Digi International

WMP100 GSM Cellular Modem

EMC Test Report

Report No. DGII0004

Report Prepared By

NORTHWEST EMC

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

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Last Date of Test: March 12, 2010

Digi International

Model: WMP100 GSM Cellular Modem

Emissions			
Test Description	**Specification**	**Test Method**	**Pass/Fail**
Field Strength of Spurious Emissions	FCC 24E:2010	ANSI/TIA/EIA-603-C-2004	**Pass**
Field Strength of Spurious Emissions	FCC 22H:2010	ANSI/TIA/EIA-603-C-2004	**Pass**
Effective Radiated Power (EIRP)	FCC 24E:2010	ANSI/TIA/EIA-603-C-2004	**Pass**
Effective Radiated Power (ERP)	FCC 22H:2010	ANSI/TIA/EIA-603-C-2004	**Pass**

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.
9349 W Broadway Ave.
Brooklyn Park, MN 55445

Phone: (763) 425-2281 Fax: (763) 424-3469

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834E-1).

Approved By:

Don Facteau, IS Manager

NVLAP

NVLAP Lab Code: 200881-0

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
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

Accreditations and Authorizations

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 accredited under the United States Department of Commerce, National Institute of Standards and Technology, and 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 2004/108/EC, and ANSI C63.4. 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.

NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 200676-0
NVLAP LAB CODE 200761-0
NVLAP LAB CODE 200881-0

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-Gen, Issue 2 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. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1)*

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.

NEMKO

Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).

Accreditations and Authorizations

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 Numbers. - Hillsboro: C-1071, R-1025, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634).*

BSMI

Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement (US0017). 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

KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (*Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157)*

VIETNAM

Vietnam MIC has approved Northwest EMC as an accredited test lab. Per Decision No. 194/QD-QLCL (dated December 15, 2009), Northwest EMC test reports can be used for Vietnam approval submissions.

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

Northwest EMC Locations

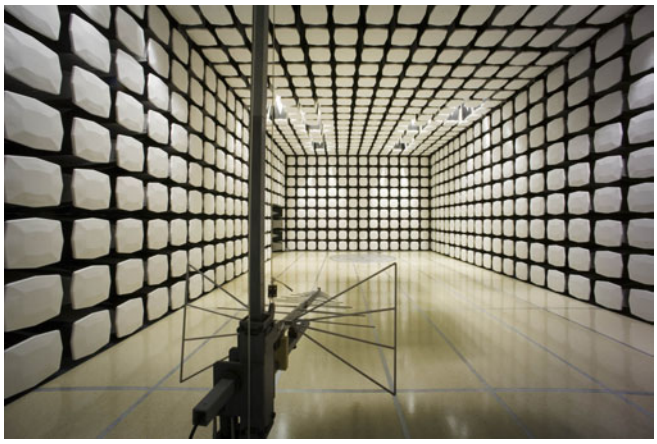
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

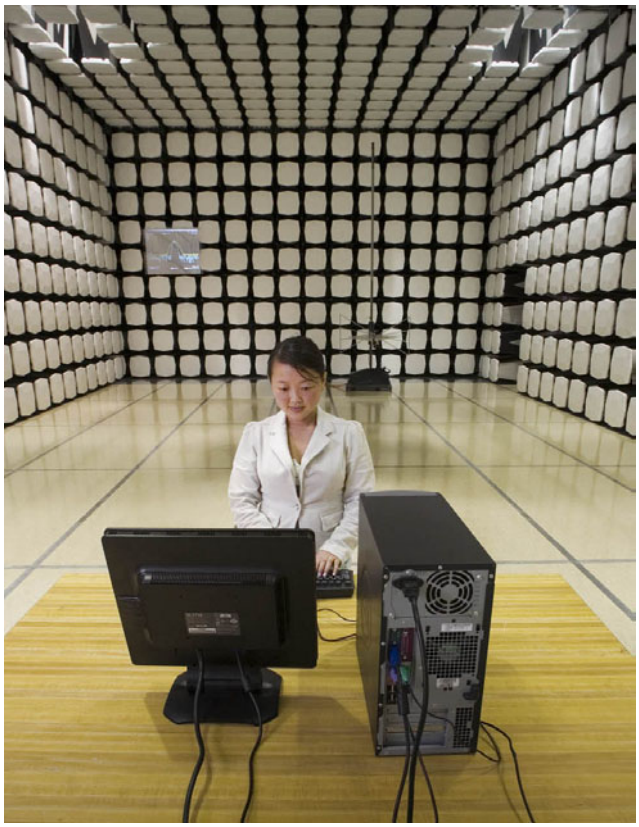
California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

Minnesota
Labs MN01-MN08
9349 W Broadway Ave.
Brooklyn Park,
MN 55445
(763) 425-2281

Washington
Labs SU01-SU07
14128 339th Ave. SE
Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796





Party Requesting the Test

Company Name:	Digi International
Address:	11001 Bren Road East
City, State, Zip:	Minnetonka, MN 55343
Test Requested By:	Nathan Carlson
Model:	WMP100 GSM Cellular Modem
First Date of Test:	March 9, 2010
Last Date of Test:	March 12, 2010
Receipt Date of Samples:	March 9, 2010
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

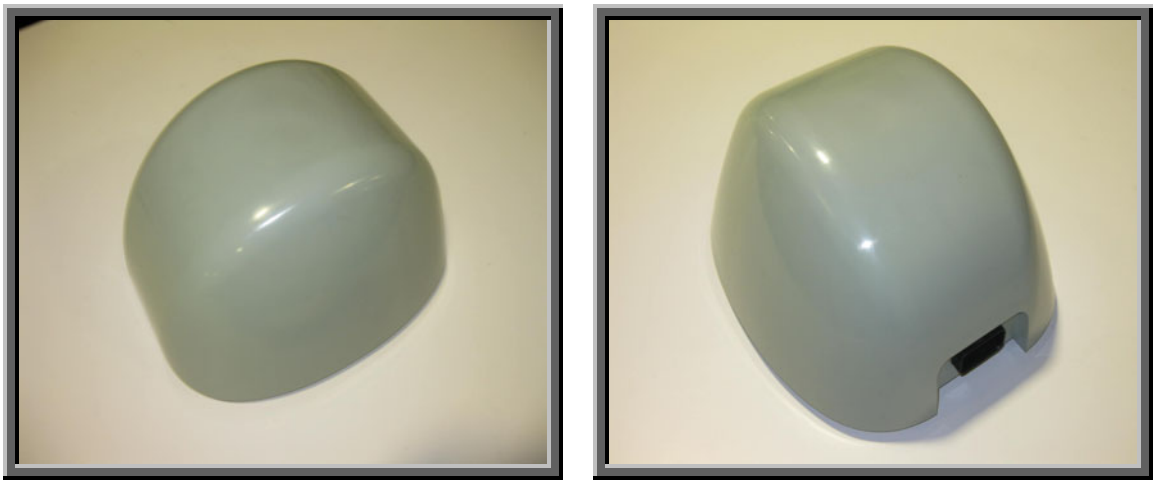
Functional Description of the EUT (Equipment Under Test):

WWAN Radio that has been previously certified under FCC ID: O9EWMP100

Testing Objective:

To demonstrate compliance of the WWAN radio to the radiated power and spurious radiated emissions requirements of FCC Part 22 and 24.

EUT Photo



CONFIGURATION 1 DGII0004

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
WMP100 GSM Cellular Modem	Digi International	50001730-xx	749360096105201

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Power Supply	Radio Shack	22-507	None
Dell Laptop	Dell	PP03L	CN-09P917-70166-328-609K

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
IO Bundle	No	3.5m	No	WMP100 GSM Cellular Modem	Dell Laptop
DC Power	No	2m	No	WMP100 GSM Cellular Modem	DC Power Supply
AC Power	No	1.8m	No	DC Power Supply	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	3/9/2010	Effective Radiated Power (ERP)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	3/10/2010	Effective Radiated Power (EIRP)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	3/12/2010	Field Strength of Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

Field Strength of Spurious Emissions

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
GPRS_CELL
GSM_CELL

CHANNELS OF OPERATION
Low Channel, Ch. 512, 1850.2MHz
Mid Channel, Ch. 661, 1880MHz
High Channel, Ch. 810, 1909.8MHz

POWER SETTINGS INVESTIGATED
13.5 Vdc

CONFIGURATIONS INVESTIGATED
DGII0004 - 1

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30 MHz	Stop Frequency	10 GHz

SAMPLE CALCULATIONS
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Dipole	EMCO	3121C-DB4	ADI	1/5/2010	24 mo
.5-1 GHz Notch Filter	K&L Microwave	3TNF-500/1000-N/N	HFT	1/8/2010	13 mo
Antenna, Horn (DRG)	ETS Lindgren	3115	AIR	2/21/2009	24 mo
Universal Radio Communication	Rhode & Schwarz	CMU200	BSU	NCR	0 mo
High Pass Filter	Micro-Tronics	HPM50108	HGP	6/24/2009	13 mo
High Pass Filter	Micro-Tronics	LPM50003	HGO	6/24/2009	13 mo
MN05 Cables	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	7/1/2009	13 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	7/1/2009	13 mo
Antenna, Horn	ETS	3160-07	AXP	NCR	0 mo
Pre-Amplifier	Miteq	AM-1616-1000	AVY	7/1/2009	13 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	1/15/2010	13 mo
Antenna, Biconilog	ETS Lindgren	3142D	AXN	12/30/2009	13 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	7/1/2009	13 mo
MN05 Cables	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	7/1/2009	13 mo
Antenna, Horn (DRG)	ETS Lindgren	3115	AIP	12/22/2009	24 mo
Attenuator, 10db, 'SMA'	S.M. Electronics	SA18H-10	REN	6/18/2009	13 mo
Attenuator, 20 dB, 'SMA'	SM Electronics	SA6-20	REO	6/18/2009	13 mo
Spectrum Analyzer	Agilent	E4446A	AAT	12/12/2008	24 mo

MEASUREMENT BANDWIDTHS

	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.				

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and receiving while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes. A preamp and high pass filter were used for this test in order to provide sufficient measurement

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the lowest channel, a middle channel, and the highest channel available. The amplitude and frequency were noted. The EUT was then replaced with a horn antenna. A signal generator was connected to the horn antenna and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the gain (dBi) of the horn antenna the effective radiated power for each emission was determined.

NORTHWEST

EMC

Field Strength of Spurious Emissions

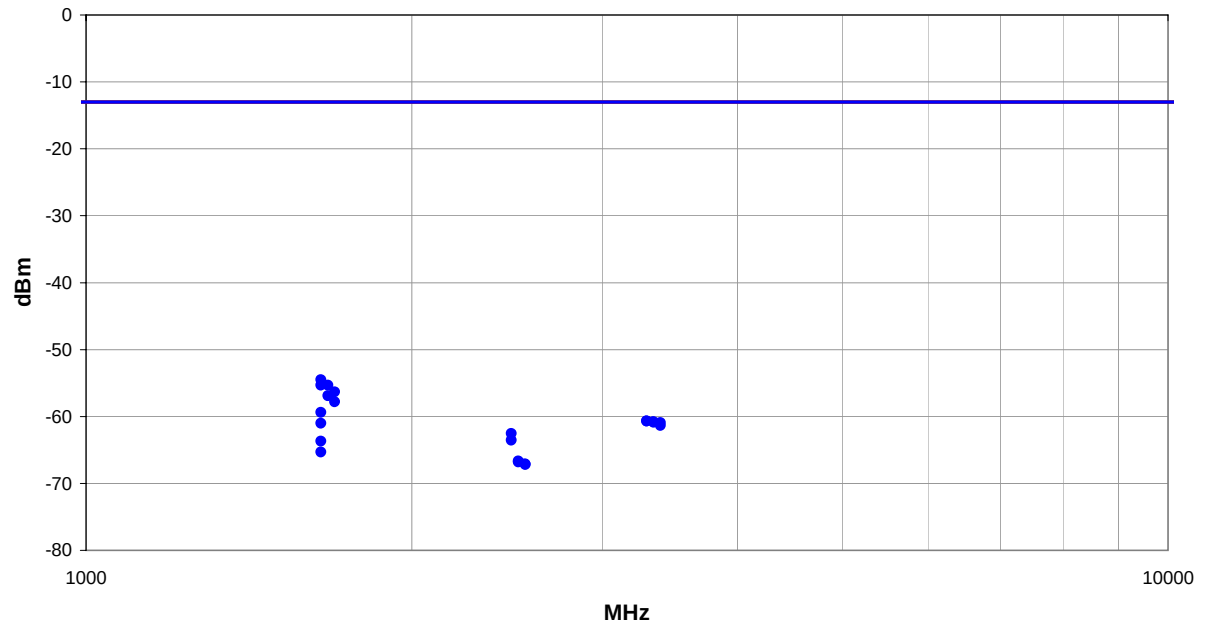
PSA-ESCI 2009.06.09
Version 2009.12.28

Work Order:	DGII0004	**Date:**	03/11/10	Trevor Buls	
Project:	None	**Temperature:**	23.7		
Job Site:	MN05	**Humidity:**	25.81		
Serial Number:	749360096105201	**Barometric Pres.:**	998.9	**Tested by:**	Trevor Buls

EUT:	WMP100 GSM Cellular Modem
Configuration:	1 - Basic Configuration
Customer:	Digi International
Attendees:	Nathan Carlson
EUT Power:	13.5 Vdc
Operating Mode:	GSM_CELL
Deviations:	No deviations.
Comments:	Radio on inside of the radome, control pc remote.

