

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-E7A

Approved by:



Nic S. Johnson, NCE

Technical Manager

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DATE: 9 May 2020

Total Pages: 85

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REVISION PAGE

Rev. No.	Date	Description
0	21 April 2020	Original – NJohnson Prepared by KVepuri/CFarrington
A	9 May 2020	1. Tables in Section 4.4 were updated to show the frequency range and statements were added to provide clarification about what data was reported. 2. Restricted band edge measurements were updated in section 4.5 and Appendix C. 3. Contains the report R20200110-20-E7 and its amendments in full. -KV

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1.0 SUMMARY OF TEST RESULTS

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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 15.247 ☑

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-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(a)(1) RSS-247 Issue 2 Section 5.2	Peak output power	Pass
FCC Part 15.247(a)(1) RSS-247 Issue 2 Section 5.2	Bandwidth	Pass
FCC Part 15.209 RSS-Gen Issue 4, Section 7.1	Receiver Radiated Emissions	Pass
FCC Part 15.209 (restricted bands), 15.247 (unrestricted) RSS-247 Issue 2 Section 5.5, RSS-Gen Issue 4, Section 8.9	Transmitter Radiated Emissions	Pass
FCC Part 15.247(a)(1) RSS-247 Issue 2 Section 5.2	Power Spectral Density	Pass
FCC Part 15.209, 15.247(d) RSS-247 Issue 2 Section 11.13	Band Edge Measurement	Pass
FCC Part 15.207 RSS-Gen Issue 4, Section 7.1	Conducted Emissions	Pass

See Section 4 for details on the test methods used for each test.



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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

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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.

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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.

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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.

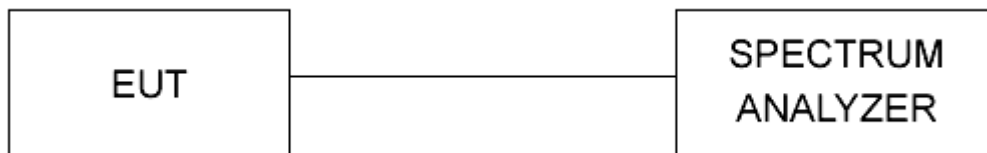


Figure 1 - Bandwidth Measurements Test Setup

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.

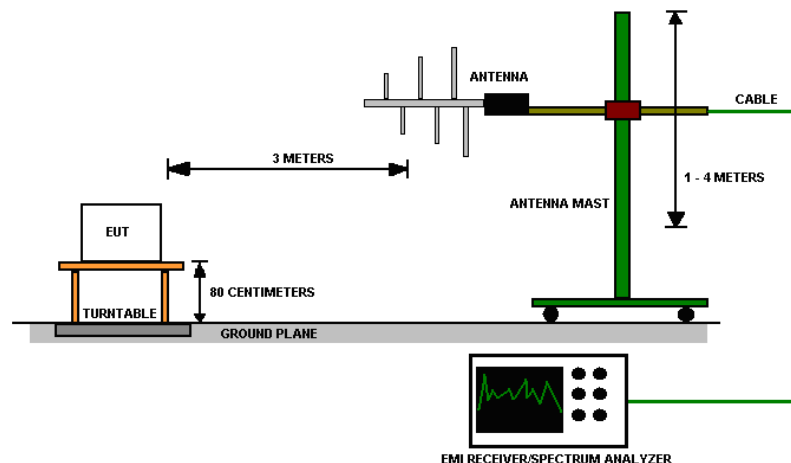


Figure 2 - Radiated Emissions Test Setup



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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.



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Peak Output Power

CHANNEL	PEAK OUTPUT POWER (dBm)	RESULT	Transmitter
Low	26.610	PASS	802.11b
Mid	24.250	PASS	802.11b
High	23.960	PASS	802.11b
Low	22.150	PASS	802.11g
Mid	25.630	PASS	802.11g
High	21.520	PASS	802.11g
Low	20.150	PASS	802.11n
Mid	25.120	PASS	802.11n
High	19.820	PASS	802.11n



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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 15.249 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.

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4.3 DUTY CYCLE

Test Method:

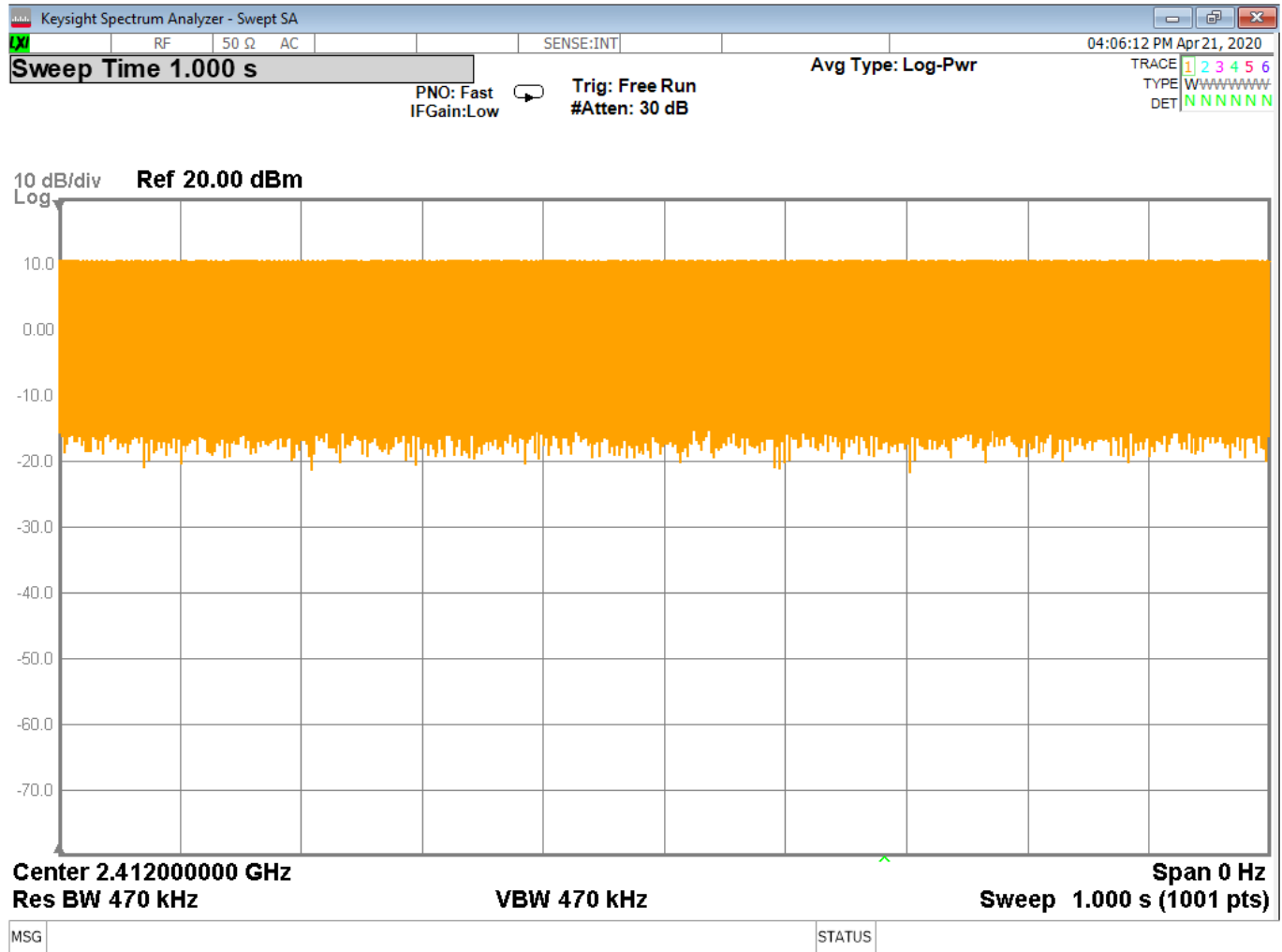


Figure 3 – Duty Cycle, 802.11 b



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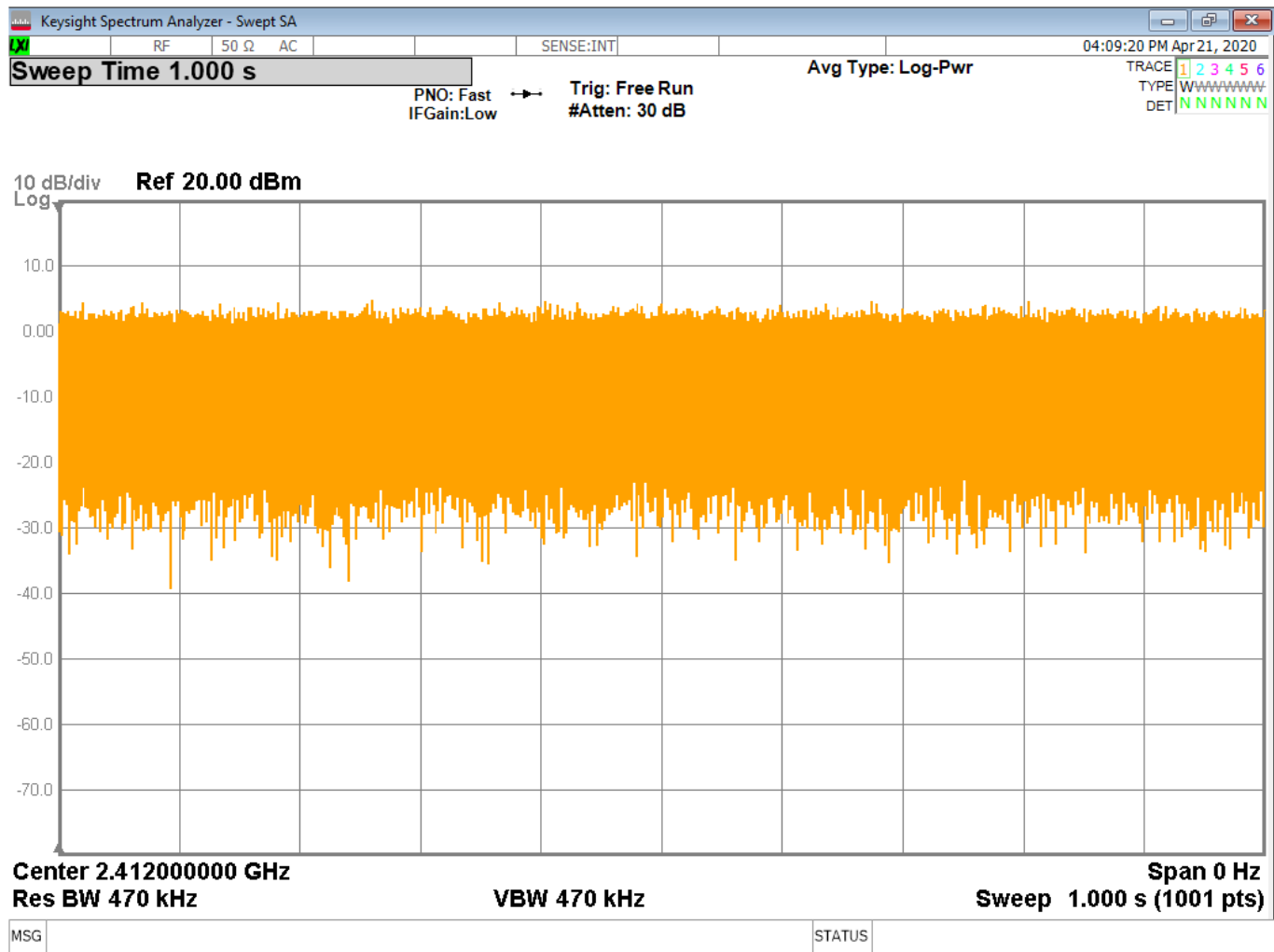


Figure 4 – Duty Cycle, 802.11 g



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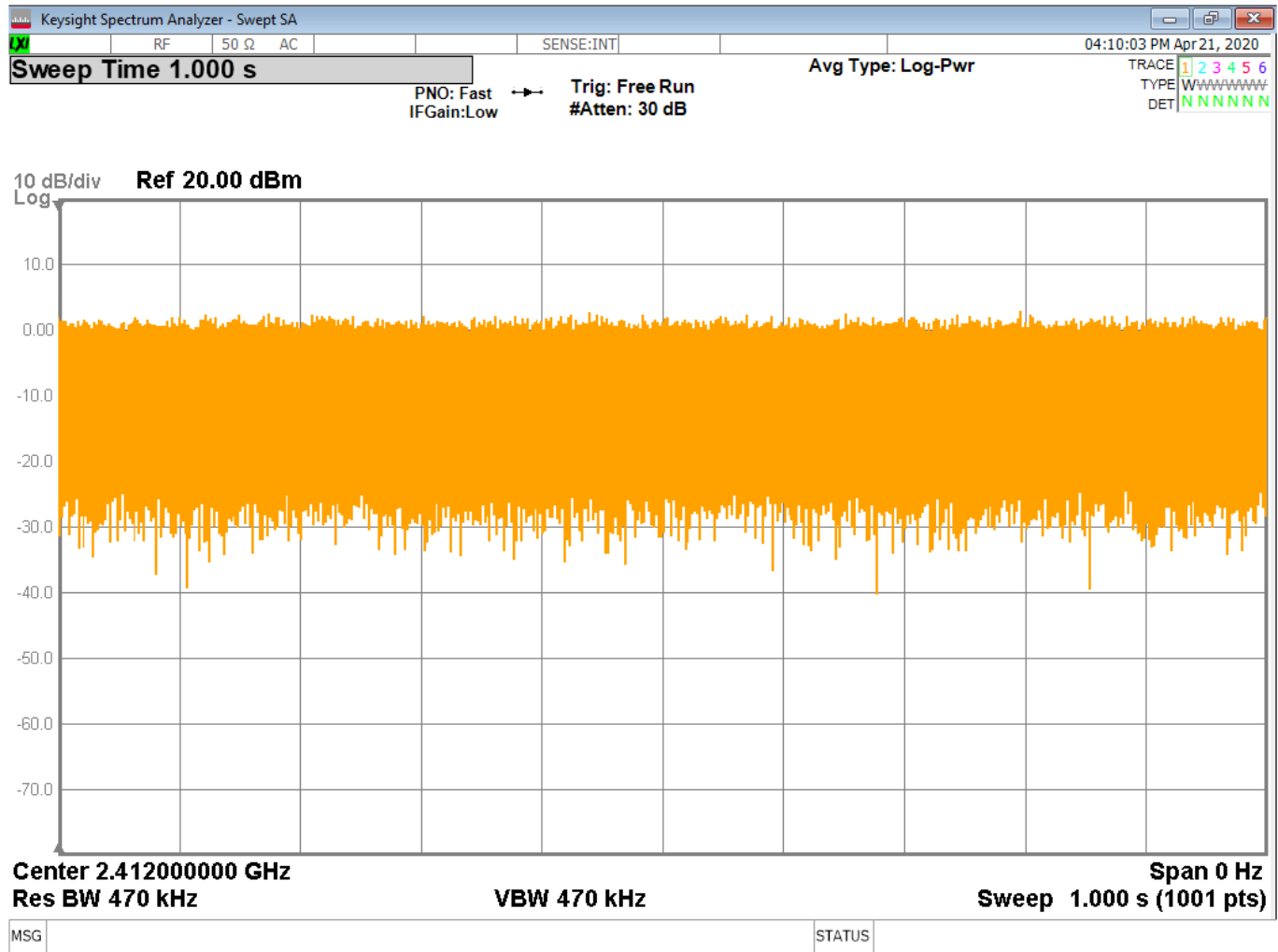


Figure 5 – Duty Cycle, 802.11 n

Duty cycle was found to be 100 percent for all three modulations.

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.



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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 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:

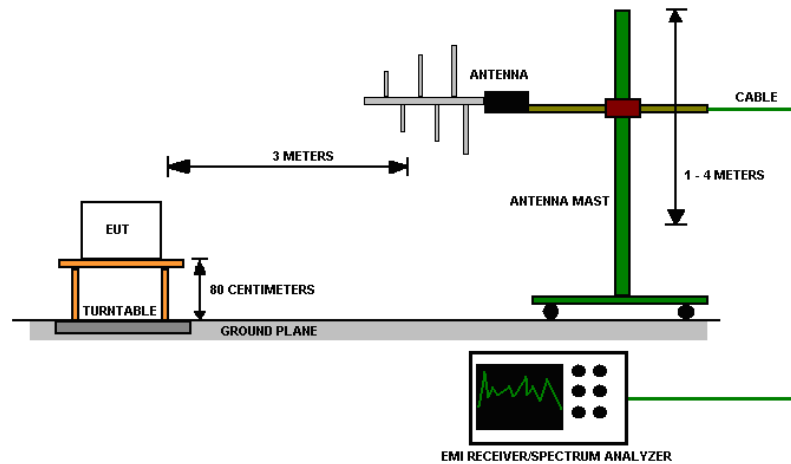


Figure 6 - Radiated Emissions Test Setup

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:

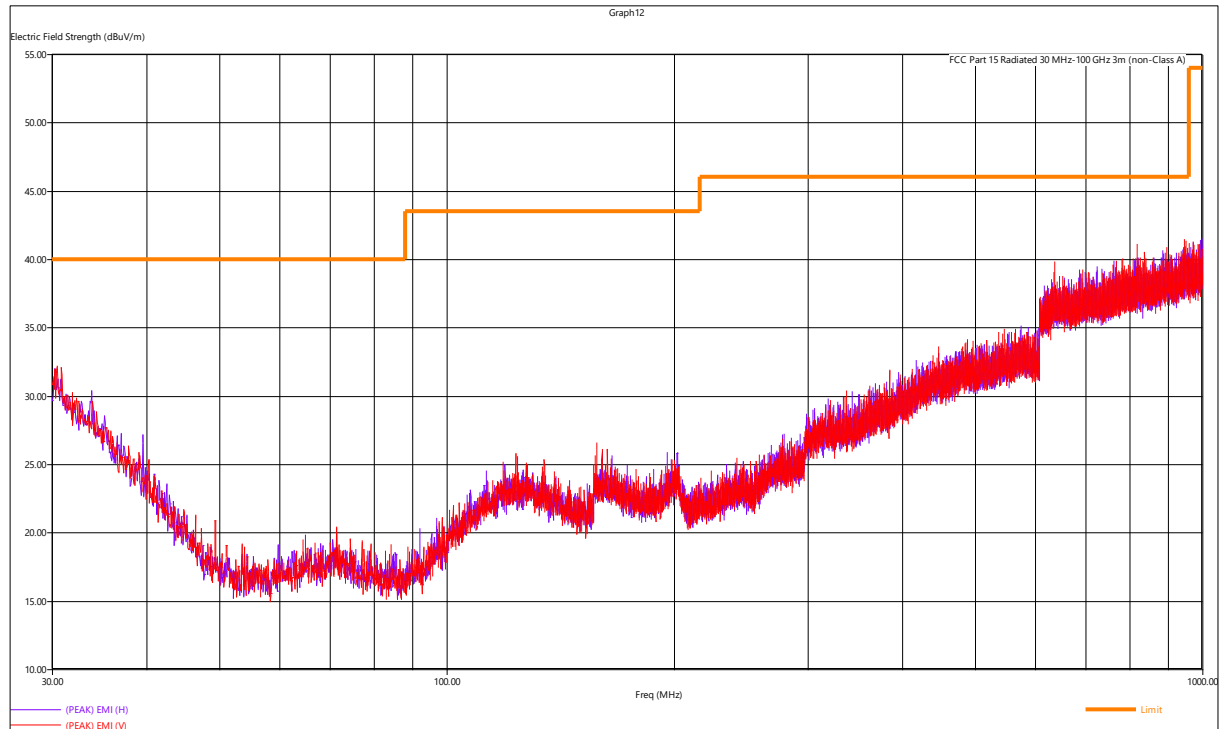


Figure 7 - Radiated Emissions Plot, Receive

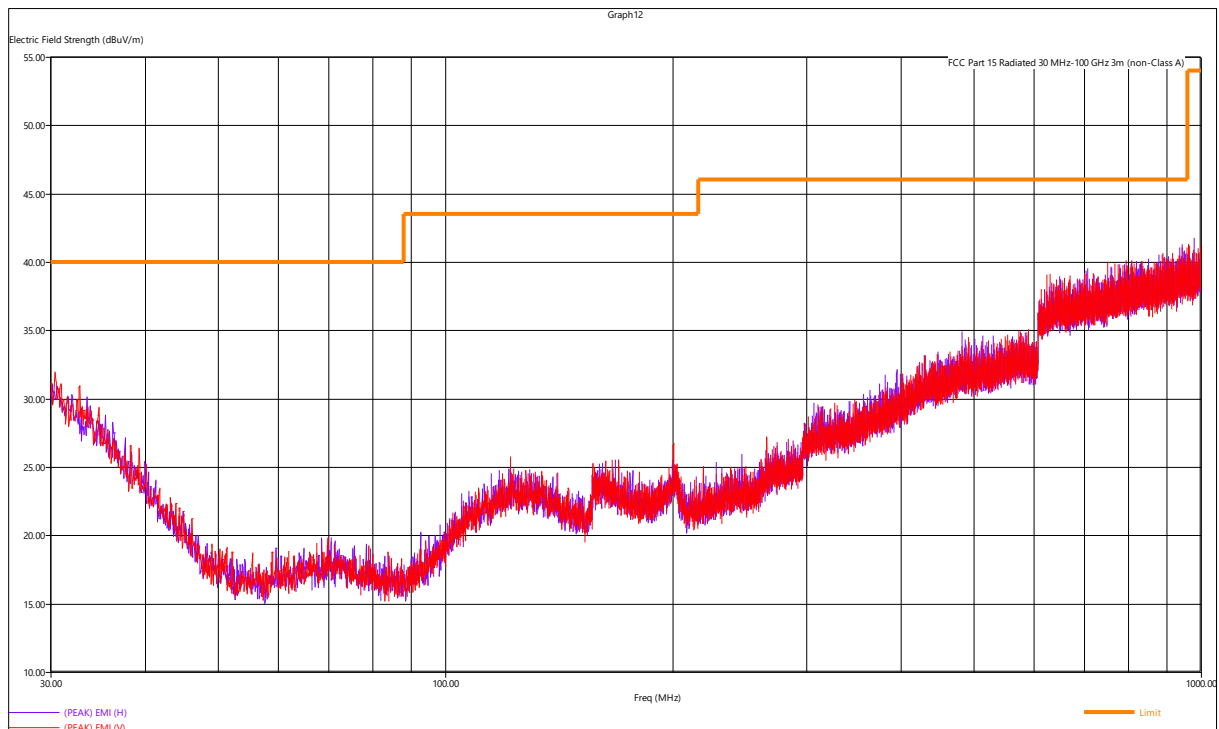


Figure 8 - Radiated Emissions Plot, 802.11b

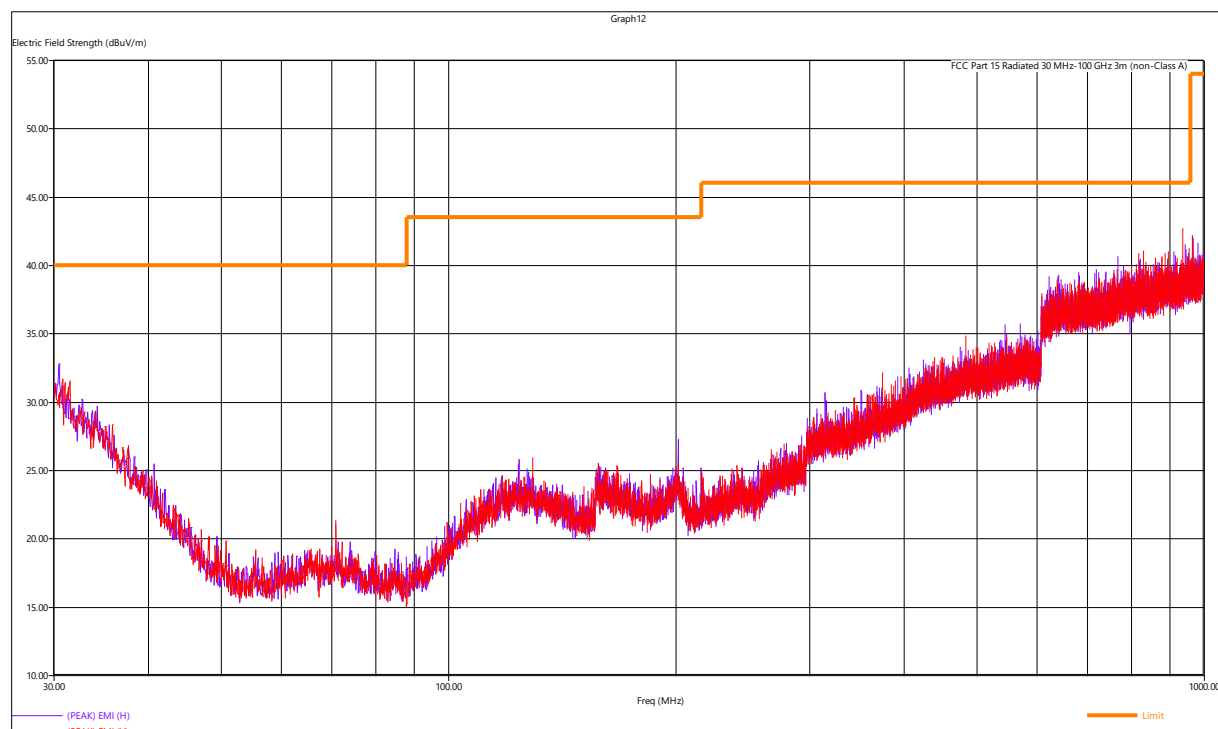


Figure 9 - Radiated Emissions Plot, 802.11g

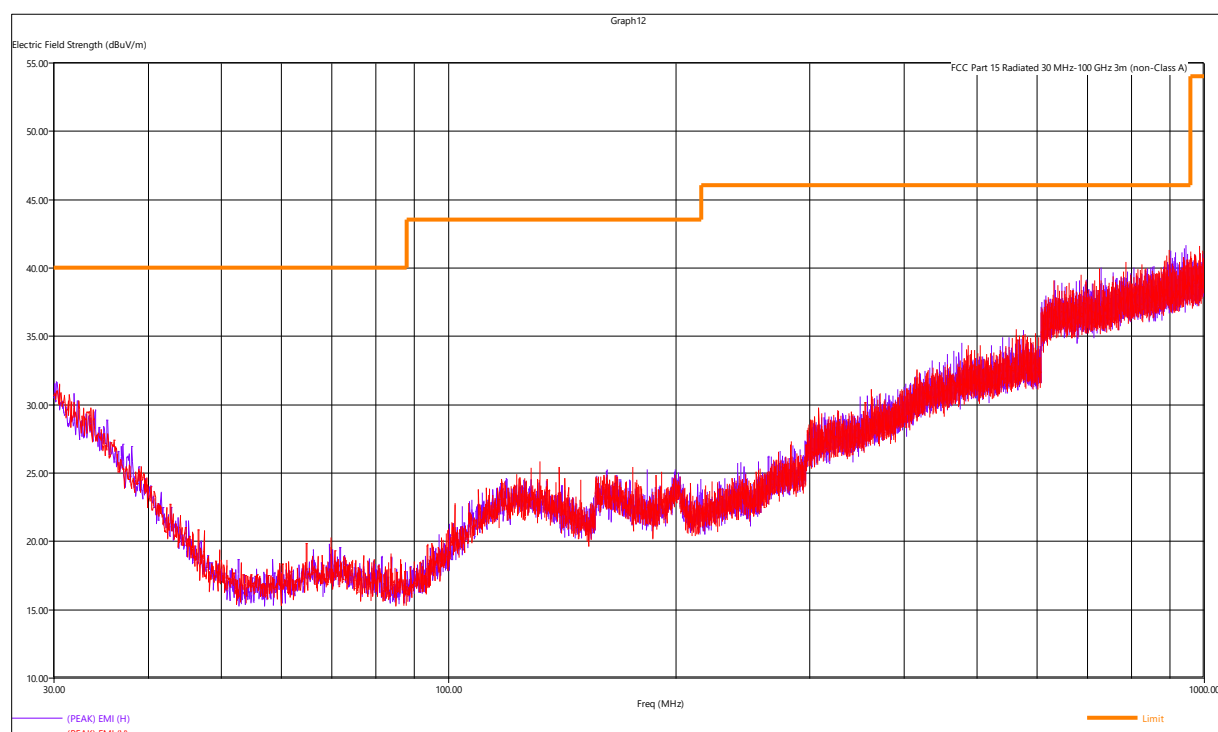


Figure 10 - Radiated Emissions Plot, 802.11n

REMARKS:

The Nebraska Center for Excellence in Electronics
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Lincoln, NE 68521



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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

Peak Measurements, 802.11, 30 MHz – 25GHz								
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation
MHz	dBμV/m	dBμV/m	dB	cm.	deg.			
2412.000000	102.22	N/A	N/A	113	197	H	Low	802.11b
2437.000000	101.76	N/A	N/A	134	199	H	Mid	802.11b
2462.000000	103.33	N/A	N/A	101	181	H	High	802.11b
2412.000000	95.69	N/A	N/A	179	154	H	Low	802.11g
2437.000000	98.84	N/A	N/A	131	157	H	Mid	802.11g
2462.000000	96.45	N/A	N/A	168	163	H	High	802.11g
2412.000000	94.60	N/A	N/A	190	157	H	Low	802.11n
2437.000000	100.18	N/A	N/A	185	161	H	Mid	802.11n
2462.000000	94.54	N/A	N/A	171	151	H	High	802.11n

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.

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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.

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Test results:

Pass

Restricted Band Edge Measurements							
Modulation	Channel	Average level	Average Limit	Average Margin	Peak Level	Peak Limit	Peak Margin
802.11b	Low	42.551	53.980	11.429	54.032	73.890	19.858
802.11b	High	41.203	53.980	12.777	55.787	73.890	18.103
802.11g	Low	44.971	53.980	9.009	60.891	73.890	12.999
802.11g	High	44.168	53.980	9.812	59.905	73.890	13.985
802.11n	Low	42.544	53.980	11.436	55.674	73.890	18.216
802.11n	High	42.278	53.980	11.702	55.043	73.890	18.847

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.



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4.6 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 15.249 Device:

Not Applicable

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:

4. All the Power Spectral Density (PSD) plots can be found in the Appendix C.
5. All the measurements were found to be compliant.
6. The measurements are reported on the graph.

