



Certification Test Report

**FCC ID: R7PNG0R1S4
IC: 5294A-NG0R1S4**

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

Report Number: AT72146310-2C5

**Manufacturer: Landis+Gyr Technology, Inc.
Model: Series-6 RF Mesh mSBR Card**

**Test Begin Date: December 11, 2018
Test End Date: February 6, 2019**

Report Issue Date: October 3, 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 27 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 modular approval.

1.2 Product description

The Landis & Gyr Series-6 RF Mesh mSBR Card radio is an electricity metering module which includes a 900 MHz ISM transmitter as well as a 2.4GHz OFDM transmitter.

This test report documents the compliance of the 900MHz Frequency Hopping Spread Spectrum transceiver mode of operation.

Technical Details:

Detail	Description
Frequency Range (MHz)	Mode 1: 902.4 – 927.6 MHz Mode 2: 904 – 926.8 MHz
Number of Channels	Mode 1: 64 Mode 2: 58
Channel Spacing	400kHz
Modulation Format	Mode 1: IEEE 802.15.4 SUN FSK, OFDM Mode 2: IEEE 802.15.4 SUN FSK
Data Rates	FSK: 50kbps, 100kbps, 150kbps, 200kbps OFDM Option 3: MCS3 – MCS6
Operating Voltage	3.3Vdc
Antenna Type(s) / Gain(s)	Dual Band Dipole / 4.5dBi

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

Test Sample Serial Number: LAN ID: 61293EB1

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 available data rates, were evaluated. The data presented in this report represents the worst case where applicable. The worst-case data rate for FSK modulation was 50kbps. The worst-case data rate for OFDM Option 3 modulation was MCS3.

For radiated emissions, the EUT was evaluated in three orthogonal orientations. The worst-case orientation was Z-position. The EUT was programmed to generate a continuously modulated signal on each channel evaluated.

For power line conducted emissions, the EUT was powered by a representative wall wart power supply.

For RF Conducted measurements, the EUT was connected to the test equipment with a U.FL to SMA connector. The EUT was programmed to generate a continuously modulated signal on each channel evaluated.

Software power setting during test: FSK: 29.5

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.

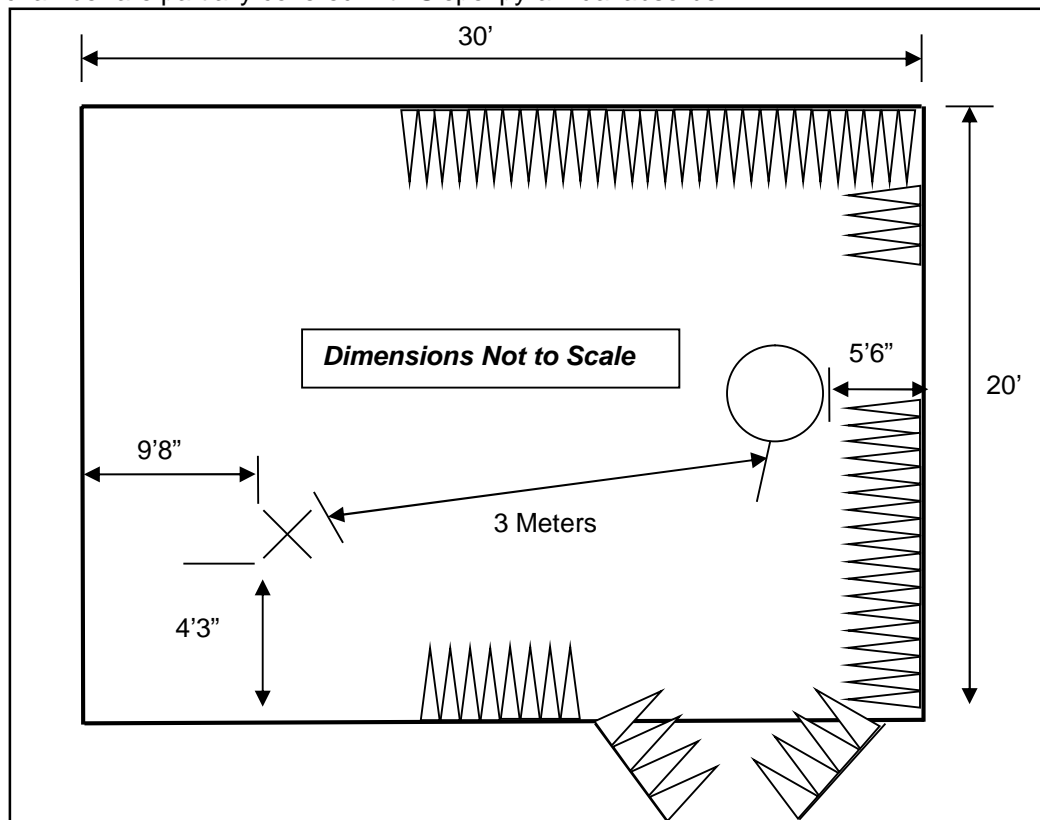


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site – Chamber A

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.

