



LS RESEARCH 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 # 313224 LSR Job #: C-1790

Compliance Testing of:

Caretaker Sentry Base Unit

Test Date(s):

August 28, September 5, 10, 11, 17, 27, October 3, 4, 7, December 30, 2013 and January 8, 2014

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: 01-08-14

Test Report Reviewed by:

Shane Rismeyer, EMC Engineer

Signature: Date: 10-24-13

Report by:

Adam Alger, EMC Engineer

Signature: Date: 10-16-13

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

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

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	5
3.0	Client Information	6
3.1	Equipment Under Test (EUT) Information	6
3.2	Product Description	6
3.3	Modifications Incorporated In the EUT for Compliance Purposes	6
3.4	Deviations & Exclusions from Test Specifications	6
3.5	Additional Information	6
4.0	Conditions of Test	7
5.0	Test Equipment	7
6.0	Conformance Summary	7
	Appendix A – Test Equipment	8
	Appendix B – Test Data	9
B.1	– RF Conducted Emissions	9
B.2	– Spectrum Etiquette	26
B.3	– Radiated Emissions (Receiver and Digital Device)	39
B.4	– AC Mains Conducted Emissions	44
	Appendix C - Uncertainty Summary	47
	Appendix D - References	48

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

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



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 Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

1.0 Summary of Test Report

In August, September, October, December 2013 and January, 2014 the EUT known as Caretaker Sentry Base unit was tested and MEETS the following requirements:

RF Related Measurements

FCC Rule Part	IC RSS-213 Section	ANSI C63.17 Section	Test Requirements	Compliance
15.323(a)	6.4	6.1.3	Emission Bandwidth	Yes
15.319(c)	6.5	6.1.2	Peak Transmit Power	Yes
15.319(d)	6.6	6.1.5	Power Spectral Density	Yes
15.323(d)	6.7.2	6.1.6	Transmitter Emissions Inside the band	Yes
15.323(d)	6.7.1	6.1.6	Transmitter Emissions Outside the band	Yes
15.323(e)	4.3.4 (c)	6.2.2/6.2.3	Frame period stability	Yes
15.323(f)	6.2	6.2.1.1/6.2.1.2 / 6.2.1.3	Carrier Frequency Stability	Yes
15.315 15.207	6.3	ANSI C63.4-2003	AC Conducted Emissions	Yes
15.317 / 15.203	RSS-GEN 7.1.2	N/A	Antenna Requirement	² Yes
15.319(e)	4.1(e)	4.3.1	Antenna Gain	² Yes
15.319(i)	RSS-102	N/A	RF Exposure Compliance	¹ Yes
15.109	6.8	ANSI C63.4-2003	Receiver and digital device emissions	Yes

¹Separate exhibit

²Manufacturer declares maximum integral antenna with 3.0 dBi max peak gain

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

Spectrum Etiquette Criteria

FCC Rule Part	IC RSS-213 Section	ANSI C63.17 Section	Test Requirements	Compliance
15.307	N/A	N/A	Coordination with fixed microwave service	² Yes
15.319(b)	6.1	6.1.4	Digital Modulation Techniques	Yes
15.319(f)	4.3.4(a)	N/A	Operational Failure	Yes
15.323(c)(1)	4.3.4(b)(1)	7.3.4	Monitoring Time and Maximum Transmit Period	Yes
15.323(c)(2)	4.3.4(b)(2)	7.3.1	Monitoring Threshold	Yes
15.323(c)(3)	4.3.4(b)(3)	8.2.2	Maximum Transmit Period	Yes
15.323(c)(4)	4.3.4(b)(4)	8.1 / 8.2	System Acknowledgement	Yes
15.323(c)(5)	4.3.4(b)(5)	7.3.2/7.3.3/ 7.3.4	Least Interfered Channel	Yes
15.323(c)(6)	4.3.4(b)(6)	8.1.3	Random Waiting	Yes
15.323(c)(7)	4.3.4(b)(7)	7.4/7.5	Monitoring System Bandwidth	Yes
15.323(c)(8)	4.3.4(b)(8)	Clause 4	Monitoring Antenna	Yes
15.323(c)(9)	4.3.4(b)(9)	Clause 4	Monitoring Threshold Relaxation	Yes
15.323(c)(10)	4.3.4(b)(10)	8.3	Duplex Connection	¹ Yes
15.323(c)(11)	4.3.4(b)(11)	8.4	Alternative Monitoring Interval for Co-located Device	¹ Yes
15.323(c)(12)	4.3.4(b)(12)	N/A	Spectrum Fair Access	Yes
N/A	5	N/A	Security Code Information	¹ N/A

¹Manufacturer declares device does not utilize.

²Separate exhibit

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 Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

3.0 Client Information

Manufacturer Name:	LogicMark, 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 Base Unit
Model Number:	40914
Serial Number:	N/A (Engineering Sample)
FCC ID	TYD-CS40914
IC Number	8471A-CS40914

3.2 Product Description

EUT uses two integral antennas for diversity with a maximum 3.0 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

3.3 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

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.

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

4.0 Conditions of Test

Environmental:

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

Mains Voltage: 120VAC 60Hz

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 Subpart D, 15.109, and Industry Canada RSS-213, Issue 2 (2005), RSS-GEN Issue 3 (2010).

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 Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

Appendix A – Test Equipment



Date : 26-Aug-2013

Type Test : All

Job # : C-1790

Prepared By: Adam A.

Customer: LogicMark

Quote #: 313224

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	CC 000213C	Signal Generator	HP	E4432B	US38220562	11/17/2012	11/17/2013	Active Calibration
2	EE 960016	2.4 GHz Signal Generator	Marconi	2024	112120/044	3/13/2013	3/13/2014	Active Calibration
3	EE 960013	EMI Receiver	HP	8546A System	3617A00320:3448A	2/11/2013	2/11/2014	Active Calibration
4	EE 960014	EMI Receiver-filter section	HP	85460A	3448A00296	2/11/2013	2/11/2014	Active Calibration
5	EE 960084	LISN - 15A	COM-POWERT	LI-215A	191920	2/6/2013	2/6/2014	Active Calibration
6	AA 960072	Transient Limiter	HP	11947A	3107A02515	2/15/2013	2/15/2014	Active Calibration
7	EE 960085	N9038A MXE 26.5GHz Receiver	Agilent	N9038A	MY5121048	8/7/2013	8/7/2014	Active Calibration
8	EE 960156	100kHz-1GHz Analog Signal Generator	Agilent	N5181A	MY49060062	9/5/2013	9/5/2014	Active Calibration
9	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	9/5/2013	9/5/2014	Active Calibration
10	EE 960158	RF Preselector	Agilent	N9039A	MY46520110	9/5/2013	9/5/2014	Active Calibration
11	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	6/10/2013	6/10/2014	Active Calibration
12	AA 960150	Bicon Antenna	ETS	3100B	0003-3346	12/12/2012	12/12/2013	Active Calibration
13	AA 960078	Log Periodic Antenna	EMCO	93146	9701-4855	12/10/2012	12/10/2013	Active Calibration
14	EE 960146	Std. Gain Horn Ant. w/preamp	Adv. Micro / EMC	WLA622-4 / 3160-09	123001	9/24/2013	9/24/2014	Active Calibration
15	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6907	1/29/2013	1/29/2014	Active Calibration
16	EE 960147	Pre-Amp	Adv. Micro	WLA612	123101	2/1/2013	2/1/2014	Active Calibration
17	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	5/28/2013	5/28/2014	Active Calibration

Project Engineer: Adam A.

Quality Assurance: John A.

Asset # EE 960073 used for tests dated 12-30-13 and 01-08-14

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

Appendix B – Test Data

B.1 – RF Conducted Emissions

Manufacturer	Logic Mark, LLC.
Test Location	LS Research, LLC
Rule Part	FCC Subpart D / RSS-213
General Measurement Procedure	ANSI C63.17-2006
General Description of Measurement using Spectrum Analyzer	A direct measurement of the transmitted signal was performed at the antenna port of the EUT via a cable connection to a spectrum analyzer. An attenuator was placed in series with the cable to protect the spectrum analyzer. The loss from the cable and the attenuator were added on the analyzer as gain offset settings thereby allowing direct measurements, without the need for any further corrections. The EUT was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source.
General Description of Measurement using R&S CMD60	A direct measurement of the transmitted signal was performed at the antenna port of the EUT via a cable connection to the R&S CMD60. The Radio communication tester has the ability to connect to the EUT and measure parameters specific to the digital modulation scheme.

Prepared For: Logic Mark, LLC.

Report: TR 313224 FCCIC TX

LSR: C-1790

Name: Caretaker Sentry Base Unit

Model: 40914

Serial: (N/A) Engineering Sample

B.1.1 – RF Conducted – Fundamental Bandwidth

Manufacturer	Logic Mark, LLC.
Date	9-17-2013
Operator	Adam A
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC Subpart D 15.323(a) / RSS-213 Section 6.4
Specific Measurement Procedure	ANSI C63.17-2006 Section 6.1.3
Additional Description of Measurement	RBW Approximately 1% of emission bandwidth with peak detection on max hold
Additional Notes	<ol style="list-style-type: none"> 1) 26 dB bandwidth between 50 kHz and 2.5 MHz 2) Continuous transmit modulated used for this test.

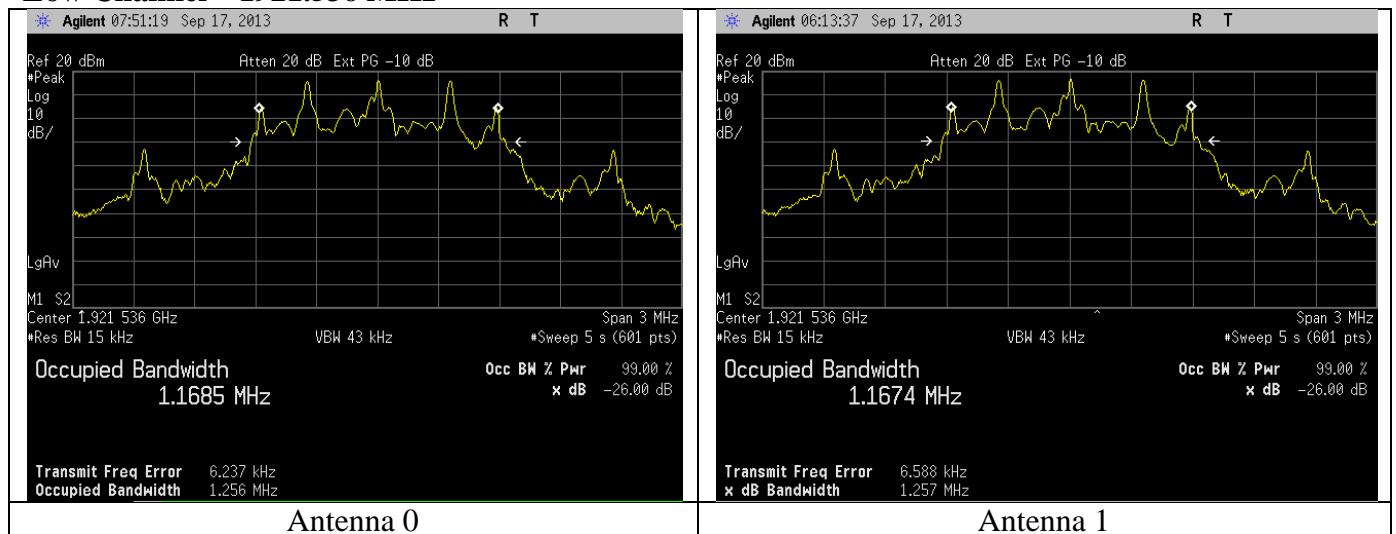
Table

Frequency (MHz)	Antenna 0 26 dB BW (MHz)	Antenna 0 99% BW (MHz)	Antenna 1 26 dB BW (MHz)	Antenna 1 99% BW (MHz)
1921.536	1.256	1.168	1.257	1.167
1924.992	1.256	1.169	1.256	1.168
1928.448	1.252	1.164	1.254	1.167

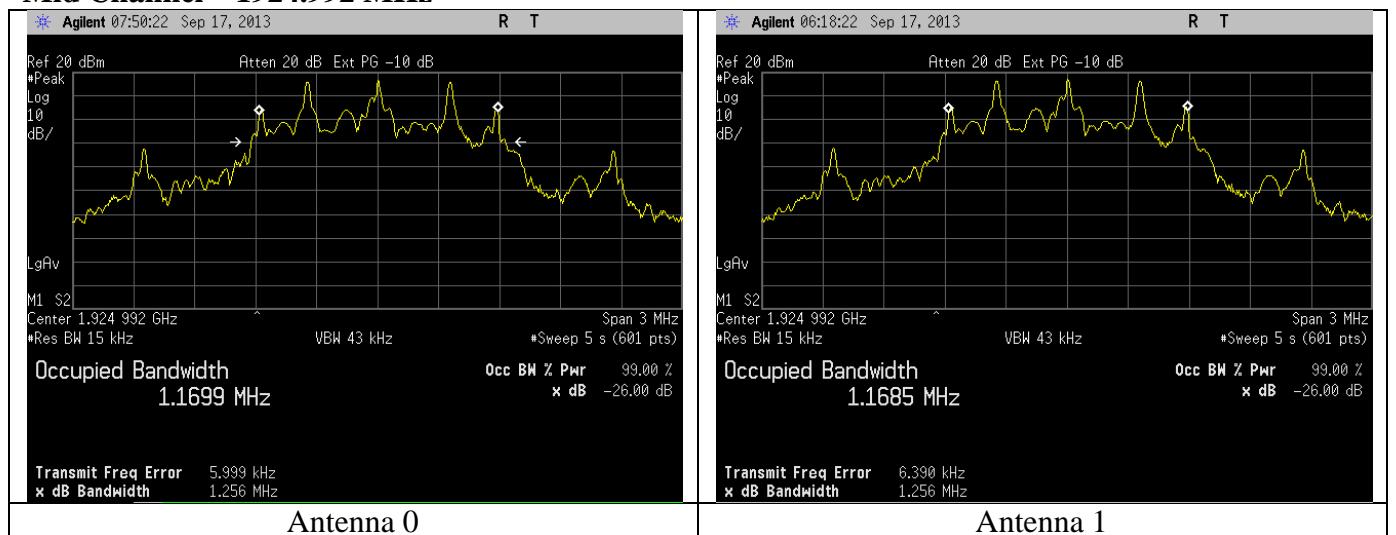
Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

Plots

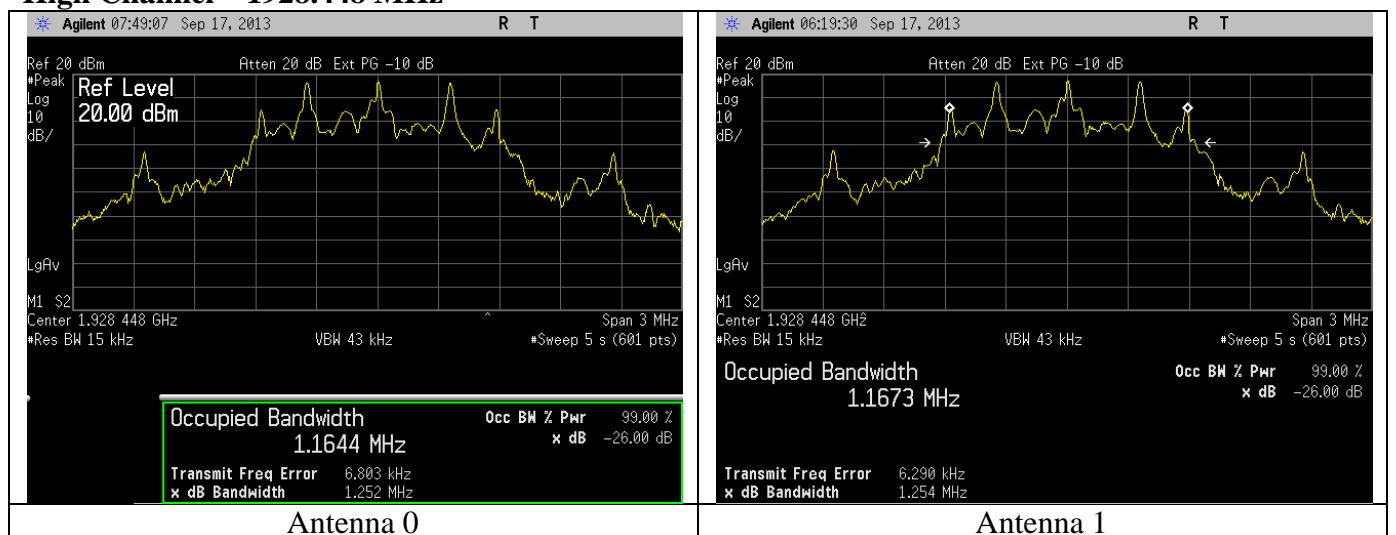
Low Channel – 1921.536 MHz



Mid Channel – 1924.992 MHz



High Channel – 1928.448 MHz



Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

Report: TR 313224 FCCIC TX

Model: 40914

LSR: C-1790

Serial: (N/A) Engineering Sample

B.1.2 – RF Conducted – Fundamental Power and Spectral Density

Manufacturer	Logic Mark, LLC.
Date	12-30-13 and 01-08-14
Operator	Adam A
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC Subpart D 15.319(c) and (d) / RSS-213 Section 6.5 and 6.6
Specific Measurement Procedure	ANSI C63.17-2006 Section 6.1.2 and 6.1.5
Additional Description of Measurement	Power: RBW > Emission Bandwidth PSD: RBW = 3 kHz
Additional Notes	Continuous transmit modulated used for this test. Sample Calculations: Peak transmit power limit = $100 \mu\text{W} * \sqrt{26 \text{ dB BW (Hz)}}$ PSD Limit = 3 mW in 3 kHz BW = 4.77 dBm / 3 kHz BW Margin (dB) = Limit – Measured level

