

Nemko USA, Inc.

2210 Faraday Ave, Suite 150  
Carlsbad, CA 92008  
Phone (760) 444-3500 Fax (760) 444-3005



www.nemko.com

# CERTIFICATION TEST REPORT

For The Implant, Glasses, Operating Room (OR) Coil,  
Video Processing Unit (VPU)

Model: A2E12

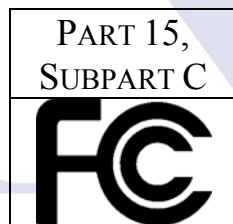
FCC ID:

Argus II Retinal Prosthesis System: SMRA01,  
Argus II Operating Room (OR) Coil: SMRA02

Prepared for:

Second Sight  
12744 San Fernando Road Building 3  
Sylmar, CA 91342

Testing performed per the following:



PREPARED ON AUGUST 6, 2013  
REPORT NUMBER: 2013 08234520 FCC  
PROJECT NUMBER: 234520  
NEX NUMBER: 234520



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## DOCUMENT HISTORY

REVISION	DATE	COMMENTS
-	August 6, 2013	Prepared By: A. Laudani
-	August 6, 2013	Initial Release: A. Laudani
1	November 20, 2013	Revised per FCC comments A. Laudani

NOTE: Nemko USA, Inc. hereby makes the following statements so as to conform to the Subclause 5.10 Requirements of ISO/IEC 17025 "General Criteria For the Competence Of Testing and Calibration Laboratories":

- The unit described in this report was received at Nemko USA, Inc.'s facilities on April 15, 2013.
- Testing was performed on the unit described in this report on April 15, 2013 to April 15, 2013.
- The Test Results reported herein apply only to the Unit actually tested, and to substantially identical Units.
- This report does not imply the endorsement of the Federal Communications Commission (FCC), NVLAP or any other government agency.

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## CERTIFICATION

The compatibility testing and this report have been prepared by Nemko USA, Inc., an independent electromagnetic compatibility consulting and test laboratory.

Testing and data collection were accomplished in accordance with the test methods listed in this report.

I certify the data evaluation and equipment configuration herein to be a true and accurate representation of the sample's test characteristics, as of the test date(s), and for the design of the test sample utilized to compile this report.




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Senior RF/EMC Engineer  
Test Report Verificator

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## 1. ADMINISTRATIVE DATA AND TEST SUMMARY

### 1.1. Administrative Data

CLIENT: Second Sight  
12744 San Fernando Road Building 3  
Sylmar, CA 91342  
818-833-5038

CONTACT: Sanjay Gaikwad  
E-Mail: sgaikwad@2-sight.com

DATE (S) OF TEST: April 15, 2013 to April 15, 2013.

EQUIPMENT UNDER TEST (EUT): Implant, Glasses, Operating Room (OR) Coil, Video Processing Unit (VPU)

MODEL: A2E12

SERIAL NUMBER: N/A

SOFTWARE REVISION: N/A

HIGHEST FREQUENCY GENERATED OR USED: 3.156 MHz

CONDITION UPON RECEIPT: Suitable for Test

TEST SPECIFICATION: Radio Frequency Emissions in accordance with requirements of FCC Part 15C per DA-11-1951A1.

### 1.2. Referenced Standards for Conducted and Radiated RF Emissions

Test Type	In Accordance with Document	Document Title
Conducted and Radiated Emissions	FCC 15C, Sec. 207, FCC 15C, Sec. 209	Title 47 -- Telecommunications, Federal Communications Commission Part 15 – Radio Frequency Devices

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### 1.3. Test Summary

#### 1.3.1. Emissions Test Summary

The Compliance Status is a judgment based on the calculated highest emissions to appropriate standard limits. Measurement uncertainty values, provided on calibration certificates, were not be used in the judgment of the final status of compliance.

Test Methods	Frequency Range	Compliance Status
FCC 15C, Sec. 207, Conducted Emissions	0.15 MHz – 30 MHz	N/A
FCC 15C, Sec. 209, per DA-11-1951A1, Radiated Emissions	6 MHz – 40 MHz	PASS

## 2. SYSTEM CONFIGURATION

### 2.1. System Components and Power Cables

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Implant, Glasses, Operating Room (OR) Coil, Video Processing Unit (VPU)	Second Sight Model: A2E12 consisting of: Implant Serial #: N/A Video Processing Unit (VPU) Serial #: N/A Glasses Serial #: N/A Argus II Operating Room (OR) Coil Serial #: N/A	N/A
Support – Implant Board	Second Sight Model: A2E12 Serial # N/A	N/A
Support – LED Test Array	Second Sight Model: 014950-000 Serial # V07015	1.5m, unshielded, 18 AWG, 2-wire, IEC connector

### 2.2. Device Interconnection and I/O Cables

Connection	I/O Cable
Glasses to VPU	Second Sight Cable
OR Coil to VPU	Second Sight Cable

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### 2.3. Description and Method of Exercising the EUT

The Retinal Prosthesis System (System) includes an Implant device and an Externals System for normal use. The Externals system includes a Video Processing Unit, Glasses and an Operating Room Coil. The function of the System is to provide electrical stimulation to the retina to induce visual perception in patients blinded by outer retinal degeneration. A video camera, which is attached to Glasses worn by the patient, captures a video image. The camera signal is sent to a Video Processing Unit (VPU), worn by the patient on a belt or strap, which processes the camera image and transforms it into electrical stimulation patterns. The electrical stimulation data are then sent to a receiving/transmitter coil mounted on the Glasses which sends both data and power via radio-frequency telemetry to the implanted retinal prosthesis. The implant receives the radio-frequency commands and delivers stimulation to the retina. Additionally, the VPU can be connected to an Operating Room (OR) Coil to verify the implant's function in the Operating Room environment.

The EUT's performance during test was evaluated against the performance criterion specified by applicable test standards. Performance results are detailed in the test results section of this report.

