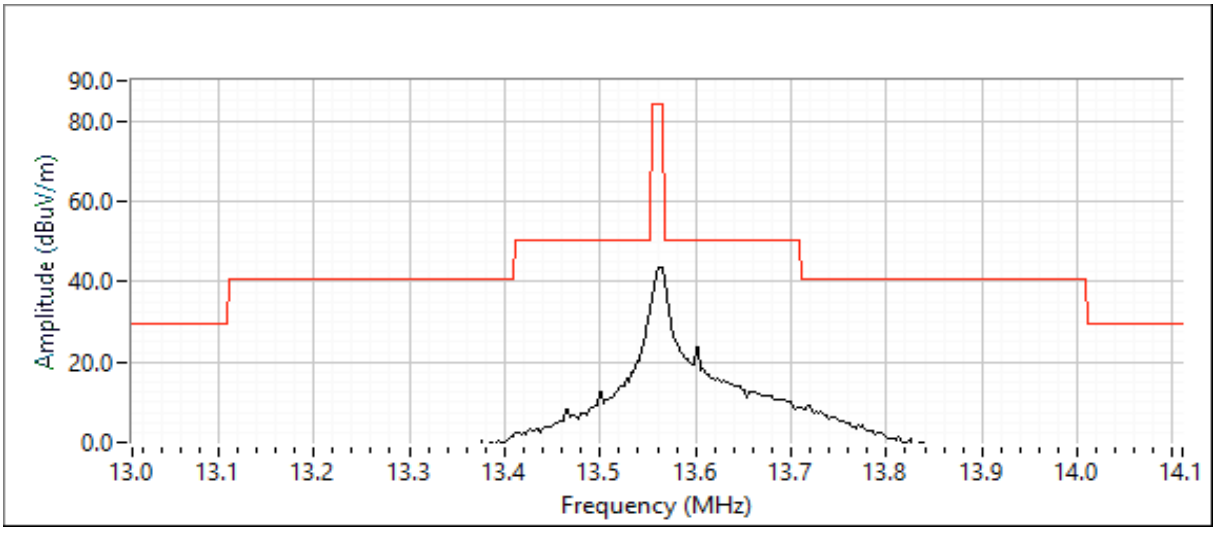
Run #1: Radiated Emissions, 0.03 - 30 MHz

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
0.03 - 0.49 MHz	3	300	-80.0
0.49 - 1.705 MHz	3	30	-40.0
1.705 - 30.0 MHz	3	30	-40.0

Note - the extrapolation factor is based on 40*log(test distance/limit distance) as described in FCC §15.31 and ANSI C63.10
Based on preliminary testing, the maximum emissons from the EUT are with the EUT placed on its side ith the coil oriented toward the receive antenna.



Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-



Preliminary readings

Frequency	Level	Pol	FCC 15.209/15.225		Detector	Azimuth	Height	Comments
MHz	dBµV/m	Loop	Limit	Margin	Pk/QP/Avg	degrees	meters	
0.756	2.6	Open	32.3	-29.7	Peak	245	1.0	
6.311	-5.3	Open	29.5	-34.8	Peak	333	2.0	
13.560	42.2	Open	50.5	-8.3	Peak	342	1.0	

Note 1:	The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, with a peak limit 20dB above the average limit.

Maximized readings (includes manipulation of EUT interface cables)

