

# UMD Technology

## WABI 007

October 02, 2003

Report No. UMDT0002

Report Prepared By:



1-888-EMI-CERT

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Test Report



22975 NW Evergreen Parkway  
Suite 400  
Hillsboro, Oregon 97124

**Certificate of Test**  
**Issue Date: October 02, 2003**  
**UMD Technology**  
**Model: WABI 007**

Emissions		
Description	Pass	Fail
FCC 15.249 Field Strength of Fundamental:2003 Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
FCC 15.249 Field Strength of Spurious Emissions:2003 Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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:**

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
00	None		

**FCC:** The Open Area Test Sites, 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.



**TCB:** 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:** Accreditation has been granted to Northwest EMC, Inc. to perform the Electromagnetic Compatibility (EMC) tests described in the Scope of Accreditation. Assessment performed to ISO/IEC 17025. Certificate Number: 200629-0, Certificate Number: 200630-0.



**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)



**TÜV Product Service:** Included in TÜV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TÜV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TÜV's current Listing of CARAT Laboratories available from TÜV. A certificate was issued to represent that this laboratory continues to meet TÜV's CARAT Program requirements. Certificate No. USA0302C



**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.



**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).



**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.



**Industry Canada:** Accredited by Industry Canada for performance of radiated measurements. Our open area test sites comply with RSS 212, Issue 1 (Provisional).



**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. - Evergreen: C-1071 and R-1025, Trails End: C-694 and R-677, Sultan: C-905, R-871 and R-1172, North Sioux City C-1246, R-1185 and R-1217*)



**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. License No.SL2-IN-E-1017.



**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



**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



	NVLAP	FCC	NIST	TUV PS	TUV Rheinland	Nemko	Technology International	Industry Canada	BSMI	VCCI	GOST	NATA
IEC 61000-4-2	✓			✓	✓	✓	✓					
IEC 61000-4-3	✓			✓	✓	✓	✓					
IEC 61000-4-4	✓			✓	✓	✓	✓					
IEC 61000-4-5	✓			✓	✓	✓	✓					
IEC 61000-4-6	✓			✓	✓	✓	✓					
IEC 61000-4-8	✓			✓	✓	✓	✓					
IEC 61000-4-11	✓			✓	✓	✓	✓					
IEC 61000-3-2	✓			✓	✓	✓	✓					
IEC 61000-3-3	✓			✓	✓	✓	✓					
AS/NZS 3548	✓											✓
CNS 13438	✓								✓			
ISO/IEC17025	✓			✓	✓	✓	✓		✓			
Radiated Emissions	✓			✓	✓	✓	✓	✓	✓	✓	✓	
Conducted Emissions	✓			✓	✓	✓	✓	✓	✓	✓	✓	
OATS Sites	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
Hillsboro 5-Meter Chamber (EV01)	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
TCB for Licensed Transmitters		✓										
TCB for un-Licensed Transmitters		✓										
Cab for R&TTE			✓									
CAB for EMC			✓									

This chart represents only a partial NVLAP Scope, please reference <http://ts.nist.gov/ts/htdocs/210/214/214.htm> for the full NVLAP Scope of Accreditation

### What is measurement uncertainty?

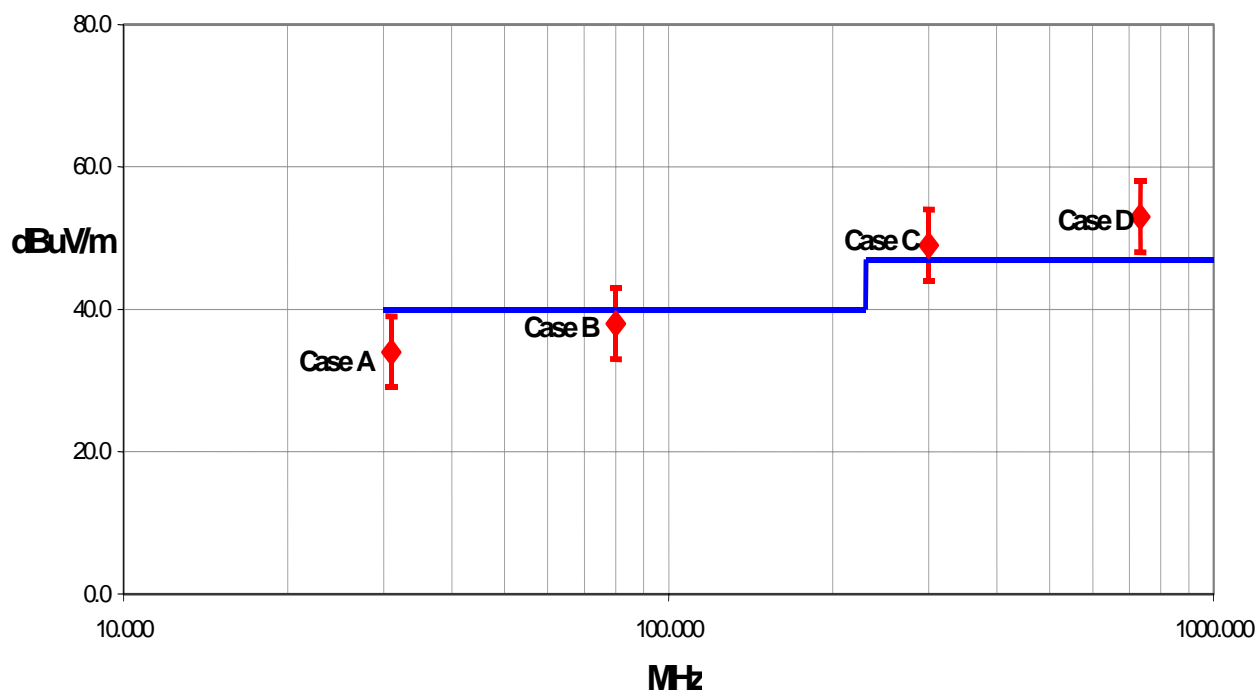
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following 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.



