

# FCC PART 15B

## Receiver Certification

### Test Report

Models:

**GMN-00831, GMN-00871**

FOR

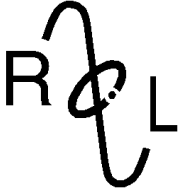
**Garmin International, Inc.**

1200 East 151<sup>st</sup> Street  
Olathe, KS 66062

Test Report Number: 151105

Authorized Signatory *Scot D. Rogers*

Scot D. Rogers



*Rogers Labs, Inc.*

4405 West 259<sup>th</sup> Terrace  
Louisburg, KS 66053  
913 837-3214

**FCC Part 15 B  
Receiver Certification  
Test Report**

**Electromagnetic Interference Test Results**

FOR

**Garmin International, Inc.**

1200 East 151<sup>st</sup> Street  
Olathe, KS 66062

Models: GMN-00831, GMN-00871

Frequency Range: 75 MHz

Test Date: November 5, 2015

Certification Date: November 5, 2015

Certifying Engineer: *Scot D. Rogers*

Scot D. Rogers  
Rogers Labs, Inc.  
4405 W. 259th Terrace  
Louisburg, KS 66053  
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Rogers Labs, Inc.  
4405 W. 259th Terrace  
Louisburg, KS 66053  
Phone/Fax: (913) 837-3214  
Revision 1

Garmin International, Inc.  
Models: GMN-00831, GMN-00871  
Test #: 151105  
Test to: 47CFR15B  
File: Garmin 0163700 Rx TstRpt 151105

FCC ID: IPH-0163700  
SN: 1YQ200000  
Date: November 12, 2015  
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**Revisions**

Revision 1 Issued November 12, 2015

## Applicable Standards & Test Procedures

This equipment is not subject to the transition provisions authorized under part 15.37 of the 47CFR. In accordance with the Code of Federal Regulations, Telecommunications Title 47 dated October 1, 2014, Part 2, Paragraphs 2.902, 2.951 through 2.956, and Part 15, Paragraphs 15.1 through 15.21, 15.31, 15.33, 15.35, 15.101(b), 15.109(a), 15.111 the following information is submitted. Test procedures used are the established American National Standard for Methods of Measurement of Radio-Noise Emissions as described in the ANSI C63.4-2014 Document.

## Opinion / Interpretation of Results

Tests Performed	Margin (dB)	Results
Radiated Emissions	-11.0	Complies
Antenna Port Conducted Emissions	-3.2	Complies

## Equipment Tested

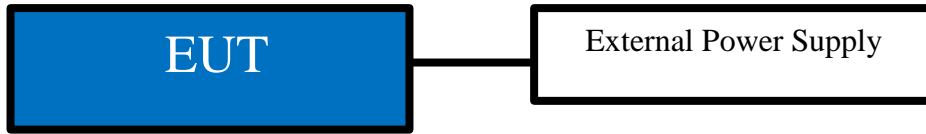
<u>Equipment</u>	<u>Model / PN</u>	<u>Serial Number</u>
EUT	GMN-00831	1YQ200000
Dc Supply	BK/1670A	N961313540

Test results in this report relate only to the items tested

## Equipment Function and Configuration

The EUT is a 75 MHz frequency receiver for in avionic applications. The EUT receives signals from ground stations associated with the Instrument Landing System (ILS) providing pilot guidance information to aircraft cockpit. The unit operates from direct current power supplied from the aircraft only and offers no provision for connection to utility power systems. The unit was powered from an external direct current bench power supply during emissions testing. The equipment is regulated under CFR47 Rule of Parts 2 and 15(B). The unit offers provision to connect to the antenna connection port for direct antenna port conducted emissions testing. Test results in this report relate only to the products described in this report.

## **Equipment Configuration**



## **General Information: Model GMN-00831, GMN-00871**

### ***Name of Manufacturer***

Garmin International, Inc.

1200 East 151<sup>st</sup> Street

Olathe, KS 66062

Garmin International, Inc. is the manufacturer of the equipment.

### ***Technical Information***

Frequency Range 75 MHz.

