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FCC/ISED Test Report

Prepared for: Garmin International, Inc.

Address:

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

Product:

A04452

Test Report No:

R20220901-21-E1C

Approved by:

1 Lane

Fox Lane, EMC Test Engineer

DATE:

December 6, 2022

Total Pages:

65

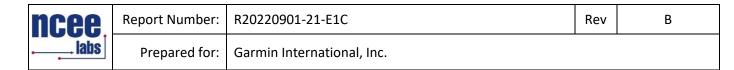
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REVISION PAGE

Rev. No. Date		Description		
		Issued – FLane		
0	21 November 2022	Reviewed by KVepuri/NJohnson		
		Prepared by FLane, GLarsen		
A	A 22 November 2022 Remove reference to GFSK - FL			
В	2 December 2022	Corrected Antenna Gain values - FL		
C 6 December 2022		Removed Antenna Gain values – 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		

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2.0 EUT DESCRIPTION

2.1 EQUIPMENT UNDER TEST

Summary and Operating Condition:

EUT	A04452
IC	1792A-04452
FCC ID	IPH-04452
EUT Received	3 October 2022
EUT Tested	3 October 2022- 7 November 2022
Serial No. 3426283485 (Radiated Measurements) 3426283465 (Conducted Measurements)	
Operating Band	2400 – 2483.5 MHz
Device Type	GMSK 🗆 GFSK 🗆 BT BR 🗆 BT EDR 2MB 🗆 BT EDR 3MB
Power Supply / Voltage Internal Battery / 5VDC Charger: Garmin (Phi Hong) Model: AQ27A GPN: 362-00118-00 (Representative Power Supply)	

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

2.2 DESCRIPTION OF TEST MODES

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

GMSK 1MB Transmissions:

Channel	Frequency
Low	2402 MHz
Mid	2440 MHz
High	2480 MHz

GMSK 2MB Transmissions:

Channel	Frequency
Low	2404 MHz
Mid	2440 MHz
High	2478 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

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

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3.1 LABORATORY DESCRIPTION

All testing was performed at the following Facility:

The Nebraska Center for Excellence in Electron	nics (NCEE Labs)
4740 Discovery Drive	
Lincoln, NE 68521	
A2LA Certificate Number:	1953.01
FCC Accredited Test Site Designation No:	US1060
Industry Canada Test Site Registration No:	4294A
NCC CAB Identification No:	US0177

Environmental conditions varied slightly throughout the tests: Relative humidity of $35 \pm 4\%$ Temperature of $22 \pm 3^{\circ}$ Celsius



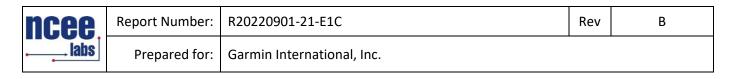
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3.2 TEST PERSONNEL

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

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



3.3 TEST EQUIPMENT

DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE	CALIBRATION DUE DATE
Keysight MXE Signal Analyzer (44GHz)**	N9038A	MY59050109	July 19, 2022	July 19, 2024
Keysight MXE Signal Analyzer (26.5GHz)**	N9038A	MY56400083	July 19, 2022	July 19, 2024
Keysight EXA Signal Analyzer**	N9010A	MY56070862	July 20, 2021	July 20, 2023
SunAR RF Motion	JB1	A082918-1	July 26, 2022	July 26, 2023
ETS EMCO Red Horn Antenna	3115	00218655	July 21, 2022	July 21, 2023
Com-Power LISN, Single Phase**	LI-220C	20070017	July 18, 2022	July 18, 2024
8447F POT H64 Preamplifier*	8447F POT H64	3113AD4667	March 21, 2022	March 21, 2024
Rohde & Schwarz Preamplifier*	TS-PR18	3545700803	August 22, 2022	August 22, 2024
Trilithic High Pass Filter*	6HC330	23042	March 21, 2022	March 21, 2024
ETS – Lindgren- VSWR on 10m Chamber***	10m Semi- anechoic chamber- VSWR	4740 Discovery Drive	July 30, 2020	July 30, 2023
NCEE Labs-NSA on 10m Chamber*	10m Semi- anechoic chamber-NSA	NCEE-001	May 25, 2022	May 25, 2024
TDK Emissions Lab Software	V11.25	700307	NA	NA
RF Cable (preamplifier to antenna)*	MFR-57500	90-195-040	August 22, 2022	August 22, 2024
RF Cable (antenna to 10m chamber bulkhead)*	FSCM 64639	01E3872	September 24, 2021	September 24, 2023
RF Cable (10m chamber bulkhead to control room bulkhead)*	FSCM 64639	01E3864	September 24, 2021	September 24, 2023
RF Cable (control room bulkhead to test receiver)*	FSCM 64639	01F1206	September 24, 2021	September 24, 2023
N connector bulkhead (10m chamber)*	PE9128	NCEEBH1	September 24, 2021	September 24, 2023
N connector bulkhead (control room)*	PE9128	NCEEBH2	September 24, 2021	September 24, 2023

*Internal Characterization

**2 Year Cal Cycle

***3 Year Cal Cycle

Notes:

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



3.4 GENERAL TEST PROCEDURE AND SETUP FOR RADIO MEASUREMNTS

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

Conducted ⊠

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.

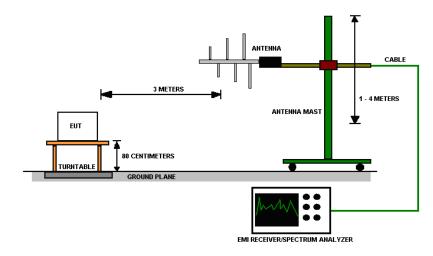


Figure 2 - Radiated Emissions Test Setup

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4.0 RESULTS

			DTS Radio Mea	asurements				
CHANNEL	Transmitter	Occupied Bandwidth (kHz)	6 dB Bandwidth (kHz)	AVERAGE OUTPUT POWER (dBm)	AVERAGE OUTPUT POWER (mW)	PSD (dBm)	RESULT	
Low	GMSK 1Mb	1365.60	1385.70	-2.680	0.540	-18.703	PASS	
Mid	GMSK 1Mb	1358.80	1374.50	1.540	1.426	-14.373	PASS	
High	GMSK 1Mb	1347.20	1329.60	-1.950	0.638	-18.537	PASS	
Low	GMSK 2Mb	2597.70	2541.90	1.210	1.321	-14.738	PASS	
Mid	GMSK 2Mb	2636.90	2575.00	1.520	1.419	-15.313	PASS	
High	GMSK 2Mb	2618.90	2551.60	-2.430	0.571	-19.619	PASS	
Occupied Ba	ndwidth = N/A;	6 dB Bandwidth Li	mit = 500 kHz	Peak Output Po	wer Limit = 30	dBm; PSD Li	mit = 8 dBm	
			Unrestricted E	Band-Edge				
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Relative Highest out of band level (dBuV)	Relative Fundamental (dBuV)	Delta (dB)	Min Delta (dB)	Result	
Low	GMSK 1Mb	2400.00	64.309	104.175	39.866	30.00	PASS	
Low	GMSK 2Mb	2400.00	65.392	106.107	40.715	30.00	PASS	
High	GMSK 1Mb	2483.50	51.553	103.856	52.303	30.00	PASS	
High	GMSK 2Mb	2483.50	58.594	101.353	42.759	30.00	PASS	
		Р	eak Restricted	Band-Edge				
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Highest out of band level (dBuV/m @ 3m)	Measurement Type	Limit (dBuV/m @ 3m)	Margin	Result	
Low	GMSK 1Mb	2390.00	52.788	Peak	73.98	21.19	PASS	
Low	GMSK 2Mb	2390.00	51.778	Peak	73.98	22.20	PASS	
High	GMSK 1Mb	2483.50	57.126	Peak	73.98	16.85	PASS	
High	GMSK 2Mb	2483.50	61.812	Peak	73.98	12.17	PASS	
*1	High GMSK 2Mb 2483.50 61.812 Peak 73.98 12.17 PASS Limit shown is the peak limit taken from FCC Part 15.209							

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	Average Restricted Band-Edge									
CHANNEL	. Mode Band edge /Measurement Frequency (MHz) (MHz) (Measurement) (Measurement				Limit (dBuV/m @ 3m)	Margin	Result			
Low	GMSK 1Mb	2390.00	41.488	Average	53.98	12.49	PASS			
Low	GMSK 2Mb	2390.00	43.839	Average	53.98	10.14	PASS			
High	GMSK 1Mb	2483.50	48.248	Average	53.98	5.73	PASS			
High	GMSK 2Mb	2483.50	53.364	Average	53.98	0.62	PASS			
*Limit shown	is the average	limit taken from FC	C Part 15.209							



4.1 OUTPUT POWER

Test Method: All measurements were performed using the section 11.9.2.2.2 from ANSI C63.10.