Tables

Antenna 0

Frequency (MHz)	Antenna 0 26 dB BW (MHz)	Power (dBm)	Power Limit (dBm)	Margin (dB)	PSD (dBm/3kHz)	PSD Limit (dBm/3 kHz)	Margin (dB)
1921.536	1.256	18.74	20.5	1.76	0.28	4.77	4.49
1924.992	1.256	18.99	20.5	1.51	1.34	4.77	3.43
1928.448	1.252	19.23	20.5	1.27	1.23	4.77	3.54

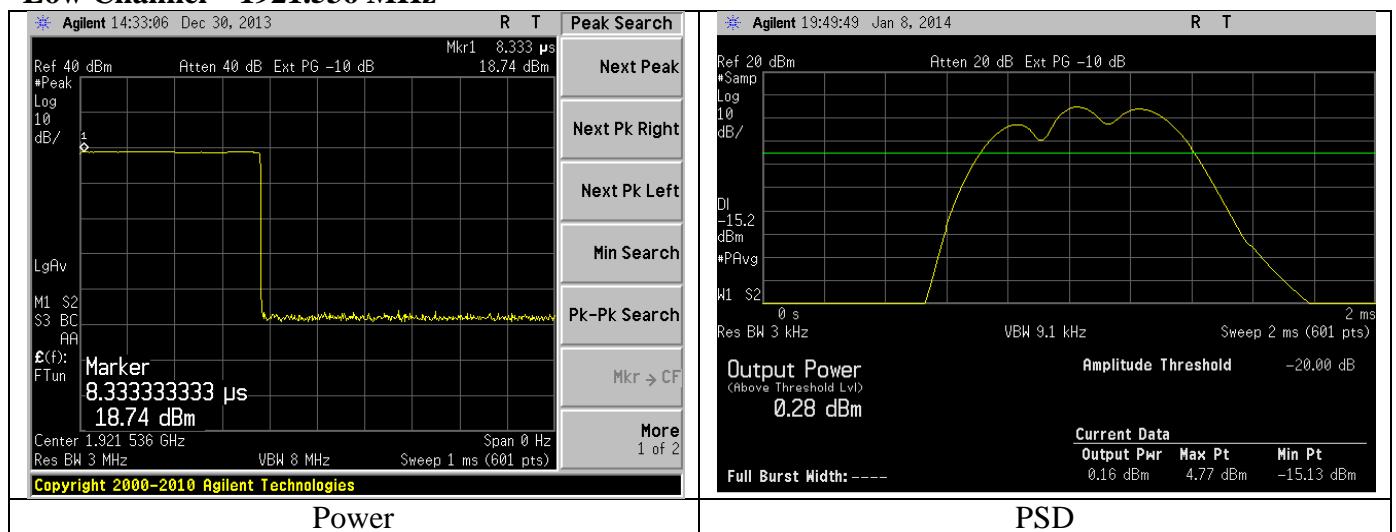
Antenna 1

Frequency (MHz)	Antenna 1 26 dB BW (MHz)	Power (dBm)	Power Limit (dBm)	Margin (dB)	PSD (dBm/3kHz)	PSD Limit (dBm/3 kHz)	Margin (dB)
1921.536	1.257	18.94	20.5	1.56	0.52	4.77	4.25
1924.992	1.256	19.18	20.5	1.32	1.64	4.77	3.13
1928.448	1.254	19.45	20.5	1.05	1.47	4.77	3.30

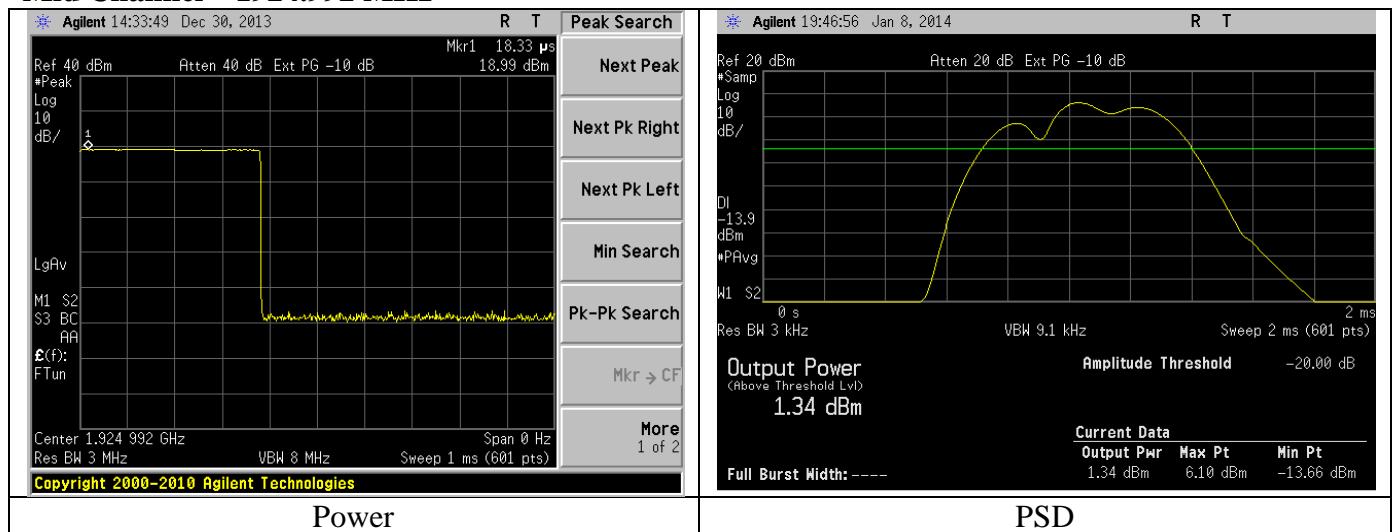
Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

Plots (Antenna 0)

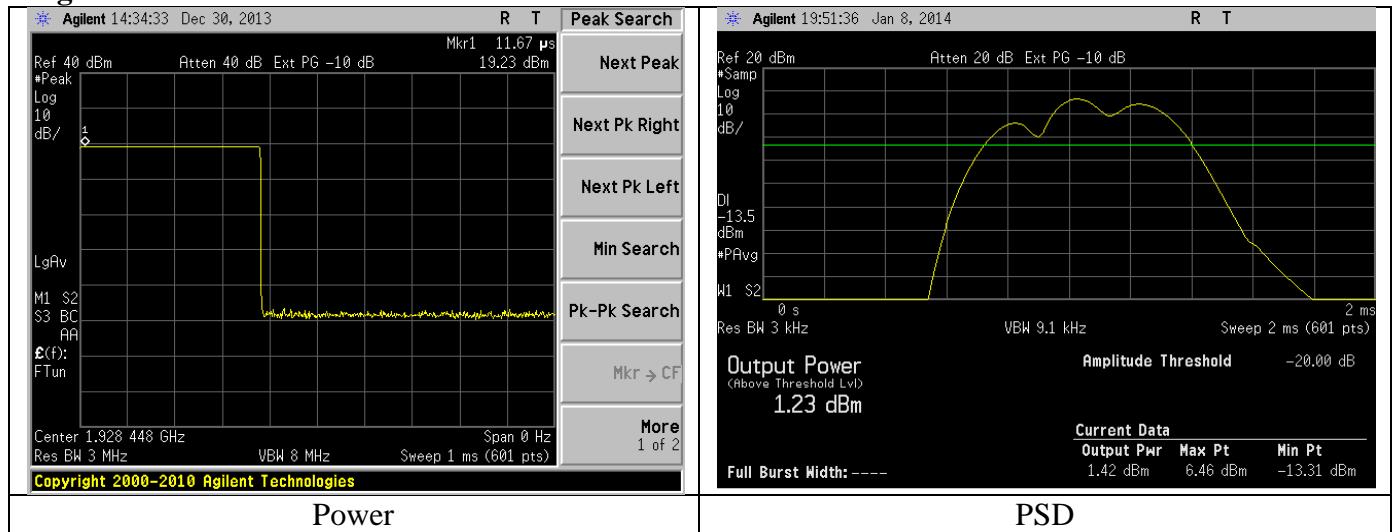
Low Channel – 1921.536 MHz



Mid Channel – 1924.992 MHz



High Channel – 1928.448 MHz



Prepared For: Logic Mark, LLC.

Report: TR 313224 FCCIC TX

LSR: C-1790

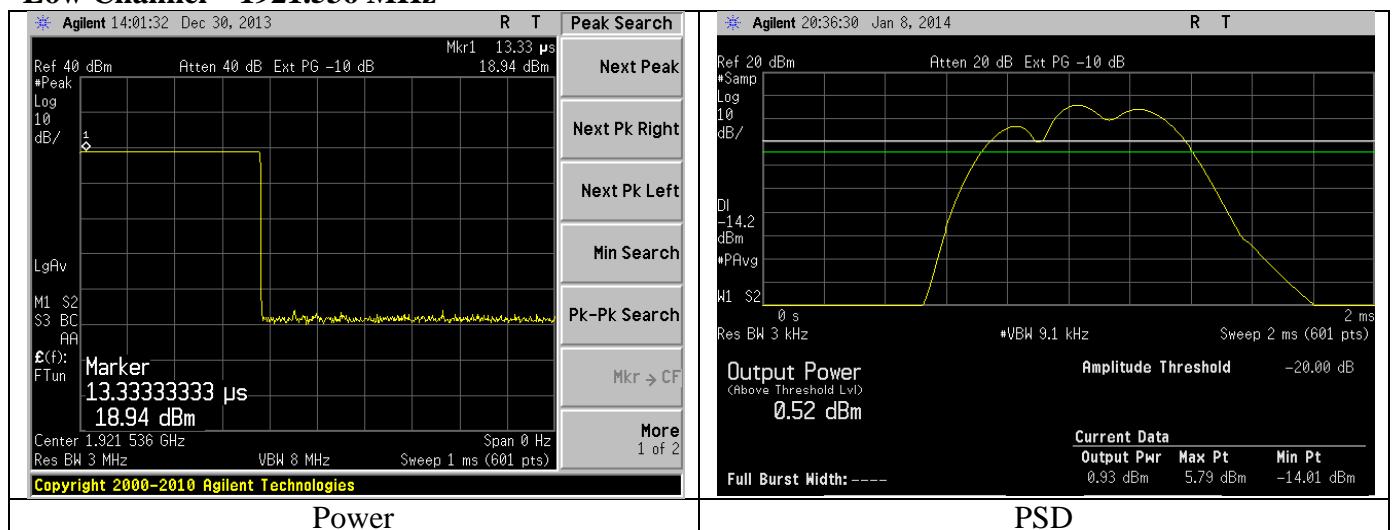
Name: Caretaker Sentry Base Unit

Model: 40914

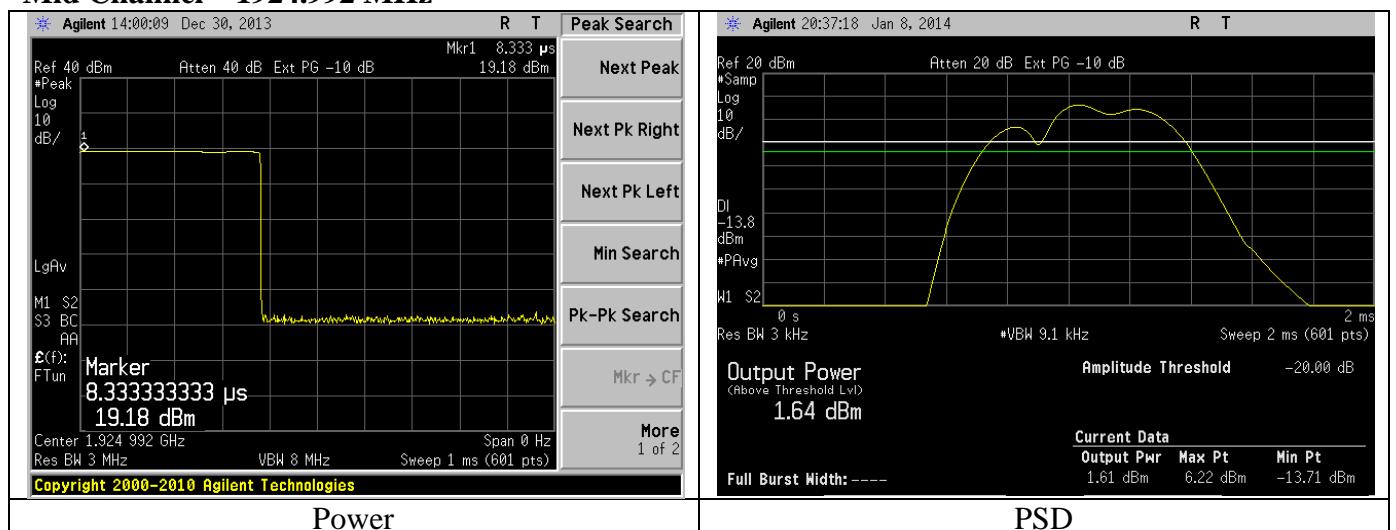
Serial: (N/A) Engineering Sample

Plots (Antenna 1)

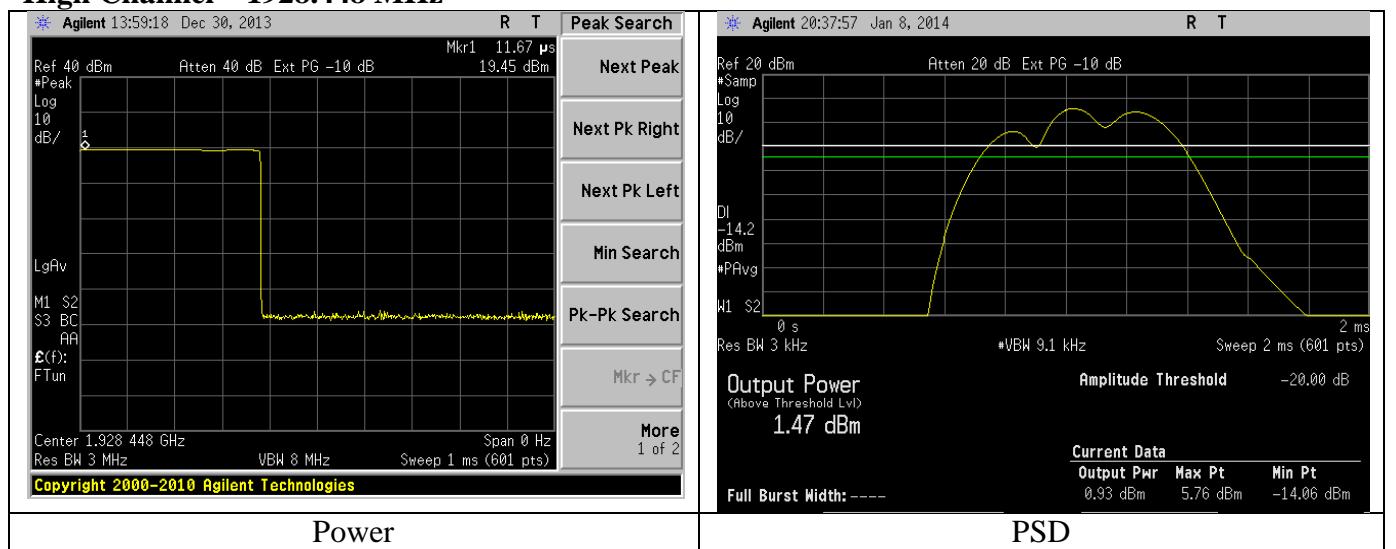
Low Channel – 1921.536 MHz



Mid Channel – 1924.992 MHz



High Channel – 1928.448 MHz



Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

Report: TR 313224 FCCIC TX

Model: 40914

LSR: C-1790

Serial: (N/A) Engineering Sample

B.1.3 – RF Conducted – Emissions inside the band

Manufacturer	LogicMark, LLC.
Date	01-08-14
Operator	Adam A
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC Subpart D 15.323(d) / RSS-213 Section 6.7.2
Specific Measurement Procedure	ANSI C63.17-2006 Section 6.1.6
Additional Description of Measurement	RBW Approximately 1% of emission bandwidth (15 kHz used)
Additional Notes	Continuous transmit modulated used for this test.