### ***FCC Identification***

The unit requires the FCC/ Industry Canada identification labeling for receiver as required under 47CFR paragraph 15.

### ***Device Description and Use***

The EUT is a 75 MHz receiver used in aircraft installations. The design provides reception of guidance signaling received from ground stations for use in assisting pilot with aircraft position.

The receiver is governed under 47CFR Rule of Parts 2 and 15 for receiver.

## Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to meet the 47CFR Part 15B emissions requirements. There were no deviations to the specifications.

## Units of Measurements

Conducted EMI      Data is in dB $\mu$ V; dB referenced to one microvolt.

Radiated EMI      Data is in dB $\mu$ V/m; dB/m referenced to one microvolt per meter.

## Test Site Locations

Radiated EMI      The radiated emissions tests were performed at the 3 meters, Open Area Test Site (OATS) located at Rogers Labs, Inc., 4405 W. 259<sup>th</sup> Terrace, Louisburg, KS.

Site Registration      Refer to Annex for FCC Site Registration Letter, # 90910 and Industry Canada 3041A-1

NVLAP      Lab code 200087-0

## Environmental Conditions

Ambient Temperature	21.9° C
Relative Humidity	37%
Atmospheric Pressure	1020.7 mb

## **Equipment Testing Procedures**

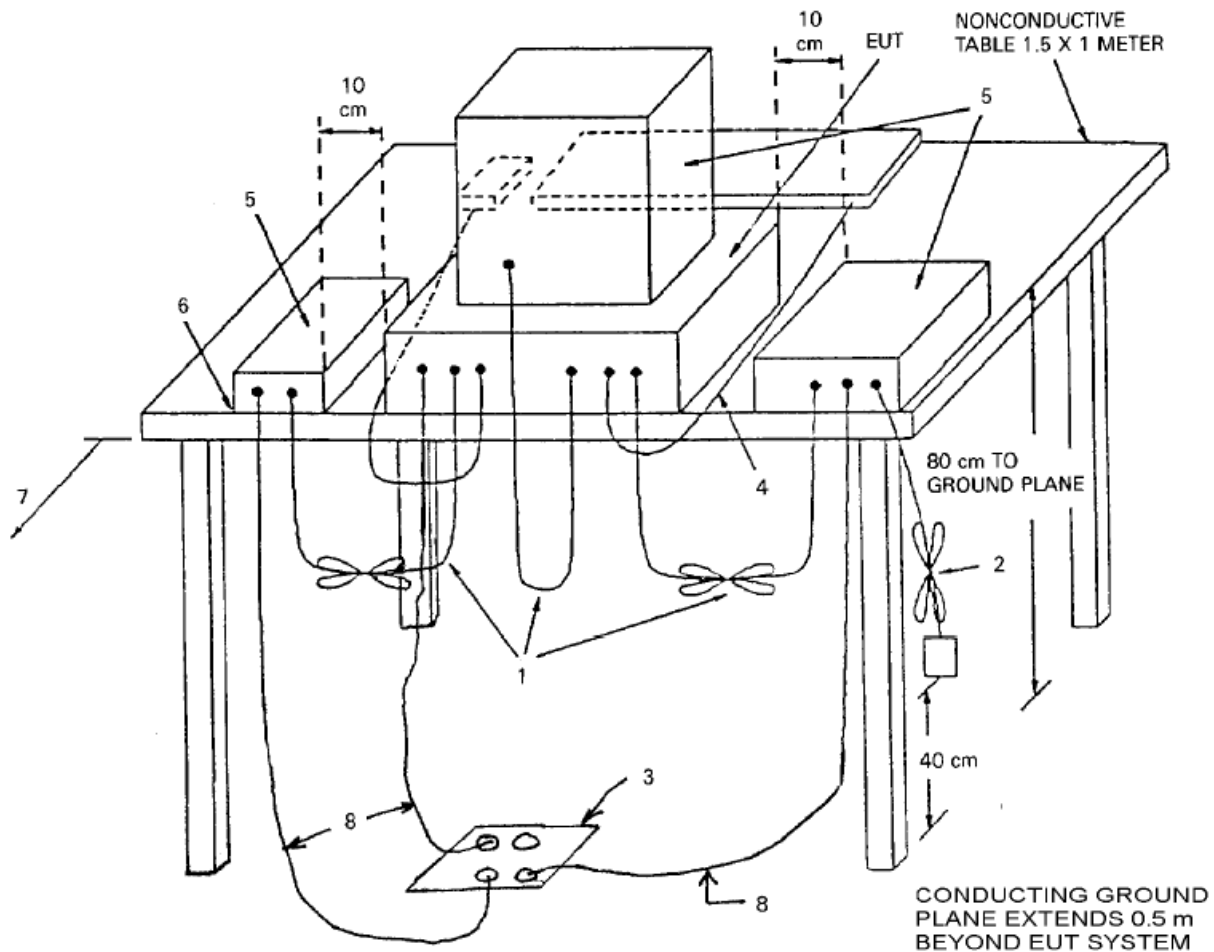
### ***AC Line Conducted Emission Test Procedure***

