

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:

A04452

Test Report No:

R20220901-21-E5A

Approved by:

I dane

Fox Lane EMC Test Engineer

DATE:

December 7, 2022

Total Pages:

136

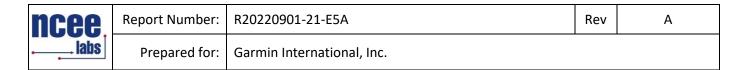
The Nebraska Center for Excellence in Electronics (NCEE) authorizes the above-named company to reproduce this report provided it is reproduced in its entirety for use by the company's employees only. Any use that a third party makes of this report, or any reliance on or decisions made based on it, are 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.



Incee labs	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

REVISION PAGE

Rev. No.	Date	Description
		Original – FLane
0	18 November 2022	Reviewed By - KVepuri
		Prepared by FLane, GLarsen
А	6 December 2022	Removed Antenna Gain - FL



CONTENTS

Revi	sion Pag	ge	2
1.0	Sum	nmary of test results	4
2.0	EUT	Description	5
	2.1	Equipment under test	5
	2.2	Description of test modes	5
	2.3	Description of support units	5
3.0	Labo	oratory and General Test Description	6
	3.1	Laboratory description	6
	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
Арр	endix A	: Sample Calculation	37
Арр	endix B	- Measurement Uncertainty	
Арр	endix C	– Graphs and Tables	40
REP		۱D	136



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 2

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 2 Section 5.4(d)	Peak output power	Pass			
FCC Part 15.247(a)(2) RSS-247 Issue 2 Section 5.2	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 2 Section 5.5, RSS-Gen Issue 5, Section 8.9	Transmitter Radiated Emissions	Pass			
FCC Part 15.247(e) RSS-247 Issue 2 Section 5.2	Power Spectral Density	Pass			
FCC Part 15.209, 15.247(d) RSS-247 Issue 2 Section 5.5	Band Edge Measurement	Pass			
FCC Part 15.207 RSS-Gen Issue 5, Section 8.8	Conducted Emissions	Pass			



2.0 EUT DESCRIPTION

2.1 EQUIPMENT UNDER TEST

Summary and Operating Condition:

EUT	A04452
IC	1792A-04452
FCC ID	IPH-04452
EUT Received	3 October 2022
EUT Tested	3 October 2022- 7 November 2022
Serial No.	3426283485 (Radiated Measurements) 3426283465 (Conducted Measurements)
Operating Band	2400 – 2483.5 MHz
Device Type	GMSK GFSK BT BR BT EDR 2MB BT EDR 3MB
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 rate			
802.11b	1MB/11MB			
802.11g	6MB/54MB			
802.11n	MCS0/MCS7			

	For 802.11x Transmissions:			
Channe	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 frequency and designations.

2.3 DESCRIPTION OF SUPPORT UNITS

None



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.	PERSONNEL	TITLE	ROLE
1	Fox Lane	Test Engineer	Testing and Report
2	Nic Johnson	Technical Manager	Review and Editing
2	Blake Winter	Test Engineer	Testing
3	Grace Larsen	Test Engineer	Testing and Report
4	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 (44GHz)**	N9038A	MY59050109	July 19, 2022	July 19, 2024
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
SunAR RF Motion	JB1	A082918-1	July 26, 2022	July 26, 2023
EMCO Horn Antenna	3115	6416	July 28, 2021	July 28, 2022
EMCO Horn Antenna***	3116	2576	March 9, 2020	March 9, 2023
Com-Power LISN, Single Phase**	LI-220C	20070017	July 18, 2022	July 18, 2024
8447F POT H64 Preamplifier*	8447F POT H64	3113AD4667	March 21, 2022	March 21, 2024
Rohde & Schwarz Preamplifier**	TS-PR18	3545700803	August 22, 2022	August 22, 2024
Trilithic High Pass Filter*	6HC330	23042	March 21, 2022	March 21, 2024
ETS – Lindgren- VSWR on 10m Chamber***	10m Semi- anechoic chamber-VSWR	4740 Discovery Drive	July 30, 2020	July 30, 2023
NCEE Labs-NSA on 10m Chamber*	10m Semi- anechoic chamber-NSA	NCEE-001	May 25, 2022	May 25, 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

***3 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 \boxtimes

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.

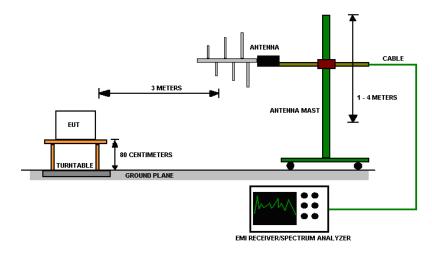


Figure 2 - Radiated Emissions Test Setup

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

4.0 RESULTS

DTS Radio Measurements 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	15.05	14.95	15.340	34.198	1.352	PASS
Mid	802.11 b	15.07	14.99	17.680	58.614	1.447	PASS
High	802.11 b	14.94	14.86	13.930	24.717	-0.048	PASS
Low	802.11 g	16.68	16.53	9.940	9.863	-14.729	PASS
Mid	802.11 g	16.83	16.55	14.630	29.040	-11.121	PASS
High	802.11 g	16.74	16.53	8.110	6.471	-16.973	PASS
Low	802.11 n	17.524	17.528	9.99	9.977	-15.607	PASS
Mid	802.11 n	17.582	17.547	14.29	26.853	-11.265	PASS
High	802.11 n	17.523	17.534	7.53	5.662	-18.353	PASS
Occupied Ba	ndwidth = N/A; 6	6 dB Bandwidth Li	mit =500 kHz	Output Power Lir	mit = 30 dBm;	PSD Limit	= 8 dBm
				e Low Data Rate			
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Relative Highest out of band level (dBuV)	Relative Fundamental (dBuV)	Delta (dB)	Min Delta (dB)	Result
Low	802.11 b	2400.00	76.57	112.68	36.11	30.00	PASS
Low	802.11 g	2400.00	67.33	103.60	36.27	30.00	PASS
Low	802.11 n	2400.00	66.96	103.29	36.32	30.00	PASS
High	802.11 b	2483.50	55.52	110.94	55.42	30.00	PASS
High	802.11 g	2483.50	54.90	100.81	45.91	30.00	PASS
High	802.11 n	2483.50	58.34	100.50	42.17	30.00	PASS
		Radiated Peak F	Restricted Ban	d-Edge Low Data	a Rate		
		Band edge	Highest		Linuit		
CHANNEL	Mode	/Measurement Frequency (MHz)	out of band level (dBuV/m @ 3m)	Measurement Type	Limit (dBuV/m @ 3m)	Margin	Result
CHANNEL	Mode 802.11 b	Frequency	level (dBuV/m @		(dBuV/m	Margin 18.41	Result PASS
		Frequency (MHz)	level (dBuV/m @ 3m)	Туре	(dBuV/m @ 3m)		
Low	802.11 b	Frequency (MHz) 2390.00	level (dBuV/m @ 3m) 55.57	Type Peak	(dBuV/m @ 3m) 73.98	18.41	PASS
Low Low Low	802.11 b 802.11 g	Frequency (MHz) 2390.00 2390.00	level (dBuV/m @ 3m) 55.57 60.21	Type Peak Peak	(dBuV/m @ 3m) 73.98 73.98	18.41 13.77	PASS PASS
Low Low Low High	802.11 b 802.11 g 802.11 n 802.11 b	Frequency (MHz) 2390.00 2390.00 2390.00 2483.50	level (dBuV/m @ 3m) 555.57 60.21 63.77 53.72	Type Peak Peak Peak Peak	(dBuV/m @ 3m) 73.98 73.98 73.98 73.98	18.41 13.77 10.21 20.26	PASS PASS PASS PASS
Low Low Low	802.11 b 802.11 g 802.11 n	Frequency (MHz) 2390.00 2390.00 2390.00	level (dBuV/m @ 3m) 55.57 60.21 63.77	Type Peak Peak Peak	(dBuV/m @ 3m) 73.98 73.98 73.98	18.41 13.77 10.21	PASS PASS PASS

ncee.	Report Number:	R20220901-21-E5A		
labs	Prepared for:	Garmin International, Inc.		

	F	Radiated Average	Restricted Ba	and-Edge Low Da	ita Rate		
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Highest out of band level (dBuV/m @ 3m)	Measurement Type	Limit (dBuV/m @ 3m)	Margin	Result
Low	802.11 b	2390.00	44.61	Average	53.98	9.37	PASS
Low	802.11 g	2390.00	46.87	Average	53.98	7.11	PASS
Low	802.11 n	2390.00	48.25	Average	53.98	5.74	PASS
High	802.11 b	2483.50	42.16	Average	53.98	11.82	PASS
High	802.11 g	2483.50	47.27	Average	53.98	6.71	PASS
High	802.11 n	2483.50	49.37	Average	53.98	4.61	PASS
*Limit shown	is the average I	imit taken from FC	CC Part 15.209				

ncee.	Report Number:	R20220901-21-E5A	Rev A	
labs	Prepared for:	Garmin International, Inc.		

		DTS Radio	o Measurements	s High Data Rat	е		
CHANNEL	Transmitter Bandwidth (MHz)		6 dB Bandwidth (MHz)	AVERAGE OUTPUT POWER (dBm)	AVERAGE OUTPUT POWER (mW)	PSD (dBm)	RESULT
Low	802.11 b	14.69	14.66	14.910	30.974	-8.286	PASS
Mid	802.11 b	14.69	14.66	17.780	59.979	-7.592	PASS
High	802.11 b	14.65	14.65	13.770	23.823	-9.541	PASS
Low	802.11 g	16.56	16.41	10.010	10.023	-13.711	PASS
Mid	802.11 g	16.61	16.41	12.950	19.724	-11.076	PASS
High	802.11 g	16.56	16.40	8.660	7.345	-16.151	PASS
Low	802.11 n	17.50	17.46	10.140	10.328	-15.421	PASS
Mid	802.11 n	17.50	17.48	11.140	13.002	-14.519	PASS
High	802.11 n	17.47	17.48	8.370	6.871	-17.486	PASS

Occupied Bandwidth = N/A; 6 dB Bandwidth Limit =500 kHz

Output Power Limit = 30 dBm; PSD Limit = 8 dBm

		Unrestric	ted Band-Edge	High Data Rate			
CHANNEL	Mode	Mode Band edge /Measurement Frequency (MHz)		Relative Fundamenta I (dBuV)	Delta (dB)	Min Delta (dB)	Result
Low	802.11 b	2390.00	75.50	112.39	36.89	30.00	PASS
Low	802.11 g	2390.00	67.29	104.48	37.20	30.00	PASS
Low	802.11 n	2390.00	67.87	105.15	37.28	30.00	PASS
High	802.11 b	2483.50	54.13	110.82	56.69	30.00	PASS
High	802.11 g	2483.50	55.93	102.66	46.73	30.00	PASS
High	802.11 n	2483.50	56.40	102.77	46.36	30.00	PASS
		Radiated Peak	Restricted Band	I-Edge High Dat	a Rate		
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Highest out of band level (dBuV/m @ 3m)	Measuremen t Type	Limit (dBuV/m @ 3m)	Margin	Result
Low	802.11 b	2390.00	55.69	Peak	73.98	18.29	PASS
Low	802.11 g	2390.00	64.83	Peak	73.98	9.15	PASS
Low	802.11 n	2390.00	62.62	Peak	73.98	11.36	PASS
High	802.11 b	2483.50	59.95	Peak	73.98	14.03	PASS
High	802.11 g	2483.50	66.39	Peak	73.98	7.59	PASS
High	802.11 n	2483.50	65.92	Peak	73.98	8.06	PASS

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

Report Number: R20220901-21-E5A Rev Prepared for: Garmin International, Inc. Rev	А			
		Garmin International, Inc.		

		Radiated Average	ge Restricted Ba	and-Edge High Da	ta Rate		
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Highest out of band level (dBuV/m @ 3m)	Measurement Type	Limit (dBuV/m @ 3m)	Margin	Result
Low	802.11 b	2390.00	44.54	Average	53.98	9.44	PASS
Low	802.11 g	2390.00	49.29	Average	53.98	4.69	PASS
Low	802.11 n	2390.00	48.80	Average	53.98	5.18	PASS
High	802.11 b	2483.50	48.64	Average	53.98	5.34	PASS
High	802.11 g	2483.50	50.35	Average	53.98	3.63	PASS
High	802.11 n	2483.50	49.46	Average	53.98	4.52	PASS
*Limit shown	is the average	limit taken from F	CC Part 15.209				



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



Garmin International, Inc.

Rev

4.2 BANDWIDTH

Prepared for:

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



4.3 DUTY CYCLE

Test Method:

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



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 worse-case emissions were produced while running off of USB power, so results from this mode are presented.



Test procedures:

a. The EUT was placed on the top of a rotating table above the ground plane in a 10 meter semianechoic 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.

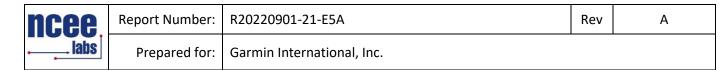
c. The antenna was a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are used to make the measurement.

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.



Test setup:

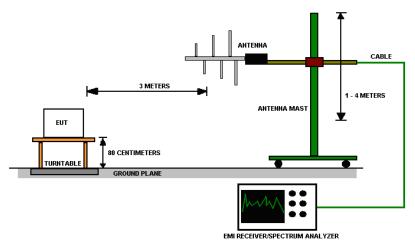


Figure 3 - Radiated Emissions Test Setup

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:

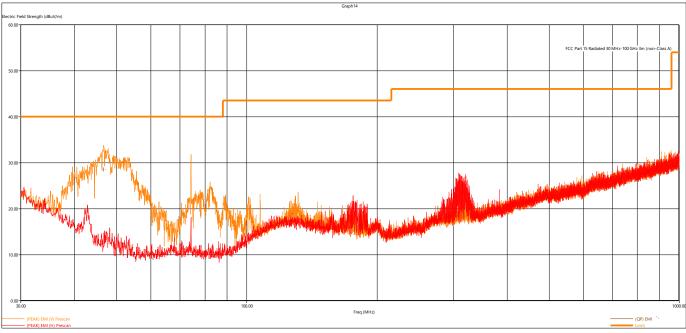
No deviation.

EUT operating conditions

Details can be found in section 2.1 of this report.

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

Test results:





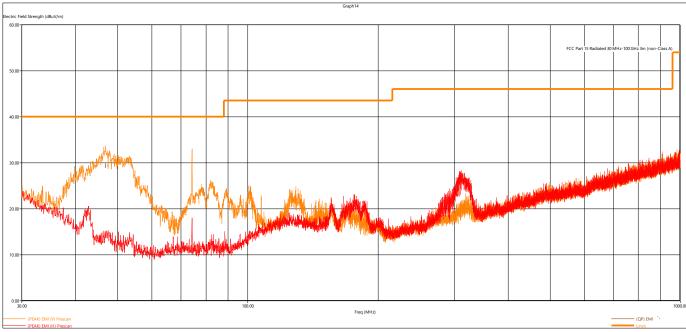
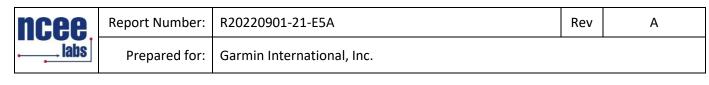


Figure 5 - Radiated Emissions Plot, 802.11b 1MB



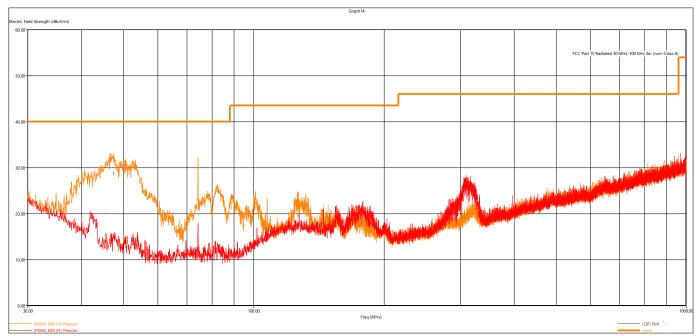


Figure 6 - Radiated Emissions Plot, 802.11b 11MB

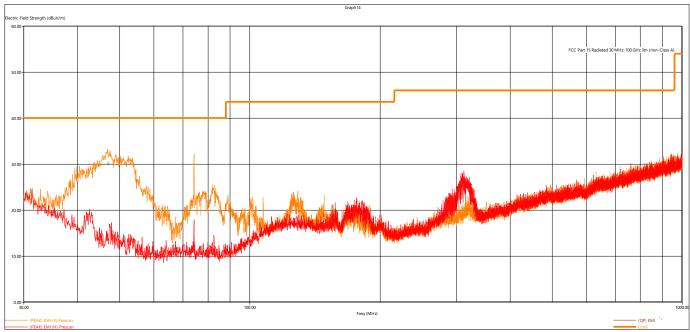
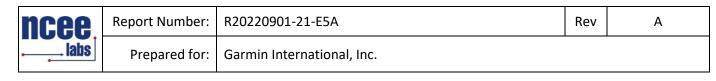
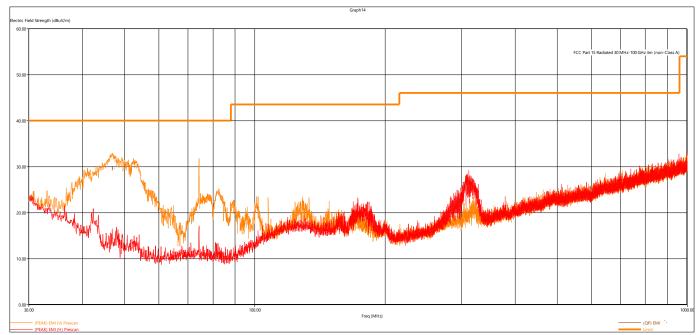
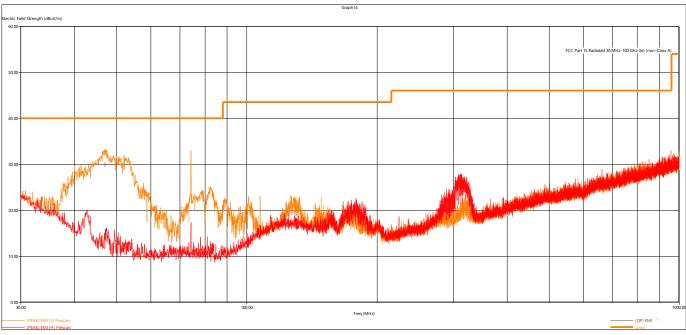


