FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7
CERTIFICATION TEST REPORT

FOR

WIFI MODULE

MODEL NUMBER: DWM-W014

REPORT NUMBER: 07J11256-1

ISSUE DATE: OCTOBER 1, 2007

Prepared for
MITSUMI ELECTRIC CO., LTD.
1601 SAKAI, ATSUGI-SHI
KANAGAWA, 243-8533, JAPAN

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/01/2007	Initial Issue	M. Heckrotte

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MITSUMI ELECTRIC CO., LTD.
1601 SAKAI, ATSUGI-SHI
KANAGAWA, 243-8533, JAPAN

EUT DESCRIPTION: WIFI MODULE

MODEL: DWM-W014

SERIAL NUMBER: 00A0968007E0

DATE TESTED: SEPTEMBER 17 - 21, 2007

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	No Non-Compliance Noted
RSS-210 Issue 7 Annex 8 and RSS-GEN Issue 2	No Non-Compliance Noted

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. 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 Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

MICHAEL HECKROTTE
ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

VIEN TRAN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

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 2, and RSS-210 Issue 7.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

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. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11b/g transceiver operating in the 2400-2484 MHz band.

The radio module is manufactured by Mitsumi Electric Co.

The radio module uses Broadcom chipset.
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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	18.74	74.82
2412 - 2462	802.11g	19.09	81.10

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two different antenna types. These are Dipole (MITSUMI_DCA-E04) with gain of 2.21 dBi and Inverted-F (Parrot_PIFA double connect2) with gain of 1.38 dBi, or Inverted-F (Parrot_PIFA connect1) with gain of 1.05 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing was BCMWL5.SYS: Ver. 4.10.34.2.

The test utility software used during testing was WL_TOOL: Ver 4.10 R50.0 and epi_ttcp: Ver. 3.8.

5.5. WORST-CASE CONFIGURATION AND MODE

For b and g mode all data were taken at 1Mb/s and 6Mb/s respectively. And the worst-case channel is determined as the channel with the highest output power.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	**Manufacturer**	**Model**	**Serial Number**
Desktop PC	Dell	DHM	FNC491X
Keyboard	Dell	SK-8110	CN-07N247-71616-442-OKFL
Mouse	Dell	M-UR69	LM3230699
Monitor	LG	L1750S	512MXWE0A763

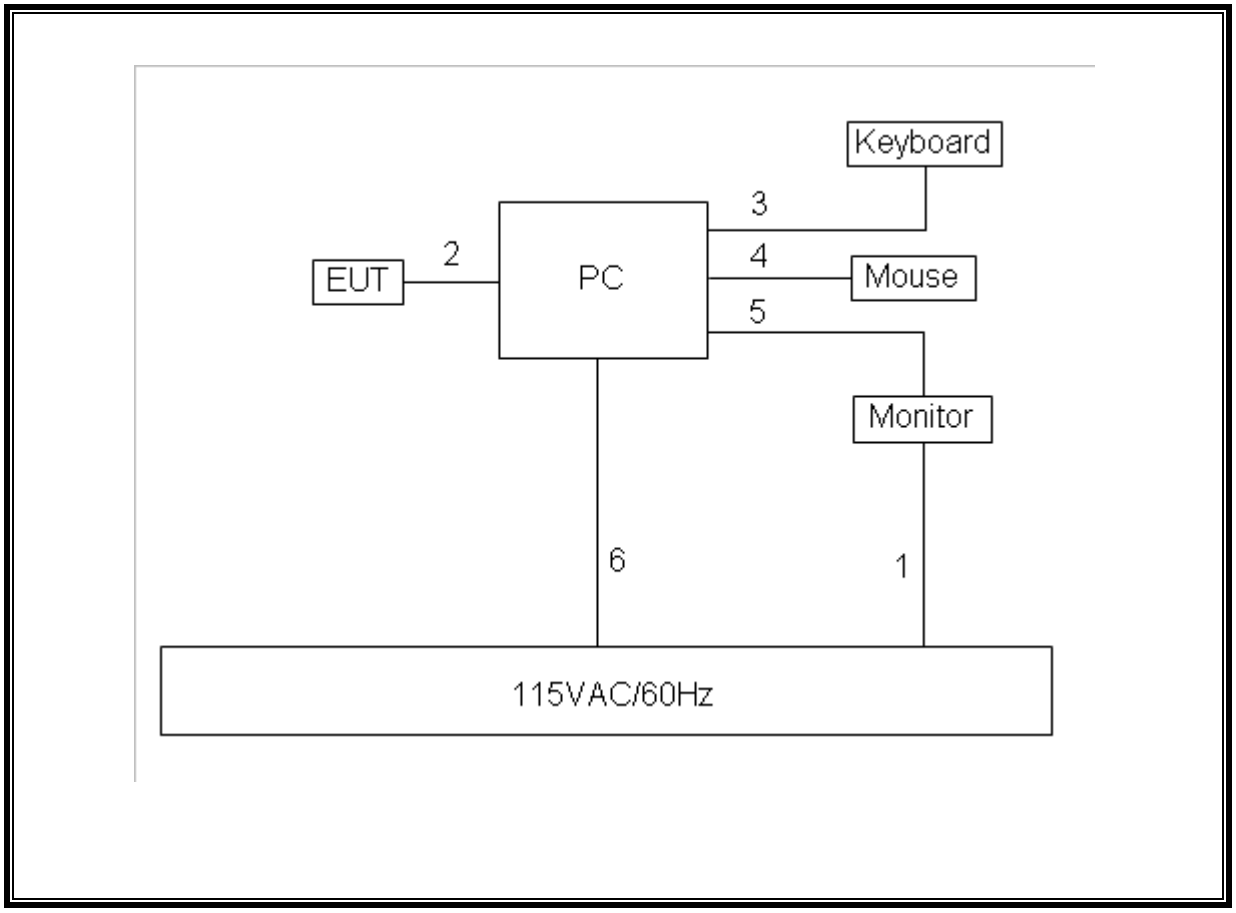
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	N/A
2	20 Pins	1	Ribbon cable	Un-shielded	0.5m	N/A
3	Keyboard	1	PS/2	Un-shielded	2m	N/A
4	Mouse	1	PS/2	Shielded	2m	N/A
5	Video	1	Monitor	Un-shielded	2m	One Ferrite at each end
6	AC	1	US 115V	Un-shielded	2m	N/A

TEST SETUP

During the testing process the EUT was connected to the PC via extender card and the software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
Spectrum Analyzer	HP	E4446A	US42510266	10/18/2007
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	4/15/2008
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	10/3/2007
Peak Power Meter	Agilent	E4416A	GB41291160	12/2/2007
Peak / Average Power Sensor	Agilent	E9327A	US40440755	12/2/2007
30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	10/13/2007
Quasi-Peak Adaptor	HP	85650A	3145A01654	1/21/2008
SA Display Section 2	HP	85662A	2816A16696	4/7/2008
SA RF Section, 1.5 GHz	HP	85680B	2814A04227	1/7/2008
Preamp 30-1000MHz	Sonoma	310N	185623	1/20/2008
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25	2023	9/15/2008
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-B	8379443	9/15/2008
EMI Test Receiver	R & S	ESHS 20	827129/006	1/27/2008

7. CHANNEL 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.

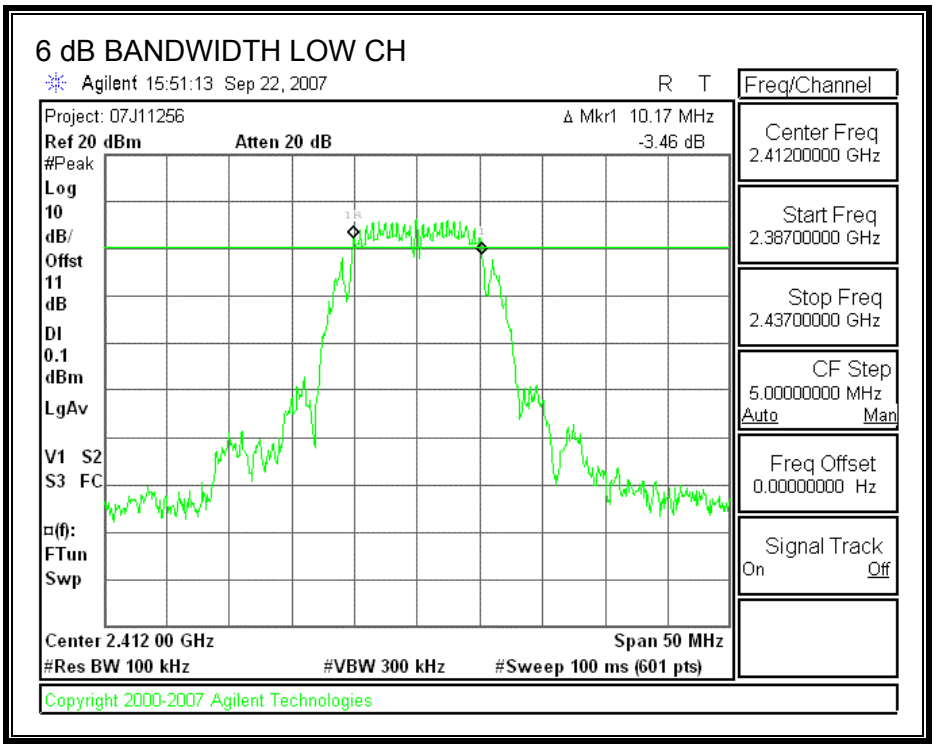
TEST PROCEDURE

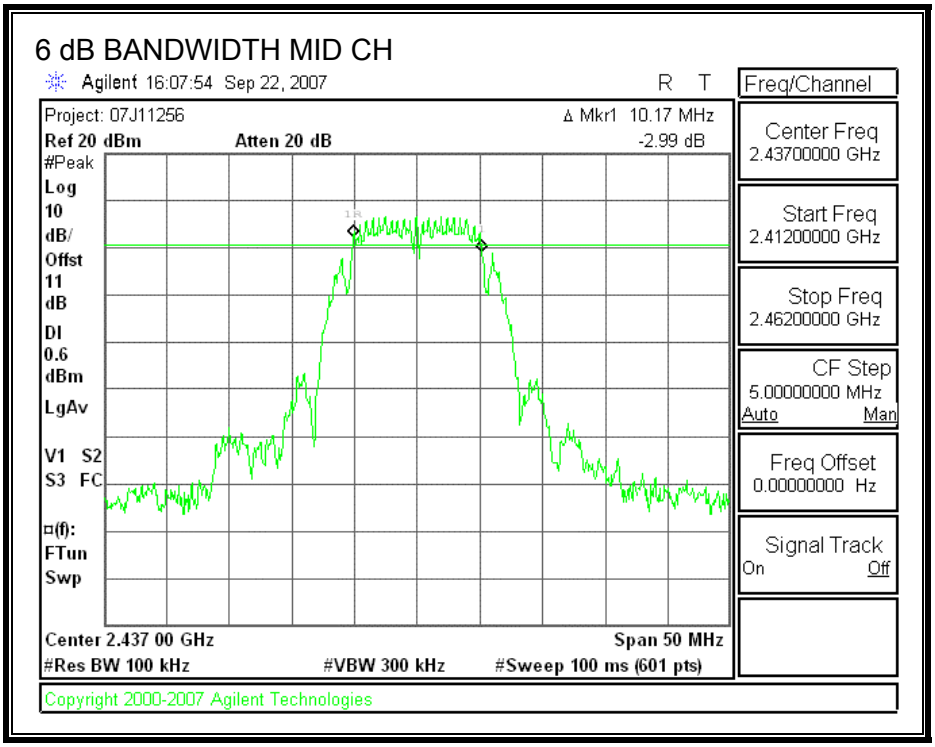
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

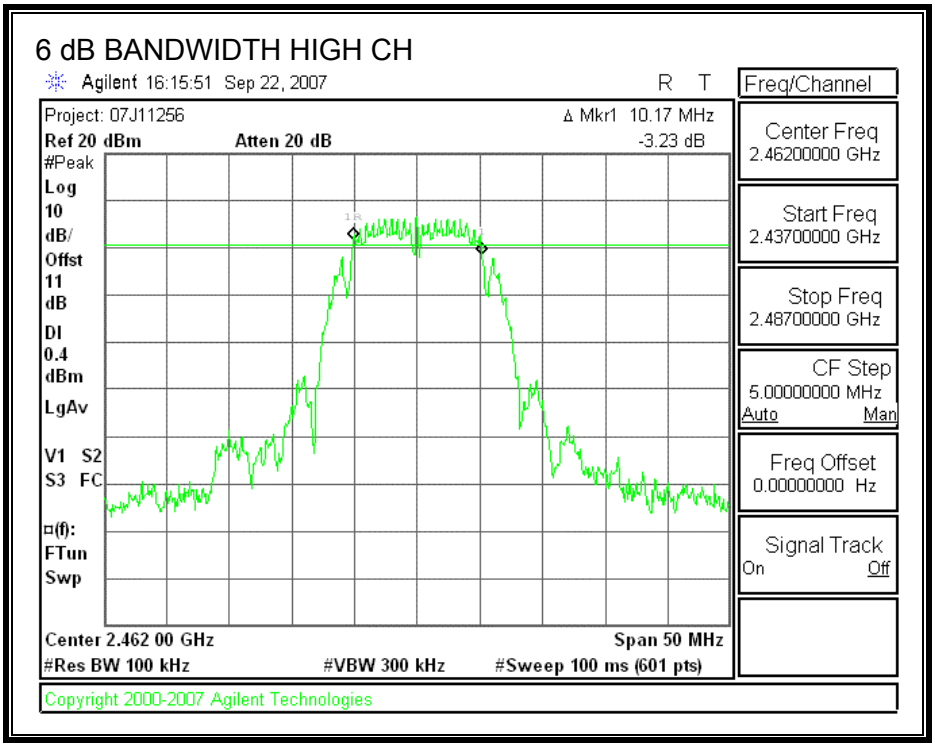
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	10.17	0.5
Middle	2437	10.17	0.5
High	2462	10.17	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

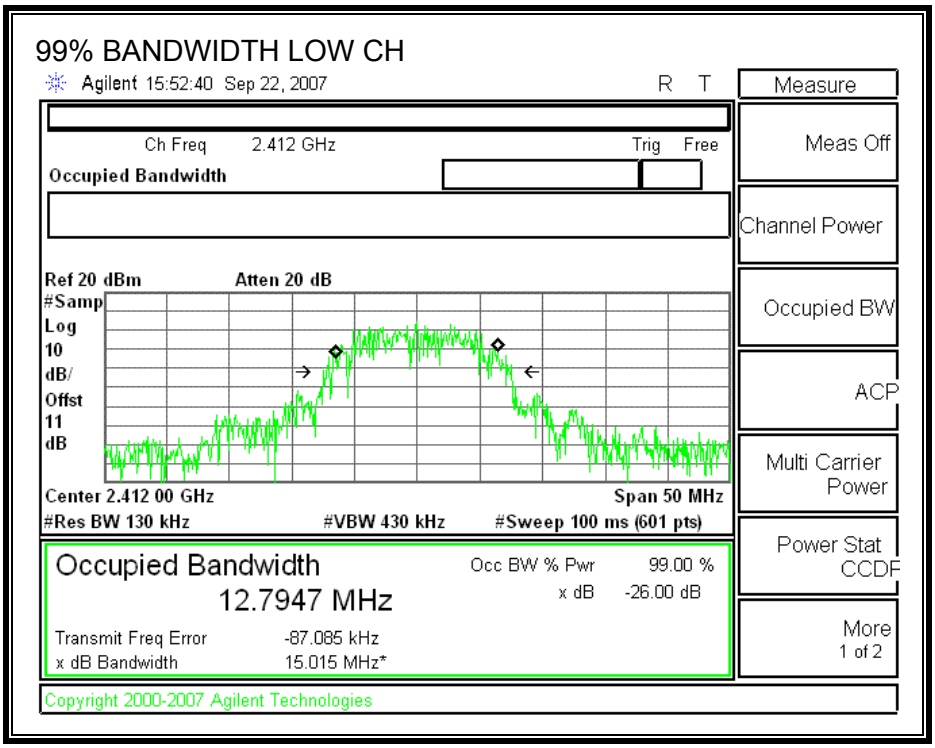
TEST PROCEDURE

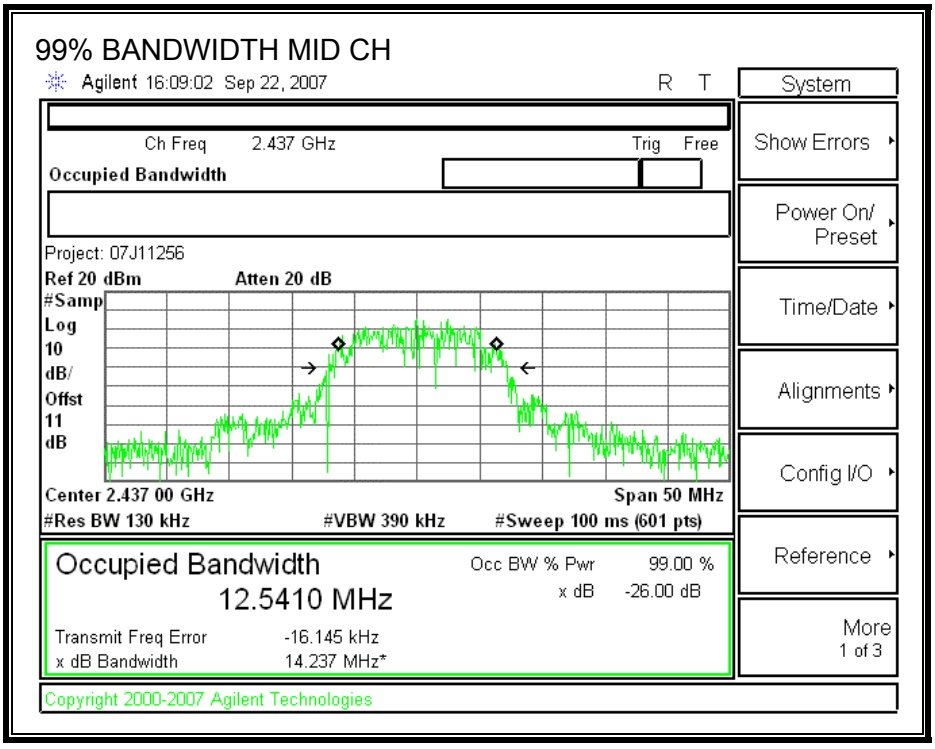
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

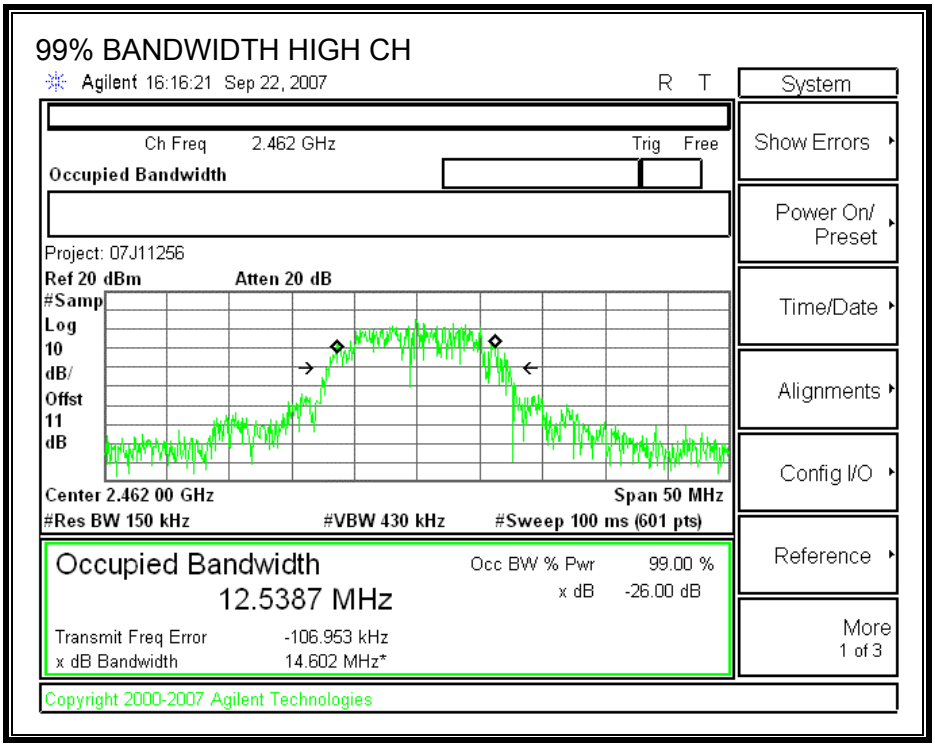
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	12.7947
Middle	2437	12.5410
High	2462	12.5387

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.

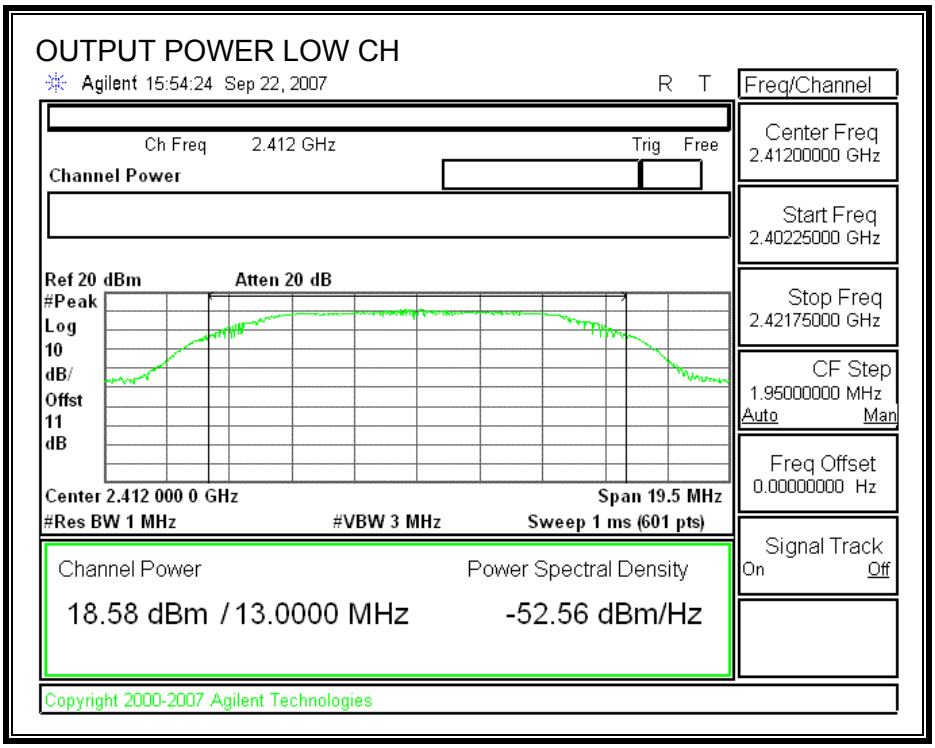
TEST PROCEDURE

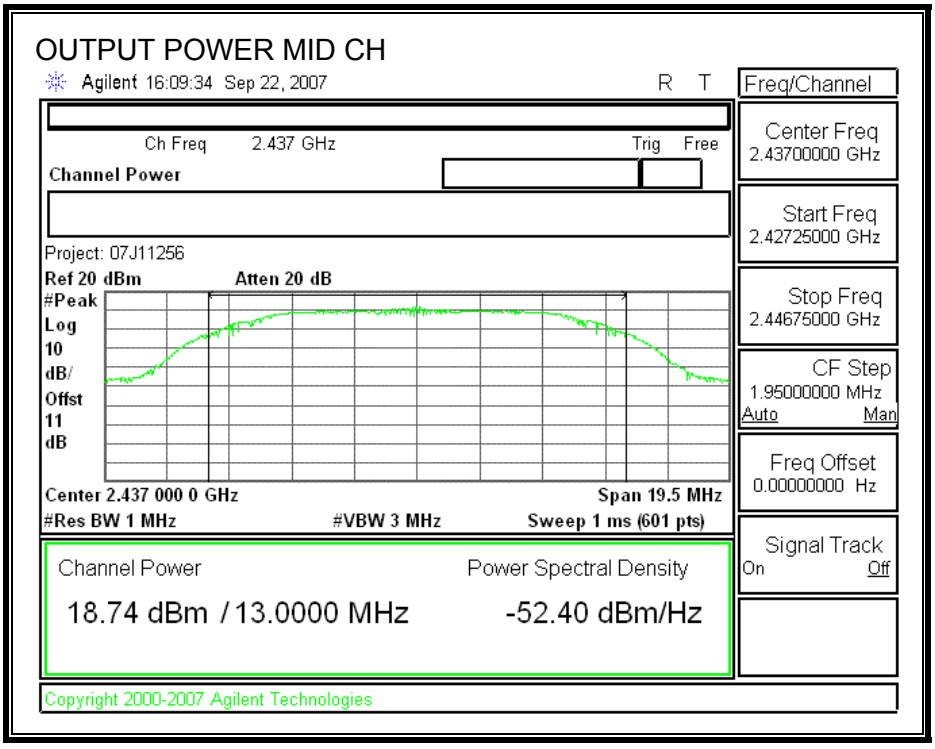
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

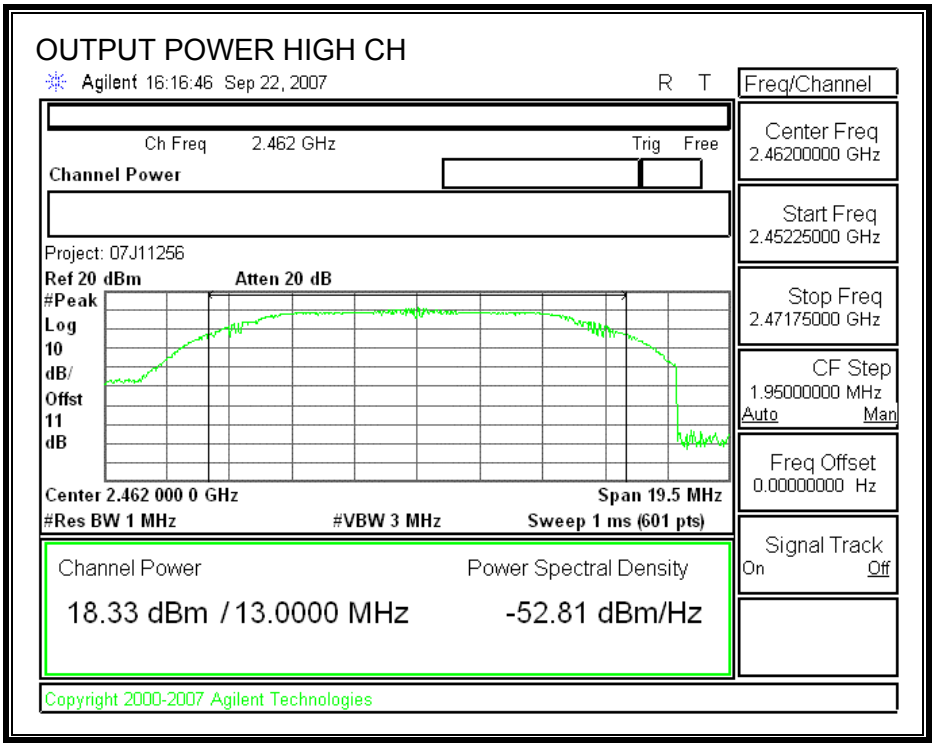
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	18.58	30	-11.42
Middle	2437	18.74	30	-11.26
High	2462	18.33	30	-11.67

OUTPUT POWER







7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 10 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	16.21
Middle	2437	16.24
High	2462	16.15

7.1.5. 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.

