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FCC/ISED Test Report

Prepared for: Garmin International, Inc.

Address:

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

Product:

A04543

Test Report No:

R20230109-20-E10C

Approved by:

red ane

Fox Lane EMC Test Engineer

DATE:

May 18, 2023

Total Pages:

194

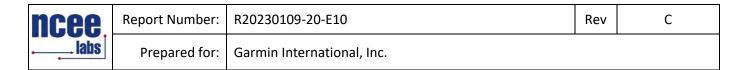
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labs	Prepared for:	Garmin International, Inc.		

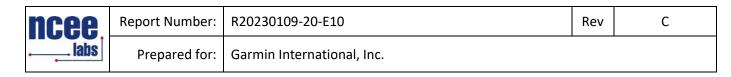
REVISION PAGE

Rev. No.	Date	Description
		Issued by FLane
0	31 March 2023	Reviewed by KVepuri
		Prepared by FLane, GLarsen, ESchmidt
A	10 April 2023	Updated Antenna Gain - FL
В	13 April 2023	Corrected FCC/IC ID - FL
С	17 May 2023	Added Channel 12 and 13 Data – ES/FL



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1.0 SUMMARY OF TEST RESULTS

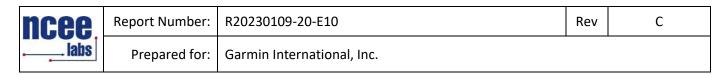
The worst-case measurements were reported in this report. Summary of test results presented in this report correspond to the following section:

FCC Part 15.247

The EUT has been tested according to the following specifications:

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

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



2.0 EUT DESCRIPTION

2.1 EQUIPMENT UNDER TEST

Summary and Operating Condition:

EUT	A04543
FCC ID	IPH-04543
IC ID	1792A-04543
EUT Received	13 February 2023
EUT Tested	15 February 2023- 23 March 2023
Serial No.	3436743098 (Radiated Measurements) 3436743374 (Conducted Measurements)
Operating Band	2400 – 2483.5 MHz
Device Type	□ GMSK □ GFSK □ BT BR □ BT EDR 2MB □ BT EDR 3MB 図 802.11x
Power Supply / Voltage	Internal Battery / 5VDC Charger: Garmin (Phi Hong) Model: AQ27A-59CFA GPN: 362-00118-00 (Representative Power Supply)
Antenna Type / Gain (dBi)	-3.02dBi Trace Antenna Antenna Gain value based off Customer provided AUT Report. Results may differ.

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

2.2 DESCRIPTION OF TEST MODES

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

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

For 802.11	For 802.11x Transmissions:					
Channel	Frequency					
Low	2412 MHz					
Mid	2437 MHz					
High	2462 MHz					
12	2467 MHz					
13	2472 MHz					

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

2.3 DESCRIPTION OF SUPPORT UNITS

None



3.0 LABORATORY AND GENERAL TEST DESCRIPTION

3.1 LABORATORY DESCRIPTION

All testing was performed at the following Facility:

The Nebraska Center for Excellence in Electronics (NCEE Labs) 4740 Discovery Drive Lincoln, NE 68521

A2LA Certificate Number:	1953.01
FCC Accredited Test Site Designation No:	US1060
Industry Canada Test Site Registration No:	4294A-1
NCC CAB Identification No:	US0177

Environmental conditions varied slightly throughout the tests:

Relative humidity of $35 \pm 4\%$ Temperature of $22 \pm 3^{\circ}$ Celsius



3.2 TEST PERSONNEL

No.	PERSONNEL	TITLE	ROLE
1	Fox Lane	Test Engineer	Testing, Review, and Report
2	Blake Winter	Test Engineer	Testing
3	Grace Larsen	Test Engineer	Testing and Report
4	Ethan Schmidt	Test Technician	Testing and Report

Notes:

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



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Prepared for: Garmin International, Inc.

3.3 TEST EQUIPMENT

DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE	CALIBRATION DUE DATE
Keysight MXE Signal Analyzer (44GHz)**	N9038A	MY59050109	July 19, 2022	July 19, 2024
Keysight MXE Signal Analyzer (26.5GHz)**	N9038A	MY56400083	July 19, 2022	July 19, 2024
Keysight EXA Signal Analyzer**	N9010A	MY56070862	July 20, 2021	July 20, 2023
SunAR RF Motion	JB1	A082918-1	July 26, 2022	July 26, 2023
EMCO Horn Antenna	3115	6416	July 28, 2021	July 28, 2022
EMCO Horn Antenna***	3116	2576	March 9, 2020	March 9, 2024
Com-Power LISN, Single Phase**	LI-220C	20070017	July 18, 2022	July 18, 2024
8447F POT H64 Preamplifier*	8447F POT H64	3113AD4667	March 21, 2022	March 21, 2024
Rohde & Schwarz Preamplifier**	TS-PR18	3545700803	August 22, 2022	August 22, 2024
Trilithic High Pass Filter*	6HC330	23042	March 21, 2022	March 21, 2024
ETS – Lindgren- VSWR on 10m Chamber***	10m Semi- anechoic chamber-VSWR	4740 Discovery Drive	July 30, 2020	July 30, 2023
NCEE Labs-NSA on 10m Chamber*	10m Semi- anechoic chamber-NSA	NCEE-001	May 25, 2022	May 25, 2024
TDK Emissions Lab Software	V11.25	700307	NA	NA
RF Cable (preamplifier to antenna)*	MFR-57500	01-07-002	March 21, 2022	March 21, 2024
RF Cable (antenna to 10m chamber bulkhead)*	FSCM 64639	01E3872	September 24, 2021	September 24, 2023
RF Cable (10m chamber bulkhead to control room bulkhead)*	FSCM 64639	01E3864	September 24, 2021	September 24, 2023
RF Cable (control room bulkhead to test receiver)*	FSCM 64639	01F1206	September 24, 2021	September 24, 2023
N connector bulkhead (10m chamber)*	PE9128	NCEEBH1	September 24, 2021	September 24, 2023
N connector bulkhead (control room)*	PE9128	NCEEBH2	September 24, 2021	September 24, 2023

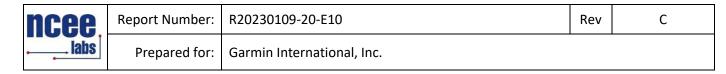
*Internal Characterization

**2 Year Cal Cycle

***4 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.

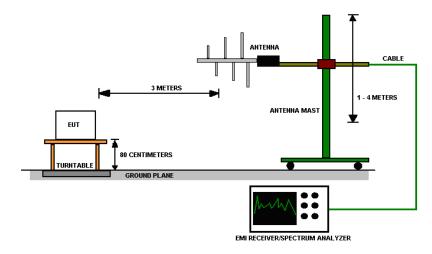


Figure 2 - Radiated Emissions Test Setup

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4.0 RESULTS

		DTS Radio	Measuremen	ts Low Data Rate	•		
CHANNEL	Transmitter	Occupied Bandwidth (MHz)	6 dB Bandwidth (MHz)	AVERAGE OUTPUT POWER (dBm)	AVERAGE OUTPUT POWER (mW)	PSD (dBm)	RESUL
Low	802.11 b	14.14	11.26	15.820	38.194	-13.443	PASS
Mid	802.11 b	14.35	11.16	17.120	51.523	-12.744	PASS
High	802.11 b	13.97	12.13	14.520	28.314	-15.448	PASS
12	802.11 b	13.922	12.19	16.27	42.364	-14.266	PASS
13	802.11 b	13.935	11.15	15.97	39.537	-14.701	PASS
Low	802.11 g	16.99	16.54	12.270	16.866	-11.407	PASS
Mid	802.11 g	17.32	16.51	15.220	33.266	-7.87	PASS
High	802.11 g	16.92	16.55	12.100	16.218	-11.925	PASS
12	802.11 g	16.986	16.53	13.52	22.491	-12.664	PASS
13	802.11 g	16.865	16.47	13.34	21.577	-11.163	PASS
Low	802.11 n	17.81	17.77	12.080	16.144	-11.957	PASS
Mid	802.11 n	17.94	17.73	15.160	32.810	-9.059	PASS
High	802.11 n	17.83	17.75	12.050	16.032	-11.987	PASS
12	802.11 n	17.749	17.75	13.3	21.380	-12.743	PASS
13	802.11 n	17.797	17.62	13.19	20.845	-12.202	PASS
		6 dB Bandwidth Li		Output Power L			
	nawiain – N/A, v						
	1	Unrestric	-	e Low Data Rate	-		
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Relative Highest out of band level (dBuV)	Relative Fundamental (dBuV)	Delta (dB)	Min Delta (dB)	Result
			. ,				
Low	802 11 b	2400.00	79 15	111 01	31.86	30.00	PASS
Low	802.11 b 802.11 g	2400.00	79.15 63.74	<u>111.01</u> 100.35	31.86 36.61	30.00 30.00	PASS PASS
Low	802.11 g	2400.00	63.74	100.35	36.61	30.00	PASS
Low Low	802.11 g 802.11 n	2400.00 2400.00	63.74 64.36	100.35 98.76	36.61 34.40	30.00 30.00	PASS PASS
Low Low High	802.11 g 802.11 n 802.11 b	2400.00 2400.00 2483.50	63.74 64.36 52.05	100.35 98.76 110.39	36.61 34.40 58.34	30.00 30.00 30.00	PASS PASS PASS
Low Low High High	802.11 g 802.11 n 802.11 b 802.11 g	2400.00 2400.00 2483.50 2483.50	63.74 64.36 52.05 63.33	100.35 98.76 110.39 105.47	36.61 34.40 58.34 42.15	30.00 30.00 30.00 30.00	PASS PASS PASS PASS
Low Low High High High	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n	2400.00 2400.00 2483.50 2483.50 2483.50	63.74 64.36 52.05 63.33 64.03	100.35 98.76 110.39 105.47 106.94	36.61 34.40 58.34 42.15 42.91	30.00 30.00 30.00 30.00 30.00	PASS PASS PASS PASS PASS
Low Low High High High 13	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11b	2400.00 2400.00 2483.50 2483.50 2483.50 2483.5	63.74 64.36 52.05 63.33 64.03 67.952	100.35 98.76 110.39 105.47 106.94 111.63	36.61 34.40 58.34 42.15 42.91 43.68	30.00 30.00 30.00 30.00 30.00 30.00	PASS PASS PASS PASS PASS PASS
Low Low High High High 13 13	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11b 802.11g	2400.00 2400.00 2483.50 2483.50 2483.50 2483.5 2483.5	63.74 64.36 52.05 63.33 64.03 67.952 76.477	100.35 98.76 110.39 105.47 106.94 111.63 107.31	36.61 34.40 58.34 42.15 42.91 43.68 30.83	30.00 30.00 30.00 30.00 30.00 30.00 30.00	PASS PASS PASS PASS PASS PASS PASS
Low Low High High High 13	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11b	2400.00 2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 2483.5	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29	30.00 30.00 30.00 30.00 30.00 30.00	PASS PASS PASS PASS PASS PASS
Low Low High High High 13 13	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11b 802.11g	2400.00 2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 2483.5	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban	100.35 98.76 110.39 105.47 106.94 111.63 107.31	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29	30.00 30.00 30.00 30.00 30.00 30.00 30.00	PASS PASS PASS PASS PASS PASS PASS
Low Low High High High 13 13	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11b 802.11g	2400.00 2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 2483.5	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban Highest out of band level (dBuV/m @ 3m)	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29	30.00 30.00 30.00 30.00 30.00 30.00 30.00	PASS PASS PASS PASS PASS PASS PASS
Low Low High High 13 13 13	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11b 802.11g 802.11g	2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 Radiated Peak F Band edge /Measurement Frequency (MHz) 2390.00	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban Highest out of band level (dBuV/m @ 3m) 53.29	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14 d-Edge Low Data Measurement	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29 a Rate Limit (dBuV/m @ 3m) 73.98	30.00 30.00 30.00 30.00 30.00 30.00 30.00 Margin 20.69	PASS PASS PASS PASS PASS PASS PASS Result
Low Low High High 13 13 13 CHANNEL	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11b 802.11g 802.11g 802.11n	2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 Radiated Peak F Band edge /Measurement Frequency (MHz)	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban Highest out of band level (dBuV/m @ 3m)	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14 d-Edge Low Data Measurement Type	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29 a Rate Limit (dBuV/m @ 3m) 73.98 73.98	30.00 30.00 30.00 30.00 30.00 30.00 30.00 Margin	PASS PASS PASS PASS PASS PASS PASS Result PASS PASS
Low Low High High 13 13 13 CHANNEL	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11g 802.11g 802.11n Mode 802.11 b 802.11 g 802.11 n	2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 Radiated Peak F Band edge /Measurement Frequency (MHz) 2390.00	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban Highest out of band level (dBuV/m @ 3m) 53.29	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14 d-Edge Low Data Measurement Type Peak	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29 a Rate Limit (dBuV/m @ 3m) 73.98	30.00 30.00 30.00 30.00 30.00 30.00 30.00 Margin 20.69	PASS PASS PASS PASS PASS PASS PASS Result
Low Low High High 13 13 13 CHANNEL Low Low	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11b 802.11g 802.11n Mode 802.11 b 802.11 g	2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 2483.5 Radiated Peak F Band edge /Measurement Frequency (MHz) 2390.00 2390.00	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban Highest out of band level (dBuV/m @ 3m) 53.29 64.79	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14 d-Edge Low Data Measurement Type Peak Peak	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29 a Rate Limit (dBuV/m @ 3m) 73.98 73.98	30.00 30.00 30.00 30.00 30.00 30.00 30.00 30.00 20.69 9.19	PASS PASS PASS PASS PASS PASS PASS Result PASS PASS
Low Low High High 13 13 13 CHANNEL Low Low Low	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11b 802.11g 802.11n Mode 802.11 b 802.11 g 802.11 n	2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 2483.5 Radiated Peak F Band edge /Measurement Frequency (MHz) 2390.00 2390.00	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban Highest out of band level (dBuV/m @ 3m) 53.29 64.79 63.06	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14 d-Edge Low Data Measurement Type Peak Peak Peak Peak	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98	30.00 30.00 30.00 30.00 30.00 30.00 30.00 30.00 20.69 9.19 10.92	PASS PASS PASS PASS PASS PASS PASS PASS
Low Low High High 13 13 13 CHANNEL Low Low Low High High	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11b 802.11g 802.11n Mode 802.11 b 802.11 g 802.11 n 802.11 n	2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 2483.5 Radiated Peak F Band edge /Measurement Frequency (MHz) 2390.00 2390.00 2390.00 2390.00	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban Highest out of band level (dBuV/m @ 3m) 53.29 64.79 63.06 54.05	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14 d-Edge Low Data Measurement Type Peak Peak Peak Peak Peak	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98 73.98	30.00 30.00 30.00 30.00 30.00 30.00 30.00 30.00 20.69 9.19 10.92 19.93	PASS PASS PASS PASS PASS PASS PASS PASS
Low Low High High 13 13 13 CHANNEL Low Low Low High	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11g 802.11g 802.11g 802.11 n 802.11 b 802.11 g 802.11 n 802.11 g 802.11 n	2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 2483.5 Radiated Peak F Band edge /Measurement Frequency (MHz) 2390.00 2390.00 2390.00 2483.50 2483.50 2483.50	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban Highest out of band level (dBuV/m @ 3m) 53.29 64.79 63.06 54.05 63.22 59.83	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14 d-Edge Low Data Measurement Type Peak Peak Peak Peak Peak Peak Peak Peak	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98	30.00 30.00 30.00 30.00 30.00 30.00 30.00 30.00 20.69 9.19 10.92 19.93 10.76 14.15	PASS PASS PASS PASS PASS PASS PASS PASS
Low Low High High 13 13 13 CHANNEL Low Low Low High High High 13	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11g 802.11g 802.11n Mode 802.11 b 802.11 g 802.11 n 802.11 g 802.11 n 802.11 g 802.11 n	2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 2483.5 Radiated Peak F Band edge /Measurement Frequency (MHz) 2390.00 2390.00 2390.00 2483.50 2483.50 2483.50	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban Highest out of band level (dBuV/m @ 3m) 53.29 64.79 63.06 54.05 63.22 59.83 58.920	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14 d-Edge Low Data Measurement Type Peak Peak Peak Peak Peak Peak Peak Peak	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98	30.00 30.00 30.00 30.00 30.00 30.00 30.00 30.00 20.69 9.19 10.92 19.93 10.76 14.15 15.06	PASS PASS PASS PASS PASS PASS PASS PASS
Low Low High High 13 13 13 CHANNEL Low Low Low High High	802.11 g 802.11 n 802.11 b 802.11 g 802.11 n 802.11g 802.11g 802.11g 802.11 n 802.11 b 802.11 g 802.11 n 802.11 g 802.11 n	2400.00 2483.50 2483.50 2483.50 2483.5 2483.5 2483.5 2483.5 Radiated Peak F Band edge /Measurement Frequency (MHz) 2390.00 2390.00 2390.00 2483.50 2483.50 2483.50	63.74 64.36 52.05 63.33 64.03 67.952 76.477 73.854 Restricted Ban Highest out of band level (dBuV/m @ 3m) 53.29 64.79 63.06 54.05 63.22 59.83	100.35 98.76 110.39 105.47 106.94 111.63 107.31 108.14 d-Edge Low Data Measurement Type Peak Peak Peak Peak Peak Peak Peak Peak	36.61 34.40 58.34 42.15 42.91 43.68 30.83 34.29 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98	30.00 30.00 30.00 30.00 30.00 30.00 30.00 30.00 20.69 9.19 10.92 19.93 10.76 14.15	PASS PASS PASS PASS PASS PASS PASS PASS

The Nebraska Center for Excellence in Electronics 4740 Discovery Drive

Lincoln, NE 68521



	Radiated Average Restricted 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	42.59	Average	53.98	11.40	PASS	
Low	802.11 g	2390.00	46.73	Average	53.98	7.26	PASS	
Low	802.11 n	2390.00	47.06	Average	53.98	6.92	PASS	
High	802.11 b	2483.50	42.41	Average	53.98	11.57	PASS	
High	802.11 g	2483.50	45.23	Average	53.98	8.75	PASS	
High	802.11 n	2483.50	45.38	Average	53.98	8.60	PASS	
13	802.11 b	2483.50	51.155	Average	53.98	2.825	PASS	
13	802.11 g	2483.50	49.825	Average	53.98	4.155	PASS	
13	802.11 n	2483.50	50.145	Average	53.98	3.835	PASS	
Limit shown is the average limit taken from FCC Part 15.209								