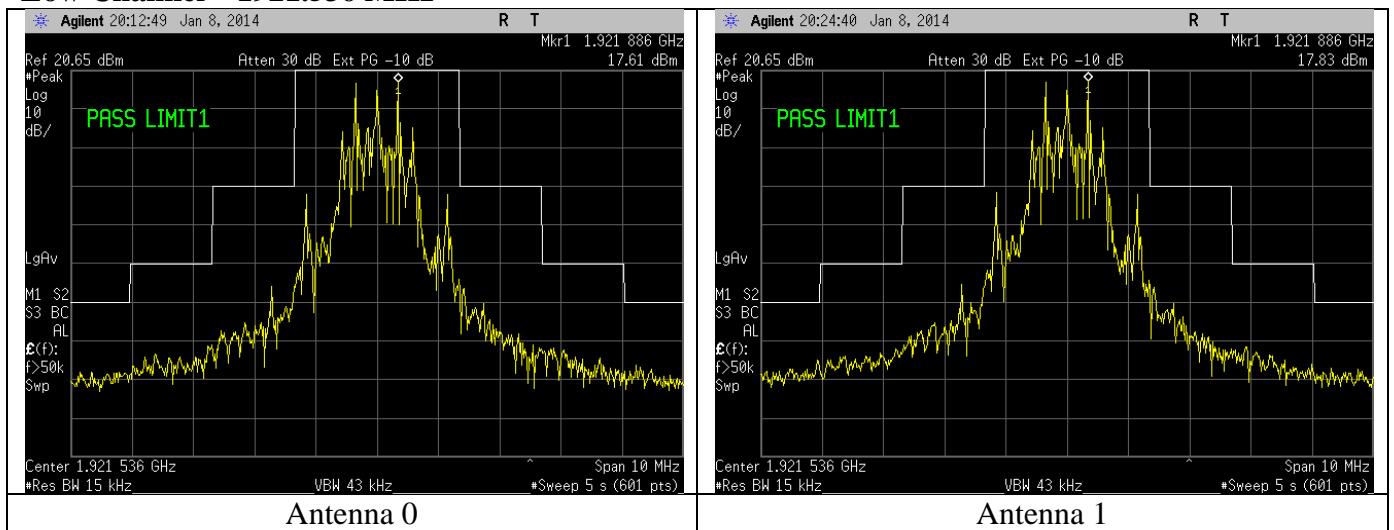
The resolution bandwidth used is approximately 1% of the emissions bandwidth (B).

$B = 1.26 \text{ MHz} * .01 = 12.6 \text{ kHz}$ however 15 kHz used because of spectrum analyzer limitations and a greater RBW will yield a worst case result.

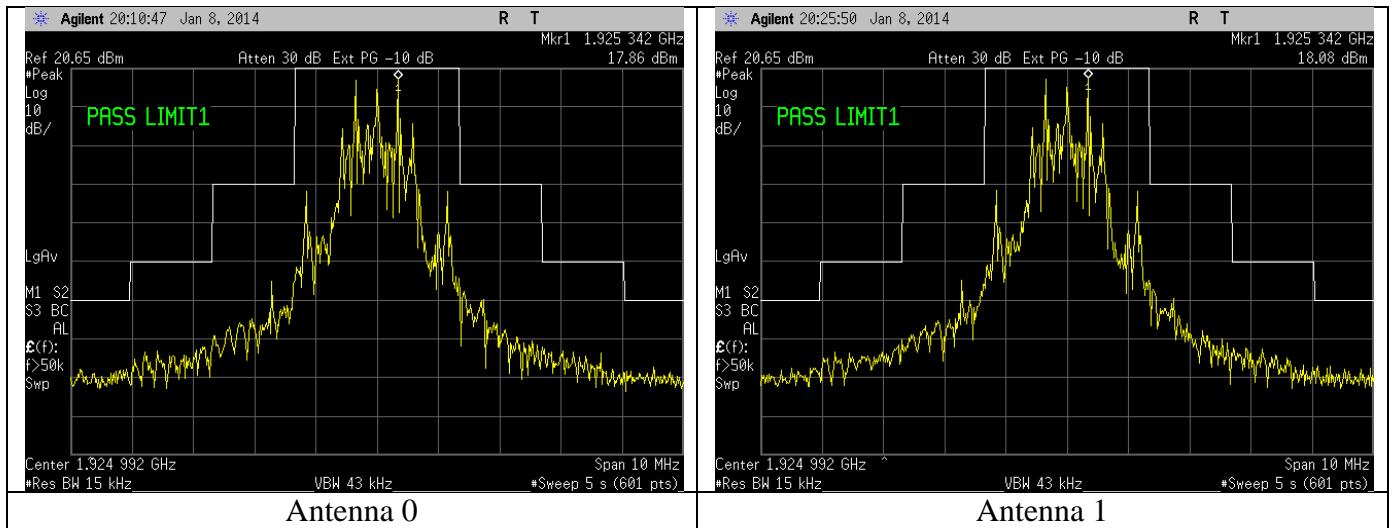
Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

Plots

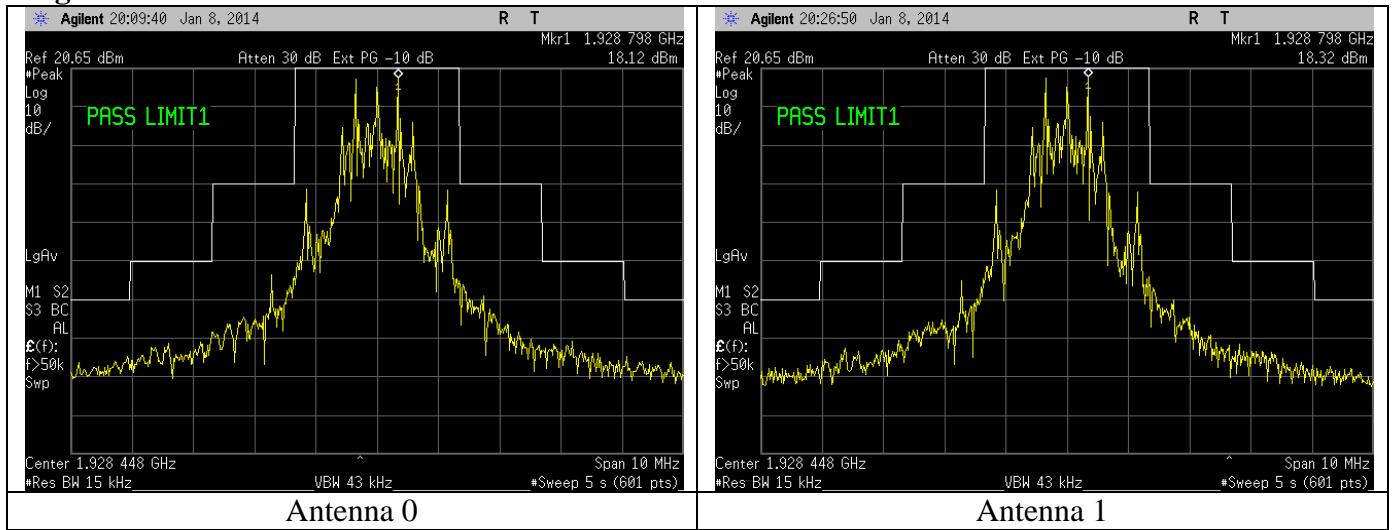
Low Channel – 1921.536 MHz



Mid Channel – 1924.992 MHz



High Channel – 1928.448 MHz



Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

Report: TR 313224 FCCIC TX

Model: 40914

LSR: C-1790

Serial: (N/A) Engineering Sample

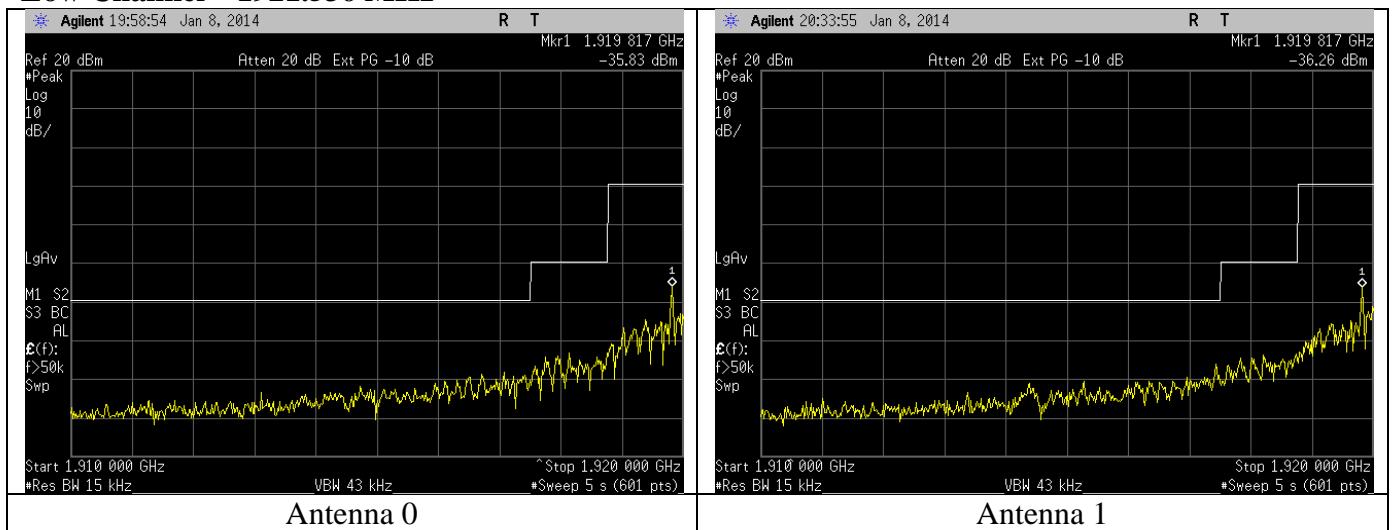
B.1.4 – RF Conducted – Emissions outside the band

Manufacturer	LogicMark, LLC.
Date	12-30-2013 and 01-08-14
Operator	Adam A
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC Subpart D 15.323(d) / RSS-213 Section 6.7.1
Specific Measurement Procedure	ANSI C63.17-2006 Section 6.1.6
Additional Description of Measurement	RBW Approximately 1% of emission bandwidth (15 kHz used)
Additional Notes	Continuous transmit modulated used for this test. Per ANSI C63.17-2006 Section 6.1.6.2 (c) emissions meet and exceed -39.5 dBm limit as RF Conducted test. Radiated test not required. All other emissions measured greater than 20 dB below limit. Worst case reported.

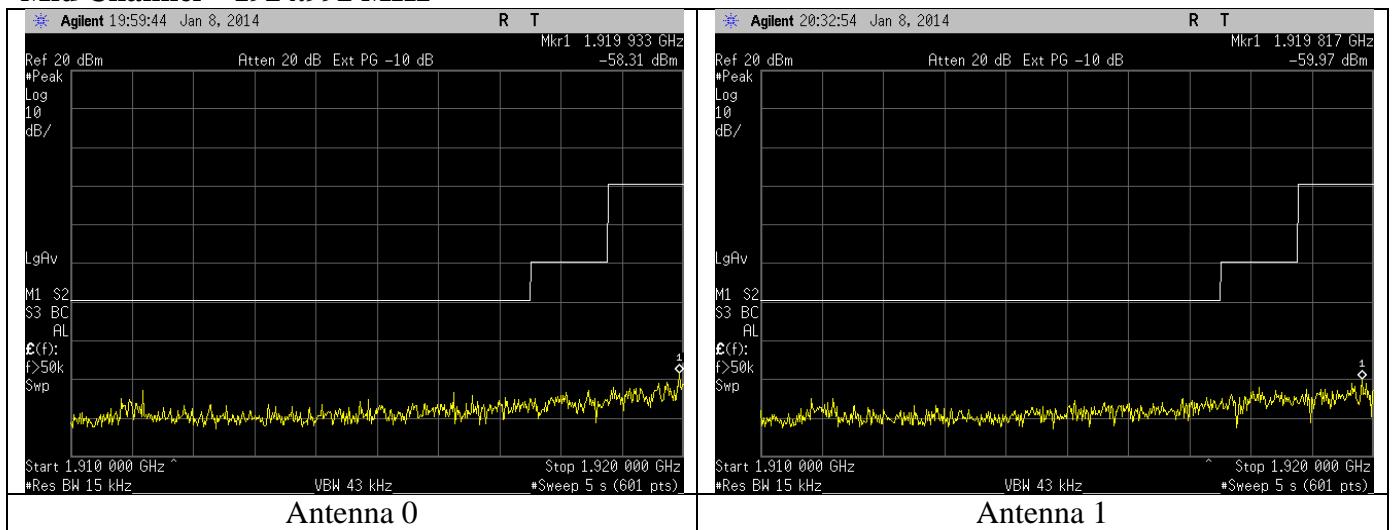
(Plots start next page)

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

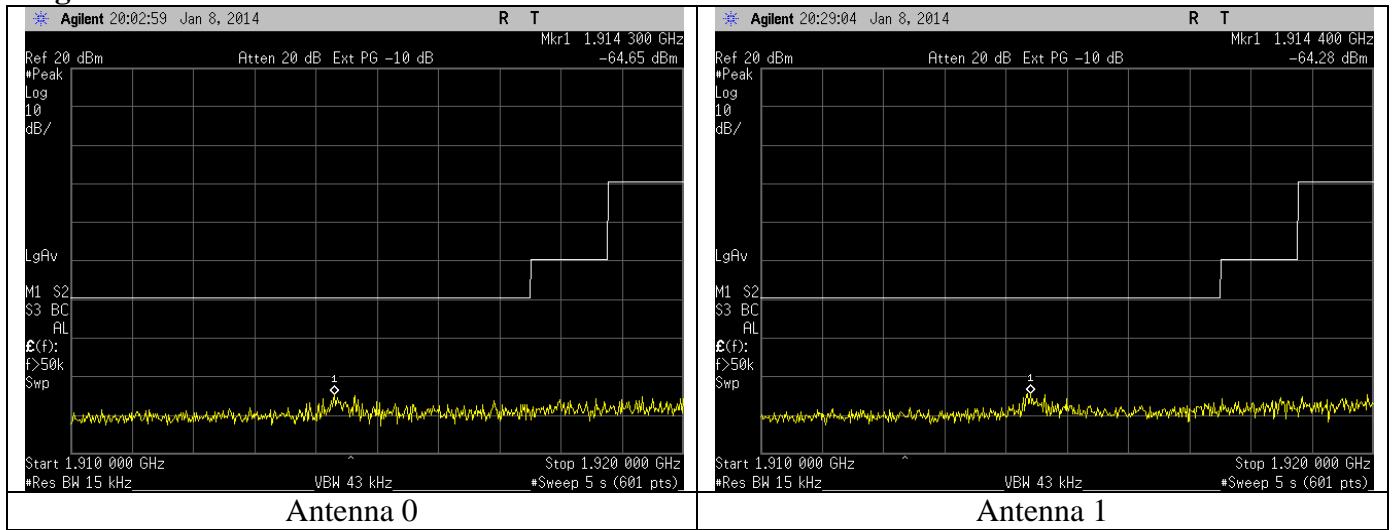
**Plots (Lower Band-edge)
Low Channel – 1921.536 MHz**



