

4740 Discovery Drive | Lincoln, NE 68521 tel- 402.323.6233 | tel -888.657.6860 | fax - 402.323.6238 info@nceelabs.com | http://nceelabs.com

FCC/ISED Test Report

Prepared for: Garmin International, Inc.

Address: 1200 E. 151st Street

Olathe, Kansas, 66062, USA

Product: A04448

Test Report No: R20230808-00-E10A

Approved by:

Fox Lane

EMC Test Engineer

DATE: September 29, 2023

Total Pages: 136

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.





Prepared for: Garmin International, Inc.

REVISION PAGE

Rev. No.	Date	Description	
		Issued by FLane	
0	28 September 2023	Reviewed by KVepuri	
		Prepared by ESchmidt/FLane	
A	29 September 2023	Corrected Customer information Page 5 - FL	

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 2 of 136



Report Number:

R20230808-00-E10A

Rev

Α

Prepared for:

Garmin International, Inc.

CONTENTS

Rev	ision Pa	ge	2		
1.0	0 Summary of test results				
2.0	EUT	Description	5		
	2.1	Equipment under test			
	2.2	Description of test modes			
	2.3	Description of support units			
2.0					
3.0		oratory and General Test Description			
	3.1	Laboratory description			
	3.2	Test personnel	6		
	3.3	Test equipment	7		
	3.4	General Test Procedure and Setup for Radio Measuremnts	8		
4.0	Res	ults	9		
	4.1	Output Power	13		
	4.2	Bandwidth	14		
	4.3	Duty Cycle	15		
	4.4	Radiated emissions	16		
	4.5	Conducted Spurious Emissions	25		
	4.6	Band edges	31		
	4.7	Power Spectral Density	33		
	4.8	Conducted AC Mains Emissions	34		
App	endix A	: Sample Calculation			
• •		- Measurement Uncertainty			
• •		- Graphs and Tables			
•		·			
KFF	ORT FI	11)	136		



Report Number:	R20230808-00-E10A	Rev	А
Prepared for:	Garmin International, Inc.		

1.0 SUMMARY OF TEST RESULTS

The worst-case measurements were reported in this report. Summary of test results presented in this report correspond to the following section:

FCC Part 15.247

The EUT has been tested according to the following specifications:

- (1) US Code of Federal Regulations, Title 47, Part 15
- (2) ISED RSS-Gen, Issue 5
- (3) ISED RSS-247, Issue 3

APPLIED STANDARDS AND REGULATIONS			
Standard Section	Test Type	Result	
FCC Part 15.35 RSS Gen, Issue 5, Section 6.10	Duty Cycle	Pass	
FCC Part 15.247(b)(3) RSS-247 Issue 3 Section 5.4(d)	Peak output power	Pass	
FCC Part 15.247(a)(2) RSS-247 Issue 3 Section 5.2 (a)	Bandwidth	Pass	
FCC Part 15.209 RSS-Gen Issue 5, Section 7.3	Receiver Radiated Emissions	Pass	
FCC Part 15.209 (restricted bands), 15.247 (unrestricted) RSS-247 Issue 3 Section 5.5, RSS-Gen Issue 5, Section 8.9	Transmitter Radiated Emissions	Pass	
FCC Part 15.247(e) RSS-247 Issue 3 Section 5.2 (b)	Power Spectral Density	Pass	
FCC Part 15.209, 15.247(d) RSS-247 Issue 3 Section 5.5	Band Edge Measurement	Pass	
FCC Part 15.207 RSS-Gen Issue 5, Section 8.8	Conducted Emissions	Pass	

Lincoln, NE 68521 Page 4 of 136



Report Number:	R20230808-00-E10A	Rev	А
Prepared for:	Garmin International, Inc.		

2.0 EUT DESCRIPTION

2.1 EQUIPMENT UNDER TEST

Summary and Operating Condition:

EUT	A04448
FCC ID	IPH-04448
IC	1792A-04448
EUT Received	24 August 2023
EUT Tested	28 August 2023 - 14 September 2023
Serial No.	3451928865 (Radiated Measurements) 3451928680 (Radiated Measurements) 3451928690 (Conducted Measurements)
Operating Band	2400 – 2483.5 MHz
Device Type	☐ GMSK ☐ GFSK ☐ BT BR ☐ BT EDR 2MB ☐ BT EDR 3MB ■ 802.11x
Power Supply / Voltage	Internal Battery / 5VDC Charger: Garmin (Phi Hong) Model: AQ27A-59CFA GPN: 362-00118-00 (Representative Power Supply)

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

2.2 DESCRIPTION OF TEST MODES

The operating range of the EUT is dependent on the device type found in section 2.1:

Data Rates:

Modulation Low/High Data rat			
802.11b	1MB/11MB		
802.11g	6MB/54MB		
802.11n	MCS0/MCS7		

For 802.11x Transmissions:

Channel	Frequency		
Low	2412 MHz		
Mid	2437 MHz		
High	2462 MHz		

These are the only representative channels tested in the frequency range according to FCC Part 15.31 and RSS-Gen Table A1. See the operational description for a list of all channel frequencies and designations.

2.3 DESCRIPTION OF SUPPORT UNITS

None

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive

Lincoln, NE 68521 Page 5 of 136



Report Number:	R20230808-00-E10A	Rev	Α

Prepared for: | Garmin International, Inc.

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-1 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 DEDSONNEL TITLE DOLE				
No.	PERSONNEL	IIILE	ROLE	
1	Fox Lane	Test Engineer	Testing, Review, and Report	
		-	-	
2	Blake Winter	Test Engineer	Testing	
3	Ethan Schmidt	Test Technician	Testing and Report	
4	Karthik Vepuri	Test Engineer	Review/Testing	

Notes:

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

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive

Lincoln, NE 68521 Page 6 of 136



Report Number:	R20230808-00-E10A	Rev	А
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 (44GHz)	N9038A	MY59050109	July 17, 2023	July 17, 2025
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
SunAR RF Motion	JB1	A091418	July 27, 2023	July 26, 2024
ETS-Lindgren Red Horn Antenna	3115	218576	July 31, 2023	July 30, 2024
EMCO Horn Antenna	3116	2576	July 31, 2023	July 30, 2024
Com-Power LISN, Single Phase	LI-220C	20070017	July 17, 2023	July 17, 2025
Agilent Preamp*	87405A	3950M00669	June 5, 2023	June 5, 2025
Rohde & Schwarz Preamplifier*	TS-PR18	3545700803	June 5, 2023	June 5, 2025
Trilithic High Pass Filter*	6HC330	23042	June 5, 2023	June 5, 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
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

^{*}Internal Characterization

Notes:

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

Lincoln, NE 68521 Page 7 of 136

^{**2} Year Cal Cycle

^{***3} Year Cal Cycle

ncee.	Report Number:	R20230808-00-E10A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

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 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.

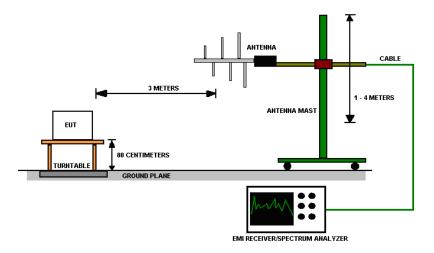


Figure 2 - Radiated Emissions Test Setup

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 8 of 136



Prepared for: Garmin International, Inc.

4.0 RESULTS

4.0 RESULTS									
		DTS Radio	Measuremen	ts Low Data Rate	•				
CHANNEL	Transmitter	Occupied Bandwidth (MHz)	6 dB Bandwidth (MHz)	AVERAGE OUTPUT POWER (dBm)	AVERAGE OUTPUT POWER (mW)	PSD (dBm)	RESULT		
Low	802.11 b	15.06	10.06	12.290	16.943	-9.717	PASS		
Mid	802.11 b	15.03	10.07	12.250	16.788	-3.882	PASS		
High	802.11 b	15.06	10.05	12.240	16.749	-1.823	PASS		
Low	802.11 g	16.86	16.58	9.980	9.954	-13.311	PASS		
Mid	802.11 g	16.87	16.54	13.770	23.823	-9.579	PASS		
High	802.11 g	16.80	16.57	8.990	7.925	-14.86	PASS		
Low	802.11 n	17.62	17.67	12.370	17.258	-12.394	PASS		
Mid	802.11 n	17.98	17.69	15.870	38.637	-9.319	PASS		
High	802.11 n	17.62	17.66	7.590	5.741	-17.034	PASS		
Occupied Bar	ndwidth = N/A; 6	dB Bandwidth Li	mit =500 kHz	Output Power Li	mit = 30 dBm;	PSD Limit	= 8 dBm		
		Unrestric	ted Band-Edge	e Low Data Rate					
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Relative Highest out of band level (dBµV)	Relative Fundamental (dBµV)	Delta (dB)	Min Delta (dB)	Result		
Low	802.11 b	2400.00	70.77	111.00	40.23	30.00	PASS		
Low	802.11 g	2400.00	69.18	103.78	34.60	30.00	PASS		
Low	802.11 n	2400.00	71.23	106.38	35.15	30.00	PASS		
High	802.11 b	2483.50	53.55	110.80	57.26	30.00	PASS		
High	802.11 g	2483.50	56.14	103.09	46.95	30.00	PASS		
High	802.11 n	2483.50	53.66	101.39	47.73	30.00	PASS		
		Radiated Peak F	Restricted Ban	d-Edge Low Data	a Rate				
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Highest out of band level (dBµV/m @ 3m)	Measurement Type	Limit (dBµV/m @ 3m)	Margin	Result		
Low	802.11 b	2390.00	53.60	Peak	73.98	20.39	PASS		
Low	802.11 g	2390.00	60.43	Peak	73.98	13.55	PASS		
Low	802.11 n	2390.00	66.04	Peak	73.98	7.94	PASS		
High	802.11 b	2483.50	57.14	Peak	73.98	16.85	PASS		
High	802.11 g	2483.50	64.20	Peak	73.98	9.78	PASS		
High	802.11 n	2483.50	62.31	Peak	73.98	11.68	PASS		
		taken from FCC							



Prepared for:

Report Number: R20230808-00-E10A Rev A

Radiated Average Restricted Band-Edge Low Data Rate										
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Highest out of band level (dB _µ V/m @ 3m)	but of band level Measurement Type 3m)		Margin	Result			
Low	802.11 b	2390.00	45.76	Average	53.98	8.22	PASS			
Low	802.11 g	2390.00	46.45	Average	53.98	7.53	PASS			
Low	802.11 n	2390.00	50.47	Average	53.98	3.51	PASS			
High	802.11 b	2483.50	48.39	Average	53.98	5.59	PASS			
High	802.11 g	2483.50	49.23	Average	53.98	4.75	PASS			
High	802.11 n	2483.50	47.73	Average	53.98	6.26	PASS			
*Limit shown	is the average I	imit taken from FC	CC Part 15.209	-						

Garmin International, Inc.



Prepared for: Garmin International, Inc.

		DTS Radio	Measurements	s High Data Rate			
CHANNEL	Transmitter	Occupied Bandwidth (MHz)	6 dB Bandwidth (MHz)	AVERAGE OUTPUT POWER (dBm)	AVERAG E OUTPUT POWER (mW)	PSD (dBm)	RESULT
Low	802.11 b	14.79	9.07	12.380	17.298	-10.23	PASS
Mid	802.11 b	14.78	9.05	12.480	17.701	-10.461	PASS
High	802.11 b	14.80	9.52	12.250	16.788	-10.623	PASS
Low	802.11 g	16.65	16.57	10.460	11.117	-13.809	PASS
Mid	802.11 g	16.69	16.57	11.950	15.668	-12.267	PASS
High	802.11 g	16.62	16.55	9.520	8.954	-14.454	PASS
Low	802.11 n	17.60	17.70	10.710	11.776	-13.559	PASS
Mid	802.11 n	17.60	17.70	10.240	10.568	-14.762	PASS
High	802.11 n	17.61	17.71	8.360	6.855	-16.313	PASS
Occupied Ba	andwidth = N/A ;	6 dB Bandwidth I	imit = 500 kHz	Output Power Li	mit = 30 dBm	i; PSD Lim	it = 8 dBm
		Unrestric	ted Band-Edge	High Data Rate			
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Relative Highest out of band level (dB _µ V)	Relative Fundamental (dBµV)	Delta (dB)	Min Delta (dB)	Result
Low	802.11 b	2390.00	69.99	111.00	41.01	30.00	PASS
Low	802.11 g	2400.00	73.58	105.54	31.96	30.00	PASS
Low	802.11 n	2400.00	71.55	105.43	33.88	30.00	PASS
High	802.11 b	2483.50	52.42	110.71	58.29	30.00	PASS
High	802.11 g	2483.50	00.40				
		2403.30	60.46	104.59	44.13	30.00	PASS
High	802.11 n	2483.50	57.29	104.59 103.15	44.13 45.85	30.00 30.00	PASS PASS
High		2483.50	57.29		45.85		
CHANNEL		2483.50	57.29	103.15	45.85		
	802.11 n	2483.50 Radiated Peak I Band edge /Measurement Frequency	57.29 Restricted Band Highest out of band level (dΒμV/m @	103.15 -Edge High Data Measurement	45.85 Rate Limit (dBµV/m	30.00	PASS
CHANNEL	802.11 n	2483.50 Radiated Peak I Band edge /Measurement Frequency (MHz)	57.29 Restricted Band Highest out of band level (dBμV/m @ 3m)	103.15 I-Edge High Data Measurement Type	45.85 Rate Limit (dΒμV/m @ 3m)	30.00 Margin	PASS Result
CHANNEL	802.11 n Mode 802.11 b	2483.50 Radiated Peak I Band edge /Measurement Frequency (MHz) 2390.00	57.29 Restricted Band Highest out of band level (dBμV/m @ 3m) 55.66	103.15 -Edge High Data Measurement Type Peak	45.85 Rate Limit (dΒμV/m @ 3m) 73.98	30.00 Margin	PASS Result PASS
CHANNEL Low Low	802.11 n Mode 802.11 b 802.11 g	2483.50 Radiated Peak I Band edge /Measurement Frequency (MHz) 2390.00 2390.00	57.29 Restricted Band Highest out of band level (dBµV/m @ 3m) 55.66 61.72	103.15 -Edge High Data Measurement Type Peak Peak	45.85 Rate Limit (dΒμV/m @ 3m) 73.98 73.98	30.00 Margin 18.32 12.26	PASS Result PASS PASS
CHANNEL Low Low Low	802.11 n Mode 802.11 b 802.11 g 802.11 n	2483.50 Radiated Peak I Band edge /Measurement Frequency (MHz) 2390.00 2390.00 2390.00	57.29 Restricted Band Highest out of band level (dBµV/m @ 3m) 55.66 61.72 62.11	103.15 -Edge High Data Measurement Type Peak Peak Peak Peak	45.85 Rate Limit (dBµV/m @ 3m) 73.98 73.98 73.98	30.00 Margin 18.32 12.26 11.87	PASS Result PASS PASS PASS
CHANNEL Low Low Low High	802.11 n Mode 802.11 b 802.11 g 802.11 n 802.11 b	2483.50 Radiated Peak I Band edge /Measurement Frequency (MHz) 2390.00 2390.00 2390.00 2483.50	57.29 Restricted Band Highest out of band level (dBμV/m @ 3m) 55.66 61.72 62.11 58.03	103.15 -Edge High Data Measurement Type Peak Peak Peak Peak Peak Peak	45.85 Limit (dΒμV/m @ 3m) 73.98 73.98 73.98 73.98	30.00 Margin 18.32 12.26 11.87 15.96	PASS Result PASS PASS PASS PASS

*Limit shown is the peak limit taken from FCC Part 15.209



Prepared for: Garmin International, Inc.

	Radiated Average Restricted Band-Edge High Data Rate										
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Highest out of band level (dBμV/m @ 3m)	Measurement Type	Limit (dBµV/m @ 3m)	Margin	Result				
Low	802.11 b	2390.00	45.26	Average	53.98	8.72	PASS				
Low	802.11 g	2390.00	46.89	Average	53.98	7.10	PASS				
Low	802.11 n	2390.00	48.10	Average	53.98	5.88	PASS				
High	802.11 b	2483.50	46.71	Average	53.98	7.27	PASS				
High	802.11 g	2483.50	50.18	Average	53.98	3.80	PASS				
High	802.11 n	2483.50	50.80	Average	53.98	3.19	PASS				
*Limit shown	is the average	limit taken from F	CC Part 15.209								



Prepared for: | Garmin International, Inc.

4.1 OUTPUT POWER

Test Method:

Power measurements were performed using ANSI C63.10, Section 11.9.2.2.2.

Limits of power measurements:

For FCC Part 15.247 Device:

The maximum allowed output power is 30 dBm.

Test procedures:

Details can be found in section 3.4 of this report.

Deviations from test standard:

No deviation.

Test setup:

Details can be found in section 3.4 of this report.

EUT operating conditions:

Details can be found in section 2.1 of this report.

Test results:

Pass

Comments:

- 1. All the output power plots can be found in Appendix C.
- 2. All the measurements were found to be compliant.
- 3. The measurements are listed in the tables in section 4.0.

Lincoln, NE 68521 Page 13 of 136



Report Number:	R20230808-00-E10A	Rev	А
Prenared for:	Garmin International Inc		

4.2 BANDWIDTH

Test Method:

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.

Limits of bandwidth measurements:

For FCC Part 15.247 Device:

The 99% occupied bandwidth is for informational purposes only. The 6dB bandwidth of the signal must be greater than 500 kHz.

