# Radioframe Networks, Inc.

## **GSM NA BV Release 1.0**

December 01, 2004

Report No. RAFN0043.1 Rev 01

**Report Prepared By** 



www.nwemc.com 1-888-EMI-CERT

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## **Certificate of Test**

Issue Date: December 01, 2004 Radioframe Networks, Inc. Model: GSM NA BV Release 1.0

	Emissions		
Specification	Test Method	Pass	Fail
FCC 15.107 AC Powerline Conducted Emissions (Receive Mode):2004	ANSI C63.4:2003	$\boxtimes$	
FCC 15.109 Radiated Emissions (Receive Mode):2004	ANSI C63.4:2003	$\square$	
FCC 15.111 Spurious Conducted Emissions - Cellular Band Receive Mode	ANSI C63.4:2003	$\boxtimes$	
FCC 22H & 24E Frequency Stability:2004	TIA/EIA-603:2001	$\square$	
FCC 22H & 24E Effective Radiated Power:2004	TIA/EIA-603:2001	$\boxtimes$	
FCC 22H & 24E Occupied Bandwidth:2004	TIA/EIA-603:2001	$\boxtimes$	
FCC 2.1046 Output Power:2004	TIA/EIA-603:2001	$\boxtimes$	
FCC 22H & 24E Spurious Conducted Emissions:2004	TIA/EIA-603:2001	$\boxtimes$	
FCC 22H & 24E Spurious Radiated Emissions:2004	TIA/EIA-603:2001	$\boxtimes$	
FCC 22H & 24E Spurious Radiated (Simultaneous Transmit) Emissions:2004	TIA/EIA-603:2001	$\boxtimes$	

#### Modifications made to the product

See the Modifications section of this report

#### **Test Facility**

 The measurement facility used to collect the data is located at: Northwest EMC, Inc.; 22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124 Phone: (503) 844-4066 Fax: 844-3826 This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:
Double martine
Don Facteau, IS Manager

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested, the specific description is noted in each of the individual sections of the test report supporting this certificate of test.



Revision Number	Description	Date	Page Number	
<b></b>		T		
01	Revised EUT Description	3/2/05	9	
01	Added Test Description, Data, Photos for Spurious Conducted Emissions	3/2/05	68-91	
01	Added headers to Effective Radiated Power Test Description	3/2/05	40-42	



**FCC:** Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities, have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

**NVLAP:** Northwest EMC, Inc. is recognized under the United States Department of Commerce, National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 89/336/EEC, ANSI C63.4, MIL-STD 461E, DO-160D and SAE J1113. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada. Accreditation has been granted to Northwest EMC, Inc. under Certificate Numbers: 200629-0, 200630-0, and 200676-0.

**Industry Canada:** Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS 212, Issue 1 (Provisional) and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements.

**CAB:** Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement

**TÜV Product Service:** Included in TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements. Certificate No. USA0401C















## **Accreditations and Authorizations**

TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992. TUV Rheinland **NEMKO:** Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory NEMKO assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119). **Technology International:** Assessed in accordance with ISO Guide 25 defining the general international requirements for the competence of calibration and testing laboratories and with ITI assessment criteria LACO196. Based upon that assessment Interference Technology International, Ltd., has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC and amendments). The scope of the approval was provided on a Schedule of Assessment supplied with the certificate and is available upon request. Australia/New Zealand: The National Association of Testing Authorities (NATA). Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body. (NVLAP) VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (Registration Nos. -Hillsboro: C-1071 and R-1025, Irvine: C-2094 and R-1943, Newberg: C-1877 and R-1760, Sultan: R-871, C-1784 and R-1761) **BSMI:** Northwest EMC has been designated by NIST and validated by C-Taipei BSMI (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No.SL2-IN-E-1017. GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification

> SCOPE For details on the Scopes of our Accreditations, please visit: <u>http://www.nwemc.com/scope.asp</u>



#### What is measurement uncertainty?

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following statement of measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" value. In the case of transient tests (ESD, EFT, Surge, Voltage Dips and Interruptions), the test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements.

The following documents were the basis for determining the uncertainty levels of our measurements:

- "ISO Guide to the Expression of Uncertainty in Measurements", October 1993
- "NIS81: The Treatment of Uncertainty in EMC Measurements", May 1994
- "IEC CISPR 16-3 A1 f1 Ed.1: Radio-interference measurements and statistical techniques", December 2000

#### How might measurement uncertainty be applied to test results?

If the diamond marks the measured value for the test and the vertical bars bracket the range of + and measurement uncertainty, then test results can be interpreted from the diagram below.



Case D: Product does not comply.



Radiated Emissions ≤ 1 GHz		Value (	dB)				
	Probability	Bico	nical	Log Pe	eriodic	Di	pole
	Distribution	Ante	enna	Ante	nna	An	tenna
Test Distance		3m	10m	3m	10m	3m	10m
Combined standard	normal	+ 1.86	+ 1.82	+ 2.23	+ 1.29	+ 1.31	+ 1.25
uncertainty <i>u<sub>c</sub>(y)</i>		- 1.88	- 1.87	- 1.41	- 1.26	- 1.27	- 1.25
Expanded uncertainty <b>U</b>	normal (k=2)	+ 3.72	+ 3.64	+ 4.46	+ 2.59	+ 2.61	+ 2.49
(level of confidence $\approx$ 95%)		- 3.77	- 3.73	-2.81	- 2.52	- 2.55	- 2.49

Radiated Emissions > 1 GHz	Value (dB)		
	Probability	Without High	With High
	Distribution	Pass Filter	Pass Filter
Combined standard uncertainty <i>u<sub>c</sub>(y)</i>	normal	+ 1.29	+ 1.38
		- 1.25	- 1.35
Expanded uncertainty <b>U</b>	normal (k=2)	+ 2.57	+ 2.76
(level of confidence $\approx$ 95%)		- 2.51	2.70

Conducted Emissions		
	Probability	Value
	Distribution	(+/- dB)
Combined standard uncertainty <i>uc(y)</i>	normal	1.48
Expanded uncertainty <b>U</b> (level of confidence ≈ 95 %)	normal (k = 2)	2.97

Radiated Immunity		
	Probability	Value
	Distribution	(+/- dB)
Combined standard uncertainty <i>uc(y)</i>	normal	1.05
Expanded uncertainty <b>U</b>	normal $(k - 2)$	2 11
(level of confidence $\approx$ 95 %)	$\operatorname{Hormal}\left( R=2\right)$	2.11

Conducted Immunity		
	Probability	Value
	Distribution	(+/- dB)
Combined standard uncertainty <i>uc(y</i> )	normal	1.05
Expanded uncertainty <b>U</b> (level of confidence ≈ 95 %)	normal (k = 2)	2.10

#### Legend

 $u_c(y)$  = square root of the sum of squares of the individual standard uncertainties

U = combined standard uncertainty multiplied by the coverage factor: **k**. This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required, then k=3 (CL of 99.7%) can be used. Please note that with a coverage factor of one, uc(y) yields a confidence level of only 68%.



## **Facilities**









#### California

Orange County Facility

41 Tesla Ave. Irvine, CA 92618 (888) 364-2378 FAX (503) 844-3826

### Oregon

Evergreen Facility 22975 NW Evergreen Pkwy., Suite 400 Hillsboro, OR 97124 (503) 844-4066 FAX (503) 844-3826

## Oregon

 Trails End Facility

 30475 NE Trails End Lane

 Newberg, OR 97132

 (503) 844-4066

 FAX (503) 537-0735

## Washington

Sultan Facility

14128 339<sup>th</sup> Ave. SE Sultan, WA 98294 (888) 364-2378 FAX (360) 793-2536



## **Product Description**

Party Requesting the Test				
Company Name:	Radioframe Networks, Inc.			
Address:	1120 112th Ave NE, Suite 600			
City, State, Zip:	ellevue, WA 98004			
Test Requested By:	Dean Busch			
Model:	GSM NA BV Release 1.0			
First Date of Test:	11/11/2004			
Last Date of Test:	11/16/2004			
Receipt Date of Samples:	11/09/2004			
Equipment Design Stage:	Production			
Equipment Condition:	No visual damage.			

#### Information Provided by the Party Requesting the Test

Clocks/Oscillators:	5 and 50 MHz
I/O Ports:	Ethernet,SMA

#### Functional Description of the EUT (Equipment Under Test):

GSM radio blade designed for cellular and PCS band operation while installed in a RadioFrame picobasestation.

#### **Client Justification for EUT Selection:**

The product is a representative production sample.

#### **Client Justification for Test Selection:**

These tests satisfy the FCC 22H and 24E requirements for the GSM radio blade.

#### EUT Photo





## **Modifications**

	Equipment modifications				
Item	Test	Date	Modification	Note	Disposition of EUT
1	Spurious Radiated Emissions – Stand Alone	11/11/2004	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.	EUT remained at Northwest EMC.
2	Effective Radiated Power	11/11/2004	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
3	Frequency Stability	11/12/2004	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
4	Spurious Conducted Emissions	11/15/2004	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
5	Conducted Output Power	11/15/2004	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
6	Occupied Bandwidth	11/15/2004	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
7	Spurious Conducted Emissions - Cellular Band Receive Mode	11/15/2004	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
8	AC Power line Conducted Emissions	11/16/2004	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.



#### Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated: GSM Cellular Receive Mode

Output Power Setting(s) Investigated: Maximum

#### Power Input Settings Investigated:

120 VAC, 60 Hz.

Software\Firmware Applied During Test					
Exercise software	Plat_Maint	Version	1.5.048		
Description					
The system was tested using special software developed to test all functions of the device during the test.					
The software allowed the t	ransmit channel, modulatio	on type, and data rate to be	selected.		

EUT and Peripherals						
Description	Manufacturer	Model/Part Number	Serial Number			
Backplane	Radio Frame Networks	RFU	N/A			
802.11(b/g) Radio Blade (EUT)	RadioFrame Networks, Inc.	iRAP	192168200215			
ACU	Radio Frame Networks	Airlink Chassis Unit	E0001			

Remote Equipment Outside of Test Setup Boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
PC	Dell	Inspiron 1100	07899029300023		
BCU RadioFrame Networks, Inc N/A E0032					
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary					



Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
LAN	No	2.5	No	EUT	ACU
LAN	No	5.0	No	BCU	ACU

Measurement Equipment						
Description	Manufacturer	Model	Identifier	Last Cal	Interval	
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/23/2003	13 mo	
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/23/2003	13 mo	
LISN	Solar	9252-50-R-24-BNC	LIO	04/30/2004	12 mo	
High Pass Filter	TTE	H97-100k-50-720B	HFC	02/01/2004	13 mo	

#### **Test Description**

**<u>Requirement:</u>** Per 47 15.107(d), if the EUT is connected to the AC power line indirectly, obtaining its power from another device that is connected to the AC power line, then it should be tested to demonstrate compliance with the conducted limits of 15.107.

**<u>Configuration</u>**: The EUT will be powered from a device that could be connected to the AC power line. Therefore, the measurements were made on the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.4-1992.

Completed by:	
Rocky le	Peling



















#### Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. All of the EUT parameters listed below were investigated. This includes, but may not be limited to, CPU speeds, video resolution settings, operational modes, and input voltages.

#### **Operating Modes Investigated:** GSM (low band) receive mode

Channels in Specified Band Investigated:				
Low				
Mid				
High				

**Power Input Settings Investigated:** 120 VAC, 60 Hz

Frequency Range Investigated				
Start Frequency	30 MHz	Stop Frequency	5 GHz	

Software\Firmware Applied During Test						
Exercise software	Plat_Maint	Version	1.5.048			
Description						
The system was tested using special software developed to test all functions of the device during the test.						
The software allowed the t	ransmit channel, modulatio	on type, and data rate to be	selected.			

EUT and Peripherals in Test Setup Boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
Backplane	Radio Frame Networks	RFU	N/A		
GSM Radio Blade (EUT)	RadioFrame Networks, Inc.	GSM NA BV Release 1.0	12104320038		

Remote Equipment Outside of Test Setup Boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
PC	Dell	Inspiron 1100	07899029300023		
ACU	Radio Frame Networks	Airlink Chassis Unit	E0001		
BCU	Radio Frame Networks	Digital Chassis Unit	E0032		
Clock source	Motorola	X516	CAF 030LT00		
Equipment isolated fro	m the EUT so as not to contribute to the me	asurement result is considered to be or	itside the test setup boundary		

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
LAN	No	1.5	No	Backplane	BCU
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment								
Description	Manufacturer	Model	Identifier	Last Cal	Interval			
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/23/2003	13 mo			
Pre-Amplifier	Amplifier Research	LN1000A	APS	02/05/2004	13 mo			
Antenna, Biconilog	EMCO	3141	AXE	12/03/2003	24 mo			
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/05/2004	13 mo			
Antenna, Horn	EMCO	3115	AHC	09/07/2004	12 mo			

#### **Test Description**

The final radiated emissions test was performed using the parameters described above as worst case. That final test was conducted at a facility that meets the ANSI C63.4 NSA requirements. The frequency range noted in the data sheets was scanned/tested at that facility. Emissions were maximized as specified, by maximizing table azimuth, antenna height, and cable manipulation.

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level will be detected. This requires the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search is utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT.

