



FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

Mini PC

Model: GE2; GE2 series

Trade Name: FIC

Wireless LAN module Brand name: Intel

Wireless LAN module Model Number: Intel WM3945ABG

Prepared for

First International Computer Inc.

NO.300, YangGuang St., NeiHu, Taipei, Taiwan, 114

Prepared by

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1. TEST RESULT CERTIFICATION

Applicant: First International Computer Inc.
No.300 YangGuang st., NeiHu, Taipei, 114

Equipment Under Test: Mini PC

Trade Name: FIC

Model: GE2;GE2 series

Date of Test: From April 9, 2006 to April 16, 2006

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC Part 15 Subpart E	No non-compliance noted

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.407.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

Reviewed by:

Tony Hsiung
General Manager of Kunshan Laboratory
Compliance Certification Services Inc.

Miro Chueh
Section Manager of Kunshan Laboratory
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	Mini PC
Trade Name	FIC
Model Number	GE2;GE2 series
Model Discrepancy	All the above models are identical except the model designation for different market.
Wireless LAN module Model Number	Intel WM3945ABG
Wireless LAN module Brand name	Intel
EUT Power Rating	Trade Name : LI SHIN Model Number: 0335C2065 Input: AC 100-240V, 1.7A, 50-60Hz DC 20V, 3.25A Trade Name : Delta Model Number: SADP-65KB A Input: AC 100-240V, 1.5A, 50-60Hz DC 20V, 3.25A
Frequency Range	5180 ~ 5240 MHz
Modulation Technique	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
Transmit Power	15.29 dBm
Number of Channels	4 Channels
Air Data Rate	54, 48, 36, 24, 18, 12, 9, 6 Mbps
Antenna Specification	2 PIFA antenna / Gain: 3.13 dB

Note: This submittal(s) (test report) is intended for FCC ID: EUNGE2I filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.



3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance 3 meters.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the Tx frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E. The composite system (Digital device) is in compliance with Subpart B authorized under the DoC procedure.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2001 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2001.

3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.5 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE802.11a: Channel 1 (5180MHz), Channel 5 (5220MHz) and Channel 8 (5240MHz), which give the highest data rate of 54Mbps, are chosen for full testing.



4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at CCS China Kunshan Lab at 10#, Weiye Rd, Innovation Park Eco. & Tec. Development Zone Kunshan city JiangSu, (215300)CHINA.

The measurement facilities are constructed in conformance with the requirements of CISPR 16-1, ANSI C63.4 and other equivalent standards.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200581-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission.

5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP	EN 55022, EN 61000-3-2, EN 61000-3-3, EN550024, EN 61000-4-2, EN 61000-4-3, EN61000-4-4, EN 61000-4-5, EN 61000-4-6, IEC 61000-4-8, EN 61000-4-11 ANSI C63.4, CISPR16-1, IEC61000-3-2, IEC61000-3-3, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11	 Lab. Code: 200581-0
USA	FCC	3/10 meter Sites to perform FCC Part 15/18 measurements	 93105, 90471
Japan	VCCI	3/10 meter Sites and conducted test sites to perform radiated/conducted measurements	VCCI R-1600 C-1707
Norway	NEMKO	EN61000-6-1/2/3/4, EN 50082-1/2, IEC 61000-6-1/2/3/4, EN 50091-2, EN 55011, EN 55022, EN 55024, EN 61000-3-2/3, EN 61000-11, IEC 61000-4-2/3/4/5/6/8/11, CISPR16-1/2/3/4	 ELA 105

** No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.*



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

SUPPORT EQUIPMENT

No	Equipment	Model	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	LCD	SDM-HX73	2404608	DoC	SONY	Shielded 1.8m with a Core	Un-Shielded, 1.5m
2	Keyboard	KB-7953	0154096	DoC	IBM	Un-Shielded, 2.0m	N/A
3	Mouse	M-BJ58	HCA42101722	DoC	Logitech	Shielded, 1.8m	N/A

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



7. FCC PART 15.407 REQUIREMENTS

7.1 RADIO FREQUENCY EXPOSURE (15.407)

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *anechoic chamber*. The *maximum total power to the antenna* is to be recorded. By adopting the **Friis Transmission Formula** and the *power gain of the antenna*, we can find the distance right away from the product, where the limit of the MPE is.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

According to OET BULLETIN 56 Fourth Edition/August 1999, Equation for Predicting RF Fields:

$$\text{Power density at the specific separation (portable): } S = \frac{PG}{4\pi R^2} = \frac{33.81 \times 2.06}{4\pi(20)^2} = 0.0139 \text{ mW/cm}^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

The Numeric gain G of antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dB antenna gain}/10)$$

$$G = \text{Log}^{-1} (3.13 / 10) = 2.06$$

**7.2PEAK POWER (15.407)****LIMIT**

- For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50mW (17dBm) or $4\text{dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4dBm in any 1 MHz band.
- For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250mW (24dBm) or $11\text{dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11dBm in any 1 MHz band.
- For the band 5.725-5.825 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1mW (30dBm) or $17\text{dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 17dBm in any 1 MHz band.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. The peak power shall not exceeded the limit as follows:

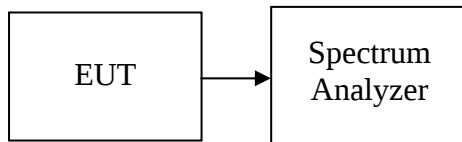
Specified Limit of the Peak Power

Frequency (MHz)	10 Log B (dB)	4 + 10 Log B	Power Limit (dBm)
5240	14.8	18.8	17

**MEASUREMENT EQUIPMENT USED**

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2006
Low-Loss RF Cable	Huber + Suhner	Sucoflex 104	N/A	N/A

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration**TEST PROCEDURE**

The test is performed in accordance with <FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices> – Part 15, Subpart E, August 2002.

TEST RESULTS

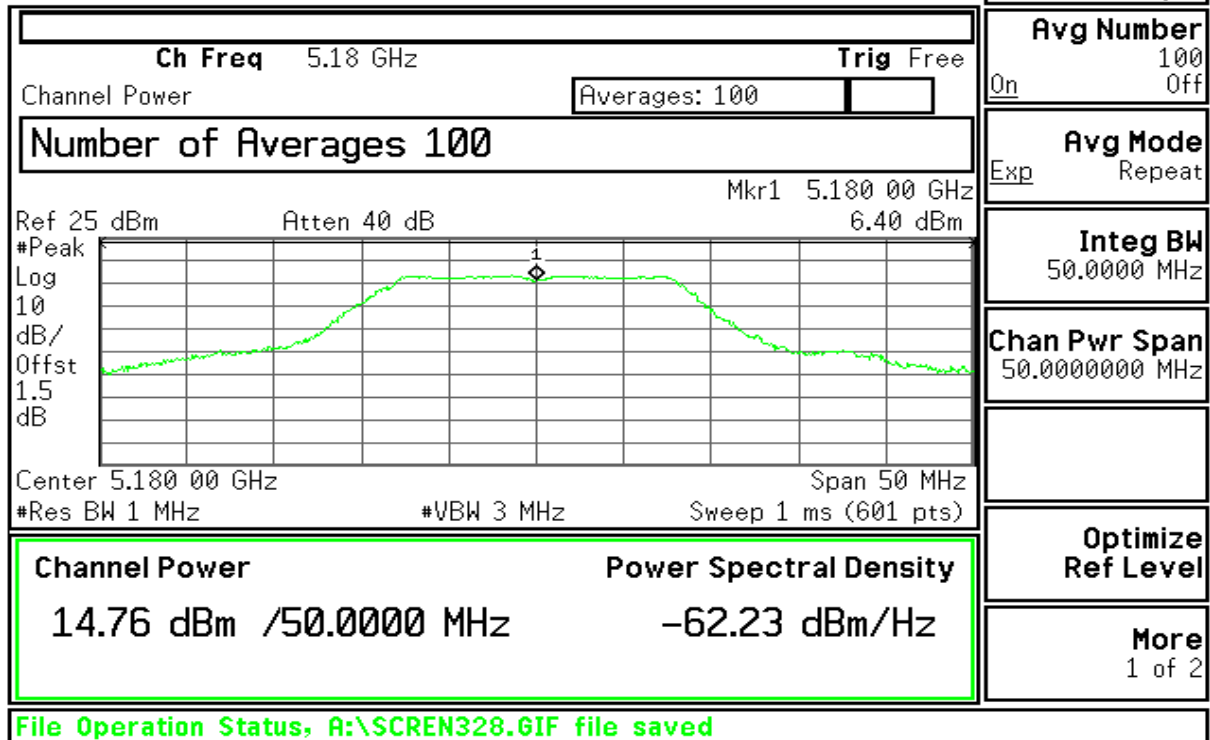
No non-compliance noted

Base Mode

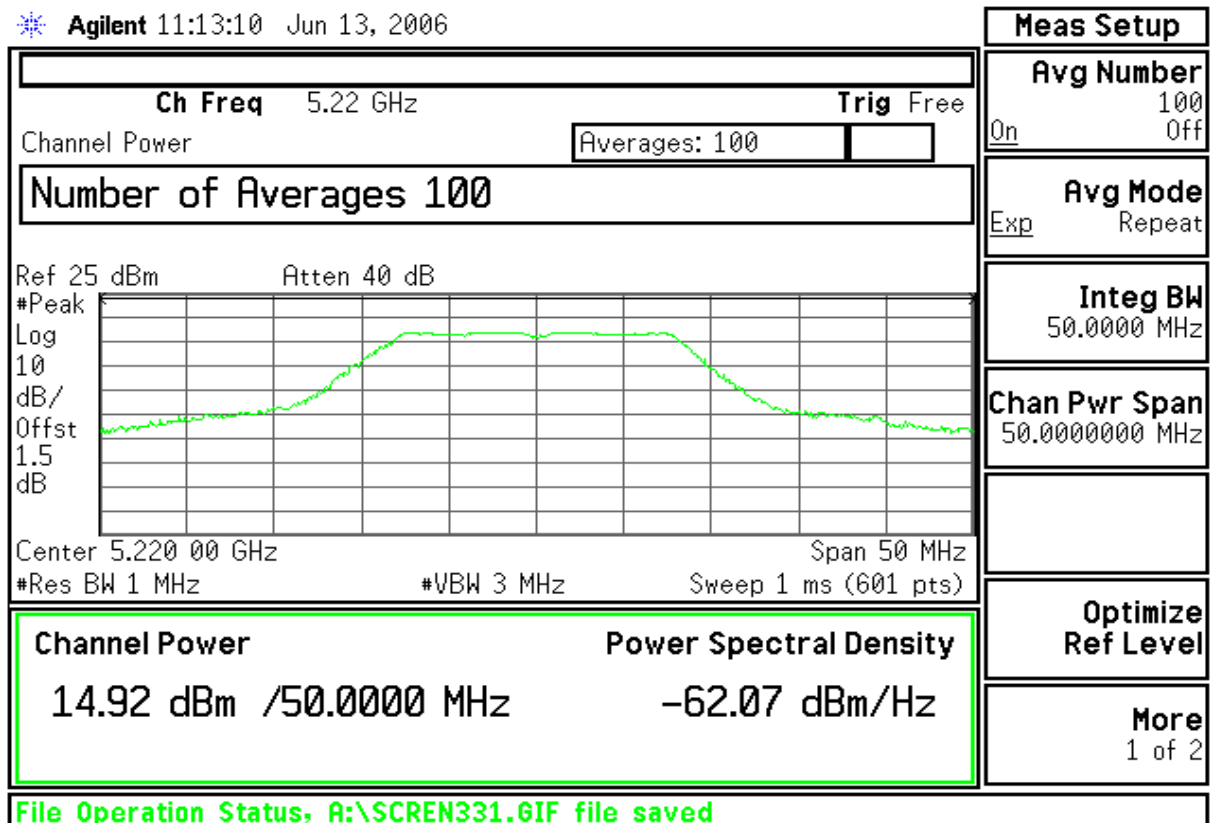
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	14. 76	17	-2.24
Middle	5220	14. 92	17	-2. 08
High	5240	15. 29	17	-1. 71

**TEST DATA PLOTS****CH Low**

* Agilent 11:08:41 Jun 13, 2006

**CH Mid**

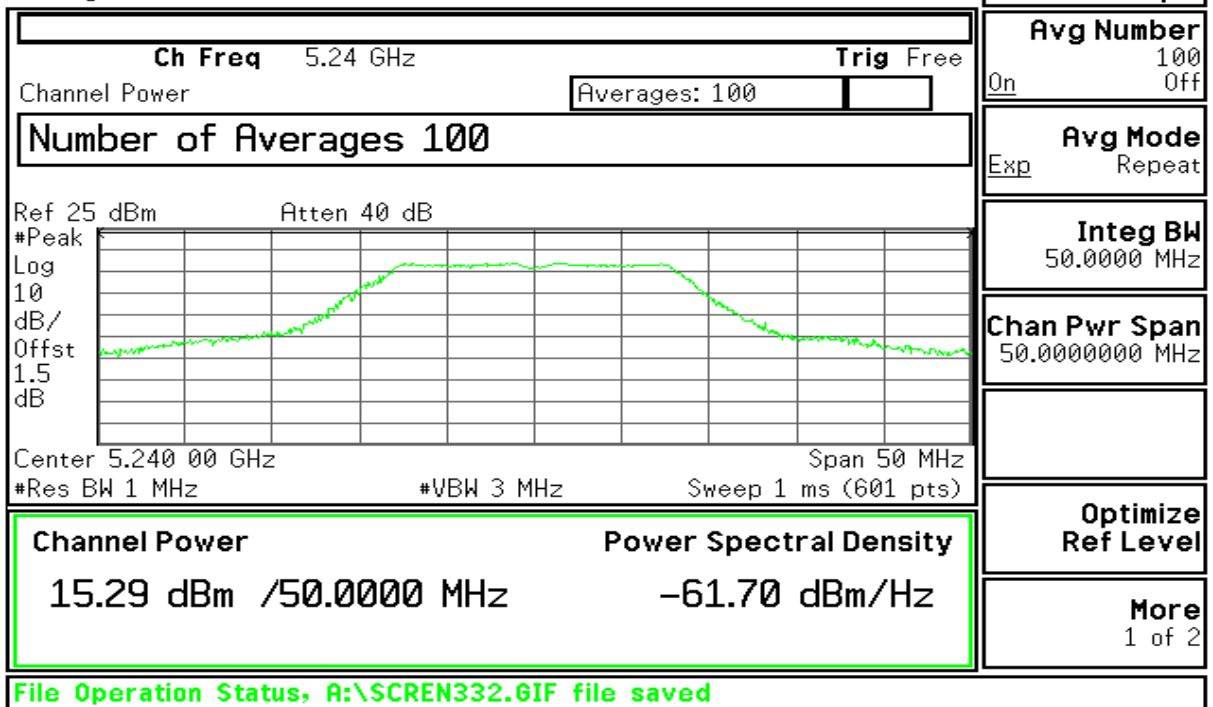
* Agilent 11:13:10 Jun 13, 2006





CH High

Agilent 11:14:11 Jun 13, 2006





7.3 RADIATED UNDESIRABLE EMISSION (15.407)

LIMIT

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / MHz (68.2dBuV/m). But Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

The provisions of §15.205 apply to intentional radiators operating under this section. The EUT is set to transmit in a continuous mode.