Mid Channel – 1924.992 MHz



High Channel – 1928.448 MHz



Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

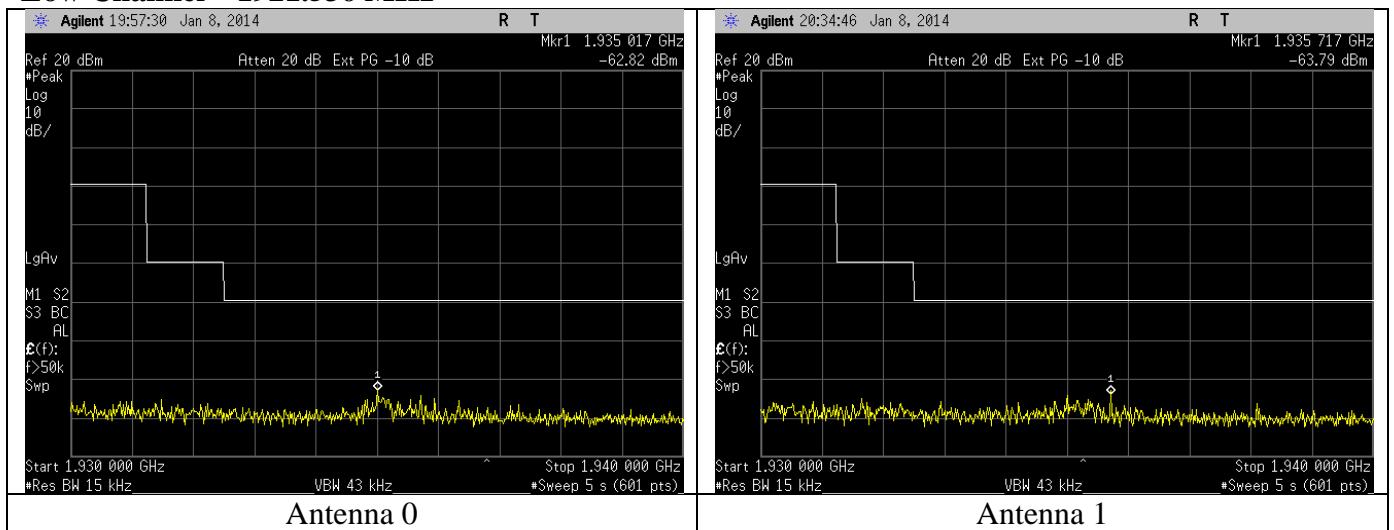
Report: TR 313224 FCCIC TX

Model: 40914

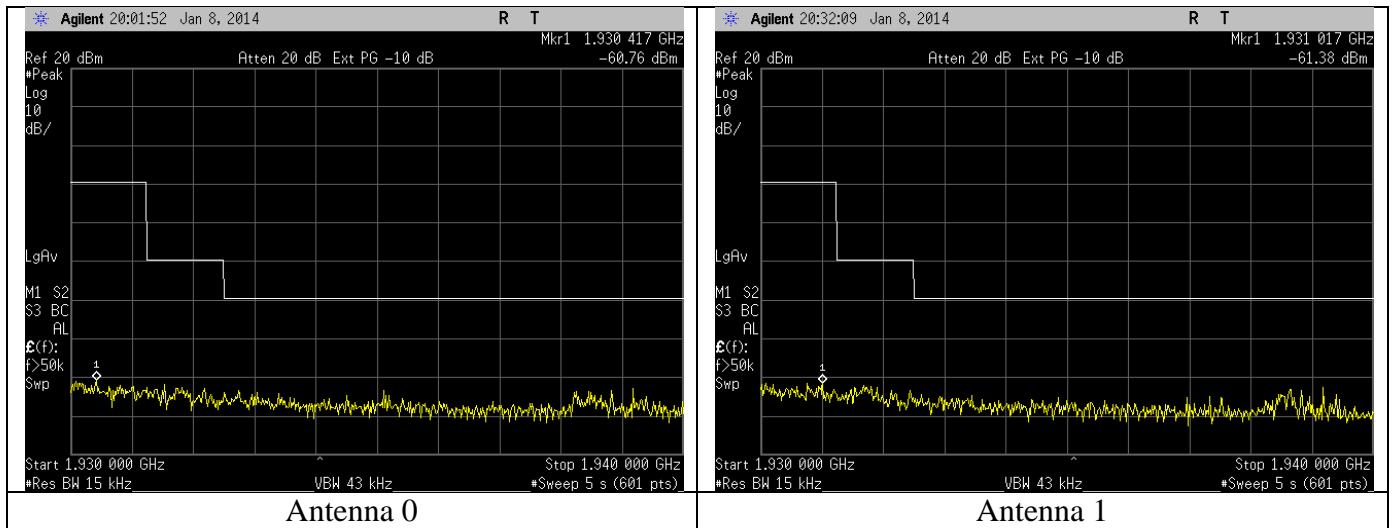
LSR: C-1790

Serial: (N/A) Engineering Sample

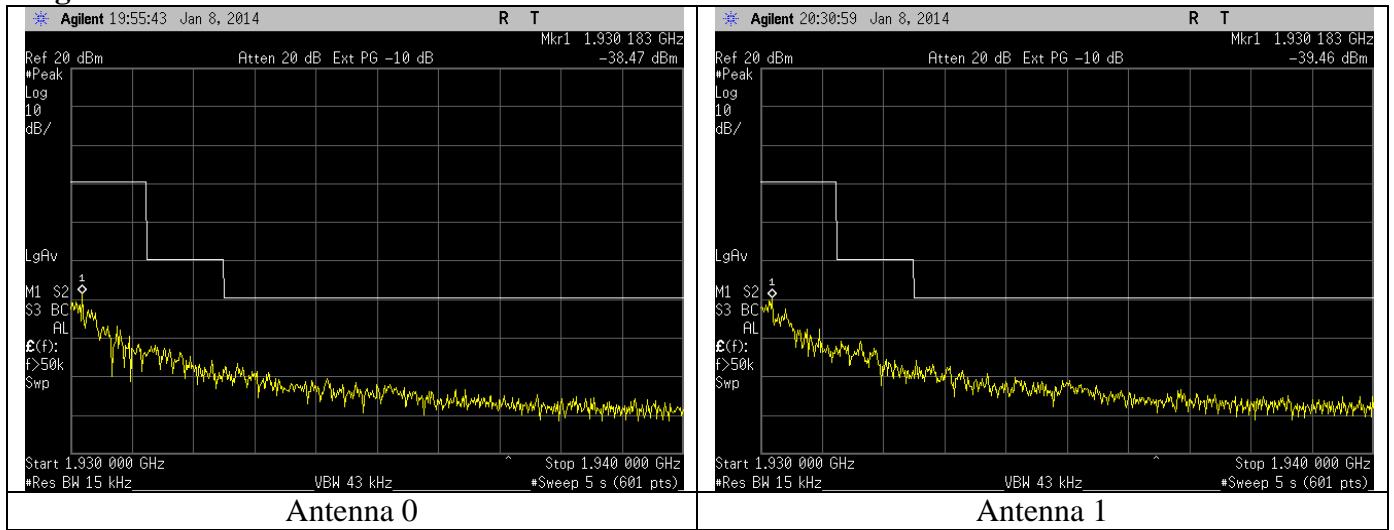
Plots (Upper Band-edge) Low Channel – 1921.536 MHz



Mid Channel – 1924.992 MHz



High Channel – 1928.448 MHz



Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

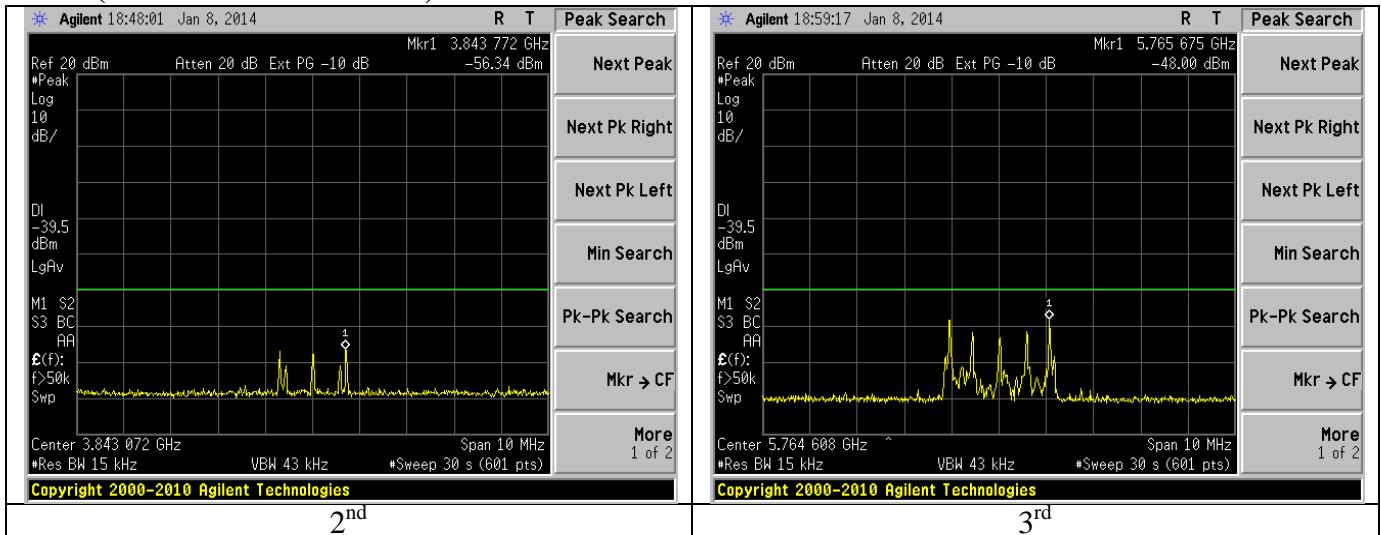
Report: TR 313224 FCCIC TX

Model: 40914

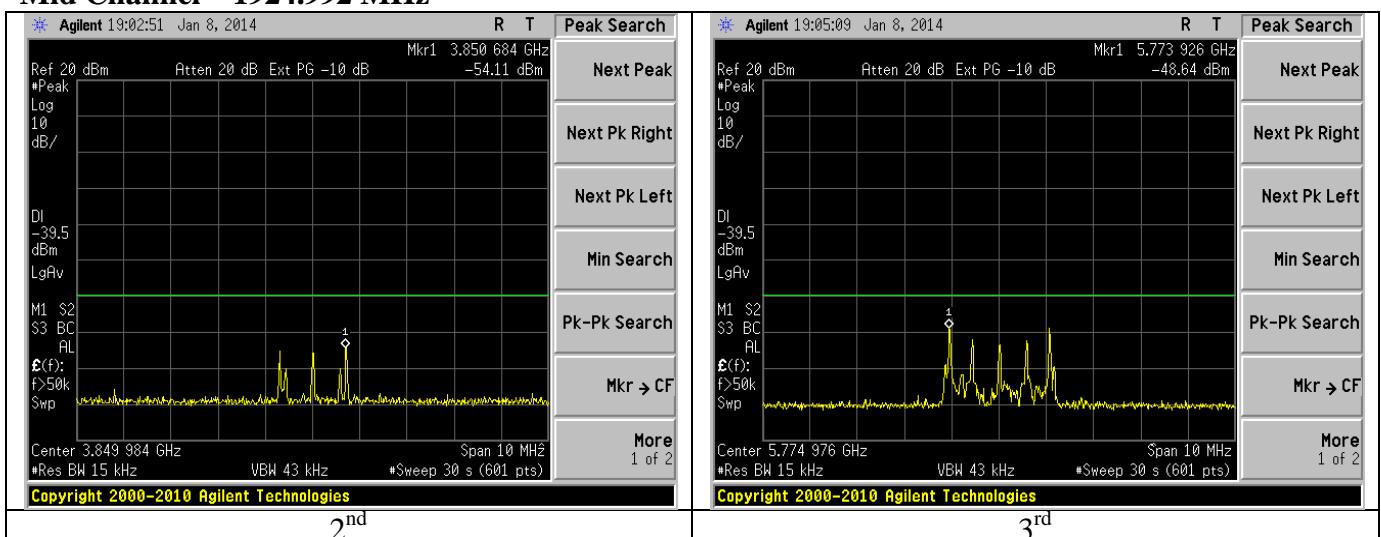
LSR: C-1790

Serial: (N/A) Engineering Sample

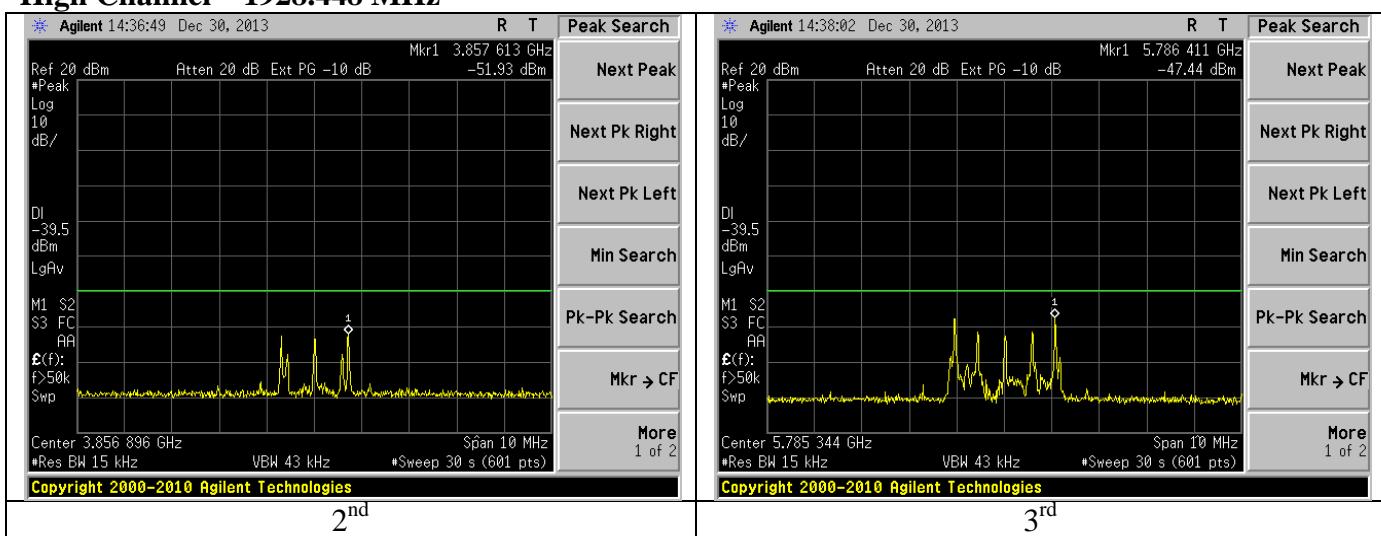
Plots (Antenna 0 - Harmonics) Low Channel – 1921.536 MHz



Mid Channel – 1924.992 MHz



High Channel – 1928.448 MHz



Prepared For: Logic Mark, LLC.

Report: TR 313224 FCCIC TX

LSR: C-1790

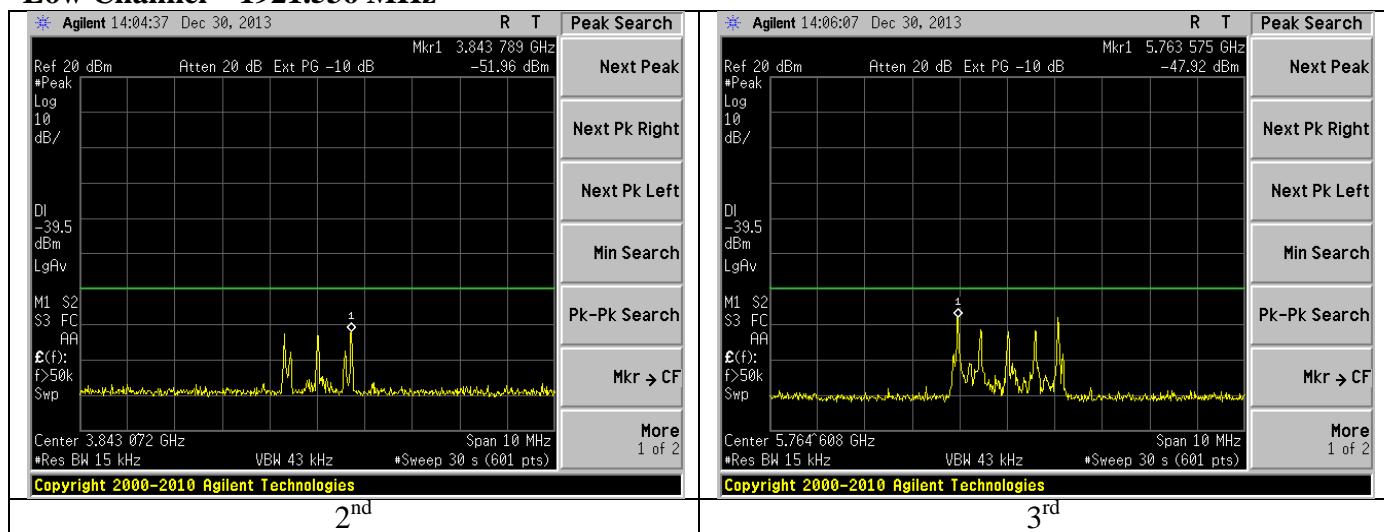
Name: Caretaker Sentry Base Unit

Model: 40914

Serial: (N/A) Engineering Sample

Plots (Antenna 1 - Harmonics)