Test procedures:

Details can be found in section 3.4 of this report.

Deviations from test standard:

No deviation.

Test setup:

Test setup details can be found in section 3.4 of this report.

EUT operating conditions:

Details can be found in section 2.1 of this report.

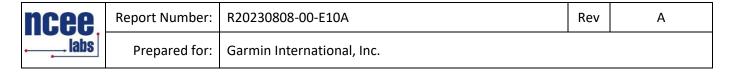
Test results:

Pass

Comments:

- 1. All the bandwidth plots can be found in Appendix C.
- 2. All the measurements were found to be compliant.
- 3. The measurements are listed in the tables in section 4.0.

Lincoln, NE 68521 Page 14 of 136



4.3 DUTY CYCLE

Test Method:

All Modulations/Transmitters in this report had a duty cycle of >98%

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 15 of 136



Prepared for: | Garmin International, Inc.

4.4 RADIATED EMISSIONS

Test Method:

ANSI C63.10-2013, Section 6.5, 6.6

Limits for radiated emissions measurements:

Emissions radiated outside of the specified bands shall be applied to the limits in 15.209 as followed:

FREQUENCIES (MHz)	FIELD STRENGTH (µV/m)	MEASUREMENT DISTANCE (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level (dBuV/m) = 20 * log * Emission level (μ V/m).
- 3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits by more than 20dB under any condition of modulation.
- 4. The EUT was tested for spurious emissions while running off of battery power and external USB power. The worst-case emissions were produced while running off of USB power, so results from this mode are presented.

Page 16 of 136



Report Number: R20230808-00-E10A Rev A

Prepared for: Garmin International, Inc.

Test procedures:

- a. The EUT was placed on the top of a rotating table above the ground plane in a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The table was 0.8m high for measurements from 30MHz-1Ghz and 1.5m for measurements from 1GHz and higher.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna was a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are used to make the measurement.
- d. For each suspected emission, the EUT was arranged to maximize its emissions and then the antenna height was varied from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum emission reading.
- e. The test-receiver system was set to use a peak detector with a specified resolution bandwidth. For spectrum analyzer measurements, the composite maximum of several analyzer sweeps was used for final measurements.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise, the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The EUT was maximized in all 3 orthogonal positions. The results are presented for the axis that had the highest emissions.



Prepared for: | Garmin International, Inc.

Test setup:

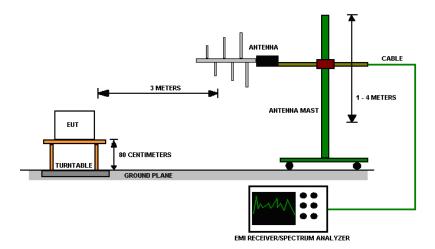


Figure 3 - Radiated Emissions Test Setup

NOTE:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequencies below 1GHz.
- 2. The resolution bandwidth 1 MHz for all measurements and at frequencies above 1GHz, A peak detector was used for all measurements above 1GHz. Measurements were made with an EMI Receiver.

Deviations from test standard:

No deviation.

EUT operating conditions

Details can be found in section 2.1 of this report.

Page 18 of 136



Report Number: R20230808-00-E10A Rev A

Prepared for: Garmin International, Inc.

Test results:

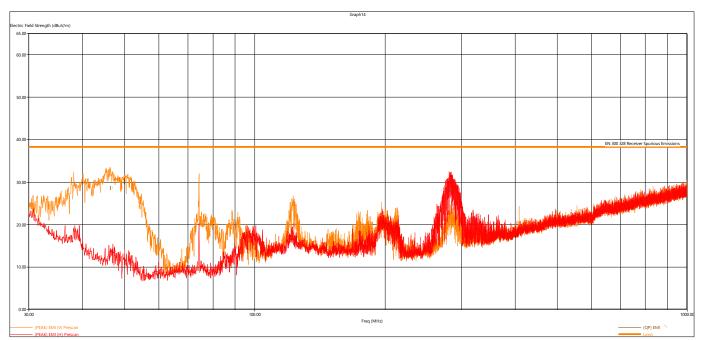


Figure 4 - Radiated Emissions Plot, Receive

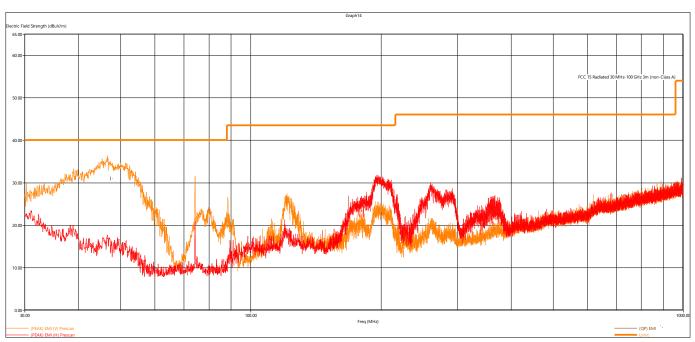
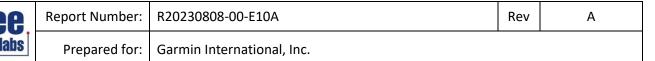


Figure 5 - Radiated Emissions Plot, 802.11b 1MB

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 19 of 136



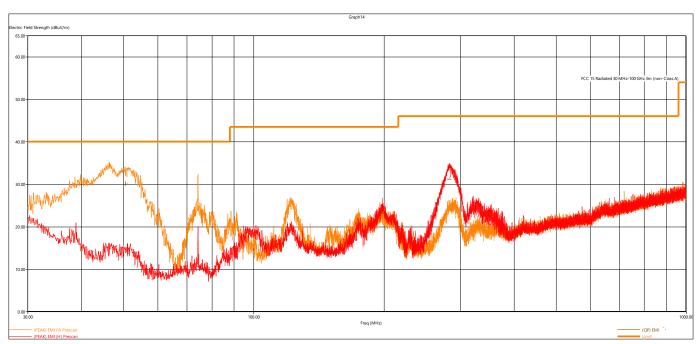


Figure 6 - Radiated Emissions Plot, 802.11b 11MB

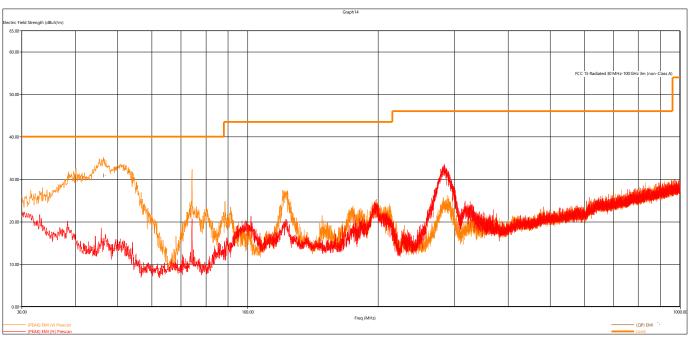


Figure 7 - Radiated Emissions Plot, 802.11g 6MB



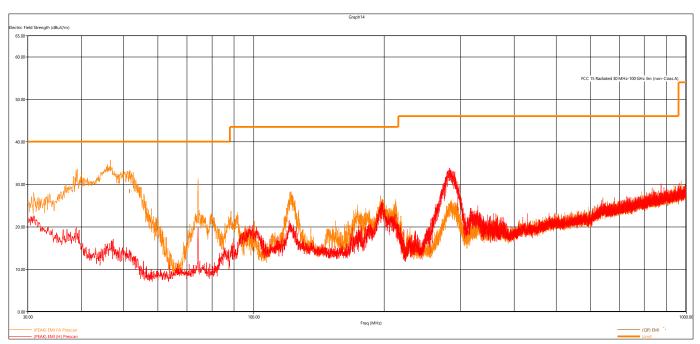


Figure 8 - Radiated Emissions Plot, 802.11g 54MB

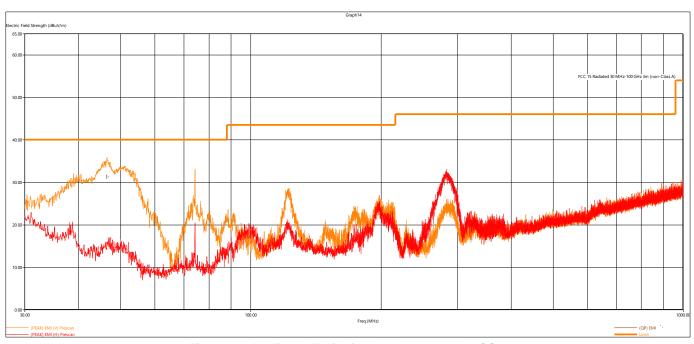


Figure 9 - Radiated Emissions Plot, 802.11n MCS0



Prepared for: | Garmin International, Inc.

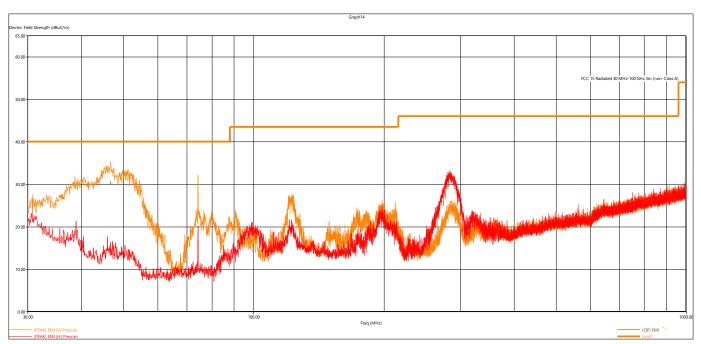


Figure 10 - Radiated Emissions Plot, 802.11n MCS7

REMARKS:

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB)
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value

	Quasi-Peak Measurements, 802.11x								
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation	
MHz	dBµV/m	dBµV/m	dB	cm.	deg.				
47.375040	30.86	40.00	9.14	106.35	45.25	V	High	WIFI B 1MB	
282.970800	31.14	46.02	14.88	109.28	267.25	Н	High	WIFI B 11MB	
50.411280	30.04	46.02	15.98	103.79	31.00	V	High	WIFI B 11MB	
46.324320	30.84	40.00	9.16	105.94	23.75	V	High	WIFI G 6MHz	
51.600960	28.38	40.00	11.62	123.01	289.00	V	High	WIFI G 54MHz	
46.594320	31.20	40.00	8.80	105.88	360.25	V	High	WIFI N MCS0	
46.599840	30.19	40.00	9.81	117.88	357.00	V	High	WIFI N MCS7	
283.217520	27.69	46.02	18.33	104.14	278.50	Н	i	Receive	
46.266000	28.49	40.00	11.51	104.38	67.50	V	F	Receive	

All other measurements were found to be at least 6 dB below the limit. Worst case emissions are reported.



 Report Number:
 R20230808-00-E10A
 Rev
 A

 Prepared for:
 Garmin International, Inc.

		Pe	ak Meası	urements	s, 802.11	x		
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation
MHz	dBµV/m	dBμV/m	dB	cm.	deg.			
2412.858000	100.23	N/A	N/A	202.11	223.00	V	Low	WIFI B 1MB
2437.804000	101.18	N/A	N/A	220.62	177.25	Н	Mid	WIFI B 1MB
7312.672000	58.21	73.98	15.77	514.17	92.00	Н	Mid	WIFI B 1MB
7234.516000	56.30	N/A	N/A	161.16	88.75	V	Low	WIFI B 1MB
7385.588000	52.28	73.98	21.70	141.52	120.75	Н	High	WIFI B 1MB
7236.618000	60.41	N/A	N/A	463.79	15.25	V	Low	WIFI B 11MB
7311.078000	62.98	73.98	11.00	540.44	90.25	Н	Mid	WIFI B 11MB
7387.078000	58.83	73.98	15.15	202.47	79.25	Н	High	WIFI B 11MB
7228.752000	55.83	N/A	N/A	503.19	43.75	Н	Low	WIFI G 6MB
7306.626000	61.04	73.98	12.94	518.23	102.25	Н	Mid	WIFI G 6MB
7313.186000	60.29	73.98	13.69	152.56	66.75	V	Mid	WIFI G 6MB
7238.410000	59.31	N/A	N/A	479.01	358.50	V	Low	WIFI G 54MB
7318.306000	58.79	73.98	15.19	161.52	72.25	V	Mid	WIFI G 54MB
7311.072000	57.51	73.98	16.47	146.53	77.25	V	Mid	WIFI N MCS0
7230.726000	58.92	N/A	N/A	195.31	70.25	V	Low	WIFI N MCS7
7316.478000	57.63	73.98	16.35	490.17	51.75	Н	Mid	WIFI N MCS7

The EUT was maximized on all 3 orthogonal axes. The worst-case is shown in the plot and table above.

All other measurements were found to be at least 6 dB Below the limit.



Report Number: R20230808-00-E10A Rev A

Prepared for: Garmin International, Inc.

	Average Measurements, 802.11x								
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation	
MHz	dBµV/m	dBµV/m	dB	cm.	deg.				
2412.858000	97.38	N/A	N/A	202.11	223.00	V	Low	WIFI B 1MB	
2437.804000	98.61	N/A	N/A	220.62	177.25	Н	Mid	WIFI B 1MB	
7312.672000	53.27	53.98	0.71	514.17	92.00	Н	Mid	WIFI B 1MB	
7234.516000	49.82	N/A	N/A	161.16	88.75	V	Low	WIFI B 1MB	
7385.588000	41.67	53.98	12.31	141.52	120.75	Н	High	WIFI B 1MB	
7236.618000	48.06	N/A	N/A	463.79	15.25	V	Low	WIFI B 11MB	
7311.078000	50.62	53.98	3.36	540.44	90.25	Н	Mid	WIFI B 11MB	
7387.078000	47.12	53.98	6.86	202.47	79.25	Н	High	WIFI B 11MB	
7228.752000	43.38	N/A	N/A	503.19	43.75	Н	Low	WIFI G 6MB	
7306.626000	48.12	53.98	5.86	518.23	102.25	Н	Mid	WIFI G 6MB	
7313.186000	45.85	53.98	8.13	152.56	66.75	V	Mid	WIFI G 6MB	
7238.410000	41.19	N/A	N/A	479.01	358.50	V	Low	WIFI G 54MB	
7318.306000	42.81	53.98	11.17	161.52	72.25	V	Mid	WIFI G 54MB	
7311.072000	43.35	53.98	10.63	146.53	77.25	V	Mid	WIFI N MCS0	
7230.726000	40.54	N/A	N/A	195.31	70.25	V	Low	WIFI N MCS7	
7316.478000	40.79	53.98	13.19	490.17	51.75	Н	Mid	WIFI N MCS7	

The EUT was maximized on all 3 orthogonal axes. The worst-case is shown in the plot and table above.

All other measurements were found to be at least 6 dB Below the limit.



Prepared for: | Garmin International, Inc.

4.5 CONDUCTED SPURIOUS EMISSIONS

Test Method:

ANSI C63.10-2013, Section 6.7

Limits of spurious emissions:

From FCC Part 15.247:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Test procedures:

The highest emissions level was measured and recorded. All spurious measurements were evaluated to 30dB below the fundamental. More details can be found in section 3.4 of this report. The line shown in the plots is a reference line placed at -20dBm.

Deviations from test standard:

Test performed at 120kHz RBW

Test setup:

Test setup details can be found in section 3.4 of this report.

EUT operating conditions:

Details can be found in section 2.1 of this report.

Test results:

Data rates and channels were investigated and worst case was reported. no emissions exceeded the limits.

There was no distinguishable difference between low and high data rate.

Page 25 of 136



Prepared for: | Garmin International, Inc.

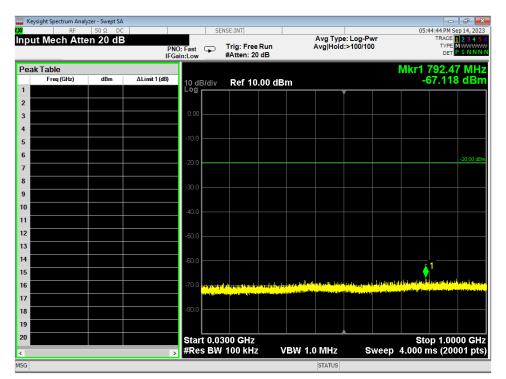


Figure 11 - Radiated Emissions Plot, WIFI 802.11b, 30M - 1G, Low

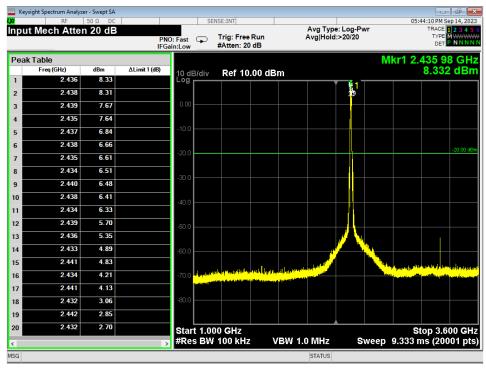


Figure 12 - Radiated Emissions Plot, WIFI 802.11b, 1G - 3.6G, Low

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 26 of 136



Prepared for: | Garmin International, Inc.