4.7 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:

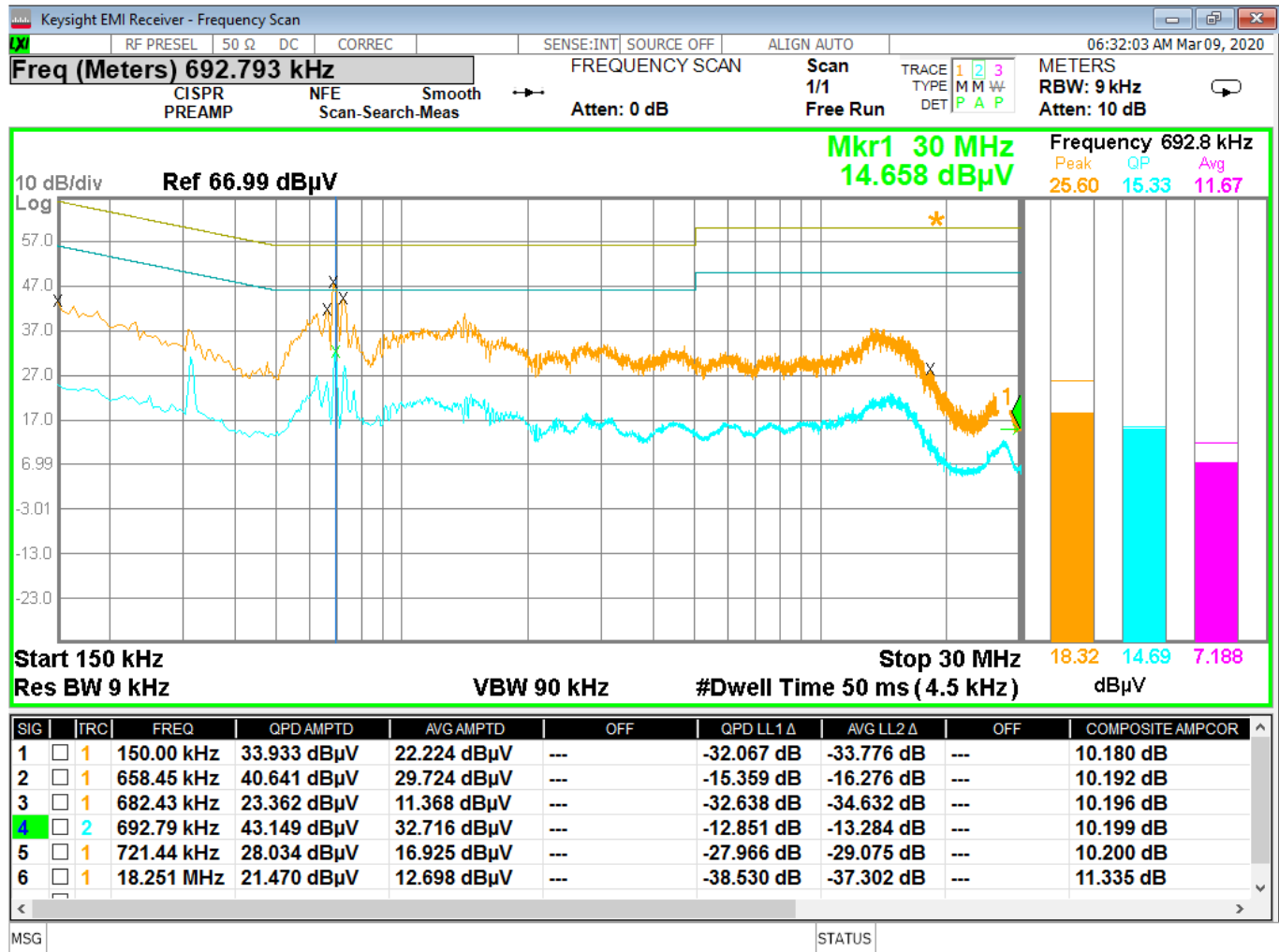


Figure 11 - Conducted Emissions Plot, Line

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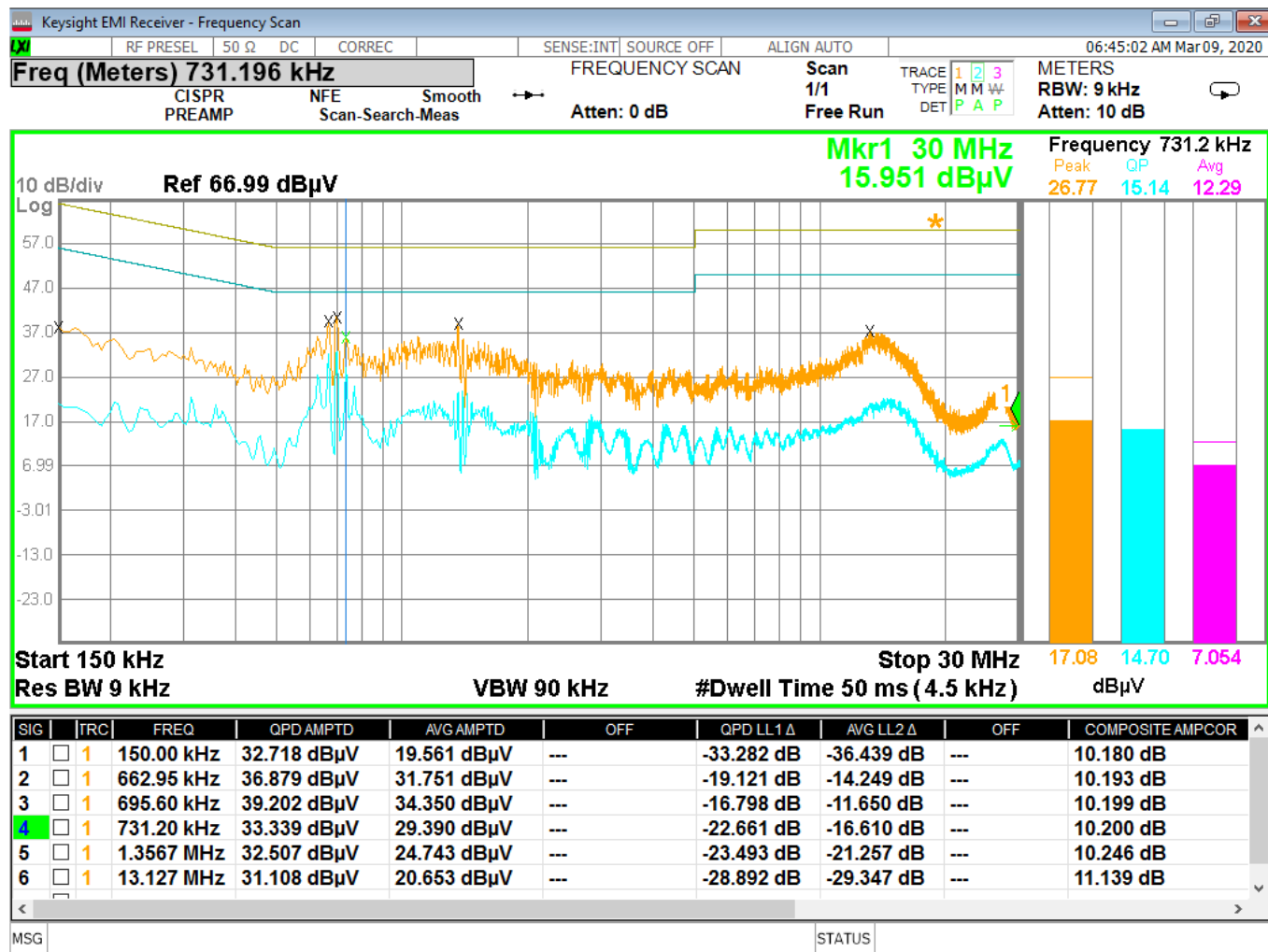


Figure 12 - Conducted Emissions Plot, Neutral



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APPENDIX A: SAMPLE CALCULATION

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF - (-CF + AG) + AV$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

AV = Averaging Factor (if applicable)

Assume a receiver reading of 55 dB 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.



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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;

$$EIRP \text{ (Watts)} = [Field \text{ Strength (V/m)} \times \text{antenna distance (m)}]^2 / 30$$

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

$$\text{Voltage (dB}\mu\text{V)} = \text{Power (dBm)} + 107 \text{ (for } 50\Omega \text{ measurement systems)}$$

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

$$\text{Gain} = 1 \text{ (numeric gain for isotropic radiator)}$$

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

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

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

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



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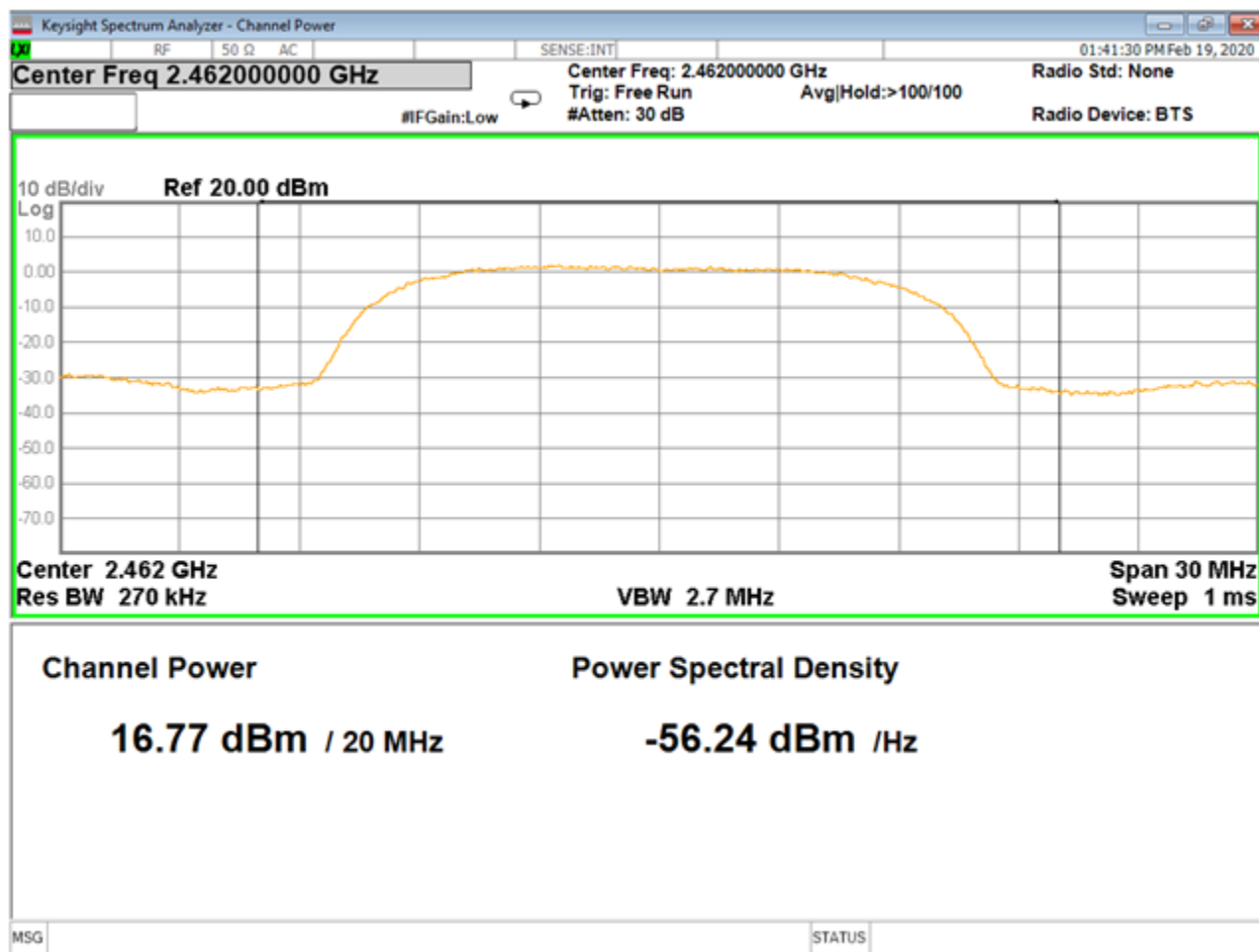
APPENDIX B – MEASUREMENT UNCERTAINTY

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

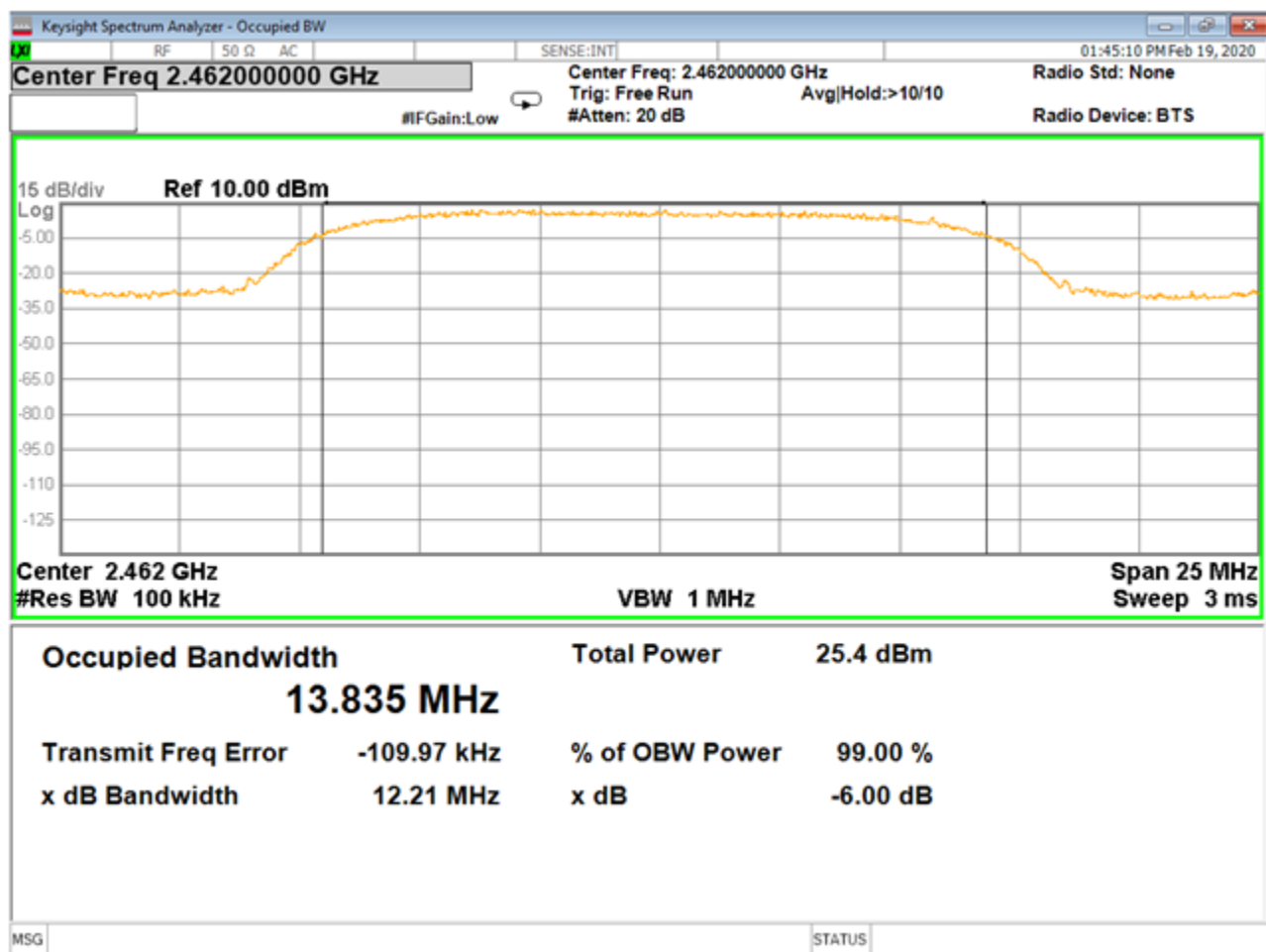
Expanded uncertainty values are calculated to a confidence level of 95%.

APPENDIX C – GRAPHS AND TABLES



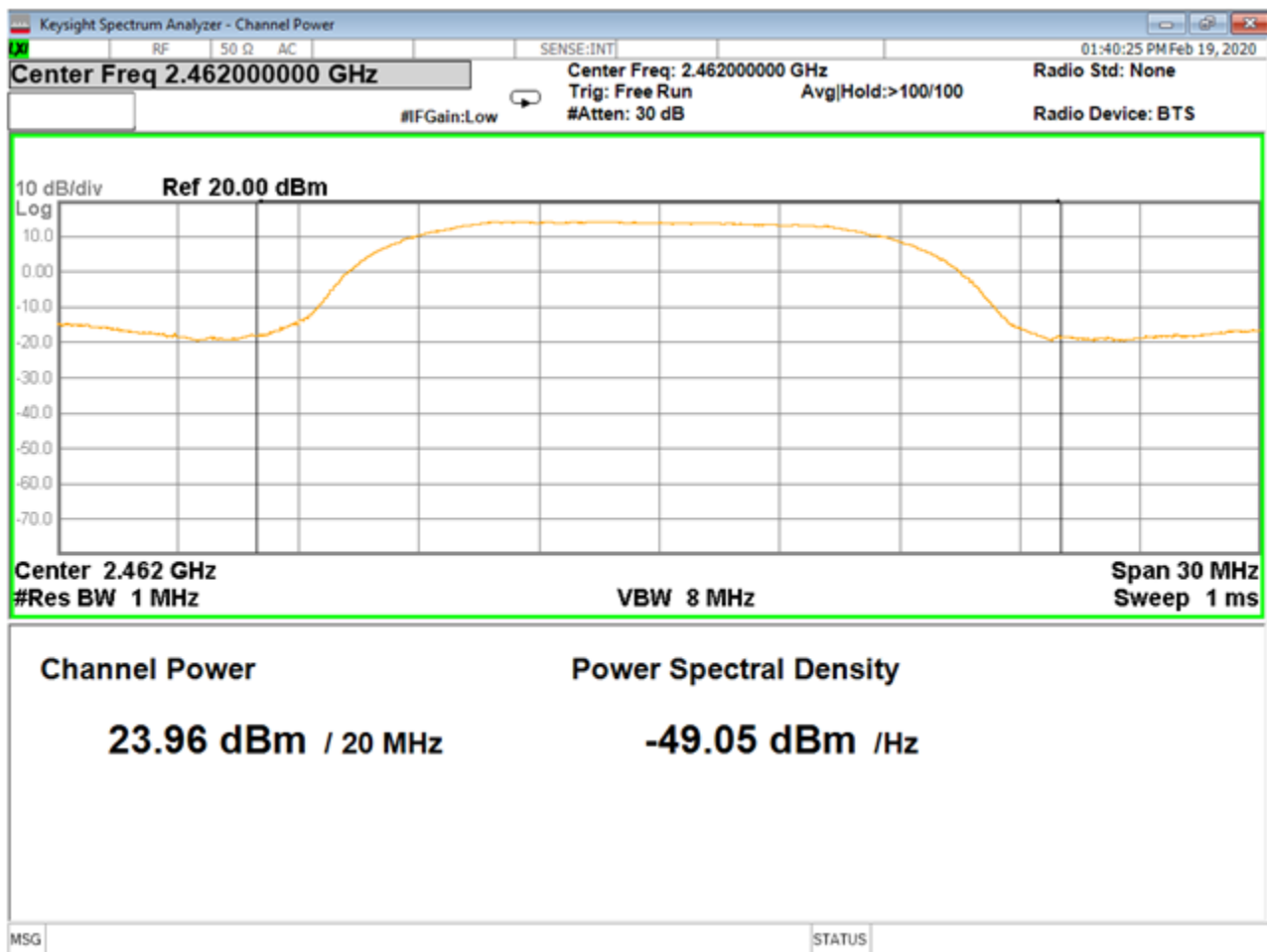
WIFI 80211 b High channel Average power

Report Number:	R20200110-20-E7	Rev	A
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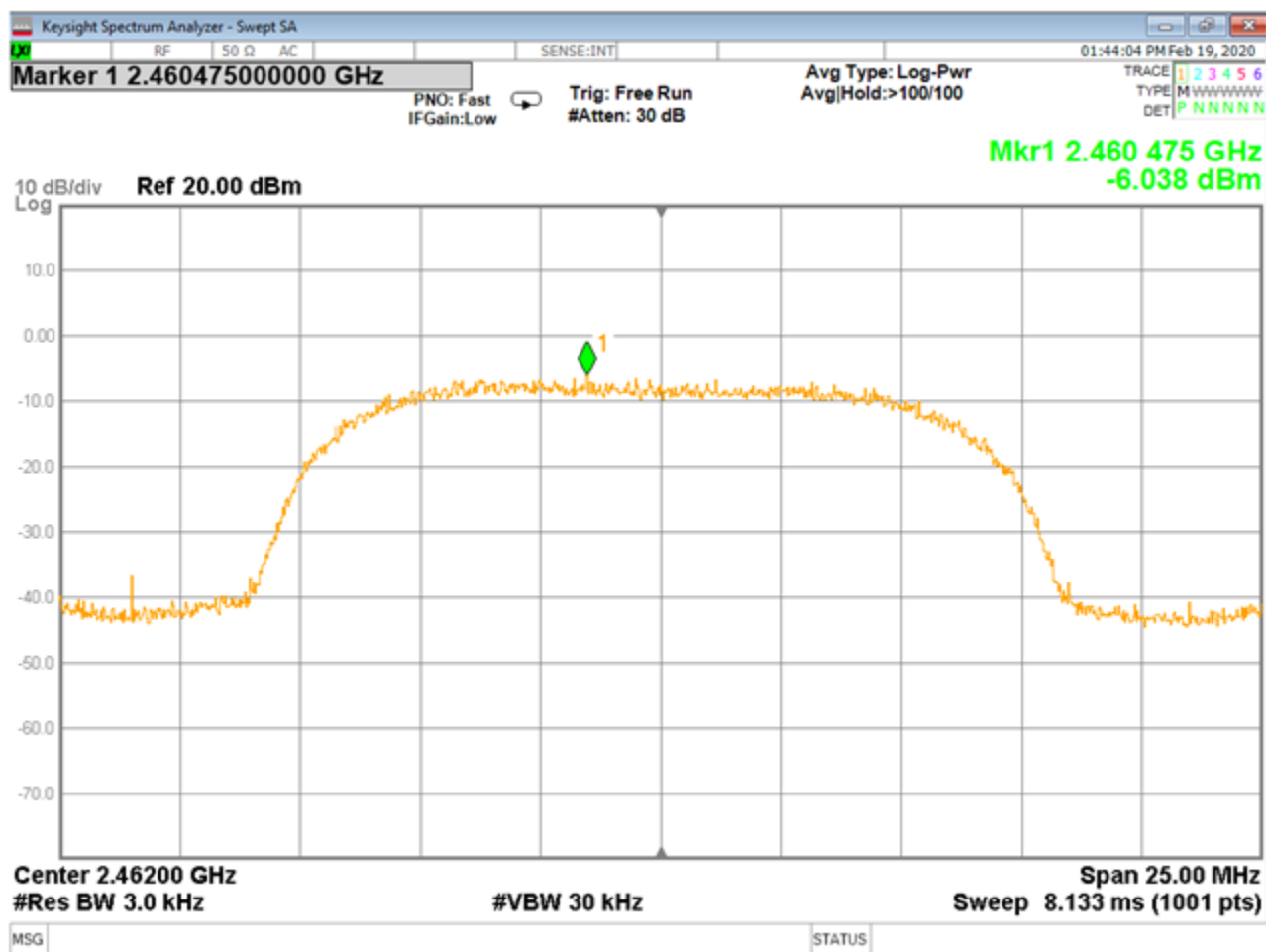
WIFI 80211 b High channel Bandwidth

Report Number:	R20200110-20-E7	Rev	A
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WIFI 80211 b High channel Peak power

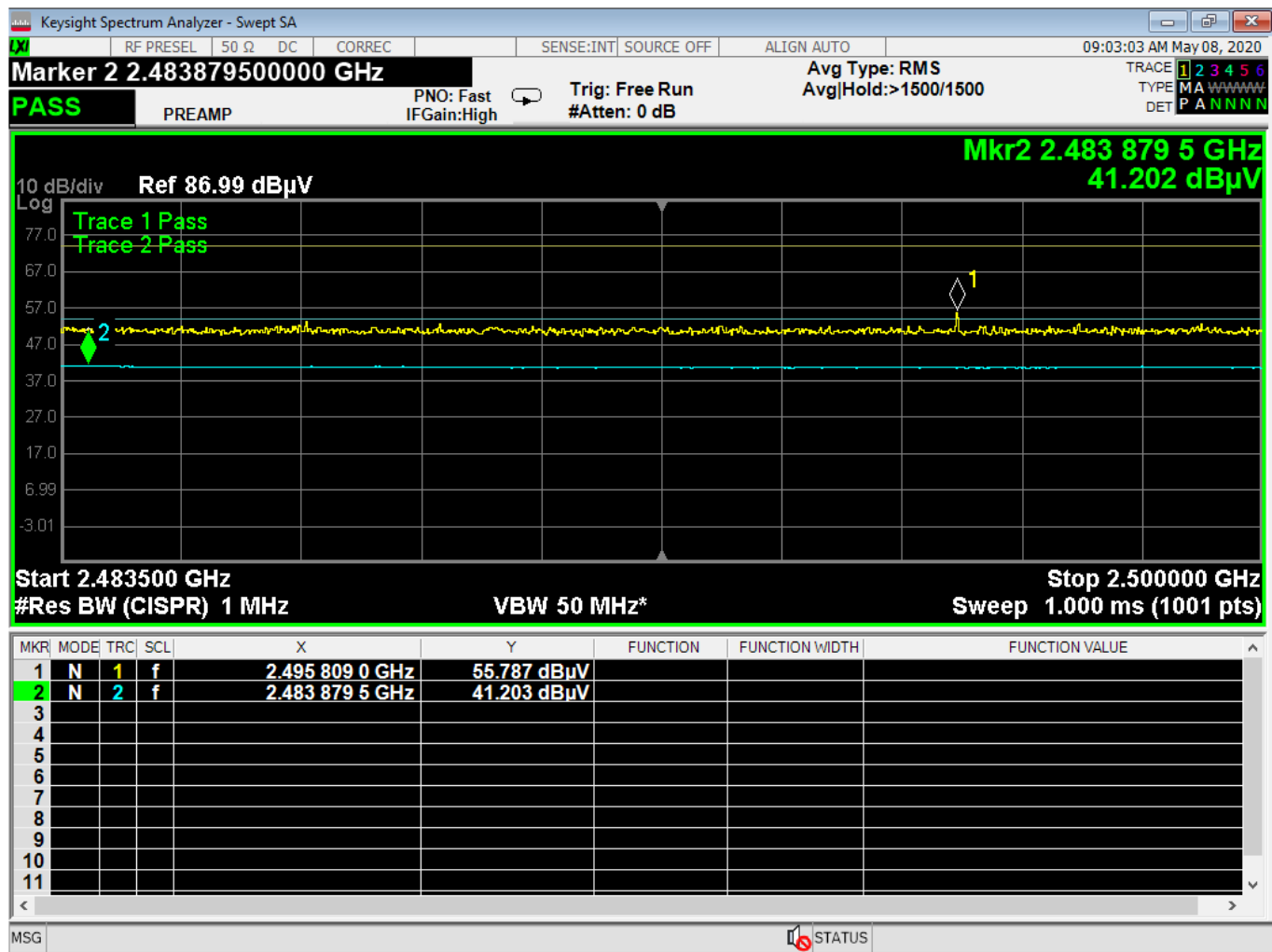
Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



