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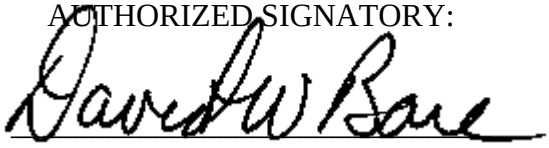
# *Radio Test Report*

## *FCC Part 95*
## *MedRadio Transmitter*

## *Model: Programmer Wand*

| | |
|---|---|
| COMPANY: | Nevro Corporation<br>4040 Campbell Ave. Suite 210<br>Menlo Park, CA 94125 |
| TEST SITE(S): | Elliott Laboratories<br>684 W. Maude Avenue<br>Sunnyvale, CA 94085 |
| and | 41039 Boyce Road.<br>Fremont, CA. 94538-2435 |
| REPORT DATE: | February 24, 2011 |
| REISSUE DATE: | January 13, 2015 |
| FINAL TEST DATES: | December 4 and 8, 2009 |

AUTHORIZED SIGNATORY:



David W. Bare
Chief Engineer
Elliott Laboratories LLC

ACCREDITED

Testing Cert #2016-01

## *REVISION HISTORY*

| Rev# | Date | Comments | Modified By |
|---|---|---|---|
| - | 02-24-2011 | First release | |
| 1 | 12-19-2014 | Revised to add notes concerning emissions 250 kHz from the band edges | DMG |
| 2 | 01-13-2015 | Revised to change radiated power emissions calculation and clarify in band and band edge emissions results | DWB |

## *TABLE OF CONTENTS*

## *SCOPE*

Tests have been performed on the Nevro Corporation 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 (Medical Device Radiocommunication Service) Subpart I

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 Elliott Laboratories test procedures:

ANSI C63.4-2003
ANSI TIA-603-C August 17, 2004

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.

The test results recorded herein are based on a single type test of the Nevro Corporation model Programmer Wand and therefore apply only to the tested sample. The sample was selected and prepared by Jon Parker of Nevro Corporation.

## *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 Nevro Corporation 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 Modulation, output power and other characteristics** | | | | |
| §2.1033 (c) (5)<br>§ 95.628(c) | Frequency range(s) | 402.45 – 404.55 MHz | 402-405 MHz | Complies |
| §2.1033 (c) (6)<br>§2.1033 (c) (7)<br>§2.1046<br>§ 95.639(f) | EIRP (Calculated from Field Strength) | 7.1µW<br>-21.5 dBm | 25µW<br>–16dBm | Complies |
| §2.1033 (c) (4)<br>§2.1047<br>§95.635(d)(4) & (5) | Emission types | F1D | - | - |
| | Unwanted emissions (-20dBc) | 39.8nW<br>-44.0 dBm | 70.8nW<br>-41.5dBm | Complies |
| §2.1049<br>§95.628(d),<br>§95.633(e)(1) | Authorized Bandwidth, 20dB | 243 kHz | 300 kHz | Complies |
| **Transmitter spurious emissions** | | | | |
| §2.1053<br>§2.1057<br>§95.635(d)(1) | Field strength | 30.8 dBµV/m<br>(34.7µV/m)@<br>804.900 MHz | See table | Complies |
| **Receiver spurious emissions** | | | | |
| 15.109 | Field strength | 30.8 dBµV/m<br>(34.7µV/m)@<br>804.900 MHz | See table | Complies |
| **Other details** | | | | |
| 95.628(a) | Frequency Monitoring | Refer to separate LBT report | - | Complies |
| §2.1055<br>§95.628(g)(2) | Frequency stability | 9.3 ppm | 100 ppm | |
| §2.1093 | RF Exposure | Refer to separate exhibit | - | Complies |
| §2.1033 (c)(8) | Final radio frequency amplifying circuit's dc voltages and currents for normal operation over the power range | 3.3V, 50mA | - | - |
| **Notes** | | | | |

*EXTREME CONDITIONS*

Frequency stability is determined over extremes of temperature. As the device is powered from the USB port of a computer, the supply voltage will not vary.

The extremes of temperature were 0°C to +55°C as specified in FCC §95.628(e)(2) for stations in the Medical Device Radiocommunication Service.

## *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 (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 | $1.7 \times 10^{-7}$ |
| Radiated emission (field strength) | dBµV/m | 25 to 1,000 MHz<br>1 to 40 GHz | ± 3.6 dB<br>± 6.0 dB |

## *EQUIPMENT UNDER TEST (EUT) DETAILS*

### *GENERAL*

The Nevro Corporation model Programmer Wand is a USB powered transciever that is designed to facilitate communication between the Nevro Programmer and the IPG or Trial Stimulator. Since the EUT would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 5 Volts DC supplied by the USB connection.

The sample was received on December 4, 2009 and tested on December 4 and 8, 2009. The EUT consisted of the following component(s):

| Company | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| Nevro | Programmer Wand | USB Programmer Wand | 15 | XKYWAND1000 |

### *ENCLOSURE*

The EUT enclosure is primarily constructed of plastic. It measures approximately 11 cm wide by 7 cm deep by 2 cm high.

### *MODIFICATIONS*

No modifications were made to the EUT during the time the product was at Elliott.

