Certification Test Report

FCC ID: 2AAUJ-R001

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

TÜV SÜD Report Number: 16-3026.W06.3A

Manufacturer: Viableware, Inc. DBA TableSafe, Inc.
Model: RAIL2

Test Begin Date: April 27, 2017
Test End Date: June 21, 2017

Report Issue Date: July 18, 2017

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code AT-1921

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

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This report contains 25 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 Radio Standards Specification: RSS-247 Certification.

1.2 Product Description

The RAIL2 is a handheld, touchscreen device that enables restaurant guests to securely self-insert credit, debit or chip enabled cards, auto-calculate the tip, split the bill multiple ways, pay-by-item, complete surveys, and display custom advertisements. RAIL2 communicates seamlessly with existing POS systems. It is enclosed in a cover designed to look like a traditional bill presentation folder used at most full-service restaurants. The product also serves as a platform for marketing, customer loyalty programs, and other consumer related value added services.

The RAIL2 includes a 13.56MHz RFID reader and a 2.4GHz WLAN 802.11b/g radio. This report applies to the WLAN 802.11b/g radio only. A separate test report covers the 13.56 MHz RFID operation.

Technical Information:

Detail	Description
Frequency Range	802.11b/g: 2412 - 2462 MHz
Number of Channels	802.11b/g: 11 channels
Modulation Format	802.11b: PSK, CCK 802.11g: PSK, QAM
Data Rates	802.11b: 1-11Mbps 802.11g: 6-54 Mbps
Number of Inputs/Outputs	1T1R
WIFI Operating Voltage	3.3 Vdc
Antenna Type / Gain	Chip antenna/ 2.2 dBi

Manufacturer Information:
Viableware Inc. DBA TableSafe Inc.
12220 - 113th Ave, NE Suite 220
Kirkland, WA 98034
USA

EUT Serial Numbers: Radiated emissions A02M100200012L, RF conducted emissions TUV #23

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

1.3 Test Methodology and Considerations

To program the unit, an application is purposely installed by the client in the EUT to allow to set the WLAN channel, bandwidth, data rates, and power levels. The power levels used are presented in the table below with the data rate determined to produce worse case in conducted and radiated emissions.

Mode	Data Rate	Power settings (qdBm)
802.11b	11 Mbps	54
802.11g	36 Mbps	58

For radiated emissions, the EUT was programmed to generate a continuously modulated signal on each channel investigated. The EUT was evaluated in three orthogonal orientations. The worst-case orientation was the X-plane. See test setup photos for more information.

For RF conducted emissions, the EUT was modified with a SMA connector to facilitate connection to the test equipment. The worst-case data rates were determined for the output peak power, the DTS bandwidth, and the power spectral density.

The unit is not capable of simultaneously transmit over the RFID radio and the WLAN transceivers, therefore the intermodulation products were not investigated.

2 TEST FACILITIES

2.1 Location

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

TÜV SÜD America Inc.
2320 Presidential Drive, Suite 101
Durham, NC 27703
Phone: (919) 381-4235

2.2 Laboratory Accreditations/Recognitions/Certifications

TÜV SÜD America Inc. is accredited to ISO/IEC 17025 by ANSI-ASQ National Accreditation Board under their ANAB program and has been issued certificate number AT-1921 in recognition of this accreditation. Unless otherwise specified, all test methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

FCC Registered Test Site Number: 637011
ISED Canada Test Site Registration Number: 4175A

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 18' x 28' x 18' shielded enclosure. The chamber is lined with Samwha Electronics Co. LTD Ferrite Absorber, model number SFA300 (HSN-1). The ferrite tile is 10cm x 10 cm and weighs approximately 1.4lbs. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber. On top of the ferrite tiles is DMAS HT-45 (Dutch Microwave Absorber Solutions) hybrid absorber on all walls except the wall behind the antenna mast which has a shorter DMAS HT-25 absorber.

The turntable is 1.50m in diameter and is located 150cm 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 short #6 copper wire. The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the turntable. 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.

Behind the turntable is a 2' x 6' x 1.5' deep shielded pit used for support equipment if necessary. The pit is equipped with 2 - 4" PVC chase from the turntable to the pit that allow 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.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

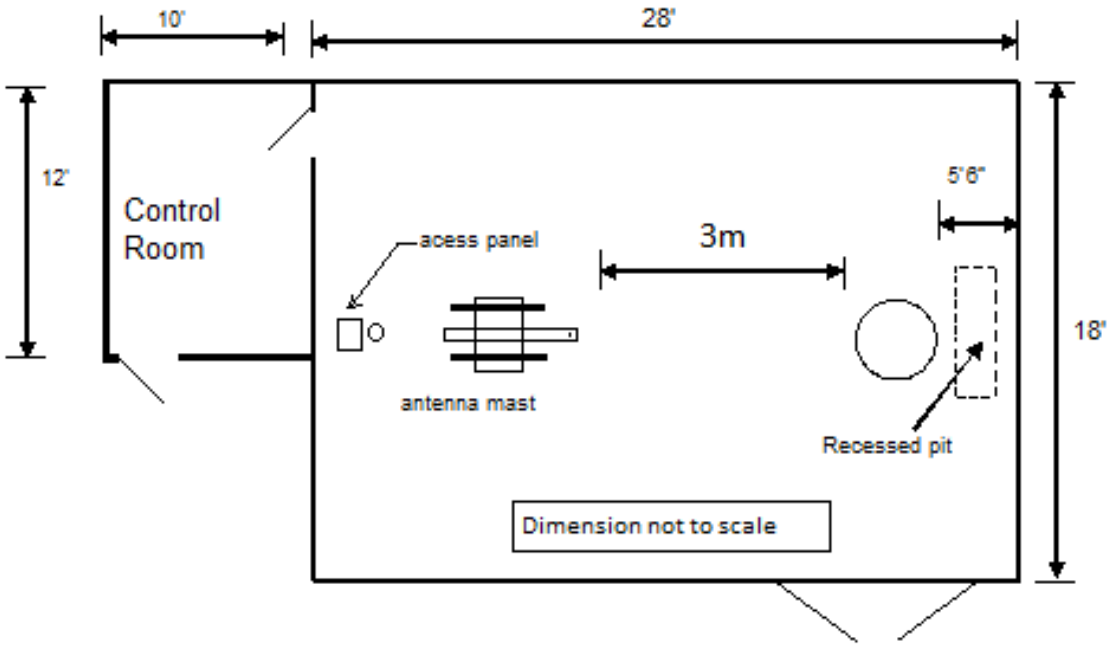

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 10' sheet galvanized steel horizontal ground reference plane (GRP) bonded every 6" to an 8' X 8' aluminum vertical ground plane.

