

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

PART 15C SUPPLEMENTARY EMC TEST REPORT
FOR THE
ITRONIX RUGGED LAPTOP PC MODEL: IX260PNLA580BT
WITH THE
INTERNAL CIRRONET BT2022 BLUETOOTH TRANSMITTER
UTILIZING THE
INTERNAL RANGESTAR SURFACE-MOUNT ANTENNA
(UPPER LEFT SIDE REAR OF LCD DISPLAY)
CO-TRANSMITTING WITH THE
SENAO NL-3054MP 802.11B/G 2.4 GHz DSSS WLAN MINI-PCI CARD
UTILIZING THE
INTERNAL RANGESTAR SURFACE-MOUNT ANTENNA
(UPPER RIGHT SIDE REAR OF LCD DISPLAY)

TRSN 022305KBC-T616-E15W/E15B
Issue 1.0

Celltech Compliance Testing & Engineering Lab
(Celltech Labs Inc.)
1955 Moss Court
Kelowna, BC
Canada
V1Y 9L3

April 20, 2005

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
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DECLARATION OF COMPLIANCE

<u>Test Lab</u>		CELLTECH LABS INC. Testing and Engineering Services 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3 Phone: 250-448-7047 Fax: 250-448-7048 e-mail: info@celltechlabs.com web site: www.celltechlabs.com		<u>Applicant Information</u>		ITRONIX CORPORATION 801 South Stevens Street Spokane, WA 99204 United States	
<u>Laboratory Registration No.(s):</u>			FCC:	714830	IC:	IC 3874	
<u>Rule Part(s):</u>			FCC:	\$15.247; \$2.1091; \$1.1310	IC:	RSS-210 Issue 5	
<u>Device Classification:</u>			FCC:	WLAN - DSSS	- Digital Transmission System (DTS)		
				Bluetooth - FHSS	- Part 15 Spread Spectrum Transmitter (DSS)		
<u>Device Identification:</u>			FCC ID:	KBCIX260PNLA580BT	IC:	1943A-IX260Pf	
<u>DUT Description:</u>							
Model(s):			IX260PNLA580BT				
Device Description:			Rugged Laptop PC with internal Cirronet BT2022 Bluetooth Transmitter and internal RangeStar surface-mount antenna (upper left side rear of LCD display), co-transmitting with the internal Senao NL-3054MP 802.11b/g 2.4 GHz DSSS WLAN Mini-PCI Card and internal RangeStar surface-mount antenna (upper right side rear of LCD display)				
Tx Frequency Range(s):			Bluetooth	2402 - 2480 MHz			
			WLAN	2412 - 2462 MHz			
Max. RF Output Power:			Bluetooth	+16.56 dBm Peak Conducted			
			WLAN	+20.43 dBm Peak Conducted (Mode b)			
				+20.21 dBm Peak Conducted (Mode g)			
Modulation Type(s):			Bluetooth	GFSK 1 Mbps 0.5 BT Gaussian			
			WLAN	DBPSK, DQPSK, CCK			
Antenna Type(s):			RangeStar P/N: 100929 Dual Internal Surface-Mount				
Power Supply:			90 Watt AC Power Adapter				

This mobile transmitting device has demonstrated compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC 47 CFR Part 15.247, Industry Canada RSS-210 Issue 5, and ANSI TIA/EIA-603-B-2002.

I attest to the accuracy of the data. All measurements reported herein were performed by me or were under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc. The results and statements contained in this report pertain only to the device(s) evaluated.

Russell W. Pease

Russell Pipe
Senior Compliance Technologist
Celltech Labs Inc.



Duane M. Friesen
EMC Manager
Celltech Labs Inc.



Applicant:	Itronix Corporation	Model:	IX260PNLA580BT	IC ID:	1943A-IX260Pf	FCC ID:	KBCIX260PNLA580BT
IX260+ Rugged Laptop PC with internal Senao NL-3054MP 802.11b/g WLAN and Cirronet BT2022 Bluetooth							
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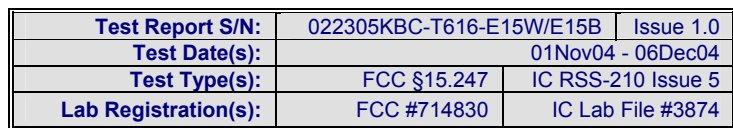
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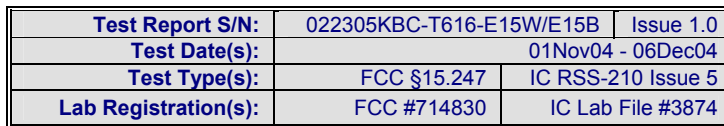
Referenced Standard: FCC CFR Title 47 Part 15

<u>Appendix</u>	<u>Test Description</u>	<u>Procedure Reference</u>	<u>Limit Reference</u>	<u>Test Start Date</u>	<u>Test End Date</u>	<u>Result</u>
B	Powerline Conducted Emissions	ANSI C63.4	§15.207	30Nov04	30Nov04	Pass
C	Bluetooth Peak Conducted RF Power	FCC 97-114	§15.247(b) (3)	06Dec04	06Dec04	Pass
D	WLAN Peak Conducted RF Power	FCC 97-114	§15.247(b) (3)	01Dec04	01Dec04	Pass
E	Radiated Spurious Emissions	FCC 97-114	§15.247(c)	01Nov04	06Dec04	Pass
F	Restricted Band Emissions	FCC 97-114	§15.205 (a), (b) §15.209 (a)	01Nov04	06Dec04	Pass
G	Maximum Permissible Exposure	FCC CFR 47 § 2.1091 IEEE Std C95.1-1999	§1.1310 Table 1 (b)	06Dec04	06Dec04	Pass
Referenced Standard: IC RSS-210 Issue 5						
B	Powerline Conducted Emissions	RSS-212, ANSI C63.4	RSS-210 §6.6	30Nov04	30Nov04	Pass
C	WLAN Conducted Peak RF Power	FCC 97-114	§15.247(b) (3)	06Dec04	06Dec04	Pass
D	WLAN Conducted Peak RF Power	FCC 97-114	§15.247(b) (3)	01Dec04	01Dec04	Pass
E	Radiated Spurious Emissions	RSS-212, ANSI C63.4	RSS-210 §6.2.2 (e1)	01Nov04	06Dec04	Pass
F	Restricted Band Emissions	RSS-212, ANSI C63.4	RSS-210 §6.3	01Nov04	06Dec04	Pass
G	Maximum Permissible Exposure	RSS-102	RSS-210 §14 Safety Code 6 2.2.1(a) Table 5	06Dec04	06Dec04	Pass

Issue	Description	Implemented By	Implementation Date
1.0	Initial Release	Jon Hughes	20Apr05

Prepared By		April 20, 2005
Name/Title	Duane M. Friesen, C.E.T. / EMC Manager	Date
Reviewed By		April 20, 2005
Name/Title	Jon Hughes / General Manager	Date

Applicant:	Itronix Corporation	Model:	IX260PNLA580BT	IC ID:	1943A-IX260Pf	FCC ID:	KBCIX260PNLA580BT
IX260+ Rugged Laptop PC with internal Senao NL-3054MP 802.11b/g WLAN and Cirronet BT2022 Bluetooth							
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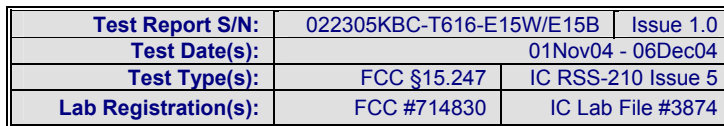


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Lab Registration(s):	FCC #714830	IC Lab File #3874

3.0 TERMS AND DEFINITIONS

AVG	Average
CFR	Code of Federal Regulations
dB	decibel
dBm	dB referenced to 1 mW
dBuV	dB referenced to 1 uV
DUT	Device under Test
dBc	dB down from carrier
EBW	Emission Bandwidth
EMC	Electromagnetic Compatibility
FCC	Federal Communication Commission
FHSS	Frequency Hopping Spread Spectrum
HP	Hewlett Packard
HPF	High Pass Filter
Hpol	Horizontal Polarization
Hz	Hertz
IC	Industry Canada
kHz	kilohertz
LNA	Low Noise Amplifier
m	meter
MHz	Megahertz
Mbps	megabits per second
na	not applicable
n/a	not available
PK	Peak
PPSD	Peak Power Spectral Density
QP	Quasi-peak
RBW	Resolution Bandwidth
R&S	Rohde & Schwarz
RSS	Radio Standard Specification
SA	Spectrum Analyzer
VBW	Video Bandwidth
Vpol	Vertical Polarization
WLAN	Wireless Local Area Network



The facilities used in collecting the test results outlined in this report are located at 1955 Moss Court, Kelowna, British Columbia, Canada, V1Y 9L3. The radiated and conducted emissions sites conform with the requirements set forth in ANSI C63.4 and are filed and listed with the FCC under Registration Number 714830 and Industry Canada under File Number IC 3874.

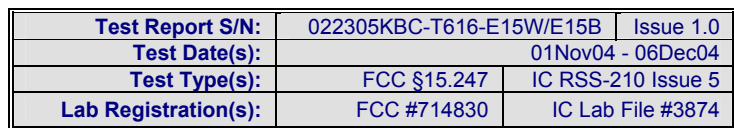
<u>Company Name:</u>	Itronix Corporation
<u>Address:</u>	801 South Stevens Street
	Spokane, WA 99204
	United States

The DUT consisted of the IX260+ Rugged Laptop PC containing a Cirronet BT2022 Bluetooth Transmitter connected to an Internal RangeStar Surface-Mount Antenna installed in the upper left side rear edge of the LCD display. Co-located within the IX260+ Rugged Laptop PC was the Senao NL-3054MP 802.11b/g WLAN Mini-PCI Card connected to a second Internal RangeStar Surface-Mount Antenna installed in the upper right side rear edge of the LCD display. Photographs of the DUT placement and construction are shown in Appendix A.

