



**Nemko Test Report:** 10228454RUS1

**Applicant:** Spinal Modulation, Inc.  
1135 O'Brien Drive  
Menlo Park, CA 94025  
USA

**Equipment Under Test:** MN20700-03  
(E.U.T.)

**FCC ID#:** Y8LMN20700-03

**In Accordance With:** **FCC Part 95, Subpart E**  
Personal Radio Devices.

**Tested By:** Nemko USA Inc.  
802 N. Kealy  
Lewisville, Texas 75057-3136

**TESTED BY:**

David Light, Wireless Engineer

**DATE:**

07-Mar-13

**APPROVED BY:**

Michael Cantwell, Reviewer

**DATE:**

22-Mar-13

**Total Number of Pages: 18**

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EQUIPMENT: MN20700-03PROJECT NO.:10228454RUS1**Section 1. Summary Of Test Results**

Manufacturer: Spinal Modulations, Inc.

Model No.: MN20700-03

Serial No.: CP1013

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 95.627. All tests were conducted using measurement procedure ANSI C63.4-2003. Radiated Emissions were made on an open area test site.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See "Summary of Test Data".



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EQUIPMENT: MN20700-03PROJECT NO.:10228454RUS1**Summary Of Test Data**

Test/Requirement Description	Pass / Fail	Applicable Rule Parts
Maximum RF Transmitting Power	Pass	2.1046, 95.135, 95.639(f)(1)
Modulation Characteristics	Pass	2.1047, 95.631(g), 95.637
Occupied Bandwidth	Pass	2.1049, 95.627(d)
Unwanted Radiation	Pass	2.1053, 95.635(d)
Frequency Stability	Pass	2.1055, 95.627(d)

Test Result: The product as presented for testing complied with test requirements as shown above.



Michael Cantwell

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**Frequency Range:**

402 to 405 MHz

402.15 to 404.85 MHz

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None

**Yes**

**No**

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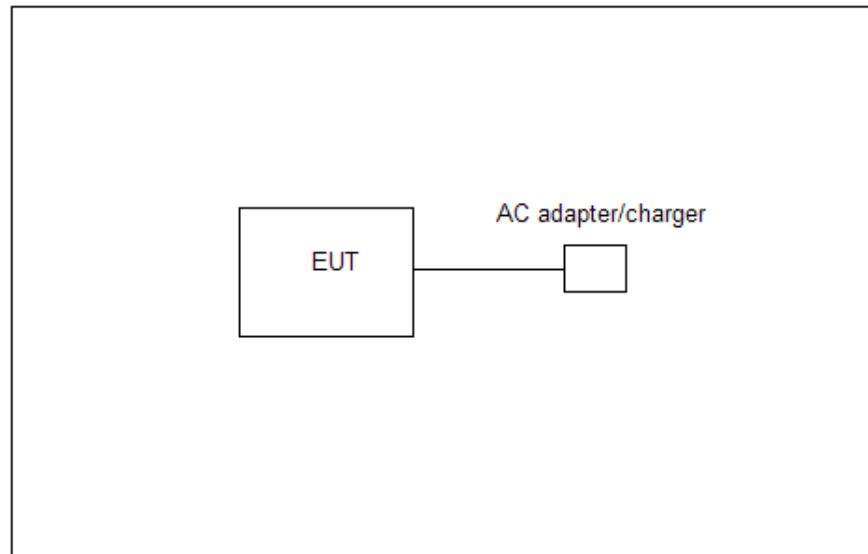
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### **Description of EUT**

The EUT is a wireless transmitter used to program medical implants.

### **System Diagram**



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**Section 3. Maximum RF Transmit Power**

NAME OF TEST: Maximum RF Transmit Power	PARA. NO.: 95.639
TESTED BY: David Light	DATE: 05 March 2013

**Minimum Standard:** §95.639(f)(1).

For transmitters operating in the 401-406 MHz band that are not excepted under § 95.627(b) from the frequency monitoring requirements of § 95.627(a), the maximum radiated power in any 300 kHz bandwidth by MedRadio transmitters operating at 402-405 MHz, or in any 100 kHz bandwidth by MedRadio transmitters operating at 401-402 MHz or 405-406 MHz shall not exceed 25 microwatts EIRP. For transmitters that are excepted under § 95.627(b) from the frequency monitoring requirements of § 95.627(a), the power radiated by any station operating in 402-405 MHz shall not exceed 100 nanowatts EIRP confined to a maximum total emission bandwidth of 300 kHz centered at 403.65 MHz, the power radiated by any station operating in 401-401.85 MHz or 405-406 MHz shall not exceed 250 nanowatts EIRP in any 100 kHz bandwidth and the power radiated by any station operating in 401.85-402 MHz shall not exceed 25 microwatts in the 150 kHz bandwidth.

