



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8**

CERTIFICATION TEST REPORT

FOR

HANDHELD TERMINAL

MODEL NUMBER: IT-800A-35U

**FCC ID: BBQIT800A
IC: 2388F-IT800A**

REPORT NUMBER: 31KE0135-SH-A

ISSUE DATE: JUNE 27, 2011

Prepared for
**CASIO COMPUTER CO., LTD
6-2 HON-MACHI 1-CHOME
SHIBUYA-KU
TOKYO, 151-8543, JAPAN**

Prepared by
**UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
TEL: +81 596 24 8116
FAX: +81 596 24 8124**



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation. *As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
---	06/27/2011	Initial Issue	T. Hatakeda

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION	6
4. CALIBRATION AND UNCERTAINTY	6
4.1. MEASURING INSTRUMENT CALIBRATION	6
4.2. SAMPLE CALCULATION	6
4.3. MEASUREMENT UNCERTAINTY.....	6
5. EQUIPMENT UNDER TEST	8
5.1. DESCRIPTION OF EUT	8
5.2. MAXIMUM OUTPUT POWER.....	8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	8
5.4. SOFTWARE AND FIRMWARE.....	8
5.5. WORST-CASE CONFIGURATION AND MODE.....	9
5.6. DESCRIPTION OF TEST SETUP.....	10
6. TEST AND MEASUREMENT EQUIPMENT	13
7. ANTENNA PORT TEST RESULTS	15
7.1. 802.11b MODE IN THE 2.4 GHz BAND.....	15
7.1.1. 6 dB BANDWIDTH.....	15
7.1.2. 99% BANDWIDTH.....	18
7.1.3. OUTPUT POWER	21
7.1.4. POWER SPECTRAL DENSITY	22
7.1.5. CONDUCTED SPURIOUS EMISSIONS.....	25
7.2. 802.11g MODE IN THE 2.4 GHz BAND.....	29
7.2.1. 6 dB BANDWIDTH.....	29
7.2.2. 99% BANDWIDTH.....	32
7.2.3. OUTPUT POWER	35
7.2.4. POWER SPECTRAL DENSITY	36
7.2.5. CONDUCTED SPURIOUS EMISSIONS.....	39
8. RADIATED TEST RESULTS.....	43
8.1. LIMITS AND PROCEDURE	43
8.2. TRANSMITTER ABOVE 1 GHz.....	44
8.2.1. 802.11b MODE	44
8.2.2. 802.11g MODE	49
8.3. RECEIVER ABOVE 1 GHz.....	54
8.4. WORST-CASE BELOW 1 GHz.....	55

9. AC POWER LINE CONDUCTED EMISSIONS.....58

10. SETUP PHOTOS61

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: CASIO COMPUTER CO., LTD
6-2 HON-MACHI 1-CHOME, SHIBUYA-KU
TOKYO, 151-8543, JAPAN

EUT DESCRIPTION: HANDHELD TERMINAL

MODEL: IT-800A-35U (HANDHELD) & HA-H62IO (ETHERNET CRADLE)

SERIAL NUMBER: 22PFU A21400526AAAA1 (RADIATED)
30 (CONDUCTED)

DATE TESTED: JUNE 20 - 21, 2011

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL Japan, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Japan, Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Japan, Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Japan, Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL Japan, Inc. By:

Tested By:



TAKAHIRO HATAKEDA
Leader of WiSE Japan
UL Verification Services
UL Japan, Inc.

TAKAYUKI SHIMADA
Engineer of WiSE Japan
UL Verification Services
UL Japan, Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN.

UL Japan, Inc. is accredited by NVLAP, Laboratory Code 200572-0
The full scope of accreditation can be viewed at
<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	Conducted emission (+dB)
	150kHz-30MHz
No.4	3.2dB

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(±dB)				(1m*)(±dB)		(0.5m*)(±dB)
	9kHz -30MHz	30MHz - 300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.4	4.0dB	5.0dB	5.1dB	4.8dB	5.0dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Power meter (±dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

Antenna terminal conducted emission and Power density (±dB)			Antenna terminal conducted emission (±dB)		Channel power (±dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a 802.11abg, Bluetooth and RFID equipped Handheld Terminal.

The 802.11abg module is manufactured by Fujitsu Component Limited.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	16.04	40.18
2412 - 2462	802.11g	21.01	126.18

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Dipole antenna, with a maximum gain of 2.3 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was RFTestTool.exe.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case data rate for each model is determined to be as follows, based on preliminary tests of the chipset utilized in this radio.

All final tests in the 802.11b mode were made at 1 Mb/s.
All final tests in the 802.11g mode were made at 6 Mb/s.

The EUT has been evaluated at X, Y, Z-orientations and the worst among them with AC/DC adapter and with Ethernet cradle. The highest measured emission was determined as the following table.

	Horizontal	Vertical
Carrier and Bandedge	Y	Y
Radiated Emission (above 1GHz)	Z	Y
Radiated Emission (below 1GHz)	X with AC/DC adapter	Z with AC/DC adapter
Conducted Emission	with Cradle	with Cradle

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
AC/DC Adaptor	Casio	AD-S15050B	18
Ethernet Cradle	Casio	HA-H62IO	224AA 3C0101725GAAA1
AC/DC Adaptor	Casio	AD-S42120B	001
Micro SD	Panasonic	RP-SM01GBJ1K	SR9FB014582

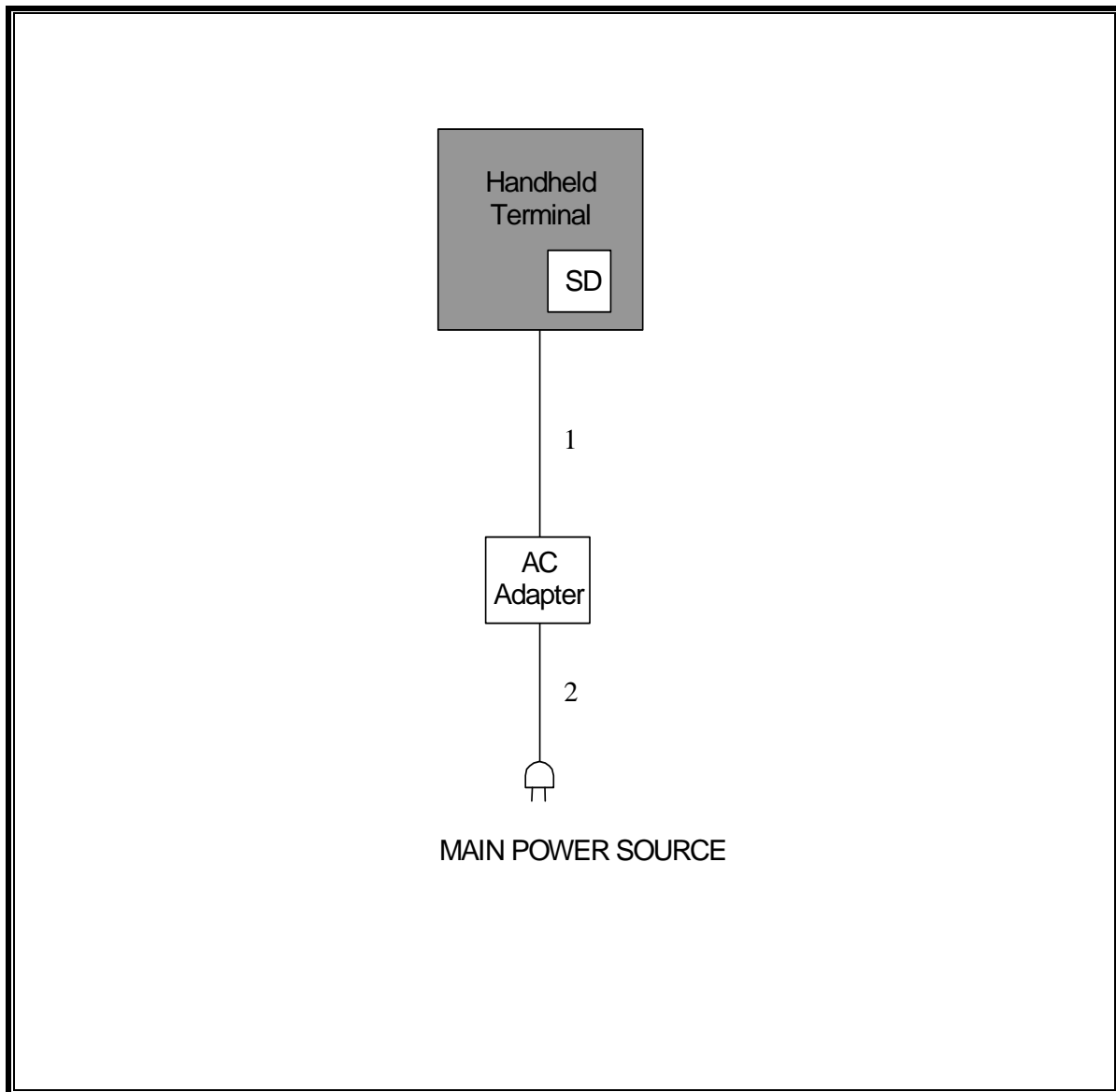
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	DC	Un-shielded	1.5m	one ferrite at Handheld Terminal end.
2	AC	1	US 115V	Un-shielded	2.0m	N/A
3	DC	1	DC	Un-shielded	1.6m	one ferrite at Cradle end.

TEST SETUP

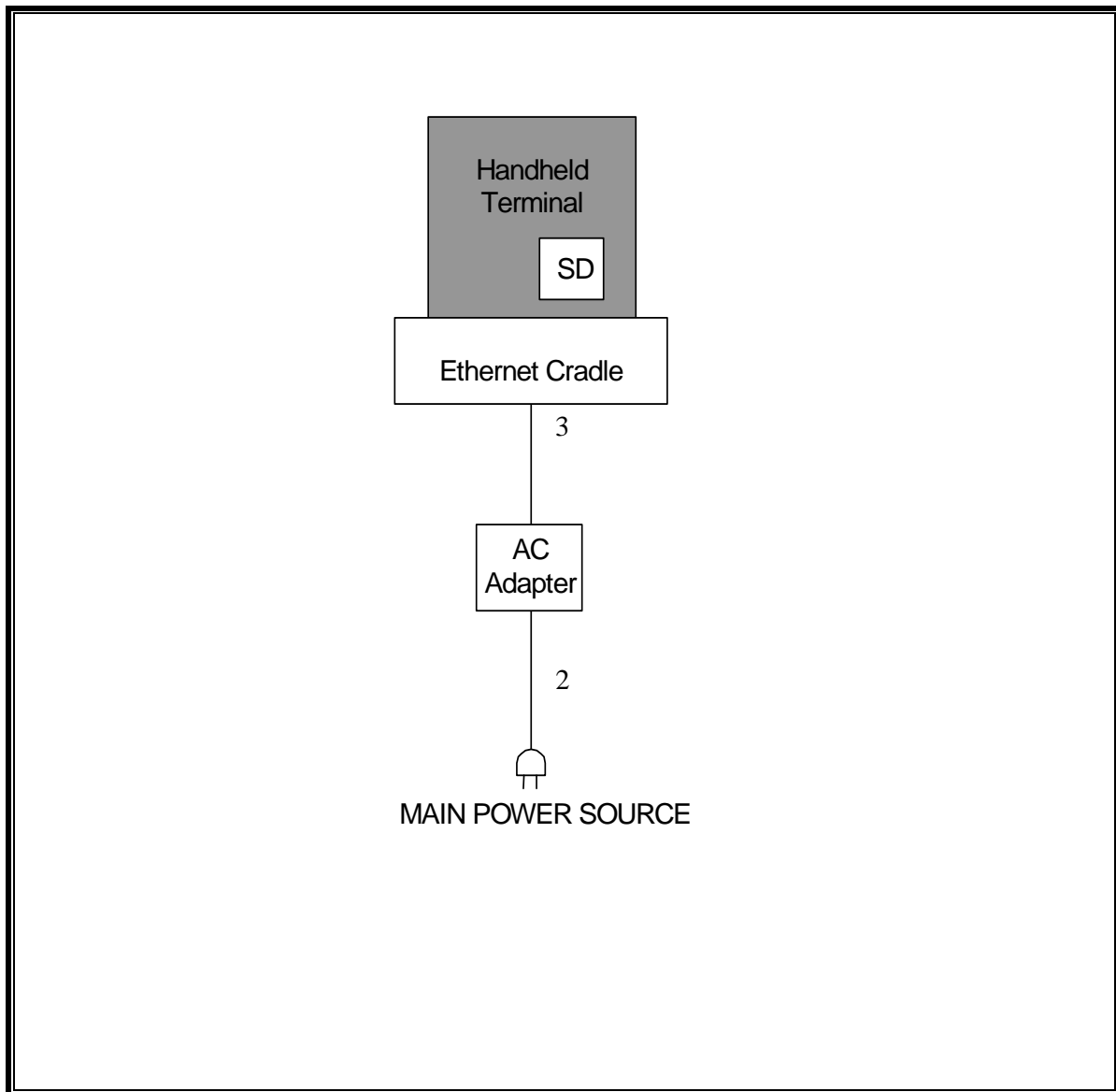
The EUT is sitting on a cradle during the Conducted emission test.
 The EUT is connected with AC/DC adapter during the Radiated emission (below 1GHz) test.
 The EUT is a stand alone configuration during Radiated emission (above 1GHz) test.
 Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS (1/2)



Radiated Emission (worst case)

SETUP DIAGRAM FOR TESTS (2/2)



Conducted emission (worst case)

6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Control No.	Instrument	Manufacturer	Model No	Serial No	Calibration Date * Interval(month)
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	2010/12/13 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	2010/11/30 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	2010/09/10 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	2010/09/10 * 12
MAT-20	Attenuator(10dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	2011/01/06 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	2011/03/01 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	2011/02/23 * 12
MJM-07	Measure	PROMART	SEN1955	-	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	2011/02/15 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	2010/08/08 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	2011/06/17 * 12
MCC-56	Microwave Cable	Suhner	SUCOFLEX104	270875/4(1m) / 284655(5m)	2011/03/02 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	2011/03/10 * 12
MCC-79	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278923/4	2010/12/02 * 12
MHF-20	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCC	607	2010/09/21 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	2011/04/08 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	2010/10/27 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	2010/10/11 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	2010/10/11 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	2011/03/25 * 12
MAT-51	Attenuator(6dB)	Weinschel	2	AS3557	2011/01/14 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	2011/03/04 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	2010/11/18 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	2011/02/22 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	2011/02/22 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform 141-PE(1m)/RFM-E121(Switcher)	-/04178	2010/07/21 * 12

