Test Report Serial No.:	040505KBC-T628-E24G		Issue 1
Test Date(s):	24May05 - 27Jun05	Report Date:	18Jul05
Test Standard(s):	FCC §2, §22H, §24E		IC RSS-132/133
Lab Registration(s):	FCC #714830		IC Lab File #3874

EMC TEST REPORT
FOR THE
ITRONIX RUGGED TABLET PC MODEL: IX325-AC775
INCLUDING THE
SIERRA WIRELESS AIRCARD 775
DUAL-BAND GSM GPRS/EDGE PCMCIA MODEM
WITH
EXTERNAL MONOPOLE ANTENNA

FCC ID: KBCIX325-AC775

IC NO.: 1943A-IX325e

TRSN 040505KBC-T628-E24G
Issue 1.0

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

July 18, 2005

DECLARATION OF COMPLIANCE

Test Lab

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Applicant Information

ITRONIX CORPORATION
801 South Stevens Street
Spokane, WA 99204
United States

Laboratory Registration No.(s):		FCC:	714830	IC:	IC 3874	
Rule Part(s):	FCC:	Dual Band GSM	§2; §22H; §24E			
	IC:	Dual Band GSM	RSS-133 Issue 3, RSS-132 Issue 1 (Provisional)			
Device Classification:	FCC:	Dual Band GSM	- PCS Licensed Transmitter (PCB)			
		Dual Band GSM	- 800 MHz Cellular Telephones Employing New Technologies - 2 GHz Personal Communication Services			
Device Identification:	FCC ID:	KBCIX325-AC775	IC ID:	1943A-IX325e		
DUT Description:						
Model:	IX325-AC775					
Device Description:	Rugged Tablet PC					
Internal Transmitter:	Sierra Wireless AirCard 775 Dual-Band GSM GPRS/EDGE PCMCIA Modem					
Antenna(s) Tested:	Dual Band GSM	Sierra Wireless Monopole Antenna				
Tx Frequency Range(s):	Dual Band GSM	Cellular	824.2 - 848.8 MHz			
		PCS	1850.2 - 1909.8 MHz			
Max. RF Output Power Measured:	Dual Band GSM	Cellular	Conducted	1.56 Watts	31.92 dBm	
			ERP	1.00 Watts	30.01 dBm	
		PCS	Conducted	0.832 Watts	29.20 dBm	
			EIRP	1.26 Watts	31.02 dBm	
Modulation Type(s):	Dual Band GSM	QMSK				
Power Source(s):	Stationary: 75 Watt AC Power Adapter (Model: ADP-75FB B)					
	Portable: 11.1V Lithium-ion Battery, 3.6Ah (Model: A2121-2)					

This wireless 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, 22H, 24E, Industry Canada RSS-132 Issue 1 (Provisional), RSS 133 Issue 3; and ANSI TIA/EIA-603-C-2004.

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.

Tested by:

Russell Pipe
Senior Compliance Technologist
Celltech Labs Inc.

Reviewed by:

Duane M. Friesen
EMC Manager
Celltech Labs Inc.

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TEST SUMMARY

Appendix	Test Description	Procedure Reference	Limit Reference	Test Start Date	Test End Date	Result
Referenced Standard: FCC CFR Title 47 Part 2, 22H						
B	Conducted RF Output Power	§2.1046	§2.1046	24May05	24May05	Pass
C	Conducted TX Spurious Emissions	§22.917(b)	§22.917(a)	25May05	25May05	Pass
E	Effective Radiated Power	ANSI/TIA/EIA-603-C	§22.913	26May05	26May05	Pass
F	Radiated TX Spurious Emissions	ANSI/TIA/EIA-603-C	§22.917 (e)	1Jun05	27Jun05	Pass
Referenced Standard: FCC CFR Title 47 Part 2, 24E						
G	Conducted RF Output Power	§2.1046	§2.1046	24May05	24May05	Pass
H	Conducted TX Spurious Emissions	§24.238(b)	§24.238(a)	25May05	25May05	Pass
J	Effective Isotropic Radiated Power	ANSI/TIA/EIA-603-C	§24.232(b)	26May05	26May05	Pass
K	Radiated TX Spurious Emissions	ANSI/TIA/EIA-603-C	§24.238 (a)	1Jun05	27Jun05	Pass
Referenced Standard: IC RSS-132 Issue 1						
B	Conducted RF Output Power	FCC CFR 47 §2.1046	§6.4	24May05	24May05	Pass
C	Conducted TX Spurious Emissions	FCC CFR 47 §22.917 (b)	§6.5	25May05	25May05	Pass
D	Conducted RX Spurious Emissions	§4.6	§6.6	26May05	26May05	Pass
E	Effective Radiated Power	ANSI/TIA/EIA-603-C	§6.4	26May05	26May05	Pass
F	Radiated TX Spurious Emissions	§4.6	§6.5	1Jun05	27Jun05	Pass
Referenced Standard: IC RSS-133 Issue 3						
G	Conducted RF Output Power	ANSI/TIA/EIA-603-C	§6.4	24May05	24May05	Pass
H	Conducted TX Spurious Emissions	FCC CFR 47 §24.238(b)	§6.5	25May05	25May05	Pass
I	Conducted RX Spurious Emissions	§4.5	§6.7 (b)	26May05	26May05	Pass
J	Effective Isotropic Radiated Power	ANSI/TIA/EIA-603-C	§6.4	26May05	26May05	Pass
K	Radiated TX Spurious Emissions	ANSI/TIA/EIA-603-C	§6.5	1Jun05	27Jun05	Pass

REVISION LOG

Issue	Description	Implemented By	Implementation Date
1.0	Initial Release	Jon Hughes	18Jul05

SIGNATORIES

Prepared By:		July 18, 2005
Name/Title	Duane M. Friesen, C.E.T. / EMC Manager	Date
Approved By:		July 18, 2005
Name/Title	Jon Hughes / General Manager	Date

1.0 SCOPE

This report outlines the measurements made and results collected during electromagnetic emissions testing of the Itronix Corporation Model: IX325-AC775 Rugged Tablet PC with the internal Sierra Wireless AirCard 775 Dual-Band GSM GPRS/EDGE PCMCIA Modem. The AirCard 775 Modem was connected to a bendable external monopole antenna attached to the end of the PCMCIA Card. 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 Parts 2, 22 Subpart H, and 24 Subpart E; and Industry Canada Radio Standards Specifications RSS-132 Issue 1 (Provisional), and RSS-133 Issue 3.

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-C:2004	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards
CFR Title 47 Part 2:2004	Code of Federal Regulations Title 47: Telecommunication Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations Part 22: Public Mobile Services 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 3 - 2 GHz Personal Communication Services

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
EIRP	Effective Isotropic Radiated Power
EDGE	Enhanced Data Rates for GSM Evolution
EMC	Electromagnetic Compatibility
ERP	Effective Radiated Power
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

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 IX325-AC775 Rugged Tablet PC containing a Sierra Wireless AirCard 775 Dual-Band GSM PCMCIA Modem connected to an attached external monopole antenna. Photographs of the DUT placement and construction are shown in Appendix A.

Device:	Rugged Tablet PC			
Model:	IX325-AC775			
Serial Number(s):	ZZGEG5073ZZ9782			
Identifier(s):	FCC ID:	KBCIX325-AC775	IC ID:	1943A-IX325e
Power Source(s):	Stationary: 75 Watt AC Power Adapter (Model: ADP-75FB B)			
	Portable: 11.1V Lithium-ion Battery, 3.6Ah (Model: A2121-2)			

Device:	Dual-Band PCS/Cellular GSM PCMCIA Modem	
Model:	Sierra Wireless AirCard 775	
Serial Number:	X04122800475010	
Rule Part(s):	FCC:	§22.913; §22.917; §24.232; §24.238
	IC:	RSS-132 Issue 1 (Provisional); RSS-133 Issue 3
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	

Device:	External Monopole Antenna
Model:	Sierra Wireless AirCard 775 Antenna

5.3 Co-Located Equipment

Name:	GPS Receiver Module with attached Antenna (Receive only)
Model:	Leadtek Model LR9805

Device:	GPS Antenna
Model:	Sarantel 101401040/2004UK

5.4 Cable Descriptions

ROUTING		Length	Model	Terminations		Shield Type	Shield Termination		Suppression
From	To	m		End 1	End 2		End 1	End 2	
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

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
	K8255	Keyboard
Sanwa Supply	MA-MBUSB	Mouse

5.6 Clock Frequencies

5.6.1 DUT Clock Frequencies

Device:	Rugged Tablet PC
Clocks:	n/a
Device:	Dual-Band PCS/Cellular GSM PCMCIA Modem
Clocks:	n/a
Device:	Monopole Antenna
Clocks:	None

5.6.2 Co-Located Clock Frequencies

Device:	Peripherals
Clocks:	n/a

5.7 Mode(s) of Operation Tested

5.7.1 Dual-Band GSM Modem

Customer supplied software was used to set the AirCard 775 modem to the appropriate channel and power level for the specific measurement. Measurements were made with the modem set to the low, mid and high channel in each band or on a worst-case channel for the measurement, as determined by prescan evaluations. The following settings were used for each channel.

5.7.1.1 Cellular GSM

TX Frequency Range:	824.2 - 848.8 MHz Ch. 128 (824.2 MHz) (low), Ch. 190 (836.6 MHz) (mid) & Ch. 251 (848.8 MHz) (high) measured unless otherwise noted
Software Power Gain Settings:	The supplied software set the power for maximum rated output power.
Modulation Type(s):	QPSK

5.7.1.2 PCS GSM

TX Frequency Range:	1850.2 - 1909.8 MHz Ch. 512 (1850.2 MHz) (low), Ch 661 (1880 MHz) (mid) & Ch. 810 (1909.8 MHz) (high) measured unless otherwise noted
Software Power Gain Settings:	The supplied software set the power for maximum rated output power.
Modulation Type(s):	QPSK

5.7.2 DUT Exercising Software Description

The DUT was configured and exercised during testing using customer supplied test software. Once the channel number was entered, the software enabled the card to transmit at the maximum power level for the set frequency.

5.8 Configuration Description

The DUT was configured, as described by the client, as being representative of a production unit that would be delivered to a final customer. Because the Tablet PC orientation can be user configured (0 degrees landscape and -90 degrees portrait only), prescan evaluations were made to determine the configuration that resulted in the highest emissions. This prescan evaluation indicated that tablet carrier field strengths were maximized during cellular operation with the unit placed flat, with the LCD facing up and the monopole antenna positioned parallel with the ground plane. Maximized carrier field strengths during PCS operation occurred with the tablet oriented with the “power port” edge facing up and the monopole antenna position parallel with the ground plane. During the radiated spurious emissions testing, the antenna was replaced with a 50-ohm termination and the Tablet PC placed in the orientation as described above. More specific details may be included in each appendix.

5.8.1 Configuration Justification

The DUT was tested in a configuration determined to emanate the maximum emission and be one described by the client as being 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 within the specified limits as defined. The pass/fail statements made in this report only apply to the unit tested.

APPENDICES

Appendix A - Photographs

A.1. DUT PHOTOGRAPHS

Photograph A.1-1 - Tablet PC in the worst-case Cellular Configuration

Photograph A.1-2 - Tablet PC in the worst-case PCS Configuration

Photograph A.1-3 - AirCard 775 PCMCIA Modem Card

Photograph A.1-4 - AirCard 775 Monopole Antenna

Appendix B - Cellular Band Conducted TX RF Output Power Measurement

B.1. REFERENCES

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

B.2. LIMITS

FCC CFR 47 §2.1046 (a)	For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedures to give the values of current and voltage on the circuit elements specified in §2.1033(c) (8).

*ERP limits are specified in Appendix E.

B.3. ENVIRONMENTAL CONDITIONS

Temperature	25 +/- 2 ºC
Humidity	35 +/- 4 %
Barometric Pressure	96 kPa

B.4. EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
00007	Gigatronics	8652A	Power Meter	18Oct04	18Oct05
00011	Gigatronics	80701A	Power Sensor	08Oct04	08Oct05
00102	Pasternack	PE7014-30	30dB attenuator	na	na*
na	Itronix	na	Cable & SMA adapter	na	na*

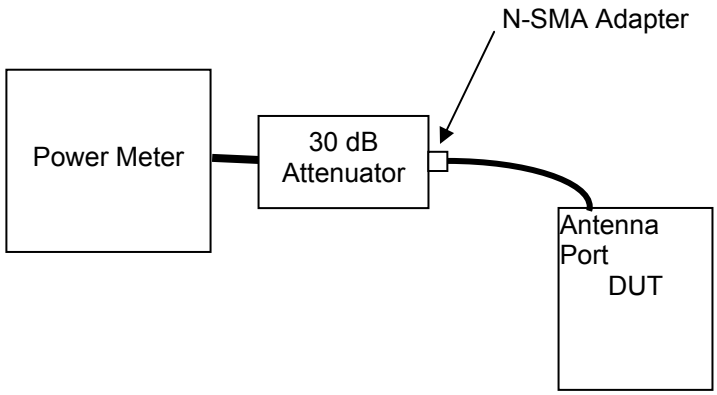
*Cable and attenuator verified with power meter prior to use

B.5. MEASUREMENT EQUIPMENT SETUP

Measurement Equipment Connections	The equipment was connected as shown in the setup drawing in B.6.
Measurement Equipment Settings	Power Meter Settings: Mode - BAP Frequency compensation set for carrier frequency Offset set appropriately to compensate for any attenuator or cable losses
Measurement Procedure	The RF conducted output power levels were measured at the DUT antenna connector port using a Gigatronics 8652A Universal Power Meter in burst average power (BAP) mode. An offset was entered into the power meter to correct for the losses of the attenuator and cable installed between the output port and the power sensor input. The DUT test software was used to set it to transmit in the maximum power control mode defined by the manufacturer.

B.6. SETUP DRAWING

Figure B.6-1 - Setup Drawing



B.7. DUT OPERATING DESCRIPTION

Power measurements were made for each of the three Cellular test channels (Channel 128, 190 & 251), with the AirCard 775 modem set appropriately as described in section 5.7.

B.8. TEST RESULTS

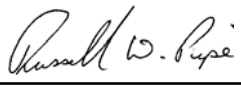
Mode	Channel	Frequency	Conducted Power	
Cellular GSM	128	824.20 MHz	+31.64 dBm	1.46 Watts
	190	836.60 MHz	+31.80 dBm	1.51 Watts
	251	848.80 MHz	+31.92 dBm	1.56 Watts

B.9. PASS/FAIL

There is no pass/fail criterion for this measurement. The ERP values, applied to appropriate regulatory requirements are outlined in Appendix E.

B.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.

24May05
Date

Appendix C - Conducted Cellular TX Spurious Emissions Measurement

C.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §22.917(a)
Procedure Reference	FCC CFR 47 §22.917(b)

C.2. LIMITS

FCC CFR 47 §22.917	*(a) Out of Band Emissions. The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by: at least 43 + 10 log P dB*

C.3. ENVIRONMENTAL CONDITIONS

Temperature	27 +/- 2 ºC
Humidity	33 +/- 2 %
Barometric Pressure	96 +/- 0.2 kPa

C.4. EQUIPMENT LIST

RECEIVING EQUIPMENT

ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
1	00015	Agilent	E4408B	Spectrum Analyzer	24Jan05	24Jan06
2	00102	Pasternack	PE7015-3030	30dB attenuator	na	na*
3	na	Itronix	na	Cable & SMA adapter	na	na*

*Verified with VNA

C.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS

The measurement equipment was connected as shown in C.6.

MEASUREMENT EQUIPMENT SETTINGS

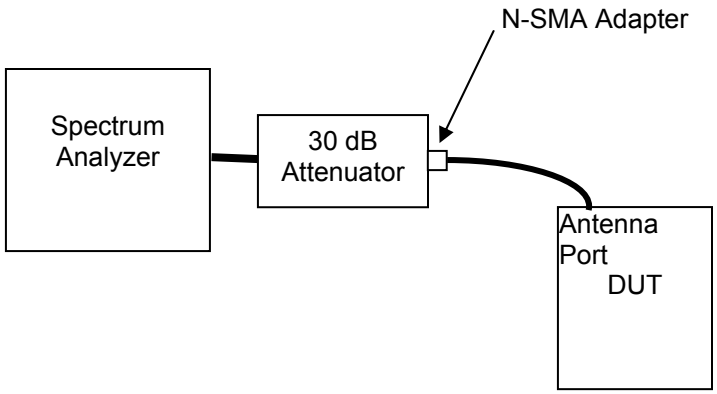
The spectrum analyzer was set to the following settings:

Frequency Range	RBW	VBW	Offset	Detector
MHz	kHz	kHz	dB	
Between Block edge and 1 MHz from Block edges	3 *	3 *	-31.0	Peak
Beyond 1MHz from Block edges	1000*	1000*		

*Specified BW of 1% of EBW within Block and 1 MHz of each edge & ≥ 100 kHz beyond 1 MHz of the block edge.

C.6. SETUP DRAWING

Figure C.6-1 - Setup Drawing



C.7. DUT OPERATING DESCRIPTION

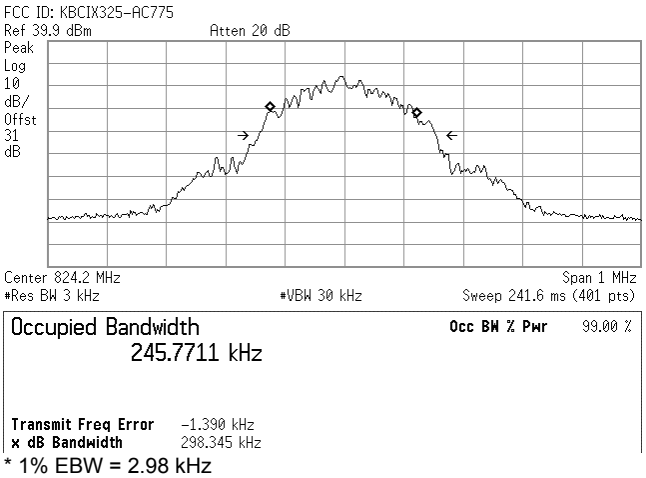
Measurements were made with the DUT transmitting at maximum power in the cellular band, in a configuration as described in Section 5 of this report. The Block edge measurements were made with the DUT transmitting on the channel closest to the edge under investigation (CH128 & CH251). The remaining spurious measurements were made on each of the three channels, Low (CH128), mid (CH190) and High (CH251).