Test Specifications	**Test Method**
FCC 22H:2010	ANSI/TIA/EIA-603-C-2004

Run #	18	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**Results**	Pass



Freq (MHz)			Antenna Height (meters)	Azimuth (degrees)			Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
1648.500			1.2	21.0			Vert	PK	3.54E-09	-54.5	-13.0	-41.5
1648.442			1.2	204.0			Horz	PK	2.95E-09	-55.3	-13.0	-42.3
1673.088			2.0	195.0			Vert	PK	2.94E-09	-55.3	-13.0	-42.3
1697.617			1.6	192.0			Vert	PK	2.33E-09	-56.3	-13.0	-43.3
1673.138			1.2	147.0			Horz	PK	2.04E-09	-56.9	-13.0	-43.9
1697.504			1.3	192.0			Horz	PK	1.65E-09	-57.8	-13.0	-44.8
1648.608			1.2	4.0			Vert	PK	1.15E-09	-59.4	-13.0	-46.4
3296.675			1.2	245.0			Vert	PK	8.51E-10	-60.7	-13.0	-47.7
3296.625			1.2	246.0			Horz	PK	8.51E-10	-60.7	-13.0	-47.7
3346.158			1.0	53.0			Vert	PK	8.39E-10	-60.8	-13.0	-47.8
3346.850			1.0	248.0			Horz	PK	8.20E-10	-60.9	-13.0	-47.9
3395.208			1.8	237.0			Horz	PK	8.07E-10	-60.9	-13.0	-47.9
1648.258			1.2	348.0			Horz	PK	7.93E-10	-61.0	-13.0	-48.0
3394.962			1.6	229.0			Vert	PK	7.36E-10	-61.3	-13.0	-48.3
2472.667			1.6	193.0			Vert	PK	5.56E-10	-62.5	-13.0	-49.5
2473.000			1.6	200.0			Horz	PK	4.42E-10	-63.5	-13.0	-50.5
1648.375			1.2	0.0			Horz	PK	4.26E-10	-63.7	-13.0	-50.7
1648.500			1.2	12.0			Vert	PK	2.95E-10	-65.3	-13.0	-52.3
2509.938			1.4	189.0			Vert	PK	2.15E-10	-66.7	-13.0	-53.7
2509.596			1.3	20.0			Horz	PK	2.10E-10	-66.8	-13.0	-53.8

NORTHWEST

EMC

Field Strength of Spurious Emissions

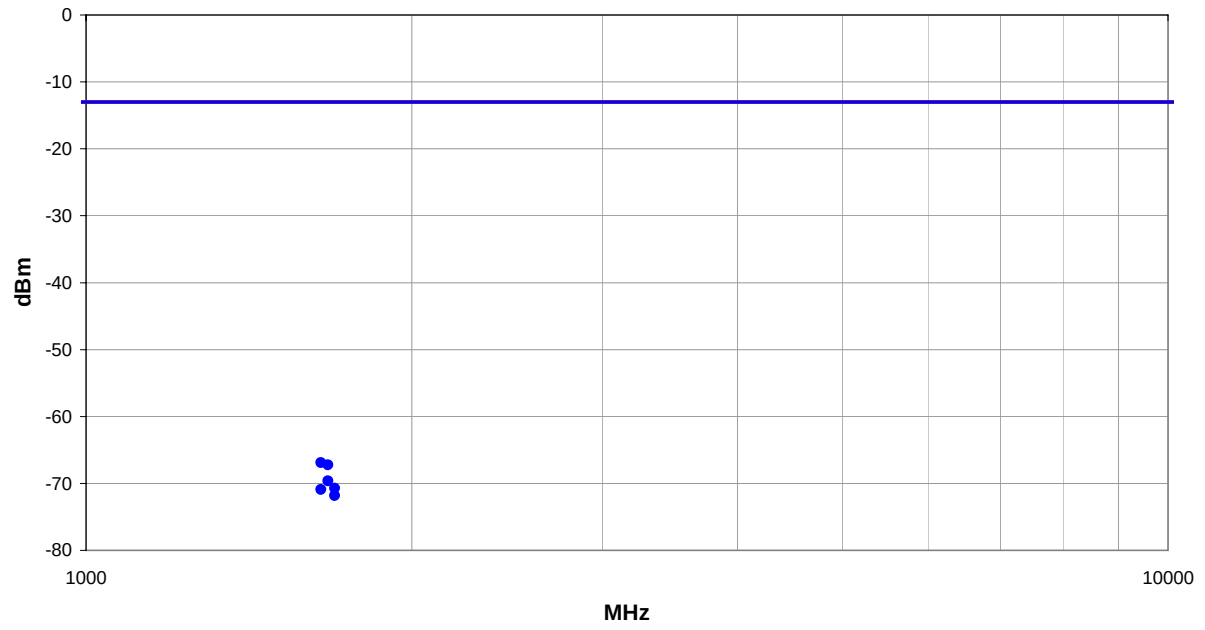
PSA-ESCI 2009.06.09
Version 2009.12.28

Work Order:	DGII0004	**Date:**	03/12/10	Trevor Buls	
Project:	None	**Temperature:**	23.7		
Job Site:	MN05	**Humidity:**	25.81		
Serial Number:	749360096105201	**Barometric Pres.:**	998.9	**Tested by:**	Trevor Buls

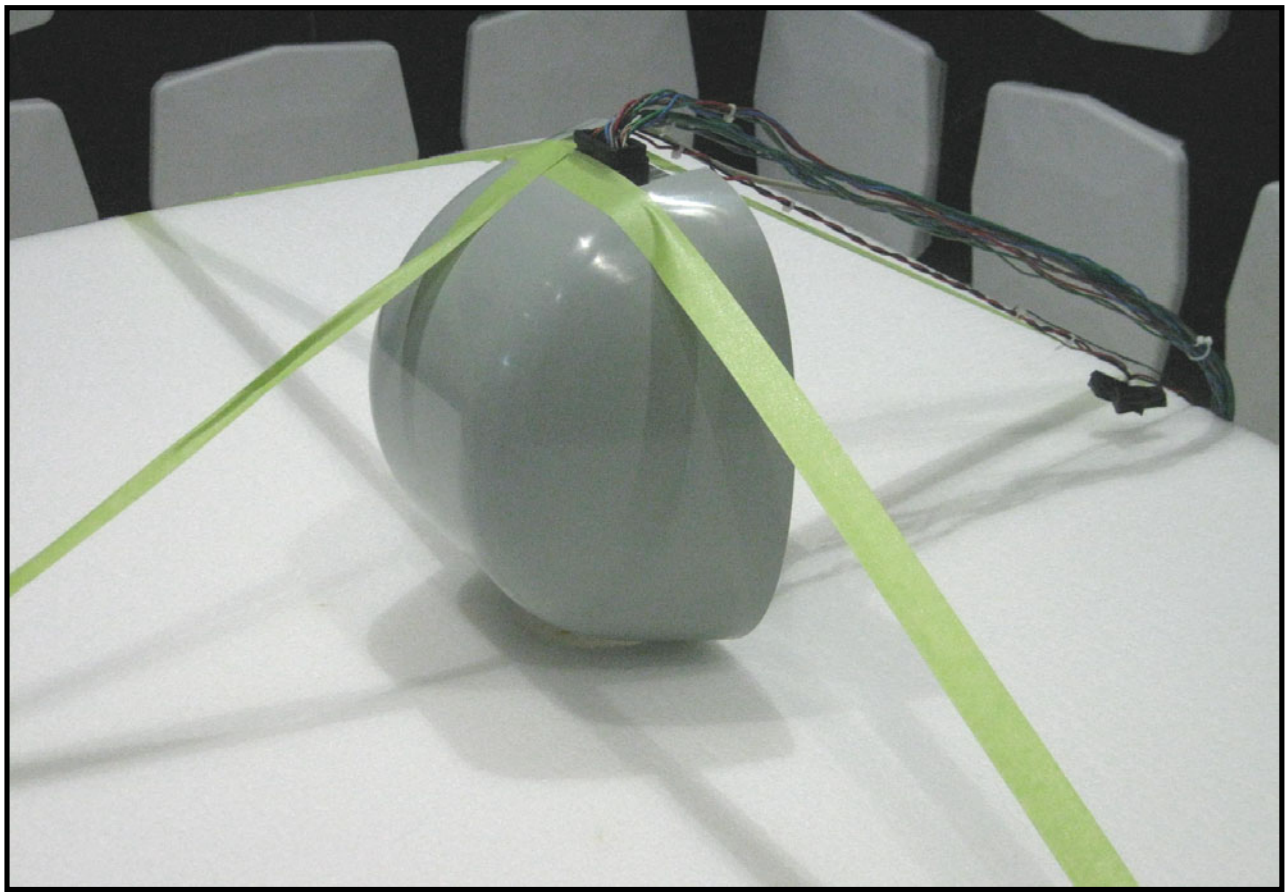
EUT:	WMP100 GSM Cellular Modem
Configuration:	1 - Basic Configuration
Customer:	Digi International
Attendees:	Nathan Carlson
EUT Power:	13.5 Vdc
Operating Mode:	GPRS_CELL
Deviations:	No deviations.
Comments:	Radio on inside of the radome, control pc remote.

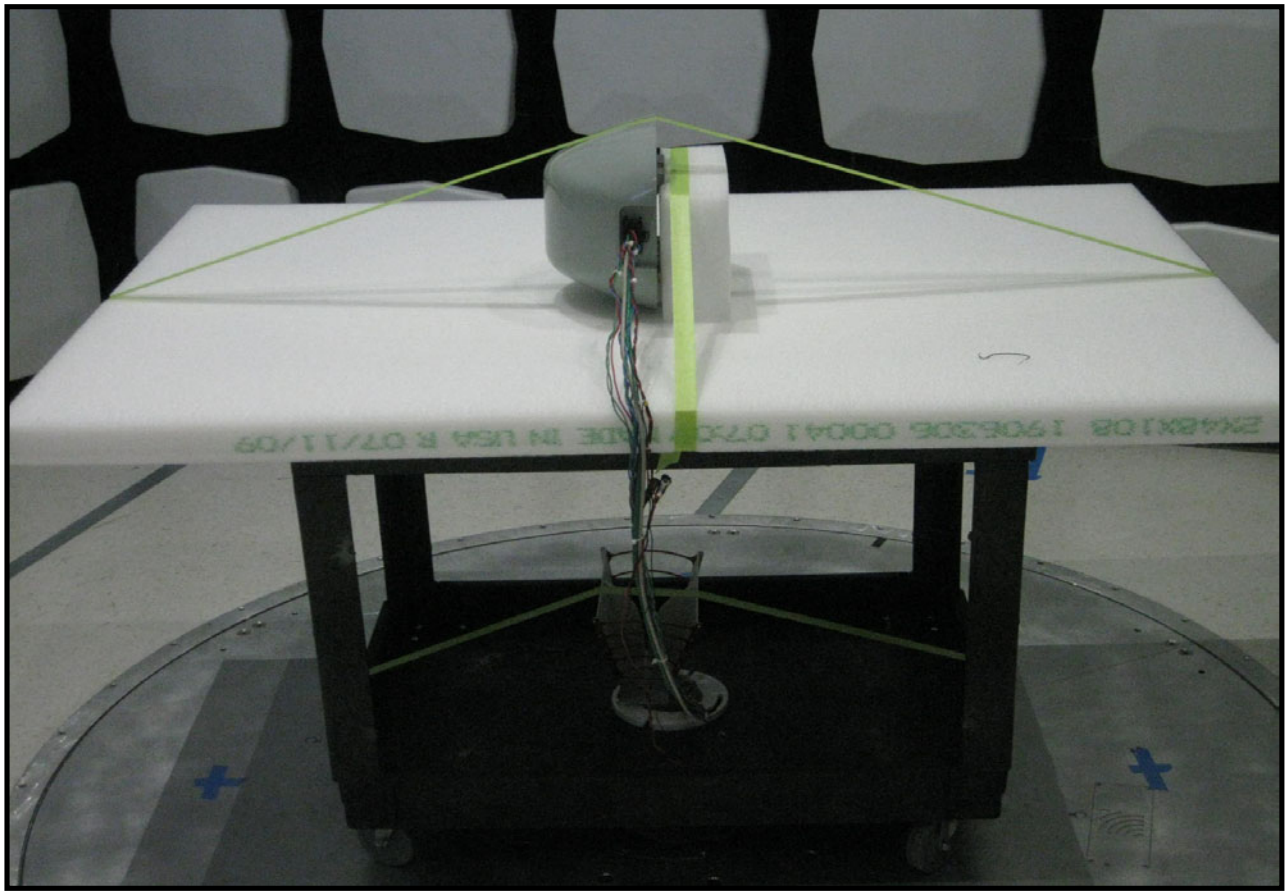
Test Specifications	**Test Method**
FCC 22H:2010	ANSI/TIA/EIA-603-C-2004

