

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

FOR

INTEL WIFI LINK 5300 SERIES

FCC MODEL: 533AN_MMW IC MODEL: 533ANMU

FCC ID: PD9533ANMU IC: 1000M-533ANMU

REPORT NUMBER: 08U11946-2A

ISSUE DATE: NOVEMBER 7, 2008

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

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

(R)

NVLAP LAB CODE 200065-0

Revision History

| Rev. | lssue Date | Revisions | Revised By |
|------|---------------|------------------------------------|------------|
| | 09/29/08 | Initial Issue | T. Chan |
| A | 11/07/08 | Added model numbers to section 5.3 | A. Zaffar |

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1. ATTESTATION OF TEST RESULTS

| | APPLICABLE STANDARDS |
|------------------|--------------------------------------------------------------------------|
| DATE TESTED: | JULY 02-14, and SEPTEMBER 27, 2008 |
| SERIAL NUMBER: | 14" LAPTOP (PK292009L0081500085); 15" LAPTOP (PK292009L0081500071) |
| IC MODEL: | 533ANMU |
| FCC MODEL: | 533AN_MMW |
| EUT DESCRIPTION: | INTEL WIFI LINK 5300 SERIES |
| COMPANY NAME: | INTEL CORPORATION 2111 NE 25TH AVENUE HILLSBORO, OREGON 97124, USA |

| 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:

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Vallian Zhuay

WILLIAM ZHUANG EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

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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 <u>http://www.ccsemc.com</u>.

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%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11n 3x3 Intel WiFI Link 5300 Series. The radio module is manufactured by Intel Corporation.

5.2. MAXIMUM OUTPUT POWER

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

5.3. DESCRIPTION OF CLASS II CHANGE

The change filed under this application is added PIFA antennas with 3x3 Module inside Portable Laptop (14 inch/Lenovo 3000 G430 and 15inch/Lenovo 3000 G530).

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of 3.46 dBi for 2.4GHZ Band, 3.3 dBi for 5150-5350MHz band, 2.75 dBi for 5470-5725MHz band, and 2.31 dBi for 5.725 – 5850MHz band.

5.5. SOFTWARE AND FIRMWARE

The EUT test utility software used during testing was CRTU version 5.0.62.0

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power and less marginal from the previous table of summary results.

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5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | | | | | |
|-----------------------------------|-----------------------------------------------------|------------------|----------------|-----|--|--|--|
| Description | Description Manufacturer Model Serial Number FCC ID | | | | | | |
| | | | | | | | |
| 14" Laptop | Lenovo | Lenovo 3000 G430 | NA | DoC | | | |
| 15" Laptop | Lenovo | Lenovo 3000 G530 | NA | DoC | | | |
| AC Adapter | Lenovo | ADP-65YBB | 36-001309-A01- | DoC | | | |

I/O CABLES

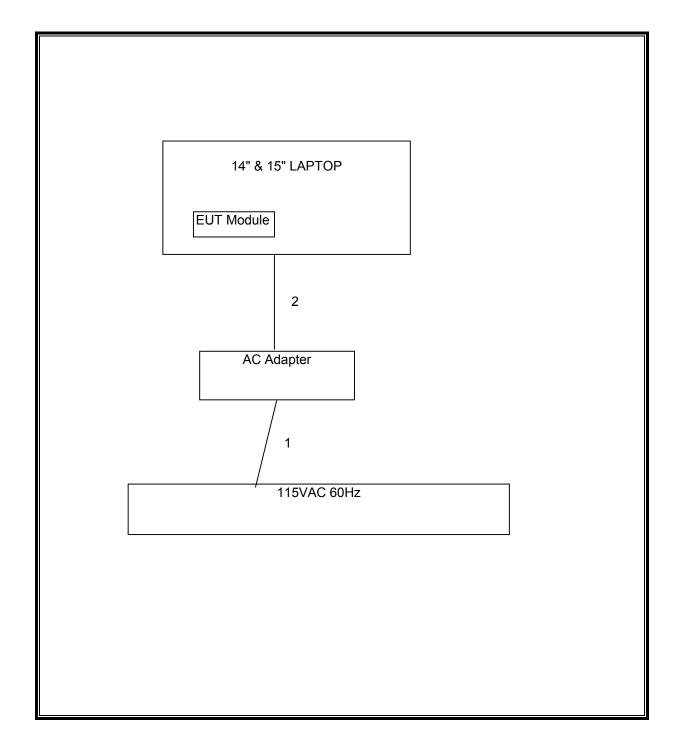
| | I/O CABLE LIST | | | | | | | | |
|--------------|----------------|---------------------------|-------------------|---------------|-----------------|---------|--|--|--|
| Cable No. | Port | # of Identica Ports | Connector Type | Cable Type | Cable Length | Remarks | | | |
| 1 | AC | 1 | US 115V | Un-shielded | 2m | N/A | | | |
| 2 | DC | 1 | DC | Un-shielded | 2m | N/A | | | |

TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test software exercised the radio card.

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SETUP DIAGRAM FOR TESTS



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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 Date | Cal Due | |
| Spectrum Analyzer, 44 GHz | Agilent / HP | E4446A | C01012 | 5/2/2006 | 3/3/2009 | |
| Peak Power Meter | Agilent / HP | E4416A | C00963 | 2/14/2006 | 12/2/2008 | |
| Power Senser | Agilent | E9327A | C00964 | 2/14/2006 | 12/2/2008 | |
| Antenna, Horn, 18 GHz | EMCO | 3115 | C00872 | 4/15/2007 | 4/15/2009 | |
| Preamplifier, 26.5 GHz | Agilent / HP | 8449B | C00749 | 8/3/2007 | 9/27/2008 | |
| EMI Receiver, 2.9 GHz | Agilent / HP | 8542E | C00957 | 2/6/2007 | 6/12/2009 | |
| RF Filter Section, 2.9 GHz | Agilent / HP | 85420E | C00958 | 2/6/2007 | 6/12/2009 | |
| Antenna, Bilog, 2 GHz | Sunol Sciences | JB1 | C01011 | 1/0/1900 | 2/11/2009 | |
| Preamplifier, 1300 MHz | Agilent / HP | 8447D | NA | 5/9/2007 | 5/9/2009 | |
| EMI Test Receiver, 30 MHz | R&S | ESHS 20 | N02396 | 10/16/2006 | 1/27/2009 | |
| LISN, 30 MHz | FCC | LISN-50/250-25-2 | N02625 | 9/15/2006 | 10/25/2008 | |
| 7.6 GHz High Pass Filter | Micro Tronics | HPM13350 | N/A | N/A | N/A | |
| 5.75 - 5.8 Reject Filter | Micro Tronics | BRC13192 | N⁄A | N/A | N/A | |

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7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

<u>LIMITS</u>

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 appplicable 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 (14 INCHES LAPTOP)

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

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN C

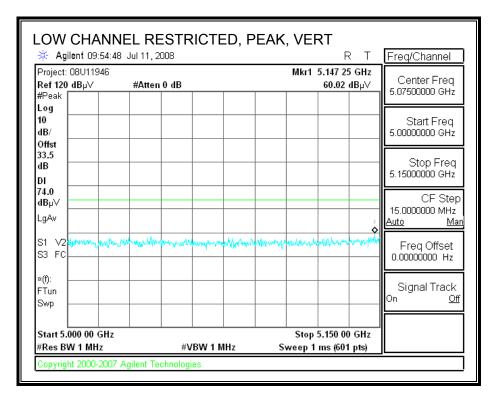
| Agilent 09:59:00 | | | Mind 4 | R T 5.137 50 GHz | Freq/Channe |
|-------------------------------------------------|--------------------------|----------------|-------------------|----------------------------------------------|-------------------------------------------|
| oject: 08U11946 ≇ f 120 dB µ∨ Peak | #Atten 0 dB | | | 58.72 dBµ∀ | Center Fre 5.07500000 GH |
| 9 8/ | | | | | Start Fre 5.0000000 GH |
| .5 | | | | | Stop Fre 5.1500000 GH |
| .0 ₿µ√ Av | | | | | CF St 15.0000000 MH |
| | all and a for the second | mandrahapenela | washing and and a | ı hallanda yaşıradır. Alanı yaşıradır. | <u>Auto</u> Freq Offse 0.00000000 H |
|): i'un vp | | | | | Signal Trac On |
| art 5.000 00 GHz tes BW 1 MHz | #VBW | 1 MHz | • | 5.150 00 GHz ms (601 pts) | |

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| | 11,2008 | RT | Freq/Channel |
|-------------------------------------|------------|---------------------------------------------|-----------------------------------------|
| #Peak | Atten 0 dB | Mkr1 5.150 00 GHz 47.22 dBµ∨ | Center Freq 5.07500000 GHz |
| Log 10 dB/ Offst | | | Start Freq 5.0000000 GHz |
| 33.5 dB DI | | | Stop Freq 5.1500000 GHz |
| 54.0 dBµ∨ | | | CF Step 15.000000 MHz |
| LgAv S1 V2 S3 FC | | | Auto Man Freq Offset 0.0000000 Hz |
| ×(f): FTun Swp | | | Signal Track On <u>Off</u> |
| Start 5.000 00 GHz #Res BW 1 MHz | #VBW 10 Hz | Stop 5.150 00 GHz Sweep 11.7 s (601 pts) | |

