

Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

SUPPLEMENTARY EMC TEST REPORT
FOR THE
ITRONIX RUGGED LAPTOP PC MODEL: IX260P-AC775BT
WITH THE
INTERNAL CIRRONET BT2022 BLUETOOTH TRANSMITTER
UTILIZING THE
INTERNAL RANGESTAR SURFACE-MOUNT ANTENNA
(INSTALLED IN THE UPPER LEFT SIDE EDGE OF LCD DISPLAY)
CO-TRANSMITTING WITH THE
SIERRA WIRELESS AIRCARD 775
DUAL-BAND GSM GPRS/EDGE PCMCIA MODEM
UTILIZING THE
EXTERNAL SWIVEL DIPOLE ANTENNA

TRSN 072804KBC-T541-E24G/E15B
Issue 1.0

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

December 17, 2004

Test Report S/N:	072804KBC-T541-E24G/E15B		
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Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

DECLARATION OF COMPLIANCE

Test Lab		CELLTECH LABS INC. Testing and Engineering Services 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3		Applicant Information		ITRONIX CORPORATION 801 South Stevens Street Spokane, WA 99204 United States		
Phone:	250-448-7047							
Fax:	250-448-7048							
e-mail:	info@celltechlabs.com							
web site:	www.celltechlabs.com							
Laboratory Registration No.(s):		FCC:	714830	IC:	IC 3874			
Rule Part(s):	FCC:	Dual Band GSM		§2 ; §22H; §24E				
		Bluetooth - FHSS		§15.247; §2.1091; §1.1310				
Device Classification:	FCC:	Dual Band GSM GPRS/EDGE		- PCS Licensed Transmitter (PCB)				
		Bluetooth - FHSS		- Part 15 Spread Spectrum Transmitter (DSS)				
Device Identification:	FCC ID:	KBCIX260P-AC775BT		IC ID:	1943A-IX260Pe			
DUT Description:								
Model:	IX260P-AC775BT							
Device Description:	Rugged Laptop PC with internal co-located transmitters (simultaneous transmit)							
Internal Transmitter(s):	Sierra Wireless AirCard 775 Dual-Band GSM GPRS/EDGE PCMCIA Modem							
	Cirronet BT2022 Bluetooth							
Tx Frequency Range(s):	Dual Band GSM	Cellular	824.2 - 848.8 MHz					
		PCS	1850.2 - 1909.8 MHz					
	Bluetooth		2402 - 2480 MHz					
Max. RF Output Power:	Bluetooth		+16.29 dBm Peak Conducted					
	Dual Band GSM	Cellular	+31.22 dBm Peak Conducted					
		PCS	+28.08 dBm Peak Conducted					
Modulation Type(s):	Bluetooth		GFSK 1 Mbps 0.5 BT Gaussian					
	Dual Band GSM		GMSK					
Antenna Type(s):	Bluetooth		RangeStar P/N: 100929 Internal Surface-Mount					
	Dual Band GSM		Itronix IX260+ External Swivel Dipole					
Power Supply:	90 Watt AC Power Adapter, 11.1 V Lithium-ion Battery, 6.0 Ah (Model: A2121-2), 12 V Vehicle Battery (for Vehicle Cradle)							

This wireless mobile 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 Parts 2, 15.247, 22H, 24E, Industry Canada RSS 133 Issue 2, RSS-132 Issue 1 (Provisional), 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 Pipe
Senior Compliance Technologist
Celltech Labs Inc.



Duane M. Friesen
EMC Manager
Celltech Labs Inc.



Applicant:	Itronix Corporation	Model:	IX260P-AC775BT	FCC ID:	KBCIX260P-AC775BT	IC ID:	1943A-IX260Pe	
Rugged Laptop PC with Sierra Wireless AC775 Dual-Band GSM Modem & Cirronet BT2022 Bluetooth								
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TEST SUMMARY

Referenced Standard: FCC CFR Title 47 Parts 2, 15, 22 & 24

Appendix	Test Description	Procedure Reference	Limit Reference	Test Start Date	Test End Date	Result
B	Powerline Conducted Emissions	ANSI C63.4	§15.207	1Dec04	1Dec04	Pass
C	Bluetooth Peak Conducted RF Output Power	FCC 97-114	§15.247(b) (3)	8Dec04	8Dec04	Pass
D	Radiated Spurious Emissions	ANSI/TIA/EIA-603-B	§22.917 (a), §24.238 (a)	07Dec04	16Dec04	Pass
E	Maximum Permissible Exposure	FCC CFR 47 § 2.1091 IEEE Std C95.1-1999	§1.1310 Table 1 (b)	15Dec04	15Dec04	Pass
F	GSM Conducted RF Output Power	FCC 97-114	§2.1046	8Dec04	8Dec04	n/a



Referenced Standard: IC RSS-210 Issue 5, RSS-132 & RSS-133

B	Powerline Conducted Emissions	RSS-212, ANSI C63.4	RSS-210 §6.6	1Dec04	1Dec04	Pass
C	Bluetooth Peak Conducted RF Output Power	RSS-210 § 10	RSS-210 A1 §(I)(iv) RSS-210 §6.2.2 (o)(b)	8Dec04	8Dec04	Pass
D	Radiated Spurious Emissions	ANSI/TIA/EIA-603-B	RSS-132 §4.4 RSS-133 §6.3	07Dec04	16Dec04	Pass
E	Maximum Permissible Exposure	RSS-102	RSS-210 §14 Safety Code 6 2.2.1(a) Table 5	15Dec04	15Dec04	Pass
F	GSM Conducted RF Output Power	ANSI/TIA/EIA-603-B	RSS-132 §4.4 RSS-133 §6.2	8Dec04	8Dec04	n/a

REVISION LOG

Issue	Description	Implemented By	Implementation Date
1.0	Initial Release	Jon Hughes	17Dec04


SIGNATORIES

Prepared By:		Dec. 17, 2004
Name/Title	Duane M. Friesen, C.E.T. / EMC Manager	Date
Approved By:		Dec. 17, 2004
Name/Title	Jon Hughes / General Manager	Date

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1.0 SCOPE

This report outlines the measurements made and results collected during electromagnetic emissions testing of the Itronix Corporation IX260+ Rugged Laptop PC with internal Cirronet BT2022 Bluetooth Transmitter co-transmitting with the Sierra Wireless AirCard 775 Dual-Band GSM GPRS/EDGE PCMCIA Modem. The Bluetooth transmitter was connected to the Rangestar internal surface-mount antenna located in the upper left side rear edge of the LCD display. The Dual-Band GSM Modem was connected to an external swivel dipole antenna located on the upper right side edge of the LCD display. The DUT also has the option of being mounted in a vehicle cradle, with the Dual-Band GSM Modem utilizing a vehicle-mount antenna. The vehicle antenna option was not considered to be worst case when investigating the co-transmitting effects, and therefore was not used in obtaining the data presented in this report. This report describes the inter-modulation product and related measurement results obtained with both transmitters installed in the IX260+ Rugged Laptop PC as described, and transmitting simultaneously. The measurement results were applied against the applicable EMC requirements and limits outlined in the technical rules and regulations set forth in the Federal Communication Commission Code of Federal Regulations Title 47 Part 2, 15 subpart C, 22 subpart H and 24 subpart E; and Industry Canada Radio Standards Specification RSS-210, RSS-132, and RSS-133.