Note: The specified distance is the horizontal separation between the closest periphery of the EUT and the center of the axis of the elements of the receiving antenna. However, if the receiving antenna is a log-periodic array, the specified distance shall be the distance between the closest periphery of the EUT and the front-to-back center of the array of elements.

Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance shall be 1 meter, 3 meters, 5 meters, 10 meters, or 30 meters. At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the antenna clears the ground surface by at least 25 cm.

Measurement Bandwidths						
Frequency Range	Peak Data	Quasi-Peak Data	Average Data			
	(KTIZ)	(KTIZ)	(KFIZ)			
0.01 – 0.15	1.0	0.2	0.2			
0.15 - 30.0	10.0	9.0	9.0			
30.0 - 1000	100.0	120.0	120.0			
Above 1000	1000.0	N/A	1000.0			
Measurements were i	Measurements were made using the bandwidths and detectors specified. No video filter was used.					

Completed by: eted by: hy te Relenge



No emissions detected from receiver.







## Spurious Conducted Emissions – Cellular Band Receive Mode

#### Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Low
Mid
High

## Operating Modes Investigated:

GSM Low Band (Cellular) - Receive Mode

#### Power Input Settings Investigated: 120 VAC, 60 Hz.

Software\Firmware Applied During Test						
Exercise software	Plat_Maint	Version	1.5.048			
Description						
The system was tested using special software developed to test all functions of the device during the test.						
The software allowed the t	transmit channel, modulation	on type, and data rate to be	selected.			

EUT and Peripherals						
Description	Manufacturer	Model/Part Number	Serial Number			
Backplane	Radio Frame Networks	RFU	N/A			
GSM Radio Blade (EUT)	RadioFrame Networks, Inc.	GSM NA BV Release 1.0	12104320038			

Remote Equipment Outside of Test Setup Boundary						
Description	Manufacturer	Model/Part Number	Serial Number			
DCU	Radio Frame Networks	Digital Chassis Unit	E0032			
PC	Dell	Inspiron 1100	07899029300023			
ACU Radio Frame Networks Airlink Chassis Unit E0001						
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary						

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	1.0	No	PC	DCU
LAN	No	1	No	DCU	ACU
LAN	No	2.5	No	EUT	ACU



## Spurious Conducted Emissions – Cellular Band Receive Mode

Measurement Equipment						
Description Manufacturer Model Identifier Last Cal Interval						
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo	

#### **Test Description**

**Requirement:** Per 47 CFR 15.111, receivers that operate (tune) in the frequency range 30 to 960 MHz that provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of Section 15.109 with the antenna terminals terminated, provided the conducted power at the antenna terminals at any frequency within the range of measurements specified in Section 15.33 (30 MHz to 5 GHz for cellular receiver) does not exceed 2.0 nW (-57 dBm).

**Configuration:** A spectrum analyzer was used to scan from 30 to 5 GHz. A 100 kHz resolution bandwidth was used. No video filtering was employed. A 20dB external attenuator was used on the RF input of the spectrum analyzer.

#### **Test Setup Diagram**



Completed by:	
ADU.K.P	

NORTHWEST						
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01	
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043	
Serial Number:	12104320038			Date:	11/15/04	
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F	
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%	
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06	
TEST SPECIFICATION	NS					
Specification:	47 CFR 15.111(a)	Year: 2004	Method: ANSI C63.4	Year:	2003	
SAMPLE CALCULATI	ONS					
					l	
COMMENTS						
COMMENTS						
EUT OPERATING MO	DES					
Receive Mode						
<b>DEVIATIONS FROM T</b>	EST STANDARD					
None						
REQUIREMENTS						
The power at the ante	nna terminal at any frequency wit	hin 30 MHz to 5 GHz shall not e	xceed 2.0 nW (-57 dBm)			
RESULTS						
Pass						
SIGNATURE						
Tested By:						
DESCRIPTION OF TE	ST					
	Spurious Co	onducted Emissio	ns - Low Channel - Cellular	Band		

#### Spurious Conducted Emissions - Low Channel - Cellular Band

I

								Tek
10.0	Ref Lvl*10.00	1Bm		10dB/		Atten OdH	3	
0.0				•				
-10.0				· ·				
-20.0				:				
-30.0				•				
-40.0								
				· · · · ·				
-50.0				· ·				
-60.Q				: :				
-70.0	produce more marked and	hanner	and have an an and the	where where the second	himbories and Alerady	nghunna an an Island	when the mound addition	physicket and the second states and the second stat
-80.0				:				
-90.0				•				
20.0	30.0MHz	to	999.9MHz					
	ResBW 100kHz		VidBW 300}	tHz		SWP	550mS	
	LEVEL	SPAN	Strt 30.0	MHz				
	KINOB 2	KNOB 1	KEYPAD	Te	ktronix	2784		

NORTHWEST						
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01	
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043	
Serial Number:	12104320038			Date:	11/15/04	
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F	
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%	
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06	
TEST SPECIFICATION	NS					
Specification:	47 CFR 15.111(a)	Year: 2004	Method: ANSI C63.4	Year:	2003	
SAMPLE CALCULATI	ONS					
					l	
COMMENTS						
COMMENTS						
EUT OPERATING MO	DES					
Receive Mode						
<b>DEVIATIONS FROM T</b>	EST STANDARD					
None						
REQUIREMENTS						
The power at the ante	nna terminal at any frequency wit	hin 30 MHz to 5 GHz shall not e	xceed 2.0 nW (-57 dBm)			
RESULTS						
Pass						
SIGNATURE						
Tested By:						
DESCRIPTION OF TE	ST					
	Spurious Co	onducted Emissio	ns - Low Channel - Cellular	Band		

#### Spurious Conducted Emissions - Low Channel - Cellular Band

I

					Tek
10.0	Ref Lvl*10.0d	lBm	10dB/	Atten Odf	3
0.0					
-10.Q					
-20.Q					
-30.0					
-40.0		.			
-50.0					
-60.Q					
-70. <u>0</u>	al population and a state of the state of th	hand not the hard and a second and the	an all the second and a second a	advanter and the sound and the	Nelizetannanan
-80 0					
-90.0					
50.0	1.000GHz	to	5.010GHz		
	ResBW 100kHz		VidBW 300kHz	SWP	2.35
	LEVEL	SPAN	Strt 1.000GHz		
	KNOB 2	KNOB 1	KEYPAD Te	ektronix 2784	

NORTHWEST					
EMC		EMISSIONS I	DATA SHEET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043
Serial Number:	: 12104320038			Date:	11/15/04
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%
Customer Ref. No.:	: N/A		Power: 120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	NS				
Specification:	47 CFR 15.111(a)	Year: 2004	Method: ANSI C63.4	Year:	2003
SAMPLE CALCULATI	ONS				
					l
COMMENTS					
COMMENTS					
EUT OPERATING MO	DES				
Receive Mode					
DEVIATIONS FROM T	EST STANDARD				
None					
REQUIREMENTS					
The power at the ante	enna terminal at any frequency with	nin 30 MHz to 5 GHz shall not exce	ed 2.0 nW (-57 dBm)		
RESULTS					
Pass					
SIGNATURE					
Tested By:					
DESCRIPTION OF TE	ST				
	Sourious Co	onducted Emission	s - Mid Channel - Cellular	Band	
Spurious Conducted Emissions - Mid Channel - Cenular Danu					

#### Spurious Conducted Emissions - Mid Channel - Cellular Band

								Tek
10.0	Ref Lvl*10.00	1Bm		10dB/		Atten Odl	В	
				-				
0.0								
-10.0								
-20.0								
-30.0				• • •				
-40.0		.						
-50.Q				•				
-60.Q								
-70.0	warmer warmer	www.www.aladlawaanser.com	maning	whiteward	the water and the state of the gas of the	anada harana da	Muchhamme	unrunnulum
-80.0								
-90.0								
	30.0MHz	to	999.9M	Hz				
	ResBW 100kHz		VidB0	J 300kHz		SWP	550mS	
	LEVEL	SPAN	Strt	30.0MHz				
	KINOB 2	KNOB 1	KE YP J	LD T	ektronix	2784		

NORTHWEST					
EMC		EMISSIONS I	DATA SHEET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043
Serial Number:	: 12104320038			Date:	11/15/04
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%
Customer Ref. No.:	: N/A		Power: 120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	NS				
Specification:	47 CFR 15.111(a)	Year: 2004	Method: ANSI C63.4	Year:	2003
SAMPLE CALCULATI	ONS				
					l
COMMENTS					
COMMENTS					
EUT OPERATING MO	DES				
Receive Mode					
DEVIATIONS FROM T	EST STANDARD				
None					
REQUIREMENTS					
The power at the ante	enna terminal at any frequency with	nin 30 MHz to 5 GHz shall not exce	ed 2.0 nW (-57 dBm)		
RESULTS					
Pass					
SIGNATURE					
Tested By:					
DESCRIPTION OF TE	ST				
	Sourious Co	onducted Emission	s - Mid Channel - Cellular	Band	
Spurious Conducted Emissions - Mid Channel - Cenular Danu					

#### Spurious Conducted Emissions - Mid Channel - Cellular Band

							Tek
10.0	Ref Lvl*10.0dB	m	1	.0dB/	Atte	en OdB	
0.0							
-10.0			· · ·				
-20.0							
-30.0							
-40.0							
10.0							
-50. <u>0</u>							
-60.Q							
-70.Q	munul puter many provide	www.www.hurgerbastel.hurgetheli	were the the state of the state	addinate growth water	M. MARAMAN MARAN	hinterature of the work of the states	the way was the second
-80.0							
-90.Q	1.0006₩~		5 010CH-				L
	ResBW 100kHz		VidBW 300kH	z		SWP 2.35	
			]				
	LEVEL	SPAN	Strt 1.00	OGHz			
	KNOB 2	KNOB 1	KEYPAD	Tekt	ronix 2'	784	

NORTHWEST						
EMC		EMISSIONS I	DATA SH	EET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043
Serial Number:	12104320038				Date:	11/15/04
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	IS					
Specification:	47 CFR 15.111(a)	Year: 2004	Method:	ANSI C63.4	Year:	2003
SAMPLE CALCULATIO	ONS					
COMMENTS						
EUT OPERATING MOD	DES					
Receive Mode						
<b>DEVIATIONS FROM T</b>	EST STANDARD					
None						
REQUIREMENTS						
The power at the anter	nna terminal at any frequency wit	hin 30 MHz to 5 GHz shall not excee	ed 2.0 nW (-57 dBm)			
RESULTS						
Pass						
SIGNATURE						
	An U.K.P					
Tested By:	Tested By:					
DESCRIPTION OF TES	бΤ					
Spurious Conducted Emissions - High Channel - Cellular Band						

## Spurious Conducted Emissions - High Channel - Cellular Band

								Tek
10.0	Ref Lvl*10.0d	lBm		10dB/		Atten OdH	3	
_								
0.0								
-10.0								
-20.0				: : :				
-30.0								
				: : :				
-40.0				· · · · · · · · · · · · · · · · · · ·				
-50.0								
-60.Q								
-70.0	- 14 day to an	marchanther and so that we have been set as		and the second the second that	human mandalater	manda ta ang ang ang ang ang ang ang ang ang an	Merikan faskalaga ay	and with the base of the
-70.0								
-80.0				· · ·				
-90.0				:				
	30.0MHz	to	999.9MHz					
	ResBW 100kHz		VidBW 3	OOkHz		SWP	550mS	
	LEVEL	SPAN	Strt 3	0.0MHz				
	KNOB 2	KNOB 1	KEYPAD	Te	ktronix	2784		

NORTHWEST							
EMC		EMISSIONS	S DATA SHEET		Rev BETA		
EUT	COM NA RV Polozco 1.0			Work Order:	01/30/01		
EUI:	GSMINA BV Release 1.0			Work Order:	KAFNUU43		
Serial Number:	12104320038	12104320038 Date: 11/15/04					
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F		
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%		
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06		
TEST SPECIFICATION	is						
Specification:	47 CFR 15.111(a)	Year: 2004	Method: ANSI C63.4	Year:	2003		
SAMPLE CALCULATION	ONS						
COMMENTS							
EUT OPERATING MO	DES						
Receive Mode							
DEVIATIONS FROM T	EST STANDARD						
None							
REQUIREMENTS							
The power at the ante	nna terminal at any frequency w	ithin 30 MHz to 5 GHz shall not	exceed 2.0 nW (-57 dBm)				
RESULTS							
Pass							
SIGNATURE							
1	An U.K.						
	ALT.						
Tested By:	Tested By:						
DESCRIPTION OF TES	ŜT						
Spurious Conducted Emissions - High Channel - Cellular Band							

#### Spurious Conducted Emissions - High Channel - Cellular Band

I

					Tek
10.0	Ref Lvl*10.0d	lBm	10dB/	Atten Odl	3
0.0			· · · · · · · · · · · · · · · · · · ·		
-10.0			· · · · · · · · · · · · · · · · · · ·		
-20.0			· · · · · · · · · · · · · · · · · · ·		
-30.0					
-40.0					
-50.0			:		
-60.Q					
-70.0	when the man we want the man when the man wh	when the state of	nontralling and a second and the second and	Muniphaman	when we are weather the open and weather and
-80.0					
-90.0					
	1.000GHz	to	5.010GHz		
	ResBW 100kHz		VidBW 300kHz	SWP	2.35
	LEVEL	SPAN	Strt 1.000GHz		
	KNOB 2	KNOB 1	KEYPAD Te	ktronix 2784	





#### Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

#### Channels in Specified Band Investigated: Mid

Operating Modes Investigated: GSM Low Band (Cellular) GSM High Band (PCS)

Data Rates Investigated: Maximum

Output Power Setting(s) Investigated: Maximum

Power Input Settings Investigated: 120 VAC, 60 Hz.

