

# **Tripod Data Systems, Inc.**

**WMBGMR01**

**May 18, 2006**

**Report No. TRPO0017.1**

Report Prepared By



[www.nwemc.com](http://www.nwemc.com)  
1-888-EMI-CERT

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**EMC Test Report**

**Certificate of Test**  
**Issue Date: May 18, 2006**  
**Tripod Data Systems, Inc.**  
**Model: WMBGMR01**

<b>Emissions</b>				
<b>Test Description</b>	<b>Specification</b>	<b>Test Method</b>	<b>Pass</b>	<b>Fail</b>
AC Powerline Conducted Emissions	FCC 15.207 AC Powerline Conducted Emissions:2005-9	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Occupied Bandwidth	FCC 15.247(a) Occupied Bandwidth:2005-9	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Output Power	FCC 15.247(b) Output Power:2005-9	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Band Edge Compliance	FCC 15.247(d) Band Edge Compliance:2005-9	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Spurious Conducted Emissions	FCC 15.247(d) Spurious Conducted Emissions:2005-9	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Spurious Radiated Emissions	FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Power Spectral Density	FCC 15.247(e) Power Spectral Density:2005-9	ANSI C63.4:2003	<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:**



Greg Kiemel, Director of Engineering

*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:** 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 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.



NVLAP LAB CODE 200629-0  
NVLAP LAB CODE 200630-0  
NVLAP LAB CODE 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 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. USA0401C.



**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).



**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, and R-2318, Irvine: C-2094 and R-1943, Sultan: R-871, C-1784 and R-1761).



**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.



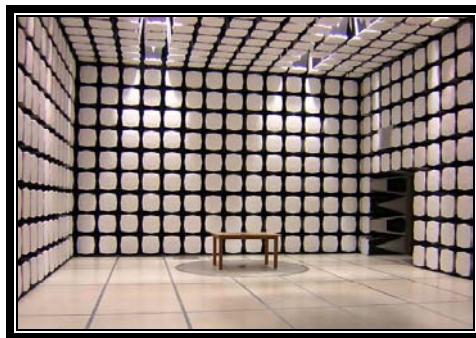
**GOST:** Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification



## SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/scope.asp>



**California – Orange County Facility  
Labs OC01 – OC13**

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



**Oregon – Evergreen Facility  
Labs EV01 – EV10**

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



**Washington – Sultan Facility  
Labs SU01 – SU07**

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

<b>Party Requesting the Test</b>	
<b>Company Name:</b>	Tripod Data Systems, Inc.
<b>Address:</b>	345 SW Avery Ave
<b>City, State, Zip:</b>	Corvallis, OR 97333
<b>Test Requested By:</b>	Bob Grant
<b>Model:</b>	WMBGMR01
<b>First Date of Test:</b>	April 21, 2006
<b>Last Date of Test:</b>	May 08, 2006
<b>Receipt Date of Samples:</b>	April 21, 2006
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No visual damage.

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

<b>Clocks/Oscillators:</b>	Not provided.
<b>I/O Ports:</b>	Serial, USB host (unused), USB client, SDIO, Compact flash (2), DC power

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

The EUT is the Bluetooth portion of a WiFi – Bluetooth combo radio module hosted in the Ranger X series, a Windows Mobile handheld computer and data collector.

**Client Justification for EUT Selection:**

The product is a representative production sample.

**Client Justification for Test Selection:**

These test satisfy the requirements for certification under FCC 15.247.

**CONFIGURATION 1 TRPO0017**

<b>EUT</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>	
EUT – WMBGMR01	Tripod Data Systems, Inc.	WMBGMR01	None	

<b>Peripherals in test setup boundary</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>	
Pocket PC Handheld Data Collector	Tripod Data Systems, Inc.	Ranger X	EMI 1	
DC Power Supply	Cincon Electronics Co.	TR30R050	N/A	

<b>Cables</b>					
<b>Cable Type</b>	<b>Shield</b>	<b>Length (m)</b>	<b>Ferrite</b>	<b>Connection 1</b>	<b>Connection 2</b>
DC Leads	No	1.8	Yes	Pocket PC Handheld Data Collector	AC Power
<b>PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.</b>					

**CONFIGURATION 2 TRPO0017**

<b>EUT</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>	
EUT – WMBGMR01	Tripod Data Systems, Inc.	WMBGMR01	None	

<b>Peripherals in test setup boundary</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>	
Pocket PC Handheld Data Collector	Tripod Data Systems, Inc.	Ranger X	EMI 1	
DC Power Supply	Cincon Electronics Co.	TR30R050	N/A	

<b>Cables</b>					
<b>Cable Type</b>	<b>Shield</b>	<b>Length (m)</b>	<b>Ferrite</b>	<b>Connection 1</b>	<b>Connection 2</b>
DC Leads	No	1.8	Yes	Pocket PC Handheld Data Collector	AC Power
Serial	Yes	1.5	No	Pocket PC Handheld Data Collector	Unterminated
USB 2	Yes	1.8	No	Pocket PC Handheld Data Collector	Unterminated
<b>PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.</b>					

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	4/21/2006	Output Power	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	4/21/2006	Occupied Bandwidth	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	4/21/2006	Band Edge Compliance	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.
4	4/21/2006	Power Spectral Density	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.
5	4/24/2006	Spurious Radiated Emissions	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.
6	5/5/2006	Spurious Conducted Emissions	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.
7	5/8/2006	AC Power Line Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# OCCUPIED BANDWIDTH

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.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Hewlett-Packard	8593E	AAN	1/25/2006	13

## MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

## TEST DESCRIPTION

The occupied bandwidth was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode.

## OCCUPIED BANDWIDTH

EUT:	WMBGMR01	Work Order:	TRPO0017
Serial Number:	None	Date:	04/21/06
Customer:	Tripod Data Systems, Inc.	Temperature:	22°C
Attendees:	Bob Grant	Humidity:	34%
Project:	None	Barometric Pres.:	30.17
Tested by:	Rod Peloquin	Power:	
TEST SPECIFICATIONS		Test Method	
FCC 15.247(a) Occupied Bandwidth 2005-9		ANSI C63.4 2003	
COMMENTS			
Bluetooth operating mode			
DEVIATIONS FROM TEST STANDARD			
Configuration #	1	Signature 	

## Modes of Operation and Test Conditions

	Value	Limit	Result
Low Channel	788 kHz	≤ 1.5 MHz	Pass
Mid Channel	780 kHz	≤ 1.5 MHz	Pass
High Channel	780 kHz	≤ 1.5 MHz	Pass

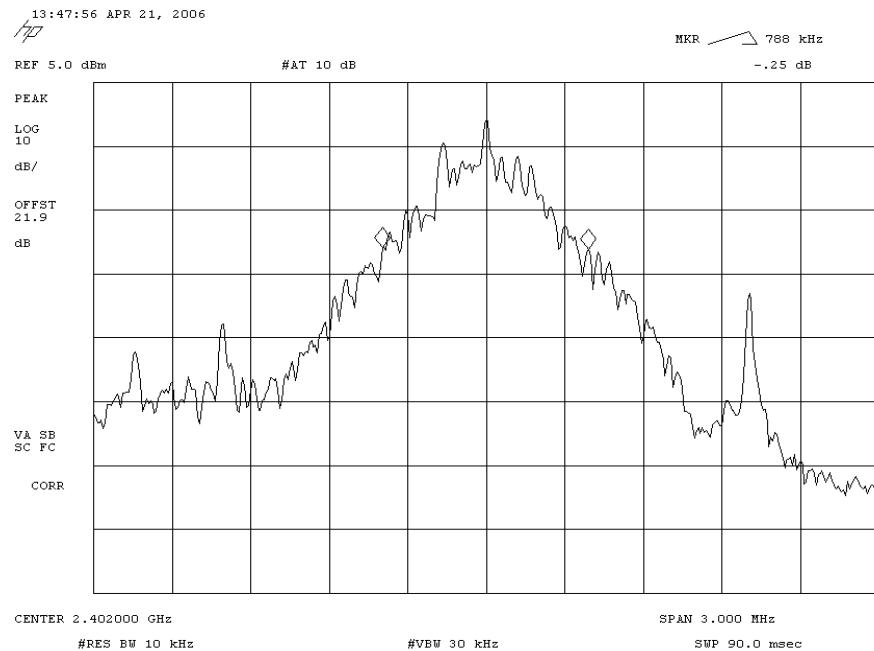
## OCCUPIED BANDWIDTH

Low Channel

Result: Pass

Value: 788 kHz

Limit: ≤ 1.5 MHz

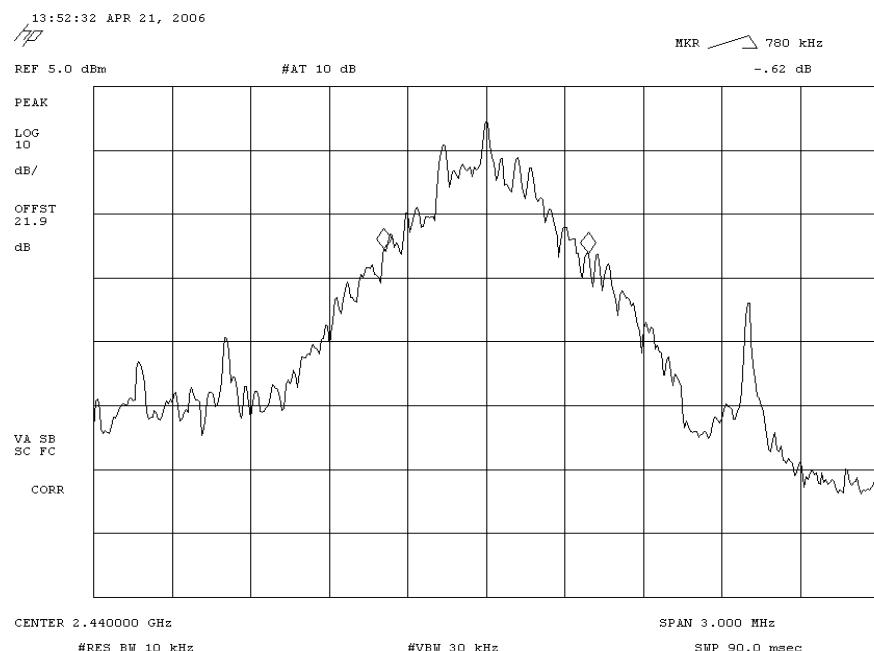


Mid Channel

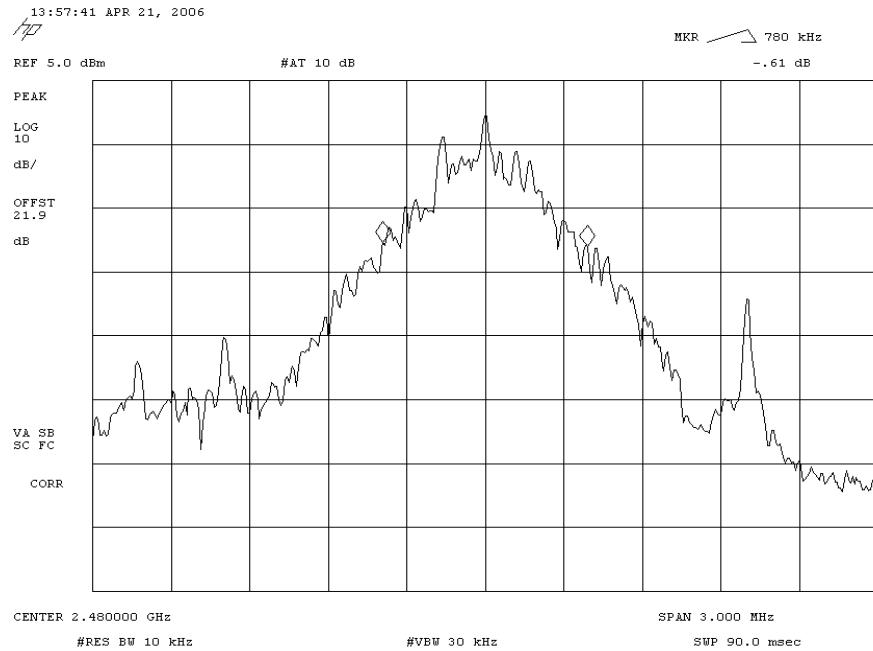
Result: Pass

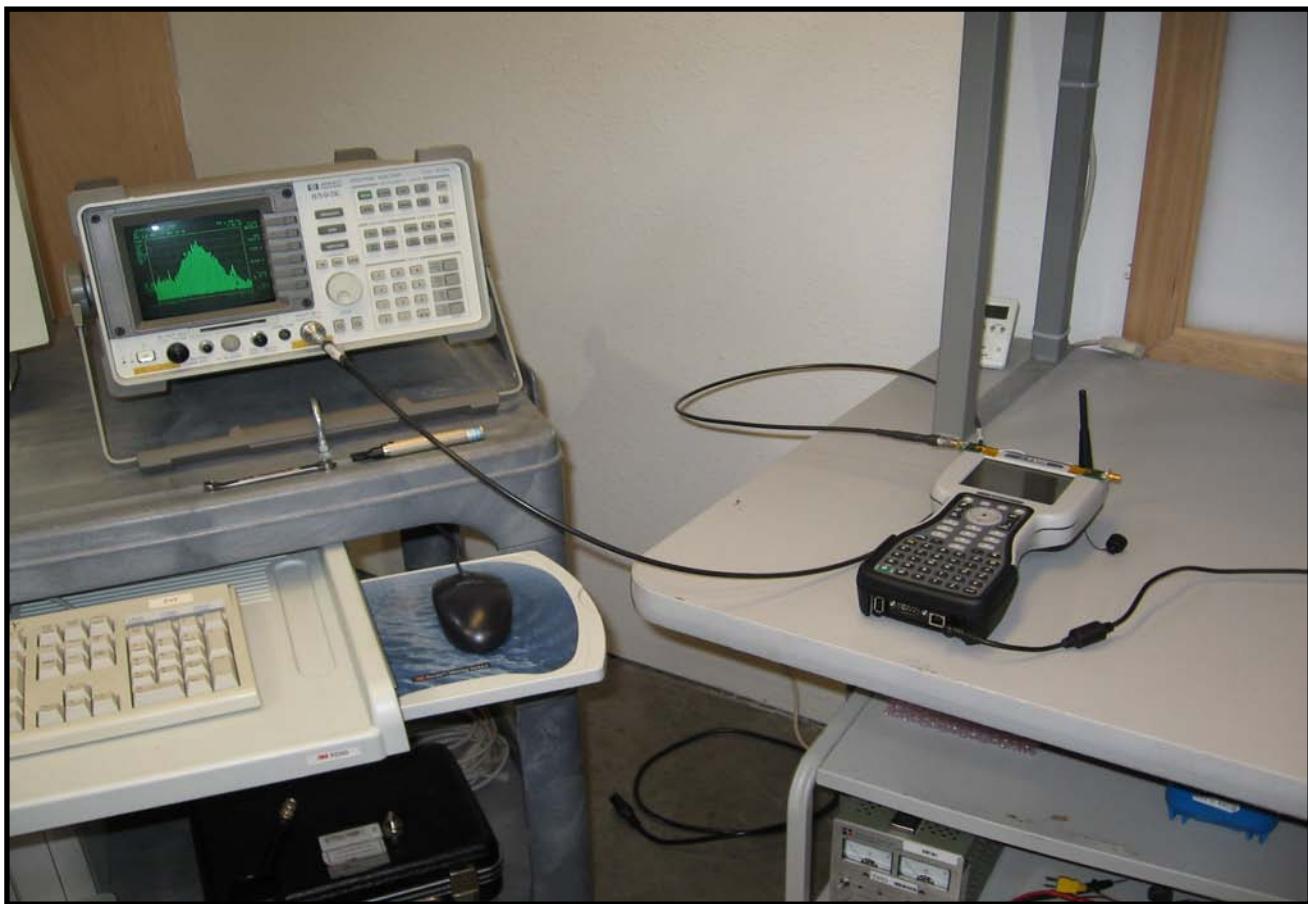
Value: 780 kHz

Limit: ≤ 1.5 MHz



High Channel		
<b>Result:</b> Pass	<b>Value:</b> 780 kHz	<b>Limit:</b> $\leq$ 1.5 MHz





# Output Power

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.