**Test Results:** Complies . . .**Measurement Data:** See attached table.**Method of Measurement:**

The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator. This antenna is fed with a signal at the spurious frequency. The level of the signal is adjusted to repeat the previously measured level. The resulting eirp is the signal level fed to the reference antenna corrected for gain referenced to an isotropic radiator.

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**Test Data – Maximum RF Transmit Power**

Frequency (MHz)	Meter Reading (dBm)	Substitution Level (dBm)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarity	Comments
										Power setting = 0x0F
402.15	-57.6	-28.5		0	2.2	-26.3	-16.0	-10.30	V	
402.15	-45.7	-18.8		0	2.2	-16.6	-16.0	-0.60	H	
404.85	-56.9	-27.8		0	2.2	-25.6	-16.0	-9.60	V	
404.85	-46.0	-19.1		0	2.2	-16.9	-16.0	-0.90	H	
Notes:										



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**Section 4. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 95.627(d)
TESTED BY: David Light	DATE: 06 March 2013

**Minimum Standard:** Para no. 95.627(d)

The authorized bandwidth of the emission from a MedRadio station operating between 402-405 MHz shall not exceed 300 kHz, and no communications session involving MedRadio stations shall use more than a total of 300 kHz of bandwidth during such a session. The authorized bandwidth of the emission from a MedRadio station operating between 401-401.85 MHz or 405-406 MHz shall not exceed 100 kHz, and no communications session involving MedRadio stations shall use more than a total of 100 kHz of bandwidth during such a session. The authorized bandwidth of the emission from a MedRadio station operating between 401.85-402 MHz shall not exceed 150 kHz, and no communications session involving MedRadio stations shall use more than a total of 150 kHz of bandwidth during such a session.

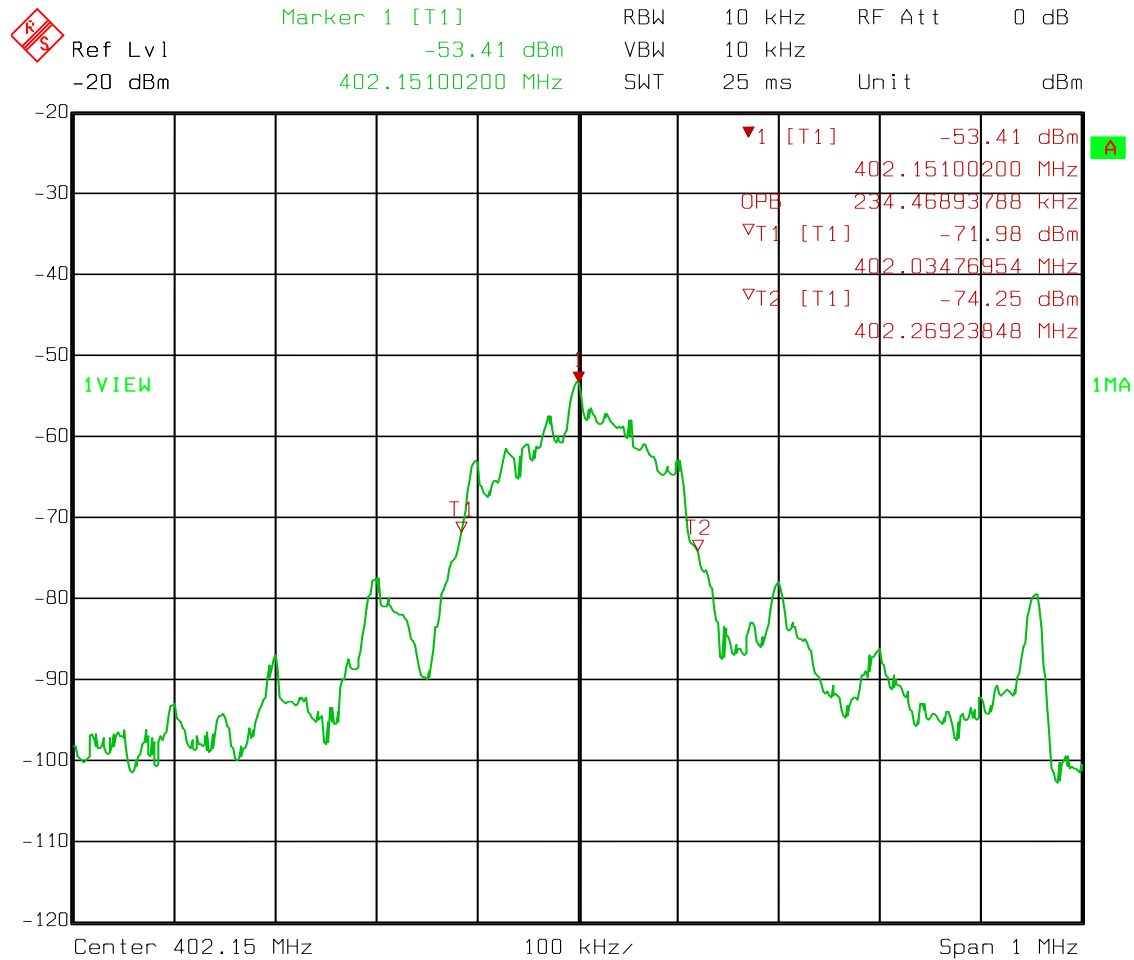
**Test Results:** Complies**Measurement Data:** See attached graph.

