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Certification Test Report

FCC ID: I6HWWS001
IC: 21449-WWS001

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

ACS Report Number: 16-3035.W06.1A

Manufacturer: GTO Access Systems, LLC
Model: 10009364

Test Begin Date: May 9, 2016
Test End Date: May 13, 2016

Report Issue Date: June 29, 2016

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code AT-1921

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

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This report contains 31 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.

1.2 Product Description

The 10009364 is an 802.11b/g/n Wi-Fi Wall Station (WWS) for a garage door opener (GDO). The wall controller connects to local Wi-Fi network that has access to the internet. Users can control and monitor the GDO status by means of a smart phone App that connects to the WWS via back end cloud service. No options are available for this product.
Variants Evaluated: PCBA in 2 different Plastic/injected molded enclosures.
Part Number: MM-WWS-01
Part Number: EN-WWS-01
Application: Remote/unattended control of a GDO.
The WWS is made from two subassemblies; a printed circuit board assembly (PCBA) and a plastic, injected molded enclosure. After the PCBA is fabricated and tested, it is assembled into the plastic enclosure.

Technical Information:

Detail	Description
Frequency Range	2412 – 2462 MHz
Number of Channels	11
Modulation Format	DSSS, CCK, OFDM, MCS7
Data Rates	1, 6, 11, 54, and 72 Mbps
Number of Inputs/Outputs	1 / 1
Operating Voltage	9VDC
Antenna Type / Gain	Monopole Chip / 1.9 dBi

Manufacturer Information:
GTO Access Systems, LLC
3121 Hartsfield Road
Tallahassee, FL 32303

EUT Serial Numbers: Unit 01

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

1.3 Test Methodology and Considerations

All modes of operation, including all available data rates, were evaluated. The data presented in this report represents the worst case where applicable.

The EUT will be wall mounted in a single orientation. Therefore, a single orientation representative of the installation position was tested. Unit 01 was used for both radiated and conducted measurements. Once radiated measurements were completed, the client installed a connector for conducted measurements.

The variants evaluated were the 10009364 PCBA installed in the MM-WWS-01 and EN-WWS-01 plastic enclosures. No spurious emission differences were found between the 2 plastic enclosures. Therefore, the PCBA with housing MM-WWS-01 is documented in the report.

Worst Case Modes of Operation:

WiFi Type	Modulation	Worst case data rates Mbps
802.11b	DSSS	1
802.11g	OFDM	6
802.11n	MCS7	72

2 TEST FACILITIES

2.1 Location

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

Advanced Compliance Solutions
2320 Presidential Drive, Suite 101
Durham, NC 27703
Phone: (919) 381-4235

2.2 Laboratory Accreditations/Recognitions/Certifications

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

FCC Registered Test Site Number: 637011
ISED Test Site Registration Number: 20446

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

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

The turntable is 1.50m in diameter and is located 150cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using short #6 copper wire. The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the turntable. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane.

Behind the turntable is a 2' x 6' x 1.5' deep shielded pit used for support equipment if necessary. The pit is equipped with 2 - 4" PVC chase from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

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

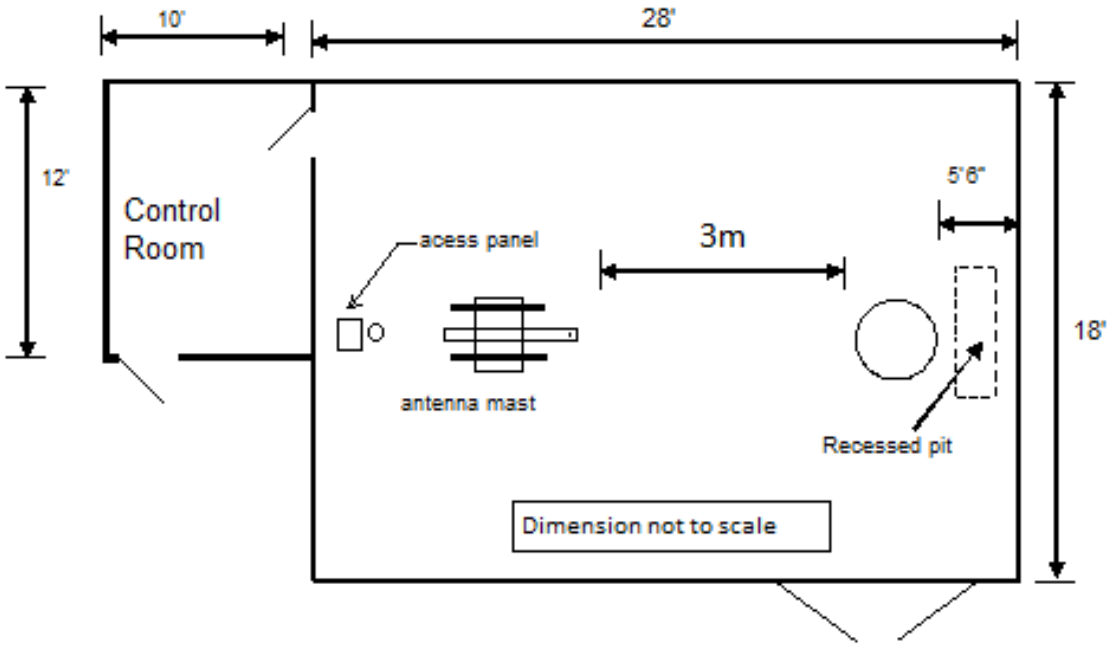

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.4 Conducted Emissions Test Site Description

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

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

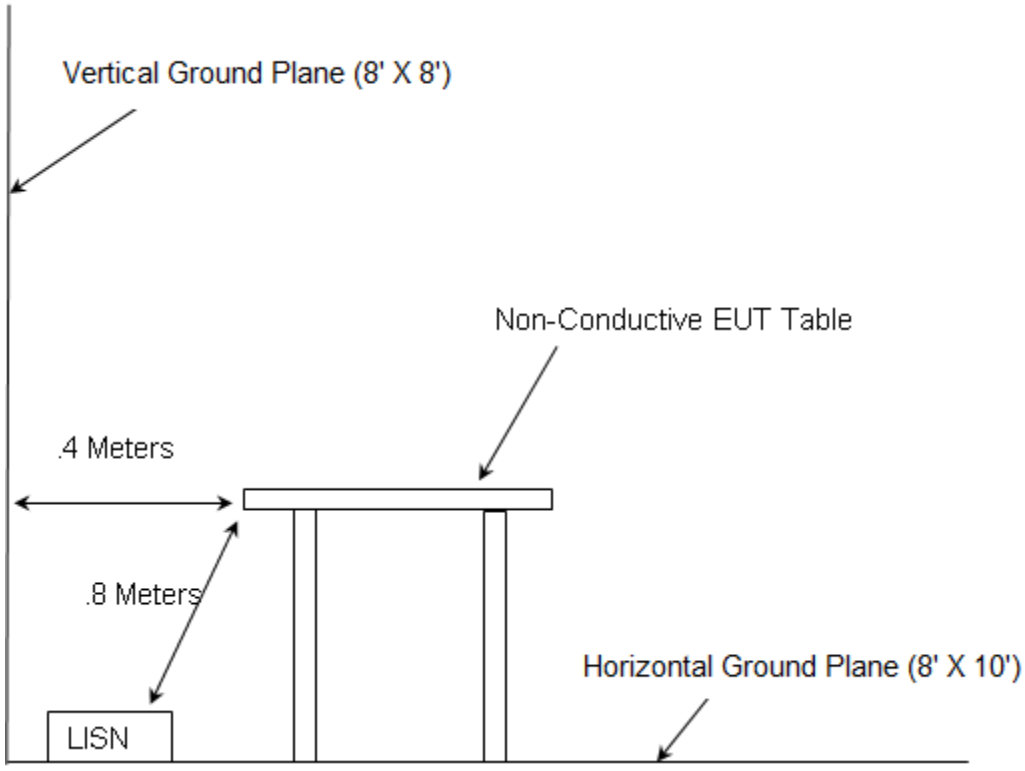

Figure 2.4-1: AC Mains Conducted EMI Site

3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2014 - American National Standard for Methods of Measurement of Radio-Noise Emissions from low-voltage electrical and electronic equipment in the range of 9kHz to 40 GHz.
- 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 v03r05 - 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 Licence-Exempt Local Area Network (LE-LAN) Devices, Issue 1, May 2015
- Industry 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
277	Emco	93146	Antennas	9904-5199	9/2/2014	9/2/2016
626	EMCO	3110B	Antennas	9411-1945	2/29/2016	2/28/2017
3002	Rohde & Schwarz	ESU40	Receiver	100346	1/8/2016	1/8/2017
3006	Rohde & Schwarz	TS-PR18	Amplifiers	122006	6/29/2015	6/29/2016
3007	Rohde & Schwarz	TS-PR26	Amplifiers	100051	6/29/2015	6/29/2016
3008	Rohde & Schwarz	NRP2	Meter	103131	1/28/2016	1/28/2017
3009	Rohde & Schwarz	NRP-Z81	Meter	102397	1/28/2016	1/28/2017
3011	Rohde & Schwarz	ENV216	LISN	3011	7/10/2015	7/10/2016
3012	Rohde & Schwarz	EMC32-EB	Software	100731	2/2/2016	8/2/2016
3016	Fei Teng Wireless Technology	HA-07M18G-NF	Antennas	2013120203	1/26/2016	1/26/2017
3027	Micro-Tronics	BRM50702	Filter	175	12/21/2015	12/21/2016
3033	Hasco, Inc.	HLL142-S1-S1-36	Cables	1435	1/7/2016	1/7/2017
3038	Florida RF Labs	NMSE-290AW-60.0-NMSE	Cable Set	1448	12/22/2015	12/22/2016
3045	Aeroflex Inmet	18N10W-20	Attenuator	1437	1/8/2016	1/8/2017
3051	Mountain View Cable	BMS-RG400-264.0-BMS	Cables	3051	12/30/2015	12/30/2016
3055	Rohde & Schwarz	3005	Cables	3055	12/30/2015	12/30/2016
3057	Advanced Technical Materials	42-441-6/BR	Antennas	R110602	NCR	NCR