### *SUPPORT EQUIPMENT*

The following equipment was used as support equipment for testing:

| Company | Model | Description | Serial Number | FCC ID |
|---|---|---|---|---|
| Nevro | IPG | Implantable pulse generator | 14 | XKYIPG1000 |
| Dell | - | Laptop | - | - |

No remote support equipment was used during testing.

*EUT INTERFACE PORTS*

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

| Port | Connected To | Cable(s) | | |
|---|---|---|---|---|
| | | Description | Shielded or Unshielded | Length(m) |
| Wand USB | Laptop | Multiwire | Shielded | 2.0 |
| AC Power (Laptop pwr supply) | AC Mains | Direct plug-in | NA | NA |
| DC Power (Laptop pwr supply) | Laptop | 2 wire | Unshielded | 3.0 |

*EUT OPERATION*

During emissions testing the EUT was set to transmit on the selected frequency for transmit modes tests and set to receive mode for all other tests.

## *TESTING*

### *GENERAL INFORMATION*

Radiated spurious emissions measurements were taken at the Elliott Laboratories Anechoic Chambers and/or Open Area Test Site(s) listed below. The sites conform to the requirements of ANSI C63.4: 2003 *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz* and CISPR 16-1-4:2007 - *Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances*. They are on file with the FCC and industry Canada.

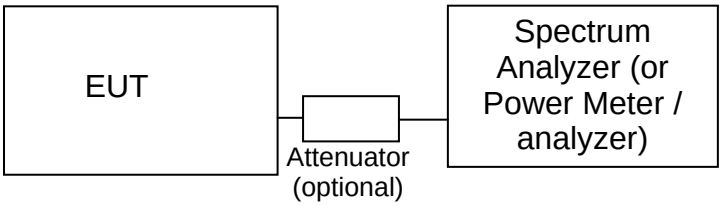
| Site | Registration Numbers | | Location |
|---|---|---|---|
| | FCC | Canada | |
| Chamber 4 | 211948 | 2845B-4 | 41039 Boyce Road<br>Fremont,<br>CA 94538-2435 |

In the case of Open Area Test Sites, ambient levels are at least 6 dB below the specification limits with the exception of predictable local TV, radio, and mobile communications traffic.

Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements.

## *RF PORT MEASUREMENT PROCEDURES*

Conducted measurements are performed with the EUT's rf input/output connected to the input of a spectrum analyzer, power meter or modulation analyzer. When required an attenuator, filter and/or dc block is placed between the EUT and the spectrum analyzer to avoid overloading the front end of the measurement device. Measurements are corrected for the insertion loss of the attenuators and cables inserted between the rf port of the EUT and the measurement equipment.




Test Configuration for Antenna Port Measurements

### *OUTPUT POWER*

Output power is measured using a power meter and an average sensor head, a spectrum analyzer or a power meter and peak power sensor head as required by the relevant rule part(s). Where necessary measurements are gated to ensure power is only measured over periods that the device is transmitting.

Power measurements made directly on the rf power port are, when appropriate, converted to an EIRP by adding the gain of the highest gain antenna that can be used with the device under test, as specified by the manufacturer.

For devices with an integral antenna the output power is measured as a field strength at a test distance of (typically) 3m and then converted to an eirp using far field equations as shown in SAMPLE CALCULATIONS –RADIATED POWER.

### *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 ANSI C63.4:2003 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 angel 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 sued 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 and adding 6dB for sites using a reflective ground plane (per FCC 95.627(g)(3):

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

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.

## *RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS*

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109.

| 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 |

For MedRadio, the above limits also apply to the transmitter per §95.635(d).

# *Appendix A Test Equipment Calibration Data*

**Environmental Test, 04-Dec-09**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| Agilent | PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX, | E4446A | 2139 | 12/30/2009 |
| Thermotron | Temp Chamber (w/ F4 Watlow Controller) | S1.2 | 2170 | 6/29/2010 |

**Radiated Emissions, 25 - 4050 MHz, 09-Dec-09**

| Manufacturer | Description | Model | Asset # | Cal Due |
|---|---|---|---|---|
| Hewlett Packard | SpecAn 9 KHz-26.5 GHz, Non-Program | 8563E | 284 | 12/29/2009 |
| Hewlett Packard | Preamplifier, 100 kHz - 1.3 GHz | 8447E | 1606 | 4/30/2010 |
| Rohde & Schwarz | EMI Test Receiver, 20 Hz-7 GHz | ESIB7 | 1756 | 2/10/2010 |
| EMCO | Antenna, Horn, 1-18 GHz (SA40-Purple) | 3115 | 1779 | 3/19/2010 |
| Hewlett Packard | Microwave Preamplifier, 1-26.5GHz | 8449B | 1780 | 9/17/2010 |

# *Appendix B Test Data*

T77539 10 Pages

| | | | |
|---|---|---|---|
| Client: | Nevro | Job Number: | J77515 |
| Model: | Programmer Wand | T-Log Number: | T77539 |
| | | Account Manager: | Sheareen Washington |
| Contact: | Jon Parker | Project Engineer: | David Bare |
| Emissions Standard(s): | FCC 15 & 95, EN 301-839-1, EN 60601-1-2 | Class: | B |
| Immunity Standard(s): | EN 401 489-1, EN 401 489-27, IEC/EN 60601-1-2 | Environment: | Radio/Medical |

