



**Nemko USA, Inc.**  
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## CERTIFICATION TEST REPORT

**Test Report:** 2009 07132038 FCCTX

**Project number:** 26184

**Nex Number:** 132038

**Applicant:** 2GIG TECHNOLOGIES, INC.  
200 Broadhollow Rd. Suite 207  
Melville, New York 11747

**Equipment Under Test (EUT):** Home Security System

**Model:** CNTRLX345, 2GIG-CNTRL1-345,  
2GIG-CNTRL2-345

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

**FCC ID#:** WDQ-CNTRLX345  
**IC:** 7794A-CNTRLX345

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

**Authorized By:**   
Alan Laudani, RF/EMC Test Specialist

**Date:** JULY 29, 2009

**Total Number of Pages:** 15



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## **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. 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:

<b>Apparatus Assessed:</b>	Home Security System
<b>Model:</b>	CNTRLX345, 2GIG-CNTRL1-345, 2GIG-CNTRL2-345
<b>Specification:</b>	FCC Part 15 Subpart C, 15.249 IC RSS-210 Issue 7 June 2007
<b>Date Received in Laboratory:</b>	July 20, 2009
<b>Compliance Status:</b>	Complies
<b>Exclusions:</b>	None
<b>Non-compliances:</b>	None





### Report Release History

REVISION	DATE	COMMENTS
-	July 29, 2009	Prepared By: Alan Laudani
-	July 29, 2009	Initial Release:


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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:  Date: July 29, 2009  
Alan Laudani, EMC 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:	Home Security System
Model:	CNTRLX345
Serial Number:	NA





## 2.2 Samples Submitted for Assessment

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

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Home Security System	2GIG TECHNOLOGIES, INC. Model: CNTRLX345 Serial #: NA	18 AWG twinlead
EUT – AC Adapter	SURE-POWER Model: SW-14017GA Serial #: NA	2 Prong wall wart 120 Vac 60 Hz / 14.0VDC 800mA

CONNECTION	I/O CABLE
Terminal strip to un-terminated	6- 2 m 20 AWG wires
Phone jack to un-terminated	RJ-31X 4 wire phone lead.

## 2.3 Theory of Operation

The CNTRLX345 is a **residential fire** warning and security system. Its function is to receive status transmissions via a 345 MHz radio receiver from smoke / CO, door / window, infrared motion detectors and remote arm / disarm control transmitters. Depending on the unit's programming, the system will transmit alarm status to a central station via Part 68 land telephone line or GSM cell phone. A Zwave 15.249 radio transceiver provides transmissions at 908.4 MHz for remote control of lighting and appliances.

The EUT was exercised by temporary test connections to a laptop computer to artificially place the radios on test channels at full power and maximum modulation for testing. The laptop computer was disconnected and was not part of any testing as it is used for test control only.

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 Technical Specifications of the EUT

<b>Manufacturer:</b>	2GIG TECHNOLOGIES, INC.
<b>Operating Frequency:</b>	908.4 MHz in the 902--928 MHz Band
<b>Number of Operating Frequencies:</b>	1
<b>Measured Power:</b>	0.0343V/m, or 34.3 mV/m or 90.7 dB $\mu$ V/m @ 3m
<b>Modulation:</b>	FSK
<b>Emissions Designator:</b>	115KF1D
<b>Antenna Data:</b>	Integral, Z-wave
<b>Antenna Connector:</b>	None
<b>Power Source:</b>	120 VAC 60 Hz





## 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 – 20 °C
Humidity range	60-66 %
Pressure range	86 - 106 kPa
Power supply range	+/- 15% of rated voltages







### 3.4 Test Equipment

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Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
111	Antenna, LPA	Electrometrics	LPA-25	1382	20-Oct-08	20-Oct-10
114	Antenna, Bicon	EMCO	3104	2997	10-Feb-09	10-Feb-10
317	Preamplifier	HP	8449A	2749A00167	16-Apr-09	16-Apr-10
877	Antenna, DRWG	AH Systems	SAS-571	688	28-Jul-08	28-Jul-10
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	31-Mar-09	31-Mar-10
811	Multimeter	Fluke	111	78130057	17-Nov-08	17-Nov-09
--	Regulating Transformer	TDGC	0-250VAC	NA	NCR	NCR
147	LISN	EMCO	3825/2	9009-1700	05-Sep-09	05-Sep-09
404	Spectrum Analyzer Display	HP	85662A	2648A15448	06-Apr-09	06-Apr-10
421	Quasi-Peak Adapter	HP	85650A	3145A01672	06-Apr-09	06-Apr-10
542	High Pass Filter	Solar	7801-5.0	838132	15-Apr-09	15-Apr-10
681	Transient Limiter	HP	11947A	3107A02634	12-Sep-08	12-Sep-09
711	Spectrum Analyzer	HP	8566B	2747A04729	06-Apr-09	06-Apr-10
898	EMI Receiver & filter set	HP	8546A	3625A00348	31-May-09	31-May-10
899	Filter Section	HP	85460A	3448A00288	31-May-09	31-May-10

