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Radio Test Report

FCC Part 95
MedRadio Transmitter

Model: Programmer Wand

FCC ID:	2AY43-INPW0
COMPANY:	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
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TOTAL NUMBER OF PAGES:	57

ACCREDITED
Testing Cert #0214.26

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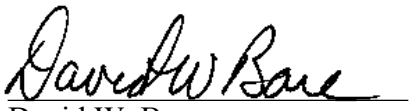
VALIDATING SIGNATORIES

PROGRAM MGR



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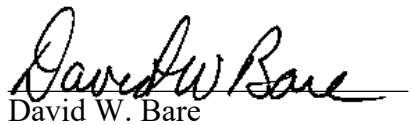

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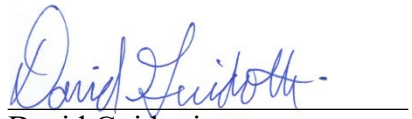

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REVISION HISTORY

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

Tests have been performed on the CCC del Uruguay Medical Devices model Programmer Wand, pursuant to the relevant requirements of the following standard(s) in order to obtain device certification against the regulatory requirements of the Federal Communications Commission.

- Code of Federal Regulations (CFR) Title 47 Part 2
- CFR 47 Part 95 Subpart I (Medical Device Radio Communication Service)

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 C63.26-2015
ANSI TIA-603-E

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.

The test results recorded herein are based on a single type test of the 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.

OBJECTIVE

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

Prior to marketing in the USA, the device requires certification. 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 standards and frequency bands declared in the scope of this test report.

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.

DEVIATIONS FROM THE STANDARDS

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

TEST RESULTS

FCC Part 95

Rule Part	Description	Measured	Limit	Result
Transmitter frequency, power, bandwidth, modulation and unwanted emissions				
§2.1033(c) (5) § 95.2563(a)	Frequency range(s)	402.45 – 404.55 MHz	402-405 MHz	Complied
§2.1033(c) (6) §2.1033(c) (7) §2.1046 §95.2567(a)(1)	EIRP (Calculated from Field Strength)	3.63µW -24.4dBm	25µW –16dBm	Complied
§2.1033(c) (4)	Emission types	F1D	-	-
§2.1047 §95.2579(c)	Unwanted emissions	< 0.25µW < -36dBm	0.25µW -36dBm	Complied
§2.1049 §95.2573(a)	Authorized Bandwidth	253 kHz	300 kHz	Complied
Transmitter spurious emissions				
§2.1053 §2.1057 §95.2579(a)	Field strength	36.0 dBµV/m @ 42.56 MHz (-4.0 dB)	See table	Complied
Other details				
95.2559	Frequency Monitoring	LBT Threshold power level -104.7 dBm Monitoring system bandwidth > 20 dB EBW Monitoring system scan cycle time 403 ms Monitoring system Minimum Channel monitoring period 0.1 ms / 10 ms Channel access based on ambient level above PTh Correct channel selection Discontinuation of MICS session 3.4 sec	LBT Threshold power level -104.7 dBm Monitoring system bandwidth > 20 dB EBW Monitoring system scan cycle time < 5 seconds Monitoring system Minimum Channel monitoring period 0.1 ms / 10 ms Channel access based on ambient level above PTh Correct channel selection Discontinuation of MICS session < 5 seconds	Complied
§2.1055 §95.2565	Frequency stability	35 ppm	100 ppm	Complied
§2.1055 §95.2565	Frequency stability-new	17.8ppm	100 ppm	Complied
§2.1093	RF Exposure	Refer to separate exhibit		
§2.1033 (c) (8)	Final radio frequency amplifying circuit's dc voltages and currents for normal operation over the power range	3.3VDC 6.5mA	-	-

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 0°C to +55°C as specified in FCC §95.2565(b) for stations in the Medical Device Radiocommunication Service.

MEASUREMENT UNCERTAINTIES

ISO Guide 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 (based on a coverage factor (k=2) and were calculated in accordance with NAMAS document NIS 81 and M3003.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
RF frequency	Hz	25 to 7,000 MHz	1.7×10^{-7}
Radiated emission (substitution method)	dBm	25 to 40,000 MHz	± 2.5 dB
Radiated emission (field strength)	dBµV/m	25 to 1,000 MHz 1 to 40 GHz	± 3.6 dB ± 6.0 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, 2022 and tested on April 15, 16, 19, 21, 26, May 6, November 17 and 18, 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 chip.

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).

TESTING

GENERAL INFORMATION

Final test measurements were taken at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 6.2 of RSS-GEN, NTS Labs LLC has been recognized as an accredited test laboratory by the Commission and Innovation, Science and Economic Development Canada. A description of the facilities employed for testing is maintained by NTS Labs LLC.

Site	Designation / Registration Numbers		Location
	FCC	Canada	
Chamber 4 & 5	US1031	2845B (Wireless test lab #US0027)	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. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4.

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN. The measurement bandwidth is set to be at least 1% of the instrument's frequency span.

FREQUENCY STABILITY

The EUT is placed inside a temperature chamber with all support and test equipment located outside of the chamber. The temperature is varied across the specified frequency range in 10 degree increments with frequency measurements made at each temperature step. The EUT is allowed enough time to stabilize at each temperature variation.

The spectrum analyzer is configured to give a 5- or 6-digit display for the marker-frequency function. The spectrum analyzer's built-in frequency counter is used to measure the maximum deviation of the fundamental frequency at each temperature. Where possible the device is set to transmit an unmodulated signal. Where this is not possible the frequency drift is determined by finding a stable point on the signal (e.g. the null at the centre of an OFDM signal) or by calculating a centre frequency based on the upper and lower XdB points (where X is typically 6dB or 10dB) on the signal's skirts.

RADIATED EMISSIONS MEASUREMENTS

Receiver radiated spurious emissions measurements are made in accordance with ANSI C63.4:2014 by measuring the field strength of the emissions from the device at a specific test distance and comparing them to a field strength limit. Where the field strength limit is specified at a longer distance than the measurement distance the measurement is extrapolated to the limit distance.

Transmitter radiated spurious emissions are initially measured as a field strength. The eirp or erp limit as specified in the relevant rule part(s) is converted to a field strength at the test distance and the emissions from the EUT are then compared to that limit. Emissions within 20dB of this limit are the subjected to a substitution measurement.

All radiated emissions measurements are performed in two phases. A preliminary scan of emissions is conducted in either an anechoic chamber or on an OATS during which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed across the complete frequency range of interest and at each operating frequency identified in the reference standard. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. Initial scans are made using a peak detector (RBW=VBW) and using scan rates to ensure that the EUT transmits before the sweep moves out of each resolution bandwidth (for transmit mode).

During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit. For transmitter spurious emissions, where the limit is expressed as an effective radiated power, the eirp or erp is converted to a field strength limit.

Final measurements are made on an OATS or in a semi-anechoic chamber at the significant frequencies observed during the preliminary scan(s) using the same process of rotating the EUT and raising/lowering the measurement antenna to find the highest level of the emission. The field strength is recorded and, for receiver spurious emissions, compared to the field strength limit. For the final measurement the appropriate detectors (average, peak, normal, sample, quasi-peak) are used. For receiver measurements below 1GHz the detector is a Quasi-Peak detector, above 1GHz a peak detector is used and the peak value (RB=VB=1MHz) and average value (RB=1MHz, VB=10Hz) are recorded.

For transmitter spurious emissions, the radiated power of all emissions within 20dB of the calculated field strength limit are determined using a substitution measurement. The substitution measurement is made by replacing the EUT with an antenna of known gain (typically a dipole antenna or a double-ridged horn antenna), connected to a signal source. The output power of the signal generator is adjusted until the maximum field strength from the substitution antenna is similar to the field strength recorded from the EUT. The erp of the EUT is then calculated.

INSTRUMENTATION

An EMI receiver as specified in CISPR 16-1-1 is used for radiated emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 7000 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.

For measurements above the frequency range of the receivers and for all conducted measurements a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis.

Measurement bandwidths for the test instruments are set in accordance with the requirements of the standards referenced in this document.

Software control is used to correct the measurements for transducer factors (e.g. antenna) and the insertion loss of cables, attenuators and other series elements to obtain the final measurement value. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are exported in a graphic and/or tabular format, as appropriate.

FILTERS/ATTENUATORS

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

ANTENNAS

A combination of biconical, log periodic or bi-log antennas are used to cover the range from 30 MHz to 1000 MHz. Broadband antennas or tuned dipole antennas are used over the entire 25 to 1000 MHz frequency range as the reference antenna for substitution measurements. Above 1000 MHz, a dual-ridge guide horn antenna or octave horn antenna are used as reference and measurement antennas.

The antenna calibration factors are included in site factors that are programmed into the test receivers and instrument control software when measuring the radiated field strength.

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.

Table mounted devices are placed on a non-conductive table at a height of 80 centimeters above the floor. Floor mounted equipment is 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. The EUT is positioned on a motorized turntable to allow it to be rotated during testing to determine the angle with the highest level of emissions.

SAMPLE CALCULATIONS

SAMPLE CALCULATIONS - CONDUCTED SPURIOUS EMISSIONS

Measurements are compared directly to the conducted emissions specification limit (decibel form). The calculation is as follows:

$$R_r - S = M$$

where:

R_r = Measured value in dBm
S = Specification Limit in dBm
M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS –RADIATED FIELD STRENGTH

Measurements of radiated field strength are compared directly to the specification limit (decibel form). The receiver and/or control software 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 is used when measurements are made at a test distance that is different to the specified limit distance 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:

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

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

SAMPLE CALCULATIONS –RADIATED POWER

The erp/eirp limits for transmitter spurious measurements are converted to a field strength in free space using the following formula:

$$E = \frac{\sqrt{30\ P\ G}}{D}$$

where:

E = Field Strength in V/m
P = Power in Watts
G = Gain of isotropic antenna (numeric gain) = 1
D = measurement distance in meters

The field strength limit is then converted to decibel form (dBuV/m) and the margin of a given emission peak relative to the limit is calculated (refer to *SAMPLE CALCULATIONS –RADIATED FIELD STRENGTH*).