# EMC Test Data

For The

# Nevro

Model

Programmer Wand

Date of Last Test: 12/17/2009

| | | | |
|---|---|---|---|
| Client: | Nevro | Job Number: | J77515 |
| Model: | Programmer Wand | T-Log Number: | T77539 |
| | | Account Manager: | Sheareen Washington |
| Contact: | Jon Parker | | |
| Standard: | FCC 15 & 95, EN 301-839-1, EN 60601-1-2 | Class: | N/A |

# FCC Radiated Spurious 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: 12/8/2009 Config. Used: 1

Test Engineer: Rafael Varelas Config Change: None

Test Location: Fremont Chamber #4 EUT Voltage: Laptop USB

## General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

## Ambient Conditions:

Temperature: 16.8 °C

Rel. Humidity: 35 %

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

| Run # | Mode | Channel | Power Setting | Measured Power | Test Performed | Limit | Result / Margin |
|---|---|---|---|---|---|---|---|
| 1a | | low | 08 | | Fundamental | 85.2 dBµV/m | 78.8dBµV/m @ 402.450MHz (-6.4dB) |
| | | | 08 | | Restricted Band Edge (402 MHz) | 46.0 dBµV/m | 43.3dBuV/m @ 401.949MHz (-2.7dB) |
| | | | 8 | | 20dB Edge at +/-150 kHz | 48.6 dBµV/m | 47.0dBµV/m @ 402.250MHz (-1.6dB) |
| | | | 08 | | Radiated Emissions, 25 - 4050 MHz | Part 95 | 30.8dBµV/m @ 804.900MHz (-15.2dB) |
| 1b | | high | 08 | | Fundamental | 85.2 dBµV/m | 79.7dBµV/m @ 404.550MHz (-5.5dB) |
| | | | 08 | | Restricted Band Edge (405 MHz) | 46.0 dBµV/m | 42.8dBµV/m @ 405.059MHz (-3.2dB) |
| | | | 8 | | 20dB Edge at +/-150 kHz | 50.5 dBµV/m | 48.0dBµV/m @ 404.350MHz (-2.5dB) |
| | | | 08 | | Radiated Emissions, 25 - 4050 MHz | Part 95 | 29.6dBµV/m @ 809.100MHz (-16.4dB) |
| 2 | | high | 08 | | 20dB Bandwidth | 300 kHz | 243 kHz |

## 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: | Nevro | Job Number: | J77515 |
| Model: | Programmer Wand | T-Log Number: | T77539 |
| | | Account Manager: | Shareen Washington |
| Contact: | Jon Parker | | |
| Standard: | FCC 15 & 95, EN 301-839-1, EN 60601-1-2 | Class: | N/A |

Run #1: Radiated Spurious Emissions, 25 - 4050 MHz.

EUT and Test Configuration Details:

*Fundamental level (Limit: 85.2 dBuV/m)*

*Level before 402MHz for low channel and after 405MHz for high channel (Limit= 65.2dBuV/m)*

