



LSRESEARCH, LLC

Wireless Product Development

W66 N220 Commerce Court • Cedarburg, WI 53012 USA • Phone: 262.375.4400 • Fax: 262.375.4248 • www.lsr.com

ENGINEERING TEST REPORT # 313223

LSR Job #: C-1789

Compliance Testing of:

Caretaker Sentry Pendant

Test Date(s):

January 4, 7, 8 and September 25, 2013

Prepared For:

Logic Mark, LLC

Attn: Douglas L. Ringer

10106 Bluegrass Parkway

Louisville, Kentucky 40299

This Test Report is issued under the Authority of: Adam Alger, EMC Engineer

Signature:

Date: 10-09-13

Test Report Reviewed by:

Khairul Aidi Zainal, Sr. EMC Engineer

Signature:

Date: 9/30/13

Report by:

Adam Alger, EMC Engineer

Signature:

Date: 9-26-13

This Test Report may not be reproduced, except in full, without written approval of LS Research, LLC.

Prepared For: Logic Mark, LLC.

Report: TR 313223 FCCICTX

LSR: C-1789

Name: Caretaker Sentry Pendant

Model: 40915

Serial: 12410051

Table of Contents

i.	Title Page	1
ii.	Table of Contents	2
iii.	LS Research, LLC.....	3
1.0	Summary of Test Report.....	4
2.0	Test Facilities	4
3.0	Client Information.....	5
3.1	Equipment Under Test (EUT) Information.....	5
3.2	Product Description	5
3.3	Modifications Incorporated In the EUT for Compliance Purposes	5
3.4	Deviations & Exclusions from Test Specifications	5
3.5	Additional Information	5
4.0	Conditions of Test.....	6
5.0	Test Equipment	6
6.0	Conformance Summary	6
Appendix A – Test Equipment		7
Appendix B – Test Data.....		8
B.1 – Radiated Emissions of Fundamental and Harmonics.....		8
B.2 – Requirements for Periodic Operations		14
B.3 – AC Mains Conducted Emissions		16
Appendix C - Uncertainty Summary		17
Appendix D - References.....		18

LS Research, LLC in Review

As an EMC Testing Laboratory, our Accreditation and Assessments are recognized through the following:



TESTING CERT #1255.01

A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope of Accreditation
A2LA Certificate Number: 1255.01



Federal Communications Commission (FCC) – USA

Listing of 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948
FCC Registration Number: 90756



Industrie
Canada

Canada

Industry Canada

On file, 3 Meter Semi-Anechoic Chamber based on RSS-212 – Issue 1
File Number: IC 3088-A
On file, 3 and 10 Meter OATS based on RSS-212 – Issue 1
File Number: IC 3088



U. S. Conformity Assessment Body (CAB) Validation

Validated by the European Commission as a U. S. Competent Body operating under the U. S./EU, Mutual Recognition Agreement (MRA) operating under the European Union Electromagnetic Compatibility – Council Directive 2004/108/EC (formerly 89/336/EEC, Article 10.2).
Date of Validation: January 16, 2001

Validated by the European Commission as a U.S. Notified Body operating under the U.S. /EU, Mutual Recognition Agreement (MRA) operating under the European Union Telecommunication Equipment – Council Directive 99/5/EC, Annex V.
Date of Validation: November 20, 2002
Notified Body Identification Number: 1243

Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Pendant

Report: TR 313223 FCCICTX

Model: 40915

LSR: C-1789

Serial: 12410051

1.0 Summary of Test Report

In January and September 2013 the EUT, Caretaker Sentry Pendant, was tested and MEETS the following requirements:

FCC and IC Paragraph	Test Requirements	Compliance (Yes/No)
FCC: 15.231 (b) IC: RSS-210 A1.1	Field Strength of Fundamental	Yes
FCC: 15.231 (b) IC: RSS-210 A1.1	Field Strength of Spurious Emissions	Yes
FCC: 15.231 (a) and (c) IC: RSS-210 A1	Requirements for Periodic Operations	Yes
FCC : 15.207 IC : RSS GEN sect. 7.2.2	Power Line Conducted Emissions Measurements	N/A

2.0 Test Facilities

All testing was performed at:

LS Research, LLC
W66 N220 Commerce Court
Cedarburg, Wisconsin, 53012 USA

LS Research, LLC is accredited by A2LA (American Association for Laboratory Accreditation) to the requirements of ISO/IEC 17025, 2005 “General Requirements for the Competence of Calibration and Testing Laboratories”.