A diagram of the room is shown below in figure 2.4-1:

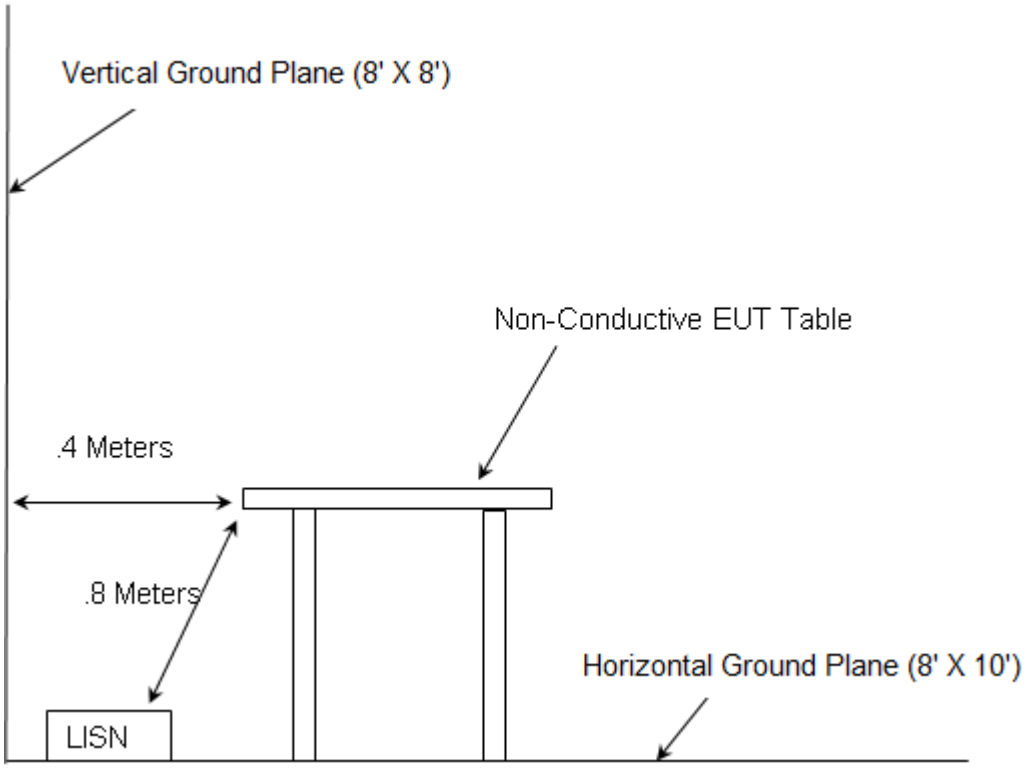

Figure 2.4-1: AC Mains Conducted EMI Site

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, 2017
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2017
- FCC KDB 558074 D01 DTS Meas Guidance v04 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247, April 5, 2017
- 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 4, Nov 2014

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 #	Last Calibration Date	Calibration Due Date
277	EMCO	93146	Antennas	9904-5199	9/12/2016	9/12/2018
626	EMCO	3110B	Antennas	9411-1945	3/21/2017	3/21/2019
3002	Rohde & Schwarz	ESU40	Receiver	100346	1/12/2017	1/12/2018
3006	Rohde & Schwarz	TS-PR18	Amplifiers	122006	1/11/2017	1/11/2018
3007	Rohde & Schwarz	TS-PR26	Amplifiers	100051	1/11/2017	1/11/2018
3008	Rohde & Schwarz	NRP2	Meter	103131	2/6/2017	2/6/2018
3009	Rohde & Schwarz	NRP-Z81	Meter	102397	2/6/2017	2/6/2018
3012	Rohde & Schwarz	EMC32-EB	Software	100731	NCR	NCR
3016	Fei Teng Wireless Technology	HA-07M18G-NF	Antennas	2013120203	1/26/2016	1/26/2018
3027	Micro-Tronics	BRM50702	Filter	175	1/13/2017	1/13/2018
3028	Micro-Tronics	HPM50111	Filter	122	1/13/2017	1/13/2018
3036	Hasco, Inc.	HLL142-S1-S1-24	Cables	2450	1/11/2017	1/11/2018
3038	Florida RF Labs	NMSE-290AW-60.0-NMSE	Cable Set	1448	1/3/2017	1/3/2018
3039	Florida RF Labs	NMSE-290AW-396.0-NMSE	Cable Set	1447	1/3/2017	1/3/2018
3042	Aeroflex Inmet	18N10W-10	Attenuator	1444	1/16/2017	1/16/2018
3045	Aeroflex Inmet	18N10W-20	Attenuator	1437	1/3/2017	1/3/2018
3049	Aeroflex Inmet	26AH-20	Attenuator	1443	1/11/2017	1/11/2018
3055	Rohde & Schwarz	3005	Cables	3055	1/3/2017	1/3/2018
3057	Advanced Technical Materials	42-441-6/BR	Antennas	R110602	NCR	NCR
3059	Mountain View Cable	A	Cables	3059	1/11/2017	1/11/2018
3085	Rohde & Schwarz	FSW43	Spectrum Analyzer	103997	8/9/2016	8/9/2017

DMAS MT-25 RF absorber material was used on the floor for all final measurements above 1 GHz.
NCR = No Calibration Required
Firmware Version: 4.73 SP4
Software Version: EMC32-B is 9.15

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
1	EUT	TableSafe, Inc.	RAIL2	TUV SUD #23, A02M100200012L