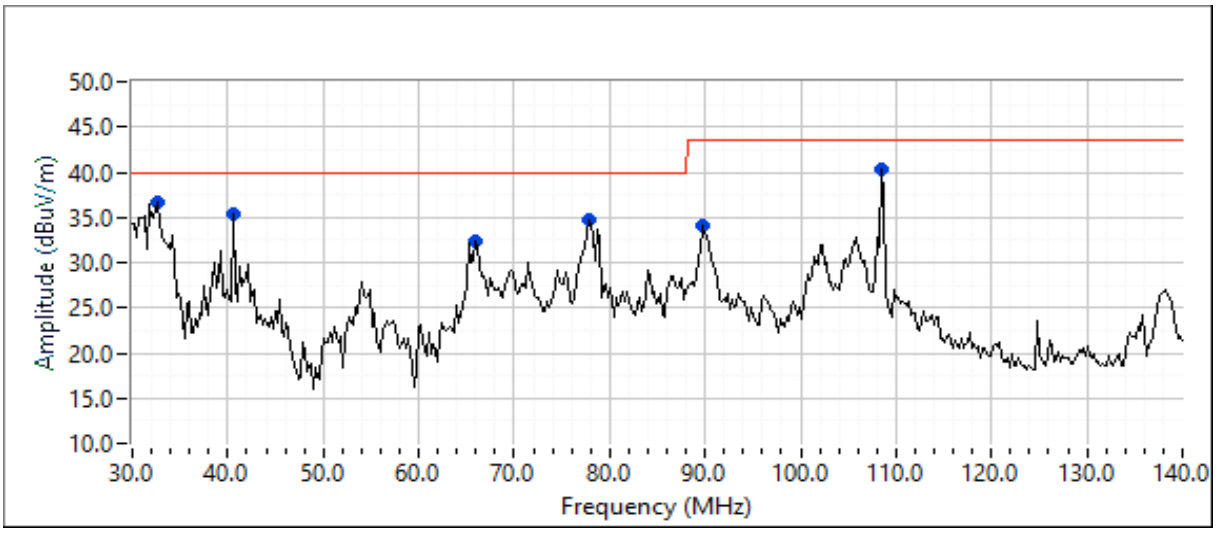
Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	Loop	Limit	Margin	Pk/QP/Avg	degrees	meters	
0.750	-7.1	Open	29.5	-36.6	QP	243	1.0	QP (1.00s)
6.311	-14.0	Open	29.5	-43.5	QP	335	1.0	QP (1.00s)
13.560	43.5	Open	50.5	-7.0	QP	350	1.0	QP (1.00s)
13.560	38.4	Closed	50.5	-12.1	QP	257	1.0	QP (1.00s)

Note 1:	The emisisons limit used at the fundamental is the limit for the bands 13.410-13.533 MHz and 13.567-13.710 MHz as the bandwidth of the emisison at 13.56 extends into these bands. See graph above.

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Run #2: Maximized Readings - Spurious Emissions, 30 - 140 MHz

