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CERTIFICATION TEST REPORT

In Accordance With: FCC Part 15 Subpart C, 15.249
IC RSS-210 Issue 7 June 2007

Applicant: AXTELL EXPRESSIONS, INC
2889 BUNSEN AVE. SUITE H
VENTURA, CA 93003-1305

Equipment Under Test : Remote Transmitter
Model: AXRGFv.310

FCC ID: YOO-AXRGFV310
IC: 9242A-AXRGFV310

Tested By: Nemko USA Inc.
11696 Sorrento Valley Road, Suite F
San Diego, CA 92121

Test Report: 2010 04147536 WL
Date: July 28, 2010
Project number: 43561-1
Nex Number: 153603

Total Number of Pages: 23

Section 1. Summary of Test Results

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 Part 15; Subpart C and RSS210. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	Remote Transmitter
Model:	AXRGFv.310
Specification:	FCC Part 15 Subpart C, 15.249 IC RSS-210 Issue 7 June 2007
Date Received in Laboratory:	July 13, 2010
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None

Report Release History

REVISION	DATE	COMMENTS
-	July 28, 2010	Prepared By: Chip Fleury
-	July 28, 2010	Initial Release: Alan Laudani

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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TESTED BY: CFleury Date: September 21, 2010
Chip Fleury, Resource Manager and RF Test Engineer



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Section 2: Equipment Under Test

2.1 Product Identification

The Equipment Under Test for compliance with FCC Part 15.249 was identified as follows:

EUT: Remote Control	Model: AXRGFv.310
Serial Number: None	

2.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:





2.3 Theory of Operation

The AXRGFv.310 is a Hand Held Remote to be used as a remote control for the controlling the movements of a ventriloquist dummy. As a handheld device, the AXRGFv.310 was tested in all three axes and with the keypad activated by mechanical means to hold the button down.

2.4 Technical Specifications of the EUT

Manufacturer:	Axtel
Operating Frequency:	2408 MHz
Number of Operating Frequencies:	1
Measured Field Strength:	87.9 dB μ V/m at 3m or 25 mV/m
Modulation:	GFSK
Emissions Designator:	6M80F1D
Antenna Data:	Trace on circuit board
Antenna Connector:	None
Power Source:	CR2032 battery, 3.0 VDC



Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.249

Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0-24.25 GHz bands.

IC RSS-210 Issue 7 June 2007

Low-power Licence-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment. Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

IC RSS-Gen Issue 2 June 2007

General Requirements and Information for the Certification of Radio-communication Equipment

3.2 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	16 – 22 °C
Humidity range	40-66 %
Pressure range	86 - 106 kPa

3.4 Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
110	Antenna, LPA	Electrometrics	LPA-25	1217	1/10/2009	2/10/2011
114	Antenna, Bicon	EMCO	3110	2997	3/5/2010	3/5/2012
317	Preamplifier	HP	8449A	2749A00167	5/7/2010	5/7/2011
897	Spectrum Analyzer	Rohde & Swartz	FSP7	837620/009	10/14/2009	10/14/2010
877	Antenna, DRG Horn, .7-18GHz	AH Systems	SAS-571	688	8/16/2010	8/16/2011

Registration of the OATS are on file with the Federal Communications Commission, under Registration Number 90579, the VCCI under registration number R-3027, and are also registered with Industry Canada under Site Numbers 2040B-1 and 2040B-2.

Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during assessment.

4.2 Record of Technical Judgements

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Tests Deleted

No Tests were deleted from this assessment.

4.5 Additional Observations

There were no additional observations made during this assessment.