LS Research, LLC’s scope of accreditation includes all test methods listed herein, unless otherwise noted.

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Pendant
Report: TR 313223 FCCICTX	Model: 40915
LSR: C-1789	Serial: 12410051

3.0 Client Information

Manufacturer Name:	Logic Mark, LLC.
Address:	10106 Bluegrass Parkway Louisville, Kentucky 40299
Contact Person:	Douglas L. Ringer

3.1 Equipment Under Test (EUT) Information

The following information has been supplied by the applicant.

Product Name:	Caretaker Sentry Pendant
Model Number:	40915
Serial Number:	12410051
FCC ID	TYD-CS40915
IC Number	8471A-CS40915

3.2 Product Description

Pendant used in a health care safety application.

3.3 Modifications Incorporated In the EUT for Compliance Purposes

None noted at time of test

3.4 Deviations & Exclusions from Test Specifications

None noted at time of test

3.5 Additional Information

Device put into test modes via a push button fitted on the EUT that cycled between normal, continuous pulsed and continuous CW operations.

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Pendant
Report: TR 313223 FCCICTX	Model: 40915
LSR: C-1789	Serial: 12410051

4.0 Conditions of Test

Environmental:

Temperature: 20-25° C
Relative Humidity: 30-60%
Atmospheric Pressure: 86-106 kPa

Battery Operated device using coin cell type: 3.0 VDC

5.0 Test Equipment

All test equipment is calibrated by a calibration laboratory accredited by A2LA to the requirements of ISO 17025. For a complete list of test equipment and calibration dates, see Appendix A. Unless otherwise noted, resolution bandwidth of measuring instrument used during testing for given frequency range, see below.

Frequency Range	Resolution Bandwidth
9 kHz – 150 kHz	200 Hz
150 kHz – 30 MHz	9 kHz
30 MHz – 1000 MHz	120 kHz
Above 1000 MHz	1 MHz

6.0 Conformance Summary

The EUT was found to MEET the requirements as described within the specification of FCC Title 47, CFR Part 15.231, and Industry Canada RSS-210, Issue 8 (2010), Annex 1.

If some emissions are seen to be within 3 dB of their respective limits:

As these levels are within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

LS Research, LLC certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specifications. The results in this Test Report apply only to the item(s) tested on the above-specified dates. Any modifications made to the EUT subsequent to the indicated test date(s) will invalidate the data herein, and void this certification.

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Pendant
Report: TR 313223 FCCICTX	Model: 40915
LSR: C-1789	Serial: 12410051

Appendix A – Test Equipment



Date : 4-Jan-2013

Type Test : Radiated Emissions

Job # : C-1789

Prepared By: Adam A

Customer : LogicMark

Quote # : 313223

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960156	100kHz-1GHz Analog Signal Generator	Agilent	N5181A	MY49060062	6/30/2012	6/30/2013	Active Calibration
2	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/29/2012	6/29/2013	Active Calibration
3	EE 960158	RF Preselector	Agilent	N9039A	MY46520110	6/29/2012	6/29/2013	Active Calibration
4	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	5/16/2012	5/16/2013	Active Calibration
5	AA 960005	Biconical Antenna	EMCO	93110B	9601-2280	6/26/2012	6/26/2013	Active Calibration
6	AA 960004	Log Periodic Antenna	EMCO	93146	9512-4276	9/17/2012	9/17/2013	Active Calibration
7	EE 960160	0.8-21GHz LNA	Mini-Circuits	ZVA-213X-S+	977711030	9/17/2012	9/17/2013	Active Calibration

Project Engineer: [Signature]

Quality Assurance: [Signature]



Date : 25-Sep-2013

Type Test : Radiated Emissions (109)

Job # : C-1789

Prepared By: Adam A

Customer : LogicMark

Quote # : 313223

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960085	N9038A MXE 26.5GHz Receiver	Agilent	N9038A	MY51210148	8/7/2013	8/7/2014	Active Calibration

Project Engineer: [Signature]

Quality Assurance: [Signature]

Prepared For: Logic Mark, LLC.

