Certification Test Report

FCC ID: XF6-RS9113DB
IC: 8407A-RS9113DB

FCC Rule Part: 15.247
ISED Canada Radio Standards Specification: RSS-247

Report Number: AT72148773-1P1

Manufacturer: Redpine Signals, Inc.
Model: RS9113DB

Test Begin Date: May 21, 2019
Test End Date: May 23, 2019

Report Issue Date: August 7, 2019

FOR THE SCOPE OF ACCREDITATION UNDER Certificate Number: 2955.09

This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

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This report contains 23 pages

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1 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Innovation, Science, and Economic Development Canada's Radio Standards Specification RSS-247 Certification for a Class II Permissive Change to address a new antenna type.

1.2 Product Description

The Redpine RS9113DB integrates a multi-threaded MAC processor with integrated analog peripherals and support for digital peripherals, baseband digital signal processor, analog front-end, crystal oscillator, calibration OTP memory, dual-band RF transceiver, dual-band high-power amplifiers, baluns, diplexers diversity switch and Quad-SPI Flash thus providing a fully-integrated solution for embedded wireless applications. It can connect to a host processor through SDIO or USB interfaces.

This test report documents the compliance of the 2.4GHz transceiver mode of operation only.

Technical Information:

Detail	Description	
Frequency Range	2412 – 2462MHz	
Number of Channels	11	
Channel Spacing	5 MHz	
Modulation Format	802.11b: 802.11g: 802.11n (HT 40):	DSSS (DBPSK / DQPSK / CCK) OFDM (BPSK, QPSK, 16-QAM, 64-QAM) OFDM (BPSK, QPSK, 16-QAM, 64-QAM)
Data Rates	802.11b: 802.11g: 802.11n (HT 40):	1 – 11 Mbps 6 – 54 Mbps 6.5 – 72 Mbps
Antenna Type / Gain	External Dipole / 2.15dBi Max in 2.4GHz Band	

Manufacturer Information:
Landis+Gyr Technology, Inc.
30000 Mill Creek Ave., Suite 100
Alpharetta, GA 30022

Test Sample Serial Number: Network Bridge

Test Sample Condition: The test samples were provided in good working order with no visible defects.

1.3 Test Methodology and Considerations

All modes of operation, including all data rates, were evaluated and the data presented in this report represents the worst case where applicable. The worst-case data rate was MCS0.

For radiated emissions, the EUT was evaluated in an orientation representative of use in the field.

For AC power line conducted emissions the EUT was evaluated with a commercially available wall wart power supply.

Power setting during test: 127 (Default Max)

2 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following addresses:

TÜV SÜD America, Inc.
5945 Cabot Pkwy, Suite 100
Alpharetta, GA 30005
Phone: (678) 341-5900

2.2 Laboratory Accreditations/Recognitions/Certifications

TÜV SÜD America, Inc. is accredited to ISO/IEC 17025 by the American Association for Laboratory Accreditation/A2LA accreditation program and has been issued certificate number 2955.09 in recognition of this accreditation.

Unless otherwise specified, all tests methods described within this report are covered under the ISO/IEC 17025 scopes of accreditation.

The Semi-Anechoic Chamber Test Sites and Conducted Emissions Sites have been fully described, submitted to, and accepted by the FCC, ISED Canada and the Japanese Voluntary Control Council for Interference by information technology equipment.

FCC Registration Number:	967699
ISED Canada Lab Code:	23932
VCCI Member Number:	1831
• VCCI Registration Number	A-0295

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site – Chamber A

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 5' in diameter and is located 5'6" from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted EMCO Model 1060 installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chase from the turntable to the pit that allows for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

The chamber rear wall is covered with a mixture of Siepel pyramidal absorber. The side walls of the chamber are partially covered with Siepel pyramidal absorber.

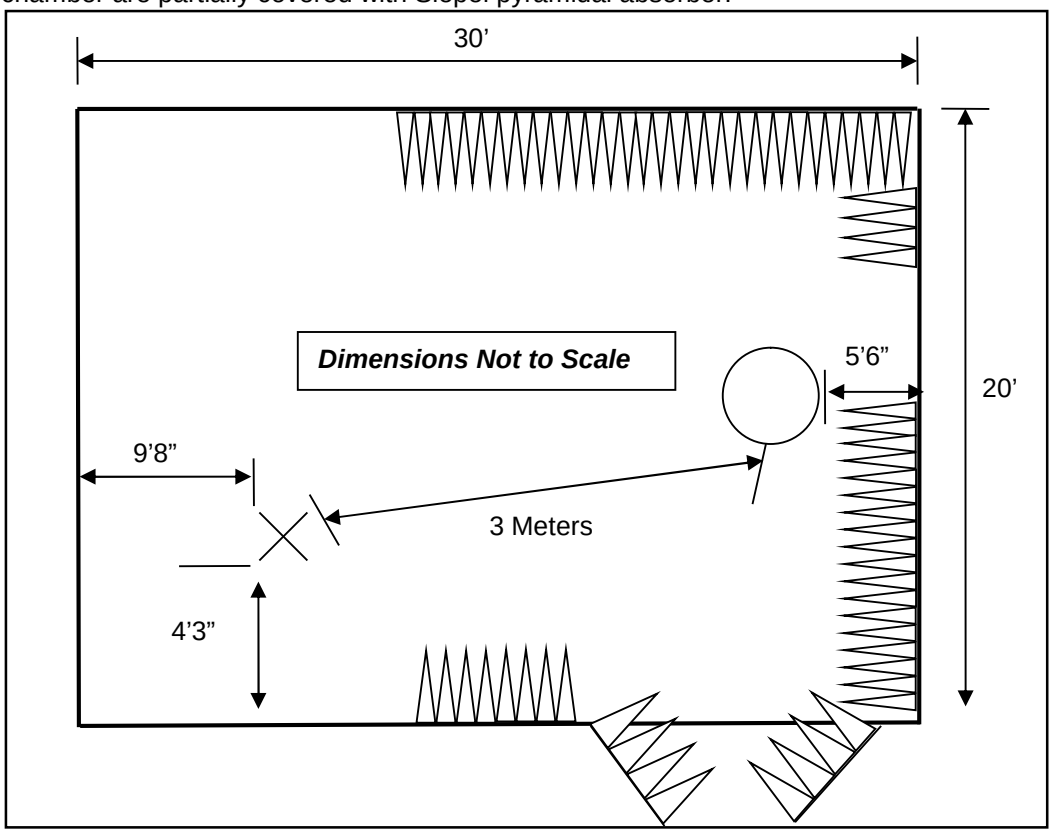


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site – Chamber A

2.3.2 Semi-Anechoic Chamber Test Site – Chamber B

The Semi-Anechoic Chamber Test Site consists of a 20'W x 30'L x 20'H shielded enclosure. The chamber is lined with ETS-Lindgren Ferrite Absorber, model number FT-1500. The ferrite tile 600 mm x 600 mm (2.62 in x 23.62 in) panels and are mounted directly on the inner walls of the chamber shield.

