Excellence in Compliance Testing

Certification Test Report

FCC ID: HSW-DNT90E
IC: 4492A-DNT90E

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

ACS Report Number: 16-0152.W06.1C

Manufacturer: Murata Electronics North America
Models: DNT90EC, DNT90EP

Test Begin Date: March 30, 2016
Test End Date: April 12, 2016

Report Issue Date: May 23, 2016

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

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.

Reviewed by:

Kirby Munroe
Director, Wireless Certifications
ACS, Inc.

This report contains 26 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 DNT90E is a frequency hopping spread spectrum (FHSS) transceiver operating in the 902-928 MHz frequency band which provides for wireless connectivity for point-to-point, point-to-multipoint and store-and-forward radio applications.

Two model variants of the DNT90E are available. Both model variants are electrically identical and differ only in the interface available for host integration. The DNT90EP radio modules have pins, while the DNT90EC modules are castellated.

Technical Details:

Detail	Description
Frequency Range	902.76 – 927.24 MHz
Number of Channels	52
Modulation Format	FSK
Data Rates	100kbps
Operating Voltage	9Vdc
Antenna Type(s) / Gain(s)	Omni (Dipole) / 5dBi Yagi / 6dBi

Manufacturer Information:
Murata Electronics North America
2200 Lake Park Drive
Smyrna, GA 30080-7604

EUT Serial Numbers: II

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

1.3 Test Methodology and Considerations

Two DNT90EC and DNT90EP models are electrically identical and differ only in the interface available for host integration. To allow use of a test fixture during testing, the DNT90EP model was evaluated.

For radiated emissions the EUT was evaluated in three orthogonal orientations. The worst case orientation was the Y-orientation.

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

Software power settings during test: Transmit Power = 1; High Power Cal = 5

2 TEST FACILITIES

2.1 Location

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

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

ACS 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, Innovation, Science, and Economic Development Canada and the Japanese Voluntary Control Council for Interference by information technology equipment.

FCC Registration Number: 391271
Innovation, Science, and Economic Development 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:

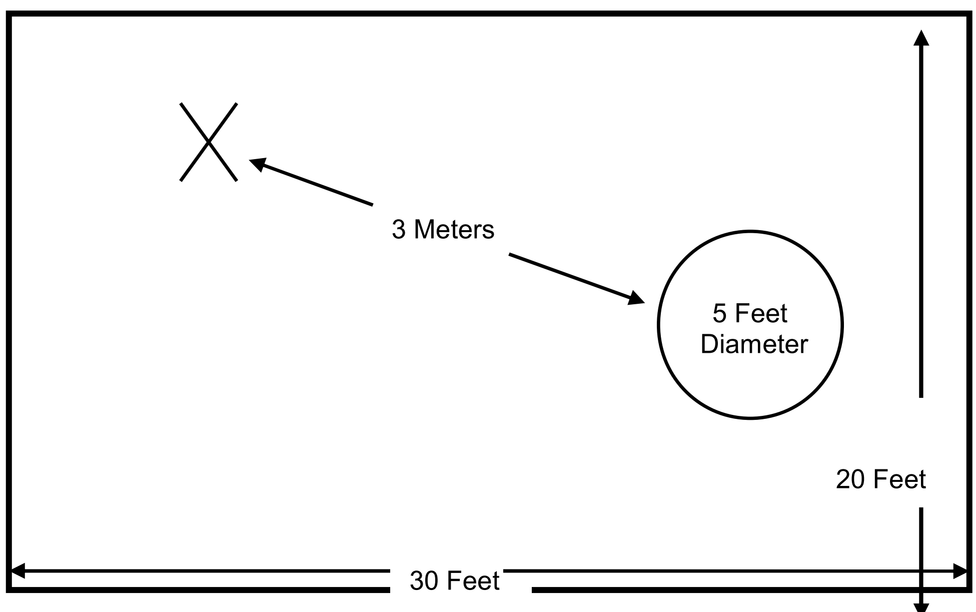

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

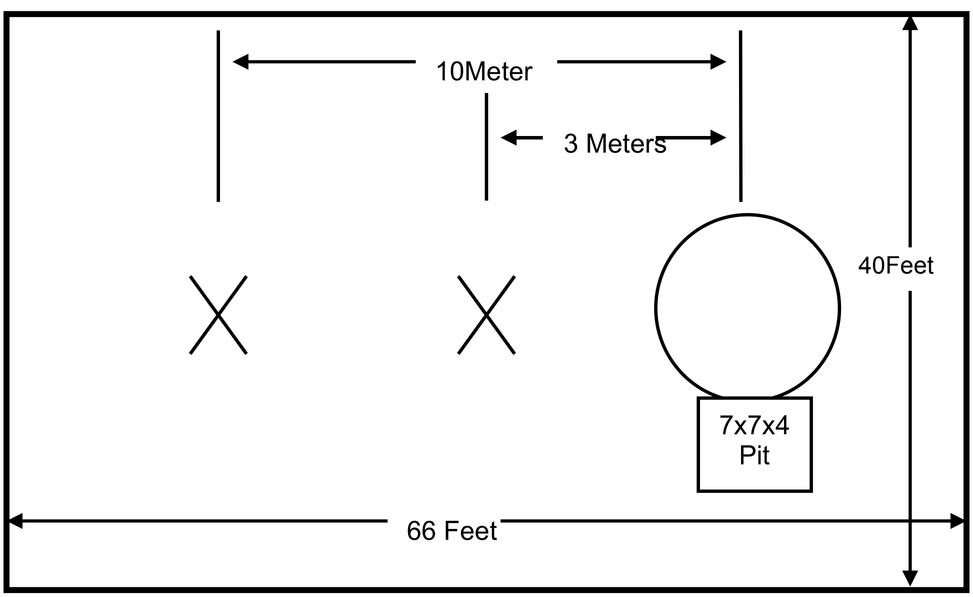

Figure 2.3-2: Open Area Test Site

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 section 6.1.4 of ANSI C63.10.

