Excellence in Compliance Testing

Certification Test Report

FCC ID: HSW-CCT900
IC: 4492A-CCT900

FCC Rule Part: 15.247
IC Radio Standards Specification: RSS-247

ACS Report Number: 16-0029.W06.1A

Manufacturer: Murata Electronics North America
Model: CCT900

Test Begin Date: January 25, 2016
Test End Date: January 29, 2016

Report Issue Date: February 4, 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 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 Industry Canada's Radio Standards Specification RSS-247 Certification for modular approval.

1.2 Product Description

The CCT900 is a 900MHz frequency hopping transceiver designed for use in industrial and commercial monitoring and control markets. The transceiver is designed to operate as a digital transmission system. The CCT900 employs a dual carrier transmission.

Technical Information:

Detail	Description
Frequency Range	903 – 927.079 MHz
Number of Channels	14
Modulation Format	FSK
Data Rates	362kbps
Number of Inputs/Outputs	2 (TX Diversity)
Operating Voltage	9Vdc
Antenna Type(s) / Gain(s)	Dipole Antenna / 5dBi gain Panel Antenna / 12dBi gain Yagi Antenna / 9dBi gain PIFA Antenna / 4dBi gain

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

EUT Serial Numbers: 000031

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

1.3 Test Methodology and Considerations

For radiated emissions three orientations of the EUT were evaluated to determine worst case. The worst case orientation was determined to be the Z orientation.

The EUT provides (2) antenna ports for Tx/Rx diversity, ANT 0/1. Preliminary measurements for radiated emissions were taken for both ports and worst case data provided where applicable. Worst case antenna port for radiated emissions was ANT 0. For RF conducted measurements, both antenna ports were evaluated in full.

Multiple antenna types are available for use with the EUT. The highest gain of each antenna type was evaluated for compliance.

Power settings utilized during testing are as follows:
LCH Power Setting: 31/30
MCH Power Setting: 29/28
HCH Power Setting: 22/21

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, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment.

FCC Registration Number: 391271
Industry 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:

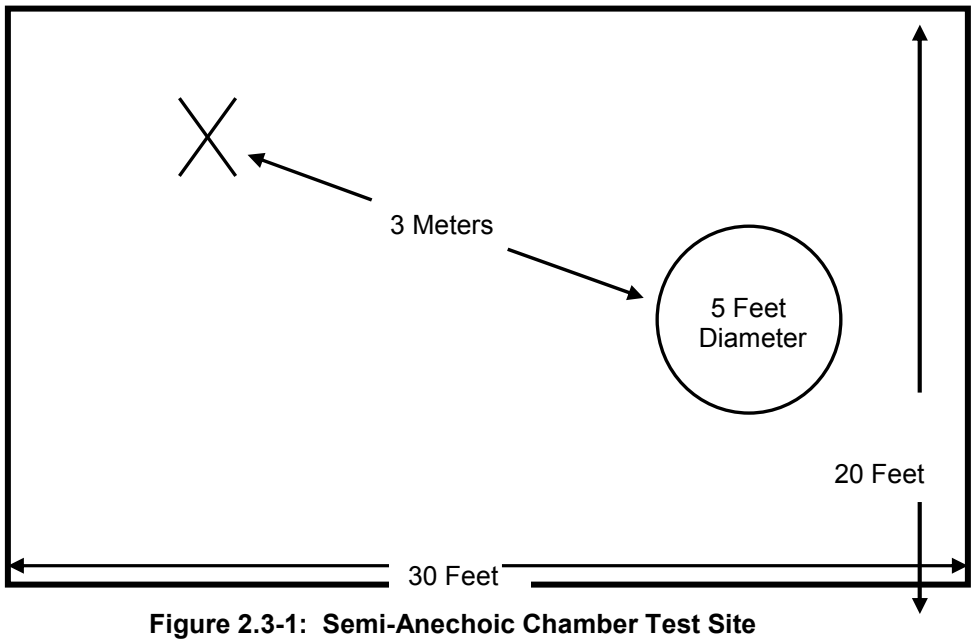

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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 C63.4.

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

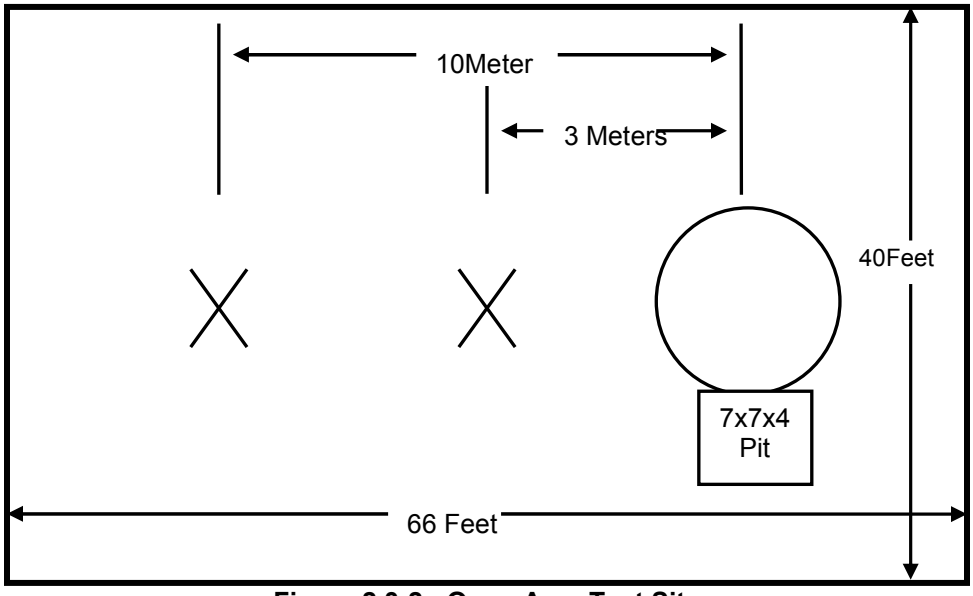

Figure 2.3-2: Open Area Test Site

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 C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