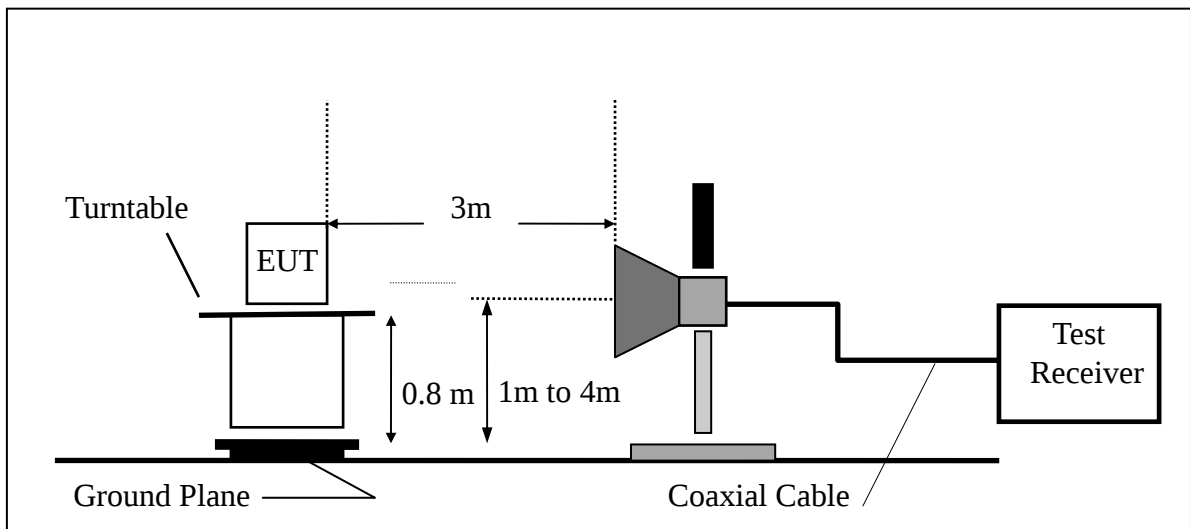
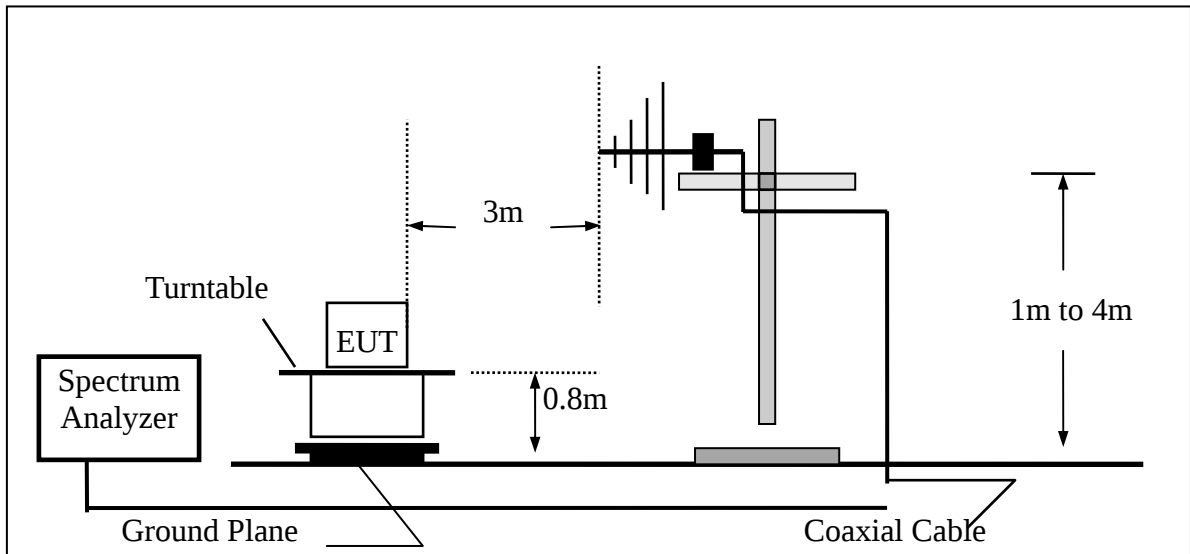
MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2006
Pre-Amplifier	Miteq	NSP4000-NF	870731	01/21/2007
Horn Antenna	Austriah	BBHA9120D	D267	09/20/2006
Turn Table	CT	CT123	4162	N.C.R
Antenna Tower	CT	CTERG23	3253	N.C.R
Controller	CT	CT100	95635	N.C.R
Coax Switch	Anitsu	MP 598	M 80094	N/A
Site NSA	CCS Lab.	N/A	N/A	12/11/2006

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration

Radiated Emission Test Setup (for frequency below 1000MHz)



Radiated Emission Test Setup (for frequency over 1 GHz)

TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable is rotated for 360 degrees to determine the orientation for generating the maximum emission level.
3. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure is performed on the six highest emissions to ensure EUT compliance.
5. Then, each emission is to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

6. Repeat the above procedure until all channels are recorded.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

Factor Calculation

The Factor is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$F = AF + CL - AG$$

Where F = Factor

E = Field Strength in Volts / meter

AF = Antenna factor

CL = Cable attenuation factor (cable loss)

AG = Amplifier gain

EIRP Calculation

Given $E = \frac{\sqrt{(30 \times P \times G)}}{d}$

Where E = Field strength (Volts/Meter)

P = Power (Watts)

G = Numeric antenna gain

d = Distance (Meter)

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields

$$P \times G = \frac{(d \times E)^2}{30}$$

Re-arranging the terms yields

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

Converting to the logarithmic form and changing to units of mW and $\mu\text{V/m}$, using

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and } E \text{ (uV/m)} = E \text{ (V/m)} / 1000000$$

Yields

$$10 \log(P \times G) = 10 \log d^2 + 10 \log E^2 - 10 \log 30 - 10 \log 10^9 = 20 \log d + 20 \log E - 104.77$$

Where $10 \log (P * G)$ is PG in dBm and $20 \log (E)$ is E in dBuV/m

Since

$$EIRP = P * G$$

Then, at a specification distance of 3 meters, the EIRP, in terms of field strength, is

$$EIRP \text{ (dBm)} = P * G \text{ (dBm)} = E \text{ (dBuV/m)} - 95.2$$



Band-edge Radiated Emissions

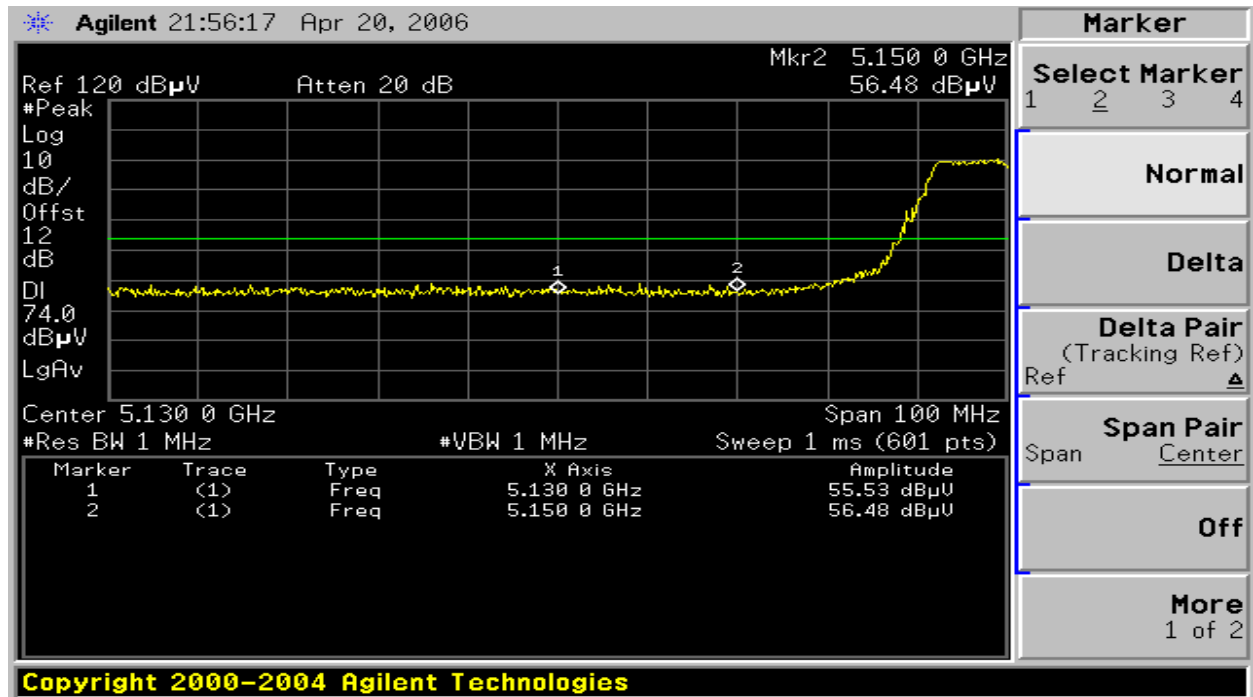
TEST RESULTS

No non-compliance noted

Band Edges (802.11a/ CH Low)

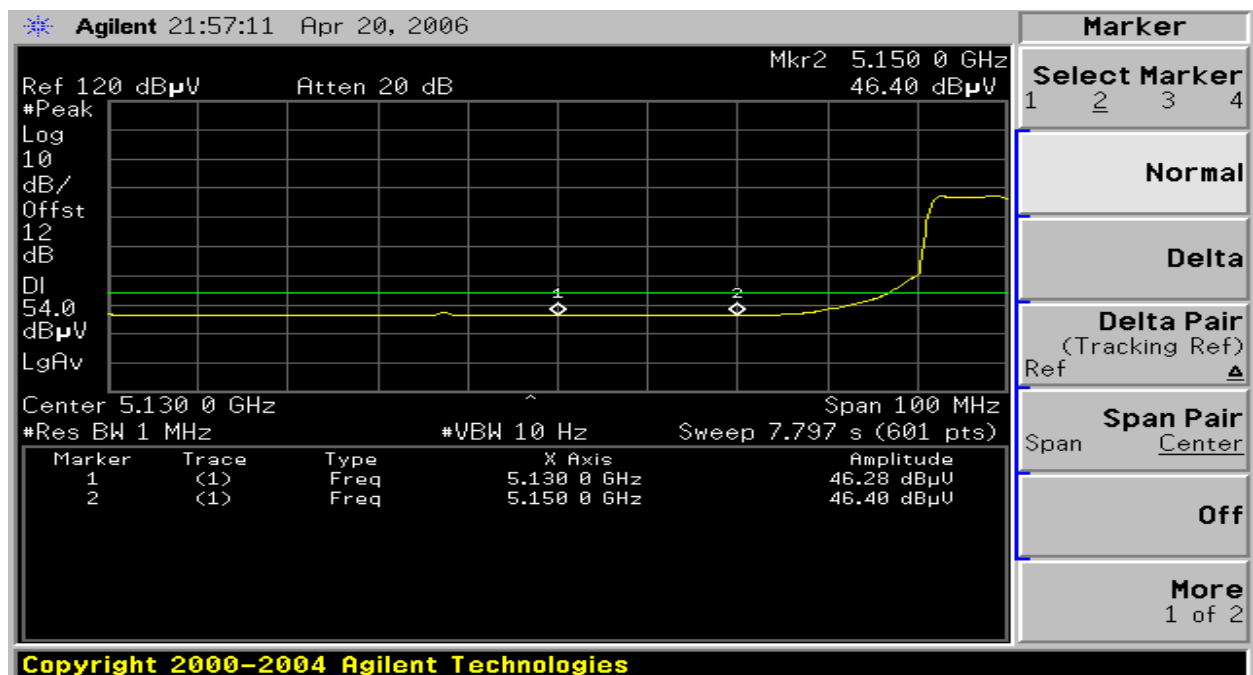
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