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

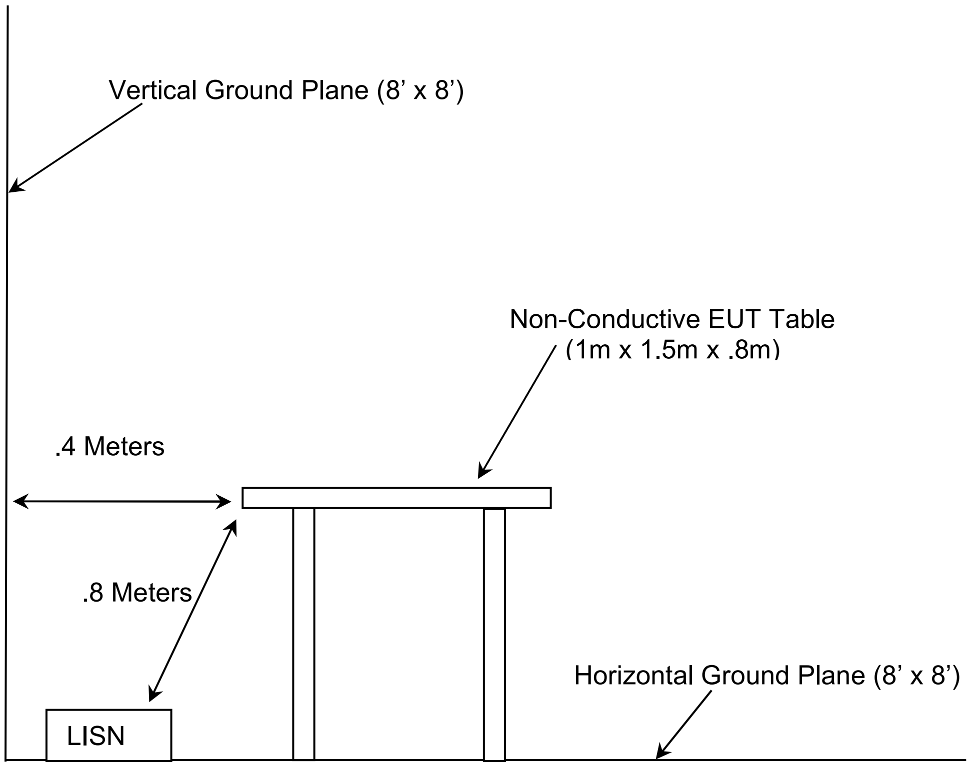

Figure 2.4-1: AC Mains Conducted EMI Site

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, 2016
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2016
- ISED Canada Radio Standards Specification: RSS-247 – Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices, Issue 1, May 2015
- ISED Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, 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
1	Rohde & Schwarz	ESMI - Display	Spectrum Analyzers	833771/007	7/14/2015	7/14/2016
2	Rohde & Schwarz	ESMI-Receiver	Spectrum Analyzers	839587/003	7/14/2015	7/14/2016
30	Spectrum Technologies	DRH-0118	Antennas	970102	4/30/2015	4/30/2017
40	EMCO	3104	Antennas	3211	2/10/2015	2/10/2017
73	Agilent	8447D	Amplifiers	2727A05624	7/15/2015	7/15/2016
167	ACS	hamber EMI Cable S	Cable Set	167	10/20/2015	10/20/2016
168	Hewlett Packard	11947A	Attenuators	44829	1/8/2016	1/8/2017
292	Florida RF Cables	SMR-290AW-480.0-SMR	Cables	None	2/17/2016	2/17/2017
316	Rohde Schwarz	ESH3-Z5	LISN	861189-010	7/14/2015	7/14/2016
324	ACS	Belden	Cables	8214	5/5/2015	5/5/2016
337	Microwave Circuits	H1G513G1	Filters	282706	5/20/2015	5/20/2016
338	Hewlett Packard	8449B	Amplifiers	3008A01111	8/21/2015	8/21/2017
340	Aeroflex/Weinschel	AS-20	Attenuators	7136	7/13/2015	7/13/2016
412	Electro Metrics	LPA-25	Antennas	1241	7/24/2014	7/24/2016
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	10/30/2015	10/30/2016
616	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	N/A	9/3/2015	9/3/2016
622	Rohde & Schwarz	FSV40	Analyzers	101338	7/15/2015	7/15/2016
RE112	Rohde & Schwarz	ESIB26	Receiver	836119/012	7/16/2015	7/16/2016

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model/Part Number	Serial Number
1	Evaluation Board	Murata	WSN802G/DNT90 Developer Kit	0007D6
2	DC Power Supply	Glob Tek, Inc.	GT-41052-1509	N/A