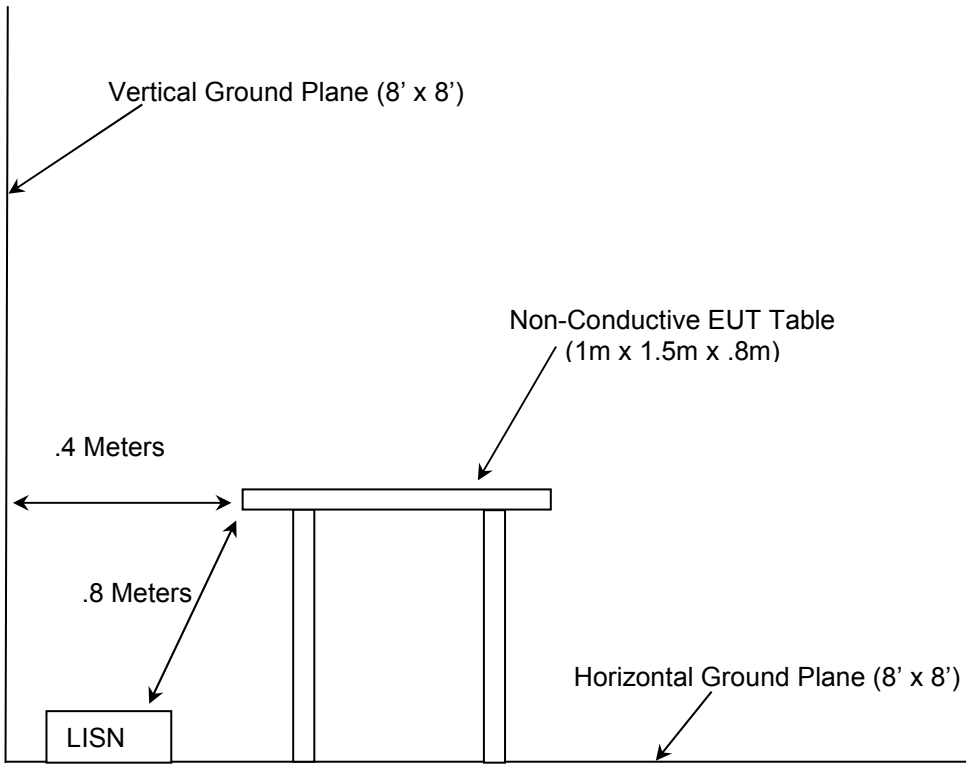

Figure 2.4-1: AC Mains Conducted EMI Site

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
- FCC KDB 558074 D01 DTS Meas Guidance v03r04 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247, January 7, 2016
- Industry 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
- Industry 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	Chamber EMI Cable Set	Cable Set	167	10/20/2015	10/20/2016
267	Agilent	N1911A	Meters	MY45100129	8/24/2015	8/24/2017
268	Agilent	N1921A	Sensors	MY45240184	8/13/2015	8/13/2017
292	Florida RF Cables	480.0-SMR	Cables	None	3/3/2015	3/3/2016
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	Cables	N/A	9/3/2015	9/3/2016
622	Rohde & Schwarz	FSV40	Analyzers	101338	7/15/2015	7/15/2016
3010	Rohde & Schwarz	ENV216	LISN	3010	7/10/2015	7/10/2016
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	Dual Carrier 2.4GHz Eval Board	N/A
2	DC Power Supply	Glob Tek, Inc.	GT-41052-1509	N/A

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

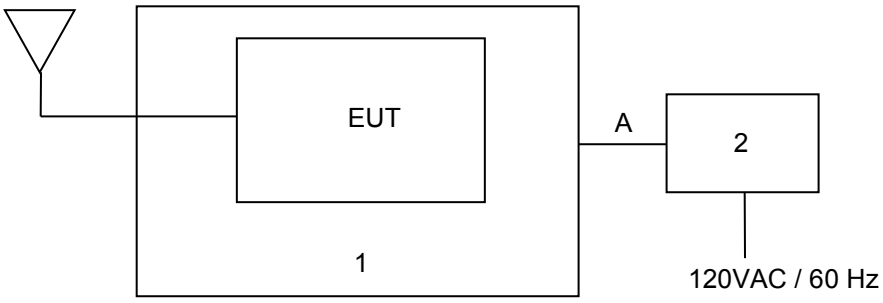

Figure 1: Radiated & AC Power Line Conducted Emissions Setup

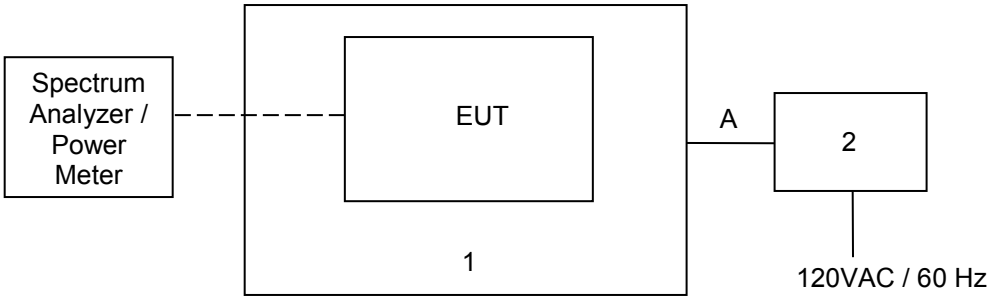

Figure 2: RF Conducted Setup

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 15.203

The antennas used are a Dipole with 5dBi gain, a PIFA with 4dBi gain, a Yagi with 9dBi gain and a Panel Antenna with 12dBi gain. Theses antennas are detachable utilizing U.FL 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 C63.4 sections 6 and 7 were the guiding documents 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)				
0.191522	---	39.11	53.81	14.70	L1	9.6
0.191522	51.03	---	63.84	12.81	L1	9.6
0.235972	---	5.24	52.00	46.76	L1	9.6
0.235972	24.53	---	62.04	37.51	L1	9.6
0.254910	---	33.08	51.35	18.27	L1	9.6
0.254910	43.30	---	61.39	18.09	L1	9.6
0.299599	---	3.72	50.01	46.29	L1	9.7
0.299599	20.36	---	60.05	39.69	L1	9.7
2.491683	---	23.17	46.00	22.83	L1	9.7
2.491683	31.47	---	56.00	24.53	L1	9.7
2.550401	---	26.19	46.00	19.81	L1	9.7
2.550401	31.83	---	56.00	24.17	L1	9.7

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)				
0.191984	---	38.27	53.79	15.52	N	9.6
0.191984	50.55	---	63.81	13.26	N	9.6
0.252706	---	31.03	51.43	20.40	N	9.6
0.252706	41.46	---	61.47	20.01	N	9.6
0.253407	---	31.85	51.40	19.55	N	9.6
0.253407	41.90	---	61.44	19.54	N	9.6
2.358818	---	27.40	46.00	18.60	N	9.7
2.358818	29.46	---	56.00	26.54	N	9.7
2.554609	---	24.31	46.00	21.69	N	9.7
2.554609	29.56	---	56.00	26.44	N	9.7
2.678257	---	26.34	46.00	19.66	N	9.7
2.678257	29.54	---	56.00	26.46	N	9.7

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

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
0.317435	---	24.28	49.54	25.26	L1	9.7
0.317435	33.69	---	59.58	25.89	L1	9.7
2.293888	---	20.76	46.00	25.24	L1	9.7
2.293888	27.57	---	56.00	28.43	L1	9.7
2.417535	---	26.89	46.00	19.11	L1	9.7
2.417535	30.87	---	56.00	25.13	L1	9.7
2.482064	---	26.36	46.00	19.64	L1	9.7
2.482064	31.60	---	56.00	24.40	L1	9.7
2.544789	---	28.00	46.00	18.00	L1	9.7
2.544789	32.89	---	56.00	23.11	L1	9.7
2.668838	---	25.90	46.00	20.10	L1	9.7
2.668838	29.45	---	56.00	26.55	L1	9.7