Section 5: Results Summary

This section contains the following:

FCC Part 15 Subpart C: §15.249
IC RSS-210 Issue 7 June 2007 A2.9
IC RSS-Gen Issue 2 June 2007

The column headed "Required" indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No: not applicable / not relevant
Y Yes: Mandatory i.e. the apparatus shall conform to these tests.
N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

5.1 Results Summary

FCC	Industry Canada	Test Description	Required	Result
15.107 (a)	RSS-Gen 7.2.2	Power line Conducted Emissions – Receive or Stand-by Mode	N	N/A
15.207 (a)	RSS-Gen 7.2.2	Power line Conducted Emissions -- Transmit Mode	N	N/A
15.215 (c)	RSS-Gen 4.6.1	Occupied Bandwidth	Y	Pass
15.249 (a)	RSS-Gen 4.8 & 4.9 & RSS-210 A2.9	Duty Cycle Test	Y	Pass
15.249 (d)	RSS-Gen 4.9 & RSS-210 A2.9	Field Strength of Emissions	Y	Pass
15.209 (a)		Spurious Emissions Outside of the band	Y	Pass
15.249 (b)		Fixed Point-to-Point Operation	N	
15.109 (a)	RSS-Gen 4.10 RSS-Gen 7.2.3	Receiver Spurious Emissions	Y	NA

No receiver function, Remote is inert until button is pressed and transmit occurs.



Appendix A: Test Results

Power line Conducted Emissions / Receiver or Stand-by Mode

Test Results: Not applicable – Battery powered

Occupied Bandwidth

4.6.1 Occupied Bandwidth

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

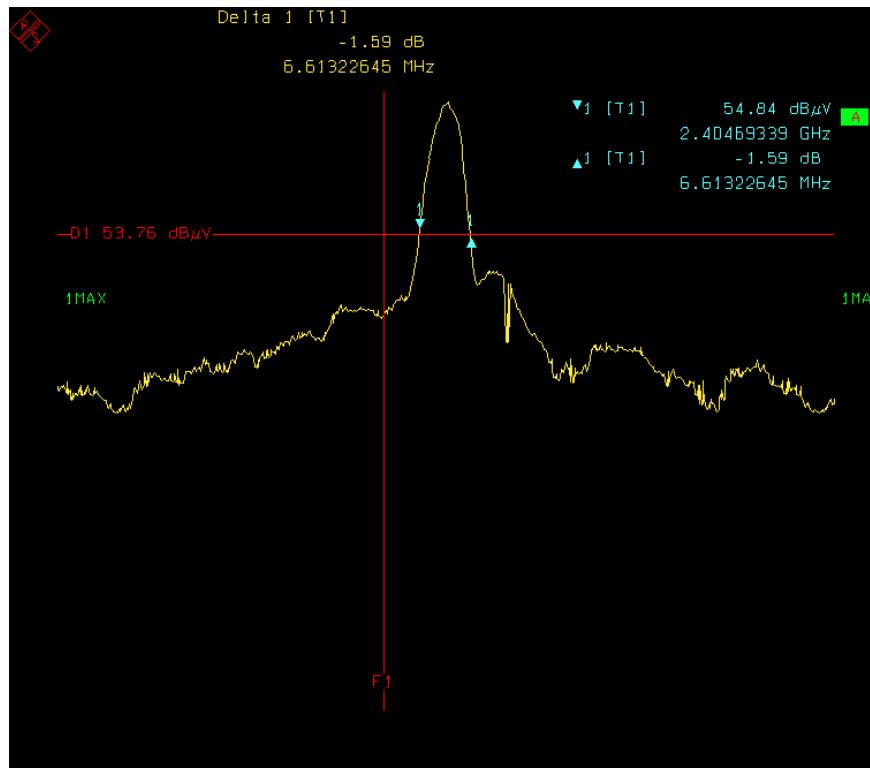
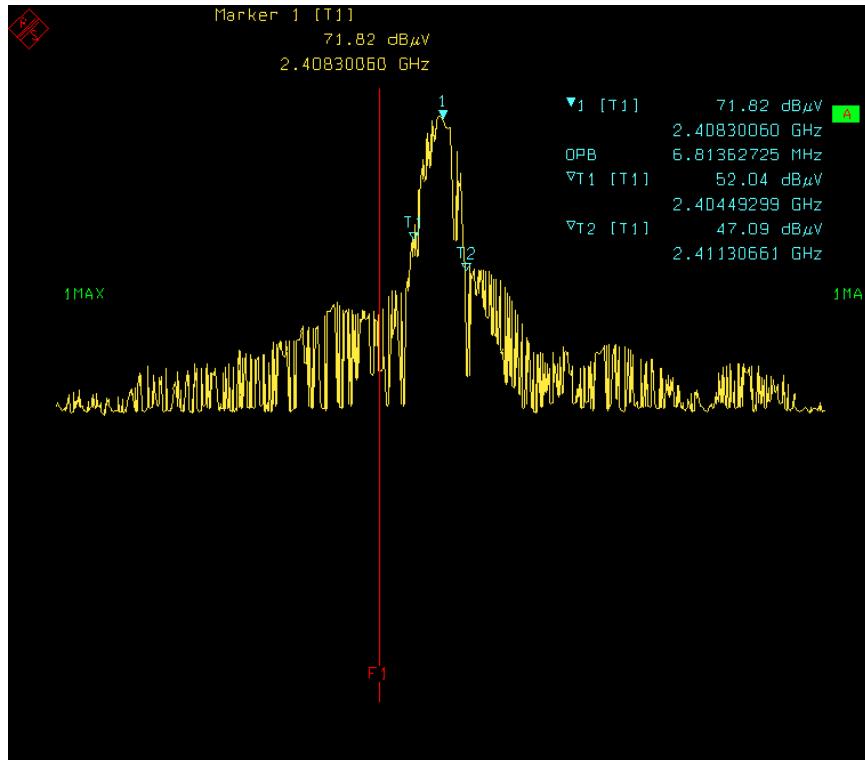
Clause 15.215(c); Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Conditions:

Sample Number:	Serial #: NA	Temperature:	22°C
Date:	8-29-2010	Humidity:	40%
Modulation State:	w/ modulation	Tester:	Chip Fleury
		Laboratory:	SOATS

Test Results: The measured Occupied BW is 6.6 MHz (see Plots below)

- Span is wide enough to capture the channel transmission
- RBW is 1% of the span
- VBW is 3X RBW
- New batteries were installed prior to test
- Sweep is auto
- Detector is Peak
- Trace is Max Hold
- A peak output max hold reading was taken, a display line was drawn 20 dB lower than peak level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.
- 99% bandwidth was performed with spectrum analyzer's function based on a 6.6 MHz bandwidth





Duty Cycle Test

Test Conditions:

Sample Number:	Serial #: NA	Temperature:	17°C
Date:	8-29-2010	Humidity:	70%
Modulation State:	w/ modulation	Tester:	Chip Fleury

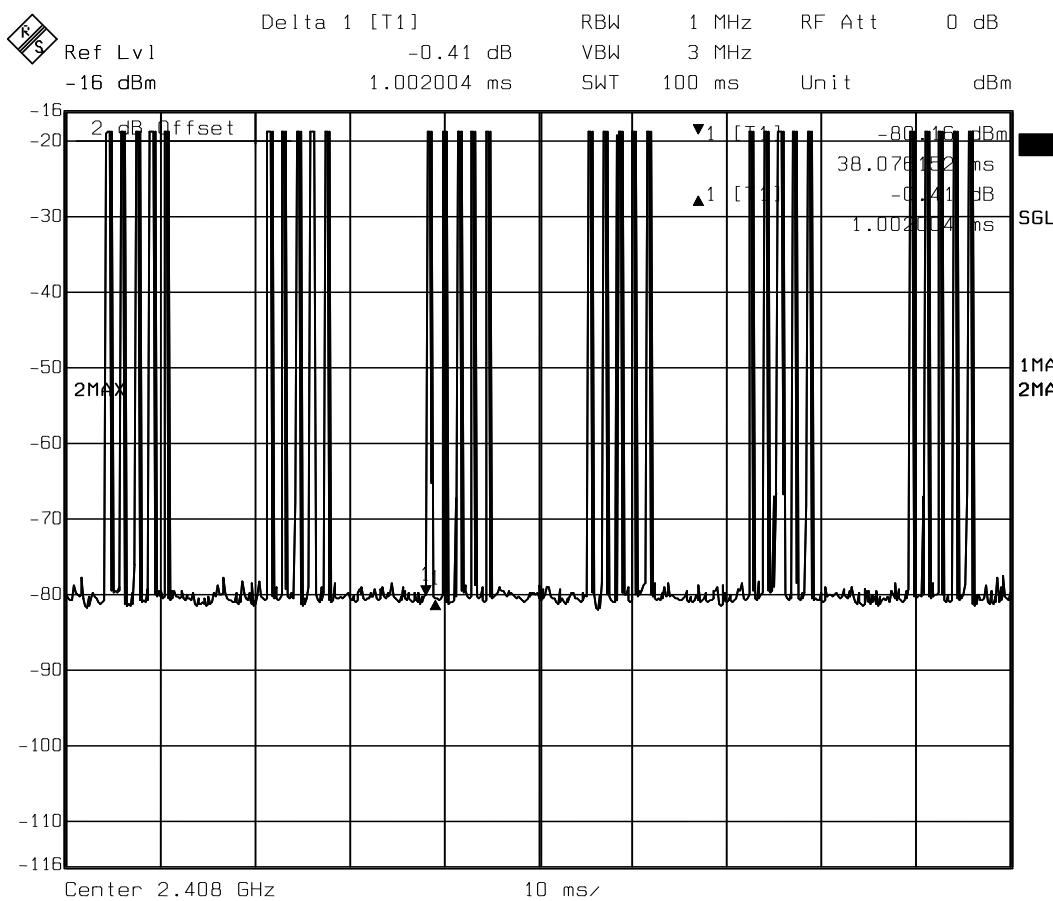
Laboratory: SOATS

Test Results: The modulation is Digital the DC is 30% and the DCF is calculated below (see calculation and plots)

Duty cycle factor calculation and measurement:

$$1 \text{ ms} \times 5 \times 6 = 30\text{ms}$$

$$\text{DCF} = 20 \times \log(30\text{ms}/100\text{ms}) = -10.4 \text{ dB}$$



Date: 29.JUL.2010 14:34:19

Field Strength of Emissions

15.249(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (mV/meter)	Field strength of harmonics (uV/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

Emissions radiated outside of the band

15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Sec. 15.209, whichever is the lesser attenuation.

Test Conditions:

Sample Number:	APX000168	Temperature:	18°C
Date:	7-27-2010	Humidity:	77%
Modulation State:	w/ modulation	Tester:	A. Laudani