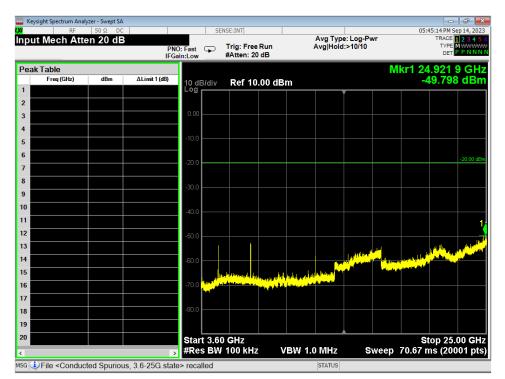


Figure 13 - Radiated Emissions Plot, WIFI 802.11b, 3.6G - 25G, Low

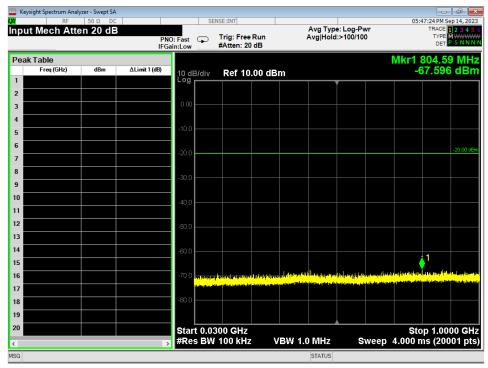


Figure 14 - Radiated Emissions Plot, WIFI 802.11g, 30M - 1G, Low

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 27 of 136



Prepared for: | Garmin International, Inc.

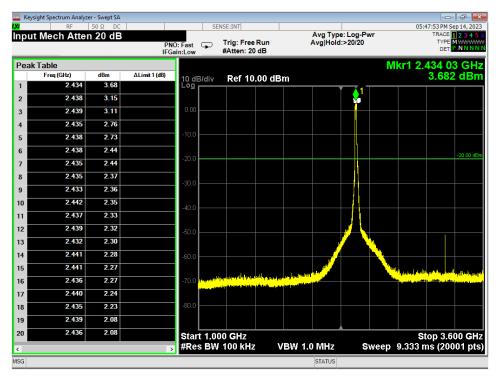


Figure 15 - Radiated Emissions Plot, WIFI 802.11g, 1G - 3.6G, Low

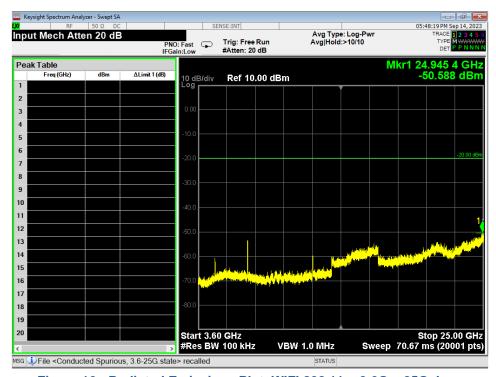


Figure 16 - Radiated Emissions Plot, WIFI 802.11g, 3.6G - 25G, Low

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 28 of 136



Prepared for: | Garmin International, Inc.

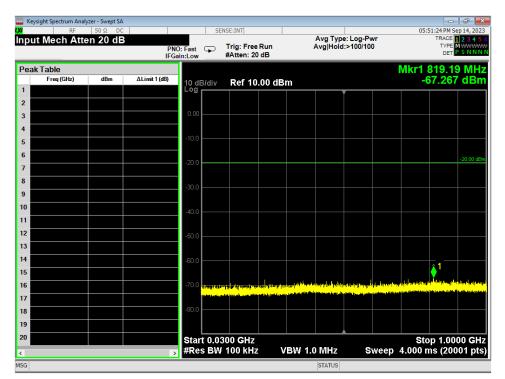


Figure 17 - Radiated Emissions Plot, WIFI 802.11n, 30M - 1G, Low

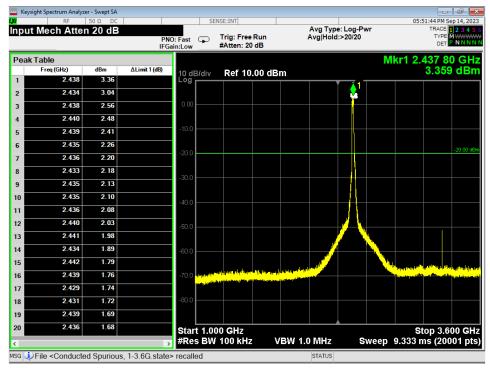


Figure 18 - Radiated Emissions Plot, WIFI 802.11n, 1G - 3.6G, Low

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 29 of 136



Prepared for: | Garmin International, Inc.

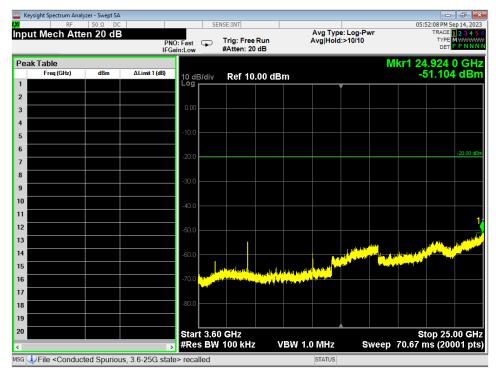


Figure 19 - Radiated Emissions Plot, WIFI 802.11n, 3.6G - 25G, Low

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 30 of 136



Prepared for: | Garmin International, Inc.

4.6 BAND EDGES

Test Method:

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.

Limits of band-edge measurements:

For FCC Part 15.247 Device:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.205(c)).

Test procedures:

The highest emissions level beyond the band-edge was measured and recorded. All band edge measurements were evaluated to the general limits in Part 15.209. More details can be found in section 3.4 of this report.

Deviations from test standard:

No deviation.

Test setup:

Test setup details can be found in section 3.4 of this report.

EUT operating conditions:

Details can be found in section 2.1 of this report.

Page 31 of 136



Report Number: R20230808-00-E10A Rev A

Prepared for: Garmin International, Inc.

Test results:

Pass

Comments:

- 1. All the band edge plots can be found in Appendix C.
- 2. If the device falls under FCC Part 15.247 (Details can be found in summary of test results), compliance is shown in the unrestricted band edges by showing minimum delta of 20 dB between peak and the band edge.
- 3. The restricted band edge compliance is shown by comparing it to the general limit defined in Part 15.209. The limit shown in the graph accounts for the antenna gain of the device.



Prepared for: | Garmin International, Inc.

4.7 POWER SPECTRAL DENSITY

Test Method:

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.

Limits of power measurements:

For FCC Part 15.247 Device:

The maximum PSD allowed is 8 dBm.

Test procedures:

Details can be found in section 3.4 of this report.

Deviations from test standard:

No deviation.

Test setup:

Details can be found in section 3.4 of this report.

EUT operating conditions:

Details can be found in section 2.1 of this report.

Test results:

Pass

Comments:

- 1. All the Power Spectral Density (PSD) plots can be found in Appendix C.
- 2. All the measurements were found to be compliant.
- 3. The measurements are listed in the tables in section 4.0.

Lincoln, NE 68521 Page 33 of 136



Report Number:	R20230808-00-E10A	Rev	А
Prenared for:	Garmin International Inc		

CONDUCTED AC MAINS EMISSIONS 4.8

Test Method:

ANSI C63.10-2013, Section(s) 6.2

Limits for conducted emissions measurements:

FREQUENCY OF EMISSION	CONDUCTED LIMIT				
(MHz)	(dBµV)				
	Quasi-peak	Average			
0.15-0.5	66 to 56	56 to 46			
0.5-5	56	46			
5-30	60 50				

Notes:

- 1. The lower limit shall apply at the transition frequencies.
- 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz
- 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

Test Procedures:

- a. The EUT was placed 0.8m above a ground reference plane and 0.4 meters from the conducting wall of a shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). The LISN provides 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference as well as the ground.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits are not reported.
- d. Results were compared to the 15.207 limits.

Deviation from the test standard:

No deviation

EUT operating conditions:

Details can be found in section 2.1 of this report.

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 34 of 136



Α

Rev

Prepared for:

Garmin International, Inc.

Test Results:



Figure 20 - Conducted Emissions Plot, Line, TX

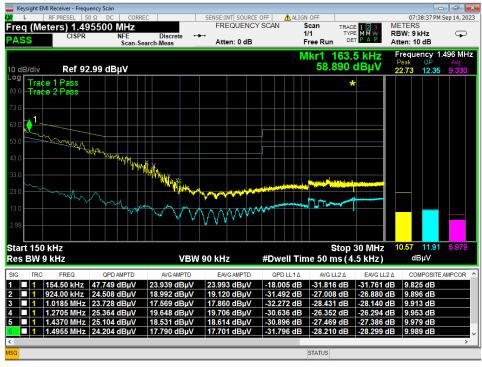


Figure 21 - Conducted Emissions Plot, Neutral, TX

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 35 of 136



Prepared for: | Garmin International, Inc.



Figure 22 - Conducted Emissions Plot, Line, IDLE

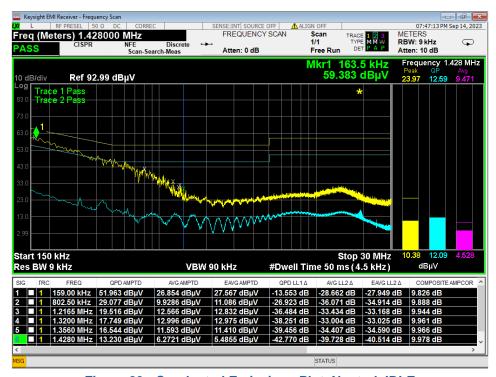


Figure 23 - Conducted Emissions Plot, Neutral, IDLE

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 36 of 136



Report Number:	R20230808-00-E10A	Rev	А
Prepared for:	Garmin International, Inc.		

APPENDIX A: SAMPLE CALCULATION

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF - (-CF + AG) + AV$$

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

AV = Averaging Factor (if applicable)

Assume a receiver reading of 55 dB $_{\mu}V$ is obtained. The Antenna Factor of 12 and a Cable Factor of 1.1 is added. The Amplifier Gain of 20 dB is subtracted, giving a field strength of 48.1 dB $_{\mu}V/m$.

$$FS = 55 + 12 - (-1.1 + 20) + 0 = 48.1 \text{ dB}\mu\text{V/m}$$

The 48.1 dB_μV/m value can be mathematically converted to its corresponding level in μV/m.

Level in μ V/m = Common Antilogarithm [(48.1 dB μ V/m)/20]= 254.1 μ V/m

AV is calculated by taking the 20*log(Ton/100) where Ton is the maximum transmission time in any 100ms window.

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive

Lincoln, NE 68521 Page 37 of 136



Prepared for: | Garmin International, Inc.

EIRP Calculations

In cases where direct antenna port measurement is not possible or would be inaccurate, output power is measured in EIRP. The maximum field strength is measured at a specified distance and the EIRP is calculated using the following equation;

EIRP (Watts) = [Field Strength (V/m) x antenna distance (m)]² / 30 Power (watts) = 10^{Power} (dBm)/10] / 1000 Voltage (dBμV) = Power (dBm) + 107 (for 50Ω measurement systems) Field Strength (V/m) = 10^{Power} (dBμV/m) / 20] / 10^{6} Gain = 1 (numeric gain for isotropic radiator) Conversion from 3m field strength to EIRP (d=3):

 $EIRP = [FS(V/m) \times d^2]/30 = FS [0.3]$ for d = 3 $EIRP(dBm) = FS(dB\mu V/m) - 10(log 10^9) + 10log[0.3] = FS(dB\mu V/m) - 95.23 10log(10^9) is the conversion from micro to milli$

Lincoln, NE 68521 Page 38 of 136



Report Number:	R20230808-00-E10A	Rev	А
Prepared for:	or: Garmin International, Inc.		

APPENDIX B - MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been for tests performed in this test report:

Test	Frequency Range	Uncertainty Value (dB)
Radiated Emissions, 3m	30MHz - 1GHz	±4.31
Radiated Emissions, 3m	1GHz - 18GHz	±5.08
Emissions limits, conducted	30MHz – 18GHz	±3.03

Expanded uncertainty values are calculated to a confidence level of 95%.

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

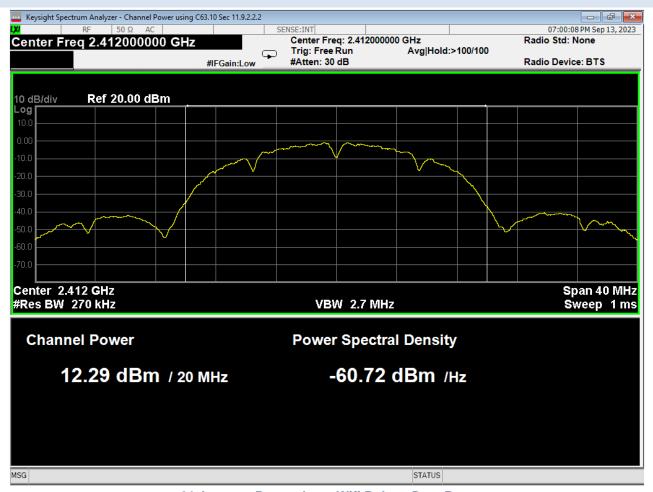
Page 39 of 136



Prepared for:

Garmin International, Inc.

APPENDIX C - GRAPHS AND TABLES



01 Average Power, Low, Wifi B, Low Data Rate

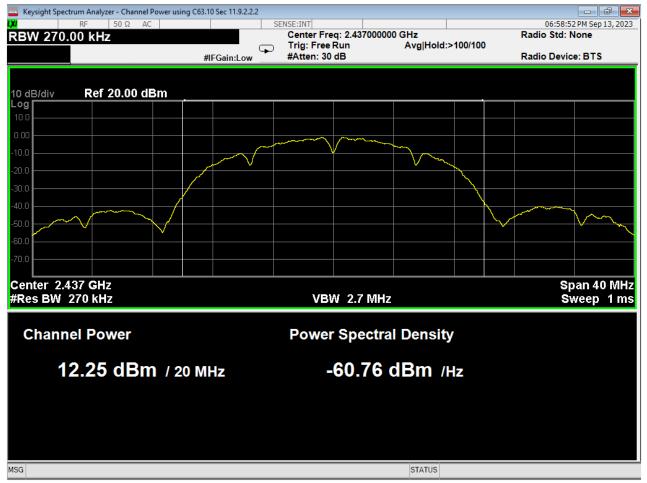
The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 40 of 136



Garmin International, Inc.

Prepared for:



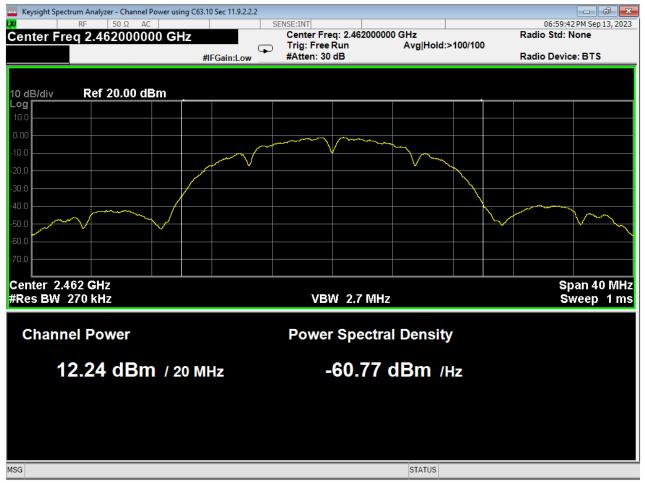
02 Average Power, Mid, Wifi B, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 41 of 136



Prepared for: | Garmin International, Inc.

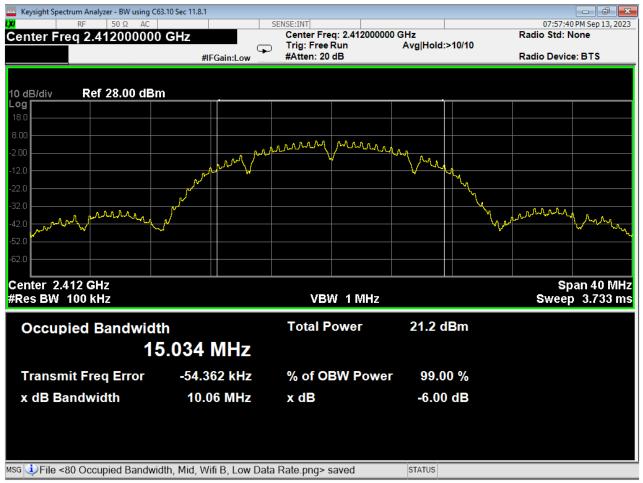


03 Average Power, High, Wifi B, Low Data Rate

Page 42 of 136



Prepared for: | Garmin International, Inc.



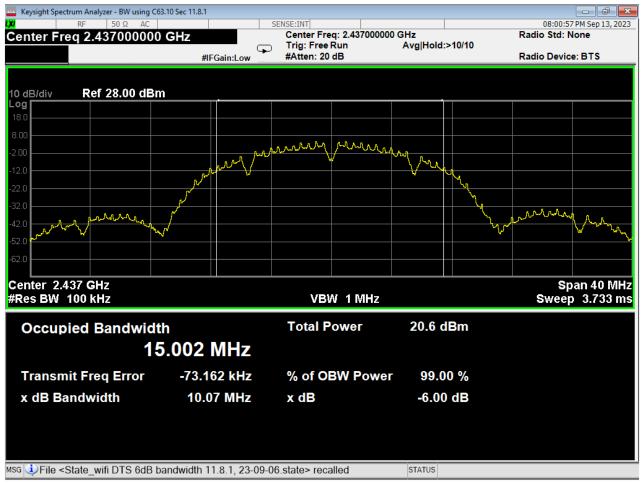
04 6dB Bandwidth, Low, Wifi B, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive

Lincoln, NE 68521 Page 43 of 136



Prepared for: | Garmin International, Inc.