#### Test Result Scenarios:

**Case A:** Product complies.

**Case B:** Product conditionally complies. It is not possible to say with 95% confidence that the product complies.

**Case C:** Product conditionally does not comply. It is not possible to say with 95% confidence that the product does not comply.

**Case D:** Product does not comply.

**Radiated Emissions ≤ 1 GHz**

Value (dB)

Test Distance	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
		3m	10m	3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.86 - 1.88	+ 1.82 - 1.87	+ 2.23 - 1.41	+ 1.29 - 1.26	+ 1.31 - 1.27	+ 1.25 - 1.25
Expanded uncertainty $U$ (level of confidence ≈ 95%)	normal (k=2)	+ 3.72 - 3.77	+ 3.64 - 3.73	+ 4.46 - 2.81	+ 2.59 - 2.52	+ 2.61 - 2.55	+ 2.49 - 2.49

**Radiated Emissions > 1 GHz**

Value (dB)

Test Distance	Probability Distribution	Without High Pass Filter		With High Pass Filter	
		3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25	+ 1.29 - 1.25	+ 1.38 - 1.35	+ 1.38 - 1.35
Expanded uncertainty $U$ (level of confidence ≈ 95%)	normal (k=2)	+ 2.57 - 2.51	+ 2.57 - 2.51	+ 2.76 - 2.70	+ 2.76 - 2.70

**Conducted Emissions**

Test Distance	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.48
Expanded uncertainty $U$ (level of confidence ≈ 95 %)	normal (k = 2)	2.97

**Radiated Immunity**

Test Distance	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.05
Expanded uncertainty $U$ (level of confidence ≈ 95 %)	normal (k = 2)	2.11

**Conducted Immunity**

Test Distance	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.05
Expanded uncertainty $U$ (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,  $u_c(y)$  yields a confidence level of only 68%.



**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

**South Dakota****North Sioux City Facility**

745 N. Derby Lane  
P.O. Box 217  
North Sioux City, SD 57049  
(605) 232-5267  
FAX (605) 232-3873

**Washington****Sultan Facility**

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

**Party Requesting the Test**

<b>Company Name:</b>	UMD Technology
<b>Address:</b>	14945 SW Sequoia Pkwy, #100
<b>City, State, Zip:</b>	Portland, OR 97224
<b>Test Requested By:</b>	Brian Denheyer
<b>Model:</b>	WABI 007
<b>First Date of Test:</b>	September 30, 2003
<b>Last Date of Test:</b>	October 1, 2003
<b>Receipt Date of Samples:</b>	September 30, 2003
<b>Equipment Design Stage:</b>	Pre-Production
<b>Equipment Condition:</b>	No visual damage.

**Information Provided by the Party Requesting the Test**

<b>Clocks/Oscillators:</b>	80 kHz, 4 MHz, 12 MHz
<b>I/O Ports:</b>	Serial for Debug / Test only.

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

902 - 928 MHz FSK Transceiver

**Client Justification for EUT Selection:**

The product is an engineering sample, representative of the final product.

**Client Justification for Test Selection**

These Tests satisfy the requirements for FCC certification.

**Other Information:**

Client has other information to provide. See product info. document.

Equipment modifications				
Item #	Test	Date	Modification	Note
1	Field Strength of Fundamental	09-30-2003	The highest channel to be used was reduced to 927.106 MHz (channel 37).	Modified from delivered configuration.
2	Band Edge (spurious radiated)	09-30-2003	The lowest channel to be used was increased to 903.096 MHz (channel 1)	This modification is in addition to previous modifications.
3	Field Strength of Spurious Emissions	09-30-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.

## 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:

Typical
---------

### Antennas Investigated:

Integral
----------

### Data Rates Investigated:

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

Maximum
---------

### Power Input Settings Investigated:

Battery
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## Software\Firmware Applied During Test

Exercise software	Special Test Software	Version	App3_09_16_ReleaseToShasta
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Description
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The system was tested using special software developed to test all functions of the device during the test.
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## EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT	UMD Technology	WABI 007	018

**Cables**

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Cable Harness	PA	0.3	PA	EUT	Unterminated

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

**Measurement Equipment**

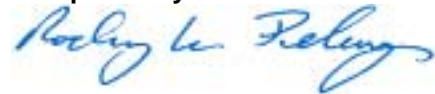
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	01/07/2003	12 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	01/07/2003	12 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	36 mo

**Test Description**

**Requirement:** The field strength of the fundamental emission shall comply with the limits, as defined in 47 CFR 15.249. Field strength limits are specified at a distance of 3 meters.

