FCC CFR47 PART 15 SUBPART E
INDUSTRY CANADA RSS-210 ISSUE 7
CLASS II PERMISSIVE CHANGE

CERTIFICATION TEST REPORT

FOR

INTEL WI-FI LINK 5100 SERIES

FCC MODEL NUMBER: 512AN_MMW

IC MODEL NUMBER: L512ANMU

FCC ID: PD9LEN512ANMU
IC: 1000M-L512ANMU

REPORT NUMBER: 08U12055-2A

ISSUE DATE: SEPTEMBER 15, 2008

Prepared for
INTEL CORPORATION
2111 N.E. 25th AVE
HILLSBORO, OR 97124-5961, U.S.A.

Prepared by
COMPLIANCE CERTIFICATION SERVICES
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	09/15/08	Initial Issue	T. Chan
A	09/15/08	Revised report to remove all instances of Caramel and replace with LENOVO THINKPAD X200 TABLET SERIES	A. Zaffar

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: INTEL CORPORATION
2111 NE 25TH AVENUE
HILLSBORO, OREGON 97124, USA

EUT DESCRIPTION: INTEL WIFI LINK 5100 SERIES

FCC MODEL: 512AN_MMW

IC MODEL: L512ANMU

SERIAL NUMBER: E14718-010

DATE TESTED: AUGUST 31-SEPTEMBER 05, 2008

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 9	Pass
INDUSTRY CANADA RSS-GEN Issue 2	Pass

Compliance Certification Services, Inc. (CCS) 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 CCS based on interpretations and/or observations of test results. 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS 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:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
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
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n transceiver Intel Wi-Fi Link 5100 Series
The radio module is manufactured by Intel.

5.2. MAXIMUM OUTPUT POWER

The test measurement passed within ± 0.5dBm of the original output power.

5.3. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is adding portable LENOVO THINKPAD X200 TABLET SERIES.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with maximum gain of -0.39dBi from 2400 - 2483.5 MHz, 1.45 dBi from 5150 - 5350 MHz, 1.47 dBi from 5470 - 5725 MHz, and 0.92 dBi from 5725 - 5850 MHz.

5.5. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing was CRTU, version 5.0.69.0

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

The worst-position was the EUT with highest emissions. To determine the worst-case, the EUT was investigated for X, Y, Z, and mobile Positions, after the investigations, the worst-position were turned out to be a mobile position for all bands.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	LCM-1 SIT	1S814Y12GLV002N0	DoC
AC Adapter	Lenovo	PA-1900-17IJ	11S92P1109Z1ZACU59X75H	DoC

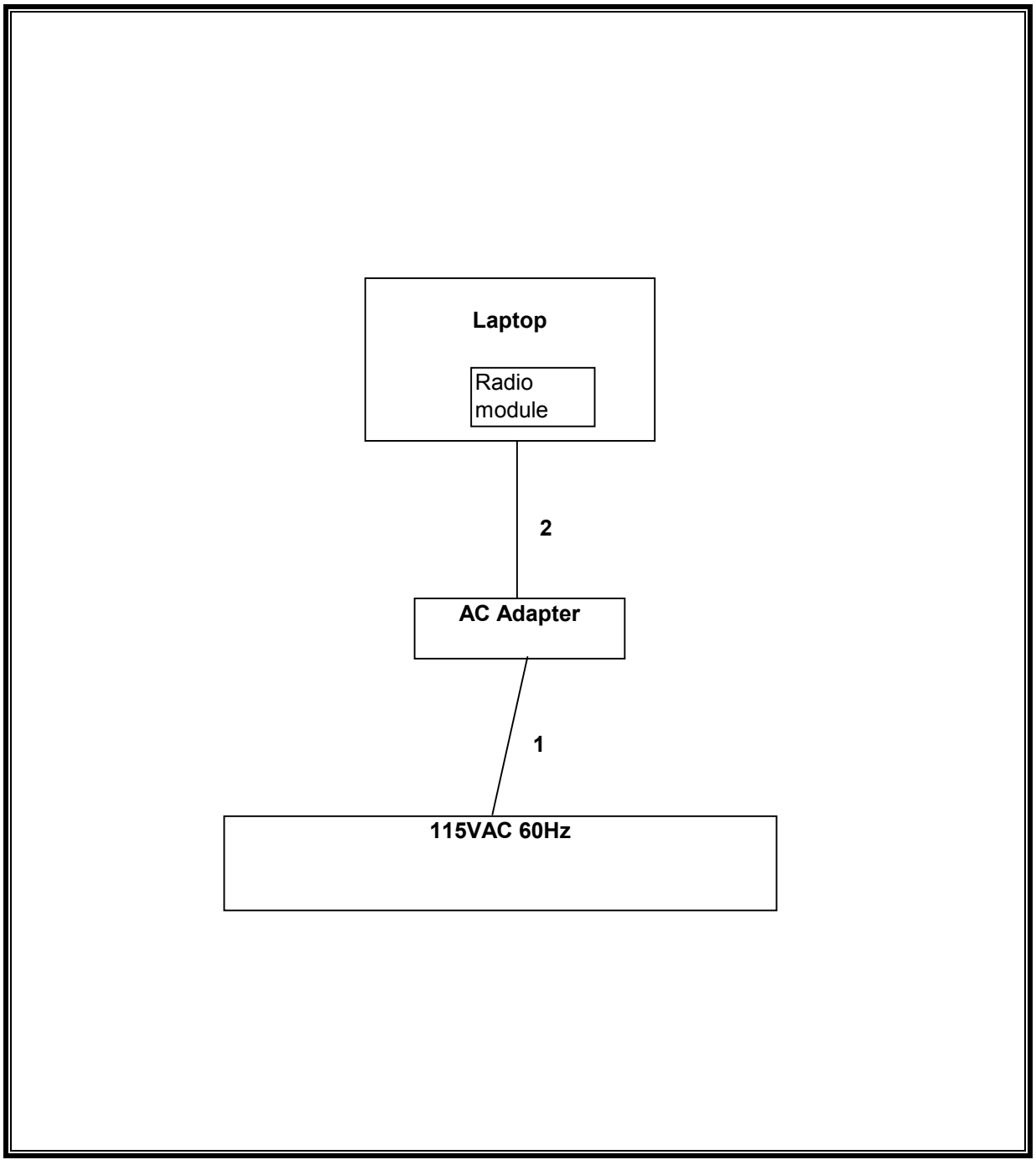
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	one ferrite at Laptop end
2	DC	1	DC	Un-shielded	2m	NA

TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test 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**	**Asset**	**Cal Due**
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	09/27/08
Antenna, Horn, 18 GHz	EMCO	3115	C00872	04/22/09
Preamp, 1000MHz	Sonoma	310N	N02891	03/31/09
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	09/28/08
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	09/19/09
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	09/19/09
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/25/08
EMI Test Receiver, 30 MHz	R&S	ESHS 20	N02396	08/06/09
Antenna, Horn, 26.5 GHz	ARA	SWH-28	C01015	09/28/08
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	03/03/09
Highpass Filter, 7.6 GHz	Micro-Tronics	HPM13195	N02681	CNR
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	10/11/08
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	04/29/09

7. RADIATED TEST RESULTS

7.1. 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, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

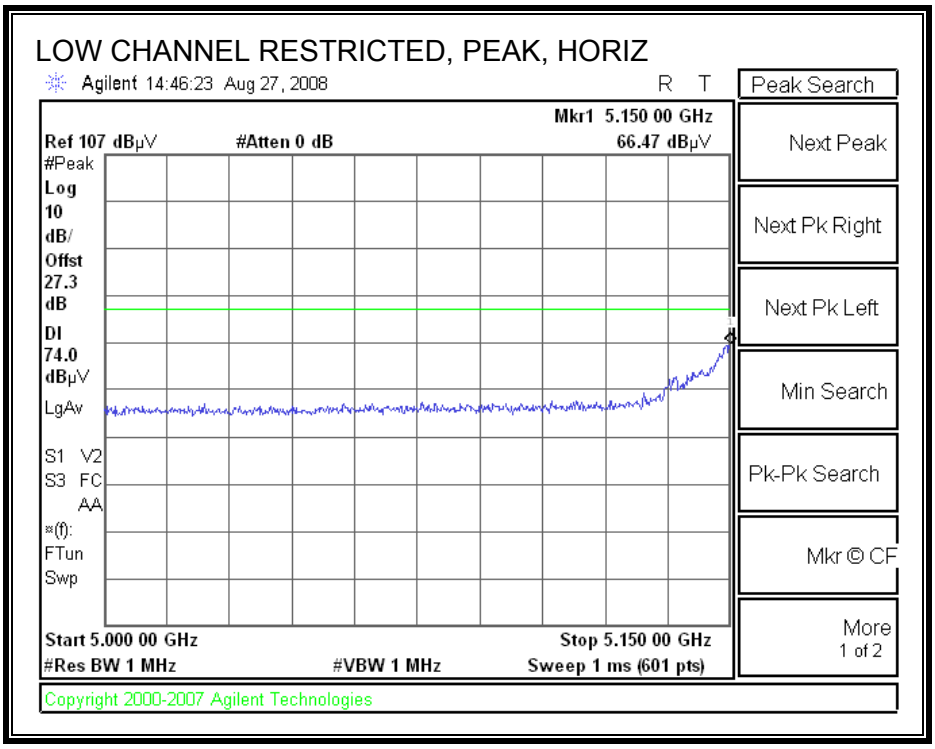
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

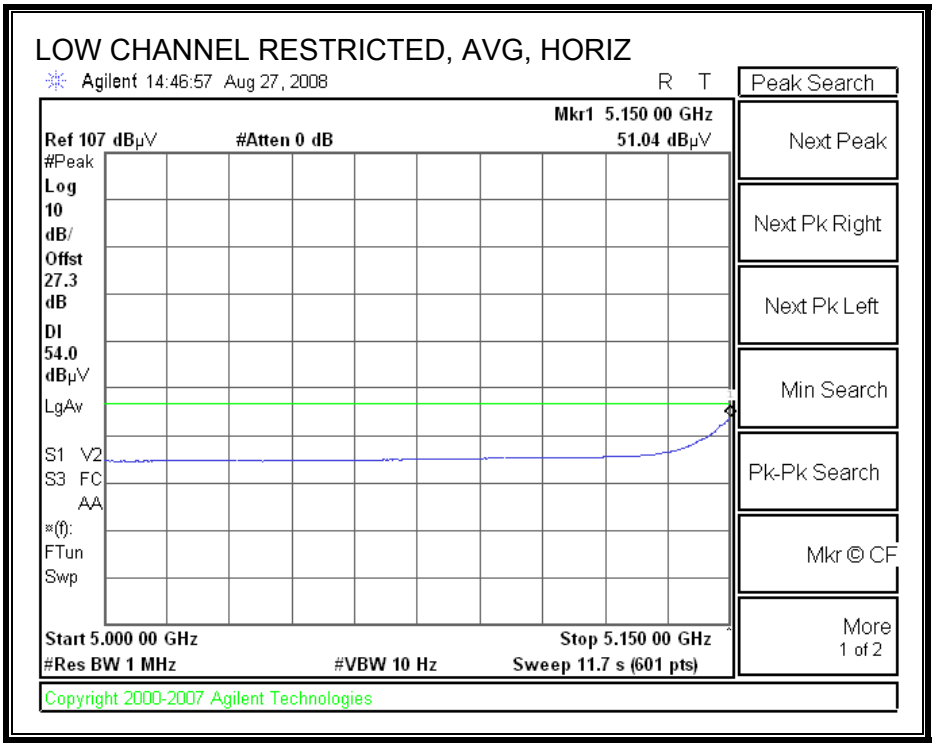
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

7.2. TRANSMITTER ABOVE 1 GHz

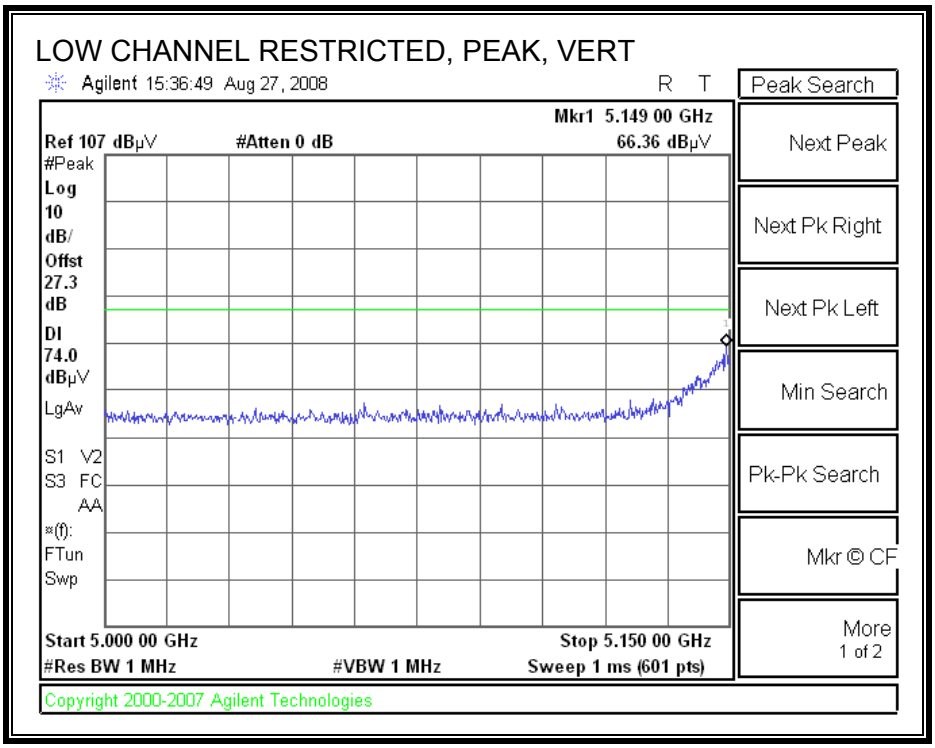
7.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE LOWER 5.2 GHz BAND

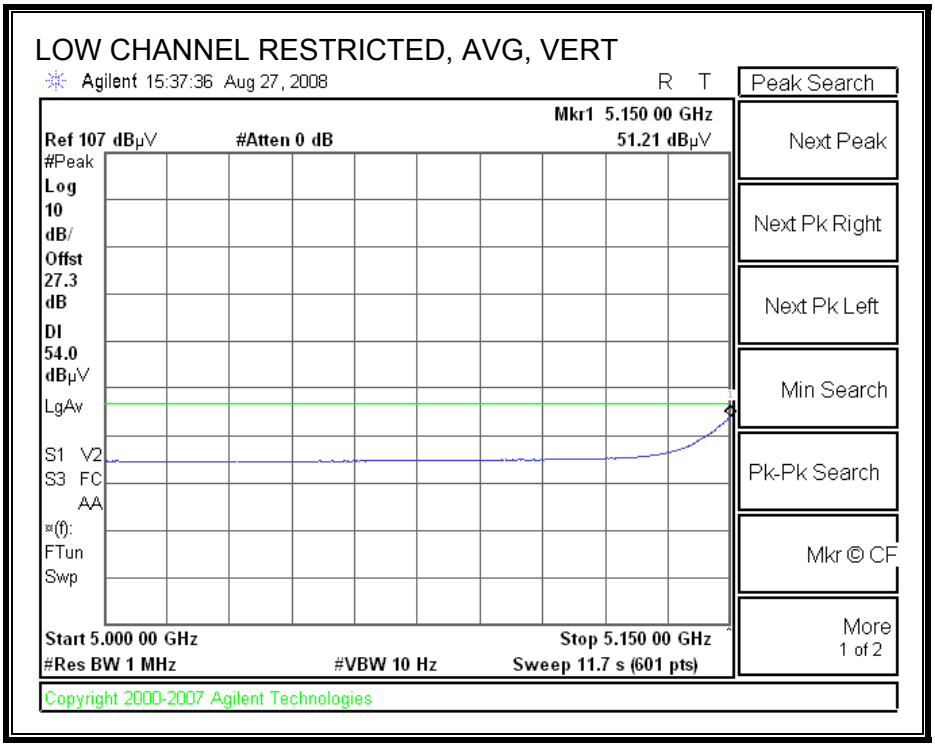
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Intel
Project #: 08U12055
Date: 9/3/2008
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: TX, a mode , Legacy, 5.2GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	C-5m Chamber	HPF_7.6GHz	