When substitution measurements are required (all signals with less than 20dB of margin relative to the calculated field strength limit) the eirp of the spurious emission is calculated using:

$$P_{EUT} = P_S - (E_S - E_{EUT})$$

and

$$P_S = G + P_{in}$$

where:

P_S = effective isotropic radiated power of the substitution antenna (dBm)
P_{in} = power input to the substitution antenna (dBm)
G = gain of the substitution antenna (dBi)
E_S = field strength the substitution antenna (dBm) at eirp P_S
E_{EUT} = field strength measured from the EUT

Where necessary the effective isotropic radiated power is converted to effective radiated power by subtracting the gain of a dipole (2.2dBi) from the eirp value.

RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 95.2579(a)(5).

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

Appendix A Test Equipment Calibration Data

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Radiated Emissions, 0.009 - 1,000 MHz, 14-Apr-21					
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
Signal Substitution, 14-Apr-21					
NTS Labs LLC	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
ETS-Lindgren	EMC Chamber #4	FACT-5	WC055566	8/3/2019	8/3/2022
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	WC064500	1/26/2021	1/26/2022
Compliance Design	Tuned Dipole Antenna	Roberts (180-400MHz)	WC064522	6/23/2020	6/23/2022
Compliance Design	Tuned Dipole Antenna	Roberts (400-1000MHz)	WC064523	6/23/2020	5/17/2022
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
Rohde & Schwarz	Power Sensor, 1 uW-100 mW, DC-18 GHz	NRV-Z51	WC068114	11/17/2020	11/17/2021
Rhode & Schwarz	Signal Generator 9kHz - 1.1GHz	SML01	WC071493	9/30/2020	9/30/2021
Rhode & Schwarz	EMI Test Receiver 20Hz-26.5GHz	ESI	WC071498	5/4/2020	5/4/2021
Radiated Emissions, 25 - 4,100 MHz, 15, 16-Apr-21					
NTS Labs LLC	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	WC064416	8/26/2020	8/26/2021
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	WC064432	12/21/2020	12/21/2022
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, 21-Apr-21					
ETS-Lindgren	EMC Chamber #3	FACT-10	WC055565	8/4/2019	8/4/2022
EMCO	LISN, 10 kHz-100 MHz	3825/2	WC064407	7/4/2020	7/4/2021
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	WC064445	7/6/2020	7/6/2021

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Rohde & Schwarz	EMI test receiver, 20Hz-40GHz	ESI	WC068000	6/17/2020	6/17/2021
Substitution, 26-Apr-21					
NTS Labs LLC	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	WC064416	8/26/2020	8/26/2021
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	WC064432	12/21/2020	12/21/2022
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	WC064500	1/26/2021	1/26/2022
Compliance Design	Tuned Dipole Antenna	Roberts (180-400MHz)	WC064522	6/23/2020	6/23/2022
Compliance Design	Tuned Dipole Antenna	Roberts (400-1000MHz)	WC064523	6/23/2020	5/17/2022
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	WC064536	1/29/2021	3/23/2023
Rohde & Schwarz	Power Sensor, 1 nW-20 mW, 10 MHz-18 GHz, 50ohms	NRV-Z1	WC064543	11/10/2020	11/10/2021
Hewlett Packard	9KHz-1300MHz pre-amp	8447F	WC064718	12/7/2020	12/7/2021
Keysight Technologies	Signal Generator 250k - 6GHz (Vector) (ESG)	E4438C	WC068186	4/21/2021	4/21/2022
Rhode & Schwarz	EMI Test Receiver 20Hz-26.5GHz	ESI	WC071498	5/4/2020	5/4/2021
LBT and Rx Blocking, 26-Apr-21					
ETS-Lindgren	EMC Chamber #2	None	WC055564	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055650	8/20/2020	8/20/2021
Agilent Technologies	Signal Generator (Vector) (PSG)	E8267D	WC055673	4/22/2021	4/22/2022
EMCO	Log Periodic Antenna, 0.2-1 GHz	3146	WC064408	N/A	
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	WC064469	N/A	
Mini-Circuits	2 way power divider, 50 MHz-2GHz	15542	WC065009	N/A	
Keysight Technologies	Signal Generator 250k - 6GHz (Vector) (ESG)	E4438C	WC068186	4/21/2021	4/21/2022
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
Radiated Emissions, 30 - 4,100 MHz, 17-Nov-21					
Manufacturer	**Description**	**Model**	**Asset #**	**Calibrated**	**Cal Due**
NTS Labs LLC	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	

ETS-Lindgren	EMC Chamber #5, Inner Dimensions (LxWxH): 24' x 38' x 20'	CH 5 (FACT-5)	WC055567	10/9/2019	10/9/2022
Hewlett Packard	Spectrum Analyzer (Red)	8564E (84125C)	WC055584	11/3/2021	11/3/2022
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	WC064416	8/19/2021	8/19/2022
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	WC064463	7/7/2020	7/7/2022
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	WC064573	12/3/2019	12/3/2021
Com-Power	Preamplifier, 30-1000 MHz	PA-103	WC064693	5/19/2021	5/19/2022
Rohde & Schwarz	EMI Test Receiver, 20Hz-40GHz	ESI	WC068000	6/23/2021	6/23/2022

LBT, 18-Nov-21

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
ETS-Lindgren	EMC Chamber #2, Inner Dimensions (LxWxH): 12' x 16' x 10'	CH 2	WC055564	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055670	8/17/2021	8/31/2022
Agilent Technologies	Signal Generator (Vector) (PSG)	E8267D	WC055673	4/22/2021	4/22/2022
Agilent Technologies	Signal Generator 100kHz - 6GHz (MXG)	N5181A	WC064545	7/21/2021	7/21/2022
Hewlett Packard	Step Attenuator	8495B	WC072181	N/A	
Narda	Directional Coupler 1-12.4GHz	3202B-10	WC072455	N/A	

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 21 – 52
TL165669-RA Pages 53 – 56

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	Job Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Coordinator:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	N/A

Radiated Emissions

Test Specific Details

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

Date of Test: 4/15 & 4/16/2021
Test Engineer: D.Demirci, D. Bare
Test Location: Fremont Chamber #4

Config. Used: 1
Config Change: None
EUT Voltage: 120 V/60 Hz (Tablet AC/DC power supply)

General Test Configuration

The EUT was located on the turntable for radiated emissions testing. The EUT was tested in all three orthogonal orientations.

The test distance and extrapolation factor (if applicable) 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: 31 %

Summary of Results

Run #	Test Performed	Limit	Result	Value / Margin
1	20dB Bandwidth	FCC Part 95	Pass	253 kHz
1	20dBc Frequencies	FCC Part 95	Pass	> 20dBc below the fundemantal

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	Job Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Coordinator:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	N/A

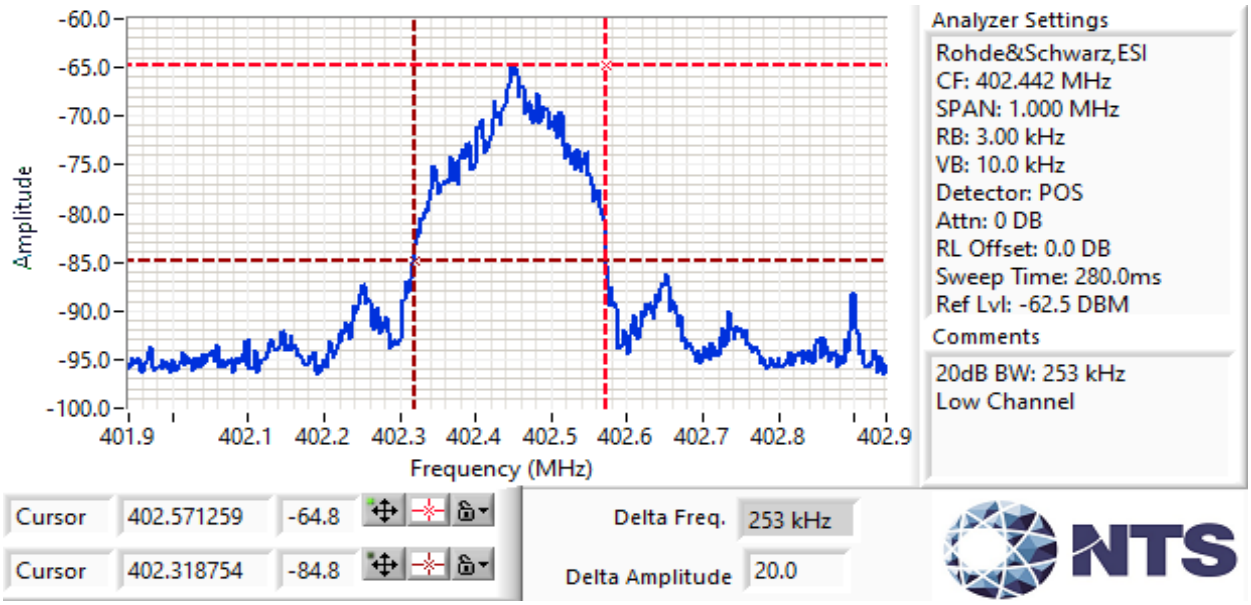
Run #1: Bandwidth, OOB and Timing Measurement(s)

Date of Test: 4/14/2021
Test Engineer: M. Birgani
Test Location: Fremont Chamber #4