### 2.4. Design Modifications for Compliance

**Device:** Implant, Glasses, Operating Room (OR) Coil, Video Processing Unit (VPU)

**Model:** A2E12

The following design modifications were made to the EUT during testing.

None. No design modifications were made to the EUT during testing.

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**Photograph 1.EUT Front and Rear**

EUT Glasses



EUT OR unit





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### 3. DESCRIPTION OF TEST SITE AND EQUIPMENT

#### 3.1. Description of Test Site

The test site is located at 2210 Faraday Ave., Suite 150, Carlsbad, CA 92008. Within the EMC facility there is a 10 meter semi-anechoic chamber and an area designated for future installation of a 3 meter semi-anechoic chamber. There are 3 general purpose EMC semi-anechoic chambers: two chambers are designed and built as MIL STD Emissions and Radiated Susceptibility chambers and one chamber has those characteristics with an additional capability to perform IEC/EN 61000-4-3 radiated susceptibility. Four test ground planes are located in the EMC area dedicated for: Conducted Emissions, EFT / Surge plane/ Conducted RF immunity, and a dedicated ESD test plane.

Radiated emissions measurements are performed in the 10 meter Semi-Anechoic chamber, which conforms to the volumetric normalized site attenuation (VNSA) for three and ten-meter measurements. The chamber also conforms to the SVSWR compliance requirements for 1-18 GHz measurements. The VNSA and SVSWR meet the technical requirements, as set, in the CISPR 16 and ANSI C63.4 documents. Facility test areas for conducted emissions and immunity testing also meet the construction and characteristics, as required by CISPR 16 and ANSI C63.4 documents.

Nemko's EMC test facility is in compliance with all the current national and international requirements and is accredited by the US National Institute for Standards and Technology (NIST) National Voluntary laboratory Accreditation Program (NVLAP) under "Electromagnetic Compatibility and Telecommunications". We have a large scope of accreditation which includes all necessary Commercial, Avionics and Military tests

Emissions measurements are performed using TILE software. Version 4.0.A.7 for radiated and version 3.4.K.24 for conducted.

#### 3.2. Facility Accreditation and Authorization

Nemko USA, Inc. is accredited through National Voluntary Laboratory Accreditation Program.



NVLAP LAB CODE 200116-0

*This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.*

Organization	Registration and Recognition numbers
Federal Communications Commission	0013750831 / US5058
Industry Canada	2040B-3

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## 4. DESCRIPTION OF TESTING METHODS

### 4.1. Introduction

Nemko USA, Inc. is accredited to ISO/IEC 17025 by the National Voluntary Laboratory Accreditation Program (NVLAP) for Electromagnetic Compatibility and Telecommunications testing. Part of the accreditation process involves the demonstration of competence in various test methods.

Prior to the beginning of work, Nemko personnel work with their clients to ensure the proper test standards and test methods are utilized. Applicable tests and the minimum criteria for a pass condition are listed in the administrative section of this report.

### 4.2. Test Methods

Digital devices sold in Canada are required to comply with the Interference Causing Equipment Standard for Digital Apparatus, ICES-003, Issue 5, Dated August 2012. These test methods and limits are specified in the Canadian Standards Association's Standard CAN/CSA-CISPR 22-10 and are "essentially equivalent" with the CISPR 22 (EN55022) rules for unintentional radiators.

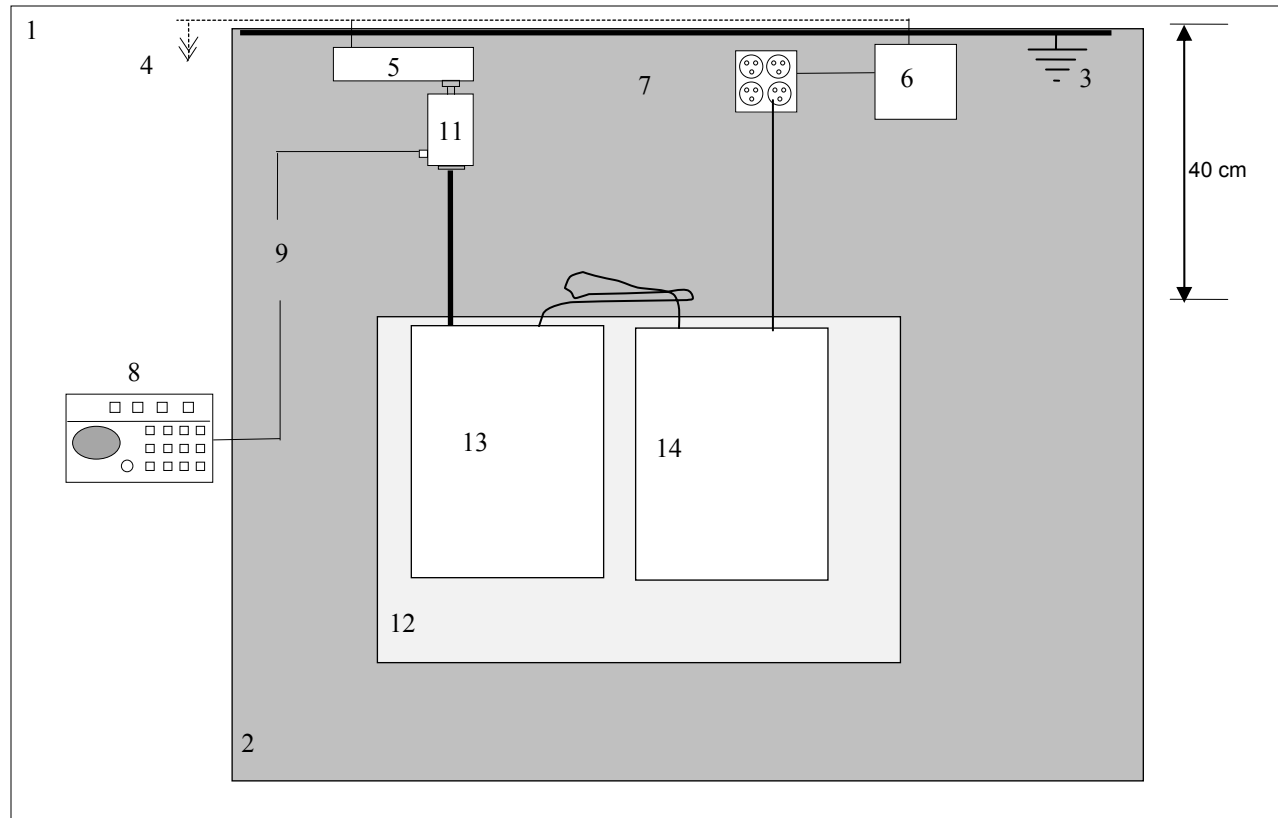
No additional testing is required for compliance to ICES-003.