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				s High Data Rat			
CHANNEL	Transmitter	Occupied Bandwidth (MHz)	6 dB Bandwidth (MHz)	AVERAGE OUTPUT POWER (dBm)	AVERAGE OUTPUT POWER (mW)	PSD (dBm)	RESULT
Low	802.11 b	13.87	11.91	14.660	29.242	-9.92	PASS
Mid	802.11 b	13.96	11.59	16.970	49.774	-7.712	PASS
High	802.11 b	13.81	11.43	14.720	29.648	-9.915	PASS
12	802.11b	13.769	11.42	16.04	40.179	-10.081	PASS
13	802.11b	13.775	11.57	16.11	40.832	-10.15	PASS
Low	802.11 g	16.85	16.55	12.160	16.444	-12.4	PASS
Mid	802.11 g	17.02	16.50	15.180	32.961	-6.838	PASS
High	802.11 g	16.75	16.53	12.090	16.181	-10.811	PASS
12	802.11g	16.693	16.51	13.36	21.677	-12.598	PASS
13	802.11g	16.702	16.47	13.45	22.131	-11.987	PASS
Low	802.11 n	17.84	17.76	12.140	16.368	-11.348	PASS
Mid	802.11 n	17.94	17.78	15.230	33.343	-8.427	PASS
High	802.11 n	17.83	17.77	12.090	16.181	-12.242	PASS
12	802.11n	17.807	17.74	13.2	20.893	-12.41	PASS
13	802.11n	17.790	17.71	13.26	21.184	-13.627	PASS
Occupied Ba	andwidth = N/A;	6 dB Bandwidth I	_imit =500 kHz	Output Power I	_imit = 30 dBm	; PSD Lim	it = 8 dBm
		Unrestric	ted Band-Edge	High Data Rate			
CHANNEL	Mode	Band edge /Measuremen	Relative Highest out of band level	Relative Fundamenta	Delta (dB)	Min Delta	Result
		t Frequency (MHz)	(dBuV)	l (dBuV)		(dB)	
Low	802.11 b	2390.00	75.22	111.45	36.23	30.00	PASS
Low	802.11 g	2400.00	63.94	99.79	35.85	30.00	PASS
Low	802.11 n	2400.00	64.22	99.26	35.05	30.00	PASS
High	802.11 b	2483.50	49.04	111.32	62.29	30.00	PASS
High	802.11 g	2483.50	62.68	107.40	44.72	30.00	PASS
	00 <u> </u>						
High	802.11 n	2483.50	62.81	107.07	44.27	30.00	PASS
High 13		2483.50 2483.5		107.07 112.58	44.27 42.92	30.00 30.00	PASS PASS
	802.11 n 802.11b		62.81				
13	802.11 n 802.11b 802.11g	2483.5 2483.5	62.81 69.67 72.10	112.58 108.80	42.92 36.70	30.00 30.00	PASS PASS
13 13	802.11 n 802.11b	2483.5 2483.5 2483.5	62.81 69.67 72.10 74.18	112.58 108.80 107.85	42.92 36.70 33.67	30.00	PASS
13 13	802.11 n 802.11b 802.11g	2483.5 2483.5 2483.5 Radiated Peak I	62.81 69.67 72.10 74.18 Restricted Banc	112.58 108.80 107.85	42.92 36.70 33.67 a Rate	30.00 30.00	PASS PASS
13 13 13	802.11 n 802.11b 802.11g 802.11n	2483.5 2483.5 2483.5 Radiated Peak I Band edge	62.81 69.67 72.10 74.18 Restricted Banc Highest out	112.58 108.80 107.85 I-Edge High Dat	42.92 36.70 33.67 a Rate Limit	30.00 30.00	PASS PASS
13 13	802.11 n 802.11b 802.11g	2483.5 2483.5 2483.5 Radiated Peak I Band edge /Measuremen	62.81 69.67 72.10 74.18 Restricted Banc Highest out of band level	112.58 108.80 107.85 I-Edge High Dat Measuremen	42.92 36.70 33.67 a Rate	30.00 30.00	PASS PASS
13 13 13	802.11 n 802.11b 802.11g 802.11n	2483.5 2483.5 2483.5 Radiated Peak I Band edge /Measuremen t Frequency	62.81 69.67 72.10 74.18 Restricted Banc Highest out of band level (dBuV/m @	112.58 108.80 107.85 I-Edge High Dat	42.92 36.70 33.67 a Rate Limit	30.00 30.00 30.00	PASS PASS PASS
13 13 13 CHANNEL	802.11 n 802.11b 802.11g 802.11n Mode	2483.5 2483.5 2483.5 Radiated Peak I Band edge /Measuremen t Frequency (MHz)	62.81 69.67 72.10 74.18 Restricted Banc Highest out of band level (dBuV/m @ 3m)	112.58 108.80 107.85 I-Edge High Dat Measuremen t Type	42.92 36.70 33.67 a Rate Limit (dBuV/m @ 3m)	30.00 30.00 30.00 Margin	PASS PASS PASS Result
13 13 13 CHANNEL	802.11 n 802.11b 802.11g 802.11n Mode 802.11 b	2483.5 2483.5 2483.5 Radiated Peak I Band edge /Measuremen t Frequency (MHz) 2390.00	62.81 69.67 72.10 74.18 Restricted Banc Highest out of band level (dBuV/m @ 3m) 53.24	112.58 108.80 107.85 I-Edge High Dat Measuremen t Type Peak	42.92 36.70 33.67 a Rate Limit (dBuV/m @ 3m) 73.98	30.00 30.00 30.00 Margin 20.74	PASS PASS PASS Result PASS
13 13 13 CHANNEL Low Low	802.11 n 802.11b 802.11g 802.11n Mode 802.11 b 802.11 g	2483.5 2483.5 2483.5 Radiated Peak I Band edge /Measuremen t Frequency (MHz) 2390.00 2390.00	62.81 69.67 72.10 74.18 Restricted Banc Highest out of band level (dBuV/m @ 3m) 53.24 62.85	112.58 108.80 107.85 I-Edge High Dat Measuremen t Type Peak Peak	42.92 36.70 33.67 a Rate Limit (dBuV/m @ 3m) 73.98 73.98	30.00 30.00 30.00 Margin 20.74 11.13	PASS PASS PASS Result PASS PASS
13 13 13 CHANNEL Low Low	802.11 n 802.11b 802.11g 802.11n Mode 802.11 b 802.11 g 802.11 n	2483.5 2483.5 2483.5 Radiated Peak I Band edge /Measuremen t Frequency (MHz) 2390.00 2390.00 2390.00	62.81 69.67 72.10 74.18 Restricted Banc Highest out of band level (dBuV/m @ 3m) 53.24 62.85 64.60	112.58 108.80 107.85 I-Edge High Dat Measuremen t Type Peak Peak Peak Peak	42.92 36.70 33.67 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98	30.00 30.00 30.00 Margin 20.74 11.13 9.38	PASS PASS PASS PASS PASS PASS
13 13 13 CHANNEL Low Low Low High	802.11 n 802.11b 802.11g 802.11n Mode 802.11 b 802.11 g 802.11 n 802.11 b	2483.5 2483.5 2483.5 Radiated Peak I Band edge /Measuremen t Frequency (MHz) 2390.00 2390.00 2390.00 2483.50	62.81 69.67 72.10 74.18 Restricted Banc Highest out of band level (dBuV/m @ 3m) 53.24 62.85 64.60 53.70	112.58 108.80 107.85 I-Edge High Dat Measuremen t Type Peak Peak Peak Peak Peak	42.92 36.70 33.67 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98 73.98 73.98	30.00 30.00 30.00 Margin 20.74 11.13 9.38 20.28	PASS PASS PASS PASS PASS PASS PASS
13 13 13 CHANNEL Low Low Low High High	802.11 n 802.11b 802.11g 802.11n Mode 802.11 b 802.11 g 802.11 n 802.11 b 802.11 g	2483.5 2483.5 2483.5 Radiated Peak I Band edge /Measuremen t Frequency (MHz) 2390.00 2390.00 2390.00 2390.00 2483.50	62.81 69.67 72.10 74.18 Restricted Banc Highest out of band level (dBuV/m @ 3m) 53.24 62.85 64.60 53.70 60.23	112.58 108.80 107.85 I-Edge High Dat Measuremen t Type Peak Peak Peak Peak Peak Peak	42.92 36.70 33.67 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98 73.98 73.98 73.98 73.98	30.00 30.00 30.00 Margin 20.74 11.13 9.38 20.28 13.75	PASS PASS PASS PASS PASS PASS PASS PASS
13 13 13 CHANNEL Low Low Low High High High	802.11 n 802.11b 802.11g 802.11n Mode 802.11 b 802.11 g 802.11 n 802.11 g 802.11 g 802.11 n	2483.5 2483.5 Radiated Peak I Band edge /Measuremen t Frequency (MHz) 2390.00 2390.00 2390.00 2483.50 2483.50 2483.50	62.81 69.67 72.10 74.18 Restricted Banc band level (dBuV/m @ 3m) 53.24 62.85 64.60 53.70 60.23 60.66	112.58 108.80 107.85 I-Edge High Dat Measuremen t Type Peak Peak Peak Peak Peak Peak Peak	42.92 36.70 33.67 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98	30.00 30.00 30.00 Margin 20.74 11.13 9.38 20.28 13.75 13.32	PASS PASS PASS PASS PASS PASS PASS PASS
13 13 13 CHANNEL Low Low Low High High High 13	802.11 n 802.11b 802.11g 802.11n Mode 802.11 b 802.11 g 802.11 p 802.11 b 802.11 g 802.11 n 802.11 b	2483.5 2483.5 2483.5 Radiated Peak I Band edge /Measuremen t Frequency (MHz) 2390.00 2390.00 2390.00 2390.00 2483.50 2483.50 2483.50 2483.50	62.81 69.67 72.10 74.18 Restricted Banc dighest out of band level (dBuV/m @ 3m) 53.24 62.85 64.60 53.70 60.23 60.66 59.756	112.58 108.80 107.85 I-Edge High Dat Measuremen t Type Peak Peak Peak Peak Peak Peak Peak Pea	42.92 36.70 33.67 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98	30.00 30.00 30.00 Margin 20.74 11.13 9.38 20.28 13.75 13.32 14.224	PASS PASS PASS PASS PASS PASS PASS PASS
13 13 13 CHANNEL Low Low Low High High High	802.11 n 802.11b 802.11g 802.11n Mode 802.11 b 802.11 g 802.11 n 802.11 g 802.11 g 802.11 n	2483.5 2483.5 Radiated Peak I Band edge /Measuremen t Frequency (MHz) 2390.00 2390.00 2390.00 2483.50 2483.50 2483.50	62.81 69.67 72.10 74.18 Restricted Banc band level (dBuV/m @ 3m) 53.24 62.85 64.60 53.70 60.23 60.66	112.58 108.80 107.85 I-Edge High Dat Measuremen t Type Peak Peak Peak Peak Peak Peak Peak	42.92 36.70 33.67 a Rate Limit (dBuV/m @ 3m) 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98 73.98	30.00 30.00 30.00 Margin 20.74 11.13 9.38 20.28 13.75 13.32	PASS PASS PASS PASS PASS PASS PASS PASS

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Radiated Average Restricted Band-Edge High Data Rate							
CHANNEL	Mode	Band edge /Measuremen t Frequency (MHz)	Highest out of band level (dBuV/m @ 3m)	Measurement Type	Limit (dBuV/m @ 3m)	Margin	Result
Low	802.11 b	2390.00	42.04	Average	53.98	11.94	PASS
Low	802.11 g	2390.00	46.78	Average	53.98	7.20	PASS
Low	802.11 n	2390.00	47.21	Average	53.98	6.77	PASS
High	802.11 b	2483.50	42.15	Average	53.98	11.83	PASS
High	802.11 g	2483.50	45.27	Average	53.98	8.71	PASS
High	802.11 n	2483.50	45.32	Average	53.98	8.66	PASS
13	802.11 b	2483.50	49.277	Average	53.98	4.703	PASS
13	802.11 g	2483.50	49.764	Average	53.98	4.216	PASS
13	802.11 n	2483.50	50.20	Average	53.98	3.78	PASS
*Limit shown	is the average	limit taken from F	CC Part 15.209		•		



4.1 OUTPUT POWER

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

Limits of power measurements: For FCC Part 15.247 Device: The maximum allowed output power is 30 dBm.

Test procedures:

Details can be found in section 3.4 of this report.

Deviations from test standard:

No deviation.

Test setup:

Details can be found in section 3.4 of this report.

EUT operating conditions:

Details can be found in section 2.1 of this report.

Test results:

Pass

Comments:

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



4.2 BANDWIDTH

Test Method: All the radio measurements were performed using the sections from ANSI C63.10, details about the section used can be found in the spectrum analyzer titles on the graph.

Limits of bandwidth measurements:

For FCC Part 15.247 Device:

The 99% occupied bandwidth is for informational 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:

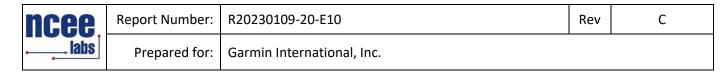
Details can be found in section 2.1 of this report.

Test results:

Pass

Comments:

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



4.3 DUTY CYCLE

Test Method:

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



4.4 RADIATED EMISSIONS

Test Method: ANSI C63.10-2013, Section 6.5, 6.6

Limits for radiated emissions measurements:

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

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

NOTE:

1. The lower limit shall apply at the transition frequencies.

2. Emission level (dBuV/m) = 20 * log * Emission level (μ V/m).

3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits by more than 20dB under any condition of modulation.

4. The EUT was tested for spurious emissions while running off of battery power and external USB power. The worse-case emissions were produced while running off of USB power, so results from this mode are presented.



Test procedures:

a. The EUT was placed on the top of a rotating table above the ground plane in a 10 meter semianechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The table was 0.8m high for measurements from 30MHz-1Ghz and 1.5m for measurements from 1GHz and higher.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

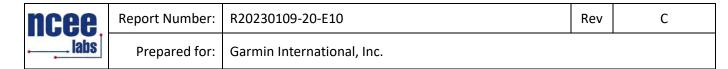
c. The antenna was a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are used to make the measurement.

d. For each suspected emission, the EUT was arranged to maximize its emissions and then the antenna height was varied from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum emission reading.

e. The test-receiver system was set to use a peak detector with a specified resolution bandwidth. For spectrum analyzer measurements, the composite maximum of several analyzer sweeps was used for final measurements.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise, the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

g. The EUT was maximized in all 3 orthogonal positions. The results are presented for the axis that had the highest emissions.



Test setup:

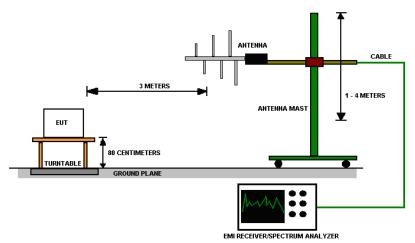


Figure 3 - Radiated Emissions Test Setup

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequencies below 1GHz.

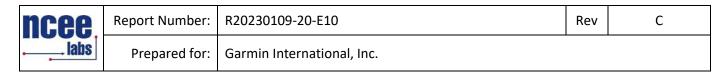
2. The resolution bandwidth was 1 MHz for all measurements and at frequencies above 1GHz, A peak and RMS detector was used for all measurements above 1GHz. Measurements were made with an EMI Receiver.

Deviations from test standard:

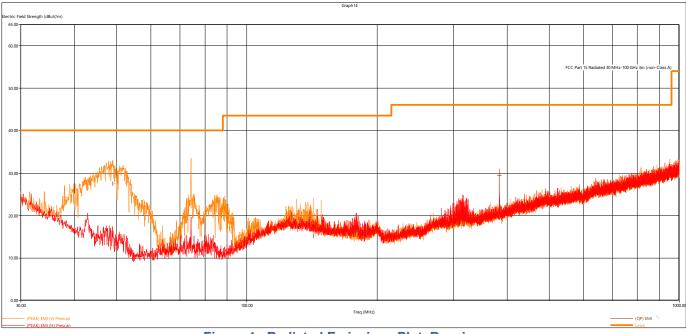
No deviation.

EUT operating conditions

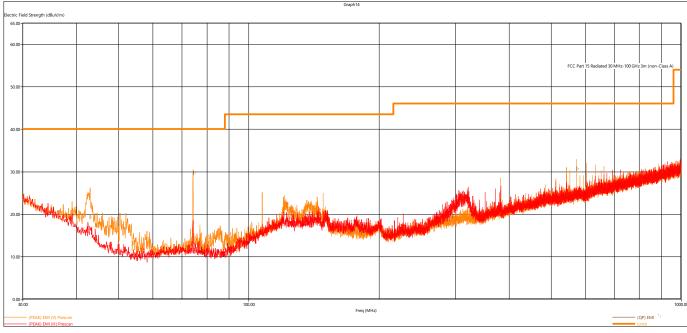
Details can be found in section 2.1 of this report.