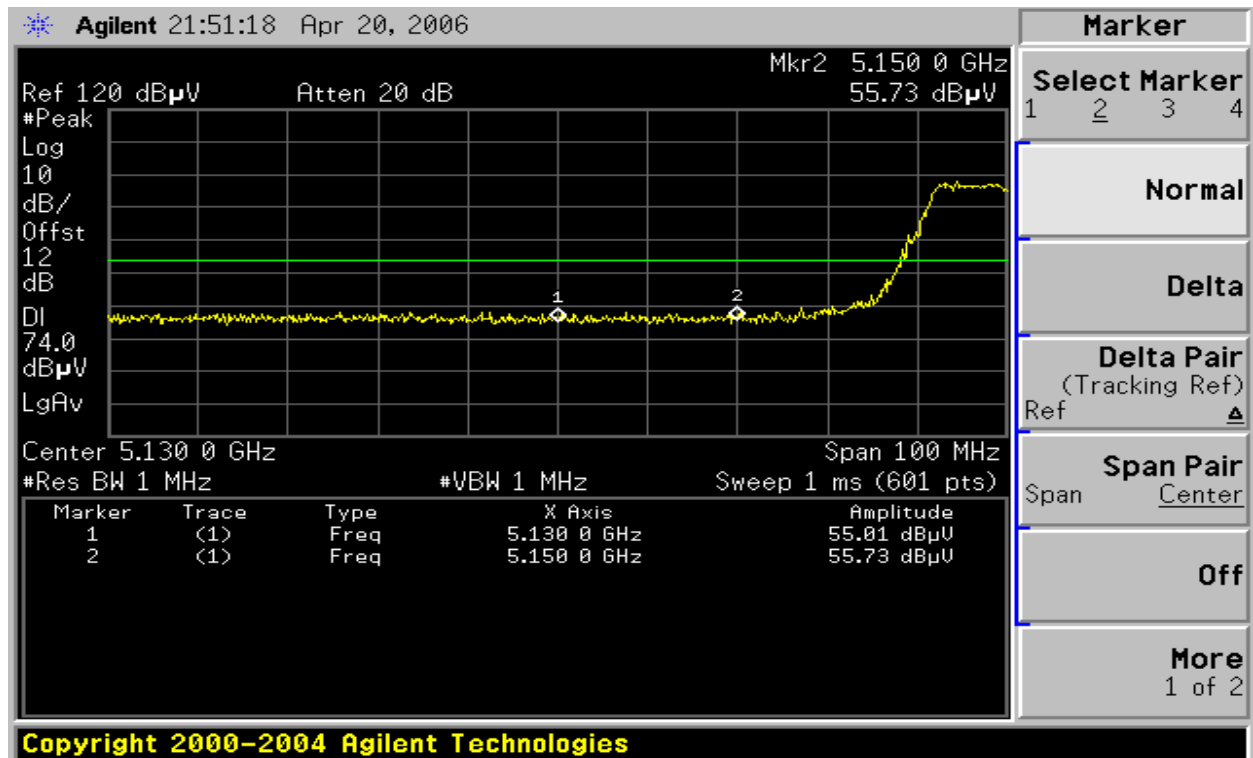
Polarity: Vertical





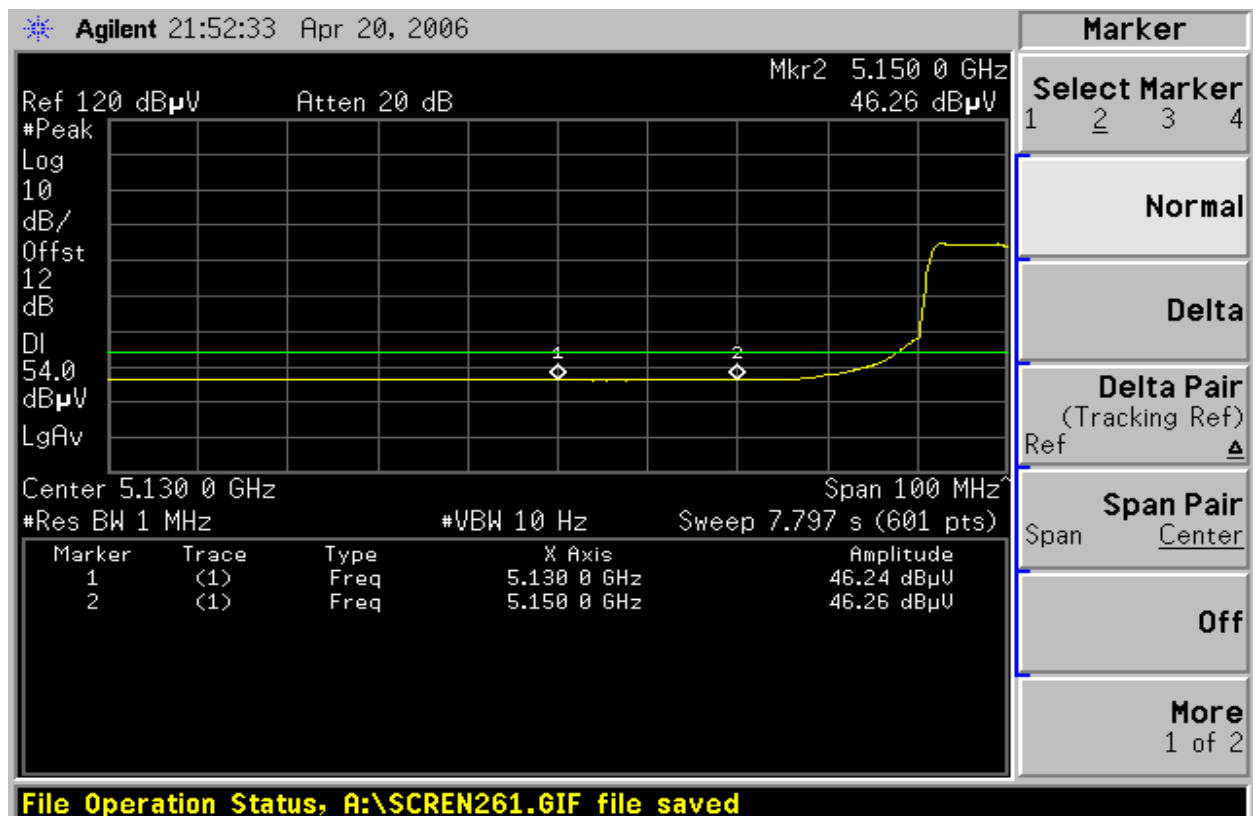
Detector mode: Peak

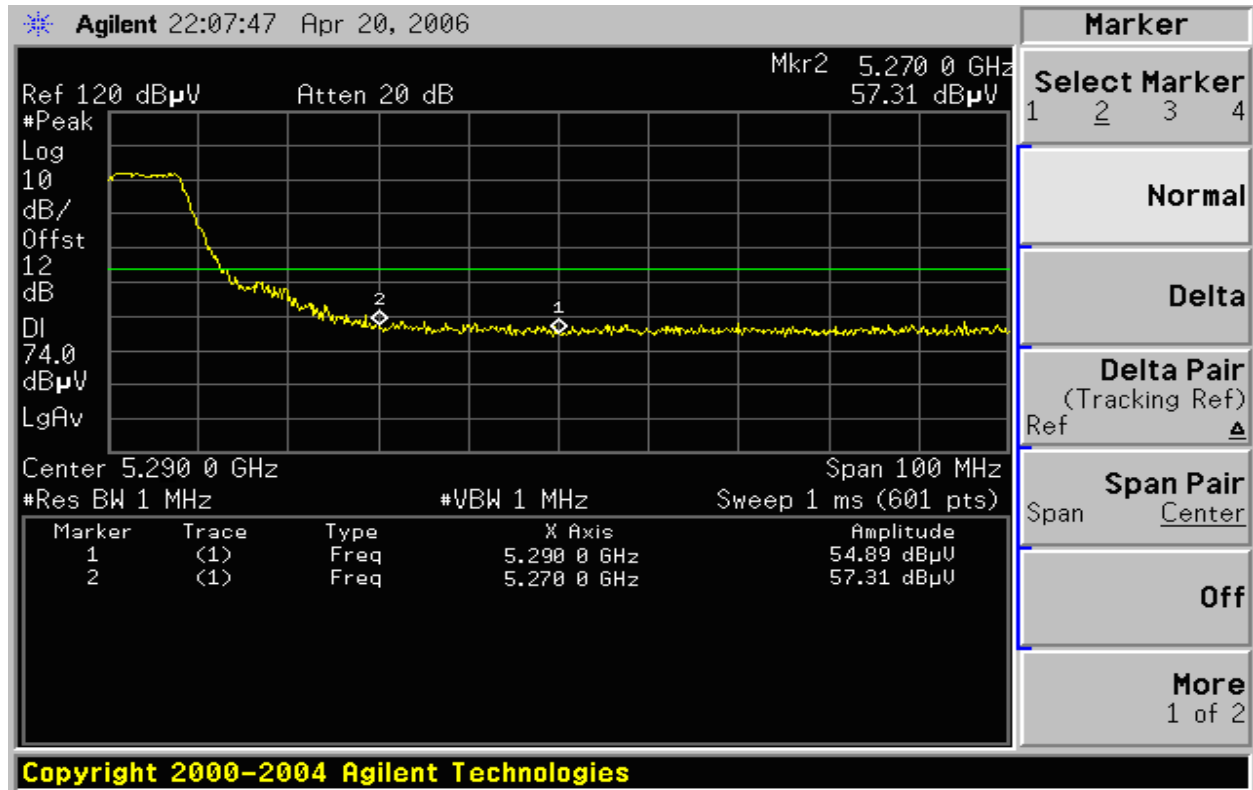
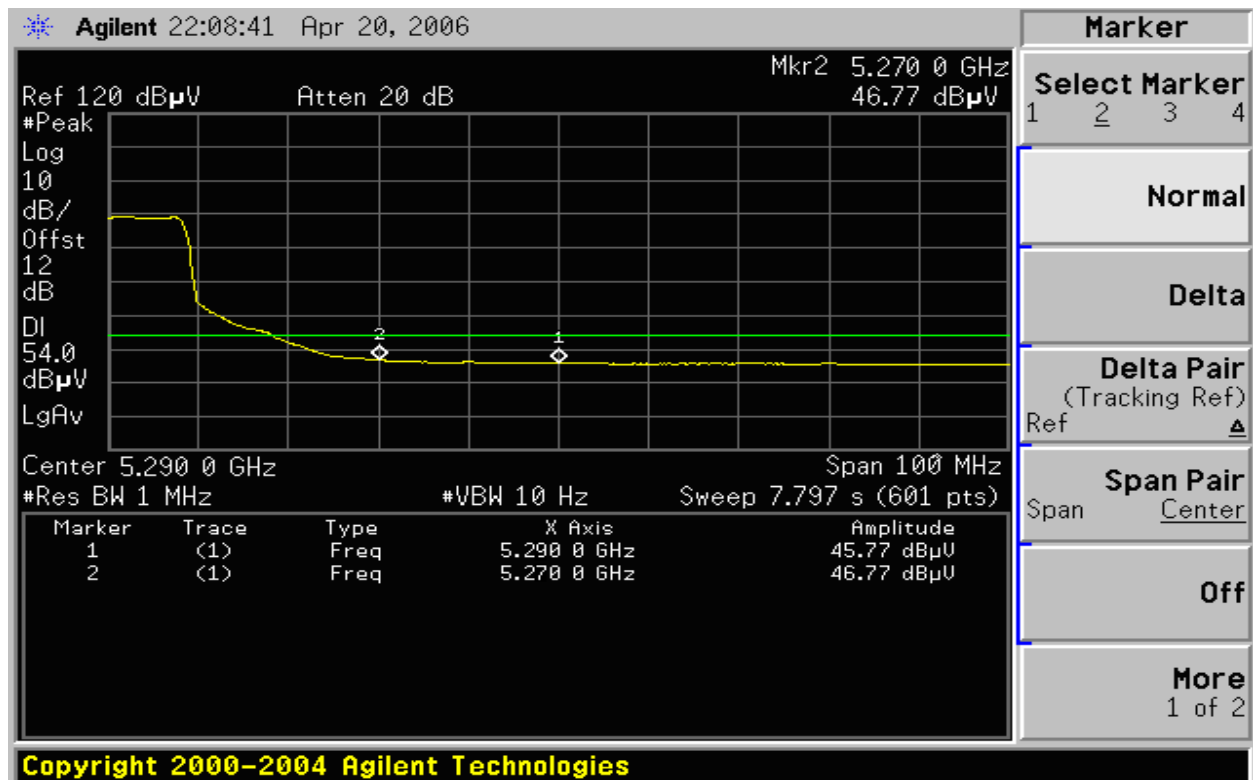
Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



