



# LSRESEARCH, LLC

Wireless Product Development

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## ENGINEERING TEST REPORT # 315006 A RFX

**LSR Job #: C-2148**

### RF Exposure Compliance of:

Caretaker Sentry 2-way voice pendant

### Test Date(s):

September 11, 12, 13, 16, 17, 27, and October 3, 4, 7 2013

January 14, and February 4-6, 2015

### 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: 3-26-15

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Prepared For: LogicMark, LLC.

Name: Caretaker Sentry 2-way voice pendant

Report: TR 315006 A RFX

Model: 41915

LSR: C-2148

Serial: N/A (engineering sample)

## **Table of Contents**

|      |   |   |
|------|---|---|
| i.   | Title Page .....                            | 1 |
| ii.  | Table of Contents .....                     | 2 |
| iii. | LS Research, LLC.....                       | 3 |
| 1.0  | Conformance Summary .....                   | 4 |
| 2.0  | SAR Test Exclusion Threshold.....           | 4 |
| 3.0  | Equipment Under Test (EUT) Information..... | 5 |
| 3.1  | Product Description .....                   | 5 |
| 3.2  | Additional Information .....                | 5 |
| 4.0  | RF Conducted Measurement Data .....         | 6 |
| 5.0  | SAR Test Exclusion Calculation .....        | 7 |
| 6.0  | Industry Canada Low Power Exemption .....   | 8 |

|                               |  |
|-------------------------------|--|
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## LS Research, LLC in Review

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

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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*

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Federal Communications Commission (FCC) – USA

*Listing of 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948*

*FCC Registration Number: 90756*

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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*

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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*

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## 1.0 Conformance Summary

The EUT was found to MEET the 5mm minimum test separation distance threshold for SAR test exclusion per FCC §2.1091(mobile) and §2.1093(portable) using methods of FCC KDB 447498 D01 General RF Exposure Guidance v05r02 as a standalone device.

## 2.0 SAR Test Exclusion Threshold

SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm

1-g SAR test exclusion threshold equation:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0$$

10-g SAR test exclusion threshold equation:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 7.5$$

|                               |  |
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### 3.0 Equipment Under Test (EUT) Information

*The following information has been supplied by the applicant.*

|                |                                      |
|----------------|--------------------------------------|
| Product Name:  | Caretaker Sentry 2-way voice pendant |
| Model Number:  | 41915                                |
| Serial Number: | N/A (Engineering Sample)             |
| FCC ID         | TYD-CS41915                          |
| IC Number      | 8471A-CS41915                        |

### 3.1 Product Description

EUT uses two integral antennas for diversity with a maximum 1.2 dBi peak gain. EUT fitted with a temporary connection (U.FL) for RF Conducted measurements.

EUT utilizes 5 RF Channels (1921.536-1928.448 MHz) with 6 timeslots for 30 TDMA Duplex Channels

### 3.2 Additional Information

EUT was programmed into continuous transmit via hyper-terminal commands for RF tests. Normal mode of operation achieved with companion device for spectrum etiquette tests.

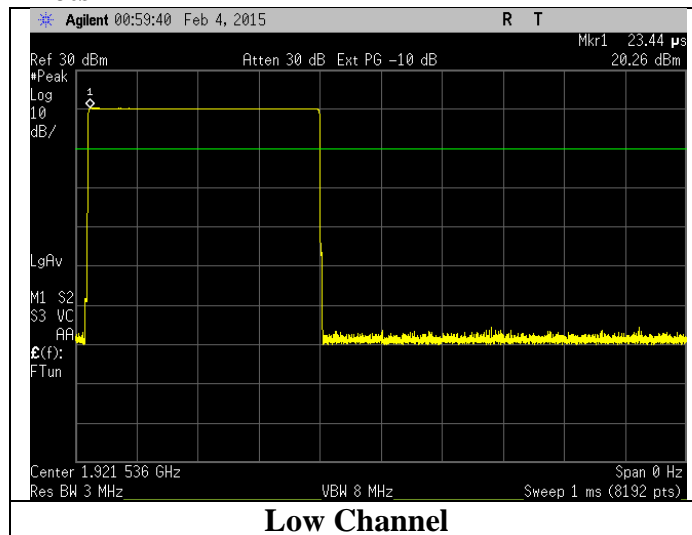
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## 4.0 RF Conducted Measurement Data