05 6dB Bandwidth, Mid, Wifi B, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 44 of 136



Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - BW using C63.10 Sec 11.8.1 _ # X 08:02:30 PM Sep 13, 2023 Center Freq: 2.462000000 GHz Center Freq 2.462000000 GHz Radio Std: None Trig: Free Run #Atten: 20 dB Avg|Hold:>10/10 Radio Device: BTS #IFGain:Low 10 dB/div Ref 28.00 dBm Log α M_{L} M while Mary Center 2.462 GHz #Res BW 100 kHz Span 40 MHz Sweep 3.733 ms VBW 1 MHz **Total Power** 20.5 dBm **Occupied Bandwidth** 15.001 MHz **Transmit Freq Error** -76.181 kHz % of OBW Power 99.00 % x dB Bandwidth 10.05 MHz x dB -6.00 dB MSG STATUS

06 6dB Bandwidth, High, Wifi B, Low Data Rate

Lincoln, NE 68521 Page 45 of 136



Prepared for: | Garmin International, Inc.



07 PSD, Low, Wifi B, Low Data Rate

Page 46 of 136



Α

Prepared for: | Garmin International, Inc.

MSG File <State_wifi PSD using 11.10.2, 23-09-06.state> recalled

| Reptight Spectrum Analyzer - PSD using C63:10 Sec 11:10.2 | PRO: Fast | PRO: Fast | FGain:Low | FRO: Fast | FGain:Low | FAtten: 30 dB | PRO: Fast |

08 PSD, Mid, Wifi B, Low Data Rate

Page 47 of 136



Prepared for: | Garmin International, Inc.

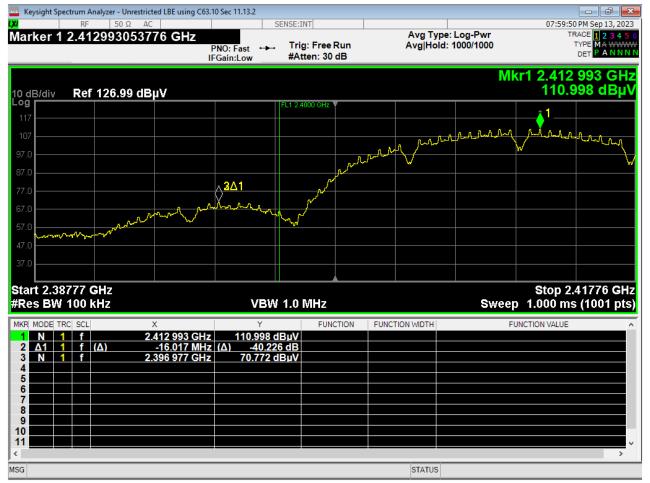


09 PSD, High, Wifi B, Low Data Rate

Page 48 of 136



Prepared for: | Garmin International, Inc.



10 Lower Bandedge, Unrestricted, Wifi B, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 49 of 136



Prepared for: | Garmin International, Inc.



11 Higher Bandedge, Unrestricted, Wifi B, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 50 of 136



Prepared for: | Garmin International, Inc.



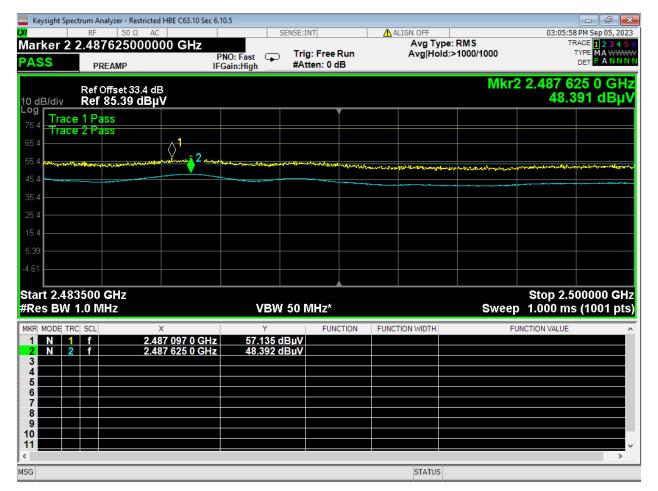
12 Lower Bandedge, Restricted, Wifi B, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 51 of 136



Prepared for: | Garmin International, Inc.



13 Higher Bandedge, Restricted, Wifi B, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 52 of 136



Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - Channel Power using C63.10 Sec 11.9.2.2.2 - F 07:03:27 PM Sep 13, 2023 Center Freq: 2.412000000 GHz Radio Std: None Center Freq 2.412000000 GHz Trig: Free Run #Atten: 30 dB Avg|Hold:>100/100 Radio Device: BTS #IFGain:Low 10 dB/div Log Ref 20.00 dBm Center 2.412 GHz #Res BW 270 kHz Span 40 MHz VBW 2.7 MHz Sweep 1 ms **Power Spectral Density Channel Power** 9.98 dBm / 20 MHz -63.03 dBm /Hz MSG STATUS

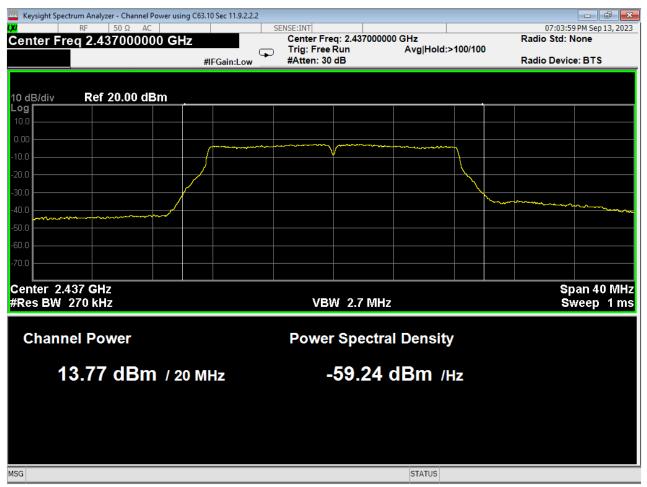
14 Average Power, Low, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 53 of 136



Prepared for: | Garmin International, Inc.



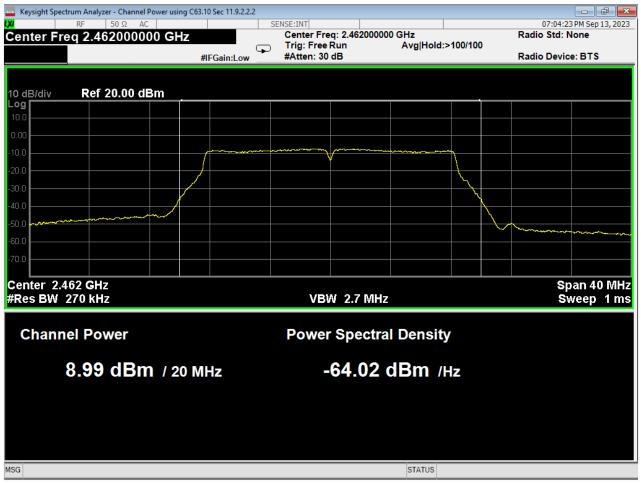
15 Average Power, Mid, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 54 of 136



Prepared for: | Garmin International, Inc.



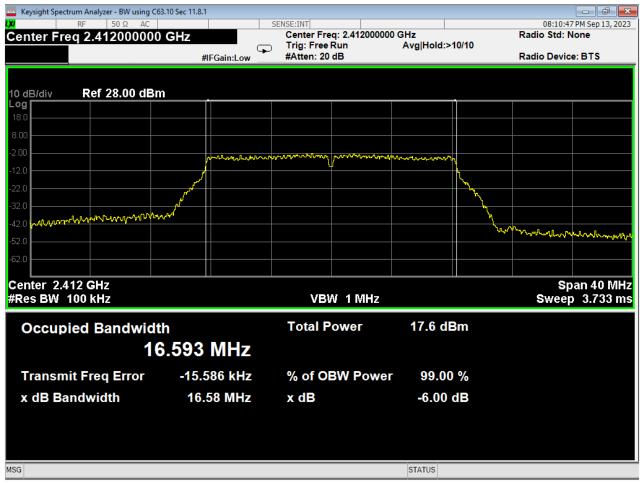
16 Average Power, High, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 55 of 136



Prepared for: | Garmin International, Inc.



17 6dB Bandwidth, Low, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 56 of 136



R20230808-00-E10A Report Number: Rev Α

Garmin International, Inc.

Prepared for:



18 6dB Bandwidth, Mid, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 57 of 136



Prepared for: | Garmin International, Inc.



19 6dB Bandwidth, High, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 58 of 136



R20230808-00-E10A Report Number: Rev Α

Garmin International, Inc.

Prepared for:



20 PSD, Low, Wifi G, Low Data Rate

Page 59 of 136



Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - PSD using C63.10 Sec 11.10.2 08:14:49 PM Sep 13, 2023 Avg Type: Log-Pwr Avg|Hold:>10/10 TRACE 1 2 3 4 5
TYPE M WWWW Center Freq 2.437000000 GHz Trig: Free Run #Atten: 30 dB PNO: Fast IFGain:Low Mkr1 2.437 610 5 GHz -9.579 dBm 10 dB/div Log Ref 20.00 dBm ╎┍╇╃╃╃╃╇╇╇ Span 35.00 MHz Sweep (#Swp) 12.47 ms (17000 pts) Center 2.43700 GHz #Res BW 3.0 kHz **#VBW 1.0 MHz** MSG File <State_wifi PSD using 11.10.2, 23-09-06.state> recalled

21 PSD, Mid, Wifi G, Low Data Rate

Page 60 of 136



MSG

Report Number: R20230808-00-E10A Rev A

Prepared for: | Garmin International, Inc.

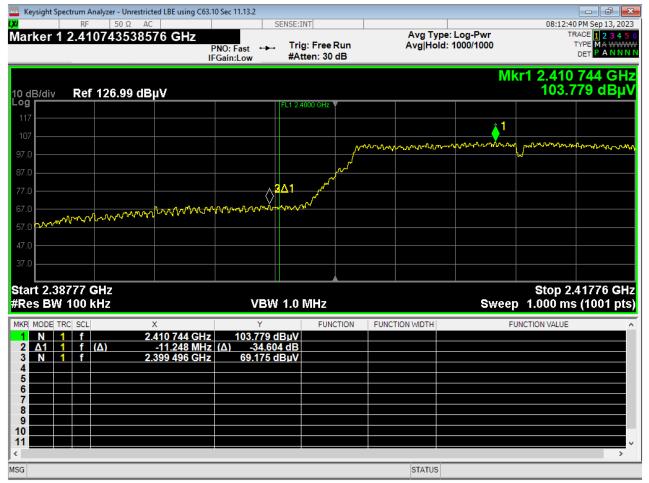
| Keysight Spectrum Analyzer - PSD using C63:10 Sec 11.10.2 | PRF | SO Q DC | SENSE:INT | O8:16:17PM Sep1.3, 2023 | TRGE | 23.3 * 5.20 * Center Freq 2.462000000 GHz | PNO: Fast | IFGain:Low | #Atten: 30 dB | Avg Type: Log-Pwr | Avg|Hold:>10/10 | TRGE | 23.3 * 5.20 * Center Freq 2.46200 GHz | PNO: Fast | FGain:Low | #Atten: 30 dB | Avg Type: Log-Pwr | Avg|Hold:>10/10 | TRGE | 23.3 * 5.20 * Center Freq 2.46200 GHz | PNO: Fast | FGain:Low | #Atten: 30 dB | Avg Type: Log-Pwr | Avg|Hold:>10/10 | TRGE | 23.3 * 5.20 * Center Prepared | PNO: Fast | FGain:Low | Free Run | Avg Type: Log-Pwr | Avg|Hold:>10/10 | TRGE | 23.3 * 5.20 * Center Prepared | PNO: Fast | FGain:Low | Free Run | FGain:Low | Avg Hold:>10/10 | TRGE | 23.3 * 5.20 * Center Prepared | PNO: Fast | FGain:Low | Free Run | FGain:Low | Avg Hold:>10/10 | TRGE | 23.3 * 5.20 * Center Prepared | PNO: Fast | FGain:Low | FGAIN: Fast | PNO: Fast | FGAIN: Fast | FGAIN:

22 PSD, High, Wifi G, Low Data Rate

Page 61 of 136



Prepared for: | Garmin International, Inc.



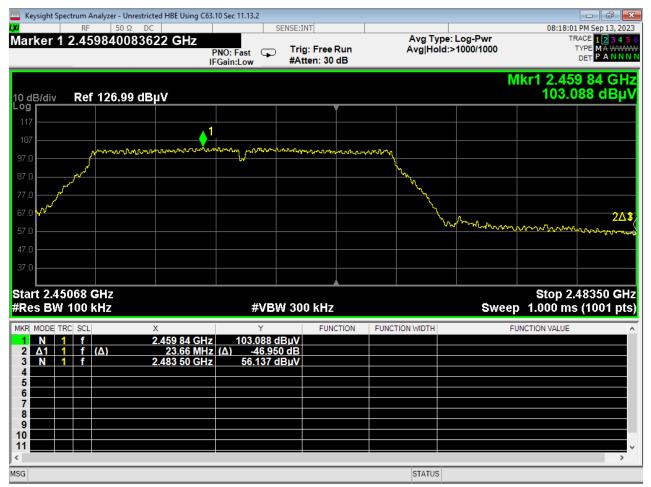
23 Lower Bandedge, Unrestricted, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 62 of 136



Prepared for: | Garmin International, Inc.



24 Higher Bandedge, Unrestricted, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 63 of 136



Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - Restricted LBE using C63.10 Sec 6.10.5 03:12:36 PM Aug 24, 2023 ALIGN OFF Avg Type: RMS Avg|Hold:>1000/1000 TRACE 1 2 3 4
TYPE MA WW Marker 2 2.389990000000 GHz Trig: Free Run #Atten: 0 dB PNO: Fast IFGain:High PASS PREAMP Mkr2 2.389 99 GHz 46.452 dBµV Ref Offset 32.95 dB **Ref 99.94 dBμV** 10 dB/div Log Trace 1 Pass Trace 2 Pass Stop 2.390000 GHz Sweep 1.000 ms (1001 pts) Start 2.380000 GHz #Res BW 1.0 MHz **#VBW 50 MHz*** FUNCTION FUNCTION WIDTH FUNCTION VALUE MKR MODE TRC SCL 2.389 96 GHz 60.433 dBμV 2.389 99 GHz (Δ) 46.452 dBμV 1 f 2 f (Δ) 5 8 9 10 11 MSG

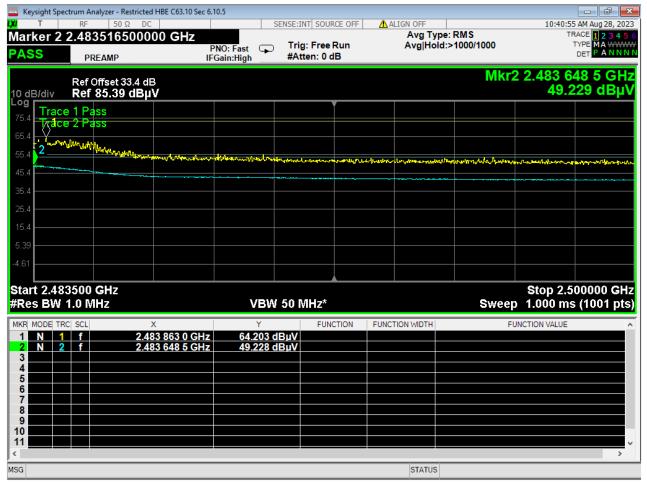
25 Lower Bandedge, Restricted, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 64 of 136



Prepared for: | Garmin International, Inc.

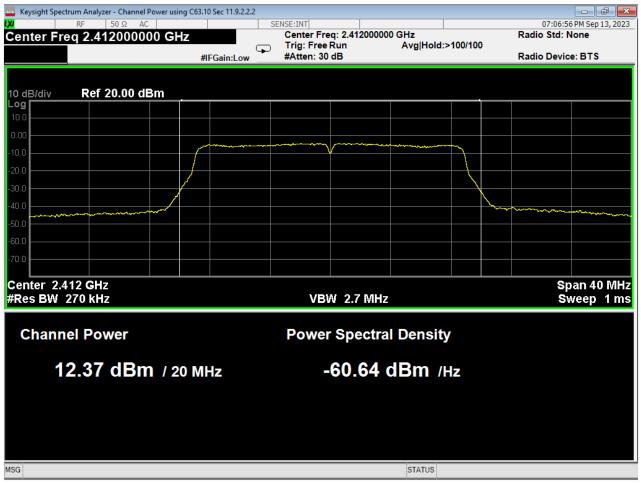


26 Higher Bandedge, Restricted, Wifi G, Low Data Rate

Page 65 of 136



Prepared for: | Garmin International, Inc.