### 4.3. Configuration and Methods of Measurements for Conducted Emissions

This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report. The Equipment Under Test (EUT) was configured based upon the requirements of the applicable test standard.

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**Figure 1. Conducted Emissions Test Setup Diagram**



**NOT TO SCALE**

### **CONFIGURATION LEGEND**

1. Test Laboratory (6 X 6 meters)
2. Ground Plane (15 square meters)
3. Vertical Conducting Wall (Grounded through Ground Plane via 10' ground rod)
4. AC Power for Devices
5. Power Line Filter, Lindgren, 120 dB, 30 amp
6. Artificial Mains Network (AMN) for peripheral devices
7. Power Distribution Box for peripheral devices
8. Spectrum Analyzer with Quasi-Peak Adapter
9. High Pass Filter
10. Coax input from EUT AMN to Spectrum Analyzer
11. AMN for EUT
12. Non-conducting table
13. EUT
14. Associated System

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#### 4.4. Configuration and Methods of Measurements for Radiated Emissions

This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing was performed in accordance with the test standard(s) referenced in the test summary section of this report. The Equipment Under Test (EUT) was configured based upon the requirements of the applicable test standard. Initial prescans for radiated emissions were performed as suggested per ANSI 63.22. The antenna is positioned at several heights while the EUT is rotated 360°. At each antenna height, the receiver scans and records the maximum emissions in the required frequency range as required by the applicable standards. From the recorded scans, a list of discrete frequencies is developed. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to produce horizontal and vertical polarities while the turntable is rotated to determine the worst emitting configuration. The numerical results are included herein to demonstrate compliance. The numerical results of the test are included herein to demonstrate compliance.

The numerical results that are applied to the emissions limits are arrived as demonstrated by the example below:

A	B	C	D	E	F	G	H	I
Measurement Frequency (MHz)	Meter Reading (dBμV)	Turn Table (degrees)	Antenna Height (cm)	Corrected Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pass Fail	Comments

A. Frequency Measured in MHz.

B. Meter Reading: Emission Amplitude as measured with the antenna in dBμV, this is from the EMI receiver or Spectrum Analyzer.

C. Turn Table reading in degrees.

D. Antenna Height in centimeters.

E. Corrected Reading, the meter reading with the antenna factor, cable loss, attenuator loss, and preamplifier gain added in. This is the emission value to compare to the limit.

F. Limit from the specification.

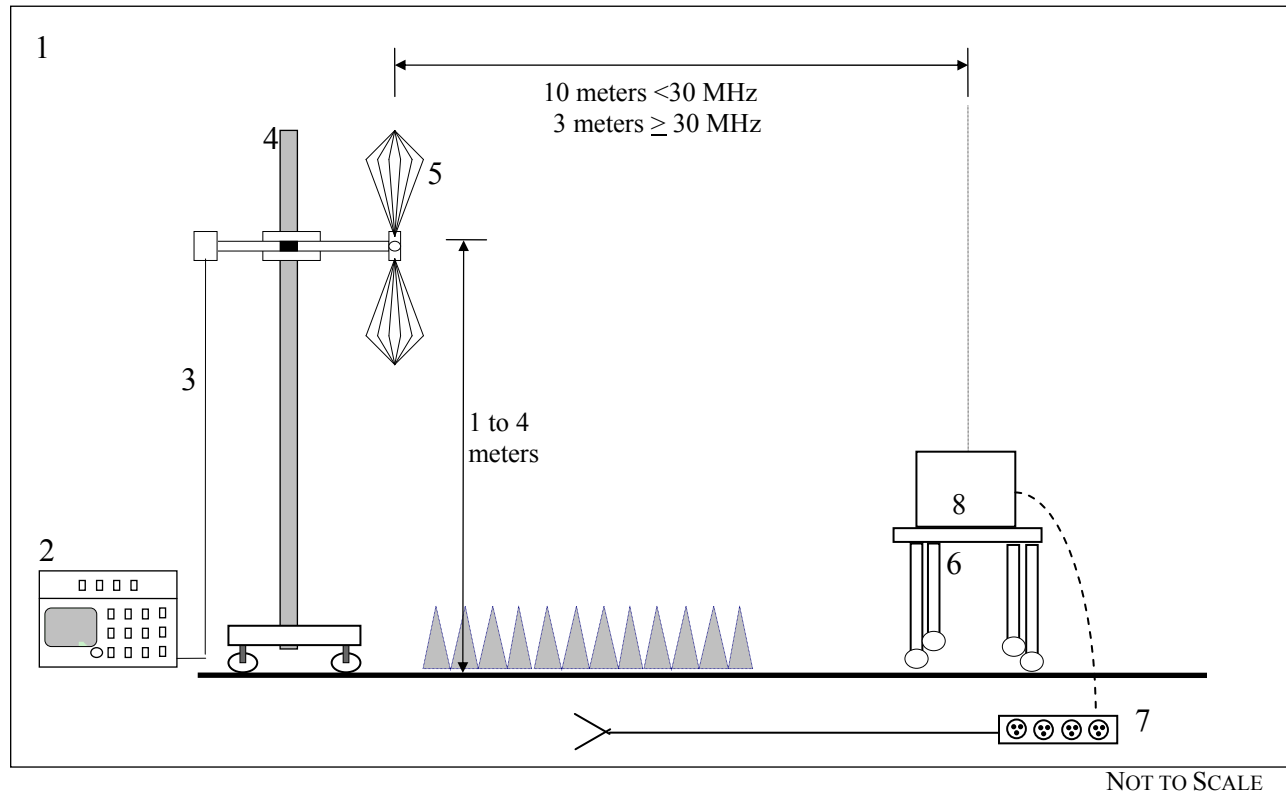
G. Margin: difference in dB of Corrected Reading and Specification Limit, negative results indicate a margin value below the specification limit.