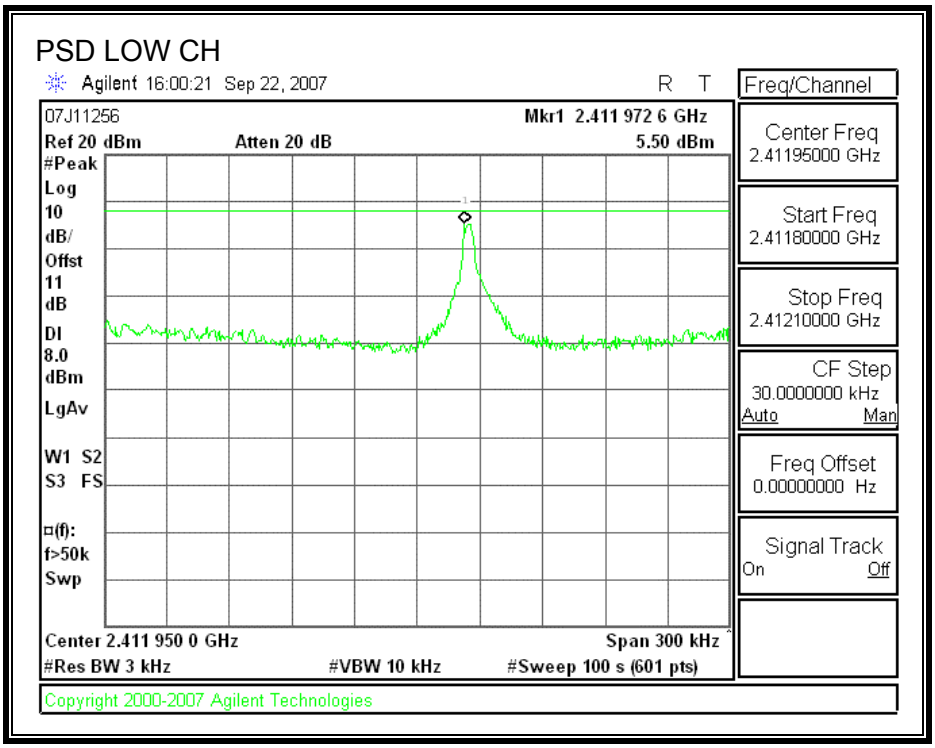
TEST PROCEDURE

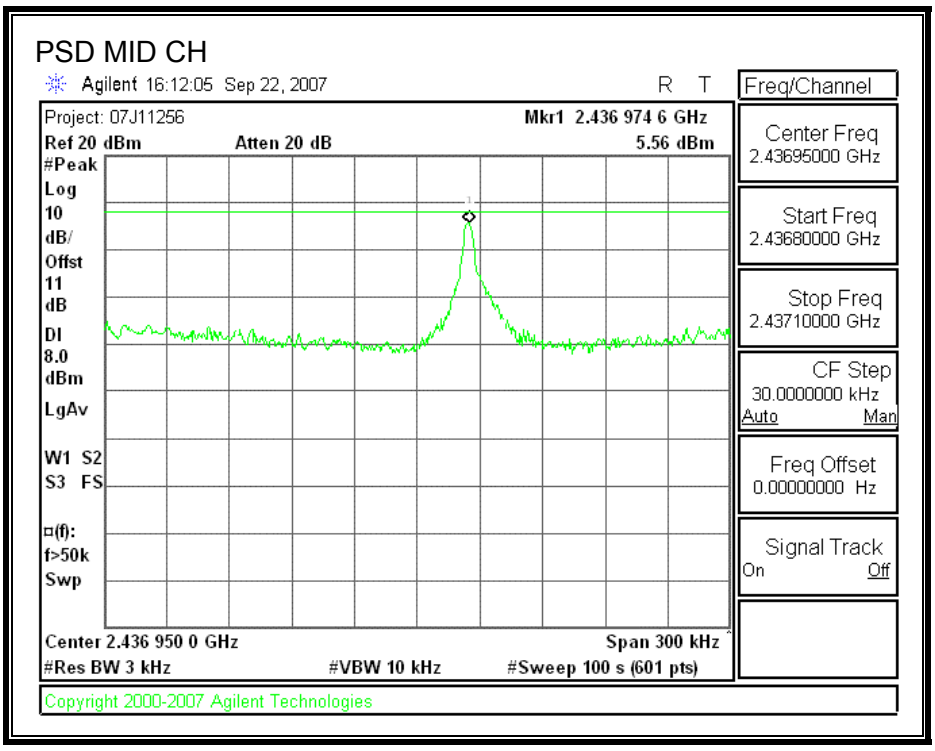
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

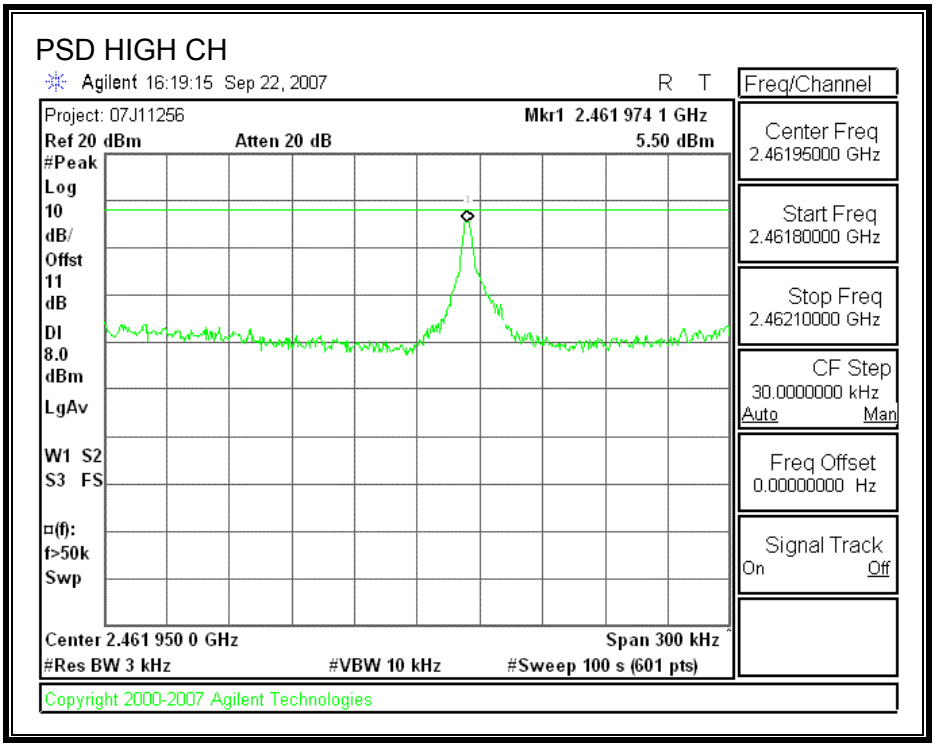
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	5.50	8	-2.50
Middle	2437	5.56	8	-2.44
High	2462	5.50	8	-2.50

POWER SPECTRAL DENSITY







7.1.6. 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.

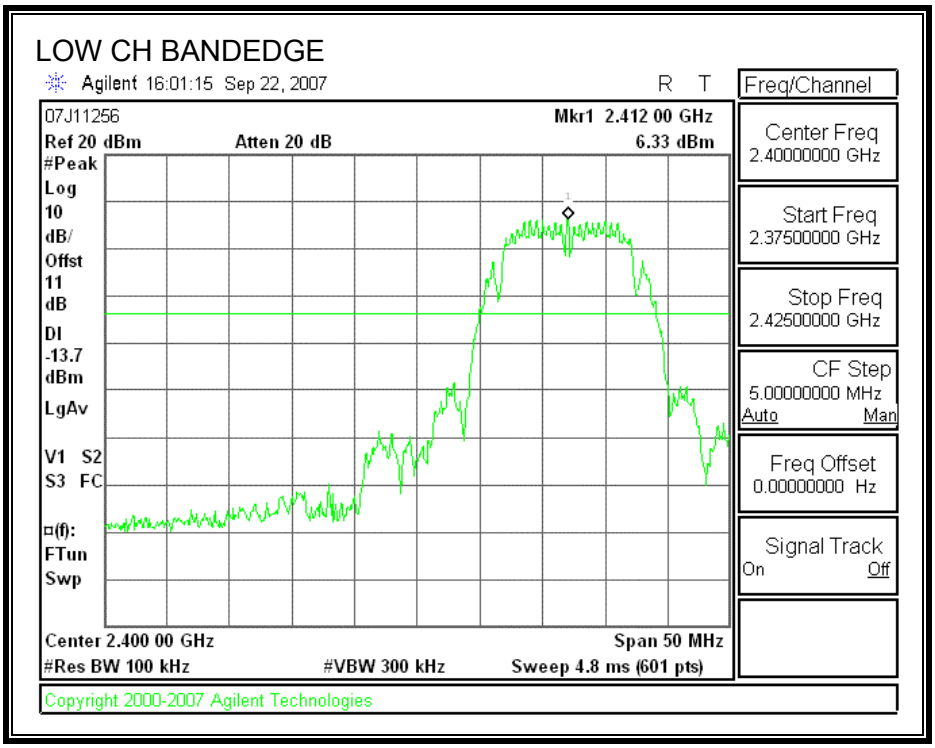
TEST PROCEDURE

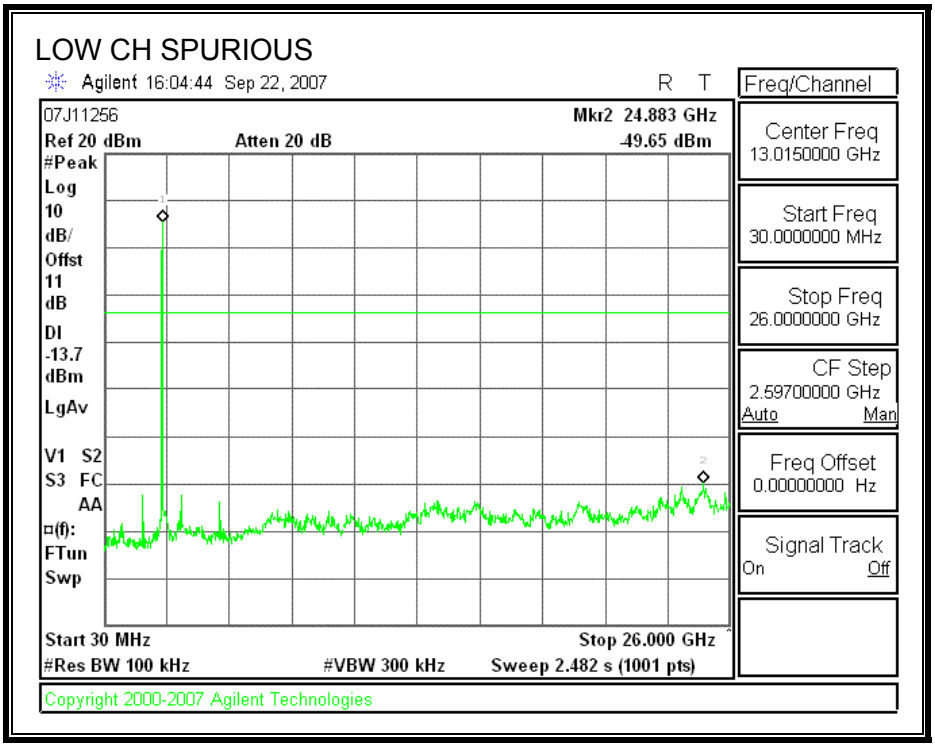
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

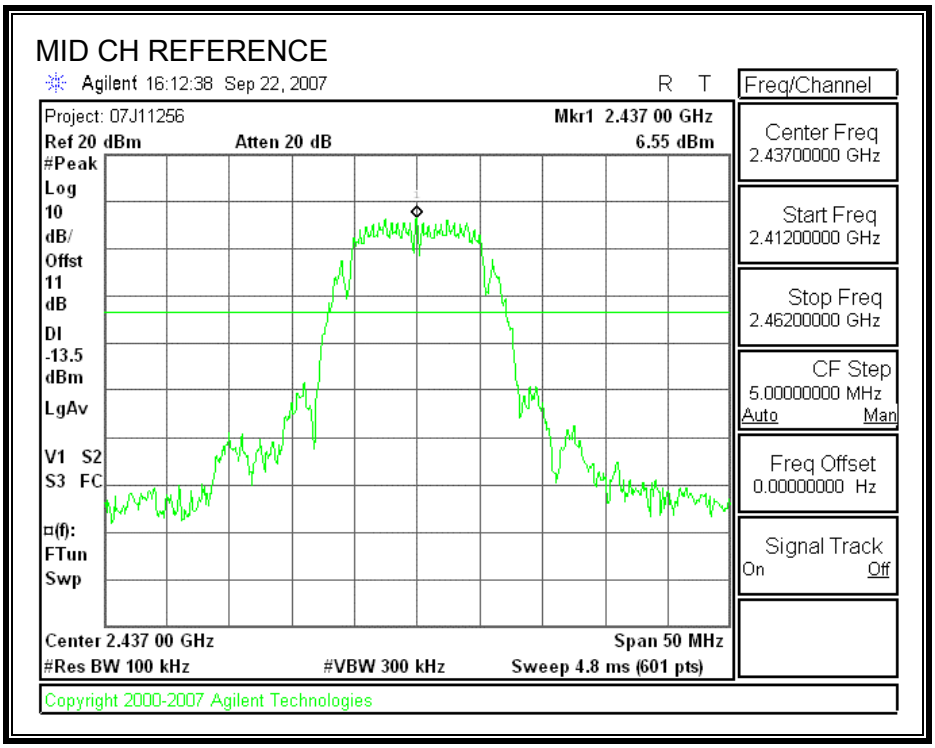
RESULTS

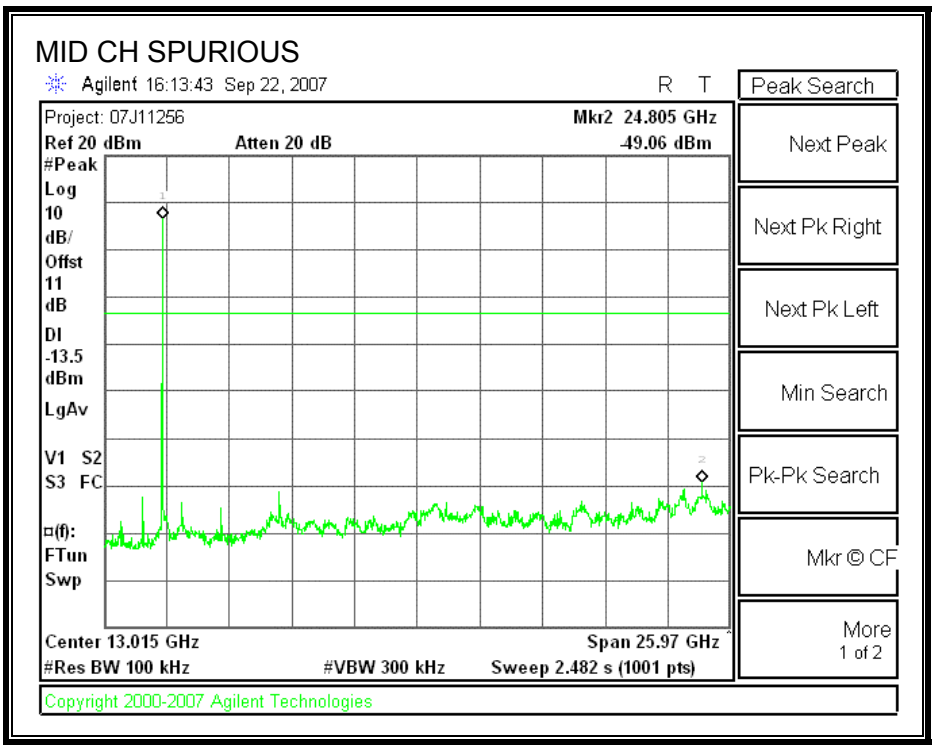
SPURIOUS EMISSIONS, LOW CHANNEL



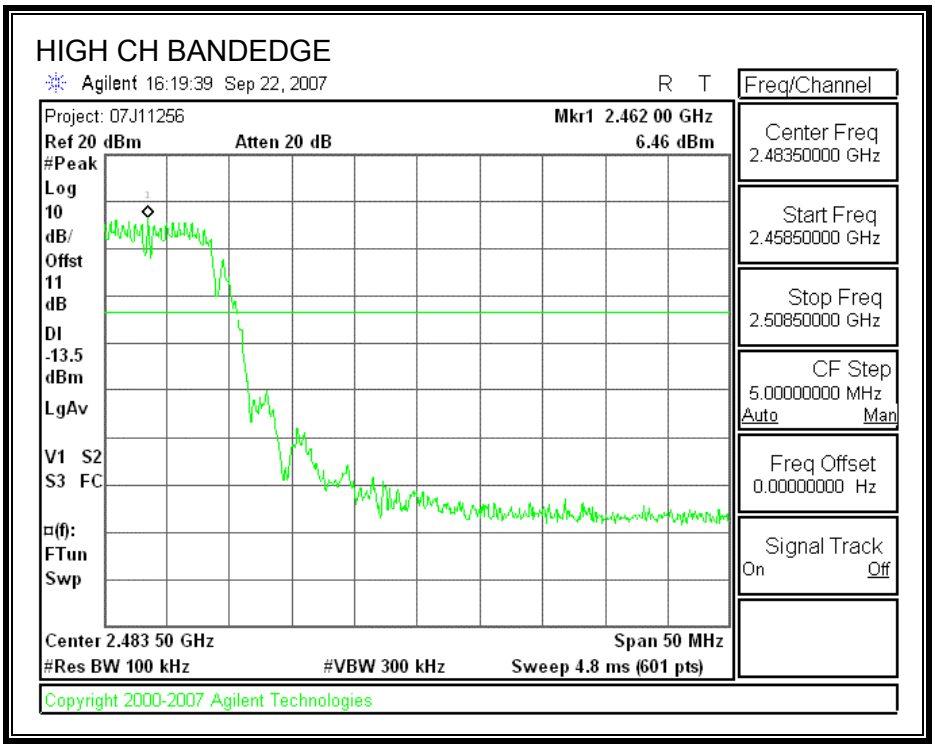


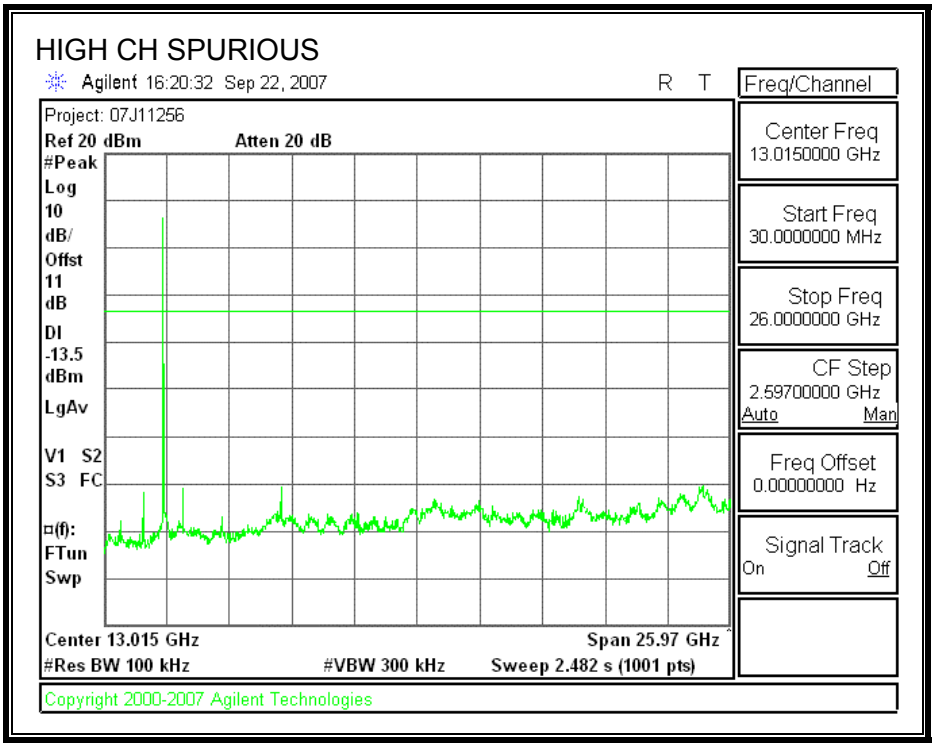
SPURIOUS EMISSIONS, MID CHANNEL





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.