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 -140 MHz	3	3	0.0



Spurious Emissions

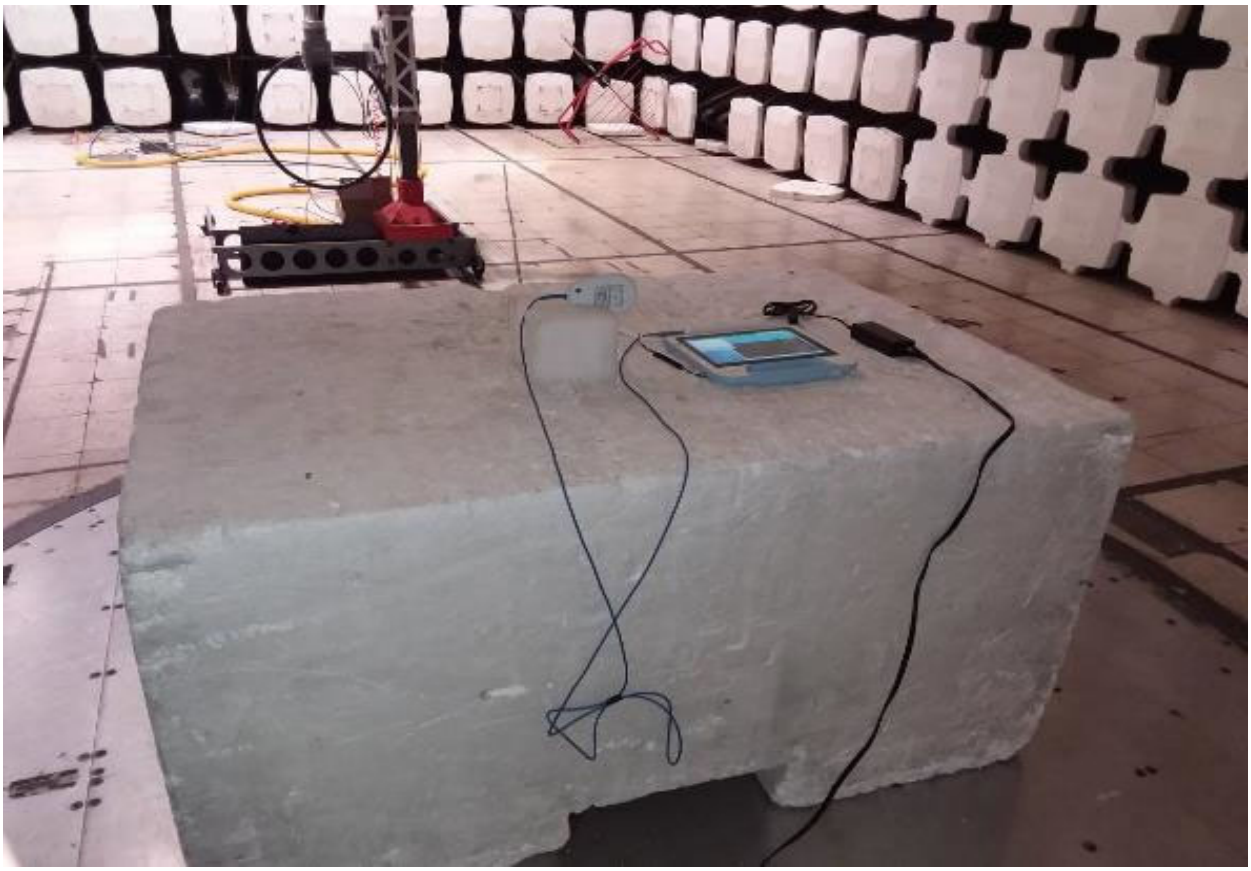
Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
32.697	32.9	V	40.0	-7.1	QP	138	1.0	QP (1.00s)
40.683	34.0	V	40.0	-6.0	QP	115	1.4	QP (1.00s)
65.958	25.8	V	40.0	-14.2	QP	165	1.7	QP (1.00s)
77.697	25.9	V	40.0	-14.1	QP	159	1.0	QP (1.00s)
89.908	26.2	V	43.5	-17.3	QP	212	1.0	QP (1.00s)
108.480	38.7	V	43.5	-4.8	QP	63	1.0	QP (1.00s)

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Test Configuration Photograph #1
(Radiated Emissions - Below 30 MHz)

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	-

Test Configuration Photograph #2
(Radiated Emissions - Below 30 MHz)



Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	N/A

FCC Part 15
Frequency Stability

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

With the exception of the radiated spurious emissions tests, all measurements are made with the EUT's rf port connected to the measurement instrument via an attenuator or dc-block if necessary. All amplitude measurements are adjusted to account for the attenuation between EUT and measuring instrument. For frequency stability measurements the EUT was place inside an environmental chamber.

Radiated measurements are made with the EUT located on a non-conductive table, 3m from the measurement antenna.

Ambient Conditions:

Temperature: 23-24 °C
Rel. Humidity: 41-42 %

Summary of Results

Run #			Test Performed	Limit	Pass / Fail	Result / Margin
1			Frequency Stability	± 100ppm	Pass	-9.2ppm

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	N/A

Run #1: Frequency Stability

Date of Test: 4/19/2021 Config. Used: 1
Test Engineer: David Bare Config Change: None
Test Location: Fremont EMC Lab #4B EUT Voltage: 5VDC

Nominal Frequency: 13.56 MHz

Frequency Stability Over Temperature

The EUT was soaked at each temperature for a minimum of 30 minutes prior to making the measurements to ensure the EUT and chamber had stabilized at that temperature.