Report: TR 313223 FCCICTX

LSR: C-1789

Name: Caretaker Sentry Pendant

Model: 40915

Serial: 12410051

Appendix B – Test Data

B.1 – Radiated Emissions of Fundamental and Harmonics

Rule Part(s)	FCC: 15.231 / 15.205 IC: RSS-210 A1 / RSS-210 Section 2.2			
Measurement Procedure	ANSI C63.4 - 2003			
Test Location	LS Research, LLC - FCC Listed 3 meter Semi-Anechoic Chamber			
Test Distance	3 meter (30-5000 MHz)			
EUT Placement	80 cm height non-conductive table above reference ground plane			
Frequency Range of Measurement	Biconical: 30-300 MHz	Log Periodic Dipole Array: 300-1000 MHz	Double-Ridged Waveguide Horn: 1-18 GHz	
Measurement Detectors	30-1000MHz RBW: 120 kHz VBW: At least 300 kHz		1 - 40 GHz: RBW : 1MHz VBW: At least 3 (MHz) Peak 10 Hz Average	
Description of Measurement	1) The antenna, cable, pre-amp, and other necessary measurement system correction factors are loaded onto the EMI receiver / spectrum analyzer when the measurements are preformed. The data is gathered and reported as the corrected values. 2) The EUT is placed on a non-conductive pedestal centered on a turn-table in the test location with the antenna at the test distance from the EUT 3) Maximum radiated RF emissions are determined by rotation of azimuth and scanning the sense antenna between 1 and 4 meters in height using both horizontal and vertical antenna polarities. Maximized levels are manually noted at degree values of azimuth and at sense antenna height.			
Example Calculations	Reported Measurement data = Raw receiver measurement + Antenna Correction Factor + Cable factor (dB) - amplification factor (when applicable) + Additional factor (when applicable)			

FCC Part 15.209 / IC RSS-210 Section 2.7 Limits:

Frequency (MHz)	3 m Limit ($\mu\text{V/m}$)	3 m Limit ($\text{dB}\mu\text{V/m}$)	Type
30-88	100	40.0	Quasi-Peak
88-216	150	43.5	Quasi-Peak
216-960	200	46.0	Quasi-Peak
Above 960	500	54.0	Average (>1 GHz)

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Pendant
Report: TR 313223 FCCICTX	Model: 40915
LSR: C-1789	Serial: 12410051

FCC Part 15.231 (b) / IC RSS-210 Annex 1 Table A

Fundamental Frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of fundamental (dBμV/meter)	Field Strength of spurious emissions (microvolts/meter)	Field strength of spurious emissions (dBμV/meter)
40.66-40.70	2,250	67.04	225	47.04
70-130	1,250	61.94	125	41.94
130-174	¹ 1,250 to 3,750	¹ 61.94 to 71.48	¹ 125 to 375	¹ 41.94 to 51.48
174-260	3,750	71.48	375	51.48
260-470	¹ 3,750 to 12,500	¹ 71.48 to 81.94	¹ 375 to 1,250	¹ 51.48 to 61.94
Above 470	12,500	81.94	1,250	61.94

¹ Linear interpolations.

B.1.1 – Field Strength of Fundamental

Manufacturer	Logicmark
Date	01-04-2013
Operator	Adam A
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	15.231/ 15.205 / RSS-210 A1
Measurement Procedure	ANSI C63.4 - 2003
Test Distance	3 meter (30-5000 MHz)
EUT Placement	80 cm height non-conductive table centered on turn-table
Detectors	Peak, RBW 120 kHz
Additional Notes	1) Tested in the worst case of continuous transmit modulated mode with EUT in three orthogonal positions at maximum power. 2) EUT maximized in azimuth and antenna height with maximum results reported.

Example Calculation:

Peak Reading (dBμV/m) – Duty Cycle (dB) = Average Calculated (dBμV/m)