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

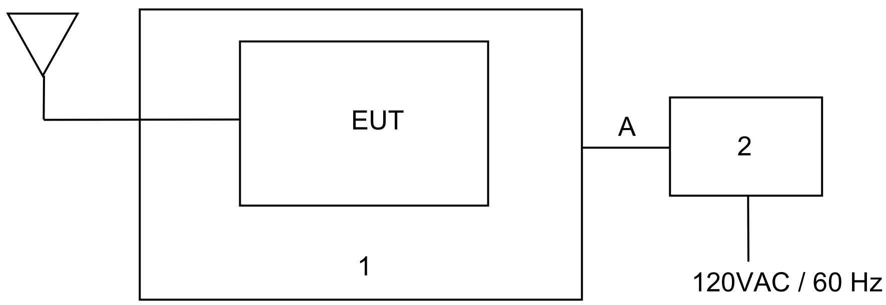

Figure 1: Radiated & AC Power Line Conducted Emissions Setup

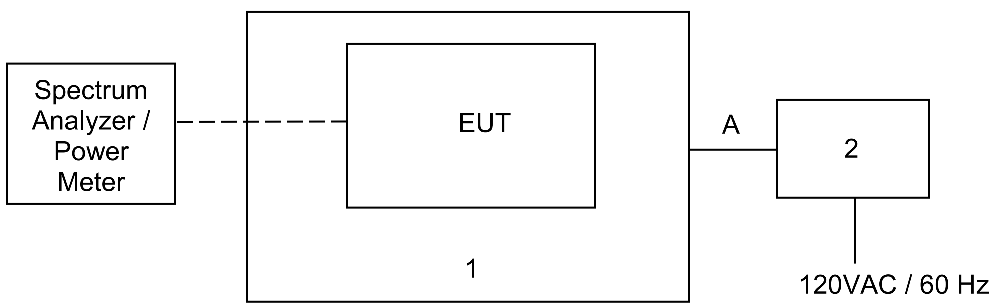

Figure 2: RF Conducted Setup

A: DC Power Cable, 200cm, Non-Shielded

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: Section 15.203

The antennas used are an Omni (Dipole) with 5dBi gain and a Yagi with 6dBi gain. These antennas are detachable utilizing U.FI coupling to the EUT, therefore satisfying the requirements of Section 15.203.

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

7.2.1 Measurement Procedure

ANSI C63.10 was the guiding document for this evaluation. 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 = Applicable Limit - Corrected Reading

7.2.2 Measurement Results

Table 7.2.2-1: Conducted EMI Results Line 1 – Antenna 1 – Dipole

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
0.249499	---	19.63	51.53	31.90	L1	9.6
0.249499	35.92	---	61.57	25.65	L1	9.6
0.391183	---	28.51	47.88	19.37	L1	9.7
0.391183	33.60	---	57.91	24.31	L1	9.7
0.718638	---	23.03	46.00	22.97	L1	9.7
0.718638	28.31	---	56.00	27.69	L1	9.7
12.502104	---	26.99	50.00	23.01	L1	10.0
12.502104	28.18	---	60.00	31.82	L1	10.0
12.746192	---	29.28	50.00	20.72	L1	10.0
12.746192	30.50	---	60.00	29.50	L1	10.0
12.809118	---	28.50	50.00	21.50	L1	10.0
12.809118	29.35	---	60.00	30.65	L1	10.0

Table 7.2.2-2: Conducted EMI Results Line 2 – Antenna 1 – Dipole

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
0.179358	---	19.47	54.39	34.92	N	9.6
0.179358	35.71	---	64.41	28.70	N	9.6
0.217134	---	21.50	52.72	31.22	N	9.6
0.217134	37.78	---	62.75	24.97	N	9.6
0.363226	---	21.12	48.47	27.35	N	9.6
0.363226	28.78	---	58.50	29.72	N	9.6
0.638678	---	16.42	46.00	29.58	N	9.7
0.638678	22.37	---	56.00	33.63	N	9.7
0.798397	---	16.13	46.00	29.87	N	9.7
0.798397	22.18	---	56.00	33.82	N	9.7
4.417936	---	9.59	46.00	36.41	N	9.8
4.417936	14.97	---	56.00	41.03	N	9.8

Table 7.2.2-3: Conducted EMI Results Line 1 – Antenna 2 – Yagi

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
0.236273	---	16.81	51.99	35.18	L1	9.6
0.236273	35.27	---	62.03	26.76	L1	9.6
0.246392	---	17.30	51.64	34.34	L1	9.6
0.246392	35.28	---	61.68	26.40	L1	9.6
0.262225	---	19.12	51.12	32.00	L1	9.6
0.262225	34.04	---	61.16	27.12	L1	9.6
0.386673	---	22.31	47.97	25.66	L1	9.7
0.386673	28.25	---	58.00	29.75	L1	9.7
0.725952	---	20.09	46.00	25.91	L1	9.7
0.725952	25.85	---	56.00	30.15	L1	9.7
0.726854	---	18.61	46.00	27.39	L1	9.7
0.726854	25.14	---	56.00	30.86	L1	9.7