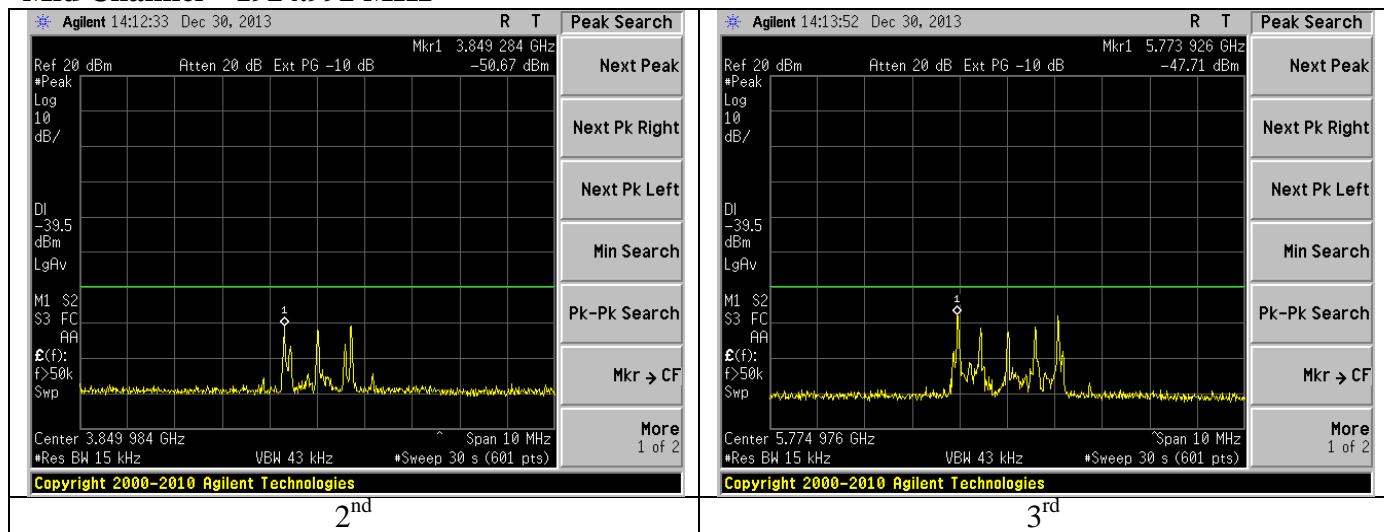
Low Channel – 1921.536 MHz



2nd

3rd

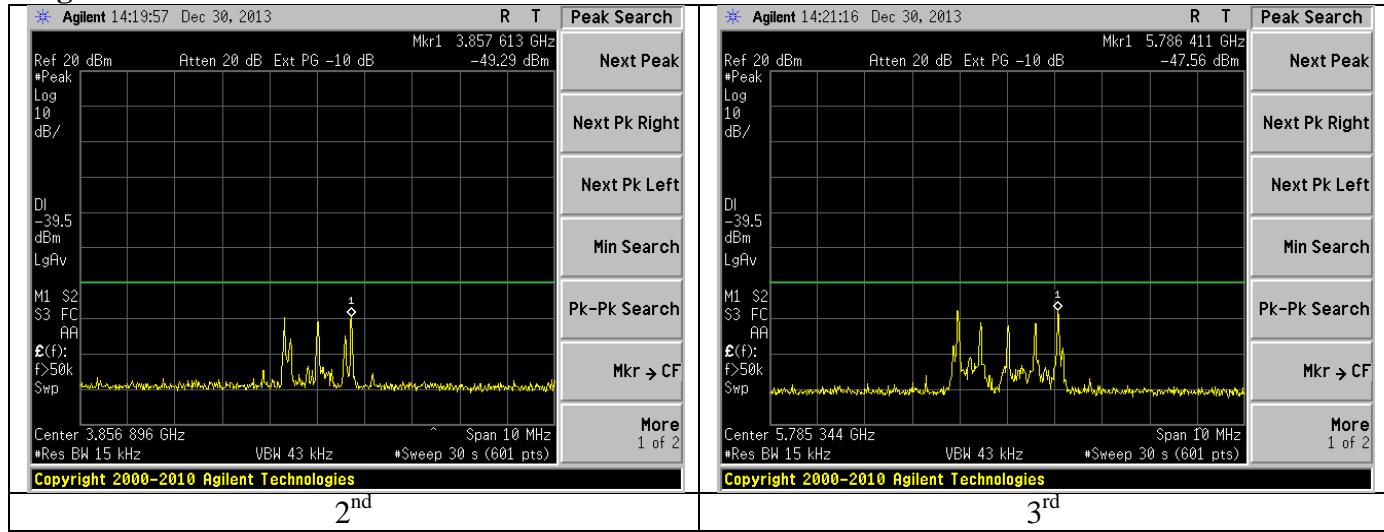
Mid Channel – 1924.992 MHz



2nd

3rd

High Channel – 1928.448 MHz



2nd

3rd

Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

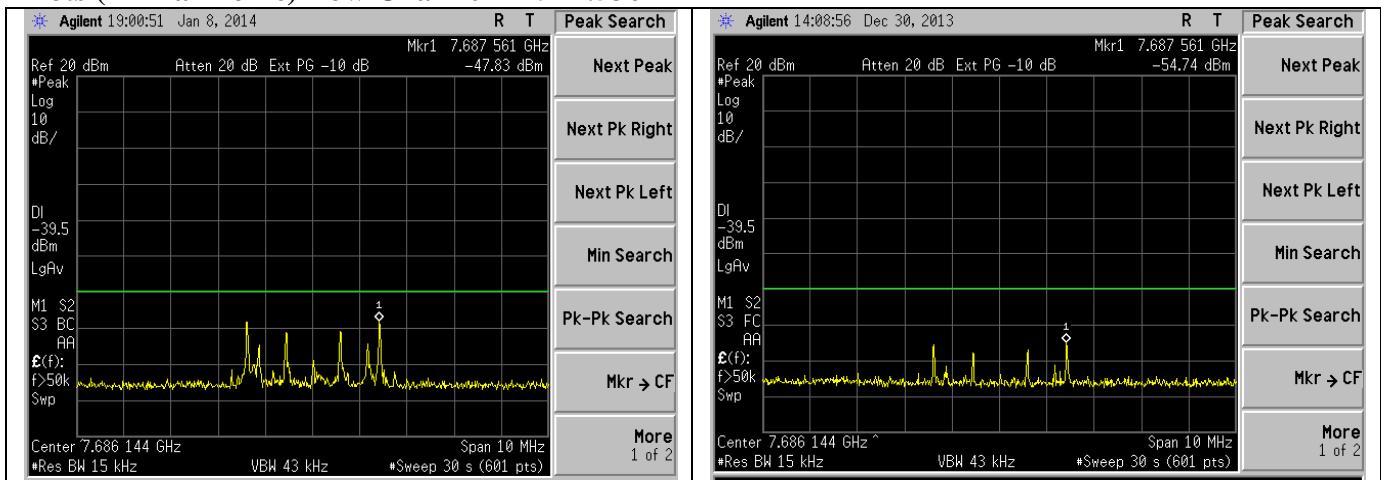
Report: TR 313224 FCCIC TX

Model: 40914

LSR: C-1790

Serial: (N/A) Engineering Sample

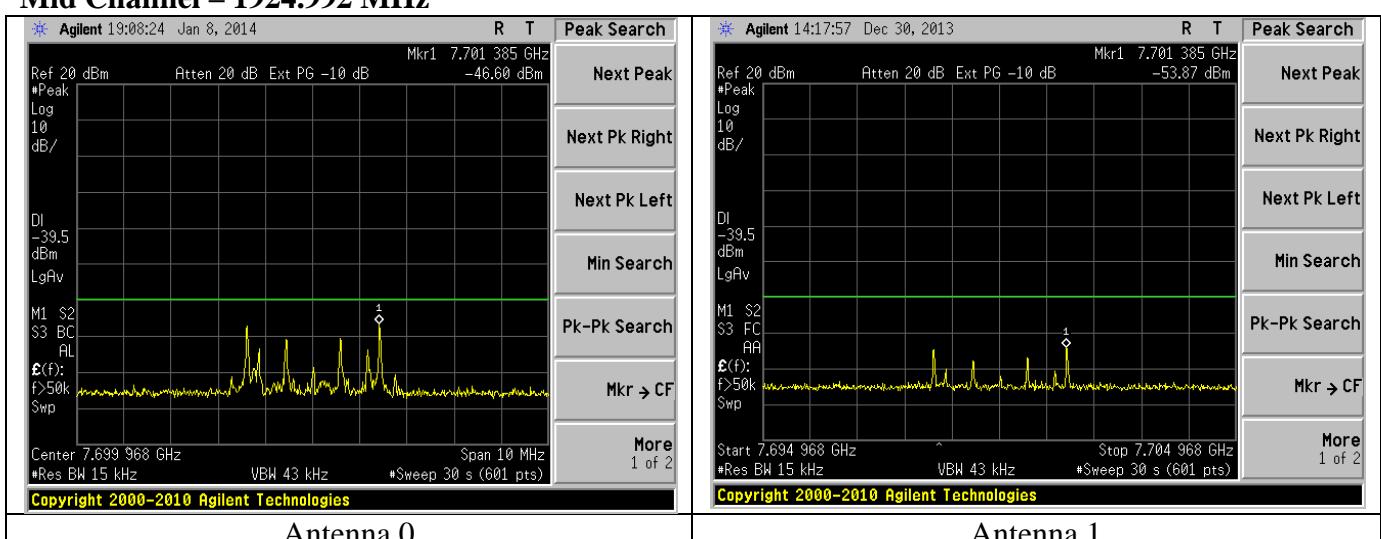
Plots (4th Harmonic) Low Channel – 1921.536 MHz



Antenna 0

Antenna 1

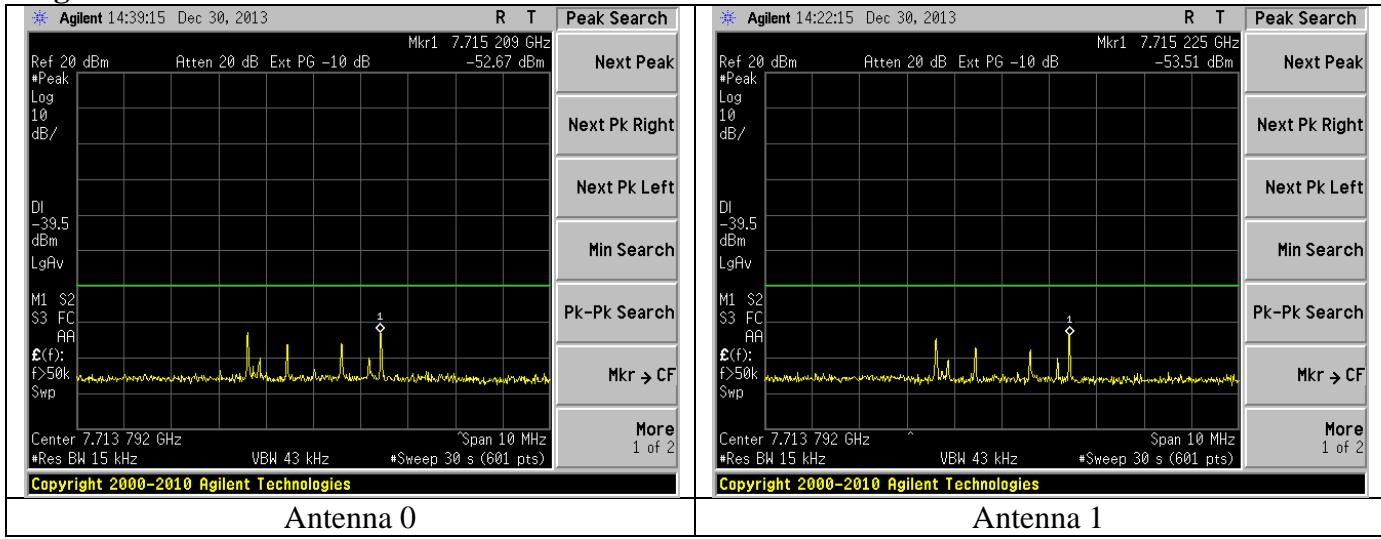
Mid Channel – 1924.992 MHz



Antenna 0

Antenna 1

High Channel – 1928.448 MHz



Antenna 0

Antenna 1

Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

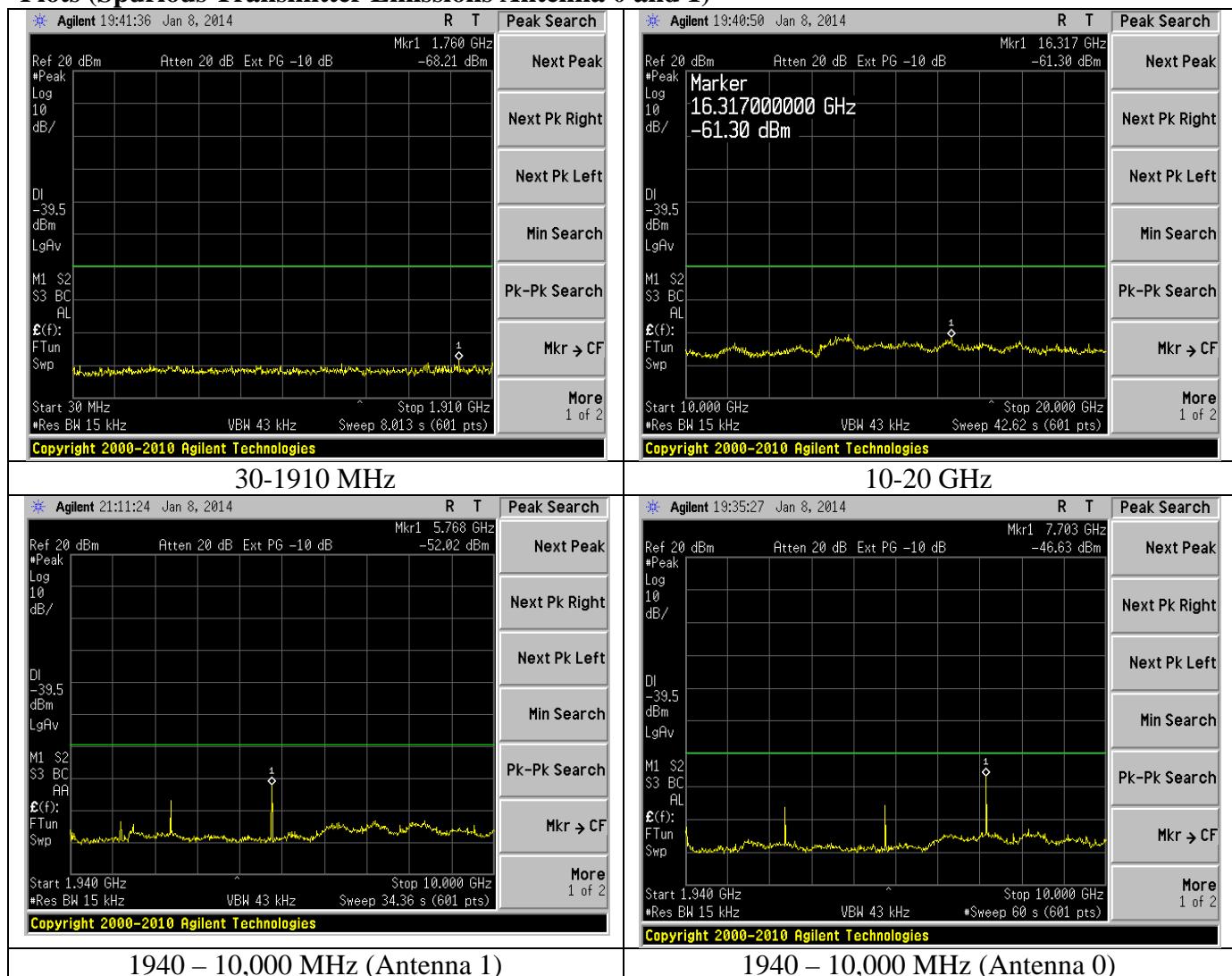
Report: TR 313224 FCCIC TX

Model: 40914

LSR: C-1790

Serial: (N/A) Engineering Sample

Plots (Spurious Transmitter Emissions Antenna 0 and 1)



Prepared For: Logic Mark, LLC.

Report: TR 313224 FCCIC TX

LSR: C-1790

Name: Caretaker Sentry Base Unit

Model: 40914

Serial: (N/A) Engineering Sample

B.1.5 – RF Conducted – Frame period stability

Manufacturer	LogicMark, LLC.
Date	9-27-13
Operator	Aidi
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC Subpart D 15.323(e) / RSS-213 Section 4.3.4(c)
Specific Measurement Procedure	ANSI C63.17-2006 Section 6.2.2 and 6.2.3
Additional Description of Measurement	Measurements made with R&S CMD60 Digital Radiocommunication Tester observed at least over a 1 hour period of time
Additional Notes	RF Conducted measurement

Frame Repetition Stability

Carrier Frequency (MHz)	Frame repetition rate (ppm)	Limit (ppm)
1924.992	+0.51	±10

Frame Period and Jitter

Carrier Frequency (MHz)	Max positive jitter (μs)	Max negative jitter (μs)	Max Jitter (μs)
1924.992	0.00	-0.01	25

Maximum results reported.

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B.1.6 – RF Conducted – Carrier frequency stability over temperature

Manufacturer	LogicMark, LLC.
Date	9-17-13
Operator	Adam A
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC Subpart D 15.323(f) / RSS-213 Section 6.2
Specific Measurement Procedure	ANSI C63.17-2006 Section 6.2.1.1 / 6.2.1.2 / 6.2.1.3
Additional Description of Measurement	Measurements made with R&S CMD60 Digital Radiocommunication Tester and Spectrum analyzer observed at least over a 1 hour period of time
Additional Notes	RF Conducted measurement

Carrier Frequency Stability over Time at Nominal Temperature

Carrier Frequency (MHz)	Max Dev. (kHz)	Max Dev. (ppm)	Limit (ppm)
1924.992	6.9	3.6	±10

Frequency Stability over Power Supply Voltage at Nominal Temperature

Voltage	Max Dev. (kHz)	Max Dev. (ppm)	Limit (ppm)
Nominal (120VAC)	6.7	3.5	±10
85 % of Nominal	6.9	3.6	±10
115% of Nominal	6.8	3.5	±10

Frequency Stability over Temperature

Temperature (°C)	Max Dev. (kHz)	Max Dev. (ppm)	Limit (ppm)
+20	6.7	3.5	±10
+50	6.4	3.4	±10
-20	-1.6	0.8	±10

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B.2 – Spectrum Etiquette

Manufacturer	Logic Mark, LLC.
Test Location	LS Research, LLC
Rule Part	FCC Subpart D / RSS-213
General Measurement Procedure	ANSI C63.17-2006
General Description of Measurement	<ol style="list-style-type: none"> 1) A direct measurement of the transmitted signal was performed at the antenna port of the EUT via a cable connection to a spectrum analyzer via a network of splitters/combiners. 2) Several attenuators were placed in the system to protect the equipment and provide offsets to ensure the EUT was appropriately affected by the interference and blocking signals. 3) The EUT was configured to run with a companion device. 4) A signal generator was configured with an arbitrary noise source to limit EUT to transmit on necessary channels (blocking source). 5) A second signal generator configured to transmit with a CW or pulsed CW signal was connected using splitter/combiners to test for monitoring and operational tests (interference signal).

