



## **Certification Test Report**

**FCC ID: 2ADCB-RMODIT**

**IC: 6715C-RMODIT**

**FCC Rule Part: 15.247**

**ISED Canada's Radio Standards Specification: RSS-247**

**Report Number: AT72131950.2P1**

**Manufacturer: Acuity Brands Lighting, Inc.  
Model: RMODIT**

**Test Begin Date: October 16, 2017**

**Test End Date: December 20, 2017**

**Report Issue Date: January 22, 2018**



FOR THE SCOPE OF ACCREDITATION UNDER Certificate Number: AT-2021

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

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**This report contains 22 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 ISSED Canada's Radio Standards Specification RSS-247 for a Class II Permissive Change.

The purpose of the Class II Permissive Change is to address the addition of two new antennas.

### 1.2 Product Description

The RMODIT RF Module is a device designed to solder directly to another PCB using castellated edges. The product is intended to allow a variety of Acuity Brands devices to communicate in a wireless network. This can either be done by using an external host processor, or by using the processor on the module.

There are two radios on the module. One radio is a 2.4GHz Bluetooth radio. The other radio is a proprietary 904-926MHz (915MHz) Implementation. The 904MHz-926MHz radio is 100kbps O-QPSK DSSS 8 symbols/bit. These radios are capable of transmitting and receiving at the same time.

This report documents the 2.4GHz transmitter only. The 904 – 926MHz transmitter evaluation is documented in a separate report.

#### Technical Information:

Detail	Description
Frequency Range	2402 – 2480 MHz
Number of Channels	40
Modulation Format	GFSK
Data Rates	1 MBPS
Operating Voltage	3.3Vdc Nominal
Antenna Type / Gain	Molex 0479480001 Chip Antenna (original): 3.0 dBi Printed Trace Antenna (new): 2.4 dBi Pulse W3911B0300 Dual Band Antenna (new): 2.5 dBi

Manufacturer Information:  
Acuity Brands Lighting, Inc.  
One Lithonia Way  
Conyers, GA 30012

EUT Serial Numbers: 16103100011009 (PCB Trace Antenna)  
16103100020008 (Dual Band Antenna)

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 and the data presented in this report represents the worst case where applicable. The manufacturer provided test software to configure and exercise the transmitter.

For radiated emissions, the EUT was evaluated in three orthogonal orientations for each antenna. The worst-case orientation for the PCB Trace Antenna was the Y-orientation for spurious emissions and Z-orientation for band-edges. The worst-case orientation for the Dual Band Antenna was the X-orientation for spurious emissions and Y-orientation for band-edges. See the test setup photos exhibit accompanying this report for more information.

For RF conducted emissions, the EUT was evaluated using the external U.FL antenna connector with suitable attenuation. The coupling cable and external attenuation were considered for all RF conducted measurements. The RF conducted emissions testing was limited to the amplitude related tests only for the addition of the diplexer circuitry when using the dual band antenna.

This device contains two independent radios which can transmit simultaneously. Radiated inter-modulation testing was performed for all combinations of simultaneous transmission and found to be in compliance. Conducted inter-modulation testing was performed for the diplexer configuration.

Power Setting During Test: 90

## **2 TEST FACILITIES**

### **2.1 Location**

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

TÜV SÜD America, Inc.  
5015 B.U. Bowman Drive  
Buford, GA 30518  
Phone: (770) 831-8048  
Fax: (770) 831-8598

### **2.2 Laboratory Accreditations/Recognitions/Certifications**

TÜV SÜD America, Inc. is accredited to ISO/IEC 17025 by the ANSI-ASQ National Accreditation Board/ANAB accreditation program, and has been issued certificate number AT-2021 in recognition of this accreditation. Unless otherwise specified, all tests methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site 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: 391271

ISED Canada Lab Code: IC 4175A

VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

## 2.3 Radiated Emissions Test Site Description

### 2.3.1 Semi-Anechoic Chamber Test Site

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 150cm in diameter and is located 160cm 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 table 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 chases 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:

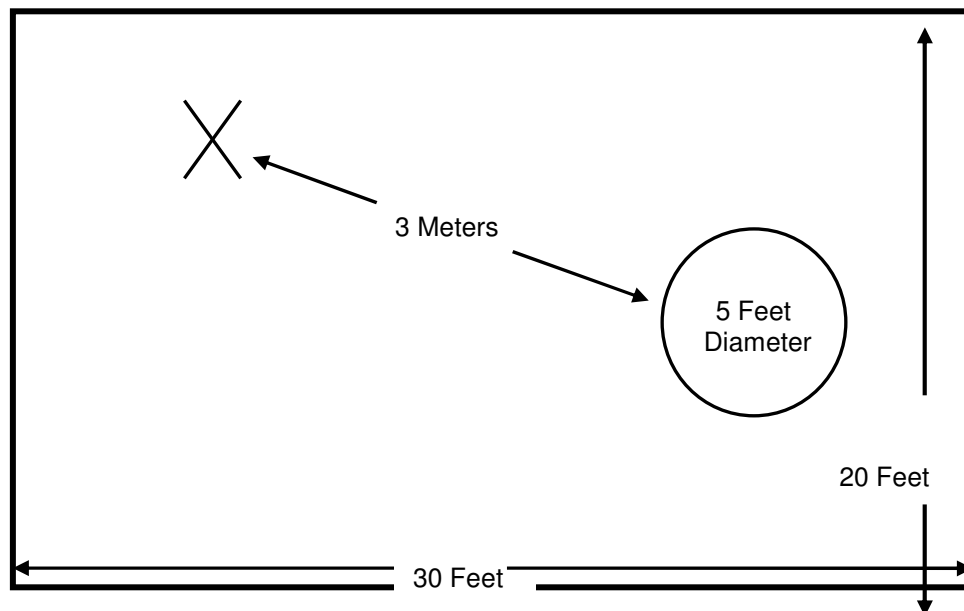


Figure 2.3-1: Semi-Anechoic Chamber Test Site

### 2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' 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.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room 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. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.10.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

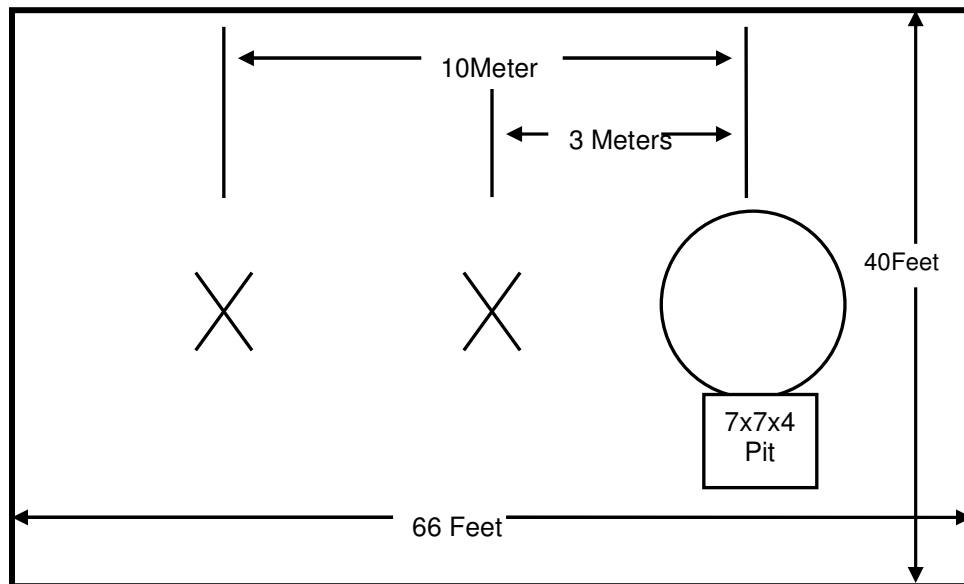


Figure 2.3-2: Open Area Test Site

## 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 8' solid aluminum horizontal ground reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

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

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

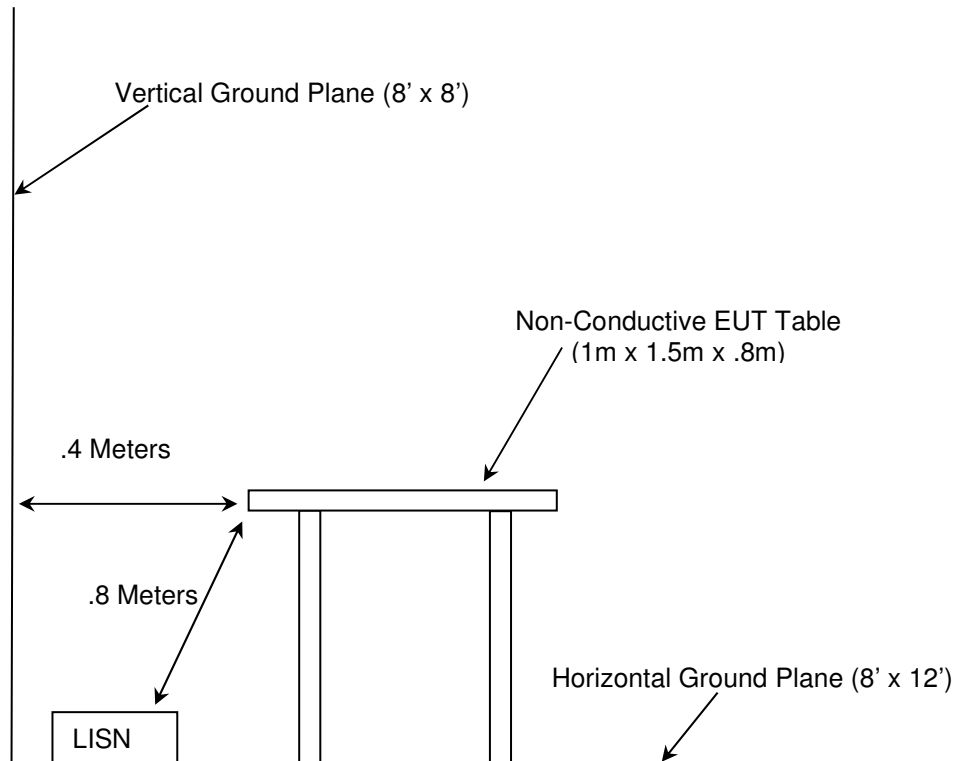


Figure 2.4-1: AC Mains Conducted EMI Site

## 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 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, Feb 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**

AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
30	Spectrum Technologies	DRH-0118	Antennas	970102	5/9/2017	5/9/2019
40	EMCO	3104	Antennas	3211	6/8/2016	6/8/2018
73	Agilent	8447D	Amplifiers	2727A05624	7/24/2017	7/24/2018
167	ACS	Chamber EMI Cable Set	Cable Set	167	9/29/2017	9/29/2018
267	Agilent	N1911A	Meters	MY45100129	8/22/2017	8/22/2019
268	Agilent	N1921A	Sensors	MY45240184	8/22/2017	8/22/2019
324	ACS	Belden	Cables	8214	3/21/2017	3/21/2018
331	Microwave Circuits	H1G513G1	Filters	31417	5/13/2017	5/13/2018
334	Rohde & Schwarz	3160-09	Antennas	49404	11/4/2010	NCR
335	Suhner	SF-102A	Cables	882/2A	7/11/2017	7/11/2018
338	Hewlett Packard	8449B	Amplifiers	3008A01111	7/11/2017	7/11/2019
340	Aeroflex/Weinschel	AS-20	Attenuators	7136	7/10/2017	7/10/2018
345	Suhner Sucoflex	102A	Cables	1077/2A	7/10/2017	7/10/2018
412	Electro Metrics	LPA-25	Antennas	1241	8/8/2016	8/8/2018
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	10/27/2016	11/27/2017
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	11/27/2017	11/27/2018
616	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	N/A	10/7/2017	10/7/2018
622	Rohde & Schwarz	FSV40	Spectrum Analyzer	101338	7/15/2016	7/15/2018
676	Florida RF Labs	SMS-290AW-480.0-SMS	Cables	MFR2Y194	11/4/2016	12/4/2017
676	Florida RF Labs	SMS-290AW-480.0-SMS	Cables	MFR2Y194	12/4/2017	12/4/2018
813	PMM	9010	Receiver	697WW30606	2/6/2017	2/6/2018
819	Rohde & Schwarz	ESR26	Receiver	101345	10/31/2017	10/31/2018
3010	Rohde & Schwarz	ENV216	LISN	3010	7/11/2017	7/11/2018
RE135	Rohde & Schwarz	FSP30	Spectrum Analyzer	835618/031	10/31/2016	10/31/2017