*Level 250kHz away from fundamental (Limit: 46.0dBuV/m)*

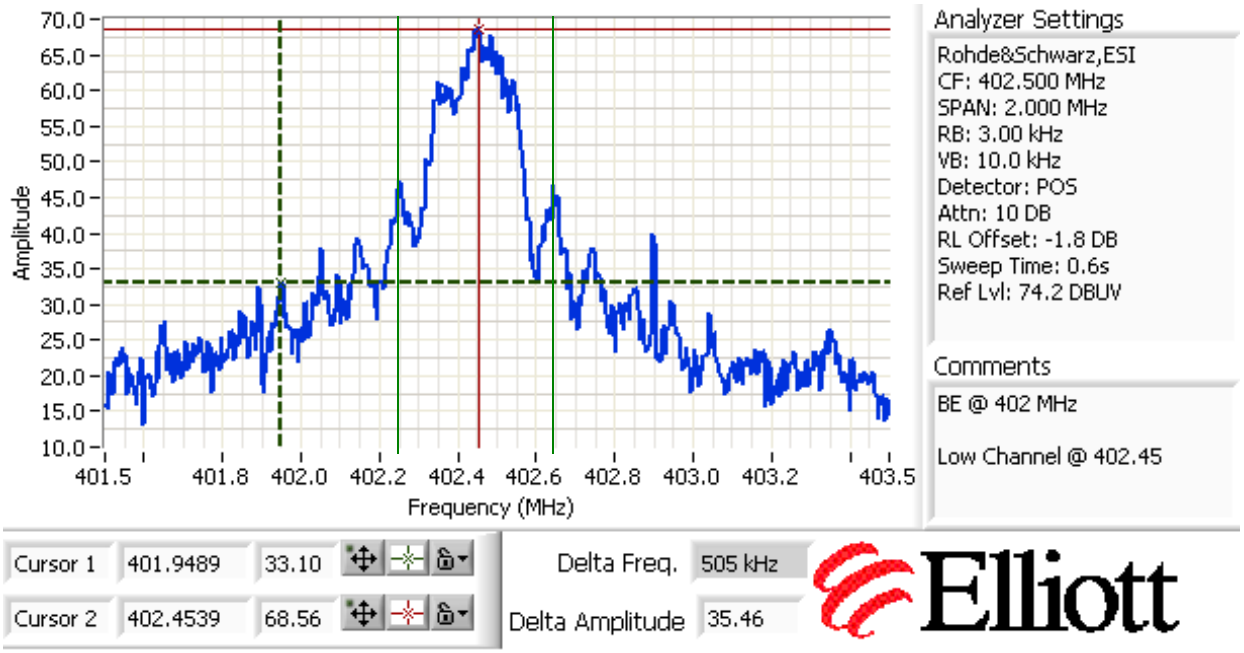
Run #1a: Low Channel @ 402.45 MHz

Fundamental Signal Field Strength: Peak values measured in 1 MHz

| Frequency | Level | Pol | FCC | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 402.450 | 78.8 | H | 85.2 | -6.4 | PK | 154 | 1.0 | EUT Upright |
| 402.450 | 78.1 | V | 85.2 | -7.1 | PK | 231 | 1.2 | EUT Upright |
| 402.450 | 78.6 | H | 85.2 | -6.6 | PK | 229 | 1.0 | EUT Flat |
| 402.450 | 72.2 | V | 85.2 | -13.0 | PK | 211 | 0.9 | EUT Flat |
| 402.450 | 77.1 | H | 85.2 | -8.1 | PK | 235 | 1.0 | EUT Side |
| 402.450 | 71.5 | V | 85.2 | -13.7 | PK | 220 | 1.0 | EUT Side |

In Band and Out of Band Delta Measurments

| Frequency | Level | Pol | FCC | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 402.000 | 33.1 | H | N/A | See note 1 | PK | 153 | 1.0 | out of band < 250 kHz from edge |
| 402.000 | 31.3 | V | N/A | See note 1 | PK | 233 | 1.2 | out of band < 250 kHz from edge |
| 402.250 | 47.0 | H | 48.6 | -1.6 | PK | 153 | 1.0 | In band >150 kHz from 402.45 MHz |
| 402.650 | 46.8 | H | 48.6 | -1.8 | PK | 153 | 1.0 | In band >150 kHz from 402.45 MHz |

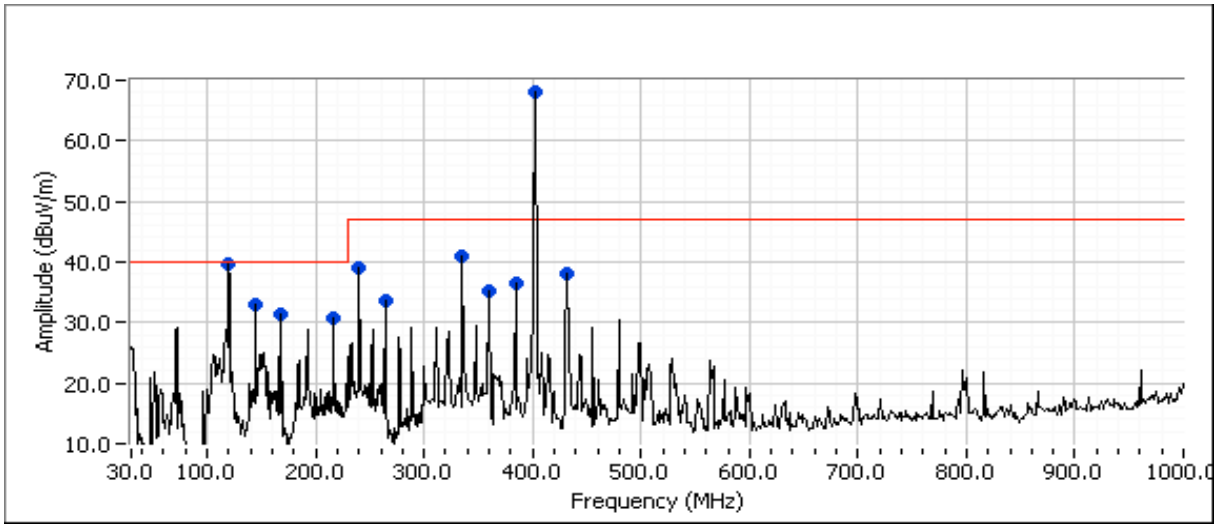


| | | | |
|---|---|---|---|
| Client: | Nevro | Job Number: | J77515 |
| Model: | Programmer Wand | T-Log Number: | T77539 |
| | | Account Manager: | Sheareen Washington |
| Contact: | Jon Parker | | |
| Standard: | FCC 15 & 95, EN 301-839-1, EN 60601-1-2 | Class: | N/A |