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

Test procedures:

Details can be found in section 3.4 of this report.

Deviations from test standard:

No deviation.

Test setup:

Details can be found in section 3.4 of this report.

EUT operating conditions:

Details can be found in section 2.1 of this report.

Test results:

Pass

Comments:

- 1. All the output power plots can be found in the Appendix C.
- 2. All the measurements were found to be compliant.
- 3. Tabulated data is listed in section 4.0.



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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:

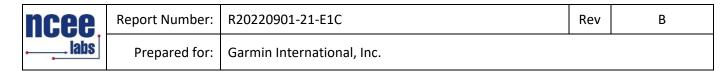
Details can be found in section 2.1 of this report.

Test results:

Pass

Comments:

- 1. All the bandwidth plots can be found in the Appendix C.
- 2. All the measurements were found to be compliant.
- 3. Tabulated data is listed in section 4.0.



4.3 DUTY CYCLE

Test Method:

All Modulations/transmitters shown have 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.



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Test procedures:

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

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

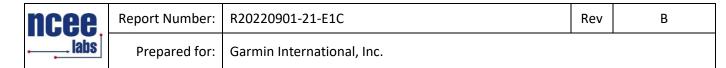
c. The antenna was a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are used to make the measurement.

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

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

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

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



Test setup:

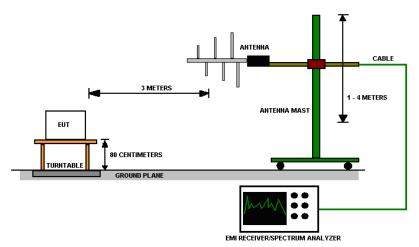


Figure 3 - Radiated Emissions Test Setup

NOTE:

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

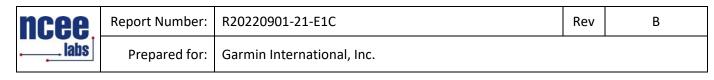
2. The resolution bandwidth 1 MHz for all measurements and at frequencies above 1GHz, A peak detector was used for all measurements above 1GHz. Measurements were made with an EMI Receiver.

Deviations from test standard:

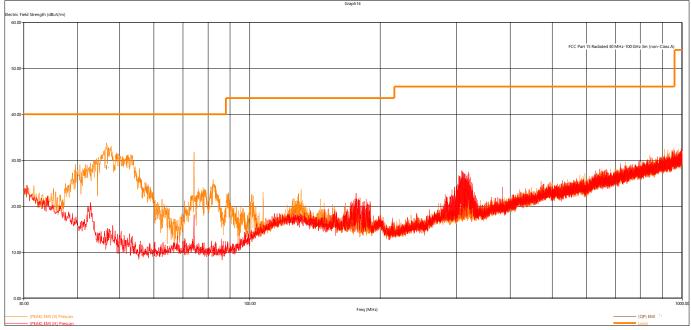
No deviation.

EUT operating conditions

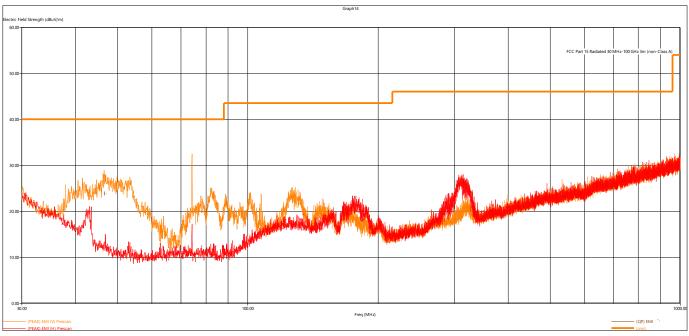
Details can be found in section 2.1 of this report.



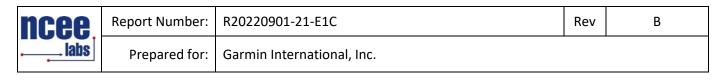
Test results:

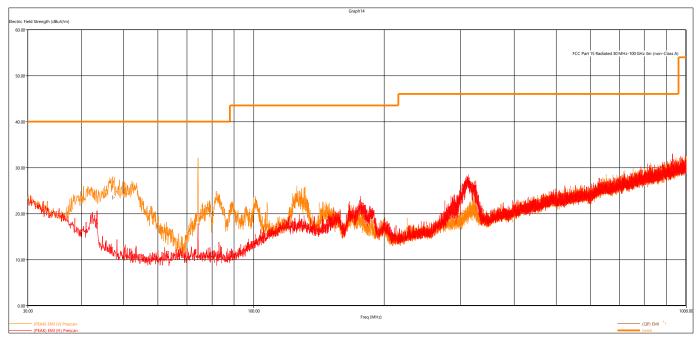














REMARKS:

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

	Quasi-Peak Measurements, GMSK									
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation		
MHz	dBµV/m	dBµV/m	dB	cm.	deg.					
46.474560	23.85	40.00	16.15	106.00	327.00	V	Low	GMSK 1MB		
46.955520	23.47	40.00	16.53	107.00	234.00	V	Low	GMSK 2MB		
46.431840	28.41	40.00	11.59	106.00	235.00	V	l	RX		

The EUT was maximized in 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.

	Peak Measurements, GMSK									
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation		
MHz	dBµV/m	dBµV/m	dB	cm.	deg.					
2402.224000	96.30	NA	NA	119.00	7.00	V	Low	GMSK 1MB		
2440.176000	100.31	NA	NA	185.00	359.00	V	Mid	GMSK 1MB		
2479.698000	97.65	NA	NA	174.00	4.00	V	High	GMSK 1MB		
2404.496000	99.56	NA	NA	164.00	7.00	V	Low	GMSK 2MB		
2439.460000	100.32	NA	NA	183.00	359.00	V	Mid	GMSK 2MB		

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2477.534000	98.06	NA	NA	180.00	3.00	V	High	GMSK 2MB
7206.458000	54.12	73.98	19.86	147.00	167.00	V	Low	GMSK 1MB
7319.674000	54.51	73.98	19.47	123.00	170.00	V	Mid	GMSK 1MB
7441.038000	52.22	73.98	21.76	167.00	166.00	V	High	GMSK 1MB
7212.844000	53.26	73.98	20.72	138.00	169.00	V	Low	GMSK 2MB
7318.482000	55.28	73.98	18.70	199.00	167.00	V	Mid	GMSK 2MB
7432.264000	52.63	73.98	21.35	556.00	330.00	Н	High	GMSK 2MB
9919.194000	54.87	73.98	19.11	312.00	131.00	V	High	GMSK 1MB
9914.924000	51.78	73.98	22.20	153.00	137.00	V	High	GMSK 2MB

The EUT was maximized in 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.