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	Y	Pass
15.207 (a)	RSS-Gen 7.2.2	Power line Conducted Emissions -- Transmit Mode	Y	Pass
15.215 (c)	RSS-Gen 4.6.1	Occupied Bandwidth	Y	Pass
		Duty Cycle Test*	N	
15.249 (a)	RSS-Gen 4.8 & 4.9 & RSS-210 A2.9	Field Strength of Emissions	Y	Pass
15.249 (d)	RSS-Gen 4.9 & RSS-210 A2.9	Spurious Emissions Outside of the band	Y	Pass
15.209 (a)		Fixed Point-to-Point Operation	N	
15.249 (b)				
15.107 (a)	RSS-Gen 4.10 RSS-Gen 7.2.3	Receiver Spurious Emissions	Y	Pass

**Notes:** \*100% duty cycle as the modulation is FSK



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## Appendix A: Test Results

### Power line Conducted Emissions / Receiver or Stand-by Mode

RSS-Gen

**Table 2 - AC Power Lines Conducted Emission Limits**

Frequency range (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

### Test Conditions:

<b>Sample Number:</b>	NA	<b>Temperature:</b>	19°C
<b>Date:</b>	July 20, 2009	<b>Humidity:</b>	61%
<b>Modification State:</b>	STAND BY	<b>Tester:</b>	Alan Laudani
		<b>Laboratory:</b>	Enclosure 2

### Test Parameters:

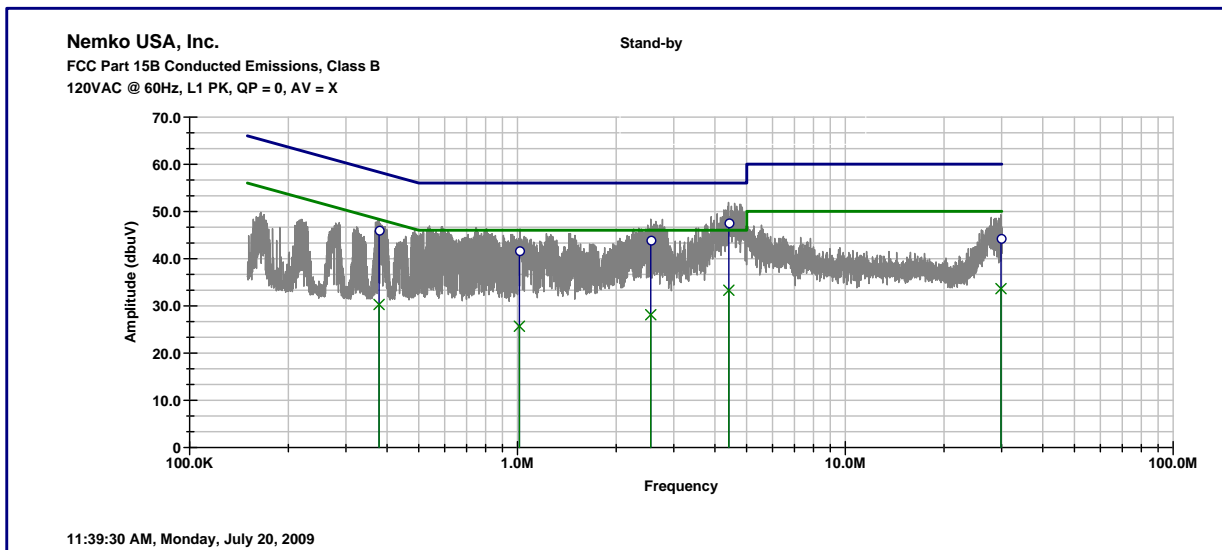
Peak RBW: 100kHz VBW: 100kHz  
 Quasi-Peak: RBW 9kHz, VBW 30 kHz  
 Average: RBW 9kHz, VBW 30 kHz  
 Quasi-Peak Limit Blue Line, Average Limit Green Line

