



Test Report

FCC Part 15, Subpart C, Section 15.247 Industry Canada RSS-210, Issue 7

Report Number: 2023288-15C

Model: TPMC-3X

FCC ID: ERO2023288
IC: 5683C-2023288

Date: October 30, 2009 (Revised November 11, 2009)

Prepared by:	<u>Grace Lin</u>	Date:	<u>Oct. 30, 2009</u>
	Grace Lin, Sr. Compliance Engineer		
Reviewed by:	<u>Wayne Owens</u>	Date:	<u>Oct. 30, 2009</u>
	Wayne Owens, Director of Program Management		



Table of Contents

1. GENERAL DESCRIPTION.....	3
1.1 PRODUCT DESCRIPTION	3
1.2 TEST METHODOLOGY	3
1.3 TEST FACILITY	3
1.4 TEST EQUIPMENT	4
1.5 EVALUATION SUMMARY.....	4
2. SYSTEM TEST CONFIGURATION	5
2.1 JUSTIFICATION	5
2.2 BLOCK DIAGRAM	5
2.3 EUT EXERCISE SOFTWARE AND MODE(S) OF OPERATION	5
2.4 CABLES.....	5
2.5 SPECIAL ACCESSORIES	6
2.6 SUPPORT EQUIPMENT.....	6
2.7 EQUIPMENT MODIFICATIONS	6
3. EVALUATION	7
3.1 ANTENNA REQUIREMENTS.....	7
3.2 6 dB BANDWIDTH.....	8
3.3 99% BANDWIDTH.....	12
3.4 POWER OUTPUT	16
3.5 BAND EDGE	17
3.5 CONDUCTED SPURIOUS EMISSIONS	21
3.6 POWER SPECTRAL DENSITY	28
3.7 AC POWER LINE CONDUCTED EMISSIONS.....	32
3.8 RADIATED SPURIOUS EMISSIONS.....	34
3.9 RECEIVER RADIATED EMISSIONS	37
3.10 RECEIVER AC POWER LINE CONDUCTED EMISSIONS.....	40



1. General Description

1.1 Product Description

The equipment under test (EUT) is a Crestron Isys i/O[®] 2.8" handheld WiFi touchpanel, model: TPMC-3X.

The EUT contains one WLAN module. The WLAN module employs IEEE 802.11 a/b/g technology. Its specifications are listed in the following table:

Technology	IEEE 802.11 b	IEEE 802.11 g	IEEE 802.11 a	
Modulation	DSSS	DSSS, OFDM	OFDM	
Data Rate (Mbps)	1, 2, 5.5, 11	1, 2, 5.5, 11, 6, 9, 12, 18, 24, 36, 48, 54	6, 9, 12, 18, 24, 36, 48, 54	
Frequency Band (GHz)	2.4 – 2.4835	2.4 – 2.4835	5.15 – 5.25	5.725 – 5.850
Number of Channels	11	11	4	5
Channel Numbers	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	36, 40, 44, 48	149, 153, 157, 161, 165
Channel Frequency (GHz)	2.412, 2.417, 2.422, 2.427, 2.432, 2.437, 2.442, 2.447, 2.452, 2.457, 2.462	2.412, 2.417, 2.422, 2.427, 2.432, 2.437, 2.442, 2.447, 2.452, 2.457, 2.462	5.18, 5.20, 5.22, 5.24	5.745, 5.765, 5.785, 5.895, 5.825

1.2 Test Methodology

Measurements were performed according to the following procedures and standards:

- 1) ANSI C63.4: 2003
- 2) FCC Procedure, "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005
- 3) Industry Canada RSS-Gen Issue 2
- 4) Industry Canada RSS-210 Issue 7
- 5) Industry Canada ICES-003 Issue 4

All measurements were performed in a 3-meter semi-anechoic chamber and the control room. Each channel was tested at the worst case data rate.

1.3 Test Facility

The 3-meter semi-anechoic chamber used to collect conducted and radiated emission data is located at 22 Link Drive, Rockleigh, New Jersey. This test facility has been placed on file with the FCC, Registration Number: 412871, and Industry Canada, File: 46405-5683.



1.4 Test Equipment

Description	Model	Serial No.	Frequency Range	Calibration Due Date
R&S EMI Receiver	ESU40	100076	20 Hz – 40 GHz	Dec. 12, 2009
Teseq Bilog Antenna	CBL 6112D	25231	30 MHz – 2 GHz	Jan. 12, 2010
ETS-Lindgren Double Ridge Horn Antenna	3117	00092366	1 GHz – 18 GHz	Oct. 7, 2010
R&S Preamplifier	TS-PR18	100044	30 MHz – 18 GHz	Feb. 11, 2010
ETS-Lindgren Standard Gain Horn Antenna	3160-09	00078911	18 GHz – 26.5 GHz	Apr. 3, 2010
R&S Preamplifier	TS-PR26	100030	18 GHz – 26.5 GHz	Jan. 21, 2010
ETS-Lindgren Standard Gain Horn Antenna	3160-10	00109155	26.5 GHz – 40 GHz	Oct. 19, 2010*
Solar Electronics LISN	9252-50-R-24-N	068545	10 kHz – 50 MHz	Feb. 16, 2010
Agilent Power Meter	N1911A	MY45100462	-	Mar. 16, 2010
Agilent Power Sensor	N1921A	MY45200295	50 MHz – 18 GHz	May 11, 2010

*Mechanical inspection

1.5 Evaluation Summary

Rule Section		Description/Parameters	Results
FCC	IC		
§15.203	N/A	Antenna Requirement	Complies
§15.247(a)(2)	§A8.2(a) of RSS-210	6 dB Bandwidth, 500 kHz	Complies
N/A	§4.6.1 of RSS-Gen	99% Occupied Bandwidth	(for reporting only)
§15.247(b)(3)	§A8.4(4) of RSS-210	Power Output, conducted, 1 Watt (30dBm)	Complies
§15.247(d)	§2.1, §A8.5 of RSS-210	Band Edge	Complies
§15.247(d)	§A8.5 of RSS-210	Conducted Spurious Emissions, 20 dBc	Complies
§15.247(e)	§A8.2(b) of RSS-210	Power Spectral Density (PSD), 8 dBm in any 3 kHz band.	Complies
§15.247(i)	§5.5 of RSS-Gen	RF Safety	Complies
§15.207	§7.2.2 of RSS-Gen	AC Power Line Conducted Emissions	Complies
§15.205, §15.209, §15.247(d)	§2.2, §2.7, §A8.5 of RSS-210	Radiated Spurious Emissions	Complies
§15.101(b)	§6 of RSS-Gen	Receiver Radiated Emission	Complies



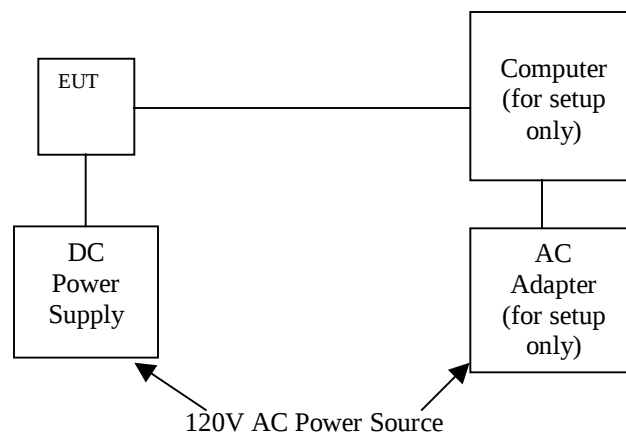
2. System Test Configuration

2.1 Justification

The EUT was tested standalone. A DC power supply supplied power to the EUT. A computer supplied test commands during setup.

2.2 Block Diagram

Block diagram is shown below.



2.3 EUT Exercise Software and Mode(s) of Operation

The EUT was configured to transmit continuously. The following table lists the channels tested. There are two test reports covering test data. One test report covers the frequency band of 5.15 – 5.25 GHz. This test report covers the rest of frequency bands.

Technology	IEEE 802.11 b	IEEE 802.11 g	IEEE 802.11 a	
Frequency Band (GHz)	2.4 – 2.4835	2.4 – 2.4835	5.15 – 5.25	5.725 – 5.850
Channels Tested	1, 6, 11	1, 6, 11	36, 44, 48	149, 157, 165

2.4 Cables

Qty	Description	Length (m)	From - To	Shielded/ Unshielded
1	Power Cord	1.5	Power Source – Computer	Unshielded
1	USB	11.5 or 2	Computer – EUT	Shielded



2.5 *Special Accessories*

There are no special accessories for compliance of this EUT.

2.6 *Support equipment*

No	Description	Manufacturer	Model No	Serial No
1	Computer	DELL	PP02X	11109700981
2	AC Adapter	DELL	LA90PS0-00	CN-0DF266-71615-68A-2AB1
3	Power Supply	CUI	3A-161WP12	Not Labeled
4	DC Power Supply	BK Precision	1670	281-2152

2.7 *Equipment Modifications*

There were no modifications installed during compliance measurements.



3. Evaluation

3.1 *Antenna Requirements*

The EUT is equipped with two antennas: Pulse W3006 and Antenova A10194. Both antennas are in SMD package. Antennas' specifications are included in separate files.

The antennas' connectors, U.FL connectors, are unique in the sense of complying with FCC §15.203, §15.204(b), and §15.204(c).



3.2 6 dB Bandwidth

Performance Criterion: The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Results: Complies

Test Details: Measurement was performed with the spectrum analyzer's resolution bandwidth (RBW) equal to 100 kHz and the span greater than RBW. Refers to the following block diagram, data table, and receiver screen captures. The EUT was tested in a continuous transmit mode.



Channel No.	Frequency (MHz)	Port No.	Technology	6dB BW (MHz)
1	2412	1	802.11b	9.90
6	2437	1		11.49
11	2462	1		11.01
1	2412	2		10.05
6	2437	2		11.11
11	2462	2		10.72
1	2412	1	802.11g	16.44
6	2437	1		16.44
11	2462	1		16.49
1	2412	2		16.49
6	2437	2		16.54
11	2462	2		16.49
149	5745	1	802.11a	16.44
157	5785	1		16.49
165	5825	1		16.39
149	5745	2		16.39
157	5785	2		16.39
165	5825	2		16.49

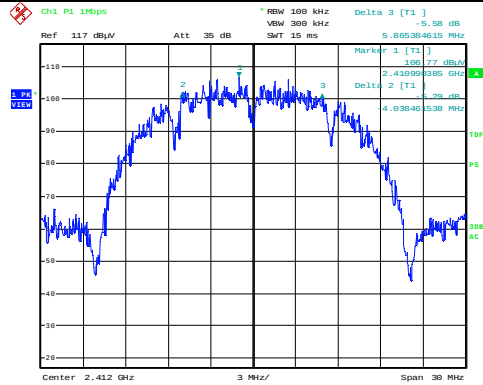
Tested by: Grace Lin

Date of Test: October 28, 2009

Note: The RF level in the screen captures is relative and is not the indication of RF output power.



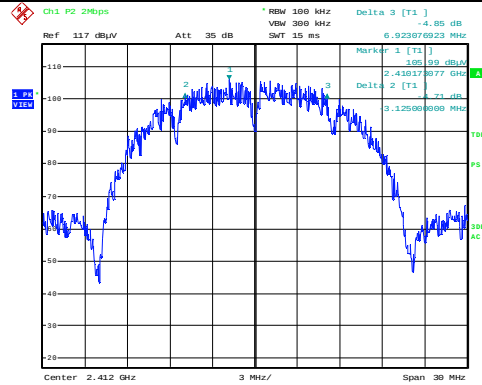
6 dB Bandwidth, 802.11b, Port 1:



Date: 28.OCT.2009 10:32:01

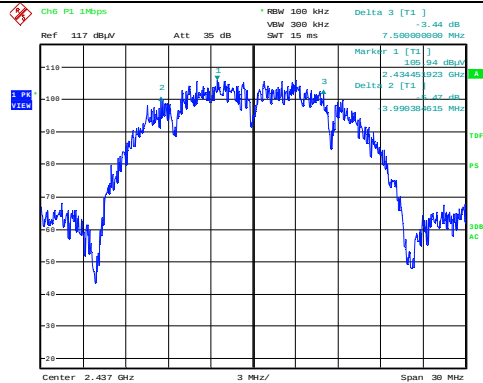
Channel 1

6 dB Bandwidth, 802.11b, Port 2:



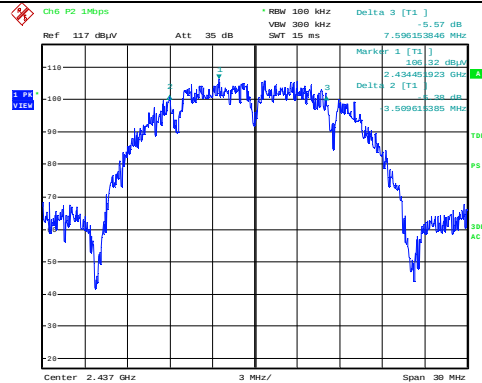
Date: 28.OCT.2009 15:02:30

Channel 1



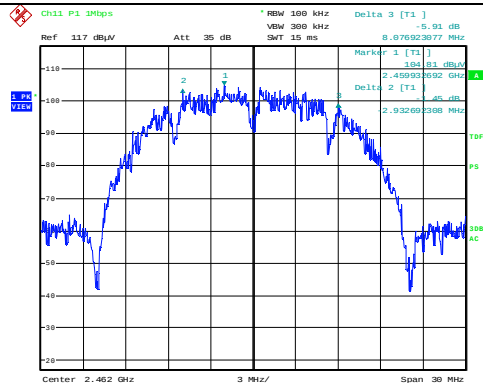
Date: 28.OCT.2009 10:36:13

Channel 6



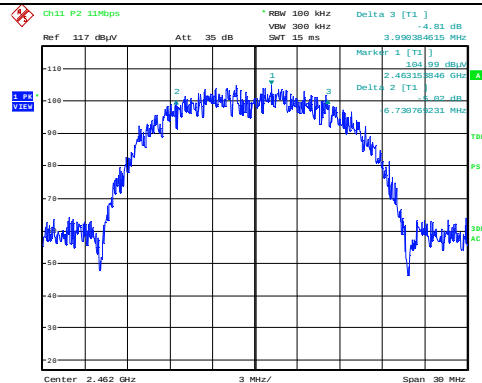
Date: 28.OCT.2009 15:15:39

Channel 6



Date: 28.OCT.2009 10:44:45

Channel 11

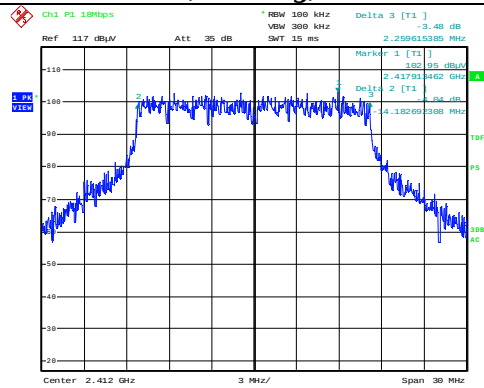


Date: 28.OCT.2009 15:22:06

Channel 11



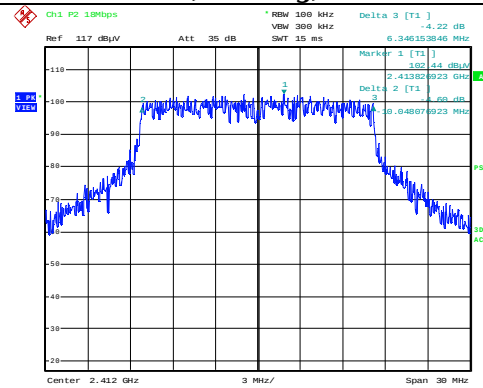
6 dB Bandwidth, 802.11g, Port 1:



Date: 28.OCT.2009 10:23:34

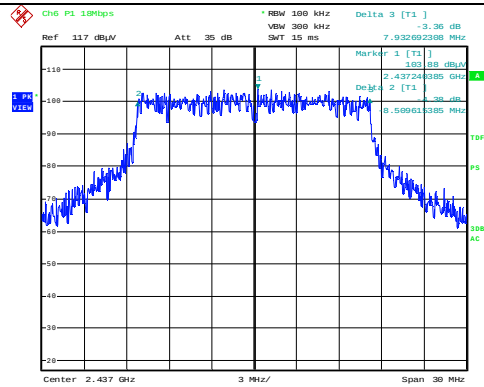
Channel 1

6 dB Bandwidth, 802.11g, Port 2:



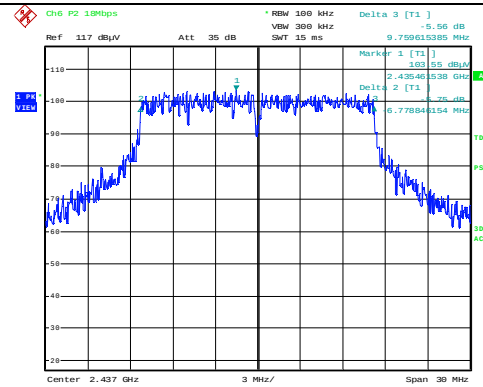
Date: 28.OCT.2009 14:58:05

Channel 1



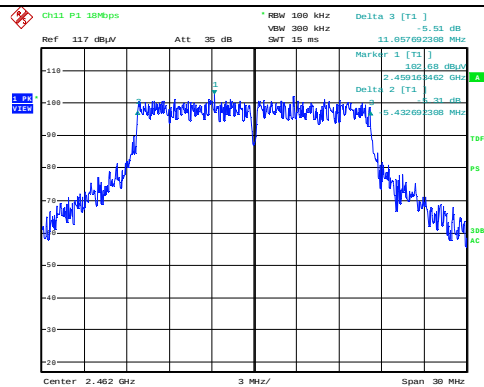
Date: 28.OCT.2009 10:38:29

Channel 6



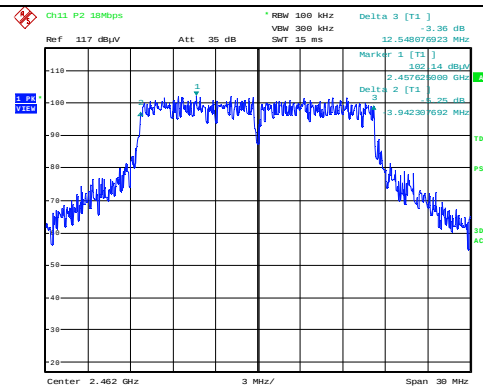
Date: 28.OCT.2009 15:09:58

Channel 6



Date: 28.OCT.2009 10:46:59

Channel 11

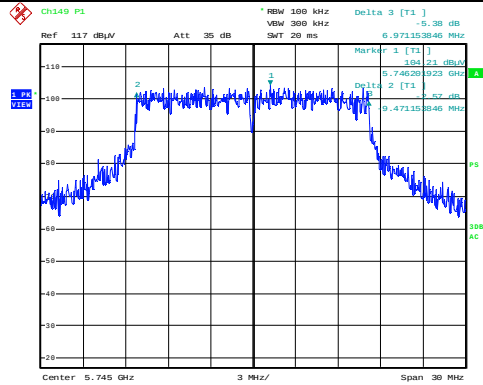


Date: 28.OCT.2009 15:26:47

Channel 11



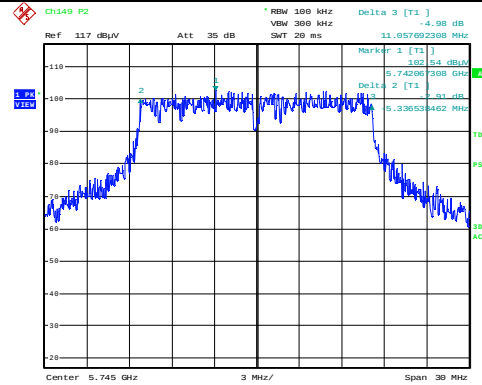
6 dB Bandwidth, 802.11a, Port 1:



Date: 28.OCT.2009 14:03:28

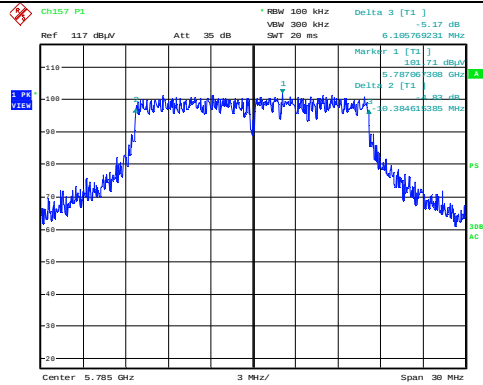
Channel 149

6 dB Bandwidth, 802.11a, Port 2:



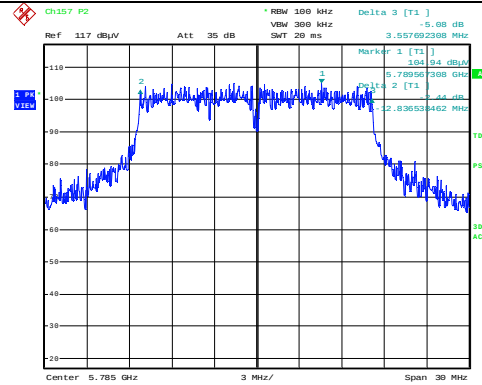
Date: 28.OCT.2009 15:51:14

Channel 149



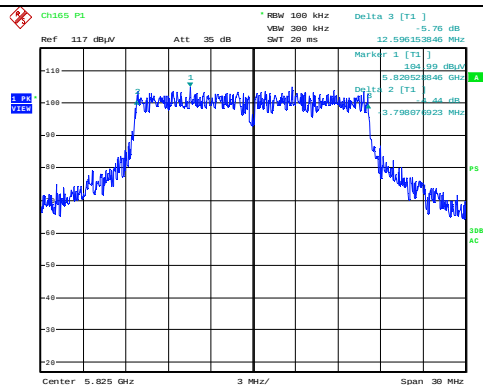
Date: 28.OCT.2009 14:00:19

Channel 157



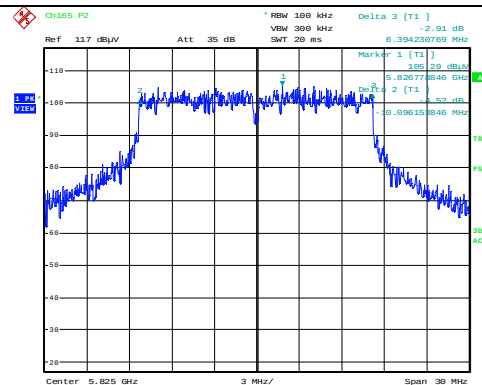
Date: 28.OCT.2009 15:56:04

Channel 157



Date: 28.OCT.2009 13:52:37

Channel 165



Date: 28.OCT.2009 16:00:27

Channel 165



3.3 99% Bandwidth

Test Details: The built-in occupied bandwidth function of the EMI receiver, under spectrum analyzer mode, was used. Refers to the following block diagram, data table, and receiver screen captures. The EUT was tested in a continuous transmit mode with maximum power level.



Channel No.	Frequency (MHz)	Port No.	Technology	99% BW (MHz)
1	2412	1	802.11b	15.72
6	2437	1		15.48
11	2462	1		15.48
1	2412	2		15.63
6	2437	2		15.63
11	2462	2		15.39
1	2412	1	802.11g	16.44
6	2437	1		16.44
11	2462	1		16.44
1	2412	2		16.49
6	2437	2		16.49
11	2462	2		16.44
149	5745	1	802.11a	16.49
157	5785	1		16.49
165	5825	1		16.44
149	5745	2		16.49
157	5785	2		16.49
165	5825	2		16.49

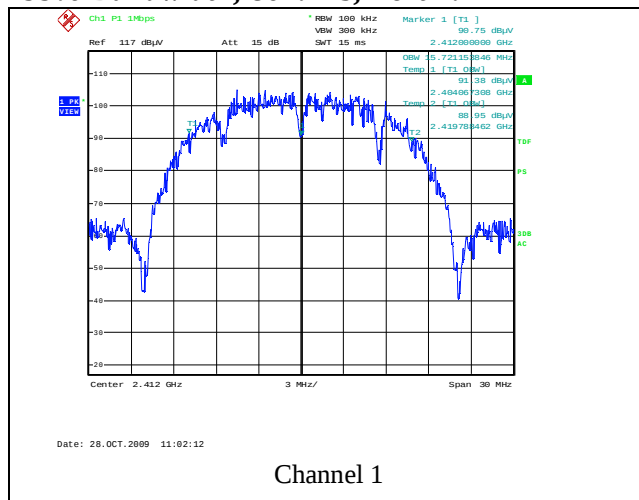
Tested by: Grace Lin

Date of Test: October 28, 2009

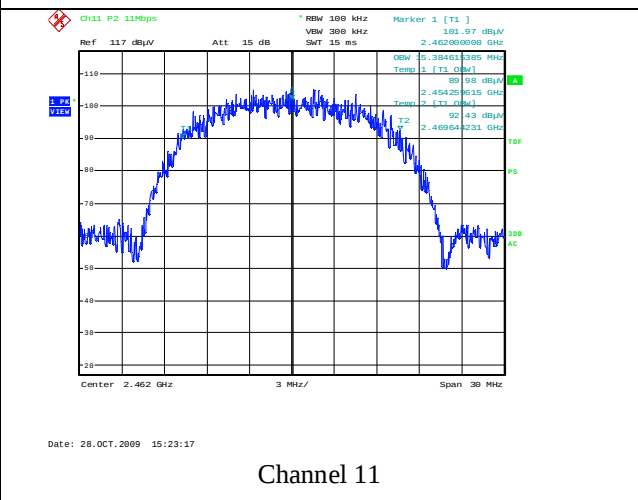
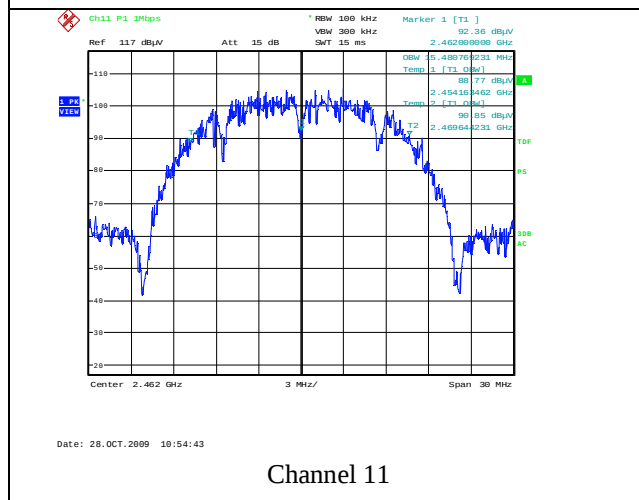
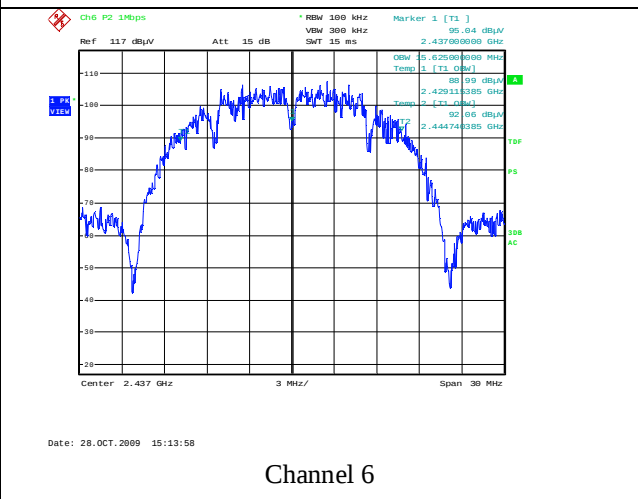
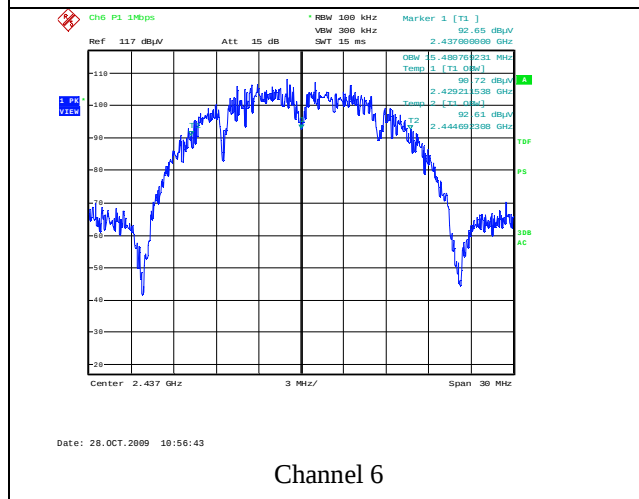
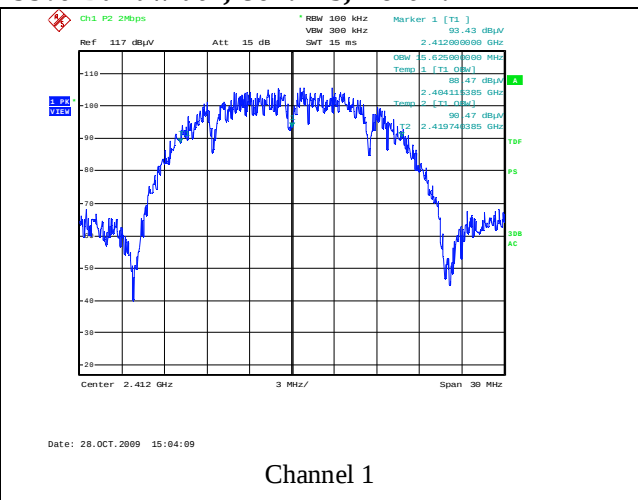
Note: The RF level in the screen captures is relative and is not the indication of RF output power.