		Ave	erage Mea	asuremer	nts, GMSI	‹		
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation
MHz	dBµV/m	dBµV/m	dB	cm.	deg.			
2402.224000	93.79	NA	NA	119.00	7.00	V	Low	GMSK 1MB
2440.176000	98.12	NA	NA	185.00	359.00	V	Mid	GMSK 1MB
2479.698000	94.26	NA	NA	174.00	4.00	V	High	GMSK 1MB
2404.496000	93.33	NA	NA	164.00	7.00	V	Low	GMSK 2MB
2439.460000	93.67	NA	NA	183.00	359.00	V	Mid	GMSK 2MB
2477.534000	92.02	NA	NA	180.00	3.00	V	High	GMSK 2MB
7206.458000	44.51	53.98	9.47	147.00	167.00	V	Low	GMSK 1MB
7319.674000	47.40	53.98	6.58	123.00	170.00	V	Mid	GMSK 1MB
7441.038000	41.31	53.98	12.67	167.00	166.00	V	High	GMSK 1MB
7212.844000	43.38	53.98	10.60	138.00	169.00	V	Low	GMSK 2MB
7318.482000	44.63	53.98	9.35	199.00	167.00	V	Mid	GMSK 2MB
7432.264000	40.85	53.98	13.13	556.00	330.00	Н	High	GMSK 2MB
9919.194000	45.04	53.98	8.94	312.00	131.00	V	High	GMSK 1MB
9914.924000	39.01	53.98	14.97	153.00	137.00	V	High	GMSK 2MB

The EUT was maximized in all 3 orthogonal axes. The worst-case is shown in the 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:

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 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.

Deviations from test standard:

None.

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:

Note that the limit shown on the plots does not apply. It is a line for reference

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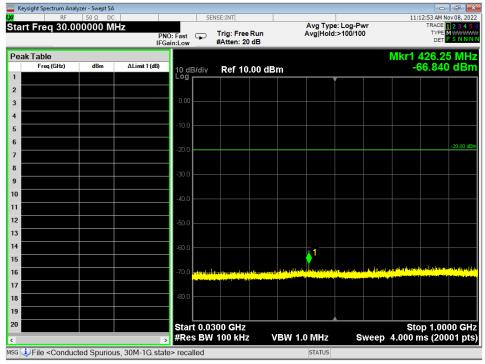


Figure 7 - Radiated Emissions Plot, GMSK 1MB, 30MHz – 1GHz, Mid

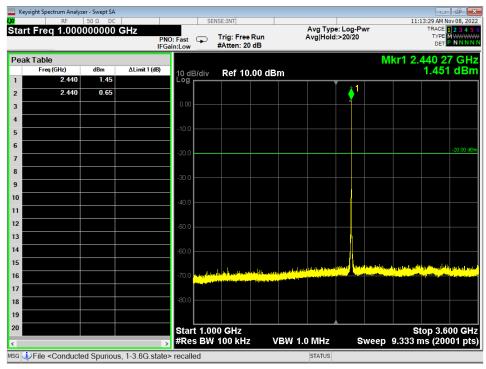


Figure 8 - Radiated Emissions Plot, GMSK 1MB, 1GHz – 3.6GHz, Mid



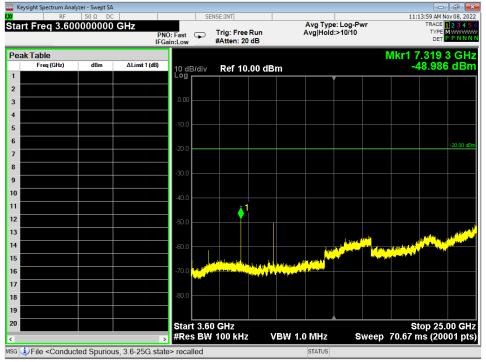
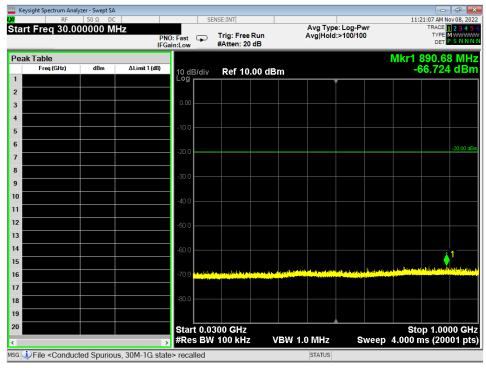


Figure 9 - Radiated Emissions Plot, GMSK 1MB, 3.6GHz - 25GHz, Mid







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	Freq (GHz)	dBm	ΔLimit 1 (dB)	10 dB	lidiv	Ref 10	00 dB	m			INI I 2 .	-0.56	dB
	2.440	-0.57		Log	/ di f				 Y				
	2.440	-1.07							Â	1			
				0.00					- s				
				-10.0									
													-20.00 a
				-20.0									
				-30.0									
				-40.0									
				*40.0									
				-50.0									
				-60.0									
										hand (pidera)		ور المعالية الم	
				-70.0	december 10	alter a that he	likelpowerths	and the (plott)					and Sounds
					al a constant	all the star Lastan 4 an	and the second						
				-80.0									
						0 GHz						top 3.6	



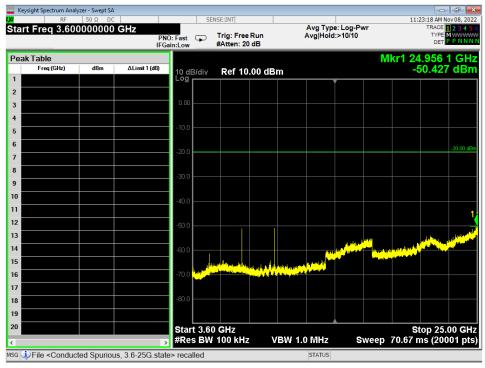


Figure 12 - Radiated Emissions Plot, GMSK 2MB, 3.6GHz – 25GHz, Mid



Rev

Prepared for: Garmin International, Inc.

4.6 BAND EDGES

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

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

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

Test procedures:

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

Deviations from test standard:

No deviation.

Test setup:

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

EUT operating conditions:

Details can be found in section 2.1 of this report.



Test results:

Pass

Comments:

1. All the band edge plots can be found in the Appendix C.

- 2. If the device falls under FCC Part 15.247 (Details can be found in summary of test results), compliance is shown in the unrestricted band edges by showing minimum delta of 20 dB between peak and the band edge.
- 3. The restricted band edge compliance is shown by comparing to the general limit defined in Part 15.209.
- 4. Tabulated data is listed in section 4.0.



4.7 **POWER SPECTRAL DENSITY**

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

Limits of power measurements:

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

Test procedures:

Details can be found in section 3.4 of this report.

Deviations from test standard:

No deviation.

Test setup:

Details can be found in section 3.4 of this report.

EUT operating conditions:

Details can be found in section 2.1 of this report.

Test results:

Pass

Comments:

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



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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 MHz3. 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 13 - Conducted Emissions Plot, Line, TX



Figure 14 - Conducted Emissions Plot, Neutral, TX



Rev

В



Figure 15 - Conducted Emissions Plot, Line, IDLE

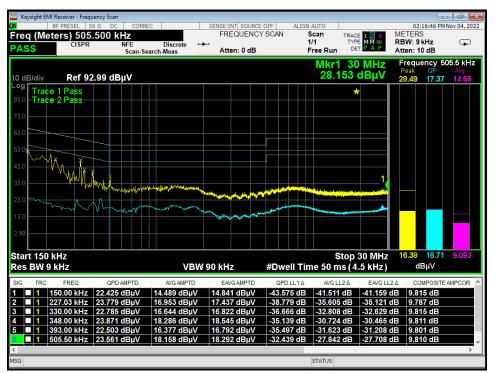


Figure 16 - Conducted Emissions Plot, Neutral, IDLE

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labs	Prepared for:	Garmin International, Inc.		