WIFI 80211 b High channel PSD

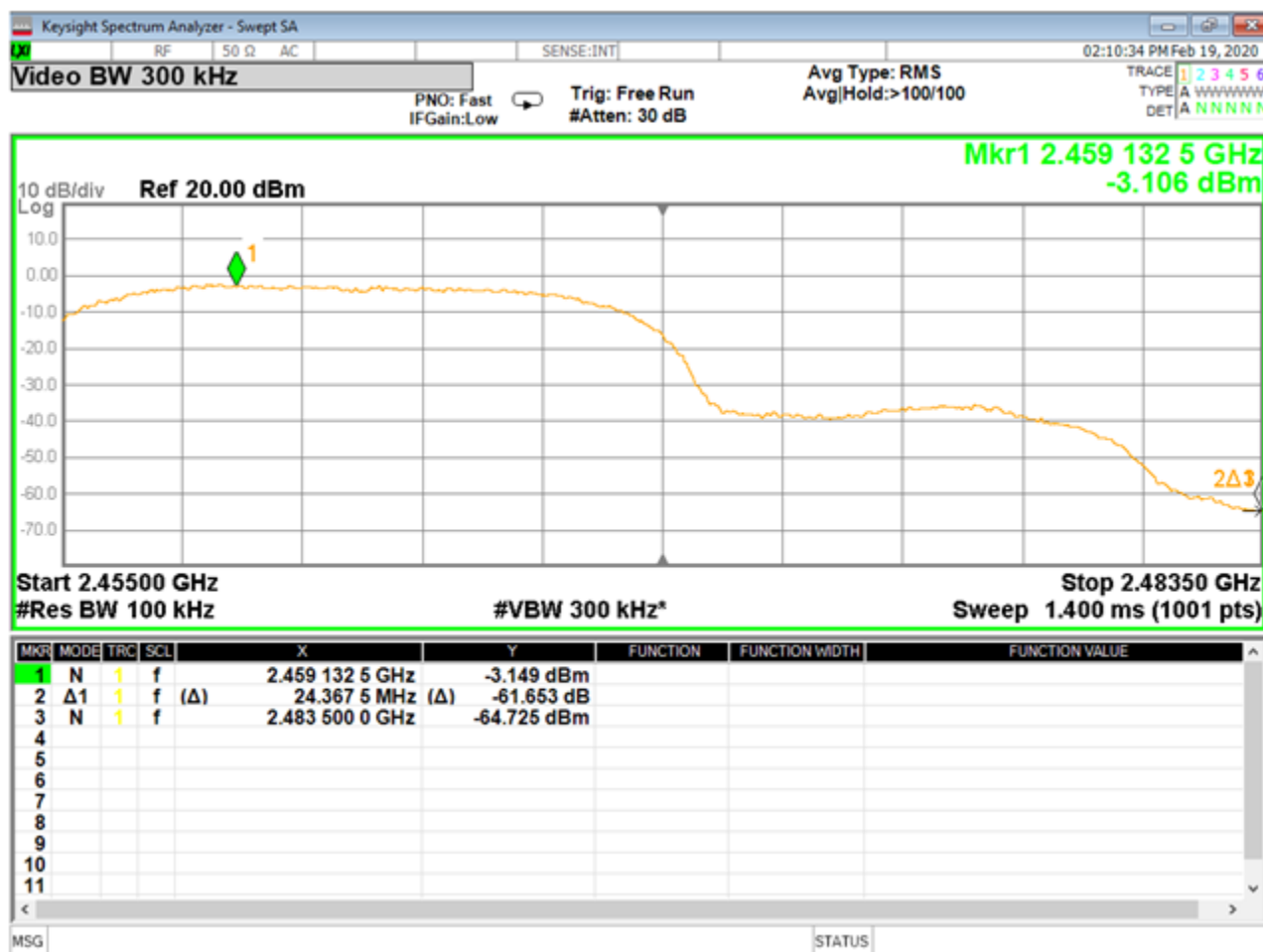


Report Number:	R20200110-20-E7	Rev	A
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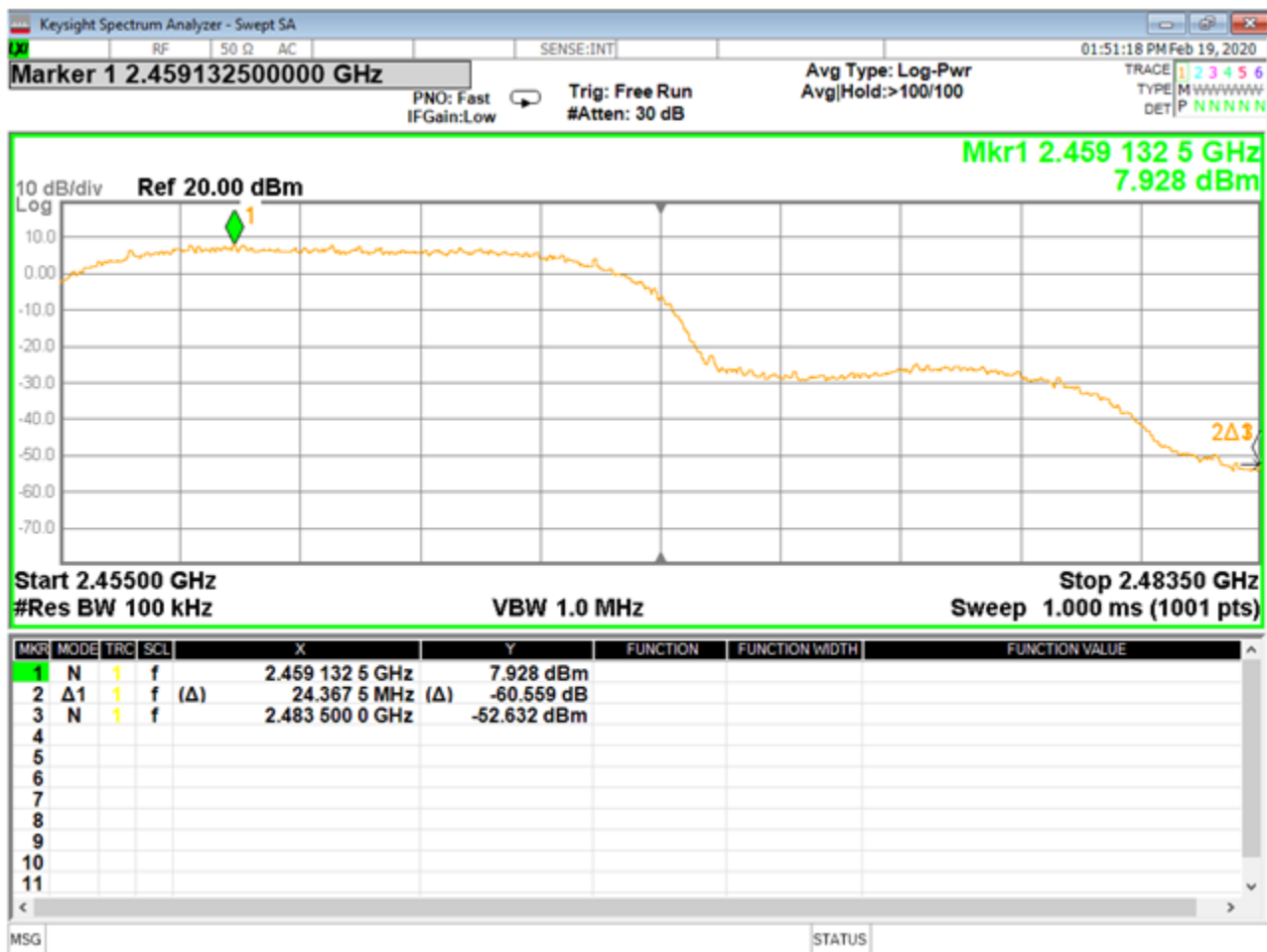


WIFI 80211 b Higher band edge restricted

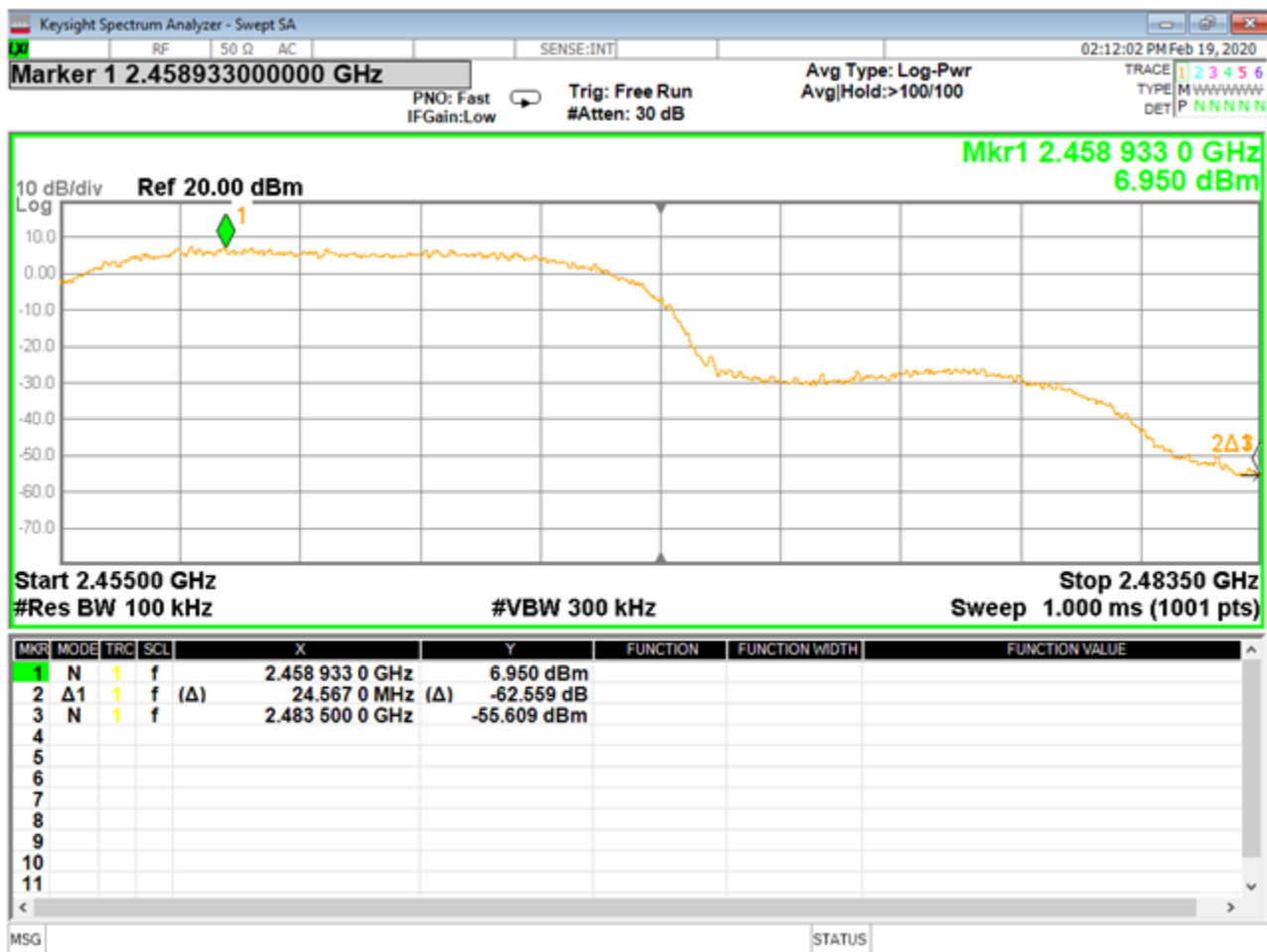
*Limit per Part 15.209 is 73.98 dBμV/m for peak and 53.98 dBμV/m for average at 3m test distance. Peak and Average Trace values are shown with corresponding limits. Tabular data for worst case frequencies shown above can be found in section 4.5.



WIFI 80211 b Higher band edge unrestricted average

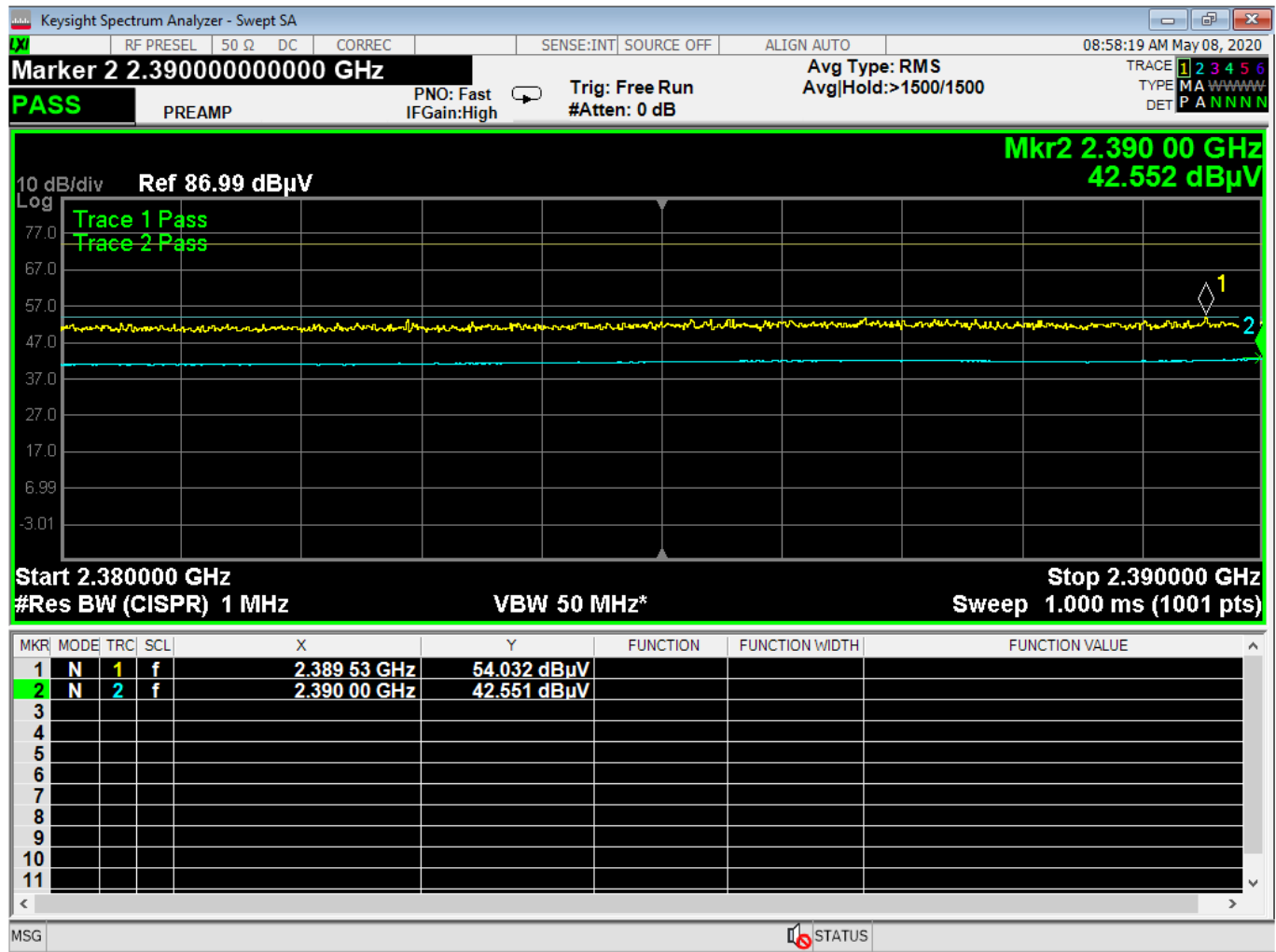


WIFI 80211 b Higher band edge unrestricted peak



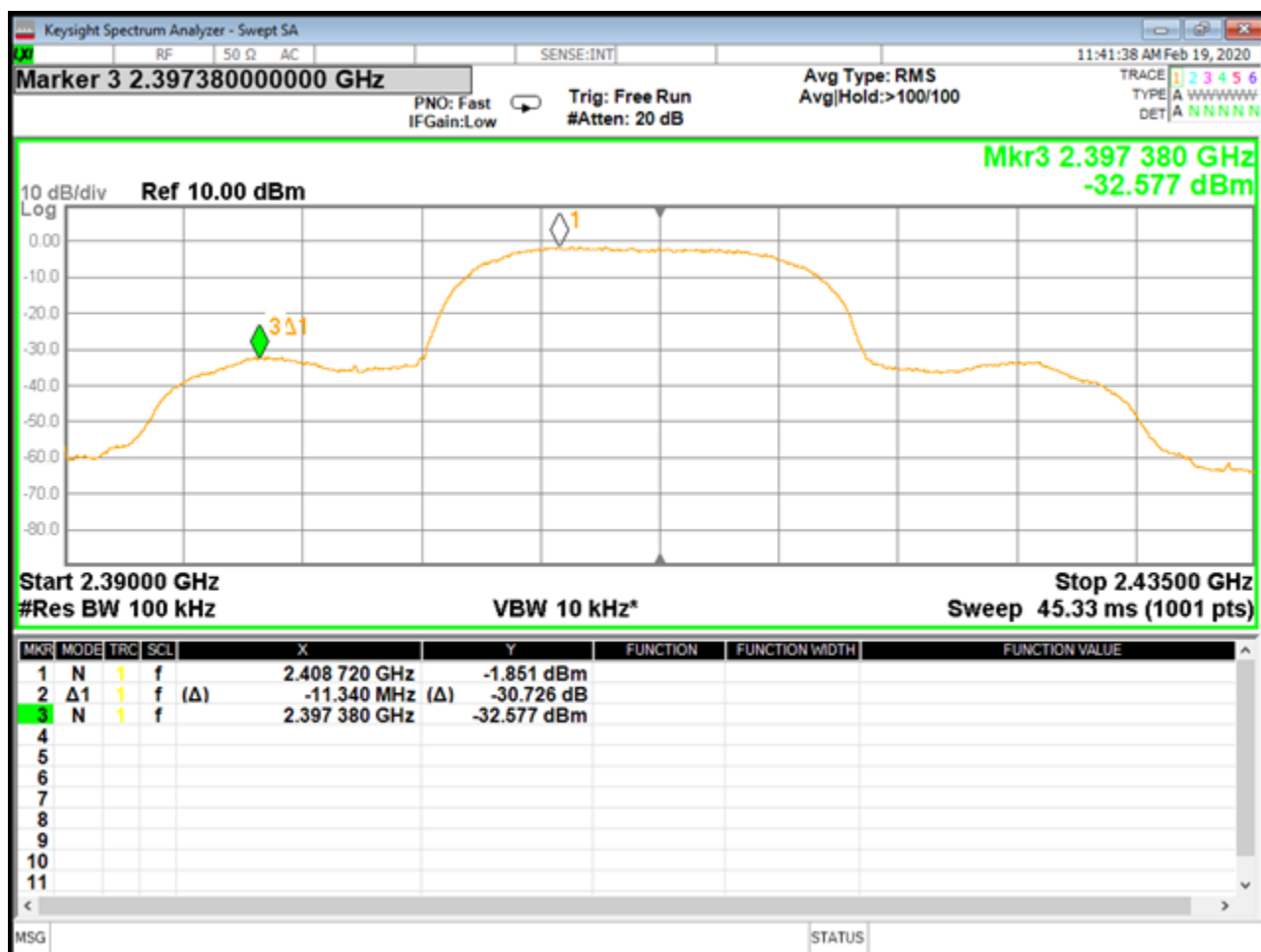
WIFI 80211 b Higher band edge unrestricted peak

	Report Number:	R20200110-20-E7	Rev	A
	Prepared for:	Garmin International, Inc.		

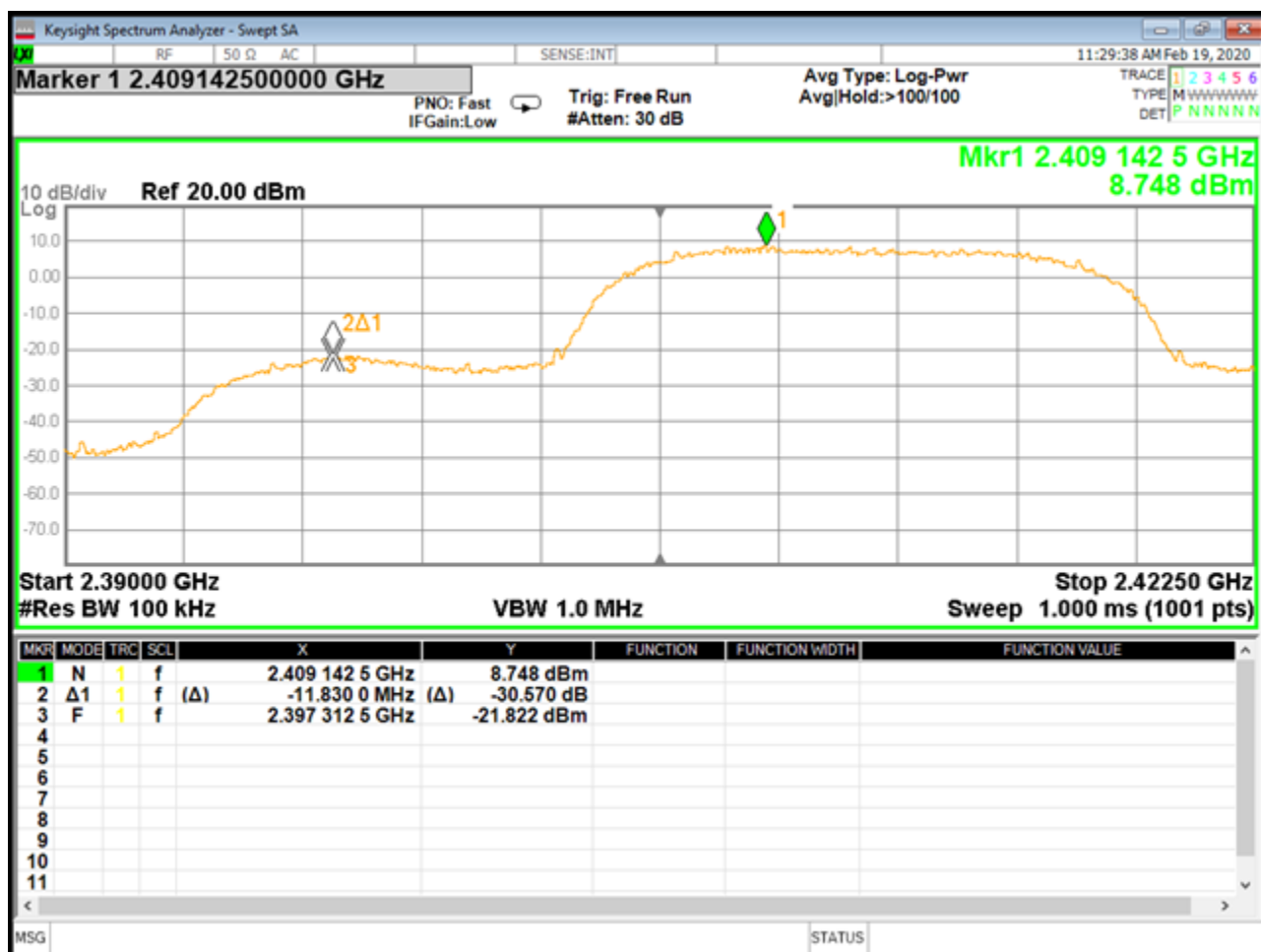


WIFI 80211 b Low band edge restricted

*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.

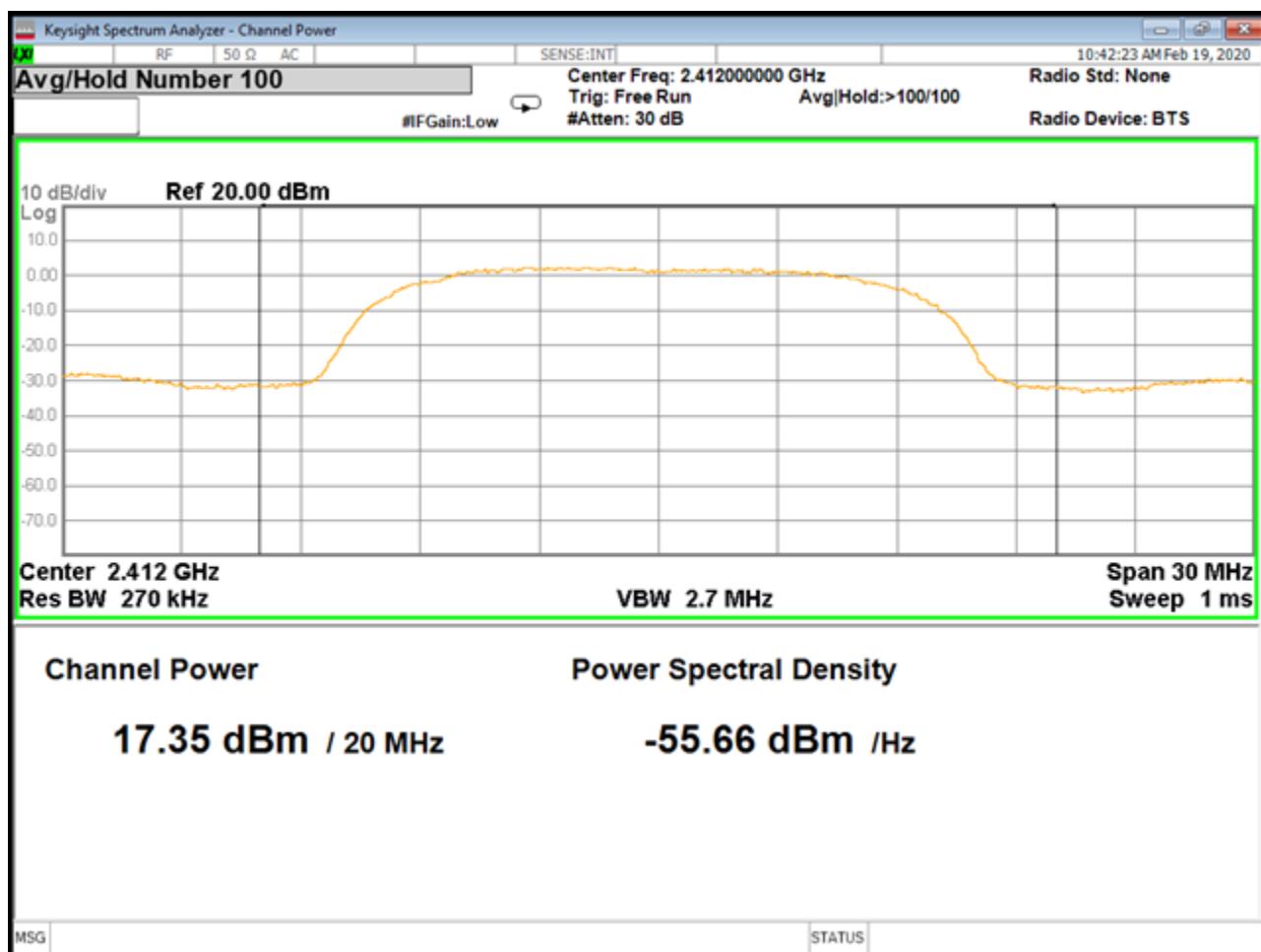


WIFI 80211 b Low band edge unrestricted average



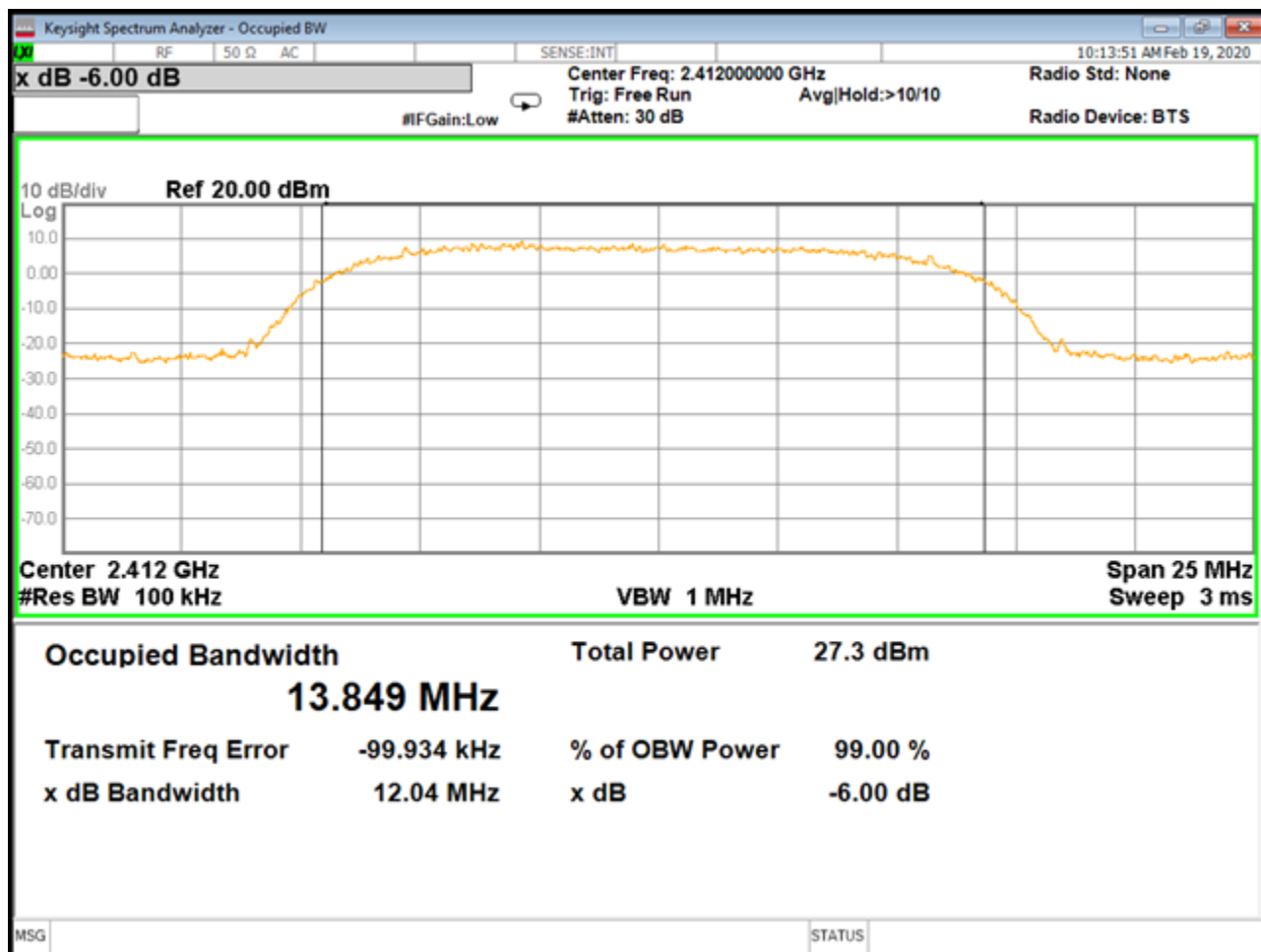
WIFI 80211 b Low band edge unrestricted

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



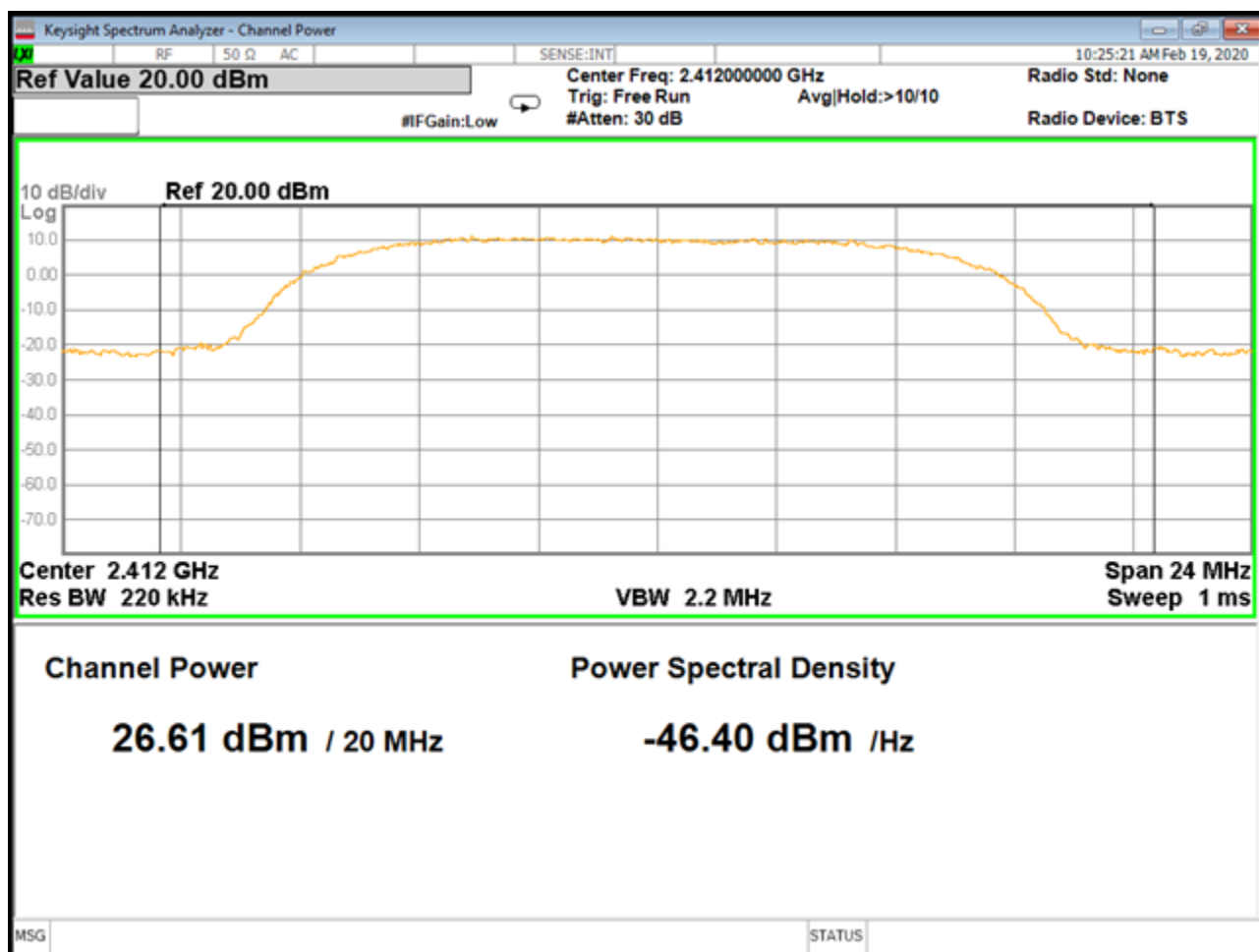
WIFI 80211 b Low channel average power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