99% Bandwidth, 802.11b, Port 1:

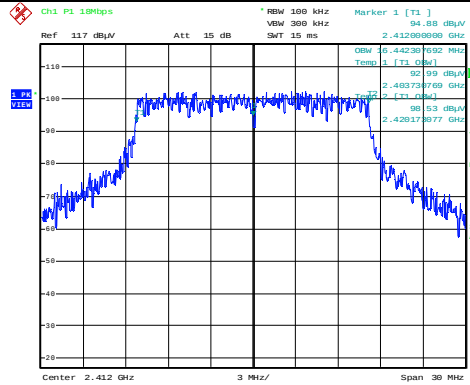


99% Bandwidth, 802.11b, Port 2:





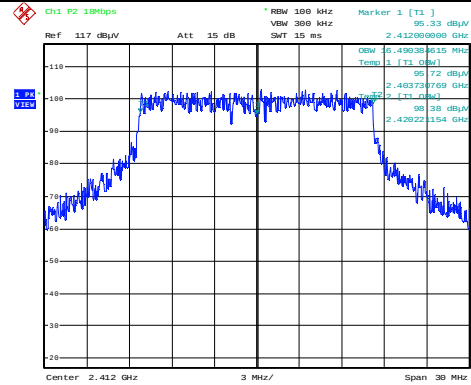
99% Bandwidth, 802.11g, Port 1:



Date: 28.OCT.2009 11:00:31

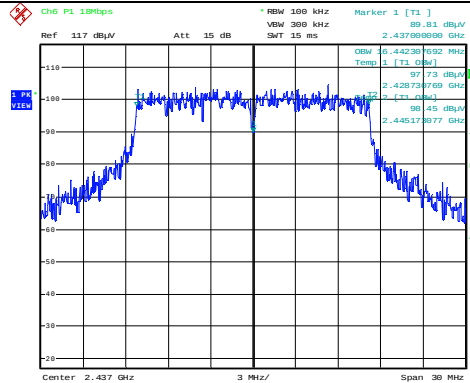
Channel 1

99% Bandwidth, 802.11g, Port 2:



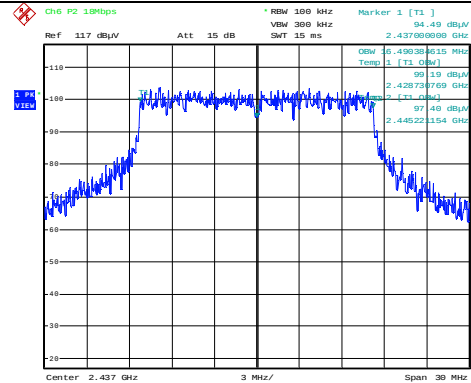
Date: 28.OCT.2009 15:06:23

Channel 1



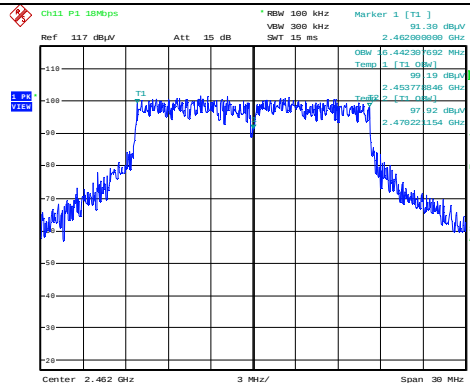
Date: 28.OCT.2009 10:58:20

Channel 6



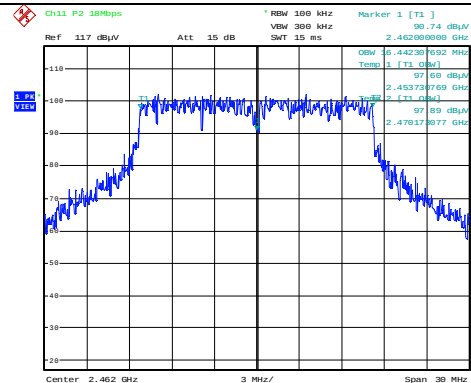
Date: 28.OCT.2009 15:08:30

Channel 6



Date: 28.OCT.2009 10:52:27

Channel 11

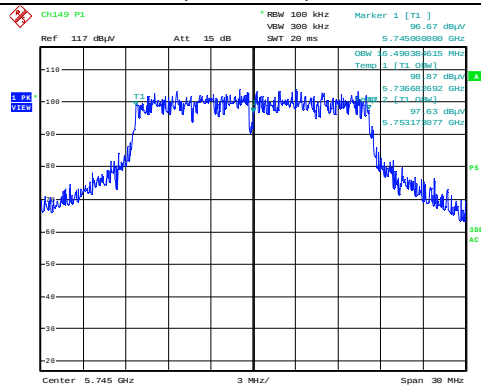


Date: 28.OCT.2009 15:24:54

Channel 11



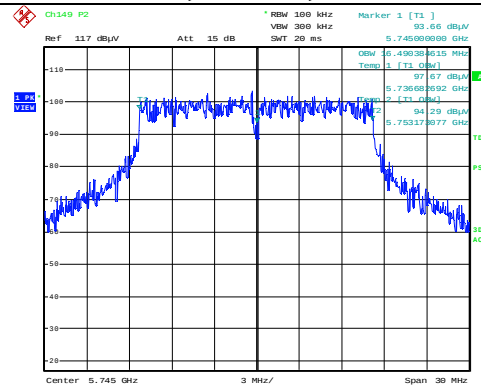
99% Bandwidth, 802.11a, Port 1:



Date: 28.OCT.2009 14:05:36

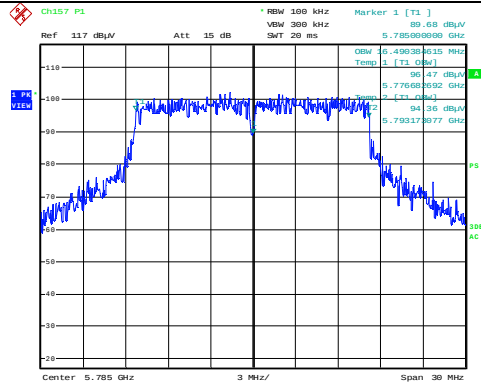
Channel 149

99% Bandwidth, 802.11a, Port 2:



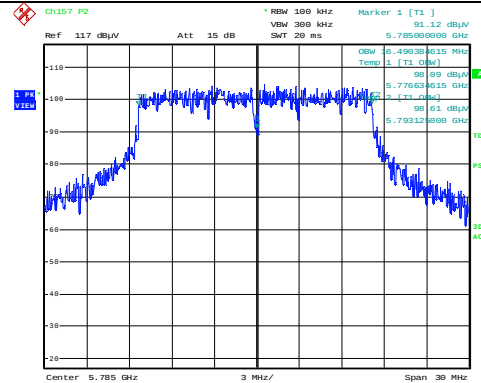
Date: 28.OCT.2009 15:52:37

Channel 149



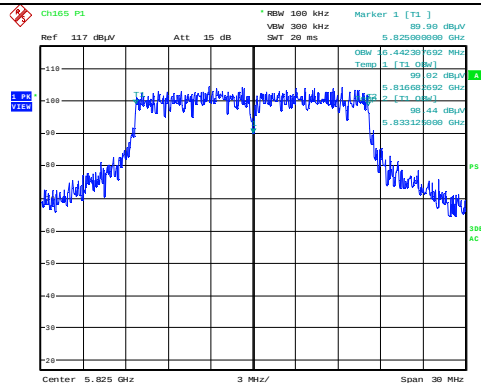
Date: 28.OCT.2009 13:58:15

Channel 157



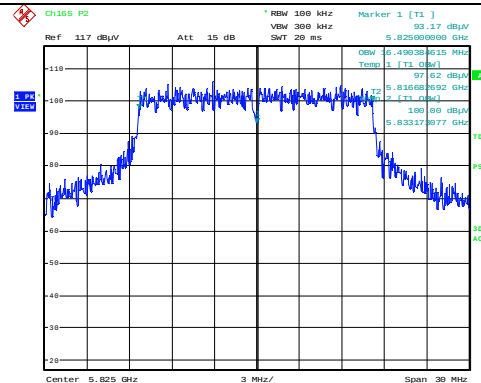
Date: 28.OCT.2009 15:57:25

Channel 157



Date: 28.OCT.2009 13:53:59

Channel 165



Date: 28.OCT.2009 15:59:10

Channel 165



3.4 Power Output

Performance Criterion: The maximum peak conducted output power shall not exceed 1 Watt.

Test Results: Complies

Test Details: Power Output Option 1 of the “Measurement of Digital Transmission Systems Operating under Section 15.247” was selected for the measurement. The EUT was tested in a continuous transmit mode with maximum power level. Refers to the following block diagram and data table.



802.11b

Channel No.	Frequency (MHz)	Port No.	Peak Conducted Power (dBm)			
			1Mbps	2Mbps	5.5Mbps	11Mbps
1	2412	1	13.74	13.66	13.27	10.62
6	2437	1	14.50	14.50	14.11	14.46
11	2462	1	12.50	12.50	12.15	12.45
1	2412	2	13.15	13.61	13.23	13.56
6	2437	2	14.53	14.46	14.06	14.41
11	2462	2	12.43	12.39	12.61	12.90

Tested by: Grace Lin

Date of Test: October 27, 2009

802.11g

Channel No.	Frequency (MHz)	Port No.	Peak Conducted Power (dBm)							
			6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
1	2412	1	20.40	20.98	20.77	20.98	20.84	20.54	20.40	20.97
6	2437	1	20.79	21.30	20.92	21.34	21.18	20.99	20.91	21.26
11	2462	1	19.84	20.31	19.96	20.33	20.19	19.83	19.65	20.34
1	2412	2	20.68	20.76	20.36	21.09	20.76	20.69	20.17	20.82
6	2437	2	20.65	21.21	20.96	21.27	21.21	20.91	20.87	21.29
11	2462	2	19.51	20.42	19.85	20.47	20.32	19.97	19.75	20.32

Tested by: Grace Lin

Date of Test: October 27, 2009

802.11a

Channel No.	Frequency (MHz)	Port No.	Peak Conducted Power (dBm)							
			6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
149	5745	1	19.52	19.86	20.17	20.04	20.18	19.44	19.62	20.21
157	5785	1	20.12	20.18	20.10	20.27	20.21	20.11	20.17	20.15
165	5825	1	19.28	19.76	19.30	19.74	16.37	20.17	20.14	20.15
149	5745	2	20.42	20.60	20.09	20.64	19.96	20.38	20.24	20.64
157	5785	2	20.54	20.61	20.58	20.71	20.53	20.43	20.42	20.71
165	5825	2	19.63	19.99	19.81	19.88	19.81	19.58	19.58	20.04

Tested by: Grace Lin

Date of Test: October 12 & 27, 2009



3.5 *Band Edge*

Performance Criterion: In any 100 kHz bandwidth outside the frequency band, the RF power shall be at least 20 dB below that in the 100 kHz bandwidth within the band.

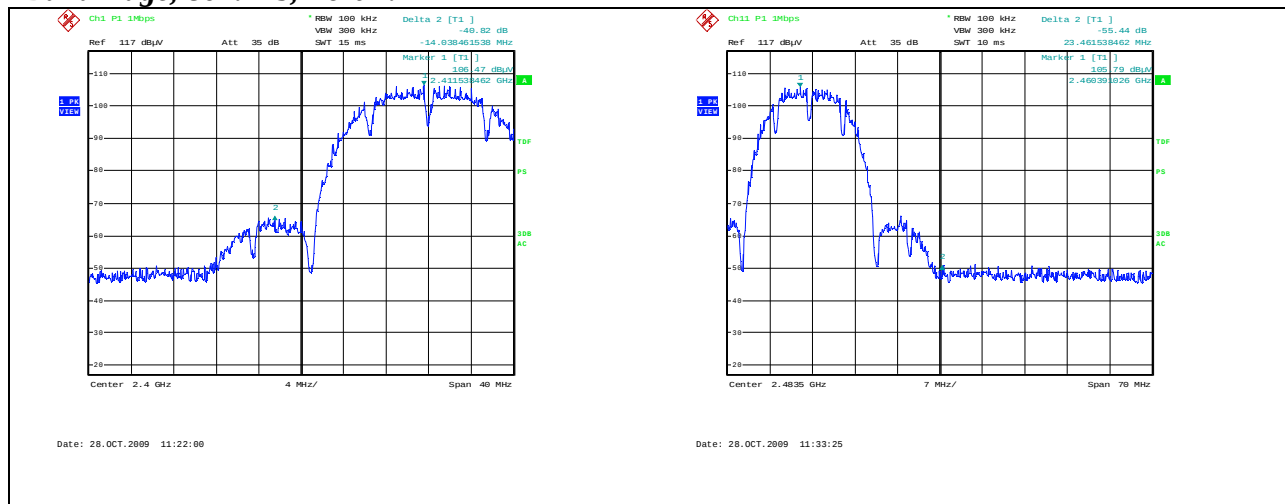
Test Results: Complies

Test Details: Refers to the following block diagram and receiver screen captures

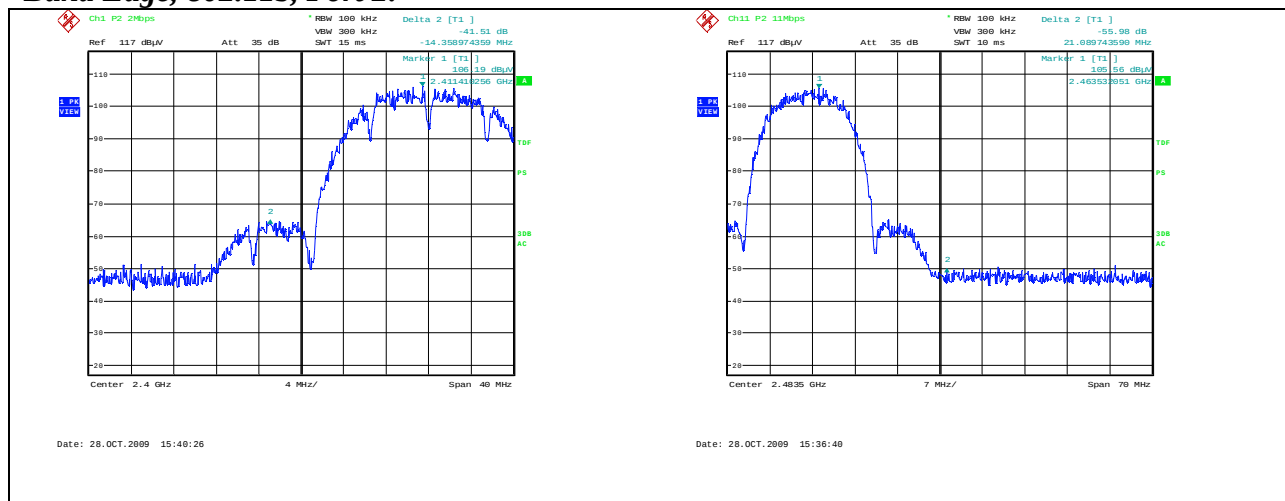




Band Edge, 802.11b, Port 1:

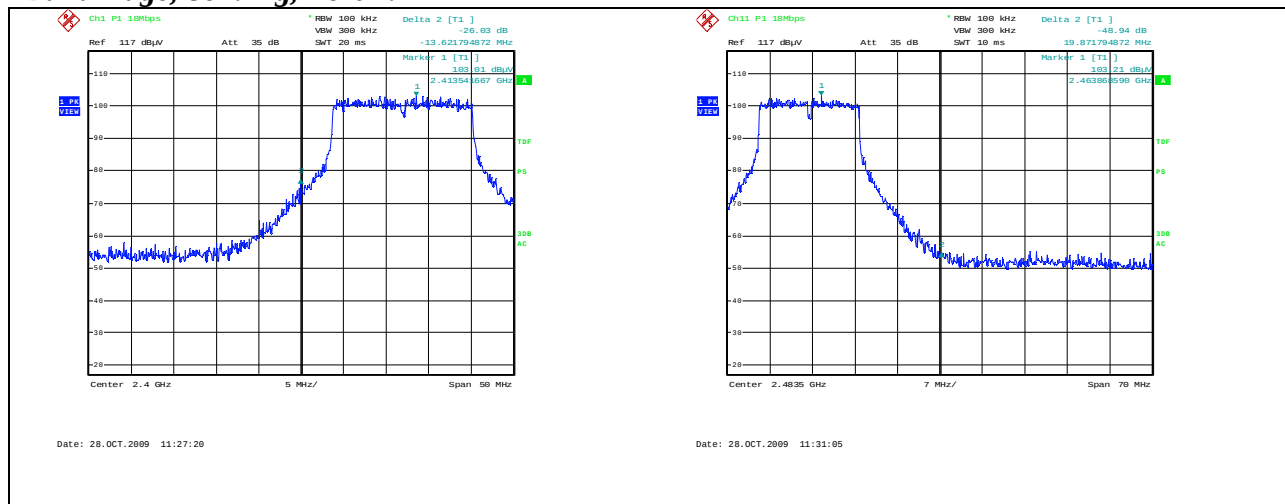


Band Edge, 802.11b, Port 2:

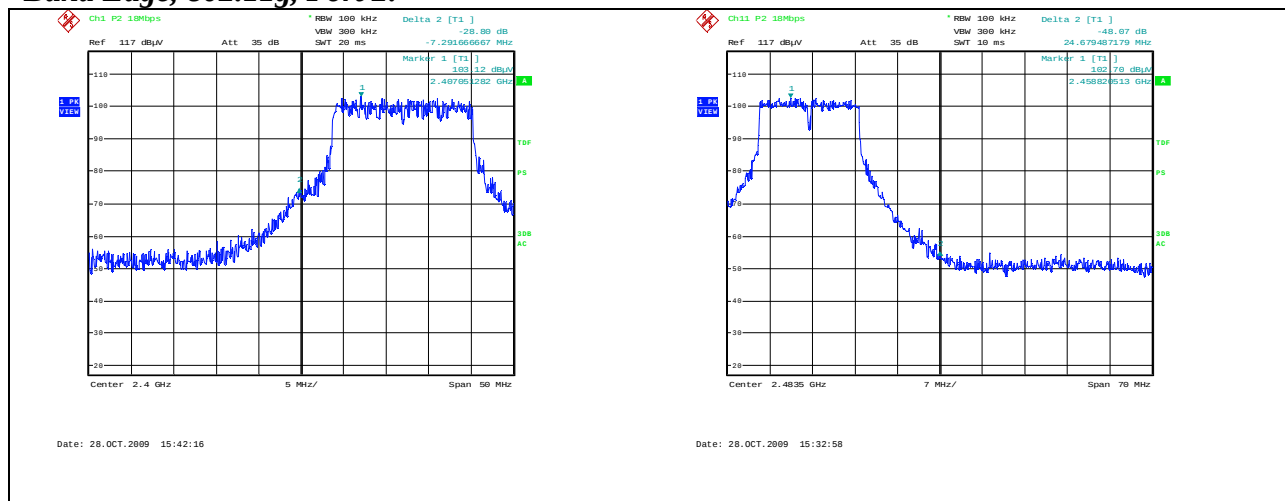




Band Edge, 802.11g, Port 1:

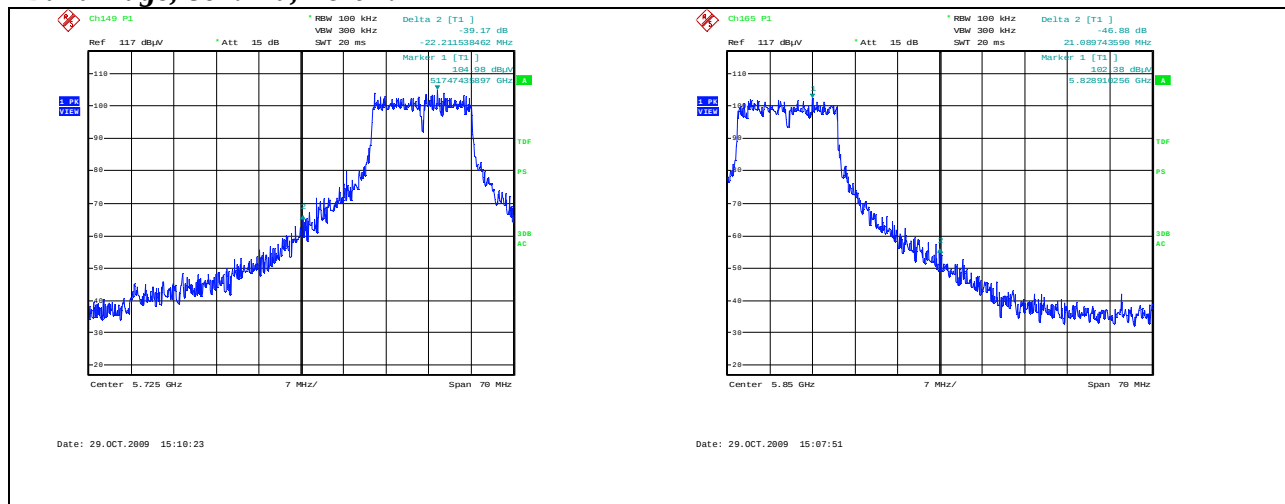


Band Edge, 802.11g, Port 2:

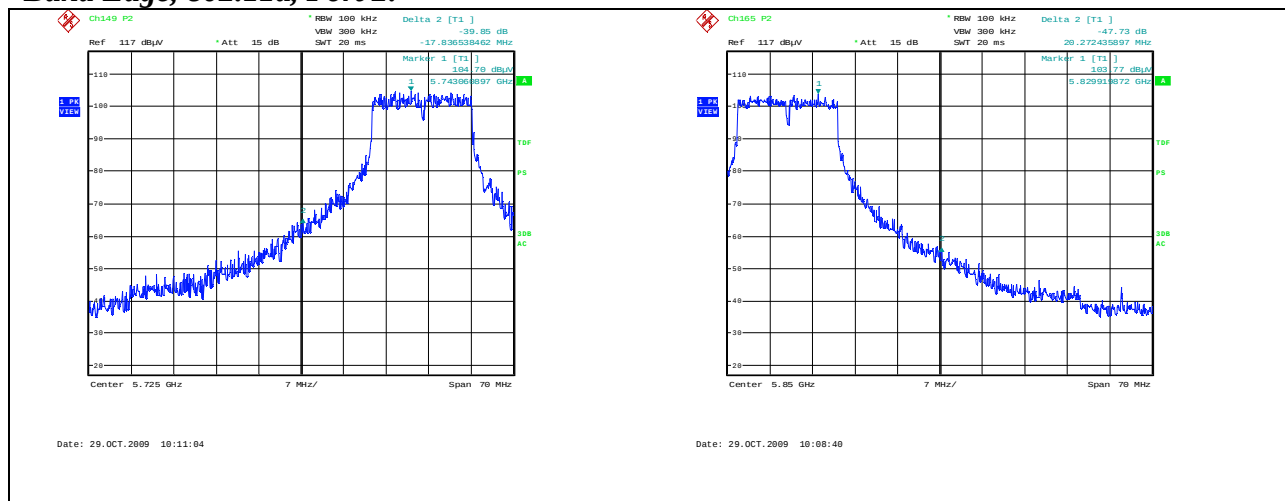




Band Edge, 802.11a, Port 1:



Band Edge, 802.11a, Port 2:





3.5 *Conducted Spurious Emissions*

Performance Criterion: In any 100 kHz bandwidth outside the frequency band, the radio frequency power shall be at least 20 dB below that in the 100 kHz bandwidth within the band.

Test Results: Complies

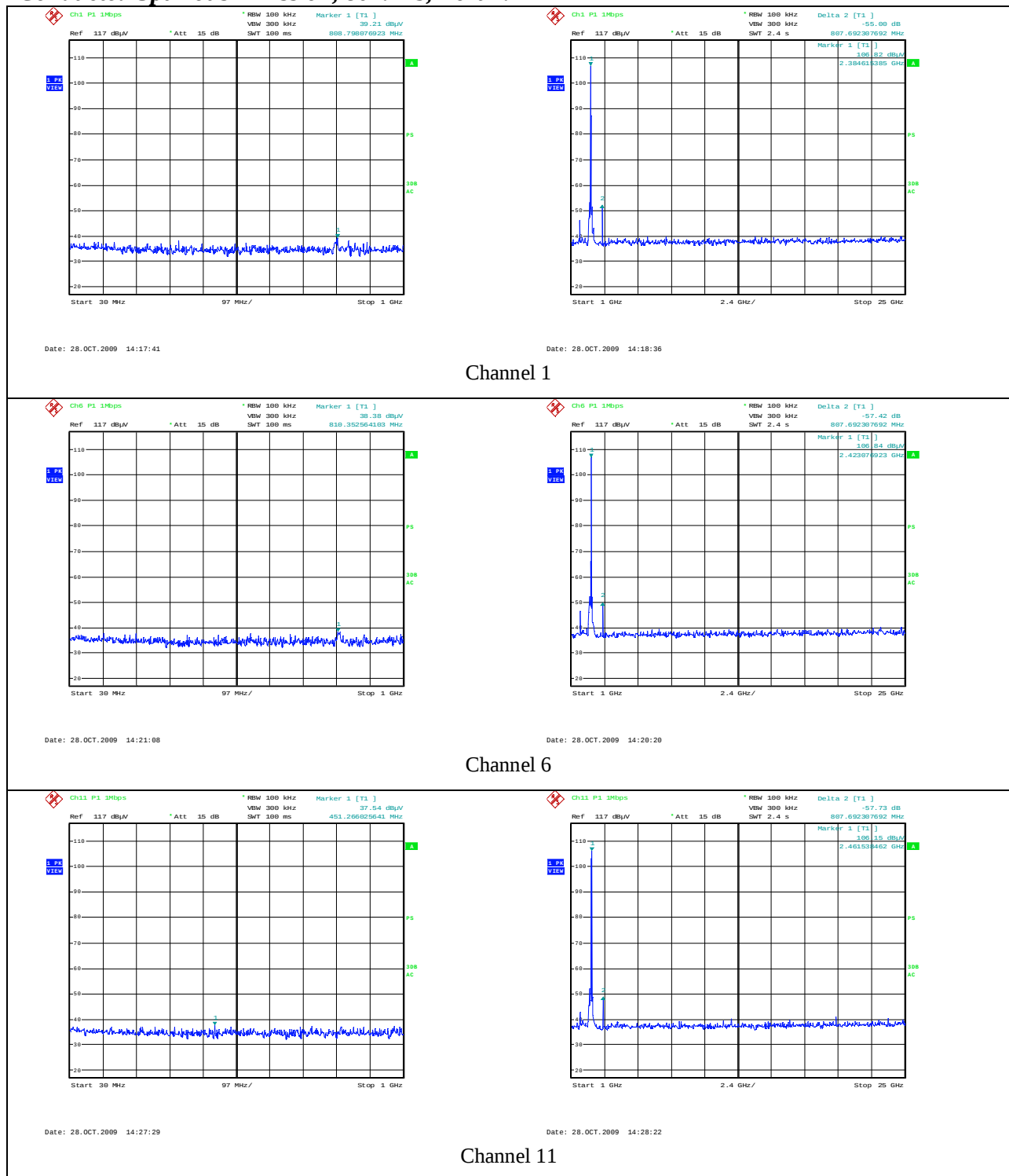
Test Details: Refers to the following block diagram and receiver screen captures

Note: The EUT was tested in a continuous transmit mode with maximum power level. The RF level in the screen captures is relative and is not the indication of RF output power.