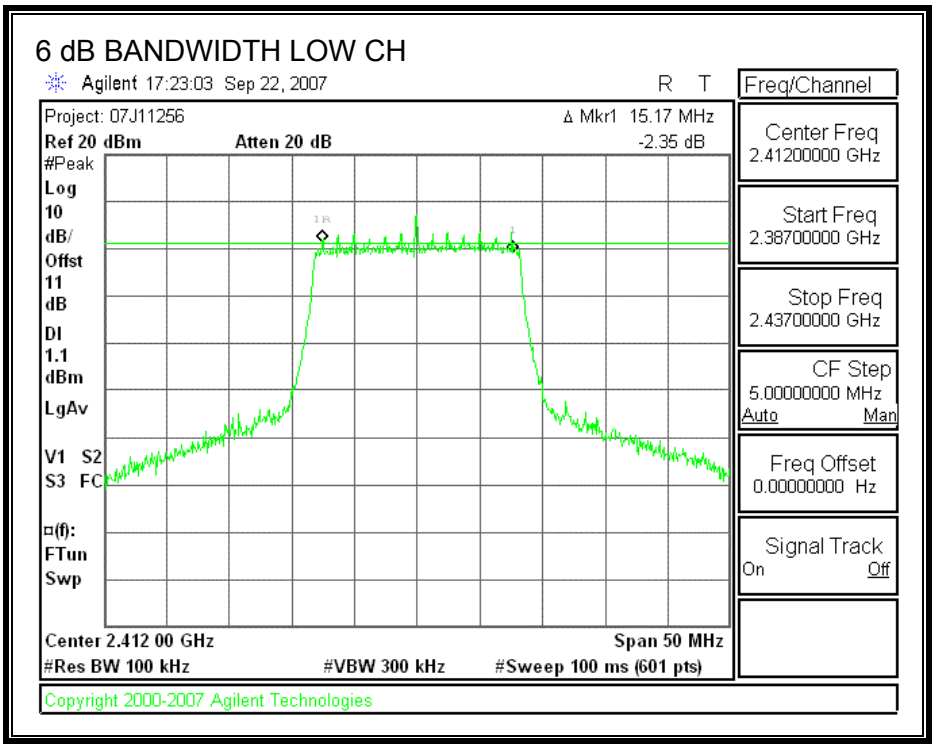
TEST PROCEDURE

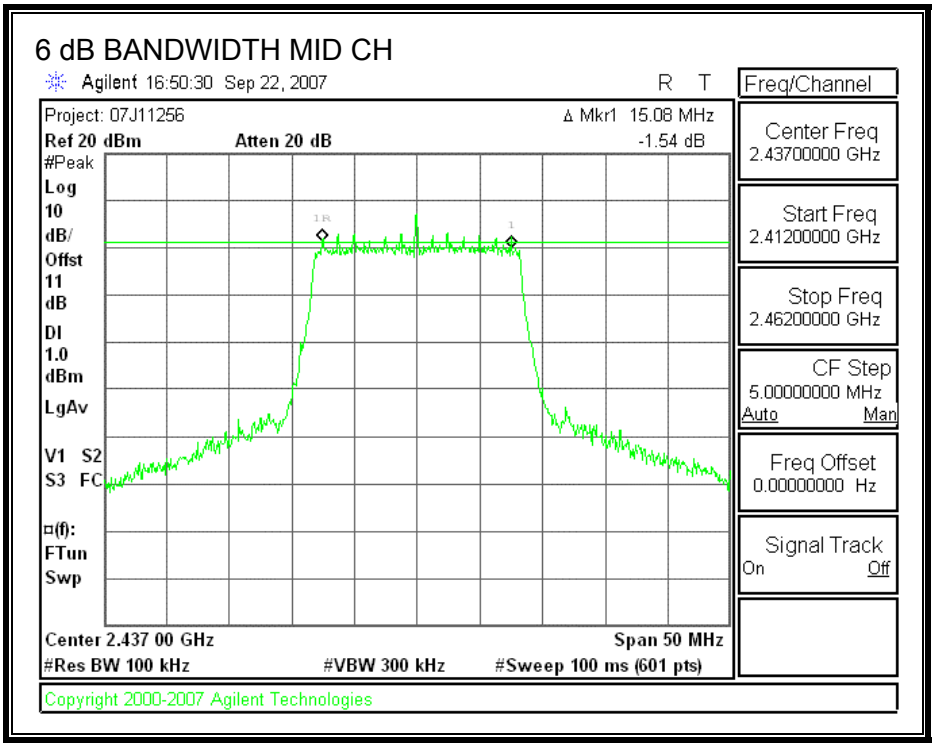
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

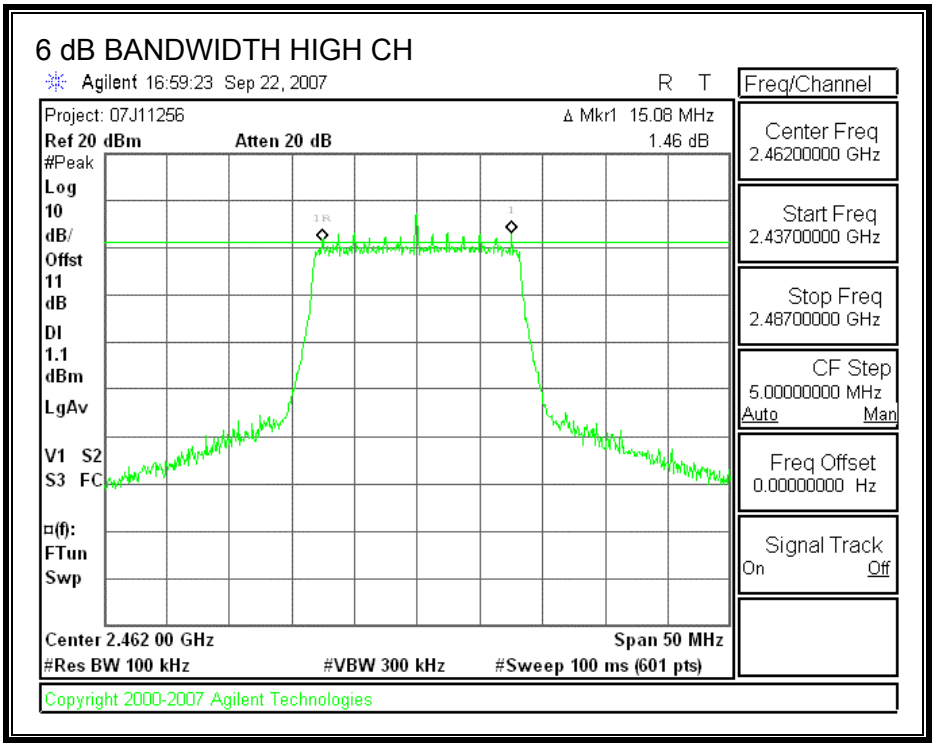
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.17	0.5
Middle	2437	15.08	0.5
High	2462	15.08	0.5

6 dB BANDWIDTH







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

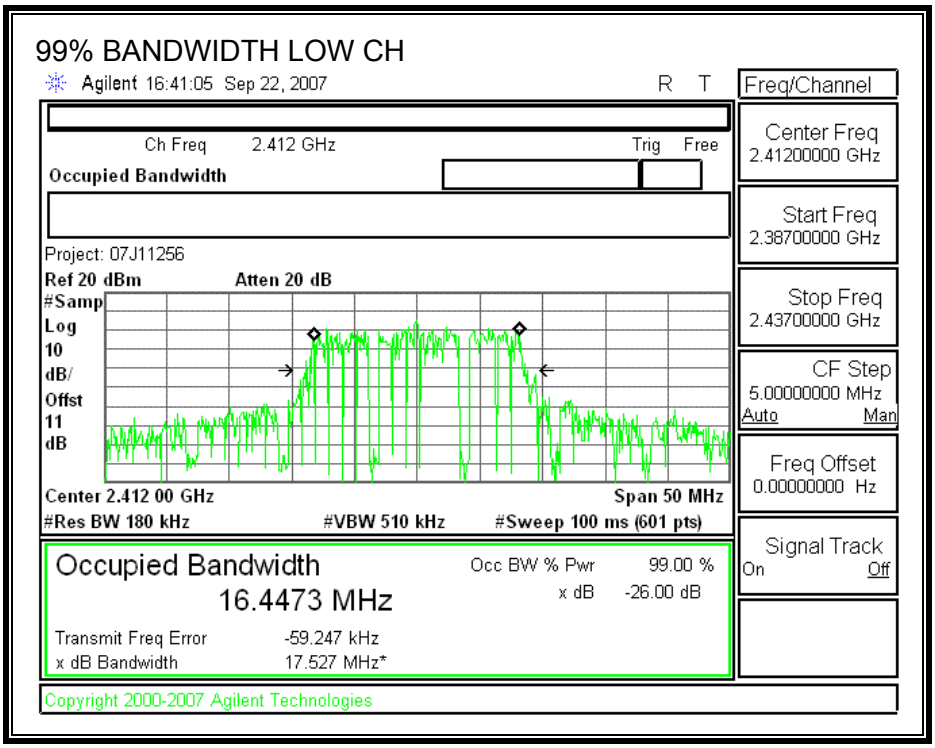
TEST PROCEDURE

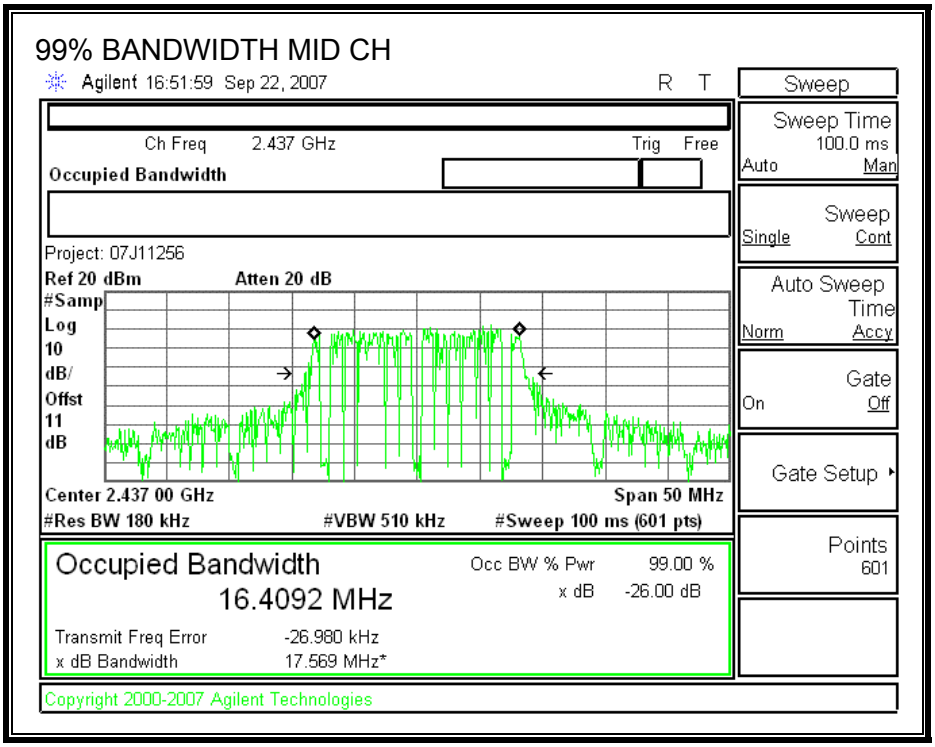
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

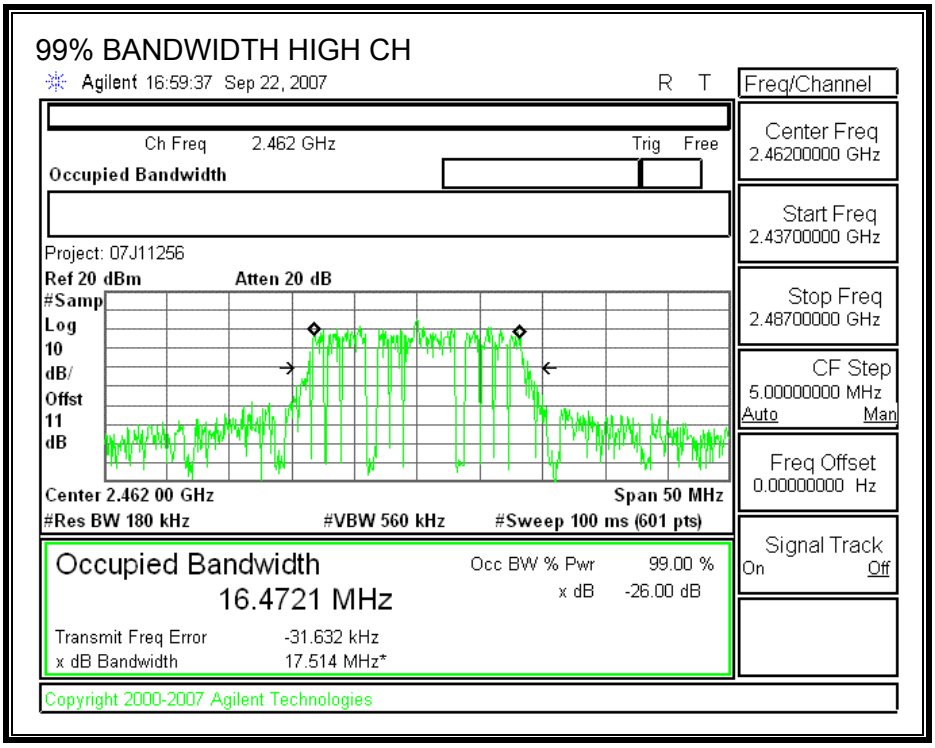
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.4473
Middle	2437	16.4092
High	2462	16.4721

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.

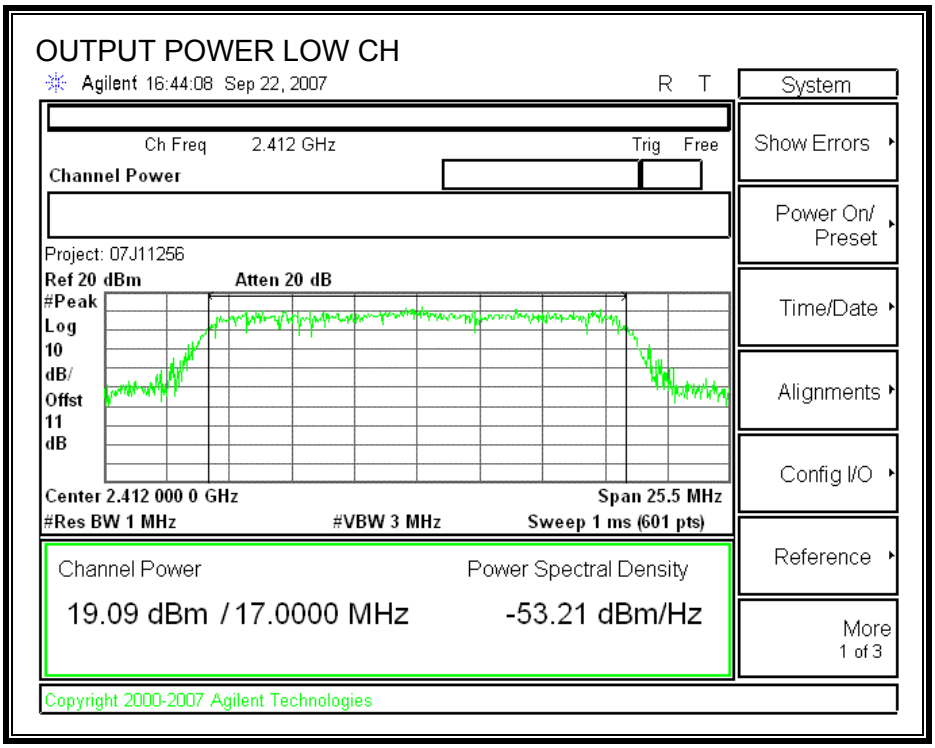
TEST PROCEDURE

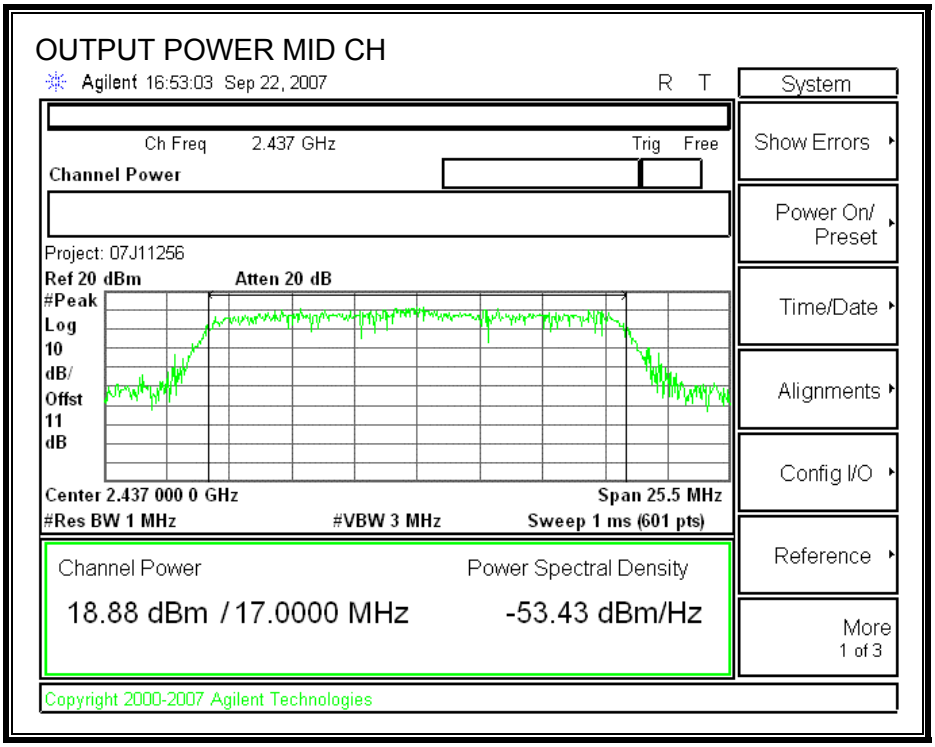
Peak power is measured using the spectrum analyzer's internal channel power integration function. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

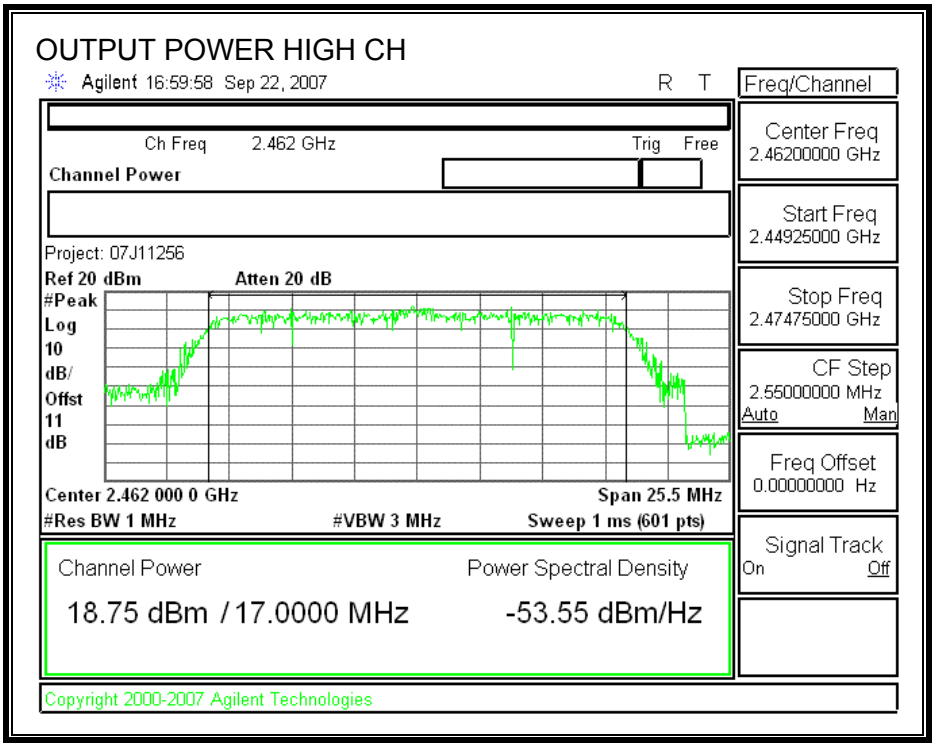
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	19.09	30	-10.91
Middle	2437	18.88	30	-11.12
High	2462	18.75	30	-11.25

OUTPUT POWER







7.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	15.16
Middle	2437	15.29
High	2462	15.17

7.2.5. 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.

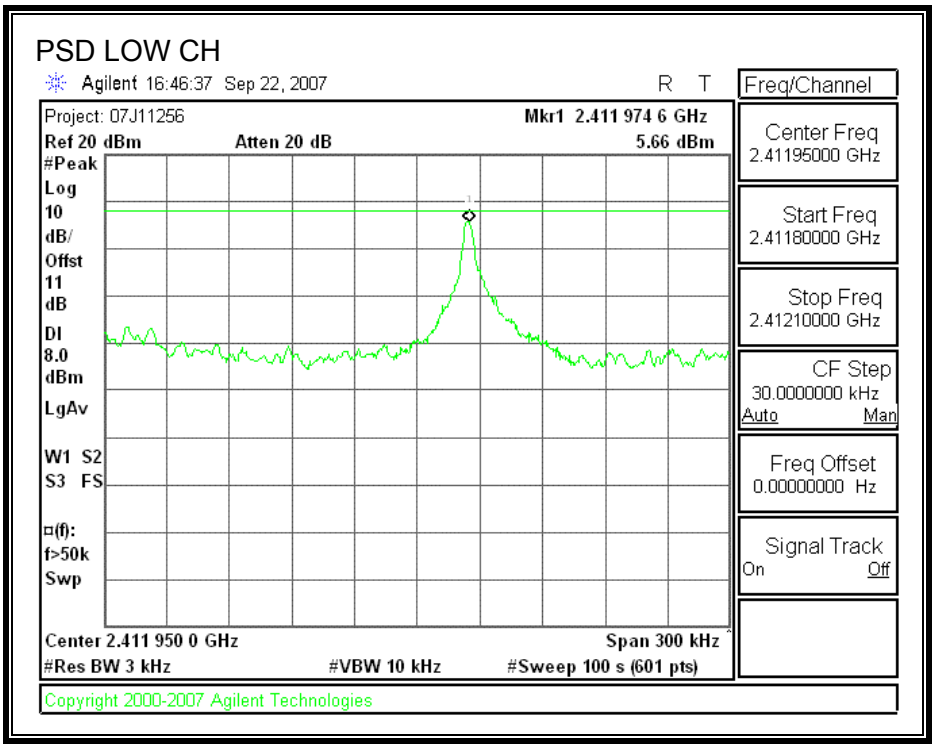
TEST PROCEDURE

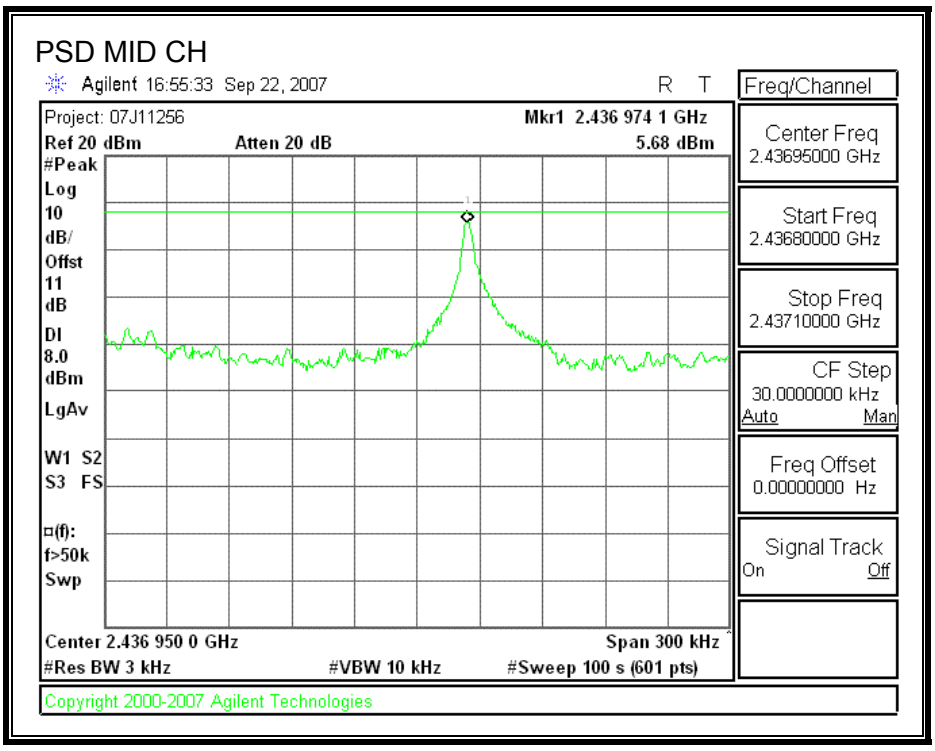
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

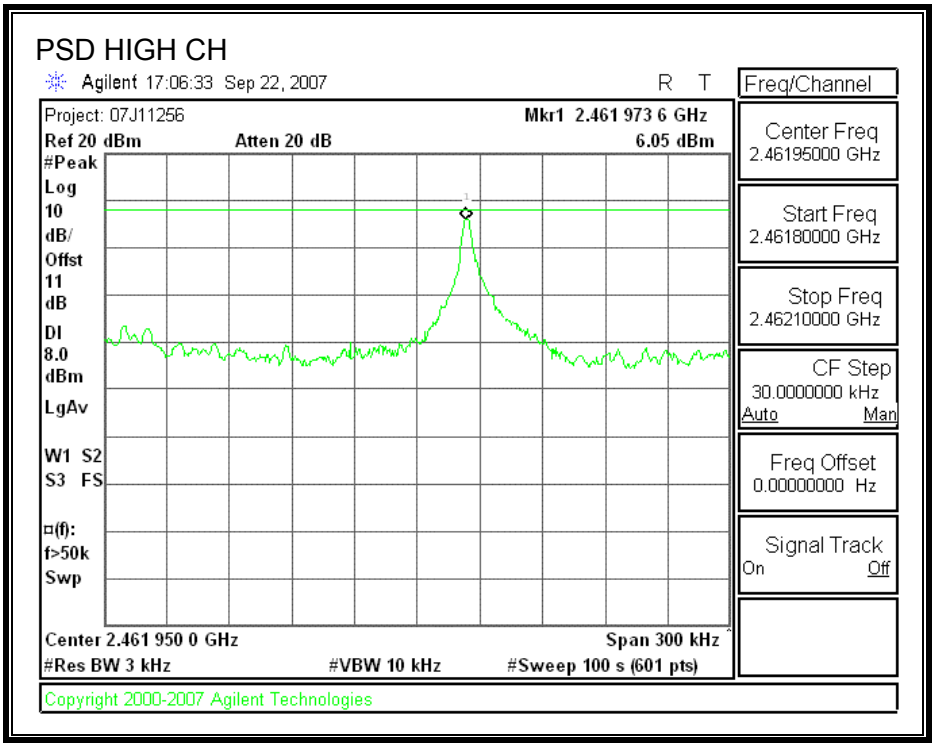
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	5.66	8	-2.34
Middle	2437	5.68	8	-2.32
High	2462	6.05	8	-1.95

POWER SPECTRAL DENSITY







7.2.6. 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.