Software\Firmware Applied During Test						
Exercise software	Plat_Maint	Version	1.5.048			
Description						
The system was tested using special software developed to test all functions of the device during the test.						
The software allowed the transmit channel, modulation type, and data rate to be selected.						

EUT and Peripherals					
Description	Manufacturer	Model/Part Number	Serial Number		
GSM Radio Blade (EUT)	RadioFrame Networks, Inc.	GSM NA BV Release 1.0	none		
Backplane	Radio Frame Networks	RFU	N/A		

Remote Equipment Outside of Test Setup Boundary						
Description	Manufacturer	Model/Part Number	Serial Number			
DCU	Radio Frame Networks	Digital Chassis Unit	E0032			
PC	Dell	Inspiron 1100	07899029300023			
ACU Radio Frame Networks Airlink Chassis Unit E0001						
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary						



Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	1.0	No	PC	DCU
LAN	No	1	No	DCU	ACU
LAN	No	2.5	No	EUT	ACU

Measurement Equipment									
Description	Manufacturer	Model	Identifier	Last Cal	Interval				
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo				
Chamber, Temp./Humidity Chamber	Cincinnati Sub Zero (CSZ)	ZH-32-2-2-H/AC	TBA	09/07/2004	12 mo				
Multimeter	Tektronix	DMM912	MMH	05/27/2004	12 mo				
Single Phase Transformer	Staco Energy Products Co.	Туре 2520С	SPT	NCR	NA				

#### **Test Description**

**<u>Requirement:</u>** Per 47 CFR 2.1055 and 24.235, the frequency stability shall be measured with variation of ambient temperature and primary supply voltage. A spectrum analyzer or frequency counter can be used to measure the frequency stability. If using a spectrum analyzer, it must have a precision frequency reference that exceeds the stability requirement of the transmitter. A temperature / humidity chamber is required.

#### **Configuration:**

#### Variation of AC Mains Supply Voltage

The primary supply voltage was varied from 85% to 115% of nominal. A variable transformer was used to vary the supply voltage from 115% to 85% of 120 V, 60 Hz. The voltage was measured at the EUT's power input with a multimeter.

#### Variation of Battery Supply Voltage

The EUT is not operated from batteries.

#### Variation of Ambient Temperature

Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range (-30° to +60° C) and at 10°C intervals.

Measurements were made at mid frequency in both the cellular and PCS bands. A direct connection was made between the RF output of the EUT and a spectrum analyzer. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Completed by:							
ADU.K.P							
EMISSIONS DATA SHEET							Rev BETA 1/30/01
-----------------------	----------------------------------------	-------------------------------------------------	---------------------	---------------	-------------	----------	---------------------
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043	
Serial Number:					Date:	11/12/04	
Customer:	Radioframe Networks, Inc.	adioframe Networks, Inc. Temperature: See below					
Attendees:	Dean Busch	· · · · · · · · · · · · · · · · · · ·	Tested by:	Greg Kiemel	Humidity:	35%	
Customer Ref. No.:	N/A		Power:	see below	Job Site:	EV09	
TEST SPECIFICATION	IS						
Specification:	47 CFR 2.1055	Year: Most Current	Method:	TIA/EIA - 603	Year:	2001	
SAMPLE CALCULATIO	ONS					•	
COMMENTS							
EUT OPERATING MO	DES						
Transmitting mid band	d						
DEVIATIONS FROM T	EST STANDARD						
None							
REQUIREMENTS							
Minimum frequency s	tability of 2.5 parts per million (ppr	n) for variations of temperature a	and supply voltage.				
RESULTS			MINIMUM FREQUENC	Y STABILITY			
Pass	s 1.83 ppm						
SIGNATURE							
Tested By:							
DESCRIPTION OF TES	SТ						
Frequency Stability							

### Frequency Stability with Variation of Ambient Temperature (Primary Supply = 120V, 60Hz)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
-30	880.40000	880.398390	1.83	2.5
-20	880.40000	880.398710	1.47	2.5
-10	880.40000	880.398735	1.44	2.5
0	880.40000	880.398685	1.49	2.5
10	880.40000	880.398655	1.53	2.5
20	880.40000	880.398760	1.41	2.5
30	880.40000	880.398675	1.50	2.5
40	880.40000	880.398855	1.30	2.5
50	880.40000	880.398765	1.40	2.5
60	880.40000	880.398840	1.32	2.5

### Frequency Stability with Variation of Primary Supply Voltage (Ambient Temperature = 20°C)

Voltage	Assigned Frequency	Measured Frequency	Tolerance	Specification
(VAC, 60Hz)	(MHz)	(MHz)	(ppm)	(ppm)
138 (115%)	880.40000	880.398655	1.53	2.5
132 (110%)	880.40000	880.398655	1.53	2.5
126 (105%)	880.40000	880.398655	1.53	2.5
120 (100%)	880.40000	880.398655	1.53	2.5
114 (95%)	880.40000	880.398655	1.53	2.5
108 (90%)	880.40000	880.398655	1.53	2.5
102 (85%)	880.40000	880.398655	1.53	2.5

EMISSIONS DATA SHEET						
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043
Serial Number:					Date:	11/12/04
Customer:	Radioframe Networks, Inc.				Temperature:	See below
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	35%
Customer Ref. No.:	N/A		Power:	see below	Job Site:	EV09
TEST SPECIFICATION	IS					
Specification:	47 CFR 2.1055 , 24.235	Year: Most Current	Method:	TIA/EIA - 603	Year:	2001
SAMPLE CALCULATIO	ONS					
COMMENTS						
COMMENTO						
FUT OPERATING MO	DES					
Transmitting mid band	d					
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
Minimum frequency si	tability of 2.5 parts per million (pp	m) for variations of temperature a	ind supply voltage.			
RESULTS			MINIMUM FREQUENC	Y STABILITY		
Pass	ass 1.95 ppm					
SIGNATURE						
Tested By:						
DESCRIPTION OF TES	λT					
Frequency Stability						

### Frequency Stability with Variation of Ambient Temperature (Primary Supply = 120V, 60Hz)

Temp	Assigned Frequency	Measured Frequency	Tolerance	Specification
(°C)	(MHz)	(MHz)	(ppm)	(ppm)
-30	1960.00000	1959.996175	1.95	2.5
-20	1960.00000	1959.996340	1.87	2.5
-10	1960.00000	1959.996625	1.72	2.5
0	1960.00000	1959.996505	1.78	2.5
10	1960.00000	1959.996490	1.79	2.5
20	1960.00000	1959.996350	1.86	2.5
30	1960.00000	1959.996630	1.72	2.5
40	1960.00000	1959.996550	1.76	2.5
50	1960.00000	1959.996670	1.70	2.5
60	1960.00000	1959.996540	1.77	2.5

Frequency Stability with Variation of Primary Supply Voltage (Ambient Temperature = 20°C)

Voltage	Assigned Frequency	Measured Frequency	Tolerance	Specification
(VAC, 60Hz)	(MHz)	(MHz)	(ppm)	(ppm)
138 (115%)	1960.00000	1959.996350	1.86	2.5
132 (110%)	1960.00000	1959.996350	1.86	2.5
126 (105%)	1960.00000	1959.996350	1.86	2.5
120 (100%)	1960.00000	1959.996350	1.86	2.5
114 (95%)	1960.00000	1959.996350	1.86	2.5
108 (90%)	1960.00000	1959.996350	1.86	2.5
102 (85%)	1960.00000	1959.996350	1.86	2.5





### Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated:	
GSM Low Band	
GSM High Band	

### Data Rates Investigated: Maximum

### Output Power Setting(s) Investigated: Maximum

Software\Firmware Applied During Test						
Exercise software	Intersil cTxRx tool	Version	3893MTFW			
Description						
The system was tested using special software developed to test all functions of the device during the test.						
The software allowed the transmit channel, modulation type, and data rate to be selected.						

EUT and Peripherals						
Description	Manufacturer	Model/Part Number	Serial Number			
Antenna	LINX	ANT-2.4-RCT-SS	N/A			
Backplane	Radio Frame Networks	RFU	N/A			
EUT- Transceiver	RadioFrame Networks, Inc.	RadioBlade, GSM NA	12104320038			

Remote Equipment Outside of Test Setup Boundary						
Description	Manufacturer	Model/Part Number	Serial Number			
DCU	Radio Frame Networks	Digital Chassis Unit	E0032			
PC	Dell	Inspiron 1100	07899029300023			
ACU	Radio Frame Networks	Airlink Chassis Unit	E0001			
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary						

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	1.0	No	PC	DCU
LAN	No	1	No	DCU	ACU
LAN	No	2.5	No	EUT	ACU

Measurement Equipr	nent				
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett- Packard	8566B	AAL	12/23/2003	13 mo
Quasi-Peak Adapter	Hewlett- Packard	85650A	AQF	12/23/2003	13 mo
Antenna, Biconilog	EMCO	3141	AXE	12/03/2003	24 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	02/05/2004	13 mo
Antenna, Horn	EMCO	3115	AHC	09/07/2004	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/05/2004	13 mo
Antenna, Horn	EMCO	3160-09	AHG	NCR	NA
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	10/08/2003	12 mo
Antenna, Horn	EMCO	3160-08	AHK	NCR	NA
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	10/08/2003	12 mo
Attenuator		2082-6148-20	ATE	02/03/2004	13 mo
High Pass Filter	Micro-Tronics	HPM50111	HFO	04/13/2004	13 mo
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo



**<u>Requirement:</u>** Per 2.1046, the peak power of the modulated carrier was measured. The applicable limits are 22.913(a) for the cellular band, and 24.232(b) for the PCS band.

Per 22.913(a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

Per 24.232(b), Mobile/portable stations are limited to 2 Watts e.i.r.p. peak power.

**Configuration:** Spectrum analyzer, signal generator, and linearly polarized antennas were used to measure the fundamental emissions. The orientation of the EUT was varied in 3 orthogonal axes to maximize the level of emissions. The EUT was configured to transmit at the highest output at low, mid, and high channels. The EUT was tested with each antenna. Only one antenna can be used at a time.

The substitution method as described in TIA/EIA-603 Section 2.2.12 was used.

**Test Methodology:** For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.12 describes a method for measuring radiated emissions that utilizes an antenna substitution method:

At an approved test site, the transmitter is place on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a ½ wave dipole that is successively tuned to each of the highest emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (ERP or e.i.r.p) is determined for each radiated emission.

Bandwidths Used for Me	asurements		
Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
Measurements were n	nade using the bandwidths	and detectors specified. No	video filter was used.

Holy Arlingh Completed by:







EMC		Effec	tive F	Radia	ted P	ower	Data	Sheet		10/22
EUT:	RadioBlade, 0	GSM NA						Work O	rder: RAFNO	043
Serial Number:	12104320038								Date: 11/16/0	)4
Customer:	Radioframe N	etworks, Inc.						Tempera	ture: 70	
Attendees:	Dean Bush							Hum	idity: 42%	
Cust. Ref. No.:							B	arometric Pres	sure 30.17	
Tested by:	Holly Ashkan	nejhad			Power:	120VAC/60	Hz	Job	Site: EV01	
SPECIFICAT	ONS									
Specification:	FCC 24.238(a)								Year: 2003	
Method:	TIA/EIA-603								Year: 1998	
PLE CALCULA adiated Emissions:	TIONS Field Strength = M	leasured Level +	Antenna Factor	+ Cable Factor -	Amplifier Gain +	Distance Adjust	ment Factor + Ext	ernal Attenuation		
ducted Emissions:	Adjusted Level = N	Aeasured Level +	Transducer Fac	tor + Cable Atter	nuation Factor + E	External Attenua	ator			
OPERATING N	n MODES									
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-30.0										
-30.0										
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-50 0										
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-60.0										
-00.0	1050 005	1050 100	1050.000	1050 005	1000 000	4000.007	4000 105	1000 000	1000 000	4001 01
1959.000	1959.200	1959.400	1959.600	1959.800	1960.000	1960.200	1960.400	1960.600	1960.800	1961.00
					MHz					
					111112					
Freq		Azin	nuth Heigl	nt		Polarity	Detector	EIF	RP.	Elf
Freq (MHz)		Azin (deg	nuth Heigl rees) (mete	nt rs)		Polarity	Detector	EIF (dB	RP m)	EIF (Wa