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

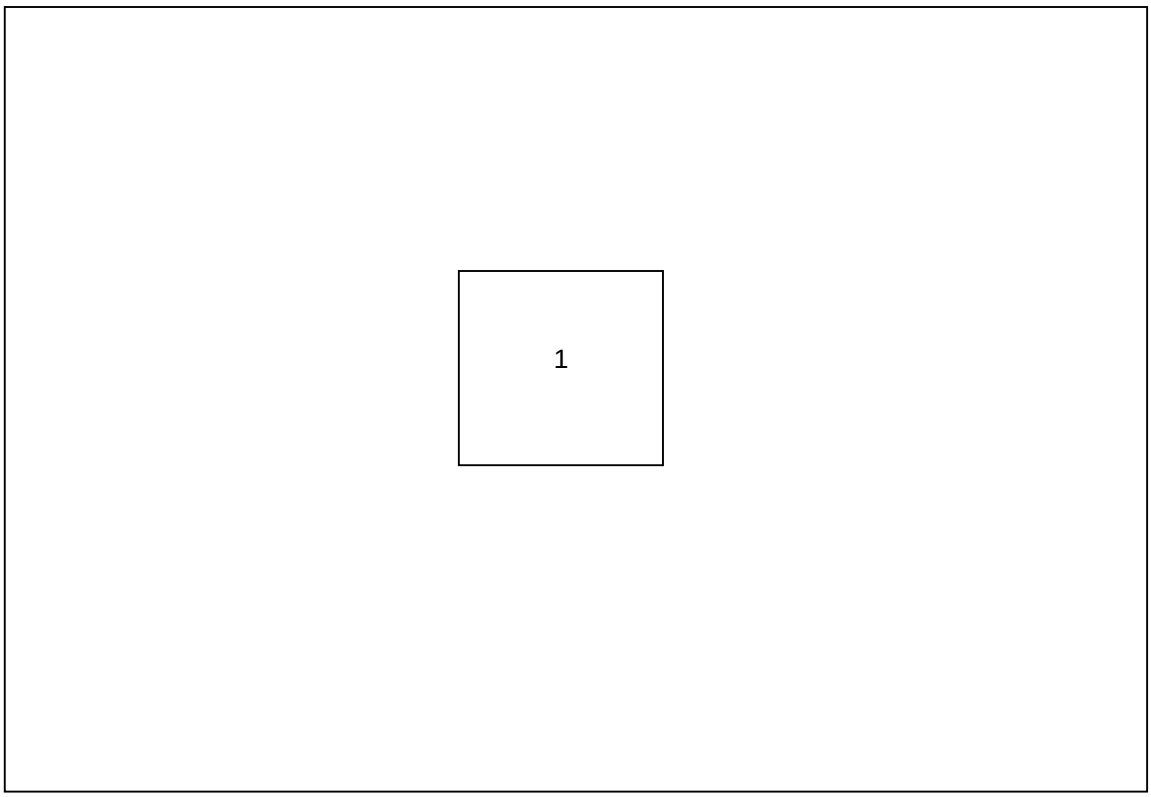

Figure 6-1: Test Setup Block Diagram

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 antenna used for the RAIL2 is an internal antenna which cannot be detached without damaging the unit. Therefore, the antenna meets the requirements of Section 15.203

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

7.2.1 Measurement Procedure

The EUT is battery powered therefore AC power line conducted emissions is not applicable.

7.3 6dB / 99% Bandwidth – FCC: 15.247(a)(2); ISED Canada: RSS-247 5.2(a)

7.3.1 Measurement Procedure

The 6dB bandwidth was measured in accordance with the FCC KDB 558074 D01 DTS Meas Guidance v04. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 3 times the RBW. The trace was set to max hold with a peak detector active. The marker-delta function of the spectrum analyzer was utilized to determine the 6 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.

7.3.2 Measurement Results

Performed by: Jean Tezil

Table 7.3.2-1: 6dB / 99% Bandwidth – 802.11b

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
2412	8.0496	12.153
2437	8.0706	12.186
2462	8.0754	12.203