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

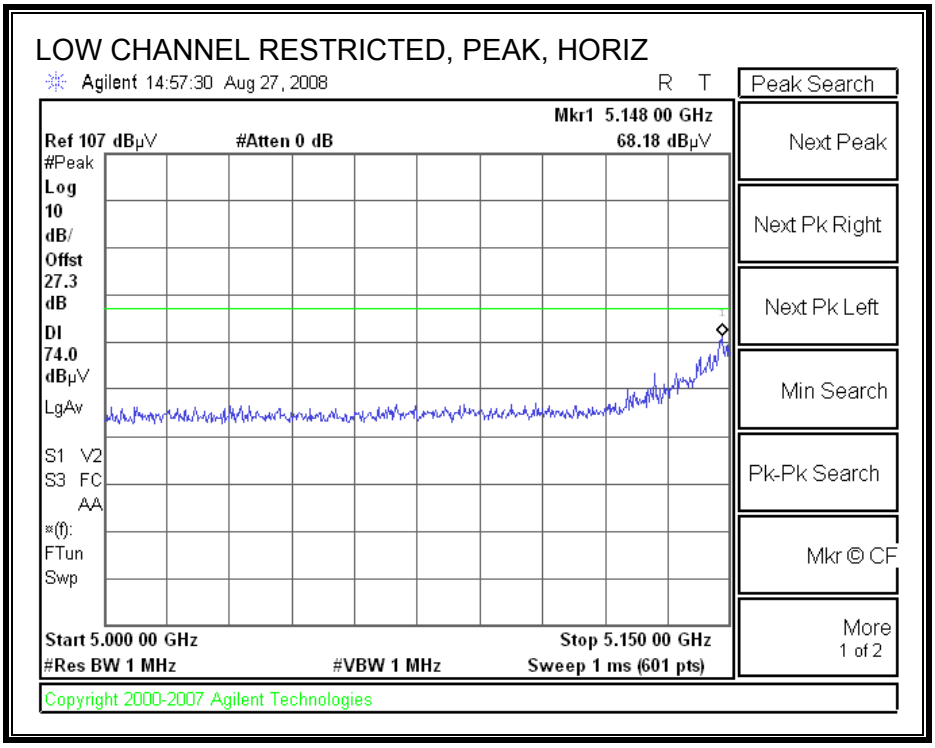
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5180MHz															
15.540	3.0	45.7	33.1	40.4	5.2	-32.2	0.0	0.7	59.9	47.3	74	54	-14.1	-6.7	V
15.540	3.0	45.0	33.0	40.4	5.2	-32.2	0.0	0.7	59.2	47.2	74	54	-14.8	-6.8	H
Mid Ch 5200MHz															
15.600	3.0	46.0	33.4	40.4	5.2	-32.2	0.0	0.7	60.2	47.6	74	54	-13.8	-6.4	V
15.600	3.0	45.4	33.2	40.4	5.2	-32.2	0.0	0.7	59.6	47.4	74	54	-14.4	-6.6	H
High Ch, 5240MHz															
15.720	3.0	45.3	33.3	40.4	5.2	-32.2	0.0	0.7	59.5	47.5	74	54	-14.5	-6.5	V
15.720	3.0	45.7	32.8	40.4	5.2	-32.2	0.0	0.7	59.9	47.0	74	54	-14.1	-7.0	H

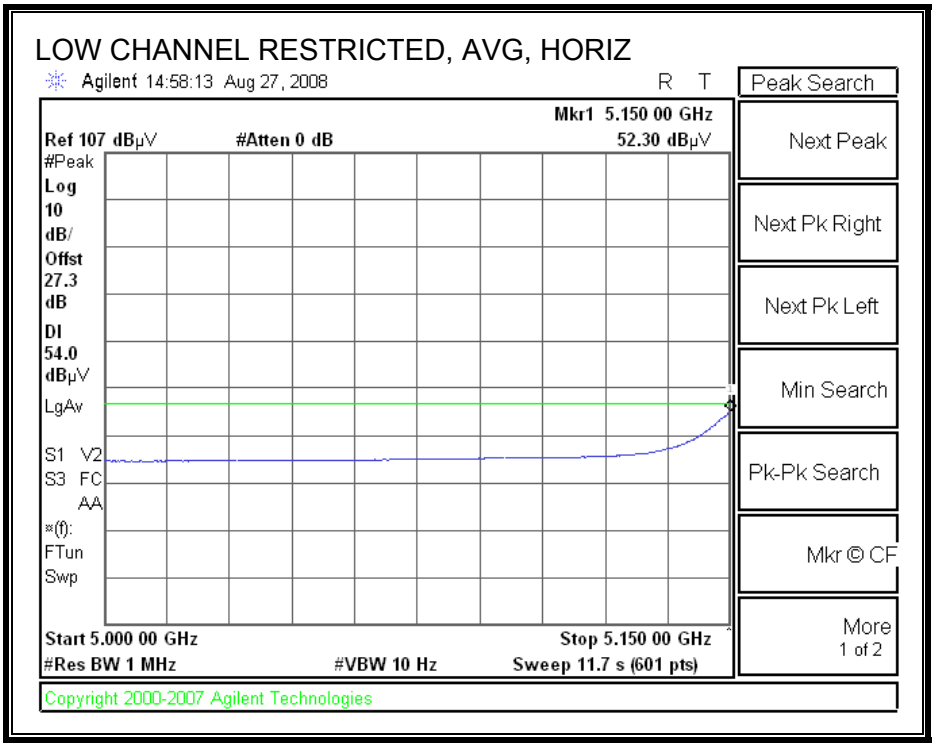
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

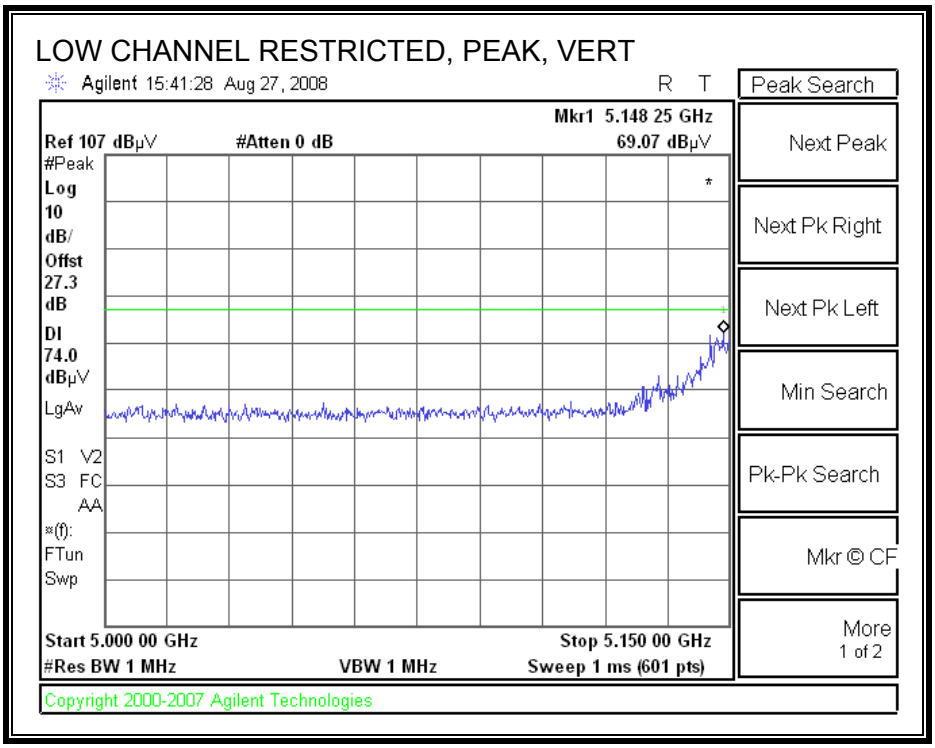
7.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE LOWER 5.2 GHz BAND

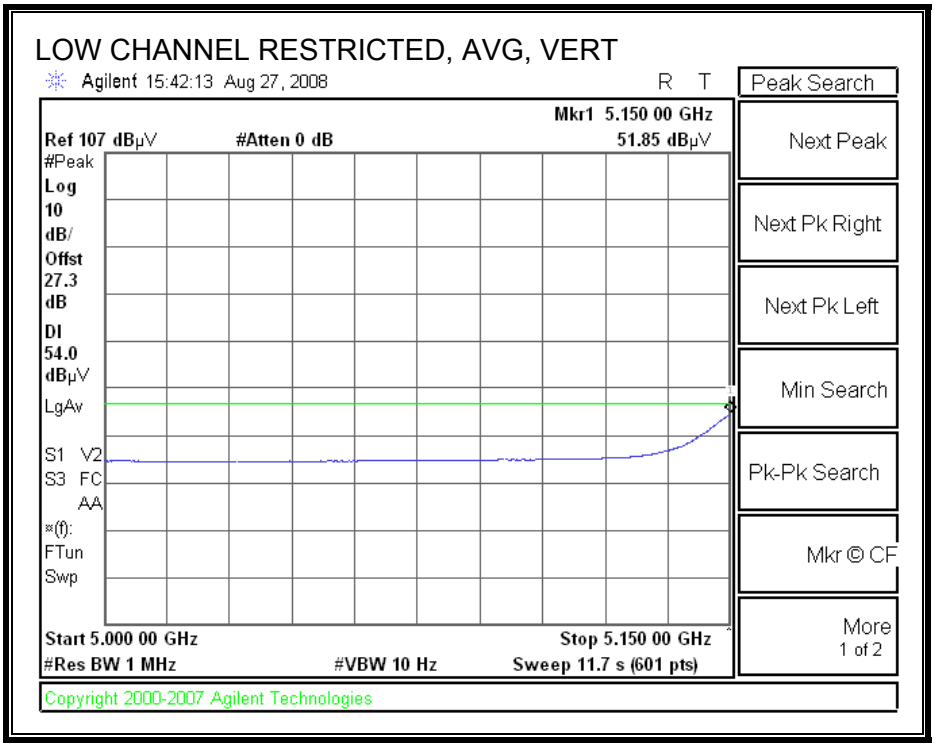
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Intel
Project #: 08U12055
Date: 9/3/2008
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: TX, HT20 mode , 5.2GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	C-5m Chamber	HPF_7.6GHz	

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

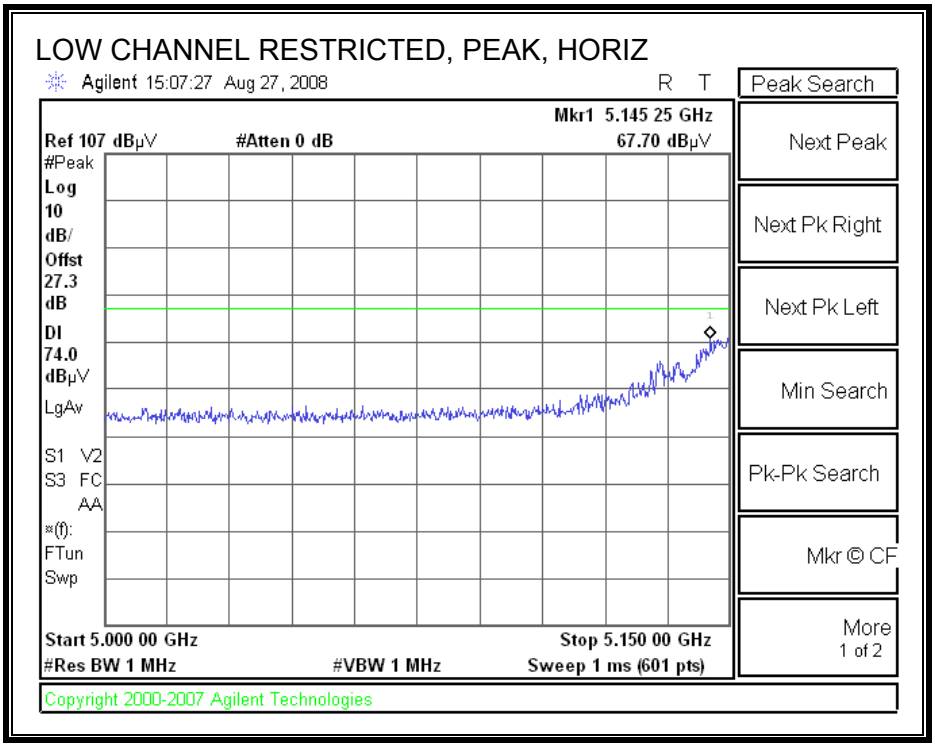
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5180MHz															
15.540	3.0	45.0	33.4	40.4	5.2	-32.2	0.0	0.7	59.2	47.6	74	54	-14.8	-6.4	V
15.540	3.0	44.8	33.2	40.4	5.2	-32.2	0.0	0.7	59.0	47.4	74	54	-15.0	-6.6	H
Mid Ch 5200MHz															
15.600	3.0	45.0	33.5	40.4	5.2	-32.2	0.0	0.7	59.2	47.7	74	54	-14.8	-6.3	V
15.600	3.0	44.6	33.0	40.4	5.2	-32.2	0.0	0.7	58.8	47.2	74	54	-15.2	-6.8	H
High Ch, 5240MHz															
15.720	3.0	45.0	33.5	40.4	5.2	-32.2	0.0	0.7	59.2	47.7	74	54	-14.8	-6.3	V
15.720	3.0	44.7	33.4	40.4	5.2	-32.2	0.0	0.7	58.9	47.6	74	54	-15.1	-6.4	H

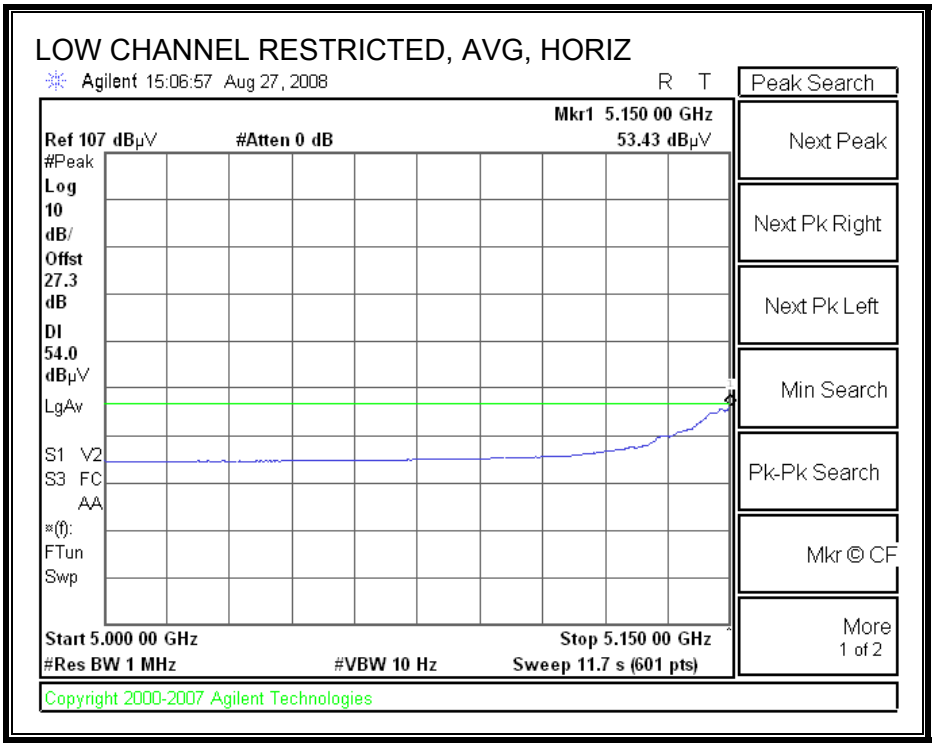
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

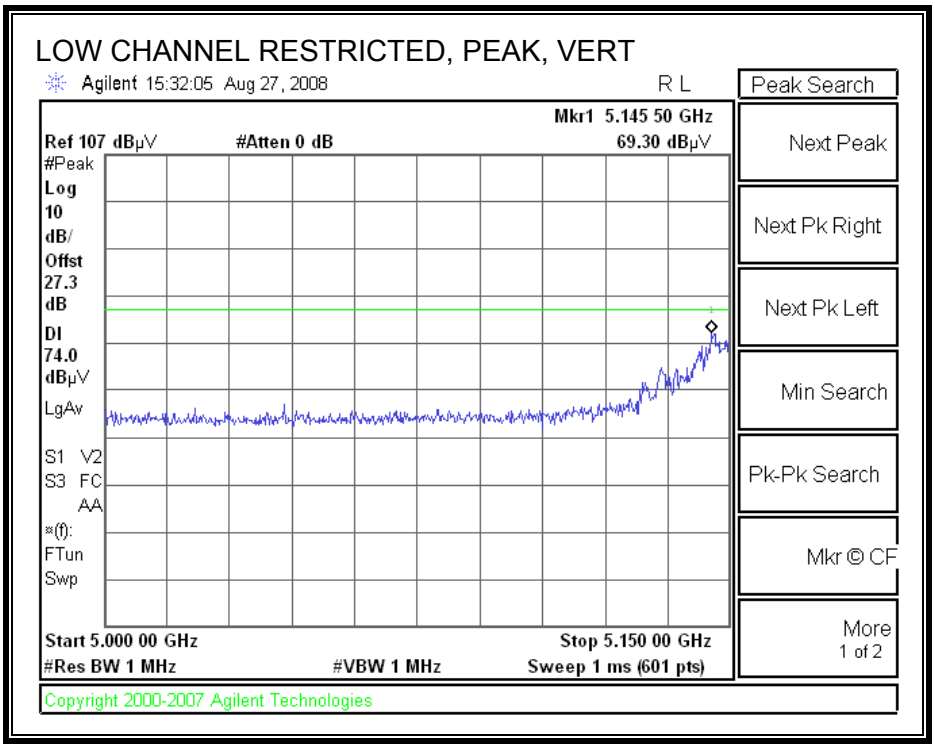
7.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE LOWER 5.2 GHz BAND