The specular regions of the chamber are lined with additional ETS-Lindgren PS-600 hybrid absorber to extend its frequency range up to 18GHz and beyond.

The turntable is a 2m ETS-Lindgren Model 2170 and installed off the center axis is located 5'6" from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the shield using #8 solid copper wire.

The antenna mast is an EMCO 1060 and is remotely controlled from the control room for both antenna height and polarization.

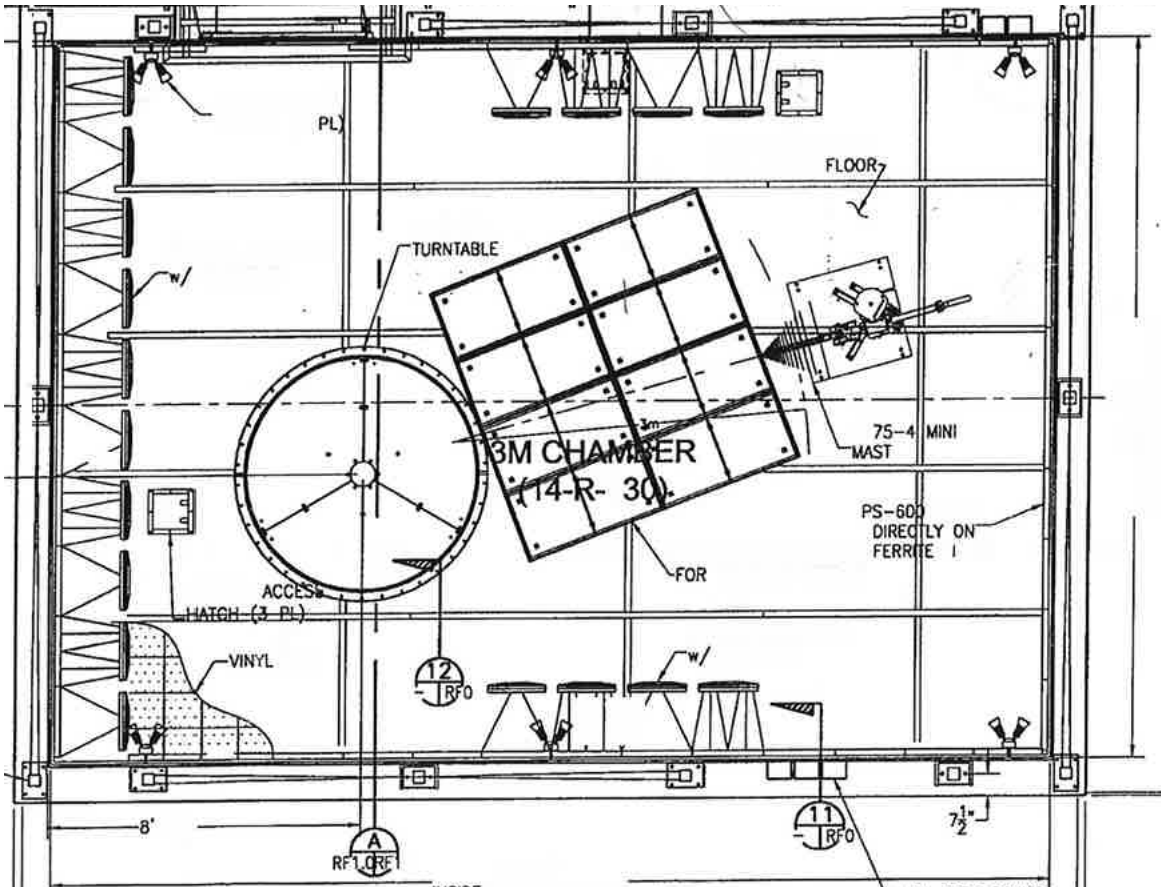


Figure 2.3.2-1: Semi-Anechoic Chamber Test Site – Chamber B

2.4 Conducted Emissions Test Site Description

2.4.1 Conducted Emissions Test Site

The AC mains conducted EMI site is located in the main EMC lab. It consists of a 12' x 10' horizontal coupling plane (HCP) as well as a 12'x8' vertical coupling plane(VCP). The HGP is constructed of 4' x 10' sheets of particle board sandwiched by galvanized steel sheets. These panels are bonded using 11AWG 1/8" x 2" by 10' galvanized sheet steel secured to the panels via by screws. The VCP is constructed of three 4'x8' sheets of 11AWG solid aluminum.

The HCP and VCP are electrically bonded together using 1"x1" angled aluminum secured with screws.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.10.