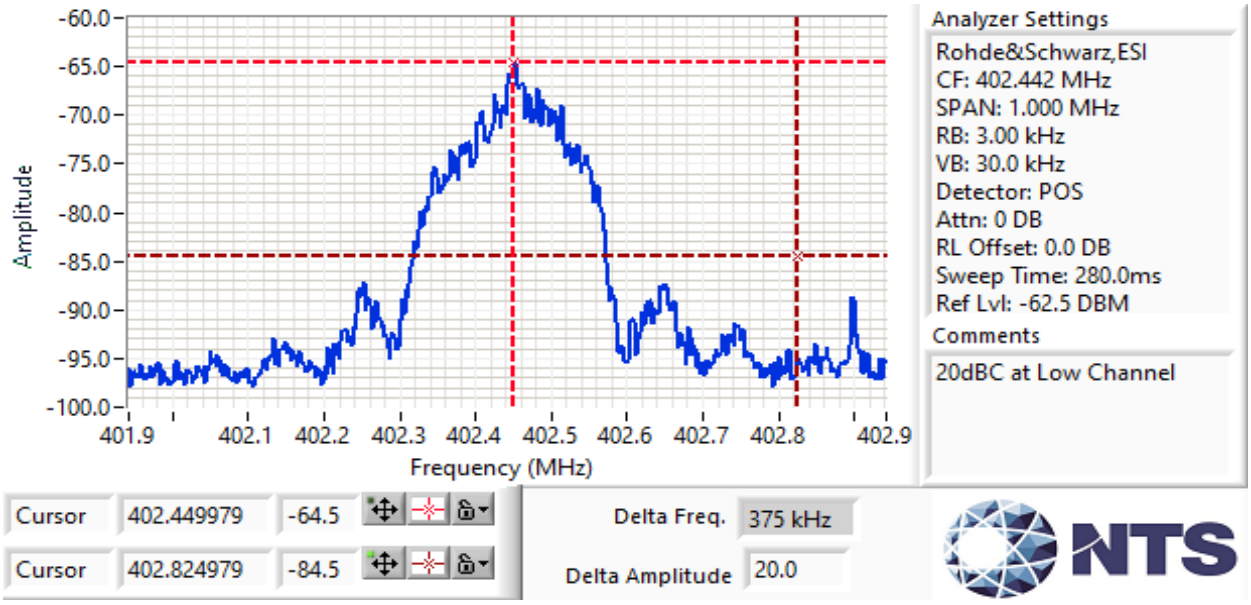
Config. Used: 1
Config Change: None
EUT Voltage: 120 V/60 Hz (Tablet AC/DC power supply)

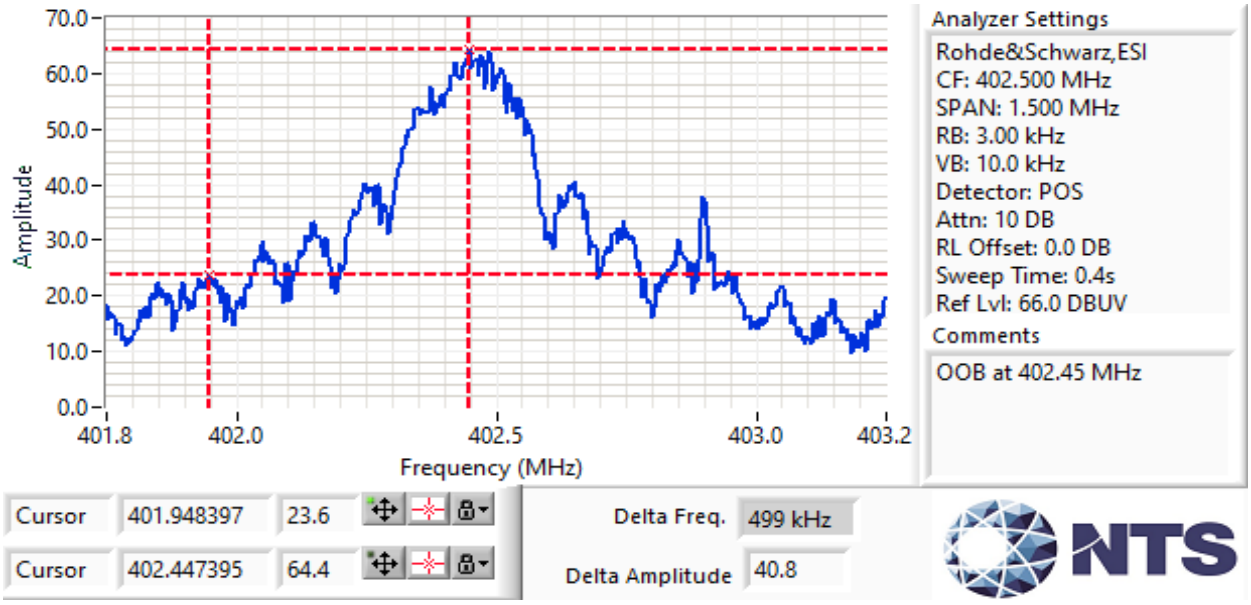
Power Setting	Frequency (MHz)	Resolution Bandwidth	Video Bandwidth	20dB BW (kHz)
Default	402.442	3k	10k	253
Default	404.536	3k	10k	240

Note 1:	20dB bandwidth measured in accordance with ANSI C63.10, with RB between 0.5% and 2% of the measured bandwidth and VB ≥ 3*RB and Span wide enough to see all the modulation components.

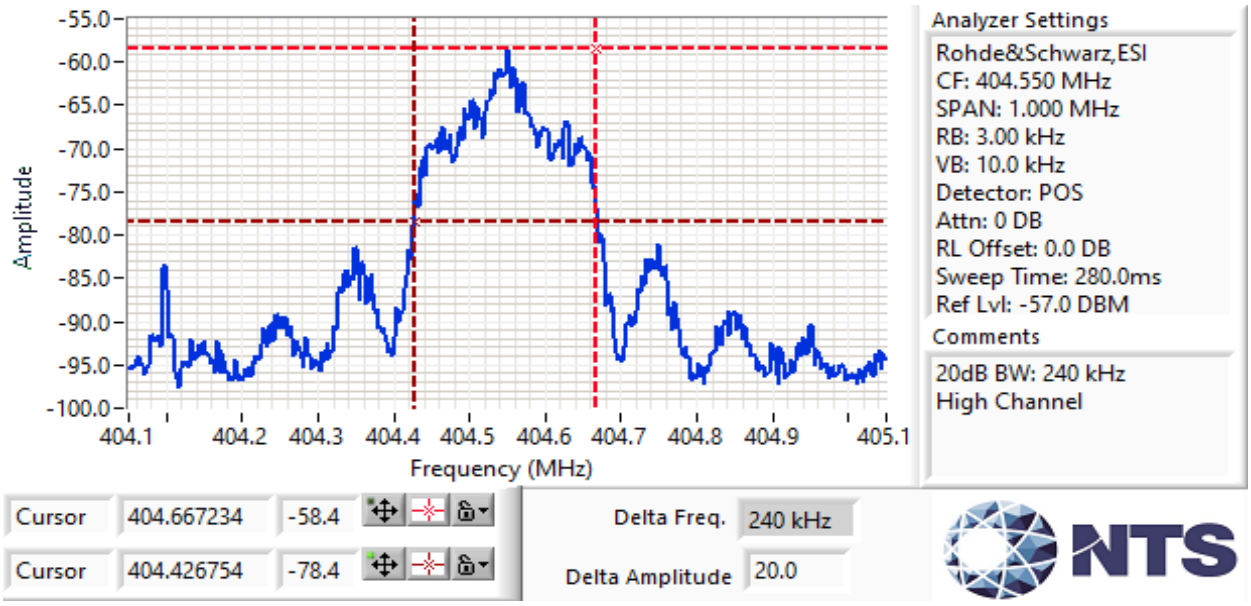


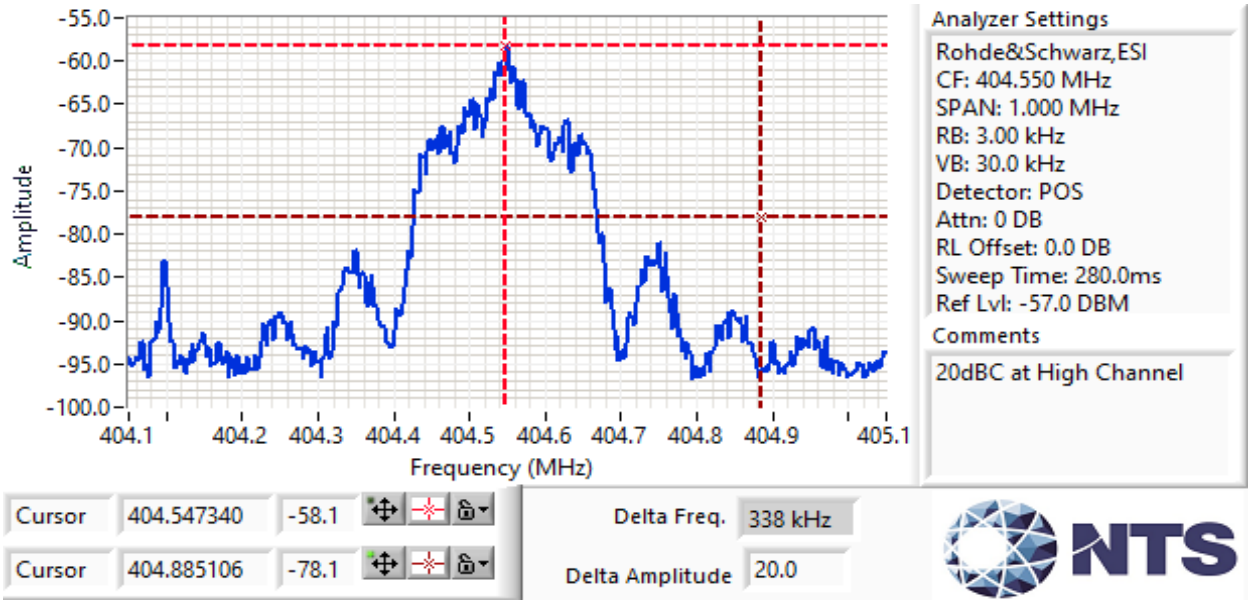
Client:	CCC del Uruguay Medical Devices	Job Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Coordinator:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	N/A



