

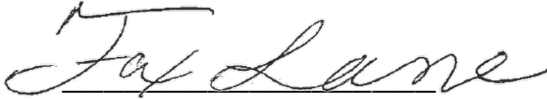
AUT Report

Prepared for: Garmin International Inc.

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

Product: A04109
Test Report No: R20220926-21-A2A

Approved by:


Fox Lane,
EMC Test Engineer

DATE: June 21, 2023

Total Pages: 10

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Prepared for:	Garmin International Inc.		

REVISION PAGE

Rev. No.	Date	Description
0	2 May 2023	Issued by FLane Prepared by FLane
A	21 June 2023	Corrected Address - FL



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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	A04109
FCC ID:	IPH-04109
EUT Received	3 March 2023
EUT Tested	3 March 2023- 28 April 2023
Serial No.	FF7 (Radiated Measurements) 010966 (Lab Assigned Serial Number) (Conducted Measurements)
Operating Band	2400 – 2483.5 MHz
Device Type	<input checked="" type="checkbox"/> GMSK <input type="checkbox"/> GFSK <input type="checkbox"/> BT BR <input type="checkbox"/> BT EDR 2MB <input type="checkbox"/> BT EDR 3MB <input type="checkbox"/> 802.11x
Power Supply / Voltage	30VDC lithium battery pack
Antenna Gain (dBi)	1.075dBi, PCB Antenna

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

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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.



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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 19, 2022	July 19, 2024
Keysight EXA Signal Analyzer**	N9010A	MY56070862	July 20, 2021	July 20, 2023
ETS EMCO Red Horn Antenna	3115	00218655	July 21, 2022	July 21, 2023
Rohde & Schwarz Preamplifier*	TS-PR18	3545700803	March 21, 2022	March 21, 2024
TDK Emissions Lab Software	V11.25	700307	NA	NA
RF Cable (preamplifier to antenna)*	MFR-57500	01-07-002	March 21, 2022	March 21, 2024
RF Cable (antenna to 10m chamber bulkhead)*	FSCM 64639	01E3872	September 24, 2021	September 24, 2023
RF Cable (10m chamber bulkhead to control room bulkhead)*	FSCM 64639	01E3864	September 24, 2021	September 24, 2023
RF Cable (control room bulkhead to test receiver)*	FSCM 64639	01F1206	September 24, 2021	September 24, 2023
N connector bulkhead (10m chamber)*	PE9128	NCEEBH1	September 24, 2021	September 24, 2023
N connector bulkhead (control room)*	PE9128	NCEEBH2	September 24, 2021	September 24, 2023

*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.

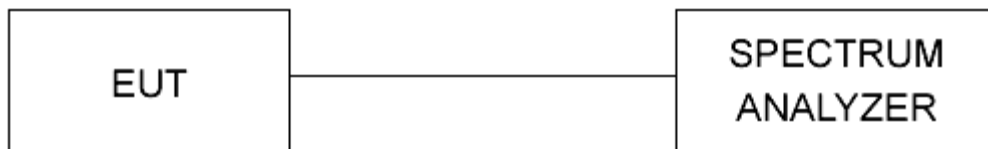


Figure 1 - Bandwidth Measurements Test Setup

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.

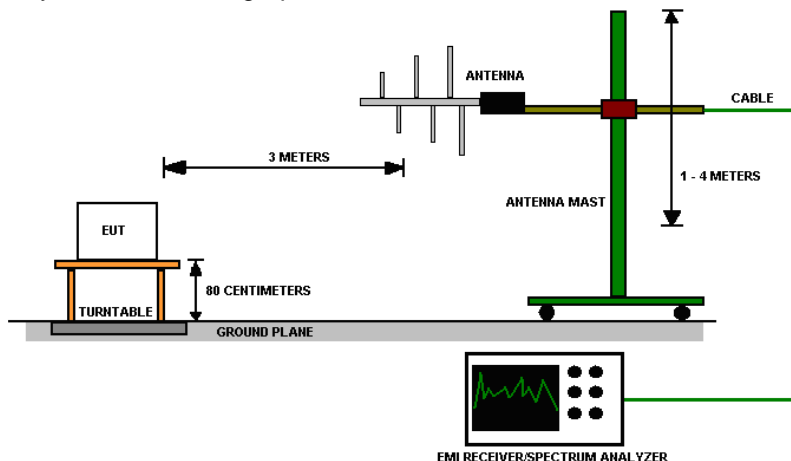


Figure 2 - Radiated Emissions Test Setup



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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
5.382 – 4.307 dBm = **+1.075dBi**

Comments:

NA

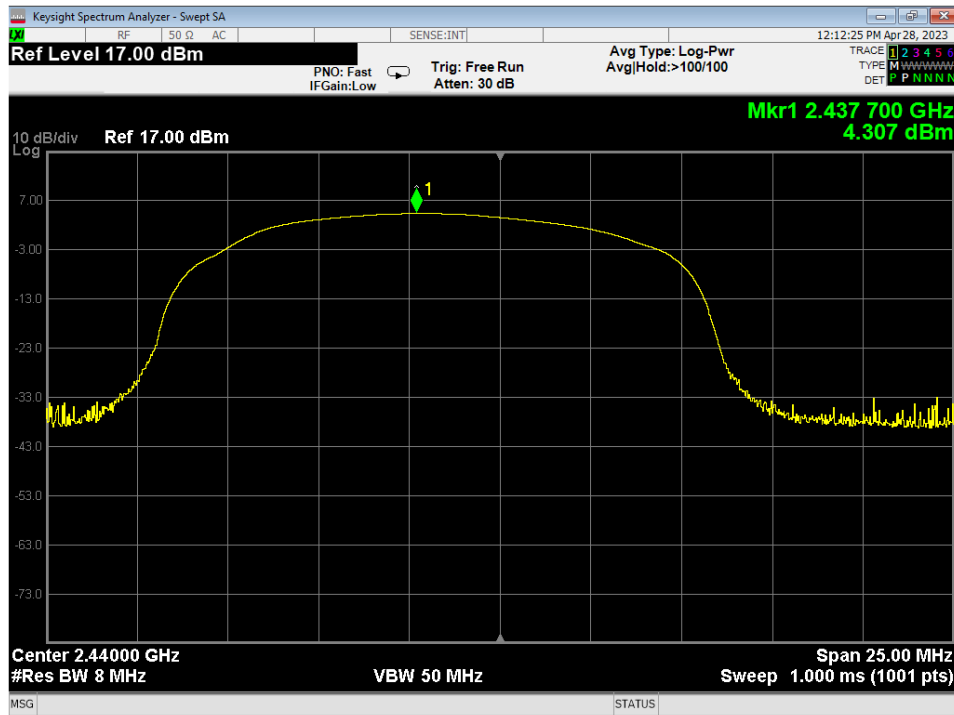


Figure 3 – Conducted Peak Power Measurement, GMSK

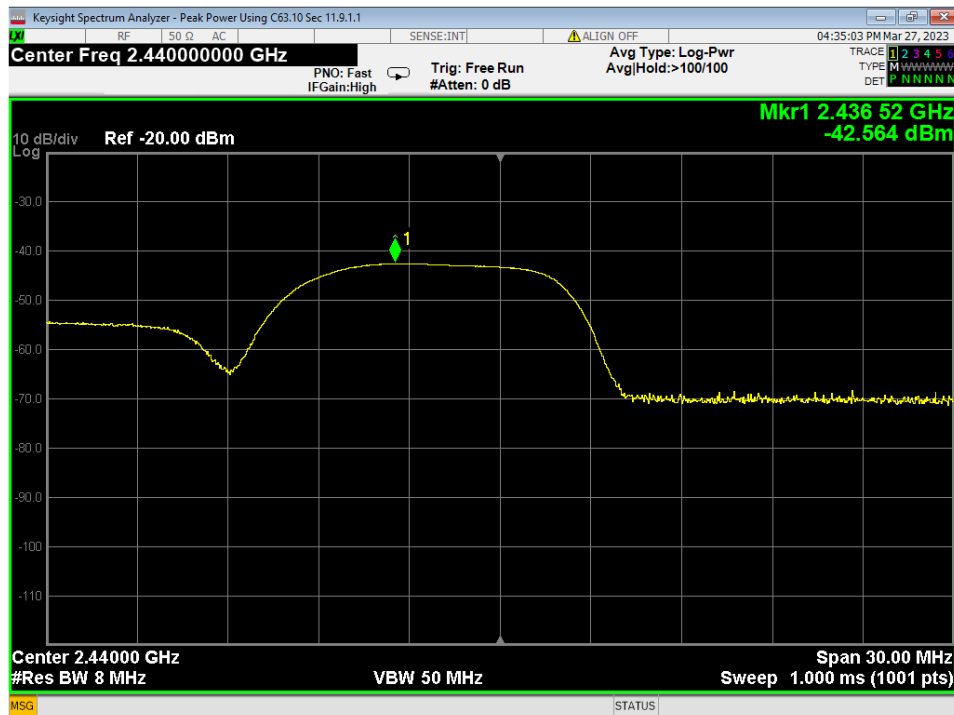


Figure 4 – Radiated Field Strength Measurement, GMSK

Measurement is uncorrected, see below for corrections/conversions

$$EIRP = \text{Raw SA value} + \text{transducer} + \text{cable} + \text{EIRP Conversion}$$

$$5.382 = -42.564 + 27.616 + 8.56 + 11.77$$



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