DMAS MT-25 RF absorber material was used on the floor for all final measurements above 1 GHz.
NCR = No Calibration Required
Firmware Version: ESU40 is 4.73 SP4
Software Version: EMC32-B is 9.15

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
1	EUT	GDO	10009364	Unit 1
2	Power Supply	Mastech	HY1803DL	224146

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

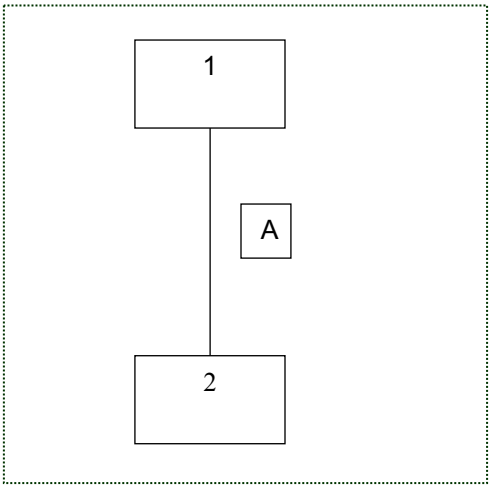

Figure 6-1: Test Setup Block Diagram

Table 6-1: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	Power	300cm	No	EUT - PS

7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement – FCC 15.203

The antenna is a monopole chip integrated on the PCBA and cannot be removed or replaced by the end user, therefore satisfying the requirements of Section 15.203. The peak gain of the antenna is 1.9 dBi.

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

7.2.1 Measurement Procedure

ANSI C63.4-2014 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

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	---	12.76	56.00	43.24	2000.0	9.000	L1	OFF	9.5
0.150000	36.15	---	66.00	29.85	2000.0	9.000	L1	OFF	9.5
0.154000	35.21	---	65.76	30.55	2000.0	9.000	L1	OFF	9.5
0.154000	---	10.99	55.76	44.77	2000.0	9.000	L1	OFF	9.5
0.158000	34.09	---	65.53	31.44	2000.0	9.000	L1	OFF	9.5
0.158000	---	10.89	55.53	44.64	2000.0	9.000	L1	OFF	9.5
7.052000	---	25.56	50.00	24.44	2000.0	9.000	L1	OFF	9.8
7.052000	32.11	---	60.00	27.89	2000.0	9.000	L1	OFF	9.8
8.460000	---	24.02	50.00	25.98	2000.0	9.000	L1	OFF	9.9
8.460000	28.61	---	60.00	31.39	2000.0	9.000	L1	OFF	9.9
9.872000	---	30.87	50.00	19.13	2000.0	9.000	L1	OFF	9.9
9.872000	35.21	---	60.00	24.79	2000.0	9.000	L1	OFF	9.9
11.284000	---	28.67	50.00	21.33	2000.0	9.000	L1	OFF	9.9
11.284000	34.28	---	60.00	25.72	2000.0	9.000	L1	OFF	9.9
12.692000	---	29.73	50.00	20.27	2000.0	9.000	L1	OFF	9.9
12.692000	34.45	---	60.00	25.55	2000.0	9.000	L1	OFF	9.9
14.100000	---	22.92	50.00	27.08	2000.0	9.000	L1	OFF	9.9
14.100000	29.05	---	60.00	30.95	2000.0	9.000	L1	OFF	9.9
15.512000	---	24.59	50.00	25.41	2000.0	9.000	L1	OFF	10.0
15.512000	29.93	---	60.00	30.07	2000.0	9.000	L1	OFF	10.0
18.332000	---	23.83	50.00	26.17	2000.0	9.000	L1	OFF	10.0
18.332000	29.67	---	60.00	30.33	2000.0	9.000	L1	OFF	10.0
19.740000	---	22.01	50.00	27.99	2000.0	9.000	L1	OFF	10.0
19.740000	28.59	---	60.00	31.41	2000.0	9.000	L1	OFF	10.0
21.156000	---	17.88	50.00	32.12	2000.0	9.000	L1	OFF	10.0
21.156000	25.07	---	60.00	34.93	2000.0	9.000	L1	OFF	10.0

Table 7.2.2-2: Conducted EMI Results – Line 2

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	---	13.25	56.00	42.75	2000.0	9.000	N	OFF	9.7
0.150000	37.39	---	66.00	28.61	2000.0	9.000	N	OFF	9.7
0.158000	---	11.90	55.53	43.63	2000.0	9.000	N	OFF	9.7
0.158000	36.12	---	65.53	29.41	2000.0	9.000	N	OFF	9.7
7.060000	---	21.37	50.00	28.63	2000.0	9.000	N	OFF	10.1
7.060000	30.07	---	60.00	29.93	2000.0	9.000	N	OFF	10.1
9.884000	---	26.63	50.00	23.37	2000.0	9.000	N	OFF	10.1
9.884000	33.37	---	60.00	26.63	2000.0	9.000	N	OFF	10.1
11.292000	---	27.60	50.00	22.40	2000.0	9.000	N	OFF	10.2
11.292000	32.01	---	60.00	27.99	2000.0	9.000	N	OFF	10.2
12.704000	---	28.43	50.00	21.57	2000.0	9.000	N	OFF	10.2
12.704000	33.71	---	60.00	26.29	2000.0	9.000	N	OFF	10.2
15.528000	---	23.16	50.00	26.84	2000.0	9.000	N	OFF	10.3
15.528000	31.14	---	60.00	28.86	2000.0	9.000	N	OFF	10.3
19.756000	---	24.69	50.00	25.31	2000.0	9.000	N	OFF	10.4
19.756000	30.41	---	60.00	29.59	2000.0	9.000	N	OFF	10.4
21.172000	---	21.04	50.00	28.96	2000.0	9.000	N	OFF	10.4
21.172000	28.93	---	60.00	31.07	2000.0	9.000	N	OFF	10.4

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 v03r05. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 3 times the RBW. The trace was set to max hold with a peak detector active. The marker-delta function of the spectrum analyzer was utilized to determine the 6 dB bandwidth of the emission.

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

7.3.2 Measurement Results

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

Frequency [MHz]	6dB Bandwidth [MHz]	99% Bandwidth [MHz]
2412	10.023	14.07
2437	10.047	14.16
2462	10.076	14.07