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

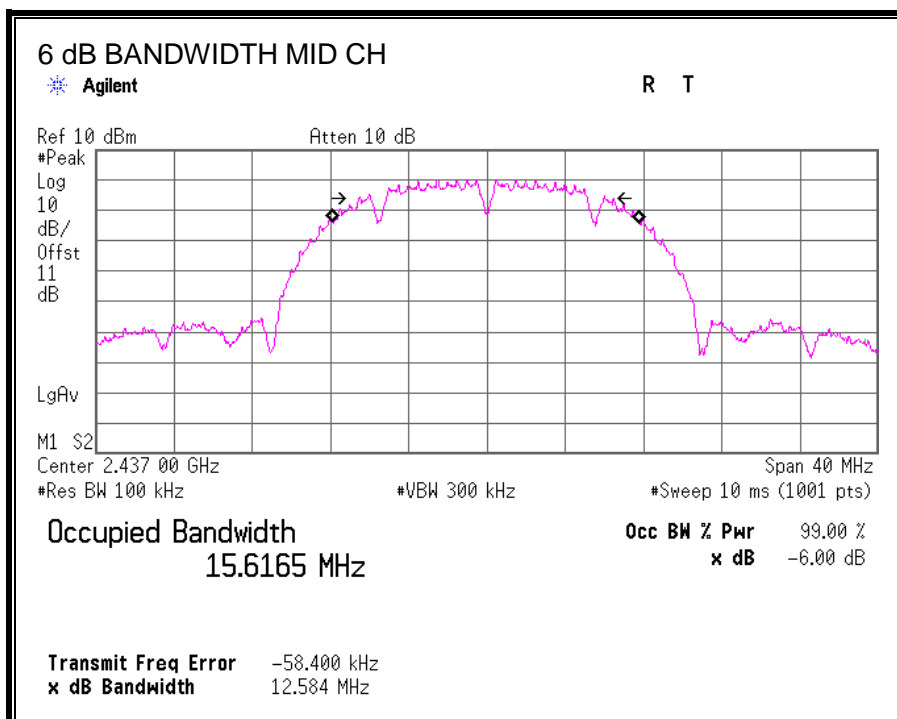
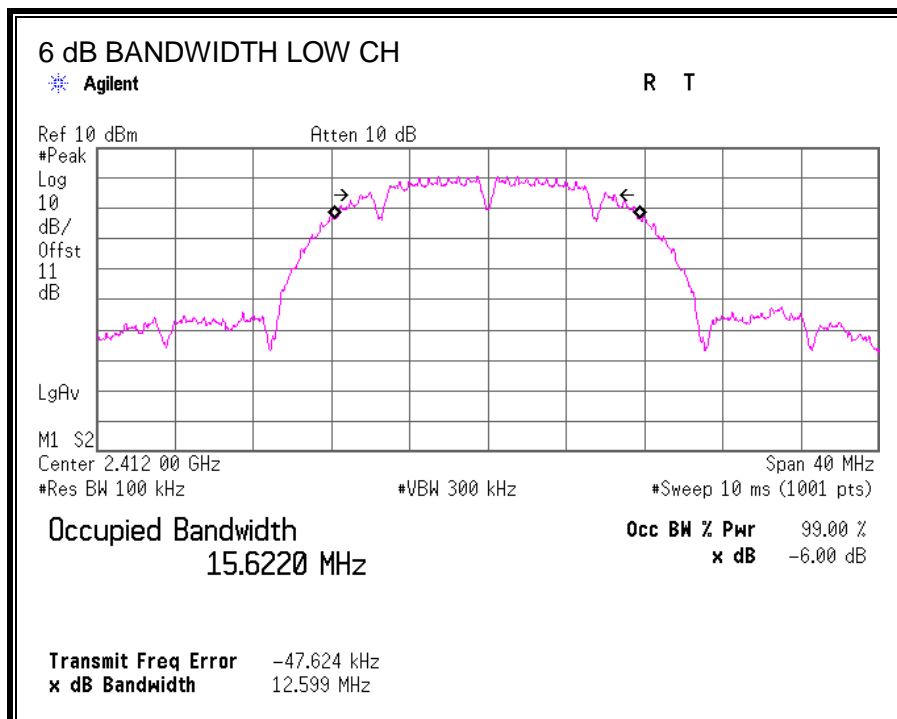
TEST PROCEDURE

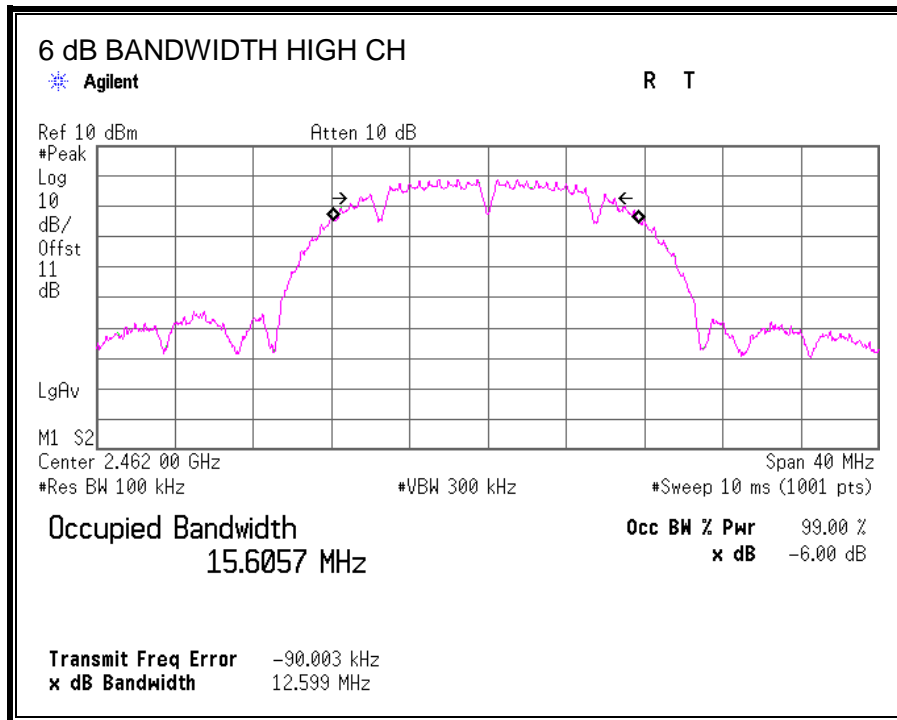
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	12.599	0.5
Middle	2437	12.584	0.5
High	2462	12.599	0.5

6 dB BANDWIDTH





7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

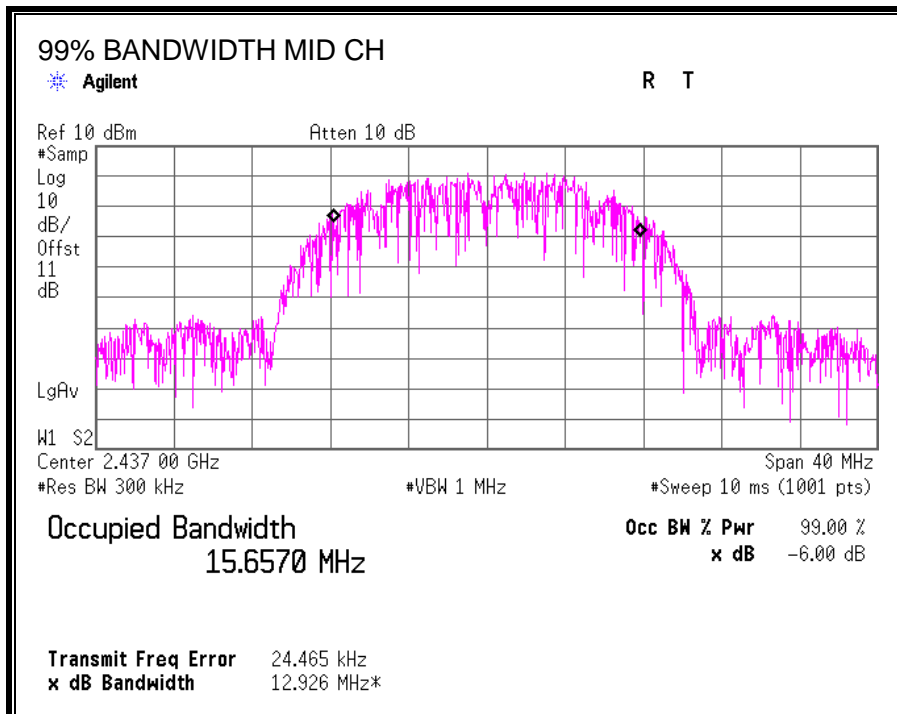
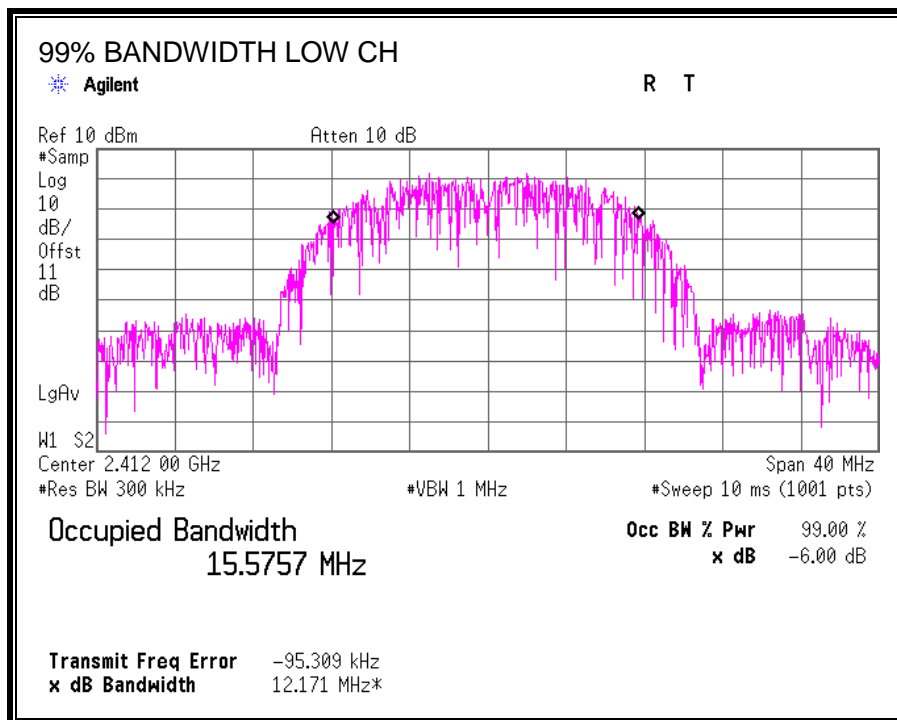
TEST PROCEDURE

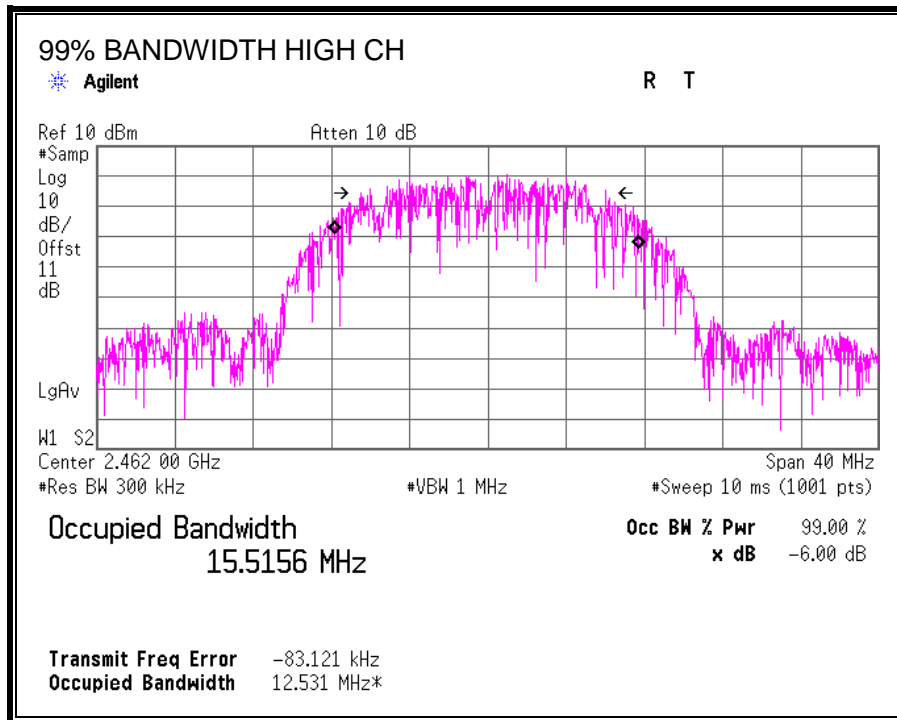
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.5757
Middle	2437	15.6570
High	2462	15.5156

99% BANDWIDTH





7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.8/10.88/10.95dB(Low/Mid/High Channel) (including 9.97 dB pad and 0.83/0.91/0.98dB(Low/Mid/High Channel) cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dBm)
Low	2412	16.04	30	13.96
Middle	2437	15.94	30	14.06
High	2462	15.41	30	14.59

7.1.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

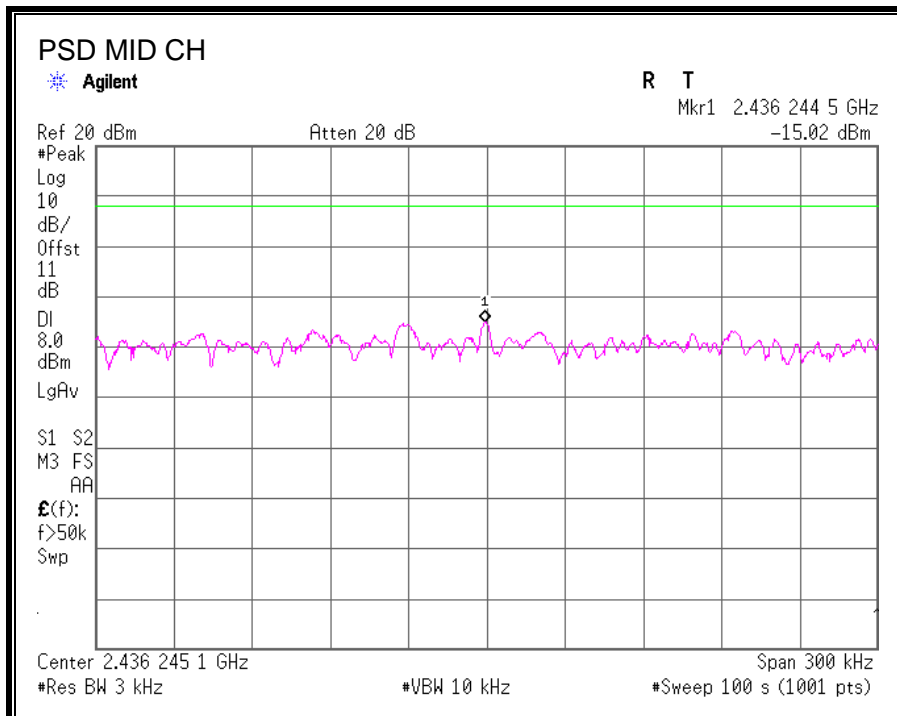
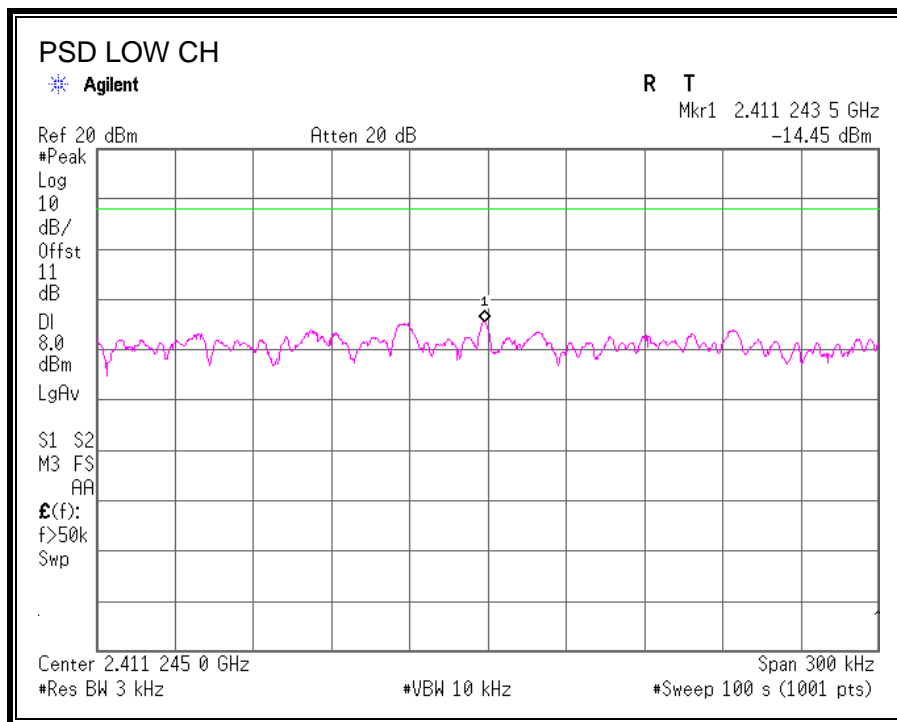
TEST PROCEDURE