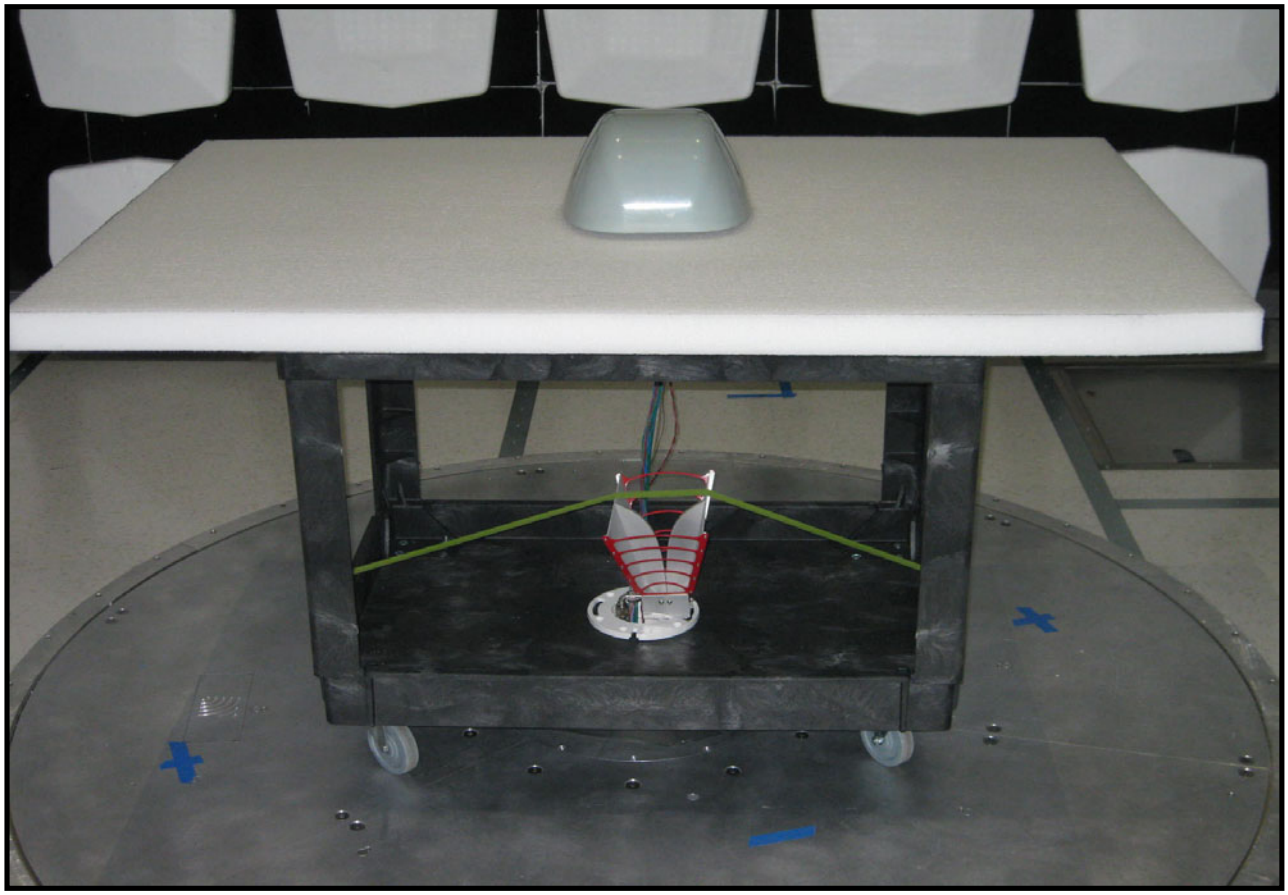
Run #	0	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**Results**	Pass



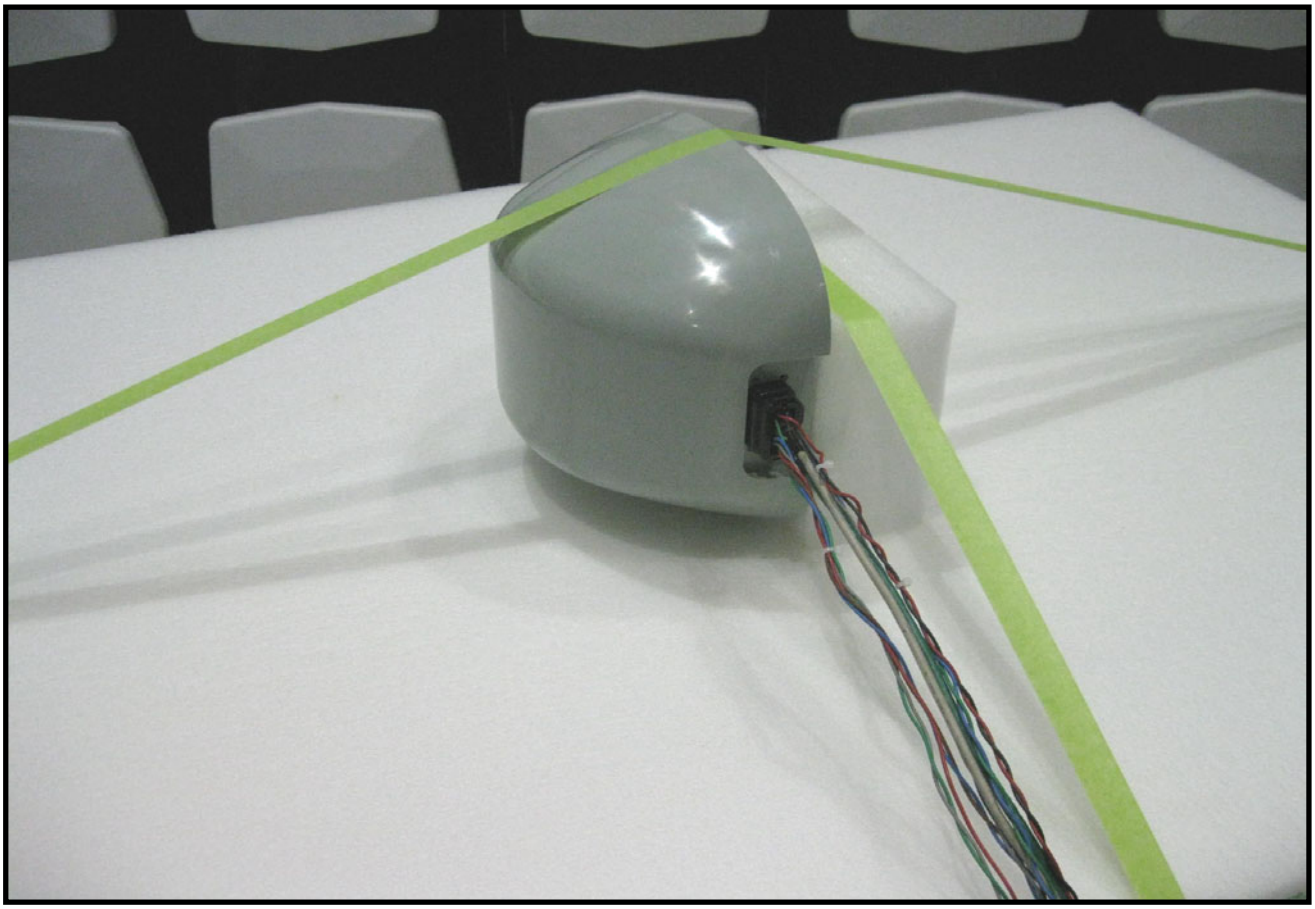
Freq (MHz)			Antenna Height (meters)	Azimuth (degrees)			Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
1648.146			1.2	185.0			Vert	PK	2.04E-10	-66.9	-13.0	-53.9
1672.967			1.2	9.0			Vert	PK	1.90E-10	-67.2	-13.0	-54.2
1673.327			1.3	208.0			Horz	PK	1.09E-10	-69.6	-13.0	-56.6
1697.947			1.2	234.0			Vert	PK	8.48E-11	-70.7	-13.0	-57.7
1648.118			1.2	213.0			Horz	PK	8.11E-11	-70.9	-13.0	-57.9
1697.159			1.2	218.0			Horz	PK	6.58E-11	-71.8	-13.0	-58.8







Field Strength of Spurious Emissions



EMC Field Strength of Spurious Emissions

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
GPRS_PCS
GSM_PCS

CHANNELS OF OPERATION
Low Channel, Ch.128, 824.2MHz
Mid Channel, Ch. 190, 836.6MHz
High Channel, Ch. 251, 848.8MHz

POWER SETTINGS INVESTIGATED
13.5 Vdc

CONFIGURATIONS INVESTIGATED
DGII0004 - 1

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30 MHz	Stop Frequency	20 GHz

SAMPLE CALCULATIONS
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Horn (DRG)	ETS Lindgren	3115	AIR	2/21/2009	24 mo
Universal Radio Communication Tester	Rhode & Schwarz	CMU200	BSU	NCR	0 mo
1-2 GHz Notch Filter	K&L Microwave	3TNF-1000/2000-N/N	HFU	1/8/2010	13 mo
High Pass Filter	Micro-Tronics	HPM50111	HGQ	6/24/2009	13 mo
Low Pass Filter	Micro-Tronics	LPM50004	HGK	7/24/2009	12 mo
MN05 Cables	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	7/1/2009	13 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	7/1/2009	13 mo
Antenna, Horn	ETS	3160-07	AXP	NCR	0 mo
Pre-Amplifier	Miteq	AM-1616-1000	AVY	7/1/2009	13 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	1/15/2010	13 mo
Antenna, Biconilog	ETS Lindgren	3142D	AXN	12/30/2009	13 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	7/1/2009	13 mo
MN05 Cables	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	7/1/2009	13 mo
Antenna, Horn (DRG)	ETS Lindgren	3115	AIP	12/22/2009	24 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	1/27/2010	13 mo
Antenna, Horn	ETS	3160-09	AHG	NCR	0 mo
MN05 Cables	ESM Cable Corp.	18-26GHz Standard Gain Horn Cable	EVD	1/27/2010	13 mo
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	7/1/2009	13 mo
Antenna, Horn	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Attenuator, 20 dB, 'SMA'	SM Electronics	SA6-20	REO	6/18/2009	13 mo
Attenuator, 10db, 'SMA'	S.M. Electronics	SA18H-10	REN	6/18/2009	13 mo
Spectrum Analyzer	Agilent	E4446A	AAT	12/12/2008	24 mo

MEASUREMENT BANDWIDTHS

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.