APPENDIX A: SAMPLE CALCULATION

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows: FS = RA + AF - (-CF + AG) + AV

where FS = Field Strength

RA = Receiver Amplitude AF = Antenna Factor CF = Cable Attenuation Factor AG = Amplifier Gain AV = Averaging Factor (if applicable)

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

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

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

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

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

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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 (dB μ V/m) / 20] / 10^{6}

Gain = 1 (numeric gain for isotropic radiator)

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

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

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

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



APPENDIX B - MEASUREMENT UNCERTAINTY

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

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

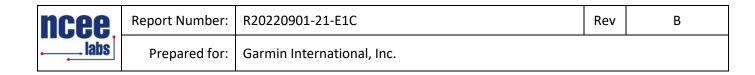
Expanded uncertainty values are calculated to a confidence level of 95%.

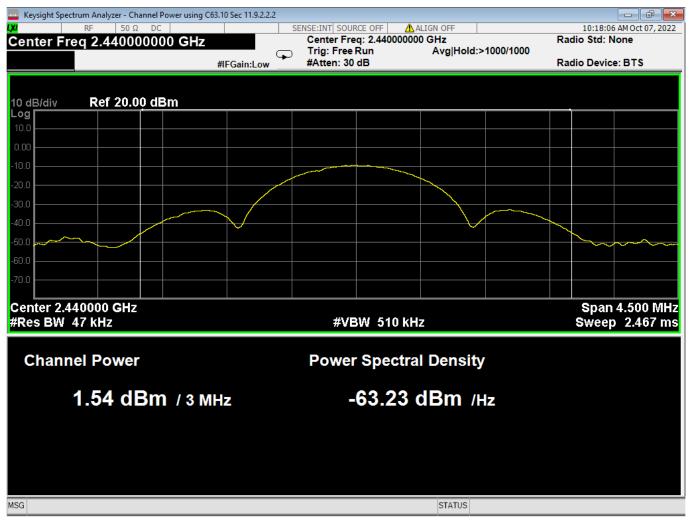
Incee labs	Report Number:	R20220901-21-E1C	Rev	В
	Prepared for:	Garmin International, Inc.		

APPENDIX C – GRAPHS AND TABLES

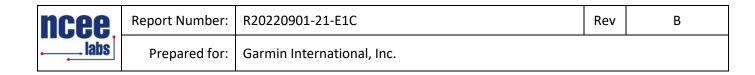


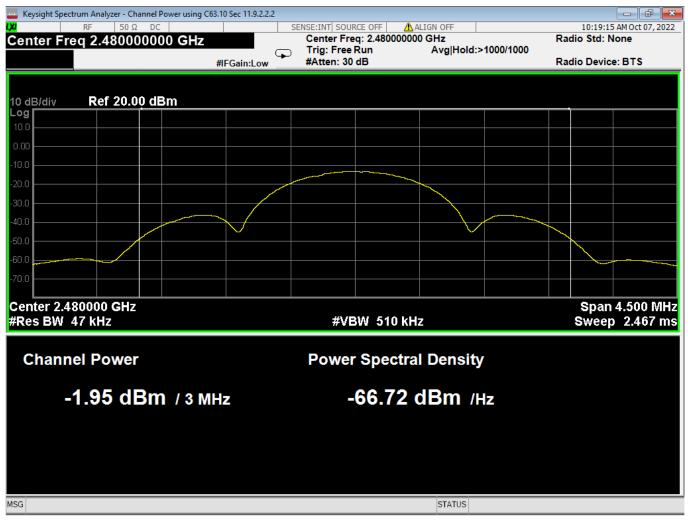
14 Average Power, Low Channel, GMSK 1MB





15 Average Power, Mid Channel, GMSK 1MB





16 Average Power, High Channel, GMSK 1MB

	Report Number:	R20220901-21-E1C	Rev	В
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using C63	10 Sec 11.8.1			
RF 50 Ω DC		SENSE:INT		03:56:02 PM Oct 11, 2022
enter Freq 2.402000000	GHz	Center Freq: 2.40200000	GHz	Radio Std: None
		Trig: Free Run #Atten: 20 dB	Avg Hold:>10/10	Radio Device: BTS
0 dB/div Ref 20.00 dBm				
og				
).00				
0.0				
0.0				
0.0				<u> </u>
0.0				Municipal and and
0.0				
0.0				
0.0				
enter 2.402 GHz Res BW 100 kHz		VBW 1 MHz		Span 5 MH: Sweep 1 ms
				Sweep This
Occupied Bandwidth		Total Power	5.17 dBm	
	3857 MHz			
Lav				
Transmit Freq Error	-20.213 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	805.3 kHz	x dB	-6.00 dB	
File <state 6<="" ant_ble="" dts="" td=""><td>dD bandwidth 11.0</td><td>1 states recalled</td><td>STATUS</td><td></td></state>	dD bandwidth 11.0	1 states recalled	STATUS	

17 6dB Bandwidth, Low Channel, GMSK 1MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

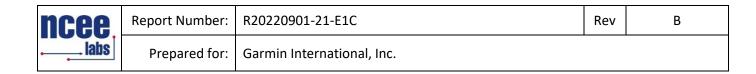
🔤 Keysight Spec	ctrum Analyzer - BW using C	53.10 Sec 11.8.1							
	RF 50 Ω DC		9	SENSE:INT	eq: 2.440000000	GH7		03:56:5 Radio Std:	1 PM Oct 11, 2022
Center Fr	eq 2.44000000	GHZ		Trig: Free	Run	Avg Hold:	>10/10	Radio Stu. I	Volle
		#IFGain:	Low	#Atten: 20	dB			Radio Devid	e: BTS
10 dB/div	Ref 20.00 dBi	n							
Log									
10.0									
0.00									
-10.0			-						
-20.0			\mathcal{A}				m		
-30.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				~~~~	<u> </u>	⁵ 74	
-40.0	······································							~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
-50.0									
-60.0									
-70.0									
-70.0									
Center 2.4								5	Span 5 MHz
#Res BW	100 kHz			VB	N 1 MHz			S	weep 1 ms
0		(Ja		Total F	ower	8.67 d	Pm		
Occup	oied Bandwid		_	TOtal F	OWEI	0.07 u	ып		
	1.	3745 MI	Z						
Traner	nit Freq Error	-13.296 k	U 7	% of O	BW Power	99.0	0 %		
x dB Ba	andwidth	862.8 k	Hz	x dB		-6.00	dB		
MSG						STATUS			

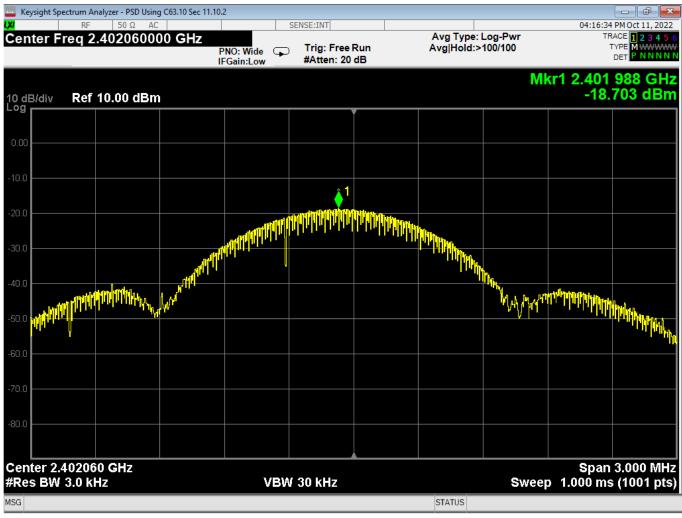
18 6dB Bandwidth, Mid Channel, GMSK 1MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

	Sec 11.8.1			
RF 50Ω DC		SENSE:INT		04:00:10 PM Oct 11, 2022
Center Freq 2.480000000 G		Center Freq: 2.480000000 Trig: Free Run	GHz Avg Hold:>10/10	Radio Std: None
	ں۔) #IFGain:Low	#Atten: 20 dB		Radio Device: BTS
10 dB/div Ref 20.00 dBm			.	
10.0				
0.00				
-10.0				
-20.0				
-30.0			Jamma .	
-40.0				
and the second se				mount - mount a
-50.0 - show				a second a s
-60.0				
-70.0				
Center 2.48 GHz #Res BW 100 kHz		VBW 1 MHz		Span 5 MHz Sweep 1 ms
				encep i no
Occupied Bandwidth		Total Power	4.25 dBm	
1.3	296 MHz			
Transmit Freq Error	-3.912 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	845.8 kHz	x dB	-6.00 dB	
ISG			STATUS	

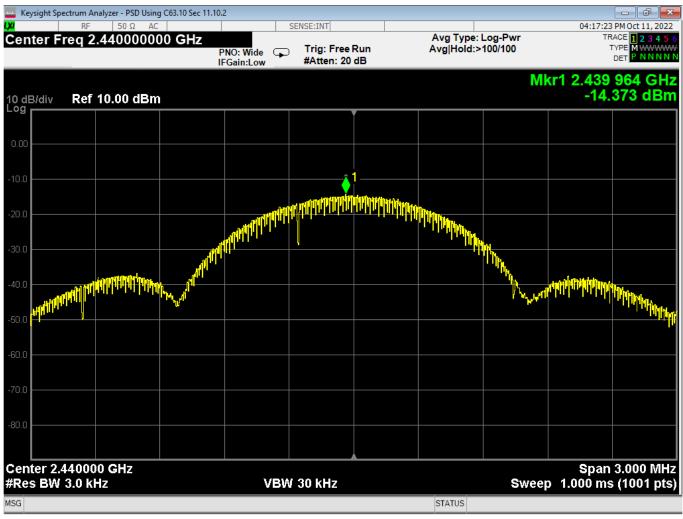
19 6dB Bandwidth, High Channel, GMSK 1MB





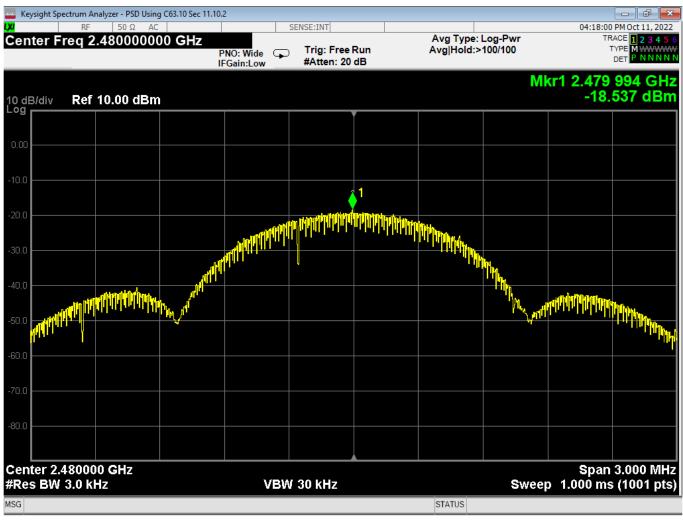
20 PSD, Low Channel, GMSK 1MB





21 PSD, Mid Channel, GMSK 1MB





22 PSD, High Channel, GMSK 1MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricted LBE using C6			
α RF 50 Ω AC Marker 2 Δ -3.041421800 MHz	PNO: Fast Trig: Free Ru IFGain:Low #Atten: 20 dE		04:49:30 PM Oct 11, 2022 TRACE 1 2 3 4 5 TYPE MA WWW DET P A N N N
10 dB/div Ref 116.99 dBµV			ΔMkr2 -3.041 MHz -39.866 dB
- og 107 97.0 87.0			
77.0			
57.0	man		
27.0			
Start 2.390000 GHz #Res BW 100 kHz	VBW 1.0 MHz	Swee	Stop 2.405808 GH: p 1.000 ms (1001 pts
MKR MODE TRC SCL X 1 N 1 f 2.402 219 GH; 2 Δ1 1 f (Δ) -3.041 MH; 3 N 1 f 2.399 184 GH; 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	z (Δ) -39.866 dB	ON FUNCTION WIDTH	FUNCTION VALUE
6 7 8 9 10			
11 < ISG		STATUS	>

23 LBE, unrestricted GMSK 1MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricted LBE using C6			- F
Marker 3 Δ 2.483500000000 GHz	PNO: Wide Trig: Free Run IFGain:Low #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold:>1000/1000	04:52:59 PM Oct 11, 2022 TRACE 1 2 3 4 5 6 TYPE MA WWWW DET P A N N N N
10 dB/div Ref 116.99 dBµV		ΔΜΙ	r3 2.483 500 GHz dB
107			
87.0			
67.0			3∆1
47.0			2
37.0			
27.0 Start 2.475645 GHz			Stop 2.483500 GHz
#Res BW 100 kHz	VBW 1.0 MHz	Sweet	5100 2.483300 GHz
MKR MODE TRC SCL X 1 N 1 f 2.480 264 GH 2 N 1 f 2.483 500 GH 3 Δ1 1 f 2.483 500 GH 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	z 51.553 dBµV	FUNCTION WIDTH FI	JNCTION VALUE
4 5 5 2 6 2 7 2 8 2			
9 9 10 11 11 11 11 11 11 11 11 11 11 11 11			×
^{MSG} ऄ File <lbe 1mb_0000.png="" ble=""> sav</lbe>	ed	STATUS	

24 HBE, unrestricted GMSK 1MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

/	SENSE:INT	ALIGN OFF	pe: RMS	04:16:16 PM Oct 04, 2 TRACE 1 2 3 4
	Trig: Free Ru #Atten: 0 dB			TYPE MAWY DET PANI
			М	kr2 2.388 70 G 41.479 dB
				41.473 00
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				Stop 2.390000 G
#VB	SW 50 MHz*		Sweep	1.000 ms (1001 p
Y	FUNCTIO	N FUNCTION WIDTH	FU	NCTION VALUE
GHZ 41.488	dBµV			
	IFGain:High	PNO: Fast IFGain:High Trig: Free Ru #Atten: 0 dB #Vew 50 MHz*	PNO: Fast IFGain:High Trig: Free Run #Atten: 0 dB Avg Ho #4tten: 0 dB Image: State	PNO: Fast IFGain:High Trig: Free Run #Atten: 0 dB Avg Hold:>1000/1000 M ////////////////////////////////////

25 LBE, Restricted GMSK 1MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spect	trum Analyzer - Restricted HBE C63.10	Sec 6.10.5				- F
	RF 50 Ω AC	SENS	E:INT	ALIGN OFF	DMC	04:19:47 PM Oct 04, 2
ASS	2.483500000000 GHz	PNO: Fast	rig: Free Run Atten: 0 dB	Avg Hold:>		TRACE 123 TYPE MAWA DET PAN
0 dB/div	Ref Offset 36.65 dB Ref 88.64 dBµV				Mkr2	2.483 500 0 G 48.242 dB
^{78,6} Trace	1 Pass 2 Pass					
68.6 1 58.6 2 mere	u					
48.6 38.6 			เงสางไหรรัฐระสาร _{สาส} สะมัญกังสะจะสุโมะ 	Angleta Ingles and Angleta Inder		La La Andre Callen Carlo and Carlos
28.6						
8.64						
1.36 	3500 GHz					Stop 2.500000 G
Res BW 1	.0 MHz	VBW 50) MHz*		Sweep	1.000 ms (1001 p
	f 2.483 896 0 0			FUNCTION WIDTH	FUN	NCTION VALUE
2 N 2 3 4	f 2.483 500 0 G	iHz 48.248 dBµ	V			
5 6 7						
8 9 0						
G				I STATUS		