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# Test Data – Occupied Bandwidth

## 99% Bandwidth



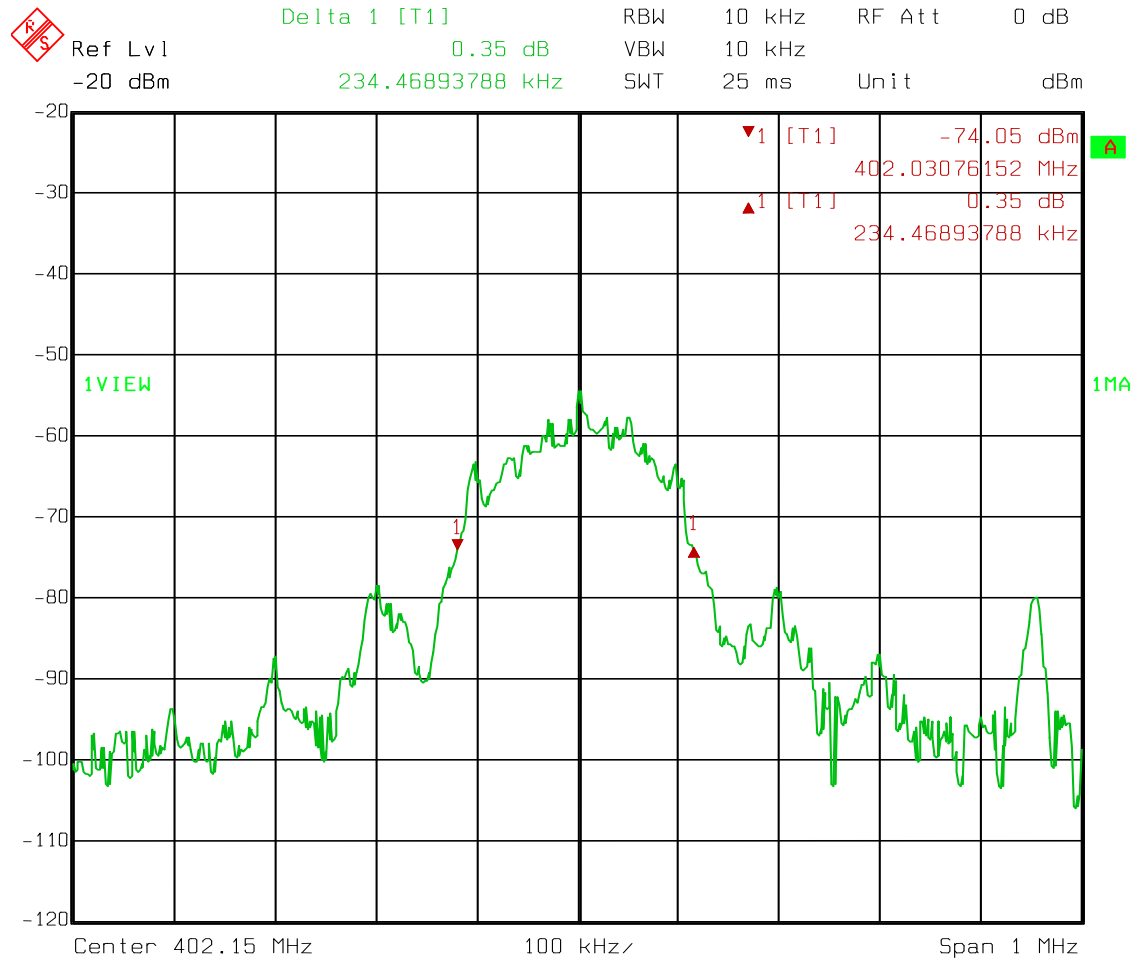
Date: 06.MAR.2013 11:16:07

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# Test Data – Occupied Bandwidth

## 20 dB Bandwidth



Date: 06.MAR.2013 11:17:05

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**Section 5. Frequency Stability**

NAME OF TEST: Frequency Stability	PARA. NO.: 95.627(e)
TESTED BY: David Light	DATE: 05 March 2013

**Minimum Standard:** Para no. 95.627(e)

Each transmitter in the MedRadio service must maintain a frequency stability of  $\pm 100$  ppm of the operating frequency over the range:

- (1) 25 °C to 45 °C in the case of medical implant transmitters; and
- (2) 0 °C to 55 °C in the case of MedRadio programmer/control transmitters and MedRadio body-worn transmitters.

**Test Results:** Complies**Measurement Data:**

Measurement Uncertainty:	1x10 <sup>-17</sup> ppm				<b>Standard Test Frequency</b>	<b>402.150000</b>	<b>MHz</b>
Temp (°C)	Measured Frequency (MHz)		Test Voltage	Frequency Error (Hz)	Limit (+/-Hz)	Error (ppm)	Comment
20	402.143236		120	-6764	40215.0	-16.8	
20	402.143238		114.0	-6762	40215.0	-16.8	
20	402.143240		138.0	-6760	40215.0	-16.8	
50	402.153392		120	3392	40215.0	8.4	
0	402.137707		120.0	-12293	40215.0	-30.6	
Notes:							

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**Section 6. Unwanted Radiation**

NAME OF TEST: Unwanted Radiation	PARA. NO.: 95.635(d)
TESTED BY: David Light	DATE: 05 March 2013

**Minimum Standard:** Para no. 95.635(d))

For transmitters designed to operate in the MedRadio service, emissions shall be attenuated in accordance with the following:

(1) Emissions from a MedRadio transmitter shall be attenuated to a level no greater than the field strength limits shown in the following table when they:

(i) Are more than 250 kHz outside of the 402-405 MHz band (for devices designed to operate in the 402-405 MHz band);

