RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC Part 15.247 & ISED RSS-247 Certification Report

Test Lab:	Applicant:
Rhein Tech Laboratories, Inc. Phone: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 www.rheintech.com Herndon, VA 20170	Innovative Wireless Technologies, Inc. (IWT) 1100 Main Street Tel: 434-316-5230 Lynchburg, VA 24504

FCC ID **IC**	SP8-FAP4213210 9568A-FAP4213210	**Test Report Date**	October 19, 2018
Platform	N/A	**RTL Work Order Number**	2018022
Model #/HVIN	FAP4213-210	**RTL Quote Number**	QRTL18-022B
American National Standard Institute	ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices		
FCC Classification	DTS – Part 15 Digital Transmission System		
FCC Rule Part(s)	FCC Rules Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz (10-01-2017)		
ISED Rule Part(s)	RSS-247 Issue 2 February 2017: Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices		

Frequency Range (MHz)	Output Power (W)*	Frequency Tolerance	Emission Designator
903 – 927	0.14	N/A	873KF1D

*Power is conducted maximum RMS

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from, the applicable parts of FCC Part 2, FCC Part 15, ANSI C63.10, and ISED RSS-247.

Signature: 

Date: October 19, 2018

Typed/Printed Name: Desmond A. Fraser

Position: President

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANAB. Refer to certificate and scope of accreditation AT-1445.

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1 General Information

1.1 Scope

Applicable Standards:

FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

ISED RSS-247: Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

1.2 Description of EUT

Equipment Under Test	Integrated Mesh Node (IMN)
Model #	FAP4213-210
Power Supply	115 VAC
Modulation Type	2-FSK
Frequency Range	903 – 927 MHz
Antenna Type	Yagi (11 dBi), Omni-directional dipole (5 dBi)

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.10 2013).

1.4 Related Submittal(s)/Grant(s)

This is an original application for certification for Innovative Wireless Technologies, Inc. Model # FAP4213-210, Integrated Mesh Node (IMN); FCC ID: SP8-FAP4213210, IC: 9568A-FAP4213210.

1.5 Modifications

No modifications were required for compliance.

2 Test Information

2.1 Description of Test Modes

In accordance with FCC 15.31(m), and because the EUT utilizes an operating band greater than 10 MHz, the following frequencies were tested:

Table 2-1: Frequencies Tested

Channel	Frequency
Low	903
Mid	915
High	927

2.2 Exercising the EUT

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The EUT was provided with software to transmit during testing. The carrier was also checked to verify that information was being transmitted. There were no deviations from the test standard(s) and/or methods. The test results reported relate only to the item tested.

2.3 Test Result Summary

Table 2-2: Test Result Summary – FCC Part 15, Subpart C (Section 15.247), ISED RSS-247/RSS-Gen

FCC Reference	ISED Reference	C63.10 Procedure	Test	Pass/Fail or N/A
FCC 15.207	RSS-Gen 8.8	6.2	AC Power Conducted Emissions	Pass
FCC 15.209	RSS-Gen 8.10	6.5, 6.6	Radiated Emissions	Pass
FCC 15.247(b)	RSS-247 5.4(d)	6.10	Maximum Peak Power Output	Pass
FCC 15.247(d)	RSS-247 5.5	6.7	Antenna Conducted Spurious Emissions	Pass
FCC 15.247(d)	RSS-247 5.5	6.9.2	Band Edge	Pass
FCC 15.247(a)(2)	RSS-247 5.2(a)	6.9.1	6 dB Bandwidth	Pass
FCC 15.247(e)	RSS-247 5.2(b)	6.11	Power Spectral Density	Pass

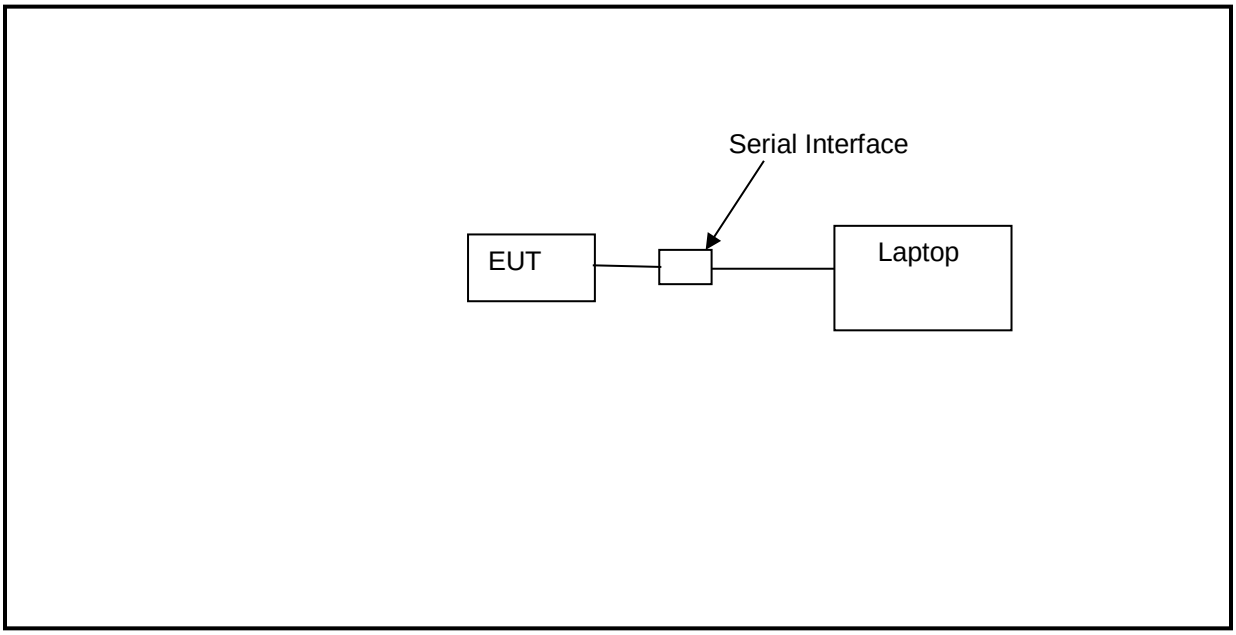
2.4 Test System Details

The test samples were received on May 7, 2018. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in the following tables.

Table 2-3: Equipment Under Test

Part	Manufacturer	Model #	Serial Number	FCC ID	RTL Bar Code
Integrated Mesh Node (IMN)	IWT	FAP4213-210	IMN18070007	SP8-FAP4213210	22924

2.5 Configuration of Tested System



3 Maximum Conducted Output Power – FCC 15.247(b)(3); ISED RSS-247 5.4(d)

3.1 Power Output Test Procedure

A conducted power measurement of the EUT was taken using a Rhode & Schwarz spectrum analyzer.

Procedure: C63.10-2013 11.9.2.2.2 Method AVGSA-1

Table 3-1: Power Output Test Equipment

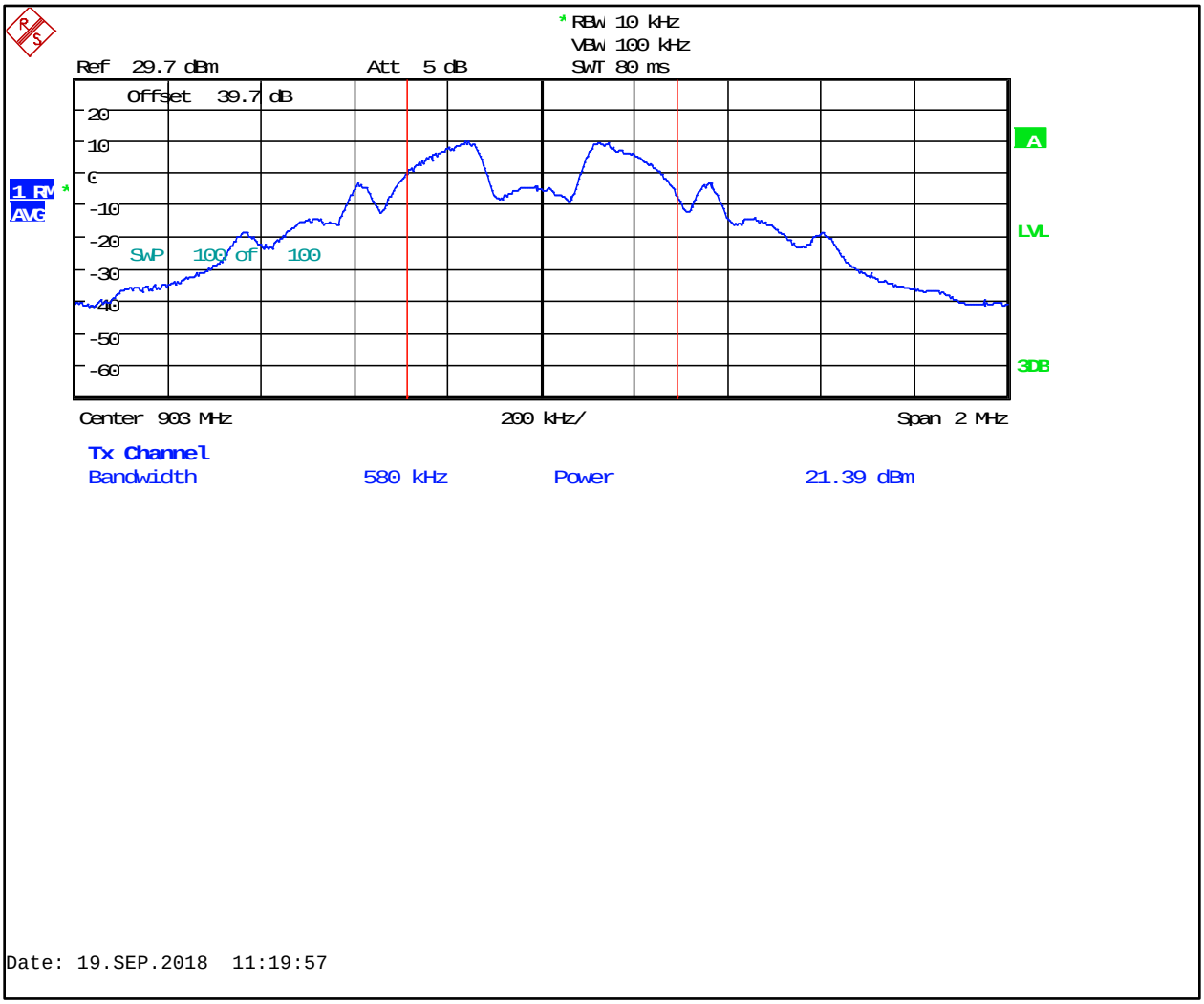
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	4/26/21
901727	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/20/19
901724	API Weinschel, Inc.	48-40-34	40 dB 100W Attenuator	CJ8921	8/7/19

