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# **FCC/ISED** Test Report

Prepared for: Garmin International, Inc.

Address:

1200 E. 151<sup>st</sup> Street Olathe, Kansas, 66062, USA

**Product:** 

A04659

**Test Report No:** 

Approved by:

R20220628-20-E3B

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

DATE:

March 22, 2023

Total Pages: 126

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## REVISION PAGE

Rev. No.	Description	
		Original – KVepuri
0	19 December 2022	Reviewed by KVepuri
		Prepared by FLane, GLarsen
А	3 January 2023	Page 6 was modified-KV
B 22 March 2023 Section 4.9/ Antenna gain information was rem		Section 4.9/ Antenna gain information was removed-KV

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## 1.0 SUMMARY OF TEST RESULTS

## FCC Part 15.247 🖂

The EUT has been tested according to the following specifications:

(1) US Code of Federal Regulations, Title 47, Part 15

APPLIED STANDARDS AND REGULATIONS					
Standard Section	Test Type	Result			
FCC Part 15.35	Duty Cycle	Pass			
FCC Part 15.247(b)(3)	Peak output power	Pass			
FCC Part 15.247(a)(2)	Bandwidth	Pass			
FCC Part 15.209	Receiver Radiated Emissions	Pass			
FCC Part 15.209 (restricted bands), 15.247 (unrestricted)	Transmitter Radiated Emissions	Pass			
FCC Part 15.247(e)	Power Spectral Density	Pass			
FCC Part 15.209, 15.247(d)	Band Edge Measurement	Pass			
FCC Part 15.207	Conducted Emissions	Pass			



### 2.0 EUT DESCRIPTION

### 2.1 EQUIPMENT UNDER TEST

### Summary and Operating Condition:

Device under test was a rechargeable battery powered transceiver manufactured by Garmin International, Inc.

EUT	A04659
FCC ID:	IPH-04659
EUT Received	21 July 2022
EUT Tested	21 July 2022 - 20 September 2022
Serial No.         3424308878 (Conducted Unit) 3424308866 (Radiated Unit)	
Operating Band	2400 – 2483.5 MHz
Device Type	□ GMSK □ GFSK □ BT BR □ BT EDR 2MB □ BT EDR 3MB ⊠ 802.11x
Power Supply / VoltageInternal Battery/ 5VDC Charger: Garmin (Phi Hong) MN: LACA046 (Representative Power Supply)	
Antenna Gain (dBi)	+0.43dBi

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:

The EUT was powered by 5 VDC. It was set to transmit continuously on the 3 different channels of its operating range where available. A ferrite was placed on the charging cable adjacent to the USB-C connector FairRite (0431164951). EUT was investigated with both a short VHF antenna (122mm) and a long VHF antenna (340mm). Data was reported from both.

For 802.11x Transmissions:				
Channel Frequency				
Low	2412 MHz			
Mid	2437 MHz			
High	2462 MHz			

Data Rate					
Modulation Low High					
802.11b	1Mb	11Mb			
802.11g	6Mb	54Mb			
802.11n	MCS0	MCS7			

These are the only representative channels tested in the frequency range according to FCC Part 15.31. 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
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	Karthik Vepuri	Test Engineer	Review/editing
2	Fox Lane	Test Engineer	Testing and Report
3	Blake Winter	Test Engineer	Testing
4	Grace Larsen	Test Engineer	Testing and Report
5	Ethan Schmidt	Test Technician	Testing

### Notes:

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



## 3.3 TEST EQUIPMENT

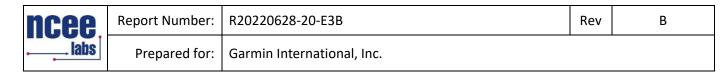
DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE	CALIBRATION DUE DATE
Keysight MXE Signal Analyzer (44GHz)**	N9038A	MY59050109	July 19, 2022	July 19, 2024
Keysight MXE Signal Analyzer (26.5GHz)***	N9038A	MY56400083	July 19, 2022	July 19, 2024
Keysight EXA Signal Analyzer**	N9010A	MY56070862	July 20, 2021	July 20, 2023
SunAR RF Motion	JB1	A091418-1	July 26, 2022	July 26, 2023
EMCO Horn Antenna**	3115	6416	July 28, 2021	July 28, 2023
Rohde & Schwarz Preamplifier*	TS-PR18	3545700803	March 21, 2022	March 21, 2024
8447F POT H64 Preamplifier	8447F POT H64	3113AD4667	March 21, 2022	March 21, 2024
Trilithic High Pass Filter*	6HC330	23042	March 21, 2022	March 21, 2024
TDK Emissions Lab Software	V11.25	700307	NA	NA
RF Cable (preamplifier to antenna)*	MFR-57500	01-07-002	March 21, 2022	March 21, 2024
RF Cable (antenna to 10m chamber bulkhead)*	FSCM 64639	01E3872	September 24, 2021	September 24, 2023
RF Cable (10m chamber bulkhead to control room bulkhead)*	FSCM 64639	01E3864	September 24, 2021	September 24, 2023
RF Cable (control room bulkhead to test receiver)*	FSCM 64639	01F1206	September 24, 2021	September 24, 2023
N connector bulkhead (10m chamber)*	PE9128	NCEEBH1	September 24, 2021	September 24, 2023
N connector bulkhead (control room)*	PE9128	NCEEBH2	September 24, 2021	September 24, 2023

\*Internal Characterization

\*\*2 Year Cal Cycle

### Notes:

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



### 3.4 GENERAL TEST PROCEDURE AND SETUP FOR RADIO MEASUREMNTS

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

## Conducted $\boxtimes$

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.

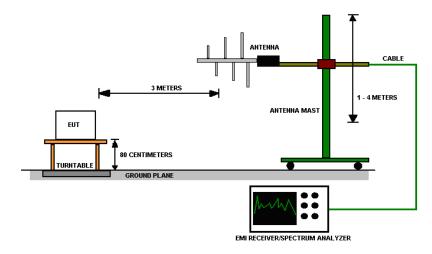


Figure 2 - Radiated Emissions Test Setup

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## 4.0 RESULTS

		DTS Rac	lio Measureme	ents, Low Data R	ate		
CHANNEL	Transmitter	Occupied Bandwidth (MHz)	6 dB Bandwidth (MHz)	AVERAGE OUTPUT POWER (dBm)	AVERAGE OUTPUT POWER (mW)	PSD (dBm)	RESULT
Low	802.11 b	15.16	10.06	17.360	54.450	2.40	PASS
Mid	802.11 b	15.19	10.06	18.290	67.453	3.948	PASS
High	802.11 b	15.26	10.06	18.380	68.865	3.123	PASS
Low	802.11 g	16.99	16.45	16.990	50.003	-6.891	PASS
Mid	802.11 g	17.13	16.51	19.110	81.470	-6.09	PASS
High	802.11 g	17.19	16.55	13.400	21.878	-10.86	PASS
Low	802.11 n	17.59	17.64	15.660	36.813	-8.674	PASS
Mid	802.11 n	17.62	17.61	17.630	57.943	-8.131	PASS
High	802.11 n	17.63	17.64	13.500	22.387	-14.258	PASS
Occupied Ba	andwidth = $N/A$ ;	6 dB Bandwidth Li	mit = 500 kHz	Peak Output Por	wer Limit = 30	dBm; PSD Li	mit = 8 dBm
		DTS Rad	lio Measureme	nts, High Data R	ate		
CHANNEL	Transmitter	Occupied Bandwidth (MHz)	6 dB Bandwidth (MHz)	AVERAGE OUTPUT POWER (dBm)	AVERAGE OUTPUT POWER (mW)	PSD (dBm)	RESULT
Low	802.11 b	14.72	9.04	17.370	54.576	-6.311	PASS
Mid	802.11 b	14.75	9.04	18.350	68.391	-4.813	PASS
High	802.11 b	14.79	8.85	18.440	69.823	-5.058	PASS
Low	802.11 g	16.45	16.54	14.470	27.990	-10.17	PASS
Mid	802.11 g	16.45	16.50	15.020	31.769	-10.353	PASS
High	802.11 g	16.45	16.52	12.450	17.579	-10.592	PASS
Low	802.11 n	17.52	17.67	13.05	20.184	-12.655	PASS
Mid	802.11 n	17.52	17.65	12.48	17.701	-10.765	PASS
High	802.11 n	17.51	17.64	13.19	20.845	-13.188	PASS
Occupied Ba	andwidth = $N/A$ ;	6 dB Bandwidth Li	mit = 500 kHz	Peak Output Po	wer Limit = 30	dBm; PSD Li	mit = 8 dBm

	Unrestricted Band-Edge, 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	2390.00	81.61	115.65	34.04	30.00	PASS					
Low	802.11 g	2390.00	66.63	109.47	42.84	30.00	PASS					
Low	802.11 n	2390.00	66.76	108.29	41.53	30.00	PASS					
High	802.11 b	2483.50	61.76	114.79	53.02	30.00	PASS					
High	802.11 g	2483.50	60.35	104.82	44.47	30.00	PASS					
High	802.11 n	2483.50	65.58	104.85	39.27	30.00	PASS					



	Unrestricted Band-Edge, High 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	81.59	116.59	35.00	30.00	PASS					
Low	802.11 g	2400.00	71.71	107.39	35.68	30.00	PASS					
Low	802.11 n	2400.00	69.41	105.06	35.65	30.00	PASS					
High	802.11 b	2483.50	67.13	117.37	50.24	30.00	PASS					
High	802.11 g	2483.50	60.63	102.90	42.27	30.00	PASS					
High	802.11 n	2483.50	61.27	103.81	42.55	30.00	PASS					

		Peak Res	tricted Band-Edge,	Low Data 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	59.60	Peak	73.98	14.38	PASS
Low	802.11 g	2390.00	67.38	Peak	73.98	6.60	PASS
Low	802.11 n	2390.00	67.18	Peak	73.98	6.80	PASS
High	802.11 b	2483.50	61.15	Peak	73.98	12.83	PASS
High	802.11 g	2483.50	68.56	Peak	73.98	5.42	PASS
High	802.11 n	2483.50	66.82	Peak	73.98	7.16	PASS
*Limit shown i	s the peak li	mit taken from FC	C Part 15.209				
		Average Re	estricted Band-Edge	e, Low Data 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	48.46	Average	53.98	5.52	PASS
Low	802.11 g	2390.00	53.67	Average	53.98	0.31	PASS
Low	802.11 n	2390.00	53.67	Average	53.98	0.31	PASS
High	802.11 b	2483.50	51.49	Average	53.98	2.49	PASS
High	802.11 g	2483.50	52.28	Average	53.98	1.70	PASS
High	802.11 n	2483.50	53.22	Average	53.98	0.76	PASS
*Limit shown i	s the average	e limit taken from	ECC Part 15 209				

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		Peak Rest	ricted Band-Ec	lge, High Data R	ate		
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	surement equency (MHz) 3m) Measurement Type @ 3m		Limit (dBuV/m @ 3m)	Margin	Result
Low	802.11 b	2390.00	59.59	Peak	73.98	14.39	PASS
Low	802.11 g	2390.00	69.09	Peak	73.98	4.89	PASS
Low	802.11 n	2390.00	66.91	Peak	73.98	7.07	PASS
High	802.11 b	2483.50	61.37	Peak	73.98	12.62	PASS
High	802.11 g	2483.50	69.98	Peak	73.98	4.01	PASS
High	802.11 n	2483.50	71.13	Peak	73.98	2.85	PASS
*Limit shown is	the peak lin	nit taken from FCC	C Part 15.209				
		Average Re	stricted Band-	Edge, High Data	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	48.66	Average	53.98	5.32	PASS
Low	802.11 g	2390.00	52.00	Average	53.98	1.98	PASS
Low	802.11 n	2390.00	51.06	Average	53.98	2.92	PASS
High	802.11 b	2483.50	50.63	Average	53.98	3.36	PASS
High	802.11 g	2483.50	52.75	Average	53.98	1.23	PASS
High	802.11 n	2483.50	53.29	Average	53.98	0.69	PASS
*Limit shown is	the average	e limit taken from I	-CC Part 15.20	9			



## 4.1 OUTPUT POWER

**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 allowed peak 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. Results were all within measurement tolerance.



Garmin International, Inc.

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## 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.



## 4.3 **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.



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Test Method: ANSI C63.10-2013, Section 7.8.8

### Limits of spurious emissions:

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)).

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### Test procedures:

The highest emissions level was measured and recorded. All spurious measurements were evaluated to 20dB below the fundamental. 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:

The highest desired power measured was 7.783 dBm at the fundamental frequency. All other emissions were at least 20 dB lower than the corresponding fundamental frequency. Please note the green line shown in the plots is a reference line, not a limit line.



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Figure 3 - Radiated Emissions Plot, Wifi B 1MB, 30M - 1G

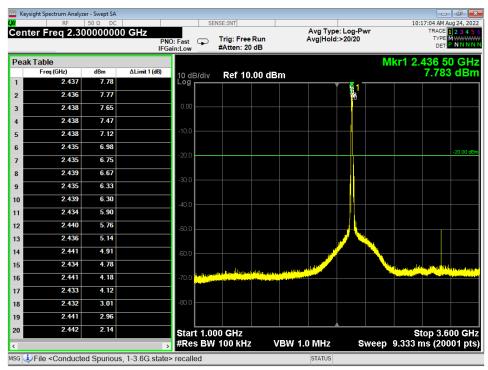
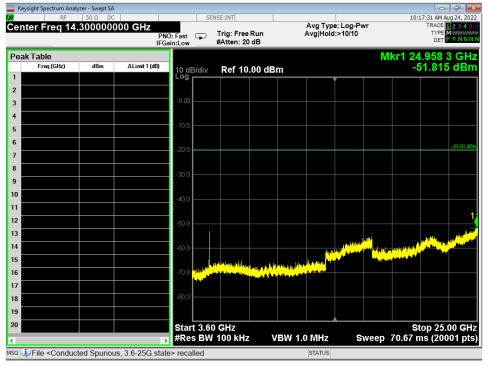
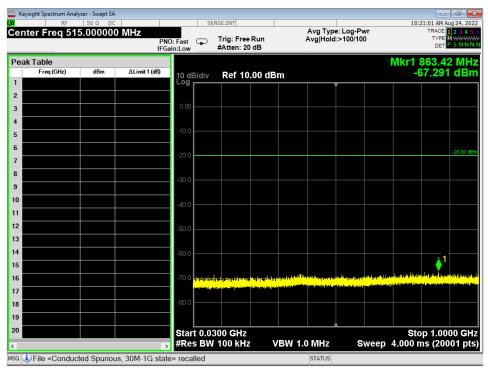


Figure 4 - Radiated Emissions Plot, Wifi B 1MB, 1G - 3.6G













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7	2.434	3.66		-20.0						
8	2.432	3.50								
9	2.436	3.46		-30.0						
10	2.437	3.41		-40.0						
11	2.434	3.32		-40.0						
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Figure 9 - Radiated Emissions Plot, Wifi N MCS0, 30M - 1G

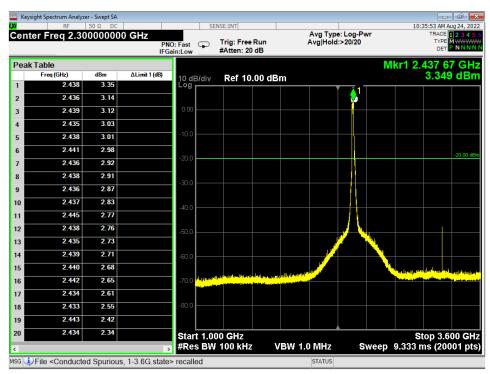


Figure 10 - Radiated Emissions Plot, Wifi N MCS0, 1G - 3.6G



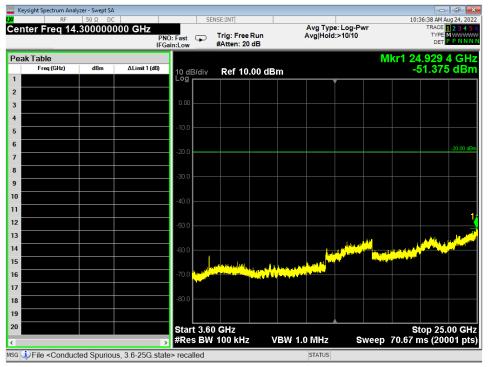


Figure 11 - Radiated Emissions Plot, Wifi N MCS0, 3.6G - 25G

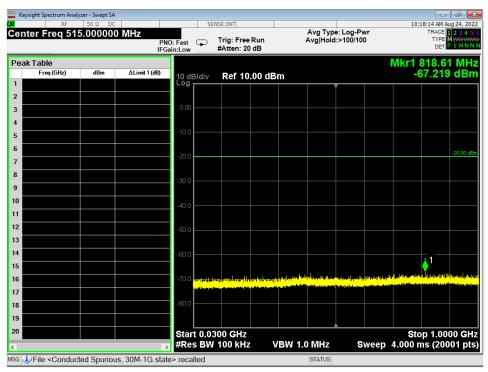


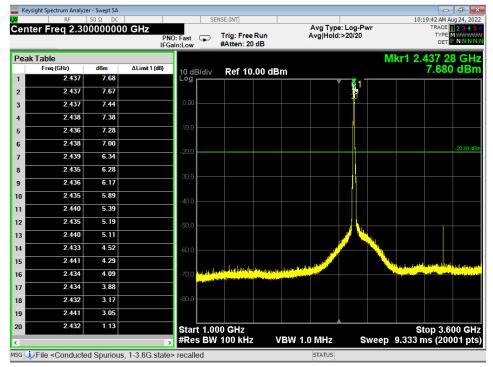
Figure 12 - Radiated Emissions Plot, Wifi B 11MB, 30M - 1G



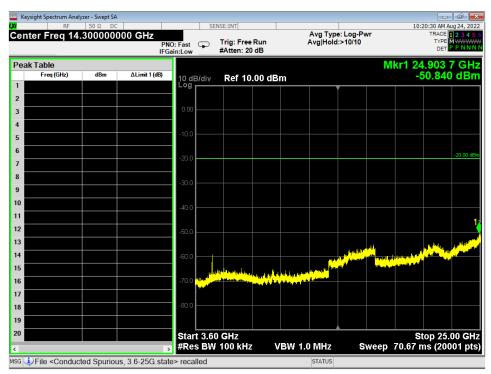
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Prepared for: Garmin International, Inc.