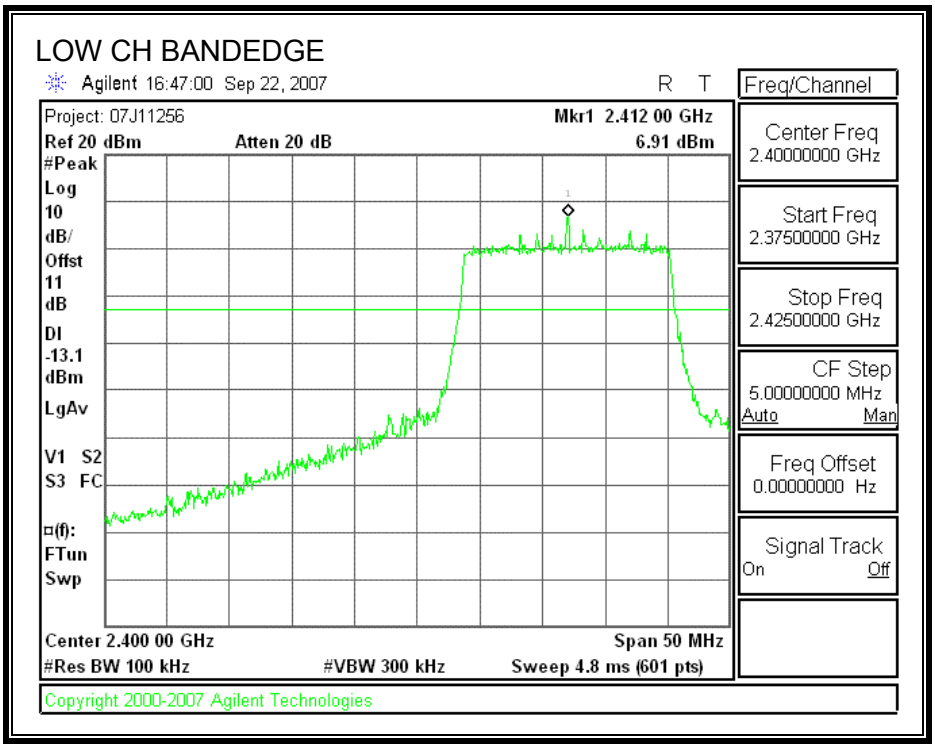
TEST PROCEDURE

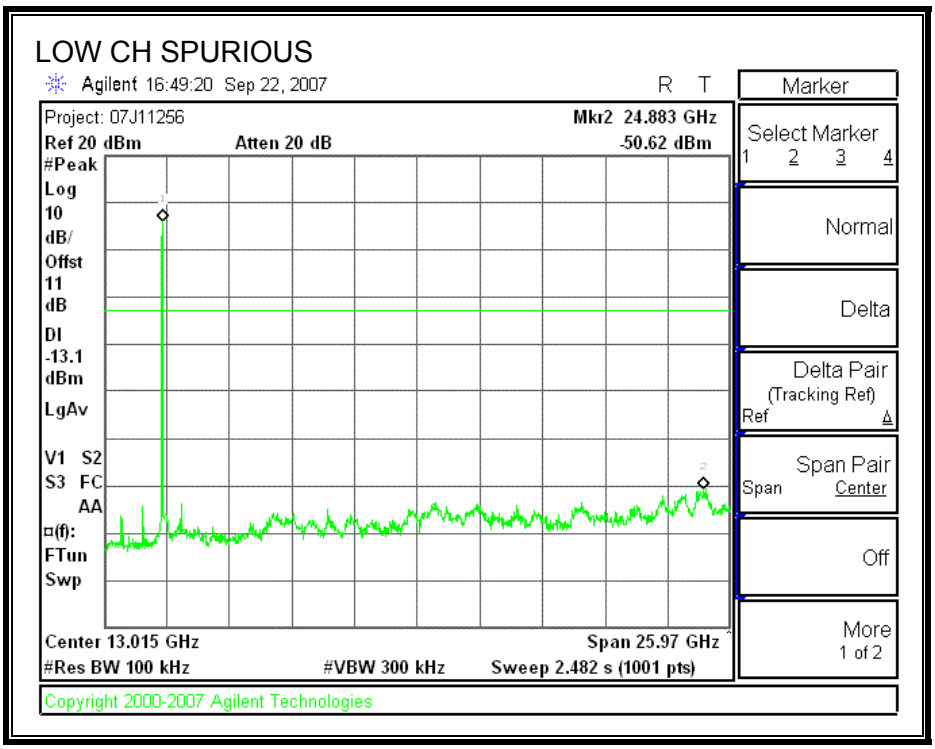
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

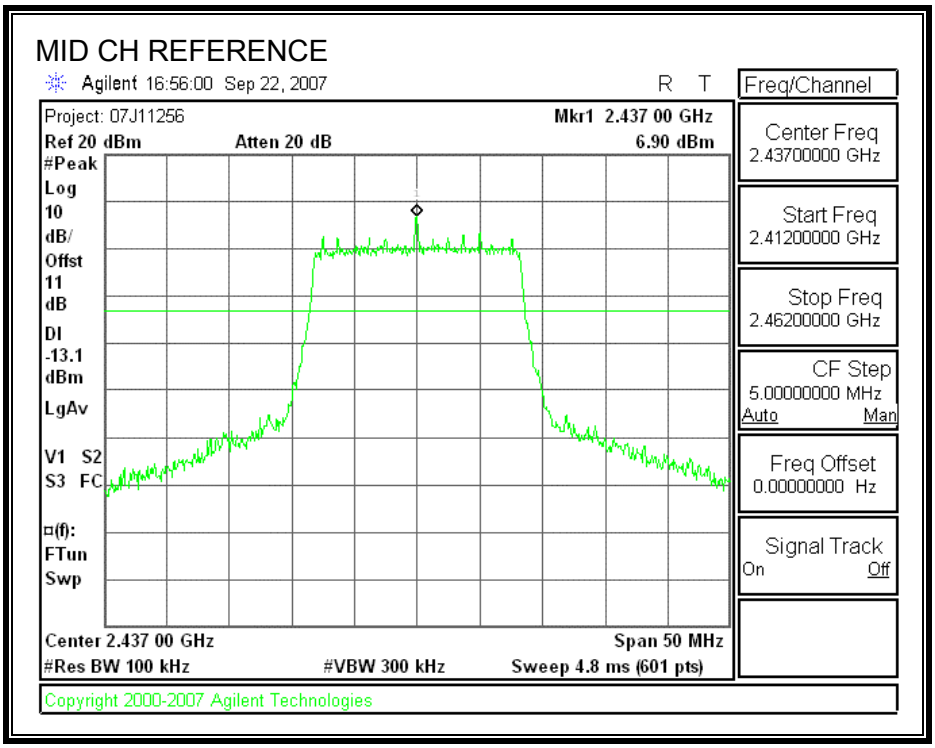
RESULTS

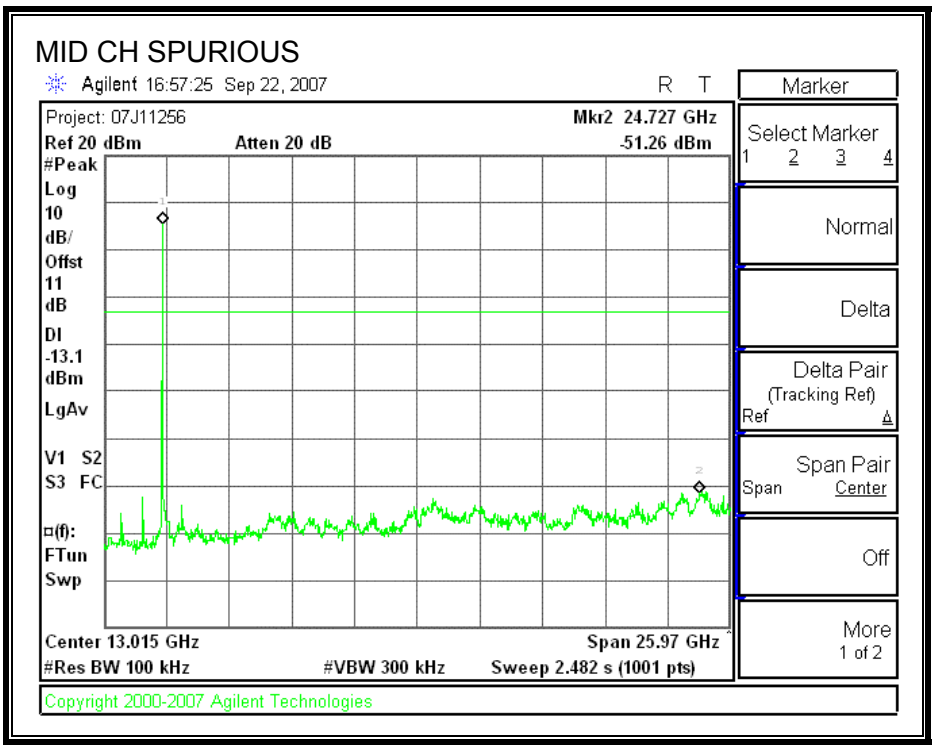
SPURIOUS EMISSIONS, LOW CHANNEL



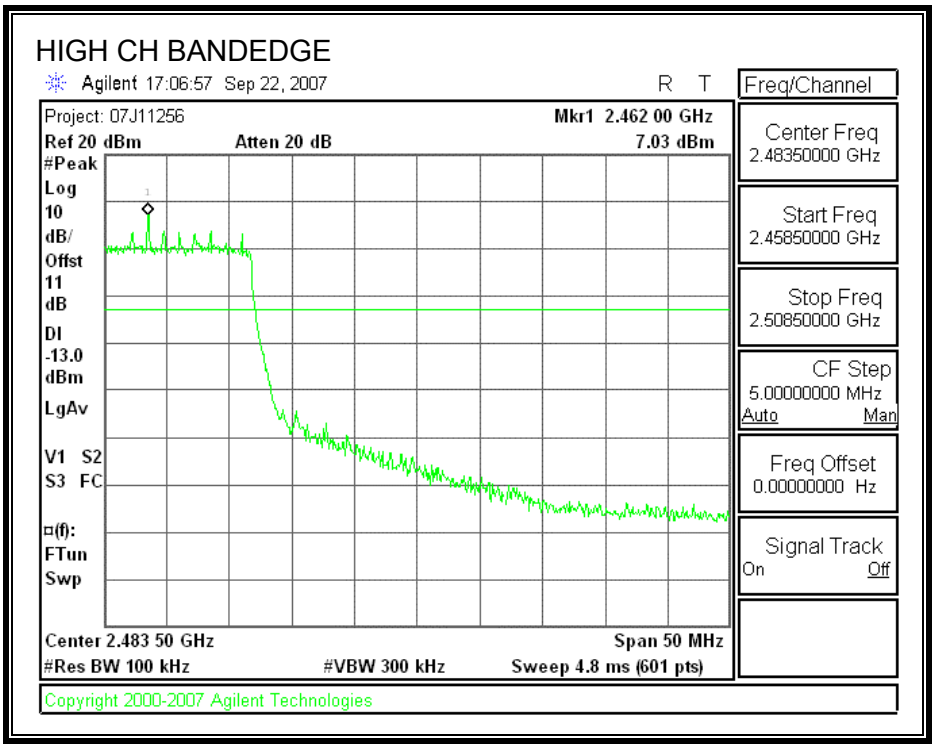


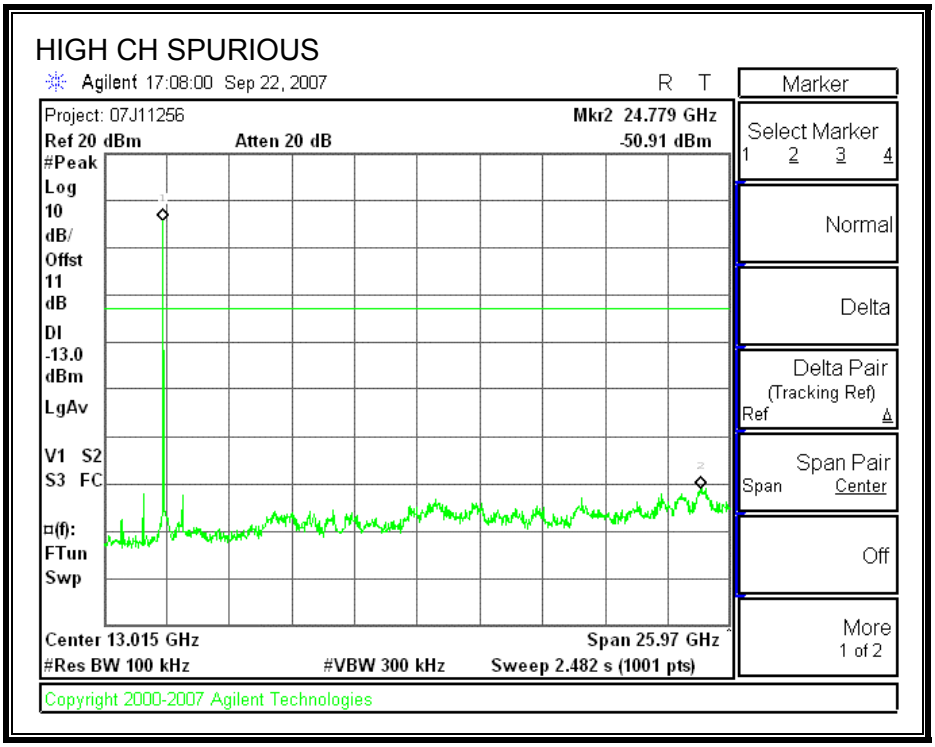
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (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, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

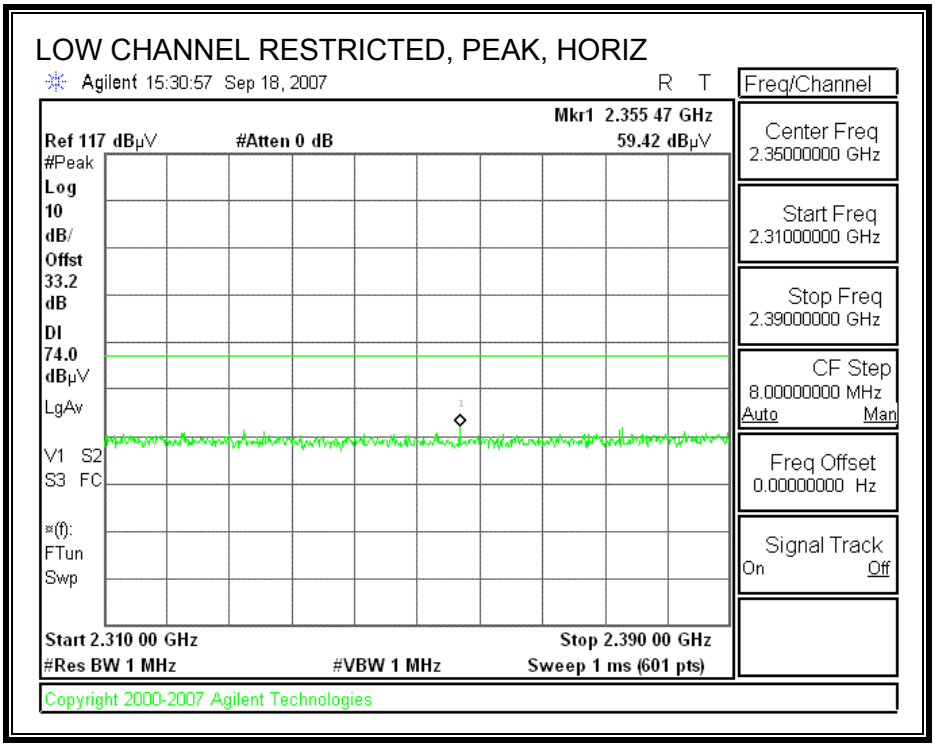
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

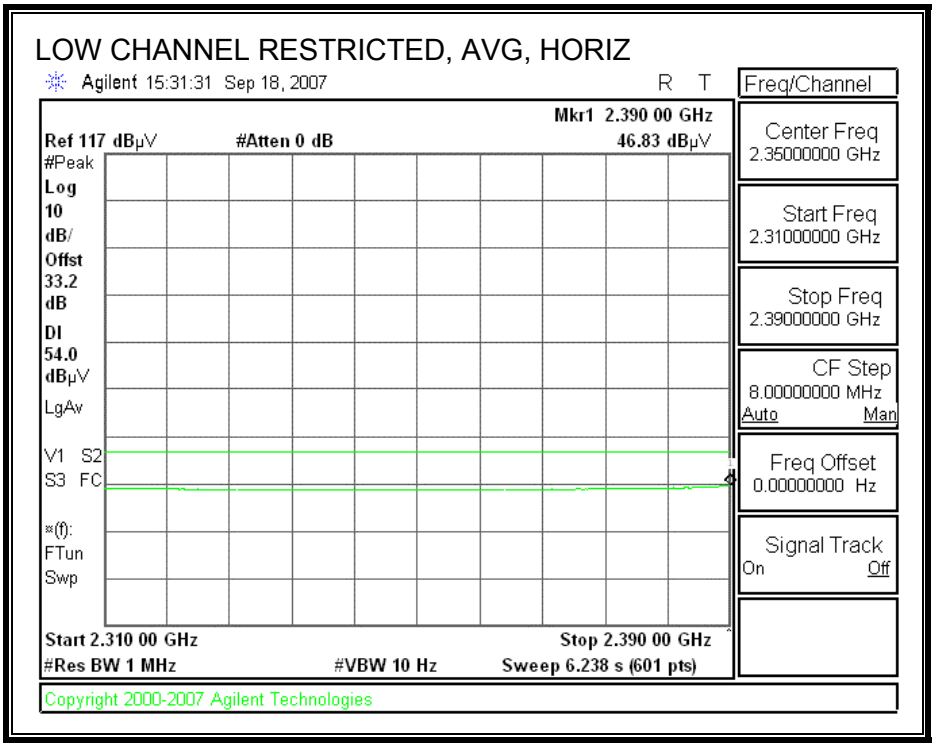
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.1.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

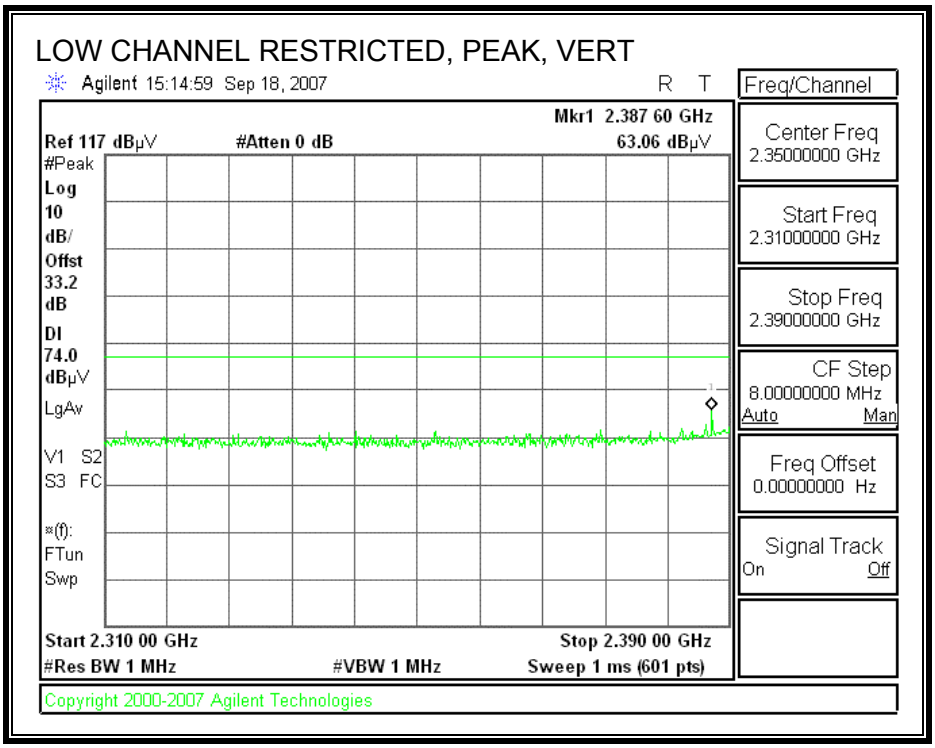
DIPOLE, 2.21dBi ANTENNA

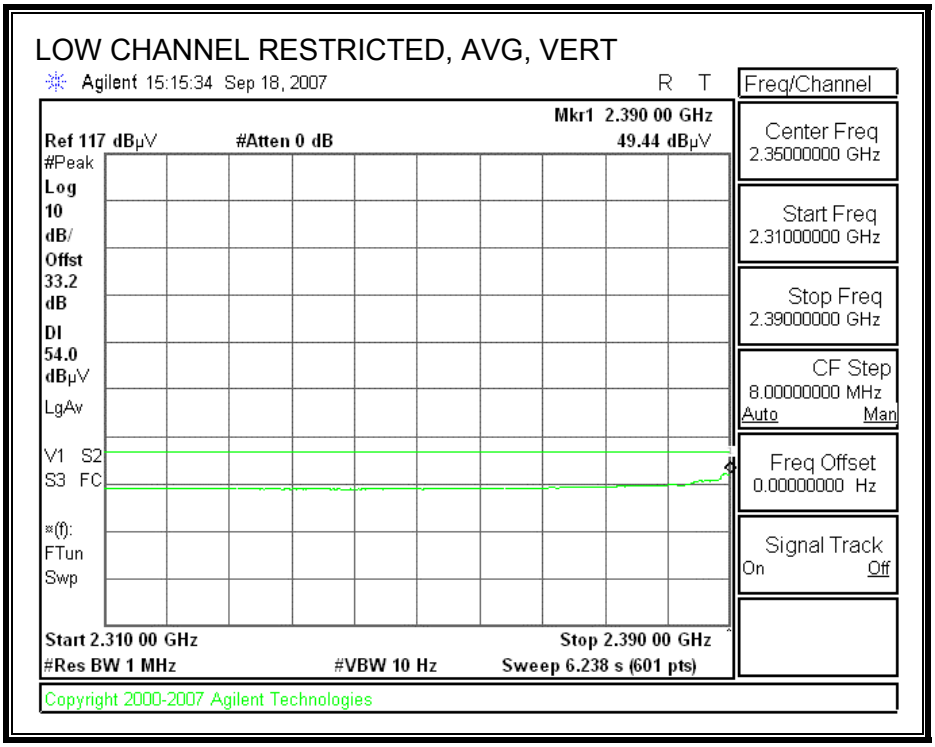
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



