

Nemko Test Report: 2L0208RUS1

Applicant: Advanced Neuromodulation Systems, Inc,
6501 Windcrest Drive, Suite 100
Plano, Texas 75024

Equipment Under Test: 3860 Programmer
(E.U.T.)

In Accordance With: **FCC Part 15, Subpart C, Paragraph 15.209**
General Limits For Low Power Transmitters

Tested By: Nemko Dallas Inc.
802 North Kealy
Dallas, TX 75057

Authorized By:



Tom Tidwell, Wireless Group Manager

Date: 4/27/2002

Total Number of Pages: 15

EQUIPMENT: 3860 Programmer

Table of Contents

SECTION 1. SUMMARY OF TEST RESULTS 3

SECTION 2. GENERAL EQUIPMENT SPECIFICATION 5

SECTION 3. POWERLINE CONDUCTED EMISSIONS 7

SECTION 4. RADIATED EMISSIONS 8

SECTION 5. TEST EQUIPMENT LIST 13

ANNEX A - TEST DIAGRAMS 14

EQUIPMENT: 3860 Programmer

Section 1. Summary Of Test Results

Manufacturer: Advanced Neuromodulation Systems, Inc,

Model No.: 3860 Programmer

Serial No.: None

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 15, Subpart C for low power devices. All tests were conducted using measurement procedure ANSI C63.4-1992. 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".

**NVLAP LAB CODE: 100496-0**

Nemko Dallas Inc. authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Dallas Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report applies only to the items tested.

EQUIPMENT: 3860 Programmer

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207	N/A
Radiated Emissions	15.209	Complies

Footnotes For N/A's:

The device is battery powered. (Qty 3, AAA or Qty 1, 9Vdc)

EQUIPMENT: 3860 Programmer

Section 2. General Equipment Specification

Frequency Range: 87.5 kHz +/- 2.5 kHz

Operating Frequency(ies) of Sample: 88.4 kHz

Crystal Frequencies: 3.6 MHz

Integral Antenna

Yes



No



Note: If antenna is not integral to transmitter explain method of attachment and type of unique connector:

EQUIPMENT: 3860 Programmer

Description of Modification for Class II Permissive Change

Not Applicable

Modifications Made During Testing

Not Applicable

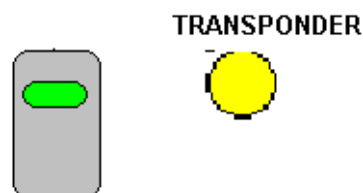
Theory of Operation

The 3860 is a multi-programmable implantable neurostimulation system designed to deliver low-intensity, electrical impulses to nerve structures. The system consists of a hand-held battery powered patient programmer which communicates to a self-powered implantable pulse generator (IPG). The IPG delivers electrical impulses through an implanted lead(s) to the selected nerve fibers in order to provide therapeutic stimulation. The 3860 patient programmer enables the patient to adjust current stimulation parameters and select new programs for customized therapy.

The 3860 Programmer and IPG communicate by modulating a 87.5 kHz $\pm$ 2.5 kHz signal for data sent to the IPG and modulating a 40Khz signal for data sent back to the patient programmer. The data is modulated using a standard 2400 Baud RS232 protocol. All of the RF circuitry for the patient programmer is included in the paddle-like device which attaches to the patient programmer called the 'wand'. The wand must be placed within several inches of the implanted IPG to communicate with it.

For the transmitter section of the wand circuitry, timer circuitry generates a signal which is approximately 87.5 kHz that drives the carrier signal through an airwound inductor that acts as an antenna. The carrier is switched on and off by a signal from the patient programmer such that it meets the RS232 2400 baud timing requirements.

For the receiver section of the wand circuitry, when the wand is in receive mode, the airwound inductor becomes part of a 40Khz LC resonant tank circuit and the received carrier is sent through a two stage 40Khz bandpass circuit where it is then lowpass filtered to recover a 2400 baud logic level signal.

System Diagram

EQUIPMENT: 3860 Programmer**Section 3. Powerline Conducted Emissions**

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY:	DATE:

Minimum Standard:

Frequency (MHz)	Maximum Powerline Conducted RF Voltage (dB μ V)
0.15 - 30.0	250
	48

Test Results:**Measurement Data:** See attached graph(s).**Method of Measurement:** (Procedure ANSI C63.4-1992)

Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak Detector. Any emissions that are close to the limit are measured using a test receiver with 10 kHz bandwidth, CISPR Quasi-Peak Detector.