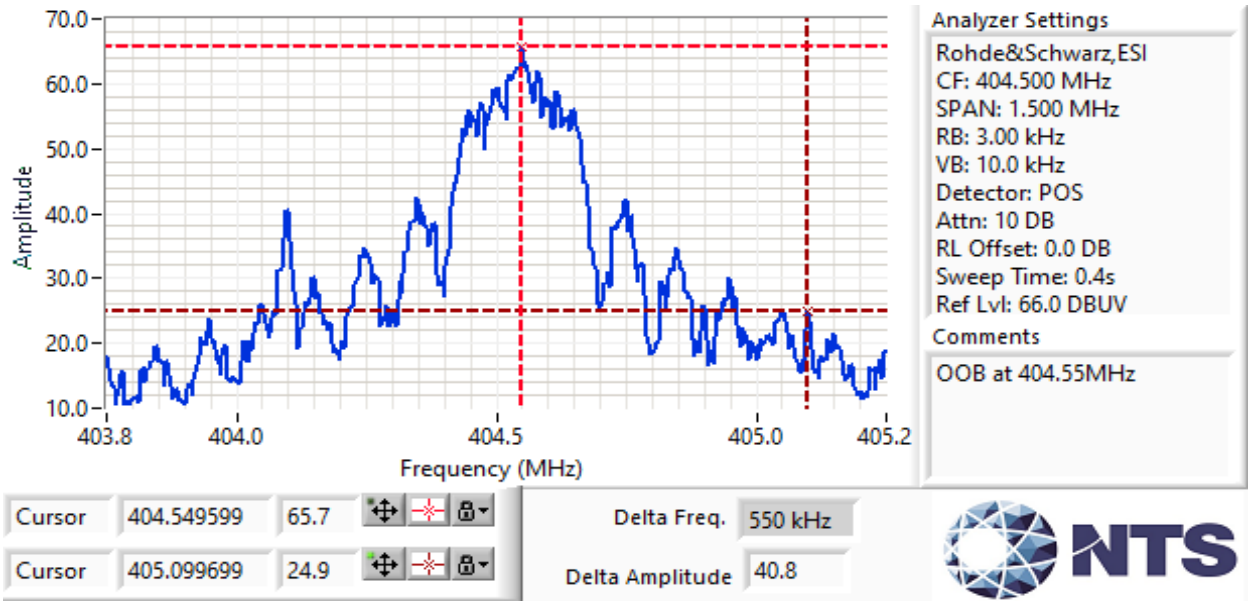


Client:	CCC del Uruguay Medical Devices	Job Number:	PR136033
Model:	Programmer Wand	T-Log Number:	TL136033-RA-PW
		Project Manager:	Christine Krebill
Contact:	Agustin Villavedra	Project Coordinator:	David Bare
Standard:	FCC Parts 15, 95, EN 300 330, EN 301 839	Class:	N/A





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



OOB emissons per FCC 95.2579

The delta in emissons level from the inband level to the level at 404.55 MHz is 40.8 dB. Subtracting this from the field strength of the fundamental at 1 MHz gives a value of 37.1 dBuV/m which complies with the spurious limit of 46 dBuV/m.

The delta in emissions level from the in band level to the highest level > 150 kHz from the center is at least 20 dB. The power of any unwanted emission is thus -37.3 dBm since the power of the wanted emissions is -17.3 dBm calculated from the 77.9 dBuV/m FS.

Compliance with FCC 95.2557 duration of transmissions:

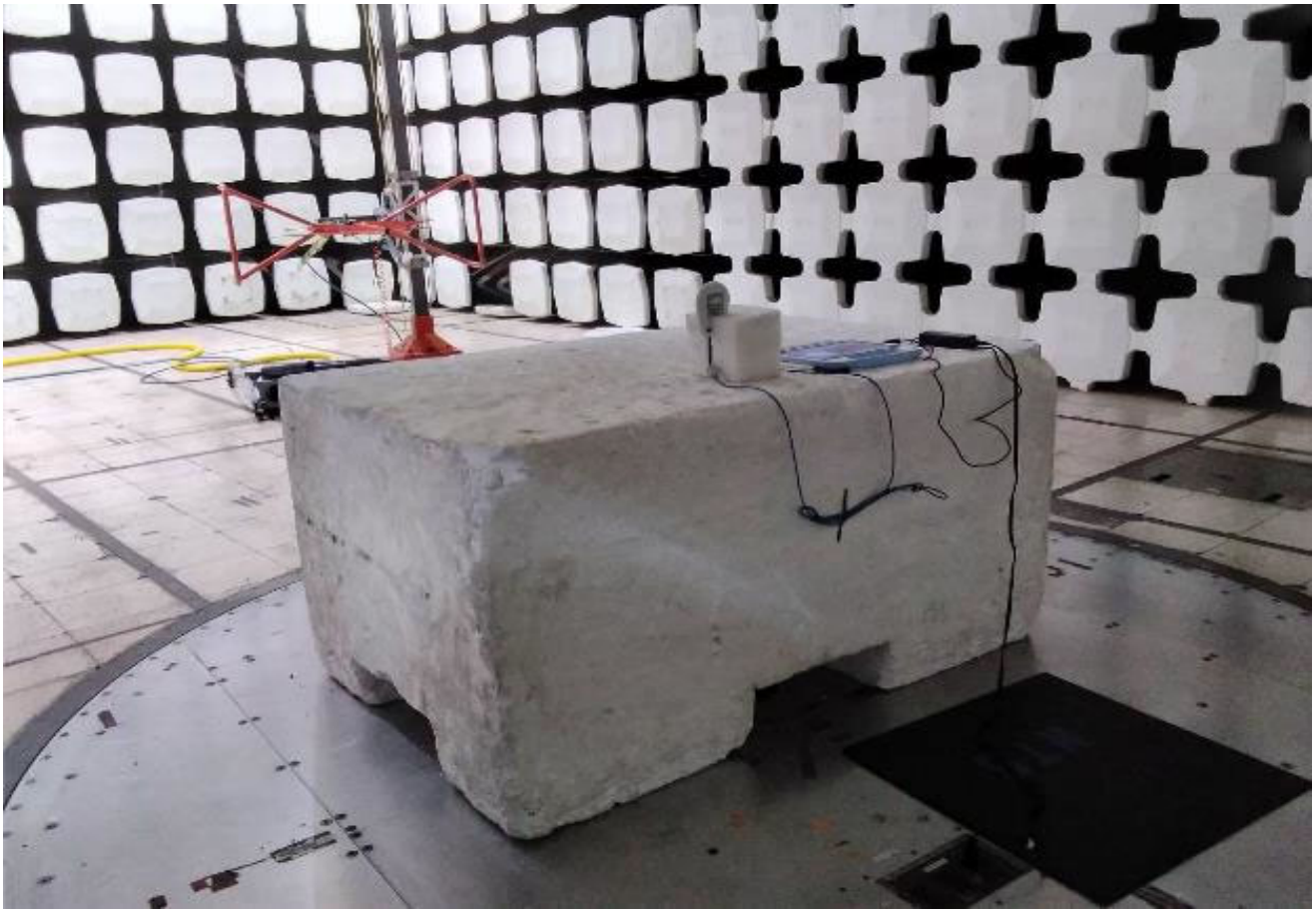
Refer to the operational description for plots and detailed description as to how the device complies with the transmit time and period between transmissions.

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

Test Configuration Photographs

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

Test Configuration Photographs



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

Test Configuration Photographs
Side orientation

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

Test Configuration Photographs
Upright orientation

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

Test Configuration Photographs
Flat orientation

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

Radiated Emissions

Test Specific Details

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

Date of Test: 11/17/2021
Test Engineer: David Bare
Test Location: Fremont Chamber #5

Config. Used: 1
Config Change: None
EUT Voltage: 120 V/60 Hz (Tablet AC/DC power supply)

General Test Configuration

The EUT was located on the turntable for radiated emissions testing. The EUT was tested in all three orthogonal orientations.

The test distance and extrapolation factor (if applicable) 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: 20-21 °C
Rel. Humidity: 54-56 %

Summary of Results

Run #	Test Performed	Limit	Result	Value / Margin
2	Fundamental Signal Field Strength	FCC Part 95.2569	Pass	76.8 dBµV/m @ 404.55 MHz (Margin: -8.4 dB)
2	Transmitter Radiated Spurious Emissions, 25 - 4,100 MHz	FCC Part 95.2579	Pass	36.0 dBµV/m @ 42.56 MHz (Margin: -4.0 dB)
4	Receiver Radiated Spurious Emissions, 25 - 4,100 MHz	FCC Part 15	Pass	36.0 dBµV/m @ 42.56 MHz (-4.0 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.

Sample Notes

Sample S/N: 000083

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
25 - 4,100 MHz	3	3	0.0

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

Run #1: Preliminary Radiated Emissions, Fundamental

Low Channel

Frequency	Level	Pol	FCC part 95		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
402.450	74.6	H	85.2	-10.6	PK	205	1.0	Flat orientation
402.450	75.7	V	85.2	-9.5	PK	271	1.0	Upright orientation
402.450	74.8	V	85.2	-10.4	PK	249	1.1	Side orientation

Note 1:	All 3 orientations were tested, upright orientation was worse case and all tests were performed upright.
Note 2:	Limit for field strength calculated from FCC §95.2569 limit of 18.2 mV/m for testing in a semi-anechoic chamber.