	sight Spectrum Anal RF Cer Freq 51	50 Ω DC	) MHz	: Fast G	SENSE:INT	e Run		Avg Type Avg Hold	: Log-Pw :>100/100	/r	10:	24:29 AM A TRACE TYPE	1 2 3 4 1 M WWW
ook	Table		IFGa	in:Low	#Atten: 2	0 dB		3			Mkr1	52.1	
	Freq (GHz)	dBm	ΔLimit 1 (dB)	10 dB/d	div Ref 10	0.00 dB	m					67.361	
				╘╻╻╻									
				0.00									
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B				-80.0									
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			> s, 30M-1G.state			2 V	/BW 1.0	STATUS	51	weep	4.000 ľ	ns (zuu	ion pr

Figure 15 - Radiated Emissions Plot, Wifi G 54MB, 30M - 1G

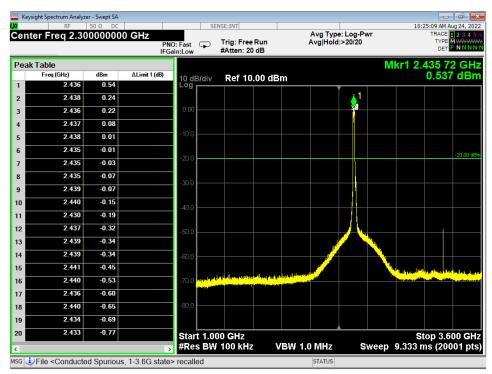


Figure 16 - Radiated Emissions Plot, Wifi G 54MB, 1G – 3.6G



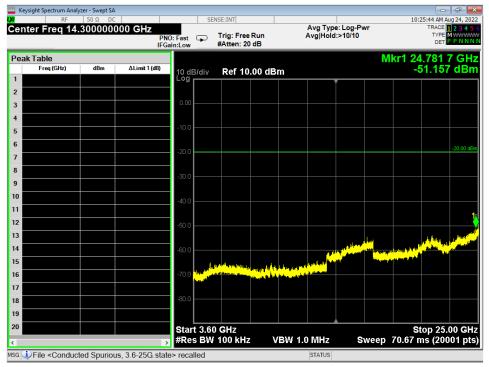


Figure 17 - Radiated Emissions Plot, Wifi G 54MB, 3.6G - 25G

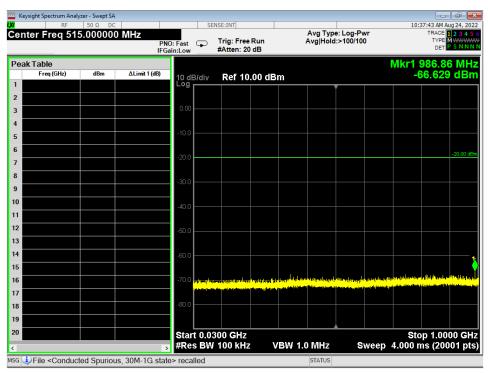


Figure 18 - Radiated Emissions Plot, Wifi N MCS7, 30M – 1G



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ente	r Freq 2.30	50 Ω DC	PN			rig: Free R		Avg Typ Avg Hold	e: Log-Pw i:>20/20	r			234 ₩₩₩₩
	T 11		IFGa	ain:Low	- #	Atten: 20 d	В				lend 0		
чеак	Table Freq (GHz)	dBm	ΔLimit1(dB)			B-6400				IVI		435 72 -0.789	
1	2.436	-0.79		10 dB. Log r	div	Ref 10.0	U aBm		•			0.705	abi
2	2.445	-1.77							â 1				
3	2.440	-1.81		0.00									
4	2.436	-1.94											
5	2.439	-2.05		-10.0									
6	2.438	-2.08											-20.00 df
7	2.437	-2.21		-20.0									-20.00 dt
8	2.444	-2.21											
9	2.434	-2.31		-30.0									
10	2.435	-2.37											
11	2.433	-2.38		-40.0									
12	2.435	-2.39		-50.0									
13	2.438	-2.42							1	<u>1.</u>			
14	2.445	-2.49		-60.0						<u> </u>			
15	2.438	-2.53										d manter and	
16	2.436	-2.73		-70.0	, also faultifi	late transfer for the second	all of a last of the			w.	a televisit		Harry Conf.
17	2.434	-2.74		ľ	A MARINE MARINE								
18	2.431	-2.75		-80.0									
19	2.437	-2.84											
20	2.433	-2.86		Start	1.000	GH7						top 3.60	10 GH
			>			00 kHz	VBV	V 1.0 MHz	SI	veep		ns (200	



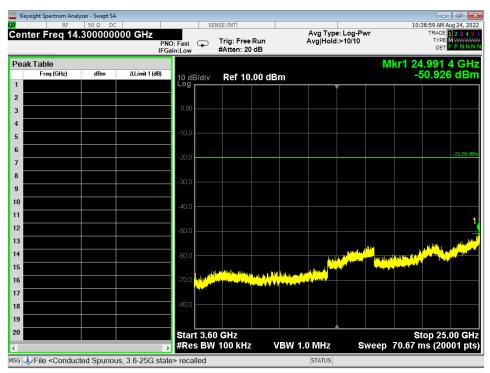


Figure 20 - Radiated Emissions Plot, Wifi N MCS7, 3.6G – 25G



## 4.5 CONDUCTED AC MAINS EMISSIONS

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

### Limits for conducted emissions measurements:

	CONDUCTED LIMIT (dBµV)				
(MHz)	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.

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### 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:**

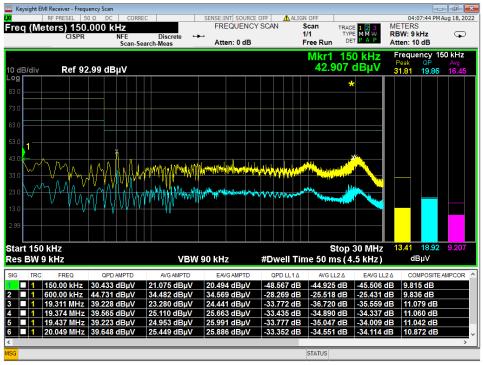


Figure 21 - Conducted Emissions Plot, Line, TX

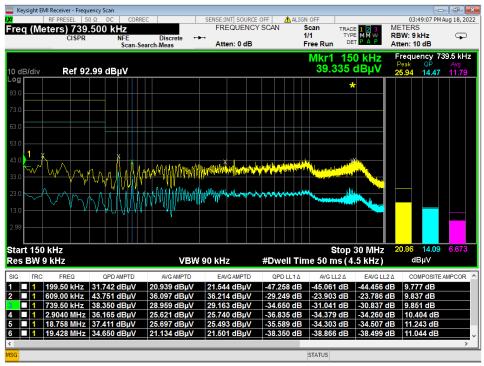


Figure 22 - Conducted Emissions Plot, Neutral, TX



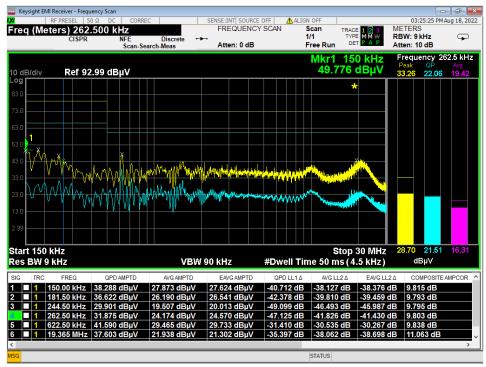


Figure 23 - Conducted Emissions Plot, Line, IDLE

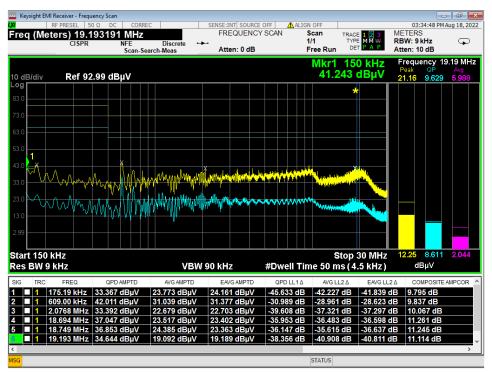


Figure 24 - Conducted Emissions Plot, Neutral, IDLE

## 4.6 DUTY CYCLE

### Test Method:

All Modulations/Transmitters in this report were provided and tested with a duty cycle of >98%



## 4.7 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 follows:

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 ( $\mu$ 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.

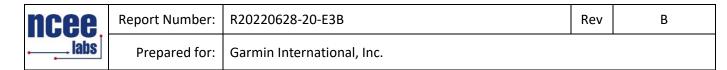
c. The antenna was a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are used to make the measurement.

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:

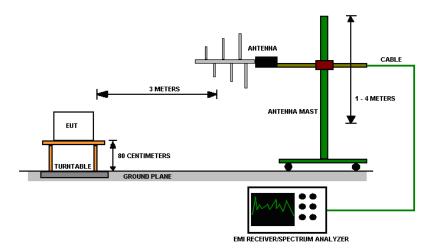


Figure 25 - Radiated Emissions Test Setup

### 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.

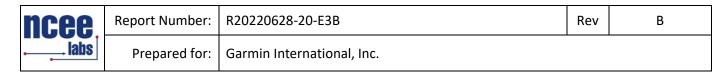
2. The resolution bandwidth 1 MHz for all measurements and at frequencies above 1GHz, A peak detector was used for all measurements above 1GHz. Measurements were made with an EMI Receiver.

Deviations from test standard:

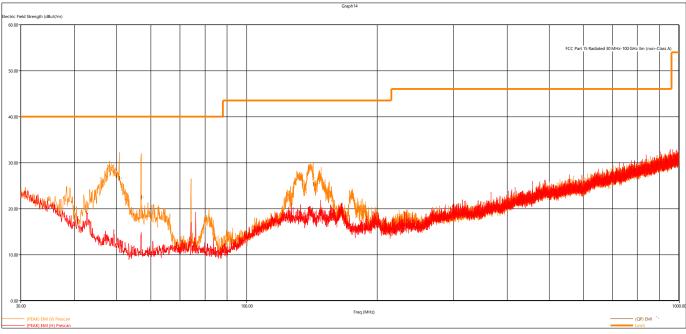
No deviation.

EUT operating conditions

Details can be found in section 2.1 of this report.



Test results:





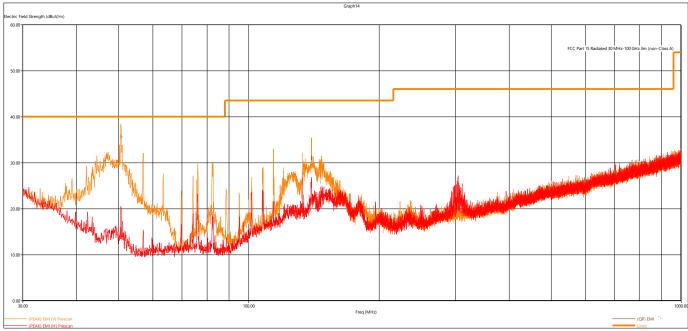
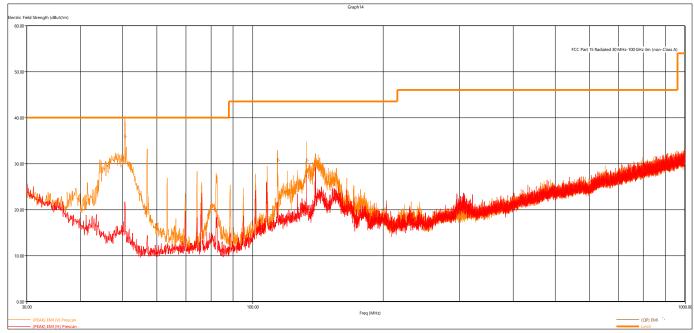


Figure 27 - Radiated Emissions Plot, 802.11b, Low Data Rate, Low Ch, Short Antenna







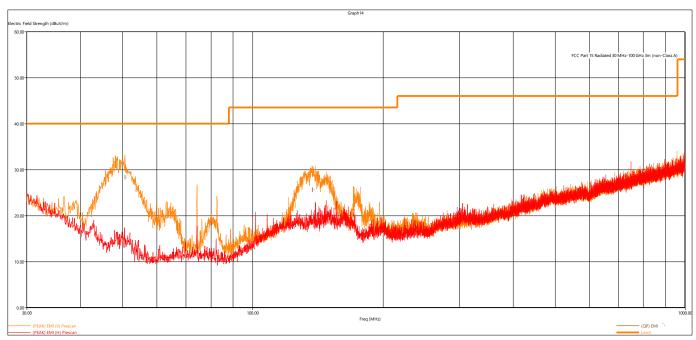
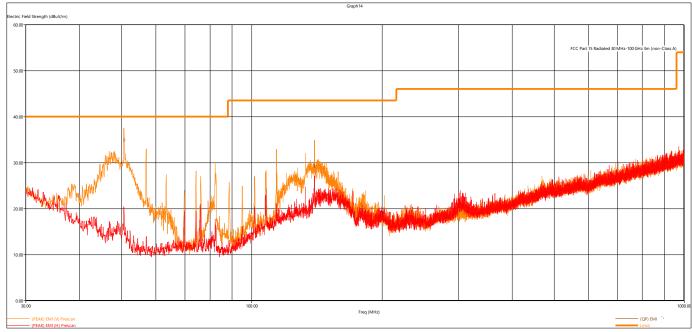


Figure 29 - Radiated Emissions Plot, 802.11n, Low Data Rate, Low Ch, Short Antenna







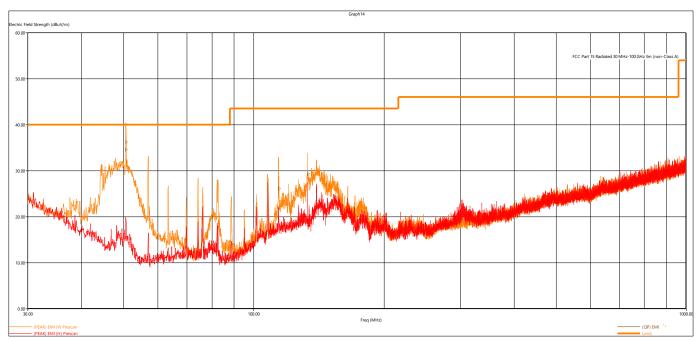
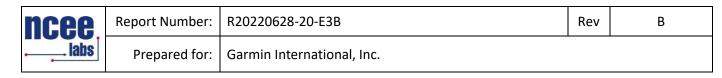
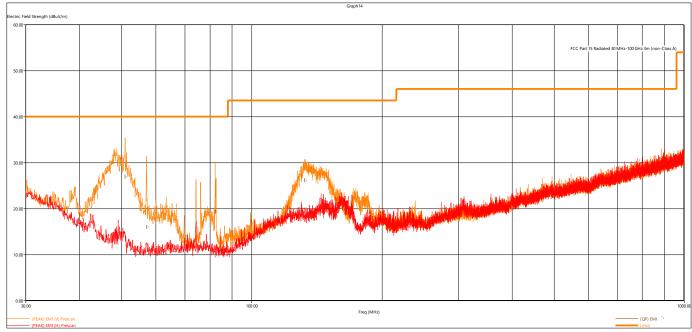


Figure 31 - Radiated Emissions Plot, 802.11g, High Data Rate, Low Ch, Short Antenna







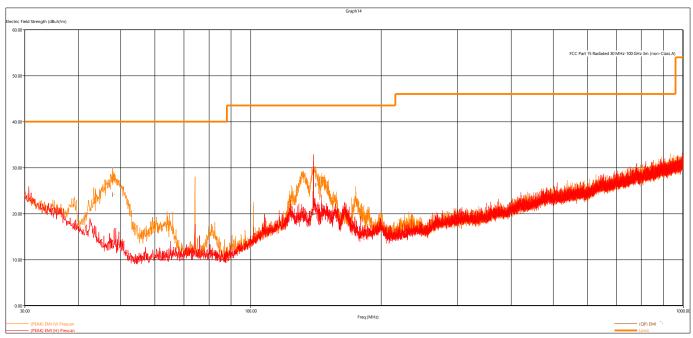
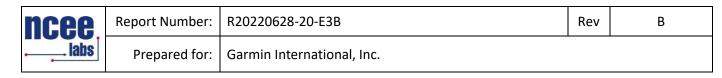
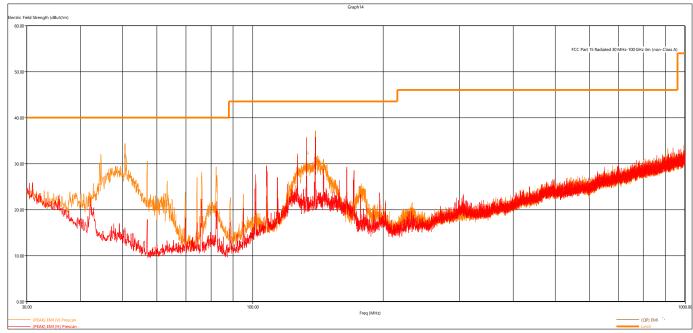


Figure 33 - Radiated Emissions Plot, Receive, Long Antenna







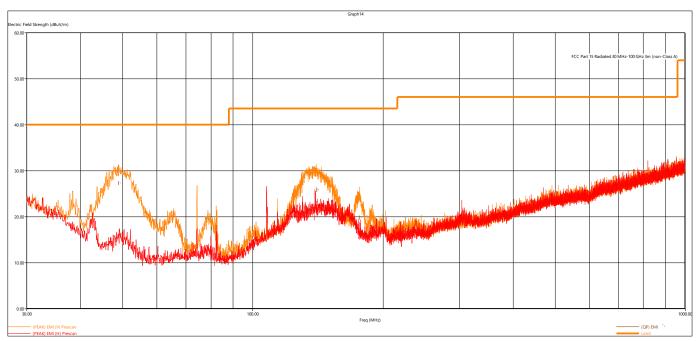
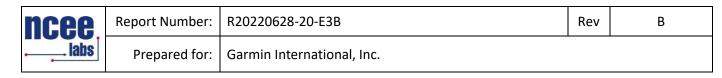
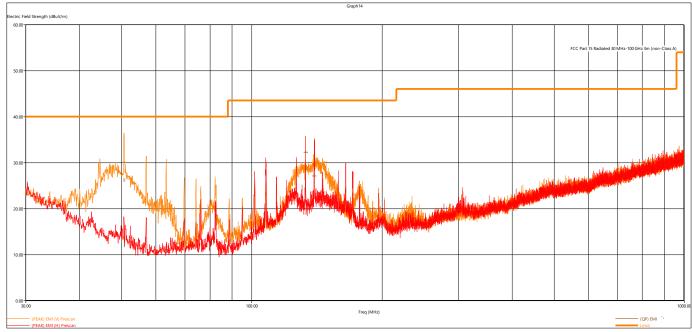