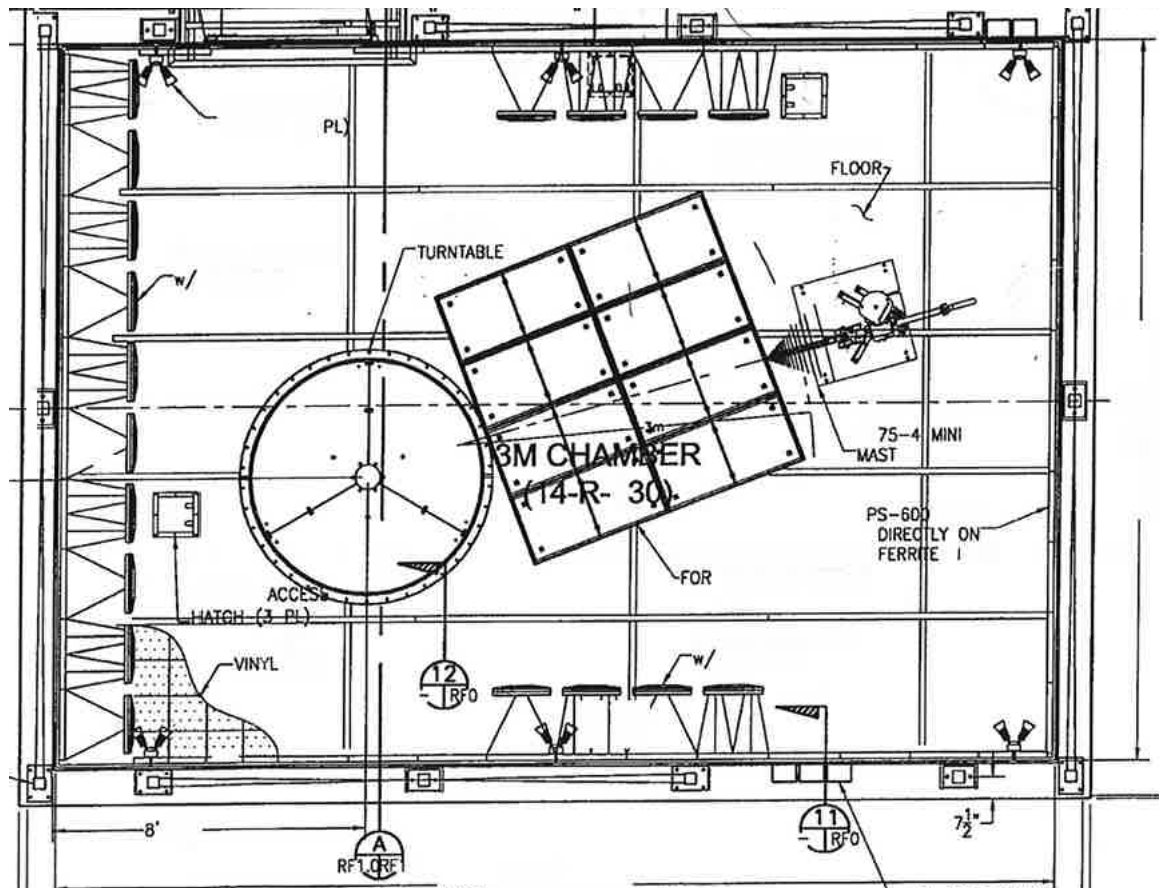


Figure 2.3.2-1: Semi-Anechoic Chamber Test Site – Chamber B

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 HCP 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.

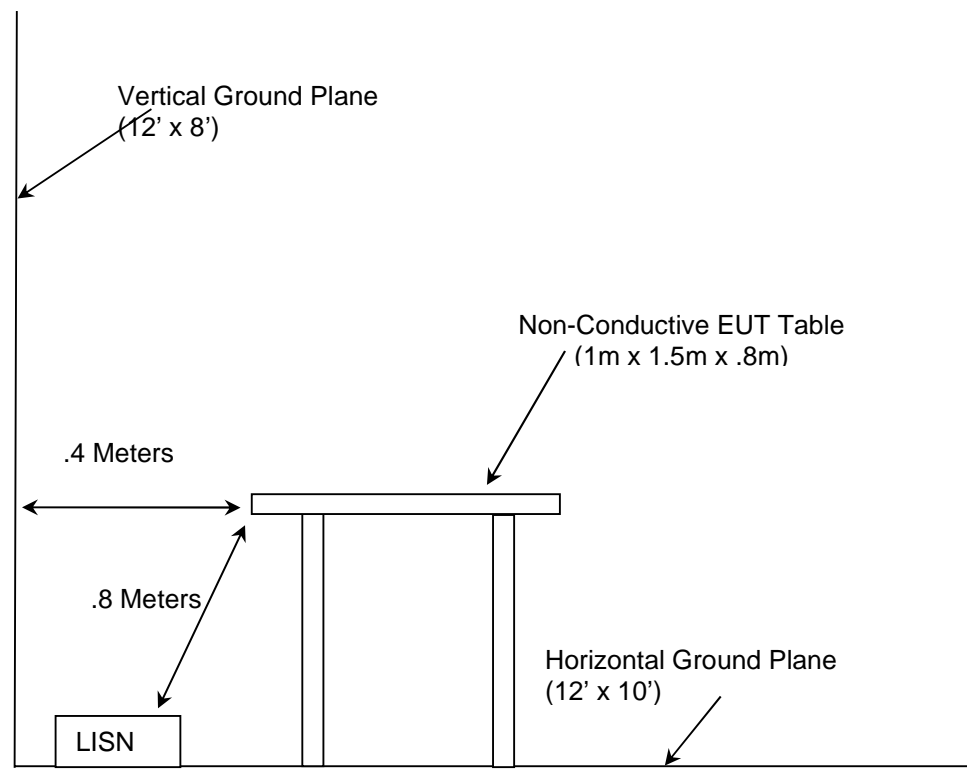


Figure 2.4.1-1: AC Mains Conducted EMI Site

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
22	Hewlett Packard	8449B	High Frequency Pre-Amp	3008A00526	07/11/2018	07/11/2020
30	Spectrum Technologies	DRH-0118	1-18GHz Horn Antenna	970102	05/09/2017	05/09/2019
213	TEC	PA 102	Amplifier	44927	07/19/2018	07/19/2019
324	ACS	Belden	Conducted EMI Cable	8214	04/05/2018	04/05/2019
337	Microwave Circuits	H1G513G1	Microwave Bandpass Filter	282706	05/16/2018	05/16/2019
622	Rohde & Schwarz	FSV40 (v3.40)	FSV Signal Analyzer 10Hz to 40GHz	101338	07/30/2018	07/30/2020
628	EMCO	6502	Active Loop Antenna 10kHz-30MHz	9407-2877	02/11/2016	02/11/2019
654	Micro-Tronics	BRC50722	Band Reject Filter	-10	10/07/2017	10/07/2018
813	PMM	9010	EMI Receiver; RF Input 50ohm; 10Hz-50MHz; 10Hz-30MHz	697WW30606	02/12/2018	02/12/2019
819	Rohde & Schwarz	ESR26	EMI Test Receiver	101345	11/06/2018	11/06/2019
827	(-)	TS8997 Rack Cable Set	TS8997 Rack Cable Set	N/A	08/13/2018	08/13/2019
836	ETS Lindgren	SAC Cable Set	SAC Cable Set includes 620, 837, 838	N/A	05/01/2018	05/01/2019
853	Teseq	CBL 6112D; 6804.17.A	Bilog Antenna; Attenuator	51616; 20181110A	10/15/2018	10/15/2019
3010	Rohde & Schwarz	ENV216	Two-Line V-Network	3010	07/11/2018	07/11/2019

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	Host Board	Landis & Gyr	ICB Host	Not Labeled
2	DC Power Supply ¹	Hewlett Packard	E3630A ¹	KR64308603
	AC Adapter ²	Unidentified	PS0538 ²	Not Labeled