EMC		E	fec	tiv	'e F	Ra	Idi	at	e	d F	<b>5</b> C	)W	er	D	at	a	S	he	et				1	10/2
EUT:	RadioBlade	, GSM N	NA															W	ork O	rder	RAF	N004	13	
Serial Number:	1210432003	8																	I	Date	: 11/1	6/04		
Customer:	Radioframe	Netwo	rks, Inc.															Ten	npera	ture	70			
Attendees:	Dean Bush																		Humi	idity	: 42%			
Cust. Ref. No.:										_	-	001/4	0.00			E	Baron	netric	Pres	sure	30.1	7		
Tested by:	Holly Ashka	nnejha	d							Powe	er: 1	20VA	C/60	)Hz					Job	Site	EV0	1		
SPECIFICATIO	JN5	(a)																			2003	,		
Specification:	FUU 24.238	a)																		rear	1003	<u> </u>		
	TIONS																			rear	1990	5		
diated Emissions:	Field Strength =	Measure	ed Level + A	ntenna	- Factor -	+ Cab	le Fac	tor - A	mplifie	er Gain	+ Di	stance	Adius	tment	Factor	+ Ext	ernal	Attenu	uation					_
lucted Emissions:	Adjusted Level =	= Measure	ed Level + 1	Transd	ucer Fac	tor + (	Cable	Attenu	ation	Factor	+ Ex	ternal /	Attenu	ator										
MENTS																								
DPERATING M ighband (PCS) Hi	ODES gh Channel																							
ATIONS FROM iations. LTS	TEST STAN	IDARD																			Run	#		
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-30.0							_																	
-40.0																		-						
-50.0																		-						
-60.0																								
-70.0																								
-80.0																_								1
1989.600	1989.	650	1989.	700	1	989.	750		198 <b>N</b>	9.800 IHz	)	19	989.8	350		1989	9.900	)	19	89.9	950	1	990	0.0
Freq			Azim	uth	Heigh	nt m						Polar	ity	Det	ector				EIR	P				EI (W
(MHz)			(degre	ees)	(meter	5)													(aBI	(III)				(

EMC		Effe	ctiv	e F	la	dia	ite	d F	20	W	er	Da	ita	S	nee	et			10/2
EUT:	RadioBlade,	GSM NA													Work	Orde	r: RAFN	0043	
Serial Number:	2104320038															Date	e: 11/17/	)4	
Customer:	Radioframe N	letworks, In	с.												Tempe	rature	e: 70		
Attendees:	Dean Bush														Hu	midity	y: 42%		
Cust. Ref. No.:							-							Barom	etric Pr	essur	e 30.17		
Tested by:	Rod Peloquir	1						Powe	er: 1	20VA	C/60	Hz			Jo	b Site	e: EV01		
SPECIFICATIO	ONS																0004		
Specification:	-CC 24.238															Yea	r: 2004		
Method:	TIA/EIA-603															rea	r: 1998		
diated Emissions: A lucted Emissions: A AENTS lone Configuration	Field Strength = N	leasured Level Measured Leve	+ Antenna I + Transdu	Factor + ucer Facto	Cable or + C	Factor able Atte	- Ampli enuatio	fier Gain n Factor	+ Di: + Ext	stance . ternal A	Adjusti .ttenua	ment Fac tor	tor + Ex	ternal /	Attenuatio	n			
DPERATING M ghband (PCS) ATIONS FROM ations.	DDES TEST STAN	DARD															Run #		
210																	Tturi #	23	
											_	Coch	y li	Te	ested By	r:			
20.0																			
10.0											•								
0.0																			
-10.0 -																			
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1900.000	1905.000	1910.000	1915	.000	192	0.000	19 	25.000 <b>MHz</b>	0	1930.	.000	193	5.000	194	40.000	19	45.000	195	50.00
Freq (MHz)		A (de	zimuth egrees)	Height (meters	t 5)					Polari	ty	Detecto	or		E	IRP dBm)			Ell (Wa











### Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated:	
GSM Low Band (Cellular)	
GSM High Band (PCS)	

### Data Rates Investigated: Maximum

### Output Power Setting(s) Investigated: Maximum

Software\Firmware Applied During Test										
Exercise software	Plat_Maint	Version	1.5.048							
Description										
The system was tested using special software developed to test all functions of the device during the test.										
The software allowed the t	ransmit channel, modulatio	n type, and data rate to be	selected.							

EUT and Peripherals											
Description	Manufacturer	Model/Part Number	Serial Number								
Backplane	Radio Frame Networks	RFU	N/A								
GSM Radio Blade (EUT)	RadioFrame Networks, Inc.	GSM NA BV Release 1.0	12104320038								

Remote Equipment Outside of Test Setup Boundary										
Description	Manufacturer	Model/Part Number	Serial Number							
DCU	Radio Frame Networks	Digital Chassis Unit	E0032							
PC	Dell	Inspiron 1100	07899029300023							
ACU	Radio Frame Networks	Airlink Chassis Unit	E0001							
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary										



Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	1.0	No	PC	DCU
LAN	No	1	No	DCU	ACU
LAN	No	2.5	No	EUT	ACU

Measurement Equipment											
Description	Manufacturer	Model	Identifier	Last Cal	Interval						
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo						

**Requirement:** Per 47 CFR 22.917, and 24.238, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10log(P) dB. Per 47 CFR 2.1049, the occupied bandwidth was measured at the RF output terminals with analyzer plots made for each band.

**Configuration:** A spectrum analyzer was used to measure the occupied bandwidth. A 20dB external attenuator was used on the RF input of the spectrum analyzer. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter was employed. The nominal carrier frequency was adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits. The emission power was measured relative to a reference baseline of the transmitter power.

# Test Setup Diagram

Completed by:
ADU.K.P

NORTHWEST EMC	<b>EMISSIONS</b>	DATA SHI	EET		Rev BETA 01/30/01
EUT: GSM NA BV Release 1.0				Work Order:	RAFN0043
Serial Number: 12104320038				Date:	11/15/04
Customer: RadioFrame Networks, Inc.				Temperature:	73 F
Attendees: Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%
Customer Ref. No.: N/A		Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATIONS					
Specification: 47 CFR 2.1049, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001
SAMPLE CALCULATIONS					
COMMENTS					
Modulated by PRBS at maximum data rate, at maximum	output power.				
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
On any frequency outside a licensee's frequency block, t	he power of any emission shall b	e attenuated below the	transmitter power (P)	) by at least 43 + 10log(I	P) dB.
RESULTS					
Pass					
SIGNATURE					
ATU.K.P					
lested By:					
DESCRIPTION OF TEST					
Occupied	Bandwidth - Refere	ence Level Plo	ot - Cellular E	Band	



									Tek
12.2	Ref Lvl*	12.2dBm			10dB	3/	Atten 10	dB	
2.2				2000-1000 Contained allowed					
-7.8					-				
-17.8					-				
-27.8									
-37.8									
-47.8									
-57.8					· · · · · · · · · · · · · · · · · · ·		-		
-67.8									
-77.8					· · ·				
-87.8									
	Freq 880	.40MHz					Span 2.0MH	Iz	
	ResBW 1M	IHz		v	idBW 7MHz		SWP	50mS	
	LEVEL		SPAN	R	∈f Lvl*12.2dE	im			
	KNOB 2		KNOB 1	K	EYPAD	Tektronix	2784		

NORTHWEST						
EMC		EMISSIONS	DATA SH	EET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043
Serial Number:	12104320038				Date:	11/15/04
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	IS					
Specification:	47 CFR 2.1049, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001
SAMPLE CALCULATI	ONS					
COMMENTS						
COMMENTO						
EUT OPERATING MOI	DES					
Modulated by PRBS a	t maximum data rate, at maximum	output power.				
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
On any frequency out	side a licensee's frequency block,	the power of any emission shall	be attenuated below the	e transmitter power (	P) by at least 43 + 10log(I	²) dB.
RESULTS			OCCUPIED BANDWID	тн		
Pass			244 kHz			
SIGNATURE						
Tested By:	ABU.K.P					
DESCRIPTION OF TES	ST					





NORTHWEST						
EMC		EMISSIONS	DATA SHI	EET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043
Serial Number:	: 12104320038				Date:	11/15/04
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%
Customer Ref. No.:	N/A Power: 120VAC/60Hz				Job Site:	EV06
TEST SPECIFICATION	NS					
Specification:	47 CFR 2.1049, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001
SAMPLE CALCULATI	ONS					
COMMENTS						
	250					
EUT OPERATING WO	DES					
Modulated by PRDS a	It maximum data rate, at maximum	output power.				
DEVIATIONS FROM T	EST STANDARD					
REQUIREMENTS						
REQUIREMENTS	taida a lizansaola fraguanay black	the new of any omission shall h	a attanuated below the	transmitter newer /	D) her at least (2 + 10log/	
Off any frequency out	Side a licensee 5 frequency brook,	the power of any emission analis	Je allenualeu pelow the	transmitter power (r	") by at least 45 + 1010g(	r) ub.
RESULTS						
Pass						
SIGNATURE						
Tested By	* ADU.K.P					
DESCRIPTION OF TE	ST					
	Occupie	d Bandwidth - Low	er Band Edge	- Cellular B	and	



NORTHWEST						
EMC		EMISSIONS	DATA SHE	ET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0				Work Order	: RAFN0043
Serial Number:	12104320038				Date	: 11/15/04
Customer:	RadioFrame Networks, Inc.				Temperature	: 73 F
Attendees:	Dean Busch	Dean Busch Tested by: Greg Kiemel			Humidity	: 41%
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site	: EV06
TEST SPECIFICATION	IS					
Specification:	47 CFR 2.1049, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year	: 2001
SAMPLE CALCULATI	ONS					
COMMENTS						
EUT OPERATING MO	DES					
Modulated by PRBS a	t maximum data rate, at maximum	output power.				
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
On any frequency out	side a licensee's frequency block,	the power of any emission shall	be attenuated below the	transmitter power (P)	by at least 43 + 10log	(P) dB.
RESULTS						
Pass						
SIGNATURE						
Tested By	ADU.K.P					
DESCRIPTION OF TE	ST					
	<b>O</b> • • • • • • •	مرميل المرافلة أبيباه مرها الم	an Danal Calma		na al	



NORTHWEST FMC	<b>EMISSIONS</b>	DATA SHEET		Rev BETA	
EUT: GSM NA BV Release 1.0			Work Order:	RAFN0043	
Serial Number: 12104320038			Date:	11/15/04	
Customer: RadioFrame Networks, Inc.			Temperature:	73 F	
Attendees: Dean Busch		Tested by: Greg Kiemel	Humidity:	41%	
Customer Ref. No.: N/A		Power: 120VAC/60Hz	Job Site:	EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 2.1049, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate, at maximum	output power.				
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
On any frequency outside a licensee's frequency block,	the power of any emission shall b	e attenuated below the transmitter power (P)	by at least 43 + 10log(	P) dB.	
RESULTS					
SIGNATURE					
Tested By:					
DESCRIPTION OF TEST					
Occupied Bandwidth - Reference Level Plot - PCS Band					



					Tek
15.7	Ref Lvl*15.7dBr	n	10dB/	Atten 10	dB
5.7				and the second	un and a state of the state of
-4.3					
-14.3					
-24.3			-		
-34.3					
-44.3					
-54.3			· · ·		
-64.3					
-74.3			· · · · · · · · · · · · · · · · · · ·		
-84.3			-		
	Freq 1.960 00	JGHz		Span 2.0M	Hz
	ResBW 1MHz	v	idBW 7MHz	SWP	50mS
	LEVEL	SPAN F1	ceq 1.960 00GHz		
	KNOB 2	KNOB 1 KH	EYPAD Te	ktronix 2784	

NORTHWEST						
EMC		EMISSIONS	DATA SH	EET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043
Serial Number:	12104320038				Date: 11/15/04	
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F
Attendees:	Dean Busch	Dean Busch Tested by: Greg Kiemel			Humidity:	41%
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	IS					
Specification:	47 CFR 2.1049, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001
SAMPLE CALCULATI	ONS					
COMMENTS						
EUT OPERATING MOI	DES					
Modulated by PRBS a	t maximum data rate, at maximum	n output power.				
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
On any frequency out	side a licensee's frequency block	, the power of any emission shall	be attenuated below the	transmitter power (	P) by at least 43 + 10log(F	') dB.
RESULTS			OCCUPIED BANDWID	тн		
Pass			258 kHz			
SIGNATURE						
Tested By:	ABU.K.P					
DESCRIPTION OF TES						





NORTHWEST						
EMC		EMISSIONS I	DATA SH	EET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043
Serial Number:	12104320038				Date:	11/15/04
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%
Customer Ref. No.:	N/A Power: 120VAC/60Hz			Job Site:	EV06	
TEST SPECIFICATION	IS					
Specification:	47 CFR 2.1049, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001
SAMPLE CALCULATI	ONS			• •		
COMMENTS						
EUT OPERATING MO	DES					
Modulated by PRBS a	t maximum data rate, at maximum	output power.				
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
On any frequency out	side a licensee's frequency block,	the power of any emission shall b	e attenuated below the	e transmitter power (P	) by at least 43 + 10log(	P) dB.
RESULTS						
Pass						
SIGNATURE						
Tested By:	A AU.K.P					
DESCRIPTION OF TES	ST					
	Occupied Bandwidth - Lower Band Edge - PCS Band					



		EMISSIONS	DATA SHI	EET		Rev BETA
						01/30/01
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043
Serial Number:	12104320038				Date:	11/15/04
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	IS					
Specification:	47 CFR 2.1049, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001
SAMPLE CALCULATI	ONS					
COMMENTS						
	550					
EUT OPERATING WOT	DES					
DEVIATIONS EDOM T	E ET STANDARD	output power.				
None	ESI SIANDARD					
REQUIREMENTS						
On any frequency out	side a licensee's frequency block.	the power of any emission shall	be attenuated below the	transmitter power (P)	) by at least 43 + 10log()	P) dR
on any nequency car	she a horibee squeney sieen,	the power of any encoder chair.	be allemaated selen alle	transmitte. perior (. )	, by at least to	, ub.
RESULTS						
Pass						
SIGNATURE						
Tested By:	ABU.K.P					
DESCRIPTION OF TES	ST					
	Occup	ied Bandwidth - Up	per Band Edg	je - PCS Ban	d	







# **Output Power**

### Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated:	
GSM Low Band (Cellular)	
GSM High Band (PCS)	

### Data Rates Investigated: Maximum

### Output Power Setting(s) Investigated: Maximum

Software\Firmware Appli	ed During Test		
Exercise software	Plat_Maint	Version	1.5.048
Description			
The system was tested using special software developed to test all functions of the device during the test.			
The software allowed the transmit channel, modulation type, and data rate to be selected.			