Laboratory:			SOATS

Test Results: See Table. EUT complies for fundamental power, band edges and spurious emissions.

Additional Observations:

- The Spectrum was searched from 30 MHz to the 10th Harmonic (9200 MHz), but no emissions within 20 dB of the limits were evident other than what is presented.
- All Measurements below 1 GHz were performed at 3m employing a CISPR quasi-peak detector
- Peak measurements above 1 GHz utilize a RBW of 1 MHz and a VBW of 3 MHz
- Measurements were made after installing fresh batteries.
- The RF module was investigated in three axes.
- As Occupied BW = 6.8 MHz, to ensure output power is captured, RBW > OBW, used 10 MHz RBW, VBW = 10 MHz. Peak, Max Hold measurements.

Limit = 50 mV/m or 94 dBuV/m average

Average = Measured Peak reading + Duty Cycle Factor = $57.9 - 20\log(0.3) = 47.5$

Average: 47.5 dBuV + antenna factor 29.2 dB/m + Cable loss 11.2 dB = 87.9 dBuV/m

$10^{((87.9-120)/20)} = 0.025 \text{ V/m, or } 25 \text{ mV/m}$


Radiated Emissions Data

Job #: 43561-1 Date : 7-27-2010
NEX #: 153603 Time : 1000
Staff : aal

Client Name : Noraxal
EUT Name : Remote Transmitter
EUT Model # : AXRGFv.310
EUT Serial # : 1026
EUT Config. : TRANSMIT

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EUT Voltage : BATT
EUT Frequency : -
Phase: -
NOATS
SOATS X
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Specification : CFR47 Part 15, Subpart C, 249

Loop Ant. #: NA
Bicon Ant. #: 128_3m Temp. (°C) : 18
Log Ant. #: 110_3m Humidity (%) : 77
DRG Ant. # : 877 Spec Analyzer #: 897
Cable LF#: SOATS Analyzer Display #: 897
Cable HF#: 60ft_blue Quasi-Peak Detector #: 897
Preamp LF#: 901 Preselector #: NA
Preamp HF# : 317