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

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
0.400401	---	19.37	47.70	28.33	N	9.7
0.400401	27.36	---	57.72	30.36	N	9.7
0.468537	---	13.26	46.49	33.23	N	9.7
0.468537	22.33	---	56.50	34.17	N	9.7
0.671443	---	17.53	46.00	28.47	N	9.7
0.671443	22.95	---	56.00	33.05	N	9.7
0.791684	---	17.68	46.00	28.32	N	9.7
0.791684	22.45	---	56.00	33.55	N	9.7
2.324749	---	10.29	46.00	35.71	N	9.7
2.324749	15.37	---	56.00	40.63	N	9.7
4.036372	---	7.92	46.00	38.08	N	9.8
4.036372	13.19	---	56.00	42.81	N	9.8

7.3 Peak Output Power - FCC 15.247(b)(2) IC: RSS-247 5.4(1)

7.3.1 Measurement Procedure (Conducted Method)

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

7.3.2 Measurement Results

Table 7.3.2-1: Maximum Conducted Peak Output Power

Frequency [MHz]	Level [dBm]
902.76	25.43
915.24	25.50
927.24	24.85

7.4 Channel Usage Requirements

7.4.1 Carrier Frequency Separation – FCC 15.247(a)(1) IC: RSS-247 5.1(2)

7.4.1.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer using suitable attenuation. The span of the spectrum analyzer was set wide enough to capture two adjacent peaks. The RBW was set to approximately 30% of the channel spacing and adjusted as necessary to best identify the center of each channel. The VBW was set > RBW.

7.4.1.2 Measurement Results

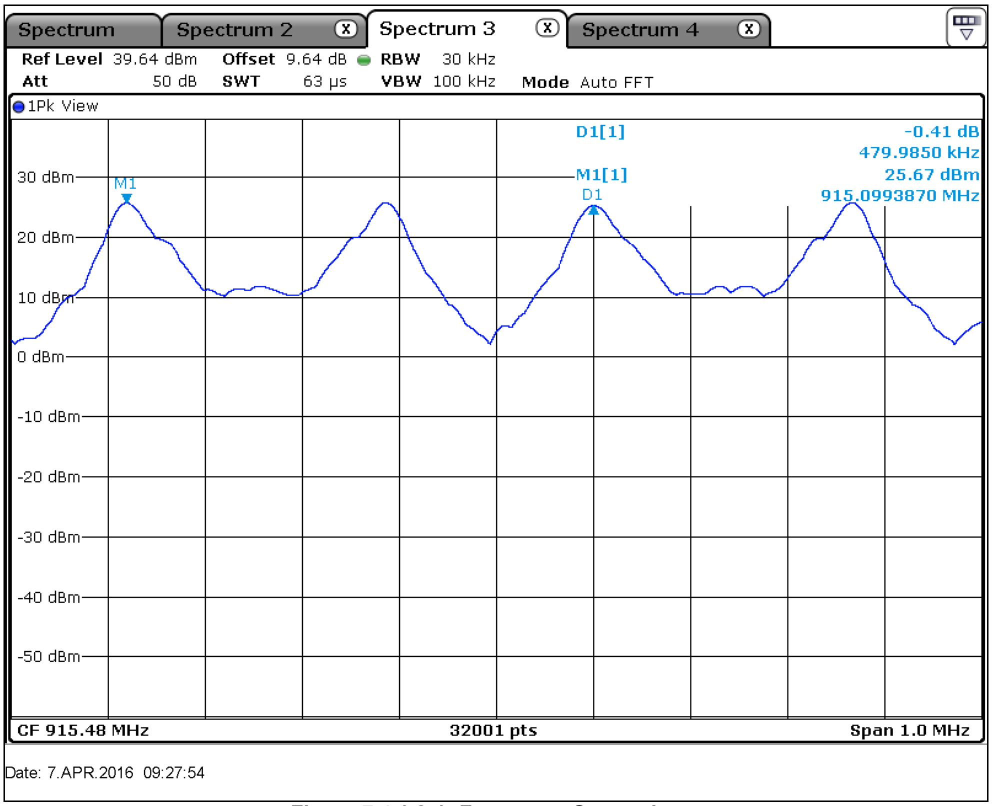

Figure 7.4.1.2-1: Frequency Separation

7.4.2 Number of Hopping Channels – FCC 15.247(a)(1)(i) IC: RSS-247 5.1(3)

7.4.2.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer using suitable attenuation. The span of the spectrum analyzer was set wide enough to capture the frequency band of operation. The RBW was set to < 30% of the channel spacing and VBW set to ≥ RBW.