Figure 7 - Radiated Emissions Plot, 802.11g 6MB



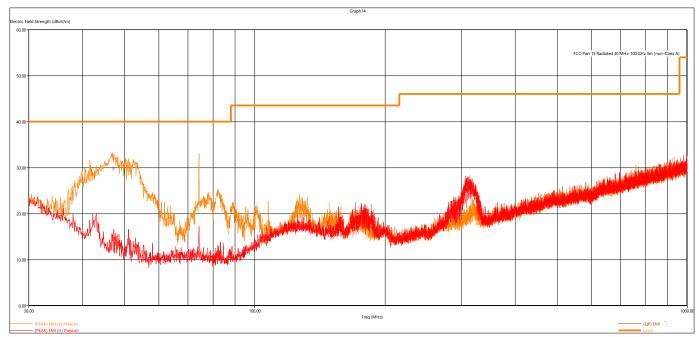














REMARKS:

- 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.						
46.806720	29.32	40.00	10.68	107.00	207.00	V	Low	802.11b 1MB			
47.449200	28.70	40.00	11.30	109.00	246.00	V	Low	802.11b 11MB			
47.005920	30.09	40.00	9.91	108.00	26.00	V	Low	802.11g 6MB			
46.906080	29.62	40.00	10.38	104.00	231.00	V	Low	802.11g 54MB			
47.034960	29.87	40.00	10.13	108.00	8.00	V	Low	802.11n MCS0			
46.938240	29.80	40.00	10.20	109.00	318.00	V	Low	802.11n MCS7			
46.431840	28.41	40.00	11.59	106.00	235.00	V	I	Receive			

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

	Peak Measurements, 802.11x									
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation		
MHz	dBµV/m	dBµV/m	dB	cm.	deg.					
2411.094000	101.97	NA	NA	154.00	7.00	V	Low	802.11b 1MB		
2437.856000	104.82	NA	NA	132.00	3.00	V	Mid	802.11b 1MB		
2461.052000	102.27	NA	NA	184.00	358.00	V	High	802.11b 1MB		

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

Page 22 of 136

cee.	Rep	ort Number:	R20220	901-21-E5,	4				Rev	А
labs	ſ	Prepared for:	Garmin	Internatio	nal, Inc.					
				•	•					
2411.9060	000	106.03	NA	NA	158.00	4.00	V	Low	802.	11b 11MB
2435.4240	000	108.51	NA	NA	189.00	360.00	V	Mid	802.	11b 11MB
2463.2120	000	106.90	NA	NA	128.00	360.00	V	High	802.	11b 11MB
2414.3300	000	99.02	NA	NA	148.00	360.00	V	Low	802.	11g 6MHz
2437.9000	000	105.40	NA	NA	129.00	360.00	V	Mid	802.	11g 6MHz
2460.5500	000	100.08	NA	NA	177.00	359.00	V	High	802.	11g 6MHz
2413.8120	000	101.20	NA	NA	311.00	350.00	V	Low	802.1	1g 54MH
2438.5940	000	105.33	NA	NA	216.00	354.00	V	Mid	802.1	1g 54MH
2460.3240	000	100.30	NA	NA	340.00	360.00	V	High	802.1	1g 54MH
2414.1540	000	98.88	NA	NA	303.00	10.00	V	Low	802.	11n MCS0
2438.4000	000	105.77	NA	NA	224.00	352.00	V	Mid	802.	11n MCSC
2460.6040	000	99.78	NA	NA	253.00	349.00	V	High	802.1	11n MCSC
2413.6580	000	101.28	NA	NA	303.00	355.00	V	Low	802.1	11n MCS7
2437.5200	000	103.20	NA	NA	217.00	351.00	V	Mid	802.1	11n MCS7
2460.1940	000	101.38	NA	NA	252.00	354.00	V	High	802.1	11n 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.



Average Measurements, 802.11x									
Frequency	Level	Limit	Margin Height Angle		Pol Channel		Modulation		
MHz	dBµV/m	dBµV/m	dB	cm.	deg.				
2411.094000	99.14	NA	NA	154.00	7.00	V	Low	802.11b 1MB	
2437.856000	101.84	NA	NA	132.00	3.00	V	Mid	802.11b 1MB	
2461.052000	99.38	NA	NA	184.00	358.00	V	High	802.11b 1MB	
2411.906000	98.38	NA	NA	158.00	4.00	V	Low	802.11b 11MB	
2435.424000	100.77	NA	NA	189.00	360.00	V	Mid	802.11b 11MB	
2463.212000	98.52	NA	NA	128.00	360.00	V	High	802.11b 11MB	
2414.330000	89.83	NA	NA	148.00	360.00	V	Low	802.11g 6MHz	
2437.900000	96.36	NA	NA	129.00	360.00	V	Mid	802.11g 6MHz	
2460.550000	91.22	NA	NA	177.00	359.00	V	High	802.11g 6MHz	
2413.812000	90.73	NA	NA	311.00	350.00	V	Low	802.11g 54MHz	
2438.594000	95.02	NA	NA	216.00	354.00	V	Mid	802.11g 54MHz	
2460.324000	90.32	NA	NA	340.00	360.00	V	High	802.11g 54MHz	
2414.154000	89.45	NA	NA	303.00	10.00	V	Low	802.11n MCS0	
2438.400000	96.62	NA	NA	224.00	352.00	V	Mid	802.11n MCS0	
2460.604000	90.20	NA	NA	253.00	349.00	V	High	802.11n MCS0	
2413.658000	90.34	NA	NA	303.00	355.00	V	Low	802.11n MCS7	
2437.520000	93.51	NA	NA	217.00	351.00	V	Mid	802.11n MCS7	
2460.194000	90.86	NA	NA	252.00	354.00	V	High	802.11n 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.

Rev



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 § 15.205(c)).

Rev

А

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.



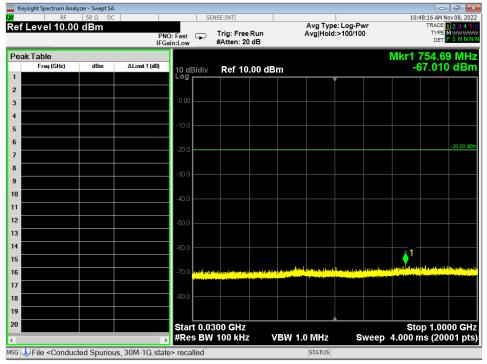


Figure 11 - Radiated Emissions Plot, WIFI 802.11b, 30M – 1G, Low

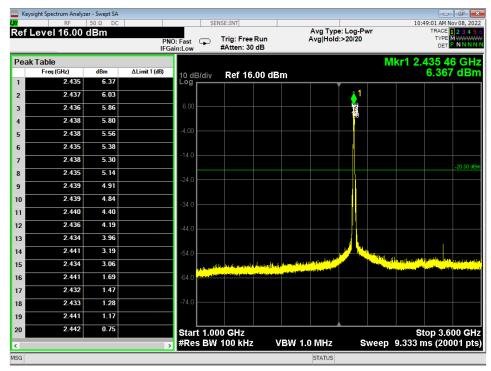
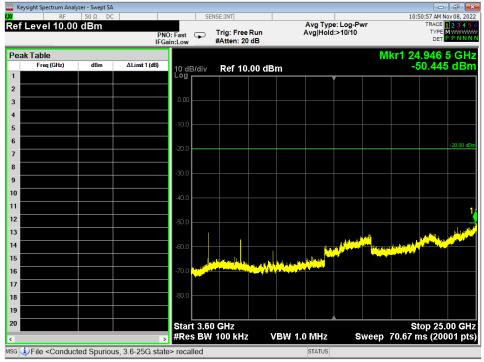


Figure 12 - Radiated Emissions Plot, WIFI 802.11b, 1G - 3.6G, Low







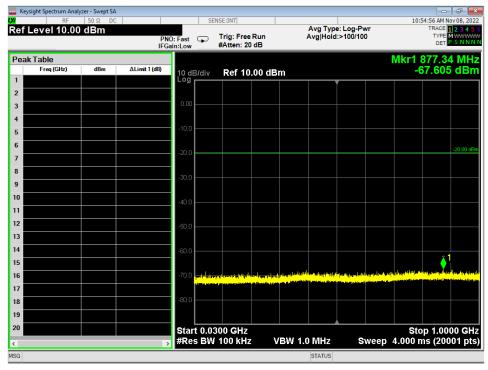


Figure 14 - Radiated Emissions Plot, WIFI 802.11g, 30M – 1G, Low



Rev

Keysight Spectrum Analyz	50 Ω DC		SENSE:INT	Avg Type Avg Hold:		10:56:14 AM Nov 08, 202 TRACE 1 2 3 4 5 TYPE M WAAAAAA
		PNO: Fast G	#Atten: 20 dB	Avg Hold:		DET
Peak Table					N	lkr1 2.437 67 GH
Freq (GHz)	dBm ΔL 1.24	imit 1 (dB) 10 dB/d	iv Ref 10.00 d	Bm		1.237 dBr
		^{Log}			<u>^ 1</u>	
-	0.98	0.00				
3 2.434	0.76	0.00				
4 2.434	0.74	-10.0				
5 2.439	0.72	-10.0				
6 2.438	0.68	-20.0				-20.00 dB
7 2.444	0.65	-20.0				
8 2.435	0.65	-30.0				
9 2.440	0.59	-30.0				
10 2.436	0.56	-40.0				
11 2.435	0.54	-40.0				
12 2.438	0.49	-50.0			Λ	
13 2.436	0.43	-30.0				
14 2.436	0.36	-60.0				
15 2.439	0.30	-00.0				1 1
16 2.439	0.25	-70.0	فرسو والالال والمريوم ومطالفه والطروين			
17 2.441	0.22		AND DESCRIPTION OF THE OWNER	and the second		
	0.19	-80.0				
	0.19					
20 2.440	0.06		.000 GHz		_	Stop 3.600 GH
		→ #Res E	SW 100 kHz	VBW 1.0 MHz	Sweep	9.333 ms (20001 pt
iG 連 File <conducte< td=""><td>ed Spurious, 1-3</td><td>.6G.state> recalled</td><td></td><td>STATUS</td><td></td><td></td></conducte<>	ed Spurious, 1-3	.6G.state> recalled		STATUS		

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

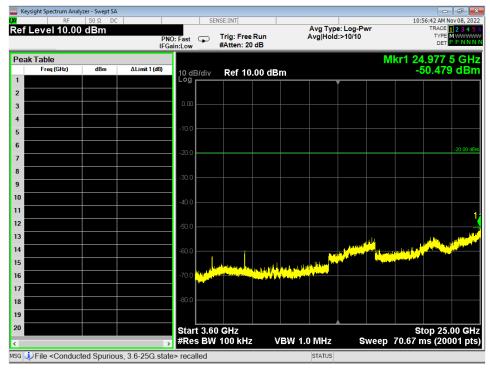


Figure 16 - Radiated Emissions Plot, WIFI 802.11g, 3.6G - 25G, Low



Rev

A

^{RF} tart Freq 30.00	50Ω DC 00000 MI	PNO): Fast 😱	Trig: Free Ru #Atten: 20 dE		Avg Type Avg Hold:	: Log-Pwr >100/100	10	59:54 AM Nov 08, 2 TRACE 2 3 4 TYPE M
eak Table									998.79 M
Freq (GHz)	dBm	∆Limit1(dB)	10 dB/div	Ref 10.00) dBm			-(67.164 dE
2									
			0.00						
			0.00						
			-10.0						
			-20.0						-20.00
	\vdash								
			-30.0						
1			-40.0						
2			-50.0						
3			-30.0						
4			-60.0						
5									
6			-70.0 Avgate	name type at the state	ليتغدينه القروطاط	a di la calanza di la c	ta den ora lla su cont		
7									
8			-80.0						
9									
0			Start 0.0	0300 GHz				Ste	op 1.0000 G
		>		N 100 kHz	VBW	1.0 MHz	Swee	p 4.000	op 1.0000 G ms (20001 p
à						STATUS			



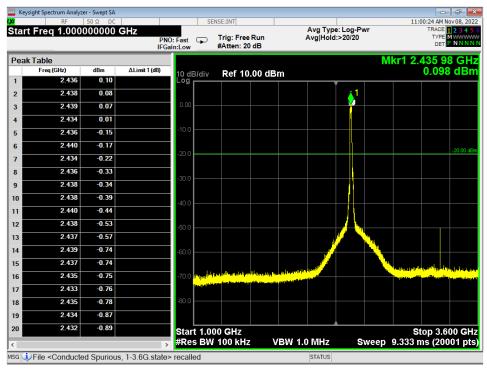


Figure 18 - Radiated Emissions Plot, WIFI 802.11n, 1G - 3.6G, Low



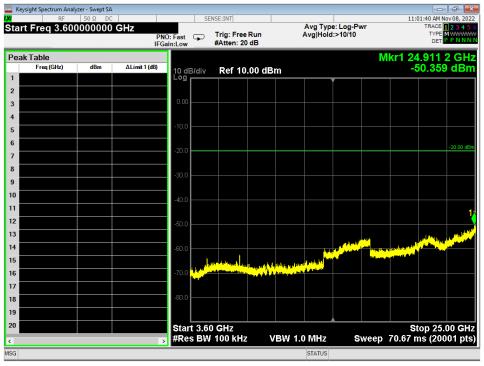


Figure 19 - Radiated Emissions Plot, WIFI 802.11n, 3.6G - 25G, Low



Rev

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.



Test results:

Pass

Comments:

1. All the band edge plots can be found in the 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 to the general limit defined in Part 15.209. The limit shown in the graph accounts for the antenna gain of the device.



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 the Appendix C.
- 2. All the measurements were found to be compliant.
- 3. The measurements are reported on the graph.
- 4. The measurements are listed in the tables in section 4.0.



4.8 CONDUCTED AC MAINS EMISSIONS

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

Limits for conducted emissions measurements:

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (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.

The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz
 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.

Rev

А

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.



Test Results:

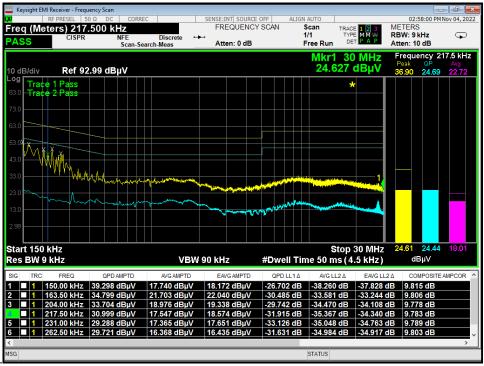


Figure 20 - Conducted Emissions Plot, Line, TX



Figure 21 - Conducted Emissions Plot, Neutral, TX



Rev

А





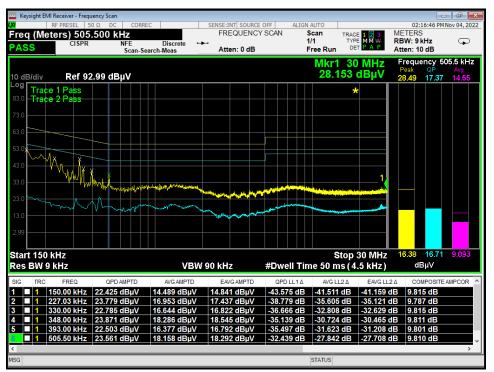


Figure 23 - Conducted Emissions Plot, Neutral, IDLE

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

APPENDIX A: SAMPLE CALCULATION

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and 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 μ 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 μ V/m.

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

The 48.1 dB μ V/m value can be mathematically converted to its corresponding level in μ V/m.

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

AV is calculated by the taking the $20^{100}(T_{on}/100)$ where T_{on} is the maximum transmission time in any 100ms window.

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	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 ($dB\mu V$) = Power (dBm) + 107 (for 50 Ω measurement systems)

Field Strength $(V/m) = 10^{Field}$ Strength $(dB\mu V/m) / 20] / 10^{6}$

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



APPENDIX B - MEASUREMENT UNCERTAINTY

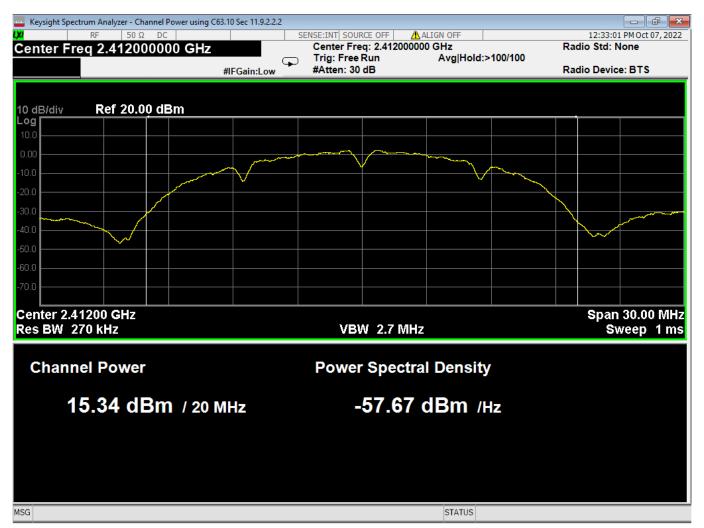
Where relevant, the following measurement uncertainty levels have been for tests performed in this test report:

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

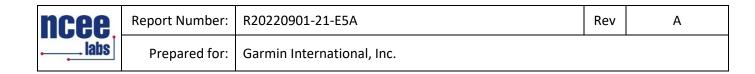
Expanded uncertainty values are calculated to a confidence level of 95%.