C.8. TEST RESULTS

The spurious measurements detailed in this section are referenced to the conducted carriers levels outlined in Appendix B of this report:

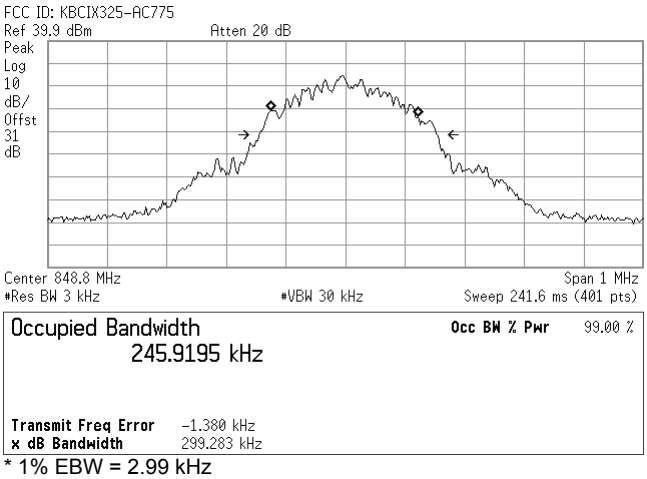
C.8.1. Spurious Emissions within 1MHz of Block Edge

Emission Bandwidth - CH128



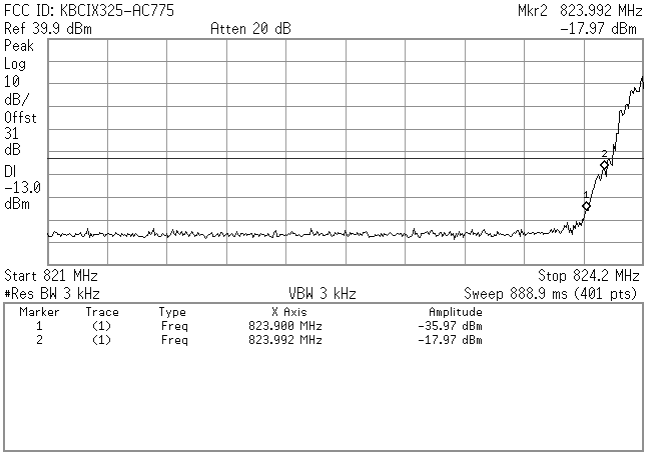
* 1% EBW = 2.98 kHz

Emission Bandwidth - CH251



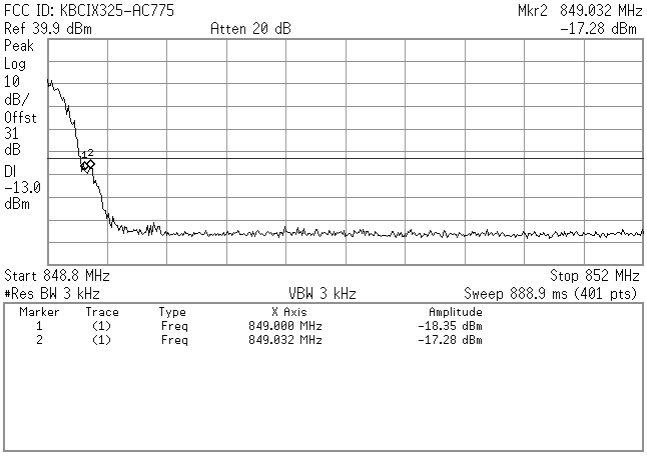
* 1% EBW = 2.99 kHz

Lower Block Edge - 824 MHz



Highest emission within 1MHz of the Lower Block Edge is at 823.992 MHz with a level of -17.97 dBm measured with an RBW of 3 kHz.

Upper Block Edge - 849 MHz

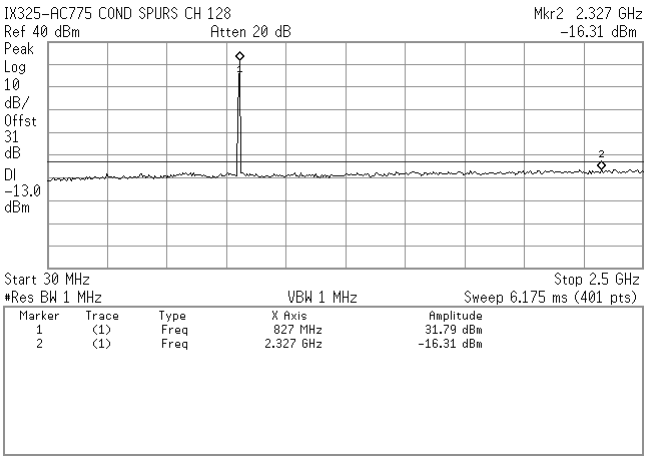


Highest emission within 1MHz of the Upper Block Edge is at 849.032 MHz with a level of –17.28 dBm measured with an RBW of 3 kHz.

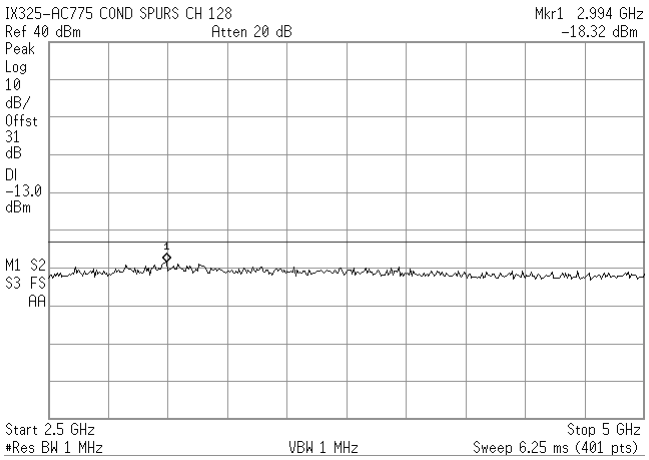
C.8.2. Spurious Emissions removed by more than 1MHz from Block Edge

Channel 128

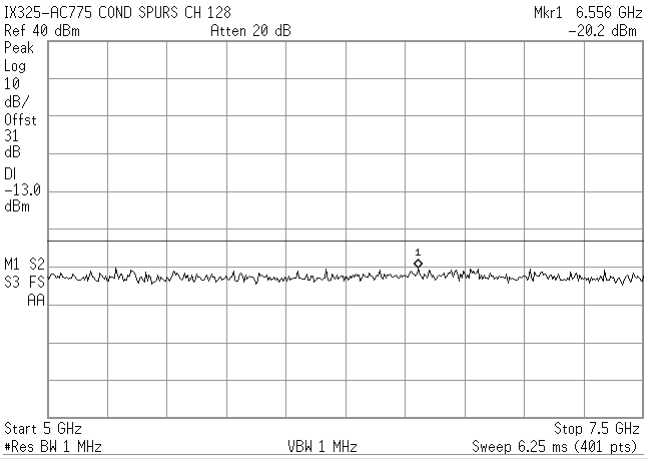
Band 1



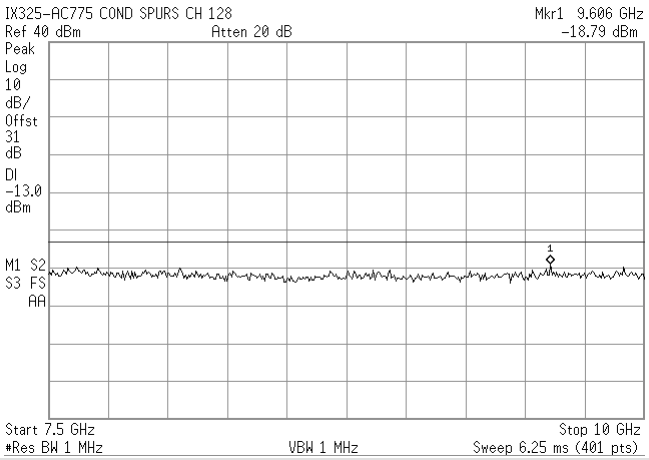
Band 2



Band 3



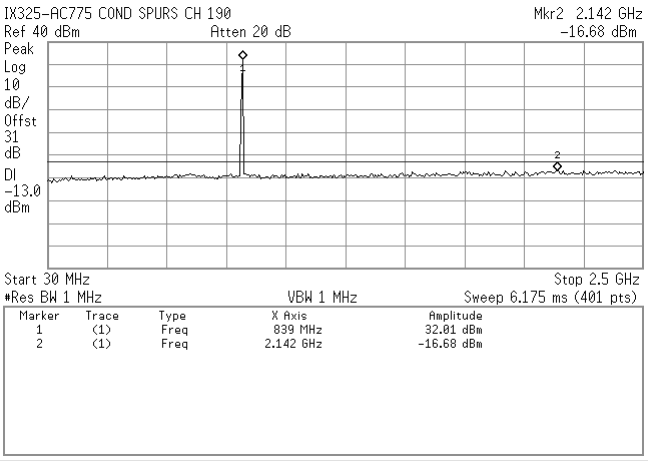
Band 4



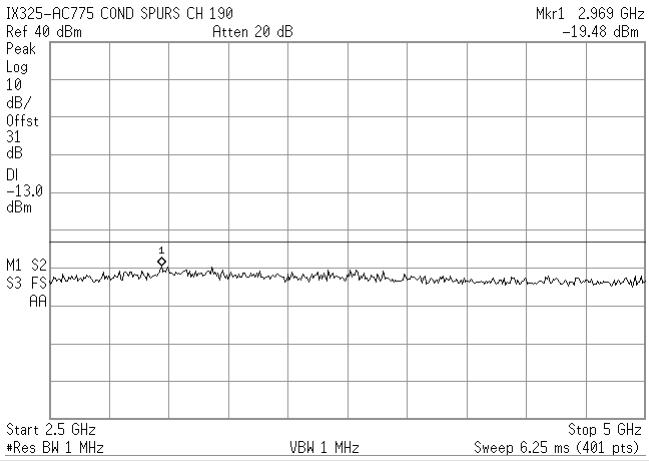
Highest emission removed by more than 1MHz from the Lower Block Edge with Channel 128 transmitting is at 2327 MHz with a peak level of -16.31 dBm measured with an RBW of 1 MHz.

Channel 190

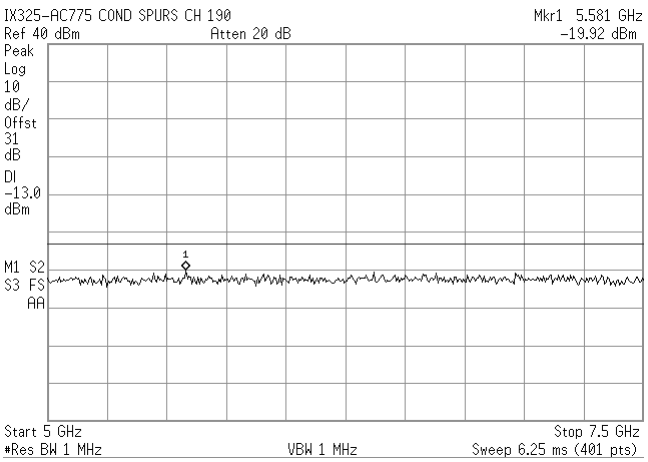
Band 1



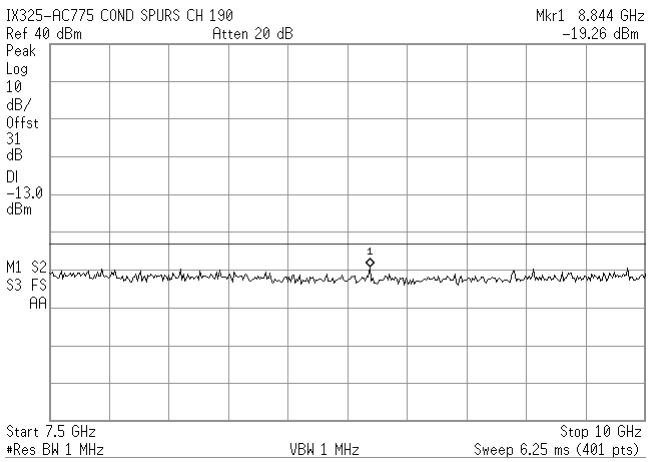
Band 2



Band 3



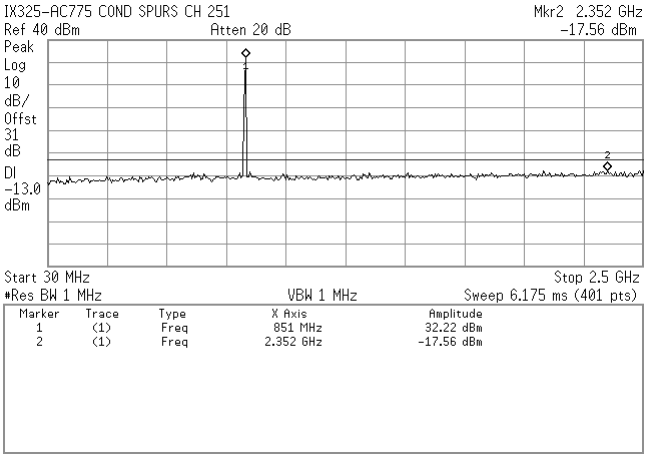
Band 4



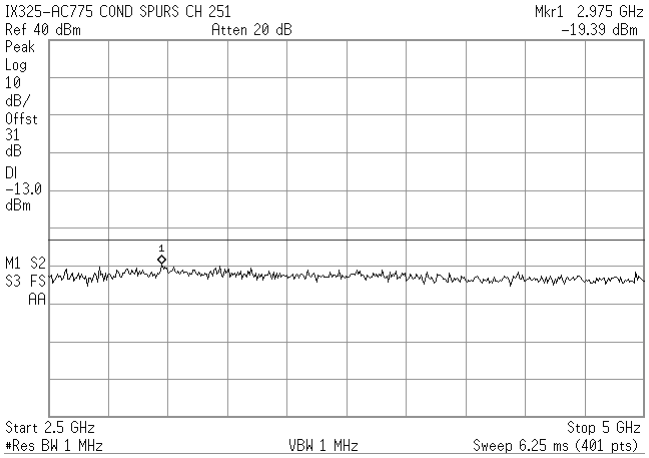
Highest emission removed by more than 1MHz from the Lower Block Edge with Channel 190 transmitting is at 2142 MHz with a peak level of -16.68 dBm measured with an RBW of 1 MHz.

Channel 251

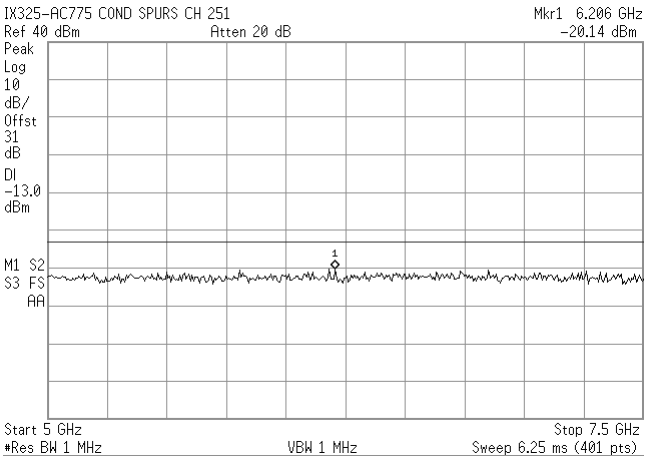
Band 1



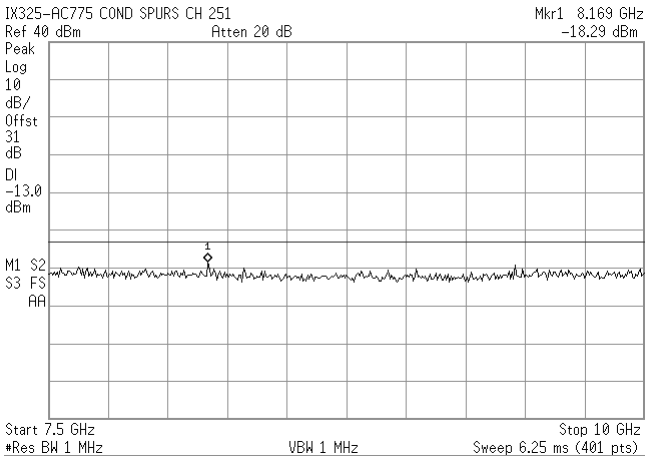
Band 2



Band 3



Band 4



Highest emission removed by more than 1MHz from the Lower Block Edge with Channel 251 transmitting is at 2352 MHz with a peak level of -17.56 dBm measured with an RBW of 1 MHz.

C.9. PASS/FAIL

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

FCC CFR 4 §22.217 (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.

The results set forth in this section meet the requirement with a margin of at least 3.31 dB
(-16.31 dBm @ 2327 MHz vs a limit of -13 dBm)

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.

25May05
Date

Appendix D - Conducted Cellular RX Spurious Emissions Measurement

D.1. REFERENCES

Normative Reference Standard	IC RSS-132 §6.6 (b)
Procedure Reference	IC RSS-132 §4.6

D.2. LIMITS

IC RSS-132 §6.6	*(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per 4 kHz spurious frequency in the band 30 – 1000 MHz or 5 nanowattts above 1 GHz.*

D.3. ENVIRONMENTAL CONDITIONS

Temperature	27 +/- 2 ºC
Humidity	33 +/- 2 %
Barometric Pressure	96 +/- 0.2 kPa

D.4. EQUIPMENT LIST

RECEIVING EQUIPMENT

ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
1	00015	Agilent	E4408B	Spectrum Analyzer	24Jan05	24Jan06
2	na	Itronix	na	Cable & SMA adapter	na	na*

*Verified with VNA

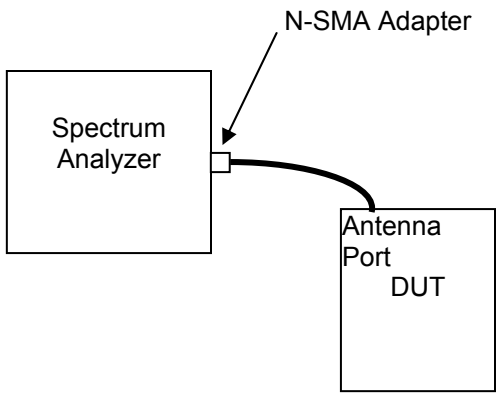
D.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS	The measurement equipment was connected as shown in D.6.			
MEASUREMENT EQUIPMENT SETTINGS	The spectrum analyzer was set to the following settings:			
	Frequency Range	RBW	VBW	Detector
	MHz	kHz	kHz	
	30 MHz - 3 x F_c	4*	4*	Peak

Note: 4 kHz RBW & VBW are not attainable with equipment used and 3 kHz will be used. A bandwidth correction factor of 10 * log (4 kHz / 3 kHz), (1.25 dB) will be added to the final results.