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and receiving while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes. A preamp and high pass filter were used for this test in order to provide sufficient measurement

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the lowest channel, a middle channel, and the highest channel available. The amplitude and frequency were noted. The EUT was then replaced with a horn antenna. A signal generator was connected to the horn antenna and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the gain (dBi) of the horn antenna the effective radiated power for each emission was determined.

NORTHWEST

EMC

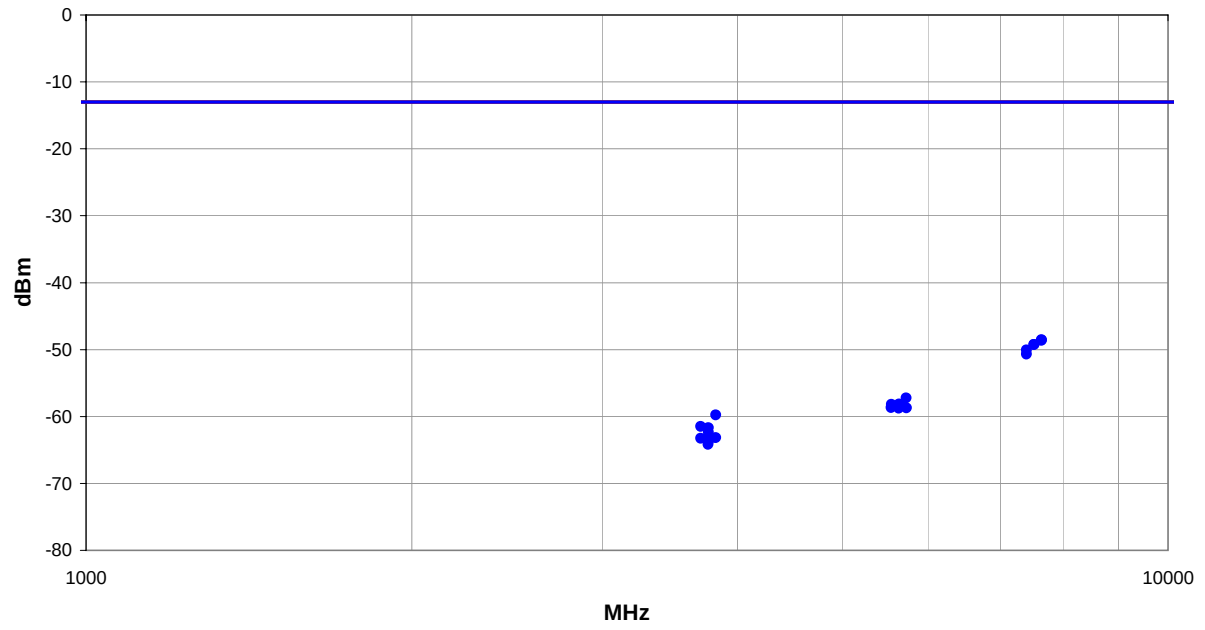
Field Strength of Spurious Emissions

PSA-ESCI 2009.06.09
Version 2009.12.28

Work Order:	DGII0004	**Date:**	03/12/10	Trevor Buls	
Project:	None	**Temperature:**	23.7		
Job Site:	MN05	**Humidity:**	25.81		
Serial Number:	749360096105201	**Barometric Pres.:**	998.9	**Tested by:**	Trevor Buls
EUT:	WMP100 GSM Cellular Modem				
Configuration:	1 - Basic Configuration				
Customer:	Digi International				
Attendees:	Nathan Carlson				
EUT Power:	13.5 Vdc				
Operating Mode:	GSM_PCS				
Deviations:	No deviations.				
Comments:	Radio on inside of the radome, control pc remote.				

Test Specifications	**Test Method**
FCC 24E:2010	ANSI/TIA/EIA-603-C-2004

Run #	30	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**Results**	Pass



Freq (MHz)			Antenna Height (meters)	Azimuth (degrees)			Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
7640.800			1.5	159.0			Vert	PK	1.40E-08	-48.5	-13.0	-35.5
7641.517			1.2	234.0			Horz	PK	1.37E-08	-48.6	-13.0	-35.6
7517.842			2.2	48.0			Vert	PK	1.19E-08	-49.2	-13.0	-36.2
7520.892			2.2	178.0			Horz	PK	1.19E-08	-49.2	-13.0	-36.2
7402.775			1.2	276.0			Horz	PK	9.83E-09	-50.1	-13.0	-37.1
7402.333			1.2	359.0			Vert	PK	8.56E-09	-50.7	-13.0	-37.7
5727.508			1.2	331.0			Vert	PK	1.89E-09	-57.2	-13.0	-44.2
5642.325			1.2	264.0			Horz	PK	1.53E-09	-58.1	-13.0	-45.1
5550.367			1.0	207.0			Horz	PK	1.52E-09	-58.2	-13.0	-45.2
5550.158			1.6	266.0			Vert	PK	1.35E-09	-58.7	-13.0	-45.7
5731.608			1.2	331.0			Horz	PK	1.34E-09	-58.7	-13.0	-45.7
5640.708			1.5	301.0			Vert	PK	1.33E-09	-58.8	-13.0	-45.8
3819.450			1.8	281.0			Vert	PK	1.06E-09	-59.8	-13.0	-46.8
3700.392			1.4	223.0			Horz	PK	7.10E-10	-61.5	-13.0	-48.5
3760.342			2.1	282.0			Vert	PK	6.80E-10	-61.7	-13.0	-48.7
3760.250			1.2	65.0			Vert	PK	5.79E-10	-62.4	-13.0	-49.4
3819.708			1.6	215.0			Horz	PK	4.84E-10	-63.2	-13.0	-50.2
3700.267			1.2	329.0			Vert	PK	4.69E-10	-63.3	-13.0	-50.3
3760.167			1.4	215.0			Horz	PK	4.49E-10	-63.5	-13.0	-50.5
3759.392			1.0	35.0			Horz	PK	4.49E-10	-63.5	-13.0	-50.5

NORTHWEST

EMC

Field Strength of Spurious Emissions

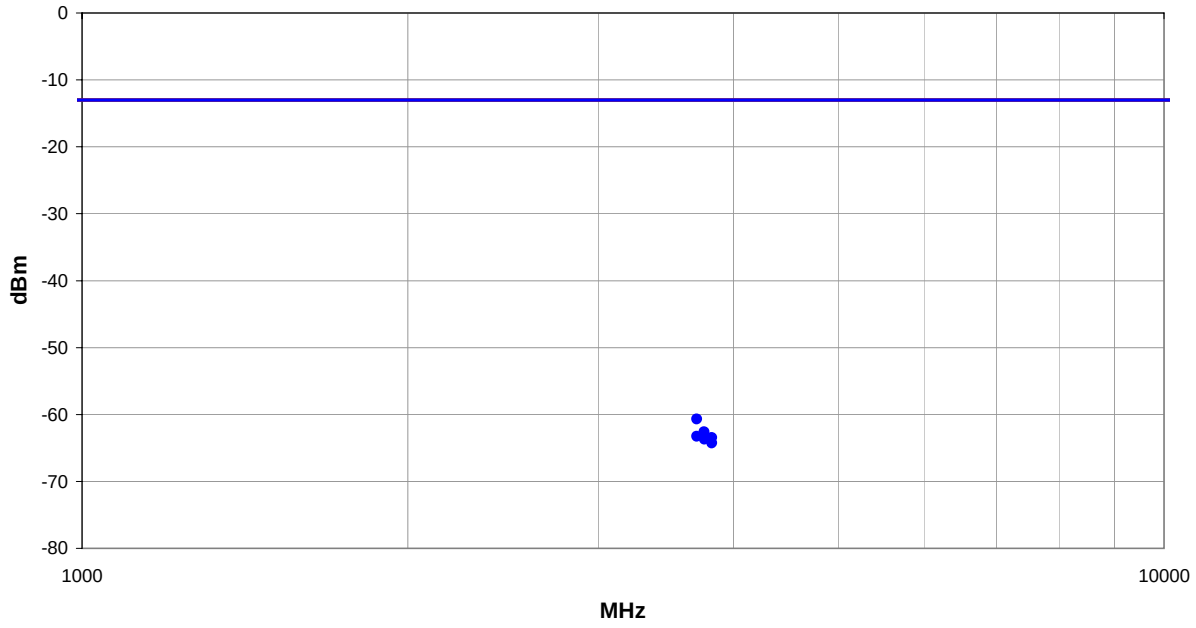
PSA-ESCI 2009.06.09
Version 2009.12.28

Work Order:	DGII0004	**Date:**	03/12/10	Trevor Buls	
Project:	None	**Temperature:**	23.7		
Job Site:	MN05	**Humidity:**	25.81		
Serial Number:	749360096105201	**Barometric Pres.:**	998.9	**Tested by:**	Trevor Buls

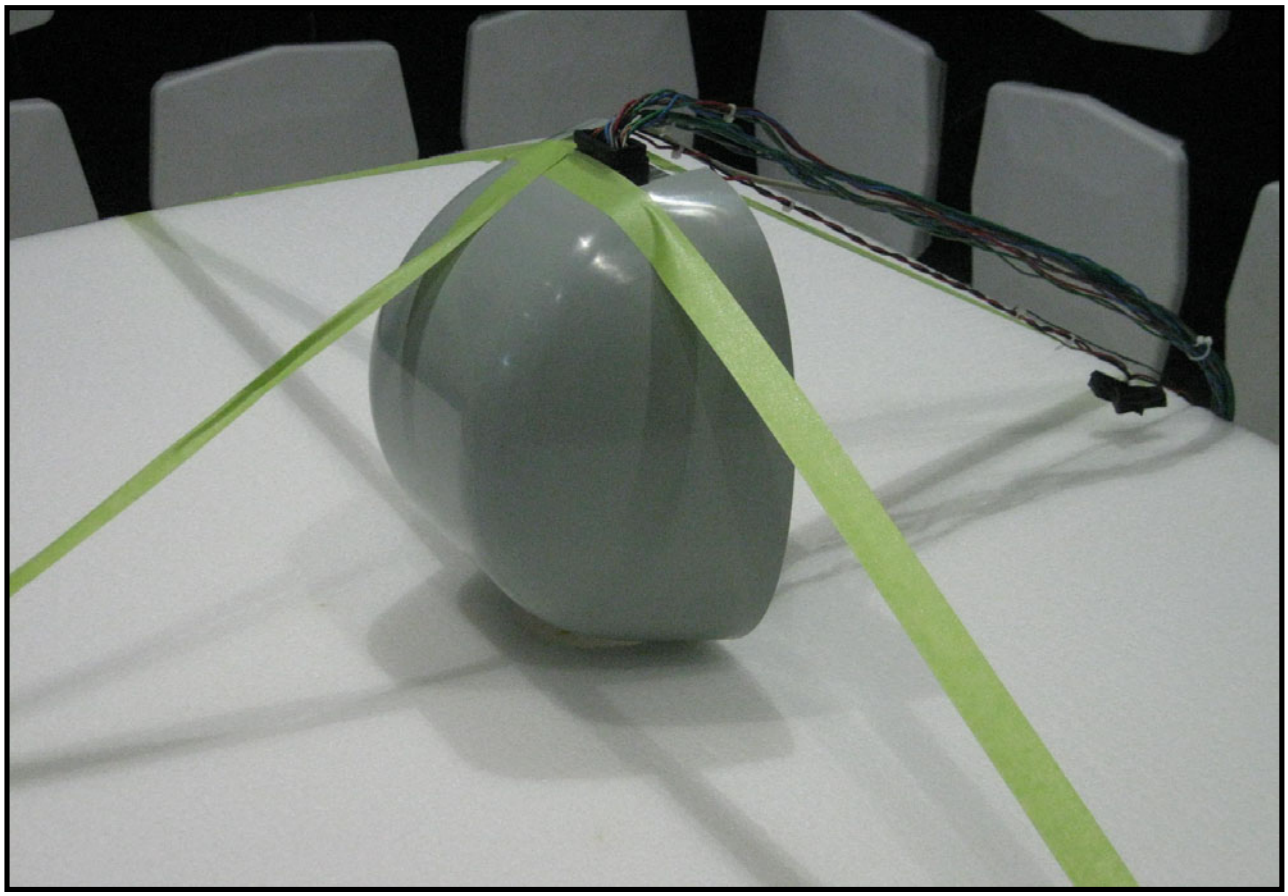
EUT:	WMP100 GSM Cellular Modem
Configuration:	1 - Basic Configuration
Customer:	Digi International
Attendees:	Nathan Carlson
EUT Power:	13.5 Vdc
Operating Mode:	GPRS_PCS
Deviations:	No deviations.
Comments:	Radio on inside of the radome, control pc remote.