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL), CHAIN C



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| | | ED, AVG, VERT | Б т | |
|----------------------------------------------------|------------------------|---------------|--------------------------|------------------------------------------|
| 🔆 Agilent 09:55:4 | 48 Jul 11, 2008 | | RΤ | Freq/Channel |
| Project: 08U11946 Ref 120 dB µ∨ #Peak | #Atten 0 dB | | 150 00 GHz I8.25 dBµ∨ | Center Freq 5.07500000 GHz |
| Log 10 dB/ Offst | | | | Start Freq 5.0000000 GHz |
| 33.5 dB | | | | Stop Freq 5.1500000 GHz |
| 54.0 dBµ∀ | | | | CF Step 15.000000 MHz |
| LgAv | | | | <u>Auto Man</u> |
| S1 V2 S3 FC | | | | Freq Offset 0.00000000 Hz |
| ×(f): FTun Swp | | | | Signal Track ^{On <u>Off</u>} |
| Start 5.000 00 GHz #Res BW 1 MHz | #VBW 10 | | 150 00 GHz | |
| | 7 Agilent Technologies | • | · · / | |

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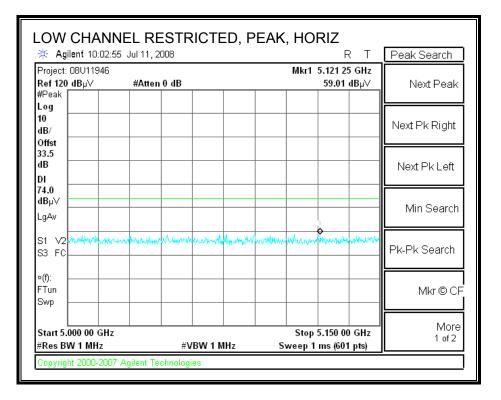
HARMONICS AND SPURIOUS EMISSIONS

| | uipmen orn 1. | 18GHz | Pre-ar | nplifer | 1-26GH | z | Pre-am | plifer | 26-40GH | z | н | orn > 18 | GHz | | Limit |
|------------|---------------------|--------------------------------------------------------------------|-------------------|--------------|---------------|--------------|--------------|-----------------------------|--------------------------------------------|---------------|------------------|-------------------|------------------------|--------------------------------------------------------------|--------------------------------------------------|
| | 5/N: 223 | | | 8449B | | • | | | | • | | | | - | FCC 15.205 |
| | quency Ca 2 foot | | | footca | able | | 121 | foot c | able | | HPF | B | eject Filte | Peal | . Measurements |
| | unh 1770 | | • | | | • | C-5m C | | | | | | _002 | RB Avera | W=VBW=1MHz ge Measurements 1MHz ; VBW=10Hz |
| f ;Hz | Dist (m) | Read Pk dBuV | Read Avg. dBuV | AF dB/m | | | 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) |
| | | | Hz, Chain C | | | | | | | | | | | | (|
| 540 540 | 3.0 3.0 | 41.7 42.1 | 29.5 29.4 | 38.0 38.0 | | 32.2 32.2 | 0.0 0.0 | 0.0 0.0 | 48.2 48.6 | 36.0 35.9 | 74 74 | 54 54 | -25.8 -25.4 | -18.0 -18.1 | V H |
| | | | | | | | | | | | | | | | |
| 7. 4.12. | f Dist | Measureme Distance to Analyzer R Antenna Fa Cable Loss | eading actor | 7 | D Av Pe | | Average | Correc Field S d Peak | ct to 3 mete Strength @ c Field Stre | 3 m | | Pk Lim Avg Mar | Peak Fiel Margin vs | Field Strengt d Strength L . Average L . Peak Limit | imit imit |
| | | | | | п. | | rugn ras | s ruter | | | | | | | |

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

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN C

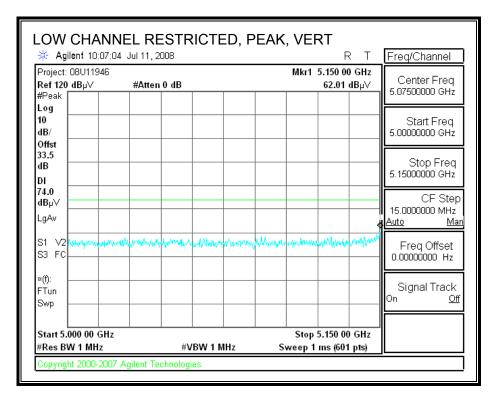


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| Agilent 10:03: | | ED, AVG, HORIZ | Peak Search |
|----------------------------------------------------|-------------|------------------------------------------------|----------------|
| Project: 08U11946 Ref 120 dB µ∀ #Peak | #Atten 0 dB | Mkr1 5.150 00 GH: 47.41 dBµ∖ | |
| Log 10 dB/ Offst | | | Next Pk Right |
| dB | | | Next Pk Left |
| 54.0 dBµ∨ LgAv | | | Min Search |
| S1 V2 S3 FC | | | Pk-Pk Search |
| ×(f): FTun Swp | | | Mkr © CF |
| Start 5.000 00 GHz #Res BW 1 MHz | #VBW 10 | Stop 5.150 00 GH: Hz Sweep 11.7 s (601 pts) | More 1 of 2 |

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL), CHAIN C



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| | | , AVG, VERI R T | Freq/Channel |
|----------------------------------------------------|-------------|---------------------------------------------|-------------------------------------------------|
| Project: 08∪11946 Ref 120 dB µ∨ #Peak | #Atten 0 dB | Mkr1 5.150 00 GHz 48.12 dBµ∀ | Center Freq 5.07500000 GHz |
| Log 10 dB/ Offst | | | Start Freq 5.0000000 GHz |
| 33.5 dB DI | | | Stop Freq 5.1500000 GHz |
| 54.0 dBμV | | | CF Step 15.000000 MHz |
| S1 V2 | | | <u>Auto Man</u> Freq Offset 0.00000000 Hz |
| *(f): FTun Swp | | | Signal Track ^{On <u>Off</u>} |
| Start 5.000 00 GHz #Res BW 1 MHz | #VBW 10 Hz | Stop 5.150 00 GHz Sweep 11.7 s (601 pts) | |

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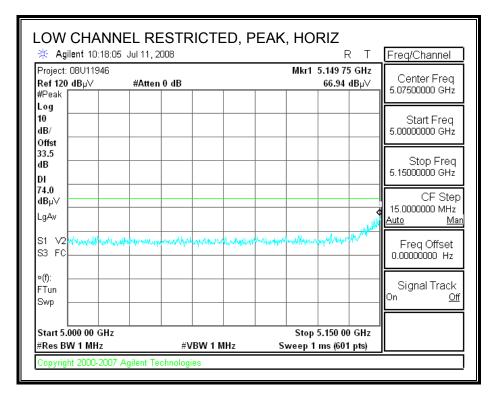
HARMONICS AND SPURIOUS EMISSIONS

| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | Horn 1-18GHz Pre-amplifer 1-26GHz Pre-amplifer 26-40GHz Horn > 18GHz Limit Too; S.N: 2238 @3m T34 HP 8449B T34 HP 8449B Taget HP requency Cables FCC 15.205 FCC 15.205 Pre-amplifer 2 foot cable 3 foot cable 12 foot cable Pre-amplifer Pre | onfigur ode: 5 | | | | | | | | | | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------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| T60; S/N: 2238 @3m T34 HP 8449B FCC 15.205 FIFrequency Cables Peak Measurements Thanh 177079008 Peak Measurements The frequency Cables Peak Measurements The frequency Cable Peak Measurements Thanh 177079008 Peak Measurements Toto cable HPF Reject Filter Peak Measurements Thanh 177079008 Peak Masurements RBW=VBW=10HIZ Toto cable C-5m Chamber Peak Marg Measurements RBW=VBW=10HIZ TO Dot cable C2 monomer Peak Avg Pk Lim Avg Mar Avg Mar Notes GHz (m) Bud Mar Avg Mar Notes GHZ Peak Avg AF CL Amp D Corr Fltr Peak Avg Pk Lim Avg Mar Marg Notes GHZ (m) Avg Mar Avg Mar Notes GHZ OD OD 48.4 36.1 74 54 -25.6 <th col<="" th=""><th>T60: S/N: 2238 @3m , T34 HP 8449B , T34 HP 8449B , T54 HP 8449B H</th><th></th><th></th><th>-</th><th>Pre-a</th><th>mplifer</th><th>1-260</th><th>GHz</th><th>Pre-am</th><th>plifer</th><th>26-40GH</th><th>Iz</th><th>н</th><th>orn > 18</th><th>GHz</th><th></th><th>Limit</th></th> | <th>T60: S/N: 2238 @3m , T34 HP 8449B , T34 HP 8449B , T54 HP 8449B H</th> <th></th> <th></th> <th>-</th> <th>Pre-a</th> <th>mplifer</th> <th>1-260</th> <th>GHz</th> <th>Pre-am</th> <th>plifer</th> <th>26-40GH</th> <th>Iz</th> <th>н</th> <th>orn > 18</th> <th>GHz</th> <th></th> <th>Limit</th> | T60: S/N: 2238 @3m , T34 HP 8449B , T34 HP 8449B , T54 HP 8449B H | | | - | Pre-a | mplifer | 1-260 | GHz | Pre-am | plifer | 26-40GH | Iz | н | orn > 18 | GHz | | Limit |
| 2 foot cable 3 foot cable 12 foot cable HPF Reject Filter Peak Measurements RBW=VBW=1MHz, Average Measurements RBW=1MHz, VBW=10H f Dist Read Pk Read Avg. dBuV AF CL Amp D Corr Fitr Peak Avg Pk Lin Average Measurements RBW=1MHz, VBW=10H f Dist Read Pk Read Avg. dBuV AF CL Amp D Corr Fitr Peak Avg Pk Lin Avg Lin Pk Mar Avg Mar Notes GHz (m) dBuV dBuV dB dB dB dB dB dB dB dVm average Notes GHz (m) dBuV dBuV dB dB dB dB dB dB dB dVm dB dWm Notes GHz (m) dBuV dB dB dB dB dB dB dWm Notes dWm dWm dWm Mag Avg Mar Notes dWm dWm dWm dWm dWm dWm dWm dWm dWm <th>2 foot cable 3 foot cable 12 foot cable HPF Reject Filter Peak Measurements RBW=VBW=1MHz 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 <t< th=""><th>T60; S</th><th>/N: 223</th><th>3 @3m</th><th></th><th>-</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>-</th><th>FCC 15.205</th></t<></th> | 2 foot cable 3 foot cable 12 foot cable HPF Reject Filter Peak Measurements RBW=VBW=1MHz 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 <t< th=""><th>T60; S</th><th>/N: 223</th><th>3 @3m</th><th></th><th>-</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>-</th><th>FCC 15.205</th></t<> | T60; S | /N: 223 | 3 @3m | | - | | | | | | | | | | - | FCC 15.205 | |
| f Dist Read Pk Read Avg. dBuV AF CL Amp D Corr Fltr Peak Avg Pk Lim Avg Lim Pk Mar Avg Mar Notes GHz (m) dBuV dBuV dB'n dB dB dB dB dB dB dB dB dB'nV/m dBuV/m dBuV/m dB'nV/m | f Dist Read Pk Read Avg. AF CL Amp D Corr Flt Peak Avg Pk Lim Avg Lim Pk Mar Avg Mar Notes GHz (m) dBuV dBuV dB dB dB dB dB dB V/m dBuV/m dBuV/m dBuV/m dBuV/m dB dB (V/H) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 <th></th> <th></th> <th></th> <th>3</th> <th>3 foot c</th> <th>able</th> <th></th> <th>12</th> <th>foot c</th> <th>able</th> <th></th> <th>HPF</th> <th>R</th> <th>eject Filto</th> <th></th> <th></th> | | | | 3 | 3 foot c | able | | 12 | foot c | able | | HPF | R | eject Filto | | | |
| GHz (m) dBuV dBuV dB dV/m dBuV/m dBuV/m dB dB (V/H) T2020 Mode Low Ch. 5180MHz, Chain C Image: Chain C | GHz (m) dBuV dB/V dB/dB dB dB dB dB dB dV/m dBuV/m dB dB dB (V/H) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | Tha | nh 1770 | 79008 | • | | | • | C-5m C | Chamb (| er 🔽 | | | ▼ R | _002 | | | |
| 5540 30 41.9 29.6 38.0 0.8 -32.2 0.0 0.0 48.4 36.1 74 54 -25.6 -17.9 V 5540 30 42.2 29.5 38.0 0.8 -32.2 0.0 0.0 48.8 36.0 74 54 -25.2 -18.0 H 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 540 30 41.9 29.6 38.0 0.8 -32.2 0.0 0.0 48.4 36.1 74 54 -25.6 -17.9 V 540 3.0 42.2 29.5 38.0 0.8 -32.2 0.0 0.0 48.8 36.0 74 54 -25.6 -17.9 V 540 3.0 42.2 29.5 38.0 0.8 -32.2 0.0 0.0 48.8 36.0 74 54 -25.2 -18.0 H v.4127 | | | | | 1 | | - | 1 | 1 | 1 | | | | 1 | | | |
| rv. 4.12.7 f Measurement Frequency Dist Distance to Antenna Read Analyzer Reading AF Antenna Factor Peak Calculated Peak Field Strength Pied | rv. 4.12.7 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 AF Antenna Factor Peak Calculated Peak Field Strength Pk Mar Margin vs. Peak Limit | .540 | 3.0 | 41.9 | 29.6 | 38.0 | | | | | | | | | | | | |
| 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 | 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 | . 24U | 3.0 | 42.2 | 293 | 38.0 | 0.8 | -32.2 | 0.0 | 0.0 | 48.8 | 2010 | 74 | 24 | -20.2 | -18.0 | H | |
| CL Cable Loss HPF High Pass Filter | CL Cable Loss HPF High Pass Filter | | Dist Read AF | Distance to Analyzer R Antenna F | Antenna leading actor | у | | D Corr Avg Peak | Distance Average Calculate | Corre Field S ed Peal | Strength @ c Field Stre | 3 m | | Pk Lim Avg Mar | Peak Fiel Margin v: | d Strength L s. Average L | imit imit | |
| | | | CL | Cable Los | 5 | | | HPF | High Pas | s Filter | | | | | | | | |

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

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN A

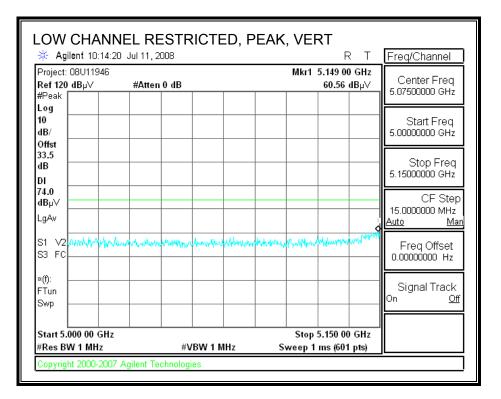


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| OW CHANN | JEL RESTRICTED 2 Jul 11, 2008 | D, AVG, HORIZ | Freq/Channel |
|----------------------------------------------------|----------------------------------|---------------------------------------------|------------------------------------------|
| Project: 08U11946 Ref 120 dB µ∨ #Peak | #Atten 0 dB | Mkr1 5.150 00 GHz 52.46 dBµ∨ | Center Freq 5.07500000 GHz |
| Log 10 dB/ Offst | | | Start Freq 5.0000000 GHz |
| 33.5 dB DI | | | Stop Freq 5.1500000 GHz |
| 54.0 dBµ∨ | | | CF Step 15.000000 MHz |
| LgAv | | | <u>Auto Man</u> |
| S1 V2 S3 FC | | | Freq Offset 0.00000000 Hz |
| ×(f): FTun Swp | | | Signal Track ^{On <u>Off</u>} |
| Start 5.000 00 GHz #Res BW 1 MHz | #VBW 10 Hz | Stop 5.150 00 GHz Sweep 11.7 s (601 pts) | |

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL), CHAIN A



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| LOW CHANN | EL RESTRICTEI Jul 11, 2008 | D, AVG, VERT | Freq/Channel |
|----------------------------------------------------|-------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Project: 08U11946 Ref 120 dB µ∨ #Peak | #Atten 0 dB | Mkr1 5.150 00 GHz 49.39 dBμ∀ | Center Freq 5.07500000 GHz |
| Log 10 dB/ Offst | | | Start Freq 5.00000000 GHz |
| 33.5 dB DI | | | Stop Freq 5.15000000 GHz |
| 54.0 dBµ∨ LgAv | | | CF Step 15.0000000 MHz |
| S1 V2 | | | Auto Man Freq Offset 0.00000000 Hz |
| ×(f): FTun Swp | | | Signal Track On <u>Off</u> |
| Start 5.000 00 GHz #Res BW 1 MHz | #VBW 10 H: | Stop 5.150 00 GHz z Sweep 11.7 s (601 pts) | a de la companya de la compa |