3.2 Power Output Test Data

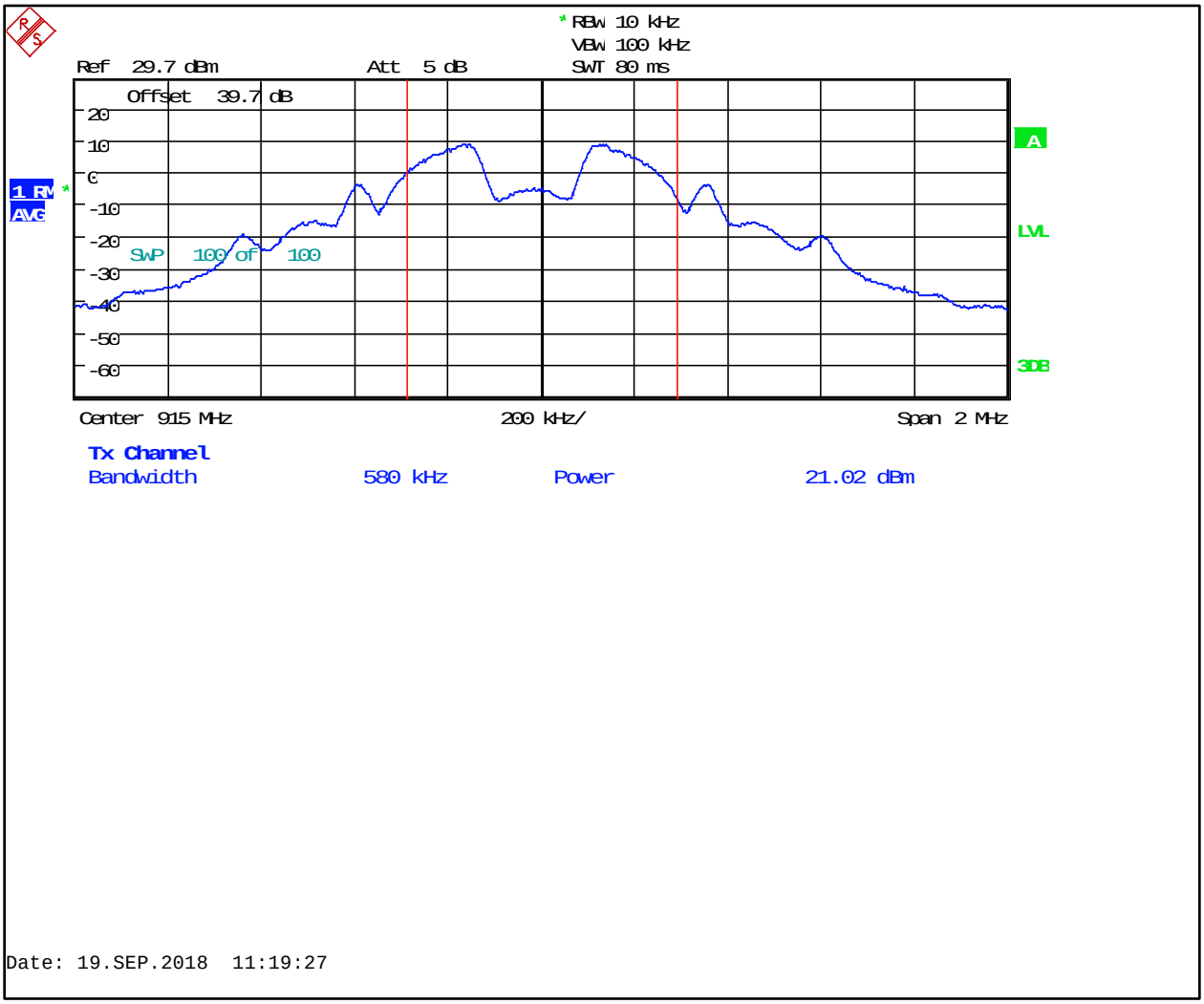
Table 3-2: Power Output Test Data

Frequency (MHz)	Conducted Power (dBm)
903	21.4
915	21.0
927	20.7

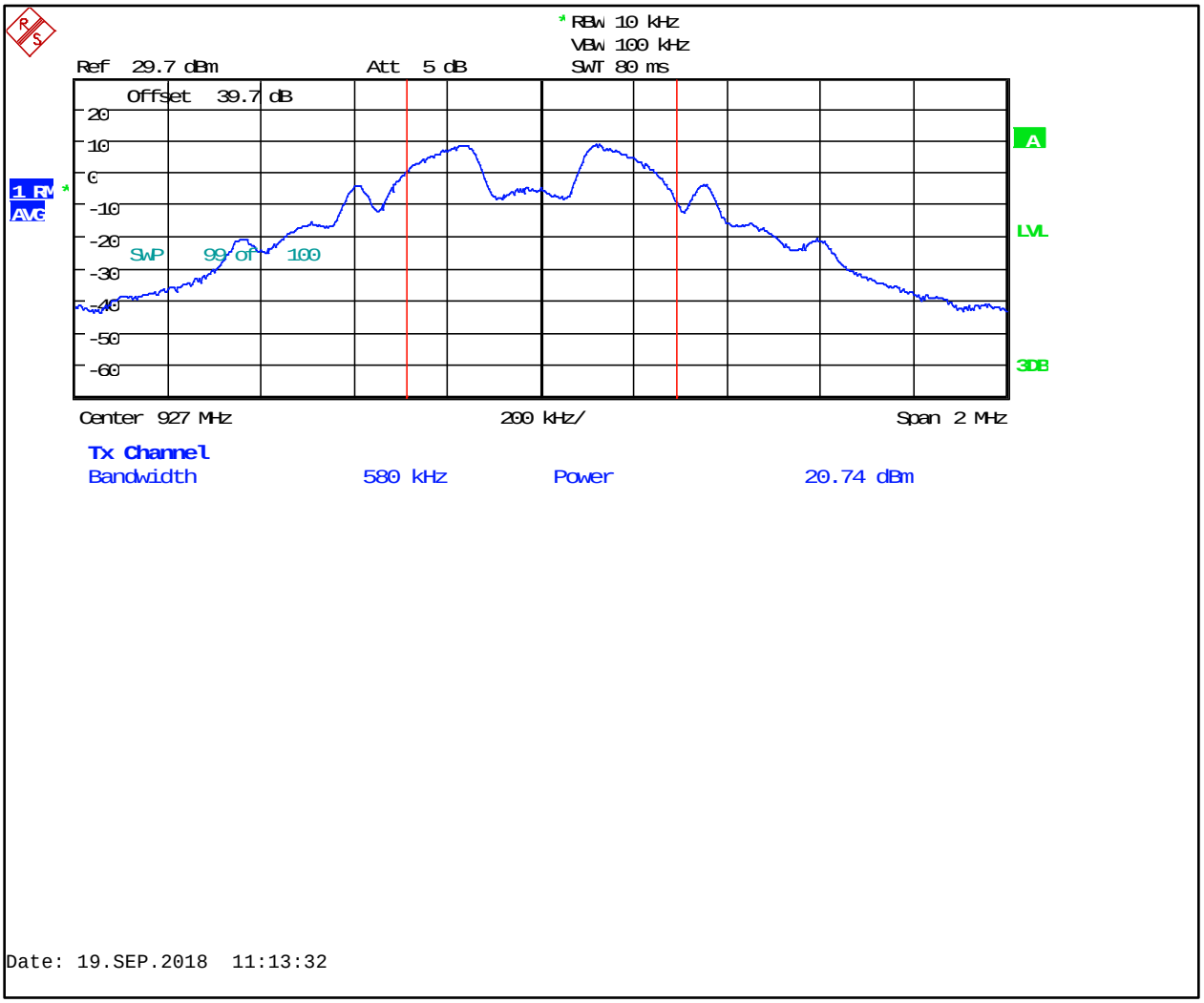
Plot 3-1: Maximum Conducted Output Power (903 MHz)



Plot 3-2: Maximum Conducted Output Power (915 MHz)



Plot 3-3: Maximum Conducted Output Power (927 MHz)



Test Personnel:

Dan Baltzell		September 19, 2018
Test Engineer	Signature	Date of Test

4 Band Edge Compliance of RF Conducted Emissions – FCC 15.247(d); ISED RSS-247 5.5

4.1 Band Edge Test Procedure

Procedure: C63.10-2013 11.13

The EUT was connected to the spectrum analyzer through suitable attenuation. The spectrum analyzer was set to the following:

Center Frequency:	Frequency of the emissions to be measured
Span:	5 MHz
RBW:	100 kHz
VBW:	3 x RBW
Detector:	Peak
Sweep:	Auto
Trace:	Max Hold

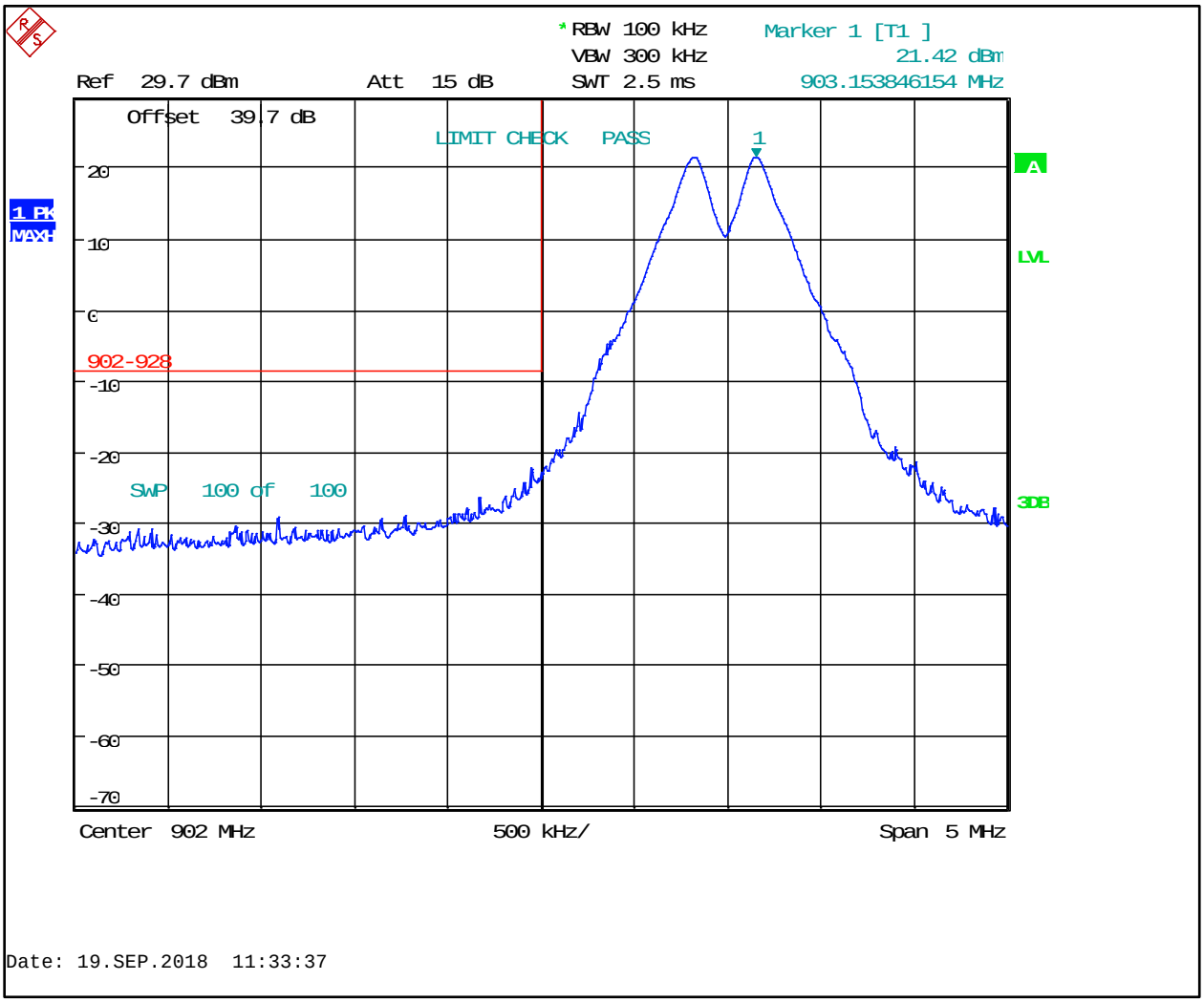
The trace was allowed to stabilize. The marker was set on the emission. The amplitude of the fundamental was used to establish the 30 dB to the band edge limit, the 30 dBc requirement of 15.247(d) since we are measuring and reporting power as average.

Table 4-1: Test Equipment

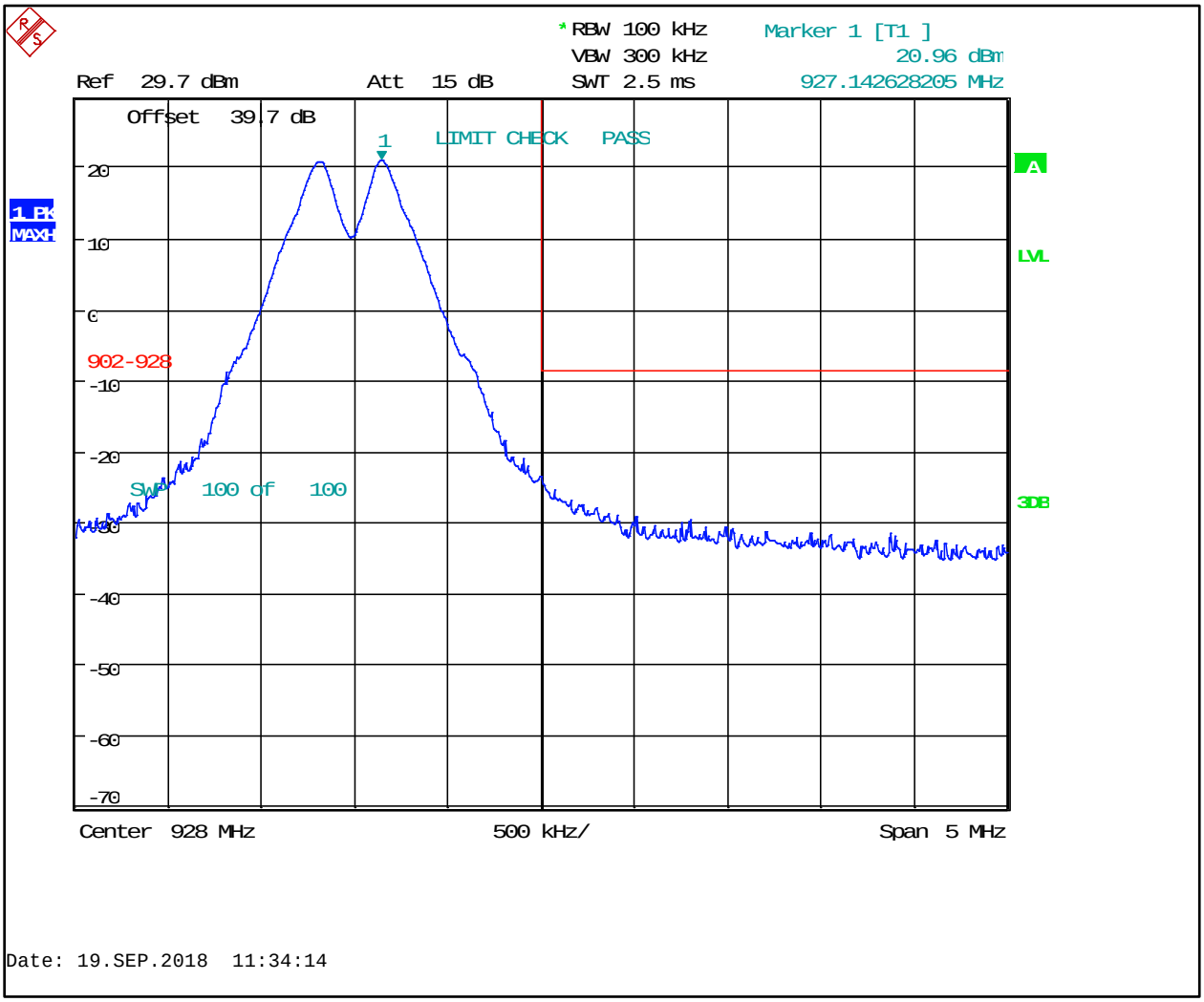
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	4/26/21
901727	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/20/19
901724	API Weinschel, Inc.	48-40-34	40 dB 100W Attenuator	CJ8921	8/7/19