Figure 35 - Radiated Emissions Plot, 802.11g, Low Data Rate, Low Ch, Long Antenna







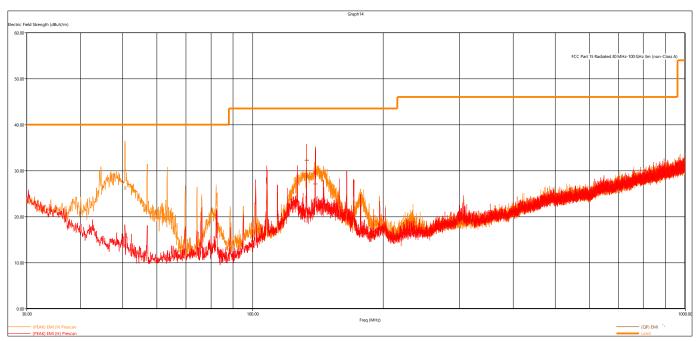
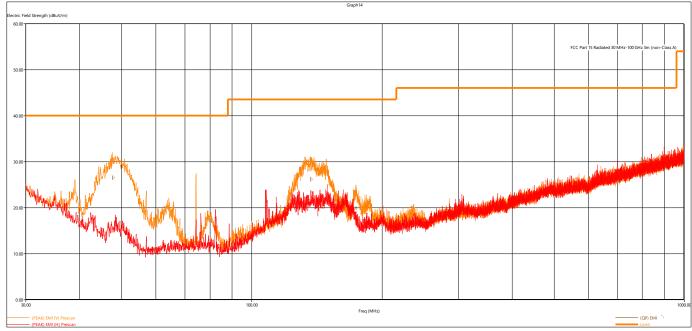


Figure 37 - Radiated Emissions Plot, 802.11b, High Data Rate, Low Ch, Long Antenna







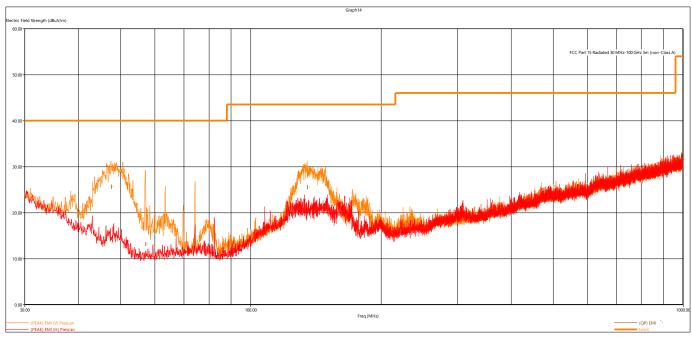


Figure 39 - Radiated Emissions Plot, 802.11n, High Data Rate, Low Ch, Long Antenna

#### 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 = Limit value Emission level

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		Quasi	-Peak Me	asureme	nts, Sho	ort Ant	enna			
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Channel Modulation R		
MHz	dBµV/m	dBµV/m	dB	cm.	deg.					
50.53248	35.65	40.00	4.35	112	229	V	Low	802.11b	Low	
139.3536	31.02	43.52	12.5	171	166	V	Low	802.11b	Low	
50.57856	34.87	40.00	5.13	127	61	V	Low	802.11b	High	
139.5787	29.33	43.52	14.19	109	133	V	Low	802.11b	High	
50.51496	35.87	40.00	4.13	113	353	V	Low	802.11g	Low	
113.8442	30.71	43.52	12.81	118	87	V	Low	802.11g	Low	
133.2324	30.67	43.52	12.85	123	153	V	Low	802.11g	Low	
50.53248	34.52	40.00	5.48	121	340	V	Low	802.11g	High	
50.55528	36.06	40.00	3.94	124	272	V	Low	802.11g	High	
114.0034	26.00	43.52	17.52	120	70	V	Low	802.11g	High	
133.1287	29.28	43.52	14.24	164	157	V	Low	802.11g	High	
49.27824	27.86	40.00	12.14	106	261	V	Low	802.11n	Low	
138.0595	26.41	43.52	17.11	105	77	V	Low	802.11n	Low	
171.8815	15.88	43.52	27.64	305	360	V	Low	802.11n	Low	
50.93712	26.84	40.00	13.16	99	0	V	Low	802.11n	High	
57.18768	15.96	40.00	24.04	138	233	V	Low	802.11n	High	
82.23768	19.18	40.00	20.82	121	216	V	Low	802.11n	High	
132.48	26.08	43.52	17.44	103	301	V	Low	802.11n	High	
50.54928	26.56	40.00	13.44	127	271	V	RX			
56.90832	22.43	40.00	17.57	163	336	V		RX		
142.1422	25.21	43.52	18.31	118	76	V		RX		

All other measurements found to be at least 6dB below the limit line



		Quasi	-Peak Me	asureme	ents, Lor	ng Ant	enna		
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation	Data Rate
MHz	dBµV/m	dBµV/m	dB	cm.	deg.				
50.55384	31.54	40.00	8.46	107	38	V	Low	802.11b	Low
133.1496	32.16	43.52	11.36	106	188	V	Low	802.11b	Low
139.4124	27.9	43.52	15.62	159	137	V	Low	802.11b	Low
133.1448	32.15	43.52	11.37	218	79	Н	Low	802.11b	High
139.3865	27.03	43.52	16.49	198	75	Н	Low	802.11b	High
50.59032	26.17	40.00	13.83	123	50	V	Low	802.11b	High
133.1064	28.35	43.52	15.17	147	154	V	Low	802.11b	High
48.8604	27.25	40.00	12.75	110	229	V	Low	802.11g	Low
140.2934	25.75	43.52	17.77	137	101	V	Low	802.11g	Low
176.4235	19.78	43.52	23.74	116	88	V	Low	802.11g	Low
47.62656	26.42	40.00	13.58	110	265	V	Low	802.11g	High
136.6452	26.07	43.52	17.45	105	168	V	Low	802.11g	High
173.9957	19.87	43.52	23.65	108	312	V	Low	802.11g	High
139.3752	20.36	43.52	23.16	295	73	Н	Low	802.11n	Low
47.88672	26.76	40.00	13.24	104	279	V	Low	802.11n	Low
136.4066	26.34	43.52	17.18	108	131	V	Low	802.11n	Low
47.4732	25.56	40.00	14.44	111	192	V	Low	802.11n	High
56.84232	13.11	40.00	26.89	199	293	V	Low	802.11n	High
134.8524	25.47	43.52	18.05	108	124	V	Low	802.11n	High
139.3452	19.81	43.52	23.71	202	52	Н	RX		
47.796	24.03	40.00	15.97	105	193	V	RX		
50.55384	31.54	40.00	8.46	107	38	V	RX		

All other measurements found to be at least 6dB below the limit line



Report Number:	R20220628-20-E3B	Rev	В
Prepared for:	Garmin International, Inc.		

			Peak Me	asureme	ents, 802	.11x			
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation	Data Rate
MHz	dBµV/m	dBµV/m	dB	cm.	deg.				
2411.112000	107.45	NA	NA	146.00	359.00	Н	Low	802.11b	Low
2436.136000	107.92	NA	NA	173.00	3.00	Н	Mid	802.11b	Low
2461.224000	107.51	NA	NA	204.00	5.00	Н	High	802.11b	Low
2435.084000	111.25	NA	NA	133.00	345.00	Н	Mid	802.11g	Low
2438.310000	111.00	NA	NA	133.00	348.00	Н	Mid	802.11n	Low
4823.360000	44.75	73.98	29.23	196.00	43.00	Н	Low	802.11b	Low
7236.586000	46.94	73.98	27.04	442.00	112.00	Н	Low	802.11b	Low
4873.958000	44.08	73.98	35.9	197.00	62.00	Н	Mid	802.11b	Low
4923.924000	45.23	73.98	28.75	129.00	341.00	Н	High	802.11b	Low
4870.500000	52.75	73.98	21.23	126.00	62.00	Н	Mid	802.11g	Low
4880.260000	43.87	73.98	30.11	459.00	56.00	Н	Mid	802.11n	Low
4924.154000	42.79	73.98	16.19	130.00	352.00	Н	Mid	802.11n	Low
2413.544000	109.91	NA	NA	128.00	347.00	Н	High	802.11b	High
2416.810000	106.79	NA	NA	205.00	352.00	Н	Low	802.11g	Low
2410.502000	107.97	NA	NA	255.00	352.00	Н	Low	802.11g	High
2413.958000	105.47	NA	NA	208.00	341.00	Н	Low	802.11n	Low
2461.450000	103.92	NA	NA	183.00	356.00	Н	Low	802.11n	High
2460.930000	106.27	NA	NA	197.00	346.00	Н	High	802.11n	Low
2459.860000	104.43	NA	NA	374.00	352.00	Н	High	802.11n	High
2459.970000	105.78	NA	NA	238.00	360.00	Н	High	802.11g	Low
4819.224000	57.20	73.98	16.78	281.00	360.00	V	High	802.11g	High
4923.872000	52.79	73.98	21.19	453.00	355.00	V	High	802.11g	Low

The EUT was maximized in all 3 orthogonal axes. The worst-case is shown in the plot and table above. All other emissions found to be at least 6dB below the limit line. System Noise floor was at least 6 dB below the limit line throughout the test range.



Report Number:	R20220628-20-E3B	Rev	В
Prepared for:	Garmin International, Inc.		

		A	verage N	leasuren	nents, 80	)2.11x			
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation	Data Rate
MHz	dBµV/m	dBµV/m	dB	cm.	deg.				
2411.112000	104.64	NA	NA	146.00	359	Н	Low	802.11b	Low
2436.136000	105.23	NA	NA	173.00	3.00	Н	Mid	802.11b	Low
2461.224000	104.87	NA	NA	204.00	5.00	Н	High	802.11b	Low
2435.084000	102.22	NA	NA	133.00	345.00	Н	Mid	802.11g	Low
2438.310000	101.63	NA	NA	133.00	348.00	Н	Mid	802.11n	Low
4823.360000	29.79	53.98	24.19	196.00	43.00	Н	Low	802.11b	Low
7236.586000	33.41	53.98	20.57	442.00	112.00	Н	Low	802.11b	Low
4873.958000	29.84	53.98	24.14	197.00	62.00	Н	Mid	802.11b	Low
4923.924000	30.97	53.98	23.01	129.00	341.00	Н	High	802.11b	Low
4870.500000	38.79	53.98	15.19	126.00	62.00	Н	Mid	802.11g	Low
4880.260000	30.43	53.98	23.55	459.00	56.00	Н	Mid	802.11n	Low
4924.154000	29.29	53.98	9.19	130.00	352.00	Н	High	802.11b	High
2413.544000	100.89	NA	NA	128.00	347.00	Н	Low	802.11g	Low
2416.810000	96.84	NA	NA	205.00	352.00	Н	Low	802.11g	High
2410.502000	98.69	NA	NA	255.00	352.00	Н	Low	802.11n	Low
2413.958000	95.32	NA	NA	208.00	341.00	Н	Low	802.11n	High
2461.450000	94.96	NA	NA	183.00	356.00	Н	High	802.11n	Low
2460.930000	95.50	NA	NA	197.00	346.00	Н	High	802.11n	High
2459.860000	94.91	NA	NA	374.00	352.00	Н	High	802.11g	Low
2459.970000	95.40	NA	NA	238.00	360.00	Н	High	802.11g	High
4819.224000	43.74	53.98	10.24	281.00	360.00	V	High	802.11g	Low
4923.872000	38.24	53.98	15.74	453.00	355.00	V	High	802.11n	High

The EUT was maximized in all 3 orthogonal axes. The worst-case is shown in the plot and table above. All other emissions found to be at least 6dB below the limit line. System Noise floor was at least 6 dB below the limit line throughout the test range.



В

Rev

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## 4.8 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.

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### 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 $\mu$ V is obtained. The Antenna Factor of 12 and a Cable Factor of 1.1 is added. The Amplifier Gain of 20 dB is subtracted, giving a field strength of 48.1 dB $\mu$ V/m.

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

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

Level in  $\mu$ V/m = Common Antilogarithm [(48.1 dB $\mu$ V/m)/20]= 254.1  $\mu$ 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.

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## **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)]<sup>2</sup> / 30

Power (watts) =  $10^{Power} (dBm)/10] / 1000$ 

Voltage ( $dB\mu V$ ) = Power (dBm) + 107 (for 50 $\Omega$  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

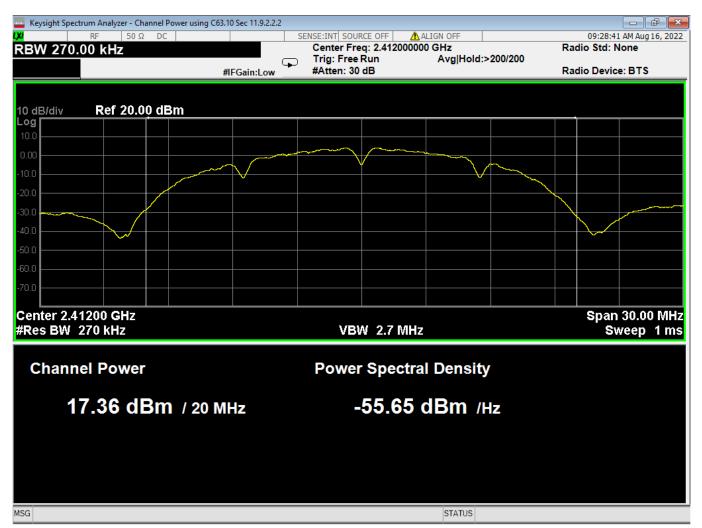
Where relevant, the following measurement uncertainty levels have been for tests performed in this test report:

Test	Frequency Range	Uncertainty Value (dB)
Radiated Emissions, 3m	30MHz - 1GHz	±4.31
Radiated Emissions, 3m	1GHz - 18GHz	±5.08
Emissions limits, conducted	150kHz – 30MHz	±3.03

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

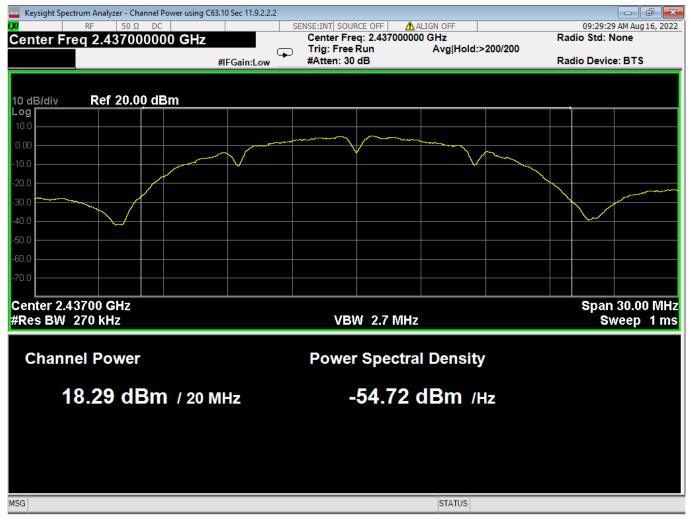
ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

### APPENDIX C – GRAPHS AND TABLES



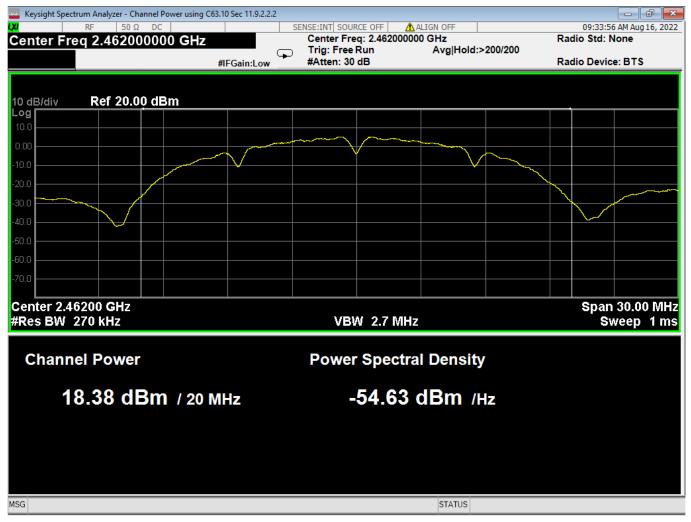
01 Average Power, Low, Wifi B, Low Data Rate

ncee,	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

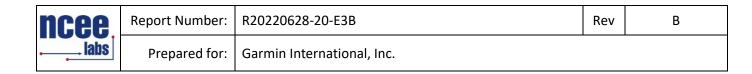


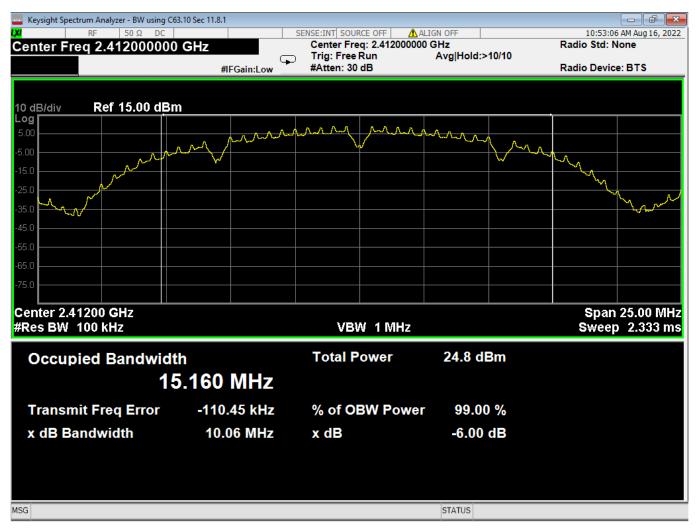
02 Average Power, Mid, Wifi B, Low Data Rate

ncee,	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

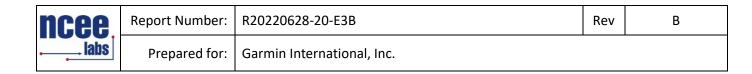


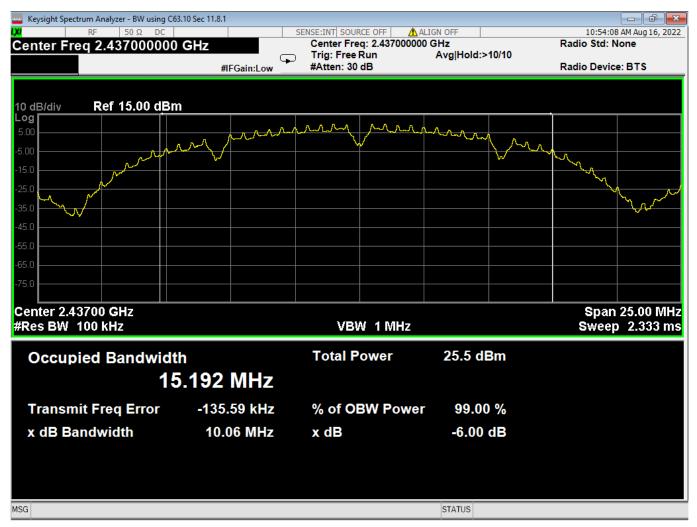
03 Average Power, High, Wifi B, Low Data Rate



