

Test Report

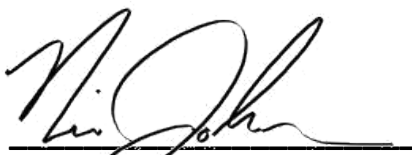
Prepared for: Inovonics

Address: 397 S. Taylor Ave.
Louisville, CO 80027

Product: EN 1248

Test Report No: R20210105-20-E3B

Approved by:



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DATE: 4 August 2021

Total Pages: 39

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Report Number:	R20210105-20-E3	Rev	B
Prepared for:	Inovonics		

REVISION PAGE

Rev. No.	Date	Description
0	26 February 2021	Original –KVepuri Prepared by KVepuri, FLane
A	26 May 2021	Updated power, harmonic, and band edge measurements
B	3 August 2021	Added note to 20dB BW measurement plots Duty cycle rounded up to 22% and calculations were updated. Added note to page 112 regarding testing of hopping and non-hopping modes.

	Report Number:	R20210105-20-E3	Rev	B
	Prepared for:	Inovonics		

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	6
2.3 Description of support units.....	6
3.0 Laboratory description.....	7
3.1 Laboratory description.....	7
3.2 Test personnel.....	7
3.3 Test equipment.....	8
3.4 GENERAL TEST PROCEDURE AND SETUP FOR RADIO MEASUREMNTS	9
4.0 Detailed results.....	10
4.1 Duty Cycle	11
4.2 Radiated emissions.....	12
4.3 Peak Output Power	18
4.4 Bandwidth.....	19
4.5 Bandedges	20
4.6 Carrier frequency seperation, number of hopping channels, time of occupancy	21
Appendix A: Sample Calculation	22
Appendix B – Measurement Uncertainty	24
Appendix C – Graphs and Tables	25
REPORT END.....	39

	Report Number:	R20210105-20-E3	Rev	B
	Prepared for:	Inovonics		

1.0 SUMMARY OF TEST RESULTS

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

SUMMARY			
Standard Section	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	Pass	Pulsed emissions duty cycle was applied
FCC 15.209 RSS-Gen, 7.1	Receiver Radiated Emissions	Pass	Meets the requirement of the limit.
FCC 15.247(a)(1)(i) RSS-247, 5.1(c)	Minimum Bandwidth, Limit: Min. 250kHz	Pass	Meets the requirement of the limit.
FCC 15.247(b)(1) RSS-247, 5.1	Maximum Peak Output Power, Limit: Max. 24 dBm	Pass	Meets the requirement of the limit.
FCC 15.209 RSS-Gen, 8.9 RSS-247, 5.5	Transmitter Radiated Emissions	Pass	Meets the requirement of the limit.
FCC 15.247(a) (1) (i) RSS-247, 5.1(c)	Frequency hopping system, Limit: Max. 0.4 Seconds in 10 Second Period	Pass	Meets the requirement of the limit.
FCC 15.209, 15.205, 15.247 RSS-Gen, 8.9 RSS-247, 5.5	Band Edge Measurement, Limit: 20dB less than the peak value of fundamental frequency	Pass	Meets the requirement of the limit.
FCC 15.207 RSS-Gen. 8.8	Conducted AC Emissions	NA	Battery Powered Equipment



Report Number: R20210105-20-E3

Rev

B

Prepared for: Inovonics

2.0 EUT DESCRIPTION

2.1 EQUIPMENT UNDER TEST

The Equipment Under Test (EUT) was a wireless FHSS transmitter, EN1248

EUT	EN 1248
EUT Received	5/12/2021
EUT Tested	5/19 – 5/26/2021
Serial No.	2638376
Operating Band	902.0 – 928.0 MHz
Device Type	FHSS
Power Supply	1.5V AA Lithium Batteries x 2

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



Report Number: R20210105-20-E3

Rev

B

Prepared for: Inovonics

2.2 DESCRIPTION OF TEST MODES

The EUT operates on, and was tested at the frequencies below:

Channel	Frequency
Low	902.4
Middle	914.8
High	927.6

These are the only three 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.

This EUT was set to transmit in a worse-case scenario with modulation on. The manufacturer modified the unit to transmit continuously on the lowest, highest and one channel in the middle.

2.3 DESCRIPTION OF SUPPORT UNITS

N/A

	Report Number:	R20210105-20-E3	Rev	B
	Prepared for:	Inovonics		

3.0 LABORATORY 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
CAB MRA Recognition Identification No: US0177

Environmental conditions varied slightly throughout the tests:

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



3.2 TEST PERSONNEL

No.	PERSONNEL	TITLE	ROLE
1	Karthik Vepuri	EMC Test Engineer	Review, Testing and Report
2	Fox Lane	EMC Test Engineer	Testing and Report
3	James Henry	Test Technician	Testing
4	Samuel Probst	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.

	Report Number:	R20210105-20-E3	Rev	B
	Prepared for:	Inovonics		

3.3 TEST EQUIPMENT

DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE	CALIBRATION DUE DATE
Keysight MXE Signal Analyzer (26.5GHz)	N9038A	MY56400083	May 5, 2020	May 5, 2022
SunAR RF Motion	JB1	A082918-1	August 17, 2020	August 17, 2021
EMCO Horn Antenna	3115	6415	March 16, 2020	March 16, 2022
Rohde & Schwarz Preamplifier**	TS-PR18	3545700803	April 14, 2020	April 14, 2022
Trilithic High Pass Filter*	6HC330	23042	April 14, 2020	April 14, 2022
MiniCircuits High Pass Filter*	VHF-1320+	15542	April 14, 2020	April 14, 2022
RF Cable (preamplifier to antenna)*	MFR-57500	01-07-002	April 14, 2020	April 14, 2022
RF Cable (antenna to 10m chamber bulkhead)*	FSCM 64639	01E3872	April 14, 2020	April 14, 2022
RF Cable (10m chamber bulkhead to control room bulkhead)*	FSCM 64639	01E3874	April 14, 2020	April 14, 2022
RF Cable (control room bulkhead to test receiver)*	FSCM 64639	01F1206	April 14, 2020	April 14, 2022
N connector bulkhead (10m chamber)*	PE9128	NCEEBH1	April 14, 2020	April 14, 2022
N connector bulkhead (control room)*	PE9128	NCEEBH2	April 14, 2020	April 14, 2022
TDK Emissions Lab Software	V11.25	700307	NA	NA

*Internal Characterization

**2 year calibration cycle

Notes:

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

	Report Number:	R20210105-20-E3	Rev	B
	Prepared for:	Inovonics		

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.

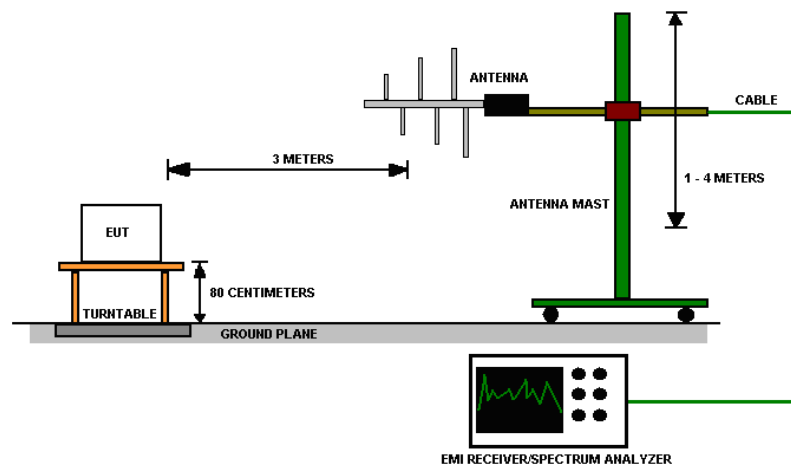


Figure 2 - Radiated Emissions Test Setup



Report Number:	R20210105-20-E3	Rev	B
Prepared for:	Inovonics		

4.0 DETAILED RESULTS

Radio Measurements								
CHANNEL	Transmitter	Occupied Bandwidth (kHz)	20 dB Bandwidth (kHz)	PEAK OUTPUT POWER (dBm)	PEAK OUTPUT POWER (mW)	RESULT	No. of Hopping Channels	Time of Occupancy
Low	Continuous	252.05	302.30	18.559	71.763	PASS	25	0.0879 s
Mid	Continuous	250.83	301.80	18.556	71.713	PASS	Frequency Separation	Duty Cycle Correction
High	Continuous	250.92	301.80	17.227	52.808	PASS	801.4 kHz	-13.15 dB
Occupied Bandwidth = N/A; 20 dB Bandwidth Limit $250 \text{ kHz} \leq \text{BW} \leq 500 \text{ kHz}$.				Peak Output Power Limit = 24 dBm; *corrections can be found in the last table of this section and under the graphs in Appendix C. Time of Occupancy < 0.4 S in 10 S				

Unrestricted Band-Edge							
CHANNEL	Mode	Band edge /Measurement Frequency (MHz)	Relative Highest out of band level (dBm)	Relative Fundamental (dBm)	Delta (dB)	Min Delta (dB)	Result
Low	Hopping	902.00	-51.24	7.15	58.39	20.00	PASS
High	Hopping	928.00	-57.57	6.79	50.77	20.00	PASS

*Measurements shown in the graph were taken in dBuV and converted to dBm using: $\text{dBm} = \text{dBuV} - 107$

**Both Hopping and Continuous modes were investigated and results deviated by less than 1dB

Peak 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	Continuous	612.998	31.60	Radiated	46.02	14.42	PASS
High	Continuous	966.000	42.61	Radiated	53.98	11.37	PASS

*Limit shown is the peak limit taken from FCC Part 15.209

**Both Hopping and Continuous modes were investigated and results deviated by less than 1dB

**Per ANSI C63.10-2013: Clause 7.8.6 requires frequency hopping device band-edge measurements pursuant to Clause 6.10.

Deviation: Authorized-band measurements are performed on a unit with hopping always on and highest duration duty cycle supported. The hopping sequence includes the lowest and highest channel. This is the worst-case configuration and additional testing at the lowest and highest channels with the hopping function turn-off is not performed.