Run #2: Maximized Readings - Fundamental and Transmitter Spurious Emissions, 25 - 4,100 MHz

High Channel

Fundamental Field Strength Limit is 25µW EIRP ~ 85.2 dBuV/m @ 3m

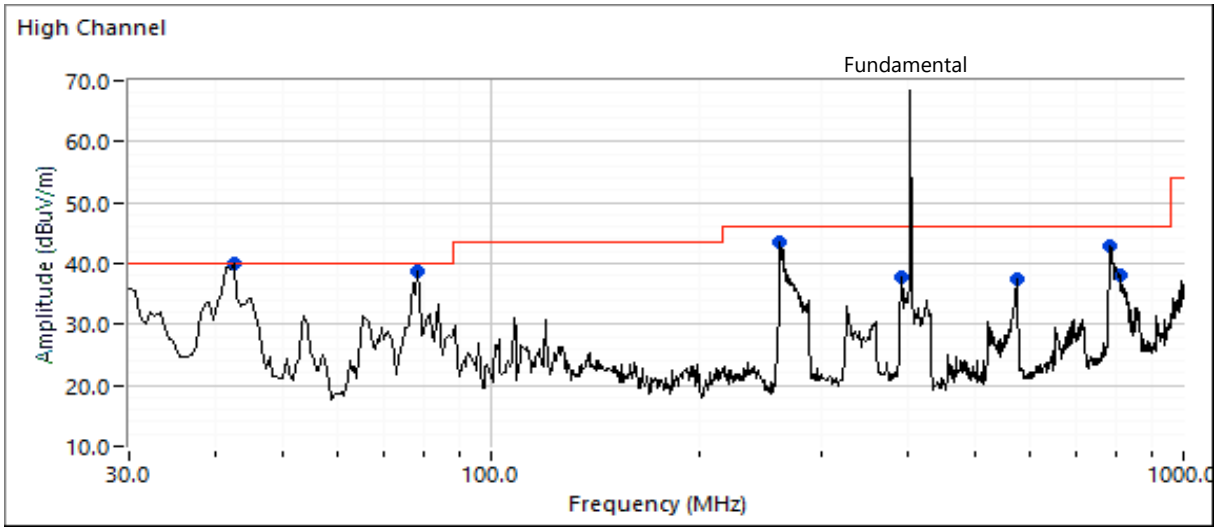
Frequency	Level	Pol	FCC part 95		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
404.550	76.8	V	85.2	-8.4	PK	271	1.1	POS; RB 1 MHz; VB: 3 MHz
404.550	70.7	H	85.2	-14.5	PK	337	1.0	POS; RB 1 MHz; VB: 3 MHz

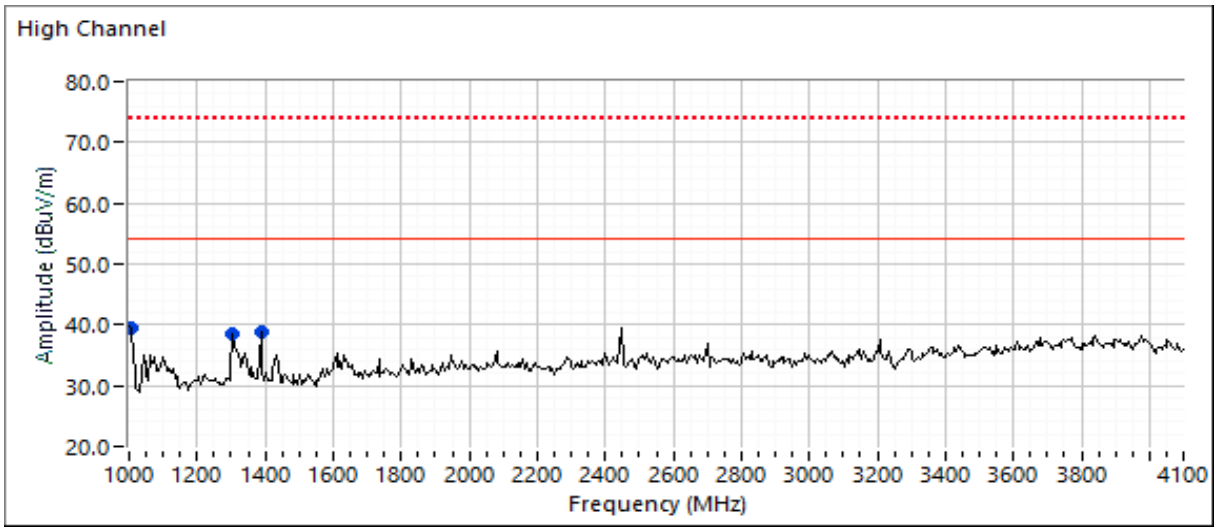
Spurious Emissions

Frequency	Level	Pol	FCC part 95		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
42.563	36.0	V	40.0	-4.0	QP	289	1.0	QP (1.00s)
78.200	27.2	V	40.0	-12.8	QP	42	1.2	QP (1.00s)
261.266	39.2	H	46.0	-6.8	QP	70	1.1	QP (1.00s)
391.935	25.3	V	46.0	-20.7	QP	289	0.9	QP (1.00s)
573.055	33.1	V	46.0	-12.9	QP	336	1.0	QP (1.00s)
783.854	34.5	V	46.0	-11.5	QP	99	1.1	QP (1.00s)
812.606	23.5	V	46.0	-22.5	QP	98	1.1	QP (1.00s)
1003.180	29.2	H	54.0	-24.8	AVG	67	1.2	RB 1 MHz;VB 10 Hz;Peak
1002.970	55.0	H	74.0	-19.0	PK	67	1.2	RB 1 MHz;VB 3 MHz;Peak
1307.960	28.8	V	54.0	-25.2	AVG	318	2.0	RB 1 MHz;VB 10 Hz;Peak
1306.720	53.5	V	74.0	-20.5	PK	318	2.0	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For spurious emissions, QP detector used below 1GHz, Peak and average detectors above 1GHz.

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





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

Low Channel

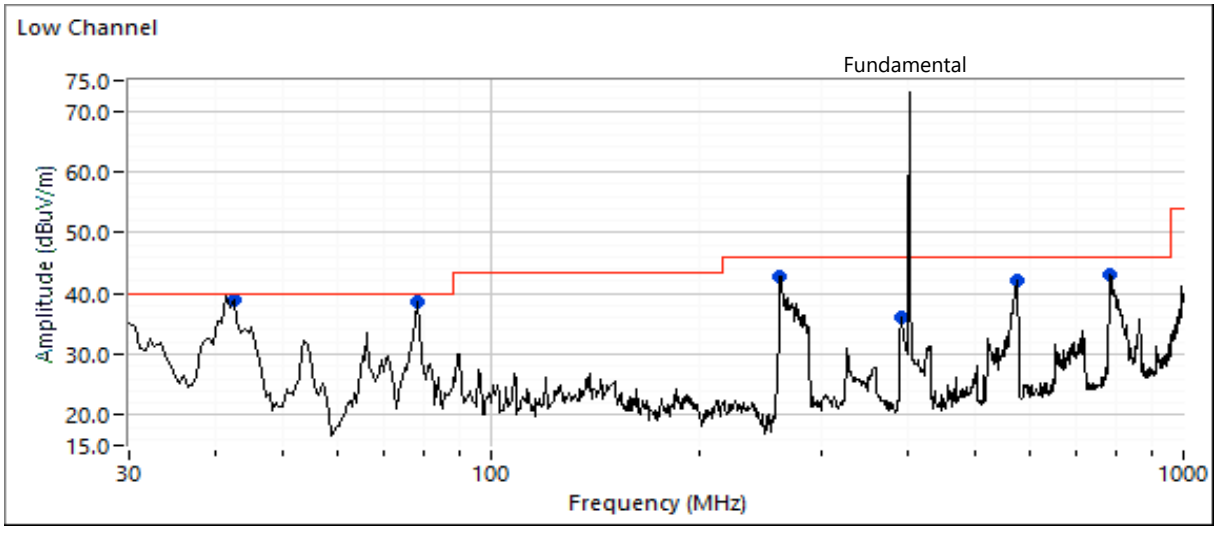
Fundamental Field Strength

Frequency	Level	Pol	FCC part 95		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
402.450	75.7	V	85.2	-9.5	PK	271	1.0	POS; RB 1 MHz; VB: 3 MHz
402.450	69.4	H	85.2	-15.8	PK	340	1.0	POS; RB 1 MHz; VB: 3 MHz

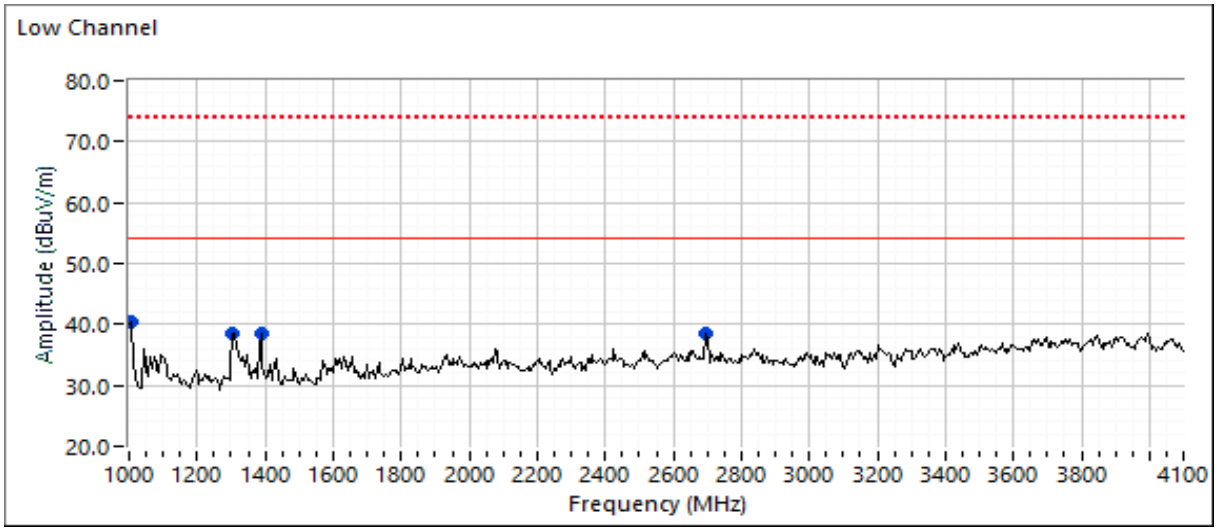
Spurious Emissions

Frequency	Level	Pol	FCC part 95		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
42.445	35.6	V	40.0	-4.4	QP	298	0.9	QP (1.00s)
261.583	40.9	H	46.0	-5.1	QP	92	1.2	QP (1.00s)
783.968	36.7	V	46.0	-9.3	QP	140	1.0	QP (1.00s)
574.950	34.0	H	46.0	-12.0	QP	301	1.6	QP (1.00s)
78.156	27.1	V	40.0	-12.9	QP	203	0.9	QP (1.00s)
391.182	28.3	V	46.0	-17.7	QP	126	1.2	QP (1.00s)
1003.590	56.0	H	74.0	-18.0	PK	57	1.0	RB 1 MHz;VB 3 MHz;Peak
1306.190	54.8	H	74.0	-19.2	PK	331	1.2	RB 1 MHz;VB 3 MHz;Peak
1004.380	29.8	H	54.0	-24.2	AVG	57	1.0	RB 1 MHz;VB 10 Hz;Peak
1307.450	29.5	H	54.0	-24.5	AVG	331	1.2	RB 1 MHz;VB 10 Hz;Peak

Note 1: For spurious emissions, QP detector used below 1GHz, Peak and average detectors above 1GHz.



