

AUT Report


Prepared for: **Garmin International Inc.**

Address: **1200 E. 151st Street**
 Olathe, Kansas, 66062, USA

Product: **A04448**

Test Report No: **R20230808-00-A1**

Approved by:


Fox Lane,
EMC Test Engineer

DATE: **September 29, 2023**

Total Pages: **10**

The Nebraska Center for Excellence in Electronics (NCEE) authorizes the above-named company to reproduce this report provided it is reproduced in its entirety for use by the company's employees only. Any use that a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. NCEE accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This report applies only to the items tested.



Report Number:	R20230808-00-A1	Rev	0
Prepared for:	Garmin International Inc.		

REVISION PAGE

Rev. No.	Date	Description
0	29 September 2023	Issued by FLane Prepared by FLane



Report Number:	R20230808-00-A1	Rev	0
Prepared for:	Garmin International Inc.		

CONTENTS

Revision Page 2

1.0 Summary of test results..... 4

2.0 EUT Description..... 4

2.1 Equipment under test 4

3.0 Laboratory and General Test Description 5

3.1 Laboratory description..... 5

3.2 Test personnel..... 5


3.3 Test equipment..... 6

3.4 General Test Procedure and Setup for Radio Measurements..... 7

4.0 Results 8

4.1 Antenna Gain 8

REPORT END..... 10

	Report Number:	R20230808-00-A1	Rev	0
	Prepared for:	Garmin International Inc.		

1.0 SUMMARY OF TEST RESULTS

Antenna Gain Measurements were reported for 2.4GHz band.

2.0 EUT DESCRIPTION

2.1 EQUIPMENT UNDER TEST

Summary and Operating Condition:

The Equipment Under Test (EUT) was a transceiver manufactured by Garmin International Inc.

EUT	A04448
FCC ID:	IPH-04448
EUT Received	28 August 2023
EUT Tested	28 August 2023- 14 September 2023
Serial No.	3451928865 (Radiated Measurements) 3451928690 (Conducted Measurements)
Operating Band	2400 – 2483.5 MHz
Device Type	<input checked="" type="checkbox"/> GMSK <input checked="" type="checkbox"/> GFSK <input checked="" type="checkbox"/> BT <input checked="" type="checkbox"/> BT EDR 2MB <input checked="" type="checkbox"/> BT EDR 3MB <input checked="" type="checkbox"/> 802.11x
Power Supply / Voltage	Internal Battery / 5VDC Charger: Garmin (Phi Hong) Model: AQ27A-59CFA GPN: 362-00118-00 (Representative Power Supply)
Antenna Gain (dBi)	-3.58, PCB Antenna

NOTE: For more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.0 LABORATORY AND GENERAL TEST DESCRIPTION

3.1 LABORATORY DESCRIPTION

All testing was performed at the following Facility:

The Nebraska Center for Excellence in Electronics (NCEE Labs)
 4740 Discovery Drive
 Lincoln, NE 68521

A2LA Certificate Number:	1953.01
FCC Accredited Test Site Designation No:	US1060
Industry Canada Test Site Registration No:	4294A
NCC CAB Identification No:	US0177

Environmental conditions varied slightly throughout the tests:

Relative humidity of $35 \pm 4\%$
 Temperature of $22 \pm 3^\circ$ Celsius



3.2 TEST PERSONNEL

No.	PERSONNEL	TITLE	ROLE
1	Fox Lane	Test Engineer	Testing and report
2	Ethan Schmidt	Test Technician	Testing

Notes:

All personnel are permanent staff members of NCEE Labs. No testing or review was sub-contracted or performed by sub-contracted personnel.



Report Number:	R20230808-00-A1	Rev	0
Prepared for:	Garmin International Inc.		

3.3 TEST EQUIPMENT

DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE	CALIBRATION DUE DATE
Keysight MXE Signal Analyzer (26.5GHz)	N9038A	MY56400083	July 17, 2023	July 17, 2025
Keysight EXA Signal Analyzer	N9010A	MY56070862	July 18, 2023	July 17, 2025
ETS-Lindgren Red Horn Antenna	3115	218576	July 31, 2023	July 30, 2024
ETS – Lindgren- VSWR on 10m Chamber	10m Semi-anechoic chamber-VSWR	4740 Discovery Drive	July 30, 2020	July 30, 2024
NCEE Labs-NSA on 10m Chamber*	10m Semi-anechoic chamber-NSA	NCEE-001	May 25, 2022	May 25, 2025
RF Cable (antenna to 10m chamber bulkhead)	FSCM 64639	01E3872	June 5, 2023	June 5, 2025
RF Cable (10m chamber bulkhead to control room bulkhead)	FSCM 64639	01E3874	June 5, 2023	June 5, 2025
RF Cable (control room bulkhead to test receiver)	FSCM 64639	01F1206	June 5, 2023	June 5, 2025
N connector bulkhead (10m chamber)	PE9128	NCEEBH1	June 5, 2023	June 5, 2025
N connector bulkhead (control room)	PE9128	NCEEBH2	June 5, 2023	June 5, 2025
TDK Emissions Lab Software	V11.25	700307	NA	NA