Band Edges (802.11a / CH High)
Detector mode: Peak
Polarity: Vertical

Detector mode: Average
Polarity: Vertical




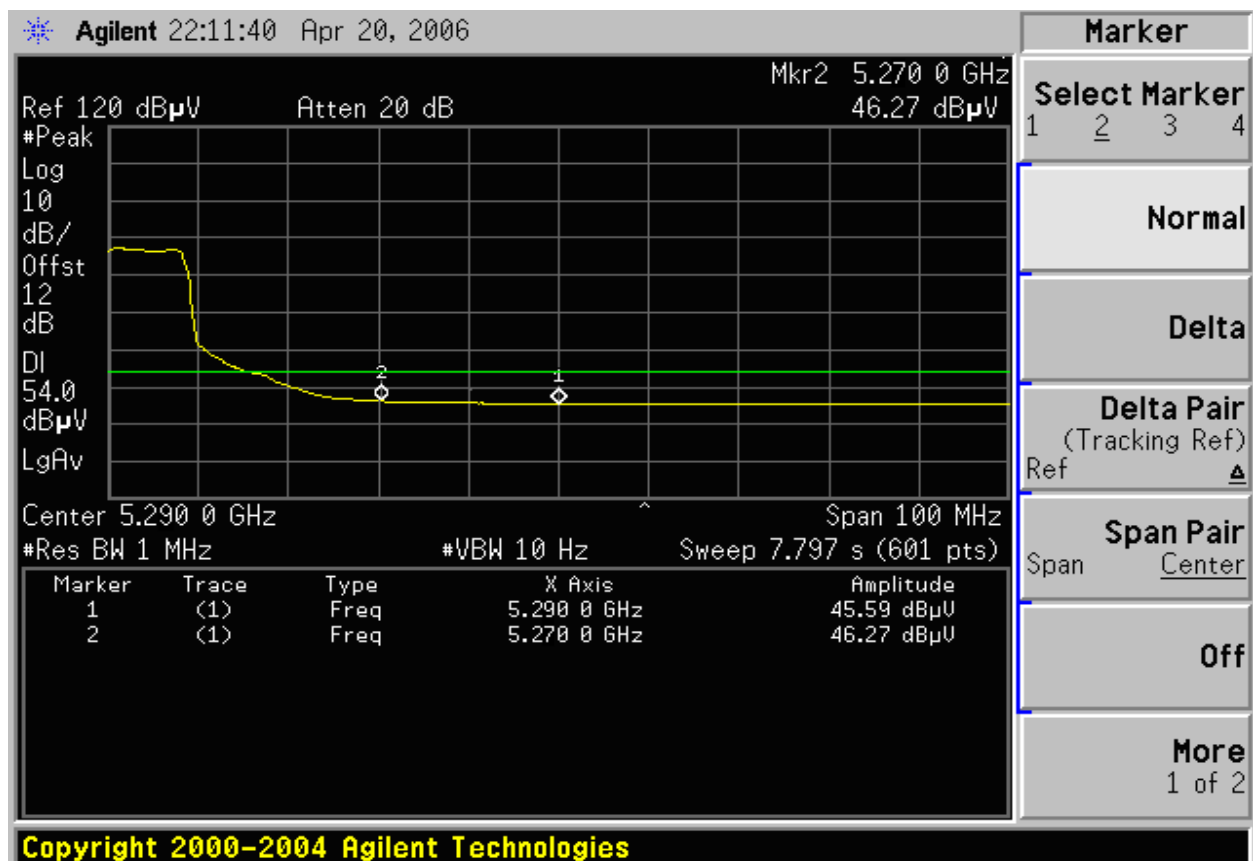
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



**Harmonic and Spurious Radiated Emission****TEST RESULTS****Below 1 GHz****Operation Mode:** TX / IEEE 802.11a / CH Low**Test Date:** April 19, 2006**Temperature:** 20°C**Tested by:** lin**Humidity:** 70 % RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
75.69	V	Peak	35.98	-5.59	30.39	40.00	-9.61
142.57	V	Peak	32.02	-1.73	30.29	43.50	-13.21
323.85	V	Peak	31.52	-2.29	29.23	46.00	-16.77
431.86	V	Peak	29.58	3.35	32.93	46.00	-13.07
649.29	V	Peak	30.02	7.35	37.37	46.00	-8.63
985.97	V	Peak	20.18	13.87	34.05	54.00	-19.95
77.46	H	Peak	35.69	-6.27	29.42	40.00	-10.58
152.83	H	Peak	31.25	-3.31	27.94	43.50	-15.56
323.85	H	Peak	36.02	-7.29	28.73	46.00	-17.27
431.83	H	Peak	36.14	-2.17	33.97	46.00	-12.03
649.29	H	Peak	29.68	5.74	35.42	46.00	-10.58
865.33	H	Peak	25.36	6.10	31.46	46.00	-14.54

Notes:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.
5. EIRP Limit = -27dBm = 68.2dBuV/m,

**Operation Mode:** TX / IEEE 802.11a / CH Mid**Test Date:** April 19, 2006**Temperature:** 20°C**Tested by:** lin**Humidity:** 70 % RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
79.25	V	Peak	39.35	-5.71	33.64	40.00	-6.36
156.36	V	Peak	36.95	-1.27	35.68	43.50	-7.82
323.85	V	Peak	35.25	-2.29	32.96	46.00	-13.04
539.88	V	Peak	34.96	3.16	38.12	46.00	-7.88
649.29	V	Peak	26.96	7.35	34.31	46.00	-11.69
757.31	V	Peak	25.02	8.82	33.84	46.00	-12.16
84.65	H	Peak	32.2	-7.25	24.95	40.00	-15.05
182.04	H	Peak	29.68	-4.96	24.72	43.50	-18.78
323.85	H	Peak	37.23	-7.29	29.94	46.00	-16.06
539.88	H	Peak	33.05	2.16	35.21	46.00	-10.79
649.29	H	Peak	30.25	5.74	35.99	46.00	-10.01
865.33	H	Peak	29.67	6.10	35.77	46.00	-10.23

Notes:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.
5. EIRP Limit = -27dBm = 68.2dBuV/m

**Operation Mode:** TX / IEEE 802.11a / CH High**Test Date:** April 19, 2006**Temperature:** 20°C**Tested by:** lin**Humidity:** 70 % RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
100.21	V	Peak	35.69	-4.71	30.98	43.50	-12.52
154.99	V	Peak	32.05	-1.29	30.76	43.50	-12.74
323.85	V	Peak	37.25	-2.29	34.96	46.00	-11.04
539.88	V	Peak	34.69	3.16	37.85	46.00	-8.15
701.2	V	Peak	29.36	6.24	35.6	46.00	-10.4
977.55	V	Peak	20.56	13.31	33.87	54.00	-20.13
77.62	H	Peak	34.78	-6.27	28.51	40.00	-11.49
159.32	H	Peak	32.86	-3.26	29.6	43.50	-13.9
252.93	H	Peak	40.25	-8.80	31.45	46.00	-14.55
323.85	H	Peak	39.65	-7.29	32.36	46.00	-13.64
539.88	H	Peak	37.73	-2.17	35.56	46.00	-10.44
757.31	H	Peak	30.14	2.82	32.96	46.00	-13.04

Notes:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.

5. EIRP Limit = -27dBm = 68.2dBuV/m

Above 1 GHz

Operation Mode: TX / IEEE 802.11a / CH Low

Test Date: April 19, 2006

Temperature: 23°C

Tested by: lin

Humidity: 56 % RH

Polarity: Ver. / Hor.

[illegible]

Notes:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
 - a. *Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.*
 - b. *AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

5. EIRP Limit=-27dBm=68.2dBuV/m

Operation Mode: TX / IEEE 802.11a / CH Mid

Test Date: April 19, 2006

Temperature: 20°C

Tested by: lin

Humidity: 70 % RH

Polarity: Ver. / Hor.

[illegible]

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
 - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.
5. EIRP Limit=-27dBm=68.2dBuV/m

Operation Mode: TX / IEEE 802.11a / CH High

Test Date: April 19, 2006

Temperature: 20°C

Tested by: lin

Humidity: 70 % RH

Polarity: Ver. / Hor.

[illegible]

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
 - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.
5. EIRP Limit=-27dBm=68.2dBuV/m

7.4 PEAK POWER SPECTRAL DENSITY (15.407)

LIMIT

- For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50mW or $4\text{dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4dBm in any 1MHz band.
- For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250mW or $11\text{dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11dBm in any 1MHz band.

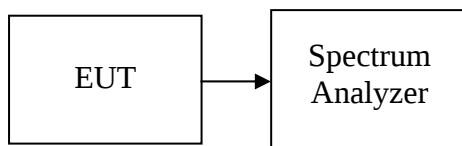
If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2006
Low-Loss RF Cable	Huber + Suhner	Sucoflex 104	N/A	N/A

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE

The test is performed in accordance with <FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices> – Part 15, Subpart E, August 2002, Method 2.

- Place the EUT on the table and set it in transmitting mode.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
- Set RBW = 1MHz, VBW = 3MHz, Span = 30MHz, Sweep time = Auto.
- Record the maximum reading.
- The above procedure is repeated until all the channels are recorded.



TEST RESULTS

No non-compliance noted

Base mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	2.15	4.00	-1.85
Middle	5220	2.81	4.00	-1.19
High	5240	3.05	4.00	-0.95

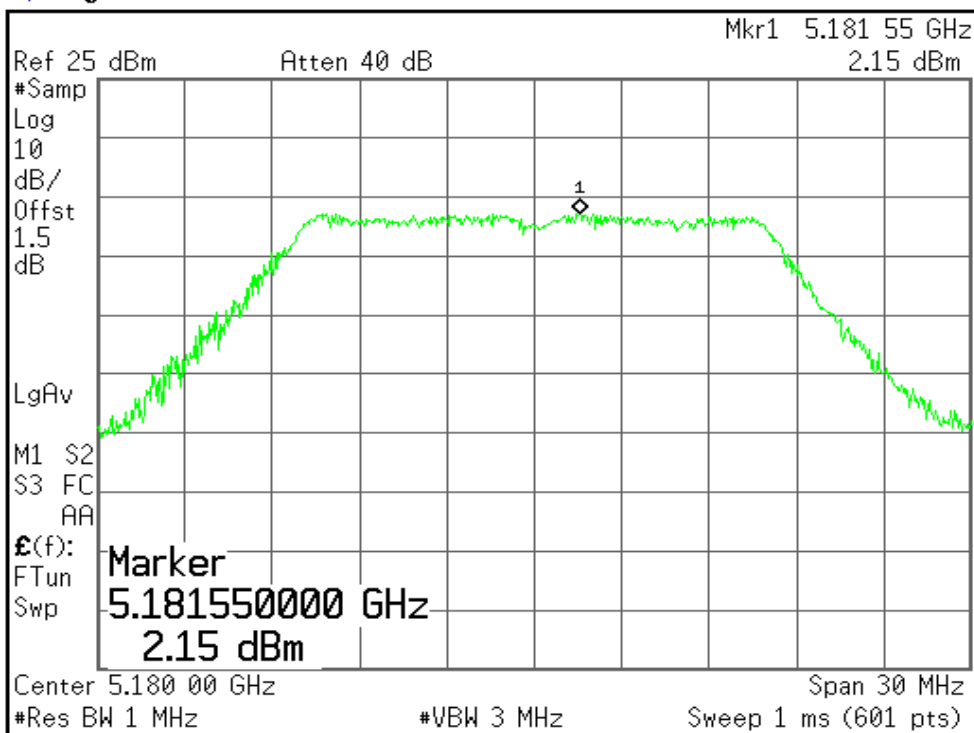
(Note: Maximum antenna gain = 3.13 dBi, therefore there is no reduction due to antenna gain.)