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

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
0.378457	---	22.60	48.14	25.54	N	9.6
0.378457	28.30	---	58.17	29.87	N	9.6
2.223347	---	26.54	46.00	19.46	N	9.7
2.223347	29.12	---	56.00	26.88	N	9.7
2.356412	---	22.79	46.00	23.21	N	9.7
2.356412	28.23	---	56.00	27.77	N	9.7
2.415131	---	26.54	46.00	19.46	N	9.7
2.415131	29.67	---	56.00	26.33	N	9.7
2.479659	---	27.80	46.00	18.20	N	9.7
2.479659	31.34	---	56.00	24.66	N	9.7
2.536573	---	19.59	46.00	26.41	N	9.7
2.536573	28.01	---	56.00	27.99	N	9.7

Table 7.2.2-5: Conducted EMI Results Line 1 – Antenna 3 – Yagi

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
0.166619	---	6.86	55.05	48.19	L1	9.6
0.166619	30.00	---	65.06	35.06	L1	9.6
0.320040	---	24.32	49.48	25.16	L1	9.7
0.320040	33.13	---	59.52	26.39	L1	9.7
2.231964	---	24.82	46.00	21.18	L1	9.7
2.231964	28.16	---	56.00	27.84	L1	9.7
2.291082	---	25.93	46.00	20.07	L1	9.7
2.291082	29.42	---	56.00	26.58	L1	9.7
2.485070	---	27.60	46.00	18.40	L1	9.7
2.485070	31.97	---	56.00	24.03	L1	9.7
2.740782	---	22.66	46.00	23.34	L1	9.7
2.740782	27.81	---	56.00	28.19	L1	9.7

Table 7.2.2-6: Conducted EMI Results Line 2 – Antenna 3 – Yagi

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
2.099298	---	24.07	46.00	21.93	N	9.7
2.099298	27.26	---	56.00	28.74	N	9.7
2.164830	---	26.96	46.00	19.04	N	9.7
2.164830	28.96	---	56.00	27.04	N	9.7
2.348798	---	17.50	46.00	28.50	N	9.7
2.348798	24.69	---	56.00	31.31	N	9.7
2.420942	---	27.48	46.00	18.52	N	9.7
2.420942	30.05	---	56.00	25.95	N	9.7
2.481263	---	27.46	46.00	18.54	N	9.7
2.481263	30.41	---	56.00	25.59	N	9.7
2.543186	---	24.35	46.00	21.65	N	9.7
2.543186	29.13	---	56.00	26.87	N	9.7

Table 7.2.2-7: Conducted EMI Results Line 1 – Antenna 4 – PIFA

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
0.191116	---	37.75	53.83	16.08	L1	9.6
0.191116	48.85	---	63.85	15.00	L1	9.6
2.289479	---	28.63	46.00	17.37	L1	9.7
2.289479	31.58	---	56.00	24.42	L1	9.7
2.354609	---	28.69	46.00	17.31	L1	9.7
2.354609	31.54	---	56.00	24.46	L1	9.7
2.419139	---	28.46	46.00	17.54	L1	9.7
2.419139	32.50	---	56.00	23.50	L1	9.7
2.540381	---	23.80	46.00	22.20	L1	9.7
2.540381	30.07	---	56.00	25.93	L1	9.7
2.610522	---	28.10	46.00	17.90	L1	9.7
2.610522	32.08	---	56.00	23.92	L1	9.7

Table 7.2.2-8: Conducted EMI Results Line 2 – Antenna 4 – PIFA

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
0.199121	---	20.34	53.47	33.13	N	9.6
0.199121	34.14	---	63.50	29.36	N	9.6
0.441984	---	20.94	46.94	26.00	N	9.7
0.441984	27.53	---	56.95	29.42	N	9.7
2.098897	---	28.43	46.00	17.57	N	9.7
2.098897	30.44	---	56.00	25.56	N	9.7
2.485471	---	22.59	46.00	23.41	N	9.7
2.485471	28.18	---	56.00	27.82	N	9.7
2.543587	---	28.50	46.00	17.50	N	9.7
2.543587	31.34	---	56.00	24.66	N	9.7
2.607516	---	29.58	46.00	16.42	N	9.7
2.607516	32.30	---	56.00	23.70	N	9.7

7.3 6dB / 99% Bandwidth – FCC 15.247(a)(2), IC: RSS-247 5.2(1)

7.3.1 Measurement Procedure

The 6dB bandwidth was measured in accordance with the FCC KDB 558074 D01 DTS Meas Guidance v03r04. 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. A peak detector was used.

7.3.2 Measurement Results

Table 7.3.2-1: 6dB / 99% Bandwidth – Antenna Port 0

Frequency [MHz]	6dB Bandwidth [MHz]	99% Bandwidth [MHz]
903.000	1.22	1.38
914.113	1.22	1.51
927.079	1.22	1.34