D.6. SETUP DRAWING

Figure D.6-1 - Setup Drawing

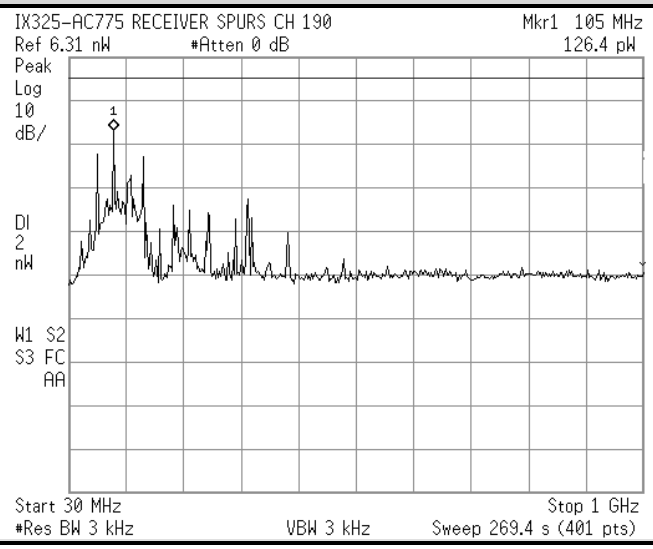


D.7. DUT OPERATING DESCRIPTION

Measurements were made with the DUT in receive mode for the cellular mid channel (CH190 836.6 MHz)

D.8. TEST RESULTS

D.8.1. Receiver Spurious Emissions



Calculations

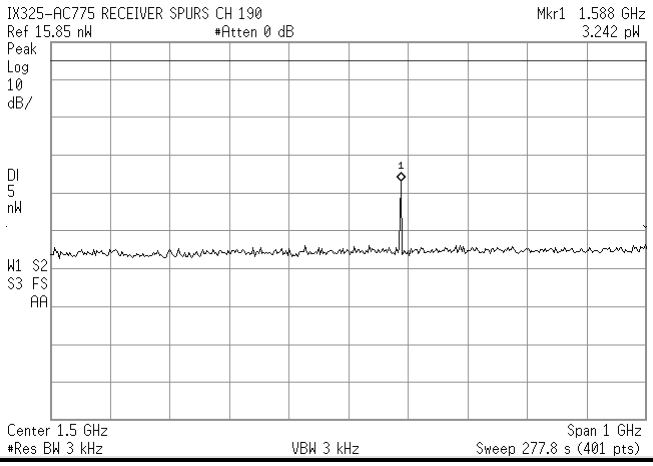
Emission (dBm) = 10 * log (Emission (mW)
BW Correction = 10 * log (4 kHz / 3 kHz)

In linear terms:
Emission (pW) = Emission (pW) * (4 kHz / 3 kHz)

For a Peak Emission of 126.4 pW with RBW of 3 KHz:

Corrected Peak Emission = 126.4 pW * 4/3
= 168.5 pW for RBW of 4 kHz
= 0.1685 nW

Margin (nW) = 2 nW – 0.1685 nW
= 1.83 nW



Calculations

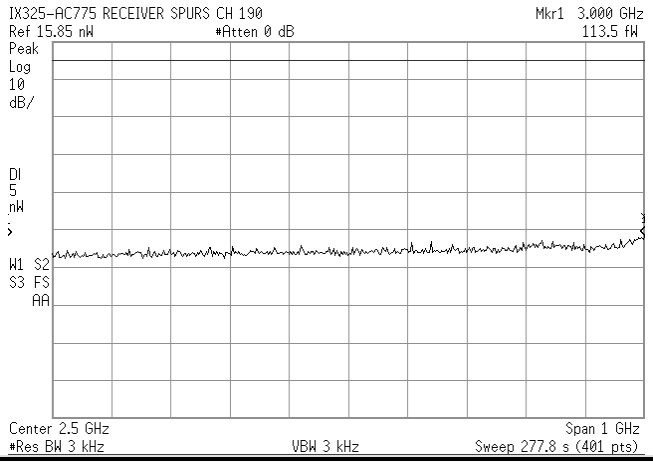
Emission (dBm) = 10 * log (Emission (mW)
BW Correction = 10 * log (4 kHz / 3 kHz)

In linear terms:
Emission (pW) = Emission (pW) * (4 kHz / 3 kHz)

For a Peak Emission of 3.242 pW with RBW of 3 KHz:

Corrected Peak Emission = 3.242 pW * 4/3
= 4.323 pW for RBW of 4 kHz
= 0.00432 nW

Margin (nW) = 5 nW – 0.00432 nW
= 4.996 nW



Calculations

Emission (dBm) = 10 * log (Emission (mW)
BW Correction = 10 * log (4 kHz / 3 kHz)

In linear terms:
Emission (pW) = Emission (pW) * (4 kHz / 3 kHz)

For a Peak Emission of 113.5 fW with RBW of 3 KHz:

Corrected Peak Emission = 113.5 fW * 4/3
= 151 fW for RBW of 4 kHz
= 0.00015 nW

Margin (nW) = 5 nW – 0.00015 nW
= 4.9998 nW

D.9. PASS/FAIL

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

IC RSS-132 §6.6 (b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per 4kHz spurious frequency in the band 30 – 1000 MHz or 5 nanowattts above 1 GHz.

The results set forth in this section meet the requirement with a margin of at least 1.83 nW

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.

Russell Pipe
Senior Compliance Technologist
Celltech Labs Inc.

26May05
Date

Appendix E - Cellular Band Effective Radiated Power Measurement

E.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §22.913 (a)
Procedure Reference	ANSI/TIA/EIA-603-C

E.2. LIMITS

FCC CFR 47 §22.913 (a)	*(a) Maximum ERP. ……. The ERP of mobile transmitters and auxiliary transmitters must not exceed 7 Watts.*

E.3. ENVIRONMENTAL CONDITIONS

Temperature	27 +/- 2 ºC
Humidity	33 +/- 4 %
Barometric Pressure	96 +/- 0.2 kPa

E.4. EQUIPMENT LIST

RECEIVING EQUIPMENT

ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
1	00072	EMCO	2075	Mini-mast	na	na
2	00073	EMCO	2080	Turn Table	na	na
3	00071	EMCO	2090	Multi-Device Controller	na	na
4	00050	Chase	CBL-6111A	Bilog Antenna	08Feb05	08Feb06
5	00051	HP	8566B	Spectrum Analyzer	12Apr05	12Apr06
6	00047	HP	85685A	Preselector	13Apr05	13Apr06
7	00120	Celltech	n/a	Microwave Cable (RX)	25Mar05	25Mar06
8	00121	Andrew	FSJ4-50B	Microwave Cable (RX)	25Mar05	25Mar06
9	00130	Andrew	FSJ1-50A	Microwave Cable (RX)	25Mar05	25Mar06

ADDITIONAL SUBSTITUTION EQUIPMENT

ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
10	00059	ETS	3121C	Roberts Dipole	04Dec03	04Dec05
11	00131	Andrew	FSJ1-50A	Microwave Cable (TX)	na	na
12	00127	Andrew	FSJ4-50B	Microwave Cable (TX)	na	na
13	00133	Andrew	FSJ1-50A	Microwave Cable (TX)	na	na
14	00006	R &S	SMR40	Signal Generator	12Apr05	12Apr06
15	00007	Gigatronics	8652A	Power Meter	18Oct04	18Oct05
16	00011	Gigatronics	80701A	Power Sensor	08Oct04	08Oct05
17	00013	Gigatronics	80701A	Power Sensor	11Oct04	11Oct05
18	00102	Pasternack	PE7015-3110	30 dB attenuator	na*	na*
19	00078	Pasternack	PE2214-20	Directional Coupler	na*	na*

*Attenuation offset in power meter setup

E.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS	The measurement equipment was connected as shown in E.6.
MEASUREMENT EQUIPMENT SETTINGS	The spectrum analyzer was set to the following settings:

Frequency Range	RBW	VBW	Detector
MHz	kHz	kHz	
30 - 1000	100	100	Peak

E.6. SETUP DRAWING

Figure E.6-1 - Field Strength Setup Drawing

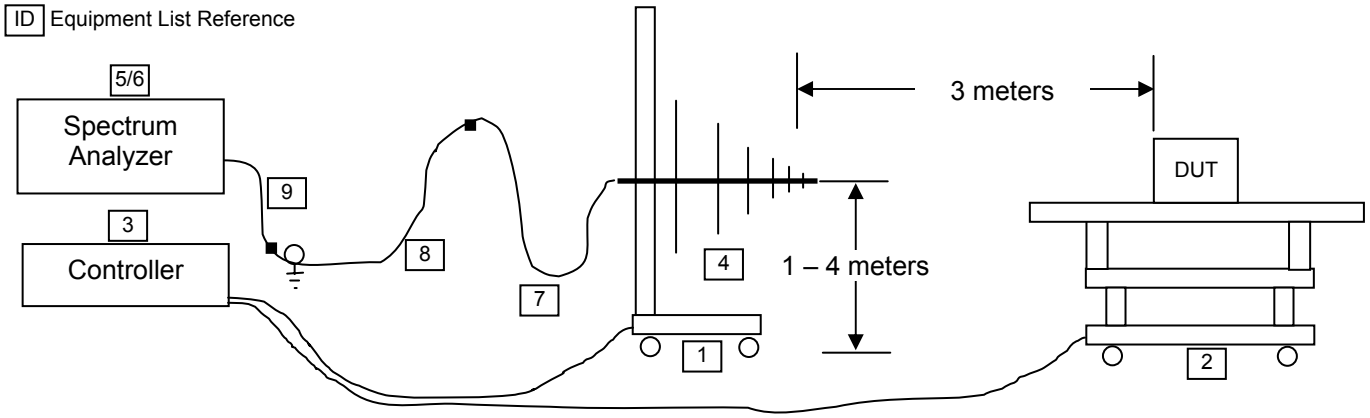
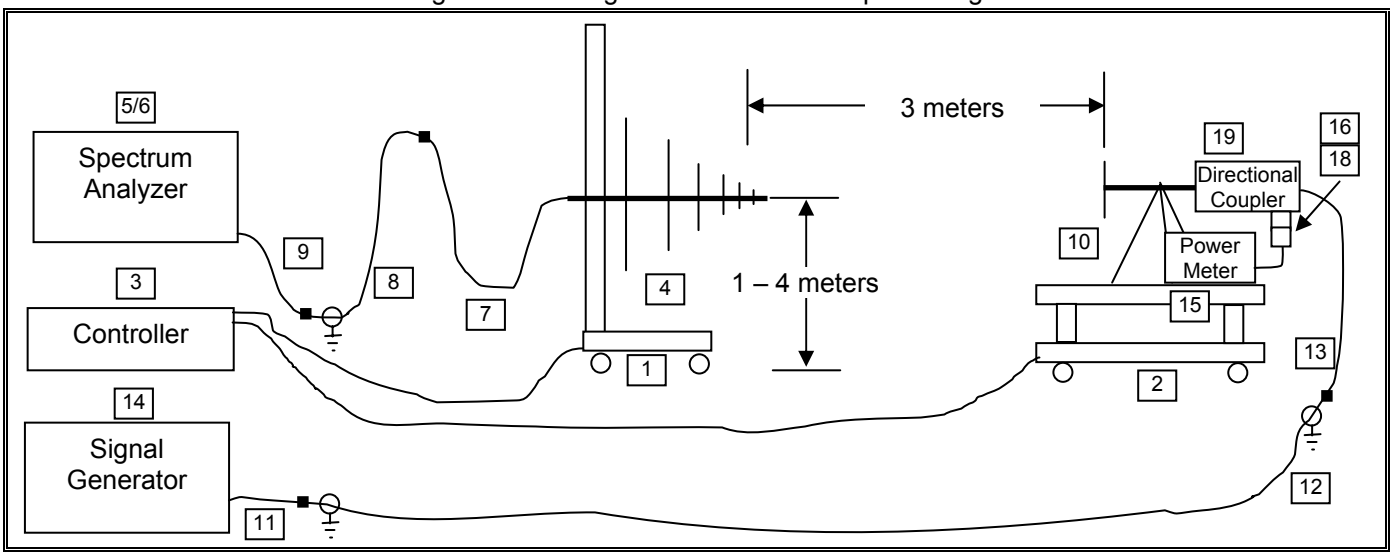


Figure E.6-2 - Signal Substitution Setup Drawing



E.7. SETUP PHOTOGRAPHS

Photograph E.7-1 - DUT in Highest Cellular Carrier Configuration

E.8. DUT OPERATING DESCRIPTION

Measurements were made for the low, mid and high GSM channels transmitting in the cellular band at maximum power levels, and the DUT configured as described in Section 5 of this report.

E.9. TEST RESULTS

Project Number: 040505KBC-T628-E24G
Company: Itronix
Product: IX325 with AC775

Standard: FCC22.913
Test Start Date: 26-May-05
Test End Date: 27-Jun-05

IX325 Tablet with AC775 Carrier Field Strengths

Polarity	Distance	Substitution Antenna Type	Carrier Channel	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	Carrier ERP Level		ERP Limit		Margin	Pass/Fail
	m			MHz	dBuV/m	dBuV	dBm	dBd	dBm	Watts	dBm	Watts	dB	
H	3	B_3121C	128	824.20	131.42	106.18	30.79	-0.85	29.94	0.986	38.45	7.00	8.51	PASS
V	3	B_3121C	128	824.20	123.20	97.96	25.05	-0.85	24.20	0.263	38.45	7.00	14.25	PASS
H	3	B_3121C	190	836.60	130.98	105.32	30.64	-0.70	29.94	0.986	38.45	7.00	8.51	PASS
V	3	B_3121C	190	836.60	123.02	97.36	24.61	-0.70	23.91	0.246	38.45	7.00	14.54	PASS
H	3	B_3121C	251	848.80	130.77	104.58	30.56	-0.55	30.01	1.00	38.45	7.00	8.44	PASS
V	3	B_3121C	251	848.80	122.81	96.62	23.53	-0.55	22.98	0.198	38.45	7.00	15.47	PASS

Note:
Dipole Antenna used for substitution

Formulae:
ERP Level (dBm) = Power Applied to Antenna (dBm) + Antenna Gain (dBd)
Margin (dB) = Limit (dBm) – Level (dBm)

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 22.913 (a) Maximum ERP. ……. The ERP of mobile transmitters and auxiliary transmitters must not exceed 7 Watts.

A maximum ERP of 30.01 dBm (1.00 Watts) was measured when Channel 251 was transmitting.

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.

27Jun05
Date

Appendix F - Radiated Cellular TX Spurious Emissions Measurement

F.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §22.917(e)
Procedure Reference	ANSI/TIA/EIA-603-C

F.2. LIMITS

FCC CFR 47 §22.917	*(e) Out of Band Emissions. The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by: at least 43 + 10 log P dB*

F.3. ENVIRONMENTAL CONDITIONS

Temperature	27 +/- 2 ºC
Humidity	33 +/- 2 %
Barometric Pressure	96 +/- 0.2 kPa

F.4. EQUIPMENT LIST

RECEIVING EQUIPMENT

ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
1	00072	EMCO	2075	Mini-mast	na	na
2	00073	EMCO	2080	Turn Table	na	na
3	00071	EMCO	2090	Multi-Device Controller	na	na
4	00050	Chase	CBL-6111A	Bilog Antenna	08Feb05	08Feb06
5	00035	ETS	3115	Double Ridged Guide Antenna (Rx)	24Mar04	24Mar06
6	00015	Agilent	E4408B	Spectrum Analyzer	24Jan05	24Jan06
7	00051	HP	8566B	Spectrum Analyzer	12Apr05	12Apr06
8	00047	HP	85685A	Preselector	13Apr05	13Apr06
9	00120	Celltech	n/a	Microwave Cable (RX)	25Mar05	25Mar06
10	00121	Andrew	FSJ4-50B	Microwave Cable (RX)	25Mar05	25Mar06
11	00130	Andrew	FSJ1-50A	Microwave Cable (RX)	25Mar05	25Mar06
12	00115	Miteq	JS4-00102600-35-5A	Low Noise Amplifier	08Jun05	08Jun06
13	00093	Microtronics	HPM50111	High Pass Filter	25Mar05	25Mar06
14	00119	INMAT	18AH-10	10dB attenuator	25Mar05	25Mar06

ADDITIONAL SUBSTITUTION EQUIPMENT						
ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
15	00059	ETS	3121C	Roberts Dipole	04Dec03	04Dec05
16	00034	ETS	3115	Double Ridged Guide Antenna (Tx)	24Mar04	24Mar06
17	00131	Andrew	FSJ1-50A	Microwave Cable (TX)	na	na
18	00127	Andrew	FSJ4-50B	Microwave Cable (TX)	na	na
19	00133	Andrew	FSJ1-50A	Microwave Cable (TX)	na	na
20	00006	R & S	SMR-20	Signal Generator	12Apr05	12Apr06
21	00007	Gigatronics	8652A	Power Meter	18Oct04	18Oct05
22	00011	Gigatronics	80701A	Power Sensor	08Oct04	08Oct05
23	00013	Gigatronics	80701A	Power Sensor	11Oct04	11Oct05
24	00102	Pasternack	PE7015-3110	30 dB attenuator	na*	na*
25	00078	Pasternack	PE2214-20	Directional Coupler	na*	na*
26	00142	HP	8491A	20 dB attenuator	na*	na*

* Attenuation offset in power meter setup

F.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS

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

Frequency Range	LNA Asset #	Filter/Attenuator Asset #	Rx Antenna Asset #	Tx Antenna Asset #
30 MHz – 1 GHz	none	none	00050	00059
1 GHz – 2 GHz	none	none	00035	00034
2 GHz – 3 GHz	00115	00119	00035	00034
3 GHz – 10 GHz	00115	00093	00035	00034

MEASUREMENT EQUIPMENT SETTINGS

The spectrum analyzer was set to the following settings:

Frequency Range	RBW	VBW	Detector
MHz	kHz	kHz	
800 MHz – 10 GHz	100*	100*	Peak

*Field strength measurements were made with a worse case RBW and VBW of 1 MHz for frequency bands above 1 GHz when adequate margins were attained.