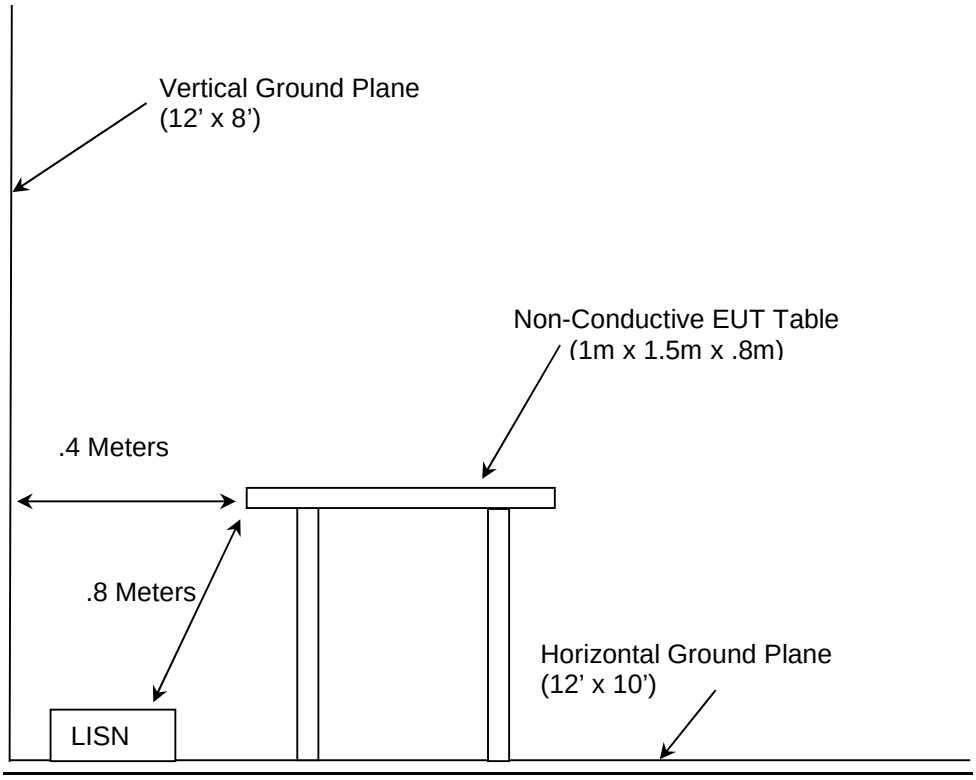


Figure 2.4.1-1: AC Mains Conducted EMI Site

3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2019
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2019
- FCC KDB 558074 D01 DTS Meas Guidance v05r02 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247, April 2, 2019
- ISED Canada Radio Standards Specification: RSS-247 – Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices, Issue 2, February 2017.
- ISED Canada Radio Standards Specification: RSS-GEN – General Requirements for Compliance of Radio Apparatus, Issue 5, April 2018.

4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

Table 4-1: Test Equipment

Asset ID	Manufacturer	Model	Equipment Type	Serial Number	Last Calibration Date	Calibration Due Date
321	Hewlett Packard	HPC 8447D	Low Freq. Pre-Amp	1937A02809	09/12/2018	09/12/2019
324	ACS	Belden	Conducted EMI Cable	8214	03/19/2019	03/19/2020
335	Suhner	SF-102A	Cable (40GHZ)	882/2A	07/10/2018	07/10/2019
338	Hewlett Packard	8449B	High Frequency Pre-Amp	3008A01111	07/11/2017	07/11/2019
345	Suhner Sucoflex	102A	Cable 42(GHZ)	1077/2A	07/10/2018	07/10/2019
432	Microwave Circuits	H3G020G4	Highpass Filter	264066	5/16/2018	11/16/2019
628	EMCO	6502	Active Loop Antenna 10kHz-30MHz	9407-2877	02/11/2019	11/02/2021
651	Rohde & Schwarz	TS-PR26	18GHz to 26.5GHz Pre-Amplifier	100023	07/10/2018	07/10/2019
652	Rohde & Schwarz	3160-09	High Frequency Antenna 18GHz to 26.5GHz	060922-21894	NCR	NCR
813	PMM	9010	EMI Receiver; RF Input 50ohm; 10Hz-50MHz; 10Hz-30MHz	697WW30606	02/25/2019	02/25/2020
819	Rohde & Schwarz	ESR26	EMI Test Receiver	101345	11/06/2018	11/06/2019
851	TUV ATLANTA	FMC0101951-100CM	ASAC Cable Set Consisting of 566, 619, and 564	N/A	09/26/2018	09/26/2019
852	Teseq	CBL 6112D	Bilog Antenna; Attenuator	51617	10/15/2018	10/15/2019
3010	Rohde & Schwarz	ENV216	Two-Line V-Network	3010	07/11/2018	07/11/2019

NCR = No Calibration Required
NOTE: All test equipment was used only during active calibration cycles.

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model/Part Number	Serial Number
1	Evaluation Board	Landis & Gyr	**Network Bridge**	**Not Labeled**
2	DC Power Supply	Redpine Signals	**RS9113DB**	**Not Labeled**
3	Antenna	Skywave	**11-1069-A**	**Not Labeled**

Table 5-2: Cable Description

Cable	Cable Type	Length	Shield	Termination
A	AC Power Cable	147 cm	No	1 - AC
B	RF cable	90 cm	No	1 - 2

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

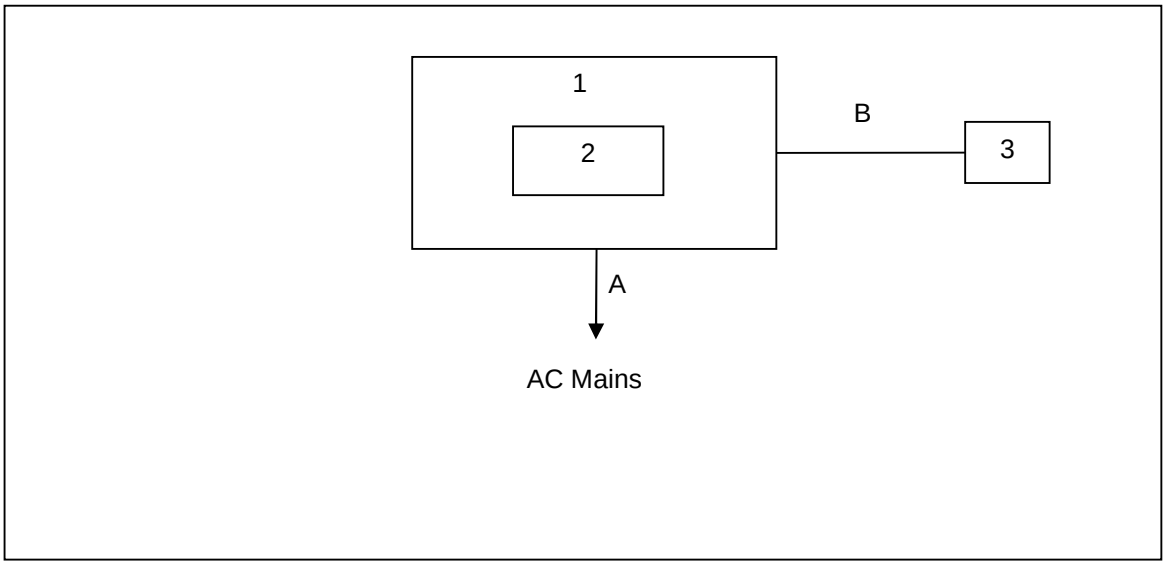


Figure 6-1: Test Setup Block Diagram

7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement – FCC 15.203

The EUT utilizes a dual band dipole antenna. Connection to the module is via a U.fl to SMA adapter cable which is a unique connection. The max gain of the antenna is 2.15dBi in the 2.4GHz band.