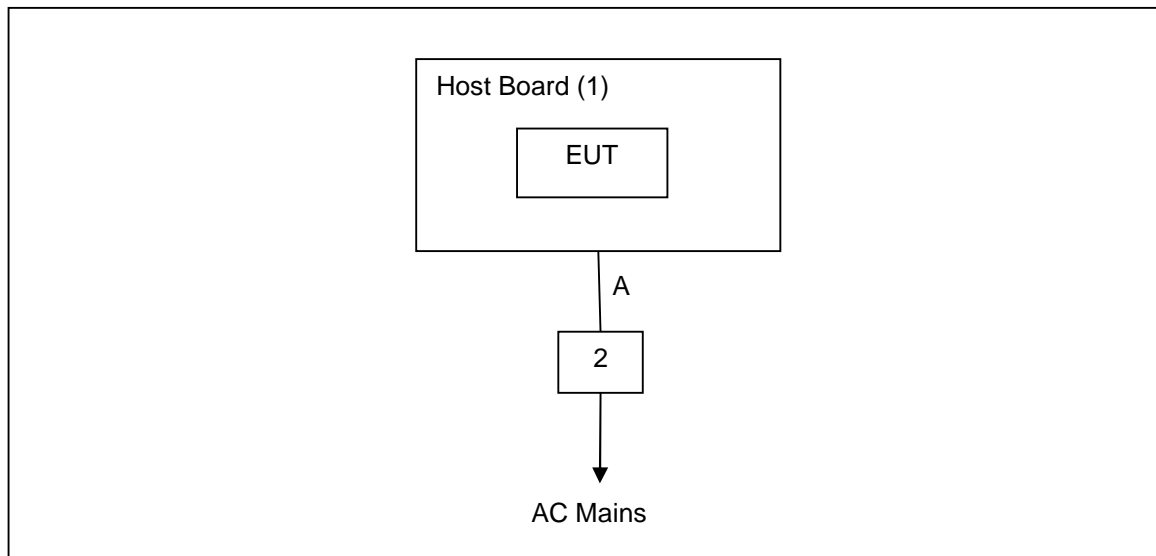
1) Radiated emissions testing

2) Conducted emissions testing

Table 5-2: Cable Description

Cable	Cable Type	Length	Shield	Termination
A	DC Power Cable	1.75 m	No	EUT to Power Supply

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 4.5dBi in the 900MHz 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: Jeremy Pickens / Sean Vick

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	37.4	22.34	66	56	-28.6	-33.66	9.59
0.154	36.68	20.13	65.78	55.78	-29.1	-35.65	9.58
0.17	41.13	25.74	64.96	54.96	-23.83	-29.22	9.58
0.206	40.42	23.92	63.37	53.37	-22.95	-29.45	9.58
0.214	38.42	27.32	63.05	53.05	-24.63	-25.73	9.58
0.222	38.3	25.22	62.74	52.74	-24.44	-27.52	9.58
0.242	37.65	22.73	62.03	52.03	-24.38	-29.3	9.58
0.254	33.94	22.6	61.63	51.63	-27.69	-29.03	9.58
0.294	34.41	16.49	60.41	50.41	-26	-33.92	9.58
0.414	33.81	25.93	57.57	47.57	-23.76	-21.64	9.59

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)	
0.154	38.01	22.95	65.78	55.78	-27.77	-32.83	9.58
0.178	42.34	27.91	64.58	54.58	-22.24	-26.67	9.58
0.194	41.75	22.66	63.86	53.86	-22.11	-31.2	9.58
0.206	40.85	22.79	63.37	53.37	-22.52	-30.58	9.58
0.226	40.32	22.51	62.6	52.6	-22.28	-30.09	9.58
0.246	39.73	22.42	61.89	51.89	-22.16	-29.47	9.58
0.418	39.37	22.41	57.49	47.49	-18.12	-25.08	9.59
2.962	31.04	22.79	56	46	-24.96	-23.21	9.62
3.246	30.74	22.49	56	46	-25.26	-23.51	9.62
23.418	32.7	23.83	60	50	-27.3	-26.17	9.82

7.3 Peak Output Power – FCC: Section 15.247(b)(2); ISED Canada: RSS-247 5.4(a)**7.3.1 Measurement Procedure (Conducted Method)**

The RF output port of the EUT was directly connected to the input of the power meter using suitable attenuation. Peak measurements were recorded. The device employs > 50 channels at any given time therefore the power is limited to 1 Watt.

7.3.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.3.2-1: Maximum Conducted Peak Output Power

Frequency [MHz]	Level [dBm]	Modulation Format	Data Rate [kbps]
902.4	30.0	FSK	50
915.2	29.9	FSK	50
927.6	29.2	FSK	50
902.4	29.5	FSK	100
915.2	29.3	FSK	100
927.6	28.5	FSK	100
902.4	29.5	FSK	150
915.2	29.3	FSK	150
927.6	28.5	FSK	150
902.4	29.5	FSK	200
915.2	29.3	FSK	200
927.6	28.5	FSK	200
902.4	30.0	OFDM	MCS3
915.0	30.0	OFDM	MCS3
927.6	29.4	OFDM	MCS3

7.4 Channel Usage Requirements

7.4.1 Carrier Frequency Separation – FCC: Section 15.247(a)(1); ISED Canada: RSS-247 5.1(b)

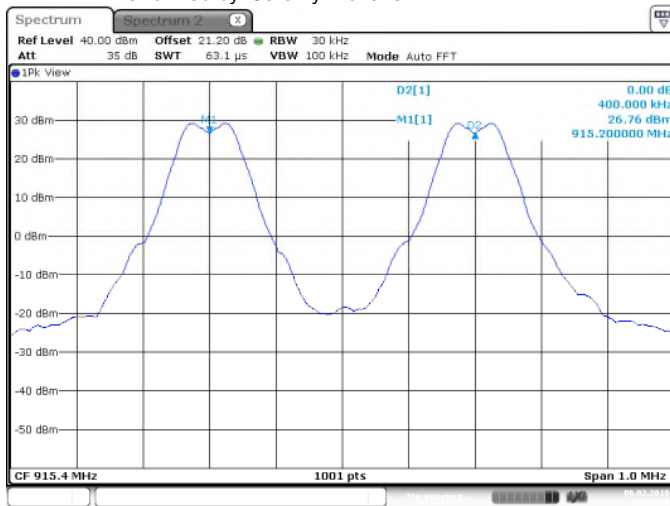
7.4.1.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer with suitable attenuation. The span of the spectrum analyzer was set wide enough to capture two adjacent peaks and the RBW started at approximately 30% of the channel spacing and adjusted as necessary to best identify the center of each individual channel. The VBW was set to \geq RBW. Frequency separation was performed at the lowest and highest data rates for the FSK modulation.

Carrier frequency separation was measured for all modes of operation and data presented in section 7.4.1.2 below.