**Configuration:** The antennas to be used with the EUT were tested. The EUT was transmitting and/or 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 (per ANSI C63.4:1992).

Completed by:



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EUT:	WABI 007		Work Order:	UMDT0002
Serial Number:	018		Date:	09/30/03
Customer:	UMD Technology		Temperature:	73
Attendees:	Chuck Pulham		Humidity:	43%
Cust. Ref. No.:			Barometric Pressure	30.07
Tested by:	Rod Peloquin	Power:	Battery	Job Site: EV01

## TEST SPECIFICATIONS

Specification:	FCC 15.249	Year:	2003
Method:	ANSI C63.4	Year:	1992

### SAMPLE CALCULATIONS

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

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

## COMMENTS

## EUT OPERATING MODES

Modulated PRBS

## DEVIATIONS FROM TEST STANDARD

**No deviations.**

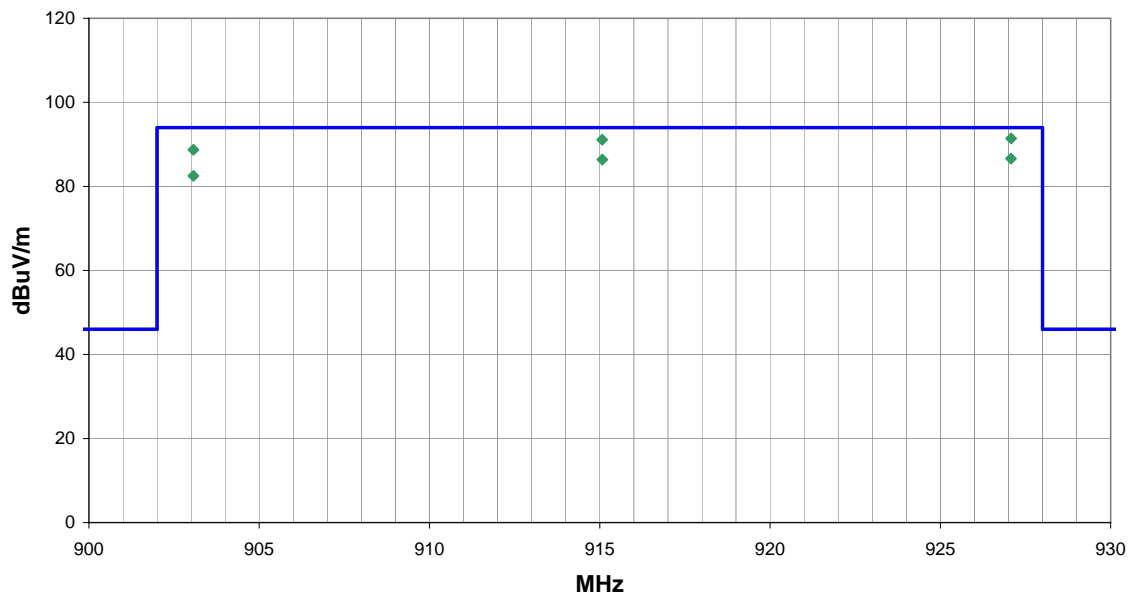