**NCR = No Calibration Required**

**NOTE: All test equipment was used only during active calibration cycles.**

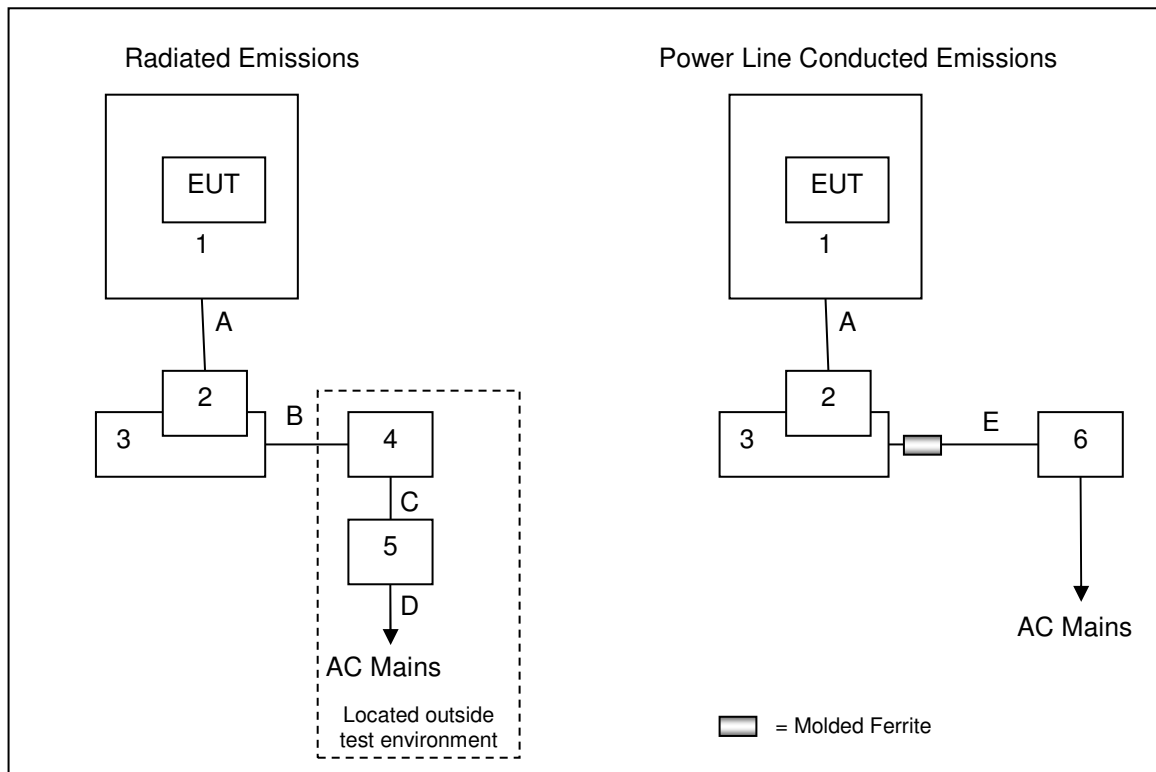
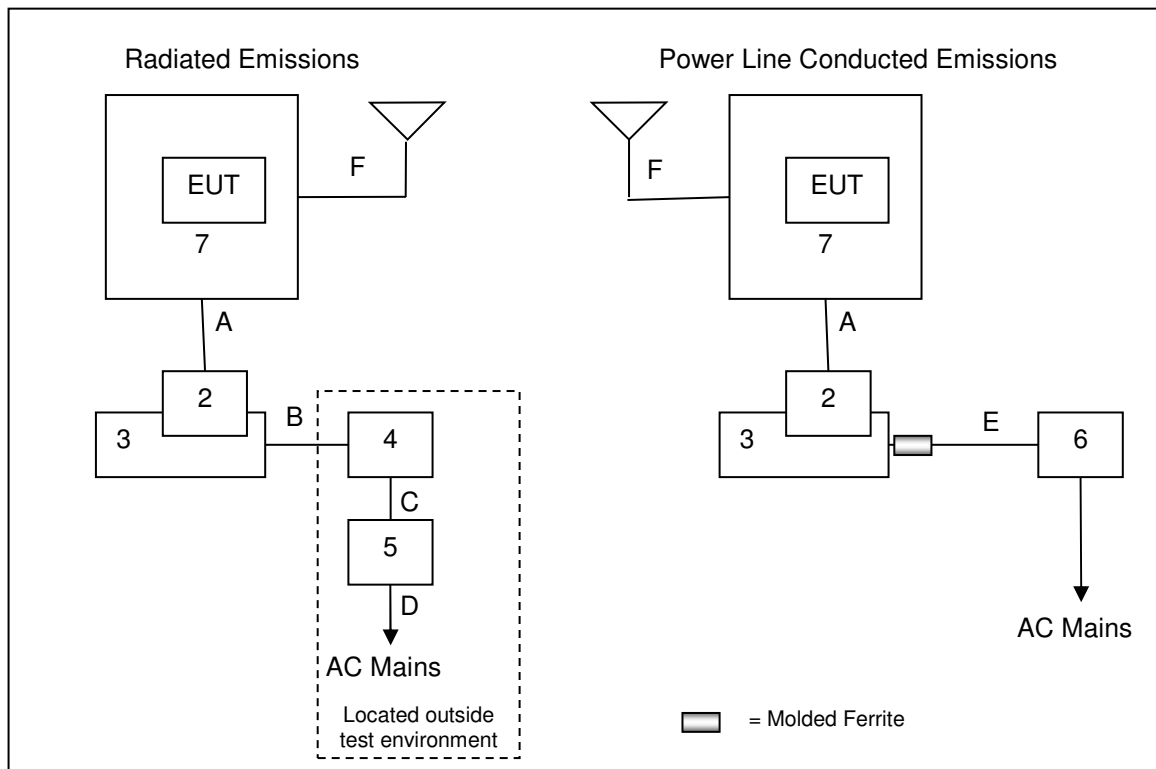
## 5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model/Part Number	Serial Number
1	PCB Trace Antenna Host PCB	Acuity Brands Lighting, Inc.	401-00837-001 rev A	01553603
2	Communication Board	Acuity Brands Lighting, Inc.	AC-3-0 3217-08	101
3	Development Board	Silicon Labs	PCB4001 rev A03	151704660
4	Laptop Computer	Microsoft	Surface	014948264753
5	Laptop Power Supply	Microsoft	1706	0CI30D0ICNF68
6	USB Power Supply	Samsung	EP-TA20JWE	R37HBXD2GB3SE3
7	Dual Band External Antenna Host PCB	Acuity Brands Lighting, Inc.	401-00838-001 rev01	9919

Table 5-2: Cable Description

Cable	Cable Type	Length	Shield	Termination
A	Ribbon Cable	23 cm	No	PCB Trace Antenna Host PCB – Communication Board
B	USB Cable	1000 cm	Yes	Development Board – Laptop
C	DC Power Cable	145 cm	No	Laptop – Laptop Power Supply
D	AC Power Cable	100 cm	No	Laptop Power Supply – AC Mains
E	USB Cable	130 cm	No	Development Board – USB Power Supply
F	RF Antenna Cable	60 cm	No	Dual Band External Antenna Host PCB – Dual Band Antenna

**6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM****Figure 6-1: Test Setup Block Diagram – PCB Trace Antenna****Figure 6-2: Test Setup Block Diagram – Dual Band Antenna**

## 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: Section 15.203

The chip antenna is a surface mount antenna and the Taoglas and Nitol antennas connect to the U.FL port. The new PCB Trace antenna and host diplexer on the host device couples to the EUT via castellated edges. The host diplexer connects to the Dual Band Antenna via U.FL connector on the host device board.

Therefore, the connection type of all antennas satisfy the requirements of Section 15.203.