TEST EQUIPMENT						
Description	Manufacturer	Model	ID	Last Cal.	Interval	
Attenuator	Pasternack	PE7005-20	AUN	2/14/2006	13	
Signal Generator	Hewlett-Packard	8648D	TGC	1/27/2006	13	
Power Sensor	Hewlett-Packard	8481H	SPB	7/23/2004	24	
Power Meter	Hewlett Packard	E4418A	SPA	7/23/2004	24	
Spectrum Analyzer	Hewlett-Packard	8593E	AAN	1/25/2006	13	

## MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

## TEST DESCRIPTION

The peak output power was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode.

Prior to measuring the output power, the spectrum analyzer amplitude offset was calibrated using a power meter and signal generator thru substitution.

**De Facto EIRP Limit:** Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36dBm.

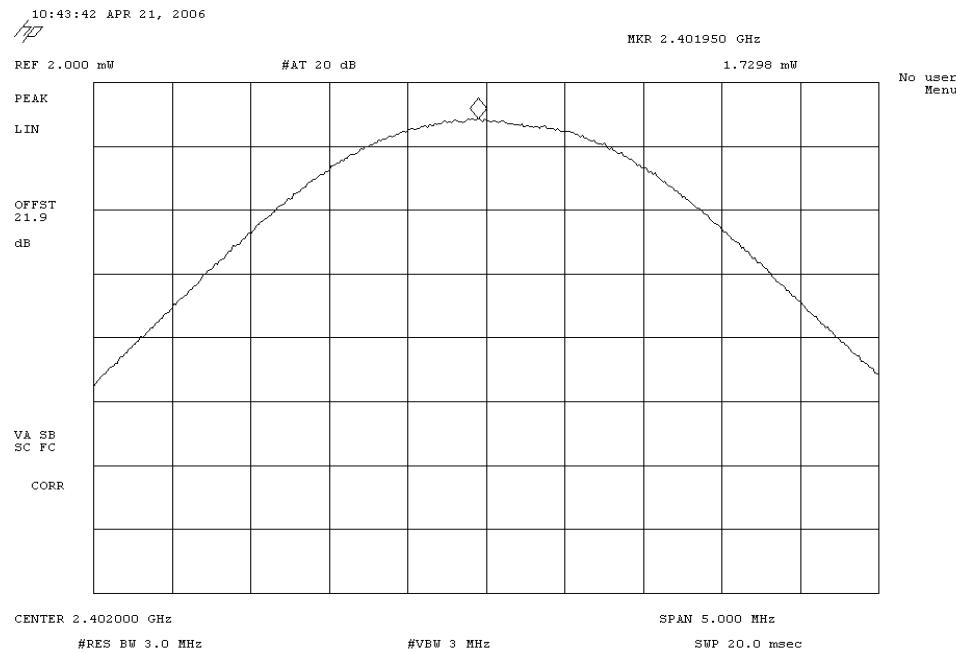
**EMC****Output Power**

EUT:	WMBGMR01	Work Order:	TRPO0017
Serial Number:	None	Date:	04/21/06
Customer:	Tripod Data Systems, Inc.	Temperature:	22°C
Attendees:	Bob Grant	Humidity:	34%
Project:	None	Barometric Pres.:	30.17
Tested by:	Greg Kiemel	Power:	
		Test Method	
FCC 15.247(b) Output Power 2005-9		ANSI C63.4 2003	
<b>COMMENTS</b>			
Bluetooth operating mode			
<b>DEVIATIONS FROM TEST STANDARD</b>			
Configuration #	1	Signature 	

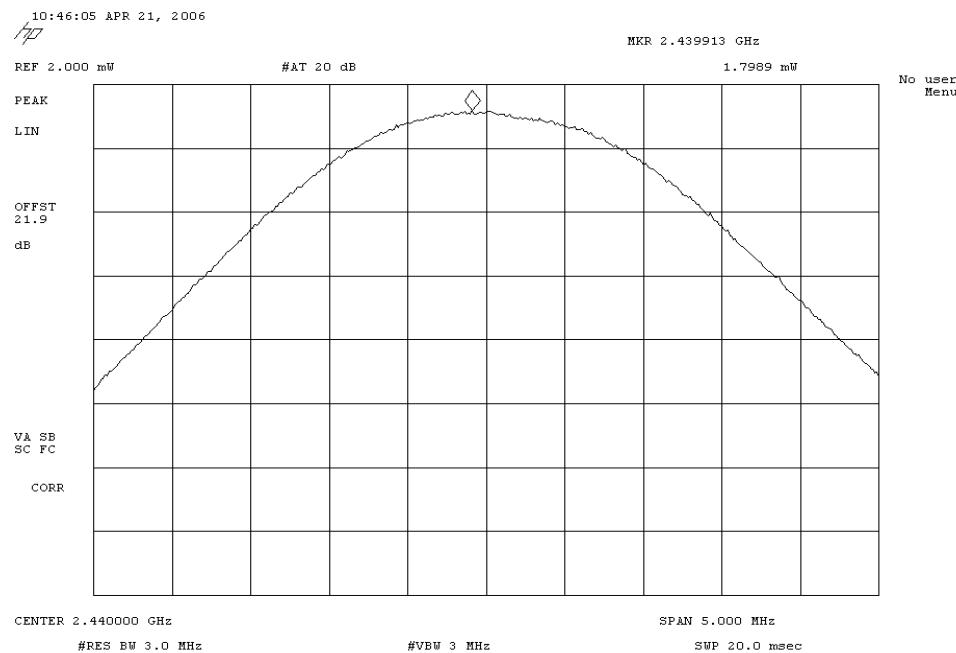
**Modes of Operation and Test Conditions**

		Value	Limit	Result
Low		1.73 mW	<= 1 W	Pass
Mid		1.80 mW	<= 1 W	Pass
High		1.92 mW	<= 1 W	Pass

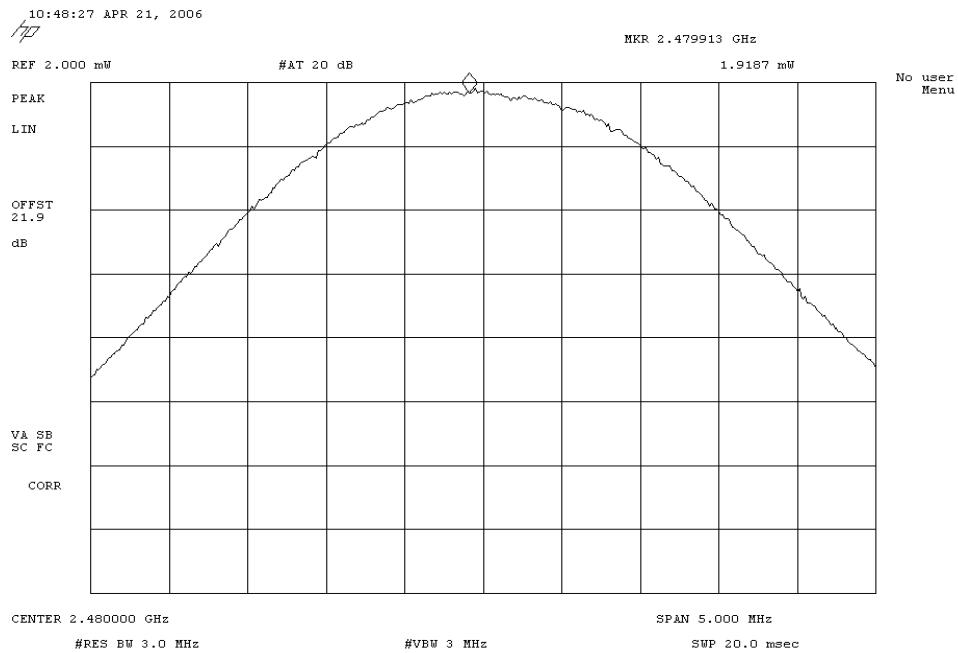
Result:	Pass	Low	Value:	1.73 mW	Limit:	<= 1 W
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Result:	Pass	Mid	Value:	1.80 mW	Limit:	<= 1 W
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Result:	Pass	High	Value:	1.92 mW	Limit:	<= 1 W
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# BAND EDGE COMPLIANCE

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.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Hewlett-Packard	8593E	AAN	1/25/2006	13

## MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

## TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode. The channels closest to the band edges were selected. The spectrum was scanned across each band edge from 5 MHz below the band edge to 5 MHz above the band edge.

## BAND EDGE COMPLIANCE

EUT:	WMBGMR01	Work Order:	TRPO0017
Serial Number:	None	Date:	04/21/06
Customer:	Tripod Data Systems, Inc.	Temperature:	22°C
Attendees:	Bob Grant	Humidity:	34%
Project:	None	Barometric Pres.:	30.17
Tested by:	Rod Peloquin	Power:	Job Site: EV06
<b>TEST SPECIFICATIONS</b>		Test Method	
FCC 15.247(d) Band Edge Compliance 2005-9		ANSI C63.4 2003	
<b>COMMENTS</b>			
Bluetooth operating mode			
<b>DEVIATIONS FROM TEST STANDARD</b>			
Configuration #	1	 <i>Rod Peloquin</i> Signature	

**Modes of Operation and Test Conditions**

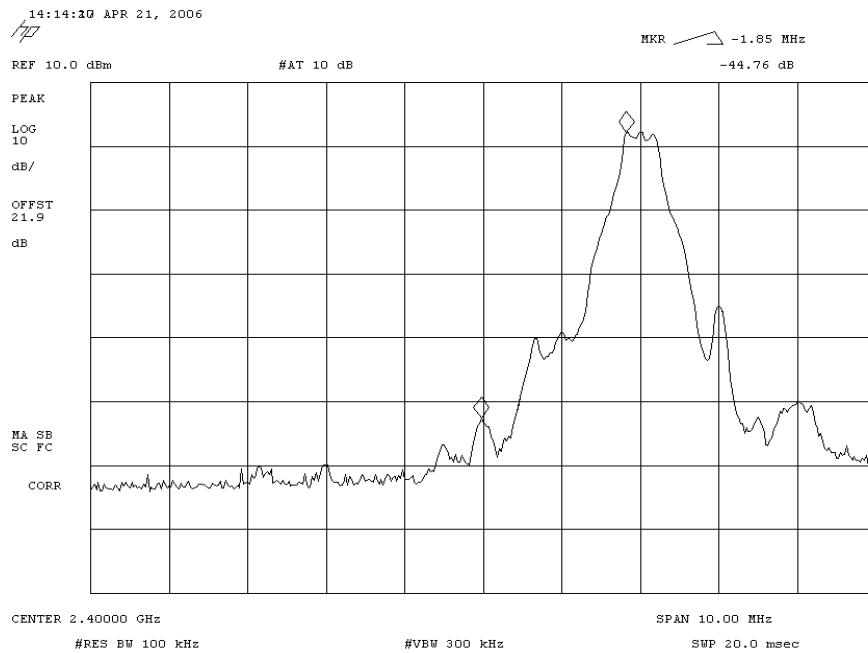
	Value	Limit	Result
Low Channel	-44.8 dBc	≤ -20 dBc	Pass
High Channel	-46.7 dBc	≤ -20 dBc	Pass

## Low Channel

Result: Pass

Value: -44.8 dBc

Limit: ≤ -20 dBc

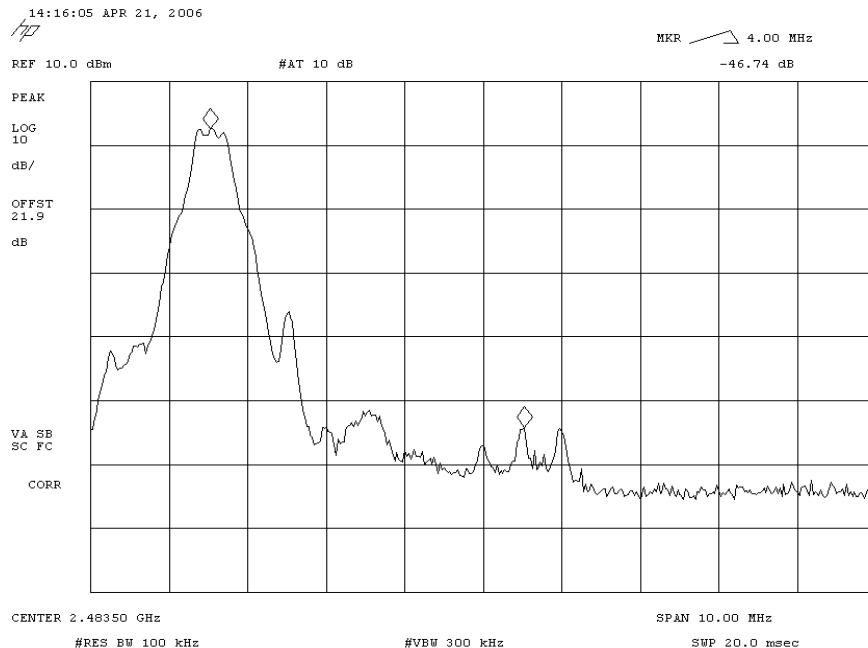


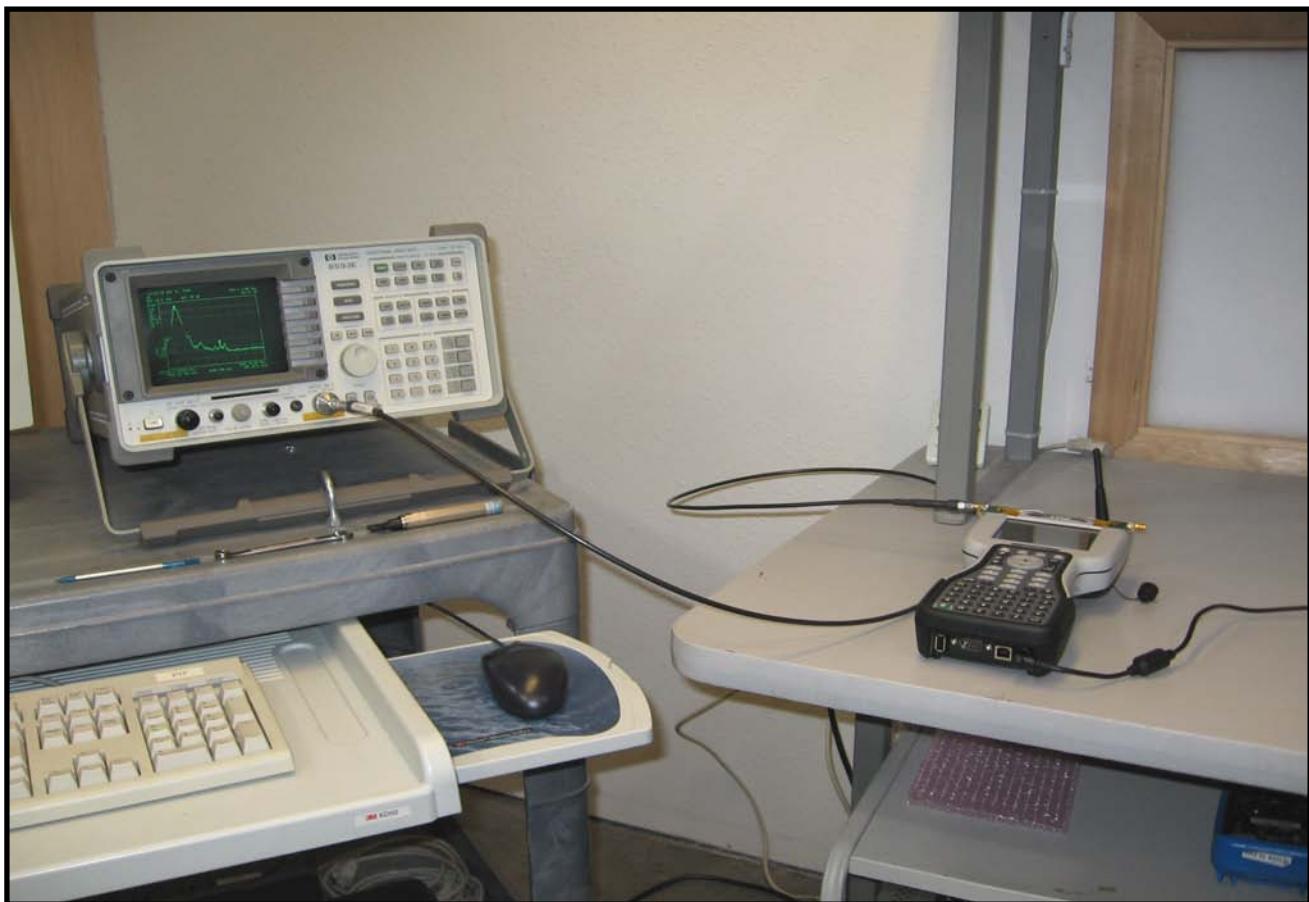
## High Channel

Result: Pass

Value: -46.7 dBc

Limit: ≤ -20 dBc





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.