EUT and Peripherals			
Description	Manufacturer	Model/Part Number	Serial Number
Backplane	Radio Frame Networks	RFU	N/A
GSM Radio Blade (EUT)	RadioFrame Networks, Inc.	GSM NA BV Release 1.0	12104320038

Remote Equipme	ent Outside of Test Setup Boun	dary	
Description	Manufacturer	Model/Part Number	Serial Number
DCU	Radio Frame Networks	Digital Chassis Unit	E0032
PC	Dell	Inspiron 1100	07899029300023
ACU	Radio Frame Networks	Airlink Chassis Unit	E0001
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			



Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	1.0	No	PC	DCU
LAN	No	1	No	DCU	ACU
LAN	No	2.5	No	EUT	ACU

Measurement Equipm	nent				
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Power Meter	Hewlett Packard	E4418A	SPA	07/23/2004	24 mo
Power Sensor	Hewlett-Packard	8481H	SPB	07/23/2004	24 mo
RF Detector	RLC Electronics	CR-133-R	ZZA	NCR	NA
Oscilloscope	Tektronix	TDS 3052	TOF	07/21/2004	12 mo
Signal Generator	Hewlett Packard	8341B	TGN	01/23/2004	13 mo

**Requirement:** Per 47 CFR 2.1046, the conducted power output was measured at the RF output terminals after the tune-up procedure.

**Configuration:** The peak output power was measured with the EUT set to low, medium, and high transmit frequencies. The peak measurement was made using a direct connection between the RF output of the EUT and a RF detector diode. The output of the diode was measured with the oscilloscope. The signal generator, tuned to the transmit frequency, was then substituted for the EUT. The CW output of the signal generator was adjusted until the output of the RF detector diode match the level produced when connected to the EUT. The power meter and sensor were then used to measure the output power level of the signal generator.

Completed by:	
AJU.K.P	

NORTHWEST EMC		EMISSIONS	DATA SH	EET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0 Work Order: RAFN0043					RAFN0043
Serial Number:	12104320038				Date:	11/15/04
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	NS					
Specification:	47 CFR 2.1046	Year: Most Current	Method:	TIA / EIA 603	Year:	2001
SAMPLE CALCULATI	ONS					
COMMENTS						
EUT OPERATING MO	DES					
Modulated by PRBS a	it maximum data rate. at maximur	n output power.				
DEVIATIONS FROM TEST STANDARD						
None						
REQUIREMENTS						
Maximum peak condu	cted output power is measured.					
RESULTS	•••		AMPLITUDE			
Pass 16.44 mW (Cellular band), 36.98 mW (PCS band)						
SIGNATURE			·			
Tested By:	ADU.K.P					
DESCRIPTION OF TES	ST					
	0	utput Power - Low,	Mid, & High C	Channels		

# Cellular Band

Frequency (MHz)	Power (mW)
869.20	13.58
880.40	16.44
893.80	15.60

# PCS Band

Frequency (MHz)	Power (mW)
1930.20	22.70
1960.00	36.98
1989.80	26.67





### Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated:	
GSM Low Band (Cellular)	
GSM High Band (PCS)	

### Data Rates Investigated: Maximum

### Output Power Setting(s) Investigated: Maximum

Software\Firmware Applied During Test						
Exercise software	Plat_Maint	Version	1.5.048			
Description						
The system was tested using special software developed to test all functions of the device during the test.						
The software allowed the transmit channel, modulation type, and data rate to be selected.						

EUT and Peripherals							
Description	Manufacturer	Model/Part Number	Serial Number				
Backplane	Radio Frame Networks	RFU	N/A				
GSM Radio Blade (EUT)	RadioFrame Networks, Inc.	GSM NA BV Release 1.0	12104320038				

Remote Equipment Outside of Test Setup Boundary						
Description	Manufacturer	Model/Part Number	Serial Number			
DCU	Radio Frame Networks	Digital Chassis Unit	E0032			
PC	Dell	Inspiron 1100	07899029300023			
ACU	Radio Frame Networks	Airlink Chassis Unit	E0001			
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary						



Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	1.0	No	PC	DCU
LAN	No	1	No	DCU	ACU
LAN	No	2.5	No	EUT	ACU

Measurement Equipment						
Description	Manufacturer	Model	Identifier	Last Cal	Interval	
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo	

**Requirement:** Per 47 CFR 22.917, and 24.238, the peak conducted power of spurious emissions, up to the  $10^{th}$  harmonic of the transmit frequency, must be less than or equal to -13 dBm. Per 47 CFR 2.1051, the spurious emissions were measured at the RF output terminals with analyzer plots made for each modulation type.

**Configuration:** A spectrum analyzer was used to scan from 0 to 20 GHz. A 1MHz resolution bandwidth was used. No video filtering was employed. A 20dB external attenuator was used on the RF input of the spectrum analyzer.

### **Test Setup Diagram**



Completed by:	
ADU.K.P	

NORTHWEST							
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01		
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043		
Serial Number:	12104320038			Date:	11/15/04		
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F		
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%		
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06		
TEST SPECIFICATION	IS						
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001		
SAMPLE CALCULATI	ONS						
COMMENTS							
	DES						
Modulated by PRBS a	DES It maximum data rate, at maximum	output power					
DEVIATIONS FROM T	EST STANDARD						
None							
REQUIREMENTS							
The peak conducted r	oower of spurious emissions, up to	o the 10th harmonic of the transm	nit frequency, must be less than or equal to -1	3 dBm			
RESULTS	•						
Pass							
SIGNATURE							
Tested By:							
DESCRIPTION OF TE	ST						
	Spurious Co	onducted Emission	is - Low Channel - Cellula	r Band			

# Spurious Conducted Emissions - Low Channel - Cellular Band

I

	Mkr 897MHz	*-40.6	OdBm				Tek
20.0	Ref Lv1*20.0d	Bm	10dB/		Atten 100	1B	
10.0							
10.0							
0.0			· · · · · · · · · · · · · · · · · · ·				
-10.0							
-20.Q							
-30.Q							
-40.0						]	<
-50.Q	Marth 1- angle of a later to a second	uninger.)	Nora-walanteria wa angana matakata katakata	man had mar mar and	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	aipledentwite-act	heartyperman
-60.0							
-70.0							
-80.0							
	OMHz	to	1.000GHz	·			
	ResBW 1MHz		VidBW 7MHz		SWP	20m5	
	LEVEL	SPAN	Mkr 897MHz				
	KINOB 2	KNOB 1	KEYPAD	Tektronix	2784		

NORTHWEST							
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01		
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043		
Serial Number:	12104320038			Date:	11/15/04		
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F		
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%		
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06		
TEST SPECIFICATION	IS						
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001		
SAMPLE CALCULATI	ONS						
COMMENTS							
	DES						
Modulated by PRBS a	DES It maximum data rate, at maximum	output power					
DEVIATIONS FROM T	EST STANDARD						
None							
REQUIREMENTS							
The peak conducted r	oower of spurious emissions, up to	o the 10th harmonic of the transm	nit frequency, must be less than or equal to -1	3 dBm			
RESULTS	•						
Pass							
SIGNATURE							
Tested By:							
DESCRIPTION OF TE	ST						
	Spurious Co	onducted Emission	is - Low Channel - Cellula	r Band			

# Spurious Conducted Emissions - Low Channel - Cellular Band

I

								Tek
20.0	Ref Lv1*20.0dH	Bm		10dB/		Atten 10	цВ	
10.0								
10.0								
0.0				· · · · · · · · · · · · · · · · · · ·				
-10.0				· ·				
-20.0								
-30.Q				· · · · · · · ·				
-40.0								
-50.Q	Julia anti-materia	water and the second state of the second states and the second sta	winderman	millippingues mandatures	about the second and a second	- Andrew May Anno	murphyllin	antheliteranteration
-60.0				•				
-00.0								
-70.0				•				
-80.0				:				
	999MHz	to	6.500	DGHz				
	ResBW 1MHz		Vid	lBW 7MHz		SWP	55mS	
	LEVEL	SPAN	Sto	op 6.500GHz				
	KINOB 2	KNOB 1	KEY	'PAD	Tektronix	2784		

NORTHWEST							
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01		
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043		
Serial Number:	12104320038			Date:	11/15/04		
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F		
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%		
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06		
TEST SPECIFICATION	IS						
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001		
SAMPLE CALCULATI	ONS						
COMMENTS							
	DEC						
Modulated by PRBS a	DES It maximum data rate, at maximum	output power					
DEVIATIONS FROM T	EST STANDARD						
None							
REQUIREMENTS							
The peak conducted r	oower of spurious emissions, up to	o the 10th harmonic of the transm	nit frequency, must be less than or equal to -1	3 dBm			
RESULTS	•						
Pass							
SIGNATURE							
Tested By:							
DESCRIPTION OF TE	ST						
	Spurious Co	onducted Emission	is - Low Channel - Cellula	r Band			

# Spurious Conducted Emissions - Low Channel - Cellular Band

I

					Tek				
20.0	Ref Lv1*20.0dBm	1	10dB/	Atten 1	DdB				
10.0									
0.0									
-10.0									
-20.Q									
-30.Q									
-40.Q									
-50.0	when when by the of many product	warman wed att Mary and a star	-tophysion and a start with a start of the	mandenson with more mine adamption	warman and the second many and the second states and the second				
-60.0									
-70.Q			· · · · · · · · · · · · · · · · · · ·						
-80.0									
	6.499GHz	to	10.000GHz						
	ResBW 1MHz		VidBW 7MHz	SWI	9 35mS				
	LEVEL	SPAN	Stop 10.000GHz						
	KNOB 2	KNOB 1	KEYPAD T	ektronix 2784					
NORTHWEST									
--------------------------	------------------------------------	----------------------------------	-------------------------------------------------	--------------	----------------------	--	--	--	--
EMC		EMISSIONS I	DATA SHEET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043				
Serial Number:	12104320038			Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F				
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	IS								
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001				
SAMPLE CALCULATION	ONS								
					l				
COMMENTS									
EUT OPERATING MO	DES								
Modulated by PRBS a	t maximum data rate, at maximum.	output power.							
<b>DEVIATIONS FROM T</b>	EST STANDARD								
None									
REQUIREMENTS									
The peak conducted p	oower of spurious emissions, up to	the 10th harmonic of the transmi	it frequency, must be less than or equal to -13	dBm					
RESULTS									
Pass									
SIGNATURE									
Tested By:	Tasted By:								
DESCRIPTION OF TES	ST								
	Spurious Co	onducted Emission	s - Mid Channel - Cellular	Band					

	Mkr 899MHz	*-39.80	DdBm				Tek
20.0	Ref Lv1*20.0d	Bm	10dB/		Atten 100	1B	
10.0							
10.0							
0.0			· · ·				
-10.0							
-20.Q							
-30.Q							
-40.Q			:				
-50.Q	har and a short where the second second	www.unnerman.m.k.	any marked and some marked where	munuharranteriprotection	mhummun	munun	muhlerithuren
-60.0							
-70.0							
-80.0							
	OMHz	to	1.000GHz				
	ResBW 1MHz		VidBW 7MHz		SWP	20mS	
	LEVEL	SPAN	Mkr 899MHz				
	KNOB 2	KNOB 1	KEYPAD	Tektronix	2784		

NORTHWEST									
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043				
Serial Number:	12104320038			Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F				
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	IS								
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001				
SAMPLE CALCULATI	ONS								
					I				
COMMENTS									
COMMENTS									
EUT OPERATING MO	DES								
Modulated by PRBS a	at maximum data rate. at maximum	output power.							
DEVIATIONS FROM T	EST STANDARD								
None									
REQUIREMENTS									
The peak conducted r	power of spurious emissions, up to	o the 10th harmonic of the transmi	it frequency, must be less than or equal to -13	3 dBm					
RESULTS									
Pass									
SIGNATURE									
Tested By:	A DU. K.P								
DESCRIPTION OF TES	ST								
	Spurious Co	onducted Emission	is - Mid Channel - Cellular	Band					

							Tek
20.0	Ref Lv1*20.0dH	Зm	10dB/	,	Atten 100	ıв	
10.0			:				
0.0			· · ·				
-10.0							
-20.0							
20.0							
-30.0							
-40.0							
-50.0	energialistics	internation and the second and the s	marken and marken and the	Annonin non boling and	her the service and	hand for the second states	ingerally which a should
-60.0							
-70.0							
-80.0			- - -				
	999MHz	to	6.500GHz				
	ResBW 1MHz		VidBW 7MHz		SWP	55mS	
	LEVEL	SPAN	Stop 6.500GHz				
	KNOB 2	KNOB 1	KEYPAD	Tektronix	2784		