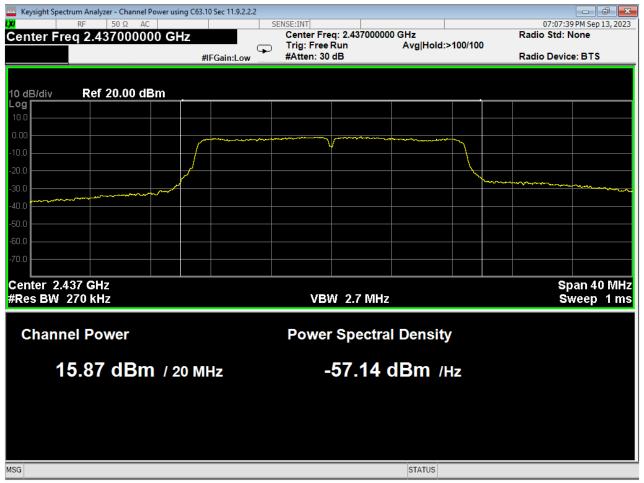
27 Average Power, Low, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 66 of 136



Prepared for: | Garmin International, Inc.

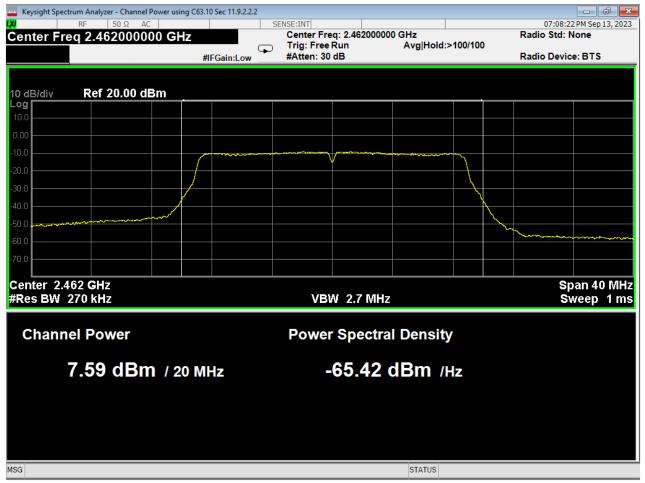


28 Average Power, Mid, Wifi N, Low Data Rate

Page 67 of 136



Prepared for: | Garmin International, Inc.



29 Average Power, High, Wifi N, Low Data Rate

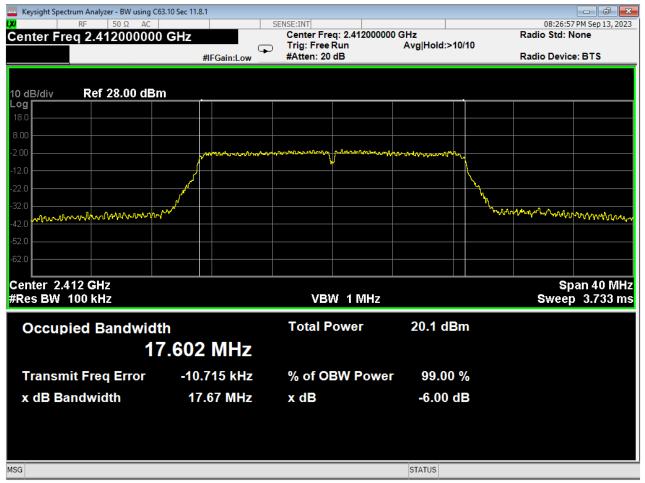
The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 68 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.



30 6dB Bandwidth, Low, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 69 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.



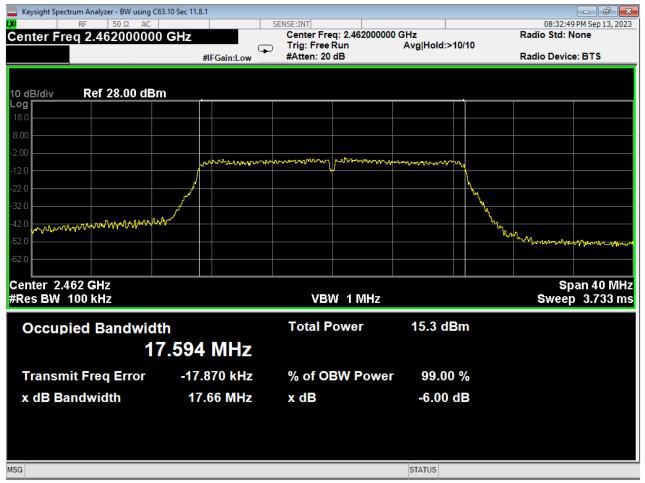
31 6dB Bandwidth, Mid, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 70 of 136



Prepared for: | Garmin International, Inc.



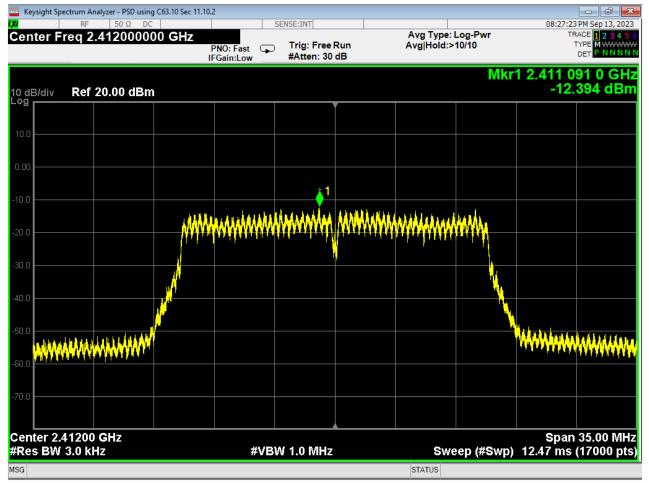
32 6dB Bandwidth, High, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 71 of 136



Prepared for: | Garmin International, Inc.

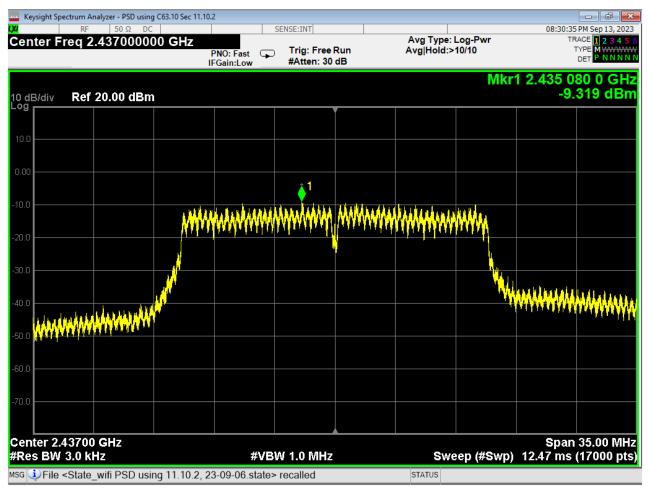


33 PSD, Low, Wifi N, Low Data Rate

Page 72 of 136



Prepared for: | Garmin International, Inc.



34 PSD, Mid, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 73 of 136



Prepared for: | Garmin International, Inc.

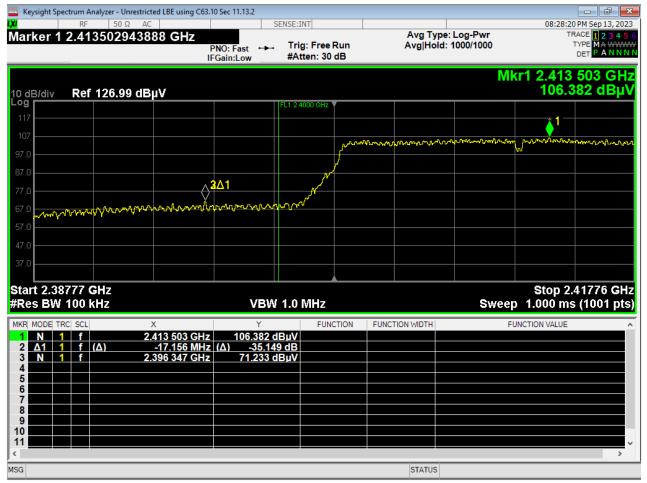
Keysight Spectrum Analyzer - PSD using C63.10 Sec 11.10.2 08:33:21 PM Sep 13, 2023 Avg Type: Log-Pwr Avg|Hold:>10/10 TRACE 1 2 3 4 5
TYPE MWWWW Center Freq 2.462000000 GHz Trig: Free Run #Atten: 30 dB Mkr1 2.461 628 4 GHz -17.034 dBm 10 dB/div Log Ref 20.00 dBm *** Span 35.00 MHz Sweep (#Swp) 12.47 ms (17000 pts) Center 2.46200 GHz #Res BW 3.0 kHz **#VBW 1.0 MHz** MSG

35 PSD, High, Wifi N, Low Data Rate

Page 74 of 136



Prepared for: | Garmin International, Inc.



36 Lower Bandedge, Unrestricted, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 75 of 136



MSG

Report Number: R20230808-00-E10A Rev A

Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - Unrestricted HBE Using C63.10 Sec 11.13.2 08:34:00 PM Sep 13, 2023 Avg Type: Log-Pwr Avg|Hold:>1000/1000 TRACE 1 2 3 4
TYPE MAWW Marker 1 2.459479114024 GHz Trig: Free Run #Atten: 30 dB PNO: Fast IFGain:Low Mkr1 2.459 48 GHz 101.391 dBµV 10 dB/div Log Ref 126.99 dBµV 2Δ3 Stop 2.48350 GHz Sweep 1.000 ms (1001 pts) Start 2.45068 GHz #Res BW 100 kHz **#VBW** 300 kHz FUNCTION FUNCTION WIDTH FUNCTION VALUE MKR MODE TRC SCL N 1 f Δ1 1 f (Δ) N 1 f 2.459 48 GHz 24.02 MHz (Δ) 2.483 50 GHz 101.391 dBµV -47.733 dB 53.658 dBµV 3 4 9 10 11

37 Higher Bandedge, Unrestricted, Wifi N, Low Data Rate

Page 76 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.

Keysight Spectrum Analyzer - Restricted LBE using C63.10 Sec 6.10.5 - F X 03:16:05 PM Aug 24, 2023 ALIGN OFF Avg Type: RMS Avg|Hold:>1000/1000 TRACE 1 2 3 4
TYPE MA WW Marker 2 2.390000000000 GHz Trig: Free Run PNO: Fast IFGain:High PASS #Atten: 0 dB PREAMP Mkr2 2.390 00 GHz Ref Offset 32.95 dB **Ref 99.94 dBμV** 50.467 dBµ\ 10 dB/div Log Trace 1 Pass Trace 2 Pass Stop 2.390000 GHz Start 2.380000 GHz #Res BW 1.0 MHz **#VBW 50 MHz*** Sweep 1.000 ms (1001 pts) FUNCTION FUNCTION WIDTH FUNCTION VALUE MKR MODE TRC SCL 2.388 26 GHz 66.037 dBμV 2.390 00 GHz (Δ) 50.466 dBμV 1 f 2 f (Δ) 3 4 5 8 9 10 11 MSG

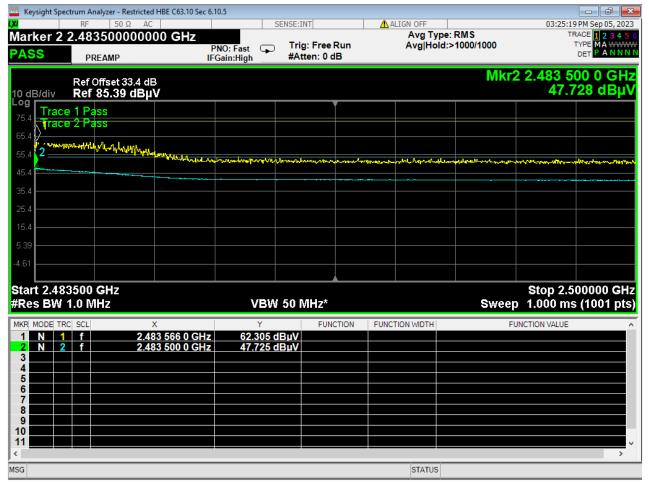
38 Lower Bandedge, Restricted, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 77 of 136



Prepared for: | Garmin International, Inc.



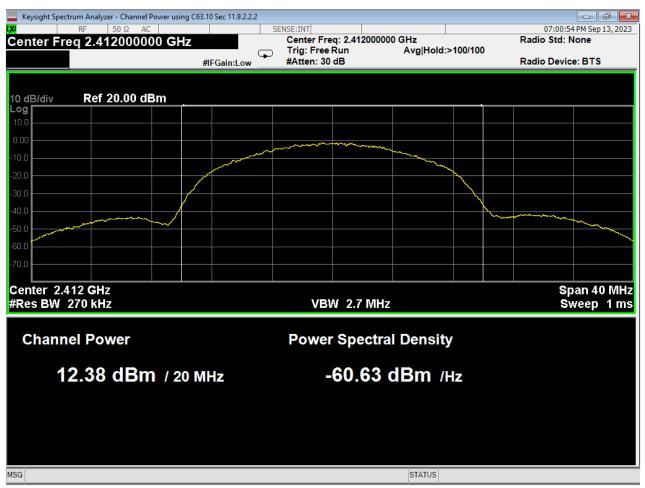
39 Higher Bandedge, Restricted, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 78 of 136



Prepared for: | Garmin International, Inc.



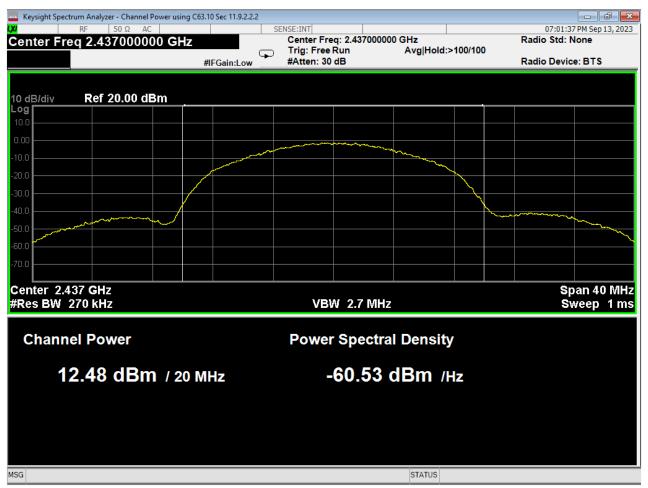
40 Average Power, Low, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 79 of 136



Prepared for: | Garmin International, Inc.



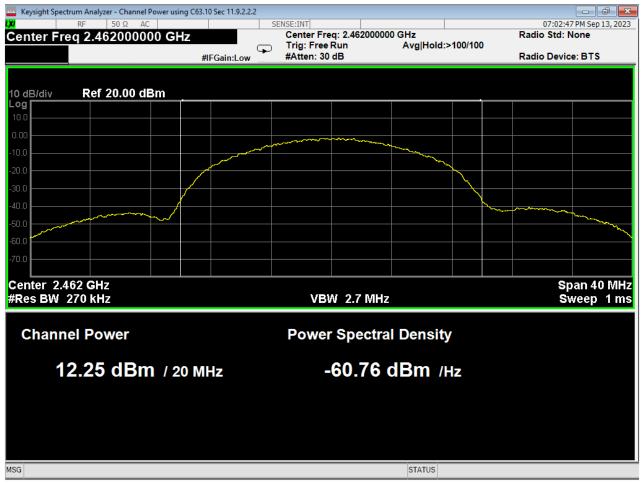
41 Average Power, Mid, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 80 of 136



Prepared for: | Garmin International, Inc.



42 Average Power, High, Wifi B, High Data Rate

Page 81 of 136



Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - BW using C63.10 Sec 11.8.1 08:04:29 PM Sep 13, 2023 Center Freq: 2.412000000 GHz Radio Std: None Center Freq 2.412000000 GHz Trig: Free Run #Atten: 20 dB Avg|Hold:>10/10 Radio Device: BTS #IFGain:Low 10 dB/div Ref 28.00 dBm Log ر الرساليماليماليماليماليماليماليماليم Center 2.412 GHz #Res BW 100 kHz Span 40 MHz Sweep 3.733 ms VBW 1 MHz **Total Power** 22.0 dBm **Occupied Bandwidth** 14.699 MHz **Transmit Freq Error** -23.527 kHz % of OBW Power 99.00 % x dB Bandwidth x dB -6.00 dB 9.066 MHz MSG STATUS

43 6dB Bandwidth, Low, Wifi B, High Data Rate

Page 82 of 136



Prepared for: | Garmin International, Inc.