H. Pass Fail: Result; EUT does or does not comply at this frequency.

I. Comments. If any, the technician enters remarks special to the test performed.

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**Figure 2. Radiated Emissions Test Setup Diagram**



### CONFIGURATION LEGEND

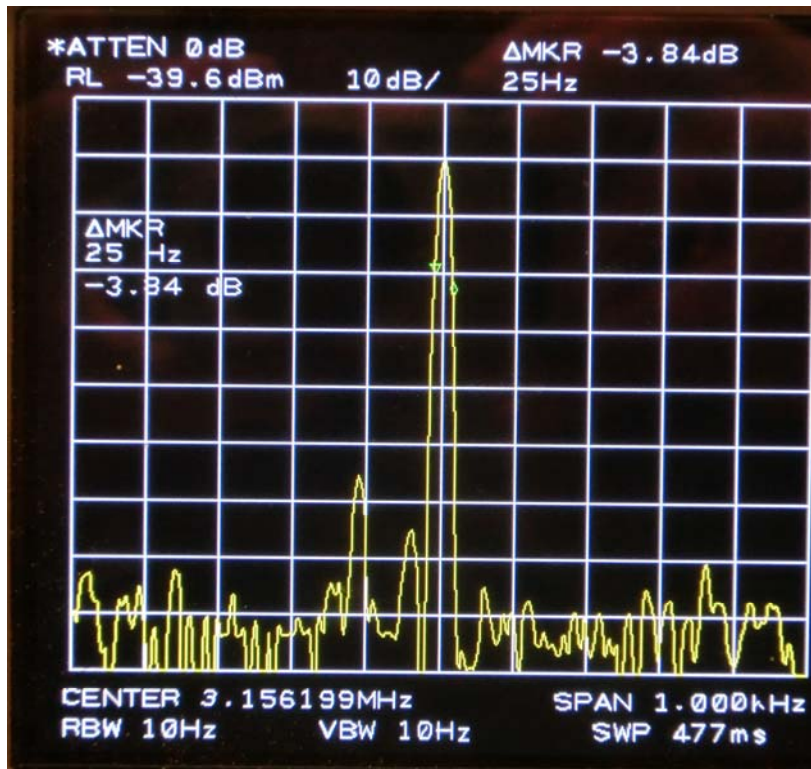
1. Semi Anechoic chamber, absorbing material on ground plane for >1GHz measurements
2. Spectrum Analyzer with Quasi-Peak Adapter
3. Coax interconnect from Receive Antenna to Spectrum Analyzer
4. Antenna Mast with motorized mounting assembly
5. Receive Antenna (basic relative position)
6. Non-Conducting table 80 cm above ground plane
7. Mains power for devices
8. EUT and Associated System

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## 5. FCC Test Results per DA-11-1951A1

