ncee labs
Product Compliance Solutions

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AUT Report

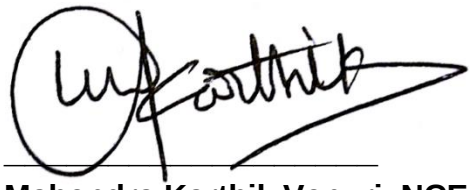
Prepared for: **Garmin International, Inc.**

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

Product: **A04223**

Test Report No: **R20220512-20-A1**

Approved by:



Mahendra Karthik Vepuri, NCE
EMC Test Engineer,
iNARTE Certified EMC Engineer #EMC-041453-E

DATE: **April 3, 2023**

Total Pages: **10**

REVISION PAGE

Rev. No.	Date	Description
0	3 April 2023	Issued by KVepuri Prepared by FLane/KVepuri

CONTENTS

1.0 SUMMARY OF TEST RESULTS

Antenna Gain Measurements were reported for 2400-2483.5 MHz band.

2.0 EUT DESCRIPTION

2.1 EQUIPMENT UNDER TEST

Summary and Operating Condition:

Equipment under test is a transceiver manufactured by Garmin International Inc.

EUT	A04223
FCC ID:	IPH-04223
EUT Received	22 September 2022
EUT Tested	22 September 2022 - 28 November 2022
Serial No.	3428794068 (Conducted Unit) 3428794249(Radiated Unit)
Operating Band	2400 – 2483.5 MHz
Power Supply / Voltage	Internal Battery/ Charger: Garmin MN: 362-00113-00
Antenna Gain (dBi)	-2.98 dBi

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 ± 4%
Temperature of 22 ± 3° Celsius

3.2 TEST PERSONNEL

No.	PERSONNEL	TITLE	ROLE
1	Karthik Vepuri	Test Engineer	Review/editing
2	Fox Lane	Test Engineer	Testing and report
3	Blake Winter	Test Engineer	Testing
4	Grace Larsen	Test Engineer	Testing and report
5	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.

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 MEASUREMNTS

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 the 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.

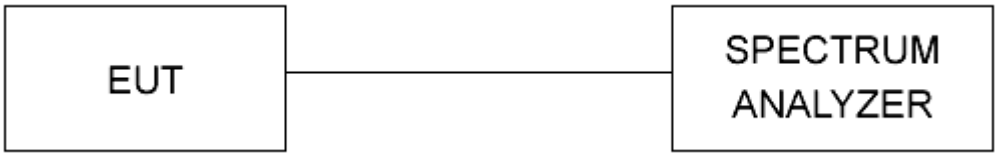


Figure 1 - Bandwidth Measurements Test Setup

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 the 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.

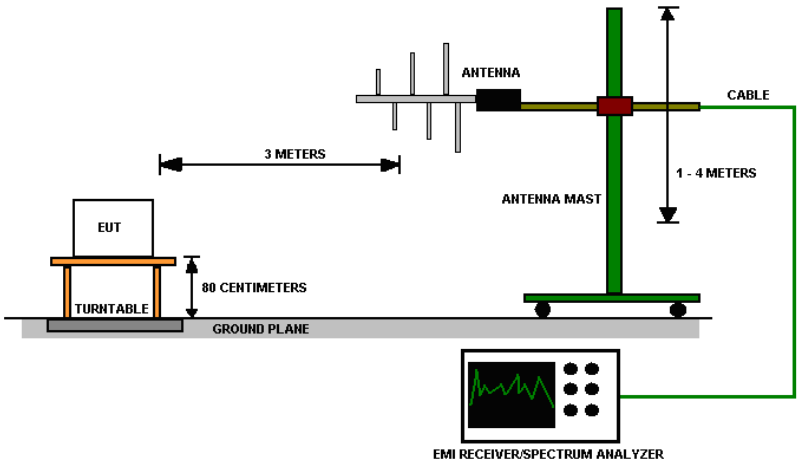


Figure 2 - Radiated Emissions Test Setup

4.0 RESULTS

4.1 ANTENNA GAIN

Test procedures:
Device's conducted power was measured then then 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
12.33 dBm – 15.31 dBm = -2.98 **dBi**

Comments:
1. Device was compared only on the highest power modulation/transmitter and the results were used for all other modulations/transmitters within that frequency band (2400 – 2483.5 MHz band)