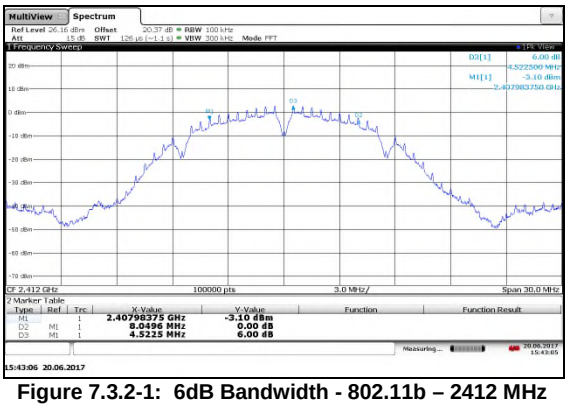

Figure 7.3.2-1: 6dB Bandwidth - 802.11b – 2412 MHz

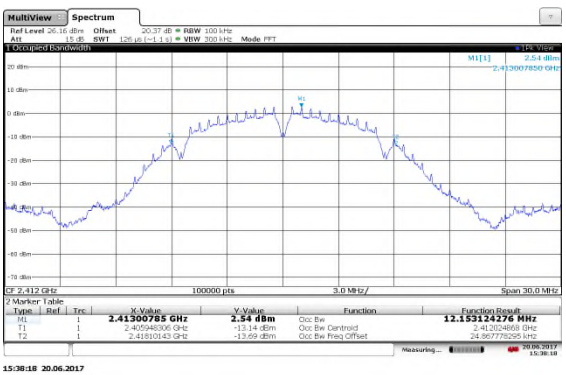

Figure 7.3.2-2: 99% Bandwidth - 802.11b – 2412 MHz

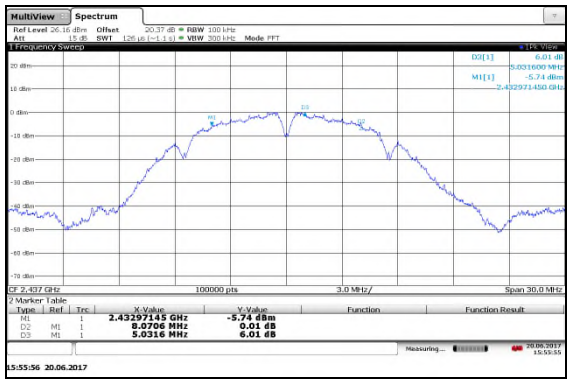

Figure 7.3.2-3: 6dB Bandwidth - 802.11b – 2437 MHz

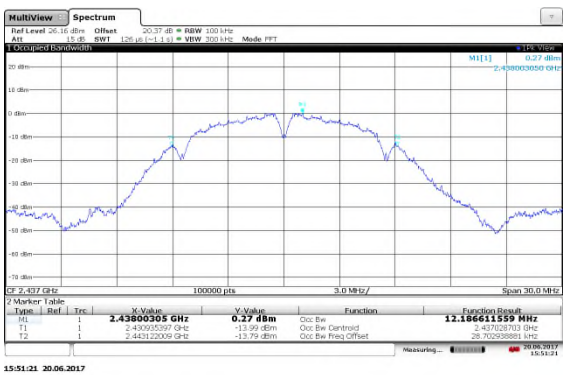

Figure 7.3.2-4: 99% Bandwidth - 802.11b – 2437 MHz

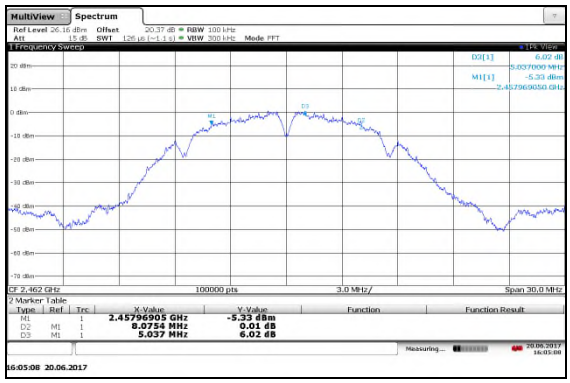

Figure 7.3.2-5: 6dB Bandwidth - 802.11b – 2462 MHz

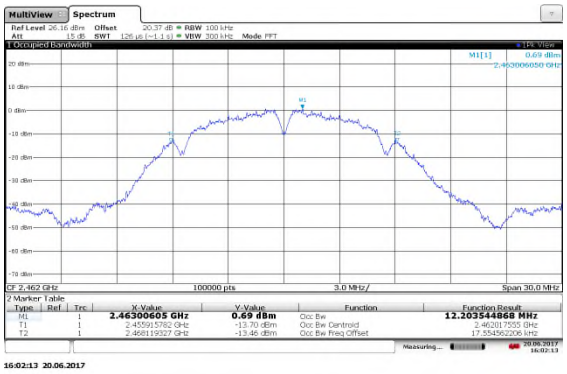

Figure 7.3.2-6: 99% Bandwidth - 802.11b – 2462 MHz

Table 7.3.2-2: 6dB / 99% Bandwidth – 802.11g

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
2412	16.248	16.308
2437	15.954	16.355
2462	16.377	16.34

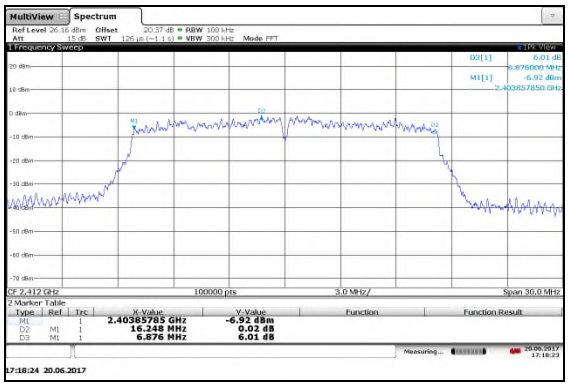

Figure 7.3.2-7: 6dB Bandwidth - 802.11g – 2412 MHz

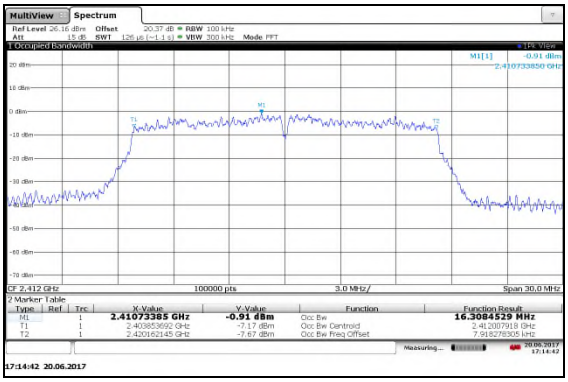

Figure 7.3.2-8: 99% Bandwidth - 802.11g – 2412 MHz

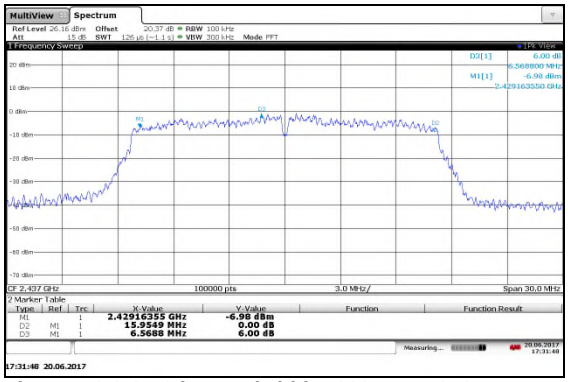

Figure 7.3.2-9: 6dB Bandwidth - 802.11g – 2437 MHz

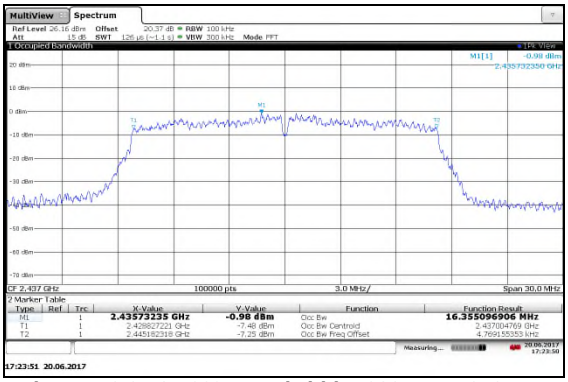

Figure 7.3.2-10: 99% Bandwidth - 802.11g – 2437 MHz

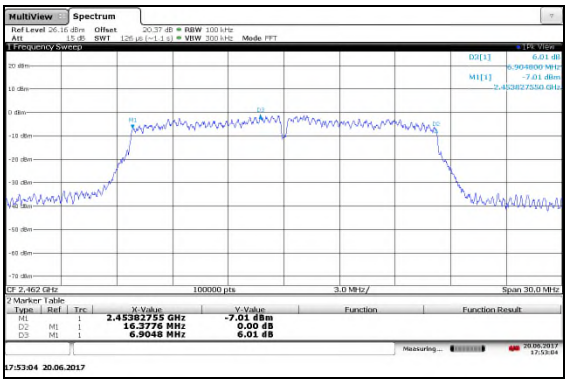

Figure 7.3.2-11: 6dB Bandwidth - 802.11g – 2462 MHz

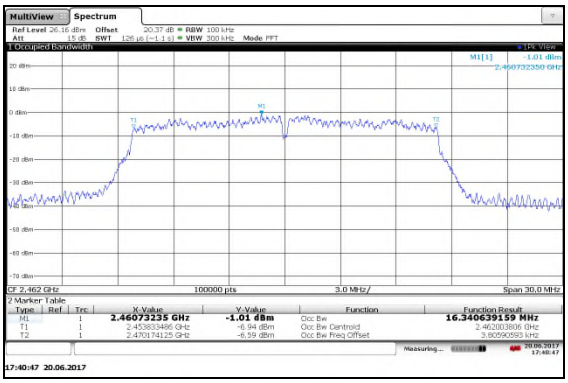

Figure 7.3.2-12: 99% Bandwidth - 802.11g – 2462 MHz

7.4 Fundamental Emission Output Power – FCC: 15.247(b)(3); ISED Canada: RSS-247 5.4(d)

7.4.1 Measurement Procedure

The maximum peak conducted output power was measured in accordance with FCC KDB 558074 D01 DTS Measurement Guidance v04 utilizing the PKPM1 Peak power meter method. The RF output of the equipment under test was directly connected to the input of the peak power meter applying suitable attenuation.