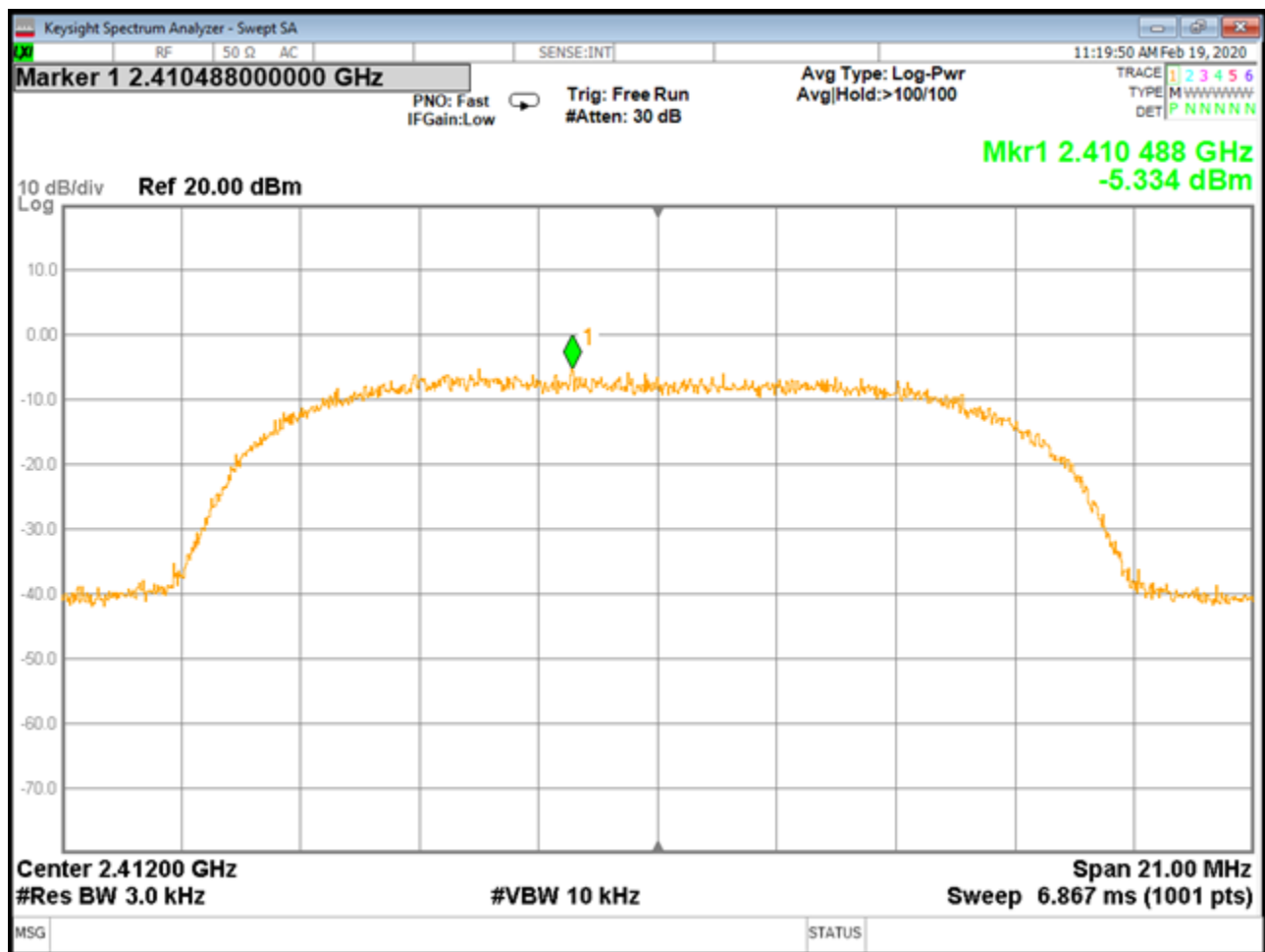
WIFI 80211 b Low channel Bandwidth

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		

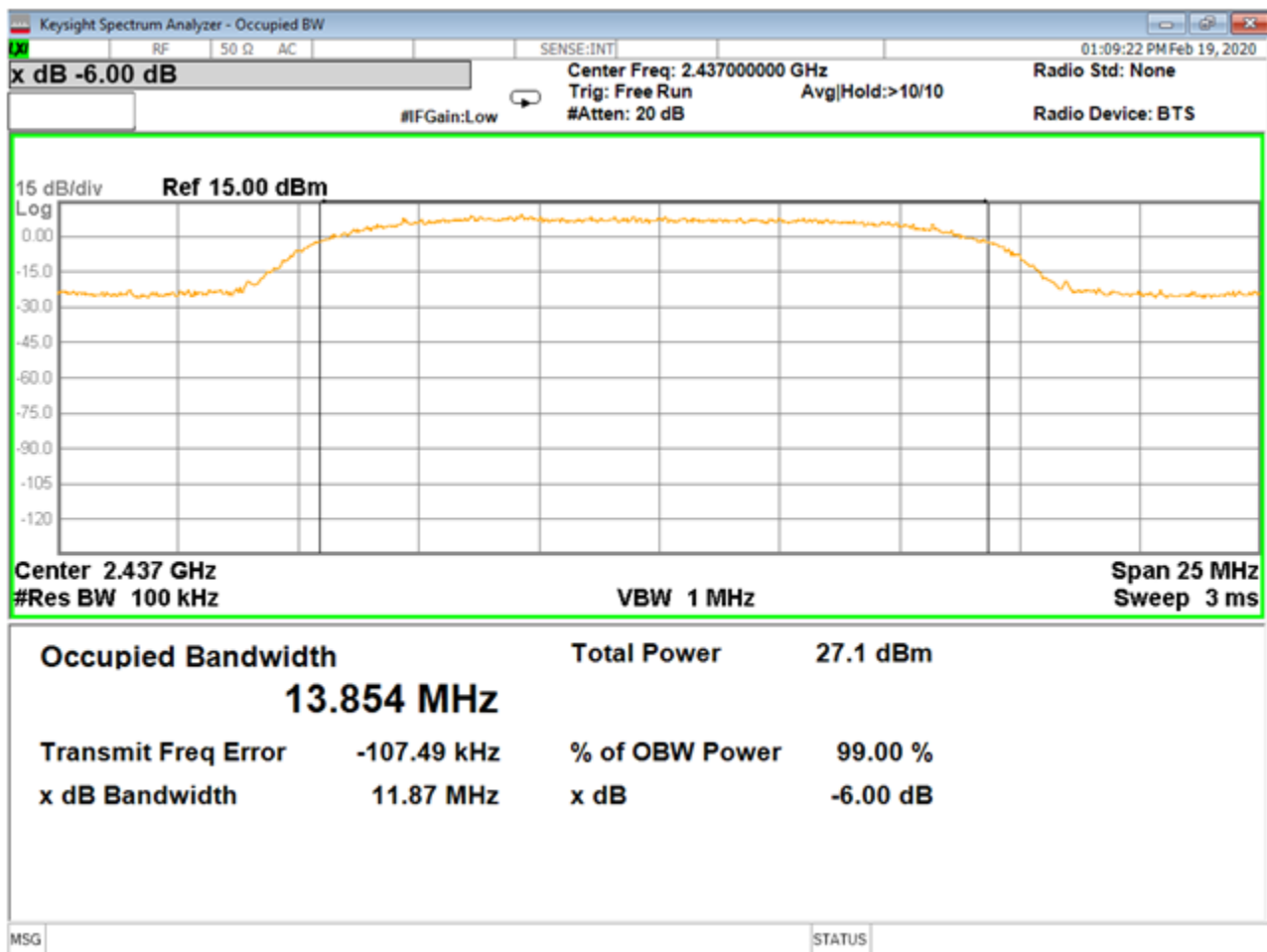


WIFI 80211 b Low channel peak power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		

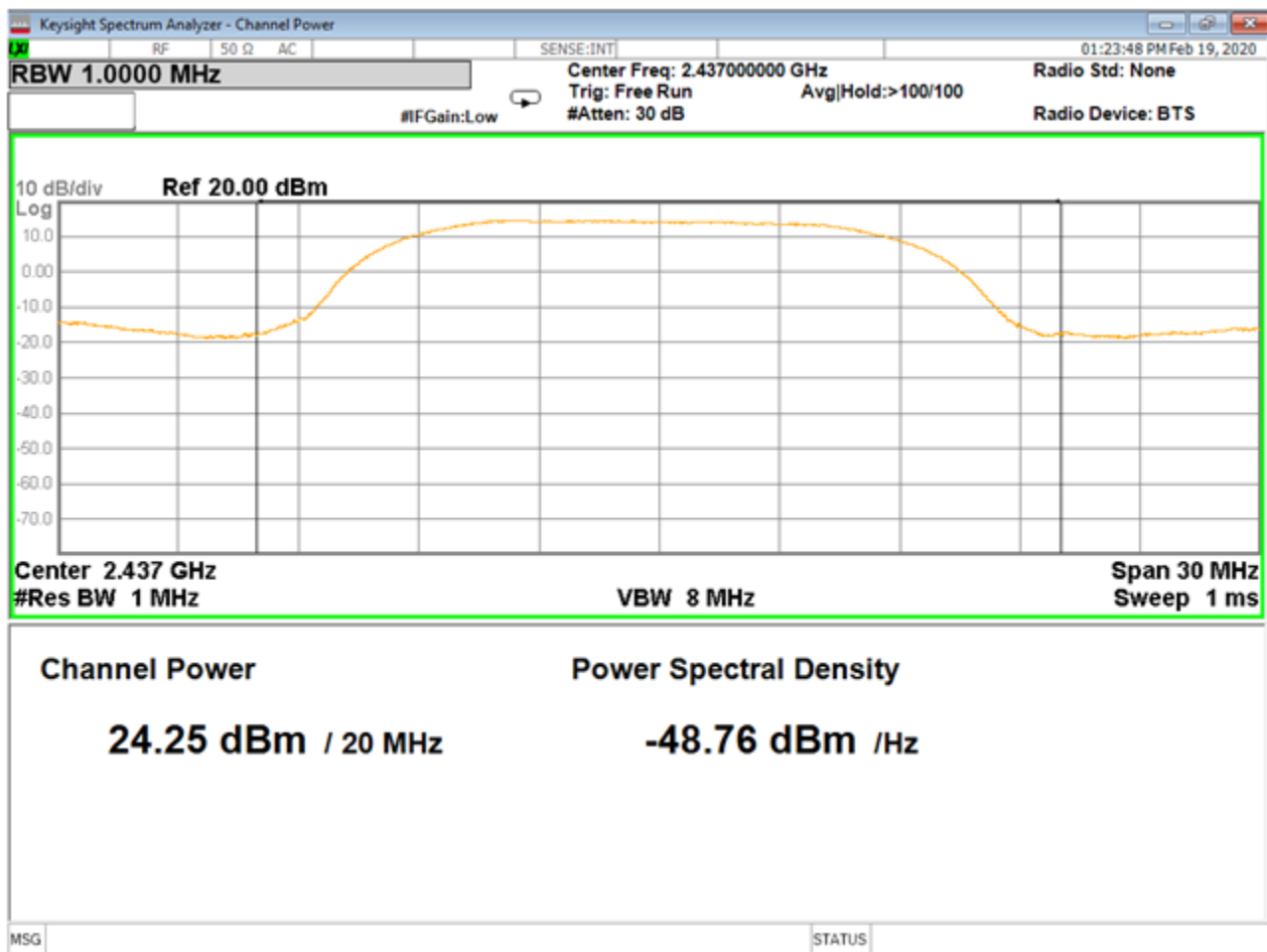


WIFI 80211 b Low channel PSD



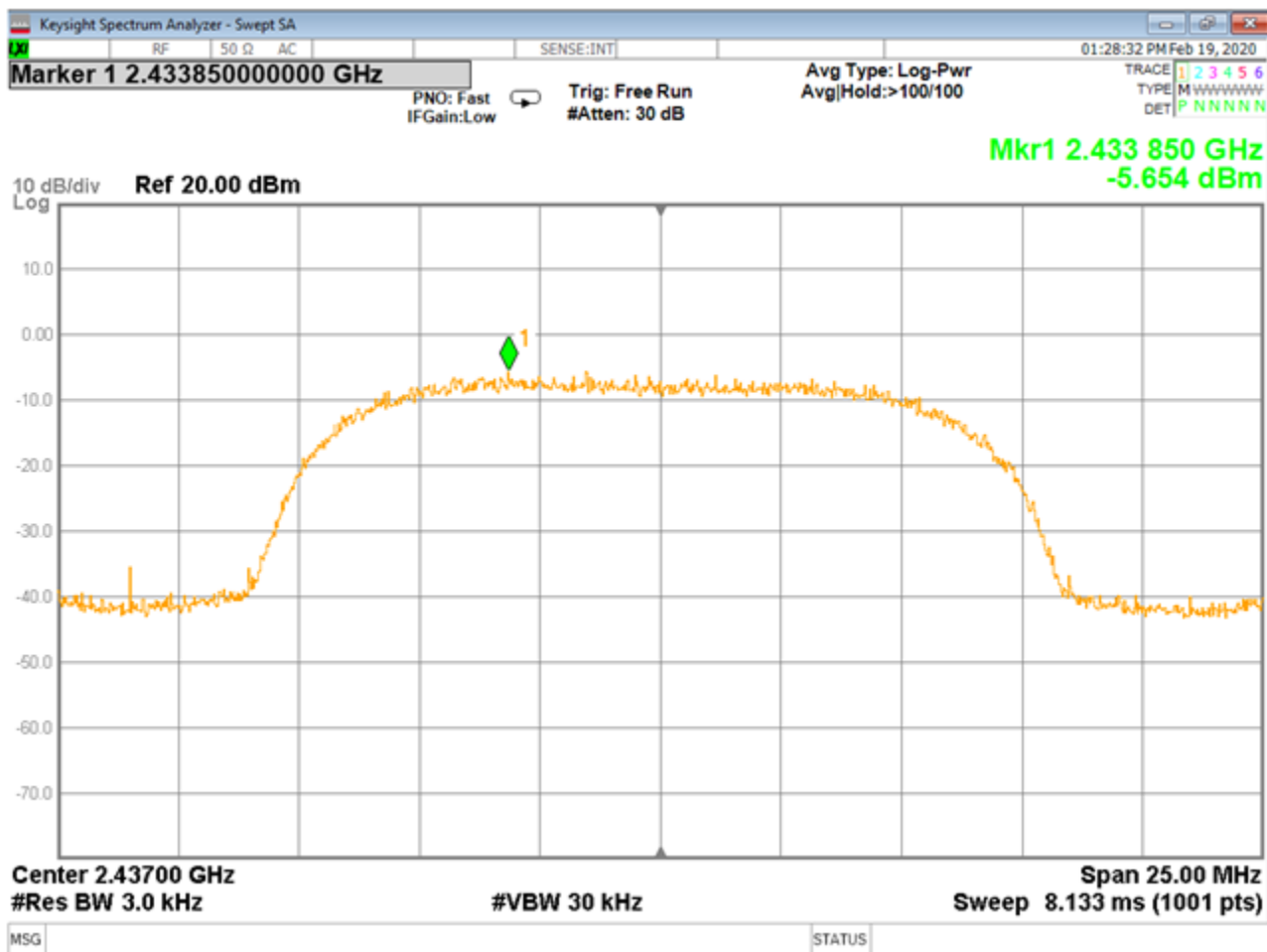
WIFI 80211 b mid channel Bandwidth

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



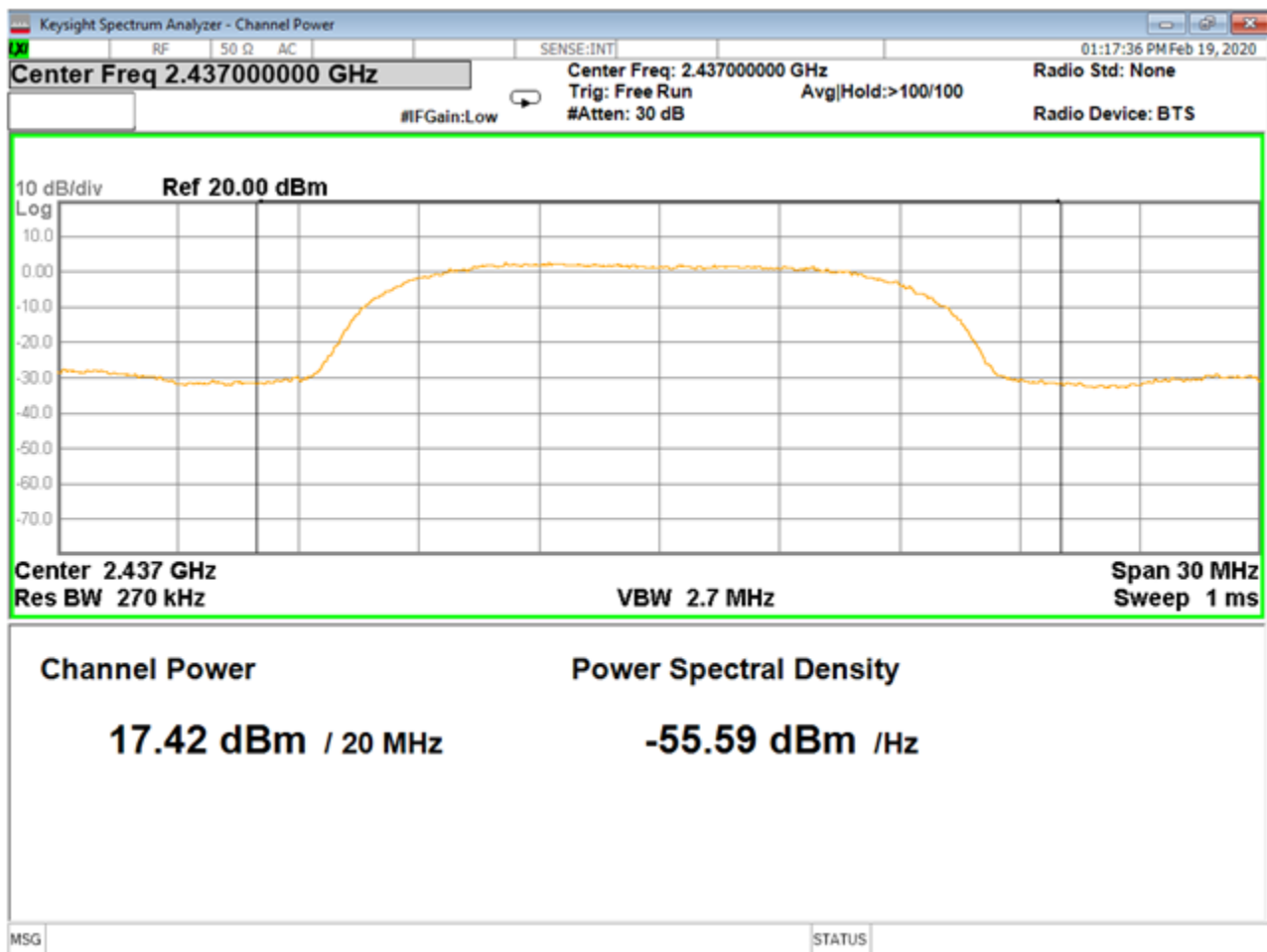
WIFI 80211 b mid channel Peak power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		

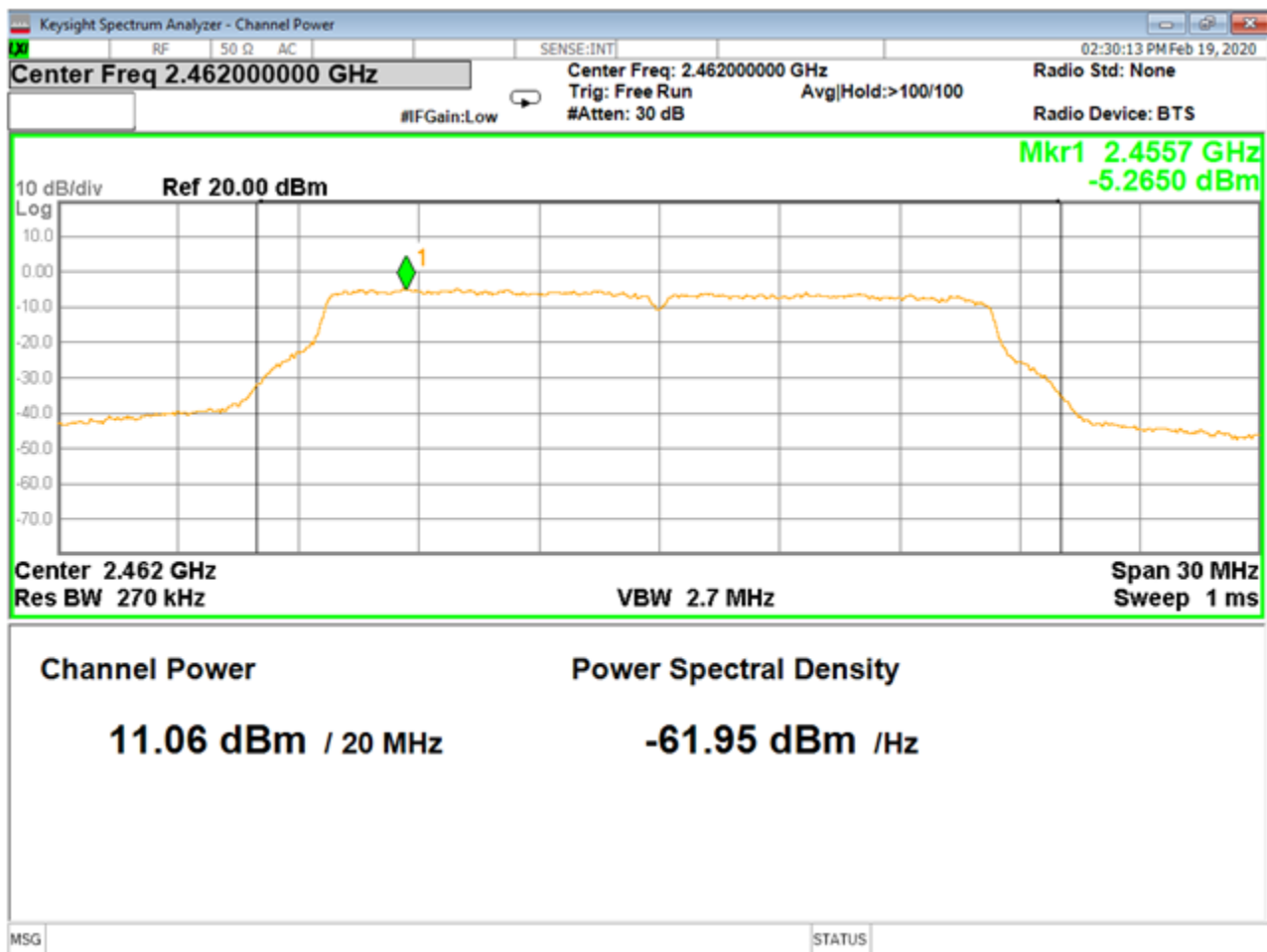


WIFI 80211 b mid channel PSD

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		

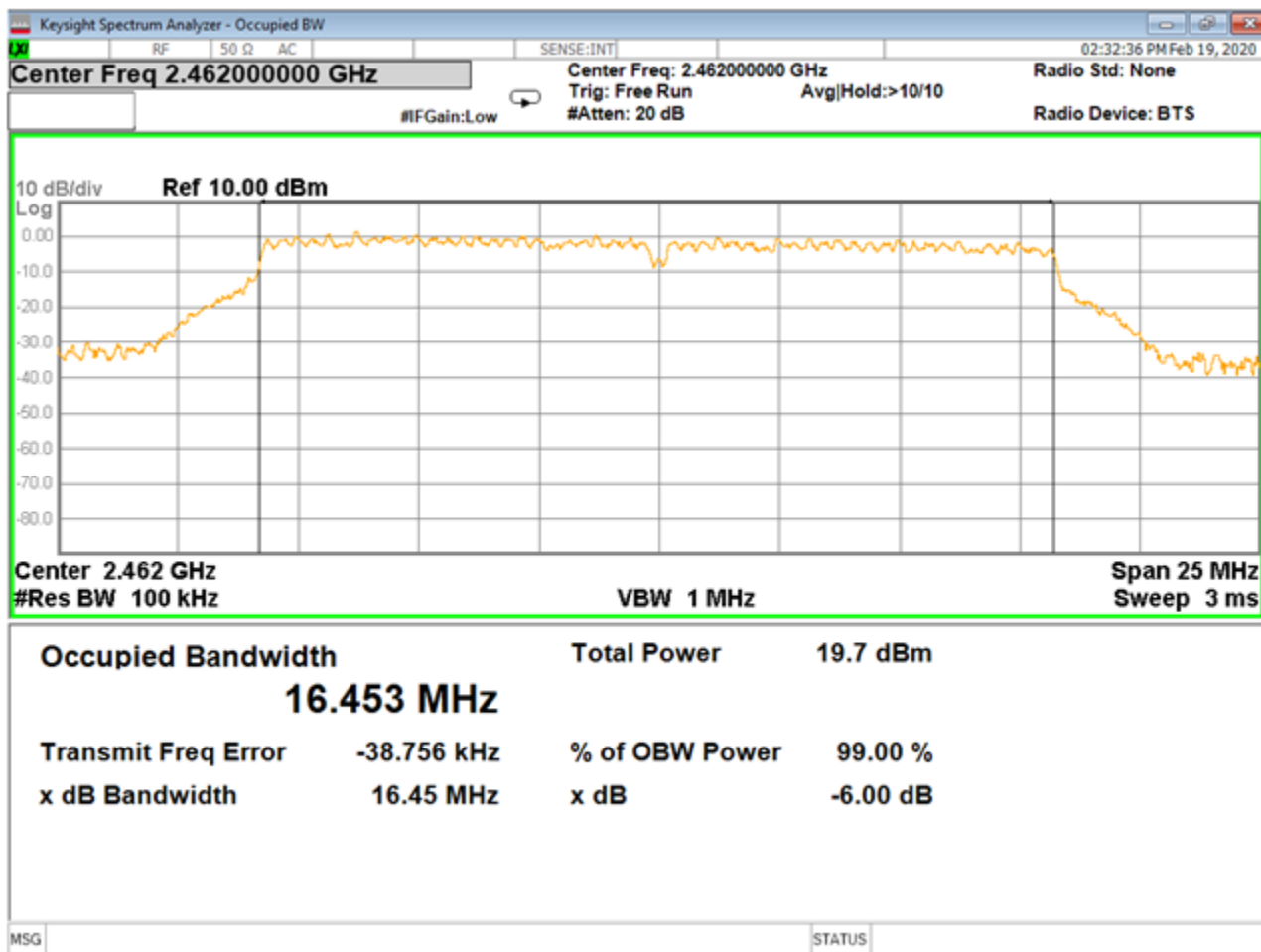


WIFI 80211 b mid channel average power



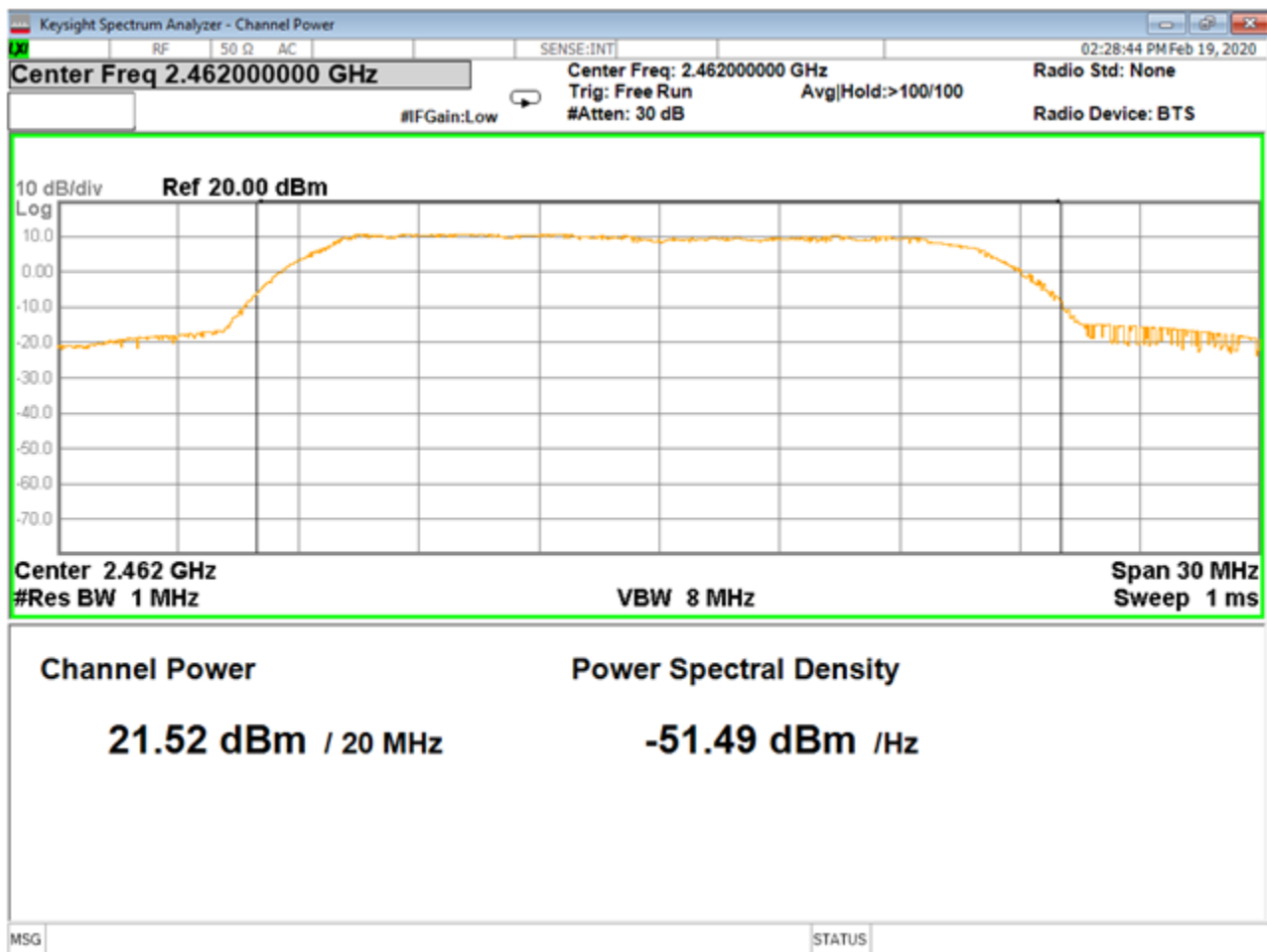
WIFI 80211 g High channel average power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