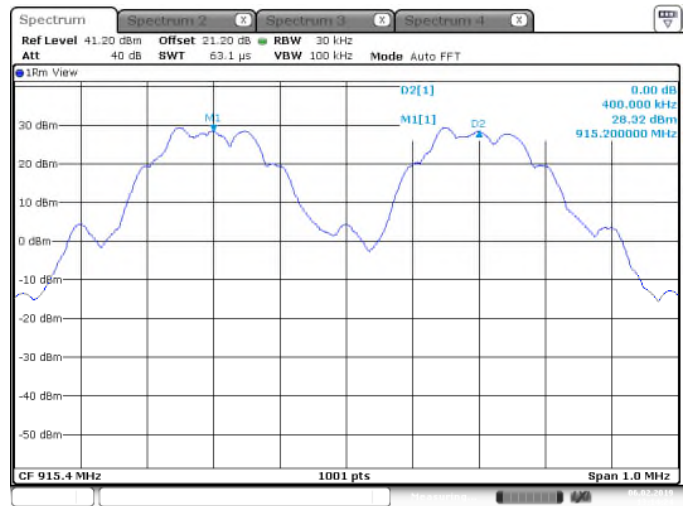
7.4.1.2 Measurement Results

Performed by: Jeremy Pickens



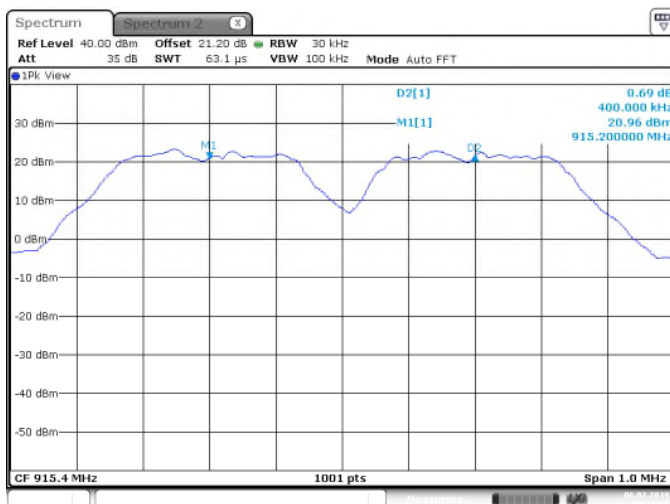
Date: 6 FEB 2019 09:27:26

Figure 7.4.1.2-1: Freq. Separation – FSK – 50kbps



Date: 6 FEB 2019 13:14:24

Figure 7.4.1.2-2: Freq. Separation – FSK – 200kbps



Date: 6 FEB 2019 09:31:02

Figure 7.4.1.2-3: Freq. Separation – OFDM – MCS3

7.4.2 Number of Hopping Channels – FCC: Section 15.247(a)(1)(i); ISCED Canada: RSS-247 5.1(c)

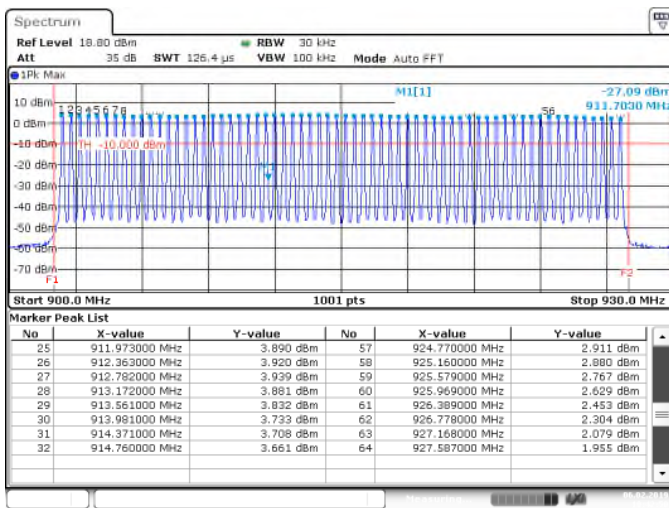
7.4.2.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer with suitable attenuation. The span of the spectrum analyzer was set wide enough to capture the frequency band of operation. The RBW was set to less than 30% of the channel spacing or the 20dB bandwidth, whichever is smaller. The VBW was set to \geq RBW.

The number of hopping channels was measured for the modes of operation and data presented in section 7.4.2.2 below.

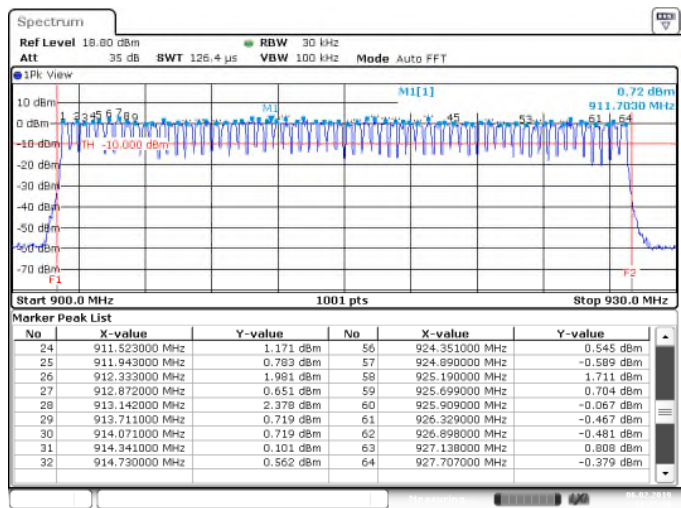
7.4.2.2 Measurement Results

Performed by: Jeremy Pickens



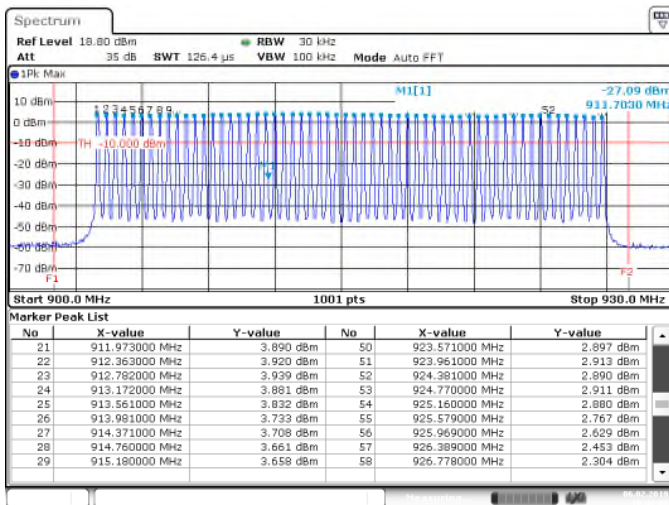
Date: 6 FEB 2019 10:42:51

Figure 7.4.2.2-1: No. of Channels – FSK – 50kbps – Mode 1



Date: 6 FEB 2019 10:25:38

Figure 7.4.2.2-2: No. of Channels – OFDM – MCS3 – Mode 1



Date: 6 FEB 2019 10:41:07

Figure 7.4.2.2-3: No. of Channels – FSK – 50kbps – Mode 2

7.4.3 Channel Dwell Time – FCC: Section 15.247(a)(1)(i); ISED Canada: RSS-247 5.1(c)**7.4.3.1 Measurement Procedure**

The EUT test mode does not generate a worst-case channel dwell time therefore a detailed engineering analysis is provided in the theory of operation.

As described in the theory of operation, the maximum channel transmitter dwell time is < 400ms per channel hop with the minimum period of 700ms between hops. Therefore, the maximum time of occupancy on any one channel within a 10s or 20s period is <400ms for all modes of operation.

7.4.4 20dB / 99% Bandwidth – FCC: Section 15.247(a)(1)(i); ISED Canada: RSS-247 5.1(c)**7.4.4.1 Measurement Procedure**

The RF output port of the EUT was directly connected to the input of the spectrum analyzer with suitable attenuation. The span of the spectrum analyzer display was set between two times and five times the occupied bandwidth (OBW) of the emission. The RBW of the spectrum analyzer was set to approximately 1 % to 5 % of the OBW. The trace was set to max hold with a peak detector active. The ndB down function of the analyzer was utilized to determine the 20 dB bandwidth of the emission.

The occupied bandwidth measurement function of the spectrum analyzer was used to measure the 99% bandwidth. The span of the analyzer was set to capture all products of the modulation process, including the emission sidebands. The resolution bandwidth was set to 1% to 5% of the occupied bandwidth. The video bandwidth was set to 3 times the resolution bandwidth. A peak detector was used.