Quasi-Peak	RBW: 120 kHz
Peak	Video Bandwidth 300 kHz
Quasi-Peak	RBW: 1 MHz
Peak	Video Bandwidth 3 MHz
Average = Peak + DCF	
DCF = $20 \times \log(0.3) = -10.4$	

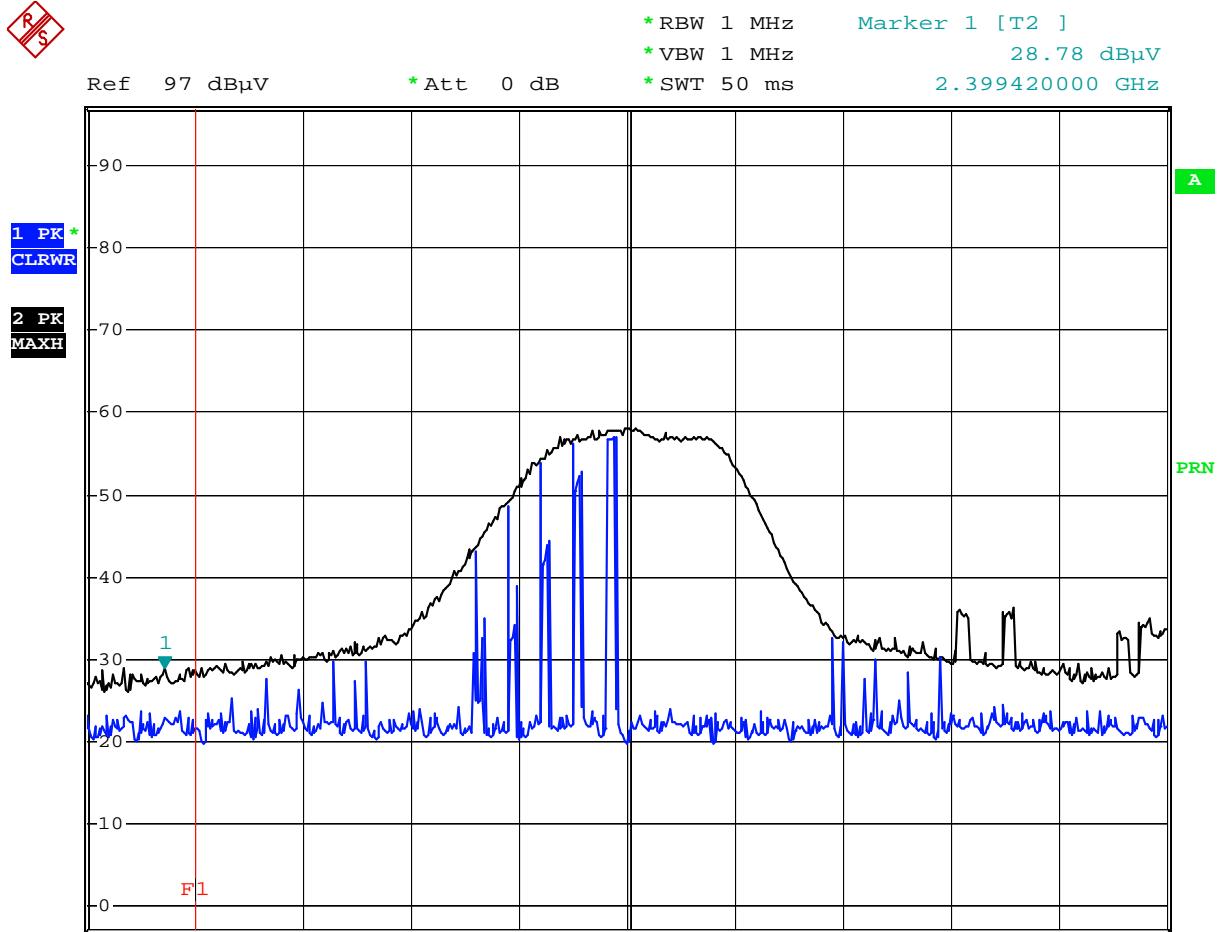
Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.

Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dB μ V)	Corrected Reading (dB μ V/m)	Spec. limit (dB μ V/m)	CR/SL Diff. (dB)	Pass Fail	Comment
2400.0	29.0	28.3	P	-	1.0	29.0	36.1	74.0	-37.8	Pass	
2483.5	24.7	24.0	P	-	1.0	24.7	31.8	74.0	-42.2	Pass	
2407.8	57.9	44.6	P	-	1.0	57.9	98.3	114.0	-15.8	Pass	up 10 MHz
2408.0	48.0	55.0	P	-	1.0	55.0	95.4	114.0	-18.7	Pass	side 10 MHz
2408.0	53.0	52.0	P	-	1.0	53.0	93.4	114.0	-20.7	Pass	flat 10 MHz
2407.8	47.5	34.2	A	-	1.0	47.5	87.9	94.0	-6.1	Pass	
2408.0	37.6	44.6	A	-	1.0	44.6	85.0	94.0	-9.1	Pass	
2408.0	42.6	41.6	A	-	1.0	42.6	83.0	94.0	-11.1	Pass	
4816.0	45.0	45.0	P	-	1.0	45.0	64.3	74.0	-9.7	Pass	up
4816.0	45.0	45.0	P	-	1.0	45.0	64.3	74.0	-9.7	Pass	side
4816.0	45.0	45.0	P	-	1.0	45.0	64.3	74.0	-9.7	Pass	flat
4816.0	34.6	34.6	A	-	1.0	34.6	43.9	54.0	-10.1	Pass	up
4816.0	34.6	34.6	A	-	1.0	34.6	43.9	54.0	-10.1	Pass	side
4816.0	34.6	34.6	A	-	1.0	34.6	43.9	54.0	-10.1	Pass	flat

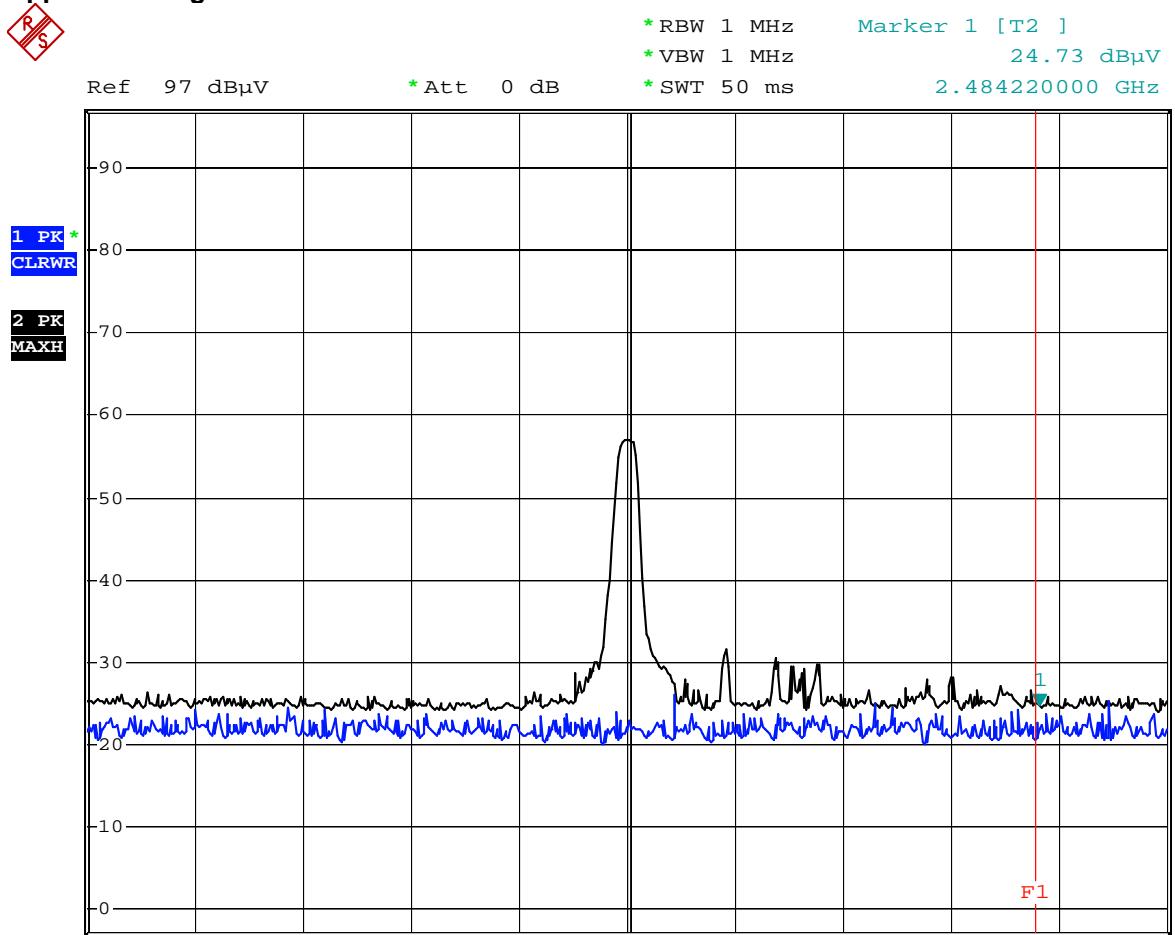
Band edge – no emissions at band edges 2400 and 2483.5 – See radiated emissions results above and plots below:

Lower Bandedge: 2400MHz



Date: 29.SEP.2010 14:02:07

Upper Bandedge: 2483.5 MHz



Date: 29.SEP.2010 14:03:34

Fixed Point-to-Point Operation

15.249 (b) Fixed, point-to-point operation as referred to in this paragraph shall be limited to systems employing a fixed transmitter transmitting to a fixed remote location. Point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information are not allowed. Fixed, point-to-point operation is permitted in the 24.05–24.25 GHz band subject to the following conditions:

- (1) The field strength of emissions in this band shall not exceed 2500 millivolts/meter.
- (2) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.001\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.
- (3) Antenna gain must be at least 33 dBi. Alternatively, the main lobe beamwidth must not exceed 3.5 degrees. The beamwidth limit shall apply to both the azimuth and elevation planes. At antenna gains over 33 dBi or beamwidths narrower than 3.5 degrees, power must be reduced to ensure that the field strength does not exceed 2500 millivolts/meter.

Test Conditions:

Sample Number:		Temperature:	
Date:		Humidity:	
Modification State:		Tester:	
Laboratory:			Nemko

Test Results: Not Applicable, EUT is not Point-to-Point.



Receiver Spurious Emissions

The following receiver spurious emission limits shall be complied with: If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

Test Conditions:

Sample Number:		Temperature:	
Date:	7-15 -2010	Humidity:	
Modulation State:	Standby / receive	Tester:	Alan Laudani
Laboratory:			

Test Results:

Not applicable, EUT is a transmitter, standby has no detectable emissions.

Additional Observations:



APPENDIX B

B. 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

Radiated Emissions Measurement Detection Systems	Applicable Frequency Range	"U" for a k=2 Coverage Factor
Spectrum Analyzer with QPA & Preamplifier	30 MHz - 200 MHz	+3.9 dB, -4.0 dB
Spectrum Analyzer with QPA & Preamplifier	200 MHz-1000 MHz	+/- 3.5 dB
Spectrum Analyzer with Preamplifier	1 GHz - 18 GHz	+2.5 dB, -2.6 dB
Spectrum Analyzer with Preamplifier	18 GHz - 40 GHz	+/- 3.4 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

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 dB_{uV/m}, and that the +/- 2 standard deviations (i.e. 95% confidence level) measurement uncertainty was +/- 3.4 dB.

APPENDIX C

C. 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).

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 manufacturer 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 and 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 Annex G.5 of CISPR 16-1(2003) or ANSI C63.5-2004, 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 Open Area Test Site. Nemko USA, Inc. uses the procedures given in both Sub clause 16.6 and Annex G.2 of CISPR 16-1 (2003), and, ANSI C63.4-2003 when performing the normalized site attenuation measurements.