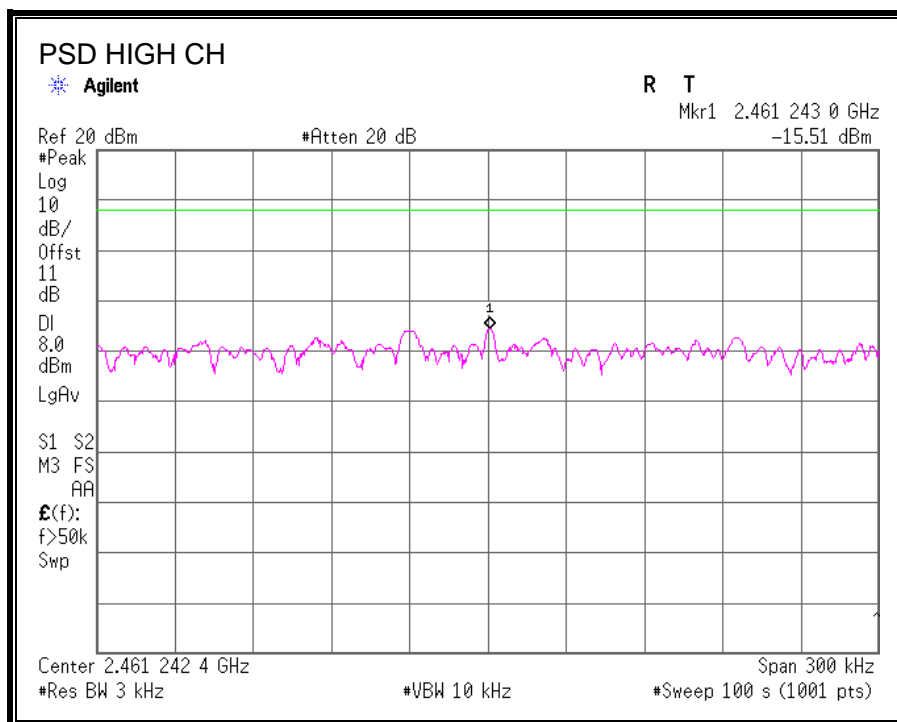
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-14.45	8	-22.45
Middle	2437	-15.02	8	-23.02
High	2462	-15.51	8	-23.51

POWER SPECTRAL DENSITY





7.1.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

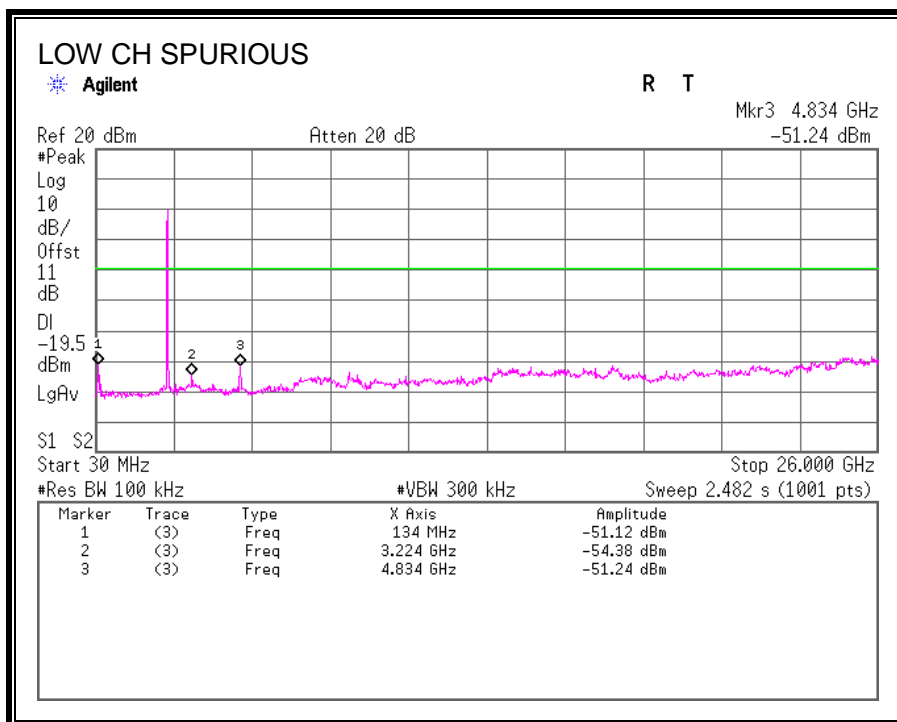
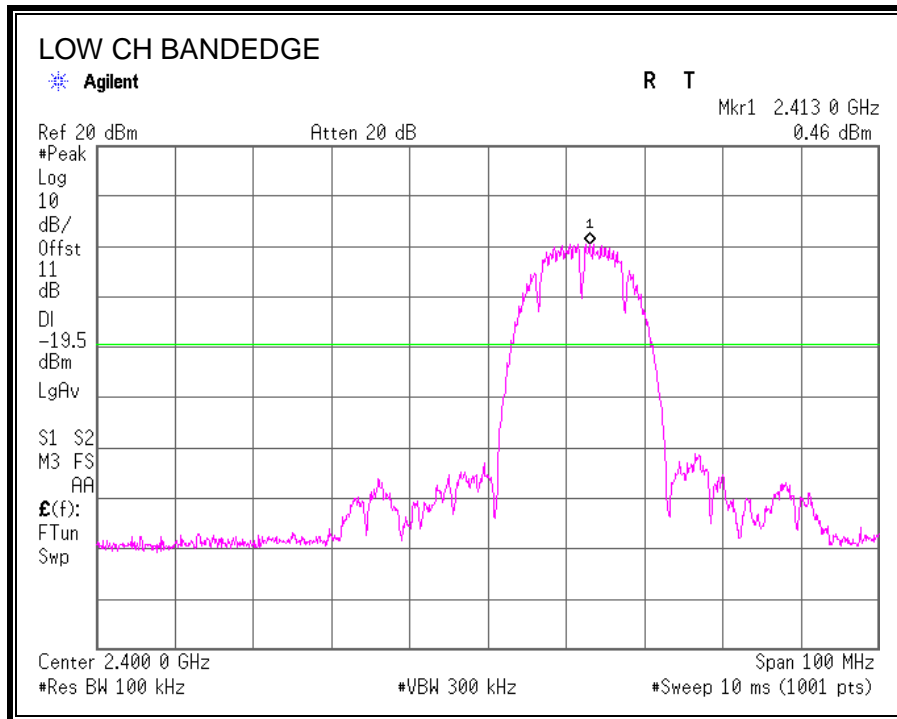
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

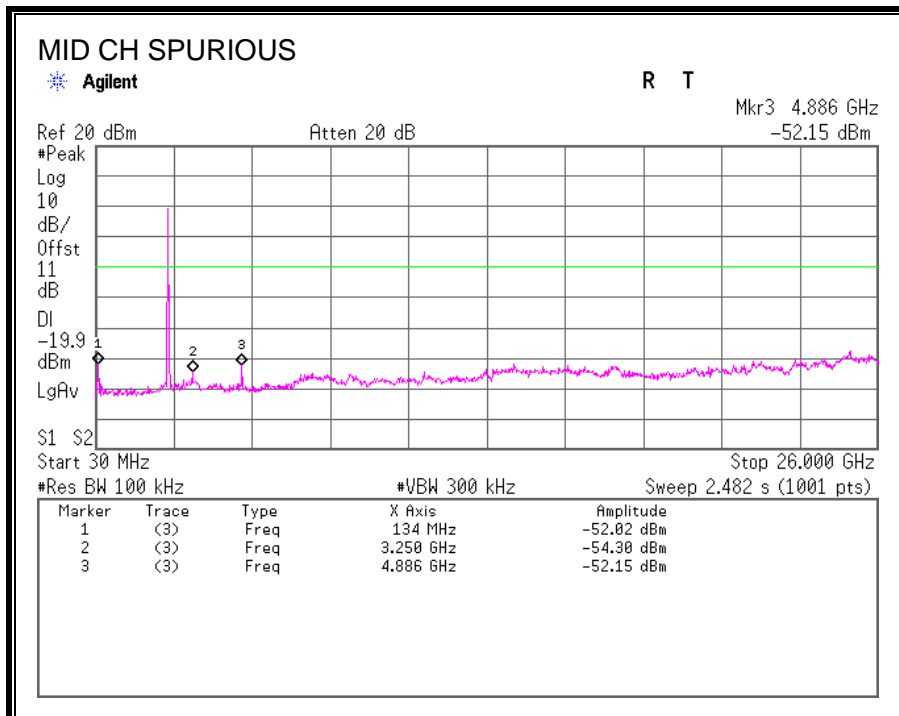
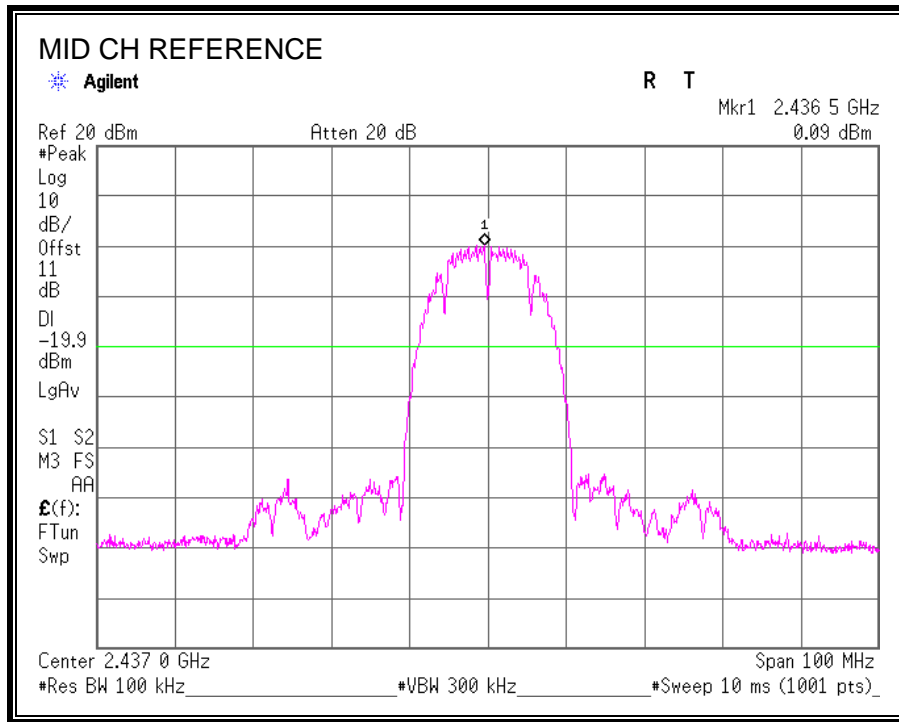
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

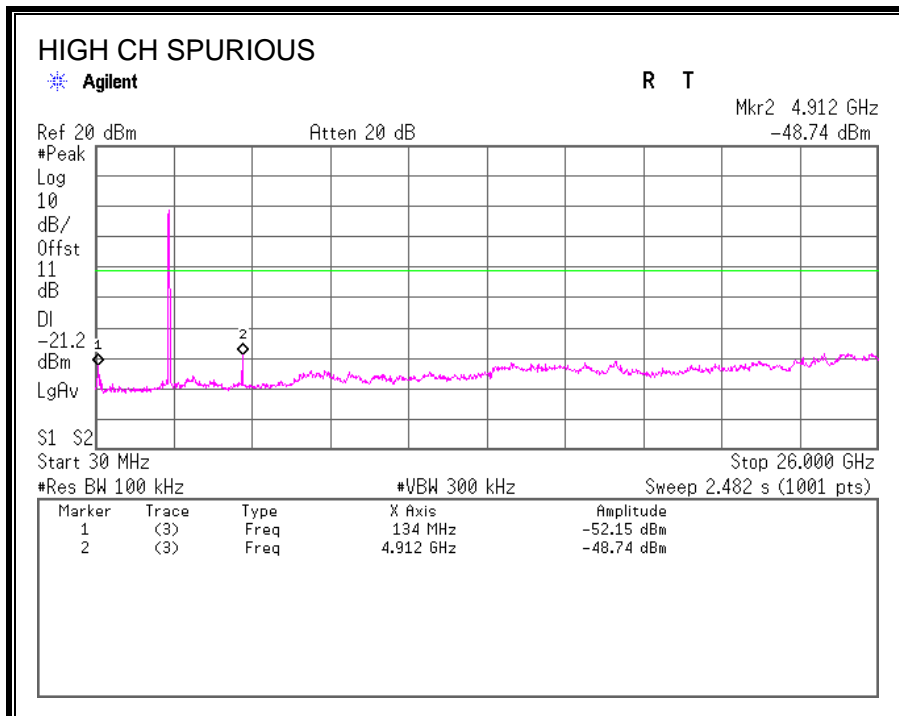
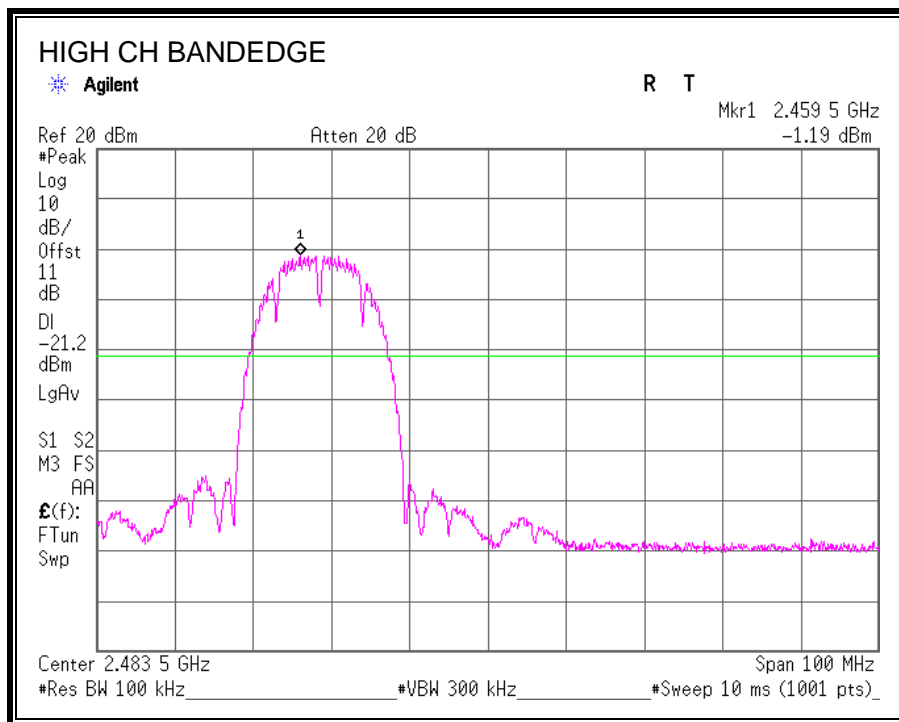
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