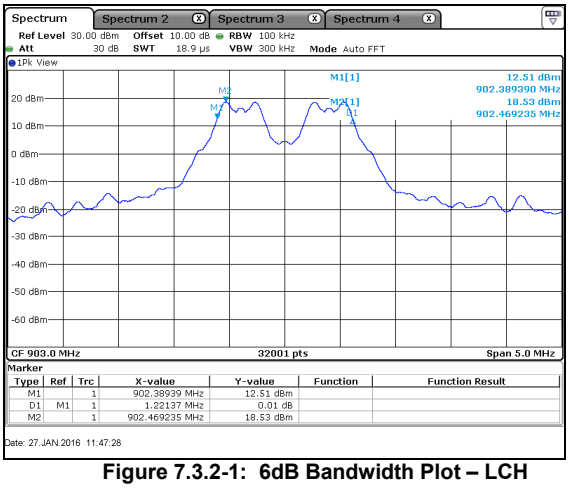

Figure 7.3.2-1: 6dB Bandwidth Plot – LCH

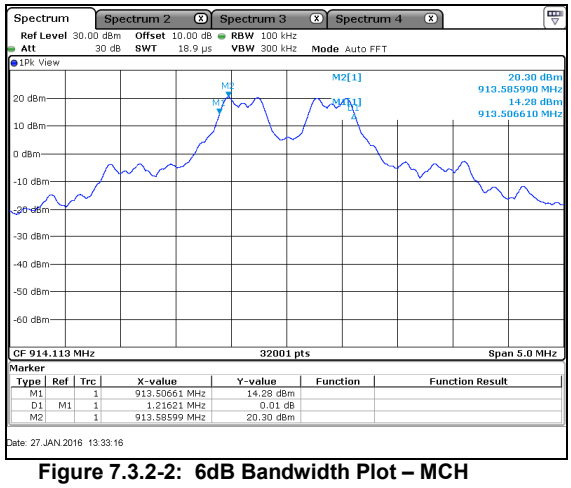

Figure 7.3.2-2: 6dB Bandwidth Plot – MCH

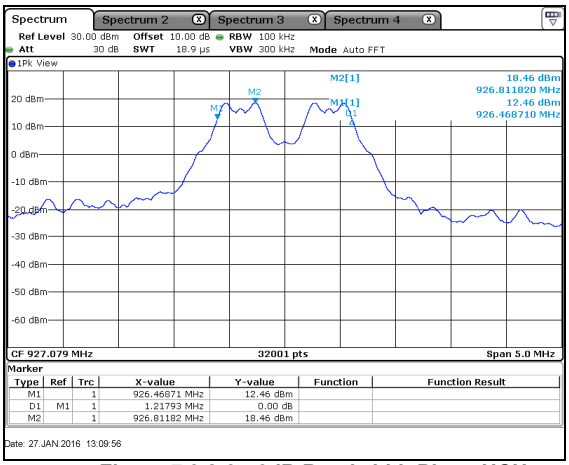

Figure 7.3.2-3: 6dB Bandwidth Plot – HCH

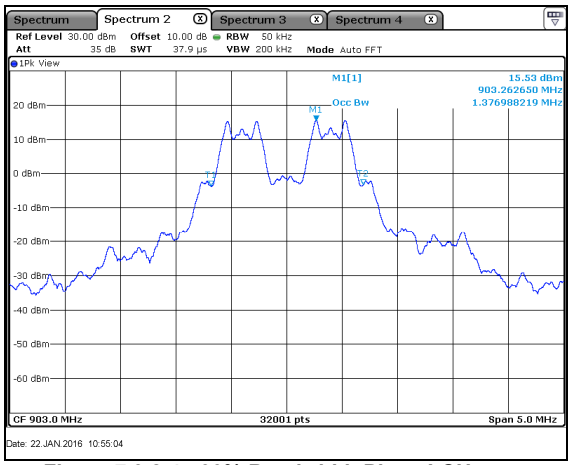

Figure 7.3.2-4: 99% Bandwidth Plot – LCH

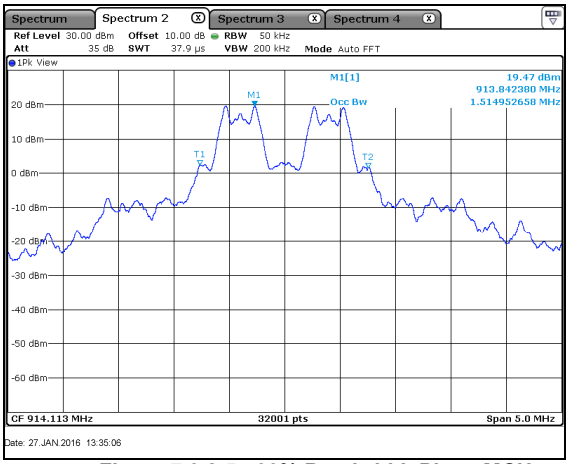

Figure 7.3.2-5: 99% Bandwidth Plot – MCH

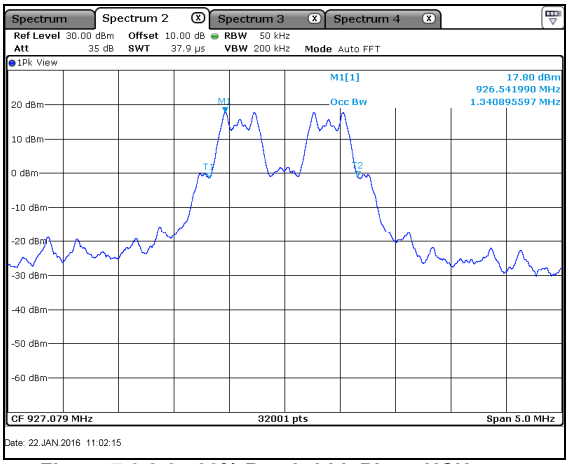

Figure 7.3.2-6: 99% Bandwidth Plot – HCH

Table 7.3.2-2: 6dB / 99% Bandwidth – Antenna Port 1

Frequency [MHz]	6dB Bandwidth [MHz]	99% Bandwidth [MHz]
903.000	1.22	1.37
914.113	1.22	1.48
927.079	1.22	1.34