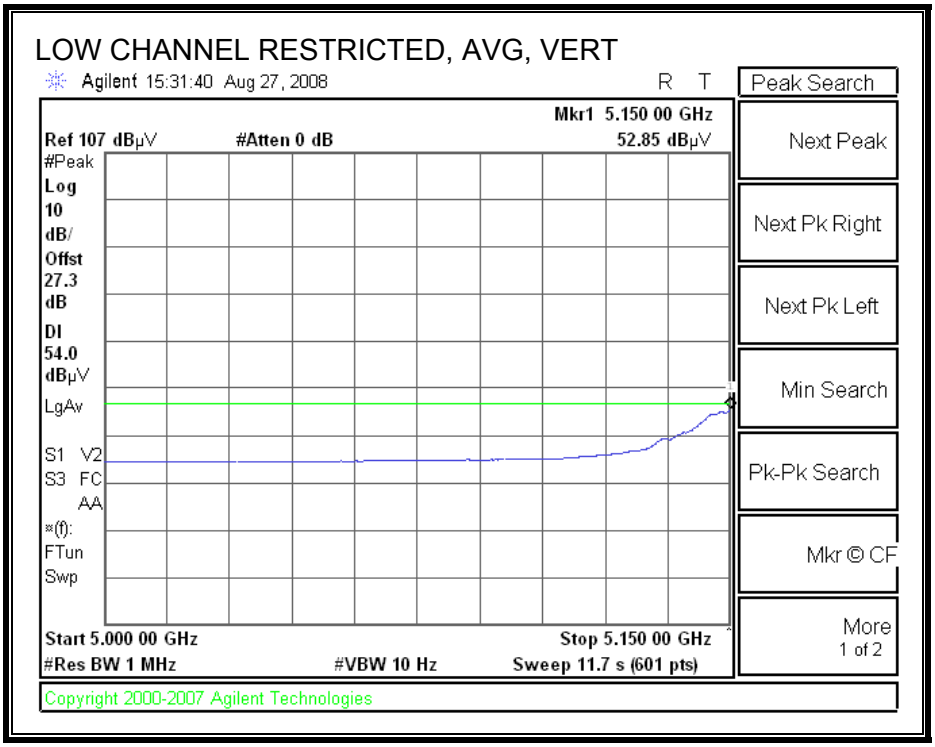
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

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Test Engineer: Chin Pang
Configuration: EUT Only
Mode: TX, HT40 mode , 5.2GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	C-5m Chamber	HPF_7.6GHz	

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 Ch, 5190MHz															
15.570	3.0	45.2	33.4	40.4	5.2	-32.2	0.0	0.7	59.4	47.6	74	54	-14.6	-6.4	V
15.570	3.0	44.0	33.0	40.4	5.2	-32.2	0.0	0.7	58.2	47.2	74	54	-15.8	-6.8	H
High Ch, 5230MHz															
15.690	3.0	45.0	33.3	40.4	5.2	-32.2	0.0	0.7	59.2	47.5	74	54	-14.8	-6.5	V
15.690	3.0	44.7	33.1	40.4	5.2	-32.2	0.0	0.7	58.9	47.3	74	54	-15.1	-6.7	H

Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
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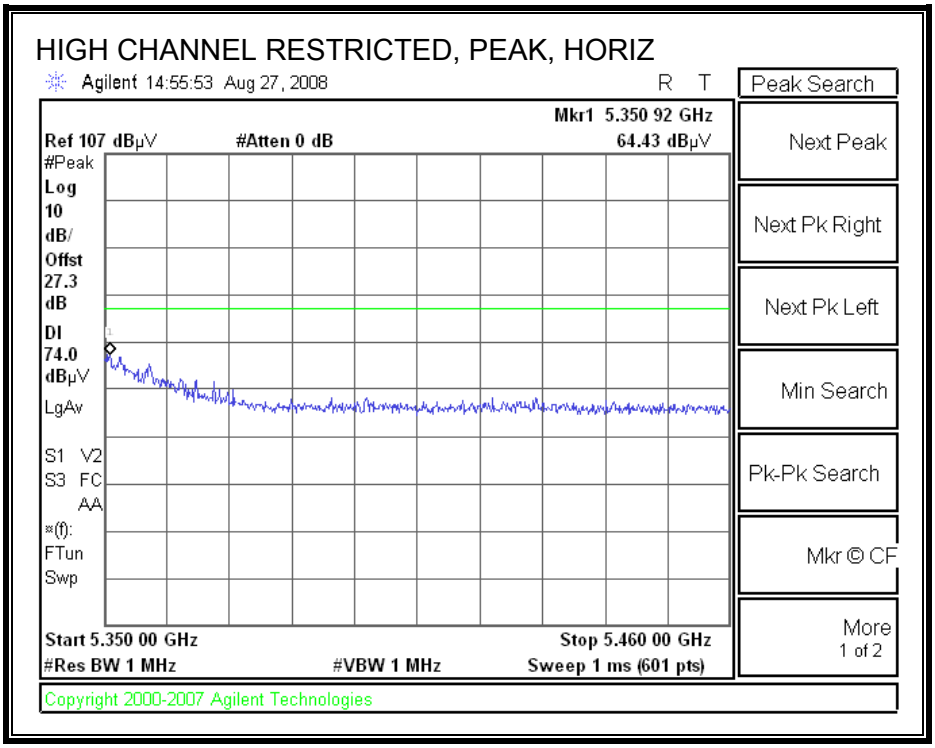
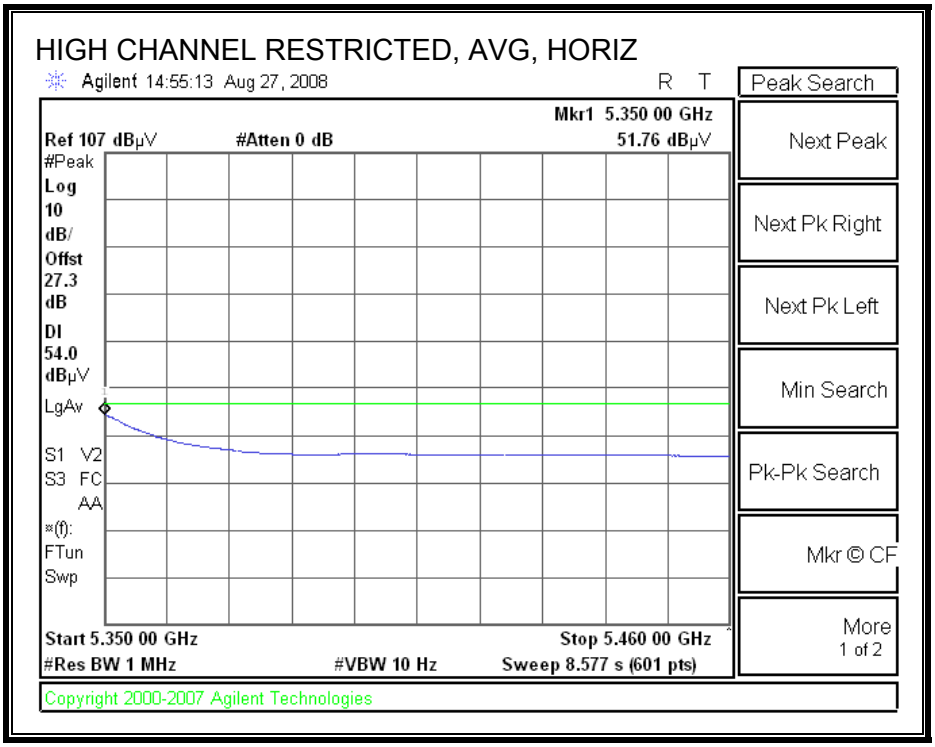
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

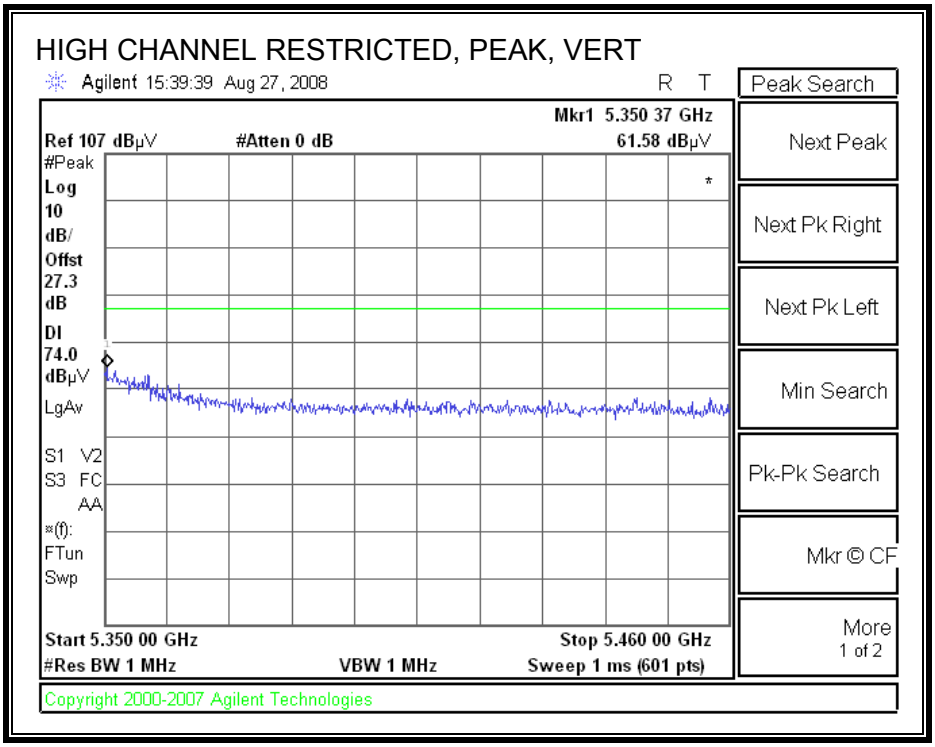
7.2.4. TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE UPPER 5.2 GHz BAND

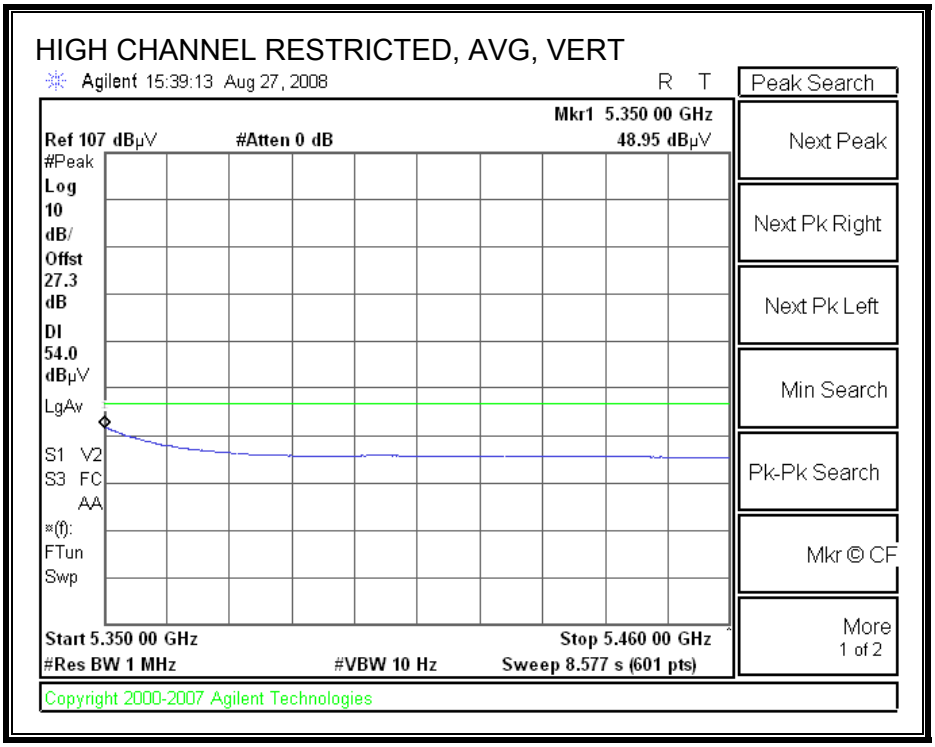
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Intel
Project #: 08U12055
Date: 9/3/2008
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: TX, a mode, Legacy, 5.3GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
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Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
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Peak Measurements
RBW=VBW=1MHz
Average Measurements
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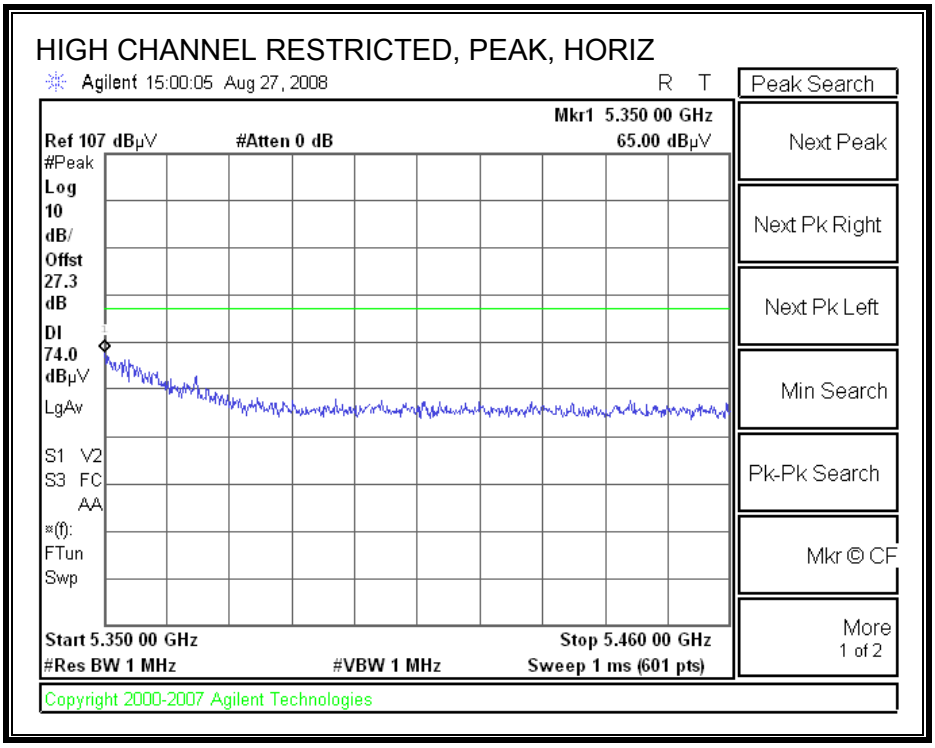
Low Ch, 5260MHz															
15.780	3.0	45.6	33.3	40.5	5.3	-32.2	0.0	0.7	59.9	47.6	74	54	-14.1	-6.4	V
15.780	3.0	45.0	32.7	40.5	5.3	-32.2	0.0	0.7	59.3	47.0	74	54	-14.7	-7.0	H
Mid Ch 5280MHz															
15.840	3.0	44.8	33.0	40.5	5.3	-32.1	0.0	0.7	59.1	47.3	74	54	-14.9	-6.7	V
15.840	3.0	44.0	32.0	40.5	5.3	-32.1	0.0	0.7	58.3	46.3	74	54	-15.7	-7.7	H
High Ch, 5320MHz															
10.640	3.0	51.0	37.7	38.5	4.1	-32.6	0.0	0.8	61.8	48.5	74	54	-12.2	-5.5	V
15.960	3.0	45.4	33.0	40.5	5.3	-32.1	0.0	0.7	59.8	47.4	74	54	-14.2	-6.6	V
10.640	3.0	45.0	34.9	38.5	4.1	-32.6	0.0	0.8	55.8	45.7	74	54	-18.2	-8.3	H
15.960	3.0	44.6	32.4	40.5	5.3	-32.1	0.0	0.7	59.0	46.8	74	54	-15.0	-7.2	H

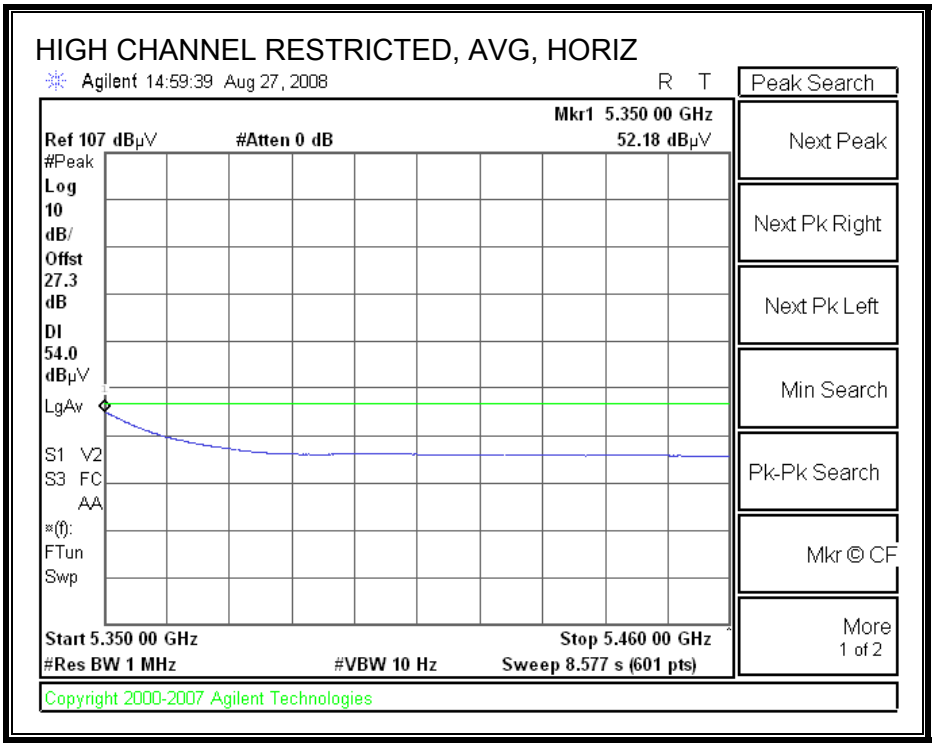
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