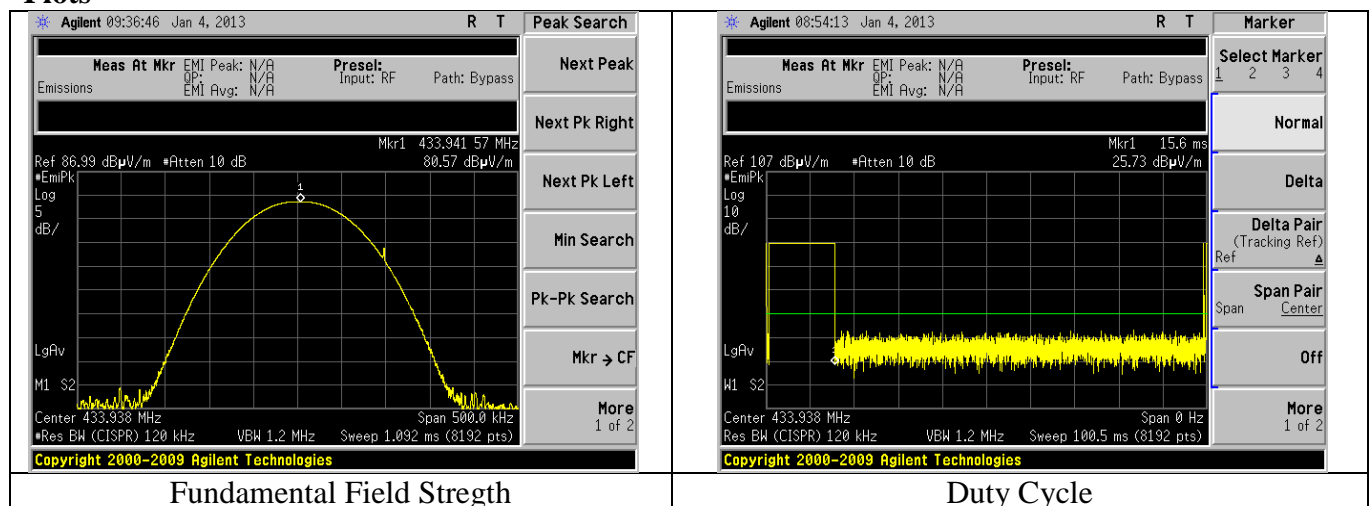
FCC 15.231 Average Limit @ 3 meter (dBμV/m) – Average Calculated (dBμV/m) = Average Margin

Data Table

Frequency (MHz)	Antenna Polarization	EUT Position	Antenna Height (cm)	Table Azimuth (degrees)	Peak Reading (dBμV/m)	Duty Cycle (dB)	Average Calculated (dBμV/m)	Average Limit (dBμV/m)	Average Margin (dB)
433.9	Vertical	Horizontal	100	91	80.57	16.1	64.47	80.82	16.4
	Horizontal	Horizontal	340	152	74.46	16.1	58.36	80.82	22.5
	Vertical	Vertical	100	96	80.26	16.1	64.16	80.82	16.7
	Horizontal	Vertical	332	153	74.47	16.1	58.37	80.82	22.5
	Vertical	Flat	193	245	62.54	16.1	46.44	80.82	34.4
	Horizontal	Flat	193	0	78.73	16.1	62.63	80.82	18.2

$$\text{Duty Cycle} = 20 * \log (15.6/100) = 16.1 \text{ (dB)}$$

Plots



Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Pendant
Report: TR 313223 FCCICTX	Model: 40915
LSR: C-1789	Serial: 12410051

B.1.2 – Field Strength of Spurious Emissions

Manufacturer	Logicmark
Date	January 4, 7, 8 2013
Operator	Adam A
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	15.231 / 15.205 / RSS-210 A1
Measurement Procedure	ANSI C63.4 - 2003
Test Distance	3 meter (30-5000 MHz)
EUT Placement	80 cm height non-conductive table centered on turn-table
Detectors	Peak, RBW 120 kHz (Below 1 GHz) 1MHz (Above 1 GHz)
Additional Notes	1) Tested in the worst case of continuous transmit modulated mode with EUT in three orthogonal positions at maximum power. 2) EUT maximized in azimuth and antenna height with maximum results reported.

Example Calculation:

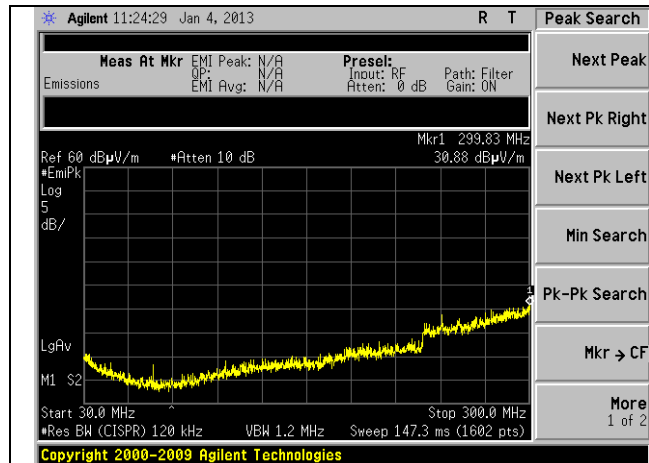
Peak Reading (dB μ V/m) – Duty Cycle (dB) = Average Calculated (dB μ V/m)