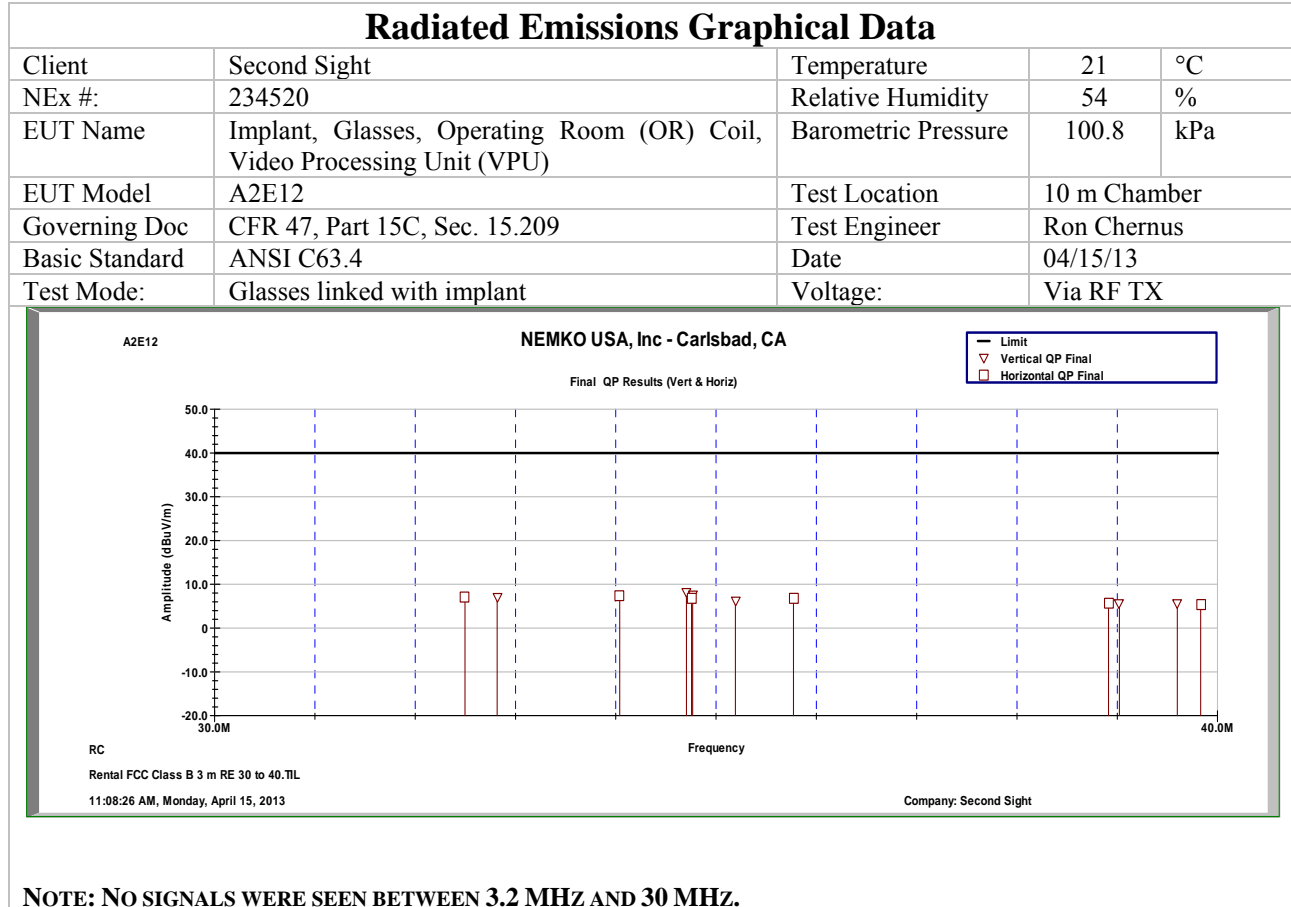
### 5.1. FCC 20dB Band Width Test Data

BW = 25 Hz



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## 5.2. FCC Radiated Emissions Test Data (Glasses)



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Horizontal RE Data								
Measurement Frequency (MHz)	QP Measured (dBμV)	Adjustments (dBm)	Turn Table (degrees)	Antenna Height (cm)	Corrected Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pass Fail
32.50	24.3	-17.4	359	111	6.9	40.0	-33.1	Pass
34.04	24.9	-17.7	360	111	7.2	40.0	-32.8	Pass
34.76	24.6	-17.8	360	111	6.8	40.0	-33.2	Pass
35.77	24.7	-18	360	112	6.6	40.0	-33.4	Pass
38.91	24.5	-18.9	361	111	5.6	40.0	-34.4	Pass
39.83	24.5	-19.1	361	111	5.4	40.0	-34.6	Pass

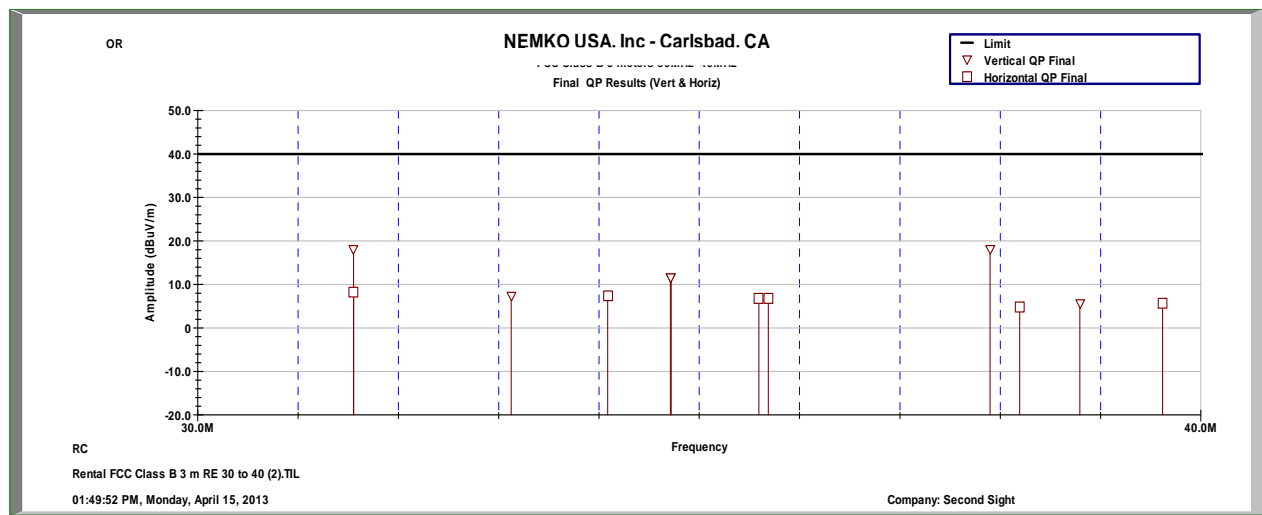
Vertical RE Data								
Measurement Frequency (MHz)	QP Measured (dBμV)	Adjustments (dBm)	Turn Table (degrees)	Antenna Height (cm)	Corrected Reading	Limit (dBμV/m)	Margin (dB)	Pass Fail
32.82	24.6	-17.4	360	111	7.1	40.0	-32.9	Pass
34.71	26	-17.8	360	111	8.2	40.0	-31.8	Pass
34.77	25.4	-17.8	361	111	7.6	40.0	-32.4	Pass
35.19	24	-17.9	359	110	6.1	40.0	-33.9	Pass
39.02	24.6	-18.9	360	111	5.7	40.0	-34.3	Pass
39.60	24.7	-19.1	360	110	5.7	40.0	-34.3	Pass



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### 5.3. FCC Radiated Emissions Test Data (OR)

Radiated Emissions Graphical Data				
Client	Second Sight	Temperature	21	°C
NEx #:	234520	Relative Humidity	54	%
EUT Name	Implant, Glasses, Operating Room (OR) Coil, Video Processing Unit (VPU)	Barometric Pressure	100.8	kPa
EUT Model	A2E12	Test Location	10 m Chamber	
Governing Doc	CFR 47, Part 15C, Sec. 15.209	Test Engineer	Ron Chernus	
Basic Standard	ANSI C63.4	Date	04/15/13	
Test Mode:	OR linked with implant	Voltage:	Via RF TX	



**NOTE: NO SIGNALS WERE SEEN BETWEEN 6MHZ AND 30MHZ.**

SIGNAL NOISE FLOOR WITH AT LEAST 6DB FROM LIMIT IN ACCORDANCE WITH ANSI C63.