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



Run #4: Receiver Spurious Emissions

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
25 - 4,100 MHz	3	3	0.0

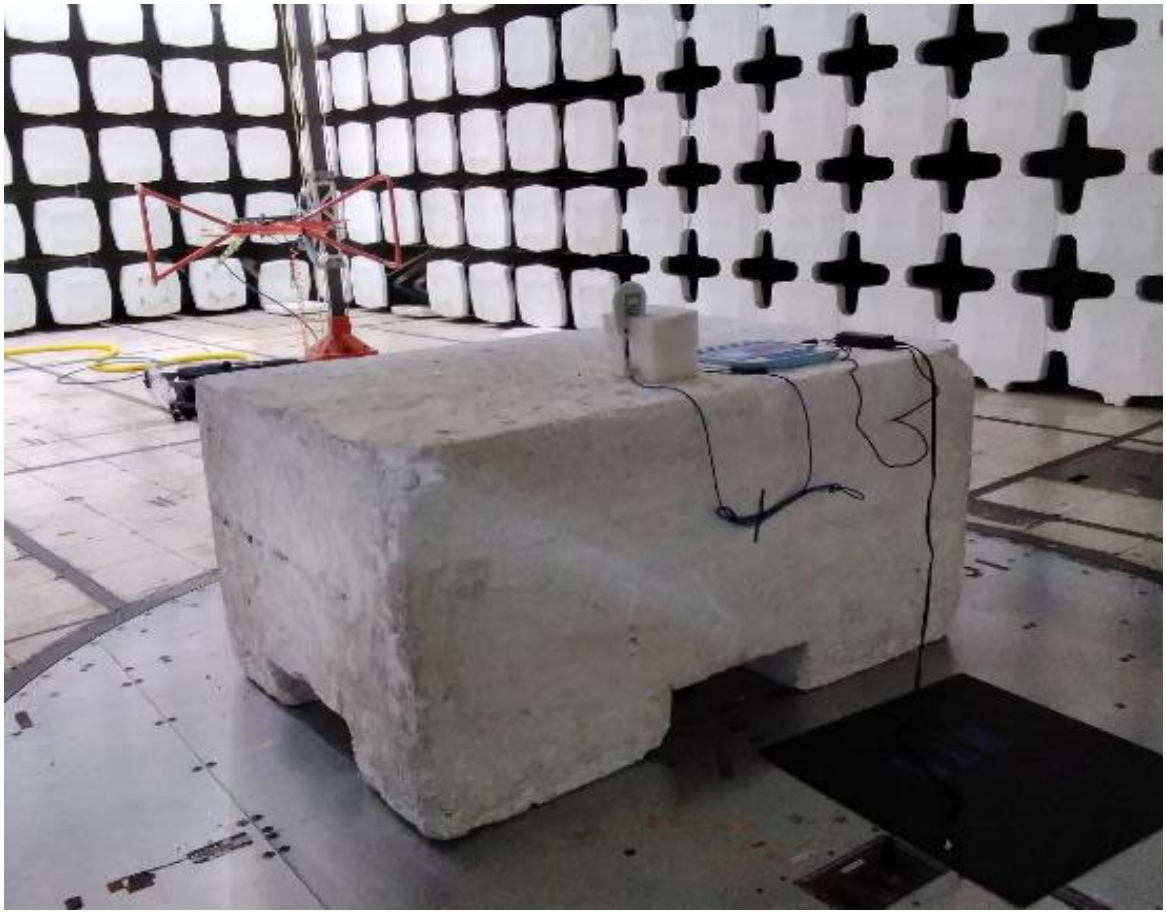
Not necessary as all emissions from the EUT while transmitting except the fundamental were below the receiver limits

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

Test Configuration Photographs

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

Test Configuration Photographs



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

LBT, FCC Part 95 & EN 301 839 v2.1.1

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: 4/26/21 and 11/18/21
Test Engineer: D. Bare; M. Birgani
Test Location: Fremont Chamber #2
Config. Used: See each run
Config Change: None
EUT Voltage: 120V, 60Hz

General Test Configuration

The EUT and all local support equipment were located on the table for LBT testing.

Ambient Conditions:

Temperature: 22-23 °C
Rel. Humidity: 45-48 %

Summary of Results - Device Operating in the 402-405 MHz Band

Run #	Mode	Test	Requirement / Limit	Result / Margin
1	Normal operation	LBT Threshold power level	-104.7 dBm	Pass
2	Normal operation	Monitoring system bandwidth	> 20 dB EBW	Pass
3	Normal operation	Monitoring system scan cycle time	> 10 ms	Pass
4	Normal operation	Monitoring system Minimum Channel monitoring period	0.1 ms / 10 ms	Pass
5	Normal operation	Channel access based on ambient level above PTh	Correct channel selection	Pass
6	Normal operation	Discontinuation of MICS session	< 5 seconds	Pass / 3.4 sec
7	Normal operation	Use of pre-scanned alternative channel	The EUT does not use this feature	N/A

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

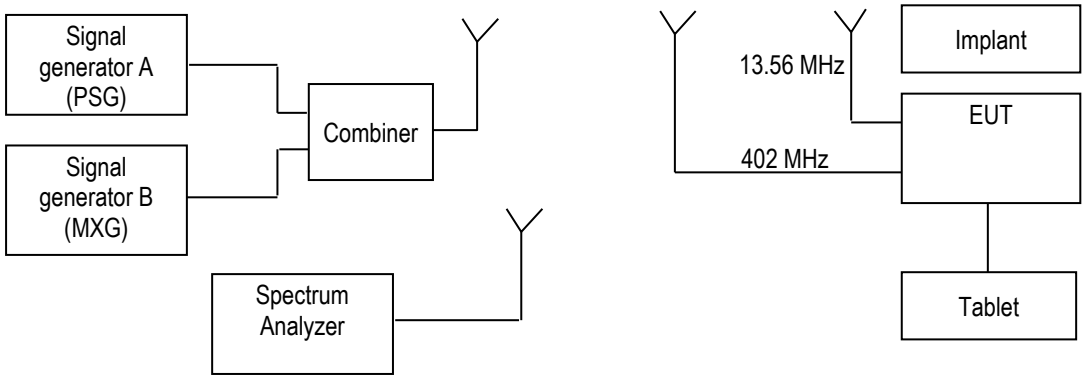
No deviations were made from the requirements of the standard.

Notes

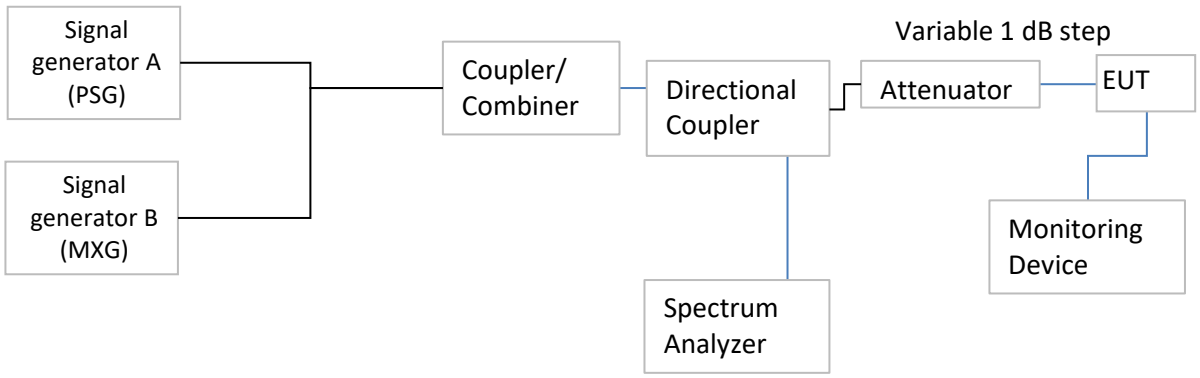
Runs 1-3 and 5-7 was performed by David Bare on 4/26/21 using radiated method and sample 000081.
Run 4 was performed by Mehran Birgani on 11/18/21 using conducted method and sample 000083.

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

Test Setup - Radiated Method



Test Setup - Conducted



Antenna Gain: -8.7 dBi
Minimum LBT threshold power = 10 Log B (Hz) - 150 + G (dBi)
When B: 253000 Hz (20 dB bandwidth)
Minimum LBT threshold power = -104.7 dBm

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

Run #1: LBT Threshold power level (FCC §95.2559, EN 301 839 5.3.7.1.3)

Test Configuration Details:

The Signal Generator B was off. The Signal Generator A (PSG vector signal generator) was configured to produce 7 un-modulated carriers at 7 of the 8 channels at;

Ch1	402.45 MHz	-101.7 dBm	
Ch2	402.75 MHz	-101.7 dBm	
Ch3	403.05 MHz	-101.7 dBm	
Ch4	403.35 MHz	-101.7 dBm	
Ch5	403.65 MHz	Turned off	f_c
Ch6	403.95 MHz	-101.7 dBm	
Ch7	404.25 MHz	-101.7 dBm	
Ch8	404.55 MHz	-101.7 dBm	

EUT Mode:

The EUT was placed in search mode looking for an implanted device. At this amplitude, the EUT must initiate communications on the channel 5 (403.65 MHz) not generated by the signal generator. A signal at f_c was applied from Gen B at a level 6 dB below the calculated threashold level and increased in 1 dB steps until the system selected other than the channel at f_c. 4 dB was subtracted from this level and compared to the threshold.