(ii) Are more than 100 kHz outside of either the 401-402 MHz or 405-406 MHz bands (for devices designed to operate in the 401-402 MHz or 405-406 MHz bands);

(iii) Are in the 406.000-406.100 MHz band (for devices designed to operate in the 401-402 MHz or 405-406 MHz bands); or

(iv) Are more than 2.5 MHz outside of the 413-419 MHz, 426-432 MHz, 438-444 MHz, or 451-457 MHz bands (for devices designed to operate in the 413-457 MHz band).

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

Note—At band edges, the tighter limit applies.

(v) Are more than 2.5 MHz outside of the 2360-2400 MHz band (for devices designed to operate in the 2360-2400 MHz band).

(2) The emission limits shown in the table of paragraph (d)(1) are based on measurements employing a CISPR quasi-peak detector except that above 1 GHz, the limit is based on measurements employing an average detector. Measurements above 1 GHz shall be performed using a minimum resolution bandwidth of 1 MHz. See also § 95.605.

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(3) The emissions from a MedRadio transmitter must be measured to at least the tenth harmonic of the highest fundamental frequency designed to be emitted by the transmitter.

(4) For devices designed to operate in the 402-405 MHz band: Emissions within the band more than 150 kHz away from the center frequency of the spectrum the transmission is intended to occupy and emissions 250 kHz or less below 402 MHz or above 405 MHz band will be attenuated below the maximum permitted output power by at least 20 dB.

(5) For devices designed to operate in the 401-402 MHz or 405-406 MHz bands: Emissions between 401-401.85 MHz or 405-406 MHz within the MedRadio bands that are more than 50 kHz away from the center frequency of the spectrum the transmission is intended to occupy (or more than 75 kHz away from the center frequency of MedRadio transmitters operating between 401.85-402 MHz) and emissions 100 kHz or less below 401 MHz or above 406 MHz shall be attenuated below the maximum permitted output power by at least 20 dB.