7.4.2.2 Measurement Results

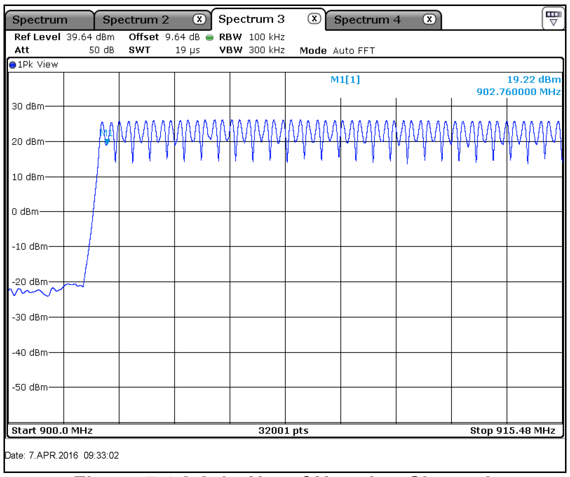

Figure 7.4.2.2-1: No. of Hopping Channels

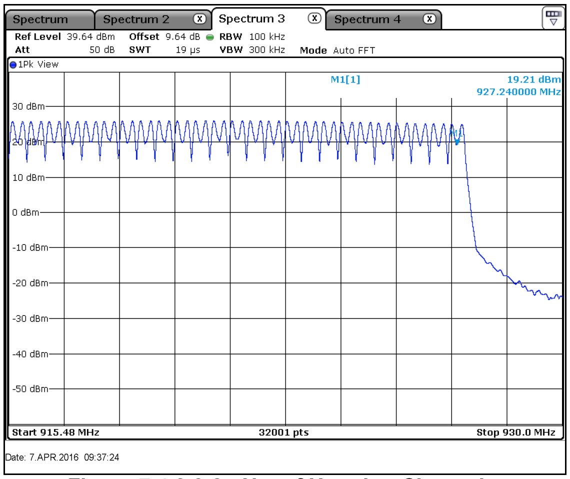

Figure 7.4.2.2-2: No. of Hopping Channels

7.4.3 Channel Dwell Time – FCC 15.247(a)(1)(i) IC: RSS-247 5.1(3)

7.4.3.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer using suitable attenuation. The span of the spectrum analyzer display was set 0 Hz centered on a hopping channel. The RBW of the spectrum analyzer was set to ≤ the EUT channel spacing and VBW set to ≥ RBW. The Marker Delta function of the analyzer was utilized to determine the dwell time.

7.4.3.2 Measurement Results

Table 7.4.3.2-1: Channel Dwell Time

Single Occurrence	Number of Occurrences / 10s	Total Dwell Time (ms)
10.58	10	105.8

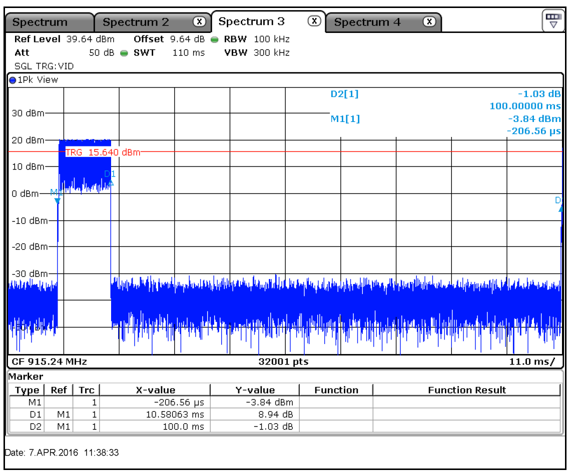

Figure 7.4.3.2-1: Dwell Time – 100ms

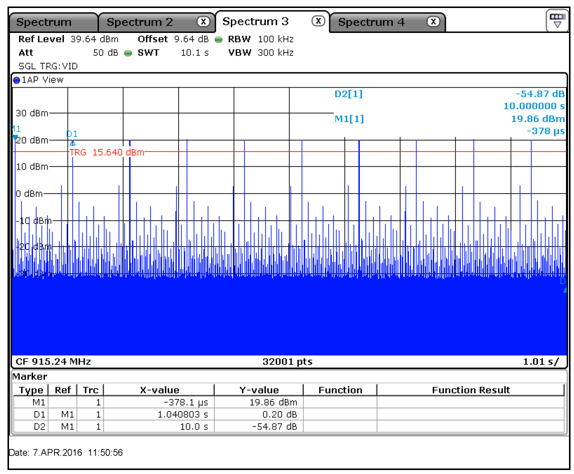

Figure 7.4.3.2-1: Dwell Time – 10s

7.4.4 20dB / 99% Bandwidth - FCC 15.247(a)(1)(i) IC: RSS-247 5.1(3)

7.4.4.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer using 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 marker delta measurement 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

Table 7.4.4.2-1: 20dB / 99% Bandwidth

Frequency [MHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]
902.76	411.36	417.71
915.24	411.05	419.08
927.24	410.49	422.21