7.4.4.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.4.4.2-1: 20dB / 99% Bandwidth

Frequency [MHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]	Data Rate [kbps]	Modulation
902.4	103.0	101.9	50	FSK
902.4	115.1	110.7	100	FSK
902.4	164.5	159.3	150	FSK
902.4	213.7	207.1	200	FSK
902.4	316.2	293.8	MCS3	OFDM
915.2	103.1	101.9	50	FSK
915.2	115.1	110.3	100	FSK
915.2	165.8	159.3	150	FSK
915.2	213.5	207.1	200	FSK
915.2	315.3	311.3	MCS3	OFDM
927.6	103.1	101.9	50	FSK
915.2	114.8	110.3	100	FSK
915.2	165.8	158.9	150	FSK
915.2	212.0	207.1	200	FSK
927.6	317.8	300.3	MCS3	OFDM



Figure 7.4.4.2-1: Sample Plot 20dB BW- FSK – 50kbps

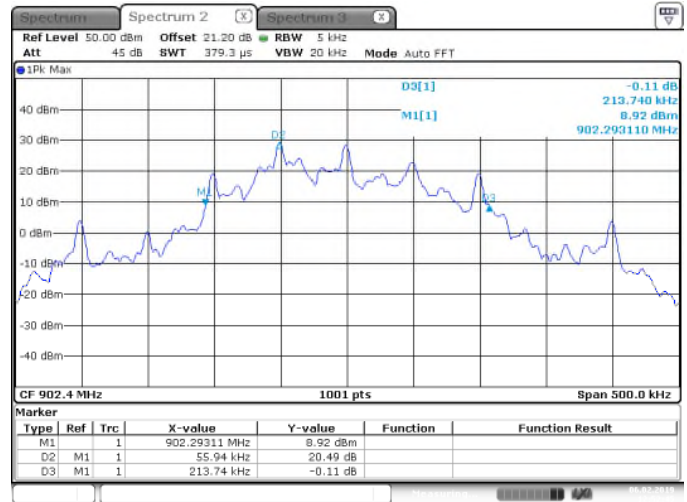


Figure 7.4.4.2-2: Sample Plot 20dB BW- FSK – 200kbps

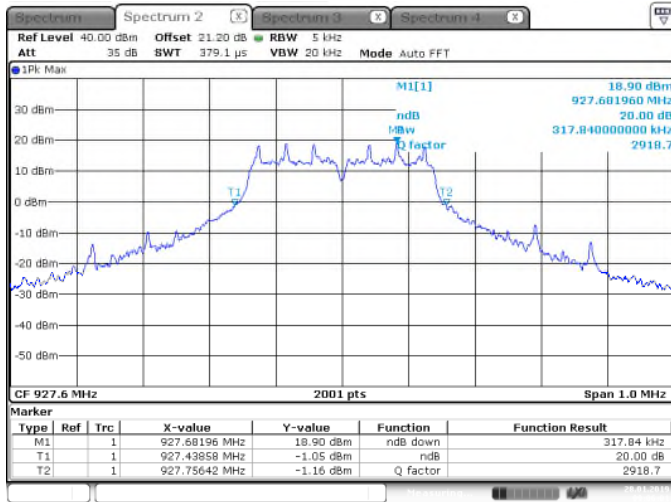


Figure 7.4.4.2-3: Sample Plot 20dB BW- OFDM – MCS3

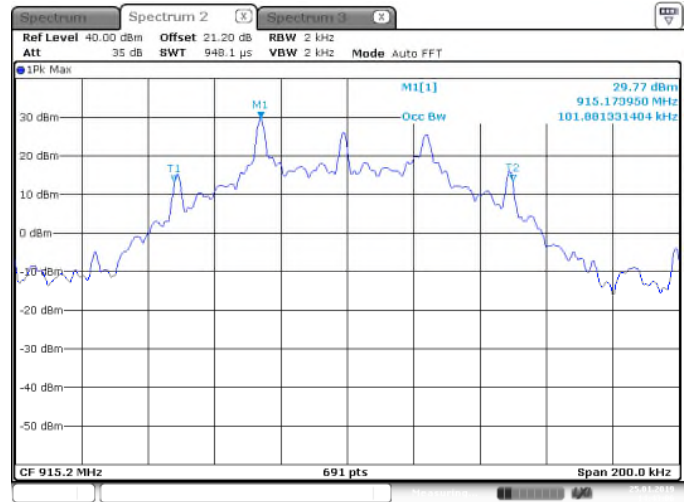


Figure 7.4.4.2-4: Sample Plot 99% OBW- FSK – 50kbps

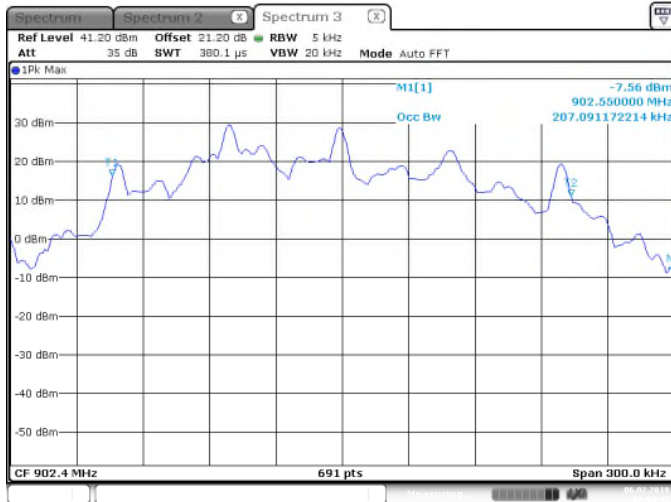


Figure 7.4.4.2-5: Sample Plot 99% OBW- FSK – 200kbps

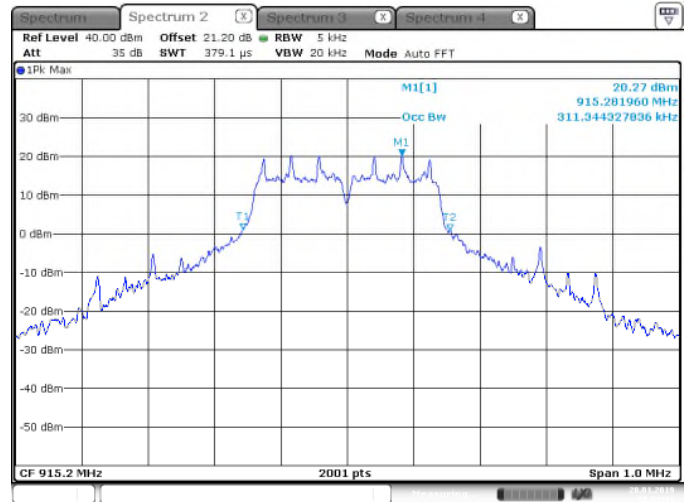


Figure 7.4.4.2-6: Sample Plot 99% OBW- OFDM – MCS3