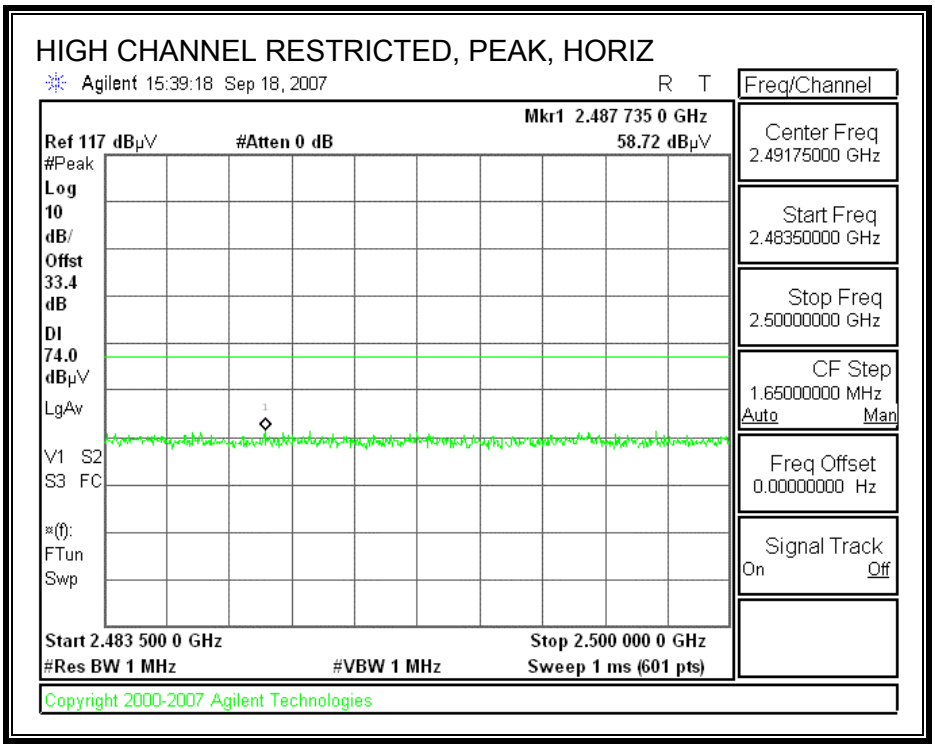


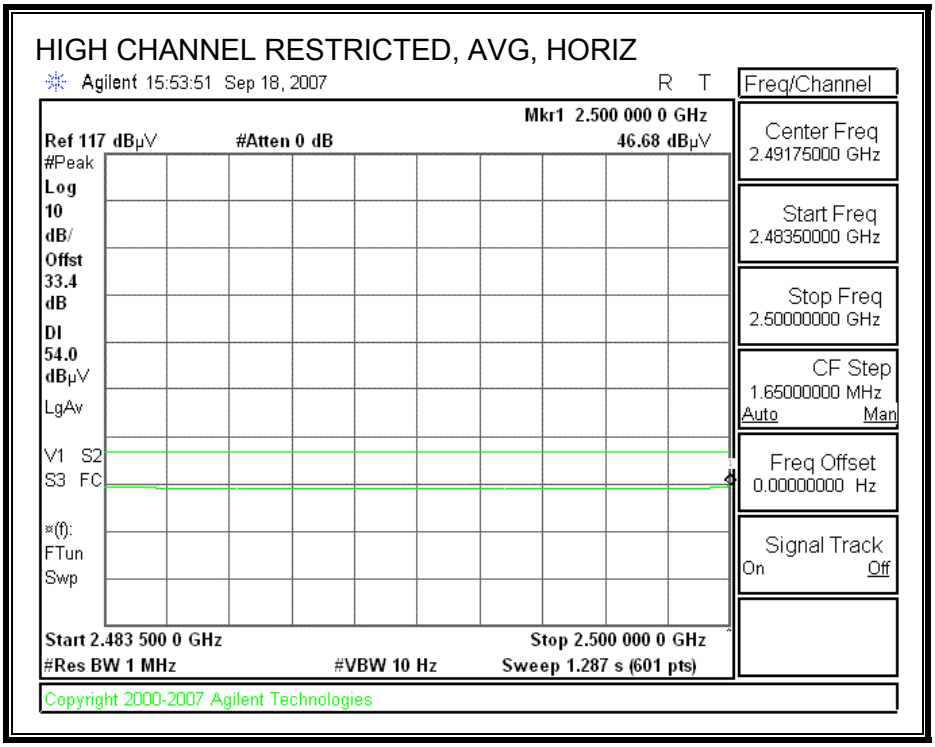
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



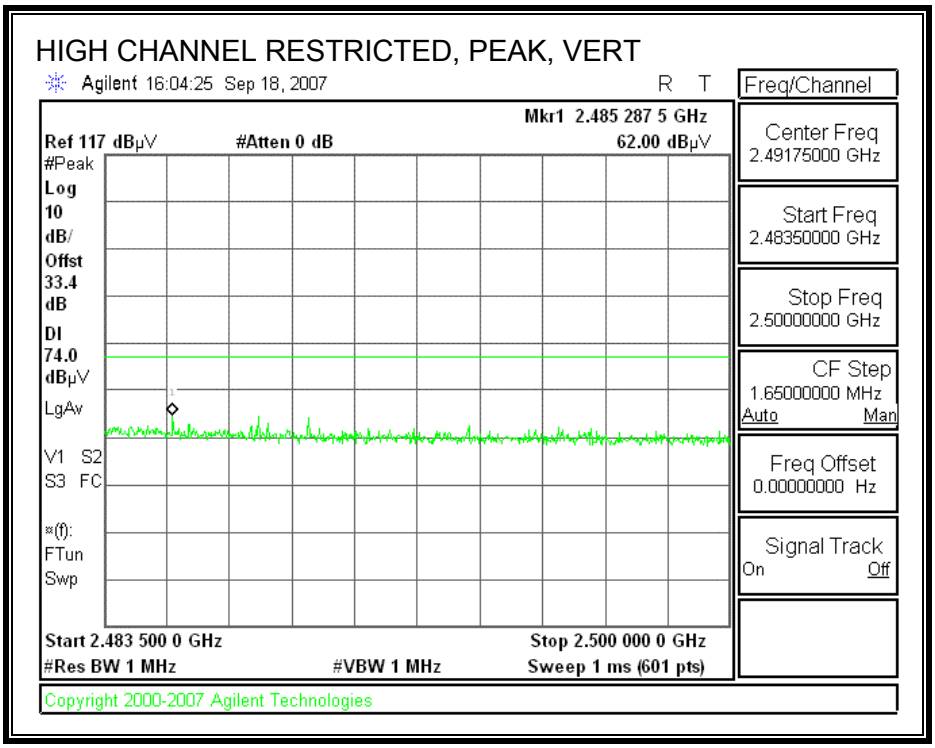


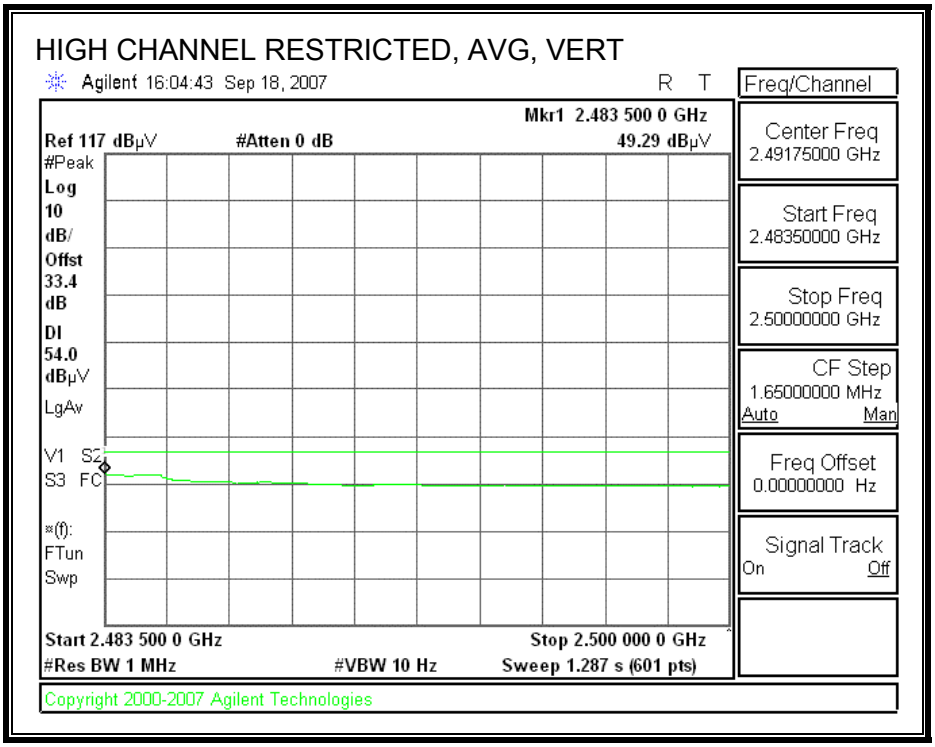
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Mitsumi Electric Co., LTD
Project #: 07J11256
Date: 09/18/07
Test Engineer: Vien Tran
Configuration: EUT on JIG, Desktop, Monitor, Key Board, Mouse,
Mode: Tx 11b Mode (with Mitsumi DCA-E04_2.21dBi Antenna)

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

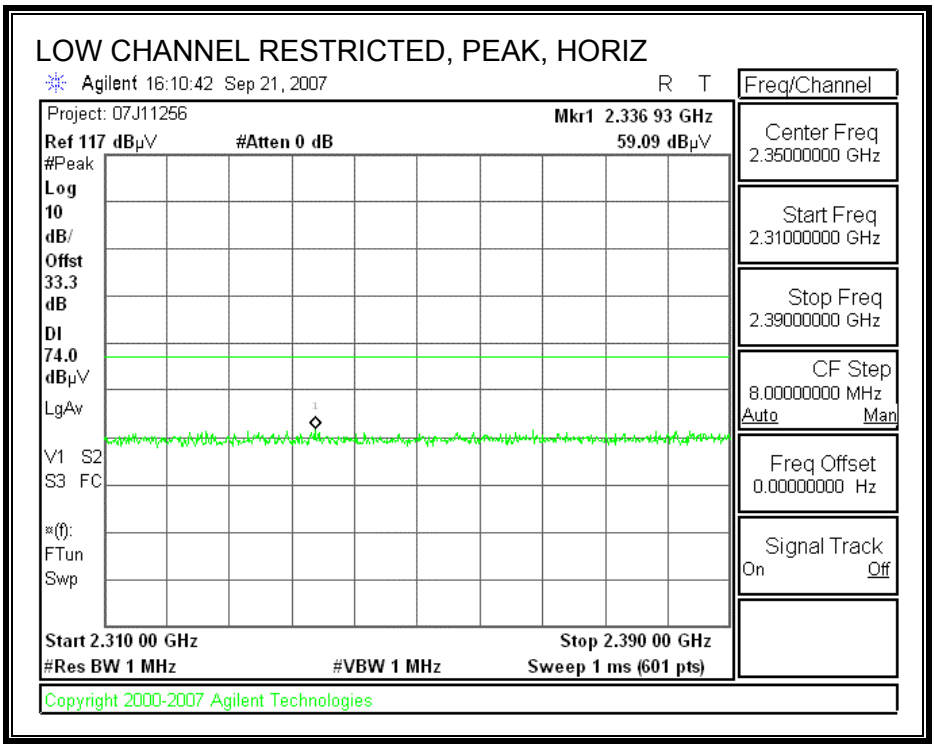
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_4.0GHz	

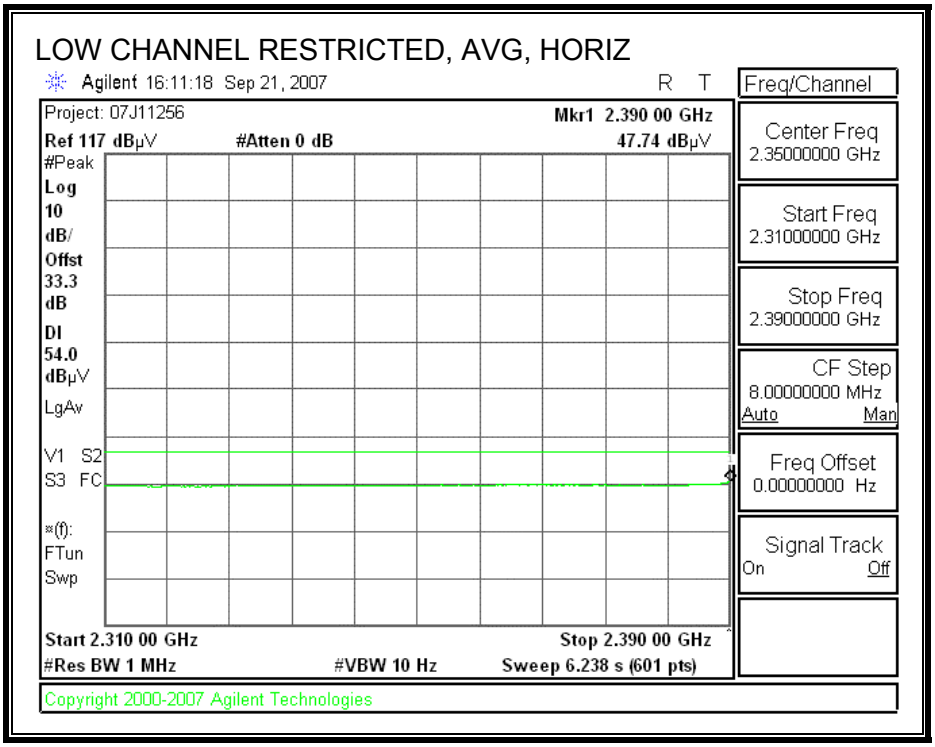
Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CHANNEL, 2412 MHz															
4.284	3.0	43.6	32.5	32.8	6.4	-36.6	0.0	0.5	46.8	35.7	74	54	-27.2	-18.3	V
4.284	3.0	42.5	30.5	32.8	6.4	-36.6	0.0	0.5	45.7	33.7	74	54	-28.3	-20.3	H
MID CHANNEL, 2437 MHz															
4.874	3.0	42.2	29.8	33.4	6.9	-36.5	0.0	0.6	46.6	34.2	74	54	-27.4	-19.8	V
7.311	3.0	48.9	43.6	35.0	8.4	-36.2	0.0	0.6	56.7	51.4	74	54	-17.3	-2.6	V
12.185	3.0	41.2	30.2	37.6	12.2	-35.4	0.0	0.9	56.5	45.5	74	54	-17.5	-8.5	V
4.874	3.0	42.7	30.9	33.4	6.9	-36.5	0.0	0.6	47.1	35.3	74	54	-26.9	-18.7	H
7.311	3.0	46.4	38.8	35.0	8.4	-36.2	0.0	0.6	54.2	46.6	74	54	-19.8	-7.4	H
12.185	3.0	40.8	29.9	37.6	12.2	-35.4	0.0	0.9	56.1	45.2	74	54	-17.9	-8.8	H
HI CHANNEL, 2462 MHz															
4.924	3.0	40.7	30.2	33.4	7.0	-36.5	0.0	0.6	45.2	34.7	74	54	-28.8	-19.3	V
7.386	3.0	51.4	45.3	35.0	8.4	-36.2	0.0	0.6	59.3	53.2	74	54	-14.7	-0.8	V
12.310	3.0	40.8	29.8	37.6	12.2	-35.4	0.0	0.9	56.1	45.1	74	54	-17.9	-8.9	V
4.924	3.0	42.2	29.8	33.4	7.0	-36.5	0.0	0.6	46.7	34.3	74	54	-27.3	-19.7	H
7.386	3.0	47.7	41.9	35.0	8.4	-36.2	0.0	0.6	55.6	49.8	74	54	-18.4	-4.2	H
12.310	3.0	41.4	29.2	37.6	12.2	-35.4	0.0	0.9	56.7	44.5	74	54	-17.3	-9.5	H
		No other emissions were detected above system noise floor													

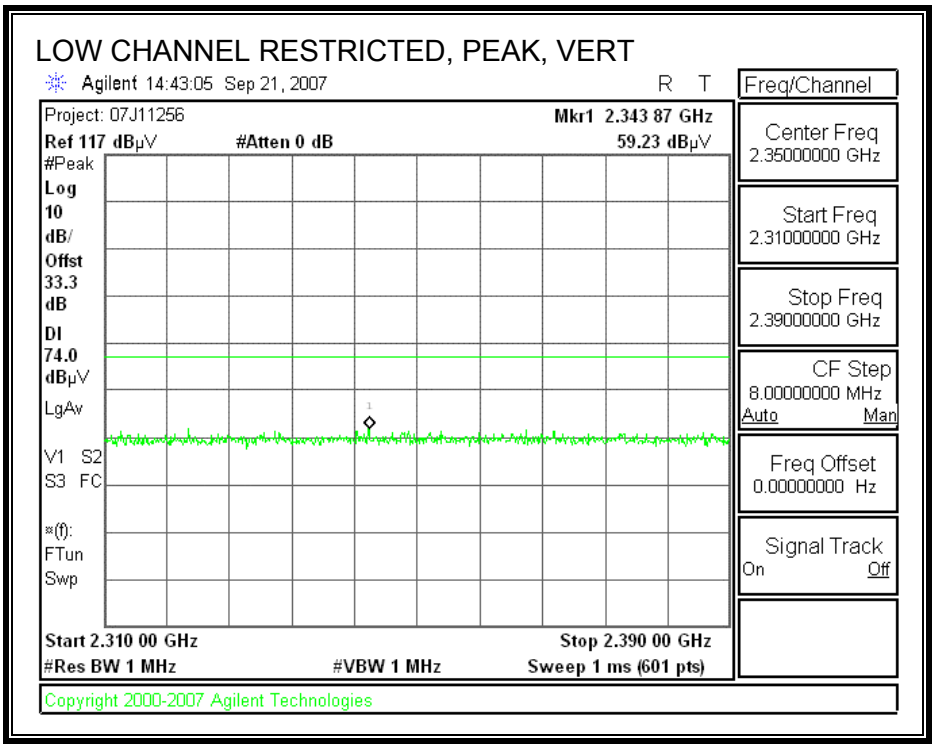
INVERTED-F, 1.38dBi ANTENNA

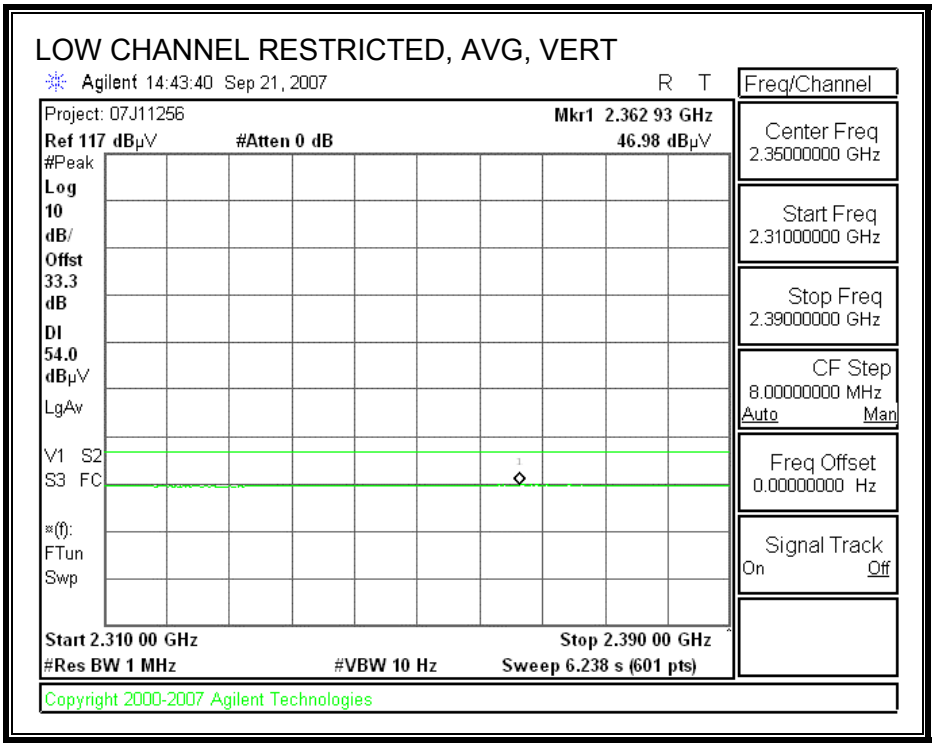
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



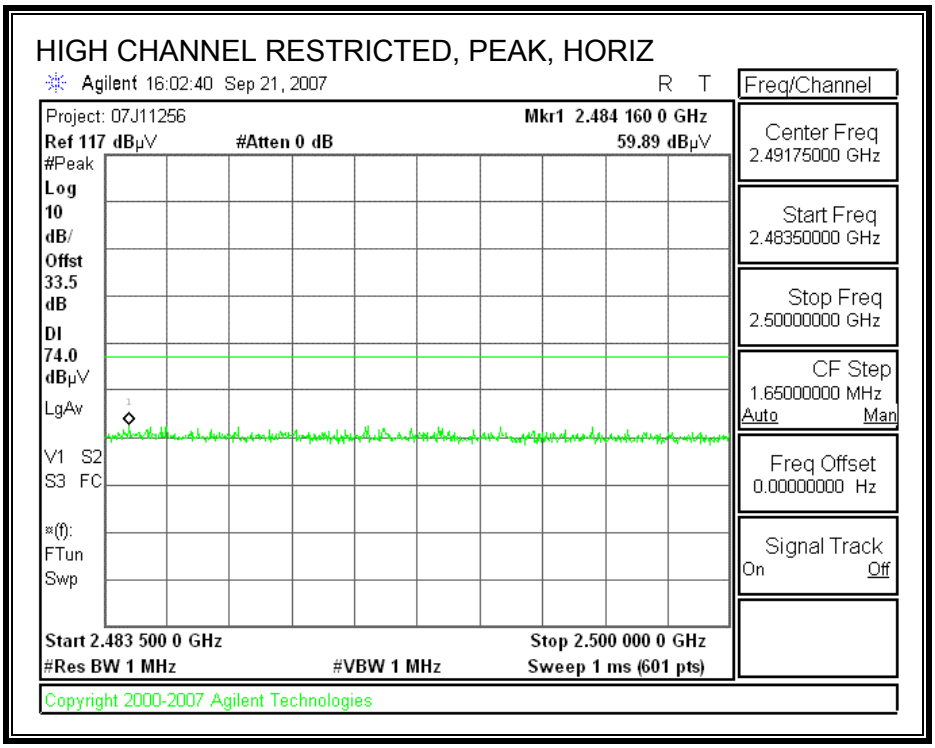


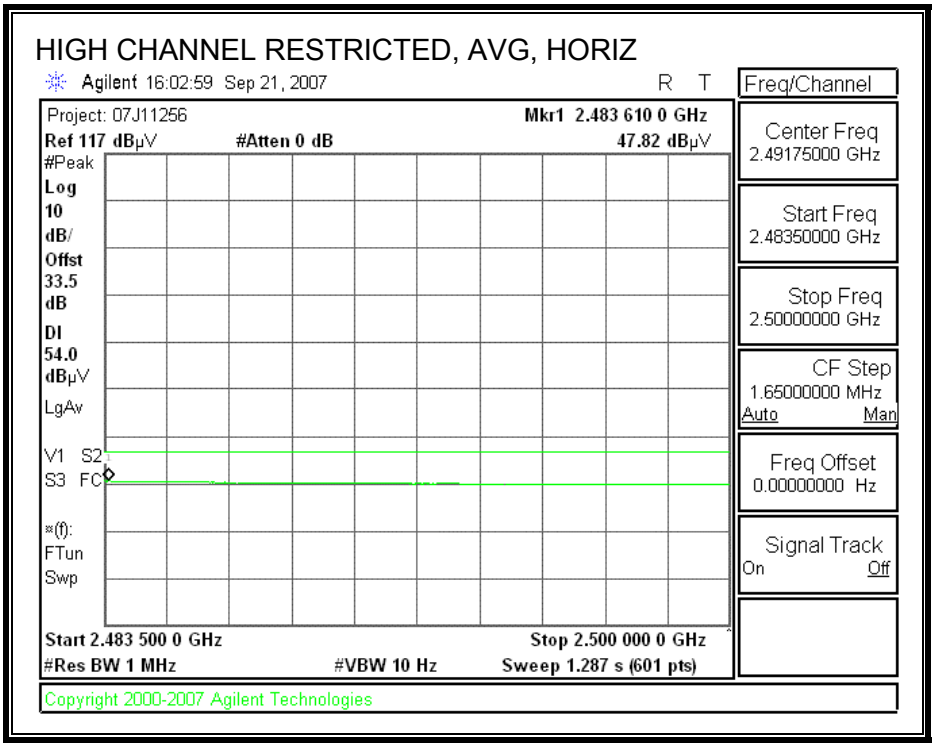
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