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

#### 7.2.1 Measurement Procedure

ANSI C63.10-2013 was the guiding document for this evaluation. Conducted emissions were performed from 150 kHz to 30 MHz 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 = Applicable Limit - Corrected Reading**

#### 7.2.2 Measurement Results

Performed by: Alton Smith

**Table 7.2.2-1: Conducted EMI Results Line 1 – PCB Trace Antenna**

Frequency (MHz)	Corrected Reading		Limit		Margin		Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	
0.154	43.47	43.47	65.78	55.78	-22.31	-12.31	9.58
0.174	42.72	42.72	64.77	54.77	-22.05	-12.05	9.58
0.19	40.7	40.7	64.04	54.04	-23.34	-13.34	9.58
0.21	38.98	38.98	63.21	53.21	-24.23	-14.23	9.58
0.238	37.04	37.04	62.17	52.17	-25.13	-15.13	9.58
0.258	35.54	35.54	61.5	51.5	-25.96	-15.96	9.58
0.674	36.7	36.7	56	46	-19.3	-9.3	9.59
0.69	37.28	37.28	56	46	-18.72	-8.72	9.59
0.714	36.03	36.03	56	46	-19.97	-9.97	9.59
0.742	36.9	36.9	56	46	-19.1	-9.1	9.59

**Table 7.2.2-2: Conducted EMI Results Line 2 – PCB Trace Antenna**

Frequency (MHz)	Corrected Reading		Limit		Margin		Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	
0.162	28.21	28.21	65.36	55.36	-37.15	-27.15	9.58
0.17	40.71	40.71	64.96	54.96	-24.25	-14.25	9.58
0.19	39.68	39.68	64.04	54.04	-24.36	-14.36	9.58
0.21	34.46	34.46	63.21	53.21	-28.75	-18.75	9.58
0.23	32.48	32.48	62.45	52.45	-29.97	-19.97	9.58
0.274	31.37	31.37	61	51	-29.63	-19.63	9.59
0.658	34.41	34.41	56	46	-21.59	-11.59	9.59
0.674	34.56	34.56	56	46	-21.44	-11.44	9.59
0.69	34.89	34.89	56	46	-21.11	-11.11	9.59
0.702	34.65	34.65	56	46	-21.35	-11.35	9.59

**Table 7.2.2-3: Conducted EMI Results Line 1 – Dual Band Antenna**

Frequency (MHz)	Corrected Reading		Limit		Margin		Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	
0.15	42.06	42.06	66	56	-23.94	-13.94	9.59
0.154	42.47	42.47	65.78	55.78	-23.31	-13.31	9.58
0.174	41.61	41.61	64.77	54.77	-23.16	-13.16	9.58
0.19	39.22	39.22	64.04	54.04	-24.82	-14.82	9.58
0.218	37.78	37.78	62.89	52.89	-25.11	-15.11	9.58
0.274	36.37	36.37	61	51	-24.63	-14.63	9.58
0.69	40.49	40.49	56	46	-15.51	-5.51	9.59
0.746	39.67	39.67	56	46	-16.33	-6.33	9.59
2.21	36.1	36.1	56	46	-19.9	-9.9	9.71
8.11	31.97	31.97	60	50	-28.03	-18.03	9.77

Table 7.2.2-4: Conducted EMI Results Line 2 – Dual Band Antenna

Frequency (MHz)	Corrected Reading		Limit		Margin		Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	
0.15	37.39	37.39	66	56	-28.61	-18.61	9.59
0.154	42.3	42.3	65.78	55.78	-23.48	-13.48	9.58
0.174	41.45	41.45	64.77	54.77	-23.32	-13.32	9.58
0.19	39.18	39.18	64.04	54.04	-24.86	-14.86	9.58
0.218	37.76	37.76	62.89	52.89	-25.13	-15.13	9.58
0.23	36.48	36.48	62.45	52.45	-25.97	-15.97	9.58
0.674	34.79	34.79	56	46	-21.21	-11.21	9.59
0.69	38.94	38.94	56	46	-17.06	-7.06	9.59
0.702	37.85	37.85	56	46	-18.15	-8.15	9.59
2.158	36.37	36.37	56	46	-19.63	-9.63	9.71

**7.3 Fundamental Emission Output Power – FCC: Section 15.247(b)(3), ISED Canada: RSS-247 5.4(d)****7.3.1 Measurement Procedure**

The maximum peak conducted output power was measured in accordance with FCC KDB 558074 D01 DTS Meas Guidance 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.

**7.3.2 Measurement Results**

Performed by: Ryan McGann

**Table 7.3.2-1: Maximum Peak Conducted Output Power**

Frequency (MHz)	Output Power (dBm)
2402	9.40
2440	9.43
2480	9.48

## 7.4 Emission Levels – FCC: Section 15.247(d), 15.205, 15.209; ISCED Canada RSS-247 5.5, RSS-Gen 8.9/8.10

### 7.4.1 Emissions into Non-restricted Frequency Bands

#### 7.4.1.1 Measurement Procedure

The unwanted emissions into non-restricted bands were measured conducted in accordance with FCC KDB 558074 D01 DTS Measurement Guidance. 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  $\geq 300$  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 25 GHz, 10 times the highest fundamental frequency.