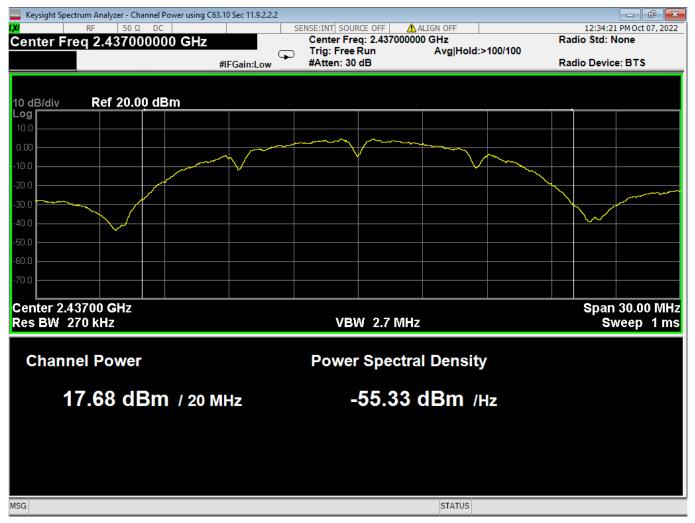
ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

APPENDIX C – GRAPHS AND TABLES



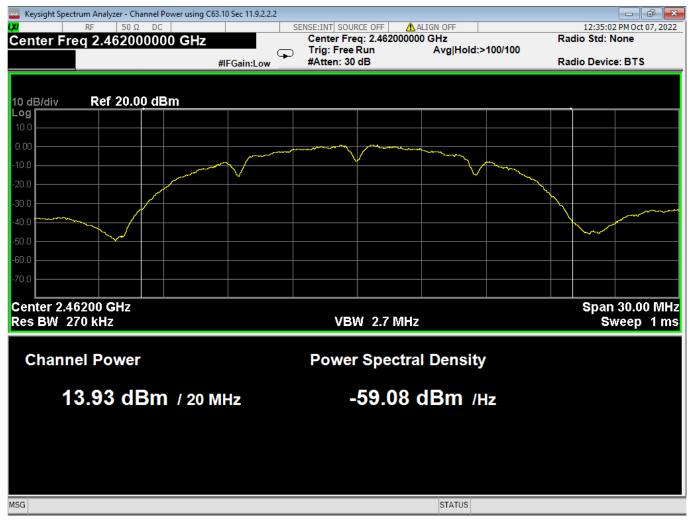
01 Average Power, Low, Wifi B, Low Data Rate





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





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



www. Keysight Spectrum Analyzer - BW using	C63.10 Sec 11.8.1			
Γ RF 50 Ω AC		SENSE:INT		05:59:42 PM Oct 17, 2022
Center Freq 2.4120000	00 GHz	Center Freq: 2.4120000		Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dE	sm			
5.00				
	port	have man	hanny ,	
-5.00		¥	\uparrow	
-5.00	- W		₩	
-25.0				
<u></u>				N.
-35.0				They want
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.412 GHz				Span 25 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandwid	lth	Total Power	21.6 dBm	
	4.949 MHz			
	4.343 WILLZ			
Transmit Freq Error	-39.388 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	10.05 MHz	x dB	-6.00 dB	
MSG			STATUS	
			STATUS	

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





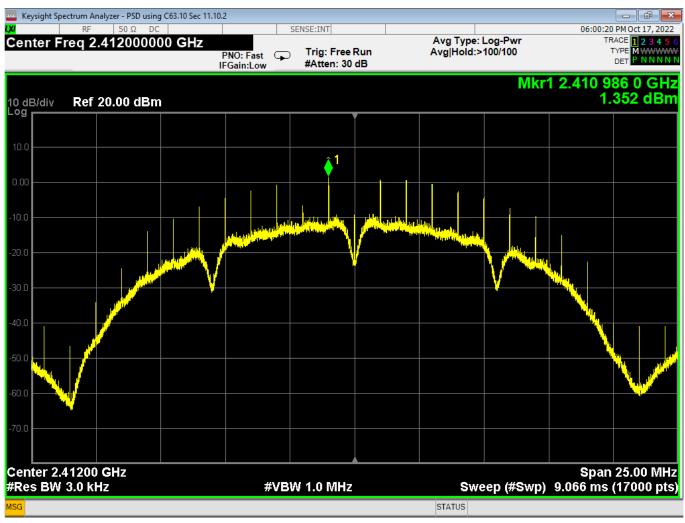
05 6dB Bandwidth, Mid, Wifi B, Low Data Rate



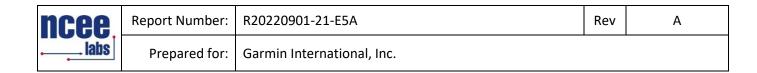
63.10 Sec 11.8.1			
	SENSE:INT		06:08:45 PM Oct 17, 2022
) GHz			Radio Std: None
#IFGain:Low	☐ Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
m			
mm		-And have a second	
			- Martin - M
			<u> </u>
			hann
			Span 25 MHz
			Sweep 2.333 ms
th	Total Power	19.9 dBm	
-77.037 kHz	% of OBW Powe	er 99.00 %	
10.04 MHz	x dB	-6.00 dB	
	#IFGain:Low	SENSE:INT Center Freq: 2.4620000 Trig: Free Run #Atten: 30 dB m M M M M M M M M M M M M M	SENSE:INT Center Freq: 2.46200000 GHz #FGain:Low #Atten: 30 dB m M VBW 1 MHz M VBW 1 MHz Total Power 19.9 dBm 4.864 MHz -77.037 kHz % of OBW Power 99.00 %

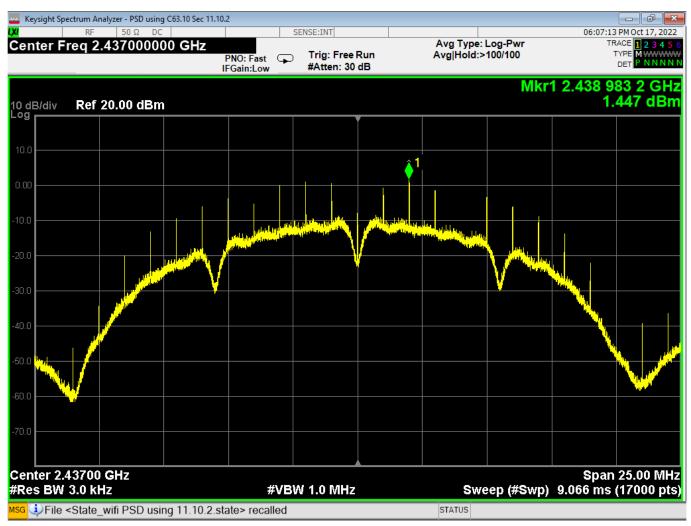
06 6dB Bandwidth, High, Wifi B, Low Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		



07 PSD, Low, Wifi B, Low Data Rate





08 PSD, Mid, Wifi B, Low Data Rate

IIGGG,	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		



09 PSD, High, Wifi B, Low Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

www.www.com.com.com.com.com.com.com.com.com.com	10 Sec 11.13.2					
	SENSE:	INT	Avg Type	Log-Pwr	06:02:51 PM (Oct 17, 2022
		ig: Free Run tten: 20 dB		>1000/1000		MAWWW
				Mk	r1 2.410 98	1 GHz
10 dB/div Ref 116.99 dBµV					112.678	
97.0		A.M. A.M.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		L.M. A. A. A.	- M
87.0 77.0 3∆1	^	por Car				
67.0	had and a for the second secon					
57.0						
37.0						
27.0						
Start 2.39000 GHz #Res BW 100 kHz	VBW 1.0	MHz		Sweep	Stop 2.418 1.000 ms (1	16 GHz 001 pts)
MKR MODE TRC SCL X	Y	FUNCTION	FUNCTION WIDTH	FUI	NCTION VALUE	^
1 N 1 f 2.410 981 GHz 2 Δ1 1 f (Δ) -13.995 MHz 3 N 1 f 2.396 984 GHz 4	(Δ) -36.111 dB					
6 7 8 9						
10 11 <						> `
MSG			STATUS			

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		



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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectru	m Analyzer - Restricted LBE using (C63.10 Sec 6.10.5					- F
	RF 50 Ω AC		NSE:INT	ALIGN OFF			PM Oct 04, 202
arker 2 2. <mark>ASS</mark>	389890000000 GH: PREAMP	PNO: Fast 😱 IFGain:High	Trig: Free Run #Atten: 0 dB	Avg Type Avg Hold:		Т	ACE 1 2 3 4 5 YPE MA WWW DET PANNN
0 dB/div	tef Offset 36.12 dΒ tef 88.11 dΒμV				M	kr2 2.389 44.6	9 89 GH 10 dBµ
og ^{78,1} Trace 1 Trace 2	Pass						
58.1 58.1							
18.1	**************************************						
8.1							
8.1							
.89							
tart 2.3800 Res BW 1.0		#VBW	/ 50 MHz*		Sweep	Stop 2.39 1.000 ms	90000 GH (1001 pt
KR MODE TRC S	f 2.389 88	Y GHz 55.571 dE		FUNCTION WIDTH	FUN	NCTION VALUE	
2 N 2 3	f 2.389 89	GHz 44.609 df	3μV				
5 6 7							
3							
0							>

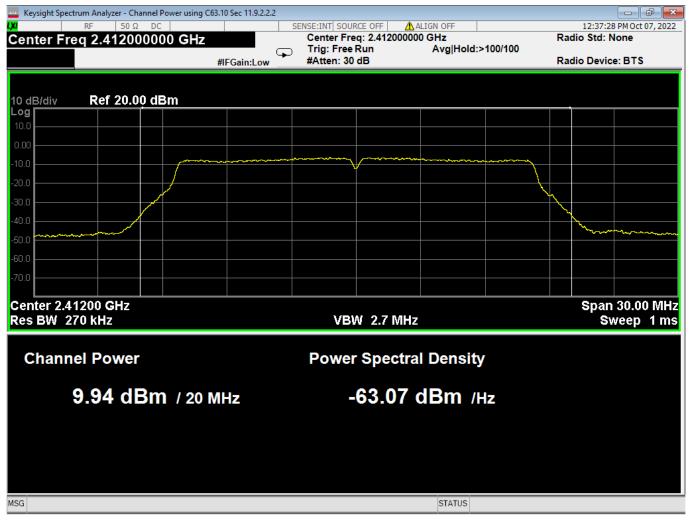
12 Lower Bandedge, Restricted, Wifi B, Low Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	A
labs	Prepared for:	Garmin International, Inc.		

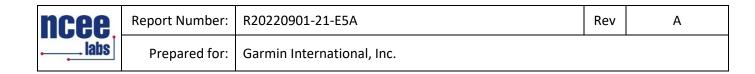
Keysight Spectrum Analyzer - Restricted HBE C63.10	Sec 6.10.5			
X/ RF 50 Ω AC	SENSE:	INT	🛕 ALIGN OFF	04:36:46 PM Oct 04, 2022
Marker 2 2.495677000000 GHz PASS PREAMP	PNO: Fast 😱 Tri	ig: Free Run tten: 0 dB	Avg Type: RMS Avg Hold:>1000/1	TRACE 1 2 3 4 5 0 TYPE MA WWW DET P A NNN
Ref Offset 36.65 dB 10 dB/div Ref 88.64 dBµV Log				Mkr2 2.495 677 0 GHz 42.157 dBµV
78.6 Trace 1 Pass 78.6 Trace 2 Pass 68.6				
58.6				{1
40.0	หร _{ัฐส} ามสาราง เมื่อนายาร์	¶−12−−¶\1636∽−1−∞−L#%∧.	Aller and a sector of the sect	2 martinetallerations of the second second second second
28.6				
18.6				
-1.36				
Start 2.483500 GHz		_		Stop 2.500000 GHz
#Res BW 1.0 MHz	VBW 50	MHz*		Sweep 1.000 ms (1001 pts
MKR MODE TRC SCL X 1 N 1 f 2.496 931 0 2 N 2 f 2.495 677 0			FUNCTION WIDTH	FUNCTION VALUE
2 N 2 I 2.495 6/7 0 0 3 4 4	42.136 UDµV			
5 6 7				
8 9				
10 11				~
ISG			STATUS	,

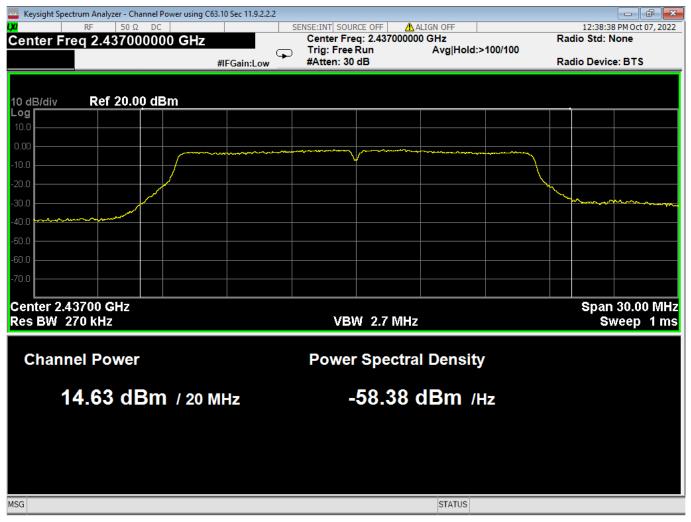
13 Higher Bandedge, Restricted, Wifi B, Low Data Rate

ncee,	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		



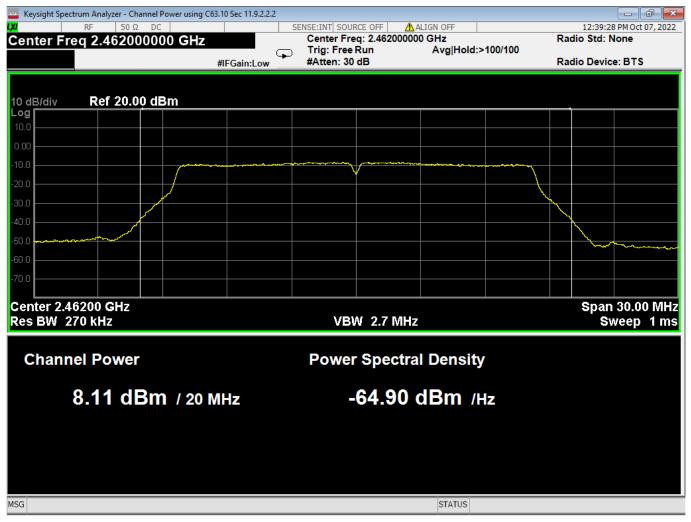
14 Average Power, Low, Wifi G, Low Data Rate





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





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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

🔤 Keysight Spec	ctrum Analyzer - BW	using C63.10 S	Gec 11.8.1						
	RF 50 Ω			SENSE:INT Center Freg: 2.	442000000 CH		B	06:24:00 adio Std: N	PM Oct 17, 2022
Center Fr	req 2.41200	0000 G	HZ	Trig: Free Run		vg Hold:>10/10	R	1010 510. 14	one
			#IFGain:Low	#Atten: 30 dB		-	Ra	adio Device	e: BTS
	_								
10 dB/div	Ref 15.00	0 dBm							
Log									
5.00									
-5.00		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	rown how how how	man ma	warnan	+	and the state		
-15.0	<i>\</i>							N	
-25.0	- Alland							مرسم	
-35.0	<u>م</u> مر							V.v	ι
-35.0 -45.0	rog mar								ᢆᠰᠰᠰᠰᠰ᠕
-55.0									
-65.0									
-75.0									
Center 2.4 #Res BW				VBW 1					an 25 MHz 2.333 ms
#RES DW				A D AA	ΙΨΙΓΊΖ			aweep	2.333 1118
Occur	bied Band	width		Total Pow	er	16.0 dBm			
occup	Jied Balla								
		16.5	526 MHz						
Transn	nit Freq Err	or	-4.007 kHz	% of OBW	Power	99.00 %			
x dB Ba	andwidth		16.57 MHz	x dB		-6.00 dB			
MSG						STATUS			

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

ncee.		R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

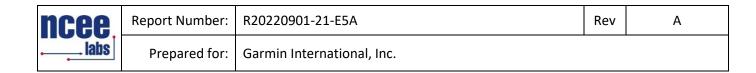
Keysight Spectrum Analyzer - BW using C	63.10 Sec 11.8.1			
X/ RF 50 Ω AC		SENSE:INT		06:26:53 PM Oct 17, 2022
Center Freq 2.43700000	0 GHz	Center Freq: 2.4370000		Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dB	m			
5.00				
-5.00	www.www.	monoring monoring	vm-hhmannight	man
ا ا <i>لب</i> ر ا		1		4
-15.0				
-25.0				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-35.0 mm// ///				
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.437 GHz				Span 25 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occurried Developid	415	Total Power	20.8 dBm	
Occupied Bandwid		TOTALLEOWEI	20.0 UBIII	
1	6.550 MHz			
Transmit Freq Error	-4.195 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	16.56 MHz	x dB	-6.00 dB	

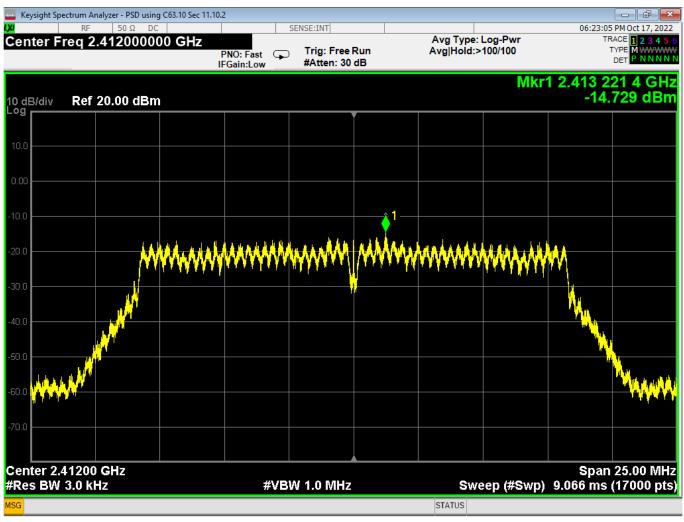
18 6dB Bandwidth, Mid, Wifi G, Low Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