7.2 Power Line Conducted Emissions – FCC 15.207, ISED Canada: RSS-Gen 8.8

7.2.1 Measurement Procedure

Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Corrected Reading – Applicable Limit

7.2.2 Measurement Results

Performed by: Fabian Nica

Table 7.2.2-1: Conducted EMI Results – Line 1

Frequency (MHz)	Corrected Reading		Limit		Margin		Correction (dB)
	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	
	(dBµV)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dB)	
0.15	46.63	22.31	66	56	-19.37	-33.69	9.61
0.154	49.05	32.27	65.78	55.78	-16.73	-23.51	9.6
0.166	48.79	22.83	65.16	55.16	-16.37	-32.33	9.57
0.182	42.09	22.77	64.39	54.39	-22.3	-31.62	9.58
0.202	41.52	22.7	63.53	53.53	-22.01	-30.83	9.6
0.226	40.39	22.6	62.6	52.6	-22.21	-30	9.61
0.25	38.17	22.46	61.76	51.76	-23.59	-29.3	9.62
0.498	38.92	22.54	56.03	46.03	-17.11	-23.49	9.66
0.53	42.02	32.22	56	46	-13.98	-13.78	9.66
14.83	33.76	23.38	60	50	-26.24	-26.62	9.89

Table 7.2.2-2: Conducted EMI Results – Line 2

Frequency (MHz)	Corrected Reading		Limit		Margin		Correction (dB)
	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	
	(dBµV)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dB)	
0.15	41.9	22.36	66	56	-24.1	-33.64	9.62
0.154	45.36	22.96	65.78	55.78	-20.42	-32.82	9.62
0.174	43.98	22.91	64.77	54.77	-20.79	-31.86	9.64
0.186	39.84	22.79	64.21	54.21	-24.37	-31.42	9.63
0.202	40.72	22.72	63.53	53.53	-22.81	-30.81	9.62
0.246	40.02	22.49	61.89	51.89	-21.87	-29.4	9.62
0.502	41.46	27.97	56	46	-14.54	-18.03	9.67
0.522	42.05	33.23	56	46	-13.95	-12.77	9.67
0.538	42.02	32.35	56	46	-13.98	-13.65	9.67
0.546	41.64	27.74	56	46	-14.36	-18.26	9.67

7.3 Emissions into Restricted Frequency Bands – FCC: 15.205, 15.209; ISED Canada: RSS-Gen 8.9 / 8.10

7.3.1 Measurement Procedure

The unwanted emissions into restricted bands were measured radiated over the frequency range of 9kHz to 25GHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1 meter to 4 meters so that the maximum radiated emissions level would be detected. For frequencies below 1000 MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak and average measurements were made with RBW and VBW of 1 MHz and 3 MHz respectively.

Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in section 15.209.

7.3.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.3.2-1: Radiated Spurious Emissions Tabulated Data – 802.11b 1 Mbps

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBµV/m)		Limit (dBµV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
2412 MHz										
2390	48.80	35.70	H	-3.80	45.00	31.90	74.0	54.0	29.0	22.1
4824	46.90	35.90	H	4.53	51.43	40.43	74.0	54.0	22.6	13.6
4824	46.80	35.70	V	4.53	51.33	40.23	74.0	54.0	22.7	13.8
2442 MHz										
4884	47.40	38.30	H	4.83	52.23	43.13	74.0	54.0	21.8	10.9
4884	48.90	41.70	V	4.83	53.73	46.53	74.0	54.0	20.3	7.5
7326	49.50	36.60	V	9.13	58.63	45.73	74.0	54.0	15.4	8.3
2462 MHz										
2483.5	49.5	38.1	H	-3.48	46.02	34.62	74.0	54.0	28.0	19.4
2483.5	51.7	41.8	V	-3.48	48.22	38.32	74.0	54.0	25.8	15.7
4924	47.2	35.1	H	5.03	52.23	40.13	74.0	54.0	21.8	13.9
4924	47.2	36.5	V	5.03	52.23	41.53	74.0	54.0	21.8	12.5
7386	45.4	32.8	V	9.18	54.58	41.98	74.0	54.0	19.4	12.0

Table 7.3.2-2: Radiated Spurious Emissions Tabulated Data – 802.11b 11 Mbps

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBµV/m)		Limit (dBµV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
2412 MHz										
2390	53.10	39.40	H	-3.80	49.30	35.60	74.0	54.0	24.7	18.4
2390	56.10	42.60	V	-3.80	52.30	38.80	74.0	54.0	21.7	15.2
4824	52.90	38.00	H	4.53	57.43	42.53	74.0	54.0	16.6	11.5
4824	60.40	45.90	V	4.53	64.93	50.43	74.0	54.0	9.1	3.6
7236	52.80	39.40	V	9.05	61.85	48.45	74.0	54.0	12.2	5.6
2442 MHz										
4884	45.50	31.70	H	4.83	50.33	36.53	74.0	54.0	23.7	17.5
4884	46.80	32.50	V	4.83	51.63	37.33	74.0	54.0	22.4	16.7
2462 MHz										
2483.5	53.3	39.8	H	-3.48	49.82	36.32	74.0	54.0	24.2	17.7
2483.5	55.6	42.9	V	-3.48	52.12	39.42	74.0	54.0	21.9	14.6
4924	46.2	31.7	H	5.03	51.23	36.73	74.0	54.0	22.8	17.3
4924	46.4	32.4	V	5.03	51.43	37.43	74.0	54.0	22.6	16.6
7386	47.8	34.2	V	9.18	56.98	43.38	74.0	54.0	17.0	10.6