*Internal Characterization
 **2 Year Cal Cycle

Notes:

All equipment is owned by NCEE Labs and stored permanently at NCEE Labs facilities.

3.4 GENERAL TEST PROCEDURE AND SETUP FOR RADIO MEASUREMENTS

Measurement type presented in this report (Please see the checked box below):

Conducted

The conducted measurements were performed by connecting the output of the transmitter directly into a spectrum analyzer using an impedance matched cable and connector soldered to the EUT in place of the antenna. The information regarding resolution bandwidth, video bandwidth, span and the detector used can be found in the graphs provided in Appendix C. All the radio measurements were performed using the sections from ANSI C63.10, details about the section used can be found in the spectrum analyzer titles on the graph.

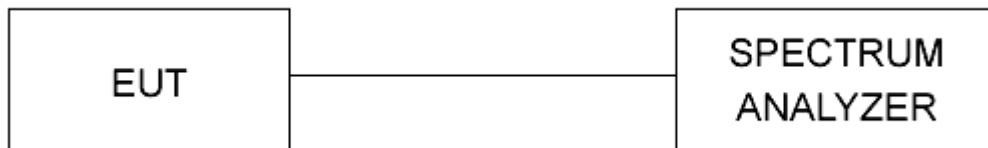


Figure 1 - Bandwidth Measurements Test Setup

Radiated

All the radiated measurements were taken at a distance of 3m from the EUT. The information regarding resolution bandwidth, video bandwidth, span and the detector used can be found in the graphs provided in Appendix C. All the radio measurements were performed using the sections from ANSI C63.10, details about the section used can be found in the spectrum analyzer titles on the graph.

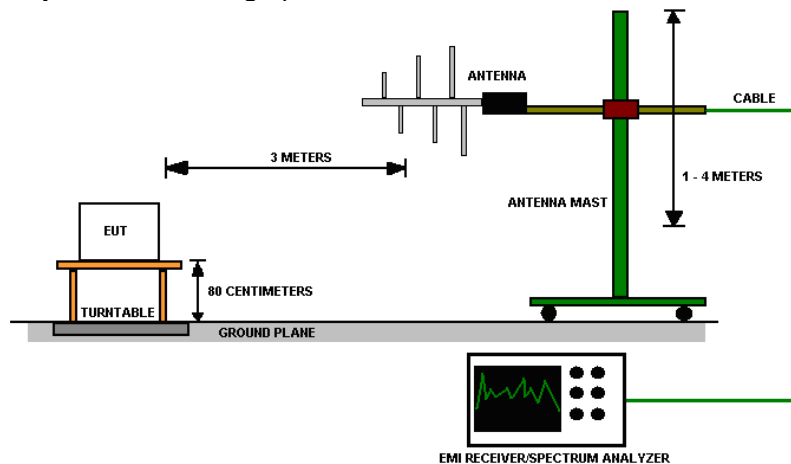


Figure 2 - Radiated Emissions Test Setup



Report Number:	R20230808-00-A1	Rev	0
Prepared for:	Garmin International Inc.		

4.0 RESULTS

4.1 ANTENNA GAIN

Test procedures:

The device's conducted power was measured then the same measurement was repeated on a radiated sample at 3m test distance and converted to E.I.R.P.

Test setup:

Details can be found in section 2.1 of this report.

EUT operating conditions:

Details can be found in section 2.1 and 2.2 of this report.