Test result:

The EUT complies with this requirement. EUT starts to initiate communication only at channel 5 without any signal from Gen B. The level of Gen B when the system selected other than f_c less 4dB was -104.7 dBm.

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

Run #2: Monitoring system bandwidth (FCC §95.2559, EN 301 839 5.3.7.1.4)

Test Configuration Details:

The PSG signal generator was configured to produce 7 un-modulated carriers at 7 of the 8 channels at;

Ch1	402.45 MHz	-101.7 dBm
Ch2	402.75 MHz	-101.7 dBm
Ch3	403.05 MHz	-101.7 dBm
Ch4	403.35 MHz	-101.7 dBm
Ch5	403.65 MHz	Turned off
Ch6	403.95 MHz	-101.7 dBm
Ch7	404.25 MHz	-101.7 dBm
Ch8	404.55 MHz	-101.7 dBm

Pa:	-101.7 dBm	@403.650 MHz			
Pb:	-81.7 dBm	@403.524 MHz	D1:	20.0 dB	Pass
Pc:	-83.7 dBm	@403.777 MHz	D2:	18.0 dB	Pass

Test result:

Pb – Pa = 20 dB and Pc – Pa = 18 dB, the EUT complies with the 20 dB monitoring bandwidth requirement.

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

Run #3: Monitoring system scan cycle time (FCC §95.2559, EN 301 839 5.3.7.1.5.1)

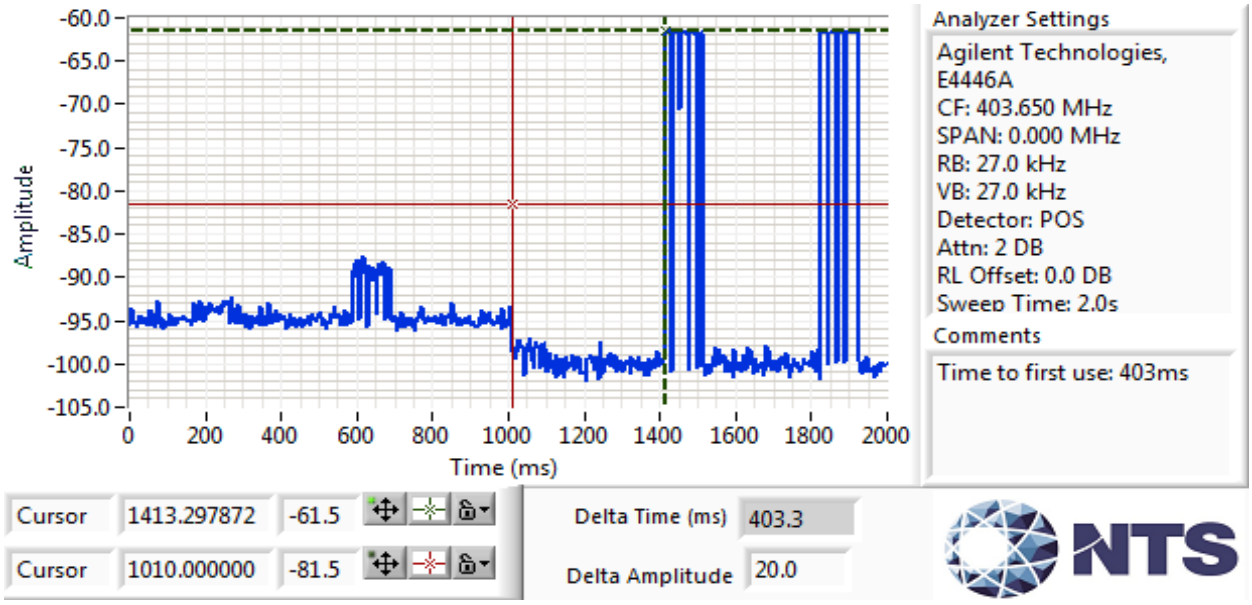
Note: The EUT performs a clear channel assessment prior to initiating any transmission

Test Configuration Details:

The PSG signal generator was configured to produce 7 un-modulated carriers at 7 of the 8 channels at;

Ch1	402.45 MHz	-101.7 dBm
Ch2	402.75 MHz	-101.7 dBm
Ch3	403.05 MHz	-101.7 dBm
Ch4	403.35 MHz	-101.7 dBm
Ch5	403.65 MHz	Turned off
Ch6	403.95 MHz	-101.7 dBm
Ch7	404.25 MHz	-101.7 dBm
Ch8	404.55 MHz	-101.7 dBm

The MXG signal generator was configured to produce 1 un-modulated carrier at channel (403.65 MHz). The output of the generators were combined. The amplitude of the MXG generator was adjusted to be 3dB above the amplitude of the PSG generator. The EUT was set to initiate a communication session. The EUT shall not transmit at 403.65 MHz. The MXG generator was switched off and the EUT was set to initiate a transmission at the same time. The time period from the point at which the MXG generator was switch off until the EUT trasnmitted on 403.65 MHz was measured.



Test result:

The first use of the channel after removal of the signal from Gen B at f_c was 403ms. Once the communication establishes, it does not stop transmitting without manual intervention. the EUT complies with this requirement.

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

Run #4: Monitoring system Minimum Channel monitoring period (FCC §95.2559, EN 301 839 5.3.7.1.5.1.2)

Test Configuration Details:

The PSG signal generator was configured to produce 7 un-modulated carriers at 7 of the 8 channels at;

Ch1	402.45 MHz	-101.7 dBm
Ch2	402.75 MHz	-101.7 dBm
Ch3	403.05 MHz	-101.7 dBm
Ch4	403.35 MHz	-101.7 dBm
Ch5	403.65 MHz	Turned off
Ch6	403.95 MHz	-101.7 dBm
Ch7	404.25 MHz	-101.7 dBm
Ch8	404.55 MHz	-101.7 dBm

The MXG signal generator was configured to produce 1 un-modulated carrier at channel (403.65 MHz). The output of the generators were combined. The amplitude of the MXG generator was adjusted to be equal to the amplitude of the PSG generator.
The output of the PSG generator was switched off and the EUT was set to initiate a transmission. The EUT did not transmit at 403.65 MHz. The output of the PSG was switched back on and the amplitude increased by 3 dB. The EUT was set to initiate a transmission. The EUT only transmitted at 403.65 MHz. The PSG generator was configured with **pulse modulation** on all the carriers. The modulation was 0.1 ms pulse with a repetition rate of 10 ms corresponding to a silent period between pulses of 9.9 ms. The EUT was set to initiate a transmission 10 times. In each case, the EUT only transmitted at 403.65 MHz

Test result:

The EUT complies with this requirement.

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

Run #5: Channel access based on ambient level above PTh (FCC §95.2559, EN 301 839 5.3.7.1.6)

Test Configuration Details:

The PSG signal generator was configured to produce 7 un-modulated carriers at 7 of the 8 channels

Ch1	402.45 MHz	-94.7 dBm				
Ch2	402.75 MHz	-101.7 dBm				
Ch3	403.05 MHz	-94.7 dBm				
Ch4	403.35 MHz	-94.7 dBm				
Ch5	403.65 MHz	-107.7 dBm	Increased:	-98.7 dBm	(MXG)	
Ch6	403.95 MHz	-94.7 dBm				
Ch7	404.25 MHz	-94.7 dBm				
Ch8	404.55 MHz	-94.7 dBm				

The MXG signal generator was configured to produce 1 un-modulated carrier at channel 5 (403.65 MHz) with 9 dB below the threshold level.

The EUT was set to initiate a transmission, it only transmitted at 403.65 MHz. The amplitude of the MXG generator was increased 9 dB and the EUT was set to initiate a transmission. The EUT only selected 402.75 MHz.

Test result:

The EUT complies with this requirement.

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

Run #6: Discontinuation of MICS session (FCC §95.2559, EN 301 839 5.3.7.1.7)

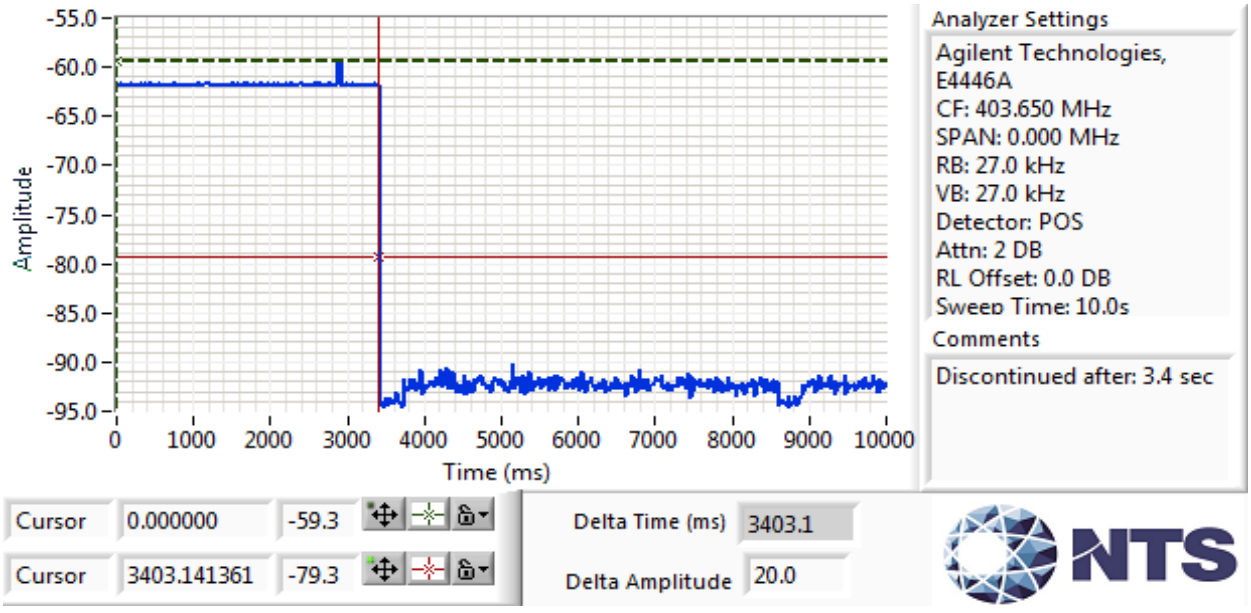
MIC systems shall cease transmission in the event the communications session is interrupted for a period of 5 seconds or more. Once a MICS session is established, it may continue as long as the silent period in two-way communication between co-operating devices does not exceed 5 seconds