Device:	Rugged Laptop PC			
Model:	IX260PNLA580BT			
Serial Number:	ZZGEG4196ZZ6494			
Identifier(s):	FCC ID:	KBCIX260PNLA580BT	IC:	1943A-IX260Pf
Power Source:	Delta Electronics Model ADP-90AB Rev B 90 Watt AC-DC power supply			

Device:	2.4GHz FHSS Bluetooth Transmitter			
Model:	Cirronet BT2022			
Serial Number:	n/a			
Rule Part(s):	FCC:	§15.247; §2.1091; §1.1310	IC:	RSS-210 Issue 5
Classification:	FCC:	Spread Spectrum Transmitter (DSS)	IC:	Low Power Licence-Exempt Transmitter
Power Source:	Powered from the internal PC power supply			

Applicant:	Itronix Corporation	Model:	IX260PNLA580BT	IC ID:	1943A-IX260Pf	FCC ID:	KBCIX260PNLA580BT
IX260+ Rugged Laptop PC with internal Senao NL-3054MP 802.11b/g WLAN and Cirronet BT2022 Bluetooth							
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Device:	Internal Surface-Mount Antenna (WLAN - upper right side rear edge of LCD display)
Model:	RangeStar P/N: 100929
Gain:	+4.5 dBi

Device:	Dual-Band CDMA PCMCIA Modem (Not co-transmitting during WLAN/Bluetooth evaluations)
Model:	Sierra Wireless AirCard
Antenna:	External Mounted Swivel Dipole
Gain:	+2.6 dBi

Device:	GPS Receiver Module and Antenna (Receive only)
Model:	Leadtek P/N GPS9547

ROUTING		Length	Model	Terminations		Shield Type	Shield Termination		Suppression
From	To	m		End 1	End 2		End 1	End 2	
PC Fire Wire Port	Unterminated	1.0	Copartner E119932	IEEE-1528	Fire wire	n/a	n/a	n/a	None
PC modem port	Unterminated	1.0	n/a	RJ-11	RJ-11	None	na	na	None
PC Ethernet Port	Ethernet Hub	1.0	n/a	RJ-45	RJ-45	None	na	na	None

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5.5 Support Equipment

The following equipment was used in support of the DUT.

CO-LOCATED SUPPORT EQUIPMENT LIST		
MANUFACTURER	MODEL	DESCRIPTION
D-Link	DE-809TC/	Ethernet hub
YNG YUH	YP-040	Hub power supply
MLi	699	Speakers
Polk Audio	n/a	Speaker-microphone
DeLorme	Tripmate	GPS Receiver
Intel	CS-430	Camera
Logitech	M-S34	Mouse

5.6 Clock Frequencies

5.6.1 DUT Clock Frequencies

Device:	Rugged Laptop PC
Clocks:	1.6 GHz processor
Device:	2.4GHz FHSS Cirronet Bluetooth Transmitter
Clocks:	n/a
Device:	2.4GHz DSSS WLAN Mini-PCI Card (802.11b/g)
Clocks:	n/a
Device:	Internal Dual Surface-Mount Antennas
Clocks:	n/a

5.6.2 Co-Located Clock Frequencies

Device:	Peripherals
Clocks:	n/a

5.7 Mode(s) of Operation Tested

5.7.1 Bluetooth Transmitter

Customer supplied software was used to place the Bluetooth Transmitter at the appropriate channel with the power level and modulation for the specific measurement. During the co-transmission testing, the Bluetooth transmitter was set in its hopping mode with the following settings:

TX Frequency Range:	2402 - 2480 MHz
Software Power Gain Settings:	220 /45
RF Peak Conducted Output Power Tested:	Ch. 0 - +16.56 dBm Ch. 39 - +16.09 dBm Ch. 78 - +15.32 dBm
Modulation Type(s):	GFSK 0.5 BT Gaussian
Battery Type(s):	11.1V Lithium-Ion, 6.0Ah (Model: A2121-2)

5.7.2 WLAN Mini-PCI Card

TX Frequency Range:	2412 - 2462 MHz Ch. 1 (2412 MHz), Ch. 6 (2437 MHz) & Ch. 11 (2462 MHz) measured unless otherwise noted	
Software Power Gain Settings:	802.11b set to power setting of 17.5 with xpdGain at 6 802.11g set to power setting of 18.5 with xpdGain at 12	
RF Peak Conducted Output Power Tested:	802.11b 2412 MHz(1 Mbps) = 20.43 dBm 802.11b 2437 MHz(1 Mbps) = 20.33 dBm 802.11b 2462 MHz(1 Mbps) = 20.29 dBm	802.11g 2412 MHz(6 Mbps) = 20.10 dBm 802.11g 2437 MHz(6 Mbps) = 20.21 dBm 802.11g 2462 MHz(6 Mbps) = 20.17 dBm
Modes / Data Rates Tested*:	802.11b (1, 5.5, 11 Mbps checked in prescan) (1 Mbps determined to be worst-case and used unless otherwise noted)	
	802.11g (6, 36, 54 Mbps checked in prescan) (6 Mbps determined to be worst-case and used unless otherwise noted)	
Modulation Type(s):	OFDM with BPSK, QPSK, 16QAM, 64QAM, DBPSK, DQPSK, CCK	
Battery Type(s):	11.1V Lithium-ion, 6.0Ah (Model: A2121-2)	

5.7.3 DUT Exercising Software Description

The DUT was configured and exercised using customer supplied test software that allowed an operator to set the parameters of the Bluetooth transmitter and WLAN Mini-PCI Card operation. The settings used are described in each appendix. More specific information on the configuration and exercising can be found in the referenced single-transmit test reports.

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Lab Registration(s):	FCC #714830	IC Lab File #3874

5.8 Configuration Description

The DUT was configured, as described by the client as being representative of what would be delivered to a final customer. More specific details may be included in each appendix.

5.8.1 Configuration Justification

The DUT was tested in a configuration described by the client as being worst-case but typical of normal use.

6.0 PASS/FAIL CRITERIA

Unless otherwise noted in the Appendices, the pass/fail criteria is the limit set forth in the reference standards. A DUT is considered to have passed the requirements, if the data collected during the described measurement procedure is no greater than the specified limits as defined. The pass/fail statements made in this report only apply to the unit tested.

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APPENDICES

Appendix A - DUT Photographs

Photograph A-1 - Front of Open IX260+ Laptop PC



Photograph A-2 - Back of Open IX260+ Laptop PC



Photograph A-3 - WLAN Mini-PCI Card Location

Senao NL-3054MP
802.11b/g WLAN

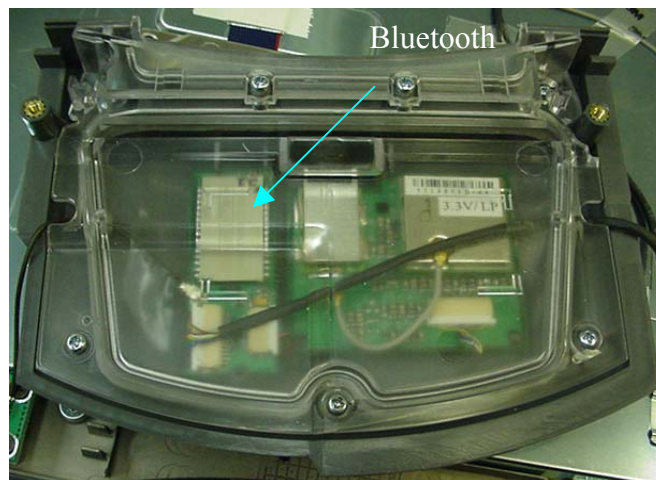


Photograph A-4 - Bluetooth Transmitter Location

Bluetooth



Photograph A-6 - Bluetooth Transmitter



Photograph A-7 - Surface-Mount Antenna Placement



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Appendix B - Powerline Conducted Emissions Measurement

B.1. REFERENCES

Normative Reference Standard	CFR 47 FCC Part 15 §15.207
Procedure Reference	ANSI C63.4

B.2. LIMITS

§15.207: Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each powerline and ground at the power terminal.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.50 – 5.0	56	46
5.0 – 30.0	60	50

*Decrease with the logarithm of the frequency

B.3. ENVIRONMENTAL CONDITIONS

Temperature	+26 ± 5 °C
Humidity	31 % ± 10% RH
Barometric Pressure	101.4 kpa

B.4. EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
00063	HP	85662A	Spectrum Analyzer Display	na	na
00051	HP	8566B	Spectrum Analyzer RF Section	18May04	18May05
00049	HP	85650A	Quasi-Peak Adapter	18May04	18May05
00047	HP	85685A	Preselector	18May04	18May05
00083	EMCO	3825/2	Line Impedance Stabilization Network	29Apr04	29Apr05
00084	EMCO	3825/2	Line Impedance Stabilization Network	29Apr04	29Apr05

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B.5. MEASUREMENT EQUIPMENT SETUP

Measurement Equipment Connections	The conducted emissions were measured on each of the two AC powerline leads connected to the DUT's power supply brick. A two line LISN was used to make this measurement. A drawing of the equipment setup is shown in B.7
Measurement Equipment Settings	Each of the monitor ports from the 2-line LISN was connected in turn to the spectrum analyzer. The port not connected to the analyzer was terminated in a 50-ohm load. A pre-scan of the peak emission levels was made of the 150 kHz – 30 MHz range split into 4 equal frequency bands. The following were the instrumentation settings: Spectrum Analyzer: Start Frequency and Stop Frequency set by software for each of the four bands RBW: 100 kHz VBW: 300 kHz Sweep: 500 mS Quasi-Peak Adapter: Normal - Automatic Bandwidth Setting: 9 kHz The resulting data from each band was corrected and collected by software and presented in the graphical representations shown in B.9 for the two leads. A defined set of frequency points of interest on each lead were used by software to optimize a set of readings for each type of detector (peak, quasi-peak and average). This data was corrected by the software is presented in the tables shown in section B.9.