7.4.2 Measurement Results

Performed by: Jean Tezil

Table 7.4.2-1: Maximum Peak Conducted Output Power - 802.11b

Frequency (MHz)	Output Power (dBm)
2412	14.33
2437	14.37
2462	14.5

Table 7.4.2-2: Maximum Peak Conducted Output Power – 802.11g

Frequency (MHz)	Output Power (dBm)
2412	20.78
2437	20.84
2462	20.94

7.5 Emission Levels – FCC: 15.247(d), 15.205, 15.209; ISED Canada RSS-247 5.5, RSS-Gen 8.9/8.10

7.5.1 Emissions into Non-restricted Frequency Bands

7.5.1.1 Measurement Procedure

The unwanted emissions into non-restricted bands were measured conducted in accordance with FCC KDB 558074 D01 DTS Measurement Guidance v04. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 300 kHz. Span was set to 1.5 times the DTS bandwidth. The trace was set to max hold with a peak detector active. The resulting spectrum analyzer peak level was used to determine the reference level with respect to the 20 dBc limit. The spectrum span was then adjusted for the measurement of spurious emissions from 30 MHz to 25GHz, 10 times the highest fundamental frequency. Additionally, a prescan was performed from 9 kHz or the lowest frequency generated to 30 MHz.

Band-edge compliance was determined using the conducted marker-delta method in which the radio frequency power that is produced by the EUT is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power.

7.5.1.2 Measurement Results

Performed by: Jean Tezil

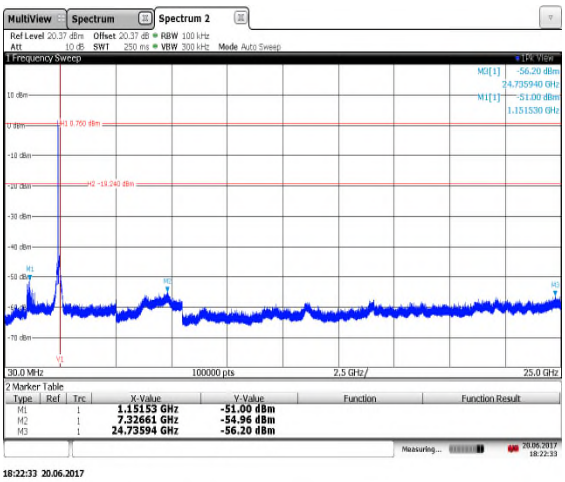

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Figure 7.5.1.2-1: 30 MHz – 25 GHz – 802.11b – 2412 MHz

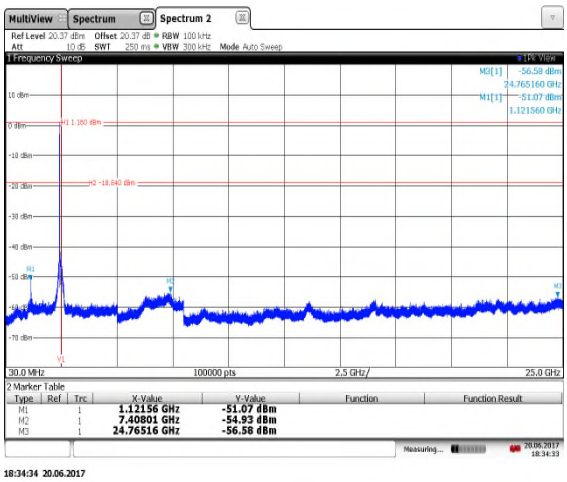

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Figure 7.5.1.2-2: 30 MHz – 25 GHz – 802.11b – 2437 MHz