Table 7.3.2-3: Radiated Spurious Emissions Tabulated Data – 802.11g

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBµV/m)		Limit (dBµV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
2412 MHz										
2390	70.30	51.90	H	-3.80	66.50	48.10	74.0	54.0	7.5	5.9
2390	70.90	52.50	V	-3.80	67.10	48.70	74.0	54.0	6.9	5.3
4824	45.40	32.00	V	4.16	49.56	36.16	74.0	54.0	24.4	17.8
2442 MHz										
4884	45.8	32.2	H	4.48	50.28	36.68	74.0	54.0	23.7	17.3
4884	47.7	33.8	V	4.48	52.18	38.28	74.0	54.0	21.8	15.7
2462 MHz										
2483.5	71.2	51.8	H	-3.48	67.72	48.32	74.0	54.0	6.3	5.7
2483.5	70.3	50.8	V	-3.48	66.82	47.32	74.0	54.0	7.2	6.7
4924	46.2	32.3	H	4.70	50.90	37.00	74.0	54.0	23.1	17.0
4924	46.5	32.4	V	4.70	51.20	37.10	74.0	54.0	22.8	16.9

Table 7.3.2-4: Radiated Spurious Emissions Tabulated Data – 802.11n

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBµV/m)		Limit (dBµV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
2412 MHz										
2390	69.40	49.50	H	-3.80	65.60	45.70	74.0	54.0	8.4	8.3
2390	74.20	54.30	V	-3.80	70.40	50.50	74.0	54.0	3.6	3.5
4824	46.00	31.90	V	4.16	50.16	36.06	74.0	54.0	23.8	17.9
2442 MHz										
4884	46.8	32.5	H	4.48	51.28	36.98	74.0	54.0	22.7	17.0
4884	48	33.8	V	4.48	52.48	38.28	74.0	54.0	21.5	15.7
2462 MHz										
2483.5	70.2	50.3	H	-3.48	66.72	46.82	74.0	54.0	7.3	7.2
2483.5	74.2	54.3	V	-3.48	70.72	50.82	74.0	54.0	3.3	3.2
4924	45.9	32.2	V	4.70	50.60	36.90	74.0	54.0	23.4	17.1

Table 7.3.2-5: Radiated Spurious Emissions Tabulated Data – 802.11n (HT40)

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBµV/m)		Limit (dBµV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
2412 MHz										
2390	61.50	43.60	H	-3.80	57.70	39.80	74.0	54.0	16.3	14.2
2390	59.90	41.60	V	-3.80	56.10	37.80	74.0	54.0	17.9	16.2
2442 MHz										
ALL EMISSIONS BELOW EQUIPMENT NOISE FLOOR										
2462 MHz										
2483.5	60.1	43.1	H	-3.48	56.62	39.62	74.0	54.0	17.4	14.4
2483.5	59.6	42.9	V	-3.48	56.12	39.42	74.0	54.0	17.9	14.6

7.3.3 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T = Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U = Uncorrected Reading
R_C = Corrected Level
AF = Antenna Factor
CA = Cable Attenuation
AG = Amplifier Gain
DC = Duty Cycle Correction Factor

Example Calculation: Peak – 802.11n – Vertical – 2483.5 MHz

Corrected Level: 74.2 - 3.48 = 70.72dBuV/m
Margin: 74dBuV/m – 70.72dBuV/m = 3.3dB

Example Calculation: Average – 802.11n – Vertical – 2483.5 MHz

Corrected Level: 54.3 - 3.48 - 0 = 50.82dBuV
Margin: 54dBuV – 50.82dBuV = 3.2dB

8 ESTIMATION OF MEASUREMENT UNCERTAINTY

The expanded laboratory measurement uncertainty figures (U_{Lab}) provided below correspond to an expansion factor (coverage factor) k = 1.96 which provide confidence levels of 95%.

Table 8-1: Estimation of Measurement Uncertainty

Parameter	U_{lab}
Occupied Channel Bandwidth	± 0.009 %
RF Conducted Output Power	± 0.349 dB
Power Spectral Density	± 0.372 dB
Antenna Port Conducted Emissions	± 1.264 dB
Radiated Emissions ≤ 1 GHz	± 5.814 dB
Radiated Emissions > 1 GHz	± 4.318 dB
Temperature	± 0.860 °C
Radio Frequency	± 2.832 x 10^{-8}
AC Power Line Conducted Emissions	± 3.360 dB

9 CONCLUSION

In the opinion of TUV SUD the RS9113DB, manufactured by Landis & Gyr meets the requirements of FCC Part 15 subpart C and ISED Canada's Radio Standards Specification RSS-247 for the tests documented herein.