FCC 15.231 Average Limit @ 3 meter (dB μ V/m) – Average Calculated (dB μ V/m) = Average Margin

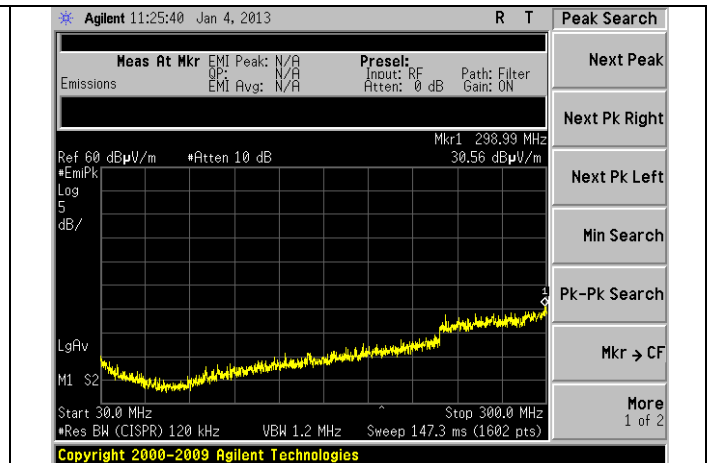
Data Table

Frequency (MHz)	Height (cm)	Azimuth (degree)	Peak Reading (dB μ V/m)	Duty Cycle (dB)	Avg Calculated (dB μ V/m)	Avg Limit (dB μ V/m)	Margin (dB)	Antenna Polarity	EUT orientation
867.8	156	115	58.6	16.1	42.5	60.8	18.3	Horizontal	Vertical
1301.7	100	182	61.9	16.1	45.8	54.0	8.2	Horizontal	Flat
1735.6	104	238	58.3	16.1	42.2	60.8	18.6	Horizontal	Flat
2169.5	100	183	68.0	16.1	51.9	60.8	8.9	Vertical	Horizontal
2603.4	113	73	50.8	16.1	34.7	60.8	26.1	Vertical	Vertical
3037.3	110	98	49.7	16.1	33.6	60.8	27.2	Horizontal	Flat
3471.2	104	175	58.9	16.1	42.8	60.8	18.1	Horizontal	Horizontal
3905.1	100	86	59.4	16.1	43.3	54.0	10.7	Vertical	Vertical
4339	103	178	63.8	16.1	47.7	54.0	6.3	Vertical	Vertical