TEST EQUIPMENT						
Description	Manufacturer	Model	ID	Last Cal.	Interval	
Spectrum Analyzer	Agilent	E4446A	AAT	4/4/2006	12	

#### MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

#### TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to low, medium, and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency.

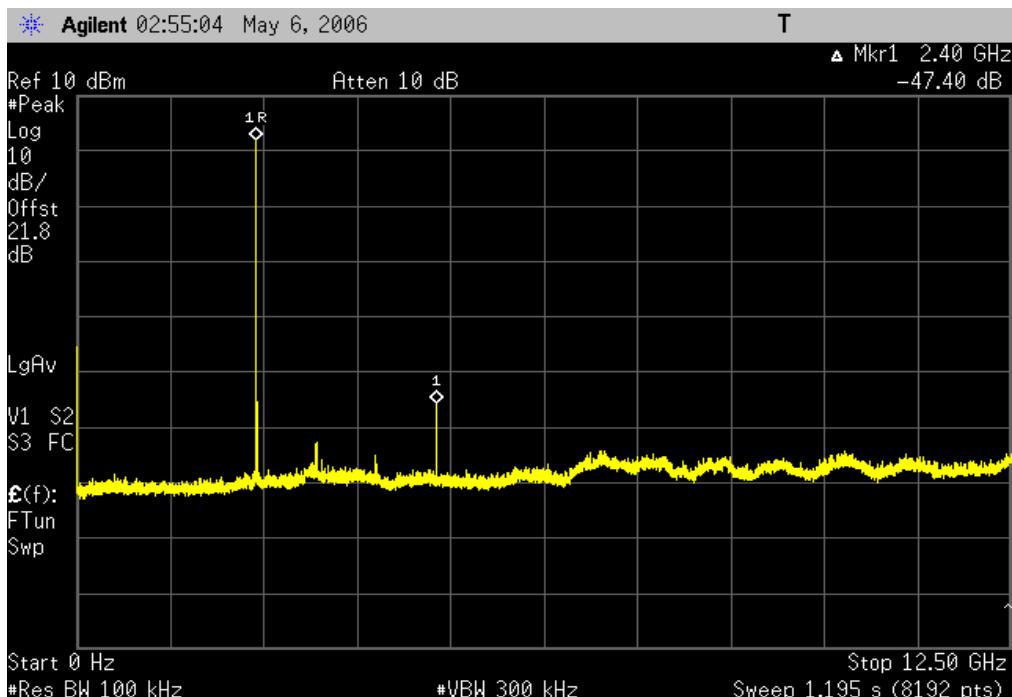
## SPURIOUS CONDUCTED EMISSIONS

EUT:	WMBGMR01	Work Order:	TRPO0017
Serial Number:	None	Date:	05/05/06
Customer:	Tripod Data Systems, Inc.	Temperature:	24°C
Attendees:	None	Humidity:	26%
Project:	None	Barometric Pres.:	29.99
Tested by:	Rod Peloquin	Power:	120VAC/60Hz
TEST SPECIFICATIONS		Test Method	
FCC 15.247(d) Spurious Conducted Emissions 2005-9		ANSI C63.4 2003	
COMMENTS			
Bluetooth operating mode			
DEVIATIONS FROM TEST STANDARD			
Configuration #	1	 Signature	

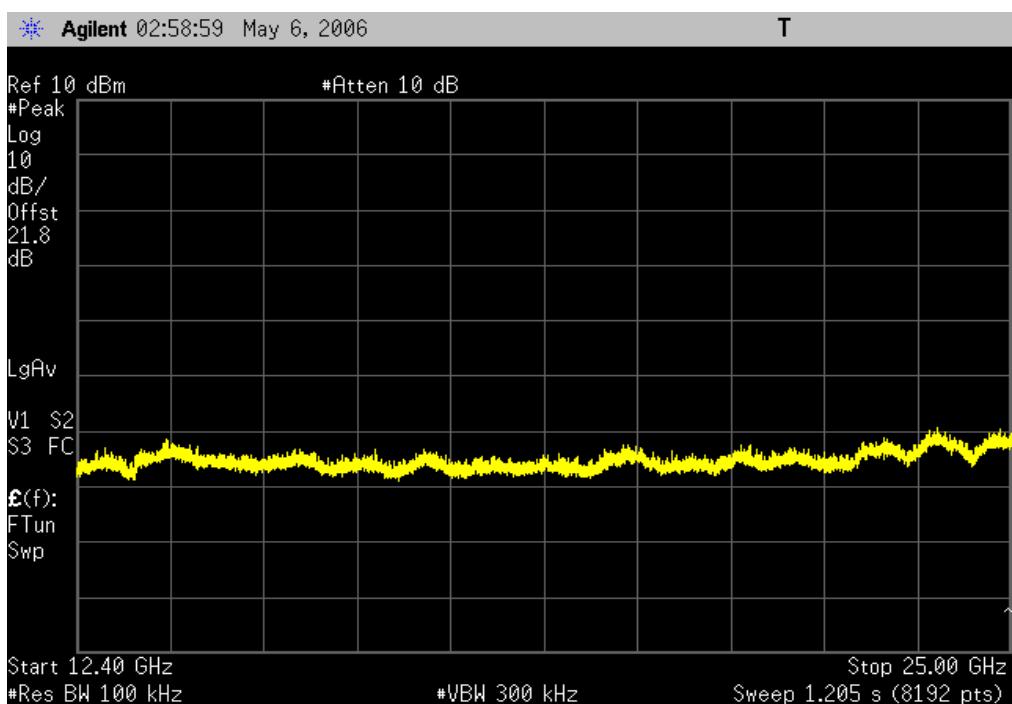
## Modes of Operation and Test Conditions

	Value	Limit	Result
Low Channel, 0MHz - 12.5GHz	-47.4 dBc	≤ -20 dBc	Pass
Low Channel, 12.4GHz-25GHz	< -50 dBc	≤ -20 dBc	Pass
Mid Channel, 0MHz - 12.5GHz	-46.8 dBc	≤ -20 dBc	Pass
Mid Channel, 12.4GHz-25GHz	< -50 dBc	≤ -20 dBc	Pass
High Channel, 0MHz - 12.5GHz	-52.8 dBc	≤ -20 dBc	Pass
High Channel, 12.4GHz-25GHz	< -50 dBc	≤ -20 dBc	Pass

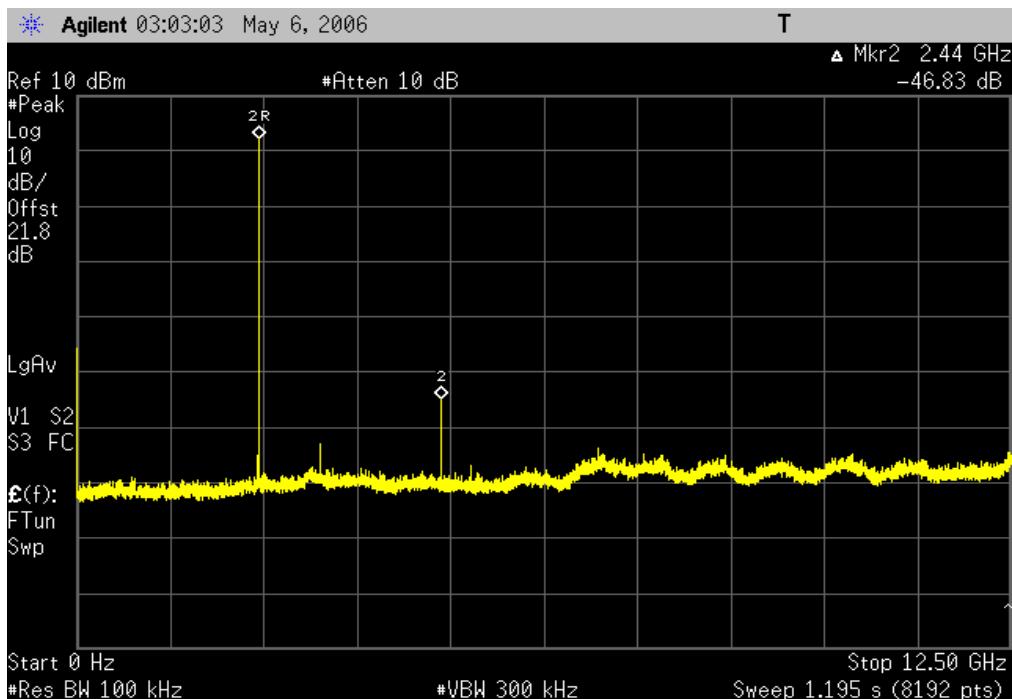
Low Channel, 0MHz - 12.5GHz		
<b>Result:</b> Pass	<b>Value:</b> -47.4 dBc	<b>Limit:</b> ≤ -20 dBc



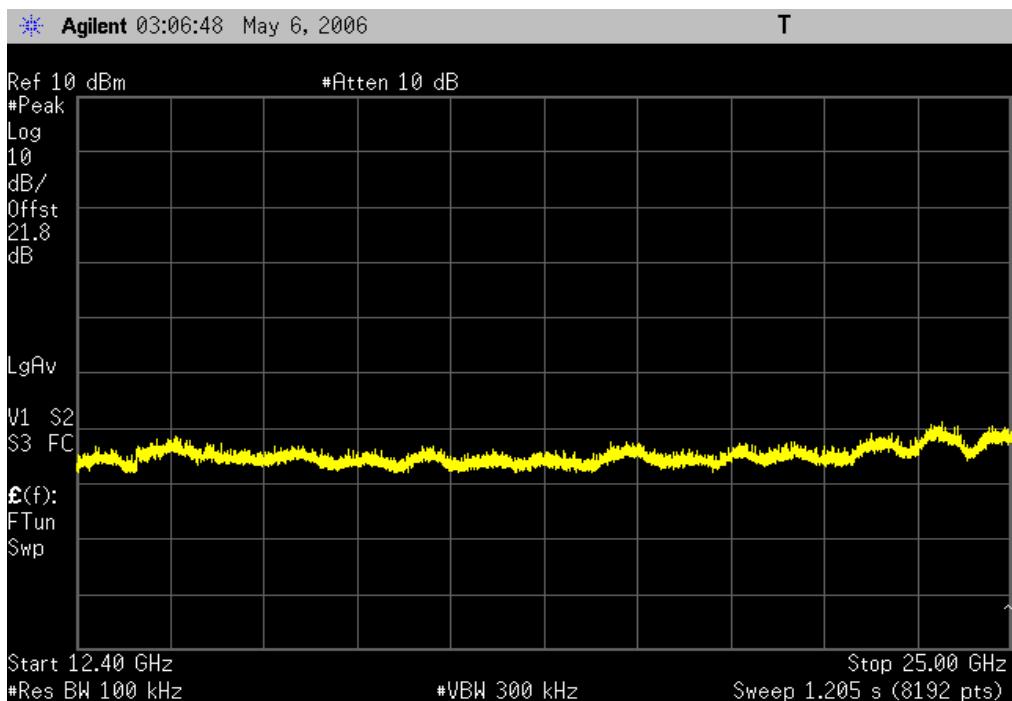
Low Channel, 12.4GHz-25GHz		
<b>Result:</b> Pass	<b>Value:</b> < -50 dBc	<b>Limit:</b> ≤ -20 dBc