NORTHWEST									
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043				
Serial Number:	12104320038			Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F				
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	IS								
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001				
SAMPLE CALCULATI	ONS								
					I				
COMMENTS									
COMMENTS									
EUT OPERATING MO	DES								
Modulated by PRBS a	at maximum data rate. at maximum	output power.							
DEVIATIONS FROM T	EST STANDARD								
None									
REQUIREMENTS									
The peak conducted r	power of spurious emissions, up to	o the 10th harmonic of the transmi	it frequency, must be less than or equal to -13	3 dBm					
RESULTS									
Pass									
SIGNATURE									
Tested By:	A DU. K.P								
DESCRIPTION OF TES	ST								
	Spurious Co	onducted Emission	is - Mid Channel - Cellular	Band					

								Tek
20.0	Ref Lv1*20.0dBn	n		10dB/		Atten 10	цВ	
10.0								
10.0				•				
0.0				· :				
-10.0								
-20.0								
-30.0								
-40.0								
-50.Q	and the second state of the second	the second way was a second way	warder and whether	he have have been and a fight	re allowed a molecular	warning to a state of the	www.	www.antine.en.tersteinether
-60.0				•				
-70.0								
-80.0	6 499CH7	to	10,00063		1	<u> </u>		<u> </u>
	ResBW 1MHz		VidBW	7MHz		SWP	35mS	
	LEVEL	SPAN	Stop	10.000GHz				
	KNOB 2	KNOB 1	KEYPA	.D T	ektronix	2784		

NORTHWEST									
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043				
Serial Number:	12104320038			Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F				
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	NS								
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001				
SAMPLE CALCULATI	IONS								
COMMENTS									
EUT OPERATING MO	DES								
Modulated by PRBS a	at maximum data rate, at maximum	output power.							
<b>DEVIATIONS FROM T</b>	EST STANDARD								
None									
REQUIREMENTS									
The peak conducted p	power of spurious emissions, up to	o the 10th harmonic of the transm	it frequency, must be less than or equal to	-13 dBm					
RESULTS									
Pass									
SIGNATURE									
Tested By:	Tested By:								
DESCRIPTION OF TE	ST								
	Spurious Co	Inducted Emission	s - High Channel - Cellu	lar Band					
	Opunious ou		3 - Thyn Onarmer - Oenu						

# Spurious Conducted Emissions - High Channel - Cellular Band

	Mkr 883MHz	*_	40.20dBm						Tek
20.0	Ref Lv1*20.	OdBm		10d)	в/		Atten 100	1B	
40.0				- - -					
10.0				: : :					
0.0				· ·					
-10.0									
-20.Q									
-30.Q									
-40.Q								<del>```</del>	
-50.Q	him more and any more thanks	and the property of the second s	the state of the s	address and	and here a water	antash-servicester	- for the second second	networkships	housember
-60.0				· · · · · · · · · · · · · · · · · · ·					
-00.0				- - -					
-70.0				· ·					
-80.Q				:					
	OMHz	to	1.0	OOGHz					
	ResBW 1MHz			idBW 7MHz			SWP	20mS	
	LEVEL	SPAN	M	kr 883MHz					
	KNOB 2	KNOB 1	K	EYPAD	Tek	tronix	2784		

NORTHWEST						
EMC		EMISSIONS I	DATA SH	EET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043
Serial Number:	12104320038				Date:	11/15/04
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	IS					
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001
SAMPLE CALCULATI	ONS					
COMMENTS						
EUT OPERATING MOD	DES					
Modulated by PRBS a	t maximum data rate, at maximum	output power.				
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
The peak conducted p	ower of spurious emissions, up to	the 10th harmonic of the transmi	it frequency, must be le	ss than or equal to -	13 dBm	
RESULTS						
Pass						
SIGNATURE						
Tested By:	AJU.K.P					
DESCRIPTION OF TH	eT.					
DESCRIPTION OF TEX		male at a d Emission			n Dan d	
	Spurious Co	nducted Emissions	s - Hign Chan	inel - Cellula	ir Band	

# Spurious Conducted Emissions - High Channel - Cellular Band

									Tek
20.0	Ref Lv1*20.00	dBm		10dB,	/		Atten 100	ıв	
10.0									
10.0				:					
0.0									
-10.0									
-20.0				•					
-30.Q				· · · · · · · ·					
-40.Q									
-50.Q	man man and a stand and a st	www.rettlerever.everstandatesta	www.alaranawarthan	and an an and the second states and	والمراجع أورابهم وارسليرانهم	induanter and	trapped and the second	rghizeta, white backing the	weeks and the second
-60.0				• • •					
				: :					
-70.Q				· · ·					
-80.Q				•					
	999MHz	to	6.50	)OGHz					
	ResBW 1MHz		Vi	dBW 7MHz			SWP	55mS	
	LEVEL	SPAN	St	op 6.500GH:	z				
·	KNOB 2	KNOB 1	KE	YPAD	Tek	tronix	2784		

NORTHWEST									
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043				
Serial Number:	12104320038			Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F				
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	NS								
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001				
SAMPLE CALCULATI	IONS								
COMMENTS									
EUT OPERATING MO	DES								
Modulated by PRBS a	at maximum data rate, at maximum	output power.							
<b>DEVIATIONS FROM T</b>	EST STANDARD								
None									
REQUIREMENTS									
The peak conducted p	power of spurious emissions, up to	o the 10th harmonic of the transm	it frequency, must be less than or equal to	-13 dBm					
RESULTS									
Pass									
SIGNATURE									
Tested By:	Tested By:								
DESCRIPTION OF TE	ST								
	Spurious Co	Inducted Emission	s - High Channel - Cellu	lar Band					
	Opunious ou		3 - Thyn Onarmer - Oenu						

# Spurious Conducted Emissions - High Channel - Cellular Band

							Tek
20.0	Ref Lv1*20.0dB	m	10dB/		Atten 100	1B	
10.0							
10.0							
0.0			· · ·				
-10.0							
-20.0			:				
-30.Q							
-40.0							
-50.0	were the set of the second	and the second which which	monormaloustantestations	www.		un an Anna an Anna an Anna an Anna an Anna Ann	an have made and
-60.0							
			:				
-70.0							
-80.0							
	6.499GHz	to	10.000GHz				
	ResBW 1MHz		VidBW 7MHz		SWP	35mS	
	LEVEL	SPAN	Stop 10.000GHz				
	KINOB 2	KNOB 1	KEYPAD	Tektronix	2784		

				Rev BETA
FUT: CSM NA BV Palasse 1.0			Work Order:	01/30/01
Serial Number: 12104320038			Date:	11/15/04
Customer: RadioFrame Networks. Inc.			Temperature:	73 F
Attendees: Dean Busch	Dean Busch Tested by: Greg Kiemel			41%
Customer Ref. No.: N/A	Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATIONS				
Specification: 47 CFR 2.1051, 22.917, 24.238 Year: Most Current	Method:	TIA / EIA 603	Year:	2001
SAMPLE CALCULATIONS				
COMMENTS				
Modulated by PRBS at maximum data rate, at maximum output power.				
DEVIATIONS FROM TEST STANDARD				
None				
REQUIREMENTS				
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit f	requency, must be le	ss than or equal to -13	dBm	
RESULTS				
Pass				
SIGNATURE				
Tested By:				
DESCRIPTION OF TEST				
Spurious Conducted Emission	s - Low Cha	nnel - PCS E	Band	

								Tek
20.0	Ref Lv1*20.0dBm	ì		10dB/		Atten 100	18	
10.0								
0.0				•				
-10.0				•				
-20.0				•				
-30.Q				· · ·				
-40.0								
-50.Q	Mangangang ang ang ang ang ang ang ang an	upiplinintenetedportane	suffer the reverse of the rest	Khodhaalaansaadhaa	ulyna,wyddanau/Muh.	Warner and an advertise of the standing of the	Mar Marker Markhow	and the second
-60.0				•				
-70.0				•				
-80.0				•				
	OMHz	to	1.000GHz					
	ResBW 1MHz		VidBW 7MHz			SWP	20mS	
	LEVEL	SPAN	Strt OMH	Z				
	KNOB 2	KNOB 1	KEYPAD	Te	ktronix	2784		

NORTHWEST					
EMC		EMISSIONS I	DATA SHEET		Rev BETA 01/30/01
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043
Serial Number:	12104320038			Date:	11/15/04
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	IS				
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001
SAMPLE CALCULATI	ONS				
COMMENTS					
EUT OPERATING MOI	DES				
Modulated by PRBS a	t maximum data rate, at maximum	output power.			
DEVIATIONS FROM T	EST STANDARD				
None					
REQUIREMENTS	ever of environe emissions up to	e the 10th hormonic of the transmi	the frequency must be less than an equal to 12	d Day	
The peak conducted p	ower of spurious emissions, up to	) the 10th narmonic of the cansing	t frequency, must be less than or equal to -13	abm	
RESULTS					
Pass					
SIGNATURE					
	An U.K.P				
Tested By:	14				
DESCRIPTION OF TH	ST				
DESCRIPTION OF TEX	Securious (	Conducted Emissie	no Low Channel DCS E	) and	
	Spurious (	Jonauctea Emissio	ns - Low Channel - PCS E	Jand	

	Mkr 1.9	973GHz	*-4:	3.70dBm						Tek
20.0	Ref Lvl*2	20.0dBm				10dB/		Atten 10	ЗB	
10.0										
0.0										
_10_0										
-10.0										
-20.0										
-30.0										
-40.0		K	. I. L	a welde blanderster	p. www.dest-ster	Manadaraharantar	an what with a state strate	an water and a state	any transferment	Walk you for the second with the
-50.Q	<u>~</u>	1.14-14-13-18 WP	64.44-40487098000 T 18	<b>~~~</b>						
-60.0						•				
-70.0										
-80.0						•				
	999 <b>M</b> Hz		to	6.5	OOGHz					
	ResBW 1M	Hz		V:	idBW 7MH	Iz		SWP	55mS	
	LEVEL		SPAN	M	tr 1.9	973GHz				
	KNOB 2		KNOB 1	KI	EYPAD	Т	ektronix	2784		

NORTHWEST								
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01			
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043			
Serial Number:	12104320038			Date:	11/15/04			
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F			
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%			
Customer Ref. No.:	N/A	Job Site:	EV06					
TEST SPECIFICATION	NS							
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001			
SAMPLE CALCULATI	ONS							
COMMENTS								
COMMENTS								
FUT OPERATING MO	DES							
Modulated by PRBS a	t maximum data rate, at maximum	output power.						
DEVIATIONS FROM T	EST STANDARD							
None								
REQUIREMENTS								
The peak conducted r	power of spurious emissions, up to	o the 10th harmonic of the transm	it frequency, must be less than or equal to	-13 dBm				
RESULTS								
Pass								
SIGNATURE								
Tested By:	Tested By:							
DESCRIPTION OF TES	ST							
	Spurious (	<b>Conducted Emissic</b>	ons - Low Channel - PCS	Band				

							Tek
20.0	Ref Lv1*20.0dB	m	10dB/		Atten 100	1B	
10.0							
10.0							
0.0							
-10.0							
-20.0							
-30.0							
-40.0							
-50.0	Maker and the advertised	warden to der the and when the	adular and deverse with and when your drive	Manna water and	******************************	nerel Andrewski, ale	ungungen with the
-30.0							
-60.0							
-70.0			· · ·				
-80.0			:				
	6.499GHz	to 1	0.000GHz				
	ResBW 1MHz		VidBW 7MHz		SWP	35mS	
	LEVEL	SPAN	Stop 10.000GHz				
	KINOB 2	KNOB 1	KEYPAD T	ektronix	2784		

NORTHWEST								
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01			
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043			
Serial Number:	12104320038			Date:	11/15/04			
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F			
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%			
Customer Ref. No.:	N/A	Job Site:	EV06					
TEST SPECIFICATION	NS							
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001			
SAMPLE CALCULATI	ONS							
COMMENTS								
COMMENTS								
FUT OPERATING MO	DES							
Modulated by PRBS a	t maximum data rate, at maximum	output power.						
DEVIATIONS FROM T	EST STANDARD							
None								
REQUIREMENTS								
The peak conducted r	power of spurious emissions, up to	o the 10th harmonic of the transm	it frequency, must be less than or equal to	-13 dBm				
RESULTS								
Pass								
SIGNATURE								
Tested By:	Tested By:							
DESCRIPTION OF TES	ST							
	Spurious (	<b>Conducted Emissic</b>	ons - Low Channel - PCS	Band				

					Tek
20.0	Ref Lv1*20.0dB	Bm	10dB/	Atten 10d	IB
10.0					
10.0					
0.0			· · · · · · · · · · · · · · · · · · ·		
-10.0					
-20.0					
-30.0					
-40.0					
-50.0	www.	nuther warder and the product of the second	man and a state of the second and a second and	with and the mention of the second second	weight with the set of
-60.0					
-70.0			· · ·		
-80.0			:		
	9.90GHz	to	20.00GHz		
	ResBW 1MHz		VidBW 7MHz	SWP	100mS
	LEVEL	SPAN	Stop 20.00GHz		
	KNOB 2	KNOB 1	KEYPAD Te	ktronix 2784	