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B.6. SETUP PHOTOS

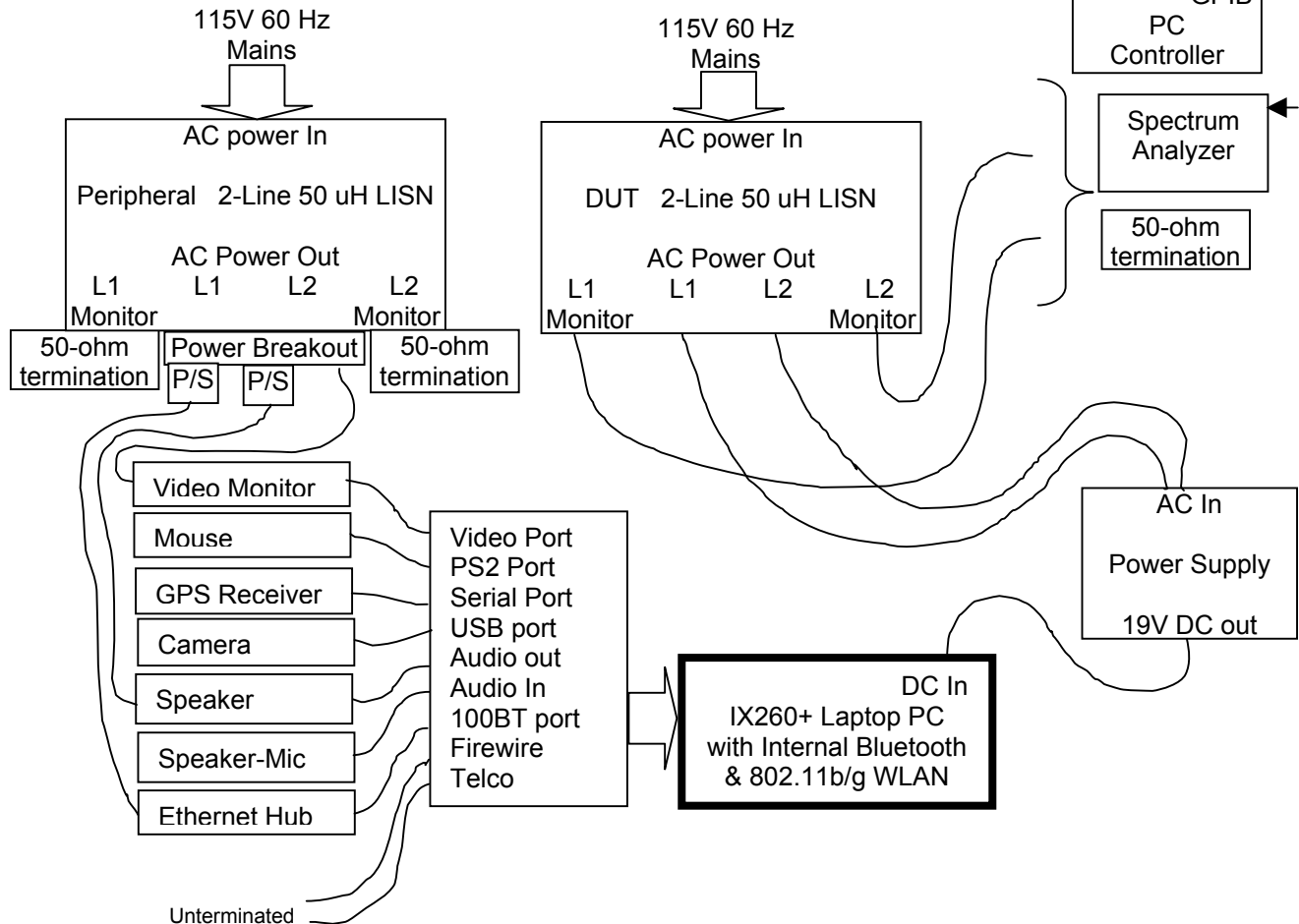
Photograph B-1 - AC Powerline Conducted Emission Configuration



Photograph B-2 - AC Powerline Conducted Emission Cable Placement



Figure B-1 - Setup Drawing

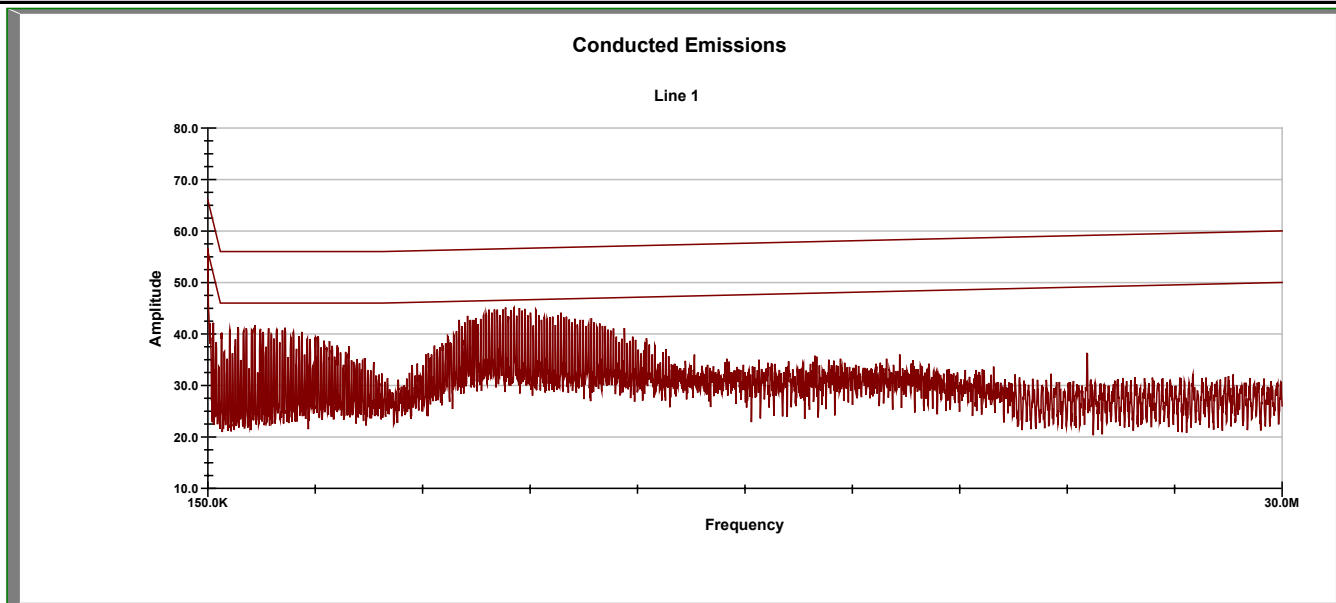


All peripherals were active, but no specific traffic was initiated.

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B.9. TEST RESULTS

Following are peak emission plots and tabular data describing the peak, quasi-peak and average measurements made of the DUT.



Project Number: 100504KBC-T565-E15W/E15B
Company: Itronix
Product: IX260+ with NL-3054MP WLAN & BT2022 Bluetooth

Standard: FCC 15.207
Test Start Date: 30-Nov-04
Test End Date: 30-Nov-04

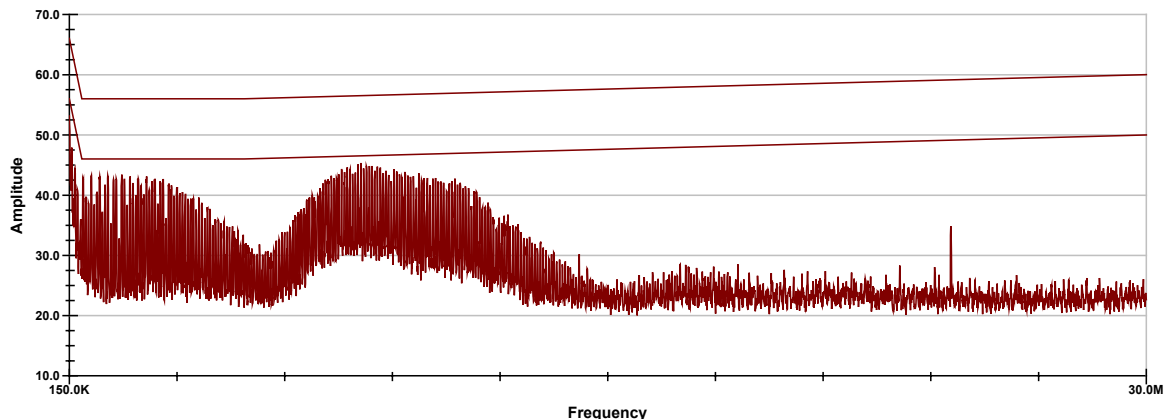
Line 1 Conducted Emissions												
Frequency MHz	Uncorrected Reading			Correction Factor dB	Corrected Emission Level			Quasi-Peak Limit dBuV	Quasi-Peak Margin dB	Average Limit dBuV	Average Margin dB	Pass/Fail
	Peak dBuV	Quasi-Peak dBuV	Average dBuV		Peak dBuV	Quasi-Peak dBuV	Average dBuV					
0.302	43.80	42.20	42.16	0.81	44.61	43.01	42.97	60.18	17.17	50.18	7.21	Pass
1.449	42.30	41.49	40.46	0.30	42.60	41.79	40.76	56.00	14.21	46.00	5.24	Pass
2.283	42.40	32.83	31.52	0.29	42.69	33.12	31.81	56.00	22.88	46.00	14.19	Pass
3.204	40.40	39.11	35.21	0.30	40.70	39.41	35.51	56.00	16.60	46.00	10.50	Pass
8.359	46.10	30.83	19.00	0.32	46.42	31.15	19.32	60.00	28.85	50.00	30.68	Pass
8.578	45.70	30.75	18.65	0.32	46.02	31.07	18.97	60.00	28.93	50.00	31.03	Pass
9.308	45.60	44.55	37.63	0.32	45.93	44.88	37.95	60.00	15.13	50.00	12.05	Pass
17.010	38.40	34.25	22.48	0.37	38.77	34.62	22.85	60.00	25.38	50.00	27.15	Pass