EQUIPMENT: 3860 Programmer

Section 4. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.209
TESTED BY: D. Light	DATE: 04/26/2002

Minimum Standard: The field strength of emissions from the device shall not exceed the following limits.

Fundamental (MHz)	Field Strength (μV/m)	Field Strength (dBμV)
0.009 - 0.490	2400/F(kHz) @ 300m	—
0.490 - 1.705	24000/F(kHz) @ 30m	—
1.705 - 30	30 @ 30m	—
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

Test Results: Complies.

Measurement Data: (Procedure ANSI C63.4-1992)

Tested with fully charged battery

Maximizing Emission Levels:

For hand held equipment or equipment that may be mounted in a variety of positions, the E.U.T. was tested on three orthogonal axis to determine orientation of worst-case emission levels. Below 30 MHz an active loop antenna is used at a fixed height of 1 meter. The loop is rotated about it's vertical axis to obtain worst-case results.

Spectrum Searched:

The spectrum was searched from the lowest frequency generated in the E.U.T. up to 1000 MHz, or the 10th harmonic of the fundamental emission.

Near-Field Measurement:

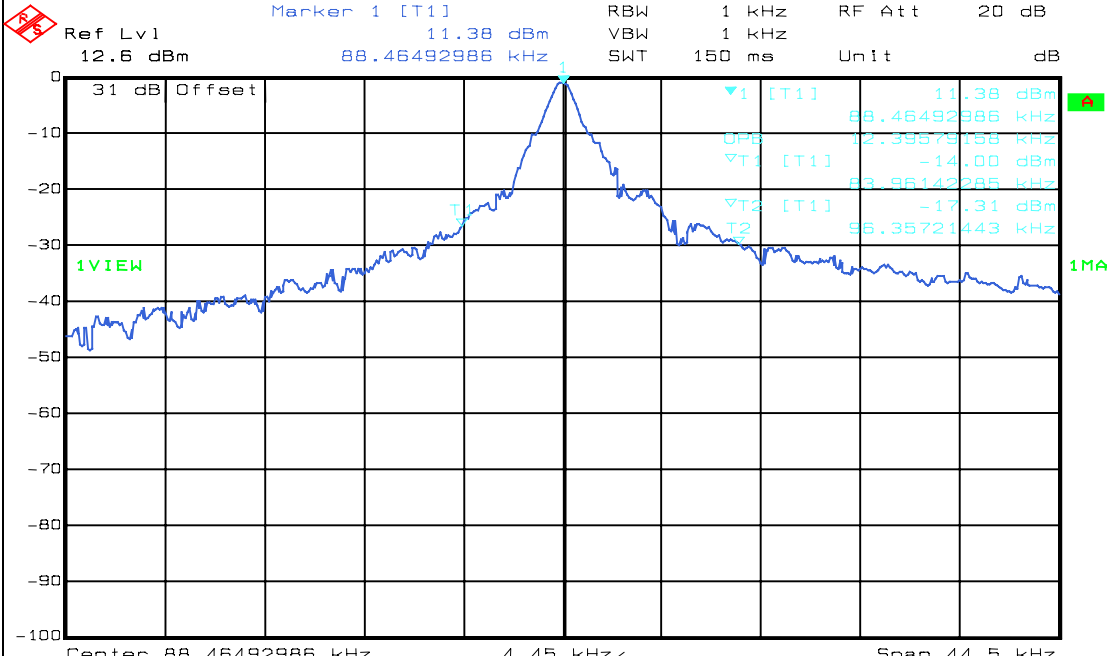
Emissions below 30 MHz are measured in the near-field and an extrapolation factor of 40 dB per decade is used to determine the 10m limit.

Example: Measurement Distance = 10m
Specification Distance = 300m

10m Limit: Specified limit (at 300m) - $(40 \log \frac{10}{300})$

Thus for measurement at 10m the specified limit is increased by 59 dB.

EQUIPMENT: 3860 Programmer**Test Data - Radiated Emissions**

Data Plot		Occupied Bandwidth	
Page 1 of 1		Complete ☒ Preliminary ☐	
Job No.: 2L0208R	Date: 4/29/02		
Specification:	Temperature(°C) 24		
Tested By: D. Light	Relative Humidity(%) 40		
E.U.T.: 3860			
Configuration: Communicating with			
Sample			
Location: Lab 1	RBW: Refer to		
Detector: Peak	VBW: Refer to		
Test Equipment Used			
Antenna:	Directional		
Pre-Amp:	Cable #1: 1046		
Filter:	Cable #2:		
Receiver: 1036	Cable #3:		
Attenuator	Cable #4:		
Attenuator	Mixer:		
Additional equipment			
Measurement	+/-1.7 dB		
 Marker 1 [T1] 11.38 dBm 88.46492986 kHz Ref Lvl 12.6 dBm RBW 1 kHz RF Att 20 dB VBW 1 kHz SWT 150 ms Unit dB 31 dB Offset 1VIEW 1MA Center 88.46492986 kHz 4.45 kHz Span 44.5 kHz			
Date: 29.APR.2002 08:03:08			
Notes: 99% Occupied Power			

