

Amended
FCC/ISED Test Report

Prepared for: Garmin International, Inc.

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

Product: A03908

Test Report No: R20200110-20-E4A

Approved by:



Nic S. Johnson, NCE

Technical Manager

iNARTE Certified EMC Engineer #EMC-003337-NE

DATE: 9 May 2020

Total Pages: 43

The Nebraska Center for Excellence in Electronics (NCEE) authorizes the above named company to reproduce this report provided it is reproduced in its entirety for use by the company's employees only. Any use that a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. NCEE accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This report applies only to the items tested.



Report Number: R20200110-20-E4

Rev

A

Prepared for: Garmin International, Inc.

REVISION PAGE

Rev. No.	Date	Description
0	21 April 2020	Original – NJohnson Prepared by KVepuri/CFarrington
A	9 May 2020	1. PSD Measurements in Appendix C were removed. 2. Tables in Section 4.4 were updated to show the frequency range and statements were added to provide clarification about what data was reported. 3. Restricted band edge measurements were updated in section 4.5 and Appendix C. 4. The data corresponding to BT BR modulation was removed. 5. Contains the report R20200110-20-E12 and its amendments in full. -KV



Report Number: R20200110-20-E4

Rev

A

Prepared for: Garmin International, Inc.

CONTENTS

Revision Page	2
1.0 Summary of test results.....	4
2.0 EUT Description	5
2.1 Equipment under test	5
2.2 Description of test modes	5
2.3 Description of support units	5
3.0 Laboratory and General Test Description	6
3.1 Laboratory description.....	6
3.2 Test personnel.....	6
3.3 Test equipment.....	7
3.4 General Test Procedure and Setup for Radio Measuremnts.....	8
4.0 Results	9
4.1 Output Power	9
4.2 Bandwidth.....	10
4.3 Duty Cycle	11
4.4 Radiated emissions.....	12
4.5 Band edges	19
4.6 Conducted AC Mains Emissions	21
Appendix A: Sample Calculation	24
Appendix B – Measurement Uncertainty	26
Appendix C – Graphs and Tables	27
REPORT END.....	43

	Report Number:	R20200110-20-E4	Rev	A
	Prepared for:	Garmin International, Inc.		

1.0 SUMMARY OF TEST RESULTS

The worst-case measurements were reported in this report. Summary of test results presented in this report correspond to the following section (Please see the checked box below for the rule part used):

FCC Part 15.249 ☑

The EUT has been tested according to the following specifications:

- (1) US Code of Federal Regulations, Title 47, Part 15
- (2) ISSED RSS-Gen, Issue 5
- (3) ISSED RSS-210, Issue 10

SUMMARY			
Requirement	Test Type and Limit	Result	Remark
FCC 15.203	Unique Antenna Requirement	Pass	PCB Antenna
FCC 15.35 RSS-Gen, 6.10	Duty cycle of pulsed emissions	N/A	Not required
NA	Maximum Peak Output Power	N/A	Informational Purpose Only
NA	Minimum Bandwidth	N/A	Informational Purpose Only
FCC 15.209 RSS-Gen, 7.1	Receiver Radiated Emissions	Pass	Meets the requirement of the limit.
FCC 15.209 RSS-Gen, 8.9 RSS-210 A1.2 FCC 15.249(a)	Transmitter Radiated Emissions	Pass	Meets the requirement of the limit.
FCC 15.209, 15.205, 15.249(d) RSS-Gen, 8.9 RSS-210, 5.5	Band Edge Measurement	Pass	Meets the requirement of the limit.
FCC 15.207 RSS-Gen. 8.8	Conducted AC Emissions	Pass	Meets the requirement of the limit.

	Report Number:	R20200110-20-E4	Rev	A
	Prepared for:	Garmin International, Inc.		

2.0 EUT DESCRIPTION

2.1 EQUIPMENT UNDER TEST

Summary and Operating Condition:

EUT	A03908
EUT Received	13 January 2020
EUT Tested	19 February 2020- 6 March 2020
Serial No.	331800557 (Radiated Measurements) 331800546 (Radiated Measurements) 331800536 (Conducted Measurements)
Operating Band	2400 – 2483.5 MHz
Device Type	☒ GMSK ☒ GFSK ☐ BT BR ☐ BT EDR 2MB ☐ BT EDR 3MB ☐ 802.11x
Power Supply / Voltage	Internal Battery/ 5VDC Charger: Garmin (Phi Hong) MN: PSAF10R-050Q (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:

For Bluetooth Transmissions:

Channel	Frequency
Low	2402 MHz
Mid	2440/2441 MHz
High	2480 MHz

For 802.11x Transmissions:

Channel	Frequency
Low	2412 MHz
Mid	2437 MHz
High	2462 MHz

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

2.3 DESCRIPTION OF SUPPORT UNITS

None

	Report Number:	R20200110-20-E4	Rev	A
	Prepared for:	Garmin International, Inc.		

3.0 LABORATORY AND GENERAL TEST DESCRIPTION

3.1 LABORATORY DESCRIPTION

All testing was performed at the following Facility:

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

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

Environmental conditions varied slightly throughout the tests:

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



3.2 TEST PERSONNEL

No.	PERSONNEL	TITLE	ROLE
1	Nic Johnson	Technical Manager	Review/editing
2	Karthik Vepuri	Test Engineer	Testing and report
3	Caleb Farrington	Test Engineer	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.

	Report Number:	R20200110-20-E4	Rev	A
	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	N9038A	MY59050109	23 Apr 2019	23 Apr 2021
Keysight EXA Signal Analyzer	N9010A	MY56070862	14 Dec 2018	14 Dec 2020
SunAR RF Motion	JB1	A082918-1	15 Oct 2018	15 Oct 2020
EMCO Horn Antenna	3115	6416	26 Jan 2018	26 Jan 2021
EMCO Horn Antenna	3116	2576	31 Jan 2018	31 Jan 2021
EMCO Loop Antenna	6512	00024936	11 Feb 2019	11 Feb 2021
Rohde & Schwarz Preamplifier	TS-PR18	3545700803	09 Mar 2018*	09 Mar 2021*
Trilithic High Pass Filter	6HC330	23042	09 Mar 2018*	09 Mar 2021*
Rohde & Schwarz LISN	ESH3-Z5	836679/010	25 Jul 2019	25 Jul 2020
TDK Emissions Lab Software	V11.25	700307	NA	NA
Humidity Meter - Omega	iTHX-SD	18020051	14 Feb 2019	14 Feb 2021
JFW Industries Variable attenuator	50DR-046 SMA	594239	29 May 2018*	29 May 2020*
RF Cable (preamplifier to antenna)	MFR-57500	01-07-002	09 Mar 2018*	09 Mar 2021*
RF Cable (antenna to 10m chamber bulkhead)	FSCM 64639	01E3872	09 Mar 2018*	09 Mar 2021*
RF Cable (10m chamber bulkhead to control room bulkhead)	FSCM 64639	01E3874	09 Mar 2018*	09 Mar 2021*
RF Cable (Control room bulkhead to RF switch)	FSCM 64639	01E3871	09 Mar 2018*	09 Mar 2021*
RF Cable (RF switch to test receiver)	FSCM 64639	01F1206	09 Mar 2018*	09 Mar 2021*
RF switch – Rohde and Schwarz	TS-RSP	1113.5503.14	09 Mar 2018*	09 Mar 2021*
N connector bulkhead (10m chamber)	PE9128	NCEEBH1	09 Mar 2018*	09 Mar 2021*
N connector bulkhead (control room)	PE9128	NCEEBH2	09 Mar 2018*	09 Mar 2021*

*Internal Characterization

Notes:

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

3.4 GENERAL TEST PROCEDURE AND SETUP FOR RADIO MEASUREMENTS

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.

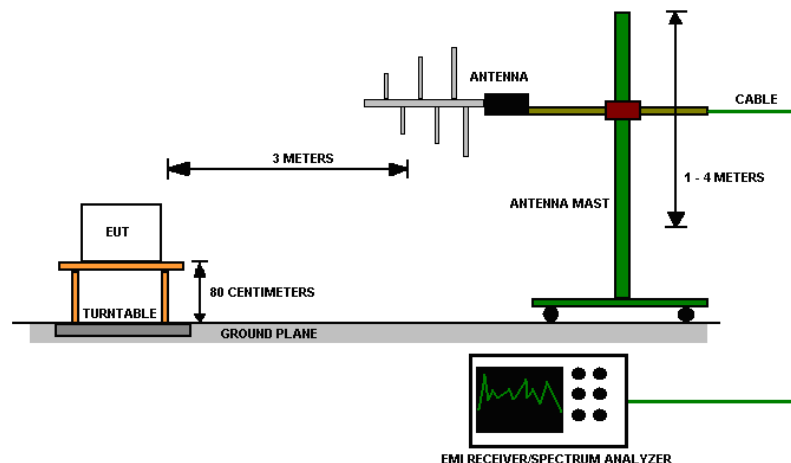


Figure 2 - Radiated Emissions Test Setup

4.0 RESULTS

4.1 OUTPUT POWER

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

Limits of power measurements:

For FCC Part 15.249 Device:

For Informational Purposes only

For FCC Part 15.247 Device:

The maximum allowed peak output power is 30 dBm.

Test procedures:

Details can be found in section 3.4 of this report.

Deviations from test standard:

No deviation.

Test setup:

Details can be found in section 3.4 of this report.

EUT operating conditions:

Details can be found in section 2.1 of this report.

Test results:

Pass

Comments:

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

Peak Output Power

CHANNEL	PEAK OUTPUT POWER (dBm)	PEAK OUTPUT POWER (mW)	RESULT	Transmitter
Low	1.160	1.306	PASS	GMSK
Mid	0.326	1.078	PASS	GMSK
High	-0.014	0.997	PASS	GMSK
Low	1.072	1.280	PASS	GFSK
Mid	-0.172	0.961	PASS	GFSK
High	-0.134	0.970	PASS	GFSK

	Report Number:	R20200110-20-E4	Rev	A
	Prepared for:	Garmin International, Inc.		

4.2 BANDWIDTH

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

Limits of bandwidth measurements:

For FCC Part 15.249 Device:

For Informational Purposes only

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.



Report Number:

R20200110-20-E4

Rev

A

Prepared for:

Garmin International, Inc.

4.3 DUTY CYCLE

Test Method: NA

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 ($\mu\text{V/m}$)	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) = $20 * \log * \text{Emission level } (\mu\text{V/m})$.
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.



Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		

Test procedures:

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

Test setup:

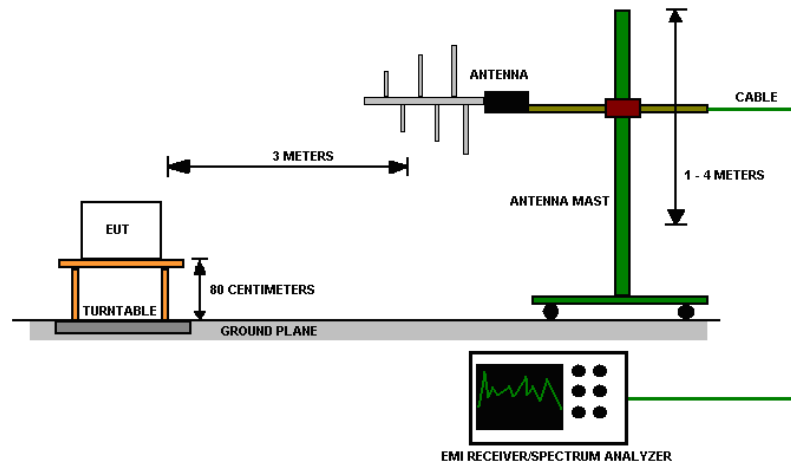


Figure 3 - Radiated Emissions Test Setup

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:

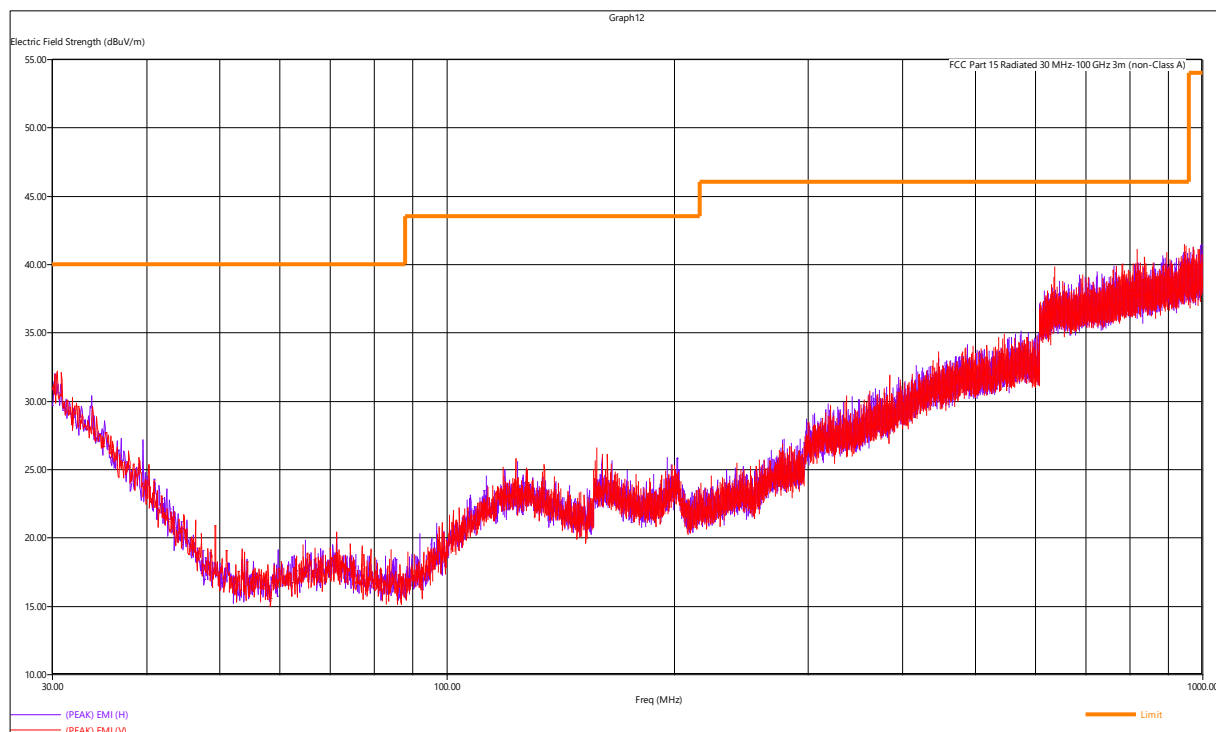


Figure 4 - Radiated Emissions Plot, Receive

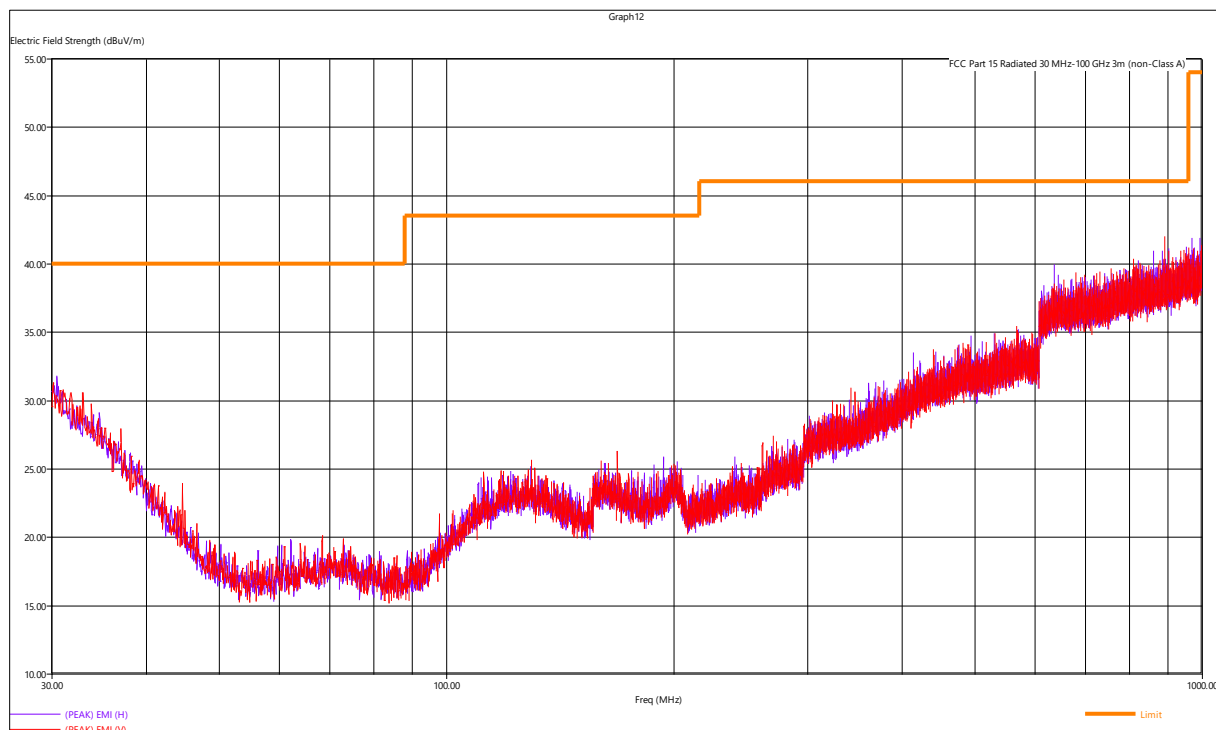


Figure 5 - Radiated Emissions Plot, GMSK

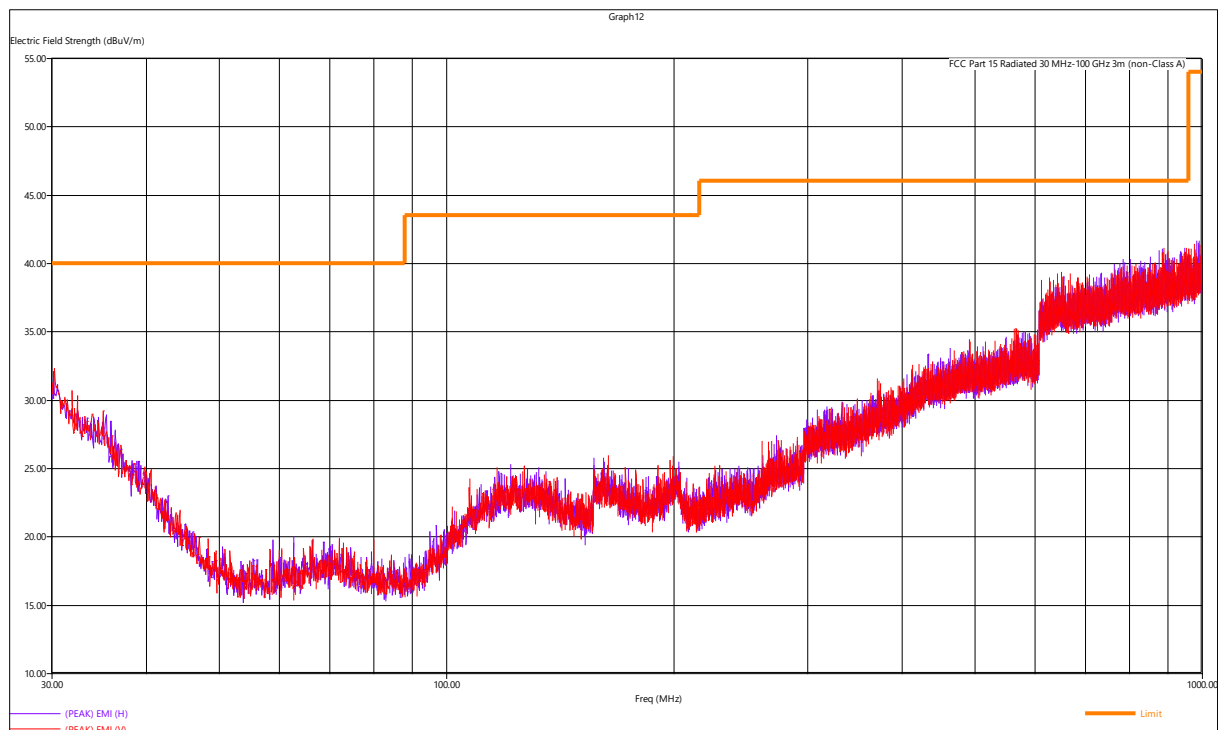


Figure 6 - Radiated Emissions Plot, GFSK

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

The EUT was maximized in all 3 orthogonal axis. The worst-case is shown in the plot and table above.
All emissions were found to be at least 6 dB below the limit.

Peak Measurements, GMSK-GFSK, 1 GHz -25 GHz								
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation
MHz	dBμV/m	dBμV/m	dB	cm.	deg.			
2402.000000	91.99	114.00	22.01	105	230	H	Low	GMSK
2440.000000	91.17	114.00	22.83	87	204	H	Mid	GMSK
2480.000000	90.51	114.00	23.49	93	239	H	High	GMSK
2402.000000	91.85	114.00	22.15	109	226	H	Low	GFSK
2440.000000	90.96	114.00	23.04	83	200	H	Mid	GFSK
2480.000000	90.41	114.00	23.59	91	243	H	High	GFSK
9146.740000	49.84	53.98	4.14	169	168	V	Low	GFSK

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

*If the measurements were found to be at least 6 dB below the limit, they were not reported.

Average Measurements, GMSK-GFSK, 1 GHz -25 GHz								
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation
MHz	dBμV/m	dBμV/m	dB	cm.	deg.			
2402.000000	85.03	94.00	8.97	105	230	H	Low	GMSK
2440.000000	83.51	94.00	10.49	87	204	H	Mid	GMSK
2480.000000	83.04	94.00	10.96	93	239	H	High	GMSK
2402.000000	89.56	94.00	4.44	109	226	H	Low	GFSK
2440.000000	88.14	94.00	5.86	83	200	H	Mid	GFSK
2480.000000	89.18	94.00	4.82	91	243	H	High	GFSK

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

*If the measurements were found to be at least 6 dB below the limit, they were not reported.

	Report Number:	R20200110-20-E4	Rev	A
	Prepared for:	Garmin International, Inc.		

4.5 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 15.249 Device:

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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 §15.209(a) (see §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:

For Unrestricted Band-Edge measurements, test setup details can be found in section 3.4 of this report.

Restricted Band-Edge Measurements were done with the test setup in section 4.4 at a distance of 3m.

EUT operating conditions:

Details can be found in section 2.1 of this report.



Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		

Test results:

Pass

Restricted Band Edge Measurements							
Modulation	Channel	Average level	Average Limit	Average Margin	Peak Level	Peak Limit	Peak Margin
GFSK	Low	40.904	53.980	13.076	52.698	73.890	21.192
GFSK	High	40.809	53.980	13.171	52.689	73.890	21.201
GMSK	Low	41.004	53.980	12.976	52.563	73.890	21.327
GMSK	High	40.804	53.980	13.176	52.31	73.890	21.580

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. If the device falls under FCC Part 15.249 (Details can be found in summary of test results), compliance is shown in the unrestricted band edges by showing minimum delta of 50 dB between peak and the band edge.
4. 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.

4.6 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 (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Notes:

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

Test Procedures:

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

Deviation from the test standard:

No deviation

EUT operating conditions:

Details can be found in section 2.1 of this report.