Applicant:	Itronix Corporation	Model:	IX260P-AC775BT	FCC ID:	KBCIX260P-AC775BT	IC ID:	1943A-IX260Pe	
Rugged Laptop PC with Sierra Wireless AC775 Dual-Band GSM Modem & Cirronet BT2022 Bluetooth								
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2.0 REFERENCES

2.1 Normative References

ANSI/ISO 17025:1999	General Requirements for competence of testing and calibration laboratories
IEEE/ANSI C63.4:2003	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
IEEE/ANSI Std C95.1:1999	American National Standard Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields
ANSI/TIA/EIA-603-B:2002	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards
CFR Title 47 Part 2:2003	Code of Federal Regulations Title 47: Telecommunication Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR Title 47 Part 15:2003	Code of Federal Regulations Title 47: Telecommunication Part 15: Radio Frequency Devices
CFR Title 47 Part 22:2003	Code of Federal Regulations Title 47: Telecommunication Part 22: Public Mobile Services
CFR Title 47 Part 24:2003	Code of Federal Regulations Title 47: Telecommunication Part 24: Personal Communication Services
IC Spectrum Management & Telecommunications Policy	Radio Standards Specification RSS-102 Issue 1 (Provisional) - Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields RSS-132 Issue 1 (Provisional) 800 MHz Cellular Telephones Employing New Technologies RSS-133 Issue 2, Revision 1 Personal Communication Services RSS-212 Issue 1 (Provisional) - Test Facilities & Test Methods for Radio Equipment RSS-210 Issue 5 - Low Power Licence-Exempt Radiocommunication Devices
Celltech Labs Test Report	EMC Test Report For the Model IX260+ Rugged Laptop PC with Sierra Wireless AirCard 775 Dual-Band GSM PCMCIA Modem Test Report Serial Number 072804KBC-T541-E24G Date: September 9, 2004
Celltech Labs Test Report	EMC Test Report For the Model IX260+ Rugged Laptop PC with Cirronet BT2022 Bluetooth Transmitter and Internal Antenna Test Report Serial Number 072804KBC-T541-E15B Date: October 22, 2004

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3.0 TERMS AND DEFINITIONS

AV	Average
CDMA	Code Division Multiple Access
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
EDGE	Enhanced Data Rates for GSM Evolution
EMC	Electromagnetic Compatibility
FCC	Federal Communication Commission
FHSS	Frequency Hopping Spread Spectrum
GSM	Global Systems for a Mobility Communication
GPRS	General Packet Radio Service
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

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4.0 FACILITIES AND ACCREDITATIONS

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.

5.0 GENERAL INFORMATION

5.1 Applicant Information

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

5.2 DUT Description

The DUT consisted of the IX260+ Rugged Laptop PC containing a Cirronet BT2022 Bluetooth Transmitter connected to an Internal Surface-Mount Antenna installed in the upper left side rear edge of the LCD display. Co-located in the IX260+ Rugged Laptop PC was a Sierra Wireless AirCard 775 Dual-Band GSM GPRS/EDGE PCMCIA Modem connected to an External Swivel Dipole Antenna located on the upper right side edge of the LCD display. The DUT has the option of being mounted in a vehicle cradle, with the Dual-Band GSM Modem utilizing a vehicle-mount antenna. The vehicle antenna option was not considered to be worst case, and therefore was not used in obtaining the data presented in this report. Photographs of the DUT placement and construction are shown in Appendix A.

Device:	Rugged Laptop PC			
Model:	IX260P-AC775BT			
Serial Number:	ZZGEG4196ZZ6494			
Identifier(s):	FCC ID:	KBCIX260P-AC775BT	IC ID:	1943A-IX260Pe
Power Source:	Delta Electronics Model ADP-90AB Rev B 90 Watt AC-DC power supply			

Device:	Dual-Band GSM GPRS/EDGE PCMCIA Modem			
Model:	Sierra Wireless AirCard 775			
Serial Number:	X04072701619010			
Identifier(s):	FCC ID:	N7NAC775	IC ID:	2417-AC775
Rule Part(s):	FCC:	§2.1091; §22.913, §22.917; §24.232(b), §24.238		
	IC:	RSS-133 Issue 2; RSS-132 Issue 1 (Provisional)		
Classification(s):	FCC:	PCS Licensed Transmitter (PCB)		
	IC:	800 MHz Cellular Telephones employing New Technologies (RSS-132) 2 GHz Personal Communication Services (RSS-133)		
Power Source:	Powered from the internal PC power supply			

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Device:	2.4GHz FHSS Bluetooth Transmitter		
Model:	Cirronet BT2022		
Serial Number:	n/a		
Identifier(s):	FCC ID:	HSW-BT2022M	IC: 4492A-BT2022M
Rule Part(s):	FCC:	§15.247; §2.1091; §1.1310	IC: RSS-210 Issue 5 - A1. 11/30/02
Classification(s):	FCC:	Spread Spectrum Transmitter (DSS)	IC: Low Power Licence-Exempt Transmitter
Power Source:	Powered from the internal PC power supply		

Name:	External Mounted Swivel Dipole Antenna (GSM - upper right side edge of LCD display)		
Model:	Itronix IX260+		
Gain:	2.6 dBi		

Device:	Internal Surface-Mount Antenna (Bluetooth - upper left side rear edge of LCD display)		
Model:	RangeStar P/N: 100929		
Gain:	4.5 dBi		

5.3 Co-Located Equipment

Name:	GPS Receiver Module with attached Antenna (Receive only)		
Model:	Leadtek P/N GPS9547		

5.4 Cable Descriptions

ROUTING		Length m	Model	Terminations		Shield Type	Shield Termination		Suppression
From	To			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
Clocks:	n/a
Device:	Dual-Band GSM Modem
Clocks:	n/a
Device:	External Swivel Dipole Antenna
Clocks:	None
Device:	Internal Surface-Mount Antenna
Clocks:	None

5.6.2 Co-Located Clock Frequencies

Device:	Peripherals
Clocks:	n/a

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5.7 Mode(s) of Operation Tested

5.7.1 Dual-Band GSM GPRS/EDGE Modem

Customer supplied software was used to set the GSM Modem to the appropriate channel and power level for the specific measurement. To insure no in-band anomalies were present, prescan measurements were made with the GSM modem set to each of the low, mid and high channels in each band while the Bluetooth was co-transmitting. Final measurements were made with the GSM modem set for each of the low and high channels in each band. The following settings were used for each channel.

5.7.1.1 Cellular GSM

TX Frequency Range:	824.2 – 848.8 MHz Ch. 128 (824.200 MHz) & Ch. 251 (848.800 MHz) measured unless otherwise noted
Software Power Gain Settings:	The supplied software set the power for maximum rated output power.
RF Peak Conducted Output Power Tested:	Ch. 128 - +31.12 dBm Ch. 251 - +31.22 dBm
Battery Type(s):	11.1V Lithium-ion, 6.0Ah (Model: A2121-2)
Modulation Type:	GMSK

5.7.1.2 PCS GSM

TX Frequency Range:	1850.2 – 1909.8 MHz Ch. 512 (1850.2 MHz) & Ch. 810 (1909.8 MHz) measured unless otherwise noted
Software Power Gain Settings:	The supplied software set the power for maximum rated output power.
RF Peak Conducted Output Power Tested:	Ch. 512 - +27.94 dBm Ch. 810 - +28.08 dBm
Battery Type(s):	11.1V Lithium-ion, 6.0Ah (Model: A2121-2)
Modulation Type:	GMSK

5.7.2 Bluetooth Transmitter

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

TX Frequency Range:	2402 – 2480 MHz
Software Power Gain Settings:	220 /45 *gain settings used during hopping mode
RF Peak Conducted Output Power Tested:	Ch. 0 - +16.29 dBm Ch. 39 - +15.83 dBm Ch. 78 - +15.10 dBm
Modulation Type(s):	GFSK 0.5 BT Gaussian

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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 Dual-Band GSM modem 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.

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. Because the swivel dipole antenna orientation can be user configured, prescan evaluations were made to determine the configuration that resulted in the highest emissions. A “horizontal, pointing back” orientation was used for the cellular band, “vertical, pointing up” was used for the PCS band. 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 worse case but typical of normal use. The system is available for use while installed in a mobile cradle, using a vehicular mounted dipole antenna and the resulting measurements using this configuration were investigated and reported in the single transmitting report. Given that the use of the mobile antenna resulted in greater separation in transmit antennas and lower dominant transmit power, only the worse case configuration using the swivel dipole antenna was used to investigate the co-transmission effects reported herein.


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.