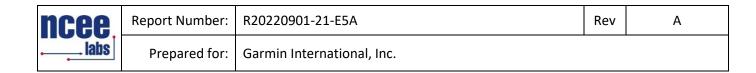
Keysight Spectrum Analyzer - BW usin	g C63.10 Sec 11.8.1			
X/ RF 50Ω A		SENSE:INT		06:21:47 PM Oct 17, 2022
Center Freq 2.4620000	00 GHz	Center Freq: 2.4620000	00 GHz	Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
	#IFGalli.LOW			Radio Berliet. B ro
10 dB/div Ref 15.00 d	Bm			
Log				
5.00				
-5.00	᠕ᢧᠰ᠋᠆ᡙᠽᠰ᠕ᢞᠲᠰᢣᡘᠬᡐᠬ᠉	where we ward	n manager and the second	mm
-15.0		<u>ل</u>		
-25.0				
-35.0				"hand
				Jordan Jordan
-45.0 mm				Jun man
-55.0				
-65.0				
-75.0				
Center 2.462 GHz				Span 25 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandwi	dth	Total Power	13.9 dBm	
	16.532 MHz			
Transmit Freq Error	-6.704 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	16.51 MHz	x dB	-6.00 dB	
	10.01 11112			
ISG			STATUS	

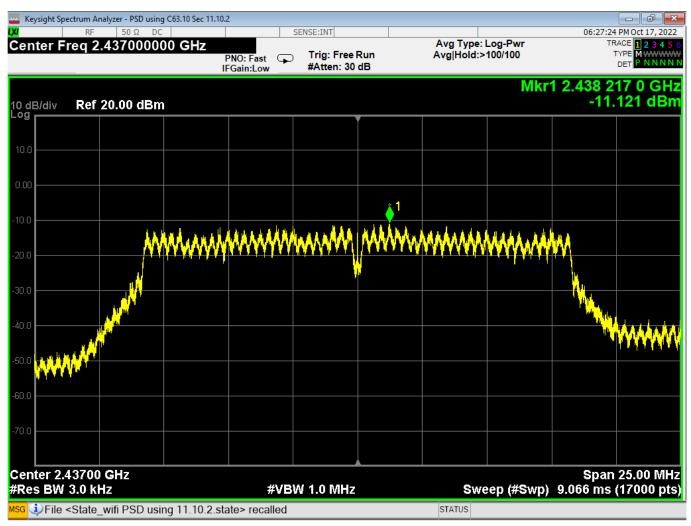
19 6dB Bandwidth, High, Wifi G, Low Data Rate



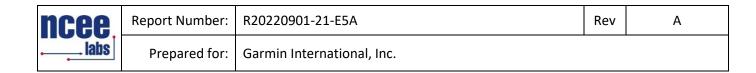


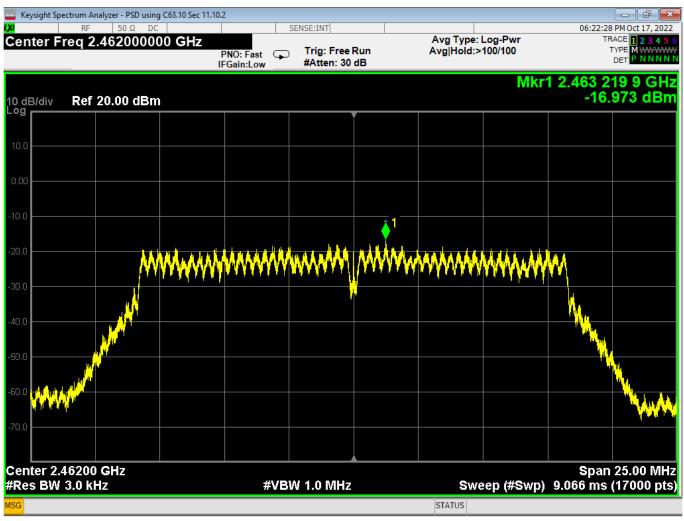
20 PSD, Low, Wifi G, Low Data Rate





21 PSD, Mid, Wifi G, Low Data Rate





22 PSD, High, Wifi G, Low Data Rate

ncee,	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

	ectrum Ar	nalyzer - Unrestrict	ted LBE using C63.1	10 Sec 11.13.2							
L <mark>XI</mark>	RF	50 Ω AC			SENSE	:INT					1 PM Oct 17, 2022
Marker 2	2 Δ -13	3.5222443	10 MHz		_				: Log-Pwr	т	RACE 1 2 3 4 5 6
			I	PNO: Fast 🔾		rig: Free Run		Avg Hold:	>1000/1000		DET P A N N N
				Gain:Low	#/	Atten: 20 dB					DEI
										AMkr2 -1	3.52 MHz
	-										36.268 dB
10 dB/div Log	Ref	116.99 dB	μν						_		0.200 UB
						Ť			1		
107								n.n. ⁿ	mann	mylynnunum	MANIN
97.0						www.whe	Alto di Curri n			MARCH CHINA	MYN UNI
07.0					م کم						
87.0					, A						- And
77.0				2∆1 							
67.0				مم محمد مع							
or low	www	γ	www.www.	kent (~ Yr Ar							
57.0									_		
47.0											
41.0											
37.0											
27.0											
21.0											
Start 2.3	0000 0	2 4 7		1						Stop 2	.42179 GHz
#Res BW				VB) MHz			Cura		s (1001 pts)
#Res DW	TUUR	пг		VD	W 1.U	γ IVIΠZ			Swee	p 1.000 m	s (1001 pts)
MKR MODE T	RC SCL		x	Y		FUNCTION	FUNCT	ION WIDTH		FUNCTION VALUE	~
1 N	1 f		2.412 99 GHz	103.596	dBµ\	/					
2 Δ1		(Δ)	-13.52 MHz	(Δ) -36.2	268 dE	3					
3 N	1 f		2.399 47 GHz	67.328	dBµ\	/					
4											
5 6											
7											
8											
9											
10											
11											~
<											>
MSG								STATUS			
					_						

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

	Gain:Low #A	int ig: Free Run tten: 30 dB	Avg Type: L Avg Hold:>1	000/1000	TR T k r1 2.46 4	PMOct 17, 202 ACE 1 2 3 4 5 YPE MA WWW DET P A NNN
Price D dB/div Ref 126.99 dBµV 99 117 107 37.0	Gain:Low #A	tten: 30 dB	Avg Hold:>1	000/1000	kr1 2.464	
og 117 107 37.0 	• · -		www.	M	kr1 2.464 100.8	ŧ 24 GH 07 dBµ'
117 107 17.0 17.0	• · -	wamamama a p	Mr.			
17.0	• · -	intrational manager of the	www.			
7.U			1 L I			
57.0 John Street						2Δ
i7.0			\îvv	ᠬ᠕ᡁᡘ	ᠬᡔ᠊ᡅᡝᡧᡗᡀᡘ᠊᠋ᡔᡊᡙᡔᠬᡀ	ᢉ᠊ᢪᢒᠣᡙᠻᢧᠼ᠇ᢌᠧᢌ
37.0						
tart 2.45068 GHz Res BW 100 kHz	#VBW 30	10 kHz		Sweep	Stop 2.4 1.000 ms	18350 GH (1001 pt
KR MODE TRC SCL X 1 N 1 f 2.464 24 GHz	۲ 100.807 dBµV	FUNCTION	FUNCTION WIDTH	FUN	NCTION VALUE	
2 Δ1 1 f (Δ) 19.26 MHz 3 N 1 f 2.483 50 GHz 4	(Δ) -45.911 dB 54.896 dBμV					
5 6 7						
8						
			STATUS			>

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Restricted LBE using C63			*		
RF 50 Ω AC Marker 2 2.389900000000 GHz PREAMP		g: Free Run tten: 0 dB	ALIGN OFF Avg Type: Avg Hold:>		04:44:17 PM Oct 04, 2022 TRACE 1 2 3 4 5 (TYPE MA WWW DET P A N N N
Ref Offset 36.12 dB 10 dB/div Ref 88.11 dBµV				M	kr2 2.389 90 GHz 46.868 dBµV
Log 78.1 Trace 1 Pass 68.1					
58.1	wale sheathy an spinor and a	elevanal—tab-splansu	uder har when an an a state of the state of	y lung frances	Landrey Michael Constrained and Constrained an
38.1					
18.1					
-1.89					Stop 2 200000 CH-
#Res BW 1.0 MHz	#VBW 50	MHz*		Sweep	Stop 2.390000 GHz 1.000 ms (1001 pts
MKR MODE TRC SCL X 1 N 1 f 2,389 75 GI 2 N 2 f 2,389 90 GI 3	iz 60.213 dBμV iz 46.868 dBμV		FUNCTION WIDTH	FUN	ICTION VALUE
4 5 6 7					
8 9 10 11					
< ISG			STATUS		>

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

🔤 Keysight Spectrum Analyzer - Restricted HBE C	63.10 Sec 6.10.5			
X/ RF 50 Ω AC	SENSE:	INT	\Lambda ALIGN OFF	04:46:05 PM Oct 04, 2022
Marker 2 2.483566000000 0 PASS PREAMP	PNO: Fast 😱 Tri	g: Free Run tten: 0 dB	Avg Type: RMS Avg Hold:>1000/10	TRACE 1 2 3 4 5 00 TYPE MA WWW DET P A N N N
Ref Offset 36.65 dB 10 dB/div Ref 88.64 dBµV				Mkr2 2.483 599 0 GHz 47.269 dBµV
Log Trace 1 Pass 78.6 Trace 2 Pass 68.6 1 58.6 2				
48.6				
18.64 -1.36				
Start 2.483500 GHz #Res BW 1.0 MHz	VBW 501	MHz*	s	Stop 2.500000 GH: weep 1.000 ms (1001 pts
MKR MODE TRC SCL X 1 N 1 f 2.483 50 2 N 2 f 2.483 59 3			FUNCTION WIDTH	FUNCTION VALUE
4 5 6 7 8 9 10 10 11 12				
11 (<			TATUS	>

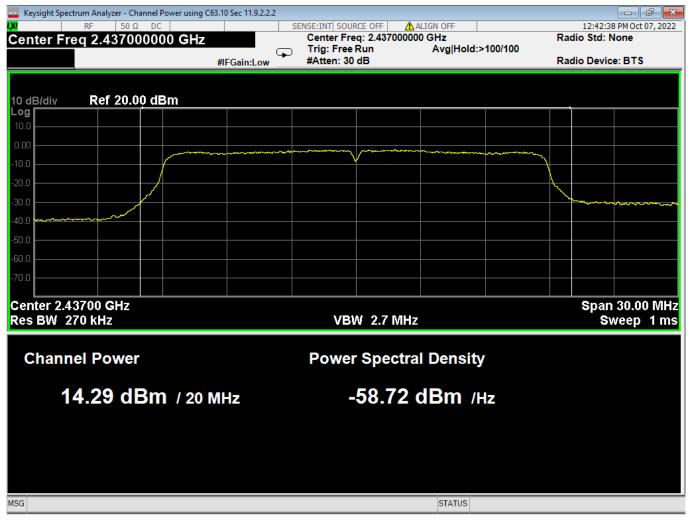
26 Higher Bandedge, Restricted, Wifi G, Low Data Rate

ncee,	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Channel Power using			
₩ RF 50 Ω DC Center Freq 2.412000000 GH	SENSE:INT SOURCE OFF		12:41:55 PM Oct 07, 2022 Radio Std: None
	#IFGain:Low #Atten: 30 dB	Avg Hold:>100/100	Radio Device: BTS
	M Guilleow		
10 dB/div Ref 20.00 dBm			
Log			
10.0			
0.00			
-10.0	·····		
-20.0			
-30.0			
-40.0			- M
-50.0			
-60.0			
-70.0			
Center 2.41200 GHz			Span 30.00 MHz
Res BW 270 kHz	VBW 2.7	MHz	Sweep 1 ms
Channel Power	Power Spe	ectral Density	
9.99 dBm / 20	MHz -63.	02 dBm /нz	
100		OTATUS	
MSG		STATUS	

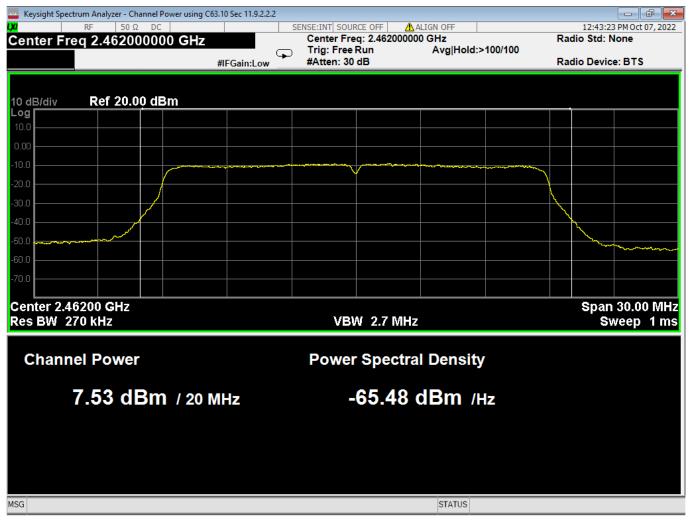
27 Average Power, Low, Wifi N, Low Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs		Garmin International, Inc.		



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

ncee,	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		



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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using C63.10 Sec 1	1.8.1			
X RF 50 Ω AC	SI	ENSE:INT Center Freq: 2.41200000		06:40:16 PM Oct 17, 2022 Radio Std: None
Center Freq 2.412000000 GHz		Trig: Free Run	Avg Hold:>10/10	Radio Sta: None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
10 dB/div Ref 15.00 dBm				
5.00				
-5.00	mal and the second s	many promotion	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	morena
.15.0				
-25.0				NA
-35.0				· · · · · · · · · · · · · · · · · · ·
				Jon Jon Contraction
40.0				
-55.0				
-65.0				
-75.0				
Center 2.412 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25 MHz Sweep 2.333 ms
FRES BW 100 KHZ				Sweep 2.333 m
Occupied Bandwidth		Total Power	16.4 dBm	
17.52	8 MHz			
Transmit Freq Error -1	6.926 kHz	% of OBW Power	99.00 %	
x dB Bandwidth 1	7.57 MHz	x dB	-6.00 dB	
<mark>/SG</mark>			STATUS	

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

	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

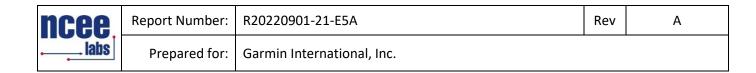
🔤 Keysight Spectrum Analyzer - BW using C	53.10 Sec 11.8.1			
R F 50 Ω AC		SENSE:INT		06:42:19 PM Oct 17, 2022
Center Freq 2.43700000) GHz	Center Freq: 2.4370000		Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBI	<u>n</u>			
5.00				
5.00 mm	where and are and and	musming manufan	mar and a contraction	mm
15.0				
J				
-25.0				A hard a
35.0 and a and a second				
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.437 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25 MHz Sweep 2.333 ms
				Sweep 2.555 ms
Occupied Bandwid	th	Total Power	20.6 dBm	
	7.547 MHz			
Transmit Freq Error	-14.428 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	17.65 MHz	x dB	-6.00 dB	
I <mark>sg</mark> 🕕 File <state_wifi 6db="" dts="" i<="" td=""><td>andwidth 11.8.1 states</td><td>recalled</td><td>STATUS</td><td></td></state_wifi>	andwidth 11.8.1 states	recalled	STATUS	
	Januwium 11.0.1.state>	lecalleu	514105	

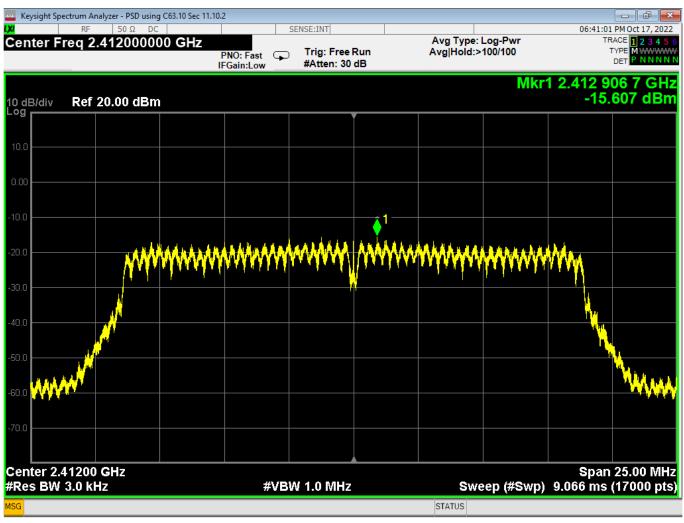
31 6dB Bandwidth, Mid, Wifi N, Low Data Rate

ncee labs	Report Number:	R20220901-21-E5A		А
	Prepared for:	Garmin International, Inc.		