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Horizontal RE Data								
Measurement Frequency (MHz)	QP Measured (dBμV)	Adjustments (dBm)	Turn Table (degrees)	Antenna Height (cm)	Corrected Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pass Fail
31.55	25.4	-17.2	357	111	8.2	40.0	-31.8	Pass
34.09	25	-17.7	360	111	7.4	40.0	-32.6	Pass
35.59	24.8	-18	361	112	6.8	40.0	-33.2	Pass
35.69	24.7	-18	361	111	6.7	40.0	-33.3	Pass
38.19	23.6	-18.7	361	111	4.9	40.0	-35.1	Pass
39.62	24.8	-19.1	360	111	5.7	40.0	-34.3	Pass

Vertical RE Data								
Measurement Frequency (MHz)	QP Measured (dBμV)	Adjustments (dBm)	Turn Table (degrees)	Antenna Height (cm)	Corrected Reading	Limit (dBμV/m)	Margin (dB)	Pass Fail
31.55	35.2	-17.2	288	111	18	40.0	-22.0	Pass
33.13	25	-17.5	350	111	7.5	40.0	-32.5	Pass
34.71	29.4	-17.8	360	111	11.6	40.0	-28.4	Pass
34.72	29.5	-17.8	357	111	11.7	40.0	-28.3	Pass
37.90	36.8	-18.6	273	111	18.1	40.0	-21.9	Pass
38.79	24.6	-18.8	350	111	5.8	40.0	-34.2	Pass

Calculation:

Meter Reading + antenna factor + cable loss – preamplifier = Corrected Reading

(Antenna factor, cable loss, preamplifier values are not listed.)

Corrected Reading – Spec. Limit = Margin

Negative Margin indicates passing emissions.

Meter Readings are Quasi-Peak maximum hold for turntable direction and antenna height.

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Sec. 15.209 Radiated emission limits; general requirements.

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Measurement	
	Field strength (microvolts/meter)	distance (meters)
0.009-0.490.....	2400/F(kHz)	300
0.490-1.705.....	24000/F(kHz)	30
1.705-30.0.....	30	30
30-88.....	100 **	3
88-216.....	150 **	3
216-960.....	200 **	3
Above 960.....	500	3

Test Notes;

The transmission radios are the same in the OR and Implant devices.

At 480 kHz, limit = 2400/480 or 5uV/m at 300m, at 10 m this is 5uV/m + 40log(300/10) or 64.1uV/m  
At 10m, this is 36.1 dBuV/m

Measurements made peak hold, This determination was not evaluated with QP measurement as the nature of the signal was nearly CW-section 5.1.

The EUT emissions were maximized with the loop antenna rotated about its axis and also set to vertical and horizontal polarity

FCC procedures for <30MHz do not require a ground plane which may artificially increase reported measurements, but in need of blocking ambient emissions, a semi-anechoic chamber was used.

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### Radiated Emissions Data

Job # : \_\_\_\_\_ Date : 5/2/2013 Page 1 of 1  
 NEX # : \_\_\_\_\_ Time : 8:30  
 Staff : RC

Client Name : Second Sight  
 EUT Name : RF Glasses  
 EUT Model # : A2E12  
 EUT Serial # : N/A  
 EUT Config. : Operational Tx

EUT Voltage : \_\_\_\_\_  
 EUT Frequency : N/A  
 Phase : N/A  
 Distance < 30 MHz : 10 m  
 Distance ≥ 30 MHz : 3 m

Specification: FCC 15.209(a) DA 11-1951  
 Loop Ant. #: 133  
 Bicon Ant. #: 110\_3m Temp. (°C) : 22  
 Log Ant. #: N/A Humidity (%) : 56  
 DRG Ant. #: N/A Spec Analyzer #: 911  
 Cable LF#: SAC10m Analyzer Display #: 911  
 Cable HF#: N/A Quasi-Peak Detector #: 911  
 Preamp LF#: 901  
 Preamp HF#: N/A

Peak RBW: 9 kHz  
 Video Bandwidth 30 kHz

Meas. Freq. (MHz)	Meter Reading Loop Face		Det.	EUT Side DEG	Ant. Height m	Max. Reading (dBuV)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
											@ 10m
0.480	17.1		P	34.0	1.5	17.1	34.3	36.1	-1.8	Pass	X axis
3.156	42.2		P	34.0	1.5	42.2	50.5	48.6	1.9		X axis
0.480	17.0		P	52.0	1.5	17.0	34.2	36.1	-1.9	Pass	Y axis
3.156	35.6		P	52.0	1.5	35.6	43.9	48.6	-4.7	Pass	Y axis
0.480	16.9		P	211.0	1.5	16.9	34.1	36.1	-2.0	Pass	Z axis
3.156	38.5		P	211.0	1.5	38.5	46.8	48.6	-1.8	Pass	Z axis
											X axis, applying exclusion
3.156	42.2		P	34.0	1.5	42.2	50.5	48.6	1.9		
3.156	42.2		P	34.0	1.5	42.2	50.2	60.6	-10.4	Pass	119uV/m exclusion

#### Section 15.209 limits

the emissions of unlicensed intentional radiators operating within the 1.705-30 MHz band to a field strength of 30 microvolts per meter (uV/m) at a measurement distance of 30 meters