Applicant:	Itronix Corporation	Model:	IX260P-AC775BT	FCC ID:	KBCIX260P-AC775BT	IC ID:	1943A-IX260Pe	
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APPENDIX

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Appendix A - DUT Photographs

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



Photograph A-2 –Side of Open IX260+ Laptop PC

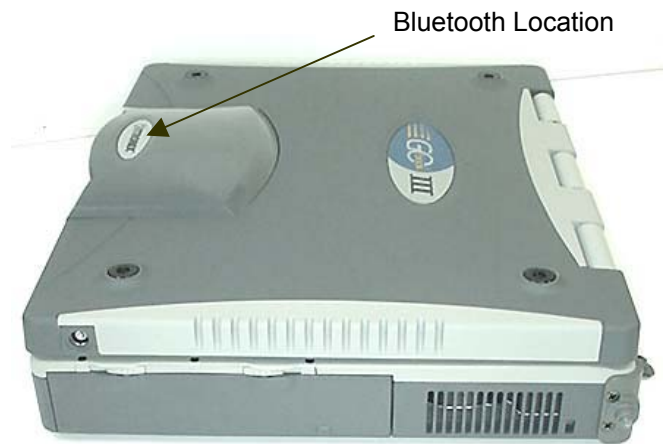


Photograph A-3 –Dual-Band GSM Location




Dual-Band GSM Modem PCMCIA Card

Photograph A-4 –Bluetooth Transmitter Location



Bluetooth Location

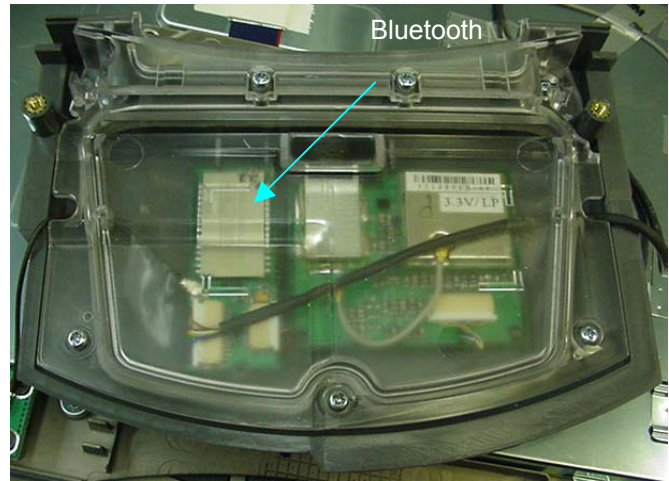
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Photograph A-5 –Dual-Band GSM PCMCIA Modem



Photograph A-6 –Bluetooth Transmitter



Photograph A-7 –Surface-Mount Antenna Placement



Applicant:	Itronix Corporation	Model:	IX260P-AC775BT	FCC ID:	KBCIX260P-AC775BT	IC ID:	1943A-IX260Pe	
Rugged Laptop PC with Sierra Wireless AC775 Dual-Band GSM Modem & Cirronet BT2022 Bluetooth								
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Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

Appendix B - Conducted Powerline 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

Test Report S/N:	072804KBC-T541-E24G/E15B		
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Lab Registration(s):	FCC #714830	IC Lab File #3874	

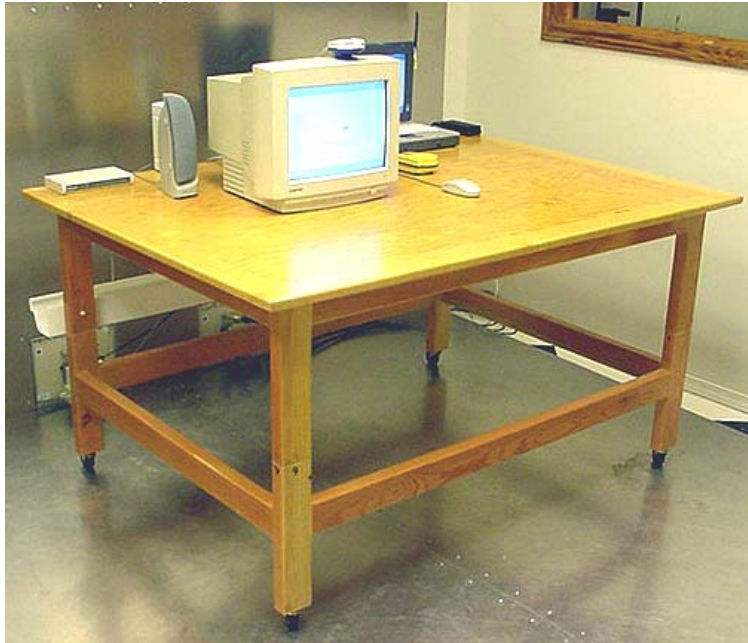
B.5. MEASUREMENT EQUIPMENT SETUP

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	<p>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:</p> <p>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</p> <p>Quasi-Peak Adapter: Normal - Automatic Bandwidth Setting: 9 kHz</p> <p>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.</p> <p>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.</p>

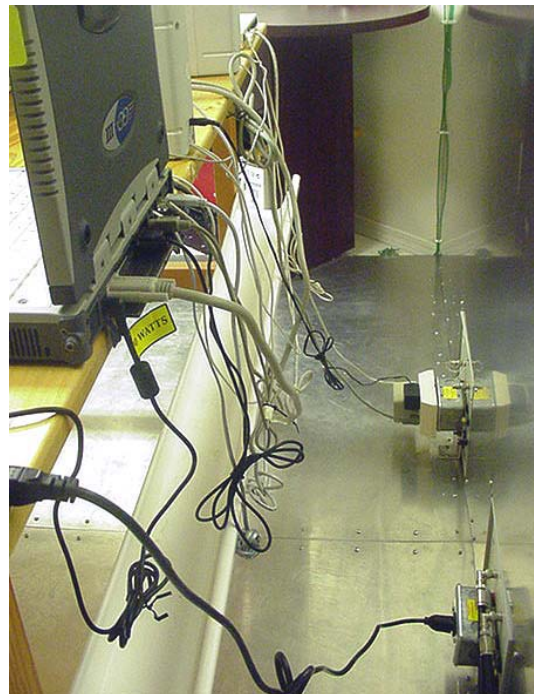
Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

B.6. SETUP PHOTOS

Photograph B-1 – AC Powerline Conducted Emission Configuration



Photograph B-2 – AC Powerline Conducted Emission Cable Placement

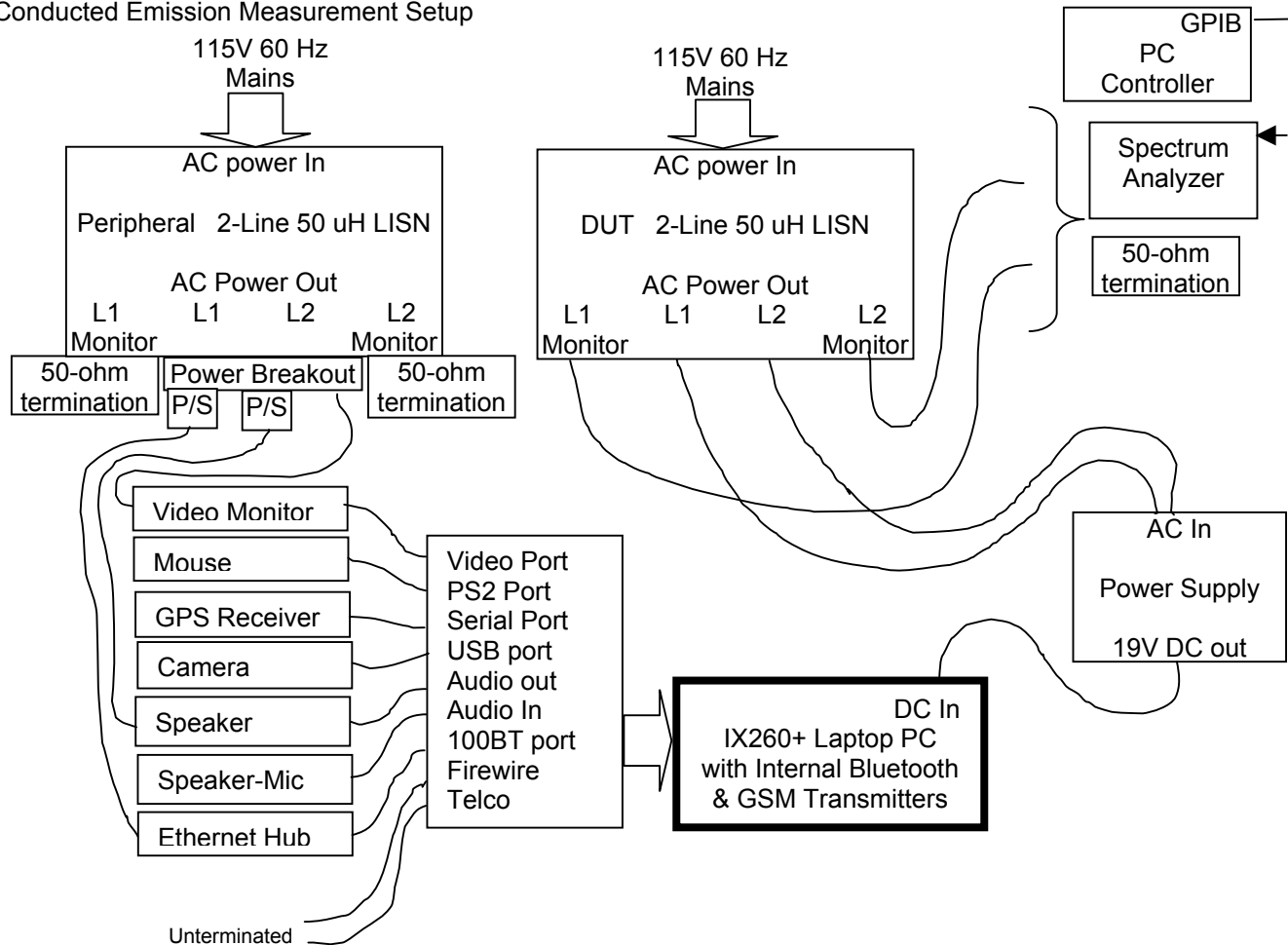


Test Report S/N:	072804KBC-T541-E24G/E15B		
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Lab Registration(s):	FCC #714830	IC Lab File #3874	