Corrections for Peak Output Power Measurements				
Channel	Uncorrected Output Power (dBm)	Transducer (dBm)	Cable Loss (dBm)	Output Power (EIRP) (dBm)
Low	-23.641	26.30	4.13	18.559
Mid	-23.894	26.60	4.08	18.556
High	-25.163	26.60	4.02	17.227

Output Power (EIRP)(dBm) = Cable Loss(dB) + Transducer(dB) + Uncorrected Output Power(dBm) + 107(dBm to dBuV) - 95.23(3m EIRP conversion)



Report Number:	R20210105-20-E3	Rev	B
Prepared for:	Inovonics		

4.1 DUTY CYCLE

The highest possible duty cycle declared by the manufacturer is 22 ms in a given 100 ms window which is 22%.
The Duty Cycle Correction Factor is $20 \cdot \log(22/100) = -13.15$ dB. from C63.10 Sec 7.5

4.2 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.



Report Number:	R20210105-20-E3	Rev	B
Prepared for:	Inovonics		

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 to 10 GHz.
- 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.

Report Number:	R20210105-20-E3	Rev	B
Prepared for:	Inovonics		

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.

Test setup:

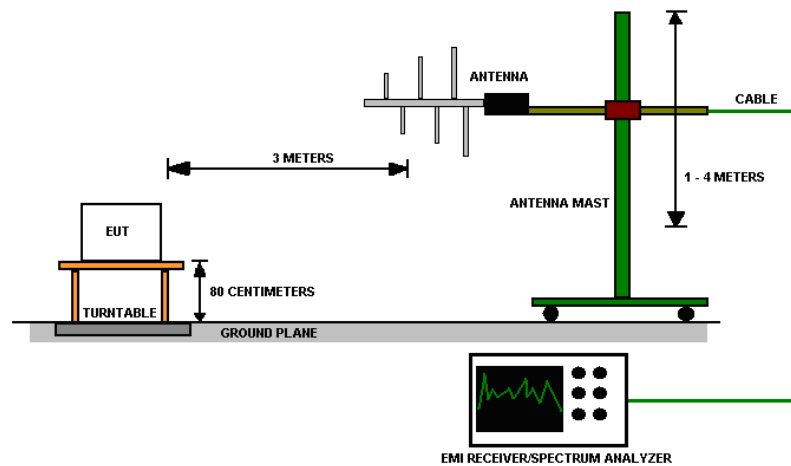


Figure 3 - Radiated Emissions Test Setup

EUT operating conditions

Details can be found in section 2.1 of this report.

Test results:

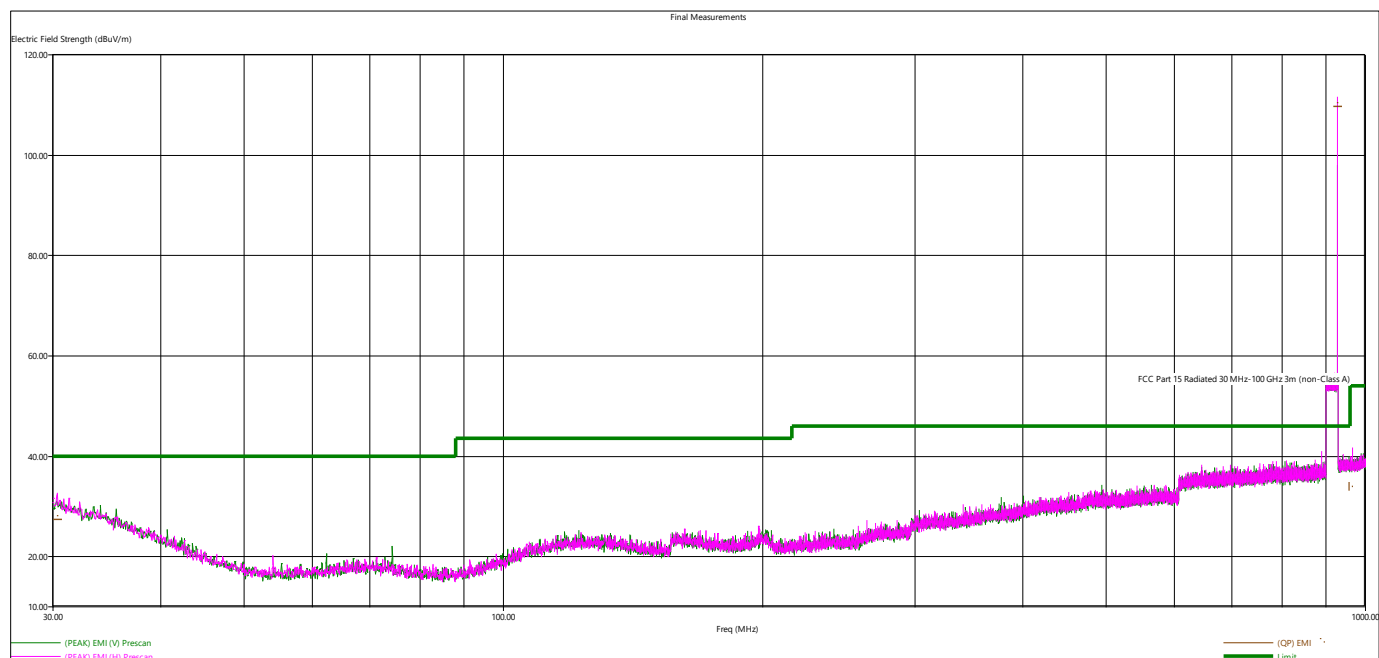


Figure 4 - Radiated Emissions Plot, High Channel

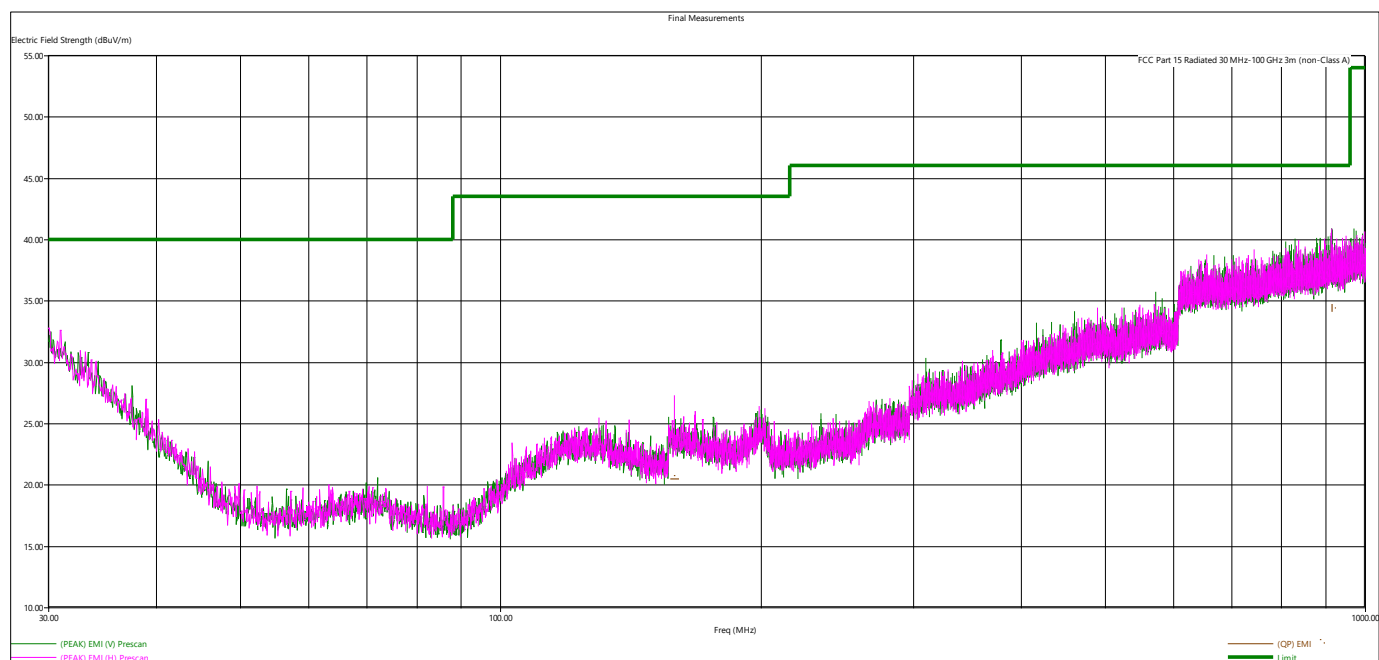


Figure 5 - Radiated Emissions Plot, Receive/ Idle Channel



Report Number:	R20210105-20-E3	Rev	B
Prepared for:	Inovonics		

Quasi-Peak Measurements							
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel
MHz	dB μ V/m	dB μ V/m	dB	cm.	deg.		
30.251520	27.15	40.00	12.85	353.00	110.00	H	High
927.594000	109.52	NA	NA	103.00	306.00	H	High
957.526320	33.78	46.02	12.24	244.00	113.00	V	High
158.658240	20.41	43.52	23.11	323	56	H	Receive/ Idle
914.886240	34.35	46.02	11.67	131	154	V	Receive/ Idle