Corrected Emission Level (dBuV) = Uncorrected Reading (dBuV) + Correction Factor (dB)
Margin (dB) = Limit (dBuV) - Corrected Emission Level (dBuV)

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Conducted Emissions

Line 2



Project Number: 100504KBC-T565-E15W/E15B
Company: Itronix
Product: IX260+ with NL-3054MP WLAN & BT2022 Bluetooth

Standard: FCC 15.207
Test Start Date: 30-Nov-04
Test End Date: 30-Nov-04

Line 2 Conducted Emissions

Frequency MHz	Uncorrected Reading			Correction Factor dB	Corrected Emission Level			Quasi-Peak Limit dBuV	Quasi-Peak Margin dB	Average Limit dBuV	Average Margin dB	Pass/Fail
	Peak dBuV	Quasi-Peak dBuV	Average dBuV		Peak dBuV	Quasi-Peak dBuV	Average dBuV					
0.216	56.80	44.71	28.75	1.30	58.10	46.01	30.04	62.98	16.98	52.98	22.94	Pass
0.990	43.60	42.86	42.86	0.33	43.93	43.19	43.19	56.00	12.81	46.00	2.81	Pass
1.596	43.70	42.57	41.93	0.30	44.00	42.87	42.23	56.00	13.13	46.00	3.77	Pass
2.282	43.30	42.43	42.12	0.29	43.59	42.72	42.41	56.00	13.28	46.00	3.59	Pass
7.844	44.60	43.22	38.74	0.32	44.92	43.54	39.06	60.00	16.46	50.00	10.94	Pass
8.226	45.50	41.25	34.80	0.33	45.83	41.58	35.13	60.00	18.42	50.00	14.87	Pass
9.822	43.60	42.36	39.57	0.33	43.93	42.69	39.90	60.00	17.31	50.00	10.10	Pass
14.234	29.60	25.33	20.99	0.40	30.00	25.73	21.39	60.00	34.27	50.00	28.61	Pass

Corrected Emission Level (dBuV) = Uncorrected Reading (dBuV) + Correction Factor (dB)
Margin (dB) = Limit (dBuV) - Corrected Emission Level (dBuV)

Applicant:	Itronix Corporation	Model:	IX260PNLA580BT	IC ID:	1943A-IX260Pf	FCC ID:	KBCIX260PNLA580BT
IX260+ Rugged Laptop PC with internal Senao NL-3054MP 802.11b/g WLAN and Cirronet BT2022 Bluetooth							

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

B.10. PASS/FAIL

In reference to the results outlined in B.9 the DUT passes the requirements as stated in the reference standards as follows:
The RF voltage measured in reference to ground on each of the power line conductors does not exceed the limits as outlined in FCC 15.207.

B.11. SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.



Russell Pipe
Senior Compliance Technologist
Celltech Labs Inc

30Nov04

Date

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

Appendix C - Bluetooth Peak Conducted RF Power Measurement

C.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §15.247(b) (3)
Procedure Reference	FCC 97-114

C.2. LIMITS

C.2.1. FCC CFR

§15.247(b): The maximum peak output power of the intentional radiator shall not exceed the following:
 §15.247(b) (3) For system using digital modulation in the 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz bands: 1 Watt.

*This measurement was made as a reference to determine the effects the co-transmission of the WLAN had on the output RF power of the Bluetooth transmitter. The single transmit conducted power measured with the same settings was:

Channel	Frequency	Peak Conducted Power	
	MHz	dBm	Watts
0	2402	16.76	0.047
39	2441	16.22	0.042
78	2480	15.36	0.034

C.3. ENVIRONMENTAL CONDITIONS

Temperature	25.2 +/- 2 °C
Humidity	35 +/- 2 %
Barometric Pressure	96.34 kPa

C.4. EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
00007	Gigatronics	8652A	Power Meter	18Oct04	18Oct05
00013	Gigatronics	80701A	Power Sensor	11Oct04	11Oct05
00075	Alpha Wire-J	9223	2ft. RG223/U RF Cable	08Jul04*	24Jun05
00076	Pasternack	PE7014-30	30dB 2 Watt Attenuator	08Jul04*	24Jun05

*Cable and attenuator verified with power meter prior to use

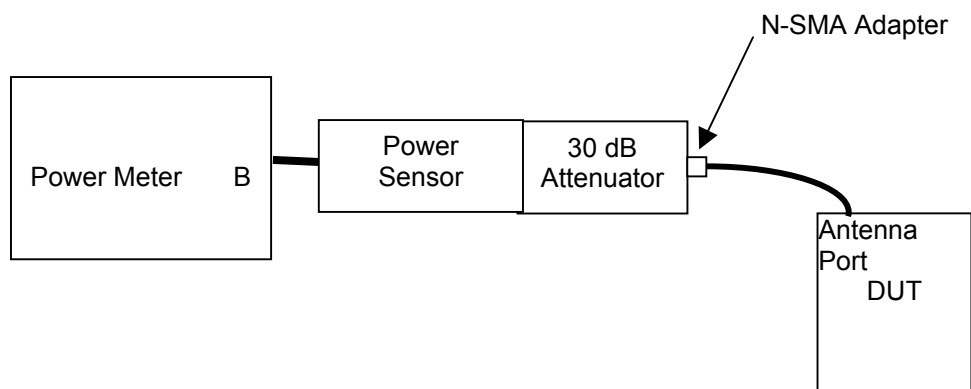
Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

C.5. MEASUREMENT EQUIPMENT SETUP

Measurement Equipment Connections	The equipment was connected as shown in the setup drawing in C.6.
Measurement Equipment Settings	To evaluate the maximum peak power, the power meter was set using the following setting: Mode: MAP

C.6. SETUP DRAWING

Figure C-1 - Setup Drawing



C.7. DUT OPERATING DESCRIPTION

Measurements were made at three channels throughout the band, Low Channel (2402 MHz), Mid Channel (2441 MHz), High Channel (2480 MHz).

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

C.8. TEST RESULTS

Channel	Frequency	Peak Conducted Power		Limit
		dBm	Watts	Watts
0 (Low)	2402	16.56	0.045	1
39 (Mid)	2441	16.09	0.041	1
79 (High)	2480	15.32	0.034	1

C.9. PASS/FAIL

In reference to the results outlined in C.8, the DUT passes the requirements as stated in the reference standards as follows:
FCC 15.247 (b) (3): The peak power did not exceed 1 Watt.

As a reference with the single transmit configuration, the conducted power levels of the Bluetooth transmitter are reduced by a maximum 0.20 dB (16.76 dBm vs 16.56 dBm) when the WLAN transmitter is active.

C.10. SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.



Russell Pipe
Senior Compliance Technologist
Celltech Labs Inc.

6Dec04

Date

Appendix D - WLAN Peak Conducted RF Power Measurement

D.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §15.247(b) (3)
Procedure Reference	FCC 97-114

D.2. LIMITS

D.2.1. FCC CFR

§15.247(b): The maximum peak output power of the intentional radiator shall not exceed the following:
 §15.247(b) (3) For system using digital modulation in the 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz bands: 1 Watt.

*This measurement was made as a reference to determine the effects the co-transmission of the Bluetooth transmitter had on the output RF power of the WLAN. The single transmit conducted power levels of the WLAN were:

Channel	Frequency	802.11b				802.11g			
		Peak Conducted Power		Limit	-26 dB EBW	Peak Conducted Power		Limit	-26 dB EBW
	MHz	dBm	Watts	Watts	MHz	dBm	Watts	Watts	MHz
Low	2412	20.42	0.110	1	19.2	20.11	0.103	1	29.59
Mid	2437	20.28	0.107	1	19.2	20.13	0.103	1	29.70
High	2462	20.35	0.108	1	19.2	20.07	0.102	1	30.56

D.3. ENVIRONMENTAL CONDITIONS

Temperature	25.2 +/- 2 °C
Humidity	35 +/- 2 %
Barometric Pressure	96.34 kPa

D.4. EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
00015	Agilent	E4408B	Spectrum Analyzer	29Dec03	29Dec04
00075	Alpha Wire-J	9223	2ft. RG223/U RF Cable	08Jul04*	24Jun05
00076	Pasternack	PE7014-30	30dB 2 Watt Attenuator	08Jul04*	24Jun05

*Cable and attenuator verified with power meter prior to use

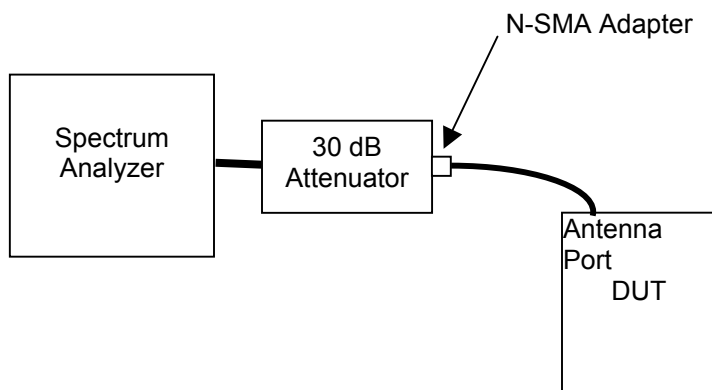
Measurement Equipment Connections

Measurement Equipment Settings

RBW – 300 kHz
VBW – 1MHz
Span – 50 MHz
Detector – Peak
Average – Power
Trace Average – 100

RBW – 1 MHz
VBW – 3 MHz
Detector – Peak
Average – Power
Integrate BW – equal to specific -26 dB EBW

Figure D-1 - Setup Drawing



The worst-case configuration was determined from prescan investigations. Measurements were made at three channels throughout the band, Low Channel (2412 MHz), Mid Channel (2437 MHz), High Channel (2462 MHz) and for both Modes b and g.

