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MEASUREMENT REPORT FCC PART 15.247

Applicant Name:
Elster Solutions, LLC
208 S. Rogers Lane
Raleigh, NC 27610
United States

Date of Testing:
May 27 - June 01, 2015
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
0Y1505260993.QZC

FCC ID:	QZCWWIC3EV
APPLICANT:	Elster Solutions, LLC

Application Type: Class II Permissive Change
Model: EA_GKWWIC3_EVXV
EUT Type: EA_Gatekeeper with Wireless WIC3G
Frequency Range: 902.8 – 927.6MHz
FCC Classification: FCC Part 15 Spread Spectrum Transmitter (DSS)
FCC Rule Part(s): Part 15 Subpart C (15.247)
Test Procedure(s): ANSI C63.10-2009, DA 00-705
Class II Permissive Change: Please see FCC change document
Original Grant Date: December 26, 2013

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2009 and DA 00-705. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.


Randy Ortanez
President



FCC ID: QZCWWIC3EV		FCC Pt. 15.247 900MHz ISM BAND TEST REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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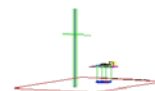
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MEASUREMENT REPORT

FCC Part 15.247



§ 2.1033 General Information

APPLICANT: Elster Solutions, LLC

APPLICANT ADDRESS: 208 S. Rogers Lane
Raleigh, NC 27610, United States

TEST SITE: PCTEST ENGINEERING LABORATORY, INC.

TEST SITE ADDRESS: 6660-B Dobbin Road, Columbia, MD 21045 USA

FCC RULE PART(S): Part 15 Subpart C (15.247)

MODEL: EA_GKWWIC3_EVXV

FCC ID: QZCWWIC3EV

Test Device Serial No.: 16672623 ☐ Production ☒ Pre-Production ☐ Engineering

FCC CLASSIFICATION: FCC Part 15 Spread Spectrum Transmitter (DSS)

Method/System: Frequency Hopping Spread Spectrum (FHSS)

DATE(S) OF TEST: May 27 - June 01, 2015

TEST REPORT S/N: 0Y1505260993.QZC

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21045, U.S.A.



- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451B-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules.
- PCTEST facility is an IC registered (2451B-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2 Testing Facility

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on February 15, 2012.

