## FCC CFR47 PART 15 SUBPART C CERTIFICATION



## **TEST REPORT ADDENDUM**

## FOR

## 802.11a/b CARDBUS INSTALLED IN TOSHIBA LAPTOP

## MODEL NUMBER: WLC221-D4 / BCP3483U

# **BRAND NAME: ASKEY**

# FCC ID: H8NWLC221-D4

# **REPORT NUMBER: 02T1639-1**

# **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**

DATE TESTED:	FEBRUARY 27 – MARCH 3, 2003
MODEL NAME:	WLC221-D4 / BCP3483U
EUT DESCRIPTION:	802.11A/B CARDBUS INSTALLED IN TOSHIBA LAPTOP
COMPANY NAME:	ASKEY COMPUTER CORP. 10F, NO. 119, CHIENKANG RD. CHUNG-HO, TAIPEI, TAIWAN, R.O.C.

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:

Tested By:

MA

MIKE HECKROTTE CHIEF ENGINEER COMPLIANCE CERTIFICATION SERVICES FRANK IBRAHIM EMC SUPERVISOR COMPLIANCE CERTIFICATION SERVICES

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# 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)).

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# 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	<b>FC</b> 1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	<b>VCCI</b> 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	N <sub>ELA 117</sub>
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	N <sub>ELA-171</sub>
Taiwan	BSMI	CNS 13438	SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	<b>Canada</b> IC2324 A,B,C, and F

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# 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.

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# 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					

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# 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	Toshiba	Satellite Pro 6100	12062458J	DoC					
AC Adapter	Lishin International	LSE9802A2060	010810241A1	N/A					

## I/O CABLES

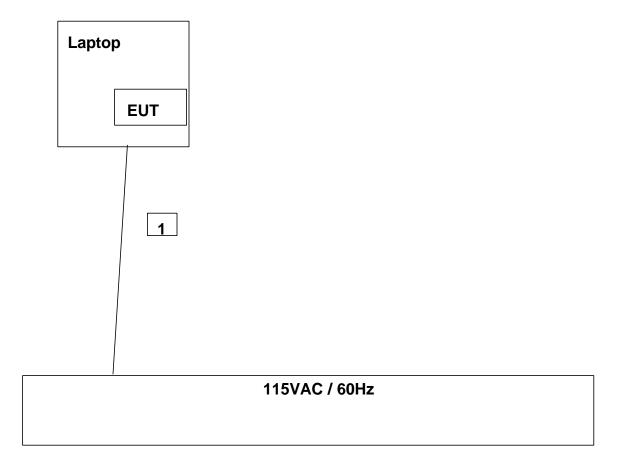
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115	Unshielded	2 m	Laptop cable is integrated with AC Adapter

## TEST SETUP

The EUT is installed in the laptop computer.

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#### SETUP DIAGRAM FOR TRANSMITTER TESTS



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## 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	Toshiba	Satellite Pro 6100	12062458J	DoC					
AC Adapter	Lishin International	LSE9802A2060	010810241A1	N/A					

## **I/O CABLES**

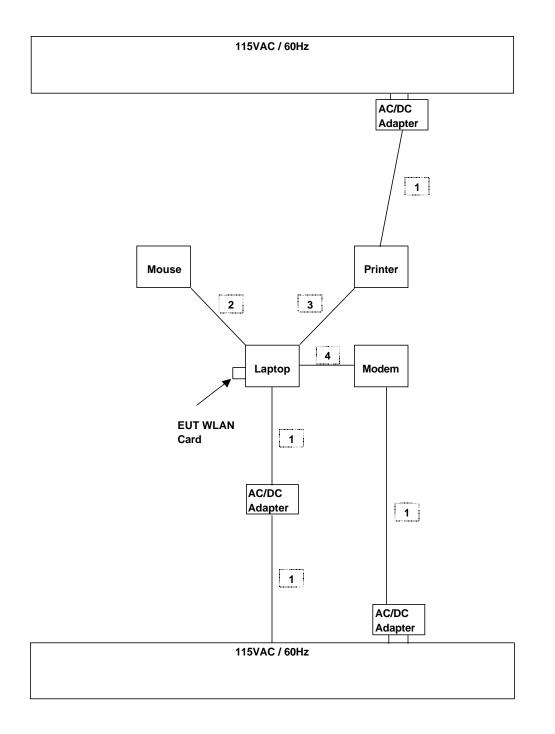
Cable	Port	# of	Connector	Cable	Cable	Remarks
No.		Identical	Туре	Туре	Length	
		Ports				
						Laptop cable is integrated with
1	AC	3	US 115V	<b>Un-shielded</b>	2m	AC Adapter
2	USB	1	USB	<b>Un-shielded</b>	2m	
3	Parallel	1	DB25	Shielded	2m	
4	Serial	1	DB9	Shielded	2m	

#### **TEST SETUP**

The EUT is installed in the laptop computer.

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#### SETUP DIAGRAM FOR DIGITAL DEVICES



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# 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.

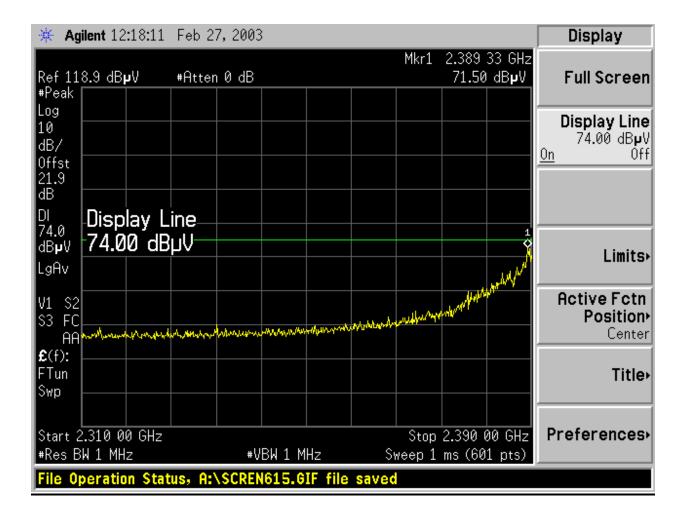
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels within the 2.4 GHz band.

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.

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



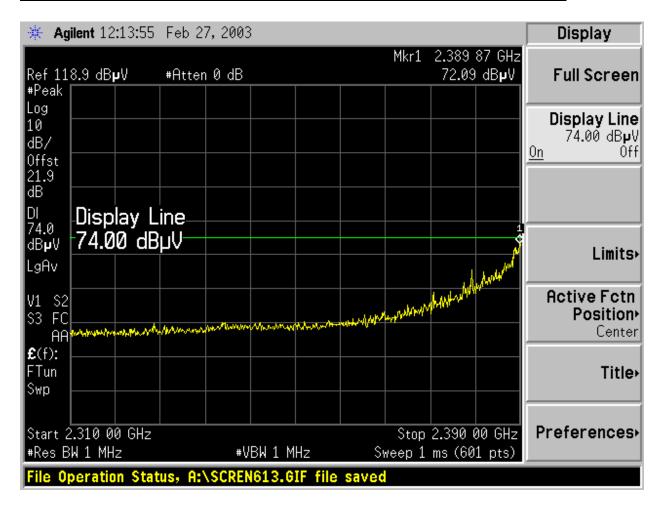
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## ADJACENT RESTRICTED BAND (Fund = 2.412GHz, NORMAL MODE, HORIZONTAL, AVERAGE

🔆 Ag	🔆 Agilent 12:17:20 Feb 27, 2003										Display
Ref 11	8 9 dB <b>i</b>	ιU	#Atter	n d dB				Mkr1		00 GHz dB <b>µ</b> V	Full Screen
#Peak									52.00		i un sor con
Log 10											Display Line
dB7											54.00 dBµV
Offst 21.9 dB											<u>On</u> Off
21.9 dB											
DI	Diep	lay L	ino								
DI 54.0	51 0	0 dB	""⊂— ``I∐								
dB <b>µ</b> V L∞0u	J4.0	ยนบ	μv								Limits⊦
LgAv											
V1 S2										1	Active Fctn
\$3 FC										A	Position► Center
AA <b>£</b> (f):									~		
FTun											Title⊦
Swp											
Start 2.310 00 GHz         Stop 2.390 00 GHz^           #Res BW 1 MHz         #VBW 10 Hz         Sweep 6.238 s (601 pts)							Preferences				
									o s (60	i pts)	
File 0	peratio	n stat	us, H:	VACKEN	614.6	IF THE	saved				

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



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

🔆 Agilent 12:12:37 Feb 27, 2003									Display		
Ref 11 #Reak	8.9 dB	٧u	#Atter	ı0 dB				Mkr1		87 GHz dB <b>µ</b> V	Full Screen
#Peak Log 10											Display Line
dB7											54.00 dBµV <u>On</u> Off
Offst 21.9 dB	D:	I I									
DI 54.0 dB <b>µ</b> V		lay L 0 dB									Limits⊦
LgAv										1	Active Fctn
V1 S2 S3 FC AA									~		Position Center
€(f): FTun Swp											Title∙
	210.0							Ĉi ar	2 200	20. CU-0	Preferences.
<b>#</b> Res B	Start 2.310 00 GHz         Stop 2.390 00 GHz           #Res BW 1 MHz         #VBW 10 Hz         Sweep 6.238 s (601 pts)           Copyright 2000-2002 Agilent Technologies							Fielelences			
Cupyri	gnt Ze	00-20	JOZ HQ	nent I	ecunul	ugies					

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

🔆 Agilent 12:22:50 Feb 27, 2003	Display
Mkr1 2.483 75 GHz Ref 118.9 dBµV #Atten 0 dB 67.86 dBµV	Full Screen
#Peak Log	Display Line
10 dB/	Display Line 74.00 dBµV
0ffst 21.9 dB	<u>On</u> Off
dB	
DI 74.0 dBpv <b>74.00 dB</b> pV	
	Limits⊦
LgAv MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM	
L9HV MMM/MM/MM/MM/MM/MM/MM/MM/MM/MM/MM/MM/MM	Active Fctn Position Center
£(f):	
FTun Swp	Title⊦
Start 2.483 50 GHz         Stop 2.500 00 GHz           #Res BW 1 MHz         #VBW 1 MHz         Sweep 1 ms (601 pts)	Preferences.
File Operation Status, A:\SCREN617.GIF file saved	

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

🔆 Agi	ilent 12	:21:01	Feb 2	7,2003							Display
	=							Mkr1		50 GHz	
Ref 113 #Peak	8.9 dB	٩V	#Atter	n 0 dB					47.79	dB <b>µ</b> V	Full Screen
Log											
10											Display Line
dB/											54.00 dB <b>µ</b> V On Off
Offst											
21.9 dB											
	Dien	lay L	ino								
DI 54.0											
dB <b>µ</b> V	54.0	ØdB	μv								Limits⊦
LgAv											
V1 S2,											Active Fctn
S3 FC											Position•
AA											Center
<b>£</b> (f):											
FTun											Title⊦
Swp											
											<b>D</b>
Start 2							~			00 GHz^	Preferences
#Res B					BW 10			p 1.28	7 s (60	1 pts)	
File Op	peratio	n Stat	us, A:	<b>\SCREN</b>	616.G	IF file	saved				

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

🔆 Agilent 12:27:02 Feb 27, 2003	Display
Mkr1 2.483 58 GHz Ref 118.9 dB <b>µ</b> V #Atten 0 dB 70.20 dB <b>µ</b> V #Peak	Full Screen
Log 10	Display Line 74.00 dBµV
dB/ Offst 21.9 dB	<u>On</u> Öff
DI 74.0 двµv \$74.00 dBµV	
	Limits≀
LgAv MMMMmMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM	Active Fctn Position• Center
£(f): FTun Swp	Title⊧
Start 2.483 50 GHz         Stop 2.500 00 GHz           #Res BW 1 MHz         #VBW 1 MHz         Sweep 1 ms (601 pts)	Preferences.
<pre>#Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts) File Operation Status, A:\SCREN619.GIF file saved</pre>	

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

🔆 Ag	ilent 12	:25:53	Feb 2	7,2003	:						Display
Ref 11	8.9 dB	٧u	#Atter	0 dB				Mkr1		50 GHz dB <b>µ</b> V	Full Screen
#Peak Log											
10											Display Line
dB/											54.00 dB <b>µ</b> V On Off
Offst 21.9 dB											
dB											
DI	Disp	lay L	ine								
DI 54.0 dB <b>µ</b> V	54.0	ØdB	μV								Limita
LgAv											Limits≻
V1 S2,											Active Fctn
\$3 FG											Position Center
AA <b>£</b> (f):											
FTun											Title⊦
Swp											
Start 2						11_	<b>6</b>			00 GHzî 1	Preferences
#Res B					BW 10			p 1.28	7 s (60	1 pts)	
File 0p	peratio	in Stat	us, A:	SCREN	618.G	IF file	saved				

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#### HARMONIC AND SPURIOUS RADIATED EMISSIONS (2.412GHz, NORMAL)

02/28/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site Test Engr: Frank Ibrahim Project #: 02T1639-1 Company: Askey Computer Corporation EUT Descrip.: 802.11 a/b Dual Band Card Bus in Toshiba 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 Pre-amplifer 1-26GHz Spectrum Analyzer Horn > 18GHz Mitea NSP2600-44 T87; ARA 18-26GHz; S/N:1049 Ŧ Ŧ T72; S/N; 6739

? (2 ft) ? (2 ~ 3 ft) ? (4 ~ 6 ft) ? (12 ft)

Hi Frequency Cables

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		Avg dBuV/m	Pk Lim dBuV/m			Avg Mar dB	Notes
4.824	9.8	46.8	31.9	34.0	3.4	-36.1	0.0	1.0	49.1	34.2	74.0	54.0	-24.9	-19.8	V, 2nd Harmonic
9.648	9.8	46.0	33.3	39.2	5.3	-35.4	0.0	1.0	56.0	43.3	74.0	54.0	-18.0	-10.7	V, 4th Harmonic
4.824	9.8	44.8	32.5	34.0	3.4	-36.1	0.0	1.0	47.1	34.8	74.0	54.0	-26.9	-19.2	H. 2nd Harmonic
	98     448     32.5     34.0     3.4     -36.1     0.0     1.0     47.1     34.8       f     Measurement Frequency     Amp     Preamp Gain       Dist     Distance to Antenna     D Corr     Distance Correct to 3 meters       Read     Analyzer Reading     Avg     Average Field Strength @ 3 m       AF     Antenna Factor     Peak     Calculated Peak Field Strength       CL     Cable Loss     HPF     High Pass Filter											Pk Lim	Peak Field Margin vs	Field Streng d Strength L S. Average L S. Peak Limi	imit .imit

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

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02/28/03 High Frequency Measurement

#### HARMONIC AND SPURIOUS RADIATED EMISSIONS (2.437GHz, NORMAL)

Compliance Certification Services, Morgan Hill Open Field Site Test Engr: Frank Ibrahim Project #: 02T1639-1 Company: Askey Computer Corporation EUT Descrip.: 802.11 a/b Dual Band Card Bus in Toshiba 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 Pre-amplifer 1-26GHz Spectrum Analyz Horn > 18GHz Mitea NSP2600-44 T87; ARA 18-26GHz; S/N:1049 Ŧ T72; S/N; 6739 • Hi Frequency Cables **Peak Measurements:** Average Measurements: ? (2 ft) ? (2 ~ 3 ft) ? (4 ~ 6 ft) ? (12 ft) 1 MHz Resolution Bandwidth 1 MHz Resolution Bandwidth 1MHz Video Bandwidth 10Hz Video Bandwidth Read Avg. f Read Pk AF  $\mathbf{CL}$ D Corr HPF Peak Pk Lim Avg Lim Pk Mar Notes Dist Amp Avg Avg Mar dBuV dB dR lBnV/ dBu∖ IR/r dB BuV BuV łBuV łR 874 9.8 41.9 29 34.1 3.4 36.1 0.0 1.0 44.3 32.0 74.0 54.0 -29.7 22.0 V. 2nd Ha 311 9.8 57.1 43.5 37.0 44 -36.3 0.0 1.0 63.2 49.6 74.0 54.0 -10.8 -4.4 V. 3rd Harmoni 0.8 3/1 1 874 18 3 20 4 74.0 54 ( 15 2nd H 37.0 4.4 7 311 98 54.1 40.7 -36.3 0.0 10 60.2 46.8 74.0 54.0 -138 H. 3rd Harm f Measurement Frequency Amp Preamp Gain Avg Lim Average Field Strength Limit D Corr Distance Correct to 3 meters Dist Distance to Antenna 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 CLCable Loss HPF High Pass Filter

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

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#### HARMONIC AND SPURIOUS RADIATED EMISSIONS (2.462GHz, NORMAL)

U .	ncy Measurement
Compliance Certificatio	on Services, Morgan Hill Open Field Site
Test Engr:	Frank Ibrahim
Project #:	02T1639-1
Company:	Askey Computer Corporation
EUT Descrip.:	802.11 a/b Dual Band Card Bus in Toshiba laptop
EUT M/N:	WLC221-D4, BCP3483U
Test Target:	FCC 15.247
Mode Oper:	EUT transmitting at High Channel (2462MHz), ART =15

Mitea NSP2600-44

st Target: ode Oper:	FCC 15.247 EUT transmitting at High Cl	hannel (2462MHz), ART =15	
st Equinment:			
EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Spectrum Analyzer	

8593EM Analyzer

Ŧ

- Hi	Frequency Ca	ables			
?	(2 ft)	<b>?</b> (2 ~ 3 ft)	<b>?</b> (4 ~ 6 ft)	? (12 ft)	

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Tes E

T72: S/N: 6739

Peak Measurements: 1 MHz Resolution Bandwidth 1MHz Video Bandwidth

: Average Measurements: width 1 MHz Resolution Bandwidth 10Hz Video Bandwidth

T87; ARA 18-26GHz; S/N:1049

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		Avg Lim dBuV/m		Avg Mar dB	Notes	
4.924	9.8	54.0	51.6	34.1	3.0	-36.1	0.0	1.0	56.1	53.7	74.0	54.0	-17.9	-0.3	V, 2nd Harmonic	
7.386	9.8	50.9	45.7	37.1	3.9	-36.2	0.0	1.0	56.7	51.5	74.0	54.0	-17.3	-2.5	V, 3rd Harmonic	
4.924	9.8	53.5	51.7	34.1	3.0	-36.1	0.0	1.0	55.6	53.8	74.0	54.0	-18.4	-0.2	H, 2nd Harmonic	
7.386	9.8	44.9	37.1	37.1	3.9	-36.2	0.0	1.0	50.7	42.9	74.0	54.0	-23.3	-11.1	H, 3rd Harmonic	
12.310	9.8	43.7	33.7	39.8	5.5	-36.4	0.0	1.0	53.5	43.5	74.0	54.0	-20.5	-10.5	H, 5th Harmonic	
10.616	98	40.3	39.2	38.8	5.0	-35.6	0.0	1.0	49.4	48.3	74.0	54.0	-24.6	-5.7	H. Spurious	
	f Measurement Frequency Amp Preamp Gain Dist Distance to Antenna D Corr Distance Correct to 3 meters											Avg Lim Average Field Strength Limit Pk Lim Peak Field Strength Limit				
	Read	d Analyzer Reading Avg Average Field Strength @ 3 m									Avg Mar	Margin vs	. Average L	limit		
	AF Antenna Factor Peak Calculated Peak Field Strength								Pk Mar Margin vs. Peak Limit							
	CL	Cable Loss				HPF	High Pas	s Filter								

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

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## HARMONIC AND SPURIOUS RADIATED EMISSIONS (5.745GHz, NORMAL)

03/03/03 <b>Complia</b>	03/03/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site														
EUT M/N Test Targ	roject #:     02T1639-II       ompany:     Askey Computer Corporation       UT Descrip.:     802.11 a/b Dual Band Card Bus in Toshiba laptop       UT M/N:     WLC221-D4, BCP3483U       est Target:     FCC 15.247       fode Oper:     EUT transmitting at Low Channel (5.745GHz), Normal Mode, ART =15.0														
EMCO T72: S/?	Finde Oper:       EO1 transmitting at Low Channel (5:743GHz), Norman Mode, AKT = 13.0         Peet Equinment:       EMCO Horn 1-18GHz         FT2: S/N: 6739       Pre-amolifer 1-26GHz         Miteo NSP2600-44       Spectrum Analyzer         Ft Frequency Cables       T87; ARA 18-26GHz; S/N:1049         ? (2 ft)       ? (2 - 3 ft)         ? (2 ft)       ? (12 ft)														
						l			Video Bandy		10Hz Video		idii		
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
11.490	9.8	55.8	42.1	39.7	5.3	-36.0	0.0	1.0	65.7	52.0	74.0	54.0	-8.3	-2.0	V, 2nd Harmonic
11,490	9.8	71.2	44.5	29.7	5.3	-36.0	0.0	1.0	71.1	44.4	74.0	54.0	-2.9	-9.6	H, 2nd Harmonic
	f Dist Read AF CL	Measureme Distance to Analyzer R Antenna Fa Cable Loss	Reading actor	у		Avg	Average	Correc Field S d Peak	ct to 3 mete Strength @ c Field Stre r	3 m		Pk Lim	Peak Field Margin vs	Field Streng d Strength L a. Average L a. Peak Limi	.imit .imit

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

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#### HARMONIC AND SPURIOUS RADIATED EMISSIONS (5.785GHz, NORMAL)

#### 03/03/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site Test Engr: Frank Ibrahim Project #: 02T1639-1 Company: EUT Descrip.: Askey Computer Corporation 802.11 a/b Dual Band Card Bus in Toshiba laptop EUT M/N: WLC221-D4, BCP3483U Test Target: FCC 15.247 Mode Oper: EUT transmitting at Mid Channel (5.785GHz), Normal Mode, ART =15.0 Test Equipment: EMCO Horn 1-18GHz Pre-amplifer 1-26GHz Spectrum Analyzer Horn > 18GHz Miteg NSP2600-44 8593EM Analyzer T87; ARA 18-26GHz; S/N:1049 T72; S/N: 6739 • Hi Frequency Cables Peak Measurements: Average Measurements: ? (2 ~ 3 ft) ? (4 ~ 6 ft) ? (12 ft) ? (2 ft) 1 MHz Resolution Bandwidth 1 MHz Resolution Bandwidth 1MHz Video Bandwidth 10Hz Video Bandwidth f Dist Read Pk Read Avg. AF CL Amp D Corr HPF Peak Avg Pk Lim Avg Lim Pk Mar Avg Ma Notes GH2 dBuV dB |BnV/ dBuV/ı dBuV iB/r dB dB |BuV/ dBuV/ı 11 570 98 53.8 30 / 30 3 5.3 36.0 0.0 1.0 63 3 49 1 74.0 54.0 10.7 49 2nd Ha 11.570 0.8 56 / 42.1 30.3 5 2 -36.0 0.0 1.0 65.0 51.6 74.0 54.0 8 1 24 H. 2nd Hs 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 Average Field Strength @ 3 m Avg Mar Margin vs. Average Limit Avg AF Antenna Factor Peak Calculated Peak Field Strength Pk Mar Margin vs. Peak Limit Cable Loss HPF High Pass Filter CL

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

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2nd Ha

#### HARMONIC AND SPURIOUS RADIATED EMISSIONS (5.825GHz, NORMAL)

#### 03/03/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site Test Engr: Frank Ibrahim Project #: 02T1639-1 Company: EUT Descrip.: Askey Computer Corporation 802.11 a/b Dual Band Card Bus in Toshiba laptop EUT M/N: WLC221-D4, BCP3483U Test Target: FCC 15.247 Mode Oper: EUT transmitting at High Channel (5.825GHz), Normal Mode, ART =15.0 Test Equipment: EMCO Horn 1-18GHz Pre-amplifer 1-26GHz Spectrum Analyzer Horn > 18GHz Miteg NSP2600-44 8593EM Analyzer T87; ARA 18-26GHz; S/N:1049 T72; S/N: 6739 • Hi Frequency Cables Peak Measurements: Average Measurements: ? (2 ~ 3 ft) ? (4 ~ 6 ft) ? (12 ft) ? (2 ft) 1 MHz Resolution Bandwidth 1 MHz Resolution Bandwidth 1MHz Video Bandwidth 10Hz Video Bandwidth f Dist Read Pk Read Avg. AF CL Amp D Corr HPF Peak Avg Pk Lim Avg Lim Pk Mar Avg Ma з**н**а dBuV dB BnV/ dBuV iB/r dB dB BuV/ dBuV/ı dBuV/ı 11 650 98 51.4 37 5 30 3 5.3 36.1 0.0 1.0 47.0 74.0 54.0 13.1 7.0 11.650 0.8 56.9 41.8 30.3 5 2 36.1 0.0 1.0 .... 51.3 74.0 54.0 - - -2.7 H 2nd H 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 Average Field Strength @ 3 m Avg Mar Margin vs. Average Limit Avg AF Antenna Factor Peak Calculated Peak Field Strength Pk Mar Margin vs. Peak Limit Cable Loss HPF High Pass Filter CL

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

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#### HARMONIC AND SPURIOUS RADIATED EMISSIONS (5.76GHz, TURBO)

#### 03/03/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site Test Engr: Frank Ibrahim Project #: 02T1639-1 Company: EUT Descrip.: Askey Computer Corporation 802.11 a/b Dual Band Card Bus in Toshiba laptop EUT M/N: WLC221-D4, BCP3483U Test Target: FCC 15.247 Mode Oper: EUT transmitting at Low Channel (5.76GHz), Turbo Mode, ART =15.0 Test Equipment: EMCO Horn 1-18GHz Pre-amplifer 1-26GHz Spectrum Analyzer Horn > 18GHz Miteg NSP2600-44 8593EM Analyzer T87; ARA 18-26GHz; S/N:1049 T72; S/N: 6739 • Hi Frequency Cables Peak Measurements: Average Measurements: ? (2 ~ 3 ft) ? (4 ~ 6 ft) ? (12 ft) ? (2 ft) 1 MHz Resolution Bandwidth 1 MHz Resolution Bandwidth 1MHz Video Bandwidth 10Hz Video Bandwidth Avg Lim Pk Mar f Dist Read Pk Read Avg. AF CL Amp D Corr HPF Peak Avg Pk Lim Avg Ma Notes GH2 dBuV dB |BnV/ dBuV/ı dBuV iB/r dB dB BuV/ dBuV/ı 11 520 98 54.5 30 39.2 5.3 36.0 0.0 10 63.9 49.0 74.0 54.0 10.1 5.0 2nd Ha 11.520 0.8 58.1 12.4 30.2 5 2 -36.0 0.0 1.0 67.6 51 8 74.0 54.0 6 4 2 2 H 2nd H 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 Average Field Strength @ 3 m Avg Mar Margin vs. Average Limit Avg AF Antenna Factor Peak Calculated Peak Field Strength Pk Mar Margin vs. Peak Limit Cable Loss HPF High Pass Filter CL

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

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#### HARMONIC AND SPURIOUS RADIATED EMISSIONS (5.80GHz, TURBO)

03/03/03 Complia			Measureme Services, Mo		lill Op	en Field	Site								
EUT M/I Test Tar	opject #:       02T1639-1         mpany:       Askey Computer Corporation         T Descrip.:       802.11 a/b Dual Band Card Bus in Toshiba laptop         T M/N:       WLC221-D4, BCP3483U         st Target:       FCC 15.247         de Oper:       EUT transmitting at High Channel (5.80GHz), Turbo Mode, ART =15.0														
EMCO T72: S/I	Mode Oper:       EUT transmitting at High Channel (5.80GHz), Turbo Mode, ART =15.0         Test Equipment:         EMCO Horn 1-18GHz       Pre-amolifer 1-26GHz       Spectrum Analyzer       Horn > 18GHz         T72: S/N: 6739       Miteo NSP2600-44       Spectrum Analyzer       T87; ARA 18-26GHz; S/N: 1049         Pil Frequency Cables       Peak Measurements:       Average Measurements:         1 MHz Resolution Bandwidth       1 MHz Resolution Bandwidth       1 MHz 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		Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
11.600	9.8	54.8	40.9	39.3	5.3	-36.1	0.0	1.0	64.3	50.4	74.0	54.0	-9.7	-3.6	V, 2nd Harmonic
11.600	9.8	61.4	44.2	30 3	53	-36.1	0.0	1.0	70.9	53.7	74.0	54.0	-31	-0.3	H_ 2nd Harmonic
	f Dist Read AF CL	Measurem Distance to Analyzer F Antenna Fa Cable Loss	Reading	у		Amp D Corr Avg Peak HPF	ImpPreamp GainAvg LimAverage Fi0 CorrDistance Correct to 3 metersPk LimPeak FieldavgAverage Field Strength @ 3 mAvg MarMargin vs.eakCalculated Peak Field StrengthPk MarMargin vs.							l Strength Li	mit mit

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

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## DIGITAL DEVICE RADIATED EMISSIONS

	FC	C, VCCI, ( , CSA, TU TEREY R(	CISPR, CE V, BSMI, I OAD, SAN	AUSTEL, DHHS, NVL JOSE, CA FAX: (408) 4	NZ AP 95037-9001	1	Proje Repo Date& T Test E	ort #: `ime:	<u>02T1639-</u> 030228B <sup>1</sup> 02/28/03 Thanh No	1 9:40PM	
:	Test Con T	Descrij Ifigura Type of	tion : Test:	801.11a/ EUT in T FCC Par	omputer C b WLAN C oshiba La t 15 Class	Card, Mod pTop , Mo	el : WLC			U	
	Mode o	f Operd	ition:	<u>TX</u>					<< N	Main Sheet	
Freq.	Reading			Pre-amp		Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)		(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
356.34	48.10	14.59	4.63	28.25	39.07	46.00	-6.93	3mV	270.00	1.00	Р
38.93	44.00	13.69	1.64	28.50	30.83	40.00	-9.17	3mV	180.00	1.00	P
330.00	44.90	13.83	4.44	28.09	35.07	46.00	-10.93	3mH	0.00	1.00	P
288.01	45.40	12.77	4.12	27.91	34.37	46.00	-11.63	3mH	270.00	1.00	P
307.22	44.70	13.17	4.26	27.95	34.19	46.00	-11.81	3mH	270.00	1.00	P
243.63 6 Worst	44.60 Data	11.72	3.80	27.98	32.14	46.00	-13.86	3mV	90.00	1.00	Р

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# 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.

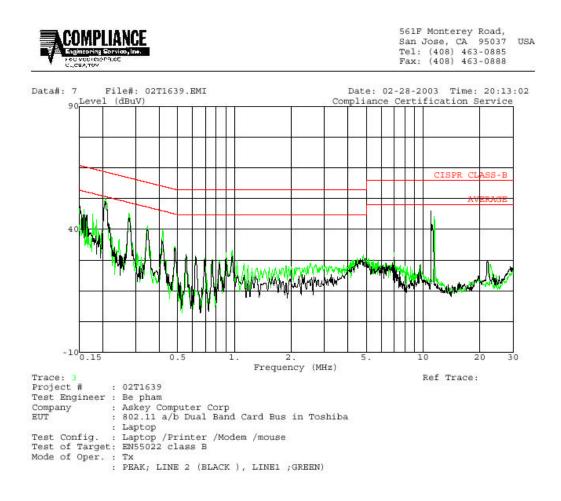
## **RESULTS**

No non-compliance noted:

Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	( <b>dB</b> )	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.21	52.70			0.00	64.40	54.40	-11.70	-1.70	L1
0.28	46.06			0.00	62.37	52.37	-16.31	-6.31	L1
11.44	45.18			0.00	60.00	50.00	-14.82	-4.82	L1
0.21	51.32			0.00	64.40	54.40	-13.08	-3.08	L2
0.28	44.30			0.00	62.37	52.37	-18.07	-8.07	L2
11.02	47.48			0.00	60.00	50.00	-12.52	-2.52	L2

EUT installed in Toshiba laptop

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# 6.3. SETUP PHOTOS

## **Radiated Emissions, freq > 1GHz**



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**Radiated Emissions, freq < 1GHz** 

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## **Power Line Conducted Emissions**

# **END OF REPORT**

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