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

D.8. TEST RESULTS

Channel	Frequency	802.11b				802.11g			
		Peak Conducted Power		Limit	-26 dB EBW	Peak Conducted Power		Limit	-26 dB EBW
	MHz	dBm	Watts	Watts	MHz	dBm	Watts	Watts	MHz
Low	2412	20.43	0.110	1	19.2	20.10	0.102	1	29.59
Mid	2437	20.33	0.108	1	19.2	20.21	0.105	1	29.70
High	2462	20.29	0.107	1	19.2	20.17	0.104	1	30.56

D.9. PASS/FAIL

In reference to the results outlined in D.8 the DUT passes the requirements as stated in the reference standards as follows:
FCC 15.247 (b) (3): The peak power did not exceed 1 Watt and the effect of the Bluetooth co-transmitting had no significant effect on the conducted power of the WLAN.

D.10. SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.



Duane M. Friesen, C.E.T.
EMC Manager
Celltech Labs Inc

1Dec04
Date

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

Appendix E - Radiated Spurious Emissions Measurement

E.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §15.247(c)
Procedure Reference	ANSI C63.4; FCC 97-114

E.2. LIMITS

E.2.1. FCC CFR 47

§15.247 (c): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in 15.209 (a) is not required.

Note: Spurious emissions within the restricted bands are reported in Appendix F.

E.3. ENVIRONMENTAL CONDITIONS

Temperature	27.4 +/- 2 °C
Humidity	33 +/- 2 %
Barometric Pressure	96.24 +/- 0.2 kPa

E.4. EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
00072	EMCO	2075	Mini-mast	n/a	n/a
00073	EMCO	2080	Turn Table	n/a	n/a
00071	EMCO	2090	Multi-Device Controller	n/a	n/a
00035	ETS	3115	Double Ridged Guide Horn	24Mar04	24Mar05
00015	Agilent	E4408B	Spectrum Analyzer	29Dec03	29Dec04
00049	HP	8566B	Spectrum Analyzer RF Section	18May04	18May05
00047	HP	85685A	RF Preselector	18May04	18May05
00048	Gore	65474	Microwave Cable	20May04	20May05
00030	HP	83017A	LNA	20May04	20May05

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

E.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS

The measurement equipment was connected as shown in E.6. A number of antennas were used to cover the applicable frequency range test. The ranges in which each antenna was used are as follows:

Frequency Range	Antenna
1 GHz – 18 GHz	ETS 3115 Horn

MEASUREMENT EQUIPMENT SETTINGS

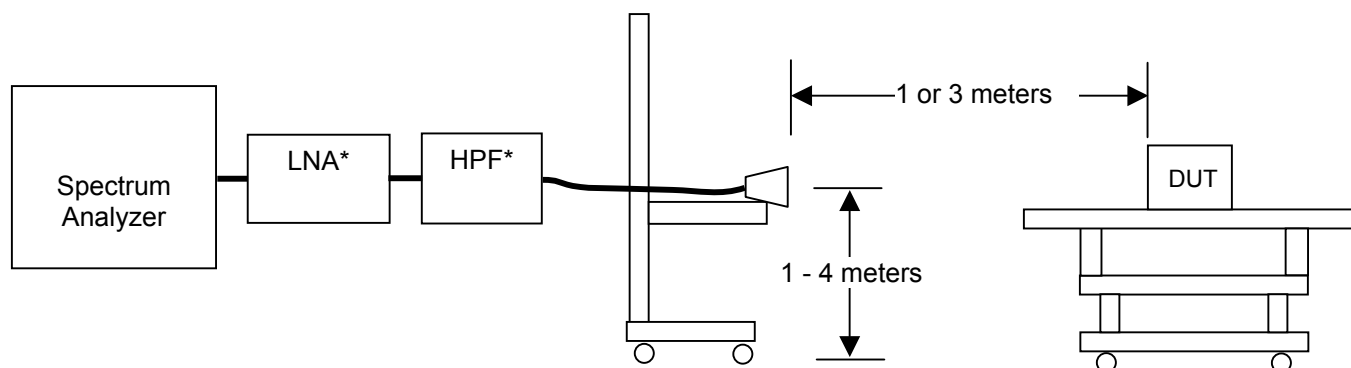
The spectrum analyzer was set to the following settings:

Frequency Range	RBW	VBW	Detector
MHz	kHz	kHz	
> 1000	1000*	1000	Peak*

*As a worst-case measurement, the average limit was applied to measurements made with a peak detector using a RBW of 1 MHz (vs the specified 100 kHz), when possible.

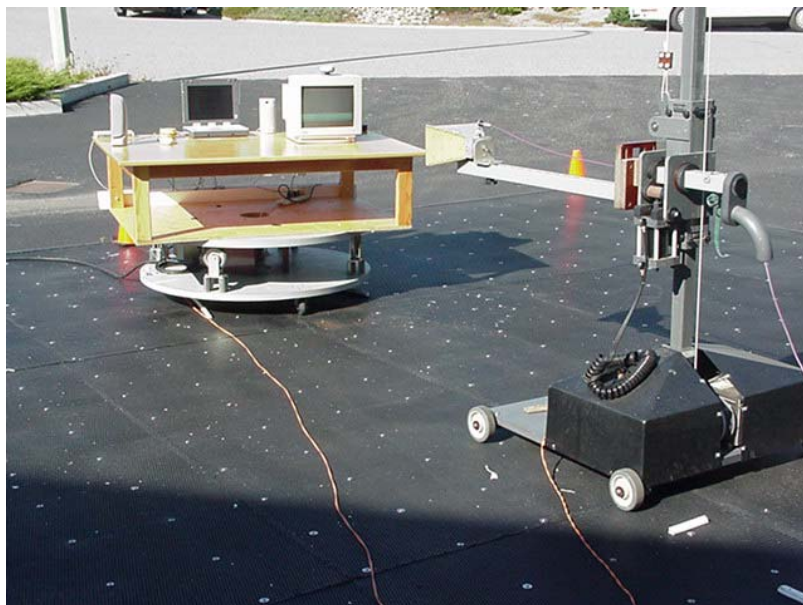
E.6. SETUP DRAWING

Figure E-1 - Setup Drawing



* Used for >1GHz

Photograph E-1 - 3115 Horn Antenna



Measurements were made of the bands that may contain inter-modulation products with both the Bluetooth and WLAN radios transmitting. Measurements were made for each combination of WLAN channels and Modes (low and high, Mode b and g) with the Bluetooth transmitter hopping or on a worst-case channel when defined.

E.9.1. Band-edge Spurious Field Strength not in a Restricted Band (WLAN Mode b co-transmitting with Bluetooth)

Project Number:	100504KBC-T565-E15W/E15B	Standard:	FCC15.247
Company:	Itronix	Test Start Date:	01Nov04
Product:	IX260+ with Senao WLAN & Bluetooth	Test End Date:	06Dec04

Formulae:

$$\text{Total CF (dB)} = \text{Antenna Factor (dB)} + \text{Cable Factor (dB)} + \text{Other Factor (Amplifier Gain, Filter Loss, etc) (dB)}$$
$$\text{Field Strength (dBuV/m)} = \text{SA Reading (dBuV)} + \text{Total CF (dB/m)}$$
$$\text{Limit (dBuV/m)} = \text{Published Limit (dBuV/m)} + \text{Limit Distance Correction (dB)}$$

Calculated Band-edge Field Strength (dBuV/m) = Carrier Radiated Field Strength (dBuV/m) - Delta-Marker (dB)

$$\text{Margin (dB)} = \text{Limit (dBuV/m)} - \text{Field Strength (dBuV/m)}$$
$$\text{Duty Cycle Correction (dB)} = 20 * \log (\text{max time transmitting in 100 mS (mS)} / 100 \text{ mS})$$

Corrected Calculated Band-edge Field Strength (dBuV/m)= Calculated Band-edge Field Strength (dBuV/m) + Duty Cycle Correction (dB)

Note: Measurements and calculation reference the Marker-Delta Method Described in FCC Public Notice DA 00-705

Project Number:	100504KBC-T565-E15W/E15B	Standard:	FCC15.247
Company:	Itronix	Test Start Date:	01Nov04
Product:	IX260+ with Senao WLAN & Bluetooth	Test End Date:	06Dec04

Formulae:

$$\text{Total CF (dB)} = \text{Antenna Factor (dB)} + \text{Cable Factor (dB)} + \text{Other Factor (Amplifier Gain, Filter Loss, etc) (dB)}$$
$$\text{Field Strength (dBuV/m)} = \text{SA Reading (dBuV)} + \text{Total CF (dB/m)}$$
$$\text{Limit (dBuV/m)} = \text{Published Limit (dBuV/m)} + \text{Limit Distance Correction (dB)}$$
$$\text{Calculated Band-edge Field Strength (dBuV/m)} = \text{Carrier Radiated Field Strength (dBuV/m)} - \text{Delta-Marker (dB)}$$
$$\text{Margin (dB)} = \text{Limit (dBuV/m)} - \text{Field Strength (dBuV/m)}$$
$$\text{Duty Cycle Correction (dB)} = 20 * \log (\text{max time transmitting in 100 mS (mS)} / 100 \text{ mS})$$

Corrected Calculated Band-edge Field Strength (dBuV/m) = Calculated Band-edge Field Strength (dBuV/m) + Duty Cycle Correction (dB)

Note: Measurements and calculation reference the Marker-Delta Method Described in FCC Public Notice DA 00-705

Applicant:	Itronix Corporation	Model:	IX260PNLA580BT	IC ID:	1943A-IX260Pf	FCC ID:	KBCIX260PNLA580BT
IX260+ Rugged Laptop PC with internal Senao NL-3054MP 802.11b/g WLAN and Cirronet BT2022 Bluetooth							
2005 Celltech Labs Inc.	This document is not to be reproduced in whole or in part without the written permission of Celltech Labs Inc.						31 of 45

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

E.9.3. Out-of-Band Spurious Field Strength not in a Restricted Band (WLAN Mode b co-transmitting with Bluetooth)

No emissions that could be attributed to the WLAN and Bluetooth co-transmitting were measured within 20 dB of the limit.