26 HBE, Restricted GMSK 1MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		



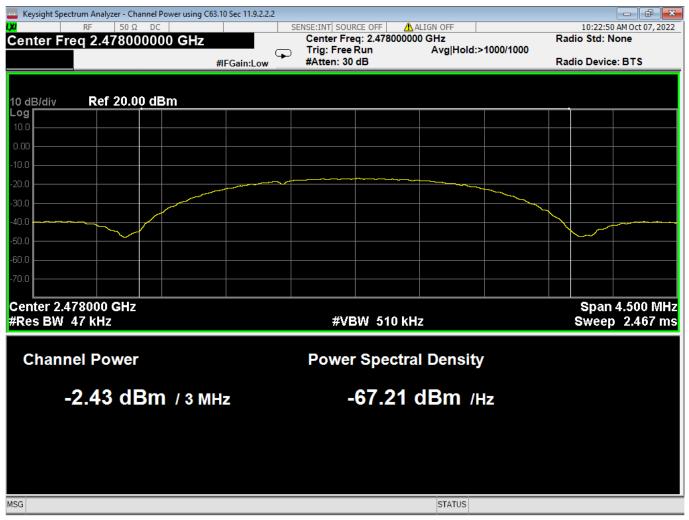
27 Average Power, Low Channel, GMSK 2MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

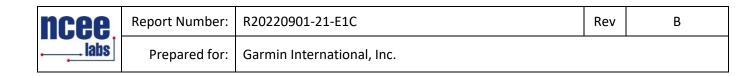
ng C63.10 Sec 11.9.2.2.2		A 11 TON OFF			
					3 AM Oct 07, 203 Ione
	Trig: Free Run			Radio Devic	e: BTS
	#\(B)M_540				4.500 MH
	#VDVV JIU			oweer	2.407 1
	Power Spec	tral Density			
MHz	-63.26 dBm /Hz				
		STATUS			
	Hz #IFGain:Low	Hz #IFGain:Low SENSE:INT SOURCE OFF Center Freq: 2.4400 Trig: Free Run #Atten: 30 dB U W W W W W W W W W W W W W	SENSE:INT SOURCE OFF ALIGN OFF Center Freq: 2.44000000 GHz Trig: Free Run #FGain:Low #Atten: 30 dB #Atten: 30 dB #Atten: 40 dB #FGain:Low #Atten: 40 dB #FGain:Low #Atten: 40 dB #Atten: 50 dB #Atten: 40 dB #FGain:Low #Atten: 40 dB #Atten: 50 dB #Atten: 40 dB #VBW 510 kHz #VBW 510 kHz Power Spectral Density -63.26 dBm /Hz MHz -63.26 dBm /Hz	Hz #FGain:Low SENSE:INT SOURCE OFF Center Freq: 2.440000000 GHz Trig: Free Run #Atten: 30 dB AuglHold:>1000/1000 #Atten: 30 dB #VBW 510 kHz Power Spectral Density -63.26 dBm /Hz	SENSE:INT SOURCE OFF ALIGN OFF 10:22:16 Center Freq: 2.44000000 GHz Trig: Free Run Avg Hold:>1000/1000 #Atten: 30 dB #Gain:Low #Atten: 30 dB #VBW 510 kHz Span Sweep Power Spectral Density MHz -63.26 dBm /Hz

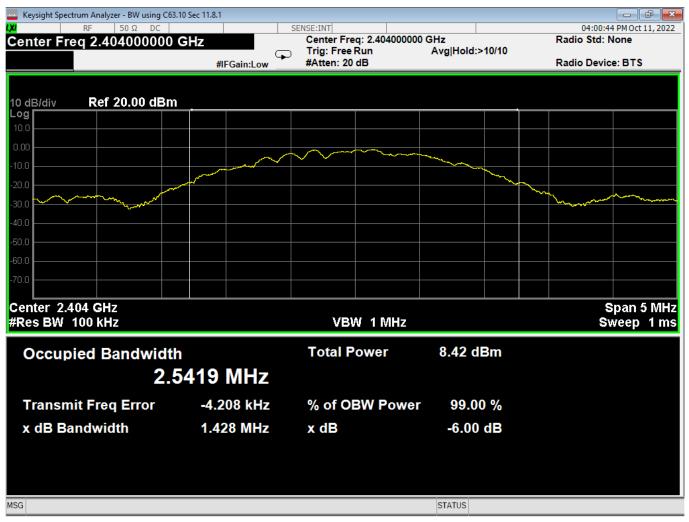
28 Average Power, Mid Channel, GMSK 2MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

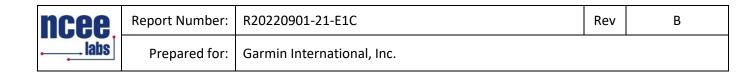


29 Average Power, High Channel, GMSK 2MB





30 6dB Bandwidth, Low Channel, GMSK 2MB





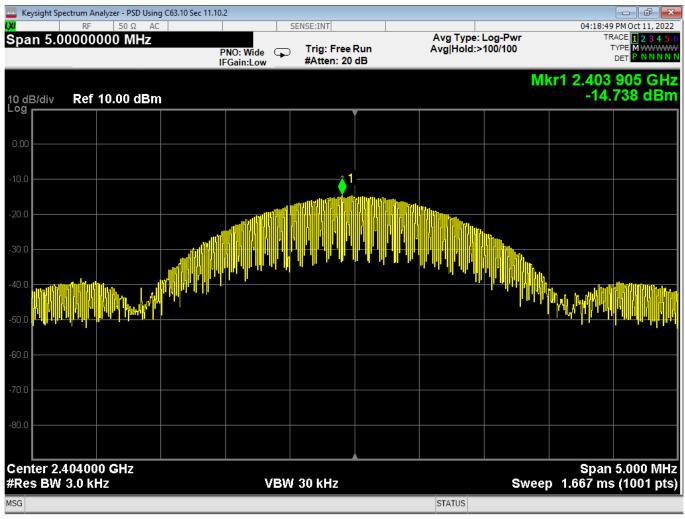
31 6dB Bandwidth, Mid Channel, GMSK 2MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

www.www.www.www.www.www.www.www.www.ww	63.10 Sec 11.8.1			
IX RF 50 Ω DC		SENSE:INT		04:02:15 PM Oct 11, 2022
Center Freq 2.48000000		Center Freq: 2.480000000 Trig: Free Run	GHz Avg Hold:>10/10	Radio Std: None
	لا #IFGain:Low	#Atten: 20 dB	Anglitola. Pione	Radio Device: BTS
10 dB/div Ref 20.00 dB	~			
10.0				
0.00				
-10.0				
-20.0	and the second s			
	r a company and			\sim
-30.0				Jacob Contraction of the second second
-40.0				
-50.0				
-60.0				
-70.0				
Center 2.48 GHz				Span 5 MHz
#Res BW 100 kHz		VBW 1 MHz		Sweep 1 ms
Occupied Bandwid	th	Total Power	4.10 dBm	
			4.10 0.011	
2.	.5516 MHz			
Transmit Freq Error	4.426 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	1.483 MHz		-6.00 dB	
	1.403 MHZ	x dB	-0.00 dB	
MSG			STATUS	

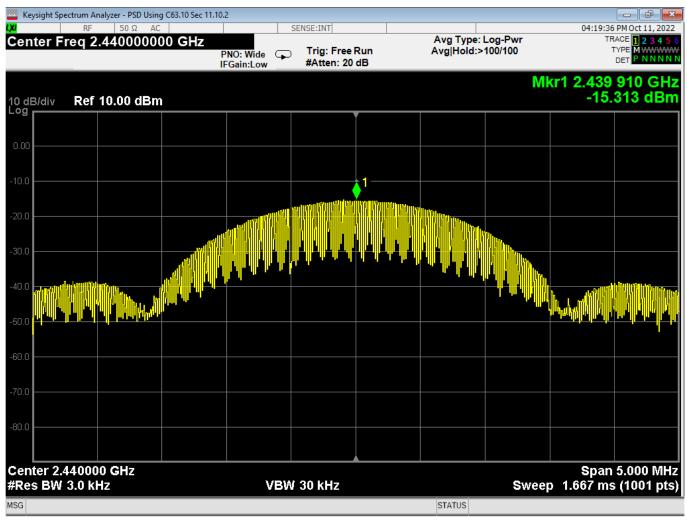
32 6dB Bandwidth, High Channel, GMSK 2MB