Test Data Plots

PPSD

CH Low

✱ Agilent 11:37:58 Jun 13, 2006



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

Pk-Pk Search

Mkr → CF

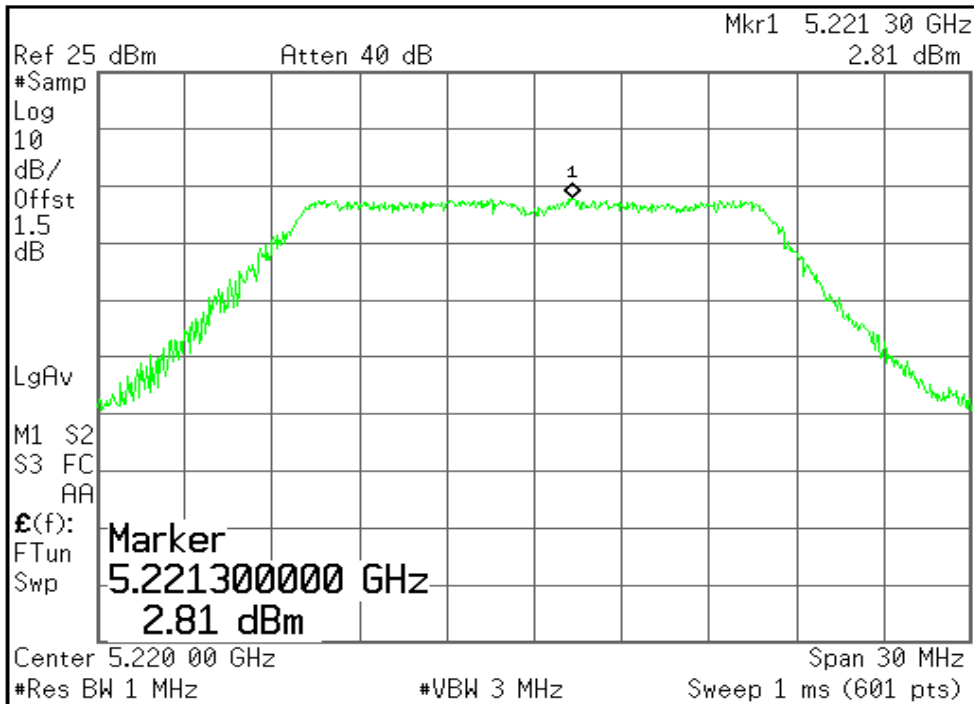
More
1 of 2

File Operation Status, A:\SCREN333.GIF file saved



CH Mid

Agilent 11:39:21 Jun 13, 2006



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

Pk-Pk Search

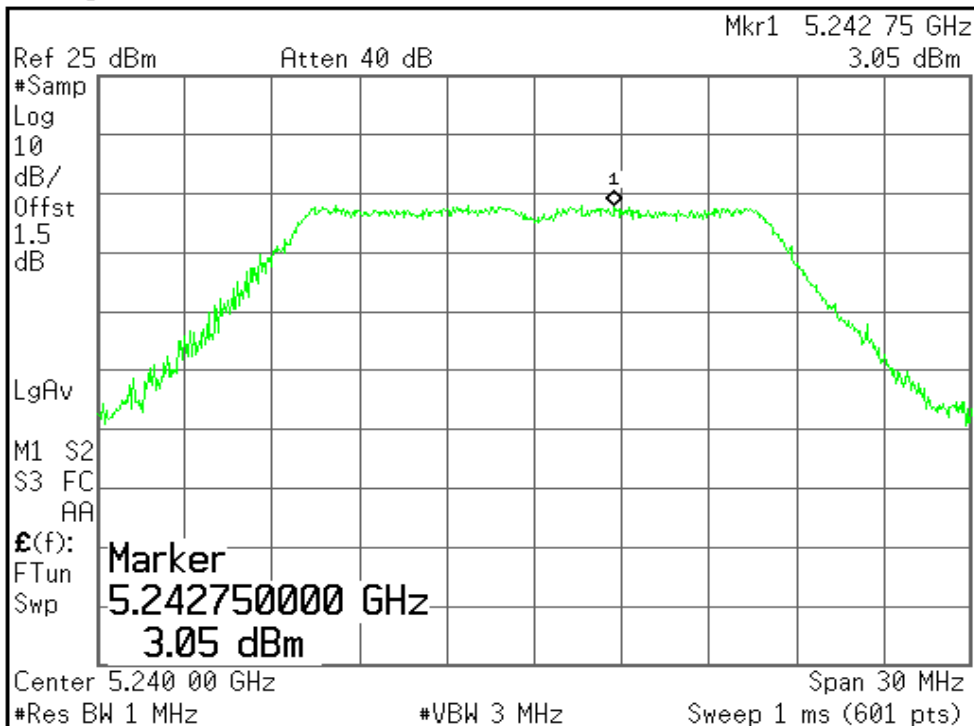
Mkr → CF

More
1 of 2

File Operation Status, A:\SCREN334.GIF file saved

CH High

Agilent 11:45:07 Jun 13, 2006



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

Pk-Pk Search

Mkr → CF

More
1 of 2

Printer not responding



7.5 CONDUCTED UNDESIRABLE EMISSION (15.407)

LIMIT

Transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / MHz. Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

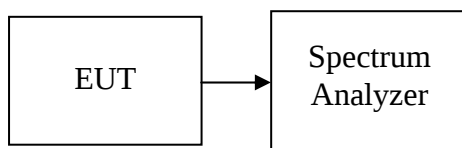
The provisions of §15.205 apply to intentional radiators operating under this section.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2006
Low-Loss RF Cable	Huber + Suhner	Sucoflex 104	N/A	N/A

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

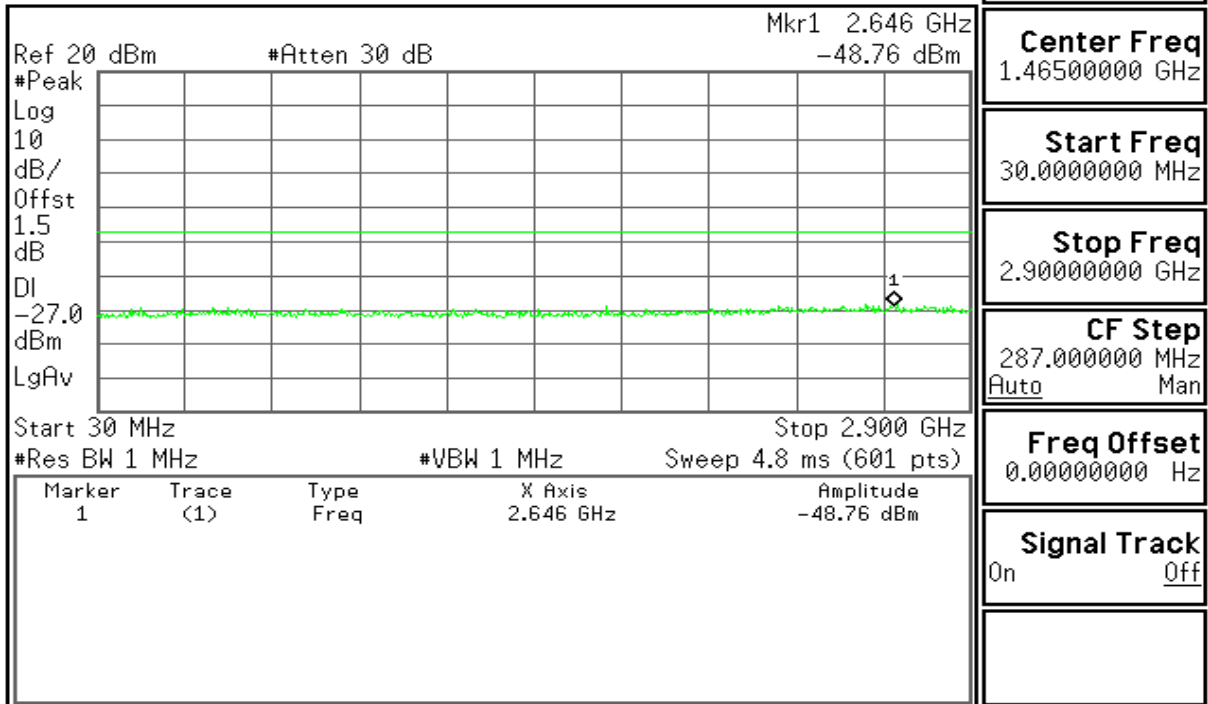
TEST RESULTS

No non-compliance noted

(Note: Maximum antenna gain = 3.13 dBi, therefore there is no reduction due to antenna gain.)

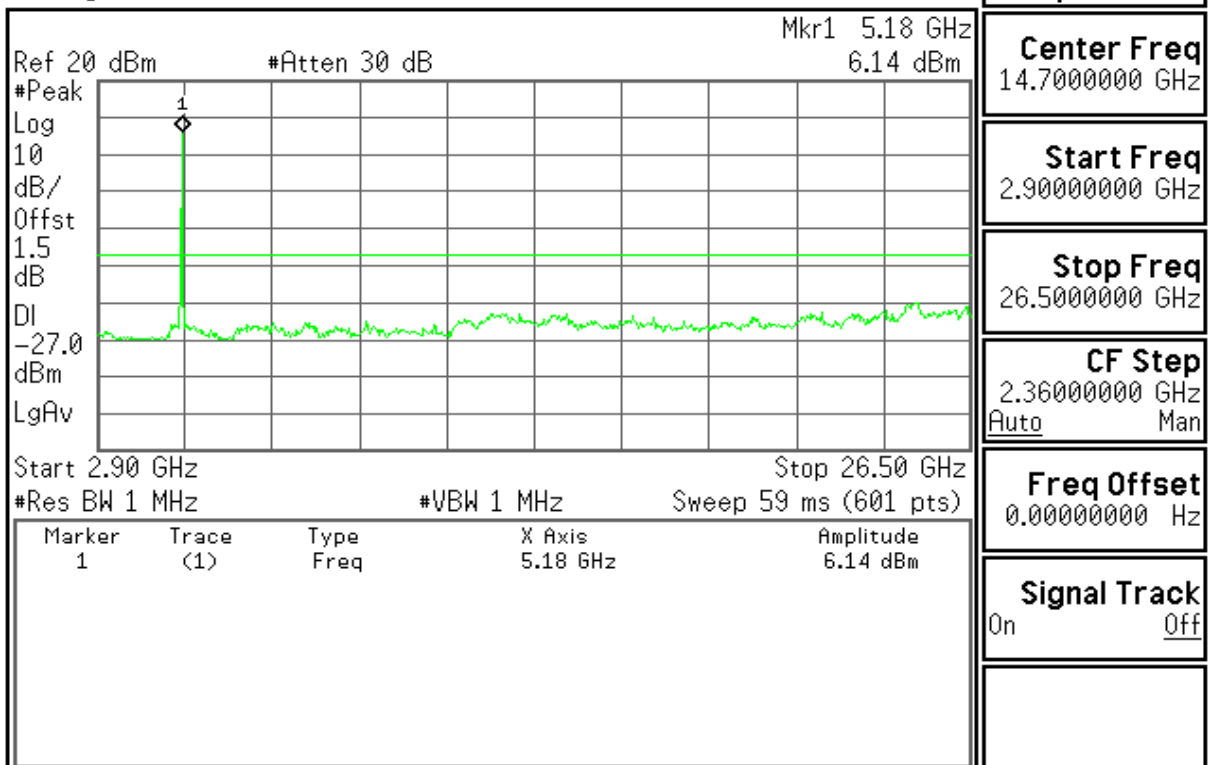
**Test Data Plots****Conducted Spurious Emissions****CH Low**

* Agilent 20:05:38 Apr 25, 2006



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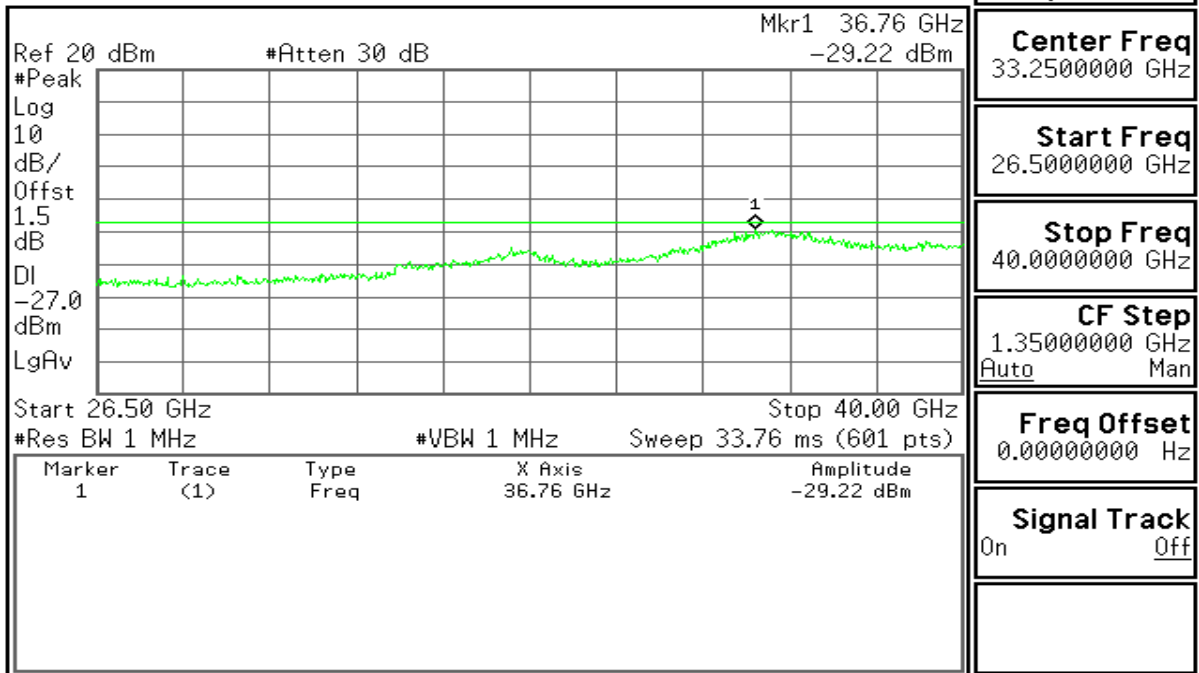
* Agilent 20:06:07 Apr 25, 2006