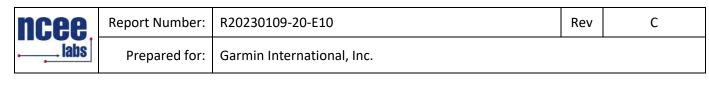
Test results:











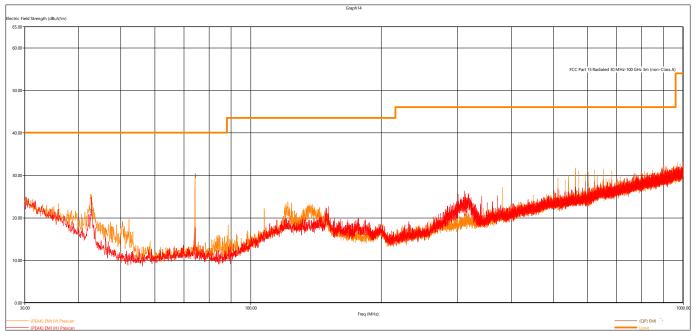


Figure 6 - Radiated Emissions Plot, 802.11b 11MB

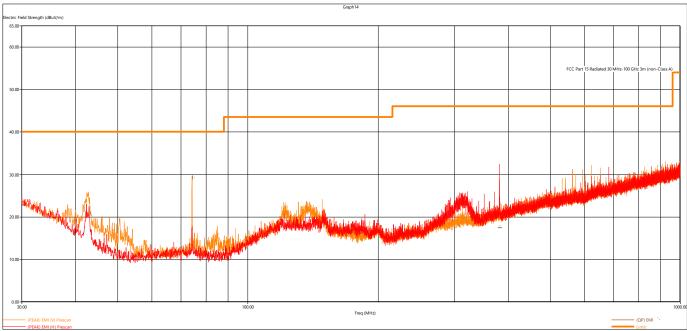
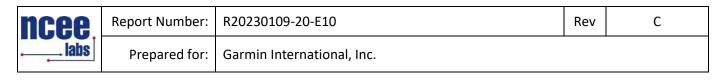
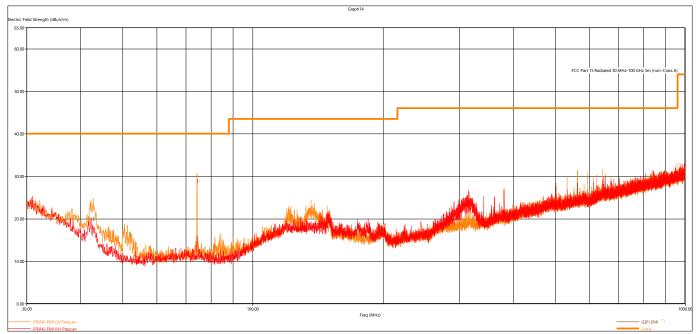
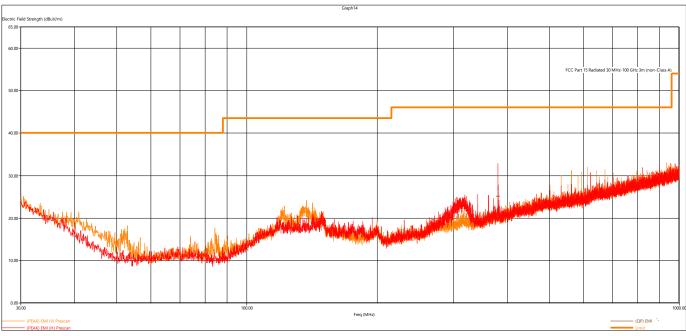


Figure 7 - Radiated Emissions Plot, 802.11g 6MB













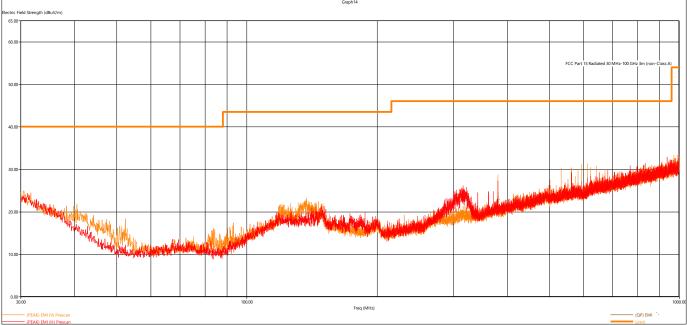


Figure 10 - Radiated Emissions Plot, 802.11n MCS7

REMARKS:

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

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	Quasi-Peak Measurements, 802.11x							
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation
MHz	dBµV/m	dBµV/m	dB	cm.	deg.			
43.06752	19.25	40.00	20.75	148	6	V	Low	WIFI B 1MB
74.244	29.6	40.00	10.40	160	278	V	Low	WIFI B 1MB
572.83248	30.6	46.02	15.42	105	153	V	Low	WIFI B 1MB
42.8328	21.55	40.00	18.45	130	66	V	Low	WIFI B 11MB
74.25048	29.8	40.00	10.20	128	251	V	Low	WIFI B 11MB
562.85376	26.06	46.02	19.96	201	156	V	Low	WIFI B 11MB
382.23216	17.32	46.02	28.70	183	103	Н	Low	WIFI G 6MHz
42.69384	20.67	40.00	19.33	125	303	V	Low	WIFI G 6MHz
74.2548	29.2	40.00	10.80	128	209	V	Low	WIFI G 6MHz
42.94368	19.81	40.00	20.19	125	84	V	Low	WIFI G 54MHz
74.24184	28.74	40.00	11.26	159	299	V	Low	WIFI G 54MHz
136.2168	18.76	43.52	24.76	107	120	V	Low	WIFI G 54MHz
380.81616	25.09	46.02	20.93	227	116	Н	Low	WIFI N MCS0
380.54208	22.76	46.02	23.26	164	141	V	Low	WIFI N MCS7
315.659040	17.57	46.02	28.45	125.00	80.00	Н	ŀ	Receive
383.528400	29.32	46.02	16.70	104.00	285.00	Н	Receive	
48.877920	27.41	40.00	12.59	116.00	210.00	V	ŀ	Receive
142.322160	15.19	43.52	28.33	174.00	138.00	V		Receive

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

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Ī	Prepared for:	Garmin International, Inc.		

	Peak Measurements, 802.11x							
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation
MHz	dBµV/m	dBµV/m	dB	cm.	deg.			
2414.694	94.08	73.98	NA	248	165	Н	Low	WIFI B 1MB
2434.224	96.76	73.98	NA	204	163	Н	Mid	WIFI B 1MB
4873.794	49.22	73.98	24.76	525	111	Н	Mid	WIFI B 1MB
2464.686	94.54	73.98	NA	239	164	Н	High	WIFI B 1MB
2414.828	97.86	73.98	NA	243	162	Н	Low	WIFI B 11MB
2433.804	100.31	73.98	NA	230	161	Н	Mid	WIFI B 11MB
4870.196	46.09	73.98	27.89	143	359	Н	Mid	WIFI B 11MB
2463.016	99.5	73.98	NA	225	163	Н	High	WIFI B 11MB
2416.932	96.63	73.98	NA	227	163	Н	Low	WIFI G 6MHz
4930.428	44.57	73.98	29.41	119	139	Н	Low	WIFI G 6MHz
2430.626	101.27	73.98	NA	185	165	Н	Mid	WIFI G 6MHz
4869.918	44.77	73.98	29.21	336	355	Н	Mid	WIFI G 6MHz
2464.116	97.02	73.98	NA	311	165	Н	High	WIFI G 6MHz
4940.626	43.4	73.98	30.58	493	293	Н	High	WIFI G 6MHz
2415.512	97.96	73.98	NA	234	169	Н	Low	WIFI G 54MHz
2429.946	101.78	73.98	NA	193	161	Н	Mid	WIFI G 54MHz
2466.930	97.75	73.98	NA	468	158	Н	High	WIFI G 54MHz
2414.12	96.35	73.98	NA	382	162	Н	Low	WIFI N MSC0
2431.64	101.4	73.98	NA	189	162	Н	Mid	WIFI N MSC0
2466.91	98.16	73.98	NA	187	163	Н	High	WIFI N MSC0
2415.848	98.51	73.98	NA	238	164	Н	Low	WIFI N MSC7
2431.048	98.7	73.98	NA	164	123	V	Mid	WIFI N MSC7
2467.354	96.64	73.98	NA	291	115	V	High	WIFI N MSC7

The EUT was maximized on all 3 orthogonal axes. The worst-case is shown in the plot and table above. All other measurements were found to be at least 6 dB Below the limit.

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Average Measurements, 802.11x											
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation			
MHz	dBµV/m	dBµV/m	dB	cm.	deg.						
2414.694	90.87	53.98	NA	248	165	Н	Low	WIFI B 1MB			
2434.224	93.68	53.98	NA	204	163	Н	Mid	WIFI B 1MB			
4873.794	43.3	53.98	10.68	525	111	Н	Mid	WIFI B 1MB			
2464.686	91.37	53.98	NA	239	164	Н	High	WIFI B 1MB			
2414.828	89.8	53.98	NA	243	162	Н	Low	WIFI B 11MB			
2433.804	92.47	53.98	NA	230	161	Н	Mid	WIFI B 11MB			
4870.196	32.87	53.98	21.11	143	359	Н	Mid	WIFI B 11MB			
2463.016	91.08	53.98	NA	225	163	Н	High	WIFI B 11MB			
2416.932	86.14	53.98	NA	227	163	Н	Low	WIFI G 6MHz			
4930.428	30.23	53.98	23.75	119	139	Н	Low	WIFI G 6MHz			
2430.626	90.52	53.98	NA	185	165	Н	Mid	WIFI G 6MHz			
4869.918	31.13	53.98	22.85	336	355	Н	Mid	WIFI G 6MHz			
2464.116	85.83	53.98	NA	311	165	Н	High	WIFI G 6MHz			
4940.626	30.15	53.98	23.83	493	293	Н	High	WIFI G 6MHz			
2415.512	86.25	53.98	NA	234	169	Н	Low	WIFI G 54MHz			
2429.946	90.3	53.98	NA	193	161	Н	Mid	WIFI G 54MHz			
2466.93	85.44	53.98	NA	468	158	Н	High	WIFI G 54MHz			
2414.12	84.44	53.98	NA	382	162	Н	Low	WIFI N MSC0			
2431.64	89.84	53.98	NA	189	162	Н	Mid	WIFI N MSC0			
2466.91	86.36	53.98	NA	187	163	Н	High	WIFI N MSC0			
2415.848	85.88	53.98	NA	238	164	Н	Low	WIFI N MSC7			
2431.048	86.68	53.98	NA	164	123	V	Mid	WIFI N MSC7			
2467.354	84.26	53.98	NA	291	115	V	High	WIFI N MSC7			

The EUT was maximized on all 3 orthogonal axes. The worst-case is shown in the plot and table above. All other measurements were found to be at least 6 dB Below the limit.



Test Method: ANSI C63.10-2013, Section 6.7

Limits of spurious emissions:

From FCC Part 15.247:

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

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Test procedures:

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

Deviations from test standard:

Test performed at 120kHz RBW.

Test setup:

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

EUT operating conditions:

Details can be found in section 2.1 of this report.

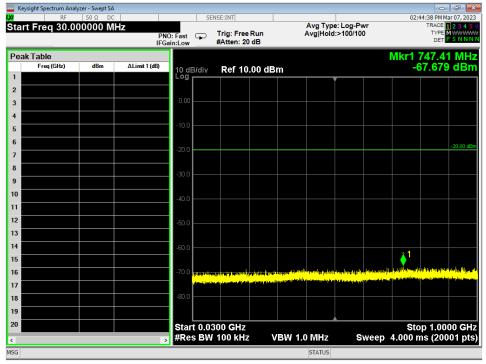
Test results:

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

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



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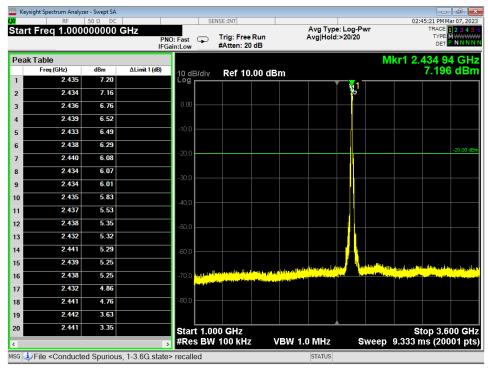


Figure 12 - Radiated Emissions Plot, WIFI 802.11b, 1G – 3.6G, Low



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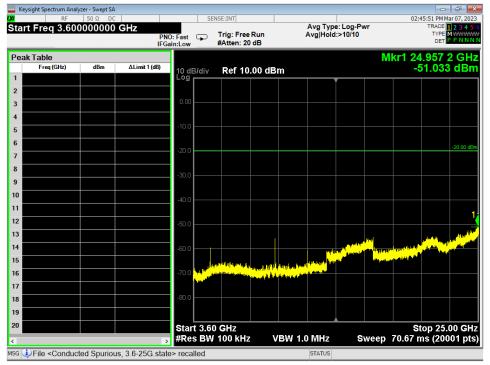


Figure 13 - Radiated Emissions Plot, WIFI 802.11b, 3.6G - 25G, Low

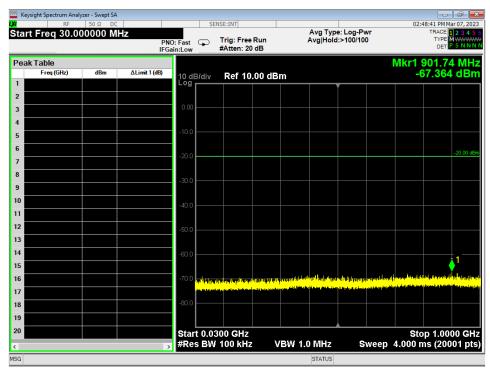


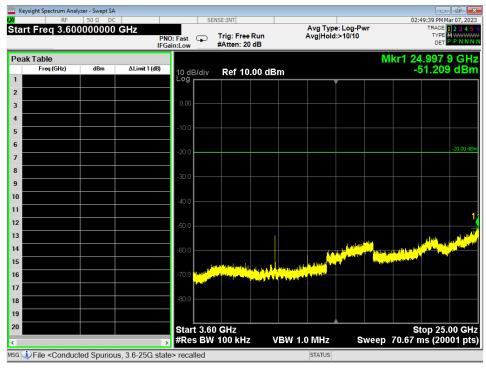
Figure 14 - Radiated Emissions Plot, WIFI 802.11g, 30M – 1G, Low



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tart	Freq 1.0000	00000	PNC	D: Fast ain:Low		Trig: Free #Atten: 2			Avg Typ Avg Hold					234 M W///// PNNN
eak	Table										N	lkr1 2.	432 34	4 GH
	Freq (GHz)	dBm	ΔLimit1(dB)	10 di	3/div	Ref 10).00 dB	m					1.965	i dBi
	2.432	1.96		Log						<u>î</u> 1				
2	2.430	1.87												
3	2.431	1.84		0.00										
	2.430	1.69												
	2.430	1.65		-10.0										
5	2.432	1.61		20.0										-20.00 d
/	2.432	1.61		-20.0										
	2.436	1.59		-30.0										
	2.431	1.59		-30.0										
0	2.434	1.59		-40.0										
1	2.435	1.52		-40.0										
2	2.433	1.35		-50.0										
3	2.438	1.28												
4	2.433	1.28		-60.0										
5	2.433	1.11												
6	2.436	1.06		-70.0	International International International International International International International International	a, an in a livit	illes be with	Market Party	nisten (julie en sen sen sen sen sen sen sen sen sen			international data		ini in an
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8	2.434	0.99		-80.0										
9	2.435	0.94												
0	2.435	0.94		Star	+ 1.00	0 GHz							top 3.6	
			>			100 GHZ		'BW 1.			Duroon	9.333 i	100 J.00	00 GI









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art Freq 30.00	50 Ω DC 00000 M	PNC): Fast (in:Low		SE:INT Trig: Free #Atten: 20	Run) dB		Avg Typ Avg Hold			02		lar 07, 20 1 2 3 4 M WWW P S N N
eak Table											Mkr1	986.1	8 MI
Freq (GHz)	dBm	ΔLimit1(dB)	10 dB	/div	Ref 10	.00 dB	m				-	67.64() dB
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			0.00										
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			-10.0										
			-20.0										-20.00 c
			-30.0										
D			-40.0										
1													
2			-50.0										
3													
4			-60.0										
5			70.0								مراجع العالية	والمنطرب وأو	ور والمعام
6			-70.0	ad tan bar		iner under der er		land blade (n.e.). Theories is not		a a a a a a a a a a a a a a a a a a a		a transformer and state	a faligher an a
7			-80.0										
B			-00.0										
9													
			Start	0.03	00 GHz				_		St	op 1.00	00 GI
		>	#Res	BW	100 kHz	V	/BW 1.0	JIVIHŻ	s	weep	4.000	ms (200	JUT pi



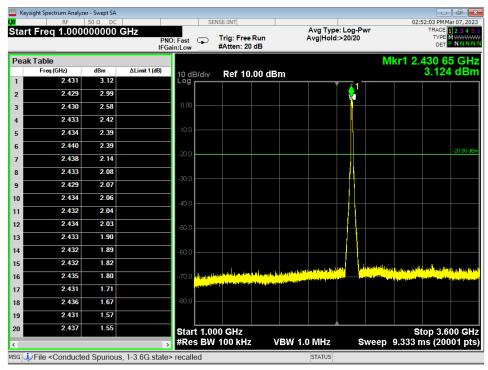


Figure 18 - Radiated Emissions Plot, WIFI 802.11n, 1G - 3.6G, Low



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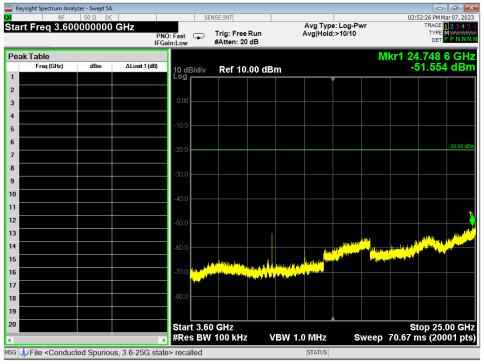


Figure 19 - Radiated Emissions Plot, WIFI 802.11n, 3.6G - 25G, Low



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4.6 BAND EDGES

Test Method: All the radio measurements were performed using the sections from ANSI C63.10, details about the section used can be found in the spectrum analyzer titles on the graph.

Limits of band-edge measurements: For FCC Part 15.247 Device:

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

Test procedures:

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

Deviations from test standard:

No deviation.

Test setup:

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

EUT operating conditions:

Details can be found in section 2.1 of this report.



Test results:

Pass

Comments:

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



4.7 **POWER SPECTRAL DENSITY**

Test Method: All the radio measurements were performed using the sections from ANSI C63.10, details about the section used can be found in the spectrum analyzer titles on the graph.

Limits of power measurements:

For FCC Part 15.247 Device: The maximum PSD allowed is 8 dBm.

Test procedures:

Details can be found in section 3.4 of this report.

Deviations from test standard:

No deviation.

Test setup:

Details can be found in section 3.4 of this report.

EUT operating conditions:

Details can be found in section 2.1 of this report.