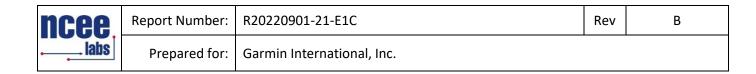


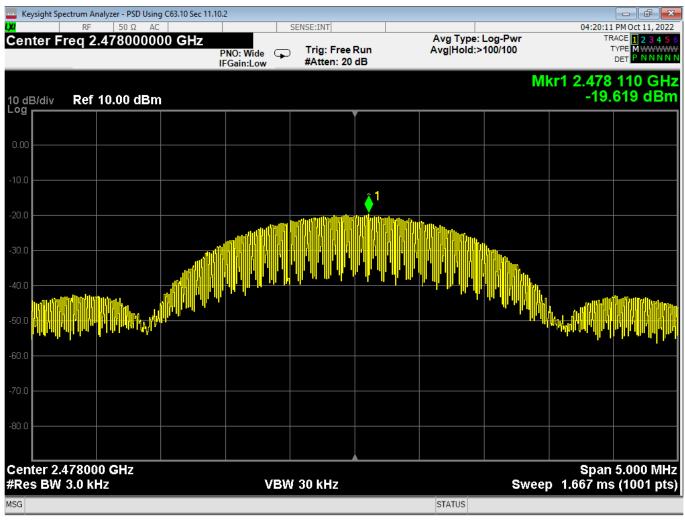
33 PSD, Low Channel, GMSK 2MB





34 PSD, Mid Channel, GMSK 2MB





35 PSD, High Channel, GMSK 2MB

ncee.	Report Number:	: R20220901-21-E1C		Rev B
	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricted LBE using C6						
RF 50 Ω AC Iarker 2 Δ -3.714829240 MHz		E:INT Frig: Free Run Atten: 20 dB	Avg Type: Avg Hold:			Dct 11, 202 1 2 3 4 5 MAWWW P A N N N
0 dB/div Ref 116.99 dBµV				Δ	Mkr2 -3.71. -40.7	5 MH 714 dE
•og						Vy Vy
77.0 67.0 57.0	~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	2Δ1			
37.0 27.0 Start 2.390000 GHz					Stop 2.4058	208 GH
Res BW 100 kHz	VBW 1.	0 MHz		Sweep	1.000 ms (1	001 pt
MKR MODE TRC SCI X 1 N 1 f 2.403 705 GH 2 Δ1 1 f (Δ) -3.715 MH 3 N 1 f 2.399 992 GH 4 - - - 5 - - - 6 - - - 7 - - - 8 - - - 9 - - - 10 - - -	z (Δ) -40.714 dl	В	FUNCTION WIDTH	FU	NCTION VALUE	
sg			STATUS			>

36 Lower Bandedge, Unrestricted, GMSK 2MB

ncee,	Report Number:	R20220901-21-E1C	Rev	Rev B
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - Unrestricted LBE using C6 K RF 50 Ω DC	3.10 Sec 11.13.2 SENSE:	INT			05:00:31 PM Oct 11, 2022
Marker 3 Δ 5.820317880 MHz	PNO: Wide 🕞 Tri	g: Free Run tten: 20 dB	Avg Type Avg Hold:	: Log-Pwr >1000/1000	TRACE 1 2 3 4 5 TYPE MA WWW DET P A N N N
10 dB/div Ref 116.99 dBµV				L	Mkr3 5.820 MH2 -42.758 dE
107 97.0					
87.0 77.0 67.0		www	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Margar Margar	<u></u>
57.0 47.0 37.0					
27.0 Start 2.475645 GHz #Res BW 100 kHz	VBW 1.0	MHz		Sweep	Stop 2.483500 GHz 1.000 ms (1001 pts
MKR MODE TRC SCL X 1 N 1 f 2.477 680 GH 2 N 1 f 2.483 500 GH 3 Δ1 1 f (Δ) 5.820 MH	Y z 101.353 dBµV z 58.594 dBµV	FUNCTION	FUNCTION WIDTH	-	ICTION VALUE
4 5 6 7 7 8 9					
10 11 < IISG			STATUS		<u> </u>

37 Higher Bandedge, Unrestricted, GMSK 2MB

ncee.	Report Number: R20220901-21-E1C Rev Prepared for: Garmin International, Inc. Rev	В		
	Prepared for:	Garmin International, Inc.		

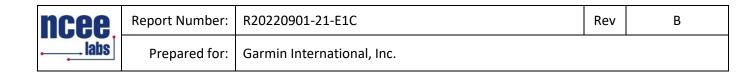
Keysight Spectrum Analyzer - I	Restricted LBE using C63.10 Se	ec 6.10.5					
RF 50		SENS	E:INT	ALIGN OFF			PM Oct 04, 20
ASS PREAMP	PN		Trig: Free Run Atten: 0 dB		pe: RMS d:>1000/1000	т	ACE 1234 YPE MA
Ref Offset					М	kr2 2.389	09 GI 40 dBj
dB/div Ref 88.11	ιαθμν						
Trace 1 Pass							
Trace 2 Pass							
3.1				4			
.1				0 <mark>1</mark>			
1 Mallana Malan	elahora-faltanen eta dari dari dari dari dari dari dari dar		allife all and the state of the	- White and a strategy an	Mr. Johnson and some	angeneret to an	2*****
·····							Y
.1							
.1							
.1							
11							
39							
art 2.380000 GHz es BW 1.0 MHz		#VBW :	50 MHz*		Sweep	Stop 2.39 1.000 ms	00000 G (1001 p
R MODE TRC SCL	Х	Y	FUNCTION	FUNCTION WIDTH	FUI	NCTION VALUE	
N 1 f	2.386 30 GHz	51.778 dBu					
N 2 f	2.389 09 GHz	43.839 dBµ	×				
				I STATUS			

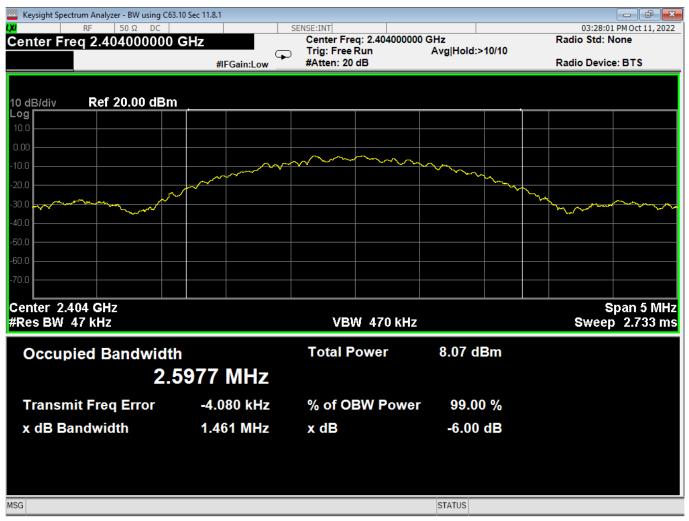
38 Lower Bandedge, Restricted, GMSK 2MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