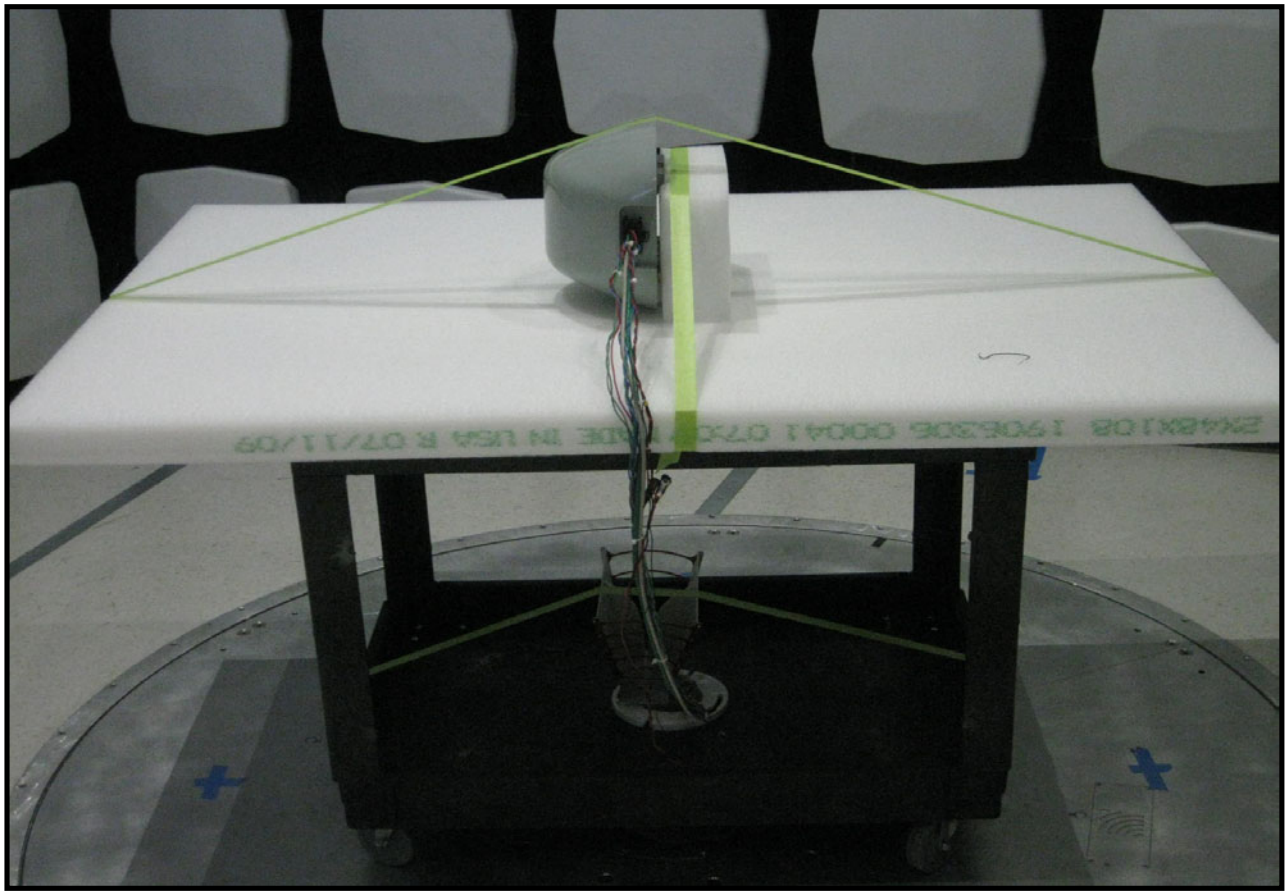
Test Specifications	**Test Method**
FCC 24E:2010	ANSI/TIA/EIA-603-C-2004

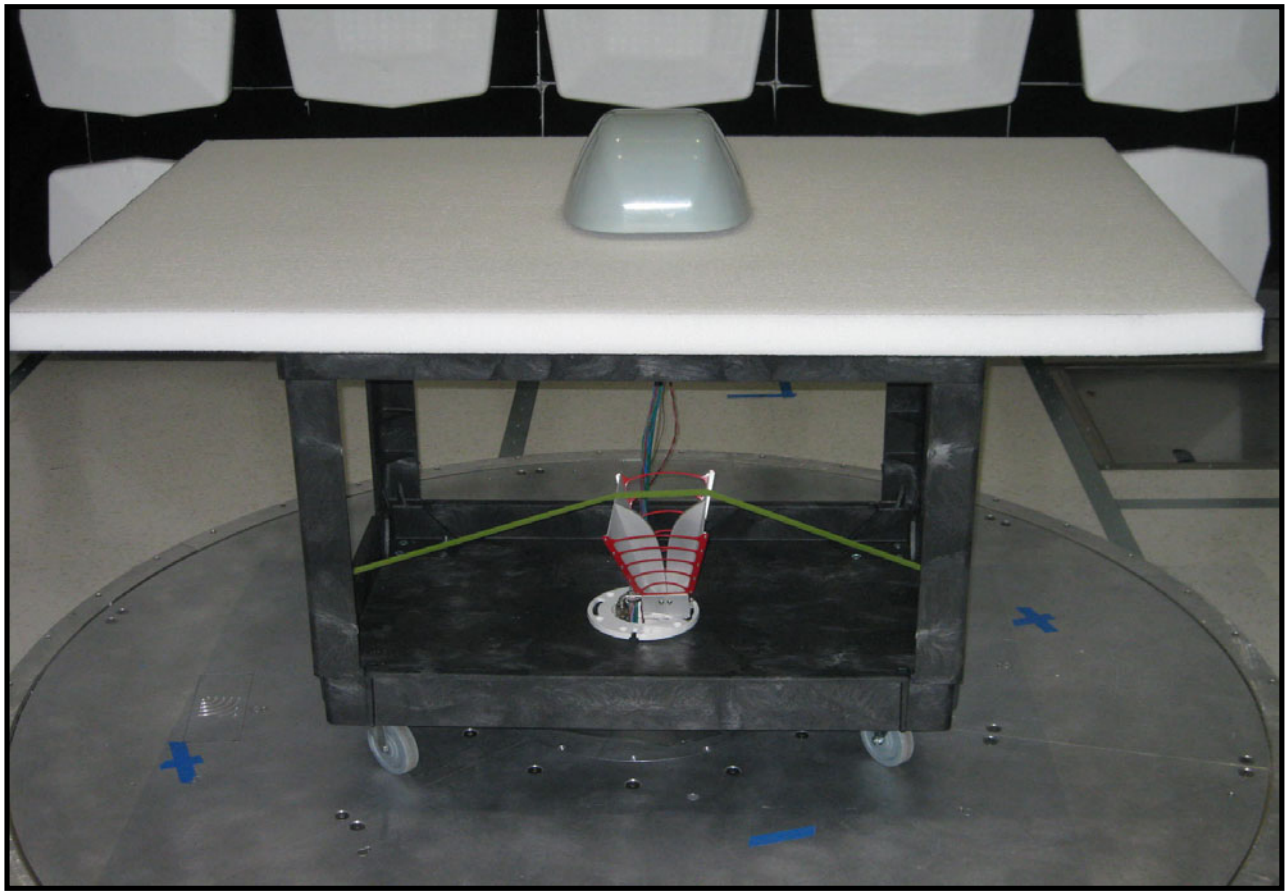
Run #	31	**Test Distance (m)**	3	**Antenna Height(s)**	1-4m	**Results**	Pass



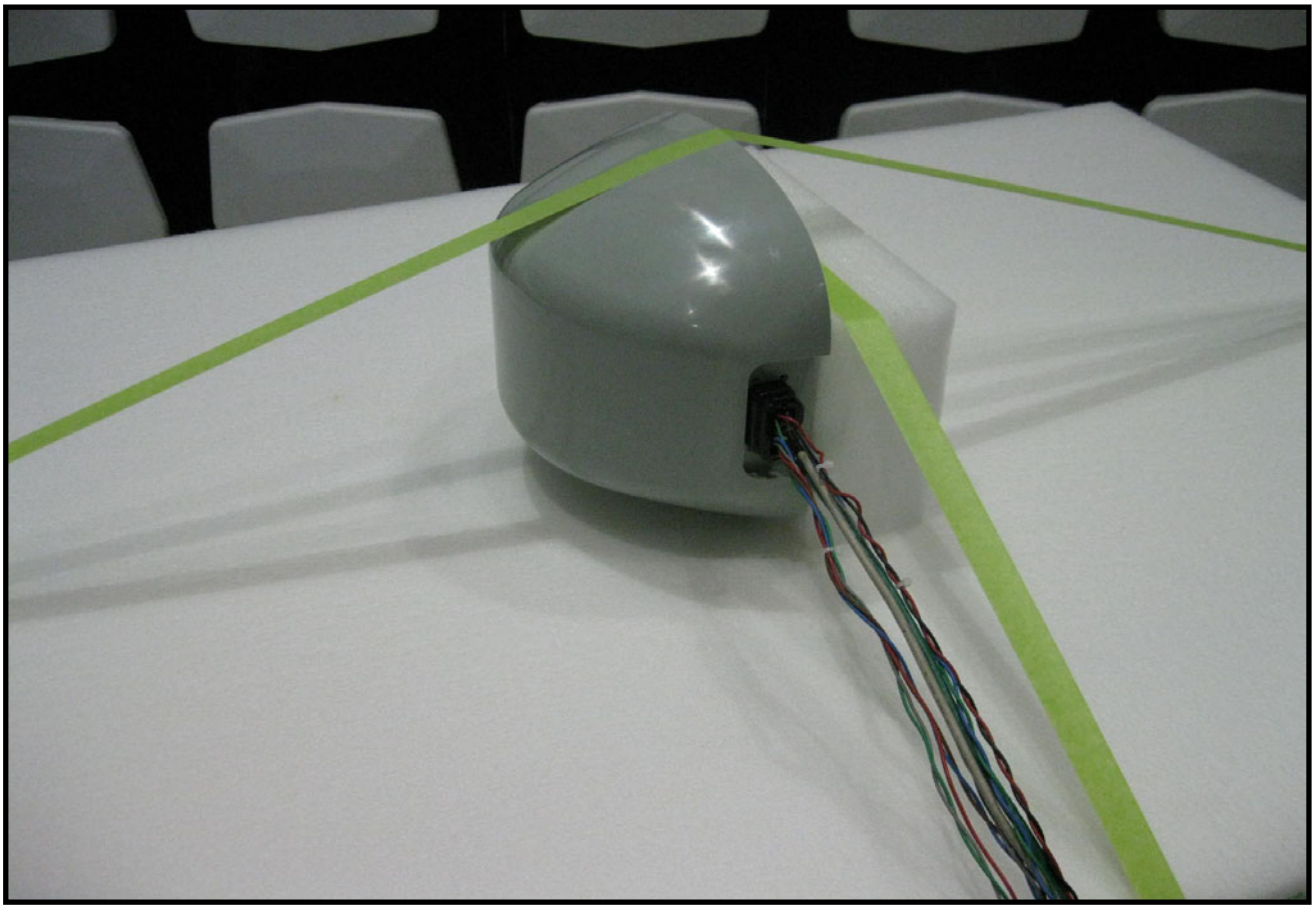
Freq (MHz)			Antenna Height (meters)	Azimuth (degrees)			Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
3700.833			2.1	284.0			Vert	PK	8.54E-10	-60.7	-13.0	-47.7
3758.717			2.1	201.0			Vert	PK	5.52E-10	-62.6	-13.0	-49.6
3700.250			1.4	217.0			Horz	PK	4.69E-10	-63.3	-13.0	-50.3
3819.800			1.6	284.0			Vert	PK	4.52E-10	-63.4	-13.0	-50.4
3760.258			1.0	26.0			Horz	PK	4.29E-10	-63.7	-13.0	-50.7
3819.875			1.4	246.0			Horz	PK	3.76E-10	-64.2	-13.0	-51.2







Field Strength of Spurious Emissions



Effective Radiated Power (ERP)

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
GSM_CELL

CHANNELS OF OPERATION
Low Channel, Ch.128, 824.2MHz
Mid Channel, Ch. 190, 836.6MHz
High Channel, Ch. 251, 848.8MHz

POWER SETTINGS INVESTIGATED
13.5 Vdc

FREQUENCY RANGE INVESTIGATED			
Start Frequency	800MHz	Stop Frequency	880MHz

SAMPLE CALCULATIONS
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Universal Radio Communication Tester	Rhode & Schwarz	CMU200	BSU	NCR	0
Antenna, Dipole	EMCO	3121C-DB4	ADI	1/5/2010	24
Antenna, Horn (DRG)	ETS Lindgren	3115	AIR	2/21/2009	24
Signal Generator	Agilent	N5183A	TIA	11/16/2008	24
Antenna, Biconilog	ETS Lindgren	3142D	AXN	12/30/2009	13
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	1/15/2010	13
Spectrum Analyzer	Agilent	E4446A	AAT	12/12/2008	24

MEASUREMENT BANDWIDTHS

	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.				