Test results:

Pass

Comments:

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



4.8 CONDUCTED AC MAINS EMISSIONS

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

Limits for conducted emissions measurements:

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

Notes:

1. The lower limit shall apply at the transition frequencies.

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

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3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

Test Procedures:

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

Deviation from the test standard:

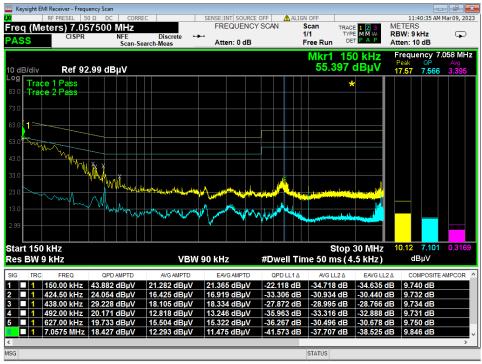
No deviation

EUT operating conditions:

Details can be found in section 2.1 of this report.



Test Results:





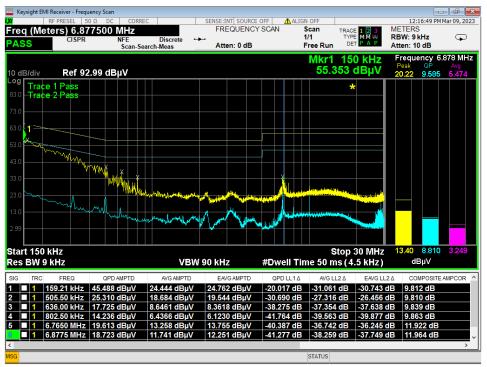


Figure 21 - Conducted Emissions Plot, Neutral, TX





Figure 22 - Conducted Emissions Plot, Line, IDLE

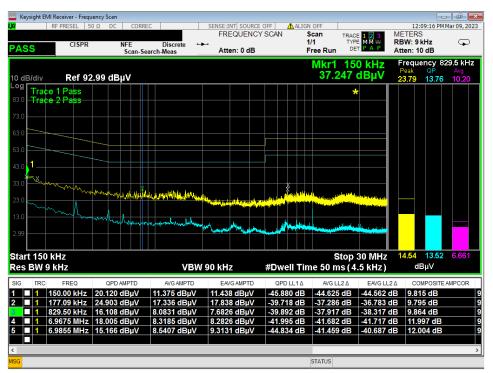


Figure 23 - Conducted Emissions Plot, Neutral, IDLE

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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 dBμV 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 dBμV/m.

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

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

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

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

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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)]² / 30

Power (watts) = 10^[Power (dBm)/10] / 1000

Voltage ($dB\mu V$) = Power (dBm) + 107 (for 50 Ω measurement systems)

Field Strength (V/m) = 10[[]Field Strength (dBµV/m) / 20] / 10⁶

Gain = 1 (*numeric gain for isotropic radiator*)

Conversion from 3m field strength to EIRP (d=3):

 $EIRP = [FS(V/m) \times d^2]/30 = FS[0.3]$ for d = 3

 $EIRP(dBm) = FS(dB\mu V/m) - 10(log \ 10^{9}) + 10log[0.3] = FS(dB\mu V/m) - 95.23$

10log(10^9) is the conversion from micro to milli



APPENDIX B - MEASUREMENT UNCERTAINTY

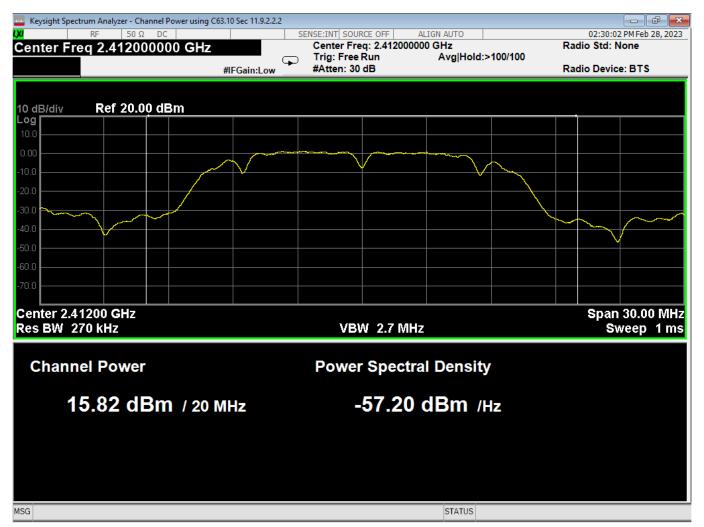
Where relevant, the following measurement uncertainty levels have been for tests performed in this test report:

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

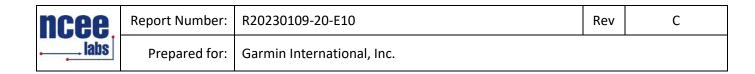
Expanded uncertainty values are calculated to a confidence level of 95%.

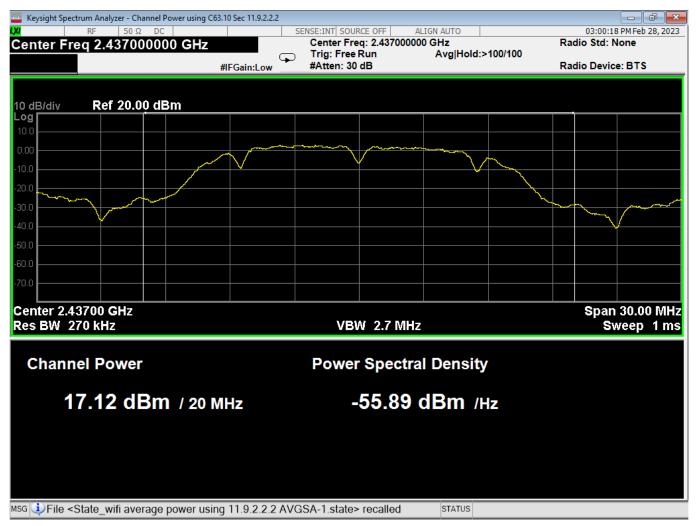
ncee,	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

APPENDIX C – GRAPHS AND TABLES

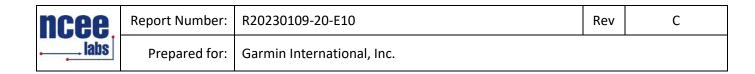


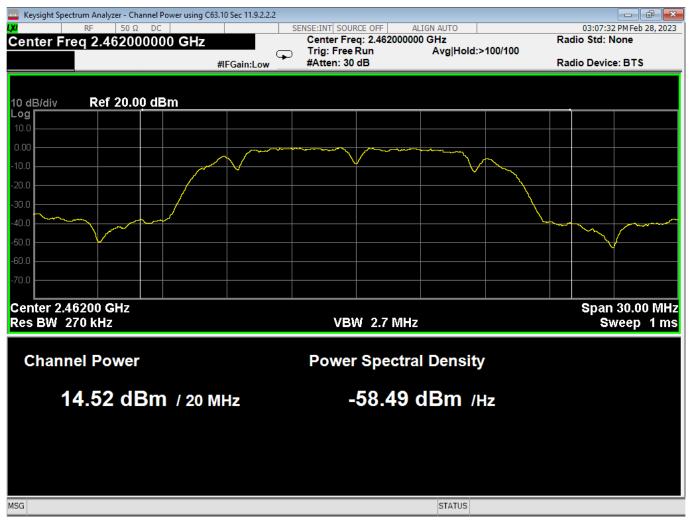
01 Average Power, Low, Wifi B, Low Data Rate



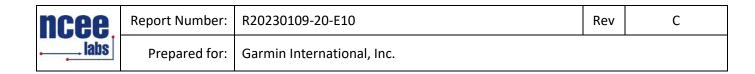


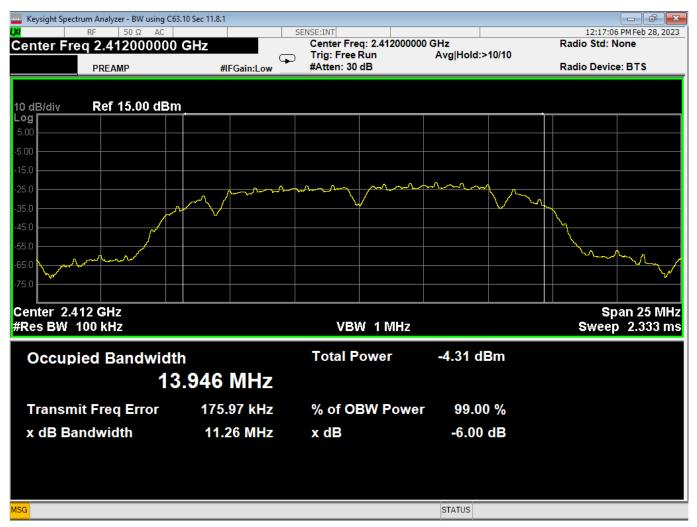
02 Average Power, Mid, Wifi B, Low Data Rate



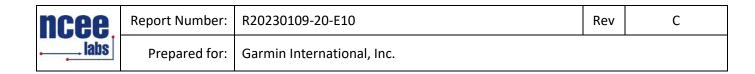


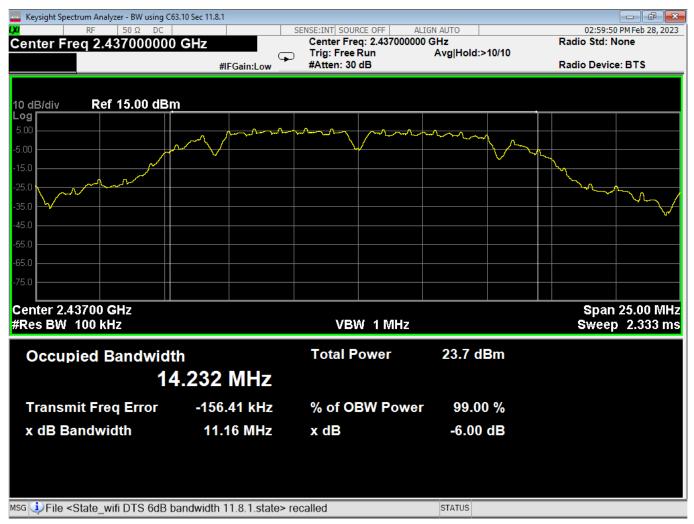
03 Average Power, High, Wifi B, Low Data Rate



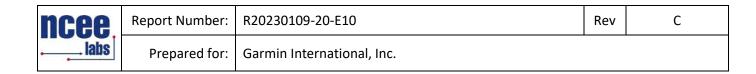


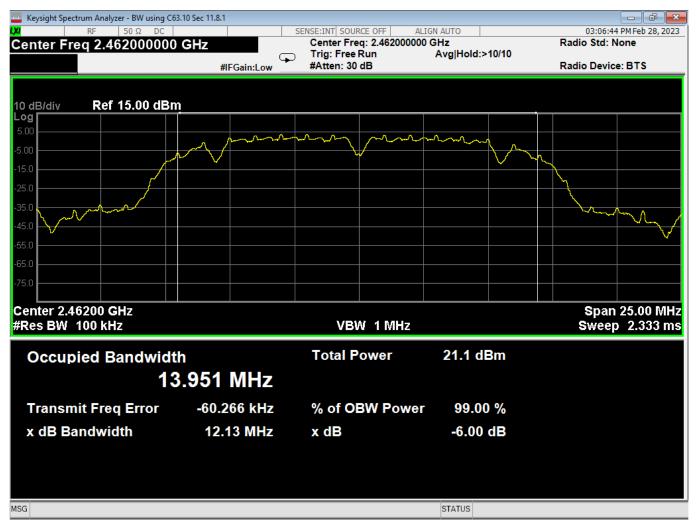
04 6dB Bandwidth, Low, Wifi B, Low Data Rate



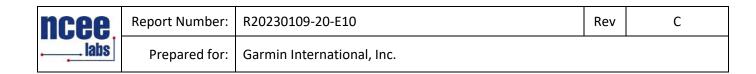


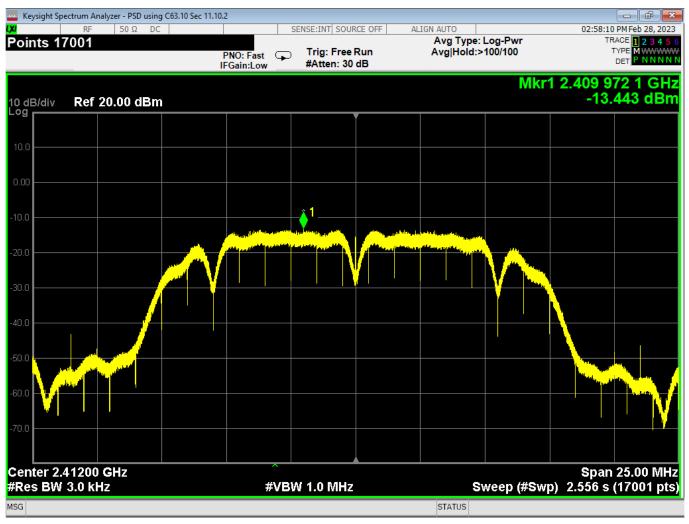
05 6dB Bandwidth, Mid, Wifi B, Low Data Rate



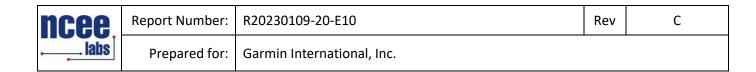


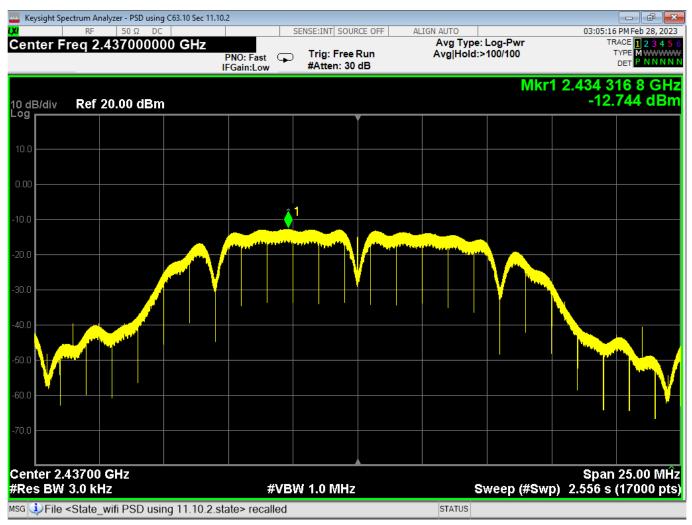
06 6dB Bandwidth, High, Wifi B, Low Data Rate



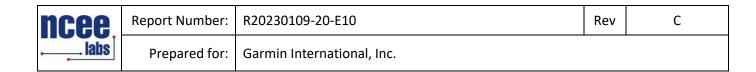


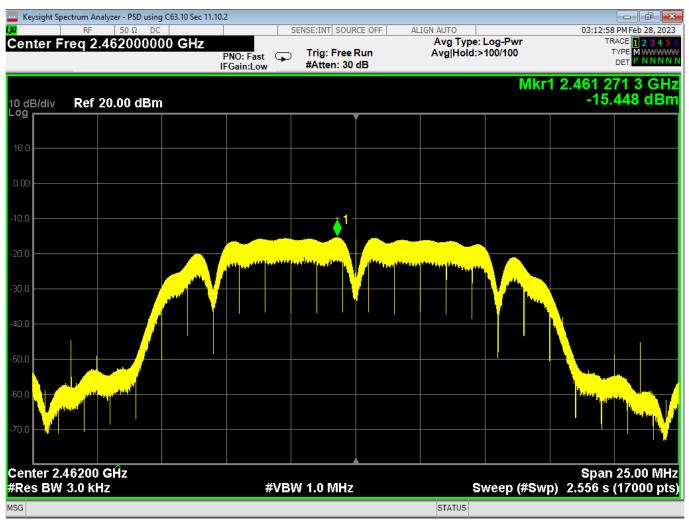
07 PSD, Low, Wifi B, Low Data Rate





08 PSD, Mid, Wifi B, Low Data Rate





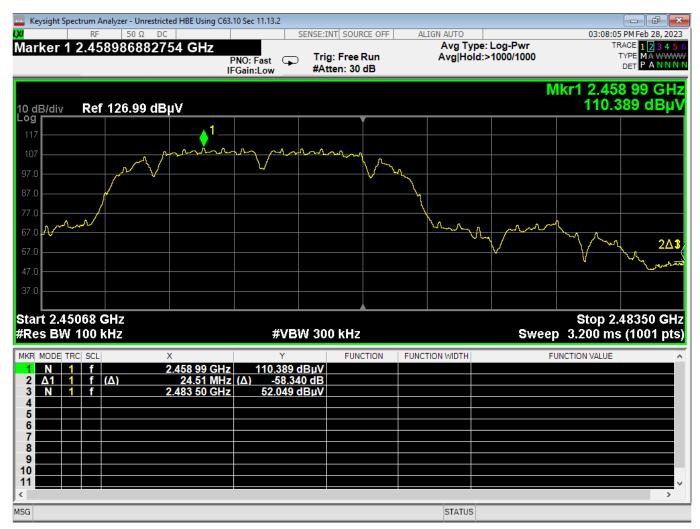
09 PSD, High, Wifi B, Low Data Rate

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

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

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	Prepared for:	Garmin International, Inc.		