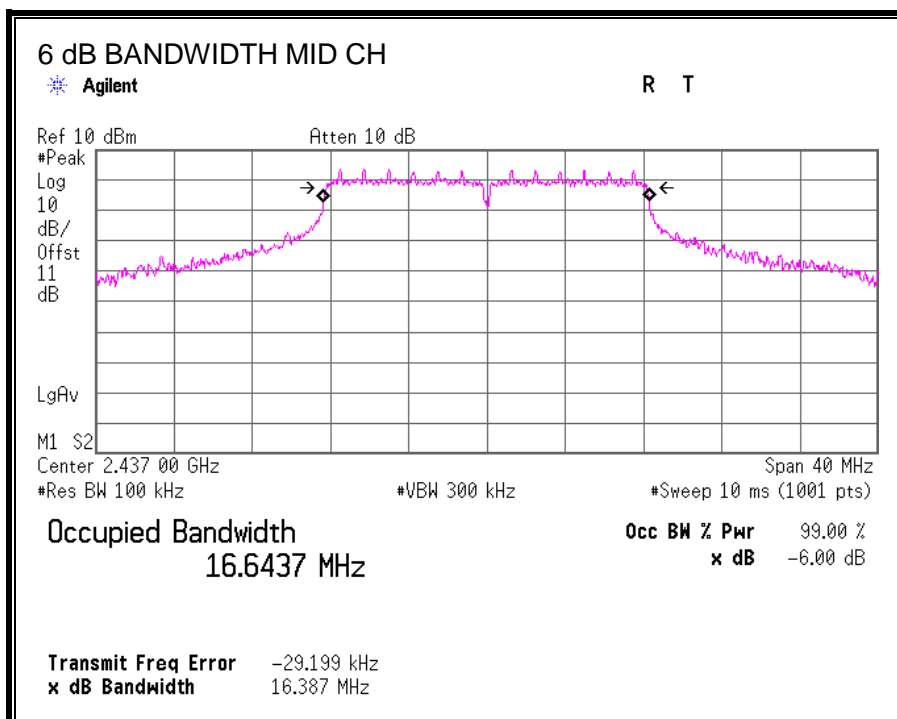
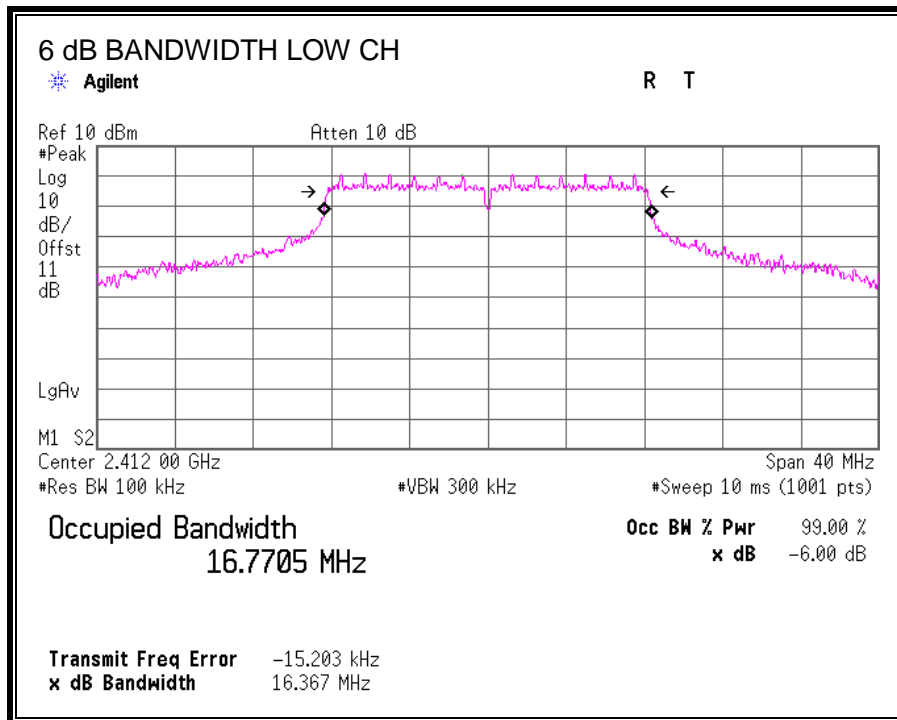
TEST PROCEDURE

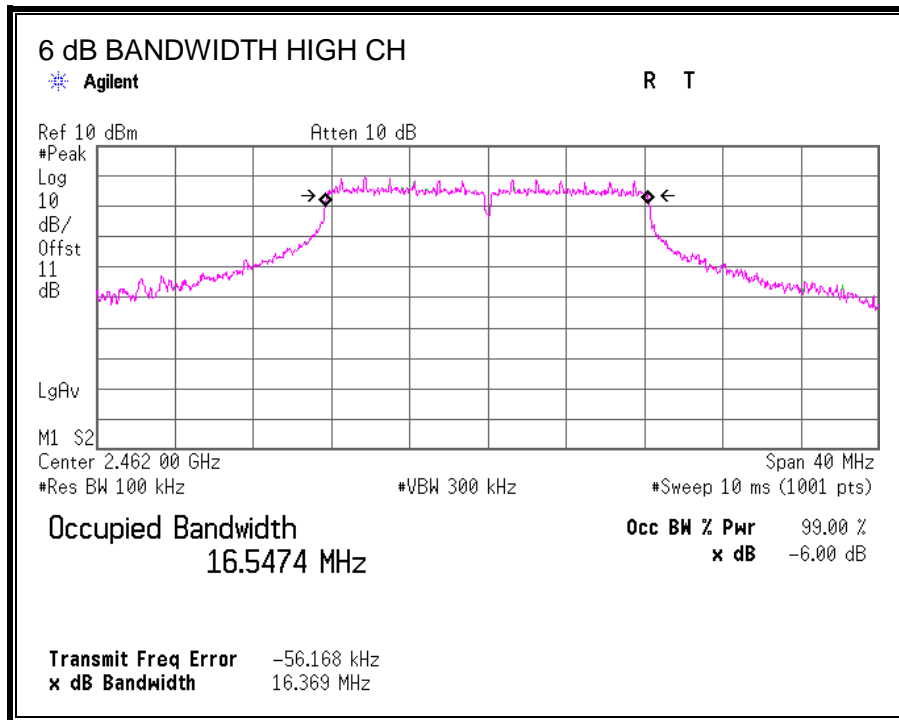
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.367	0.5
Middle	2437	16.387	0.5
High	2462	16.369	0.5

6 dB BANDWIDTH





7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

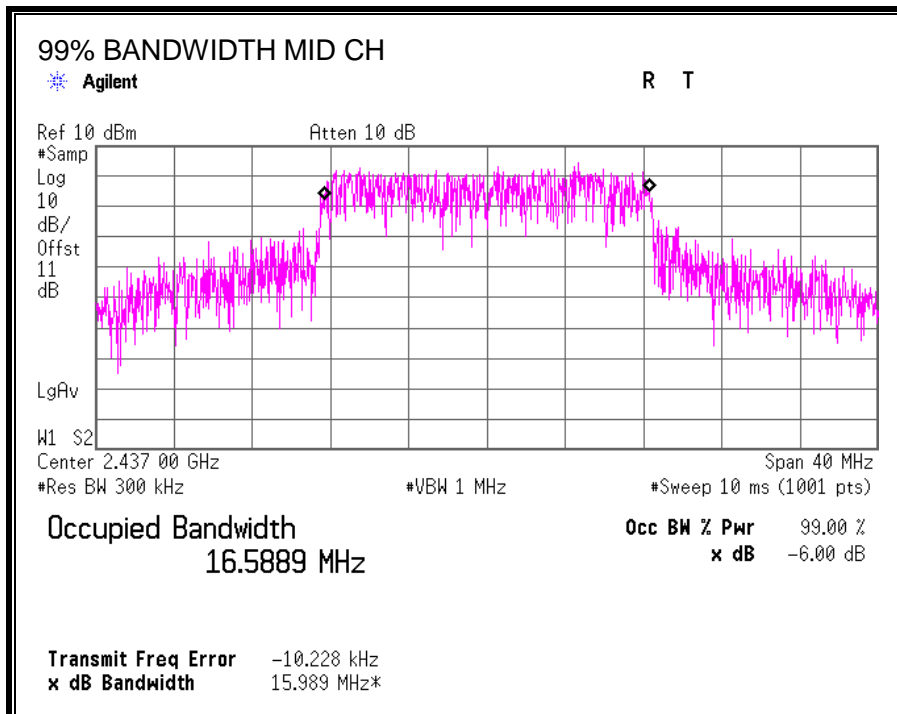
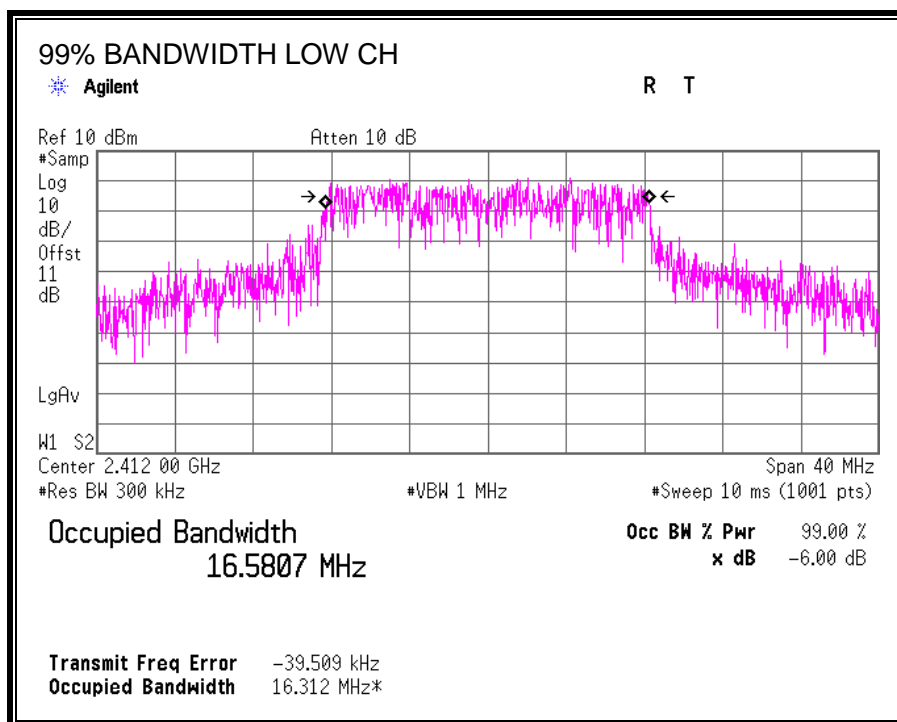
TEST PROCEDURE

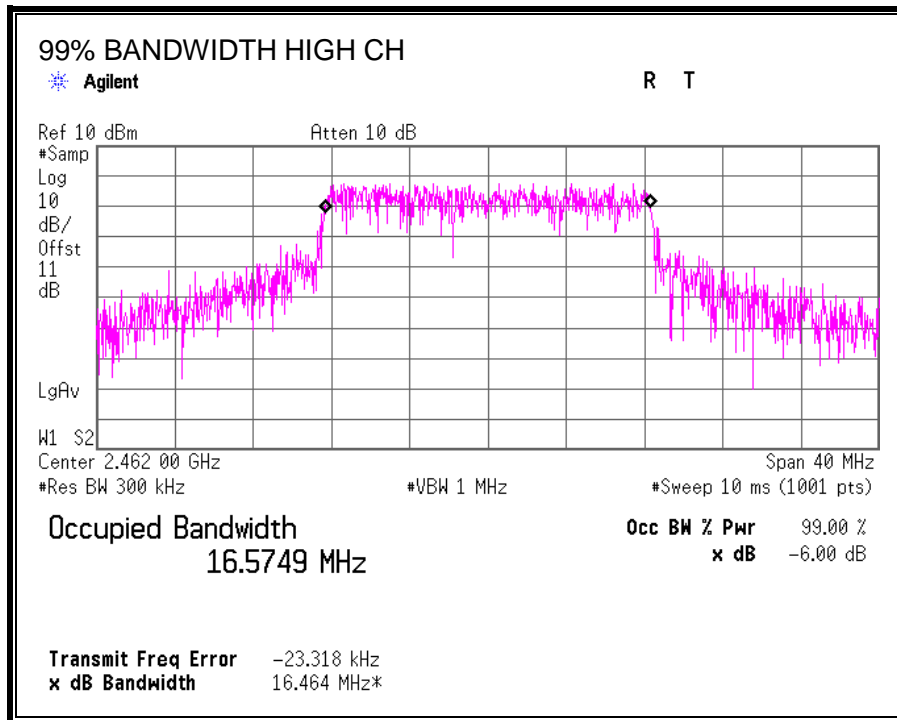
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.5807
Middle	2437	16.5889
High	2462	16.5749

99% BANDWIDTH





7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.8/10.88/10.95dB(Low/Mid/High Channel) (including 9.97 dB pad and 0.83/0.91/0.98dB(Low/Mid/High Channel) cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dBm)
Low	2412	20.59	30	9.41
Middle	2437	21.01	30	8.99
High	2462	20.83	30	9.17

7.2.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

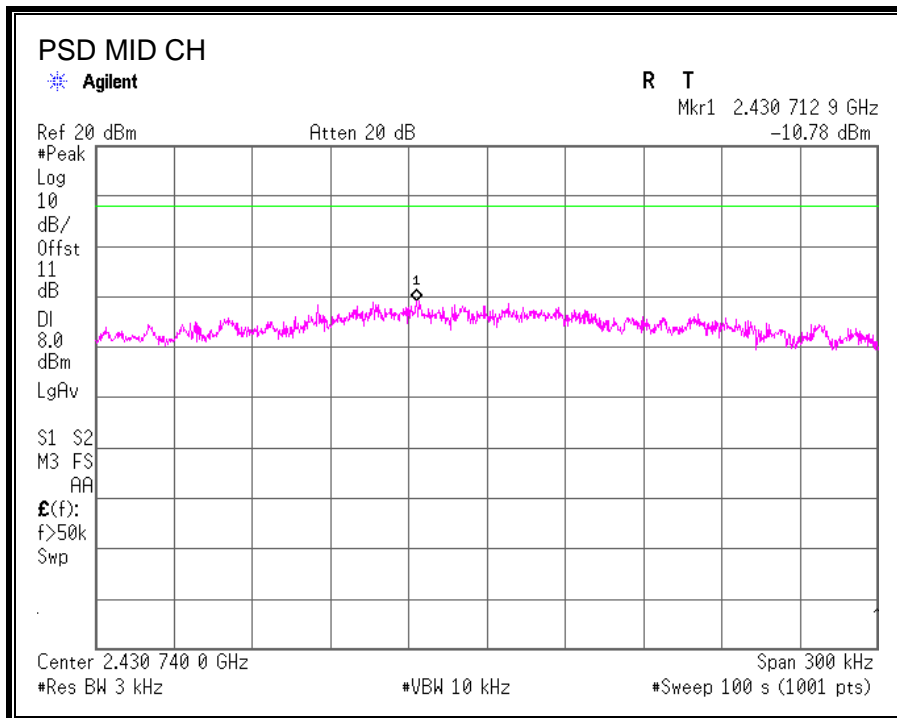
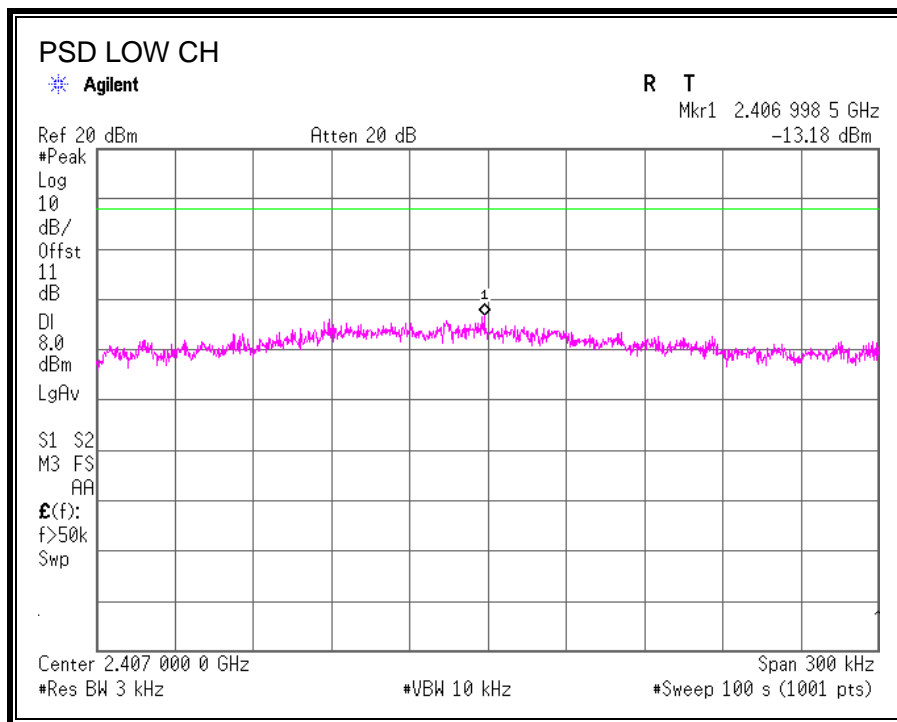
TEST PROCEDURE