(6) For devices designed to operate in the 413-419 MHz, 426-432 MHz, 438-444 MHz, and 451-457 MHz bands: In the first 2.5 megahertz beyond any of the frequency bands authorized for MMN operation, the EIRP level associated with any unwanted emission must be attenuated within a 1 megahertz bandwidth by at least 20 dB relative to the maximum EIRP level within any 1 megahertz of the fundamental emission.

(7) For devices designed to operate in the 2360-2400 MHz band: In the first 2.5 megahertz beyond any of the frequency bands authorized for MBAN operation, the EIRP level associated with any unwanted emission must be attenuated within a 1 megahertz bandwidth by at least 20 dB relative to the maximum EIRP level within any 1 megahertz of the fundamental emission.

(8) Compliance with the limits described in subparagraphs (4) through (6) are based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

**Test Results:** Complies

**Measurement Data:** See attached table.

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**Test Data – Unwanted Emissions**

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
											Tx @ 402.15 MHz
804.30	H	0.0	29.2	22.4	1.9	24.0	29.5	46.0	-16.5	Pass	
1206.45	H	0.0	36.3	22.7	1.6	30.3	30.3	54.0	-23.7	Pass	Noise floor
1608.60	H	0.0	35.0	24.3	2.4	31.2	30.5	54.0	-23.5	Pass	Noise floor
2010.75	H	0.0	35.5	28.5	2.9	31.5	35.4	54.0	-18.6	Pass	Noise floor
2412.90	H	0.0	36.0	29.0	3.1	31.8	36.3	54.0	-17.7	Pass	Noise floor
2815.05	H	0.0	34.0	29.7	3.4	30.8	36.3	54.0	-17.7	Pass	Noise floor
3217.20	H	0.0	34.0	29.7	3.4	31.3	35.8	54.0	-18.2	Pass	Noise floor
3619.35	H	0.0	35.0	29.9	3.5	31.7	36.7	54.0	-17.3	Pass	Noise floor
4021.50	H	0.0	34.0	31.6	3.9	32.2	37.3	54.0	-16.7	Pass	Noise floor
804.30	V	0.0	28.5	22.4	1.9	24.0	28.8	46.0	-17.2	Pass	
1206.45	V	0.0	36.3	22.7	1.6	30.3	30.3	54.0	-23.7	Pass	Noise floor
1608.60	V	0.0	35.0	24.3	2.4	31.2	30.5	54.0	-23.5	Pass	Noise floor
2010.75	V	0.0	35.5	28.5	2.9	31.5	35.4	54.0	-18.6	Pass	Noise floor
2412.90	V	0.0	36.0	29.0	3.1	31.8	36.3	54.0	-17.7	Pass	Noise floor
2815.05	V	0.0	34.0	29.7	3.4	30.8	36.3	54.0	-17.7	Pass	Noise floor
3217.20	V	0.0	34.0	29.7	3.4	31.3	35.8	54.0	-18.2	Pass	Noise floor
3619.35	V	0.0	35.0	29.9	3.5	31.7	36.7	54.0	-17.3	Pass	Noise floor
4021.50	V	0.0	34.0	31.6	3.9	32.2	37.3	54.0	-16.7	Pass	Noise floor

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**Section 7. Test Equipment List**

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal	Next Cal
993	Antenna, Horn	A.H. Systems	SAS-200/571	162	22-Sep-2011	22-Sep-2013
1016	Preamplifier	Hewlett Packard	8449A	2749A00159	23-Jul-2012	23-Jul-2013
1036	Spectrum Analyzer	Rohde & Schwartz	FSEK30	830844/006	23-Dec-2011	23-Dec-2013
1480	Antenna, Bilog	Schaffner- Chase	CBL6111C	2572	25-Feb-2013	25-Feb-2014
1783	Cable Assy, 3m Chamber	Nemko	Chamber		26-Sep-2012	26-Sep-2013
791	Watkins Johnson 30MHz to 1GHz Pre Amplifier	Nemko, USA	CRA69 321003 9605	119	19-Oct-2012	19-Oct-2013



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**ANNEX A**  
**TEST DIAGRAMS**

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**Test Site For Radiated Emissions**