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.

#### 7.4.1.2 Measurement Results

Performed by: Alton Smith

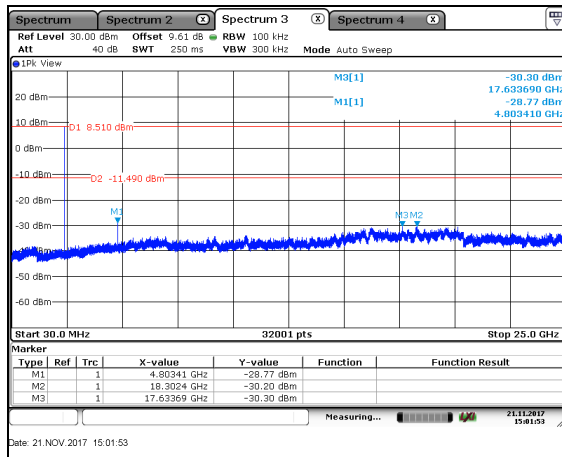


Figure 7.4.1.2-1: Cond. Emissions – LCH

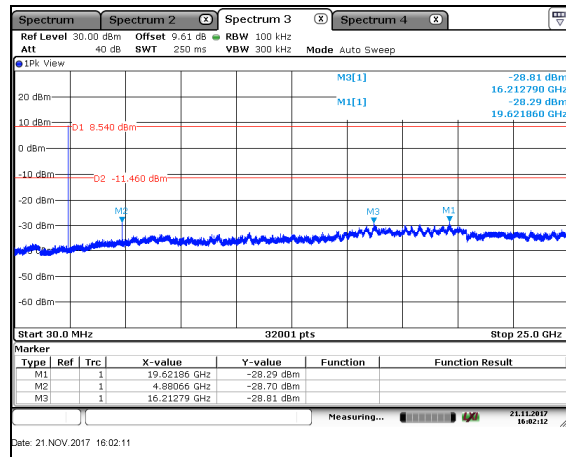


Figure 7.4.1.2-2: Cond. Emissions – MCH

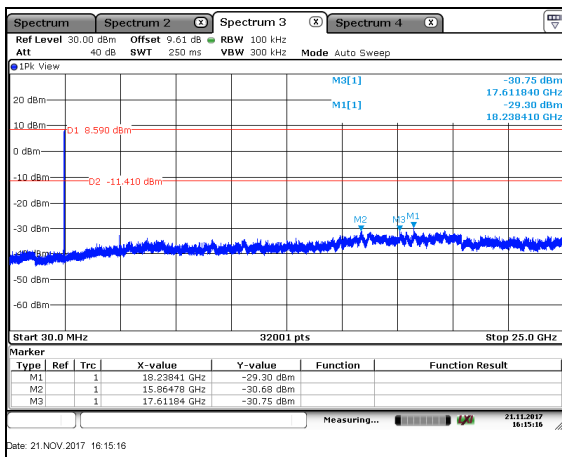


Figure 7.4.1.2-3: Cond. Emissions – HCH

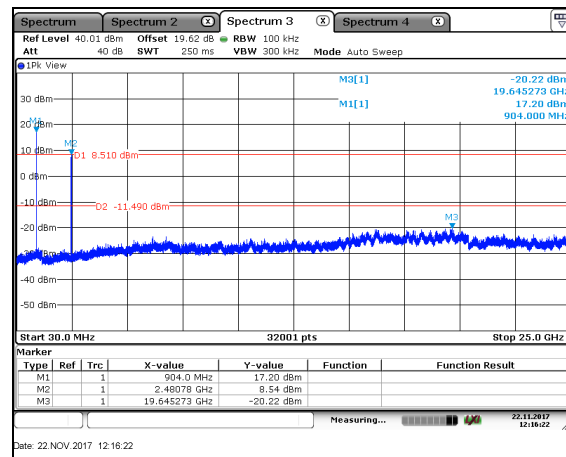


Figure 7.4.1.2-4: Cond. Emissions – Simultaneous Tx

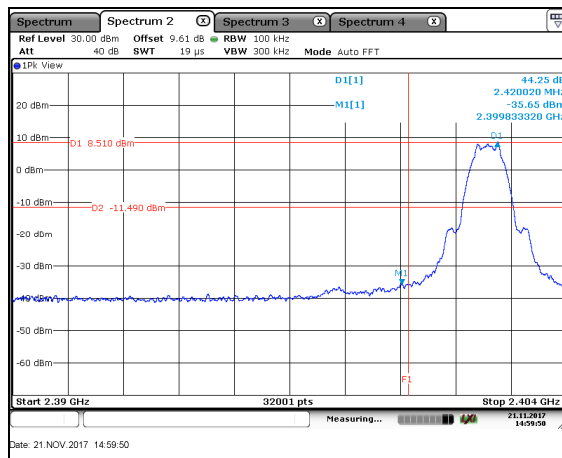


Figure 7.4.1.2-5: Lower Band-edge - LCH

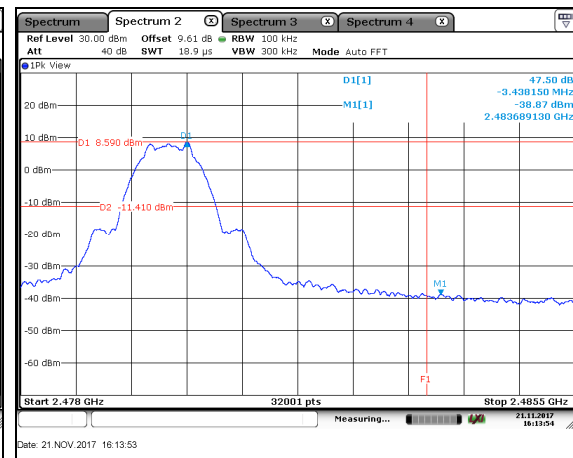


Figure 7.4.1.2-6: Upper Band-edge - HCH

## **7.4.2 Emissions into Restricted Frequency Bands**

### **7.4.2.1 Measurement Procedure**

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

Measurements below 30 MHz were performed in a semi-anechoic chamber with a 3 meter separation distance between the EUT and the measurement antenna. The EUT was rotated 360 degrees to maximize each emission. The magnetic loop receiving antenna was positioned with its lowest point 1 meter above the ground. The loop antenna was aligned along the site axis, orthogonal to the site axis, and ground-parallel to the site axis.

The spectrum analyzer's resolution and video bandwidths were set to 200 Hz and 1000 Hz respectively for frequencies below 150 kHz and 9 kHz and 30 kHz respectively for frequencies above 150 kHz and below 30 MHz.

For measurements above 30 MHz, 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 RBW of 120 kHz and a 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.

### **7.4.2.2 Duty Cycle Correction**

For average radiated measurements, using a 4.88% duty cycle, the measured level was reduced by a factor 26.23 dB. The duty cycle correction factor is determined using the formula:  $20\log(4.88/100) = -26.23$  dB.