4.2 Test Results

Plot 4-1: Lower Band Edge (902 MHz Band Edge, 903 MHz Carrier)



Plot 4-2: Upper Band Edge (928 MHz Band Edge, 927 MHz Carrier)



Test Personnel:

Dan Baltzell		September 19, 2018
Test Engineer	Signature	Date of Test

5 Antenna Conducted Spurious Emissions – FCC 15.247(d); ISED RSS-247 5.5

5.1 Antenna Conducted Spurious Emissions Test Procedures

Procedure: C63.10-2013 11.12.2.

Antenna spurious emissions per FCC 15.247(d) were measured from the EUT antenna port using a 50-ohm spectrum analyzer with the resolution bandwidth set at 1 MHz, and the video bandwidth set at 3 MHz. The modulated carrier was identified at the following frequencies: 903 MHz, 915 MHz and 927 MHz. The carrier to the 10th harmonic of the carrier frequency was investigated.

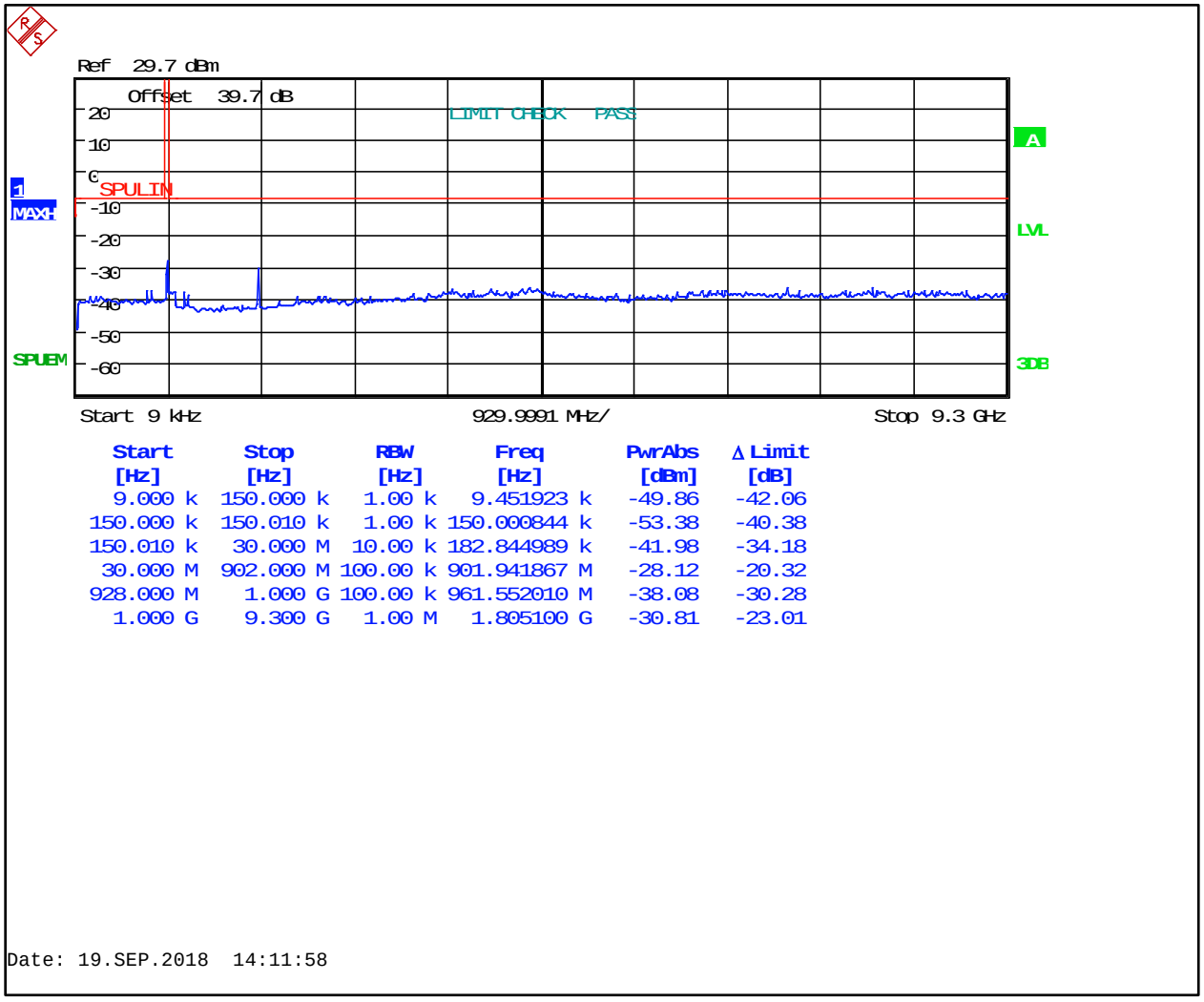
Table 5-1: Antenna Conducted Spurious Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	4/26/21
901727	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/20/19
901724	API Weinschel, Inc.	48-40-34	40 dB 100W Attenuator	CJ8921	8/7/19

5.2 Antenna Conducted Spurious Emissions Test Results

All spurious emissions were greater than 20 dB below the limit (note that we are reporting power as average so the limit is 30 dBc).

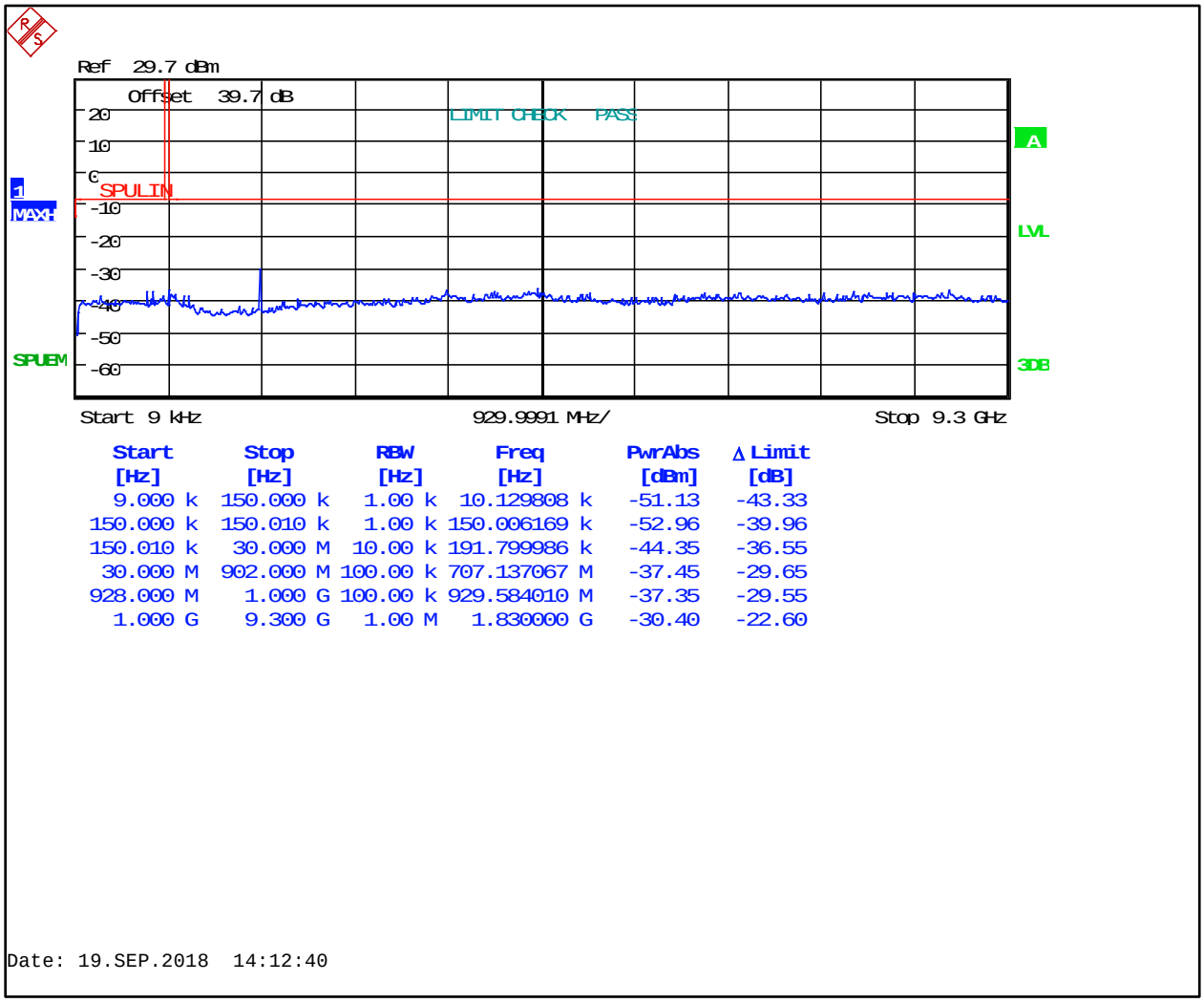
Plot 5-1: Antenna Conducted Spurious Emissions (903 MHz)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
9.000 k	150.000 k	1.00 k	9.451923 k	-49.86	-42.06
150.000 k	150.010 k	1.00 k	150.000844 k	-53.38	-40.38
150.010 k	30.000 M	10.00 k	182.844989 k	-41.98	-34.18
30.000 M	902.000 M	100.00 k	901.941867 M	-28.12	-20.32
928.000 M	1.000 G	100.00 k	961.552010 M	-38.08	-30.28
1.000 G	9.300 G	1.00 M	1.805100 G	-30.81	-23.01