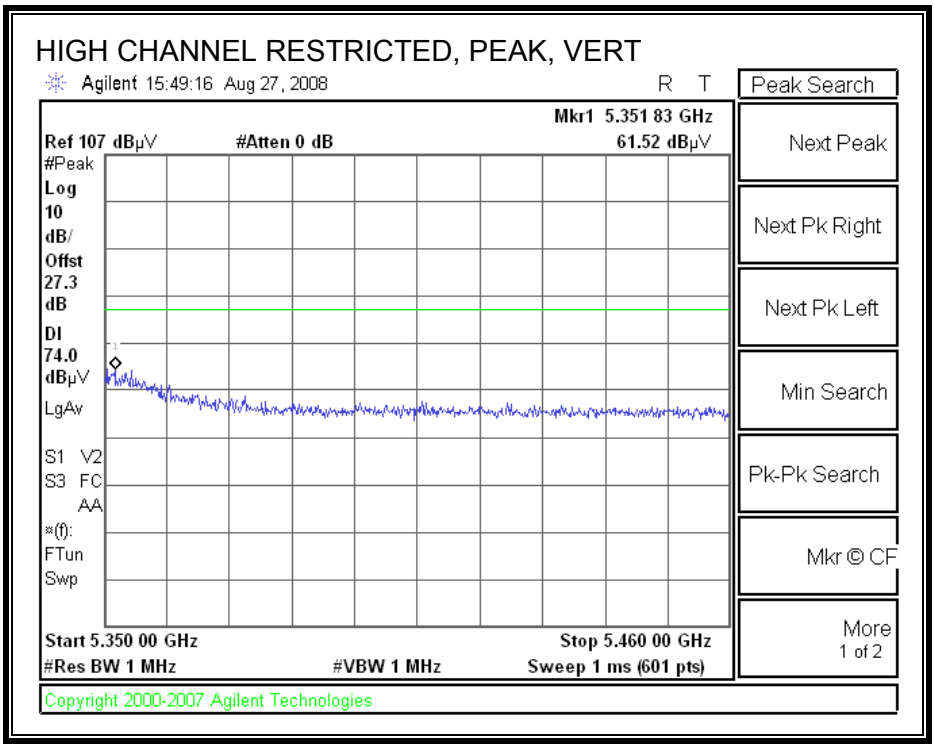
7.2.5. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE UPPER 5.2 GHz BAND

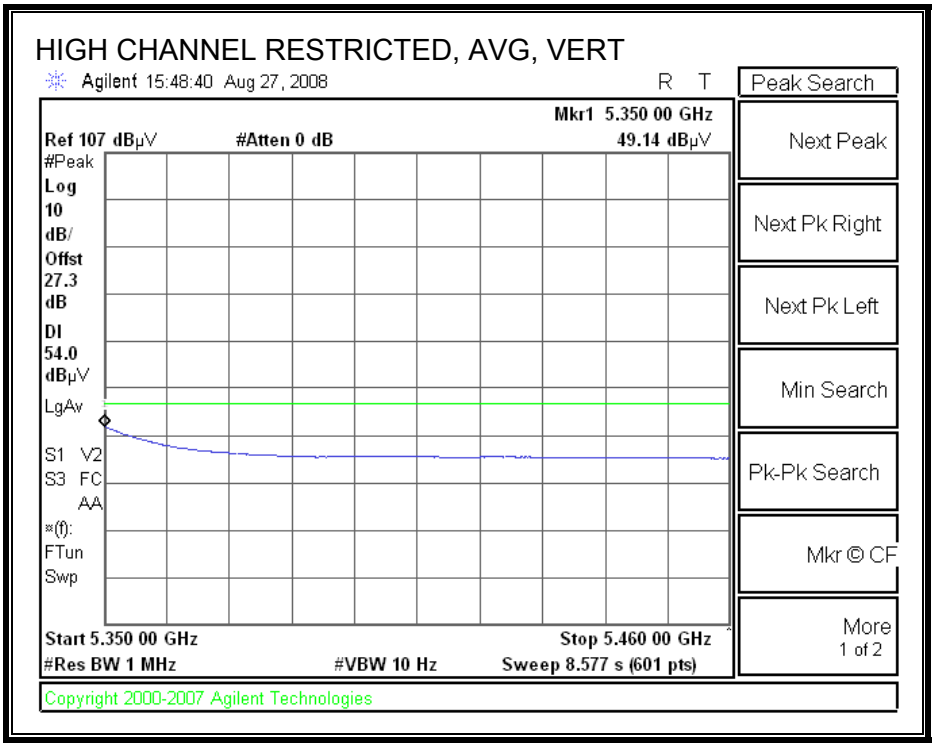
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Intel
Project #: 08U12055
Date: 9/3/2008
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: TX, HT20 mode , 5.3GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	C-5m Chamber	HPF_7.6GHz	

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

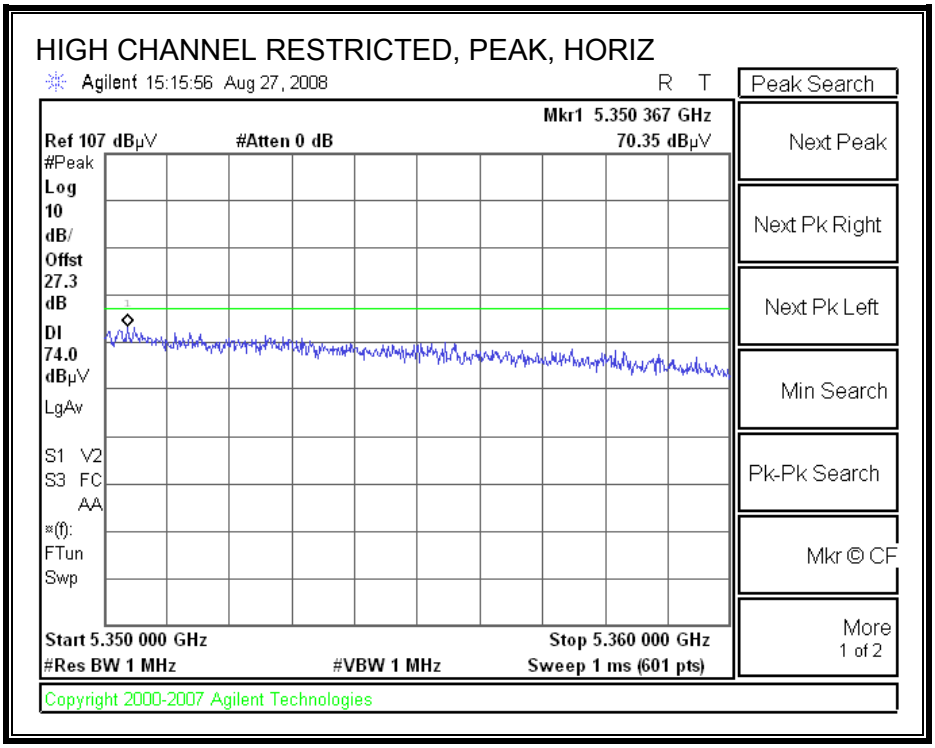
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5260MHz															
15.780	3.0	45.0	33.0	40.5	5.3	-32.2	0.0	0.7	59.3	47.3	74	54	-14.7	-6.7	V
15.780	3.0	44.3	32.6	40.5	5.3	-32.2	0.0	0.7	58.6	46.9	74	54	-15.4	-7.1	H
Mid Ch 5280MHz															
15.840	3.0	44.7	32.6	40.5	5.3	-32.1	0.0	0.7	59.0	46.9	74	54	-15.0	-7.1	V
15.840	3.0	44.5	32.3	40.5	5.3	-32.1	0.0	0.7	58.8	46.6	74	54	-15.2	-7.4	H
High Ch, 5320MHz															
10.640	3.0	49.0	36.0	38.5	4.1	-32.6	0.0	0.8	59.8	46.8	74	54	-14.2	-7.2	V
15.960	3.0	44.5	32.5	40.5	5.3	-32.1	0.0	0.7	58.9	46.9	74	54	-15.1	-7.1	V
10.640	3.0	45.5	34.0	38.5	4.1	-32.6	0.0	0.8	56.3	44.8	74	54	-17.7	-9.2	H
15.960	3.0	44.3	32.3	40.5	5.3	-32.1	0.0	0.7	58.7	46.7	74	54	-15.3	-7.3	H

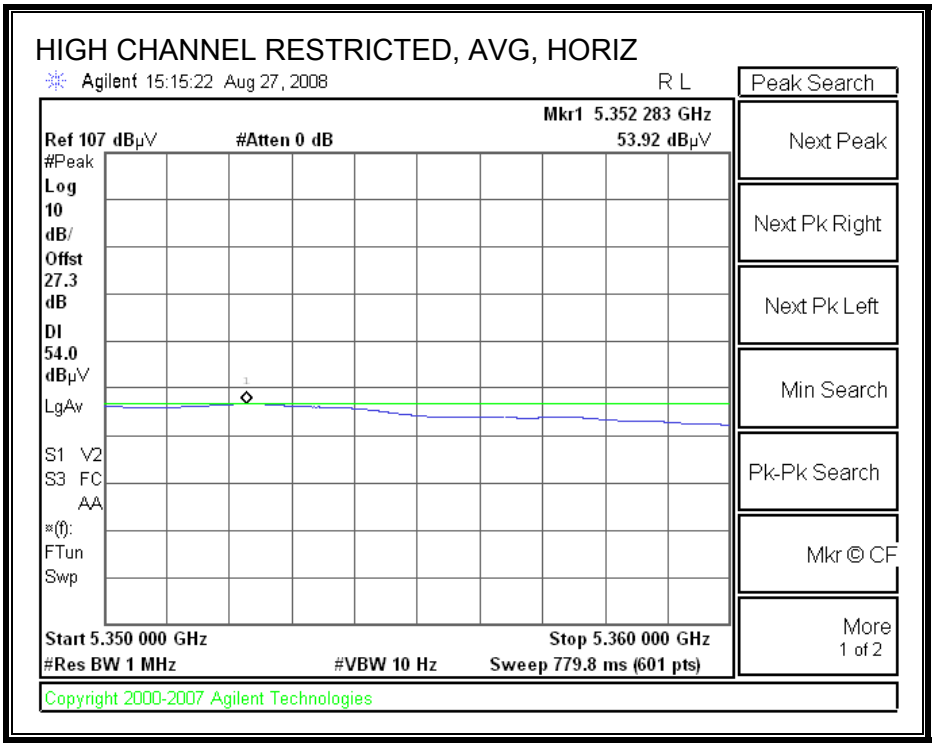
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

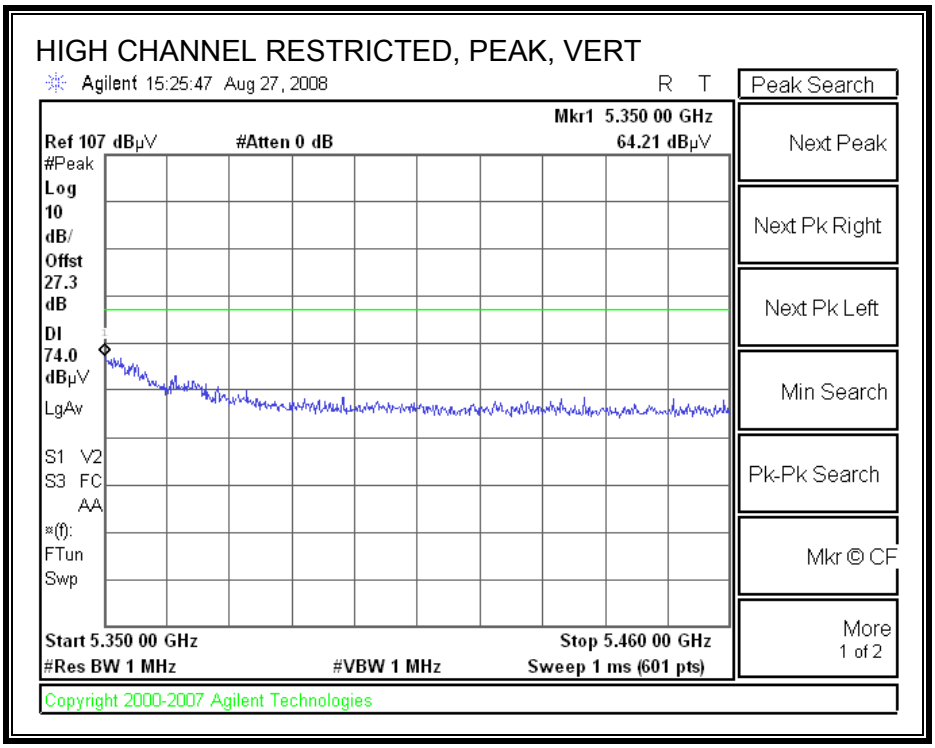
7.2.6. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE UPPER 5.2 GHz BAND

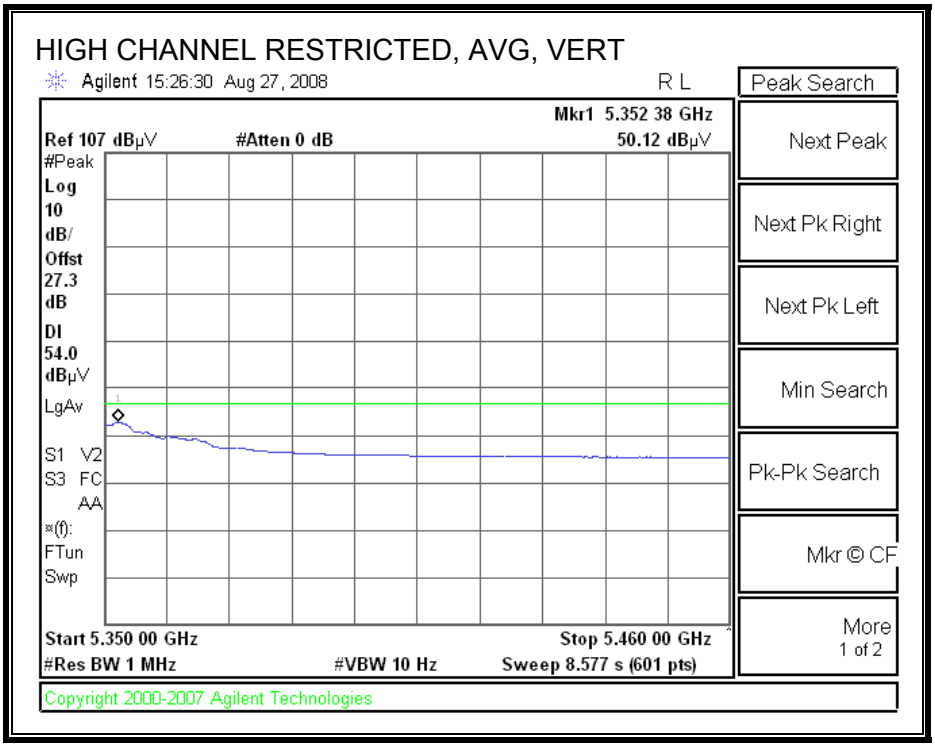
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Intel
Project #: 08U12055
Date: 9/3/2008
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: TX, HT40 mode , 5.3GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	C-5m Chamber	HPF_7.6GHz	

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

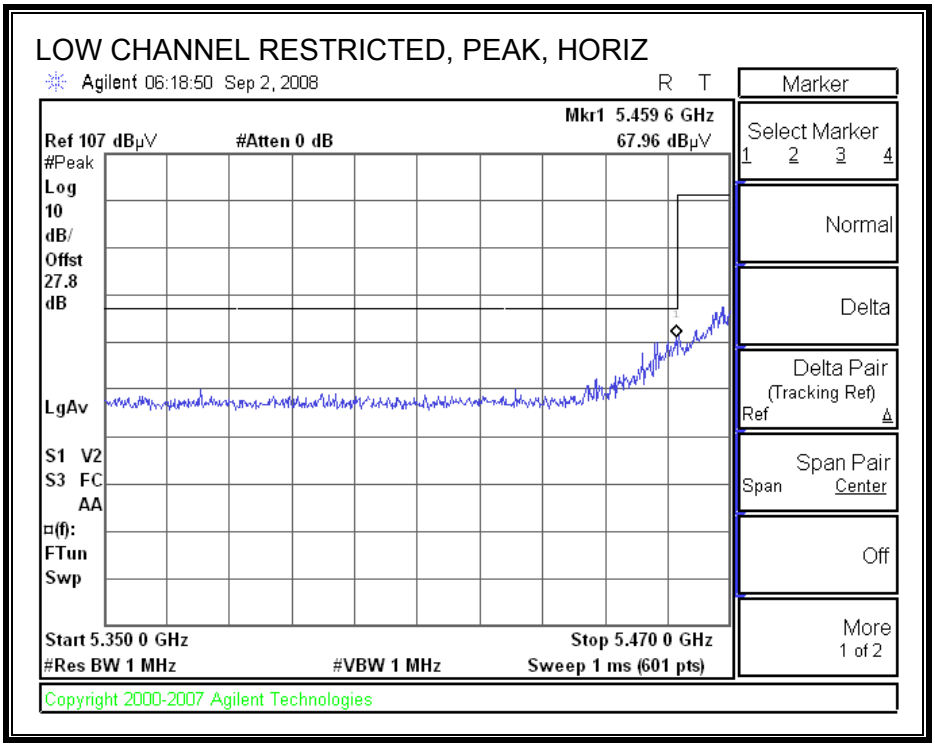
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5270MHz															
15.810	3.0	44.7	32.5	40.5	5.3	-32.2	0.0	0.7	59.0	46.8	74	54	-15.0	-7.2	V
15.810	3.0	44.5	32.3	40.5	5.3	-32.2	0.0	0.7	58.8	46.6	74	54	-15.2	-7.4	H
High Ch, 5310MHz															
10.620	3.0	46.0	34.0	38.5	4.1	-32.6	0.0	0.8	56.8	44.8	74	54	-17.2	-9.2	V
15.930	3.0	44.5	33.0	40.5	5.3	-32.1	0.0	0.7	58.8	47.3	74	54	-15.2	-6.7	V
10.620	3.0	44.4	32.7	38.5	4.1	-32.6	0.0	0.8	55.2	43.5	74	54	-18.8	-10.5	H
15.930	3.0	44.6	32.6	40.5	5.3	-32.1	0.0	0.7	58.9	46.9	74	54	-15.1	-7.1	H