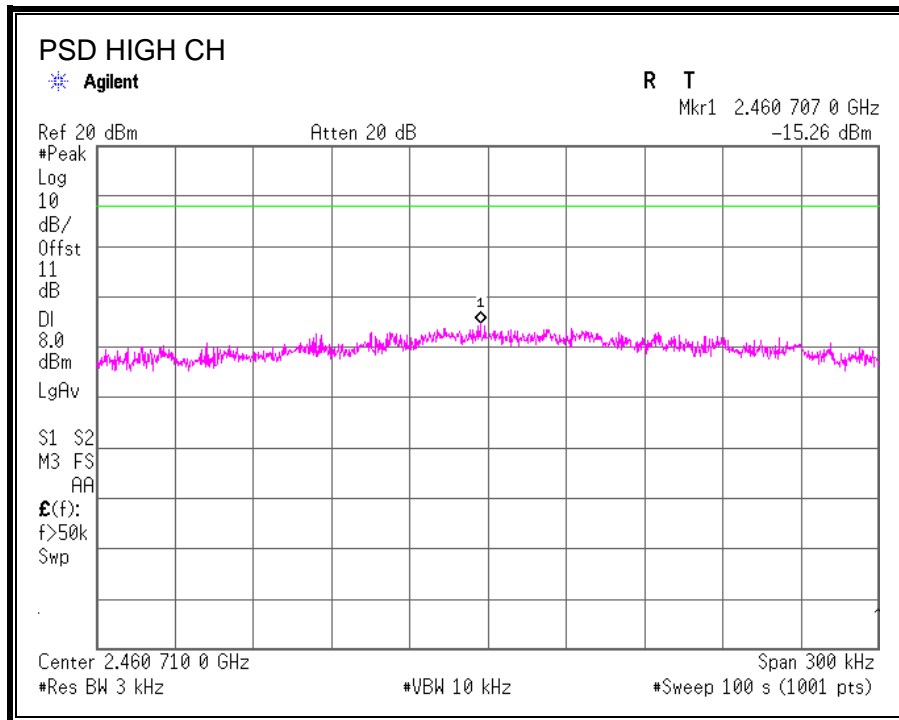
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-13.18	8	-21.18
Middle	2437	-10.78	8	-18.78
High	2462	-15.26	8	-23.26

POWER SPECTRAL DENSITY





7.2.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

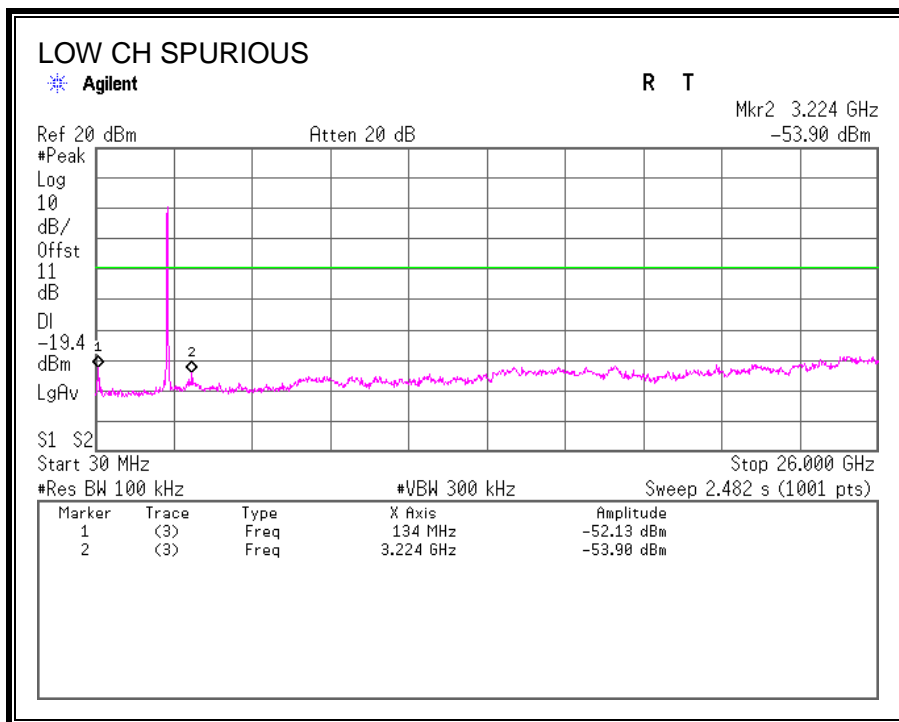
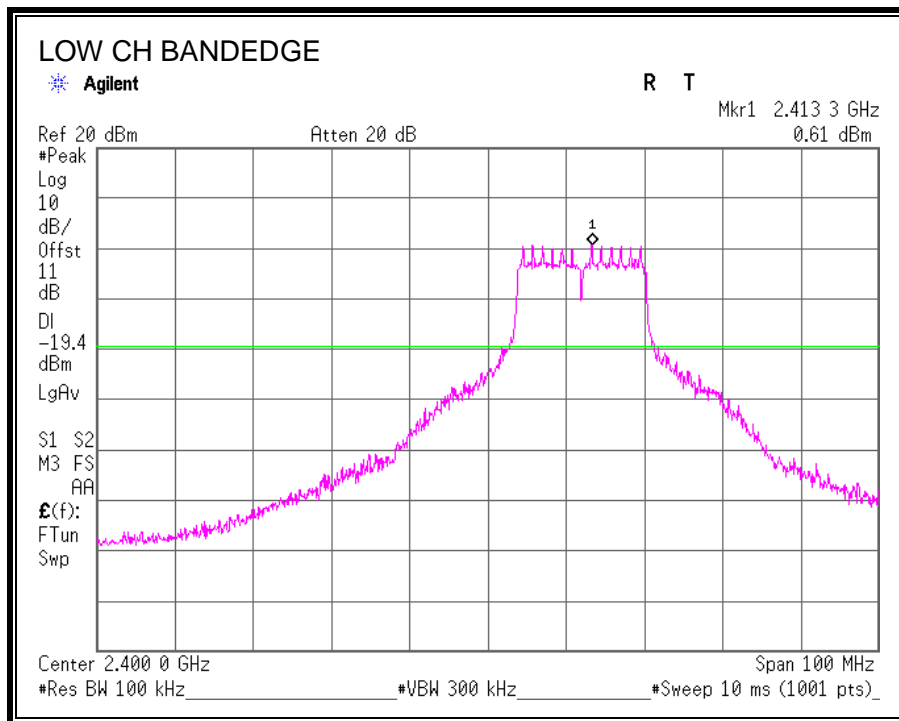
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

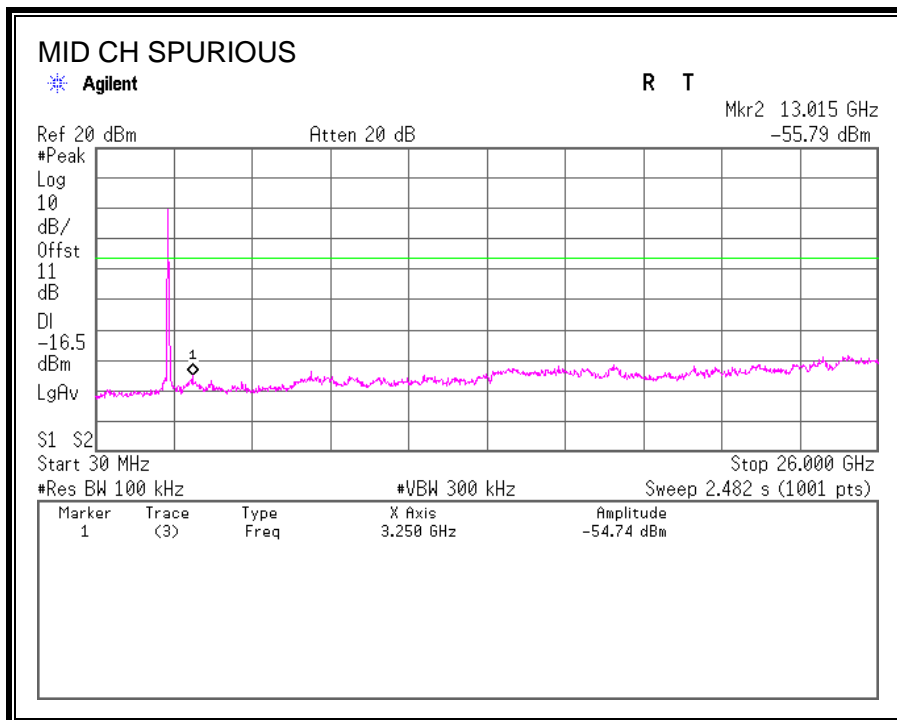
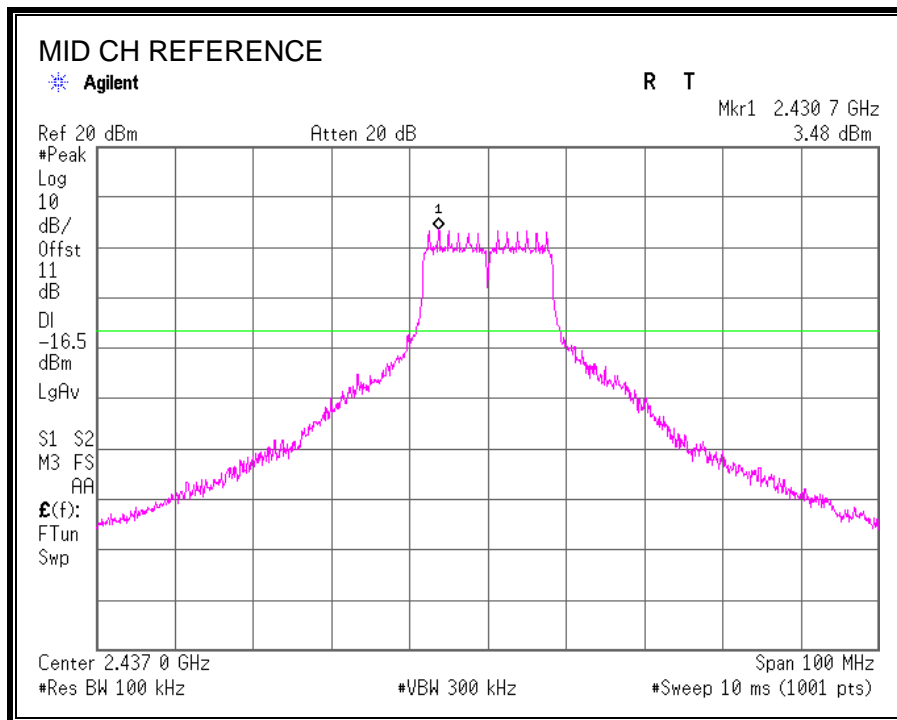
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

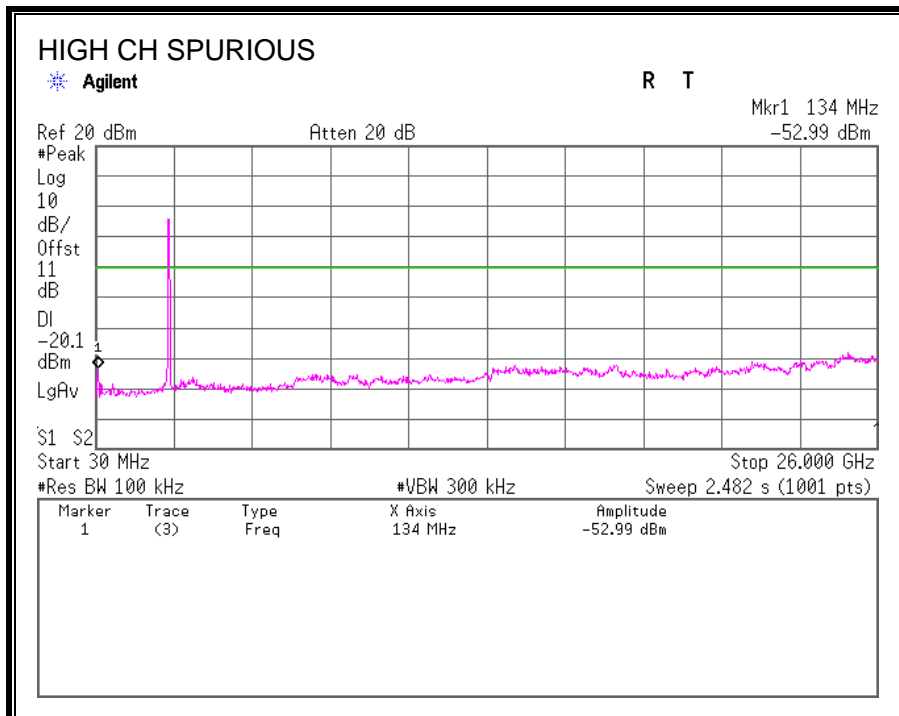
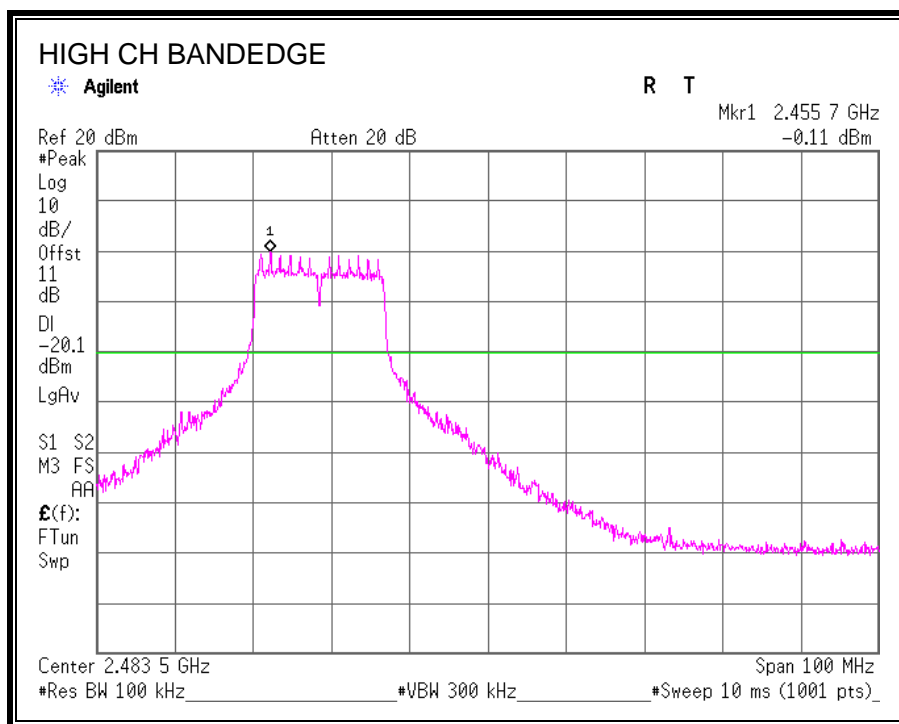
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.5 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

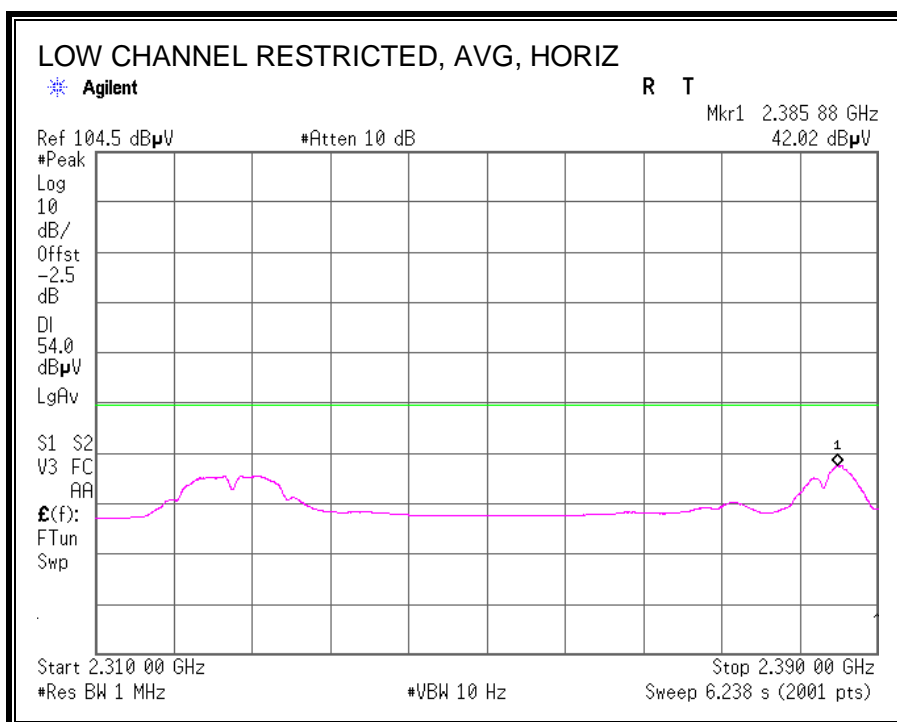
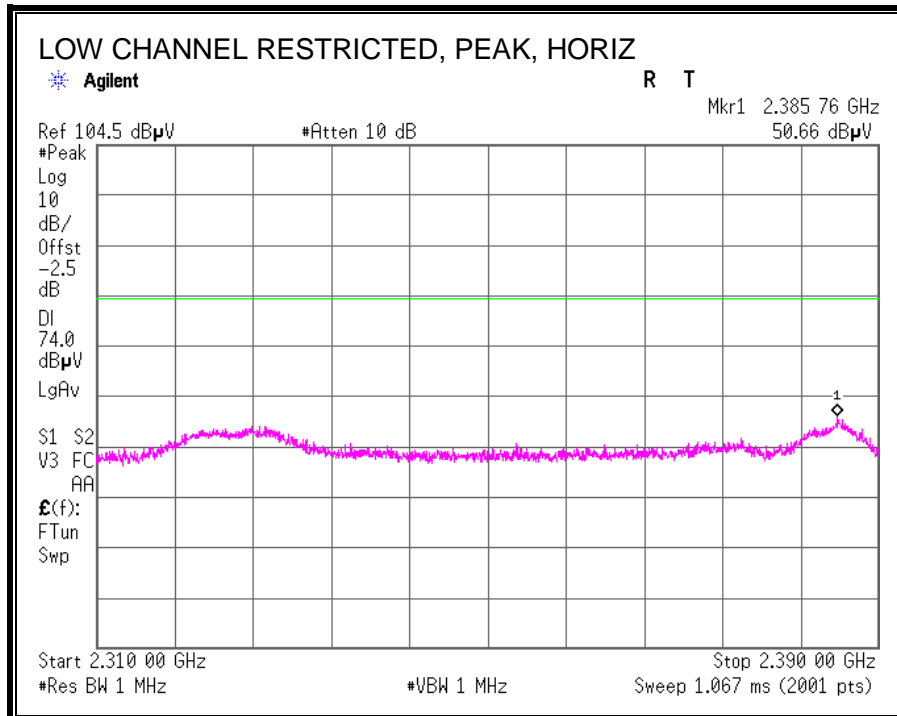
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