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

Report Number:	R20210105-20-E3	Rev	B
Prepared for:	Inovonics		

Peak Measurements								
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation
MHz	dBμV/m	dBμV/m	dB	cm.	deg.			
2707.272	46.47	73.98	27.51	346	313	H	Low	CW
4511.918	51.19	73.98	22.79	292	351	H	Low	CW
5414.768	47.63	73.98	26.35	113	74	H	Low	CW
3609.36	44.08	73.98	29.90	494	338	V	Low	CW
3659.242	52.59	73.98	21.39	253	143	H	Mid	CW
4573.762	49.91	73.98	24.07	280	359	H	Mid	CW
2744.438	48.6	73.98	25.38	294	300	H	Mid	CW
1855.234	61.74	73.98	12.24	290	37	H	High	CW
2782.976	48.12	73.98	25.86	327	293	H	High	CW
3710.436	55.79	73.98	18.19	302	135	H	High	CW

Average Measurements								
Frequency	Level	Limit	Margin	Height	Angle	Pol	Channel	Modulation
MHz	dBμV/m	dBμV/m	dB	cm.	deg.			
2707.272	33.32	53.98	20.66	346	313	H	Low	CW
4511.918	38.04	53.98	15.94	292	351	H	Low	CW
5414.768	34.48	53.98	19.50	113	74	H	Low	CW
3609.36	30.93	53.98	23.05	494	338	V	Low	CW
3659.242	39.44	53.98	14.54	253	143	H	Mid	CW
4573.762	36.76	53.98	17.22	280	359	H	Mid	CW
2744.438	35.45	53.98	18.53	294	300	H	Mid	CW
1855.234	48.59	53.98	5.39	290	37	H	High	CW
2782.976	34.97	53.98	19.01	327	293	H	High	CW
3710.436	42.64	53.98	11.34	302	135	H	High	CW

*Average Level = Peak Level - Duty Cycle Correction (see section 4.1 for further details)

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.
5. The EUT was measured in all 3 orthogonal axes. See the test setup photo exhibit for details on the orientations.

	Report Number:	R20210105-20-E3	Rev	B
	Prepared for:	Inovonics		

4.3 PEAK OUTPUT POWER

Test Method: ANSI C63.10, Section(s) 7.8.5

Limits of bandwidth measurements:

Per FCC Part 15

For an FHSS system with 25 channels, the output power is required to be less than 250 mW or 24 dBm.

Test procedures:

Spectrum analyzer was set with a resolution bandwidth greater than occupied bandwidth and centered on the operating channel.

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 data is in the table in results section 4.0.
3. All the measurements were found to be compliant.



Report Number: R20210105-20-E3

Rev

B

Prepared for: Inovonics

4.4 BANDWIDTH

Test Method: ANSI C63.10, Section(s) 6.9.2

Limits of bandwidth measurements:

The allowed 20 dB bandwidth of the hopping channel is $250 \text{ kHz} \leq \text{BW} \leq 500 \text{ kHz}$.

Test procedures:

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 9 kHz RBW and 30 kHz VBW.

The 20 dB bandwidth is defined as the bandwidth of which is higher than peak power minus 20dB. The 99% bandwidth is defined as the bandwidth that contains 99% of the power.

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 bandwidth plots can be found in the Appendix C.
2. All data is in the table in results section 4.0.
3. All the measurements were found to be compliant.



Report Number:	R20210105-20-E3	Rev	B
Prepared for:	Inovonics		

4.5 BANDEDGES

Test Method: ANSI C63.10, Section(s) 6.10.6

Limits of band edge measurements:

For emissions outside of the allowed band of operation (902 – 928MHz), the emission level needs to be 20dB under the maximum fundamental field strength. However, if the emissions fall within one of the restricted bands from 15.205 the field strength levels need to be under that of the limits in 15.209.

Test procedures:

The EUT was tested in the same method as described in section 4.4 - *Bandwidth*. The resolution bandwidth was set to 100kHz and the EMI receiver was used to scan from the band edge to the fundamental frequency with a quasi-peak detector. The highest emissions level beyond the band edge was measured and recorded. For restricted band edge measurements, the unit was tested to the same method as section 4.2 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 band edge plots can be found in the Appendix C.
2. All data is in the table in results section 4.0.
3. 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.
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.



Report Number: R20210105-20-E3

Rev

B

Prepared for: Inovonics

4.6 CARRIER FREQUENCY SEPERATION, NUMBER OF HOPPING CHANNELS, TIME OF OCCUPANCY

Test Method: ANSI C63.10, Section 7.8.2, 7.8.3, 7.8.4

Limits for Time of Occupancy

Average time of occupancy on any frequency, not to exceed 0.4 seconds within a 10 second period.

Test procedures:

The method from KDB 558074 D01 v05

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 plots can be found in the Appendix C.
2. All the measurements were found to be compliant.
3. The measurements are reported on the graph and section 4.0 of this report.

	Report Number:	R20210105-20-E3	Rev	B
	Prepared for:	Inovonics		

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: R20210105-20-E3

Rev

B

Prepared for: Inovonics

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;

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

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

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

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

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

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



Report Number: R20210105-20-E3

Rev

B

Prepared for: Inovonics

APPENDIX B – MEASUREMENT UNCERTAINTY

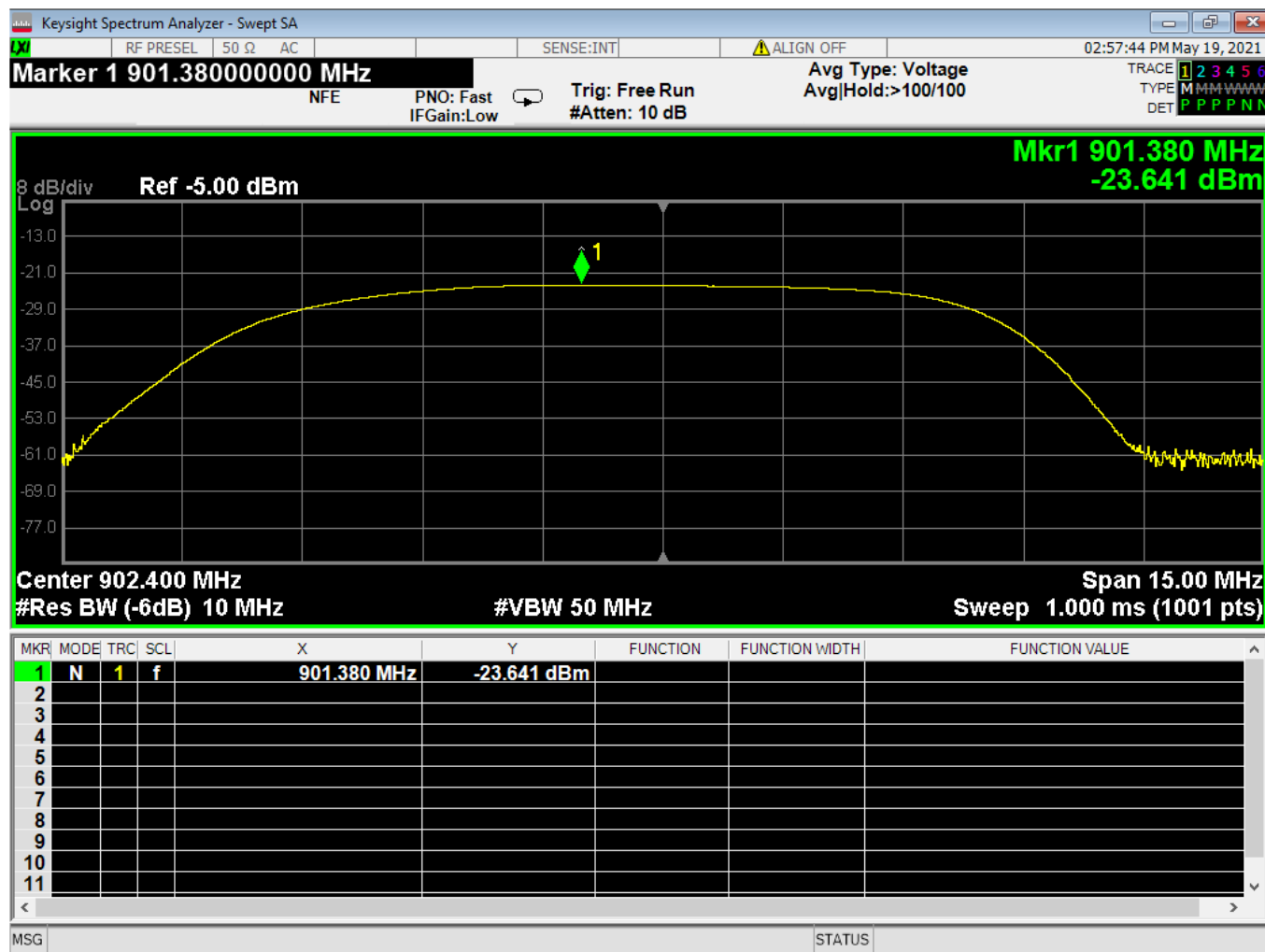
Where relevant, the following measurement uncertainty levels have been for tests performed in this test report:

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:	R20210105-20-E3	Rev	B
	Prepared for:	Inovonics		

APPENDIX C – GRAPHS AND TABLES



01 Peak Output Power, Low Channel

Corrections and losses are not included in the graph.