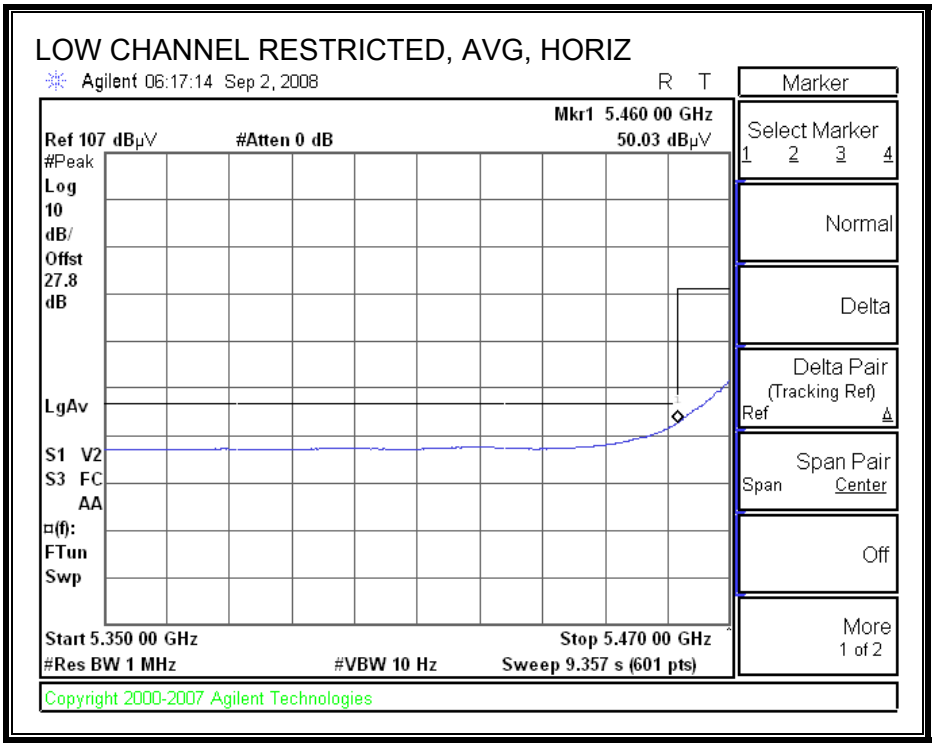
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

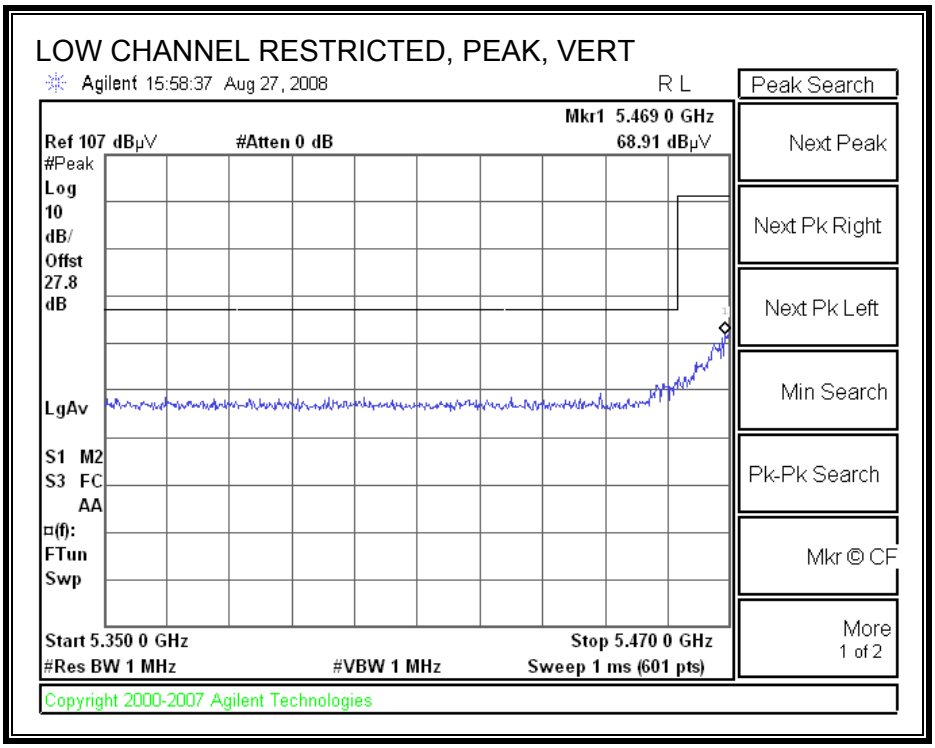
7.2.7. TRANSMITTER ABOVE 1 GHz FOR 802.11a MODE IN THE 5.6 GHz BAND

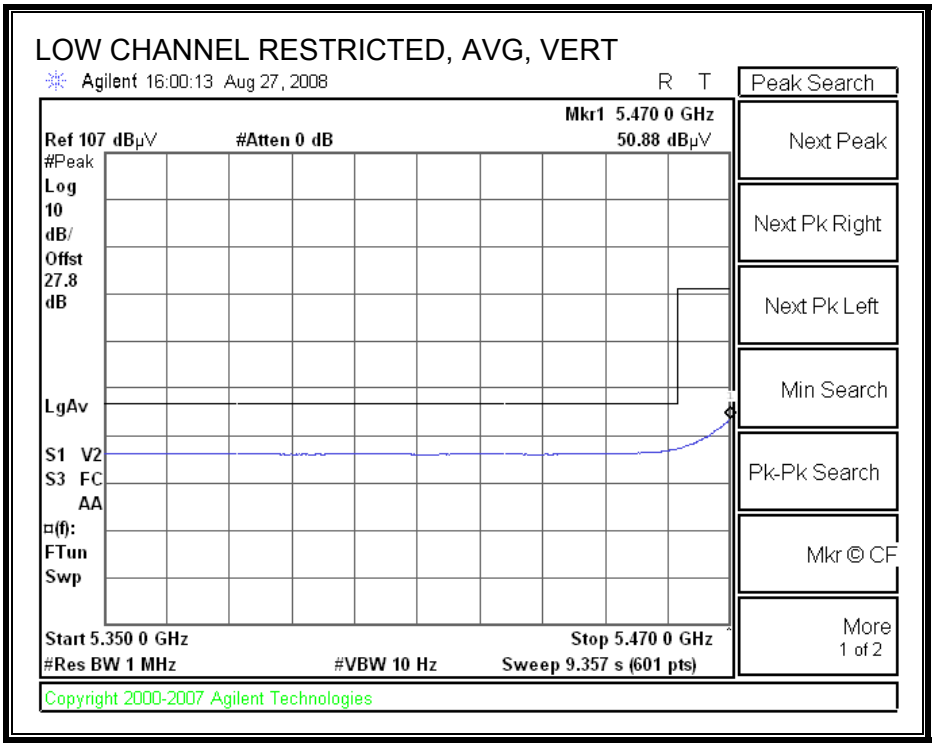
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



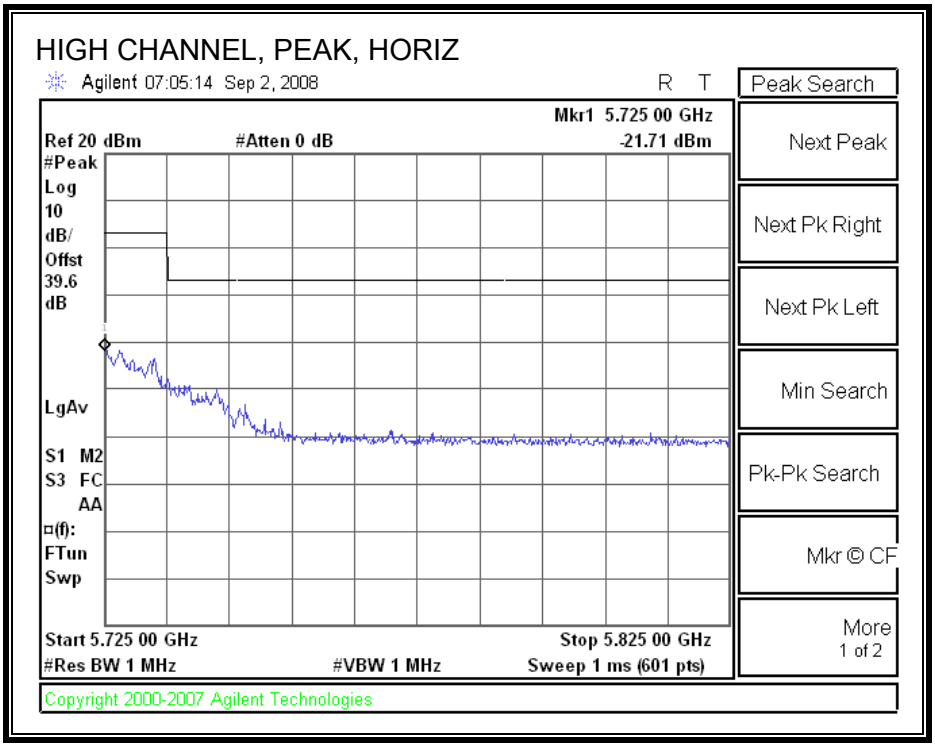


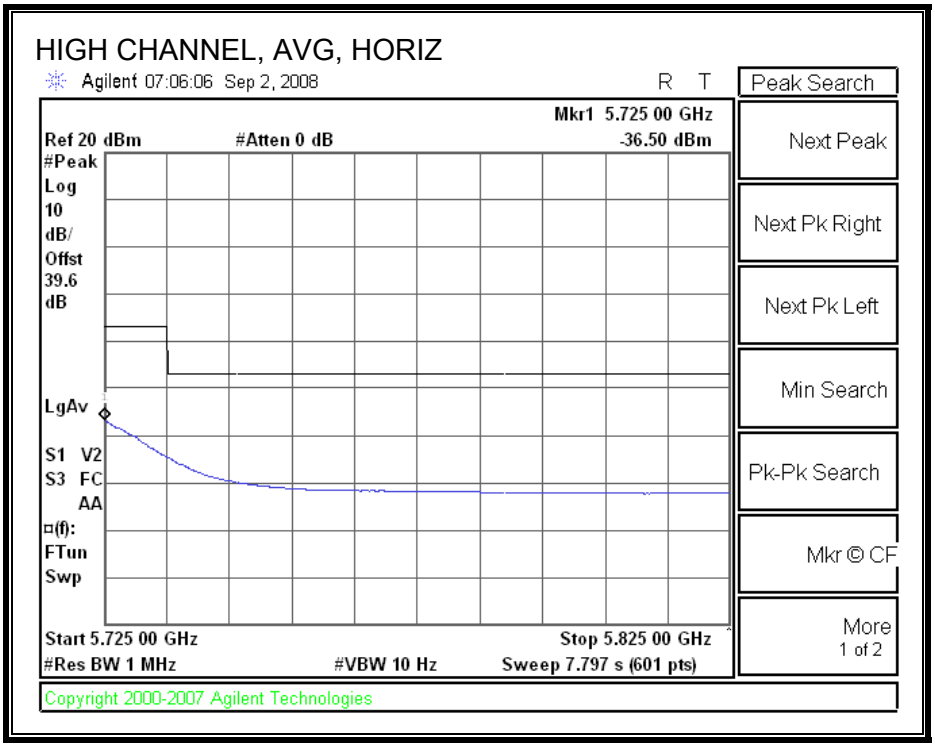
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



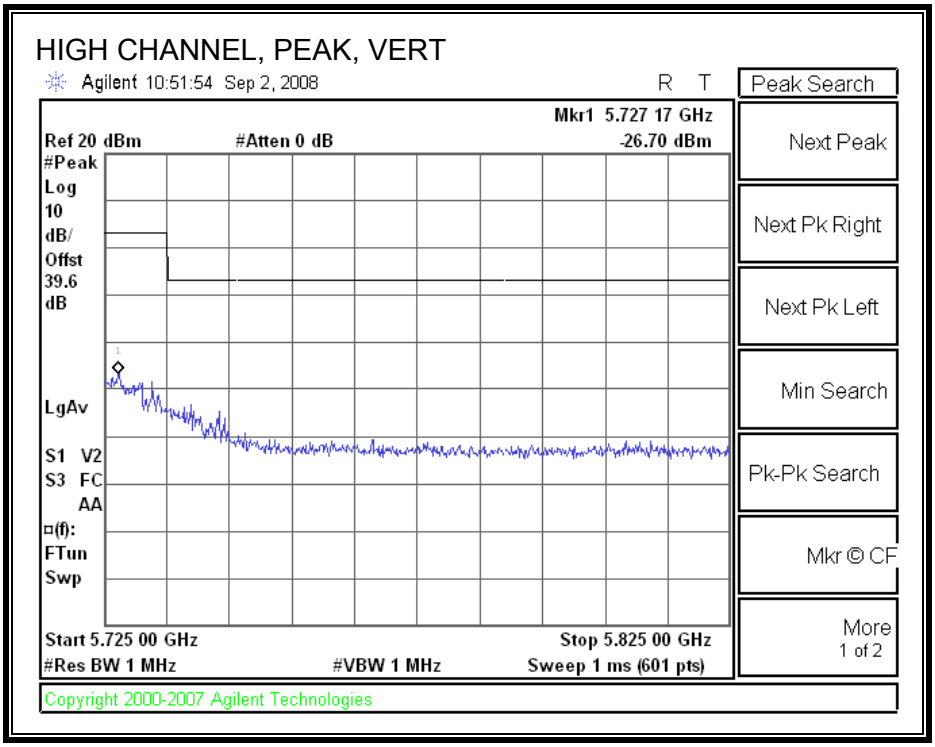


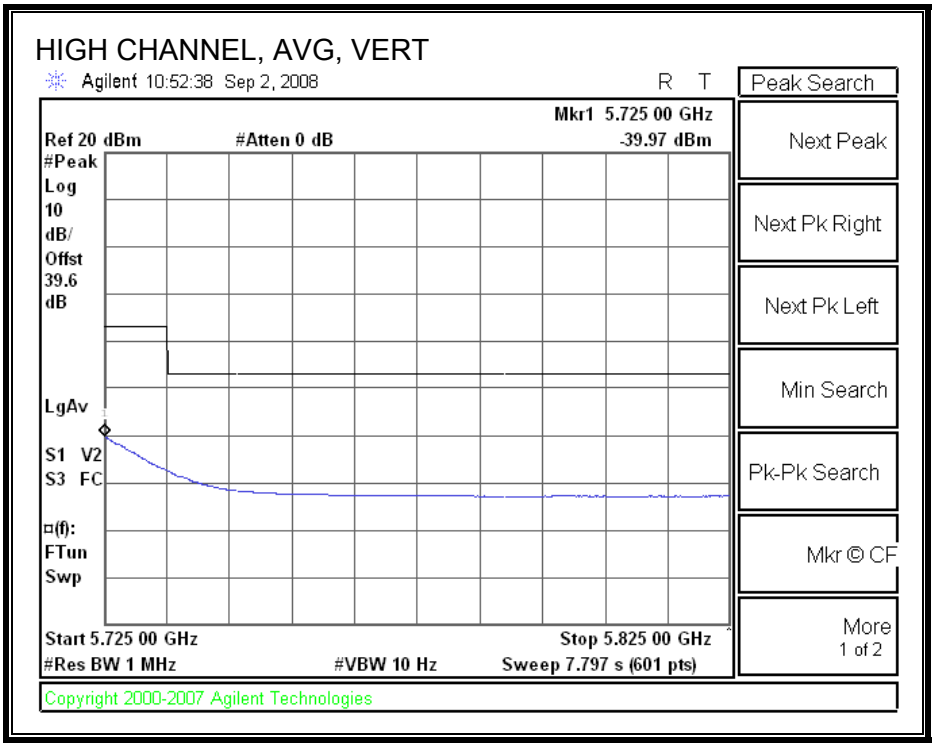
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Intel
Project #: 08U12055
Date: 9/4/2008
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: TX, a mode, Legacy, 5.5GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	C-5m Chamber	HPF_7.6GHz	