Test Configuration Details:

The PSG signal generator was configured to produce 7 un-modulated carriers at 7 of the 8 channels

Ch1	402.45 MHz	-94.7 dBm			
Ch2	402.75 MHz	-101.7 dBm			
Ch3	403.05 MHz	-94.7 dBm			
Ch4	403.35 MHz	-94.7 dBm			
Ch5	403.65 MHz	-107.7 dBm	Increased:	-98.7 dBm	(MXG)
Ch6	403.95 MHz	-94.7 dBm			
Ch7	404.25 MHz	-94.7 dBm			
Ch8	404.55 MHz	-94.7 dBm			

The MXG signal generator was configured to produce 1 un-modulated carrier at channel 5 (403.65 MHz)
The EUT was set to initiate a transmission to communicate with the implant. The EUT transmitted at 403.65 MHz. The Implant was removed from the test setup to block the communications. From the point in time when the Implant was blocked to the end of transmissions from the EUT was 3.4 seconds. After the implant is introduced to the test setup, no transmissions were observed.



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

Test result:
The transmissions from the EUT has stopped in less than 5 seconds and did not re-initiate, the EUT complied with this requirement

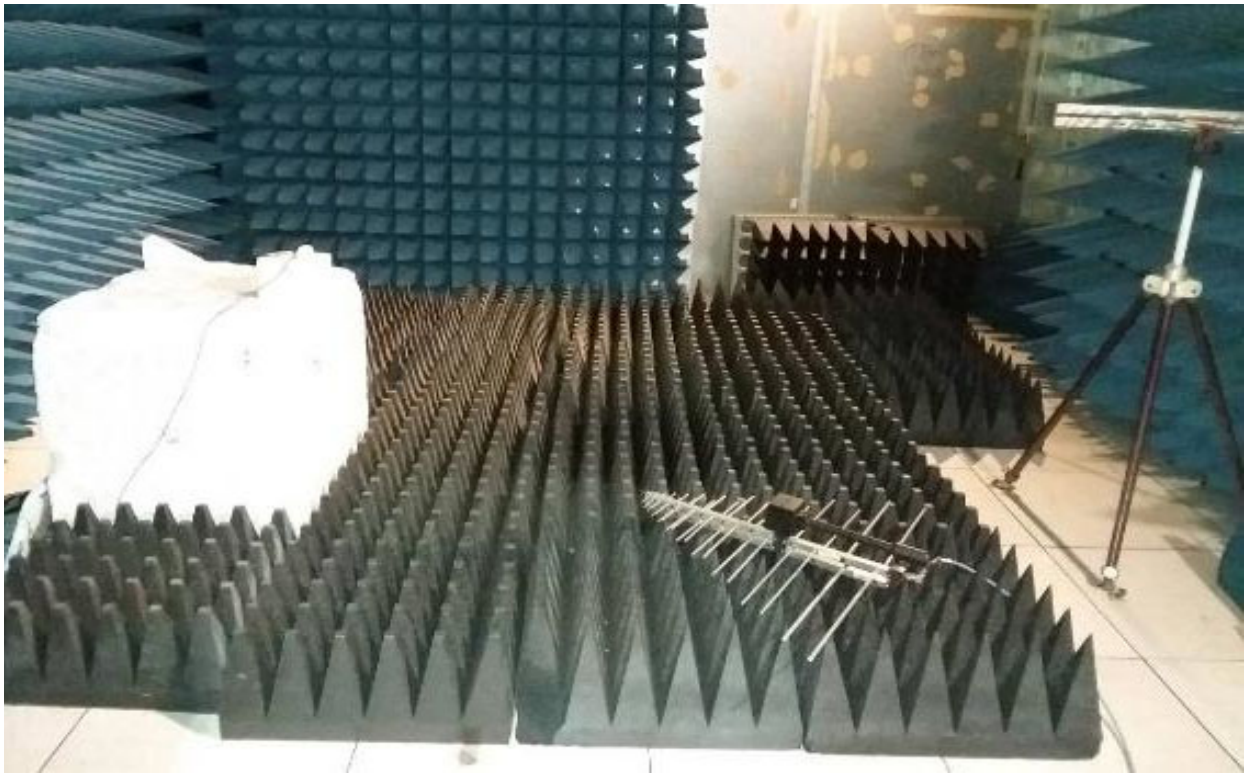
Run #7: Use of pre-scanned alternative channel

The test is not applicable. The EUT does not use this feature.

Test result: N/A

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

Test Configuration Photograph #1



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

Test Configuration Photograph #2

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 95 & EN 301 839

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	-35ppm

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: 402.45 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)
0	402.450930	930	2.3
10	402.449118	-882	-2.2
20	402.445727	-4273	-10.6
30	402.442400	-7600	-18.9
40	402.439334	-10666	-26.5
50	402.437000	-13000	-32.3
55	402.435910	-14090	-35.0
	Worst case:	-13000	-35.0

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 § 95.2565 (FCC §2.1055(d))
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	100 ppm	Pass, 17.8ppm

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: 403.65 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)
0	403.644370	-5630	13.9
10	403.647282	-2718	6.7
20	403.650138	138	0.3
30	403.651256	1256	3.1
40	403.653650	3650	9.0
50	403.655643	5643	14.0
55	403.657170	7170	17.8
	Worst case:	7170	17.8

Frequency Stability Over Input Voltage

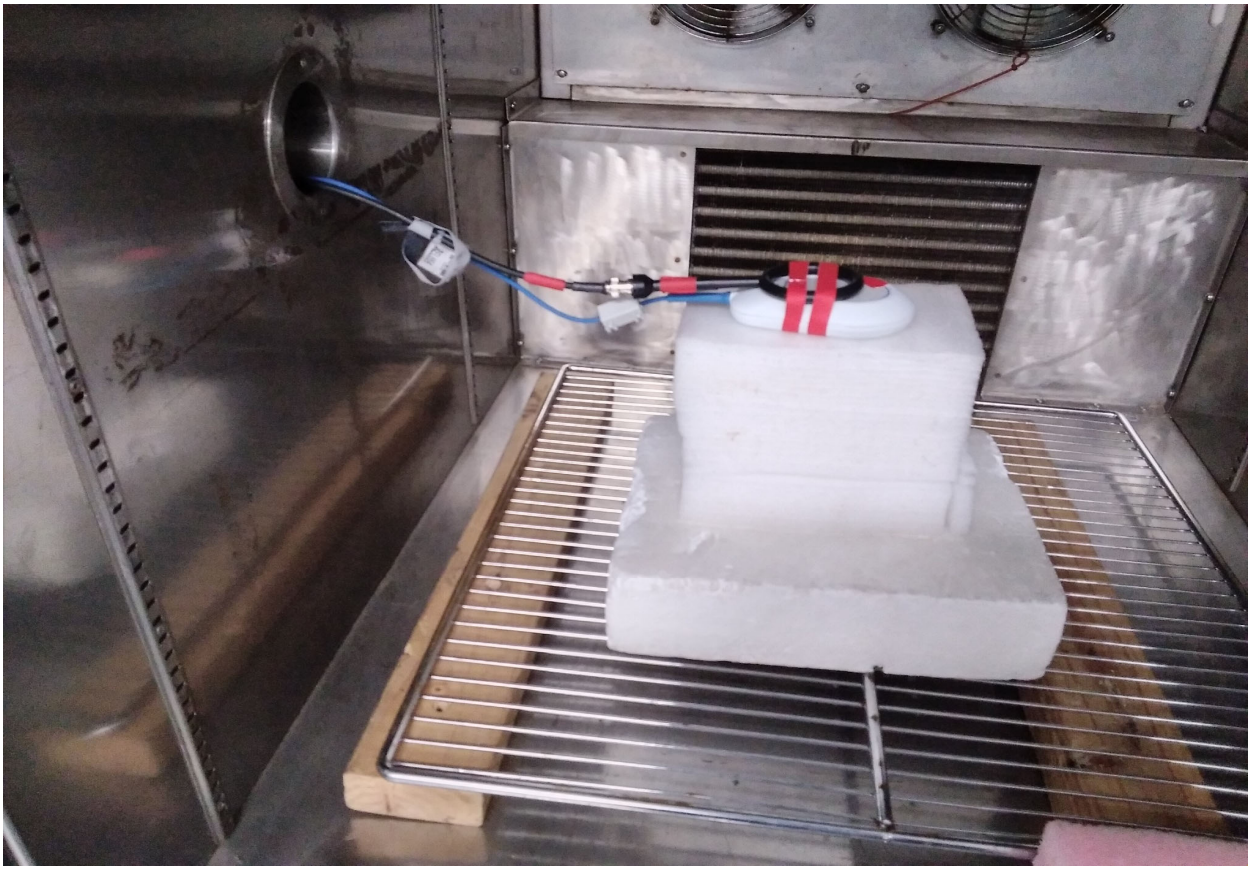
Nominal Voltage is 5.0Vdc.

Voltage	Frequency Measured	Drift	
(DC)	(MHz)	(Hz)	(ppm)
85%	403.645665	-4335	10.7
115%	403.645923	-4077	10.1
	Worst case:	-4335	10.7

Note: The power shutdown at 2.5V 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

Test Configuration Photographs



End of Report

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