**Test Results:** EUT complies

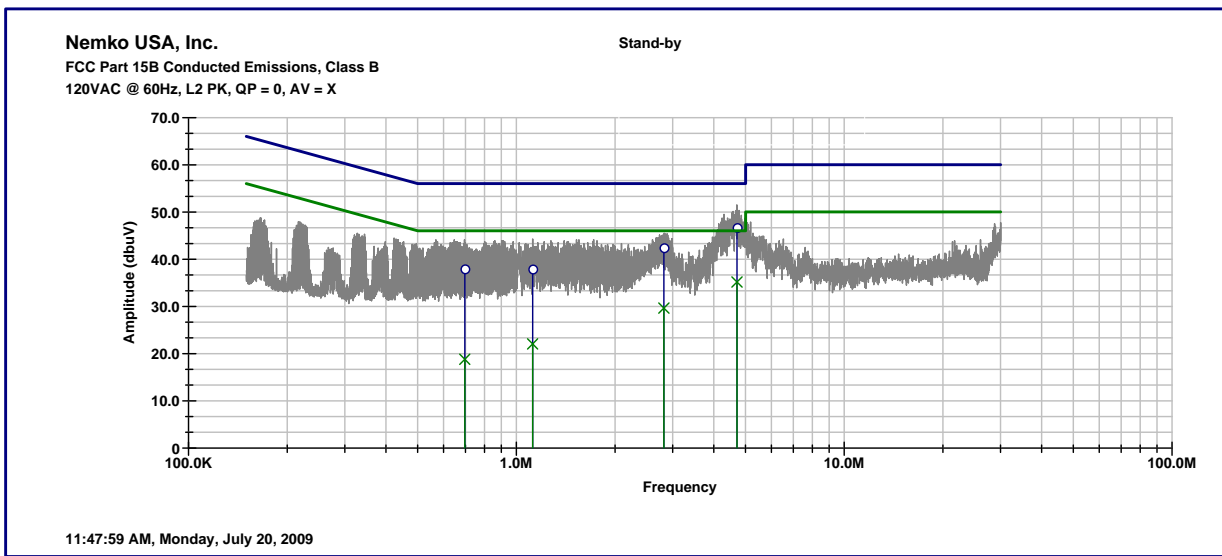
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Stand-by Mode