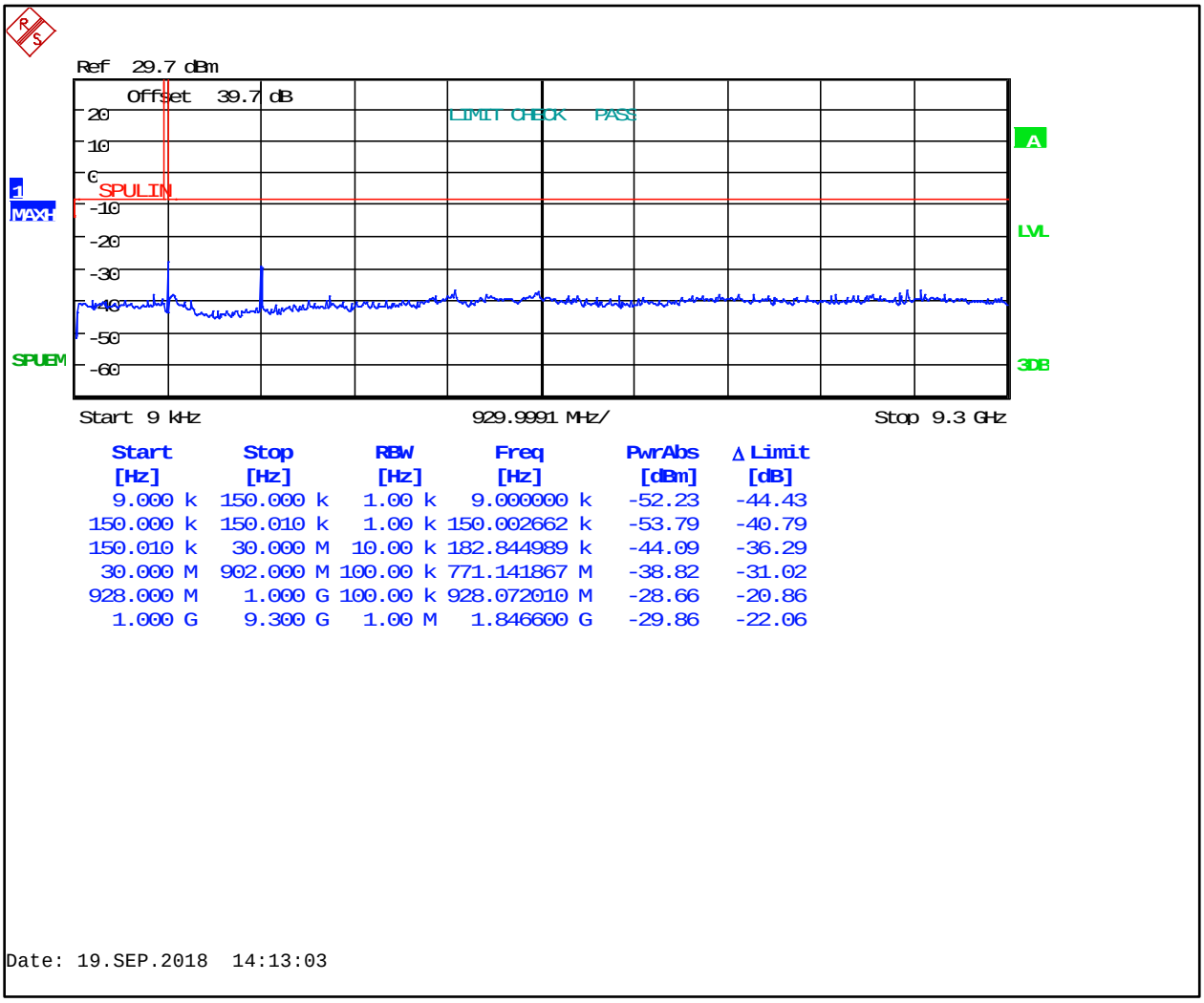
Date: 19.SEP.2018 14:11:58

Plot 5-2: Antenna Conducted Spurious Emissions (915 MHz)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
9.000 k	150.000 k	1.00 k	10.129808 k	-51.13	-43.33
150.000 k	150.010 k	1.00 k	150.006169 k	-52.96	-39.96
150.010 k	30.000 M	10.00 k	191.799986 k	-44.35	-36.55
30.000 M	902.000 M	100.00 k	707.137067 M	-37.45	-29.65
928.000 M	1.000 G	100.00 k	929.584010 M	-37.35	-29.55
1.000 G	9.300 G	1.00 M	1.830000 G	-30.40	-22.60

Plot 5-3: Antenna Conducted Spurious Emissions (927 MHz)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
9.000 k	150.000 k	1.00 k	9.000000 k	-52.23	-44.43
150.000 k	150.010 k	1.00 k	150.002662 k	-53.79	-40.79
150.010 k	30.000 M	10.00 k	182.844989 k	-44.09	-36.29
30.000 M	902.000 M	100.00 k	771.141867 M	-38.82	-31.02
928.000 M	1.000 G	100.00 k	928.072010 M	-28.66	-20.86
1.000 G	9.300 G	1.00 M	1.846600 G	-29.86	-22.06

Test Personnel:

Dan Baltzell		September 19, 2018
Test Engineer	Signature	Date of Test

6 Bandwidth – FCC 15.247(a)(2); ISED RSS-247 5.2(a)

6.1 Bandwidth Test Procedure

Procedure: C63.10-2013 11.8.

The minimum 6 dB bandwidths per FCC 15.247(a)(2) were measured using a 50-ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The device was modulated. The minimum 6 dB bandwidths are presented below.

Table 6-1: 6 dB Bandwidth Test Equipment

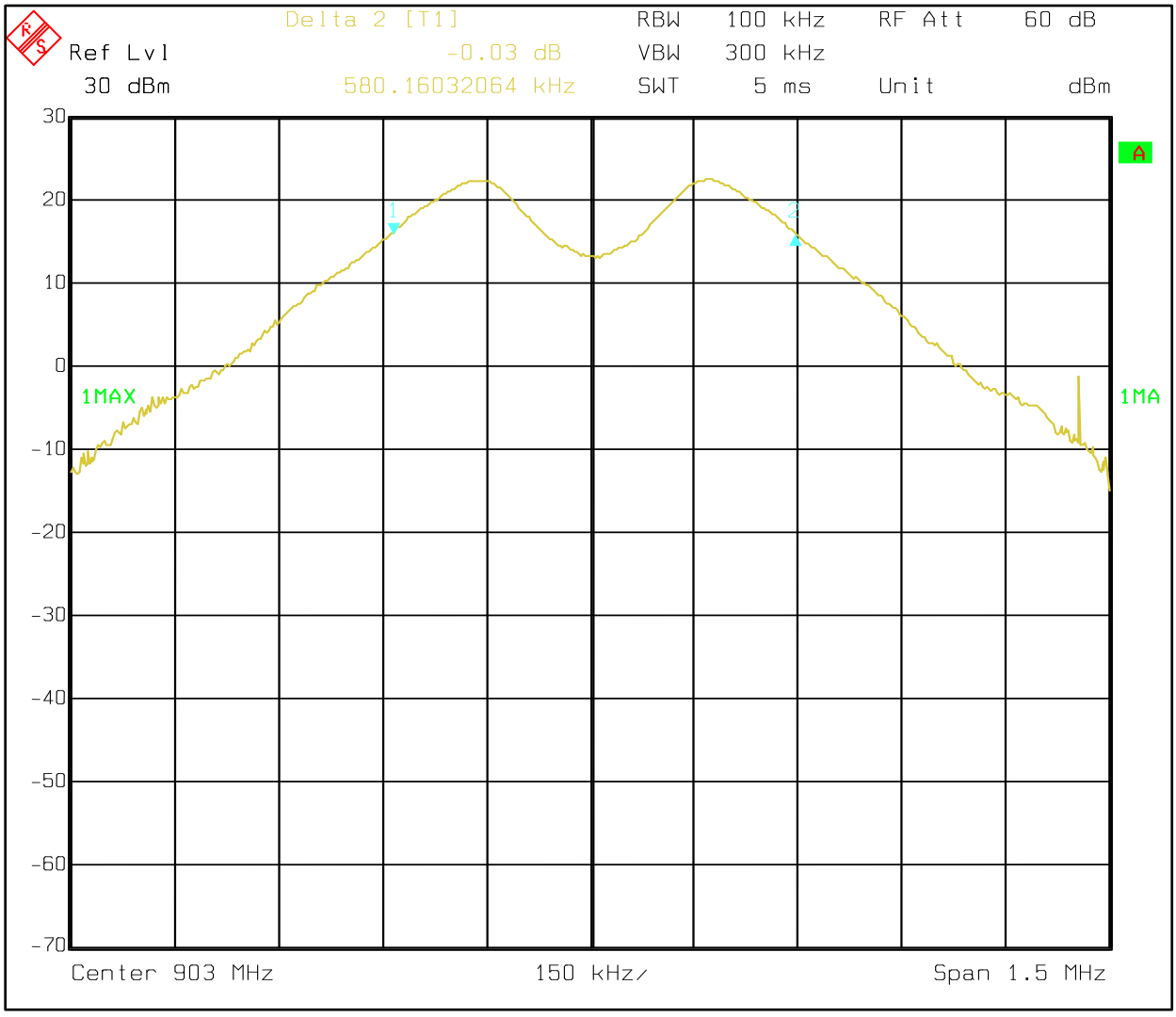
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901672	Rohde & Schwarz	FSEM30	Spectrum Analyzer	FSEM30	4/17/19

6.2 Bandwidth Test Results

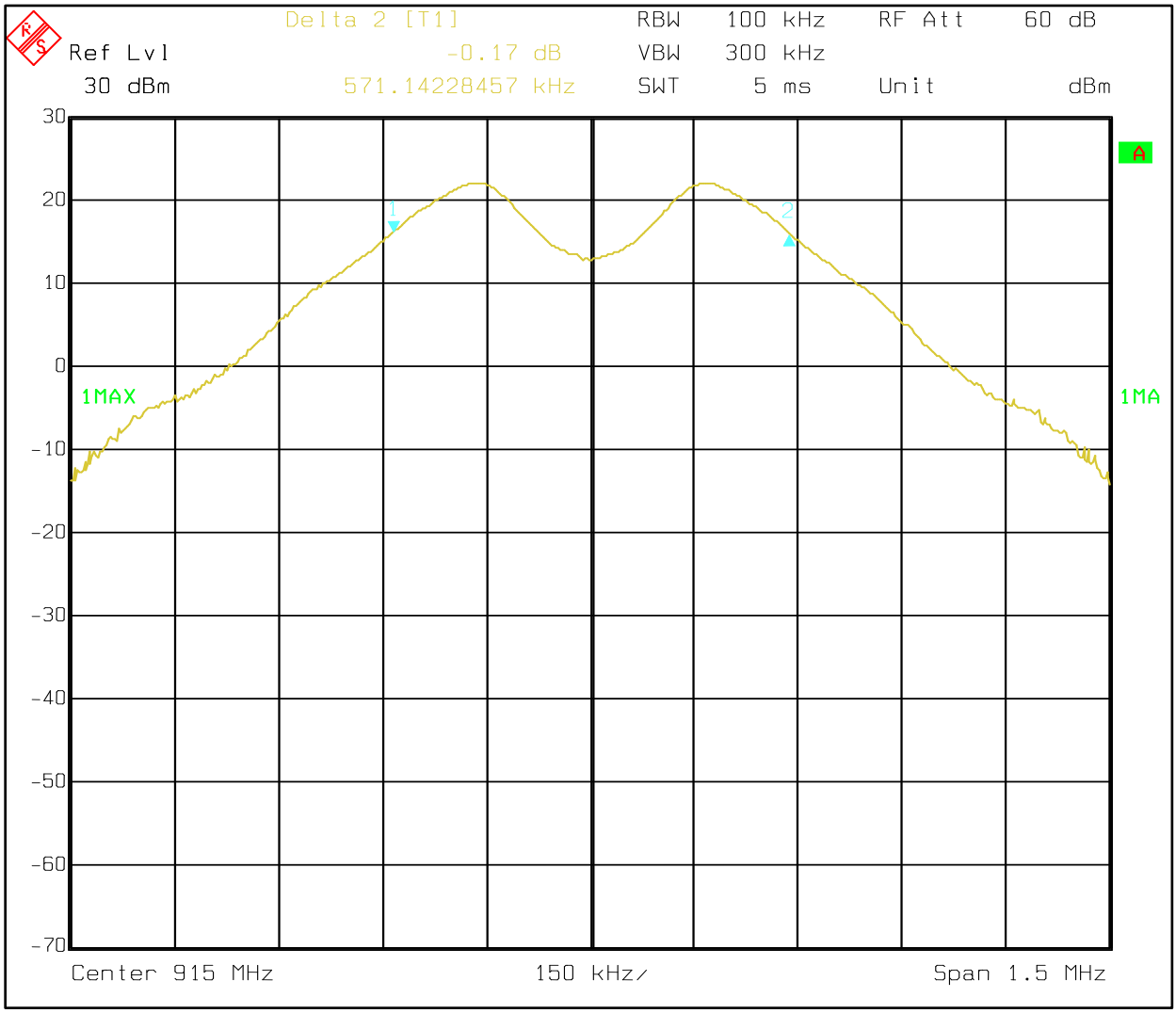
Table 6-2: 6 dB Bandwidth Test Data

Frequency (MHz)	Bandwidth (kHz)	Minimum Limit (kHz)	Pass/Fail
903	580	500	Pass
915	571	500	Pass
927	574	500	Pass