F.6. SETUP DRAWING

Figure F.6-1 - Field Strength Setup Drawing

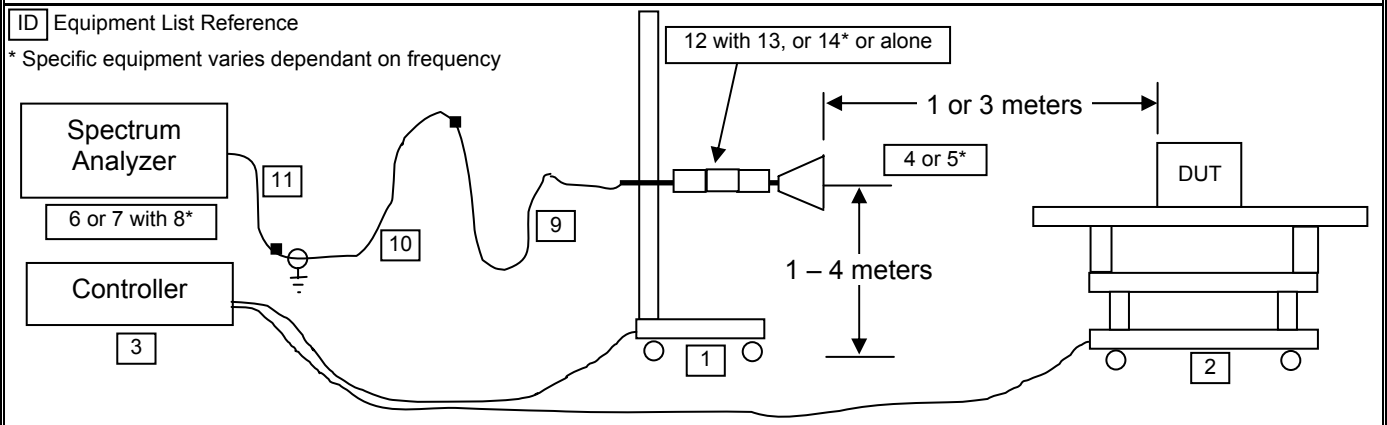
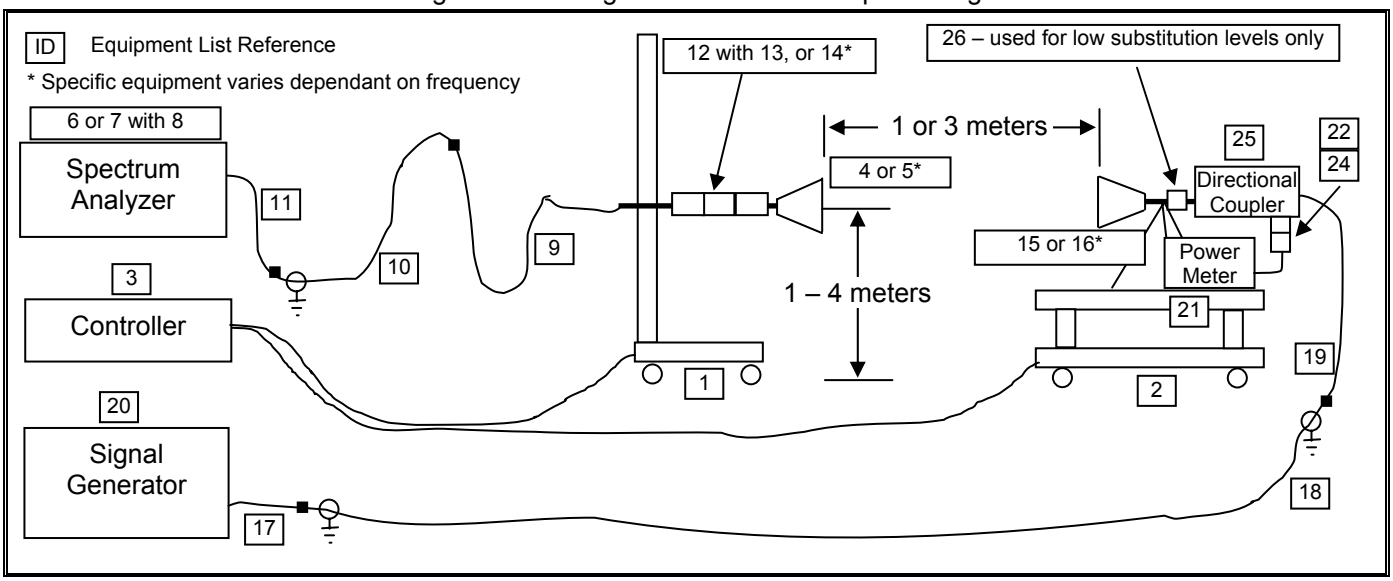


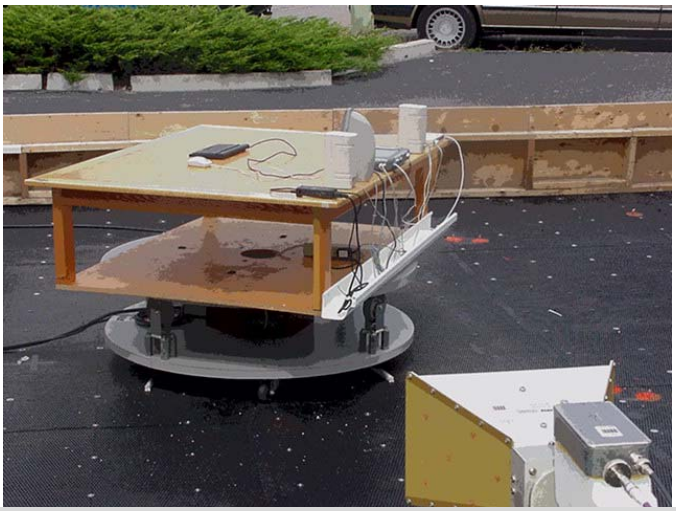
Figure F.6-2 - Signal Substitution Setup Drawing



F.7. SETUP PHOTOGRAPHS

Photograph F.7-1 - Horizontal Bilog Cellular Radiated Emissions Setup

Photograph F.7-2 - Vertical 3115 Horn and LNA Cellular Radiated Emissions Setup



F.8. DUT OPERATING DESCRIPTION

Measurements were made for the low, mid and high GSM channels transmitting in the cellular band at maximum power levels as described in Section 5 of this report. During these measurements, the antenna was replaced with a 50-ohm load. The conducted emissions described in Appendix C supplement the results described in this appendix.

F.9. TEST RESULTS

The spurious measurements detailed in this section are referenced to the carrier levels set forth in Appendix E of this report:

F.9.1. Spurious Emissions

Channel 128

Polarity	Distance	Substitution Antenna Type	Carrier Channel	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	ERP Emission Level	Limit	Margin	Pass/Fail
	m			MHz	dBuV/m	dBuV	dBm	dBd	dBm	dBm or dBuV/m*	dB	
H	3	Horn SN6267	CH128	1631.00	59.71	27.70	-58.84	4.19	-54.65	-13.00	41.65	PASS
H	3	none	CH128	1891.00	62.72					84.4*	21.6*	PASS*
H	3	none	CH128	2190.00	38.70					84.4*	45.7*	PASS*
H	3	Horn SN6267	CH128	2472.60	46.60	34.20	-62.26	5.60	-56.66	-13.00	43.66	PASS
H	3	none	CH128	2796.00	38.88					84.4*	45.5*	PASS*
H	3	Horn SN6267	CH128	3296.80	43.73	36.10	-64.86	5.84	-59.02	-13.00	46.02	PASS
H	3	Horn SN6267	CH128	4121.00	39.68	29.30	-71.12	6.03	-65.09	-13.00	52.09	PASS
H	3	Horn SN6267	CH128	4945.20	44.78	32.60	-66.13	6.47	-59.66	-13.00	46.66	PASS
H	3	none	CH128	5271.50	47.81					84.4*	36.6*	PASS*
H	3	Horn SN6267	CH128	5769.40	42.40	28.30	-69.46	6.78	-62.68	-13.00	49.68	PASS
H	3	Horn SN6267	CH128	6593.60	46.67	31.50	-74.06	7.40	-66.66	-13.00	53.66	PASS
H	3	Horn SN6267	CH128	7417.80	46.45	28.90	-79.28	6.83	-72.45	-13.00	59.45	PASS
H	3	Horn SN6267	CH128	8245.00	46.15	27.30	-80.99	7.16	-73.83	-13.00	60.83	PASS
H	3	none	CH128	8302.50	52.56					84.4*	31.8*	PASS*
H	3	none	CH128	8374.25	54.58					84.4*	29.8*	PASS*
H	3	none	CH128	9039.25	47.54					84.4*	36.8*	PASS*
V	3	Horn SN6267	CH128	1648.40	60.03	27.90	-59.03	4.21	-54.82	-13.00	41.82	PASS
V	3	none	CH128	1879.00	61.63					84.4*	22.7*	PASS*
V	3	Horn SN6267	CH128	2027.00	38.56	27.40	-65.69	4.62	-61.07	-13.00	48.07	PASS
V	3	Horn SN6267	CH128	2472.60	51.70	39.30	-54.42	5.60	-48.82	-13.00	35.82	PASS
V	3	none	CH128	2629.00	44.27					84.4*	40.1*	PASS*
V	3	none	CH128	2686.00	40.63					84.4*	43.7*	PASS*
V	3	Horn SN6267	CH128	3296.80	51.63	44.00	-56.29	5.84	-50.45	-13.00	37.45	PASS
V	3	Horn SN6267	CH128	4121.00	43.08	32.70	-64.98	6.03	-58.95	-13.00	45.95	PASS
V	3	Horn SN6267	CH128	4945.20	53.78	41.60	-54.80	6.47	-48.33	-13.00	35.33	PASS
V	3	none	CH128	5266.25	47.80					84.4*	36.6*	PASS*
V	3	Horn SN6267	CH128	5769.40	46.20	32.10	-63.01	6.78	-56.23	-13.00	43.23	PASS
V	3	Horn SN6267	CH128	6593.60	46.37	31.20	-64.77	7.40	-57.37	-13.00	44.37	PASS
V	3	Horn SN6267	CH128	7417.80	45.95	28.40	-67.27	6.83	-60.44	-13.00	47.44	PASS
V	3	Horn SN6267	CH128	8242.00	46.00	27.10	-68.20	7.16	-61.04	-13.00	48.04	PASS
V	3	none	CH128	9352.50	48.30					84.4*	36.1*	PASS*

*Margin and Pass/Fail based on measured field strengths applied against a theoretical field strength limit.

Note:
The emissions reported above represent the highest emissions or noise floor measured within the frequency band of 30MHz and the 10th harmonic of the carrier with field strengths within 20 dB of the theoretical limit. All other emissions attributed to the EUT had field strengths greater than 20 dB below the theoretical limit and substitutions were not made.

Formulae:
ERP Emission Level (dBm) = Power applied to antenna (dBm) + Antenna Gain (dBd)
Margin (dB) = Limit (dBm) – ERP Emission Level (dBm) or Theoretical Limit (dBuV/m) – Corrected Field Strength (dBuV/m)
Theoretical Limit (V/m) = SQRT(30 * P / r^2) where P is the total transmitted power (W), r is measurement distance (m)

Channel 190

Polarity	Distance	Substitution Antenna Type	Carrier Channel	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	ERP Emission Level	Limit	Margin	Pass/Fail
	m			MHz	dBuV/m	dBuV	dBm	dBd	dBm	dBm or dBuV/m*	dB	
H	3	Horn SN6267	CH190	1685.00	59.74	27.40	-55.97	4.25	-51.73	-13.00	38.73	PASS
H	3	Horn SN6267	CH190	2511.00	46.06	33.50	-63.21	5.66	-57.55	-13.00	44.55	PASS
H	3	none	CH190	2665.00	39.31					84.4*	45.1*	PASS*
H	3	none	CH190	2671.00	39.15					84.4*	45.2*	PASS*
H	3	Horn SN6267	CH190	3346.40	44.08	36.30	-64.72	5.87	-58.85	-13.00	45.85	PASS
H	3	Horn SN6267	CH190	4183.00	42.53	32.00	-68.02	6.12	-61.90	-13.00	48.90	PASS
H	3	Horn SN6267	CH190	5019.60	48.20	35.90	-58.90	6.46	-52.44	-13.00	39.44	PASS
H	3	none	CH190	5273.25	47.87					84.4*	36.5*	PASS*
H	3	Horn SN6267	CH190	5856.20	44.92	30.60	-66.07	6.89	-59.18	-13.00	46.18	PASS
H	3	Horn SN6267	CH190	6692.80	45.49	30.10	-70.20	7.34	-62.86	-13.00	49.86	PASS
H	3	Horn SN6267	CH190	7529.40	47.23	29.40	-67.05	6.78	-60.27	-13.00	47.27	PASS
H	3	none	CH190	8302.50	52.46					84.4*	31.9*	PASS*
H	3	Horn SN6267	CH190	8366.00	46.92	28.10	-63.84	7.16	-56.68	-13.00	43.68	PASS
H	3	none	CH190	8372.50	54.29					84.4*	30.1*	PASS*
H	3	none	CH190	9366.50	47.65					84.4*	36.7*	PASS*
V	3	Horn SN6267	CH190	1673.20	59.47	27.20	-55.36	4.23	-51.13	-13.00	38.13	PASS
V	3	none	CH190	1896.00	62.36					84.4*	22.0*	PASS*
V	3	Horn SN6267	CH190	2511.00	52.56	40.00	-55.47	5.66	-49.81	-13.00	36.81	PASS
V	3	none	CH190	2633.00	41.69					84.4*	42.7*	PASS*
V	3	none	CH190	2681.00	40.61					84.4*	43.8*	PASS*
V	3	none	CH190	2744.00	39.34					84.4*	45.0*	PASS*
V	3	Horn SN6267	CH190	3346.40	53.28	45.50	-53.97	5.87	-48.10	-13.00	35.10	PASS
V	3	Horn SN6267	CH190	4183.00	42.83	32.30	-66.32	6.12	-60.20	-13.00	47.20	PASS
V	3	Horn SN6267	CH190	5019.60	42.90	30.60	-65.41	6.46	-58.95	-13.00	45.95	PASS
V	3	none	CH190	5264.50	48.24					84.4*	36.1*	PASS*
V	3	none	CH190	5766.75	52.38					84.4*	32.0*	PASS*
V	3	Horn SN6267	CH190	5856.20	45.62	31.30	-67.03	6.89	-60.14	-13.00	47.14	PASS
V	3	Horn SN6267	CH190	6692.80	48.49	33.10	-62.27	7.34	-54.93	-13.00	41.93	PASS
V	3	Horn SN6267	CH190	7529.40	46.98	29.15	-66.27	6.78	-59.49	-13.00	46.49	PASS
V	3	Horn SN6267	CH190	8366.00	47.25	28.43	-69.73	7.16	-62.57	-13.00	49.57	PASS
V	3	none	CH190	9203.75	53.72					84.4*	30.7*	PASS*

*Margin and Pass/Fail based on measured field strengths applied against a theoretical field strength limit.

Note:
The emissions reported above represent the highest emissions or noise floor measured within the frequency band of 30MHz and the 10th harmonic of the carrier with field strengths within 20 dB of the theoretical limit. All other emissions attributed to the EUT had field strengths greater than 20 dB below the theoretical limit and substitutions were not made.

Formulae:
ERP Emission Level (dBm) = Power applied to antenna (dBm) + Antenna Gain (dBd)
Margin (dB) = Limit (dBm) – ERP Emission Level (dBm) or Theoretical Limit (dBuV/m) – Corrected Field Strength (dBuV/m)
Theoretical Limit (V/m) = SQRT(30 * P / r^2) where P is the total transmitted power (W), r is measurement distance (m)

Channel 251

Polarity	Distance	Substitution Antenna Type	Carrier Channel	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	ERP Carrier Level	Limit	Margin	Pass/Fail
	m			MHz	dBuV/m	dBuV	dBm	dBd	dBm	dBm or dBuV/m*	dB	
H	3	Horn SN6267	CH251	1699.00	60.33	27.90	-55.86	4.26	-51.60	-13.00	38.60	PASS
H	3	none	CH251	2303.39	37.70					84.4*	46.7*	PASS*
H	3	none	CH251	2493.00	52.09					84.4*	32.3*	PASS*
H	3	Horn SN6267	CH251	2546.24	48.01	35.30	-60.51	5.66	-54.85	-13.00	41.85	PASS
H	3	Horn SN6267	CH251	3395.20	45.77	37.80	-62.76	5.90	-56.86	-13.00	43.86	PASS
H	3	Horn SN6267	CH251	4244.00	43.92	33.40	-67.71	6.20	-61.51	-13.00	48.51	PASS
H	3	Horn SN6267	CH251	5092.80	45.61	33.00	-63.04	6.46	-56.58	-13.00	43.58	PASS
H	3	none	CH251	5271.00	44.31					84.4*	40.1*	PASS*
H	3	Horn SN6267	CH251	5641.60	46.00	32.10	-65.04	6.63	-58.41	-13.00	45.41	PASS
H	3	none	CH251	5766.75	48.08					84.4*	36.3*	PASS*
H	3	Horn SN6267	CH251	6790.40	47.24	31.50	-65.33	7.29	-58.04	-13.00	45.04	PASS
H	3	Horn SN6267	CH251	7639.20	51.11	33.00	-57.49	6.87	-50.62	-13.00	37.62	PASS
H	3	none	CH251	8302.50	52.46					84.4*	31.9*	PASS*
H	3	none	CH251	8374.25	54.98					84.4*	29.4*	PASS*
H	3	Horn SN6267	CH251	8488.00	51.49	32.40	-52.69	7.16	-45.53	-13.00	32.53	PASS
V	3	Horn SN6267	CH251	1696.00	60.21	27.80	-55.48	4.26	-51.22	-13.00	38.22	PASS
V	3	Horn SN6267	CH251	2546.21	53.71	41.00	-53.23	5.66	-47.57	-13.00	34.57	PASS
V	3	none	CH251	2685.20	51.03					84.4*	33.3*	PASS*
V	3	none	CH251	2743.00	47.53					84.4*	36.8*	PASS*
V	3	none	CH251	2796.00	47.28					84.4*	37.1*	PASS*
V	3	Horn SN6267	CH251	3395.20	54.97	47.00	-50.70	5.90	-44.80	-13.00	31.80	PASS
V	3	Horn SN6267	CH251	4244.00	43.62	33.10	-67.67	6.20	-61.47	-13.00	48.47	PASS
V	3	Horn SN6267	CH251	5092.80	50.51	37.90	-58.42	6.46	-51.96	-13.00	38.96	PASS
V	3	none	CH251	5252.25	47.27					84.4*	37.1*	PASS*
V	3	none	CH251	5761.50	53.04					84.4*	31.3*	PASS*
V	3	Horn SN6267	CH251	5941.60	49.06	34.50	-60.92	6.99	-53.93	-13.00	40.93	PASS
V	3	Horn SN6267	CH251	6790.40	48.04	32.30	-61.22	7.29	-53.93	-13.00	40.93	PASS
V	3	Horn SN6267	CH251	7639.20	51.51	33.40	-56.78	6.87	-49.91	-13.00	36.91	PASS
V	3	none	CH251	8374.25	48.88					84.4*	35.5*	PASS*
V	3	Horn SN6267	CH251	8488.00	51.89	32.80	-54.18	7.16	-47.02	-13.00	34.02	PASS

*Margin and Pass/Fail based on measured field strengths applied against a theoretical field strength limit.

Note:
The emissions reported above represent the highest emissions or noise floor measured within the frequency band of 30MHz and the 10th harmonic of the carrier with field strengths within 20 dB of the theoretical limit. All other emissions attributed to the EUT had field strengths greater than 20 dB below the theoretical limit and substitutions were not made.

Formulae:
ERP Emission Level (dBm) = Power applied to antenna (dBm) + Antenna Gain (dBi)
Margin (dB) = Limit (dBm) – ERP Emission Level (dBm) or Theoretical Limit (dBuV/m) – Corrected Field Strength (dBuV/m)
Theoretical Limit (V/m) = SQRT(30 * P / r^2) where P is the total transmitted power (W), r is measurement distance (m)

F.10. PASS/FAIL

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

(e) Out of Band Emissions. The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by: at least 43 + 10 log P dB

The results set forth in this section meet the requirement with a margin of at least 21.6 dB

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.

27Jun05
Date

Appendix G - PCS Band Conducted TX RF Output Power Measurement

G.1. REFERENCES

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

G.2. LIMITS

FCC CFR 47 §2.1046 (a)	For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedures to give the values of current and voltage on the circuit elements specified in §2.1033(c) (8).

*EIRP limits are specified in Appendix J.

G.3. ENVIRONMENTAL CONDITIONS

Temperature	25 +/- 2 ºC
Humidity	35 +/- 4 %
Barometric Pressure	96 kPa

G.4. EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
00007	Gigatronics	8652A	Power Meter	18Oct04	18Oct05
00011	Gigatronics	80701A	Power Sensor	08Oct04	08Oct05
00102	Pasternack	PE7014-30	30dB attenuator	8Jun04	8Dec05
na	Itronix	na	Cable & SMA adapter	na	na*

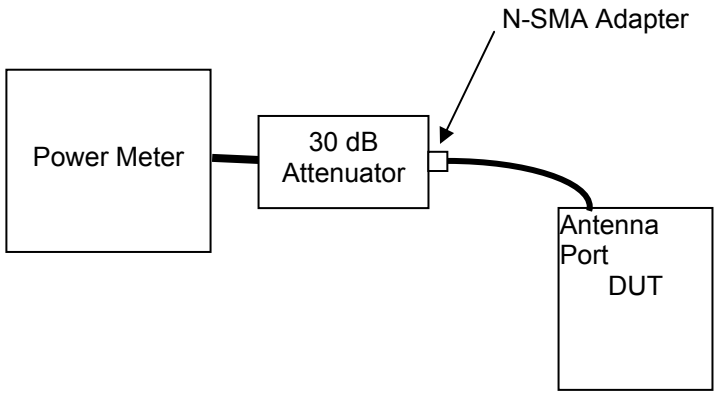
*Cable and attenuator verified with power meter prior to use

G.5. MEASUREMENT EQUIPMENT SETUP

Measurement Equipment Connections	The equipment was connected as shown in the setup drawing in G.6.
Measurement Equipment Settings	Power Meter Settings: Mode - BAP Frequency compensation set for carrier frequency Offset set appropriately to compensate for any attenuator or cable losses
Measurement Procedure	The RF conducted power levels were measured at the DUT antenna connector port using a Gigatronics 8652A Universal Power Meter in burst average power (BAP) mode. An offset was entered into the power meter to correct for the losses of the attenuator and cable installed between the output port and the power sensor input. The DUT test software was used to set it to transmit in the maximum power control mode defined by the manufacturer.