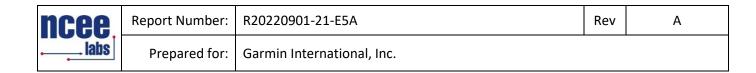
Keysight Spectrum A	Analyzer - BW using C6	53.10 Sec 11.8.1				
XI RF			SENSE:INT		06:44:28 PM Oct 17, 2022	
Center Freq 2	2.46200000) GHz	Center Freq: 2.46200		Radio Std: None	
			Trig: Free Run Avg Hold:>10/10 #Atten: 30 dB		Radio Device: BTS	
10 dB/div	Ref 15.00 dBr	n				
5.00						
-5.00						
	John Martin	When have the second	man man	Man how have how have how how have how	~~~~~	
15.0	<u>† ∫</u> – †					
25.0						
35.0					\	
45.0					and a second	
55.0						
65.0						
75.0						
Center 2.462					Span 25 MHz	
Res BW 100	kHz		VBW 1 MH	Z	Sweep 2.333 ms	
Occupied	Bandwidt	th	Total Power	13.8 dBm		
occupied						
	1	7.534 MHz				
Transmit F	req Error	-16.764 kHz	% of OBW Pow	wer 99.00 %		
x dB Band	width	17.64 MHz	x dB	-6.00 dB		
		11.04 11112		-0.00-012		
SG				STATUS		
Ju						

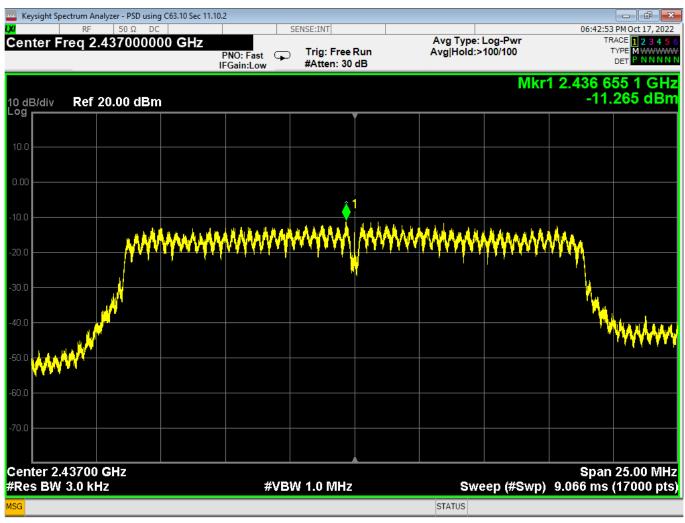
32 6dB Bandwidth, High, Wifi N, Low Data Rate



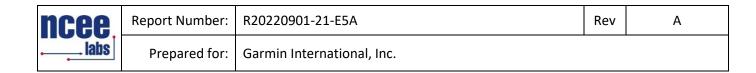


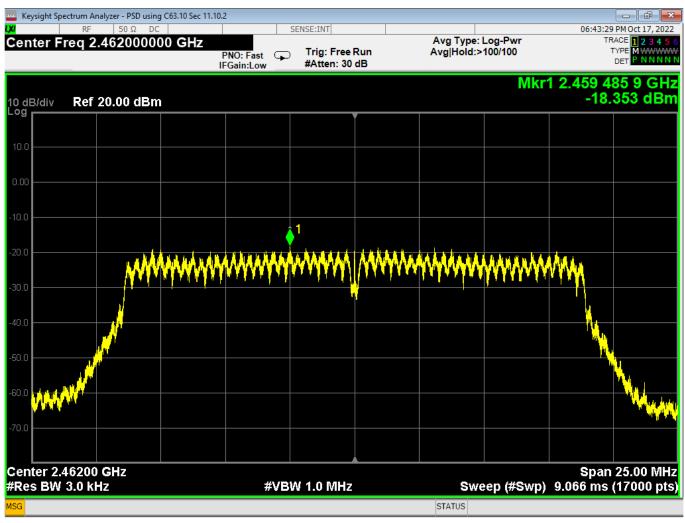
33 PSD, Low, Wifi N, Low Data Rate





34 PSD, Mid, Wifi N, Low Data Rate





35 PSD, High, Wifi N, Low Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyz	er - Unrestricted LBE using C63.1	0 Sec 11.13.2					×
XI RF	50 Ω AC	SENSE	:INT			06:38:52 PM Oct 17, 2	
Marker 2 ∆ -10.9	P		rig: Free Run Atten: 20 dB		be: Log-Pwr d:>1000/1000	TRACE 1 2 3 4 TYPE MA WW DET P A NI	www
10 dB/div Ref 11	6.99 dBµV				ΔΜ	r2 -10.993 7 M -36.325 (
107							
97.0		س	ᡢᡊᠷᠬᡙᢦᡳᢩᡅ᠈ᠳᢧᡘᡘ᠕᠕	mansanana	Warnan		
87.0						h	1.
77.0		2Δ1					
67.0 57.0							
47.0							
37.0							
27.0							
Start 2.39000 GHz #Res BW 100 kHz		VBW 1.0) MHz		Sweep	Stop 2.42210 G 1.000 ms (1001 p	SHz ots)
MKR MODE TRC SCL	Х	Y	FUNCTION	FUNCTION WIDTH	FU	NCTION VALUE	^
1 N 1 f 2 Δ1 1 f (Δ)	2.410 736 9 GHz -10.993 7 MHz	103.287 dBμ\ (Δ) -36.325 dE	3				
3 N 1 f	2.399 758 6 GHz	66.963 dBµ\					
5 6 7							
8							
10							
<							>
1SG				STATUS			

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricted HBE Using CO	i3.10 Sec 11.13.2					- 6 🗾
Marker 1 2.461349592850 GHz		g: Free Run ten: 30 dB	Avg Type: L Avg Hold:>1		TRAC TY	M Oct 17, 2022 E 12345 PE MAWWW ET PANNN
10 dB/div Ref 126.99 dBµV				MI	kr1 2.461 100.50	35 GHz 3 dBµ\
	11					
97.0 97.0	unny moment	᠆ᢉᡌᠯᡪ᠊᠋ᢚᢇᠴᡌᡊᡔᡘᢛᠼᡘᡧᡘ	many			
77.0 67.0						261
57.0 47.0				mar and a star	ᡣ᠆᠆᠕᠕ᡘ᠕᠁	᠆ᠴᠴᢦ
37.0						
Start 2.45068 GHz ¢Res BW 100 kHz	#VBW 30	0 kHz		Sweep	Stop 2.43 1.000 ms (8350 GH 1001 pts
MKR MODE TRC SCI X 1 N 1 f 2.461 35 GH 2 Δ1 1 f 2.461 35 GH		FUNCTION	FUNCTION WIDTH	FUN	ICTION VALUE	
3 N 1 f 2.483 50 GH	z 58.338 dBµV					
6 7 8 9						
						>
sg			STATUS			

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

Incee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Restricted HBE C63.10 Sec 6 RF 50 Ω AC	10.5 SENSE:INT	ALIGN OFF	04:53:11 PM Oct 04, 2022
Marker 2 2.483500000000 GHz	PNO: Fast Trig: Free Run Gain:High #Atten: 0 dB	Avg Type: RMS Avg Hold:>1000/1000	TRACE 1 2 3 4 5 6 TYPE MA WWW DET P A N N N
Ref Offset 36.65 dB 10 dB/div Ref 88.64 dBµV		Mkr2	2 2.483 500 0 GHz 49.368 dBµV
Log 78.6 Trace 1 Pass 78.6 Trace 2 Pass			
58.6 2	and the second and a second and the second	attragger and developed attraction of the of general model to general the second	IN-Chilly-annewsynamide-dame.stadaury-guest-ba
38.6			
28.6			
8.64 -1.36			
Start 2.483500 GHz #Res BW 1.0 MHz	VBW 50 MHz*	Sweep	Stop 2.500000 GHz 1.000 ms (1001 pts)
MKR MODE TRC SCL X 1 N 1 f 2.485 117 0 GHz 2 N 2 f 2.483 500 0 GHz	Y FUNCTION 62.503 dBµV 49.367 dBµV	FUNCTION WIDTH FU	JNCTION VALUE
6 7 8			
9 10 11			~ ~
MSG		STATUS	

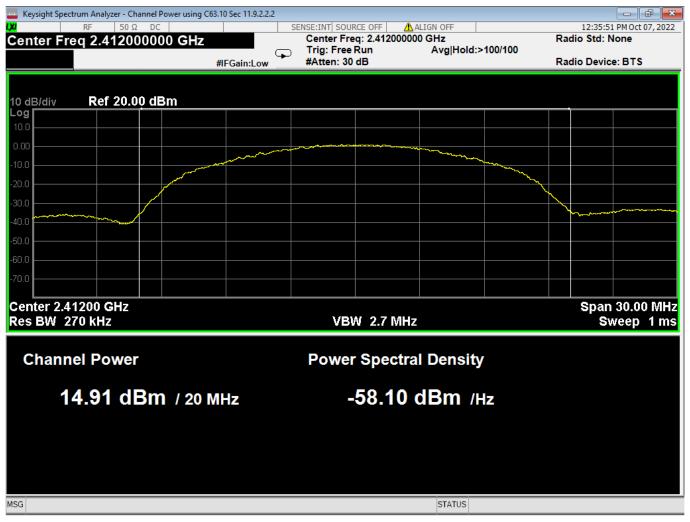
38 Lower Bandedge, Restricted, Wifi N, Low Data Rate

Incee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Restricted LBE using C63.1 Ν RF 50 Ω AC Marker 2 2.389930000000 GHz	SENSE:INT	ALIGN OFF	04:51:23 PM Oct 04, 2022 TRACE 1 2 3 4 5 6
PASS PREAMP	PNO: Fast 😱 Trig: Free Run FGain:High #Atten: 0 dB	Avg Hold:>1000/1000	TYPE MA WWWW DET PANNN
Ref Offset 36.12 dB 10 dB/div Ref 88.11 dBµV		N	/kr2 2.389 93 GHz 48.247 dBµV
Trace 1 Pass 78.1 Trace 2 Pass 68.1			1
59.4	unous and the part of a second	an my and man and a second and a	
38.1			
18.11			
-1.89			
Start 2.380000 GHz #Res BW 1.0 MHz	#VBW 50 MHz*	Swee	Stop 2.390000 GHz p 1.000 ms (1001 pts)
MKR MODE TRC SCL X 1 N 1 f 2.388 21 GH; 2 N 2 f 2.389 93 GH; 3		FUNCTION WIDTH F	UNCTION VALUE
4 5 6 6			
7 8 9 10			
MSG			×

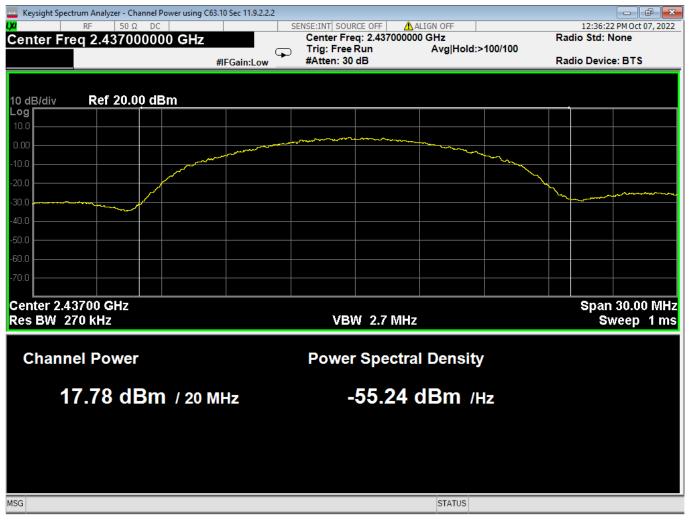
39 Higher Bandedge, Restricted, Wifi N, Low Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		



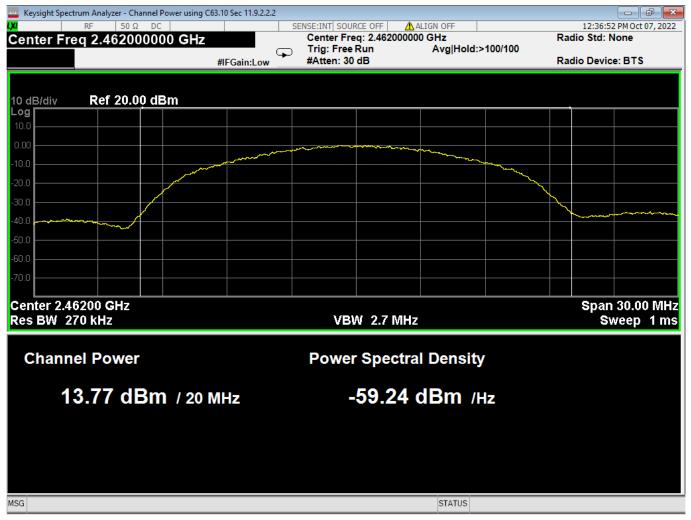
40 Average Power, Low, Wifi B, High Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		



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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
		Garmin International, Inc.		

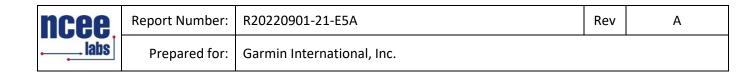


42 Average Power, High, Wifi B, High Data Rate



🔤 Keysight Spectrum Analyzer - BW using (C63.10 Sec 11.8.1			
LXI RF 50 Ω AC		SENSE:INT		06:12:57 PM Oct 17, 2022
Center Freq 2.41200000	0 GHz	Center Freq: 2.41200000) GHz	Radio Std: None
	#IFGain:Low	⊃ Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dB	m			
5.00		Man Alex Araller And Martine Conversion		
-5.00	handresser		and the second s	
م مسرف	Arrow Contraction		- www.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-15.0				- bronger
-25.0				
مر الم				my my of share
-35.0 mmmmmm				
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.412 GHz				Span 25 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandwid	th	Total Power	22.4 dBm	
	4.659 MHz			
Transmit Freq Error	-4.732 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	9.050 MHz	x dB	-6.00 dB	
MSG			STATUS	

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



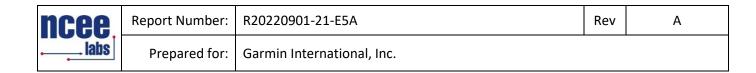
	BW using C63.10 Sec	11.8.1			
IX RF 50	Ω AC		SENSE:INT		06:16:33 PM Oct 17, 2022
Center Freq 2.437	000000 GH	z	Center Freq: 2.437		Radio Std: None
		#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/1	0 Radio Device: BTS
10 dB/div Ref 15	.00 dBm				
Log					
5.00			man man	Ammon	
-5.00	^ ~ m	mm		a source of the	w.,
	and the second				- And
-15.0	Mar				
-25.0					
-35.0					- marine and a second s
-45.0					
-55.0					
-65.0					
75 0					
-75.0					
Center 2.437 GHz					Span 25 MHz
#Res BW 100 kHz			VBW 1 M	IHz	Sweep 2.333 ms
Occupied Bar	dwidth		Total Power	23.2 dBm	
Cocupied Bai					
	14.66	61 MHz			
Transmit Freq E	rror -	16.411 kHz	% of OBW P	ower 99.00 %	
x dB Bandwidth		9.502 MHz	x dB	-6.00 dB	
мsg 🕕 File <state_wifi d<="" td=""><td>TS 6dB bandwi</td><td>idth 11.8.1 state></td><td>recalled</td><td>STATUS</td><td></td></state_wifi>	TS 6dB bandwi	idth 11.8.1 state>	recalled	STATUS	

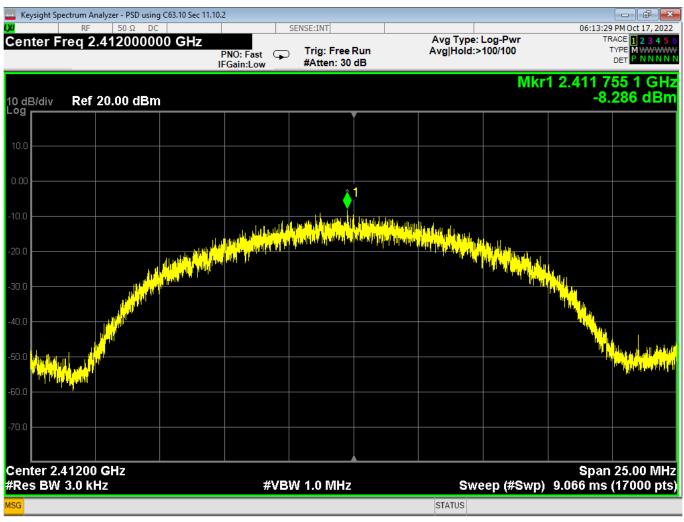
44 6dB Bandwidth, Mid, Wifi B, High Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

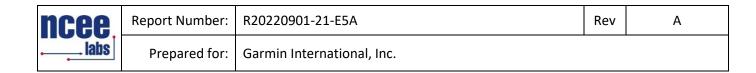
🔤 Keysight Spectrum Analyzer - BW using (C63.10 Sec 11.8.1			
LXI RF 50 Ω AC		SENSE:INT		06:18:28 PM Oct 17, 2022
Center Freq 2.46200000	0 GHz	Center Freq: 2.46200000		Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dB	P 0			
5.00				
-5.00		w_{m}		
	months and a second second		- May My	~~~
-15.0				
-25.0				
-35.0				When the second
-45.0				
-55.0				
-65.0				
-75.0				
13.0				
Center 2.462 GHz				Span 25 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandwid	1th	Total Power	21.0 dBm	
Occupied Bandwid			2 no abiii	
1	4.649 MHz			
Transmit Freq Error	-35.467 kHz	% of OBW Power	r 99.00 %	
x dB Bandwidth	9.163 MHz	x dB	-6.00 dB	
MSG			STATUS	

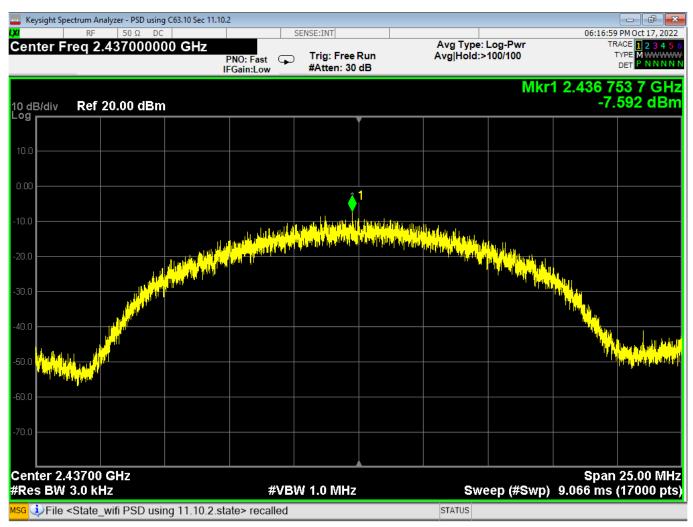
45 6dB Bandwidth, High, Wifi B, High Data Rate