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The fundamental emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization and manipulating the EUT antenna in 3 orthogonal planes.

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the lowest channel, a middle channel, and the highest channel available. The amplitude and frequency were noted. The EUT was then replaced with a ½ wave dipole that was successively tuned to the highest emission. A signal generator was connected to the dipole antenna and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the gain (dBi) of the dipole antenna the effective radiated power for each emission was determined.

NORTHWEST EMC

Effective Radiated Power (ERP)

PSA 2008.07.21
EMI 2009.4.13

EUT:	WMP100 GSM Cellular Modem			Work Order:	DGII0004
Serial Number:	749360096105201			Date:	03/09/10
Customer:	Digi International			Temperature:	23.67
Attendees:	Nathan Carlson			Humidity:	21%
Project:	None			Barometric Pres.:	1009.4
Tested by:	Trevor Buls	Power:	13.5 Vdc	Job Site:	MN05

TEST SPECIFICATIONS	Test Method
FCC 22H:2010	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

Radio on inside of the radome, control pc remote.

EUT OPERATING MODES

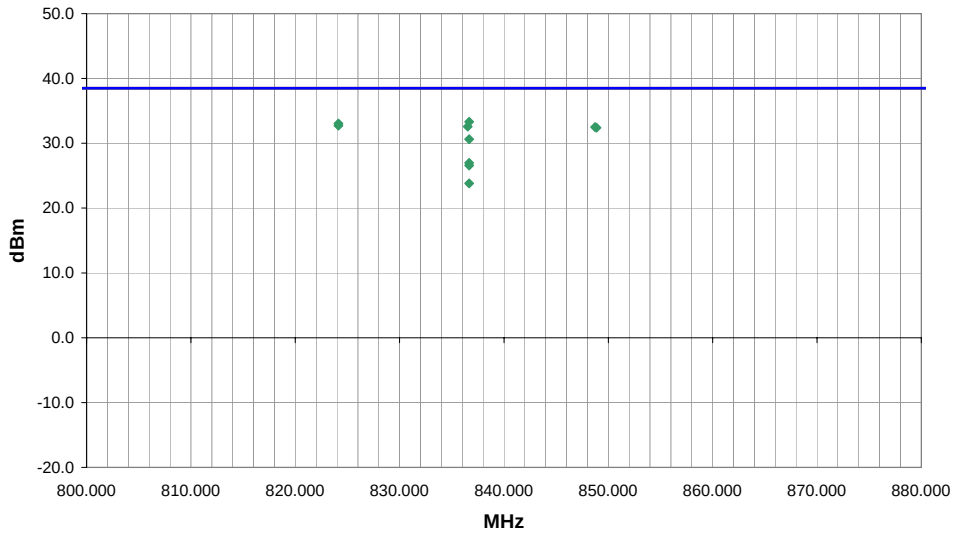
GSM_CELL

DEVIATIONS FROM TEST STANDARD

No deviations.