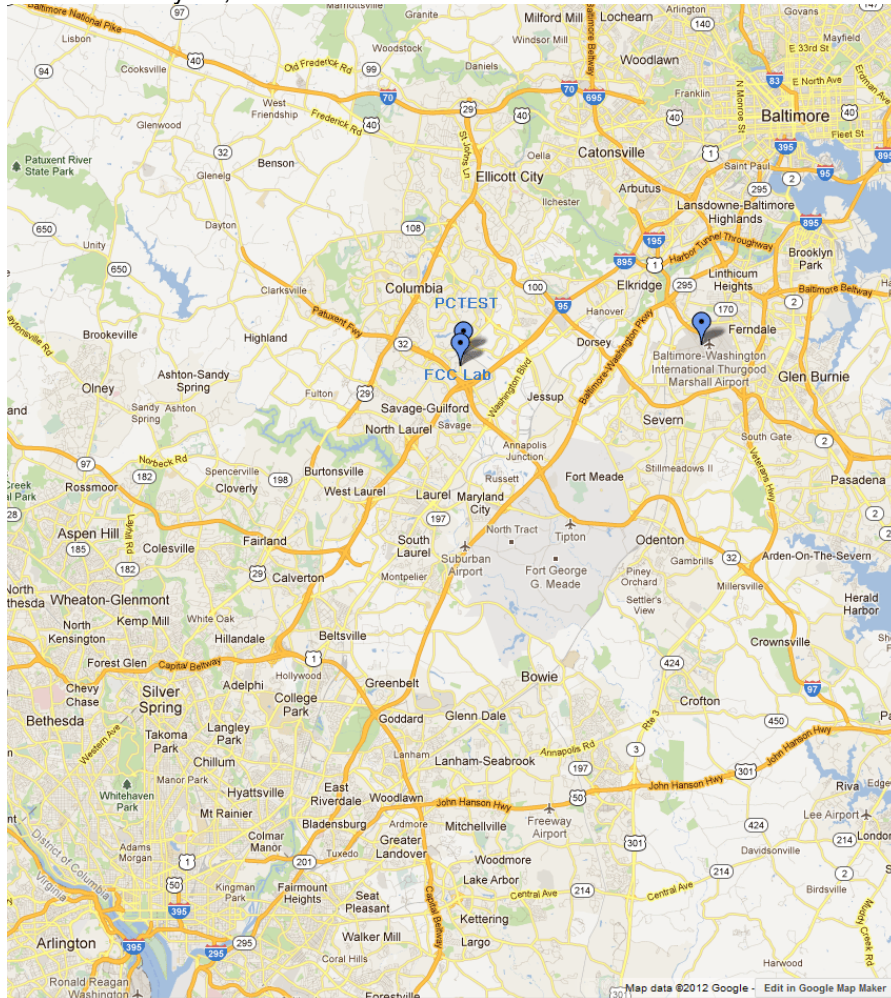


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Elster EA_Gatekeeper with Wireless WIC3G FCC ID: QZCWWIC3EV**. The test data contained in this report pertains only to the emissions due to the EUT's 900MHz transmitter.

- This module has been previously approved and we confirm the following:
 - A) The hopping sequence is pseudorandom
 - B) All channels are used equally on average
 - C) The receiver input bandwidth equals the transmit bandwidth
 - D) The receiver hops in sequence with the transmit signal
- 15.247(g): The system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.
- 15.247(h): The system does not coordinate its channels selection/ hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO, 900MHz ISM Tx

Note: This device operates on 50 channels over the 900MHz ISM band however only 25 channels can operate at a time. The other 25 channels will not operate until the device switches over to that network. For additional information, see the technical description document.

2.3 Test Configuration

The Elster EA_Gatekeeper with Wireless WIC3G FCC ID: QZCWWIC3EV was tested per the guidance of ANSI C63.10-2009 and DA 00-705. The EUT was connected to a laptop via an optical probe connection. The EUT operation was controlled via software installed on the laptop. See Section 3.2 of this test report for a description radiated emissions test setup.

2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009) and the "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" (DA 00-705) were used in the measurement of the **Elster EA_Gatekeeper with Wireless WIC3G FCC ID: QZCWWIC3EV**.

Deviation from measurement procedure.....None

3.2 Radiated Emissions

Radiated power measurements are performed on the 3 meter OATS per the guidelines of ANSI/TIA-603-C-2004. The measurement area is situated on an 18 meter x 20 meter galvanized 1/2" hardware cloth as the conducting ground plane. This material is sewn together in sections 4 feet wide and 60 feet long. A total of eighteen sections are required to cover the entire measurement area. Sections are laid across the width of the pad, overlapped 1" and sewn and soldered together at intervals of 3" (7.6 cm.) The terrain of the test site is reasonably flat and level. Power and cable to the test site are buried 18" deep into the ground outside the perimeter of the site. An all-weather non-metallic housing is situated on a 2 x 3 meter area adjacent to the measurement area to house the test equipment.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

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4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The 900MHz antenna of the Elster EA_Gatekeeper with Wireless WIC3G is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The **Elster EA_Gatekeeper with Wireless WIC3G FCC ID: QZCWWIC3EV** unit complies with the requirement of §15.203.

Ch.	Frequency (MHz)
1	902.8
:	:
31	914.8
:	:
63	927.6

Table 4-1. Frequency/ Channel Operations

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	10/24/2014	Annual	10/24/2015	N/A
Agilent	8447D	Broadband Amplifier	6/2/2014	Annual	6/2/2015	1937A03348
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/28/2014	Annual	10/28/2015	3613A00315
Agilent	N9030A	PXA Signal Analyzer (26.5GHz)	6/8/2014	Annual	6/8/2015	MY49432391
Anritsu	ML2495A	Power Meter	10/31/2013	Biennial	10/31/2015	941001
Anritsu	MA2411B	Pulse Sensor	4/8/2014	Biennial	4/8/2016	846215
Com-Power	PAM-118A	Pre-Amplifier	4/10/2015	Annual	4/10/2016	551042
Emco	6502	Active Loop Antenna (10k - 30 MHz)	6/24/2014	Biennial	6/24/2016	267
K & L	11SH10	Band Pass Filter	N/A	Annual	N/A	1300/4000
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
Sunol	DRH-118	Horn Antenna (1-18 GHz)	6/19/2013	Biennial	6/19/2015	A042511
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/28/2014	Biennial	1/28/2016	A051107
VWR	62344-734	Thermometer with Clock	2/20/2014	Biennial	2/20/2016	140140336

Table 5-1. Annual Test Equipment Calibration Schedule

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6.0 TEST RESULTS

6.1 Summary

Company Name: Elster Solutions, LLC
 FCC ID: QZCWWIC3EV
 Method/System: Frequency Hopping Spread Spectrum (FHSS)
 Number of Channels: 50 channels (25 per network)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (Tx)					
15.205, 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	RADIATED	PASS	Section 6.2

Table 6-1. Summary of Test Results

Notes:

- All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.