Appendix A: Plots

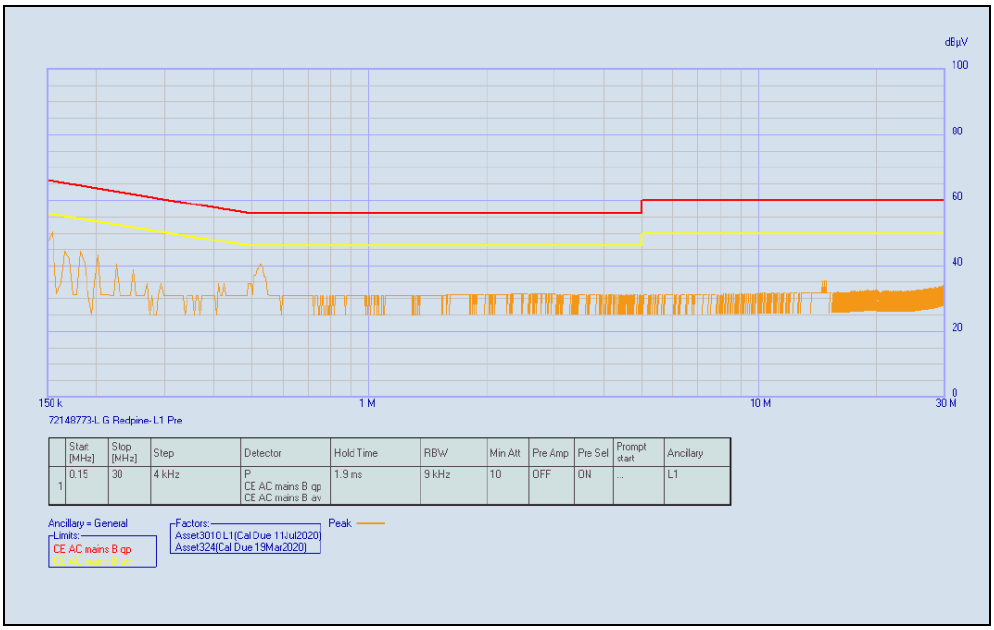


Figure A-1: Power Line Conducted Emissions – Line 1

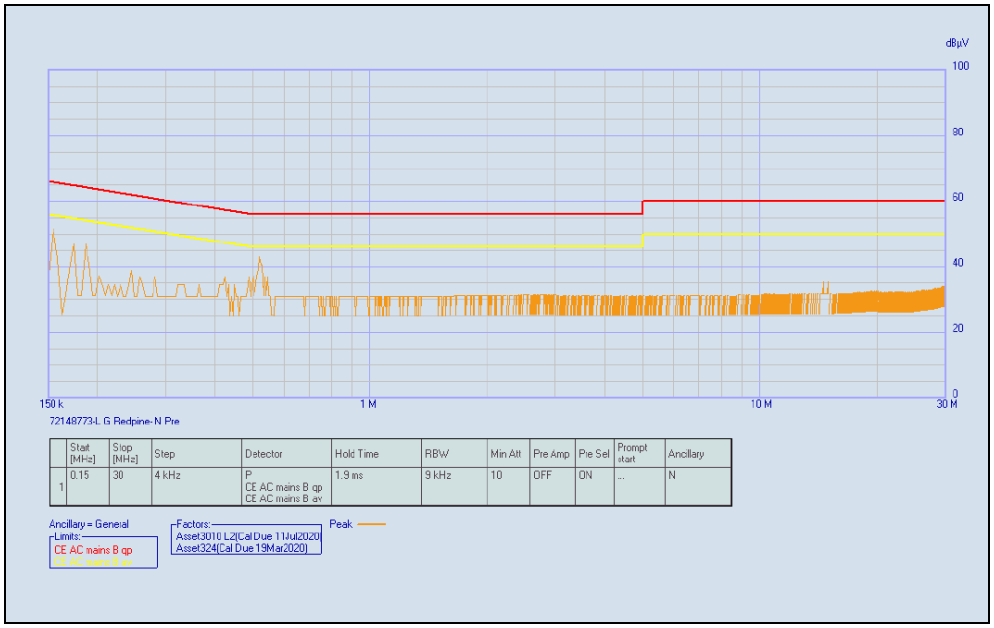


Figure A-2: Power Line Conducted Emissions – Line 2

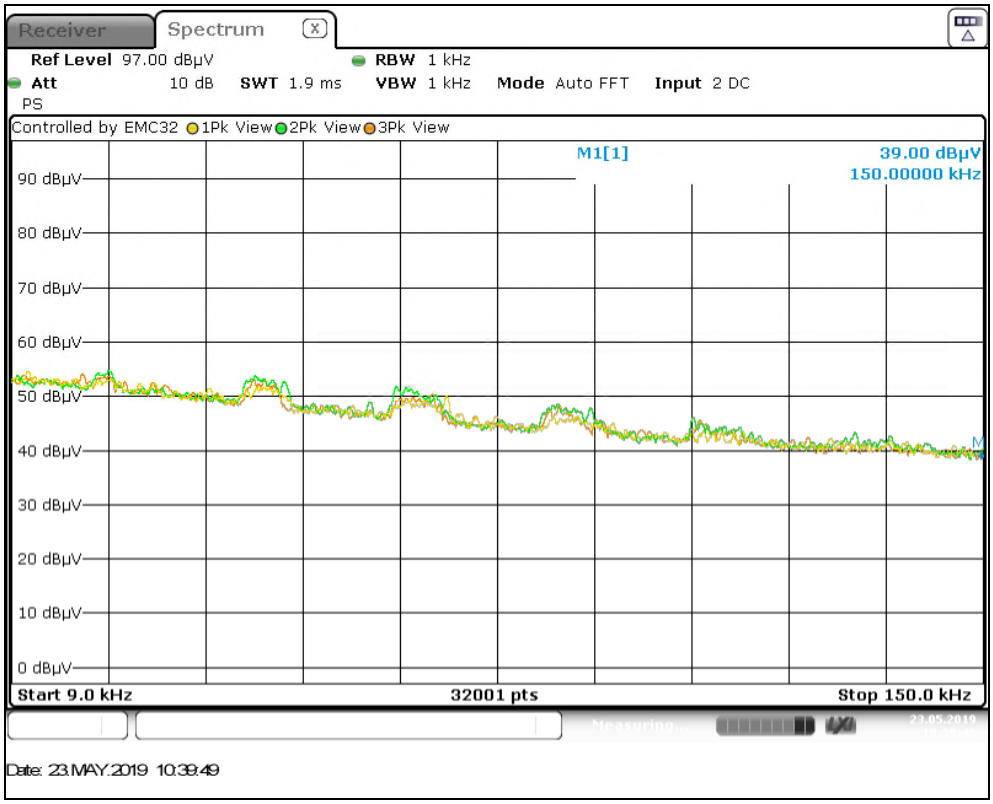


Figure A-3: Radiated Emissions – 9kHz-150kHz