EQUIPMENT: 3860 Programmer**Test Data – Radiated Emissions**

Radiated Emissions							
Radiated Emissions H - Field							
Complete	<u> X </u>						
Preliminary	<u> </u>						
Page <u> 1 </u> of <u> 1 </u>							
Client: <u> ANS </u>		W.O.#: <u> 2L0208R </u>		Date: <u> 4/26/02 </u>			
EUT: <u> 3860 Programmer </u>		S/N: <u> None </u>					
Tech: <u> D. Light </u>		Test #: <u> 1 </u>		Lab: <u> AOATS </u>		Photo ID: <u> None </u>	
Equipment Used: <u> 981-966 </u>				Antenna Distance: <u> 3 Meters </u>			
Configuration: <u> Transmitting to transponder in test fixture </u>							
IF Bandwidth: <u> See below </u>		Video Bandwidth: <u> N/A </u>		Detector: <u> </u> Peak <u> X </u> Quasi Peak			
Ambient Temperature: <u> 23 </u> C		EUT Power: <u> </u> 115 V.A.C.		<u> </u> 60 Hz		<u> </u> 1 Phase	
Relative Humidity: <u> 53 </u> %		<u> </u> 230 V.A.C.		<u> </u> 50 Hz		<u> </u> 3 Phase	
		<u> X </u> Other		<u> 1 fresh 9 Vdc battery </u>			

Freq. (kHz)	Meter Reading (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	RBW (Hz)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	Delta (dB)	Comments:
88.4	47.3	0	0	200	47.3	108.7	-61.4	
176.8	40.1	0	0	200	40.1	102.7	-62.6	
265.2	44.4	0	0	9k	44.4	99.1	-54.7	
353.6	40.7	0	0	9k	40.7	96.6	-55.9	
442.0	30	0	0	9k	30	94.7	-64.7	Noise floor
530.4	46.6	0	0	9k	46.6	73.1	-26.5	
618.8	32	0	0	9k	32	71.8	-39.8	Noise floor
707.2	33	0	0	9k	33	70.6	-37.6	Noise floor
795.6	35	0	0	9k	35	69.9	-34.9	Ambient
884.0	35	0	0	9k	35	68.7	-33.7	Noise floor