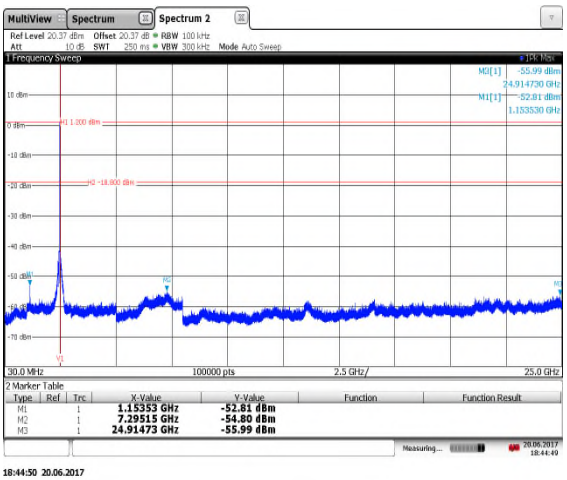

Figure 7.5.1.2-3: 30 MHz – 25 GHz – 802.11b – 2462 MHz

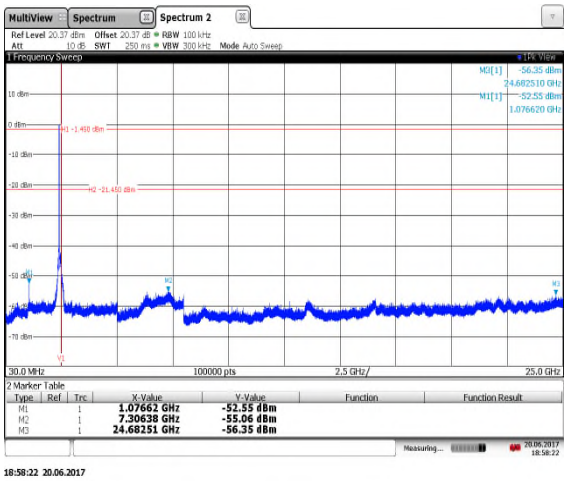

Figure 7.5.1.2-4: 30 MHz – 25 GHz – 802.11g – 2412 MHz

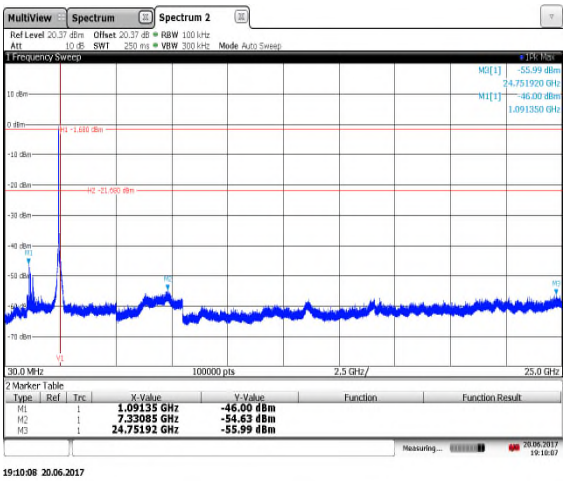

Figure 7.5.1.2-5: 30 MHz – 25 GHz – 802.11g – 2437 MHz

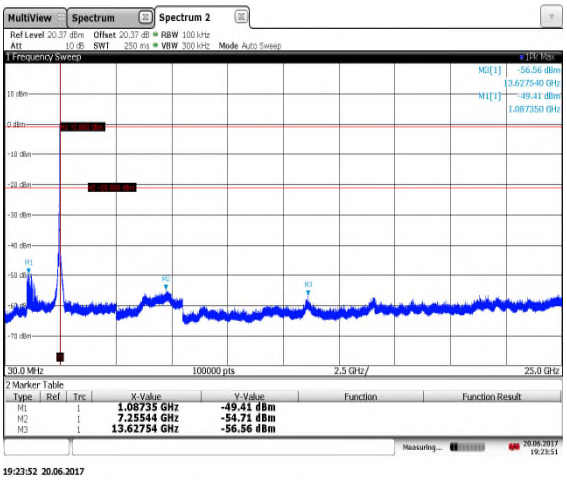

Figure 7.5.1.2-6: 30 MHz – 25 GHz – 802.11g – 2462 MHz

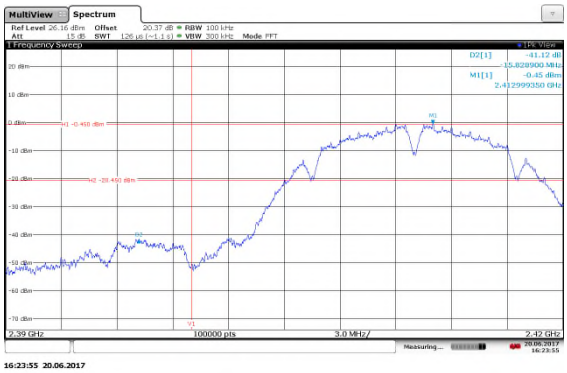

Figure 7.5.1.2-7: Lower Band-edge - 802.11b – 2412 MHz

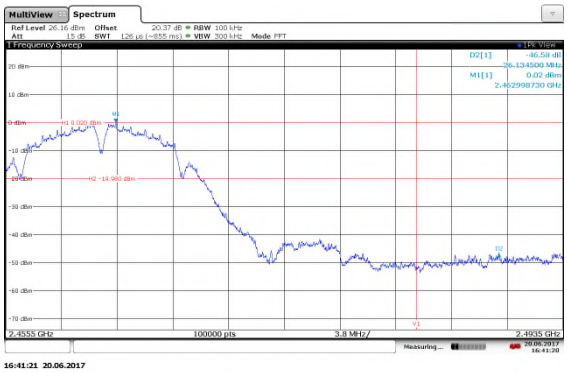

Figure 7.5.1.2-8: Upper Band-edge - 802.11b – 2462 MHz

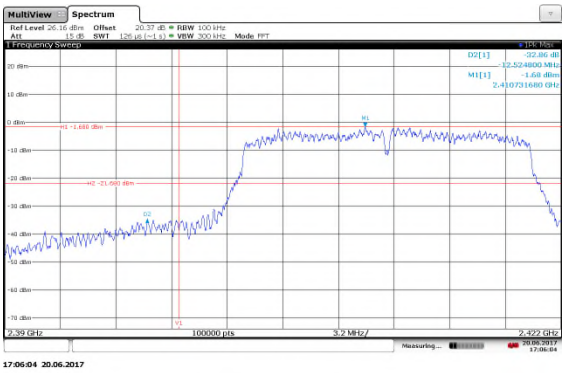

Figure 7.5.1.2-9: Lower Band-edge - 802.11g - 2412 MHz

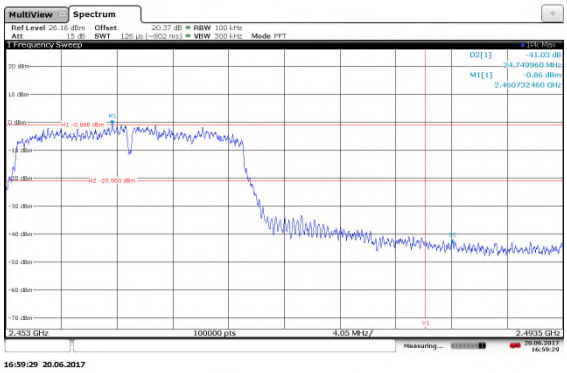

Figure 7.5.1.2-10: Upper Band-edge - 802.11g - 2462 MHz

7.6 Emissions into Restricted Frequency Bands

7.6.1.1 Measurement Procedure

The unwanted emissions into restricted bands were measured radiated over the frequency range of 30MHz to 25GHz, 10 times the highest fundamental frequency.

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

7.6.1.2 Duty Cycle Correction

The Duty Cycle Correction was not required.