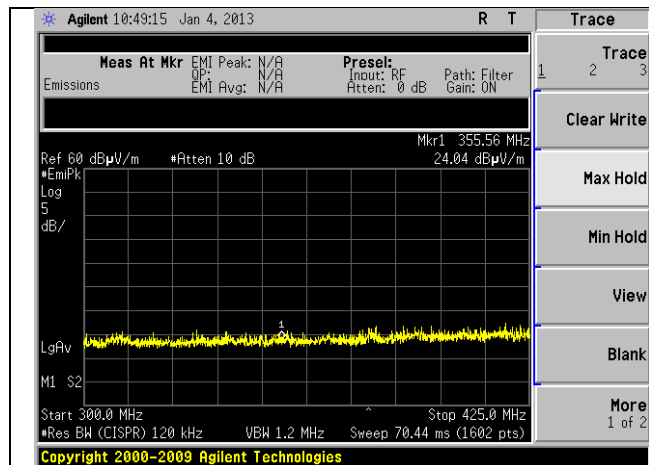
Plots



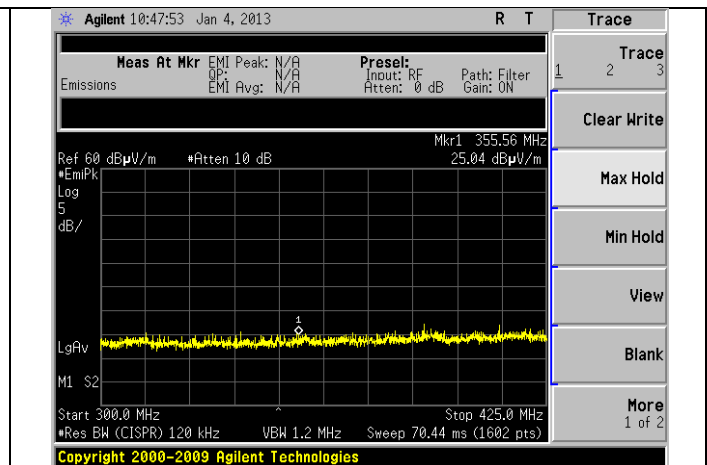
30-300 MHz Horizontal



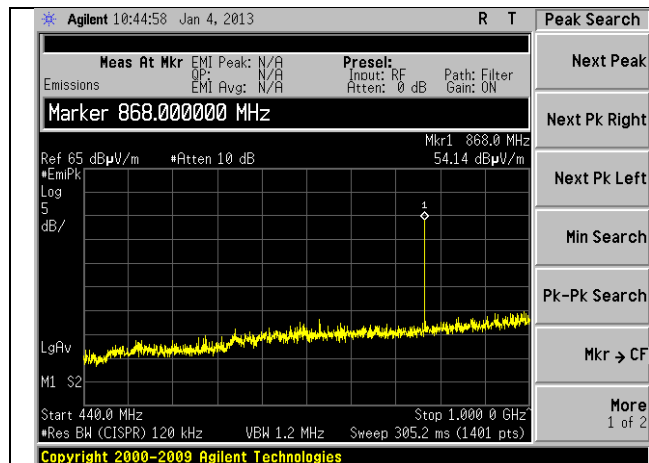
30-300 MHz Vertical



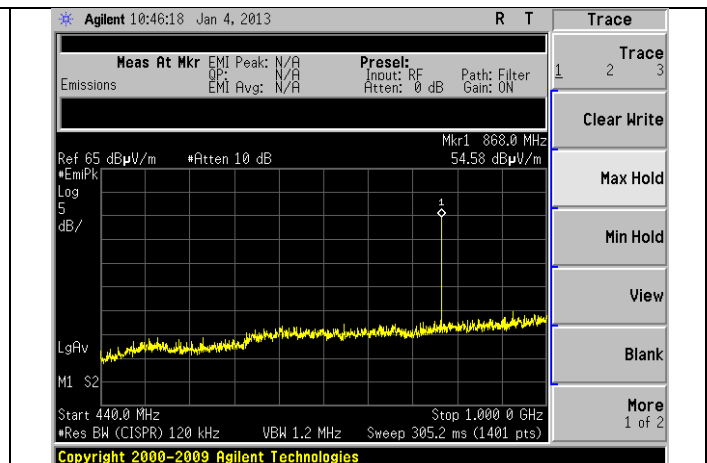
300-425 MHz Horizontal



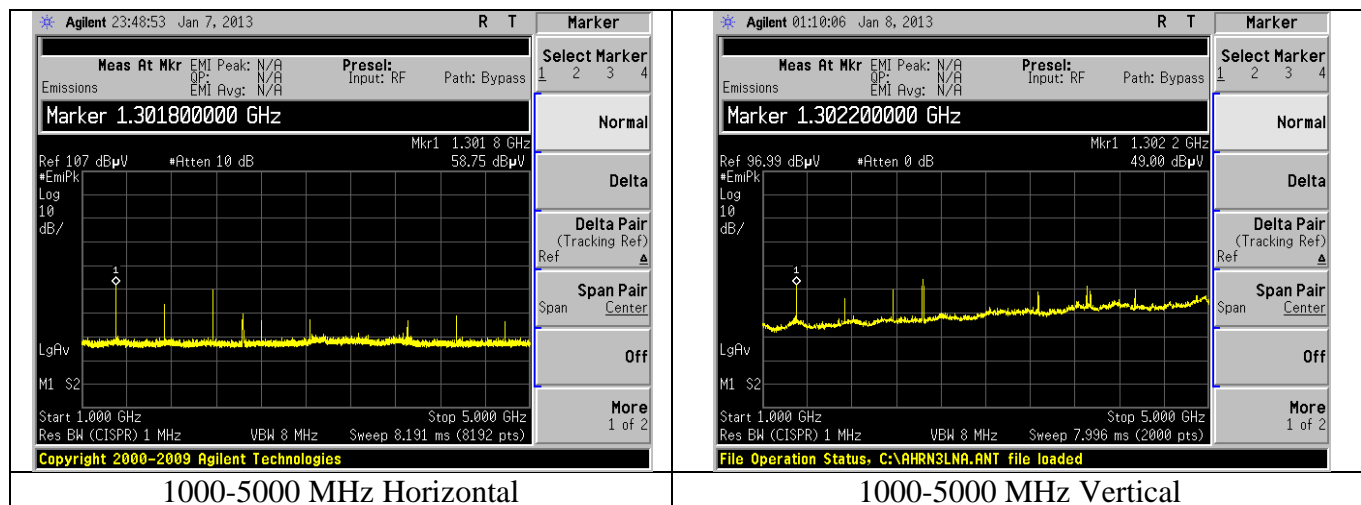
300-425 MHz Vertical



440-1000 MHz Horizontal



440-1000 MHz Vertical



Prepared For: Logic Mark, LLC.

Report: TR 313223 FCCICTX

LSR: C-1789

Name: Caretaker Sentry Pendant

Model: 40915

Serial: 12410051

B.2 – Requirements for Periodic Operations

Manufacturer	Logicmark
Date	09-25-13
Operator	Adam A
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	15.231 / 15.205 / RSS-210 A1
Measurement Procedure	ANSI C63.4 - 2003
Test Distance	N/A
EUT Placement	N/A
Detectors	See below
Additional Notes	1) Normal mode of operation used.

FCC Rule Part	FCC Rule Part Description	Manufacturer Response
15.231 (a) (1)	A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.	Yes, packet are repeated three times and will not transmit until button is pushed again