(FP=fixed part or base unit)

(PP=portable part or mobile unit)

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B2.0.1 – Manufacture's Information

ANSI C63.17 Section 4.11 Manufacturer's Declarations and Descriptions	Manufacturer's Response
The channel plan	5 Channels: 1921.536M, 1923.264M, 1924.992M, 1926.720, 1928.448M
Maximum EUT antenna gain GA (dBi), and orientation and polarization for maximum gain	3.0 dBi; horizontal
Maximum peak power level	19.45 dBm
Emission bandwidth	1.26 MHz
Nominal receive bandwidth	1.3 MHz
Frame period and time slot plan, if time-division multiple-access (TDMA) techniques are used	10mS Frame: 6 Tx/Rx Slot Pairs
Minimum and maximum burst length, if TDMA techniques are used	Minimum Burst is 90uS, Max Burst is 640uS
Minimum and maximum operating temperature ranges declared to the end user	Min: -20°C; Max: +50°C
Whether a system built with the EUT does or does not operate under the provisions of 47CFR15.323(c)(10) to test for deferral only in conjunction with a companion device	PP initiates traffic bearers. The FP is the responding device. In the frame preceding the first transmission, the PP scans both Rx and Tx slots to confirm little/no change of spectrum use. PP then transmits on Tx side of slot-chan pair and opens up an Rx slot for FP response. If response is received, the bearer is set up and both FP and PP transmit every 10mS
Whether a system built with the EUT does or does not implement the provisions of 47CFR15.323(c)(5) enabling the use of the upper threshold for deferral	Yes. We have 6x5 = 30 duplex channels. Thus we are eligible to utilize this LIC clause
The nominal value of the deferral threshold	-38 dBm
Whether a system built using the EUT does or does not operate under the provisions of 47CFR15.323(c)(6) incorporating provisions for waiting for a channel to go clear	Only FP transmits beacons. FP will attempt to set up beacon on alternate channel if 1st selection fails. PP sets up the traffic bearers. If it fails on 1st choice, it will try another channel (slot-freq pair)
Whether a system built using the EUT does or does not operate under the provisions of 47CFR15.323(c)(11) enabling the access criteria check on the receive channel while in the presence of collocated interferers	Does not operate under the provisions.
The provisions within the EUT for self-check, by which compliance with 47CFR15.319(f) is obtained	DECT FP transmits a Control Channel (called a beacon or dummy bearer). PP does not. PP initiates all traffic bearers. FP only responds. If PP does not get FP response, it drops the traffic bearer
Whether the EUT does or does not have the monitoring made through the radio receiver used for communication	Same receiver is used for communication and for scanning
Whether the EUT does or does not transmit control and signaling channel(s)	Only FP transmits beacons. FP will attempt to set up beacon on alternate channel if 1st selection fails. PP sets up the traffic bearers. If it fails on 1st choice, it will try another channel (slot-freq pair)
Nominal mains and battery voltage	Mains Voltage 120VAC 60 Hz

Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

Report: TR 313224 FCCIC TX

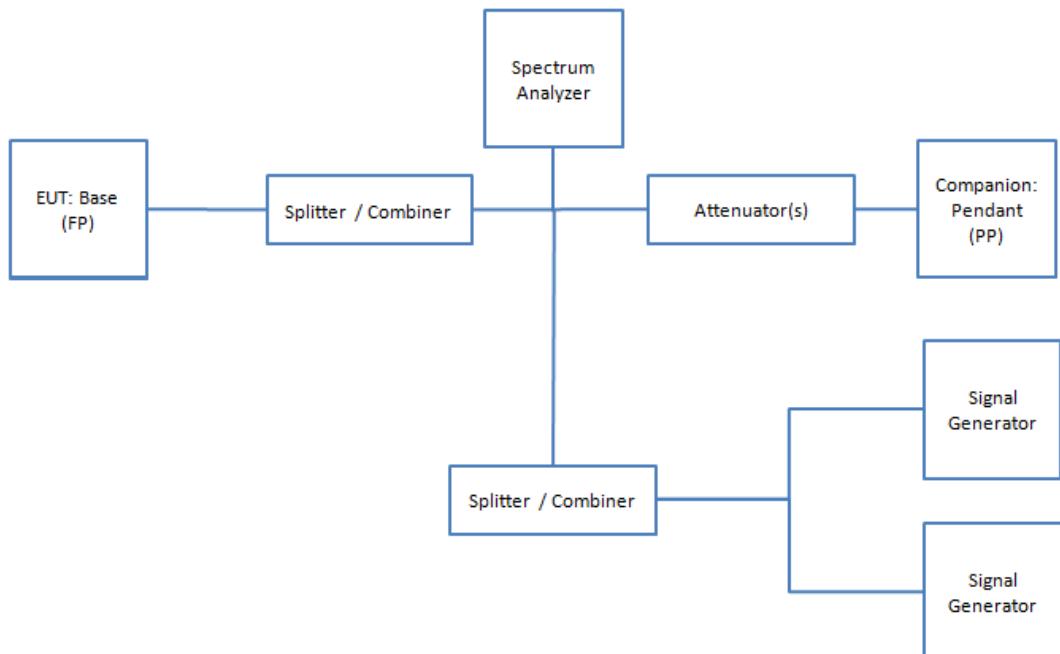
Model: 40914

LSR: C-1790

Serial: (N/A) Engineering Sample

B2.0.2 – Setup and Calibrations

a)



b)



c)



Date : 26-Aug-2013

Type Test: Spectrum Monitoring

Job #: C-1790

Prepared By: Adam A

Customer: LogicMark

Quote #: 313224

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	CC 000213C	Signal Generator	HP	E4432B	US38220562	1/17/2012	1/17/2013	Active Calibration
2	EE 960016	2.4 GHz Signal Generator	Marconi	2024	11210044	3/13/2013	3/13/2014	Active Calibration
3	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	5/28/2013	5/28/2014	Active Calibration
4	CC 000465	Digital Radiocommunication Tester	R&S	CMD 60	1050.9008.80	2/28/2013	As needed	Active Calibration

Project Engineer: Adam A

Quality Assurance: John Doe

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B.2.1 – Coordination with fixed microwave service

§ 15.307 Coordination with fixed microwave service.

Each application for certification of equipment operating under the provisions of this subpart must be accompanied by an affidavit from UTAM, Inc. certifying that the applicant is a participating member of UTAM, Inc. In the event a grantee fails to fulfill the obligations attendant to participation in UTAM, Inc., the Commission may invoke administrative sanctions as necessary to preclude continued marketing and installation of devices covered by the grant of certification, including but not limited to revoking certification.

Manufacturer provided as separate exhibit.

B.2.2 – Digital Modulation Techniques

§ 15.319 (b) All transmissions must use only digital modulation techniques. Both asynchronous and isochronous operations are permitted within the 1920-1930 MHz band.

RSS-213 Section 6.1: Equipment certified under this standard shall use digital modulation

Manufacturer declares: DECT FSK Modulation.

B.2.3 – Operational Failure

§ 15.319 (f) The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. The provisions in this section are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

RSS-213 Section 4.3.4 (a)

Manufacturer declares: DECT FP transmits a Control Channel (called a beacon or dummy bearer). PP does not. PP initiates all traffic bearers. FP only responds. If PP does not get FP response, it drops the traffic bearer

Test Notes: EUT verified to stop transmissions when power removed. When companion is lost EUT resumes control information.

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B.2.4 – Monitoring Time and Maximum Transmit Period

§ 15.323 (c)(1) Immediately prior to initiating transmission, devices must monitor the combined time and spectrum windows in which they intend to transmit for a period of at least 10 milliseconds for systems designed to use a 10 milliseconds or shorter frame period or at least 20 milliseconds for systems designed to use a 20 milliseconds frame period.

RSS-213 Section 4.3.4 (b)(1)

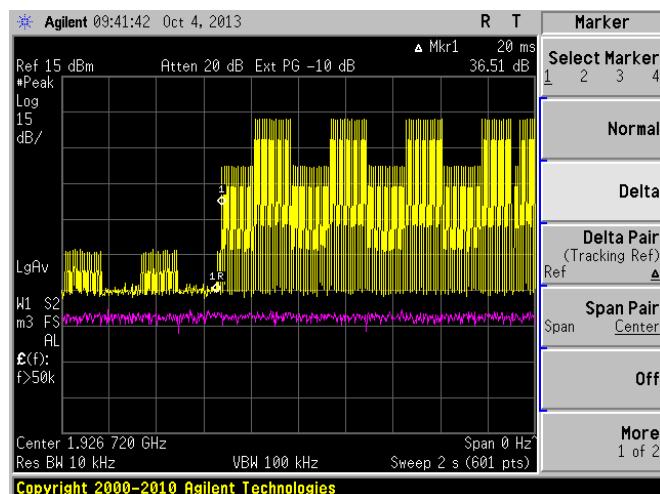
Manufacturer declares: 10 ms transmit period utilized.

DUT tracks the Least-Interfered Channels (Slot-Freq) by scanning RSSI. Within 20 mS of initiating a transmission on the best LIC, the DUT double checks the slot- freq chosen to make sure that the level has not changed over the last 10s

Test Notes: ANSI C63.17-2006 Section 7.3.4 (Selected Channel Confirmation)

EUT verified to transmit on channel without interference when interference removed

- a) AWGN Interference generator used to limit EUT to transmit only on f1 (1926.720 MHz) and f2 (1928.448 MHz) at $T_U + U_M$ ($-38 + 6 = -32$ dBm). CW interference applied to f1 at $T_U + U_M$ ($-38 + 6 = -32$ dBm) but not to f2.
- b) Transmission initiated and verified transmits on f2 and then terminated transmission.
- c) CW interference applied on f2 at $T_U + U_M$ ($-38 + 6 = -32$ dBm) while removing interference from f1. EUT transmits on f1
- d) Plot shows EUT to transmit on f1



Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B.2.5 – Monitoring Threshold

§ 15.323 (c)(2) The monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth used by the device.

RSS-213 Section 4.3.4 (b) (2)

Manufacturer declares: Lower threshold set at -80 dBm. This system uses greater than 20 duplex channels and Least Interfered channel Procedure (LIC)

Test Notes: ANSI C63.17-2006 Section 7.3.1

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

Lower Threshold:

$$T_L = 15 \log B - 184 + 30 - P_{EUT}$$

$$\text{Calculated Thersholt: } 15 * \log(1.256 \text{ MHz}) - 184 + 30 - 17.7 = -80.2 \text{ dBm}$$

B.2.6 – Maximum Transmit Period

§ 15.323 (c)(3) If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

RSS-213 Section 4.3.4 (b) (3)

Manufacturer declares: A timer is used trigger setup of dummy (control) bearer or traffic (communication) bearer on a new slot-freq pair before 8 hours has passed
DUT tracks the Least-Interfered Channels (Slot-Freq) by scanning RSSI. Within 20 mS of initiating a transmission on the best LIC, the DUT double checks the slot- freq chosen to make sure that the level has not changed over the last 10s

Test Notes: ANSI C63.17-2006 Section 8.2.2 (Transmission duration)

Test not applicable. EUT repeats access criteria every 20 ms.

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

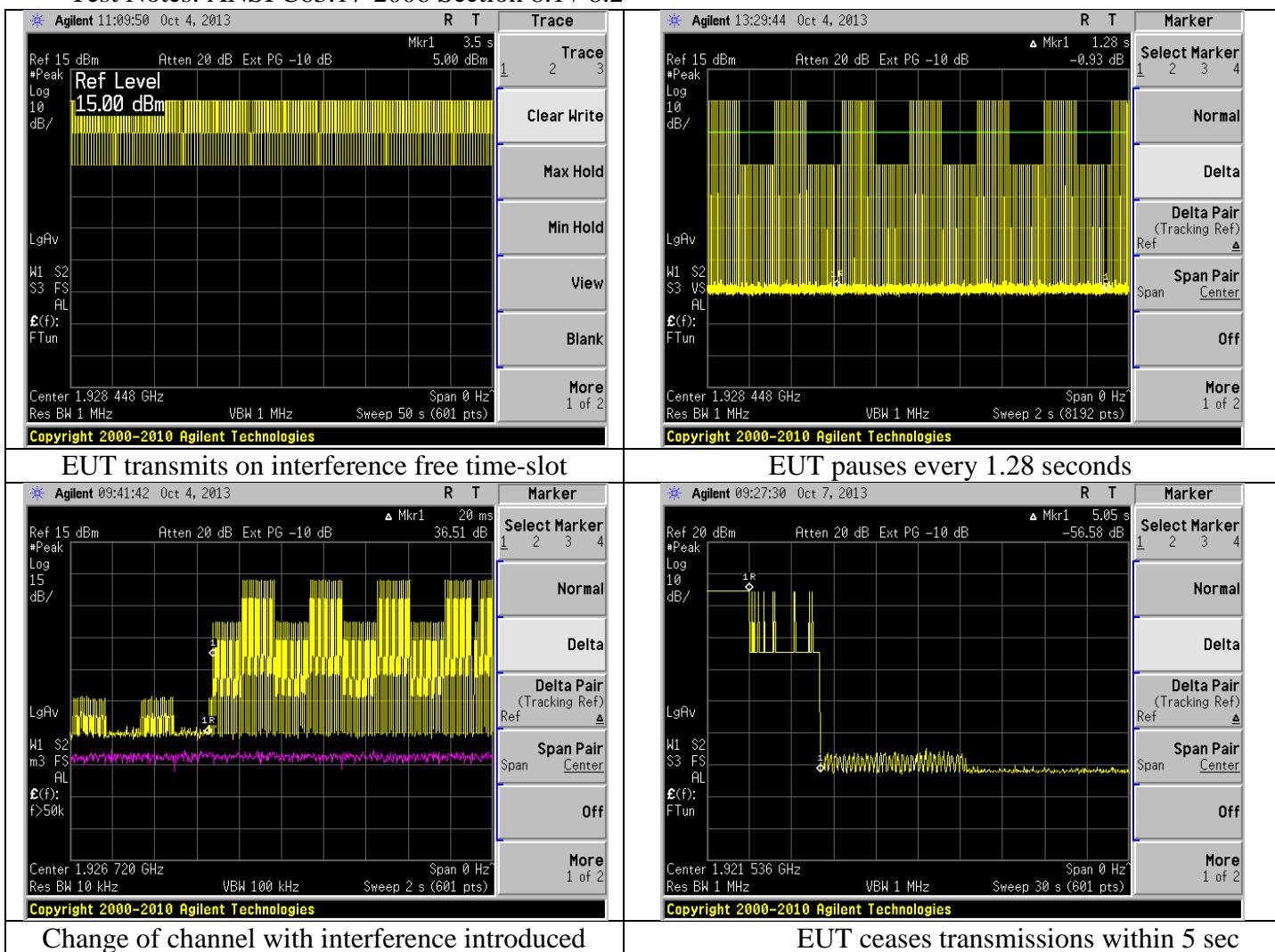
B.2.7 – System Acknowledgement

§ 15.323 (c) (4) Once access to specific combined time and spectrum windows is obtained an acknowledgment from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgments must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgment, at which time the access criteria must be repeated.

RSS-213 Section 4.3.4 (b) (4)

Manufacturer declares: FPs will only set up (Control) Dummy Bearers (no response from PP side). FP will reapply access criteria every 1.5s for existing Dummy Bearer. This Dummy Bearer will be of 90uS duration. PP will set up all traffic bearers. If no acknowledgment is received from FP, PP will immediately terminate this bearer. For existing traffic bearer where the FP or PP does not receive acknowledge from the partner, it will cease transmission within 5s

Test Notes: ANSI C63.17-2006 Section 8.1 / 8.2



Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

Report: TR 313224 FCCIC TX

Model: 40914

LSR: C-1790

Serial: (N/A) Engineering Sample

B.2.8 – Least Interfered Channel

§ 15.323 (c) (5) If access to spectrum is not available as determined by the above, and a minimum of 20 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level may be accessed. A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 milliseconds frame period) immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value. The power measurement resolution for this comparison must be accurate to within 6 dB. No device or group of co-operating devices located within 1 meter of each other shall during any frame period occupy more than 6 MHz of aggregate bandwidth, or alternatively, more than one third of the time and spectrum windows defined by the system.