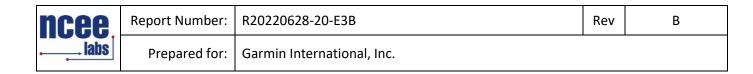


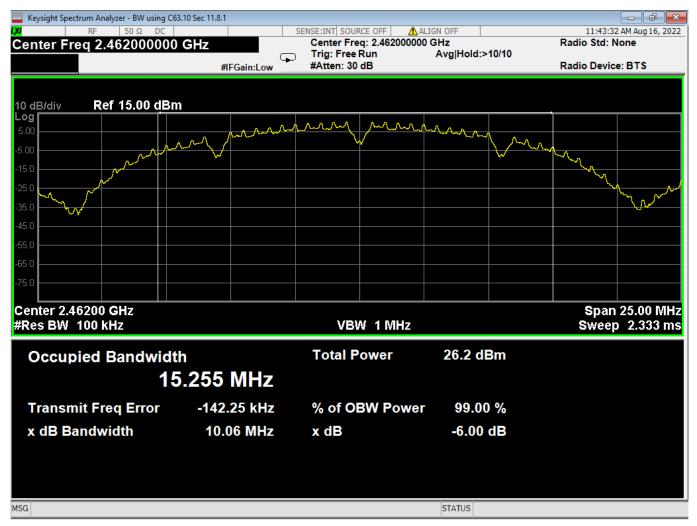
04 Bandwidth, Low, Wifi B, Low Data Rate



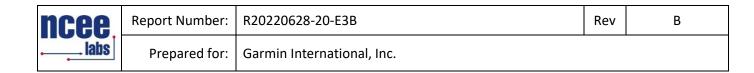


05 Bandwidth, Mid, Wifi B, Low Data Rate



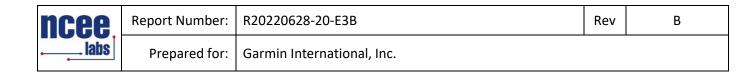


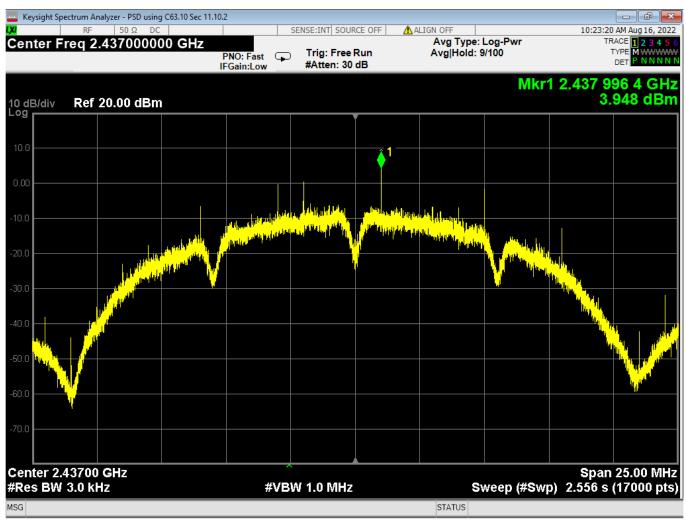
06 Bandwidth, High, Wifi B, Low Data Rate



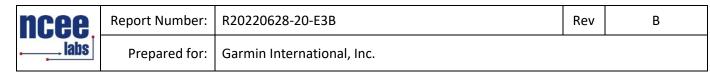


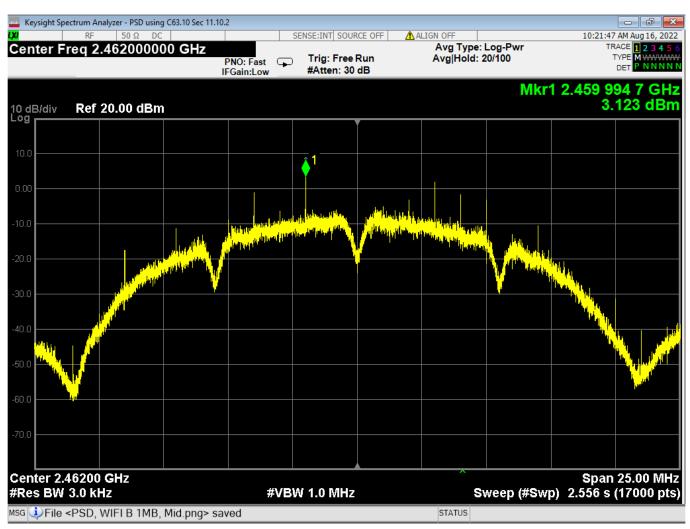
07 PSD, Low, Wifi B, Low Data Rate





08 PSD, Mid, Wifi B, Low Data Rate





09 PSD, High, Wifi B, Low Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectru	ım Analyzer - Unrestric	ted LBE Using C63.1	0 Sec 11.13.2						
	RF 50 Ω D			SENSE:INT SOU	JRCE OFF	ALIGN OFF	I		0 PM Aug 16, 202
larker 3 ∆	-15.503729	F	PNO: Fast Gain:Low	Trig: Free #Atten: 3			e: Log-Pwr d:>1000/1000	1	TYPE MAWWW DET PANNN
0 dB/div	Ref 126.99 dE	βμV						ΔMkr3 -1 -3	5.50 MH 4.043 di
og 117							¢1		
107 97.0				M	V	MAAAAAA	hum	my	han a
37.0 <b></b>		3∆1	- N	af C					<u>\</u>
مر 67.0	mm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~/						
57.0 <b>~~~~~</b>									
47.0 37.0									
tart 2.3900 Res BW 10			VBW	1.0 MHz			Swee	Stop 2. p 3.000 ms	42188 GH s (1001 pt
		× 2.412 51 GHz	۲ 115.649			FUNCTION WIDTH	l	FUNCTION VALUE	
2 N 1 3 A1 1		2.397 01 GHz -15.50 MHz	81.606	dBµV					
4		-13.30 MIHZ	<u>(A)</u> -34.04						
6									
8									
0									
									>

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

ncee,	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricted HBE Using C	53.10 Sec 11.13.2					
<b>LXI</b> RF 50 Ω AC	SENSE:1	NT			04:32:19	PM Aug 22, 2022
Marker 3 2.483500000000 GHz	PNO: Fast 🕞 Tri	g: Free Run		e: Log-Pwr :>1000/1000	Т	CE 123456 (PE MA WWW
	IFGain:Low #At	tten: 30 dB				PANNN
				Μ	kr3 2.483	50 GHz
10 dB/div Ref 126.99 dBµV					61.7	64 dBµV
Log 117						
107 a paralitad	my marine	Sul a a				
97.0 mahaman	\v/	man have	-vî "			
Sr. O Marked W			hall by 1			
87.0				, Marah M	hay and	
77.0						VL 3
67.0 <del>Λ<sup>/</sup></del>			¥ •			- Low Ly
57.0						
47.0						<u>2</u> 41
37.0						⇒
Start 2.45068 GHz		<b>A</b>			Stop 24	8350 GHz
#Res BW 100 kHz	#VBW 30	0 kHz		Sweep	1.000 ms	(1001 pts)
	Y	FUNCTION	FUNCTION WIDTH	FU	NCTION VALUE	~
1         f         2.462 99 GH           2         Δ1         1         f         (Δ)         2.483 50 GH						
3 N 1 f (Δ) 2.483 50 GH						
4 5						
6						
8						
9						
11						~
K MSG			STATUS			>
			STATUS			

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Re	stricted LBE using C63.10 Se	ec 6.10.5					
RF 50 Ω	AC	SENSE	INT	🛕 ALIGN OFF		03:21:14	PM Aug 15, 20
arker 2 2.3860700	00000 GHz			Avg Typ		TR/	CE 1 2 3 4
			ig: Free Run	Avg Hold	:>1000/1000		
ASS PREAMP		ain:High #A	tten: 0 dB			[	DET PANN
		-				Mkr2 2.386	07.01
Ref Offset 36							
dB/div Ref 88.98	dBµV					48.4	64 dBµ
Trace 1 Pass			The second se				
<sup>3.0</sup> Trace 2 Pass							
9.0					_		
					) I		
.0	werland water water	hat a strengthere a state for the strengthere and	Alex an an article fight and		warman love	MARKAR BRANCH	۲۰۰٬۰۰۰ میروند. ۲۰۰٬۰۰۰ میروند
				•~			
						·····	
.0							
9.0							
98							
D2							
art 2.380000 GHz						Stop 2.39	0000 G
tes BW 1.0 MHz		#VBW 50	) MHz*		Swe	ep 1.000 ms	(1001 p
R MODE TRC SCL	х	Y	FUNCTION	FUNCTION WIDTH		FUNCTION VALUE	
N 1 f	2.386 85 GHz	59,599 dBuV		Í.			
N 2 f	2.386 07 GHz	48.463 dBuV					
4 5 6 7 8							
3 4 5 6 7 7 8 8 9 9							

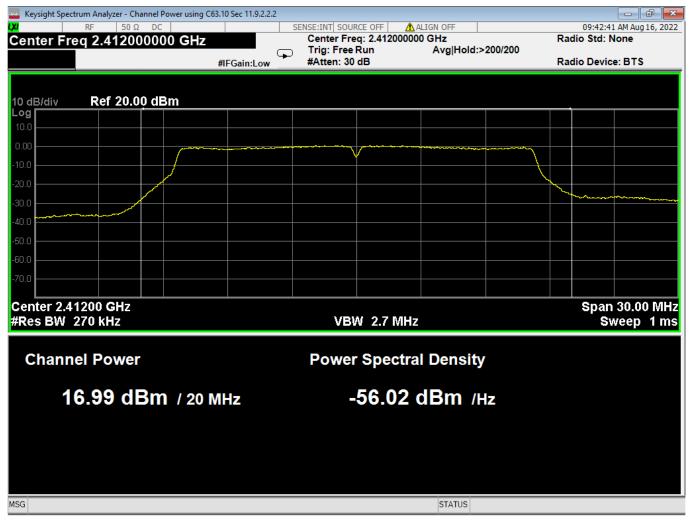
12 Lower Bandedge, Restricted, Wifi B, Low Data Rate

ncee,	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

🔤 Keysight Spectrum Analyzer - Restricted HBE C63.10 Sec	: 6.10.5				- 6 -
X/ RF 50 Ω AC	SENS	E:INT	ALIGN OFF		03:10:13 PM Aug 15, 2022
Marker 2 2.483500000000 GHz PASS PREAMP		Trig: Free Run Atten: 0 dB	Avg Type: R Avg Hold:>1		TRACE 12345 TYPE MA WWW DET PANNN
Ref Offset 37.2 dB 10 dB/div Ref 89.19 dBµV				Mkr2	2.483 500 0 GHz 51.487 dBµ\
Log 79.2 Trace 1 Pass Frace 2 Pass 69.2 59.2 2 49.2 39.2 29.2 19.2 9.1 9.2 9.1 9.2 1 1 1 1 1 1 1 1 1 1 1 1 1				4~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
Start 2.483500 GHz #Res BW 1.0 MHz	VBW 50	) MHz*		Sweep	Stop 2.500000 GH 1.000 ms (1001 pts
MKR         MODE         TRC         SCL         X           1         N         1         f         2.483         962         0 GH           2         N         2         f         2.483         500         0 GH           3         -			FUNCTION WIDTH	FUN	ICTION VALUE
SG			STATUS		

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		



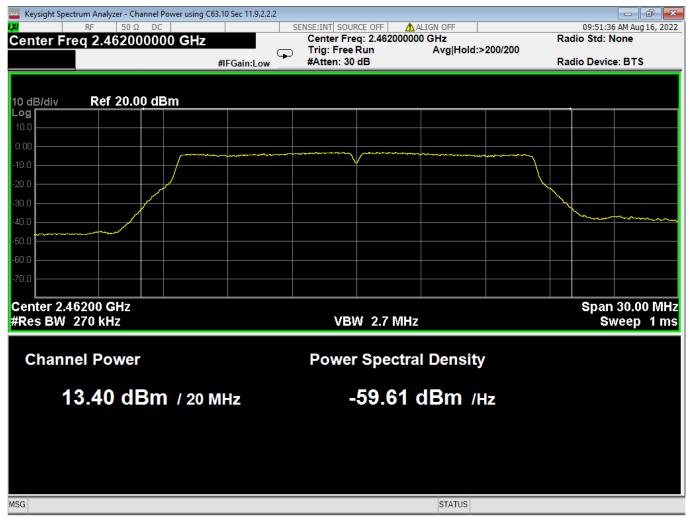
14 Average Power, Low, Wifi G, Low Data Rate

ncee,	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Channel Power using     RF 50 Ω DC	SENSE:IN		ALIGN OFF		09:44:03 AM Aug 16, 2022
Center Freq 2.437000000 GHz	2.437000000 GHz #IFGain:Low Center Freq: 2.437000000 GHz Trig: Free Run Avg Hold:>200/200 #Atten: 30 dB				
40 JE/Jin Pof 20 00 dBm					
10 dB/div Ref 20.00 dBm					
0.00			••••••••••••••••••••••••••••••••••••••		
-10.0					~
-30.0					
-40.0					
-60.0					
Center 2.43700 GHz					Span 30.00 MHz
#Res BW 270 kHz		VBW 2.7 MH:	Z		Sweep 1 ms
Channel Power	Po	ower Spectra	al Density		
19.11 dBm / 20	MHz	-53.90	z		
MSG			STATUS		

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		



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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using	C63.10 Sec 11.8.1			
RF 50 Ω DC Center Freq 2.41200000		SENSE:INT SOURCE OFF AL Center Freg: 2.412000000	IGN OFF GHz	11:48:41 AM Aug 16, 2022 Radio Std: None
	#IFGain:Low	Trian Eres Dun	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dE	3m			
5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		man	m
5.00				- how
25.0				
35.0				
45.0				
65.0				
-75.0				
Center 2.41200 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25.00 MHz Sweep 2.333 ms
Occupied Bandwid	lth	Total Power	26.5 dBm	
1	6.988 MHz			
Transmit Freq Error	Fransmit Freq Error 138.30 kHz		99.00 %	
x dB Bandwidth	16.45 MHz	x dB	-6.00 dB	
ISG			STATUS	

17 Bandwidth, Low, Wifi G, Low Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

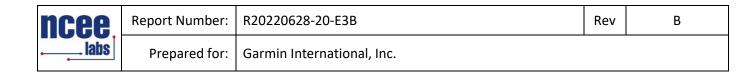
Keysight Spectrum Analyzer - BW using C6:           RF         50 Ω         DC		SENSE:INT SOURCE OFF		11:49:45 AM Aug 16, 2022 Radio Std: None
Center Freq 2.437000000	#IFGain:Low	Tria: Erec Dun	Avg Hold:>10/10	Radio Device: BTS
10 dB/div <b>Ref 15.00 dBm</b>				
5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man partations	ware and ware and the second	Junear
15.0 www.				Mar Markan
35.0				
45.0				
65.0				
Center 2.43700 GHz Res BW 100 kHz		VBW 1 MHz		Span 25.00 MHz Sweep 2.333 ms
Occupied Bandwidt		Total Power	26.7 dBm	0wccp 2.335 ms
	.130 MHz			
Transmit Freq Error	197.65 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	16.51 MHz	x dB	-6.00 dB	
SG			STATUS	

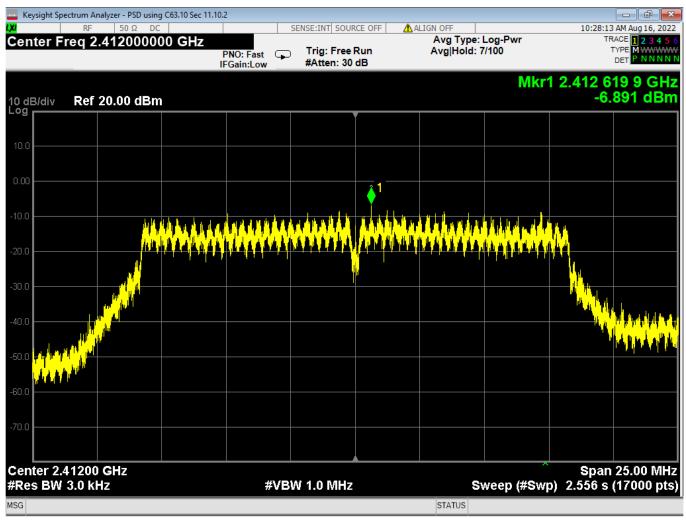
18 Bandwidth, Mid, Wifi G, Low Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

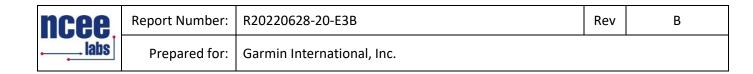
Keysight Spectrum Analyzer - BW using C63.1 KF 50 Ω DC			IGN OFF	ت الت الت الت الت الت الت الت الت الت ال
Center Freq 2.462000000 C	#IFGain:Low	Center Freq: 2.462000000 Trig: Free Run #Atten: 30 dB	GHz Avg Hold:>10/10	Radio Std: None Radio Device: BTS
10 dB/div Ref 15.00 dBm				
5.00	ᠵᡒᠧᢧᡄᡎᡀᢦᠣᢖᢝᢪ᠊ᠣᡀᠬᠣᠵᡔᠰᡗᢦ᠆᠊ᠥ	annon hann	and a contraction of the contrac	mmy
-5.00				Maria
-25.0				
-45.0				
-65.0				
Center 2.46200 GHz				Span 25.00 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandwidth 17.	189 MHz	Total Power	26.6 dBm	
Transmit Freq Error	Transmit Freq Error 182.84 kHz		99.00 %	
x dB Bandwidth	16.55 MHz	x dB	-6.00 dB	
MSG			STATUS	