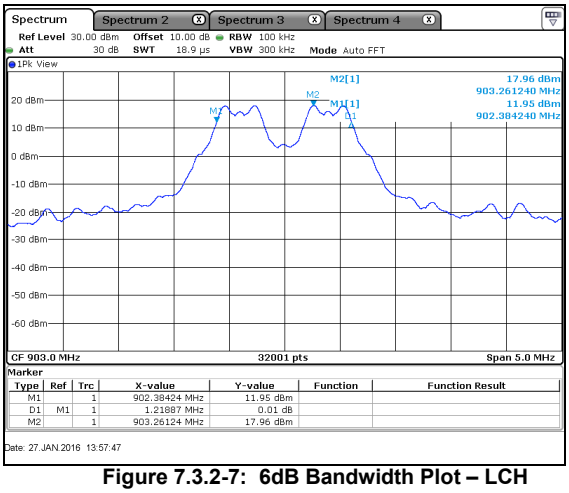

Figure 7.3.2-7: 6dB Bandwidth Plot – LCH

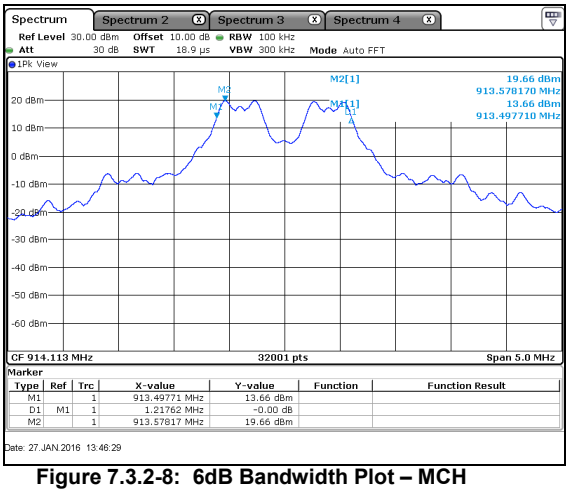

Figure 7.3.2-8: 6dB Bandwidth Plot – MCH

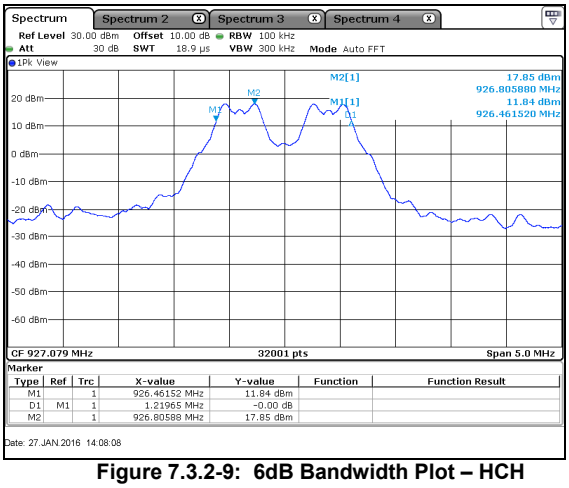

Figure 7.3.2-9: 6dB Bandwidth Plot – HCH

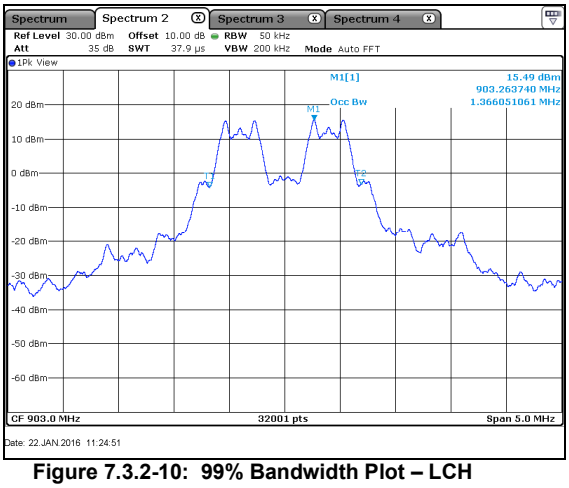

Figure 7.3.2-10: 99% Bandwidth Plot – LCH

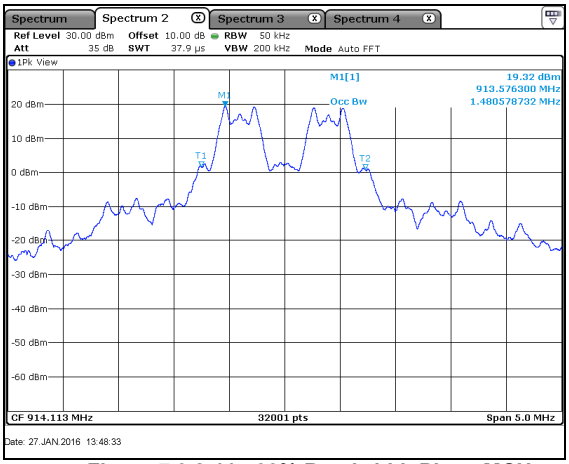

Figure 7.3.2-11: 99% Bandwidth Plot – MCH

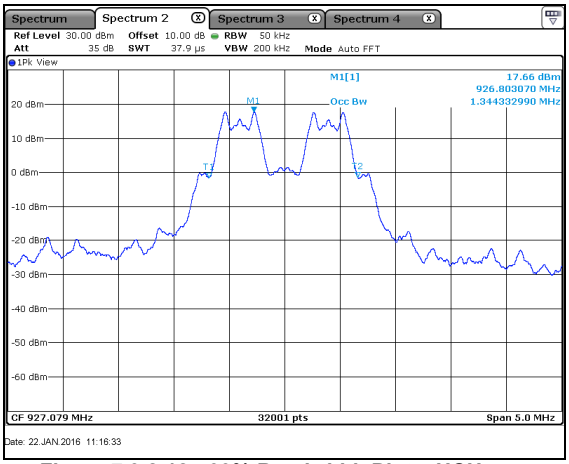

Figure 7.3.2-12: 99% Bandwidth Plot – HCH

7.4 Fundamental Emission Output Power – FCC 15.247(b)(3), IC: RSS-247 5.4(4)

7.4.1 Measurement Procedure

The maximum conducted output power was measured in accordance with FCC KDB 558074 D01 DTS Meas Guidance v03r04 utilizing the AVGPM method (Measurement using an RF average power meter). The RF output of the equipment under test was directly connected to the input of the power meter applying suitable attenuation.

7.4.2 Measurement Results

Table 7.4.2-1: Maximum Average Conducted Output Power – Antenna Port 0

Frequency [MHz]	Level [dBm]
903.000	22.03
914.113	22.81
927.079	21.78

Table 7.4.2-2: Maximum Average Conducted Output Power – Antenna Port 1

Frequency [MHz]	Level [dBm]
903.000	21.83
914.113	22.83
927.079	21.71

7.5 Emission Levels – FCC 15.247(d), 15.205, 15.209; IC RSS-247 5.5, RSS-Gen 8.9

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 Meas Guidance v03r04. 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 30 dBc limit. The spectrum span was then adjusted for the measurement of spurious emissions from 30MHz to 10GHz, 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 30 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