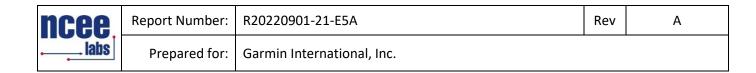


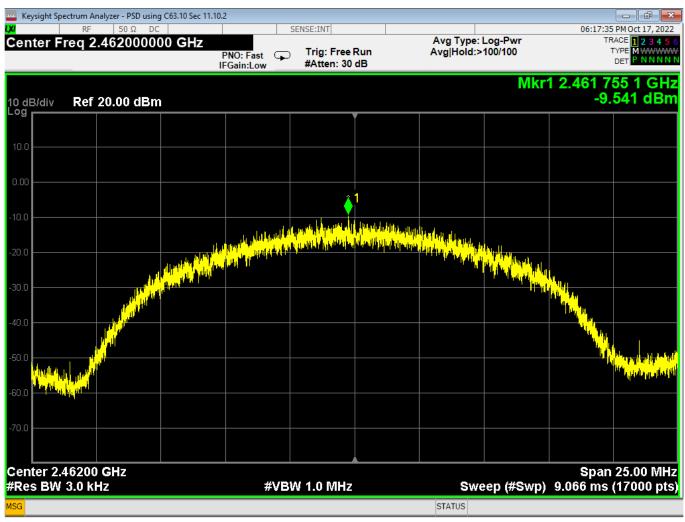
46 PSD, Low, Wifi B, High Data Rate





47 PSD, Mid, Wifi B, High Data Rate





48 PSD, High, Wifi B, High Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

	10 Sec 11.13.2 SENSE:INT PNO: Fast FGain:Low #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold:>1000/1000	06:15:24 PM Oct 17, 2022 TRACE 1 2 3 4 5 6 TYPE MA WWWW DET P A NNNN
10 dB/div Ref 116.99 dBµV		N	lkr1 2.411 75 GHz 112.390 dBμV
107 97.0 87.0		way have 1 more	harman har
67.0 3 Δ1 67.0 3 Δ1			
47.0			
27.0 Start 2.39000 GHz #Res BW 100 kHz	VBW 1.0 MHz	Sweep	Stop 2.42121 GHz 1.000 ms (1001 pts)
MKR MODE TRC SCL X 1 N 1 f 2.411 75 GHz 2 Δ1 1 f (Δ) -15.22 MHz 3 N 1 f 2.396 52 GHz 4	(Δ) -36.889 dB	FUNCTION WIDTH FU	NCTION VALUE
5 6 7 8 9 10			
11 A		STATUS	×

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricted HBE Using RF 50 Ω DC Marker 1 2.4623340555390 GHz	SENSE:II		Avg Type: Lo		06:19:11 PM Oct 17, 2022 TRACE 12345
		g: Free Run ten: 30 dB	Avg Hold:>10		
10 dB/div Ref 126.99 dBµV				WIKT	2.462 33 GHz 110.819 dBµV
117	1	Ĭ			
97.0		-hard have have			
87.0			handra		
77.0			- Jun Marine	montonal	wh n
67.0 ~~~~ 57.0 ~~~~					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
47.0					
37.0					
Start 2.45068 GHz #Res BW 100 kHz	#VBW 30	0 kHz		sweep 1.	Stop 2.48350 GH: 000 ms (1001 pts
	۲ Hz 110.819 dBµV	FUNCTION F	UNCTION WIDTH	FUNCTIO	ON VALUE
2 Δ1 1 f (Δ) 21.17 N 3 N 1 f 2.483 50 G	Hz (Δ) -56.686 dB				
4 5					
67 7					
9 10 10 10 10 10 10 10 10 10 10 10 10 10					
11 <					>
SG			STATUS		

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

					- 6 -
PNO: Fast 🕞 Tri	g: Free Run	Avg Type		TF	PM Oct 04, 2022 ACE 1 2 3 4 5 TYPE MA WWW DET P A N N N
IFGain:High #At	tten: 0 dB				
			M	44.5 kr2	9 93 GHz 40 dBµV
	ĭ				
				4	
				_ \ '	
๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	and and States and a second			┿┲╾ ╢ ┟╍╢╍╲╵╍ [╼] ┙ _╍ ┲╍╢╲╽	2
	_			Stop 2.3	90000 GHz
	WHZ*		-		(1001 pts
	FUNCTION	FUNCTION WIDTH	FUI	NCTION VALUE	^
					~
					>
	PNO: Fast IFGain:High #At #At #VBW 50 Y Iz 55.689 dBuV	SENSE:INT PNO: Fast IFGain:High Trig: Free Run #Atten: 0 dB IFGain:High Trig: Free Run #Atten: 0 dB IFGain:High IFGAIN I	SENSE:INT PNO: Fast IFGain:High Trig: Free Run #Atten: 0 dB Avg Type: Avg Type: Avg Hold:: Avg	SENSE:INT ALIGN OFF PNO: Fast IFGain:High Trig: Free Run #Atten: 0 dB Avg Type: RMS Avg Hold:>1000/1000 M	SENSE:INT ALIGN OFF 04:39:27 PNO: Fast IFGain:High Trig: Free Run #Atten: 0 dB Avg Type: RMS Avg Hold:>1000/1000 TF Mkr2 2.388 (44.5) Mkr2 2.388 (44.5) Image: Sense: Sense

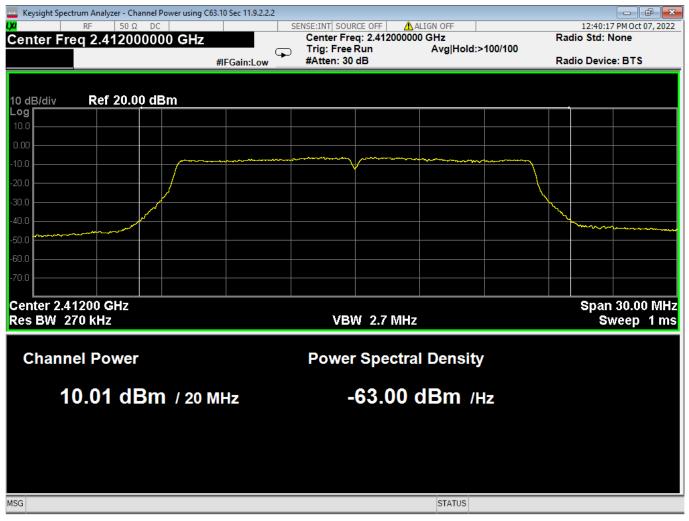
51 Lower Bandedge, Restricted, Wifi B, High Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spec	trum Analyzer - Res	tricted HBE C63.10 Sec	6.10.5				- F
	RF 50 Ω		SE	NSE:INT	ALIGN OFF		04:43:04 PM Oct 04, 2
arker 2 : <mark>ASS</mark>	2.48356600 PREAMP		PNO: Fast 😱 FGain:High	Trig: Free Run #Atten: 0 dB	Avg Type Avg Hold	e: RMS :>1000/1000	TRACE 1 2 3 4 TYPE MA WW DET P A N N
dB/div	Ref Offset 36 Ref 88.64 (Mkr2	2.483 566 0 GI 48.640 dBj
	e 1 Pass			Ĭ			
Irace	2 Pass					_	
.6		0 1					
.6 2	Martin Martin Construction	n-marine inglessation that fear a fear and	Searcan Search Carlot Agent	Alert Mary Contraction	hard and a start and a start and a start	alim Manager and	V
6 			• • • • • • • • • • • • • • • • • • •				······································
.6							
6							
6							
64							
36							
	3500 GHz 1.0 MHz		VBW	50 MHz*		Sweep	Stop 2.500000 G 1.000 ms (1001 p
	C SCL	Х	Y	FUNCTION	FUNCTION WIDTH	FU	NCTION VALUE
N 1 N 2	f	2.487 031 0 GHz 2.483 566 0 GHz	2 59.952 dE 2 48.641 dE				

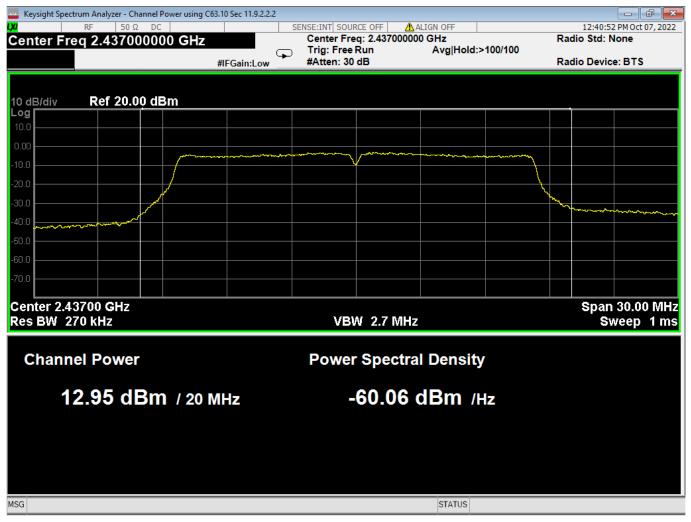
52 Higher Bandedge, Restricted, Wifi B, High Data Rate

ncee,	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		



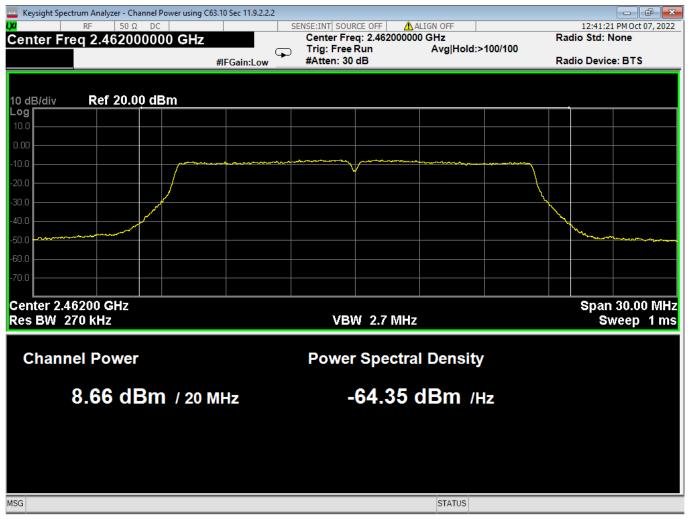
53 Average Power, Low, Wifi G, High Data Rate





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

ncee,	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

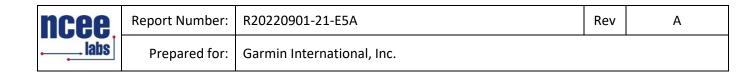


55 Average Power, High, Wifi G, High Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs		Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using C63.	10 Sec 11.8.1			
LXI RF 50 Ω AC		SENSE:INT		06:34:17 PM Oct 17, 2022
Center Freq 2.412000000	GHz	Center Freq: 2.41200000) GHz	Radio Std: None
		Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBm				
5.00				
5.00		A AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	~~~~	
-15.0	ᡃᢧᡔᠽᡔ᠋᠆ᡧᡯᠣ᠆ᡔᡆᡐᢛᠬᢧᢑ᠕			
-25.0				N
				- Marine -
-35.0				han
-43.0				
-55.0				
-65.0				
-75.0				
Center 2.412 GHz				Span 25 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandwidth	1	Total Power	16.9 dBm	
	.410 MHz			
10				
Transmit Freq Error	-9.740 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	16.52 MHz	x dB	-6.00 dB	
MSG			STATUS	

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



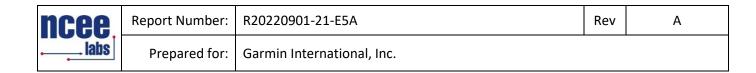
Keysight Spectrum Analyzer - BW using C6	3.10 Sec 11.8.1			
RF 50 Ω AC		SENSE:INT		06:29:33 PM Oct 17, 202
enter Freq 2.43700000		Center Freq: 2.43700000 Trig: Free Run	0 GHz Avg Hold:>10/10	Radio Std: None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
0 dB/div Ref 15.00 dBn	1			
og				
			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	0
5.00				
15.0				
25.0				Mar
35.0 ALAMAMA				a A. D. d. Markeday
45.0				
55.0				
65.0				
75.0				
Center 2.437 GHz				Span 25 MF
Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 m
Occupied Bandwidt	h	Total Power	19.8 dBm	
Transmit Freq Error	-12.136 kHz	% of OBW Power	r 99.00 %	
x dB Bandwidth	16.51 MHz	x dB	-6.00 dB	
		us selled	074740	
<mark>iG</mark>	andwidth 11.8.1.state>	recalled	STATUS	

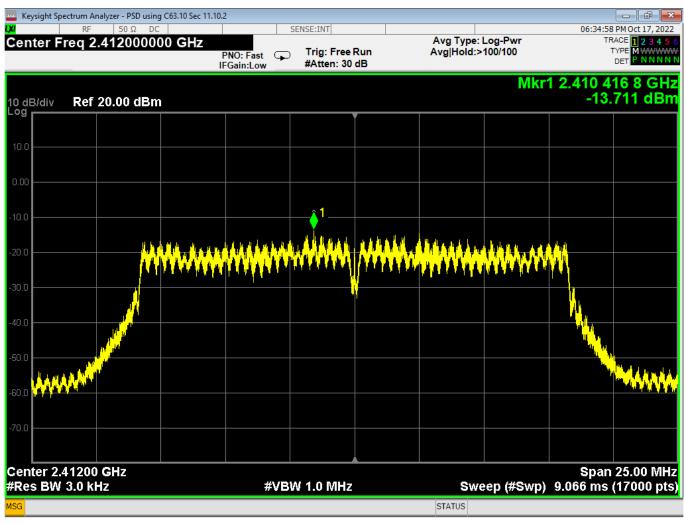
57 6dB Bandwidth, Mid, Wifi G, High Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

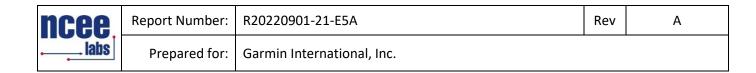
🔤 Keysight Spec	trum Analyzer - BW	using C63.10 Sec	: 11.8.1							×
LXI	RF 50 Ω	AC		SENSE:INT						9 PM Oct 17, 2022
Center Fre	eq 2.46200	0000 GH	z	Center Freq:				Rad	lio Std: N	lone
				<ul> <li>Trig: Free Ru</li> <li>#Atten: 30 dE</li> </ul>		Avg Hold:>	10/10	Rad	lio Devic	e: BTS
10 dB/div Log	Ref 15.00	0 dBm								
5.00										
-5.00			$\sim \sim $	Marine 1	www	᠕ᡊᡘ᠕᠋ᡃᢆ᠕ᡔ᠕	$\sim \sim $			
-15.0								- • • • <u> </u>		
-25.0									L _L	
-35.0	م محمد الم								· VI	
-45.0	ply ny not									www.
-55.0										
-65.0										
-75.0										
Center 2.4 #Res BW				VBW	1 MHz				Sweer	an 25 MHz 2.333 ms
inteo Bh									oncep	2.000 1113
Occup	oied Band	width		Total Po	wer	15.6 dl	Зm			
		16.4	02 MHz							
Transm	nit Freq Err	or -	14.608 kHz	% of OB	N Power	99.00	) %			
x dB Ba	andwidth		16.51 MHz	x dB		-6.00	dB			
MSG						STATUS				

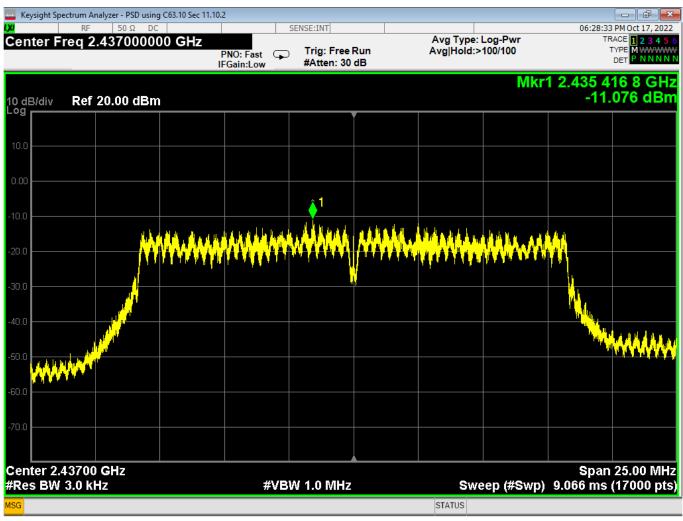
58 6dB Bandwidth, High, Wifi G, High Data Rate



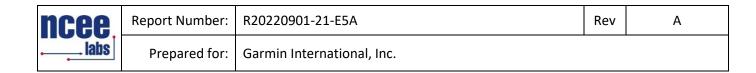


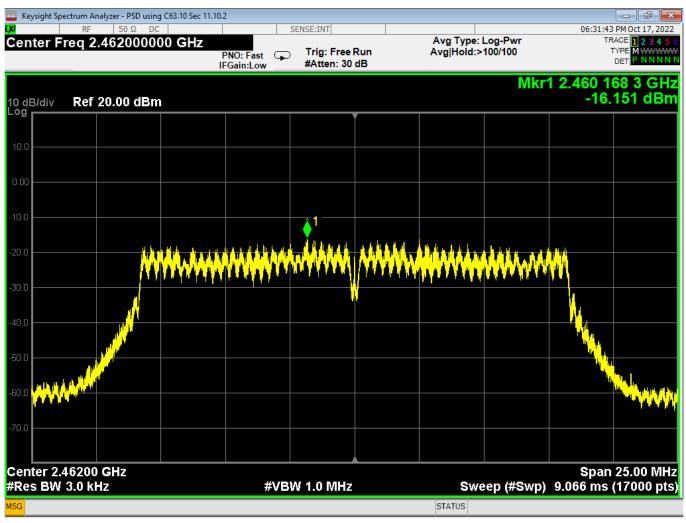
59 PSD, Low, Wifi G, High Data Rate





60 PSD, Mid, Wifi G, High Data Rate





61 PSD, High, Wifi G, High Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

🔤 Keysight Sp		•	ed LBE using C63.1	0 Sec 11.13.2					- P ×
	RF	50 Ω AC			SENSE:IN	IT	A.v	pe: Log-Pwr	06:37:09 PM Oct 17, 2022 TRACE 1 2 3 4 5 (
Marker 2	Δ-11	.2184397	P	PNO: Fast 📮		: Free Run en: 20 dB		ld:>1000/1000	TYPE MAWWW DET PANNN
				Sumeon				٨M	kr2 -11.218 4 MHz
10 dB/div	Ref 1	16.99 dB	μV						-37.195 dB
107						ľ			
					- man	www.	www.	1 pmmm	www.www.
97.0								k(	
87.0					_ کړ				
77.0				2Δ1					
67.0		. alanarrati	mmm	and the second s					
57.0	var var var	<b>VVTTVVVVVVVVVVVVV</b>							
47.0									
37.0									
27.0									
27.0									
Start 2.3	9000 GI	Hz					·		Stop 2.42210 GHz
#Res BW	100 kł	lz		VBV	V 1.0 I	٧Hz		Sweep	1.000 ms (1001 pts)
MKR MODE T	RC SCL	;	x	Y		FUNCTION	FUNCTION WIDTH	FL	INCTION VALUE
1 N	1 f		10 736 9 GHz						
2 Δ1 ⁴ 3 N	1 f (// 1 f		1.218 4 MHz 99 533 9 GHz	<u>(Δ) -37.1</u> 67.289	95 dB dBuV				
4									
5 6									
7									
8									
10									
44									
11 <									> `
							STATUS		>