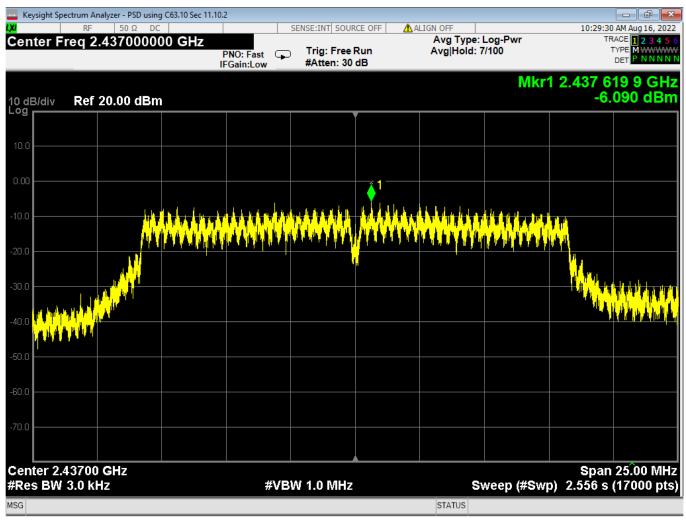
19 Bandwidth, High, Wifi G, Low Data Rate



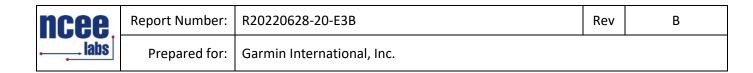


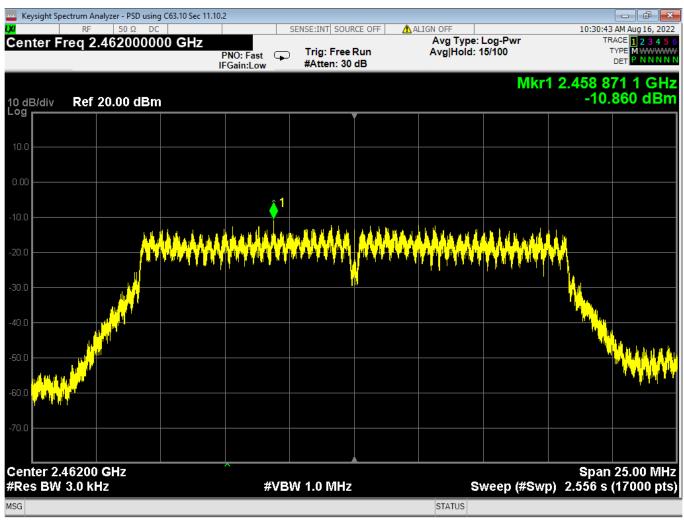
20 PSD, Low, Wifi G, Low Data Rate





21 PSD, Mid, Wifi G, Low Data Rate





22 PSD, High, Wifi G, Low Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spe	ectrum Analyzer - Un	restricted LBE Using	C63.10 Sec 11.13.2						
		DC		SENSE:IN	IT SOURCE OFF	ALIGN AUTO		11:33:4	2 AM Sep 16, 20
arker 1	2.4057714	71626 GHz	PNO: Fast ( IFGain:Low		: Free Run en: 30 dB	Avg Typ Avg Hol	be: Log-Pwr d:>1000/1000	Т	TYPE MAWW DET PANN
) dB/div	Ref 126.99	dBμV						/lkr1 2.40 109.4	)5 77 G⊦ 467 dBµ
<b>og</b> 117									
07				man	᠕ᢣ᠋ᡜᢧᠬᠧᡣᡔ᠆᠆᠆ᢦᠵᠰᡵᢪᠰᠴᡃᠶᢪᢇ	man warman	ᠬᡥᢦᠧ᠋ᡌ᠆ᠺ᠕ᡔ᠆᠆ᡔᢧ᠆ᡔ᠊ᡀᠭ	ann	
7.0 7.0								- Vorante	
7.0			<mark>∕341</mark> √						Anger Manna
.0 .0	Wayley	ᡗᢦᠬᢧᡟ᠋ᠴᡗᡳᡳ᠋ᡔᠧ᠋ᠯᠧᡧ᠆ <b>᠉ᢇ</b> ᡳᠬ							
′.o									
7.0									
	0000 GHz 100 kHz		VI	3W 1.0 I	ИНz		Swee	Stop 2 p 3.400 m	.42642 G s (1001 p
	RC SCL	× 2.405 77 (	Y GHz 109.46	67 dBµV	FUNCTION	FUNCTION WIDTH	F	UNCTION VALUE	
Ν 1 Δ1 1	f f (Δ)	2.400 00 (	GHz 66.63	81 dBµV 8.836 dB					
									>

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricted HBE Using Co	53.10 Sec 11.13.2					
RF 50 Ω DC	SENSE:	INT SOURCE OFF	ALIGN AUTO			AM Sep 16, 20
arker 1 2.461677747030 GHz		g: Free Run tten: 30 dB	Avg Type Avg Hold:	: Log-Pwr >1000/1000		ACE 1 2 3 4 YPE MAWW DET PANN
dB/div Ref 126.99 dBµV				N	1kr1 2.46 <sup>,</sup> 104.8	1 68 G⊦ 21 dBµ
<b>Pg</b>	1					
07 7.0	mont	m Marine	~~			
7.0						
7.0 mm <sup>2</sup>				ᠵᠴᡗᡗ᠋᠕ᡗᡏᢘᡀ᠇ᢛᢘᠧᢇ	WWWWWWWWW	21
7.0						
7.0						
art 2.45068 GHz Res BW 100 kHz	#VBW 30	0 kHz		Sweet	Stop 2.4 3.200 ms	48350 G (1001 p
IR         MODE         TRC         SCL         X           N         1         f         2.461         68         GH	Y 2 104.821 dBµV	FUNCTION	FUNCTION WIDTH	FI	UNCTION VALUE	
2 Δ1 1 f (Δ) 21.82 MH 3 N 1 f 2.483 50 GH	Iz (Δ) -44.473 dB					

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

	ectrum Analyzer - Restric	ted LBE using C63.10	Sec 6.10.5						
XI	RF 50 Ω	AC		SENSE:INT	<u> </u>	LIGN OFF		03:27:52	PM Aug 15, 2022
Markor 2	2.389730000			o chi o chi n		Avg Type:	RMS		ACE 1 2 3 4 5
Marker Z	2.309130000			Trig: Free	Run	Avg Hold:>		1	
PASS	DDCAMD		PNO: Fast 🖵	#Atten: 0		Avginoid.	1000/1000		DET PANNN
	PREAMP	11	Gain:High	#Atten. 0	uD				
							M	kr2 2.38	73 GHz
	Ref Offset 36.99	9 dB							
10 dB/div	Ref 88.98 dE	βμV						55.0	73 dBµ\
	e 1 Pass								
	e 2 Pass								4
	e z Pass							^	) <b></b>
69.0					• •			asheld and we	abund there ?
59 0 Armyra	- I the second shares we	when all any of the marine	han shawyh	panentalitational	Mart mart and		acally algodian and the	مريا ورهايه الماسي ماي المريم الم	#www.dumewry 2
59.0									
49.0									
39.0									
29.0									
19.0									
10.0									
8.98									
1.00									
-1.02									
	ļ		ļ		<u> </u>				
Start 2.38	30000 GHz							Stop 2.3	90000 GHz
	1.0 MHz		#\/B	W 50 MHz	*		Sweep		(1001 nte
TRUS DW	1.0 141112		<i></i>				owcep	1.000 1115	(1001 pts
MKR MODE T	RC SCL	Х	Y	FUN	CTION FUNC	TION WIDTH	FU	NCTION VALUE	/
1 N 1	f f	2.388 97 GHz	67.383	dBuV					
2 N 2	2 F	2.389 73 GHz	53.671						
3		2.000 10 0112	00.011						
4									
5									
6									
7									
8									
9									
10									
-									· · · · · · · · · · · · · · · · · · ·
10									\
10						STATUS			

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

www. Keysight Spectrum Analyzer - Restricted HBE C63.10 Sec	: 6.10.5				- F	×
<b>LX</b> RF 50 Ω AC	SE	NSE:INT	ALIGN OFF		03:13:11 PM Aug 15,	2022
Marker 2 2.483566000000 GHz			Avg Type:		TRACE 1 2 3	
PASS PREAMP	PNO: Fast 🖵 IFGain:High	Trig: Free Run #Atten: 0 dB	Avg Hold:>	>1000/1000	DET PAN	
Ref Offset 37.2 dB				Mkr2	2.483 566 0 G	
10 dB/div Ref 89.19 dBµV					52.283 dB	μV
Trace 1 Pass		Ť				
<sup>79.2</sup> Trace 2 Pass						
69.2 59.2 2 59.2 2	and the second that a second second	webilledgeargerangeranger	1. 19 mar	aller and the stand of the stand		
49.2						
39.2						
29.2						
19.2						
9.19						
-0.81						
Start 2.483500 GHz					Stop 2 50000 C	<u></u>
#Res BW 1.0 MHz	VBW	50 MHz*		Sweep	Stop 2.500000 0 1.000 ms (1001 p	pts)
MKR MODE TRC SCL X	Y	FUNCTION	FUNCTION WIDTH	FUN	ICTION VALUE	^
1 N 1 f 2.483 500 0 GH 2 N 2 f 2.483 566 0 GH	z 68.559 dE z 52.284 dE					
3						
5						
6						
8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9						
10						Ţ
<						> `
MSG			STATUS			

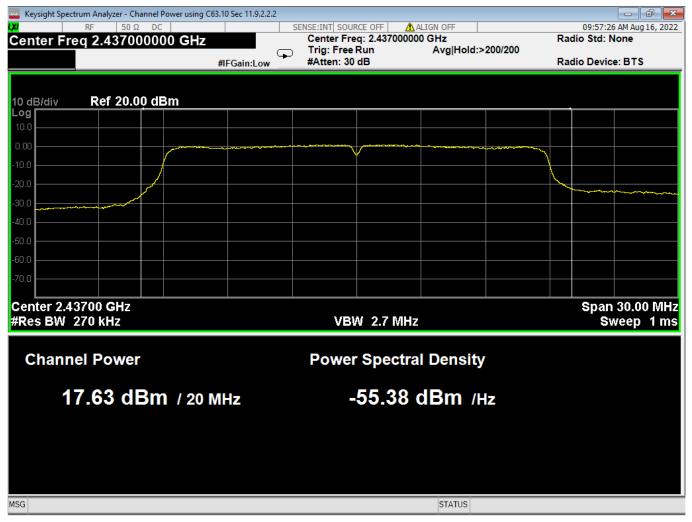
26 Higher Bandedge, Restricted, Wifi G, Low Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Channel Power using 0           RF         50 Ω         DC         Center Freq 2.412000000 GHz	09:56:40 AM Aug 16, 2022 Radio Std: None 00/200	
10 dB/div Ref 20.00 dBm	#IFGain:Low #Atten: 30 dB	Radio Device: BTS
-10.0		
-30.0		
-60.0		
Center 2.41200 GHz #Res BW 270 kHz	VBW 2.7 MHz	Span 30.00 MHz Sweep 1 ms
Channel Power	Power Spectral Density	
15.66 dBm / 20	мнz -57.35 dBm /нz	2
MSG	STATUS	

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		



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

	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

63.10 Sec 11.9.2.2.2 SENSE:INT SOURCE OFF ALIGN OFF Center Freq: 2.462000000 GHz	09:58:16 AM Aug 16, 2022 Radio Std: None	
Inter Freq 2.462000000 GHz         Center Freq: 2.462000000 GHz           #IFGain:Low         Trig: Free Run         Avg Hold:>200/200           #Atten: 30 dB         #Atten: 30 dB		
	Span 30.00 MHz	
VBW 2.7 MHz	Sweep 1 ms	
Power Spectral Density		
-59 51 dBm /uz		
STATUS		
	Center Freq: 2.46200000 GHz Trig: Free Run Avg Hold:>200/200 #Atten: 30 dB VBW 2.7 MHz Power Spectral Density MHz -59.51 dBm /Hz	

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

🔤 Keysight Spectrum Analyzer - BW using C6	3.10 Sec 11.8.1			
		SENSE:INT SOURCE OFF A		11:55:39 AM Aug 16, 2022 Radio Std: None
Center Freq 2.412000000	GHZ	Trian Eres Dum	Avg Hold:>10/10	Radio Sta. None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
10 dB/div Ref 15.00 dBn	n			
Log				
5.00	www.www.www.	mmmy shring	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man
-5.00				
-15.0				
-25.0				www.www
-35.0				
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.41200 GHz				Span 25.00 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
,				
Occupied Bandwidt	h	Total Power	24.7 dBm	
17	7.590 MHz			
Transmit Freq Error	145 Hz	% of OBW Power	99.00 %	
x dB Bandwidth	17.64 MHz	x dB	-6.00 dB	
MSG			STATUS	

30 Bandwidth, Low, Wifi N, Low Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

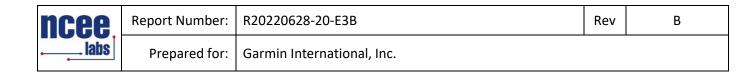
Keysight Spectrum Analyzer - BW using C63	.10 Sec 11.8.1			
RF 50 Ω DC Center Freq 2.437000000	CH7	SENSE:INT SOURCE OFF A Center Freg: 2.43700000	LIGN OFF 0 GHz	11:56:37 AM Aug 16, 2022 Radio Std: None
	#IFGain:Low	Trian Eres Dum	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBm				
L <b>og</b>				
5.00	www.www.and		+	man and a second
15.0				he has a second s
25.0 July mary and a second se				- marting from
35.0				
45.0				
55.0				
65.0				
75.0				
Center 2.43700 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25.00 MHz Sweep   2.333 ms
Occupied Bandwidt	n	Total Power	25.2 dBm	
17	.622 MHz			
Transmit Freq Error	8.178 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	17.61 MHz	x dB	-6.00 dB	
sg			STATUS	

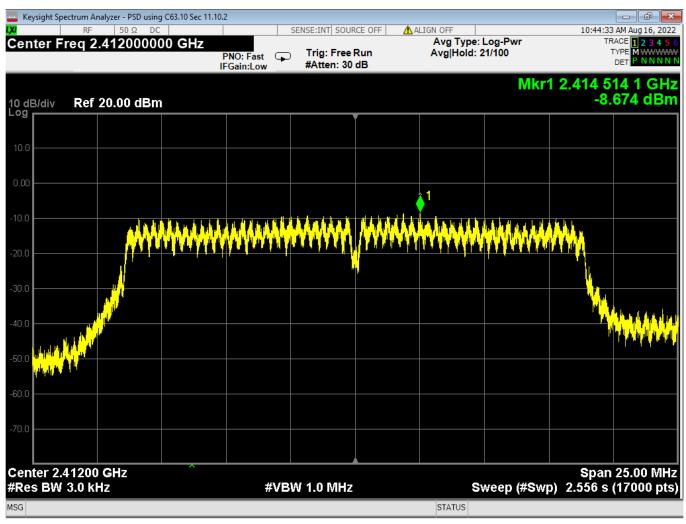
31 Bandwidth, Mid, Wifi N, Low Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

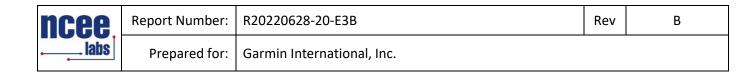
Keysight Spectrum Analyzer - BW using C	63.10 Sec 11.8.1			
X RF 50Ω DC		SENSE:INT SOURCE OFF A Center Freg: 2.46200000	LIGN OFF	11:57:22 AM Aug 16, 2022 Radio Std: None
Center Freq 2.4620000		_ Trig: Free Run	Avg Hold:>10/10	Radio Sta. None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
10 dB/div Ref 15.00 dB	m			
5.00				
www	MACAALIAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	man man	and the second and the second	many
-5.00				
-15.0				ᢆᠣ᠋᠕ᢆ᠕᠕ᠺᡘᢋᠮ
-25.0				
-35.0				
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.46200 GHz				Span 25.00 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandwid	th	Total Power	25.0 dBm	
	7.632 MHz			
Transmit Freq Error	9.952 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	17.64 MHz	x dB	-6.00 dB	
	17.04 WINZ	X UD	-0.00 UB	
,			, , ,	
ISG			STATUS	

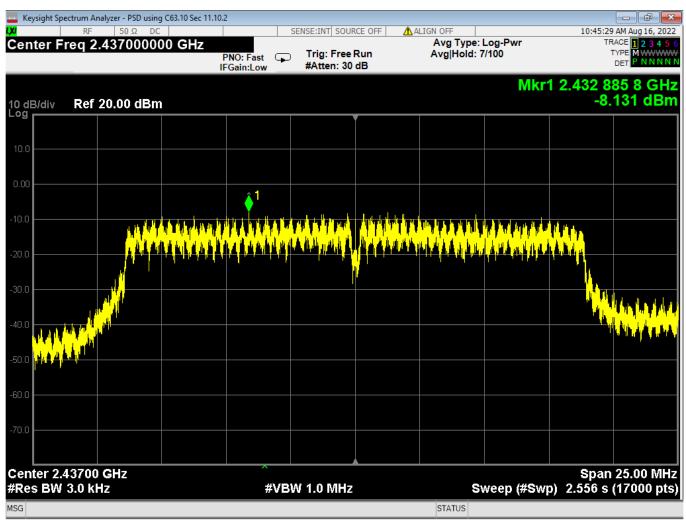
32 Bandwidth, High, Wifi N, Low Data Rate