The EUT operates from DC power only received from the Direct Current power from internal replaceable battery. Therefore, no AC power line conducted emissions testing was required or performed.

### ***Radiated Emission Test Procedure***

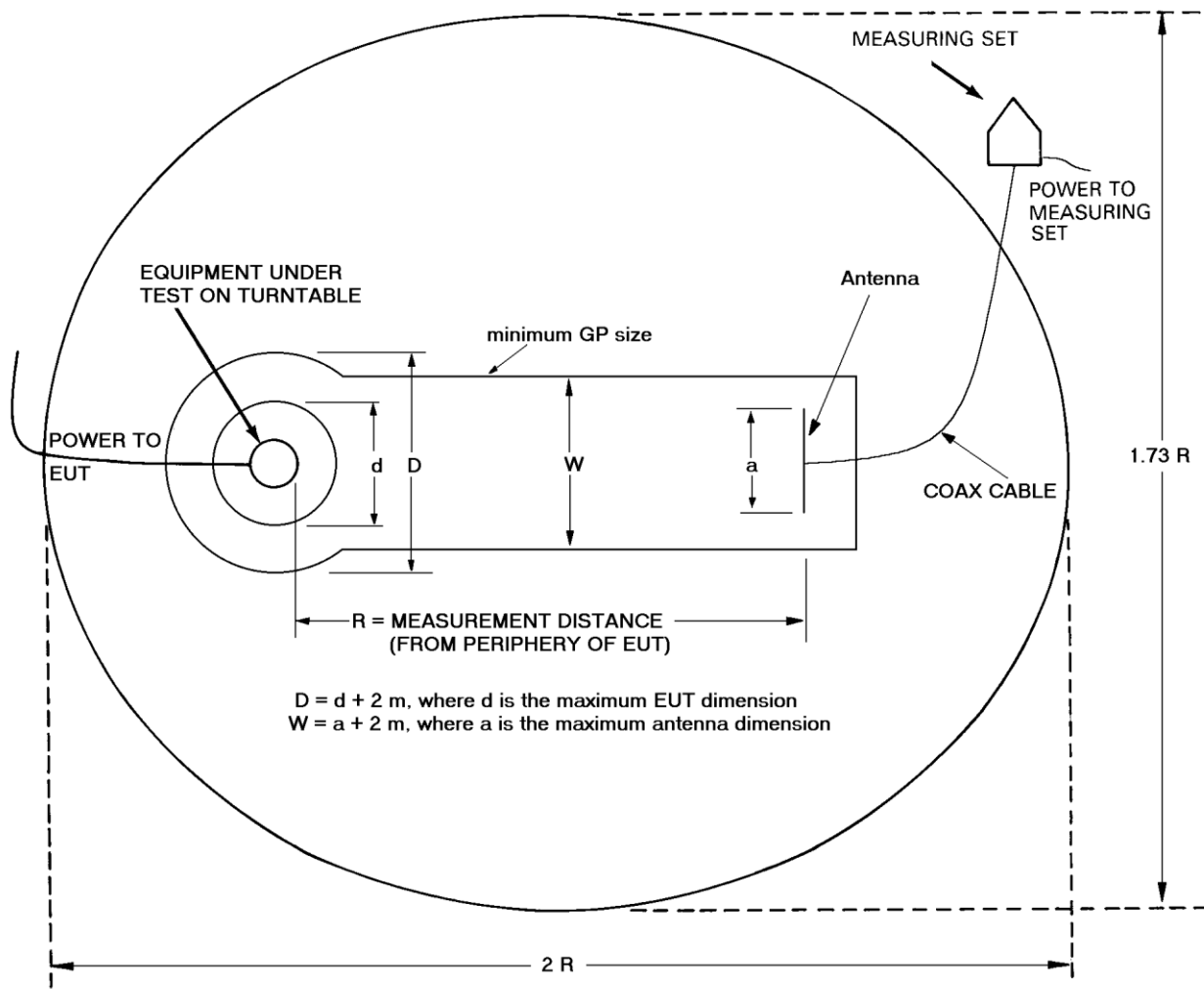
The EUT was placed on a rotating 1 x 1.5-meter platform, elevated as required above the ground plane at a distance of 3 meters from the FSM antenna. Radiated emissions testing were performed as required in 47CFR 15 and specified in ANSI C63.4-2014. EMI energy was maximized by equipment placement, raising and lowering the FSM antenna, changing the antenna polarization, and by rotating the turntable. Each emission was maximized before data was taken using a spectrum analyzer. The frequency spectrum from 9 kHz to 6,000 MHz was searched for during preliminary investigation. Refer to diagrams one and two showing typical test arrangement and photographs in the test setup exhibits for specific EUT placement during testing.





1. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center, forming a bundle 30 cm to 40 cm long.
2. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance. The total length shall not exceed 1 m.
3. If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground plane with the receptacle flush with the ground plane.
4. Cables of hand-operated devices, such as keyboards, mice, and so on, shall be placed as for normal use.
5. Non-EUT components of EUT system being tested.
6. Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop (possibly center of table for transmitter equipment).
7. No vertical conducting plane used.
8. Power cords drape to the floor and are routed over to receptacle.

**Diagram 1 Test arrangement for radiated emissions of tabletop equipment**



AREA DIMENSIONS =	R = 3m	R = 10 m	R = 30 m
	6 m x 5.2 m	20 m x 17.3 m	60 m x 52 m

Frequency: 9 kHz-30 MHz	Frequency: 30 MHz- 1 GHZ	Frequency: Above 1 GHz
Loop Antenna	Broadband Biconilog	Horn
RBW = 9 kHz	RBW = 120 kHz	RBW = 1 MHz
VBW = 30 kHz	VBW = 120 kHz	VBW = 1 MHz
Sweep time = Auto	Sweep time = Auto	Sweep time = Auto
Detector = PK, QP	Detector = PK, QP	Detector = PK, AV
Antenna Height 1m	Antenna Height 1-4m	Antenna Height 1-4m

**Diagram 2 Test arrangement for radiated emissions tested on Open Area Test Site (OATS)**

## List of Test Equipment

A Rohde and Schwarz ESU40 and/or Hewlett Packard 8591EM was used as the measuring device for the emissions testing of frequencies below 1 GHz. A Rohde and Schwarz ESU40 and/or Hewlett Packard 8562A Spectrum Analyzer was used as the measuring device for testing the emissions at frequencies above 1 GHz. The analyzer settings used are described in the following table. Refer to the appendix for a complete list of test equipment.

AC Line Conducted Emissions (0.150 -30 MHz)		
RBW	AVG. BW	Detector Function
9 kHz	30 kHz	Peak / Quasi Peak
Emissions (30-1000 MHz)		
RBW	AVG. BW	Detector Function
120 kHz	300 kHz	Peak / Quasi Peak
Emissions (Above 1000 MHz)		
RBW	Video BW	Detector Function
100 kHz	100 kHz	Peak
1 MHz	1 MHz	Peak / Average