A detailed analysis of the duty cycle timing is provided in the Theory of Operation accompanying the application for certification.

**7.4.2.3 Measurement Results**

Performed by: Arthur Sumner

**Table 7.4.2.3-1: Radiated Spurious Emissions Tabulated Data – PCB Trace Antenna**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
2390	49.31	39.87	H	-5.35	43.96	8.29	74.0	54.0	30.0	45.7
2390	47.94	36.09	V	-5.35	42.59	4.51	74.0	54.0	31.4	49.5
4804	56.25	51.75	H	2.38	58.63	27.90	74.0	54.0	15.4	26.1
4804	61.16	58.01	V	2.38	63.54	34.16	74.0	54.0	10.5	19.8
Middle Channel										
4880	47.36	39.16	H	2.67	50.03	15.59	74.0	54.0	24.0	38.4
4880	46.18	36.58	V	2.67	48.85	13.01	74.0	54.0	25.2	41.0
7320	47.45	37.74	H	7.83	55.28	19.34	74.0	54.0	18.7	34.7
7320	47.82	37.52	V	7.83	55.65	19.12	74.0	54.0	18.3	34.9
High Channel										
2483.5	74.42	69.70	H	-4.95	69.47	38.52	74.0	54.0	4.5	15.5
2483.5	64.96	58.73	V	-4.95	60.01	27.55	74.0	54.0	14.0	26.5
4960	49.09	38.30	H	2.97	52.06	15.03	74.0	54.0	21.9	39.0
4960	48.76	37.47	V	2.97	51.73	14.20	74.0	54.0	22.3	39.8
7440	47.77	36.97	H	7.91	55.68	18.64	74.0	54.0	18.3	35.4
7440	48.86	37.00	V	7.91	56.77	18.67	74.0	54.0	17.2	35.3

**Table 7.4.2.3-2: Radiated Spurious Emissions Tabulated Data – Dual Band Antenna**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
2390	45.99	36.15	H	-5.35	40.64	4.57	74.0	54.0	33.4	49.4
2390	47.93	35.91	V	-5.35	42.58	4.33	74.0	54.0	31.4	49.7
4804	65.15	61.86	H	2.38	67.53	38.01	74.0	54.0	6.5	16.0
4804	65.89	62.01	V	2.38	68.27	38.16	74.0	54.0	5.7	15.8
Middle Channel										
4880	63.93	59.82	H	2.67	66.60	36.25	74.0	54.0	7.4	17.7
4880	63.80	60.22	V	2.67	66.47	36.65	74.0	54.0	7.5	17.3
High Channel										
2483.5	72.72	67.41	H	-4.95	67.77	36.23	74.0	54.0	6.2	17.8
2483.5	66.65	60.78	V	-4.95	61.70	29.60	74.0	54.0	12.3	24.4
4960	61.23	58.53	H	2.97	64.20	35.26	74.0	54.0	9.8	18.7
4960	62.03	59.05	V	2.97	65.00	35.78	74.0	54.0	9.0	18.2