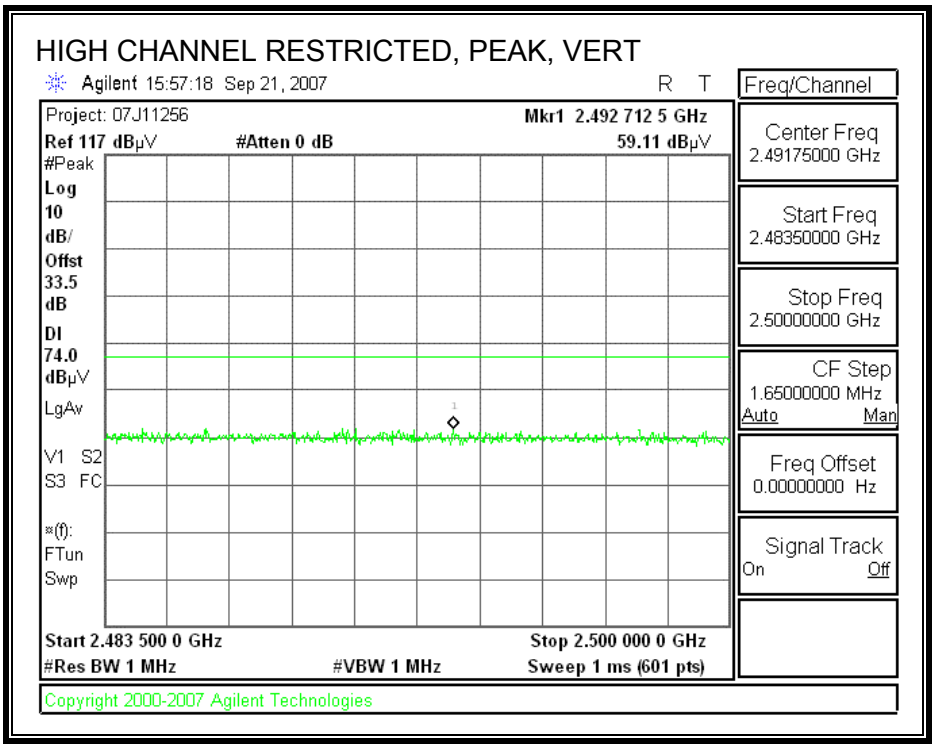


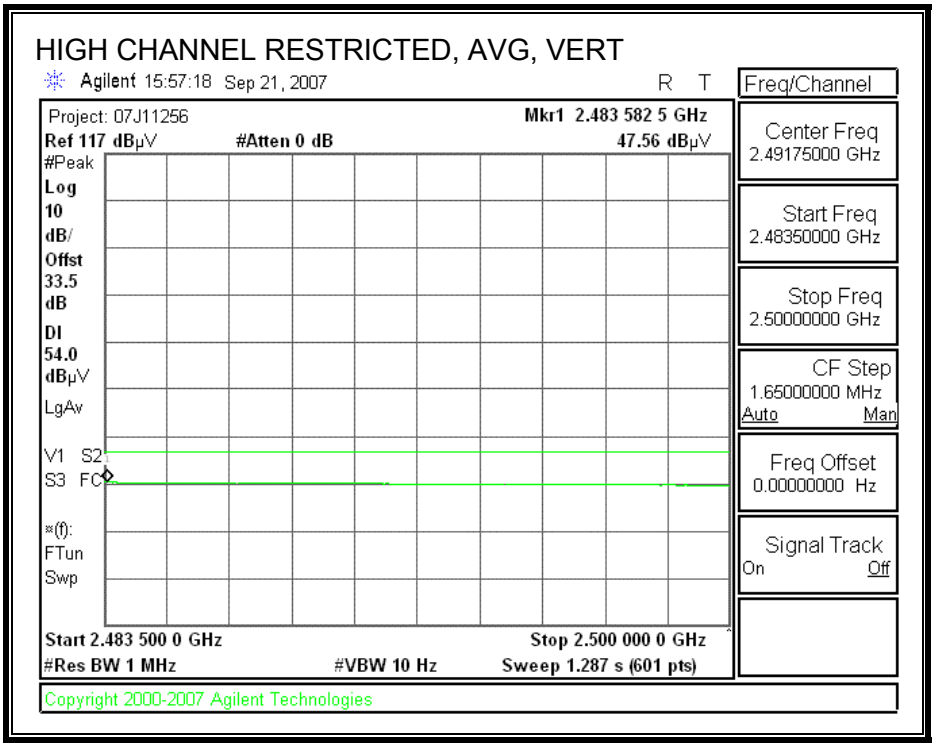
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Company: Mitsumi Electric Co., LTD
Project #: 07J11256
Date: 09/21/07
Test Engineer: Vien Tran
Configuration: EUT on JIG, Desktop, Monitor, Key Board, Mouse,
Mode: Tx 11b Mode (with Parrot_PIFA Double Connector 2_Antenna)

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T145 Agilent 3008A005(			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Frank 177079007		Chin 200354001	HPF_4.0GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

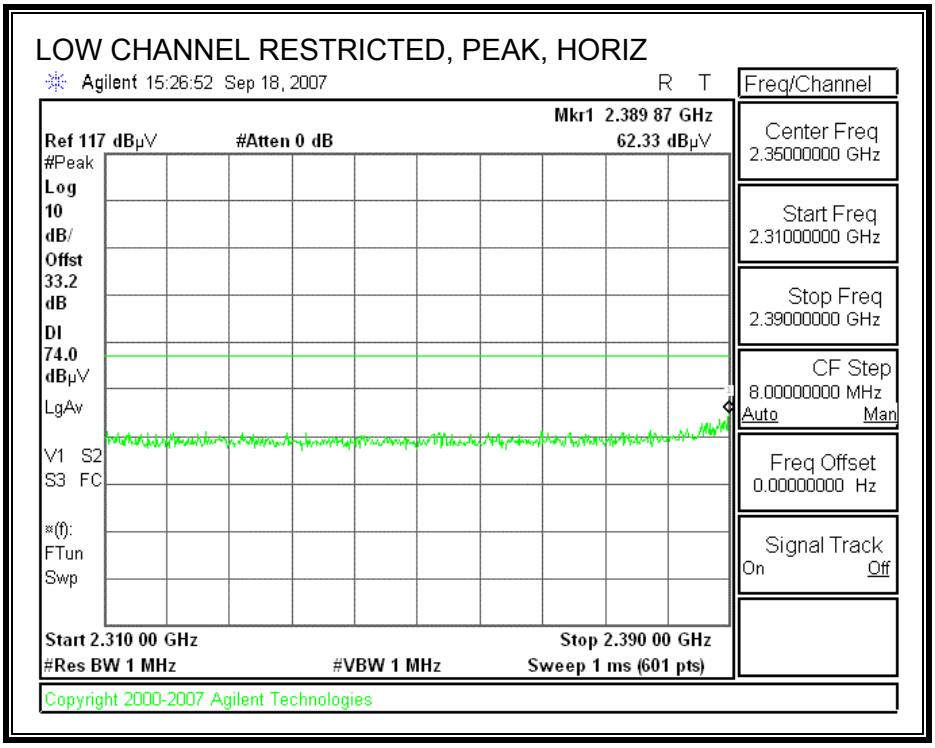
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CHANNEL, 2412 MHz															
4.284	3.0	46.7	33.6	33.2	3.3	-34.8	0.0	0.5	48.9	35.8	74	54	-25.1	-18.2	V
4.284	3.0	48.3	40.5	33.2	3.3	-34.8	0.0	0.5	50.5	42.7	74	54	-23.5	-11.3	H
MID CHANNEL, 2437 MHz															
4.874	3.0	45.0	32.9	33.7	3.5	-34.9	0.0	0.6	48.0	35.9	74	54	-26.0	-18.1	V
7.311	3.0	46.9	36.5	35.2	4.0	-34.7	0.0	0.6	52.1	41.7	74	54	-21.9	-12.3	V
4.874	3.0	46.8	38.2	33.7	3.5	-34.9	0.0	0.6	49.8	41.2	74	54	-24.2	-12.8	H
7.311	3.0	48.9	41.5	35.2	4.0	-34.7	0.0	0.6	54.1	46.7	74	54	-19.9	-7.3	H
HI CHANNEL, 2462 MHz															
4.924	3.0	45.5	32.7	33.8	3.5	-34.9	0.0	0.6	48.6	35.8	74	54	-25.4	-18.2	V
7.386	3.0	47.8	38.5	35.2	4.0	-34.6	0.0	0.6	53.0	43.7	74	54	-21.0	-10.3	V
4.924	3.0	46.6	33.7	33.8	3.5	-34.9	0.0	0.6	49.7	36.8	74	54	-24.3	-17.2	H
7.386	3.0	48.8	36.9	35.2	4.0	-34.6	0.0	0.6	54.0	42.1	74	54	-20.0	-11.9	H
		No other emissions were detected above system noise floor													

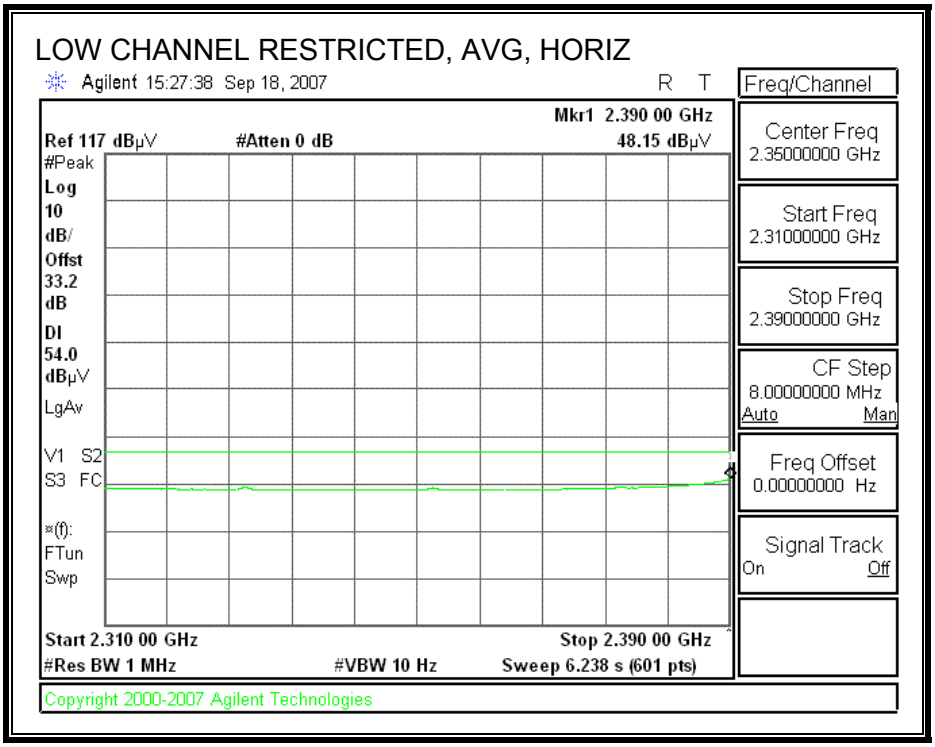
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.1.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

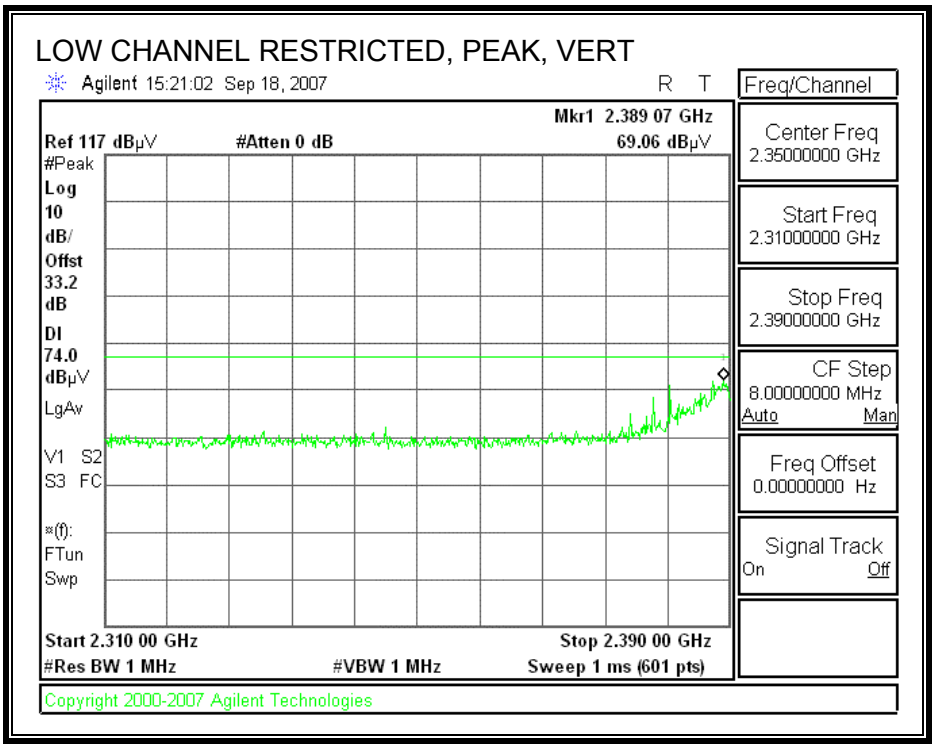
DIPOLE, 2.21dBi ANTENNA

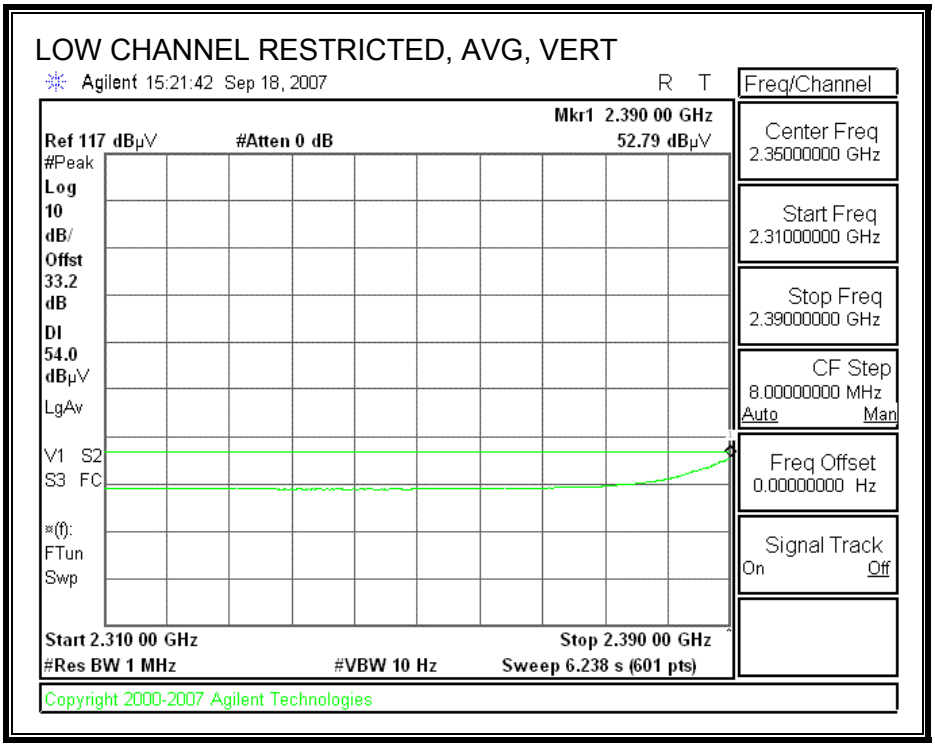
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



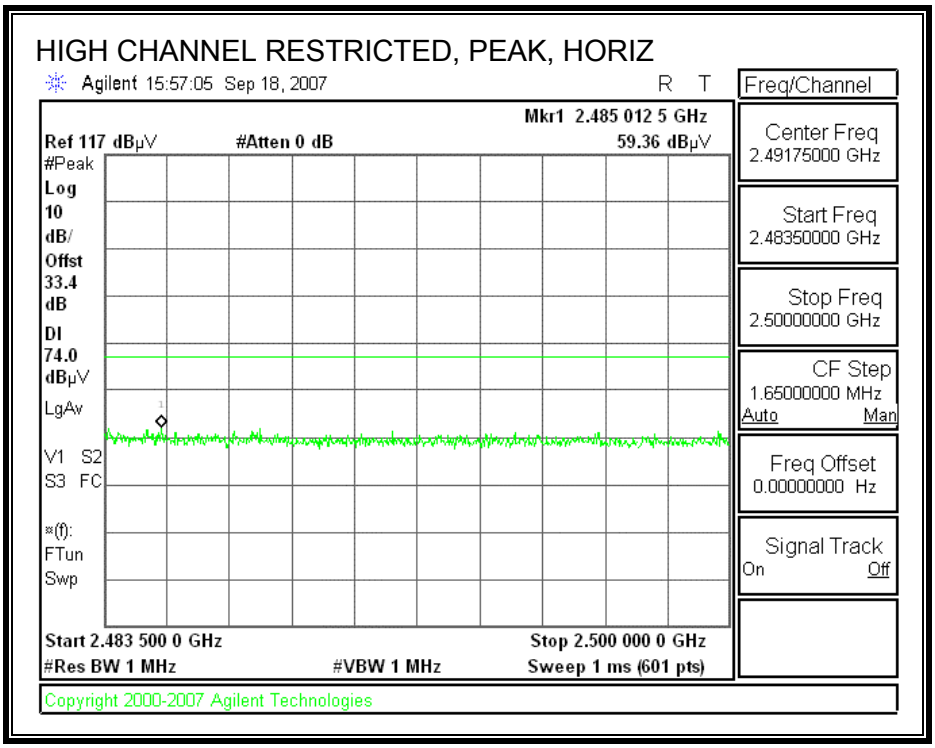


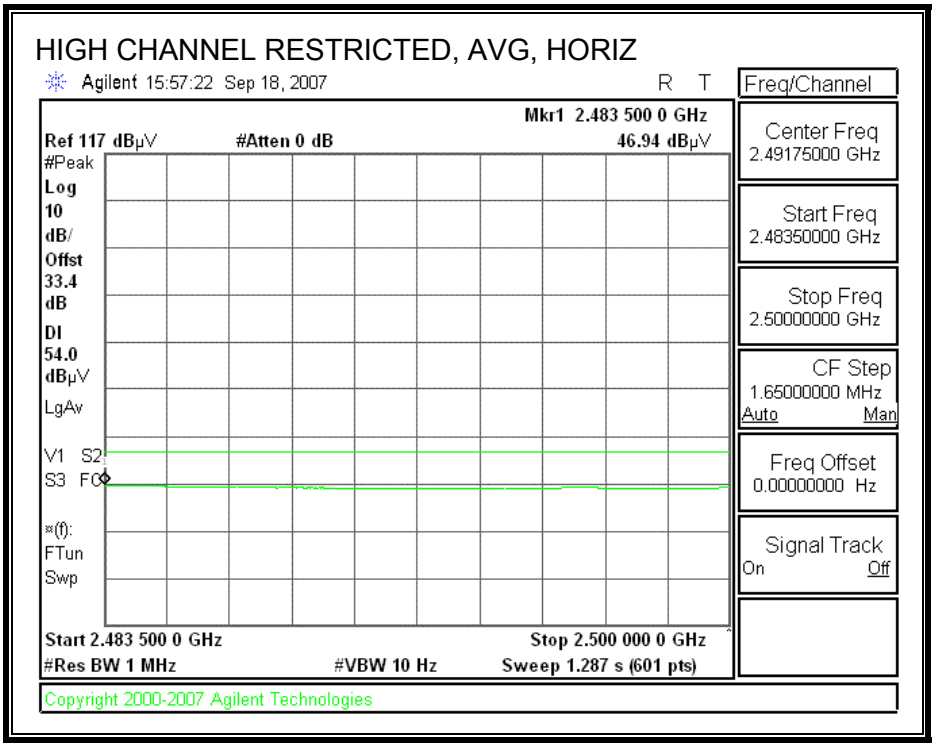
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



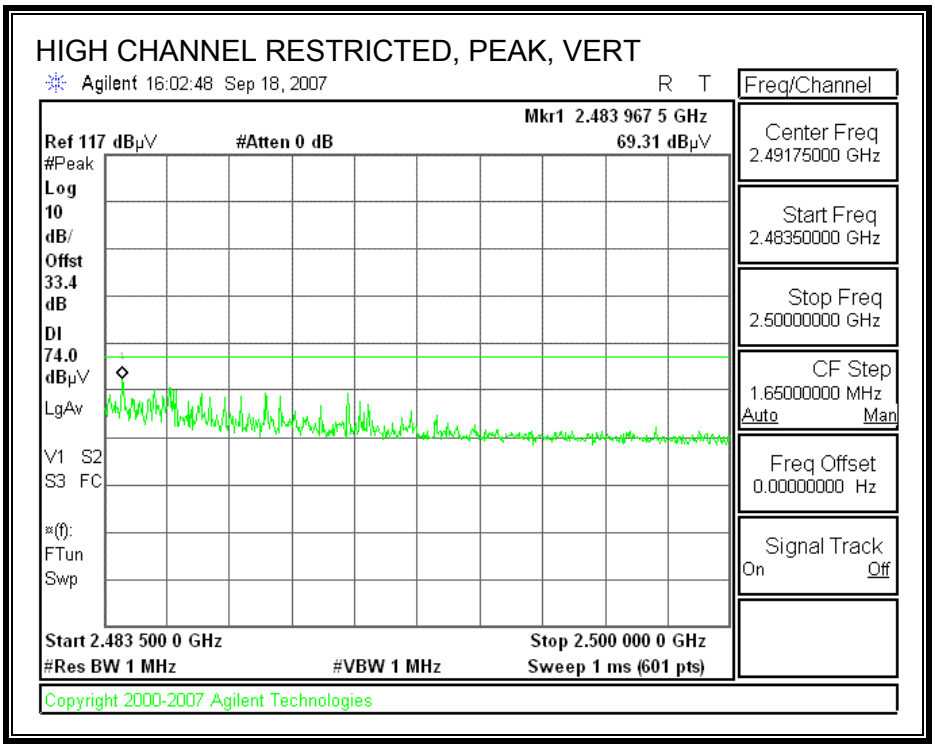


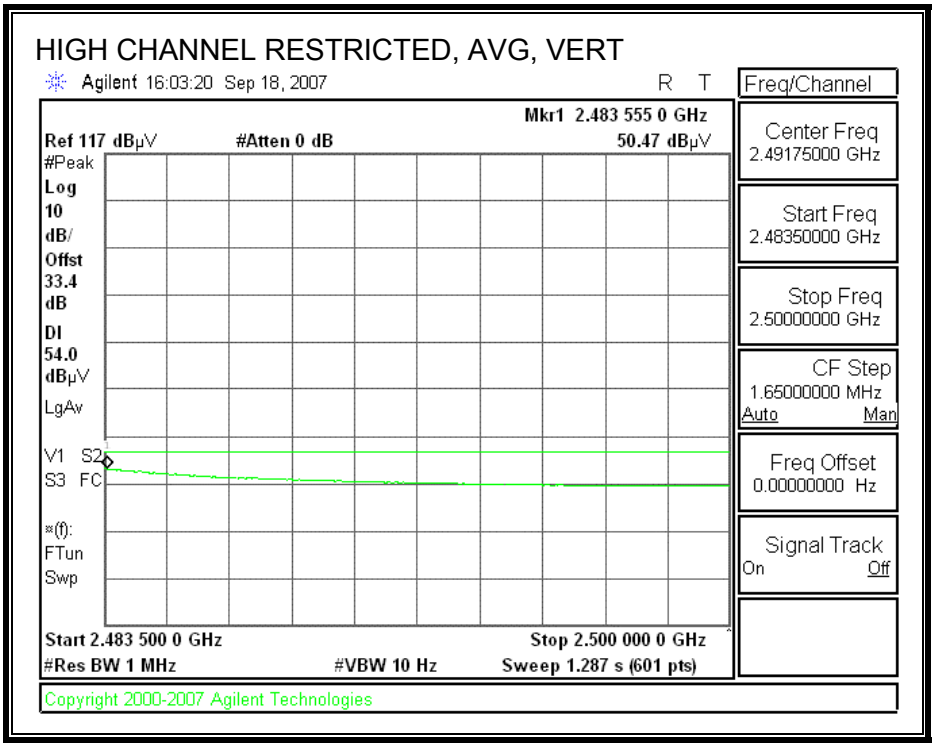
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Mitsumi Electric Co., LTD
Project #: 07J11256
Date: 09/18/07
Test Engineer: Vien Tran
Configuration: EUT on JIG, Desktop, Monitor, Key Board, Mouse,
Mode: Tx 11g Mode (with Mitsumi DCA-E04_2.21dBi Antenna)