44 6dB Bandwidth, Mid, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 83 of 136



MSG

Report Number: R20230808-00-E10A Rev A

Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - BW using C63.10 Sec 11.8.1 08:08:46 PM Sep 13, 2023 Center Freq: 2.462000000 GHz Radio Std: None Center Freq 2.462000000 GHz Trig: Free Run #Atten: 20 dB Avg|Hold:>10/10 Radio Device: BTS #IFGain:Low 10 dB/div Ref 28.00 dBm Log TMM Center 2.462 GHz #Res BW 100 kHz Span 40 MHz Sweep 3.733 ms VBW 1 MHz **Total Power** 21.7 dBm **Occupied Bandwidth** 14.679 MHz **Transmit Freq Error** -23.600 kHz % of OBW Power 99.00 % x dB Bandwidth x dB -6.00 dB 9.520 MHz

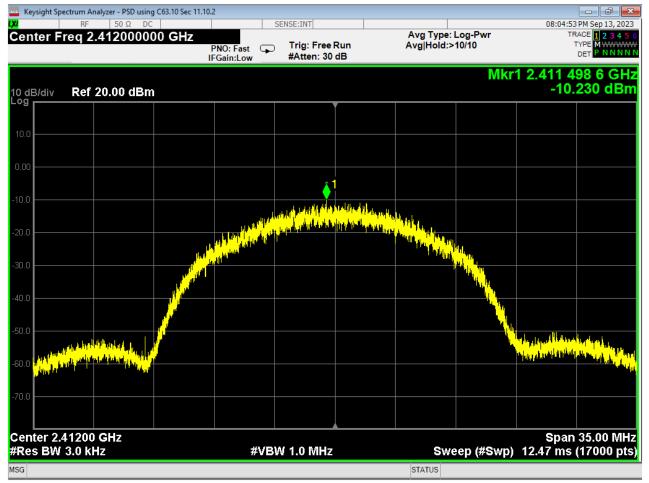
45 6dB Bandwidth, High, Wifi B, High Data Rate

STATUS

Lincoln, NE 68521 Page 84 of 136



Prepared for: | Garmin International, Inc.



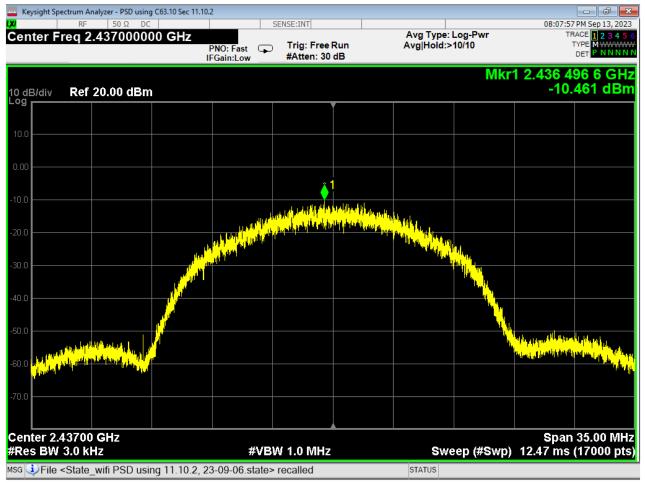
46 PSD, Low, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 85 of 136



Prepared for: | Garmin International, Inc.



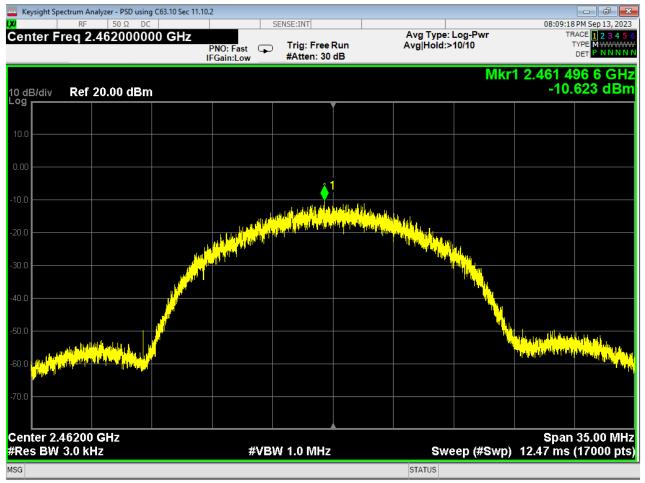
47 PSD, Mid, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 86 of 136



Prepared for: | Garmin International, Inc.



48 PSD, High, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 87 of 136



Prepared for: | Garmin International, Inc.



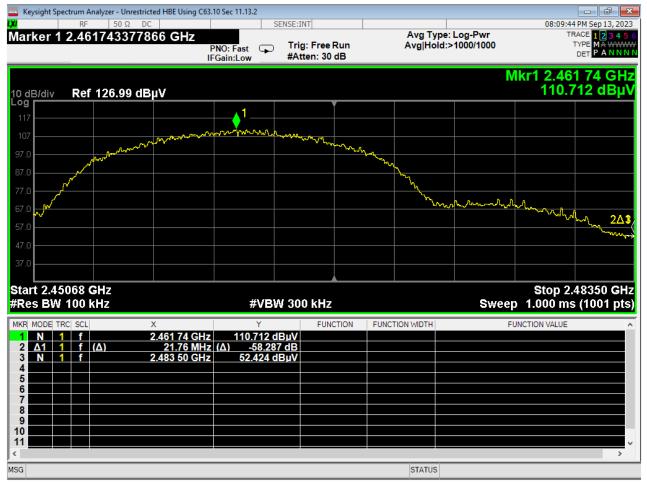
49 Lower Bandedge, Unrestricted, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 88 of 136



Prepared for: | Garmin International, Inc.



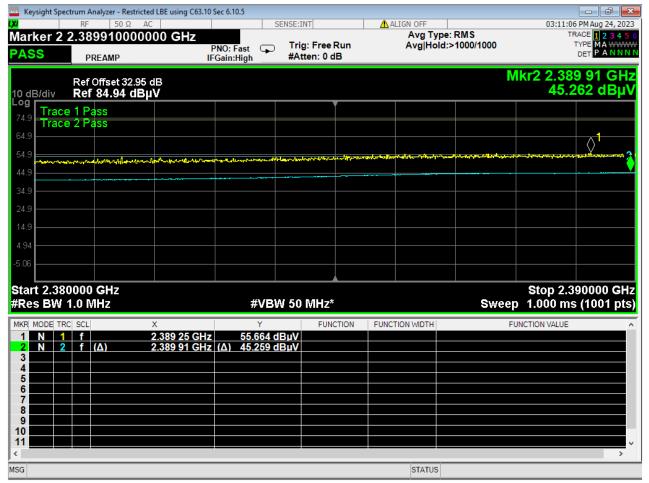
50 Higher Bandedge, Unrestricted, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 89 of 136



Prepared for: | Garmin International, Inc.



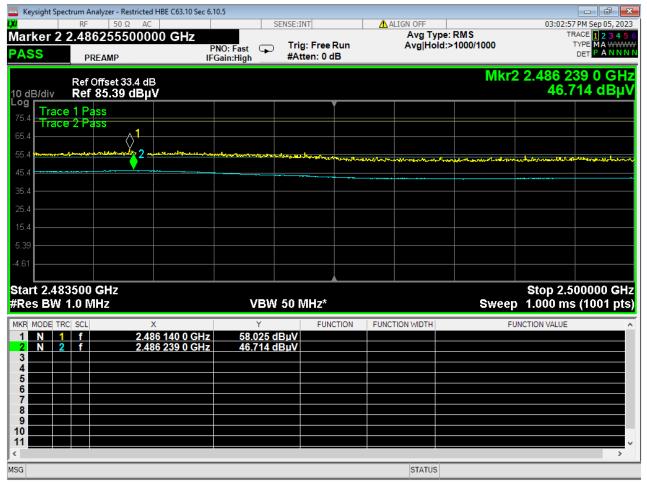
51 Lower Bandedge, Restricted, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 90 of 136



Prepared for: | Garmin International, Inc.



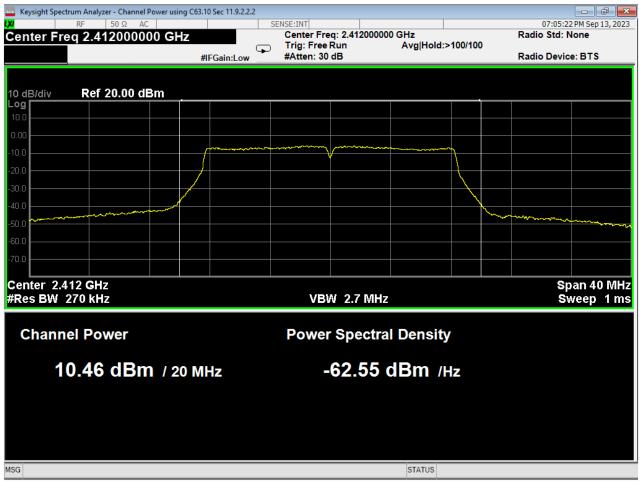
52 Higher Bandedge, Restricted, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 91 of 136



Prepared for: | Garmin International, Inc.



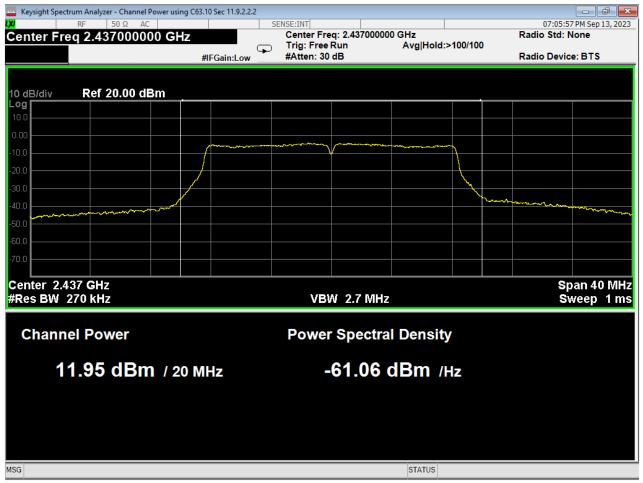
53 Average Power, Low, Wifi G, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 92 of 136



Prepared for: | Garmin International, Inc.



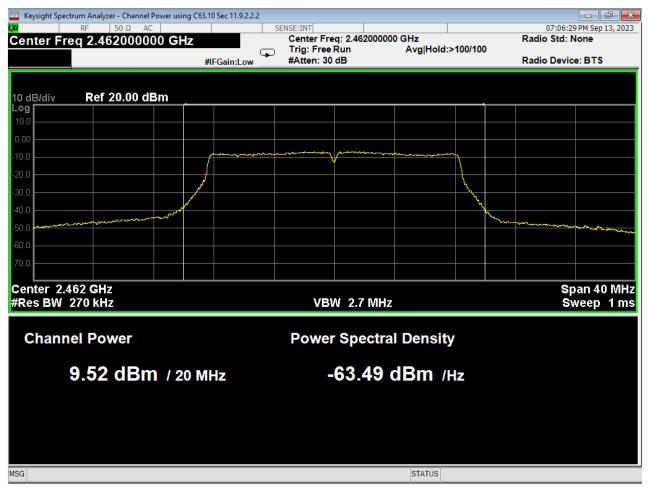
54 Average Power, Mid, Wifi G, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 93 of 136



Prepared for: Garmin International, Inc.



55 Average Power, High, Wifi G, High Data Rate

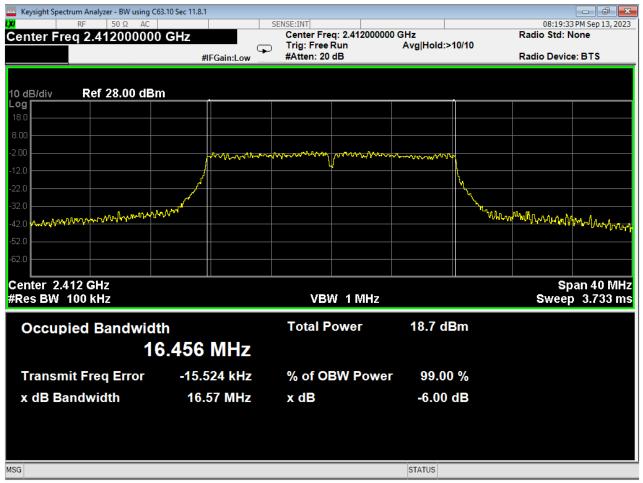
The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 94 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.



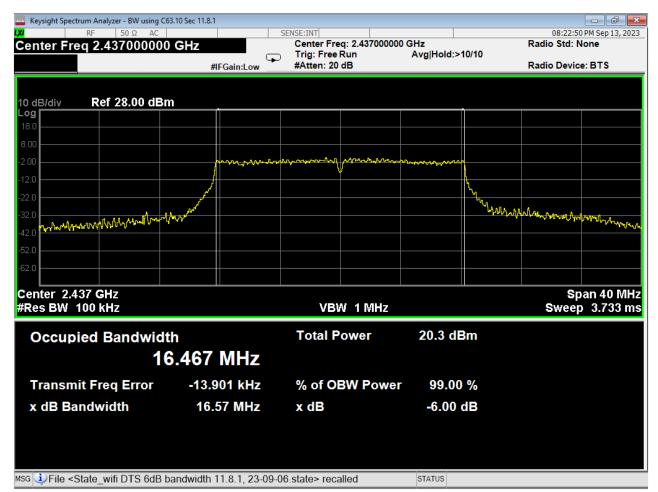
56 6dB Bandwidth, Low, Wifi G, High Data Rate

Page 95 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.



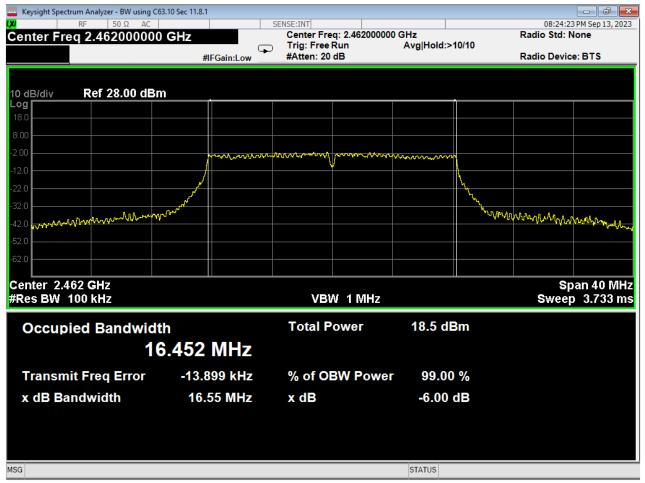
57 6dB Bandwidth, Mid, Wifi G, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 96 of 136



Prepared for: | Garmin International, Inc.



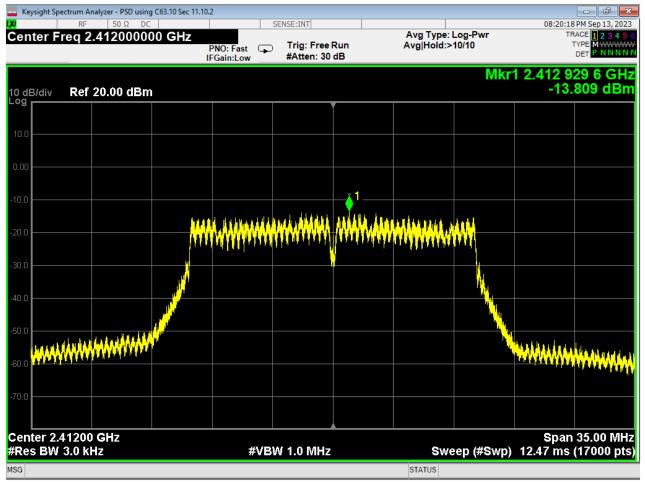
58 6dB Bandwidth, High, Wifi G, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 97 of 136



Prepared for: | Garmin International, Inc.

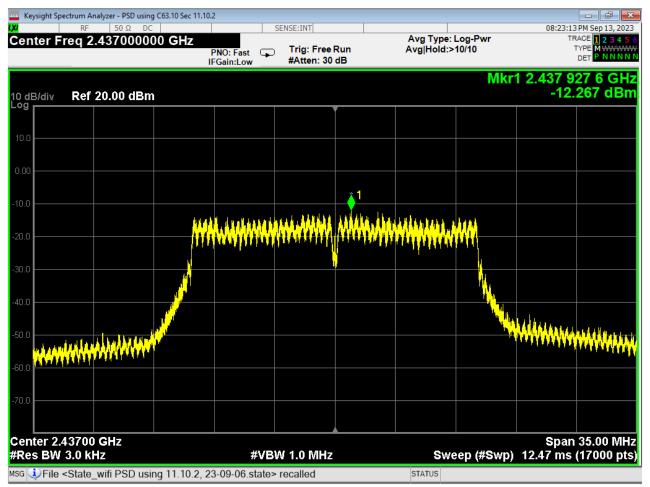


59 PSD, Low, Wifi G, High Data Rate

Page 98 of 136



Prepared for: | Garmin International, Inc.



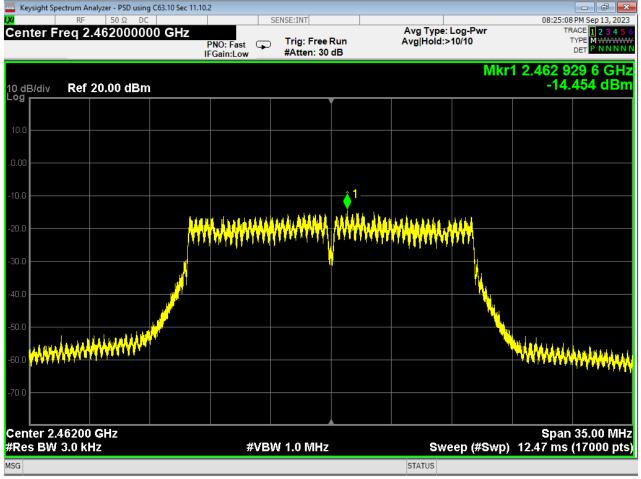
60 PSD, Mid, Wifi G, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 99 of 136



Prepared for: | Garmin International, Inc.