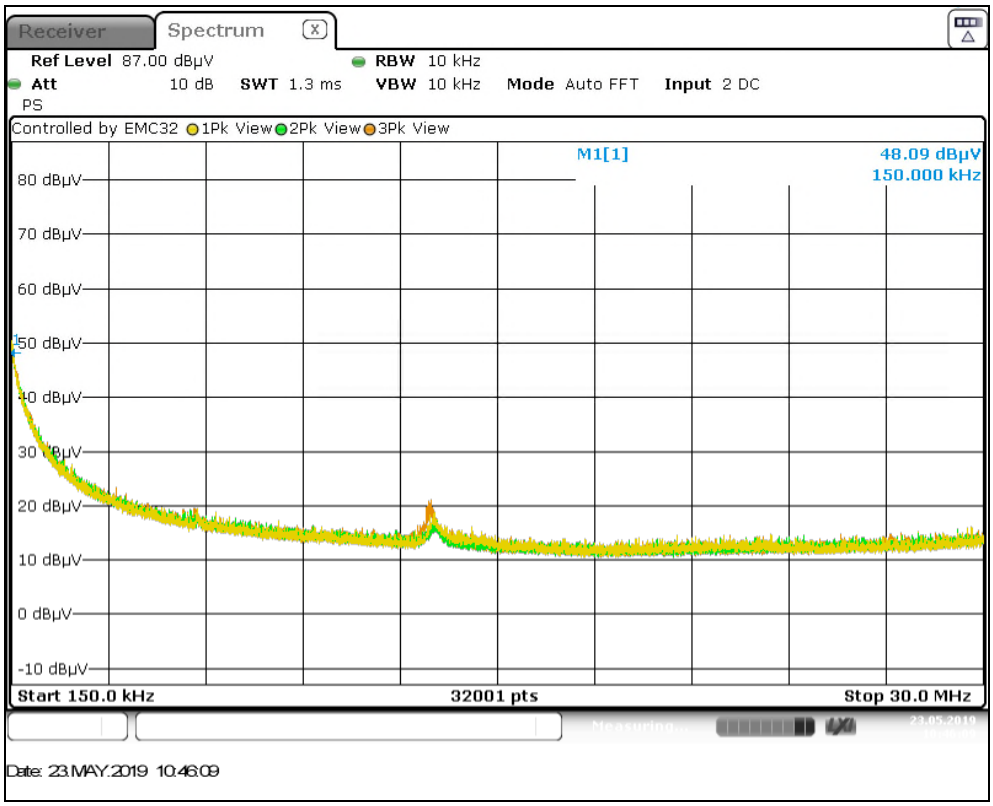
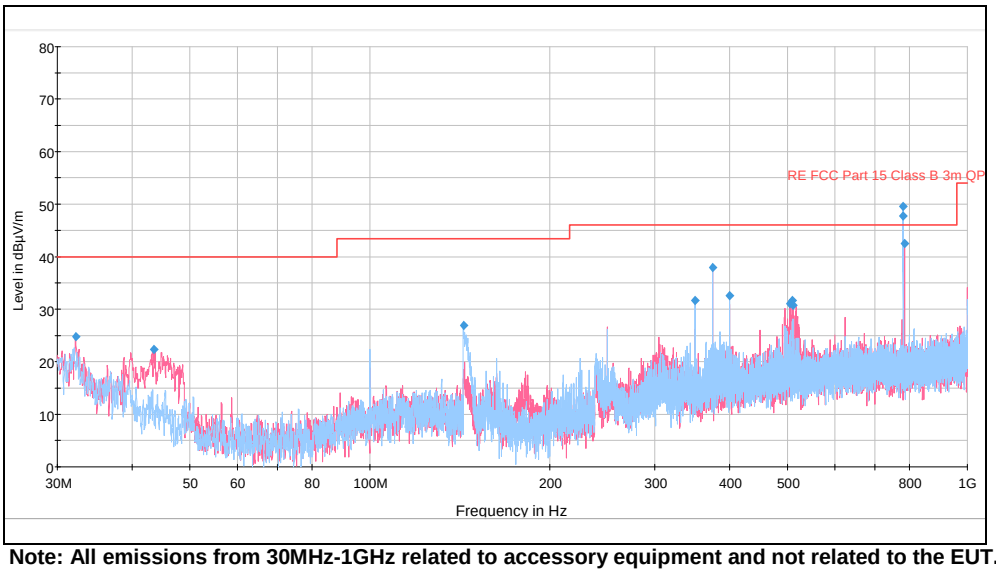
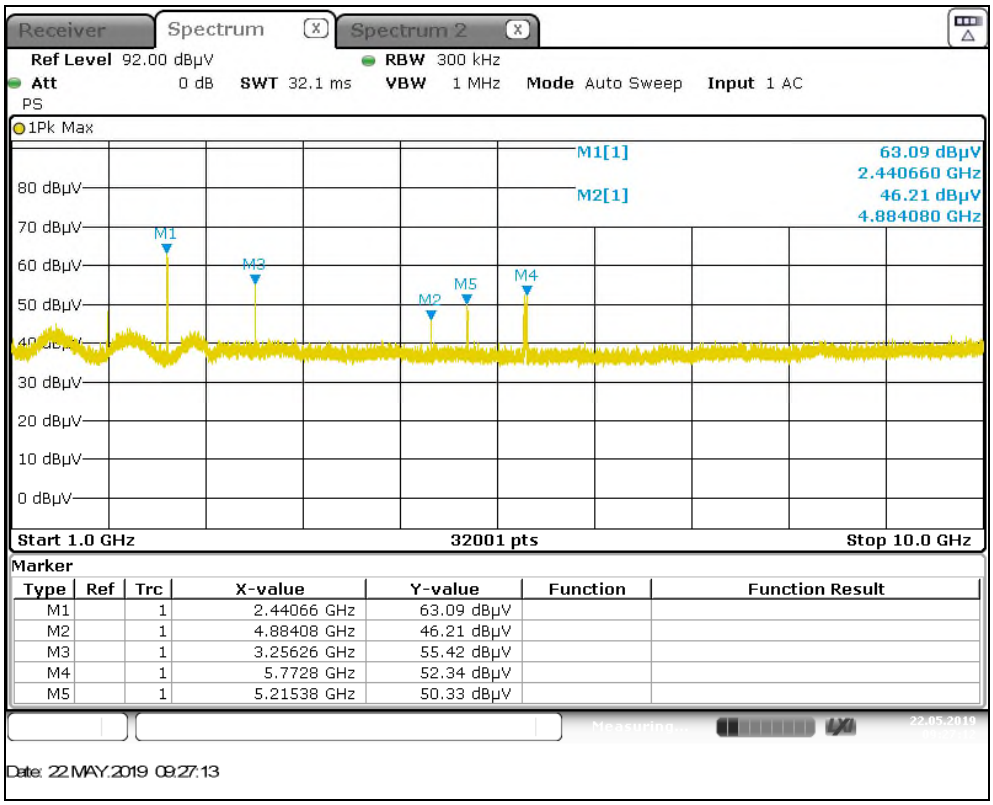


Figure A-4: Radiated Emissions – 150kHz-30MHz



Note: All emissions from 30MHz-1GHz related to accessory equipment and not related to the EUT.