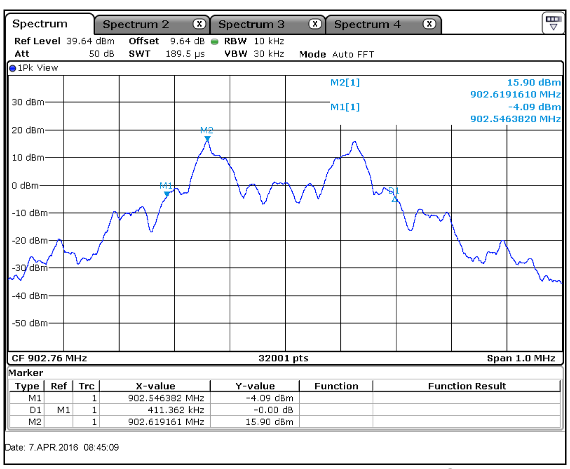

Figure 7.4.4.2-1: 20dB BW Low Channel

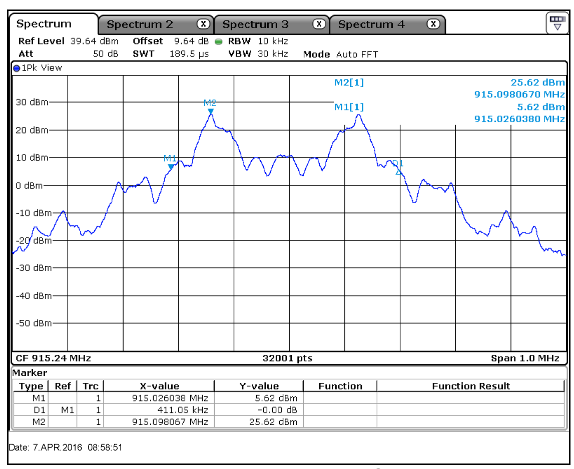

Figure 7.4.4.2-2: 20dB BW Mid Channel

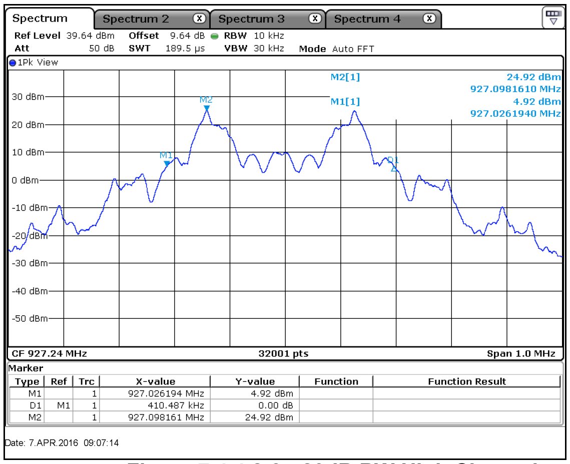

Figure 7.4.4.2-3: 20dB BW High Channel

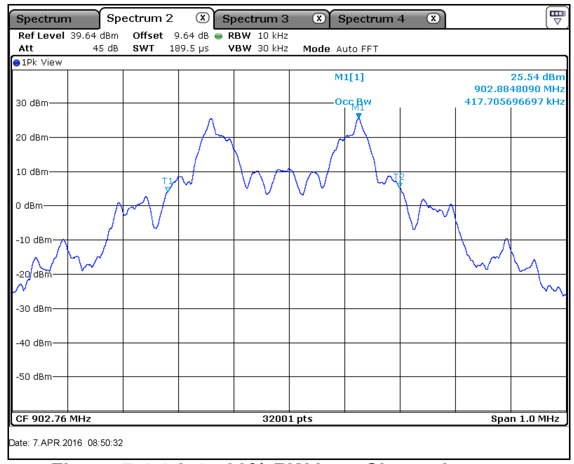

Figure 7.4.4.2-4: 99% BW Low Channel

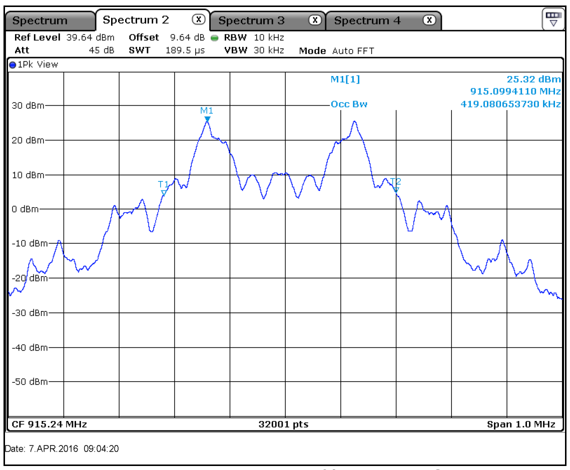

Figure 7.4.4.2-5: 99% BW Mid Channel

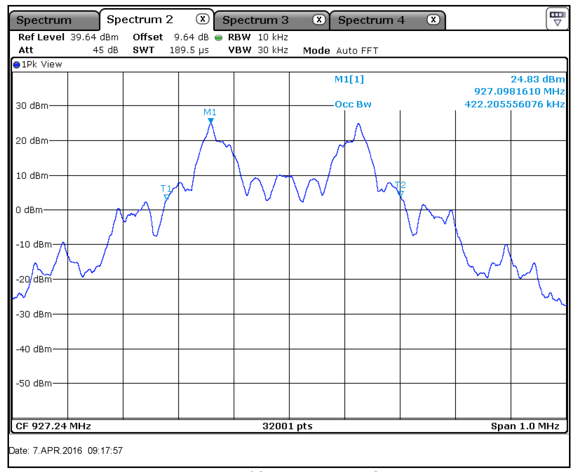

Figure 7.4.4.2-6: 99% BW High Channel

7.5 Band-Edge Compliance and Spurious Emissions

7.5.1 Band-Edge Compliance of RF Conducted Emissions - FCC 15.247(d); IC 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 using 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 100 kHz, and the VBW was set to 300 kHz.

7.5.1.2 Measurement Results

NON-HOPPING MODE:

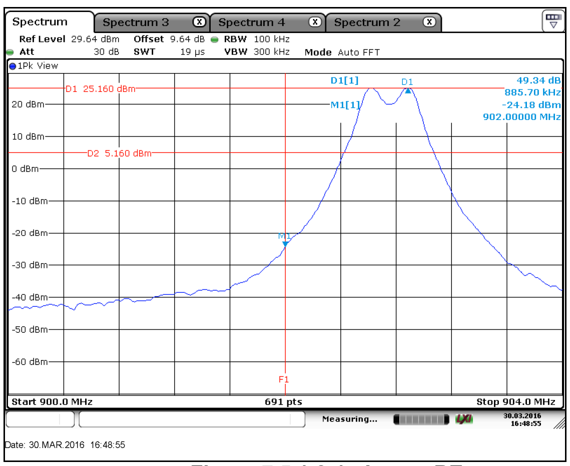

Figure 7.5.1.2-1: Lower BE

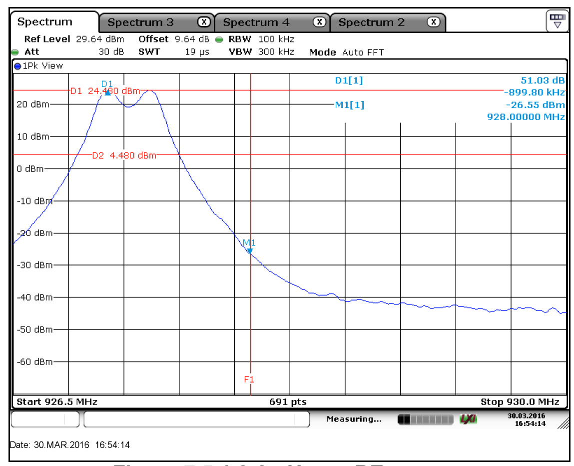

Figure 7.5.1.2-2: Upper BE

HOPPING MODE:

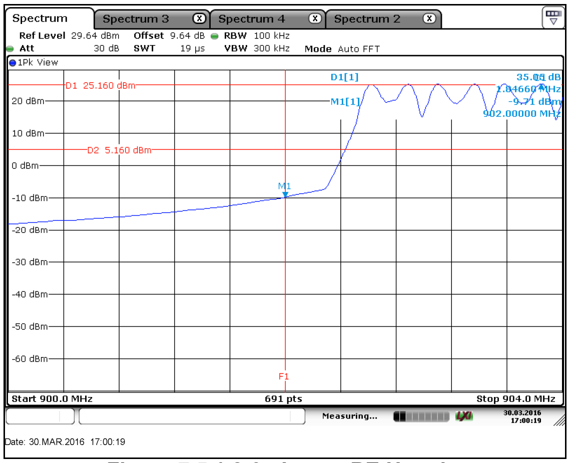

Figure 7.5.1.2-3: Lower BE Hopping

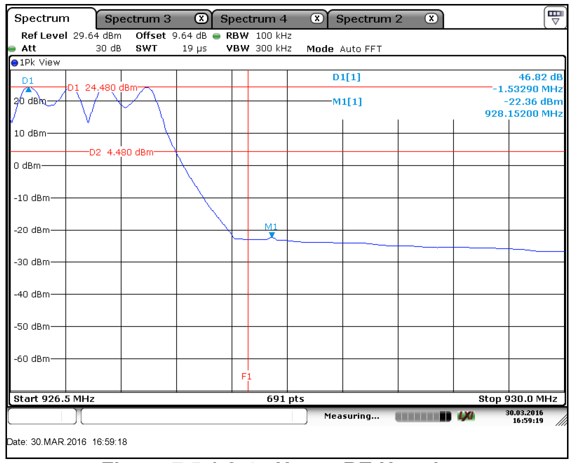

Figure 7.5.1.2-4: Upper BE Hopping

7.5.2 RF Conducted Spurious Emissions - FCC 15.247(d); IC 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 using suitable attenuation. 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.