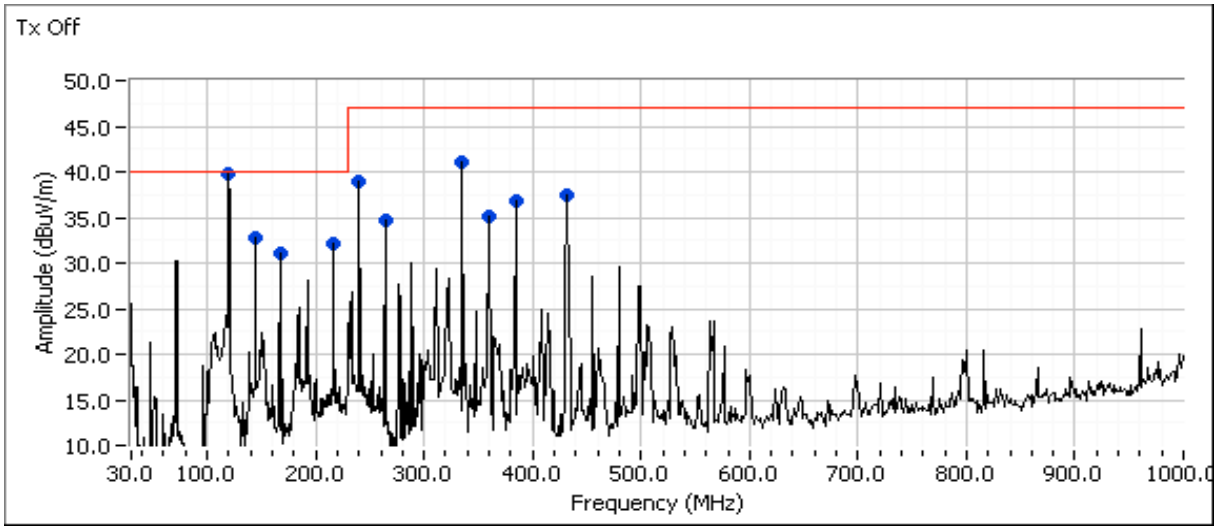
| | |
|---|---|
| Note 1: | The delta in emissons level from the inband level to the level at 401.949 is 35.5 dB. Subtracting this from the field strength of the fundamental at 1 MHz gives a value of 43.3 dBuV/m which even complies with the out of band limit of 46 dBuV/m. |

Other Spurious Emissions

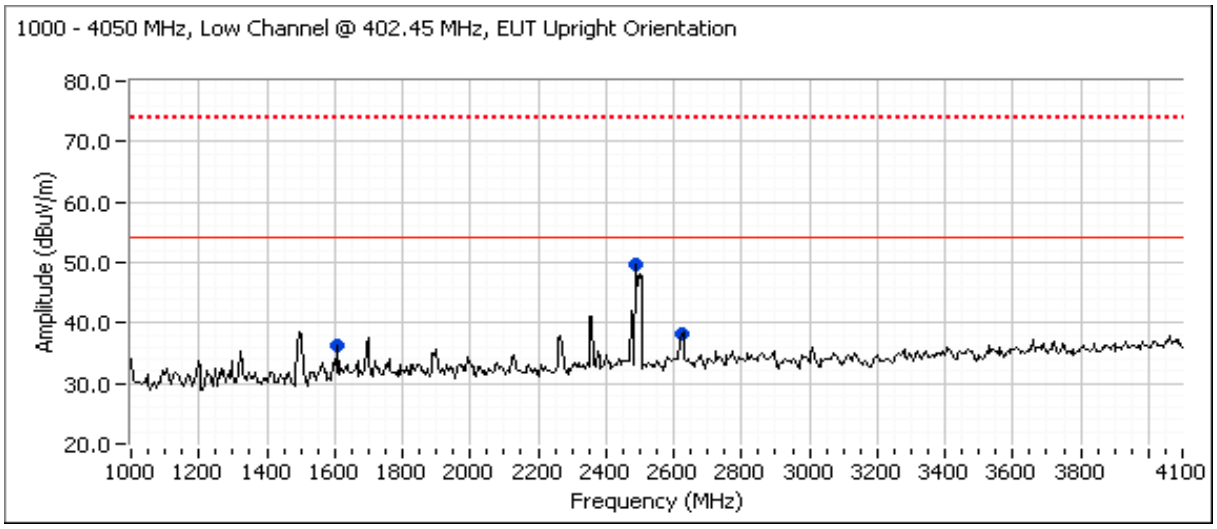
| Frequency | Level | Pol | FCC | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 804.900 | 30.8 | H | 46.0 | -15.2 | QP | 200 | 1.0 | QP (1.00s) |
| 804.900 | 26.4 | V | 46.0 | -19.6 | QP | 149 | 1.1 | QP (1.00s) |
| 2489.120 | 38.6 | V | - | - | AVG | 215 | 1.3 | Laptop |
| 2488.140 | 53.6 | V | - | - | PK | 215 | 1.3 | Laptop |
| 2626.490 | 29.0 | V | 54.0 | -25.0 | AVG | 243 | 1.0 | EUT Upright |
| 2628.030 | 40.4 | V | 74.0 | -33.6 | PK | 243 | 1.0 | EUT Upright |
| 1609.910 | 31.5 | V | 54.0 | -22.5 | AVG | 288 | 1.9 | EUT Upright |
| 1609.410 | 40.1 | V | 74.0 | -33.9 | PK | 288 | 1.9 | EUT Upright |
| 2638.060 | 29.0 | V | 54.0 | -25.0 | AVG | 40 | 1.0 | EUT Side |
| 2637.780 | 41.1 | V | 74.0 | -32.9 | PK | 40 | 1.0 | EUT Side |
| 1609.820 | 29.2 | H | 54.0 | -24.8 | AVG | 44 | 1.5 | EUT Side |
| 1609.940 | 38.3 | H | 74.0 | -35.7 | PK | 44 | 1.5 | EUT Side |
| 1609.870 | 32.4 | V | 54.0 | -21.6 | AVG | 154 | 1.0 | EUT Flat |
| 1610.110 | 41.2 | V | 74.0 | -32.8 | PK | 154 | 1.0 | EUT Flat |



