



FCC CFR47 PART 15 SUBPART B

DECLARATION OF CONFORMITY TEST REPORT

FOR

2X3 ACCESS POINT W/ 802.11 a/b/g/n CARD

FCC ID: BCGA1254

MODEL NUMBER: A1254

REPORT NUMBER: 07U11257-16

ISSUE DATE: JANUARY 14, 2008

Prepared for

APPLE, INC.

1 INFINITE LOOP

CUPERTINO, CA 95014, USA

Prepared by

COMPLIANCE CERTIFICATION SERVICES

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NVLAP®

NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	1/14/08	Initial Issue	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA 95014, USA

EUT DESCRIPTION: 2X3 Access Point w/ 802.11a/b/g/n Card

MODEL: A1254

SERIAL NUMBER: 6F73002JYZV

DATE TESTED: OCTOBER 10, 2007 AND JANUARY 11, 2008

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART B	No Non-Compliance Noted

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:



THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



TOM CHEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003.

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a wireless access point intended for use in a networking environment.

GENERAL INFORMATION

CHASSIS MATERIAL	PLASTIC
ENCLOSURE MATERIAL	PLASTIC
POWER REQUIREMENTS	100-240 VAC / 50-60 Hz
POWERLINE FILTER MANUFACTURER AND MODEL	N/A (BUILT IN)
LIST OF ALL OSCILLATOR FREQUENCIES GREATER THAN OR EQUAL TO 9 kHz	25MHz, 32.768MHz, and 500MHz (Controller)

SUBASSEMBLIES

The EUT was constructed using the following subassemblies:

Subassembly Description	Manufacturer	Part Number
Wireless Card	Apple Computer	XB72
Main Logic PCBA	Apple Computer	056-2258
AC Adapter	Delta Electronics	M28

5.2. TEST CONFIGURATIONS

The following configurations were investigated during testing:

EUT Configuration	Description
Basic	EUT / Notebook PCs / MP3 Player / Ethernet Loop back Cable

5.3. MODE(S) OF OPERATION

Mode	Description
EMC Test	Pinging and Linked to MP3 player via USB Port

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT was 7.2d2auto20070529T0400.

The test utility used during testing was a ping command from a terminal window.

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DETAILS OF TESTED SYSTEM

SUPPORT EQUIPMENT & PERIPHERALS

Description	Manufacturer	Model	Serial Number	FCC ID
Notebook PC	Apple Computer	A1181	PT358811	DoC
Notebook PC AC Adapter	Delta Electronics	A1184	MV625H2QVHKB	DoC
MP3 Player	Apple Computer	Ipod Nano	YM5447S4S2B	DoC