7.6.1.3 Measurement Results

Performed by: Jean Tezil

Table 7.6.1.3-1: Radiated Spurious Emissions Tabulated Data – 802.11b 11Mbps

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel = 2412 MHz										
2365.8	64.00	55.20	H	-3.76	60.24	51.44	74.0	54.0	13.8	2.6
2365.7	57.80	48.60	V	-3.76	54.04	44.84	74.0	54.0	20.0	9.2
2485.2	63.70	54.30	H	-3.45	60.25	50.85	74.0	54.0	13.8	3.2
2494.3	58.80	48.30	V	-3.43	55.37	44.87	74.0	54.0	18.6	9.1
4824	46.70	33.90	H	3.68	50.38	37.58	74.0	54.0	23.6	16.4
4824	43.90	30.00	V	3.68	47.58	33.68	74.0	54.0	26.4	20.3
3618	44.00	37.00	H	1.29	45.29	38.29	74.0	54.0	28.7	15.7
3618	45.2	40.4	V	1.29	46.49	41.69	74.0	54.0	27.5	12.3
19296	42.80	30.90	H	8.22	51.02	39.12	74.0	54.0	23.0	14.9
Middle Channel = 2437 MHz										
2387.3	65.70	55.90	H	-3.71	61.99	52.19	74.0	54.0	12.0	1.8
2388.7	57.70	45.80	V	-3.70	54.00	42.10	74.0	54.0	20.0	11.9
2490	66.80	57.20	H	-3.44	63.36	53.76	74.0	54.0	10.6	0.2
2490	60.50	50.40	V	-3.44	57.06	46.96	74.0	54.0	16.9	7.0
3655	43.70	37.40	H	1.40	45.10	38.80	74.0	54.0	28.9	15.2
3655	43.80	38.30	V	1.40	45.20	39.70	74.0	54.0	28.8	14.3
4874	46.20	33.70	H	3.67	49.87	37.37	74.0	54.0	24.1	16.6
4874	44.60	30.80	V	3.67	48.27	34.47	74.0	54.0	25.7	19.5
19496	43.00	30.20	H	8.26	51.26	38.46	74.0	54.0	22.7	15.5
High Channel = 2462 MHz										
2388.8	61.3	51.3	V	-3.70	57.60	47.60	74.0	54.0	16.4	6.4
2388.9	55.4	44.5	V	-3.70	51.70	40.80	74.0	54.0	22.3	13.2
2499	62.60	53.60	H	-3.42	59.18	50.18	74.0	54.0	14.8	3.8
2499.2	57.30	47.50		-3.42	53.88	44.08	74.0	54.0	20.1	9.9
3693	42.00	35.00	H	1.52	43.52	36.52	74.0	54.0	30.5	17.5
3693	44	38.9	V	1.52	45.52	40.42	74.0	54.0	28.5	13.6
4924	44.90	34.20	H	3.66	48.56	37.86	74.0	54.0	25.4	16.1
4924	43.60	30.00	V	3.66	47.26	33.66	74.0	54.0	26.7	20.3
19696	42.60	30.50	H	8.68	51.28	39.18	74.0	54.0	22.7	14.8

Table 7.6.1.3-2: Radiated Spurious Emissions Tabulated Data – 802.11g 36Mbps

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel = 2412 MHz										
2363	69.60	55.90	H	-3.77	65.83	52.13	74.0	54.0	8.2	1.9
2365	61.80	48.90	V	-3.77	58.03	45.13	74.0	54.0	16.0	8.9
2390	75.10	53.50	H	-3.70	71.40	49.80	74.0	54.0	2.6	4.2
2386.8	64.30	45.90	V	-3.71	60.59	42.19	74.0	54.0	13.4	11.8
3618	43.70	37.70	H	1.29	44.99	38.99	74.0	54.0	29.0	15.0
3618	45.00	39.80	V	1.29	46.29	41.09	74.0	54.0	27.7	12.9
4824	44.30	31.00	H	3.68	47.98	34.68	74.0	54.0	26.0	19.3
4824	41.90	28.70	V	3.68	45.58	32.38	74.0	54.0	28.4	21.6
19296	43.60	30.80	H	8.22	51.82	39.02	74.0	54.0	22.2	15.0
Middle Channel = 2437 MHz										
2390	69.60	55.90	H	-3.70	65.90	52.20	74.0	54.0	8.1	1.8
2390	62.50	48.50	H	-3.70	58.80	44.80	74.0	54.0	15.2	9.2
2484.5	69.50	56.10	H	-3.46	66.04	52.64	74.0	54.0	8.0	1.4
2484.3	63.60	49.70	V	-3.46	60.14	46.24	74.0	54.0	13.9	7.8
3655	43.40	36.90	H	1.40	44.80	38.30	74.0	54.0	29.2	15.7
3655	45.50	40.60	V	1.40	46.90	42.00	74.0	54.0	27.1	12.0
4874	42.90	31.00	H	3.67	46.57	34.67	74.0	54.0	27.4	19.3
4874	40.10	28.10	V	3.67	43.77	31.77	74.0	54.0	30.2	22.2
19496	43.20	30.10	H	8.26	51.46	38.36	74.0	54.0	22.5	15.6
High Channel = 2462 MHz										
2483.5	76.60	54.80	H	-3.46	73.14	51.34	74.0	54.0	0.9	2.7
2483.5	68.50	48.60	V	-3.46	65.04	45.14	74.0	54.0	9.0	8.9
2499.9	69.10	54.40	H	-3.42	65.68	50.98	74.0	54.0	8.3	3.0
2499.9	62.80	48.30	V	-3.42	59.38	44.88	74.0	54.0	14.6	9.1
3693	42.10	35.80	H	1.52	43.62	37.32	74.0	54.0	30.4	16.7
3693	44.00	38.90	V	1.52	45.52	40.42	74.0	54.0	28.5	13.6
4924	43.30	31.90	H	3.66	46.96	35.56	74.0	54.0	27.0	18.4
4924	40.80	29.90	V	3.66	44.46	33.56	74.0	54.0	29.5	20.4
19696	43.00	30.20	H	8.68	51.68	38.88	74.0	54.0	22.3	15.1

7.6.1.4 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

Corrected Level: 64.00 -3.76 = 60.24dBuV/m
Margin: 74dBuV/m – 60.24dBuV/m = 13.76dB

Example Calculation: Average

Corrected Level: 55.20 -3.76 = 51.44dBuV
Margin: 54dBuV – 51.44dBuV = 2.56dB

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

7.7.1 Measurement Procedure

The power spectral density was measured in accordance with the FCC KDB 558074 D01 DTS Meas Guidance v04 utilizing the PKPSD (peak PSD) method. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 3 kHz. The Video Bandwidth (VBW) was set to 10 kHz. Span was set to 1.5 times the DTS bandwidth. The trace was set to max hold with a peak detector active.