Line 1



Line 2

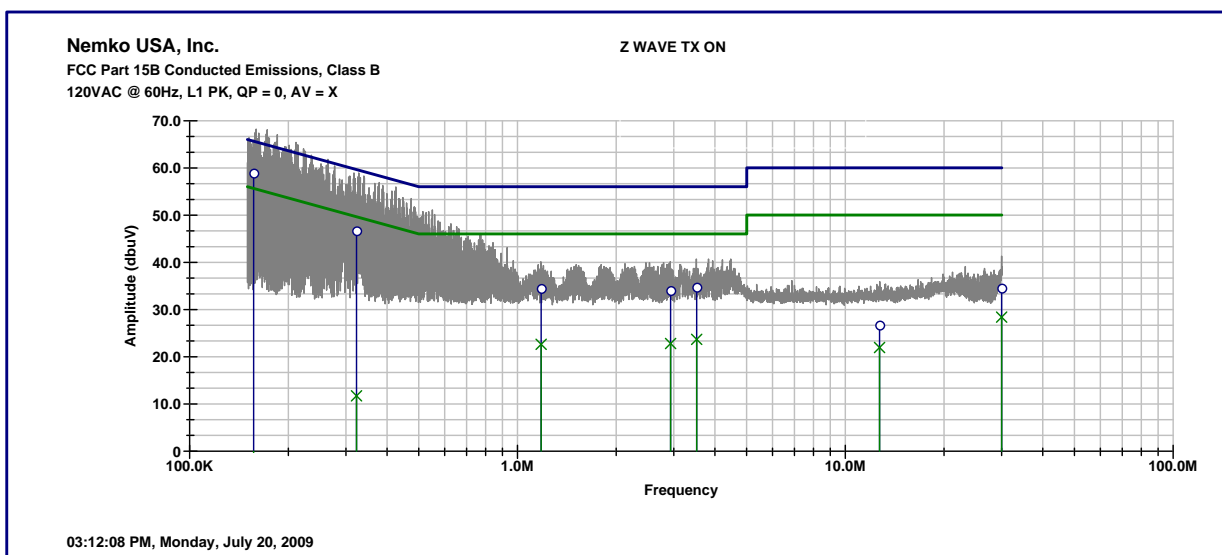


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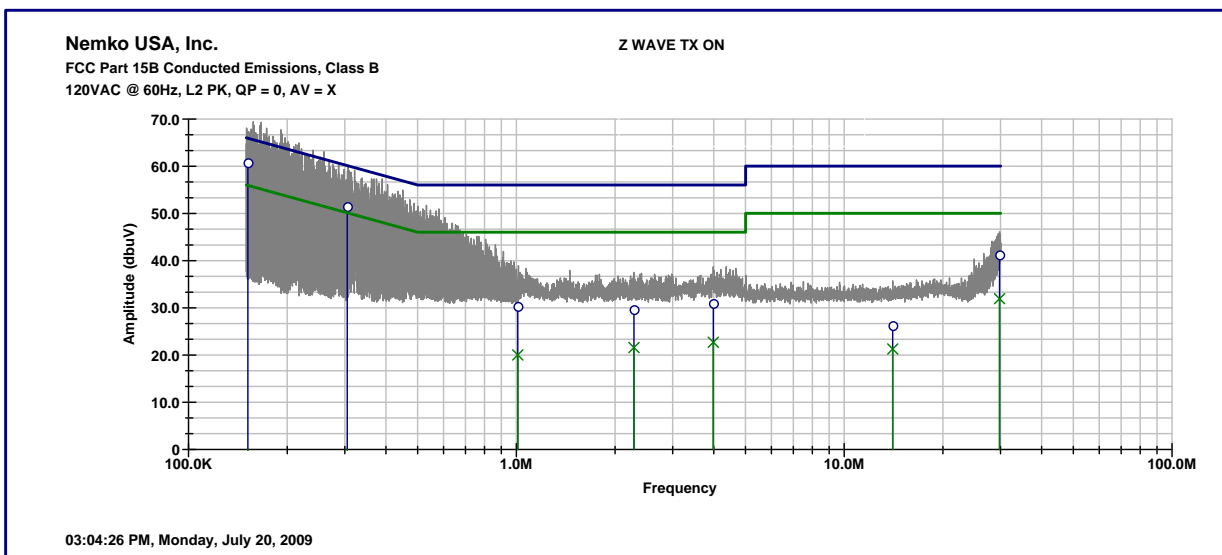
**Power line Conducted Emissions – Transmit Mode**

<b>Sample Number:</b>	NA	<b>Temperature:</b>	19°C
<b>Date:</b>	July 20, 2009	<b>Humidity:</b>	61%
<b>Modification State:</b>	Transmit Zwave	<b>Tester:</b>	Alan Laudani
		<b>Laboratory:</b>	Enclosure 2

Line 1



Line 2



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## 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:

<b>Sample Number:</b>	NA	<b>Temperature:</b>	19°C
<b>Date:</b>	July 21, 2009	<b>Humidity:</b>	61%
<b>Modification State:</b>		<b>Tester:</b>	Alan Laudani
		<b>Laboratory:</b>	SOATS

**Test Results:**                    115 kHz

- Span is wide enough to capture the channel transmission
- RBW is 1% of the span
- VBW is 3X RBW
- 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.

See Plot below.