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HARMONICS AND SPURIOUS EMISSIONS

| Complia | | | Measurem Services, Fr | | 5m Ch | amber | | | | | | | | | |
|-------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------|--------------------------------|----------------------------------------------|------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Project Date: 7/ Fest En Configu | | 11946 3 William Zh Laptop star | | | | | | | | | | | | | |
| | luipmen | _ | | | | | _ | | | | | | | | |
| | | 18GHz | Pre-ar | nplifer P 8449B | | GHz | Pre-am | plifer | 26-40GH | | H | orn > 180 | GHz | | Limit |
| | S/N: 223 | • | • 134 H | ° 8449B | | • | | | | - | | | | • | FCC 13.203 |
| | quency Cal | | 3 | foot c | able | | 121 | foot c | able | | HPF | Re | eiect Filte | | Measurements |
| Tha | anh 1770 | 79008 | | | | _ | C-5m C | hambo | er _ | | | | <u> </u> | RB' | W=VBW=1MHz ge Measurements |
| Tha | anh 1770 | 79008 | • | | | • | C-5m C | hambo | er 🗸 | | | | 002 | RB' Avera | W=VBW=1MHz |
| f | Dist | | Read Avg. dBuV | AF dB/m | CL | • Amp dB | C-5m C D Corr dB | | Peak | Avg dBuV/m | Pk Lim | • R_ | 002 | RB' Avera | W=VBW=1MHz ge Measurements 1MHz; VBW=10Hz Notes |
| f GHz | Dist (m) | Read Pk dBuV | - | dB/m | | Amp | D Согг | Fltr | Peak | Avg dBuV/m | Pk Lim | • R_ | 002 Pk Mar | RB [*] Avera RBW= | W=VBW=1MHz ge Measurements 1MHz ; VBW=10Hz |
| f GHz HT40 N 5.570 | Dist (m) /Iode, L 3.0 | Read Pk dBuV ow Ch. 519 41.2 | dBuV 0MHz, Cha 28.8 | dB/m in A, 38.0 | dB 0.8 | Amp dB -32.2 | D Corr dB | Fltr dB 0.0 | Peak dBuV/m 47.8 | dBuV/m 35.3 | Pk Lim dBuV/m 74 | R_ Avg Lim dBuV/m | 002 Pk Mar dB -26.2 | Avera RBW= | W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz (V/H) V |
| f GHz HT40 N 15570 | Dist (m) /Iode, L | Read Pk dBuV ow Ch. 519 | dBuV 0MHz, Cha | dB/m in A, | dB | Amp dB | D Corr dB | Fltr dB | Peak dBuV/m | dBuV/m | Pk Lim dBuV/m | R_ Avg Lim dBuV/m | 002 Pk Mar dB | RB [™] Avera RBW= Avg Mar dB | W=VBW=1MHz <u>ge Measurements</u> 1MHz; VBW=10Hz Notes (V/H) |
| f GHz HT40 N 5570 | Dist (m) /Iode, L 3.0 | Read Pk dBuV ow Ch. 519 41.2 | dBuV 0MHz, Cha 28.8 | dB/m in A, 38.0 | dB 0.8 | Amp dB -32.2 | D Corr dB | Fltr dB 0.0 | Peak dBuV/m 47.8 | dBuV/m 35.3 | Pk Lim dBuV/m 74 | R_ Avg Lim dBuV/m | 002 Pk Mar dB -26.2 | Avera RBW= | W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz (V/H) V |
| f GHz HT40 N 15570 | Dist (m) /Iode, L 3.0 | Read Pk dBuV ow Ch. 519 41.2 | dBuV 0MHz, Cha 28.8 | dB/m in A, 38.0 | dB 0.8 | Amp dB -32.2 | D Corr dB | Fltr dB 0.0 | Peak dBuV/m 47.8 | dBuV/m 35.3 | Pk Lim dBuV/m 74 | R_ Avg Lim dBuV/m | 002 Pk Mar dB -26.2 | Avera RBW= | W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz (V/H) V |
| f GHz HT40 N 15570 | Dist (m) /Iode, L 3.0 | Read Pk dBuV ow Ch. 519 41.2 | dBuV 0MHz, Cha 28.8 | dB/m in A, 38.0 | dB 0.8 | Amp dB -32.2 | D Corr dB | Fltr dB 0.0 | Peak dBuV/m 47.8 | dBuV/m 35.3 | Pk Lim dBuV/m 74 | R_ Avg Lim dBuV/m | 002 Pk Mar dB -26.2 | Avera RBW= | W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz (V/H) V |
| f GHz HT40 N 15570 | Dist (m) Jode, L 3.0 3.0 | Read Pk dBuV ow Ch. 519 41.2 | dBuV 0MHz, Cha 28.8 | dB/m in A, 38.0 | dB 0.8 | Amp dB -32.2 | D Corr dB | Fltr dB 0.0 | Peak dBuV/m 47.8 | dBuV/m 35.3 | Pk Lim dBuV/m 74 | R_ Avg Lim dBuV/m | 002 Pk Mar dB -26.2 | Avera RBW= | W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz (V/H) V |
| f GHz HT40 N 15570 | Dist (m) Jode, L 3.0 3.0 | Read Pk dBuV ow Ch. 519 41.2 | dBuV 0MHz, Cha 28.8 | dB/m in A, 38.0 | dB 0.8 | Amp dB -32.2 | D Corr dB | Fltr dB 0.0 | Peak dBuV/m 47.8 | dBuV/m 35.3 | Pk Lim dBuV/m 74 | R_ Avg Lim dBuV/m | 002 Pk Mar dB -26.2 | Avera RBW= | W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz (V/H) V |
| f GHz HT40 N 15570 | Dist (m) /Iode, L 3.0 3.0 7 | Read Pk dBuV ow Ch. 519 41.2 41.3 | dBuV 0MHz, Cha 28.8 28.7 | dB/m in A, 38.0 38.0 | dB 0.8 | Amp dB -32.2 -32.2 | D Corr dB 0.0 0.0 | Fltr dB 0.0 | Peak dBuV/m 47.8 | dBuV/m 35.3 | Pk Lim dBuV/m 74 | Avg Lim dBuV/m 54 54 | 002 Pk Mar dB -26.2 -26.2 | Avera RBW= | W=VBW=1MHz <u>ge Measwements</u> 1MHz ; VBW=10Hz Notes (V/H) V H |
| f GHz HT40 N 5570 | Dist (m) /Iode, L 3.0 3.0 7 | Read Pk dBuV ow Ch. 519 41.2 41.3 Measurem | dBuV 0MHz, Cha 28.8 28.7 ent Frequency | dB/m in A, 38.0 38.0 | dB 0.8 | Amp dB -32.2 -32.2 -32.2 -32.2 | D Corr dB 0.0 0.0 Preamp (| Fltr dB 0.0 0.0 | Peak dBuV/m 47.8 47.8 | dBuV/m 35.3 35.3 | Pk Lim dBuV/m 74 | Avg Lim | 002 Pk Mar dB -26.2 -26.2 -26.2 | RB ³ Avera RBW= Avg Mar dB - 18.7 - 18.7 - 18.7 | W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz Notes (V/H) V H h Limit |
| f GHz HT40 N 5570 | Dist (m) Jode, L 3.0 3.0 7 | Read Pk dBuV ow Ch. 519 41.2 41.3 Measurement Distance to | dBuV 0MHz, Cha 28.8 28.7 ent Frequenc; Antenna | dB/m in A, 38.0 38.0 | dB 0.8 | Amp dB -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 -32.2 | D Corr dB 0.0 0.0 0.0 Preamp (Distance | Fltr dB 0.0 0.0 Jain | Peak dBuV/m 47.8 47.8 | dBuV/m 35.3 35.3 | Pk Lim dBuV/m 74 | • R Avg Lim BuV/m 54 54 54 Avg Lim Pk Lim | 002 Pk Mar dB -26.2 -26.2 -26.2 Average I Peak Fiel | RB³ Avera RBW= Avg Mar dB -18.7 -18.7<td>W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz Notes (V/H) V H h Limit imit</td> | W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz Notes (V/H) V H h Limit imit |
| f GHz | Dist (m) Jode, L 3.0 3.0 7 | Read Pk dBuV ow Ch. 519 41.2 41.3 Measurem | dBuV 0MHz, Cha 28.8 28.7 ent Frequency Antenna eading | dB/m in A, 38.0 38.0 | dB 0.8 | Amp dB -32.2 -32.2 -32.2 -32.2 | D Corr dB 0.0 0.0 Preamp (Distance Average | Fltr dB 0.0 0.0 Gain Correct | Peak dBuV/m 47.8 47.8 | dBuV/m 35.3 35.3 35.3 ers 3 m | Pk Lim dBuV/m 74 74 | • R Avg Lim dBuV/m 54 54 54 Avg Lim Pk Lim Avg Mar | 002 Pk Mar dB -26.2 -26.2 -26.2 Average I Peak Fiel Margin vs | RB ³ Avera RBW= Avg Mar dB - 18.7 - 18.7 - 18.7 | W=VBW=1MHz <u>ge Measurements</u> 1MHz ; VBW=10Hz Notes (V/H) <u>V</u> H h Limit imit |

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7.3. TRANSMITTER ABOVE 1 GHz (15 INCHES LAPTOP)

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

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN A

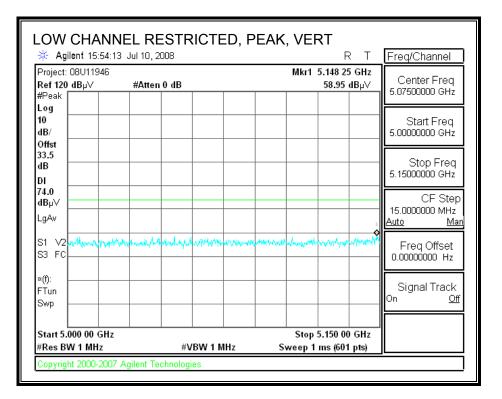
| , | 39 Jul 10, 2008 | | | R T | Freq/Channel |
|-------------------------------------------------|----------------------------------|---------|----------------------------|--------------------|----------------------------------|
| roject: 08U11946 ef 120 dB µ∨ ⊃eak | #Atten 0 dB | | Mkr1 5.149 62. | 900 GHz 79 dBµ∨ | Center Freq 5.07500000 GHz |
| og | | | | | |
|) B/ | | | | | Start Freq 5.0000000 GHz |
| ffst 3.5 B | | | | _ | Stop Freq |
| | | | | | 5.15000000 GHz |
| l.0 Bµ∀ | | | | | CF Step |
| βΑν | | | | d | 15.0000000 MHz <u>Auto Ma</u> |
| 1 V2 3 FC | everthe provingent the residence | manuple | na hulha power makeur an h | www. | Freq Offset 0.00000000 Hz |
| f): | | | | | |
| run Mip | | | | | Signal Track On <u>Ot</u> |
| | | | | | |
| tart 5.000 00 GHz | | | Stop 5.150 | 00 GHz | |