Plot 6-1: 6 dB Bandwidth – 903 MHz



Plot 6-2: 6 dB Bandwidth – 915 MHz



Plot 6-3: 6 dB Bandwidth – 927 MHz

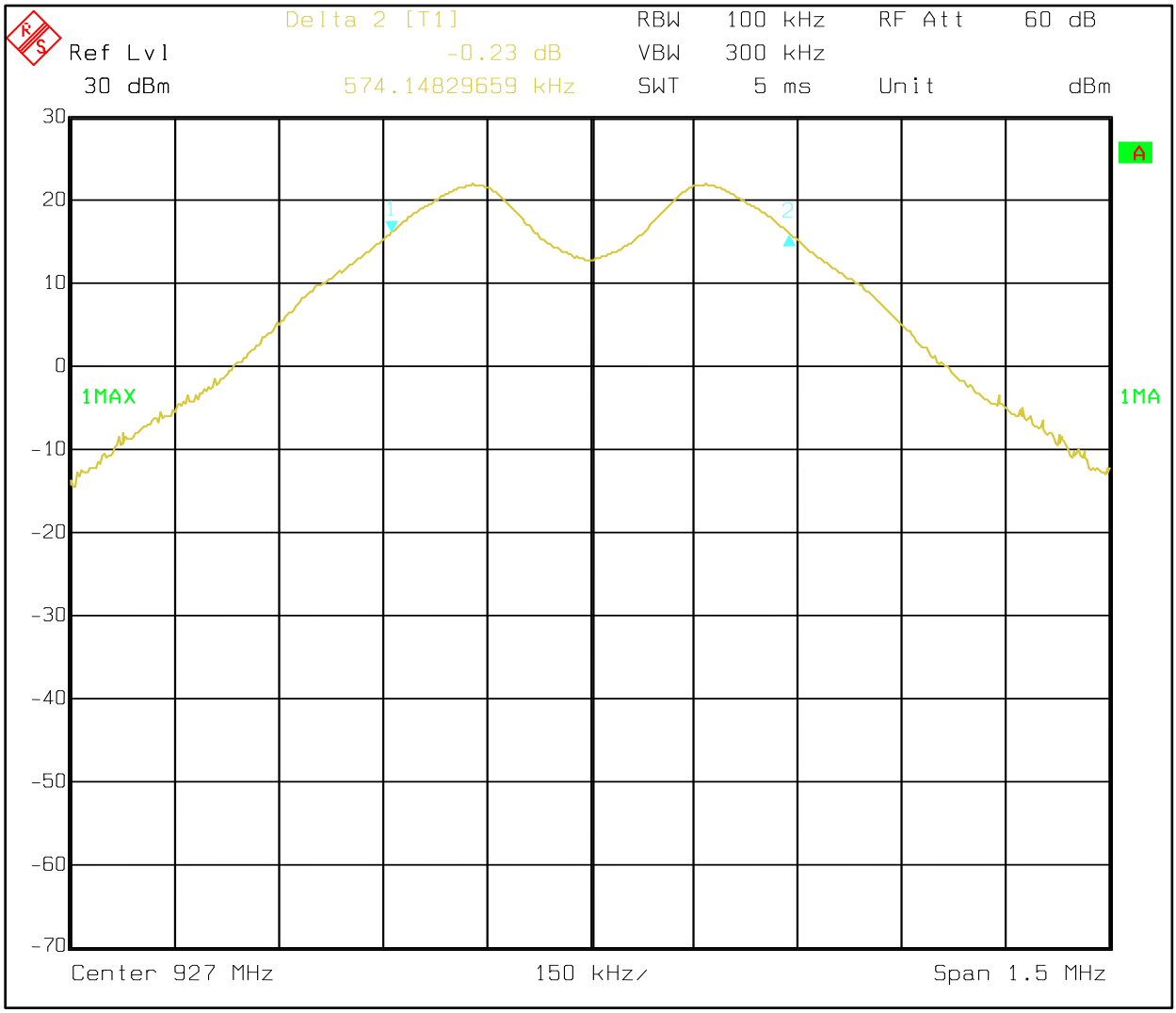
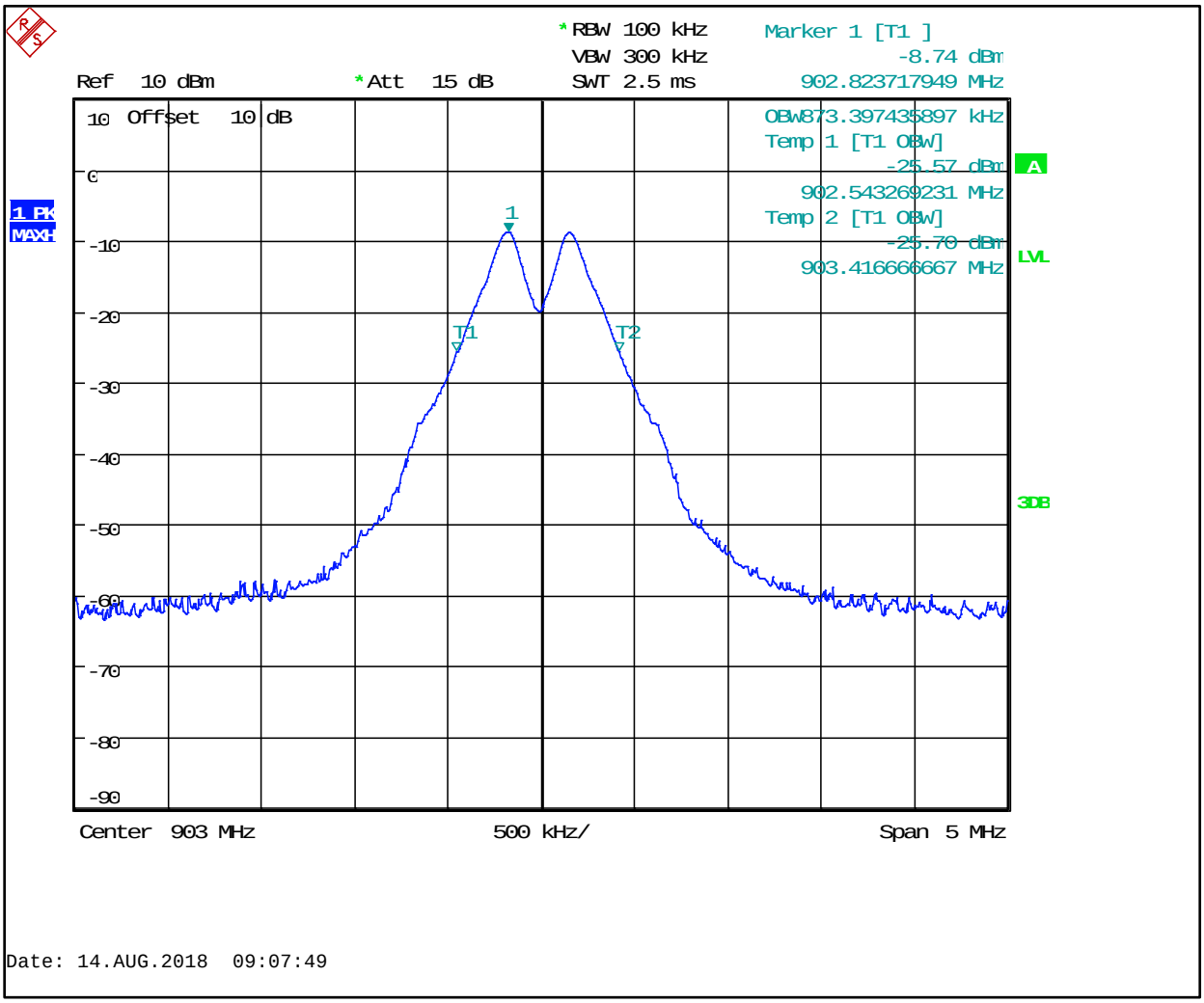


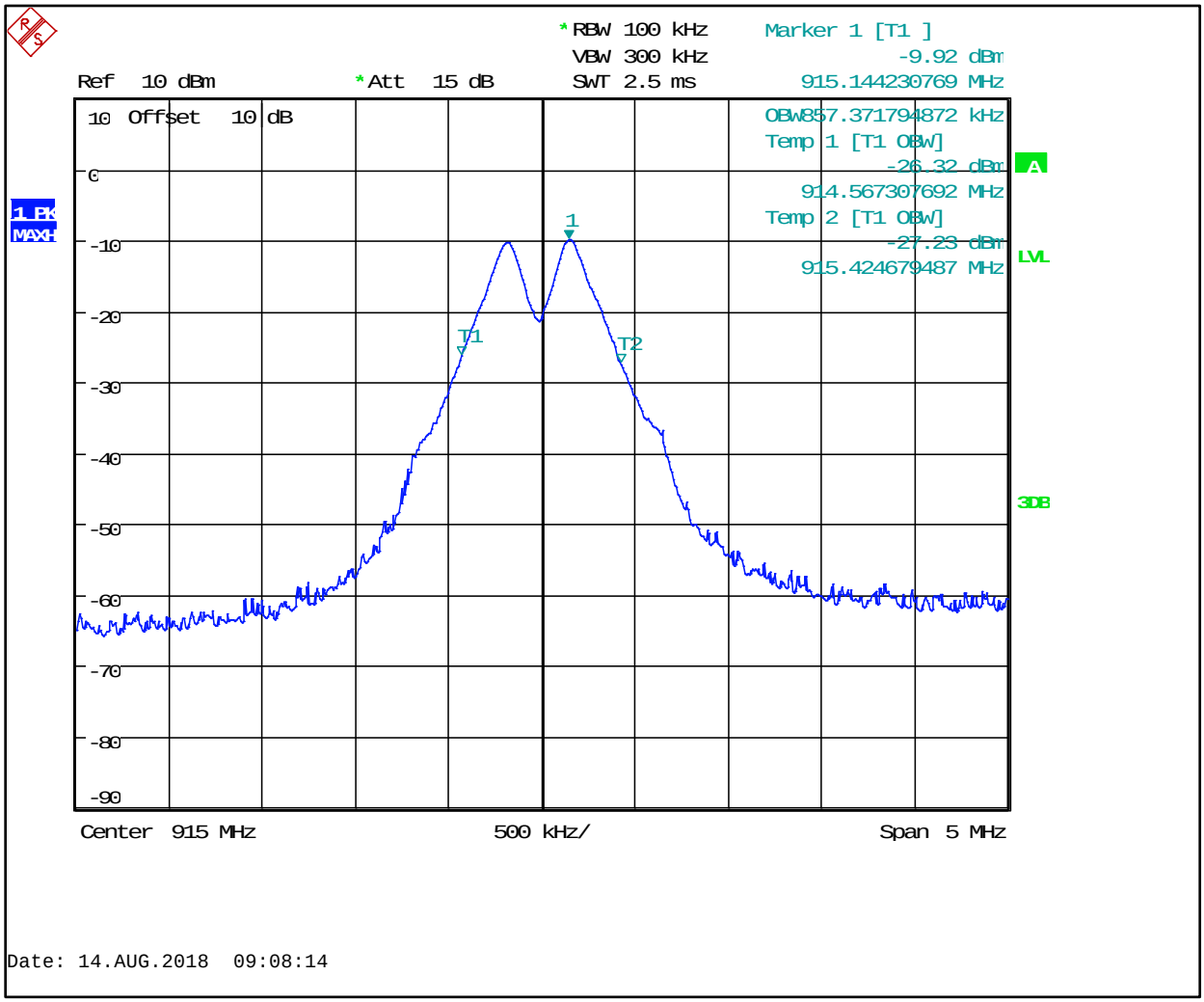
Table 6-3: 99% Bandwidth Test Data

Frequency (MHz)	Bandwidth (kHz)
903	873
915	857
927	857

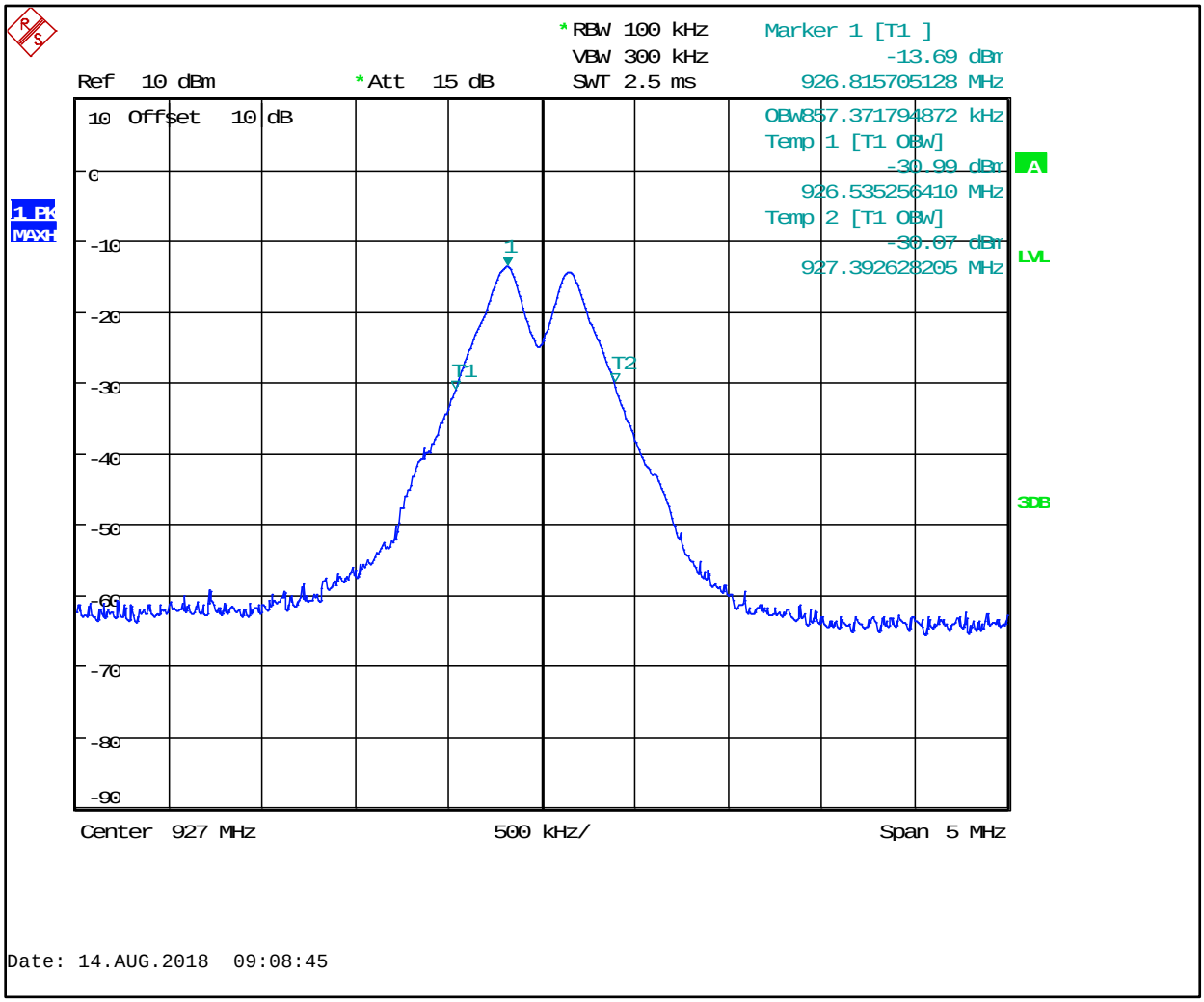
Plot 6-4: 99% Bandwidth – 903 MHz



Plot 6-5: 99% Bandwidth – 915 MHz



Plot 6-6: 99% Bandwidth – 927 MHz



Test Personnel:

Dan Baltzell		May 9 & August 14, 2018
Test Engineer	Signature	Dates of Test

7 Power Spectral Density – FCC 15.247(e); ISED RSS-247 5.2(b)

7.1 Power Spectral Density Test Procedure

Procedure: C63.10-2013 11.10.3

The power spectral density per FCC 15.247(e) was measured using a 50-ohm spectrum analyzer with the resolution bandwidth set at 3 kHz, the video bandwidth set at 10 kHz. RMS trace averaging over 100 sweeps was used to resolve the spectral density for the modulated carriers at 903, 915 and 927 MHz. These levels are below the +8 dBm limit. See the power spectral density table and plots that follow.

Table 7-1: Power Spectral Density Test Equipment

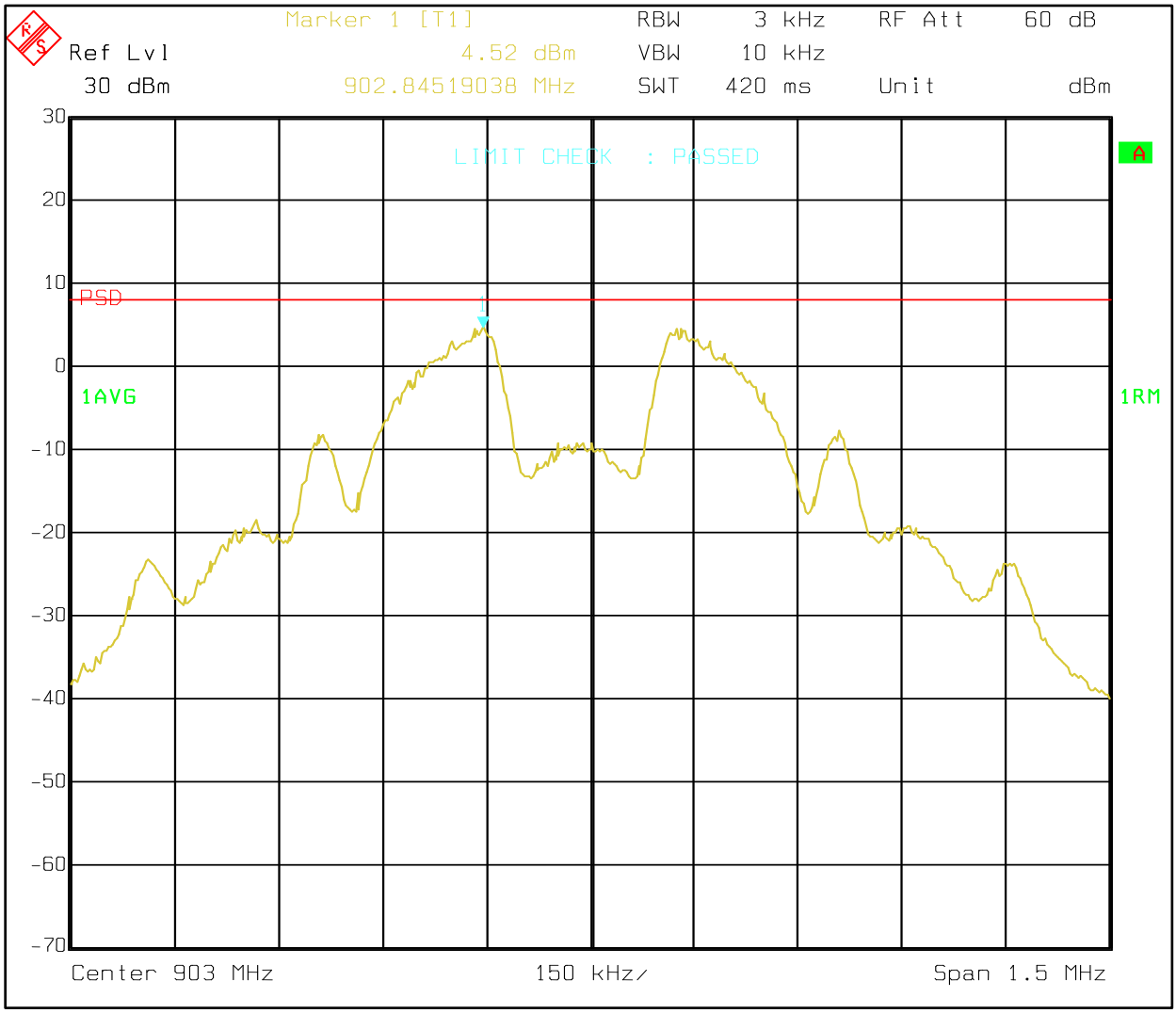
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901672	Rohde & Schwarz	FSEM30	Spectrum Analyzer	FSEM30	4/17/19

7.2 Power Spectral Density Test Data

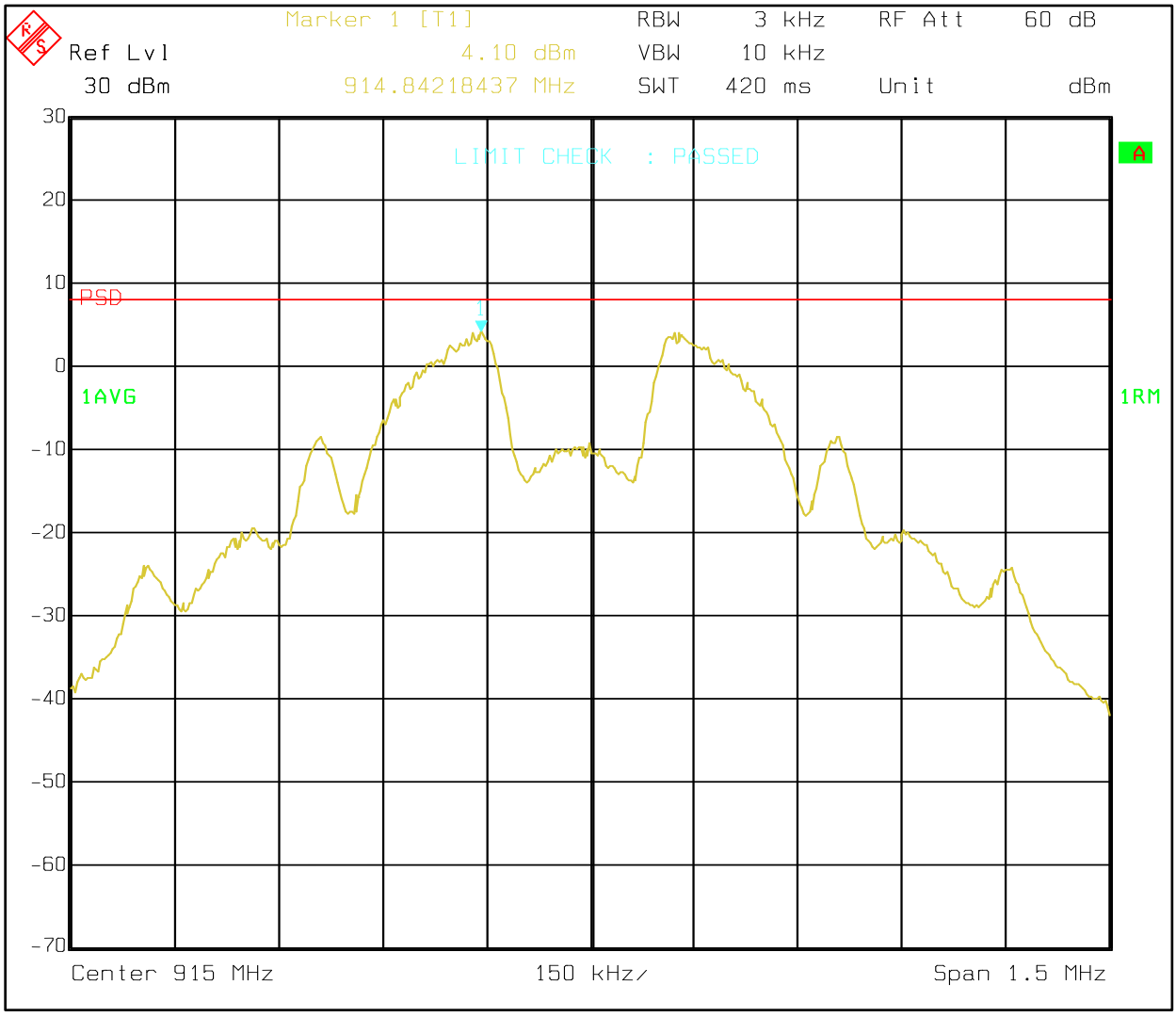
Table 7-2: Power Spectral Density Test Data

Frequency (MHz)	RF Power Level (dBm)	Maximum Limit +8 dBm	Pass/Fail
903	4.5	8	Pass
915	4.1	8	Pass
927	3.8	8	Pass

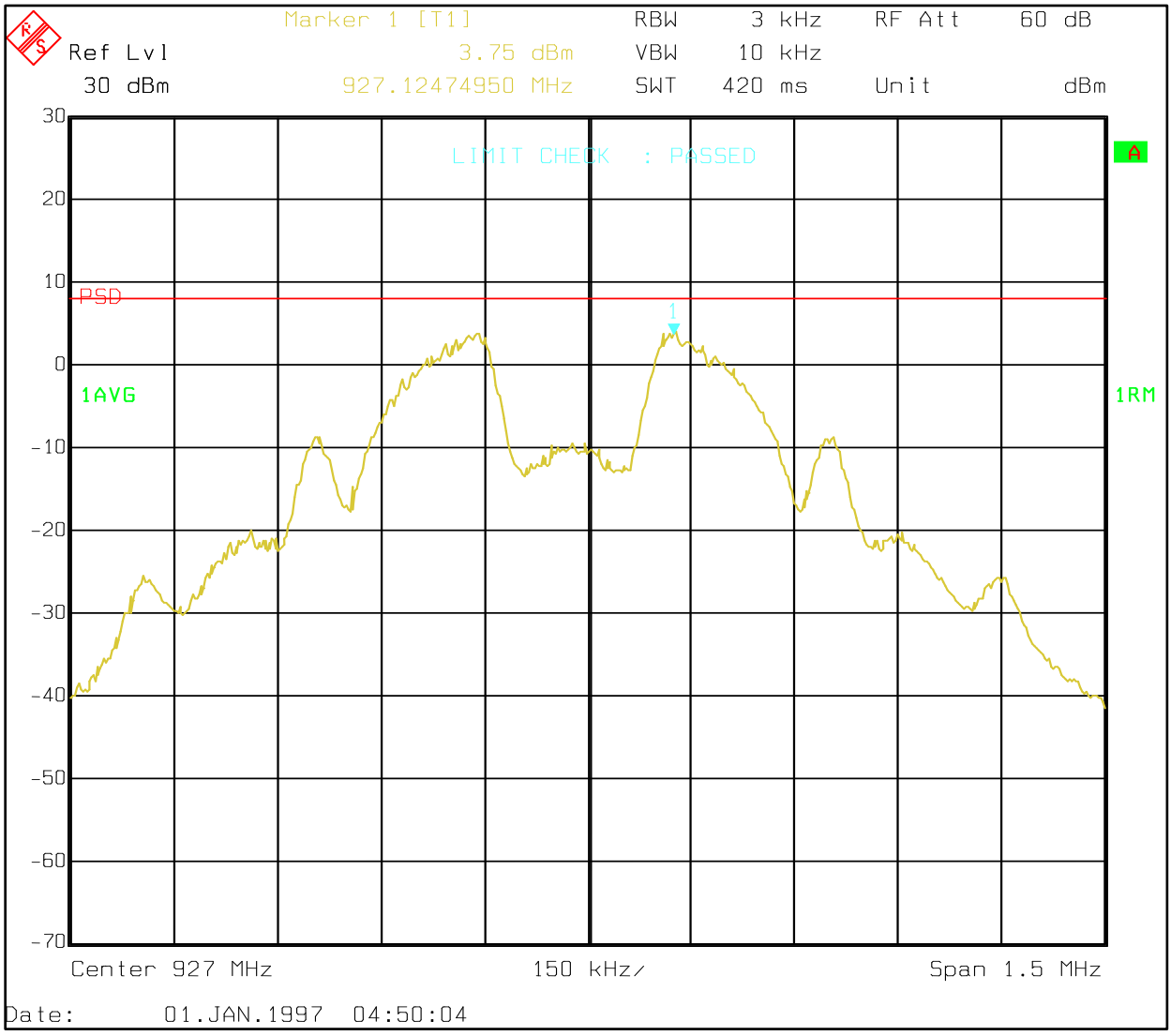
Plot 7-1: Power Spectral Density – 903 MHz