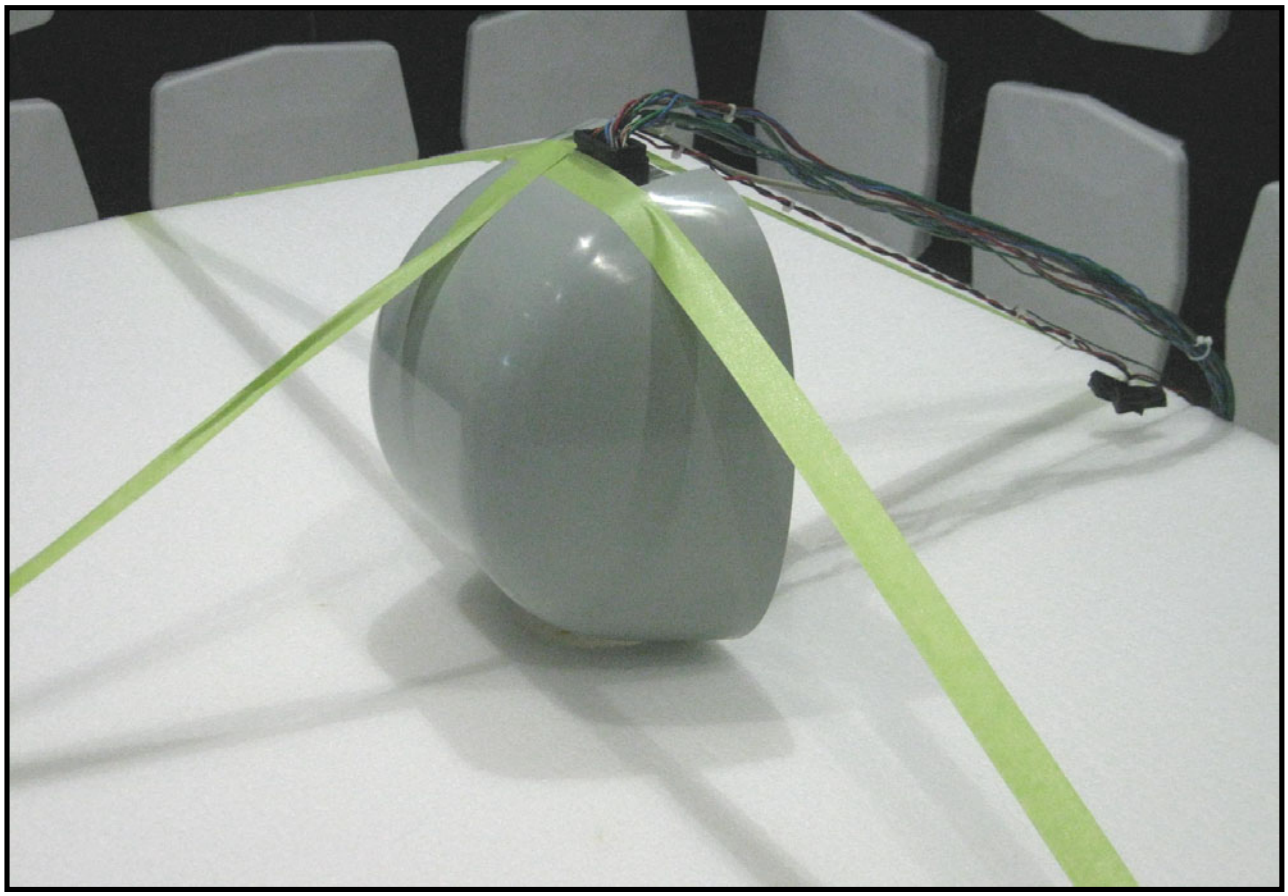
Run #	1
Configuration #	1
Results	Pass

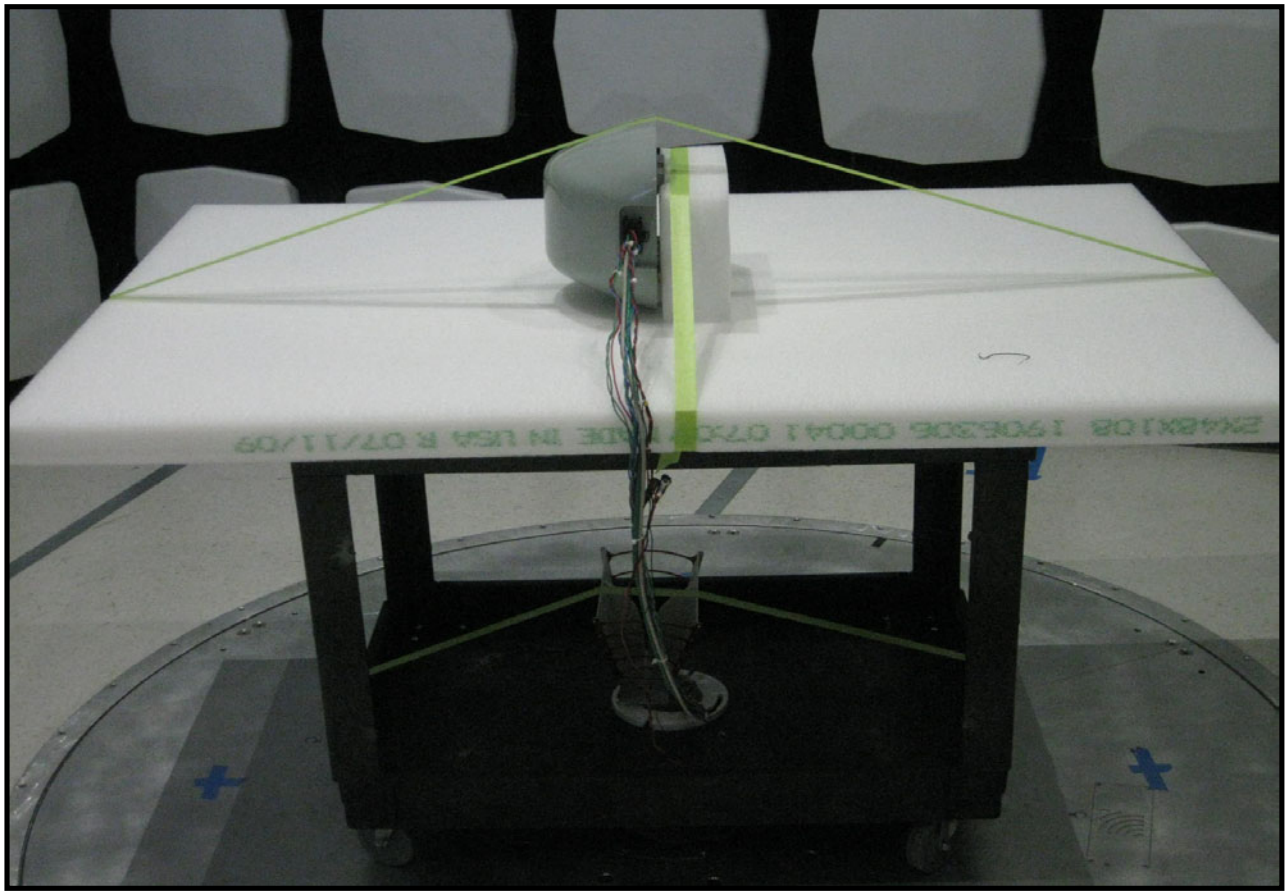
Signature Trevor Buls



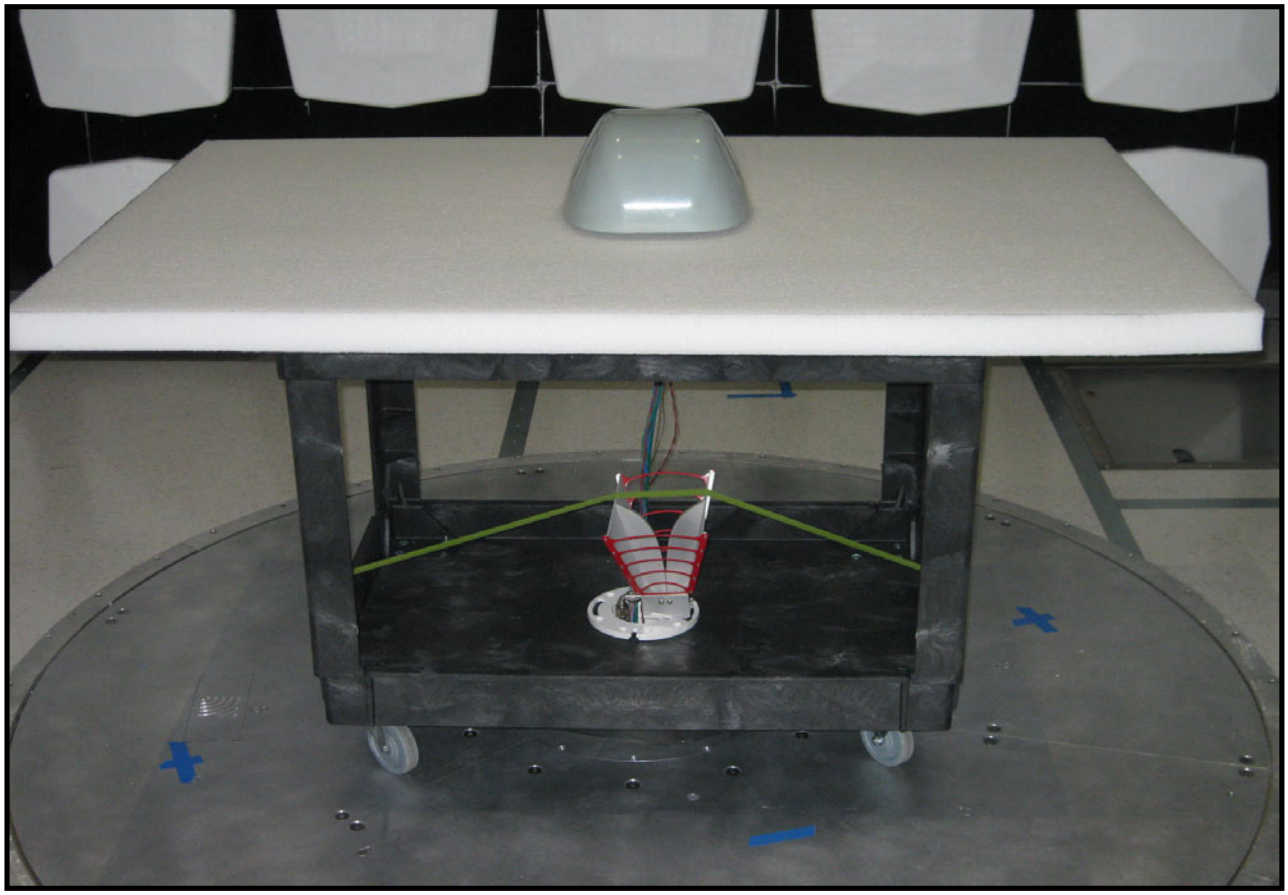
Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
836.665			159.0	1.6			H-Bilog	PK	2.15E+00	33.3	38.5	-5.2	Mid Channel, GSM, EUT on side
824.133			183.0	1.0			H-Bilog	PK	2.01E+00	33.0	38.5	-5.5	Low Channel, GSM, EUT on side
824.132			207.0	1.3			V-Bilog	PK	1.87E+00	32.7	38.5	-5.8	Low Channel, GSM, EUT horizontal
836.532			246.0	1.2			V-Bilog	PK	1.81E+00	32.6	38.5	-5.9	Mid Channel, GSM, EUT horizontal
848.734			178.0	1.6			H-Bilog	PK	1.78E+00	32.5	38.5	-6.0	High Channel, GSM, EUT on side
848.868			210.0	1.2			V-Bilog	PK	1.73E+00	32.4	38.5	-6.1	High Channel, GSM, EUT horizontal
836.666			45.0	1.0			H-Bilog	PK	1.15E+00	30.6	38.5	-7.9	Mid Channel, GSM, EUT vertical
836.664			253.0	1.7			V-Bilog	PK	4.98E-01	27.0	38.5	-11.5	Mid Channel, GSM, EUT on side
836.666			133.0	1.3			V-Bilog	PK	4.54E-01	26.6	38.5	-11.9	Mid Channel, GSM, EUT vertical
836.668			158.0	1.8			H-Bilog	PK	2.41E-01	23.8	38.5	-14.7	Mid Channel, GSM, EUT horizontal

Effective Radiated Power (ERP)

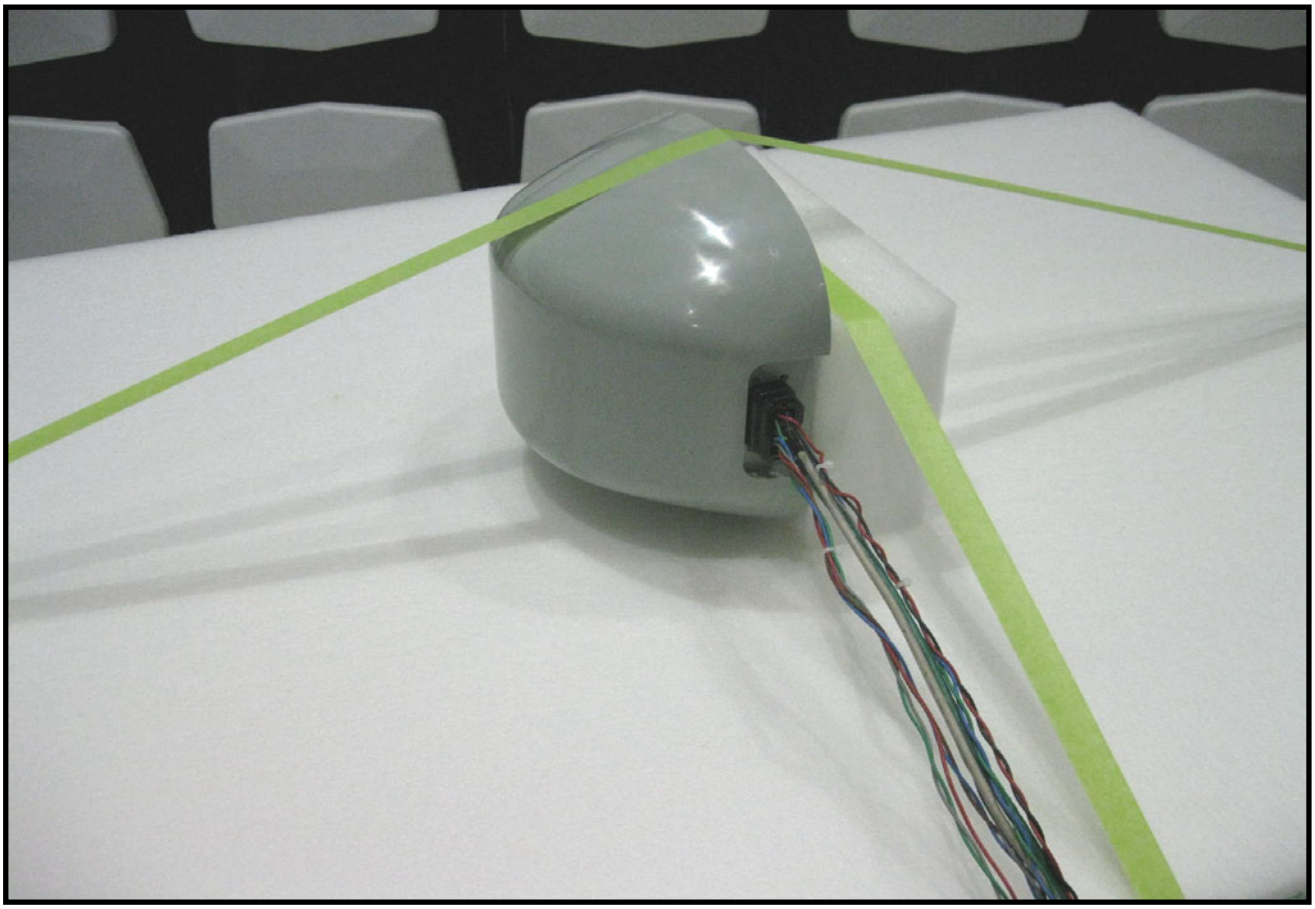




Effective Radiated Power (ERP)



Effective Radiated Power (ERP)



Effective Radiated Power (EIRP)

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
GSM_PCS

CHANNELS OF OPERATION
Low Channel, Ch. 512, 1850.2MHz
Mid Channel, Ch. 661, 1880MHz
High Channel, Ch. 810, 1909.8MHz

POWER SETTINGS INVESTIGATED
13.5 Vdc

FREQUENCY RANGE INVESTIGATED			
Start Frequency	1800MHz	Stop Frequency	2000MHz

SAMPLE CALCULATIONS
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Signal Generator	Agilent	N5183A	TIA	11/16/2008	24
Universal Radio Communication Tester	Rhode & Schwarz	CMU200	BSU	NCR	0
Antenna, Horn (DRG)	ETS Lindgren	3115	AIR	2/21/2009	24
Antenna, Horn (DRG)	ETS Lindgren	3115	AIP	12/22/2009	24
MN05 Cables	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	7/1/2009	13
Spectrum Analyzer	Agilent	E4446A	AAT	12/12/2008	24

MEASUREMENT BANDWIDTHS				
	Frequency Range	**Peak Data**	**Quasi-Peak Data**	**Average Data**
	(MHz)	**(kHz)**	**(kHz)**	**(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.				

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The fundamental emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization and manipulating the EUT antenna in 3 orthogonal planes.

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the lowest channel, a middle channel, and the highest channel available. The amplitude and frequency were noted. The EUT was then replaced with a horn antenna. A signal generator was connected to the horn antenna and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the gain (dBi) of the horn antenna the effective radiated power for each emission was determined.

NORTHWEST EMC

Effective Radiated Power (EIRP)

PSA 2008.07.21
EMI 2009.4.13

EUT:	WMP100 GSM Cellular Modem	Work Order:	DGII0004
Serial Number:	749360096105201	Date:	03/10/10
Customer:	Digi International	Temperature:	23.67
Attendees:	Nathan Carlson	Humidity:	21%
Project:	None	Barometric Pres.:	1009.4
Tested by:	Trevor Buls	Power: 13.5 Vdc	Job Site: MN05

TEST SPECIFICATIONS	Test Method
FCC 24E:2010	ANSI/TIA/EIA-603-C-2004

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

Radio on inside of the radome, control pc remote.

EUT OPERATING MODES

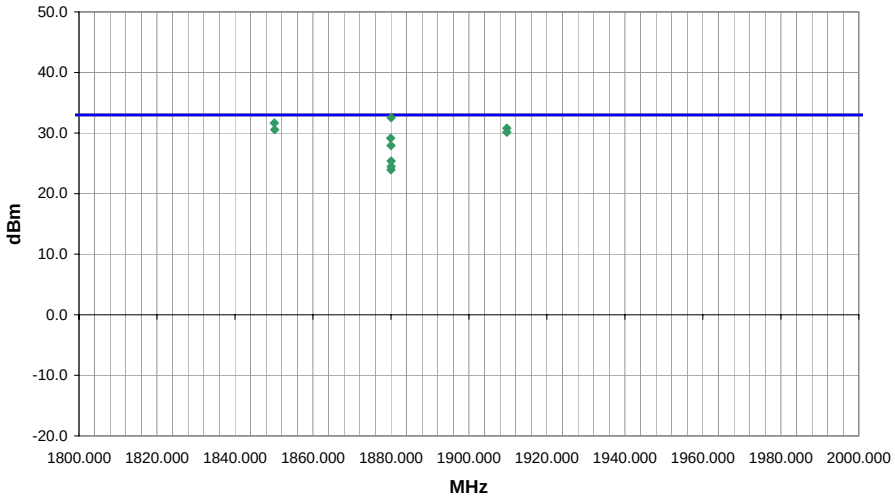
GSM_PCS

DEVIATIONS FROM TEST STANDARD

No deviations.