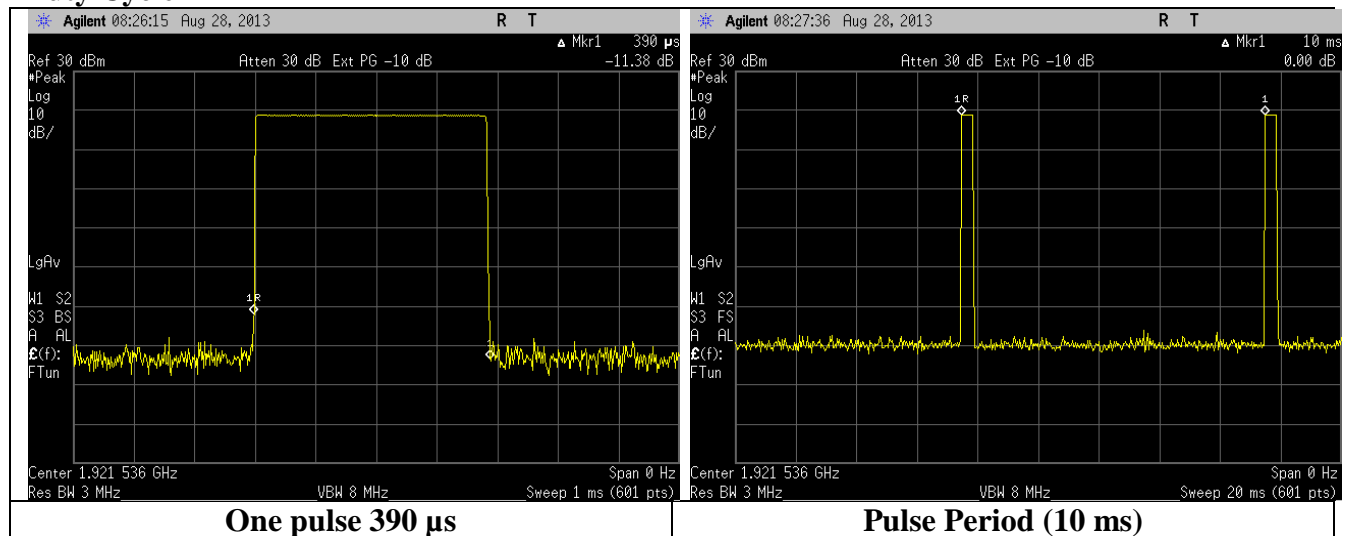
Table

| Frequency (MHz) | Power Antenna (dBm) |
|-----------------|---------------------|
| 1921.536        | 20.26               |
| 1924.992        | 20.19               |
| 1928.448        | 20.14               |

Plots



Duty Cycle



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## 5.0 SAR Test Exclusion Calculation

| Description  | Line # | Data     | Unit  | Additional Description  |
|--|--------|----------|-------|---|
| Transmit Packet on time:                                     | 1      | 0.39     | (ms)  | Worst case  |
| Packet repetition time:                                      | 2      | 10       | (ms)  | Worst case  |
| Duty factor:   | 3      | 0.039    |       | Transmit Packet on time / Packet repetition time (Line # 1/2) |
| Maximum peak output power at antenna input terminal:         | 4      | 20.26    | (dBm) | Measured worst case   |
| Maximum peak power:  | 5      | 106.170  | (mW)  | dBm to mW conversion  |
| Prediction distance:   | 6      | 5        | (mm)  | Minimum test separation distance                              |
| Prediction frequency:  | 7      | 1.921536 | (GHz) | Measured frequency  |
| Square root of frequency (GHz):                              | 8      | 1.386195 |       | Calculation   |
| Duty factor applied to maximum peak radiated power (mW):     | 9      | 4.140613 | (mW)  | duty factor * maximum peak power (Line # 11*3)                |
| Source based power (mW) / min test separation distance (mm): | 10     | 0.828123 |       | Calculation (Line # 5/6)                                      |
| SAR exclusion calculation:                                   | 11     | 1.15     |       | Calculation (Line # 10*8)                                     |
| Threshold:   | 12     | 3        |       |   |
| Margin:  | 13     | 1.85     |       | Calculation (Line # 12-11)                                    |

|                               |  |
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## 6.0 Industry Canada Low Power Exemption

RSS 102 Issue 5, Section 2.5 states that all transmitters that meet the output power requirements as stated in section 2.5.1 and 2.5.2 of RSS 102 are exempt from routine SAR and RF exposure evaluation.

### Output Power Evaluation.

Evaluation Frequency = 1921.536 MHz

Device Operation separation distance:  $\leq 20\text{cm}$

Maximum Effective Isotropic Radiated Power (dBm) = 20.26 dBm + 1.2 dBi = 21.46 dBm

Maximum Effective Isotropic Radiated Power (mW) =  $\log^{-1}(\text{EIRP (dBm)}/10)$  = 139.9587 mW

Duty cycle (source-based, time-averaged) =  $390\mu\text{s}/10\text{ms}$  = 0.039 \* 139.9587 mW = 5.4584 mW

Section 2.5.1 general public use limit at for devices operating less than 20cm:

**Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance<sup>4,5</sup>**

| Frequency (MHz) | Exemption Limits (mW)                 |                                 |                                 |                                 |                                 |
|-----------------|---------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                 | At separation distance of $\leq 5$ mm | At separation distance of 10 mm | At separation distance of 15 mm | At separation distance of 20 mm | At separation distance of 25 mm |
| $\leq 300$      | 71 mW                                 | 101 mW                          | 132 mW                          | 162 mW                          | 193 mW                          |
| 450             | 52 mW                                 | 70 mW                           | 88 mW                           | 106 mW                          | 123 mW                          |
| 835             | 17 mW                                 | 30 mW                           | 42 mW                           | 55 mW                           | 67 mW                           |
| 1900            | 7 mW                                  | 10 mW                           | 18 mW                           | 34 mW                           | 60 mW                           |
| 2450            | 4 mW                                  | 7 mW                            | 15 mW                           | 30 mW                           | 52 mW                           |
| 3500            | 2 mW                                  | 6 mW                            | 16 mW                           | 32 mW                           | 55 mW                           |
| 5800            | 1 mW                                  | 6 mW                            | 15 mW                           | 27 mW                           | 41 mW                           |

Linear interpolation to obtain exemption limit at 1921.536 MHz = 6.8825 mW (at separation distance of  $\leq 5$  mm)

Conclusion:

Since the maximum effective radiated power (ERP) is less than the applicable section limit, the product is exempt from SAR/RF Evaluation.



## END OF REPORT

| Date    | Version | Comments | Person |
|---------|---------|----------|--------|
| 3-26-15 | V0      | Final    | Adam A |
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