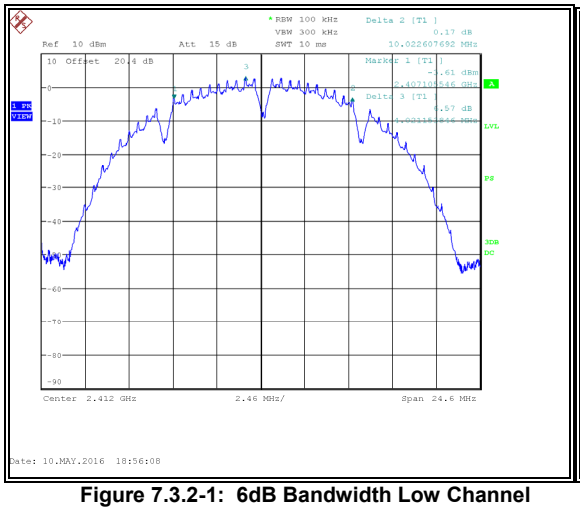

Figure 7.3.2-1: 6dB Bandwidth Low Channel

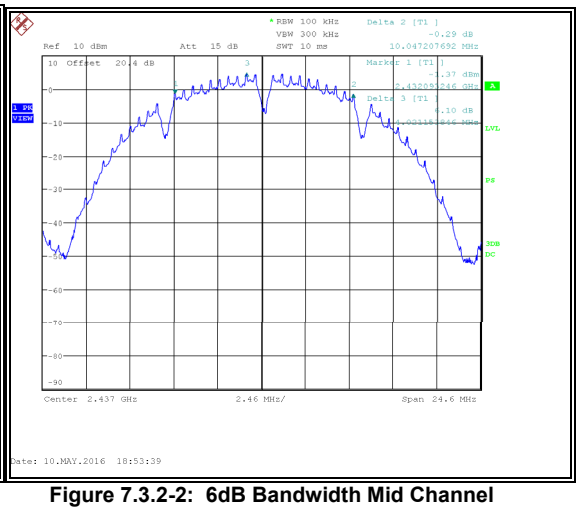

Figure 7.3.2-2: 6dB Bandwidth Mid Channel

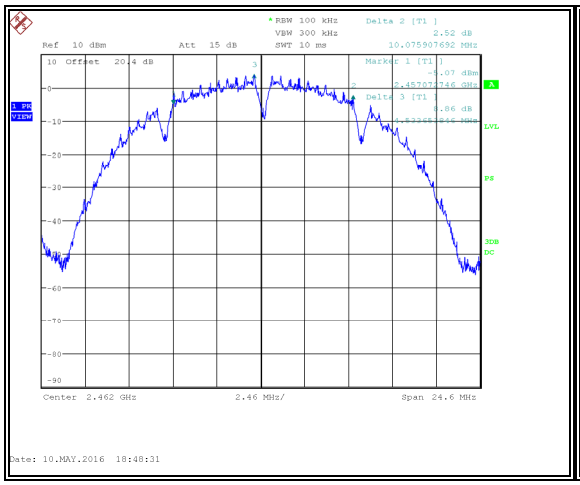

Figure 7.3.2-3: 6dB Bandwidth High Channel

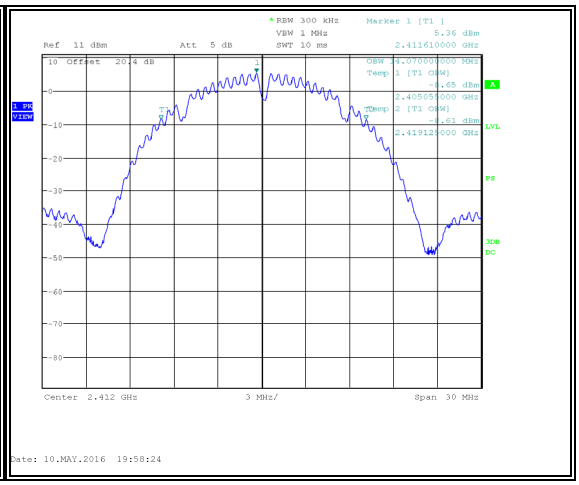

Figure 7.3.2-4: 99% Bandwidth Low Channel

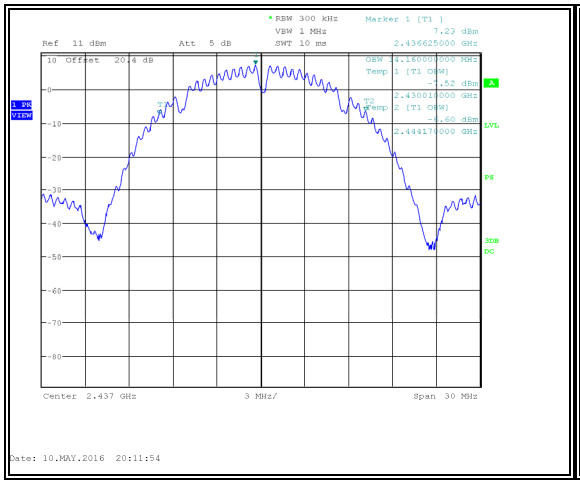

Figure 7.3.2-5: 99% Bandwidth Mid Channel

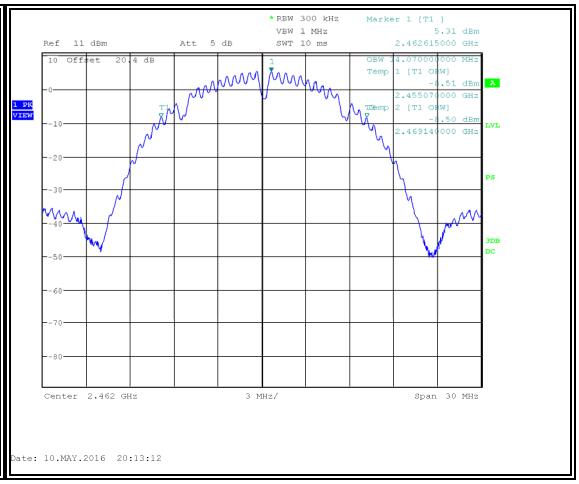

Figure 7.3.2-6: 99% Bandwidth High Channel

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

Frequency [MHz]	6dB Bandwidth [MHz]	99% Bandwidth [MHz]
2412	15.137	16.77
2437	15.128	17.50
2462	15.128	16.90

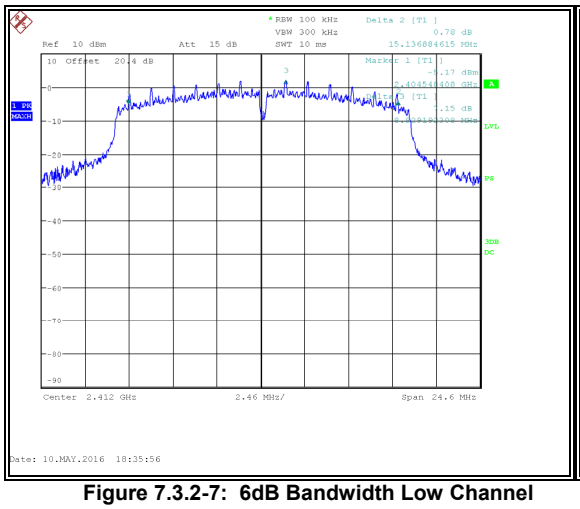

Figure 7.3.2-7: 6dB Bandwidth Low Channel

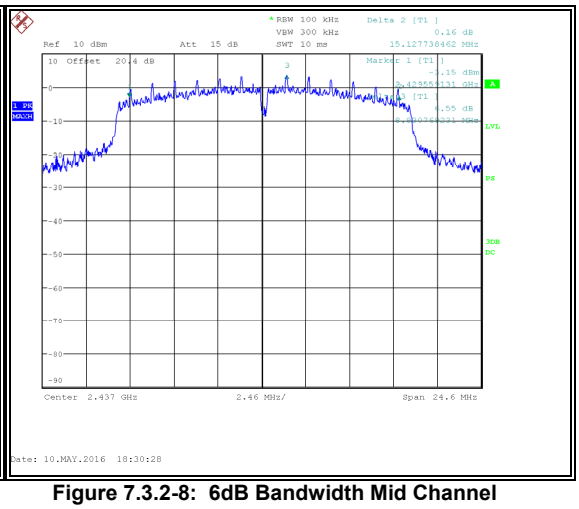

Figure 7.3.2-8: 6dB Bandwidth Mid Channel

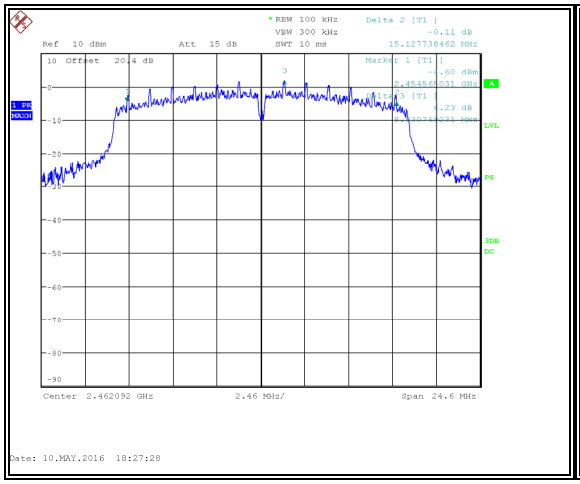

Figure 7.3.2-9: 6dB Bandwidth High Channel

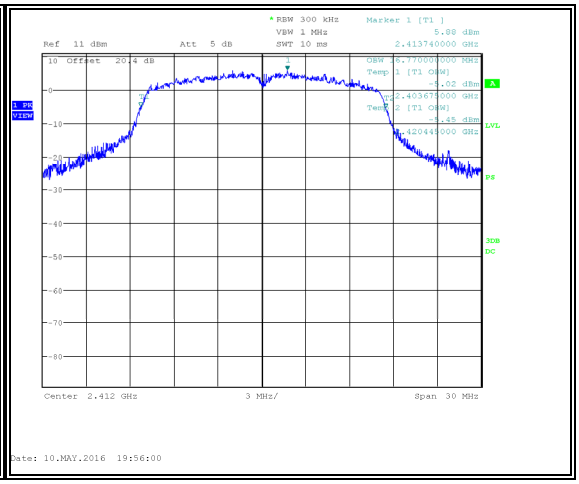

Figure 7.3.2-10: 99% Bandwidth Low Channel

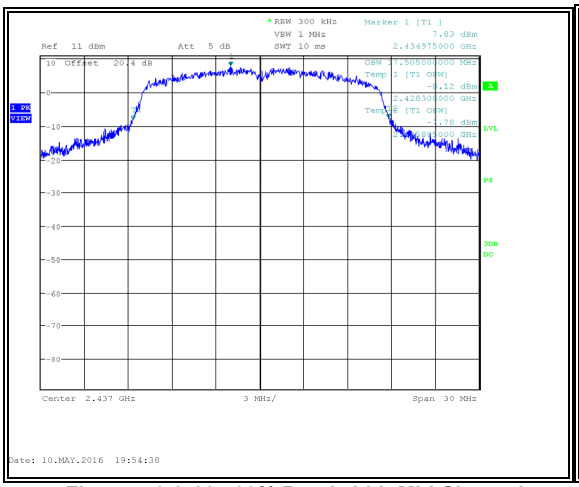

Figure 7.3.2-11: 99% Bandwidth Mid Channel

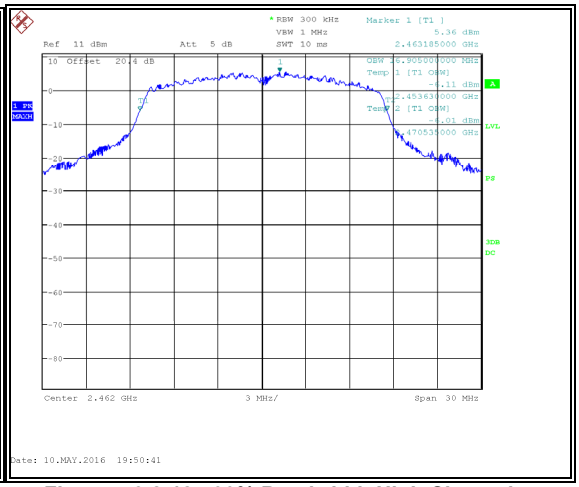

Figure 7.3.2-12: 99% Bandwidth High Channel

Table 7.3.2-3: 6dB / 99% Bandwidth - 802.11n

Frequency [MHz]	6dB Bandwidth [MHz]	99% Bandwidth [MHz]
2412	17.758	18.12
2437	17.640	18.12
2462	17.667	18.13