## RESULTS

Pass	2 & 6
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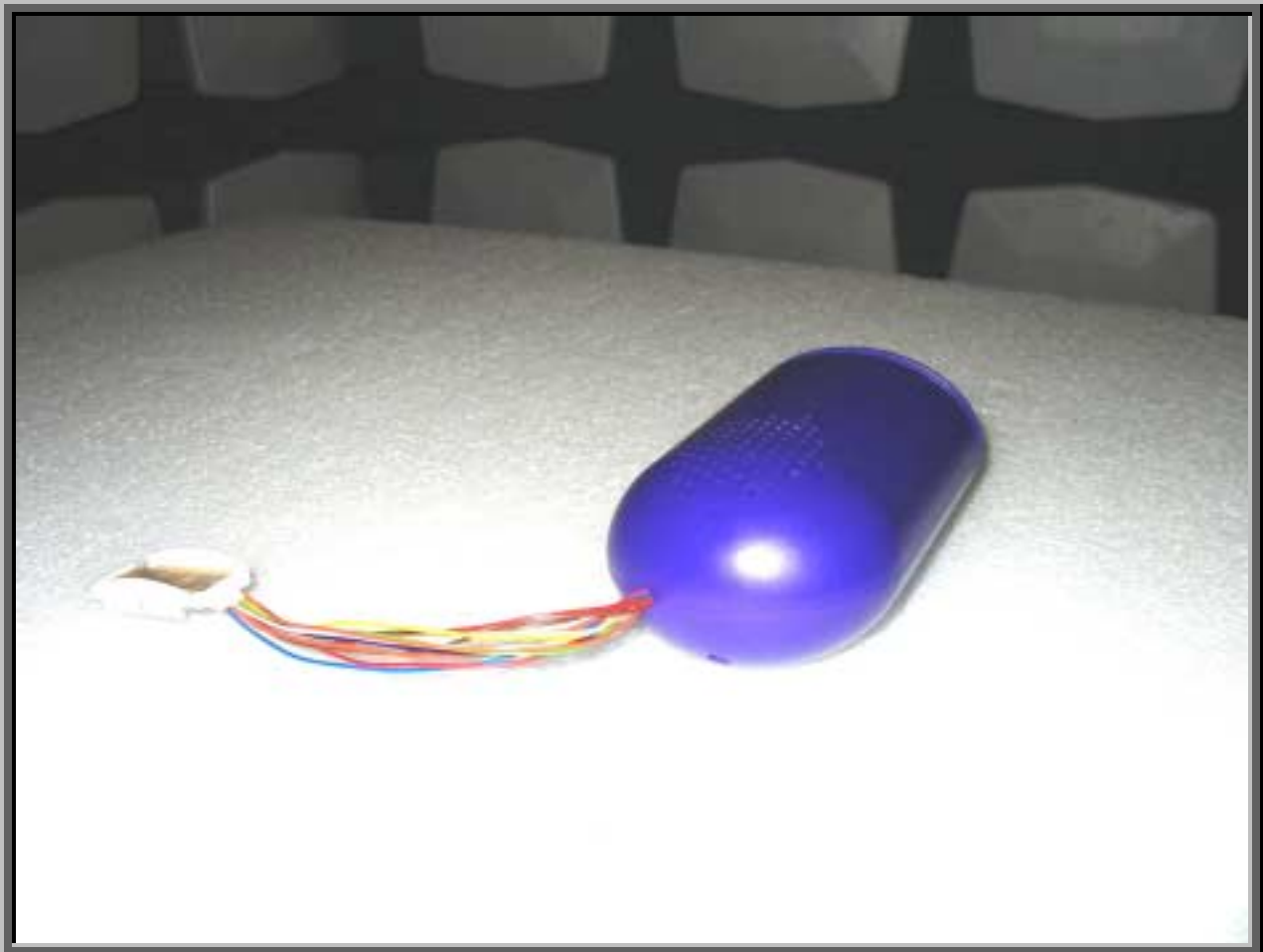
Other

# Policy to Policy

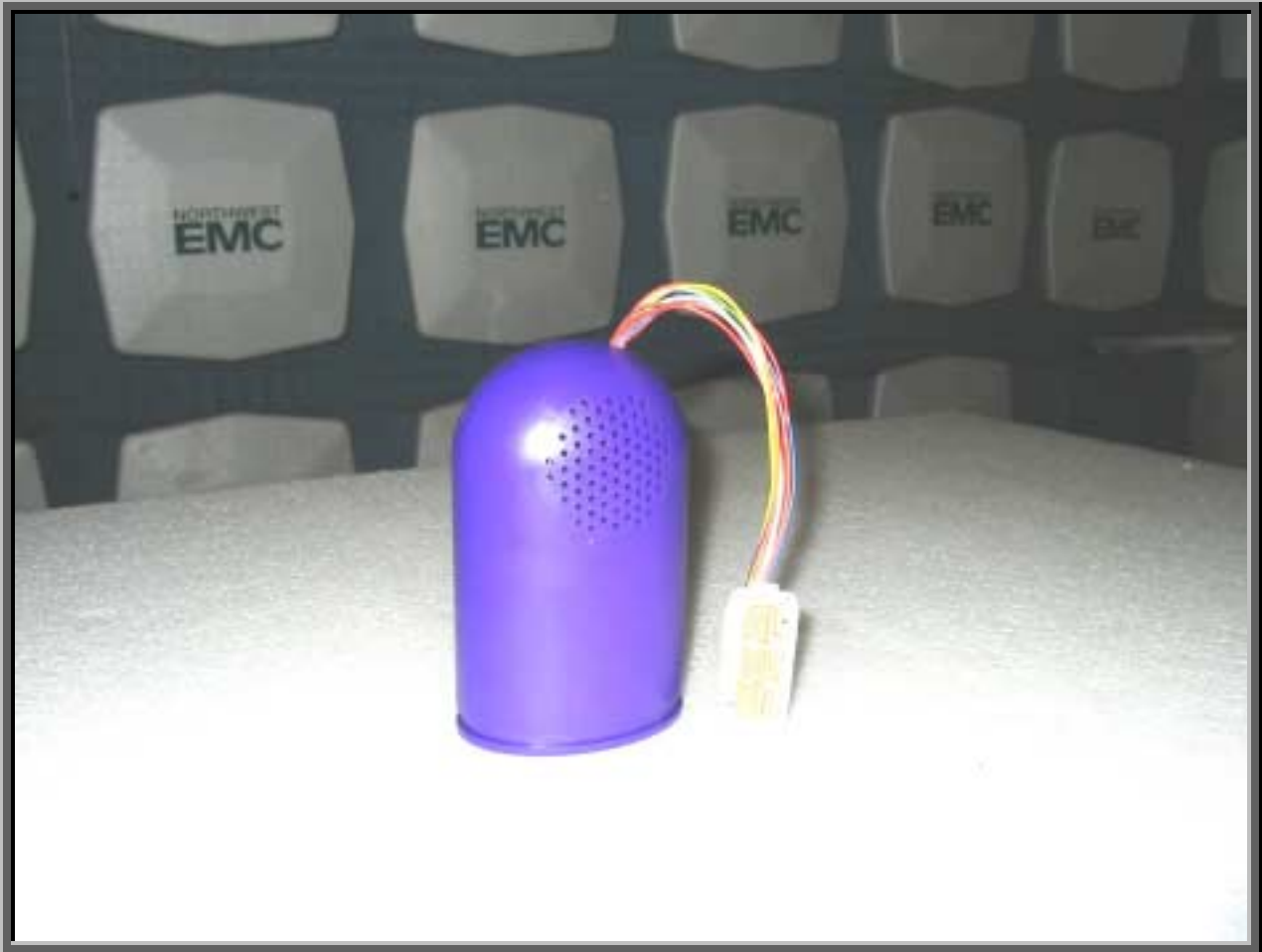
Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	
													Comments
927.078	58.8	32.6	308.0	1.0	3.0	0.0	H-Bilog	QP	0.0	91.4	94.0	-2.6	high channel, EUT horizontal
915.069	58.6	32.5	130.0	1.0	3.0	0.0	H-Bilog	QP	0.0	91.1	94.0	-2.9	mid channel, EUT vertical
927.075	54.0	32.6	291.0	1.1	3.0	0.0	V-Bilog	QP	0.0	86.6	94.0	-7.4	high channel, EUT vertical
915.073	53.9	32.5	288.0	1.1	3.0	0.0	V-Bilog	QP	0.0	86.4	94.0	-7.6	mid channel, EUT vertical
903.066	56.3	32.4	10.0	1.6	3.0	0.0	H-Bilog	QP	0.0	88.7	94.0	-5.3	low channel, EUT horizontal
903.069	50.1	32.4	326.0	1.1	3.0	0.0	V-Bilog	QP	0.0	82.5	94.0	-11.5	low channel, EUT vertical