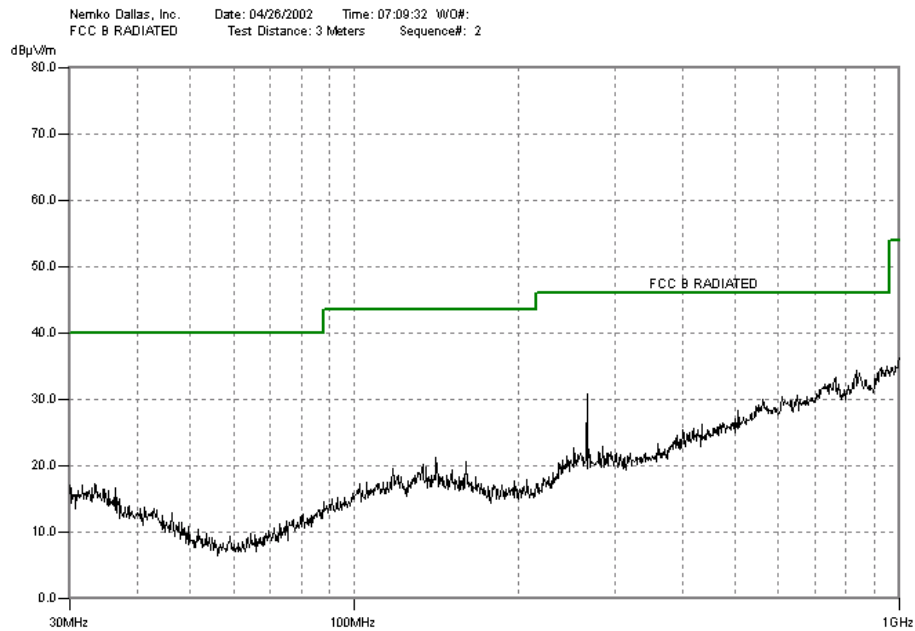
Scanned 9 kHz to 30 MHz

EQUIPMENT: 3860 Programmer

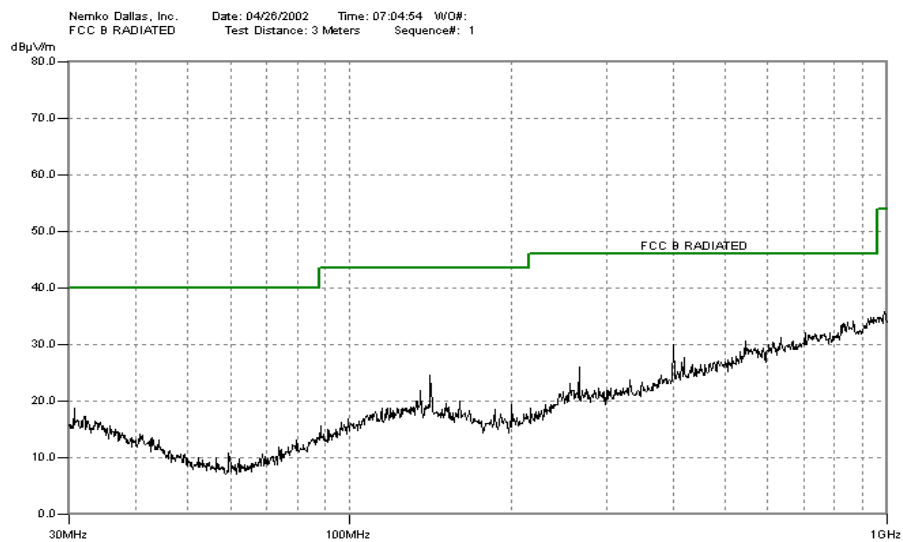
Test Data - Radiated Emissions

No emissions were detected above 30 MHz during prescan in an anechoic chamber.

Data plot horizontal



Data plot vertical



EQUIPMENT: 3860 Programmer

Radiated Photographs (Worst Case Configuration)

FRONT VIEW



REAR VIEW



EQUIPMENT: 3860 Programmer

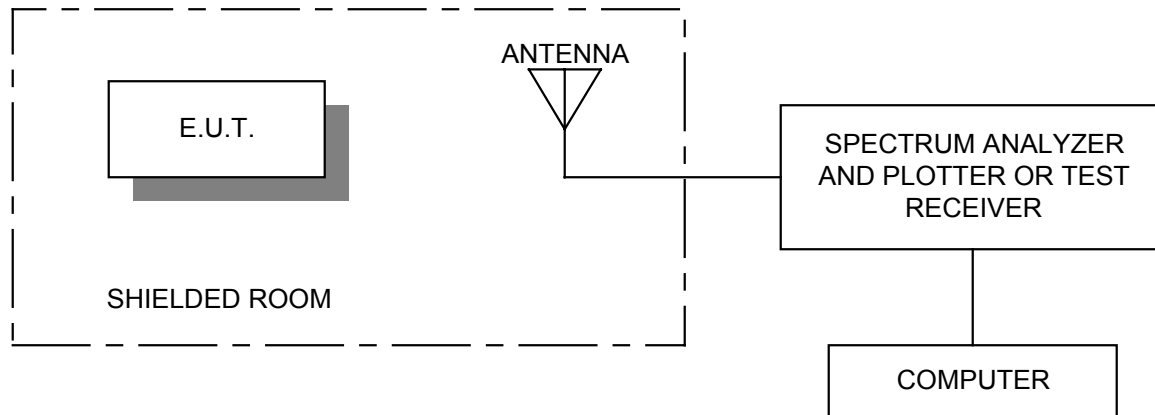
Section 5. Test Equipment List

Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
ANTENNA, LOOP	ROHDE & SCHWARZ HFH2-Z2	871336/20	Cal Not Req	Cal Not Req
Filter, High pass 5khz	Solartron 7930-5.0	933124	05/29/01	05/29/02
Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/02	01/02/03
Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	06/01/01	06/01/02
Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	06/01/01	06/01/02
PREAMP, 25dB	ICC LNA25	398	08/16/01	08/16/02
Bilog Antenna	Schaffner-Chase CBL6111C	2572	CalNotReq	CalNotReq

ANNEX A - TEST DIAGRAMS

EQUIPMENT: 3860 Programmer

Radiated Prescan



Test Site For Radiated Emissions