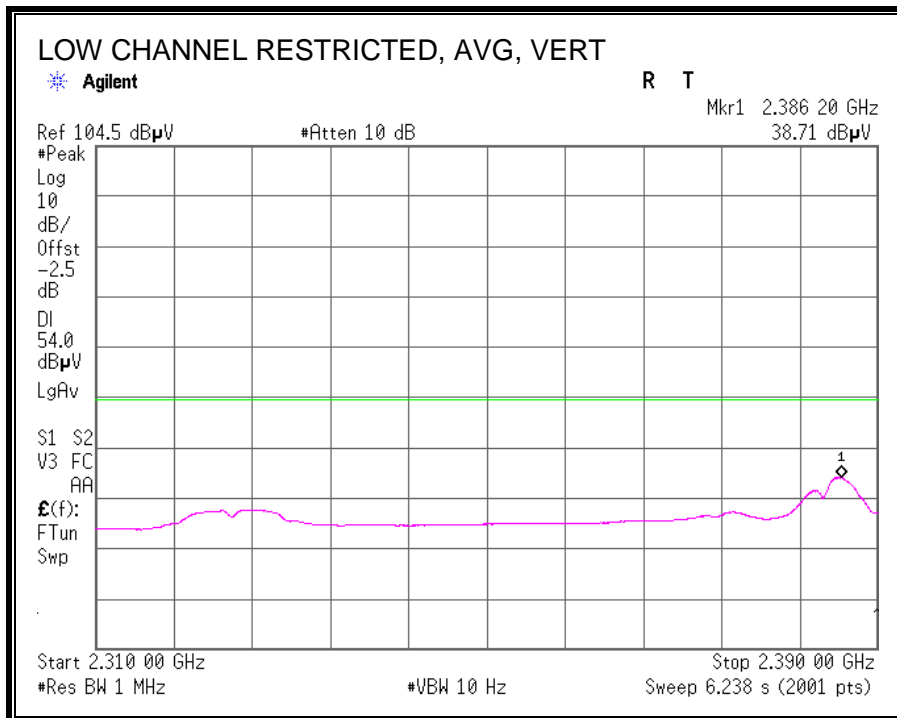
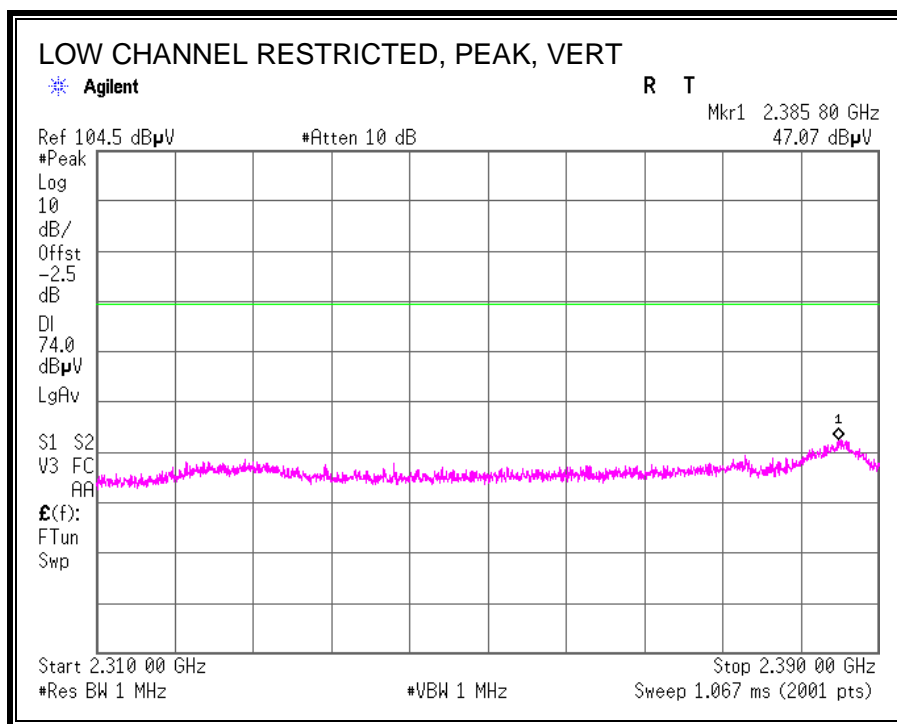
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. 802.11b MODE

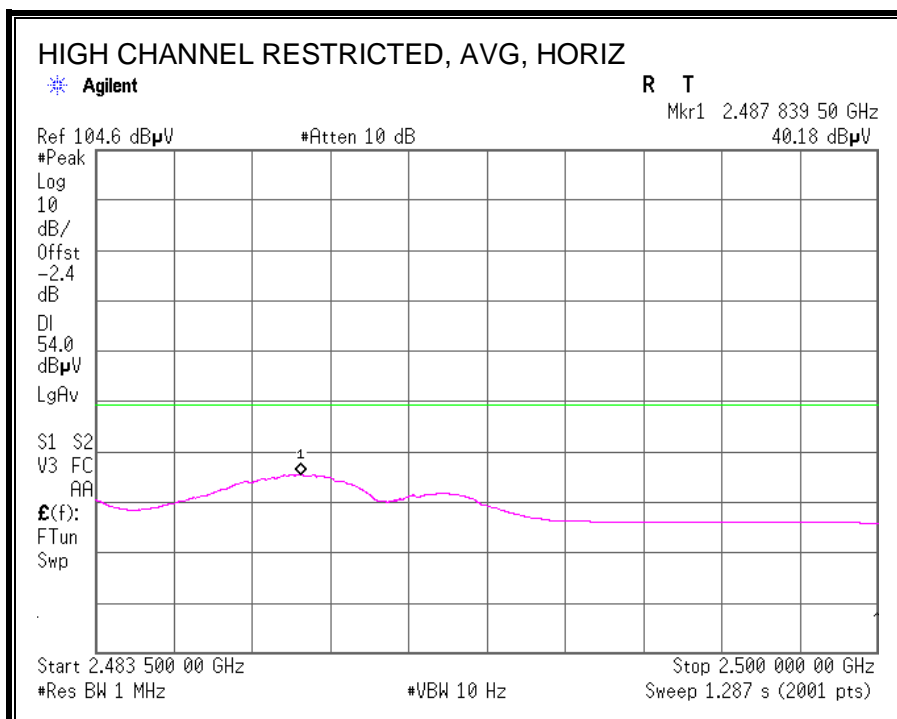
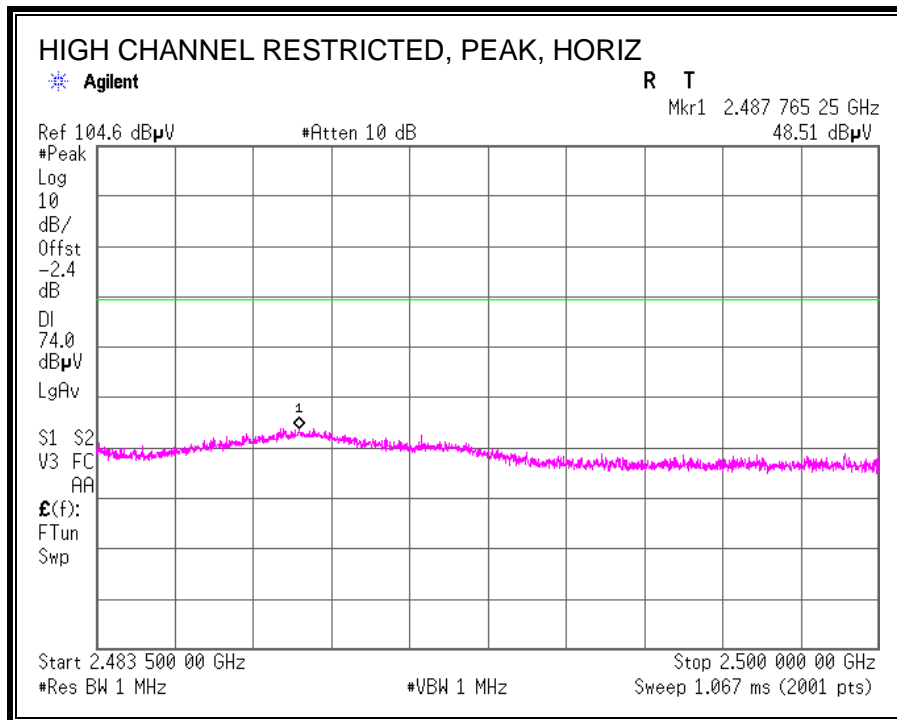
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



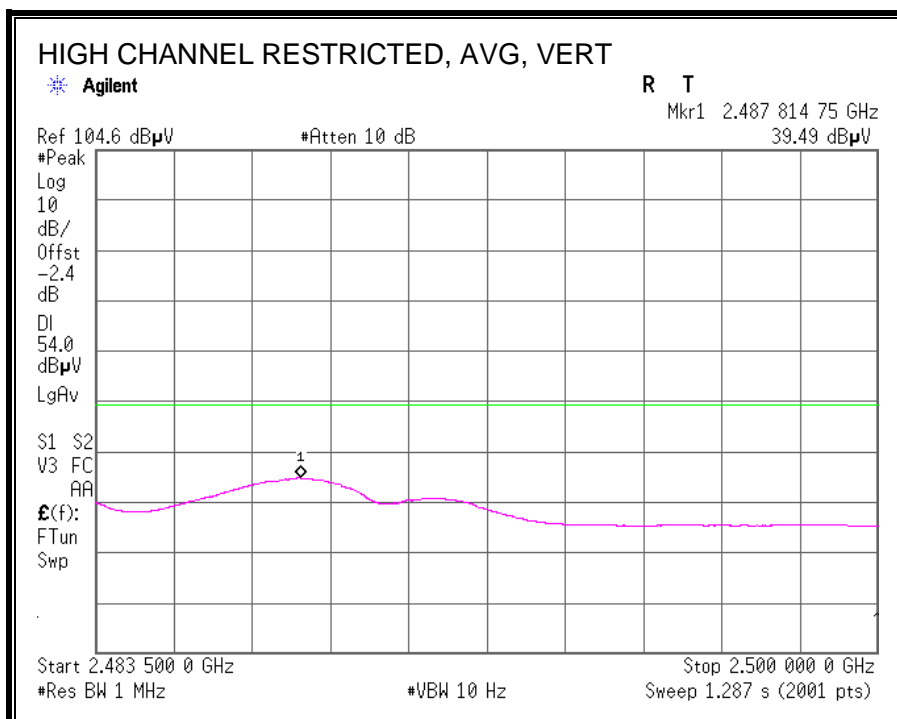
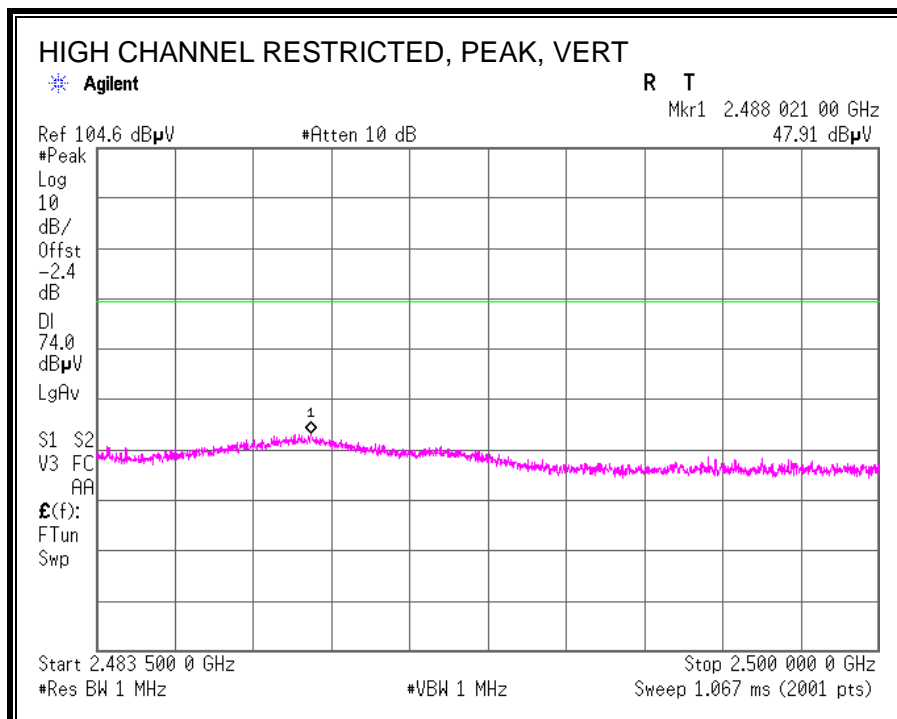
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
 Report No. 31KE0135-SH-A
 Date 06/20/2011 06/21/2011
 Temperature/ Humidity 24 deg. C / 62% RH 24 deg. C / 62% RH
 Engineer Takumi Shimada Takumi Shimada
 (1-10GHz) (Above 10GHz)
 Mode 11b Tx

LOW CH(2412MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2385.880	PK	53.1	27.2	2.5	32.2	50.6	74.0	-23.4	
Hori	2390.000	PK	47.6	27.2	2.5	32.2	45.1	74.0	-28.9	
Hori	2400.000	PK	58.3	27.2	2.5	32.2	55.8	74.0	-18.2	
Hori	4824.000	PK	46.6	30.9	5.2	31.4	51.3	74.0	-22.7	
Hori	2385.880	AV	44.2	27.2	2.5	32.2	41.7	54.0	-12.3	
Hori	2390.000	AV	35.6	27.2	2.5	32.2	33.1	54.0	-20.9	
Hori	2400.000	AV	51.9	27.2	2.5	32.2	49.4	54.0	-4.6	
Hori	4824.000	AV	40.5	30.9	5.2	31.4	45.2	54.0	-8.8	
Vert	2386.200	PK	50.8	27.2	2.5	32.2	48.3	74.0	-25.7	
Vert	2390.000	PK	46.4	27.2	2.5	32.2	43.9	74.0	-30.1	
Vert	2400.000	PK	55.9	27.2	2.5	32.2	53.4	74.0	-20.6	
Vert	4824.000	PK	45.8	30.9	5.2	31.4	50.5	74.0	-23.5	
Vert	2386.200	AV	41.4	27.2	2.5	32.2	38.9	54.0	-15.1	
Vert	2390.000	AV	33.8	27.2	2.5	32.2	31.3	54.0	-22.7	
Vert	2400.000	AV	50.2	27.2	2.5	32.2	47.7	54.0	-6.3	
Vert	4824.000	AV	40.9	30.9	5.2	31.4	45.6	54.0	-8.4	