<u>Equipment</u>	<u>Manufacturer</u>	<u>Model (SN)</u>	<u>Band</u>	<u>Cal Date</u>	<u>Due</u>
<input type="checkbox"/> LISN	FCC	FCC-LISN-50-2-10(1PA) (160611)	.15-30MHz	6/15	5/16
<input checked="" type="checkbox"/> Cable	Time Microwave	750HF290-750 (L10M)	9kHz-40 GHz	10/15	10/16
<input type="checkbox"/> Cable	Belden	RG-58 (L1-CAT3-11509)	9kHz-30 MHz	10/15	10/16
<input type="checkbox"/> Cable	Belden	RG-58 (L2-CAT3-11509)	9kHz-30 MHz	10/15	10/16
<input type="checkbox"/> Antenna	ARA	BCD-235-B (169)	20-350MHz	10/15	10/16
<input type="checkbox"/> Antenna	EMCO	3147 (40582)	200-1000MHz	10/15	10/16
<input checked="" type="checkbox"/> Antenna	ETS-Lindgren	3117 (200389)	1-18 GHz	5/15	5/17
<input type="checkbox"/> Antenna	Com Power	AH-118 (10110)	1-18 GHz	10/15	10/16
<input type="checkbox"/> Antenna	Com Power	AH-840 (101046)	18-40 GHz	5/15	5/17
<input checked="" type="checkbox"/> Antenna	EMCO	6509 (9502-1374)	.001-30 MHz	10/15	10/16
<input checked="" type="checkbox"/> Antenna	Sunol	JB-6 (A100709)	30-1000 MHz	10/15	10/16
<input type="checkbox"/> Antenna	EMCO	3143 (9607-1277)	20-1200 MHz	5/15	5/16
<input type="checkbox"/> Analyzer	HP	8591EM (3628A00871)	9kHz-1.8GHz	5/15	5/16
<input type="checkbox"/> Analyzer	HP	8562A (3051A05950)	9kHz-110GHz	5/15	5/16
<input type="checkbox"/> Analyzer	HP External Mixers	11571, 11970	25GHz-110GHz	5/15	5/16
<input checked="" type="checkbox"/> Analyzer	Rohde & Schwarz	ESU40 (100108)	20Hz-40GHz	5/15	5/16
<input checked="" type="checkbox"/> Amplifier	Com-Power	PA-010 (171003)	100Hz-30MHz	10/15	10/16
<input checked="" type="checkbox"/> Amplifier	Com-Power	CPPA-102 (01254)	1-1000 MHz	10/15	10/16
<input checked="" type="checkbox"/> Amplifier	Com-Power	PAM-118A (551014)	0.5-18 GHz	10/15	10/16

## AC Line Conducted Emissions Procedure

The EUT operates from DC power only received from the Direct Current power from internal replaceable battery. Therefore, no AC power line conducted emissions testing was required or performed.

## Radiated Emissions Interference

The EUT was arranged as manufacturer directed and operated through defined modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies that produced the highest emissions. The frequency spectrum from 9 kHz to 6,000 MHz was searched for radiated emissions. The EUT, supporting equipment, and cable locations were noted and reconfigured at the open area test site during final emissions testing. Each radiated emission was maximized at this location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the open area test site at a distance of 3 meters between the EUT and the receiving antenna. Measured emission levels were maximized by EUT placement on the table, changing cable location, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna polarization between horizontal and vertical. Antennas used during testing included, loop, Broadband Biconical, Log Periodic, Biconilog, Double Ridge Horns, and pyramidal horns.

**Table 1 Radiated Emissions Data**

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Quasi-Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Quasi-Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)
89.8	32.7	26.1	N/A	27.0	24.1	N/A	43.5
205.0	26.1	20.9	N/A	20.3	17.4	N/A	43.5
208.9	30.7	27.5	N/A	24.7	22.0	N/A	43.5
210.2	32.7	30.0	N/A	26.1	24.0	N/A	43.5
215.5	34.1	31.8	N/A	27.0	24.8	N/A	43.5
217.0	34.9	33.6	N/A	25.5	23.5	N/A	46.0
218.1	36.2	35.0	N/A	24.4	22.3	N/A	46.0
218.3	34.1	31.8	N/A	24.3	21.4	N/A	46.0
219.3	35.8	32.1	N/A	25.5	22.2	N/A	46.0
221.9	34.2	32.6	N/A	23.8	21.7	N/A	46.0
89.8	32.7	26.1	N/A	27.0	24.1	N/A	43.5

Other emissions present had amplitudes at least 20 dB below the limit.