Figure A-5: Radiated Emissions – 30MHz-1GHz



Note: Marker 3, Marker 4, and Marker 5 are local ambient emissions not related to the EUT system.

Figure A-6: Radiated Emissions – 1GHz-10GHz

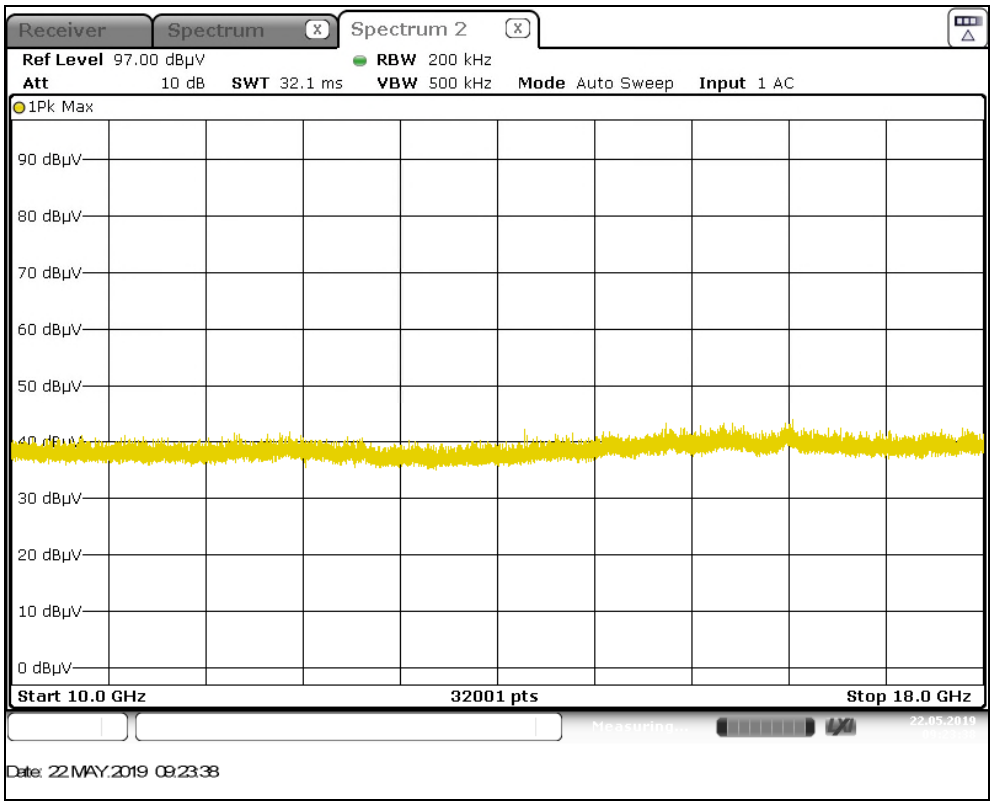


Figure A-7: Radiated Emissions – 10GHz-18GHz

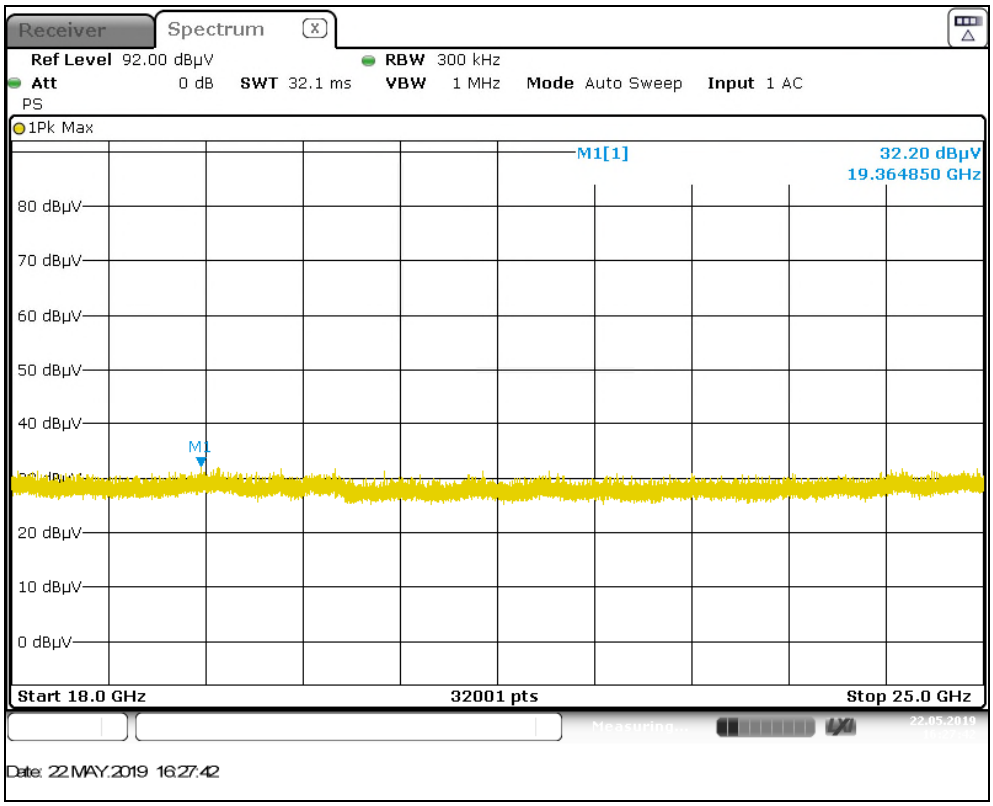


Figure A-8: Radiated Emissions – 18GHz-25GHz

END REPORT