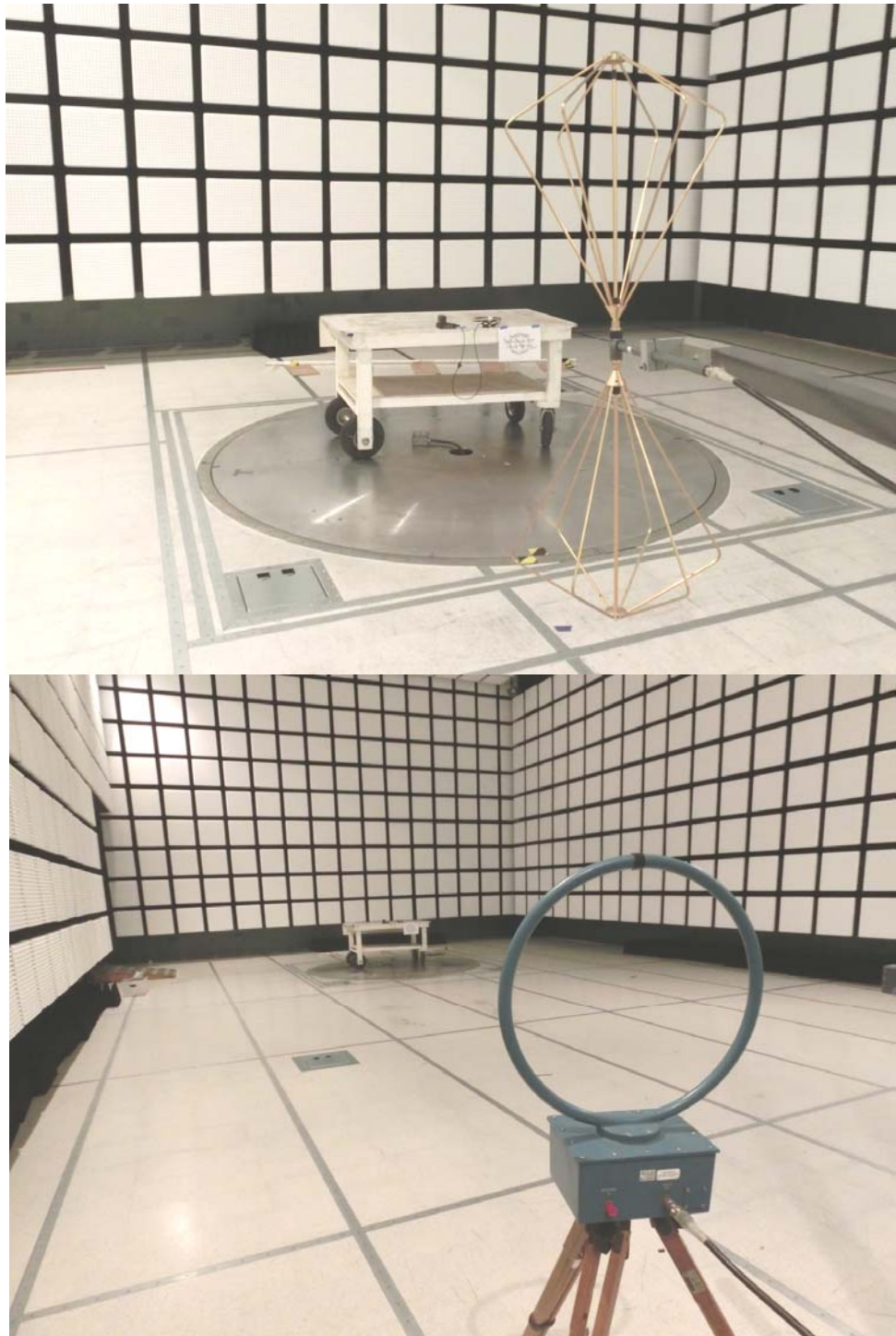
29.542 FCC 15.209a DA 11-1951 119 uV/m at 30m exclusion  
 19.09 dBuV/m at 30 m 41.51 dBuV/m at 30 m  
 48.63 convert 30m to 10m 19.08 convert 30m to 10m  
 60.60 dBuV/m at 10 m

### Radiated Emissions Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
rental	Bicon	AH systems	SAS542	829	7/25/2012	7/25/2013
111	Antenna, LPA	EMCO	3146	1382	1/9/2013	1/9/2014
133	Antenna, loop	Electro-Metrics	ALR-25M	678	7/18/2011	7/18/2013
901	Preamplifier	Sonoma	310 N	130607	10/15/2012	10/15/2013
911	Spectrum Analyzer	Agilent	E4440A	US41421266	10/15/2012	10/15/2013

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**Photograph 2. Radiated Emissions Test Configuration**



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## APPENDIX A

### A. Radiated Emissions Measurement Uncertainties

#### 1. Introduction

ISO/IEC 17025:2005 and ANSI/NCSL Z540.3: 2006 require that all measurements contained in a test report be “traceable”. “Traceability” is defined in the International Vocabulary of Basic and General Terms in Metrology (ISO: 1993) as: “the property of the result of a measurement... whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons, all having stated uncertainties”.

The purposes of this Appendix are to “state the Measurement Uncertainties” of the conducted emissions and radiated emissions measurements contained in Section 5 of this Test Report, and to provide a practical explanation of the meaning of these measurement uncertainties.