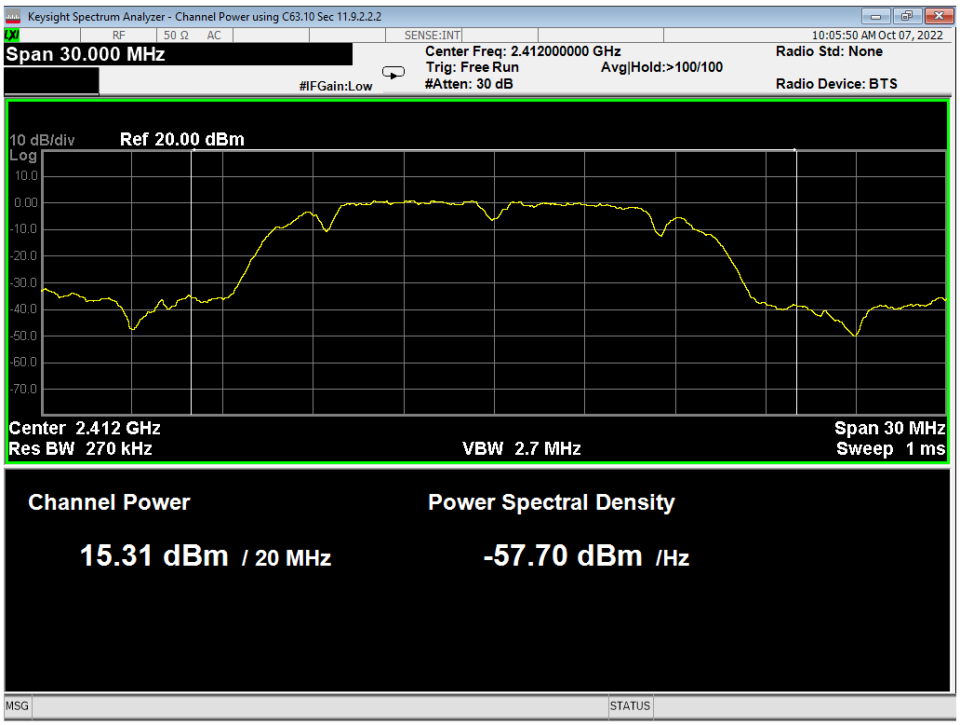


Figure 3 – Conducted Average Power Measurement, 802.11b 1MB, for antenna gain calculation

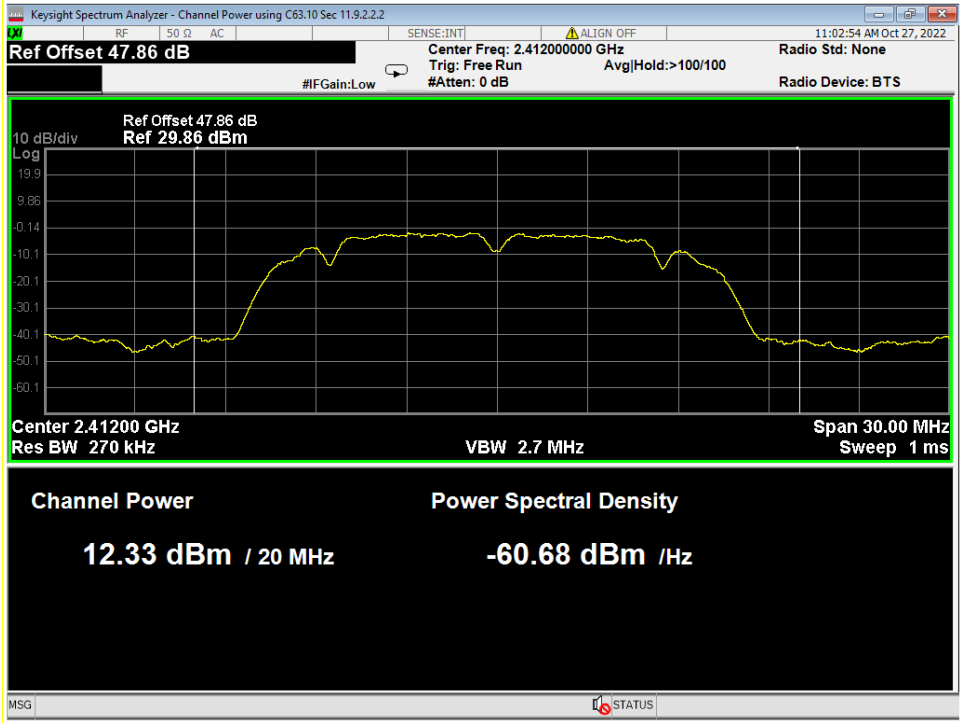


Figure 4 – Radiated Average Power Measurement, 802.11b 1MB, for antenna gain calculation

Corrections and EIRP conversion included in reference offset

REPORT END