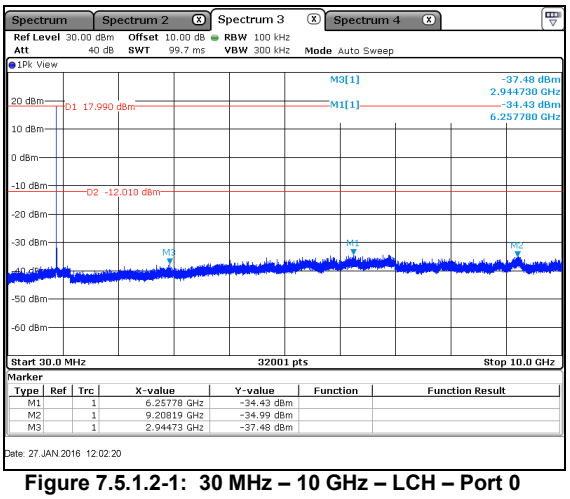

Figure 7.5.1.2-1: 30 MHz – 10 GHz – LCH – Port 0

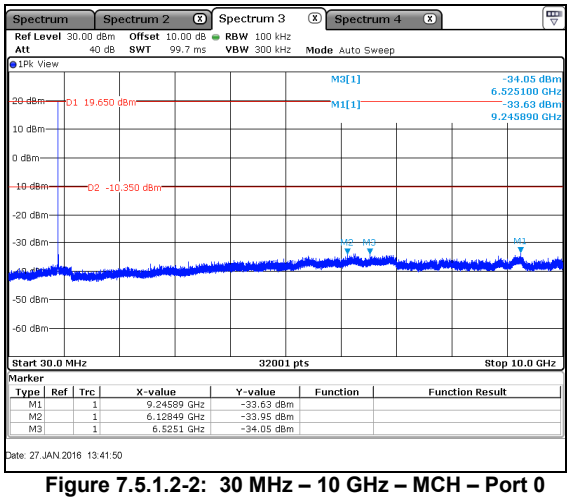

Figure 7.5.1.2-2: 30 MHz – 10 GHz – MCH – Port 0

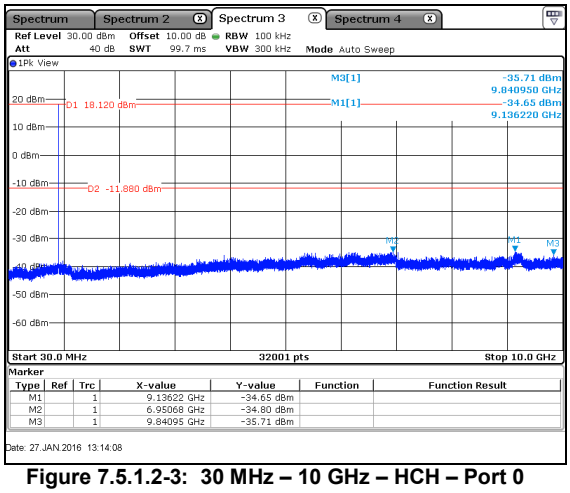

Figure 7.5.1.2-3: 30 MHz – 10 GHz – HCH – Port 0

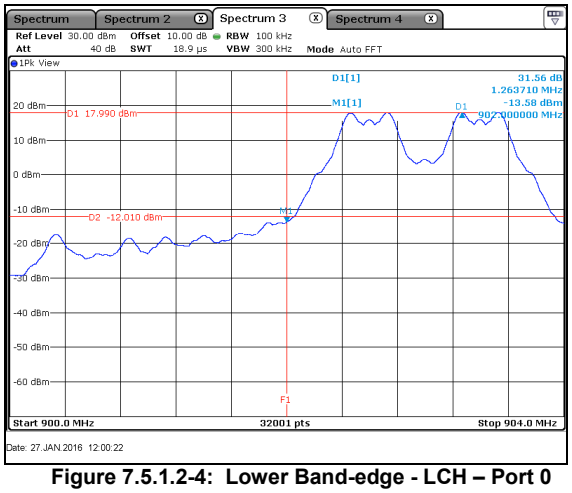

Figure 7.5.1.2-4: Lower Band-edge - LCH – Port 0

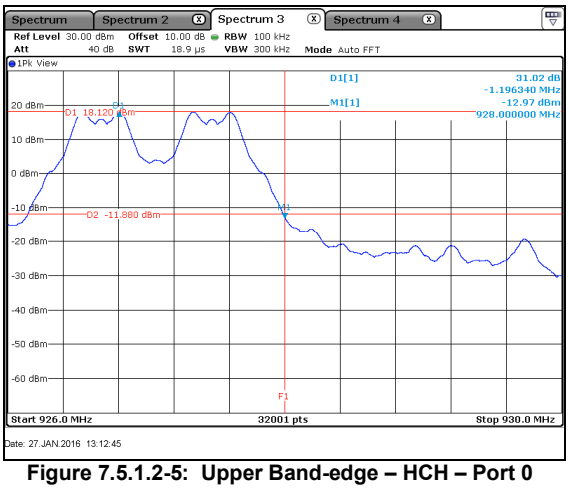

Figure 7.5.1.2-5: Upper Band-edge – HCH – Port 0

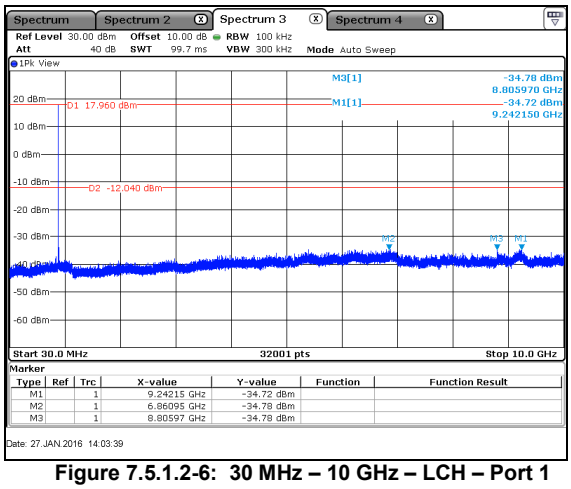

Figure 7.5.1.2-6: 30 MHz – 10 GHz – LCH – Port 1

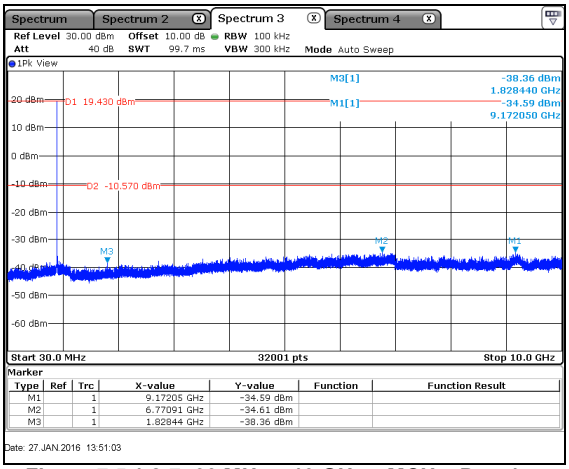

Figure 7.5.1.2-7: 30 MHz – 10 GHz – MCH – Port 1

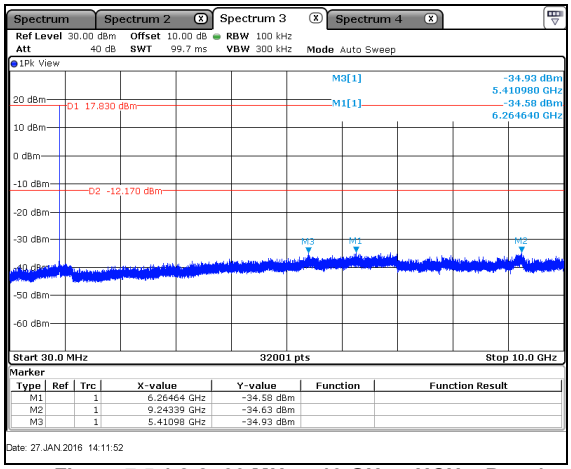

Figure 7.5.1.2-8: 30 MHz – 10 GHz – HCH – Port 1

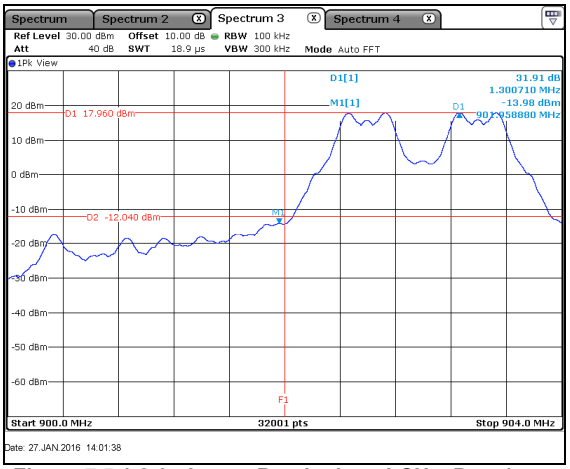

Figure 7.5.1.2-9: Lower Band-edge - LCH – Port 1

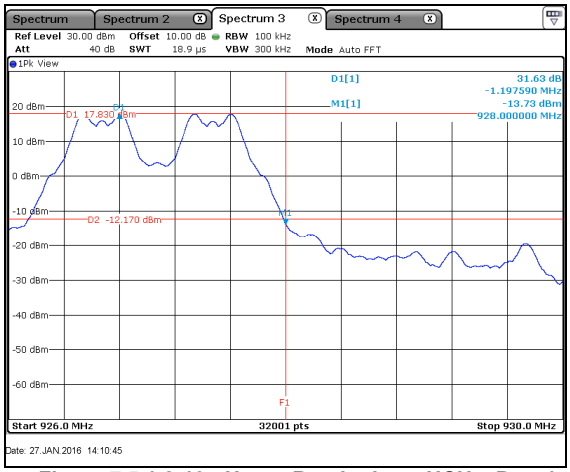

Figure 7.5.1.2-10: Upper Band-edge – HCH – Port 1

7.5.2 Emissions into Restricted Frequency Bands – FCC 15.205, 15.209; RSS-Gen 8.9/8.10

7.5.2.1 Measurement Procedure

The unwanted emissions into restricted bands were measured radiated 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 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.

7.5.2.2 Duty Cycle Correction

For average radiated measurements, using a 5.08% duty cycle, the measured level was reduced by a factor 25.88dB. The duty cycle correction factor is determined using the formula: 20log (5.08/100) = -25.88dB. A detailed analysis of the duty cycle timing is provided in the Theory of Operation accompanying the application for certification.

7.5.2.3 Measurement Results

Table 7.5.2.3-1: 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										
2709	50.55	41.46	H	-3.74	46.81	11.84	74.0	54.0	27.2	42.2
2709	55.60	48.09	V	-3.74	51.86	18.47	74.0	54.0	22.1	35.5
Middle Channel										
2742.339	52.45	43.67	H	-3.66	48.79	14.13	74.0	54.0	25.2	39.9
2742.339	64.02	57.96	V	-3.66	60.36	28.42	74.0	54.0	13.6	25.6
High Channel										
2781.237	50.98	41.81	H	-3.57	47.41	12.37	74.0	54.0	26.6	41.6
2781.237	61.85	55.45	V	-3.57	58.28	26.01	74.0	54.0	15.7	28.0
8343.711	43.19	31.68	V	8.29	51.48	14.09	74.0	54.0	22.5	39.9

Table 7.5.2.3-2: Radiated Spurious Emissions Tabulated Data – Antenna 2 – Panel

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										
2709	55.91	48.37	H	-3.74	52.17	18.75	74.0	54.0	21.8	35.3
2709	56.21	49.18	V	-3.74	52.47	19.56	74.0	54.0	21.5	34.4
Middle Channel										
2742.339	61.21	54.64	H	-3.66	57.55	25.10	74.0	54.0	16.5	28.9
2742.339	65.91	59.84	V	-3.66	62.25	30.30	74.0	54.0	11.8	23.7
High Channel										