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

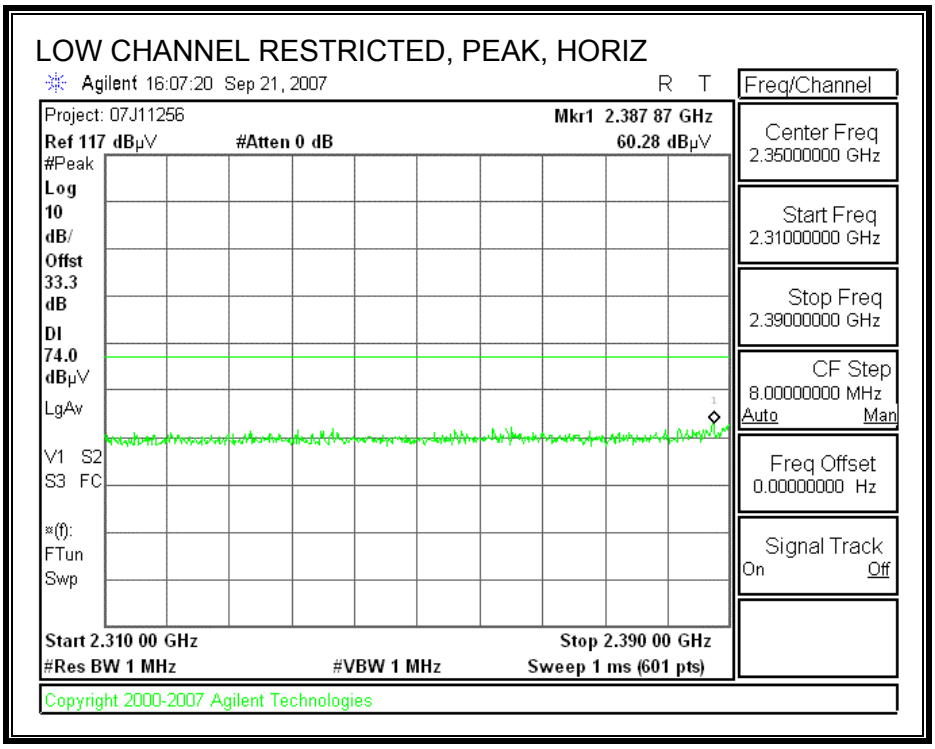
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_4.0GHz	

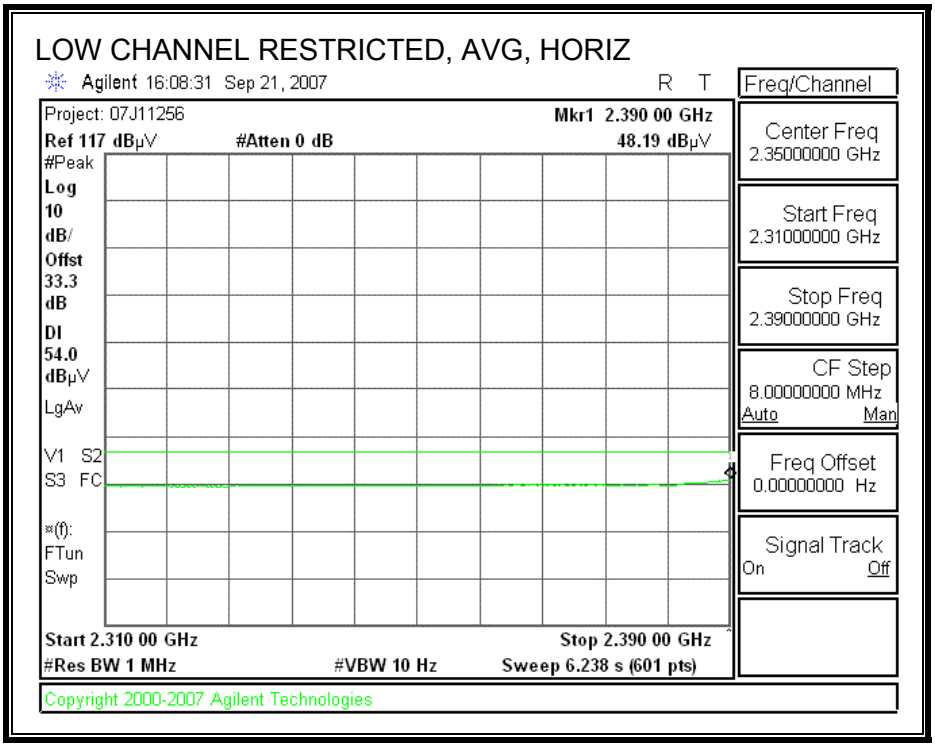
Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CHANNEL, 2412 MHz															
4.284	3.0	40.3	29.9	32.8	6.4	-36.6	0.0	0.5	43.5	33.1	74	54	-30.5	-20.9	V
7.236	3.0	39.2	29.4	34.9	8.4	-36.2	0.0	0.6	46.9	37.1	74	54	-27.1	-16.9	H
MID CHANNEL, 2437 MHz															
4.874	3.0	39.9	29.6	33.4	6.9	-36.5	0.0	0.6	44.3	34.0	74	54	-29.7	-20.0	V
7.311	3.0	48.4	34.9	35.0	8.4	-36.2	0.0	0.6	56.2	42.7	74	54	-17.8	-11.3	V
12.185	3.0	40.8	29.8	37.6	12.2	-35.4	0.0	0.9	56.1	45.1	74	54	-17.9	-8.9	V
4.874	3.0	40.8	29.3	33.4	6.9	-36.5	0.0	0.6	45.2	33.7	74	54	-28.8	-20.3	H
7.311	3.0	42.8	31.8	35.0	8.4	-36.2	0.0	0.6	50.6	39.6	74	54	-23.4	-14.4	H
12.185	3.0	40.2	29.0	37.6	12.2	-35.4	0.0	0.9	55.5	44.3	74	54	-18.5	-9.7	H
HI CHANNEL, 2462 MHz															
4.924	3.0	40.3	29.8	33.4	7.0	-36.5	0.0	0.6	44.8	34.3	74	54	-29.2	-19.7	V
7.386	3.0	49.7	35.8	35.0	8.4	-36.2	0.0	0.6	57.6	43.7	74	54	-16.4	-10.3	V
12.310	3.0	39.6	29.4	37.6	12.2	-35.4	0.0	0.9	54.9	44.7	74	54	-19.1	-9.3	V
4.924	3.0	41.2	29.3	33.4	7.0	-36.5	0.0	0.6	45.7	33.8	74	54	-28.3	-20.2	H
7.386	3.0	42.5	31.4	35.0	8.4	-36.2	0.0	0.6	50.4	39.3	74	54	-23.6	-14.7	H
12.310	3.0	40.0	28.9	37.6	12.2	-35.4	0.0	0.9	55.3	44.2	74	54	-18.7	-9.8	H
		No other emissions were detected above system noise floor													

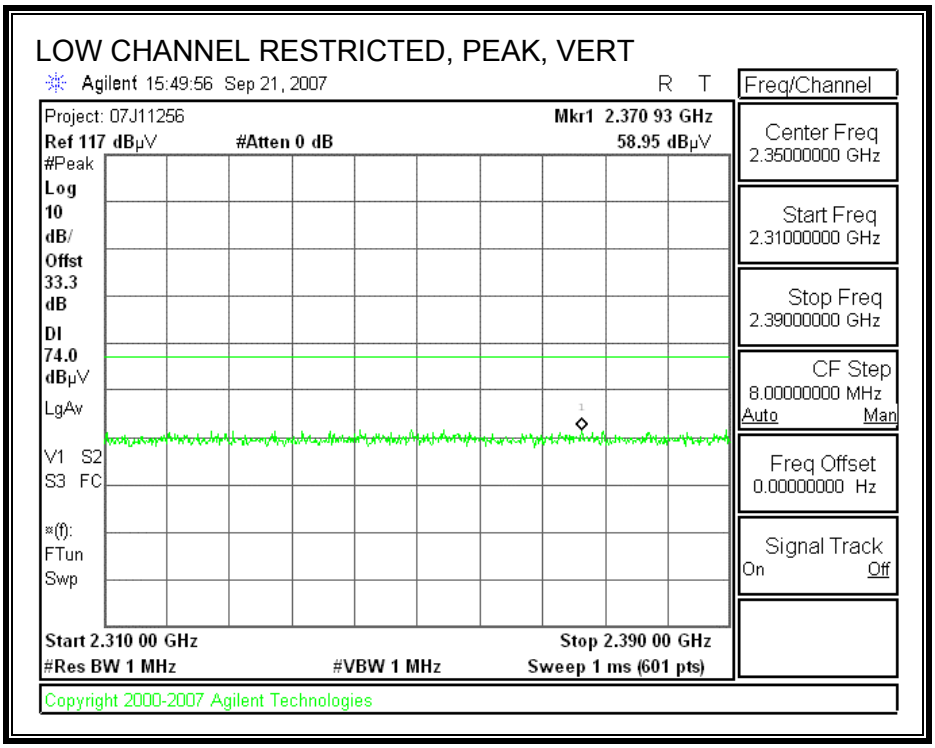
INVERTED-F, 1.38dBi ANTENNA

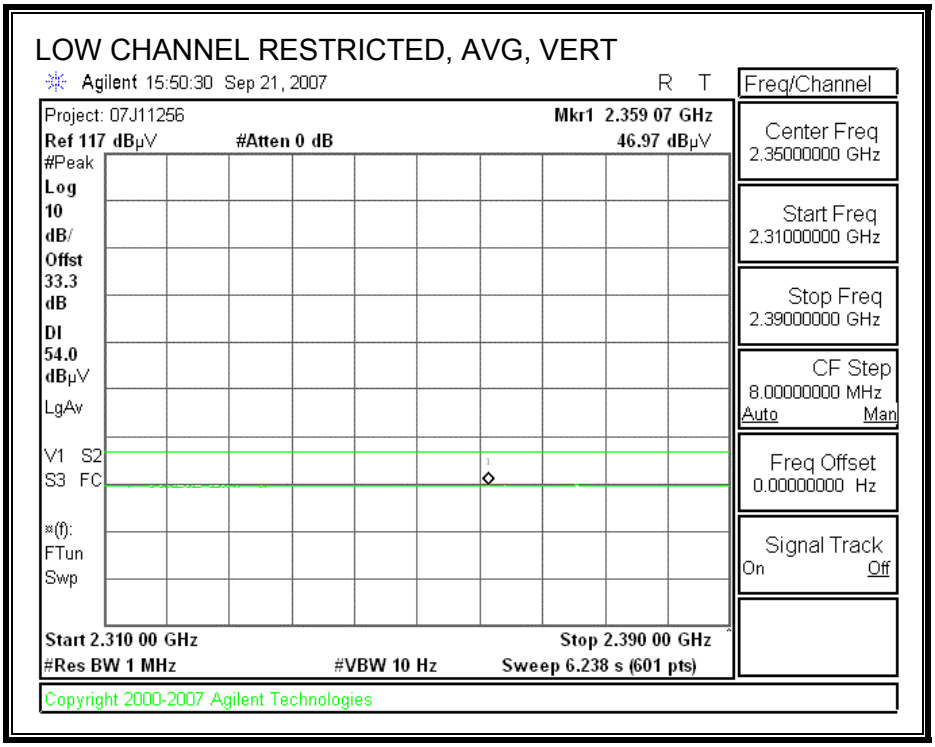
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



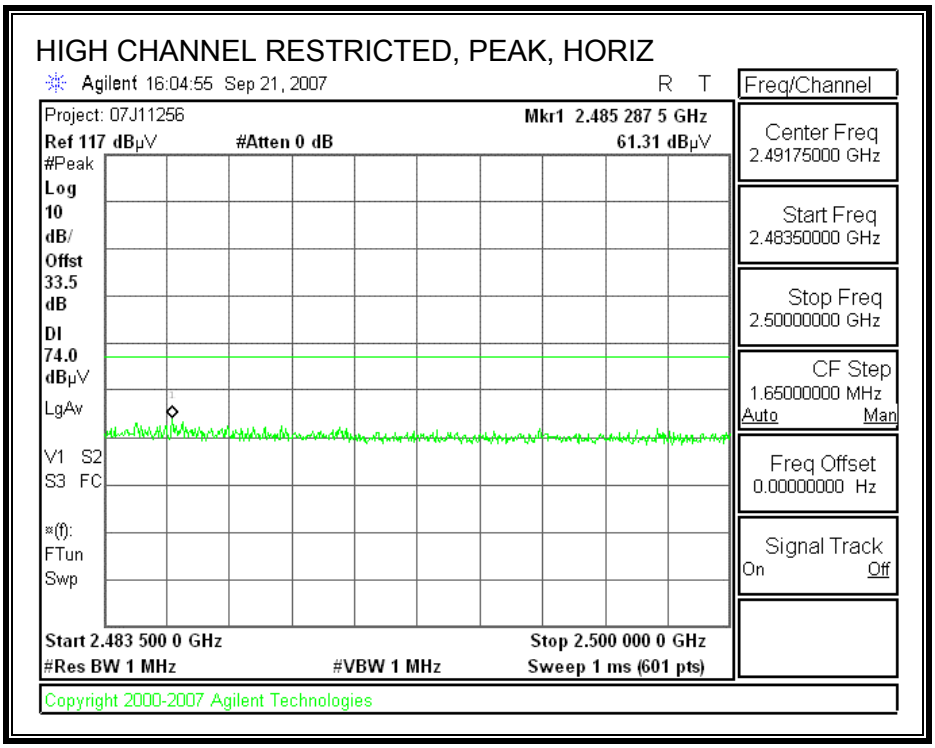


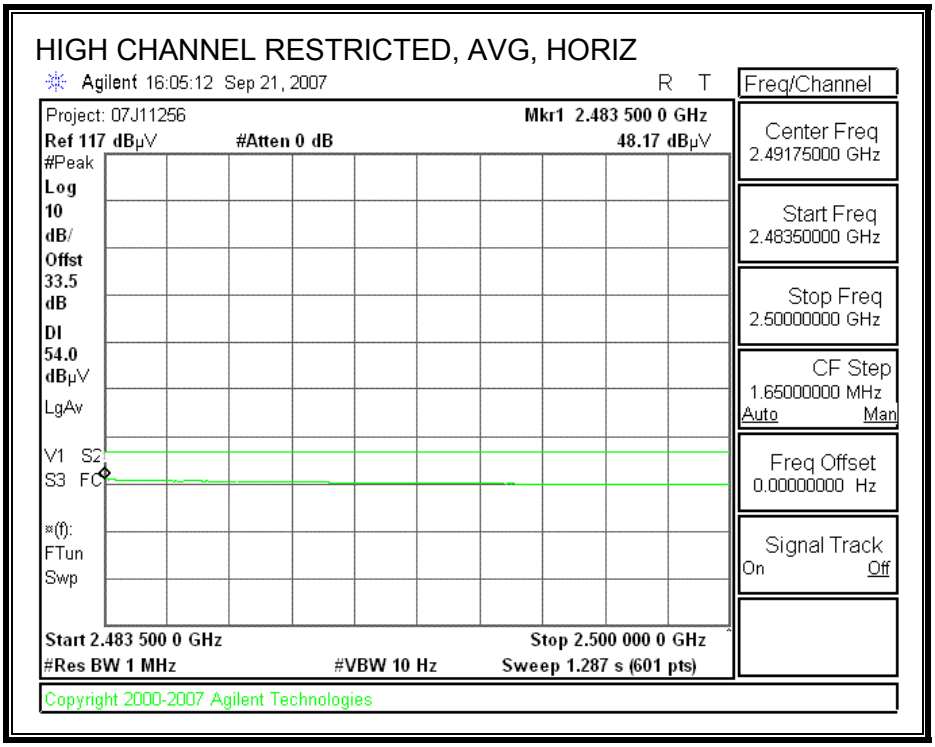
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



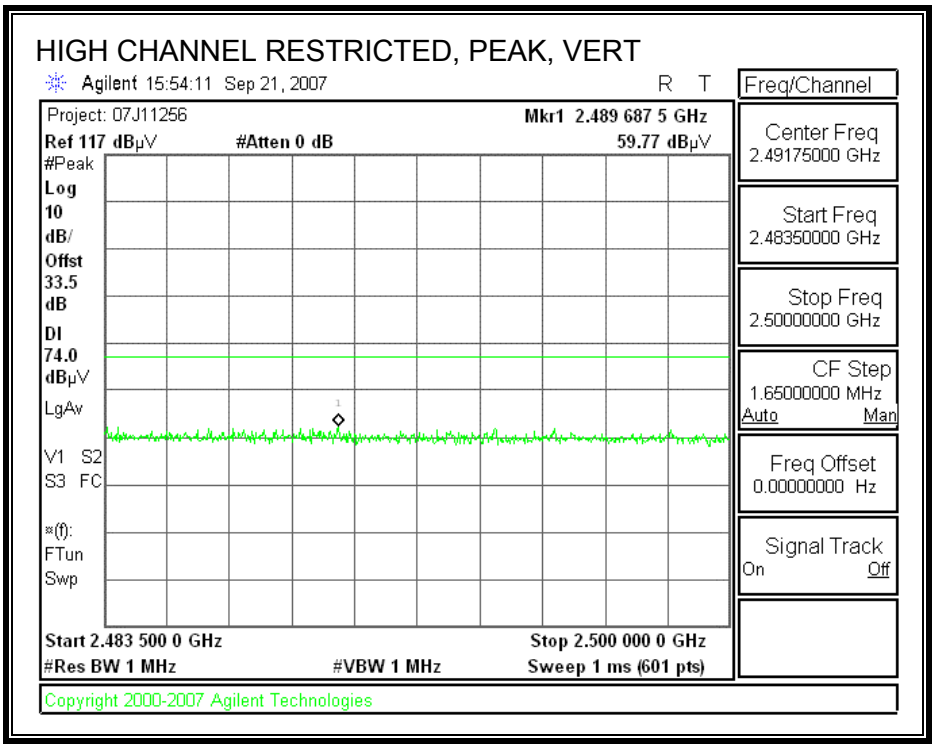


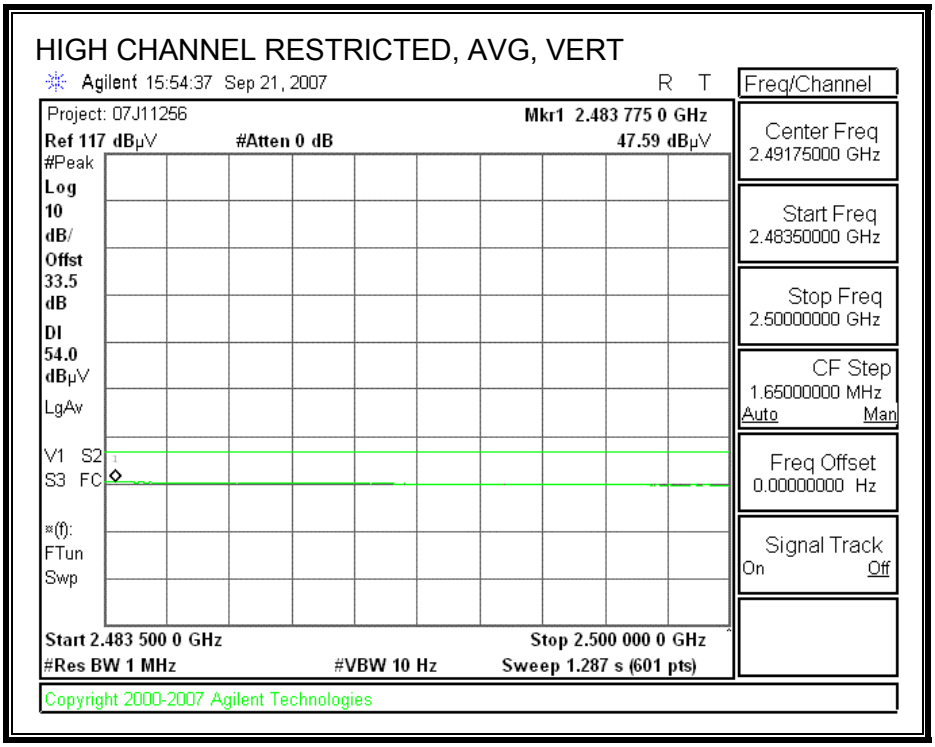
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Company: Mitsumi Electric Co., LTD
Project #: 07J11256
Date: 09/21/07
Test Engineer: Vien Tran
Configuration: EUT on JIG, Desktop, Monitor, Key Board, Mouse,
Mode: Tx 11g Mode (with Parrot_PIFA Double Connector 2_Antenna)

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T145 Agilent 3008A005(			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Frank 177079007		Chin 200354001	HPF_4.0GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CHANNEL, 2412 MHz															
4.284	3.0	44.9	33.4	33.2	3.3	-34.8	0.0	0.5	47.1	35.6	74	54	-26.9	-18.4	V
4.284	3.0	46.3	34.4	33.2	3.3	-34.8	0.0	0.5	48.5	36.6	74	54	-25.5	-17.4	H
MID CHANNEL, 2437 MHz															
4.874	3.0	45.3	32.8	33.7	3.5	-34.9	0.0	0.6	48.3	35.8	74	54	-25.7	-18.2	V
7.311	3.0	46.3	34.1	35.2	4.0	-34.7	0.0	0.6	51.5	39.3	74	54	-22.5	-14.7	V
4.874	3.0	46.6	33.8	33.7	3.5	-34.9	0.0	0.6	49.6	36.8	74	54	-24.4	-17.2	H
7.311	3.0	47.7	34.9	35.2	4.0	-34.7	0.0	0.6	52.9	40.1	74	54	-21.1	-13.9	H
HI CHANNEL, 2462 MHz															
4.924	3.0	45.5	33.0	33.8	3.5	-34.9	0.0	0.6	48.6	36.1	74	54	-25.4	-17.9	V
7.386	3.0	46.6	34.4	35.2	4.0	-34.6	0.0	0.6	51.8	39.6	74	54	-22.2	-14.4	V
4.924	3.0	45.7	33.2	33.8	3.5	-34.9	0.0	0.6	48.8	36.3	74	54	-25.2	-17.7	H
7.386	3.0	48.0	35.7	35.2	4.0	-34.6	0.0	0.6	53.2	40.9	74	54	-20.8	-13.1	H
		No other emissions were detected above system noise floor													

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.2. RECEIVER ABOVE 1 GHz

8.2.1. RECEIVER ABOVE 1 GHz IN THE 2.4 GHz BAND

DIPOLE, 2.21dBi ANTENNA

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Mitsumi Electric Co., LTD
Project #: 07J11256
Date: 09/19/07
Test Engineer: Thanh Nguyen
Configuration: EUT on JIG, Desktop, Monitor, Key Board, Mouse,
Mode: Rx Mode (with Mitsumi_CA-E04_Dipole 2.21dBi Antenna)

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			RX RSS 210

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.158	3.0	63.0	51.4	24.4	3.2	-39.3	0.0	0.0	51.3	39.7	74	54	-22.7	-14.3	V
1.417	3.0	56.4	53.5	25.3	3.5	-38.9	0.0	0.0	46.4	43.4	74	54	-27.6	-10.6	V
3.000	3.0	57.3	49.3	30.0	5.3	-37.4	0.0	0.0	55.3	47.2	74	54	-18.7	-6.8	V
1.033	3.0	58.6	56.1	23.9	3.0	-39.4	0.0	0.0	46.1	43.6	74	54	-27.9	-10.4	H
1.558	3.0	54.1	52.3	25.8	3.7	-38.7	0.0	0.0	44.9	43.2	74	54	-29.1	-10.8	H
3.000	3.0	55.1	46.9	30.0	5.3	-37.4	0.0	0.0	53.0	44.9	74	54	-21.0	-9.1	H
		No other emissions were detected above system noise floor													

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

INVERTED-F, 1.38dBi ANTENNA

High Frequency Measurement
Compliance Certification Services

Company: Mitsumi Electric Co., LTD
Project #: 07J11256
Date: September 21, 2007
Test Engineer: Ninous Davoudi
Configuration: EUT on JIG, Desktop, Monitor, Key Board, Mouse,
Mode: Rx Mode (with Parrot_PIFA Double Connector 2_Inverted-F 1.38dBi Antenna)

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T145 Agilent 3008A005(			RX RSS 210