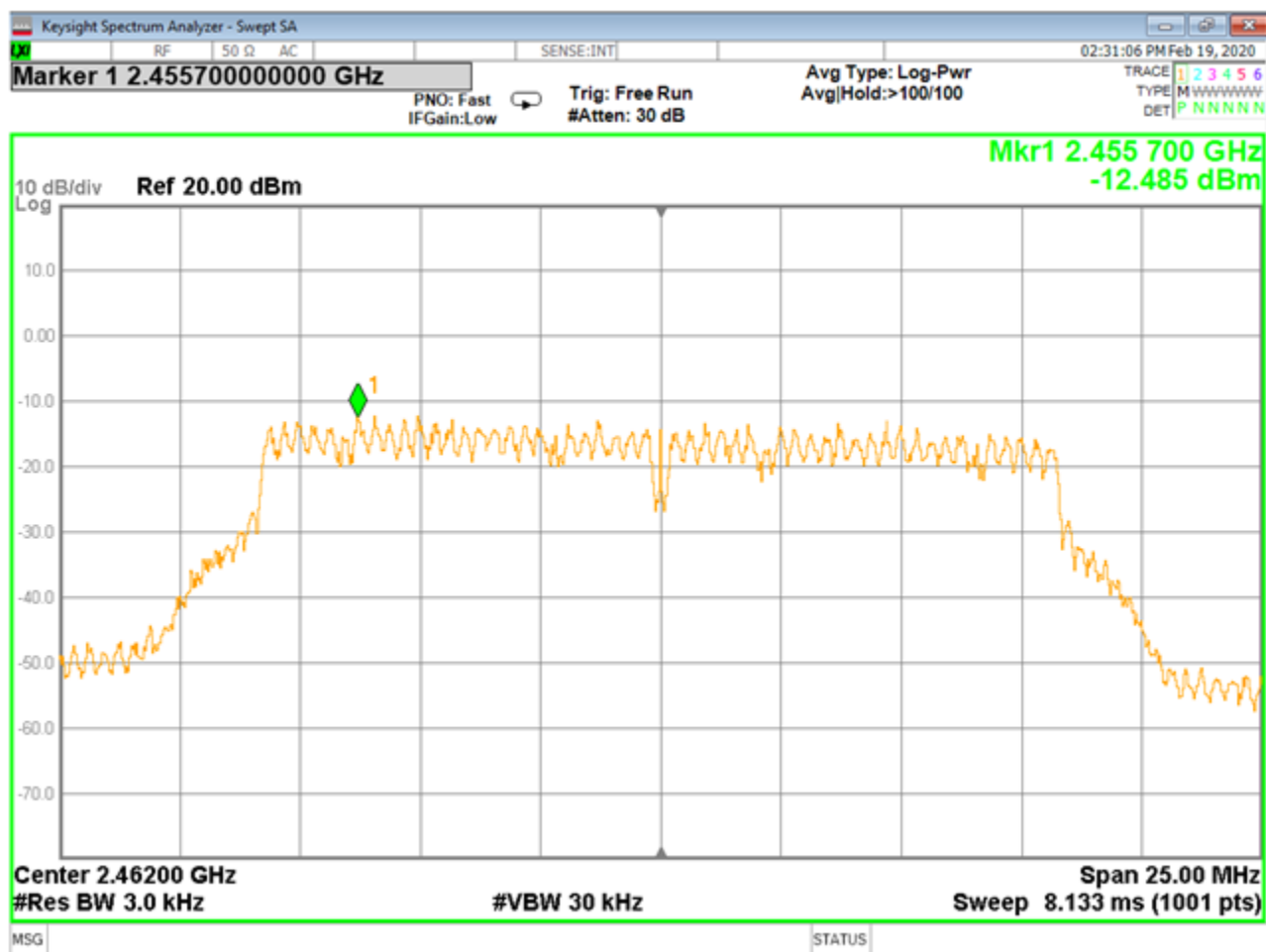
WIFI 80211 g High channel BANDWIDTH

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



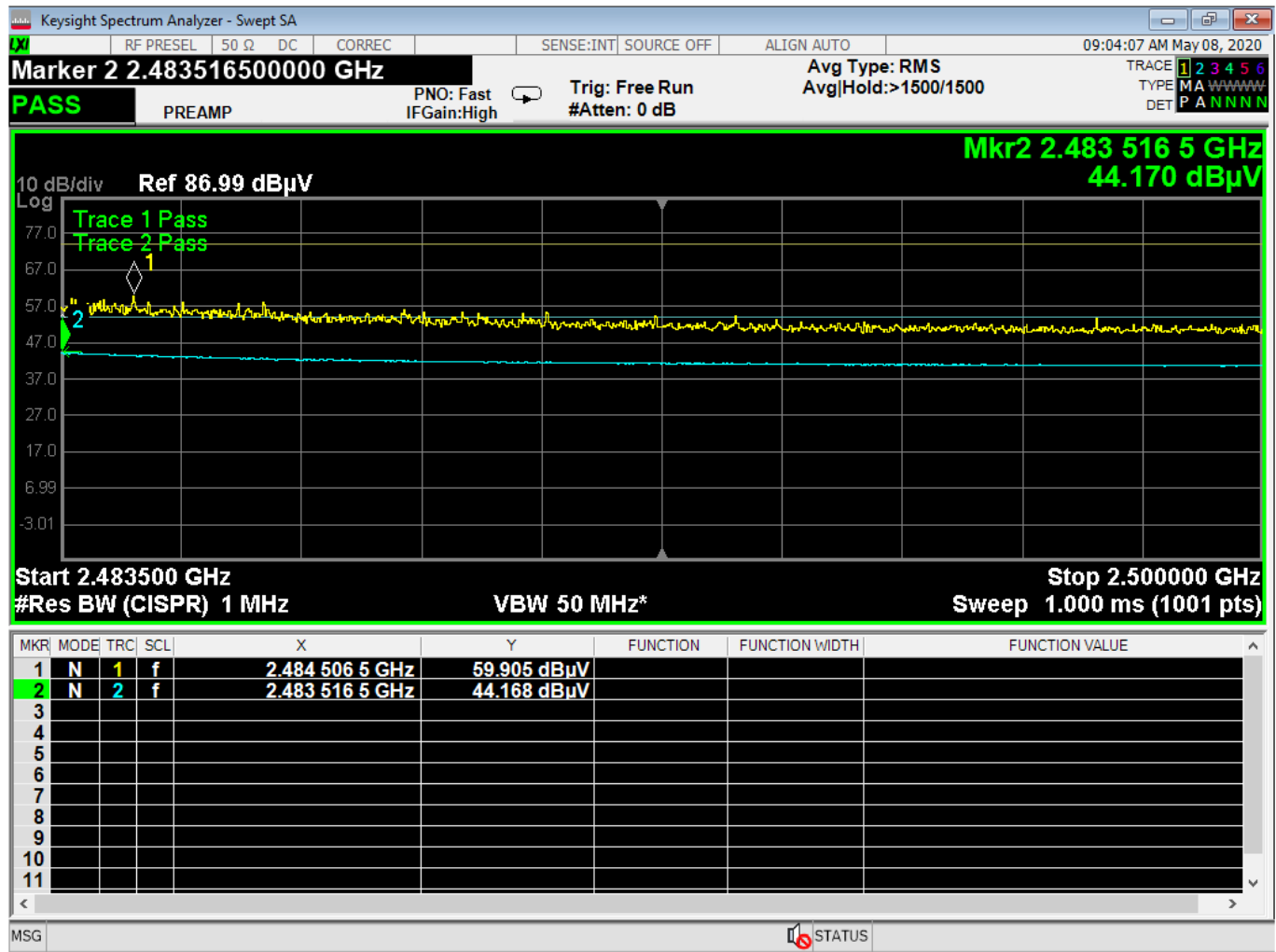
WIFI 80211 g High channel peak power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



WIFI 80211 g High channel PSD

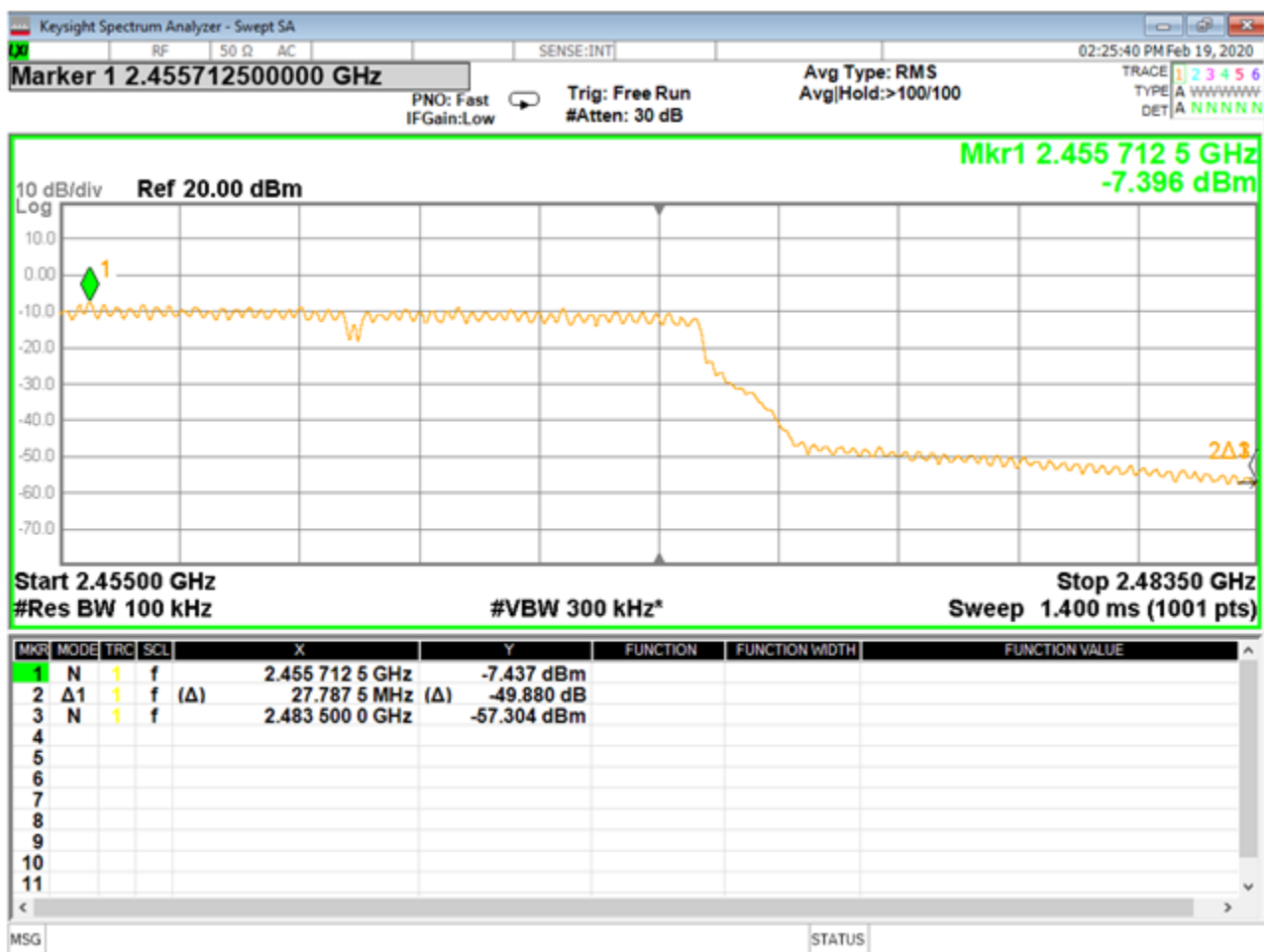
	Report Number:	R20200110-20-E7	Rev	A
	Prepared for:	Garmin International, Inc.		



WIFI 80211 g Higher band edge restricted

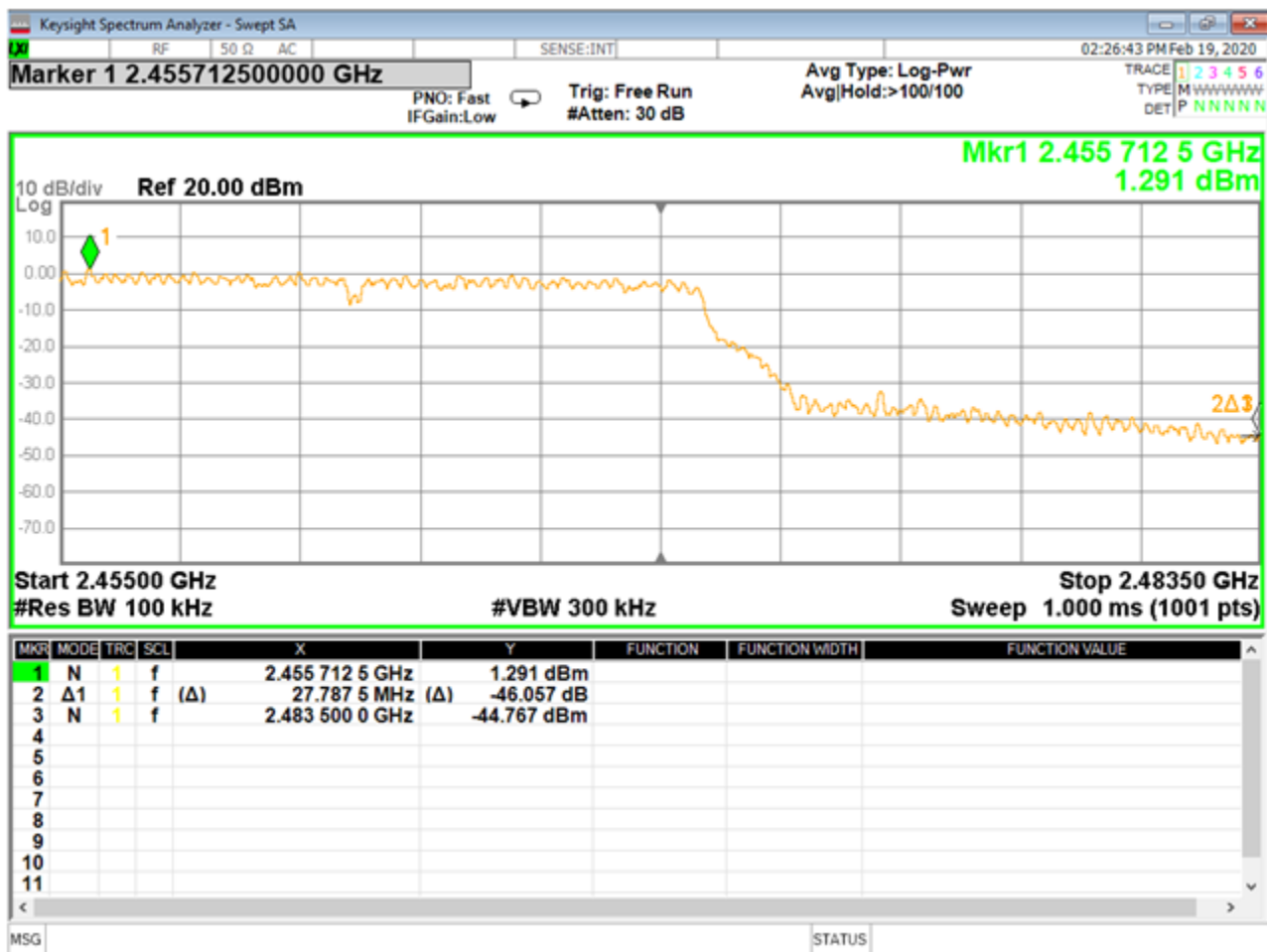
*Limit per Part 15.209 is 73.98 dBμV/m for peak and 53.98 dBμV/m for average at 3m test distance. Peak and Average Trace values are shown with corresponding limits. Tabular data for worst case frequencies shown above can be found in section 4.5.

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Prepared for:	Garmin International, Inc.		



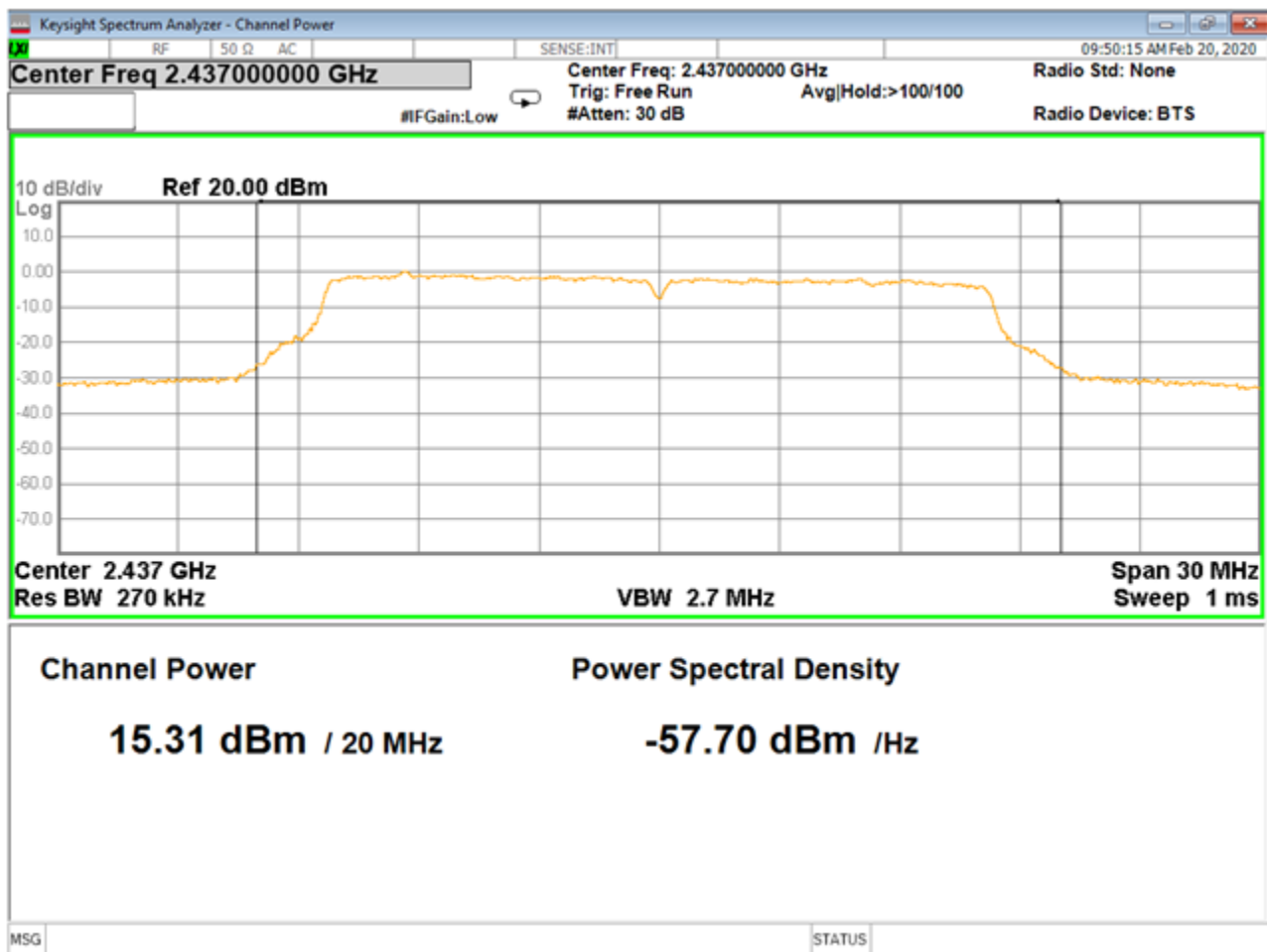
WIFI 80211 g Higher band edge unrestricted average

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



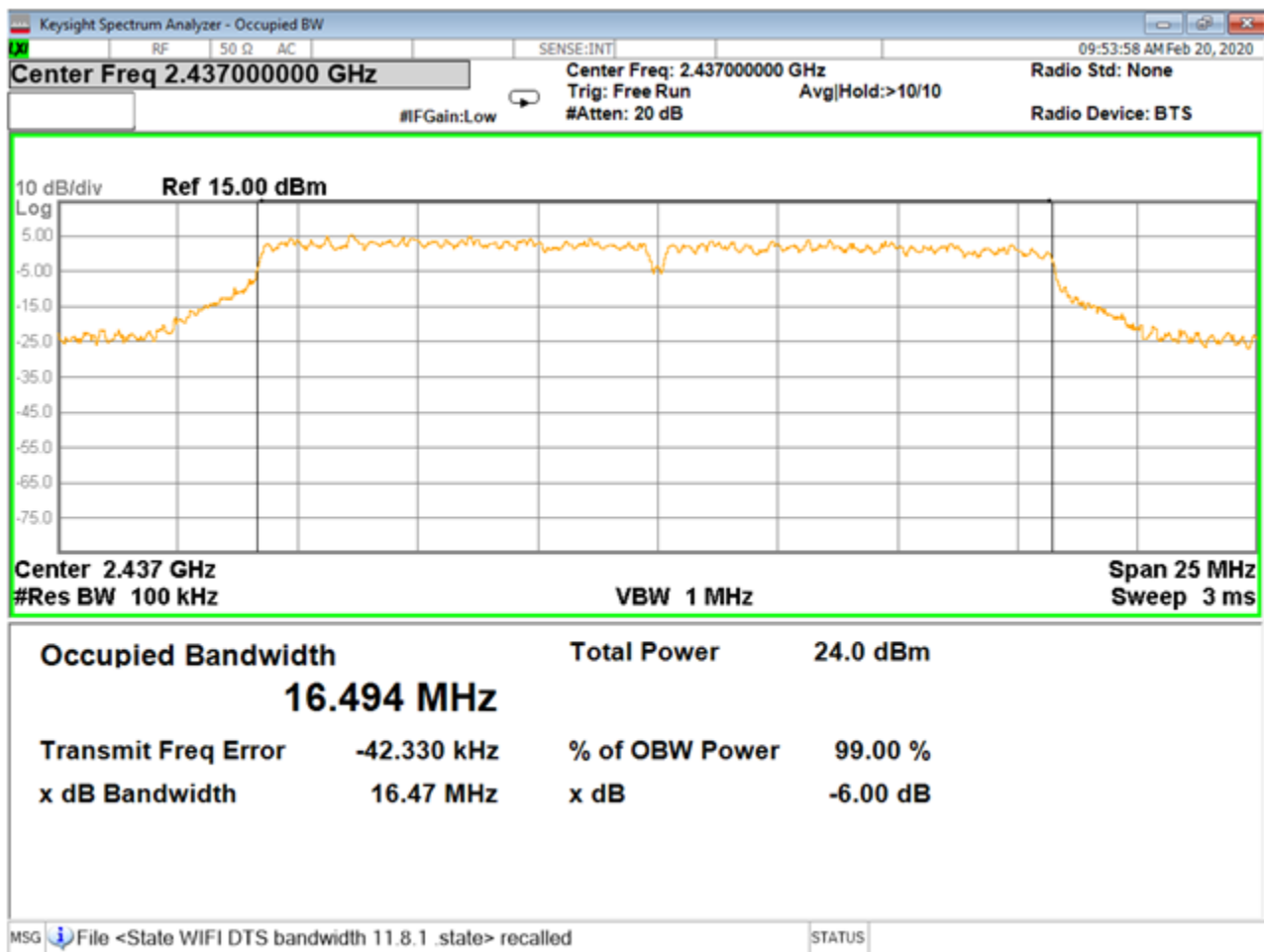
WIFI 80211 g Higher band edge unrestricted peak

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



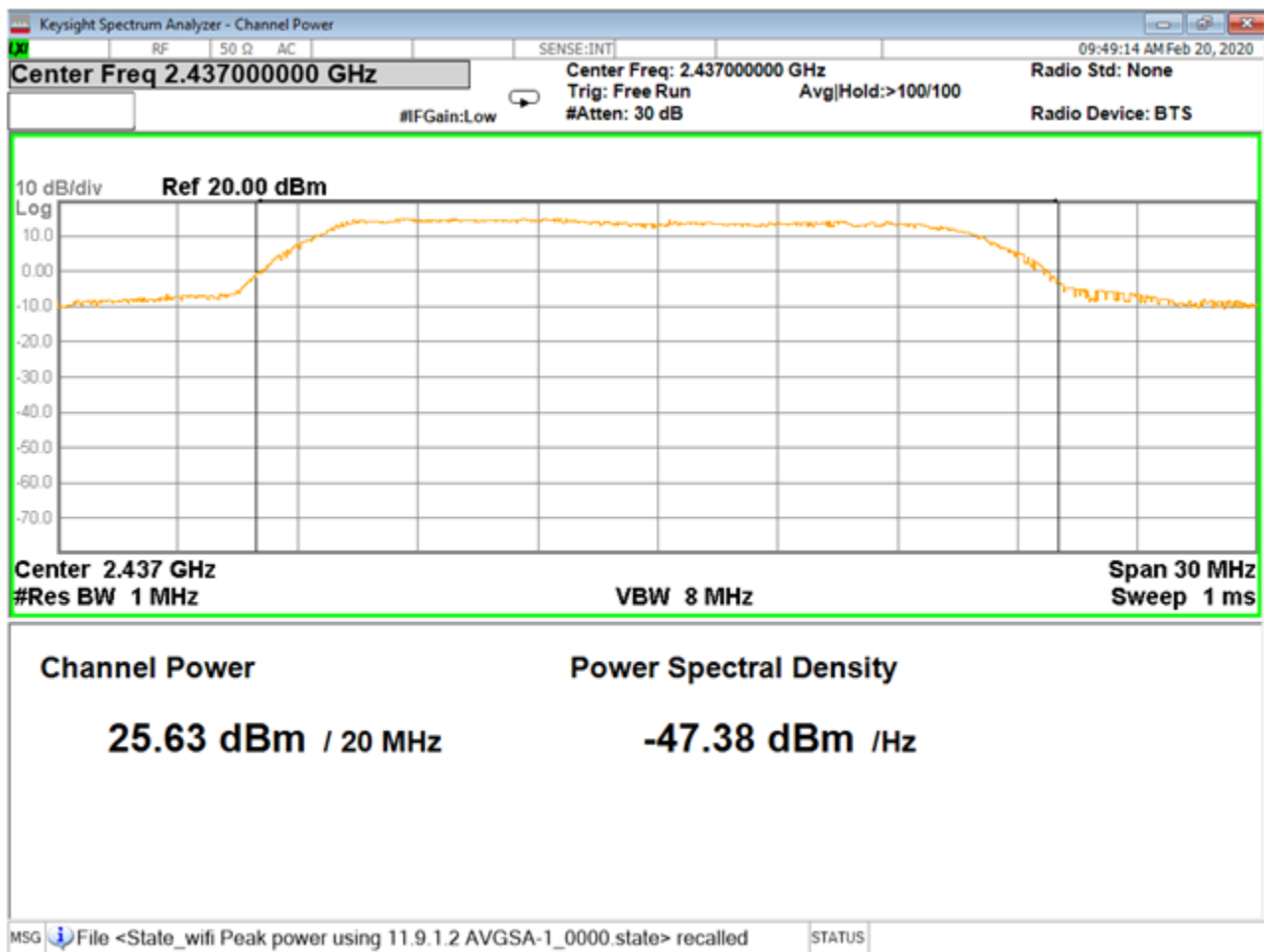
WIFI 80211 g mid channel average power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		