Plot 7-2: Power Spectral Density – 915 MHz



Plot 7-3: Power Spectral Density – 927 MHz



Test Personnel:

Dan Baltzell	Signature	May 9, 2018
Test Engineer		Date of Test

8 Conducted Emissions Measurement Limits – FCC 15.207; ISED RSS-Gen

8.1 Limits of Conducted Emissions Measurement

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

8.2 Conducted Emissions Measurement Test Procedure

Procedure: C63.10-2009 6.2

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50-ohm / 50 micro Henry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

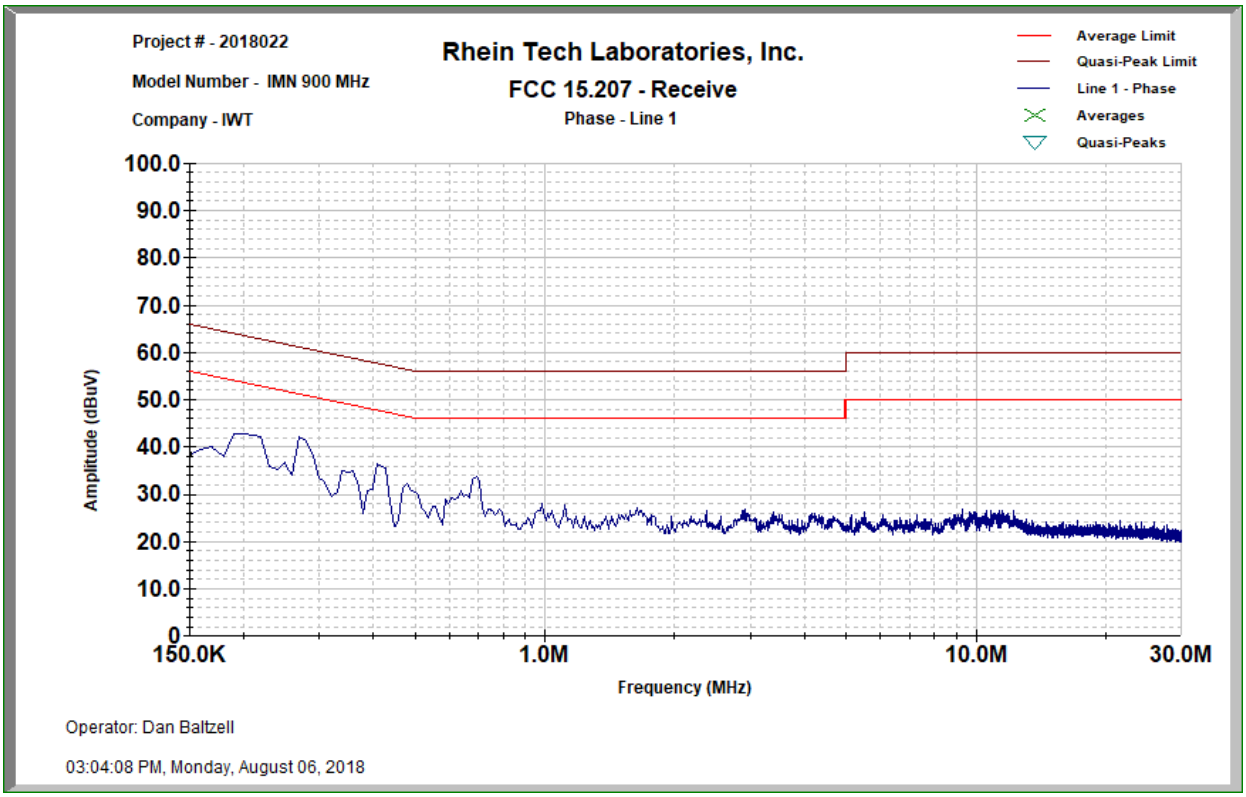
The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

Table 8-1: Conducted Emissions Test Equipment

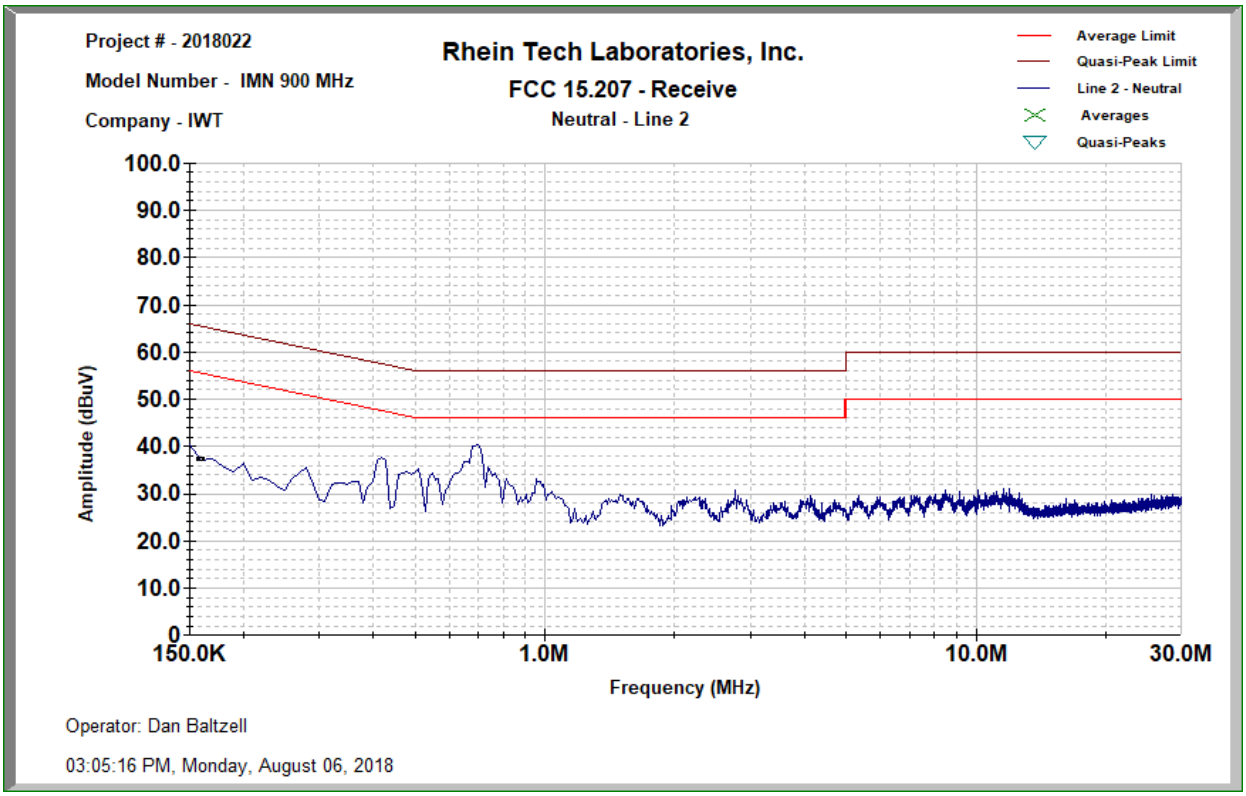
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901083	AFJ International	LS16	16A LISN (110 V)	16010020080	2/13/21
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	4/26/19
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	4/26/19
900728	Solar	8130	Filter	947305	4/24/20
900339	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz - 1 GHz)	2521A00743	4/24/20

8.3 Conducted Line Emissions Test Data

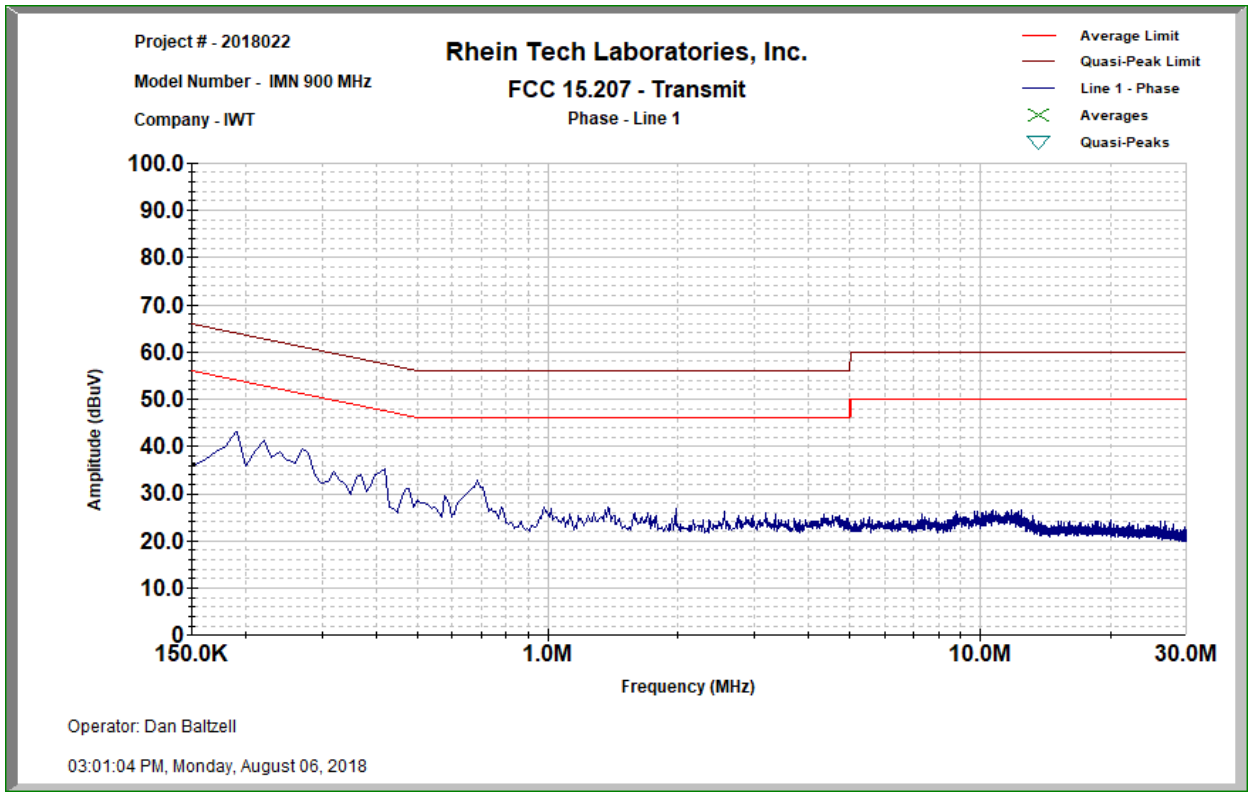
Plot 8-1: Conducted Line Emissions – Phase – Receive Mode