7.5 Band-Edge Compliance and Spurious Emissions

7.5.1 Band-Edge Compliance of RF Conducted Emissions – FCC: Section 15.247(d); ISCED Canada: RSS-247 5.5

7.5.1.1 Measurement Procedure

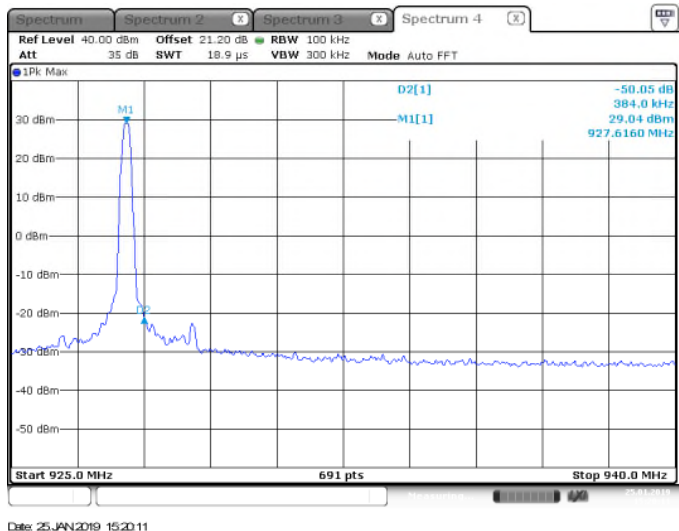
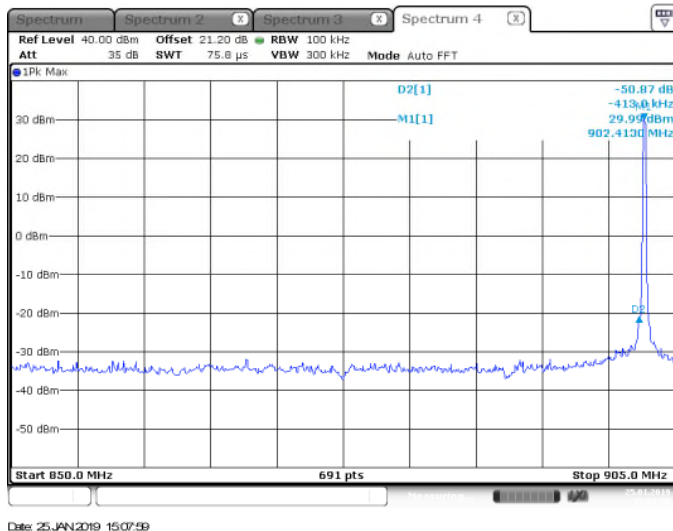
The RF output port of the EUT was directly connected to the input of the spectrum analyzer with suitable attenuation. The EUT was investigated at the lowest and highest channel available to determine band-edge compliance. For each measurement, the spectrum analyzer's RBW was set to 100kHz and the VBW was set to 300kHz.

Band-edge was evaluated for the lowest and highest FSK data rates as well as the OFDM MCS3 data rate.

7.5.1.2 Measurement Results

Performed by: Jeremy Pickens

NON-HOPPING MODE:



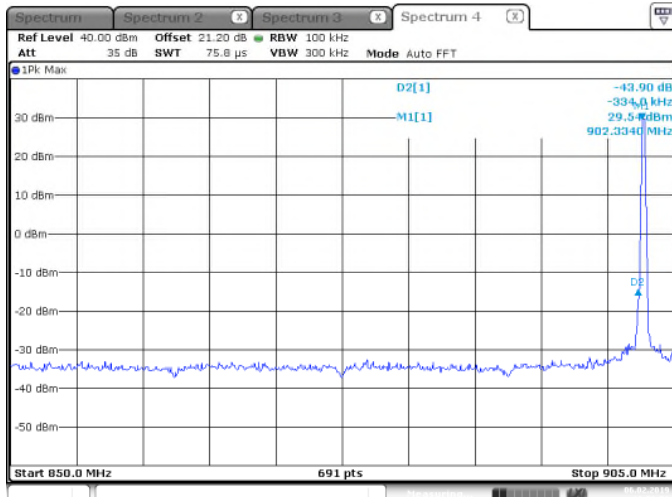


Figure 7.5.1.2-3: Lower Band-edge – FSK – 200kbps

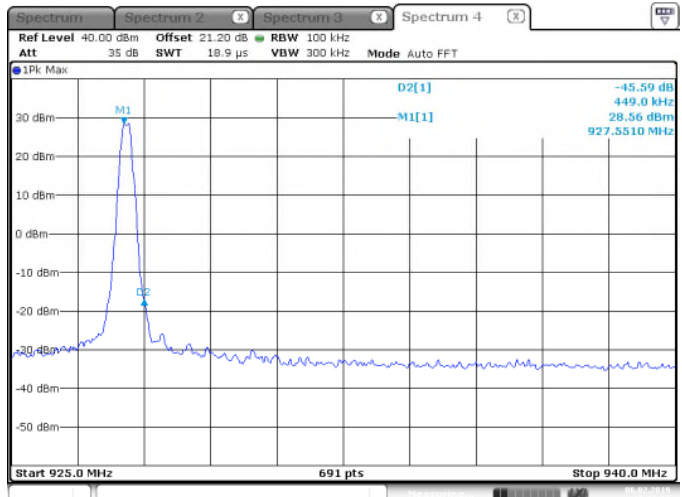


Figure 7.5.1.2-4: Upper Band-edge – FSK – 200kbps

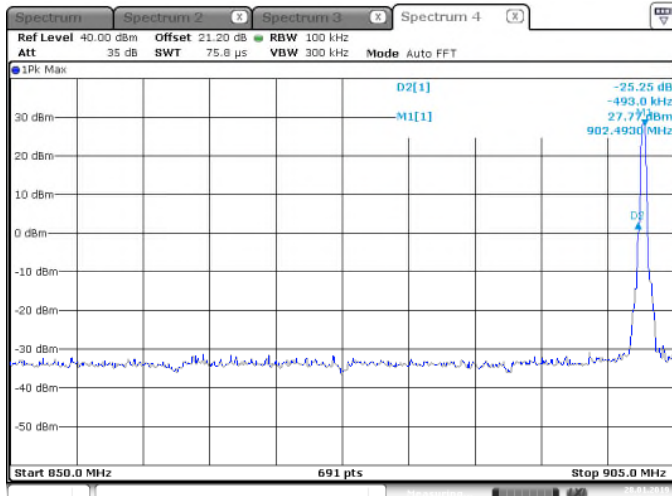


Figure 7.5.1.2-5: Lower Band-edge – OFDM – MCS3

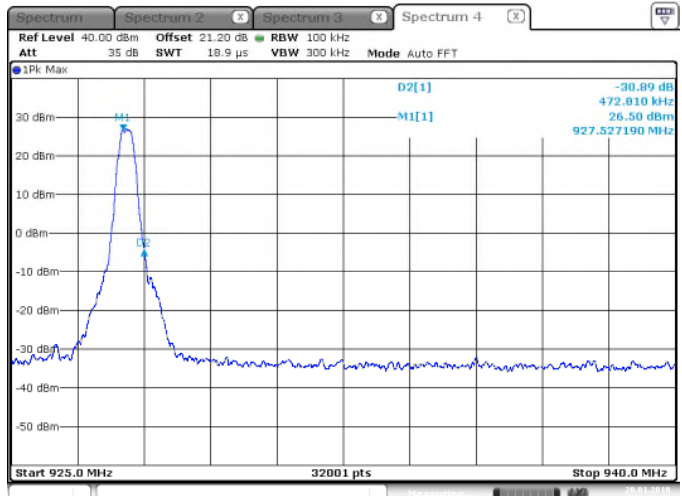


Figure 7.5.1.2-6: Upper Band-edge – OFDM – MCS3

HOPPING MODE:

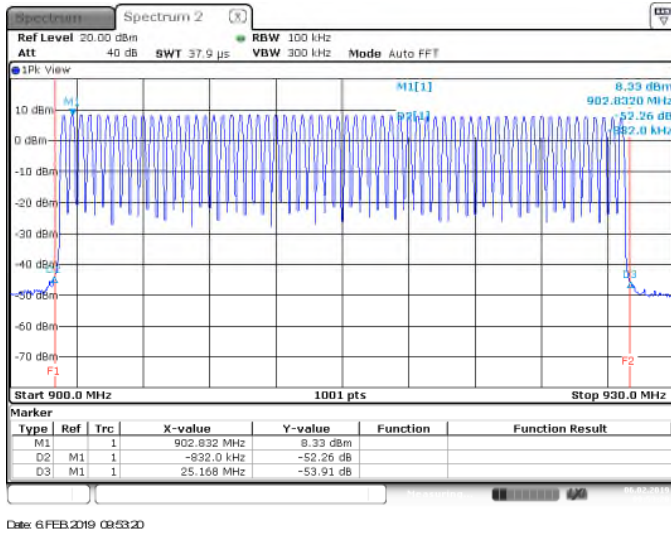


Figure 7.5.1.2-7: Band Edges – FSK – 50kbps

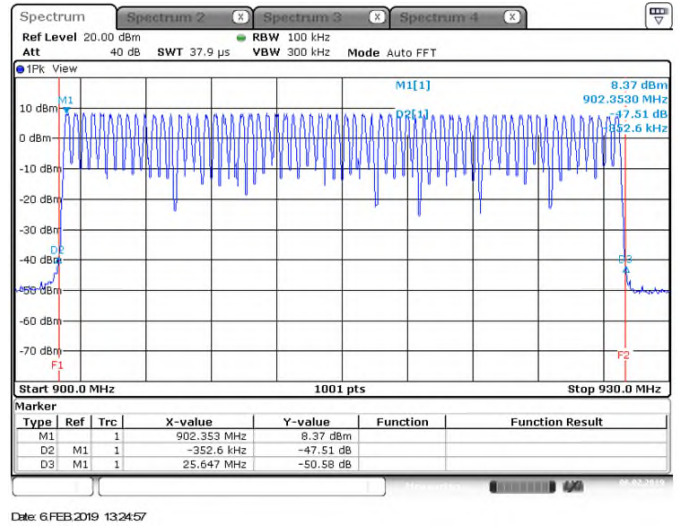


Figure 7.5.1.2-8: Band Edges – FSK – 200kbps

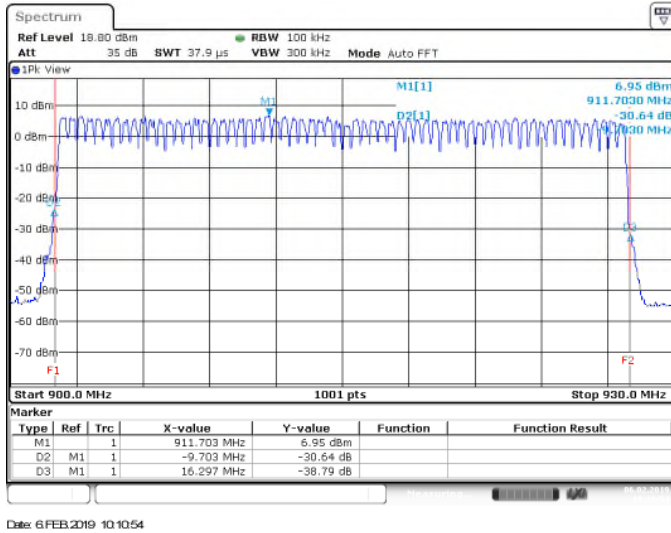


Figure 7.5.1.2-9: Band Edges – OFDM – MCS3

7.5.2 RF Conducted Spurious Emissions – FCC: Section 15.247(d); ISED Canada: RSS-247 5.5

7.5.2.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The EUT was investigated for conducted spurious emissions from 30MHz to 10GHz, 10 times the highest fundamental frequency. Measurements were made at the low, center and high channels of the EUT. For each measurement, the spectrum analyzer's RBW was set to 100kHz. A peak detector function was used with the trace set to max hold. Measurements were recorded at the worst case data rates: FSK, 50kbps and OFDM, MCS3.

7.5.2.2 Measurement Results

Performed by: Jeremy Pickens

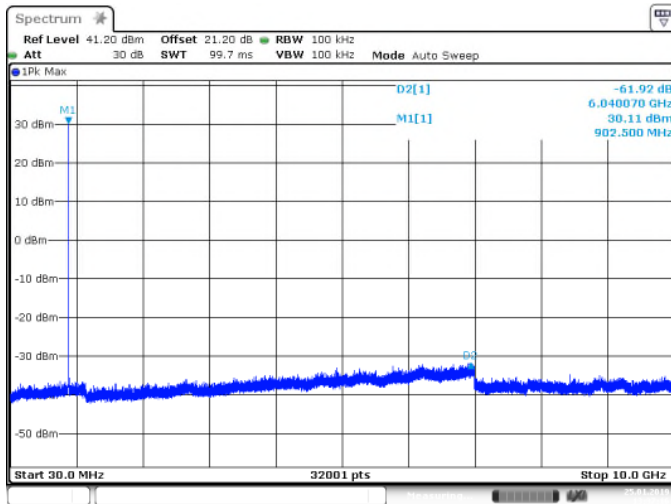


Figure 7.5.2.2-1: FSK – 50kbps 30 MHz – 10 GHz – Low Channel

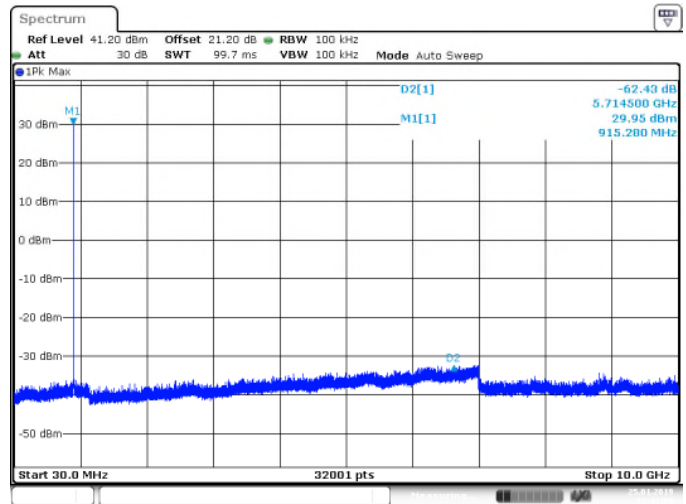


Figure 7.5.2.2-2: FSK – 50kbps 30 MHz – 10 GHz – Mid Channel

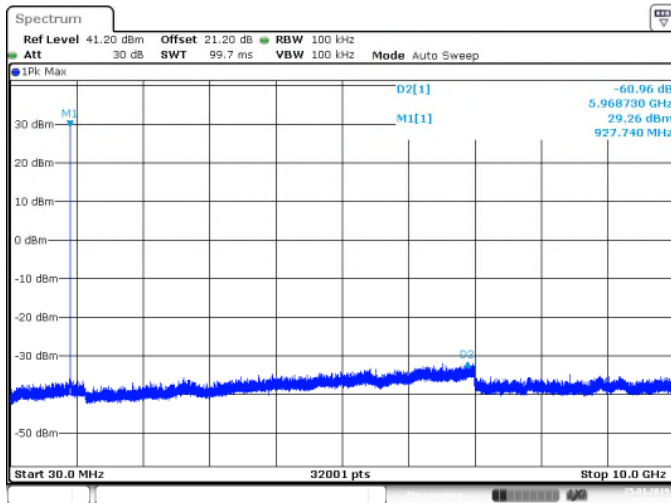


Figure 7.5.2.2-3: FSK – 50kbps 30 MHz – 10 GHz –High Channel

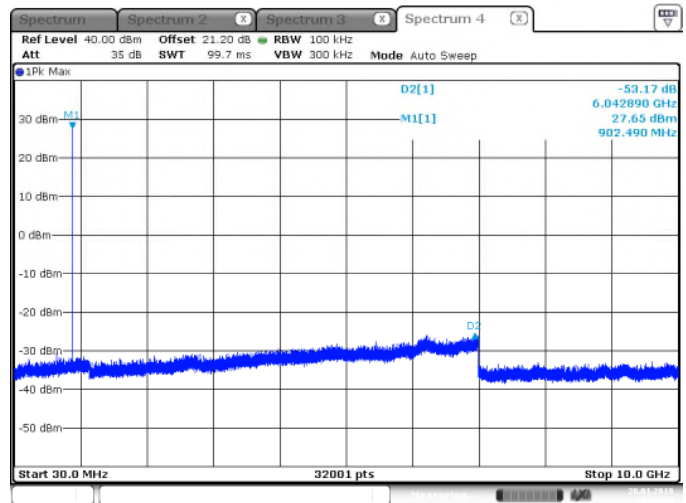


Figure 7.5.2.2-4: OFDM – MCS3 30 MHz – 10 GHz –Low Channel

7.5.3 Radiated Spurious Emissions – FCC: Section 15.205, 15.209; ISD Canada: RSS-Gen 8.9/8.10

7.5.3.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30MHz to 10GHz, 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.

The EUT was caused to generate a continuous modulated carrier on the hopping channel.

Each emission found to be in a restricted band was compared to the applicable radiated emission limits.

Radiated spurious emissions were evaluated for all combinations of operating modes and data rates with worst case data provided (FSK, 50kHz and OFDM, MCS3).

7.5.3.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.5.3.2-1: Radiated Spurious Emissions Tabulated Data (FSK 50kHz)

Frequency (MHz)	Level (dBμV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg	
Low Channel											
2707.2	54.40	39.70	H	1.99	56.39	41.69	74.0	54.0	17.6	12.3	
2707.2	58.90	44.20	V	1.99	60.89	46.19	74.0	54.0	13.1	7.8	
Middle Channel											
2745.6	55.70	42.40	H	2.13	57.83	44.53	74.0	54.0	16.2	9.5	
2745.6	60.70	48.00	V	2.13	62.83	50.13	74.0	54.0	11.2	3.9	
High Channel											
2782.8	45.6	35.3	H	2.27	47.87	37.57	74.0	54.0	26.1	16.4	
2782.8	61	48.8	V	2.27	63.27	51.07	74.0	54.0	10.7	2.9	
4638	45.5	36.2	H	7.27	52.77	43.47	74.0	54.0	21.2	10.5	
4638	46.2	37.6	V	7.27	53.47	44.87	74.0	54.0	20.5	9.1	

Table 7.5.3.2-2: Radiated Spurious Emissions Tabulated Data (OFDM MCS3)

Frequency (MHz)	Level (dBμV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
2707.2	56.50	41.20	H	1.99	58.49	43.19	74.0	54.0	15.5	10.8
2707.2	61.00	45.60	V	1.99	62.99	47.59	74.0	54.0	11.0	6.4
4512	45.80	30.20	H	6.73	52.53	36.93	74.0	54.0	21.5	17.1
4512	44.20	29.90	V	6.73	50.93	36.63	74.0	54.0	23.1	17.4
Middle Channel										
2745.6	58.00	42.30	H	2.13	60.13	44.43	74.0	54.0	13.9	9.6
2745.6	61.00	46.80	V	2.13	63.13	48.93	74.0	54.0	10.9	5.1
High Channel										
2782.8	54.8	38.8	H	2.27	57.07	41.07	74.0	54.0	16.9	12.9
2782.8	62.4	46.5	V	2.27	64.67	48.77	74.0	54.0	9.3	5.2

7.5.3.3 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 – FSK 50kbpsCorrected Level: $61.00 + 2.13 = 63.13\text{dBuV/m}$ Margin: $74\text{dBuV/m} - 63.13\text{dBuV/m} = 10.9\text{dB}$ **Example Calculation: Average – FSK 50kbps**Corrected Level: $46.80 + 2.13 - 0 = 48.93\text{dBuV}$ Margin: $54\text{dBuV} - 48.93\text{dBuV} = 5.1\text{dB}$

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	$\pm 0.009 \%$
RF Conducted Output Power	$\pm 0.349 \text{ dB}$
Power Spectral Density	$\pm 0.372 \text{ dB}$
Antenna Port Conducted Emissions	$\pm 1.264 \text{ dB}$
Radiated Emissions $\leq 1 \text{ GHz}$	$\pm 5.814 \text{ dB}$
Radiated Emissions $> 1 \text{ GHz}$	$\pm 4.318 \text{ dB}$
Temperature	$\pm 0.860 \text{ }^{\circ}\text{C}$
Radio Frequency	$\pm 2.832 \times 10^{-8}$
AC Power Line Conducted Emissions	$\pm 3.360 \text{ dB}$

9 CONCLUSION

In the opinion of TÜV SÜD America, Inc. the Series-6 RF Mesh mSBR Card, manufactured by Landis+Gyr Technology, Inc. meets the requirements of FCC Part 15 subpart C and Innovation, Science and Economic Development Canada's Radio Standards Specification RSS-247 for the tests documented herein.

END REPORT