2781.237	54.38	46.81	H	-3.57	50.81	17.37	74.0	54.0	23.2	36.6
2781.237	66.52	60.29	V	-3.57	62.95	30.85	74.0	54.0	11.0	23.2

Table 7.5.2.3-3: Radiated Spurious Emissions Tabulated Data – Antenna 3 – 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										
2709	52.87	44.33	H	-3.74	49.13	14.71	74.0	54.0	24.9	39.3
2709	59.79	53.16	V	-3.74	56.05	23.54	74.0	54.0	18.0	30.5
Middle Channel										
2742.339	51.44	42.73	H	-3.66	47.78	13.19	74.0	54.0	26.2	40.8
2742.339	57.30	50.47	V	-3.66	53.64	20.93	74.0	54.0	20.4	33.1
High Channel										
2781.237	48.47	38.26	H	-3.57	44.90	8.82	74.0	54.0	29.1	45.2
2781.237	51.82	43.62	V	-3.57	48.25	14.18	74.0	54.0	25.7	39.8

Table 7.5.2.3-4: Radiated Spurious Emissions Tabulated Data – Antenna 4 – PIFA

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										
2709	66.57	59.41	H	-3.74	62.83	29.79	74.0	54.0	11.2	24.2
2709	67.10	59.77	V	-3.74	63.36	30.15	74.0	54.0	10.6	23.9
3612	51.32	41.13	H	-0.84	50.48	14.41	74.0	54.0	23.5	39.6
3612	51.56	41.66	V	-0.84	50.72	14.94	74.0	54.0	23.3	39.1
4515	55.96	46.87	H	0.88	56.84	21.87	74.0	54.0	17.2	32.1
4515	57.12	48.24	V	0.88	58.00	23.24	74.0	54.0	16.0	30.8
Middle Channel										
2742.339	65.33	57.91	H	-3.66	61.67	28.37	74.0	54.0	12.3	25.6
2742.339	67.41	59.99	V	-3.66	63.75	30.45	74.0	54.0	10.3	23.5
3656.452	50.21	40.11	H	-0.67	49.54	13.56	74.0	54.0	24.5	40.4
3656.452	52.10	43.44	V	-0.67	51.43	16.89	74.0	54.0	22.6	37.1
4570.565	62.10	54.13	H	1.04	63.14	29.29	74.0	54.0	10.9	24.7
4570.565	61.80	53.87	V	1.04	62.84	29.03	74.0	54.0	11.2	25.0
High Channel										
2781.237	74.72	67.43	H	-3.57	71.15	37.99	74.0	54.0	2.8	16.0
2781.237	74.93	69.14	V	-3.57	71.36	39.70	74.0	54.0	2.6	14.3
3708.316	48.77	38.08	H	-0.48	48.29	11.72	74.0	54.0	25.7	42.3
3708.316	52.76	43.59	V	-0.48	52.28	17.23	74.0	54.0	21.7	36.8
4635.395	68.70	61.24	H	1.22	69.92	36.59	74.0	54.0	4.1	17.4
4635.395	69.31	62.03	V	1.22	70.53	37.38	74.0	54.0	3.5	16.6

7.5.2.4 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 (Antenna 1 – Dipole)

Corrected Level: 50.55 - 3.74 = 46.81dBuV/m
Margin: 74.0dBuV/m – 46.81dBuV/m = 27.2dB

Example Calculation: Average (Antenna 1 – Dipole)

Corrected Level: 41.46 - 3.74 - 25.88 = 11.84dBuV
Margin: 54.0dBuV – 11.84dBuV =42.2dB

7.6 Maximum Power Spectral Density in the Fundamental Emission – FCC 15.247(e) IC: RSS-247 5.2(2)

7.6.1 Measurement Procedure

The power spectral density was measured in accordance with the FCC KDB 558074 D01 DTS Meas Guidance v03r04 utilizing the AVGPSD-1 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 occupied bandwidth. An RMS detector was used with trace averaging over at least 100 sweeps.