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
Frank 177079007		Chin 200354001		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
1.128	3.0	55.7	52.3	28.3	1.9	-36.1	0.0	0.0	49.9	46.5	74	54	-24.1	-7.5	V
1.367	3.0	54.0	51.3	29.2	2.1	-35.9	0.0	0.0	49.4	46.7	74	54	-24.6	-7.3	V
1.607	3.0	50.0	44.9	30.1	2.2	-35.7	0.0	0.0	46.6	41.6	74	54	-27.4	-12.4	V
2.039	3.0	48.1	40.8	31.6	2.5	-35.4	0.0	0.0	46.8	39.6	74	54	-27.2	-14.4	V
3.000	3.0	51.4	42.7	32.8	2.9	-35.2	0.0	0.0	52.0	43.2	74	54	-22.0	-10.8	V
1.175	3.0	57.1	55.2	28.5	2.0	-36.0	0.0	0.0	51.6	49.6	74	54	-22.4	-4.4	H
1.415	3.0	51.2	47.0	29.4	2.1	-35.8	0.0	0.0	46.9	42.7	74	54	-27.1	-11.3	H
1.512	3.0	50.9	46.5	29.8	2.2	-35.8	0.0	0.0	47.1	42.7	74	54	-26.9	-11.3	H
1.656	3.0	50.3	44.5	30.3	2.3	-35.7	0.0	0.0	47.2	41.4	74	54	-26.8	-12.6	H
1.895	3.0	51.8	47.6	31.2	2.4	-35.5	0.0	0.0	49.9	45.7	74	54	-24.1	-8.3	H
1.991	3.0	49.4	44.4	31.6	2.5	-35.4	0.0	0.0	48.0	43.0	74	54	-26.0	-11.0	H
No other emissions were detected above system noise floor															

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

8.3. WORST-CASE BELOW 1 GHz

DIPOLE, 2.21dBi ANTENNA

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

HORIZONTAL

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 19 File#: 30-1000 A.EMI Date: 09-19-2007 Time: 14:37:55

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Thanh Nguyen
Project #: : 07J11256
Company: : Mitsumi
Configuration:: EUT on JIG, Desktop, KB, Mouse, & LCD
Mode : : Tx worst-case with Dipole 2.21dBi atenna
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	182.290	51.49	-14.95	36.54	43.50	-6.96	Peak
2	295.780	48.10	-12.41	35.69	46.00	-10.31	Peak
3	342.340	51.43	-11.22	40.21	46.00	-5.79	Peak
4	439.340	49.72	-8.83	40.89	46.00	-5.11	Peak
5	567.380	44.30	-6.03	38.27	46.00	-7.73	Peak
6	766.230	37.63	-2.50	35.13	46.00	-10.87	Peak
7	887.480	35.76	-1.19	34.57	46.00	-11.43	Peak

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

VERTICAL

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 20 File#: 30-1000 A.EMI Date: 09-19-2007 Time: 14:31:53

Condition: FCC CLASS-B VERTICAL
Test Operator:: Thanh Nguyen
Project #: : 07J11256
Company: : Mitsumi
Configuration:: EUT on JIG, Desktop, KB, Mouse, & LCD
Mode : : Tx worst-case with Dipole 2.21dBi atenna
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	182.290	46.54	-14.95	31.59	43.50	-11.91	Peak
2	240.490	53.10	-14.48	38.62	46.00	-7.38	Peak
3	392.780	53.54	-10.08	43.46	46.00	-2.54	Peak
4	439.340	49.06	-8.83	40.23	46.00	-5.77	Peak
5	584.840	49.07	-5.68	43.39	46.00	-2.61	Peak
6	869.050	42.68	-1.38	41.30	46.00	-4.70	Peak

INVERTED-F, 1.38dBi ANTENNA

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

HORIZONTAL

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 23 File#: 30-1000 A.EMI Date: 09-19-2007 Time: 15:27:18

Condition: FCC CLASS-B HORIZONTAL
Test Operator:: Thanh Nguyen
Project #: : 07J11256
Company: : Mitsumi
Configuration:: EUT on JIG, Desktop, KB, Mouse, & LCD
Mode : : Tx worst-case with Inverted F_1.38dBi antenna
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	31.940	38.86	-6.60	32.26	40.00	-7.74	Peak
2	120.210	46.93	-13.31	33.63	43.50	-9.88	Peak
3	216.240	49.01	-15.29	33.72	46.00	-12.28	Peak
4	381.140	52.24	-10.31	41.93	46.00	-4.07	Peak
5	584.840	47.99	-5.68	42.31	46.00	-3.69	Peak
6	775.930	43.58	-2.39	41.19	46.00	-4.81	Peak
7	870.990	43.76	-1.38	42.38	46.00	-3.62	Peak

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

VERTICAL

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 26 File#: 30-1000 A.EMI Date: 09-19-2007 Time: 15:34:36

Condition: FCC CLASS-B VERTICAL
Test Operator:: Thanh Nguyen
Project #: : 07J11256
Company: : Mitsumi
Configuration:: EUT on JIG, Desktop, KB, Mouse, & LCD
Mode : : Tx worst-case with Inverted-F_1.38dBi antenna
Target: : FCC Class B

	Freq	Read Level	Factor	Limit Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	31.940	41.08	-6.60	34.48	40.00	-5.52	Peak
2	94.990	52.87	-18.29	34.58	43.50	-8.92	Peak
3	232.730	46.67	-14.75	31.92	46.00	-14.08	Peak
4	392.780	45.54	-10.08	35.46	46.00	-10.54	Peak
5	453.890	48.65	-8.44	40.21	46.00	-5.79	Peak
6	526.640	46.04	-6.87	39.17	46.00	-6.83	Peak
7	681.840	46.44	-3.82	42.62	46.00	-3.38	Peak

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

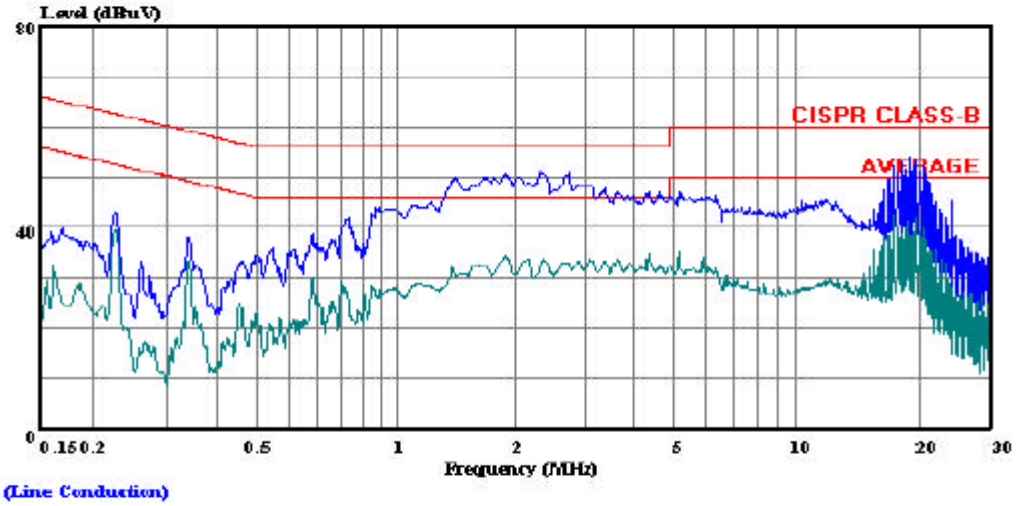
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
1.53	49.43	--	31.50	0.00	56.00	46.00	-6.57	-14.50	L1
2.42	50.96	--	33.44	0.00	56.00	46.00	-5.04	-12.56	L1
18.92	53.86	--	49.57	0.00	60.00	50.00	-6.14	-0.43	L1
1.50	50.79	--	35.65	0.00	56.00	46.00	-5.21	-10.35	L2
2.81	51.24	--	34.86	0.00	56.00	46.00	-4.76	-11.14	L2
18.23	44.90	--	37.57	0.00	60.00	50.00	-15.10	-12.43	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: 07J11256.EMI Date: 09-23-2007 Time: 09:19:03



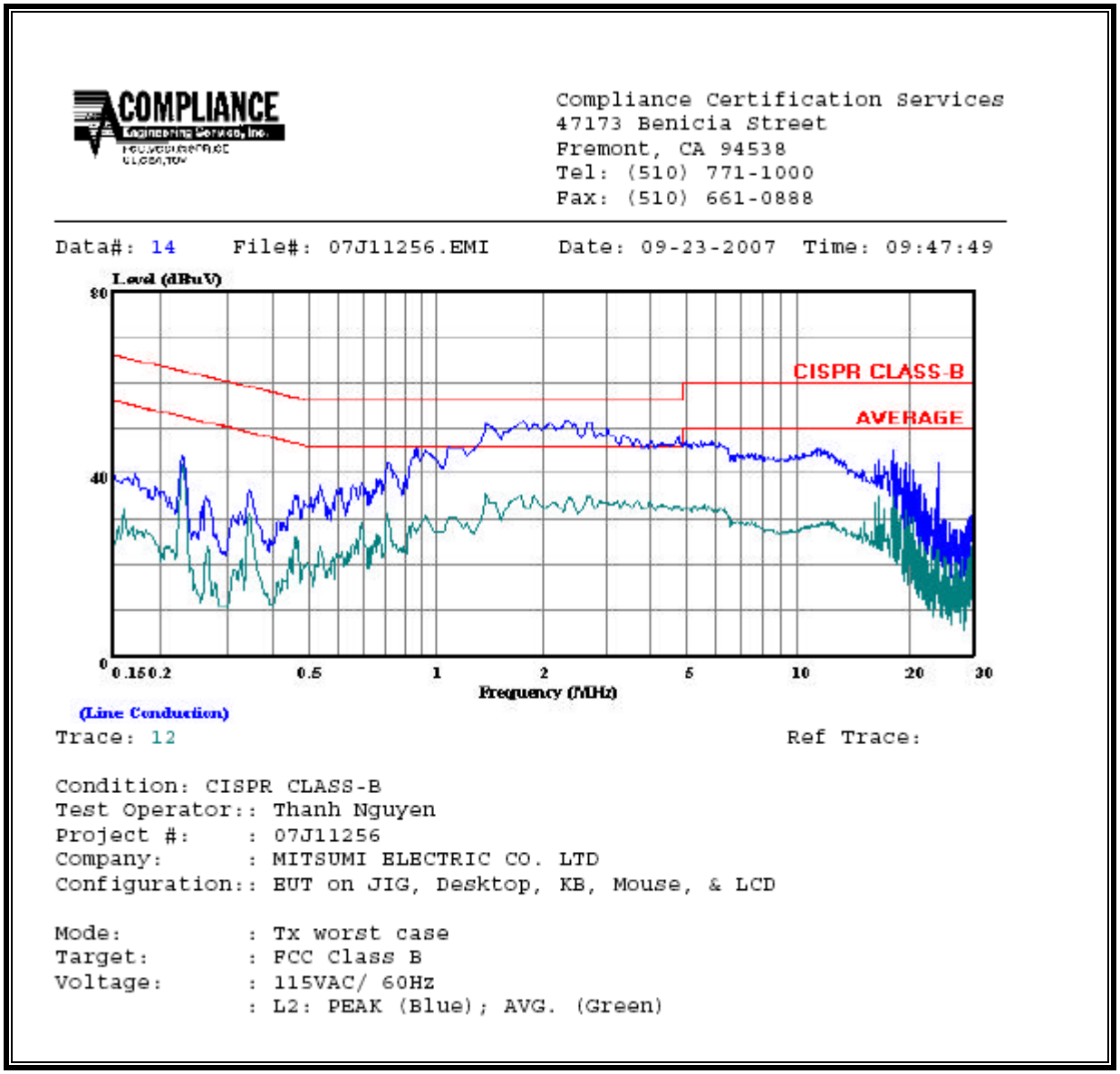
(Line Conduction)

Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Thanh Nguyen
Project #: : 07J11256
Company: : MITSUMI ELECTRIC CO. LTD
Configuration:: EUT on JIG, Desktop, KB, Mouse, & LCD

Mode: : Tx worst case
Target: : FCC Class B
Voltage: : 115VAC/ 60Hz
: L1: PEAK (Blue); AVG. (Green)

LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 ^ ((P + G) / 10) / (d^2)$

The power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by a factor of 10.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

RESULTS

(MPE distance equals 20 cm)

DIPOLE, 2.21dBi ANTENNA

Mode	Band	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	IC Power Density (W/m^2)
WLAN	2.4 GHz	20.0	18.74	2.21	0.02	0.25

INVERTED-F, 1.38dBi ANTENNA

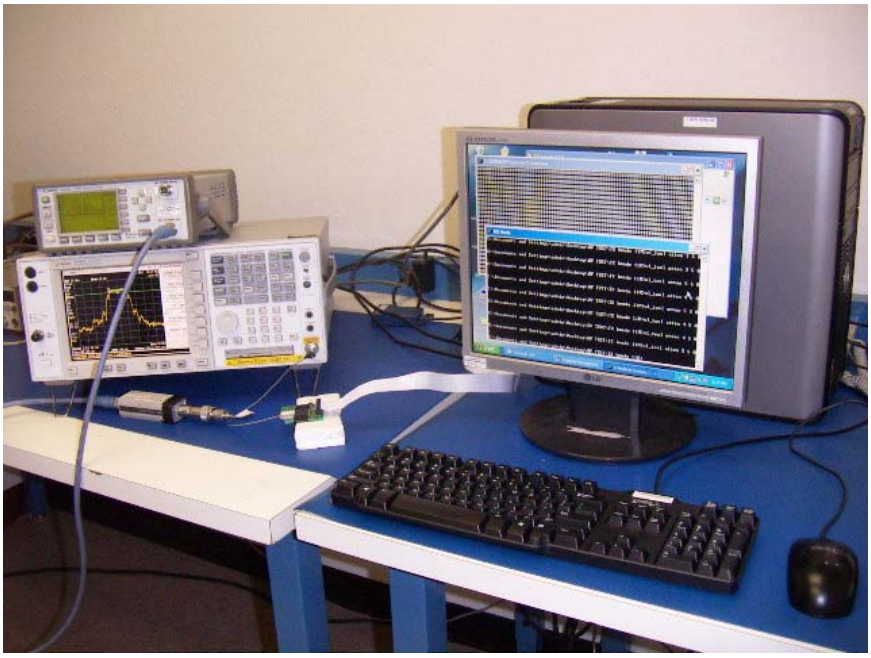
Mode	Band	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	IC Power Density (W/m^2)
WLAN	2.4 GHz	20.0	19.09	1.38	0.02	0.22

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

11. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

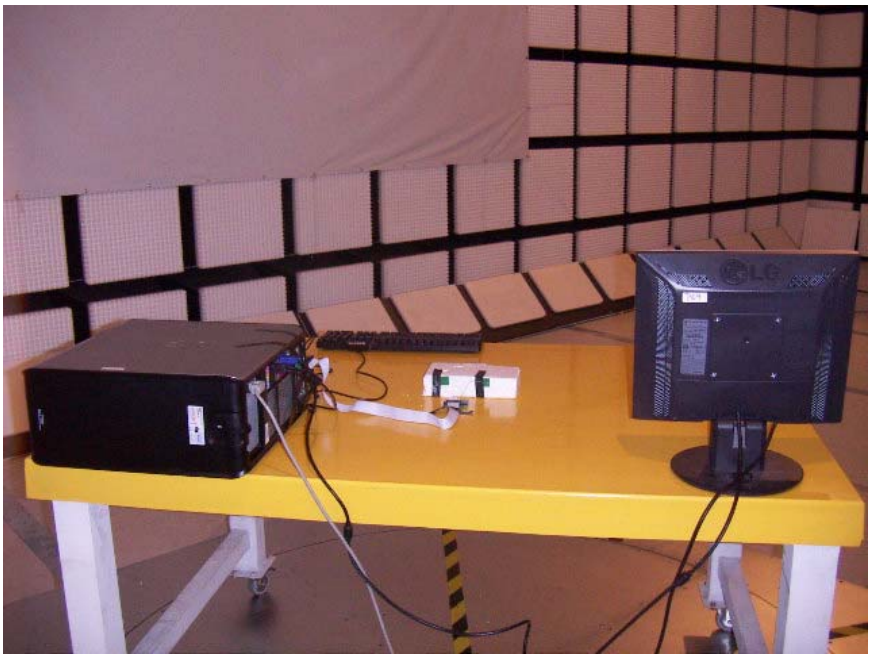
ANTENNA PORT CONDUCTED PHOTO



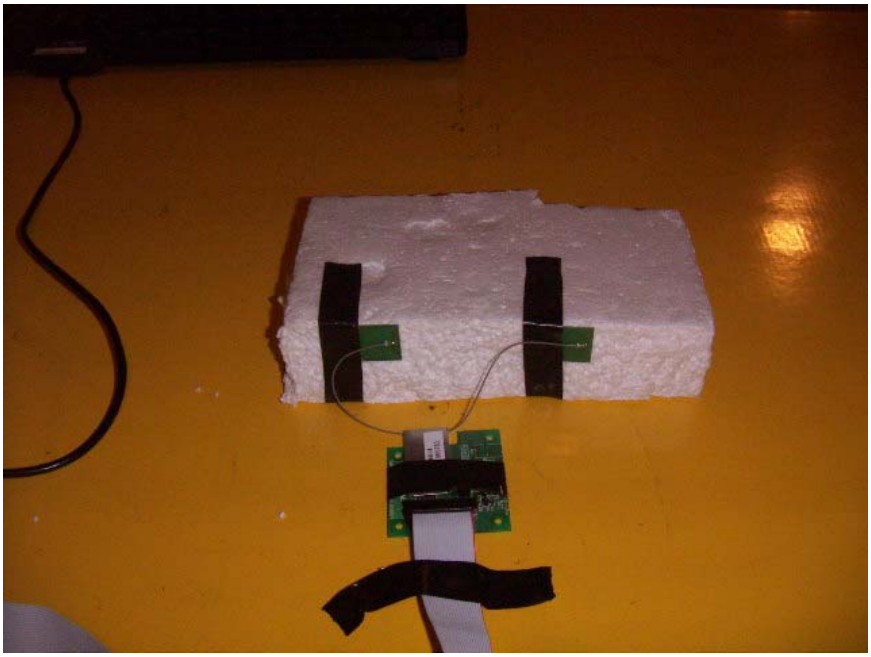
RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION

DIPOLE, 2.21dBi ANYENNA_WORST-CASE CONFIGURATION

EUT AT X-AXIS & ANTENNA AT Z-AXIS - FRONT PHOTO

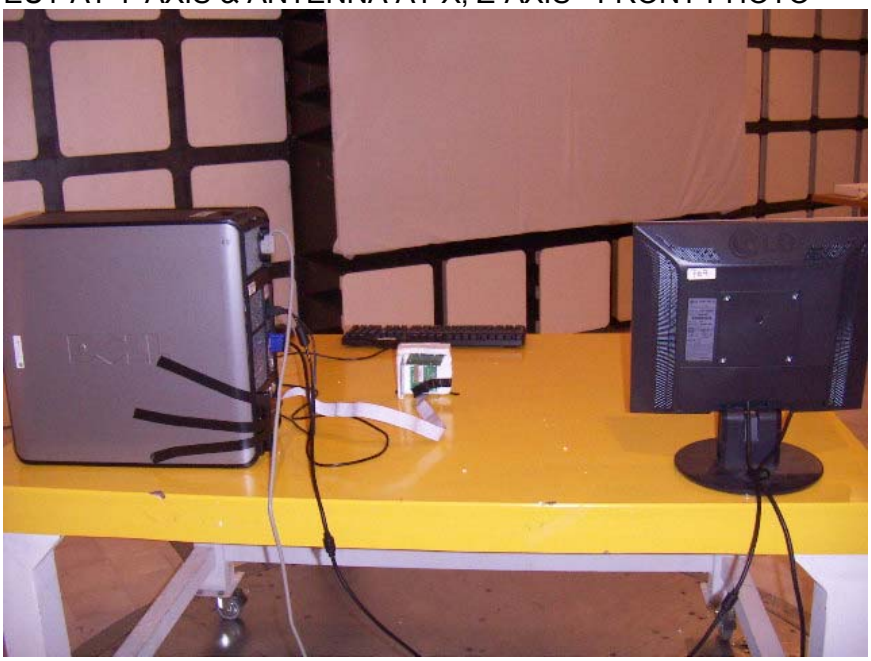


EUT AT X-AXIS & ANTENNA AT Z-AXIS – CLOSE UP PHOTO

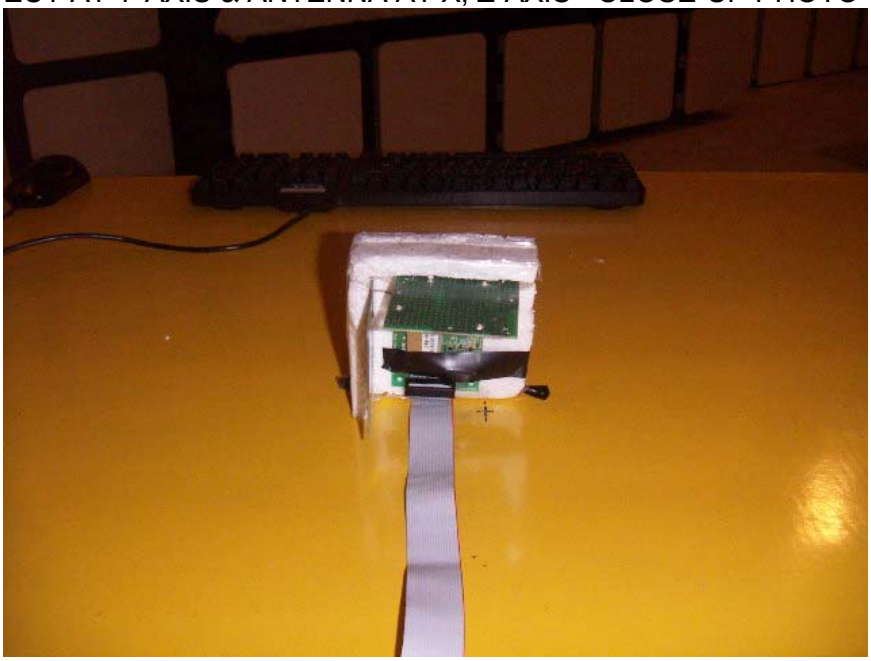


INVERTED-F, 2.21dBi ANTENNA_WORST-CASE CONFIGURATION

EUT AT Y-AXIS & ANTENNA AT X, Z-AXIS - FRONT PHOTO

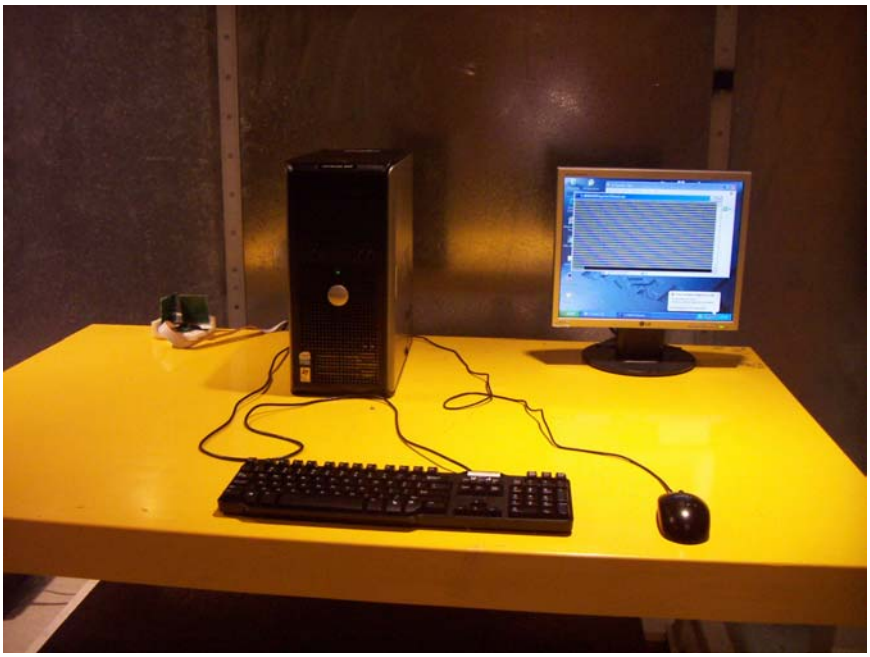


EUT AT Y-AXIS & ANTENNA AT X, Z-AXIS - CLOSE-UP PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO



LINE CONDUCTED BACK PHOTO

END OF REPORT