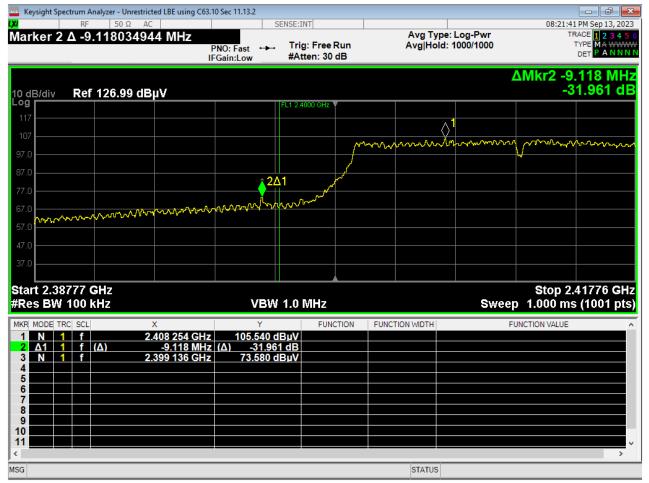


61 PSD, High, Wifi G, High Data Rate

Lincoln, NE 68521 Page 100 of 136



Prepared for: | Garmin International, Inc.



62 Lower Bandedge, Unrestricted, Wifi G, High Data Rate

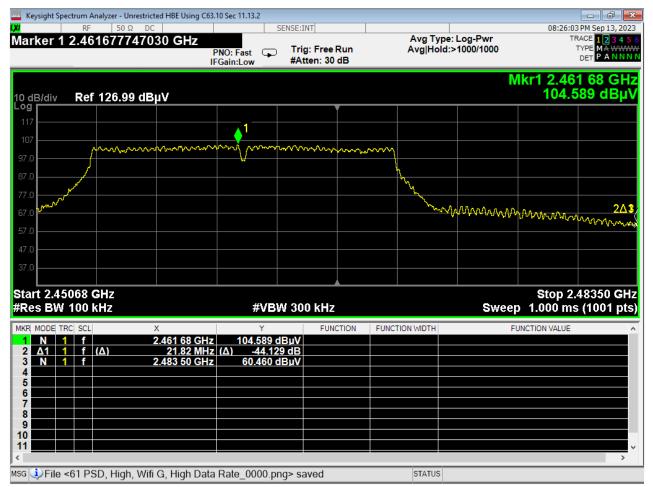
The Nebraska Center for Excellence in Electronics 4740 Discovery Drive

Lincoln, NE 68521 Page 101 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.



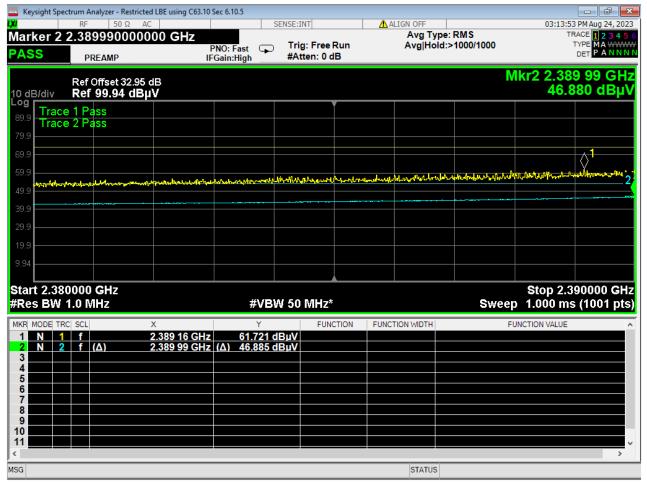
63 Higher Bandedge, Unrestricted, Wifi G, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 102 of 136



Prepared for: | Garmin International, Inc.

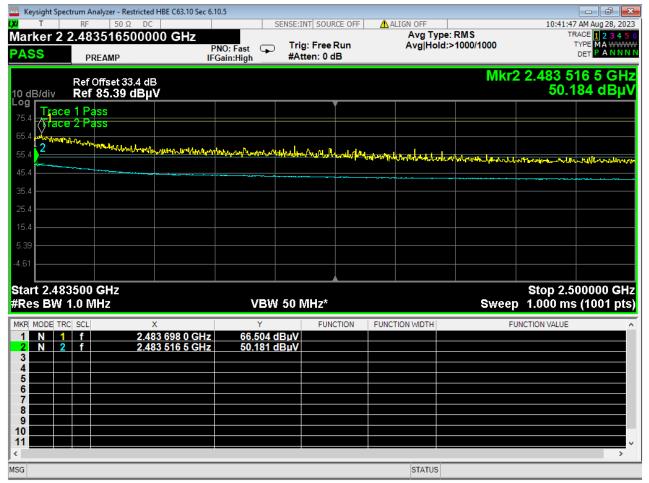


64 Lower Bandedge, Restricted, Wifi G, High Data Rate

Lincoln, NE 68521 Page 103 of 136



Prepared for: | Garmin International, Inc.



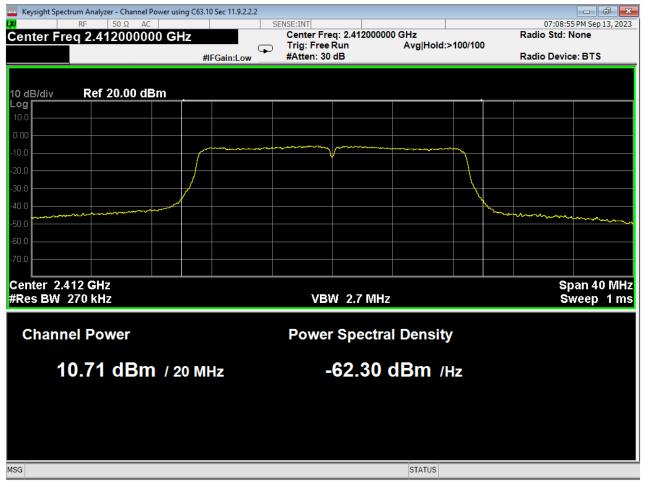
65 Higher Bandedge, Restricted, Wifi G High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 104 of 136



Prepared for: | Garmin International, Inc.

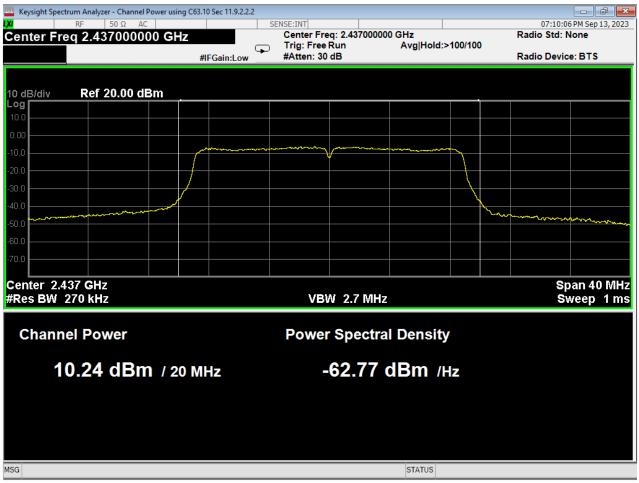


66 Average Power, Low, Wifi N, High Data Rate

Page 105 of 136



Prepared for: Garmin International, Inc.



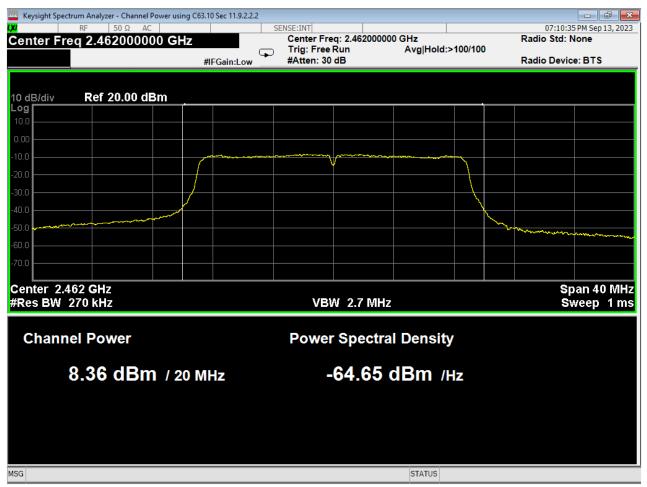
67 Average Power, Mid, Wifi N, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 106 of 136



Prepared for: | Garmin International, Inc.



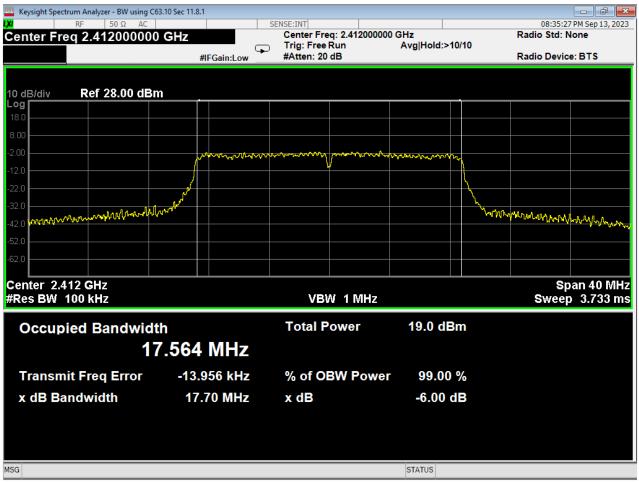
68 Average Power, High, Wifi N, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 107 of 136



Prepared for: | Garmin International, Inc.

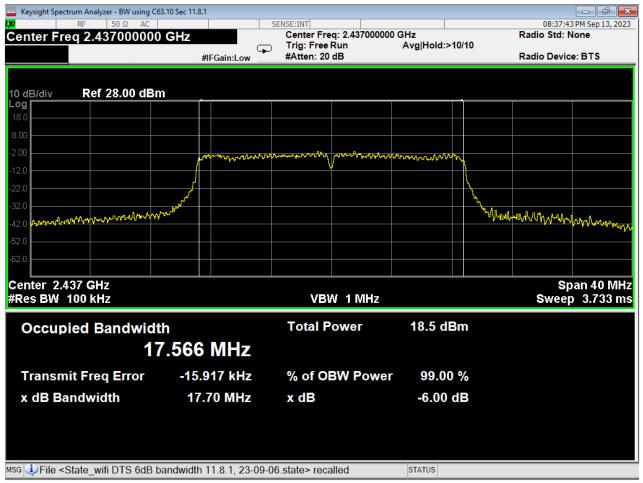


69 6dB Bandwidth, Low, Wifi N, High Data Rate

Lincoln, NE 68521 Page 108 of 136



Prepared for: | Garmin International, Inc.



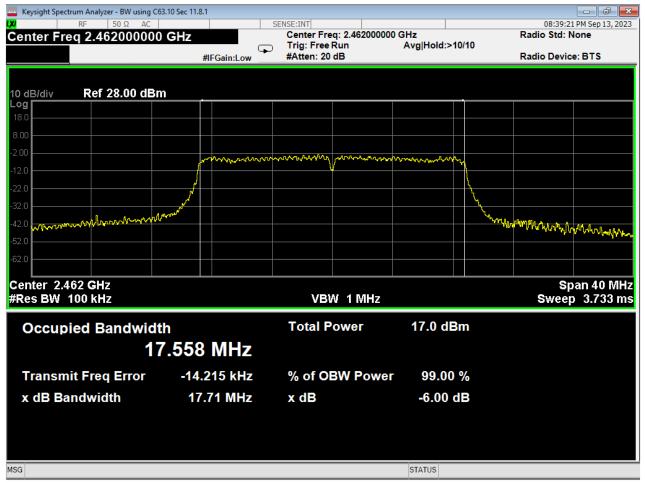
70 6dB Bandwidth, Mid, Wifi N, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 109 of 136



Prepared for: | Garmin International, Inc.



71 6dB Bandwidth, High, Wifi N, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 110 of 136



Prepared for: | Garmin International, Inc.



72 PSD, Low, Wifi N, High Data Rate

Page 111 of 136



Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - PSD using C63.10 Sec 11.10.2 08:38:12 PM Sep 13, 2023 SENSE:INT Avg Type: Log-Pwr Avg|Hold:>10/10 TRACE 1 2 3 4 5 Center Freq 2.437000000 GHz Trig: Free Run #Atten: 30 dB PNO: Fast IFGain:Low Mkr1 2.436 058 0 GHz -14.762 dBm 10 dB/div Log Ref 20.00 dBm ┪┩╏┸┸╏┍┩┩╃╃╃╃╃╃╃╃╃╃╃╃╃╃ *** Span 35.00 MHz Sweep (#Swp) 12.47 ms (17000 pts) Center 2.43700 GHz #Res BW 3.0 kHz **#VBW 1.0 MHz** MSG

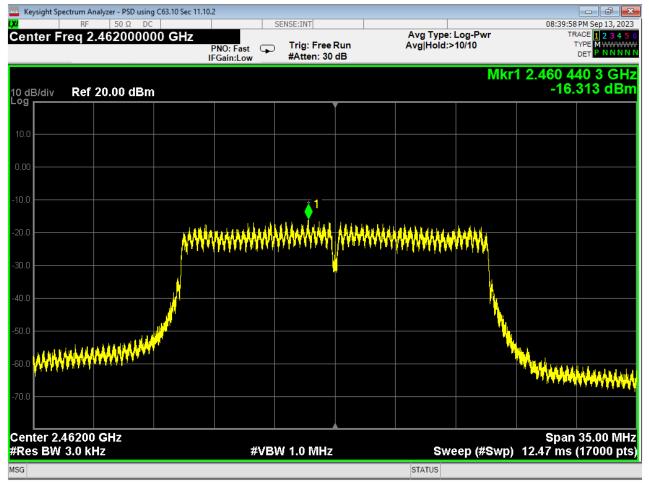
73 PSD, Mid, Wifi N, High Data Rate

Page 112 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.

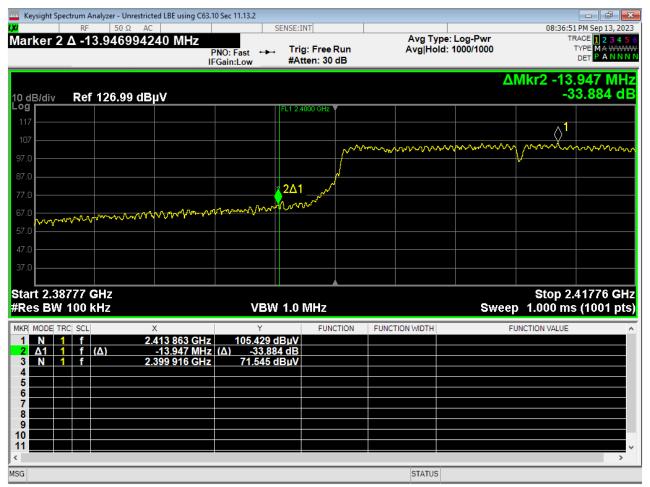


74 PSD, High, Wifi N, High Data Rate

Page 113 of 136



Prepared for: | Garmin International, Inc.



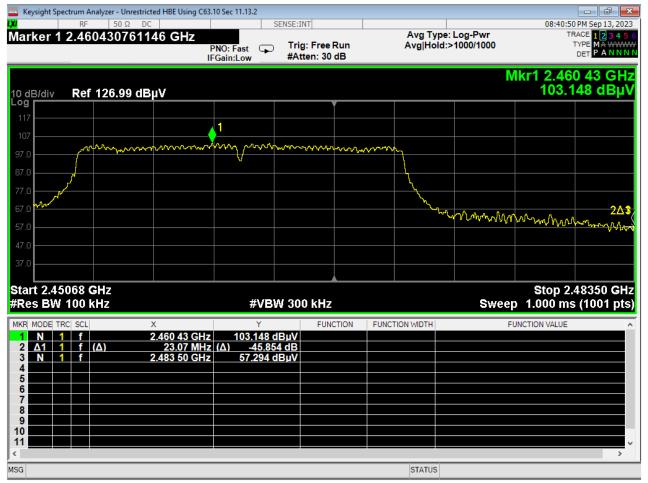
75 Lower Bandedge, Unrestricted, Wifi N, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 114 of 136



Prepared for: | Garmin International, Inc.



76 Higher Bandedge, Unrestricted, Wifi N, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 115 of 136



Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - Restricted LBE using C63.10 Sec 6.10.5 03:17:26 PM Aug 24, 2023 ALIGN OFF Avg Type: RMS Avg|Hold:>1000/1000 TRACE 1 2 3 4
TYPE MA WW Marker 2 2.389990000000 GHz Trig: Free Run PNO: Fast IFGain:High PASS #Atten: 0 dB PREAMP Mkr2 2.389 99 GHz 48.099 dBµV Ref Offset 32.95 dB **Ref 99.94 dBμV** 10 dB/div Log Trace 1 Pass Trace 2 Pass Stop 2.390000 GHz Start 2.380000 GHz #Res BW 1.0 MHz **#VBW 50 MHz*** Sweep 1.000 ms (1001 pts) FUNCTION FUNCTION WIDTH FUNCTION VALUE MKR MODE TRC SCL 2.388 83 GHz 62.114 dBμV 2.389 99 GHz (Δ) 48.097 dBμV 1 f 2 f (Δ) 3 4 5 8 9 10 11 MSG

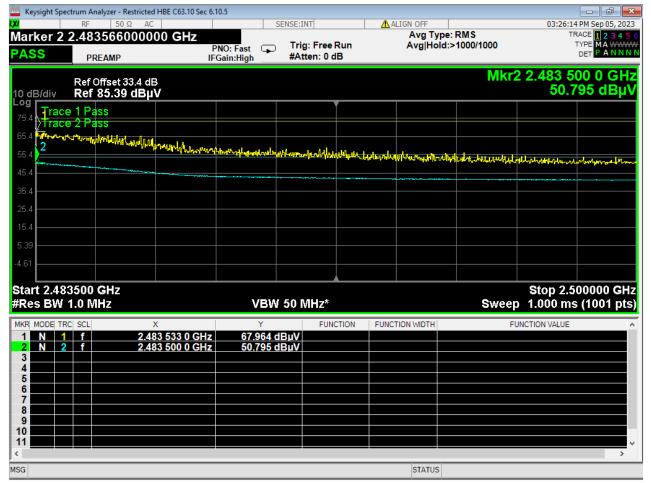
77 Lower Bandedge, Restricted, Wifi N, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 116 of 136



Prepared for: | Garmin International, Inc.