**Table 7.4.2.3-3: Radiated Spurious Emissions Tabulated Data – Dual Band Antenna Simultaneous Tx**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Simultaneou Transmission										
232	-----	33.84	H	-12.88	-----	20.96	-----	46.0	-----	25.0
232	-----	34.05	V	-12.88	-----	21.17	-----	46.0	-----	24.8
440	-----	24.46	H	-6.50	-----	17.96	-----	46.0	-----	28.0
440	-----	21.09	V	-6.50	-----	14.59	-----	46.0	-----	31.4
672	-----	33.30	H	-0.78	-----	32.52	-----	46.0	-----	13.5
672	-----	32.34	V	-0.78	-----	31.56	-----	46.0	-----	14.4
1344	52.59	44.42	H	-10.45	42.14	33.97	74.0	54.0	31.9	20.0
1808	54.25	50.27	H	-7.32	46.93	42.95	74.0	54.0	27.1	11.0
2712	55.64	49.05	V	-3.67	51.97	45.38	74.0	54.0	22.0	8.6
3384	48.64	41.29	H	-1.39	47.25	39.90	74.0	54.0	26.7	14.1
4520	49.78	40.31	H	1.26	51.04	41.57	74.0	54.0	23.0	12.4

**7.4.2.4 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 – Trace Antenna LCH**

Corrected Level:  $56.25 + 2.38 = 58.63\text{dBuV/m}$

Margin:  $74\text{dBuV/m} - 58.63\text{dBuV/m} = 15.4 \text{ dB}$

**Example Calculation: Average – Trace Antenna LCH**

Corrected Level:  $51.75 + 2.38 - 26.23 = 27.90\text{dBuV/m}$

Margin:  $54\text{dBuV/m} - 27.90\text{dBuV/m} = 26.1 \text{ dB}$

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

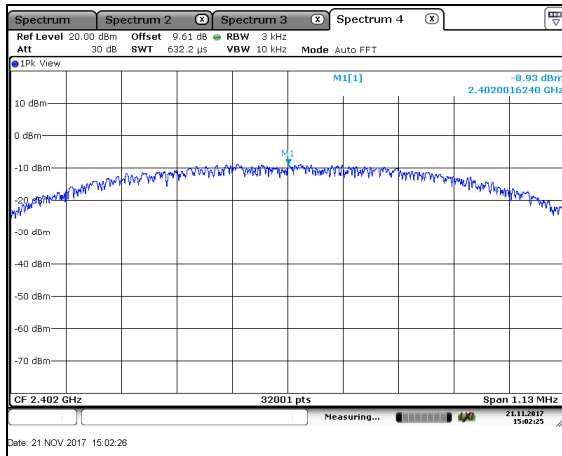
### 7.5.1 Measurement Procedure

The power spectral density was measured in accordance with the FCC KDB 558074 D01 DTS Measurement Guidance 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.

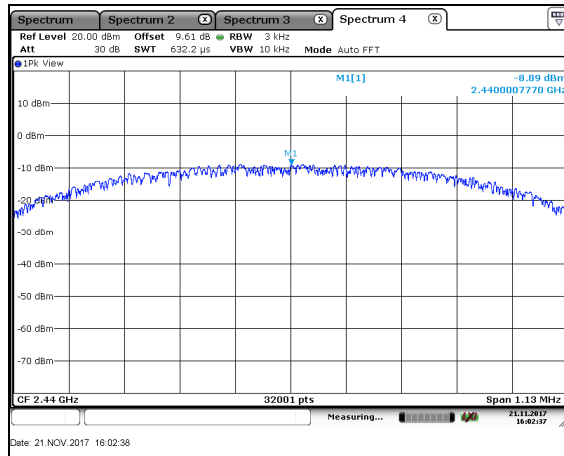
### 7.5.2 Measurement Results

**Table 7.5.2-1: Peak Power Spectral Density**

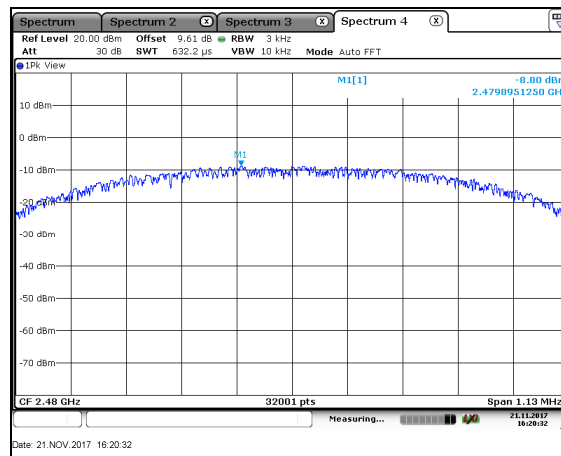
Frequency (MHz)	PSD Level (dBm)
2402	-8.93
2440	-8.89
2480	-8.80



**Figure 7.5.2-1: PSD Plot – LCH**



**Figure 7.5.2-2: PSD Plot – MCH**



**Figure 7.5.2-3: PSD Plot – HCH**

## 8 ESTIMATION OF MEASUREMENT UNCERTAINTY

The expanded laboratory measurement uncertainty figures ( $U_{\text{Lab}}$ ) 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	$U_{\text{lab}}$
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 RMODIT, manufactured by Acuity Brands Lighting, Inc. meets the requirements of FCC Part 15 subpart C and ISED Canada's Radio Standards Specification RSS-247 for Class II Permissive Change.

**END REPORT**