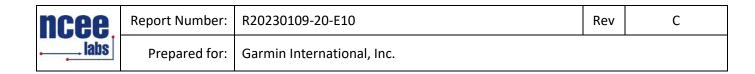
Keysight Spectrum Analyzer - Restricted LBE using C63.			•			
RF 50 Ω AC Marker 2 2.389950000000 GHz PASS PREAMP		ig: Free Run itten: 0 dB	ALIGN OFF Avg Type: Avg Hold:>		TR/ T	AM Feb 28, 2023 ACE 1 2 3 4 5 6 YPE MA WWW DET PANNN
Ref Offset 36.12 dB 10 dB/div Ref 88.11 dBµV				M	kr2 2.389 42.5	95 GHz 33 dBµV
78.1 Trace 1 Pass Trace 2 Pass						
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38.1						
18.1						
-1.89						
Start 2.380000 GHz #Res BW 1.0 MHz	#VBW 50) MHz*		Sweep	Stop 2.39 1.000 ms	0000 GHz (1001 pts)
MKR MODE TRC SCL X 1 N 1 f 2.389 68 GH 2 N 2 f 2.389 95 GH		FUNCTION	FUNCTION WIDTH	FUI	NCTION VALUE	^
2 H 2 H 2.005 50 GH 3 4 5 5 5 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	2 42.303 UDµV					
6 7 7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9						
9 10 11 11						
K MSG			STATUS			>

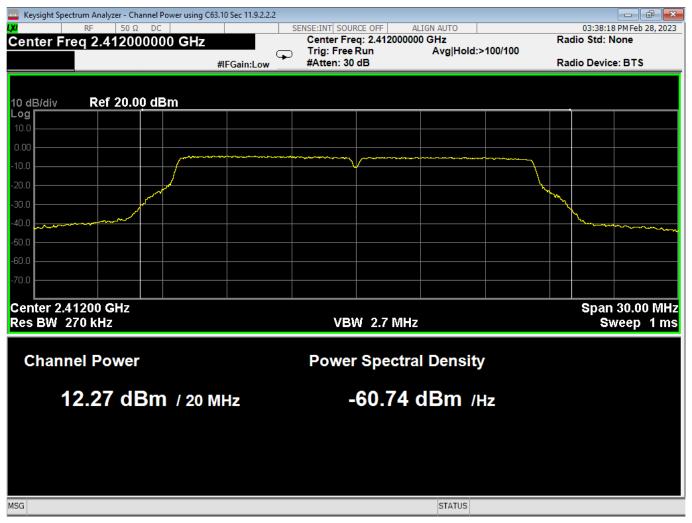
12 Lower Bandedge, Restricted, Wifi B, Low Data Rate

Incee labs	Report Number:	R20230109-20-E10	Rev	С
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Restricted HBE C63.10 Sec		A	
RF 50 Ω AC Marker 2 2.487526000000 GHz PASS DEFAME	PNO: Fast Trig: Free Ru EGain:High #Atten: 0 dB	▲ ALIGN OFF Avg Type: RMS n Avg Hold:>1000/1000	09:51:16 AM Feb 28, 2023 TRACE 1 2 3 4 5 6 TYPE MA WWW DET P A N N N
Ref Offset 36.65 dB 10 dB/div Ref 88.64 dBµV	FGain:High #Atten: 0 dB	М	kr2 2.487 526 0 GHz 42.408 dBµV
Log 78.6 Trace 1 Pass Trace 2 Pass 68.6			
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48.6 2 -			
28.6			
8.64			
Start 2.483500 GHz #Res BW 1.0 MHz	VBW 50 MHz*	Sw	Stop 2.500000 GHz eep 1.000 ms (1001 pts)
MKR MODE TRC SCL X 1 N 1 f 2.491 255 0 GH	Y FUNCTION	DN FUNCTION WIDTH	FUNCTION VALUE
2 N 2 f 2.487 526 0 GH 3 4			
5 6 7 8			
9 10 11			
< /second statements and statements		STATUS	>

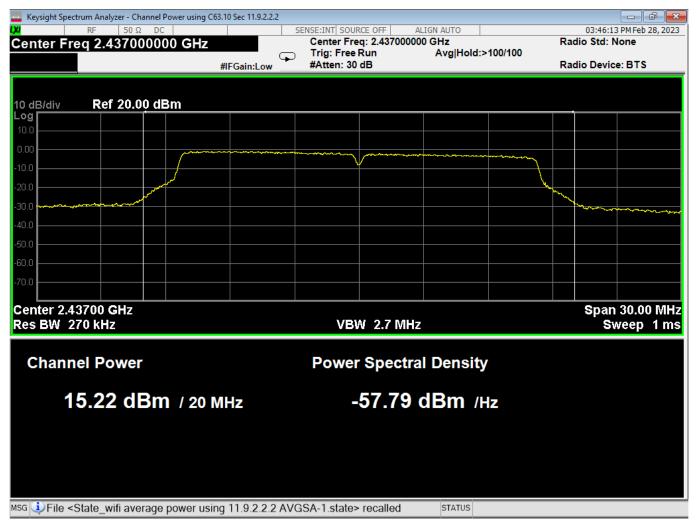
13 Higher Bandedge, Restricted, Wifi B, Low Data Rate



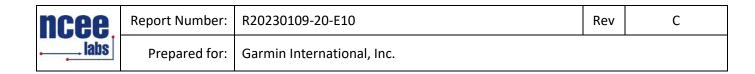


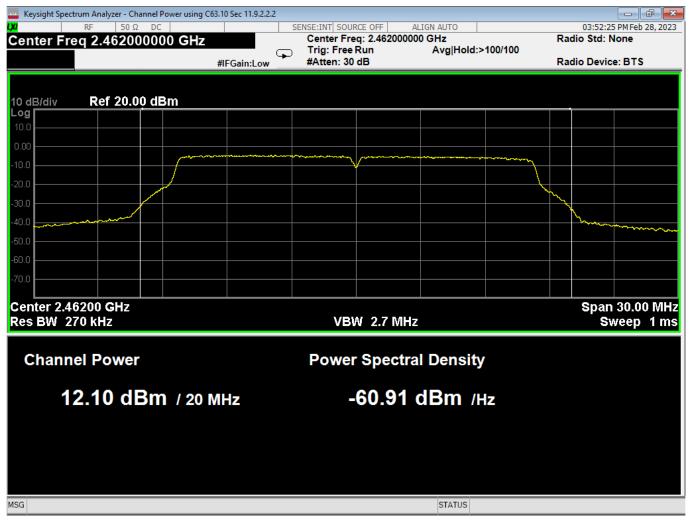
14 Average Power, Low, Wifi G, Low Data Rate

ncee labs	Report Number:	R20230109-20-E10	Rev	С
	Prepared for:	Garmin International, Inc.		



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





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

ncee labs	Report Number:	R20230109-20-E10	Rev	С
	Prepared for:	Garmin International, Inc.		

	C63.10 Sec 11.8.1			
RF 50 Ω DC			ALIGN AUTO	03:37:45 PM Feb 28, 2023
Center Freq 2.41200000		Center Freq: 2.4120000 Trig: Free Run	Avg Hold:>10/10	Radio Std: None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
40 JD/JB/	P 0			
10 dB/div Ref 15.00 dB				
5.00				
-5.00	mar have and grown and	mmmm mmmmm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~
-15.0				
and a second				
-25.0 mlon mm				
-35.0 Mrv (1944) 477 V				᠋ᢅ᠕ᢩᡁᡊ᠕ᡘᡘᢢᠰᡕ
-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 Bandwid	th	Total Power	19.3 dBm	
	6.575 MHz			
Transmit Freq Error	-38.318 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	16.54 MHz	x dB	-6.00 dB	
100			CT ATUS	
ASG			STATUS	

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

ncee	Report Number:	R20230109-20-E10	Rev	С
labs		Garmin International, Inc.		

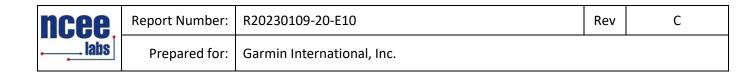
🚾 Keysight Spectrum Analyzer - BW us	-			- 6 🔀
₩ 8 F 50 Ω Ref Value 26.00 dBm	DC	SENSE:INT SOURCE OFF A		03:45:44 PM Feb 28, 2023 Radio Std: None
	ے #IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 26.00	dBm			
16.0				
6.00				
-4.00	ᠬᡁᢛᠬᡙᡔ᠆᠂ᠰᠵᠲᡐ᠆ᡎᡊ᠆ᢛᡅᠰᠧᢋᡗᡧ᠆ᢧᠬ	monormy promosom	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	when
-4.00				
A D B D D D P MAR				Mary Ry my Are A m
24.0				······································
-34.0				
-44.0				
-54.0				
-64.0				
Center 2.43700 GHz				Span 25.00 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandw	vidth	Total Power	22.4 dBm	
	16.809 MHz			
Transmit Freq Erro	r -165.77 kHz	% of OBW Power	r 99.00 %	
x dB Bandwidth	16.51 MHz	x dB	-6.00 dB	
ISG			STATUS	

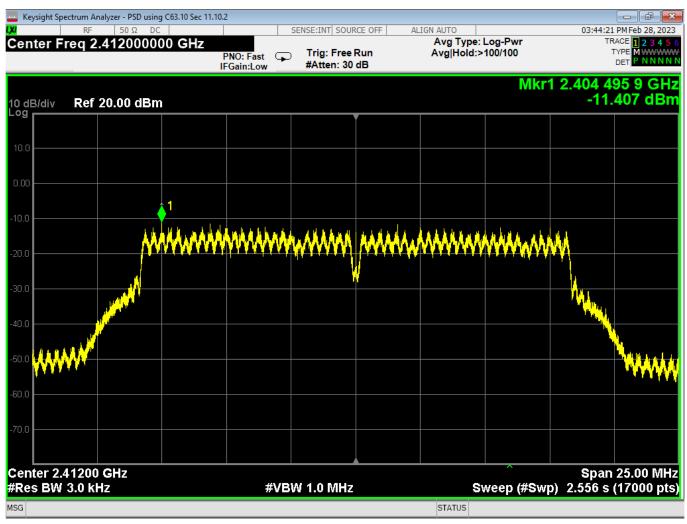
18 6dB Bandwidth, Mid, Wifi G, Low Data Rate

ncee	Report Number:	R20230109-20-E10	Rev	С
labs		Garmin International, Inc.		

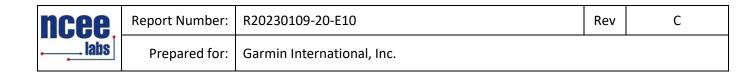
Keysight Spectrum Analyzer - BW using C	63.10 Sec 11.8.1			
XI RF 50 Ω DC		SENSE:INT SOURCE OFF	LIGN AUTO	03:51:57 PM Feb 28, 2023
Center Freq 2.46200000	0 GHz	Center Freq: 2.4620000		Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dB	m			
5.00				
-5.00	$-\omega^{-}\omega^{-}\omega^{-}\omega^{-}\omega^{-}\omega^{-}\omega^{-}\omega^{-$	warman manana	white many and the second second	many
-15.0				
month				www.
-25.0				
-45.0				
-55.0				
-65.0				
-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	18.9 dBm	
1	6.536 MHz			
Transmit Freq Error	-37.131 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	16.55 MHz	x dB	-6.00 dB	
1SG			STATUS	

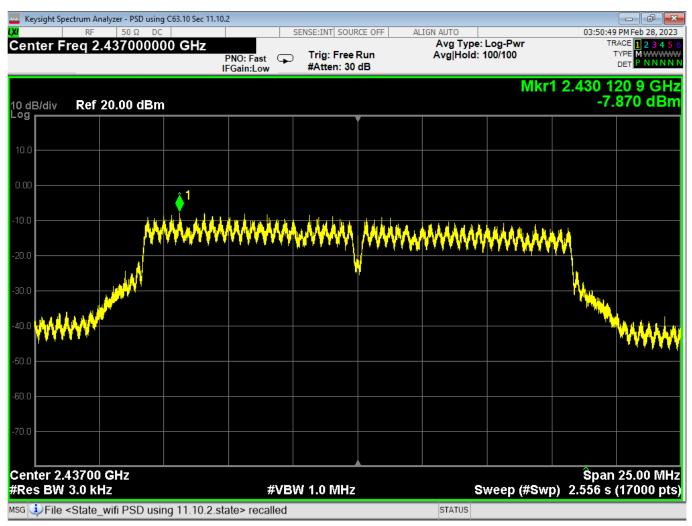
19 6dB Bandwidth, High, Wifi G, Low Data Rate



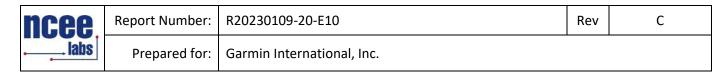


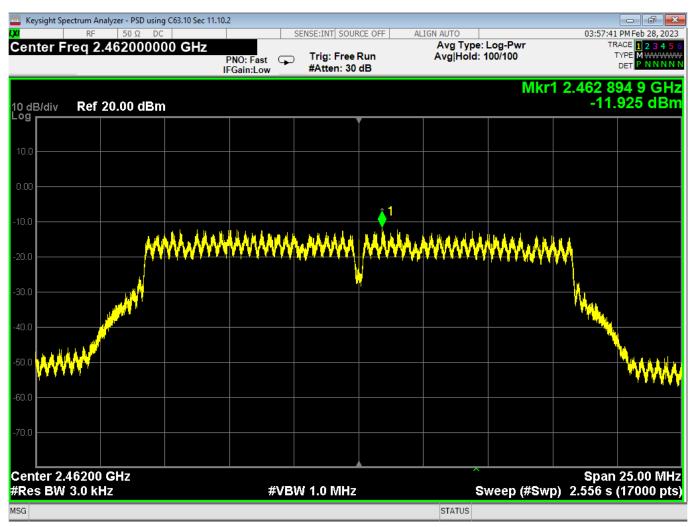
20 PSD, Low, Wifi G, Low Data Rate





21 PSD, Mid, Wifi G, Low Data Rate





22 PSD, High, Wifi G, Low Data Rate

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

Keysight Spe	ectrum Analyze	r - Unrestricted LBE	using C63.10 Sec 11.13.2						- # - ×
LXI	RF	50 Ω AC		SENSE:I	NT			05:24:12 PM	Mar 02, 2023
Marker 3	2 39979	9392668 (GHz			Avg Typ	e: RMS	TRACI	12345
marker 5	2.33373	/JJJJ2000 0	PNO: Fast	Tric	g: Free Run		1: 1000/1000	TYP	A A WWWW
			IFGain:Low		ten: 20 dB	-		DE	AANNN
			II Gameow						
							Mk	r3 2.399 7	99 GHz
	D-5 444	200 JD						63 74	4 dBµV
10 dB/div Log	Rei II	δ.99 dBμV							- abp -
					Ť	. 1			
107									
97.0						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
97.0									W
87.0									vv
						<u>ک</u> م			
77.0					. /				
				▲3∆					
67.0					\sim				
57.0		$\sim\sim\sim\sim$	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~					
	$\sim\sim\sim\sim\sim$								
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37.0									
27.0									
27.0									
Start 2.39	000 OU-							Stop 2.41	339 GHz
	9000 GHZ								
			V	BM 10 k	(H7*		Sween	23.60 ms (1	1001 nfe)
#Res BW			V	BW 10 k	(Hz*		Sweep	23.60 ms (1	001 pts)
#Res BW	100 kHz					FUNCTION WIDTH	-	•	001 pts)
	100 kHz	X	1	(FUNCTION	FUNCTION WIDTH	-	23.60 ms (1	001 pts)
#Res BW	100 kHz	× 2.405 4	12 GHz 100.3	52 dΒμV		FUNCTION WIDTH	-	•	001 pts)
#Res BW	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	001 pts)
#Res BW MKR MODE TF 1 N 1 2 Δ1 1 3 N 1	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dΒμV		FUNCTION WIDTH	-	•	001 pts)
#Res BW MKR MODE TF 1 N 1 2 A1 1 3 N 1 4	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	001 pts)
#Res BW MKR MODE TF 1 N 2 A1 3 N 4 5	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	001 pts)
#Res BW MKR MODE TF 1 N 1 2 A1 1 3 N 1 4 5 6	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	001 pts)
#Res BW MKR MODE TF 1 N 1 2 A1 1 3 N 1 4 5 6 7	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	001 pts)
#Res BW MKR MODE TF 1 N 1 2 Δ1 1 3 N 1 4 5 6 7 8 9	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	001 pts)
#Res BW MKR MODE TF 1 N 1 2 A1 1 3 N 1 4 5 6 7 8 9	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	001 pts)
#Res BW MKR MODE TF 1 N 1 2 A1 1 3 N 1 4 5 6 7 8 9 9 10 10	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	
#Res BW MKR MODE TF 1 N 1 2 A1 1 3 N 1 4 5 6 7 8 9 10 11 11	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	
#Res BW MKR MODE TF 1 N 1 2 A1 1 3 N 1 4 5 6 7 8 9 9 10 10	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	
#Res BW MKR MODE TF 1 N 1 2 A1 1 3 N 1 4 5 6 7 8 9 10 11 1	100 kHz	× 2.405 4 -5.6	112 GHz 100.3 313 MHz (Δ) -30	52 dBµV 6.608 dB		FUNCTION WIDTH	-	•	

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

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

Keysight Spec	ctrum Analyzer ·	Unrestricted HBE Usi	ng C63.10 Sec 11.13.2							- F
		0Ω DC		SENSE:IN	T SOURCE OFF	ALIGN AUT		_og-Pwr		8 PM Feb 28, 20
arker 1	2.460496	5391982 GH	Z PNO: Fast IFGain:Low		: Free Run en: 30 dB			1000/1000		
	B-6400	00 JB-07						N	kr1 2.46	0 50 GI 173 dBj
dB/div	Ref 126.	99 dBµV							100.4	
17			<u> </u>							
07		mada a franchisa e new ad	<u> </u>	an /						
7.0				walk with free free states of the states of	ᡗᠬᠬᠯ᠕ᠯ᠆᠇᠆᠆᠕᠕᠆ᡁᡧ᠕ᡃ					
7.0	and a start of the second					Wiles.				
مر 🗧										
7.0 <mark>vyv^r</mark>							why	haman	America	2/
7.0									╸┙╹┙┩║╲╾┙╢┉╖	why
7.0										
7.0										
7.0										
									6 4 0	40050 0
art 2.450 Res BW	068 GHz 100 kHz		#	VBW 300	kHz			Sweep	3.200 ms	48350 G s (1001 p
	C SCL	X		Y	FUNCTION	FUNCTION WID	тн	FL	INCTION VALUE	
1 Ν 1 2 Δ1 1	f f (Δ)	2.460 50		73 dBµV 2.145 dB						
Β Ν 1	f	2.483 50		28 dBµV						
4										
6										
7 B										
9										
D										
										2