**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:**

Typical

**Antennas Investigated:**

Integral

**Data Rates Investigated:**

Maximum

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

Maximum

**Power Input Settings Investigated:**

Battery

**Frequency Range Investigated**

Start Frequency

30 MHz

Stop Frequency

10 GHz

**Software\Firmware Applied During Test**

Exercise software

Special Test Software

Version

App3\_09\_16\_ReleaseToShasta

**Description**

The system was tested using special software developed to test all functions of the device during the test.

**EUT and Peripherals**

Description	Manufacturer	Model/Part Number	Serial Number
EUT	UMD Technology	WABI 007	018

**Cables**

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Cable Harness	PA	0.3	PA	EUT	Unterminated

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	01/07/2003	12 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	01/06/2003	12 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	36 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/06/2003	12 mo
Antenna, Horn	EMCO	3115	AHC	09/18/2003	12 mo
High Pass Filter	Hewlett-Packard	84300-80037	HFE	05/01/2003	12 mo

## Test Description

**Requirement:** The field strength of harmonics and spurious radiated emissions shall comply with the limits as defined in 47 CFR 15.249. Field strength limits are specified at a distance of 3 meters. Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Sec. 15.209, whichever is the lesser attenuation. As shown in Sec. 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified in Sec. 15.249 by more than 20 dB under any condition of modulation.

**Configuration:** 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 (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

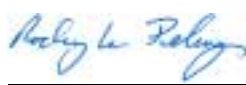
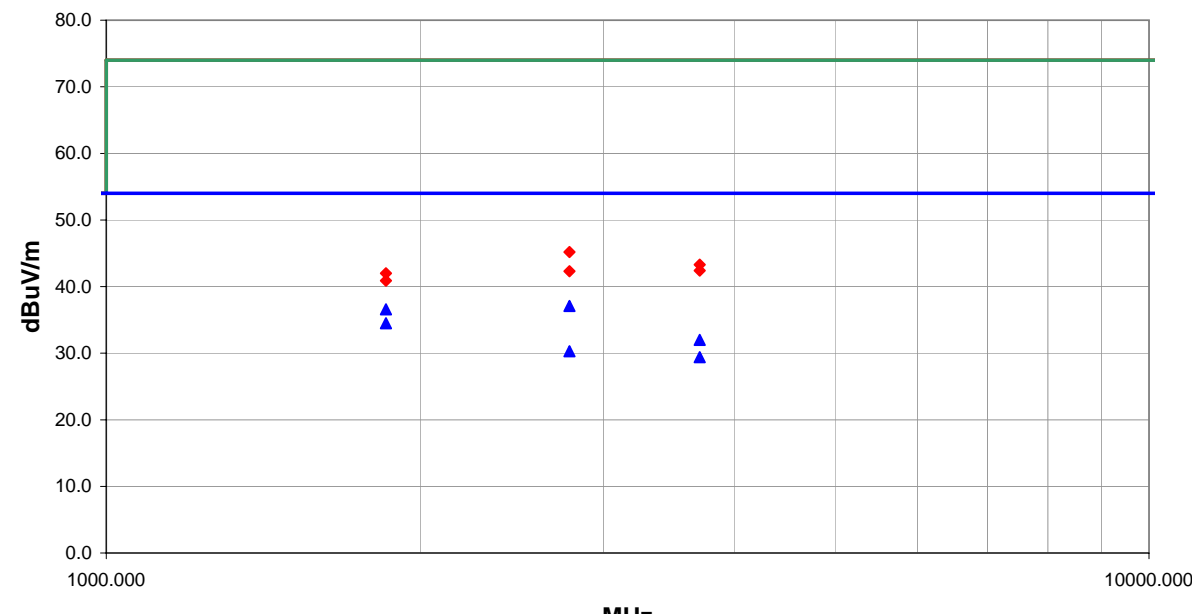
## Bandwidths Used for Measurements