Corrections for Peak Output Power Measurements				
Channel	Uncorrected Output Power (dBm)	Transducer (dBm)	Cable Loss (dBm)	Output Power (EIRP) (dBm)
Low	-23.641	26.30	4.13	18.559

Output Power (EIRP)(dBm) =Cable Loss(dB)+Transducer(dB)+Uncorrected Output Power(dBm)+107(dBm to dBuV)-95.23(3m EIRP conversion)

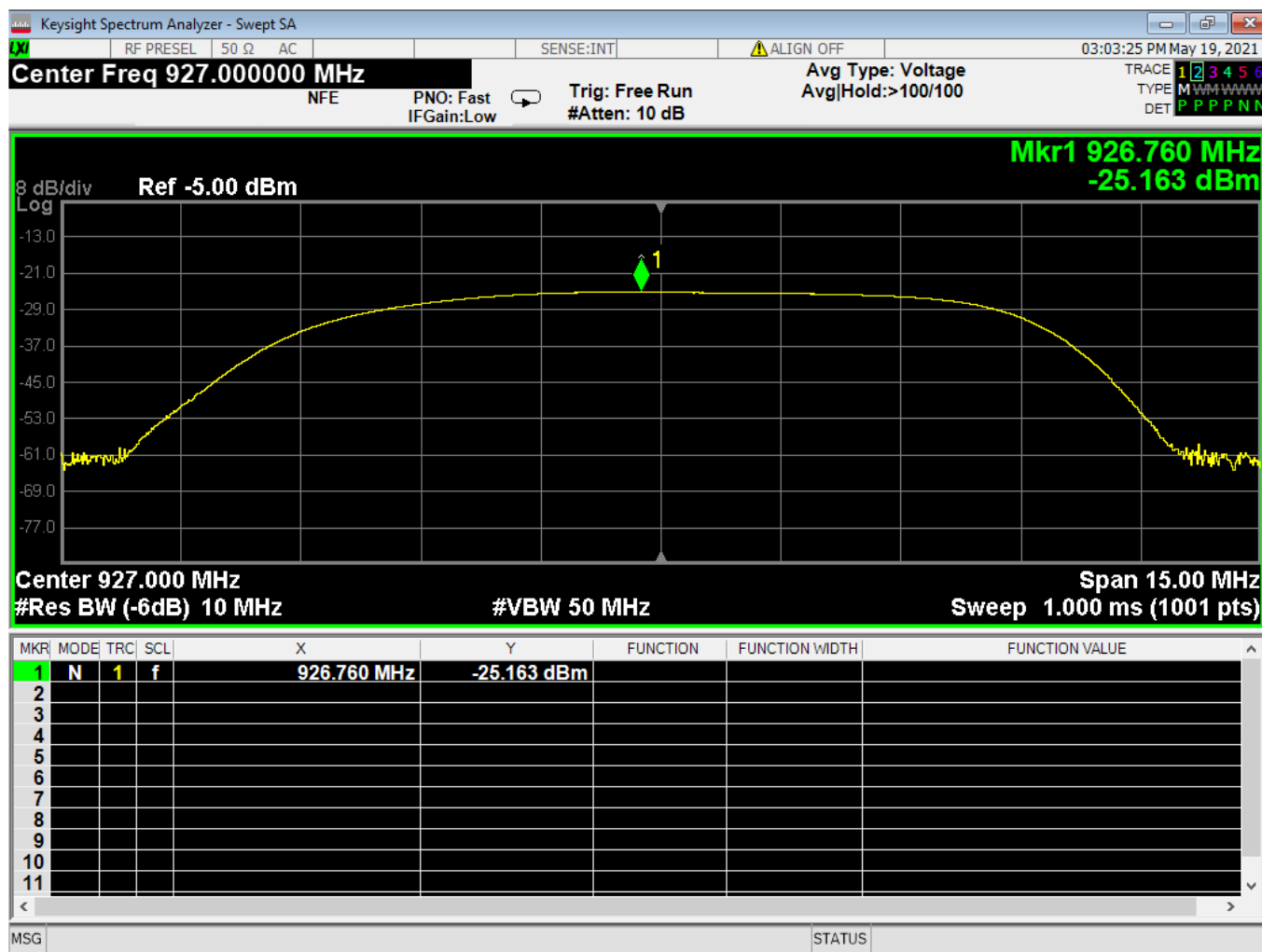


Report Number: R20210105-20-E3

Rev

B

Prepared for: Inovonics

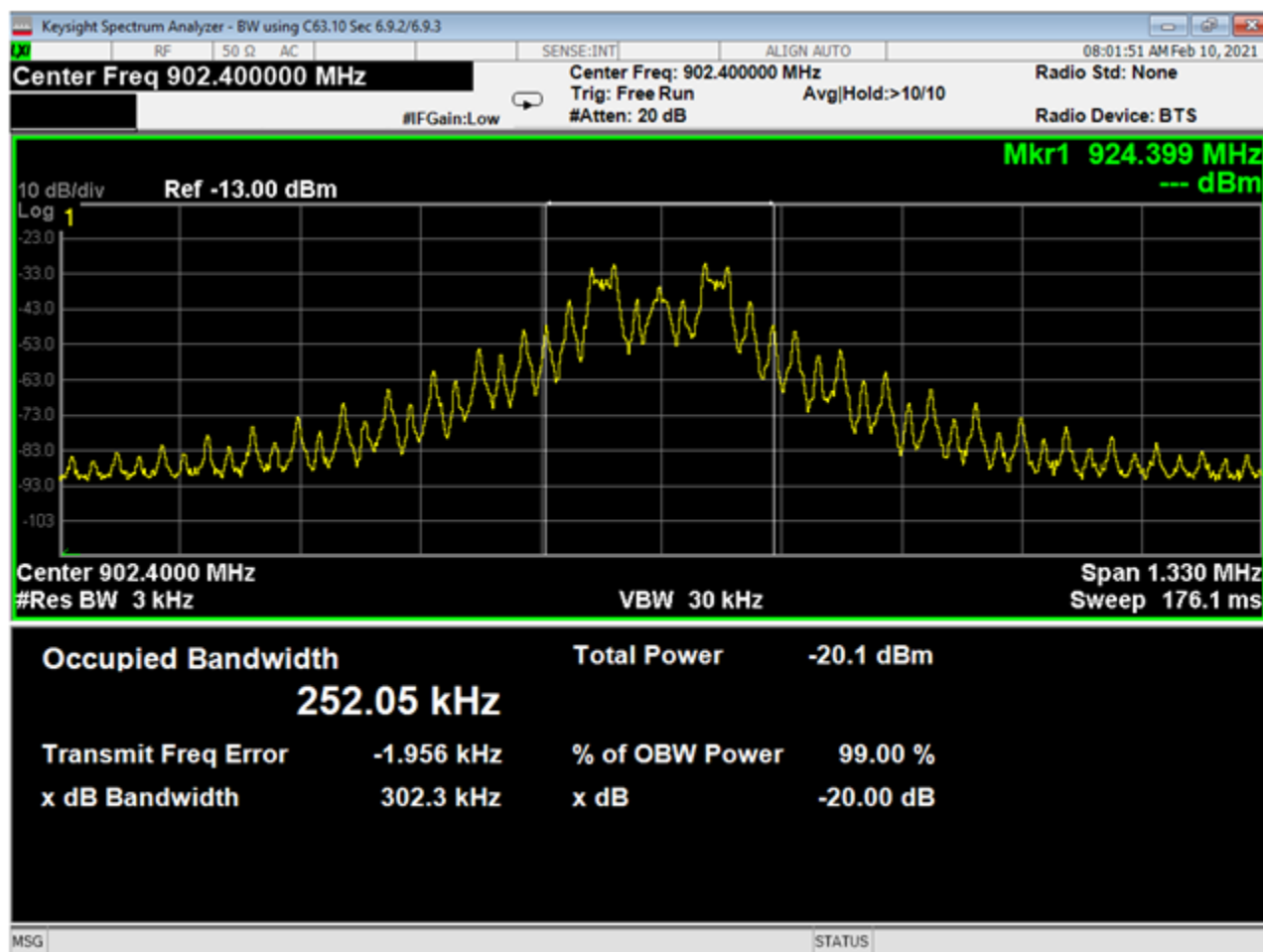


03 Peak Output Power, High Channel

Corrections and losses are not included in the graph.