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15:21:59 JUL 21, 2009

MKR $\Delta$  115 kHz  
-.07 dB

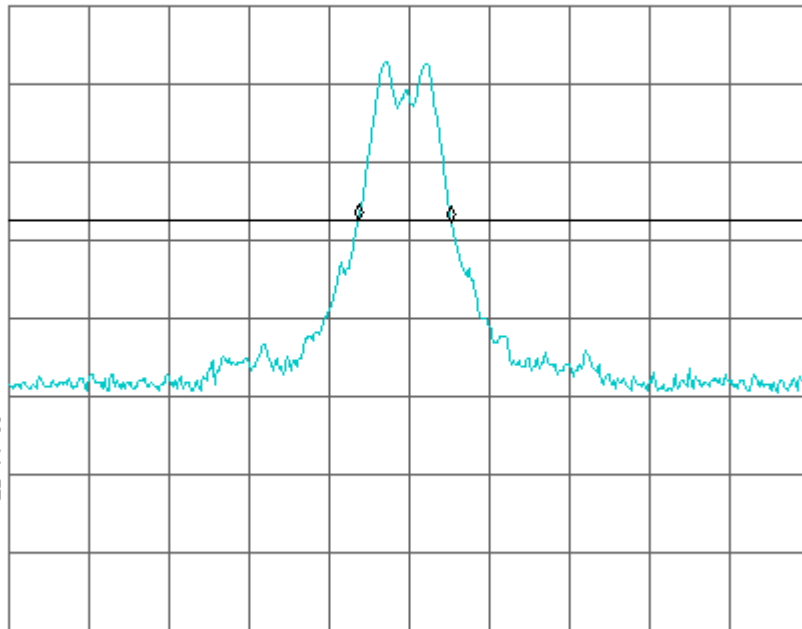
REF 67.0 dB $\mu$ V

AT 10 dB

PEAK  
LOG  
10  
dB/

DL  
39.6  
dB $\mu$ V

SA MB  
SC FC  
CORR



CENTER 908.400 MHz  
#RES BW 10 kHz

VBW 30 kHz

SPAN 1.000 MHz  
SWP 30.0 msec



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## 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)
<b>902-928</b>	<b>50</b>	<b>500</b>
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:

<b>Sample Number:</b>	NA	<b>Temperature:</b>	31°C
<b>Date:</b>	July 21, 2009	<b>Humidity:</b>	205
<b>Modification State:</b>	Transmit Zwave	<b>Tester:</b>	Alan Laudani
		<b>Laboratory:</b>	SOATS

## Test Results:

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

## Additional Observations:

- The Spectrum was searched from 30MHz to the 10<sup>th</sup> Harmonic (9085 MHz).
- The EUT was tested while varying the AC mains input to the AC adapter. No variance of RF out occurred while varying the AC mains from 102 VAC to 138 VAC.
- All Measurements below 1GHz were performed at 3m employing a CISPR quasi-peak detector, except for the radio's fundamental.
- Peak measurements above 1GHz would have been done utilizing RBW of 1MHz and VBW of 3MHz, but no emissions within 20 dB of the limits were evident.
- After measurements were made, the GSM transmitter was turned on at low band frequencies of 824.2, 836.6. and 848.8 MHz, no noticeable differences at any frequency were noted.
- After measurements were made, the GSM transmitter was turned on at high band frequencies of 1850.0, 1880.2. and 1909.8 MHz, no noticeable differences at any frequency were noted.
- No Harmonic or Digital Spurious Emissions due to the GSM transmitter were noted within 20 dB of the limit for Part 22H and Part 24E from 30 MHz to 19100 MHz.

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Rated Power Calculations:

Limit = 50 mV/m

Measured average reading 63.0 dBuV + antenna factor 23.6 dB/m + Cable loss 4.1 dB =  
corrected average reading = 90.7 dBuV/m

$10^{(90.7-120)/20} = 0.0343V/m$ , or 34.3 mV/m

Radiated Emissions Data											
Job # :	26184		Date :	7-21-09		Page	1		of	1	
NEX #:	132038		Time :	1530							
			Staff :	aal							
Client Name :	Linear LLC					EUT Voltage :	120				
EUT Name :	Home Security System					EUT Frequency :	60				
EUT Model # :	CNTRLX345					Phase:	1				
EUT Serial # :	na					NOATS					
EUT Config. :	Transmit ZWAVE					SOATS	X				
						Distance < 1000 MHz:	3 m				
						Distance > 1000 MHz:	3 m				
Specification :	CFR47 Part 15, Subpart C, 15.249										
Loop Ant. #:											
Bicon Ant.#:	114 3m		Temp. (°C) :	31							
Log Ant.#:	111 3m		Humidity (%) :	20							
DRG Ant. #	877		Spec Analyzer #:	835		898					
Cable LF#:	SOATS		Analyzer Display #:	835		898					
Cable HF#:	SOATS		Quasi-Peak Detector #:	NA		898					
Preamp LF#:	NA		Preselector #:	NA		899					
Preamp HF#	317										
Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated. Measurements above 1 GHz are Average values, unless otherwise stated.											
	Quasi-Peak		RBW: 120 kHz								
	Video Bandwidth 300 kHz										
	Peak		RBW: 100 kHz								
	Video Bandwidth 300 kHz										
Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBuV)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
34.3	19.6	12.0	Q	-	1.0	19.6	33.8	40.0	-6.2	Pass	
44.0	16.7	13.0	Q	-	1.0	16.7	28.7	40.0	-11.3	Pass	
78.0	22.4	19.2	Q	F	1.0	22.4	29.7	40.0	-10.3	Pass	
108.5	13.5	11.4	Q	F	1.0	13.5	26.8	43.5	-16.7	Pass	
123.9	10.4	7.6	Q	F	1.0	10.4	27.5	43.5	-16.0	Pass	
153.0	6.8	5.9	Q	-	1.0	6.8	21.2	43.5	-22.3	Pass	
902.0	15.9	14.2	P		1.1	15.9	43.6	46.0	-2.4	Pass	AMBIENT
908.4	64.9	63.6	P	FR	1.1	64.9	92.6	94.0	-1.4	Pass	RBW200 VBW 500
908.4	63.0	62.3	A	FR	1.1	63.0	90.7	94.0	-3.3	Pass	RBW200 VBW 10
928.0	15.3	15.6	P		1.1	15.6	43.2	46.0	-2.8	Pass	AMBIENT