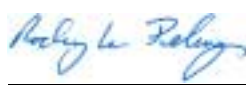
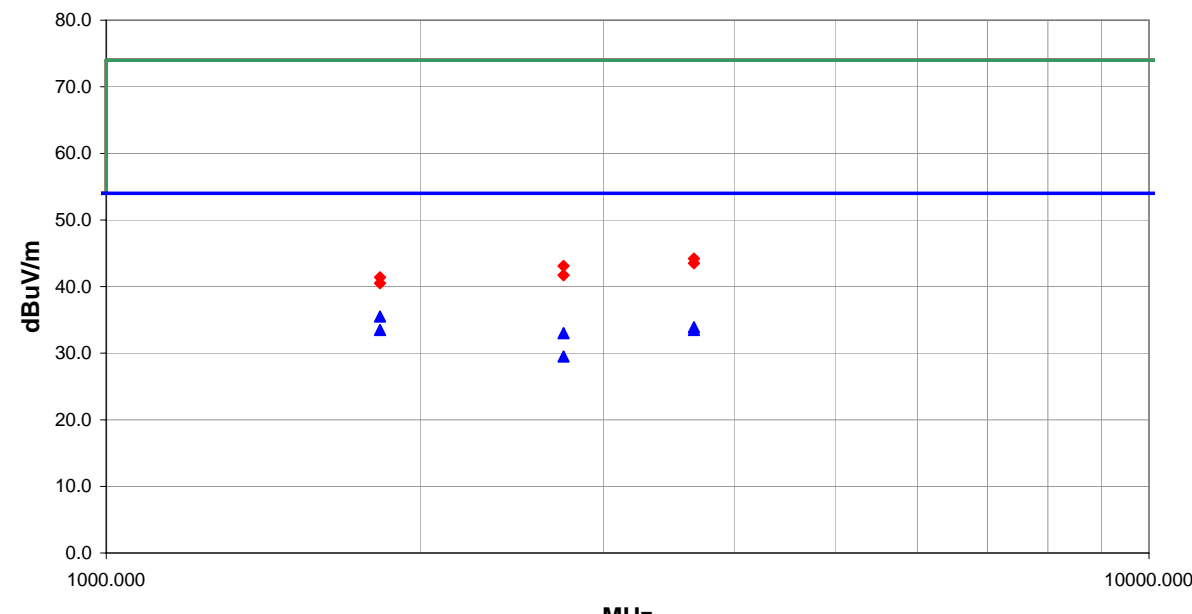
Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 – 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

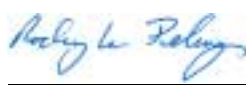
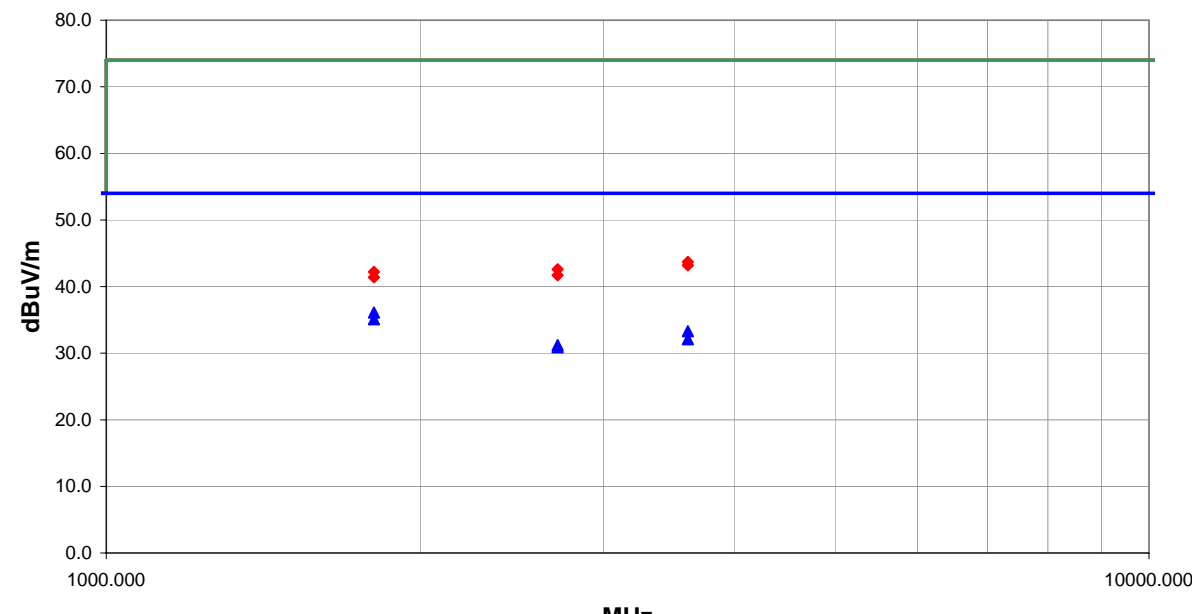
*Measurements were made using the bandwidths and detectors specified. No video filter was used.*