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

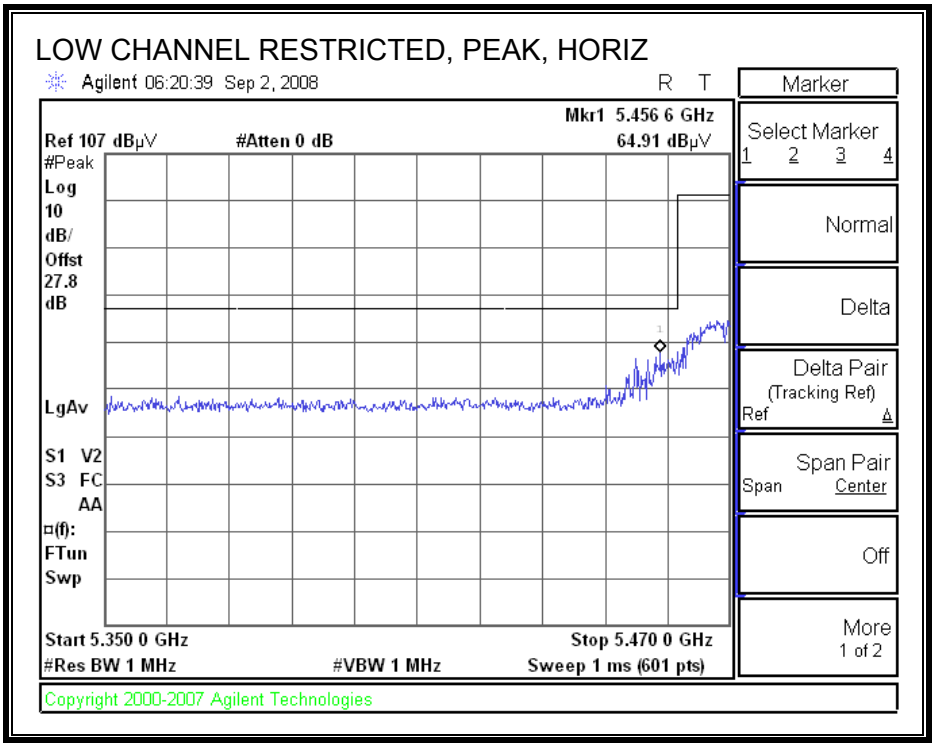
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5500MHz															
11.000	3.0	53.5	42.2	38.6	4.2	-32.6	0.0	0.7	64.5	53.2	74	54	-9.5	-0.8	V
11.000	3.0	50.5	39.0	38.6	4.2	-32.6	0.0	0.7	61.5	50.0	74	54	-12.5	-4.0	H
Mid Ch 5600MHz															
11.200	3.0	47.5	37.0	38.7	4.2	-32.6	0.0	0.7	58.6	48.1	74	54	-15.4	-5.9	V
11.200	3.0	46.5	35.6	38.7	4.2	-32.6	0.0	0.7	57.6	46.7	74	54	-16.4	-7.3	H
High Ch, 5700MHz															
11.400	3.0	47.0	35.8	38.7	4.2	-32.5	0.0	0.7	58.1	46.9	74	54	-15.9	-7.1	V
11.400	3.0	45.0	34.0	38.7	4.2	-32.5	0.0	0.7	56.1	45.1	74	54	-17.9	-8.9	H

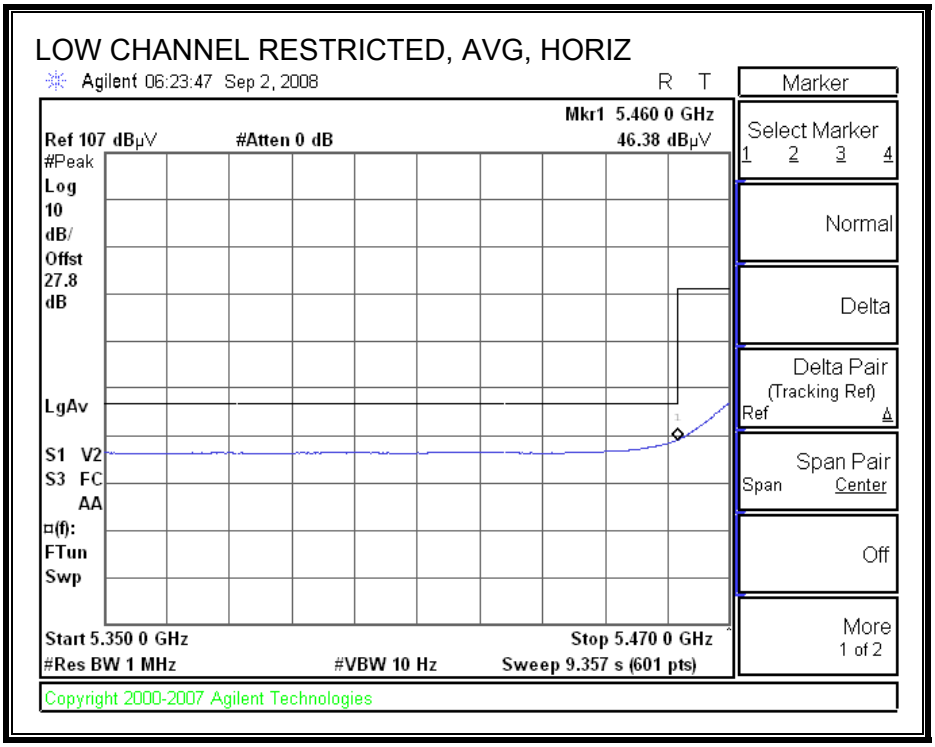
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

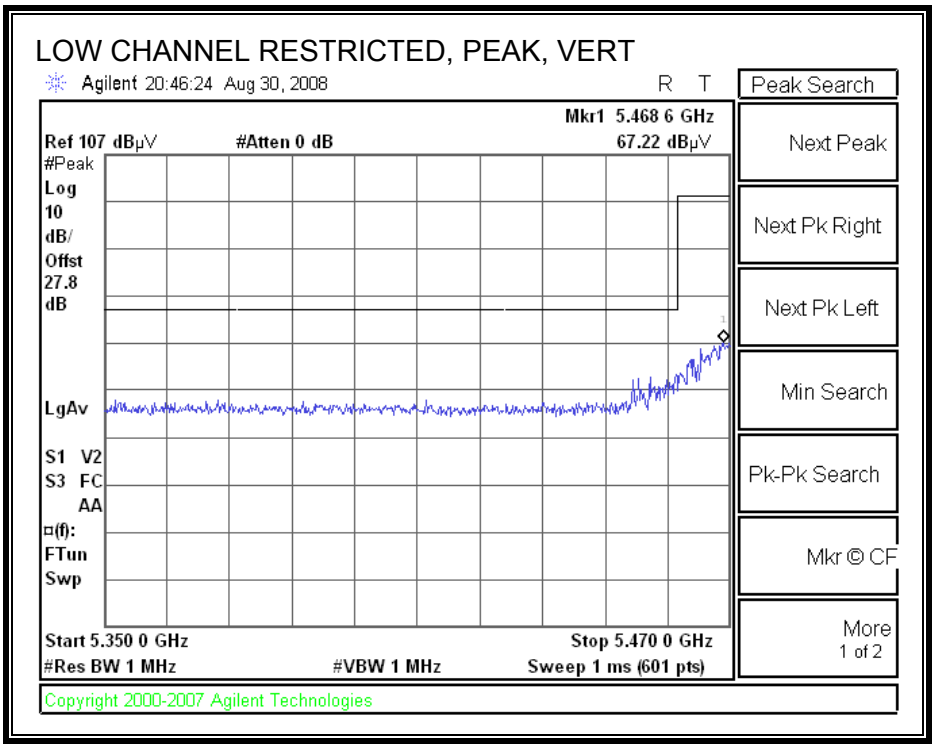
7.2.8. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 MODE IN THE 5.6 GHz BAND

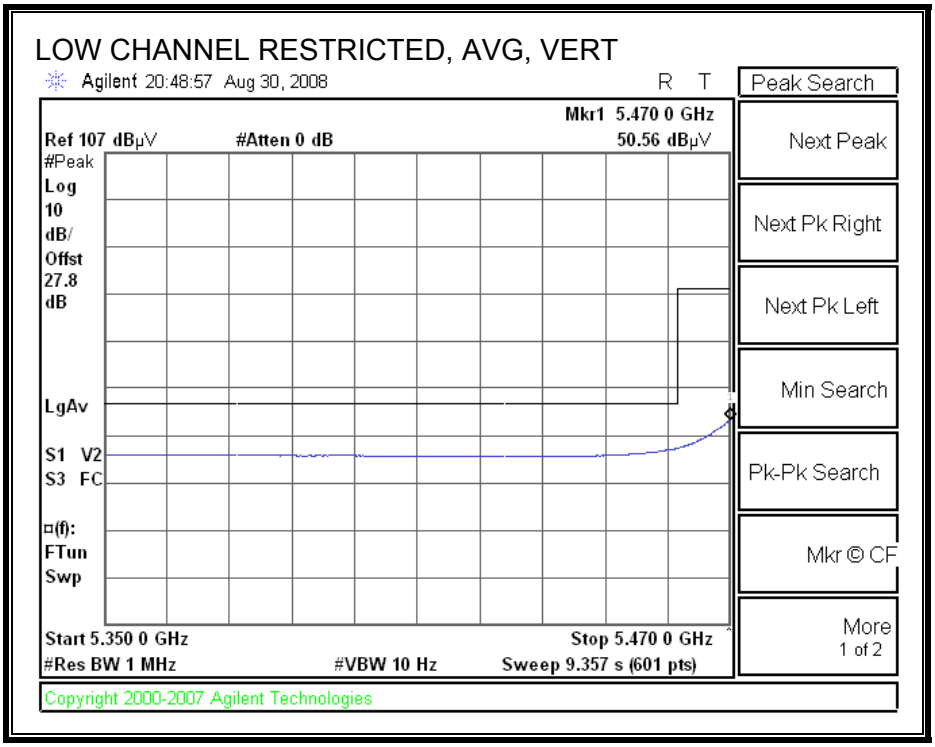
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



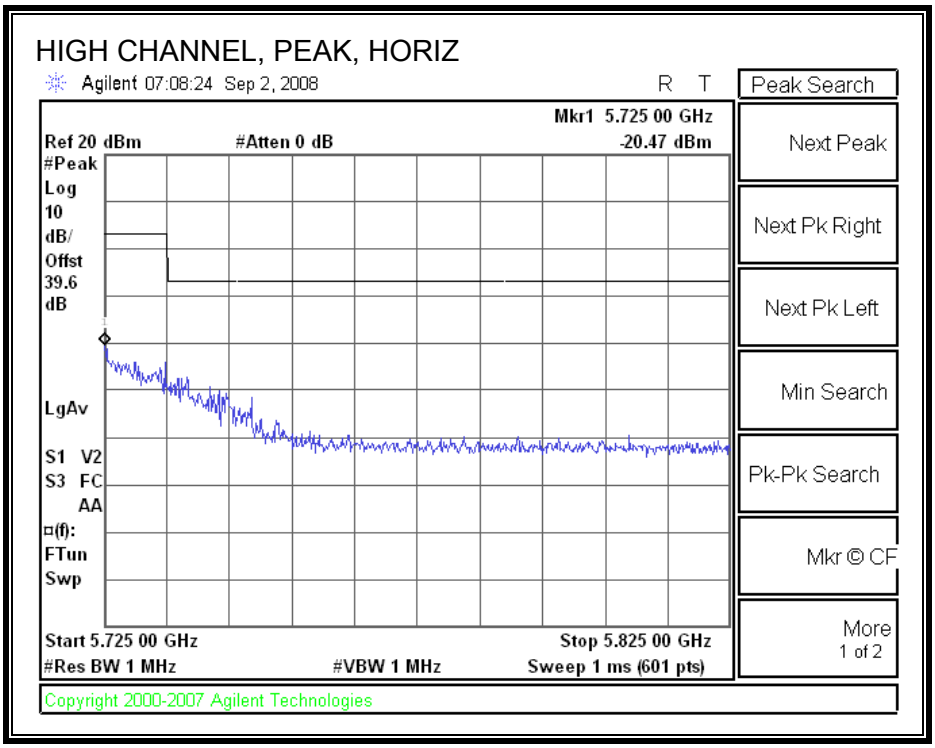


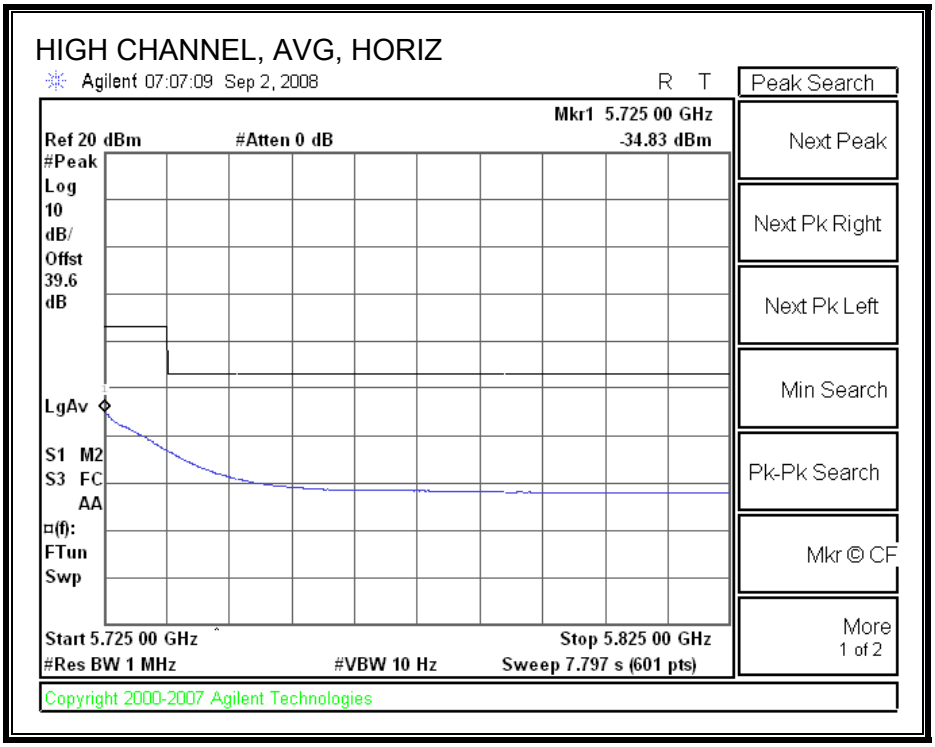
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



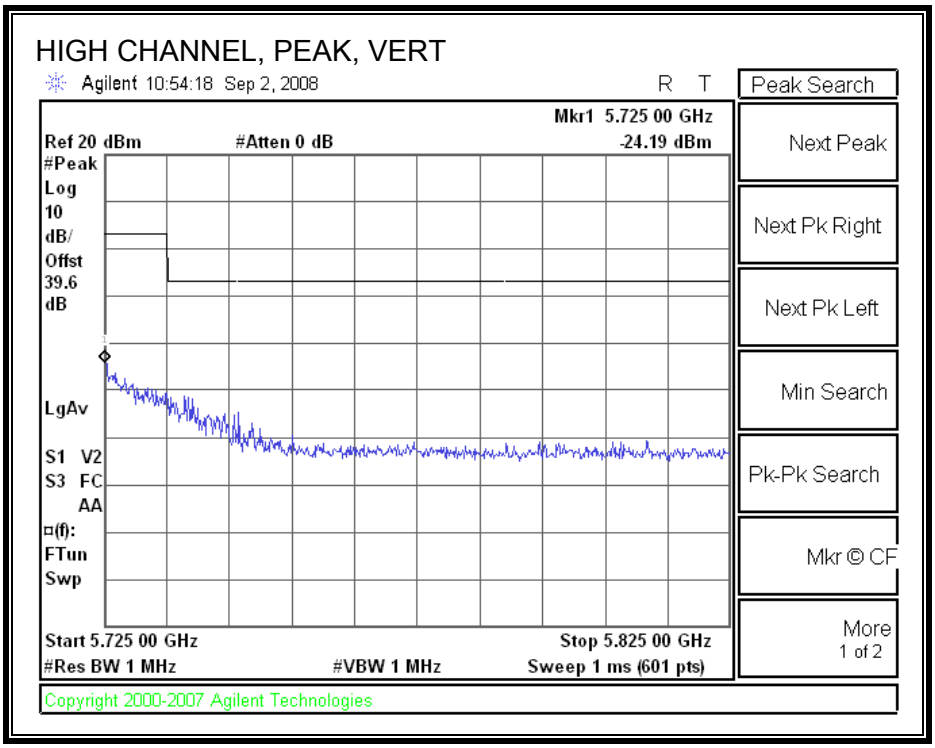


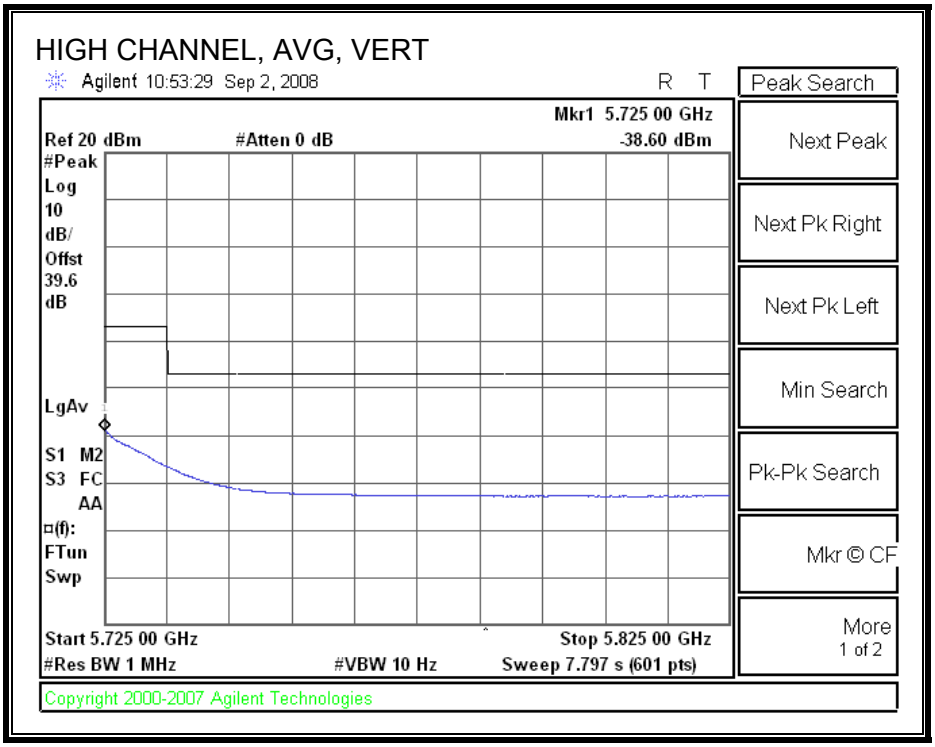
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Intel
Project #: 08U12055
Date: 9/4/2008
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: TX, HT20 mode , 5.5GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	C-5m Chamber	HPF_7.6GHz	