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## 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:

<b>Sample Number:</b>		<b>Temperature:</b>	
<b>Date:</b>		<b>Humidity:</b>	
<b>Modification State:</b>		<b>Tester:</b>	Alan Laudani
		<b>Laboratory:</b>	Nemko

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

## Duty Cycle Test

### Test Conditions:

<b>Sample Number:</b>		<b>Temperature:</b>	
<b>Date:</b>		<b>Humidity:</b>	
<b>Modification State:</b>		<b>Tester:</b>	Alan Laudani
		<b>Laboratory:</b>	Nemko

**Test Results:** The modulation is FSK, duty cycle is 100%.

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## 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:

<b>Sample Number:</b>	NA	<b>Temperature:</b>	31°C
<b>Date:</b>	July 21, 2009	<b>Humidity:</b>	20.5
<b>Modification State:</b>	Stand by	<b>Tester:</b>	A. Laudani
		<b>Laboratory:</b>	Nemko SOATS

## Test Results: EUT complies

Radiated Emissions Data											
Job # :	26184		Date :	7-21-09		Page	1		of	1	
NEX #:	132038		Time :	1323							
			Staff :	aal							
Client Name :	Linear LLC					EUT Voltage :	120				
EUT Name :	Home Security System					EUT Frequency :	60				
EUT Model # :	CNTRLX345					Phase:	1				
EUT Serial # :	010F9B94					NOATS					
EUT Config. :	Standby					SOATS	X				
						Distance < 1000 MHz:	3 m				
						Distance > 1000 MHz:	3 m				
Specification :	CFR47 Part 15, Subpart B, Class B										
Loop Ant. #:	NA		Temp. (°C) :	31		Quasi-Peak	RBW: 120 kHz				
Bicon Ant.#:	114_3m		Humidity (%) :	20		Video Bandwidth	300 kHz				
Log Ant.#:	111_3m		Spec Analyzer #:	898		Peak	RBW: 1 MHz				
DRG Ant. #	877		Analyzer Display #:	898		Video Bandwidth	3 MHz				
Cable LF#:	SOATS		Quasi-Peak Detector #:	898		Average	RBW: 1 MHz				
Cable HF#:	SOATS		Preselector #:	899		Video Bandwidth	10 Hz				
Preamp LF#:	NA										
Preamp HF#:	317										
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 (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
34.3	19.6	12.0	Q	-	1.0	19.6	34.0	40.0	-6.0	Pass	
44.0	16.7	13.0	Q	-	1.0	16.7	28.7	40.0	-11.3	Pass	
78.0	22.4	19.2	Q	F	1.0	22.4	30.1	40.0	-9.9	Pass	
108.5	13.5	11.4	Q	F	1.0	13.5	27.3	43.5	-16.3	Pass	
123.9	10.4	7.6	Q	F	1.0	10.4	28.0	43.5	-15.5	Pass	
153.0	6.8	5.9	Q	-	1.0	6.8	21.8	43.5	-21.8	Pass	

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## 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

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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:

- o *ANSI Z540.2 (2002) Guide to the Expression of Uncertainty in Measurement*
- o NIS 81:1994, *The Treatment of Uncertainty in EMC Measurements* (NAMAS, 1994)
- o 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 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).

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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 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.



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**APPENDIX D**  
**D. NVLAP Certification**

<p>United States Department of Commerce National Institute of Standards and Technology</p>  <p><b>Certificate of Accreditation to ISO/IEC 17025:2005</b></p> <hr/> <p>NVLAP LAB CODE: 200116-0</p> <p><b>Nemko USA, Inc. - San Diego EMC Division</b> San Diego, CA</p> <p><i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i></p> <p><b>ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS</b></p> <p><i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2005).</i></p> <p>2009-01-01 through 2009-12-31 <i>Effective dates</i></p>  <p><i>Dolly J. Bruce</i> <i>For the National Institute of Standards and Technology</i></p>
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