Completed by:



NORTHWEST EMC										REV d14.00 08/12/2003			
RADIATED EMISSIONS DATA SHEET													
EUT: WABI 007					Work Order: UMDT0002								
Serial Number: 018					Date: 09/30/03								
Customer: UMD Technology					Temperature: 73								
Attendees: Chuck Pulham					Humidity: 43%								
Cust. Ref. No.:					Barometric Pressure: 30.07								
Tested by: Rod Peloquin					Power: Battery					Job Site: EV01			
TEST SPECIFICATIONS													
Specification: FCC 15.249					Year: 2003								
Method: ANSI C63.4					Year: 1992								
SAMPLE CALCULATIONS													
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation													
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator													
COMMENTS													
EUT OPERATING MODES													
High channel, Modulated PRBS													
DEVIATIONS FROM TEST STANDARD													
No deviations.													
RESULTS													
Pass												Run #	
												8	
Other													
												 Tested By:	
													
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	
2781.318	37.1	0.0	336.0	1.0	3.0	0.0	V-Horn	AV	0.0	37.1	54.0	-16.9	
1854.212	40.7	-4.1	20.0	1.4	3.0	0.0	H-Horn	AV	0.0	36.6	54.0	-17.4	
1854.212	38.6	-4.1	360.0	1.0	3.0	0.0	V-Horn	AV	0.0	34.5	54.0	-19.5	
3708.424	29.9	2.1	52.0	2.1	3.0	0.0	H-Horn	AV	0.0	32.0	54.0	-22.0	
2781.318	30.3	0.0	347.0	1.0	3.0	0.0	H-Horn	AV	0.0	30.3	54.0	-23.7	
3708.424	27.3	2.1	123.0	1.0	3.0	0.0	V-Horn	AV	0.0	29.4	54.0	-24.6	
2781.318	45.2	0.0	336.0	1.0	3.0	0.0	V-Horn	PK	0.0	45.2	74.0	-28.8	
3708.424	41.2	2.1	52.0	2.1	3.0	0.0	H-Horn	PK	0.0	43.3	74.0	-30.7	
3708.424	40.3	2.1	123.0	1.0	3.0	0.0	V-Horn	PK	0.0	42.4	74.0	-31.6	
2781.318	42.3	0.0	347.0	1.0	3.0	0.0	H-Horn	PK	0.0	42.3	74.0	-31.7	
1854.212	46.1	-4.1	20.0	1.4	3.0	0.0	H-Horn	PK	0.0	42.0	74.0	-32.0	
1854.212	45.0	-4.1	360.0	1.0	3.0	0.0	V-Horn	PK	0.0	40.9	74.0	-33.1	

NORTHWEST EMC										REV d14.00 08/12/2003			
RADIATED EMISSIONS DATA SHEET													
EUT: WABI 007					Work Order: UMDT0002								
Serial Number: 018					Date: 09/30/03								
Customer: UMD Technology					Temperature: 73								
Attendees: Chuck Pulham					Humidity: 43%								
Cust. Ref. No.:					Barometric Pressure: 30.07								
Tested by: Rod Peloquin					Power: Battery					Job Site: EV01			
TEST SPECIFICATIONS													
Specification: FCC 15.249					Year: 2003								
Method: ANSI C63.4					Year: 1992								
SAMPLE CALCULATIONS													
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation													
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator													
COMMENTS													
EUT OPERATING MODES													
Mid channel, Modulated PRBS													
DEVIATIONS FROM TEST STANDARD													
No deviations.													
RESULTS										Run #			
Pass										10			
Other										 Tested By:			
													