78 Higher Bandedge, Restricted, Wifi N, High Data Rate

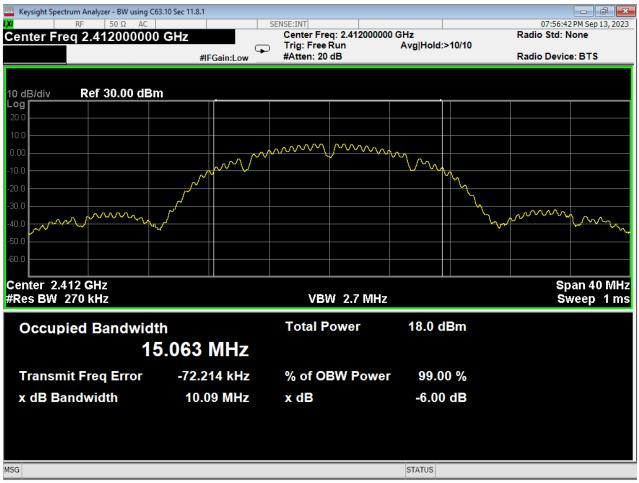
The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 117 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.



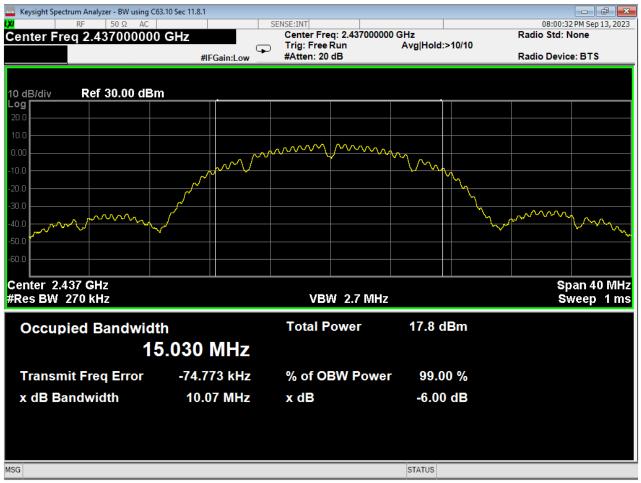
79 Occupied Bandwidth, Low, Wifi B, Low Data Rate

Page 118 of 136



Α

Prepared for: | Garmin International, Inc.



80 Occupied Bandwidth, Mid, Wifi B, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 119 of 136



Α

Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - BW using C63.10 Sec 11.8.1 08:02:05 PM Sep 13, 2023 Center Freq: 2.462000000 GHz Radio Std: None Center Freq 2.462000000 GHz Trig: Free Run #Atten: 20 dB Avg|Hold:>10/10 Radio Device: BTS #IFGain:Low 10 dB/div Ref 30.00 dBm Log M Center 2.462 GHz #Res BW 270 kHz Span 40 MHz Sweep 1 ms VBW 2.7 MHz **Total Power** 17.7 dBm **Occupied Bandwidth** 15.062 MHz **Transmit Freq Error** -92.210 kHz % of OBW Power 99.00 % x dB Bandwidth 10.06 MHz x dB -6.00 dB MSG STATUS

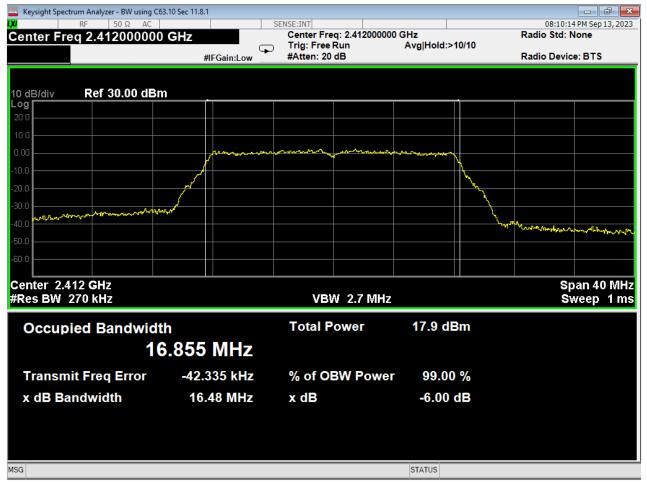
81 Occupied Bandwidth, High, Wifi B, Low Data Rate

Lincoln, NE 68521 Page 120 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.

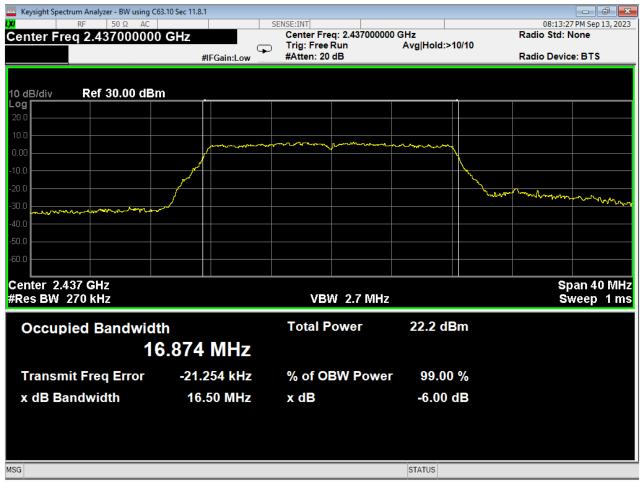


82 Occupied Bandwidth, Low, Wifi G, Low Data Rate

Page 121 of 136



Prepared for: | Garmin International, Inc.



83 Occupied Bandwidth, Mid, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 122 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.



84 Occupied Bandwidth, High, Wifi G, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 123 of 136



Prepared for: | Garmin International, Inc.



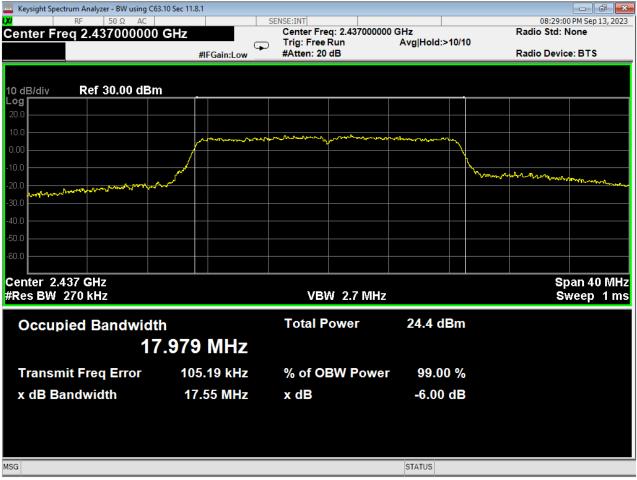
85 Occupied Bandwidth, Low, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 124 of 136



Prepared for: Garmin International, Inc.



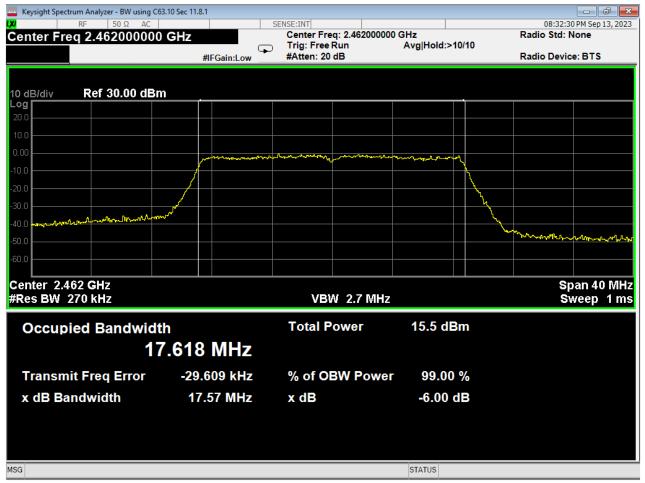
86 Occupied Bandwidth, Mid, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive

Lincoln, NE 68521 Page 125 of 136



Prepared for: | Garmin International, Inc.



87 Occupied Bandwidth, High, Wifi N, Low Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 126 of 136



Α

Prepared for: | Garmin International, Inc.

Keysight Spectrum Analyzer - BW using C63.10 Sec 11.8.1 - F 08:04:04 PM Sep 13, 2023 Center Freq: 2.412000000 GHz Radio Std: None Center Freq 2.412000000 GHz Avg|Hold:>10/10 Trig: Free Run #Atten: 20 dB Radio Device: BTS #IFGain:Low 10 dB/div Ref 30.00 dBm Log Center 2.412 GHz #Res BW 270 kHz Span 40 MHz Sweep 1 ms VBW 2.7 MHz **Total Power** 21.0 dBm **Occupied Bandwidth** 14.787 MHz **Transmit Freq Error** -29.074 kHz % of OBW Power 99.00 % x dB Bandwidth x dB -6.00 dB 9.828 MHz MSG STATUS

88 Occupied Bandwidth, Low, Wifi B, High Data Rate

Page 127 of 136



Prepared for: | Garmin International, Inc.



89 Occupied Bandwidth, Mid, Wifi B, High Data Rate

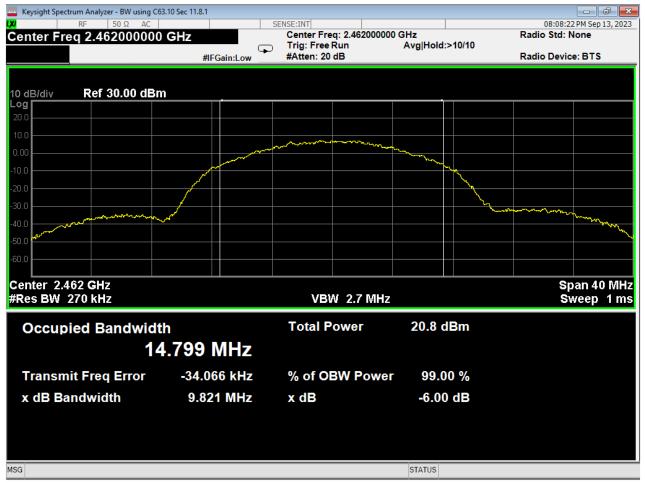
The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 128 of 136



Α

Prepared for: | Garmin International, Inc.



90 Occupied Bandwidth, High, Wifi B, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive

Lincoln, NE 68521 Page 129 of 136



Prepared for: | Garmin International, Inc.



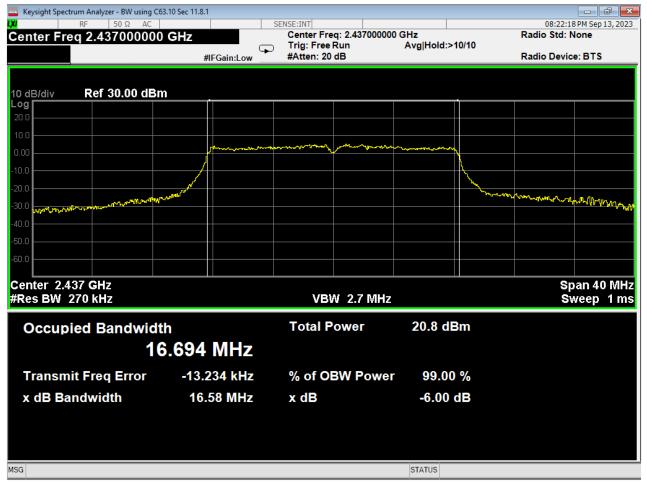
91 Occupied Bandwidth, Low, Wifi G, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive

Lincoln, NE 68521 Page 130 of 136



Prepared for: | Garmin International, Inc.



92 Occupied Bandwidth, Mid, Wifi G, High Data Rate

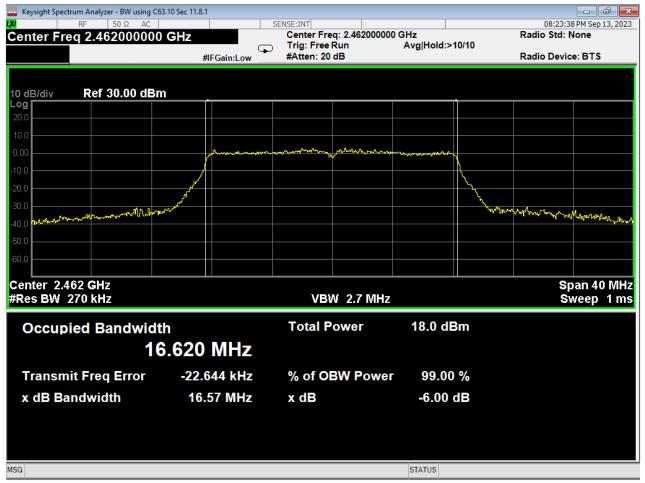
The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 131 of 136



R20230808-00-E10A Report Number: Rev Α

Prepared for: Garmin International, Inc.



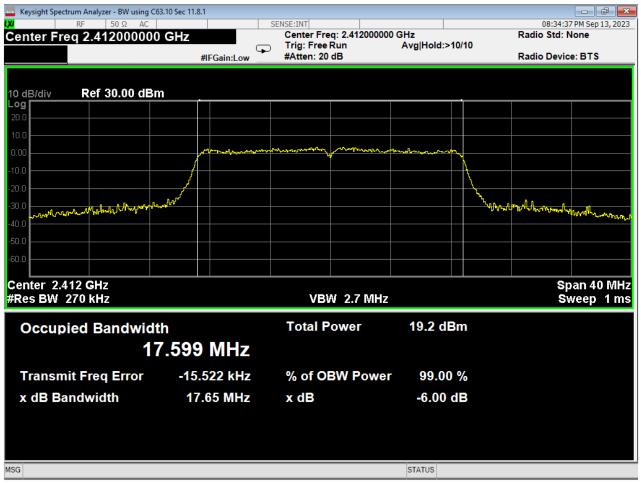
93 Occupied Bandwidth, High, Wifi G, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 132 of 136



Prepared for: | Garmin International, Inc.



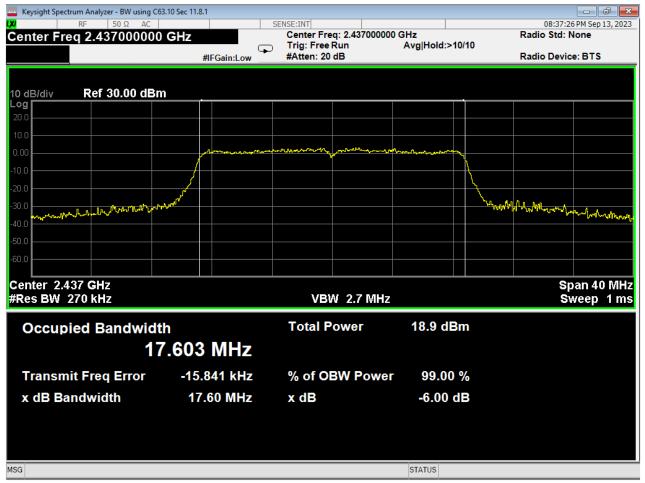
94 Occupied Bandwidth, Low, Wifi N, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 133 of 136



Prepared for: | Garmin International, Inc.



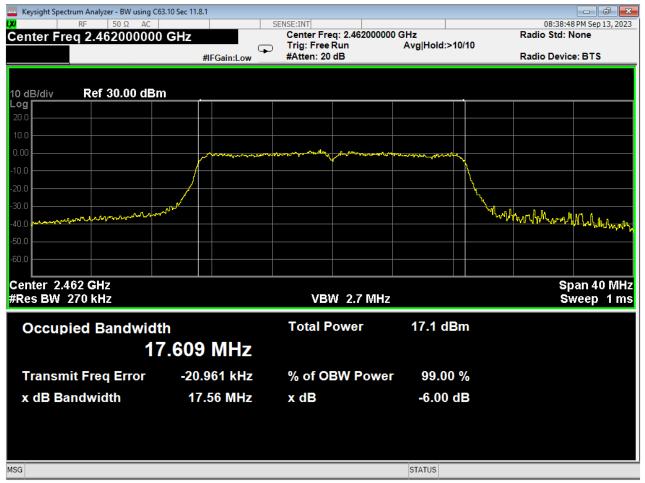
95 Occupied Bandwidth, Mid, Wifi N, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive

Lincoln, NE 68521 Page 134 of 136



Prepared for: | Garmin International, Inc.



96 Occupied Bandwidth, High, Wifi N, High Data Rate

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 135 of 136



 Report Number:
 R20230808-00-E10A
 Rev
 A

 Prepared for:
 Garmin International, Inc.

REPORT END

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive Lincoln, NE 68521

Page 136 of 136