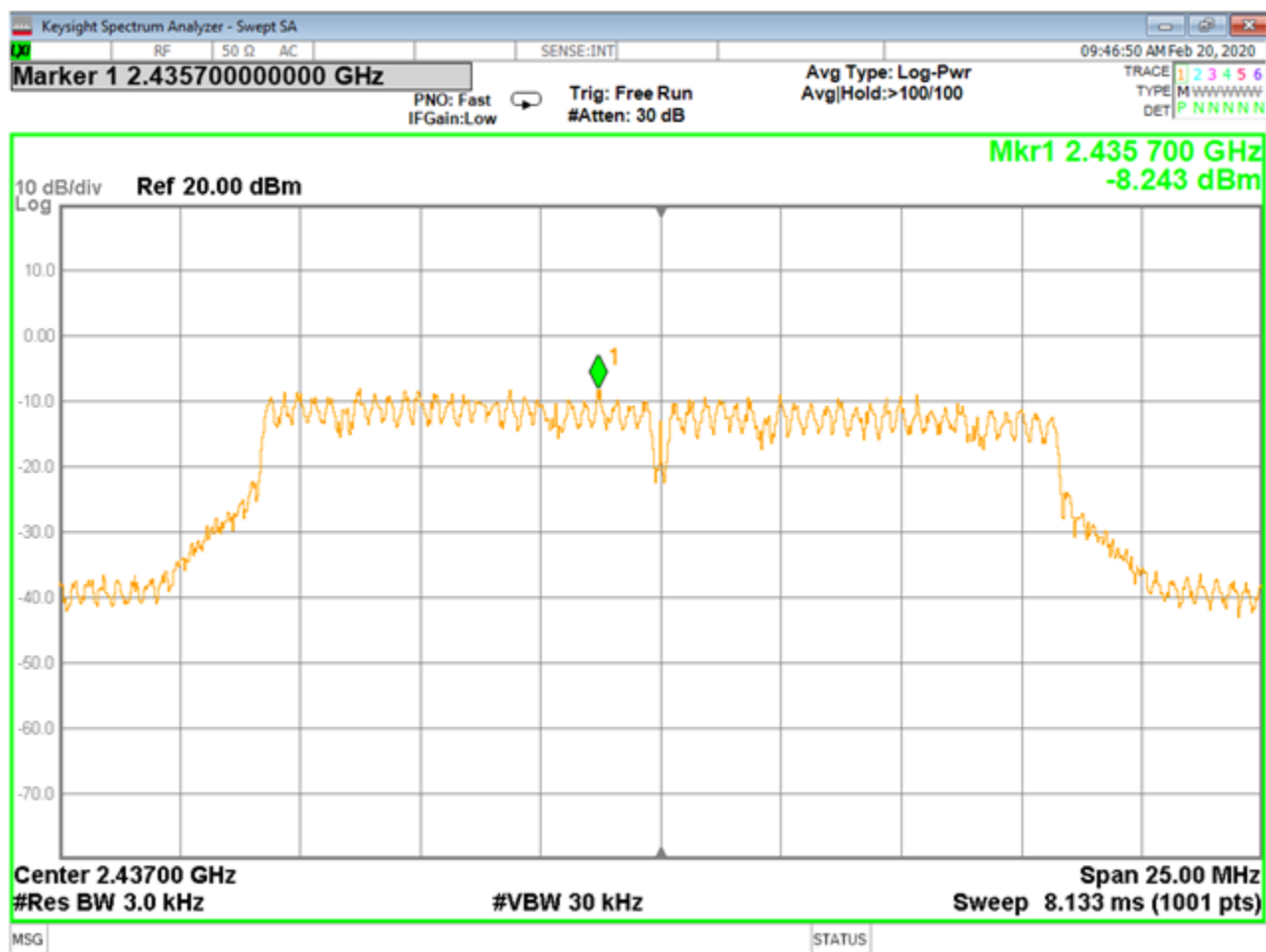


WIFI 80211 g mid channel Bandwidth

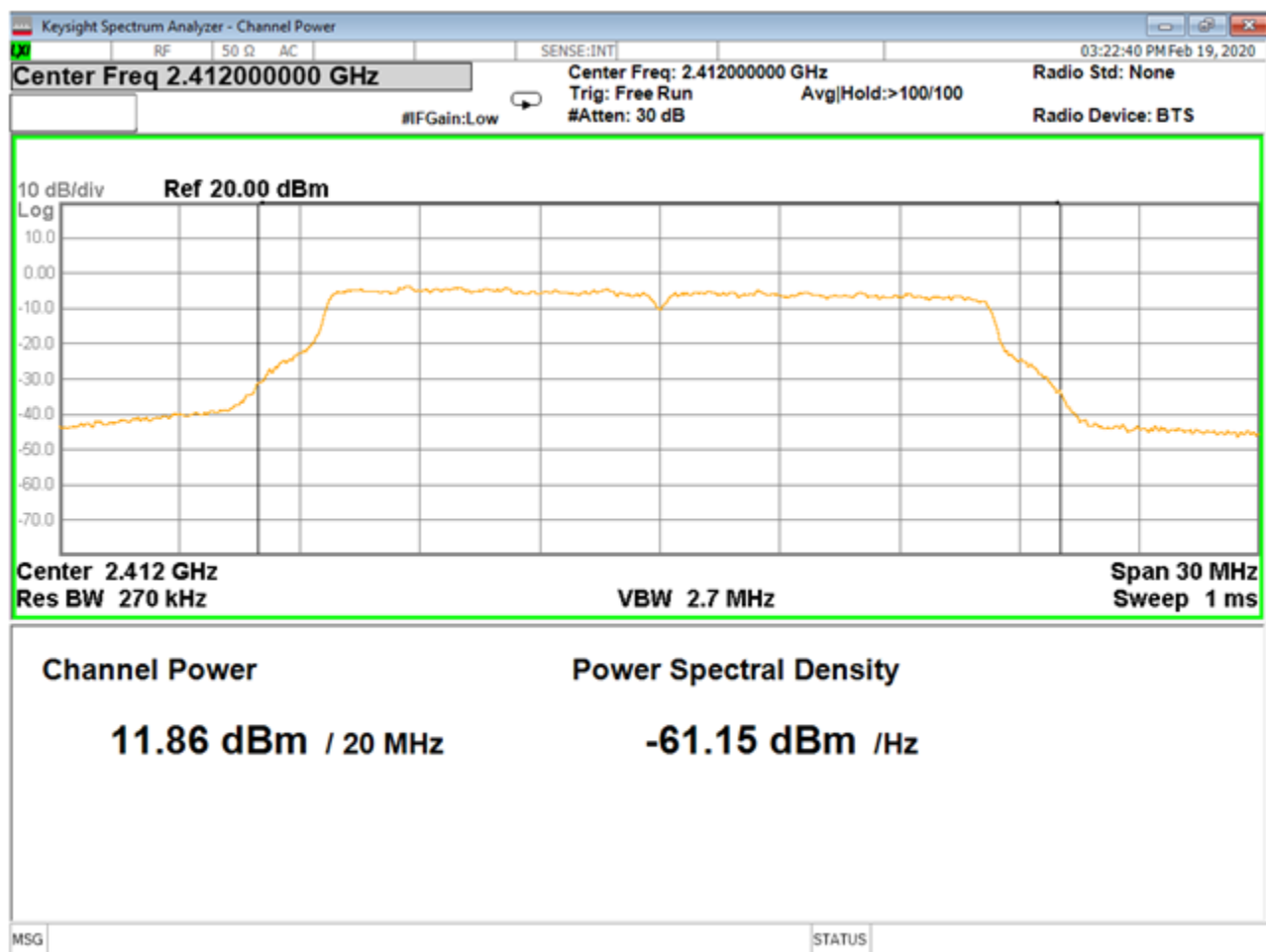
Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



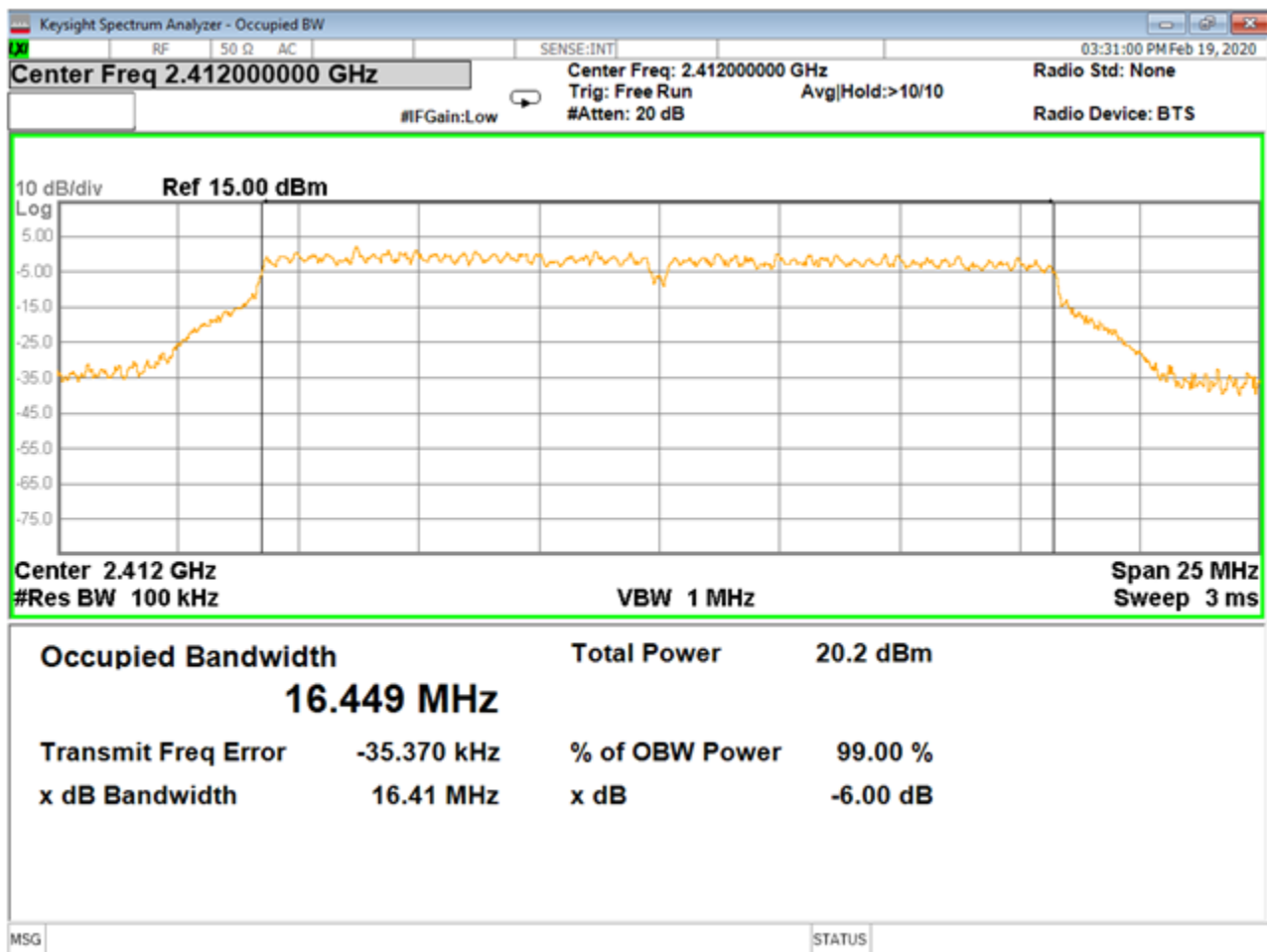
WIFI 80211 g mid channel Peak power



WIFI 80211 g mid channel PSD

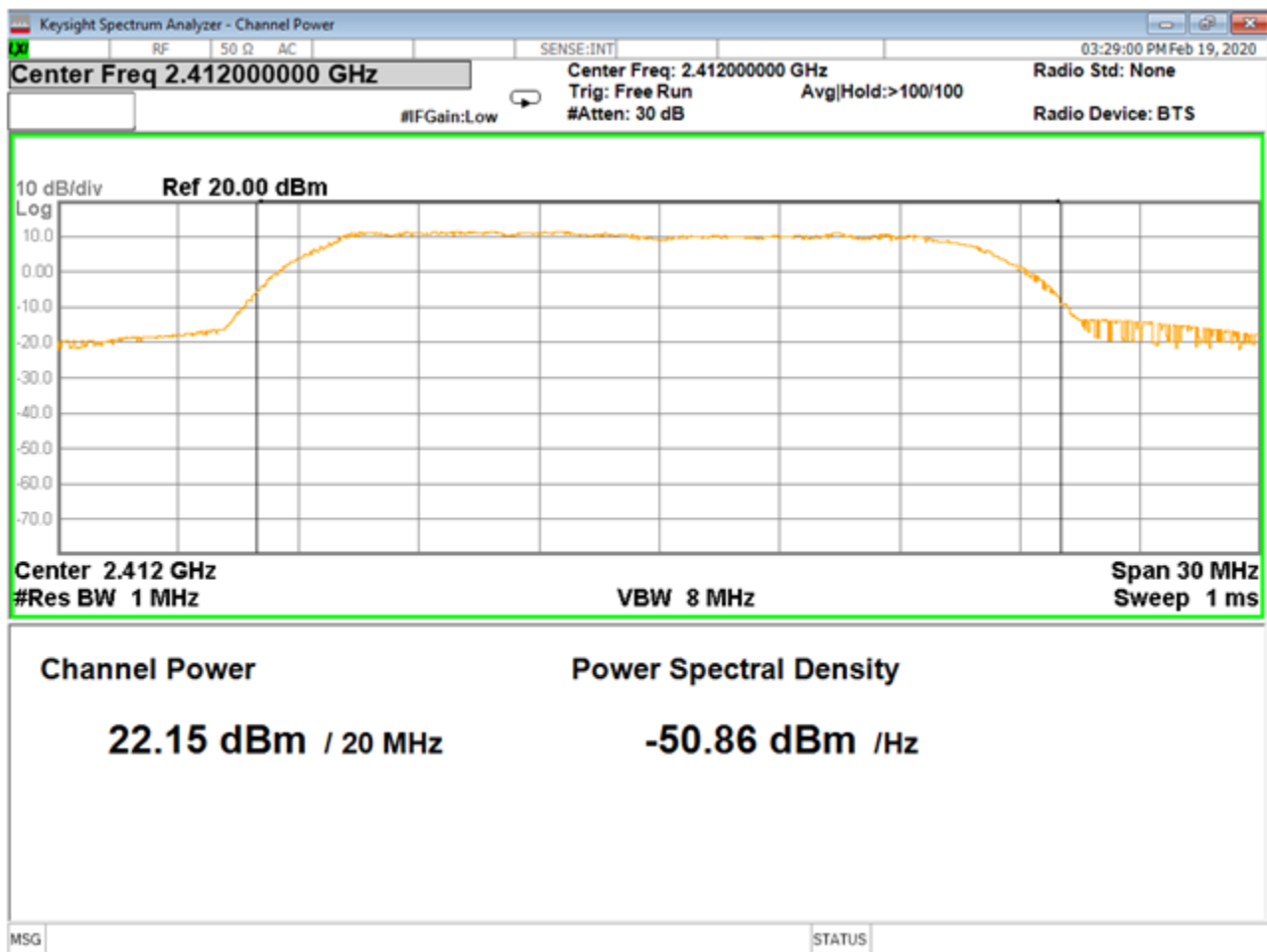


WIFI 80211 g low channel Average power



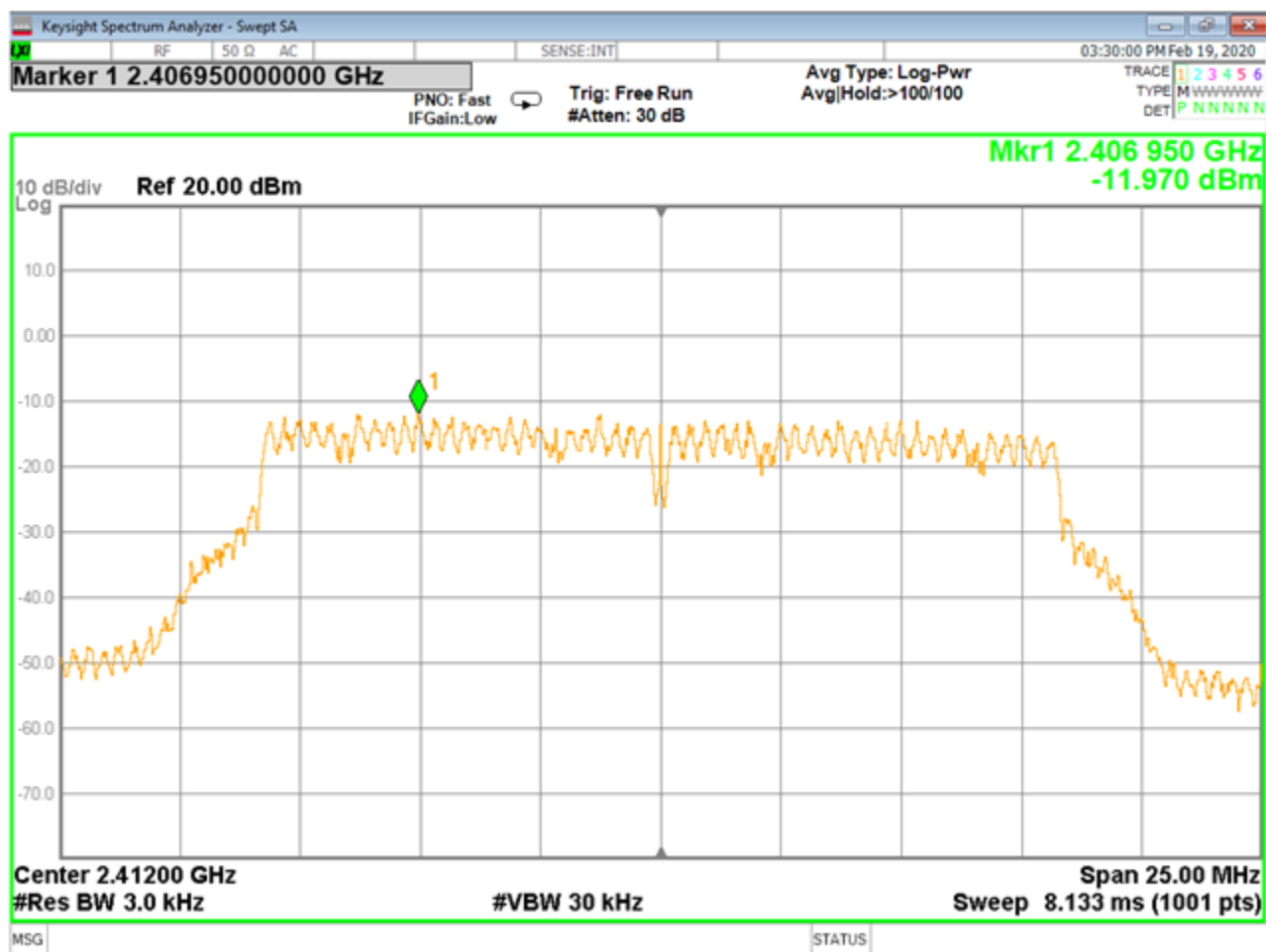
WIFI 80211 g low channel bandwidth

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



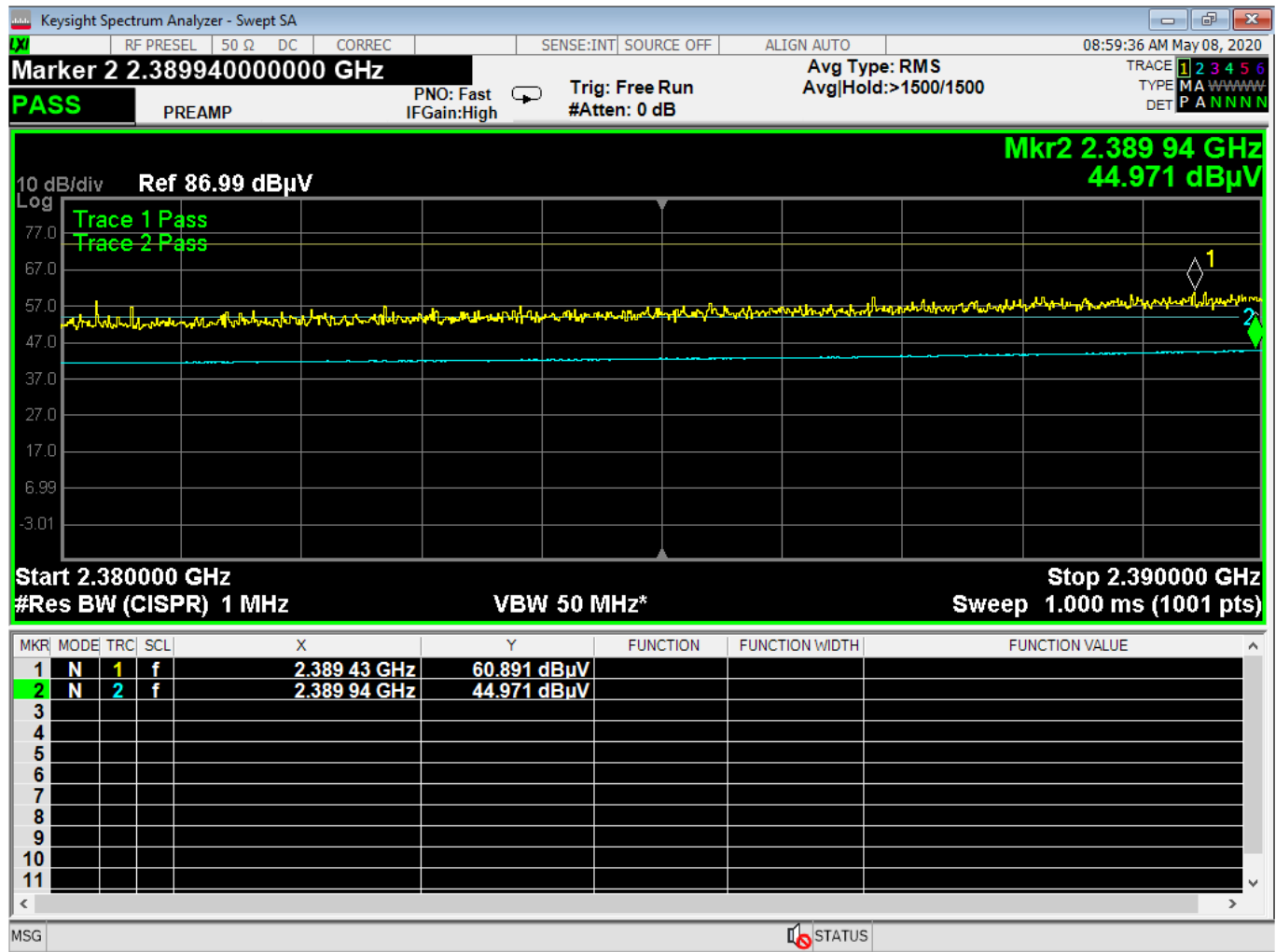
WIFI 80211 g low channel pk power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



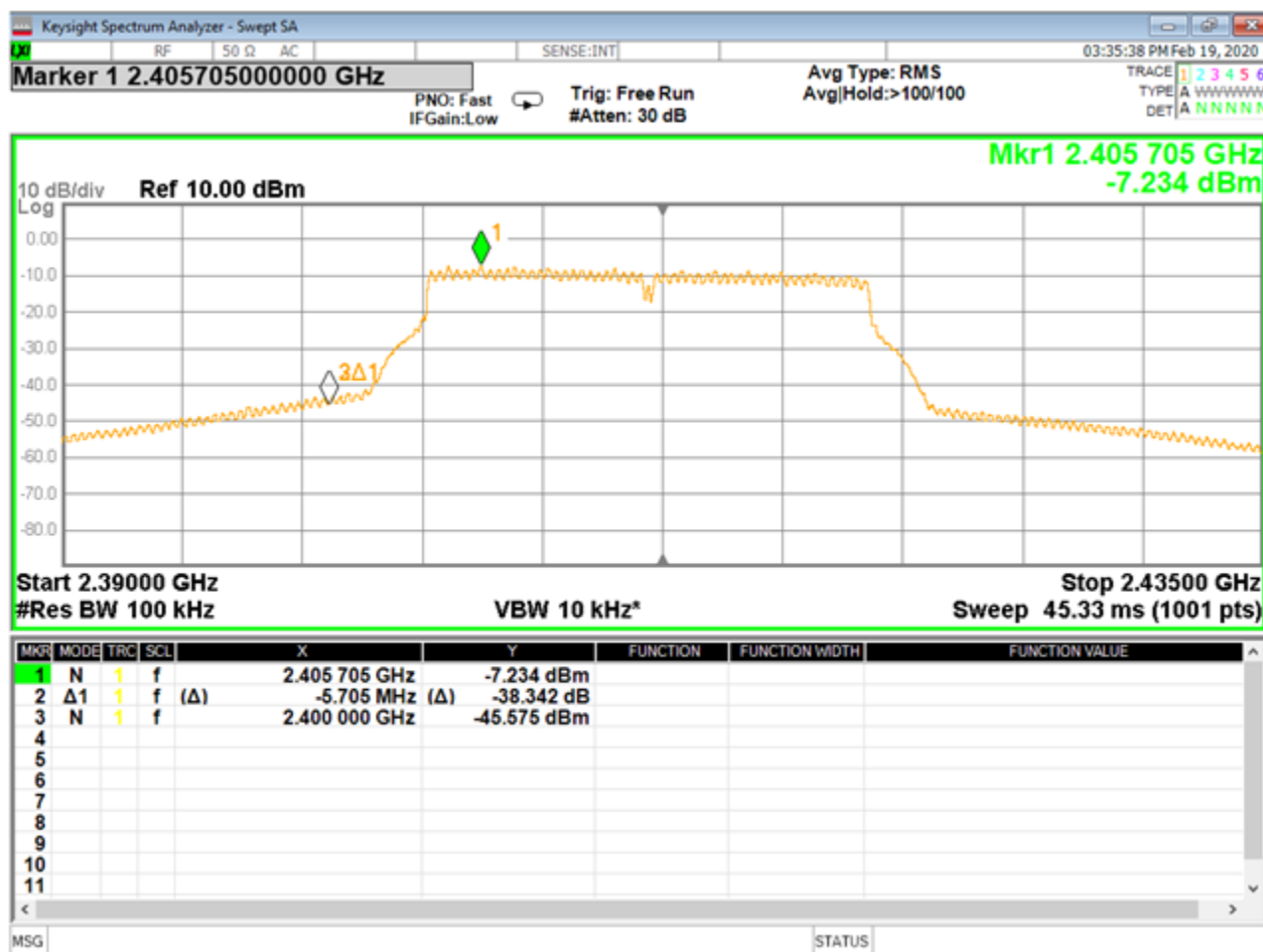
WIFI 80211 g low channel psd

	Report Number:	R20200110-20-E7	Rev	A
	Prepared for:	Garmin International, Inc.		



WIFI 80211 g 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.

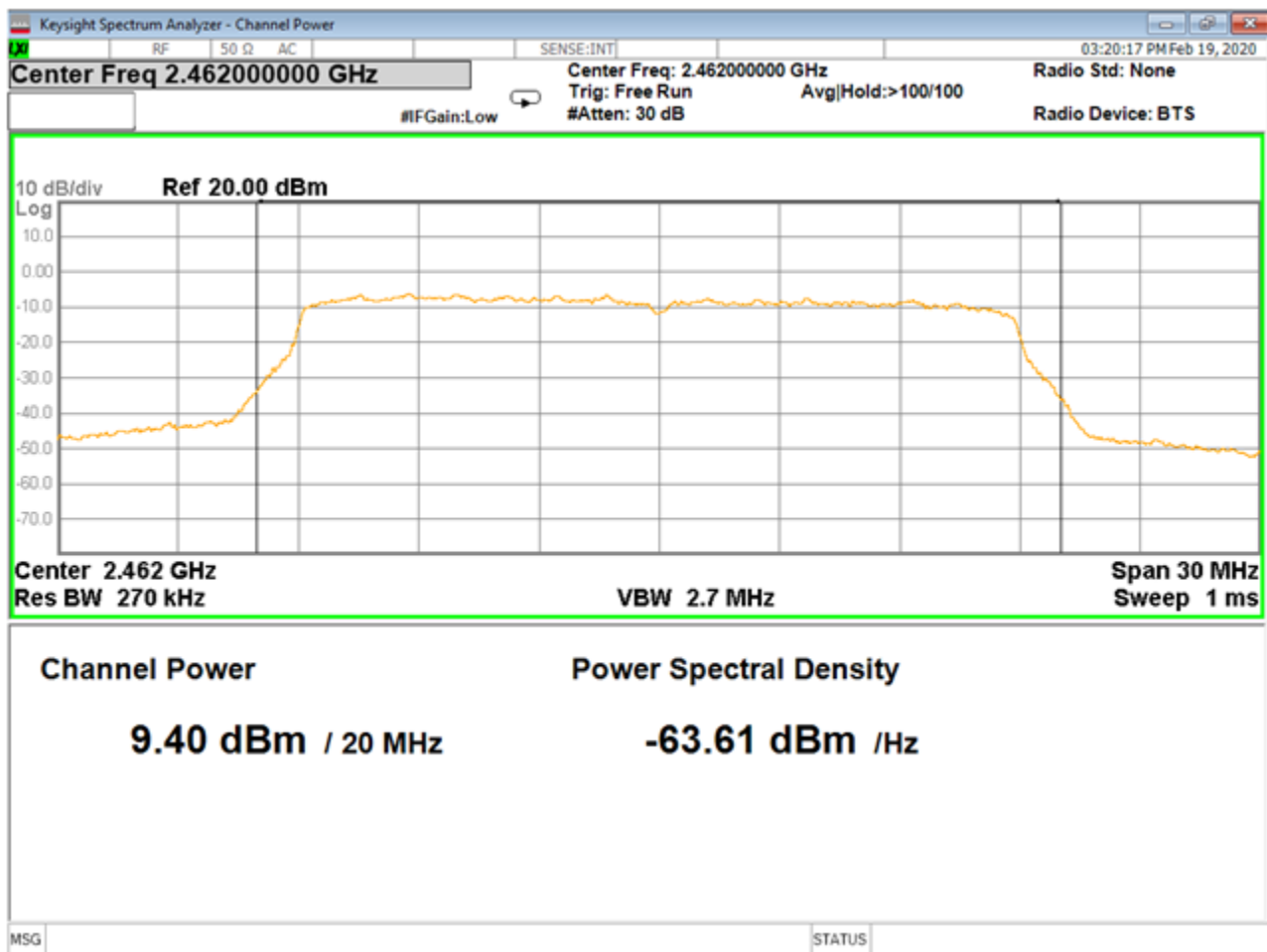


WIFI 80211 g lower band edge unrestricted Average



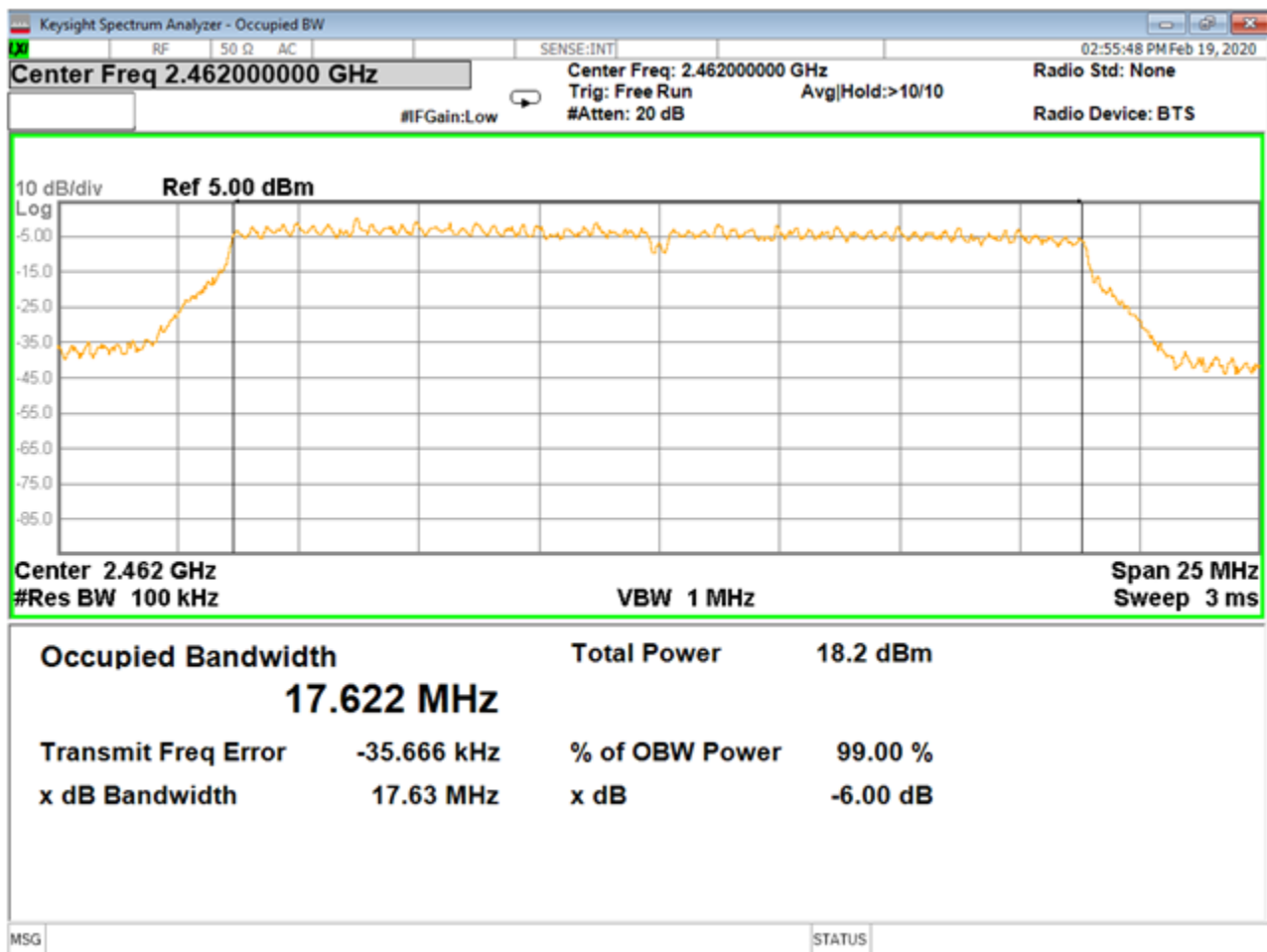
WIFI 80211 g lower band edge unrestricted peak