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

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

arker 2 2.389950000000 GHz Avg Type: RMS Avg Hold:>1000/1000 TRACE 12 3 4 MAWW Det PA NN ASS PREAMP PRO: Fast IFGain:High Trig: Free Run #Atten: 0 dB Avg Type: RMS Avg Hold:>1000/1000 TRACE 12 3 4 MAWW Det PA NN Ref Offset 36.12 dB Mkr2 2.389 95 GH 46.728 dBµ 0 dB/div Ref 88.11 dBµV Avg Type: RMS Avg Hold:>1000/1000 Trace 1/2 3 4 MAWW Det PA NN 9 Trace 1 Pass 1 1 1 1 76.1 Trace 2 Pass 1 1 1 1 81.1 1 1 1 1 1 1 10.1 1 1 1 1 1 1 11.1 1 1 1 1 1 1 11.1 1 1 1 1 1 1 12.1 1 1 1 1 1 1 1 12.1 1 1 1 1 1 1 1 1 13.1 1 1 1 1 1 1 1 1 1 1 1	Keysight Spectrum Analyzer - Rest	ricted LBE using C63.10 Sec 6.10.5			
Arker 2 2.389950000000 GHz PNO: Fast Trig: Free Run Avg Type: RMS Avg Hold:>1000/1000 Trig: Free Run ASS PREAMP Pro: Fast Trig: Free Run Avg Type: RMS Avg Hold:>1000/1000 Trice I Past Ref Offset 56.12 dB 0 dB/div Ref 88.11 dBµV Mkr2 2.389 95 GHz 46.728 dBµ Trace 1 Pass Trace 2 Pass Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Trace 2 Pass Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV Image: Ref 88.11 dBµV<	RF 50 Ω	AC	SENSE:INT	ALIGN OFF	09:54:43 AM Feb 28, 2023
ASS PRAMP PNO: Fast IFGain:High Trig: Free Run #Atten: 0 dB Avg Hold:>1000/1000 Tree Mark Ref Offset 36.12 dB Ref offset 36.12 dB Mkr2 2.389 95 GHz Mkr2 2.389 95 GHz 0g Trace 1 Pass Trace 2 Pass 1	larker 2 2 38995000	0000 GHz		Avg Type: RMS	TRACE 1 2 3 4 5
ASS PREAMP IFGain:High #Atten: 0 dB Def Attain Ref Offset 36.12 dB Ref 88.11 dBµV Mkr2 2.389 95 GH 46.728 dBµ Mkr2 2.389 95 GH 46.728 dBµ Trace 1 Pass Image: Stop 2.39000 GH Image: Stop 2.39000 GH Image: Stop 2.39000 GH Ital: 2.380000 GHz Image: Stop 2.390000 GH Image: Stop 2.390000 GH Image: Stop 2.390000 GH Ital: 2.380000 GHz Image: Stop 2.39957 GHz Image: Stop 2.390000 GH Image: Stop 2.390000 GH Ital: 2.389 95 GHz Image: Stop 2.39957 GHz Image: Stop 2.399000 GH Image: Stop 2.390000 GH Ital: 2.389 95 GHz Image: Stop 2.39957 GHz Image: Stop 2.399000 GH Image: Stop 2.399000 GH Ital: 2.389 95 GHz Image: Stop 2.399000 GH Image: Stop 2.399000 GH Image: Stop 2.399000 GH Ital: 2.389 95 GHz Image: Stop 2.399000 GH Image: Stop 2.399000 GH Image: Stop 2.399000 GH Ital: 2.389 95 GHz Image: Stop 2.399000 GH Image: Stop 2.399000 GH Image: Stop 2.399000 GH Ital: 3.389 95 GHz Image: Stop 2.399000 GH Image: Stop 2.399000 GH Image: Stop 2.399000 GH Ital: 3.380000 GHz Image: Stop 2.399000 GH Image: Stop 2.399000 GH			Trig: Free Run		TYPE MA WWW
Ref Offset 36.12 dB Mkr2 2.389 95 GF 043/div Ref 88.11 dBµV 041 Trace 1 Pass 1 1	PASS PREAMP		#Atten: 0 dB		DET PANNN
Ref 88.11 dBµV 46.728 dBµ 7 1 8 1 8 1 9 1					
0 dB/div Ref 88.11 dBµV 46.728 dBµ Trace 1 Pass	Ref Offect 36	12 dB			
99 Trace 1 P ass 1 1 1 1					46.728 dBu\
81 Trace 2 Pass 1 81 1 1 81 <t< td=""><td>_00</td><td></td><td>The second secon</td><td></td><td></td></t<>	_00		The second secon		
1 1					
38.1	Trace 2 Pass				
No.1 Image: Stop 2.390000 GHz Stop 2.390000 GHz tart 2.380000 GHz tart 2.389 57 GHz tart 2.389 57 GHz tart 2.389 95 GHz tart 2.380 000 000 000000000000000000000000000	68.1				\ \ \ \ \ \ _
No.1 Image: Stop 2.390000 GHz Stop 2.390000 GHz tart 2.380000 GHz tart 2.389 57 GHz tart 2.389 57 GHz tart 2.389 95 GHz tart 2.380 000 000 000000000000000000000000000					
No.1 Image: Stop 2.390000 GHz Stop 2.390000 GHz tart 2.380000 GHz tart 2.389 57 GHz tart 2.389 57 GHz tart 2.389 95 GHz tart 2.380 000 000 000000000000000000000000000			a h have a walker all how	warder and wheel a law and a firm and a strate of the state of the strate of the strat	
8.1 9.1 9	48.1				
28.1					
18.1 1	38.1				
18.1 1					
3.11	28.1				
3.11	18.1				
83 Stop 2.390000 GHz tart 2.380000 GHz Stop 2.390000 GHz Res BW 1.0 MHz #VBW 50 MHz* Stop 2.390000 GHz KR MODE TC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE V Y FUNCTION FUNCTION WIDTH FUNCTION VALUE V 1 f 2.389 57 GHz 64.791 dBµV 46.725 dBµV X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE X Z F Z.389 95 GHZ					
Stop 2.390000 GHz Res BW 1.0 MHz Stop 2.390000 GHz KR MODE TC Scl X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 1 N 1 f 2.389 57 GHz 64.791 dB _J V 64.791 dB_JV 64.791 dB_JV 64.791 dB_JV	8.11				
Stop 2.390000 GHz Res BW 1.0 MHz Stop 2.390000 GHz KR MODE TC Scl X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 1 N 1 f 2.389 57 GHz 64.791 dB _J V 64.791 dB_JV 64.791 dB_JV 64.791 dB_JV	1.00				
KR MODE TC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 1 N 1 f 2.389 57 GHz 64.791 dBµV - <td>1.09</td> <td></td> <td></td> <td></td> <td></td>	1.09				
KR MODE TC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 1 N 1 f 2.389 57 GHz 64.791 dBµV - <td></td> <td></td> <td></td> <td></td> <td></td>					
KR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 1 N 1 f 2.389 57 GHz 64.791 dBµV 64.791 dBµV 2 N 2 f 2.389 95 GHz 46.725 dBµV 64.791 dBµV 3 - - - - - 4 - - - - 5 - - - - 6 - - - - 7 - - - - 8 - - - - 9 - - - -					Stop 2.390000 GH
KR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 1 N 1 f 2.389 57 GHz 64.791 dBµV 64.791 dBµV 2 N 2 f 2.389 95 GHz 46.725 dBµV 64.791 dBµV 3 - - - - - 4 - - - - 5 - - - - 6 - - - - 7 - - - - 8 - - - - 9 - - - -	Res BW 1.0 MHz	#\	/BW 50 MHz*	Sw	eep 1.000 ms (1001 pts
1 N 1 f 2.389 57 GHz 64.791 dBµV 2 N 2 f 2.389 95 GHz 46.725 dBµV 3 4 4 4 4 4 4 4 5 5 5 5 6 6 6 6 6 6 6 8 4 6 6 6 6 9 4 6 6 6 6					
2 N 2 f 2.389 95 GHz 46.725 dBµV 3 - - - - 4 - - - - 5 - - - - 6 - - - - 7 - - - - 9 - - - -				FUNCTION WIDTH	FUNCTION VALUE
3	1 N 1 f				
4		2.389 95 GHz 46.72	25 dBµV		
5 6 6 6 7 6 7 6 6 8 6 6 9 6 6					
6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	-				
7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9					
9					
	11				
>	<				>
G STATUS	SG			STATUS	

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

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

🔤 Keysight Spe		stricted HBE C63.10 Sec 6.	10.5				
		AC	SENS	SE:INT	ALIGN OFF	DMC	09:56:53 AM Feb 28, 20
Marker 2 PASS	2.4836650 PREAMP			Trig: Free Run #Atten: 0 dB		pe: RMS d:>1000/1000	TRACE 1234 TYPE MA WW DET PANN
10 dB/div	— Ref Offset 36 Ref 88.64	6.65 dB				Mkr2	2.483 665 0 GF 45.237 dBµ
Log 78.6 Trac 68.6 →	e 1 Pass e 2 Pass						
58.6 - 1 	willow the state	hamelanderlander	pited definition of the second	water the start of	the work work was a started as	มป _{อากั} ปการประหลังจะกำรุงประก	ahahaddagwitadar (wagatrawitahuw)
38.6 28.6 18.6							
8.64 -1.36							
Start 2.48 #Res BW	3500 GHz 1.0 MHz		VBW 5	0 MHz*		Sweep	Stop 2.500000 GF 1.000 ms (1001 pt
MKR MODE TF	f	× 2.483 978 5 GHz 2.483 665 0 GHz	Y 63.219 dBu 45.233 dBu		FUNCTION WIDTH	FUI	NCTION VALUE
3 4 5 6		2.400 000 0 GHZ	40.200 001				
7 8 9 10 11							
<					CTATUS		>
MSG					STATUS		

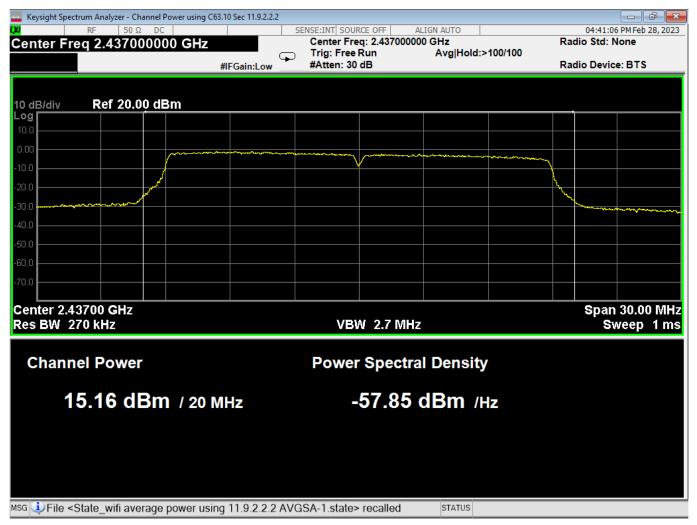
26 Higher Bandedge, Restricted, Wifi G, Low Data Rate

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for: Garmin International, Inc.			

	Spectrum Analyzer - Cł	hannel Powe	r using C63.10 S	Sec 11.9.2.2.2							
		2 DC			SENSE:INT SOUR	RCE OFF AL			Pa	04:21:5 dio Std: N	7 PM Feb 28, 2023
Center	Freq 2.4120	00000	GHZ	_ _	Trian Eres		Avg Hold:>	100/100	Ra	ulo Sta. I	vone
			#IF	Gain:Low 📕	#Atten: 30	dB			Ra	dio Devic	e: BTS
10 dB/div	Ref 20.0)0 dBm									
Log											
10.0											
0.00											
-10.0		+									
-20.0		+/							<u> </u>		
-30.0									<u> </u>		
-40.0										La contraction of the second s	
-50.0											and the second s
-50.0											
-70.0											
Center 2	2.41200 GHz									Snan	30.00 MHz
	270 kHz				VB	N 2.7 MHz					weep 1 ms
Char	nnel Powe	-			Dower	Spectra	l Deneity	,			
Cillai					FOWCI	opecua	Density				
	40.00 -	D				<u> </u>					
	12.08 d	BM /	20 MH	Z		60.93 (abm /F	Z			
MSG							STATUS				

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

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for: Garmin International, Inc.			



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

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for: Garmin International, Inc.			

Keysight Spectrum Analyzer - Channel Power us RF 50 Ω DC Center Freq 2.462000000	SENSE:INT SOURCE OFF ALIGN AUTO	04:42:46 PM Feb 28, 2023 Radio Std: None 0 Radio Device: BTS
10 dB/div Ref 20.00 dBm		
10.0 0.00 -10.0		
-20.0		
-50.0		
Center 2.46200 GHz Res BW 270 kHz	VBW 2.7 MHz	Span 30.00 MHz Sweep 1 ms
Channel Power	Power Spectral Density	
12.05 dBm / 2	о мнz -60.96 dBm /нz	
MSG	STATUS	

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

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for: Garmin International, Inc.			

Keysight Spectrum Analyzer - BW using C6	3.10 Sec 11.8.1			
RF 50 Ω DC			ALIGN AUTO	04:21:17 PM Feb 28, 20
enter Freq 2.41200000		Center Freq: 2.4120000 Trig: Free Run	00 GHz Avg Hold:>10/10	Radio Std: None
	#IFGain:Low	#Atten: 30 dB	Avg Hold.>10/10	Radio Device: BTS
dB/div Ref 15.00 dBn	1			
g	-			
o how	᠂ᠧᠴᡗᡃᢦᡐ᠆ᢦᡀᠯ᠋᠈ᠮᢆᢣᡘᢛᡘᠴᡗᠰᡘᠵ᠆			
				\
0 ANAR				W. Charles
0				
0				
nter 2.41200 GHz				Span 25.00 M
es BW 100 kHz		VBW 1 MHz		Sweep 2.333 r
Occupied Bandwidt	h	Total Power	19.8 dBm	
17	.665 MHz			
Transmit Freq Error	-28.031 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	17.77 MHz	x dB	-6.00 dB	
			STATUS	

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

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for: Garmin International, Inc.			

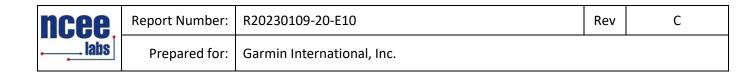
Keysight Spect	trum Analyzer - BW using C6	53.10 Sec 11.8.1			
	RF 50 Ω DC				04:40:39 PM Feb 28, 2023
Ref Value	25.00 dBm		Center Freq: 2.43700000 Trig: Free Run	Avg Hold:>10/10	Radio Std: None
		#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
10 dB/div	Ref 25.00 dBr	n			
Log					
15.0					
5.00					
-5.00			- harrow har		~~~~~~~
-15.0					
-25.0 40000	and allowed				March A - a
-35.0					
-45.0					
-55.0					
-65.0					
Center 2.4			VBW 1 MHz		Span 25.00 MH
#Res BW	100 KH2				Sweep 2.333 ms
Occup	ied Bandwidt	th	Total Power	23.2 dBm	
occup					
	1	7.685 MHz			
Transm	nit Freq Error	-54.017 kHz	% of OBW Powe	r 99.00 %	
x dB Ba	andwidth	17.73 MHz	x dB	-6.00 dB	
ISG				STATUS	

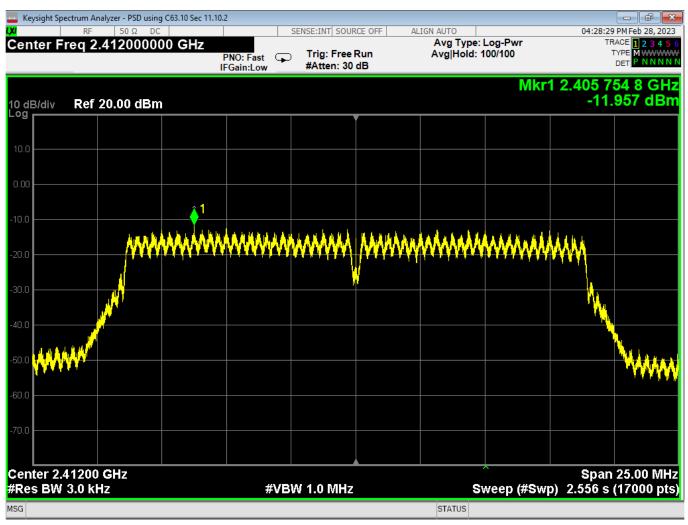
31 6dB Bandwidth, Mid, Wifi N, Low Data Rate

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for: Garmin International, Inc.			

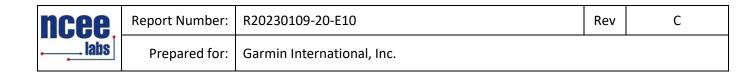
Keysight Spectrum Analyzer - BW using C63	.10 Sec 11.8.1			
₩ RF 50 Ω DC Ref Value 25.00 dBm		Center Freq: 2.4620000		04:42:20 PM Feb 28, 2023 Radio Std: None
	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 25.00 dBm				
Log				
15.0				
5.00	\dots	wyhar and	how	Abra -
-5.00		v		
-25.0				han
-35.0				- A A A A A A A A A A A A A A A A A A A
-45.0				
-55.0				
-65.0				
Center 2.46200 GHz				Span 25.00 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 2.333 ms
Occupied Bandwidt	h	Total Power	20.1 dBm	
	.639 MHz			
Transmit Freq Error	-21.338 kHz	% of OBW Powe	r 99.00 %	
x dB Bandwidth	17.75 MHz	x dB	-6.00 dB	
MSG			STATUS	

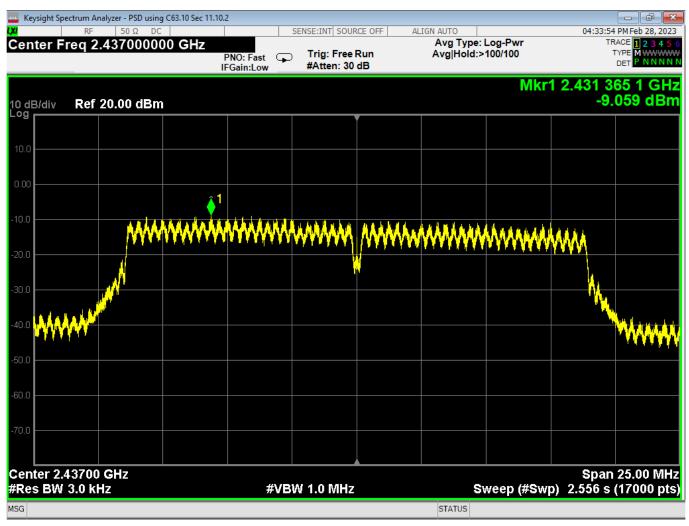
32 6dB Bandwidth, High, Wifi N, Low Data Rate