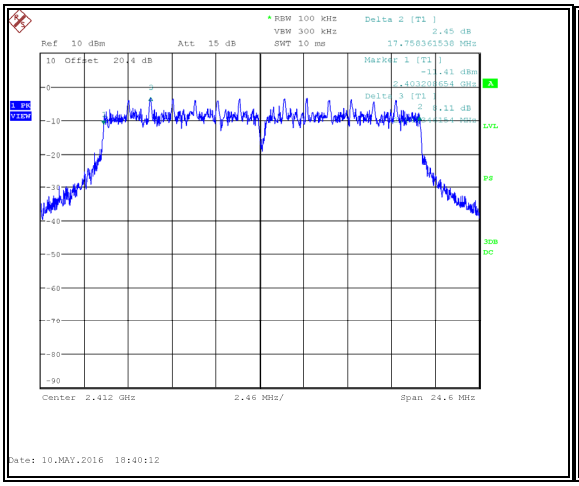

Figure 7.3.2-13: 6dB Bandwidth Low Channel

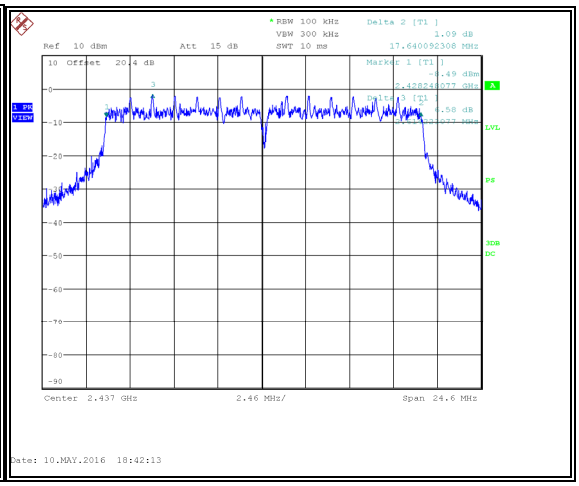

Figure 7.3.2-14: 6dB Bandwidth Mid Channel

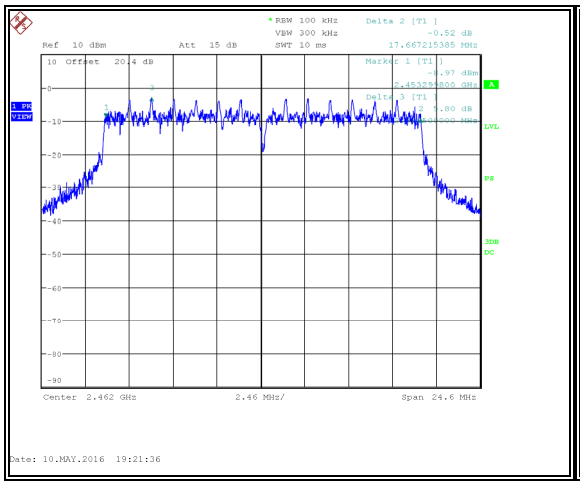

Figure 7.3.2-15: 6dB Bandwidth High Channel

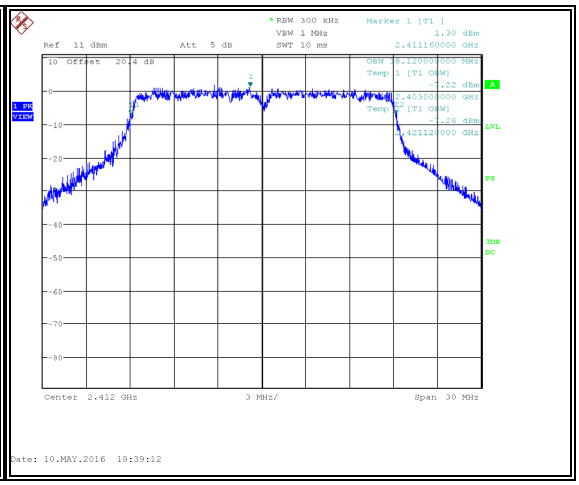

Figure 7.3.2-16: 99% Bandwidth Low Channel

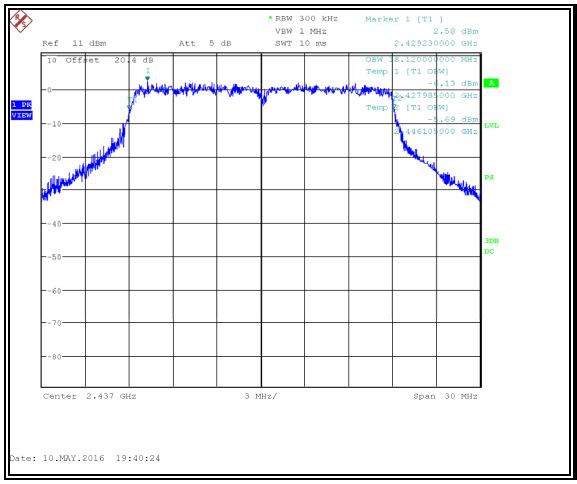

Figure 7.3.2-17: 99% Bandwidth Mid Channel

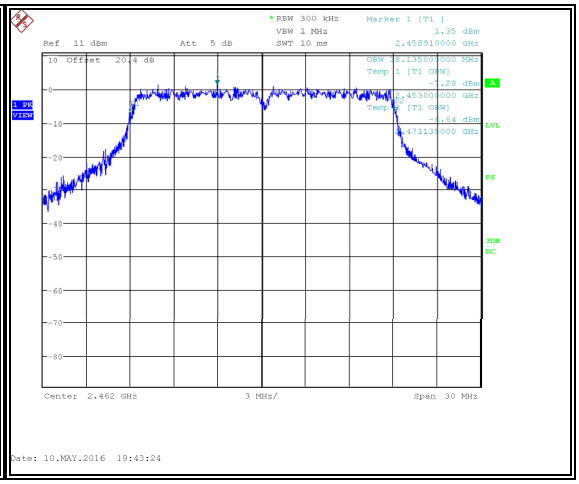

Figure 7.3.2-18: 99% Bandwidth High Channel

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

7.4.1 Measurement Procedure

The maximum peak conducted output power was measured in accordance with FCC KDB 558074 D01 DTS Measurement Guidance v03r05 utilizing the PKPM1 Peak power meter method. The RF output of the equipment under test was directly connected to the input of the peak power meter applying suitable attenuation.

7.4.2 Measurement Results

Table 7.4.2-1: Maximum Peak Conducted Output Power

Frequency (MHz)	Output Power (dBm) 802.11b	Output Power (dBm) 802.11g	Output Power (dBm) 802.11n
2412	12.45	7.54	-0.40
2437	14.40	9.60	0.08
2462	12.70	7.10	-0.42

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

7.5.1 Emissions into Non-restricted Frequency Bands

7.5.1.1 Measurement Procedure

The unwanted emissions into non-restricted bands were measured conducted in accordance with FCC KDB 558074 D01 DTS Measurement Guidance v03r05. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 300 kHz. Span was set to 1.5 times the DTS bandwidth. The trace was set to max hold with a peak detector active. The resulting spectrum analyzer peak level was used to determine the reference level with respect to the 20 dBc limit. The spectrum span was then adjusted for the measurement of spurious emissions from 30 MHz to 25GHz, 10 times the highest fundamental frequency. Additionally a prescan was performed from 9 kHz or the lowest frequency generated to 30 MHz.