G.6. SETUP DRAWING

Figure G.6-1 - Setup Drawing



G.7. DUT OPERATING DESCRIPTION

Power measurements were made for each of the three PCS test channels (Channel 512, 661 & 810), with the AirCard 775 modem set appropriately as described in section 5.7.

G.8. TEST RESULTS

Mode	Channel	Frequency	Conducted Power	
PCS GSM	512	1850.20 MHz	+29.10 dBm	0.813 Watts
	661	1880.00 MHz	+29.05 dBm	0.804 Watts
	810	1909.80 MHz	+29.20 dBm	0.832 Watts

G.9. PASS/FAIL

There is no pass/fail criterion for this measurement. The EIRP values, applied to appropriate regulatory requirements are outlined in Appendix J.

G.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.

24May05
Date

Appendix H - Conducted PCS TX Spurious Emissions Measurement

H.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §24.238(a)
Procedure Reference	FCC CFR 47 §24.238(b)

H.2. LIMITS

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.*

H.3. ENVIRONMENTAL CONDITIONS

Temperature	27 +/- 2 ºC
Humidity	33 +/- 2 %
Barometric Pressure	96 +/- 0.2 kPa

H.4. EQUIPMENT LIST

RECEIVING EQUIPMENT

ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
1	00015	Agilent	E4408B	Spectrum Analyzer	24Jan05	24Jan06
2	00102	Pasternack	PE7015-3030	30dB attenuator	na	na*
3	na	Itronix	na	Cable & SMA adapter	na	na*

*Verified with VNA

H.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS

The measurement equipment was connected as shown in H.6.

MEASUREMENT EQUIPMENT SETTINGS

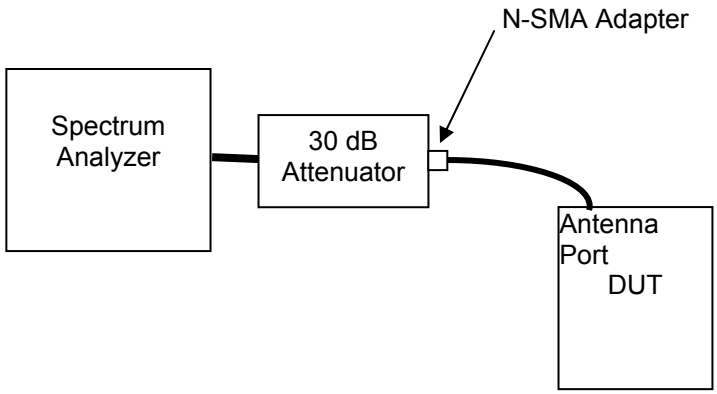
The spectrum analyzer was set to the following settings:

Frequency Range	RBW	VBW	Offset	Detector
MHz	kHz	kHz	dB	
Between Block edge and 1 MHz from Block edges	3 *	3 *	-31.0	Peak
Beyond 1MHz from Block edges	1000	1000		

*Specified BW of 1% of EBW within Block and 1 MHz of each edge.

H.6. SETUP DRAWING

Figure H.6-1 - Setup Drawing



H.7. DUT OPERATING DESCRIPTION

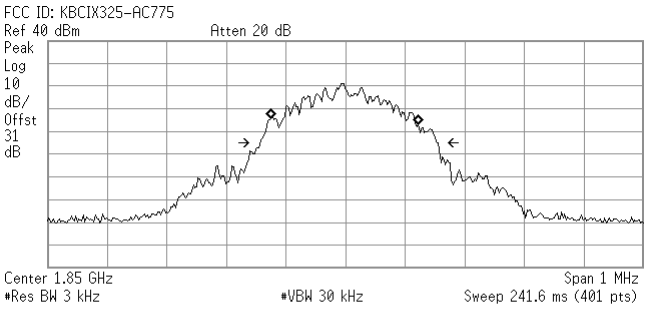
Measurements were made with the DUT transmitting at maximum power in the PCS band, in a configuration as described in Section 5 of this report. The Block edge measurements were made with the DUT transmitting on the channel closest to the edge under investigation (CH512 & CH810). The remaining spurious measurements were made on each of the three channels, Low (CH512), mid (CH661) and High (CH810).

H.8. TEST RESULTS

The spurious measurements detailed in this section are referenced to the conducted carrier levels set forth in Appendix G of this report:

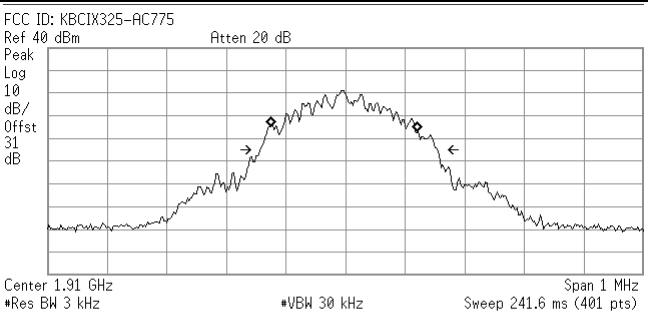
H.8.1. Spurious Emissions within 1MHz of Block Edge

Emission Bandwidth - CH512



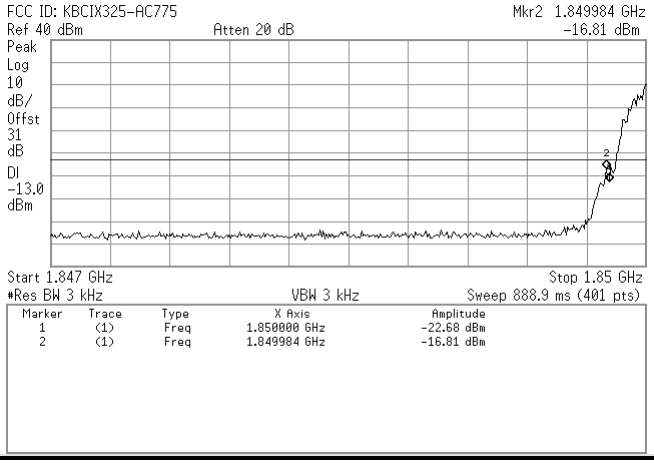
*1% EBW = 2.99 kHz

Emission Bandwidth - CH810



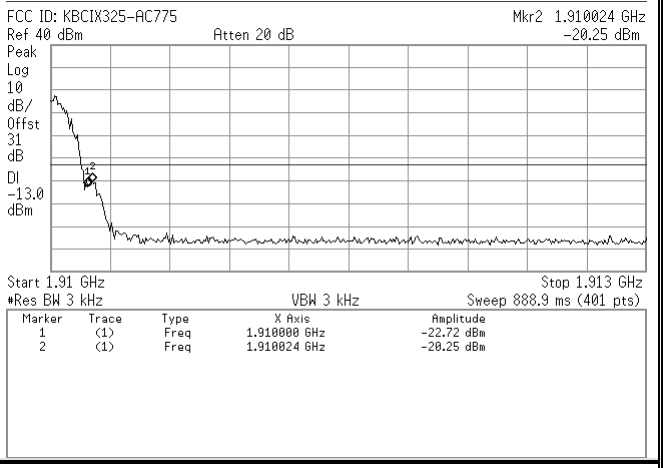
*1% EBW = 2.97 kHz

Lower Block Edge - 1850 MHz



Highest emission within 1MHz of the Lower Block Edge is at 1849.98 MHz with a level of -16.81 dBm measured with an RBW of 3 kHz.

Upper Block Edge - 1910

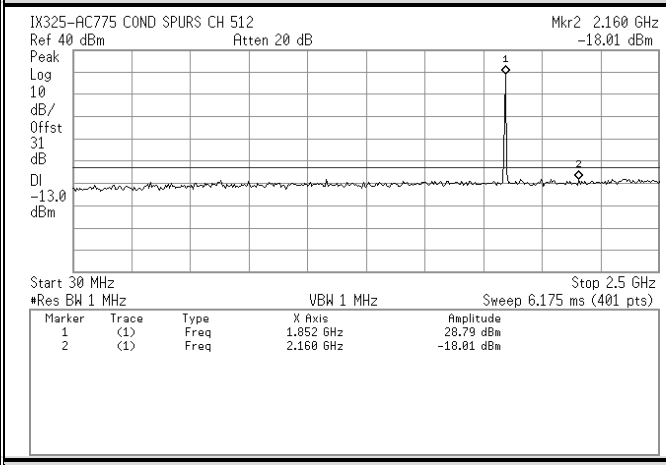


Highest emission within 1MHz of the Lower Block Edge is at 1910.02 MHz with a level of -20.25 dBm measured with an RBW of 3 kHz.

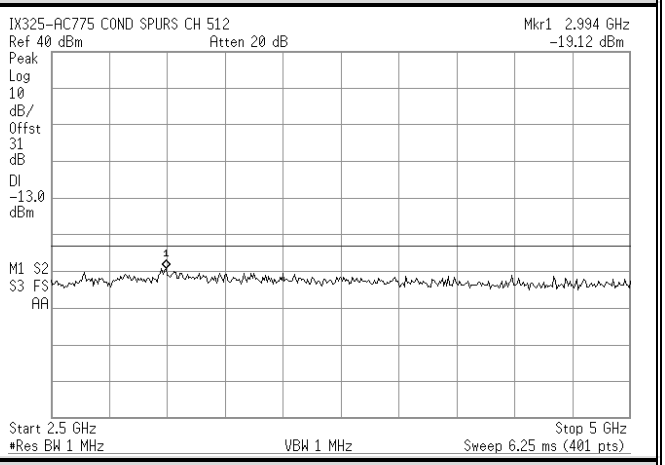
H.8.2. Spurious Emissions removed by more than 1MHz from Block Edge

Channel 512

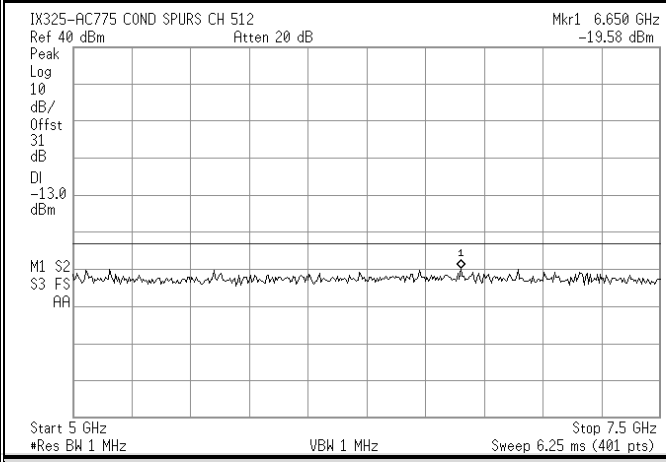
Band 1



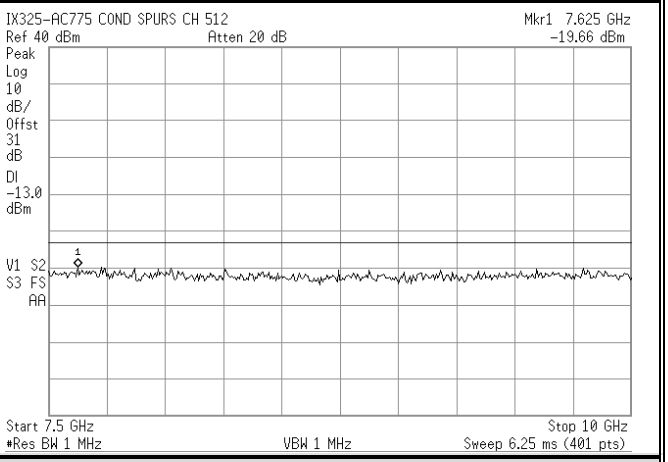
Band 2



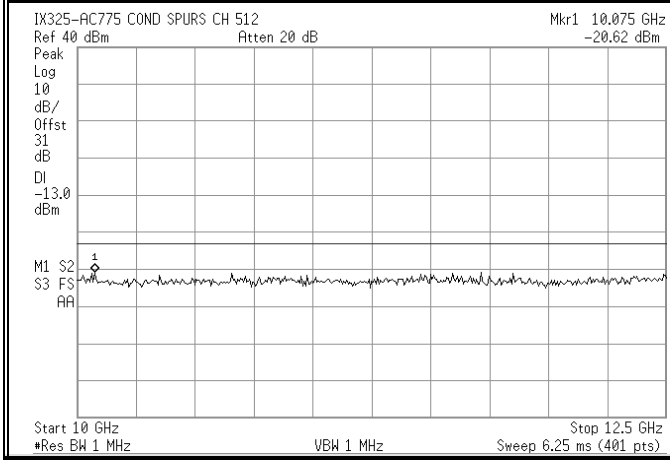
Band 3



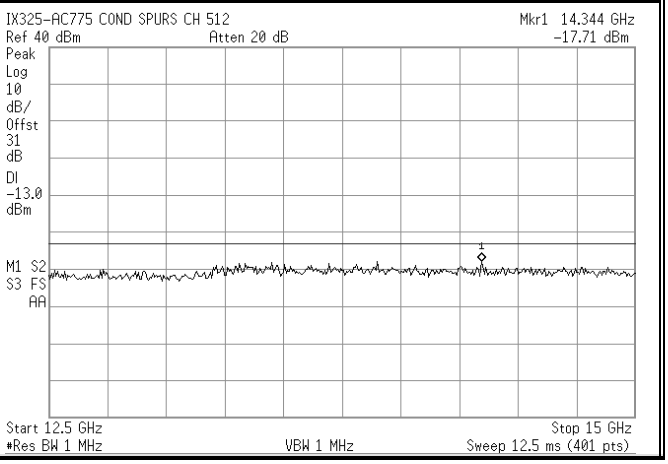
Band 4

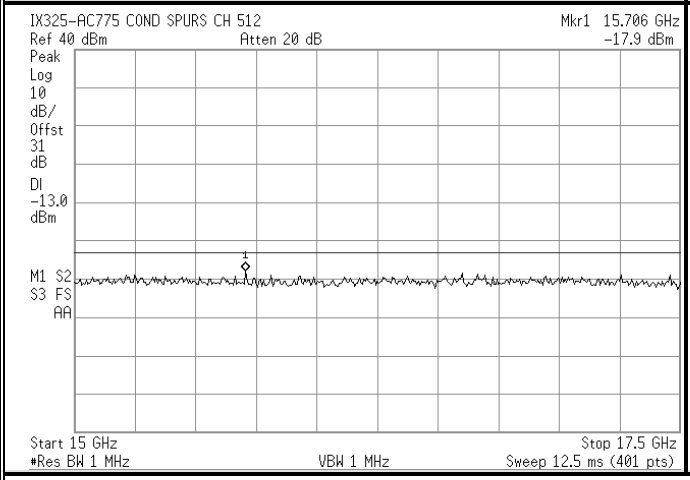
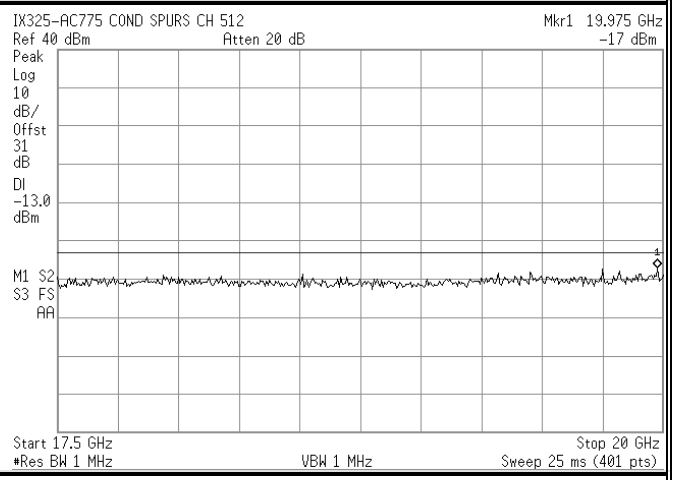


Band 5



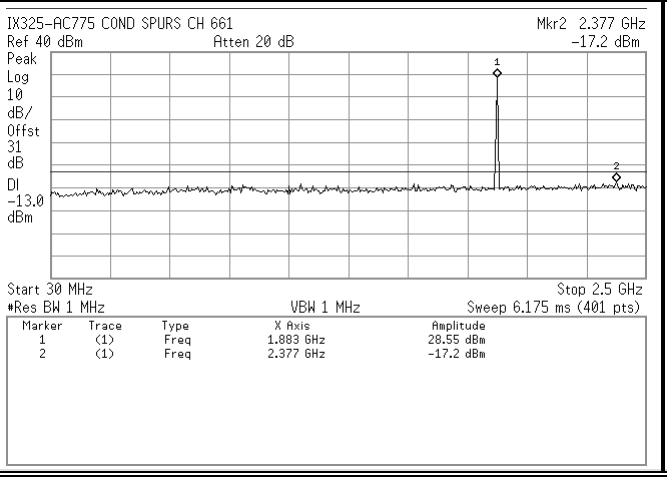
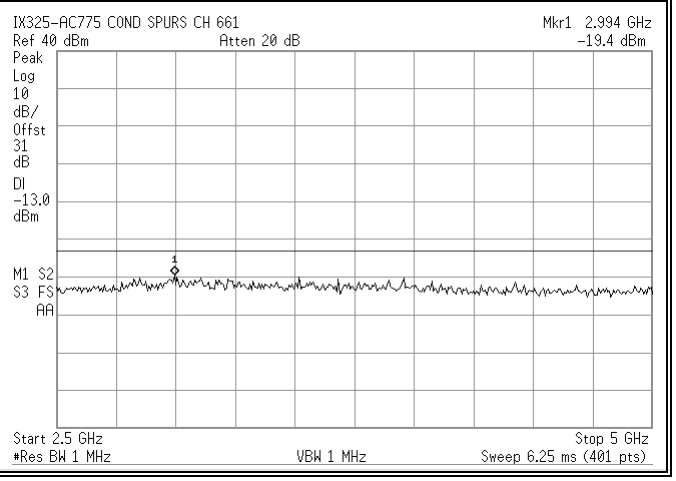
Band 6



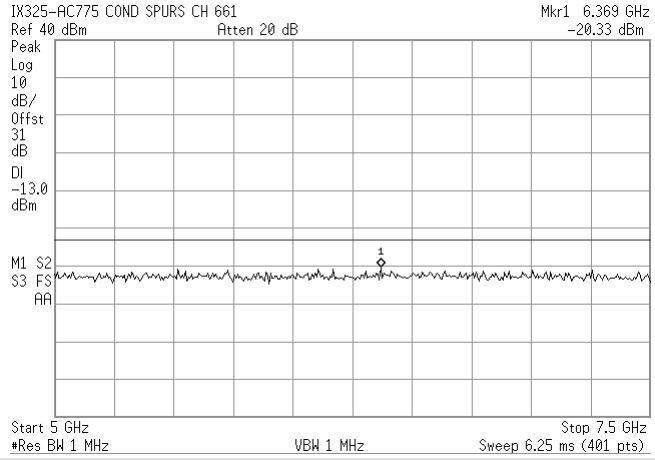
Band 7	Band 8
	

Highest emission removed by more than 1MHz from the Lower Block Edge with Channel 512 transmitting is at 19.975 GHz with a peak level of -17.0 dBm measured with an RBW of 1 MHz.