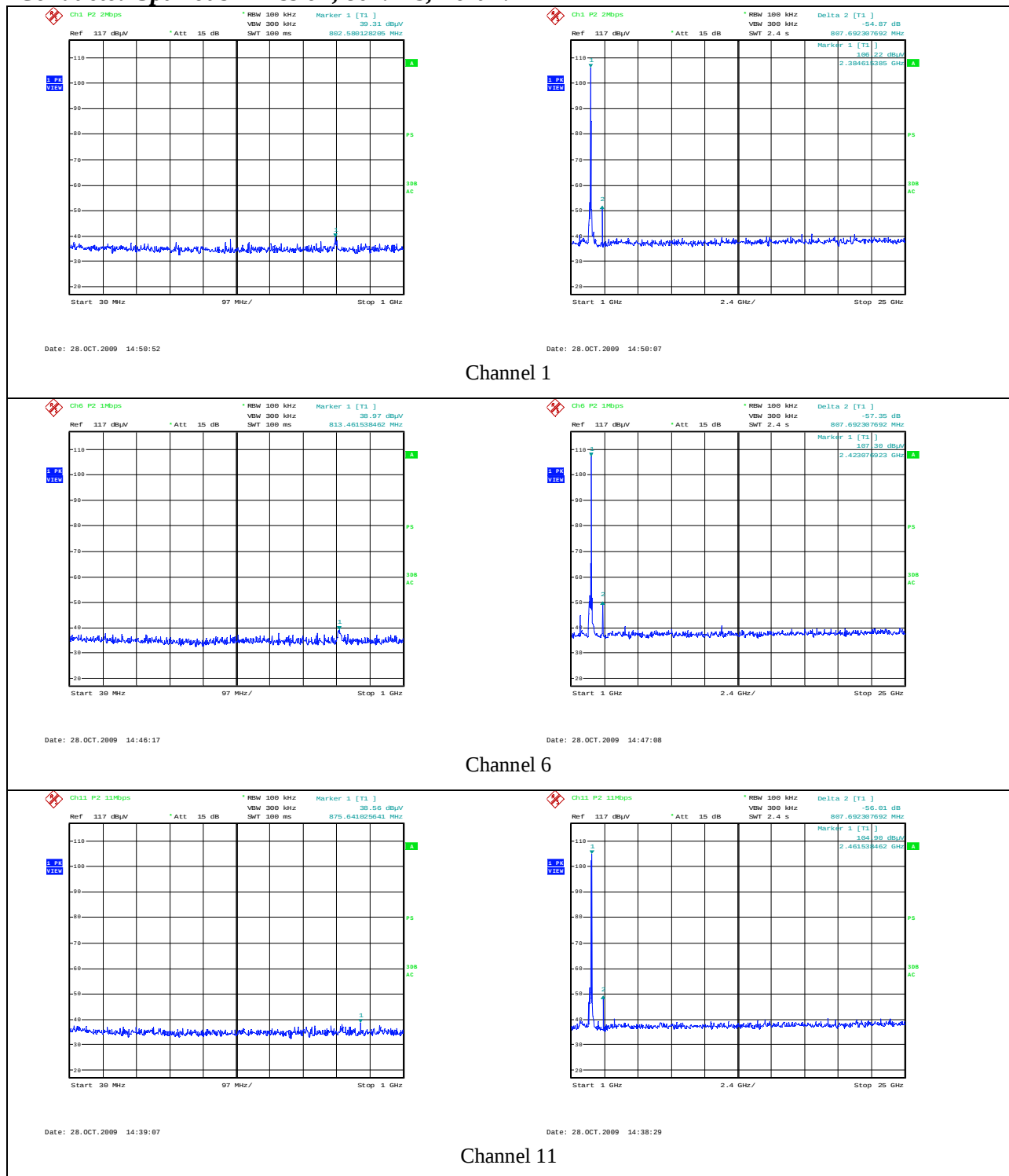


Conducted Spurious Emission, 802.11b, Port 1:



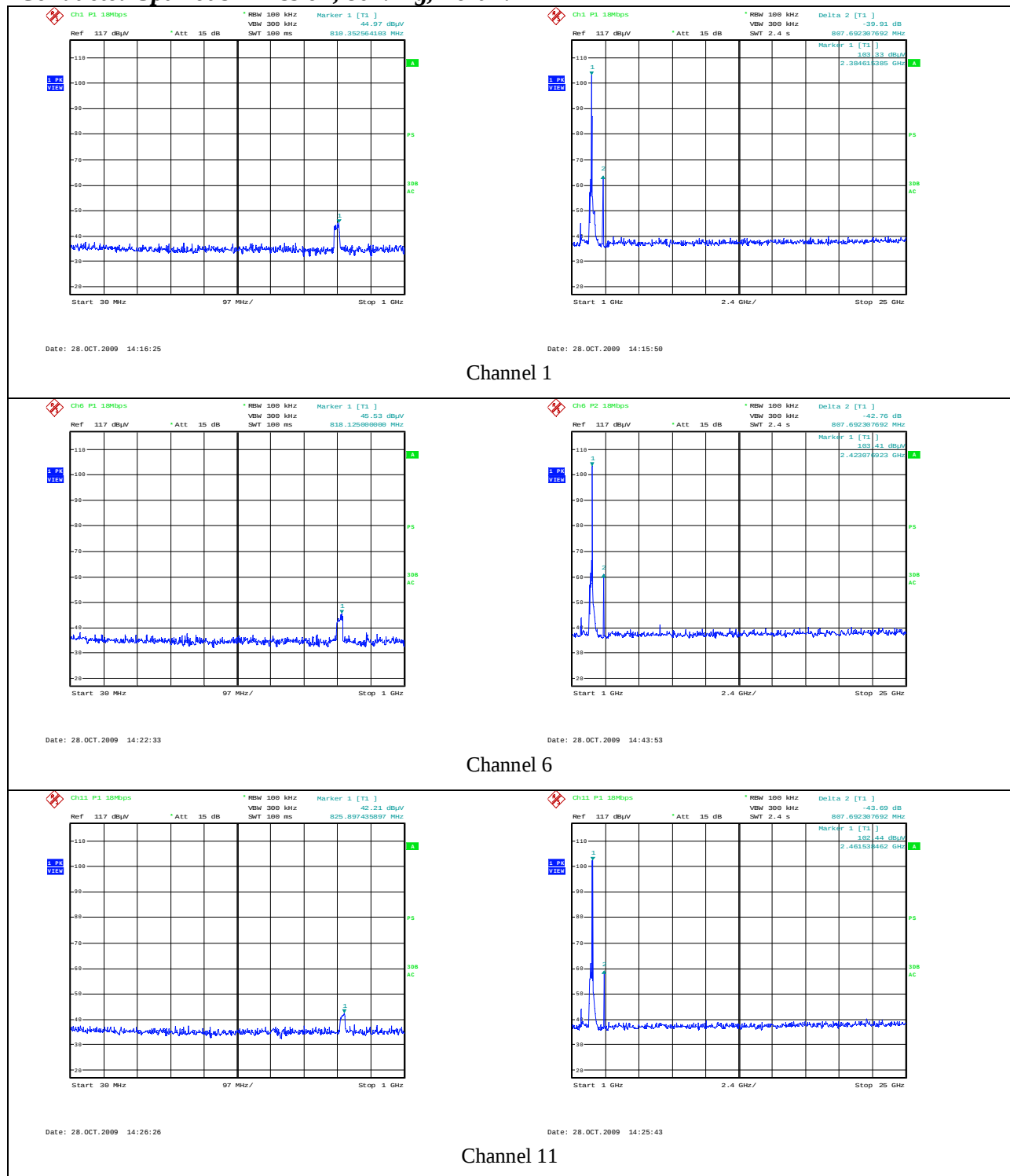


Conducted Spurious Emission, 802.11b, Port 2:



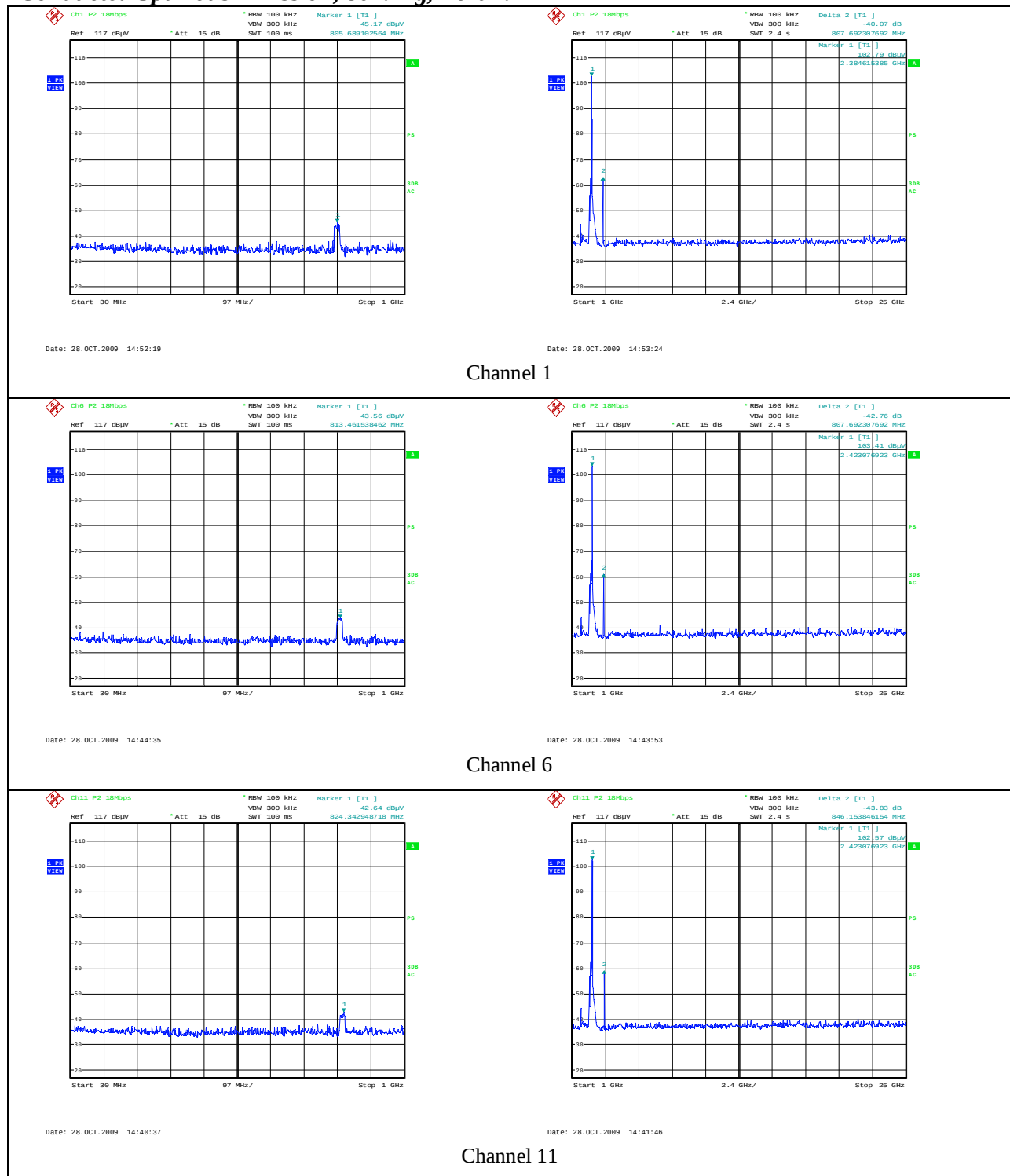


Conducted Spurious Emission, 802.11g, Port 1:



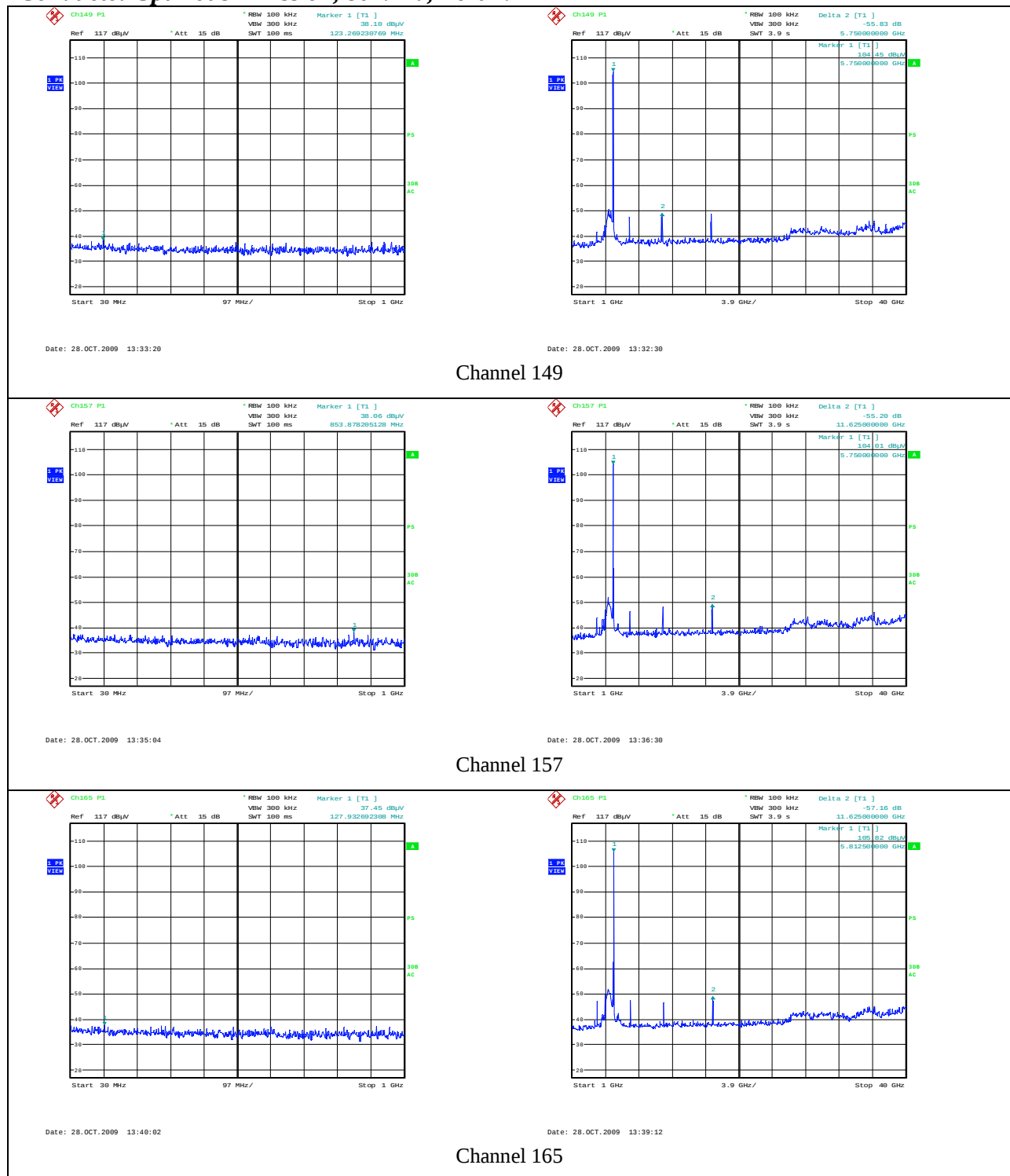


Conducted Spurious Emission, 802.11g, Port 2:



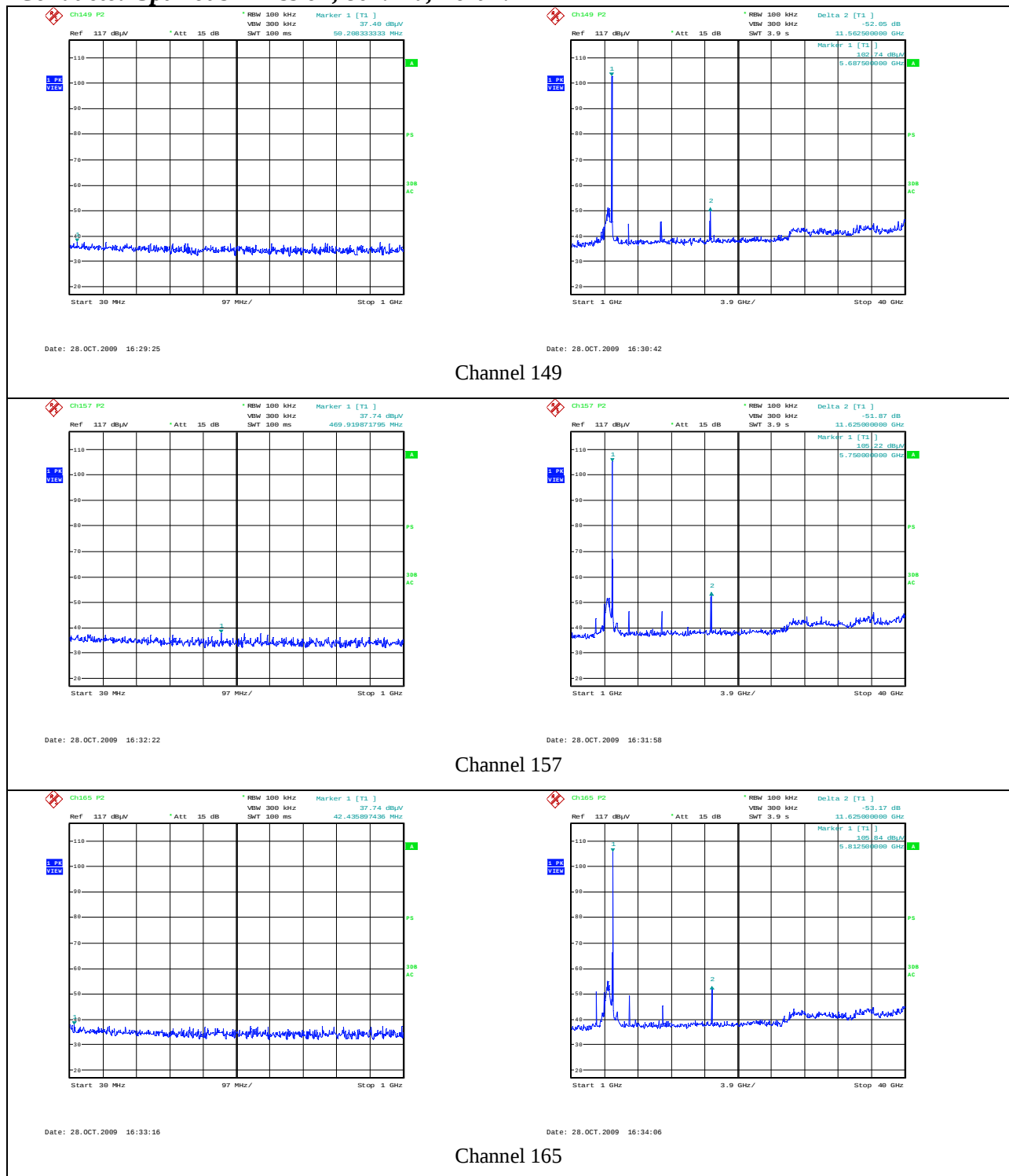


Conducted Spurious Emission, 802.11a, Port 1:





Conducted Spurious Emission, 802.11a, Port 2:





3.6 *Power Spectral Density*

Performance Criterion: The power spectral density shall not be greater than 8 dBm in any 3 kHz band.

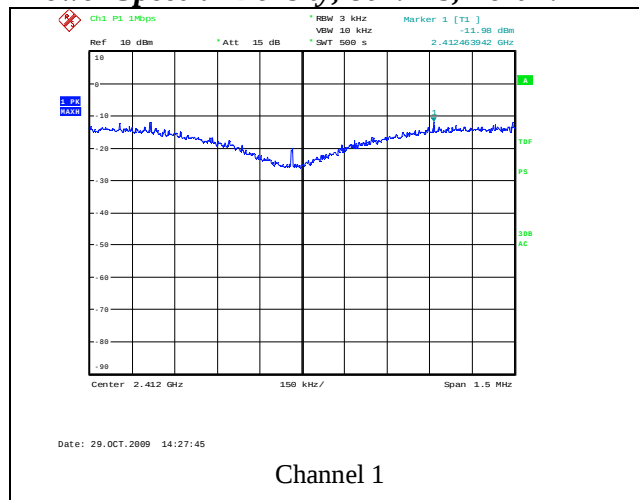
Test Results: Complies

Test Details: PSD Option 1 of the “Measurement of Digital Transmission Systems Operating under Section 15.247” was selected for the measurement. The EUT was tested in a continuous transmit mode with maximum power. Refers to the following table and receiver screen captures. The insertion loss was compensated for in the receiver.

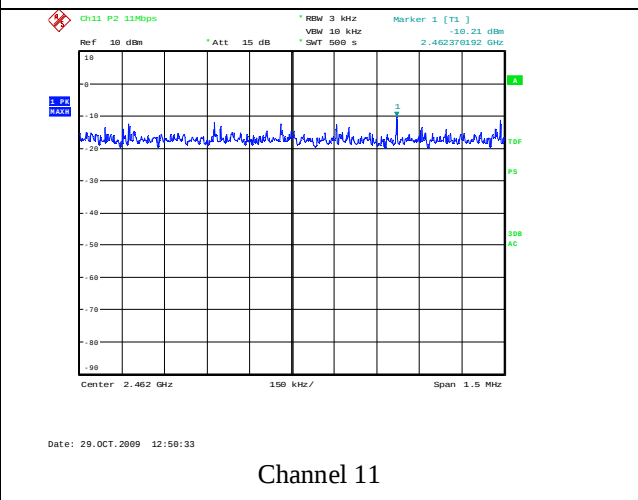
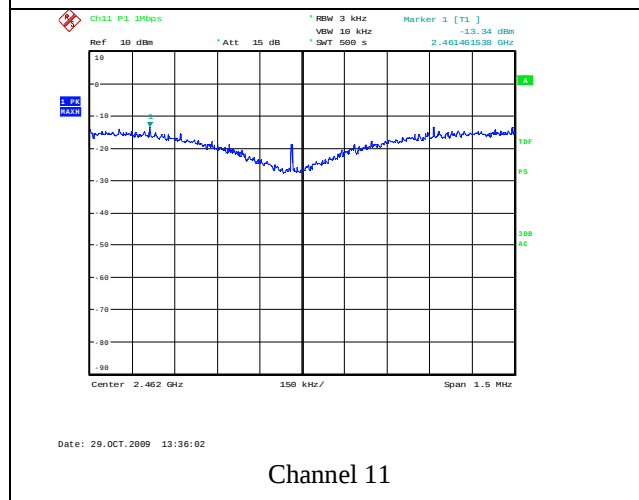
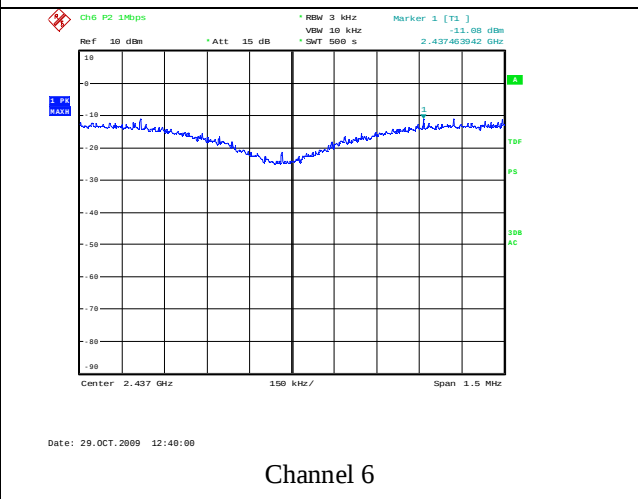
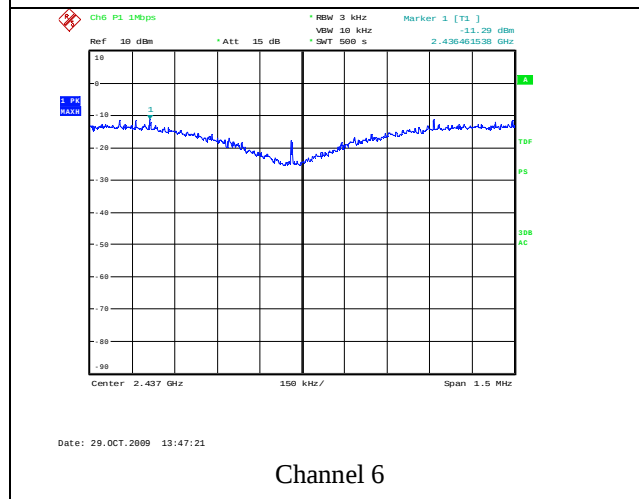
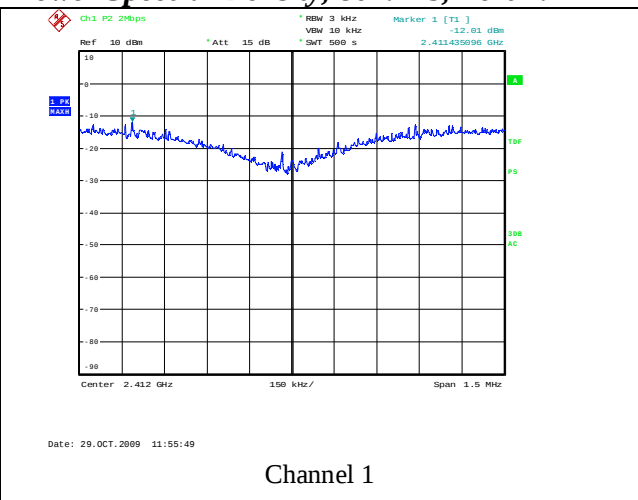




Power Spectral Density, 802.11b, Port 1:

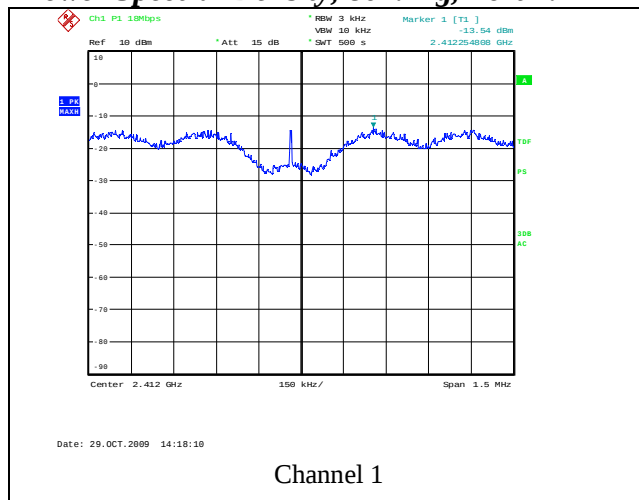


Power Spectral Density, 802.11b, Port 2:

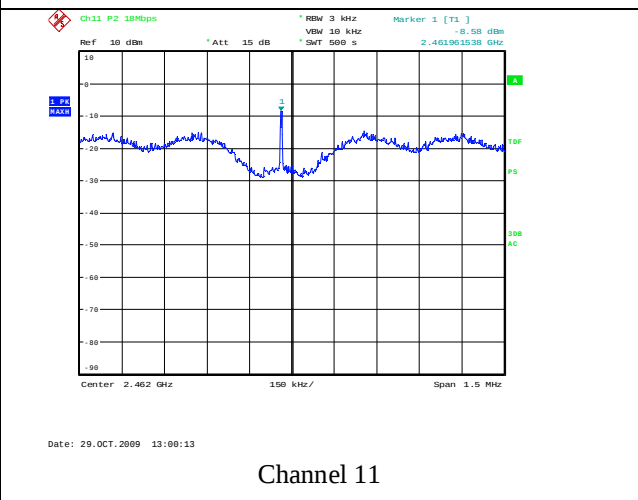
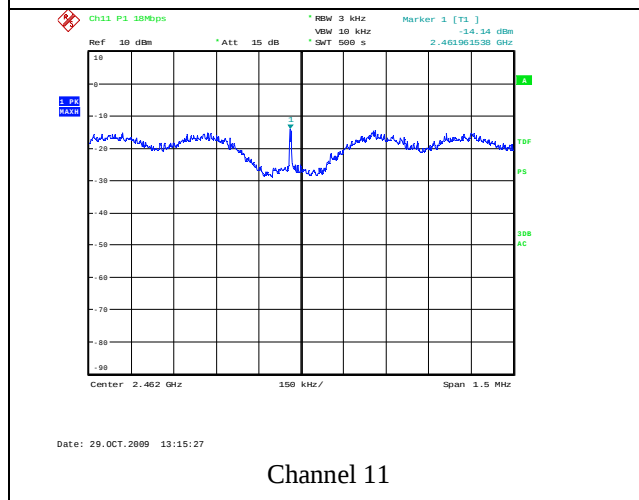
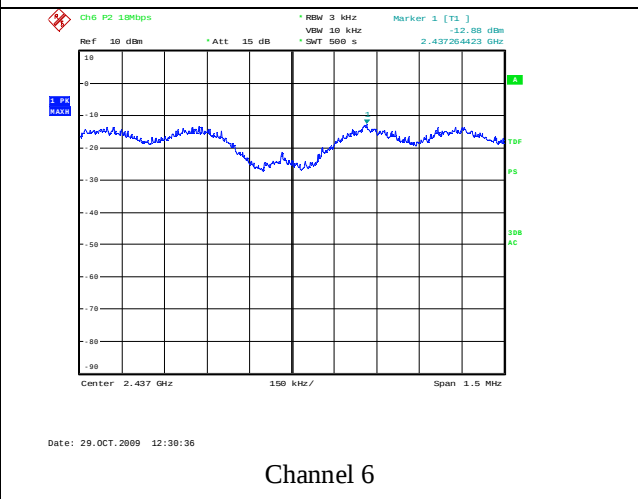
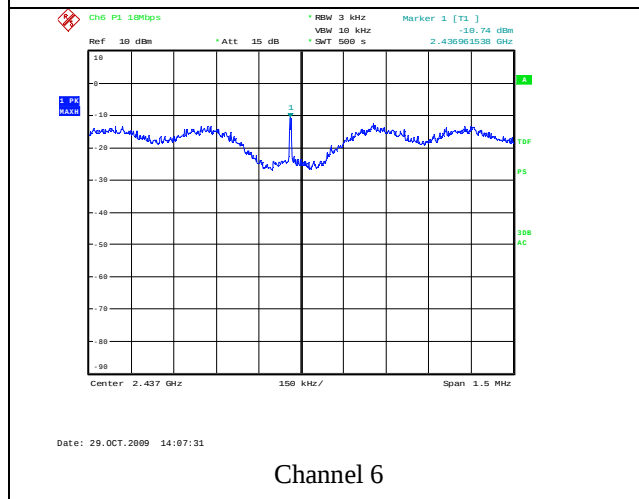
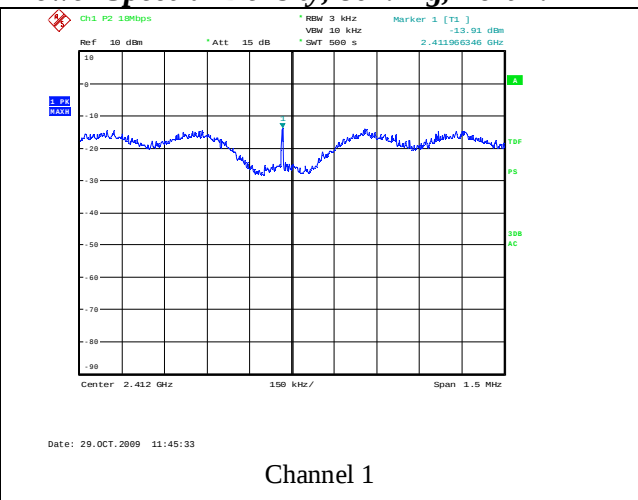