Mid Channel, 0MHz - 12.5GHz		
Result: Pass	Value: -46.8 dBc	Limit: ≤ -20 dBc



Mid Channel, 12.4GHz-25GHz		
Result: Pass	Value: < -50 dBc	Limit: ≤ -20 dBc

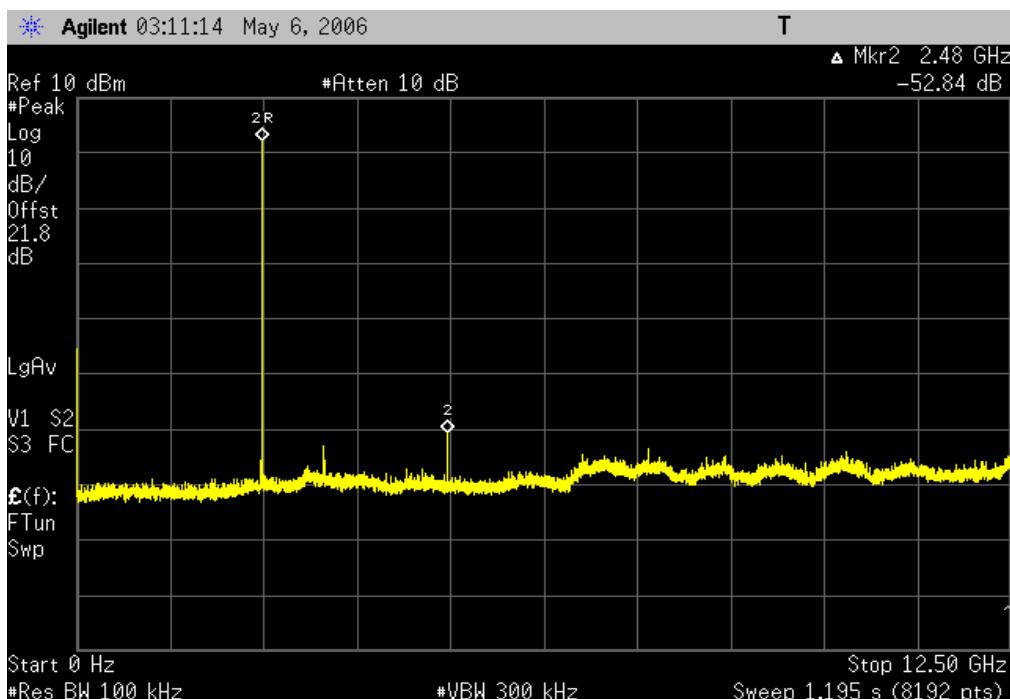


High Channel, 0MHz - 12.5GHz

Result: Pass

Value: -52.8 dBc

Limit: ≤ -20 dBc

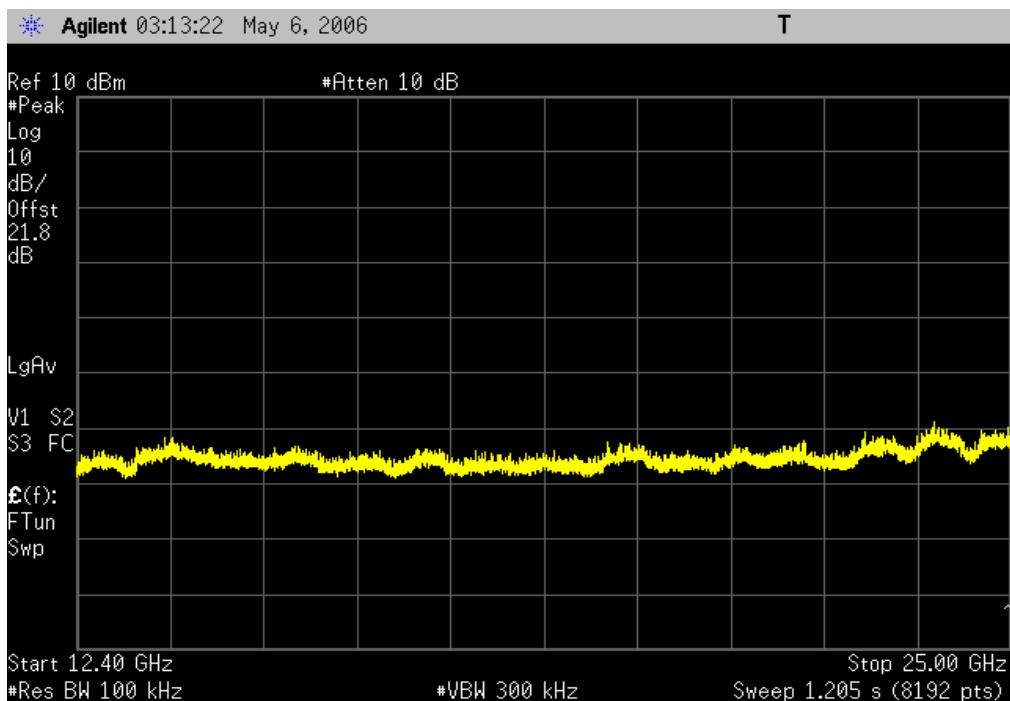


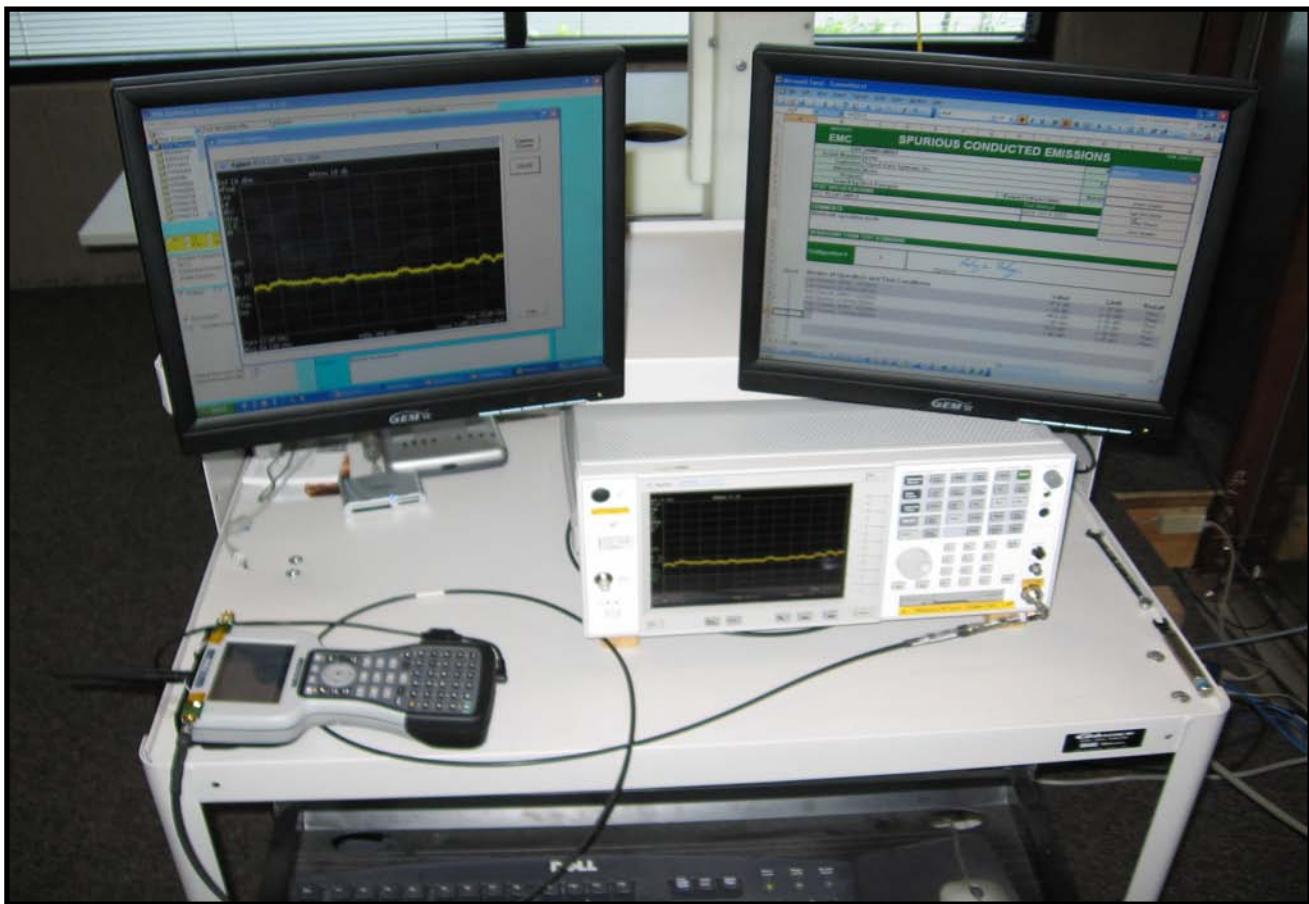
High Channel, 12.4GHz-25GHz

Result: Pass

Value: &lt; -50 dBc

Limit: ≤ -20 dBc





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.

**TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Hewlett-Packard	8593E	AAN	1/25/2006	13

**MEASUREMENT UNCERTAINTY**

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

**TEST DESCRIPTION**

The peak power spectral density measurements were measured with the EUT set to low, mid, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data. Per the procedure outlined in FCC 97-114, the spectrum analyzer was used as follows:

The emission peak(s) were located and zoom in on within the passband. The resolution bandwidth was set to 3 kHz, the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep speed was set equal to the span divided by 3 kHz (sweep = (SPAN/3 kHz)). For example, given a span of 1.5 MHz, the sweep should be  $1.5 \times 10^6 \div 3 \times 10^3 = 500$  seconds. External attenuation was used and added to the reading. The following FCC procedure was used for modifying the power spectral density measurements:

*"If the spectrum line spacing cannot be resolved on the available spectrum analyzer, the noise density function on most modern conventional spectrum analyzers will directly measure the noise power density normalized to a 1 Hz noise power bandwidth. Add 34.8 dB for correction to 3 kHz."*

## POWER SPECTRAL DENSITY

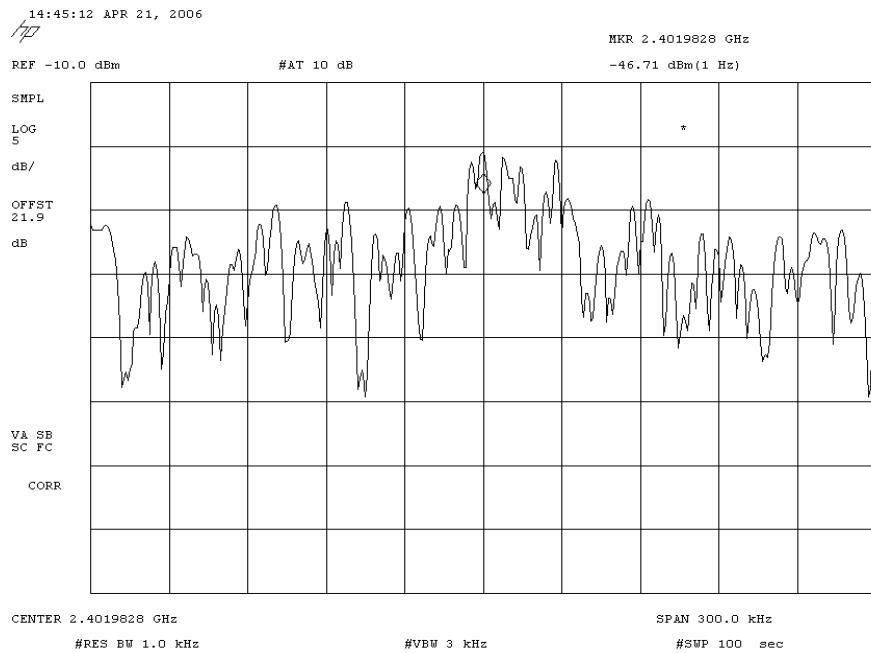
EUT:	WMBGMR01	Work Order:	TRPO0017
Serial Number:	None	Date:	04/21/06
Customer:	Tripod Data Systems, Inc.	Temperature:	23°C
Attendees:	None	Humidity:	33%
Project:	None	Barometric Pres.:	30.17
Tested by:	Rod Peloquin	Power:	Job Site: EV06
<b>TEST SPECIFICATIONS</b>		Test Method	
FCC 15.247(e) Power Spectral Density 2005-9		ANSI C63.4 2003	
<b>COMMENTS</b>			
Bluetooth operating mode			
<b>DEVIATIONS FROM TEST STANDARD</b>			
Configuration #	1	 <i>Rod Peloquin</i> Signature	

**Modes of Operation and Test Conditions**

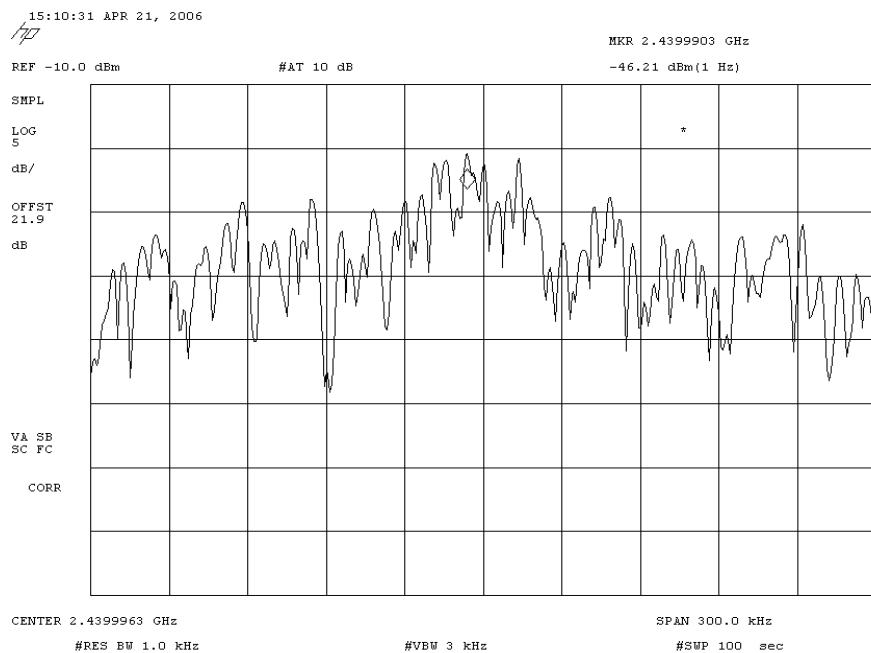
	Value	Limit	Result
Low Channel	-11.9 dBm / 3 kHz	≤ 8 dBm / 3 kHz	Pass
Mid Channel	-11.7 dBm / 3 kHz	≤ 8 dBm / 3 kHz	Pass
High Channel	-11.2 dBm / 3 kHz	≤ 8 dBm / 3 kHz	Pass

## POWER SPECTRAL DENSITY

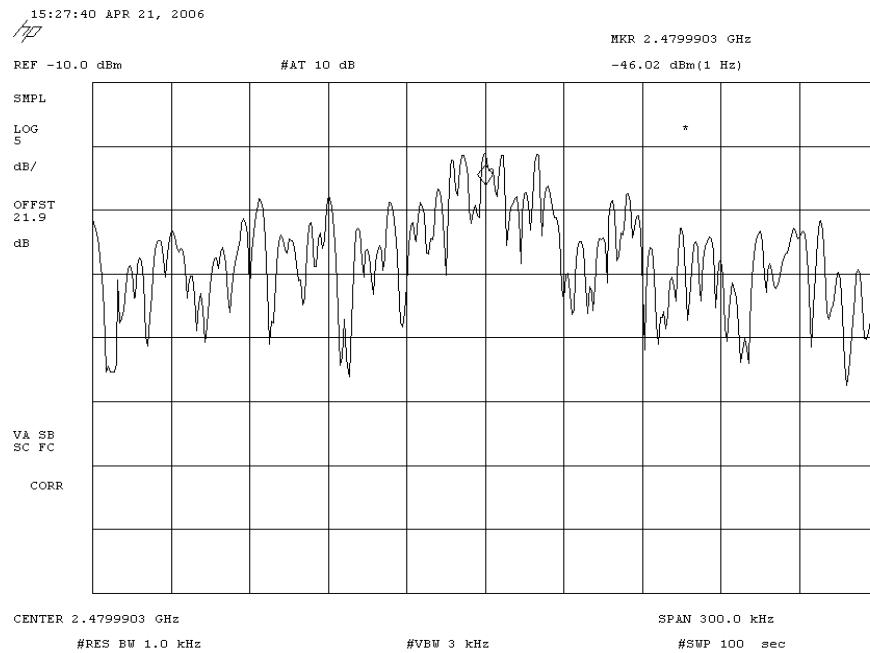
Low Channel		
<b>Result:</b> Pass	<b>Value:</b> -11.9 dBm / 3 kHz	<b>Limit:</b> ≤ 8 dBm / 3 kHz