E.9.4. Out-of-Band Spurious Field Strength not in a Restricted Band (WLAN Mode g co-transmitting with Bluetooth)

No emissions that could be attributed to the WLAN and Bluetooth co-transmitting were measured within 20 dB of the limit.

E.10. PASS/FAIL

In reference to the results outlined in E.9, the DUT passes the requirements as stated in the reference standards as follows:
FCC 15.247 (c): All emissions within any 100kHz bandwidth outside the operating frequency band are greater than 20 dB below the maximum 100 kHz bandwidth signal within the operating band.

E.11. SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.



Russell Pipe
Senior Compliance Technologist
Celltech Labs Inc.

26Nov04

Date

Appendix F - Restricted Band Emissions Measurement

F.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §15.205 (a) (b), FCC CFR 47 §15.209 (a)
Procedure Reference	FCC 97-114

F.2. LIMITS

FCC CFR 47 §15.205	(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:																																																																											
	<table><tr><th>MHz</th><th>MHz</th><th>MHz</th><th>GHz</th></tr><tr><td>0.090–0.110</td><td>16.42–16.423</td><td>399.9–410</td><td>4.5–5.15</td></tr><tr><td>¹0.495–0.505</td><td>16.69475–16.69525</td><td>608–614</td><td>5.35–5.46</td></tr><tr><td>2.1735–2.1905</td><td>16.80425–16.80475</td><td>960–1240</td><td>7.25–7.75</td></tr><tr><td>4.125–4.128</td><td>25.5–25.67</td><td>1300–1427</td><td>8.025–8.5</td></tr><tr><td>4.17725–4.17775</td><td>37.5–38.25</td><td>1435–1626.5</td><td>9.0–9.2</td></tr><tr><td>4.20725–4.20775</td><td>73–74.6</td><td>1645.5–1646.5</td><td>9.3–9.5</td></tr><tr><td>6.215–6.218</td><td>74.8–75.2</td><td>1660–1710</td><td>10.6–12.7</td></tr><tr><td>6.26775–6.26825</td><td>108–121.94</td><td>1718.8–1722.2</td><td>13.25–13.4</td></tr><tr><td>6.31175–6.31225</td><td>123–138</td><td>2200–2300</td><td>14.47–14.5</td></tr><tr><td>8.291–8.294</td><td>149.9–150.05</td><td>2310–2390</td><td>15.35–16.2</td></tr><tr><td>8.362–8.366</td><td>156.52475–156.52525</td><td>2483.5–2500</td><td>17.7–21.4</td></tr><tr><td>8.37625–8.38675</td><td>156.7–156.9</td><td>2655–2900</td><td>22.01–23.12</td></tr><tr><td>8.41425–8.41475</td><td>162.0125–167.17</td><td>3260–3267</td><td>23.6–24.0</td></tr><tr><td>12.29–12.293</td><td>167.72–173.2</td><td>3332–3339</td><td>31.2–31.8</td></tr><tr><td>12.51975–12.52025</td><td>240–285</td><td>3345.8–3358</td><td>36.43–36.5</td></tr><tr><td>12.57675–12.57725</td><td>322–335.4</td><td>3600–4400</td><td>(²)</td></tr><tr><td>13.36–13.41</td><td></td><td></td><td></td></tr></table>	MHz	MHz	MHz	GHz	0.090–0.110	16.42–16.423	399.9–410	4.5–5.15	¹ 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46	2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75	4.125–4.128	25.5–25.67	1300–1427	8.025–8.5	4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2	4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5	6.215–6.218	74.8–75.2	1660–1710	10.6–12.7	6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4	6.31175–6.31225	123–138	2200–2300	14.47–14.5	8.291–8.294	149.9–150.05	2310–2390	15.35–16.2	8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4	8.37625–8.38675	156.7–156.9	2655–2900	22.01–23.12	8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0	12.29–12.293	167.72–173.2	3332–3339	31.2–31.8	12.51975–12.52025	240–285	3345.8–3358	36.43–36.5	12.57675–12.57725	322–335.4	3600–4400	(²)	13.36–13.41						
MHz	MHz	MHz	GHz																																																																									
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15																																																																									
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4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2																																																																									
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5																																																																									
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7																																																																									
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4																																																																									
6.31175–6.31225	123–138	2200–2300	14.47–14.5																																																																									
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2																																																																									
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4																																																																									
8.37625–8.38675	156.7–156.9	2655–2900	22.01–23.12																																																																									
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0																																																																									
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8																																																																									
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5																																																																									
12.57675–12.57725	322–335.4	3600–4400	(²)																																																																									
13.36–13.41																																																																												
	¹ Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz. ² Above 38.6																																																																											
	(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions of 15.35 apply to these measurements.																																																																											
FCC CFR 47 §15.209	(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:																																																																											
	<table><tr><th>Frequency</th><th>Field Strength</th><th>Measurement Distance</th></tr><tr><th>MHz</th><th>uV/m</th><th>Meters</th></tr><tr><td>.009 – 0.490</td><td>2400/F(kHz)</td><td>300</td></tr><tr><td>0.490 – 1.705</td><td>24000/F(kHz)</td><td>30</td></tr><tr><td>1.705 – 30.0</td><td>30</td><td>30</td></tr><tr><td>30 – 88</td><td>100</td><td>3</td></tr><tr><td>88 – 216</td><td>150</td><td>3</td></tr><tr><td>216 - 960</td><td>200</td><td>3</td></tr><tr><td>Above 960</td><td>500</td><td>3</td></tr></table>	Frequency	Field Strength	Measurement Distance	MHz	uV/m	Meters	.009 – 0.490	2400/F(kHz)	300	0.490 – 1.705	24000/F(kHz)	30	1.705 – 30.0	30	30	30 – 88	100	3	88 – 216	150	3	216 - 960	200	3	Above 960	500	3																																																
Frequency	Field Strength	Measurement Distance																																																																										
MHz	uV/m	Meters																																																																										
.009 – 0.490	2400/F(kHz)	300																																																																										
0.490 – 1.705	24000/F(kHz)	30																																																																										
1.705 – 30.0	30	30																																																																										
30 – 88	100	3																																																																										
88 – 216	150	3																																																																										
216 - 960	200	3																																																																										
Above 960	500	3																																																																										
	(b) In the emission table above, the tighter limit applies at the band edges.																																																																											

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

F.3. ENVIRONMENTAL CONDITIONS

Temperature	27.4 +/- 2 °C
Humidity	33 +/- 2 %
Barometric Pressure	96.24 +/- 0.2 kPa

F.4. EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
00072	EMCO	2075	Mini-mast	n/a	n/a
00073	EMCO	2080	Turn Table	n/a	n/a
00071	EMCO	2090	Multi-Device Controller	n/a	n/a
00035	ETS	3115	Double Ridged Guide Horn	24Mar04	24Mar05
00015	Agilent	E4408B	Spectrum Analyzer	29Dec03	29Dec04
00049	HP	8566B	Spectrum Analyzer RF Section	18May04	18May05
00047	HP	85685A	RF Preselector	18May04	18May05
00048	Gore	65474	Microwave Cable	20May04	20May05
00030	HP	83017A	LNA	20May04	20May05

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
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Lab Registration(s):	FCC #714830	IC Lab File #3874

F.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS

The measurement equipment was connected as shown in F.6. A number of antennas were used to cover the applicable frequency range test. The ranges in which each antenna was used are as follows:

Frequency Range	Antenna
1 GHz – 18 GHz	ETS 3115 Horn

MEASUREMENT EQUIPMENT SETTINGS

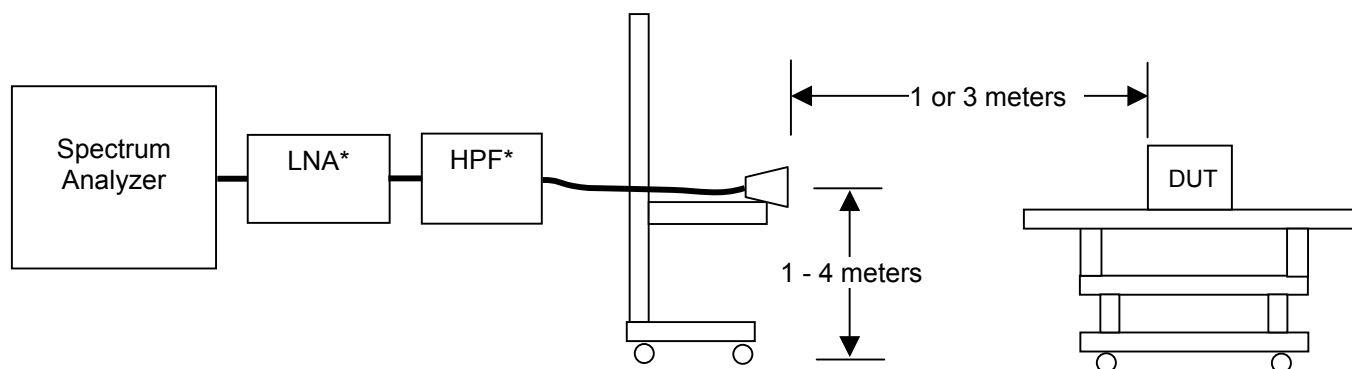
The spectrum analyzer was set to the following settings:

Frequency Range	RBW	VBW	Detector
MHz	kHz	kHz	
> 1000	1000*	1000	

*As a worst-case measurement, the average/quasi-peak limits were applied to measurements made with a peak detector.