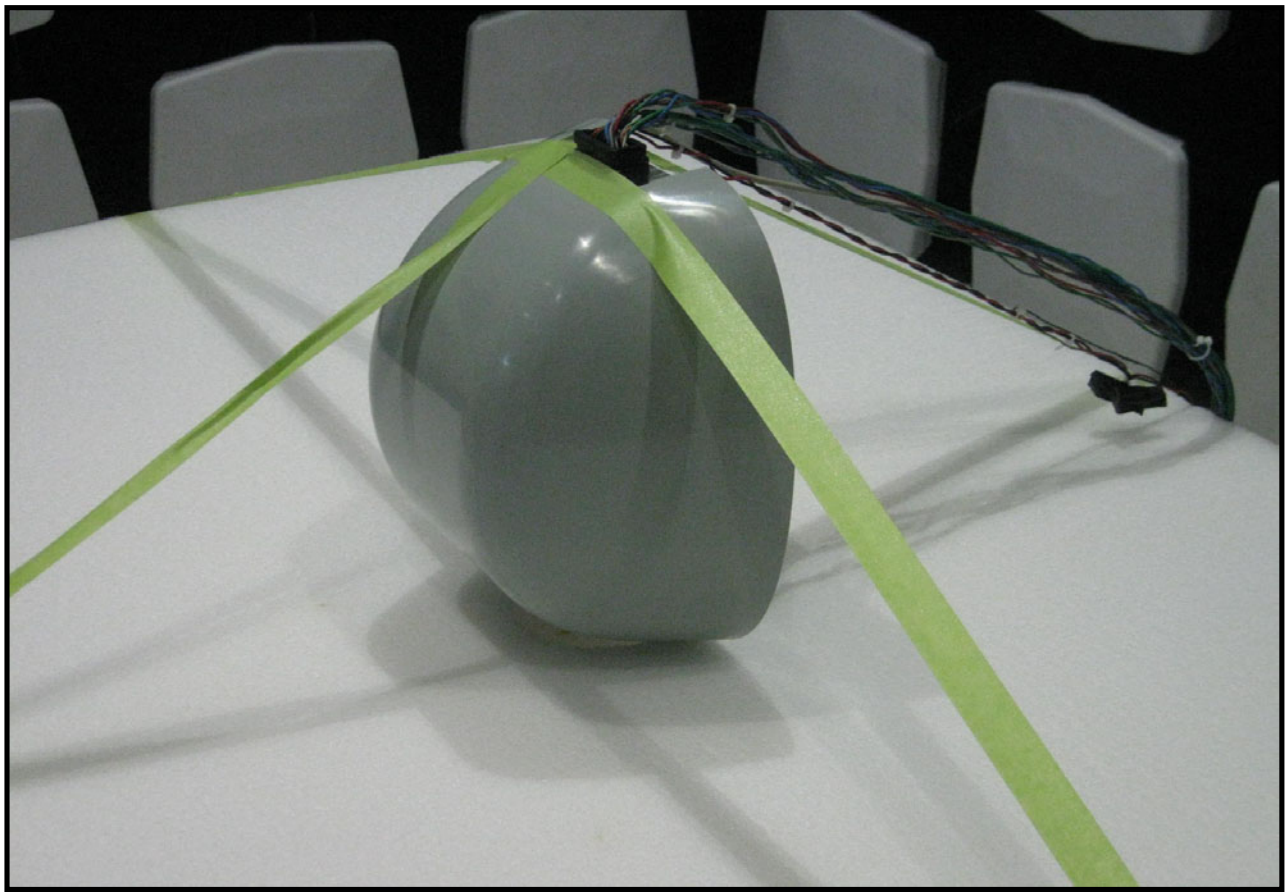
Run #	3
Configuration #	1
Results	Pass

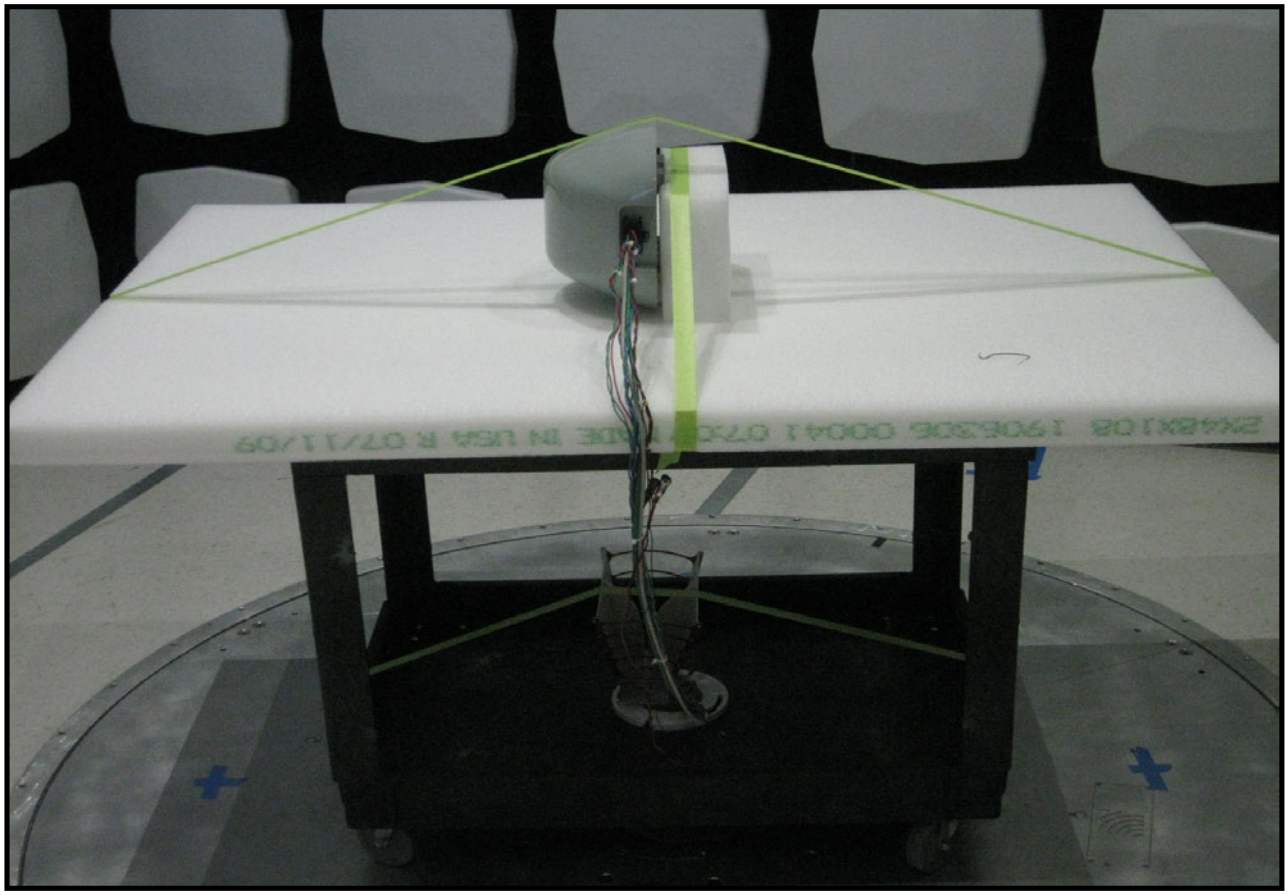
Signature Trevor Buls



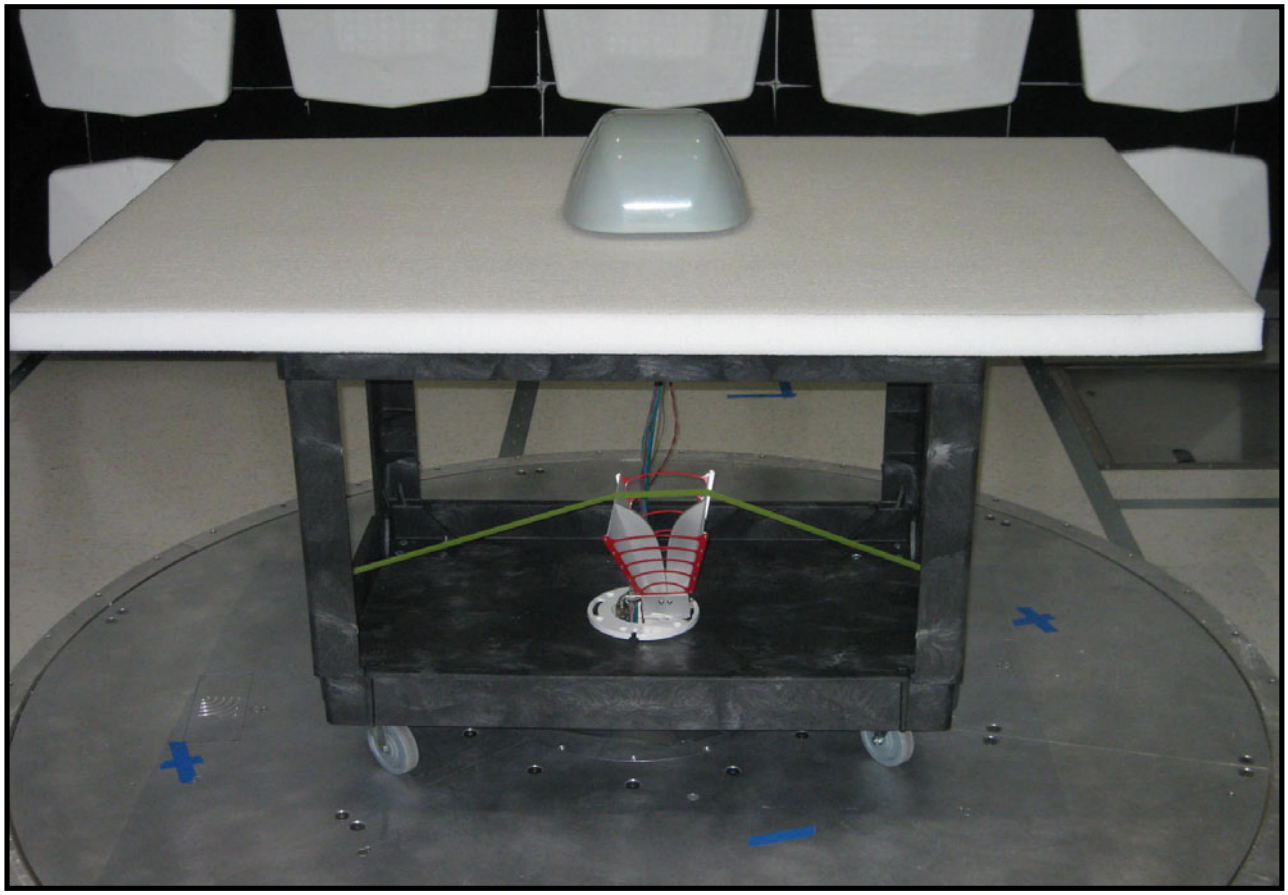
Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
1880.065			279.0	1.1			H-Horn	PK	1.79E+00	32.5	33.0	-0.5	Mid Channel, GSM_PCS, EUT on side
1850.120			108.0	1.1			V-Horn	PK	1.47E+00	31.7	33.0	-1.3	Low Channel, GSM_PCS, EUT Horizontal
1909.725			93.0	1.1			H-Horn	PK	1.20E+00	30.8	33.0	-2.2	High Channel, GSM_PCS, EUT on side
1850.200			95.0	1.1			H-Horn	PK	1.14E+00	30.6	33.0	-2.4	Low Channel, GSM_PCS, EUT on side
1909.740			103.0	1.0			V-Horn	PK	1.03E+00	30.1	33.0	-2.9	High Channel, GSM_PCS, EUT Horizontal
1879.950			102.0	1.0			V-Horn	PK	8.26E-01	29.2	33.0	-3.8	Mid Channel, GSM_PCS, EUT Horizontal
1880.000			152.0	1.4			H-Horn	PK	6.24E-01	28.0	33.0	-5.1	Mid Channel, GSM_PCS, EUT Vertical
1880.065			101.0	1.0			V-Horn	PK	3.44E-01	25.4	33.0	-7.6	Mid Channel, GSM_PCS, EUT Vertical
1880.050			13.0	1.4			V-Horn	PK	2.80E-01	24.5	33.0	-8.5	Mid Channel, GSM_PCS, EUT on side 3m
1880.030			218.0	1.0			H-Horn	PK	2.48E-01	23.9	33.0	-9.1	Mid Channel, GSM_PCS, EUT Horizontal 3m

Effective Radiated Power (EIRP)





Effective Radiated Power (EIRP)



Effective Radiated Power (EIRP)