Temperature	Frequency Measured	Drift	
(Celsius)	(MHz)	(Hz)	(ppm)
-20	13.559877	-31	-2.3
-10	13.559903	-5	-0.4
0	13.559923	15	1.1
10	13.559920	12	0.9
20	13.559908	0	0.0
30	13.559892	-16	-1.2
40	13.559875	-33	-2.4
50	13.559883	-25	-1.8
55	13.559892	-16	-1.2
	Worst case:	-33	-2.4

Nominal Voltage is 5Vdc supplied from USB port on tablet.

Client:	CCC del Uruguay Medical Devices	PR Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Engineer:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	N/A

Test Configuration Photographs

Client:	Impulse Dynamics	PR Number:	PR165669
Product	Programmer Wand	T-Log Number:	TL165669-RA
System Configuration:	'-	Project Manager:	Christine Krebill
Contact:	Jordan Thimot	Project Engineer:	David Bare
Emissions Standard(s):	FCC §15.225(e), FCC §95.2565 (§2.1055(d))	Class:	-
Immunity Standard(s):	-	Environment:	Radio

EMC Test Data

For The

Impulse Dynamics

Product

Programmer Wand

Date of Last Test: 11/28/2022

Client:	Impulse Dynamics	PR Number:	PR165669
Model:	Programmer Wand	T-Log Number:	TL165669-RA
		Project Manager:	Christine Krebill
Contact:	Jordan Thimot	Project Engineer:	David Bare
Standard:	FCC §15.225(e), FCC §95.2565 (§2.1055(d))	Class:	N/A

FCC § 15.225(e)
Frequency Stability

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

All measurements are made with the EUT's rf port connected to the measurement instrument via an attenuator or dc-block if necessary. For frequency stability measurements the EUT was placed inside an environmental chamber.

Ambient Conditions:

Temperature: 21-22 °C
Rel. Humidity: 43-45 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail
1	Frequency Stability	±0.01% (100 ppm)	Pass, 11.4ppm

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Date of Test: 11/28/22
Test Engineer: M. Birgani
Test Location: Lab 3

Config. Used: 1
Config Change: -
EUT Voltage: 5V DC

Client:	Impulse Dynamics	PR Number:	PR165669
Model:	Programmer Wand	T-Log Number:	TL165669-RA
		Project Manager:	Christine Krebill
Contact:	Jordan Thimot	Project Engineer:	David Bare
Standard:	FCC §15.225(e), FCC §95.2565 (§2.1055(d))	Class:	N/A

Run #1: Frequency Stability

Nominal Frequency: 13.56 MHz

Frequency Stability Over Temperature

The EUT was soaked at each temperature for a minimum of 30 minutes prior to making the measurements to ensure the EUT and chamber had stabilized at that temperature.

Temperature	Frequency Measured	Drift	
(Celsius)	(MHz)	(Hz)	(ppm)
-20	13.559881	-119	8.8
-10	13.559910	-90	6.6
0	13.559917	-83	6.1
10	13.559914	-86	6.3
20	13.559889	-111	8.2
30	13.559881	-119	8.8
40	13.559858	-142	10.5
50	13.559846	-154	11.4
	Worst case:	-154	11.4