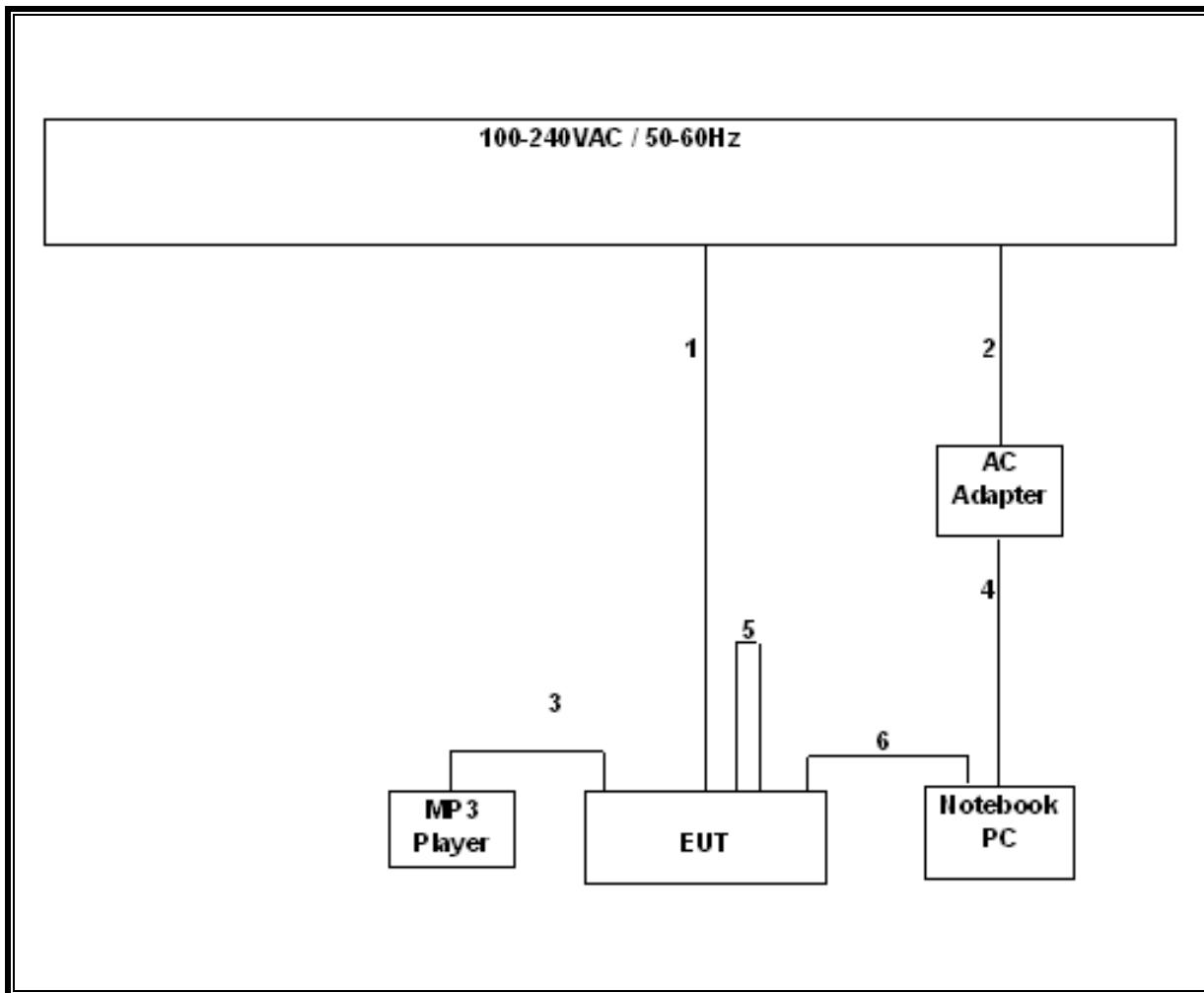
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC Input	1	2 Prong	Un-shielded	1.5m	
2	AC Input	1	3 Prong	Un-shielded	2m	
3	USB	1	USB	Shielded	3.5 ft.	
4	DC Input	1	4 Pin	Un-shielded	2m	
5	Ethernet Loopback	1	RJ-45	Shielded	2m	
6	Ethernet	1	RJ-45	Shielded	3m	

TEST SETUP

The EUT is installed in a typical configuration. Test software exercised the EUT.

TEST SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
Peak Power Meter	Agilent / HP	E4416A	GB41291160	12/02/08
Peak / Average Power Sensor	Agilent	E9327A	US40440755	12/02/08
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	MY43360112	08/07/08
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	04/15/08
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00931	08/03/08
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	10/15/08
EMI Test Receiver	R & S	ESHS 20	827129/006	01/27/08
SA Display Section 2	Agilent / HP	85662A	2816A16696	04/07/08
SA RF Section, 1.5 GHz	Agilent / HP	85680B	2814A04227	01/07/08
Quasi-Peak Adaptor	Agilent / HP	85650A	3145A01654	01/21/08
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	09/28/08
Preamp 30-1000MHz	Sonoma	310N	185623	01/20/08

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4

The highest clock frequency generated or used in the EUT is 500 MHz, therefore the frequency range was investigated from 30 MHz to 5 GHz.

LIMIT

§15.109 (g) As an alternative to the radiated emission limits shown in paragraphs (a) and (b) of this section, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment—Radio Disturbance Characteristics—Limits and Methods of Measurement" (incorporated by reference, see §15.38). In addition:

- (1) The test procedure and other requirements specified in this part shall continue to apply to digital devices.
- (2) If, in accordance with §15.33 of this part, measurements must be performed above 1000 MHz, compliance above 1000 MHz shall be demonstrated with the emission limit in paragraph (a) or (b) of this section, as appropriate. Measurements above 1000 MHz may be performed at the distance specified in the CISPR 22 publications for measurements below 1000 MHz provided the limits in paragraphs (a) and (b) of this section are extrapolated to the new measurement distance using an inverse linear distance extrapolation factor (20 dB/decade), e.g., the radiated limit above 1000 MHz for a Class B digital device is 150 uV/m, as measured at a distance of 10 meters.
- (3) The measurement distances shown in CISPR Pub. 22, including measurements made in accordance with this paragraph above 1000 MHz, are considered, for the purpose of §15.31(f)(4) of this part, to be the measurement distances specified in this part.
- (4) If the radiated emissions are measured to demonstrate compliance with the alternative standards in this paragraph, compliance must also be demonstrated with the conducted limits shown in §15.107(e).

Limits for radiated disturbance of Class B ITE at measuring distance of 10 m	
Frequency range (MHz)	Quasi-peak limits (dB μ V/m)
30 to 230	30
230 to 1000	37
Note: The lower limit shall apply at the transition frequency.	

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m		
Frequency range (MHz)	Peak limits (dB μ V/m)	Average limits (dB μ V/m)
Above 1000	74	54

RESULTS

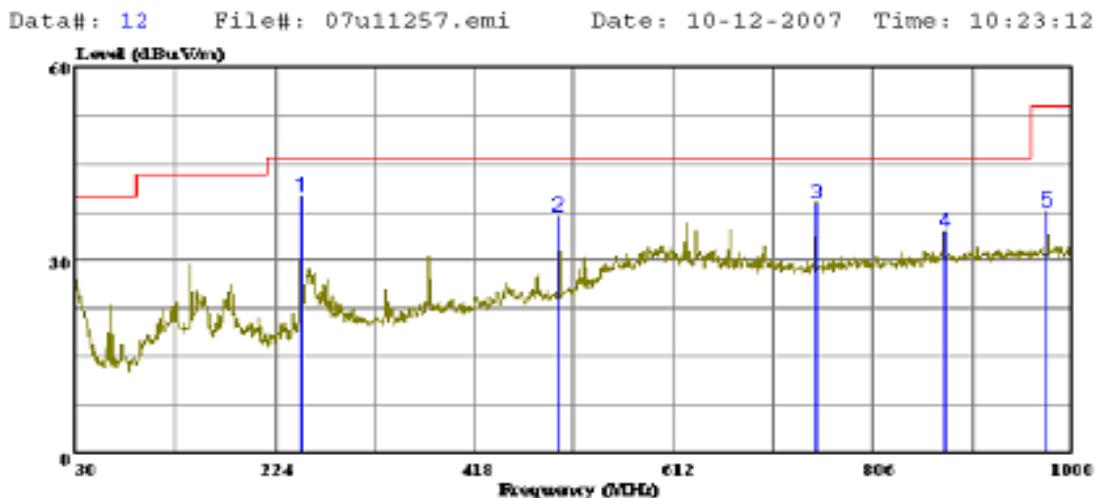
No non-compliance noted:

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

HORIZONTAL DATA



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



Trace: 11

Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Engineer: : Thanh Nguyen
Company: : Apple Computer Inc.
Project #: : 07U11257
Test Configuration: : EUT with Support Equipment
Mode of operation: : Wireless link, play music and R/W to HD
Test Target: : FCC Class B

Page: 1

Freq	Read		Over		Remark
	Level	Level	Limit	dB	
MHz	dBuV	dBuV/m	dB		
1	249.220	54.10	39.91	-6.09	Peak
2	499.480	44.30	36.90	-9.10	Peak
3	750.710	41.70	38.93	-7.07	Peak
4	875.840	35.80	34.48	-11.52	Peak
5	975.750	38.40	37.65	-16.35	Peak

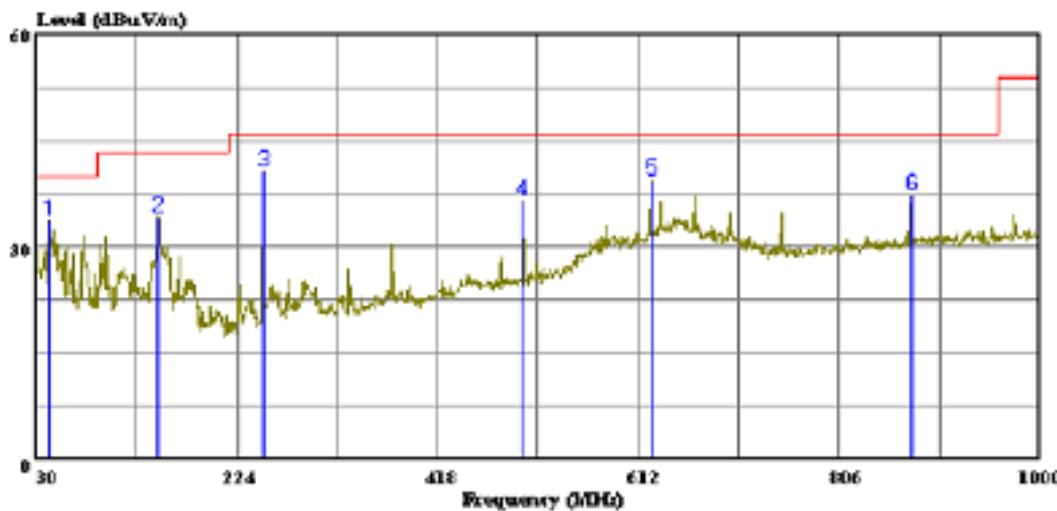
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL DATA



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

Data#: 10 File#: 07U11257.emi Date: 10-12-2007 Time: 10:11:37



Trace: 9

Ref Trace:

Condition: FCC CLASS-B 3m VERTICAL
Engineer: : Thanh Nguyen
Company: : Apple Computer Inc.
Project #: : 07U11257
Test Configuration: : EUT with Remote Support Laptop
Mode of operation: : Wireless link, play music and R/W to HD
Test Target: : FCC Class B

Page: 1

Freq	Read	Over		Remark
	Level	Level	Limit	
MHz	dBuV	dBuV/m	dB	
1	41.640	46.49	33.64	-6.36 Peak
2	148.340	47.93	34.19	-9.31 Peak
3	249.220	55.00	40.81	-5.19 Peak
4	499.480	44.00	36.60	-9.40 Peak
5	624.610	44.30	39.36	-6.64 Peak
6	875.840	38.60	37.28	-8.72 Peak

TRANSMITTER AND RECEIVER SPURIOUS EMISSIONS ABOVE 1 GHz

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber																																																					
Company: APPLE COMPUTER INC. Project #: 07U11257 Date: 01-11-2008 Test Engineer: Tom Chen Configuration: EUT, support Laptop and Peripheral. Mode: Transmit and Receive data w/ wireless link.																																																					
Test Equipment: <table border="1"> <tr> <td>Horn 1-18GHz</td> <td>Pre-amplifier 1-26GHz</td> <td>Pre-amplifier 26-40GHz</td> <td colspan="4">Horn > 18GHz</td> <td>Limit</td> </tr> <tr> <td>T60; S/N: 2238 @3m</td> <td>T144 Miteq 3008A00931</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>FCC 15.209</td> </tr> <tr> <td colspan="8">Hi Frequency Cables</td> </tr> <tr> <td>2 foot cable</td> <td>3 foot cable</td> <td>12 foot cable</td> <td colspan="2">Thanh 208946003</td> <td>HPF</td> <td>Reject Filter</td> <td>Peak Measurements RBW=VBW=1MHz</td> </tr> <tr> <td></td> <td></td> <td></td> <td colspan="2"></td> <td></td> <td></td> <td>Average Measurements RBW=1MHz; VBW=10Hz</td> </tr> </table>														Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz				Limit	T60; S/N: 2238 @3m	T144 Miteq 3008A00931						FCC 15.209	Hi Frequency Cables								2 foot cable	3 foot cable	12 foot cable	Thanh 208946003		HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz								Average Measurements RBW=1MHz; VBW=10Hz
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f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Plk Lim dBuV/m	Avg Lim dBuV/m	Plk Mar dB	Avg Mar dB	Notes (V/H)																																						
Spurious emissions																																																					
1.008	3.0	52.17	41.89	25.4	1.0	-39.5	0.0	0.0	39.1	28.8	74	54	-34.9	-25.2	H																																						
1.330	3.0	51.75	40.93	26.3	1.1	-39.0	0.0	0.0	40.1	29.3	74	54	-33.9	-24.7	H																																						
1.428	3.0	47.21	37.61	26.5	1.1	-38.9	0.0	0.0	36.0	26.4	74	54	-38.0	-27.6	H																																						
1.875	3.0	46.70	36.13	27.6	1.3	-38.2	0.0	0.0	37.4	26.8	74	54	-36.6	-27.2	H																																						
1.997	3.0	46.18	34.71	27.9	1.4	-38.1	0.0	0.0	37.4	25.9	74	54	-36.6	-28.1	H																																						
1.012	3.0	52.88	42.68	25.5	1.0	-39.5	0.0	0.0	39.8	29.6	74	54	-34.2	-24.4	V																																						
1.328	3.0	54.17	43.02	26.3	1.1	-39.0	0.0	0.0	42.5	31.3	74	54	-31.5	-22.7	V																																						
1.993	3.0	49.85	35.60	27.9	1.4	-38.1	0.0	0.0	41.1	26.8	74	54	-32.9	-27.2	V																																						
<table border="0"> <tr> <td>f</td> <td>Measurement Frequency</td> <td>Amp</td> <td>Preamp Gain</td> <td>Avg Lim</td> <td>Average Field Strength Limit</td> </tr> <tr> <td>Dist</td> <td>Distance to Antenna</td> <td>D Corr</td> <td>Distance Correct to 3 meters</td> <td>Pk Lim</td> <td>Peak Field Strength Limit</td> </tr> <tr> <td>Read</td> <td>Analyzer Reading</td> <td>Avg</td> <td>Average Field Strength @ 3 m</td> <td>Avg Mar</td> <td>Margin vs. Average Limit</td> </tr> <tr> <td>AF</td> <td>Antenna Factor</td> <td>Peak</td> <td>Calculated Peak Field Strength</td> <td>Pk Mar</td> <td>Margin vs. Peak Limit</td> </tr> <tr> <td>CL</td> <td>Cable Loss</td> <td>HPF</td> <td>High Pass Filter</td> <td></td> <td></td> </tr> </table>														f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit	Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit	Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit	AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit	CL	Cable Loss	HPF	High Pass Filter												
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* No emissions were detected up to 5GHz.

7.2. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4

LIMIT

§15.107 (a) Except for Class A digital devices, for equipment that 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 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (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

Notes:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

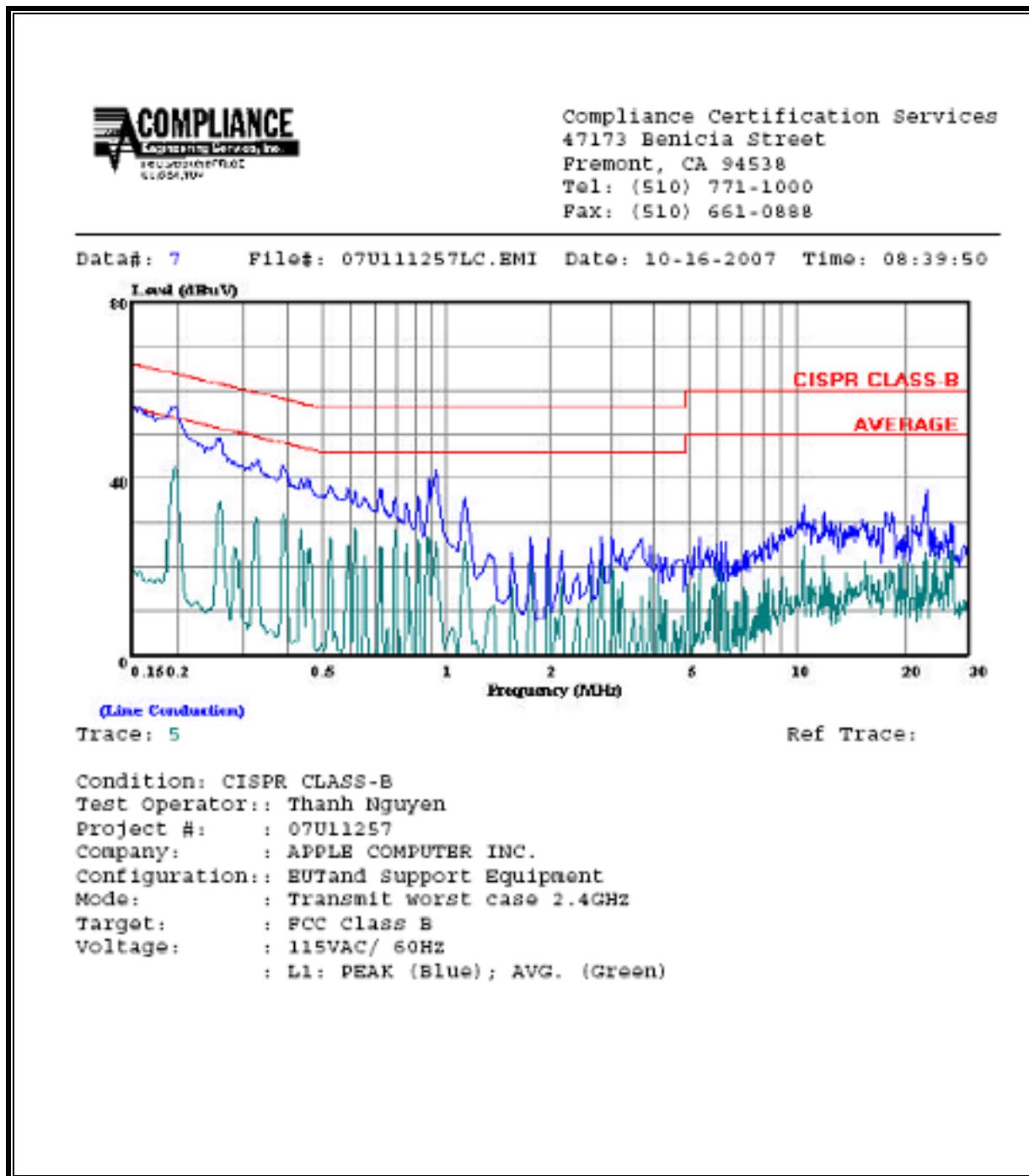
RESULTS

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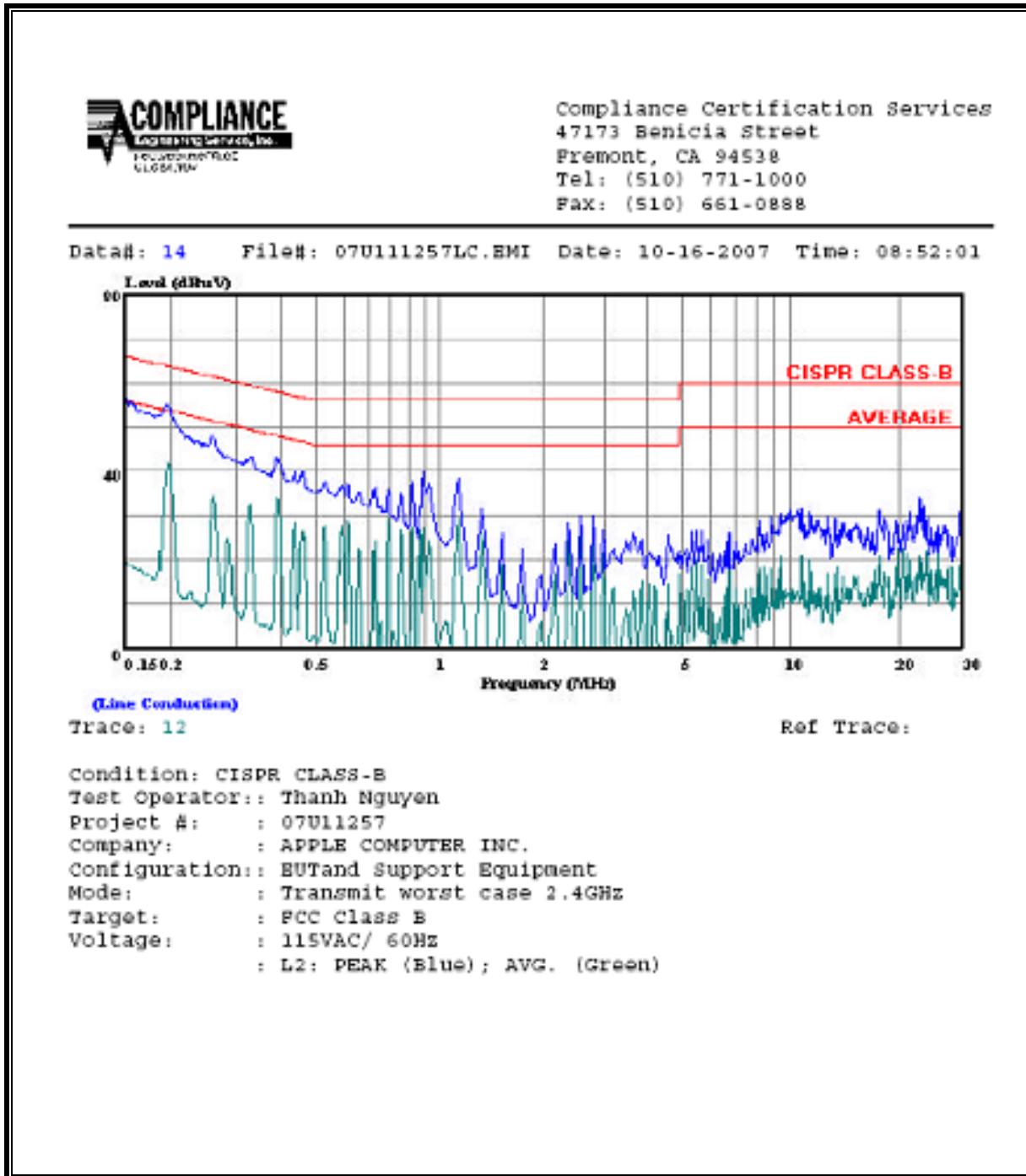
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Closs (dB)	Limit		Margin		Remark
	PK (dBuV)	QP (dBuV)	AV (dBuV)		QP	AV	QP (dB)	AV (dB)	
0.20	53.64	--	42.47	0.00	63.82	53.82	-10.18	-11.35	L1
1.03	41.90	--	25.71	0.00	56.00	46.00	-14.10	-20.29	L1
23.02	37.46	--	23.25	0.00	60.00	50.00	-22.54	-26.75	L1
0.20	54.88	--	41.58	0.00	63.82	53.82	-8.94	-12.24	L2
0.99	39.78	--	27.28	0.00	56.00	46.00	-16.22	-18.72	L2
23.02	33.60	--	22.22	0.00	60.00	50.00	-26.40	-27.78	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



END OF REPORT

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