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

7.5.1.2 Measurement Results

802.11b

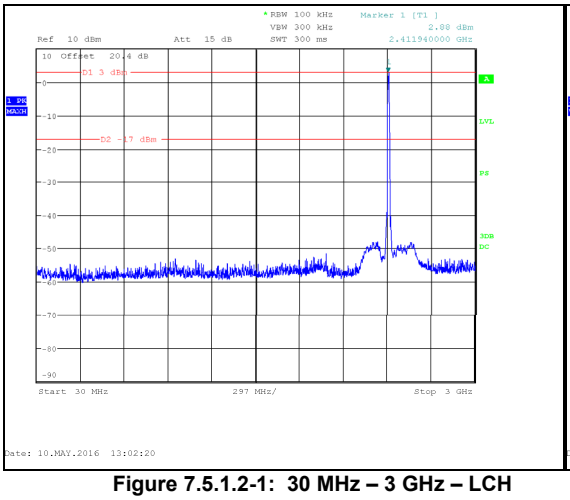

Figure 7.5.1.2-1: 30 MHz – 3 GHz – LCH

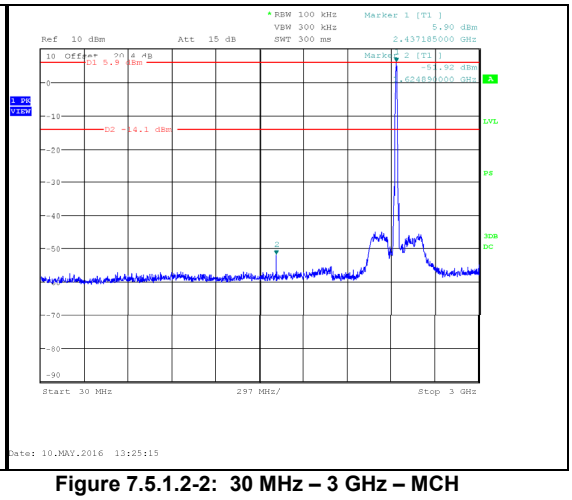

Figure 7.5.1.2-2: 30 MHz – 3 GHz – MCH

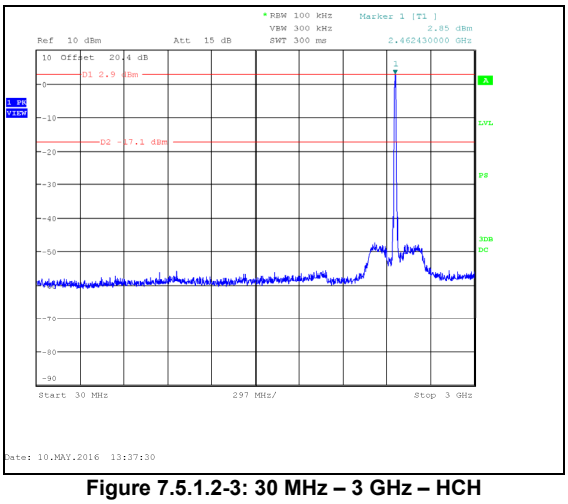

Figure 7.5.1.2-3: 30 MHz – 3 GHz – HCH

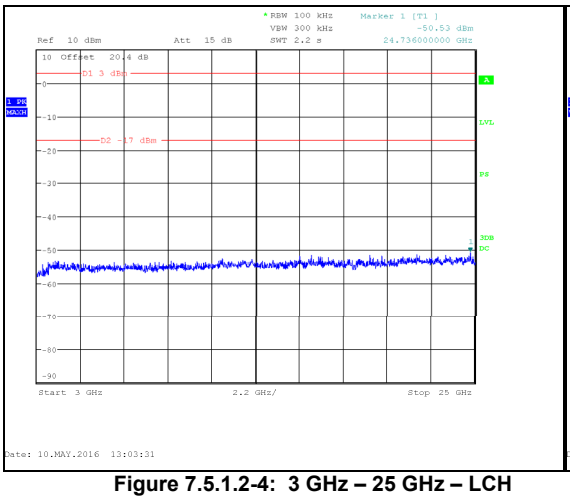

Figure 7.5.1.2-4: 3 GHz – 25 GHz – LCH

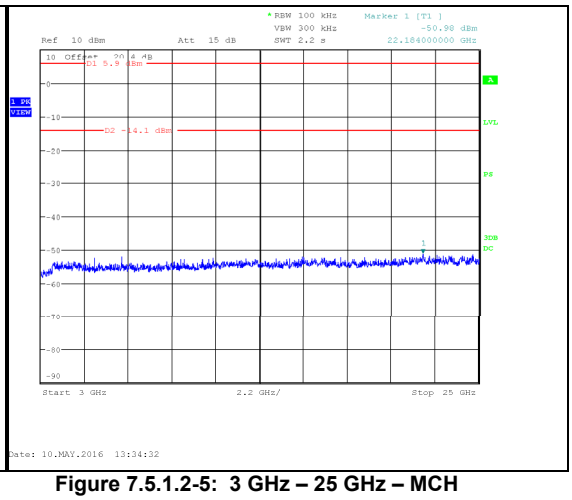

Figure 7.5.1.2-5: 3 GHz – 25 GHz – MCH

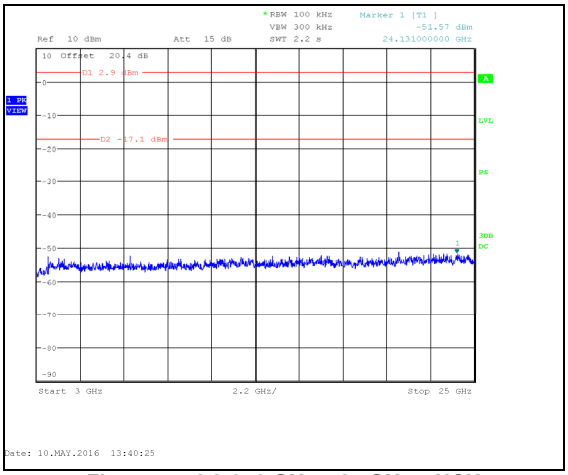

Figure 7.5.1.2-6: 3 GHz – 25 GHz – HCH

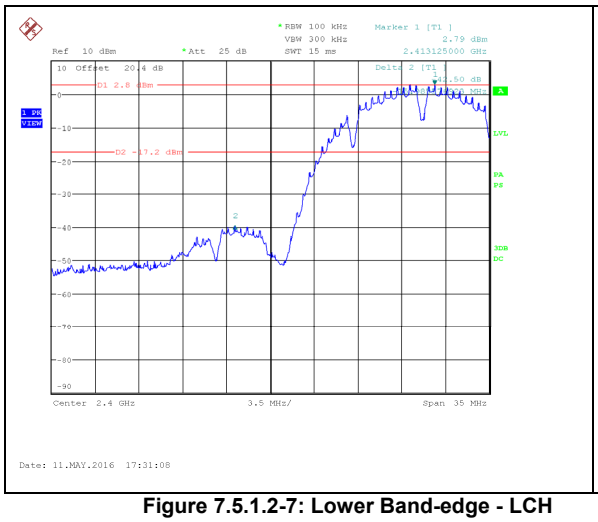

Figure 7.5.1.2-7: Lower Band-edge - LCH

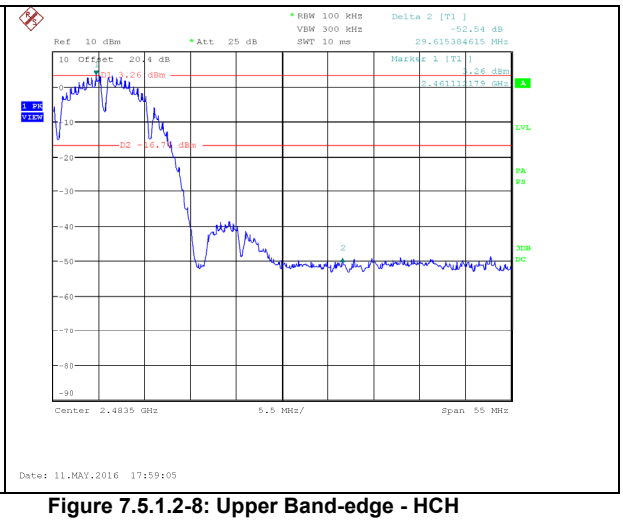

Figure 7.5.1.2-8: Upper Band-edge - HCH

802.11g

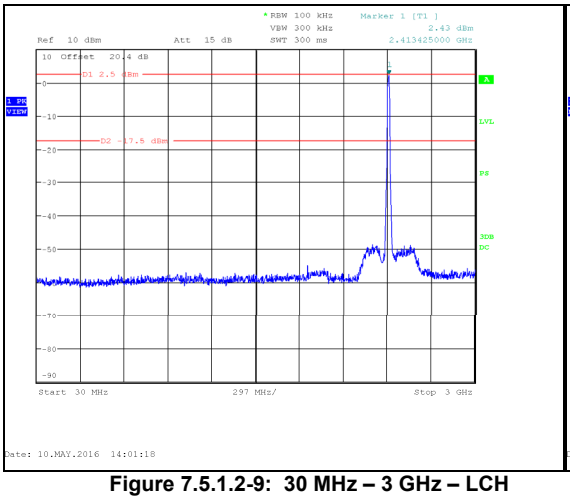

Figure 7.5.1.2-9: 30 MHz – 3 GHz – LCH

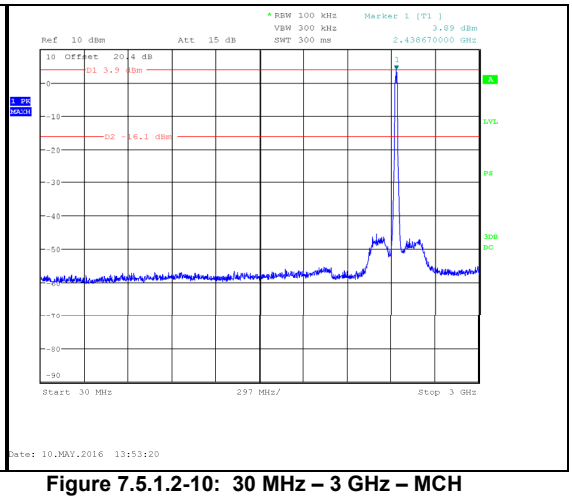

Figure 7.5.1.2-10: 30 MHz – 3 GHz – MCH

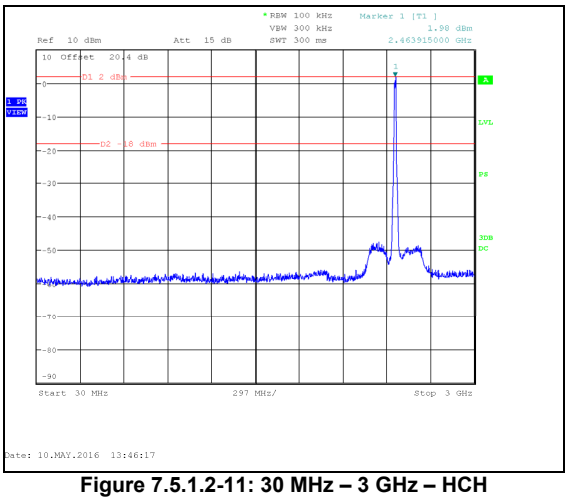

Figure 7.5.1.2-11: 30 MHz – 3 GHz – HCH

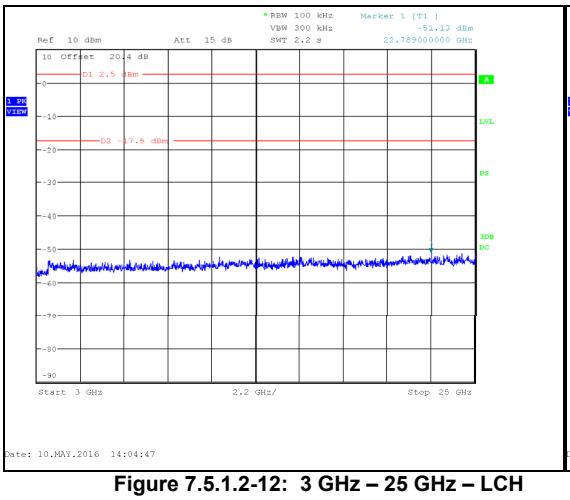

Figure 7.5.1.2-12: 3 GHz – 25 GHz – LCH

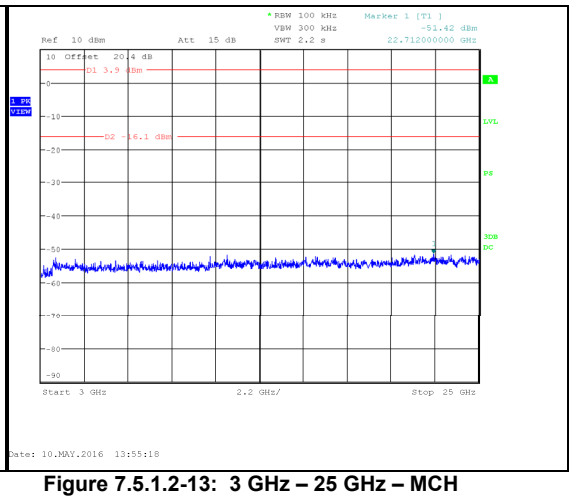

Figure 7.5.1.2-13: 3 GHz – 25 GHz – MCH

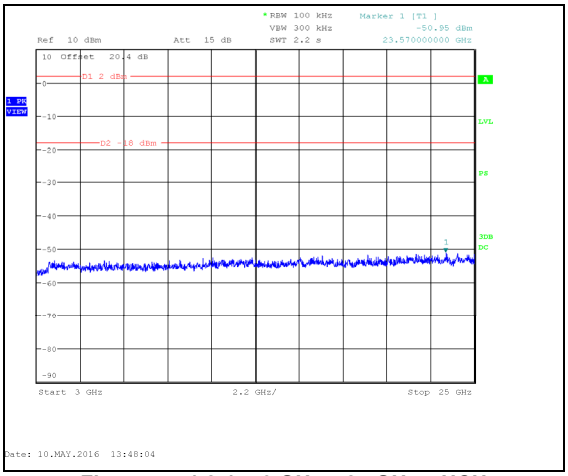

Figure 7.5.1.2-14: 3 GHz – 25 GHz – HCH

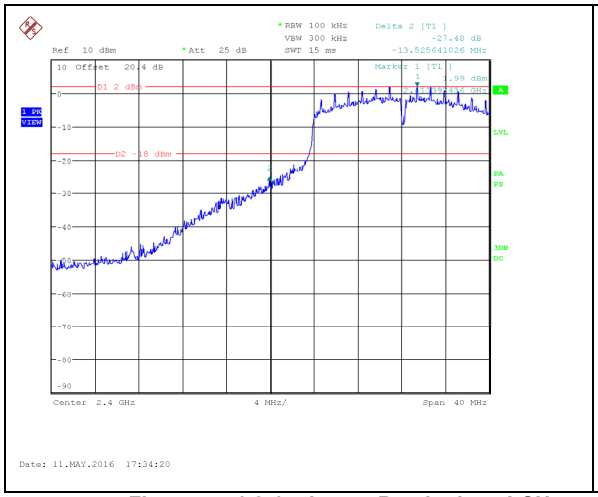

Figure 7.5.1.2-15: Lower Band-edge - LCH

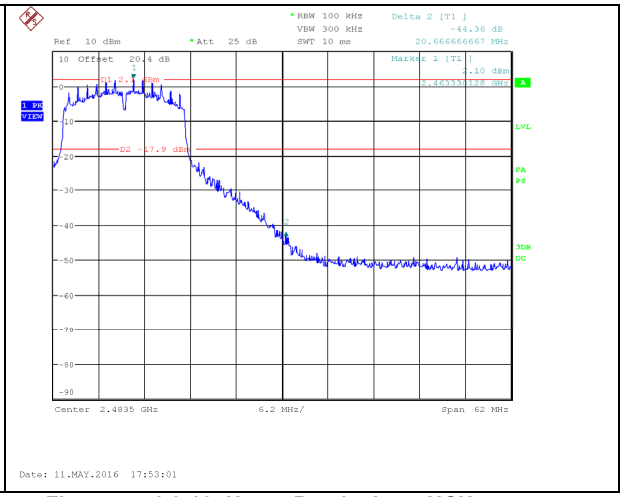

Figure 7.5.1.2-16: Upper Band-edge – HCH

802.11n

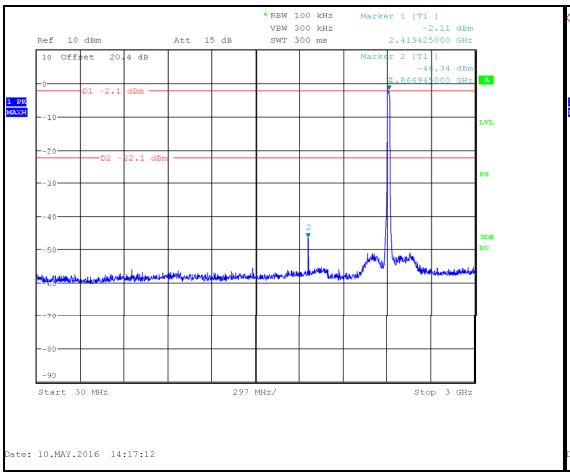

Figure 7.5.1.2-17: 30 MHz – 3 GHz – LCH

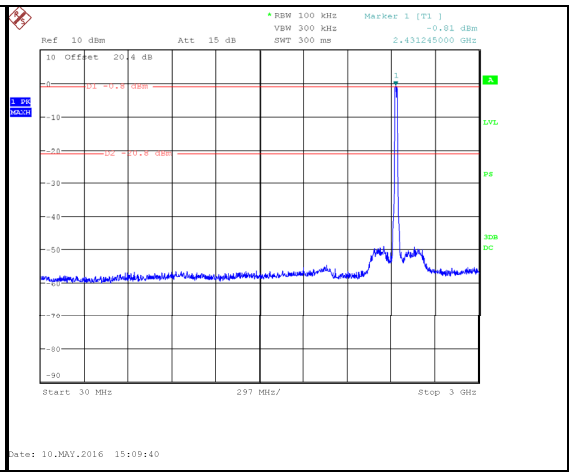

Figure 7.5.1.2-18: 30 MHz – 3 GHz – MCH

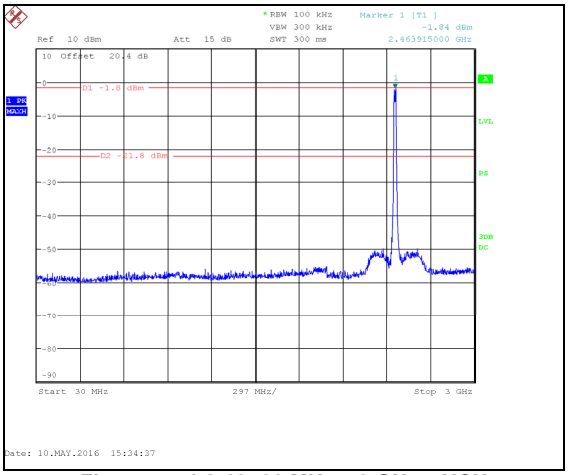

Figure 7.5.1.2-19: 30 MHz – 3 GHz – HCH

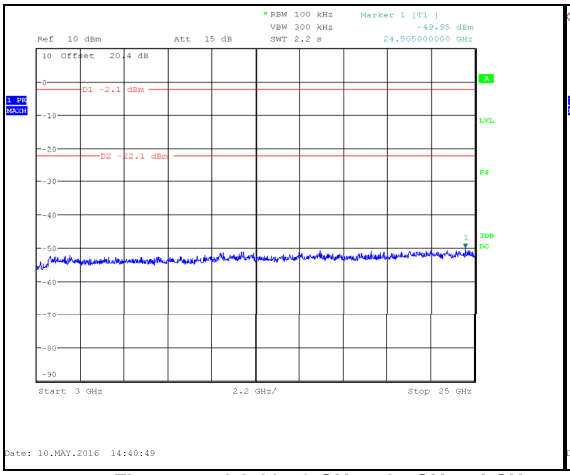

Figure 7.5.1.2-20: 3 GHz – 25 GHz – LCH

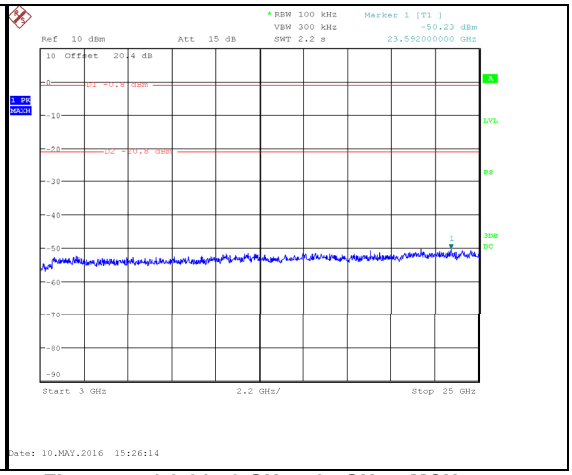

Figure 7.5.1.2-21: 3 GHz – 25 GHz – MCH

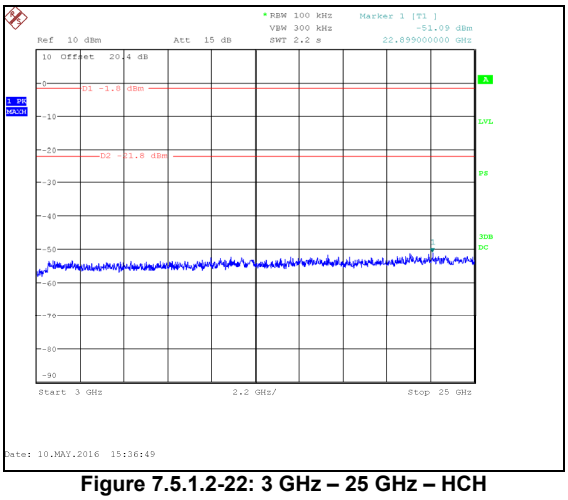

Figure 7.5.1.2-22: 3 GHz – 25 GHz – HCH

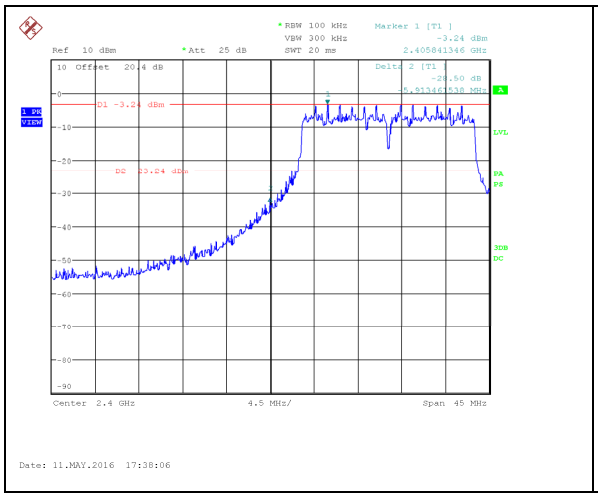

Figure 7.5.1.2-23: Lower Band-edge - LCH

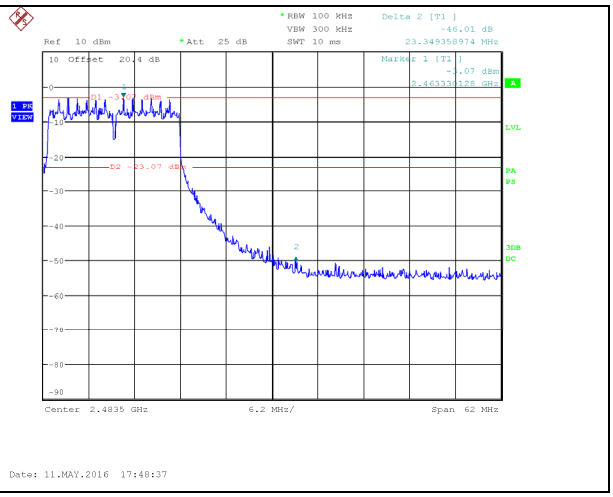

Figure 7.5.1.2-24: Upper Band-edge - HCH

7.5.2 Emissions into Restricted Frequency Bands

7.5.2.1 Measurement Procedure

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

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a RBW of 120 kHz and a VBW of 300 kHz. For frequencies above 1000MHz, peak and average measurements were made with RBW and VBW of 1 MHz and 3 MHz respectively.

Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in section 15.209.

7.5.2.2 Duty Cycle Correction

The Duty Cycle Correction was not required.

7.5.2.3 Measurement Results

802.11b

Table 7.5.2.3-1: Radiated Spurious Emissions Tabulated Data

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										
4824	41.70	30.80	H	6.16	47.86	36.96	74.0	54.0	26.1	17.0
4824	40.90	29.80	V	6.16	47.06	35.96	74.0	54.0	26.9	18.0
4018.8	51.50	44.60	H	4.94	56.44	49.54	74.0	54.0	17.6	4.5
4018.8	46.60	38.10	V	4.94	51.54	43.04	74.0	54.0	22.5	11.0
2334	58.80	45.20	H	-1.84	56.96	43.36	74.0	54.0	17.0	10.6
2334	63.30	50.40	V	-1.84	61.46	48.56	74.0	54.0	12.5	5.4
2254	51.20	37.40	H	-2.04	49.16	35.36	74.0	54.0	24.8	18.6
2254	62.00	49.10	V	-2.04	59.96	47.06	74.0	54.0	14.0	6.9
Middle Channel										
4874	46.80	40.60	H	6.17	52.97	46.77	74.0	54.0	21.0	7.2
4874	44.30	36.80	V	6.17	50.47	42.97	74.0	54.0	23.5	11.0
7311	42.20	31.20	H	8.79	50.99	39.99	74.0	54.0	23.0	14.0
7311	39.20	26.00	V	8.79	47.99	34.79	74.0	54.0	26.0	19.2
4063	52.00	45.50	H	5.05	57.05	50.55	74.0	54.0	17.0	3.5
4063	46.40	38.30	V	5.05	51.45	43.35	74.0	54.0	22.6	10.7
High Channel										
4924	47.50	41.50	H	6.18	53.68	47.68	74.0	54.0	20.3	6.3
4924	45.30	37.80	V	6.18	51.48	43.98	74.0	54.0	22.5	10.0
7386	42.30	31.30	H	9.12	51.42	40.42	74.0	54.0	22.6	13.6
4094	51.80	44.10	H	5.12	56.92	49.22	74.0	54.0	17.1	4.8
4094	46.40	37.20	V	5.12	51.52	42.32	74.0	54.0	22.5	11.7
2483.5	59.00	45.00	H	-1.47	57.53	43.53	74.0	54.0	16.5	10.5
2483.5	61.00	46.70	V	-1.47	59.53	45.23	74.0	54.0	14.5	8.8

802.11g

Table 7.5.2.3-2: Radiated Spurious Emissions Tabulated Data

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										
4824	43.80	29.10	H	6.50	50.30	35.60	74.0	54.0	23.7	18.4
4824	42.80	28.80	V	6.50	49.30	35.30	74.0	54.0	24.7	18.7
12060	41.70	28.20	H	12.19	53.89	40.39	74.0	54.0	20.1	13.6
12060	40.80	28.00	V	12.19	52.99	40.19	74.0	54.0	21.0	13.8
4018.8	53.60	35.20	H	5.82	59.42	41.02	74.0	54.0	14.6	13.0
4018.8	46.70	31.30	V	5.82	52.52	37.12	74.0	54.0	21.5	16.9
2389.6	57.40	32.10	H	-1.70	55.70	30.40	74.0	54.0	18.3	23.6
2389.6	75.30	49.10	V	-1.70	73.60	47.40	74.0	54.0	0.4	6.6
Middle Channel										
4874	45.60	30.20	H	6.17	51.77	36.37	74.0	54.0	22.2	17.6