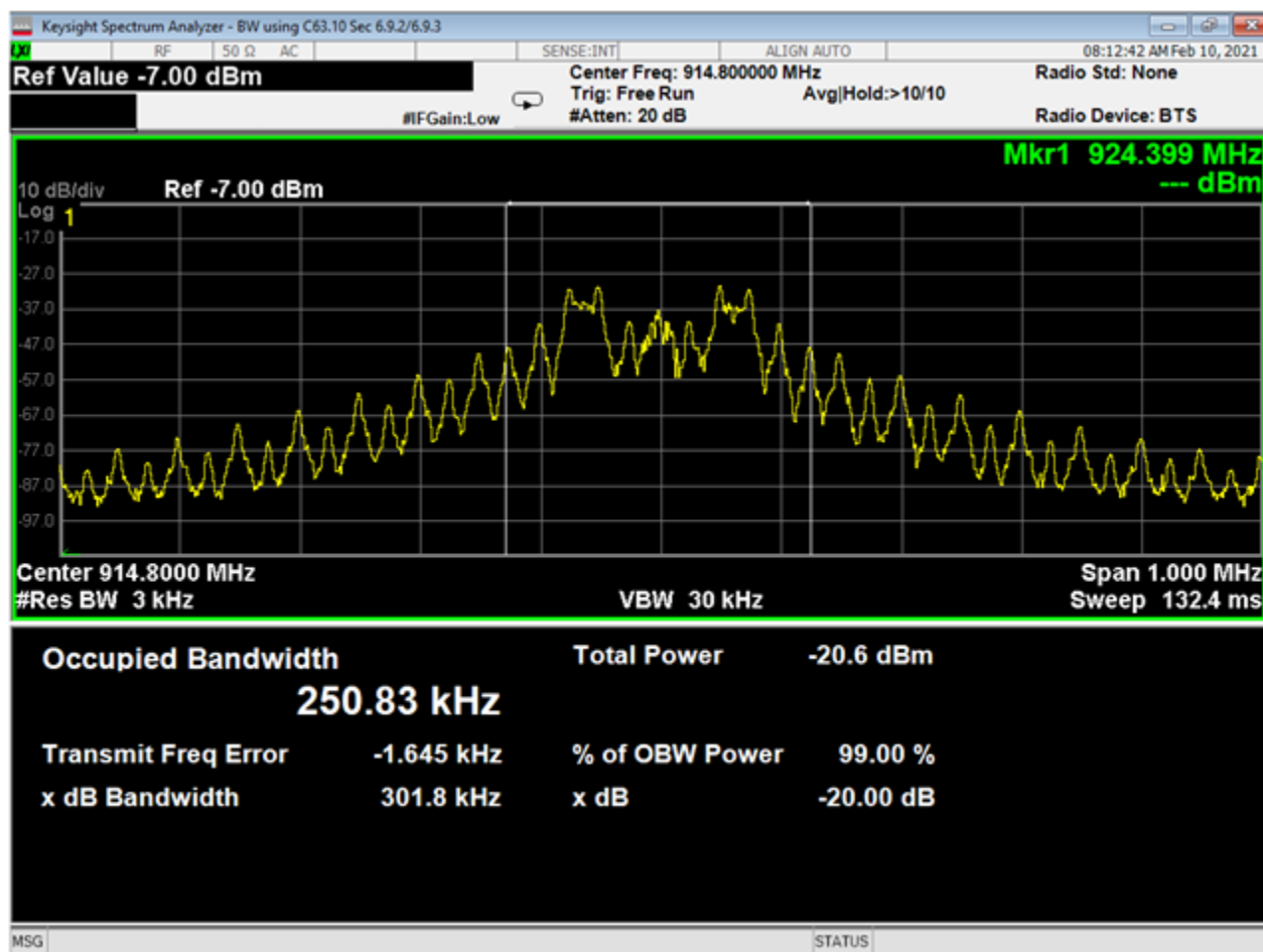
Corrections for Peak Output Power Measurements				
Channel	Uncorrected Output Power (dBm)	Transducer (dBm)	Cable Loss (dBm)	Output Power (EIRP) (dBm)
High	-25.163	26.60	4.02	17.227

Output Power (EIRP)(dBm) =Cable Loss(dB)+Transducer(dB)+Uncorrected Output Power(dBm)+107(dBm to dBuV)-95.23(3m EIRP conversion)



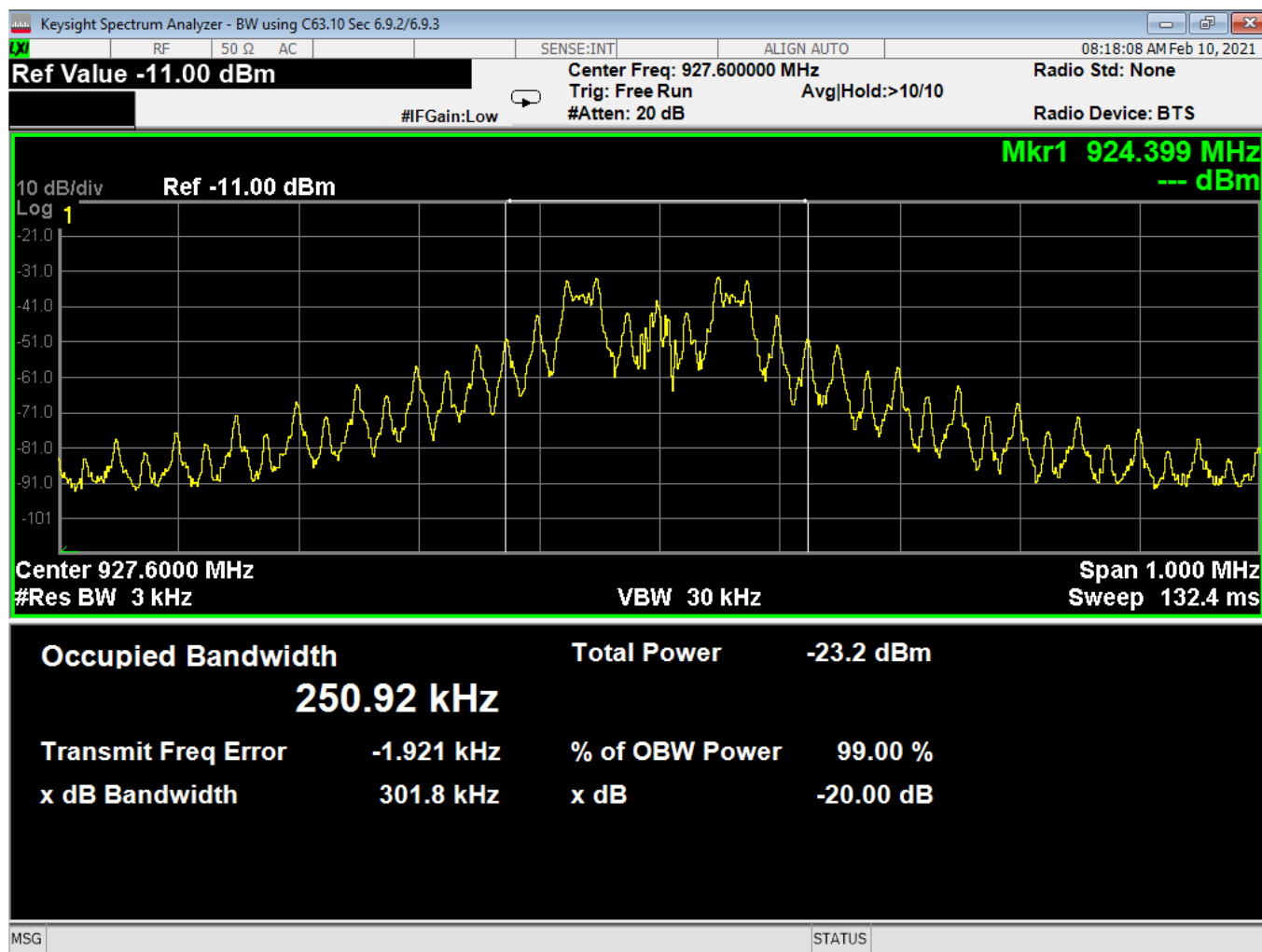
04 Bandwidth, Low Channel

Note: the vertical lines in the plot show the occupied bandwidth. The 20 dB bandwidth measurement is displayed, but the lines are not shown.



05 Bandwidth, Mid Channel

Note: the vertical lines in the plot show the occupied bandwidth. The 20 dB bandwidth measurement is displayed, but the lines are not shown.



06 Bandwidth, High Channel

Note: the vertical lines in the plot show the occupied bandwidth. The 20 dB bandwidth measurement is displayed, but the lines are not shown.