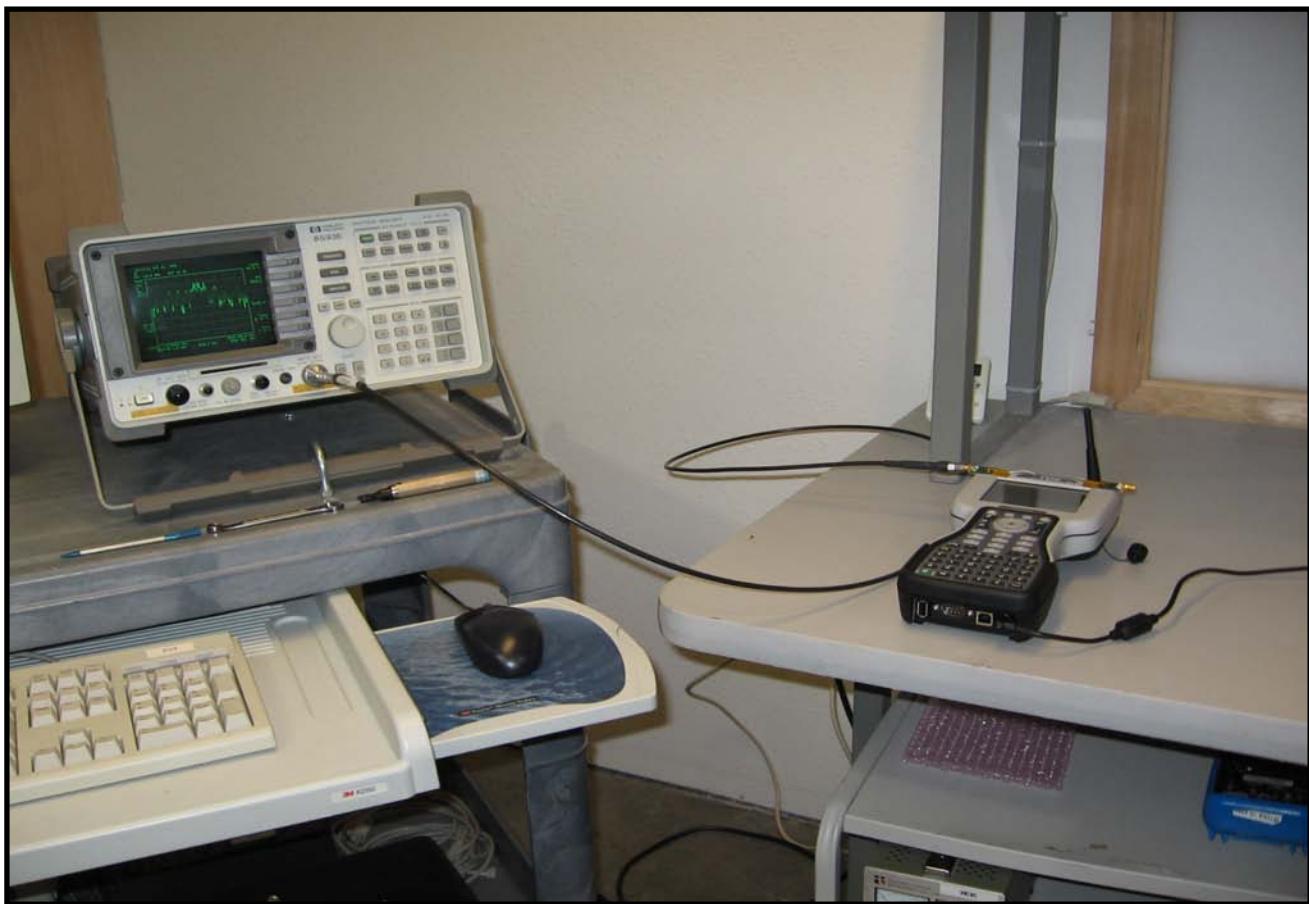


Mid Channel		
<b>Result:</b> Pass	<b>Value:</b> -11.7 dBm / 3 kHz	<b>Limit:</b> ≤ 8 dBm / 3 kHz



High Channel		
<b>Result:</b> Pass	<b>Value:</b> -11.2 dBm / 3 kHz	<b>Limit:</b> ≤ 8 dBm / 3 kHz





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**

Low Channel, Bluetooth
Mid Channel, Bluetooth
High Channel, Bluetooth

**MODE USED FOR FINAL DATA**

Low Channel, Bluetooth
Mid Channel, Bluetooth
High Channel, Bluetooth

**POWER SETTINGS INVESTIGATED**

120VAC/60Hz
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**POWER SETTINGS USED FOR FINAL DATA**

120VAC/60Hz
-------------

**FREQUENCY RANGE INVESTIGATED**

Start Frequency	30MHz	Stop Frequency	26.5GHz
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**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, Biconilog	EMCO	3141	AXE	12/28/2005	24
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	3/23/2006	13
Antenna, Horn	EMCO	3160-09	AHG	NCR	0
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	2/17/2005	16
Antenna, Horn	EMCO	3160-08	AHK	NCR	0
High Pass Filter	Micro-Tronics	HPM50111	HFO	4/4/2006	13
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	8/2/2005	13
Pre-Amplifier	Miteq	AM-1616-1000	AOL	1/4/2006	13
Spectrum Analyzer	Agilent	E4446A	AAT	4/4/2006	12
Antenna, Horn	EMCO	3115	AHC	8/30/2005	12

**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**

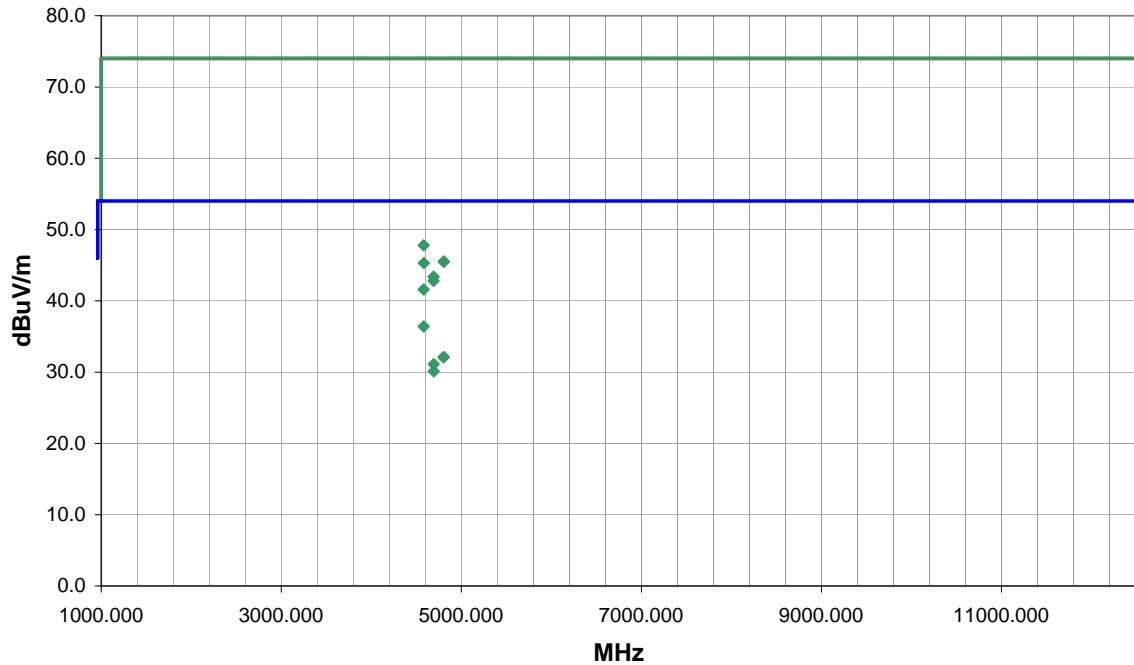
Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

**TEST DESCRIPTION**

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.

Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna 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 3 meters or 10 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.

SPURIOUS RADIATED EMISSIONS DATA SHEET												PSA 2006.04.06
												EMI 2006.3.30
EUT: WMBGMR01						Work Order: TRPO0017						
Serial Number: None						Date: 04/24/06						
Customer: Tripod Data Systems, Inc.						Temperature: 24°C						
Attendees: None						Humidity: 26%						
Project: None						Barometric Pres.: 30.17						
Tested by: David Divergigelis						Power: 120VAC/60Hz						
TEST SPECIFICATIONS												Job Site: EV01
FCC 15.247(d) Spurious Radiated Emissions:2005-9												Test Method: ANSI C63.4:2003
TEST PARAMETERS												
Antenna Height(s) (m)			1 - 4			Test Distance (m)			3			
COMMENTS												
Bluetooth operating mode												
EUT OPERATING MODES												
Low Channel												
DEVIATIONS FROM TEST STANDARD												
No deviations.												
Run #	4											Signature <i>David Divergigelis</i>
Configuration #	2											
Results	Pass											
NVLAP Lab Code 200630-0												



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)
4582.197	35.8	5.8	13.0	1.1	3.0	0.0	V-Horn	AV	0.0	41.6	54.0	-12.4
4582.174	30.6	5.8	175.0	1.6	3.0	0.0	H-Horn	AV	0.0	36.4	54.0	-17.6
4803.982	25.8	6.3	299.0	1.3	3.0	0.0	H-Horn	AV	0.0	32.1	54.0	-21.9
4803.989	25.8	6.3	337.0	1.5	3.0	0.0	V-Horn	AV	0.0	32.1	54.0	-21.9
4693.056	25.1	6.0	34.0	1.2	3.0	0.0	V-Horn	AV	0.0	31.1	54.0	-22.9
4693.081	24.1	6.0	147.0	1.3	3.0	0.0	H-Horn	AV	0.0	30.1	54.0	-23.9
4582.299	42.0	5.8	13.0	1.1	3.0	0.0	V-Horn	PK	0.0	47.8	74.0	-26.2
4803.519	39.2	6.3	299.0	1.3	3.0	0.0	H-Horn	PK	0.0	45.5	74.0	-28.5
4804.620	39.2	6.3	337.0	1.5	3.0	0.0	V-Horn	PK	0.0	45.5	74.0	-28.5
4582.464	39.5	5.8	175.0	1.6	3.0	0.0	H-Horn	PK	0.0	45.3	74.0	-28.7
4692.328	37.4	6.0	34.0	1.2	3.0	0.0	V-Horn	PK	0.0	43.4	74.0	-30.6
4691.506	36.8	6.0	147.0	1.3	3.0	0.0	H-Horn	PK	0.0	42.8	74.0	-31.2

EUT: WMBGMR01	Work Order: TRPO0017
Serial Number: None	Date: 04/24/06
Customer: Tripod Data Systems, Inc.	Temperature: 24°C
Attendees: None	Humidity: 26%
Project: None	Barometric Pres.: 30.17
Tested by: David Divergigelis	Job Site: EV01

## TEST SPECIFICATIONS

FCC 15.247(d) Spurious Radiated Emissions:2005-9

Test Method

FCC 15.247(d) Spurious Radiated Emissions:2005-9	ANSI C63.4:2003
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## TEST PARAMETERS

Antenna Height(s) (m)	1 - 4	Test Distance (m)	3
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## COMMENTS

Bluetooth operating mode

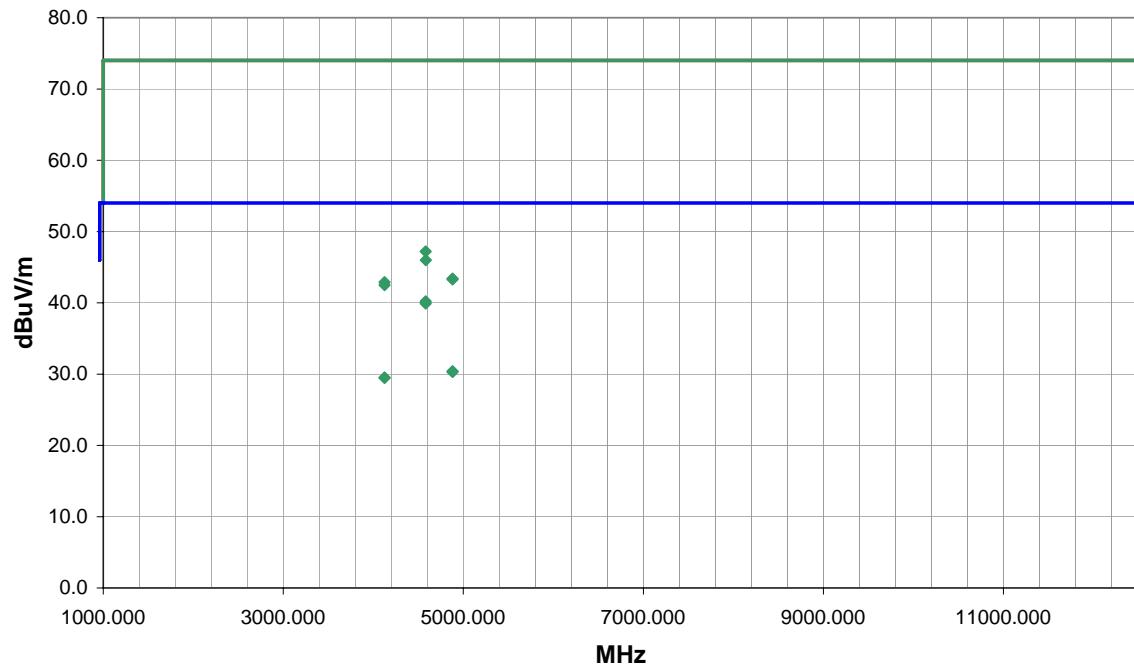
## EUT OPERATING MODES

Mid Channel

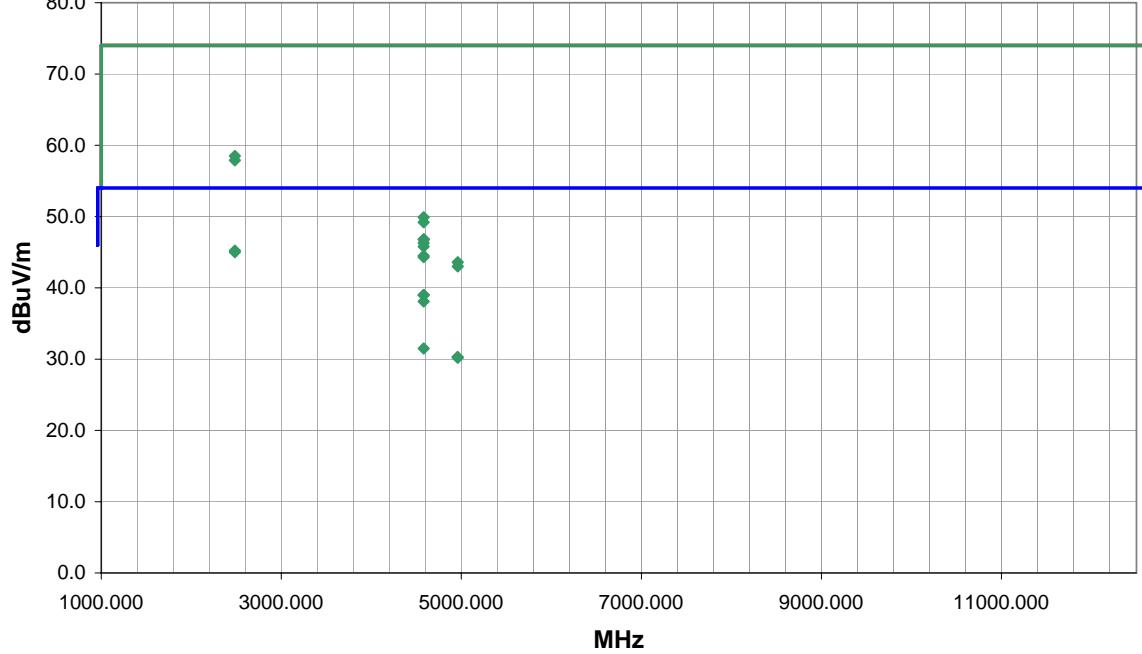
## DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	5	NVLAP Lab Code 200630-0	Signature <i>David DiVergigelis</i>
Configuration #	2		
Results	Pass		