#### 2. Statement of the Worst-Case Measurement Uncertainties for the Conducted and Radiated Emissions Measurements Contained in This Test Report

**Table 1: Worst-Case Expanded Uncertainty "U" of Measurement for a k=2 Coverage Factor**

<b>Conducted and Radiated Emissions Measurement Detection Systems</b>	<b>Applicable Frequency Range</b>	<b>"U" for a k=2 Coverage Factor</b>
Spectrum Analyzer and LISN	100 kHz – 30 MHz	+/-2.8 dB
Spectrum Analyzer and Telecom ISN	100 kHz – 30 MHz	+/-1.38dB
Spectrum Analyzer, Pre-amp, and Antenna	30 MHz-200 MHz	+/-3.9 dB
Spectrum Analyzer, Pre-amp, and Antenna	200 MHz-1000 MHz	+/- 3.5 dB
Spectrum Analyzer, Pre-amp, and Antenna	1 GHz - 18 GHz	+/-2.6 dB

**NOTES:**

1. Applies to 3 and 10 meter measurement distances
2. Applies to all valid combinations of Transducers (i.e. LISNs, Line Voltage Probes, and Antennas, as appropriate)
3. Excludes the Repeatability of the EUT

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### 3. Practical Explanation of the Meaning of Radiated Emissions Measurement Uncertainties

In general, a “Statement of Measurement Uncertainty” means that with a certain (specified) confidence level, the “true” value of a measurand will be between a (stated) upper bound and a (stated) lower bound.

In the specific case of EMC Measurements in this test report, the measurement uncertainties of the conducted emissions measurements and the radiated emissions measurements have been calculated in accordance with the method detailed in the following documents:

- ANSI Z540.2 (2002) Guide to the Expression of Uncertainty in Measurement
- NIS 81:1994, The Treatment of Uncertainty in EMC Measurements (NAMAS, 1994)
- NIST Technical Note 1297(1994), Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results (NIST, 1994)

The calculation method used in these documents requires that the stated uncertainty of the measurements be expressed as an “expanded uncertainty”, U, with a k=2 coverage factor. The practical interpretation of this method of expressing measurement uncertainty is shown in the following example:

EXAMPLE: Assume that at 39.51 MHz, the (measured) radiated emissions level was equal to +26.5 dBuV/m, and that the +/- 2 standard deviations (i.e. 95% confidence level) measurement uncertainty was +/- 3.4 dB.

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## **APPENDIX B**

### **B. Nemko USA, Inc. Test Equipment & Facilities Calibration Program**

Nemko USA, Inc. operates a comprehensive Periodic Calibration Program in order to ensure the validity of all test data. Nemko USA's Periodic Calibration Program is fully compliant to the requirements of NVLAP Policy Guide PG-1-1988, ANSI/NCSL Z540.3: 2006, ISO 10012:2003, ISO/IEC 17025:2005, and ISO-9000: 2000. Nemko USA, Inc.'s calibrations program therefore meets or exceeds the US national commercial and military requirements [N.B. ANSI/NCSL Z540-1-1994 replaced MIL-STD-45662A].

Specifically, all of Nemko USA's primary reference standard devices (e.g. vector voltmeters, multimeters, attenuators and terminations, RF power meters and their detector heads, oscilloscope mainframes and plug-ins, spectrum analyzers, RF preselectors, quasi-peak adapters, interference analyzers, impulse generators, signal generators and pulse/function generators, field-strength meters and their detector heads, etc.) and certain secondary standard devices (e.g. RF Preamplifiers used in CISPR 11/22 and FCC Part 15/18 tests) are periodically recalibrated by:

- A Nemko USA-approved independent (third party) metrology laboratory that uses NIST-traceable standards and that is ISO Guide 25-accredited as a calibration laboratories by NIST; or,
- A Nemko USA-approved independent (third party) metrology laboratory that uses NIST-traceable standards and that is ISO Guide 25-accredited as a calibration laboratory by another accreditation body (such as A2LA) that is mutually recognized by NIST; or,
- A manufacturer of Measurement and Test Equipment (M&TE), if the manufacturer uses NIST-traceable standards and is ISO Guide 25-accredited as calibration laboratory either by NIST or by another accreditation body (such as A2LA) that is mutually recognized by NIST; or
- A manufacturer of M&TE (or by a Nemko USA-approved independent third party metrology laboratory) that is not ISO Guide 25-accredited. (In these cases, Nemko USA conducts an annual audit of the manufacturer or metrology laboratory for the purposes of proving traceability to NIST, ensuring that adequate and repeatable calibration procedures are being applied, and verifying conformity with the other requirements of ISO Guide 25).



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In all cases, the entity performing the Calibration is required to furnish Nemko USA with a calibration test report and/or certificate of calibration, and a “calibration sticker” on each item of M&TE that is successfully calibrated.

Calibration intervals are normally one year, except when the manufacture advises a shorter interval or if US Government directives or client requirements demand a shorter interval. Items of instrumentation/related equipment which fail during routine use, or which suffer visible mechanical damage (during use or while in transit), are sidelined pending repair and recalibration. (Repairs are carried out either in-house [if minor] or by a Nemko USA-approved independent [third party] metrology laboratory, or by the manufacturer of the item of M&TE).

Each antenna used for CISPR 11, CISPR 14, CISPR 22, and FCC Part 15 and Part 18 radiated emissions testing (and for testing to the equivalent European Norms) is calibrated annually by either a NIST (or A2LA) ISO Standard 17025-Accredited third-party Antenna Calibration Laboratory or by the antenna’s OEM if the OEM is NIST or A2LA ISO Standard 17025-accredited as an antenna calibration laboratory. The antenna calibrations are performed using the methods specified in CISPR 16-1-4 or ANSI C63.5-2006, including the “Three-Antenna Method”. Certain other kinds of antennas (e.g. magnetic-shielded loop antennas) are calibrated annually by either a NIST (or A2LA) ISO Standard 17025-accredited third-party antenna calibration laboratory, or by the antenna’s OEM if the OEM is NIST or A2LA ISO Standard 17025-accredited as an antenna calibration laboratory using the procedures specified in the latest version of SAE ARP-958.

In accordance with FCC and other regulations, Nemko USA recalibrates its suite of antennas used for radiated emissions tests on an annual basis. These calibrations are performed as a precursor to the FCC-required annual revalidation of the Normalized Site Attenuation properties of Nemko USA’s 10-meter Semi-Anechoic chamber. Nemko USA, Inc. uses the procedures given in CISPR 16-1-4 and, ANSI C63.4-2009 when performing the normalized site attenuation measurements.