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6.2 Radiated Spurious Emission Measurements

§15.247 (d), §15.205, §15.209

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 6-2. Radiated Limits

Sample Calculation

- o Field Strength Level $_{[dB\mu V/m]} = \text{Analyzer Level }_{[dBm]} + 107 + \text{AFCL }_{[dB/m]} + \text{Duty Cycle Correction }_{[dB]}$
- o $\text{AFCL }_{[dB/m]} = \text{Antenna Factor }_{[dB/m]} + \text{Cable Loss }_{[dB]}$
- o $\text{Margin }_{[dB]} = \text{Field Strength Level }_{[dB\mu V/m]} - \text{Limit }_{[dB\mu V/m]}$

Test Notes

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 6-2.
2. Average measurements > 1GHz using RBW = 1MHz and VBW = 1kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = 1MHz and VBW = 3MHz. Both average and peak measurements were made using a peak detector.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested while powered by an AC power source.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. Emissions whose levels were not within 20dB of the respective limits were not reported.
6. Average levels at -135 dBm and peak levels at -125dBm represent the analyzer noise floor and signify that no emission was detected.

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Radiated Spurious Emission Measurements (Cont'd)

§15.247 (d) / §15.205 & §15.209

Mode: Continuous Tx
 Measurement Distance: 3 Meters
 Operating Frequency: 902.8MHz
 Channel: 1

FREQ [MHz]	Detector Type	Analyzer Level [dBm]	POL [H/V]	AFCL [dBm]	Field Strength [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
2708.4	Avg	-101.49	H	34.86	40.37	53.979	-13.61
2708.4	Peak	-90.99	H	34.86	50.87	73.979	-23.11
3611.2	Avg	-105.05	H	38.17	40.12	53.979	-13.86
3611.2	Peak	-92.63	H	38.17	52.54	73.979	-21.44
4514	Avg	-103.35	H	40.52	44.17	53.979	-9.81
4514	Peak	-93.13	H	40.52	54.39	73.979	-19.59
5416.8	Avg	-100.35	H	42.94	49.59	53.979	-4.39
5416.8	Peak	-92.98	H	42.94	56.96	73.979	-17.02

Table 6-3. Radiated Measurements

Mode: Continuous Tx
 Measurement Distance: 3 Meters
 Operating Frequency: 914.8MHz
 Channel: 31

FREQ [MHz]	Detector Type	Analyzer Level [dBm]	POL [H/V]	AFCL [dBm]	Field Strength [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
2744.4	Avg	-100.61	H	34.79	41.18	53.979	-12.80
2744.4	Peak	-90.71	H	34.79	51.08	73.979	-22.90
3659.2	Avg	-103.68	H	38.49	41.81	53.979	-12.17
3659.2	Peak	-92.09	H	38.49	53.40	73.979	-20.58
4574	Avg	-100.39	H	40.85	47.46	53.979	-6.52
4574	Peak	-91.49	H	40.85	56.36	73.979	-17.62
7318.4	Avg	-108.15	H	47.14	45.99	53.979	-7.99
7318.4	Peak	-96.18	H	47.14	57.96	73.979	-16.02

Table 6-4. Radiated Measurements

Radiated Spurious Emission Measurements (Cont'd)

§15.247 (d) / §15.205 & §15.209

Mode: Continuous Tx
 Measurement Distance: 3 Meters
 Operating Frequency: 927.6MHz
 Channel: 63

FREQ [MHz]	Detector Type	Analyzer Level [dBm]	POL [H/V]	AFCL [dBm]	Field Strength [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
2782.8	Avg	-93.55	H	34.81	48.26	53.979	-5.72
2782.8	Peak	-88.00	H	34.81	53.81	73.979	-20.17
3710.4	Avg	-104.94	H	38.76	40.82	53.979	-13.16
3710.4	Peak	-93.07	H	38.76	52.69	73.979	-21.29
4638	Avg	-101.85	H	40.88	46.03	53.979	-7.95
4638	Peak	-93.07	H	40.88	54.81	73.979	-19.17
7420.8	Avg	-108.48	H	47.10	45.62	53.979	-8.36
7420.8	Peak	-96.63	H	47.10	57.47	73.979	-16.51

Table 6-5. Radiated Measurements

7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Elster EA_Gatekeeper with Wireless WIC3G FCC ID: QZCWWIC3EV** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules.

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