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	
1830.288	39.7	-4.2	23.0	1.4	3.0	0.0	H-Horn	AV	0.0	35.5	54.0	-18.5	
3660.456	32.0	1.9	301.0	1.1	3.0	0.0	H-Horn	AV	0.0	33.9	54.0	-20.1	
1830.288	37.7	-4.2	21.0	1.0	3.0	0.0	V-Horn	AV	0.0	33.5	54.0	-20.5	
3660.456	31.6	1.9	356.0	1.5	3.0	0.0	V-Horn	AV	0.0	33.5	54.0	-20.5	
2745.342	33.2	-0.2	342.0	1.1	3.0	0.0	V-Horn	AV	0.0	33.0	54.0	-21.0	
2745.342	29.7	-0.2	7.0	1.0	3.0	0.0	H-Horn	AV	0.0	29.5	54.0	-24.5	
3660.456	42.3	1.9	301.0	1.1	3.0	0.0	H-Horn	PK	0.0	44.2	74.0	-29.8	
3660.456	41.6	1.9	356.0	1.5	3.0	0.0	V-Horn	PK	0.0	43.5	74.0	-30.5	
2745.342	43.3	-0.2	342.0	1.1	3.0	0.0	V-Horn	PK	0.0	43.1	74.0	-30.9	
2745.342	41.9	-0.2	7.0	1.0	3.0	0.0	H-Horn	PK	0.0	41.7	74.0	-32.3	
1830.210	45.6	-4.2	23.0	1.4	3.0	0.0	H-Horn	PK	0.0	41.4	74.0	-32.6	
1830.180	44.7	-4.2	21.0	1.0	3.0	0.0	V-Horn	PK	0.0	40.5	74.0	-33.5	

NORTHWEST EMC										RADIATED EMISSIONS DATA SHEET				REV d14.00 08/12/2003	
EUT: WABI 007										Work Order: UMDT0002					
Serial Number: 018										Date: 09/30/03					
Customer: UMD Technology										Temperature: 73					
Attendees: Chuck Pulham										Humidity: 43%					
Cust. Ref. No.:										Barometric Pressure: 30.07					
Tested by: Rod Peloquin					Power: Battery					Job Site: EV01					
TEST SPECIFICATIONS															
Specification: FCC 15.249										Year: 2003					
Method: ANSI C63.4										Year: 1992					
SAMPLE CALCULATIONS															
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation															
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator															
COMMENTS															
EUT OPERATING MODES															
Low channel, Modulated PRBS															
DEVIATIONS FROM TEST STANDARD															
No deviations.															
RESULTS														Run #	
Pass														12	
Other															
										 Tested By:					
															
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)			
1806.192	40.5	-4.4	26.0	1.4	3.0	0.0	H-Horn	AV	0.0	36.1	54.0	-17.9			
1806.192	39.5	-4.4	201.0	1.0	3.0	0.0	V-Horn	AV	0.0	35.1	54.0	-18.9			
3612.384	31.6	1.7	149.0	1.1	3.0	0.0	V-Horn	AV	0.0	33.3	54.0	-20.7			
3612.384	30.4	1.7	150.0	1.1	3.0	0.0	H-Horn	AV	0.0	32.1	54.0	-21.9			
2709.288	31.5	-0.3	164.0	1.0	3.0	0.0	V-Horn	AV	0.0	31.2	54.0	-22.8			
2709.288	31.2	-0.3	212.0	1.0	3.0	0.0	H-Horn	AV	0.0	30.9	54.0	-23.1			
3612.384	42.0	1.7	149.0	1.1	3.0	0.0	V-Horn	PK	0.0	43.7	74.0	-30.3			
3612.384	41.5	1.7	150.0	1.1	3.0	0.0	H-Horn	PK	0.0	43.2	74.0	-30.8			
2709.187	42.9	-0.3	164.0	1.0	3.0	0.0	V-Horn	PK	0.0	42.6	74.0	-31.4			
1806.192	46.6	-4.4	26.0	1.4	3.0	0.0	H-Horn	PK	0.0	42.2	74.0	-31.8			
2709.288	42.0	-0.3	212.0	1.0	3.0	0.0	H-Horn	PK	0.0	41.7	74.0	-32.3			
1806.126	45.8	-4.4	201.0	1.0	3.0	0.0	V-Horn	PK	0.0	41.4	74.0	-32.6			

NORTHWEST										REV									
EMC										RADIATED EMISSIONS DATA SHEET									
EUT: WABI 007										Work Order: UMDT0002									
Serial Number: 018										Date: 09/30/03									
Customer: UMD Technology										Temperature: 73									
Attendees: Chuck Pulham										Humidity: 43%									
Cust. Ref. No.:										Barometric Pressure: 30.07									
Tested by: Rod Peloquin					Power: Battery					Job Site: EV01									
TEST SPECIFICATIONS																			
Specification: FCC 15.249										Year: 2003									
Method: ANSI C63.4										Year: 1992									
SAMPLE CALCULATIONS																			
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation																			
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator																			
COMMENTS																			
EUT OPERATING MODES																			
High channel, Modulated PRBS																			
DEVIATIONS FROM TEST STANDARD																			
No deviations.																			
RESULTS															Run #				
Pass															4				
Other																			
										Rodry Le Peloquin									
										Tested By:									
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments						
928.001	30.0	2.3	326.0	1.6	3.0	10.0	H-Bilog	QP	0.0	42.3	46.0	-3.7	high channel, EUT hori						
928.002	26.0	2.3	256.0	1.7	3.0	10.0	V-Bilog	QP	0.0	38.3	46.0	-7.7	high channel, EUT hori						
901.990	25.1	1.9	360.0	1.0	3.0	10.0	H-Bilog	QP	0.0	37.0	46.0	-9.0	low channel, EUT verti						
901.999	23.3	1.9	0.0	1.0	3.0	10.0	V-Bilog	QP	0.0	35.2	46.0	-10.8	low channel, EUT verti						