Power Spectral Density, 802.11g, Port 1:

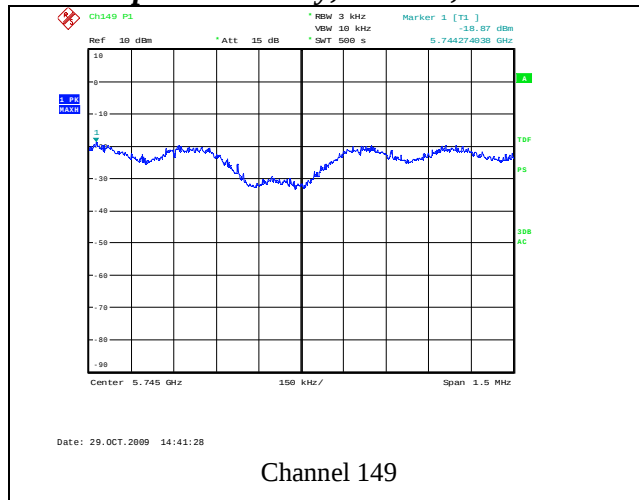


Power Spectral Density, 802.11g, Port 2:

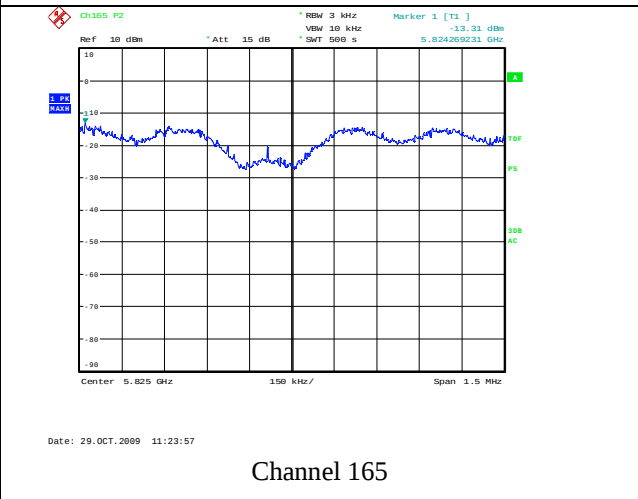
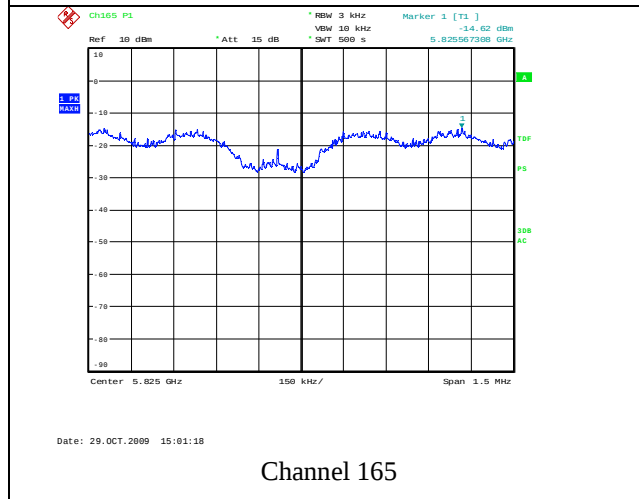
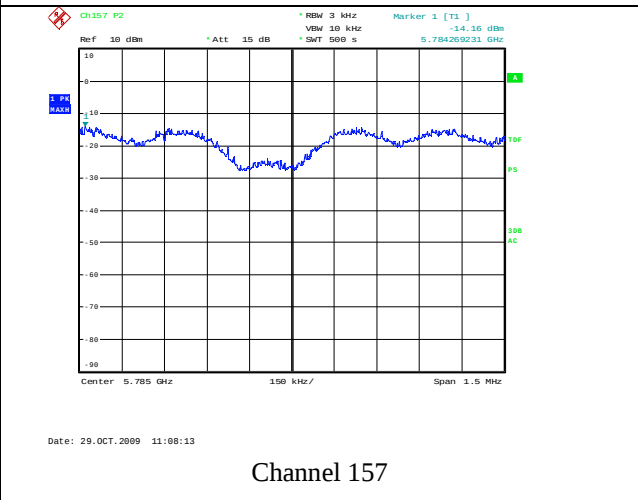
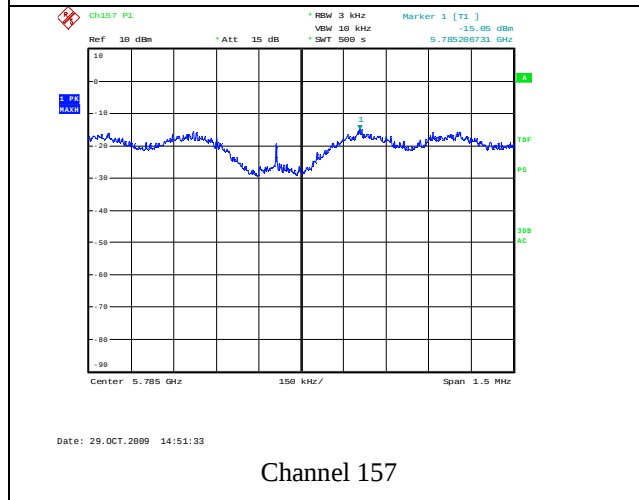
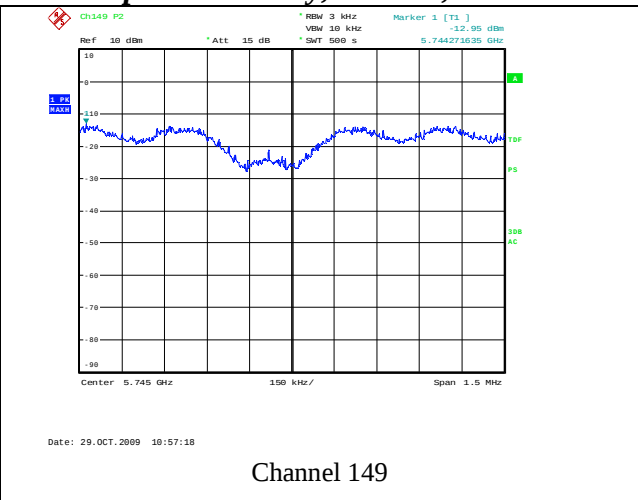




Power Spectral Density, 802.11a, Port 1:



Power Spectral Density, 802.11a, Port 2:



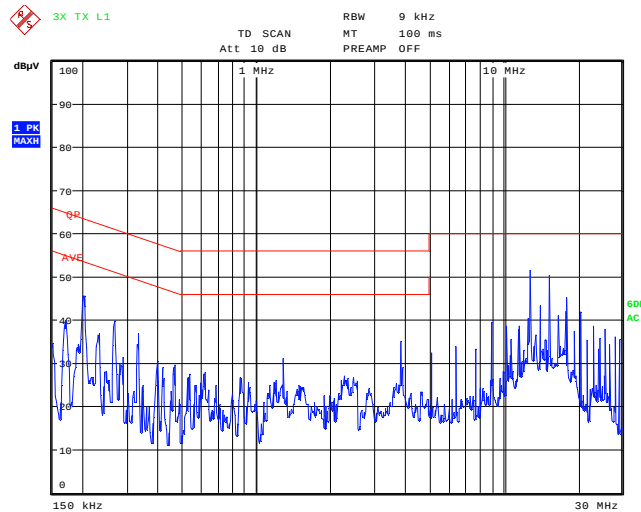
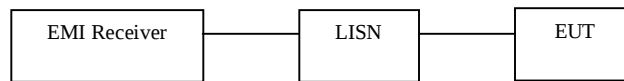


3.7 AC Power Line Conducted Emissions

Performance Criterion: AC power line conducted emissions shall not exceed the limits specified in FCC § 15.207 and Table 2 of § 7.2.2 of IC RSS-Gen.

Test Results: Complies.

Test Details: AC power line conducted emissions were performed from 150 kHz to 30 MHz and measured with a resolution bandwidth of 9 kHz. EUT was set in the transmitting mode. Refers to the following screen captures (using a peak detector), block diagram, and data tables.

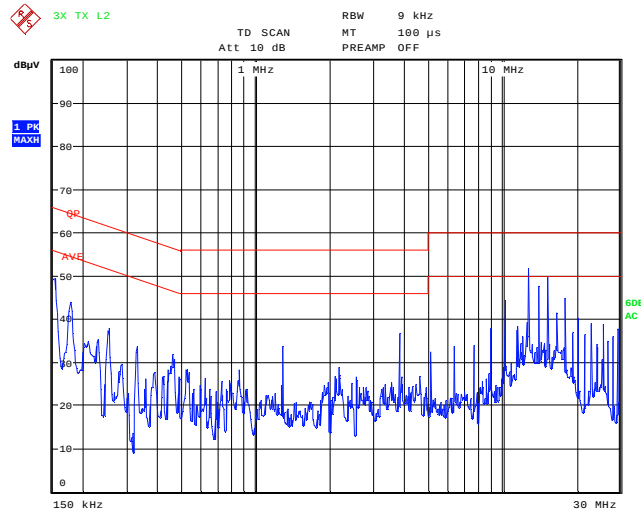


Line 1:

Frequency (MHz)	Level (dBuV)		Limits (dBuV)		Margin (dB)
	QP	AVE	QP	AVE	
0.200	45.24	30.07	63.61	53.61	18.37
12.824	52.27	47.16	60	50	2.84
14.107	47.13	44.29	60	50	5.71
15.389	50.73	49.04	60	50	0.96
16.672	42.55	40.49	60	50	9.51
17.950	45.45	44.29	60	50	5.71

Tested by: Grace Lin

Date of Test: November 11, 2009



Date: 11.NOV.2009 12:50:54

Line 2:

Frequency (MHz)	Level (dBuV)		Limits (dBuV)		Margin (dB)
	QP	AVE	QP	AVE	
0.152	49.55	36.97	65.89	55.89	16.34
10.257	43.34	38.46	60	50	11.54
12.824	52.42	47.61	60	50	2.39
14.102	43.53	37.72	60	50	12.28
15.387	50.25	47.46	60	50	2.54
17.952	44.51	42.15	60	50	7.85

Tested by: Grace Lin

Date of Test: November 11, 2009

3.8 Radiated Spurious Emissions

Performance Criterion: Radiated spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified in FCC § 15.209(a) and Table 2 of IC RSS-210.

Test Results: Complies

Test Details: Radiated spurious emission was performed from 30 MHz to the tenth harmonics of the carrier. For each scan of radiated emission measurement, the procedures for maximizing emissions were followed. The EUT was rotated and antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. All radiated emission measurements, up to 18 GHz, were performed at 3-meter distance between an antenna and the EUT. All radiated emission measurements, above 18 GHz, were performed at 1-meter distance between an antenna and the EUT.

The peak level of radiated emissions above 1 GHz was measured with a resolution bandwidth (RBW) of 1 MHz and a video bandwidth (VBW) of 3 MHz.

For harmonics/spurs that fall in the restricted band, the radiated spurious emissions above 1 GHz were measured with RBW of 1 MHz, VBW of 10 Hz, and Sweep of Auto. The unit was modified for continuous operation using the settings shown above.

EUT was tested in three orthogonal orientations (XY, YZ, and ZX planes).



EUT = XY

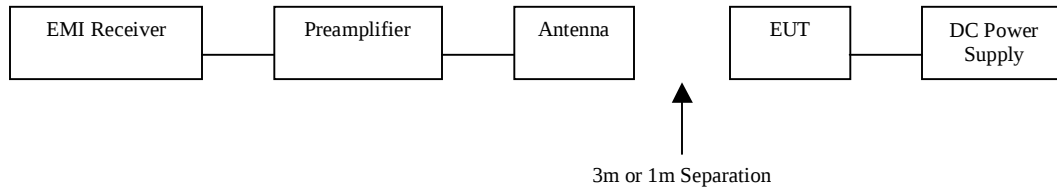


EUT = YZ



EUT = ZX

Refers to the following block diagram and data table for test data. Antenna factor, cable loss, and preamplifier gain were compensated for in the receiver. A factor of 20 dB/decade applies to measurements made at a closer distance than the limit distance before comparing to the limits. For the emissions compared to the limit of 74 dBuV/m, a peak detector was used. For the emissions compared to the limit of 54 dBuV/m, an average detector was used.