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| | | ED, AVG, HORIZ | |
|---------------------------------------------------|----------------------|------------------------------------------------|-------------------------------|
| 🔆 Agilent 15:49:0 | 1 JULIO, 2008 | | Freq/Channel |
| Project:08U11946 Ref 120 dB µ∨ #Peak | #Atten 0 dB | Mkr1 5.150 00 GHz 49.05 dBµ∨ | Center Freq 5.07500000 GHz |
| Log 10 dB/ Offst | | | Start Freq 5.0000000 GHz |
| 33.5 dB | | | - Stop Freq 5.15000000 GHz |
| 54.0 dBµ∨ | | | CF Step 15.000000 MHz |
| LgAv | | | <u>Auto Man</u> |
| S1 V2 S3 FC | | | Freq Offset |
| ×(f): FTun Swp | | | Signal Track |
| Start 5.000 00 GHz #Res BW 1 MHz | #VBW 10 | Stop 5.150 00 GHz Hz Sweep 11.7 s (601 pts) | |
| | Agilent Technologies | | |

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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| LOW CHANI | | TED, A | VG, VERT | - RT | |
|----------------------------------------------------|------------------------|---------|----------------------|-----------------------------|-------------------------------|
| | 11 Julio, 2000 | | | | Freq/Channel |
| Project: 08U11946 Ref 120 dB µ∨ #Peak | #Atten 0 dB | | Mkr1 5 | 5.150 00 GHz 47.58 dBµ∨ | Center Freq 5.07500000 GHz |
| Log 10 dB/ Offst | | | | | Start Freq 5.00000000 GHz |
| 33.5 dB DI | | | | | Stop Freq 5.1500000 GHz |
| 54.0 dBµ∀ | | | | | CF Step 15.000000 MHz |
| LgAv | | | | | <u>Auto Man</u> |
| S1 V2 S3 FC | | | | | Freq Offset 0.00000000 Hz |
| ×(f): FTun Swp | | | | | Signal Track |
| Start 5.000 00 GHz #Res BW 1 MHz | | / 10 Hz | Stop 5 Sweep 11.7 | 5.150 00 GHz s (601 pts) | |
| Copyright 2000-2007 | 7 Agilent Technologies | | • | / | |

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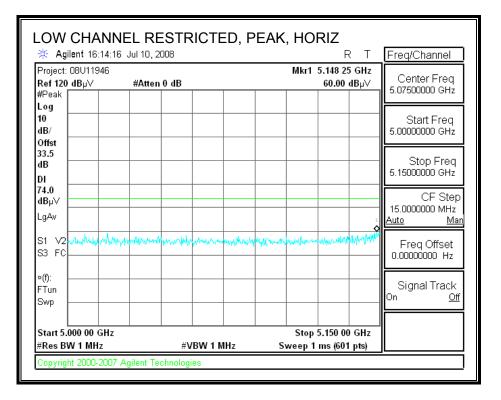
HARMONICS AND SPURIOUS EMISSIONS

| Complia | ~ | | y Measuren Services, Fi | | 5m (1 | amher | | | | | | | | | |
|-----------------------------------------------------|------------------------------------------------------|---------------------------------------|----------------------------|--------------|------------|----------------|------------------------|------------------|--------------------------------------------|---------------|---------------|-------------------|------------------------|----------------|---------------------------------------------------------------------------------------|
| Compan Project Date: 7/ Cest En Configu | ny: Inte #: 08U /14/200 ngineer: ration: | l 11946 | huang | emont | | lander | | | | | | | | | |
| est Eq | uipmer | <u>it:</u> | | | | | | | | | | | | | |
| н | orn 1 | 18GHz | Pre-ar | nplifer | 1-26 | GHz | Pre-am | plifer | 26-40GH | z | н | orn > 18 | GHz | | Limit |
| T60; S | S/N: 223 | 8 @3m | ▼ T34 H | P 8449B | | - | | | | - | | | | - | FCC 15.205 🗸 |
| | nh 177(| | • Read Avg. | ofoot o | cL | Amp | 12 C-5m C D Corr | | | Avg | HPF Pk Lim | • R | 002 | RBV Averag | <u>Measurements</u> V=VBW=1MHz <u>ze Measurements</u> MHz; VBW=10Hz Notes |
| t GHz | Dist (m) | dBuV | Read Avg. dBuV | AF dB/m | | Amp dB | dB | dB | | Avg dBuV/m | 1 | | 1 | Avg Mar dB | Notes (V/H) |
| | | · · · · · · · · · · · · · · · · · · · | Hz, Chain A | | | | | | | | | | | | |
| 5.540 5.540 | 3.0 3.0 | 42.9 43.8 | 29.8 29.9 | 38.0 38.0 | 0.8 0.8 | -32.2 -32.2 | 0.0 0.0 | 0.0 0.0 | 49.4 50.4 | 36.3 36.4 | 74 74 | 54 54 | -24.6 -23.6 | -17.7 -17.6 | Н |
| | | | | | | | | | | | | | | | |
| | | | | 1 | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | | | |
| ev. 4.12. | | | | | | | | | | | | | | | |
| ev. 4.12. | | | | | | | | | | | | | | | |
| ev. 4.12. | f | | ent Frequenc | у | | Amp | Preamp | | | | | Avg Lim | - | Field Strength | |
| ev. 4.12. | f Dist | Distance to | Antenna | у | | D Corr | Distance | Corre | ct to 3 mete | | | Pk Lim | Peak Fiel | d Strength Li | nit |
| v. 4.12. | f Dist | | Antenna Reading | у | | D Corr Avg | Distance Average | Corre Field S | ct to 3 mete Strength @ k Field Stre | 3 m | | Pk Lim Avg Mar | Peak Fiel Margin vs | 0 | nit |

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

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN C

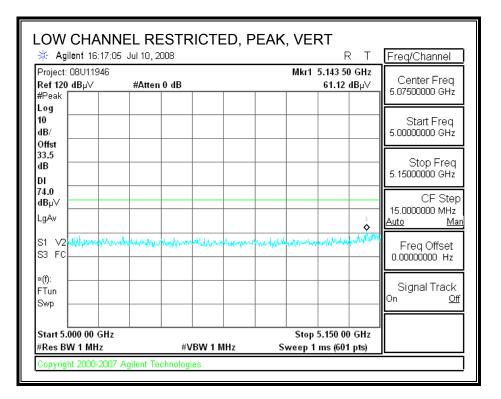


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| LOW CHAN | NEL RESTRIC 9 Jul 10, 2008 | TED, A | VG, HORI | I Z RT | Freq/Channel |
|----------------------------------------------------|-------------------------------|--------|----------------------|-----------------------------|---------------------------------------------|
| Project: 08∪11946 Ref 120 dB µ∨ #Peak | #Atten 0 dB | | Mkr1 5 | 5.150 00 GHz 48.29 dBµ∀ | Center Freq 5.07500000 GHz |
| Log 10 dB/ Offst | | | | | Start Freq 5.00000000 GHz |
| 33.5 dB DI | | | | | Stop Freq 5.1500000 GHz |
| 54.0 dBµ∨ LgAv | | | | | CF Step 15.000000 MHz <u>Auto Man</u> |
| S1 V2 S3 FC | | | | | Freq Offset |
| »(f): FTun Swp | | | | | Signal Track On <u>Off</u> |
| Start 5.000 00 GHz #Res BW 1 MHz | #VBW | 10 Hz | Stop 5 Sweep 11.7 | 5.150 00 GHz s (601 pts) | ń |
| Copyright 2000-2007 | Agilent Technologies | | | | |

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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| | | ED, AVG, VER | | |
|----------------------------------------------------|----------------------|--------------|-------------------------------|--------------------------------------|
| 🔆 Agilent 16:18:00 | J JULIO, 2008 | | RT | Freq/Channel |
| Project: 08U11946 Ref 120 dB µ∨ #Peak | #Atten 0 dB | Mkr1 | 5.150 00 GHz 48.20 dBµ∀ | Center Freq 5.07500000 GHz |
| Log 10 dB/ Offst | | | | Start Freq 5.0000000 GHz |
| 33.5 dB | | | | Stop Freq 5.1500000 GHz |
| 54.0 dBµ∀ LgAv | | | | CF Step 15.000000 MHz Auto Man |
| S1 V2 S3 FC | | | | Freq Offset 0.00000000 Hz |
| »(f): FTun Swp | | | | Signal Track On <u>Off</u> |
| Start 5.000 00 GHz #Res BW 1 MHz | #VBW 10 | | 5.150 00 GHz 7 s (601 pts) | |
| Copyright 2000-2007 | Agilent Technologies | | | |