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)
4582.141	34.4	5.8	2.0	1.2	3.0	0.0	V-Horn	AV	0.0	40.2	54.0	-13.8
4582.197	34.1	5.8	170.0	1.7	3.0	0.0	H-Horn	AV	0.0	39.9	54.0	-14.1
4880.203	23.9	6.5	52.0	1.2	3.0	0.0	V-Horn	AV	0.0	30.4	54.0	-23.6
4879.973	23.8	6.5	81.0	1.8	3.0	0.0	H-Horn	AV	0.0	30.3	54.0	-23.7
4124.310	23.8	5.7	185.0	1.2	3.0	0.0	V-Horn	AV	0.0	29.5	54.0	-24.5
4125.044	23.8	5.7	77.0	1.6	3.0	0.0	H-Horn	AV	0.0	29.5	54.0	-24.5
4582.278	41.4	5.8	2.0	1.2	3.0	0.0	V-Horn	PK	0.0	47.2	74.0	-26.8
4582.794	40.2	5.8	170.0	1.7	3.0	0.0	H-Horn	PK	0.0	46.0	74.0	-28.0
4880.144	36.9	6.5	81.0	1.8	3.0	0.0	H-Horn	PK	0.0	43.4	74.0	-30.6
4880.645	36.8	6.5	52.0	1.2	3.0	0.0	V-Horn	PK	0.0	43.3	74.0	-30.7
4125.477	37.2	5.7	185.0	1.2	3.0	0.0	V-Horn	PK	0.0	42.9	74.0	-31.1
4125.483	36.8	5.7	77.0	1.6	3.0	0.0	H-Horn	PK	0.0	42.5	74.0	-31.5

SPURIOUS RADIATED EMISSIONS DATA SHEET										PSA 2006.04.06								
										EMI 2006.3.30								
EUT: WMBGMR01					Work Order: TRPO0017													
Serial Number: None					Date: 04/24/06													
Customer: Tripod Data Systems, Inc.					Temperature: 24°C													
Attendees: None					Humidity: 26%													
Project: None					Barometric Pres.: 30.17													
Tested by: David Divergigelis					Power: 120VAC/60Hz					Job Site: EV01								
TEST SPECIFICATIONS										Test Method								
FCC 15.247(d) Spurious Radiated Emissions:2005-9										ANSI C63.4:2003								
TEST PARAMETERS																		
Antenna Height(s) (m) 1 - 4					Test Distance (m) 3													
COMMENTS																		
Bluetooth operating mode																		
EUT OPERATING MODES																		
High Channel																		
DEVIATIONS FROM TEST STANDARD																		
No deviations.																		
Run #	1		 <p>The graph plots dBuV/m on the y-axis (0.0 to 80.0) against MHz on the x-axis (1000.000 to 11000.000). A horizontal blue line at 54.0 dBuV/m represents the specification limit. Test data points are shown as green diamonds. Most points are clustered between 3000 MHz and 5000 MHz, with values ranging from approximately 30 to 60 dBuV/m. A few points are at lower frequencies (around 1000-2000 MHz) with values around 45-58 dBuV/m.</p>															
Configuration #	2																	
Results	Pass										NVLAP Lab Code 200630-0							
										Signature <i>David DiVergigelis</i>								

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)
4582.176	40.0	5.8	221.0	1.4	3.0	0.0	H-Horn	AV	0.0	45.8	54.0	-8.2
2484.354	24.7	0.5	248.0	1.2	3.0	20.0	V-Horn	AV	0.0	45.2	54.0	-8.8
2483.859	24.5	0.5	220.0	1.3	3.0	20.0	H-Horn	AV	0.0	45.0	54.0	-9.0
4582.195	38.5	5.8	11.0	1.5	3.0	0.0	V-Horn	AV	0.0	44.3	54.0	-9.7
4582.177	33.2	5.8	222.0	1.2	3.0	0.0	V-Horn	AV	0.0	39.0	54.0	-15.0
4582.187	33.2	5.8	241.0	1.3	3.0	0.0	H-Horn	AV	0.0	39.0	54.0	-15.0
2483.761	38.0	0.5	248.0	1.2	3.0	20.0	V-Horn	PK	0.0	58.5	74.0	-15.5
4582.194	32.3	5.8	61.0	1.3	3.0	0.0	H-Horn	AV	0.0	38.1	54.0	-15.9
2483.879	37.4	0.5	220.0	1.3	3.0	20.0	H-Horn	PK	0.0	57.9	74.0	-16.1
4582.124	25.7	5.8	185.0	1.2	3.0	0.0	V-Horn	AV	0.0	31.5	54.0	-22.5
4958.766	23.6	6.7	241.0	1.3	3.0	0.0	H-Horn	AV	0.0	30.3	54.0	-23.7
4960.150	23.5	6.7	83.0	1.2	3.0	0.0	V-Horn	AV	0.0	30.2	54.0	-23.8
4582.149	44.1	5.8	221.0	1.4	3.0	0.0	H-Horn	PK	0.0	49.9	74.0	-24.1
4581.978	43.4	5.8	11.0	1.5	3.0	0.0	V-Horn	PK	0.0	49.2	74.0	-24.8
4582.057	41.0	5.8	222.0	1.2	3.0	0.0	V-Horn	PK	0.0	46.8	74.0	-27.2
4582.565	41.0	5.8	241.0	1.3	3.0	0.0	H-Horn	PK	0.0	46.8	74.0	-27.2
4582.321	40.5	5.8	61.0	1.3	3.0	0.0	H-Horn	PK	0.0	46.3	74.0	-27.7
4582.030	38.7	5.8	185.0	1.2	3.0	0.0	V-Horn	PK	0.0	44.5	74.0	-29.5
4960.170	36.9	6.7	83.0	1.2	3.0	0.0	V-Horn	PK	0.0	43.6	74.0	-30.4
4960.924	36.3	6.7	241.0	1.3	3.0	0.0	H-Horn	PK	0.0	43.0	74.0	-31.0







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

Transmitting Bluetooth, low channel  
Transmitting Bluetooth, mid channel  
Transmitting Bluetooth, high channel

#### POWER SETTINGS INVESTIGATED

120VAC/60Hz

#### SAMPLE CALCULATIONS

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

#### TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-R-24-BNC	LIQ	12/13/2005	13
Attenuator	Coaxicom	66702 2910-20	RBS	12/19/2005	13
Spectrum Analyzer	Hewlett-Packard	8568B	AAI	12/21/2005	13
Spectrum Analyzer Display	Hewlett Packard	85662A	AAID	12/21/2005	13
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQD	12/21/2005	13

#### 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

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

#### TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50  $\Omega$  measuring port is terminated by a 50  $\Omega$  EMI meter or a 50  $\Omega$  resistive load. All 50  $\Omega$  measuring ports of the LISN are terminated by 50 $\Omega$ .

EUT: WMBGMR01	Work Order: TRPO0017
Serial Number: None	Date: 05/08/06
Customer: Tripod Data Systems, Inc.	Temperature: 22
Attendees: None	Humidity: 26%
Project: None	Barometric Pres.: 29.93
Tested by: David DiVergigelis	Job Site: EV07

## TEST SPECIFICATIONS

FCC 15.207 AC Powerline Conducted Emissions: 2005-09

Test Method

ANSI C63.4:2003

## TEST PARAMETERS

Cable or Line Tested

L1

## COMMENTS

## EUT OPERATING MODES

Transmitting Bluetooth, high channel

## DEVIATIONS FROM TEST STANDARD

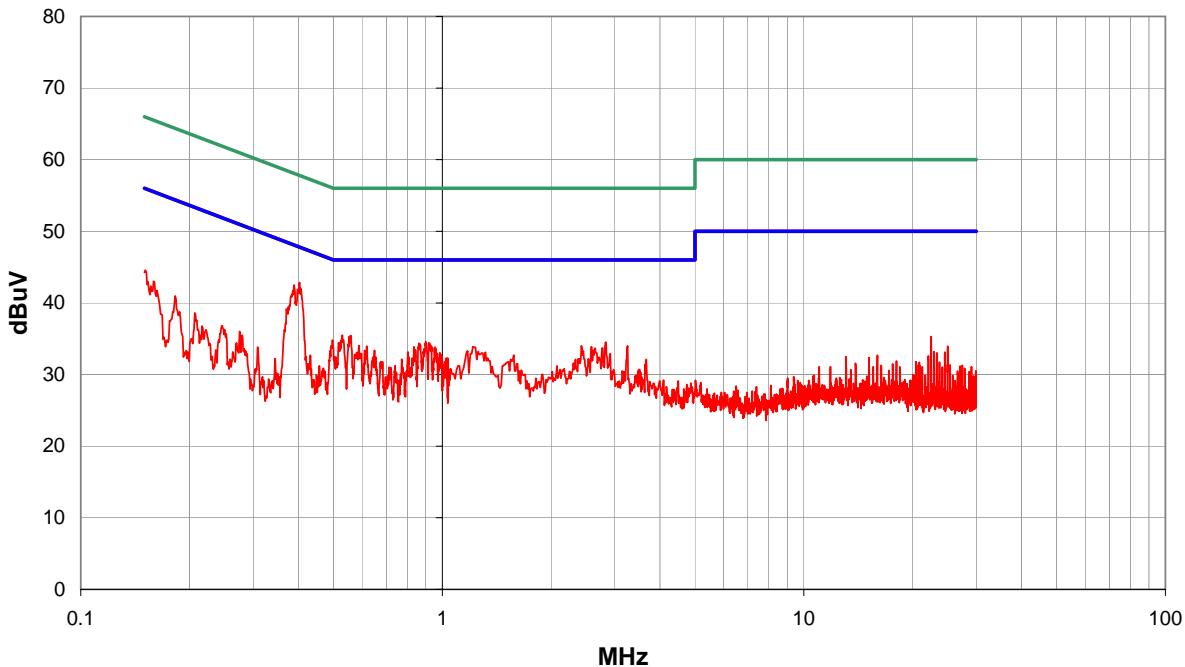
No deviations.

Run # 3

Configuration # 2

Results Pass

NVLAP Lab Code 200630-0

Signature *David DiVergigelis*

Freq (MHz)	Amplitude (dBuV)	Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [Ppk] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.403	20.7	2.2	0.0	20.0		42.9	47.8	-4.9
0.389	20.3	2.2	0.0	20.0		42.5	48.1	-5.6
0.529	13.7	1.8	0.0	20.0		35.5	46.0	-10.5
0.559	13.7	1.7	0.0	20.0		35.4	46.0	-10.6
0.497	12.9	1.9	0.0	20.0		34.8	46.1	-11.3
0.151	21.7	2.9	0.0	20.0		44.6	56.0	-11.4
0.900	13.8	0.8	0.0	20.0		34.6	46.0	-11.4
2.826	14.0	0.5	0.0	20.0		34.5	46.0	-11.5
0.919	13.7	0.7	0.0	20.0		34.4	46.0	-11.6
0.861	13.5	0.9	0.0	20.0		34.4	46.0	-11.6
0.588	12.4	1.6	0.0	20.0		34.0	46.0	-12.0
2.426	13.5	0.5	0.0	20.0		34.0	46.0	-12.0
3.256	13.5	0.5	0.0	20.0		34.0	46.0	-12.0
0.618	12.4	1.6	0.0	20.0		34.0	46.0	-12.0
1.215	13.4	0.5	0.0	20.0		33.9	46.0	-12.1
2.586	13.4	0.5	0.0	20.0		33.9	46.0	-12.1
0.834	12.9	1.0	0.0	20.0		33.9	46.0	-12.1
0.955	13.2	0.6	0.0	20.0		33.8	46.0	-12.2
2.766	13.2	0.5	0.0	20.0		33.7	46.0	-12.3

EUT: WMBGMR01	Work Order: TRPO0017
Serial Number: None	Date: 05/08/06
Customer: Tripod Data Systems, Inc.	Temperature: 22
Attendees: None	Humidity: 26%
Project: None	Barometric Pres.: 29.93
Tested by: David DiVergigelis	Job Site: EV07

## TEST SPECIFICATIONS

FCC 15.207 AC Powerline Conducted Emissions: 2005-09

Test Method

ANSI C63.4:2003

## TEST PARAMETERS

Cable or Line Tested

L1

## COMMENTS

## EUT OPERATING MODES

Transmitting Bluetooth, mid channel

## DEVIATIONS FROM TEST STANDARD

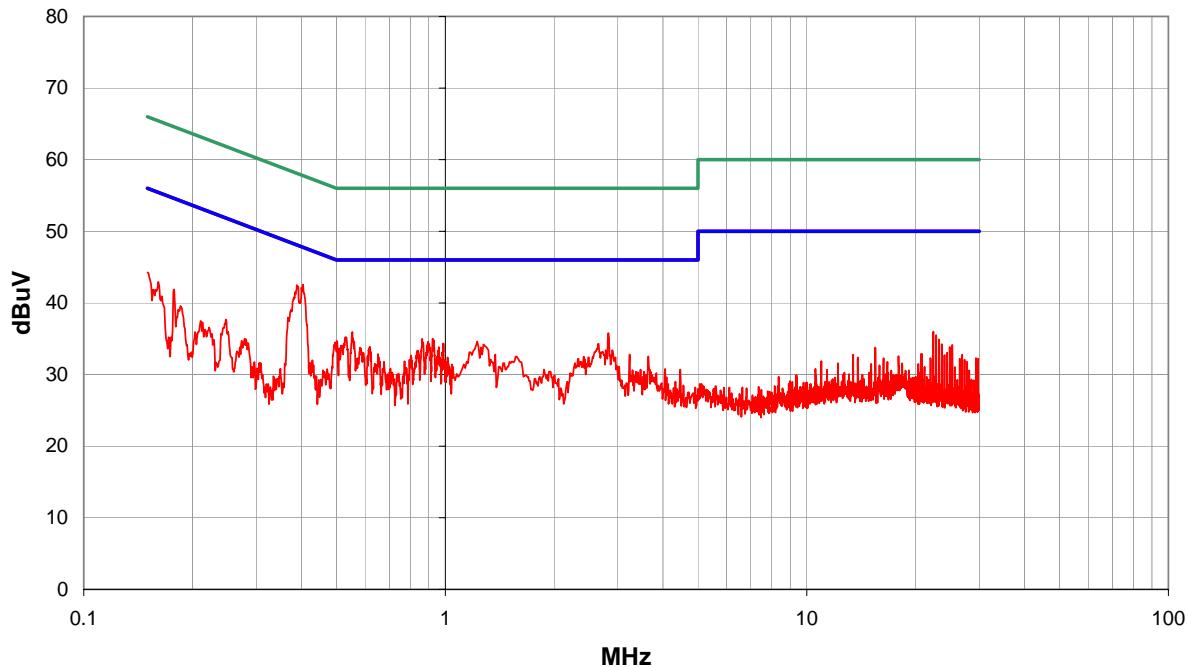
No deviations.