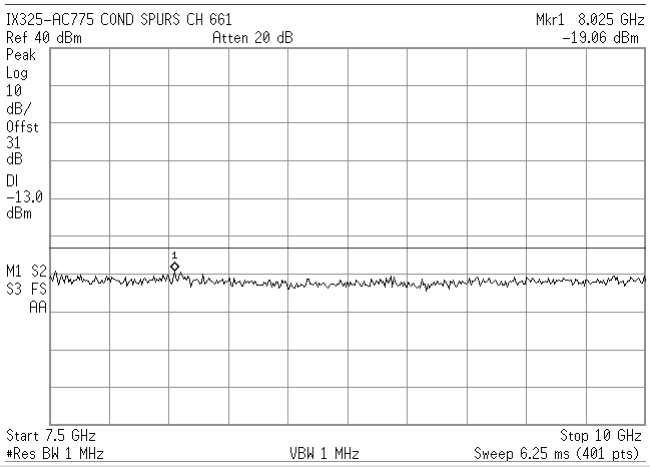
Channel 661

Band 1	Band 2
	

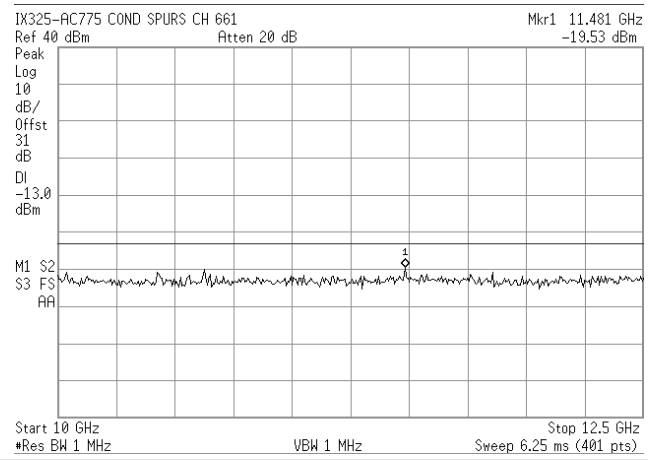
Band 3



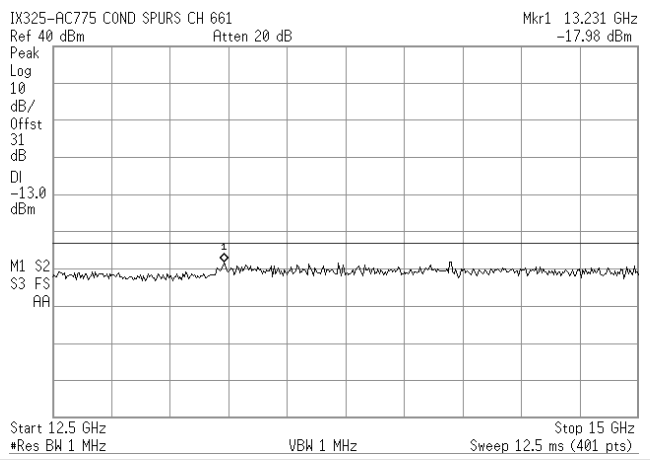
Band 4



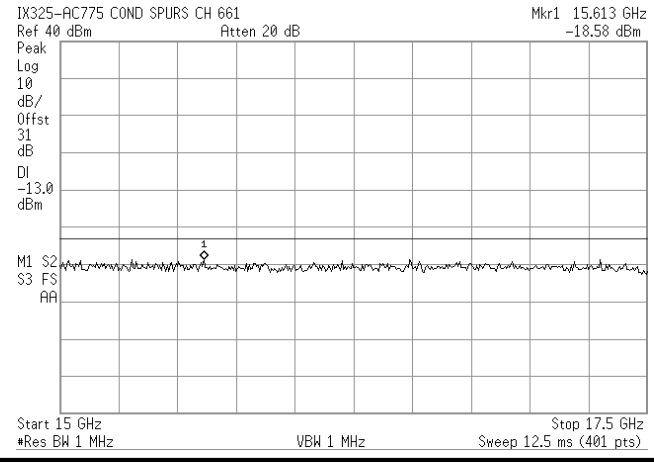
Band 5



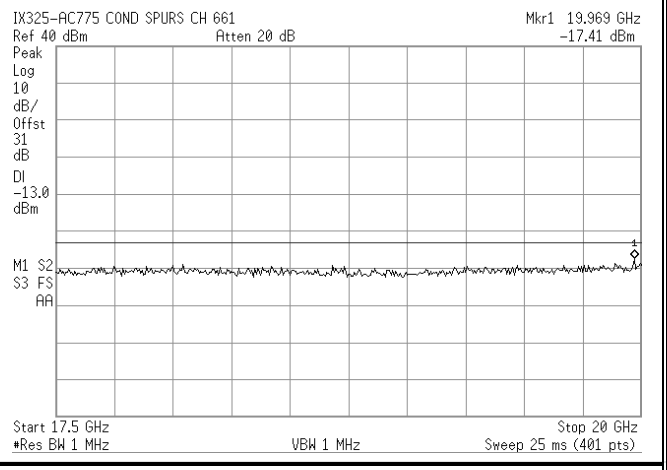
Band 6



Band 7



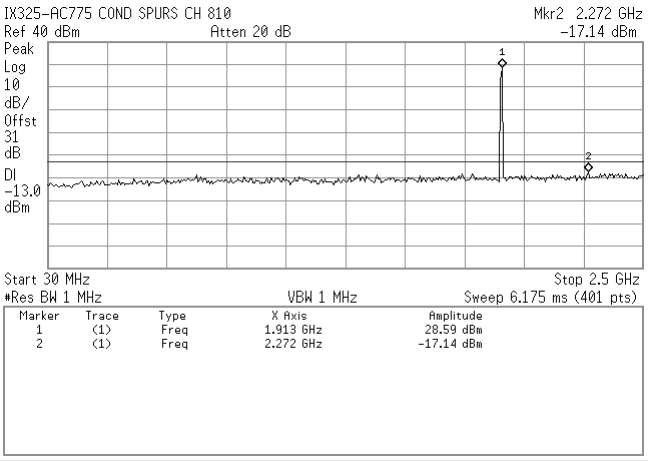
Band 8



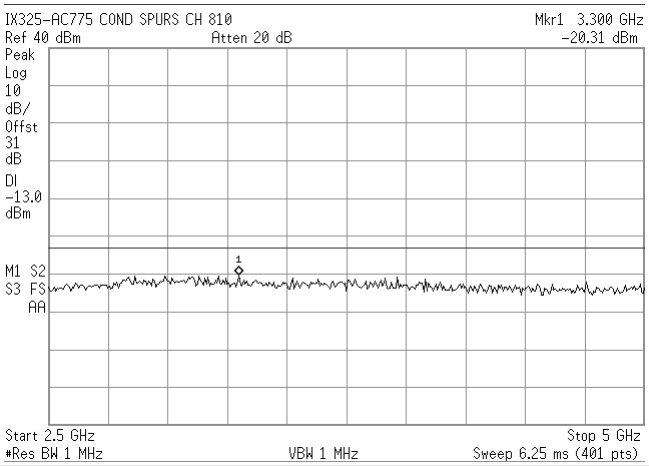
Highest emission removed by more than 1MHz from the Lower Block Edge with Channel 661 transmitting is at 2377 MHz with a peak level of -17.2 dBm measured with an RBW of 1 MHz.

Channel 810

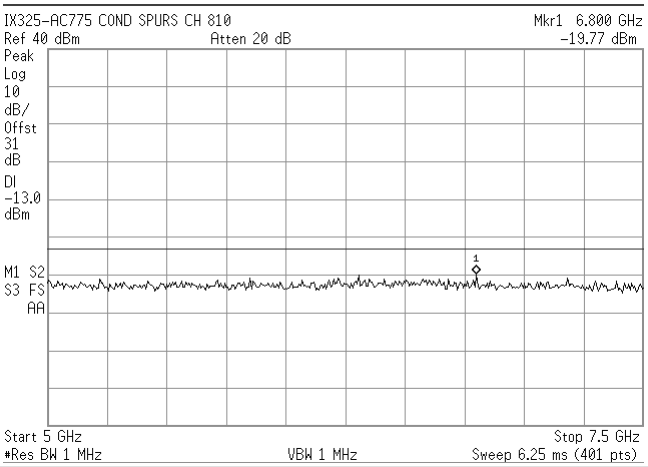
Band 1



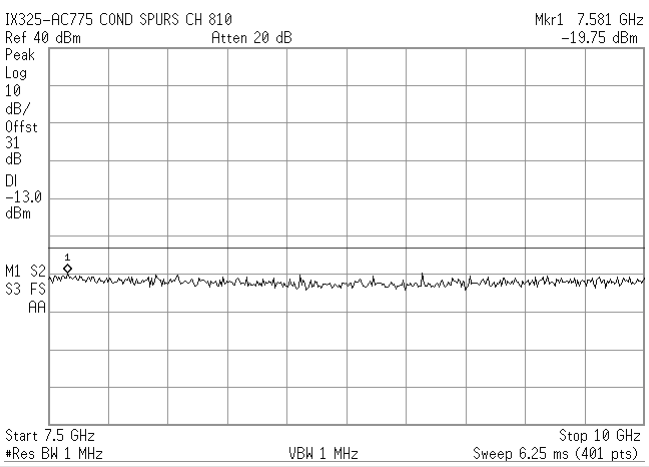
Band 2



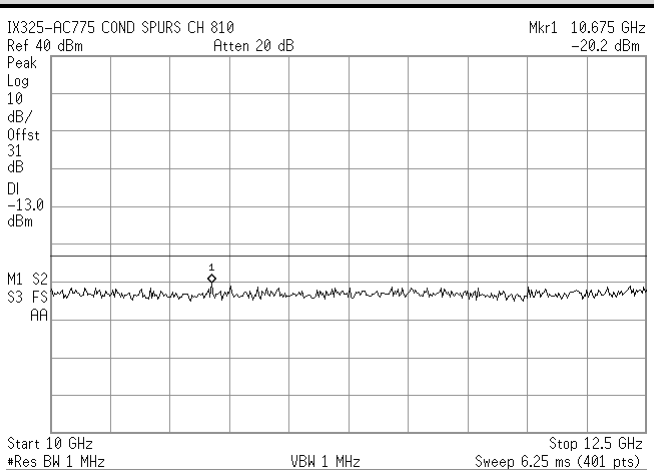
Band 3



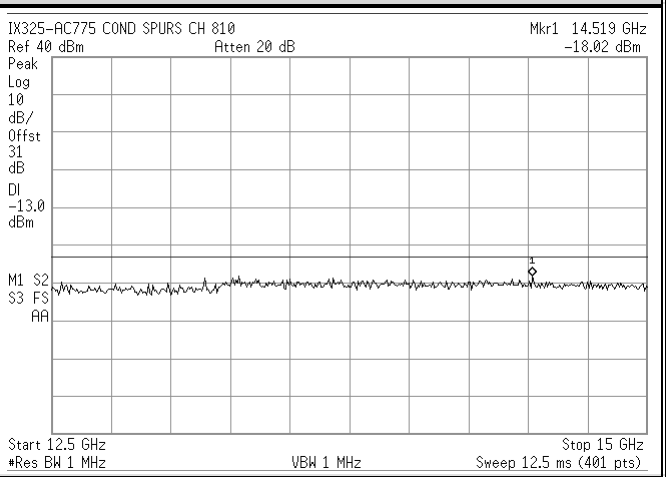
Band 4

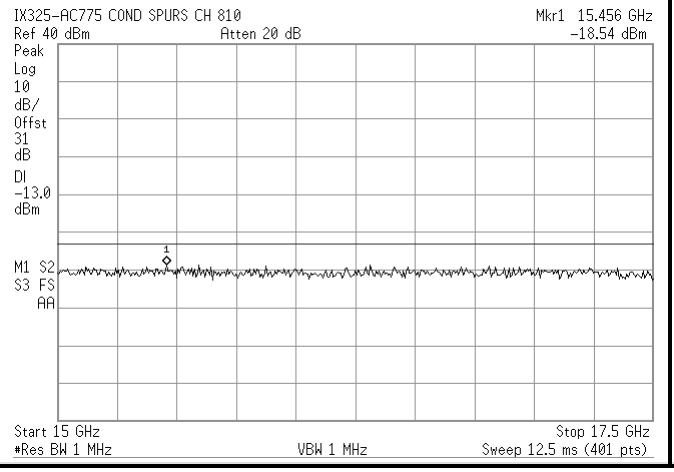
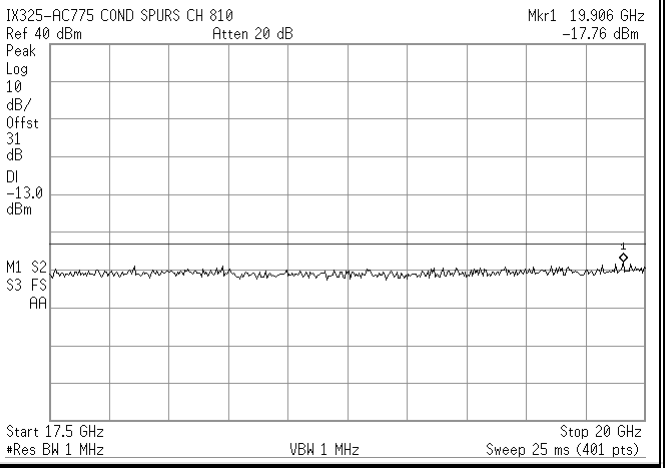


Band 5



Band 6



Band 6	Band 8
	

Highest emission removed by more than 1MHz from the Lower Block Edge with Channel 810 transmitting is at 2272 MHz with a peak level of -17.14 dBm measured with an RBW of 1 MHz.

H.9. PASS/FAIL

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

FCC CFR 4 §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.

The results set forth in this section meet the requirement with a margin of at least 4.00 dB
(-17.0 dBm @ 19.975 vs a limit of -13 dBm)

H.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.

25May05
Date

Appendix I - Conducted PCS RX Spurious Emissions Measurement

I.1. REFERENCES

Normative Reference Standard	IC RSS-133 §6.7 (b)
Procedure Reference	IC RSS-133 §4.5

I.2. LIMITS

IC RSS-133 §6.7	*(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per 4 kHz spurious frequency in the band 30 – 1000 MHz or 5 nanowattts above 1 GHz.*

I.3. ENVIRONMENTAL CONDITIONS

Temperature	27 +/- 2 ºC
Humidity	33 +/- 2 %
Barometric Pressure	96 +/- 0.2 kPa

I.4. EQUIPMENT LIST

RECEIVING EQUIPMENT

ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
1	00015	Agilent	E4408B	Spectrum Analyzer	24Jan05	24Jan06
2	na	Itronix	na	Cable & SMA adapter	na	na*

*Verified with VNA

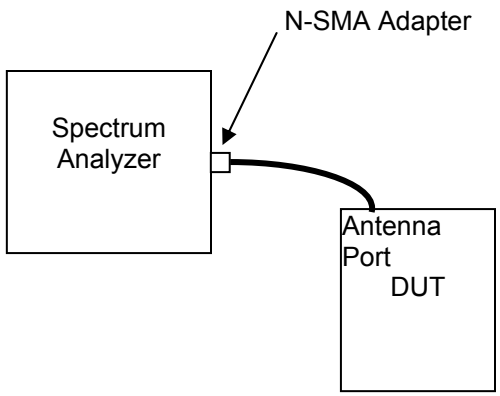
I.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS	The measurement equipment was connected as shown in I.6.			
MEASUREMENT EQUIPMENT SETTINGS	The spectrum analyzer was set to the following settings:			
	Frequency Range	RBW	VBW	Detector
	MHz	kHz	kHz	
	30 MHz - 3 x F_c	4*	4*	Peak

Note: 4 kHz RBW & VBW are not attainable with equipment used and 3 kHz will be used. A bandwidth correction factor of 10 * log (4 kHz / 3 kHz), (1.25 dB) will be added to the final results.

I.6. SETUP DRAWING

Figure I.6-1 - Setup Drawing

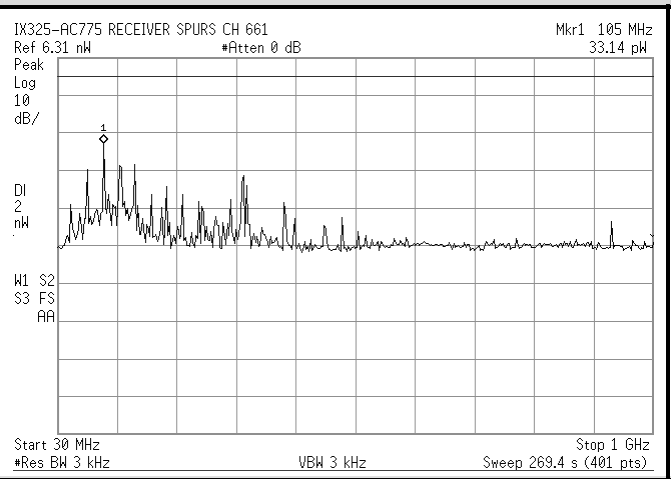


I.7. DUT OPERATING DESCRIPTION

Measurements were made with the DUT in the receive mode for the PCS band mid channel (CH661 1880 MHz)

I.8. TEST RESULTS

I.8.1. Receiver Spurious Emissions



Calculations

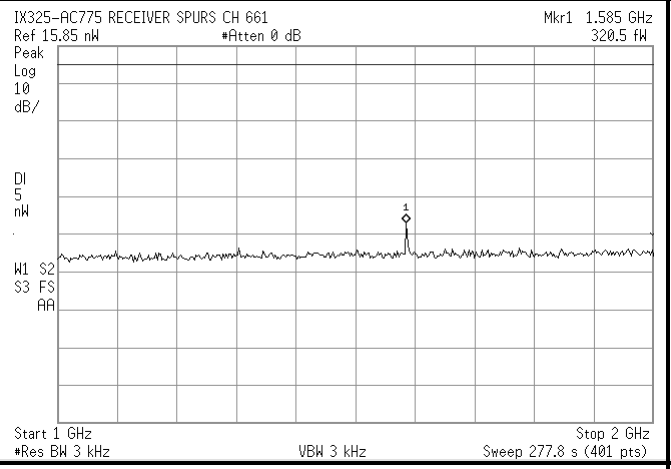
Emission (dBm) = 10 * log (Emission (mW)
BW Correction = 10 * log (4 kHz / 3 kHz)

In linear terms:
Emission (pW) = Emission (pW) * (4 kHz / 3 kHz)

For a Peak Emission of 33.14 pW with RBW of 3 KHz:

Corrected Peak Emission (pW0 = 33.14 pW * 4/3
= 44.18 pW for RBW of 4 kHz
= 0.0442 nW

Margin (nW) = 2 nW - .044 nW
= 1.956 nW



Calculations

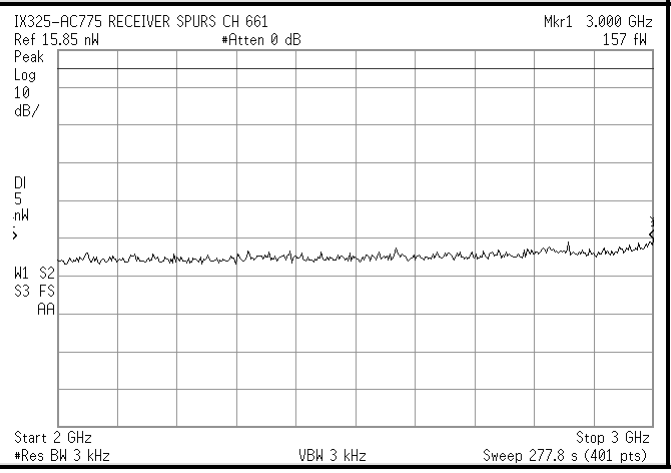
Emission (dBm) = 10 * log (Emission (mW)
BW Correction = 10 * log (4 kHz / 3 kHz)

In linear terms:
Emission (pW) = Emission (pW) * (4 kHz / 3 kHz)

For a Peak Emission of 320.5 fW with RBW of 3 KHz:

Corrected Peak Emission = 320.5 fW * 4/3
= 427.3 fW for RBW of 4 kHz
= 0.00043 nW

Margin (nW) = 5 nW - .0004 nW
= 4.9996 nW



Calculations

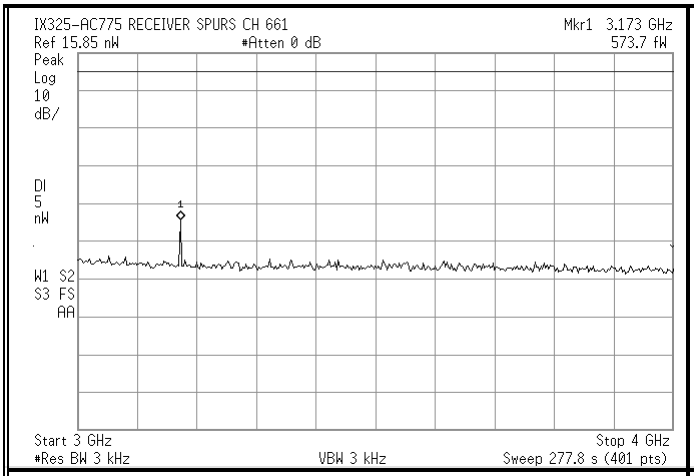
Emission (dBm) = 10 * log (Emission (mW)
BW Correction = 10 * log (4 kHz / 3 kHz)

In linear terms:
Emission (pW) = Emission (pW) * (4 kHz / 3 kHz)

For a Peak Emission of 157 fW with RBW of 3 KHz:

Corrected Peak Emission (pW0 = 157 fW * 4/3
= 209 fW for RBW of 4 kHz
= 0.00021 nW

Margin (nW) = 5 nW - .0002 nW
= 4.9998 nW



Calculations

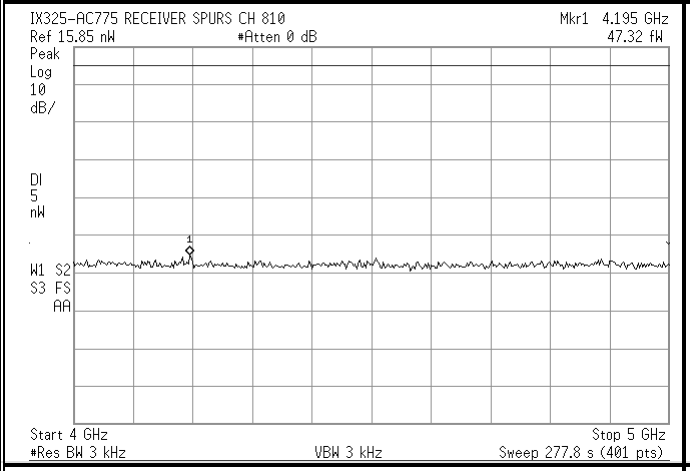
Emission (dBm) = 10 * log (Emission (mW)
BW Correction = 10 * log (4 kHz / 3 kHz)

In linear terms:
Emission (pW) = Emission (pW) * (4 kHz / 3 kHz)

For a Peak Emission of 573.7 fW with RBW of 3 KHz:

Corrected Peak Emission (pW0 = 573.7 fW * 4/3
= 764.9 fW for RBW of 4 kHz
= 0.00077 nW

Margin (nW) = 5 nW - .0008 nW
= 4.9992 nW



Calculations

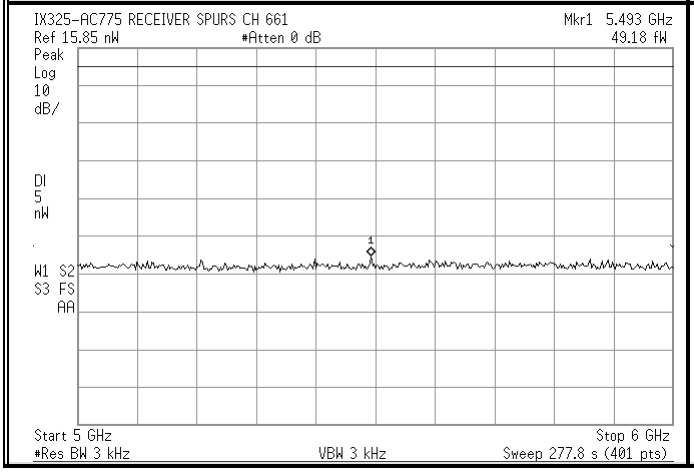
Emission (dBm) = 10 * log (Emission (mW)
BW Correction = 10 * log (4 kHz / 3 kHz)

In linear terms:
Emission (pW) = Emission (pW) * (4 kHz / 3 kHz)

For a Peak Emission of 47.32 fW with RBW of 3 KHz:

Corrected Peak Emission (pW0 = 47.32 fW * 4/3
= 63.09 fW for RBW of 4 kHz
= 0.00006 nW

Margin (nW) = 5 nW - .0001 nW
= 4.9999 nW



Calculations

Emission (dBm) = 10 * log (Emission (mW)
BW Correction = 10 * log (4 kHz / 3 kHz)

In linear terms:
Emission (pW) = Emission (pW) * (4 kHz / 3 kHz)

For a Peak Emission of 49.18 fW with RBW of 3 KHz:

Corrected Peak Emission = 49.18 fW * 4/3
= 65.6 fW for RBW of 4 kHz
= 0.00007 nW

Margin (nW) = 5 nW - .0001 nW
= 4.9999 nW

I.9. PASS/FAIL

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

IC RSS-133 §6.7 (b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per 4kHz spurious frequency in the band 30 – 1000 MHz or 5 nanowattts above 1 GHz.

The results set forth in this section meet the requirement with a margin of at least 1.96 nW.

I.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.

26May05
Date

Appendix J - PCS Band Effective Isotropic Radiated Power Measurement

J.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §24.232(b)
Procedure Reference	ANSI/TIA/EIA-603-C

J.2. LIMITS

FCC CFR 47 §24.232 (b)	*(b) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.*

J.3. ENVIRONMENTAL CONDITIONS

Temperature	27 +/- 2 ºC
Humidity	33 +/- 2 %
Barometric Pressure	96 +/- 0.2 kPa

J.4. EQUIPMENT LIST

RECEIVING EQUIPMENT

ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
1	00072	EMCO	2075	Mini-mast	na	na
2	00073	EMCO	2080	Turn Table	na	na
3	00071	EMCO	2090	Multi-Device Controller	na	na
4	00035	ETS	3115	Double Ridged Guide Antenna (Rx)	24Mar04	24Mar06
5	00051	HP	8566B	Spectrum Analyzer	12Apr05	12Apr06
6	00047	HP	85685A	Preselector	13Apr05	13Apr06
7	00120	Celltech	n/a	Microwave Cable (RX)	25Mar05	25Mar06
8	00121	Andrew	FSJ4-50B	Microwave Cable (RX)	25Mar05	25Mar06
9	00130	Andrew	FSJ1-50A	Microwave Cable (RX)	25Mar05	25Mar06

ADDITIONAL SUBSTITUTION EQUIPMENT

ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
10	00034	ETS	3115	Horn Antenna (Tx)	24Mar04	24Mar06
11	00131	Andrew	FSJ1-50A	Microwave Cable (TX)	na	na
12	00127	Andrew	FSJ4-50B	Microwave Cable (TX)	na	na
13	00131	Andrew	FSJ1-50A	Microwave Cable (TX)	na	na
14	00006	R & S	SMR-20	Signal Generator	12Apr05	12Apr06
15	00007	Gigatronics	8652A	Power Meter	18Oct04	18Oct05
16	00011	Gigatronics	80701A	Power Sensor	08Oct04	08Oct05
17	00013	Gigatronics	80701A	Power Sensor	11Oct04	11Oct05
18	00102	Pasternack	PE7015-3110	30 dB attenuator	na*	na*
19	00078	Pasternack	PE2214-20	Directional Coupler	na*	na*
20	00142	HP	8491A	20 dB attenuator	na*	na*

*Attenuation offset in power meter setup

J.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS

The measurement equipment was connected as shown in J.6.

MEASUREMENT EQUIPMENT SETTINGS

The spectrum analyzer was set to the following settings:

Frequency Range	RBW	VBW	Detector
MHz	MHz	MHz	
1000 - 2000	1	1	Peak

J.6. SETUP DRAWING

Figure J.6-1 - Field Strength Setup Drawing

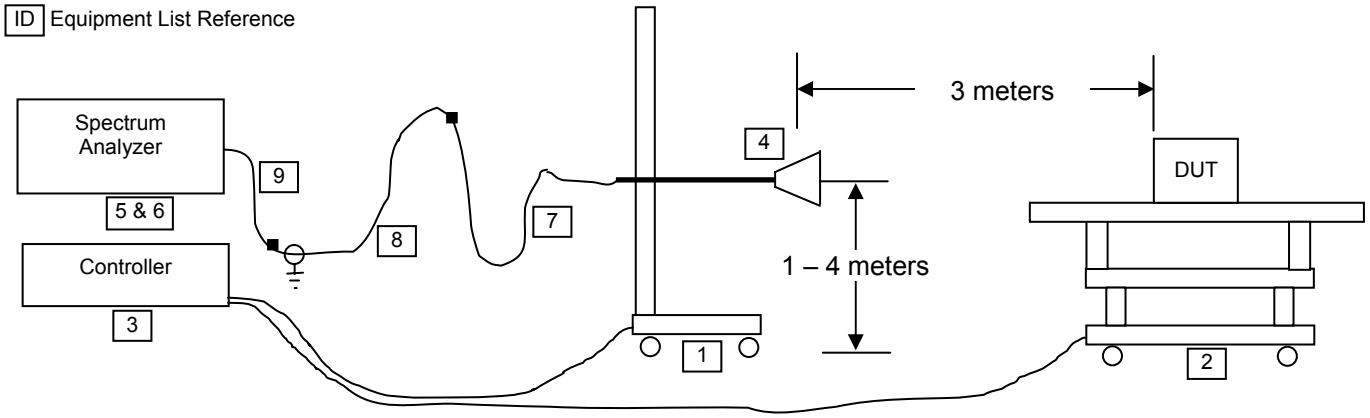
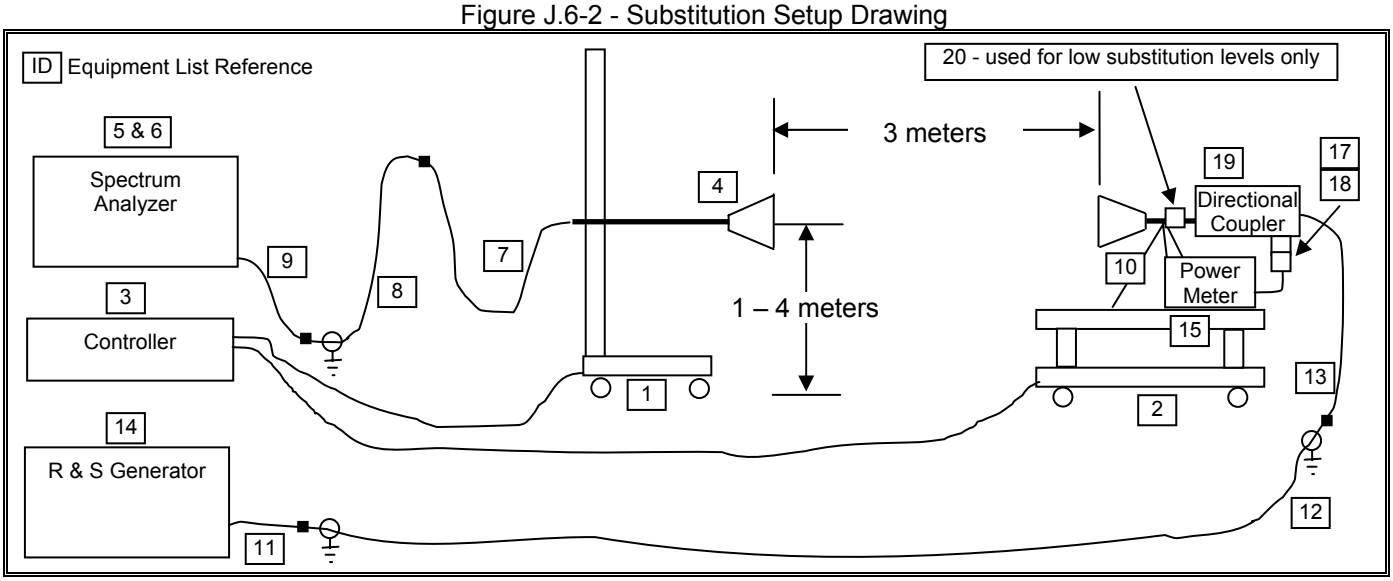


Figure J.6-2 - Substitution Setup Drawing



J.7. SETUP PHOTOGRAPHS

Photograph J.7-1 - DUT in Highest PCS Carrier Configuration

J.8. DUT OPERATING DESCRIPTION

Measurements were made for the low, mid and high GSM channels transmitting in the PCS band at maximum power levels, and the DUT configured as described in Section 5 of this report.

J.9. TEST RESULTS

Project Number: 040505KBC-T628-E24G
Company: Itronix
Product: IX325 with AC775
Standard: FCC24.232b
Test Start Date: 26-May-05
Test End Date: 27-Jun-05

IX325 with AC775 Carrier Field Strengths

Polarity	Distance	Substitution Antenna Type	Carrier Channel	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	Carrier EIRP Level		EIRP Limit		Margin	Pass/Fail
	m			MHz	dBuV/m	dBuV	dBm	dBi	dBm	Watts	dBm	Watts	dB	
H	3	Horn SN6267	512	1850.20	131.06	97.72	24.47	6.55	31.02	1.26	33.01	2.00	1.99	PASS
V	3	Horn SN6267	512	1850.20	123.88	90.54	18.22	6.55	24.77	0.300	33.01	2.00	8.24	PASS
H	3	Horn SN6267	661	1880.00	128.84	95.30	22.70	6.58	29.28	0.847	33.01	2.00	3.73	PASS
V	3	Horn SN6267	661	1880.00	123.38	89.84	18.32	6.58	24.90	0.309	33.01	2.00	8.11	PASS
H	3	Horn SN6267	810	1909.80	128.55	94.84	22.72	6.61	29.33	0.857	33.01	2.00	3.68	PASS
V	3	Horn SN6267	810	1909.80	123.15	89.44	17.99	6.61	24.60	0.288	33.01	2.00	8.41	PASS

Note:
Double Ridged Guide Antenna used for substitution

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

J.10. PASS/FAIL

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

FCC 24.232 (b) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications…..

A maximum EIRP of 31.02 dBm (1.26 Watts) was measured when Channel 512 was transmitting through the attached swivel dipole antenna.

J.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.

27Jun05
Date

Appendix K - Radiated PCS TX Spurious Emissions Measurement

K.1. REFERENCES

Normative Reference Standard	FCC CFR 47 §24.238(a)
Procedure Reference	ANSI/TIA/EIA-603-C

K.2. LIMITS

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.*

K.3. ENVIRONMENTAL CONDITIONS

Temperature	27 +/- 2 ºC
Humidity	33 +/- 2 %
Barometric Pressure	96 +/- 0.2 kPa

K.4. EQUIPMENT LIST

RECEIVING EQUIPMENT

ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
1	00072	EMCO	2075	Mini-mast	na	na
2	00073	EMCO	2080	Turn Table	na	na
3	00071	EMCO	2090	Multi-Device Controller	na	na
4	00035	ETS	3115	Double Ridged Guide Antenna (Rx)	24Mar04	24Mar06
5	00161/00166	Waveline	899/801-KF	Standard Gain Horn Antenna (Rx)	n/a	n/a
6	00015	HP	E4408B	Spectrum Analyzer	24Jan05	24Jan06
7	00051	HP	8566B	Spectrum Analyzer	12Apr05	12Apr06
8	00047	HP	85685A	Preselector	13Apr05	13Apr06
9	00120	Celltech	n/a	Microwave Cable (RX)	25Mar05	25Mar06
10	00121	Andrew	FSJ4-50B	Microwave Cable (RX)	25Mar05	25Mar06
11	00130	Andrew	FSJ1-50A	Microwave Cable (RX)	25Mar05	25Mar06
12	00115	Miteq	JS4-00102600-35-5A	Low Noise Amplifier	08Jun05	08Jun06
13	00093	Microtronics	HPM50111	High Pass Filter	8Jun04	8Jun05
14	00119	INMAT	18AH-10	10dB attenuator	8Jun04	8Jun05

ADDITIONAL SUBSTITUTION EQUIPMENT						
ID	ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	LAST CAL	CAL DUE
15	00034	ETS	3115	Horn Antenna (Tx)	24Mar04	24Mar06
16	00162/00165	Waveline	899/801-KF	Standard Gain Horn Antenna (Tx)	na	na
17	00131	Andrew	FSJ1-50A	Microwave Cable (TX)	na	na
18	00127	Andrew	FSJ4-50B	Microwave Cable (TX)	na	na
19	00133	Andrew	FSJ1-50A	Microwave Cable (TX)	na	na
20	00006	R & S	SMR-20	Signal Generator	12Apr05	12Apr06
21	00007	Gigatronics	8652A	Power Meter	18Oct04	18Oct05
22	00011	Gigatronics	80701A	Power Sensor	08Oct04	08Oct05
23	00013	Gigatronics	80701A	Power Sensor	11Oct04	11Oct05
24	00102	Pasternack	PE7015-3110	30 dB attenuator	na*	na*
25	00078	Pasternack	PE2214-20	Directional Coupler	na*	na*
26	00142	HP	8491A	20 dB attenuator	na*	na*

* Attenuation offset in power meter setup

K.5. MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS

The measurement equipment was connected as shown in K.6. A number of measurement equipment configurations were used to cover the applicable frequency ranges. The configurations for each range are as follows:

Frequency Range	LNA Asset #	Filter/Attenuator Asset #	Rx Antenna Asset #	Tx Antenna Asset #
1 GHz – 2 GHz	none	none	00035	00034
2 GHz – 3 GHz	00115	00119	00035	00034
3 GHz – 18 GHz	00115	00093	00035	00034
18 GHz – 25 GHz	00115	none	000161/00166	000162/00165