RSS-213 Section 4.3.4 (b) (5)

Manufacturer declares: $6 \times 5 = 30$ duplex channels thus eligible to utilize LIC

Test Notes: ANSI C63.17-2006

Section 7.3.2 b)

By a AWGN interference signal applied across the band to all channels at a level of $T_U + U_M + 10\text{dB}$ ($-38 + 6 + 10 = -22\text{ dBm}$) and EUT verified to transmit when interference reached $T_U + U_M$ ($-38 + 6 = -32\text{ dBm}$)

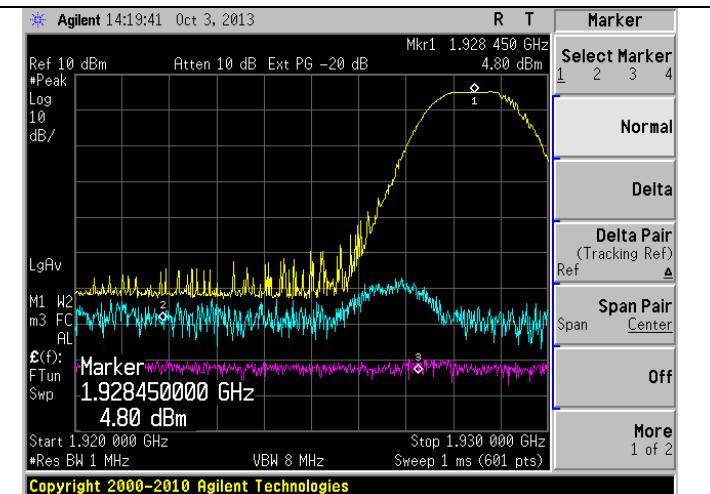
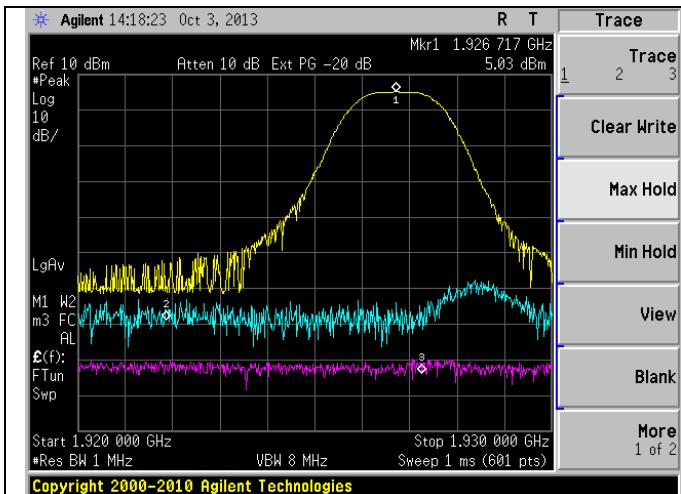
Section 7.3.3

- a) AWGN Interference generator used to limit EUT to transmit only on f1 (1926.720 MHz) and f2 (1928.448 MHz) at $T_U + U_M$ ($-38 + 6 = -32\text{ dBm}$).
- b) CW interference applied to EUT on f2 at a level of $T_L + U_M + 7\text{ dB}$ ($-80 + 6 + 7 = -67\text{ dBm}$) and AWGN adjusted to encompass f1 at $T_L + U_M$ ($-80 + 6 = -74\text{ dBm}$). EUT transmits on f2 as seen in plot below.
- c) CW interference applied to EUT on f1 at a level of $T_L + U_M + 7\text{ dB}$ ($-80 + 6 + 7 = -67\text{ dBm}$) and AWGN adjusted to encompass f2 at $T_L + U_M$ ($-80 + 6 = -74\text{ dBm}$). EUT transmits on f1 as seen in plot below.
- d) CW interference applied to EUT on f1 at a level of $T_L + U_M + 1\text{ dB}$ ($-80 + 6 + 1 = -73\text{ dBm}$) and AWGN adjusted to encompass f2 at $T_L + U_M - 6\text{ dB}$ ($-80 + 6 - 6 = -80\text{ dBm}$). EUT transmits on f2 as seen in plot below.
- e) CW interference applied to EUT on f1 at a level of $T_L + U_M - 6\text{ dB}$ ($-80 + 6 - 6 = -80\text{ dBm}$) and AWGN adjusted to encompass f2 at $T_L + U_M + 1\text{ dB}$ ($-80 + 6 + 1 = -73\text{ dBm}$). EUT transmits on f1 as seen in plot below.

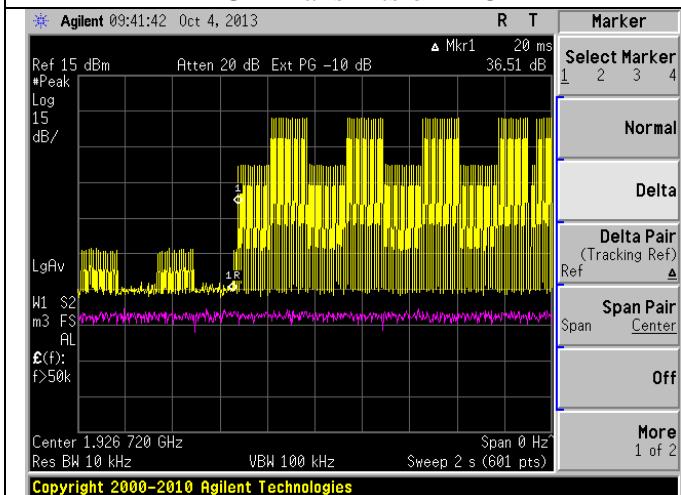
Section 7.3.4

- a) AWGN Interference generator used to limit EUT to transmit only on f1 (1926.720 MHz) and f2 (1928.448 MHz) at $T_U + U_M$ ($-38 + 6 = -32\text{ dBm}$). CW interference applied to f1 at $T_U + U_M$ ($-38 + 6 = -32\text{ dBm}$) but not to f2.
- b) Transmission initiated and verified transmits on f2 and then terminated transmission.
- c) CW interference applied on f2 at $T_U + U_M$ ($-38 + 6 = -32\text{ dBm}$) while removing interference from f1. EUT transmits on f1
- d) Plot shows EUT to transmit on f1

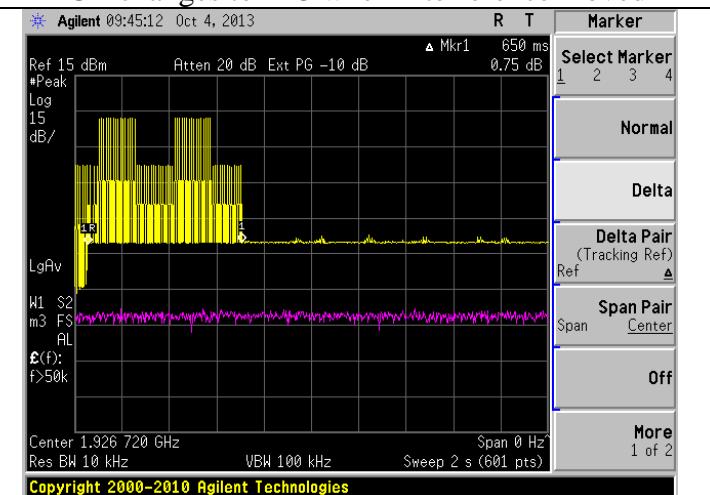
Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample



EUT Transmits on LIC



EUT changes to LIC when interference moved



EUT moves channel within 20 ms

Connection after 0.65s when interference removed

Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

Report: TR 313224 FCCIC TX

Model: 40914

LSR: C-1790

Serial: (N/A) Engineering Sample

B.2.9 – Random Waiting

§ 15.323 (c) (6) If the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same windows after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.

RSS-213 Section 4.3.4 (b) (6)

Manufacturer declares: Only FP transmits beacons. FP will attempt to set up beacon on alternate channel if 1st selection fails. PP sets up the traffic bearers. If it fails on 1st choice, it will try another channel (slot-freq pair)

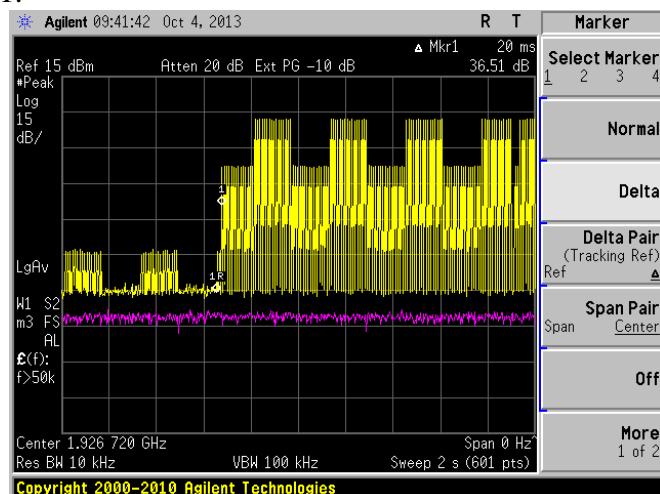
Test Notes:

ANSI C63.17-2006

Section 8.1.2

a) AWGN Interference generator used to limit EUT to transmit only on f1 (1926.720 MHz) and f2 (1928.448 MHz) at $T_U + U_M$ ($-38 + 6 = -32$ dBm).

b) EUT activated and it transmits on f2 (As seen on the plot centered on f1. The adjacent channel is appearing on the plot with reduced amplitude a period of time before interference is introduced) CW interference applied to f2 at $T_U + U_M$ ($-38 + 6 = -32$ dBm) but not to f1 and then EUT transmissions occur on f1.



Prepared For: Logic Mark, LLC.

Name: Caretaker Sentry Base Unit

Report: TR 313224 FCCIC TX

Model: 40914

LSR: C-1790

Serial: (N/A) Engineering Sample

B.2.10 – Monitoring System Bandwidth

§ 15.323 (c) (7) The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission and have a maximum reaction time less than $50 \times \text{SQRT}(1.25/\text{emission bandwidth in MHz})$ microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds. If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be $35 \times \text{SQRT}(1.25/\text{emission bandwidth in MHz})$ microseconds but shall not be required to be less than 35 microseconds.

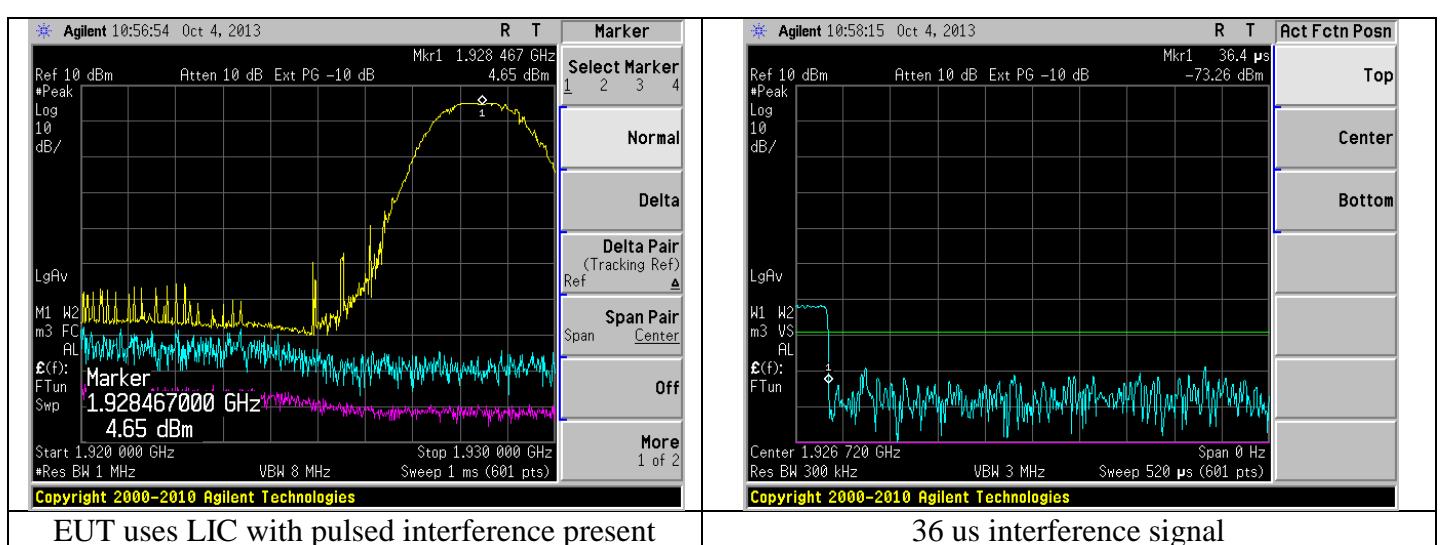
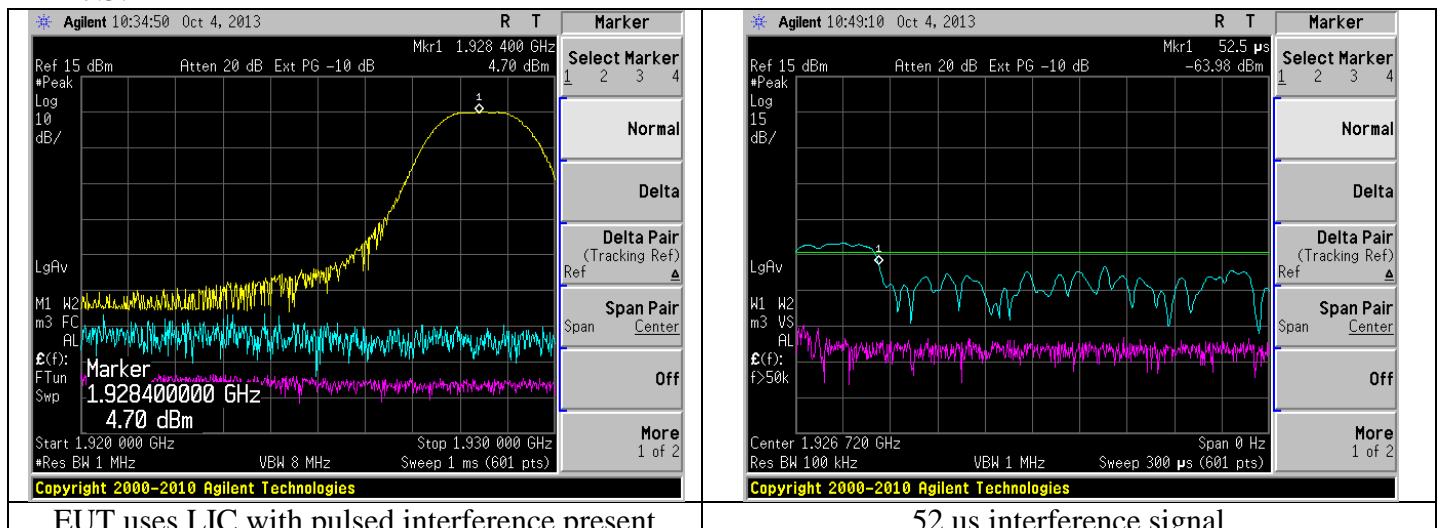
RSS-213 Section 4.3.4 (b) (7)

Manufacturer declares: Same receiver is used for communication and for scanning

Test Notes: ANSI C63.17-2006 Section 7.4 / 7.5

7.4 Test not applicable. EUT is a transceiver.

7.5:



Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B.2.11 – Monitoring Antenna

§ 15.323 (c) (8) The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

RSS-213 Section 4.3.4 (b) (8)

Manufacturer declares: Same antenna is used for receiving as the device is a transceiver.

Test Notes: ANSI C63.17-2006 Clause 4
Test not applicable. EUT is a transceiver.

B.2.12 – Monitoring Threshold Relaxation

§ 15.323 (c) (9) Devices that have a power output lower than the maximum permitted under this subpart may increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

RSS-213 Section 4.3.4 (b) (9)

Manufacturer declares: Device does not utilize this clause

Test Notes: ANSI C63.17-2006 Clause 4
Test not applicable.

B.2.13 – Duplex Connection

§ 15.323 (c) (10) An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

RSS-213 Section 4.3.4 (b) (10)

Manufacturer declares: PP initiates traffic bearers. The FP is the responding device. In the frame preceding the first transmission, the PP scans both Rx and Tx slots to confirm little/no change of spectrum use. PP then transmits on Tx side of slot-chan pair and opens up an Rx slot for FP response. If response is received, the bearer is set up and both FP and PP transmit every 10mS

Test Notes: ANSI C63.17-2006 Section 8.3
Test only applicable to EUT that is initiating device.

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B.2.14 – Alternative Monitoring Interval for Co-located Device

§ 15.323 (c) (11) An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within 1.25 MHz of the center frequency of channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

RSS-213 Section 4.3.4 (b) (11)

Manufacturer declares: Device does not utilize this clause

Test Notes: ANSI C63.17-2006 Section 8.4

Test not applicable to this EUT.

B.2.15 – Alternative Monitoring Interval for Co-located Device

§ 15.323 (c) (12) The provisions of (c)(10) or (c)(11) of this section shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

RSS-213 Section 4.3.4 (b) (12)

Manufacturer declares: This is the case with this system.

Test Notes: N/A

B.2.16 – Security Code Information

RSS-213 Section 5: Provide a fixed security code at the time of manufacture that is continuously varied either randomly or sequentially.

Manufacturer declares: Not relevant for this system.