Run #	4
Configuration #	2
Results	Pass

NVLAP Lab Code 200630-0

Signature

David DiVergigelis



Freq (MHz)	Amplitude (dBuV)	Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [Ppk] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.404	20.4	2.2	0.0	20.0		42.6	47.8	-5.2
0.389	20.3	2.2	0.0	20.0		42.5	48.1	-5.6
0.553	14.2	1.7	0.0	20.0		35.9	46.0	-10.1
2.826	15.3	0.5	0.0	20.0		35.8	46.0	-10.2
0.529	13.4	1.8	0.0	20.0		35.2	46.0	-10.8
0.923	14.3	0.7	0.0	20.0		35.0	46.0	-11.0
0.863	14.1	0.9	0.0	20.0		35.0	46.0	-11.0
0.502	12.8	1.9	0.0	20.0		34.7	46.0	-11.3
1.225	14.1	0.5	0.0	20.0		34.6	46.0	-11.4
0.896	13.8	0.8	0.0	20.0		34.6	46.0	-11.4
0.988	13.8	0.5	0.0	20.0		34.3	46.0	-11.7
2.646	13.8	0.5	0.0	20.0		34.3	46.0	-11.7
0.150	21.4	2.9	0.0	20.0		44.3	56.0	-11.7
0.619	12.3	1.6	0.0	20.0		33.9	46.0	-12.1
0.959	13.2	0.6	0.0	20.0		33.8	46.0	-12.2
0.581	12.1	1.7	0.0	20.0		33.8	46.0	-12.2
0.161	20.1	2.8	0.0	20.0		42.9	55.4	-12.5
0.840	12.4	0.9	0.0	20.0		33.3	46.0	-12.7
0.178	19.1	2.8	0.0	20.0		41.9	54.6	-12.7

EUT: WMBGMR01	Work Order: TRPO0017
Serial Number: None	Date: 05/08/06
Customer: Tripod Data Systems, Inc.	Temperature: 22
Attendees: None	Humidity: 26%
Project: None	Barometric Pres.: 29.93
Tested by: David DiVergigelis	Job Site: EV07

## TEST SPECIFICATIONS

FCC 15.207 AC Powerline Conducted Emissions: 2005-09

Test Method

ANSI C63.4:2003

## TEST PARAMETERS

Cable or Line Tested

L1

## COMMENTS

## EUT OPERATING MODES

Transmitting Bluetooth, low channel

## DEVIATIONS FROM TEST STANDARD

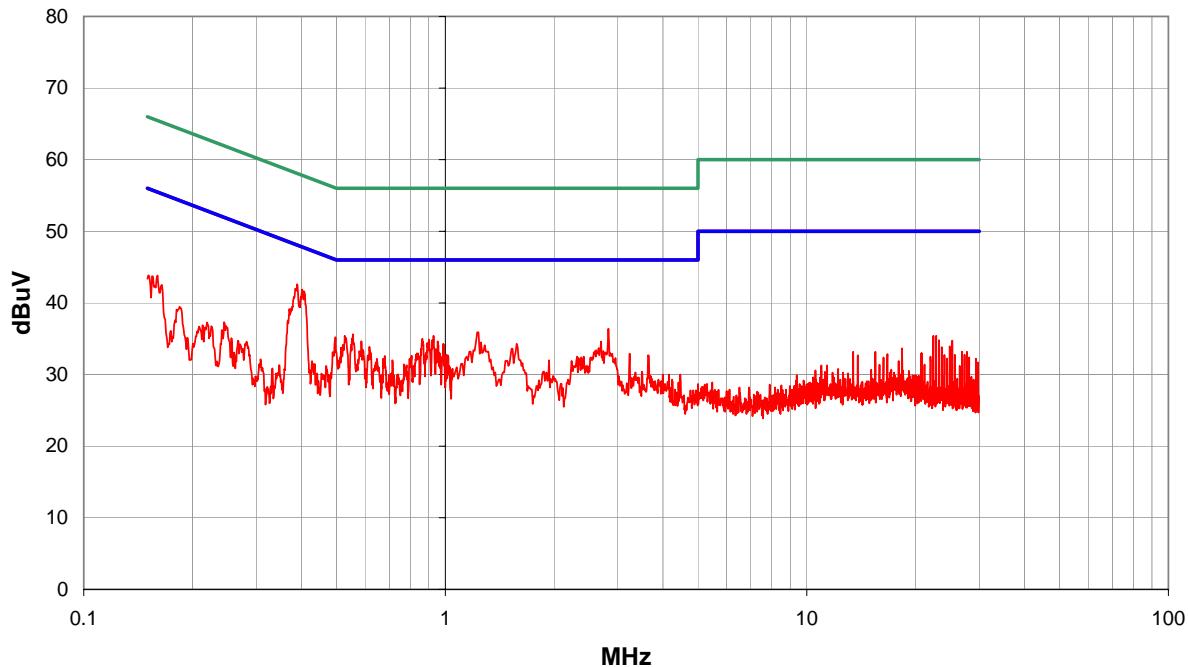
No deviations.

Run # 5

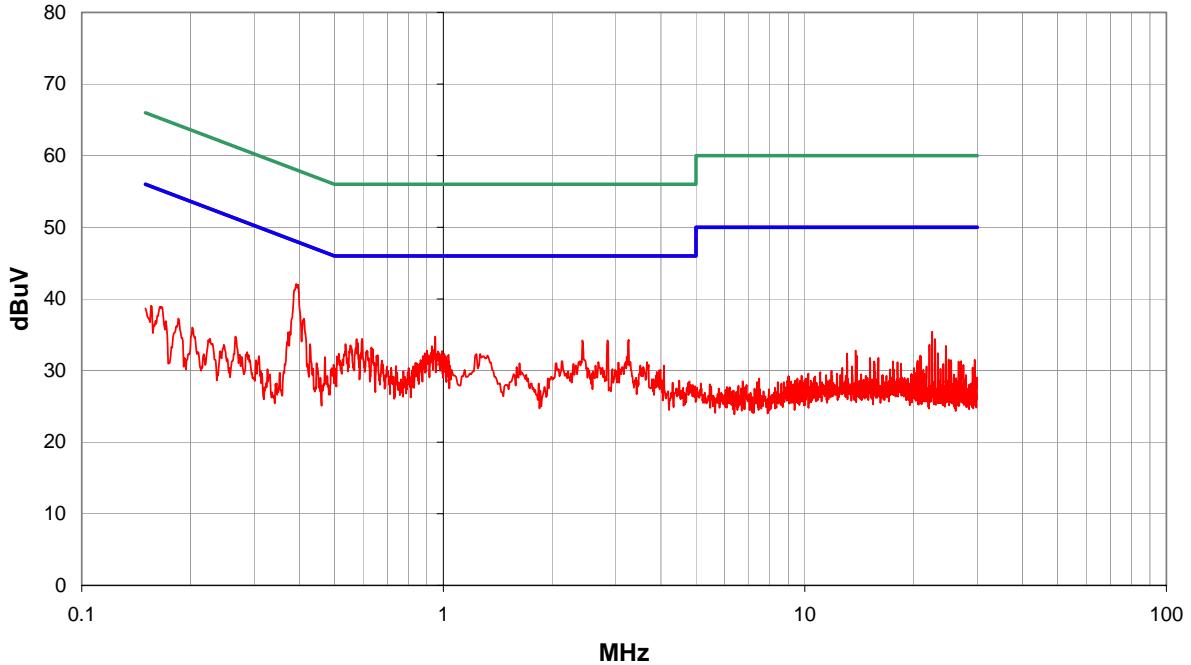
Configuration # 2

Results Pass

NVLAP Lab Code 200630-0

Signature *David DiVergigelis*

Freq (MHz)	Amplitude (dBuV)	Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [Ppk] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.389	20.4	2.2	0.0	20.0		42.6	48.1	-5.5
0.402	19.7	2.2	0.0	20.0		41.9	47.8	-6.0
2.826	15.9	0.5	0.0	20.0		36.4	46.0	-9.6
1.225	15.4	0.5	0.0	20.0		35.9	46.0	-10.1
0.555	13.9	1.7	0.0	20.0		35.6	46.0	-10.4
0.527	13.6	1.8	0.0	20.0		35.4	46.0	-10.6
0.928	14.7	0.7	0.0	20.0		35.4	46.0	-10.6
0.497	13.3	1.9	0.0	20.0		35.2	46.1	-10.9
0.864	14.1	0.9	0.0	20.0		35.0	46.0	-11.0
0.901	14.1	0.8	0.0	20.0		34.9	46.0	-11.1
0.586	13.0	1.7	0.0	20.0		34.7	46.0	-11.3
0.953	14.0	0.6	0.0	20.0		34.6	46.0	-11.4
2.696	14.1	0.5	0.0	20.0		34.6	46.0	-11.4
0.160	21.0	2.8	0.0	20.0		43.8	55.5	-11.6
1.575	13.8	0.5	0.0	20.0		34.3	46.0	-11.7
0.986	13.7	0.5	0.0	20.0		34.2	46.0	-11.8
0.151	21.0	2.9	0.0	20.0		43.9	56.0	-12.1
0.616	12.3	1.6	0.0	20.0		33.9	46.0	-12.1
1.525	13.1	0.5	0.0	20.0		33.6	46.0	-12.4

NORTHWEST		AC POWERLINE CONDUCTED EMISSIONS DATA SHEET								ACQ-2006.04.25	
EMC										EMI 2005.9.18	
EUT:	WMBGMR01					Work Order:		TRPO0017			
Serial Number:	None					Date:		05/08/06			
Customer:	Tripod Data Systems, Inc.					Temperature:		22			
Attendees:	None					Humidity:		26%			
Project:	None					Barometric Pres.:		29.93			
Tested by:	David DiVergigelis	Power:		120VAC/60Hz		Job Site:		EV07			
TEST SPECIFICATIONS											
FCC 15.207 AC Powerline Conducted Emissions: 2005-09						ANSI C63.4:2003					
TEST PARAMETERS											
Cable or Line Tested		N									
COMMENTS											
EUT OPERATING MODES											
Transmitting Bluetooth, low channel											
DEVIATIONS FROM TEST STANDARD											
No deviations.											
Run #	6										
Configuration #	2										
Results	Pass										
NVLAP Lab Code 200630-0											
											

Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [Ppk] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.392	19.9			2.2	0.0	20.0				42.1	48.0	-5.9
0.412	15.1			2.1	0.0	20.0				37.2	47.6	-10.4
0.950	14.1			0.6	0.0	20.0				34.7	46.0	-11.3
0.596	12.8			1.6	0.0	20.0				34.4	46.0	-11.6
0.576	12.7			1.7	0.0	20.0				34.4	46.0	-11.6
3.256	13.8			0.5	0.0	20.0				34.3	46.0	-11.7
2.426	13.7			0.5	0.0	20.0				34.2	46.0	-11.8
2.846	13.7			0.5	0.0	20.0				34.2	46.0	-11.8
0.536	11.9			1.8	0.0	20.0				33.7	46.0	-12.3
0.553	11.8			1.7	0.0	20.0				33.5	46.0	-12.5
0.929	12.7			0.7	0.0	20.0				33.4	46.0	-12.6
0.632	11.7			1.5	0.0	20.0				33.2	46.0	-12.8
0.901	12.0			0.8	0.0	20.0				32.8	46.0	-13.2
0.614	11.2			1.6	0.0	20.0				32.8	46.0	-13.2
0.992	12.2			0.5	0.0	20.0				32.7	46.0	-13.3
0.966	12.1			0.6	0.0	20.0				32.7	46.0	-13.3
0.889	11.6			0.8	0.0	20.0				32.4	46.0	-13.6
0.428	11.6			2.1	0.0	20.0				33.7	47.3	-13.6
0.514	10.5			1.9	0.0	20.0				32.4	46.0	-13.6

EUT: WMBGMR01	Work Order: TRPO0017
Serial Number: None	Date: 05/08/06
Customer: Tripod Data Systems, Inc.	Temperature: 22
Attendees: None	Humidity: 26%
Project: None	Barometric Pres.: 29.93
Tested by: David DiVergigelis	Job Site: EV07

## TEST SPECIFICATIONS

FCC 15.207 AC Powerline Conducted Emissions: 2005-09

Test Method

ANSI C63.4:2003

## TEST PARAMETERS

Cable or Line Tested

N

## COMMENTS

## EUT OPERATING MODES

Transmitting Bluetooth, mid channel

## DEVIATIONS FROM TEST STANDARD

No deviations.

Run # 7

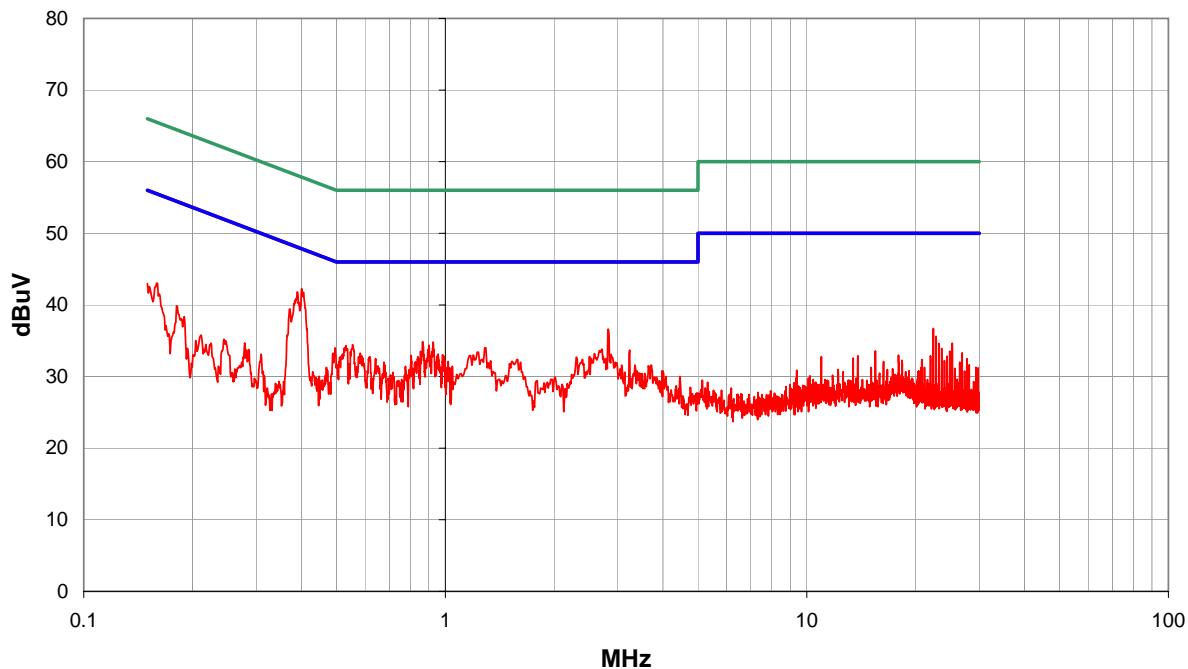
Configuration # 2

Results Pass

NVLAP Lab Code 200630-0

Signature

David DiVergigelis



Freq (MHz)	Amplitude (dBuV)	Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [Ppk] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.401	20.1	2.2	0.0	20.0		42.3	47.8	-5.6
0.389	19.6	2.2	0.0	20.0		41.8	48.1	-6.3
2.816	16.1	0.5	0.0	20.0		36.6	46.0	-9.4
0.865	14.0	0.9	0.0	20.0		34.9	46.0	-11.1
0.926	14.1	0.7	0.0	20.0		34.8	46.0	-11.2
0.554	12.7	1.7	0.0	20.0		34.4	46.0	-11.6
0.901	13.6	0.8	0.0	20.0		34.4	46.0	-11.6
0.531	12.5	1.8	0.0	20.0		34.3	46.0	-11.7
1.285	13.5	0.5	0.0	20.0		34.0	46.0	-12.0
0.496	12.1	1.9	0.0	20.0		34.0	46.1	-12.1
2.706	13.3	0.5	0.0	20.0		33.8	46.0	-12.2
3.236	13.2	0.5	0.0	20.0		33.7	46.0	-12.3
0.159	20.2	2.8	0.0	20.0		43.0	55.5	-12.5
0.582	11.6	1.7	0.0	20.0		33.3	46.0	-12.7
0.955	12.5	0.6	0.0	20.0		33.1	46.0	-12.9
0.983	12.5	0.5	0.0	20.0		33.0	46.0	-13.0
0.150	20.1	2.9	0.0	20.0		43.0	56.0	-13.0
0.804	11.9	1.0	0.0	20.0		32.9	46.0	-13.1
2.506	12.3	0.5	0.0	20.0		32.8	46.0	-13.2