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



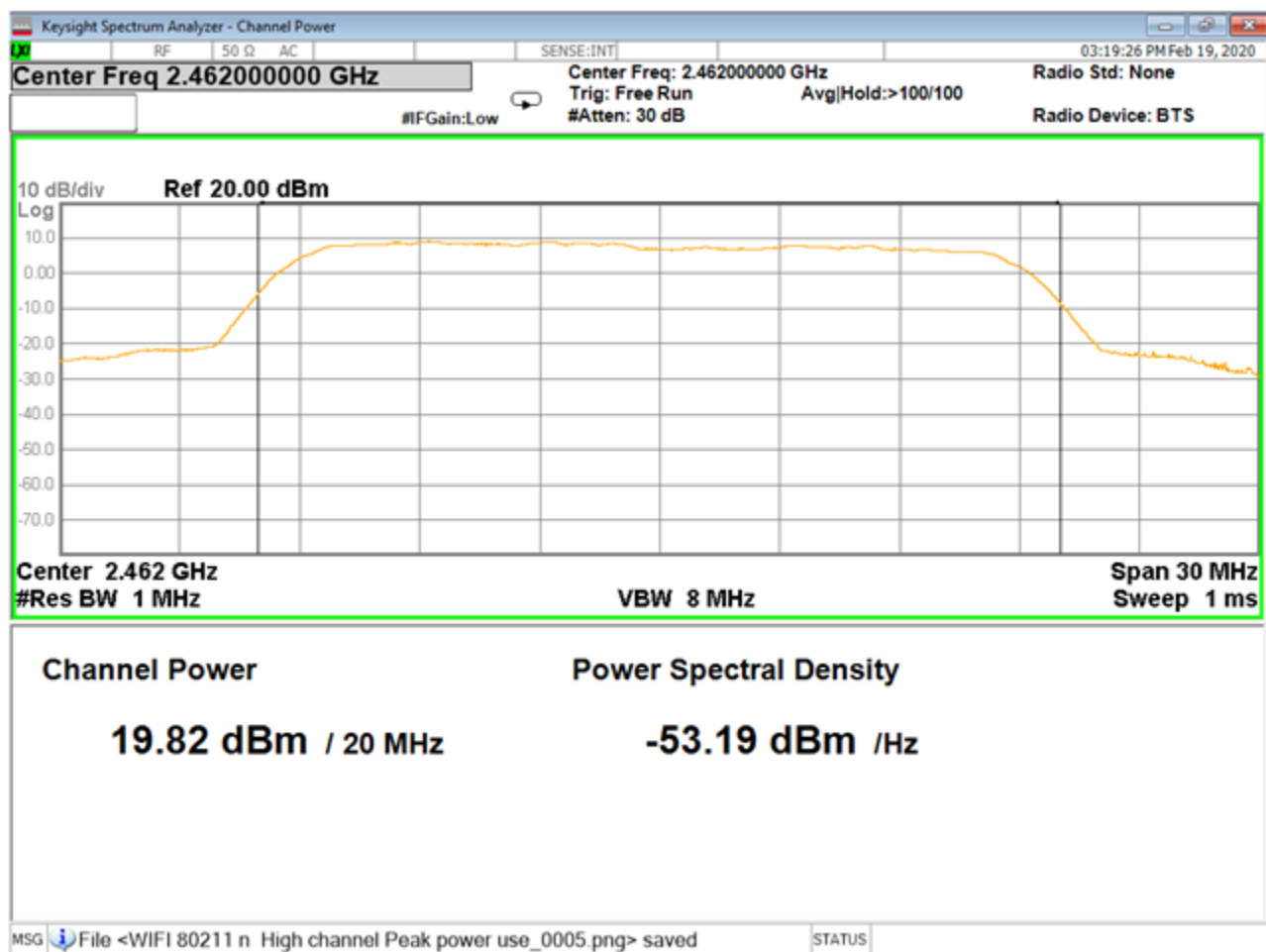
WIFI 80211 n High channel Average power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



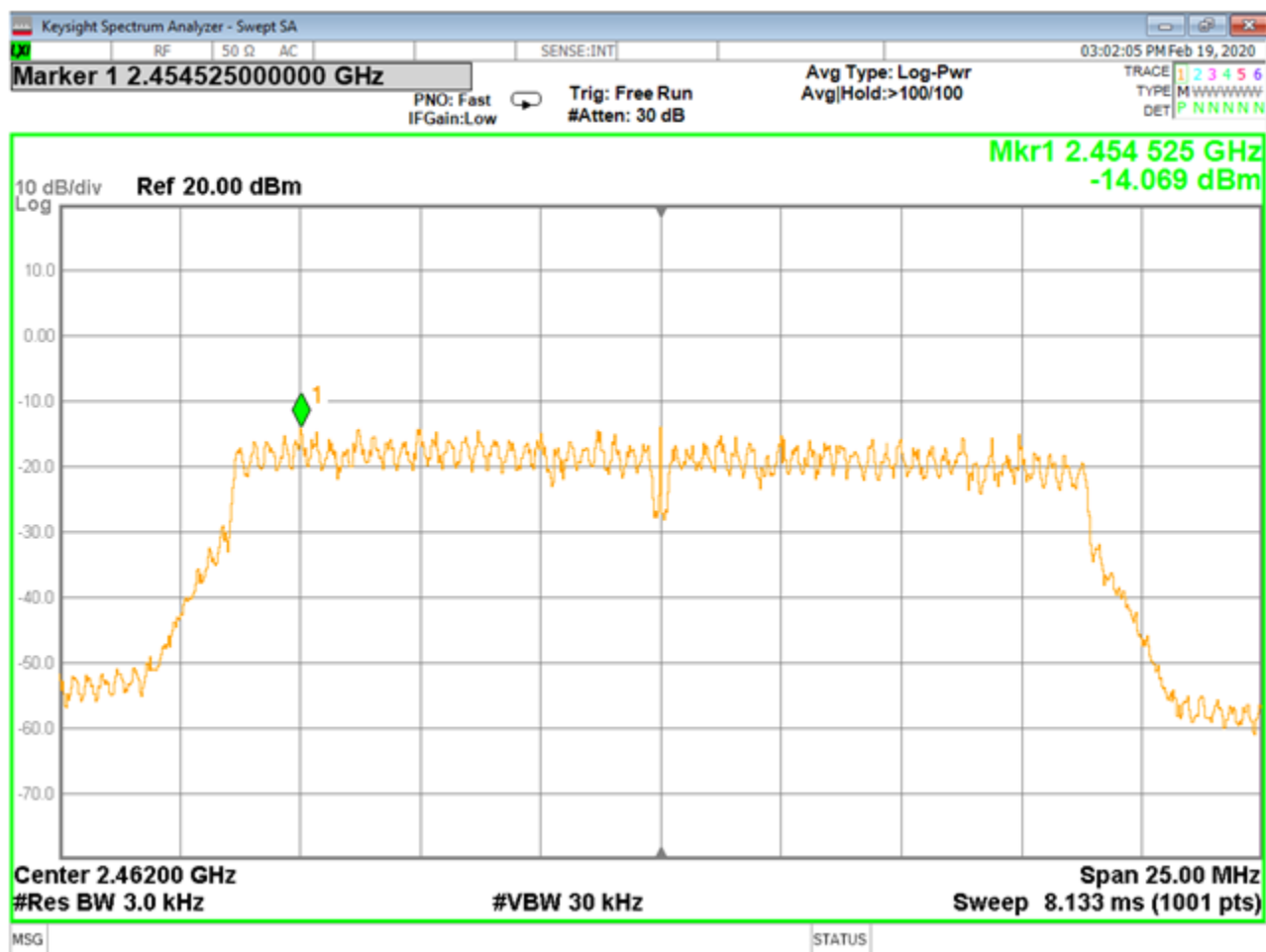
WIFI 80211 n High channel BANDWIDTH

Report Number:	R20200110-20-E7	Rev	A
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WIFI 80211 n High channel Peak power

Report Number:	R20200110-20-E7	Rev	A
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WIFI 80211 n High channel PSD

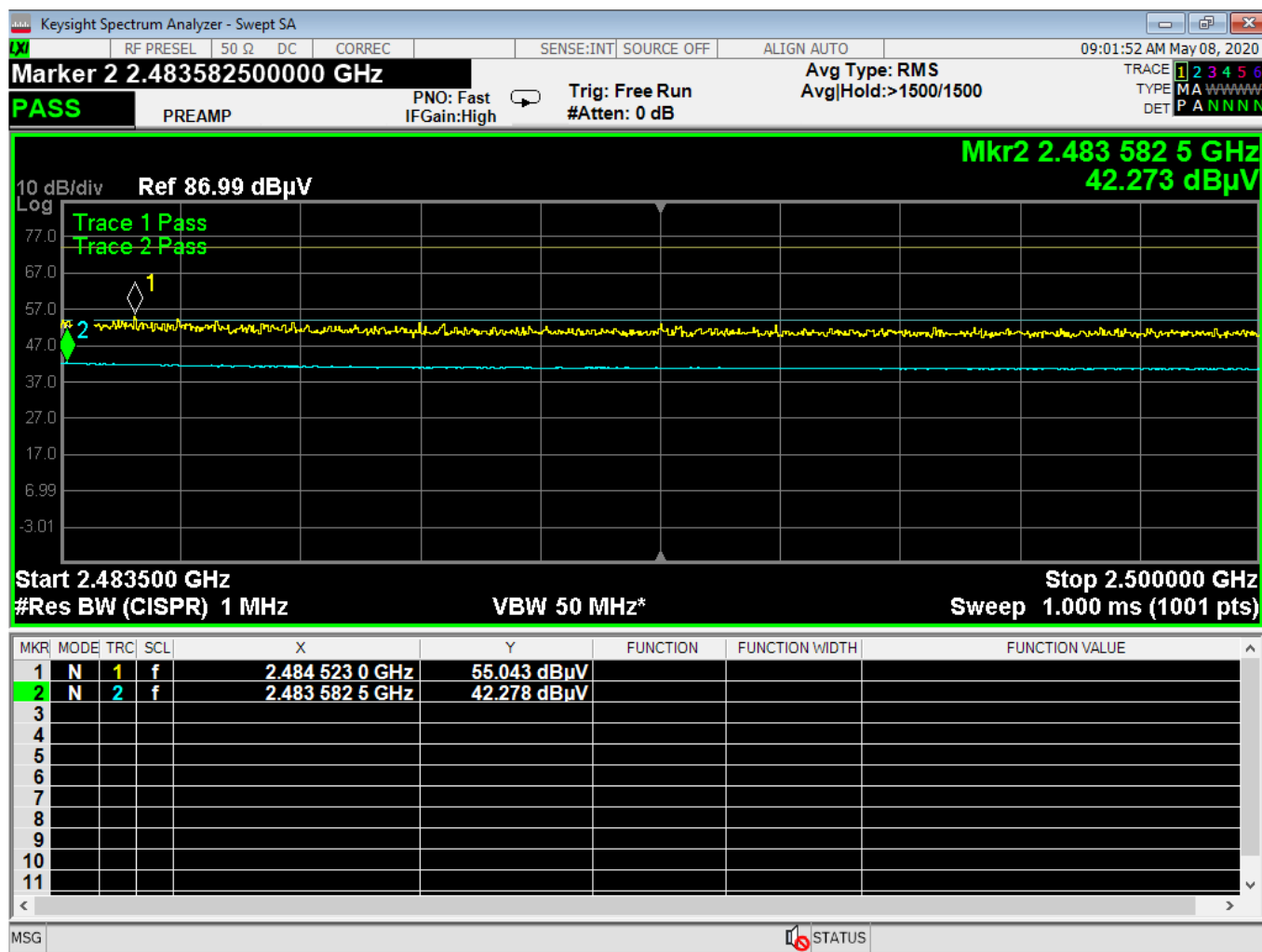


Report Number: R20200110-20-E7

Rev

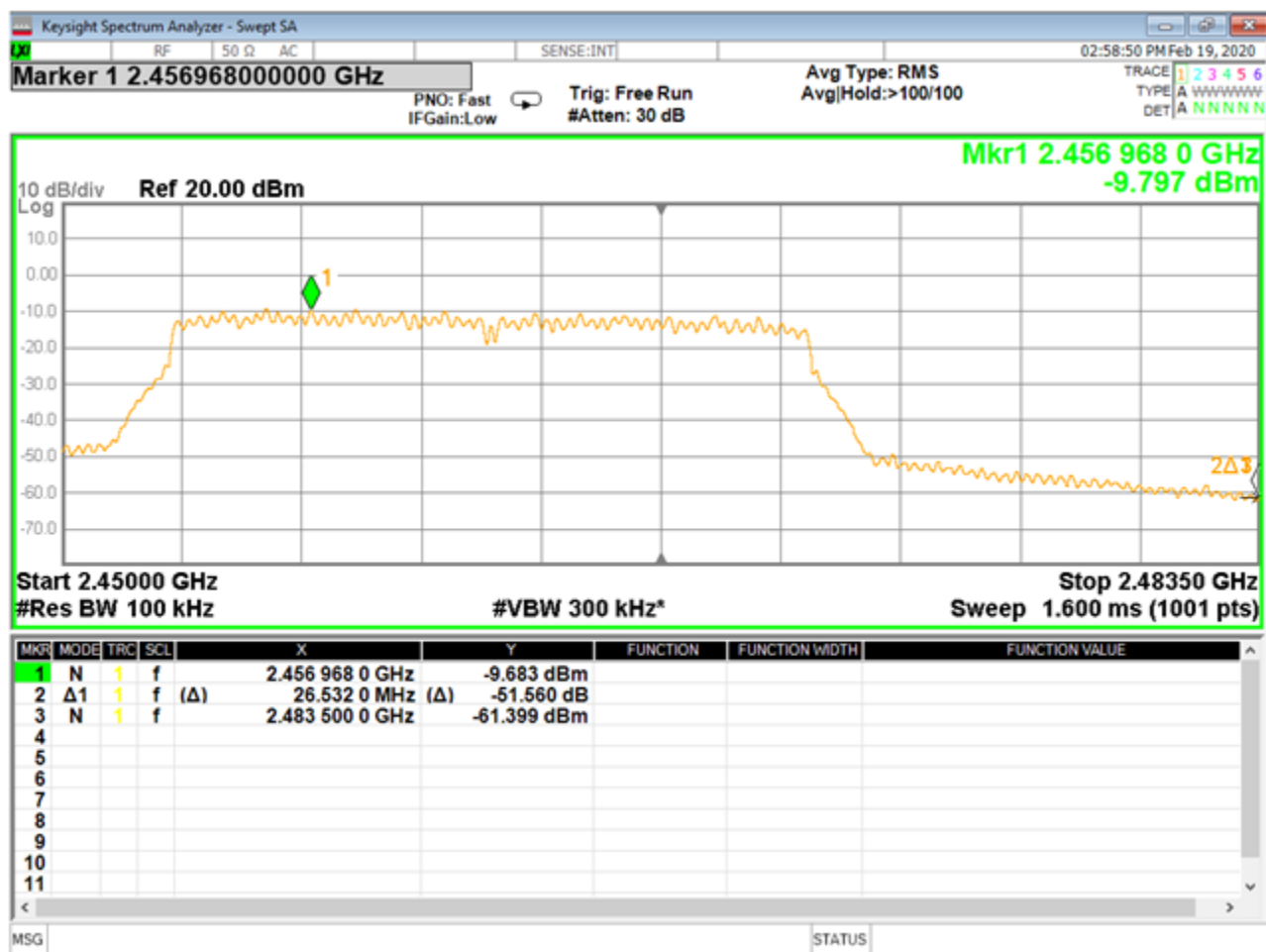
A

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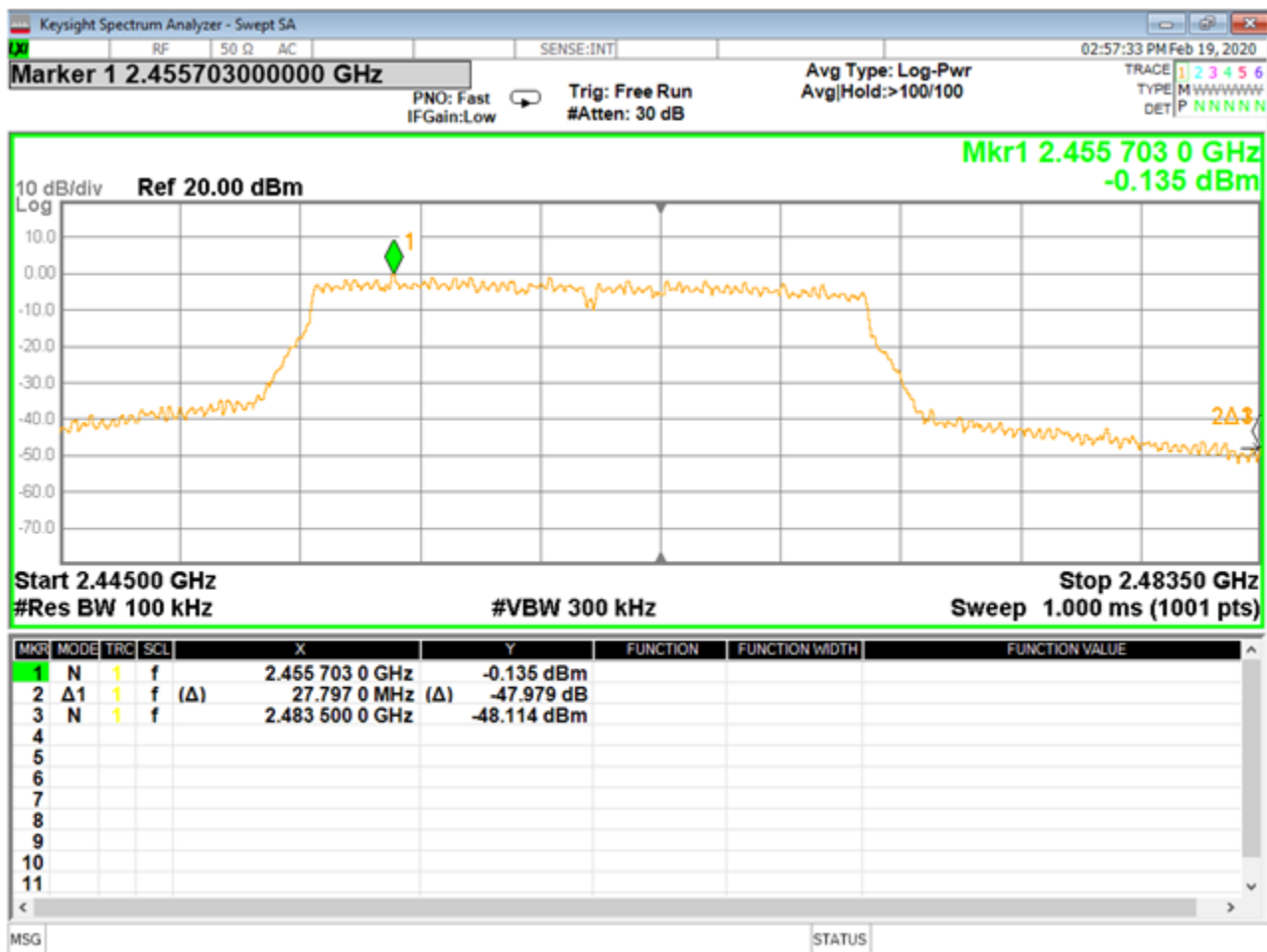


WIFI 80211 n High channel restricted band edge

*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.

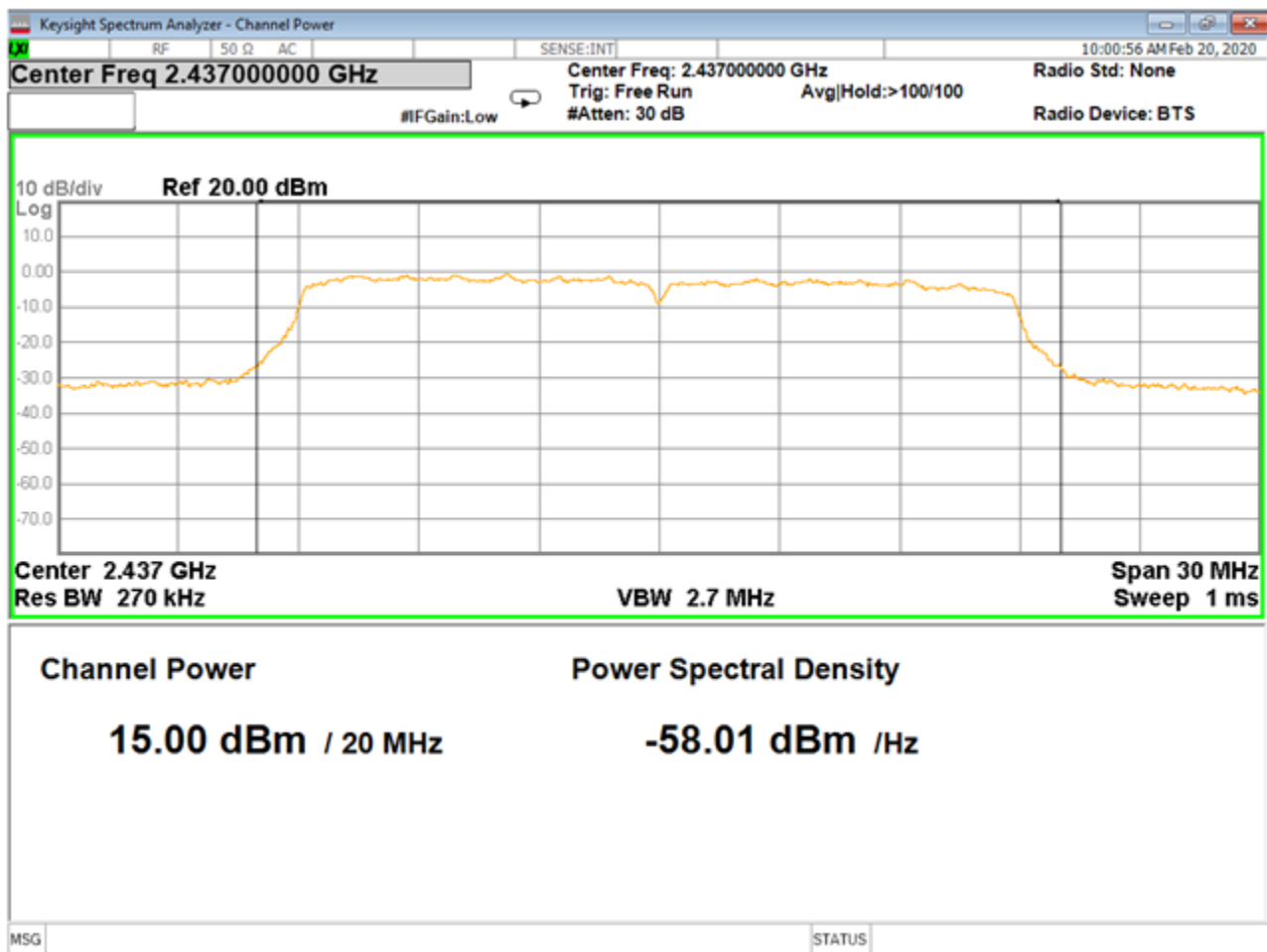


WIFI 80211 n High channel unrestricted average band edge



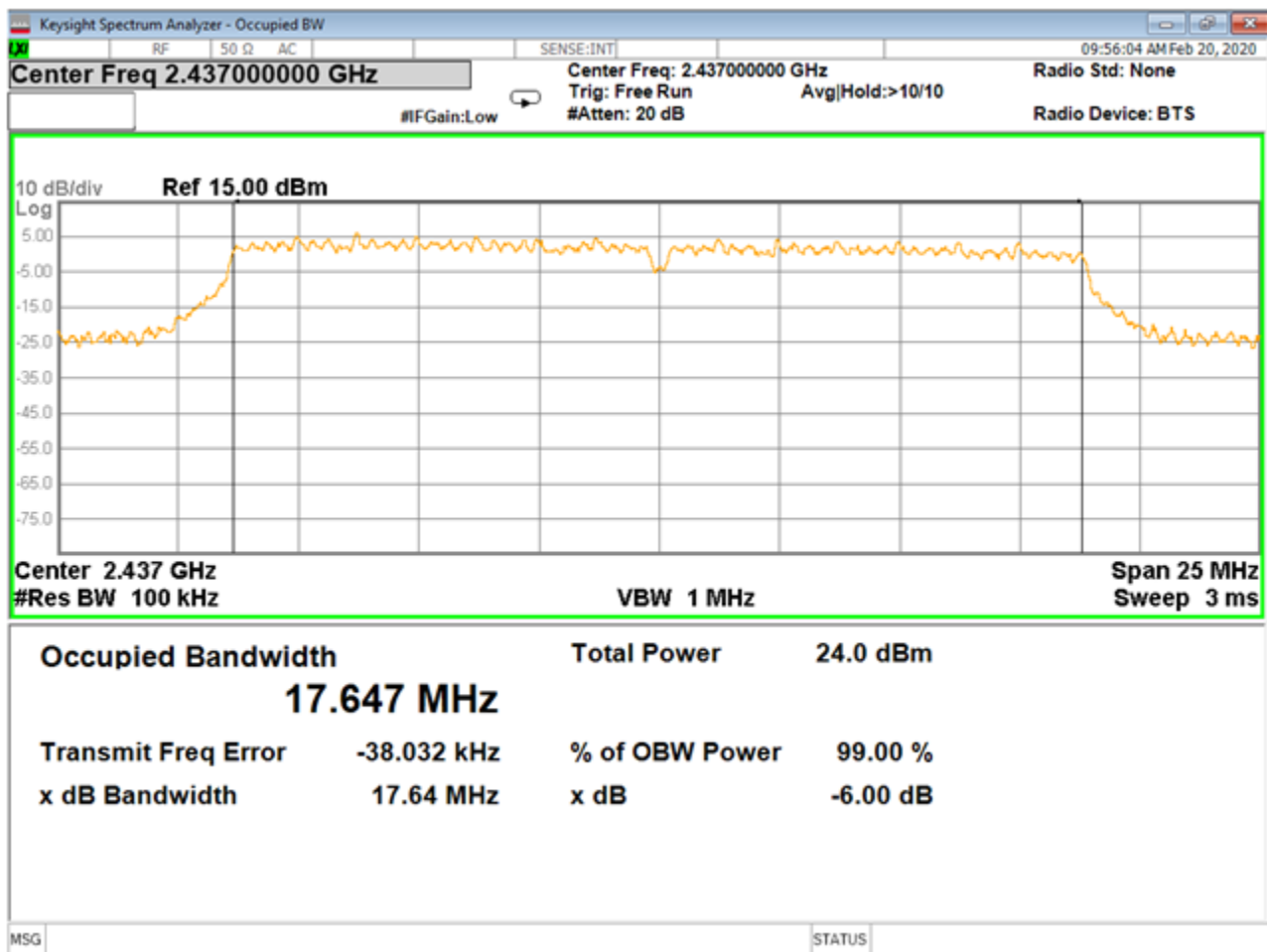
WIFI 80211 n High channel unrestricted peak band edge