Test Notes: N/A

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B.3 – Radiated Emissions (Receiver and Digital Device)

Rule Part(s)	FCC: 15.109 IC: RSS-213 Section 6.8					
Measurement Procedure	ANSI C63.4 - 2003					
Test Location	LS Research, LLC - FCC Listed 3 meter Semi-Anechoic Chamber					
Test Distance	See data section					
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	Standard gain horn: 18-26 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	<p>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.</p> <p>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</p> <p>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.</p>					
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 (μ 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 Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B.3.1 – Radiated Emissions Receive Mode

Manufacturer	LogicMark, LLC
Date	9-5,10,11-2013
Operator	Adam A / Mike H, Peter F
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	15.109
Measurement Procedure	ANSI C63.4 - 2003
Test Distance	3 meter 30-4000 MHz; 1 meter 4-26 GHz
EUT Placement	80 cm height non-conductive table centered on turn-table
Detectors	Peak, Quasi-Peak, Average
Additional Notes	1) Tested in receive and normal mode of operation 2) Maximum results reported 3) All other emissions greater than 20 below applicable limit

Example Calculation:

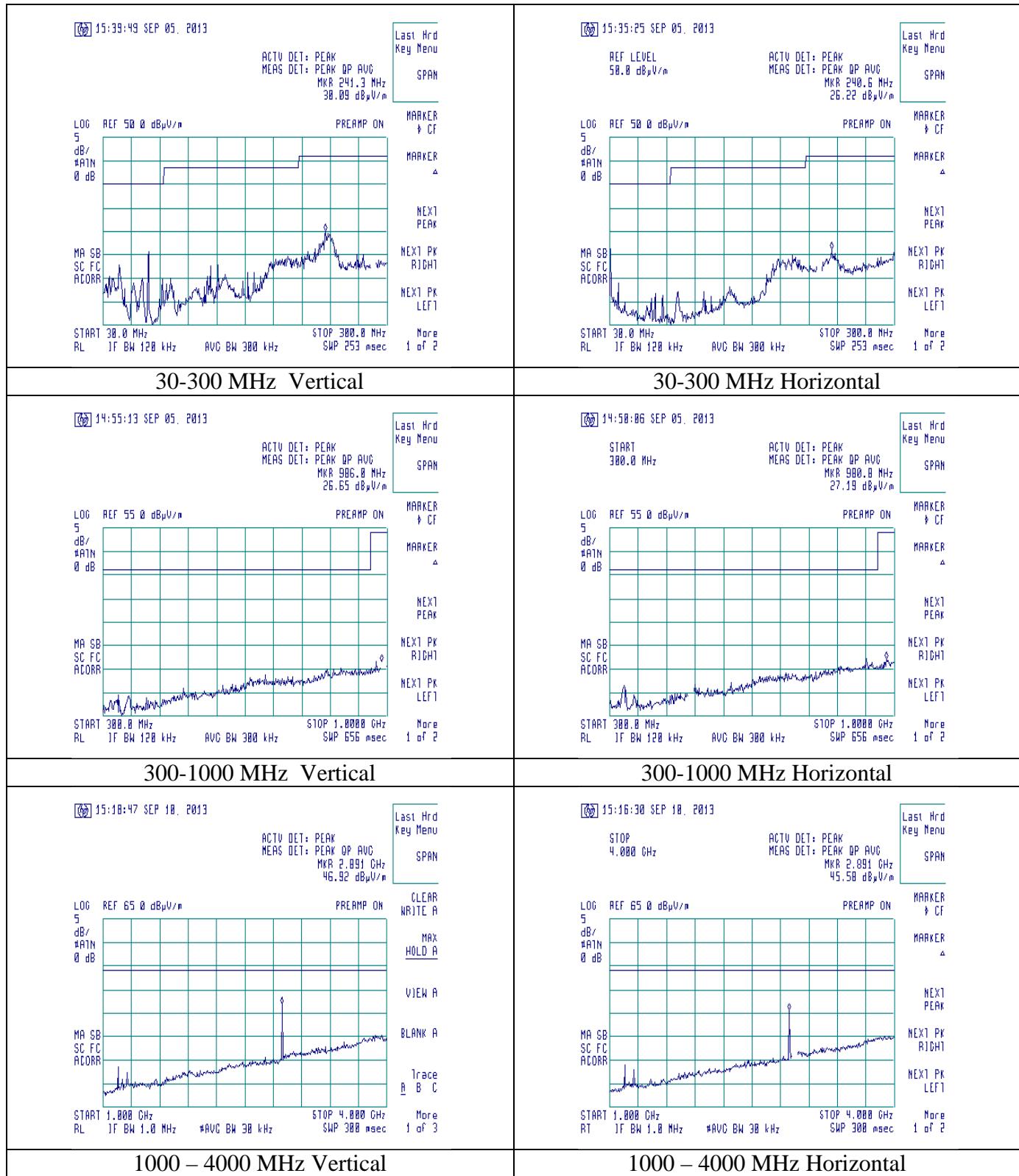
$$\text{Limit (dB}\mu\text{V/m)} - \text{Reading (dB}\mu\text{V/m)} = \text{Margin}$$

Table 30-4000 MHz

Frequency (GHz)	Antenna Polarity	Height (cm)	Azimuth (degree)	Peak Reading (dB μ V/m)	Average Reading (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	EUT Antenna	EUT Channel
2.8836	Vertical	103	153	46.16	42.04	54.00	11.96	0	23
2.8836	Horizontal	113	206	45.32	40.41	54.00	13.59	0	23
2.8888	Vertical	100	244	47.14	43.54	54.00	10.46	0	25
2.8888	Horizontal	115	209	45.75	41.17	54.00	12.83	0	25
2.8939	Vertical	100	242	47.02	42.97	54.00	11.03	0	27
2.8939	Horizontal	112	204	46.39	41.55	54.00	12.45	0	27
2.8836	Vertical	100	230	46.53	42.21	54.00	11.79	1	23
2.8836	Horizontal	113	204	45.25	40.35	54.00	13.65	1	23
2.8888	Vertical	102	136	47.09	43.60	54.00	10.40	1	25
2.8888	Horizontal	115	205	45.55	41.24	54.00	12.76	1	25
2.8939	Vertical	101	136	46.41	42.55	54.00	11.45	1	27
2.8939	Horizontal	115	209	45.53	41.06	54.00	12.94	1	27

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

Plots 30-4000 MHz



Prepared For: Logic Mark, LLC.

Report: TR 313224 FCCIC TX

LSR: C-1790

Name: Caretaker Sentry Base Unit

Model: 40914

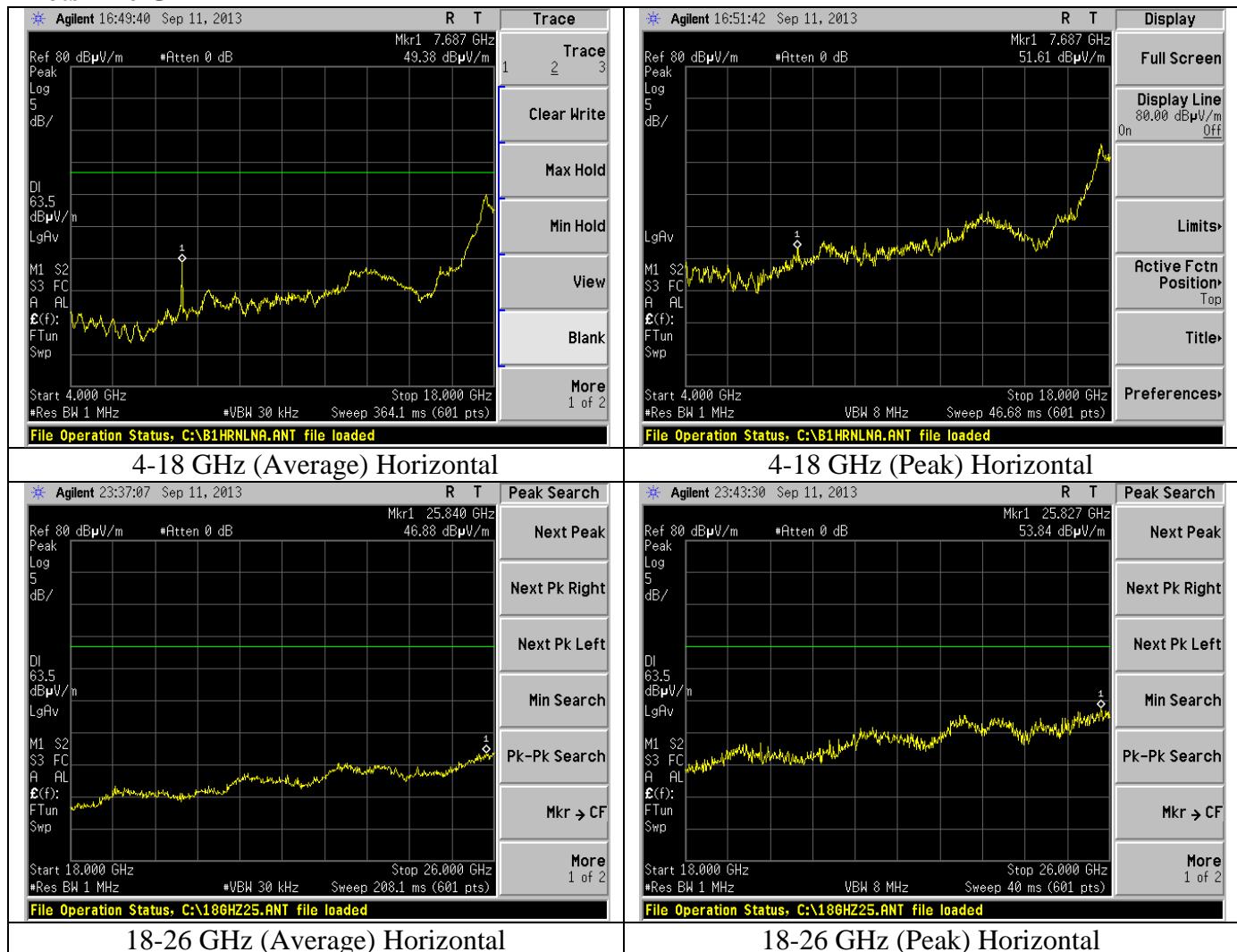
Serial: (N/A) Engineering Sample

Table 30 MHz - 26 GHz

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dB μ V/m)	Average Reading (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Antenna Polarity	EUT Channel	EUT Antenna
7689.6	1.00	120	55.2	48.9	63.5	14.6	H	23	0
7689.6	1.00	355	57.0	52.0	63.5	11.5	V	23	0
11534.3	1.00	21	53.2	42.0	63.5	21.5	H	23	0
11534.3	1.05	350	53.6	44.6	63.5	18.9	V	23	0
7703.4	1.00	192	53.7	48.0	63.5	15.5	H	25	0
7703.4	1.00	127	53.0	44.8	63.5	18.7	V	25	0
11555.1	1.00	24	52.5	41.4	63.5	22.1	H	25	0
11555.1	1.04	352	54.1	45.0	63.5	18.5	V	25	0
7717.2	1.00	122	53.1	46.1	63.5	17.4	H	27	0
7717.2	1.04	350	53.9	47.9	63.5	15.6	V	27	0
11575.8	1.00	21	53.7	41.9	63.5	21.6	H	27	0
11575.8	1.05	350	53.9	45.4	63.5	18.1	V	27	0
7689.6	1.00	83	53.5	47.8	63.5	15.7	H	23	1
7689.6	1.04	207	55.3	49.7	63.5	13.8	V	23	1
11534.3	1.02	231	52.9	42.8	63.5	20.7	H	23	1
11534.3	1.03	352	53.3	44.2	63.5	19.3	V	23	1
7703.4	1.00	82	52.8	45.8	63.5	17.7	H	25	1
7703.4	1.05	357	54.8	48.2	63.5	15.3	V	25	1
11555.1	1.00	26	53.3	42.8	63.5	20.8	H	25	1
11555.1	1.03	354	53.6	44.4	63.5	19.1	V	25	1
7717.2	1.08	311	51.9	45.0	63.5	18.5	H	27	1
7717.2	1.03	203	54.5	49.7	63.5	13.8	V	27	1
11757.8	1.00	20	54.4	42.6	63.5	20.9	H	27	1
11757.8	1.00	347	53.4	44.6	63.5	18.9	V	27	1

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

Plots 4-26 GHz



Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

B.4 – 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 50Ω (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 (dB μ V)		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.

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

Test Data

Manufacturer:	LogicMark, LLC.				
Date(s) of Test:	10-07-13				
Test Engineer:	Adam A				
Voltage:	120 VAC 60Hz				
Operation Mode:	Normal mode of operation of EUT with DECT in transmit mode, 433 MHz receiver, and calling mode.				
Environmental Conditions in the Lab:	Temperature: 71°F Relative Humidity: 40%				
Test Location:	X	AC Mains Test area			Chamber
EUT Placed On:	X	40cm from Vertical Ground Plane			10cm Spacers
	X	80cm above Ground Plane			Other:
Measurements:		Pre-Compliance		Preliminary	X Final
Detectors Used:	X	Peak		Quasi-Peak	Average

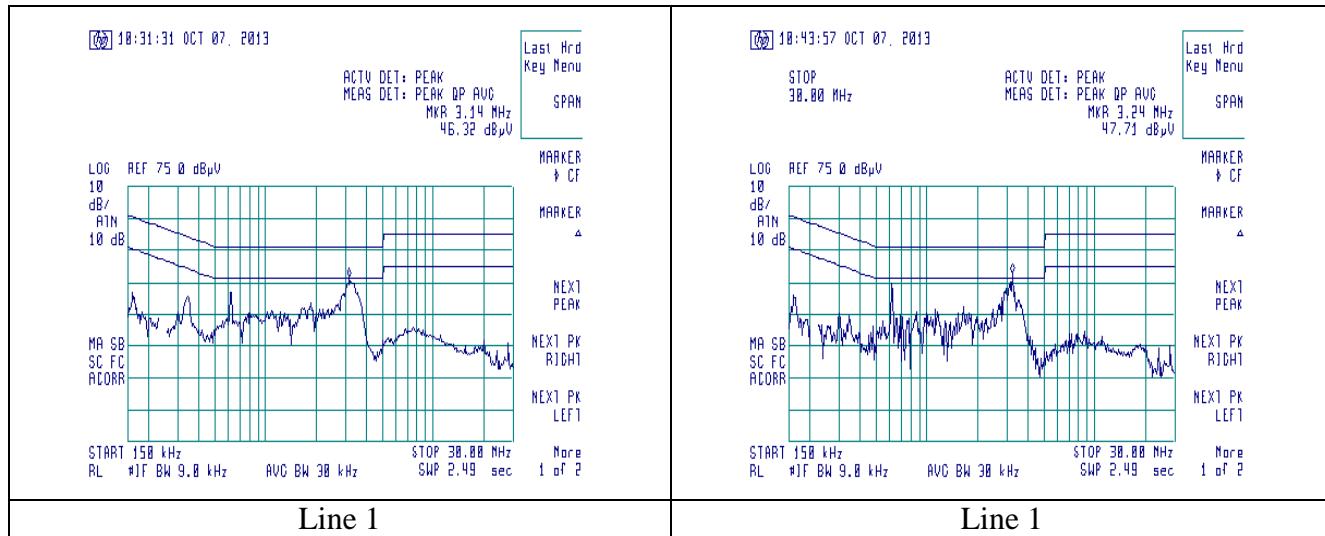
Sample Calculation:

$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V)} - \text{Reading (dB}\mu\text{V)}$$

Frequency (MHz)	Line	Quasi-Peak			Average		
		Q-Peak Reading (dB μ V)	Q-Peak Limit (dB μ V)	Quasi-Peak Margin (dB)	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)
3.203	1	42.3	56.0	13.7	32.4	46.0	13.6
3.145	1	42.5	56.0	13.5	32.4	46.0	13.6
3.186	1	42.9	56.0	13.1	32.8	46.0	13.2
0.622	1	39.8	56.0	16.2	33.4	46.0	12.6
0.340	1	39.9	59.2	19.3	33.1	49.2	16.1
0.164	1	37.8	65.3	27.5	34.2	55.3	21.1
3.191	2	40.8	56.0	15.2	26.4	46.0	19.6
3.100	2	39.9	56.0	16.1	25.3	46.0	20.7
3.212	2	40.4	56.0	15.6	26.3	46.0	19.7
0.622	2	42.2	56.0	13.8	34.1	46.0	11.9
0.304	2	33.6	60.1	26.5	30.8	50.1	19.3
0.165	2	38.9	65.2	26.3	35.2	55.2	20.0

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

These screen captures represent Peak Emissions. For conducted emission measurements, both a Quasi-Peak detector function and an Average detector function are utilized. The emissions must meet both the Quasi-peak limit and the Average limit as described in 47 CFR 15.207 and RSS GEN 7.2.2 (Table 2).



Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

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

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

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-213 Issue 2	2005	2 GHz Licence-exempt Personal Communications Service Devices (LE-PCS)
RSS-GEN Issue 3	2010	General Requirements and Information for the Certification of Radio Apparatus
ANSI C63.17	2006	American National Standard Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample

END OF REPORT

Date	Version	Comments	Person
10-16-13	V0	Initial Draft Release	Adam A
10/24/13	V1	Reviewed	SDR
12-16-13	V1a	TCB Comments addressed	Adam A
1-8-14	V1b	TCB Comments addressed	Adam A

Prepared For: Logic Mark, LLC.	Name: Caretaker Sentry Base Unit
Report: TR 313224 FCCIC TX	Model: 40914
LSR: C-1790	Serial: (N/A) Engineering Sample
Page 49 of 49	