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

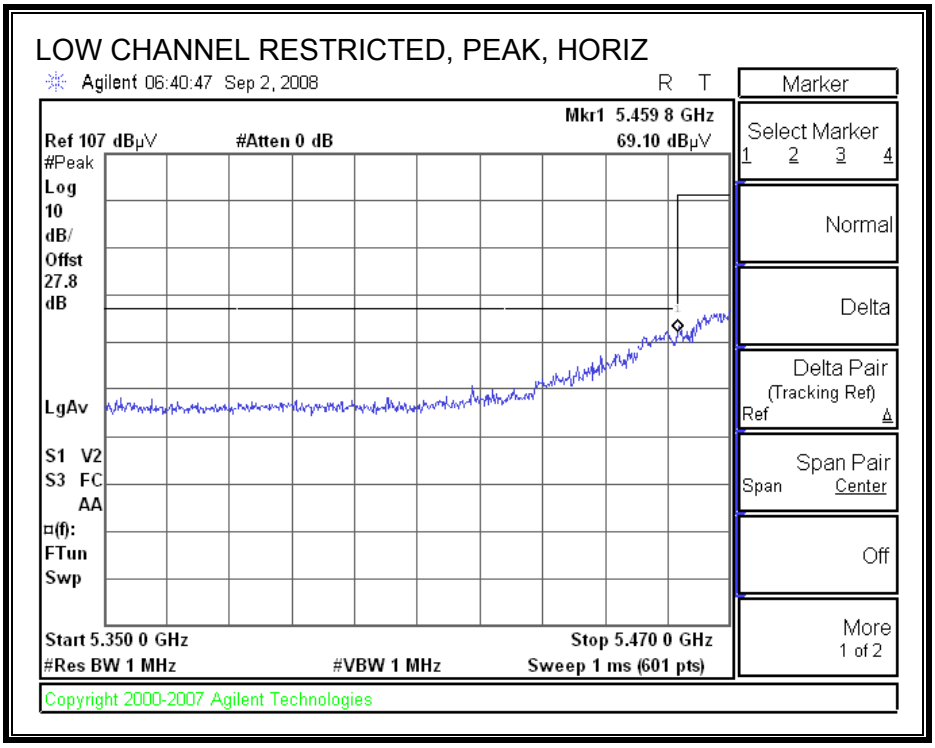
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch, 5500MHz															
11.000	3.0	53.2	41.5	38.6	4.2	-32.6	0.0	0.7	64.2	52.5	74	54	-9.8	-1.5	V
11.000	3.0	48.0	37.0	38.6	4.2	-32.6	0.0	0.7	59.0	48.0	74	54	-15.0	-6.0	H
Mid Ch 5600MHz															
11.200	3.0	47.0	36.0	38.7	4.2	-32.6	0.0	0.7	58.1	47.1	74	54	-15.9	-6.9	V
11.200	3.0	45.0	34.0	38.7	4.2	-32.6	0.0	0.7	56.1	45.1	74	54	-17.9	-8.9	H
High Ch, 5700MHz															
11.400	3.0	47.5	35.6	38.7	4.2	-32.5	0.0	0.7	58.6	46.7	74	54	-15.4	-7.3	V
11.400	3.0	44.0	33.0	38.7	4.2	-32.5	0.0	0.7	55.1	44.1	74	54	-18.9	-9.9	H

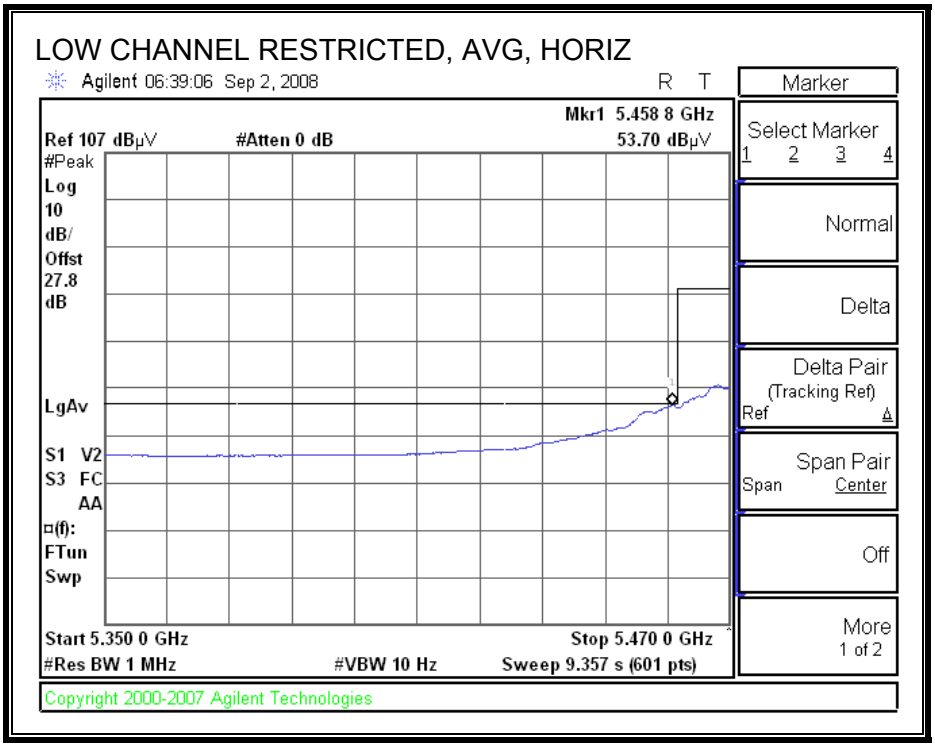
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

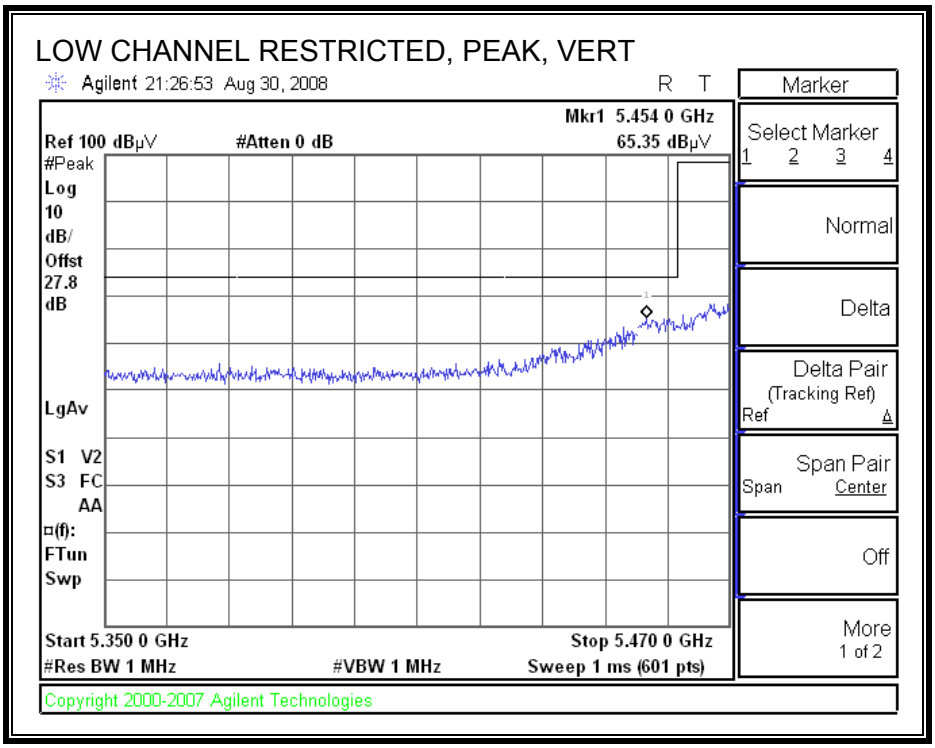
7.2.9. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT40 MODE IN THE 5.6 GHz BAND

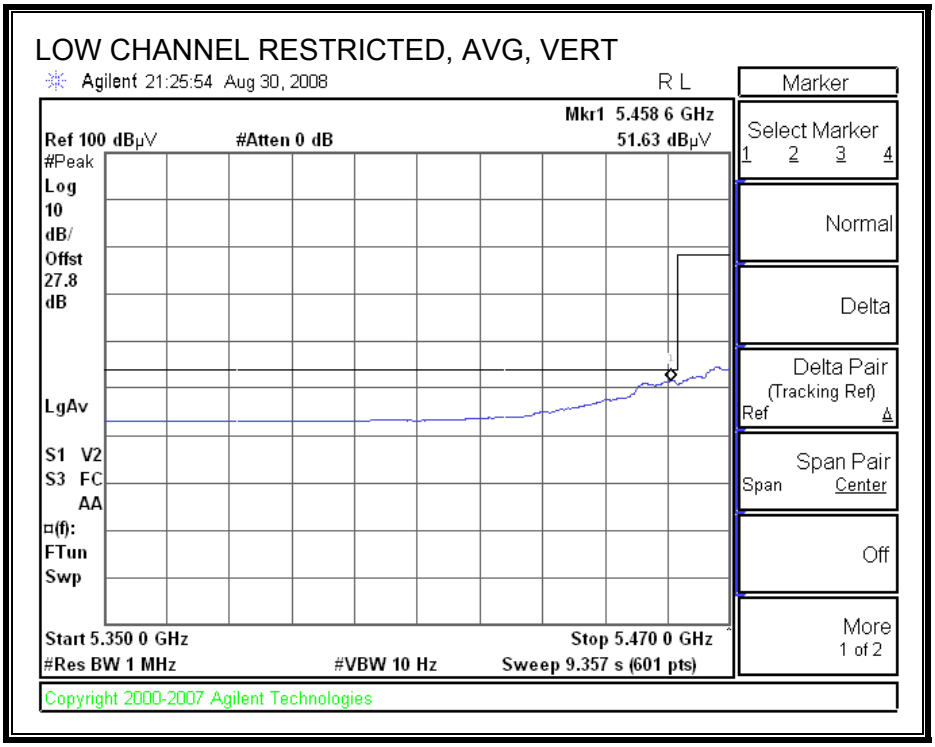
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



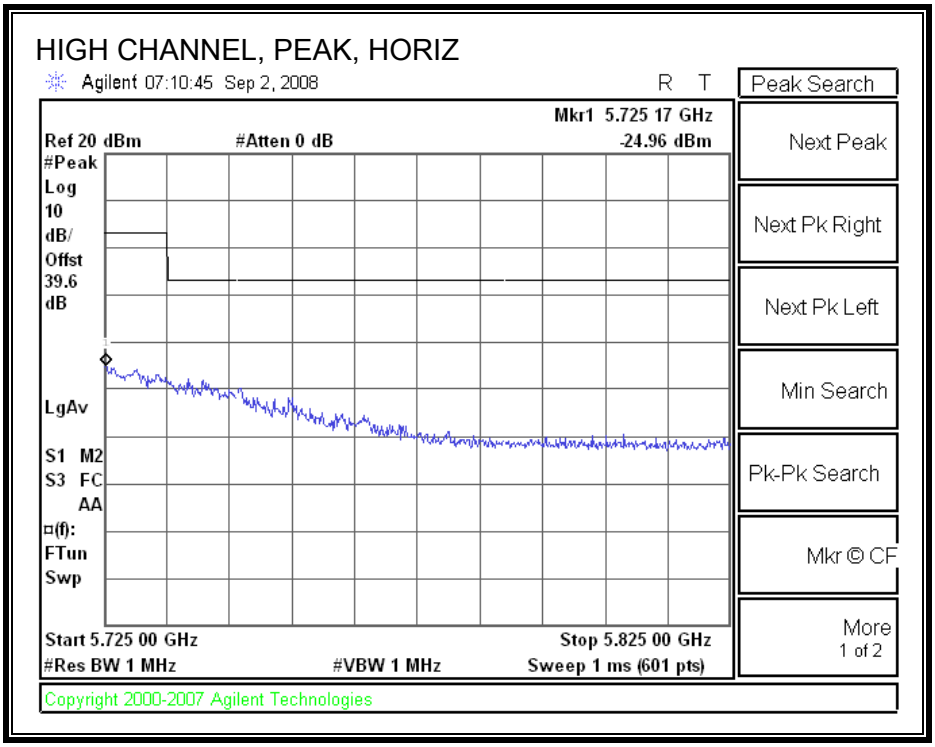


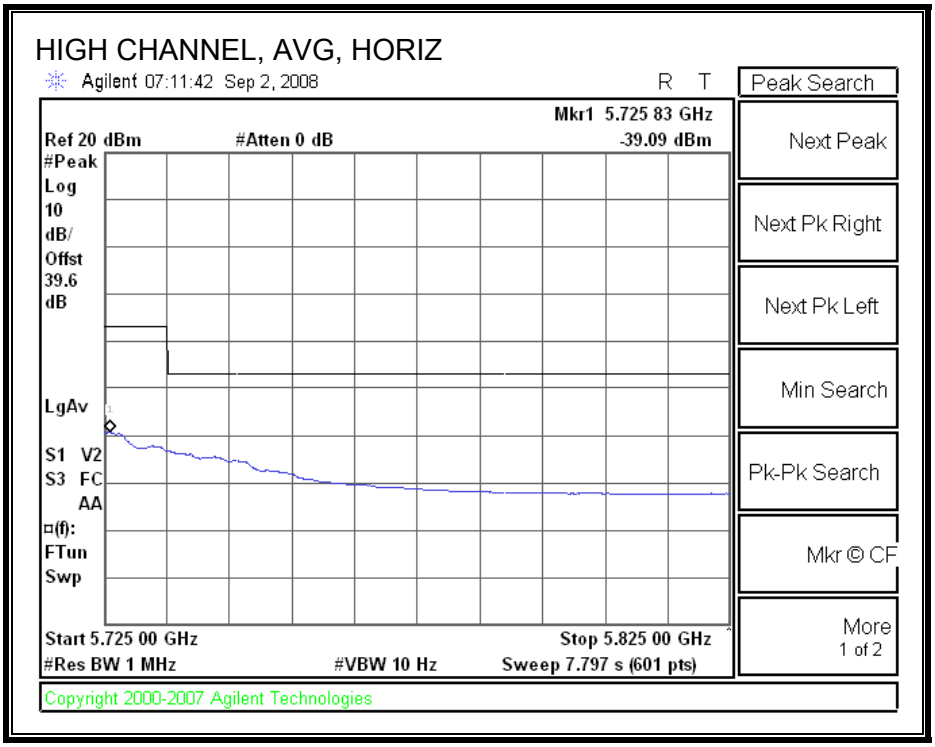
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



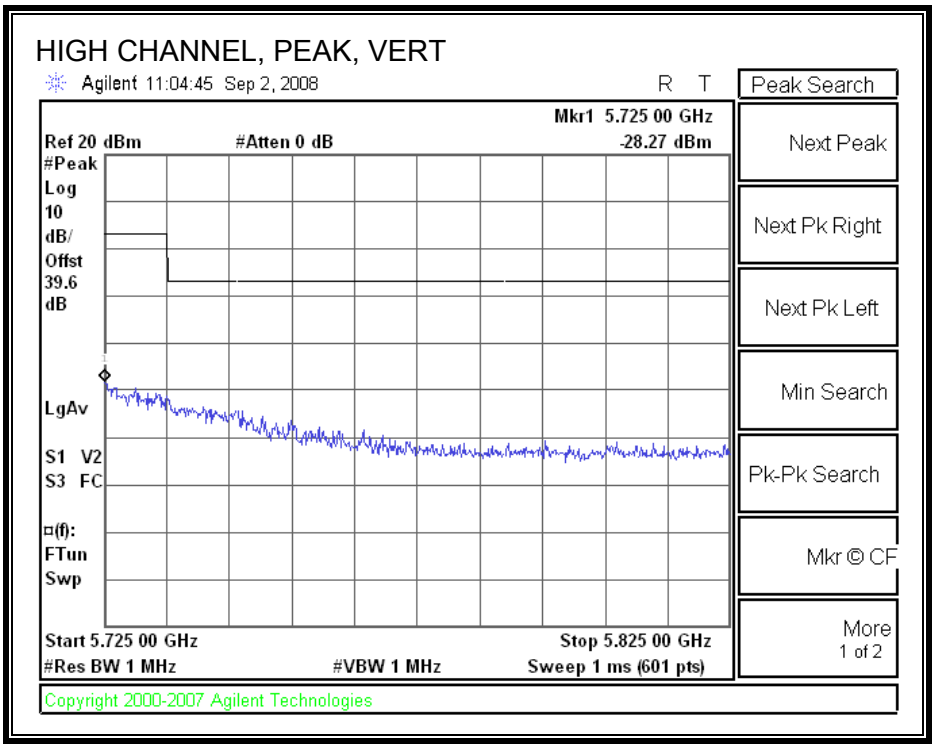


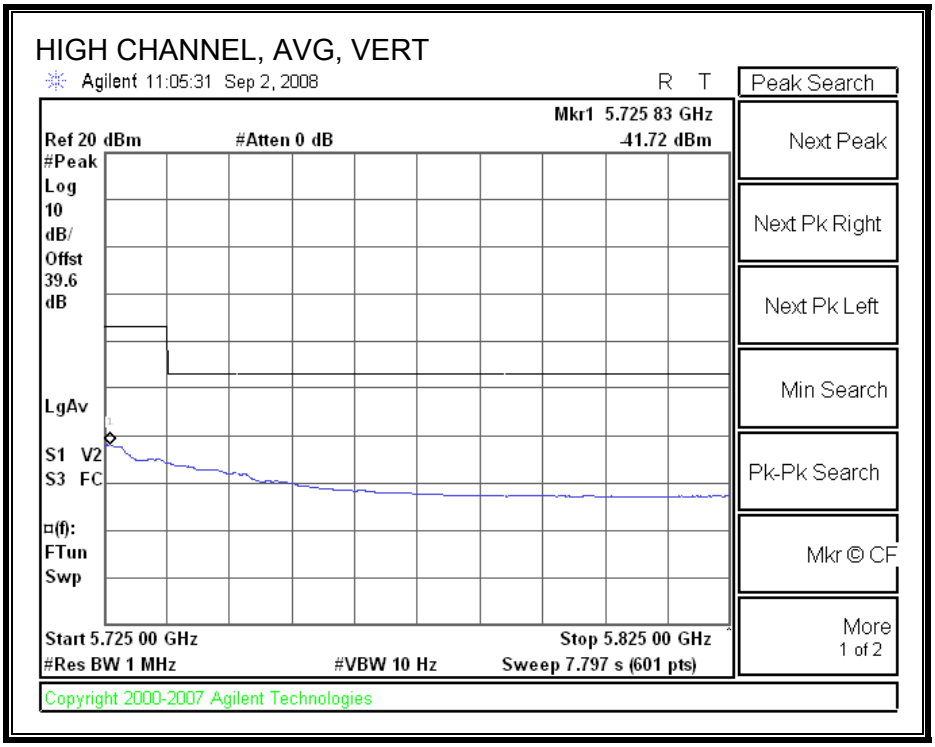
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Intel
Project #: 08U12055
Date: 9/4/2008
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: TX, HT40 mode , 5.5GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	T88 Miteq 26-40GHz	T125; ARA 18-26GHz; S/N:1007	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	C-5m Chamber	HPF_7.6GHz	