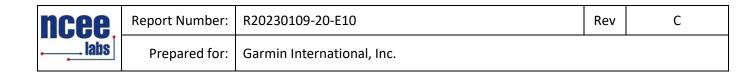


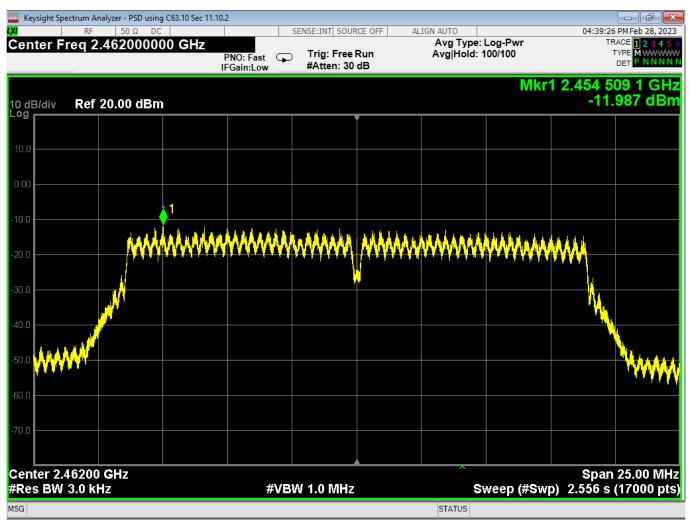
33 PSD, Low, Wifi N, Low Data Rate





34 PSD, Mid, Wifi N, Low Data Rate





35 PSD, High, Wifi N, Low Data Rate

ncee.	Report Number: R20230109-20-E10 Image: Prepared for: Garmin International, Inc.	R20230109-20-E10	Rev	С
	Prepared for:	Garmin International, Inc.		

	ectrum Analyzer	- Unrestricted LBE	using C63.10 Sec 11.13.	2					
LXI	RF	50 Ω AC		SENSE	:INT			05:40:2	6 PM Mar 02, 2023
Marker 3	2 30082	4915164 0	Hz			Ava	Type: RMS	Т	RACE 1 2 3 4 5 (
marker 5	2.33302	4313104 0	PNO: Fast	Tr interest	ig: Free Run		Hold: 1000/1000		TYPE A A WWW
			IFGain:Low		tten: 20 dB				DET A A N N N I
			II Gamieou						
								Mkr3 2.399) 825 GHz
	Dof 446	AD JD.						64 :	360 dBµV
10 dB/div Log	Rei 110	.99 dBµV							
					Ť				
107									
97.0									
97.0						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			M
87.0									W
						<i>C</i>			
77.0					~ 2 <u>1</u>	~			
07.0					31				
67.0			~~~~~		~~~~~				
57.0			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		·				
· · · · · · · · · · · · · · · · · · ·	$\sim \sim $	00001							
47.0									
37.0									
27.0									
27.0									
Start 2.38								Stop 2	.41406 GHz
#Res BW	100 kHz			VBW 10	kHz*		Swe	ep 25.67 m	s (1001 pts)
									- (
MKR MODE TF	RC SCL	Х		Y	FUNCTION	FUNCTION WIDT	'H	FUNCTION VALUE	^
1 N 1	f	2.406 0	65 GHz 98	.758 dBµV	7				
2 A1 1	f (Δ)	-6.2	65 MHz (Δ) -	34.328 dB					
3 N 1	f	2,399.8	25 GHz 64	.360 dBuV					
4									
5									
6									
7									
8									
9									
10									
11									
<									<u> </u>
-									
MSG						STAT	TUS		

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

ncee.	laha	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Anal	/zer - Unrestricted HBE Usin	g C63.10 Sec 11.13.2							
RF	50 Ω DC		SENSE:INT SO	URCE OFF	ALIGN AUTO				7 PM Feb 28,
rker 1 2.4563	361649314 GHz	PNO: Fast 🕞 IFGain:Low) Trig: Fre #Atten: 3			Type: Log-Pwr Hold:>1000/100	0		RACE 123 TYPE MAW DET PAN
dB/div Ref 1	26.99 dBµV						M	kr1 2.45	6 36 G 35 dB
	20.99 ubµv								
7	1								
17	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\sim \sim $		wanne 1	LANDER .				
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1 म भ						White white	MARKN	Am don B -	2
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0									
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.0									
art 2.45068 GH es BW 100 kH		#VE	W 300 kH	z		Sv	veep	Stop 2. 3.200 ms	48350 (6 (1001
MODE TRC SCL	Х	Y		NCTION	FUNCTION WIDT	Н	FUN	ICTION VALUE	
Ν 1 f Δ1 1 f (Δ	2.456 36		<u>dBµV</u> 05 dB						
	2.483 50								

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

ncee	laka	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

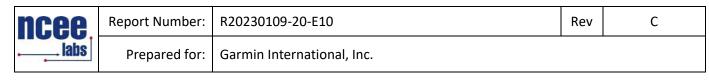
🔤 Keysight Spe	ectrum Analyzer - Restricted LBE using C6	.10 Sec 6.10.5				
L XI	RF 50 Ω AC	SENSE:	INT	ALIGN OFF		10:04:48 AM Feb 28, 202
Marker 2	2.389920000000 GHz			Avg Type:		TRACE 1 2 3 4 5
PASS			ig: Free Run	Avg Hold:>	1000/1000	TYPE MA WWW DET P A N N N
PASS	PREAMP	IFGain:High #A	tten: 0 dB			DEI
					M	kr2 2.389 92 GH
	Ref Offset 36.12 dB					
10 dB/div	Ref 88.11 dBµV					47.063 dBµ
	e 1 Pass					
78.1	e 2 Pass					
68.1	e 21 doo					
60.1						
58.1				anna dara Talan Marana	Jow Praymon Markets	and the second and the second and the
amounder	manalter and share and an and and	and and the second and the	LATER BARAN	alla fra an airth a state and a fair fra		
48.1						
38.1						
30.1						
28.1						
10.1						
18.1						
8.11						
-1.89						
			k			
Start 2.38	:0000 GHz					Stop 2.390000 GH
#Res BW	1.0 MHz	#VBW 50) MHz*		Sweep	
					•	· · ·
MKR MODE TF		Y	FUNCTION	FUNCTION WIDTH	FUI	VCTION VALUE
1 N 1	f 2.389 55 G					
2 N 2	f 2.389 92 G	Hz 47.063 dBµV				
3						
4						
5						
7						
8						
9						
10						
11						
<						>
ISG				CTATUO		
				STATUS		

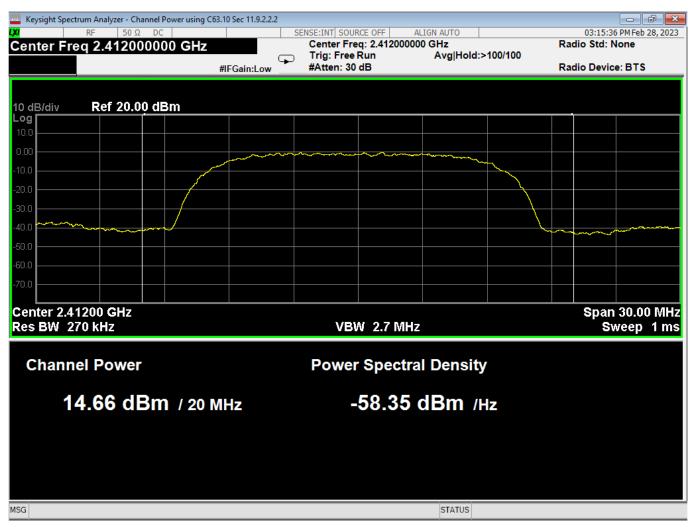
38 Lower Bandedge, Restricted, Wifi N, Low Data Rate

ncee.	Report Number: R20230109-20-E10 Prepared for: Garmin International, Inc.	R20230109-20-E10	Rev	С
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Restricted HBE C63.10 Sec 6.	10.5				
RF 50 Ω AC	SENSE:I	NT	ALIGN OFF Avg Type	DMS	10:05:56 AM Feb 28, 2023 TRACE 1 2 3 4 5 (
		g: Free Run tten: 0 dB	Avg Hold	:>1000/1000	TYPE MA WWW DET PANNN
				Mkr2	2.483 615 5 GHz
Ref Offset 36.65 dB 10 dB/div Ref 88.64 dBµV				WINI Z	45.377 dBµV
Log Trace 1 Pass					
78.6 Trace 2 Pass					
68.6					
58.6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ulona e terre				
48.6	والمستعدية والمستعدية والمحادثين والمستعدية والمستعدة والمستعدة والمستعدة والمستعدة والمستعدة والمستعدة والمستع	^{ar a} r an	Wellow Land Lag Man North Argen	ℽ ℯℯℎℳⅆℴℴ <i>ℽ</i> ℎℳℴℴℯℴ	arenany production and the partie
38.6			·····		
28.6					
18.6					
8.64					
-1.36					
Start 2.483500 GHz		A			Stop 2.500000 GHz
#Res BW 1.0 MHz	VBW 50 I	VIHz*		Sweep	1.000 ms (1001 pts)
MKR MODE TRC SCL X	Y	FUNCTION	FUNCTION WIDTH	FUN	ICTION VALUE
1 N 1 f 2.484 770 5 GHz 2 N 2 f 2483 615 5 GHz	59.826 dBµV				
2 N 2 f 2.483 615 5 GHz	45.376 dBµV				
4					
6					
7 8					
9					
10					
<					>
MSG			STATUS		

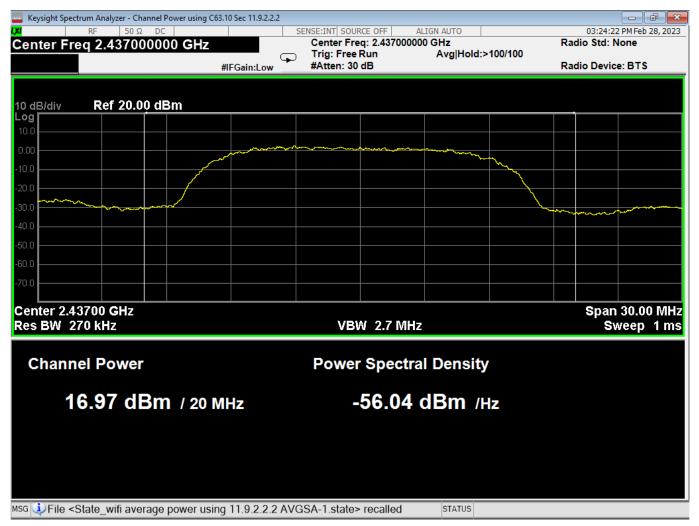
39 Higher Bandedge, Restricted, Wifi N, Low Data Rate



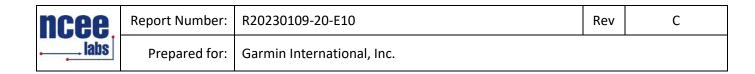


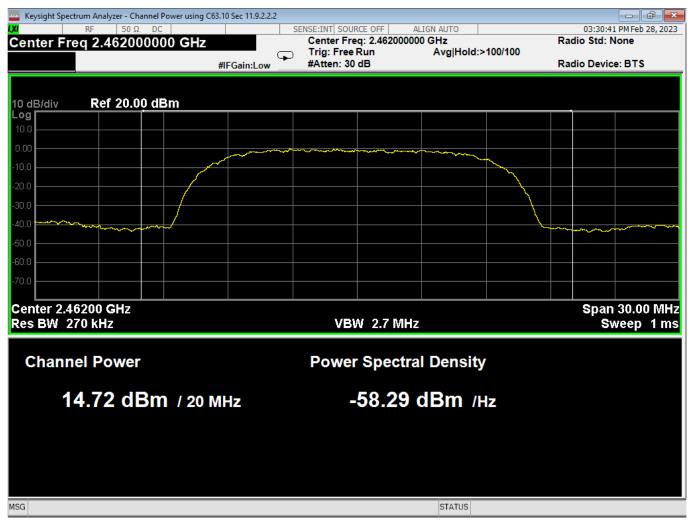
40 Average Power, Low, Wifi B, High Data Rate

ncee.	laha	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

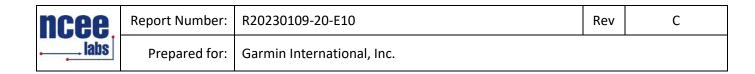


41 Average Power, Mid, Wifi B, High Data Rate



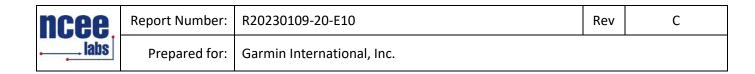


42 Average Power, High, Wifi B, High Data Rate



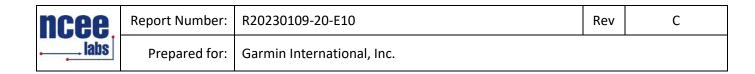
Keysight Spectrum Analyzer - BW using C6	3.10 Sec 11.8.1			
		SENSE:INT SOURCE OFF AL Center Freq: 2.41200000		03:14:22 PM Feb 28, 2023 Radio Std: None
Center Freq 2.412000000	GHZ	Tricy Erec Dup	Avg Hold:>10/10	Radio Stu. None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
10 dB/div Ref 15.00 dBn	n			
5.00				
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man when when when when when when when whe	www.www.www.	
-5.00				ــــــــــــــــــــــــــــــــــــــ
-15.0				h~
-25.0				
-35.0				mmmmm
-45.0				
-55.0				
-65.0				
-75.0				
				0
Center 2.41200 GHz #Res BW 100 kHz		VBW 1 MHz		Span 25.00 MHz Sweep   2.333 ms
TOO KIIZ				5weep 2.333 ms
Occupied Bandwidt	h	Total Power	22.1 dBm	
	8.796 MHz			
Transmit Freq Error	-20.831 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	11.91 MHz	x dB	-6.00 dB	
			0.00 42	
MSG 😳 File < Occupied Bandwidth,	WIT B 11MHz Low_000	JU.png> saved	STATUS	

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



Keysight Spectrum Analyzer - BW using O	63.10 Sec 11.8.1			
גע פון גע פון גע פון גע פון גע פון גע גע Center Freq 2.437000000	) GHz	SENSE:INT SOURCE OFF AL Center Freg: 2.437000000	IGN AUTO	03:24:00 PM Feb 28, 2023 Radio Std: None
	#IFGain:Low	Tria: Erec Dun	Avg Hold:>10/10	Radio Device: BTS
10 dB/div Ref 15.00 dB	n			
5.00				
-5.00			m m m	
-15.0				nd hy
-25.0				
-35.0				M. M. Martin
-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	th	Total Power	24.4 dBm	
	3.900 MHz			
	5.500 IVINZ			
Transmit Freq Error	-104.51 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	11.59 MHz	x dB	-6.00 dB	
MSG			STATUS	

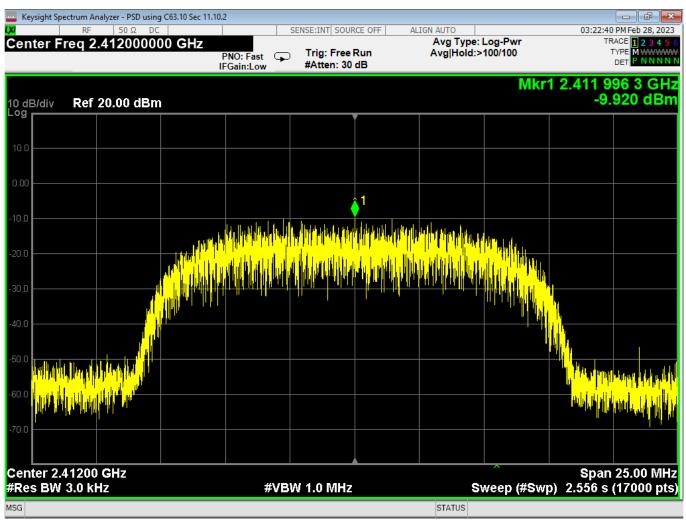
44 6dB Bandwidth, Mid, Wifi B, High Data Rate



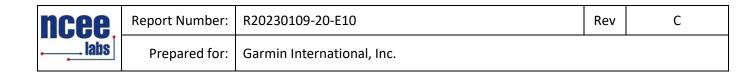
Keysight Spect	trum Analyzer - BW using (	C63.10 Sec 11.8.1						
(X) Contor Er	RF 50 Ω DC eq 2.46200000		SENSE:INT SOUR	RCE OFF AL	IGN AUTO		03:30:1 Radio Std:	7 PM Feb 28, 2023
	eq 2.46200000	#IFGain:Lo	Trig: Free	Run	Avg Hold:>1	10/10	Radio Devi	
10 dB/div	Ref 15.00 dB	sm						
Log 5.00								
		m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\cdots$	mar mar	m		
-5.00		m m m					ς	
-15.0	سمر						Trans.	
-25.0							+	
-35.0	mmm						harris	Mr.
-45.0	_							
-55.0								
-65.0								
-75.0								
Center 2.4	6000 <b>O</b> U-						Oner	
#Res BW			VBI	N 1 MHz				n 25.00 MHz p= 2.333 ms
Occup	ied Bandwid	lth	Total P	ower	22.1 dE	ßm		
	1	3.741 MH	Ζ					
Transm	nit Freq Error	-40.008 kH	z % of Ol	BW Power	99.00	%		
x dB Ba	andwidth	11.43 MH	z x dB		-6.00 (	dB		
MSG					STATUS			

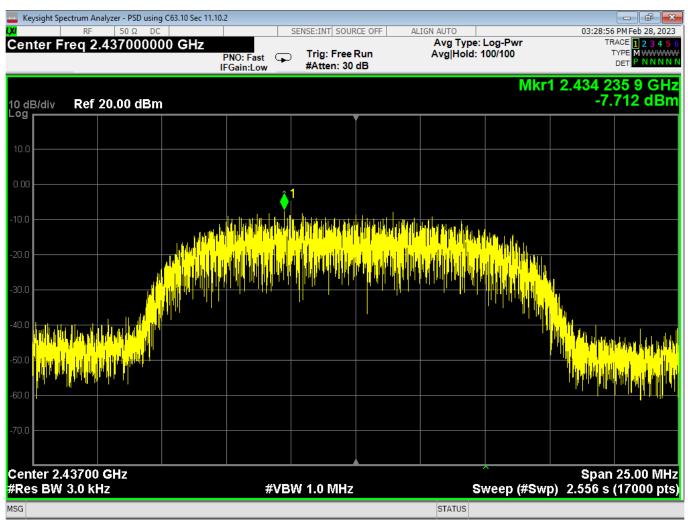
45 6dB Bandwidth, High, Wifi B, High Data Rate