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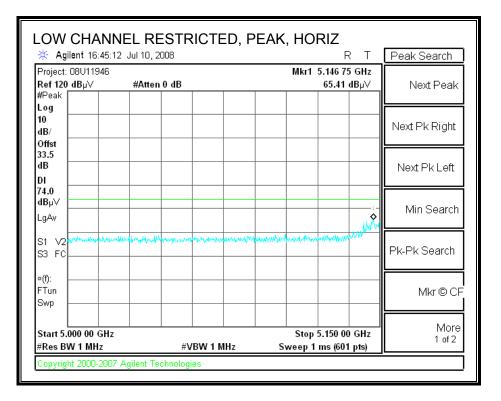
HARMONICS AND SPURIOUS EMISSIONS

| | #: 08U 14/2008 gineer: ration: 1 5.2GHz | 11946 3 William Zhu Laptop stand Tx On | | | | | | | | | | | | | |
|----------------|-----------------------------------------------------|----------------------------------------------------|-------------------|----------------------|------------|------------------------------|-----------------------|------------------|--------------------------------------------|---------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------|
| Horn 1-18GHz | | | Pre-an | Pre-amplifer 1-26GHz | | | Pre-amplifer 26-40GHz | | | Horn > 18GHz | | | | Limit | |
| T60; S | /N: 223 | 3@3m 🚽 | T34 HF | 9 8449B | | - | | | | - | | | | - | FCC 15.205 |
| | 2 foot nh 1770 | | 3 | foot c | able | • | 12 1 C-5m C | foot c hambe | | | HPF | | ject Filte 002 | RB | <u>k Measurements</u> W=VBW=1MHz age Measurements =1MHz ; VBW=10Hz |
| f GHz | Dist (m) | Read Pk I 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 | <u> </u> | Pk Mar dB | Avg Mar dB | Notes (V/H) |
| | | ow Ch. 5180 | | | <u>س</u> | | | ι | ubuv/m | ubu v/m | ubu v/m | and the second s | <u>س</u> | | (1/11) |
| 5.540 5.540 | 3.0 3.0 | 42.1 42.4 | 29.8 29.6 | 38.0 38.0 | 0.8 0.8 | -32.2 -32.2 | 0.0 0.0 | 0.0 0.0 | 48.6 48.9 | 36.3 36.1 | 74 74 | 54 54 | -25.4 -25.1 | -17.7 -17.9 | V H |
| | f Dist | Measuremen Distance to A Analyzer Rea | Antenna | 7 | | Amp D Corr Avg Peak | Average | Corre Field S | ct to 3 mete Strength @ c Field Stre | 3 m | | Pk Lim Avg Mar | Peak Fiel Margin vs | Field Strengt d Strength L . Average L . Peak Limit | .imit .imit |

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

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL), CHAIN A

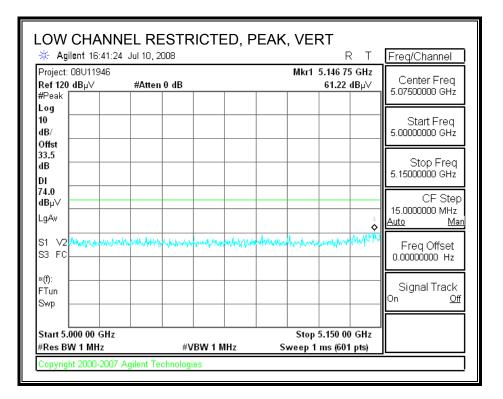


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| 🔆 Agilent 16:46 | NEL RESTRIC | 120,7 | | R T | Peak Search |
|----------------------------------------------------|-------------|-------|----------------------|----------------------------|----------------|
| Project: 08U11946 Ref 120 dB µ∨ #Peak | #Atten 0 dB | | Mkr1 5 | 5.150 00 GHz 51.19 dBµ∨ | Next Peak |
| Log 10 dB/ | | | | | Next Pk Right |
| Offst 33.5 dB DI | | | | | Next Pk Left |
| 54.0 dBµ∨ LgAv | | | | | Min Search |
| S1 V2 S3 FC | | | | | Pk-Pk Search |
| ×(f): FTun Swp | | | | | Mkr © CF |
| Start 5.000 00 GH #Res BW 1 MHz | z #VBW | 10 Hz | Stop 5 Sweep 11.7 | .150 00 GHz s (601 pts) | More 1 of 2 |

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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| LOW CHANNE | EL RESTRICTED Jul 10, 2008 | D, AVG, VERT | Freq/Channel |
|----------------------------------------------------|-------------------------------|---------------------------------------------|-------------------------------|
| Project: 08∪11946 Ref 120 dB µ∨ #Peak | #Atten 0 dB | Mkr1 5.150 00 GHz 49.20 dBμ∀ | Center Freq 5.07500000 GHz |
| Log 10 dB/ Offst | | | Start Freq 5.00000000 GHz |
| 33.5 dB DI | | | Stop Freq 5.15000000 GHz |
| 54.0 dBµ∨ | | | CF Step 15.000000 MHz |
| LgAv | | | <u>Auto Man</u> |
| S1 V2 S3 FC | | | Freq Offset |
| ×(f): FTun Swp | | | Signal Track On <u>Off</u> |
| Start 5.000 00 GHz #Res BW 1 MHz | #VBW 10 Hz | Stop 5.150 00 GHz Sweep 11.7 s (601 pts) | |

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HARMONICS AND SPURIOUS EMISSIONS

| - Compai | ny: Intel | l | Services, Fr | chione | on on | amoer | | | | | | | | | |
|-------------|-------------------|-----------------|---------------|---------|-------|-------|----------|----------|--------------|--------|--------|-----------|------------|---------------|-------------------------------------|
| | #: 08U /14/200 | | | | | | | | | | | | | | |
| | | , William Zł | uona | | | | | | | | | | | | |
| | | Laptop star | | | | | | | | | | | | | |
| ~ | 5.2 GHz | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| est Ec | puipmen | <u>t:</u> | | | | | | | | | | | | | |
| | | 18GHz | Draw | nplifer | 4.000 | 211- | Dra and | | 26-40GH | _ | | orn > 18(| | | Limit |
| н | iorn 1- | 18GHZ | Pre-ar | npiirer | 1-260 | JHZ | Pre-am | piirer | 26-40GH | z | н | orn > 180 | JHZ | | |
| T60; | S/N: 223 | 8 @3m | T34 H | P 8449B | | - | | | | - | | | | - | FCC 15.205 |
| | quency Ca | | | | | | 1 | | | | | | | | - |
| - Hi Fre | quency Ca | Dies | | | | | | | | | | | | | |
| | 2 foot | cable | 3 | foot o | able | | 121 | foot c | able | | HPF | Re | ject Filte | | <u>k Measurements</u> W=VBW=1MHz |
| The | anh 1770 | 79009 | | | | | C-5m C | hamh | o.r. | | | | 002 | | w=vBw=1MHz ige Measurements |
| "" | | 15000 | • | | | - | | namb | • | | | • R_ | 002 | | 1MHz; VBW=10Hz |
| 1 | | - | | | | | 1 | | | | | | | | , |
| f | Dist | Read Pk | Read Avg. | AF | CL | Amp | D Corr | Fltr | Peak | Avg | Pk Lim | Avg Lim | Pk Mar | Avg Mar | Notes |
| GHz | (m) | dBuV | dBuV | dB/m | dB | dB | dB | dB | dBuV/m | dBuV/m | dBuV/m | dBuV/m | dB | dB | (V/H) |
| | | v | 0MHz, Cha | | | | | | | | | | | | |
| 5.570 | 3.0 | 41.4 | 29.2 | 38.0 | 0.8 | -32.2 | 0.0 | 0.0 | 48.0 | 35.7 | 74 | 54 | -26.0 | -18.3 | <u>v</u> |
| 5.570 | 3.0 | 41.5 | 29.2 | 38.0 | 0.8 | -32.2 | 0.0 | 0.0 | 48.0 | 35.8 | 74 | 54 | -26.0 | -18.2 | H |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | ļ | <u> </u> | | | ļ | | | <u> </u> | | ļ | | | <u> </u> | |
| ev. 4.12 | .7 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | _ | | _ | | | | _ | | | | | | | | |
| | f | | ent Frequency | У | | Amp | Preamp (| | | | | - | - | Field Strengt | |
| | Dist | Distance to | | | | | | | ct to 3 mete | | | | | d Strength L | |
| | | Analyzer R | 0 | | | Avg | _ | | Strength @ | | | - | - | . Average L | |
| | AF | Antenna Fa | | | | Peak | | | c Field Stre | ngth | | Pk Mar | Margin vs | . Peak Limit | ; |
| | CL | Cable Loss | | | | HPF | High Pas | e Filter | | | | | | | |