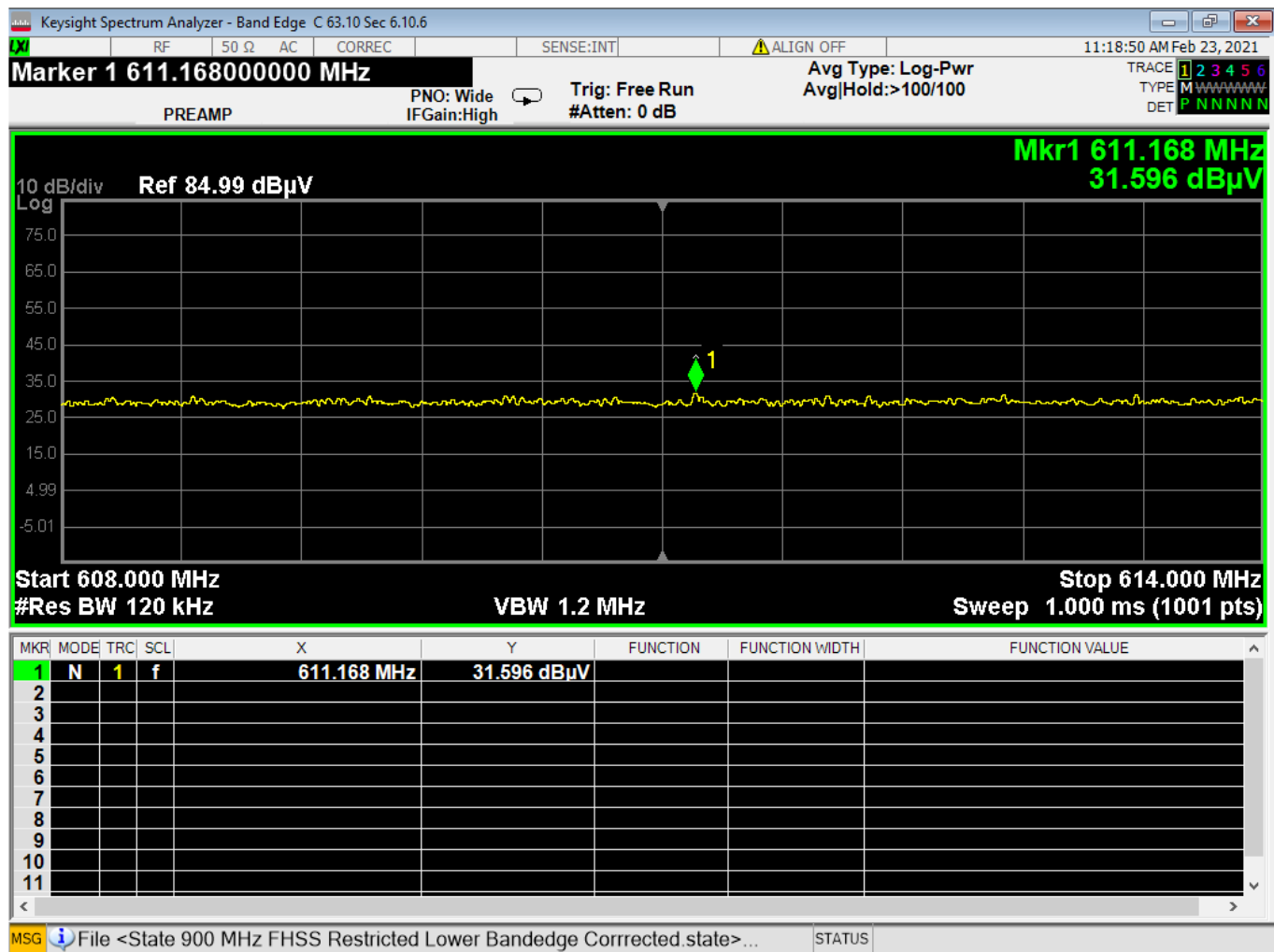


Report Number: R20210105-20-E3

Rev

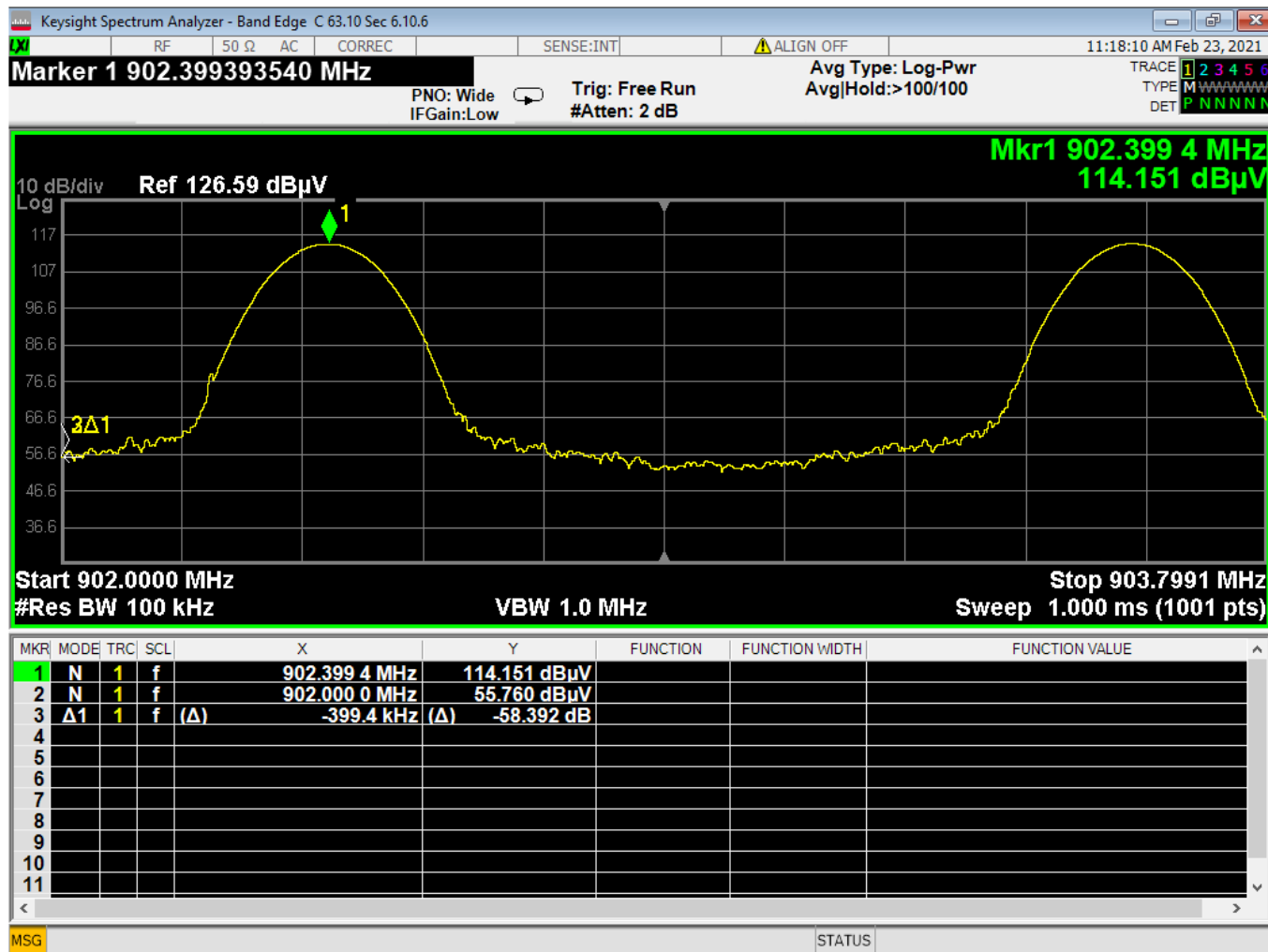
B

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11 Band-Edge Measurement, Low Channel, Restricted Frequency, Hopping

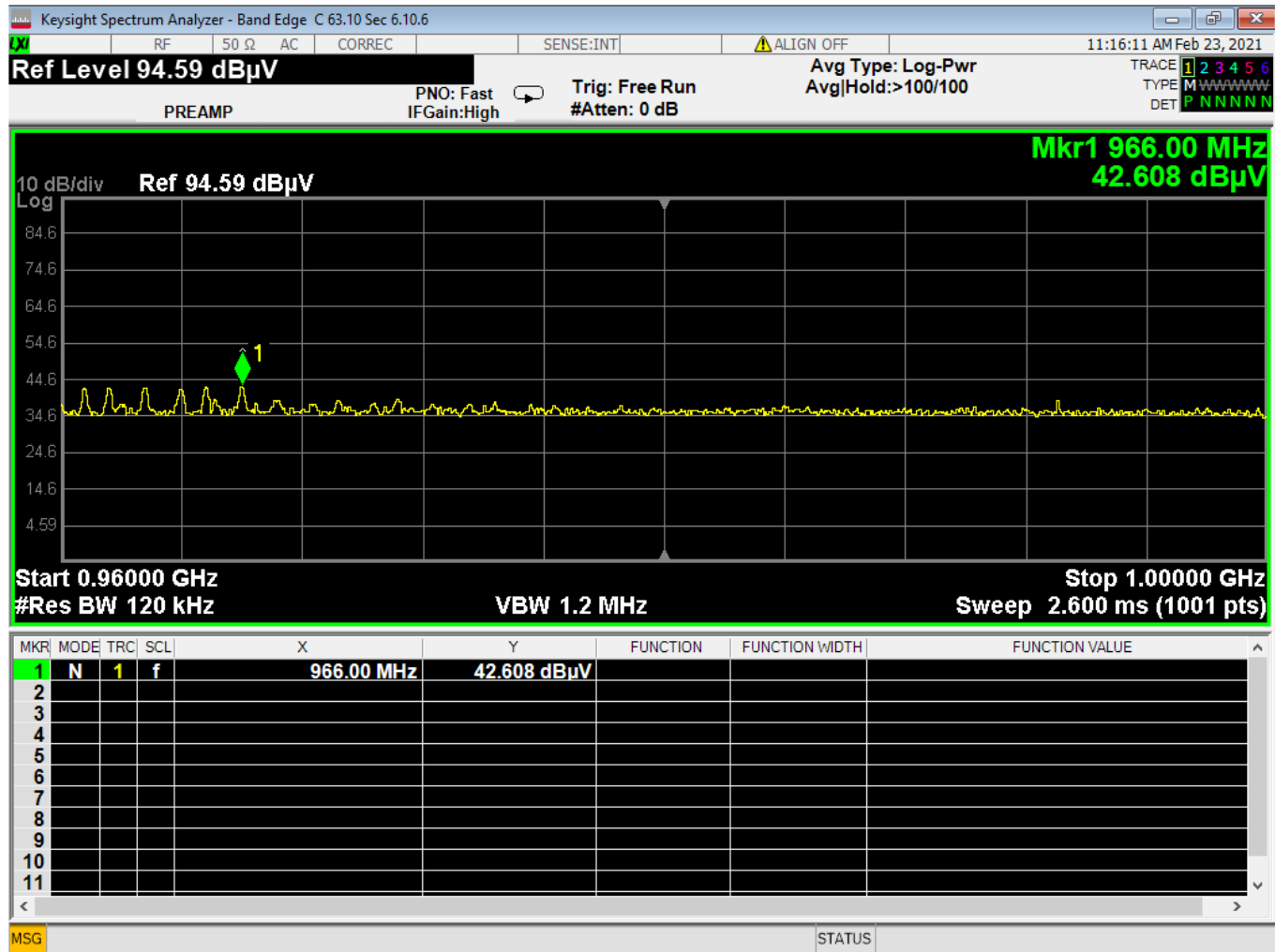
Corrections and losses are included in the graph.