B.7. SETUP DRAWING

Figure B-1 – Setup Drawing

Conducted Emission Measurement Setup



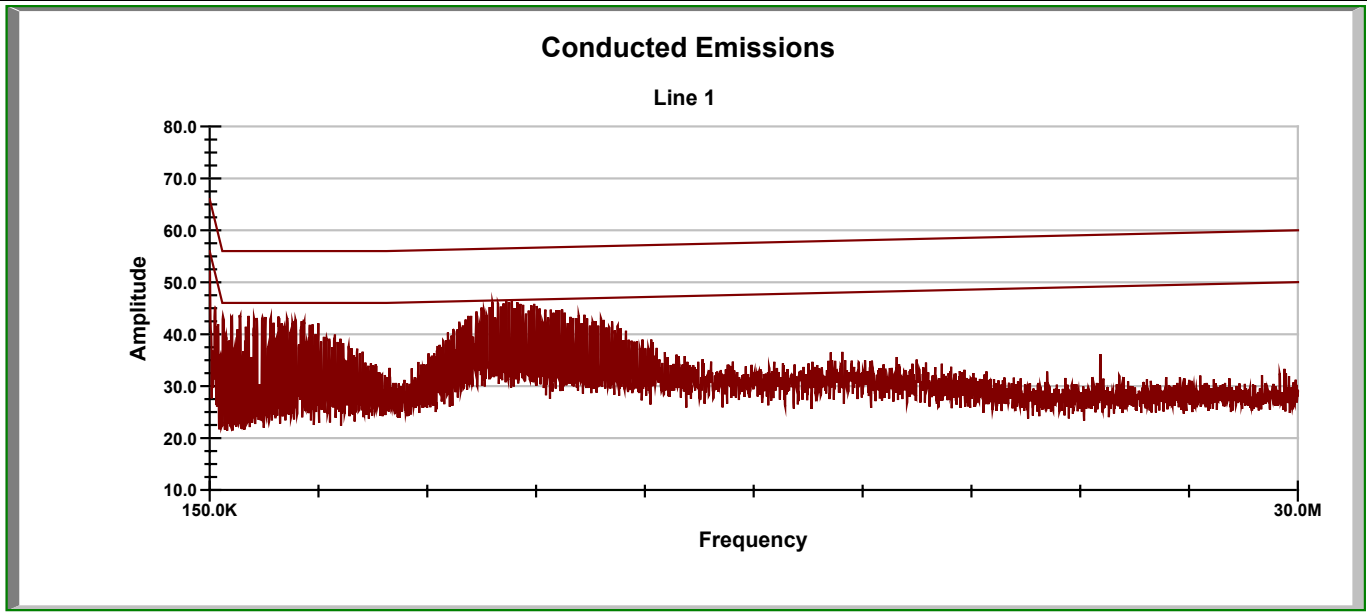
B.8. DUT OPERATING DESCRIPTION

Bluetooth	While hopping channels, the Bluetooth transmitter was set to transmit a data stream with a max. power setting equivalent to that described in the referenced single-transmit test report.
Dual-Band GSM	The Dual-Band GSM modem was set to transmit on the channel with the highest radiated power with power settings equivalent to that described in the referenced single-transmit test report.
PC	Other than operating the Bluetooth software and running MS windows, no PC exercising was performed.
Peripherals	All peripherals were active, but no specific traffic was initiated.

Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
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Lab Registration(s):	FCC #714830	IC Lab File #3874	

B.9. TEST RESULTS

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



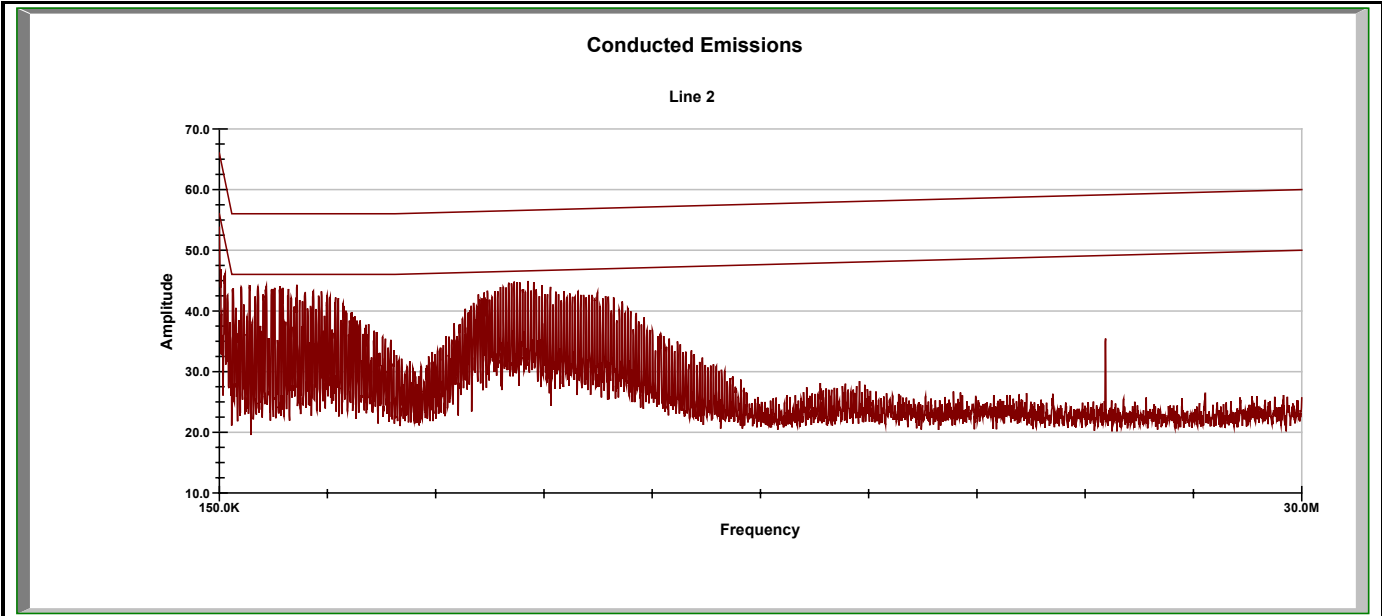
Project Number: 072804-541-E24G/E15B
Company: Itronix
Product: IX260+ with AC775 & Bluetooth

Standard: FCC 15.207
Test Start Date: 1-Dec-04
Test End Date: 1-Dec-04

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	Quasi-Peak	Average		Peak	Quasi-Peak	Average					
	dBuV	dBuV	dBuV		dBuV	dBuV	dBuV					
0.294	36.60	28.81	22.43	0.84	37.44	29.65	23.27	60.41	30.76	50.41	27.14	Pass
0.977	29.80	23.07	18.58	0.32	30.12	23.39	18.90	56.00	32.61	46.00	27.10	Pass
2.049	43.60	42.59	42.19	0.29	43.89	42.88	42.48	56.00	13.12	46.00	3.52	Pass
7.900	45.70	43.54	38.28	0.32	46.02	43.86	38.60	60.00	16.14	50.00	11.40	Pass
8.058	46.00	44.73	40.58	0.33	46.33	45.06	40.91	60.00	14.95	50.00	9.10	Pass
8.281	45.80	41.76	36.68	0.32	46.12	42.08	37.00	60.00	17.92	50.00	13.00	Pass
17.507	34.40	28.96	18.64	0.38	34.78	29.34	19.02	60.00	30.66	50.00	30.98	Pass
23.190	31.40	24.50	16.37	0.47	31.87	24.97	16.84	60.00	35.03	50.00	33.16	Pass
24.575	36.70	34.76	32.59	0.43	37.13	35.19	33.02	60.00	24.81	50.00	16.98	Pass