F.6. SETUP DRAWING

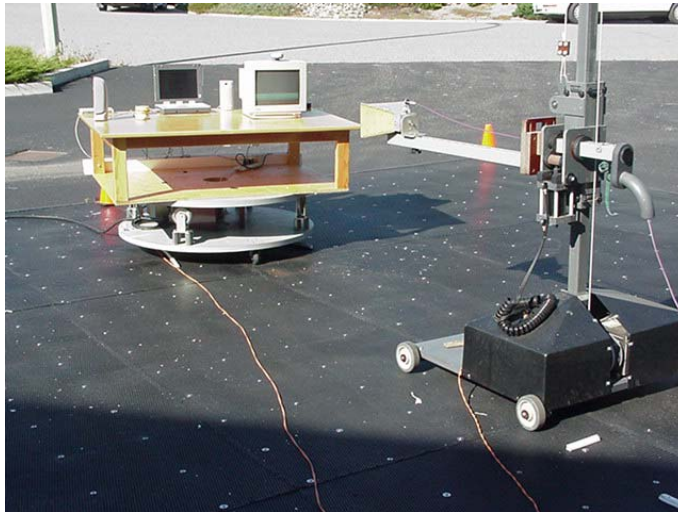
Figure F-1 - Setup Drawing



* Used for >1GHz

F.7. SETUP PHOTOGRAPHS

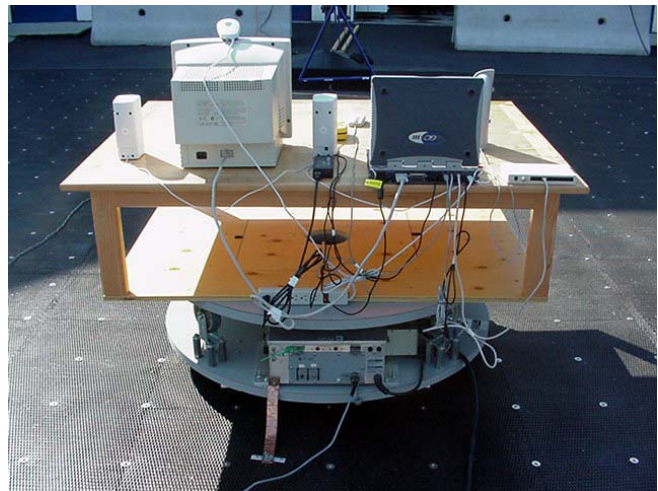
Photograph F-1 - 3115 Horn Antenna



Photograph F-2 - Front of Radiated Emission Configuration



Photograph F-3 - Back of Radiated Emission Configuration



F.8. DUT OPERATING DESCRIPTION

Measurements were made of the bands that may contain inter-modulation products with both the Bluetooth and WLAN radios transmitting. Measurements were made for each combination of WLAN channels and Modes (low and high, Mode b and g) with the Bluetooth transmitter hopping or on a worst-case channel when defined.

F.9. TEST RESULTS

F.9.1. Band-edge Spurious Field Strength adjacent a Restricted Band (WLAN Mode b co-transmitting with Bluetooth)



Project Number: 100504KBC-T565-E15W/E15B
Company: Itronix
Product: IX260+ with Senao WLAN & Bluetooth
Standard: FCC15.247
Test Start Date: 01Nov04
Test End Date: 06Dec04

Senao WLAN Mode b with Bluetooth CH78													
WLAN Channel	Polarity	Distance	Frequency	Carrier Radiated Field Strength	Delta-Marker	Detector	Calculated Band-edge Field Strength	Limit Distance	Duty Cycle Correction	Corrected Calculated Band-edge Field Strength	Specified Limit	Margin	Pass/Fail
		m	MHz	dBuV/m	dB		dBuV/m	m	dB	dBuV/m	dBuV/m	dB	
11	H	3	2483.50	106.27	41.97	PK	64.30	3.00	-20.00	44.30	73.98	29.68	Pass
11	H	3	2483.50	98.27	41.97	AV	56.30	3.00	-20.00	36.30	53.98	17.68	Pass
11	V	3	2483.50	97.77	49.07	PK	48.70	3.00	-20.00	28.70	73.98	45.28	Pass
11	V	3	2483.50	89.67	49.07	AV	40.60	3.00	-20.00	20.60	53.98	33.38	Pass

Formulae:

Total CF (dB) = Antenna Factor (dB) + Cable Factor (dB) + Other Factor (Amplifier Gain, Filter Loss, etc) (dB)

Field Strength (dBuV/m) = SA Reading (dBuV) + Total CF (dB/m)

Limit (dBuV/m) = Published Limit (dBuV/m) + Limit Distance Correction (dB)

Calculated Band-edge Field Strength (dBuV/m) = Carrier Radiated Field Strength (dBuV/m) - Delta-Marker (dB)

Margin (dB) = Limit (dBuV/m) - Field Strength (dBuV/m)

Duty Cycle Correction (dB) = $20 \cdot \log(\text{max time transmitting in 100 ms (mS)} / 100 \text{ mS})$

Corrected Calculated Band-edge Field Strength (dBuV/m) = Calculated Band-edge Field Strength (dBuV/m) + Duty Cycle Correction (dB)

Note: Measurements and calculation reference the Marker-Delta Method Described in FCC Public Notice DA 00-705

F.9.2. Band-edge Spurious Field Strength adjacent a Restricted Band (WLAN Mode g co-transmitting with Bluetooth)



Project Number: 100504KBC-T565-E15W/E15B
Company: Itronix
Product: IX260+ with Senao WLAN & Bluetooth
Standard: FCC15.247
Test Start Date: 01Nov04
Test End Date: 06Dec04

Senao WLAN Mode g with Bluetooth CH78													
WLAN Channel	Polarity	Distance	Frequency	Carrier Radiated Field Strength	Delta-Marker	Detector	Calculated Band-edge Field Strength	Limit Distance	Duty Cycle Correction	Corrected Calculated Band-edge Field Strength	Specified Limit	Margin	Pass/Fail
		m	MHz	dBuV/m	dB		dBuV/m	m	dB	dBuV/m	dBuV/m	dB	
11	H	3	2483.50	111.57	46.22	PK	65.35	3.00	-20.00	45.35	73.98	28.63	Pass
11	H	3	2483.50	102.07	46.22	AV	55.85	3.00	-20.00	35.85	53.98	18.13	Pass
11	V	3	2483.50	105.87	48.07	PK	57.80	3.00	-20.00	37.80	73.98	36.18	Pass
11	V	3	2483.50	96.67	48.07	AV	48.60	3.00	-20.00	28.60	53.98	25.38	Pass

Formulae:

Total CF (dB) = Antenna Factor (dB) + Cable Factor (dB) + Other Factor (Amplifier Gain, Filter Loss, etc) (dB)

Field Strength (dBuV/m) = SA Reading (dBuV) + Total CF (dB/m)

Limit (dBuV/m) = Published Limit (dBuV/m) + Limit Distance Correction (dB)

Calculated Band-edge Field Strength (dBuV/m) = Carrier Radiated Field Strength (dBuV/m) - Delta-Marker (dB)

Margin (dB) = Limit (dBuV/m) - Field Strength (dBuV/m)

Duty Cycle Correction (dB) = $20 \cdot \log(\text{max time transmitting in 100 ms (mS)} / 100 \text{ mS})$

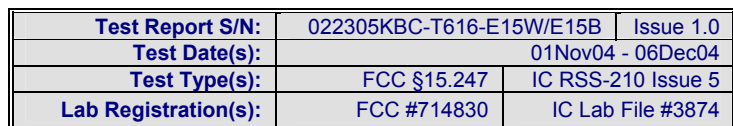
Corrected Calculated Band-edge Field Strength (dBuV/m) = Calculated Band-edge Field Strength (dBuV/m) + Duty Cycle Correction (dB)

Note: Measurements and calculation reference the Marker-Delta Method Described in FCC Public Notice DA 00-705

Applicant:	Itronix Corporation	Model:	IX260PNLA580BT	IC ID:	1943A-IX260Pf	FCC ID:	KBCIX260PNLA580BT
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IX260+ Rugged Laptop PC with internal Senao NL-3054MP 802.11b/g WLAN and Cirronet BT2022 Bluetooth





Celltech
Testing and Engineering Services Ltd

Standard:	FCC15.209
Test Start Date:	01Nov04
Test End Date:	06Dec04

Formulae:

Total CF (dB) = Antenna Factor (dB) + Cable Factor (dB) + Other Factor (Amplifier Gain, Filter Loss, etc) (dB)

Field Strength (dBuV/m) = SA Reading (dBuV) + Total CF (dB/m)

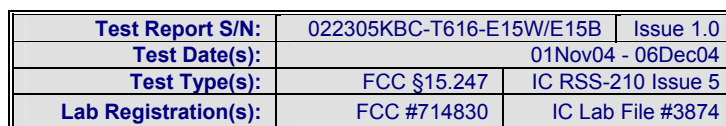
Limit Distance Correction (dB) = $40 \cdot \log(d1/d2)$ for $f < 30$ MHz; $20 \cdot \log(d1/d2)$ for $f > 30$ MHz; where $d1$ is the measurement distance and $d2$ is the published limit distance

Limit (dBuV/m) = Published Limit (dBuV/m) + Limit Distance Correction (dB)

Margin (dB) = Limit (dBuV/m) - Field Strength (dBuV/m)

Where there is acceptable margin between the peak emission reported and the average limit stated, the average limit is referenced. Where the average limit is exceeded by the peak emission or the margin unacceptable, the peak limit is referenced and an average measurement made and referenced to the average limit.