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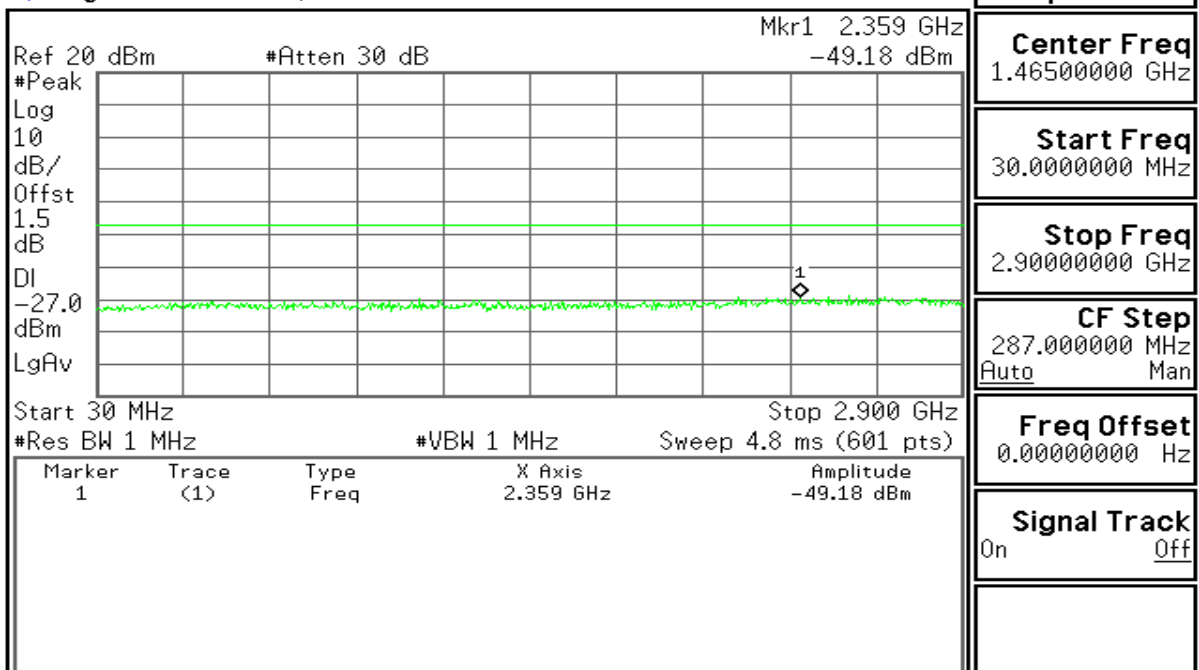
* Agilent 20:06:38 Apr 25, 2006



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CH Mid

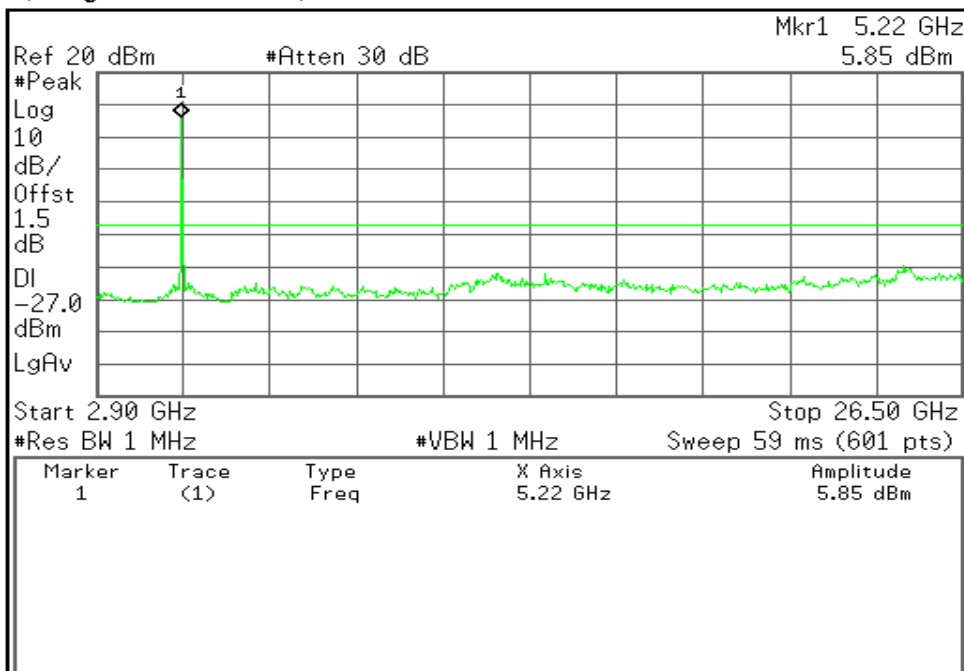
* Agilent 20:08:59 Apr 25, 2006



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* Agilent 20:09:35 Apr 25, 2006

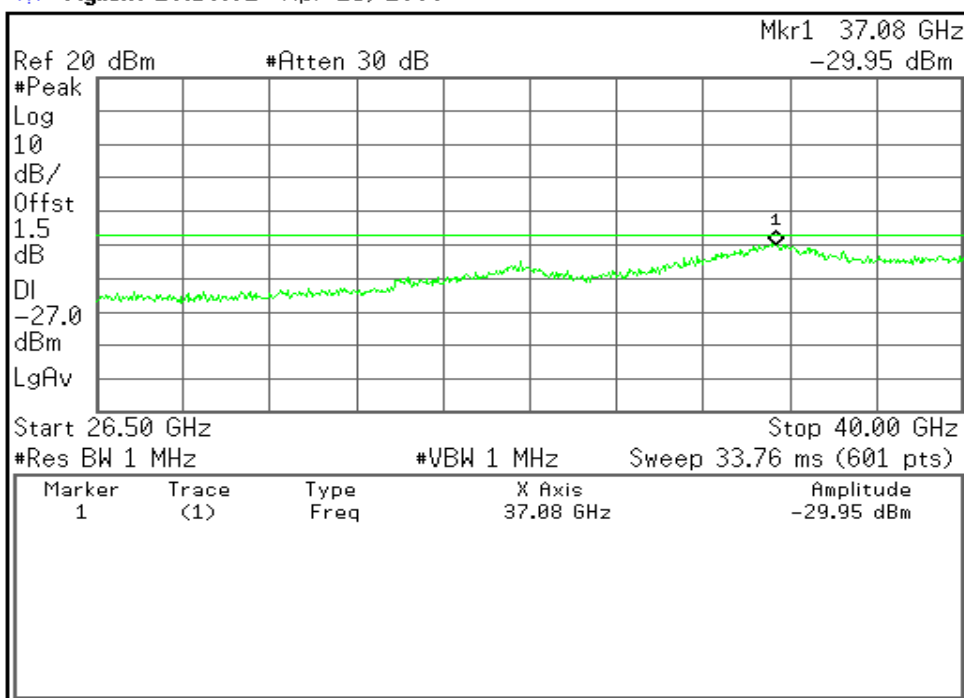


Freq/Channel

Center Freq
14.7000000 GHzStart Freq
2.9000000 GHzStop Freq
26.5000000 GHzCF Step
2.36000000 GHz
Auto ManFreq Offset
0.00000000 HzSignal Track
On Off

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* Agilent 20:10:02 Apr 25, 2006



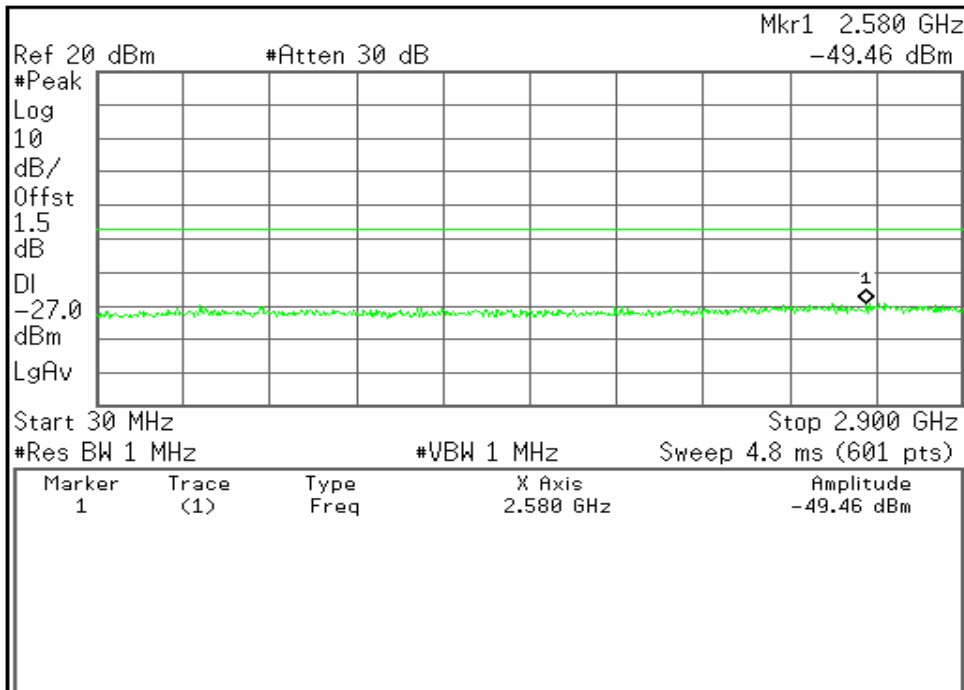
Freq/Channel

Center Freq
33.2500000 GHzStart Freq
26.5000000 GHzStop Freq
40.0000000 GHzCF Step
1.35000000 GHz
Auto ManFreq Offset
0.00000000 HzSignal Track
On Off

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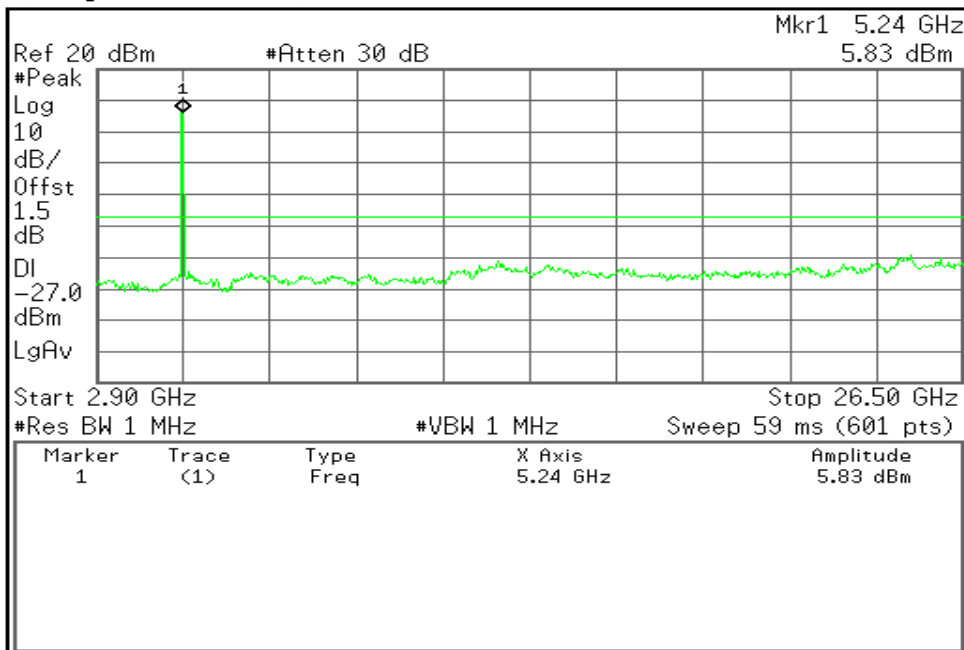
**CH High**

Agilent 20:17:23 Apr 25, 2006

**Freq/Channel****Center Freq**
1.46500000 GHz**Start Freq**
30.0000000 MHz**Stop Freq**
2.90000000 GHz**CF Step**
287.000000 MHz
Auto Man**Freq Offset**
0.00000000 Hz**Signal Track**
On Off

Copyright 2000-2004 Agilent Technologies

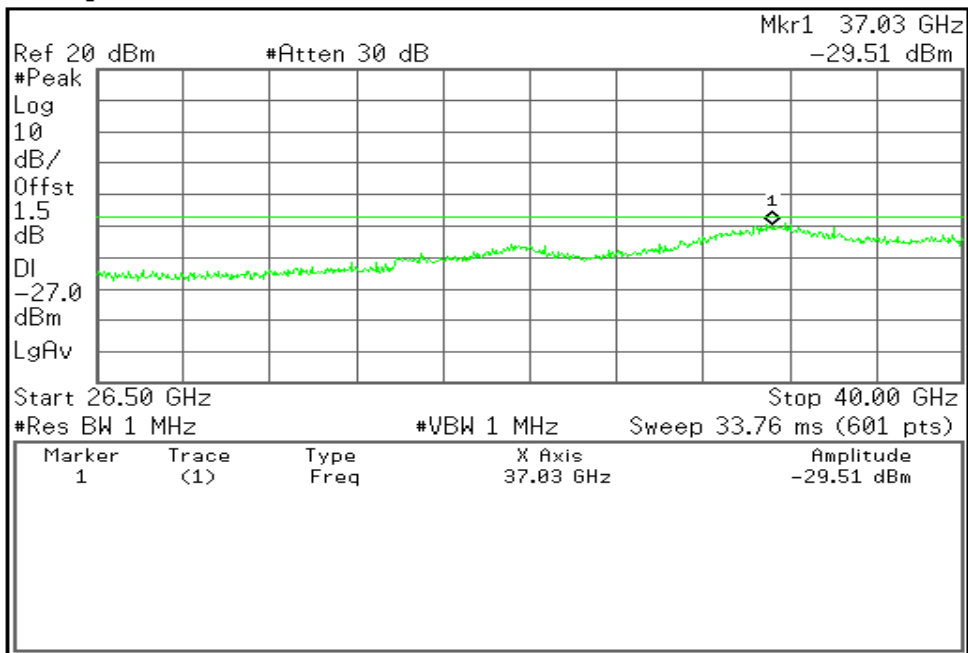
Agilent 20:18:34 Apr 25, 2006

**Freq/Channel****Center Freq**
14.7000000 GHz**Start Freq**
2.90000000 GHz**Stop Freq**
26.5000000 GHz**CF Step**
2.36000000 GHz
Auto Man**Freq Offset**
0.00000000 Hz**Signal Track**
On Off

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Agilent 20:19:14 Apr 25, 2006



Freq/Channel

Center Freq
33.2500000 GHz

Start Freq
26.5000000 GHz

Stop Freq
40.0000000 GHz

CF Step
1.35000000 GHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

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7.6 FREQUENCY STABILITY (15.407)

LIMIT

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Referring to the theory of operation, the crystal used to set the frequency has a temperature coefficient of +/- 20 ppm over the specified rated temperature range. For a transmitter fundamental frequency of 5.24 GHz, this corresponds to +/- 106.4 kHz.