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

Test Report S/N:	072804KBC-T541-E24G/E15B		
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Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	



Project Number: 072804-541-E24G/E15B
Company: Itronix
Product: IX260+ with AC775 & Bluetooth

Standard: FCC 15.207
Test Start Date: 1-Dec-04
Test End Date: 1-Dec-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					
0.312	40.90	34.06	19.11	0.79	41.69	34.85	19.90	59.92	25.07	49.92	30.02	Pass
0.988	44.30	43.41	43.38	0.33	44.63	43.74	43.70	56.00	12.26	46.00	2.30	Pass
1.443	43.90	43.24	42.99	0.30	44.20	43.54	43.29	56.00	12.46	46.00	2.71	Pass
2.283	43.80	43.27	42.96	0.29	44.09	43.56	43.25	56.00	12.44	46.00	2.75	Pass
8.365	44.60	43.26	39.83	0.33	44.93	43.59	40.16	60.00	16.41	50.00	9.84	Pass
8.665	44.40	42.67	39.51	0.33	44.73	43.00	39.83	60.00	17.01	50.00	10.17	Pass
10.569	42.50	41.43	38.41	0.35	42.85	41.78	38.76	60.00	18.22	50.00	11.24	Pass
17.714	28.30	23.04	17.98	0.40	28.70	23.44	18.38	60.00	36.56	50.00	31.62	Pass
24.575	35.70	33.81	32.40	0.43	36.13	34.24	32.83	60.00	25.76	50.00	17.17	Pass
27.305	26.80	18.00	12.61	0.42	27.22	18.42	13.03	60.00	41.58	50.00	36.97	Pass

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

Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
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 outline 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.

 1Dec04
 Date

Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

Appendix C – Bluetooth Peak Conducted RF Output 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 GSM Modem made to the output RF power of the Bluetooth transmitter. The single transmit RF conducted output power levels were reported as:

Channel	Frequency MHz	Peak Conducted Power	
		dBm	Watts
0	2402	16.33	.0429
39	2441	15.84	.0384
78	2480	15.16	.0328

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

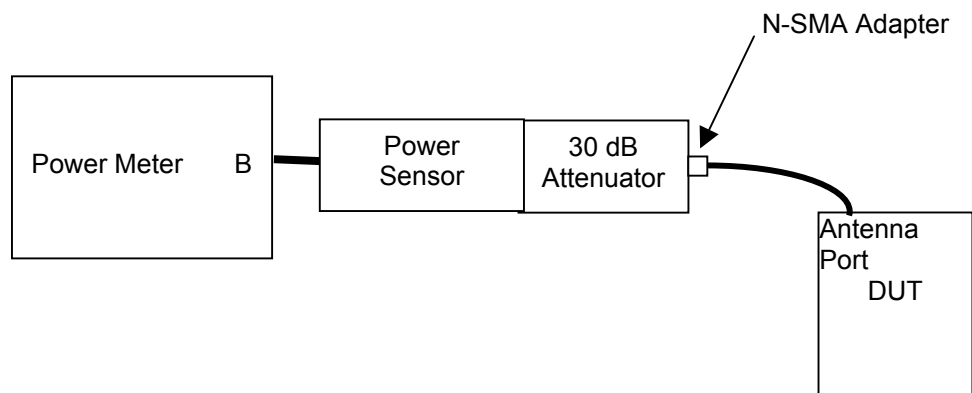
Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

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

With the AC775 transmitting on the channel with the highest conducted power, Bluetooth measurements were made at three channels throughout the band, Low Channel (0) (2402 MHz), Mid Channel (39) (2441 MHz), High Channel (78) (2480 MHz).

C.8. TEST RESULTS

Channel	Frequency	Peak Conducted Power		Limit
	MHz	dBm	Watts	Watts
0 (Low)	2402	16.29	.0426	1
39 (Mid)	2441	15.83	.0383	1
79 (High)	2480	15.10	.0324	1

Test Report S/N:	072804KBC-T541-E24G/E15B		
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Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

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 varied minimally with the GSM transmitter 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.

8Dec04

Date

Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

Appendix D - Radiated Spurious Emissions Measurement

D.1. REFERENCES

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

D.2. LIMITS

D.2.1. FCC CFR 47

FCC CFR 47 §22.917	(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB
FCC CFR 47 §24.238	(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.


* In reference to FCC Interpretation Database Item 20020405-001, the above limits are applied to all spurious emissions attributed to the composite device.

D.3. ENVIRONMENTAL CONDITIONS

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

D.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
00050	Chase	CBL-6111A	Bilog Antenna	30Apr04	30Apr05
00055	EMCO	3121C	Dipole Antenna	4Dec03	4Dec05
00034	ETS	3115	Double Ridged Guide Horn	24Mar04	24Mar05
00036	ETS	3115	Double Ridged Guide Horn	24Mar04	24Mar05
00202	ETS	3160-09	Small Horn Antenna	27May04	27Jun05
00015	Agilent	E4408B	Spectrum Analyzer	29Dec03	29Dec04
00049	HP	8566B	Spectrum Analyzer RF Section	18May04	18May05
00049	HP	85650A	Quasi-peak Adapter	18May04	18May05
00047	HP	85685A	RF Preselector	18May04	18May05
00048	Gore	65474	Microwave Cable	20May04	20May05
00030	HP	83017A	LNA	20May04	20May05
00006	R & S	SMR 20	Signal Generator (10MHz-40GHz)	30Apr04	30Apr05
00114	Amplifier Research	DC7154	Directional Coupler (0.8-4.2 GHz)	n/a	n/a
00078	Pasternack	PE2214-20	Directional Coupler (1-18 GHz)	n/a	n/a
00106	Amplifier Research	5S1G4	Power Amplifier (5W, 800MHz-4.2GHz)	n/a	n/a
00041	Amplifier Research	10W1000C	Power Amplifier (0.5 – 1 GHz)	n/a	n/a
00008	Gigatronics	8652A	Power Meter	30Apr04	30Apr05
00010	Gigatronics	80701A	Power Sensor	30Apr04	30Apr05

Applicant:	Itronix Corporation	Model:	IX260P-AC775BT	FCC ID:	KBCIX260P-AC775BT	IC ID:	1943A-IX260Pe	
Rugged Laptop PC with Sierra Wireless AC775 Dual-Band GSM Modem & Cirronet BT2022 Bluetooth								
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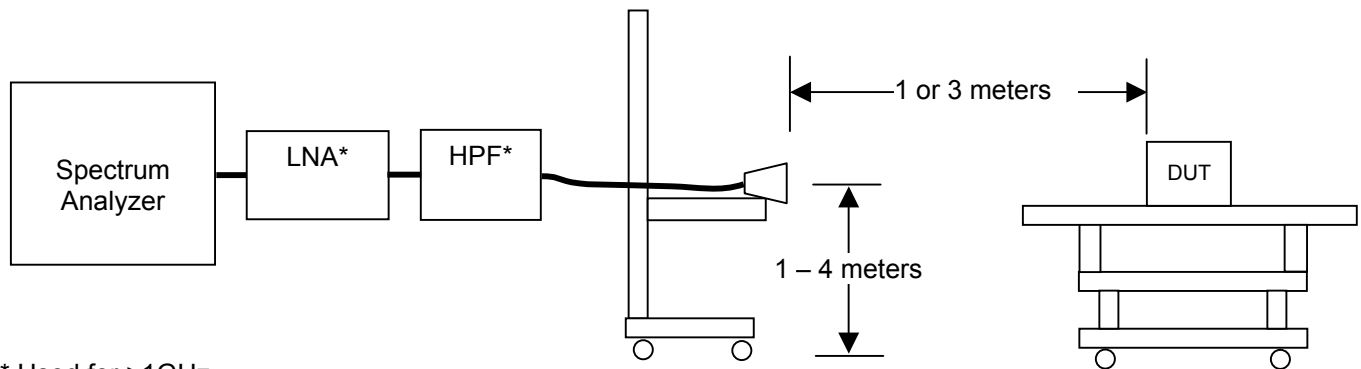
Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

D.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS	For the field strength measurements, the measurement equipment was connected as shown in D.6. A number of antennas were used to cover the applicable frequency range tested ¹ . The ranges in which each antenna was used are as follows. For the final substitutions, the DUT was replaced with the appropriate antenna and fed from a CW signal source sufficient to replicate the received field strength of the emission being investigated.			
	Frequency Range	RX Antenna	TX Antenna	
	30 MHz – 1GHz	Bilog	Dipole	
	1 GHz – 18 GHz	ETS 3115 Horn	ETS 3115 Horn	
MEASUREMENT EQUIPMENT SETTINGS	For the spurious out-of-band emissions, the spectrum analyzer was set to the following settings:			
	Mode	RBW	VBW	Detector
		kHz	kHz	
	Cellular	100	300	Peak
	PCS	1000	1000	Peak
Note 1: Only ranges where inter-modulation products might occur were investigated.				
For the block-edge delta-marker radiated measurements, the spectrum analyzer was set for 30 kHz RBW and VBW and the delta marker applied to radiated carrier levels measured at a 3-meter distance with the resolutions as defined above.				