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7.4. RECEIVER ABOVE 1 GHz

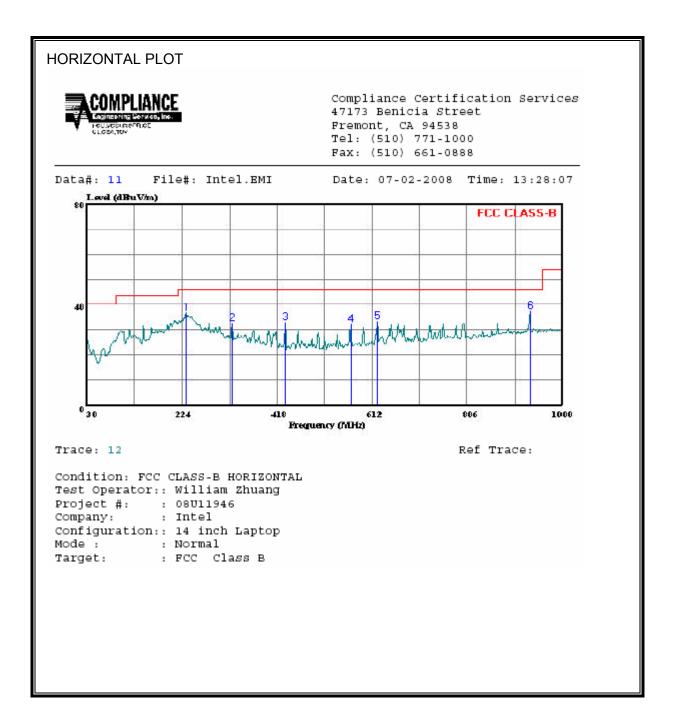
Note: No emissions were found within above 1GHz of 20dB below the system noise.

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7.5. WORST-CASE BELOW 1 GHz

14 NCHES LAPTOP

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



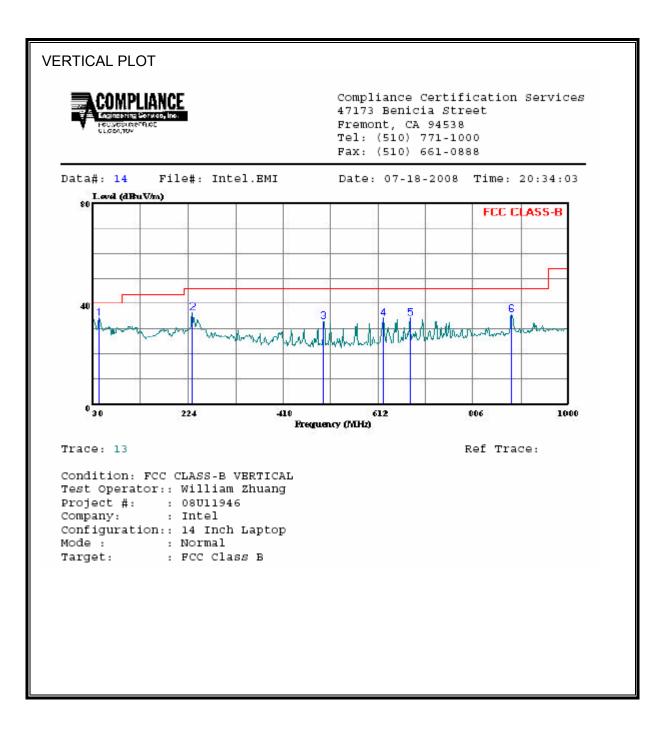
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| HORIZ | ONTAL DATA | | | | | | | |
|----------------------------|------------|----------------------------------|----------------------------------|----------------------------------|---------------|--------------------------------------|------------------------------|--|
| | Freq | Read Level | Factor | Level | Limit Line | | Remark | |
| | MHz | dBuV | dB | dBuV/m | dBuV/m | db | | |
| 1 2 3 4 5 6 | 324.880 | 42.64 41.19 38.29 38.60 | -9.97 -8.27 -6.16 -5.35 | 32.67 32.92 32.13 33.25 | 46.00 | -13.33 -13.08 -13.87 -12.75 | Peak Peak Peak Peak | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |

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



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| VERTI | CAL DATA | | | | | | |
|--------|--------------------|---------------|--------|--------|---------------------|---------------|--------|
| | Freq | Read Level | Factor | Level | | Over Limit | Remark |
| | MHz | dBuV | db | dBuV/m | \overline{dBuV}/m | db | |
| 1 | | | | 34.15 | | | |
| 2 3 | 232.730 499.480 | 40.12 | -7.19 | 32.93 | 46.00 | -13.07 | Peak |
| 4 5 | 623.640 676.990 | | | | | | |
| 6 | 885.540 | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |

 COMPLIANCE CERTIFICATION SERVICES
 FORM NO: CCSUP4031B

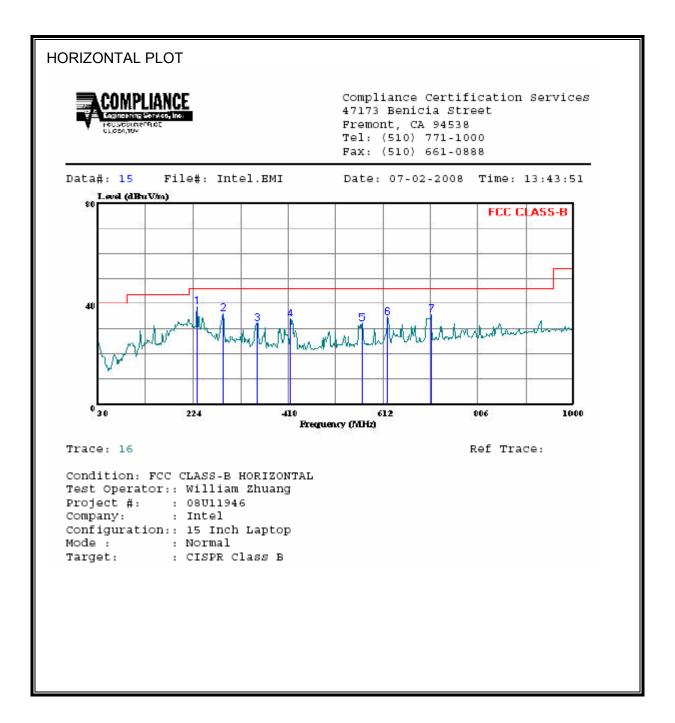
 47173 BENICIA STREET, FREMONT, CA 94538, USA
 TEL: (510) 771-1000
 FAX: (510) 661-0888

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15 INCHES LAPTOP

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



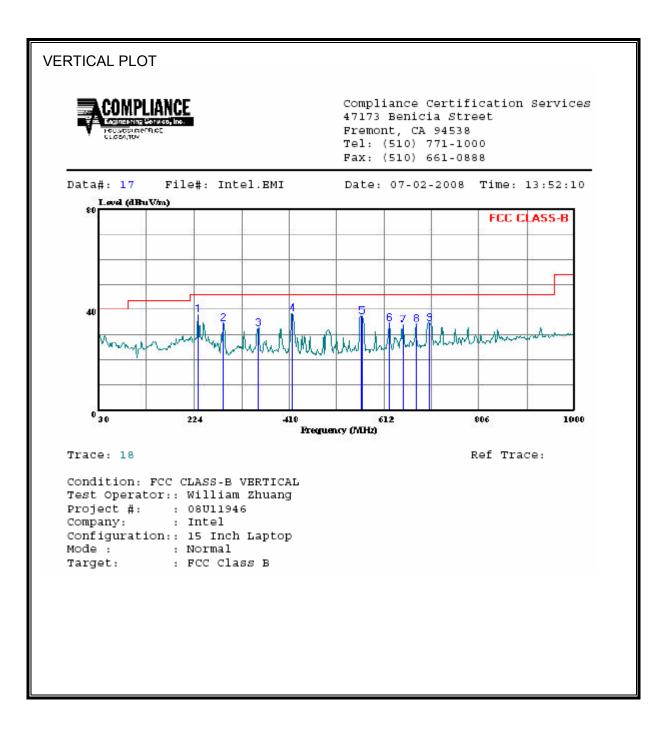
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| HORIZO | ONTAL DATA | | | | | | |
|----------------------------|-------------------------------|----------------------------------|-----------------------------------|----------------------------------|----------------|-------------------------------------|------------------------------|
| | Freq | Read Level | Factor | Level | Limit Line | Over Limit | Remark |
| | MHz | dBuV | db | ₫BuV/m | dBuV/m | dB | |
| 1 2 3 4 5 6 | 286.080 353.980 421.880 | 47.22 41.71 42.27 38.45 | -11.14 -9.53 -8.45 -6.16 | 36.08 32.18 33.82 32.29 | 46.00 46.00 | -9.92 -13.82 -12.18 -13.71 | Peak Peak Peak Peak |
| 7 | | | | | 46.00 | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

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



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| VERTIC | VERTICAL DATA | | | | | | | | | |
|-------------------------------------------|--------------------|-------------------------------------------------------------|----------------|-------------------------------------------------------------|----------------------------------------------------|----------------------------------------------|------------------------------------------------------|--|--|--|
| | Freq | Read Level | Factor | Level | Limit Line | Over Limit | Remark | | | |
| | MHz | dBuV | dB | ₫BuV/m | \overline{dBuV}/m | db | | | | |
| 1 2 3 4 5 6 7 8 9 | 284.140 353.980 | 45.87 42.08 47.00 43.67 39.85 38.88 38.68 | -5.35 -4.97 | 34.64 32.55 38.59 37.51 34.50 33.91 34.26 | 46.00 46.00 46.00 46.00 46.00 46.00 | -13.45 -7.41 -8.49 -11.50 -12.09 | Peak Peak Peak Peak Peak Peak Peak | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