Test Results:

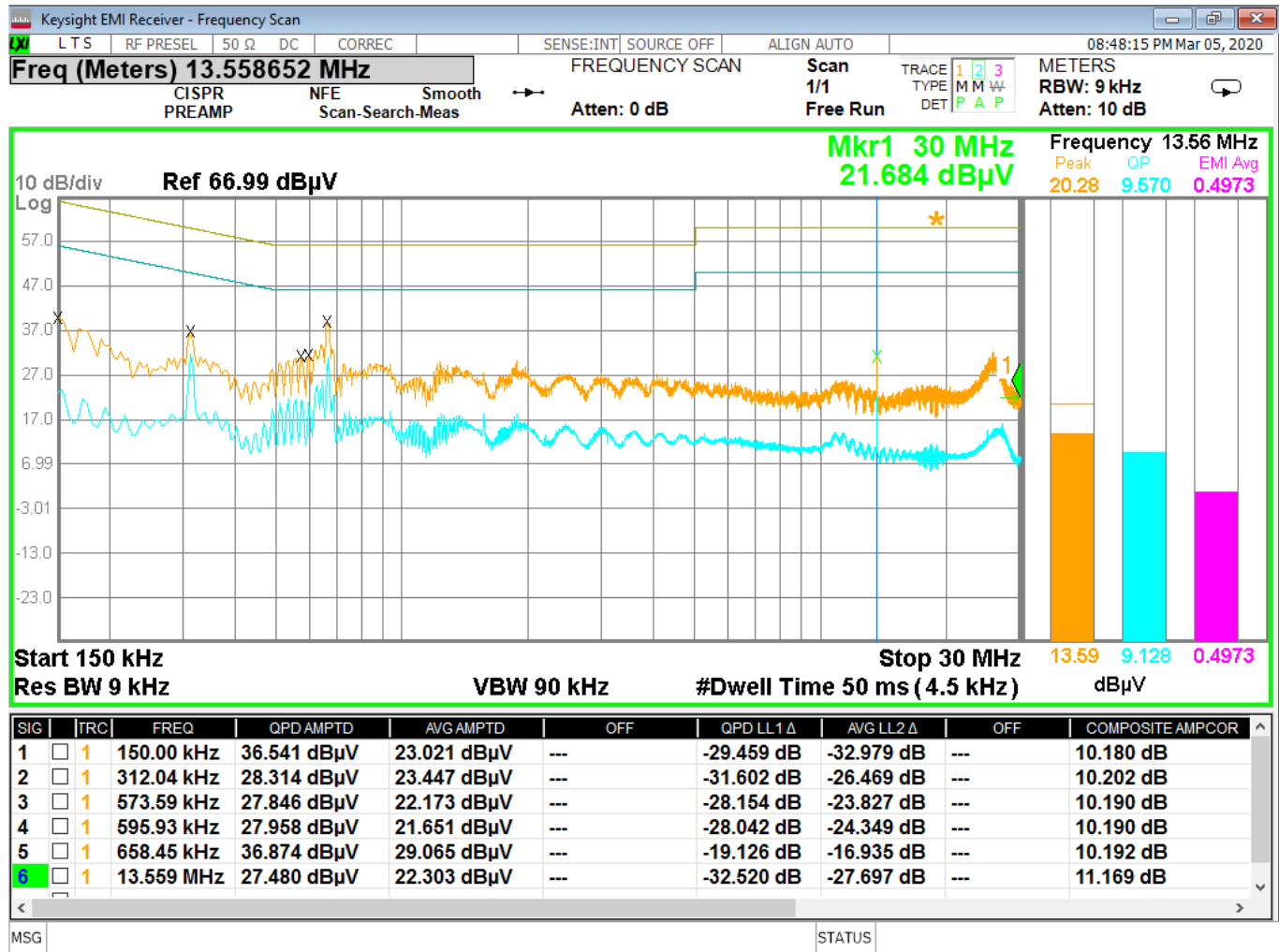


Figure 7 - Conducted Emissions Plot, Line

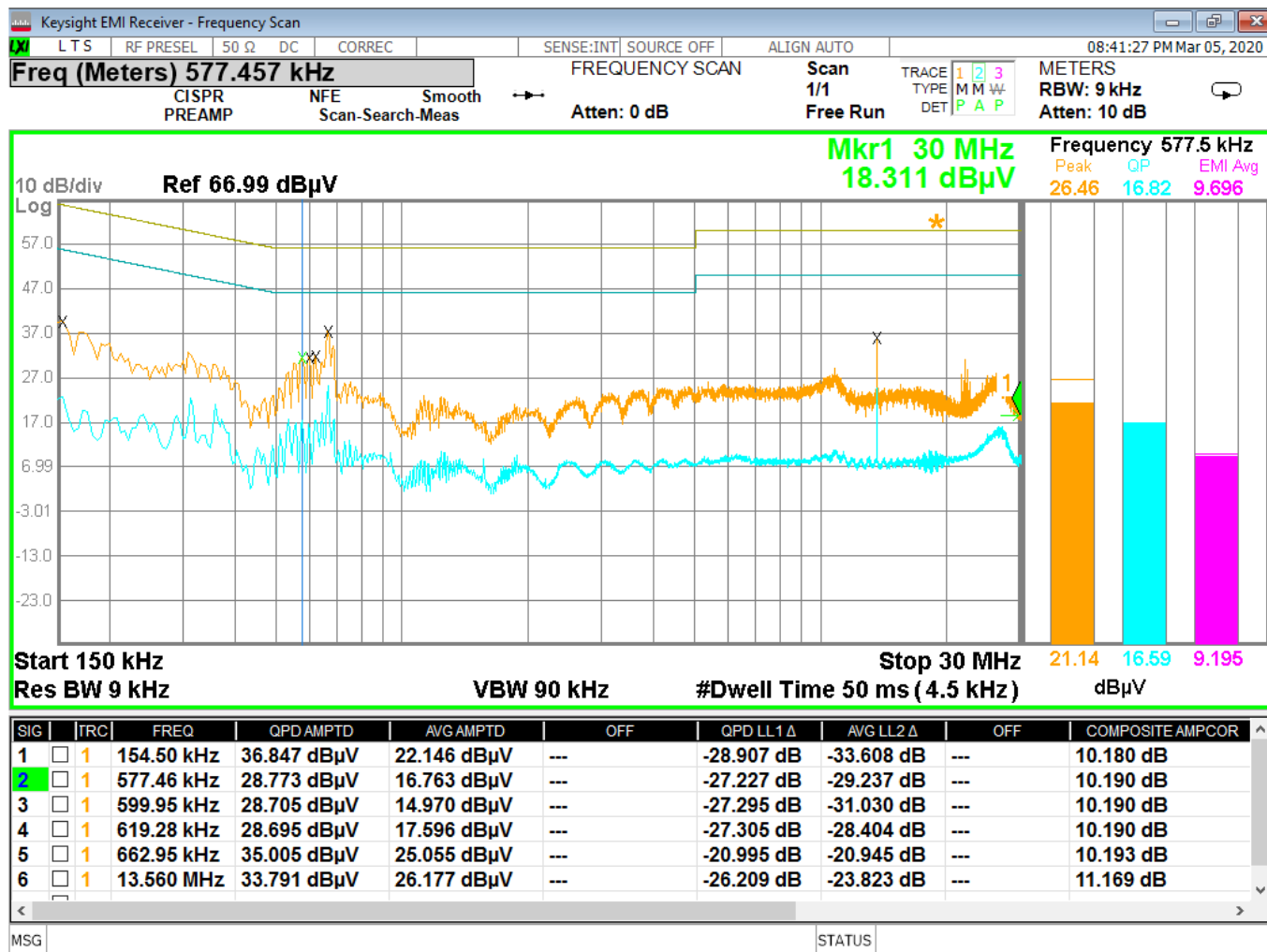


Figure 8 - Conducted Emissions Plot, Neutral



Report Number: R20200110-20-E4

Rev

A

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.

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

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



Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		

EIRP Calculations

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

EIRP (Watts) = [Field Strength (V/m) x antenna distance (m)]² / 30

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

Voltage (dBμV) = Power (dBm) + 107 (for 50Ω measurement systems)

Field Strength (V/m) = 10[^][Field Strength (dBμV/m) / 20] / 10[^]6

Gain = 1 (numeric gain for isotropic radiator)

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

EIRP = [FS(V/m) x d²]/30 = FS [0.3] for d = 3

EIRP(dBm) = FS(dBμV/m) – 10(log 10[^]9)+ 10log[0.3] = FS(dBμV/m) - 95.23

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



Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		

APPENDIX B – MEASUREMENT UNCERTAINTY

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

Test	Frequency Range	Uncertainty Value (dB)
Radiated Emissions, 3m	30MHz - 1GHz	3.82
Radiated Emissions, 3m	1GHz - 18GHz	4.44
Emissions limits, conducted	30MHz – 18GHz	±3.30 dB

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



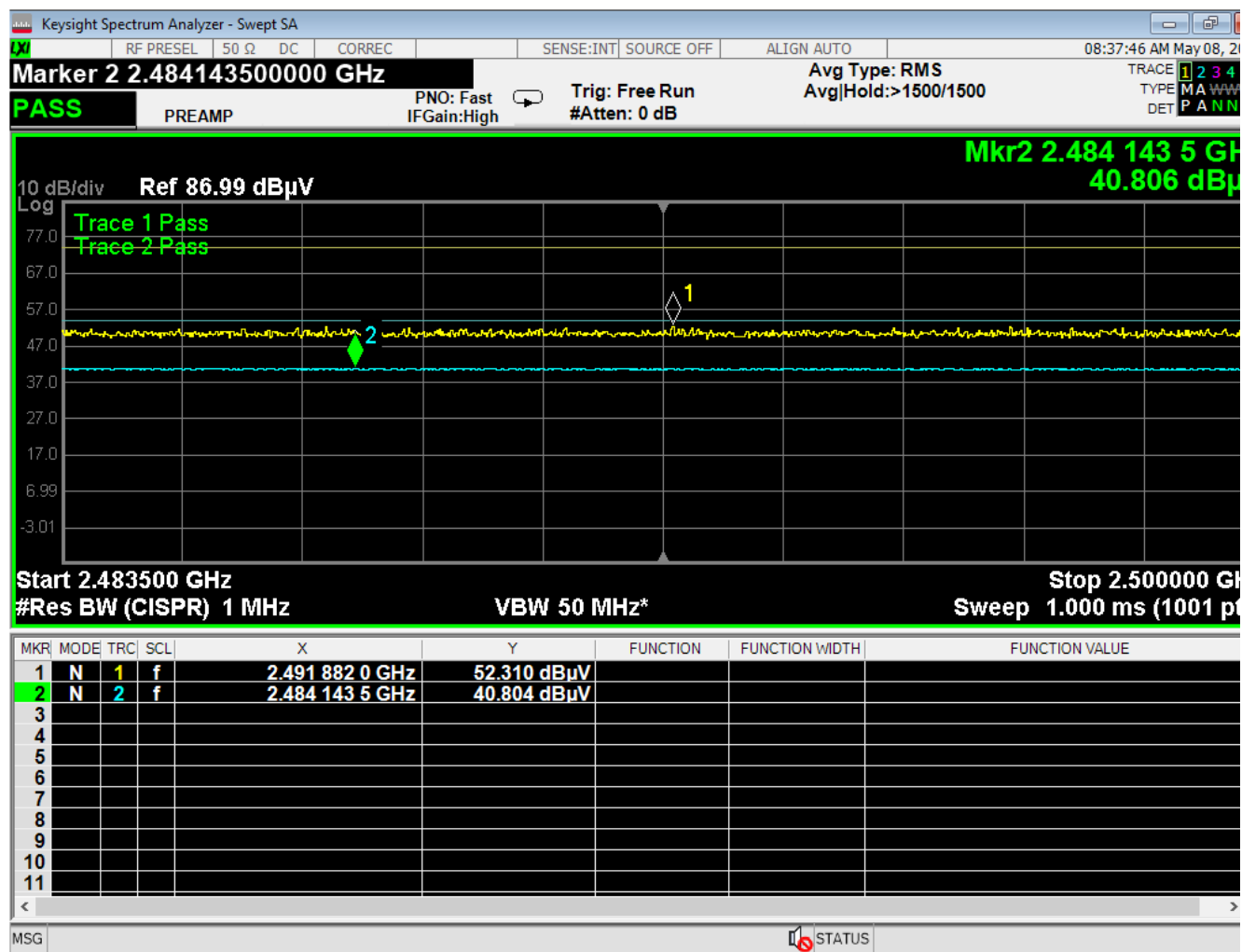
Report Number: R20200110-20-E4

Rev

A

Prepared for: Garmin International, Inc.