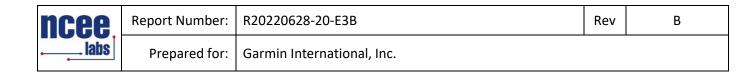


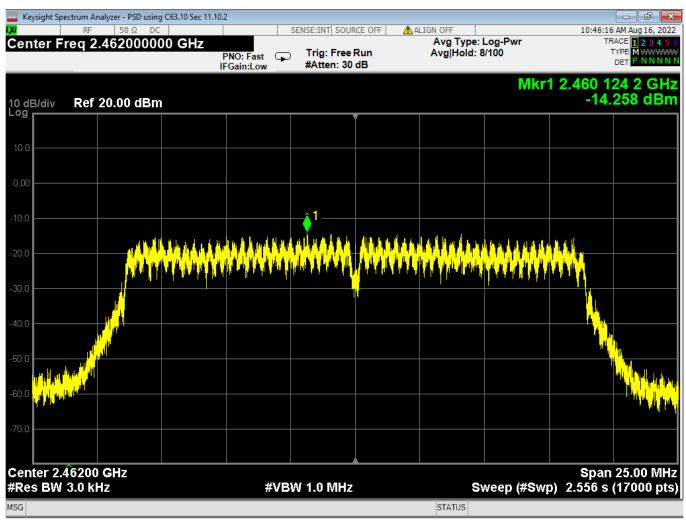
33 PSD, Low, Wifi N, Low Data Rate





34 PSD, Mid, Wifi N, Low Data Rate





35 PSD, High, Wifi N, Low Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyz	er - Unrestricted LBE Using O	63.10 Sec 11.13.2				
RF	50 Ω DC	SENSE:	INT SOURCE OFF	ALIGN AUTO		11:35:01 AM Sep 16, 20
arker 1 2.4126	19131362 GHz		ig: Free Run tten: 30 dB	Avg Type: Avg Hold::	: Log-Pwr >1000/1000	TRACE 1234 TYPE MAWW DET PANN
) dB/div Ref 12	:6.99 dBµV				Mkr	2.412 62 GH 108.285 dBµ
<b>ng</b>				1		
07			ለምር የሆነ እምር እምር እምር እምር የ	promotion rolling	aftrestand and a second	
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. O when the state of the state	when a good a second and a second					
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···						
.0						
art 2.39000 GH Res BW 100 kHz		VBW 1.0	MHz		Sweep 3.	Stop 2.42642 G 400 ms (1001 p
R MODE TRC SCL	Х	Y	FUNCTION	FUNCTION WIDTH	FUNCTIO	ON VALUE
N 1 f	2.412 62 GF 2.399 45 GF					
$\Delta 1  1  f  (\Delta)$	-13.17 M					
3						
1				STATUS		
				STATUS		

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricte	ed HBE Using C63.10 Sec 11.13.2			- 6 <b>-</b>
<b>Χ</b> RF 50 Ω AC	SENSE:	INT		04:36:14 PM Aug 22, 202
Marker 1 2.46262597374	PNO: Fast 😱 Tri	ig: Free Run tten: 30 dB	Avg Type: Log-Pwr Avg Hold:>1000/1000	TRACE 12345 TYPE MA WWW DET PANNN
				Mkr1 2.462 63 GH 104.853 dBµ\
10 dB/div Ref 126.99 dB	1V	•		104.000 0.001
117				
107				
when have a second and	www.menandemanly whome because	ᠣᡊᡁᠣᡊᡡᡙᡳᡘ᠘᠇ᠺ <sub>᠇ᡗ</sub> ᡊᡕ᠕᠇ᠬ᠕᠉ᡐᠬ	<b>`</b> ^	
97.0				
87.0			- h	
77.0				
67.0			1 4.4.1.1.1.4.1. And 1.4.1.	Mr. Marker Marker Marker Marker
57.0				
47.0				<u>2Δ</u> 1
37.0				
Start 2.45068 GHz		<b>*</b>		Stop 2.48350 GH
#Res BW 100 kHz	#VBW 30	)0 kHz	Swee	ep 1.000 ms (1001 pts
			TION WIDTH	FUNCTION VALUE
	2.462 63 GHz 104.853 dBμV 2.483 86 GHz (Δ) dB			
	2.483 50 GHz (Δ) 65.580 dBµV			
4 5				
6				
7 8				
9				
10				
11 <u> </u>				>
SG			STATUS	

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Re	stricted LBE using C63.10	Sec 6.10.5				
RF 50 0	AC	S	ENSE:INT	ALIGN OFF		03:24:32 PM Aug 15, 2
arker 2 2.3899300					e: RMS	TRACE 1 2 3 4
			Trig: Free Run		:>1000/1000	
SS PREAMP		PNO: Fast 💭 FGain:High	#Atten: 0 dB	, trainera		DET PANN
PREAMP		-Gain:rign	#Atten. v ub			
					M	kr2 2.389 93 GI
Ref Offset 3						
dB/div Ref 88.98	dBµV					53.671 dBj
			Y			
Trace 1 Pass						
Trace 2 Pass			A <b>1</b>			
.0			<u> </u>			
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	hand of the second states and					
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38						
]2						
art 2.380000 GHz						Stan 2 200000 C
						Stop 2.390000 G
es BW 1.0 MHz		#VBV	V 50 MHz*		Sweep	1.000 ms (1001 p
R MODE TRC SCL	Х	Y	FUNCTION	FUNCTION WIDTH	FU	NCTION VALUE
N 1 f	2.384 60 GHz	67.177 d	BμV			
N 2 f	2.389 93 GHz		BuV			
						2
				STATUS		1

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

ncee,	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

🔤 Keysight Spectrum Analyzer - Restricted HBE C63.10 Sec	6.10.5					×
RF 50 Ω AC	SENS	E:INT	ALIGN OFF			PM Aug 15, 2022
Marker 2 2.483500000000 GHz           PASS         PREAMP		Trig: Free Run #Atten: 0 dB	Avg Type: Avg Hold:>		т	ACE 1 2 3 4 5 6 YPE MA WWW DET PANNNN
Ref Offset 37.2 dB 10 dB/div Ref 89.19 dBµV				Mkr2	2.483 50 53.2	00 0 GHz 17 dBµV
Log 79.2 Trace 1 Pass 69.2 2 2 4 59.2 2 2 4 59.2			איז <u>ו איז</u> רקאינאינטענגענייניטענייטענייטענייטענייטענייטענ		ſ∿_ungeret∭ugtersjtjejd	
49.2 39.2 29.2						
19.2       9.19       -0.81						
Start 2.483500 GHz #Res BW 1.0 MHz	VBW 5	0 MHz*		Sweep	Stop 2.50 1.000 ms	00000 GHz (1001 pts)
MKR         MODE         TRC         SCL         X           1         N         1         f         2.484         952         0         GH           2         N         2         f         2.483         500         0         GH           3         - <td></td> <td></td> <td>FUNCTION WIDTH</td> <td>FUI</td> <td>NCTION VALUE</td> <td>^</td>			FUNCTION WIDTH	FUI	NCTION VALUE	^
4 5 6 7 8 9 10 11						
< MSG			STATUS			>

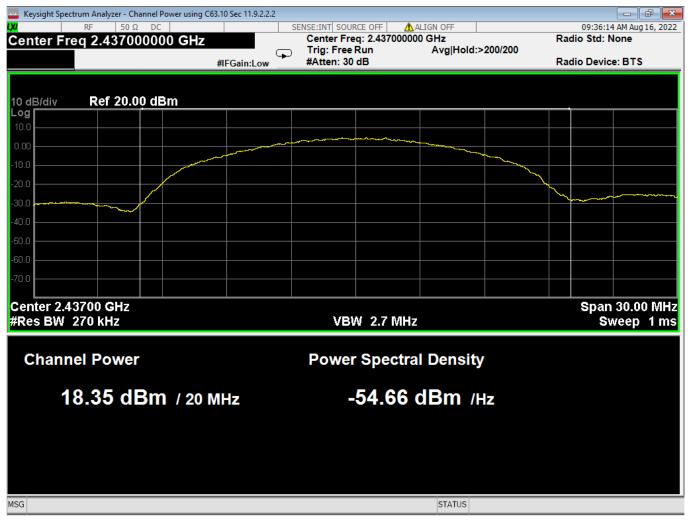
39 Higher Bandedge, Restricted, Wifi N, Low Data Rate

ncee,	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

🔤 Keysight Spectrum Analyzer - Channel Power using (		
Center Freq 2.412000000 GHz	SENSE:INT SOURCE OFF ALIGN OFF Center Freq: 2.412000000 GHz	09:34:51 AM Aug 16, 2022 Radio Std: None
Center Freq 2.412000000 GHZ	Trig: Free Run Avg Hold:>20	00/200
	#IFGain:Low #Atten: 30 dB	Radio Device: BTS
10 dB/div Ref 20.00 dBm		
10.0		
0.00		
-10.0		
-20.0		
-30.0		
-40.0		
-50.0		
-60.0		
-70.0		
		0
Center 2.41200 GHz #Res BW 270 kHz	VBW 2.7 MHz	Span 30.00 MHz Sweep 1 ms
		Gweep This
Channel Power	Power Spectral Density	
17.37 dBm / 20	мнz -55.64 dBm /нz	
MSG	STATUS	

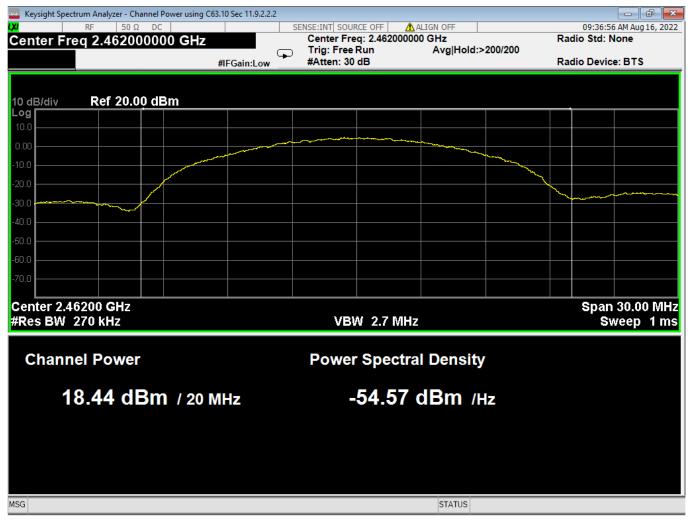
40 Average Power, Low, Wifi B, High Data Rate

ncee,	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

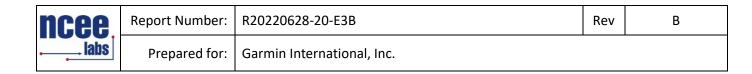


41 Average Power, Mid, Wifi B, High Data Rate

ncee,	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

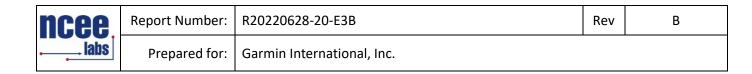


42 Average Power, High, Wifi B, High Data Rate



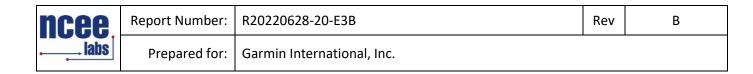
Keysight Spectrum Analyzer - BW using C63     RF 50 Ω DC     Center Freq 2.412000000		Center Freq: 2.41200000		11:44:21 AM Aug 16, 2022 Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBm				
5.00	an	m		
-5.00	man t		- w wy	1 manan
-15.0				have a - head
-35.0				Maray af and
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.41200 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25.00 MHz Sweep   2.333 ms
Occupied Bandwidt	h	Total Power	26.5 dBm	
	.724 MHz			
Transmit Freq Error	-4.550 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	9.043 MHz	x dB	-6.00 dB	
MSG			STATUS	

43 Bandwidth, Low, Wifi B, High Data Rate



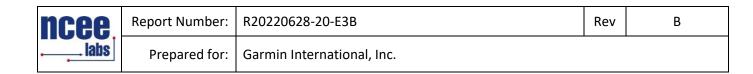
Keysight Spectrum Analyzer - BW using C	63.10 Sec 11.8.1			
KF 50 Ω DC     Center Freq 2.437000000	) GHz	SENSE:INT SOURCE OFF A Center Freq: 2.43700000	ALIGN OFF 0 GHz	11:45:08 AM Aug 16, 2022 Radio Std: None
	#IFGain:Low	⊃ Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dB	<u>n</u>			
Log 5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m. m		
-5.00				N why
-15.0				han han have had
-35.0				
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.43700 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25.00 MHz Sweep 2.333 ms
Occupied Bandwid	th	Total Power	27.5 dBm	
	4.748 MHz			
Transmit Freq Error	-13.874 kHz	% of OBW Power	r 99.00 %	
x dB Bandwidth	9.039 MHz	x dB	-6.00 dB	
MSG			STATUS	

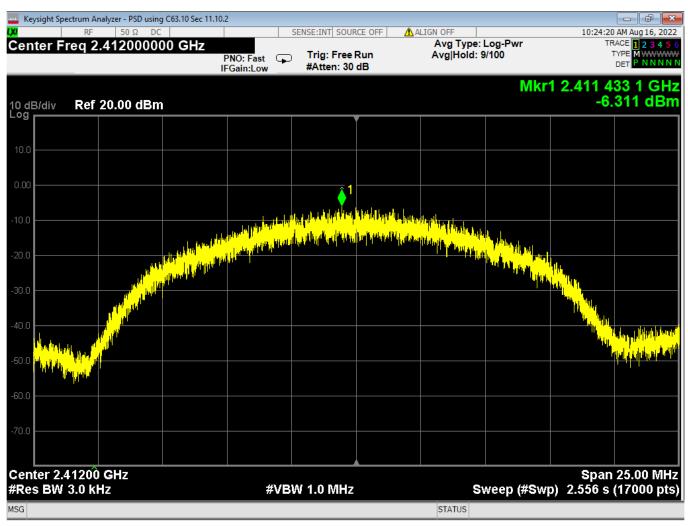
44 Bandwidth, Mid, Wifi B, High Data Rate



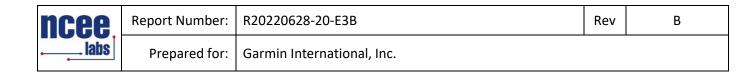
Keysight Spectrum Analyzer - BW using C	63.10 Sec 11.8.1			
₩ RF 50 Ω DC Center Freq 2.46200000	) GHz	Center Freq: 2.4620000		11:46:37 AM Aug 16, 2022 Radio Std: None
	#IFGain:Low	⊃ Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dB	m			
5.00	Mary Mary	mannon	- March - A	
	www.		- more particular	4
-15.0				
				Mar
-25.0				
-45.0				
-55.0				
-65.0				
-75.0				
-75.0				
Center 2.46200 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25.00 MHz Sweep   2.333 ms
Occupied Bandwid	th	Total Power	27.3 dBm	
	4.794 MHz			
Transmit Freq Error	-34.048 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	8.849 MHz	x dB	-6.00 dB	
MSG			STATUS	

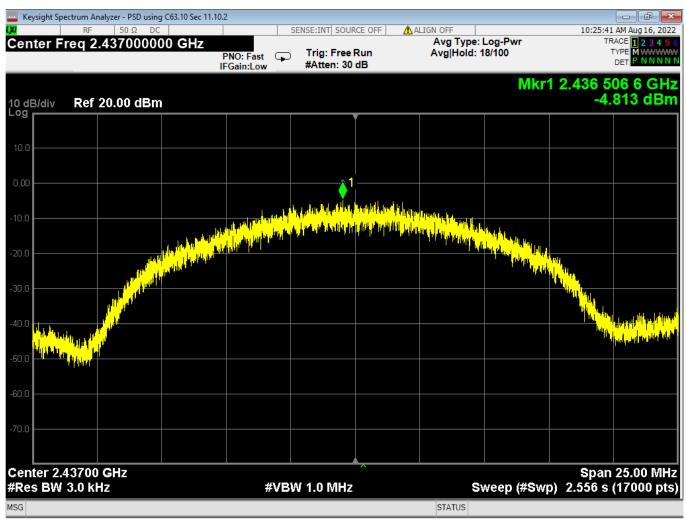
45 Bandwidth, High, Wifi B, High Data Rate



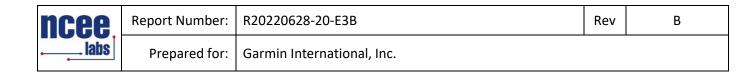


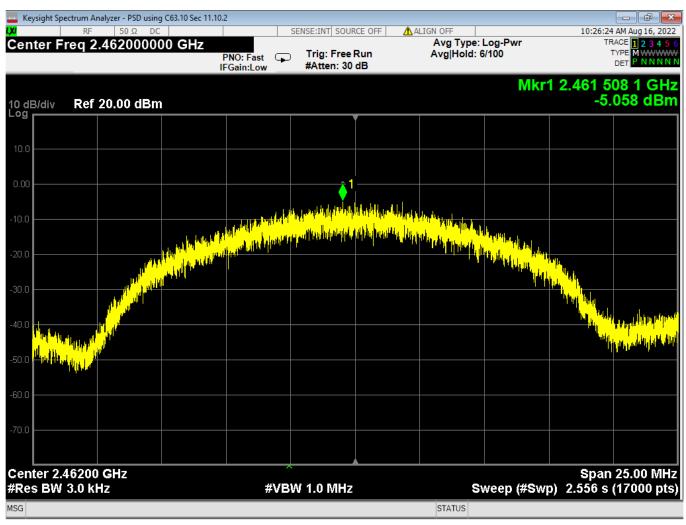
46 PSD, Low, Wifi B, High Data Rate





47 PSD, Mid, Wifi B, High Data Rate





48 PSD, High, Wifi B, High Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Sp	ectrum Analy	zer - Unrestrict	ed LBE Using C63.	10 Sec 11.13.2							
	RF	50 Ω DC			SENSE:I	NT SOURCE OFF	🗥 ALIGN	OFF		03:40:4	7 PM Aug 16, 2
arker 3	Δ-16.2	2369618	26 MHz					vg Type:		т	RACE 1 2 3 4
				PNO: Fast		g: Free Run	A	vg Hold:>	1000/1000		TYPE MA WW
			I	FGain:Low	#A1	tten: 30 dB					DET PANN
										ΔMkr3 -1	6 24 MI
) dB/div	Ref 12	26.99 dB	μV								35.000 c
<sup>og</sup>						Ĭ					
117							n and	$\sqrt{1}$	man		
107						~~~	Mar and a start and			www.	
7.0					_m	roman and a second					and made
			<mark>∡</mark> 3∆1		Nor and						- North
7.0					<u></u>						
7.0		منهم مردار ا	Anterton	harmond							
7.0	and had	What									
L MARA	- Mar										
7.0											
7.0											
7.0											
tart 2.39	9000 GH	7								Stop 2	.42188 G
	100 kH			VE	3W 1.0	MHz			Swee	p 3.000 m	s (1001 p
KR MODE TI			κ	Y		FUNCTION	FUNCTION			UNCTION VALUE	<u> </u>
			、 2.412 76 GHz		94 dBµV	FUNCTION	FUNCTION		г	FONCTION VALUE	
2 N 1			2.396 54 GHz	81.59	94 dBµV						
3 Δ1 <sup>4</sup>	i f (Δ)		-16.24 MHz	(Δ) -35	.000 dB						
1											
5											
6											
8											
9											
8 9 0											
9											
								STATUS			2