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8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

| Frequency of Emission (MHz) | Conducted I | .imit (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

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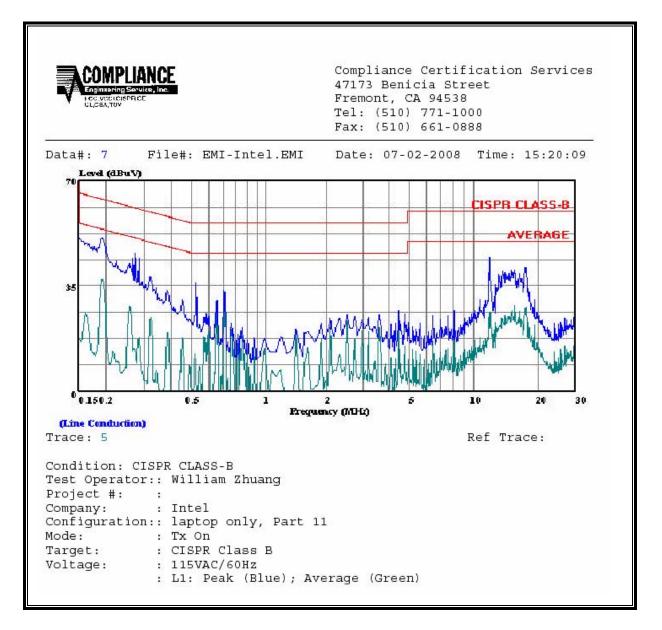
14 INCHES LAPTOP

<u>6 WORST EMISSIONS</u>

| | CONDUCTED EMISSIONS DATA (115VAC 60Hz) | | | | | | | | | | |
|-----------|----------------------------------------|-----------|-----------|---------|-------|-------|---------|--------|-------|--------|--|
| Freq. | Reading | | | Reading | | Closs | Limit | FCC_B | Marg | Remark | |
| (MHz) | PK (dBuV) | QP (dBuV) | AV (dBuV) | (dB) | QP | AV | QP (dB) | AV(dB) | L1/L2 | | |
| 0.19 | 50.81 | | 37.15 | 0.00 | 63.95 | 53.95 | -13.14 | -16.80 | L1 | | |
| 12.00 | 44.50 | | 26.40 | 0.00 | 60.00 | 50.00 | -15.50 | -23.60 | L1 | | |
| 17.66 | 41.28 | | 28.54 | 0.00 | 60.00 | 50.00 | -18.72 | -21.46 | L1 | | |
| 0.29 | 52.16 | | 21.76 | 0.00 | 60.41 | 50.41 | -8.25 | -28.65 | L2 | | |
| 12.00 | 44.60 | | 26.16 | 0.00 | 60.00 | 50.00 | -15.40 | -23.84 | L2 | | |
| 17.66 | 42.26 | | 27.76 | 0.00 | 60.00 | 50.00 | -17.74 | -22.24 | L2 | | |
| 6 Worst I | Data | | | | | | | | | | |

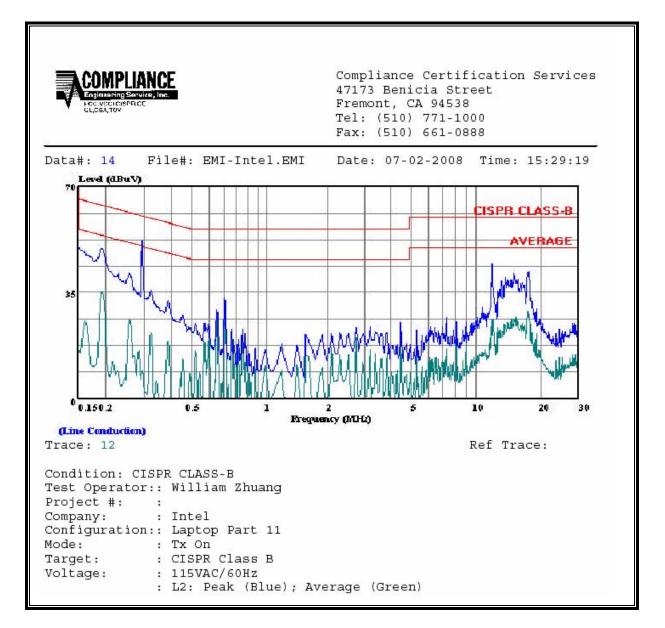
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LINE 1 RESULTS



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LINE 2 RESULTS



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1

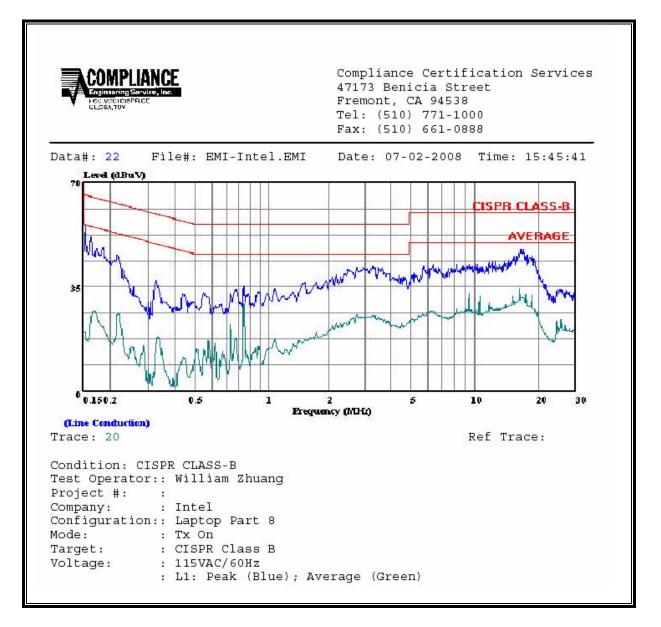
15 INCHES LAPTOP

<u>6 WORST EMISSIONS</u>

| | CONDUCTED EMISSIONS DATA (115VAC 60Hz) | | | | | | | | | | |
|-----------|----------------------------------------|-----------|-----------|---------------------------------|-------|-------|---------|--------|-------|--|--|
| Freq. | Reading | | | eading Closs Limit FCC B Margin | | | ;iл | Remark | | | |
| (MHz) | PK (dBuV) | QP (dBuV) | AV (dBuV) | (dB) | QP | AV | QP (dB) | AV(dB) | L1/L2 | | |
| 0.15 | 55.67 | | 26.97 | 0.00 | 65.94 | 55.94 | -10.27 | -28.97 | L1 | | |
| 0.16 | 51.88 | | 29.42 | 0.00 | 65.31 | 55.31 | -13.43 | -25.89 | L1 | | |
| 16.75 | 47.50 | | 34.50 | 0.00 | 60.00 | 50.00 | -12.50 | -15.50 | L1 | | |
| 0.16 | 49.07 | | 25.49 | 0.00 | 65.41 | 55.41 | -16.34 | -29.92 | L2 | | |
| 16.40 | 47.60 | | 31.21 | 0.00 | 60.00 | 50.00 | -12.40 | -18.79 | L2 | | |
| 18.43 | 46.63 | | 29.38 | 0.00 | 60.00 | 50.00 | -13.37 | -20.62 | L2 | | |
| 6 Worst I | Data | | | | | | | | | | |

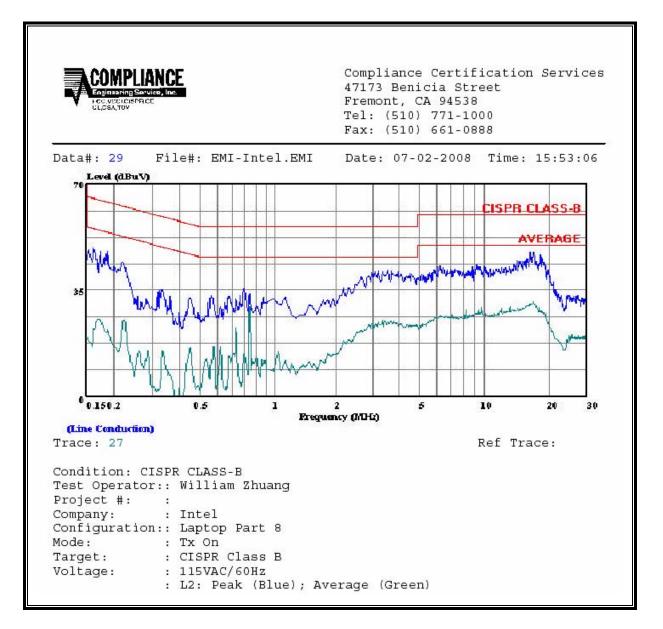
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LINE 1 RESULTS



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LINE 2 RESULTS



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9. SETUP PHOTOS

RADIATED RF MEASUREMENT SETUP



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POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP



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END OF REPORT

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