TEST RESULTS

No non-compliance noted

Channel Frequency (MHz)	Measured Frequency (MHz)	Delta Frequency (kHz)	20 ppm Limit ($\pm$ kHz)	Margin (kHz)
5240	5319.974	-26.00	106.40	-80.40

Note: An examination of the band-edge plots shows that the emission will stay within the authorized band over the entire temperature range.

7.7 26 DB EMISSION BANDWIDTH (15.407)

LIMIT

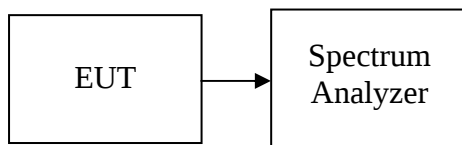
For purposes of this subpart, the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2006
Low-Loss RF Cable	Huber + Suhner	Sucoflex 104	N/A	N/A

Remark: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE

- 1.Place the EUT on the table and set it in the transmitting mode.
- 2.Remove the antenna from the EUT and then connect a low-loss RF cable from the antenna port to the spectrum analyzer.
- 3.Set the spectrum analyzer as RBW = 1%EBW, VBW = RBW, Span = 50MHz / 100MHz (Turbo Mode), and Sweep = auto.
- 4.Mark the peak frequency and -26dBc (upper and lower) frequency.
- 5.Repeat until all the rest channels were investigated.



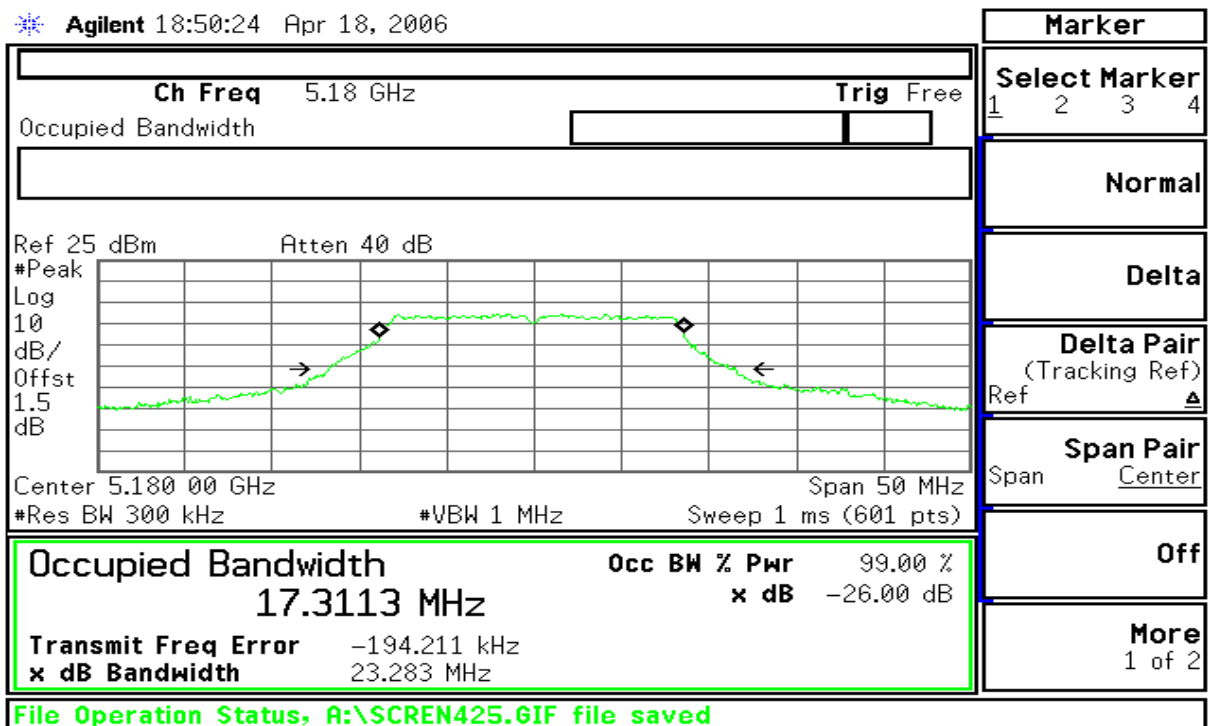
TEST RESULTS

No non-compliance noted

Channel	Frequency (MHz)	Bandwidth (kHz)	PASS/FAIL
Low	5180	17311	PASS
Middle	5260	17258	PASS
High	5320	17249	PASS

TEST DATA PLOTS

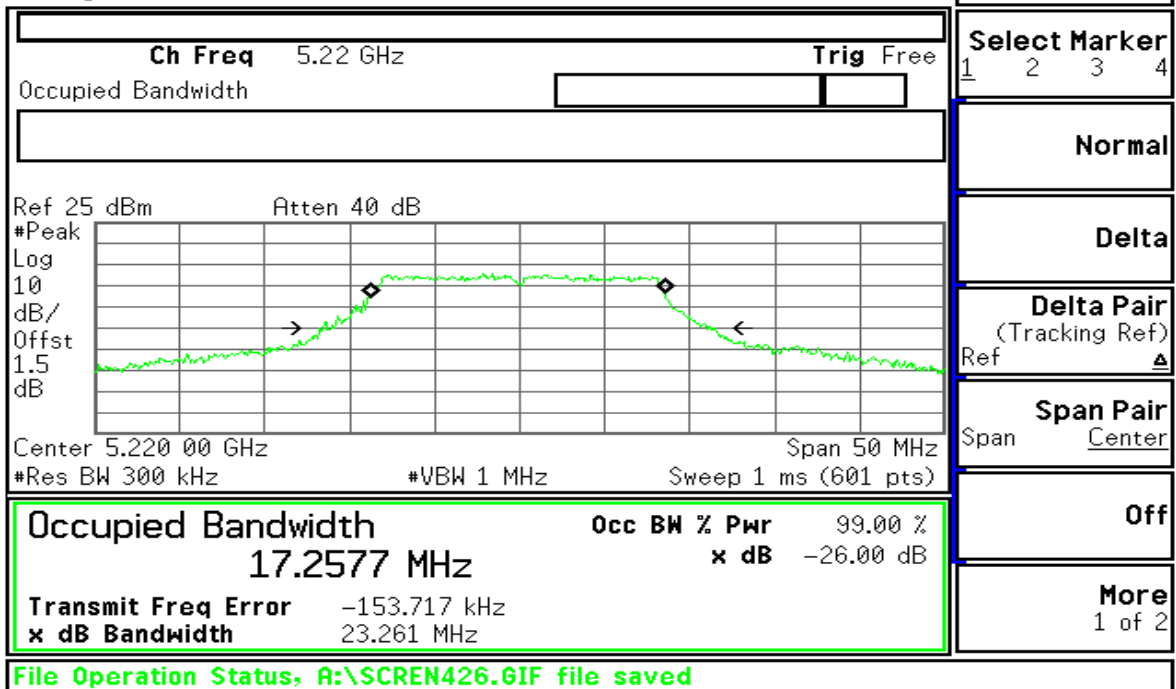
CH Low





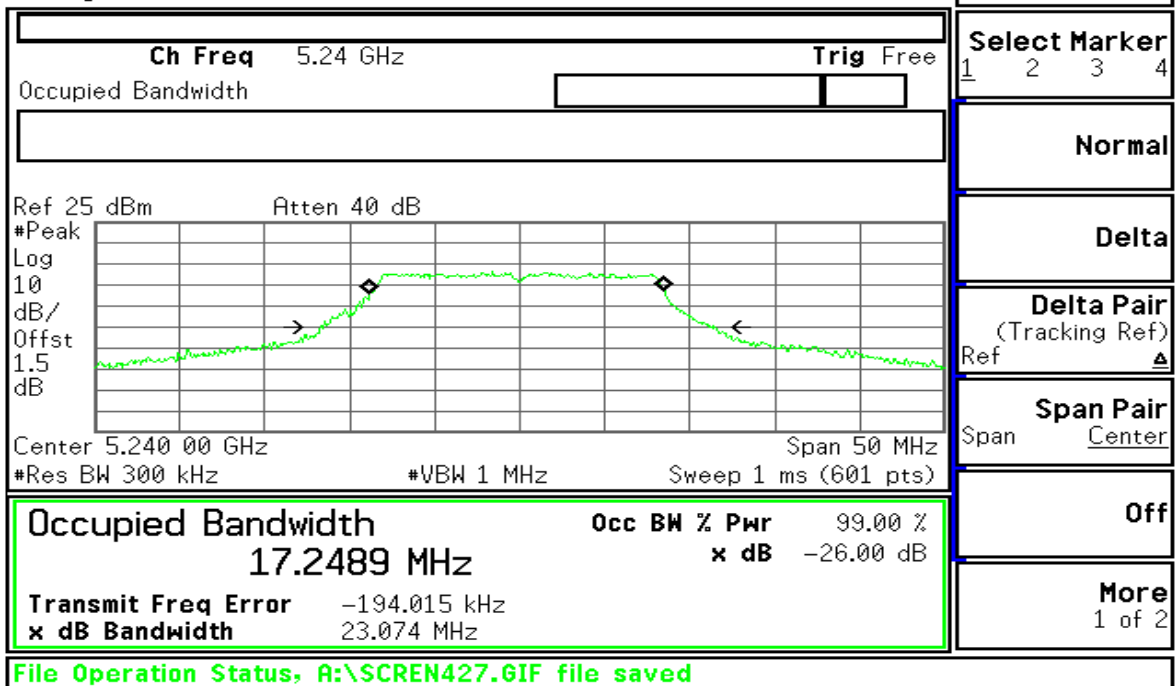
CH Mid

* Agilent 18:51:24 Apr 18, 2006



CH High

* Agilent 18:52:48 Apr 18, 2006





7.8 PEAK EXCURSION (15.407)

LIMIT

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

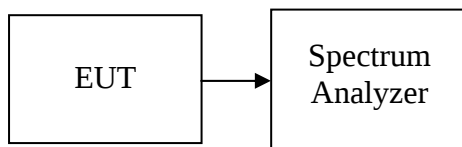
MEASUREMENT EQUIPMENT USED

Remark

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2006
Low-Loss RF Cable	Huber + Suhner	Sucoflex 104	N/A	N/A

: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE

The test is performed in accordance with <FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices> – Part 15, Subpart E, August 2002.

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
3. Trace A, Set RBW = 1MHz, VBW = 3MHz, Span = 50MHz, Max. hold.
4. Trace B, Set RBW = 1MHz, VBW = 30kHz, Span = 50MHz, Max. hold.
5. Delta Mark trace A Maximum frequency and trace B same frequency.
6. Repeat the above procedure until measurements for all frequencies were complete.

TEST RESULTS

No non-compliance noted



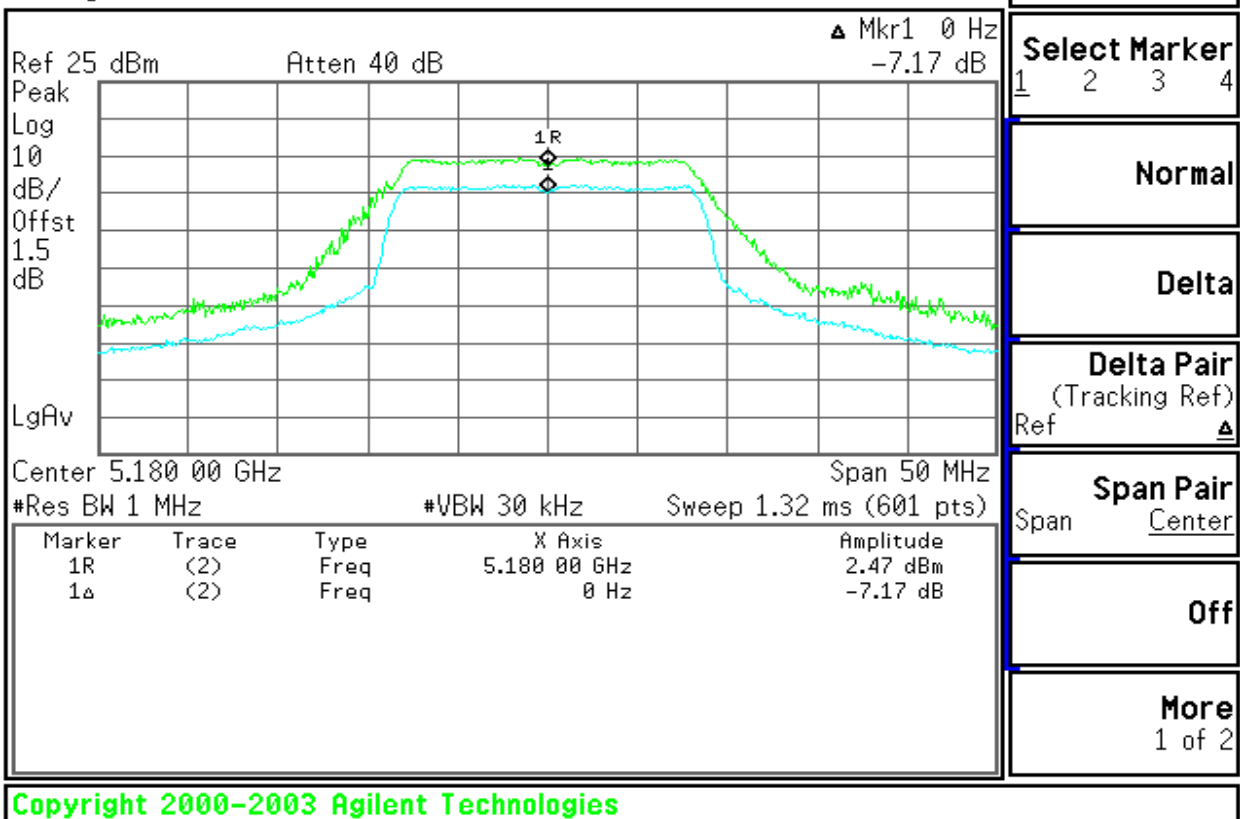
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	7.17	13	-5.83
Middle	5220	6.66		-6.34
High	5240	7.06		-5.94

(Note: Maximum antenna gain = 3.13 dBi, therefore there is no reduction due to antenna gain.)