NORTHWEST							
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01		
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043		
Serial Number:	12104320038			Date:	11/15/04		
Customer:	RadioFrame Networks, Inc.	RadioFrame Networks, Inc.					
Attendees:	Dean Busch	Humidity:	41%				
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06		
TEST SPECIFICATION	IS						
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001		
SAMPLE CALCULATI	ONS						
COMMENTS							
EUT OPERATING MO	DES						
Modulated by PRBS a	t maximum data rate, at maximum	output power.					
<b>DEVIATIONS FROM T</b>	EST STANDARD						
None							
REQUIREMENTS							
The peak conducted p	power of spurious emissions, up to	o the 10th harmonic of the transm	nit frequency, must be less than or equal to -1	3 dBm			
RESULTS							
Pass							
SIGNATURE							
Tested By:							
DESCRIPTION OF TES	ST						
	Spurious	<b>Conducted Emissi</b>	ons - Mid Channel - PCS E	Band			

							Tek
20.0	Ref Lv1*20.0dBn	n	10dB/		Atten 100	18	
10.0							
10.0							
υ.υ							
-10.0							
-20.0							
-30.0							
-40.Q							
-50.0	where a gradient water and a state of the st	contraction and the second second	emals. Tomate and a manufacture and	and south and the second	hydron and the second	where a stand where the	an-handrakelangskalags
-60.0							
-70.0							
_90_0							
00.0	OMHz	to	' 1.000GHz	1			
	ResBW 1MHz		VidBW 7MHz		SWP	20mS	
	LEVEL	SPAN	Strt OMHz				
'	KNOB 2	KNOB 1	KEYPAD	Tektronix	2784		

NODTHWEAT						
FMC		<b>EMISSIONS</b>	DATA SH	EET		Rev BETA
	CONTRACTOR				West Orden	01/30/01
EUI:	GSM NA BV Release 1.0				Work Order:	RAFN0043
Serial Number:	12104320038				Date:	11/15/04
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F
Attendees:	Dean Busch Tested by: Greg Kiemel				Humidity:	41%
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATION	IS					
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001
SAMPLE CALCULATION	ONS					
COMMENTS						
EUT OPERATING MOI	DES					
Modulated by PRBS a	t maximum data rate, at maximum	output power.				
DEVIATIONS FROM T	EST STANDARD					
None						
REQUIREMENTS						
The peak conducted p	oower of spurious emissions, up to	o the 10th harmonic of the transmi	it frequency, must be le	ess than or equal to -1	3 dBm	
RESULTS			-			
Pass						
SIGNATURE						
	An U.K.f					
	$\sim (12)$					
Tested By:						
DESCRIPTION OF TES	ST					
	Spurious	Conducted Emissic	ne Mid Cha	nnol DCS E	Rand	
	Spunous	Conducted Emissic	ons - ivilu Cha	innei - PC3 c	banu	

					Tek
20.0	Ref Lv1*20.0d	Bm	10dB/	Atten 10	dB
10.0		1			
10.0					
0.0			· · · · · · · · · · · · · · · · · · ·		
-10.0					
-20.0					
-30.0					
-40.0			:		
-50.0	administration and	hammenter	mound-independences where an address show the	www.herbourd.her.go.go.go.go.go.go.go.go.go.go.go.go.go.	how we have a second of the
-60.0					
-70.0					
-80.0			· · · ·		
	999MHZ ResBW 1MHz	to	6.500GHz VidBM 7MHz	SWP	55m3
	LEVEL	SPAN	Strt 999MHz		
	KNOB 2	KNOB 1	KEYPAD Te	ektronix 2784	

NORTHWEST										
EMC		<b>EMISSIONS</b>	DATA SH	EET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043				
Serial Number:	12104320038				Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F				
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	IS									
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001				
SAMPLE CALCULATI	ONS									
COMMENTS										
COMMENTS										
EUT OPERATING MO	DES									
Modulated by PRBS a	t maximum data rate, at maximum	output power.								
DEVIATIONS FROM T	EST STANDARD									
None										
REQUIREMENTS										
The peak conducted p	oower of spurious emissions, up to	the 10th harmonic of the transm	it frequency, must be le	ess than or equal to -	13 dBm					
RESULTS										
Pass										
SIGNATURE										
Tested By:	Tested By:									
DESCRIPTION OF TE	ST									
	Spurious	Conducted Emissic	one - Mid Cha	nnol - PCS	Band					
	Spurious	Soliducied Ellissic	JIIS - IVIIU CIIA		Sanu					

					Tek
20.0	Ref Lv1*20.0d	Bm	10dB/	Atten 10	DdB
10.0					
10.0					
0.0			· · ·		
-10.0					
-20.0					
-30.0					
-40.0					
-50.0	and and the second second states	rody advance of a construction of the second	the second and the se	and the space of the second second second	+++++++++++++++++++++++++++++++++++++++
60.0					
-00.0					
-70.0			· · · · · · · · · · · · · · · · · · ·		
-80.0			:		
	6.499GHz	to	10.000GHz		
	ResBW 1MHz		VidBW 7MHz	SWF	35mS
	LEVEL	SPAN	Stop 10.000GHz		
	KINOB 2	KNOB 1	KEYPAD T	ektronix 2784	

NORTHWEST									
EMC		EMISSIONS	DATA SHEET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0			Work Order:	RAFN0043				
Serial Number:	12104320038			Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.			Temperature:	73 F				
Attendees:	Dean Busch		Tested by: Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power: 120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	IS								
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method: TIA / EIA 603	Year:	2001				
SAMPLE CALCULATIONS									
COMMENTS									
EUT OPERATING MO	DES								
Modulated by PRBS a	t maximum data rate, at maximum	output power.							
<b>DEVIATIONS FROM T</b>	EST STANDARD								
None									
REQUIREMENTS									
The peak conducted p	power of spurious emissions, up to	o the 10th harmonic of the transm	nit frequency, must be less than or equal to -1	3 dBm					
RESULTS									
Pass									
SIGNATURE									
Tested By:	Tested By:								
DESCRIPTION OF TES	ST								
	Spurious	<b>Conducted Emissi</b>	ons - Mid Channel - PCS E	Band					

										Tek
20.0	Ref Lv1*2	0.0dBm			1	DdB/		Atten 100	1B	
10.0										
10.0					:					
0.0					· ·					
-10.0					:					
-20.0										
-30.0					· · · · · ·					
-40.0					· · · · · · · · · · · · · · · · · · ·					
	moder the spectra and the second	www.	have the state of	Ja Jon Marthale	hold wat the the stin	granner, tother windstage	With de floor and a stranger	Lawyerston and the second	, Margan and Margan	writeren open begref in fattere
-50.0			<b>1</b>							
-60.0										
-70.0					:					
-80.0										
	9.90GH	Iz	to	20.	OOGHz					
	ResBW 1MH	Iz		V:	idBW 7MHz			SWP	100mS	
	LEVEL		SPAN	St	top 20.00	GHz				
	KNOB 2		KNOB 1	KI	EYPAD	Te	ktronix	2784		

NORTHWEET										
EMC		EMISSIONS I	DATA SH	EET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043				
Serial Number:	12104320038				Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F				
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	IS									
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001				
SAMPLE CALCULATIONS										
COMMENTS										
COMMENTS										
EUT OPERATING MO	DES									
Modulated by PRBS a	t maximum data rate, at maximum	output power.								
<b>DEVIATIONS FROM T</b>	EST STANDARD									
None										
REQUIREMENTS										
The peak conducted p	oower of spurious emissions, up to	the 10th harmonic of the transmi	it frequency, must be le	ess than or equal to -1	3 dBm					
RESULTS										
Pass										
SIGNATURE										
Tested By:	Tested By:									
DESCRIPTION OF TES	ST									
	Spurious C	Conducted Emission	ns - High Cha	annel - PCS	Band					

					Tek
20.0	Ref Lv1*20.0dB	m	10dB/	Atten	10dB
40.0					
10.0					
0.0			· · ·		
-10.0					
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-50.Q	here prove with more marked	n mar and the stand of the state		the last last and a second and the second	water and the state of the stat
-60.0					
-70.0					
-80.0					
	OMHz	to	1.000GHz		
	ResBW 1MHz		VidBW 7MHz	s	WP 20mS
	LEVEL	SPAN	Strt OMHz		
	KNOB 2	KNOB 1	KEYPAD	Tektronix 2784	ł

NORTHWEET										
EMC		EMISSIONS I	DATA SH	EET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043				
Serial Number:	12104320038				Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F				
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	IS									
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001				
SAMPLE CALCULATIONS										
COMMENTS										
COMMENTS										
EUT OPERATING MO	DES									
Modulated by PRBS a	t maximum data rate, at maximum	output power.								
<b>DEVIATIONS FROM T</b>	EST STANDARD									
None										
REQUIREMENTS										
The peak conducted p	oower of spurious emissions, up to	the 10th harmonic of the transmi	it frequency, must be le	ess than or equal to -1	3 dBm					
RESULTS										
Pass										
SIGNATURE										
Tested By:	Tested By:									
DESCRIPTION OF TES	ST									
	Spurious C	Conducted Emission	ns - High Cha	annel - PCS	Band					

Spurious Conducted Emissions - High Channel - PCS Band

								Tek
20.0	Ref Lv1*20.0dBm			10dB/		Atten 100	iB	
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-10.0				· :				
-20.0								
-30.0				· · · · · · · ·				
-40.0				:				
-50.Q	John Start S	-	have been and the second of th	have an apply and an	whenty the mentions	a more and my states	hay well where we have	Manadad and Andrews
-60.0				- - - -				
70.0								
-70.0				: : :				
-80.0	000884		6 500CW-					
	ResBW 1MHz		VidBW 7M	Hz		SWP	55mS	
	LEVEL	SPAN	Stop 6	.500GHz				
I	KINOB 2	KNOB 1	KEYPAD	Te	ktronix	2784		

NORTHWEET										
EMC		EMISSIONS I	DATA SH	EET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043				
Serial Number:	12104320038				Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F				
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	IS									
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001				
SAMPLE CALCULATIONS										
COMMENTS										
COMMENTS										
EUT OPERATING MO	DES									
Modulated by PRBS a	t maximum data rate, at maximum	output power.								
<b>DEVIATIONS FROM T</b>	EST STANDARD									
None										
REQUIREMENTS										
The peak conducted p	oower of spurious emissions, up to	the 10th harmonic of the transmi	it frequency, must be le	ess than or equal to -1	3 dBm					
RESULTS										
Pass										
SIGNATURE										
Tested By:	Tested By:									
DESCRIPTION OF TES	ST									
	Spurious C	Conducted Emission	ns - High Cha	annel - PCS	Band					

					Tek
20.0	Ref Lv1*20.0dB	Bm	10dB/	Atten 10	dB
_					
10.0			· · · · ·		
0.0					
-10.0					
-20.0					
-30.0					
-40.0					
-50.0	washing and the survey of the second	water ward and the show	en marine rates allow and on the marine was an and	Mullimber mark the wards have	man more description of many
60.0					
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-70.0			· ·		
-80.0			•		
	6.499GHz	to	10.000GHz		
	ResBW 1MHz		VidBW 7MHz	SWP	35mS
	LEVEL	SPAN	Stop 10.000GHz		
	KINOB 2	KNOB 1	KEYPAD Te	ktronix 2784	

NORTHWEET										
EMC		EMISSIONS I	DATA SH	EET		Rev BETA 01/30/01				
EUT:	GSM NA BV Release 1.0				Work Order:	RAFN0043				
Serial Number:	12104320038				Date:	11/15/04				
Customer:	RadioFrame Networks, Inc.				Temperature:	73 F				
Attendees:	Dean Busch		Tested by:	Greg Kiemel	Humidity:	41%				
Customer Ref. No.:	N/A		Power:	120VAC/60Hz	Job Site:	EV06				
TEST SPECIFICATION	IS									
Specification:	47 CFR 2.1051, 22.917, 24.238	Year: Most Current	Method:	TIA / EIA 603	Year:	2001				
SAMPLE CALCULATIONS										
COMMENTS										
COMMENTS										
EUT OPERATING MO	DES									
Modulated by PRBS a	t maximum data rate, at maximum	output power.								
<b>DEVIATIONS FROM T</b>	EST STANDARD									
None										
REQUIREMENTS										
The peak conducted p	oower of spurious emissions, up to	the 10th harmonic of the transmi	it frequency, must be le	ess than or equal to -1	3 dBm					
RESULTS										
Pass										
SIGNATURE										
Tested By:	Tested By:									
DESCRIPTION OF TES	ST									
	Spurious C	Conducted Emission	ns - High Cha	annel - PCS	Band					

									Tek
20.0	Ref Lv1*20.	OdBm		10dB,	/		Atten 100	ıв	
10.0									
10.0									
0.0				· ·					
-10.0									
-20.0				· · · · · · · · · · · · · · · · · · ·					
-30.0									
-40.0				:					
-50.Q	warry white the states	man when a way the start when	preserve and the second	warmon American Make	man phone with	ANNING WARNED	inger of the states of the	Mayorandund	here and the second
-60.0									
70.0				-					
-80.0				- - - - -					
	9.90GHz	to	20.	OOGHz					
	ResBW 1MHz		v:	idBW 7MHz			SWP	100mS	
	LEVEL	SPAN	St	top 20.00GHz					
	KNOB 2	KNOB 1	KI	EYPAD	Tekt	ronix	2784		





#### Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated:	
GSM Low Band (Cellular)	
GSM High Band (PCS)	

#### Data Rates Investigated: Maximum

#### Output Power Setting(s) Investigated: Maximum

Power Input Settings Investigated: 120 VAC, 60 Hz.