MID CH(2437MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	50.8	31.0	3.7	31.4	54.1	74.0	-19.9	
Hori	4874.000	AV	47.9	31.0	3.7	31.4	51.2	54.0	-2.8	
Vert	4874.000	PK	49.6	31.0	5.1	31.4	54.3	74.0	-19.7	
Vert	4874.000	AV	46.2	31.0	5.1	31.4	50.9	54.0	-3.1	

HI CH(2462MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	48.3	27.2	2.6	32.2	45.9	74.0	-28.1	
Hori	2487.765	PK	51.6	27.2	2.6	32.2	49.2	74.0	-24.8	
Hori	4924.000	PK	50.8	31.2	5.1	31.4	55.7	74.0	-18.3	
Hori	2483.500	AV	37.0	27.2	2.6	32.2	34.6	54.0	-19.4	
Hori	2487.765	AV	42.6	27.2	2.6	32.2	40.2	54.0	-13.8	
Hori	4924.000	AV	47.5	31.2	5.1	31.4	52.4	54.0	-1.6	
Vert	2483.500	PK	48.8	27.2	2.6	32.2	46.4	74.0	-27.6	
Vert	2488.021	PK	50.4	27.2	2.6	32.2	48.0	74.0	-26.0	
Vert	4924.000	PK	51.3	31.2	5.1	31.4	56.2	74.0	-17.8	
Vert	2483.500	AV	36.7	27.2	2.6	32.2	34.3	54.0	-19.7	
Vert	2488.021	AV	41.1	27.2	2.6	32.2	38.7	54.0	-15.3	
Vert	4924.000	AV	48.4	31.2	5.1	31.4	53.3	54.0	-0.7	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

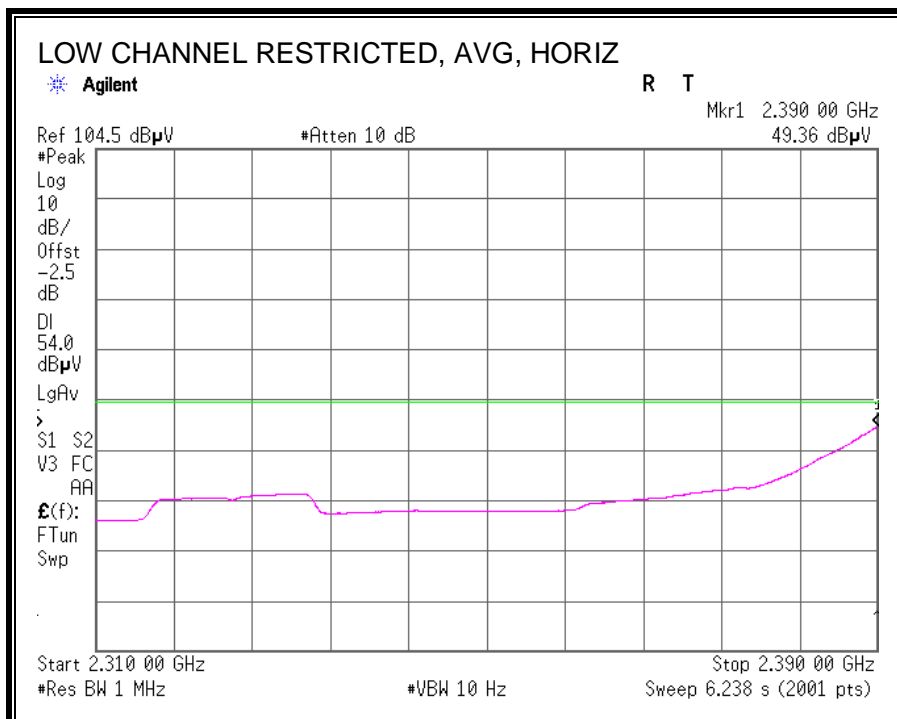
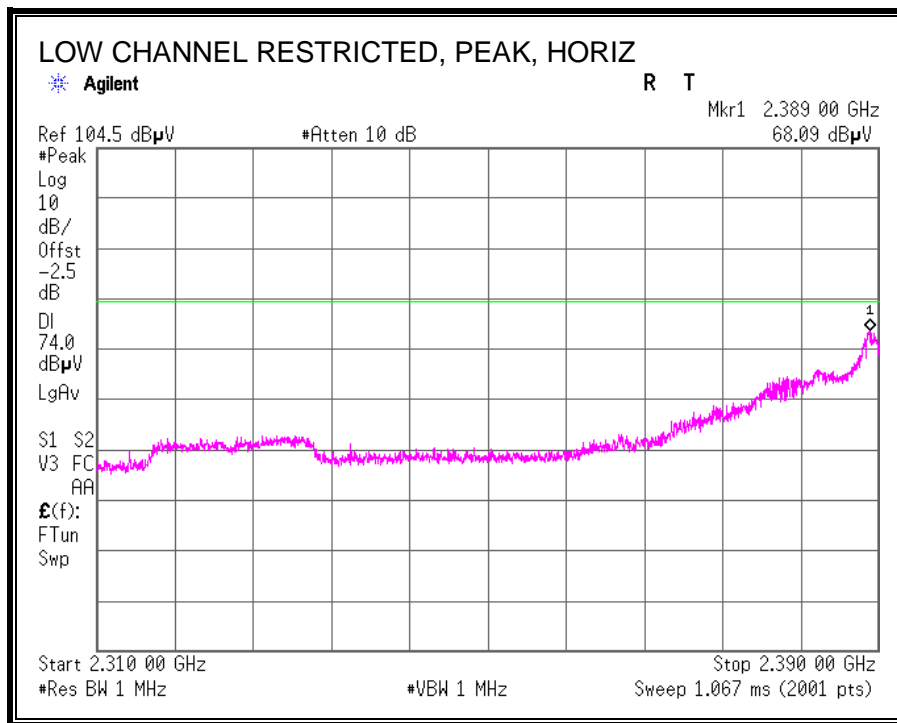
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

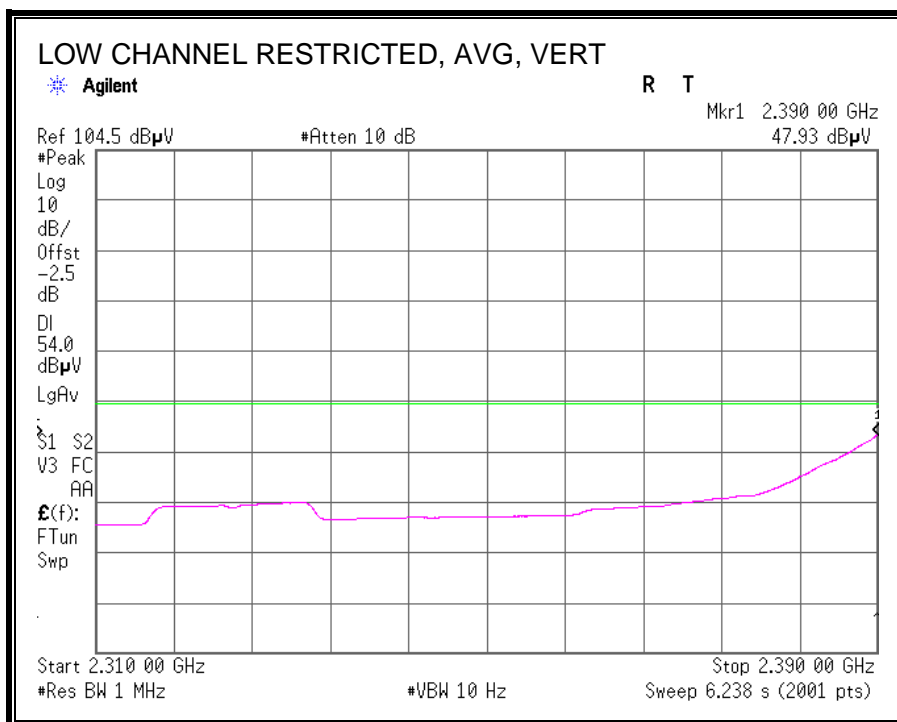
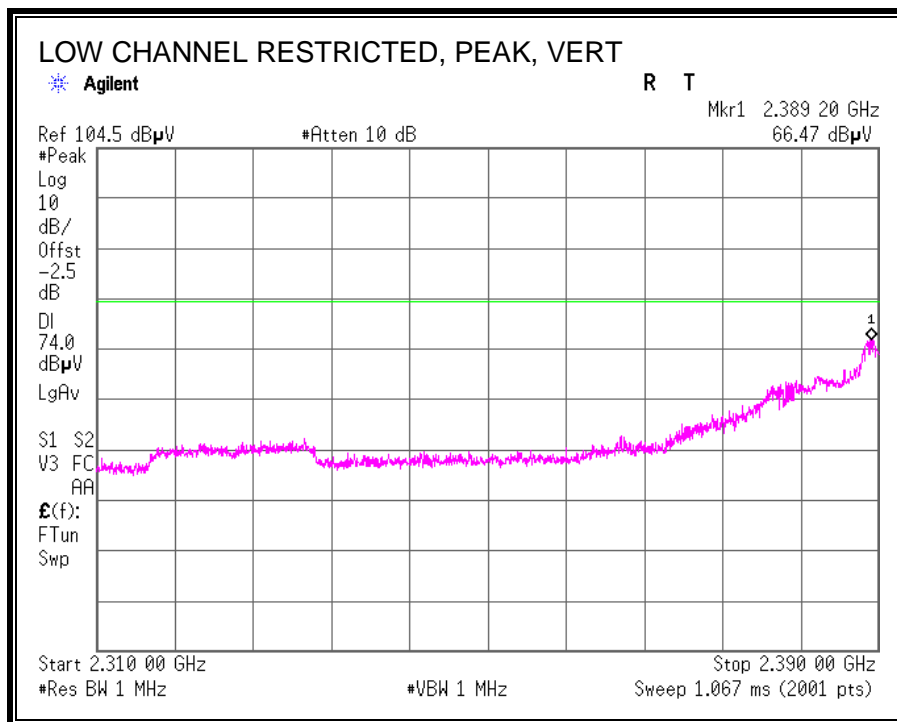
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

8.2.2. 802.11g MODE

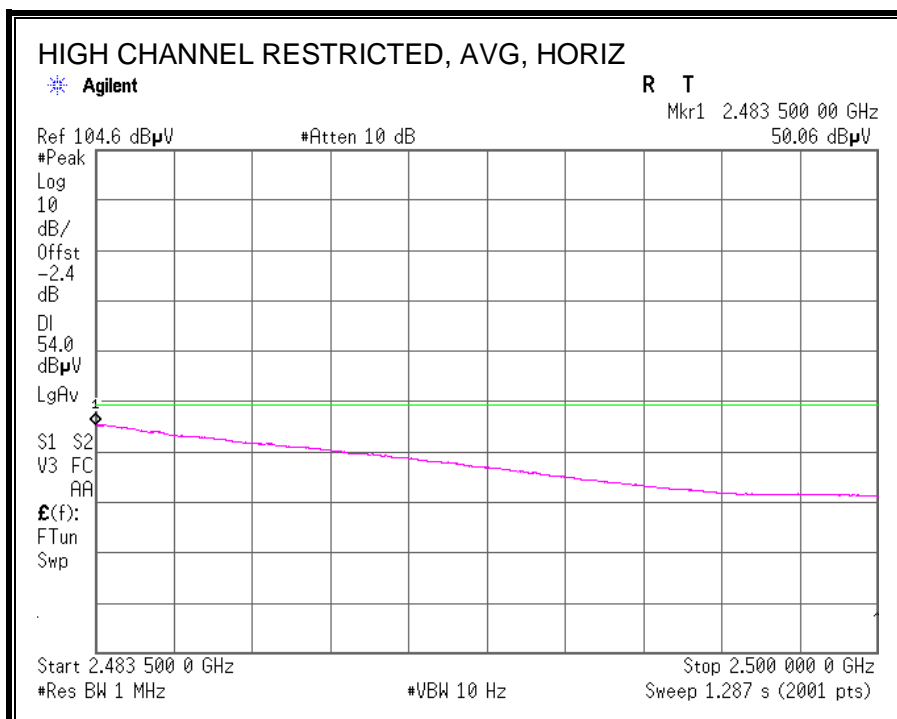
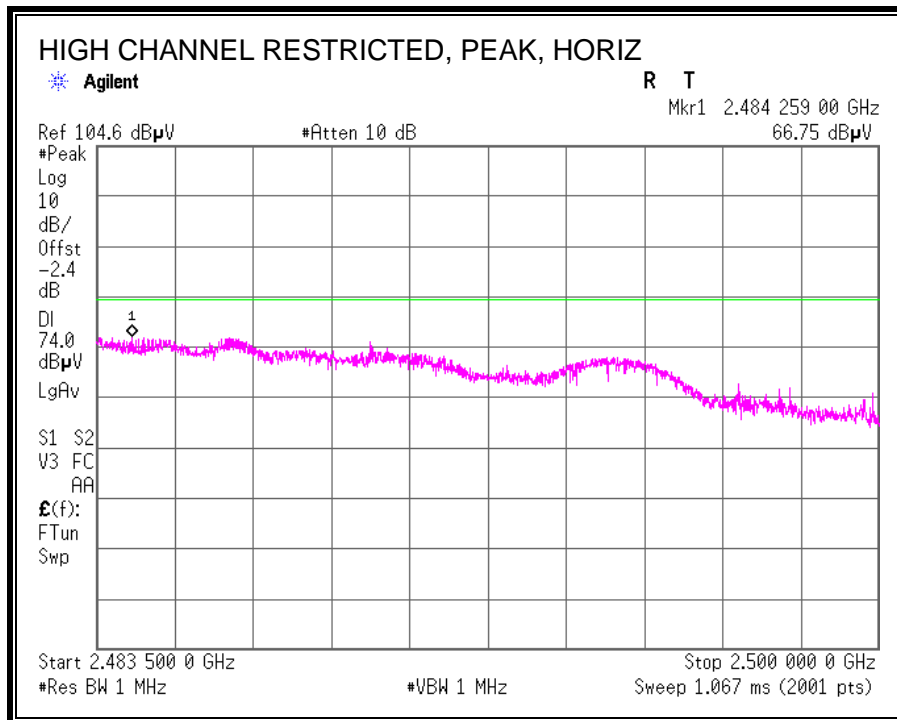
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