12 Band-Edge Measurement, Low Channel, Unrestricted Frequency, Hopping

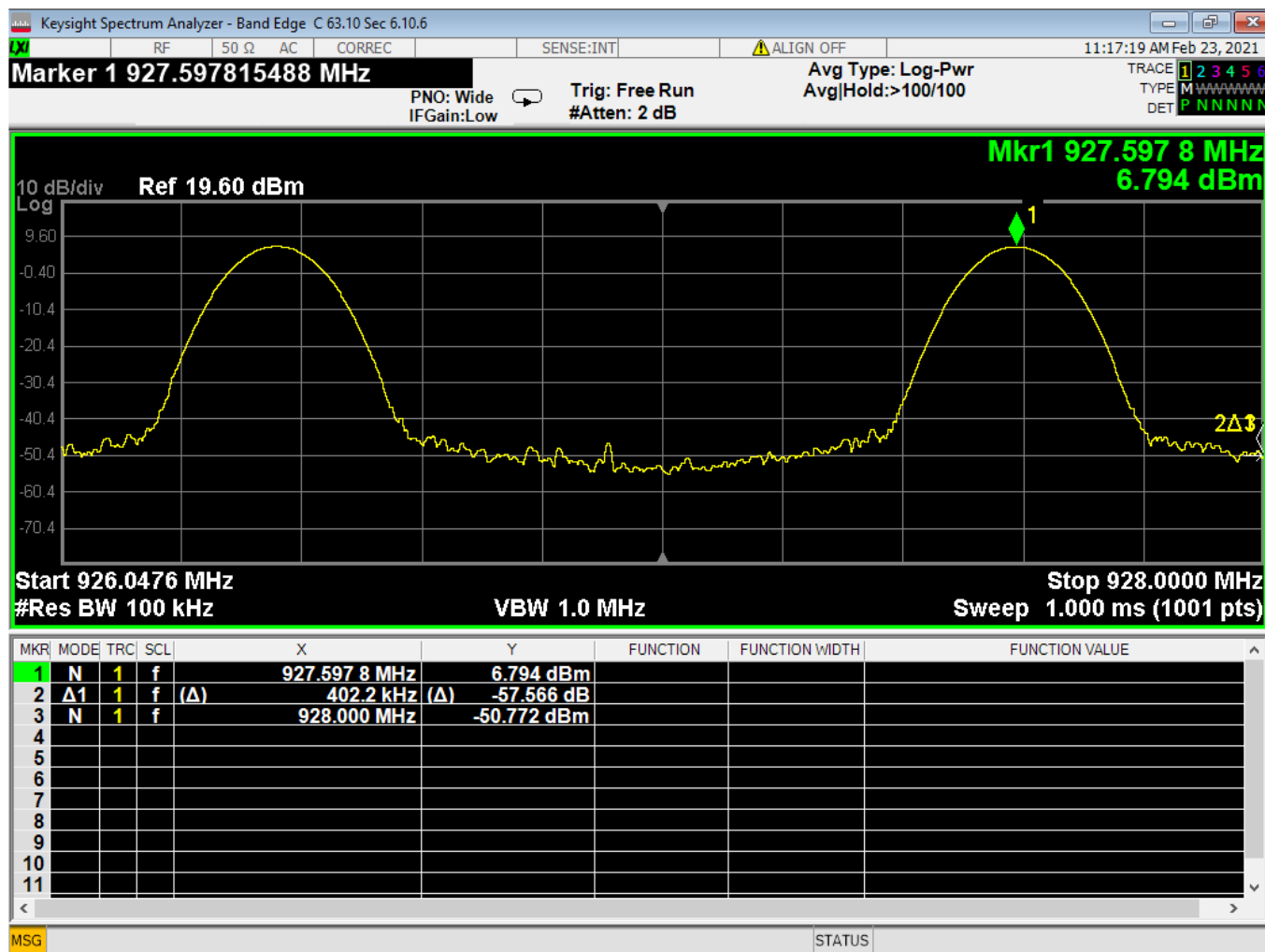
Corrections and losses are included in the graph.

*Measurements shown in the graph were taken in dBuV and converted to dBm using: $\text{dBm} = \text{dBuV} - 107$ to report in section 4.0



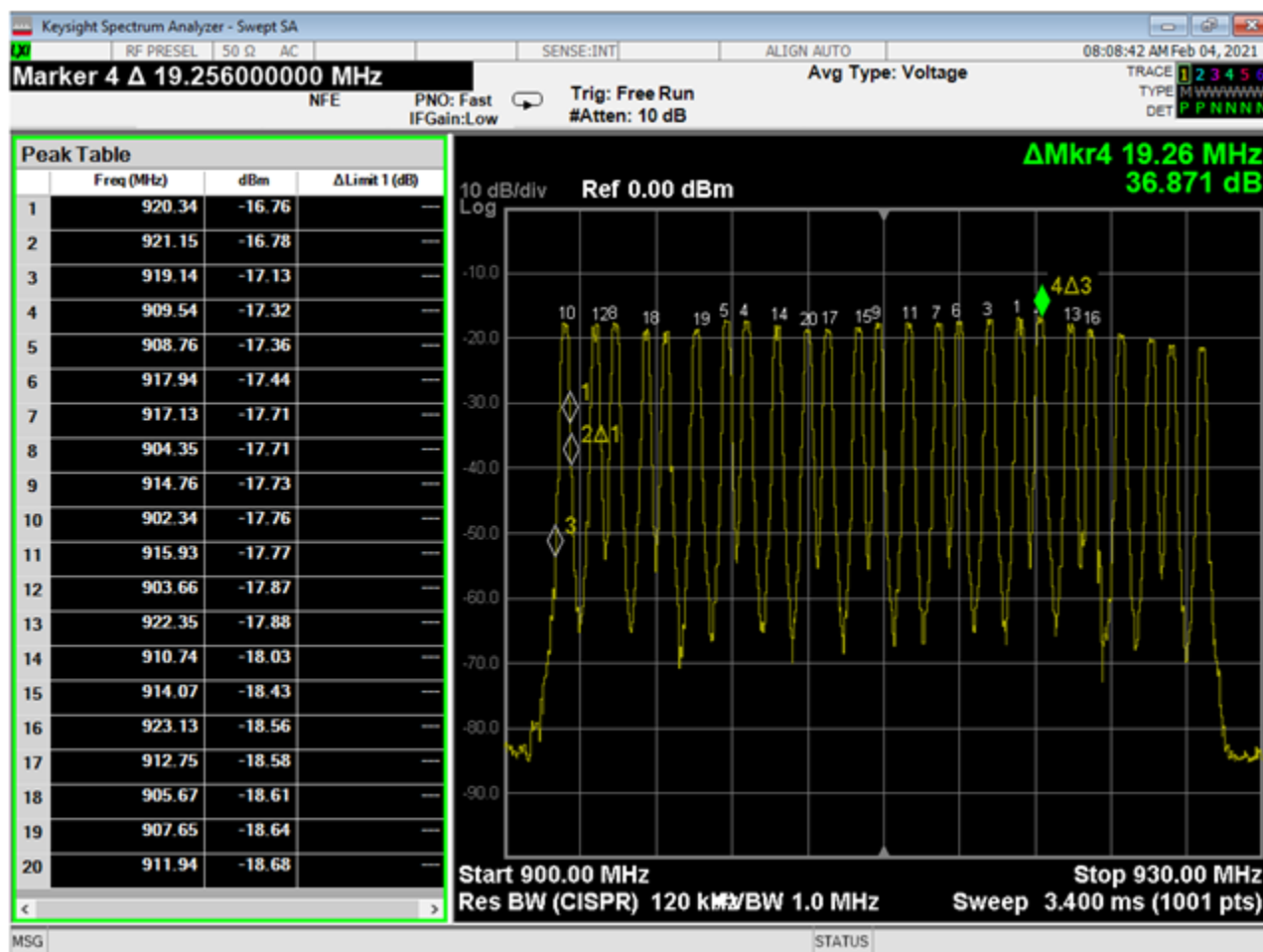
13 Band-Edge Measurement, High Channel, Restricted Frequency, Hopping

Corrections and losses are included in the graph.