Peak and Quasi-Peak amplitude emissions are recorded above for frequency range of below 1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

## Antenna Power Conduction Limits for Receivers

Receivers which provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of 15.109 with the antenna terminals shielded and terminated with a termination equal to the impedance specified for the antenna, provided these receivers also comply with the following: With the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in 15.33 shall not exceed 2.0 nanowatts (-57 dBm). The antenna port was connected to a spectrum analyzer for testing the antenna-conducted emissions. The antenna connection under test was connected to the spectrum analyzer through a short coaxial cable. The spectrum analyzer provided the 50-ohm load for the antenna port. The frequency spectrum was investigated at the antenna port with the worst case data presented. Refer to figures seven and eight showing the spectrum analyzer display of worst-case antenna conduction emissions.

**Table 2 Antenna Conducted Emissions Measurements**

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
516.0	-72.40	-57.0	-15.4
589.8	-75.65	-57.0	-18.7
635.9	-75.23	-57.0	-18.2
645.1	-60.21	-57.0	-3.2
903.1	-75.05	-57.0	-18.1
967.7	-75.70	-57.0	-18.7
1032.0	-71.94	-57.0	-14.9
1078.3	-75.60	-57.0	-18.6
1290.0	-71.49	-57.0	-14.5
2580.4	-85.65	-57.0	-28.7

Other emissions present had amplitudes at least 20 dB below the limit.

## Summary of Results

### ***AC Line Conducted Emissions Results***

The EUT operates from DC power only received from the Direct Current power supplied from aircraft installation. Therefore, no AC power line conducted emissions testing was required or performed. The EUT demonstrated compliance with the AC Line Conducted Emissions requirements of 47CFR Part 15B.

### ***Summary of Results of Radiated Emissions***

The EUT demonstrated compliance with the Radiate Emissions requirements of 47CFR Part 15B and other applicable Class B emissions requirements. The EUT demonstrated compliance with the radiated emissions requirements of 47CFR Part 15B with a -11.0 dB minimum margin below requirements. Other emissions were present with amplitudes at least 20 dB below Class B limits.

### ***Antenna Port Conducted Emissions***

The EUT demonstrated compliance with the antenna conducted emissions requirements of 47CFR Part 15B. The EUT demonstrated a minimum margin of -3.2 dB below the antenna port conducted emission limit. Other emissions were present with amplitudes at least 20 dB below the CFR47 15B.

## Conclusion

Receiver Models, GMN-00831, GMN-00871, complies with the requirements of 47CFR Part 15, Subpart B Regulations. No modifications to the EUT were required for the unit to demonstrate compliance with the requirements. There were no deviations or exceptions to the specifications.

## Annex

- Annex A Measurement Uncertainty Calculations
- Annex B Rogers Labs Test Equipment List
- Annex C Rogers Qualifications
- Annex D FCC Site Registration Letter
- Annex E Industry Canada Site Registration Letter



### **Annex A Measurement Uncertainty Calculations**

Measurement uncertainty calculations were made for the laboratory. Result of measurement uncertainty calculations are recorded below for AC line conducted and radiated emission measurements.

Measurement Uncertainty	$U_{(E)}$	$U_{(lab)}$
3 Meter Horizontal 30-200 MHz Measurements	2.08	4.16
3 Meter Vertical 30-200 MHz Measurements	2.16	4.33
3 Meter Vertical Measurements 200-1000 MHz	2.99	5.97
10 Meter Horizontal Measurements 30-200 MHz	2.07	4.15
10 Meter Vertical Measurements 30-200 MHz	2.06	4.13
10 Meter Horizontal Measurements 200-1000 MHz	2.32	4.64
10 Meter Vertical Measurements 200-1000 MHz	2.33	4.66
3 Meter Measurements 1-6 GHz	2.57	5.14
3 Meter Measurements 6-18 GHz	2.58	5.16
AC Line Conducted	1.72	3.43