802.11b

Antenna Polarization	Frequency (MHz)	Channel No.	Antenna Port	Data Rate (MHz)	EUT Orientation	Measured Data (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Turntable Degree
H	2390	1	1	1	ZX	53.28	74	20.72	127.7	91.1
H	2390	1	1	1	ZX	41.27	54	12.73	127.1	91.1
H	2390	1	2	1	XY	52.15	74	21.85	100	0
H	2390	1	2	1	XY	41.7	54	12.3	100	0
H	4824	1	2	1	XY	49.98	74	24.02	119.2	0
H	4824	1	2	1	XY	45.15	54	8.85	119.2	0
H	7236 (NF)	1	2	1	XY	43.36	74	30.64	-	-
H	7236 (NF)	1	2	1	XY	33.81	54	20.19	-	-
H	12060 (NF)	1	2	1	XY	53.58	74	20.42	-	-
H	12060 (NF)	1	2	1	XY	40.78	54	13.22	-	-
H	14472 (NF)	1	2	1	XY	53.87	74	20.13	-	-
H	14472 (NF)	1	2	1	XY	41.4	54	12.6	-	-
H	19296 (NF)*	1	2	1	XY	38.16	74	35.84	-	-
H	19296 (NF)*	1	2	1	XY	23.58	54	30.42	-	-
H	4874	6	2	1	XY	55.70	74	18.3	115.9	6.6
H	4874	6	2	1	XY	53.78	54	0.22	115.9	6.6
H	7311	6	2	1	XY	49.14	74	24.86	120	329.9
H	7311	6	2	1	XY	37.48	54	16.52	120	329.9
H	12185 (NF)	6	2	1	XY	53.75	74	20.25	-	-
H	12185 (NF)	6	2	1	XY	40.84	54	13.16	-	-
H	19496*	6	2	1	XY	38.96	74	35.04	100	0
H	19496*	6	2	1	XY	24.44	54	29.56	100	0
H	2483.5	11	1	1	ZX	51.41	74	22.59	119.6	66.2
H	2483.5	11	1	1	ZX	41.29	54	12.71	119.6	66.2
H	2483.5	11	2	1	XY	52.68	74	21.32	119.2	309.5
H	2483.5	11	2	1	XY	41.75	54	12.25	119.2	309.5
H	4924	11	2	1	XY	55.42	74	18.58	100	5.8
H	4924	11	2	1	XY	53.12	54	0.88	100	5.8
H	7386 (NF)	11	2	1	XY	47.22	74	26.78	-	-
H	7386 (NF)	11	2	1	XY	33.95	54	20.05	-	-
H	12310 (NF)	11	2	1	XY	54.21	74	19.79	-	-
H	12310 (NF)	11	2	1	XY	41.09	54	12.91	-	-
H	19696 (NF)*	11	2	1	XY	38.02	74	35.98	-	-
H	19696 (NF)*	11	2	1	XY	23.73	54	30.27	-	-
H	22158 (NF)*	11	2	1	XY	39.75	74	34.25	-	-
H	22158 (NF)*	11	2	1	XY	24.01	54	29.99	-	-

NF: Noise Floor

*: Measured at 1m

Date of Test: October 14-19, 2009

Tested by: Grace Lin


802.11g

Antenna Polarization	Frequency (MHz)	Channel No.	Antenna Port	Data Rate	EUT Orientation	Measured Data (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Turntable Degree
H	2390	1	1	18	ZX	59.33	74	14.67	100.0	88.9
H	2390	1	1	18	ZX	45.18	54	8.82	100.0	88.9
H	2390	1	2	18	XY	61.72	74	12.28	100.0	0.0
H	2390	1	2	18	XY	46.88	54	7.12	100.0	0.0
H	4824	1	2	18	XY	56.78	74	17.22	100.0	290.5
H	4824	1	2	18	XY	42.31	54	11.69	100.0	290.5
H	7236	1	2	18	XY	60.52	74	13.48	124.5	357.1
H	7236	1	2	18	XY	44.87	54	9.13	124.5	357.1
H	12060 (NF)	1	2	18	XY	53.07	74	20.93	-	-
H	12060 (NF)	1	2	18	XY	40.43	54	13.57	-	-
H	14472 (NF)	1	2	18	XY	53.86	74	20.14	-	-
H	14472 (NF)	1	2	18	XY	41.13	54	12.87	-	-
H	19296 (NF)*	1	2	18	XY	40.99	74	33.01	-	-
H	19296 (NF)*	1	2	18	XY	28.51	54	25.49	-	-
H	4874	6	2	18	XY	64.31	74	9.69	115.4	0.0
H	4874	6	2	18	XY	50.46	54	3.54	115.4	0.0
H	7311	6	2	18	XY	64.66	74	9.34	124.2	0.0
H	7311	6	2	18	XY	48.79	54	5.21	124.2	0.0
H	12185 (NF)	6	2	18	XY	53.35	74	20.65	-	-
H	12185 (NF)	6	2	18	XY	40.61	54	13.39	-	-
H	19496 (NF)*	6	2	18	XY	40.79	74	33.21	-	-
H	19496 (NF)*	6	2	18	XY	28.74	54	25.26	-	-
H	2483.5	11	1	18	ZX	54.53	74	19.47	121.8	2.1
H	2483.5	11	1	18	ZX	42.16	54	11.84	121.8	2.1
H	2483.5	11	2	18	XY	60.31	74	13.69	118.2	359.9
H	2483.5	11	2	18	XY	47.05	54	6.95	118.2	359.9
H	4924	11	2	18	XY	61.69	74	12.31	116.8	6.7
H	4924	11	2	18	XY	46.60	54	7.40	116.8	6.7
H	7386	11	2	18	XY	58.76	74	15.24	120.3	2.0
H	7386	11	2	18	XY	44.44	54	9.56	120.3	2.0
H	12310 (NF)	11	2	18	XY	53.66	74	20.34	-	-
H	12310 (NF)	11	2	18	XY	40.97	54	13.03	-	-
H	19696 (NF)*	11	2	18	XY	40.90	74	33.10	-	-
H	19696 (NF)*	11	2	18	XY	28.60	54	25.40	-	-
H	22158 (NF)*	11	2	18	XY	31.25	74	42.75	-	-
H	22158 (NF)*	11	2	18	XY	21.00	54	33.00	-	-

NF: Noise Floor

Date of Test: October 14-19, 2009

*: Measured at 1 meter

Tested by: Grace Lin

802.11a

Antenna Polarization	Frequency (MHz)	Channel No.	Antenna Port	Data Rate	EUT Orientation	Measured Data (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Turntable Degree
H	11490	149	2	18	XY	57.69	74	16.31	104.9	14.4
H	11490	149	2	18	XY	44.09	54	9.91	104.9	14.3
H	22980*	149	2	18	XY	47.88	74	26.12	100	0
H	22980*	149	2	18	XY	34.42	54	19.58	100	0
H	11570	157	2	18	XY	56.8	74	17.2	135.5	130.2
H	11570	157	2	18	XY	43.42	54	10.58	135.5	130.2
H	11650	165	2	18	XY	57.13	74	16.87	153	107.6
H	11650	165	2	18	XY	43.46	54	10.54	153	107.6

NF: Noise Floor

Date of Test: October 16-19, 2009

*: Measured at 1m

Tested by: Grace Lin

3.9 Receiver Radiated Emissions

Performance Criterion: Receiver radiated emissions must meet the requirements of Table 1 of IC RSS-Gen. Receivers operating above 960 MHz or below 30 MHz are exempt from complying with the technical provisions of FCC Part 15 Subpart B.

Test Results: Complies

Test Details: Radiated emission was performed from 30 MHz to the fifth harmonics of the carrier. For each scan of radiated emission measurement, the procedures for maximizing emissions were followed. The EUT was rotated and antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. All radiated emission measurements, up to 18 GHz, were performed at 3-meter distance between an antenna and the EUT. All radiated emission measurements, above 18 GHz, were performed at 1-meter distance between an antenna and the EUT.

For the measurement of radiated emission at the frequency range 30-1000MHz, measurement was made by using a quasi-peak detector with a 120 kHz bandwidth. For the frequency range above 1 GHz, measurement was made using an average detector with a 1 MHz bandwidth.

EUT was tested in three orthogonal orientations (XY, YZ, and ZX planes).



EUT = XY

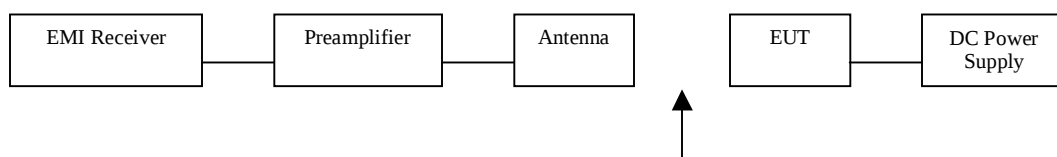


EUT = YZ



EUT = ZX

Refers to the following block diagram, data table, and receiver screen captures for test data. Antenna factor, cable loss, and preamplifier gain were compensated for in the receiver.





3m Separation

Receiver Radiated Emission, 802.11 b/g:

Antenna Polarization	Frequency (MHz)	Channel No.	EUT Orientation	Antenna Port	Measured Data (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Turntable Degree
V	180.36	1	ZX	2	40.05	43.5	3.45	100.0	227.0
H	480.00	1	ZX	2	38.88	46	7.12	100.0	243.6
H	540.00	1	XY	1	32.98	46	13.02	100.0	229.8
V	660.00	1	YZ	1	41.70	46	4.30	100.0	33.9
H	960.00	1	XY	1	36.28	46	9.72	100.0	307.7
H	1440.00	1	XY	1	46.39	54	7.61	100.0	55.0
V	180.36	6	ZX	2	40.80	43.5	2.70	100.0	290.0
H	480.00	6	ZX	2	38.97	46	7.03	100.0	237.3
H	540.00	6	XY	1	39.31	46	6.69	170.0	284.7
V	660.00	6	YZ	1	41.96	46	4.04	100.0	113.7
H	960.00	6	XY	1	35.78	46	10.22	100.0	307.7
H	1440.00	6	XY	1	46.23	54	7.77	100.0	53.2
V	180.36	11	ZX	2	39.87	43.5	3.63	100.0	240.4
H	480.00	11	ZX	2	39.05	46	6.95	100.0	245.2
H	540.00	11	XY	1	40.02	46	5.98	168.8	94.0
V	660.00	11	YZ	1	42.03	46	3.97	100.0	224.2
H	960.00	11	XY	1	35.19	46	10.81	100.0	306.3
H	1440.00	11	XY	1	46.43	54	7.57	100.0	54.3

Tested by: Grace Lin

Date of Test: October 21, 2009



Receiver Radiated Emission, 802.11a:

Antenna Polarization	Frequency (MHz)	Channel No.	EUT Orientation	Antenna Port	Measured Data (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Turntable Degree
H	180.36	149	ZX	1	39.98	43.5	3.52	115.5	111.0
V	480.00	149	YZ	2	42.20	46	3.80	100.0	307.2
V	540.00	149	YZ	1	38.54	46	7.46	100.0	287.5
V	624.00	149	YZ	2	38.62	46	7.38	100.0	281.2
V	660.00	149	YZ	2	41.49	46	4.51	100.0	279.5
H	7659.90	149	ZX	1	49.49	54	4.51	143.0	132.9
H	180.36	157	ZX	1	38.96	43.5	4.54	106.0	115.0
V	480.00	157	YZ	2	42.35	46	3.65	100.0	306.3
V	540.00	157	YZ	1	38.68	46	7.32	100.0	282.4
V	624.00	157	YZ	2	38.77	46	7.23	100.0	283.7
V	660.00	157	YZ	2	41.50	46	4.50	100.0	276.7
H	7713.25	157	ZX	1	50.27	54	3.73	147.4	143.8
H	180.36	165	ZX	1	38.95	43.5	4.55	100.0	119.4
V	480.00	165	YZ	2	42.29	46	3.71	100.0	305.0
V	540.00	165	YZ	1	37.89	46	8.11	100.0	277.3
V	624.00	165	YZ	2	37.92	46	8.08	100.0	276.0
V	660.00	165	YZ	2	41.42	46	4.58	100.0	259.5
H	7766.59	165	ZX	1	50.19	54	3.81	146.5	135.1

Tested by: Grace Lin

Date of Test: October 22-23, 2009

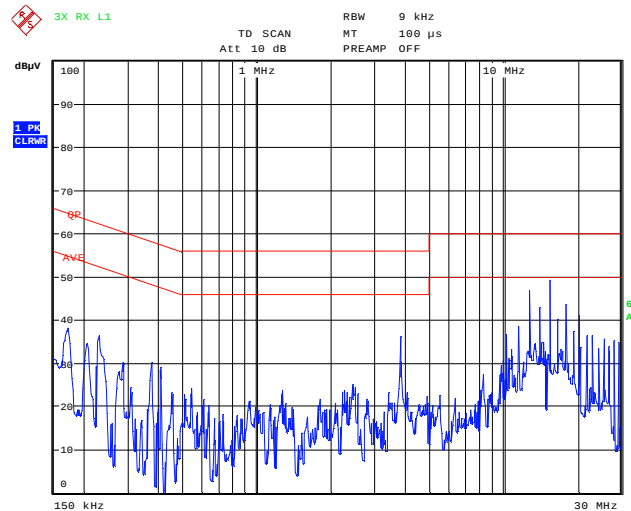
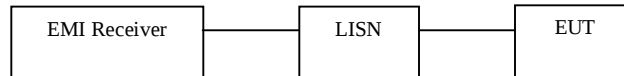


3.10 Receiver AC Power Line Conducted Emissions

Performance Criterion: AC power line conducted emissions shall not exceed the limits specified in FCC § 15.207 and Table 2 of IC RSS-Gen.

Test Results: Complies.

Test Details: AC power line conducted emissions were performed from 150 kHz to 30 MHz and measured with a resolution bandwidth of 9 kHz. EUT was set in the receiving mode. Refers to the following screen captures (using a peak detector), block diagram, and data tables.



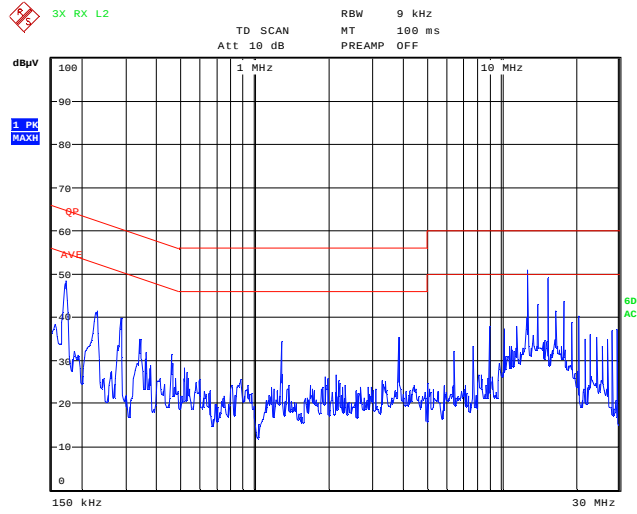
Date: 11.NOV.2009 11:59:09

Line 1:

Frequency (MHz)	Level (dBμV)		Limits (dBμV)		Margin (dB)
	QP	AVE	QP	AVE	
0.173	47.07	35.01	64.82	54.82	17.75
12.849	49.08	43.15	60	50	6.85
14.134	43.97	43.70	60	50	6.30
15.421	47.19	42.46	60	50	7.54
16.708	40.86	35.35	60	50	14.65
17.993	42.84	37.63	60	50	12.37

Tested by: Grace Lin

Date of Test: November 11, 2009



Date: 11.NOV.2009 12:22:00

Line 2:

Frequency (MHz)	Level (dBuV)		Limits (dBuV)		Margin (dB)
	QP	AVE	QP	AVE	
0.170	47.87	36.93	64.96	54.96	17.09
12.854	49.49	42.34	60	50	7.66
14.141	44.97	41.54	60	50	8.46
15.423	46.86	43.97	60	50	6.03
16.708	38.53	36.17	60	50	13.83
17.997	42.62	39.54	60	50	10.46

Tested by: Grace Lin

Date of Test: November 11, 2009