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



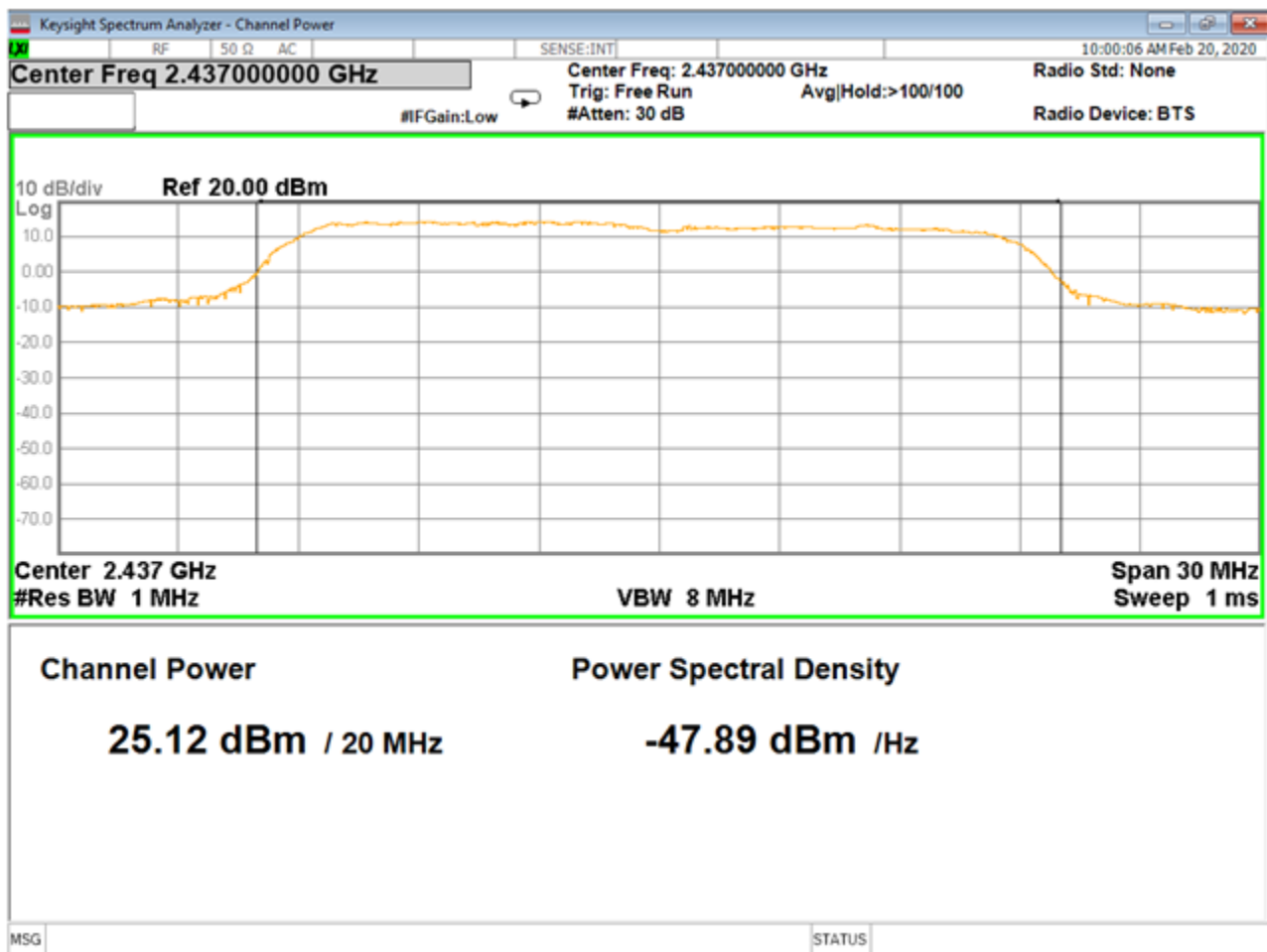
WIFI 80211 n mid channel Average power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



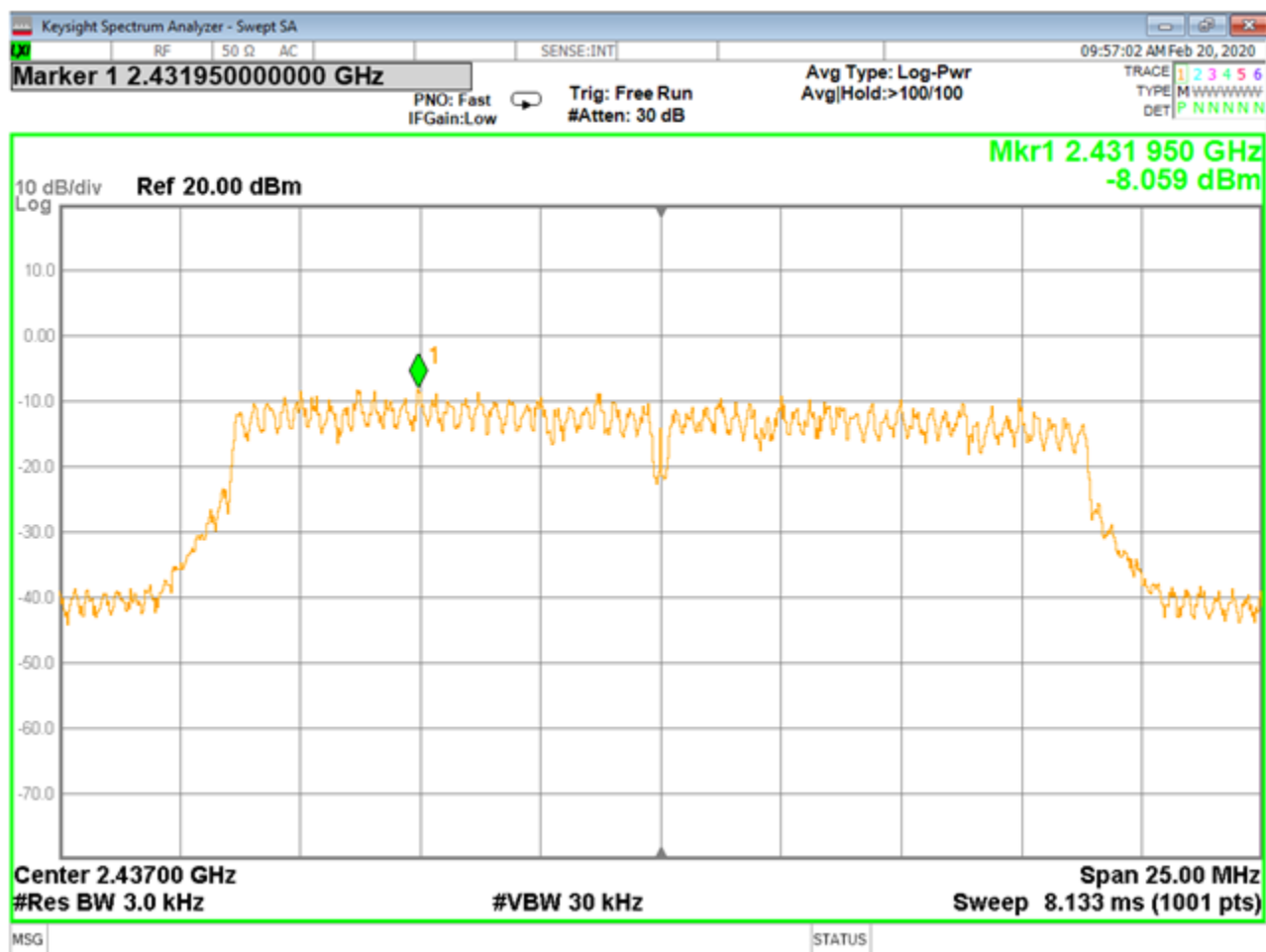
WIFI 80211 n mid channel bandwidth

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



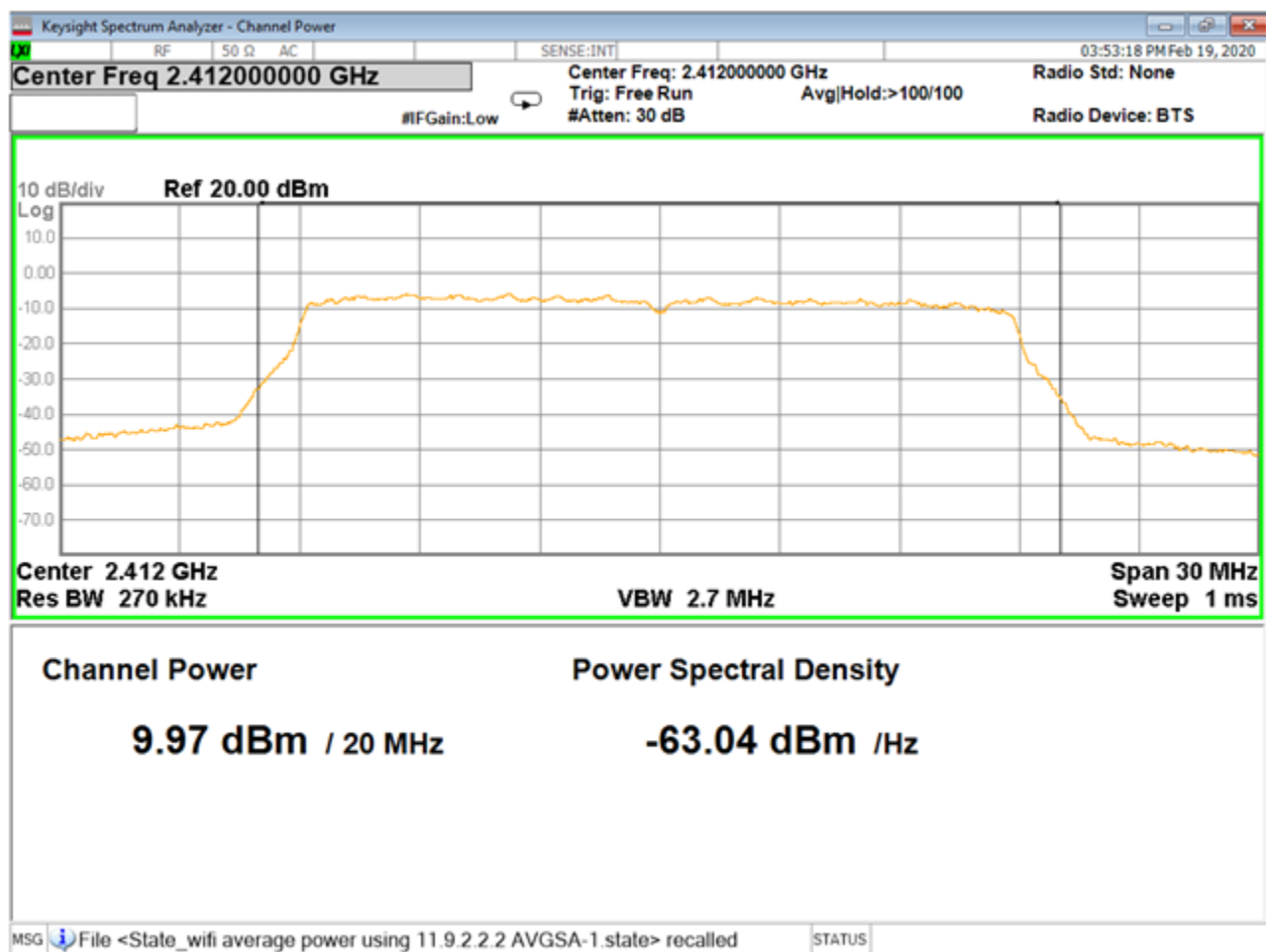
WIFI 80211 n mid channel Peak power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



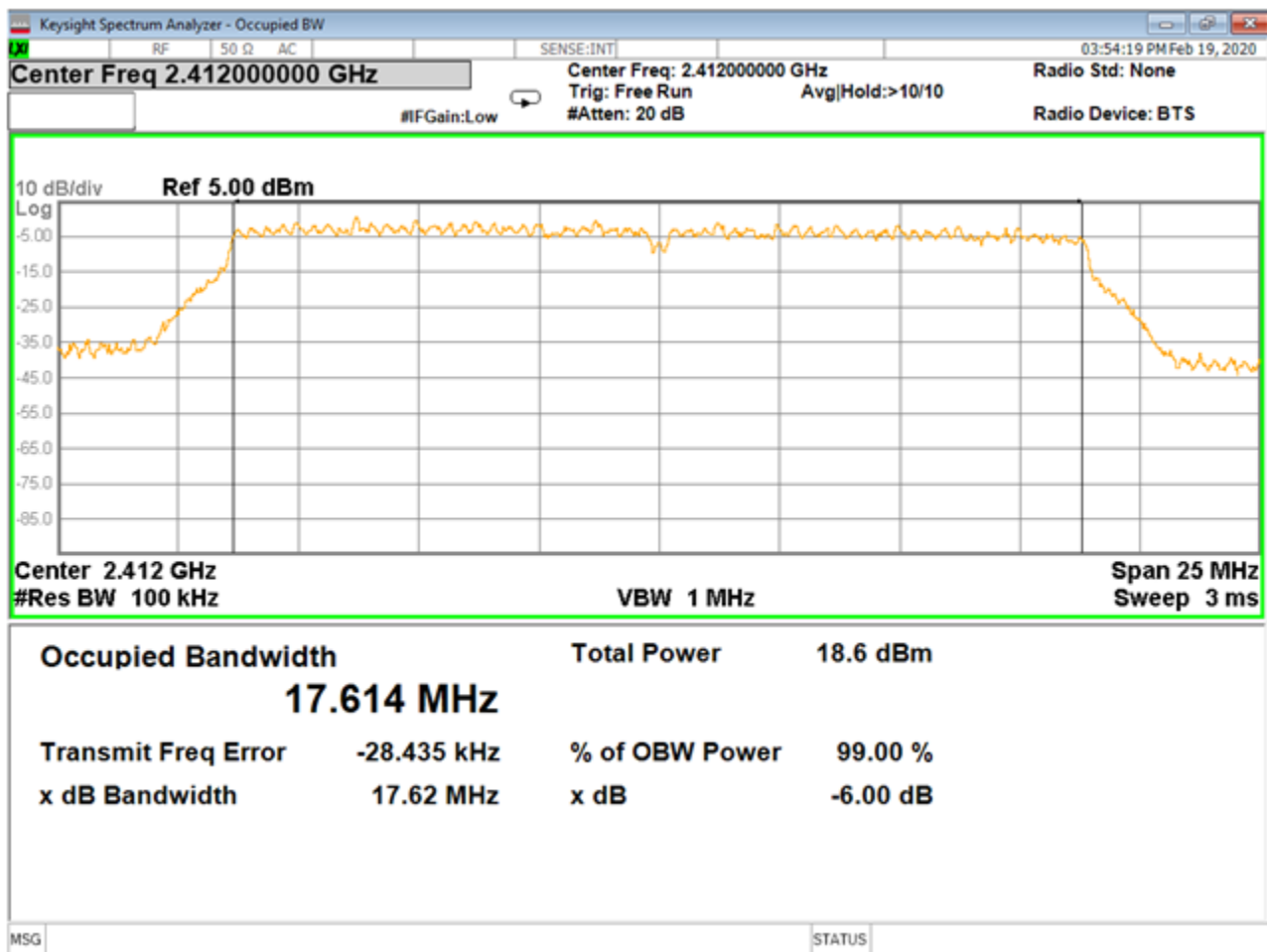
WIFI 80211 n mid channel PSD

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



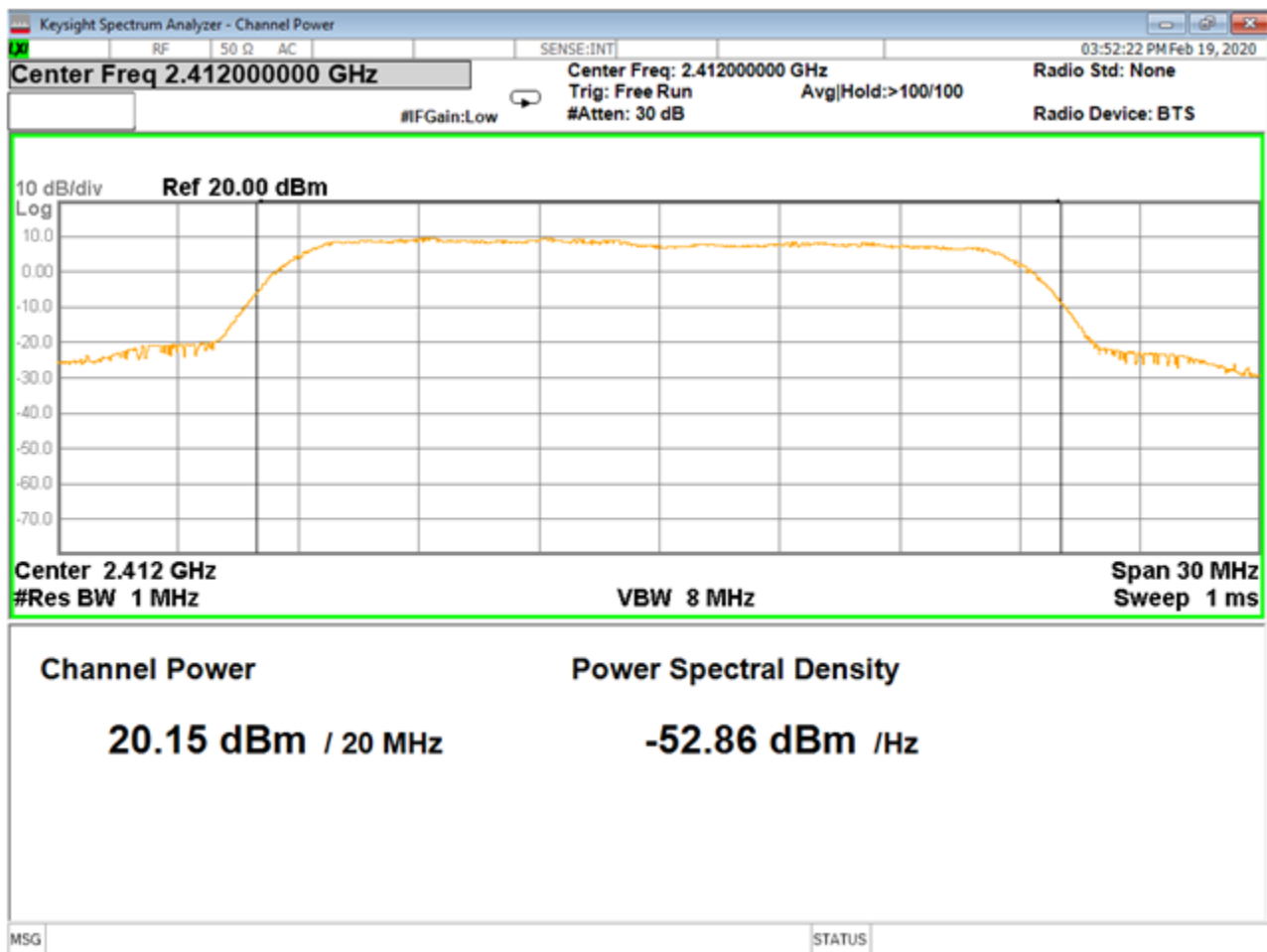
WIFI 80211 n low ch avg power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



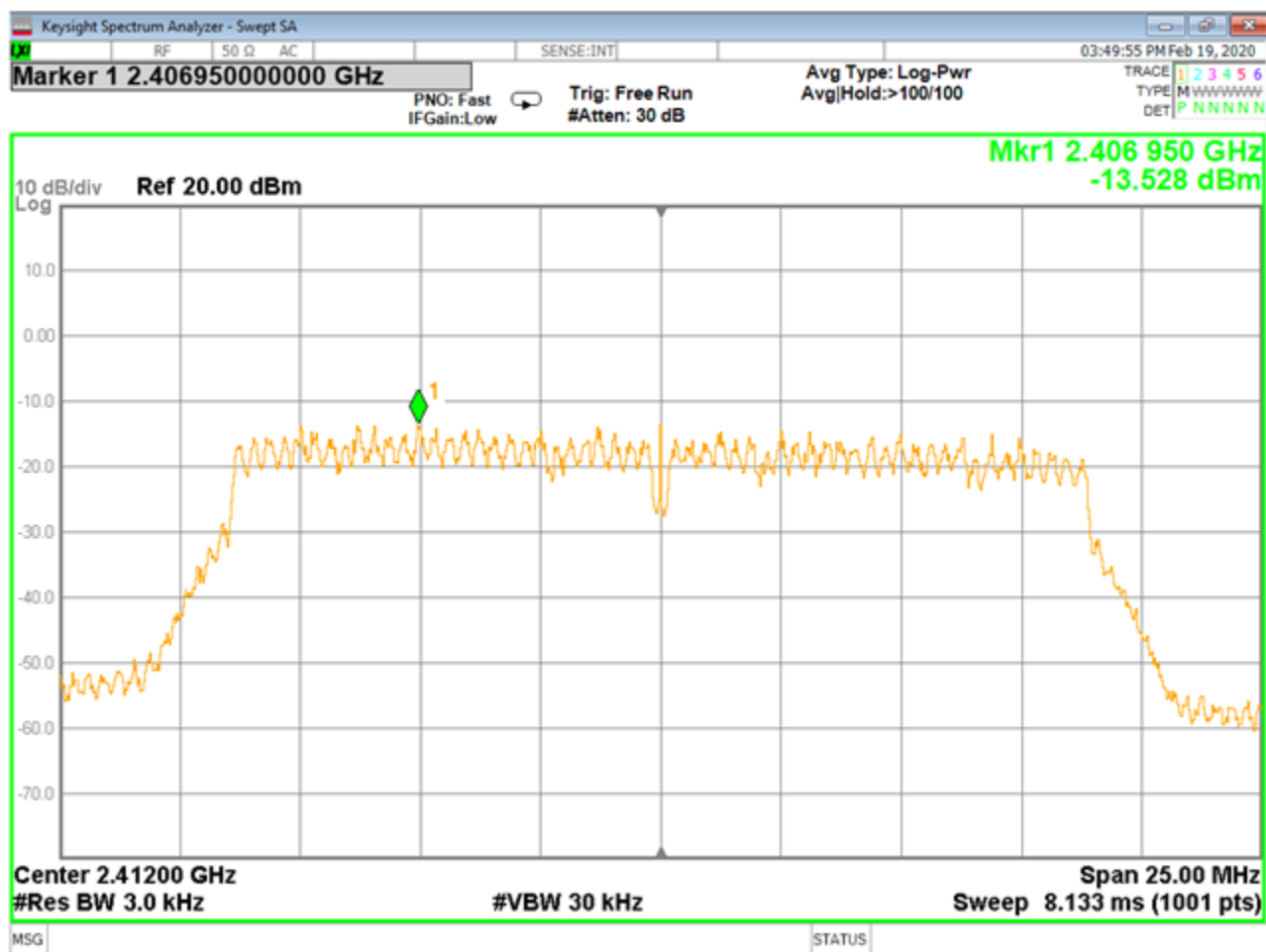
WIFI 80211 n low ch bandwidth

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



WIFI 80211 n low ch Peak power

Report Number:	R20200110-20-E7	Rev	A
Prepared for:	Garmin International, Inc.		



WIFI 80211 n low ch PSD

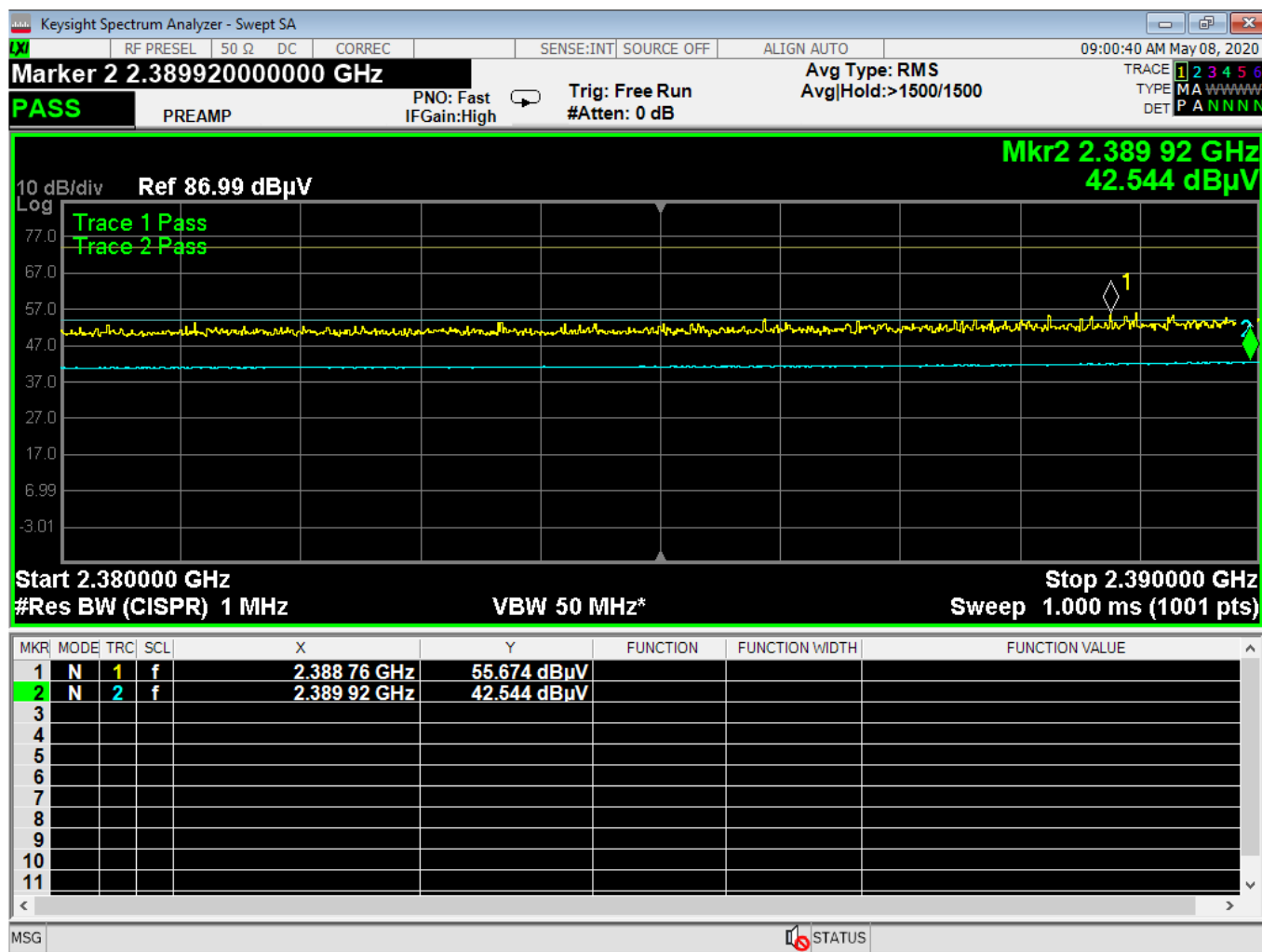


Report Number: R20200110-20-E7

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A

Prepared for: Garmin International, Inc.

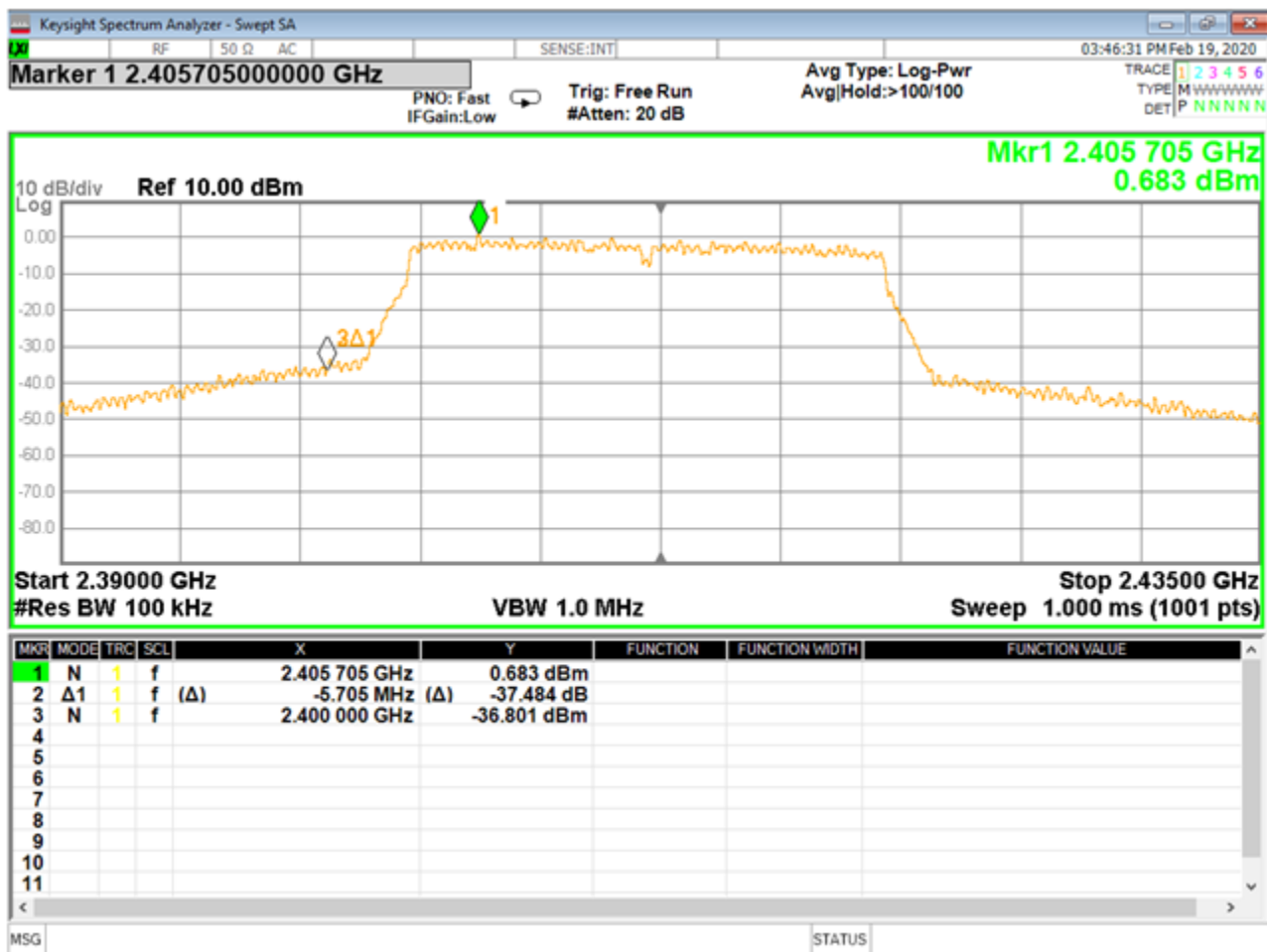


WIFI 80211 n lower band edge restricted

*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.



WIFI 80211 n lower band edge unrestricted Average



WIFI 80211 n lower band edge unrestricted Peak



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REPORT END