7.5.2.2 Measurement Results

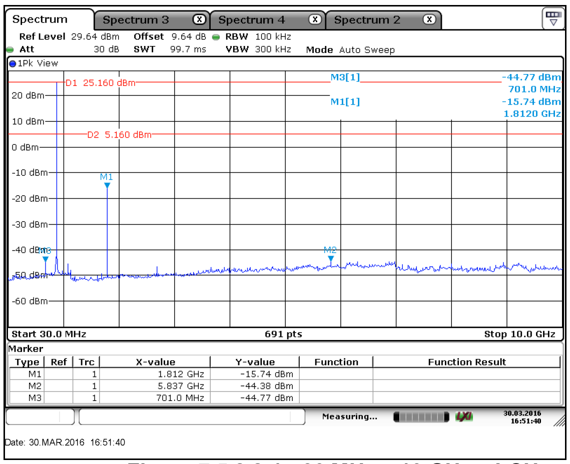

Figure 7.5.2.2-1: 30 MHz – 10 GHz – LCH

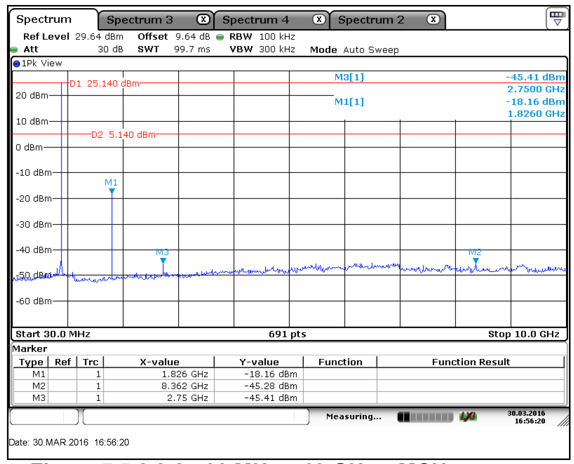

Figure 7.5.2.2-2: 30 MHz – 10 GHz – MCH

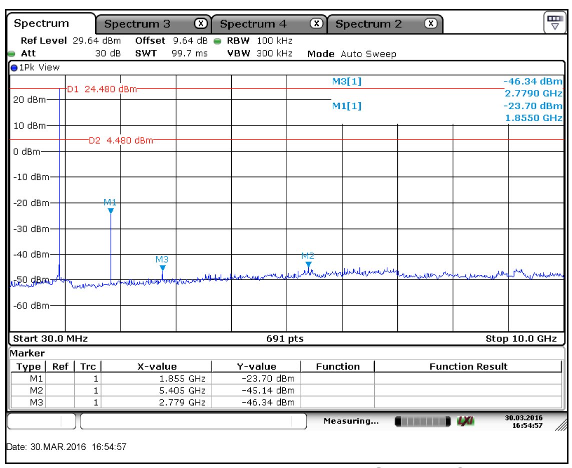

Figure 7.5.2.2-3: 30 MHz – 10 GHz – HCH

7.5.3 Radiated Spurious Emissions - FCC 15.205, 15.209; 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 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000MHz, peak and average measurements were made with RBW and VBW of 1 MHz and 3MHz 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.

7.5.3.2 Duty Cycle Correction

For average radiated measurements, using a 10.58% duty cycle, the measured level was reduced by a factor 19.51dB. The duty cycle correction factor is determined using the formula: 20log (10.58/100) = -19.51dB. A detailed analysis of the duty cycle timing is provided in the Theory of Operation accompanying the application for certification.

7.5.3.3 Measurement Results

Table 7.5.3.3-1: Radiated Spurious Emissions Tabulated Data – Antenna 1 – Dipole

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										
2708.28	52.02	43.74	H	-3.79	48.23	20.43	74.0	54.0	25.8	33.6
2708.28	48.79	37.90	V	-3.79	45.00	14.59	74.0	54.0	29.0	39.4
3611.04	49.05	38.53	H	-0.87	48.18	18.15	74.0	54.0	25.8	35.9
3611.04	48.49	37.26	V	-0.87	47.62	16.88	74.0	54.0	26.4	37.1
Middle Channel										
2745.72	48.21	41.68	H	-3.56	44.65	18.61	74.0	54.0	29.4	35.4
2745.72	54.22	48.24	V	-3.56	50.66	25.17	74.0	54.0	23.3	28.8
3660.96	49.24	37.21	H	-0.54	48.70	17.16	74.0	54.0	25.3	36.8
3660.96	49.23	39.16	V	-0.54	48.69	19.11	74.0	54.0	25.3	34.9
4576.2	49.24	37.59	H	1.19	50.43	19.27	74.0	54.0	23.6	34.7
4576.2	48.98	40.36	V	1.19	50.17	22.04	74.0	54.0	23.8	32.0
7321.92	46.21	35.69	V	8.07	54.28	24.25	74.0	54.0	19.7	29.8
High Channel										
2781.72	55.29	48.23	H	-3.58	51.71	25.14	74.0	54.0	22.3	28.9
2781.72	50.61	41.83	V	-3.58	47.03	18.74	74.0	54.0	27.0	35.3
3708.96	52.86	44.17	H	-0.50	52.36	24.16	74.0	54.0	21.6	29.8
3708.96	49.02	38.53	V	-0.50	48.52	18.52	74.0	54.0	25.5	35.5
4636.2	48.39	38.08	H	1.24	49.63	19.81	74.0	54.0	24.4	34.2

Table 7.5.3.3-2: Radiated Spurious Emissions Tabulated Data – Antenna 2 – Yagi

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										
2708.28	56.72	49.61	H	-3.79	52.93	26.30	74.0	54.0	21.1	27.7
2708.28	53.03	44.60	V	-3.79	49.24	21.29	74.0	54.0	24.8	32.7
3611.04	57.02	49.50	H	-0.87	56.15	29.12	74.0	54.0	17.9	24.9
3611.04	51.43	42.01	V	-0.87	50.56	21.63	74.0	54.0	23.4	32.4
Middle Channel										
2745.72	54.81	47.01	H	-3.69	51.12	23.81	74.0	54.0	22.9	30.2
2745.72	50.09	40.21	V	-3.69	46.40	17.01	74.0	54.0	27.6	37.0
3660.96	50.44	41.02	H	-0.68	49.76	20.83	74.0	54.0	24.2	33.2
3660.96	48.56	37.59	V	-0.68	47.88	17.40	74.0	54.0	26.1	36.6
High Channel										
2781.72	55.12	48.21	H	-3.58	51.54	25.12	74.0	54.0	22.5	28.9
2781.72	46.91	34.95	V	-3.58	43.33	11.86	74.0	54.0	30.7	42.1
3708.96	49.35	39.12	H	-0.50	48.85	19.11	74.0	54.0	25.1	34.9
4636.2	48.18	37.24	H	1.24	49.42	18.97	74.0	54.0	24.6	35.0

7.5.3.4 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 – Dipole Antenna

Corrected Level: 52.02 - 3.79 = 48.23dBuV/m
Margin: 74dBuV/m – 48.23dBuV/m = 25.8dB

Example Calculation: Average – Dipole Antenna

Corrected Level: 43.74 - 3.79 - 19.51 = 20.43dBuV
Margin: 54dBuV – 20.43dBuV = 33.6dB

8 CONCLUSION

In the opinion of ACS, Inc. the DNT90EC and DNT90EP, manufactured by Murata Electronics North America meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-247.

END REPORT