FCC CFR47 PART 15 SUBPART C CERTIFICATION

TEST REPORT ADDENDUM

FOR

802.11a/b CARDBUS INSTALLED IN IBM LAPTOP

MODEL NUMBER: WLC221-D4 / BCP3483U

BRAND NAME: ASKEY

FCC ID: H8NWLC221-D4

REPORT NUMBER: 02T1639-3

ISSUE DATE: MARCH 7, 2003

Prepared for

ASKEY COMPUTER CORP.
10F, NO. 119, CHIENKANG RD.
CHUNG-HO, TAIPEI
TAIWAN, R.O.C.

Prepared by

COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885
FAX: (408) 463-0888

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1. TEST RESULT CERTIFICATION

COMPANY NAME: ASKEY COMPUTER CORP.
10F, NO. 119, CHIENKANG RD.
CHUNG-HO, TAIPEI, TAIWAN, R.O.C.

EUT DESCRIPTION: 802.11A/B CARDBUS INSTALLED IN IBM LAPTOP

MODEL NAME: WLC221-D4 / BCP3483U

DATE TESTED: FEBRUARY 27 – MARCH 4, 2003

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the radiated and conducted emissions 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: This document reports conditions under which testing was conducted and results of tests performed. 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.

Note: The 2.4 and 5.8 GHz bands are applicable to this report; another band of operation (5.2 GHz) is documented in a separate report

Approved & Released For CCS By:

MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

THANH NGUYEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

Conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, and 15.407.

3. FACILITIES AND ACCREDITATION

3.1. FACILITIES AND EQUIPMENT

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specifications for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

3.2. LABORATORY ACCREDITATIONS AND LISTINGS

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: 200065-0 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 (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2)).

3.3. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	ELA 117
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	ELA-171
Taiwan	BSMI	CNS 13438	SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	IC2324 A,B,C, and F

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING 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.

4.2. MEASUREMENT UNCERTAINTY

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

Radiated Emission	
30MHz – 200 MHz	+/- 3.3dB
200MHz – 1000MHz	+4.5/-2.9dB
1000MHz – 2000MHz	+4.6/-2.2dB
Power Line Conducted Emission	
150kHz – 30MHz	+/-2.9

Any results falling within the above values are deemed to be marginal.

4.3. TEST AND MEASUREMENT EQUIPMENT

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

TEST AND MEASUREMENT EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due Date
Spectrum Analyzer	HP	8566B	3014A06685	6/1/03
Spectrum Display	HP	85662A	2152A03066	6/1/03
Quasi-Peak Detector	HP	85650A	3145A01654	6/1/03
Preamplifier	HP	8447D	2944A06833	8/22/03
Log Periodic Antenna	EMCO	3146	9107-3163	3/30/03
Biconical Antenna	Eaton	94455-1	1197	3/30/03
Preamplifier (1 - 26.5GHz)	Miteq	NSP10023988	646456	4/26/03
Horn Antenna (1 - 18GHz)	EMCO	3115	6717	2/4/04
Horn Antenna (18 – 26.5GHz)	ARA	MWH 1826/B	1013	11/7/03
High Pass Filter (4.57GHz)	FSY Microwave	FM-4570-9SS	003	N.C.R.
Harmonic Mixer	HP	11970A	3008A04190	10/14/05
Spectrum Analyzer	HP	E4404B	ID 963805	3/25/03

5. SETUP OF EQUIPMENT UNDER TEST

SETUP INFORMATION FOR TRANSMITTER TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
Laptop	IBM	Think Pad A20M	97-051T607/00	DoC
AC Adapter	IBM	02K6654	1Z0Z4997732	N/A

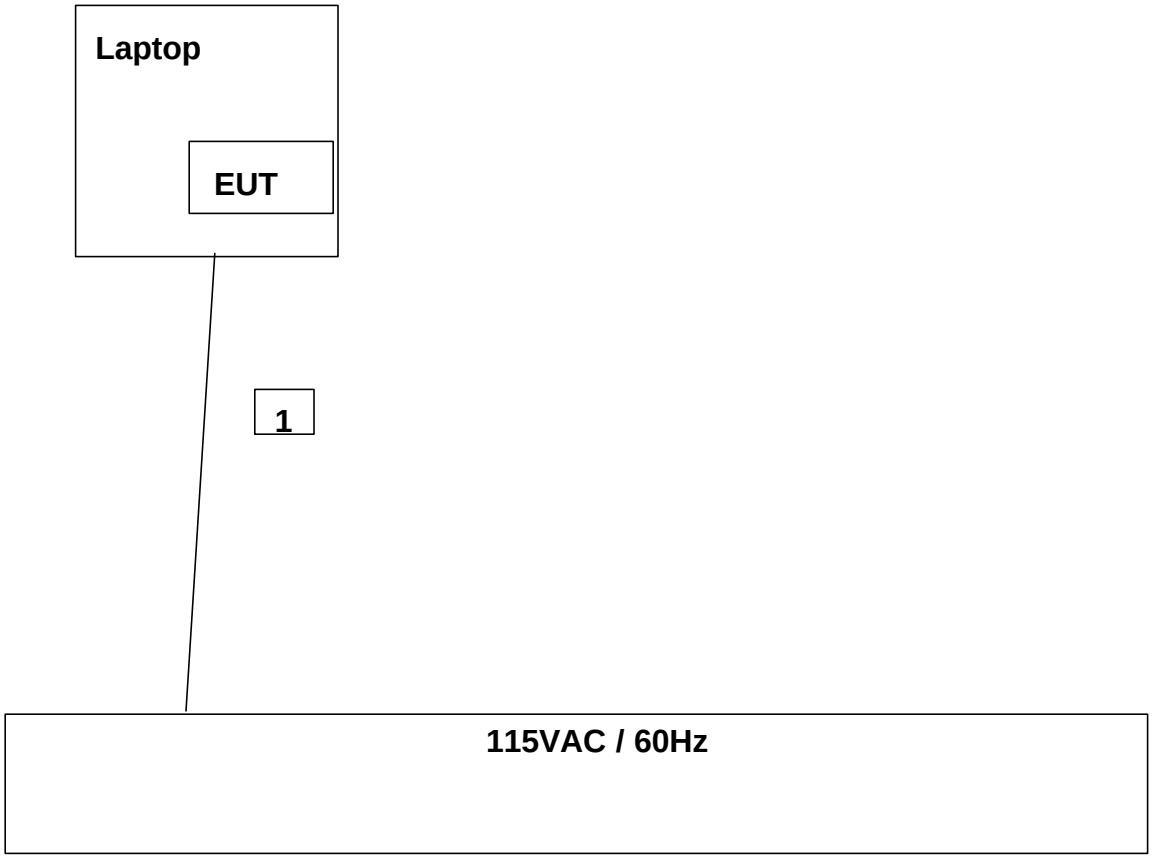
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115	Unshielded	2 m	Laptop cable is integrated with AC Adapter

TEST SETUP

The EUT is installed in the laptop computer.

SETUP DIAGRAM FOR TRANSMITTER TESTS



SETUP INFORMATION FOR DIGITAL DEVICE TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
MODEM	ACEEX	1414	9013538	IFAXDM1414
PRINTER	HP	2225C	2541S41679	BS46XU2225C
PS/2 MOUSE	PACKARD BELL	FDM-611	FWMC55039667	F4Z4K3FDM-612
Laptop	IBM	Think Pad A20M	97-051T607/00	DoC
AC Adapter	IBM	02K6654	1Z0Z4997732	N/A

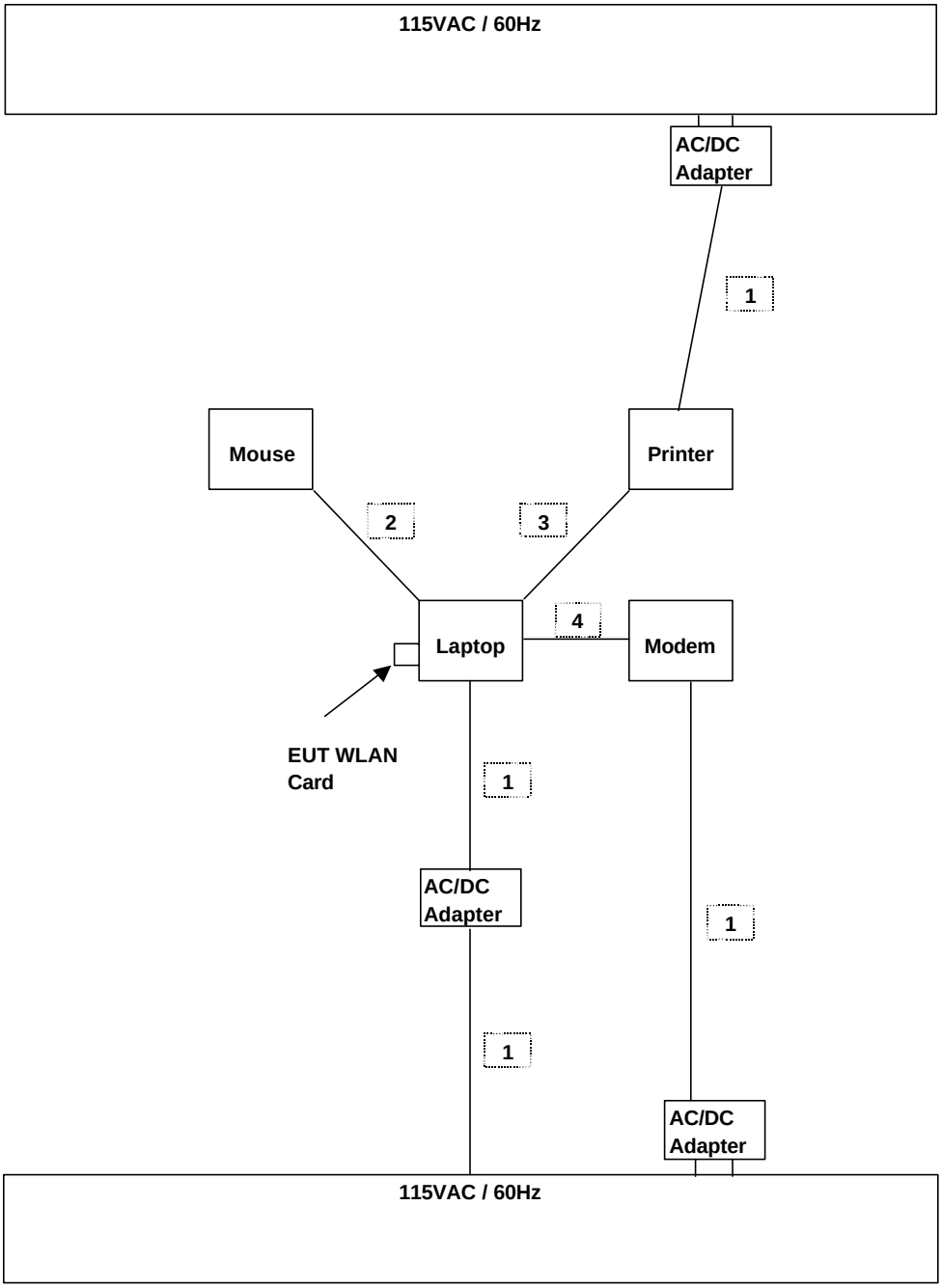
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	**AC**	**3**	**US 115V**	**Un-shielded**	**2m**	Laptop cable is integrated with AC Adapter
2	**USB**	**1**	**USB**	**Un-shielded**	**2m**	
3	**Parallel**	**1**	**DB25**	**Shielded**	**2m**	
4	**Serial**	**1**	**DB9**	**Shielded**	**2m**	

TEST SETUP

The EUT is installed in the laptop computer.

SETUP DIAGRAM FOR DIGITAL DEVICES



6. RESULTS

6.1. RADIATED SPURIOUS EMISSIONS

TEST SETUP

The EUT is placed on the wooden table. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4/1992.

The EUT is set to transmit in a continuous mode.

TEST PROCEDURE

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.

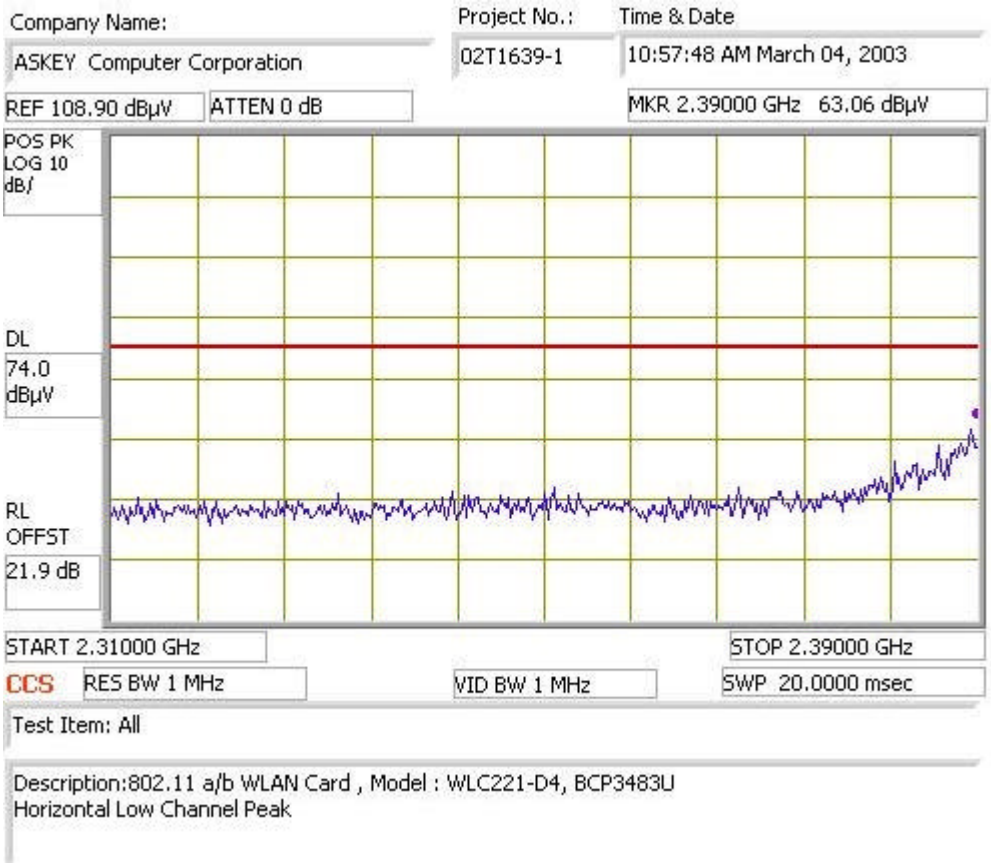
For measurements above 1 GHz, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

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

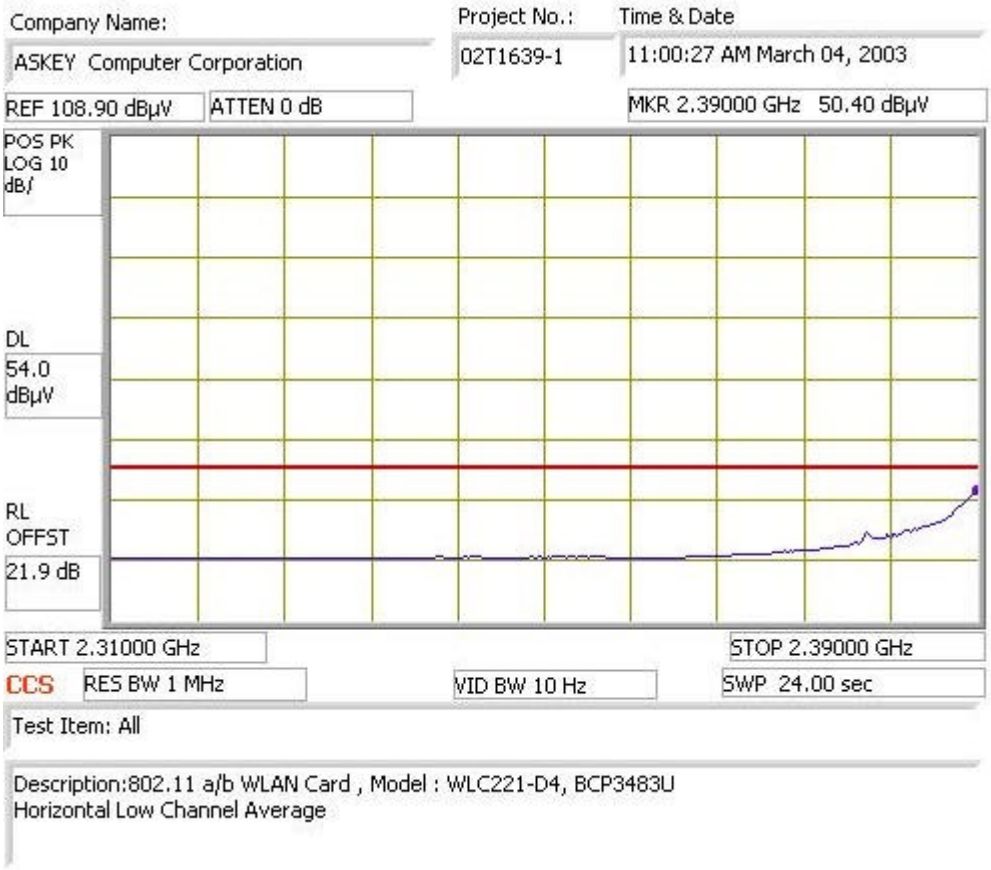
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels within the 5.8 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The frequency span is set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. 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 suspected signal. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

ADJACENT RESTRICTED BAND (Fund = 2.412GHz, NORMAL MODE, HORIZONTAL, PEAK)



ADJACENT RESTRICTED BAND (Fund = 2.412GHz, NORMAL MODE, HORIZONTAL, AVERAGE



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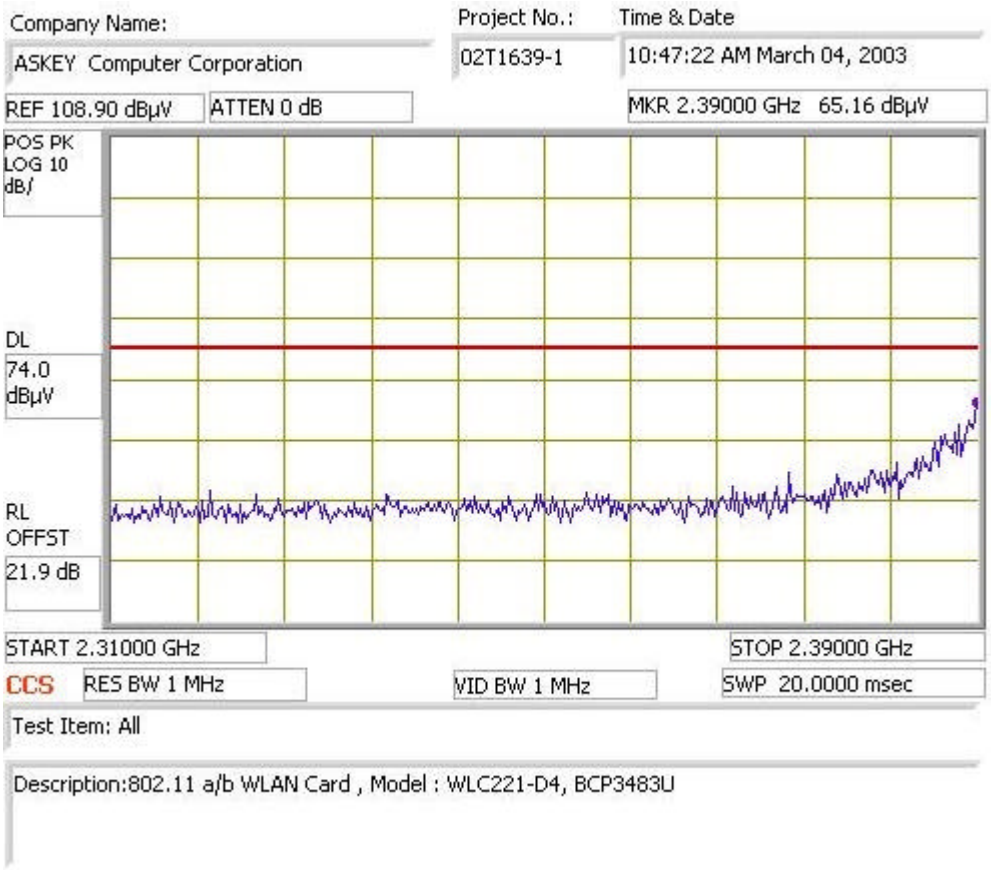
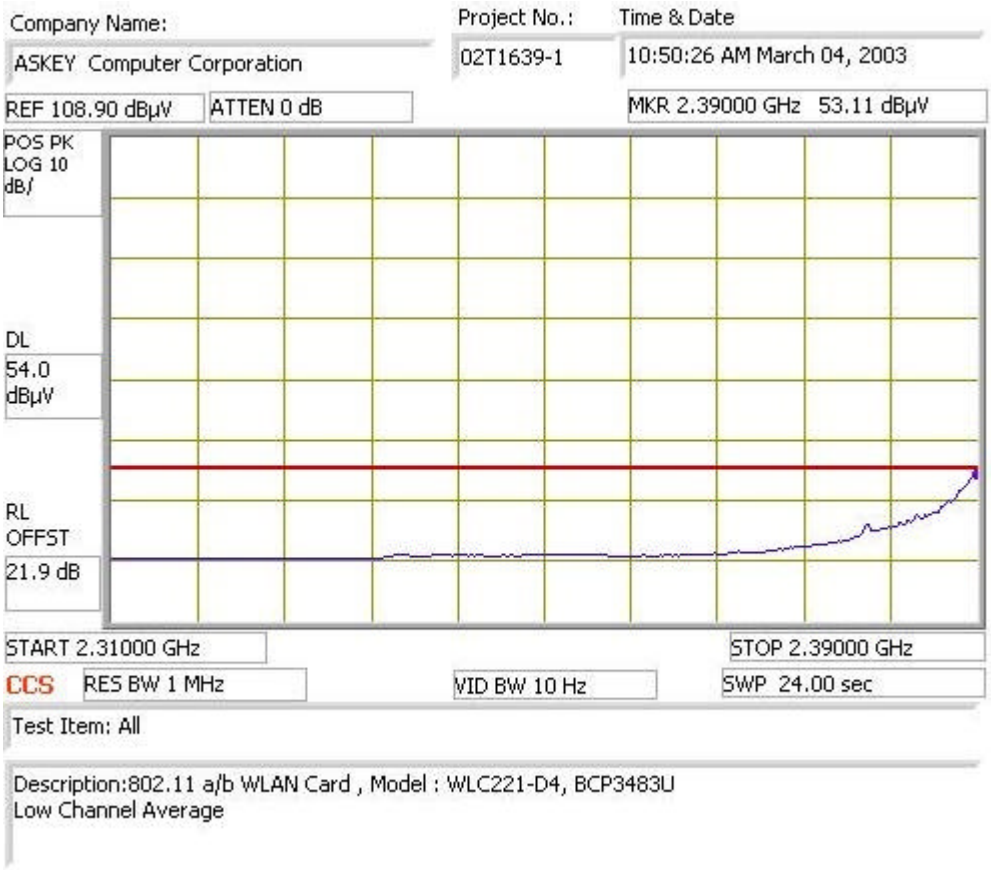
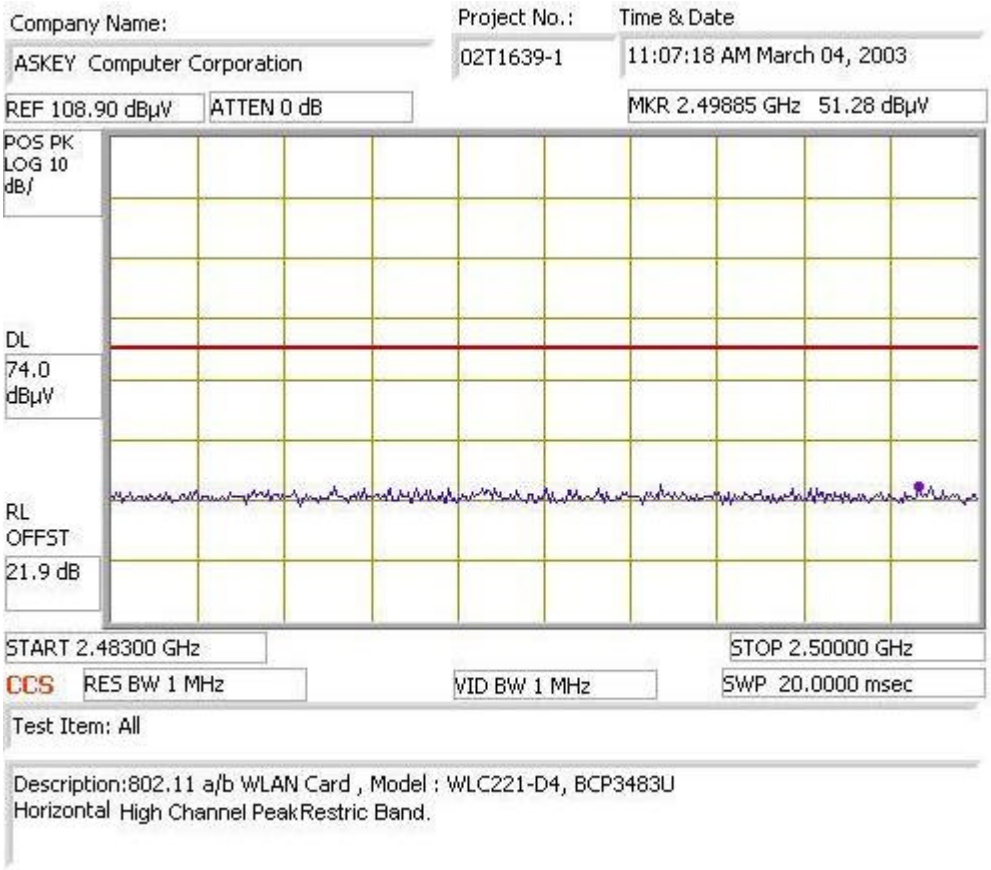


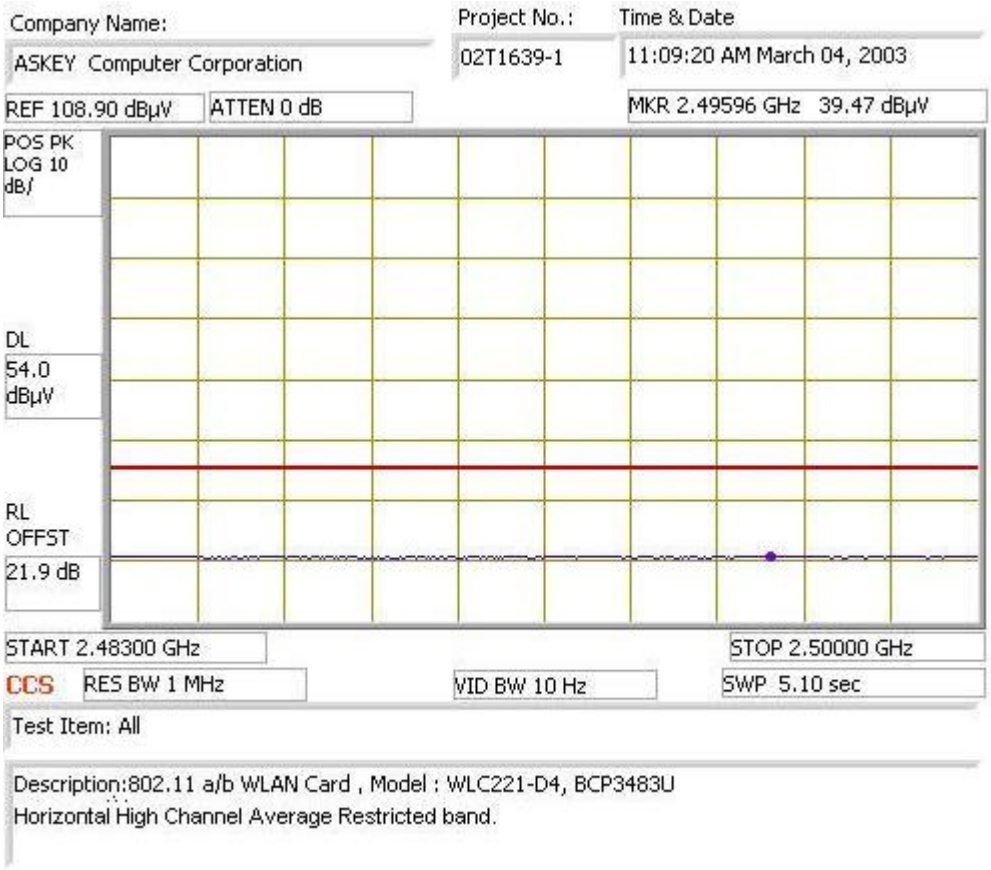
ADJACENT RESTRICTED BAND (Fund = 2.412GHz, NORMAL MODE, VERTICAL, AVERAGE



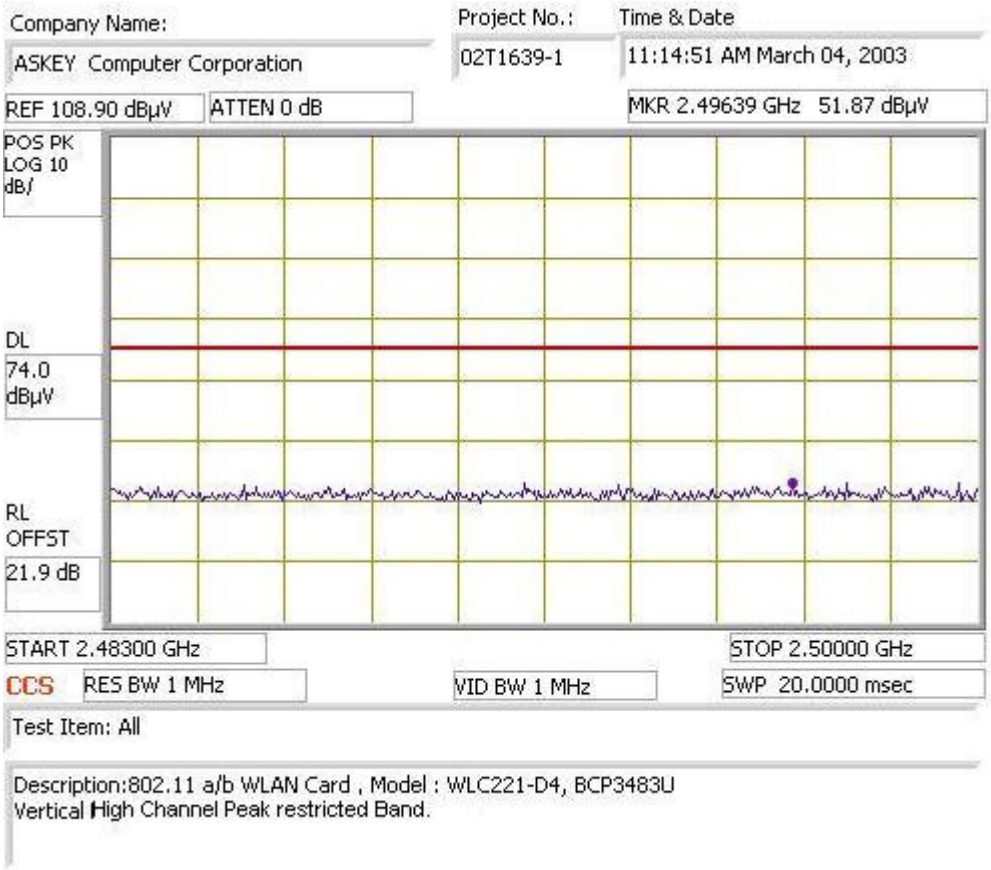
ADJACENT RESTRICTED BAND (Fund = 2.462GHz, NORMAL MODE, HORIZONTAL, PEAK



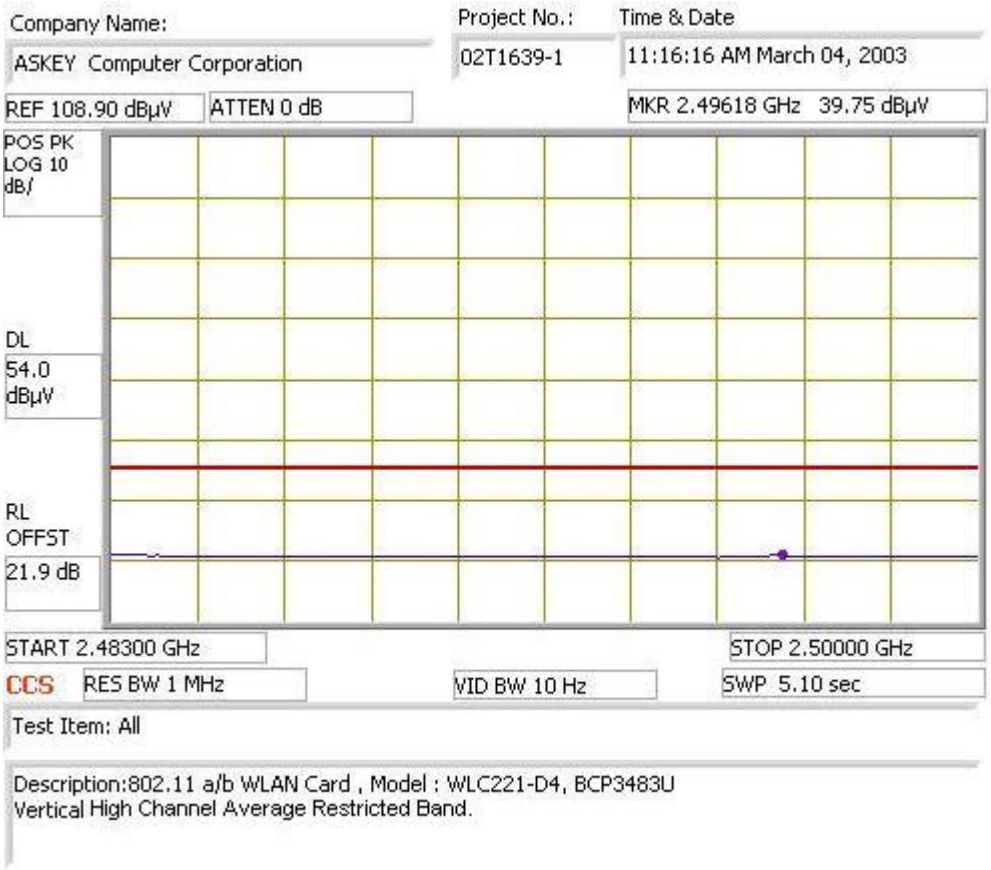
ADJACENT RESTRICTED BAND (Fund = 2.462GHz, NORMAL MODE, HORIZONTAL, AVERAGE



ADJACENT RESTRICTED BAND (Fund = 2.462GHz, NORMAL MODE, VERTICAL, PEAK



ADJACENT RESTRICTED BAND (Fund = 2.462GHz, NORMAL MODE, VERTICAL, AVERAGE



HARMONIC AND SPURIOUS RADIATED EMISSIONS (2.412GHz, NORMAL)

03/02/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:	Thanh Nguyen
Project #:	02T1639-1
Company:	Askey Computer Corporation
EUT Descrip.:	802.11 a/b Dual Band Card Bus in IBM Laptop
EUT M/N:	WLC221-D4, BCP3483U
Test Target:	FCC 15.247
Mode Oper:	EUT transmitting at Low Channel (2412MHz), ART =15

Test Equipment:

EMCO Horn 1-18GHz — T73: S/N: 6717
Pre-amplifer 1-26GHz — Miteq NSP2600-44
Spectrum Analyzer — 8593EM Analyzer
Horn > 18GHz — T87; ARA 18-26GHz; S/N:1049

Hi Frequency Cables
☐ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
4.824	9.8	46.3	45.1	33.9	3.4	-36.1	0.0	1.0	48.5	47.3	74.0	54.0	-25.5	-6.7	V, 2nd Harmonic
4.824	3.3	48.0	36.2	33.9	3.4	-36.1	-9.5	1.0	40.7	28.9	74.0	54.0	-33.3	-25.1	H, 2nd Harmonic

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		

Note: No other spurious or harmonic signals were found above the system noise floor.

HARMONIC AND SPURIOUS RADIATED EMISSIONS (2.437GHz, NORMAL)

03/02/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thanh guyen
Project #: 02T1639-1
Company: Askey Computer Corporation
EUT Descrip.: 802.11 a/b Dual Band Card Bus in IBM laptop
EUT M/N: WLC221-D4, BCP3483U
Test Target: FCC 15.247
Mode Oper: EUT transmitting at Mid Channel (2437MHz), ART =15

Test Equipment:

EMCO Horn 1-18GHz — T73: S/N: 6717
Pre-amplifer 1-26GHz — Miteq NSP2600-44
Spectrum Analyzer — 8593EM Analyzer
Horn > 18GHz — T87; ARA 18-26GHz; S/N:1049

Hi Frequency Cables
☐ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
4.874	9.8	45.9	44.1	33.9	3.4	-36.1	0.0	1.0	48.2	46.4	74.0	54.0	-25.8	-7.6	V, 2nd Harmonic
7.311	9.8	50.2	44.4	36.8	4.4	-36.3	0.0	1.0	56.1	50.3	74.0	54.0	-17.9	-3.7	V, 3rd Harmonic
4.874	9.8	43.7	41.1	33.9	3.4	-36.1	0.0	1.0	46.0	43.4	74.0	54.0	-28.0	-10.6	H, 2nd Harmonic

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		

Note: No other spurious or harmonic signals were found above the system noise floor.

HARMONIC AND SPURIOUS RADIATED EMISSIONS (2.462GHz, NORMAL)

03/02/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:	Thanh Nguyen
Project #:	02T1639-1
Company:	Askey Computer Corporation
EUT Descrip.:	802.11 a/b Dual Band Card Bus, in IBM laptop
EUT M/N:	WLC221-D4, BCP3483U
Test Target:	FCC 15.247
Mode Oper:	EUT transmitting at High Channel (2462MHz), ART =15

Test Equipment:

EMCO Horn 1-18GHz — T72: S/N: 6739
Pre-amplifer 1-26GHz — Miteq NSP2600-44
Spectrum Analyzer — 8593EM Analyzer
Horn > 18GHz — T87; ARA 18-26GHz; S/N:1049

Hi Frequency Cables
☐ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
4.924	9.8	43.2	30.9	34.1	3.4	-36.1	0.0	1.0	45.7	33.4	74.0	54.0	-28.3	-20.6	V, 2nd Harmonic
7.386	9.8	55.2	43.2	37.1	4.4	-36.2	0.0	1.0	61.5	49.5	74.0	54.0	-12.5	-4.5	V, 3rd Harmonic
4.924	9.8	45.1	31.9	34.1	3.4	-36.1	0.0	1.0	47.6	34.4	74.0	54.0	-26.4	-19.6	H, 2nd Harmonic
7.386	9.8	49.2	36.7	37.1	4.4	-36.2	0.0	1.0	55.6	42.0	74.0	54.0	-18.4	-12.0	H, 3rd Harmonic

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		

Note: No other spurious or harmonic signals were found above the system noise floor.

HARMONIC AND SPURIOUS RADIATED EMISSIONS (5.745GHz, NORMAL)

03/03/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:	Thanh Nguyen
Project #:	02T1639-1
Company:	Askey Computer Corporation
EUT Descrip.:	802.11 a/b Dual Band Card Bus, in IBM laptop
EUT M/N:	WLC221-D4, BCP3483U
Test Target:	FCC 15.247
Mode Oper:	EUT transmitting at Channel LOW (5745MHz), ART =15, Normal MODE

Test Equipment:

EMCO Horn 1-18GHz — T72: S/N: 6739
Pre-amplifer 1-26GHz — Miteq NSP2600-44
Spectrum Analyzer — 8593EM Analyzer
Horn > 18GHz — T87; ARA 18-26GHz; S/N:1049

Hi Frequency Cables: ☐ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
5.745															
11.490	9.8	51.4	38.6	39.2	5.9	-36.0	0.0	1.0	61.5	48.7	74.0	54.0	-12.5	-5.3	V, 2nd Harmonic
11.490	9.8	49.5	38.1	39.2	5.9	-36.0	0.0	1.0	59.6	48.2	74.0	54.0	-14.4	-5.8	H, 2nd Harmonic

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		

Note: No other spurious or harmonic signals were found above the system noise floor.

HARMONIC AND SPURIOUS RADIATED EMISSIONS (5.785GHz, NORMAL)

03/03/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thanh Nguyen
Project #: 02T1639-1
Company: Askey Computer Corporation
EUT Descrip.: 802.11 a/b Dual Band Card Bus, in IBM laptop
EUT M/N: WLC221-D4, BCP3483U
Test Target: FCC 15.247
Mode Oper: EUT transmitting at Channel MID (5785MHz), ART =15, Normal Mode

Test Equipment:

EMCO Horn 1-18GHz — T72; S/N: 6739
Pre-amplifer 1-26GHz — Miteq NSP2600-44
Spectrum Analyzer — 8593EM Analyzer
Horn > 18GHz — T87; ARA 18-26GHz; S/N:1049

Hi Frequency Cables
☐ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
5.785															
11.570	9.8	48.2	37.8	39.3	5.9	-36.0	0.0	1.0	58.3	47.9	74.0	54.0	-15.7	-6.1	V, 2nd Harmonic
11.570	9.8	45.8	35.6	39.3	5.9	-36.0	0.0	1.0	55.9	45.7	74.0	54.0	-18.1	-8.3	H, 2nd Harmonic

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		

Note: No other spurious or harmonic signals were found above the system noise floor.

HARMONIC AND SPURIOUS RADIATED EMISSIONS (5.825GHz, NORMAL)

03/03/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thanh Nguyen
Project #: 02T1639-1
Company: Askey Computer Corporation
EUT Descrip.: 802.11 a/b Dual Band Card Bus, in IBM laptop
EUT M/N: WLC221-D4, BCP3483U
Test Target: FCC 15.247
Mode Oper: EUT transmitting at Channel HIGH (5825MHz), ART =15, Normal Mode

Test Equipment:

EMCO Horn 1-18GHz — T72; S/N: 6739
Pre-amplifer 1-26GHz — Miteq NSP2600-44
Spectrum Analyzer — 8593EM Analyzer
Horn > 18GHz — T87; ARA 18-26GHz; S/N:1049

Hi Frequency Cables: ☐ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
5.825															
11.650	9.8	43.9	30.4	39.3	5.9	-36.1	0.0	1.0	54.0	40.5	74.0	54.0	-20.0	-13.5	V, 2nd Harmonic
11.650	9.8	50.8	36.7	39.3	5.9	-36.1	0.0	1.0	60.9	46.8	74.0	54.0	-13.1	-7.2	H, 2nd Harmonic

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		

Note: No other spurious or harmonic signals were found above the system noise floor.

HARMONIC AND SPURIOUS RADIATED EMISSIONS (5.76GHz, TURBO)

03/03/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:	Thanh Nguyen
Project #:	02T1639-1
Company:	Askey Computer Corporation
EUT Descrip.:	802.11 a/b Dual Band Card Bus, in IBM laptop
EUT M/N:	WLC221-D4, BCP3483U
Test Target:	FCC 15.247
Mode Oper:	EUT transmitting at Channel LOW (5760MHz), ART =15, TURBO MODE

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Spectrum Analyzer	Horn > 18GHz
T72; S/N: 6739	Miteq NSP2600-44	8593EM Analyzer	T87; ARA 18-26GHz; S/N:1049

Hi Frequency Cables
☐ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
5.760															
11.520	9.8	47.9	34.3	39.2	5.9	-36.0	0.0	1.0	58.0	44.4	74.0	54.0	-16.0	-9.6	V, 2nd Harmonic
11.520	9.8	44.5	33.0	39.2	5.9	-36.0	0.0	1.0	54.6	43.1	74.0	54.0	-19.4	-10.9	H, 2nd Harmonic

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		

Note: No other spurious or harmonic signals were found above the system noise floor.

HARMONIC AND SPURIOUS RADIATED EMISSIONS (5.80GHz, TURBO)

03/03/03 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Thanh Nguyen
Project #: 02T1639-1
Company: Askey Computer Corporation
EUT Descrip.: 802.11 a/b Dual Band Card Bus, in IBM laptop
EUT M/N: WLC221-D4, BCP3483U
Test Target: FCC 15.247
Mode Oper: EUT transmitting at Channel LOW (5800MHz), ART =15, TURBO MODE

Test Equipment:

EMCO Horn 1-18GHz — T72: S/N: 6739
Pre-amplifer 1-26GHz — Miteq NSP2600-44
Spectrum Analyzer — 8593EM Analyzer
Horn > 18GHz — T87; ARA 18-26GHz; S/N:1049

Hi Frequency Cables
☐ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:
1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:
1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
5.800															
11.600	9.8	44.7	32.8	39.3	5.9	-36.1	0.0	1.0	54.8	42.9	74.0	54.0	-19.2	-11.1	V, 2nd Harmonic
11.600	9.8	43.3	31.9	39.3	5.9	-36.1	0.0	1.0	53.4	42.0	74.0	54.0	-20.6	-12.0	H, 2nd Harmonic

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		

Note: No other spurious or harmonic signals were found above the system noise floor.

DIGITAL DEVICE RADIATED EMISSIONS

COMPLIANCE Certification Services

FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #:	02T1639-1
Report #:	030228B1
Date& Time:	02/28/03 8:05 PM
Test Engr:	Thanh Nguyen
Company:	Askey Computer Corporation
EUT Description:	801.11a/b WLAN Card, Model : WLC221-D4, BCP3843U
Test Configuration :	EUT in IBM LapTop , Modem, Printer, Mouse.
Type of Test:	FCC Part 15 Class B
Mode of Operation:	TX

<< Main Sheet

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
480.07	45.40	17.03	5.50	28.77	39.15	46.00	-6.85	3mV	180.00	1.50	P
130.52	44.00	11.47	2.78	28.35	29.91	43.50	-13.59	3mV	180.00	1.00	P
239.25	44.80	11.42	3.77	27.99	32.00	46.00	-14.00	3mV	180.00	1.00	P
132.72	43.30	11.36	2.80	28.34	29.12	43.50	-14.38	3mV	180.00	1.00	P
240.03	44.30	11.47	3.77	27.98	31.56	46.00	-14.44	3mV	0.00	1.50	P
153.32	44.00	10.30	2.97	28.27	28.99	43.50	-14.51	3mV	180.00	1.00	P
6 Worst Data											

6.2. AC POWERLINE CONDUCTED EMISSIONS

TEST SETUP

The EUT is placed on a wooden table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane on the floor.

The EUT is set to transmit in a continuous mode.

TEST PROCEDURE

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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

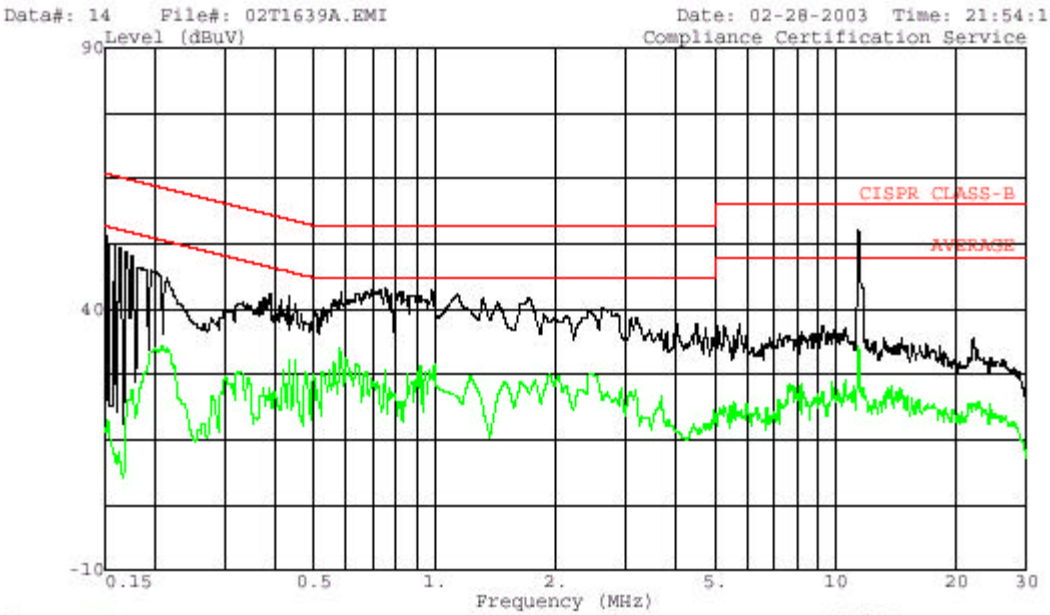
RESULTS

No non-compliance noted:

CONDUCTED EMISSIONS DATA (115VAC 60Hz)

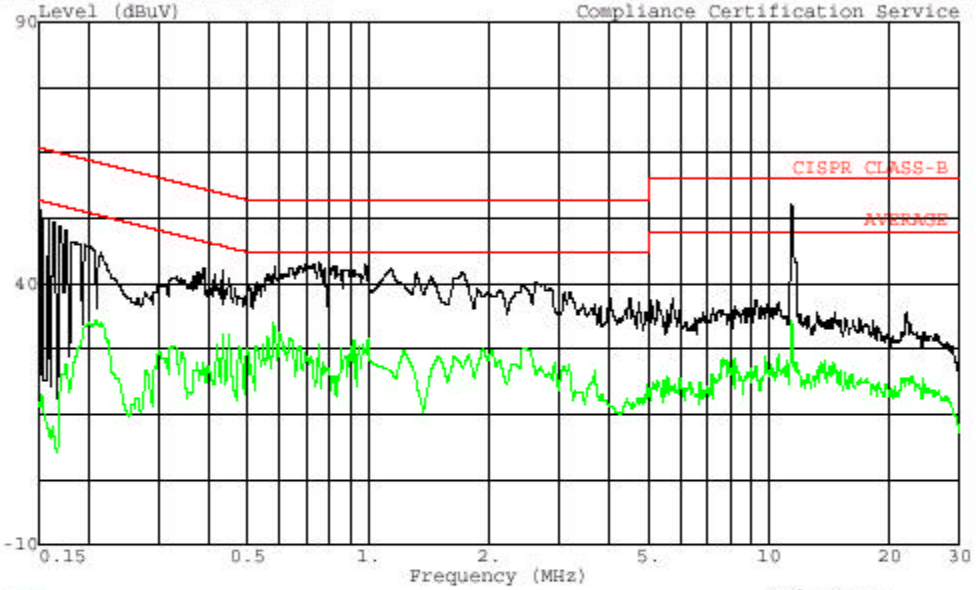
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	56.30	--	33.08	0.00	65.94	55.94	-9.64	-22.86	L1
0.40	47.44	--	34.65	0.00	58.80	48.80	-11.36	-14.15	L1
11.08	56.60	--	34.30	0.00	60.00	50.00	-3.40	-15.70	L1
0.15	53.92	--	28.67	0.00	65.91	55.91	-11.99	-27.24	L2
0.41	41.80	--	28.56	0.00	58.49	48.49	-16.69	-19.93	L2
11.38	55.22	--	32.90	0.00	60.00	50.00	-4.78	-17.10	L2
6 Worst Data									

561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888



COMPLIANCE Engineering Corporation
561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 14 File#: 02T1639A.EMI Date: 02-28-2003 Time: 21:54:18

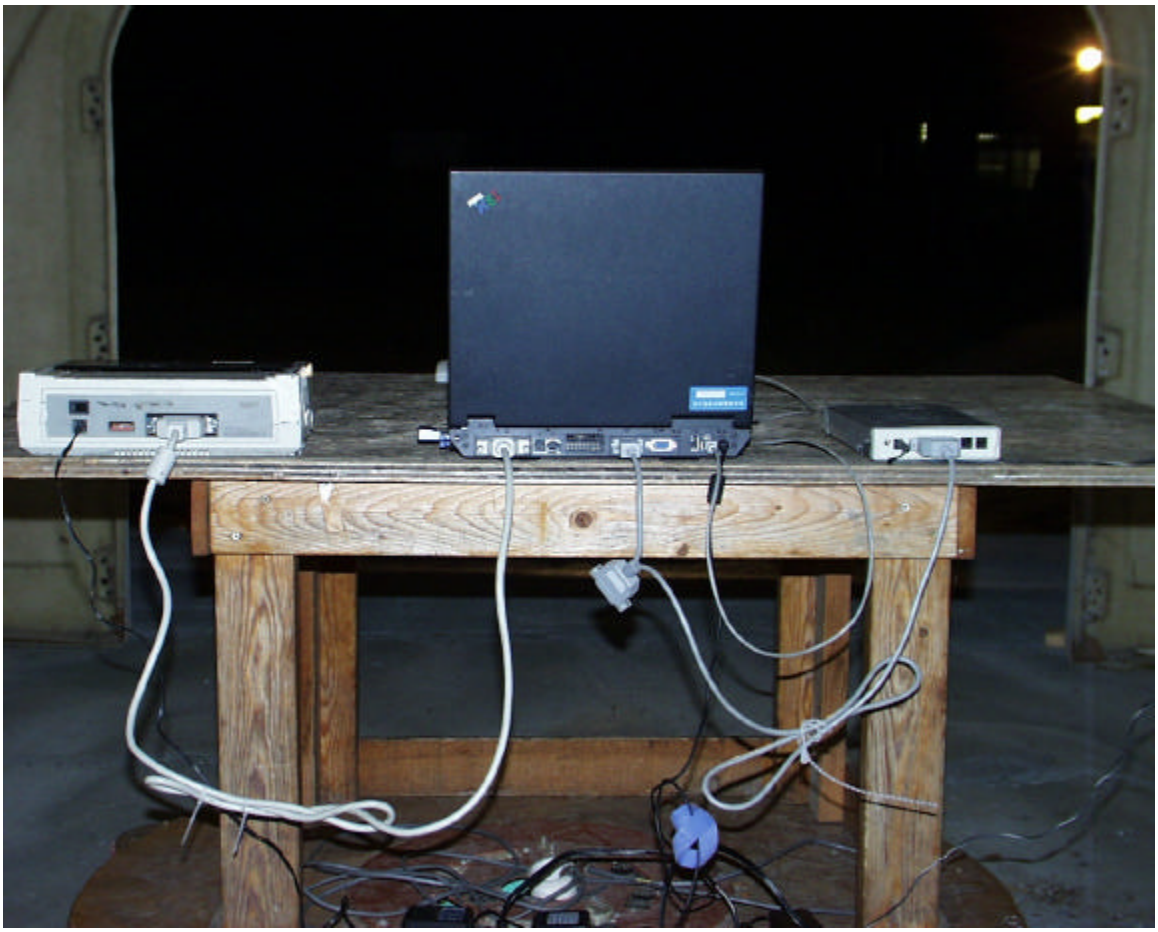


Trace: 12 Ref Trace:
Project # : 02t1639-1
Test Engineer : Be pham
Company : Askey Computer Corp
EUT : 802.11 a/b Dual Band Card Bus in IBM
: Laptop
Test Config. : Laptop /Printer /Modem /mouse
Test of Target: EN55022 class B
Mode of Oper. : Tx
: Line 2: Peak (Black), AVE (Green)

6.3. SETUP PHOTOS

Radiated Emissions, freq > 1GHz

Radiated Emissions, freq < 1GHz



Power Line Conducted Emissions

END OF REPORT