Test results:

Antenna Gain:

Radiated Average Power (EIRP) – Conducted Average Power = Antenna gain
 $10.19\text{dBm} - 13.77\text{dBm} = -3.58\text{dBi}$

Comments:

NA

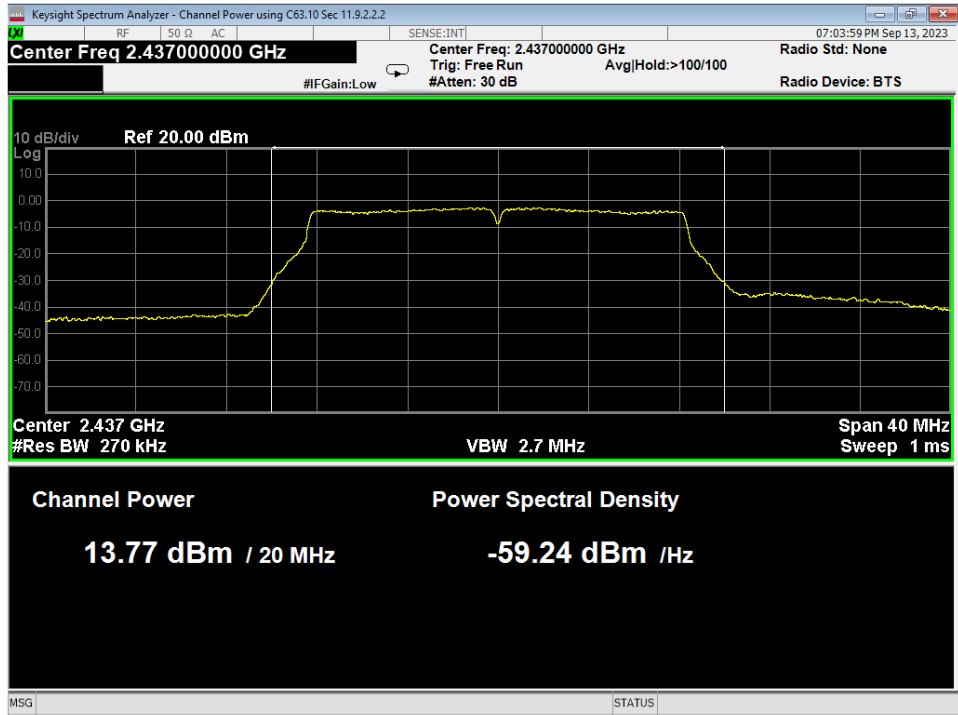


Figure 3 – Conducted Average Power Measurement, 802.11g

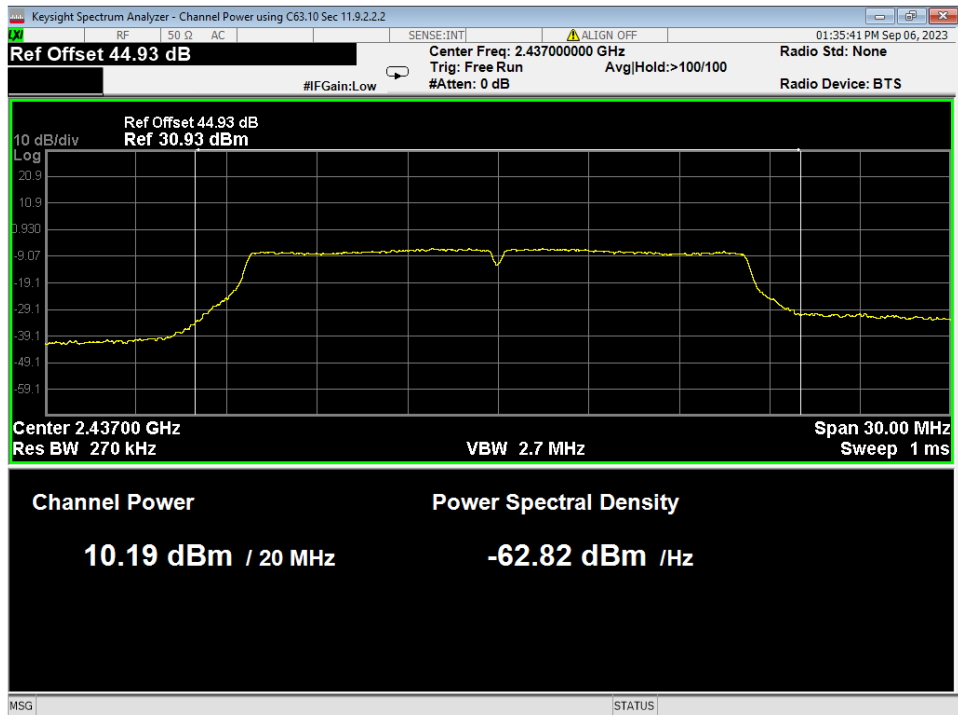


Figure 4 – Radiated Average Power Measurement, 802.11g
 Measurement corrections/EIRP conversions are included in reference offset.



Report Number:	R20230808-00-A1	Rev	0
Prepared for:	Garmin International Inc.		

REPORT END