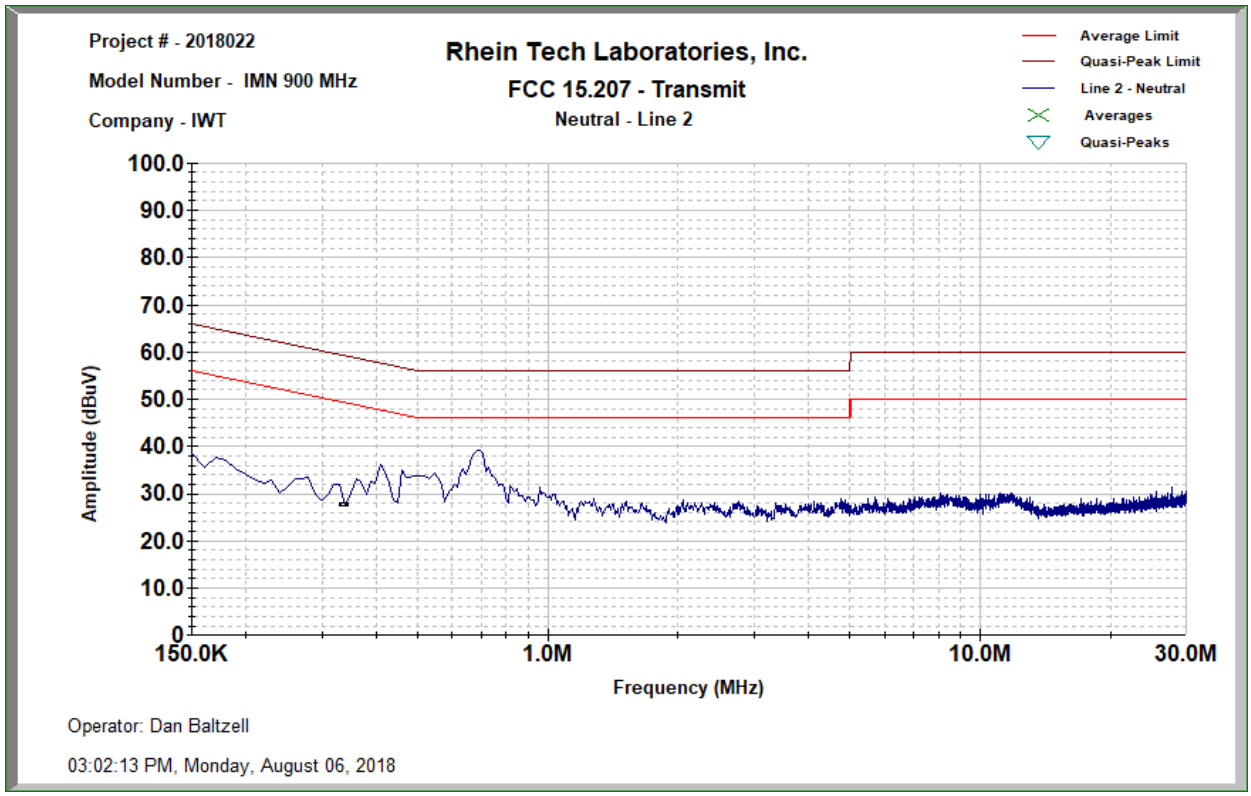
Plot 8-2: Conducted Line Emissions – Neutral – Receive Mode



Plot 8-3: Conducted Line Emissions – Phase – Transmit Mode



Plot 8-4: Conducted Line Emissions – Neutral – Transmit Mode



Results: Pass

Test Personnel:

Dan Baltzell		August 6, 2018
EMC Test Engineer	Signature	Date of Test

9 Radiated Emissions – FCC 15.209; ISED RSS-247, RSS-Gen

9.1 Limits of Radiated Emissions Measurement

Frequency (MHz)	Field Strength (uV/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	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000 MHz, 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, specified above by more than 20 dB under any circumstances of modulation.

9.2 Radiated Emissions Measurement Test Procedure

Procedure: C63.10-2013 11.12.1

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane. The spectrum was examined from 9 kHz to the 10^{th} harmonic of the highest fundamental transmitter frequency (9 GHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations. For frequencies between 30 and 1000 MHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1,000 MHz, emissions are measured using the average detector function with a minimum resolution bandwidth of 1 MHz. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Table 9-1: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Laboratories, Inc.	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	N/A
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	8/18/18
901242	Rhein Tech Laboratories, Inc.	WRT-000-0003	Wood rotating table	N/A	N/A
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	4/9/19
900321	EMCO	3161-03	Horn Antennas (4 - 8,2 GHz)	9508-1020	4/9/19
900323	EMCO	3160-7	Horn Antennas (8,2 - 12,4 GHz)	9605-1054	4/9/19
901672	Rohde & Schwarz	FSEM30	Spectrum Analyzer	FSEM30	4/17/19
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	10/4/20

9.3 Radiated Emissions Test Results

9.3.1 Radiated Emissions Unintentional

Table 9-2: Quasi-Peak Radiated Emissions Unintentional

Emission Frequency (MHz)	Quasi-Peak Detector Level (dBuV) (120 kHz RBW/ 500 kHz VBW)	Site Correction Factor (dB/m)	Quasi-Peak Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Quasi-Peak Margin (dB)
30.0	18.0	17.3	35.3	40.0	-4.7
85.0	7.6	7.5	15.1	40.0	-24.9
103.0	5.3	8.8	14.1	43.5	-29.4
195.0	5.6	10.7	16.3	43.5	-27.2
200.0	2.2	10.9	13.1	43.5	-30.4
312.0	1.9	14.1	16.0	46.0	-30.0

9.3.2 Radiated Emissions Harmonics/Spurious

Table 9-3: Peak Radiated Emissions Harmonics/Spurious TX Frequency; 903 MHz; Omni Ant.

Emission Frequency (MHz)	Peak Detector Level (dBuV) (1 MHz RBW/ 3 MHz VBW)	Site Correction Factor (dB/m)	Peak Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
1006.843	13.4	25.0	38.4	74.0	-35.6
2709.0	16.0	35.4	51.4	74.0	-22.6
3612.0	14.8	38.7	53.5	74.0	-20.5
4515.0	14.6	40.7	55.3	74.0	-18.7
5418.0	13.7	41.5	55.2	74.0	-18.8
8127.0	14.3	44.8	59.1	74.0	-14.9
9030.0	14.0	45.9	59.9	74.0	-14.1

Table 9-4: Average Radiated Emissions Harmonics/Spurious TX Frequency; 903 MHz; Omni Ant.

Emission Frequency (MHz)	Average Detector Level (dBuV)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
1006.843	13.4	25.0	38.4	54.0	-15.6
2709.0	11.5	35.4	46.9	54.0	-7.1
3612.0	3.3	38.7	42.0	54.0	-12.0
4515.0	3.8	40.7	44.5	54.0	-9.5
5418.0	2.6	41.5	44.1	54.0	-9.9
8127.0	3.4	44.8	48.2	54.0	-5.8
9030.0	3	45.9	48.9	54.0	-5.1

Table 9-5: Peak Radiated Emissions Harmonics/Spurious TX Frequency; 915 MHz; Omni Ant.

Emission Frequency (MHz)	Peak Detector Level (dBuV) (1 MHz RBW/ 3 MHz VBW)	Site Correction Factor (dB/m)	Peak Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
2745.0	16.8	35.5	52.3	74.0	-21.7
3660.0	13.9	38.9	52.8	74.0	-21.2
4575.0	16.0	43.5	59.5	74.0	-14.5
7320.0	12.3	36.4	48.7	74.0	-25.3
8235.0	12.8	39.2	52.0	74.0	-22.0
9150.0	13.1	41.5	54.6	74.0	-19.4

Table 9-6: Average Radiated Emissions Harmonics/Spurious TX Frequency; 915 MHz; Omni Ant.

Emission Frequency (MHz)	Average Detector Level (dBuV)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
2745.0	12.9	35.5	48.4	54.0	-5.6
3660.0	2.8	38.9	41.7	54.0	-12.3
4575.0	4.8	43.5	48.3	54.0	-5.7
7320.0	1.2	36.4	37.6	54.0	-16.4
8235.0	1.9	39.2	41.1	54.0	-12.9
9150.0	2	41.5	43.5	54.0	-10.5

Table 9-7: Peak Radiated Emissions Harmonics/Spurious TX Frequency; 927 MHz; Omni Ant.

Emission Frequency (MHz)	Peak Detector Level (dBuV) (1 MHz RBW/ 3 MHz VBW)	Site Correction Factor (dB/m)	Peak Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
2781.0	15.5	35.7	51.2	74.0	-22.8
3708.0	13.6	39.1	52.7	74.0	-21.3
4635.0	14.6	43.8	58.4	74.0	-15.6
7416.0	13.3	44.0	57.3	74.0	-16.7
8343.0	15.0	45.1	60.1	74.0	-13.9

Table 9-8: Average Radiated Emissions Harmonics/Spurious TX Frequency; 927 MHz; Omni Ant.

Emission Frequency (MHz)	Average Detector Level (dBuV)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
2781.0	10.1	35.7	45.8	54.0	-8.2
3708.0	3.9	39.1	43.0	54.0	-11.0
4635.0	3.7	43.8	47.5	54.0	-6.5
7416.0	2	44.0	46.0	54.0	-8.0
8343.0	3.8	45.1	48.9	54.0	-5.1

Table 9-9: Peak Radiated Emissions Harmonics/Spurious TX Frequency; 903 MHz; Yagi Ant.

Emission Frequency (MHz)	Peak Detector Level (dBuV) (1 MHz RBW/ 3 MHz VBW)	Site Correction Factor (dB/m)	Peak Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
2709.0	21.3	35.4	56.7	74.0	-17.3
3612.0	19.9	38.7	58.6	74.0	-15.4
4515.0	14.6	40.7	55.3	74.0	-18.7
5418.0	13.0	41.5	54.5	74.0	-19.5
8127.0	14.3	44.8	59.1	74.0	-14.9
9030.0	14.2	45.9	60.1	74.0	-13.9

Table 9-10: Average Radiated Emissions Harmonics/Spurious TX Frequency; 903 MHz; Yagi Ant.

Emission Frequency (MHz)	Average Detector Level (dBuV)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
2709.0	15.9	35.4	51.3	54.0	-2.7
3612.0	10.3	38.7	49.0	54.0	-5.0
4515.0	4.0	40.7	44.7	54.0	-9.3
5418.0	2.9	41.5	44.4	54.0	-9.6
8127.0	1.2	44.8	46.0	54.0	-8.0
9030.0	0.9	45.9	46.8	54.0	-7.2

Table 9-11: Peak Radiated Emissions Harmonics/Spurious TX Frequency; 915 MHz; Yagi Ant.

Emission Frequency (MHz)	Peak Detector Level (dBuV) (1 MHz RBW/ 3 MHz VBW)	Site Correction Factor (dB/m)	Peak Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
2745.0	22.8	35.5	58.3	74.0	-15.7
3660.0	18.4	38.9	57.3	74.0	-16.7
4575.0	16.2	43.5	59.7	74.0	-14.3
7320.0	13.0	43.9	56.9	74.0	-17.1
8235.0	12.9	44.9	57.8	74.0	-16.2
9150.0	14.3	46.2	60.5	74.0	-13.5

Table 9-12: Average Radiated Emissions Harmonics/Spurious TX Frequency; 915 MHz; Yagi Ant.

Emission Frequency (MHz)	Average Detector Level (dBuV)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
2745.0	18.4	35.5	53.9	54.0	-0.1
3660.0	7.4	38.9	46.3	54.0	-7.7
4575.0	5.0	43.5	48.5	54.0	-5.5
7320.0	1.3	43.9	45.2	54.0	-8.8
8235.0	1.7	44.9	46.6	54.0	-7.4
9150.0	1.6	46.2	47.8	54.0	-6.2

Table 9-13: Peak Radiated Emissions Harmonics/Spurious TX Frequency; 927 MHz; Yagi Ant.

Emission Frequency (MHz)	Peak Detector Level (dBuV) (1 MHz RBW/ 3 MHz VBW)	Site Correction Factor (dB/m)	Peak Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
2781.0	18.6	35.7	54.3	74.0	-19.7
3708.0	17.7	39.1	56.8	74.0	-17.2
4635.0	14.9	43.8	58.7	74.0	-15.3
7416.0	13.1	44.0	57.1	74.0	-16.9
8343.0	14.3	45.1	59.4	74.0	-14.6

Table 9-14: Average Radiated Emissions Harmonics/Spurious TX Frequency; 927 MHz; Yagi Ant.

Emission Frequency (MHz)	Average Detector Level (dBuV)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
2781.0	13.6	35.7	49.3	54.0	-4.7
3708.0	6.9	39.1	46.0	54.0	-8.0
4635.0	3.6	43.8	47.4	54.0	-6.6
7416.0	2.1	44.0	46.1	54.0	-7.9
8343.0	3.5	45.1	48.6	54.0	-5.4

Test Personnel:

Dan Baltzell		May 10, 2018
EMC Test Engineer	Signature	Date of Test

10 Conclusion

The data in this measurement report shows the Innovative Wireless Technologies, Inc. Model # FAP4213-210, Integrated Mesh Node (IMN), FCC ID: SP8-FAP4213210, IC: 9568A-FAP4213210, complies with the applicable requirements of Parts 2 and 15 of the FCC rules and regulations, and RSS-247 and RSS-Gen of the ISED rules and regulations.