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

ncee,	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricted HBE Using C63				
	PNO: Fast Trig: Free Gain:Low #Atten: 3	Avg eRun Avg	Type: Log-Pwr Hold:>1000/1000	03:45:40 PM Aug 16, 2022 TRACE 123456 TYPE MAWWWW DET PANNN
10 dB/div Ref 126.99 dBµV			Mk	r3 2.483 500 GHz 67.130 dBµV
Log 1 117 107	m monor man			
97.0 87.0		March	Lanna Ardan	2 <u>01</u>
67.0				3
47.0				
37.0 Start 2.45577 GHz				Stop 2.48350 GHz
#Res BW 100 kHz	#VBW 300 kH	Z	Sweep	2.667 ms (1001 pts)
MKR         MODE         TRC         SCL         X           1         N         1         f         2.462 757 GHz           2         Δ1         1         f         (Δ)         2.483 500 GHz           3         N         1         f         2.483 500 GHz           4         5         5         5         5	117.370 dBµV	NCTION FUNCTION WID	TH FU	NCTION VALUE
6 6 7 7 8 9 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10				
MSG		STA	TUS	×

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spe	ectrum Analyzer - Restricted LBE using C6	3.10 Sec 6.10.5					đ 📄
	RF 50 Ω AC	SENS	E:INT	ALIGN OFF		03:21:53 PM Aug	15,207
larker 2 <mark>ASS</mark>	2.389860000000 GHz PREAMP		Trig: Free Run Atten: 0 dB	Avg Type: I Avg Hold:>′		TRACE 1 TYPE M DET P	
	Ref Offset 36.99 dB				M	kr2 2.389 86	
0 dB/div og <b>r</b>	Ref 88.98 dBµV					48.662 c	звh
70 Trac	e 1 Pass		Ĭ				
59.0	e 2 Pass						4
							$\Diamond$
	๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	Manageneral Chargers Print	aldel of a low for the second	all the state of the second state of the secon	we have the shade a shade	an and a share and a share and	e dipose
9.0				<u> </u>	·····		
9.0							
9.0							
9.0							
.98							
.02							
	:0000 GHz 1.0 MHz	#VBW :	50 MHz*		Sweep	Stop 2.39000 1.000 ms (100	0 GI 01 pi
R MODE TR	RC SCL X	Y	FUNCTION	FUNCTION WIDTH		ICTION VALUE	
1 N 1	f 2.389 59 G						
2 N 2	f 2.389 86 G	Hz 48.663 dBµ	V				
5							
7							
8							
0							
1							>
i				STATUS			

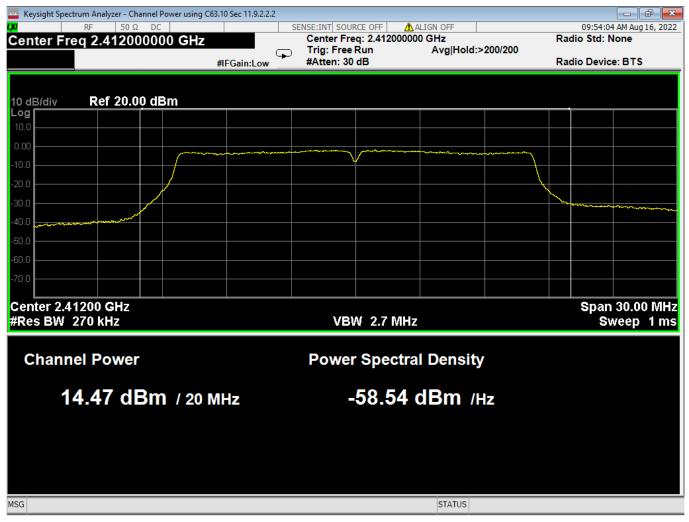
51 Lower Bandedge, Restricted, Wifi B, High Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

🔤 Keysight Spectrum Analyzer - Restricted HBE C63.10 Sec	6.10.5			
<b>LX</b> RF 50 Ω AC	SENSE:INT	ALIGN OFF		03:11:16 PM Aug 15, 2022
Marker 2 2.483681500000 GHz           PASS         PREAMP	PNO: Fast 🖵 Trig: F IFGain:High #Atter		e: RMS :>1000/1000	TRACE 123456 TYPE MAWWW DET PANNN
Ref Offset 37.2 dB 10 dB/div Ref 89.19 dBµV			Mkr2 2	2.483 681 5 GHz 50.625 dBµV
79.2 Trace 1 Pass 79.2 Trace 2 Pass				
Start 2.483500 GHz #Res BW 1.0 MHz	VBW 50 MH	Z*	Sweep	Stop 2.500000 GHz 1.000 ms (1001 pts)
MKR         MODE         TRC         SCL         X           1         N         1         f         2.485         150         0         GH           2         N         2         f         2.485         150         0         GH           3         - <td>Y z 61.365 dBμV z 50.625 dBμV</td> <td>FUNCTION FUNCTION WIDTH</td> <td>FUNC</td> <td>TION VALUE</td>	Y z 61.365 dBμV z 50.625 dBμV	FUNCTION FUNCTION WIDTH	FUNC	TION VALUE
MSG		STATUS		

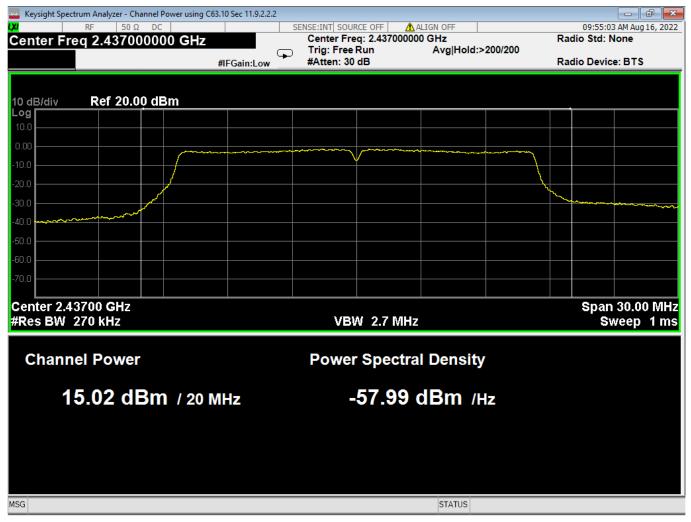
52 Higher Bandedge, Restricted, Wifi B, High Data Rate

ncee.	Report Number:	R20220628-20-E3B		В
labs	Prepared for:	Garmin International, Inc.		



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

ncee.	Report Number:	R20220628-20-E3B		В
labs	Prepared for:	Garmin International, Inc.		



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

ncee.	Report Number:	R20220628-20-E3B		В
labs	Prepared for:	Garmin International, Inc.		

🔤 Keysight Spectrum Analyzer - Channel Power using (		
	SENSE:INT SOURCE OFF ALIGN OFF Center Freq: 2.462000000 GHz	09:55:33 AM Aug 16, 2022 Radio Std: None
Center Freq 2.462000000 GHz	Trig: Free Run Avg Hold:>200	
	#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		
-50.0		
-60.0		
-70.0		
-70.0		
Center 2.46200 GHz		Span 30.00 MHz
#Res BW 270 kHz	VBW 2.7 MHz	Sweep 1 ms
Channel Power	Power Spectral Density	
	,	
12.45 dBm / 20	инz -60.56 dBm /нz	
MSG	STATUS	

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

ncee labs	Report Number:	R20220628-20-E3B		В
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using	C63.10 Sec 11.8.1			
₩ RF 50 Ω DC Center Freq 2.41200000		SENSE:INT SOURCE OFF  Center Freg: 2.41200000	ALIGN OFF	11:52:18 AM Aug 16, 202 Radio Std: None
	#IFGain:Low	Trian Eres Dum	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dE	łm			
5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	horan horan	Morrow	~~~~~~
5.00		¥		
15.0				
25.0				- www.www.www.
35.0				
45.0				
-55.0				
65.0				
-75.0				
Center 2.41200 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25.00 MH Sweep 2.333 ms
Occupied Bandwid	ith	Total Power	22.8 dBm	
1	6.448 MHz			
Transmit Freq Error	-570 Hz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	16.54 MHz	x dB	-6.00 dB	
ISG			STATUS	

56 Bandwidth, Low, Wifi G, High Data Rate

ncee.	Report Number:	R20220628-20-E3B		В
labs	Prepared for:	Garmin International, Inc.		

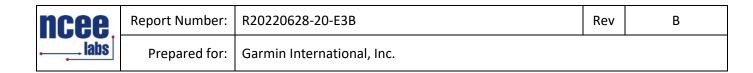
Keysight Spectrum Analyzer - BW using C	63.10 Sec 11.8.1			- 6 -
$RF$ 50 $\Omega$ DC		SENSE:INT SOURCE OFF A Center Freq: 2.43700000	ALIGN OFF	11:53:36 AM Aug 16, 2022 Radio Std: None
Center Freq 2.43700000		🗋 Trig: Free Run	Avg Hold:>10/10	Radio Stu. None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
10 dB/div Ref 15.00 dB	m			
Log				
5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mon for the former	v mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm	www.
-5.00		Υ		
-15.0				
-25.0				- WWWWWWWW
-35.0				
-45.0				
-55.0				
-65.0				
-75.0				
Center 2.43700 GHz				Span 25.00 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandwid	4b	Total Power	22.9 dBm	
			22.5 (18)	
1	6.446 MHz			
Transmit Freq Error	4.385 kHz	% of OBW Power	r 99.00 %	
x dB Bandwidth	16.50 MHz	x dB	-6.00 dB	
	10.50 MHZ		-0.00 uB	
ISG			STATUS	

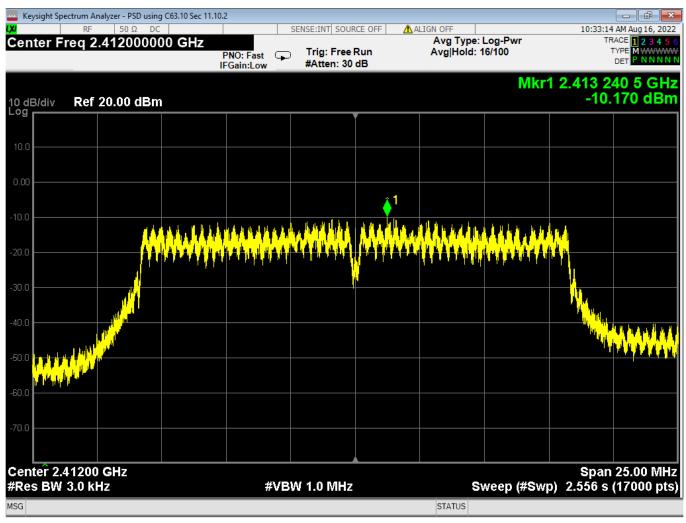
57 Bandwidth, Mid, Wifi G, High Data Rate

ncee.	Report Number:	R20220628-20-E3B		В
labs	Prepared for:	Garmin International, Inc.		

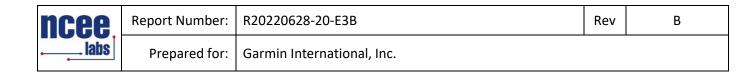
Keysight Spectrum Analyzer - BW us Keysight Spectrum Analyzer - BW us Keysight So Ω	DC		LIGN OFF	다. (주)
Center Freq 2.462000	000 GHz #IFGain:Low	Center Freq: 2.46200000 Trig: Free Run #Atten: 30 dB	0 GHz Avg Hold:>10/10	Radio Std: None Radio Device: BTS
10 dB/div Ref 15.00	dBm			
5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	participation	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~
-5.00		¥		
-15.0				
-25.0 Manala				
-35.0				
-45.0				
-65.0				
-75.0				
Center 2.46200 GHz				Span 25.00 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandw	vidth	Total Power	23.1 dBm	
	16.452 MHz			
Transmit Freq Erro	r -712 Hz	% of OBW Power	99.00 %	
x dB Bandwidth	16.52 MHz	x dB	-6.00 dB	
MSG			STATUS	

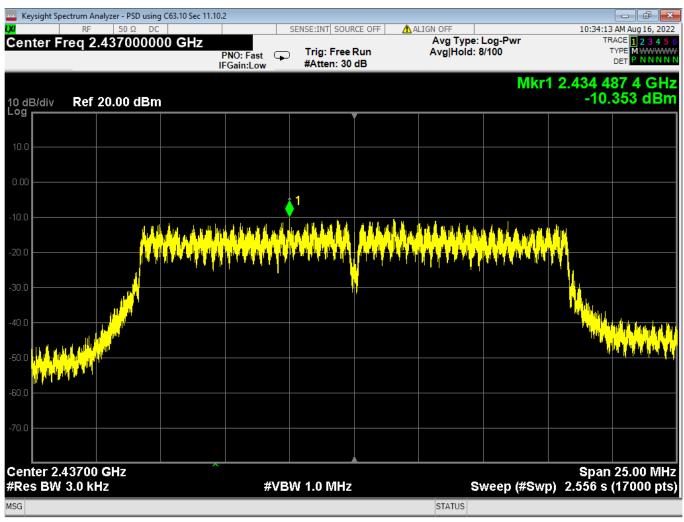
58 Bandwidth, High, Wifi G, High Data Rate



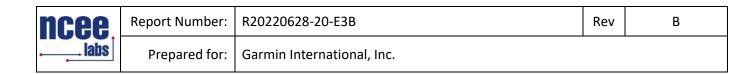


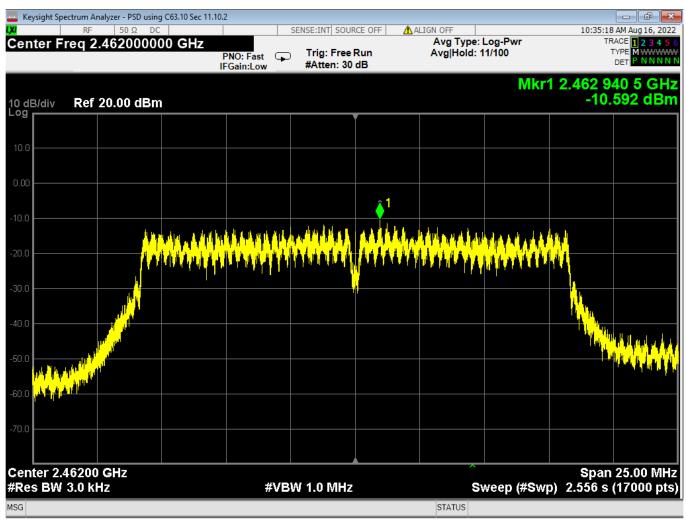
59 PSD, Low, Wifi G, High Data Rate





60 PSD, Mid, Wifi G, High Data Rate





61 PSD, High, Wifi G, High Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spe	ectrum Ana	ılyzer - Unres	tricted LBE Using C6	3.10 Sec 11.13.2							
	RF	50 Ω			SENSE:	INT SOURCE OF	F ALI	GN AUTO			28 AM Sep 16, 2
arker 1	2.412	910521	1138 GHz	PNO: Fast IFGain:Low		g: Free Run tten: 30 dB			: Log-Pwr >1000/1000		TYPE MAWM DET PANN
dB/div	Ref 1	126.99 c	lBµV						ľ	41 Mkr1 2.41 107.	l2 91 GI 394 dBj
<b>g</b> 17								1			
					mon	$\gamma$	$\gamma$	Mar was	Mr. Maryana	m	
				<u>مر</u> 1						v v v	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
.0	www.ww	an white	ᠵᡔᢇᡳᡙᡰᡗᡧᡘᡬᡣᢇ	www							
.0											
art 2.39 les BW				V	/BW 1.0	MHz			Swee	Stop 2 p 3.400 m	2.42642 G s (1001 p
R MODE TF	RC  SCL		Х		Y	FUNCTION	FUNCTI	ION WIDTH	F	UNCTION VALUE	
N 1 N 1	f		2.412 91 GH 2.399 45 GH	z 71.	394 dBµV 710 dBµV						
Δ1 1	f (/	<u>(</u> )	-13.46 MH	z (Δ) -3	35.684 dB						
											2

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spe	ectrum Analyzer	- Unrestricted HBE	Using C63.10 Sec 11.13	2					
	1.11	50 Ω DC		SENSE:INT	SOURCE OFF	ALIGN AUTO			8 AM Sep 16, 20
arker 1	2.46476	2396322 G	HZ PNO: Fast IFGain:Low		Free Run n: 30 dB		pe: Log-Pwr ld:>1000/1000	Т	RACE 1 2 3 4 TYPE MAWW DET PANN
) dB/div	Ref 126	.99 dBµV					Ν	/kr1 2.46 102.8	4 76 GH 895 dBµ
<b>pg</b> 117				<u>^1</u>					
107 <b></b> 7.0 <b></b>	por the	Jaman	man	-	ᡰᠬ᠋᠕ᡣ᠕ᡯᡢᡁᠯᡳᡧᢘ	to the second			
7.0	<sup>1</sup> 27								
7.0						<b>`</b>	·····	hun and have	21 Marman
7.0 <u> </u>									
art 2 45	068 GHz							Stop 2	.48350 G
	100 kHz		7	#VBW 300	kHz		Swee	p 3.200 m	s (1001 p
(R MODE TR	RC SCL		76 GHz 102.	Y 895 dBµV	FUNCTION	FUNCTION WIDTH	F	UNCTION VALUE	
Δ1 1 N 1	f (Δ)			42.270 dB 625 dBµV					
									>

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer -	Restricted LBE using C63.10 Sec 6.10.	5			
	Ω ΑC	SENSE:INT	🛕 ALIGN OFF		03:29:53 PM Aug 15, 20
arker 2 2.389830		ist 🕞 Trig: Free igh #Atten: 0	eRun Avg H	Гуре: RMS lold:>1000/1000	TRACE 1 2 3 4 5 TYPE MA WWW DET P A N N
Ref Offset dB/div Ref 88.98				Mk	r2 2.389 83 GH 52.004 dBµ
9.0 Trace 1 Pass 9.0 Trace 2 Pass 9.0					1 1/140 /0001-1/11/14/1-1-1/11
9.0 <mark>mmutinerralatationalaside</mark> 9.0	hall an other the particular fallows	hihaykaadharjinadhallooda	yeldynthydwyddyyr yr meddhynonaeth		Indiverses to indiverse to the second
).0 .0					
.0					
98					
art 2.380000 GHz Res BW 1.0 MHz		#VBW 50 MHz	<u>*</u>	Sweep	Stop 2.390000 Gi 1.000 ms (1001 pi
R MODE TRC SCL		69.090 dBµV	NCTION FUNCTION WIDTH	H  FUNC	TION VALUE
N 2 f	2.389 83 GHz	52.001 dBµV			
					>
			STATU	10	