Other Settings Investigated: Antennas ports terminated

Software\Firmware Appli	ed During Test											
Exercise software	Plat_Maint	Version	1.5.048									
Description												
The system was tested usi	ing special software develo	ped to test all functions of t	the device during the test.									
The software allowed the t	ransmit channel, modulatio	in type, and data rate to be	selected.									

<b>EUT and Peripherals</b>	EUT and Peripherals														
Description	Manufacturer	Model/Part Number	Serial Number												
Antenna	LINX	ANT-2.4-RCT-SS	N/A												
Backplane	Radio Frame Networks	RFU	N/A												
GSM Radio Blade (EUT)	RadioFrame Networks, Inc.	GSM NA BV Release 1.0	12104320038												

# **Spurious Radiated Emissions**

Remote Equipme	Remote Equipment Outside of Test Setup Boundary													
Description	Manufacturer	Model/Part Number	Serial Number											
DCU	Radio Frame Networks	Digital Chassis Unit	E0032											
PC	Dell	Inspiron 1100	07899029300023											
ACU	Radio Frame Networks	Airlink Chassis Unit	E0001											
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary														

Cables	Cables													
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2									
Serial	Yes	1.0	No	PC	DCU									
LAN	No	1	No	DCU	ACU									
LAN	No	2.5	No	EUT	ACU									

Measurement Equipr	ment					
Description	Manufacturer	Model	Identifier	Last Cal	Interval	
Spectrum Analyzer	Hewlett- Packard	8566B	AAL	12/23/2003	13 mo	
Quasi-Peak Adapter	Hewlett- Packard	85650A	AQF	12/23/2003	13 mo	
Antenna, Biconilog	EMCO	3141	AXE	12/03/2003	24 mo	
Pre-Amplifier	Amplifier Research	LN1000A	APS	02/05/2004	13 mo	
Antenna, Horn	EMCO	3115	AHC	09/07/2004	12 mo	
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/05/2004	13 mo	
Antenna, Horn	EMCO	3160-09	AHG	NCR	NA	
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	10/08/2003	12 mo	
Antenna, Horn	EMCO	3160-08	AHK	NCR	NA	
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	10/08/2003	12 mo	
Attenuator		2082-6148-20	ATE	02/03/2004	13 mo	
High Pass Filter Micro-Tronics		HPM50111	HFO	04/13/2004	13 mo	
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo	

#### **Test Description**

**<u>Requirement:</u>** Per 2.1053, the field strength of spurious radiation was measured in the far-field at an FCC Listed semi-anechoic chamber up to 25 GHZ. The applicable limits are 22.917(e) for the cellular band, and 24.238(a) for the PCS band.

Per 22.917(e), the mean power of out of band 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. (-13 dBm).

Per 24.238(a), on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. (-13 dBm).



**Configuration:** Spectrum analyzer, signal generator, and linearly polarized antennas were used to measure radiated harmonics and spurious emissions. The orientation of the EUT and measurement antenna were manipulated to maximize the level of emissions. The EUT was configured to transmit at the highest output at low, mid, and high channels.

The substitution method as described in TIA/EIA-603 Section 2.2.12 was used for the highest spurious emissions. The EUT was tested individually, then while simultaneously transmitting with a co-located radio.

Test Methodology: For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.12 describes a method for measuring radiated emissions that utilizes an antenna substitution method:

At an approved test site, the transmitter is place on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a 1/2 wave dipole that is successively tuned to each of the highest emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (ERP or e.i.r.p) is determined for each radiated emission.

For the purposes of preliminary measurements, the field strength of the spurious emissions can be measured and compared with a 3 meter limit. The final measurements must be made utilizing the substitution method described above. The 3 meter limit was calculated to be 84.3 dBuV/m at 3 meters. This was based upon an output power of 0.224 W.

The spectrum was scanned throughout the specified range. While scanning, emissions from the radios were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antennas in three orthogonal axes, and adjusting the measurement antenna height and polarization (per ANSI C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Bandwidths Used for Me	asurements		
Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
Measurements were n	hade using the bandwidths	and detectors specified. No	video filter was used

Completed by: Holy Aligh



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	UT Padio	Blad	GSM															M	lork	Order	RAF	N0043	10/22/200
Serial Numb	per: 12104	3200	38																VOIR	Date:	11/11	/04	
Custom	ner: Radio	frame	e Netw	orks,	Inc.													Те	mpei	rature:	73		
Attende	es: Dean	Busc	h																Hur	nidity:	34%	_	
Cust. Ref. N	lo.:	Achk	onnoil							1	Dave		4201/	AC 6	01-		Barc	metri	ic Pre	essure	30.15	5	
Tested	ATIONS	ASNK	annejr	nad							Pow	er:	1200	AC, 6	UHZ				JO	b Site:	EVUI		
Specificati	on: FCC 2	2.917	7(e)																	Year:	2003		
Meth	od: TIA/E	A-60	3																	Year:	2001		
SAMPLE CALCU	JLATION	3																					
Radiated Emission	ons: Field St	rength	= Measu	ured Lev	el + Anten	na Factor	+ Cab	le Facto	or - A	mplifi	er Gai	n + D	listanc	e Adjus	stment	Factor	+ Externa	al Atter	nuatio	n			
Conducted Emissio	ons: Adjuste	d Level	l = Meas	ured Lev	vel + Trans	sducer Fa	ctor +	Cable A	Attenu	ation	Facto	r + E:	xterna	Attenu	lator								
Stand alone configu	ration.																						
and alone comiga																							
EUT OPERATIN	G MODES	3																					
SSM Lowband, Cha	nnel																						
				_																			
DEVIATIONS FR	OM TEST	STA	NDAR	D																			
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-60.0																							_
70.0																							
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Eron		T		T	Azimuth	Linia						Т	Del	ority :		a ato -			-		S	Limit	Compared
Freq (MH=)					(degrees)	(mete	ers)						Pol	anty	Det	ector			= (d	IRP Bm)	Spec. (dF	. Linit 3m)	opec. (dB)
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			Ap	pare	nt	Powe	er Dat	a She	et			RE df4
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Serial Num	per: 12104320	100, 0311 NA							wor	Norder:	11/11/04	3
Custon	ner: Radiofra	me Networks	, Inc.						Temp	erature:	73	
Attende	es: Dean Bu	sch	,						Ĥ	umidity:	34%	
Cust. Ref. I	No.:						-		Barometric F	Pressure	30.15	
Tested	by: Holly Asl	hkannejhad				Pow	ver: 120VAC, 6	50Hz		lob Site:	EV01	
TEST SPECIFIC	ATIONS											
Specificati	on: FCC 22.9	17(e)								Year:	2003	
		503								rear:	2001	
Radiated Emissi	ons: Field Streng	th = Measured L	evel + Antenna	Factor + Cabl	le Facto	r - Amplifier Gai	n + Distance Adiu	stment Factor + F	xternal Attenuat	ion		
Conducted Emissi	ons: Adjusted Le	vel = Measured I	Level + Transdu	ucer Factor + C	Cable At	tenuation Facto	r + External Atten	uator				
COMMENTS												
Stand alone configu	iration.											
GSM Lowband, Mid	Channel											
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DEVIATIONS EF	OM TEST ST											
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(MHz)			(degrees)	(meters)						(dBm)	(dBm)	(dB)
2641.2	200		299.0	1.5			V-Horn	PK		-57.6	-13.0	-44.
2641.	200		202.0	1.0			H-Horn	PK		-58.9	-13.0	-45.
1760.0	200		289.0	1.3			V-Horn	PK DV		-59.0	-13.0	-46.
1700.0	500		∠04.0	1.2				гN		-02.4	-13.0	-49.

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Custor	ner: Radio	frame	Netwo	orks	. Inc.														Те	mper	ature:	73	04		
Attende	ees: Dean	Busc	h		,															Hur	nidity:	34%			
Cust. Ref.	No.:																	Baro	metri	c Pre	essure	30.15			
Tested	by: Holly	Ashka	annejha	ad								Powe	r: 120	VAC,	60Hz					Jo	b Site:	EV01			
TEST SPECIFIC	ATIONS																								
Specificat	ion: FCC 2	22.917	'(e)																		Year:	2003			
Meth	nod: TIA/E	IA-603	3																		Year:	2001			
SAMPLE CALC	ULATION	S							_								_								
Radiated Emiss	ions: Field St	rength :	= Measur	ed Lo	evel + Ar	ntenna	Factor ·	+ Cabl	le Fact	tor - A	Amplifie	r Gain	+ Dista	nce Adju	ustmen	it Facto	or + E	xternal	I Atter	uatio	n				
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#### Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:	
Low (1)	
High (11)	

Operating Modes Investigated:
GSM channels 128, 184, 210, 251 : 802.11(b) channel 11
GSM Highband (PCS) channels 512, 610, 710, 810 - 802.11b/g Channel 11
GSM Highband (PCS) channels 512, 610, 710, 810 - 802.11b/g Channel 1

# Data Rates Investigated:

Maximum

### **Output Power Setting(s) Investigated:**

Maximum

# **Power Input Settings Investigated:**

120 VAC, 60 Hz.

Software\Firmware Applied During Test				
Exercise software	Plat_Maint	Version	1.5.048	
Description				
The system was tested using special software developed to test all functions of the device during the test.				
The software allowed the t	ransmit channel, modulatio	on type, and data rate to be	selected.	

EUT and Peripherals			
Description	Manufacturer	Model/Part Number	Serial Number
Antenna	LINX	ANT-2.4-RCT-SS	N/A
Backplane	Radio Frame Networks	RFU	N/A
(4) GSM Radio Blade	RadioFrame Networks, Inc.	GSM NA BV Release 1.0	none
802.11 b/g Radio	RadioFrame Networks, Inc.	iRAP	192168200215

Remote Equipment Outside of Test Setup Boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
DCU	Radio Frame Networks	Digital Chassis Unit	E0032		
PC	Dell	Inspiron 1100	07899029300023		
ACU Radio Frame Networks Airlink Chassis Unit E0001					
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary					

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	1.0	No	PC	DCU
LAN	No	1	No	DCU	ACU
LAN	No	2.5	No	EUT	ACU

Measurement Equipment					
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett- Packard	8566B	AAL	12/23/2003	13 mo
Quasi-Peak Adapter	Hewlett- Packard	85650A	AQF	12/23/2003	13 mo
Antenna, Horn	EMCO	3115	AHC	09/07/2004	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/05/2004	13 mo
Antenna, Horn	EMCO	3160-09	AHG	NCR	NA
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	10/08/2003	12 mo
Antenna, Horn	EMCO	3160-08	AHK	NCR	NA
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	10/08/2003	12 mo
Attenuator		2082-6148-20	ATE	02/03/2004	13 mo
High Pass Filter	Micro-Tronics	HPM50111	HFO	04/13/2004	13 mo
Spectrum Analyzer	Tektronix	2784	AÃO	02/26/2003	24 mo

#### **Test Description**

**<u>Requirement:</u>** Per 2.1053, the field strength of spurious radiation was measured in the far-field at an FCC Listed semi-anechoic chamber up to 25 GHZ. The applicable limits are 22.917(e) for the cellular band, and 24.238(a) for the PCS band.

Per 22.917(e), the mean power of out of band 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. (-13 dBm).

Per 24.238(a), on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. (-13 dBm).

**Configuration:** Spectrum analyzer, signal generator, and linearly polarized antennas were used to measure radiated harmonics and spurious emissions. The orientation of the EUT and measurement antenna were manipulated to maximize the level of emissions. The EUT was configured to transmit at the highest output at low, mid, and high channels.



The substitution method as described in TIA/EIA-603 Section 2.2.12 was used for the highest spurious emissions. The EUT was tested individually, then while simultaneously transmitting with a co-located radio.

**Test Methodology:** For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.12 describes a method for measuring radiated emissions that utilizes an antenna substitution method:

At an approved test site, the transmitter is place on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a ½ wave dipole that is successively tuned to each of the highest emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (ERP or e.i.r.p) is determined for each radiated emission.

For the purposes of preliminary measurements, the field strength of the spurious emissions can be measured and compared with a 3 meter limit. The final measurements must be made utilizing the substitution method described above. The 3 meter limit was calculated to be 84.3 dBuV/m at 3 meters. This was based upon an output power of 0.224 W.

The spectrum was scanned throughout the specified range. While scanning, emissions from the radios were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antennas in three orthogonal axes, and adjusting the measurement antenna height and polarization (per ANSI C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Bandwidths Used for Measurements			
Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used			

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S	erial Numb	er:	vario	ous	;																								Date	: 11/	17/04		
	Custom	er:	Rad	iofr	am	e N	etw	ork	s, Ir	nc.																	Te	mpe	rature	: 73			
	Attende	es:	Dea	n B	usc	:h																						Hu	midity	: 37%	6		
С	Cust. Ref. N	o.:																							E	Barom	netri	c Pr	essure	e 30.1	15		
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