50 Ω AC 3500000000 GHz		:INT	ALIGN OFF	514.0	04:23:12 PM Oct 04, 20
REAMP		rig: Free Run Atten: 0 dB		>1000/1000	TRACE 1234 TYPE MA WW DET PANN
Offset 36.65 dB ∕ 88.64 dBµV				Mkr2	2.483 500 0 GI 53.362 dB
		1n/~r/s=bHyyy		กับ _{การประส} าชินปัญหาราช (การจะการจะการจะ 	ษณฑ์ ^{เป็น} างระได้หลูไหนงขุณ _ท างที่ได้และใจหล่างสายส _า ยางก
GHz NHz	VBW 50	MHz*		Sweep	Stop 2.500000 G 1.000 ms (1001 p
× 2.483 516 5 0 2.483 500 0			FUNCTION WIDTH	FUI	NCTION VALUE

39 Higher Bandedge, Restricted, GMSK 2MB



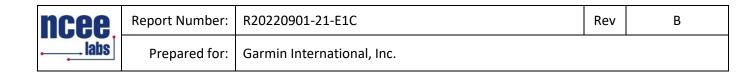


43 Occupied Bandwidth, Low Channel, GMSK 1MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using C63.	10 Sec 11.8.1			
Χ RF 50 Ω DC		SENSE:INT		03:29:26 PM Oct 11, 2022
Center Freq 2.440000000		Center Freq: 2.440000000 Trig: Free Run	GHz Avg Hold:>10/10	Radio Std: None
	#IFGain:Low	#Atten: 20 dB		Radio Device: BTS
10 dB/div Ref 20.00 dBm	_			
Log 10.0				
0.00				
-10.0			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
-20.0				ν _γ
.30.0				
40.0				
50.0				
60.0				
-70.0				
Center 2.44 GHz #Res BW 47 kHz		VBW 470 kHz		Span 5 MHz Sweep 2.733 ms
				•
Occupied Bandwidth	1	Total Power	8.14 dBm	
2.6	5369 MHz			
Transmit Freq Error	-1.607 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	1.488 MHz	x dB	-6.00 dB	
SG			STATUS	
50			514105	

44 Occupied Bandwidth, Mid Channel, GMSK 1MB



Keysight Spectrum Analyzer - BW using C63	3.10 Sec 11.8.1			
RF 50 Ω DC		SENSE:INT		03:30:04 PM Oct 11, 202
enter Freq 2.478000000	GHz	Center Freq: 2.47800000		Radio Std: None
		Trig: Free Run #Atten: 20 dB	Avg Hold:>10/10	Radio Device: BTS
dB/div Ref 20.00 dBm				
og				
.00				
0.0				
0.0				
0.0				
0.0				
D.O				
0.0				
0.0				
enter 2.478 GHz				Span 5 MH
Res BW 47 kHz		VBW 470 kHz		Sweep 2.733 m
Occupied Bandwidt	h	Total Power	3.50 dBm	
2.0	6189 MHz			
			99.00 %	
Transmit Freq Error	-9.025 kHz	% of OBW Power	99.00 %	
Transmit Freq Error x dB Bandwidth	-9.025 kHz 1.498 MHz	x dB	-6.00 dB	

45 Occupied Bandwidth, High Channel, GMSK 1MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs		Garmin International, Inc.		

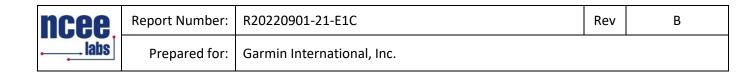
Keysight Spectrum Analyzer - BW using C63.	10 Sec 11.8.1			
RF 50 Ω DC		SENSE:INT		03:23:18 PM Oct 11, 2022
Center Freq 2.40200000	GHz	Center Freq: 2.402000000		Radio Std: None
	#IFGain:Low	 Trig: Free Run #Atten: 20 dB 	Avg Hold:>10/10	Radio Device: BTS
IO dB/div Ref 20.00 dBm				
- og 10.0				
0.00		0		
10.0				
20.0			<u>~</u>	
30.0				
40.0				~~
50.0				- Marine
60.0				
70.0				
				Span 5 MHz
Center 2.402 GHz #Res BW 47 kHz		VBW 470 kHz		Span 5 MHz Sweep 2.733 ms
Res BW 47 kHz		VBW 470 kHz Total Power	4.58 dBm	Span 5 MHz Sweep 2.733 ms
Res BW 47 kHz Occupied Bandwidth			4.58 dBm	Span 5 MHz Sweep 2.733 ms
Res BW 47 kHz Occupied Bandwidth	3656 MHz		4.58 dBm	Span 5 MH: Sweep 2.733 m
Res BW 47 kHz Occupied Bandwidth 1.3			4.58 dBm 99.00 %	Span 5 MH: Sweep 2.733 m
Res BW 47 kHz Occupied Bandwidth 1.3 Transmit Freq Error	3656 MHz -7.534 kHz	Total Power % of OBW Power	99.00 %	Span 5 MH: Sweep 2.733 m
Res BW 47 kHz Occupied Bandwidth 1.3	8656 MHz	Total Power		Span 5 MH: Sweep 2.733 m
Res BW 47 kHz Occupied Bandwidth 1.3 Transmit Freq Error	3656 MHz -7.534 kHz	Total Power % of OBW Power	99.00 %	Span 5 MH: Sweep 2.733 m
Res BW 47 kHz Occupied Bandwidth 1.3 Transmit Freq Error	3656 MHz -7.534 kHz	Total Power % of OBW Power	99.00 %	Span 5 MH Sweep 2.733 m
Res BW 47 kHz Occupied Bandwidth 1.3 Transmit Freq Error	3656 MHz -7.534 kHz	Total Power % of OBW Power	99.00 %	Span 5 MH Sweep 2.733 m

46 Occupied Bandwidth, Low Channel, GMSK 2MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

Keysight Spectrum Analyzer - BW using C63.	10 Sec 11.8.1			- F -
RF 50 Ω DC		SENSE:INT Center Freg: 2.440000000	CH-	03:25:28 PM Oct 11, 2022 Radio Std: None
	G	🕤 Trig: Free Run	Avg Hold:>10/10	
	#IFGain:Low	#Atten: 20 dB		Radio Device: BTS
0 dB/div Ref 20.00 dBm				
- og 10.0				
).00				
10.0				
0.0			\sim	
0.0	\sim		1 mm	
0.0				man and a second
60.0				
0.0				
enter 2.44 GHz				Span 5 MH
Res BW 47 kHz		VBW 470 kHz		Sweep 2.733 m
Occupied Bandwidth		Total Power	8.51 dBm	
1.3	3588 MHz			
Transmit Freq Error	-8.886 kHz	% of OBW Power	99.00 %	
x dB Bandwidth	796.4 kHz	x dB	-6.00 dB	
	130.4 KHZ	x ub	-0.00 01	
			074740	
G			STATUS	

47 Occupied Bandwidth, Mid Channel, GMSK 2MB



🔤 Keysight Spectrum Analyzer - B	W using C63.10 Sec 11.8	3.1			- 6 -
R F 50 9	Ω DC		SENSE:INT		03:26:52 PM Oct 11, 2022
Center Freq 2.4800	00000 GHz		Center Freq: 2.4800000		Radio Std: None
		#IFGain:Low	Trig: Free Run #Atten: 20 dB	Avg Hold:>10/10	Radio Device: BTS
	00 dBm				
Log 10.0					
0.00					
-10.0					
				~	
-20.0					
-30.0	~~~~				<u> </u>
-40.0	- The second second				- hy
-50.0					Man Marine Marine
-60.0					
-70.0					
Center 2.48 GHz					Span 5 MHz
#Res BW 47 kHz			VBW 470 kHz	2	Sweep 2.733 ms
Occupied Ban	dwidth		Total Power	4.34 dBm	
	1.3472	2 MHz			
T			0/ -f ODW/ D	- 00.00.0/	
Transmit Freq E		.204 kHz	% of OBW Powe		
x dB Bandwidth	8	04.5 kHz	x dB	-6.00 dB	

48 Occupied Bandwidth, High Channel, GMSK 2MB

ncee.	Report Number:	R20220901-21-E1C	Rev	В
labs	Prepared for:	Garmin International, Inc.		

REPORT END