**Annex B Rogers Labs Test Equipment List**

List of Test Equipment	Calibration	<u>Date</u>	<u>Due</u>
Spectrum Analyzer: Rohde & Schwarz ESU40		5/15	5/16
Spectrum Analyzer: HP 8562A, HP Adapters: 11518, 11519, and 11520		5/15	5/16
Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W			
Spectrum Analyzer: HP 8591EM		5/15	5/16
Antenna: EMCO Biconilog Model: 3143		5/15	5/16
Antenna: Sunol Biconilog Model: JB6		10/15	10/16
Antenna: EMCO Log Periodic Model: 3147		10/15	10/16
Antenna: Com Power Model: AH-118		10/15	10/16
Antenna: Com Power Model: AH-840		5/15	5/17
Antenna: Antenna Research Biconical Model: BCD 235		10/15	10/16
Antenna: EMCO 6509		10/15	10/16
LISN: Compliance Design Model: FCC-LISN-2.Mod.cd, 50 µHy/50 ohm/0.1 µf		10/15	10/16
R.F. Preamp CPPA-102		10/15	10/16
Attenuator: HP Model: HP11509A		10/15	10/16
Attenuator: Mini Circuits Model: CAT-3		10/15	10/16
Attenuator: Mini Circuits Model: CAT-3		10/15	10/16
Cable: Belden RG-58 (L1)		10/15	10/16
Cable: Belden RG-58 (L2)		10/15	10/16
Cable: Belden 8268 (L3)		10/15	10/16
Cable: Time Microwave: 4M-750HF290-750		10/15	10/16
Cable: Time Microwave: 10M-750HF290-750		10/15	10/16
Frequency Counter: Leader LDC825		2/15	2/16
Oscilloscope Scope: Tektronix 2230		2/15	2/16
Wattmeter: Bird 43 with Load Bird 8085		2/15	2/16
Power Supplies: Sorensen SRL 20-25, SRL 40-25, DCR 150, DCR 140		2/15	2/16
R.F. Generators: HP 606A, HP 8614A, HP 8640B		2/15	2/16
R.F. Power Amp 65W Model: 470-A-1010		2/15	2/16
R.F. Power Amp 50W M185- 10-501		2/15	2/16
R.F. Power Amp A.R. Model: 10W 1010M7		2/15	2/16
R.F. Power Amp EIN Model: A301		2/15	2/16
LISN: Compliance Eng. Model 240/20		2/15	2/16
LISN: Fischer Custom Communications Model: FCC-LISN-50-16-2-08		2/15	2/16
Antenna: EMCO Dipole Set 3121C		2/15	2/16
Antenna: C.D. B-101		2/15	2/16
Antenna: Solar 9229-1 & 9230-1		2/15	2/16
Audio Oscillator: H.P. 201CD		2/15	2/16
ELGAR Model: 1751		2/15	2/16
ELGAR Model: TG 704A-3D		2/15	2/16
ESD Test Set 2010i		2/15	2/16
Fast Transient Burst Generator Model: EFT/B-101		2/15	2/16
Field Intensity Meter: EFM-018		2/15	2/16
KEYTEK Ecat Surge Generator		2/15	2/16
Shielded Room 5 M x 3 M x 3.0 M			

## **Annex C Rogers Qualifications**

***Scot D. Rogers, Engineer***

### **Rogers Labs, Inc.**

Mr. Rogers has approximately 17 years' experience in the field of electronics. Work experience includes six years working in the automated controls industry and remaining years working with the design, development and testing of radio communications and electronic equipment.

#### Positions Held:

Systems Engineer: A/C Controls Mfg. Co., Inc. 6 Years

Electrical Engineer: Rogers Consulting Labs, Inc. 5 Years

Electrical Engineer: Rogers Labs, Inc. Current

#### Educational Background:

- 1) Bachelor of Science Degree in Electrical Engineering from Kansas State University
- 2) Bachelor of Science Degree in Business Administration Kansas State University
- 3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.