4874	43.60	29.30	V	6.17	49.77	35.47	74.0	54.0	24.2	18.5
7311	46.30	29.20	H	8.79	55.09	37.99	74.0	54.0	18.9	16.0
7311	42.50	28.30	V	8.79	51.29	37.09	74.0	54.0	22.7	16.9
4063	53.20	36.30	H	5.05	58.25	41.35	74.0	54.0	15.8	12.7
4063	48.10	32.30	V	5.05	53.15	37.35	74.0	54.0	20.9	16.7
High Channel										
4924	45.80	30.20	H	6.50	52.30	36.70	74.0	54.0	21.7	17.3
4924	44.10	29.10	V	6.50	50.60	35.60	74.0	54.0	23.4	18.4
7386	46.50	29.40	H	9.50	56.00	38.90	74.0	54.0	18.0	15.1
7386	42.00	28.40	V	9.50	51.50	37.90	74.0	54.0	22.5	16.1
12310	42.60	28.40	H	12.55	55.15	40.95	74.0	54.0	18.9	13.1
12310	42.50	28.40	V	12.55	55.05	40.95	74.0	54.0	19.0	13.1
4103.6	52.70	34.40	H	5.94	58.64	40.34	74.0	54.0	15.4	13.7
4103.6	46.20	30.60	V	5.94	52.14	36.54	74.0	54.0	21.9	17.5
2483.5	54.50	37.70	H	-1.47	53.03	36.23	74.0	54.0	21.0	17.8
2483.5	69.30	43.60	V	-1.47	67.83	42.13	74.0	54.0	6.2	11.9

802.11n

Table 7.5.2.3-3: Radiated Spurious Emissions Tabulated Data

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										
4824	40.50	35.70	H	6.50	47.00	42.20	74.0	54.0	27.0	11.8
4824	39.00	24.80	V	6.50	45.50	31.30	74.0	54.0	28.5	22.7
4018.8	49.50	27.70	H	5.82	55.32	33.52	74.0	54.0	18.7	20.5
4018.8	43.90	26.20	V	5.82	49.72	32.02	74.0	54.0	24.3	22.0
2389.6	59.60	29.40	H	-1.70	57.90	27.70	74.0	54.0	16.1	26.3
2389.6	59.60	29.40	V	-1.70	57.90	27.70	74.0	54.0	16.1	26.3
Middle Channel										
4874	50.60	29.70	H	6.50	57.10	36.20	74.0	54.0	16.9	17.8
4874	44.60	27.20	V	6.50	51.10	33.70	74.0	54.0	22.9	20.3
4063	50.50	29.70	H	5.89	56.39	35.59	74.0	54.0	17.6	18.4
4063	44.30	26.90	V	5.89	50.19	32.79	74.0	54.0	23.8	21.2
High Channel										
4924	39.80	24.40	H	6.50	46.30	30.90	74.0	54.0	27.7	23.1
4924	38.70	24.40	V	6.50	45.20	30.90	74.0	54.0	28.8	23.1
4103.6	49.30	28.10	H	5.94	55.24	34.04	74.0	54.0	18.8	20.0
4103.6	43.60	26.30	V	5.94	49.54	32.24	74.0	54.0	24.5	21.8
2483.5	40.80	25.00	H	-1.47	39.33	23.53	74.0	54.0	34.7	30.5
2483.5	55.30	27.80	V	-1.47	53.83	26.33	74.0	54.0	20.2	27.7

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

Corrected Level: 40.50 + 6.50 = 47.0dBuV/m
Margin: 74dBuV/m – 47.0dBuV/m = 27.0dB

Example Calculation: Average

Corrected Level: 35.70 + 6.50 - 0 = 42.20dBuV
Margin: 54dBuV – 42.20dBuV = 11.80dB

7.6 Power Spectral Density – 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 v03r05 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.