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
	Prepared for:	Garmin International, Inc.		

	trum Analyzer - Restricted HBE	C63.10 Sec 6.10.5						e X
LXI	RF 50 Ω AC		SENSE:I	NT	ALIGN OFF		03:14:02 PM Au	g 15, 2022
Marker 2	2.483500000000	GHz			Avg Type	: RMS	TRACE	2345
	2.4000000000	PNO: Fast	— Trig	g: Free Run		>1000/1000		A www
PASS	PREAMP	IFGain:High		ten: 0 dB	•		DET	ANNNI
	T REAM	n Guiningh						
						Mkr2	2.483 533 0	) GHz
	Ref Offset 37.2 dB						52.756	
10 dB/div	Ref 89.19 dBµV						02.100	abhr
	e 1 Pass			Ť				
	2 Pass							
/	21 435							
69.2	المعالية المتحدية الملط							
59.2 2	htelenergelikeringerliker het frighten	Mary Holders Apple marsh was	a shine a	اسه بالد				
			a Luch Ports	Mappine	Man bearing bearing be	-	where where the server the server where	mounder
49.2								
								~ · · ·
39.2						++		
20.0								
29.2								
19.2								
10.2								
9.19						++		
-0.81								
Start 2.48	3500 GHz						Stop 2.50000	)0 GHz
#Res BW		14	BW 50 M	<b>11.1 -</b> *		Swoon	1.000 ms (10	04 pto
#Res DW		<u>v</u>	BW JUP	VIELZ		Sweep	1.000 IIIS (10	στ μιs,
MKR MODE TR	CI SCLI X		Y I	FUNCTION	FUNCTION WIDTH	EUI	NCTION VALUE	
1 N 1			75 dBuV	TONCHON	TONCHONWIDTH	101	ICTION VALUE	
2 N 2 3	1 2.463 55	33 0 GHz 52.7	53 dBµV					
4								
5 6								
_								
7								
8								
9								
40								
10								
11								~
								> ×
11					STATUS			>

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Channel Power using     RF 50 Ω DC				
Center Freq 2.412000000 GHz		Freq: 2.412000000 GHz		10:01:13 AM Aug 16, 2022 Radio Std: None
	#IFGain:Low #Atten:		ld:>200/200 F	Radio Device: BTS
10 dB/div Ref 20.00 dBm				
Log 10.0				
0.00				
-10.0				
-20.0				
-30.0				
-40.0				man and a construction of the
-50.0				
-60.0				
-70.0				
Center 2.41200 GHz				Span 30.00 MHz
#Res BW 270 kHz	V	BW 2.7 MHz		Sweep 1 ms
	<b>D</b> =			
Channel Power	Pow	er Spectral Dens	ity	
13.05 dBm / 20	N411-	-59.96 dBm	/11-	
13.05 uBill / 20		-59.90 ubiii	/82	
MSG		STATUS		

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Channel Power us     RF 50 Ω DC	-	SENSE:INT SOURCE OFF	ALIGN OFF	10:	02:04 AM Aug 16, 2022		
	Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz						
	#IFGain:Low #Atten: 30 dB						
10 dB/div Ref 20.00 dBm							
10.0							
0.00							
-10.0		Y					
-20.0							
-30.0							
-50.0							
-60.0							
-70.0							
Center 2.43700 GHz				Sn	an 30.00 MHz		
#Res BW 270 kHz		VBW 2.7 N	1Hz		Sweep 1 ms		
Channel Power		Power Spec	tral Density				
12.48 dBm / 2		-60.5	3 dBm /нz	_			
12.40 UDIII / 2		-00.0					
MSG			STATUS				

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Channel Power using 0     RF 50 Ω DC	SENSE:INT SO			10:02:44 AM Aug 16, 2022
Center Freq 2.462000000 GHz	🖵 🛛 Trig: Fre		1:>200/200	adio Std: None adio Device: BTS
	#IFGain:Low #Atten: 3		Ka	allo Device: B 1 S
10 dB/div Ref 20.00 dBm				
10.0				
0.00		<pre></pre>	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
-10.0		Y		
-20.0				
-40.0				
-50.0				
-60.0				
-70.0				
Center 2.46200 GHz #Res BW 270 kHz	VE	SW 2.7 MHz		Span 30.00 MHz Sweep 1 ms
Channel Power	Powe	er Spectral Densi	ty	
13.19 dBm / 20		-59.82 dBm	/니ㅋ	
		-55.02 ubm	/ <b>H</b> 2	
MSG		STATUS		

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using	C63.10 Sec 11.8.1			- 6 -
XI RF 50Ω DC		SENSE:INT SOURCE OFF A	ALIGN OFF	11:59:30 AM Aug 16, 2022 Radio Std: None
Center Freq 2.4120000		🗋 Trig: Free Run	Avg Hold:>10/10	Radio Sta. None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
10 dB/div Ref 15.00 dE	3m			
5.00				
	www.www.	www.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
5.00		Ψ		
15.0				
25.0				
35.0 mm				՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟՟
45.0				
55.0				
65.0				
75.0				
Center 2.41200 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25.00 MHz Sweep   2.333 ms
				Sweep 2.333 ms
Occupied Bandwig	dth	Total Power	20.2 dBm	
	7.524 MHz			
Transmit Freq Error	-1.078 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	17.67 MHz	x dB	-6.00 dB	
ISG			STATUS	

69 Bandwidth, Low, Wifi N, High Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

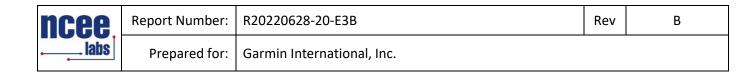
Keysight Spectrum Analyzer - BW using C63.           RF         50 Ω         DC	10 Sec 11.8.1	SENSE:INT SOURCE OFF	ALIGN OFF	12:00:44 PM Aug 16, 2022
Center Freq 2.437000000	GHz	Center Freq: 2.43700000	0 GHz	Radio Std: None
	#IFGain:Low	─ Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dBm				
Log				
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		Y		
15.0				
25.0 may March and				Why Men Mary
0.0				
45.0 55.0				
55.0				
75.0				
Center 2.43700 GHz Res BW 100 kHz		VBW 1 MHz		Span 25.00 MH: Sweep   2.333 ms
Occupied Bandwidth		Total Power	21.9 dBm	
			21.5 0.011	
17.	.522 MHz			
Transmit Freq Error	-2.841 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	17.65 MHz	x dB	-6.00 dB	
SG			STATUS	

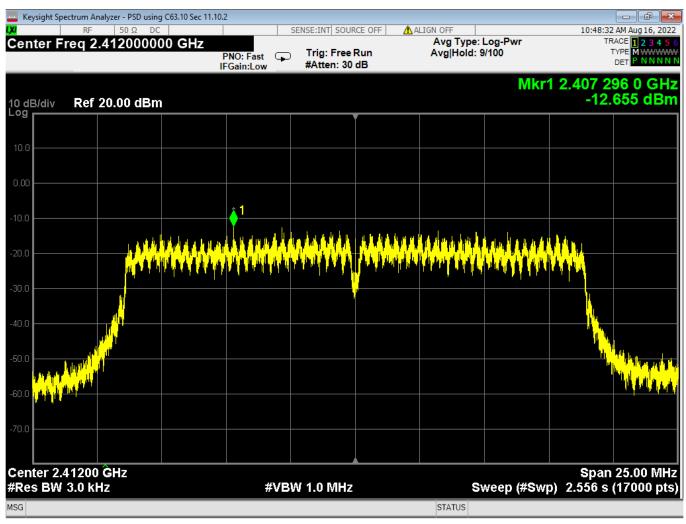
70 Bandwidth, Mid, Wifi N, High Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

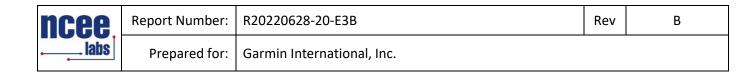
Keysight Spectrum Analyzer - BW using	g C63.10 Sec 11.8.1			
$RF = 50 \Omega DO$		SENSE:INT SOURCE OFF A Center Freq: 2.46200000	ALIGN OFF	12:05:30 PM Aug 16, 2022 Radio Std: None
Center Freq 2.4620000	#IFGain:Low	Trian Erran Dum	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 d	Bm			
_ <b>og</b>				
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	many mon		mm.
5.00		\//		
15.0				
25.0				
35.0 more and a more a				March March
45.0				
55.0				
65.0				
75.0				
Center 2.46200 GHz Res BW 100 kHz		VBW 1 MHz		Span 25.00 MH: Sweep   2.333 ms
				Sweep 2.333 m
Occupied Bandwi	dth	Total Power	20.8 dBm	
	17.511 MHz			
Transmit Freq Error	924 Hz	% of OBW Power	r 99.00 %	
x dB Bandwidth	17.64 MHz	x dB	-6.00 dB	
SG			STATUS	
			STATUS	

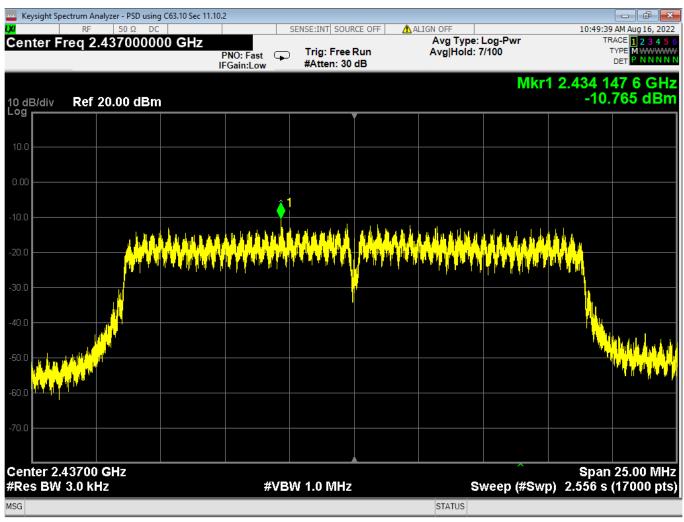
71 Bandwidth, High, Wifi N, High Data Rate



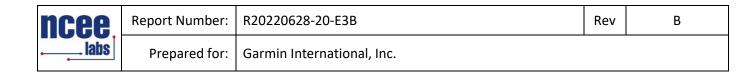


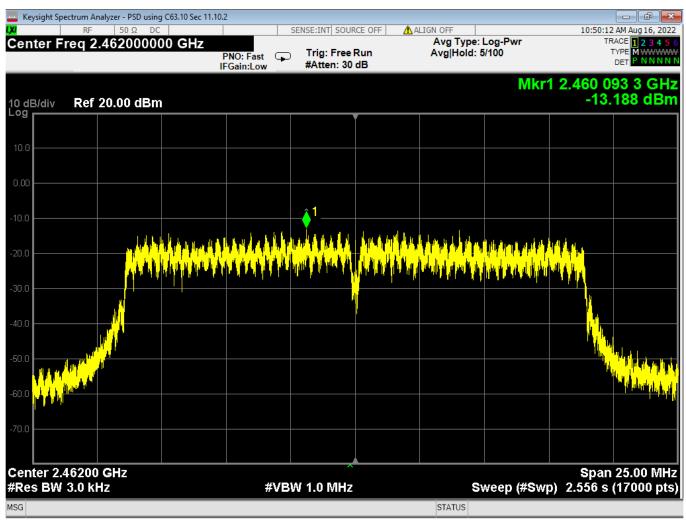
72 PSD, Low, Wifi N, High Data Rate





73 PSD, Mid, Wifi N, High Data Rate





74 PSD, High, Wifi N, High Data Rate

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

	PNO: Fast	ISE:INT SOURCE O Trig: Free Run #Atten: 30 dB	Avg	o Type: Log-Pwr  Hold:>1000/1000		54 AM Sep 16, 20 TRACE 1 2 3 4 TYPE MMWW
					1	
			Avg	Hold:>1000/1000		TYPE M MARKAN
	IFGain:Low	#Atten: 30 dB				DET PANN
						DEI
					Mkr1 2.41	1 09 GI
1 BO AS E 0   = 1   A /					105.	062 dBj
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					Stop 2	.42642 G
	VBW 1	.0 MHz		Swe	eep 3.400 m	s (1001 p
X	Y	EUNCTION		тн	EUNCTION VALUE	
2.411 09 GHz	z 105.062 dB	uV				
	z 69.411 dB	μV				
-11.64 MHz	z (Δ) -35.650 (	dB				
						2
			STA	TUS		
	2.399 45 GH	→ → → → → → → → → → → → → →	З∆1 «Учити и и и и и и и и и и и и и и и и и и	χ         Y         FUNCTION         FUNCTION         WILD           X         Y         FUNCTION         FUNCTION         WILD           2.411 09 GHz         105.062 dBµV         4000000000000000000000000000000000000	3Δ1         Λ           ΛΛΛΛΛΛΛΛΛΛΛΛ         Image: Constraint of the second seco	3Δ1         3Δ1         3Δ1

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

ncee.	Report Number:	R20220628-20-E3B	Rev	В
labs	Prepared for:	Garmin International, Inc.		

cysigne spe			cted HBE Using C6	i3.10 Sec 11.13.2							
	RF	50 Ω D	-		SENSE:I	NT SOURCE (	DFF A	LIGN AUTO		1	1:37:01 AM Sep 16
rker 1	2.4613	3824082	268 GHz		<b>T</b>	g: Free Rur			/pe: Log-Pwr old:>1000/1000		
				PNO: Fast IFGain:Low		ten: 30 dB		Avgine	na.>1000/1000	,	DET PAN
				IFGain:Low	#/\	tten. 50 ub					
										Mkr1 2	.461 38 G
lB/div	Pef 1	26.99 dE	RuV							10	03.812 dE
	INGI I	20.33 ui									
,											
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7 <b></b>				0.000	d - 440 - 70	<u>م</u>					
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Jord								No.	S as field a		
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1											
J											
rt 2.45	068 GI	7								Str	op 2.48350
	100 GI			-#	<b>VBW</b> 30	ヘレロッ			<b>C</b> 14	300 2 300	0 ms (1001
:5 DW		2		#	A DAA 10	V KHZ			34	reep J.20	0 IIIS (1001
MODE TR	C SCL		Х		Y	FUNCTIO	N FUNC	TION WIDTH		FUNCTION V	ALUE
N 1	f		2.461 38 GH	z 103.8	12 dBµV						
Δ1 1			22.12 MH		2.547 dB						
N 1	f		2.483 50 GH	z 61.2	265 dBµV						

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

Incee	Report Number:	R20220628-20-E3B	Rev	В
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Ana	lyzer - Restricted LBE using C63	3.10 Sec 6.10.5				
RF	50 Ω AC		ENSE:INT	ALIGN OFF		03:25:29 PM Aug 15, 202
larker 2 2 380	960000000 GHz			Avg Type:	RMS	TRACE 1 2 3 4 5
	300000000 GHZ	PNO: Fast	Trig: Free Run		>1000/1000	TYPE MA WWW
PASS PRE	AMP	IFGain:High	#Atten: 0 dB	•		DET PANN
Ref Of	fset 36.99 dB				M	kr2 2.389 96 GH
	8.98 dBµV					51.065 dBµ
79.0 Trace 1 Pas	S		Ĭ			
<sup>79.0</sup> Trace 2 Pas						
69.0						
				Mundught Marsh Mar	to as of a rate between the	whether was a source of the so
59.0	et to make the first the second	Landerstand and a stranger	half and a star of a shall and		A Madina and a share	
49.0						
49.0						
39.0						
29.0						
19.0						
13.0						
8.98						
1.02						
Start 2.380000 C	Hz					Stop 2.390000 GH
Res BW 1.0 MH	z	#VB\	V 50 MHz*		Sweep	1.000 ms (1001 pt
IKR MODE TRC SCL	X	Y	FUNCTION	FUNCTION WIDTH		NCTION VALUE
	2.389 96 GI			TONCHON WIDTH	10	ACTION VALUE
2 N 2 f	2.389 96 G					
3	2.369 90 G	HZ 51.004 0	Βμν			
4						
5						
6						
7						
8						
8						
9						
9 0 0						>
9 0 1				STATUS		>

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

Incee	Report Number:	R20220628-20-E3B	Rev	В
	Prepared for:	Garmin International, Inc.		

🔤 Keysight Spectrum Analyzer - Restricted HBE C63.10 Se	c 6.10.5					
RF 50 Ω AC	SENSE:	INT	ALIGN OFF		03:15:25 PM	Aug 15, 2022
Marker 2 2.483599000000 GHz	_		Avg Type			<b>1</b> 2 3 4 5 (
PASS		ig: Free Run tten: 0 dB	Avg Hold:	>1000/1000	DET	
PREAMP	IFGain:High #A					·
Ref Offset 37.2 dB				Mkr2	2.483 632	
10 dB/div Ref 89.19 dBµV					53.291	dBµV
Trace 1 Pass		Ĭ				
<sup>79.2</sup> Trace 2 Pass						
69.2 And Marth Marth Mugh My marting						
59.2 2 59.2 2	hand a shall a shall a shall and a shall a sha	most with the for the	What was a shall be a	47-466-16-18-18-18-18-18-18-18-18-18-18-18-18-18-	and Month and the set	مى ئۆمىيەرلىلارىيلىرا، مەرىل
49.2						
39.2						
29.2						
19.2						
0.40						
9.19						
-0.81						
Start 2.483500 GHz				_	Stop 2.500	000 GHz
#Res BW 1.0 MHz	VBW 50	MHz*		Sweep	1.000 ms (1	001 pts;
MKR MODE TRC SCL X	Y	FUNCTION	FUNCTION WIDTH	FUI	NCTION VALUE	^
1 N 1 f 2.483 648 5 GH						
2 N 2 f 2.483 632 0 GH	lz 53.291 dBµV					
3						
5						
6						
7						
7						
7 8 8 9 10 10						
7 8 8 9 10 11						
7 8 8 9 10 10 10 10 10 10 10 10 10 10 10 10 10 1						> ×

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

Incee	Report Number:	R20220628-20-E3B	Rev	В
	Prepared for:	Garmin International, Inc.		

## REPORT END