15.231 (a) (2)	A transmitter activated automatically shall cease transmission within 5 seconds after activation.	yes, once every 13 hours < 100 mS
15.231 (a) (3)	Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.	Sends check in packets once every 13 hours
15.231 (a) (4)	Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition	yes
15.231 (a) (5)	Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.	Not a security system..

Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Pendant

Report: TR 313223 FCCICTX

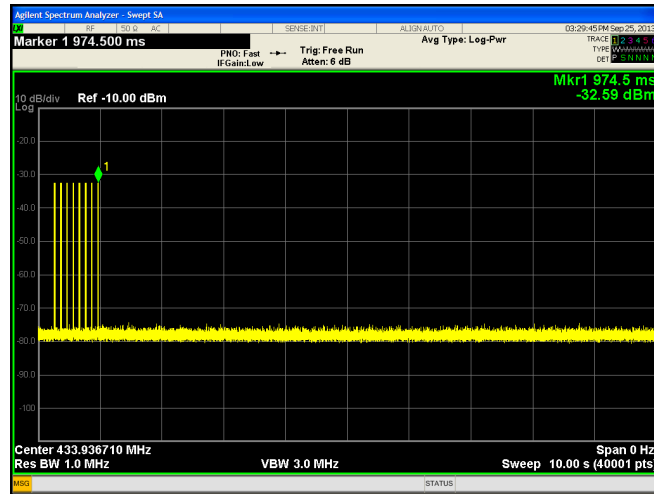
Model: 40915

LSR: C-1789

Serial: 12410051

FCC Part 15.231 (a) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

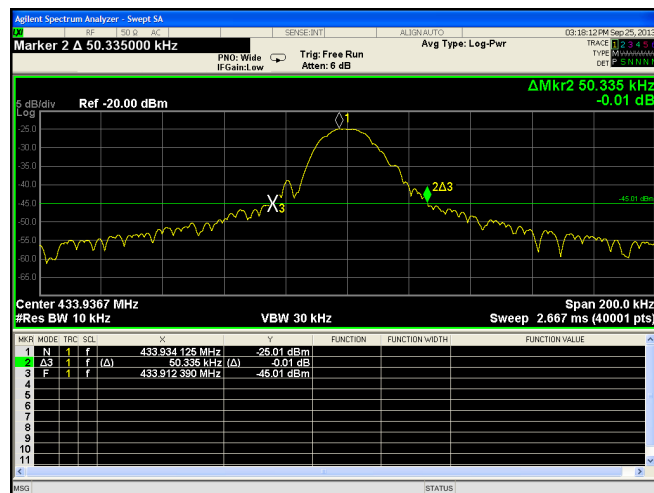
Manufacturer declares manual operation compliant with rule part. Measurement also shows compliance to requirement:



FCC Part 15.231 (c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

For device operating at 433.9 MHz the 20 dB bandwidth of 50.33 kHz meets the maximum requirement of 1.08 MHz.