Test Data Plots

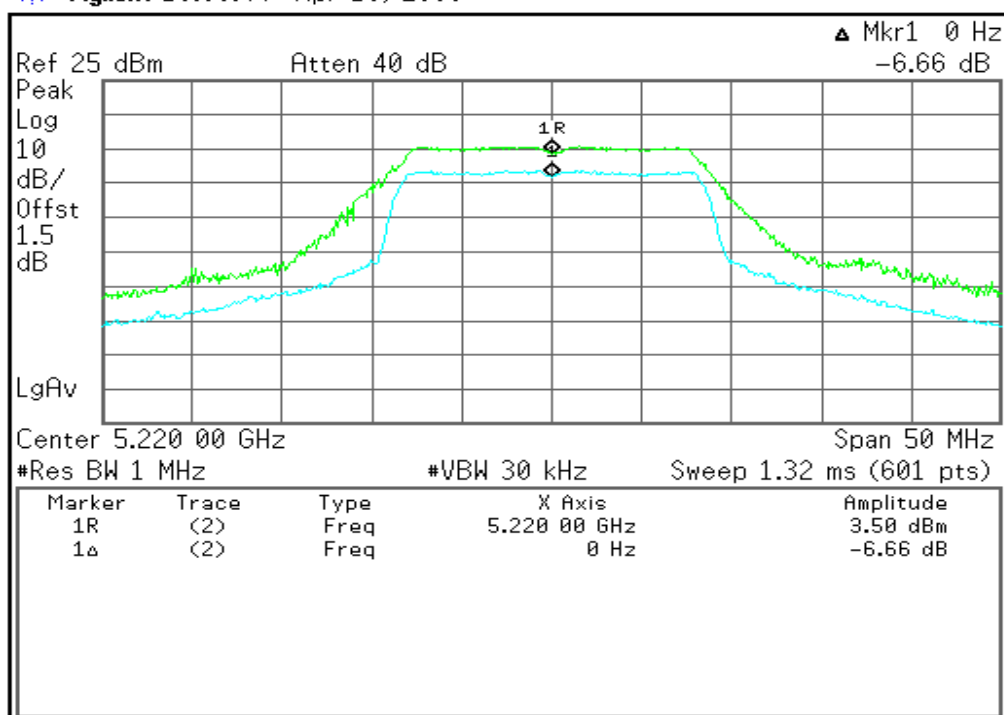
Peak Excursion

Agilent 19:10:19 Apr 18, 2006





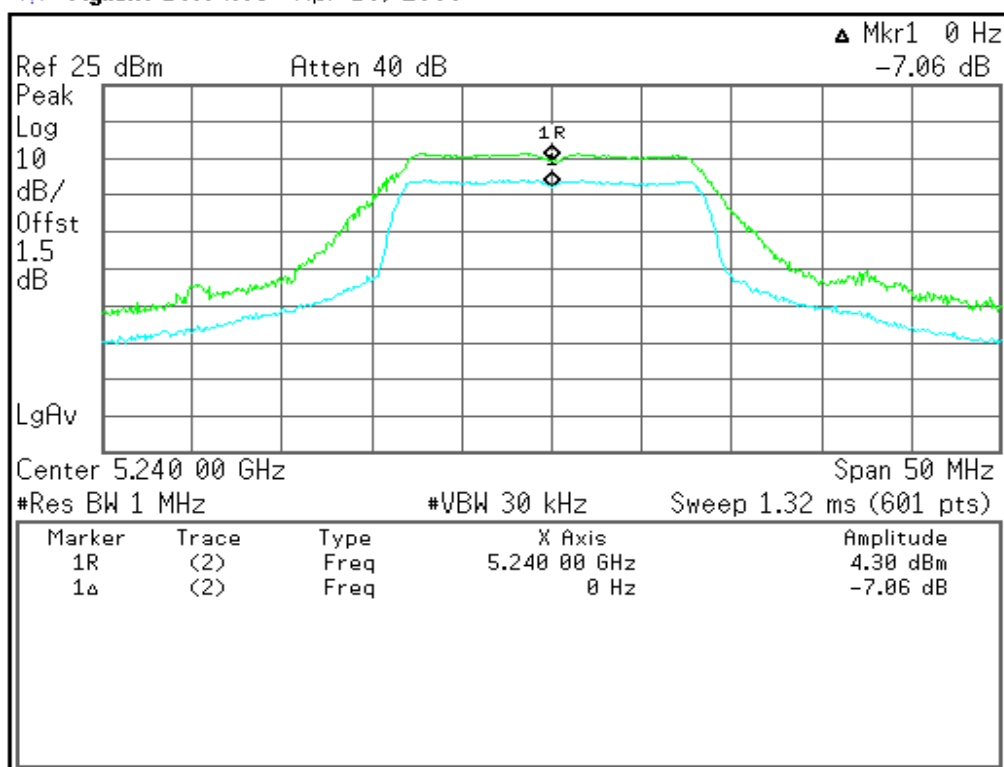
* Agilent 19:06:44 Apr 18, 2006



Marker
Select Marker 1 2 3 4
Normal
Delta
Delta Pair (Tracking Ref) Ref Δ
Span Pair Span Center
Off
More 1 of 2

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* Agilent 19:04:03 Apr 18, 2006



Marker
Select Marker 1 2 3 4
Normal
Delta
Delta Pair (Tracking Ref) Ref Δ
Span Pair Span Center
Off
More 1 of 2

Unable to save file

7.9 POWERLINE CONDUCTED EMISSION (15.407)

LIMIT

For an intentional radiator, which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band of 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range of 0.15 MHz to 0.50 MHz). The limits at a specific frequency range is listed as follows:

Frequency Range (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

MEASUREMENT EQUIPMENT USED

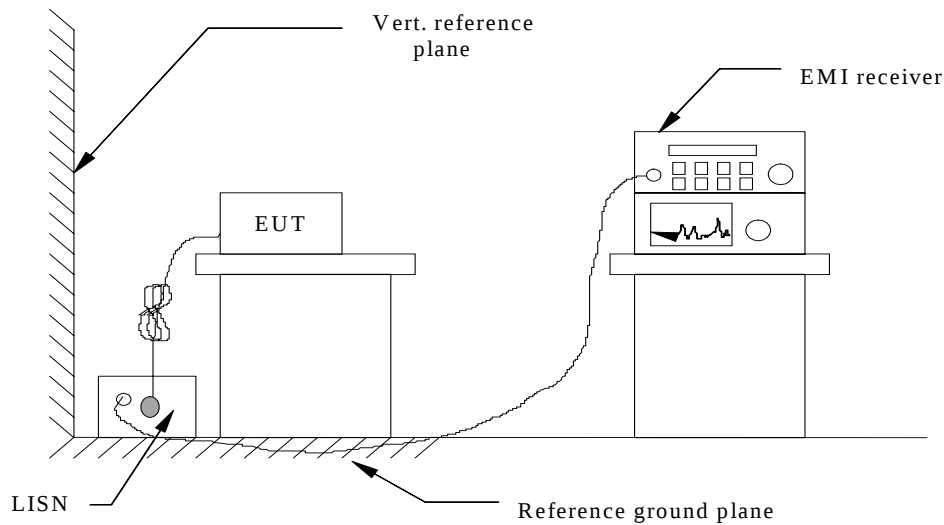
Conducted Emission Test Site A (10m chamber)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESI26	100068	01/21/2007
EMC Analyzer	Agilent	E7402A	US41160329	01/21/2007
LISN	FCC	FCC-LISN-50-50-2-M	01067	N/A
LISN (EUT)	FCC	FCC-LISN-50-50-2-M	01068	07/29/2006
FOUR BALANCED TELECOM PAIRS ISN	FCC	FCC-TLISN-T8-02	20165	08/30/2006
4-WIRE ISN	R&S	ENY41	830663/024	08/30/2006
Double 2-Wire ISN	R&S	ENY22	830661/027	08/30/2006
TRANSIENT LIMITER	SCHAFFNER	CFL9206	1710	05/19/2007
EMI Monitor control box	FCC	0-SVDC	N/A	N/A

Remark: Each piece of equipment is scheduled for calibration once a year.

TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 8.4.3 and EN 55022:1998 Clause 5 for the measurement methods.

Test Configuration



TEST RESULTS

No non-compliance noted

Test Data

Model: GE2

Test Mode: Mode1

Temperature: 25°C

Humidity: 62% RH

Tested by: meteor

Test Results: Pass

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	PEAK. Raw (dBuV)	Q.P. Raw (dBuV)	AVG Raw (dBuV)	Q.P. Limit (dBuV)	AVG Limit (dBuV)	Margin (dB)	Factor (dB)	Remark
0.215	46.65	40.11	40.22	64.14	54.14	-13.92	10.37	Line
0.280	37.12	19.24	19.75	62.29	52.29	-32.54	10.39	Line
0.360	34.98	29.28	29.90	60.00	50.00	-20.10	10.41	Line
0.565	37.98	19.43	19.67	56.00	46.00	-26.33	10.40	Line
0.645	36.62	33.92	33.88	56.00	46.00	-12.12	10.41	Line
18.210	36.87	14.58	15.67	60.00	50.00	-34.33	12.08	Line
0.215	51.77	37.53	37.47	64.14	54.14	-16.67	10.37	Neutral
0.280	46.13	25.04	26.57	62.29	52.29	-25.72	10.39	Neutral
0.350	39.27	16.64	17.28	60.29	50.29	-33.01	10.41	Neutral
0.430	35.29	22.33	22.16	58.00	48.00	-25.84	10.41	Neutral
0.560	38.02	20.44	20.48	56.00	46.00	-25.52	10.40	Neutral
0.645	37.76	30.70	30.98	60.00	50.00	-19.02	10.41	Neutral



Remark:

1. The measuring frequencies range between 0.15 MHz and 30 MHz.
2. The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.
3. “---” denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.
4. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.

Note:

Freq. = Emission frequency in KHz

Factor (dB) = cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER (The TRANSIENT LIMITER included 10 dB ATTENUATION)

Amptd dBuV = Uncorrected Analyzer/Receiver reading + cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER,
if it > 0.5 dB

Limit dBuV = Limit stated in standard

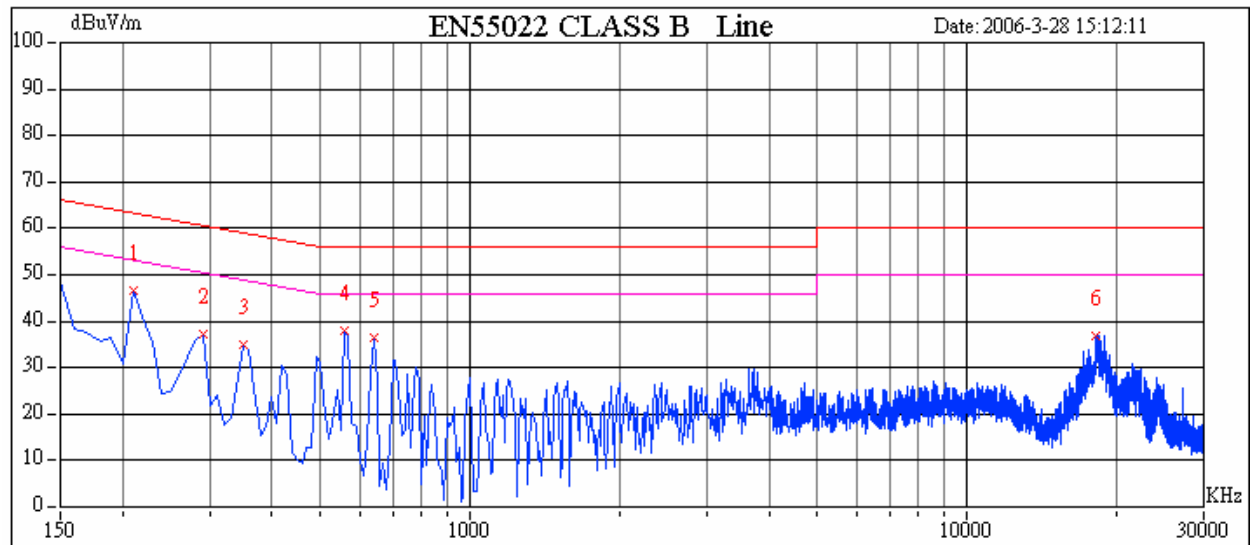
Margin dB = Reading in reference to limit

Calculation Formula

Margin (dB) = *Amptd (dBuV)* – *Limit (dBuV)*

Test Plot

Conducted emissions (Line 1)



Test Plot

Conducted emissions (Line 2)