7.7.2 Measurement Results

Performed by: Jean Tezil

Table 7.7.2-1: Peak Power Spectral Density – 802.11b

Frequency (MHz)	PSD Level (dBm)
2412	-11.58
2437	-11.65
2462	-11.54

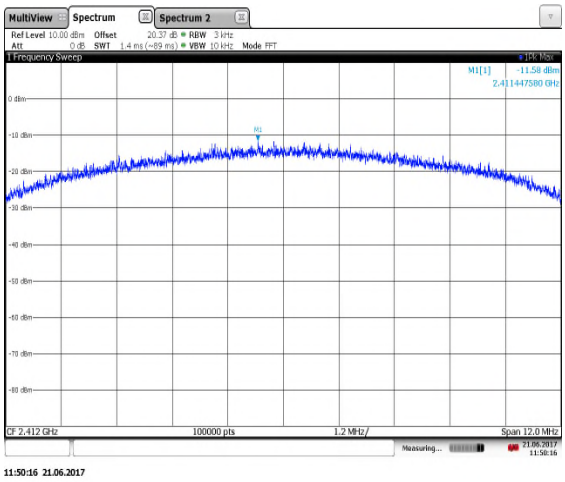

Figure 7.7.2-1: PSD Plot – 802.11b – 2412 MHz

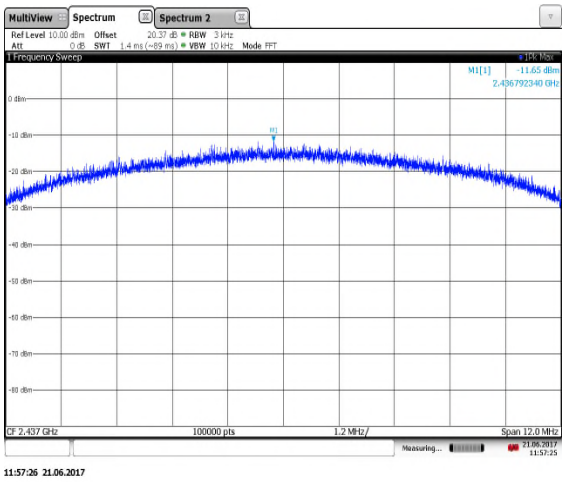

Figure 7.7.2-2: PSD Plot – 802.11b – 2437 MHz

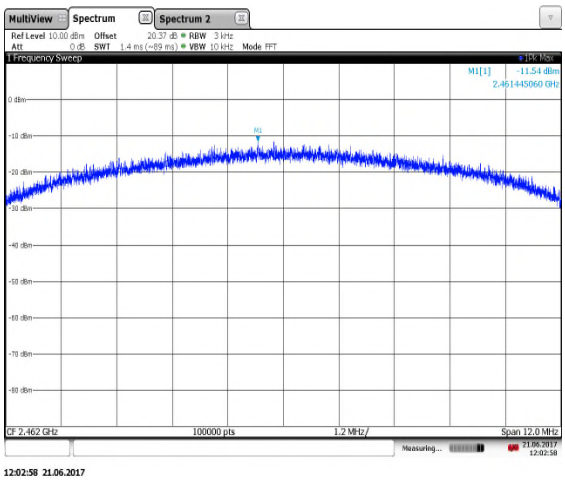

Figure 7.7.2-3: PSD Plot – 802.11b – 2462 MHz

Table 7.7.2-2: Peak Power Spectral Density – 802.11g

Frequency (MHz)	PSD Level (dBm)
2412	-12.63
2437	-12.58
2462	-12.68

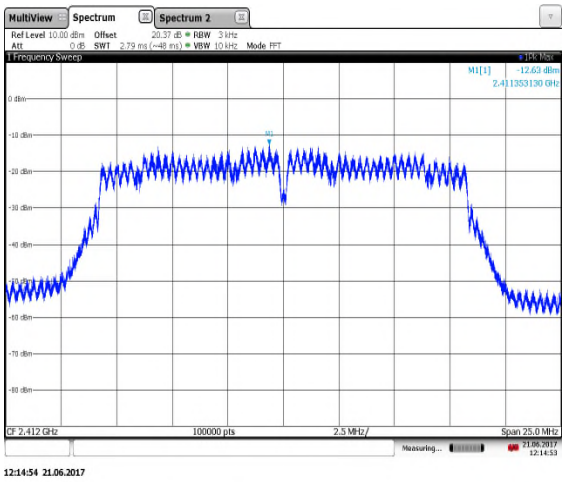

Figure 7.7.2-4: PSD Plot – 802.11g – 2412 MHz

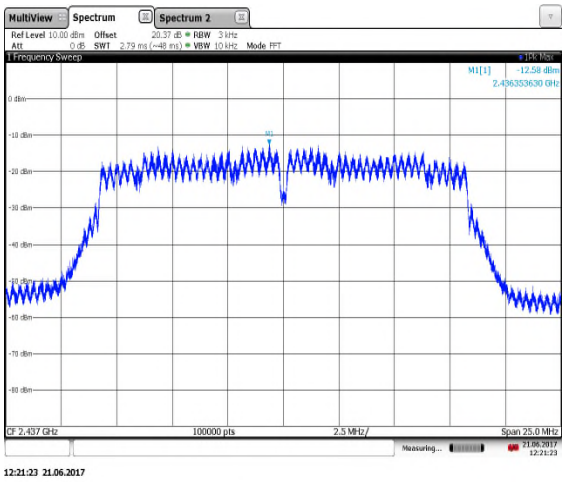

Figure 7.7.2-5: PSD Plot – 802.11g – 2437 MHz

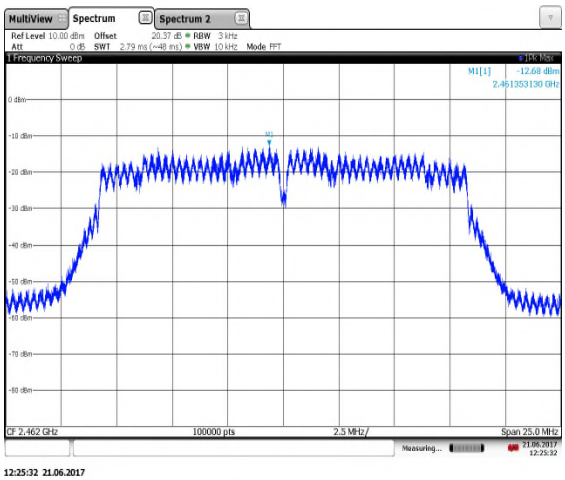

Figure 7.7.2-6: PSD Plot – 802.11g – 2462 MHz

8 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%.

Parameter	U_{lab}
Occupied Channel Bandwidth	**± 0.004%**
RF Conducted Output Power	**± 0.689 dB**
Power Spectral Density	**±0.5 dB**
Antenna Port Conducted Emissions	**± 2.717 dB**
Radiated Emissions	**± 5.877 dB**
Temperature	**± 0.860 °C**
Radio Frequency	**±2.832 x 10-8**
AC Power Line Conducted Emissions	**±2.85**

9 CONCLUSION

In the opinion of TÜV SÜD America Inc. the RAIL2, manufactured by Viableware, Inc. DBA TableSafe, Inc., Inc. meets the requirements of FCC Part 15 subpart C and ISED Canada Radio Standards Specification: RSS-247 for the tests documented herein.

END REPORT