ANSI C63.4-2003 Annex H.6 Minimum instrument bandwidth of 10 kHz used for measurement.



Prepared For: Logic Mark, LLC.

Report: TR 313223 FCCICTX

LSR: C-1789

Name: Caretaker Sentry Pendant

Model: 40915

Serial: 12410051

B.3 – AC Mains Conducted Emissions

Test Setup

The test area and setup are in accordance with ANSI C63.4-2003 and with Title 47 CFR, FCC Part 15, Industry Canada RSS-210 and RSS GEN. The EUT was placed on a non-conductive wooden table, with a height of 80 cm above the reference ground plane. The EUT's power cable was plugged into a Line Impedance Stabilization Network (LISN). The AC power supply of 120V was provided via an appropriate broadband EMI Filter, and then to the LISN line input. Final readings were then taken and recorded. After the EUT was setup and connected to the LISN, the RF Sampling Port of the LISN was connected to a 10 dB Attenuator-Limiter, and then to the EMI Receiver. The LISN used has the ability to terminate the unused port with a 50 Ω (ohm) load when switched to either L1 (line) or L2 (neutral).

Test Procedure

The EUT was investigated in continuous modulated transmit mode for this portion of the testing. The appropriate frequency range and bandwidths were selected on the EMI Receiver, and measurements were made. The bandwidth used for these measurements was as specified for Quasi-Peak and Average detectors in the frequency range of 150 kHz to 30 MHz. Final readings were then taken and recorded.

Limits of Conducted Emissions at the AC Mains Ports

Frequency Range (MHz)	Class B Limits (dBμV)		Measuring Bandwidth
	Quasi-Peak	Average	
0.150 -0.50 *	66-56	56-46	RBW = 9 kHz
0.5 – 5.0	56	46	
5.0 – 30	60	50	
* The limit decreases linearly with the logarithm of the frequency in this range.			

NOT APPLICABLE. EUT BATTERY POWERED ONLY

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Pendant
Report: TR 313223 FCCICTX	Model: 40915
LSR: C-1789	Serial: 12410051

Appendix C - Uncertainty Summary

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of $k=2$.

Table of Expanded Uncertainty Values, (K=2) for Specified Measurements

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 – Meter chamber, Biconical Antenna	4.82 dB
Radiated Emissions	3-Meter Chamber, Log Periodic Antenna	4.88 dB
Radiated Emissions	3-Meter Chamber, Horn Antenna	4.85 dB
Radiated Emissions	10-Meter OATS, Biconical Antenna	4.32 dB
Radiated Emissions	10-Meter OATS, Log Periodic Antenna	3.63 dB
Absolute Conducted Emissions	Agilent PSA/ESA Series	1.38 dB
AC Line Conducted Emissions	Shielded Room/EMCO LISN	3.20 dB
Radiated Immunity	3 Volts/Meter in 3-Meter Chamber	2.05 Volts/Meter
Conducted Immunity	3 Volts level	2.33 V
EFT Burst, Surge, VDI	230 VAC	54.4 V
ESD Immunity	Discharge at 15kV	3200 V
Temperature/Humidity	Thermo-hygrometer	0.64°/ 2.88 %RH

Appendix D - References

Publication	Year	Title
FCC CFR Parts 0-15	2013	Code of Federal Regulations – Telecommunications
ANSI C63.4	2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
RSS-210 Annex 8	2010	Low-power License-exempt Radio communication Devices (All Frequency Bands): Category I Equipment
RSS-GEN Issue 3	2010	General Requirements and Information for the Certification of Radio Apparatus

END OF REPORT

Date	Version	Comments	Person
9-26-13	V0	Initial Draft Release	Adam A
10-09-13	V1	Final Release	Adam A
11-19-13	V1a	Fixed date reference on page 7	Adam A

Prepared For: Logic Mark, LLC.

Report: TR 313223 FCCICTX

LSR: C-1789

Name: Caretaker Sentry Pendant

Model: 40915

Serial: 12410051