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricted HBE Using C	53.10 Sec 11.13.2					
α RF 50 Ω DC Marker 1 2.462891917496 GHz		g: Free Run tten: 30 dB	Avg Type: L Avg Hold:>1	og-Pwr 000/1000	TR/ T	PM Oct 17, 202 ACE 1 2 3 4 5 YPE MA WWW DET P A N N N
10 dB/div Ref 126.99 dBµV				M	kr1 2.462 102.6	2 89 GH: 56 dBµ\
- <b>og</b> 117 107	1					
97.0	www.	www.www.	~			
87.0						
67.0			h M h M h M h	mmunn	ᡣᢦᠬᡅᠬᢦᡧᡢ	ᢓᢩ᠘᠄ ᠉ᡣᡅᡘ᠕ᡔᠼᡀ
47.0						
Start 2.45068 GHz					Stop 2.4	8350 GH
Res BW 100 kHz	#VBW 30	0 kHz		Sweep	1.000 ms	(1001 pt
MKR         MODE         TRC         SCL         X           1         N         1         f         2.462         89         GH           2         Δ1         1         f         (Δ)         20.61         MH           3         N         1         f         2.483         50         GH	z (Δ) -46.730 dB	FUNCTION	FUNCTION WIDTH	FUI	ICTION VALUE	
4 5 6						
7 8 8 9 9						
						>
sg			STATUS			

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Restricted LBE usir	ig C63.10 Sec 6.10.5				
XI RF 50 Ω AC	SENSE:	INT	ALIGN OFF		04:47:34 PM Oct 04, 2022
Marker 2 2.389980000000 G	Hz		Avg Type: RMS		TRACE 1 2 3 4 5
PASS PREAMP	PNO: Fast 🕟 Tri	g: Free Run tten: 0 dB	Avg Hold:>1000	/1000	DET PANN
Ref Offset 36.12 dB					2.389 98 GH
10 dB/div Ref 88.11 dBµV					49.296 dBµ\
Trace 1 Pass		Ĭ			
^{76.1} Trace 2 Pass 68.1					
		and the state of the	ye ar mark and a she was a she was a she	hoursenser	Indeputer whendhown 2
58.1 Universite market and a second s	and a film of the second s	Goffiller of the factor of the			
	· · · · · · · · · · · · · · · · · · ·				
38.1					
28.1					
18.1					
8.11					
-1.89					
Start 2.380000 GHz		<b>A</b>		Sto	p 2.390000 GH
#Res BW 1.0 MHz	#VBW 50	MHz*		Sweep 1.00	00 ms (1001 pts
MKR MODE TRC SCL X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION	VALUE
1 N 1 f 2.3898 2 N 2 f 2.3899	64.834 dBµV 8 GHz 49.294 dBµV				
3	49.294 0001				
4					
6					
8					
9					
11					
			I STATUS		>
SG			STATUS		

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

ncee.	Report Number:	R20220901-21-E5A		А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Restricted HBE C63.10 Sec 6			
	PNO: Fast Trig: Free Run Gain:High #Atten: 0 dB	ALIGN OFF Avg Type: RMS Avg Hold:>1000/1000	04:49:06 PM Oct 04, 2022 TRACE 1 2 3 4 5 6 TYPE MA WWWW DET P A N N N N
Ref Offset 36.65 dB 10 dB/div Ref 88.64 dBµV		Mkr	2 2.483 500 0 GHz 50.354 dBµV
Trace 1 Pass 78.6 Trace 2 Pass 68.6			
Magny mary and and marked to be a	hand and the state of the state	ให้ของหนึ่งปฏาใหญ่ และ เป็นเขาไป และ เป็นเขาได้ ๆ อยู่ไปให้ไปได้ เครื่อง ๆ _เ ป็นเป็น	
38.6		· · · · · · · · · · · · · · · · · · ·	
18.6			
-1.36			
Start 2.483500 GHz #Res BW 1.0 MHz	VBW 50 MHz*	Sweet	Stop 2.500000 GHz 5 1.000 ms (1001 pts)
MKR         MODE         TRC         SCL         X           1         N         1         f         2.483 615 5 GHz           2         N         2         f         2.483 500 0 GHz		FUNCTION WIDTH FI	UNCTION VALUE
3 4 5			
6 7 8 9			
			×
MSG		<b>I</b> STATUS	

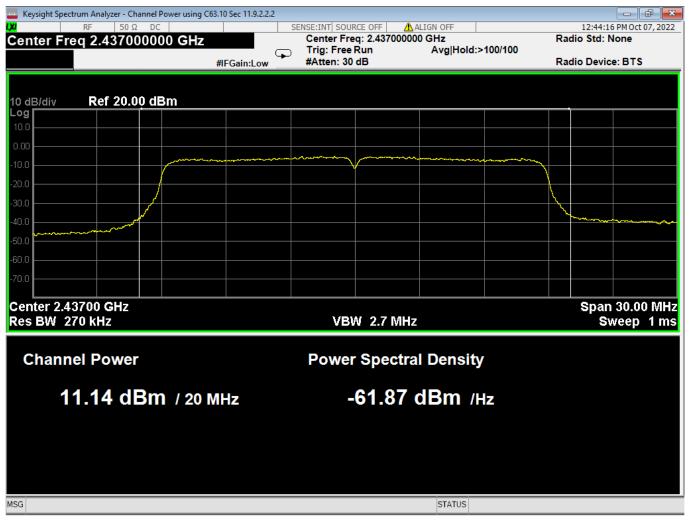
65 Higher Bandedge, Restricted, Wifi G, High Data Rate

Incee	Report Number:	R20220901-21-E5A		А
	Prepared for:	Garmin International, Inc.		

www. Keysight Spectrum Analyzer - Channel Power us	ng C63.10 Sec 11.9.2.2.2		
K RF 50 Ω DC		ALIGN OFF	12:43:47 PM Oct 07, 2022 Radio Std: None
Center Freq 2.412000000 G	Z Center Freq: 2.412000 Trig: Free Run	Avg Hold:>100/100	Radio Sta: None
	#IFGain:Low #Atten: 30 dB		Radio Device: BTS
10 dB/div Ref 20.00 dBm			
Log			
10.0			
0.00			
-10.0			~
-20.0			
-30.0			
-40.0			
and a second designed a			
-50.0			
-60.0			
-70.0			
Center 2.41200 GHz Res BW 270 kHz	VBW 2.7 MH	17	Span 30.00 MHz Sweep 1 ms
Res BW 210 KHZ	VBW 2.7 WF	12	Sweep Tins
Channel Power	Power Spectr	al Density	
10.14 dBm / 2	омнz -62.87	dBm /Hz	
MSG		STATUS	
		311100	

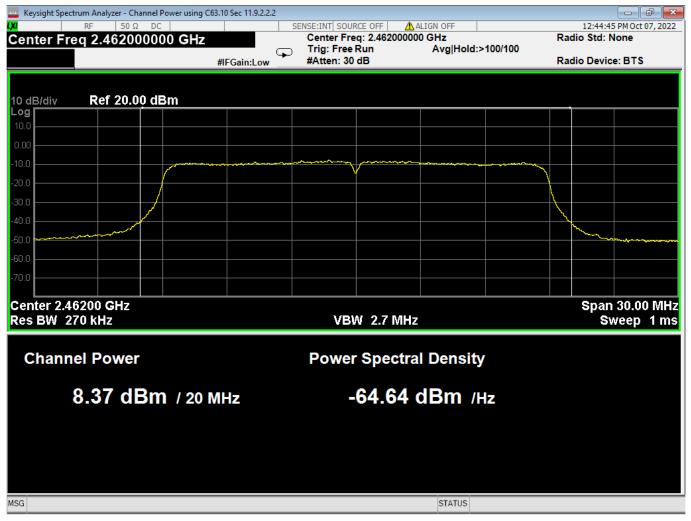
66 Average Power, Low, Wifi N, High Data Rate

Incee	Report Number:	R20220901-21-E5A		А
	Prepared for:	Garmin International, Inc.		



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

Incee	Report Number:	R20220901-21-E5A		А
	Prepared for:	Garmin International, Inc.		



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

ncee.	Report Number:	R20220901-21-E5A		А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using (	C63.10 Sec 11.8.1			- 6 -
RF 50 Ω AC		SENSE:INT		06:49:33 PM Oct 17, 2022
Center Freq 2.41200000	0 GHz	Center Freq: 2.4120000	00 GHz	Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
	<b>1</b> 22			
10 dB/div Ref 15.00 dB				
5.00				
5.00	ᡊ᠋ᠧᡔᡔᠯᠵ᠆ᠰᠥᡰᢆᢧᢂ᠋ᢆᡎᡧᡘᡆᠯᢦᢁᢝᢦ᠆		ᡁᢆᠵᡐᡙᡊ᠊ᡐᠰᡒ᠆ᡆ᠆ᠧᢞᢘᡵ᠊᠇ᡒ᠆ᠵᠧᠰᡀᢛᠬᢧᢪᠧ᠆ᡆ	w w w
-15.0				
-25.0				\
				- And
35.0				Mal Umor or and
45.0				
-55.0				
65.0				
-75.0				
Center 2.412 GHz				Span 25 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandwid	th	Total Power	17.1 dBm	
1	7.462 MHz			
Transmit Freq Error	-6.285 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	17.36 MHz	x dB	-6.00 dB	
	11.00 11112			
sg			STATUS	
			JANUS	

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

Incee labs	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

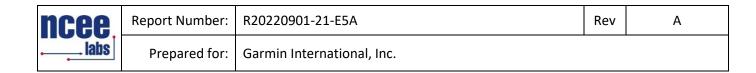
www. Keysight Spectrum Analyzer - BW using C63.10 Sec 1	.8.1						
LX/ RF 50 Ω AC	SENSE:INT		06:54:54 PM Oct 17, 2022				
Center Freq 2.437000000 GHz	Center Freq: 2.43	7000000 GHz	Radio Std: None				
	#IFGain:Low #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS				
10 dB/div Ref 15.00 dBm							
Log							
5.00							
-5.00	man man man	manna					
-15.0			<b>\</b>				
-25.0							
-35.0			- And a start of the start of t				
-35.0 -1pl/ml/h-12							
-55.0							
-65.0							
-75.0							
Center 2.437 GHz			Span 25 MHz				
#Res BW 100 kHz	VBW 1 N	1H7	Sweep 2.333 ms				
		1112	0400p 2.000 m3				
Occupied Bandwidth	Total Power	18.4 dBm					
17.40	0 MHz						
Transmit Freq Error -10	0.754 kHz % of OBW P	ower 99.00 %					
x dB Bandwidth 1	7.58 MHz x dB	-6.00 dB					
JFile <state_wifi 11.8.1.state="" 6db="" bandwidth="" dts=""> recalled   STATUS</state_wifi>							

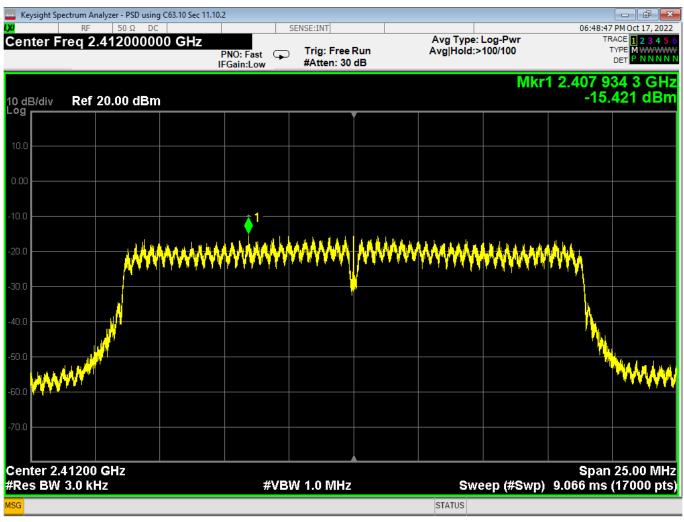
70 6dB Bandwidth, Mid, Wifi N, High Data Rate

Incee labs	Report Number:	R20220901-21-E5A		А
	Prepared for:	Garmin International, Inc.		

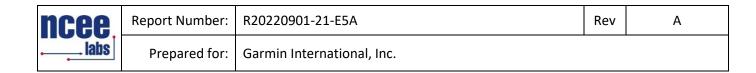
🔤 Keysight Spectrum Analyzer - BW using C6	3.10 Sec 11.8.1			— ē <mark>×</mark>
Center Freq 2.46200000		SENSE:INT Center Freg: 2.46200000	) GHz	06:47:27 PM Oct 17, 2022 Radio Std: None
	#IFGain:Low	Tuine Free Dure	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBm	1			
5.00				
-5.00	ᠬᠬᡧ᠕᠃ᠬ	man man	wwwwwww	un u
-15.0		Ψ		
-25.0				
-35.0				
-45.0 mm. h.				Thule Arthouse
-55.0				
-65.0				
-75.0				
Center 2.462 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25 MHz Sweep   2.333 ms
Occupied Bandwidt	h	Total Power	15.2 dBm	
17	.483 MHz			
Transmit Freq Error	-15.524 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	17.59 MHz	x dB	-6.00 dB	
MSG			STATUS	

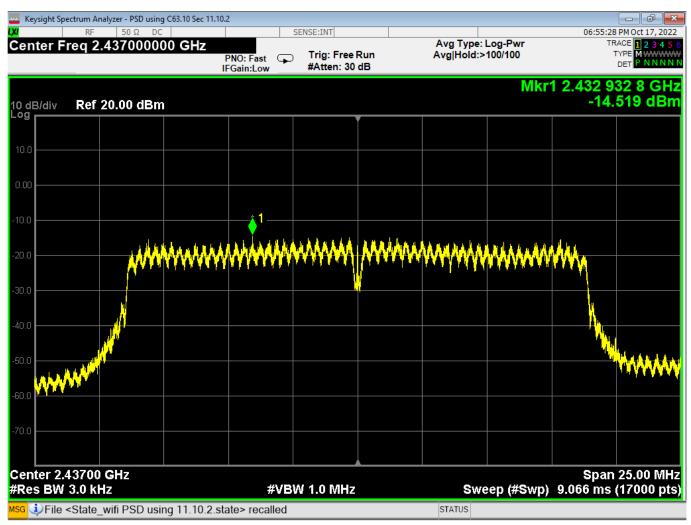
71 6dB Bandwidth, High, Wifi N, High Data Rate



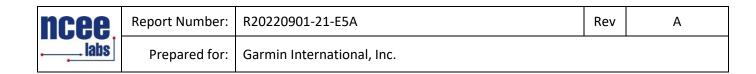


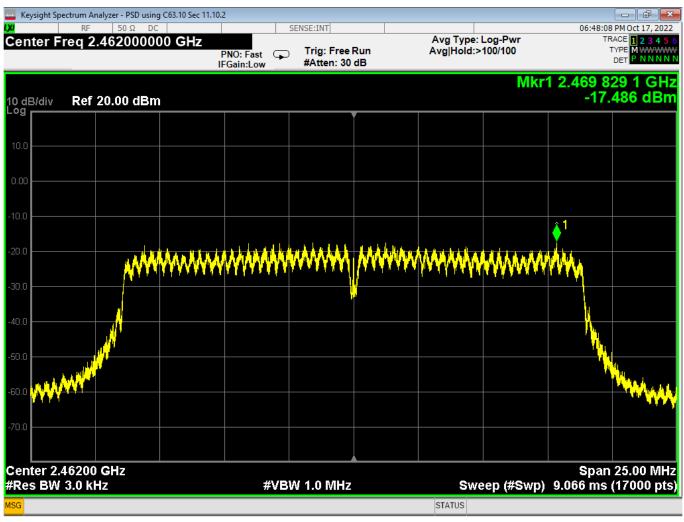
72 PSD, Low, Wifi N, High Data Rate





73 PSD, Mid, Wifi N, High Data Rate





74 PSD, High, Wifi N, High Data Rate

ncee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

🔤 Keysight Sp	ectrum Analyzer - Unre	stricted LBE using C63.	.10 Sec 11.13.2							
<mark>XI</mark> Morkor 1	RF 50 Ω 2.41011468			SENSE:INT		Δν	g Type: Lo	a-Pwr		5 PM Oct 17, 2022
Marker	2.41011408		PNO: Fast 🖵 FGain:Low	Trig: F #Atten	ree Run : 20 dB		g Hold:>10			
	Dof 116 00	dBu)/						Μ		0 11 GHz I49 dBµV
10 dB/div ^{Log}	Ref 116.99	ивни			Ţ		1		100.1	
107				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			~~~~ ~~	᠕᠋ᡎ᠇᠊ᡪᡅ᠕ᡘᠵᡪ	~ጊላ <u>ሉ</u> ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
97.0					YR2 0 0 - 0 -		V			
87.0			n	r'						<u>├</u>
77.0			<u>3∆1</u> ′							<u>ــــــــــــــــــــــــــــــــــــ</u>
67.0	mmm	$\sqrt{1}$	mann							
57.0										
47.0										
37.0										
27.0										
	9000 GHz 100 kHz		VBM	√ 1.0 MH	z			Sweep	Stop 2. 1.000 ms	42188 GHz s (1001 pts
MKR MODE T	RC SCL	х	Y		FUNCTION	FUNCTION WI	DTH	FU	NCTION VALUE	^
1 N ·	1 f 1 f (Δ)	2.410 11 GHz -10.24 MHz								
3 N 1	1 f	2.399 88 GHz	67.872	dBµV						
4 5										
6										
8										
9										
11										~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
SG						ST	ATUS			