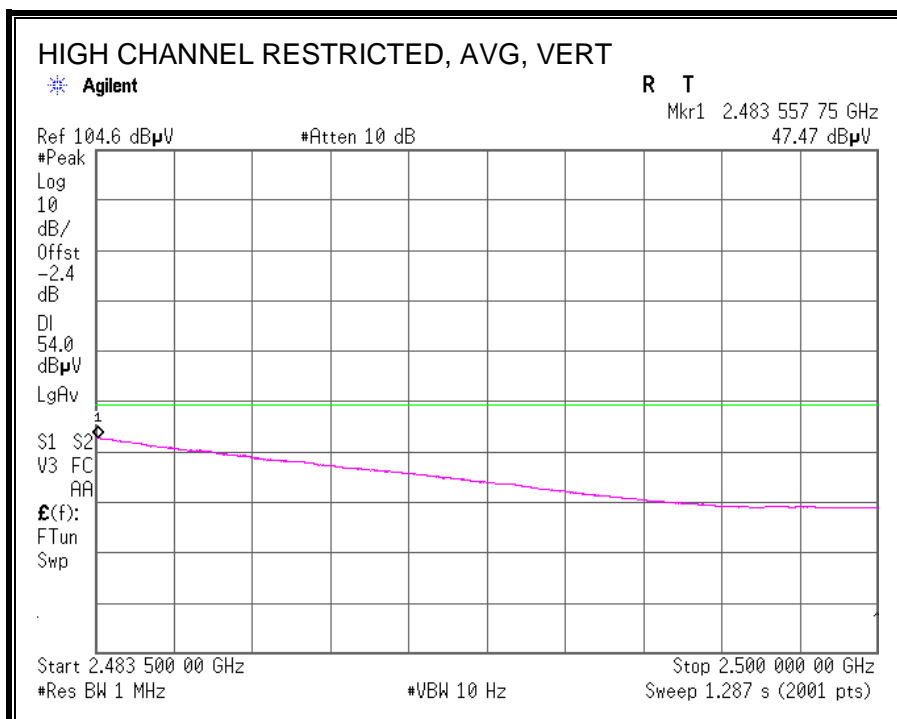
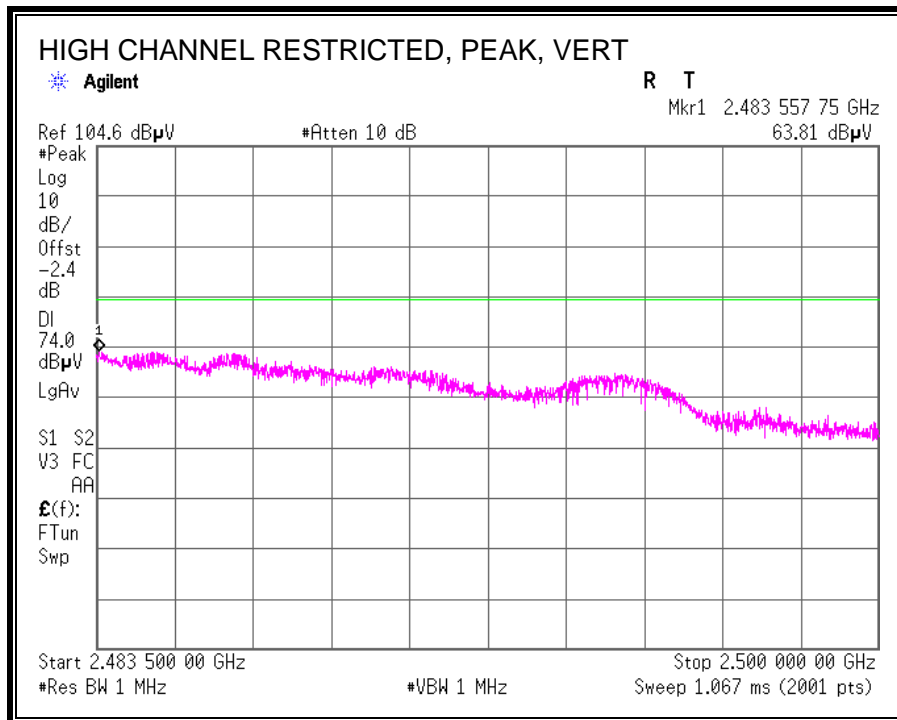
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
 Report No. 31KE0135-SH-A
 Date 06/20/2011 06/21/2011
 Temperature/ Humidity 24 deg. C / 62% RH 24 deg. C / 62% RH
 Engineer Takumi Shimada Takumi Shimada
 (1-10GHz) (Above 10GHz)
 Mode 11g Tx

LOW CH(2412MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2389.000	PK	70.8	27.2	2.5	32.2	68.3	74.0	-5.7	See 20dBc Data Sheet
Hori	2390.000	PK	70.2	27.2	2.5	32.2	67.7	74.0	-6.3	
Hori	2400.000	PK	86.0	27.2	2.5	32.2	83.5	-	-	
Hori	4824.000	PK	43.7	30.9	5.2	31.4	48.4	74.0	-25.6	
Hori	2389.000	AV	52.8	27.2	2.5	32.2	50.3	54.0	-3.7	See 20dBc Data Sheet
Hori	2390.000	AV	54.1	27.2	2.5	32.2	51.6	54.0	-2.4	
Hori	2400.000	AV	66.4	27.2	2.5	32.2	63.9	-	-	
Hori	4824.000	AV	31.2	30.9	5.2	31.4	35.9	54.0	-18.1	
Vert	2389.200	PK	69.3	27.2	2.5	32.2	66.8	74.0	-7.2	See 20dBc Data Sheet
Vert	2390.000	PK	68.2	27.2	2.5	32.2	65.7	74.0	-8.3	
Vert	2400.000	PK	84.9	27.2	2.5	32.2	82.4	-	-	
Vert	4824.000	PK	43.2	30.9	5.2	31.4	47.9	74.0	-26.1	
Vert	2389.200	AV	48.9	27.2	2.5	32.2	46.4	54.0	-7.6	See 20dBc Data Sheet
Vert	2390.000	AV	49.9	27.2	2.5	32.2	47.4	54.0	-6.6	
Vert	2400.000	AV	60.0	27.2	2.5	32.2	57.5	-	-	
Vert	4824.000	AV	29.7	30.9	5.2	31.4	34.4	54.0	-19.6	

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	97.6	27.2	2.5	32.2	95.1	-	-	Carrier
Hori	2400.000	PK	69.8	27.2	2.5	32.2	67.3	75.1	-7.8	
Vert	2412.000	PK	96.5	27.2	2.5	32.2	94.0	-	-	Carrier
Vert	2400.000	PK	68.5	27.2	2.5	32.2	66.0	74.0	-8.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

MID CH(2437MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	49.0	31.0	5.1	31.4	53.7	74.0	-20.3	
Hori	4874.000	AV	36.2	31.0	5.1	31.4	40.9	54.0	-13.1	
Vert	4874.000	PK	47.8	31.0	5.1	31.4	52.5	74.0	-21.5	
Vert	4874.000	AV	35.1	31.0	5.1	31.4	39.8	54.0	-14.2	

HI CH(2462MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	69.2	27.2	2.6	32.2	66.8	74.0	-7.2	
Hori	2484.259	PK	70.4	27.2	2.6	32.2	68.0	74.0	-6.0	
Hori	4924.000	PK	52.0	31.2	5.1	31.4	56.9	74.0	-17.1	
Hori	2483.500	AV	51.8	27.2	2.6	32.2	49.4	54.0	-4.6	
Hori	2484.259	AV	51.2	27.2	2.6	32.2	48.8	54.0	-5.2	
Hori	4924.000	AV	38.0	31.2	5.1	31.4	42.9	54.0	-11.1	
Vert	2483.500	PK	66.6	27.2	2.6	32.2	64.2	74.0	-9.8	
Vert	2483.558	PK	66.4	27.2	2.6	32.2	64.0	74.0	-10.0	
Vert	4924.000	PK	49.1	31.2	5.1	31.4	54.0	74.0	-20.0	
Vert	2483.500	AV	49.3	27.2	2.6	32.2	46.9	54.0	-7.1	
Vert	2483.558	AV	49.3	27.2	2.6	32.2	46.9	54.0	-7.1	
Vert	4924.000	AV	36.8	31.2	5.1	31.4	41.7	54.0	-12.3	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

8.3. RECEIVER ABOVE 1 GHz

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
 Report No. 31KE0135-SH-A
 Date 06/21/2011
 Temperature/ Humidity 24 deg. C / 62% RH
 Engineer Takayuki Shimada
 Mode Rx

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2437.000	PK	43.2	27.2	2.5	32.2	40.7	74.0	-33.3	
Hori	2437.000	PK	31.6	27.2	2.5	32.2	29.1	74.0	-44.9	
Vert	2437.000	PK	43.2	27.2	2.5	32.2	40.7	74.0	-33.3	
Vert	2437.000	PK	31.6	27.2	2.5	32.2	29.1	74.0	-44.9	

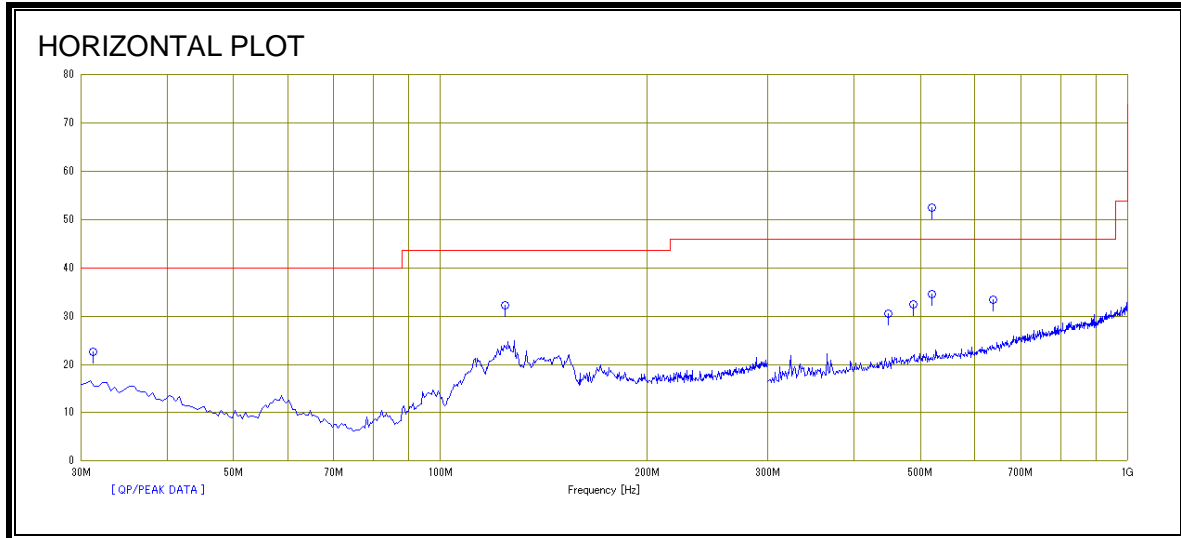
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

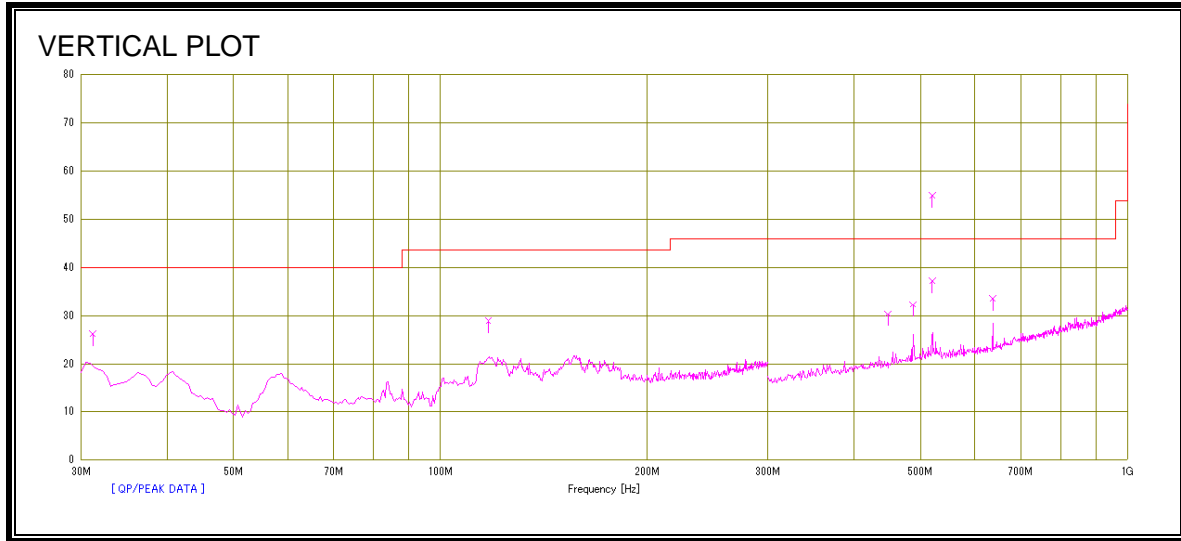
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

8.4. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



RADIATED EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



RADIATED EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
 Report No. 31KE0135-SH-A
 Date 06/21/2011
 Temperature/ Humidity 24 deg. C / 62% RH
 Engineer Takayuki Shimada
 Mode Tx

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	520.002	QP	36.2	19.4	11.1	32.1	34.6	46.0	-11.4	
Hori	31.215	PK	30.2	17.6	7.0	32.2	22.6	40.0	-17.4	
Hori	124.105	PK	42.7	13.3	8.3	32.1	32.2	43.5	-11.3	
Hori	448.501	PK	33.5	18.4	10.7	32.1	30.5	46.0	-15.5	
Hori	487.501	PK	34.7	19.0	10.9	32.1	32.5	46.0	-13.5	
Hori	637.002	PK	33.1	20.8	11.7	32.2	33.4	46.0	-12.6	
Vert	520.002	QP	38.8	19.4	11.1	32.1	37.2	46.0	-8.8	
Vert	31.215	PK	33.8	17.6	7.0	32.2	26.2	40.0	-13.8	
Vert	117.538	PK	40.0	12.7	8.2	32.1	28.8	43.5	-14.7	
Vert	448.501	PK	33.3	18.4	10.7	32.1	30.3	46.0	-15.7	
Vert	487.501	PK	34.4	19.0	10.9	32.1	32.2	46.0	-13.8	
Vert	637.002	PK	33.2	20.8	11.7	32.2	33.5	46.0	-12.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz $20\log(3.0m/1.0m)= 9.5dB$
 26.5GHz-40GHz $20\log(3.0m/0.5m)=15.6dB$

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.4

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

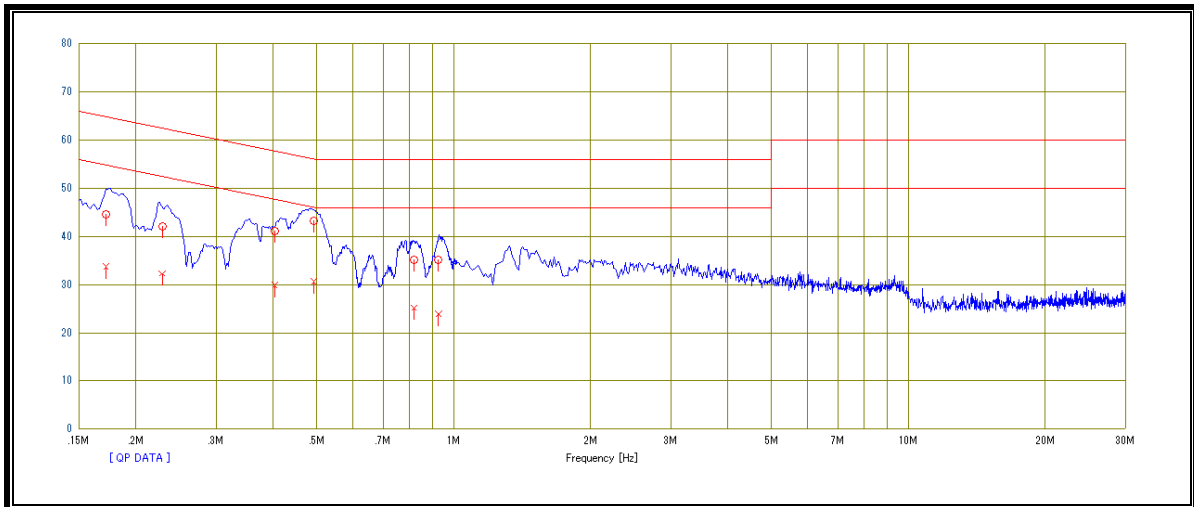
ANSI C63.4

RESULTS

6 WORST EMISSIONS

Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.17190	31.5	20.6	13.1	44.6	33.7	64.9	54.9	-20.3	-21.2	N	
0.22870	28.8	18.9	13.3	42.1	32.2	62.5	52.5	-20.4	-20.3	N	
0.40415	27.8	16.5	13.3	41.1	29.8	57.8	47.8	-16.7	-18.0	N	
0.49215	30.0	17.3	13.3	43.3	30.6	56.1	46.1	-12.8	-15.5	N	
0.81733	21.8	11.8	13.3	35.1	25.1	56.0	46.0	-20.9	-20.9	N	
0.92615	21.8	10.6	13.3	35.1	23.9	56.0	46.0	-20.9	-22.1	N	
0.17125	28.4	19.2	13.1	41.5	32.3	64.9	54.9	-23.4	-22.6	L	
0.22890	28.3	17.8	13.3	41.6	31.1	62.5	52.5	-20.9	-21.4	L	
0.40410	26.6	15.4	13.3	39.9	28.7	57.8	47.8	-17.9	-19.1	L	
0.49225	29.3	16.5	13.3	42.6	29.8	56.1	46.1	-13.5	-16.3	L	
0.81745	20.9	11.1	13.3	34.2	24.4	56.0	46.0	-21.8	-21.6	L	
0.92615	20.9	9.9	13.3	34.2	23.2	56.0	46.0	-21.8	-22.8	L	

LINE 1 RESULTS



LINE 2 RESULTS