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 Ch, 5510MHz															
11.020	3.0	49.6	37.3	38.6	4.2	-32.6	0.0	0.7	60.6	48.3	74	54	-13.4	-5.7	V
11.020	3.0	44.5	34.0	38.6	4.2	-32.6	0.0	0.7	55.5	45.0	74	54	-18.5	-9.0	H
Mid Ch, 5590MHz															
11.180	3.0	49.5	37.0	38.7	4.2	-32.6	0.0	0.7	60.5	48.0	74	54	-13.5	-6.0	V
11.180	3.0	45.0	33.5	38.7	4.2	-32.6	0.0	0.7	56.0	44.5	74	54	-18.0	-9.5	H
High Ch, 5670MHz															
11.340	3.0	45.0	33.0	38.7	4.2	-32.6	0.0	0.7	56.1	44.1	74	54	-17.9	-9.9	V
11.340	3.0	43.0	31.8	38.7	4.2	-32.6	0.0	0.7	54.1	42.9	74	54	-19.9	-11.1	H

Rev. 4.12.7
Note: No other emissions were detected above the 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		

7.3. RECEIVER ABOVE 1 GHz

7.3.1. RECEIVER ABOVE 1 GHz FOR THE 5.2 GHz BAND (WORST CASE)

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Intel
Project #: 08U12055
Date: 9/5/2008
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: RX (Worst Case), 5.3GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	C-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)
1.020	3.0	52.6	47.3	26.5	1.6	-38.2	0.0	0.0	42.4	37.1	74	54	-31.6	-16.9	V
1.040	3.0	49.0	40.0	26.5	1.6	-38.2	0.0	0.0	38.9	29.9	74	54	-35.1	-24.1	V
1.080	3.0	52.0	43.2	26.6	1.6	-38.1	0.0	0.0	42.1	33.3	74	54	-31.9	-20.7	V
3.506	3.0	39.0	39.0	31.9	2.3	-35.4	0.0	0.0	37.8	37.8	74	54	-36.2	-16.2	V
1.020	3.0	52.7	45.7	26.5	1.6	-38.2	0.0	0.0	42.5	35.5	74	54	-31.5	-18.5	H
1.040	3.0	50.4	40.5	26.5	1.6	-38.2	0.0	0.0	40.3	30.4	74	54	-33.7	-23.6	H
1.080	3.0	53.1	44.8	26.6	1.6	-38.1	0.0	0.0	43.2	34.9	74	54	-30.8	-19.1	H
3.506	3.0	46.0	38.0	31.9	2.3	-35.4	0.0	0.0	44.8	36.8	74	54	-29.2	-17.2	H

Rev. 4.12.7
Note: No other emissions were detected above the 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		

7.3.2. RECEIVER ABOVE 1 GHz FOR THE 5.6 GHz BAND (WORST CASE)

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Intel
Project #: 08U12055
Date: 9/5/2008
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: RX (Worst Case), 5.5GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
	Thanh 187215003	C-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)
1.020	3.0	52.6	47.3	26.5	1.6	-38.2	0.0	0.0	42.4	37.1	74	54	-31.6	-16.9	V
1.040	3.0	49.0	40.0	26.5	1.6	-38.2	0.0	0.0	38.9	29.9	74	54	-35.1	-24.1	V
1.080	3.0	52.0	43.2	26.6	1.6	-38.1	0.0	0.0	42.1	33.3	74	54	-31.9	-20.7	V
3.733	3.0	47.0	40.5	32.4	2.3	-35.2	0.0	0.0	46.5	40.0	74	54	-27.5	-14.0	V
1.020	3.0	52.7	45.7	26.5	1.6	-38.2	0.0	0.0	42.5	35.5	74	54	-31.5	-18.5	H
1.040	3.0	50.4	40.5	26.5	1.6	-38.2	0.0	0.0	40.3	30.4	74	54	-33.7	-23.6	H
1.080	3.0	53.1	44.8	26.6	1.6	-38.1	0.0	0.0	43.2	34.9	74	54	-30.8	-19.1	H
3.733	3.0	45.7	39.0	32.4	2.3	-35.2	0.0	0.0	45.2	38.5	74	54	-28.8	-15.5	H

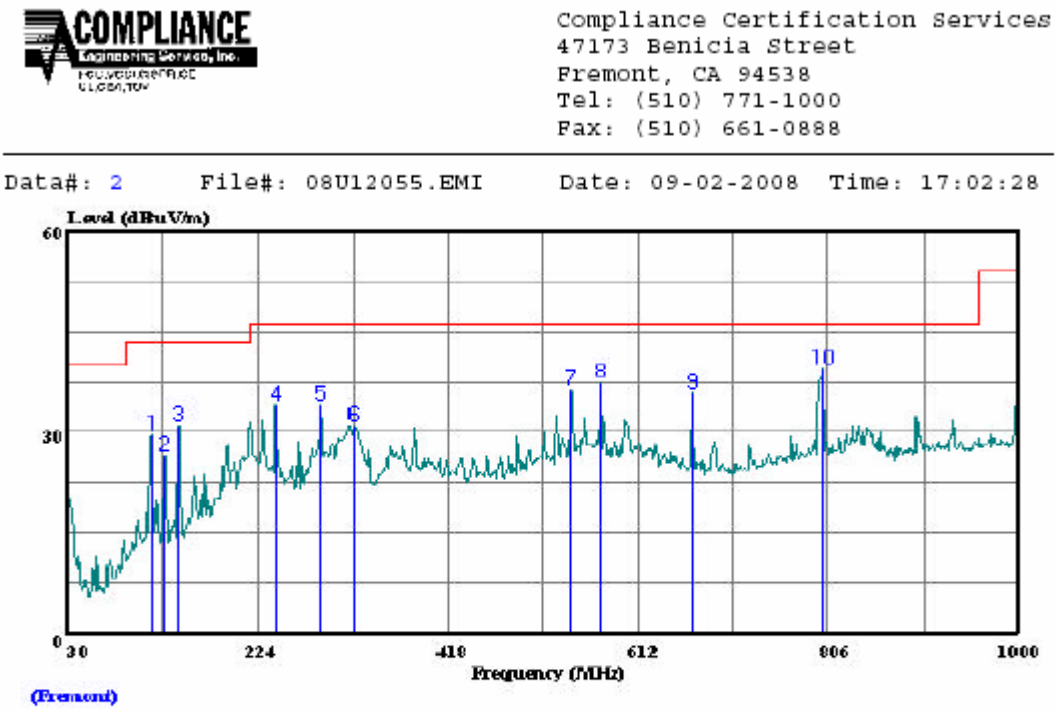
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

7.4. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT

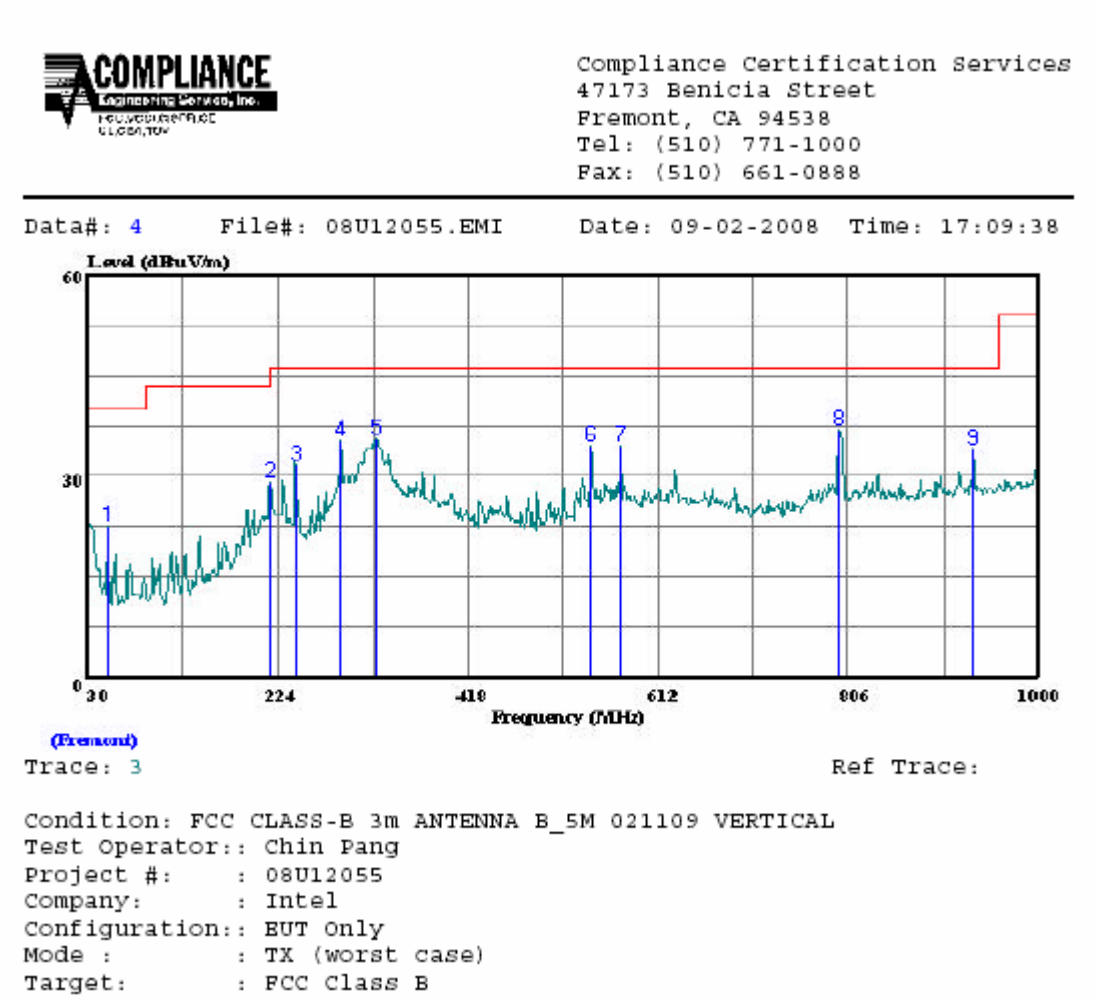


HORIZONTAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	115.360	47.50	-17.86	29.64	43.50	-13.86	Peak
2	127.970	44.17	-17.57	26.60	43.50	-16.90	Peak
3	142.520	49.00	-18.02	30.98	43.50	-12.52	Peak
4	241.460	51.83	-17.72	34.11	46.00	-11.89	Peak
5	288.020	50.17	-16.05	34.12	46.00	-11.88	Peak
6	321.970	45.83	-14.90	30.93	46.00	-15.07	Peak
7	544.100	45.50	-9.22	36.28	46.00	-9.72	Peak
8	573.200	46.33	-8.87	37.47	46.00	-8.53	Peak
9	666.320	43.00	-7.08	35.92	46.00	-10.08	Peak
10	801.150	44.17	-4.59	39.58	46.00	-6.42	Peak

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

VERTICAL PLOT



VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	50.370	46.33	-23.73	22.60	40.00	-17.40	Peak
2	217.210	46.50	-17.49	29.01	46.00	-16.99	Peak
3	241.460	49.50	-17.72	31.78	46.00	-14.22	Peak
4	288.020	51.50	-16.05	35.45	46.00	-10.55	Peak
5	323.910	50.33	-14.84	35.49	46.00	-10.51	Peak
6	544.100	43.67	-9.22	34.44	46.00	-11.56	Peak
7	573.200	43.33	-8.87	34.47	46.00	-11.53	Peak
8	797.270	41.50	-4.60	36.90	46.00	-9.10	Peak
9	933.070	35.50	-1.56	33.94	46.00	-12.06	Peak

8. 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

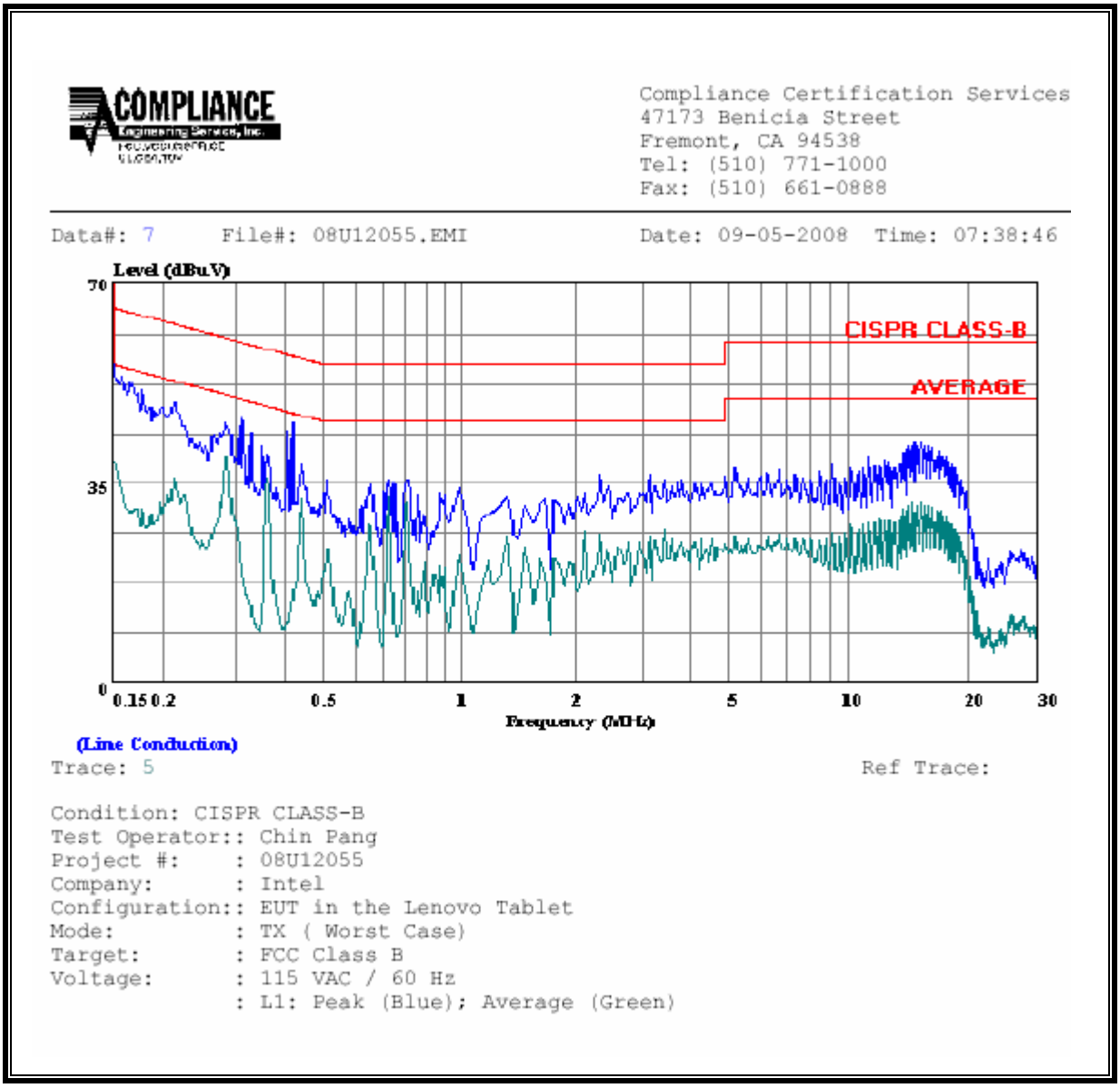
ANSI C63.4

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
0.15	53.28	--	38.80	0.00	65.84	55.84	-12.56	-17.04	L1
0.29	45.89	--	39.79	0.00	60.58	50.58	-14.69	-10.79	L1
14.59	42.36	--	31.91	0.00	60.00	50.00	-17.64	-18.09	L1
0.15	53.86	--	38.60	0.00	65.89	55.89	-12.03	-17.29	L2
0.29	44.73	--	40.42	0.00	60.67	50.67	-15.94	-10.25	L2
14.52	43.29	--	32.17	0.00	60.00	50.00	-16.71	-17.83	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS