

FCC CFR47 PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 8 CLASS II PERMESSIVE CHANGE

CERTIFICATION TEST REPORT

FOR

802.11n Wireless PCI Adapter

MODEL NUMBER: PCI-1020

FCC ID: TUIPCI1020 IC: 6241A-PCI1020

REPORT NUMBER: 12U14287-1, Rev. A

ISSUE DATE: April 10, 2012

Prepared for LG-Ericsson Co., Ltd. 533, Hogye-1dong, Dongan-gu, Anyang-shi, Kyungki-do 431-749 Korea, Republic of Korea

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

(R)

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
	3/8/12	Initial Issue	T. LEE
А	4/10/12	Clarified cable and antenna used on EUT	T. LEE

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	LG-Ericsson Co., Ltd. 533, Hogye-1dong, Dongan-gu, Anyang-shi, Kyungki-do 431-749 Korea, Republic of Korea
EUT DESCRIPTION:	802.11n Wireless PCI Adapter
MODEL:	PCI-1020
SERIAL NUMBER:	LE11520258
DATE TESTED:	MARCH 7, 2012

APPLICABLE STANDARDS					
STANDARD	TEST RESULTS				
CFR 47 Part 15 Subpart C	Pass				
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass				
INDUSTRY CANADA RSS-GEN Issue 3	Pass				

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

Ti Ar

TIM LEE STAFF ENGINEER UL CCS

Tested By:

Mautionaup

THANH NGUYEN EMC ENGINEER UL CCS

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11n Wireless PCI Adapter, model number PCI-1020.

The radio module is manufactured by LG Ericsson Inc.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range	Mode	Output Power	Output Power	
(MHz)		(dBm)	(mW)	
2412 - 2462	802.11b	19.56	90.36	
2412 - 2462	802.11g	24.27	267.30	
2412 - 2462	802.11n HT20	22.61	182.39	
2422 - 2452	802.11n HT40	22.59	181.55	

5.3. DESCRIPTION OF AVAILABLE ANTENNA

The radio utilizes an external dipole antenna (ANTENEX), with a maximum gain of 3 dBi.

A 20 ft cable, manufactured by Times Microwave Systems, Model LMR-400 Ultraplex Coaxial Cable was connected to the radio card and the antenna, manufactured by Antenex, Model TRA24003.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Ralink Software RT3060.

The test utility software used during testing was Ralink QA Tool.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST						
Description Manufacturer Model Serial Number						
Monitor	Viewsonic VX900	VLCD26105-2W	A24044402049			
Desktop	Sony	VSIO, PCV-2210	3005395			
Mouse	Dell	M-S69	HCD52214622			
Keyboard	Dell	SK-810	CN-07N242-71616-550-)M2A			

I/O CABLES

	I/O CABLE LIST							
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks		
1	AC	1	US 115V	Un-shielded	2m	NA		
2	Video	1	DB15	Shielded	1m	One Torroid on Each End		
3	USB	1	Mouse	Un-shielded	2m	NA		
4	USB	1	Keyboard	Un-shielded	2m	NA		

TEST SETUP

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

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SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST						
Description	Manufacturer	Model	Asset	Cal Date	Cal Due	
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	6/13/2011	6/13/2012	
Preamplifier, 1300 MHz	Agilent / HP	8447D	C01048	7/16/2011	7/16/2012	
BiLog Antenna	ETS	3117	C01005	7/25/2011	7/25/2012	
Antenna, Horn, 18 GHz	EMCO	3115	C00945	6/26/2011	6/26/2012	
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	8/7/2011	8/7/2012	
PSA	Agilent	E4440A	T129	4/28/2011	4/28/2012	
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	8/6/2011	10/6/2012	

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7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1.6 dB BANDWIDTH

<u>LIMITS</u>

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	12.025	0.5
Middle	2437	11.500	0.5

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6 dB BANDWIDTH



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7.1.2. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency	Output	Limit	Margin
		Power		
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	19.56	30	-10.44
Middle	2437	18.41	30	-11.59
High	2462	19.35	30	-10.65

OUTPUT POWER



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7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

<u>LIMITS</u>

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	16.18	0.5

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6 dB BANDWIDTH



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7.2.2. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency	Output	Limit	Margin
		Power		
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	24.11	30	-5.89
Middle	2437	24.04	30	-5.96
High	2462	24.27	30	-5.73

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OUTPUT POWER



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7.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

7.3.1.6 dB BANDWIDTH

<u>LIMITS</u>

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	16.18	0.5

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6 dB BANDWIDTH



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7.3.2. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency	Output	Limit	Margin
		Power		
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	22.52	30	-7.48
Middle	2437	22.39	30	-7.61
High	2462	22.61	30	-7.39

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OUTPUT POWER



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7.4. 802.11n HT40 MODE IN THE 2.4 GHz BAND

7.4.1.6 dB BANDWIDTH

<u>LIMITS</u>

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2452	36.078	0.5

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6 dB BANDWIDTH



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7.4.2. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

Channel	Frequency	Output	Limit	Margin
		Power		
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	22.49	30	-7.51
Middle	2437	22.56	30	-7.44
High	2462	22.59	30	-7.41

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OUTPUT POWER



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8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

<u>LIMITS</u>

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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

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

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. TX ABOVE 1 GHz FOR 802.11b 1TX MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

e Aglient 23:07	1:54 Mar 6, 2012			КI	<u> ⊢req/Channel</u>
roject: 12U14287 ef 100 dBµ∨ Peak	#Atten 0 dE]	Mkr1	2.389 56 GHz 49.94 dBµ∨	Center Freq 2.35000000 GHz
9g 1 3/					Start Freq 2.31000000 GHz
57 3					Stop Freq 2.3900000 GHz
1.0 3μ∨ Av <mark>γ≥λουλοποι/</mark>	nenasahah falan (istro kalan falman ka	latularyani-milipapetanyadi	-	د مراجع مراجع مراجع مراجع مراجع مراجع مر	CF Ste 8.0000000 MHz Auto M
1 V2 3 FC					Freq Offset 0.00000000 Hz
): -un vp					Signal Track On <u>O</u>
art 2.310 00 GH Res BW 1 MHz	lz	#VBW 1 MHz	Sween 1.067	2.390 00 GHz	

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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oiect: 12U14287		Mkr1 2.48	37 773 50 GHz	
ef 100 dBµ∨ Peak	#Atten 0 dB		44.24 dBµ∨	Center Freq 2.49175000 GHz
)g				
}/				2.48350000 GHz
76 3				- Stop Fred 2.5000000 GHz
.0				CF Ste
Av				1.65000000 MHz Auto M
1 V2 3 FC				Freq Offset 0.00000000 Hz
): -un				Signal Track
vp				
art 2 493 500 00 1	CH7	Ston 2 50	0.000.00.6Hz	-1

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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HARMONICS AND SPURIOUS EMISSIONS

Company Project #: Date: Cest Engin Configura Iode:	: neer: ation:		LG-ERICSS 12U14287 3/7/2012 Thanh Nguy EUT and ren Transmit b n	ON US# en note sup node	A, INC oport P	с									
est Equip	orn 1-	18GHz	Pre-ar	nplifer	1-260	GHz	Pre-am	plifer	26-40 G H	z	Ho	orn > 18G	Hz		Limit
T73; S/	N: 6717	′@3m	▼ T144 N	/iteq 30	08A009	931 💂				▼ T89;	ARA 18-260	GHz; S/N:10	49	-	FCC 15.205
Hi Freque	ancy Cable able 2	s 2807700	12' c	able 2	28076	500	20' ca	ble 22	807500		HPF	Re	ject Filte	r <u>Pea</u>	ik Measurements
3' ca	ble 228	07700	• 12' ca	ıble 228	07600	-	20' cab	le 2280	7500 -			- R_	001	Aver RBW=	age Measurements 1MHz ; VBW=10Hz
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	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
ow Ch 824 824	3.0 3.0	50.4 47.3	48.7 45.1	33.4 33.4	6.2 6.2	-35.5 -35.5	0.0 0.0	0.0 0.0	54.5 51.5	52.8 49.3	74 74	54 54	-19.5 -22.5	-1.2 -4.7	V H
874 311 874	3.0 3.0 3.0	50.2 36.7 47.2	48.5 24.4 44.4	33.5 35.7 33.5	6.2 8.4 6.2	-35.5 -35.4 -35.5	0.0 0.0 0.0	0.0 0.0 0.0	54.4 45.3 51.4	52.8 33.0 48.6	74 74 74	54 54 54	-19.6 -28.7 -22.6	-1.2 -21.0 -5.4	V/Set 17 V/Noise floor H
311 igh Ch 924	3.0 3.0	37.7 49.9	30.1 48.5	35.7 33.5	8.4 6.3	-35.4 -35.5	0.0	0.0	46.3 54.2	38.7 52.8	74	54 54	-27.7 -19.8	-15.3 -1.2	H/Noise floor V/Set 18
386 924 386	3.0 3.0 3.0	36.8 48.8 35.8	24.2 46.7 24.0	35.8 33.5 35.8	8.4 6.3 8.4	-35.5 -35.5 -35.5	0.0 0.0 0.0	0.0 0.0 0.0	45.5 53.1 44.6	33.0 51.0 32.8	74 74 74	54 54 54	-28.5 -20.9 -29.4	-21.0 -3.0 -21.2	V/Noise floor H H/Noise floor
.v. 11.10.	.11 f Dist Read AF CL	Measureme Distance to Analyzer R Antenna Fa Cable Loss	ent Frequency Antenna Reading actor	y		Amp D Corr Avg Peak HPF	Preamp o Distance Average Calculate High Pas	Gain Corre Field ed Peal ss Filte	ct to 3 mete Strength @ k Field Strengt	ers 3 m ength		Avg Lim Pk Lim Avg Mar Pk Mar	Average I Peak Field Margin vs Margin vs	Field Streng d Strength L 5. Average I 5. Peak Limi	th Limit imit t

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8.2.2. TX ABOVE 1 GHz FOR 802.11g 1TX MODE IN THE 2.4 GHz BAND

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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miect: 12U14287		Mkr1 2.483 5	24 75 GHz	1
lef 100 dBµ∨	#Atten 0 dB	4	l6.80 dBµ∨	Center Freq
na l				2.10110000 0112
0 B/				Start Freq 2.48350000 GHz
offst .76 B				Stop Freq
1				2.5000000 GHz
4.0 Βμ∨ 1				CF Step
gAv				1.65000000 MHz <u>Auto Ma</u>
11 V2 13 FC				Freq Offset 0.00000000 Hz
(f):				Signal Track
wp				On <u>Of</u>
itart 2.483 500 00 v	GHz	Stop 2.500 0	00 00 GHz	

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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Project: 12U14287			Mkr1 2.48	3 516 50 GHz	<u> </u>
Ref 100 dBµ∨	#Atten 0 dB			52.35 dBµ∨	Center Freq 2.49175000 GHz
on l					
10 10					Start Freq
Dffst					2.40350000 GHZ
7.76 IB					Stop Freq
					2.50000000 GH2
)4.U i IBu∨ ∳					CF Step
_gAv					1.65000000 MHz <u>Auto Ma</u>
S1 V2					Freq Offset
					0.00000000 Hz
(f):					
Tun					On <u>Off</u>
5mp					
Start 2.483 500 00	GHz		Stop 2.50	0 000 00 GHz	~
Res BW 1 MHz	#VB	W 10 Hz	Sween 1.287	s (2001 nts)	

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HARMONICS AND SPURIOUS EMISSIONS

Company Project # Date: Cest Engi Configur: Mode:	v: : neer: ation:		LG-ERICSSOI 12U14287 3/7/2012 Thanh Nguyen EUT and remo Transmit g mo	N USA, I ote suppor	NC. rt PC										
fest Equi	orn 1-	18GHz	Pre-ar	nplifer	1-260	GHz	Pre-am	plifer	26-40 G H	z	Ho	orn > 18G	Hz		Limit
T73; S	/N: 6717	7 @3m	• T144 N	/liteq 30	08A009	931 🖵				- T 89;	; ARA 18-260	GHz; S/N:10/	49	•	FCC 15.205
3' c	able 2	2807700	12' c	able 2	28076	500	20' ca	ble 22	807500		HPF	Re	ject Filte	r <u>Pea</u>	<u>ik Measurements</u> W=VBW=1MHz
3' ca	ble 228	807700	• 12' ca	ble 228	07600	-	20' cab	le 2280	7500 -			- R_	001	• <u>Aver</u> RBW=	age Measurements 1MHz ; VBW=10Hz
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	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
ow Ch	()														((),,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
824 824	3.0 3.0	52.5 48.0	36.3 33.6	33.4 33.4	6.2 6.2	-35.5 -35.5	0.0	0.0 0.0	56.6 52.1	40.4 37.7	74 74	54 54	-17.4 -21.9	-13.6 -16.3	U H
lid Ch															
874 311	3.0 3.0	51.8 36.6	38.4 24.6	33.5 35.7	6.2 8.4	-35.5	0.0	0.0	56.1 45.3	42.6 33.3	74 74	54 54	-17.9 -28.7	-11.4 -20.7	V/Noise floor
874	3.0	49.6	34.2	33.5	6.2	-35.5	0.0	0.0	53.8	38.5	74	54	-20.7	-15.5	H
311	3.0	37.6	25.3	35.7	8.4	-35.4	0.0	0.0	46.3	33.9	74	54	-27.7	- 20.1	H/Noise floor
igh Ch		46.5		ac -			0.0	0.0					ac -		
924 386	3.0	49.6 36.6	34.1	33.5	6.3 8 4	-35.5	0.0	0.0	53.9 45 4	38.5 33.0	74 74	54 54	-20.1	-15.5	V V/Noise floor
924	3.0	44.2	30.8	33.5	6.3	-35.5	0.0	0.0	43.4 48.5	35.0 35.1	74 74	54 54	-28.0 -25.5	-21.0	Windise Hoor
.386	3.0	36.1	24.4	35.8	8.4	-35.5	0.0	0.0	44.9	33.1	74	54	-29.1	-20.9	H/Noise floor
ev. 11.10	f Dist Read AF CL	Measuremo Distance to Analyzer R Antenna Fa Cable Loss	ent Frequency Antenna Leading actor	y		Amp D Corr Avg Peak HPF	Preamp of Distance Average Calculato High Pas	Gain Corre Field ed Peal ss Filte	ct to 3 mete Strength @ k Field Stre r	ers 3 m ength		Avg Lim Pk Lim Avg Mar Pk Mar	Average I Peak Field Margin vs Margin vs	Field Streng d Strength L s. Average L s. Peak Limi	th Limit imit imit t

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8.2.3. TX ABOVE 1 GHz FOR 802.11n HT20 1TX MODE IN THE 2.4 GHz BAND

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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-		Mbrt 27	102 500 25 CU-	
ef 100 dBµV	#Atten 0 dB		41.10 dBµ∨	Center Freq 2.49175000 GHz
og				
B/				2.48350000 GHz
76 B				Stop Freq
4.0				2.5000000 GH2
Bµ∨ gAv i				CH Step 1.65000000 MHz Auto Ma
1 V2				
3 FC				- 0.00000000 Hz
(f): Tun				Signal Track
wp				
tart 2.483 500 00 (GHz	Stop 2.5	500 000 00 GHz	_

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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roject: 121114287		Mkr1 2 483 516 /	50 GHz
ef 100 dBµ∨ Peak	#Atten 0 dB	50.6	9 dBµ√ Center Freq 2.49175000 GHz
pg			
B/			2.48350000 GHz
ffst 76 B			Stop Freq
			2.50000000 GHZ
βAv			Auto Ma
1 V2 3 FC			Freq Offset 0.00000000 Hz
f):			
wp			On <u>Of</u>
Lart 2 493 500 00	СН2	Stop 2 500 000 (

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HARMONICS AND SPURIOUS EMISSIONS

Company Project # Date: Test Engi Configur: Mode:	y: : neer: ation:		LG-ERICSS 12U14287 3/7/2012 Thanh Nguy EUT and ren Transmit HT	CON USA ren note sup f 20 moo	A, INC oport F de	PC									
<u>est Equi</u>	orn 1-	18GH7	Pre-ar	nnlifer	1-26	GH7	Pre-am	nlifer	26-40GH	7	На	orn > 180	H7		Limit
T73; S	/N: 6717	7 @3m	• T144 N	Aliteq 30	08A00	931 🖵		-pinor	20 10 011	- T89;	ARA 18-260	Hz; S/N:10	49	-	FCC 15.205
- Hi Frequ	ency Cable	95								a					· · ·
3' c	able 2	2807700	12' c	able 2	2807	600	20' ca	ble 22	807500		HPF	Re	ject Filte	r <u>Pea</u> RB	<u>k Measurements</u> W=VBW=1MHz
3' ca	ble 228	07700	• 12' ca	able 228	07600	-	20' cab	le 2280	7500 -			- R_	001	• Aver RBW=	age Measurements 1MHz ; VBW=10Hz
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	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
ow Ch .824 .824	3.0 3.0	48.0 45.4	32.8 31.2	33.4 33.4	6.2 6.2	-35.5 -35.5	0.0 0.0	0.0 0.0	52.1 49.5	37.0 35.4	74 74	54 54	-21.9 -24.5	-17.0 -18.6	V H
Iid Ch 874	3.0	50.5	35.5	33.5	6.2	-35.5	0.0	0.0	54.7	39.7	74	54	-19.3	-14.3	V
.311	3.0	36.5	24.8	35.7	8.4	-35.4	0.0	0.0	45.1	33.4	74	54	-28.9	-20.6	V/Noise floor
874 311	3.0 3.0	47.9 36.5	30.5 25.5	33.5 35.7	6.2 8.4	-35.5 -35.4	0.0	0.0	52.1 45.1	34.7 34.2	74 74	54 54	-21.9 -28.9	-19.3 -19.8	H H/Noise floor
igh Ch															
924 386	3.0 3.0	50.6 35.7	33.9 25.5	33.5 35.8	6.3 8.4	-35.5 -35.5	0.0	0.0	55.0 44.5	38.2 34.2	74 74	54 54	-19.0 -29.5	-15.8 -19.8	V V/Noise floor
924	3.0	45.4	29.4	33.5	6.3	-35.5	0.0	0.0	49.7	33.7	74	54	-24.3	-20.3	Н
.386 o other o	3.0 emissior	36.1 Is were dete	25.4 cted above the	35.8 system	8.4 noise f	-35.5 loor	0.0	0.0	44.8	34.2	74	54	-29.2	-19.8	H/Noise floor
ev. 11.10	f Dist Read AF CL	Measurem Distance to Analyzer R Antenna Fa Cable Loss	ent Frequency o Antenna Leading actor	у		Amp D Corr Avg Peak HPF	Preamp (Distance Average Calculate High Pas	Gain Corre Field ed Peal ss Filte	ct to 3 mete Strength @ k Field Stre r	ers 3 m ength		Avg Lim Pk Lim Avg Mar Pk Mar	Average I Peak Fiel Margin vs Margin vs	Field Streng d Strength L s. Average L s. Peak Limi	th Limit imit imit t

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8.2.4. TX ABOVE 1 GHz FOR 802.11n HT40 1TX MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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roject: 12U14287		 Mkr1 2.390	00 GHz	
tef 100 dBµ∨ Peak	#Atten 0 dB	38.1	3 dBµ∨	Center Freq 2.35000000 GHz
og 0 B/				Start Freq 2.31000000 GHz
.61 B				Stop Freq 2.3900000 GHz
4.0 Βμ√ gAv				CF Step 8.00000000 MHz <u>Auto Ma</u>
1 V2 3 FC				Freq Offset 0.00000000 Hz
(f): Tun wp				Signal Track ^{On <u>Of</u>}
itart 2.310 00 GHz		 Stop 2.390	00 GHz	

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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Project: 12U14287		Mkr1 2.390 00 GHz	
Ref 100 dBµ∨ #Peak	#Atten 0 dB	45.73 dBµ∨	Center Freq 2.3500000 GHz
.og			Start Freq 2.31000000 GHz
7.61 IB			Stop Freq 2.3900000 GHz
i4.0 IBμ√ gAv			- CF Step -1 8.0000000 MHz Auto Ma
61 V2			Freq Offset 0.00000000 Hz
(f): Tun Swp			Signal Track
Start 2.310 00 GHz	#\/B)A(10 H)	Stop 2.390 00 GHz z Sween 6 238 s (2001 ptc)	

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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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roject: 121114287		Mbr1 27	83 607 25 GHz	
ef 100 dBµ∨	#Atten 0 dB		40.12 dBµ∨	Center Freq 2.49175000 GHz
Dg				
) B/				Start Freq 2.48350000 GHz
ffst 72				Stop Fred
				2.5000000 GHz
I.O Bu∀				CF Ster
JAV				1.6500000 MHz Auto Ma
1 V2				Freq Offset
3 FC				0.00000000 Hz
ή): Γυη				Signal Track
wp				On <u>Of</u>
				ļ

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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oject: 12U14287		Mkr1 2.48	3 722 75 GHz	
e f 100 dB µ∨ 'eak	#Atten 0 dB		47.73 dBµ∨	Center Freq 2.49175000 GHz
g				
				Start Freq 2.48350000 GHz
72 				- Stop Fred 2.5000000 GHz
.0				CF Ste
Av o		 		1.6500000 MHz Auto M
V2 FC				Freq Offset 0.00000000 Hz
):				Signal Track
vp				
art 2 483 500 00 (SHz	Stop 2.50	0.000.00.GHz	-1

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HARMONICS AND SPURIOUS EMISSIONS

Company Project # Date: Test Engi Configur Mode:	y: : ineer: ation:		LG-ERICSS 12U14287 3/7/2012 Thanh Nguy EUT and rer Transmit H7	CON US σen note suj Γ 40 mo	A, INC oport P de	c									
Horn 1-18GHz Pre-amplifer 1-26GHz							Pre-am	plifer	26-40GH	z	Но	orn > 18G	iHz		Limit
T73; S/N: 6717 @3m					T89; ARA 18-26GHz; S/N:1049							•	FCC 15.205		
Hi Frequ	iency Cabl	es	1					h. h. ac	007500						l. Moosuromonts
3' 0	3' cable 22807700 12' cable 2280		28076	500	20' ca	ble 22	807500	HPF		Re	ject Filte	r <u>rea</u> RB	W=VBW=1MHz		
3 62	adie 220	507700	• 12' ca	able 228	07600	•	20' cable 22807500			R_001			001	RBW=1MHz ; VBW=10Hz	
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz .ow Ch	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
.844	3.0	42.9	31.3	33.5	6.2	-35.5	0.0	0.0	47.0	35.4	74	54	-27.0	-18.6	V
.266	3.0	36.3	25.3	35.6	8.4	-35.4	0.0	0.0	44.8	33.9 32.5	74	54 54	-29.2	-20.1	V/Noise floor
.266	3.0	36.7	28.3	35.6	0.2 8.4	-35.5	0.0	0.0	45.2	33.9	74	54	-29.3	-21.5	V/Noise floor
lid Ch															
.874	3.0	48.6	34.7	33.5	6.2	-35.5	0.0	0.0	52.8	38.9	74	54	-21.2	-15.1	V
.311	3.0	37.1	24.9	35.7	8.4	-35.4	0.0	0.0	45.7	33.5	74	54	-28.3	-20.5	V/Noise floor
.874	3.0	36.1	24.3	35.7	0.2 8.4	-35.5	0.0	0.0	44.8	32.9	74	54	-25.4	-10.0	H/Noise floor
ligh Ch															
.904	3.0	42.1	29.6	33.5	6.3	-35.5	0.0	0.0	46.4	33.9	74	54	-27.6	-20.1	v
7.356	3.0	36.2	24.6	35.8	8.4	-35.4	0.0	0.0	45.0	33.3	74	54	-29.0	-20.7	V/Noise floor
356	3.0	35.9	20.0	35.5	0.3 84	-35.5	0.0	0.0	43.3	33.0	74	54 54	-30.7	-23.7	H/Noise floor
o other	emissio	ns were dete	cted above the	system	noise f	loor									
ev. 11.10.11 f Measurement Frequency Amp Dist Distance to Antenna D Corr Read Analyzer Reading Avg AF Antenna Factor Peak CL Cable Loss HPF						Preamp Gain Distance Correct to 3 meters Average Field Strength @ 3 m Calculated Peak Field Strength High Pass Filter					Avg LimAverage Field Strength LimitPk LimPeak Field Strength LimitAvg MarMargin vs. Average LimitPk MarMargin vs. Peak Limit				

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8.3. RECEIVER ABOVE 1 GHz

8.3.1. RECEIVER ABOVE 1 GHz IN THE 2.4 GHz BAND

Horn 1-18GHz T73; SN: 6717 @3m Pre-amplifer 1-26GHz T44 Miteq Pre-amplifer 26-40GHz T Horn > 18GHz RX Image: Sine State 3' cable 22807700 12' cable 22807600 20' cable 22807500 Image: Sine State												ımber-A C	m Cha A, INC	nt emont 5 ON USA en aote sup	Measureme Services, Fre LG-ERICSS 12U14287 3/7/2012 Thanh Nguya EUT and ren Receive	Frequency rtification S	High nce Ce y: t: ineer: ation: <u>ipment:</u>	Complia Compan Project # Date: Test Eng Configur Mode: <u>Test Equ</u>
T73; SIN: 6717 @3m T144 Miteq 3008A00931 Rx I Frequency Cables 3' cable 22807700 12' cable 22807600 20' cable 22807500 Reject Filter Reject Filter Regerate Mean RBW=1MHz f Dist Read Pk Read Avg. AF CL Amp D Corr Fltr Peak Avg Pk Lim Avg Lim Pk Mar Avg Mar GHz (m) dBuV dBuV dB	Limit			Hz	n > 18G	Hor		z	26-40GH	plifer	Pre-am	GHz	1-26	nplifer	Pre-an	18GHz	orn 1-	Н
In Frequency Cables 12' cable 22807600 20' cable 22807500 Percent and a constraints of the constrand constraints of the constraint of the constraint	(RSS 210	▼ F	•					•				931 🕌	08A00	Aiteq 30	▼ T144 N	7 @3m	S/N: 671	T73; S
f Dist Read Pk Read Avg. AF CL Amp D Corr Fltr Peak Avg Pk Lim Avg Lim Pk Mar Avg Mar GHz (m) dBuV dBuV dB/m dB dB dB dB dB dB/w/m dBuV/m dBuV/m dBuV/m dBuV/m dB dB dB Mid Ch dB	asurements BW=1MHz easurements ; VBW=10Hz	<u>Peak M</u> RBW=V <u>Average 1</u> RBW=1MF	er <u>A</u> RB	ect Filte	Rej		HPF		807500	ble 22 e 2280	20' cal	000 -	2 8076 07600	able 2 ble 2280	12' c	es 22807700 807700	uency Cabl cable 2 able 228	Hi Frequ 3' (3' ca
GHz (m) dBuV dBv/m dB dB dB dB dB dB dB dBuV/m dBuV/m dBuV/m dB dB dB Mid Ch - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -	Notes	Mar	Avg M	Pk Mar	Avg Lim	m	Pk L	Avg	Peak	Fltr	D Corr	Amp	CL	AF	Read Avg.	Read Pk	Dist	f
Into L	(V/H)	B	dB	dB	lBuV/m	m/	dBuV	dBuV/m	dBuV/m	dB	dB	dB	dB	dB/m	dBuV	dBuV	(m)	GHz
0.075 3.0 53.6 43.2 24.1 2.8 -38.7 0.0 0.0 41.8 31.5 74 54 -32.2 -22.5 500 3.0 53.5 35.5 25.6 3.3 -38.1 0.0 0.0 44.3 26.3 74 54 -29.7 -27.7 610 3.0 54.3 38.6 26.0 3.0 174 54 -28.2 -23.9 880 3.0 46.7 33.5 27.0 3.7 -37.6 0.0 0.0 49.8 20.6 74 54 -28.2 -23.9 880 3.0 46.0 32.6 28.3 4.2 -37.1 0.0 0.0 41.5 28.0 74 54 -32.5 -26.0 503 3.0 60.1 45.4 25.6 3.3 -38.1 0.0 0.0 50.9 36.3 74 54 -23.1 -17.7 6 other emissions were detected above the system noise floor. - - - - - - - - - <td>V</td> <td>).6</td> <td>-20.6</td> <td>-32.4</td> <td>54</td> <td></td> <td>74</td> <td>33.4</td> <td>41.6</td> <td>0.0</td> <td>0.0</td> <td>-38.8</td> <td>2.7</td> <td>23.9</td> <td>45.6</td> <td>53.8</td> <td>3.0</td> <td>.005</td>	V).6	-20.6	-32.4	54		74	33.4	41.6	0.0	0.0	-38.8	2.7	23.9	45.6	53.8	3.0	.005
500 3.0 53.5 35.5 25.6 3.3 -38.1 0.0 0.0 44.3 26.3 74 54 -29.7 -27.7 610 3.0 54.3 38.6 26.0 3.5 38.0 0.0 0.0 44.3 26.3 74 54 -29.7 -27.7 880 3.0 54.3 38.6 26.0 3.5 -38.0 0.0 0.0 45.8 30.1 74 54 -28.2 -23.9 -27.4 300 3.0 46.0 32.6 28.3 4.2 -37.1 0.0 0.0 41.5 28.0 74 54 -34.2 -27.4 300 3.0 46.0 32.6 28.3 4.2 -37.1 0.0 0.0 41.5 28.0 74 54 -32.5 -26.0 503 3.0 60.1 45.4 25.6 3.3 -38.1 0.0 0.0 50.9 36.3 74 54 -23.1 -17.7 a other emissions were detected above the system noise floor.	<u>v</u>	2.5	-22.5	-32.2	54		74	31.5	41.8	0.0	0.0	-38.7	2.8	24.1	43.2	53.6	3.0	075
f Measurement Frequency Amp Preamp Gain Avg Lim Avg Lim Average Field Strength Limit Px. 11.10.11 Preamp Gain Preamp Gain Avg Average Field Strength Limit Avg Mar Margin vs. Average Limit	v	3.0	-27.7	-29.7	54 54		74	26.3	44.3 45.8	0.0	0.0	-38.1	3.3	25.6 26.0	35.5	53.5 54.3	3.0	500 610
300 3.0 46.0 32.6 28.3 4.2 -37.1 0.0 0.0 41.5 28.0 74 54 -32.5 -26.0 503 3.0 60.1 45.4 25.6 3.3 -38.1 0.0 0.0 50.9 36.3 74 54 -32.5 -26.0 co other emissions were detected above the system noise floor.	v	7.4	-27.4	-34.2	54		74	26.6	39.8	0.0	0.0	-37.6	3.7	27.0	33.5	46.7	3.0	880
503 3.0 60.1 45.4 25.6 3.3 -38.1 0.0 0.0 50.9 36.3 74 54 -23.1 -17.7 o other emissions were detected above the system noise floor.	V	5.0	-26.0	-32.5	54		74	28.0	41.5	0.0	0.0	-37.1	4.2	28.3	32.6	46.0	3.0	300
o other emissions were detected above the system noise floor. ev. 11.10.11 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	Н	7.7	-17.7	-23.1	54		74	36.3	50.9	0.0	0.0	-38.1	3.3	25.6	45.4	60.1	3.0	.503
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																	0.11	.ev. 11.10
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	it	Strength Li	Field Str	Average F	voLim					iain	Preamp (Amp		7	ent Frequency	Measureme	f	
Read Analyzer Reading Avg Average Field Strength @ 3 m Avg Mar Margin vs. Average Limit	Pk Lim Peak Field Strength Limit					1	Distance Correct to 3 meters					Dist Distance to Antenna D Corr						
-		Avg Mar Margin vs. Average Limit					Average Field Strength @ 3 m					Read Analyzer Reading Avg						
AF Antenna Factor Peak Calculated Peak Field Strength Pk Mar Margin vs. Peak Limit		Pk Mar Margin vs. Peak Limit					Calculated Peak Field Strength					AF Antenna Factor Peak						
CL Cable Loss HPF High Pass Filter									r	s Filter	High Pas	HPF			5	Cable Loss	CL	

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WORST-CASE BELOW 1 GHz 8.4.

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



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



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VERTICAL DATA

Model / De	evice:PCI-	1020/ 802n	Wireless PCI						
Config / O	ther:EUT	inside the	PC						
Test By:T	hanh Nguy	yen							
Range 1 3	0 - 1000MI	Hz							
Test	Meter	Detector	Pre-Amp Gain	Antenna	Corrected	Class B	QP	Height	Polarity
Frequency	Reading		+ cable loss	Factor	Reading	Limit	Margin		
MHz	dB(µV)		dB	dBm ⁻¹	dB(µV/m)	dB(µV/m)	dB	cm	
78.2674	50.06	PK	-27.1	7.8	30.76	40	-9.24	200	Horz
118.5871	45.69	PK	-26.7	13.8	32.79	43.5	-10.71	300	Horz
126.5348	47.53	PK	-26.8	13.8	34.53	43.5	-8.97	200	Horz
152.7038	43.31	PK	-26.6	12	28.71	43.5	-14.79	200	Horz
Range 1 3	0 - 1000MI	Hz							
Test	Meter	Detector	Pre-Amp Gair	Antenna	Corrected	Class B	QP	Height	Polarity
Frequency	Reading		+ cable loss	Factor	Reading	Limit	Margin		
MHz	dB(µV)		dB	dBm ⁻¹	dB(µV/m)	dB(µV/m)	dB	cm	
30	42.82	PK	-27.5	21.3	36.62	40	-3.38	100	Vert
64.6982	58.29	PK	-27.2	7.7	38.79	40	-1.21	300	Vert
64.6982	42.63	QP	-27.2	7.7	23.13	40	-16.87	339	Vert
71.0951	54.59	PK	-27.1	8.1	35.59	40	-4.41	100	Vert
118.9748	50.67	PK	-26.7	13.9	37.87	43.5	-5.63	100	Vert
78.2674	53.84	PK	-27.1	7.8	34.54	40	-5.46	100	Vert
204.4604	50.46	PK	-26.3	11	35.16	43.5	-8.34	100	Vert
335.8873	44.86	PK	-25.7	13.7	32.86	46	-13.14	100	Vert
527.9876	38.88	PK	-24.6	18.1	32.38	46	-13.62	100	Vert
	37.08	PK	-24	18.4	31.48	46	-14.52	100	Vert
602.0364	26 70	PK	-23.2	22.3	35.89	46	-10.11	100	Vert
602.0364 944.948	30 / 9				00.00		19.11		V 011

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9. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



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RADIATED RF MEASUREMENT SETUP



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END OF REPORT

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