Frequency Stability Over Input Voltage

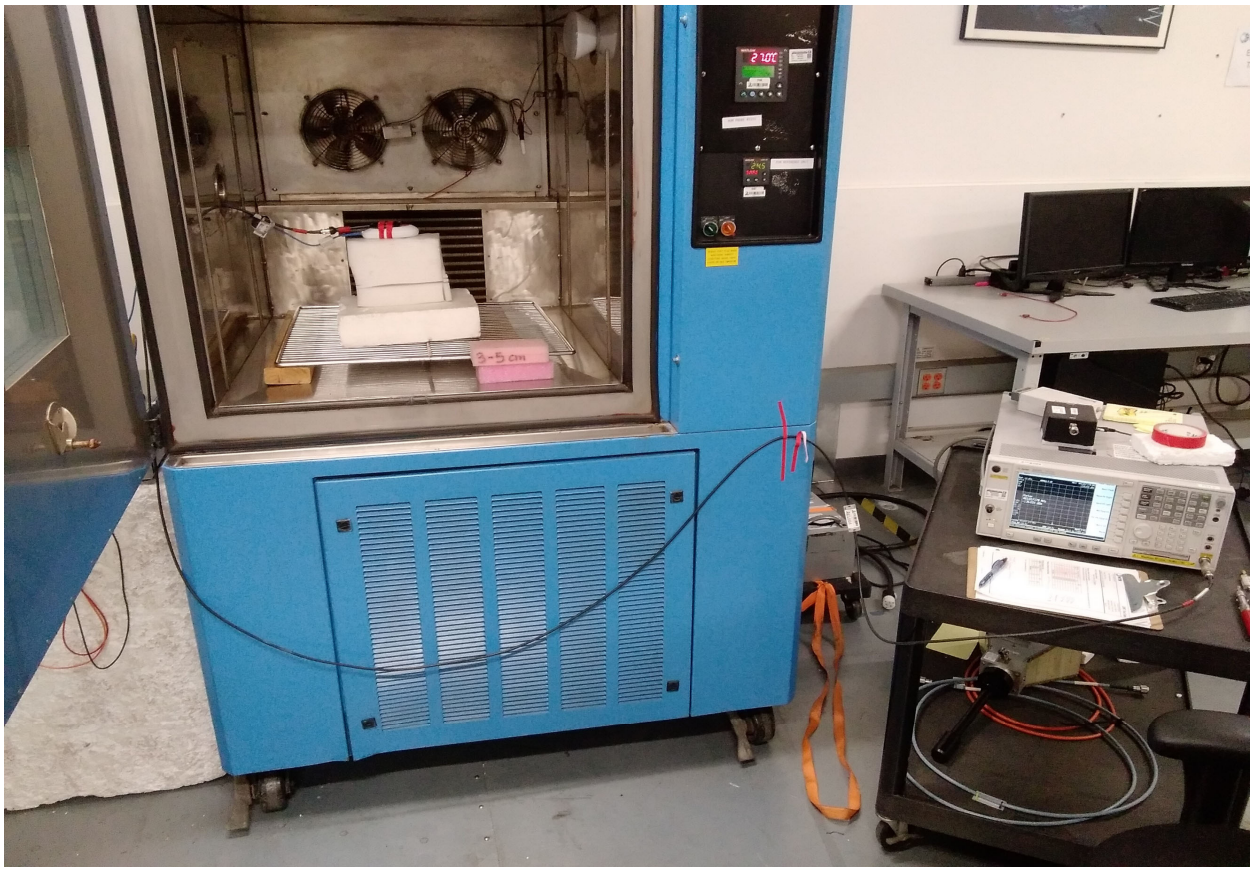
Nominal Voltage is 5.0Vdc.

Voltage	Frequency Measured	Drift	
(DC)	(MHz)	(Hz)	(ppm)
85%	13.559890	-110	8.1
115%	13.559880	-120	8.8
	Worst case:	-120	8.8

Note: The power shutdown at 4.24V dc

Client:	Impulse Dynamics	PR Number:	PR165669
Model:	Programmer Wand	T-Log Number:	TL165669-RA
		Project Manager:	Christine Krebill
Contact:	Jordan Thimot	Project Engineer:	David Bare
Standard:	FCC §15.225(e), FCC §95.2565 (§2.1055(d))	Class:	N/A

Test Configuration Photographs



End of Report

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