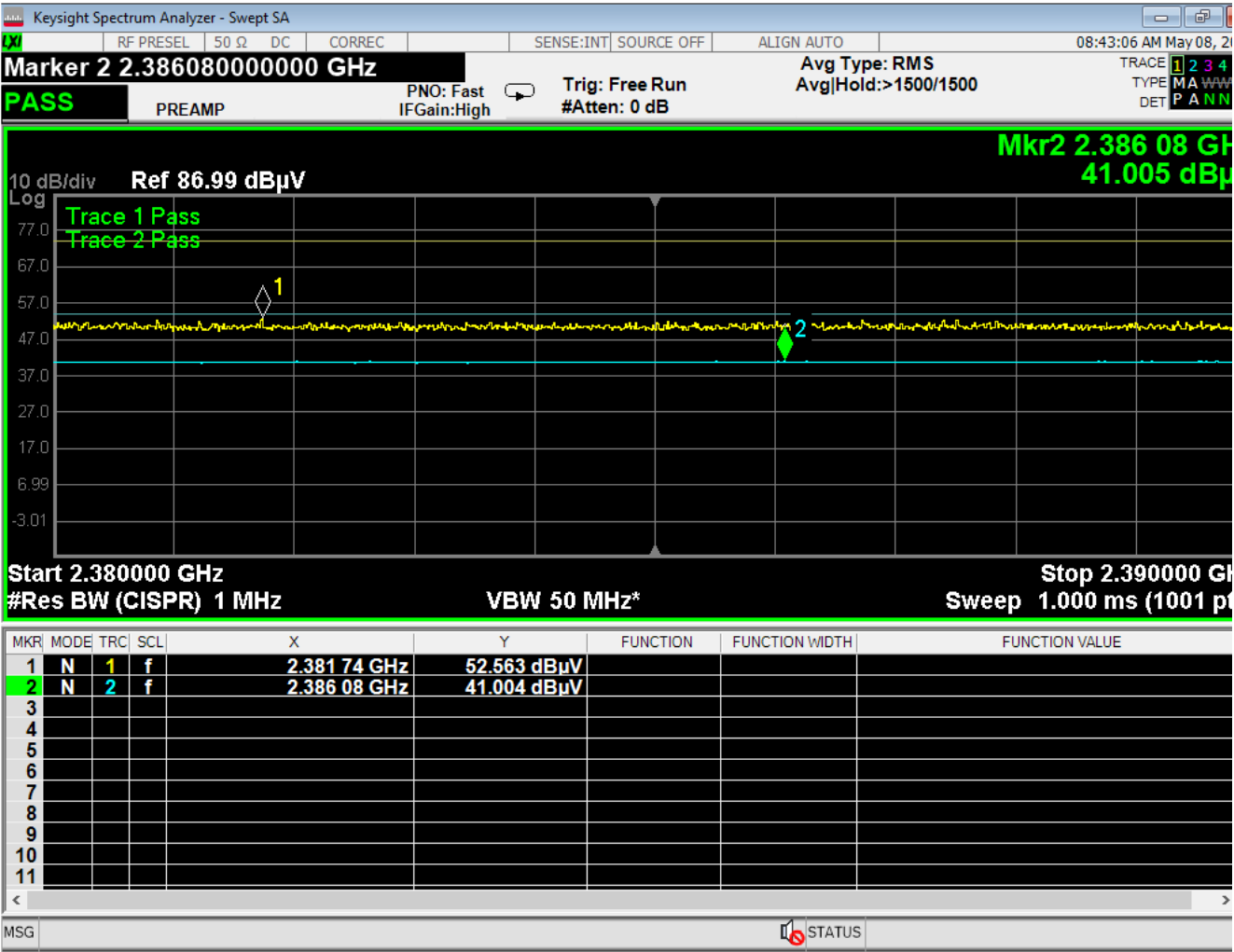
APPENDIX C – GRAPHS AND TABLES



GMSK peak higher band edge restricted

*Limit per Part 15.209 is 73.98 dBμV/m for peak and 53.98 dBμV/m for average at 3m test distance. Peak and Average Trace values are shown with corresponding limits. Tabular data for worst case frequencies shown above can be found in section 4.5.

	Report Number:	R20200110-20-E4	Rev	A
	Prepared for:	Garmin International, Inc.		



GMSK Lower band edge Restricted

*Limit per Part 15.209 is 73.98 dBμV/m for peak and 53.98 dBμV/m for average at 3m test distance. Peak and Average Trace values are shown with corresponding limits. Tabular data for worst case frequencies shown above can be found in section 4.5.

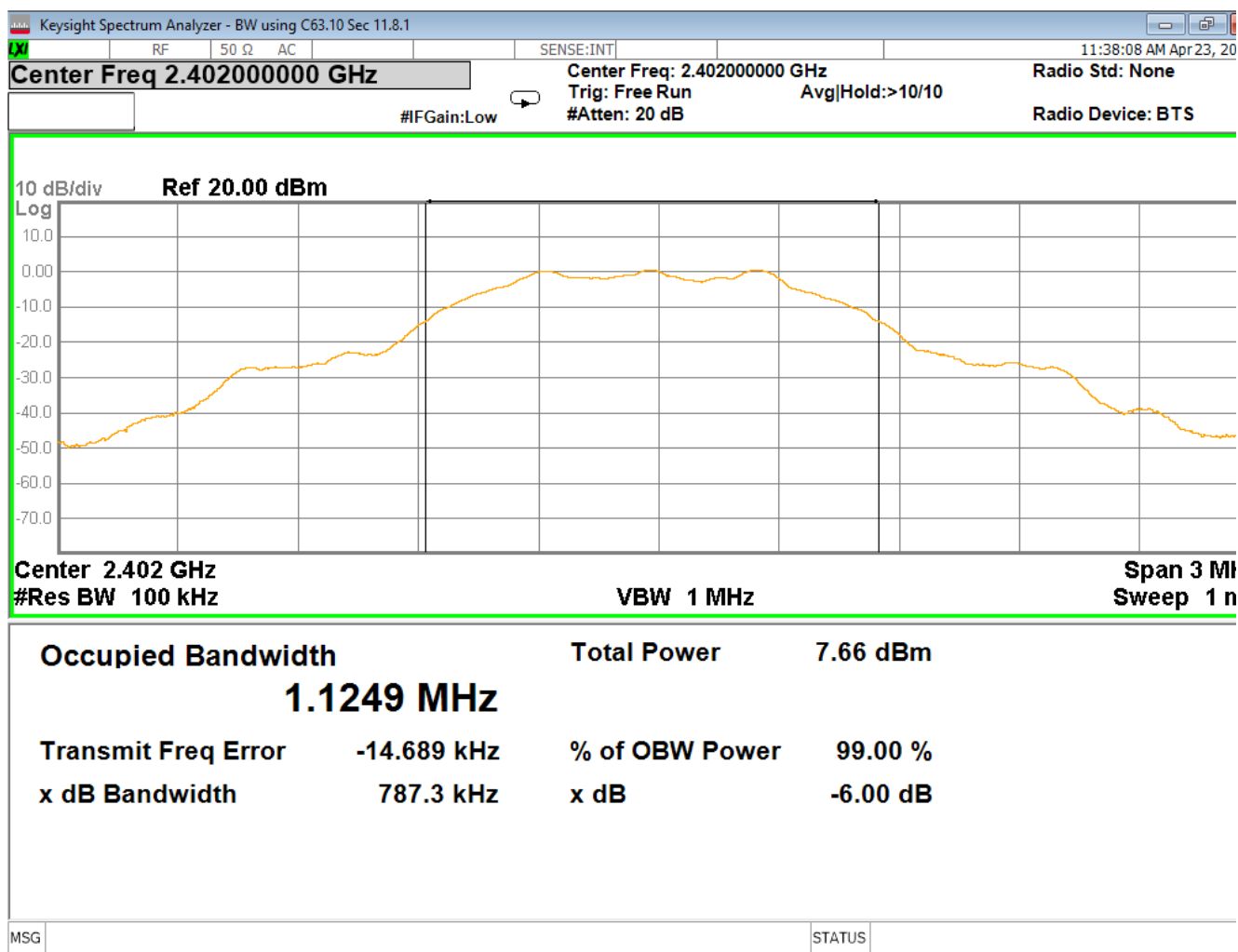


Report Number: R20200110-20-E4

Rev

A

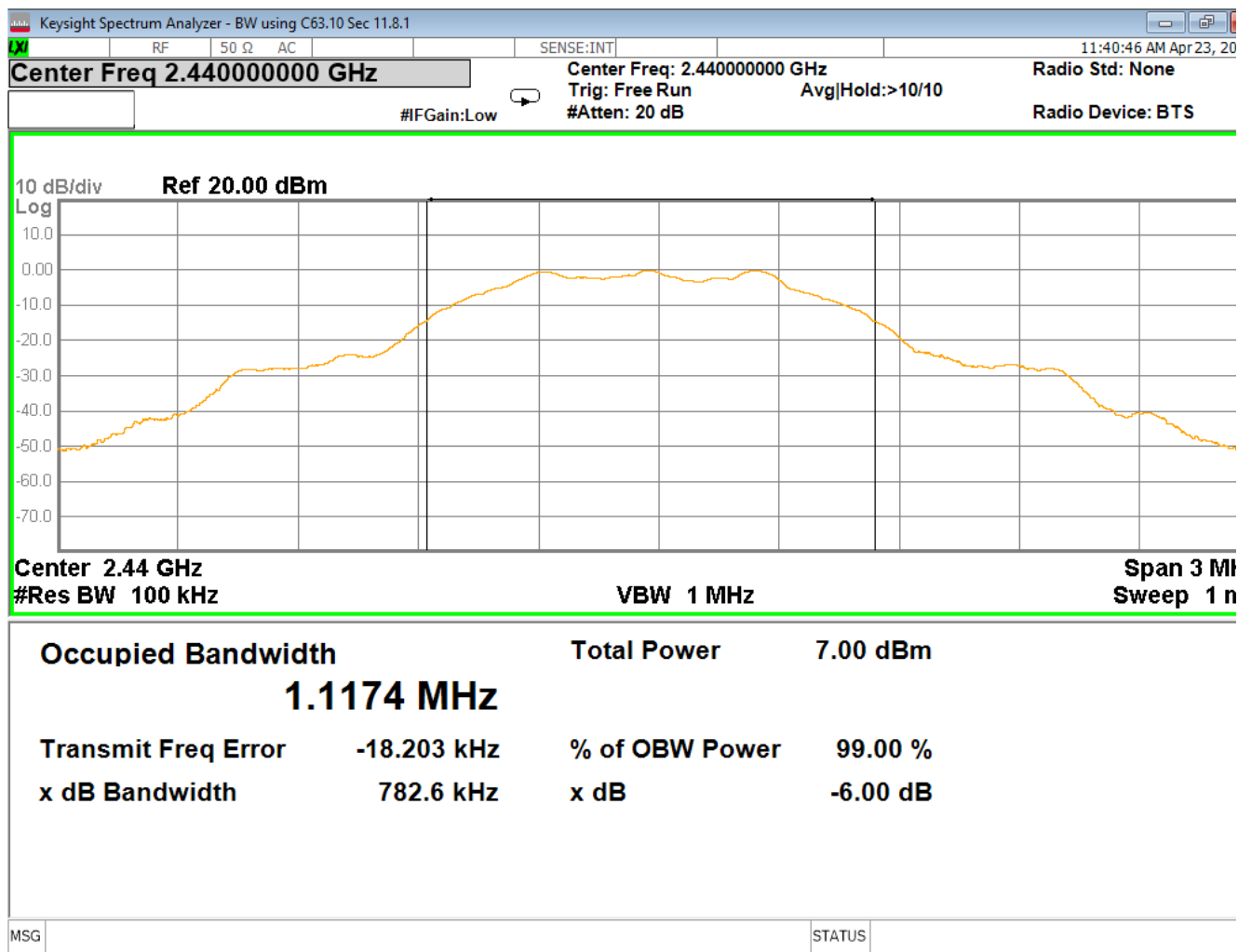
Prepared for: Garmin International, Inc.