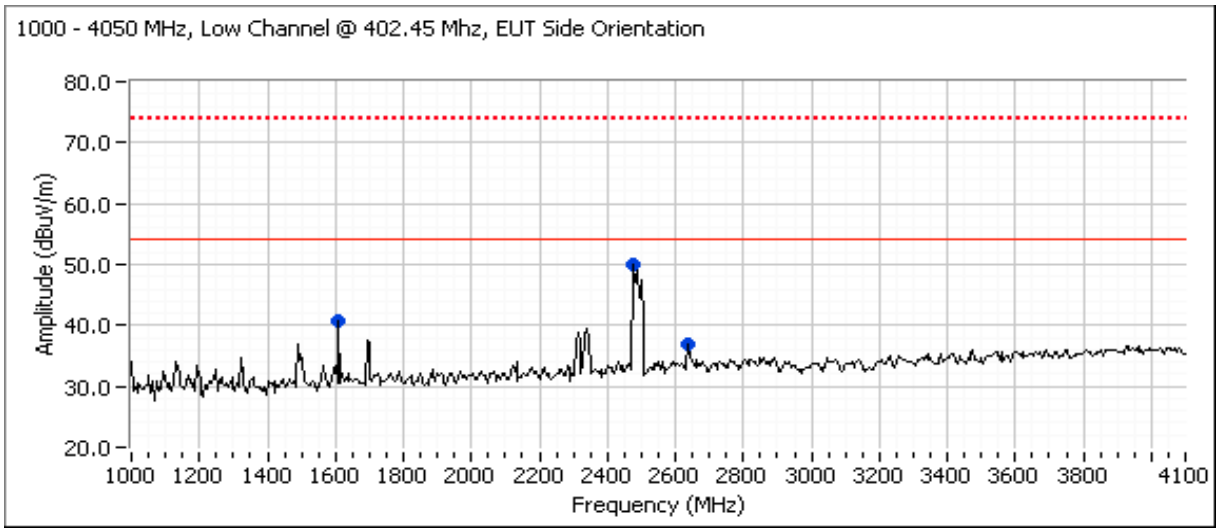
| | | | |
|---|---|---|---|
| Client: | Nevro | Job Number: | J77515 |
| Model: | Programmer Wand | T-Log Number: | T77539 |
| | | Account Manager: | Sheareen Washington |
| Contact: | Jon Parker | | |
| Standard: | FCC 15 & 95, EN 301-839-1, EN 60601-1-2 | Class: | N/A |

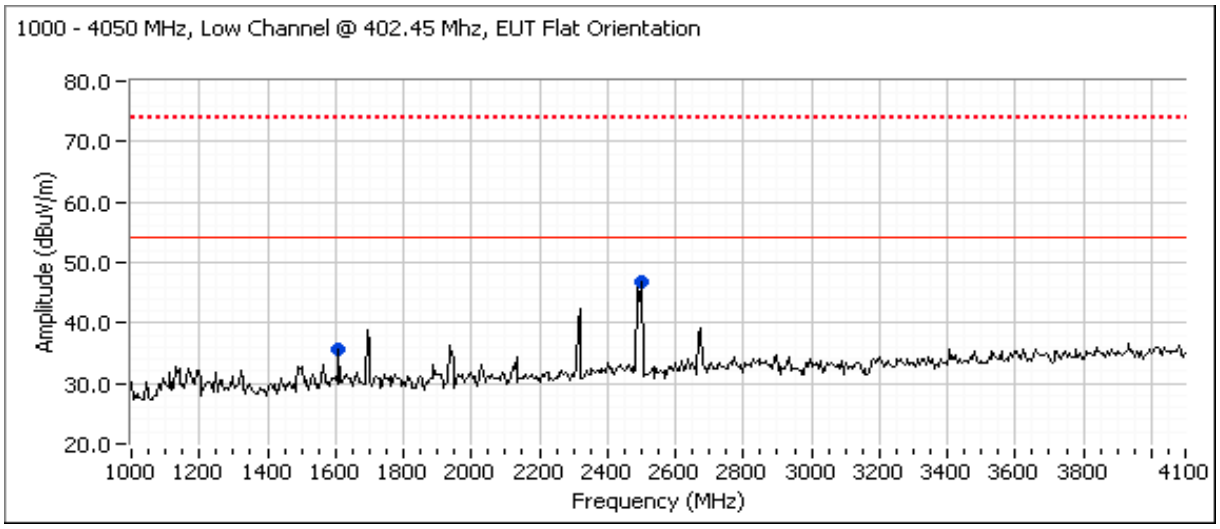



Note: The above plot was taken to verify that all the emissions other than the radio fundamental are not related to the transmitter. They are from the digital circuitry.