EUT: WMBGMR01	Work Order: TRPO0017
Serial Number: None	Date: 05/08/06
Customer: Tripod Data Systems, Inc.	Temperature: 22
Attendees: None	Humidity: 26%
Project: None	Barometric Pres.: 29.93
Tested by: David DiVergigelis	Job Site: EV07

## TEST SPECIFICATIONS

FCC 15.207 AC Powerline Conducted Emissions: 2005-09 | ANSI C63.4:2003

## TEST PARAMETERS

Cable or Line Tested | N

## COMMENTS

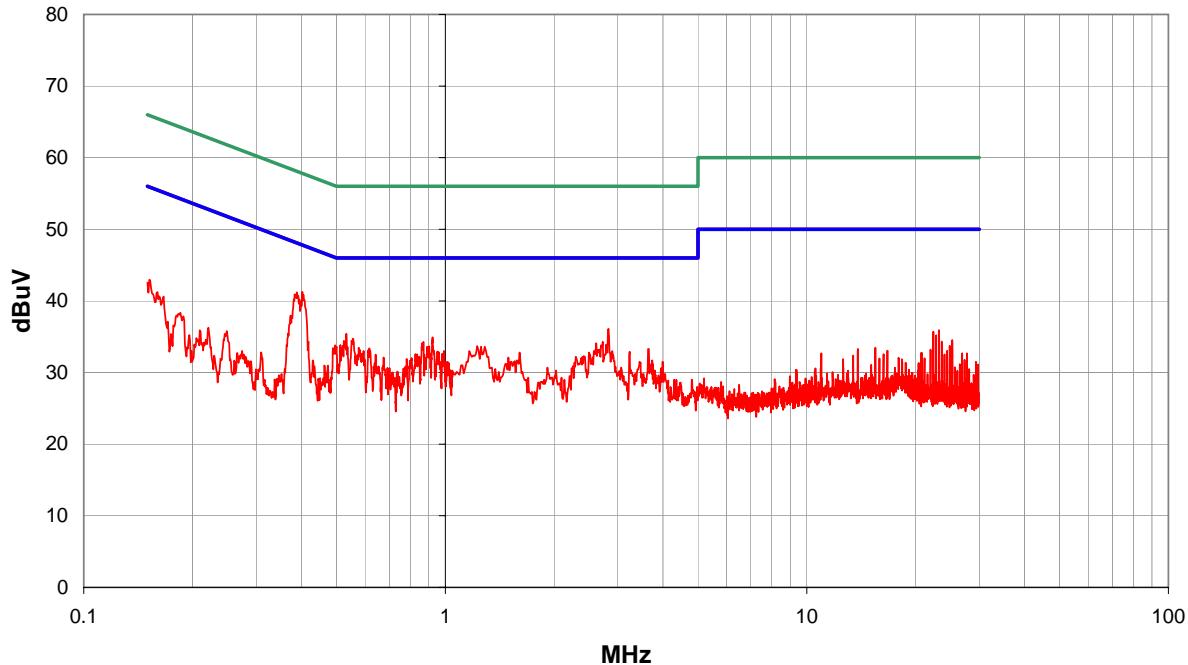
## EUT OPERATING MODES

Transmitting Bluetooth, high channel

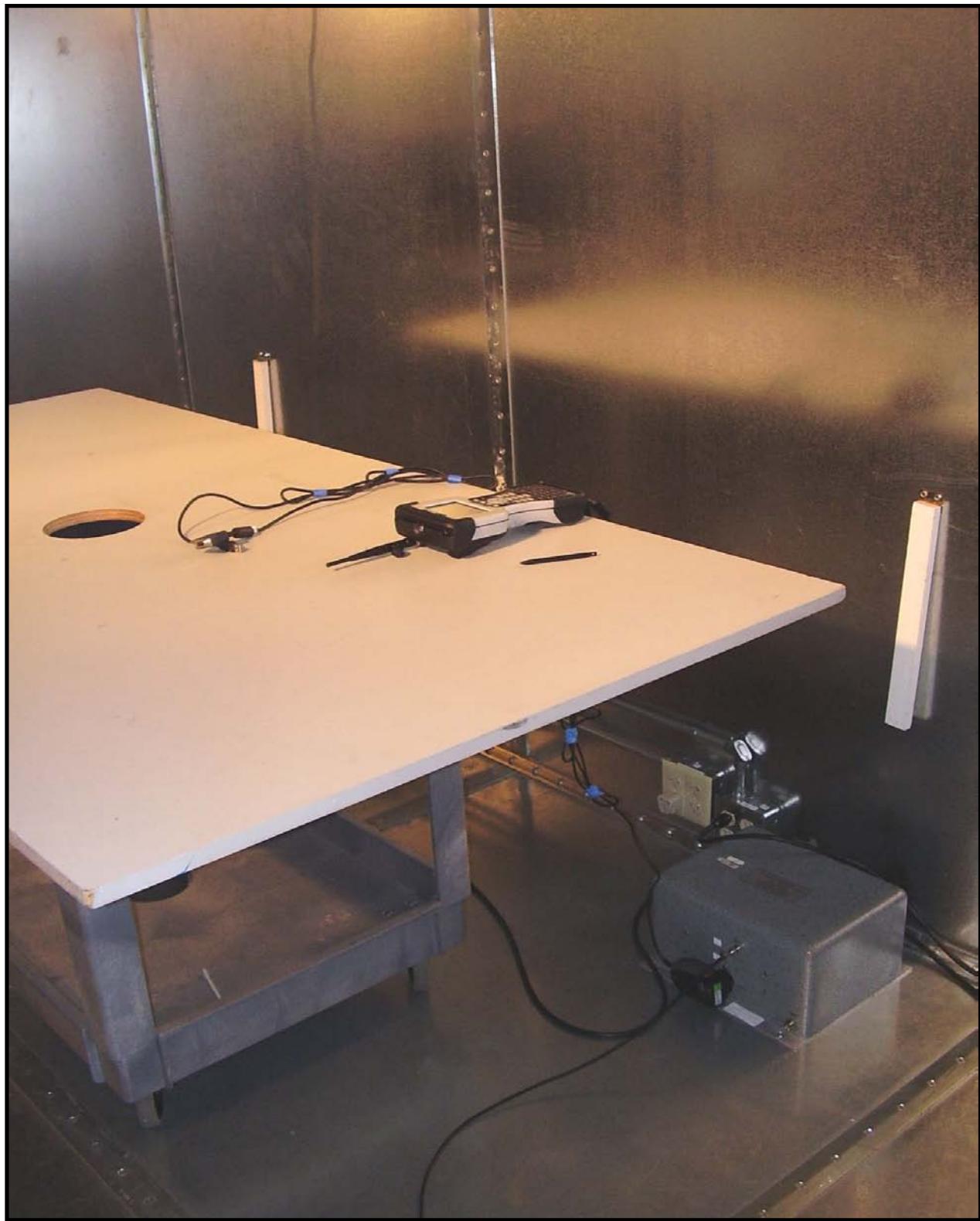
## DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	8	NVLAP Lab Code 200630-0	Signature <i>David DiVergigelis</i>
Configuration #	2		
Results	Pass		



Freq (MHz)	Amplitude (dBuV)	Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [Ppk] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.402	19.1	2.2	0.0	20.0		41.3	47.8	-6.6
0.389	19.0	2.2	0.0	20.0		41.2	48.1	-6.9
2.826	15.6	0.5	0.0	20.0		36.1	46.0	-9.9
0.532	13.6	1.8	0.0	20.0		35.4	46.0	-10.6
0.922	14.2	0.7	0.0	20.0		34.9	46.0	-11.1
0.556	13.0	1.7	0.0	20.0		34.7	46.0	-11.3
2.726	13.8	0.5	0.0	20.0		34.3	46.0	-11.7
0.870	13.4	0.9	0.0	20.0		34.3	46.0	-11.7
0.513	12.0	1.9	0.0	20.0		33.9	46.0	-12.1
0.496	11.9	1.9	0.0	20.0		33.8	46.1	-12.3
1.225	13.2	0.5	0.0	20.0		33.7	46.0	-12.3
0.902	12.9	0.8	0.0	20.0		33.7	46.0	-12.3
0.577	11.8	1.7	0.0	20.0		33.5	46.0	-12.5
0.616	11.8	1.6	0.0	20.0		33.4	46.0	-12.6
3.636	12.8	0.5	0.0	20.0		33.3	46.0	-12.7
0.152	20.1	2.9	0.0	20.0		43.0	55.9	-12.9
0.991	12.5	0.5	0.0	20.0		33.0	46.0	-13.0
0.951	12.3	0.6	0.0	20.0		32.9	46.0	-13.1
3.236	12.4	0.5	0.0	20.0		32.9	46.0	-13.1



**BLUETOOTH APPROVALS**  
FCC Procedure Received from Joe Dichoso on 2-15-02

The following exhibit indicates the FCC Spread Spectrum requirements in Section 15.247 for devices meeting the Bluetooth Specifications in the 2.4 GHz band as of February 2001 operating in the USA. The purpose of this exhibit is to help expedite the approval process for Bluetooth devices. This exhibit provides items that vary for each device and also provides a list of items that are common to Bluetooth devices that explains the remaining requirements. The list of common items can be submitted for each application for equipment authorization. This exhibit only specifies requirements in Section 15.247, requirements in other rule Sections for intentional radiators such as in Section 15.203 or 15.207 must be also be addressed. A Bluetooth device is a FHSS transmitter in the data mode and applies as a Hybrid spread spectrum device in the acquisition mode.

For each individual device, the following items, 1-7 will vary from one device to another and must be submitted.

- 1) The occupied bandwidth in Section 15.247(a)(1)(ii).
- 2) Conducted output power specified in Section 15.247(b)(1).
- 3) EIRP limit in Section 15.247(b)(3).
- 4) RF safety requirement in Section 15.247(b)(4)
- 5) Spurious emission limits in Section 15.247(c).
- 6) Processing gain and requirements for Hybrids in Section 15.247(f) in the acquisition mode.
- 7) Power spectral density requirement in Section 15.247(f) in the acquisition mode.

For all devices, the following items, 1-12, are common to all Bluetooth devices and will not vary from one device to another. This list can be copied into the filing.

**1 Output power and channel separation of a Bluetooth device in the different operating modes:**

The different operating modes (data-mode, acquisition-mode) of a Bluetooth device don't influence the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters.

Only a different hopping sequence will be used. For this reason, the RF parameters in one op-mode is sufficient.

**2 Frequency range of a Bluetooth device:**

The maximum frequency of the device is: **2402 – 2480 MHz**.

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for devices which will be operated in the USA. Other frequency ranges ( e.g. for Spain, France, Japan) which are allowed according the Core Specification must **not be** supported by the device.

**3 Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters:**

Bluetooth units which want to communicate with other units must be organized in a structure called piconet. This piconet consist of max. 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from it's BD address which is unique for every Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

**4 Example of a hopping sequence in data mode:**

Example of a 79 hopping sequence in data mode:

40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67, 56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59, 72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75, 09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06, 01, 51, 03, 55, 05, 04

## **5 Equally average use of frequencies in data mode and short transmissions:**

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection
2. Internal master clock

The LAP (lower address part) are the 24 LSB's of the 48 BD\_ADDRESS. The BD\_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD\_ADDRESS. The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronization with other units, only the offsets are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5  $\mu$ s. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions, the Bluetooth system has the following behavior: The first connection between the two devices is established, a hopping sequence is generated. For transmitting the wanted data, the complete hopping sequence is not used and the connection ends. The second connection will be established. A new hopping sequence is generated. Due to the fact that the Bluetooth clock has a different value, because the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5  $\mu$ s). The hopping sequence will always differ from the first one.

## **6 Receiver input bandwidth, synchronization and repeated single or multiple packets:**

The input bandwidth of the receiver is 1 MHz.

In every connection, one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multi-slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing is according to the packet type of the connection. Also, the slave of the connection uses these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence

## **7 Dwell time in data mode**

The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is as follows:

Dwell time = time slot length \* hop rate / number of hopping channels \*30s

Example for a DH1 packet (with a maximum length of one time slot)

Dwell time = 625  $\mu$ s \* 1600 1/s / 79 \* 30s = 0.3797s (in a 30s period)

For multi-slot packet the hopping is reduced according to the length of the packet.

Example for a DH5 packet (with a maximum length of five time slots)

Dwell time =  $5 * 625 \mu s * 1600 * 1/5 * 1/s / 79 * 30s = 0.3797s$  (in a 30s period)

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices **comply** with the FCC dwell time requirement in the data mode.

This was checked during the Bluetooth Qualification tests.

The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)

## **8 Channel Separation in hybrid mode**

The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.

The maximum “initial carrier frequency tolerance” which is allowed for Bluetooth is  $f_{center} = 75 \text{ kHz}$ .

This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2441, 2480 MHz).

## **9 Derivation and examples for a hopping sequence in hybrid mode**

For the generation of the inquiry and page hop sequences the same procedures as described for the data mode are used (see item 5), but this time with different input vectors:

\*\*For the inquiry hop sequence, a predefined fixed address is always used. This results in the same 32 frequencies used by all devices doing an inquiry but every time with a different start frequency and phase in this sequence.

\*\*For the page hop sequence, the device address of the paged unit is used as the input vector. This results in the use of a subset of 32 frequencies which is specific for that initial state of the connection establishment between the two units. A page to different devices would result in a different subset of 32 frequencies.

So it is ensured that also in hybrid mode, the frequency is used equally on average.

Example of a hopping sequence in inquiry mode:

48, 50, 09, 13, 52, 54, 41, 45, 56, 58, 11, 15, 60, 62, 43, 47, 00, 02, 64, 68, 04, 06, 17, 21, 08, 10, 66, 70, 12, 14, 19, 23

Example of a hopping sequence in paging mode:

08, 57, 68, 70, 51, 02, 42, 40, 04, 61, 44, 46, 63, 14, 50, 48, 16, 65, 52, 54, 67, 18, 58, 56, 20, 53, 60, 62, 55, 06, 66, 64

## **10 Receiver input bandwidth and synchronization in hybrid mode:**

The receiver input bandwidth is the same as in the data mode (1 MHz). When two Bluetooth devices establish contact for the first time, one device sends an inquiry access code and the other device is scanning for this inquiry access code. If two devices have been connected previously and want to start a new transmission, a similar procedure takes place. The only difference is, instead of the inquiry access code, a special access code, derived from the BD\_ADDRESS of the paged device will be, will be sent by the master of this connection. Due to the fact that both units have been connected before (in the inquiry procedure) the paging unit has timing and frequency information about the page scan of the paged unit. For this reason the time to establish the connection is reduced.

## **11 Spread rate / data rate of the direct sequence signal**

The Spread rate / Data rate in inquiry and paging mode can be defined via the access code. The access code is the only criterion for the system to check if there is a valid transmission or not. If you regard the presence of a valid access code as one bit of information, and compare it with the length of the access code of 68 bits, the Spread rate / Data rate will be 68/1.

## **12 Spurious emission in hybrid mode**

The Dwell in hybrid mode is shorter than in data mode. For this reason the spurious emissions average level in data mode is worst case. The spurious emissions peak level is the same for both modes.