Applicant:	Itronix Corporation	Model:	IX260PNLA580BT	IC ID:	1943A-IX260Pf	FCC ID:	KBCIX260PNLA580BT
IX260+ Rugged Laptop PC with internal Senao NL-3054MP 802.11b/g WLAN and Cirronet BT2022 Bluetooth							
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Standard: FCC15.209
Test Start Date: 01Nov04
Test End Date: 06Dec04

WLAN Mode g with Bluetooth Hopping																				
Channel	Polarity	Distance	Rx Antenna	Frequency	SA Level	Noise Floor	Rx AF	Rx CL	Other Rx	Total Rx CF	Field Strength	Duty Cycle Correction	Corrected Field Strength	Detector	Limit Distance	Limit Distance Correction	Calculated Limit	Lower Limit	Margin	Pass/Fail
		m		MHz	dBuV		dB/m	dB	dB	dB/m	dBuV/m	dB	dBuV/m	PK/QP/AV	m	dB	dBuV/m		dB	
1	H	3	Horn SN6276	2390.00	86.80		30.22	3.47	-37.40	-3.71	83.09	-20.00	63.09	PK	3.00	0.00	73.98		10.89	PASS
1	H	3	Horn SN6276	2390.00	67.80		30.22	3.47	-37.40	-3.71	64.09	-20.00	44.09	AV	3.00	0.00	53.98		9.89	PASS
1	H	3	Horn SN6276	2688.00	50.90		31.00	3.65	-26.98	7.67	58.57	-20.00	38.57	PK	3.00	0.00	53.98	*	15.41	PASS
1	H	3	Horn SN6276	7275.25	57.30		38.30	6.31	-34.32	10.28	67.58	-20.00	47.58	PK	3.00	0.00	73.98		26.39	PASS
1	H	3	Horn SN6276	7275.25	43.40		38.30	6.31	-34.32	10.28	53.68	-20.00	33.68	AV	3.00	0.00	53.98		20.29	PASS
1	V	3	Horn SN6276	2390.00	66.70		30.22	3.47	-37.40	-3.71	62.99	-20.00	42.99	PK	3.00	0.00	53.98	*	10.99	PASS
1	V	3	Horn SN6276	2687.90	52.90		31.00	3.65	-26.98	7.67	60.57	-20.00	40.57	PK	3.00	0.00	53.98	*	13.41	PASS
1	V	3	Horn SN6276	7275.25	57.90		38.30	6.31	-34.32	10.28	68.18	-20.00	48.18	PK	3.00	0.00	73.98		25.79	PASS
1	V	3	Horn SN6276	7275.25	43.40		38.30	6.31	-34.32	10.28	53.68	-20.00	33.68	AV	3.00	0.00	53.98		20.29	PASS
11	H	3	Horn SN6276	2688.00	51.90		31.00	3.65	-20.76	13.89	65.79	-20.00	45.79	PK	3.00	0.00	73.98		28.19	PASS
11	H	3	Horn SN6276	2688.00	39.00		31.00	3.65	-20.76	13.89	52.89	-20.00	32.89	AV	3.00	0.00	53.98		21.09	PASS
11	H	3	Horn SN6276	4949.50	48.90		35.60	5.05	-26.03	14.62	63.52	-20.00	43.52	PK	3.00	0.00	53.98	*	10.46	PASS
11	H	3	Horn SN6276	7368.00	55.20		38.46	6.33	-34.32	10.48	65.68	-20.00	45.68	PK	3.00	0.00	73.98		28.30	PASS
11	H	3	Horn SN6276	7368.00	43.10		38.46	6.33	-34.32	10.48	53.58	-20.00	33.58	AV	3.00	0.00	53.98		20.40	PASS
11	V	3	Horn SN6276	4949.50	50.10		35.60	5.05	-34.09	6.56	56.66	-20.00	36.66	PK	3.00	0.00	53.98	*	17.32	PASS

Total CF (dB) = Antenna Factor (dB) + Cable Factor (dB) + Other Factor (Amplifier Gain, Filter Loss, etc) (dB)
 Field Strength (dBuV/m) = SA Reading (dBuV) + Total CF (dB/m)
 Limit Distance Correction (dB) = $40 \cdot \log(d1/d2)$ for $f < 30$ MHz, $20 \cdot \log(d1/d2)$ for $f > 30$ MHz; where d1 is the measurement distance and d2 is the published limit distance
 Limit (dBuV/m) = Published Limit (dBuV/m) + Limit Distance Correction (dB)
 Margin (dB) = Limit (dBuV/m) - Field Strength (dBuV/m)

Where there is acceptable margin between the peak emission reported and the average limit stated, the average limit is referenced. Where the average limit is exceeded by the peak emission or the margin unacceptable, the peak limit is referenced and an average measurement made and referenced to the average limit.

Applicant:	Itronix Corporation	Model:	IX260PNLA580BT	IC ID:	1943A-IX260Pf	FCC ID:	KBCIX260PNLA580BT
IX260+ Rugged Laptop PC with internal Senao NL-3054MP 802.11b/g WLAN and Cirronet BT2022 Bluetooth							
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Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

F.10. PASS/FAIL

In reference to the results outlined in F.9, the DUT passes the requirements as stated in the reference standards as follows: FCC 15.205 (a) (b) and 15.209 (a): No emissions were measured within the restricted bands as outlined in 15.205 that exceeded the limits stated in 15.209.

F.11. SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.



Russell Pipe
Senior Compliance Technologist
Celltech Labs Inc.

26Nov04

Date

Appendix G - Maximum Permissible Exposure Calculation

G.1. REFERENCES

Normative Reference Standard	FCC CFR 47§1.1310 IEEE Std C95.1-1999
Procedure Reference	FCC CFR 47§2.1091

G.2. LIMITS

FCC CFR 47§1.1310 Table 1(b)	1.0 mW/cm ²
------------------------------	------------------------

G.3. ENVIRONMENTAL CONDITIONS

Temperature	na
Humidity	na
Barometric Pressure	na

G.4. EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
na					

G.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS	The results described herein were determined by the calculation, so no measurement equipment was used.
MEASUREMENT EQUIPMENT SETTINGS	na

G.6. SETUP PHOTOS

na

G.7. SETUP DRAWINGS

na

G.8. DUT OPERATING DESCRIPTION

Bluetooth	The maximum Bluetooth conducted power used for these calculations was measured on Channel 0, with a power setting of 220/45 while the WLAN was transmitting on Channel 1 Mode g with an AGC setting of (0,8).
WLAN	The maximum WLAN conducted powers used for these calculations were measured on Channel 1 for Mode b and Channel 7 for Mode g, with an AGC setting of (0,8) while the Bluetooth transmitter was transmitting a data stream with a max. power setting of (220/45).

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Lab Registration(s):	FCC #714830	IC Lab File #3874

G.9. TEST RESULTS

G.9.1. Single-Transmit Calculations:

RangeStar Internal Antenna (WLAN 802.11b mode):

Tx Frequency: 2412 (MHz)
 RF Output Power at Antenna Input Terminal: 20.43 (dBm)
 Antenna gain: 4.50 (dBi)

S= 1.00 (mW/cm²)
 P= 110.4079 (mW)
 G= 2.82 (numeric)

R = 4.98 (cm)

S at 20cm: 0.06183856 (mW/cm²)

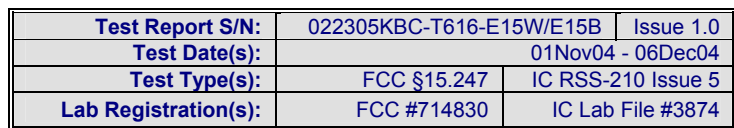
RangeStar Internal Antenna (WLAN 802.11g mode):

Tx Frequency: 2437 (MHz)
 RF Output Power at Antenna Input Terminal: 20.21 (dBm)
 Antenna gain: 4.50 (dBi)

S= 1.00 (mW/cm²)
 P= 104.9542 (mW)
 G= 2.82 (numeric)

R = 4.85 (cm)

S at 20cm: 0.058784032 (mW/cm²)



Tx Frequency:	2402	(MHz)
RF Output Power at Antenna Input Terminal:	16.56	(dBm)
Antenna gain:	4.50	(dBi)

S= 1.00 (mW/cm^2)
P= 45.2898 (mW)
G= 2.82 (numeric)

R = 3.19 (cm)

S at 20cm: 0.025366431 (mW/cm^2)

$$S = \frac{PG}{4 R^2}$$

$$R = \sqrt{\frac{P}{4S}}$$

where: S = Power Density Limit
P = Power Applied to the Antenna
G = Numeric Antenna Gain
R = Distance from Antenna

Mode	Power Density Limit	RF Conducted Output Power	Antenna Gain	MPE Distance	Power Density at 20 cm
	mW/cm ²	dBm	dBi	cm	mW/cm ²
WLAN (802.11b)	1.0	20.43	4.5	4.98	0.062
WLAN (802.11g)	1.0	20.21	4.5	4.85	0.059
Bluetooth (CH0)	1.0	16.56	4.5	3.19	0.025

Radio	20 cm Power Density	Ratio	Limit
	mW/cm ²	(S/Limit)	mW/cm ²
Highest WLAN	0.062	0.062	1
Bluetooth	0.025	0.025	1
	Sum =	0.087	1

Applicant:	Itronix Corporation	Model:	IX260PNLA580BT	IC ID:	1943A-IX260Pf	FCC ID:	KBCIX260PNLA580BT
IX260+ Rugged Laptop PC with internal Senao NL-3054MP 802.11b/g WLAN and Cirronet BT2022 Bluetooth							
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Test Date(s):	01Nov04 - 06Dec04	
Test Type(s):	FCC §15.247	IC RSS-210 Issue 5
Lab Registration(s):	FCC #714830	IC Lab File #3874

G.10. PASS/FAIL

In reference to the results outlined in G.9 the DUT passes the requirements as stated in the reference standards as follows:
1) The DUT must comply with the minimum spacing requirement of 20 cm to ensure an exposure of not more than 1 mW/cm².

G.11. SIGN-OFF

I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.



Duane M. Friesen, C.E.T.
EMC Manager
Celltech Labs Inc.

06Dec04

Date

Test Report S/N:	022305KBC-T616-E15W/E15B	Issue 1.0
Test Date(s):	01Nov04 - 06Dec04	
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END OF DOCUMENT