| | | | |
|---|---|---|---|
| Client: | Nevro | Job Number: | J77515 |
| Model: | Programmer Wand | T-Log Number: | T77539 |
| | | Account Manager: | Sheareen Washington |
| Contact: | Jon Parker | | |
| Standard: | FCC 15 & 95, EN 301-839-1, EN 60601-1-2 | Class: | N/A |



| | | | |
|---|---|---|---|
| Client: | Nevro | Job Number: | J77515 |
| Model: | Programmer Wand | T-Log Number: | T77539 |
| | | Account Manager: | Sheareen Washington |
| Contact: | Jon Parker | | |
| Standard: | FCC 15 & 95, EN 301-839-1, EN 60601-1-2 | Class: | N/A |

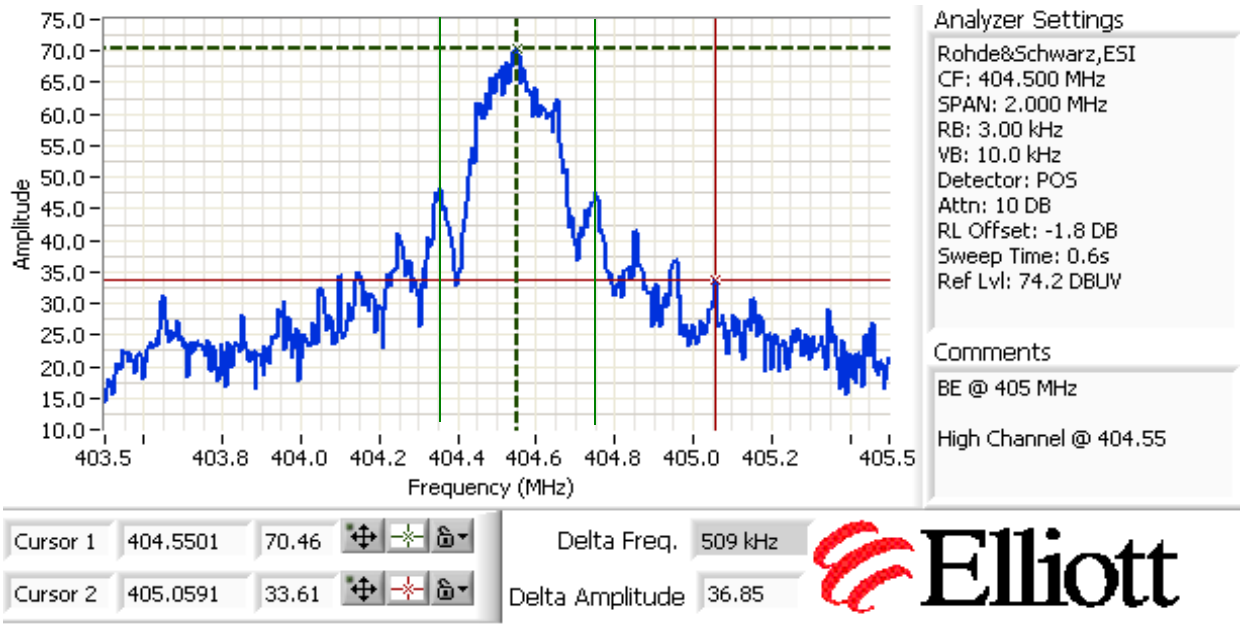
Run #1c: High Channel @ 404.55 MHz

Fundamental Signal Field Strength: Peak values measured in 1 MHz

| Frequency | Level | Pol | FCC | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 404.550 | 79.7 | H | 85.2 | -5.5 | PK | 157 | 1.0 | EUT Upright |
| 404.550 | 78.5 | V | 85.2 | -6.7 | PK | 234 | 1.0 | EUT Upright |

In Band and Out of Band Delta Measurments

| Frequency | Level | Pol | FCC | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 405.000 | 34.4 | H | N/A | See note 1 | PK | 157 | 1.0 | out of band < 250 kHz from edge |
| 405.000 | 33.1 | V | N/A | See note 1 | PK | 235 | 1.0 | out of band < 250 kHz from edge |
| 404.350 | 48.0 | H | 50.5 | -2.5 | PK | 157 | 1.0 | In band >150 kHz from 404.55 MHz |
| 404.750 | 47.5 | H | 50.5 | -3.0 | PK | 157 | 1.0 | In band >150 kHz from 404.55 MHz |




| | |
|---|---|
| Note 1: | The delta in emissons level from the inband level to the level at 405.059 is 36.9 dB. Subtracting this from the field strength of the fundamental at 1 MHz gives a value of 42.8 dBuV/m which even complies with the out of band limit of 46 dBuV/m. |