MEASUREMENT EQUIPMENT SETTINGS

The spectrum analyzer was set to the following settings:

Frequency Range	RBW	VBW	Detector
MHz	kHz	kHz	
1 GHz – 25 GHz	1000	1000	Peak

K.6. SETUP DRAWING

Figure K.6-1 - Field Strength Setup Drawing

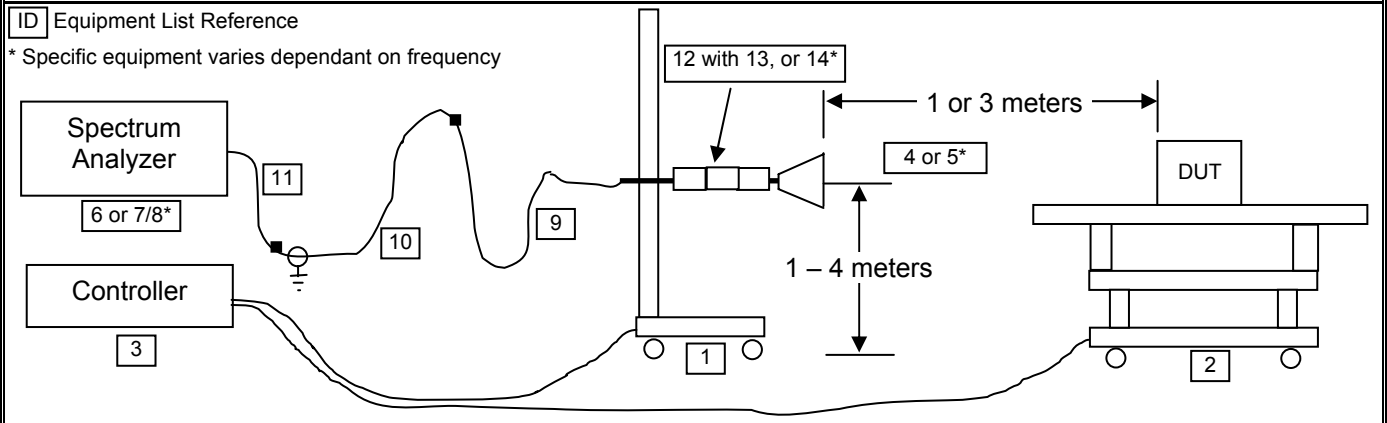
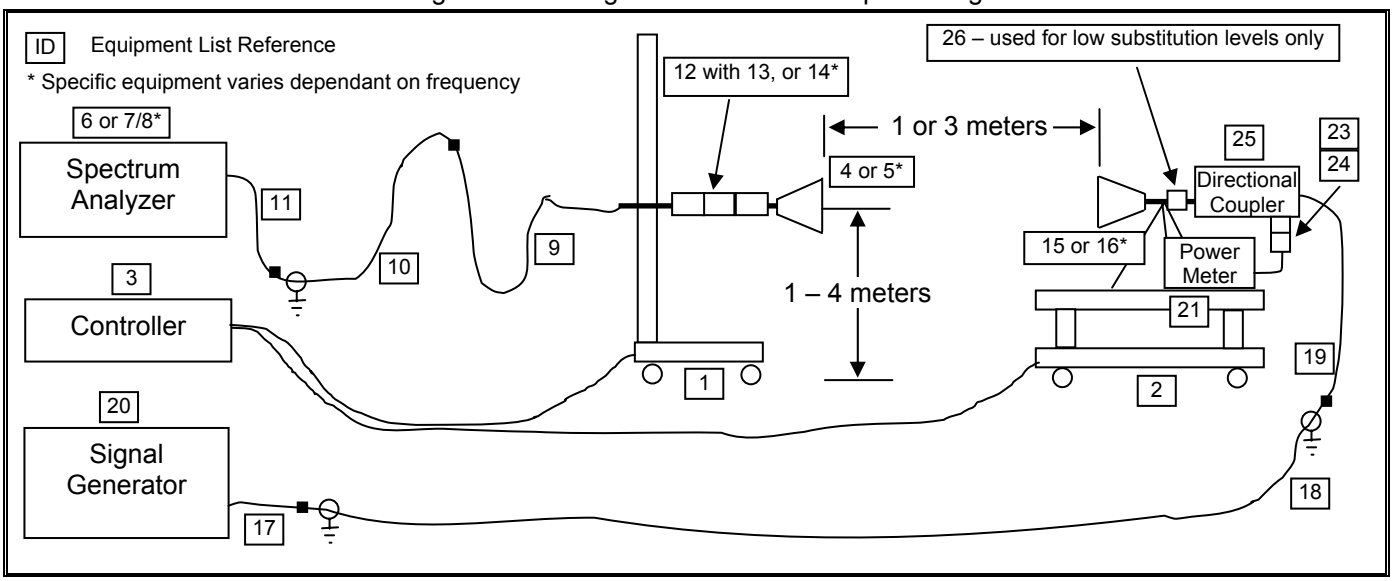


Figure K.6-2 - Signal Substitution Setup Drawing



K.7. SETUP PHOTOGRAPHS

Photograph K.7-1 - Vertical Bilog PCS Band Radiated Emissions 3-meter Setup

Photograph K.7-2 - Vertical 3115 Horn and LNA PCS Band Radiated Emissions 3-meter Setup

Photograph K.7-3 - Vertical 3115 Horn and LNA PCS Band Radiated Emissions 1-meter Setup

K.8. DUT OPERATING DESCRIPTION

Measurements were made for the low, mid and high GSM channels transmitting in the PCS band at maximum power levels as described in Section 5 of this report. During these measurements, the antenna was replaced with a 50-ohm load. The conducted emissions described in Appendix H supplement the results described in this appendix.

K.9. TEST RESULTS

The spurious measurements detailed in this section are referenced to the carrier levels set forth in Appendix E of this report:

K.9.1. Spurious Emissions

Channel 512

Polarity	Distance	Substitution Antenna Type	Carrier Channel	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	EIRP Emission Level	Limit	Margin	Pass/Fail
	m			MHz	dBuV/m	dBuV	dBm	dBi	dBm	dBm or dBuV/m*	dB	
H	3	Horn SN6267	CH512	2329.00	47.90	35.90	-60.52	7.42	-53.10	-13.00	40.10	PASS
H	3	none	CH512	2494.00	48.80					82.2*	33.4*	PASS*
H	3	none	CH512	3169.75	40.55					82.2*	41.7*	PASS*
H	3	none	CH512	4762.25	44.72					82.2*	37.5*	PASS*
H	3	none	CH512	5273.25	59.97					82.2*	22.3*	PASS*
H	3	Horn SN6267	CH512	3700.00	56.35	47.20	-57.21	8.06	-49.15	-13.00	36.15	PASS
H	3	Horn SN6267	CH512	5549.75	47.25	33.50	-68.54	8.66	-59.88	-13.00	46.88	PASS
H	3	Horn SN6267	CH512	7399.50	57.73	40.10	-52.43	8.98	-43.45	-13.00	30.45	PASS
H	3	Horn SN6267	CH512	9251.00	56.38	35.40	-48.94	9.05	-39.89	-13.00	26.89	PASS
H	1	Horn SN6267	CH512	11101.20	72.25	43.80	-43.09	10.44	-32.65	-13.00	19.65	PASS
H	1	Horn SN6267	CH512	12951.40	68.47	43.00	-39.57	10.65	-28.92	-13.00	15.92	PASS
H	1	Horn SN6267	CH512	14801.60	73.12	41.10	-51.76	11.06	-40.70	-13.00	27.70	PASS
H	1	none	CH512	18502.00	72.35					91.8*	19.4*	PASS*
V	3	Horn SN6267	CH512	1121.00	62.11	32.00	-47.13	4.31	-42.83	-13.00	29.83	PASS
V	3	none	CH512	1132.00	67.46					82.2*	14.8*	PASS*
V	3	none	CH512	1586.00	67.75					82.2*	14.5*	PASS*
V	3	none	CH512	2625.00	67.95					82.2*	14.3*	PASS*
V	3	Horn SN6267	CH512	2685.00	53.83	40.50	-63.15	7.80	-55.35	-13.00	42.35	PASS
V	3	none	CH512	3169.75	39.85					82.2*	42.4*	PASS*
V	3	none	CH512	4762.25	44.22					82.2*	38.0*	PASS*
V	3	none	CH512	9251.00	71.58					82.2*	10.6*	PASS*
V	3	Horn SN6267	CH512	3700.40	51.96	42.80	-57.89	8.06	-49.83	-13.00	36.83	PASS
V	3	Horn SN6267	CH512	7400.80	56.03	38.40	-59.06	8.98	-50.08	-13.00	37.08	PASS
V	3	Horn SN6267	CH512	5550.60	51.86	38.10	-55.18	8.66	-46.52	-13.00	33.52	PASS
V	1	Horn SN6267	CH512	9251.00	71.58	50.60	-23.86	9.05	-14.81	-13.00	1.81	PASS
V	1	Horn SN6267	CH512	11101.20	68.55	40.10	-47.04	10.44	-36.60	-13.00	23.60	PASS
V	1	Horn SN6267	CH512	12951.40	69.67	44.20	-41.90	10.65	-31.25	-13.00	18.25	PASS
V	1	Horn SN6267	CH512	14801.60	72.62	40.60	-51.24	11.06	-40.18	-13.00	27.18	PASS
V	1	none	CH512	18502.00	70.60					91.8*	21.2*	PASS*

*Margin and Pass/Fail based on measured field strengths applied against a theoretical field strength limit.

Note:
The emissions reported above represent the highest emissions or noise floor measured within the frequency band of 30MHz and the 10th harmonic of the carrier with field strengths within 20 dB of the theoretical limit. All other emissions attributed to the EUT had field strengths greater than 20 dB below the theoretical limit and substitutions were not made.

Formulae:
EIRP Emission Level (dBm) = Power applied to antenna (dBm) + Antenna Gain (dBi)
Margin (dB) = Limit (dBm) – EIRP Emission Level (dBm) or Theoretical Limit (dBuV/m) – Corrected Field Strength (dBuV/m)
Theoretical Limit (V/m) = SQRT(30 * P / r^2) where P is the total transmitted power (W), r is measurement distance (m)

Channel 661

Polarity	Distance	Substitution Antenna Type	Carrier Channel	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	EIRP Emission Level	Limit	Margin	Pass/Fail
	m			MHz	dBuV/m	dBuV	dBm	dBi	dBm	dBm or dBuV/m*	dB	
H	3	Horn SN6267	CH661	2326.00	47.39	35.40	-62.67	7.42	-55.25	-13.00	42.25	PASS
H	3	none	CH661	2629.00	52.67					82.2*	29.6*	PASS*
H	3	Horn SN6267	CH661	3759.96	53.36	44.00	-51.00	8.05	-42.95	-13.00	29.95	PASS
H	3	Horn SN6267	CH661	5639.89	44.22	30.30	-69.40	8.77	-60.63	-13.00	47.63	PASS
H	3	Horn SN6267	CH661	7521.20	54.52	36.60	-67.08	8.92	-58.16	-13.00	45.16	PASS
H	3	Horn SN6267	CH661	9400.16	60.46	39.10	-49.10	9.20	-39.90	-13.00	26.90	PASS
H	3	none	CH661	3177.16	40.17					82.2*	42.1*	PASS*
H	3	none	CH661	4759.48	44.91					82.2*	37.3*	PASS*
H	3	none	CH661	5269.20	68.65					82.2*	13.6*	PASS*
H	1	Horn SN6267	CH661	11280.00	71.81	42.10	-44.51	10.69	-33.82	-13.00	20.82	PASS
H	1	Horn SN6267	CH661	13160.00	67.39	41.60	-36.27	10.70	-25.57	-13.00	12.57	PASS
H	1	Horn SN6267	CH661	15040.00	77.55	42.75	-26.48	11.29	-15.19	-13.00	2.19	PASS
H	1	Horn SN6267	CH661	16920.00	67.95	37.00	-51.33	11.91	-39.42	-13.00	26.42	PASS
H	1	3160-09	CH661	18800.00	72.49	45.45	-45.45	15.42	-30.03	-13.00	17.03	PASS
V	3	none	CH661	2628.00	58.26					82.2*	24.0*	PASS*
V	3	Horn SN6267	CH661	2686.00	52.03	38.70	-59.28	7.80	-51.48	-13.00	38.48	PASS
V	3	Horn SN6267	CH661	3760.00	59.86	50.50	-48.04	8.05	-39.99	-13.00	26.99	PASS
V	3	Horn SN6267	CH661	5640.00	46.82	32.90	-66.54	8.77	-57.77	-13.00	44.77	PASS
V	3	Horn SN6267	CH661	7520.00	53.43	35.50	-74.56	8.92	-65.64	-13.00	52.64	PASS
V	3	Horn SN6267	CH661	9400.00	55.87	34.50	-46.27	9.20	-37.07	-13.00	24.07	PASS
V	3	none	CH661	4319.50	48.36					82.2*	33.9*	PASS*
V	3	none	CH661	4764.00	51.98					82.2*	30.3*	PASS*
V	3	none	CH661	5763.25	63.00					82.2*	19.2*	PASS*
V	3	none	CH661	3171.50	52.90					82.2*	29.3*	PASS*
V	1	Horn SN6267	CH661	11280.00	69.51	39.80	-46.86	10.69	-36.17	-13.00	23.17	PASS
V	1	Horn SN6267	CH661	13160.00	66.29	40.50	-41.90	10.70	-31.20	-13.00	18.20	PASS
V	1	Horn SN6267	CH661	15040.00	77.25	42.45	-24.97	11.29	-13.68	-13.00	0.68	PASS
V	1	Horn SN6267	CH661	16920.00	68.05	37.10	-46.93	11.91	-35.02	-13.00	22.02	PASS
V	1	3160-09	CH661	18800.00	72.29	45.25	-45.25	15.42	-29.83	-13.00	16.83	PASS

*Margin and Pass/Fail based on measured field strengths applied against a theoretical field strength limit.

Note:
The emissions reported above represent the highest emissions or noise floor measured within the frequency band of 30MHz and the 10th harmonic of the carrier with field strengths within 20 dB of the theoretical limit. All other emissions attributed to the EUT had field strengths greater than 20 dB below the theoretical limit and substitutions were not made.

Formulae:
EIRP Emission Level (dBm) = Power applied to antenna (dBm) + Antenna Gain (dBi)
Margin (dB) = Limit (dBm) – EIRP Emission Level (dBm) or Theoretical Limit (dBuV/m) – Corrected Field Strength (dBuV/m)
Theoretical Limit (V/m) = SQRT(30 * P / r^2) where P is the total transmitted power (W), r is measurement distance (m)

Channel 810

Polarity	Distance	Substitution Antenna Type	Carrier Channel	Frequency	Corrected Field Strength	Substituted SA Signal Level (uncorrected)	Power Applied to Antenna	Antenna Gain	EIRP Carrier Level	Limit	Margin	Pass/Fail
	m			MHz	dBuV/m	dBuV	dBm	dBi	dBm	dBm or dBuV/m*	dB	
H	3	none	CH810	2899.00	58.71					82.2*	23.5*	PASS*
H	3	Horn SN6267	CH810	2326.00	47.79	35.80	-60.62	7.42	-53.20	-13.00	40.20	PASS
H	3	Horn SN6267	CH810	3819.60	56.11	46.50	-51.75	8.04	-43.71	-13.00	30.71	PASS
H	3	Horn SN6267	CH810	5729.40	47.40	33.40	-57.87	8.88	-48.99	-13.00	35.99	PASS
H	3	Horn SN6267	CH810	7639.20	57.16	39.05	-51.16	9.01	-42.15	-13.00	29.15	PASS
H	3	Horn SN6267	CH810	9549.00	57.50	35.90	-40.28	9.36	-30.92	-13.00	17.92	PASS
H	3	none	CH810	4762.25	50.92					82.2*	31.3*	PASS*
H	3	none	CH810	5273.25	55.37					82.2*	26.9*	PASS*
H	3	none	CH810	5768.50	53.19					82.2*	29.0*	PASS*
H	1	Horn SN6267	CH810	11458.80	67.37	38.50	-48.18	10.94	-37.24	-13.00	24.24	PASS
H	1	Horn SN6267	CH810	13368.60	68.90	40.80	-36.81	10.82	-25.99	-13.00	12.99	PASS
H	1	Horn SN6267	CH810	15278.40	79.49	41.20	-60.73	12.44	-48.29	-13.00	35.29	PASS
H	1	Horn SN6267	CH810	17188.20	71.91	42.20	-27.56	11.10	-16.46	-13.00	3.46	PASS
H	1	3160-09	CH810	19098.00	72.40	45.35	-45.35	15.56	-29.79	-13.00	16.79	PASS
V	3	Horn SN6267	CH810	2629.00	47.07	34.00	-64.03	7.80	-56.23	-13.00	43.23	PASS
V	3	none	CH810	2681.00	54.61					82.2*	27.6*	PASS*
V	3	none	CH810	2738.00	48.00					82.2*	34.2*	PASS*
V	3	Horn SN6267	CH810	3819.60	58.96	49.35	-48.71	8.04	-40.67	-13.00	27.67	PASS
V	3	Horn SN6267	CH810	5729.40	56.10	42.10	-57.04	8.88	-48.16	-13.00	35.16	PASS
V	3	Horn SN6267	CH810	7639.20	56.66	38.55	-54.02	9.01	-45.01	-13.00	32.01	PASS
V	3	Horn SN6267	CH810	9549.00	57.20	35.60	-43.16	9.36	-33.80	-13.00	20.80	PASS
V	3	none	CH810	4762.25	52.12					82.2*	30.1*	PASS*
V	3	none	CH810	5766.75	57.83					82.2*	24.4*	PASS*
V	3	none	CH810	6342.50	57.38					82.2*	24.8*	PASS*
V	1	Horn SN6267	CH810	11458.80	70.82	41.95	-40.80	10.94	-29.86	-13.00	16.86	PASS
V	1	Horn SN6267	CH810	13368.60	70.75	42.65	-37.02	10.82	-26.20	-13.00	13.20	PASS
V	1	Horn SN6267	CH810	15278.40	79.59	41.30	-60.62	12.44	-48.18	-13.00	35.18	PASS
V	1	Horn SN6267	CH810	17188.20	72.41	42.70	-26.19	11.10	-15.09	-13.00	2.09	PASS
V	1	3160-09	CH810	19098.00	72.30	45.25	-45.25	15.56	-29.69	-13.00	16.69	PASS

*Margin and Pass/Fail based on measured field strengths applied against a theoretical field strength limit.

Note:
The emissions reported above represent the highest emissions or noise floor measured within the frequency band of 30MHz and the 10th harmonic of the carrier with field strengths within 20 dB of the theoretical limit. All other emissions attributed to the EUT had field strengths greater than 20 dB below the theoretical limit and substitutions were not made.

Formulae:
EIRP Emission Level (dBm) = Power applied to antenna (dBm) + Antenna Gain (dBi)
Margin (dB) = Limit (dBm) – EIRP Emission Level (dBm) or Theoretical Limit (dBuV/m) – Corrected Field Strength (dBuV/m)
Theoretical Limit (V/m) = SQRT(30 * P / r^2) where P is the total transmitted power (W), r is measurement distance (m)

K.10. PASS/FAIL

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

FCC CFR 4 §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.

The results set forth in this section meet the requirement with a margin of at least 0.68 dB.

K.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.

27Jun05
Date

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