D.6. SETUP DRAWING

Figure D-1 – Setup Drawing



* Used for >1GHz

Test Report S/N:	072804KBC-T541-E24G/E15B		
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Lab Registration(s):	FCC #714830	IC Lab File #3874	

D.7. SETUP PHOTOGRAPHS

Photograph D-1 - 3115 Horn Antenna




D.8. DUT OPERATING DESCRIPTION

Measurements were made of the bands that may contain inter-modulation products with both the Bluetooth and GSM radios transmitting. Measurements were made for each combination of low and high GSM channel transmitting while the Bluetooth was in hopping mode. The Bluetooth power setting was set to worse case (highest recorded conducted power) with the GSM modem power settings equivalent to those described in the referenced single-transmit test reports.

D.9. TEST RESULTS

All significant inter-modulations products or representative noise floor levels with field strengths within 20 dB of the theoretical limit were substituted and reported herein. The GSM block-edge is also presented. All Bluetooth band-edge measurements were greater than 20 dB below the applicable limit, so are not presented. All other spurious emissions are described in the appropriate sections in the individual reports referenced.

Applicant:	Itronix Corporation	Model:	IX260P-AC775BT	FCC ID:	KBCIX260P-AC775BT	IC ID:	1943A-IX260Pe	
Rugged Laptop PC with Sierra Wireless AC775 Dual-Band GSM Modem & Cirronet BT2022 Bluetooth								
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Test Report S/N:	072804KBC-T541-E24G/E15B		
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D.9.1. Cellular GSM Carrier Levels



Project Number: 072804KBC-T541-E24G/E15B
Company: Itronix
Product: AC775 with Cirronet Bluetooth

Standard: FCC22.913
Test Start Date: 7-Dec-04
Test End Date: 16-Dec-04

AC775 with Bluetooth Carrier Power Levels														
Polarity	Distance	Substitution Antenna Type	Carrier	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	Carrier ERP Level		ERP Limit		Margin	Pass/Fail
				MHz	dBuV/m	dBuV	dBm	dBi	dBm	Watts	dBm	Watts	dB	
H	3	B_3121C	128	824.20	128.05	102.90	35.23	1.29	34.38	2.74	38.45	7.00	4.07	PASS
H	3	B_3121C	251	848.80	128.19	102.60	33.82	1.59	33.27	2.12	38.45	7.00	5.18	PASS
V	3	B_3121C	128	824.20	120.15	95.00	27.49	1.29	26.64	0.461	38.45	7.00	11.81	PASS
V	3	B_3121C	251	848.80	119.09	93.50	24.98	1.59	24.43	0.277	38.45	7.00	14.02	PASS

Note:
Dipole Antenna used for substitution

Formulae:
 ERP Level (dBm) = Power applied to Antenna (dBm) + Antenna Gain (dBi) - 2.14
 Margin (dB) = Limit (dBm) - Level (dBm)

D.9.2. PCS GSM Carrier Levels



Project Number: 072804KBC-T541-E24G/E15B
Company: Itronix
Product: AC775 with Cirronet Bluetooth

Standard: FCC24.232b
Test Start Date: 7-Dec-04
Test End Date: 16-Dec-04

AC775 with Bluetooth Carrier Power Levels														
Polarity	Distance	Substitution Antenna Type	Carrier	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	Carrier EIRP Level		EIRP Limit		Margin	Pass/Fail
				MHz	dBuV/m	dBuV	dBm	dBi	dBm	Watts	dBm	Watts	dB	
H	3	Horn SN6276	512	1850.20	124.85	92.90	15.13	6.67	21.80	0.151	33.01	2.00	11.21	PASS
H	3	Horn SN6276	810	1909.80	118.75	86.50	13.03	6.68	19.71	0.094	33.01	2.00	13.30	PASS
V	3	Horn SN6276	512	1850.20	122.45	90.50	13.55	6.67	20.22	0.105	33.01	2.00	12.79	PASS
V	3	Horn SN6276	810	1909.80	118.65	86.40	13.86	6.68	20.54	0.113	33.01	2.00	12.47	PASS

Note:
Horn Antenna used for substitution

Formulae:
 EIRP Level (dBm) = Power applied to Antenna (dBm) + Antenna Gain (dBi)
 Margin (dB) = Limit (dBm) - Level (dBm)

Applicant: Itronix Corporation **Model:** IX260P-AC775BT **FCC ID:** KBCIX260P-AC775BT **IC ID:** 1943A-IX260Pe

Rugged Laptop PC with Sierra Wireless AC775 Dual-Band GSM Modem & Cirronet BT2022 Bluetooth



Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

D.9.3. Cellular GSM Block-edge



Project Number: 072804KBC-T541-E24G/E15B
Company: Itronix
Product: AC775 with Cirronet Bluetooth

Standard: FCC22.917
Test Start Date: 7-Dec-04
Test End Date: 16-Dec-04

AC775 with Bluetooth Spurious Emissions												
Polarity	Distance	Substitution Antenna Type	Carrier	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	Emission ERP Level	ERP Limit	Margin	Pass/Fail
				MHz	dBuV/m	dBuV	dBm	dBi	dBm	dBm*	dB	
H	3	B_3121C	CH128	824.00	72.15	47.00	-24.80	1.28	-23.52	-13.00	10.52	PASS
V	3	B_3121C	CH128	824.00	67.05	41.90	-26.60	1.28	-25.32	-13.00	12.32	PASS
H	3	B_3121C	CH251	849.00	78.09	52.50	-19.40	1.59	-17.81	-13.00	4.81	PASS
V	3	B_3121C	CH251	849.00	67.69	42.10	-26.78	1.59	-25.19	-13.00	12.19	PASS

Note:
Dipole Antenna used for substitution
Only emissions with field strengths within 20 dB of the theoretical limit were substituted and reported herein.

Formulae:
ERP Level (dBm) = Power applied to Antenna (dBm) + Antenna Gain (dBi) - 2.14
Margin (dB) = Limit (dBm) - Level (dBm)

D.9.4. Spurious Emissions (Cellular GSM with Bluetooth Hopping)



Project Number: 072804KBC-T541-E24G/E15B
Company: Itronix
Product: AC775 with Cirronet Bluetooth

Standard: FCC22.917
Test Start Date: 7-Dec-04
Test End Date: 16-Dec-04

AC775 with Bluetooth Spurious Emissions												
Polarity	Distance	Substitution Antenna Type	Carrier	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	Emission ERP Level	ERP Limit	Margin	Pass/Fail
				MHz	dBuV/m	dBuV	dBm	dBi	dBm	dBm*	dB	
H	3	Horn SN6267	CH128	1648.40	64.36	33.60	-45.99	6.35	-41.78	-13.00	28.78	PASS
H	3	Horn SN6267	CH128	4933.00	64.06	58.90	-38.61	8.61	-32.14	-13.00	19.14	PASS
V	3	Horn SN6267	CH128	1640.00	66.52	35.80	-43.56	6.34	-37.22	-13.00	24.22	PASS
V	3	Horn SN6267	CH128	1648.40	64.66	33.90	-45.79	6.35	-39.44	-13.00	26.44	PASS
V	3	Horn SN6267	CH128	7219.25	67.07	58.20	-38.73	9.12	-29.61	-13.00	16.61	PASS
V	3	Horn SN6267	CH128	7254.25	68.11	59.10	-37.46	9.10	-28.36	-13.00	15.36	PASS
H	3	Horn SN6267	CH251	1579.00	66.20	35.80	-43.31	6.28	-37.03	-13.00	24.03	PASS
H	3	Horn SN6267	CH251	1697.00	69.34	38.30	-40.64	6.40	-34.24	-13.00	21.24	PASS
H	3	Horn SN6267	CH251	4242.50	65.27	51.50	-39.68	8.34	-31.34	-13.00	18.34	PASS
H	3	Horn SN6267	CH251	4956.50	64.71	49.50	-39.22	8.61	-30.61	-13.00	17.61	PASS
V	3	Horn SN6267	CH251	1697.00	65.84	34.80	-43.64	6.40	-37.24	-13.00	24.24	PASS

Note:
Horn Antenna used for substitution
Only emissions with field strengths within 20 dB of the theoretical limit were substituted and reported herein.