7.6.2 Measurement Results

802.11b

Table 7.6.2-1: Peak Power Spectral Density

Frequency (MHz)	PSD Level (dBm)
2412	-11.84
2437	-9.80
2462	-11.67

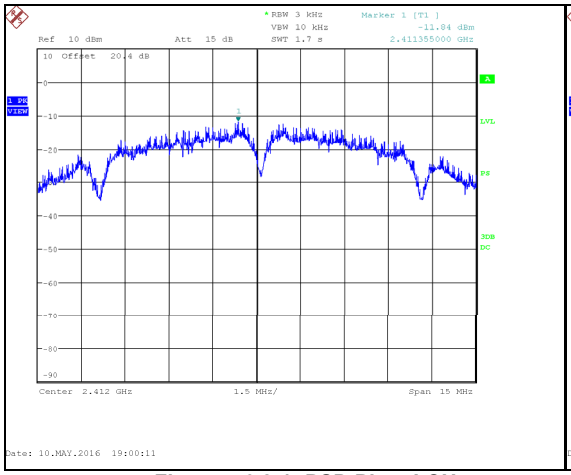

Figure 7.6.2-1: PSD Plot –LCH

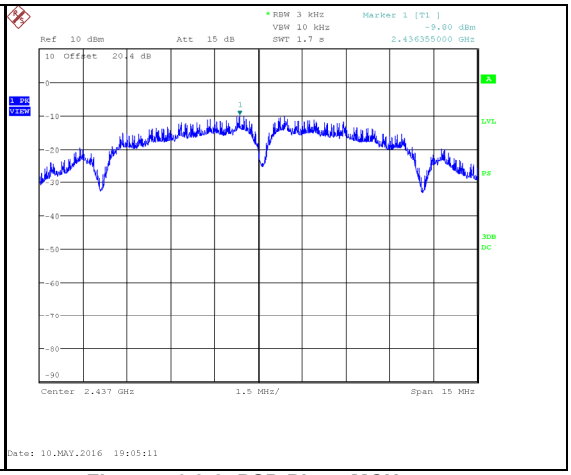

Figure 7.6.2-2: PSD Plot – MCH

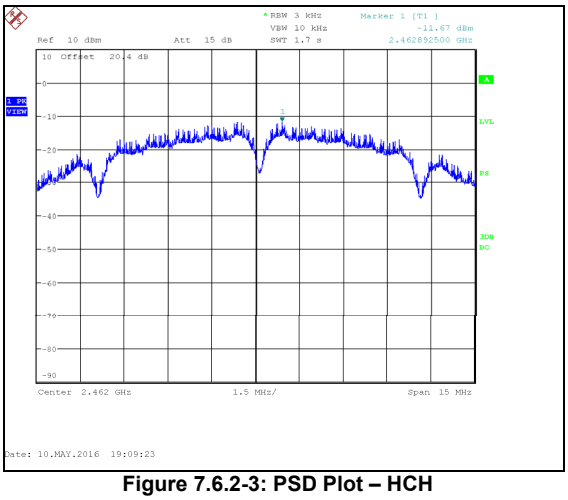

Figure 7.6.2-3: PSD Plot – HCH

802.11g

Table 7.6.2-2: Peak Power Spectral Density

Frequency (MHz)	PSD Level (dBm)
2412	-15.06
2437	-12.76
2462	-14.49

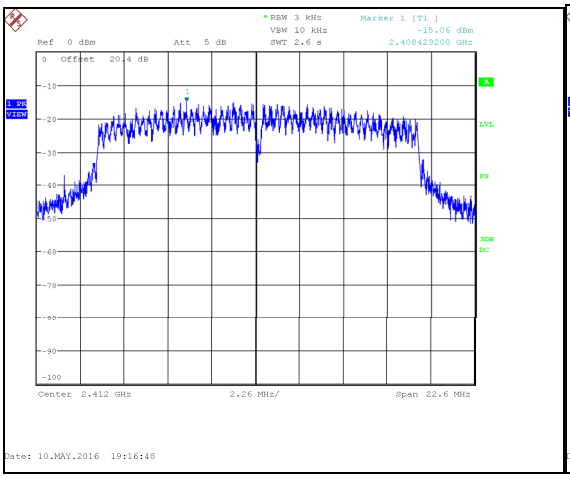

Figure 7.6.2-41: PSD Plot –LCH

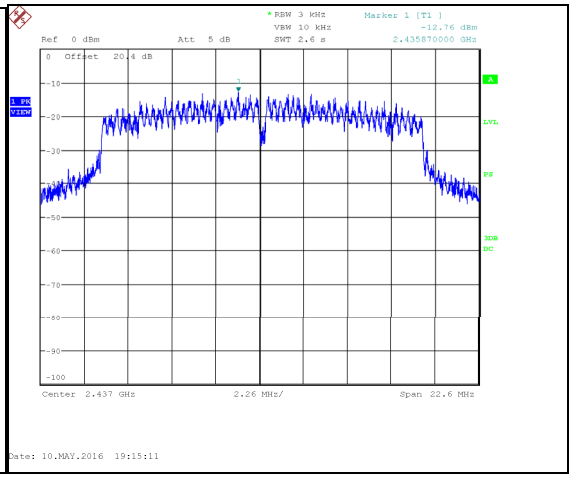

Figure 7.6.2-5: PSD Plot – MCH

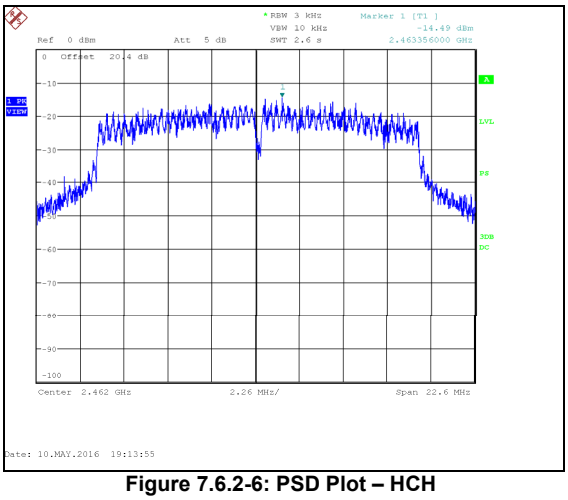

Figure 7.6.2-6: PSD Plot – HCH

802.11n

Table 7.6.2-3: Peak Power Spectral Density

Frequency (MHz)	PSD Level (dBm)
2412	-22.21
2437	-19.36
2462	-21.85

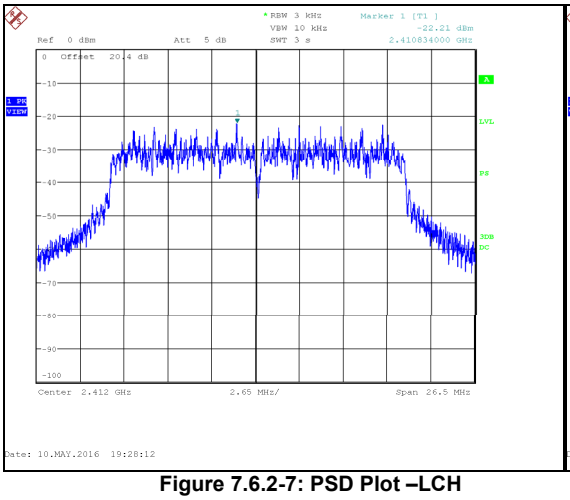

Figure 7.6.2-7: PSD Plot –LCH

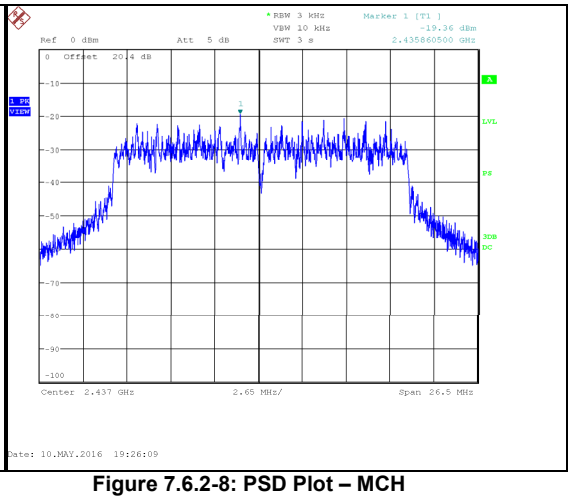

Figure 7.6.2-8: PSD Plot – MCH

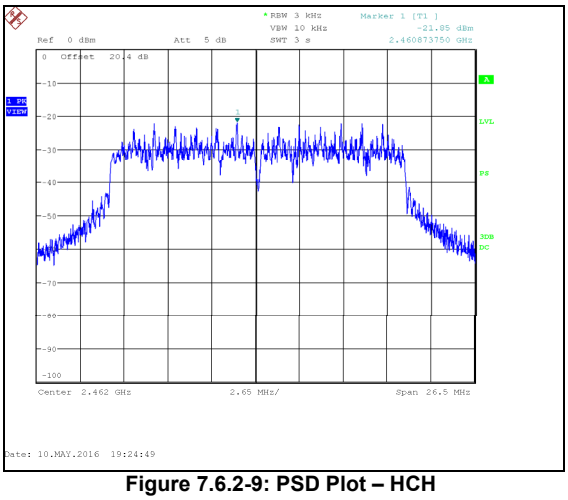

Figure 7.6.2-9: PSD Plot – HCH

8 CONCLUSION

In the opinion of ACS, Inc. the 10009364, manufactured by GTO Access Systems, LLC meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-247.

END REPORT