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		



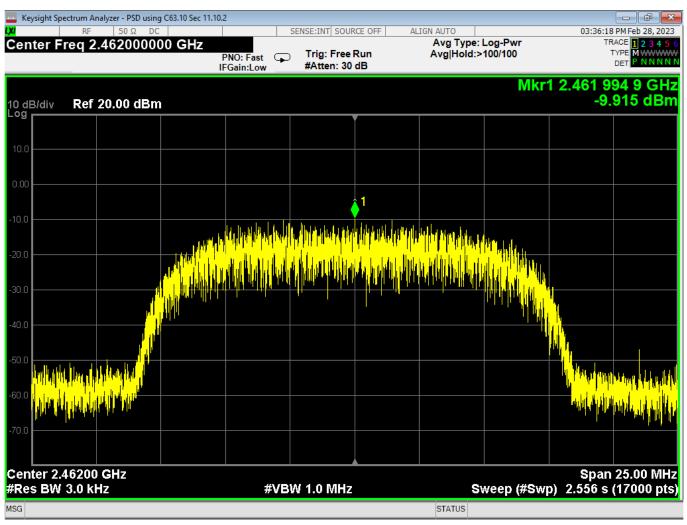
46 PSD, Low, Wifi B, High Data Rate





47 PSD, Mid, Wifi B, High Data Rate

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		



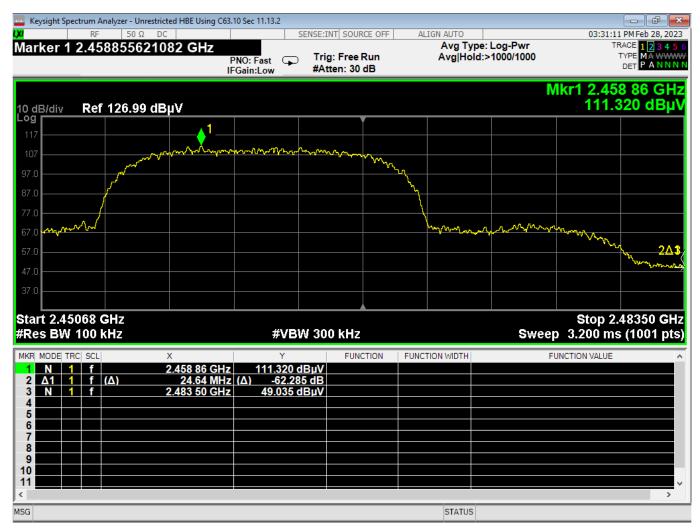
48 PSD, High, Wifi B, High Data Rate

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

Keysight Spe	ctrum Analy	zer - Unrestri	cted LBE using C63	.10 Sec 11.13	.2								
	RF	50 Ω D			SEN	SE:INT SOU	RCE OFF	ALI	GN AUTO	I			4 PM Feb 28, 20
arker 2	Δ -11.0	)25863)		PNO: Fast IFGain:Lov	· ·	Trig: Free #Atten: 20				e: Log-Pw d:>1000/10		T	TYPE MAWW DET PANN
) dB/div	Ref 11	l6.99 dE	βμV								ΔΝ		.026 MI 36.229 d
og 107								~~~~~~	ᡔ᠊ᠬᡐᡐᡐ	$\sim$	ᢣᠬ᠇᠇ᠵ᠊ᠬᠬ	᠕ᠰ᠆᠕ᠰ᠆᠆ᡎ	man
97.0 <b></b> 97.0 <b></b>				<u>_</u> 2∆1 —			مر	√					
7.0			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www							
i7.0 i7.0	مممم	John Mark				- Υ							
7.0	<u></u>												
27.0													
tart 2.39 Res BW					VBW 1	.0 MHz	· · · · · ·			s	weep	Stop 2 2.467 m	.41663 GI s (1001 pt
KR MODE TR	f		× .408 882 GHz		Y .448 dB	μV	ICTION	FUNCT	ON WIDTH		FUN	ICTION VALUE	
2 Δ1 1 3 N 1 4	f (Δ) f		<u>-11.026 MHz</u> .397 869 GHz		<u>-36.229 c</u> 5.218 dBj								
5 5 7													
1													>
ì									STATUS				

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

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		



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

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

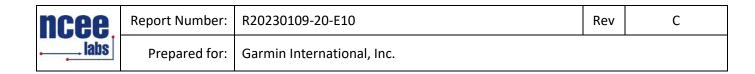
IXI	ctrum Analyzer - Restricte RF 50 Ω A 2.3871400000	C C		NSE:INT		vg Type: RMS		TF	AM Feb 28, 2023
PASS	PREAMP		NO: Fast 💭 Gain:High	Trig: Free Run #Atten: 0 dB	AV	/g Hold:>1000/	1000		
10 dB/div	Ref Offset 36.12 Ref 88.11 dB						M		7 14 GHz 40 dBµV
^{70.1} Trace	e 1 Pass e 2 Pass								
68.1 58.1						1			
	ales all managed and	///	manhanter	www.when	~~~~drameter	mumeral 2	manhibitit	<b>Ϥ┟┶╱╠╱<b>╞</b>╱┝╌┲╲<u>┠</u>╱</b>	ha-mulanana
38.1	<u> </u>	<u> </u>							
28.1									
18.1									
8.11									
-1.89									
Start 2.38 #Res BW			#VBW	50 MHz*			Sweep	Stop 2.3 1.000 ms	90000 GHz ; (1001 pts)
MKR MODE TR	C  SCL	X	Y	FUNCTION	FUNCTION W	/IDTH	FUN	ICTION VALUE	^
1 N 1 2 N 2	f	2.386 96 GHz 2.387 14 GHz	53.244 dB 42.039 dB						
3									
5									
7 8									
9									
11 <u> </u>									> ×
MSG					S	TATUS			

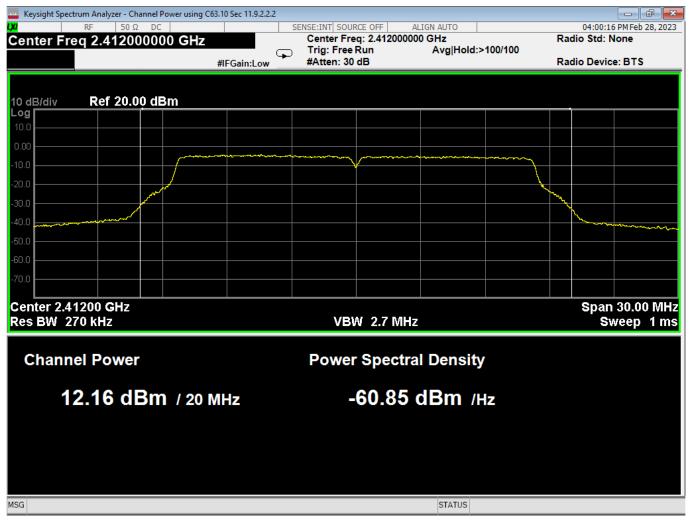
51 Lower Bandedge, Restricted, Wifi B, High Data Rate

ncee.	Report Number:	R20230109-20-E10	Rev	С
labs	Prepared for:	Garmin International, Inc.		

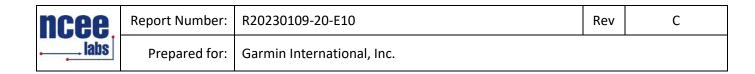
Keysight Spectrum Analyzer - Restricted HBE C63.10 S				1	- F
₩ RF 50 Ω AC Marker 2 2.487757000000 GHz	SENSE	INT	ALIGN OFF	e: RMS	09:52:41 AM Feb 28, 2023 TRACE 1 2 3 4 5 6
PASS PREAMP		ig: Free Run Atten: 0 dB	Avg Hold	l:>1000/1000	TYPE MA WWW DET PANNN
Ref Offset 36.65 dB				Mkr2	2.487 163 0 GHz
10 dB/div Ref 88.64 dBµV					42.150 dBµV
78.6 Trace 2 Pass					
58.6	1				
48.6 Regended Branner Republic manual lines 2 with		hallow and a starty baseling	un and an and an all and and and and and and and and an	mat-4-449Rnjedmann1.4-1	han all and a surply of the second states of the second second second second second second second second second
38.6					
28.6					
18.6					
8.64					
-1.36					
Start 2.483500 GHz		<b>_</b>			Stop 2.500000 GHz
#Res BW 1.0 MHz	<b>VBW 50</b>	MHz*		Sweep	
MKR MODE TRC SCL X	Y	FUNCTION	FUNCTION WIDTH	FU	NCTION VALUE
1 N 1 f 2.488 549 0 G	Hz 53.698 dBµV	1			
2 N 2 f 2.487 163 0 G	Hz 42.151 dBµV				
4					
5 6 6					
7					
9					
10					
<					>
MSG			STATUS		

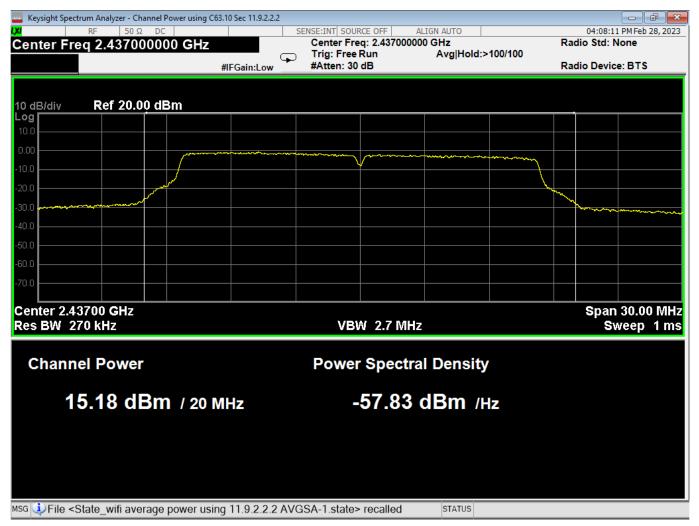
52 Higher Bandedge, Restricted, Wifi B, High Data Rate



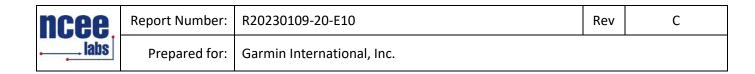


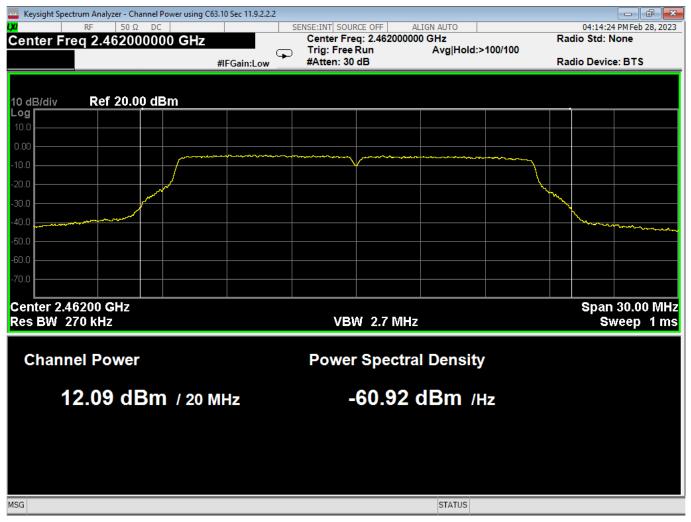
53 Average Power, Low, Wifi G, High Data Rate





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





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

ncee	Report Number:	R20230109-20-E10	Rev	С
labs		Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using C	63.10 Sec 11.8.1			- F
RF 50 Ω DC			ALIGN AUTO	03:59:22 PM Feb 28, 2 Radio Std: None
nter Freq 2.41200000		Center Freq: 2.4120000	Avg Hold:>10/10	Radio Std: None
	#IFGain:Low	#Atten: 30 dB		Radio Device: BTS
dB/div Ref 15.00 dB	n			
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0				
nter 2.41200 GHz				Span 25.00 M
es BW 100 kHz		VBW 1 MHz		Sweep 2.333 r
				0400p 2.0001
Occupied Bandwid	th	Total Power	20.2 dBm	
1	6.476 MHz			
Transmit Freq Error	-24.474 kHz	% of OBW Powe	r 99.00 %	
		x dB		
x dB Bandwidth	16.55 MHz	x dB	-6.00 dB	

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

ncee	Report Number:	R20230109-20-E10	Rev	С
labs		Garmin International, Inc.		

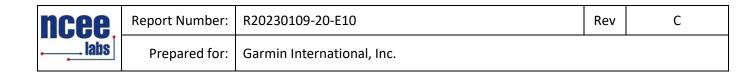
	er - BW using	C63.10 Sec 11.8.1						
RF	50 Ω DC		SENSE:INT SOU		LIGN AUTO			46 PM Feb 28, 2023
Ref Value 25.00	dBm		Trian Eres	eq: 2.43700000 Run	OGHZ Avg Hold:>	10/10	Radio Std:	None
		#IFGain:Low					Radio Devi	ce: BTS
10 dB/div Ref	25.00 dE	200						
	29.0 <u>0 u</u>							
15.0								
5.00								
-5.00	1 million	ᢣᡊ᠕ᠧ᠆ᡗ᠋ᡣ᠆ᠰ᠆ᢣ᠆ᢣ᠕᠕ᢧᡊ᠘ᠰ	mon	rowwww	᠇᠆᠈᠂᠂᠂᠂᠂᠂᠂᠂	ᢣ᠈᠂ᡎᠬᢦ᠇ᡐᡊᢏᡅᡁᠰᠧ᠇	$\sim$	
	~^^			ľ			l K	
-15.0							- www.	WWWWWWW
-25.0								~ Word Wwww
-35.0								
-45.0								
-55.0								
-65.0								
Center 2.43700 G	H7						Spar	n 25.00 MHz
#Res BW 100 kH			VB	N 1 MHz			Swee	p 2.333 ms
Occupied Ba	andwie	dth	Total P	ower	23.5 dE	ßm		
	-	6.527 MHz						
Transmit Free	Error	-62.617 kHz	% of O	BW Power	r 99.00	%		
x dB Bandwid		16.50 MHz	x dB		-6.00	dD		
	ui	10.30 WIHZ	хив		-0.00	u D		
MSG					STATUS			

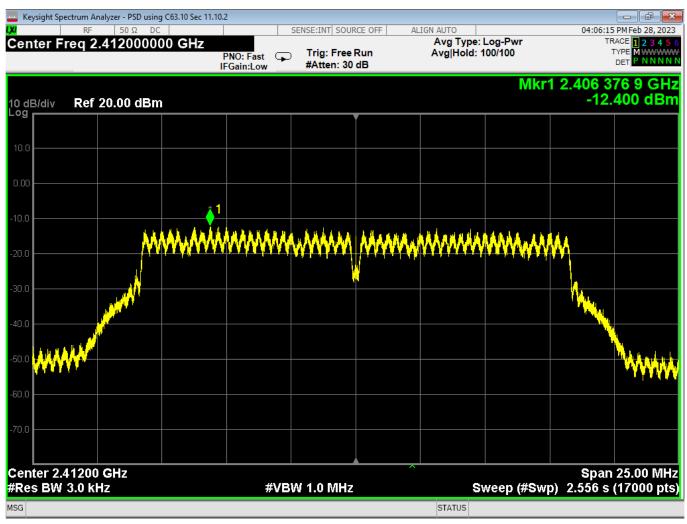
57 6dB Bandwidth, Mid, Wifi G, High Data Rate

ncee	Report Number:	R20230109-20-E10	Rev	С
labs		Garmin International, Inc.		

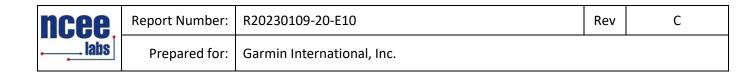
Keysight Spectrum Analyzer - BW using C	63.10 Sec 11.8.1			
RF 50 Ω DC			LIGN AUTO	04:13:56 PM Feb 28, 20
ef Value 25.00 dBm	_	Center Freq: 2.46200000 Trig: Free Run	0 GHz Avg Hold:>10/10	Radio Std: None
	#IFGain:Low	#Atten: 30 dB	/ trightenet. Finite	Radio Device: BTS
dB/div Ref 25.00 dBi				
5.0				
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enter 2.46200 GHz				Span 25.00 MI
Enter 2.40200 GHZ		MOMA A BALL-		Sweep 2.333 n
Res BW 100 kHz		VBW 1 MHz		encop 2.000 ii
tes BW 100 kHz				
	th	Total Power	20.3 dBm	
Res BW 100 kHz Occupied Bandwid	th 6.467 MHz		20.3 dBm	
Res BW 100 kHz Occupied Bandwid 1				
Res BW 100 kHz Occupied Bandwid 1 Transmit Freq Error	6.467 MHz -23.360 kHz	Total Power % of OBW Powe	r 99.00 %	
Res BW 100 kHz Occupied Bandwid 1	6.467 MHz	Total Power		
Res BW 100 kHz Occupied Bandwid 1 Transmit Freq Error	6.467 MHz -23.360 kHz	Total Power % of OBW Powe	r 99.00 %	
Res BW 100 kHz Occupied Bandwid 1 Transmit Freq Error	6.467 MHz -23.360 kHz	Total Power % of OBW Powe	r 99.00 %	
es BW 100 kHz Occupied Bandwid 1 Transmit Freq Error	6.467 MHz -23.360 kHz	Total Power % of OBW Powe	r 99.00 %	

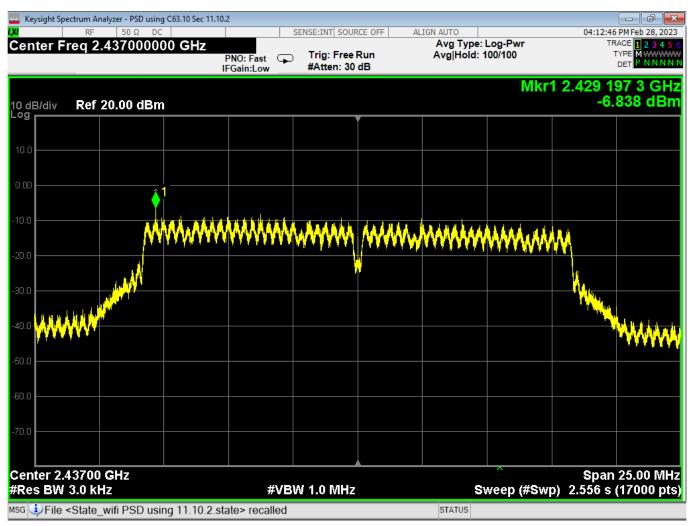
58 6dB Bandwidth, High, Wifi G, High Data Rate





59 PSD, Low, Wifi G, High Data Rate





60 PSD, Mid, Wifi G, High Data Rate