GMSK BANDWIDTH low

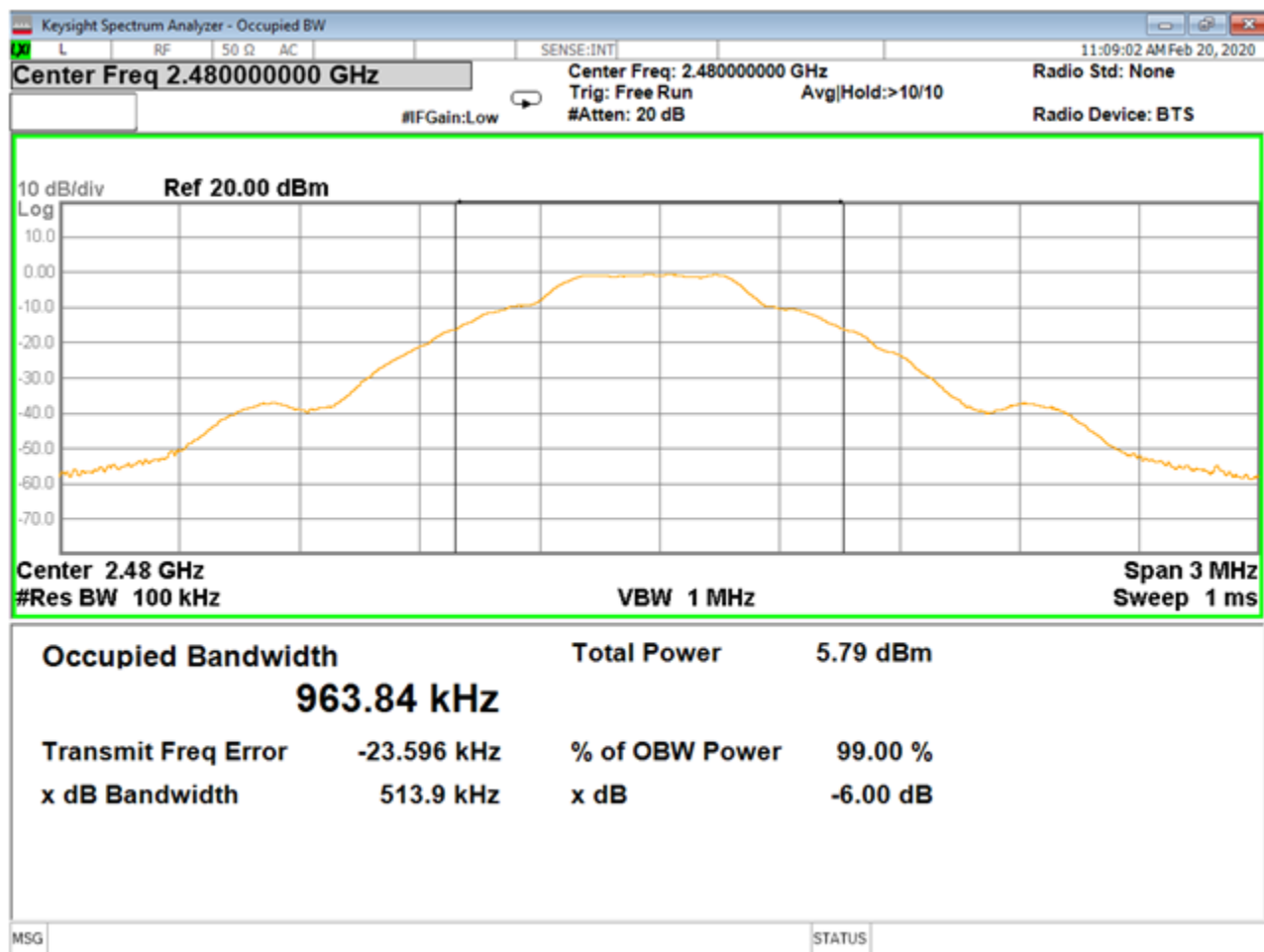


Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		



GMSK BANDWIDTH mid

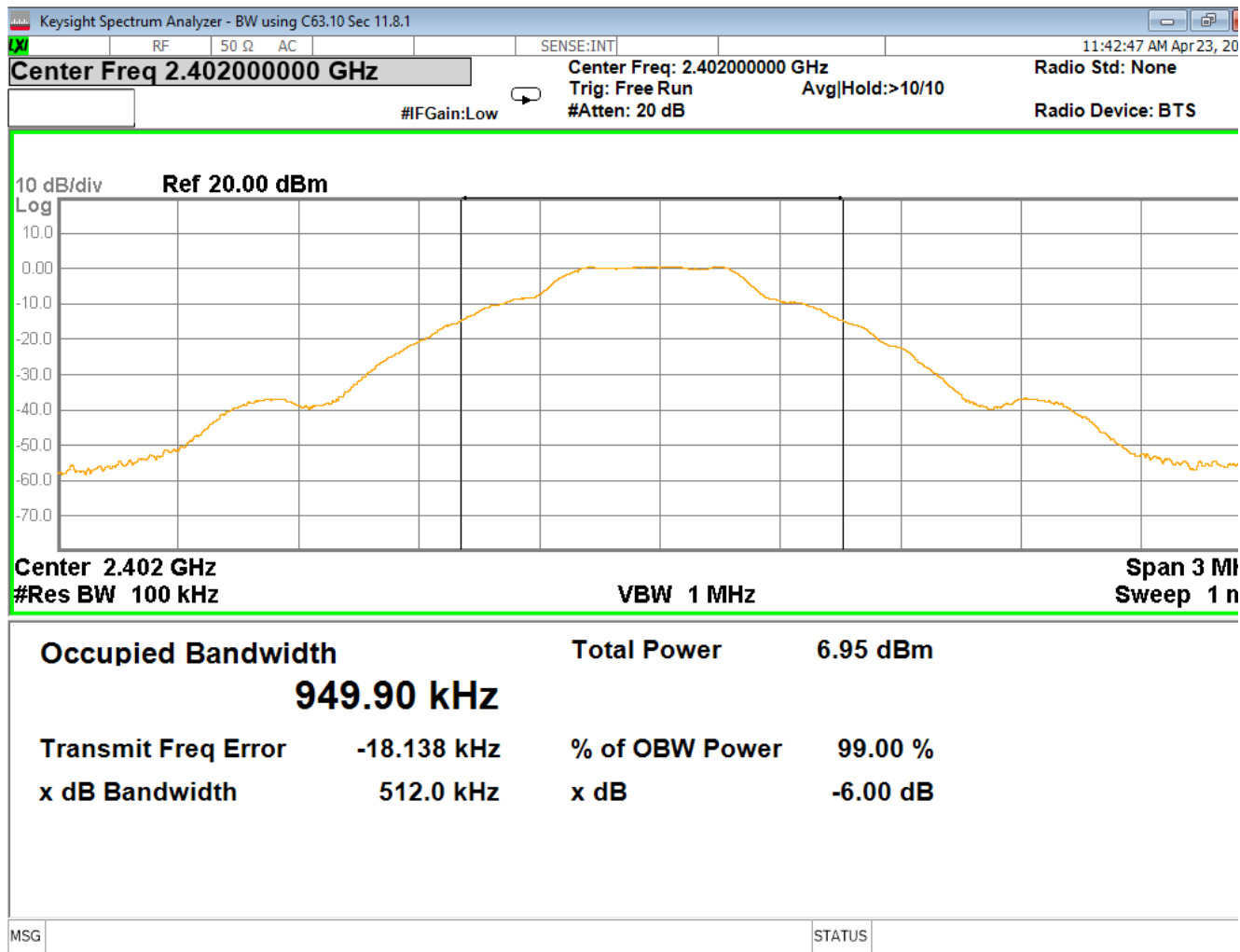
Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		



GMSK BANDWIDTH high



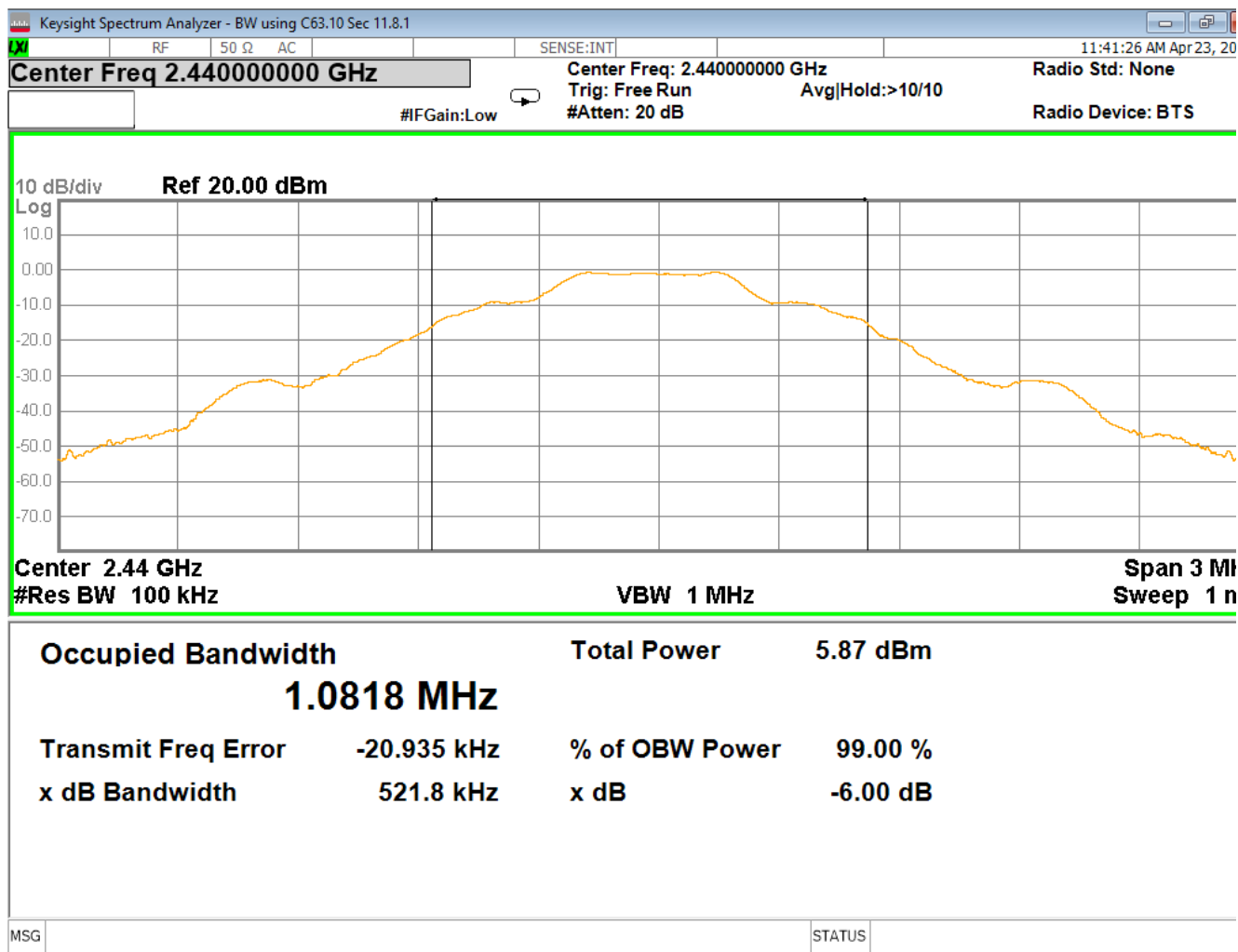
Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		



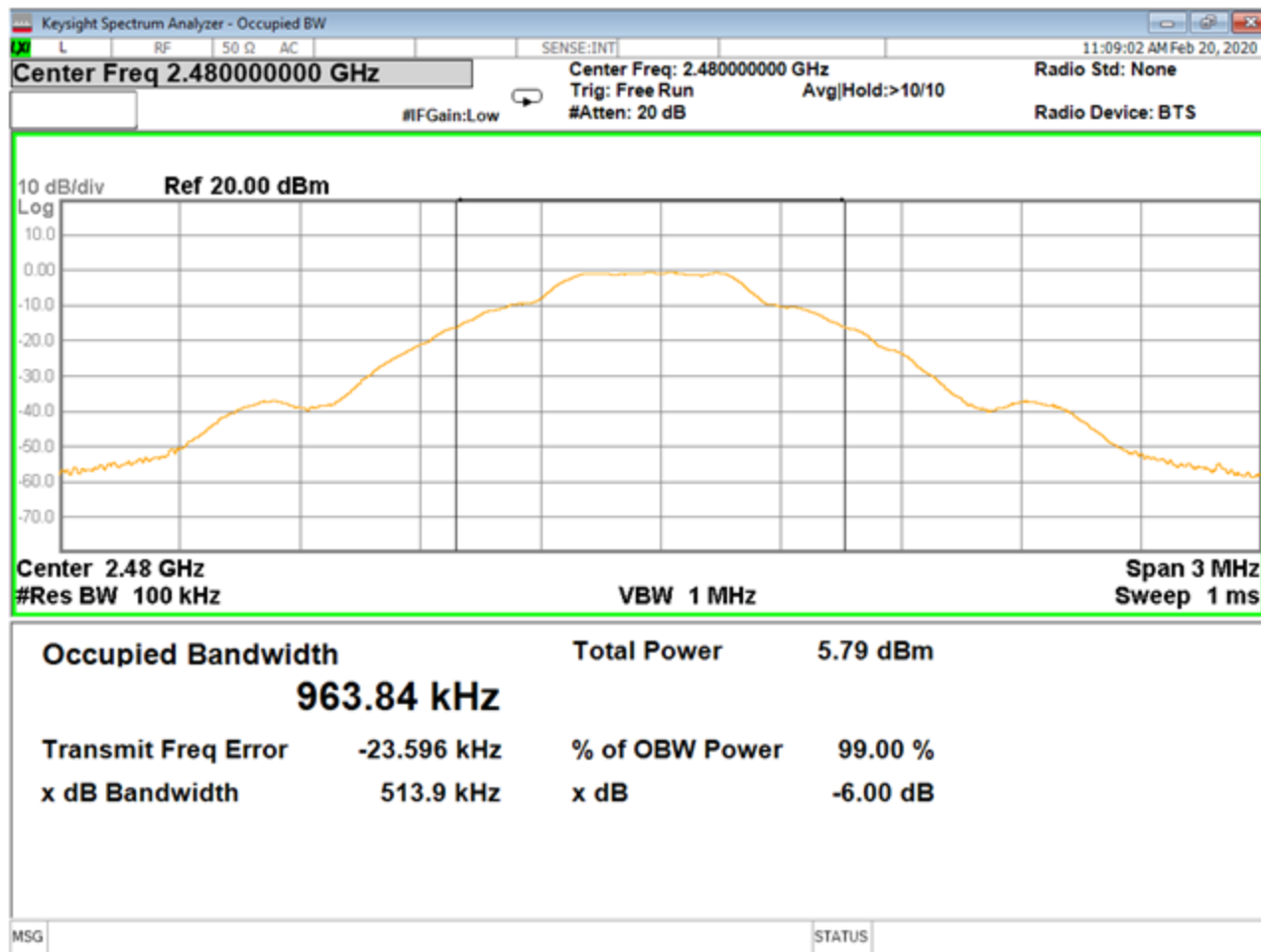
GFSK BANDWIDTH low



Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		

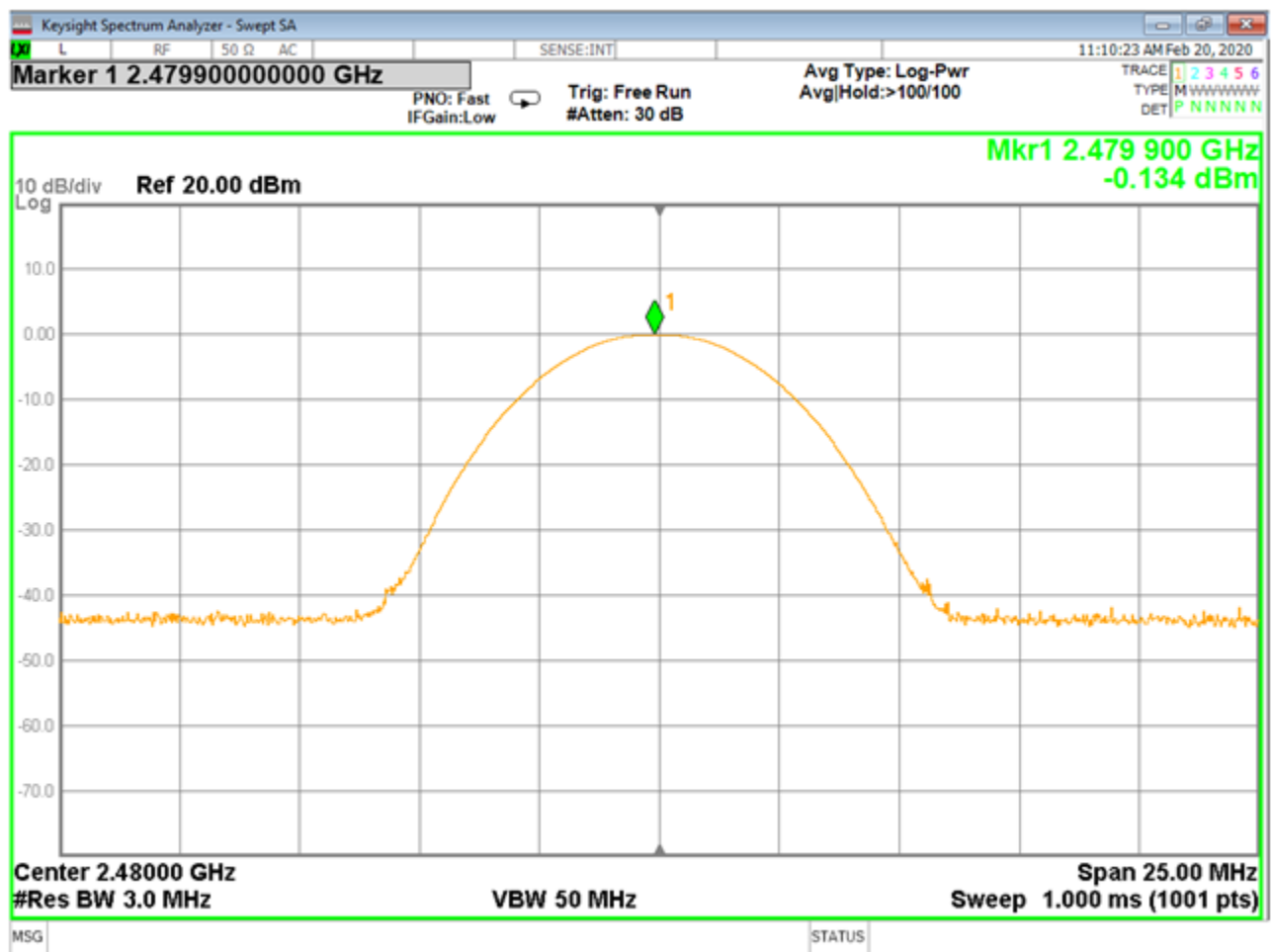


GFSK BANDWIDTH mid



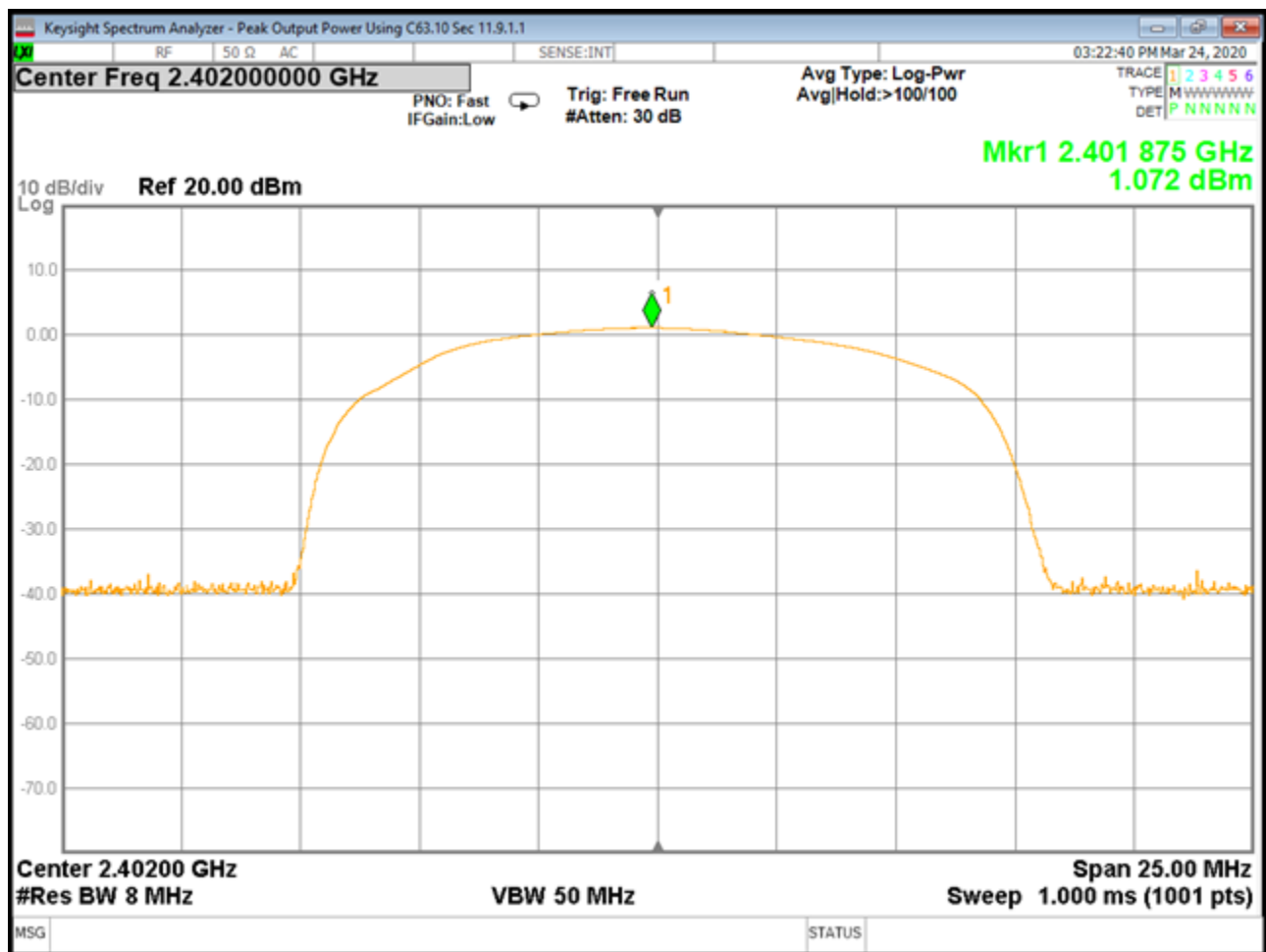
GFSK BANDWIDTH high

Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		



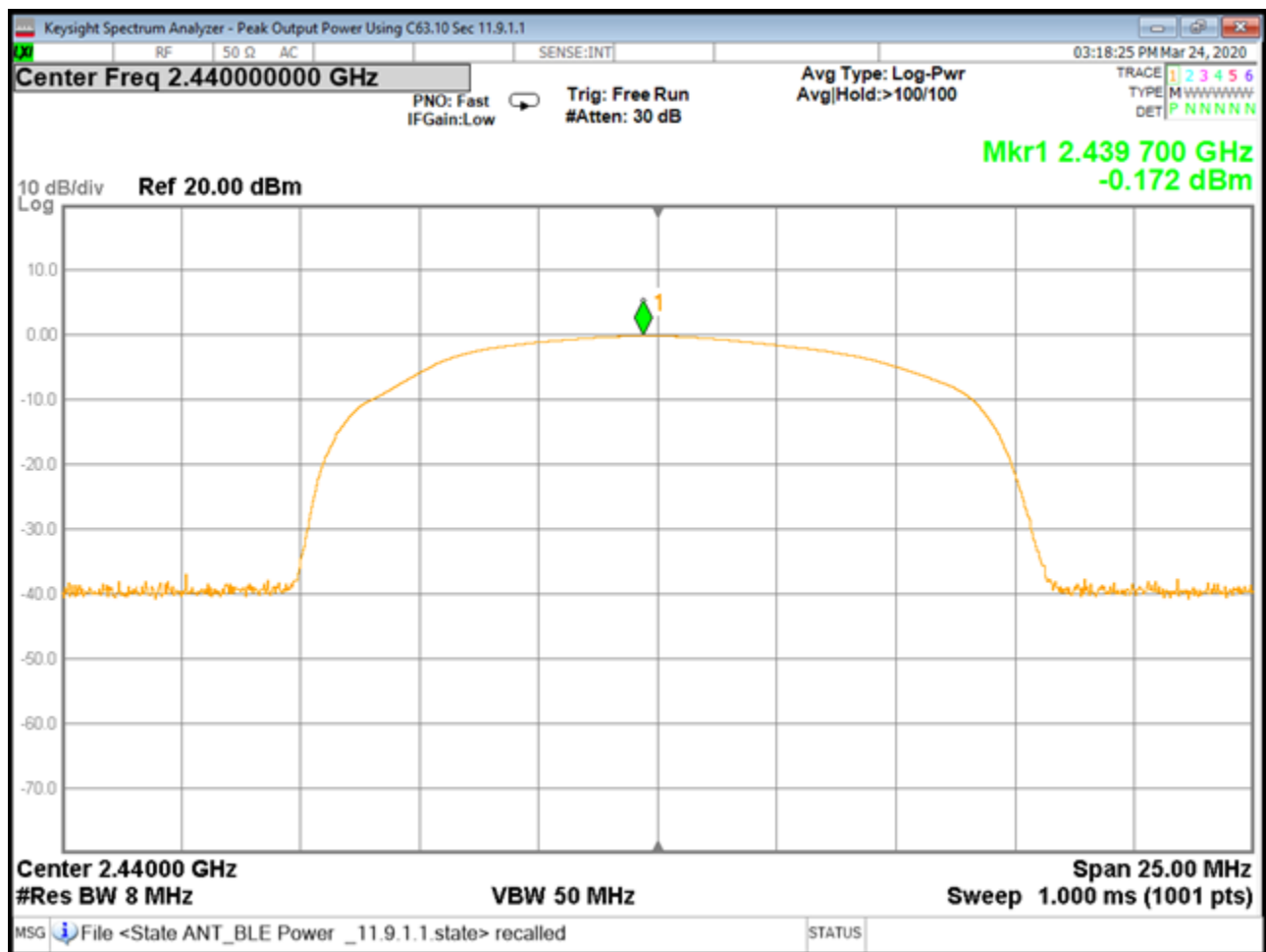
GMSK pwr high

Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		



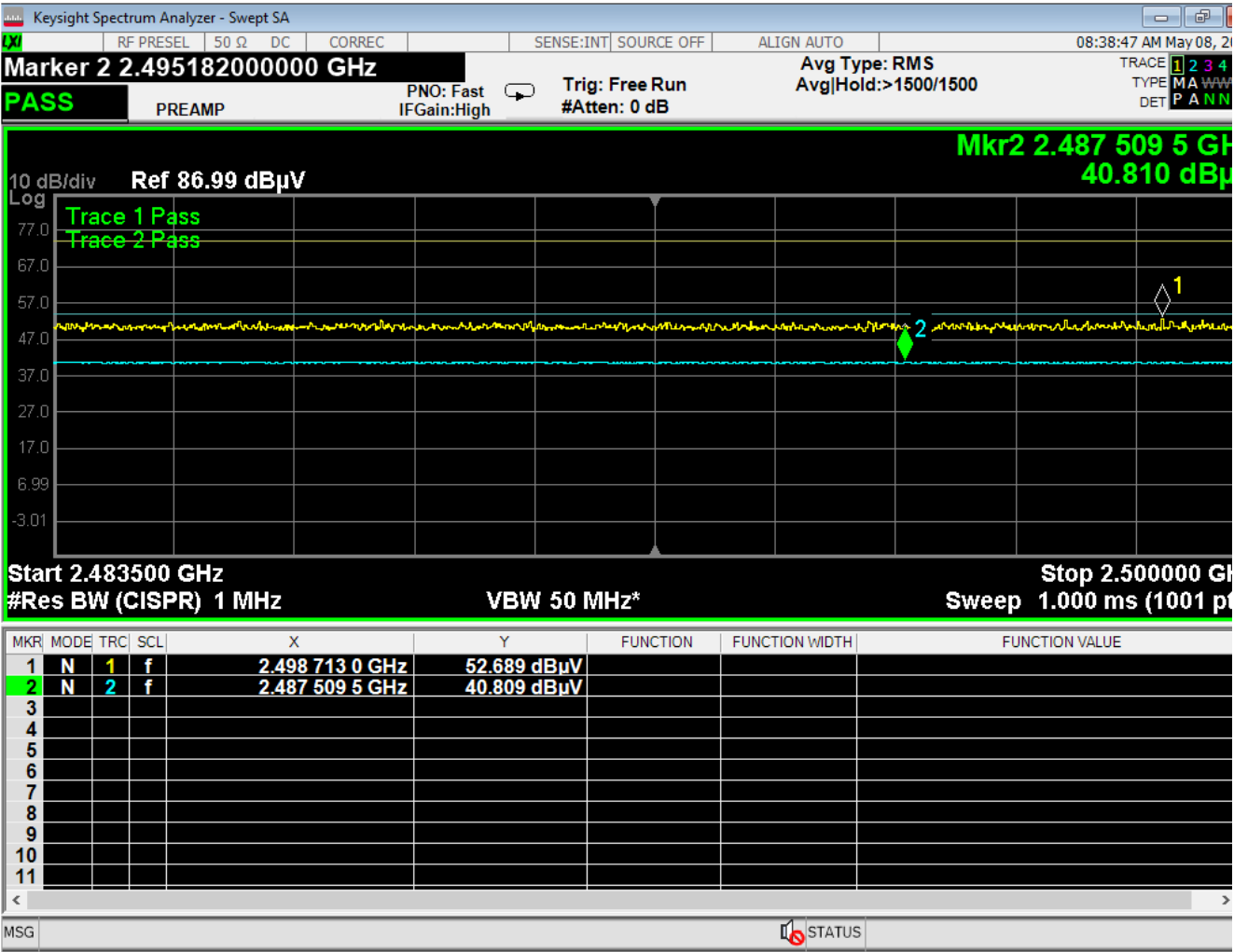
GMSK pwr low

Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		



GMSK pwr mid

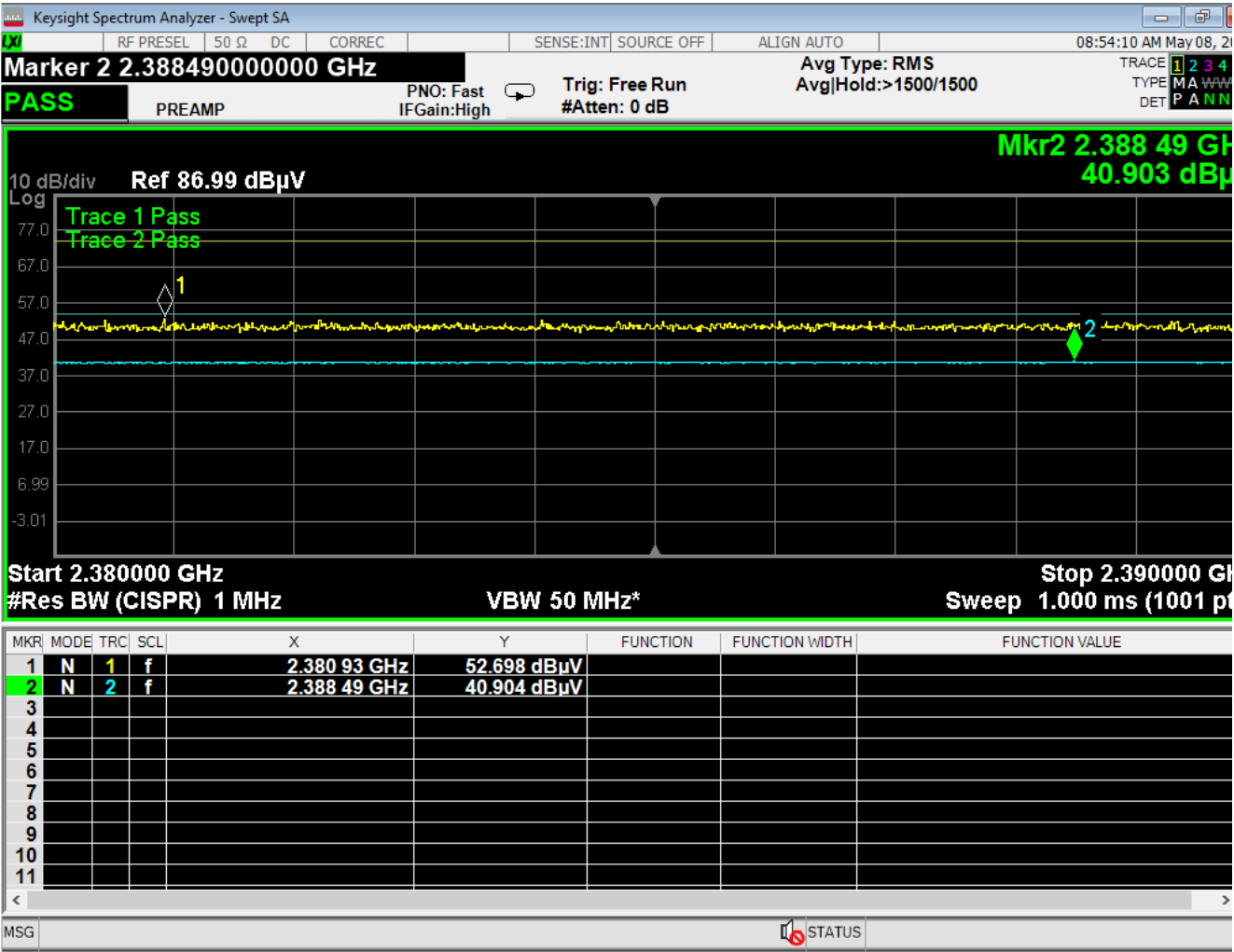
	Report Number:	R20200110-20-E4	Rev	A
	Prepared for:	Garmin International, Inc.		



GFSK higher band edge restricted

*Limit per Part 15.209 is 73.98 dBμV/m for peak and 53.98 dBμV/m for average at 3m test distance. Peak and Average Trace values are shown with corresponding limits. Tabular data for worst case frequencies shown above can be found in section 4.5.

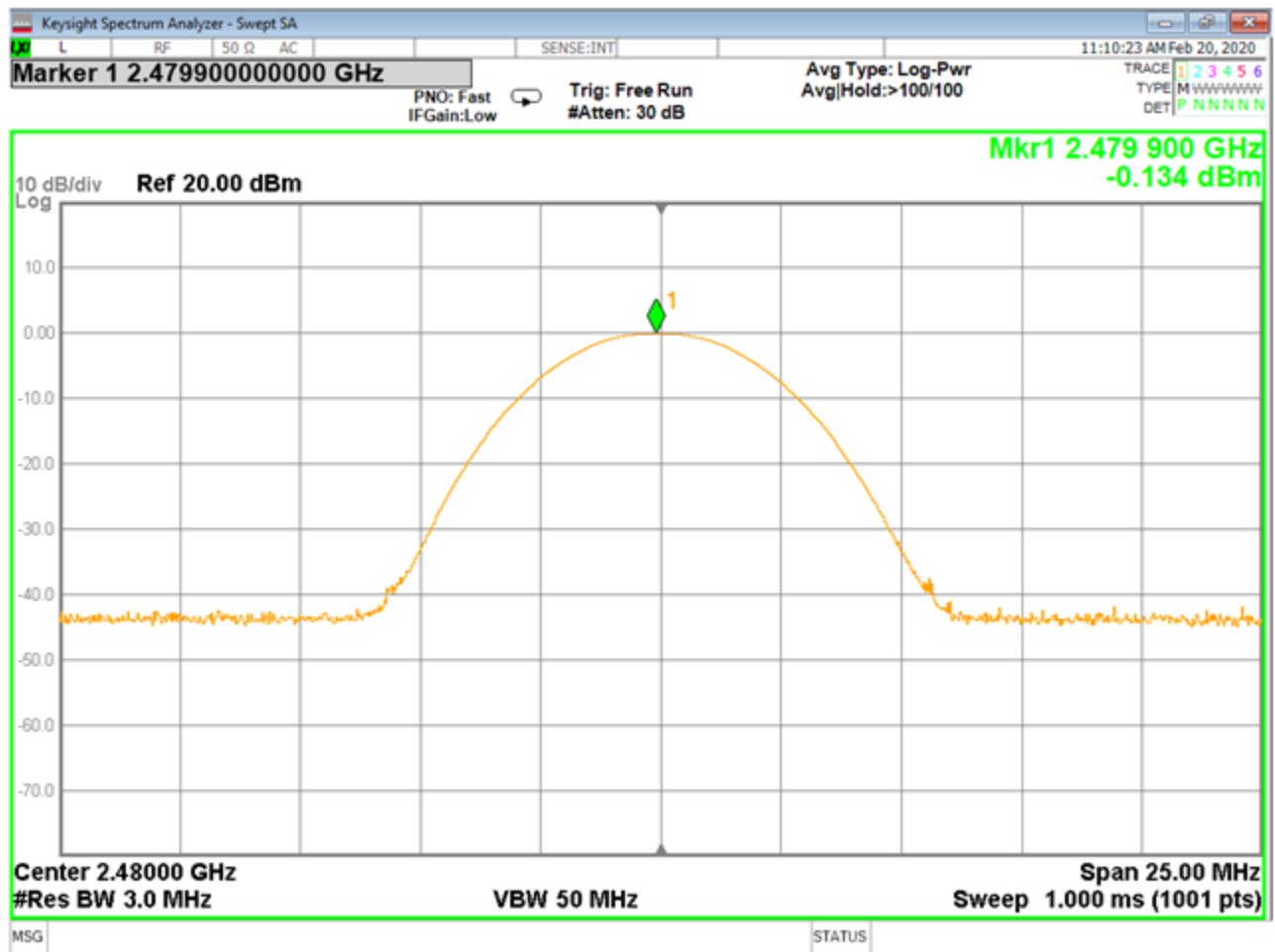
	Report Number:	R20200110-20-E4	Rev	A
	Prepared for:	Garmin International, Inc.		



GFSK Lower band edge Restricted

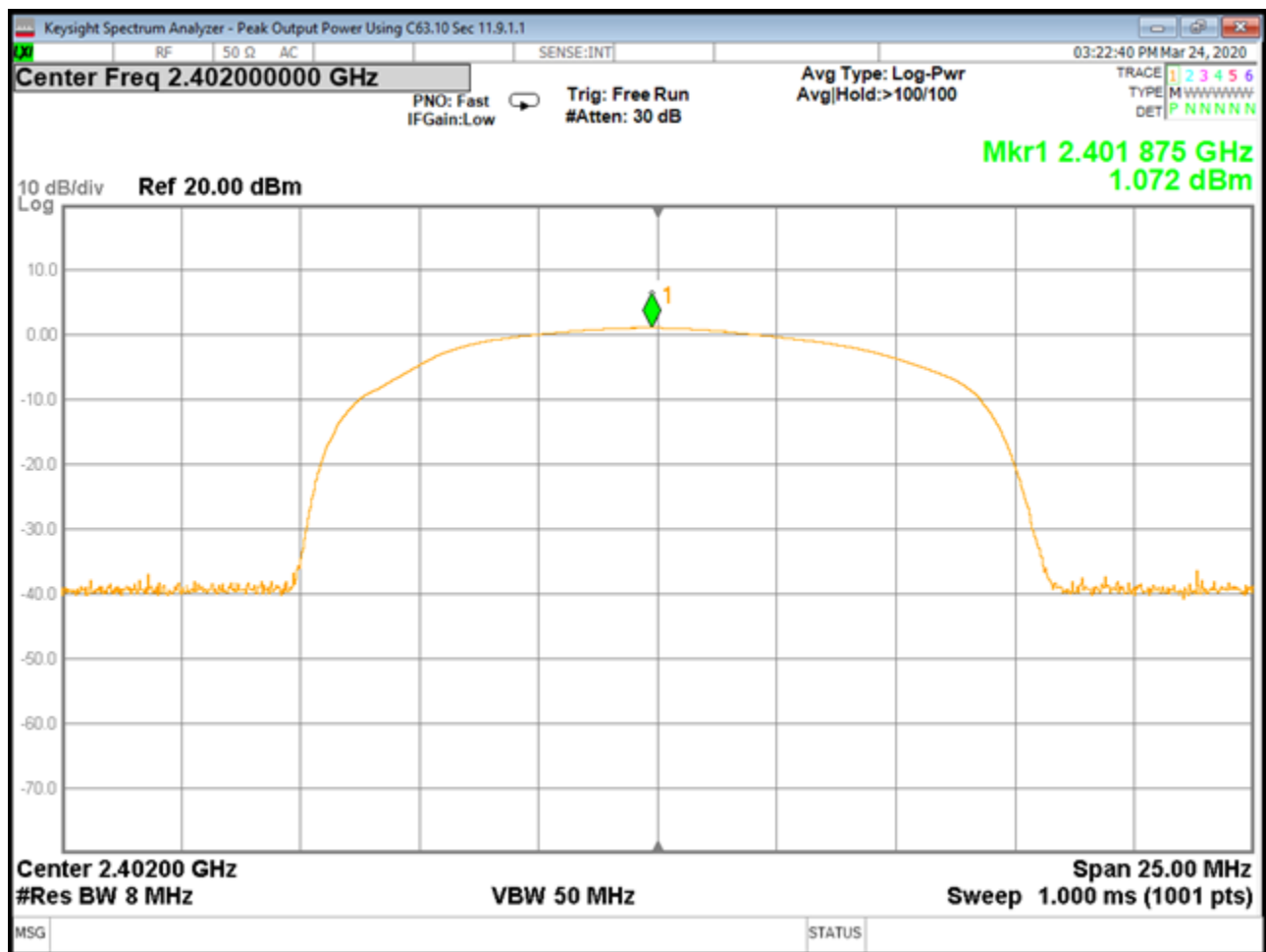
*Limit per Part 15.209 is 73.98 dBμV/m for peak and 53.98 dBμV/m for average at 3m test distance. Peak and Average Trace values are shown with corresponding limits. Tabular data for worst case frequencies shown above can be found in section 4.5.

Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		



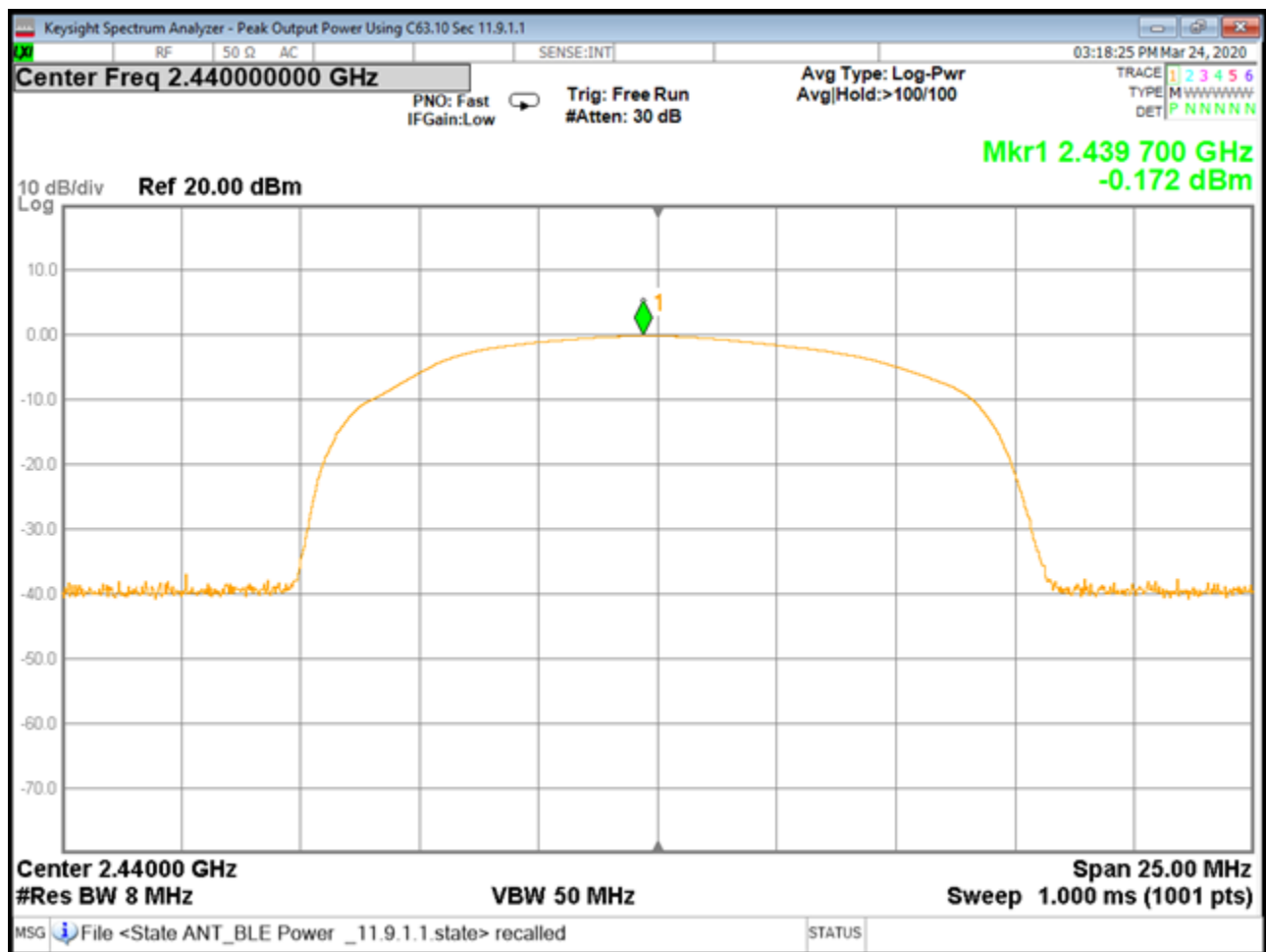
GFSK pwr high

Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		



GFSK pwr low

Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		



GFSK pwr mid



Report Number:	R20200110-20-E4	Rev	A
Prepared for:	Garmin International, Inc.		

REPORT END