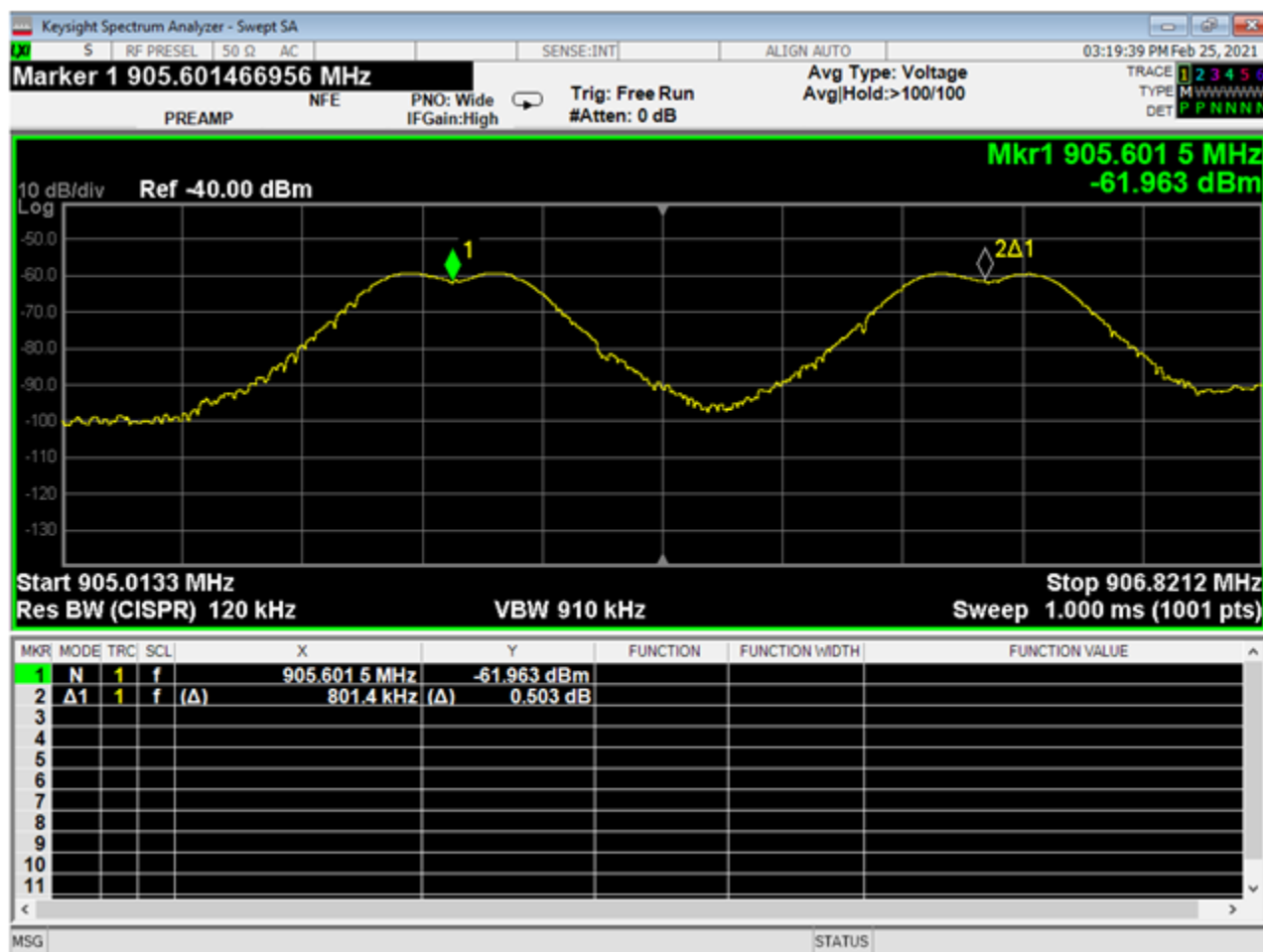


14 Band-Edge Measurement, High Channel, Unrestricted Frequency, Hopping

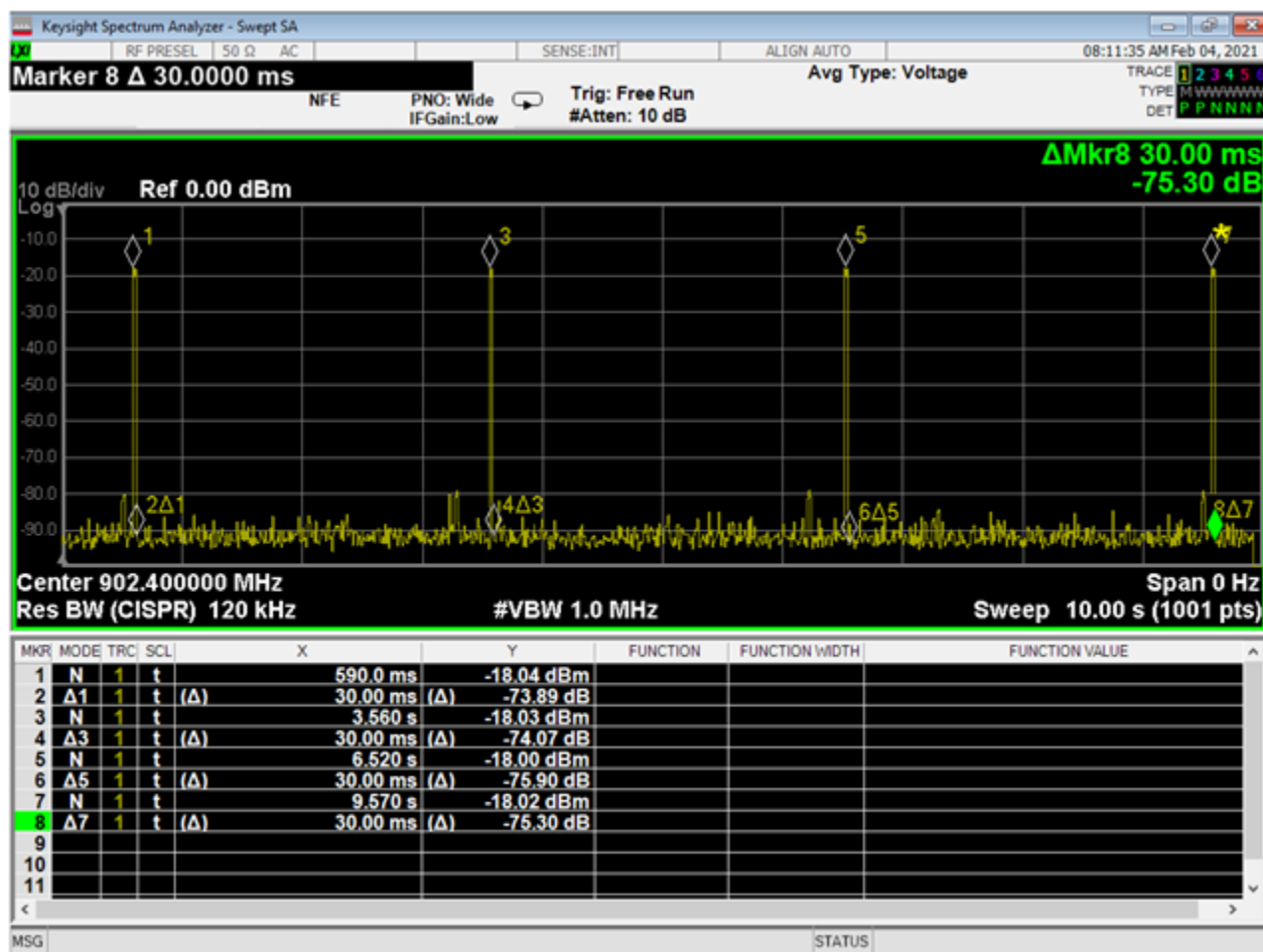
Corrections and losses are included in the graph.



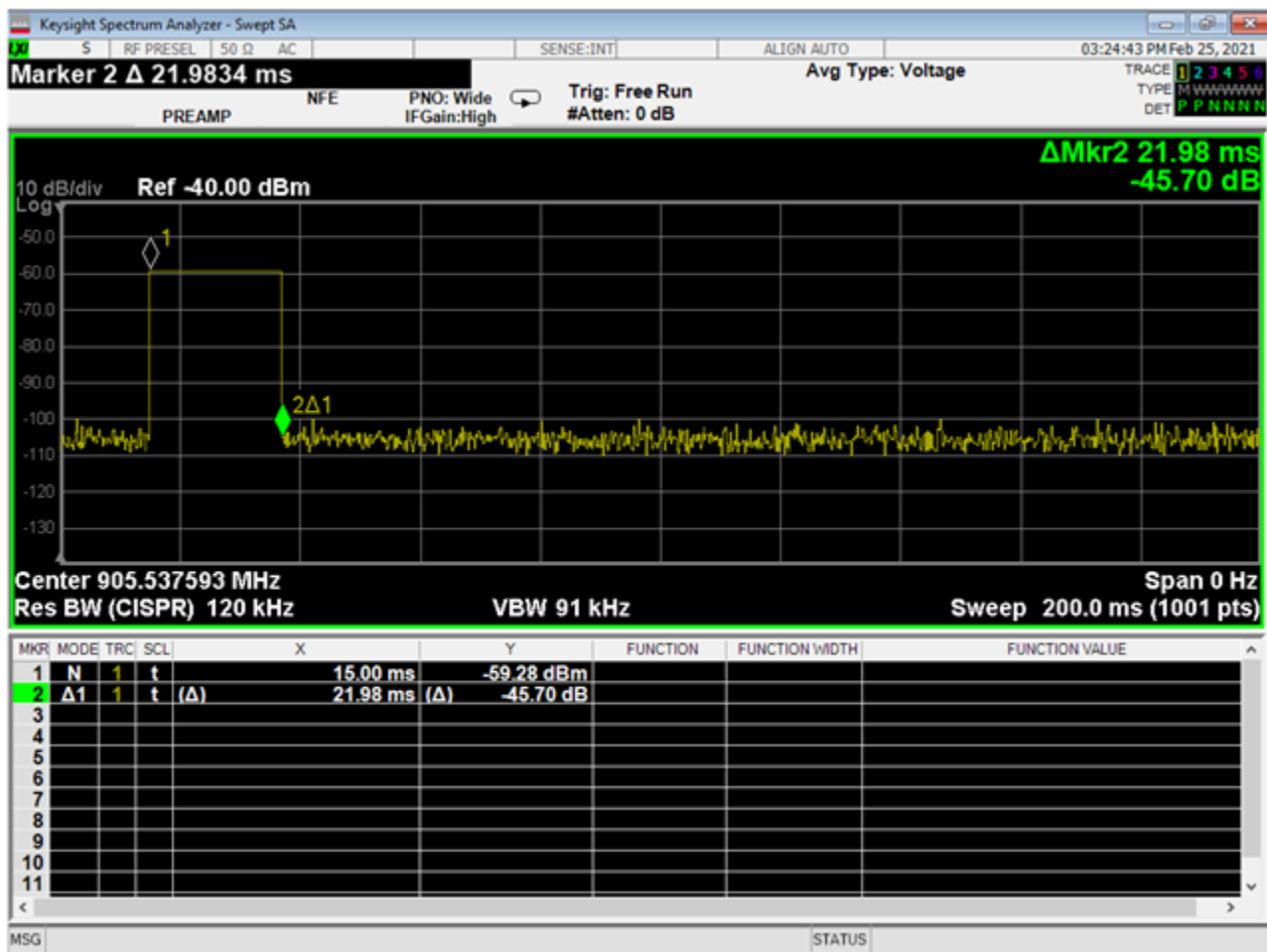
15 Hop Count



16 Minimum Frequency Separation



17 ON Time over 10 seconds



18 ON Time, 0.02198 s



Report Number:	R20210105-20-E3	Rev	B
Prepared for:	Inovonics		

REPORT END