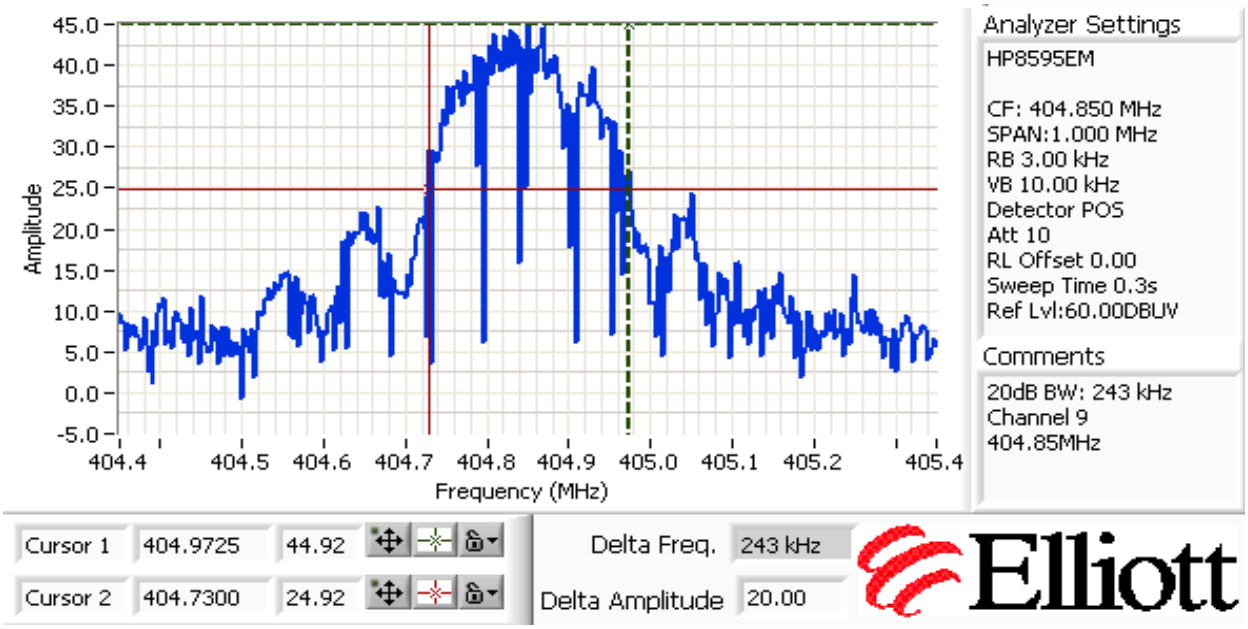
The delta in emissions level from the inband level to the highest level >150 kHz from the center is 22.5 dB. The power of this unwanted emmission is thus -44.0 dBm since the power of the wanted emission is -21.5 dBm calculated from the 79.7 dBuV/m FS.

| | | | |
|---|---|---|---|
| Client: | Nevro | Job Number: | J77515 |
| Model: | Programmer Wand | T-Log Number: | T77539 |
| | | Account Manager: | Sheareen Washington |
| Contact: | Jon Parker | | |
| Standard: | FCC 15 & 95, EN 301-839-1, EN 60601-1-2 | Class: | N/A |

Other Spurious Emissions

| Frequency | Level | Pol | FCC | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 809.100 | 29.6 | H | 46.0 | -16.4 | QP | 199 | 1.0 | QP (1.00s) |
| 809.100 | 25.8 | V | 46.0 | -20.2 | QP | 178 | 1.1 | QP (1.00s) |
| 1618.220 | 33.6 | V | 54.0 | -20.4 | AVG | 156 | 1.0 | EUT Upright |
| 1617.830 | 41.7 | V | 74.0 | -32.3 | PK | 156 | 1.0 | EUT Upright |
| 1618.150 | 28.9 | H | 54.0 | -25.1 | AVG | 127 | 1.6 | EUT Upright |
| 1618.580 | 39.4 | H | 74.0 | -34.6 | PK | 127 | 1.6 | EUT Upright |

Run #2: 20dB Bandwidth



| | | | |
|---|---|---|---|
| Client: | Nevro | Job Number: | J77515 |
| Model: | Programmer Wand | T-Log Number: | T77539 |
| | | Account Manager: | Sheareen Washington |
| Contact: | Jon Parker | | |
| Standard: | FCC 15 & 95, EN 301-839-1, EN 60601-1-2 | Class: | N/A |

# FCC Part 95.628
## 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 a probe. 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: 20 °C
Rel. Humidity: 40 %

### Summary of Results

| Run # | Test Performed | Limit | Pass / Fail | Result / Margin |
|---|---|---|---|---|
| 1 | Frequency Stability | 100ppm | Pass | 9.3ppm |

### 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: | Nevro | Job Number: | J77515 |
| Model: | Programmer Wand | T-Log Number: | T77539 |
| | | Account Manager: | Sheareen Washington |
| Contact: | Jon Parker | | |
| Standard: | FCC 15 & 95, EN 301-839-1, EN 60601-1-2 | Class: | N/A |

Run #1: Frequency Stability

Date: 12/4/2009 Engineer: Mehran Birgani Location: Environmental Chamber

Nominal Frequency: 404.55 MHz

Frequency Stability Over Temperature

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

| Temperature | Frequency Measured | Drift | |
|---|---|---|---|
| (Celsius) | (MHz) | (Hz) | (ppm) |
| 0 | 404.553511 | 3511 | 8.7 |
| 10 | 404.553501 | 3501 | 8.7 |
| 20 | 404.553650 | 3650 | 9.0 |
| 30 | 404.552261 | 2261 | 5.6 |
| 40 | 404.551149 | 1149 | 2.8 |
| 50 | 404.553782 | 3782 | 9.3 |
| 55 | 404.551947 | 1947 | 4.8 |
| | Worst case: | 3782 | 9.3 |

Frequency Stability Over Input Voltage

| | |
|---|---|
| Note 1: | The unit receive its power from host computer and power will not drop. |