7.6.2 Measurement Results

Table 7.6.2-1: Peak Power Spectral Density – Antenna Port 0

Frequency (MHz)	PSD Level (dBm)
903.000	0.06
914.113	0.88
927.079	-0.59

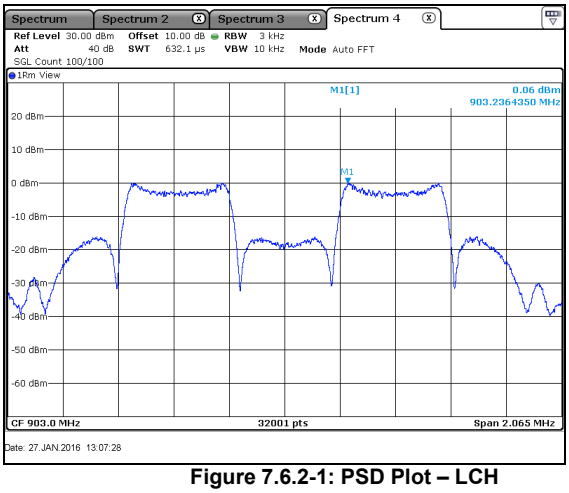

Figure 7.6.2-1: PSD Plot – LCH

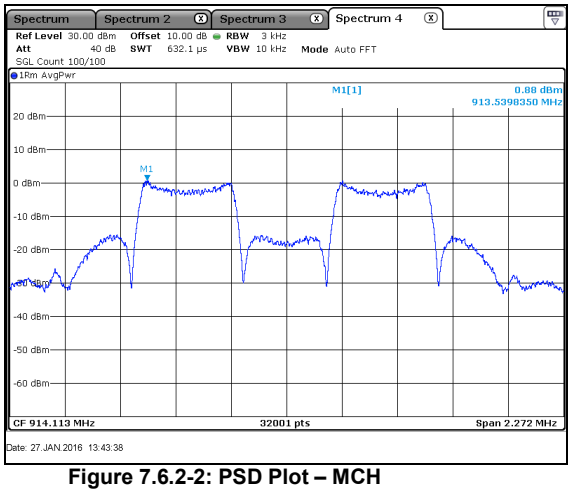

Figure 7.6.2-2: PSD Plot – MCH

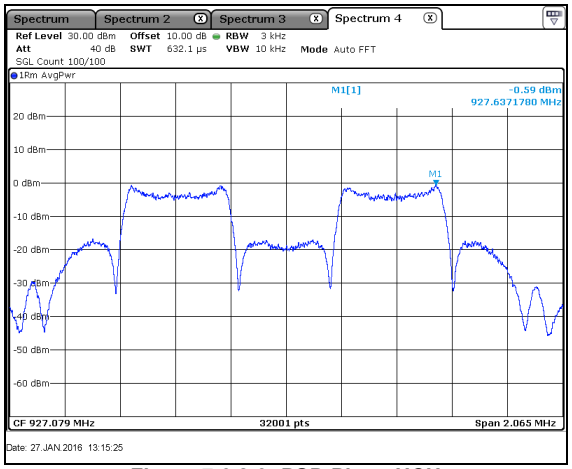

Figure 7.6.2-3: PSD Plot – HCH

Table 7.6.2-2: Peak Power Spectral Density – Antenna Port 1

Frequency (MHz)	PSD Level (dBm)
903.000	-0.24
914.113	0.52
927.079	-0.51

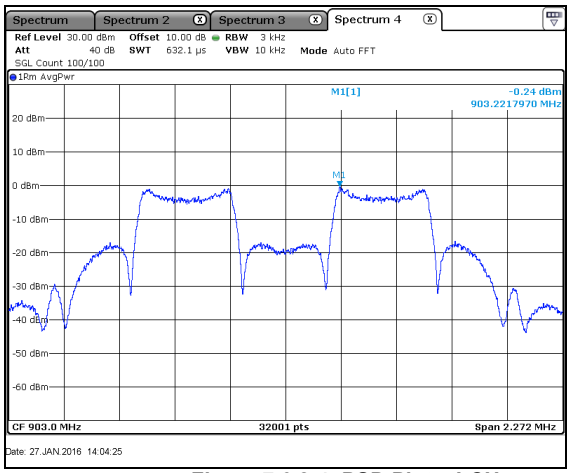

Figure 7.6.2-4: PSD Plot – LCH

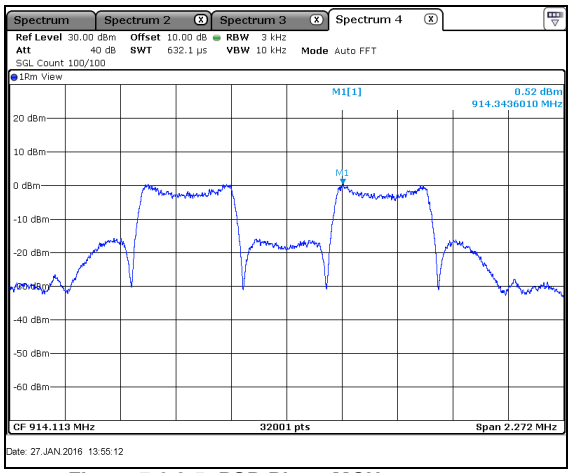

Figure 7.6.2-5: PSD Plot – MCH

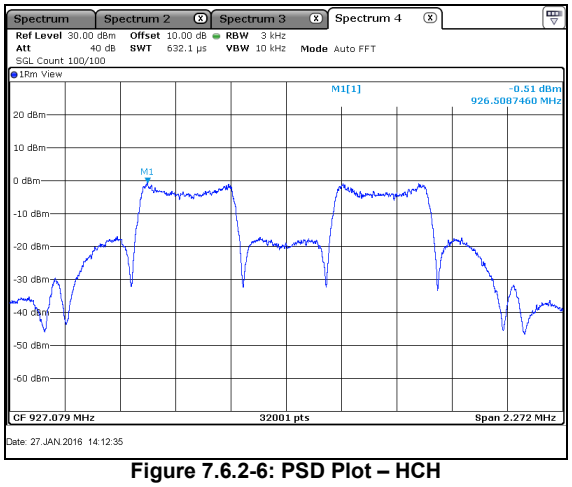

Figure 7.6.2-6: PSD Plot – HCH

8 CONCLUSION

In the opinion of ACS, Inc. the CCT900, provided 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