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

Incee labs	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

	B.10 Sec 11.13.2 SENSE:INT PNO: Fast FGain:Low #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold:>1000/1000	06:46:14 PM Oct 17, 2022 TRACE 12 3 4 5 6 TYPE MAWWW DET P A NNNN
10 dB/div Ref 126.99 dBµV	rgani.Low writen. to ub	1	Mkr1 2.460 10 GHz 102.768 dBµV
117 107 97.0	1 mm mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm		
87.0 77.0 67.0			243
57.0       47.0       37.0			2 <b>∆3</b> 7
Start 2.45068 GHz #Res BW 100 kHz	#VBW 300 kHz	Swee	Stop 2.48350 GHz p 1.000 ms (1001 pts)
MKR         MODE         TRC         SCL         X           1         N         1         f         2.460 10 GHz           2         Δ1         1         f         2.3.40 MHz           3         N         1         f         2.483 50 GHz           4           2.483 50 GHz	(Δ) -46.365 dB	FUNCTION WIDTH	FUNCTION VALUE
5 6 7 8			
9 10 11 < MSG		STATUS	×

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Restricted LBE using C63.	10 Sec 6.10.5					- 67 - <b>-</b> X
RF 50 Ω AC	SENSE:II	T	ALIGN OFF		04:54:08 PM	Oct 04, 2022
Marker 2 2.389930000000 GHz PASS PREAMP		j: Free Run ten: 0 dB	Avg Type: I Avg Hold:>		TYPE	1 2 3 4 5 MA P A N N N
Ref Offset 36.12 dB 10 dB/div Ref 88.11 dBµV				M	kr2 2.389 9 48.797	3 GH₂ ′dBµ\
Log 78.1 Trace 1 Pass Trace 2 Pass 68.1 58.1				- L mandraha	and the state of t	1 1
48.1	<u>, , , , , , , , , , , , , , , , , , , </u>					
28.1 18.1 8.11						
1.89 Start 2.380000 GHz Res BW 1.0 MHz	#VBW 50	MHz*		Sweep	Stop 2.3900 1.000 ms (1	000 GH
MKR MODE TRC SCL X 1 N 1 f 2.389 49 GH	Y	FUNCTION	FUNCTION WIDTH		ICTION VALUE	
2 N 2 f 2.389 93 GH 3 4 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	1z 48.797 dBµV					
8 9 10 11						>
SG			<b>I</b> STATUS			

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Restricted HBE C63.10 Sec 6.1  RF 50 Ω AC		ALIGN OFF	
Marker 2 2.483549500000 GHz	NO: Fast Trig: Free Run Gain:High #Atten: 0 dB	Avg Type: RMS Avg Hold:>1000/1000	04:55:42 PM Oct 04, 2022 TRACE 1 2 3 4 5 6 TYPE MA WWW DET P A N N N N
Ref Offset 36.65 dB 10 dB/div Ref 88.64 dBµV Log		Mkr2	2 2.483 533 0 GHz 49.463 dBµV
78.6 Frace 2 Pass 68.6			
58.6 2 48.6	have a contraction of the second s		ส่งในหลางสู่เกลร์การสู่การสู่การสู่เป็นสร้างสุดไป
38.6	····		
18.6			
-1.36			
Start 2.483500 GHz #Res BW 1.0 MHz	VBW 50 MHz*	Sweep	Stop 2.500000 GHz 1.000 ms (1001 pts)
MKR         MODE         TRC         SCL         X           1         N         1         f         2.483         615         5         GHz           2         N         2         f         2.483         533         0         GHz           3	Y FUNCTION 65.924 dBµV 49.462 dBµV	FUNCTION WIDTH FU	NCTION VALUE
4 5 6			
7 8 9 10			
11 MSG		I STATUS	×

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





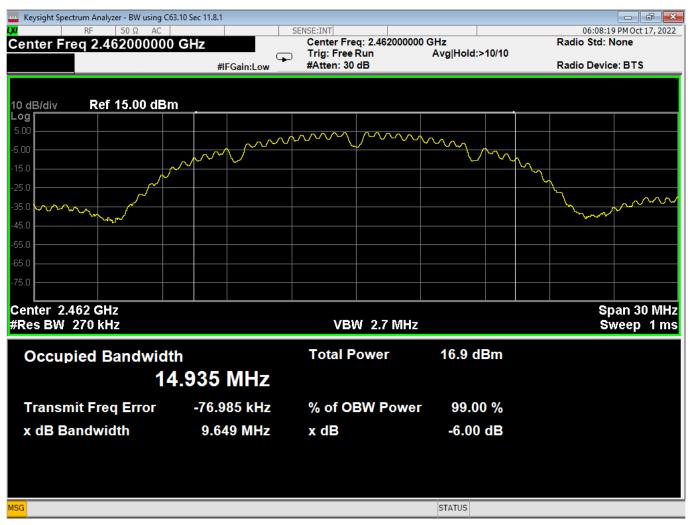
79 Occupied Bandwidth, Low, Wifi B, Low Data Rate





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





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



Keysight Spectrum Analyzer - BW using (	C63.10 Sec 11.8.1			- 6 💌
X/ RF 50 Ω AC		SENSE:INT		06:23:29 PM Oct 17, 2022
Center Freq 2.41200000	0 GHz	Center Freq: 2.4120000		Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dB	m			
Log				
5.00				
5.00	man	have a second a secon	and the second sec	n
15.0				
ممرسه				- Martin - Contraction - Contr
25.0				- Why
35.0				have an and the second and the second
45.0				
55.0				
-65.0				
-75.0				
Center 2.412 GHz				Span 30 MHz
#Res BW 270 kHz		VBW 2.7 MHz	2	Sweep 1 ms
Occupied Bandwid	lth	Total Power	16.2 dBm	
1	6.684 MHz			
Transmit Freq Error	-18.521 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	16.39 MHz	x dB	-6.00 dB	
sg 🔱 File <state_wifi dts="" occ<="" td=""><td>upied bandwidth 11.8.</td><td>1.state&gt; recalled</td><td>STATUS</td><td></td></state_wifi>	upied bandwidth 11.8.	1.state> recalled	STATUS	
	•			

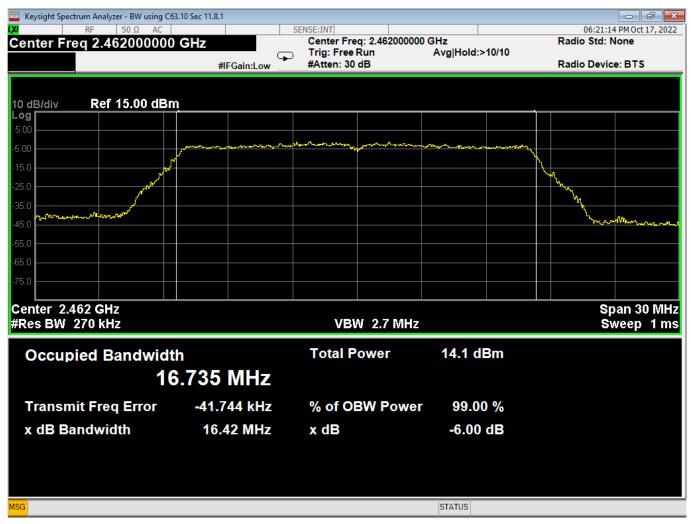
82 Occupied Bandwidth, Low, Wifi G, Low Data Rate





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





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



Keysight Spectrum Analyzer - BW using C63.	10 Sec 11.8.1			
<b>ΓΧΙ</b> RF 50 Ω AC		SENSE:INT		06:39:41 PM Oct 17, 2022
Center Freq 2.412000000	GHz	Center Freq: 2.41200000		Radio Std: None
		Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBm				
5.00				
5.00				
-5.00	<u>, , , , , , , , , , , , , , , , , , , </u>		and a second	
-15.0				
۲ ^۳ (۲۰۰۲)				Wh.
-25.0				
-35.0				March March Mall Charge and and
Man and a second and a second se				مالمحيما والمراكب المراجع والمحمولات
-45.0				
-55.0				
-65.0				
-85.0				
-75.0				
Center 2.412 GHz				Span 30 MHz
#Res BW 270 kHz		VBW 2.7 MHz		Sweep 1 ms
Occupied Bandwidth		Total Power	16.5 dBm	
17	.524 MHz			
Transmit Freq Error	-8.909 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	17.45 MHz	x dB	-6.00 dB	
мsg 🔱 File <state_wifi dts="" occupi<="" td=""><td>ed bandwidth 11.8.1.s</td><td>state&gt; recalled</td><td>STATUS</td><td></td></state_wifi>	ed bandwidth 11.8.1.s	state> recalled	STATUS	

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



Keysight Spectrum Analyzer - BW using C63.	.10 Sec 11.8.1			
<b>ΙΧΙ</b> RF 50 Ω AC		SENSE:INT		06:41:53 PM Oct 17, 2022
Center Freq 2.437000000	GHz	Center Freq: 2.437000000		Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBm				
5.00	Annon and all all and and the second	arturiles after the sector	and a second a s	
-5.00				
				Ϋ́,
-15.0				John Margaran Margaran Jose Wardy and Jose Wardy an
-25.0				. the network of the design
-35.0				
-45.0				
-55.0				
-65.0				
-75.0				
-73.0				
Center 2.437 GHz				Span 30 MHz
#Res BW 270 kHz		VBW 2.7 MHz		Sweep 1 ms
Occupied Bandwidth	า	Total Power	21.1 dBm	
	.582 MHz			
Transmit Freq Error	13.495 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	17.42 MHz	x dB	-6.00 dB	
		X UB	-0.00 uB	
			CTATUC	
MSG			STATUS	

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



	C63.10 Sec 11.8.1			
<b>Γ</b> RF 50 Ω AC		SENSE:INT		06:43:54 PM Oct 17, 2022
Center Freq 2.4620000	0 GHz	Center Freq: 2.46200000	) GHz	Radio Std: None
		Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dE	3m			
5.00				
-5.00		when when and the second secon		~
-15.0				
-25.0				
^				
-35.0				
-45.0				- how when the second s
-55.0				
-65.0				
-75.0				
Center 2.462 GHz				Span 30 MHz
#Res BW 270 kHz		VBW 2.7 MHz		Sweep 1 ms
Occupied Bandwid	dth	Total Power	13.9 dBm	
	7.523 MHz			
	-27.301 kHz	% of OBW Power	99.00 %	
Transmit Freq Error				
x dB Bandwidth	17.54 MHz	x dB	-6.00 dB	
MSG			STATUS	

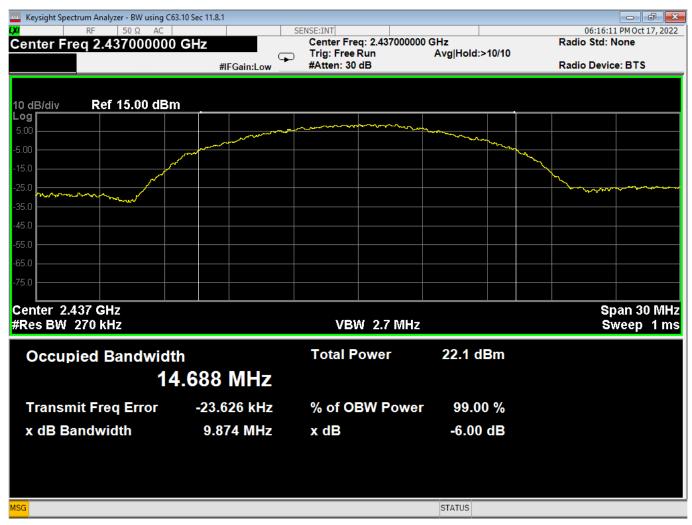
87 Occupied Bandwidth, High, Wifi N, Low Data Rate





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





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





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



Keysight Spectrum Analyzer - BW using C6	i3.10 Sec 11.8.1			- 6 -
RF 50 Ω AC		SENSE:INT		06:33:43 PM Oct 17, 2022
Center Freq 2.41200000	GHz	Center Freq: 2.41200000		Radio Std: None
		Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBr	n			
5.00				
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man man man	* mar	
5.00				
15.0				
-25.0				
-35.0				Which we have been a factor of the state of
45.0				
-55.0				
65.0				
.75.0				
-/5.0				
Center 2.412 GHz				Span 30 MHz
#Res BW 270 kHz		VBW 2.7 MHz		Sweep 1 ms
Occupied Bandwid	h	Total Power	17.5 dBm	
	6.560 MHz			
Transmit Freq Error	-7.158 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	16.53 MHz	x dB	-6.00 dB	
	10.00 1012			
	pied bandwidth 11.8.1.s		STATUS	

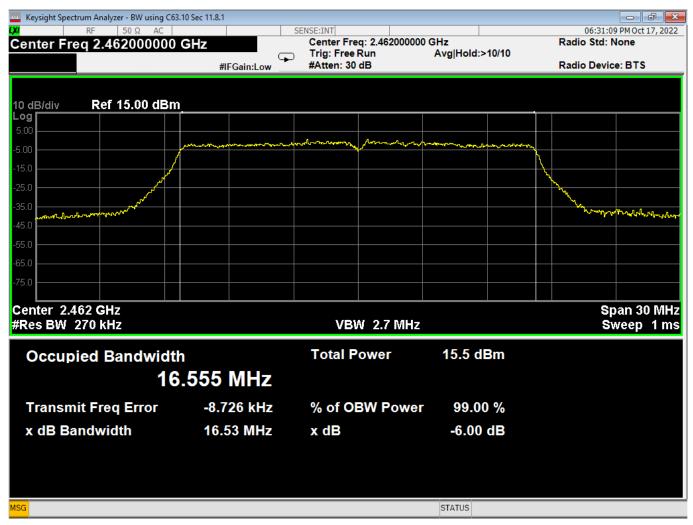
91 Occupied Bandwidth, Low, Wifi G, High Data Rate



Keysight Spectrum Analyzer - BW using C	63.10 Sec 11.8.1			
XI RF 50 Ω AC		SENSE:INT		06:29:07 PM Oct 17, 2022
Center Freq 2.43700000	0 GHz	Center Freq: 2.43700000	0 GHz	Radio Std: None
		Trig: Free Run	Avg Hold:>10/10	
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
10 dB/div Ref 15.00 dB	m			-
5.00	- many and the second	when the second of the second se	~ the many and a provention of the second se	
-5.00	A			┣
-15.0	/			<u>\</u>
معر				whether a set
-25.0				multi between the sound of the
-35.0				
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.437 GHz				Ener 20 MHz
				Span 30 MHz
#Res BW 270 kHz		VBW 2.7 MHz		Sweep 1 ms
		Total Power	19.6 dBm	
Occupied Bandwid	th	Total Fower	19.0 dBm	
1	6.607 MHz			
	0.007 10112			
Transmit Freq Error	-10.095 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	16.43 MHz	x dB	-6.00 dB	
MSG			STATUS	

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





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



	C63.10 Sec 11.8.1			
LXI RF 50 Ω AC		SENSE:INT		06:54:02 PM Oct 17, 2022
Center Freq 2.4120000	00 GHz	Center Freq: 2.41200000		Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dl	Rm			
Log				
5.00				
-5.00	and and the second of the second of the second of the second seco	and the second s	warmly mannen	مر
				N
-15.0				
-25.0				- have
-35.0				handrew half all and hand literated
A set of the set of th				
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.412 GHz				Span 30 MHz
#Res BW 270 kHz		VBW 2.7 MHz		Sweep 1 ms
#Res BW ZIO KHZ				Sweep This
Occupied Bandwig	dth	Total Power	17.2 dBm	
1	7.499 MHz			
Transmit Freq Error	-13.611 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	17.48 MHz	x dB	-6.00 dB	
MSG			STATUS	
			Sin too	

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

ncee,	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using C63	.10 Sec 11.8.1			
LX/ RF 50 Ω AC		SENSE:INT		06:52:49 PM Oct 17, 2022
Center Freq 2.437000000	GHz	Center Freg: 2.43700000	GHz	Radio Std: None
		Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBm				
5.00				
-5.00	and - and a second and a second at	and a second and a second second	√~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m~
-15.0				
-25.0				have the state of
-35.0 Martin Martin Martin				²
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.437 GHz #Res BW 270 kHz		VBW 2.7 MHz		Span 30 MHz Sweep 1 ms
Occupied Bandwidtl	_	Total Power	18.5 dBm	
			IO.0 UBIII	
1/	.500 MHz			
Transmit Freq Error	-10.768 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	17.54 MHz	x dB	-6.00 dB	
	17.54 MHz	x dB	-6.00 dB	
	17.54 MHz	x dB	-6.00 dB	
	17.54 MHz	x dB	-6.00 dB	

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



Keysight Spectrum Analyzer - BW using C63.10 Sec 1	1.8.1			- 6 <mark>-</mark>
Γ RF 50 Ω AC	SI	ENSE:INT		06:46:56 PM Oct 17, 2022
Center Freq 2.462000000 GHz		Center Freq: 2.46200000		Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBm				
5.00				
-5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mand many and the second	~ ^{en} ett ^{wor}	
				N
-15.0				
-25.0				
-35.0				
and the and the state of the st				March Carl Contraction
-45.0				
-55.0				
-65.0				
-75.0				
				On an 20 Mile
Center 2.462 GHz #Res BW 270 kHz		VBW 2.7 MHz		Span 30 MHz
#Res BW 270 KHZ				Sweep 1 ms
Occupied Bandwidth		Total Power	15.6 dBm	
17.46	5 MHz			
Transmit Freq Error -2	5.799 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	7.50 MHz	x dB	-6.00 dB	
MSG			STATUS	
			514105	

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

ncee.	Report Number:	R20220901-21-E5A	Rev	А
labs	Prepared for:	Garmin International, Inc.		

REPORT END