Formulae:
ERP Level (dBm) = Power applied to Antenna (dBm) + Antenna Gain (dBi) - 2.14
Margin (dB) = Limit (dBm) - Level (dBm)

Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

D.9.5. PCS GSM Block-edge

	Project Number: 072804KBC-T541-E24G/E15B	Standard: FCC24.238
	Company: Itronix	Test Start Date: 7-Dec-04
	Product: AC775 with Cirronet Bluetooth	Test End Date: 16-Dec-04

AC775 with Bluetooth Spurious Emissions												
Polarity	Distance	Substitution Antenna Type	Carrier	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	Emission EIRP Level	EIRP Limit	Margin	Pass/Fail
				MHz	dBuV/m	dBuV	dBm	dBi	dBm	dBm*	dB	
H	3	Horn SN6276	CH512	1850.00	72.65	40.70	-34.90	6.67	-28.23	-13.00	15.23	PASS
V	3	Horn SN6276	CH512	1850.00	72.35	40.40	-34.70	6.67	-28.03	-13.00	15.03	PASS
H	3	Horn SN6276	CH810	1910.00	70.15	37.90	-31.00	6.68	-24.32	-13.00	11.32	PASS
V	3	Horn SN6276	CH810	1910.00	69.25	37.00	-33.30	6.68	-26.62	-13.00	13.62	PASS

Note:
Horn Antenna used for substitution
Only emissions with field strengths within 20 dB of the theoretical limit were substituted and reported herein.

Formulae:
EIRP Level (dBm) = Power applied to Antenna (dBm) + Antenna Gain (dBi)
Margin (dB) = Limit (dBm) - Level (dBm)

D.9.6. Spurious Emissions (PCS GSM with Bluetooth Hopping)

	Project Number: 072804KBC-T541-E24G/E15B	Standard: FCC24.238
	Company: Itronix	Test Start Date: 7-Dec-04
	Product: AC775 with Cirronet Bluetooth	Test End Date: 16-Dec-04

AC775 with Bluetooth Spurious Emissions												
Polarity	Distance	Substitution Antenna Type	Carrier	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	Emission EIRP Level	EIRP Limit	Margin	Pass/Fail
				MHz	dBuV/m	dBuV	dBm	dBi	dBm	dBm*	dB	
H	3	Horn SN6276	CH512	4856.75	62.87	47.90	-42.22	8.53	-33.69	-13.00	20.69	PASS
H	3	Horn SN6276	CH512	4947.75	68.79	53.60	-34.79	8.51	-26.28	-13.00	13.28	PASS
H	3	Horn SN6276	CH512	7350.50	63.59	44.40	-41.81	9.09	-32.72	-13.00	19.72	PASS
H	3	Horn SN6276	CH512	7399.50	65.39	46.10	-41.27	9.06	-32.21	-13.00	19.21	PASS
H	3	Horn SN6276	CH512	9251.00	63.57	41.80	-40.89	9.30	-31.59	-13.00	18.59	PASS
V	3	Horn SN6276	CH512	6752.00	62.46	44.70	-45.25	9.45	-35.80	-13.00	22.80	PASS
V	3	Horn SN6276	CH512	7268.25	67.03	48.00	-39.92	9.14	-30.78	-13.00	17.78	PASS
V	3	Horn SN6276	CH512	7399.50	63.69	44.40	-47.67	9.06	-38.61	-13.00	25.61	PASS
V	3	Horn SN6276	CH512	8295.50	67.12	46.70	-47.40	9.32	-38.08	-13.00	25.08	PASS
V	3	Horn SN6276	CH512	9251.00	63.37	41.60	-44.82	9.30	-35.52	-13.00	22.52	PASS
H	3	Horn SN6276	CH810	3820.75	62.92	50.10	-38.52	7.67	-30.85	-13.00	17.85	PASS
H	3	Horn SN6276	CH810	4940.75	67.48	52.30	-33.50	8.51	-24.99	-13.00	11.99	PASS
H	3	Horn SN6276	CH810	7417.00	63.95	44.60	-39.30	9.05	-30.25	-13.00	17.25	PASS
H	3	Horn SN6276	CH810	7637.50	65.54	45.80	-43.90	9.05	-34.85	-13.00	21.85	PASS
H	3	Horn SN6276	CH810	9548.50	65.02	43.10	-39.58	9.54	-30.04	-13.00	17.04	PASS
V	3	Horn SN6276	CH810	3819.00	62.92	50.10	-39.74	7.67	-32.07	-13.00	19.07	PASS
V	3	Horn SN6276	CH810	3820.75	63.12	50.30	-39.53	7.67	-31.86	-13.00	18.86	PASS
V	3	Horn SN6276	CH810	7207.00	65.02	46.20	-43.36	9.18	-34.18	-13.00	21.18	PASS
V	3	Horn SN6276	CH810	7268.25	63.63	44.60	-45.31	9.14	-36.17	-13.00	23.17	PASS
V	3	Horn SN6276	CH810	7637.50	65.14	45.40	-46.33	9.05	-37.28	-13.00	24.28	PASS
V	3	Horn SN6276	CH810	8757.50	64.13	43.10	-51.90	9.25	-42.65	-13.00	29.65	PASS
V	3	Horn SN6276	CH810	9548.50	64.62	42.70	-43.14	9.54	-33.60	-13.00	20.60	PASS
V	3	Horn SN6276	CH810	9702.50	64.42	42.50	-42.83	9.66	-33.17	-13.00	20.17	PASS

Note:
Horn Antenna used for substitution
Only emissions with field strengths within 20 dB of the theoretical limit were substituted and reported herein.

Formulae:
EIRP Level (dBm) = Power applied to Antenna (dBm) + Antenna Gain (dBi)
Margin (dB) = Limit (dBm) - Level (dBm)

Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

D.10. PASS/FAIL

In reference to the results outlined in D.9, the DUT passes the requirements as stated in the reference standards as follows:

FCC 22.917 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

FCC 24.238 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

D.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.

16Dec04

Date

Applicant:	Itronix Corporation	Model:	IX260P-AC775BT	FCC ID:	KBCIX260P-AC775BT	IC ID:	1943A-IX260Pe	
Rugged Laptop PC with Sierra Wireless AC775 Dual-Band GSM Modem & Cirronet BT2022 Bluetooth								
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Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

Appendix E - Maximum Permissible Exposure Calculation

E.1. REFERENCES

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

E.2. LIMITS

FCC CFR 47§1.1310 Table 1(b)	Frequency	Power Density
	300 – 1500 MHz	f/1500 mW/cm ²
	1500 – 100,000 MHz	1.0 mW/cm ²

E.3. ENVIRONMENTAL CONDITIONS

Temperature	na
Humidity	na
Barometric Pressure	na

E.4. EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
na					

E.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS	The results described herein were determined by calculations, so no measurement equipment was used. The power measurements for each radio used in these calculations were made with the system co-transmitting as described in Appendix C and F of this report.
MEASUREMENT EQUIPMENT SETTINGS	na

E.6. SETUP PHOTOS

na

E.7. SETUP DRAWINGS

na

E.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 Dual-Band GSM Modem was transmitting on Channel 128.
Dual-Band GSM	The maximum GSM Modem conducted power in each band, used for these calculations was measured on Channel 251 for cellular and Channel 810 for PCS, with the Bluetooth in hopping mode.

Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

E.9. TEST RESULTS

E.9.1. Individual Transmitter Calculations:

Rangestar Internal Antenna (Highest Power Bluetooth Channel):

Tx Frequency:	2402	(MHz)
RF Output Power at Antenna Input Terminal:	16.29	(dBm)
Source-Based Time -Average Duty Factor:	0.00	(dB)
Source-Based Time-Averaged RF Output Power at Antenna Input Terminal:	16.29	(dBm)
Antenna gain:	4.50	(dBi)

S=	1.00	(mW/cm ²)
P=	42.5598	(mW)
G=	2.82	(numeric)

$$R = 3.09 \text{ (cm)}$$

$$S \text{ at } 20\text{cm: } 0.023837427 \text{ (mW/cm}^2\text{)}$$

*worst case 100% duty cycle used

External Swivel Dipole Antenna (Highest Power Cellular GSM Channel):

Tx Frequency:	849	(MHz)
RF Output Power at Antenna Input Terminal:	31.22	(dBm)
Source-Based Time -Average Duty Factor:	-3.01	(dB)
Source-Based Time-Averaged RF Output Power at Antenna Input Terminal:	28.21	(dBm)
Antenna gain:	2.60	(dBi)

S=	0.57	(mW/cm ²)
P=	662.1708	(mW)
G=	1.82	(numeric)

$$R = 13.02 \text{ (cm)}$$

$$S \text{ at } 20\text{cm: } 0.239458012 \text{ (mW/cm}^2\text{)}$$

*50% duty cycle used

External Swivel Dipole Antenna (Highest Power PCS GSM Channel):

Tx Frequency:	1910	(MHz)
RF Output Power at Antenna Input Terminal:	28.08	(dBm)
Source-Based Time -Average Duty Factor:	-3.01	(dB)
Source-Based Time-Averaged RF Output Power at Antenna Input Terminal:	25.07	(dBm)
Antenna gain:	2.60	(dBi)

S=	1.00	(mW/cm ²)
P=	321.3439	(mW)
G=	1.82	(numeric)

$$R = 6.82 \text{ (cm)}$$

$$S \text{ at } 20\text{cm: } 0.116206219 \text{ (mW/cm}^2\text{)}$$

*50% duty cycle used

Formulae:


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

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

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

Source-Based Time-Average Factor = 10 * log (Time On / (Time On + Time Off))

Source-Based Time-Average RF Output Power (dBm) = RF Output Power (dBm) + Source-Based Time Average Factor (dB)

Applicant:	Itronix Corporation	Model:	IX260P-AC775BT	FCC ID:	KBCIX260P-AC775BT	IC ID:	1943A-IX260Pe	
Rugged Laptop PC with Sierra Wireless AC775 Dual-Band GSM Modem & Cirronet BT2022 Bluetooth								
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Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

Results:

Mode	Source-Based Time-Averaged RF Conducted Output Power	Antenna Gain	MPE Distance	Power Density at 20 cm	Power Density Limit
	dBm	dBi	cm	mW/cm²	mW/cm²
Bluetooth (CH0)	16.29	4.5	3.09	0.0238	1.0
Cellular - GSM	28.21	2.6	13.02	0.2395	0.57
PCS -GSM	25.07	2.6	6.82	0.1162	1.0

E.9.2. Co-Transmit MPE Calculations

Radio	20 cm Power Density	Ratio	Limit
	mW/cm²	(S/Limit)	mW/cm²
GSM Cellular	0.2395	0.4232	0.57
Bluetooth	0.0238	0.0238	1
Sum =		0.4470	1

Radio	20 cm Power Density	Ratio	Limit
	mW/cm²	(S/Limit)	mW/cm²
GSM PCS	0.1162	0.1162	1
Bluetooth	0.0238	0.0238	1
Sum =		0.1400	1

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:
 1) The DUT must comply with the minimum spacing requirement of 20 cm to ensure an exposure of not more than f/1500 (0.57) mW/cm² for frequencies between 300 and 1500 MHz and 1 mW/cm² for frequencies between 1500 and 100,000 MHz.

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.



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

15Dec04
Date

Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

Appendix F – GSM Conducted RF Output Power Measurement

F.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §2.1046
Procedure Reference	FCC CFR 47 §2.1046

F.2. LIMITS

For reference only to compare the effect the bluetooth transmitter co-transmitting had on the GSM transmitter power. Single transmit conducted powers:

Mode	Channel	Frequency	Conducted Power
Cellular GSM	128	824.2 MHz	+31.73 dBm
	190	836.6 MHz	+31.61 dBm
	251	848.8 MHz	+31.71 dBm
PCS GSM	512	1850.2 MHz	+28.51 dBm
	661	1880.0 MHz	+28.55 dBm
	810	1909.8 MHz	+28.63 dBm

F.3. ENVIRONMENTAL CONDITIONS

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

F.4. EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
00008	Gigatronics	8652A	Power Meter	30Apr04	30Apr05
00010	Gigatronics	80701A	Power Sensor	30Apr04	30Apr05
00012	Gigatronics	80701A	Power Sensor	30Apr04	30Apr05
00107	HP	8491C	Attenuator	n/a	n/a

*Cable and attenuator verified with power meter prior to use

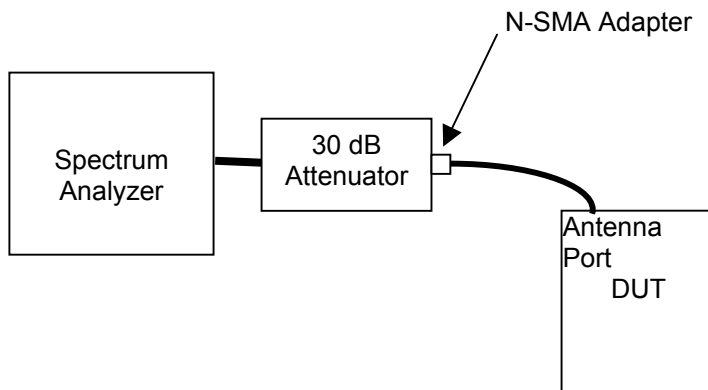
Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

F.5. MEASUREMENT EQUIPMENT SETUP

Measurement Equipment Connections	The equipment was connected as shown in the setup drawing in F.6.
Measurement Equipment Settings	Power Meter Settings: Mode – MAP Frequency compensation set for carrier frequency Offset set appropriately for carrier frequency and attenuator characteristics
Measurement Procedure	The RF conducted power levels for both PCS and cellular bands were measured at the DUT antenna connector port using a Gigatronics 8652A Universal Power Meter in mean average power mode. An offset was entered into the power meter to correct for the losses of the attenuator and cable installed between the transmitter output port and the power sensor input. The DUT test software was used to set it to transmit in the GSM “always up” power control mode. All subsequent tests were performed using the same power measurement procedures.

F.6. SETUP DRAWING

Figure F-1 – Setup Drawing



Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

F.7. DUT OPERATING DESCRIPTION

During this evaluation, the Bluetooth transmitter was set to co-transmit in a hopping mode as described in section 5.7.2. Power measurements were then made of each channel in both the cellular and PCS bands, with the GSM modem set appropriately as described in section 5.7.1

F.8. TEST RESULTS

Mode	Channel	Frequency	Conducted Power
Cellular GSM	128	824.2 MHz	+31.12 dBm
	190	836.6 MHz	+31.18 dBm
	251	848.8 MHz	+31.22 dBm
PCS GSM	512	1850.2 MHz	+27.94 dBm
	661	1880.0 MHz	+28.05 dBm
	810	1909.8 MHz	+28.08 dBm

F.9. PASS/FAIL

As a reference with the single transmit conducted RF power levels, the output of the GSM transmitter was reduced by a maximum of 0.61 dB when co-transmitting with the Bluetooth transmitter.

F.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.

 8Dec04
 Date

Test Report S/N:	072804KBC-T541-E24G/E15B		
Test Date(s):	07Dec04 - 16Dec04		
Test Type:	FCC §2, §15.247, §22H, §24E	IC RSS-210/132/133	
Lab Registration(s):	FCC #714830	IC Lab File #3874	

END OF DOCUMENT

Applicant:	Itronix Corporation	Model:	IX260P-AC775BT	FCC ID:	KBCIX260P-AC775BT	IC ID:	1943A-IX260Pe
Rugged Laptop PC with Sierra Wireless AC775 Dual-Band GSM Modem & Cirronet BT2022 Bluetooth							
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