NVLAP Lab Code 200087-0

**Annex D FCC Test Site Registration Letter**

**FEDERAL COMMUNICATIONS COMMISSION**

**Laboratory Division  
7435 Oakland Mills Road  
Columbia, MD 21046**

April 16, 2015

Registration Number: 90910

Rogers Labs, Inc.  
4405 West 259th Terrace  
Louisburg, KS 66053

Attention: Scot Rogers,

Re: Measurement facility located at Louisburg  
3 & 10 meter site  
Date of Renewal: April 16, 2015

Dear Sir or Madam:

Your request for renewal of the registration of the subject measurement facility has been received. The information submitted has been placed in your file and the registration has been renewed. The name of your organization will remain on the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website [www.fcc.gov](http://www.fcc.gov) under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

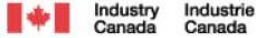
Phyllis Parrish  
Industry Analyst

Rogers Labs, Inc.  
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Garmin International, Inc.  
Models: GMN-00831, GMN-00871  
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File: Garmin 0163700 Rx TstRpt 151105

FCC ID: IPH-0163700  
SN: 1YQ200000  
Date: November 12, 2015  
Page 20 of 21

## Annex E Industry Canada Test Site Registration Letter



June 19, 2013

OUR FILE: 46405-3041  
Submission No: 168037

Rogers Labs Inc.  
4405 West 259th Terrace  
Louisburg  
KS, USA  
66053

**Attention:** Mr. Scot D. Rogers

Dear Sir:

The Bureau has received your application for the renewal of 3/10m OATS. Be advised that the information received was satisfactory to Industry Canada. The following number(s) is now associated to the site(s) for which registration / renewal was sought (**Site# 3041A-1**). Please reference the appropriate site number in the body of test reports containing measurements performed on the site. In addition, please keep for your records the following information;

- The company address code associated to the site(s) located at the above address is: **3041A**

Furthermore, to obtain or renew a unique site number, the applicant shall demonstrate that the site has been accredited to ANSI C63.4-2003 or later. A scope of accreditation indicating the accreditation by a recognized accreditation body to ANSI C63.4-2003 or later shall be accepted. Please indicate in a letter the previous assigned site number if applicable and the type of site (example: 3 metre OATS or 3 metre chamber). If the test facility is not accredited to ANSI C63.4-2003 or later, the test facility shall submit test data demonstrating full compliance with the ANSI standard. The Bureau will evaluate the filing to determine if recognition shall be granted.

The frequency for re-validation of the test site and the information that is required to be filed or retained by the testing party shall comply with the requirements established by the accrediting organization. However, in all cases, test site re-validation shall occur on an interval not to **exceed three years**. There is no fee or form associated with an OATS filing. OATS submissions are encouraged to be submitted electronically to the Bureau using the following URL;  
[http://strategis.ic.gc.ca/epic/internet/inceb-bhst.nsf/en/h\\_tt00052e.html](http://strategis.ic.gc.ca/epic/internet/inceb-bhst.nsf/en/h_tt00052e.html).

If you have any questions, you may contact the Bureau by e-mail at [certification.bureau@ic.gc.ca](mailto:certification.bureau@ic.gc.ca) Please reference our file and submission number above for all correspondence.

Yours sincerely,

A handwritten signature in black ink that reads "Bill Payn".

Bill Payn  
For: Wireless Laboratory Manager  
Certification and Engineering Bureau  
3701 Carling Ave., Building 94  
P.O. Box 11490, Station "H"  
Ottawa, Ontario K2H 8S2  
Email: [Bill.Payn@ic.gc.ca](mailto:Bill.Payn@ic.gc.ca)  
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Rogers Labs, Inc.  
4405 W. 259th Terrace  
Louisburg, KS 66053  
Phone/Fax: (913) 837-3214  
Revision 1

Garmin International, Inc.  
Models: GMN-00831, GMN-00871  
Test #: 151105  
Test to: 47CFR15B  
File: Garmin 0163700 Rx TstRpt 151105

FCC ID: IPH-0163700  
SN: 1YQ200000  
Date: November 12, 2015  
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